

ROG STRIX B450-F GAMING II

BIOS Manual



Motherboard

E18263
First Edition
April 2021

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BIOS Setup

1. Knowing BIOS



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

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

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



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



-
- When downloading or updating the BIOS file for your motherboard, rename it as **XXXXX.CAP**. 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.



-
- 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.



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

2.1 Advanced Mode

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



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

The screenshot displays the BIOS Advanced Mode interface. The top bar includes the date and time (03/25/2021 17:32 Thursday), language (English), and various function keys (MyFavorite(F3), Qfan Control(F6), EZ Tuning Wizard(F11), Search(F9), AURA ON/OFF(F4), ReSize BAR). The main menu on the left lists options: My Favorites, Main, AI Tweaker, Advanced, Monitor, Boot, Tool, and Exit. The AI Tweaker section is expanded, showing settings for Target CPU Speed (3300MHz), Target DRAM Frequency (2133MHz), AI Overclock Tuner (Auto), Performance Enhancer (Auto), CPU Core Ratio (Manual), Performance Bias (D.O.C.P. Standard), Memory Frequency (Auto), FCLK Frequency (Auto), Core Performance Boost (Auto), SMT Mode (Auto), CPU Core Ratio (Per COI) (Auto), and TPU (Keep Current Settings). A hardware monitor on the right shows CPU and Memory status. The bottom bar includes Version 2.20.1271, Copyright (C) 2021 American Megatrends, Inc., Last Modified, EzMode(F7), Hot Keys, and Search on FAQ. Red lines and labels point to various UI elements: Configuration fields, Pop-up Menu, Menu bar, Language, MyFavorite(F3), Qfan Control(F6), EZ Tuning Wizard(F11), Search(F9), AURA ON/OFF(F4), ReSize BAR, Scroll bar, Hardware Monitor, CPU, Frequency, Temperature, 3300 MHz, 56°C, BCLK, Core Voltage, 100 MHz, 1.406 V, Ratio, 33.0 x, Memory, Frequency, Voltage, 2133 MHz, 1.200 V, Capacity, 4096 MB, Voltage, +12V, +5V, 12.295 V, 5.014 V, +3.3V, 3.335 V, Submenu items, General help, Last modified settings, Go back to EZ Mode, Search on FAQ, Hot keys, and Menu items.

Displays a quick overview of the system status and prediction

Menu bar

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

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

Menu items

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

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

Submenu items

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

Language

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

My Favorites(F3)

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



Refer to section **My Favorites** for more information.

Q-Fan Control(F6)

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



Refer to section **QFan Control** for more information.

EZ Tuning Wizard(F11)

This button above the menu bar allows you to view and tweak the overclocking settings of your system.



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

Search(F9)

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

ReSize Bar

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

[On] Enable ReSize BAR support to fully harness GPU memory.

[Off] ReSize BAR support will be disabled.

AURA ON/OFF(F4)

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

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

[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.

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

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.

Hot keys

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

Search on FAQ

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



2.2 EZ Mode

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

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

Displays a quick overview of the system status

Selects the display language of the BIOS setup program

EZ Tuning Wizard(F11)

Search(F9)

AURA ON/OFF(F4)

