# ROG STRIX X870E Series

## BIOS Manual

Motherboard

E25598
First Edition
July 2025

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# BIOS Setup

## 1. Knowing BIOS

**NOTE:** 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.

**CAUTION!** 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**.

**IMPORTANT!** We Strongly recommend ALWAYS using the ZIP file from the ASUS website to update your BIOS when using ASUS EZ Flash, so that the ME version will be updated as well. If you opt to only use the CAP file, make sure the ME version matches the new BIOS. Keep in mind that once the ME is updated, it cannot be rolled back. For more information please check the product page on the ASUS website.

**NOTE:**

- When downloading or updating the BIOS file for your motherboard, rename it as **XXXXX.CAP** or launch the **BIOSRenamer.exe** application to automatically rename the file. The name of the CAP file varies depending on models. Refer to the user manual that came with your motherboard for the name.
- The screenshots in this manual are for reference only, please refer to the latest BIOS version for settings and options.
- BIOS settings and options may vary due to different BIOS release versions or CPU installed. Please refer to the latest BIOS version for settings and options.

# 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.

**IMPORTANT!**

- 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 **Exit menu** for details.
- If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value. See your motherboard manual for information on how to erase the RTC RAM.
- The BIOS setup program does not support Bluetooth devices.

## BIOS menu screen

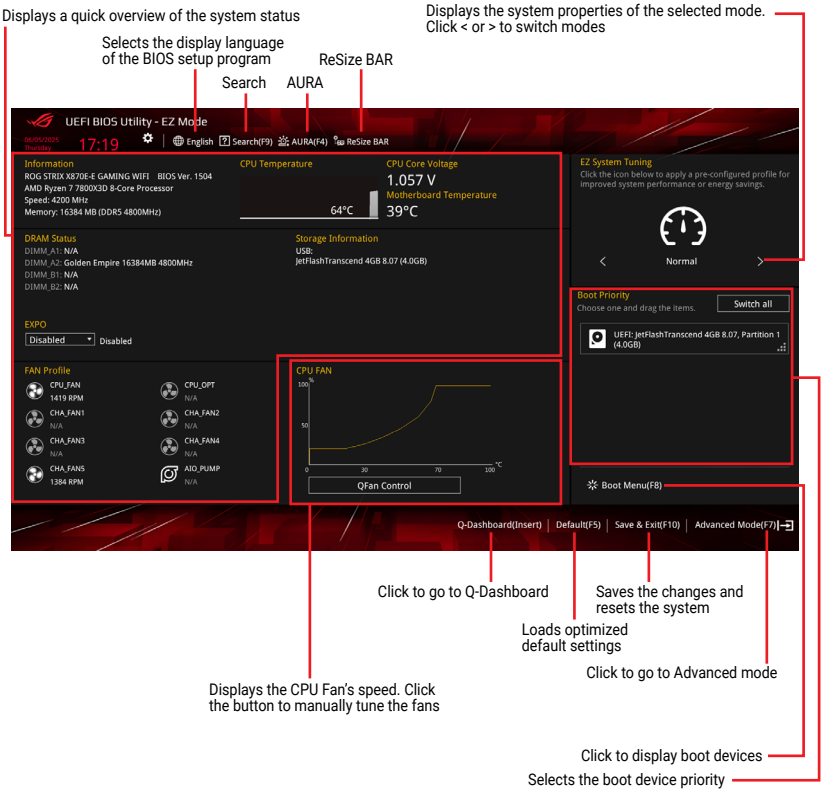
The BIOS Setup program can be used under two modes: **EZ Mode** and **Advanced Mode**. You can change modes from **Setup Mode** in **Boot menu** or by pressing the <F7> hotkey.

**NOTE:** The BIOS settings and options for each motherboard may differ slightly with the screenshots in this manual. Please refer to the BIOS of your motherboard for the actual settings and options.

## 2.1 EZ Mode

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

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

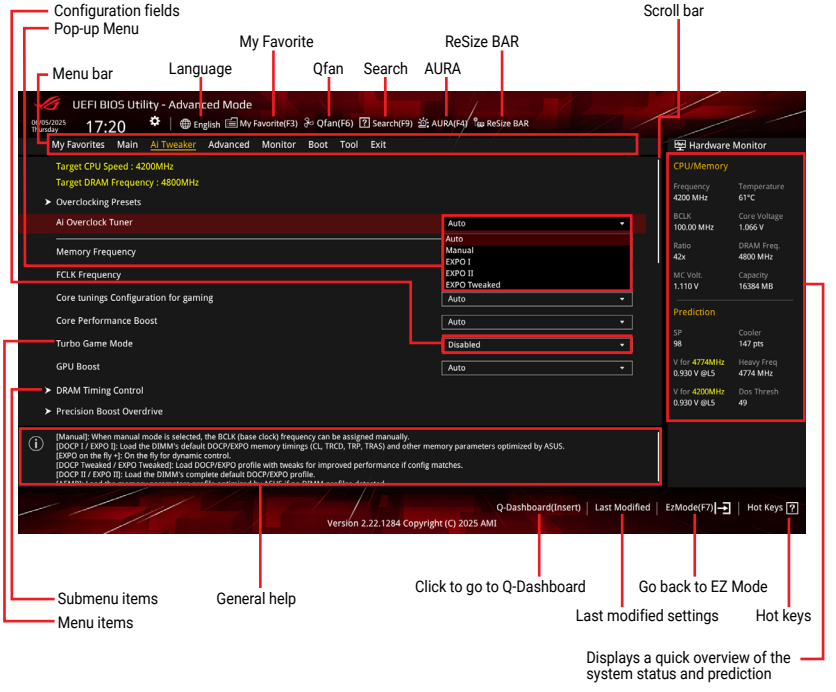



**NOTE:** The boot device options vary depending on the devices you installed to the system.

## 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.

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



### Menu bar

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

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

### Menu items

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

### Submenu items

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

### Language

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

### My Favorite

This button above the menu bar shows all BIOS items in a Tree Map setup. Select frequently-used BIOS settings and save it to **My Favorites** menu. You may also access this item by pressing the <F3> key on the keyboard.

> **NOTE:** Refer to section **My Favorites** for more information.

### Qfan

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. You may also access this item by pressing the <F6> key on the keyboard.

> **NOTE:** Refer to section **Qfan Control** for more information.

### Search

This button allows you to search for BIOS items by entering its name, enter the item name to find the related item listing. You may also access this item by pressing the <F9> key on the keyboard.

### AURA

This button allows you to turn the RGB LED lighting or functional LED on or off. You may also access this item by pressing the <F4> key on the keyboard.

[All On]: All LEDs (Aura or Functional) will be enabled.

[Stealth Mode]: All LEDs (Aura and Functional) will be disabled.

[Aura Only]: Aura LEDs will be enabled and functional LEDs will be disabled.

[Aura Off]: Aura LEDs will be disabled, however functional LEDs will still be enabled.

### ReSize BAR

This button allows you to turn ReSize BAR function on or off.

[On] Enable ReSize BAR support to fully harness GPU memory. CSM (Compatibility Support Module) will be disabled.

[Off] ReSize BAR support will be disabled.

### Hot keys

This button at the bottom right 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.

### Q-Dashboard

This button allows you to view all the ports and connectors on your motherboard as well as quick access to the settings of these ports and connectors. You may also access this item by pressing the <Insert> key on the keyboard.

**NOTE:** Refer to section **Q-Dashboard** for more information.

## 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.

### 2.3.1 Configuring fans manually

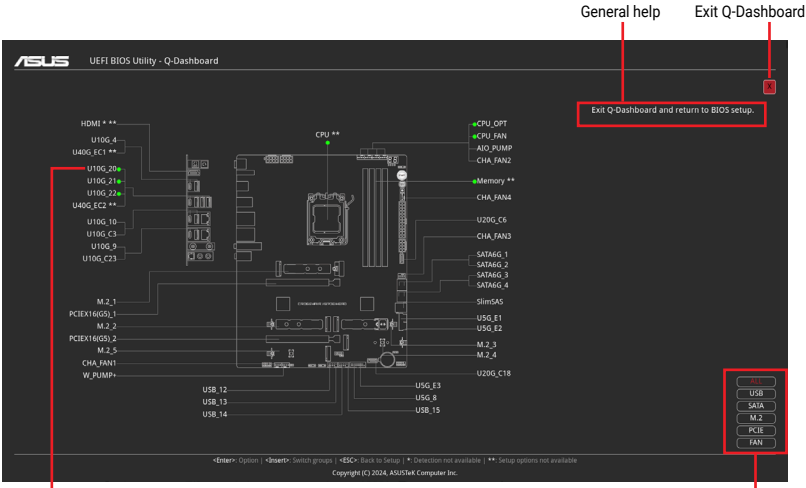
Select **Manual** from the list of profiles to manually configure your fans' operating speed.

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)**.

## 2.4 Q-Dashboard

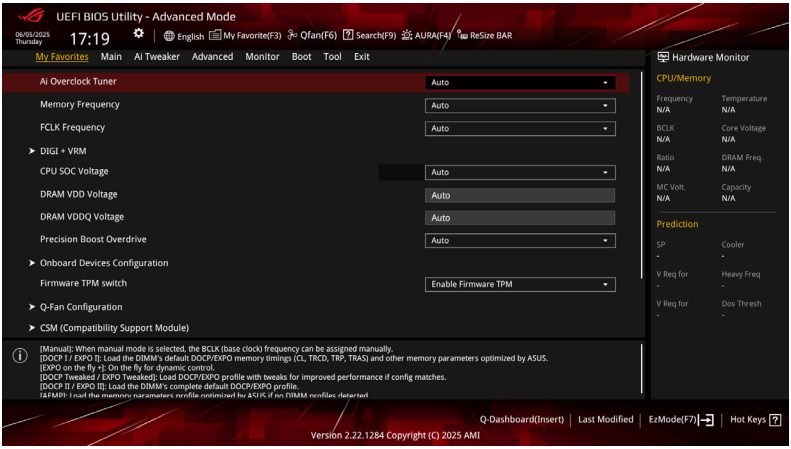
The Q-Dashboard gives you a quick overview of the ports and connectors available on your motherboard. Clicking on a port or connector will redirect you to the BIOS setting of the selected port or connector.



# 3. My Favorites

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

**NOTE:** The screenshots in this section are for reference only and items listed may differ to your motherboard. Please refer to your motherboard for the actual items.



### Adding items to My Favorites

To add BIOS items:

1. Press <F3> on your keyboard or click **MyFavorite** from the BIOS screen to open Setup Tree Map screen.
2. On the Setup Tree Map screen, 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.

**NOTE:** You cannot add the following items to My Favorite items:

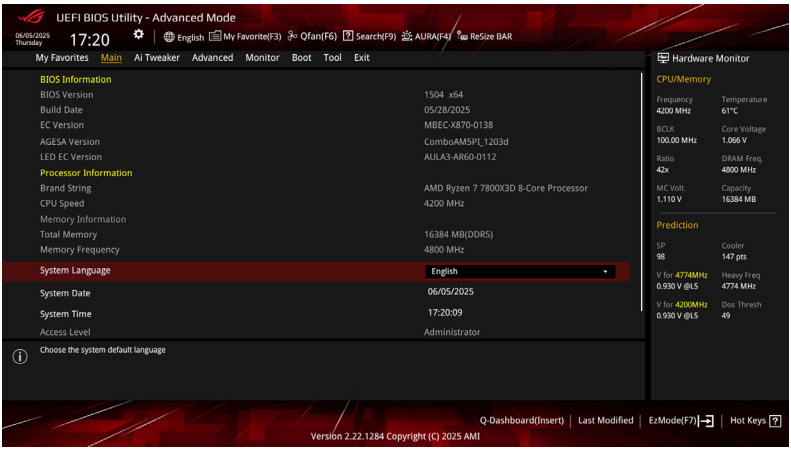
- Items with submenu options.
- User-managed items such as language and boot order.
- Configuration items such as Memory SPD Information, system time and date.




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

# 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.




## System Language

Allows you to set the system default language.

## System Date

Allows you to set the system date. Use <Tab> to switch between Date elements.

## System Time

Allows you to set the system time. Use <Tab> to switch between Time elements.

## Security

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

**NOTE:**

- If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See the motherboard for information on how to erase the RTC RAM.
- 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 already have an administrator password set, 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. In the **Create New Password** box, key in a password, then press <Enter>.
3. Re-type to confirm the password then select **OK**.

To change an administrator password:

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

To clear an administrator password:

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

To change a user password:

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

To clear a user password:

1. Select the **User Password** item and press <Enter>.
2. In the **Enter Current Password** box, key in the current password, then press <Enter>.
3. 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]**.

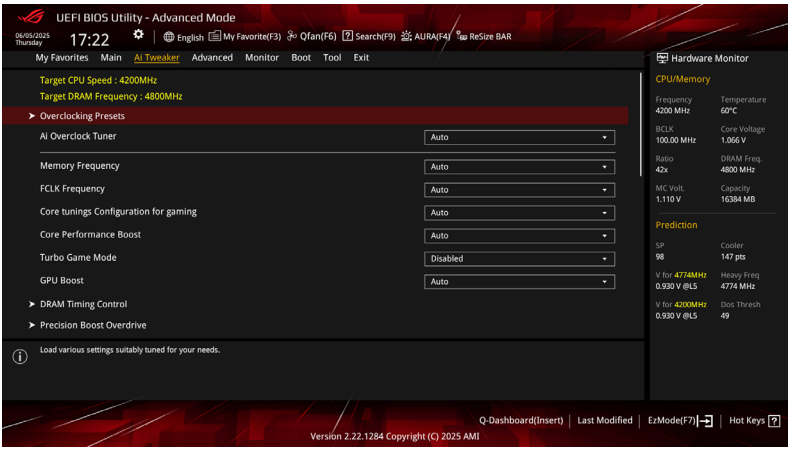
# 5. Ai Tweaker menu

The Ai Tweaker menu items allow you to configure overclocking-related items.

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

**NOTE:** 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.




## Overclocking Presets

Select this item to load various settings suitably tuned for your needs.

### Ai Overclock Tuner

| | |
|---|---|
| [Auto] | Loads the optimal settings for the system. |
| [Manual] | When the manual mode is selected, the BCLK (base clock) frequency can be assigned manually. |
| [DOCP I] | Load the DIMM's default DOCP memory timings (CL, TRCD, TRP, TRAS) and other memory parameters optimized by ASUS. |
| [DOCP II] | Load the DIMM's complete default DOCP profile. |
| [DOCP Tweaked] | Load DOCP profile with tweaks for improved performance if config matches. |
| [EXPO I] | Load the DIMM's default EXPO memory timings (CL, TRCD, TRP, TRAS) and other memory parameters optimized by ASUS. |
| [EXPO II] | Load the DIMM's complete default EXPO profile. |
| [EXPO Tweaked] | Load EXPO profile with tweaks for improved performance if config matches. |
| [EXPO on the fly +] | On the fly for dynamic control. |
| [AEMP] | Load the memory parameters profile optimized by ASUS if no DIMM profiles detected. |

**NOTE:** The configuration options for this item vary depending on the DIMM model you installed on the motherboard.

**NOTE:** The following items appear only when **Ai Overclock Tuner** is set to **[Manual]**, **[DOCP I]**, **[DOCP II]**, **[DOCP Tweaked]**, **[EXPO I]**, **[EXPO II]**, **[EXPO Tweaked]**, **[EXPO on the fly +]** or **[AEMP]**.

### eCLK Mode

Configuration options: [Auto] [Synchronous mode] [Asynchronous mode]

### BCLK1 Frequency

Adjusts Base Clock Frequency for CPU and also PCIE. Default is 100. Please note that changing the BCLK will affect stability of devices, in particular SATA devices.

**NOTE:** The following item appears only when **eCLK Mode** is set to **[Asynchronous mode]**.

### BCLK2 Frequency

BCLK2 Frequency only for CPU CLK. Use the <+> or <-> to adjust the value. The values range from 80.0MHz to 200.0MHz with an interval of 0.05.

**NOTE:** The following item appears only when **Ai Overclock Tuner** is set to **[DOCP I]**, **[DOCP II]**, or **[DOCP Tweaked]**.

### DOCP

Each profile has its own DRAM frequency, timing and voltage.

**NOTE:** The following item appears only when **Ai Overclock Tuner** is set to **[EXPO I]**, **[EXPO II]**, or **[EXPO Tweaked]**, or **[EXPO on the fly +]**.

### EXPO

Each profile has its own DRAM frequency, timing and voltage.

**NOTE:** The following item appears only when **Ai Overclock Tuner** is set to **[AEMP]**.

### AEMP

Each profile has its own DRAM frequency, timing and voltage.

#### Memory Frequency

Forces a DDR5 frequency slower than the common tCK detected via SPD.
Configuration options: [Auto] [DDR5-2000 MHz] - [DDR5-12000 MHz]

#### FCLK Frequency

Specifies the FCLK frequency.
Configuration options: [Auto] [800 MHz] - [3000 MHz]

#### Core tunings Configuration for gaming

Configuration options: [Auto] [Legacy] [Level 1] [Level 2]

#### Core Performance Boost

Automatically overclocks the CPU and DRAM to enhance system performance.
Configuration options: [Auto] [Enabled] [Disabled]

#### Turbo Game Mode

Turbo Game Mode enables optimized gaming performance by disabling second CCD and SMT, allowing for a more focused and efficient use of processing power in certain games.
Configuration options: [Enabled] [Disabled]

**NOTE:** While Turbo Game Mode can enhance performance in some games, the improvement will vary depending on the game. Disabling CCD (Core Complex Die) and Simultaneous multithreading (SMT) may impact the performance of other applications, particularly those related to productivity. Use this mode selectively based on your specific needs.

#### AI Cache Boost

Enable AI Cache Boost on AMD compatible processors to enhance performance and compute power when using AI-based tools.
Configuration options: [Auto] [Disabled] [Enabled]

#### GPU Boost

Set to [Manual] if you want to select the desired value in frequency range.
Configuration options: [Auto] [Manual Mode]

**NOTE:** The following item appears only when **GPU Boost** is set to **[Manual Mode]**.

#### GPU clock frequency

Allows you to set the GPU clock frequency.

## DRAM Timing Control

The sub-items in this menu allow you to set the DRAM timing control features. Use the <+> and <-> keys to adjust the value. To restore the default setting, type **[Auto]** using the keyboard and press the <Enter> key. You can also select various Memory Presets to load settings suitably tuned for some memory modules.

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

### DDR Training Runtime Reduction

| | |
|---|---|
| [Auto] | Default code behavior. If OC is enabled, DDR Training Runtime Reduction will be disabled by default. |
| [Disabled] | Force disable DDR Training Runtime Reduction. |
| [Enabled] | Force enable DDR Training Runtime Reduction. |

### Memory Contect Restore

Configure the memory context restore mode. When enabled, DRAM re-training is avoided when possible and the POST latency is minimized.
Configuration options: [Auto] [Enabled] [Disabled]

### Mem Over Clock Fail Count

Mem Over Clock Fail Count.

### Power Down Enable

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

### UCLK DIV1 MODE

Configuration options: [Auto] [UCLK=MEMCLK] [UCLK=MEMCLK/2]

### ADDR_CMD_MODE

Configuration options: [Auto] [Buf] [UnBuf]

### Primary Timings

#### Tcl

DRAM CAS# Latency, the value stepping is 2.

#### Trcd

DRAM RAS# to CAS# Delay.

#### Trp

DRAM RAS# PRE Time.

#### Tras

DRAM RAS# ACT Time.

### Secondary Timings

#### Trc

DRAM Row Cycle Time.

#### Twr

DRAM WRITE to READ Delay, the value stepping is 6.

#### Refresh Interval

Allows you to set Refresh Interval.

Trfc1
DRAM REF Cycle Time.

Trfc2
Allows you to set Trfc2.

Trfcsb
Allows you to set Trfcsb.

Trtp
DRAM READ to PRE Time.

TrrdL
DRAM RAS# to RAS# Delay(tRRDL).

TrrdS
DRAM RAS# to RAS# Delay(tRRDS).

Tfaw
Allows you to set Tfaw.

TwtrL
DRAM WRITE to READ Delay(tWTR_L).

TwtrS
DRAM WRITE to READ Delay(tWTR_S).

TrdrdScl
Allows you to set TrdrdScl.

TrdrdSc
Allows you to set TrdrdSc.

TrdrdSd
Allows you to set TrdrdSd.

Trdrddd
Allows you to set Trdrddd.

TwrwrScl
Allows you to set TwrwrScl.

TwrwrSc
Allows you to set TwrwrSc.

TwrwrSd
Allows you to set TwrwrSd.

TwrwrDd
Allows you to set TwrwrDd.

Twrrd
Allows you to set Twrrd.

Trdwr
Allows you to set Trdwr.

Additional Timings

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

M_ORDERING

Configuration options: [Auto] [NORM] [STRICT] [RELAXED]

S_COL_WIDTH

Allows you to set S_COL_WIDTH.

MC_SVA_TRIM0

Allows you to set MC_SVA_TRIM0.

MC_SVA_TRIM1

Allows you to set MC_SVA_TRIM1.

MC_SVA_TRIM2

Allows you to set MC_SVA_TRIM2.

MMCM_MULT_F

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

DRAM Signal Control

Processor ODT P0-P3 Page

CA ODT GroupA-B

Specifies the CA ODT.
Configuration options: [Auto] [RTT_OFF] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CK ODT GroupA-B

Specifies the CK ODT.
Configuration options: [Auto] [RTT_OFF] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CS ODT GroupA-B

Specifies the CS ODT.
Configuration options: [Auto] [RTT_OFF] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

Processor ODT P0-3 Page

Processor ODT Impedance Pull Up P0-3

Specifies the Processor ODT Impedance Pull Up P0-3.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68 ohm] [60 ohm] [53 ohm] [48 ohm] [43 ohm] [40 ohm] [36 ohm] [34 ohm] [32 ohm] [30 ohm] [28 ohm] [26 ohm] [25 ohm]

Processor ODT Impedance Pull Down P0-3

Specifies the Processor ODT Impedance Pull Down P0-3.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68 ohm] [60 ohm] [53 ohm] [48 ohm] [43 ohm] [40 ohm] [36 ohm] [34 ohm] [32 ohm] [30 ohm] [28 ohm] [26 ohm] [25 ohm]

Processor DQ drive strengths Pull Up P0-3

Processor DQ drive strengths Pull Up P0-3.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Processor DQ drive strengths Pull Down P0-3

Processor DQ drive strengths Pull Down P0-3.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Dram ODT Impedance RTT_NOM_WR P0-3

Dram ODT Impedance RTT_NOM_WR P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance RTT_NOM_RD P0-3

Dram ODT impedance RTT_NOM_RD P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance RTT_WR P0-3

Dram ODT impedance RTT_WR P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance RTT_PARK P0-3

Dram ODT impedance RTT_PARK P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT impedance DQS_RTT_PARK P0-3

Dram ODT impedance DQS_RTT_PARK P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram DQ drive strengths Pull Up P0-3

Dram DQ drive strengths Pull Up P0-3.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

Dram DQ drive strengths Pull Down P0-3

Dram DQ drive strengths Pull Down P0-3.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

Proc CS Drive Strength

Proc CS Drive Strength.
Configuration options: [Auto] [120 ohm] [60 ohm] [40 ohm] [30 ohm]

Proc CK Drive Strength

Proc CK Drive Strength.
Configuration options: [Auto] [120 ohm] [60 ohm] [40 ohm] [30 ohm]

Proc CA Drive Strength

Proc CA Drive Strength.
Configuration options: [Auto] [120 ohm] [60 ohm] [40 ohm] [30 ohm]

Proc Data Drive Strength

Proc Data Drive Strength.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

CPU On-Die Termination

CPU On-Die Termination(ProcODT).
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68.6 ohm] [60 ohm] [53.3 ohm] [48 ohm] [43.6 ohm] [40 ohm] [36.9 ohm] [34.3 ohm] [32 ohm] [30 ohm] [28.2 ohm] [26.7 ohm] [25.3 ohm]

DRAM Data Drive Strength

DRAM Data Drive Strength.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

Rtt Nom Wr

Rtt Nom Wr.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Rtt Nom Rd

Rtt Nom Rd.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Rtt Wr

Rtt Wr.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Rtt Park

Rtt Park.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Rtt Park Dqs

Rtt Park Dqs.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

CA Tx Phase Shift Clk

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

CS Tx Phase Shift Clk

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

CK Tx Phase Shift Clk

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

CA Rx Phase Shift Clk

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

CS Rx Phase Shift Clk

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

CK Rx Phase Shift Clk

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

FIFO Wr En Fine Delay

FIFO Wr En Fine Delay.
Configuration options: [Auto] [0] [1]

#### POC Sample PD

POC Sample PD.
Configuration options: [Auto] [Enabled] [Disabled]

#### Bank Swap Mode

Bank Swap Mode.
Configuration options: [Auto] [Disabled] [Swap CPU] [Swap APU]

### Precision Boost Overdrive

#### Medium Load Boostit

Enabling may help improve performance under medium loads.
Configuration options: [Auto] [Disabled] [Enabled]

#### Precision Boost Overdrive

When this item is enabled, it allows the processor to run beyond defined values for PPT, VDD_CPU EDC, VDD_CPU TDC, VDD_SOC EDC, VDD_SOC TDC to the limits of the board, and allows it to boost at higher voltages for longer durations than default operation.
Configuration options: [Auto] [Disabled] [Enabled] [Enhancement] [Manual] [AMD ECO Mode]

**NOTE:** The following item appears only when **Precision Boost Overdrive** is set to **[Enhancement]**.

#### Thermal Limit

Thermal Limit.
Configuration options: [Level 1 (90°C)] [Level 2 (80°C)] [Level 3 (70°C)]

**NOTE:** The following items appear only when **Precision Boost Overdrive** is set to **[Manual]**.

#### PPT Limit

PPT Limit [W], Board Socket Power capability, adjustable up to motherboard programed PPT limit.

#### TDC Limit

TDC Limit [A], Board thermally constrained current delivery capability, adjustable up to motherboard programed board TDC limit.

#### EDC Limit

EDC Limit [A], Board electrically constrained current delivery capability, adjustable up to motherboard programed board EDC limit.

**NOTE:** The following items appear only when **Precision Boost Overdrive** is set to **[AMD ECO Mode]**.

#### AMD ECO Mode

Adjust the CPU control limits to manage performance. Performance may vary depending on the CPU cooler or other components.
cTDP 65W (88W/75A/150A)
cTDP 105W (142W/110A/170A)
cTDP 170W (230W/160A/225A)
Configuration options: [Auto] [cTDP 35W] [cTDP 65W] [cTDP 105W] [cTDP 170W]

Precision Boost Overdrive Scalar

[Auto] Part runs with a scalar of 1X, i.e. normal operation.

[Manual] Part runs with a scalar of customized value.

**NOTE:** The following item appears only when **Precision Boost Overdrive Scalar** is set to **[Manual]**.

Customized Precision Boost Overdrive Scalar

Precision Boost Overdrive increases the maximum boost voltage used (runs above parts specified maximum) and the amount of time spent at that voltage. The larger the value entered the larger the boost voltage used and the longer that voltage will be maintained.
Configuration options: [1X] - [10X]

CPU Boost Clock Override

Allows you to increase (positive) or decrease (negative) the maximum CPU frequency that may be automatically achieved by the CPU Boost Algorithm.
Configuration options: [Auto] [Disabled] [Enabled (Positive)] [Enabled (Negative)]

**NOTE:** The following item appears only when **CPU Boost Clock Override** is set to **[Enabled (Positive)]**.

Max CPU Boost Clock Override(+)

Increases the maximum CPU frequency that may be automatically achieved by the Precision Boost 2 algorithm.

**NOTE:** The following item appears only when **CPU Boost Clock Override** is set to **[Enabled (Negative)]**.

Max CPU Boost Clock Override(-)

Decreases the maximum CPU frequency that may be automatically achieved by the Precision Boost 2 algorithm.

Per-Core Boost Clock Limit

Per-Core Boost Clock Limit

Set specific limits to each core in MHz unit. This will still be capped by the global CPU Boost clock but limiting down from this for each core will restrain it's frequency.
Limiting a weaker core may improve it's curve optimizer margin.
Configuration options: [Auto] [Disabled] [Enabled]

**NOTE:** The following items appear only when **Per-Core Boost Clock Limit** is set to **[Enabled]**.

Core 0~15

The recommended value is based on parameters of your setup with the current settings of Ai Tweaker Menu.

Platform Thermal Throttle Limit

Allows the user to decrease the maximum allowed processor temperature (celsius).
Configuration options: [Manual] [Auto]

**NOTE:** The following item appears only when **Per-Core Boost Clock Limit** is set to **[Manual]**.

Platform Thermal Throttle Limit

Allows the user to decrease the maximum allowed processor temperature (celsius).

Curve Optimizer

Curve Optimizer

Allows the user to shift the Voltage / Frequency (AVFS) curve to include higher voltages (positive values) or lower voltages (negative values). The larger the value entered the larger the magnitude of the voltage limit.
Configuration options: [Auto] [All Cores] [Per Core]

**NOTE:** The following items appear only when **Curve Optimizer** is set to **[All Cores]**.

All Core Curve Optimizer Sign

Determines the direction of the curve shift on all cores. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

All Core Curve Optimizer Magnitude

Determines the magnitude of the curve shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

**NOTE:** The following items appear only when **Curve Optimizer** is set to **[Per Core]**.

Core 0-63 Curve Optimizer Sign

Determines the direction of the curve shift on this core. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Core 0-63 Curve Optimizer Magnitude

Determines the magnitude of the curve shift to be made to this core (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

GFX Curve Optimizer

GFX Curve Optimizer

Allows the user to shift the GFX Voltage / Frequency (AVFS) curve to include higher voltages (positive values) or lower voltages (negative values). The larger the value entered the larger the magnitude of the voltage shift.
Configuration options: [Auto] [GFX Curve Optimizer]

**NOTE:** The following items appear only when **GFX Curve Optimizer** is set to **[GFX Curve Optimizer]**.

GFX Curve Optimizer Sign

Determines the direction of the curve shift for GFX. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

GFX Curve Optimizer Magnitude

Determines the magnitude of the GFX curve shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift. Field defaults to 0 and the user can enter whole integer numbers. Value entered, combined with the sign above, is used to send the SMU a GFX Curve Optimizer command.

Curve Shaper

Min Frequency - Low Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Min Frequency - Low Temperature** is set to **[Enable]**.

Min Frequency - Low Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Min Frequency - Low Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Min Frequency - Med Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Min Frequency - Med Temperature** is set to **[Enable]**.

Min Frequency - Med Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Min Frequency - Med Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Min Frequency - High Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Min Frequency - High Temperature** is set to **[Enable]**.

Min Frequency - High Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Min Frequency - High Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Low Frequency - Low Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Min Frequency - High Temperature** is set to **[Enable]**.

Low Frequency - Low Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Low Frequency - Low Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Low Frequency - Med Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Low Frequency - Med Temperature** is set to **[Enable]**.

Low Frequency - Med Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Low Frequency - Med Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Low Frequency - High Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Min Frequency - High Temperature** is set to **[Enable]**.

Low Frequency - High Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Low Frequency - High Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Med Frequency - Low Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Med Frequency - Low Temperature** is set to **[Enable]**.

Med Frequency - Low Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Med Frequency - Low Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Med Frequency - Med Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Med Frequency - Med Temperature** is set to **[Enable]**.

Med Frequency - Med Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Med Frequency - Med Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Med Frequency - High Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Med Frequency - High Temperature** is set to **[Enable]**.

Med Frequency - High Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Med Frequency - High Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

High Frequency - Low Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **High Frequency - Low Temperature** is set to **[Enable]**.

High Frequency - Low Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

High Frequency - Low Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

High Frequency - Med Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **High Frequency - Med Temperature** is set to **[Enable]**.

High Frequency - Med Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

High Frequency - Med Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

High Frequency - High Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **High Frequency - High Temperature** is set to **[Enable]**.

High Frequency - High Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

High Frequency - High Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Max Frequency - Low Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Max Frequency - Low Temperature** is set to **[Enable]**.

Max Frequency - Low Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Max Frequency - Low Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Max Frequency - Med Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/ Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Max Frequency - Med Temperature** is set to **[Enable]**.

Max Frequency - Med Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Max Frequency - Med Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

Max Frequency - High Temperature

Curve Shaper is an advanced overclocking tuning suite utilizing the same "Curve optimizer" steps. It changes variable voltage across all cores for finite (overlapping) frequency and temperature regions. This can be used to more precisely tune the voltage required by your system. In general, Low temperature corresponds to idle temps, Med Temperature corresponds to 1T/Gaming Workloads, and high temperature is for stress tests. Additionally, Min and Low frequencies are idle/background tasks, Medium is high core count workloads, and high and Max frequency are for gaming and 1T workloads. These settings work as "bands" so you may find that for particular cases several settings impact the behavior. Ex, A workload running at 65 Celsius will likely be influenced by Low temp and Med temp values. Workloads lower than 65C will be more impacted by Low. Workloads above 65C will be more impacted by Medium.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **Max Frequency - High Temperature** is set to **[Enable]**.

Max Frequency - High Temperature Sign

Determines the direction of the shift. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Max Frequency - High Temperature Magnitude

Determines the magnitude of the shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

CO Load Guard

Enable to switch over to Safe Curve Optimizer value during periods of very heavy loading.
Configuration options: [Auto] [Disable] [Enable]

**NOTE:** The following items appear only when **CO Load Guard** is set to **[Enable]**.

All Core Safe CO Sign

Configuration options: [Positive] [Negative]

## Digi+ VRM

VRM Initialization Check

When any error occurs during VRM initialization, the system will hang at POST code 76/77 if this function is enabled.
Configuration options: [Disabled] [Enabled]

Voltage training

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

CPU Load-line Calibration

CPU Load-Line Calibration is defined by AMD VRM spec and affects CPU voltage. The CPU working voltage will decrease proportionally to CPU loading. Higher value could get higher voltage and good overclocking performance but increase the CPU and VRM thermal.
Configuration options [Auto] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5:Recommended for OC] [Level 6] [Level 7] [Level 8]

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

CPU Current Capability

A higher value brings a wider total power range and extends the overclocking frequency range simultaneously.
Configuration options: [Auto] [100%] - [140%]

**NOTE:** Configure higher values when overclocking or under a high loading for extra power support.

Segment2 Loadline

Segment 2 Loadline implements a customized Loadline for high CPU Workloads whose boundary is defined by Segment 2 Current Threshold. This can be a different value from CPU Loadline Calibration for finer control. Lower values result in a higher voltage droop.
Configuration options: [Auto] [Disabled] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5] [Level 6] [Level 7]

**NOTE:** The following item appears only when **Segment2 Loadline** is set to **[Level 1]**, **[Level 2]**, **[Level 3]**, **[Level 4]**, **[Level 5]**, **[Level 6]**, or **[Level 7]**.

Segment2 Current Threshold

Segment 2 Current Threshold sets the boundray between CPU Loadline Calibration and Segment 2 Loadline. Unit is in amps. When current is lower than threshold, VRM loadline follows CPU Loadline Calibration value. When current is higher threshold, VRM loadline follows Segment2 Loadline value.

CPU Current Reporting Scale

The Scale for the current reported to the CPU via the SVI Bus.
Configuration options: [Auto] [100%] [75%] [50%] [25%]

CPU VRM Switching Frequency

Sets the VRM switching frequency. VRM switching frequency affects transient response and VRM component temperatures. Setting a higher switching frequency will result in better transient response at the expense of higher VRM temperatures. Active cooling of the VRM heatsink is recommended when running high CPU voltage and high load-line calibration values.
Configuration options: [Auto] [Manual]

**CAUTION!** Do not remove the VRM heatsink.

**NOTE:** The following item appears only when **CPU VRM Switching Frequency** is set to **[Manual]**.

Fixed CPU VRM Switching Frequency(KHz)

Allows you to set a higher frequency for a quicker transient response speed. The values range from 300 KHz to 800 KHz with an interval of 50 KHz.

CPU Power Duty Control

CPU power duty control adjusts the duty cycle of each VRM phase based upon current and/or temperature.

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

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

CPU Power Phase Control

Allows you to set the power phase control of the CPU.

| | |
|---|---|
| [Auto] | Automatically selects the power phase control. |
| [Standard] | The number of active phases is controlled by the CPU. |
| [Extreme] | Sets full phase mode. |
| [Manual] | Manually select the power phase response speed. |

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

**NOTE:** The following item appears only when **CPU Power Phase Control** is set to **[Manual]**.

Power Phase Response

Select the ultra fast mode for a faster power phase response. The reaction time will be longer when the regular mode is selected.
Configuration options: [Ultra Fast] [Fast] [Medium] [Regular]

VDDSOC Current Reporting Scale

The Scale for the current reported to the CPU via the SVI Bus
Configuration options: [Auto] [100%] [75%] [50%] [25%]

VDDSOC Switching Frequency

Configuration options: [Auto] [Manual]

**NOTE:** The following item appears only when **VDDSOC Switching Frequency** is set to **[Manual]**.

Fixed VDDSOC VRM Switching Frequency(KHz)

The switching frequency will affect the VDDSOC transient response speed and the component thermal production. Configure a higher frequency for a quicker transient response speed. The values range from 400 KHz to 700 KHz with an interval of 100 KHz.

VDDSOC Power Phase Control

Configuration options: [Auto] [Standard] [Optimized] [Extreme] [Manual]

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

**NOTE:** The following item appears only when **VDDSOC Power Phase Control** is set to **[Manual]**.

Power Phase Response

Select ultra fast mode for a faster power phase response. The reaction time will be longer when regular mode is selected.
Configuration options: [Ultra Fast] [Fast] [Medium] [Regular]

MISC Switching Frequency

Configuration options: [Auto] [Manual]

**NOTE:** The following item appears only when **MISC Switching Frequency** is set to **[Manual]**.

Fixed MISC Switching Frequency(KHz)

The switching frequency will affect the MISC transient response speed and the component thermal production. Configure a higher frequency for a quicker transient response speed. The values range from 400 KHz to 700 KHz with an interval of 100 KHz.

## Performance Bias

Different Values may help different Software's performance.
Configuration options: [Auto] [None] [CB R23] [GB3]

## Tweaker's Paradise

Clock Spread Spectrum

Allows you to enable or disable Clock Spread Spectrum.
Configuration options: [Auto] [Enabled] [Disabled]

BCLK1 Amplitude

Sets the signal magnitude of the reference BCLK1 supplied to the processor. Higher values may improve overclocking stability.
Configuration options: [Auto] [800mV] [900mV]

BCLK1 Slew Rate

The speed at which the base clock rises or falls. Set a high value for overclocking stability.
Configuration options: [Auto] [Slow] [Fast]

Stretch mode for L3 DFLL

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

1.8V PLL Voltage

Allows you to set the 1.8V PLL Voltage. Use the <+> or <-> to adjust the value. The values range from 1.500V to 2.500V with an interval of 0.010V.