ReSize BAR

Displays the system properties of the selected mode. Click < > to switch modes

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

Loads optimized default settings

Saves the changes and resets the system

Click to go to Advanced mode

Click to display boot devices

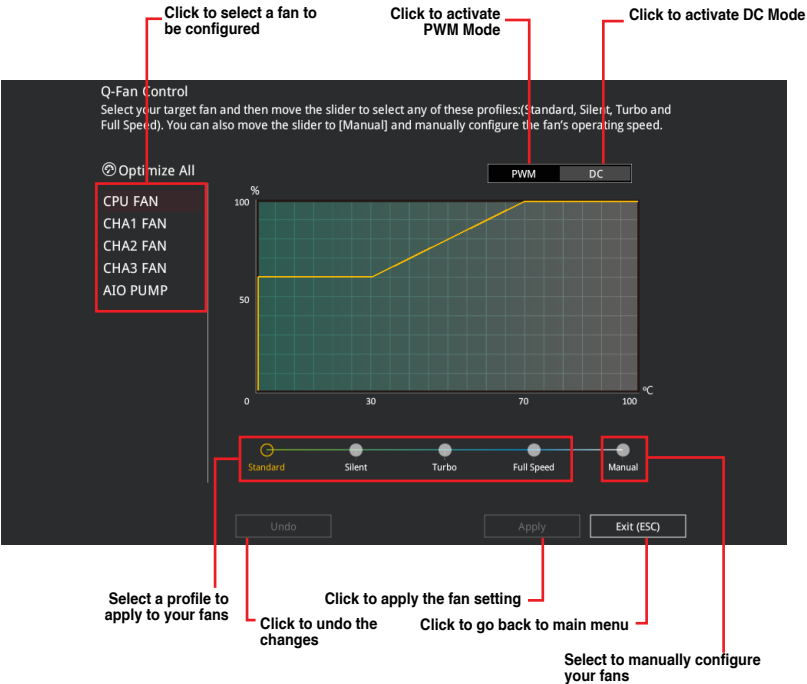
Selects the boot device priority

Search on FAQ

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

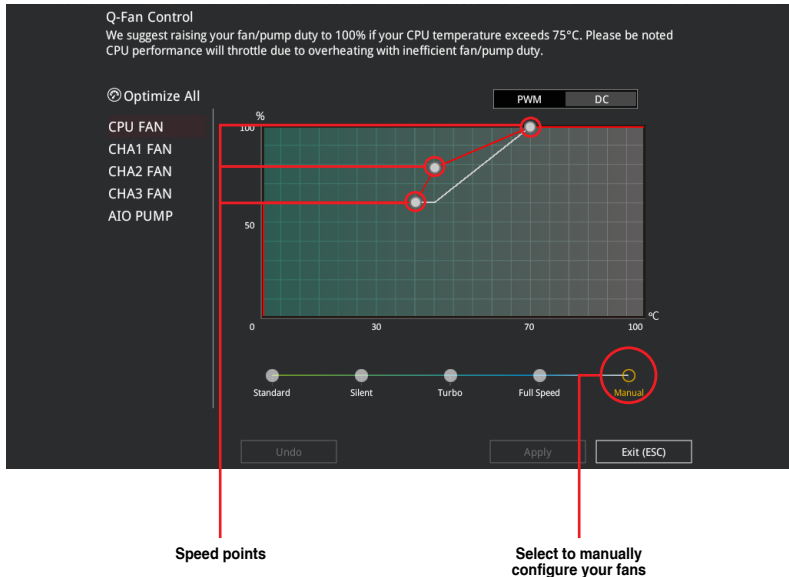
2.3 Q-Fan Control

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



Configuring fans manually

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

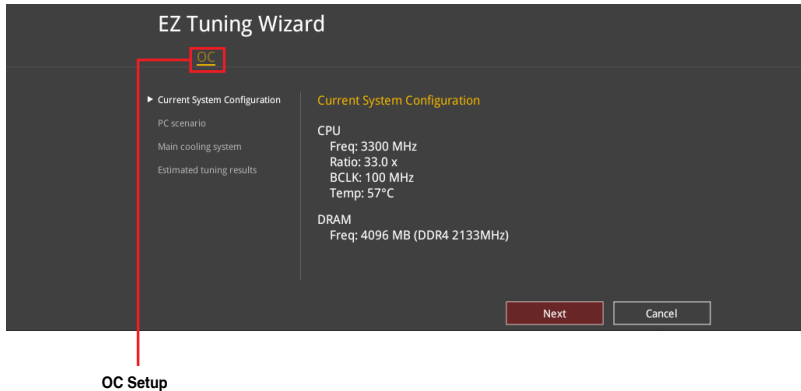


To configure your fans:

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

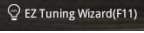
2.4 EZ Tuning Wizard

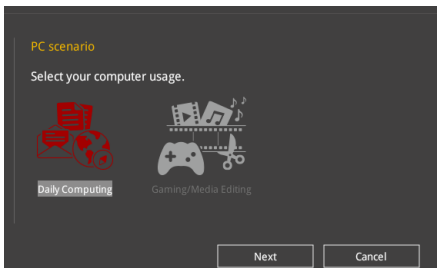
EZ Tuning Wizard allows you to easily overclock your CPU and DRAM, computer usage, and CPU fan to their best settings.