#### 1.8V Standby Voltage

Allows you to set the 1.8V Standby Voltage. Use the <+> or <-> to adjust the value. The values range from 1.500V to 2.500V with an interval of 0.010V.

#### Misc_ALW

Allows you to set the Misc_ALW Voltage. Use the <+> or <-> to adjust the value. The values range from 0.600V to 1.500V with an interval of 0.010V.

#### Chipset0-1 VDD Voltage

Allows you to set the Chipset0-1 VDD Voltage. Use the <+> or <-> to adjust the value. The values range from 0.800V to 1.400V with an interval of 0.005V.

#### CPU 3.3V

Allows you to set the CPU 3.3V Voltage. Use the <+> or <-> to adjust the value. The values range from 2.800V to 4.000V with an interval of 0.020V.

#### Sense MI Skew 1-4

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

#### Sense MI Skew 1-4

Use the <+> or <-> to adjust the value. The values range from 0.000 to 2.800 with an interval of 0.00625V.

### Core Flex

Customize your own algorithms to adjust boosting behavior for more optimized power efficiency, temperatures and performance. Customize up to 3 concurrent algorithms.

#### Load X3D Core Flex Gaming Preset

Loads a preconfigured Algorithm for X3D Processors.

#### Algorithm 1-3

Set to Enabled to customize this Algorithm.
Configuration options: [Auto] [Disabled] [Enabled]

---

**NOTE:** The following items appear only when **Algorithm 1-3** is set to **[Enabled]**.

---

#### Algorithm 1-3 Condition

Select the condition to monitor for and take action upon. When multiple Algorithms watch for the same condition then the result is 'AND' and the smaller of the 2 Action Values get written.
Configuration options: [Auto] [CPU Temperature] [Core Voltage] [Core Current]

#### Algorithm 1-3 Action

Select the Action to take when targeted condition crosses the threshold. When multiple Algorithms execute the same Actions then the result is 'AND' and the smaller of the 2 Action Values get written.
Configuration options: [Auto] [Package Power Limit Fast] [Package Power Limit Slow] [Thermal Limit] [Vcore TDC Limit] [Vcore EDC Limit] [SOC TDC Limit] [SOC EDC Limit] [CCD Priority] [Mem On The Fly]

Level1 Threshold Value

Set the boundary separating Level1 Action Value and Level2 Action Value. When condition is below or equal to this value, then Level1 Action Value gets written. If above but below Level2 Threshold Value, then Level2 Action Value gets written. Temperature is in degrees Celsius, Voltage is in millivolts, and current is in Ampere.

Level2 Threshold Value

Set the boundary separating Level2 Action Value and Level3 Action Value. When condition is below or equal to this value and above Level1 Threshold Value, then Level2 Action Value gets written. If above, then Level3 Action Value gets written. Temperature is in degrees Celsius, Voltage is in millivolts, and current is in Ampere.

Level1 Action Value

Set the value for Action to take when condition lies below the first boundary. Power is in Watt, Temperature in degrees Celsius, current is in Ampere, BCLK is in MHz. CCD Priority Action Value refers to CCD number, 0 for CCD0, 1 for CCD1, any values higher than 1 will be capped to 1.

Level2 Action Value

Set the value for Action to take when condition lies between the first boundary and the second boundary. Power is in Watt, Temperature in degrees Celsius, current is in Ampere, BCLK is in MHz. CCD Priority Action Value refers to CCD number, 0 for CCD0, 1 for CCD1, any values higher than 1 will be capped to 1.

Level3 Action Value

Set the value for Action to take when condition lies above the second boundary. Power is in Watt, Temperature in degrees Celsius, current is in Ampere, BCLK is in MHz. CCD Priority Action Value refers to CCD number, 0 for CCD0, 1 for CCD1, any values higher than 1 will be capped to 1.

CCD Priority Memory Activity Threshold

If Algo is set to CCD Priority, CCD Priority Switching will only occur if the Memory Activity is higher than the threshold specified. For no checks, just set this to 0.

CCD Priority Hysteresis

If Algo is set to CCD Priority, CCD Priority Switching will only occur if the Memory Activity is higher than the threshold specified. For no checks, just set this to 0.

## AI Features

Processor Utilization

Displays processor utilization information.

Cooler Efficiency Customize

| | |
|---|---|
| [Keep Training] | Continuous evaluations will be performed on Cooler efficiency and updated accordingly. |
| [Stop Training] | Cooler efficiency evaluations will stop and current evaluated efficiency will be used. |
| [User Specify] | Manually specify the Cooler efficiency and all predictions will be based off this manual setting. |

**NOTE:** The following item appears only when **Cooler Efficiency Customize** is set to **[User Specify]**.

Cooler Score

The value of the Cooler's pts. [Maximum] 250 pts; [Minimum] 67 pts; [Default] 125 pts.

Recalibrate Cooler

Allows you to recalibrate your cooler efficiency.

Cooler Re-evaluation Algorithm

Allows you to set how inclined the re-evaluation will update.
Configuration options: [Normal] [More inclined to update] [Very inclined to update] [Less inclined to update] [Least inclined to update]

Optimism Scale

Allows you to set the optimism of the predictions. The higher the value, the more optimistic the predictions and vice versa.

### CPU SOC Voltage

Increase to help Memory Frequency overclock. The reading shown on the right is the SOC Voltage Reading from the remote ADC Sensing. The reading shown below is the true SOC Voltage sensed from the Processor's sensor.
Configuration options: [Auto] [Manual Mode]

**NOTE:** The following item appears only when **CPU SOC Voltage** is set to **[Manual Mode]**.

### VDDSOC Voltage Override

Use the <+> and <-> keys to adjust the value. The values range from 0.625V to 1.300V with an interval of 0.005V.

**NOTE:** The following item appears only when **CPU SOC Voltage** is set to **[Offset Mode]**.

### VDDSOC Offset Mode Sign

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

### VDDSOC Voltage Offset

Use the <+> or <-> to adjust the value. The values range from 0.0050V to 0.5000V with an interval of 0.0050V.

### VDDSOC Voltage Offset

Use the <+> or <-> to adjust the value. The values range from 0.0050V to 0.5000V with an interval of 0.0050V.

### CPU VDDIO / MC Voltage

Configuration options: [Auto] [Manual Mode]

### Misc Voltage

Misc Voltage supplies power for the internal VDDG rails which power the GMI bus.
Configuration options: [Auto] [Manual Mode] [Offset Mode]

**NOTE:** The following items appear only when **Misc Voltage** is set to **[Manual Mode]**.

### Misc Voltage Override

Configure the input voltage for the Misc by the external voltage regulator.

**NOTE:** The following items appear only when **Misc Voltage** is set to **[Offset Mode]**.

### Offset Mode Sign

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

[–] To offset the Misc voltage by a negative value.

### Misc Voltage Offset

Use the <+> or <-> to adjust the value. The values range from 0.0050V to 0.5000V with an interval of 0.0050V.

### VDDP Voltage

Use the <+> or <-> to adjust the value. The values range from 0.700V to 1.800V with an interval of 0.001V.

### High DRAM Voltage Mode

If disabled, the upper range for DRAM Voltage will be 1.435V. If enabled, the upper range will be 2.070V. If enabled on non-supported DRAM, the voltage will be lower than requested.
Configuration options: [Auto] [Disabled] [Enabled]

### DRAM VDD Voltage

Allows you to set the power for the DRAM IC's VDD portion.

### DRAM VDDQ Voltage

Allows you to set the power for the DRAM IC's VDD Data portion.

### VDDG CCD Voltage

VDDG CCD represents voltage for the data portion of the Infinity Fabric. Range is 650mV~1650mV of stepping 10mV.
Configuration options: [Auto] [650 mV] - [1650 mV]

### VDDG IOD Voltage

VDDG IOD represents voltage for the data portion of the Infinity Fabric. Range is 650mV~1650mV of Stepping 10mV.
Configuration options: [Auto] [650 mV] - [1650 mV]

### Advanced Memory Voltages

#### PMIC Force Continuous Current Mode

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

#### PMIC Voltages

Configuration options: [Auto] [Sync All PMICs] [By per PMIC]

**NOTE:** The following items appear only when **PMIC Voltages** is set to **[Sync All PMICs]**.

#### SPD HUB VLDO (1.8V)

Allows you to set the main power for the SPD Hub Logic. Default set to 1.8V.

#### SPD HUB VDDIO (1.0V)

Allows you to set the main power for the SPD Hub side-band interface. Default set to 1.0V.

Memory VDD Voltage
Allows you to set the power for the DRAM IC's VDD portion.

Memory VDDQ Voltage
Allows you to set the power for the DRAM IC's Data portion.

Memory VPP Voltage
Allows you to set the power for the DRAM Activating Power Supply.

Memory Voltage Switching Frequency
Allows you to set the switching frequency of memory voltage regulator in MHz.

Memory Current Capability
Allows you to set the current capability for the Switching Regulators in Amps.

**The** following items appear only when **PMIC Voltages** is set to **[By per PMIC]**.

PMIC0~3 SPD HUB VLDO (1.8V)
Allows you to set the main power for the SPD Hub Logic. Default set to 1.8V.

PMIC0~3 SPD HUB VDDIO (1.0V)
Allows you to set the main power for the SPD Hub side-band interface. Default set to 1.0V.

PMIC0~3 Memory VDD Voltage
Allows you to set the power for the DRAM IC's VDD portion.

PMIC0~3 Memory VDDQ Voltage
Allows you to set the power for the DRAM IC's Data portion.

PMIC0~3 Memory VPP Voltage
Allows you to set the power for the DRAM Activating Power Supply.

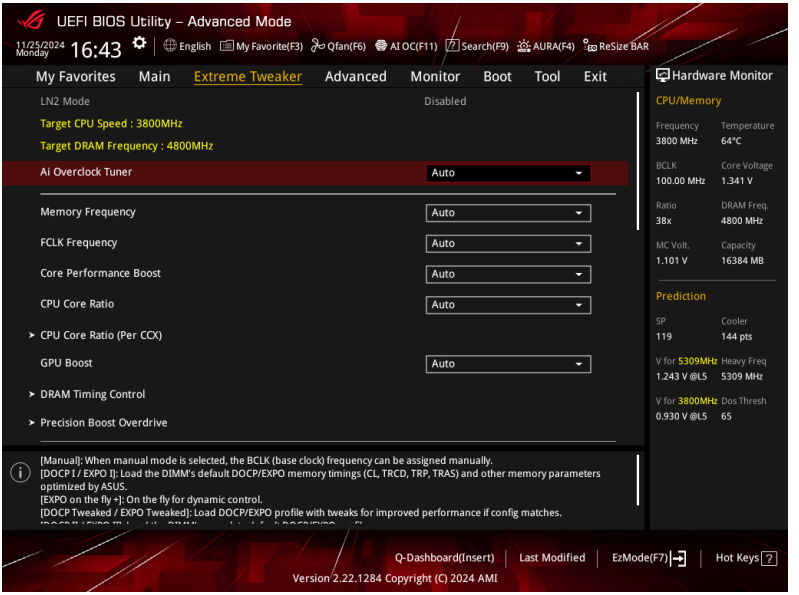
PMIC0~3 Memory Voltage Switching Frequency
Switching frequency of Memory Voltage Regulator in MHz.

PMIC0~3 Memory Current Capability
Current capability for the switching regulators in Amps.

# 6. Advanced menu

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

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




## 6.1 Trusted Computing

The items in this menu allow you to configure the Trusted Computing settings.

### Security Device Support

Allows you to enable or disable the BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Configuration options: [Disable] [Enable]

### SHA256 PCR Bank

Enable or disable SHA256 PCR Bank.
Configuration options: [Disabled] [Enabled]

### Pending operation

Schedule an Operation for the Security Device.
Configuration options: [None] [TPM Clear]

**NOTE:** Your computer will reboot during restart in order to change the State of the Security Device.

### Platform Hierarchy

Enable or Disable Platform Hierarchy.
Configuration options: [Disabled] [Enabled]

### Storage Hierarchy

Enable or disable Storage Hierarchy.
Configuration options: [Disabled] [Enabled]

### Endorsement Hierarchy

Enable or disable Endorsement Hierarchy.
Configuration options: [Disabled] [Enabled]

### Physical Presence Spec Version

Allows you to select to Tell O.S. to support PPI Version 1.2 or 1.3.
Configuration options: [1.2] [1.3]

> **NOTE:** Some HCK tests might not support 1.3.

## 6.2 AMD fTPM configuration

The items in this menu show the AMD fTPM configuration options.

### Firmware TPM switch

Allows you to enable or disable Firmware TPM.

| | |
|---|---|
| [Enable Firmware TPM] | Enables platform Firmware TPM. |
| [Disable Firmware TPM] | Disables platform Firmware TPM. |

> **CAUTION!** When **[Disable Firmware TPM]** is selected, fTPM will be disabled and all data saved on it will be lost.

### Erase fTPM NV for factory reset

Allows you to enable or disable fTPM reset for newly installed CPUs.

| | |
|---|---|
| [Disabled] | Keep previous fTPM records and continue system boot, fTPM will not be enabled with the new CPU unless fTPM is reset (reinitialized). Swapping back to the old CPU may allow you to recover TPM related keys and data. |
| [Enabled] | Reset fTPM, if you have Bitlocker or encryption-enabled system, the system will not boot without a recovery key. |

## 6.3 UEFI Variables Protection

### Password protection of Runtime Variables

Control the NVRAM Runtime Variable protection through System Admin Password.
Configuration options: [Enable] [Disable]

## 6.4 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects. Scroll down to display other BIOS items.

### PSS Support

Allows you to enable or disable the generation of ACPI_PPC, and _PCT objects.
Configuration options: [Disabled] [Enabled]

### NX Mode

Allows you enable or disable No-execute page protection Function.
Configuration options: [Disabled] [Enabled]

### SVM Mode

Allows you enable or disable CPU Virtualization.
Configuration options: [Disabled] [Enabled]

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

## 6.5 PCI Subsystem Settings

The items in this menu allow you to configure PCI, PCI-X, and PCI Express settings.

### Above 4G Decoding

Allows you to enable or disable 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System supports 64 bit PCI Decoding).
Configuration options: [Disabled] [Enabled]

**NOTE:** Only enabled under 64bit operating system.

### Re-Size BAR Support

If the system has Resizable BAR capable PCIe Devices, this option enables or disables Resizable BAR Support (Only if System supports 64 bit PCI Decoding).
Configuration options: [Disabled] [Enabled]

**NOTE:** To enable Re-Size BAR Support for harnessing full GPU memory, please go to the **Boot** section and set **CSM(Compatibility Support Module)** to **[Disabled]**.

### SR-IOV Support

Allows you to enable or disable Single Root IO Virtualization Support if the system has SR-IOV capable PCIe devices.
Configuration options: [Disabled] [Enabled]

## 6.6 USB Configuration

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

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

### Legacy USB Support

[Enabled] Enables the Legacy USB support.

[Disabled] USB devices are available only for EFI applications.

[Auto] Automatically disables the Legacy USB support if USB devices are not connected.

### XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

[Disabled] Support XHCI by XHCI drivers for operating systems with XHCI support.

[Enabled] Support XHCI by BIOS for operating systems without XHCI support.

### USB Mass Storage Driver Support

Allows you to enable or disable USB Mass Storage Driver Support
Configuration options: [Disabled] [Enabled]

### USB Single Port Control

Allows you to enable or disable the individual USB ports.

> **NOTE:** Refer to section **Motherboard layout** and **Rear I/O connection** in your motherboard's user guide for the location of the USB ports.

## 6.7 Network Stack Configuration

The items in this menu allow you to change the Network Stack Configuration.

### Network stack

Allows you to disable or enable the UEFI network stack.
Configuration options: [Disabled] [Enabled]

> **NOTE:** The following items appear only when **Network Stack** is set to **[Enabled]**.

### Ipv4/Ipv6 PXE Support

Allows you to enable or disable the Ipv4/Ipv6 PXE boot support.
Configuration options: [Disabled] [Enabled]

## 6.8 NVMe Configuration

This menu displays the NVMe controller and Drive information of the connected devices. You may press <Enter> on a connected NVMe device which appears in this menu to view more information on the NVMe device.

**NOTE:** The options displayed in this menu may vary depending on the devices connected to your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

## 6.9 HDD/SSD SMART Information

The items in this menu allow you to view the SMART information for connected storage devices.

**NOTE:**

- The options displayed in this menu may vary depending on the devices connected to your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.
- NVM Express devices do not support SMART information.

## 6.10 SATA Configuration

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

**NOTE:** The settings and options of this menu may vary depending on your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

### SATA Controller(s)

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

**NOTE:** The following items appear only when **SATA Controller(s)** is set to **[Enabled]**.

### SATA Mode

This item allows you to set the SATA configuration.

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

### NVMe RAID Mode

This item allows you to enable or disable the NVMe RAID mode.
Configuration options: [Disabled] [Enabled]

### SMART Self Test

S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) is a monitoring system that shows a warning message during POST (Power-on Self Test) when an error occurs in the hard disks.
Configuration options: [Disabled] [Enabled]

**NOTE:** The SATA items may vary according to your motherboard's ports/slots. Please refer to the BIOS of your motherboard for the actual settings and options.

### SATA6G

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

### SATA6G Hot Plug

Designates this port as Hot Pluggable.
Configuration options: [Disabled] [Enabled]

## 6.11 APM Configuration

The items in this menu allow you to change the advanced power management settings.

### Restore AC Power Loss

Select AC power state when power is re-applied after a power failure.
Configuration options: [Power Off] [Power On] [Last State]

### ErP Ready

Allow BIOS to switch off some power at S4/S5 to get the system ready for ErP requirement. When set to Enabled, all other PME options will be switched off. RGB LEDs and RGB/ Addressable RGB Headers will also be disabled.
Configuration options: [Disabled] [Enabled (S4+S5)] [Enabled (S5)]

### Max Power Saving

Configuration options: [Disabled] [Enabled]

### Power On By PCI-E

Enable or disable the wake-on-LAN function of the onboard LAN controller or other installed PCI-E LAN cards.
Configuration options: [Disabled] [Enabled]

### Power On By RTC

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]

## 6.12 Onboard Devices Configuration

The items in this menu allow you to change the onboard devices settings. Scroll down to view the other BIOS items.

**NOTE:** The settings and options of this menu may vary depending on your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

### Native ASPM

| | |
|---|---|
| [Auto] | Default setting |
| [Enabled] | OS Controlled ASPM |
| [Disabled] | BIOS Controlled ASPM |

### CPU PCIE ASPM Mode Control

Configuration options: [Disabled] [L0s Entry] [L1 Entry] [L0s And L1 Entry] [Auto]

### PCIEX16(G5) Bandwidth Bifurcation Configuration

| | |
|---|---|
| [Auto Mode] | Automatically switch PCIEX16_1 to x8 based on PCIEX16_2 or M.2_2 or M.2_3 usage. |
| [PCIE X16 Mode] | Switch PCIEX16_1 to x16, and disable PCIEX16_2 and M.2_2 and M.2_3. |
| [PCIE RAID Mode] | Detect up to 4 SSDs on Hyper M.2 X16 series card. |
| [GPU with M.2 Storage] | Support x8 graphics card and x4 NVMe M.2 SSD on PCIEX16_1. |

**NOTE:** Use RAID Modes for Hyper M.2 X16 or other M.2 adapters. Installing other devices may lead to boot-up failure. SSD support depends on processor's PCIe bifurcation abilities.

### USB Audio Controller

Enable/Disable USB Audio.
Configuration options: [Disabled] [Enabled]

### **Realtek LAN Controller**

Allows you to enable or disable Realtek LAN Controller.
Configuration options: [Disabled] [Enabled]

### **Intel LAN Controller**

Allows you to enable or disable Intel LAN Controller.
Configuration options: [Disabled] [Enabled]

### Wi-Fi Controller

Allows you to enable or disable Wi-Fi Controller.
Configuration options: [Disabled] [Enabled]

### Bluetooth Controller

Allows you to enable or disable Bluetooth Controller.
Configuration options: [Disabled] [Enabled]

### LED lighting

#### When system is in working state

Allows you to turn the RGB LED lighting on or off when the system is in the working state.

[All On] RGB LEDs and Functional will be behave normally.

[Stealth Mode] All LEDs will be disabled.

[Aura Only] RGB LEDs will light up, while all functional LEDs will be disabled.

[Aura Off] Functional LEDs behave normally, while RGB LEDs will be disabled.

**NOTE:** The RGB Header(s) and Addressable Header(s) will only work under the S0 (working) state.

#### Windows Dynamic Lighting

Windows Dynamic Lighting allows users to control RGB devices through Windows Settings.
Configuration options: [Disabled] [Enabled]

**NOTE:**

- Compatibility is limited to Windows 11 OS builds 22621.2361 and later, ensure to verify your system's compatibility before activating it.
- The aura effect may be limited due to technical constraints when Windows Dynamic Lighting is enabled.

### Q-Code LED Function

[Disabled] Disable the Q-Code LED.

[POST Code Only] Show POST (Power-On Self-Test) code on Q-Code LED.

[Auto] Automatically display POST (Power-On Self-Test) code and CPU temperature on Q-Code LED.

#### When system is in sleep, hibernate or soft off states

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

[All On] RGB LEDs and Functional will be behave normally.

[Stealth Mode] All LEDs will be disabled.

[Aura Only] RGB LEDs will light up, while all functional LEDs will be disabled.

[Aura Off] Functional LEDs behave normally, while RGB LEDs will be disabled.

**NOTE:** The RGB Header(s) and Addressable Header(s) will only work under the S0 (working) state.

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

Allows you to enable or disable USB power when your PC is in the S5 state.
Configuration options: [Disabled] [Enabled]

### Alteration Mode Switch

[PCIE Link Speed] 1st step: Gen 4.0, 2nd step: Gen 3.0

[Fan Profile] 1st step: Silent, 2nd step: Full Speed

### PCIE Link Speed

This submenu allows you to set parameters for PCIE Link Speed.

> **NOTE:** The PCIe and M.2 items may vary according to your motherboard's connectors/slots. Please refer to the BIOS of your motherboard for the actual settings and options.

#### PCIEX16(G5) Link Mode

Allows you to set the link speed for PCIEX16 Slot.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4] [GEN 5]

#### M.2 Link Mode

Allows you to set the link speed for M.2 Device.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4] [GEN 5]

#### Chipset Link Mode

Allows you to set the link speed between CPU and Chipset.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4]

#### USB4 Link Mode

Allows you to set the link speed for USB4 Device.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4] [GEN 5]

#### SlimSAS Link Mode

Allows you to set the link speed for SlimSAS.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4]

#### PCIEX16(G4) Link Mode

Allows you to set the link speed for PCIEX16 Slot.
Configuration options: [Auto] [GEN 1] [GEN 2] [GEN 3] [GEN 4]

## 6.13 NB Configuration

The items in this menu allow you to change the NB Configurations.

### Primary Video Device

Allows you to select Primary Video Device BIOS will use for output.
Configuration options: [IGFX Video] [PCIE Video]

### Integrated Graphics

Enable Integrate Graphics Controller.
Configuration options: [Disabled] [Force] [Auto]

### UMA Frame Buffer Size

Allows you to set the UMA FB Size.
Configuration options: [Auto] [64M] [80M] [96M] [128M] [256M] [384M] [512M] [768M] [1G] [2G] [3G] [4G] [8G] [16G]

## 6.14 AMD CBS

The items in this menu shows the AMD Common BIOS Specifications.

> **NOTE:** The configuration options for this section vary depending on the motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

### Global C-state Control

Allows you to control IO based C-state generation and DF C-states.
Configuration options: [Disabled] [Enabled] [Auto]

### IOMMU

Allows you to enable or disable IOMMU.
Configuration options: [Disabled] [Enabled] [Auto]

### ECC

Allows you to enable or disable ECC. Setting this item to **[Auto]** will set ECC to enable.
Configuration options: [Disabled] [Enabled] [Auto]

### SMT Control

Can be used to disable symmetric multithreading. To re-enable SMT, a POWER CYCLE is needed after setting this item to **[Auto]**.
Configuration options: [Disable] [Auto]

### Core Performance Boost

Allows you to disable Core Performance Boost.
Configuration options: [Disabled] [Auto]

### App Compatibility Database

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

### CPU Common Options

#### Thread Enablement

#### Performance

#### Prefetcher settings

##### L1 Stream HW Prefetcher

Allows you to enable or disable L1 Stream HW Prefetcher.
Configuration options: [Disable] [Enable] [Auto]

##### L2 Stream HW Prefetcher

Allows you to enable or disable L2 Stream HW Prefetcher.
Configuration options: [Disable] [Enable] [Auto]

##### L1 Stride Prefetcher

Uses memory access history of individual instructions to fetch additional lines when each access is a constant distance from the previous.
Configuration options: [Disable] [Enable] [Auto]

##### L1 Region Prefetcher

Uses memory access history to fetch additional lines when the data access for a given instruction tends to be followed by other data accesses.
Configuration options: [Disable] [Enable] [Auto]

L1 Burst Prefetch Mode

Allows you to enable or disable L1 Burst Prefetch Mode.
Configuration options: [Disable] [Enable] [Auto]

L2 Up/Down Prefetcher

Uses memory access history to determine whether to fetch the next or previous line for all memory accesses.
Configuration options: [Disable] [Enable] [Auto]

Core Watchdog

Core Watchdog Timer Enable

Allows you to enable or disable CPU Watchdog Timer.
Configuration options: [Disabled] [Enabled] [Auto]

---

**NOTE:** The following items appear only when **Core Watchdog Timer Enable** is set to **[Enabled]**.

---

Core Watchdog Timer Interval

Allows you to select CPU Watchdog Timer interval.
Configuration options: [Auto] [39.68us] [80.64us] [162.56us] [326.4us] [654.08us] [1.309ms] [2.620ms] [5.241ms] [10.484ms] [20.970ms] [40.64ms] [82.53ms] [166.37ms] [334.05ms] [669.41ms] [1.340s] [2.681s] [5.364s] [10.730s] [21.461s]

Core Watchdog Timer Severity

Allows you to specify the CPU Watchdog Time severity (MSRC001_0074[CpuWdTmrCfgSeverity]).
Configuration options: [No Error] [Transparent] [Corrected] [Deferred] [Uncorrected] [Fatal] [Auto]

RedirectForReturnDis

From a workaround for GCC/C000005 issue for XV Core on CZ A0, setting MSRC001_1029 Decode Configuration (DE_CFG) bit 14 [DecfgNoRdrctForReturns] to 1.
Configuration options: [1] [0] [Auto]

Power Supply Idle Control

Configuration options: [Low Current Idle] [Typical Current Idle] [Auto]

Opcache Control

Allows you to enable or disable the Opcache.
Configuration options: [Disabled] [Enabled] [Auto]

Streaming Stores Control

Allows you to enable or disable the Streaming Stores functionality.
Configuration options: [Disabled] [Enabled] [Auto]

Local APIC MOde

Allows you to select local APIC operation modes.
Configuration options: [Compatibility] [xAPIC] [x2APIC] [Auto]

ACPI _CST C1 Declaration

Determines whether or not to declare the C1 state to the OS.
Configuration options: [Disabled] [Enabled] [Auto]

Platform First Error Handling

Allows you to enable or disable PFEH, cloack individual banks, and mask deferred error interrupts from each bank.
Configuration options: [Enabled] [Disabled] [Auto]

MCA error thresh enable

Allows you to enable MCA error thresholding.
Configuration options: [False] [True] [Auto]

---

**NOTE:** The following item appears only when **MCA error thresh enable** is set to **[True]**.

---

MCA error thresh count

Effective error threshold count = 4095(0xFFF) - <this value> (e.g. the default value of 0xFF5 results in a threshold of 10)

MCA FruText

Allows you to enable MCA FruText.
Configuration options: [False] [True]

SMU and PSP Debug Mode

When this item is set to **[Enabled]**, uncorrected errors detected by the PSP FW or SMU FW that should cause a cold reset, will hang and not restart the system.
Configuration options: [Disabled] [Enabled] [Auto]

PPIN Opt-in

Allows you to turn on PPIN feature.
Configuration options: [Disabled] [Enabled] [Auto]

REP-MOV/STOS Streaming

Allow REP-MOV/STOS to use non-caching streaming store for large sizes.
Configuration options: [Disabled] [Enabled]

Enhanced REP MOVSB/STOSB

This item is set to 1 by default, but can be set to zero for analysis purposes as long as OS supports it.
Configuration options: [Disabled] [Enabled]

Fast Short REP MOVSB (FSRM)

This item is set to 1 by default, but can be set to zero for analysis purposes as long as OS supports it.
Configuration options: [Disabled] [Enabled]

SNP Memory (RMP Table) Coverage

When this item is set to **[Enabled]**, the ENTIE system memory is covered.
Configuration options: [Disabled] [Enabled] [Custom] [Auto]

---

**NOTE:** The following item appears only when **SNP Memory (RMP Table) Coverage** is set to **[Custom]**.

---

Amount of Memory to Cover

Specify MB of System Memory to be covered in Hex.

SMEE

Control secure memory enryption enable.
Configuration options: [Disable] [Enable] [Auto]

Action on BIST Failure

Allows you to set the action to take when a CCD BIST failure is detected.
Configuration options: [Do nothing] [Down-CCD] [Auto]

Log Transparent Errors

Log transparent errors in MCA in addition to debug registers.
Configuration options: [Disabled] [Enabled] [Auto]

AVX512

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

MONITOR and MWAIT Disable

When this option is enabled, MONITOR, MWAIT, MONITORX, and MWAITX opcodes become invalid.
Configuration options: [Disabled] [Enabled] [Auto]

Corrector Branch Predictor

Enabling for branch heavy codes may reduce conditional branch mispredicts.
Configuration options: [Disabled] [Enabled]

PAUSE Delay

Number of cycles thread will be idle after a PAUSE instruction.
Configuration options: [Auto] [Disabled] [16 cycles] [32 cycles] [64 cycles] [128 cycles]

CPU Speculative Store Modes

| | |
|---|---|
| [Balanced] | Store instructions may delay sending out their invalidations to remote cacheline copies when the cacheline is present but not in a writable state in the local cache. |
| [More Speculative] | Store instructions will send out invalidations to remote cacheline copies as soon as possible. |
| [Less Speculative] | Store instructions may delay sending out their invalidations to remote cacheline copies when the cacheline is not present in the local cache or not in a writable state in the local cache. |
| [Auto] | Default setting is applied. |

SVM Lock

Allows you to enable or disable VM_CR[Lock].
Configuration options: [Enabled] [Disabled] [Auto]

SVM Enable

Allows you to enable or disable VM_CR[SvmeDisable].
Configuration options: [Enabled] [Disabled] [Auto]

## DF Common Options

Memory Addressing

Memory interleaving

Allows for disabling memory channel interleaving.
Configuration options: [Disabled] [Enabled] [Auto]

Memory interleaving size

Controls the memory interleaving size. The valid values are AUTO, 256 bytes, 512 bytes, 1 Kbytes, or 2 Kbytes. This determines the starting address of the interleave (bit 8, 9, 10 or 11).
Configuration options: [256 Bytes] [512 Bytes] [1KB] [2KB] [Auto]

DRAM map inversion

Inverting the map will cause the highest memory channels to get assigned the lowest addresses in the system.
Configuration options: [Disable] [Enable] [Auto]

Location of private memory regions

Controls whether or not the private memory regions (PSP, SMU and CC6) are at the top of DRAM pair or distributed. Note that distributed requires memory on all dies. Note that it will always be at the top of DRAM if some dies don't have memory regardless of this option's setting.
Configuration options: [Distributed] [Consolidated] [Consolidated to 1st DRAM pair] [Auto]

ACPI

ACPI SRAT L3 Cache as NUMA Domain

| | |
|---|---|
| [Disabled] | Memory Addressing \ NUMA nodes per socket will be declared. |
| [Enabled] | Each CCX in the system will be declared as a separate NUMA domain. |
| [Auto] | Sets to the default option. |

Disable DF to external downstream IP Sync Flood Propagation

Disables Error propagation to UMC or any downstream slaves eg. FCH. Use this to avoid reset in failure scenario.
Configuration options: [Sync flood disabled] [Sync flood enabled] [Auto]

Disable DF sync flood propagation

Disables propagation from PIE to other DF components and eventually to SDP ports.
Configuration options: [Sync flood disabled] [Sync flood enabled] [Auto]

Freeze DF module queues on error

This item allows you to enable or disable freezing of all DF queues on error and also forces a sync flood on HWA even if MCAs are disabled.
Configuration options: [Disabled] [Enabled] [Auto]

DF Cstates

When DF Cstate feature is set to **[Enabled]**, FW programs the registers required to enable this feature is the DF HW. (For **[Auto]** option, it means this option will synchronize with Global C State).
Configuration options: [Disabled] [Enabled] [Auto]

PSP error injection support

Configuration options: [False] [True]

## UMC Common Options

### DDR Options

#### DDR Timing Configuration

**CAUTION!** Damage caused by use of your AMD processor outside of specification or in excess of factory settings are not covered by your system manufacturers warranty.

**NOTE:** The following items appear only when **[Accept]** is selected for **DRAM Timing Configuration**.

Active Memory Timing Settings

Configuration options: [Auto] [Enabled]

**NOTE:** The following items appear only when **[Enabled]** is selected for **Active Memory Timing Settings**.

Memory Target Speed

Specifies the memory target speed in MT/s. The valid input is 2000 MT/s, 2400 MT/s, and range of 3200 MT/s ~ 12000 MT/s (stepping of 200 MT/s). The value is in decimal. The user input value will be rounded down to align with the stepping of 200 MT/s. The maximum speed defined in the JEDEC spec is 8400 MT/s, any input value that is greater than 8400 MT/s will be limited to 8400 MT/s.

DDR SPD Timing

Tcl Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Tcl Ctrl** is set to **[Manual]**.

Tcl

Specifies the CAS Latency. Valid values: 0x16 ~ 0x40, with a stepping of 2. The value is in hex.

Trcd Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trcd Ctrl** is set to **[Manual]**.

Trcd

Specifies the RAS# Active to CAS# Read Delay Time. Valid values: 0x8 ~ 0x3E with a stepping of 2. The value is in hex.

Trp Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trp Ctrl** is set to **[Manual]**.

Trp

Specifies Row Precharge Delay Time. Valid values: 0x8 ~ 0x3E with a stepping of 2. The value is in hex.

Tras Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Tras Ctrl** is set to **[Manual]**.

Tras

Specifies Active to Precharge Delay Time. Valid values: 0x1E ~ 0x7E with a stepping of 2.

Trc Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trc Ctrl** is set to **[Manual]**.

Trc

Specifies Active to Active/Refresh Delay Time. Valid values: 0x20 ~ 0xFF. The value is in hex.

Twr Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Twr Ctrl** is set to **[Manual]**.

Twr

Specifies the Minimum Write Recovery Time. Valid values: 0x30 ~ 0x60. The value is in hex.

Trfc1 Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trfc1 Ctrl** is set to **[Manual]**.

Trfc1

Specifies the Refresh Recovery Delay Time (tRFC1). Valid values: 0x32 ~ 0xFFF. The value is in hex.

Trfc2 Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trfc2 Ctrl** is set to **[Manual]**.

Trfc2

Specifies the Refresh Recovery Delay Time (tRFC2). Valid values: 0x32 ~ 0xFFF. The value is in hex.

TrfcSb Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **TrfcSb Ctrl** is set to **[Manual]**.

TrfcSb

Specifies the Refresh Recovery Delay Time (tRFCSB). Valid values: 0x32 ~ 0x7FF. The value is in hex.

DDR Non-SPD Timing

Trtp Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **Trtp Ctrl** is set to **[Manual]**.

Trtp

Specifies the Read CAS# to Precharge command delay time. Valid values: 0x5 ~ 0x1F. The value is in hex.

TrrdL Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **TrrdL Ctrl** is set to **[Manual]**.

TrrdL

Specifies the Activate to Activate Delay Time, same bank group (tRRD_L). Valid values: 0x4 ~ 0x20. The value is in hex.

TrrdS Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **TrrdS Ctrl** is set to **[Manual]**.

TrrdS

Specifies the Activate to Activate Delay Time, different bank group (tRRD_S). Valid values: 0x4 ~ 0x14. The value is in hex.

Tfaw Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **Tfaw Ctrl** is set to **[Manual]**.

Tfaw

Specifies the Four Activate Window Time. Valid values: 0x14 ~ 0x50. The value is in hex.

TwtrL Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwtrL Ctrl** is set to **[Manual]**.

TwtrL

Specifies the Minimum Write to Read Time, the same bank group. Valid values: 0x8 ~ 0x30. The value is in hex.

TwtrS Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwtrS Ctrl** is set to **[Manual]**.

TwtrS

Specifies the Minimum Write to Read Time, different bank group. Valid values: 0x2 ~ 0x10. The value is in hex.

TrdrdScL Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TrdrdScL Ctrl** is set to **[Manual]**.

TrdrdScL

Specifies the CAS to CAS delay time, same bank group. Valid values: 0x1 ~ 0xF. The value is in hex.

TrdrdSc Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TrdrdSc Ctrl** is set to **[Manual]**.

TrdrdSc

Specifies the Read to Read turnaround timing in the same chipselect. Valid values: 0x1 ~ 0xF. The value is in hex.

TrdrdSd Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TrdrdSd Ctrl** is set to **[Manual]**.

TrdrdSd

Specifies the Read to Read turnaround timing in the same DIMM. Valid values: 0x1 ~ 0xF. The value is in hex.

TrdrdDd Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TrdrdDd Ctrl** is set to **[Manual]**.

TrdrdDd

Specifies the Read to Read turnaround timing in a different DIMM. Valid values: 0x1 ~ 0xF. The value is in hex.

TwrwrScL Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwrwrScL Ctrl** is set to **[Manual]**.

TwrwrScL

Specifies the CAS to CAS Delay Time, same bank group. Valid values: 0x1 ~ 0x3F. The value is in hex.

TwrwrSc Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwrwrSc Ctrl** is set to **[Manual]**.

TwrwrSc

Specifies the Write to Write turnaround timing in the same chipselect. Valid values: 0x1 ~ 0xF. The value is in hex.

TwrwrSd Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwrwrSd Ctrl** is set to **[Manual]**.

TwrwrSd

Specifies the Write to Write turnaround timing in the same DIMM. Valid values: 0x1 ~ 0xF. The value is in hex.

TwrwrDd Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwrwrDd Ctrl** is set to **[Manual]**.

TwrwrDd

Specifies the Write to Write turnaround timing in a different DIMM. Valid values: 0x1 ~ 0xF. The value is in hex.

Twrrd Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Twrrd Ctrl** is set to **[Manual]**.

Twrrd

Specifies the Write to Read turnaround timing. Valid values: 0x1 ~ 0xF. The value is in hex.

Trdwr Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trdwr Ctrl** is set to **[Manual]**.

Trdwr

Specifies the Read to Write turnaround timing. Valid values: 0x1 ~ 0x1F. The value is in hex.

DDR BUS Configuration

Processor CK drive strengths

Specifies the Processor CK drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor CA drive strengths

Specifies the Processor CA drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor CS drive strengths

Specifies the Processor CS drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

CA ODT GroupA-B

Specifies the CA ODT.
Configuration options: [Auto] [RTT_OFF (Disable)] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CK ODT GroupA-B

Specifies the CK ODT.
Configuration options: [Auto] [RTT_OFF (Disable)] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

CS ODT GroupA-B

Specifies the CS ODT.
Configuration options: [Auto] [RTT_OFF (Disable)] [RZQ/0.5 (480)] [RZQ/1 (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RFU] [RZQ/6 (40)]

Processor ODT impedance Pull Up P0-3

Specifies the Processor ODT impedance Pull Up P0-3.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68 ohm] [60 ohm] [53 ohm] [48 ohm] [43 ohm] [40 ohm] [36 ohm] [34 ohm] [32 ohm] [30 ohm] [28 ohm] [26 ohm] [25 ohm]

Processor ODT impedance Pull Down P0-3

Specifies the Processor ODT impedance Pull Down P0-3.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68 ohm] [60 ohm] [53 ohm] [48 ohm] [43 ohm] [40 ohm] [36 ohm] [34 ohm] [32 ohm] [30 ohm] [28 ohm] [26 ohm] [25 ohm]

Processor DQ drive strengths Pull Up P0-3

Specifies the Processor DQ drive strengths Pull Up P0-3.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Processor DQ drive strengths Pull Down P0-3

Specifies the Processor DQ drive strengths Pull Down P0-3.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Dram ODT Impedance RTT_NOM_WR P0-3

Specifies the Dram ODT Impedance RTT_NOM_WR P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance RTT_NOM_RD P0-3

Specifies the Dram ODT Impedance RTT_NOM_RD P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance RTT_WR P0-3

Specifies the Dram ODT Impedance RTT_WR P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance RTT_PARK P0-3

Specifies the Dram ODT Impedance RTT_PARK P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance DQS_RTT_PARK P0-3

Specifies the Dram ODT Impedance DQS_RTT_PARK P0-3.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

DRAM DQ drive strengths Pull Up P0-3

Specifies the DRAM DQ drive strengths Pull Up P0-3.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

DRAM DQ drive strengths Pull Down P0-3

Specifies the DRAM DQ drive strengths Pull Up P0-3.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

DDR Controller Configuration

DDR Power Options

Power Down Enable

Allows you to enable or disable DDR power down mode.
Configuration options: [Disabled] [Enabled] [Auto]

DDR RAS

Disable Memory Error Injection

Configuration options: [False] [True] [Auto]

DDR ECC Configuration

Allows you to configure DDR ECC configurations.

DDR Security

TSME

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

Data Scramble

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

DDR Addressing Options

Chipselect Interleaving

Interleave memory blocks across the DRAM chip selects for node 0.
Configuration options: [Disabled] [Auto]

Address Hash Bank

Allows you to enable or disable bank address hashing.
Configuration options: [Disabled] [Enabled] [Auto]

Address Hash CS

Enable or disable CS address hashing.
Configuration options: [Auto] [Enabled] [Disabled]

Address Hash Subchannel

Enable or disable sub-channel address hashing.
Configuration options: [Auto] [Enabled] [Disabled]

BankSwapMode

Configuration options: [Auto] [Disabled] [Swap CPU] [Swap APU]

DDR Training Options

DFE Read Training

Perform 2D Read Training with DFE on.
Configuration options: [Auto] [Enable] [Disable]

DRAM PDA Enumerate ID Programming Mode

Configuration options: [Auto] [Sequential PDA enumeration mode] [Legacy PDA enumeration mode]

TX DFE Taps

Specifies the number of TX DFE taps.
Configuration options: [Auto] [1 Tap] [2 Taps] [3 Taps] [4 Taps]

PPT Control

Specifies the PPT Control.
Configuration options: [Auto] [Disabled] [Relock+Retrain only] [UMC Snoop PPT] [DFI Retrain PPT] [Relock Only] [Relock Only with DFI PPT]

DDR Training Runtime Reduction

[Disabled] Force Disable DDR Training Runtime Reduction.
[Enabled] Force Enable DDR Training Runtime Reduction.
[Auto] Default code behavior. If OC is ENABLE, DDR Training Runtime Reduction will be DISABLE by DEFAULT.

RX Burst Length

Extended sequence for read training.
[Auto] Default code behavior.
[1 x ] 1 x burst length.
[2 x ] 2 x burst length.
[4 x ] 4 x burst length.
[8 x ] 8 x burst length.

Nitro TX Burst Length

Extended sequence for write training.
[Auto] Default code behavior.
[1 x ] 1 x burst length.
[2 x ] 2 x burst length.
[4 x ] 4 x burst length.
[8 x ] 8 x burst length.

RX2D_TrainOpt

Configuration options: [Auto] [Manual]

**NOTE:** The following items appear only when **RX2D_TrainOpt** is set to **[Manual]**.

RX2D_DFE

Used to force Rx DFE on or off.
Configuration options: [Auto] [Disabled] [Enabled]

RX2D Voltage Step Size (2^n)

0 = 1 DAC setting between checked values. 1 = 2 DAC settings between checked values. 2 = 4 DAC settings between checked values. 3 = 8 DAC settings between checked values.

RX2D Delay Step Size (2^n)

0 = 1 LCDL delays between checked values. 1 = 2 LCDL delays between checked values. 2 = 4 LCDL delays between checked values. 3 = 8 LCDL delays between checked values.

TX2D_TrainOpt

Configuration options: [Auto] [Manual]

**NOTE:** The following items appear only when **TX2D_TrainOpt** is set to **[Manual]**.

TX2D_DFE

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

TX2D Voltage Step Size (2^n)

0 = 1 DAC setting between checked values. 1 = 2 DAC settings between checked values. 2 = 4 DAC settings between checked values. 3 = 8 DAC settings between checked values.

TX2D Delay Step Size (2^n)

0 = 1 LCDL delays between checked values. 1 = 2 LCDL delays between checked values. 2 = 4 LCDL delays between checked values. 3 = 8 LCDL delays between checked values.

TX2D Voltage Step Multiplier

0 = Voltage Step Size is not modified. 1 = Voltage Step Size is multiplied by 16.

TX2D Delay Step Multiplier

0 = Delay Step Size is not modified. 1 = Delay Step Size is multiplied by 16.
Configuration options: [Auto] [Multiply DAC step size by 16] [No Multiplier]

RX DFE Taps

Specifies the number of RX DFE taps.
Configuration options: [Auto] [1 Tap] [2 Taps] [3 Taps] [4 Taps]

DDR Memory BIST

MBIST Enable

Allows you to enable or disable Memory MBIST.
Configuration options: [Disabled] [Enabled] [Auto]

---

**NOTE:** The following items appear only when **MBIST Enable** is set to **[Enabled]**.

---

MBIST Test Mode

Allows you to select the MBIST Test Mode - Interface Mode (Tests Single and Multiple CS transactions and Basic Connectivity) or Data Eye Mode (Measures Voltage vs. Timing).
Configuration options: [Interface Mode] [Data Eye Mode] [Both] [Auto]

MBIST Aggressors

Allows you to enable or disable Memory Aggressor test.
Configuration options: [Disabled] [Enabled] [Auto]

MBIST Per Bit Slave Die Reporting

Reports 2D Data Eye Results in ABL Log for each DQ, Chipselect, and Channel.
Configuration options: [Disabled] [Enabled] [Auto]

DDR Data Eye

Pattern Select

Configuration options: [Auto] [PRBS] [SSO] [Both]

Pattern Length Select

Configuration options: [Auto] [Manual]

---

**NOTE:** The following items appear only when **Pattern Length Select** is set to **[Manual]**.

---

Pattern Length

This token helps to determine the pattern length. The possible options are N=3...12.

Aggressor Channel

This helps read the aggressors channels. If set to **[Enabled]**, you can read from one or more than one aggressor channel. The default is set to **[Disabled]**.
Configuration options: [Auto] [Disabled] [1 Aggressor Channel] [3 Aggressor Channels] [7 Aggressor Channels]

DDR Memory Features

Memory Context Restore

Allows you to configure the memory context restore mode. When enabled, DRAM re-training is avoided when possible and the POST latency is minimized.
Configuration options: [Auto] [Enabled] [Disabled]

DDR Turnaround Times

Read Drift Adjustment

AUTO - Read Drift Adjustment 0.
Configuration options: [Auto] [minus 4] [minus 3] [minus 2] [minus 1] [plus 1] [plus 2] [plus 3] [plus 4]

Read Drift Adjustment P0-3

AUTO - Read Drift Adjustment 0.
Configuration options: [Auto] [minus 4] [minus 3] [minus 2] [minus 1] [plus 1] [plus 2] [plus 3] [plus 4]

Write Drift Adjustment

AUTO - Write Drift Adjustment 0.
Configuration options: [Auto] [minus 4] [minus 3] [minus 2] [minus 1] [plus 1] [plus 2] [plus 3] [plus 4]

Write Drift Adjustment P0-3

AUTO - Write Drift Adjustment 0.
Configuration options: [Auto] [minus 4] [minus 3] [minus 2] [minus 1] [plus 1] [plus 2] [plus 3] [plus 4]

## NBIO Common Options

PCIe ARI Support

Enables Alternative Routing-ID Interpretation.
Configuration options: [Disabled] [Enabled] [Auto]

PCIe All Port ECRC

Enable or disable PCIe all port ECRC.
Configuration options: [Disabled] [Enabled] [Auto]

Advanced Error Reporting (AER)

Enable or disable support for Advanced Error Reporting (AER).
Configuration options: [Not Supported] [Supported] [Auto]

PCIe ARI Enumeration

ARI Forwarding enabled for each downstream port.
Configuration options: [Disable] [Enable] [Auto]

GFX Configuration

UMA Version

| | |
|---|---|
| [Legacy] | UMA Legacy Version |
| [Non-Legacy] | UMA Non-Legacy Version |
| [Auto] | Hybrid Secure |

GPU Host Translation Cache

Allows you to enable or disable GPU Host Translation Cache.
Configuration options: [Disabled] [Enabled] [Auto]

Audio Configuration

NB Azalia

Allows you to enable or disable the integrated HD audio controller.
Configuration options: [Disabled] [Enabled] [Auto]

Audio IOs

Configuration options: [Auto] [HDA(3SDI) + PDM(2CH)(Default)] [HDA (1SDI) + PDM(6CH)] [HDA(1SDI) + SW0(1MDATA) + PDM(2CH)] [SW0(4MDATA) + PDM(6CH)] [SW0(4MDATA) + SW1(1MDATA) + PDM(2CH)]

PCIe loopback Mode

Allows you to enable or disable PcieLoopBackMode.
Configuration options: [Auto] [Disabled] [Enabled]

Persistence mode for legacy endpoints

Enable or disable persistence mode for legacy endpoints. Enable this option if some legacy PCIe devices are not detected.
Configuration options: [Auto] [Disabled] [Enabled]

Retimer margining support

| | |
|---|---|
| [Auto] | Disabled. Root port receiver margining support is enabled by default. |
| [Enabled] | Enables support for margining a retimer. |
| [Disabled] | Retimer margining is not supported. |

## SMU Common Options

CPPC Dynamic Preferred Cores

Configuration options: [Frequency] [Cache] [Driver] [Auto]

TDP Control

| | |
|---|---|
| [Auto] | Use the default sustained power limit. |
| [Manual] | User can set customized sustained power limit. |

**NOTE:** The following item appears only when **TDP Control** is set to **[Manual]**.

TDP

Allows you to set the sustained power limit [mW].

ECO Mode

Adjust the CPU control limits to manage operation within a 65w thermal design power.

| | |
|---|---|
| [Enable] | Enables 65W processor power definition. |
| [Disable] | System uses default processor power definition. |

PPT Control

Specifies the PPT Control.
Configuration options: [Manual] [Auto]

**NOTE:** The following item appears only when **PPT Control** is set to **[Manual]**.

PPT

Allows you to set the PPT [mW].

Thermal Control

[Auto] Use the default TctlMax.

[Manual] User can set customized TctlMax.

**NOTE:** The following item appears only when **Thermal Control** is set to **[Manual]**.

TjMax

Allows you to set the maximum operating temperature [°C] (IRM limit will be enforced).

TDC Control

[Auto] Use the default TDC Limits.

[Manual] User can set customized TDC Limits.

**NOTE:** The following item appears only when **TDC Control** is set to **[Manual]**.

TDC_VDDCR_VDD

Allows you to set the VDDCR_VDD TDC Limit [mA] (IRM limit will be enforced).

EDC Control

[Auto] Use the default EDC Limits.

[Manual] User can set customized EDC Limits.

**NOTE:** The following item appears only when **EDC Control** is set to **[Manual]**.

EDC_VDDCR_VDD

Allows you to set the VDDCR_VDD EDC Limit [mA] (IRM limit will be enforced).

Fan Control

[Auto] Use the default fan controller settings.

[Manual] User can set customized fan controller setting.

**NOTE:** The following item appears only when **Fan Control** is set to **[Manual]**.

Fan Table Control

[Auto] Use the default fan table.

[Manual] User can set customized fan table.

**NOTE:** The following items appear only when **Fan Table Control** is set to **[Manual]**.

Low Temperature

Allows you to set the low temperature [°C].

Medium Temperature

Allows you to set the medium temperature [°C].

High Temperature

Allows you to set the high temperature [°C].

Critical Temperature

Allows you to set the critical temperature [°C].

Low Pwm
Configuration options: [0] - [100]

Medium Pwm
Configuration options: [0] - [100]

High Pwm
Configuration options: [0] - [100]

Temperature Hysteresis
Allows you to set the temperature hysteresis [°C].

PWM Frequency

| | |
|---|---|
| [Auto] | Sets to the default option |
| [1] | 100Hz |
| [0] | 25kHz |

Fan Polarity

| | |
|---|---|
| [Auto] | Sets to the default option |
| [1] | Positive |
| [0] | Negative |

VDDP Voltage Control

| | |
|---|---|
| [Auto] | Use the default VDDP Voltage. |
| [Manual] | User can set custom VDDP Voltage. |

**NOTE:** The following items appear only when **VDDP Voltage Control** is set to **[Manual]**.

VDDP Voltage
Allows you to specify the target VDDP voltage [mV].

Infinity Fabric Frequency and Dividers
Configuration options: [Auto] [100 MHz] - [1066 MHz]

SyncFifo Mode Override
Configuration options: [Disable] [Enable] [Auto]

Sustained PowerLimit
PcdMsgSetSustainedPowerLimit.

Fast PPT Limit
PcdMsgSetFastPPTLimit.

Slow PPT Limit
PcdMsgSetSlowPPTLimit.

Slow PPT Time Constant
Slow PPT Time Constant [seconds].

GFXOFF
Configuration options: [Disable] [Enable] [Auto]

## 6.15 AMD PBS

The items in this menu shows the AMD PBS Setup page.

> **NOTE:** The configuration options for this section vary depending on the motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

### Graphics Features

This submenu allows you to configure Graphics Features - HG, DGPU Features and BOMACO configurations.

**Special Display Features**

Allows you to enable or disable HybridGraphics.
Configuration options: [Disabled] [HybridGraphics]

**D3Cold Support**

Allows you to enable or disable PCIe x8 Slot D3Cold.
Configuration options: [Disabled] [Enabled] [Dummy D3Cold]

**Discrete CPU_DSM Function A-B**

Allows you to enable or disable PCI-SIG ECN_DSM Function A-B for Discrete GPU's GPP Bridge.
Configuration options: [Disabled] [Enabled]

**NVIDIA DGPU Power Enable**

For NVIDIA mobile DGPU card only. Output DGPU_EN# A19 pin and DGPU_SEL# B17 pin to high at every power on state.
Configuration options: [Disabled] [Enabled]

**Non-Eval Discrete GPU Support**

Set to **[Enabled]** to support Non-Eval Discrete GPU that doesn't have specific EVAL_PWRGD(B30), EVAL_PRESENT#(A5).
Configuration options: [Disabled] [Enabled]

**Discrete GPU HPD Circuitry**

Allows you to enable or disable Discrete GPU Display HPD Circuitry.
Configuration options: [OR Circuitry] [Pulse Circuitry]

**Discrete GPU's USB Port**

Allows you to disable Discrete GPU's USB Port or keep default setting.
Configuration options: [Keep Default Setting] [Disabled]

**Discrete GPU's SSID/SVID**

Program Discrete GPU's SSID/SVID depends on HybridGraphics setting.
Configuration options: [Keep Default Setting] [Program by Vendor]

**Discrete GPU BOMACO Support**

Allows you to enable or disable Discrete GPU BOMACO Support.
Configuration options: [Disabled] [Enabled]

### USB4 configuration (ASM4242 Controller)

USB4 configuration (ASM4242 Controller) - PCIe resource, D3 support, Native USB4 support, and other options.

#### USB4 (ASM4242 Controller) Support

Enable or disable USB4 (ASM4242 Controller) PCIe slot.
Configuration options: [Disabled] [Enabled]

**NOTE:** The following items appear only when **USB4 (ASM4242 Controller) Support** is set to **[Enabled]**.

#### PCIe Bus Number

Reserve USB4 (ASM4242 Controller) PCIe Bus number per port (16 ~ 56).

#### PCIe Non-Prefetchable MMIO (MB)

Reserve USB4 (ASM4242 Controller) PCIe Non-Prefetchable MMIO per port (256 ~ 4096 MB).

#### PCIe Prefetchable MMIO (GB)

Reserve USB4 (ASM4242 Controller) PCIe Prefetchable MMIO per port (1 ~ 512 GB).

#### ACPI D3 Support

Disable or enable USB4 (ASM4242 Controller) ACPI D3 Support.
Configuration options: [Disabled] [D3Hot]

#### XHCI Port0-1 Speed

Configures the USB4 (ASM4242 Controller) XHCI Port0-1 Speed.
Configuration options: [Gen1x1] [Gen1x2] [Gen2x1] [Gen2x2]

### AMD Variable Protection

Protect some AMD specific variables for CBS, PBS and AOD. If locked, some utilities like RU that modify variable at runtime do not work.
Configuration options: [Disabled] [Enabled]

### Processor Aggregator Device

Enable or disable Processor Aggregator Device.
Configuration options: [Disabled] [Enabled]

**NOTE:** The following item appears only when **Processor Aggregator Device** is set to **[Enabled]**.

### Core Count Control

Enable or disable Core Count Control.
Configuration options: [Disabled] [Enabled]

### HDMI 3.0G Tx SLEW

Configuration options: [Disabled] [Enabled]

**NOTE:** The following item appears only when **HDMI 3.0G Tx SLEW** is set to **[Enabled]**.

### HDMI 3.0G Tx Slew Control Value

HDMI 3.0G Tx Slew Control Value (0 ~ 255).

## 6.16 AMD Overclocking

The items in this menu shows the AMD Overclocking Setup page.

**NOTE:** The configuration options for this section vary depending on the motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

**CAUTION!** Damage caused by use of your AMD processor outside of specification or in excess of factory settings are not covered by your system manufacturers warranty.

**NOTE:** The following items appear only when **[Accept]** is selected for **AMD Overclocking**.

### Manual CPU Overclocking

#### CPU Core Count Control

##### CCD 00 Bit Map Down Core Control

Setting this item to 1 means core is enabled, setting this item to 0 means core is software down.

##### Bit Map Down Core Discard Changes

Discard changes.

##### Bit Map Down Core Apply Changes

Check and apply changes, need to make sure core number is equaled in each CCD.

##### SMT Control

Can be used to disable symmetric multithreading. To re-enable SMT, a POWER CYCLE is needed after selecting the **[Auto]** option.
Configuration options: [Auto] [Disable]

**CAUTION!** S3 is NOT SUPPORTED on systems where SMT is disabled.

### DDR and Infinity Fabric Frequency/Timings

#### DDR Options

##### DDR Timing Configuration

###### EXPO

Enabling EXPO will detect if a Memory OC Profile is present on the installed DIMMs and pretrain that profile / apple needed voltages to later set that profile if desired.
Configuration options: [Auto] [Enabled]

**NOTE:** The following item appears only when **EXPO** is set to **[Enabled]**.

###### EXPO Profile

Select EXPO Profile. CL means Minimum CAS Latency.

###### Active Memory Timing Settings

Configuration options: [Auto] [Enabled]

**NOTE:** The following items appear only when **Active Memory Timing Settings** is set to **[Enabled]**.

Memory Target Speed

Specifies the memory target speed in MT/s. The valid input is 2000 MT/s, 2400 MT/s, and range of 3200 MT/s ~ 12000 MT/s (stepping of 200 MT/s). The user input value will be rounded down to align with the stepping of 200 MT/s.

DDR SPD Timing

Tcl Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **Tcl Ctrl** is set to **[Manual]**.

Tcl

Specifies the CAS Latency. Valid values: 0x16 ~ 0x3E, with a stepping of 2. The value is in hex.

Trcd Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **Trcd Ctrl** is set to **[Manual]**.

Trcd

Specifies the RAS# Active to CAS# Read Delay Time. Valid values: 0x8 ~ 0x3E with a stepping of 2. The value is in hex.

Trp Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **Trp Ctrl** is set to **[Manual]**.

Trp

Specifies Row Precharge Delay Time. Valid values: 0x8 ~ 0x3E with a stepping of 2. The value is in hex.

Tras Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **Tras Ctrl** is set to **[Manual]**.

Tras

Specifies Active to Precharge Delay Time. Valid values: 0x1E ~ 0x7E.The value is in hex.

Trc Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **Trc Ctrl** is set to **[Manual]**.

Trc

Specifies Active to Active/Refresh Delay Time. Valid values: 0x20 ~ 0xFF. The value is in hex.

Twr Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Twr Ctrl** is set to **[Manual]**.

Twr

Specifies the Minimum Write Recovery Time. Valid values: 0x30 ~ 0x60, stepping of 6. The value is in hex.

Trfc1 Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trfc1 Ctrl** is set to **[Manual]**.

Trfc1

Specifies the Refresh Recovery Delay Time (tRFC1). Valid values: 0x32 ~ 0xFFF. The value is in hex.

Trfc2 Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trfc2 Ctrl** is set to **[Manual]**.

Trfc2

Specifies the Refresh Recovery Delay Time (tRFC2). Valid values: 0x32 ~ 0xFFF. The value is in hex.

TrfcSb Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TrfcSb Ctrl** is set to **[Manual]**.

TrfcSb

Specifies the Refresh Recovery Delay Time (tRFCSb). Valid values: 0x32 ~ 0x7FF. The value is in hex.

Trtp Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trtp Ctrl** is set to **[Manual]**.

Trtp

Specifies the Read CAS# to Precharge command delay time. Valid values: 0x5 ~ 0x1F. The value is in hex.

TrrdL Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TrrdL Ctrl** is set to **[Manual]**.

TrrdL

Specifies the Activate to Activate Delay Time, same bank group (tRRD_L). Valid values: 0x4 ~ 0x20. The value is in hex.

TrrdS Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TrrdS Ctrl** is set to **[Manual]**.

TrrdS

Specifies the Activate to Activate Delay Time, different bank group (tRRD_S). Valid values: 0x4 ~ 0x14. The value is in hex.

Tfaw Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Tfaw Ctrl** is set to **[Manual]**.

Tfaw

Specifies the Four Activate Window Time. Valid values: 0x14 ~ 0x50. The value is in hex.

TwtrL Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwtrL Ctrl** is set to **[Manual]**.

TwtrL

Specifies the Minimum Write to Read Time, the same bank group. Valid values: 0x8 ~ 0x30. The value is in hex.

TwtrS Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwtrS Ctrl** is set to **[Manual]**.

TwtrS

Specifies the Minimum Write to Read Time, different bank group. Valid values: 0x2 ~ 0x10. The value is in hex.

DDR Non-SPD Timing

TrdrdScL Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **TrdrdScL Ctrl** is set to **[Manual]**.

TrdrdScL

Specifies the CAS to CAS delay time, same bank group. Valid values: 0x1 ~ 0xF. The value is in hex.

TrdrdSc Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **TrdrdSc Ctrl** is set to **[Manual]**.

TrdrdSc

Specifies the Read to Read turnaround timing in the same chipselect. Valid values: 0x1 ~ 0xF. The value is in hex.

TrdrdSd Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **TrdrdSd Ctrl** is set to **[Manual]**.

TrdrdSd

Specifies the Read to Read turnaround timing in the same DIMM. Valid values: 0x1 ~ 0xF. The value is in hex.

TrdrdDd Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **TrdrdDd Ctrl** is set to **[Manual]**.

TrdrdDd

Specifies the Read to Read turnaround timing in a different DIMM. Valid values: 0x1 ~ 0xF. The value is in hex.

TwrwrScL Ctrl

[Auto] Follow default setting.
[Manual] Manually specify.

**NOTE:** The following item appears only when **TwrwrScL Ctrl** is set to **[Manual]**.

TwrwrScL

Specifies the CAS to CAS Delay Time, same bank group. Valid values: 0x1 ~ 0x3F. The value is in hex.

TwrwrSc Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwrwrSc Ctrl** is set to **[Manual]**.

TwrwrSc

Specifies the Write to Write turnaround timing in the same chipselect. Valid values: 0x1 ~ 0xF. The value is in hex.

TwrwrSd Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwrwrSd Ctrl** is set to **[Manual]**.

TwrwrSd

Specifies the Write to Write turnaround timing in the same DIMM. Valid values: 0x1 ~ 0xF. The value is in hex.

TwrwrDd Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **TwrwrDd Ctrl** is set to **[Manual]**.

TwrwrDd

Specifies the Write to Write turnaround timing in a different DIMM. Valid values: 0x1 ~ 0xF. The value is in hex.

Twrrd Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Twrrd Ctrl** is set to **[Manual]**.

Twrrd

Specifies the Write to Read turnaround timing. Valid values: 0x1 ~ 0xF. The value is in hex.

Trdwr Ctrl

| | |
|---|---|
| [Auto] | Follow default setting. |
| [Manual] | Manually specify. |

**NOTE:** The following item appears only when **Trdwr Ctrl** is set to **[Manual]**.

Trdwr

Specifies the Read to Write turnaround timing. Valid values: 0x1 ~ 0x1F. The value is in hex.

DDR BUS Configuration

Processor CS drive strengths

Specifies the Processor CS drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor CK drive strengths

Specifies the Processor CK drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor CA drive strengths

Specifies the Processor CA drive strengths.
Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm]

Processor DQ drive strengths

Select the drive strength for all DQ and DMI IOs.
Configuration options: [Auto] [High Impedance] [240 ohm] [120 ohm] [80 ohm] [60 ohm] [48 ohm] [40 ohm] [34.3 ohm]

Processor ODT impedance

Select the impedance for all DBYTE IOs.
Configuration options: [Auto] [High Impedance] [480 ohm] [240 ohm] [160 ohm] [120 ohm] [96 ohm] [80 ohm] [68.8 ohm] [60 ohm]

Dram DQ drive strengths

Selects the Dram Pull-up ahnd Pull-down Output Driver Impedance for all DQ and DMI IOs.
Configuration options: [Auto] [48 ohm] [40 ohm] [34 ohm]

Dram ODT Impedance RTT_NOM_WR

Specifies the Dram ODT Impedance RTT_NOM_WR.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance RTT_NOM_RD

Specifies the Dram ODT Impedance RTT_NOM_RD.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance RTT_WR

Specifies the Dram ODT Impedance RTT_WR.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

Dram ODT Impedance RTT_PARK

Specifies the Dram ODT Impedance RTT_PARK.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

#### Dram ODT Impedance DQS_RTT_PARK

Specifies the Dram ODT Impedance DQS_RTT_PARK.
Configuration options: [Auto] [RTT_OFF] [RZQ (240)] [RZQ/2 (120)] [RZQ/3 (80)] [RZQ/4 (60)] [RZQ/5 (48)] [RZQ/6 (40)] [RZQ/7 (34)]

### DDR Controller Configuration

#### DDR Power Options

##### Power Down Enable

Allows you to enable or disable DDR power down mode.
Configuration options: [Disabled] [Enabled] [Auto]

#### Additional Memory Tweaks

##### RX2D_TrainOpt

Configuration options: [Auto] [Manual]

**NOTE:** The following items appear only when **RX2D_TrainOpt** is set to **[Manual]**.

##### RX2D_DFE

Used to force Rx DFE on or off. This is always enabled when Runtime Reduction is disabled.
Configuration options: [Auto] [Disable] [Enable]

##### RX2D Voltage Step Size (2^n)

0 = 1 DAC setting between checked values. 1 = 2 DAC settings between checked values. 2 = 4 DAC settings between checked values. 3 = 8 DAC settings between checked values.
Configuration options: [Auto] [1 DAC steps per loop] [2 DAC steps per loop] [4 DAC steps per loop] [8 DAC steps per loop]

##### RX2D Delay Step Size (2^n)

0 = 1 LCDL delays between checked values. 1 = 2 LCDL delays between checked values. 2 = 4 LCDL delays between checked values. 3 = 8 LCDL delays between checked values.
Configuration options: [Auto] [1 DAC steps per loop] [2 DAC steps per loop] [4 DAC steps per loop] [8 DAC steps per loop]

##### TX2D_TrainOpt

Configuration options: [Auto] [Manual]

**NOTE:** The following items appear only when **TX2D_TrainOpt** is set to **[Manual]**.

##### TX2D_DFE

Configuration options: [Auto] [Disable] [Enable]

##### TX2D Voltage Step Size (2^n)

0 = 1 DAC setting between checked values. 1 = 2 DAC settings between checked values. 2 = 4 DAC settings between checked values. 3 = 8 DAC settings between checked values.
Configuration options: [Auto] [1 DAC steps per loop] [2 DAC steps per loop] [4 DAC steps per loop] [8 DAC steps per loop]

TX2D Delay Step Size (2^n)

0 = 1 LCDL delays between checked values. 1 = 2 LCDL delays between checked values. 2 = 4 LCDL delays between checked values. 3 = 8 LCDL delays between checked values.
Configuration options: [Auto] [1 DAC steps per loop] [2 DAC steps per loop] [4 DAC steps per loop] [8 DAC steps per loop]

TX2D Voltage Step Multiplier

0 = Voltage Step Size is not modified. 1 = Voltage Step Size is multiplied by 16.
Configuration options: [Multiply DAC step size by 16] [No Multiply]

TX2D Delay Step Multiplier

0 = Delay Step Size is not modified. 1 = Delay Step Size is multiplied by 16.
Configuration options: [Multiply DAC step size by 16] [No Multiply]

RX DFE Taps

Specifies the number of RX DFE taps. Value only applies when RX2D_DFE is enabled.
Configuration options: [Auto] [1 Tap] [2 Tap] [3 Tap] [4 Tap]

TX DFE Taps

Specifies the number of TX DFE taps. Value only applies when TX2D_DFE is enabled.
Configuration options: [Auto] [1 Tap] [2 Tap] [3 Tap] [4 Tap]

DDR5 Nitro Mode

Can improve overclocked memory support for modules over 6000Mt/s with potential boot time and/or latency tradeoffs.
Configuration options: [Auto] [Enable] [Disable]

**NOTE:** The following items appear only when **DDR Nitro Mode** is set to **[Enable]**.

DDR5 Robust Training Mode

A more comprehensive memory training algorithm that increases boot time but can result in improved stability at overclocked memory settings.
Configuration options: [Auto] [Enable] [Disable]

Nitro RX Data

Configures the RX Timing between memory controller and PHY. Higher value may enable increased memory frequency at the expense of increased latency.
Configuration options: [Auto] [1] [2] [Disabled]

Nitro TX Data

Configures the TX Timing between memory controller and PHY. Higher value may enable increased memory frequency at the expense of increased latency.
Configuration options: [Auto] [0] [1] [2] [3] [Disabled]

Nitro Control Line

Configures the command timing latency between the memory controller and PHY. Higher value may enable increased memory frequency at the expense of increased latency.
Configuration options: [Auto] [0] [1] [Disabled]

Nitro RX Burst Length

DQ Training Pattern Length - Higher number results in more robust training and longer runtime. Lower number results in less robust training and shorter runtime, but potentially less stability.
Configuration options: [Auto] [1x] [2x] [4x] [8x]

Nitro TX Burst Length

DQ Training Pattern Length - Higher number results in more robust training and longer runtime. Lower number results in less robust training and shorter runtime, but potentially less stability.
Configuration options: [Auto] [1x] [2x] [4x] [8x]

Nitro DFE Vref Offset Limits

Disabling the TxDFE/RxDEF Vref offset limit to give them more margin for those edge cases where the guardband is not sufficient.
Configuration options: [Auto] [Disable]

Infinity Fabric Frequency and Dividers

Infinity Fabric Frequency and Dividers

Allows you to set Infinity Fabric Frequency (FCLK). Auto = FCLK = MCLK. Manual = FCLK must be less than MCLK for best performance in most cases. Latency penalties are incurred if FCLK and MCLK are mismatched, but sufficiently high MCLK can negate or overcome this penalty.
Configuration options: [Auto] [100 MHz] - [3000 MHz]

UCLK DIV1 MODE

Allows you to set UCLK DIV mode.
Configuration options: [Auto] [UCLK=MEMCLK] [UCLK=MEMCLK/2]

Fclk VDCI Mode Pref

[Predictive] Force VDCI predictive mode. Higher latency, but better stability at higher voltages / frequencies.

[Auto] Allow SyncFifo and Bypass mode. Lower latency.

## Precision Boost Overdrive

Precision Boost Overdrive

When this item is enabled, it allows the processor to run beyond defined values for PPT, VDD_CPU EDC, VDD_CPU TDC, VDD_SOC EDC, VDD_SOC TDC to the limits of the board, and allows it to boost at higher voltages for longer durations than default operation.
Configuration options: [Auto] [Disable] [Enabled] [Advanced]

**NOTE:** The following items appear only when **Precision Boost Overdrive** is set to **[Advanced]**.

PBO Limits

[Auto] Loads AMD default socket power (PPT), electrically-limited VRM current (EDC), and thermally-limited VRM current (TDC) limits.

[Disable] Disabled PBO limits.

[Motherboard] Allows the processor to run according to increased PPT, EDC, and TDC limits defined by your motherboard.

[Manual] Allows the processor to ignore AMD default limits for PPT, EDC, and TDC and instead use manual values (up to the maximum capabilities of the motherboard).

**NOTE:** The following items appear only when **PBO Limits** is set to **[Manual]**.

PPT Limit [mW]
Adjust total CPU socket power delivery capability. Adjustable up to the limit supported bu your motherboard.

TDC Limit [mA]
Adjust peak current from your motherboard's CPU core VRM phases in thermally-limited scenarios. Adjustable up to the limit supported by you motherboard.

EDC Limit [mA]
Adjust peak current from your motherboard's CPU core VRM phases in electrically-limited scenarios. Adjustable up to the limit supported by you motherboard.

Precision Boost Overdrive Scalar Ctrl
Configuration options: [Auto] [Manual]

**NOTE:** The following item appears only when **Precision Boost Overdrive Scalar Ctrl** is set to **[Manual]**.

Precision Boost Overdrive Scalar
Overrides the AMD default silicon health management to potentially achieve higher sustained frequencies under CPU load.
Configuration options: [1X] - [10X]

CPU Boost Clock Override
Increases (Positive) or Decreases (Negative) the maximum CPU frequency that may be automatically achieved by the CPU Boost Algorithm.
Configuration options: [Disabled] [Enabled (Positive)] [Enabled (Negative)]

**NOTE:** The following item appears only when **CPU Boost Clock Override** is set to **[Enabled (Positive)]**.

Max CPU Boost Clock Override(+)
Increases the maximum CPU frequency that may be automatically achieved by the Precision Boost 2 algorithm. Use the <+> or <-> to adjust the value.

**NOTE:** The following item appears only when **CPU Boost Clock Override** is set to **[Enabled (Negative)]**.

Max CPU Boost Clock Override(-)
Decreases the maximum CPU frequency that may be automatically achieved by the Precision Boost 2 algorithm. Use the <+> or <-> to adjust the value.

Platform Thermal Throttle Ctrl
Allows the user to decrease the maximum allowed processor temperature (celsius)
Configuration options: [Manual] [Auto]

**NOTE:** The following item appears only when **Platform Thermal Throttle Ctrl** is set to **[Manual]**.

Platform Thermal Throttle Limit
Allows the user to decrease the maximum allowed processor temperature (celsius)

GFX Curve Optimizer

GFX Curve Optimizer

Allows the user to shift the GFX Voltage / Frequency (AVFS) curve to include higher voltages (positive values) or lower voltages (negative values). The larger the value entered the larger the magnitude of the voltage shift.
Configuration options: [Disable] [GFX Curve Optimizer]

**NOTE:** The following items appear only when **GFX Curve Optimizer** is set to **[GFX Curve Optimizer]**.

GFX Curve Optimizer Sign

Determines the direction of the curve shift for GFX. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

GFX Curve Optimizer Magnitude

Determines the magnitude of the GFX curve shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift. Field defaults to 0 and the user can enter whole integer numbers. Value entered, combined with the sign above, is used to send the SMU and GFX Curve Optimizer.

Curve Optimizer

Curve Optimizer

Allows the user to shift the Voltage / Frequency (AVFS) curve to include higher voltages (positive values) or lower voltages (negative values). The larger the value entered the larger the magnitude of the voltage limit.
Configuration options: [Disable] [All Cores] [Per Core] [Per CCD]

**NOTE:** The following items appear only when **Curve Optimizer** is set to **[All Cores]**.

All Core Curve Optimizer Sign

Determines the direction of the curve shift on all cores. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

All Core Curve Optimizer Magnitude

Determines the magnitude of the curve shift to be made (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

**NOTE:** The following items appear only when **Curve Optimizer** is set to **[Per Core]**.

Core 0-7 Curve Optimizer Sign

Determines the direction of the curve shift on this core. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

Core 0-7 Curve Optimizer Magnitude

Determines the magnitude of the curve shift to be made to this core (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

**NOTE:** The following items appear only when **Curve Optimizer** is set to **[Per CCD]**.

CCD 0 Curve Optimizer Sign

Determines the direction of the curve shift on this core. Positive shifts the curve up to use higher voltages. Negative shifts the curve down to use lower voltages.
Configuration options: [Positive] [Negative]

CCD 0 Curve Optimizer Magnitude

Determines the magnitude of the curve shift to be made to this core (entered in whole numbers) the larger the value entered the larger the magnitude of the shift.

## VDDG Voltage Control

VDDG Voltage Control

VDDG represents voltage for the data portion of the Infinity Fabric. It is derived from the CPU SoC/Uncore Voltage (VDD_SOC). VDDG can approach but not exceed VDD_SOC.
Configuration options: [Auto] [Global VDDG Voltage Control] [Per-CCD VDDG Voltage Control]

**NOTE:** The following items appear only when **VDDG Voltage Control** is set to **[Global VDDG Voltage Control]**.

Global VDDG CCD Voltage

VDDG CCD represents voltage for the data portion of the Infinity Fabric. Range is 650mV ~ 1650mV. Stepping is 10mV.
Configuration options: [Auto] [VDDG voltage 650mV] - [VDDG voltage 1650mV]

Global VDDG IOD Voltage

VDDG IOD represents voltage for the data portion of the Infinity Fabric. . Range is 650mV - 1650mV. Stepping is 10mV.
Configuration options: [Auto] [VDDG voltage 650mV] - [VDDG voltage 1650mV]

**NOTE:** The following items appear only when **VDDG Voltage Control** is set to **[Per-CCD VDDG Voltage Control]**.

CCD0-CCD VDDG Voltage

VDDG CCD represents voltage for the data portion of the Infinity Fabric. Range is 650mV ~ 1650mV. Stepping is 10mV.
Configuration options: [Auto] [VDDG voltage 650mV] - [VDDG voltage 1650mV]

CCD0-IOD VDDG Voltage

VDDG IOD represents voltage for the data portion of the Infinity Fabric. . Range is 650mV - 1650mV. Stepping is 10mV.
Configuration options: [Auto] [VDDG voltage 650mV] - [VDDG voltage 1650mV]

## VDDP Voltage Control

### VDDP Voltage Control

Allows the user to adjust the VDDP voltage.

[Auto] VDDP is system default.

[Manual] Set voltage for the DDR bus signaling (PHY).

**NOTE:** The following items appear only when **VDDP Voltage Control** is set to **[Manual]**.

### VDDP Voltage Adjust

VDDP is a voltage for the DDR bus signaling (PHY), and it is dervied from your DRAM Voltage (VDDIO_Mem). As a result, VDDP voltage in mV can approach but not exceed your DRAM Voltage. Stepping is 5mv.

## SoC/Uncore OC Mode

### SoC/Uncore OC Mode

Forces CPU SoC/Uncore components (e.g. Infinity Fabric, memory, and integrated graphics) to run at their maximum specified frequency at all times. May improve performance at the expense of idle power savings.
Configuration options: [Auto] [Enabled] [Disabled]

## SoC Voltage

### SoC Voltage

Specifies the SoC/Uncore voltage (VDD_SOC) in mV to support memory and Infinity Fabric overclocking. VDD_SOC also determines the GPU voltage on processors with integrated graphics. Stepping is 5mv. Voltage ranges allowed to be set will be limited outside of LN2 mode. If in LN2 mode (and CPU temp is below -40c) the allowable range of settable voltages will be extended.

## VDD Misc

### VDD Misc Control

Allows the user to adjust the VDD Misc Voltage.

[Auto] VDD MISC is set to system default.

[Manual] Set voltage for the GMI PHY.

**NOTE:** The following item appears only when **VDD Misc Control** is set to **[Manual]**.

### VDD Misc Voltage

Specifies the VDD MISC Voltage in mV, definitely follow SVI3 type 2 Slave VID (500-5600mV, step 10mV). Note that the minimum voltage supported is based on the specific processor, such as Raphael OC require the voltage higher than 1100mv. Voltage ranges allowed to be set will be limited outside of LN2 mode. If LN2 mode (and CPU temp is below -40c) the allowable range of settable voltages will be extended.

## LCLK Frequency Control

### LCLK Frequency Control

[Auto] Use default settings.

[Manual] Manually configure LCLK frequency.

**NOTE:** The following item appears only when **LCLK Frequency Control** is set to **[Manual]**.

Maximum Frequency

Allows you to set the maximum LCLK frequency. Range: 1029 ~ 2500.

## Onboard Voltage Control

### VDDIO Voltage Control

VDDIO Ctrl

Allows the user to adjust the VDDIO voltage.

| | |
|---|---|
| [Auto] | Use the default VDDIO voltage. |
| [Manual] | Set DIMM VDD/VDDQ to synchronize to APU VDDIO. |
| [Separate] | Independent control of APU VDDIO, DIMM VDD/VDDQ. |

**IMPORTANT!** Running VDDQ != VDD is non-standard and may cause memory stability issues. Take care that during ramp down and ramp up, the VDDQ-VDD voltage must be less than 200mV.

**NOTE:** The following item appears only when **VDDIO Ctrl** is set to **[Manual]** or **[Separate]**.

DIMM VDD Adjust

Adjust DIMM Power Supply, stepping is 10mV. Range is from 800mV to 1430mV. Take care that during ramp down and ramp up, the VDDQ-VDD voltage must be less than 200mV.

**NOTE:** The following items appear only when **VDDIO Ctrl** is set to **[Separate]**.

DIMM VDDQ Adjust

Adjust DIMM DQ Power Supply, stepping is 10mV. Range is from 800mV to 1430mV. Take care that during ramp down and ramp up, the VDDQ-VDD voltage must be less than 200mV, and Vpp must always be equal to or greater than VDDQ.

APU VDDIO Adjust

Adjust APO VDDIO, stepping is 10mV. Range is from 700mV to 1400mV.

Enable Platform PMIC Control

When Enable Platform PMIC Control is enabled, the DDR PMIC voltages are not adjusted by processor FW, and may be adjusted directly by EC or other platform based mechanism.
Configuration options: [Auto] [Enable] [Disable]

### VPP Voltage Control

VPP Ctrl

| | |
|---|---|
| [Auto] | Use the default setting. |
| [Manual] | Manually specify the memory VPP Voltage. |

**NOTE:** The following item appears only when **VPP Ctrl** is set to **[Manual]**.

VPP Adjust

Adjust MEM VPP, stepping is 10mV. Range is from 1500mV to 2135mV.
Configuration options: [1500] - [2135]

ECO Mode

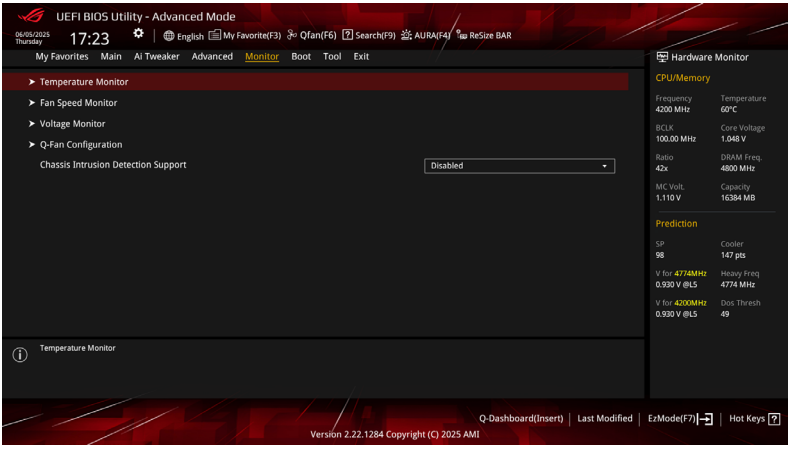
ECO Mode
Configuration options: [Auto] [65W] [105W]

# 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.

**NOTE: The** settings and options of this menu may vary depending on your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.




## Temperature Monitor

CPU Temperature, CPU Package Temperature, MotherBoard Temperature, VRM Temperature, Chipset Temperature, T_Sensor Temperature, DIMM A Temperature, DIMM B Temperature [xxx°C/xxx°F]

The onboard hardware monitor automatically detects and displays the temperatures for the different components. Select **[Ignore]** if you do not wish to display the detected temperatures.

## Fan Speed Monitor

CPU Fan Speed, CPU Optional Fan Speed, Chassis Fan Speed, AIO PUMP Speed [xxxx RPM]

The onboard hardware monitor automatically detects and displays the fan speeds 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.

## Voltage and Current Monitor

CPU Core Voltage, 12V Voltage, 5V Voltage, 3.3V Voltage, CPU VDDIO / MC Voltage, CHIPSET Standby Voltage [x.xxx V]

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

## Q-Fan Configuration

### Q-Fan Tuning

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

**CAUTION!** The process may take 2 to 5 minutes. DO NOT shut down or reset your system during the tuning process.

### CPU Q-Fan Control

Allows you to set the CPU Q-Fan operating mode.

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

### CPU Fan Profile

Allows you to set the appropriate performance level of the assigned fan/pump. When selecting **[Manual]**, we suggest raising your fan/pump duty to 100% if your CPU temperature exceeds 75°C. Please be noted CPU performance will throttle due to overheating with inefficient fan/pump duty.
Configuration options: [Standard] [Silent] [Turbo] [Full Speed] [Manual]

**NOTE:** The following items appear only when **CPU Fan Profile** is set to **[Standard]**, **[Silent]**, **[Turbo]**, or **[Manual].**

### CPU Fan Q-Fan Source

The assigned fan/pump will be controlled according to the selected temperature source.
Configuration options: [CPU] [CPU Package]

### CPU Fan Step Up

Step up allows you to adjust how quickly the fan rotation speed increases, with level 0 being an instantaneous change in speed. The higher the level, the slower the change in speed, and may also result in less noise, but this will also cause slower heat dissipation.
Configuration options: [Level 0] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5]

### CPU Fan Step Down

Step down allows you to adjust how quickly the fan rotation speed decreases, with level 0 being an instantaneous change in speed. The higher the level, the slower the change in speed, and may also result in less noise, but this will also cause slower heat dissipation.
Configuration options: [Level 0] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5]

### CPU Fan Speed Low Limit

Allows you to set the lower speed limit for assigned fan/pump. A warning message will appear when the limit is reached; the warning message will not appear if **[Ignore]** is selected.
Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

**NOTE:** The following items appear only when **CPU Fan Profile** is set to **[Manual].**

CPU Fan Point8 Temperature

When the temperature source is lower than the temperature of P8, the duty cycle will be determined according to the P7-P8 and the temperature source. When the temperature source is higher than the temperature of P8, the fan will operate at the duty cycle of P8.

CPU Fan Point8 Duty Cycle (%)

When the temperature source is lower than the temperature of P8, the duty cycle will be determined according to the P7-P8 and the temperature source. When the temperature source is higher than the temperature of P8, the fan will operate at the duty cycle of P8.

CPU Fan Point7 Temperature

When the temperature source is lower than the temperature of P7, the duty cycle will be determined according to the P6-P7 and the temperature source. When the temperature source is higher than the temperature of P7, the duty cycle will be determined according to the P7-P8 and the temperature source.

CPU Fan Point7 Duty Cycle (%)

When the temperature source is lower than the temperature of P7, the duty cycle will be determined according to the P6-P7 and the temperature source. When the temperature source is higher than the temperature of P7, the duty cycle will be determined according to the P7-P8 and the temperature source.

CPU Fan Point6 Temperature

When the temperature source is lower than the temperature of P6, the duty cycle will be determined according to the P5-P6 and the temperature source. When the temperature source is higher than the temperature of P6, the duty cycle will be determined according to the P6-P7 and the temperature source.

CPU Fan Point6 Duty Cycle (%)

When the temperature source is lower than the temperature of P6, the duty cycle will be determined according to the P5-P6 and the temperature source. When the temperature source is higher than the temperature of P6, the duty cycle will be determined according to the P6-P7 and the temperature source.

CPU Fan Point5 Temperature

When the temperature source is lower than the temperature of P5, the duty cycle will be determined according to the P4-P5 and the temperature source. When the temperature source is higher than the temperature of P5, the duty cycle will be determined according to the P5-P6 and the temperature source.

CPU Fan Point5 Duty Cycle (%)

When the temperature source is lower than the temperature of P5, the duty cycle will be determined according to the P4-P5 and the temperature source. When the temperature source is higher than the temperature of P5, the duty cycle will be determined according to the P5-P6 and the temperature source.

CPU Fan Point4 Temperature

When the temperature source is lower than the temperature of P4, the duty cycle will be determined according to the P3-P4 and the temperature source. When the temperature source is higher than the temperature of P4, the duty cycle will be determined according to the P4-P5 and the temperature source.

CPU Fan Point4 Duty Cycle (%)

When the temperature source is lower than the temperature of P4, the duty cycle will be determined according to the P3-P4 and the temperature source. When the temperature source is higher than the temperature of P4, the duty cycle will be determined according to the P4-P5 and the temperature source.

CPU Fan Point3 Temperature

When the temperature source is lower than the temperature of P3, the duty cycle will be determined according to the P2-P3 and the temperature source. When the temperature source is higher than the temperature of P3, the duty cycle will be determined according to the P3-P4 and the temperature source.

CPU Fan Point3 Duty Cycle (%)

When the temperature source is lower than the temperature of P3, the duty cycle will be determined according to the P2-P3 and the temperature source. When the temperature source is higher than the temperature of P3, the duty cycle will be determined according to the P3-P4 and the temperature source.

CPU Fan Point2 Temperature

When the temperature source is lower than the temperature of P2, the duty cycle will be determined according to the P1-P2 and the temperature source. When the temperature source is higher than the temperature of P2, the duty cycle will be determined according to the P2-P3 and the temperature source.

CPU Fan Point2 Duty Cycle (%)

When the temperature source is lower than the temperature of P2, the duty cycle will be determined according to the P1-P2 and the temperature source. When the temperature source is higher than the temperature of P2, the duty cycle will be determined according to the P2-P3 and the temperature source.

CPU Fan Point1 Temperature

When the temperature source is lower than the temperature of P1, the fan will operate at the duty cycle of P1. When the temperature source is higher than the temperature of P1, the duty cycle will be determined according to the P1-P2 and the temperature source.

CPU Fan Point1 Duty Cycle (%)

When the temperature source is lower than the temperature of P1, the fan will operate at the duty cycle of P1. When the temperature source is higher than the temperature of P1, the duty cycle will be determined according to the P1-P2 and the temperature source.

Chassis Fan(s) Configuration

Chassis Fan Q-Fan Control

Allows you to set the Chassis Fan operating mode.

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

Chassis Fan Profile

Allows you to set the appropriate performance level of the assigned fan/pump. When selecting **[Manual]**, we suggest raising your fan/pump duty to 100% if your CPU temperature exceeds 75°C. Please be noted CPU performance will throttle due to overheating with inefficient fan/pump duty.
Configuration options: [Standard] [Silent] [Turbo] [Full Speed] [Manual]

**NOTE:** The following items appear only when **CPU Fan Profile** is set to **[Standard]**, **[Silent]**, **[Turbo]**, or **[Manual].**

Chassis Fan Q-Fan Source

The assigned fan/pump will be controlled according to the selected temperature source.
Configuration options: [CPU] [CPU Package] [MotherBoard] [VRM] [T_Sensor] [Multiple Sources]

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

Chassis Fan Step Up

Step up allows you to adjust how quickly the fan rotation speed increases, with level 0 being an instantaneous change in speed. The higher the level, the slower the change in speed, and may also result in less noise, but this will also cause slower heat dissipation.
Configuration options: [Level 0] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5]

Chassis Fan Step Down

Step down allows you to adjust how quickly the fan rotation speed decreases, with level 0 being an instantaneous change in speed. The higher the level, the slower the change in speed, and may also result in less noise, but this will also cause slower heat dissipation.
Configuration options: [Level 0] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5]

Chassis Fan Speed Low Limit

Allows you to set the lower speed limit for assigned fan/pump. A warning message will appear when the limit is reached; the warning message will not appear if **[Ignore]** is selected.
Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

**NOTE:** The following items appear only when **Chassis Fan Profile** is set to **[Manual].**

Chassis Fan Point8 Temperature

When the temperature source is lower than the temperature of P8, the duty cycle will be determined according to the P7-P8 and the temperature source. When the temperature source is higher than the temperature of P8, the fan will operate at the duty cycle of P8.

Chassis Fan Point8 Duty Cycle (%)

When the temperature source is lower than the temperature of P8, the duty cycle will be determined according to the P7-P8 and the temperature source. When the temperature source is higher than the temperature of P8, the fan will operate at the duty cycle of P8.

Chassis Fan Point7 Temperature

When the temperature source is lower than the temperature of P7, the duty cycle will be determined according to the P6-P7 and the temperature source. When the temperature source is higher than the temperature of P7, the duty cycle will be determined according to the P7-P8 and the temperature source.

Chassis Fan Point7 Duty Cycle (%)

When the temperature source is lower than the temperature of P7, the duty cycle will be determined according to the P6-P7 and the temperature source. When the temperature source is higher than the temperature of P7, the duty cycle will be determined according to the P7-P8 and the temperature source.

Chassis Fan Point6 Temperature

When the temperature source is lower than the temperature of P6, the duty cycle will be determined according to the P5-P6 and the temperature source. When the temperature source is higher than the temperature of P6, the duty cycle will be determined according to the P6-P7 and the temperature source.

Chassis Fan Point6 Duty Cycle (%)

When the temperature source is lower than the temperature of P6, the duty cycle will be determined according to the P5-P6 and the temperature source. When the temperature source is higher than the temperature of P6, the duty cycle will be determined according to the P6-P7 and the temperature source.

Chassis Fan Point5 Temperature

When the temperature source is lower than the temperature of P5, the duty cycle will be determined according to the P4-P5 and the temperature source. When the temperature source is higher than the temperature of P5, the duty cycle will be determined according to the P5-P6 and the temperature source.

Chassis Fan Point5 Duty Cycle (%)

When the temperature source is lower than the temperature of P5, the duty cycle will be determined according to the P4-P5 and the temperature source. When the temperature source is higher than the temperature of P5, the duty cycle will be determined according to the P5-P6 and the temperature source.

Chassis Fan Point4 Temperature

When the temperature source is lower than the temperature of P4, the duty cycle will be determined according to the P3-P4 and the temperature source. When the temperature source is higher than the temperature of P4, the duty cycle will be determined according to the P4-P5 and the temperature source.

Chassis Fan Point4 Duty Cycle (%)

When the temperature source is lower than the temperature of P4, the duty cycle will be determined according to the P3-P4 and the temperature source. When the temperature source is higher than the temperature of P4, the duty cycle will be determined according to the P4-P5 and the temperature source.

Chassis Fan Point3 Temperature

When the temperature source is lower than the temperature of P3, the duty cycle will be determined according to the P2-P3 and the temperature source. When the temperature source is higher than the temperature of P3, the duty cycle will be determined according to the P3-P4 and the temperature source.

Chassis Fan Point3 Duty Cycle (%)

When the temperature source is lower than the temperature of P3, the duty cycle will be determined according to the P2-P3 and the temperature source. When the temperature source is higher than the temperature of P3, the duty cycle will be determined according to the P3-P4 and the temperature source.

Chassis Fan Point2 Temperature

When the temperature source is lower than the temperature of P2, the duty cycle will be determined according to the P1-P2 and the temperature source. When the temperature source is higher than the temperature of P2, the duty cycle will be determined according to the P2-P3 and the temperature source.

Chassis Fan Point2 Duty Cycle (%)

When the temperature source is lower than the temperature of P2, the duty cycle will be determined according to the P1-P2 and the temperature source. When the temperature source is higher than the temperature of P2, the duty cycle will be determined according to the P2-P3 and the temperature source.

Chassis Fan Point1 Temperature

When the temperature source is lower than the temperature of P1, the fan will operate at the duty cycle of P1. When the temperature source is higher than the temperature of P1, the duty cycle will be determined according to the P1-P2 and the temperature source.

Chassis Fan Point1 Duty Cycle (%)

When the temperature source is lower than the temperature of P1, the fan will operate at the duty cycle of P1. When the temperature source is higher than the temperature of P1, the duty cycle will be determined according to the P1-P2 and the temperature source.

Allow Fan Stop

This function allows the fan to run at 0% duty cycle when the temperature of the source is dropped below the lower temperature.
Configuration options: [Disabled] [Enabled]

AIO Pump Q-Fan Control

Allows you to set the AIO Pump operating mode.

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

AIO Pump Profile

Allows you to set the appropriate performance level of the assigned fan/pump. When selecting **[Manual]**, we suggest raising your fan/pump duty to 100% if your CPU temperature exceeds 75°C. Please be noted CPU performance will throttle due to overheating with inefficient fan/pump duty.
Configuration options: [Standard] [Silent] [Turbo] [Full Speed] [Manual]

**NOTE:** The following items appear only when **AIO Pump Profile** is set to **[Standard]**, **[Silent]**, **[Turbo]**, or **[Manual].**

AIO Pump Q-Fan Source

The assigned fan/pump will be controlled according to the selected temperature source.
Configuration options: [CPU] [CPU Package] [MotherBoard] [VRM] [T_Sensor] [Multiple Sources]

AIO Pump Step Up

Step up allows you to adjust how quickly the fan rotation speed increases, with level 0 being an instantaneous change in speed. The higher the level, the slower the change in speed, and may also result in less noise, but this will also cause slower heat dissipation.
Configuration options: [Level 0] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5]

AIO Pump Step Down

Step down allows you to adjust how quickly the fan rotation speed decreases, with level 0 being an instantaneous change in speed. The higher the level, the slower the change in speed, and may also result in less noise, but this will also cause slower heat dissipation.
Configuration options: [Level 0] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5]

AIO Pump Speed Low Limit

Allows you to set the lower speed limit for assigned fan/pump. A warning message will appear when the limit is reached; the warning message will not appear if **[Ignore]** is selected.
Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

**NOTE:** The following items appear only when **Chassis Fan Profile** is set to **[Manual].**

AIO Pump Point8 Temperature

When the temperature source is lower than the temperature of P8, the duty cycle will be determined according to the P7-P8 and the temperature source. When the temperature source is higher than the temperature of P8, the fan will operate at the duty cycle of P8.

AIO Pump Point8 Duty Cycle (%)

When the temperature source is lower than the temperature of P8, the duty cycle will be determined according to the P7-P8 and the temperature source. When the temperature source is higher than the temperature of P8, the fan will operate at the duty cycle of P8.

AIO Pump Point7 Temperature

When the temperature source is lower than the temperature of P7, the duty cycle will be determined according to the P6-P7 and the temperature source. When the temperature source is higher than the temperature of P7, the duty cycle will be determined according to the P7-P8 and the temperature source.

AIO Pump Point7 Duty Cycle (%)

When the temperature source is lower than the temperature of P7, the duty cycle will be determined according to the P6-P7 and the temperature source. When the temperature source is higher than the temperature of P7, the duty cycle will be determined according to the P7-P8 and the temperature source.

AIO Pump Point6 Temperature

When the temperature source is lower than the temperature of P6, the duty cycle will be determined according to the P5-P6 and the temperature source. When the temperature source is higher than the temperature of P6, the duty cycle will be determined according to the P6-P7 and the temperature source.

AIO Pump Point6 Duty Cycle (%)

When the temperature source is lower than the temperature of P6, the duty cycle will be determined according to the P5-P6 and the temperature source. When the temperature source is higher than the temperature of P6, the duty cycle will be determined according to the P6-P7 and the temperature source.

AIO Pump Point5 Temperature

When the temperature source is lower than the temperature of P5, the duty cycle will be determined according to the P4-P5 and the temperature source. When the temperature source is higher than the temperature of P5, the duty cycle will be determined according to the P5-P6 and the temperature source.

AIO Pump Point5 Duty Cycle (%)

When the temperature source is lower than the temperature of P5, the duty cycle will be determined according to the P4-P5 and the temperature source. When the temperature source is higher than the temperature of P5, the duty cycle will be determined according to the P5-P6 and the temperature source.

AIO Pump Point4 Temperature

When the temperature source is lower than the temperature of P4, the duty cycle will be determined according to the P3-P4 and the temperature source. When the temperature source is higher than the temperature of P4, the duty cycle will be determined according to the P4-P5 and the temperature source.

AIO Pump Point4 Duty Cycle (%)

When the temperature source is lower than the temperature of P4, the duty cycle will be determined according to the P3-P4 and the temperature source. When the temperature source is higher than the temperature of P4, the duty cycle will be determined according to the P4-P5 and the temperature source.

AIO Pump Point3 Temperature

When the temperature source is lower than the temperature of P3, the duty cycle will be determined according to the P2-P3 and the temperature source. When the temperature source is higher than the temperature of P3, the duty cycle will be determined according to the P3-P4 and the temperature source.

AIO Pump Point3 Duty Cycle (%)

When the temperature source is lower than the temperature of P3, the duty cycle will be determined according to the P2-P3 and the temperature source. When the temperature source is higher than the temperature of P3, the duty cycle will be determined according to the P3-P4 and the temperature source.

AIO Pump Point2 Temperature

When the temperature source is lower than the temperature of P2, the duty cycle will be determined according to the P1-P2 and the temperature source. When the temperature source is higher than the temperature of P2, the duty cycle will be determined according to the P2-P3 and the temperature source.

AIO Pump Point2 Duty Cycle (%)

When the temperature source is lower than the temperature of P2, the duty cycle will be determined according to the P1-P2 and the temperature source. When the temperature source is higher than the temperature of P2, the duty cycle will be determined according to the P2-P3 and the temperature source.

AIO Pump Point1 Temperature

When the temperature source is lower than the temperature of P1, the fan will operate at the duty cycle of P1. When the temperature source is higher than the temperature of P1, the duty cycle will be determined according to the P1-P2 and the temperature source.

AIO Pump Point1 Duty Cycle (%)

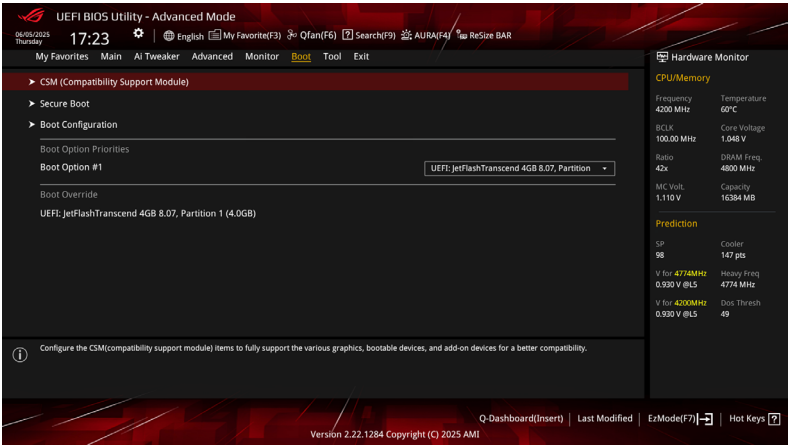
When the temperature source is lower than the temperature of P1, the fan will operate at the duty cycle of P1. When the temperature source is higher than the temperature of P1, the duty cycle will be determined according to the P1-P2 and the temperature source.

### Chassis Intrusion Detection Support

Set this item to **[Enabled]** to enable the chassis intrusion detection function.
Configuration options: [Enabled] [Disabled]

# 8. Boot menu

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




## CSM (Compatibility Support Module)

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.

**IMPORTANT! Launch CSM** will be set to **[Disabled]** and cannot be configured when using the integrated graphics.

### Launch CSM

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

**NOTE:** The following items appear only when **Launch CSM** is set to **[Enabled]**.

### Boot Device Control

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

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

### Boot from Storage Devices

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

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

Allows you to select the type of PCI-E/PCI expansion devices that you want to launch.
Configuration options: [Ignore] [Legacy only] [UEFI only]

### Secure Boot

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. |

**NOTE:** The Microsoft secure boot can only function properly on Windows UEFI mode.

#### Secure Boot Mode

This option allows you to select the Secure Boot mode from between Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.
Configuration options: [Standard] [Custom]

**NOTE:** The following item appears only when **Secure Boot Mode** is set to **[Custom]**.

#### Key Management

##### Install Default Secure Boot keys

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. Allows you to clear all default Secure Boot keys.

##### Save all Secure Boot variables

Allows you to save all secure boot keys to a USB storage device.

#### PK Management

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

##### Save To File

Allows you to save the PK to a USB storage device.

##### Set New key

Allows you to load the downloaded PK from a USB storage device.

Delete key

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]

**IMPORTANT!** 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).

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

Save to file

Allows you to save the KEK to a USB storage device.

Set New key

Allows you to load the downloaded KEK from a USB storage device.

Append Key

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

Delete key

Allows you to delete the KEK from your system.
Configuration options: [Yes] [No]

**IMPORTANT!** 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.

Save to file

Allows you to save the db to a USB storage device.

Set New key

Allows you to load the downloaded db from a USB storage device.

Append Key

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

Delete key

Allows you to delete the db file from your system.
Configuration options: [Yes] [No]

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

#### DBX Management

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

##### Save to file

Allows you to save the dbx to a USB storage device.

##### Set New key

Allows you to load the downloaded dbx from a USB storage device.

##### Append Key

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

##### Delete key

Allows you to delete the dbx file from your system.
Configuration options: [Yes] [No]

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

### Boot Configuration

#### Fast Boot

Allows you to enable or disable boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
Configuration options: [Disabled] [Enabled]

**NOTE:** The following item appears only when **Fast Boot** is set to **[Enabled]**.

#### Next Boot after AC Power Loss

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

#### Boot Logo Display

| | |
|---|---|
| [Auto] | Automatically adjust the boot logo size for Windows requirements. |
| [Full Screen] | Maximize the boot logo size. |
| [Disabled] | Hide the logo during POST. |

**NOTE:** The Following item appears only when **Boot Logo Display** is set to **[Auto]** or **[Full Screen]**.

#### Post Delay Time

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]

**IMPORTANT!** This feature only works when set under normal boot.

**NOTE:** The following item appears only when **Boot Logo Display** is set to **[Disabled]**.

Post Report

Allows you to select a desired POST report waiting time or until ESC is pressed.
Configuration options: [1 sec] - [10 sec] [Until Press ESC]

Boot up NumLock State

Allows you to select the keyboard NumLock state.
Configuration options: [On] [Off]

Wait For 'F1' If Error

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

Option ROM Messages

| | |
|---|---|
| [Force BIOS] | The Option ROM Messages will be shown during the POST. |
| [Keep Current] | Only the ASUS logo will be shown during the POST. |

Interrupt 19 Capture

Enable this item to allow the option ROMs to trap the interrupt 19.
Configuration options: [Enabled] [Disabled]

AMI Native NVMe Driver Support

Allows you to enable or disable AMI Native NVMe driver.
Configuration options: [Disabled] [Enabled]

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. |

## Boot Option Priorities

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

**IMPORTANT!**

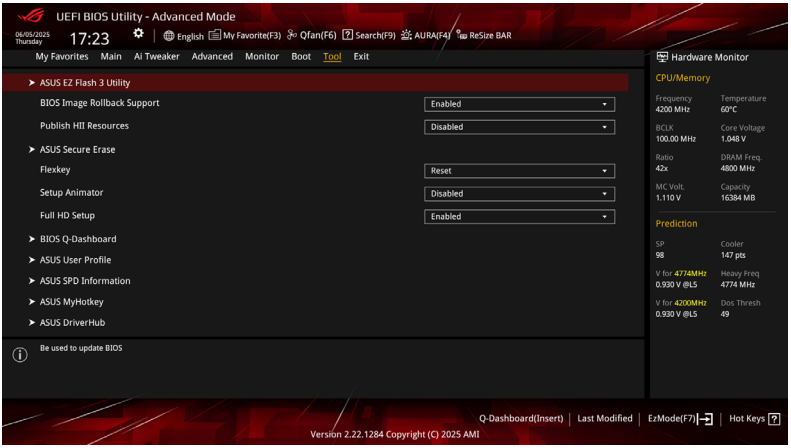
- To access Windows® OS in Safe Mode, press <F8 > after POST (Windows® 8 not supported).
- To select the boot device during system startup, press <F8> when ASUS Logo appears.

## Boot Override

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

# 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.




## BIOS Image Rollback Support

[Enabled] Support roll back your BIOS to a previous version, but this setting violates the NIST SP 800-147 requirement.

[Disabled] Only support updating your BIOS to a newer version, and this setting meets the NIST SP 800-147 requirement.

## Publish HII Resources

Configuration options: [Disabled] [Enabled]

> **NOTE:** The availability of the following items may vary according to your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

## Flexkey

[Reset] Reboots the system.

[Aura On/Off] Enable or Disable Aura LEDs. This setting does not sync with the BIOS/ software option.

[DirectKey] Boot directly into the BIOS.

## Setup Animator

Allows you to enable or disable the Setup animator.
Configuration options: [Disabled] [Enabled]

## Full HD Setup

Enable this feature to have a 1920x1080 resolution for BIOS Setup. Please note the feature is supported when your monitor and graphics card are both 1080p or above. This feature may be limited by the compatibility of your GPU and monitor pairing. When the BIOS detects a Clear CMOS action, the BIOS will forcibly set the Full HD Setup to [Disabled] during this boot process.
Configuration options: [Disabled] [Enabled]

## 9.1 ASUS EZ Flash 3 Utility

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

**NOTE:** For more details, refer to section **ASUS EZ Flash 3**.

## 9.2 ASUS Secure Erase

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

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

**NOTE:**

- 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, ctive 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.

## 9.3 BIOS Q-Dashboard

This item allows you to access the BIOS Q-Dashboard feature. This feature provides you with a perspective of the motherboard with vital components and connectors labeled for quick access.

**NOTE:** For more details, refer to section **Q-Dashboard**.

## 9.4 ASUS User Profile

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

### Load from Profile

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**.

**NOTE:**

- 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

Allows you to key in a profile name.

### Save to Profile

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

Allows you to load or save profile from your USB drive, load and save profile to your USB drive.

## 9.5 ASUS SPD Information

This item allows you to view the DRAM SPD information.

## 9.6 ASUS MyHotkey

This menu allow you to configure Hotkeys.

> **NOTE:** The availability of this menu, as well as the settings and options may vary depending on your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

### Hotkey F3

Press <F3> to enter UEFI-USB or UEFI-HDD or UEFI-CDROM/DVDROM or UEFI-PXE or ASUS AZ Flash 3 in POST.
Configuration options: [Disabled] [Boot from UEFI USB] [Boot from UEFI HDD] [Boot from UEFI CDROM/DVDROM] [Boot from UEFI PXE] [Toggle ASUS EZ Flash 3]

> **NOTE:** Please make sure Network is enabled before AsusMyHotkey is set to Boot From UEFI PXE. (**Advanced** -> **Network Stack Configuration** -> **Network Stack**)

### Hotkey F4

Press F4 to enter UEFI-USB or UEFI-HDD or UEFI-CDROM/DVDROM or UEFI-PXE or ASUS EZ Flash 3 in POST.
Configuration options: [Disabled] [Boot from UEFI USB] [Boot from UEFI HDD] [Boot from UEFI CDROM/DVDROM] [Boot from UEFI PXE] [Toggle ASUS EZ Flash 3]

> **NOTE:** Please make sure Network is enabled before AsusMyHotkey is set to Boot From UEFI PXE. (**Advanced** -> **Network Stack Configuration** -> **Network Stack**)

## 9.7 ASUS DriverHub

This menu allow you to download and install the ASUS DriverHub app.

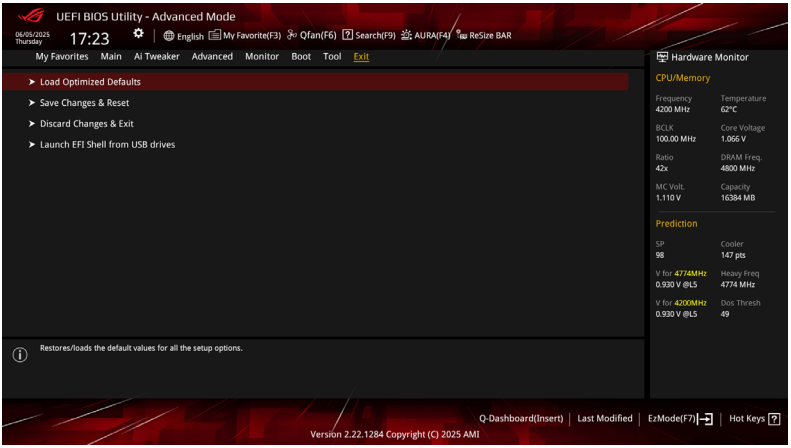
**NOTE:** The availability of this menu, as well as the settings and options may vary depending on your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.

### Download & Install ASUS DriverHub app

Allows you to enable DriverHub download process. DriverHub app can help you manage and download the latest drivers and utility updates for your motherboard.
Configuration options: [Disabled] [Enabled]

# 10. Exit menu

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




## Load Optimized Defaults

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

## Save Changes & Reset

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

## Discard Changes & Exit

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

## Launch EFI Shell from USB drives

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

# 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.

**IMPORTANT!** 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.

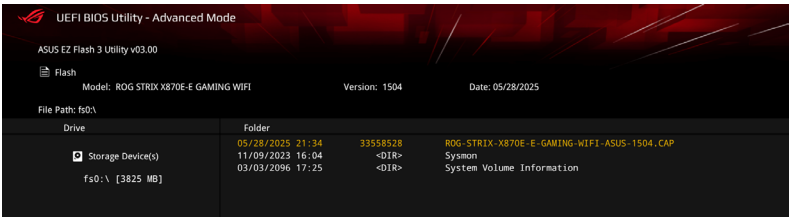
1. ASUS EZ Flash 3: Updates the BIOS using a USB flash drive.
2. ASUS CrashFree BIOS 3: Restores the BIOS using a USB flash drive when the BIOS file fails or gets corrupted.

## 11.1 ASUS EZ Flash 3

ASUS EZ Flash 3 allows you to download and update to the latest BIOS using a USB drive.

To update the BIOS:

1. Insert the USB flash drive that contains the latest BIOS file to a USB port.
2. Enter the Advanced Mode of the BIOS setup program. Go to the **Tool** menu to select **ASUS EZ Flash 3 Utility** and press <Enter>.
3. Press Left arrow key to switch to the Drive field.
4. Press the Up/Down arrow keys to find the USB flash drive that contains the latest BIOS, and then press <Enter>.
5. Press Right arrow key to switch to the Folder field.
6. 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.



## 11.2 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 a USB flash drive that contains the BIOS file.

**IMPORANT!** Make sure to download the latest BIOS 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 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.

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