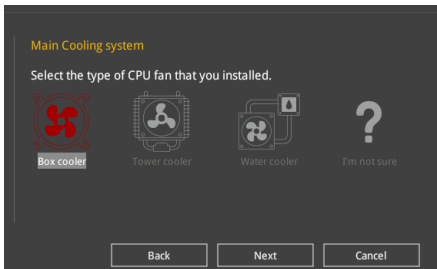
OC Tuning

To start OC Tuning:

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



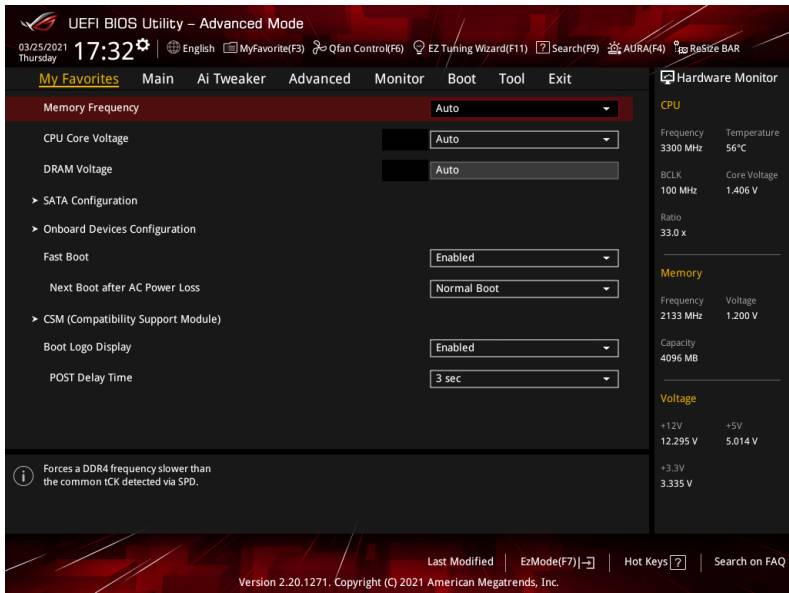
4. Select a Main Cooling System **BOX cooler**, **Tower cooler**, **Water cooler**, or **I'm not sure**, then click **Next**.



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

3. My Favorites

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

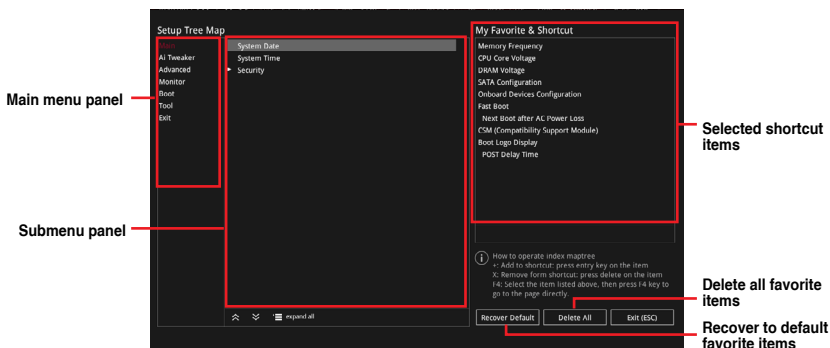


My Favorites comes with several performance, power saving, and fast boot related items by default. You can personalize this screen by adding or removing items.

Adding items to My Favorites

To add BIOS items:

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



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



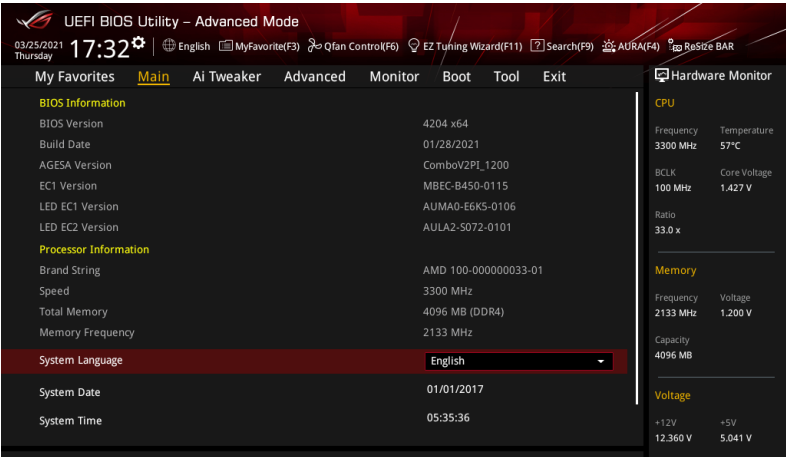
You cannot add the following items to My Favorite items:

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

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

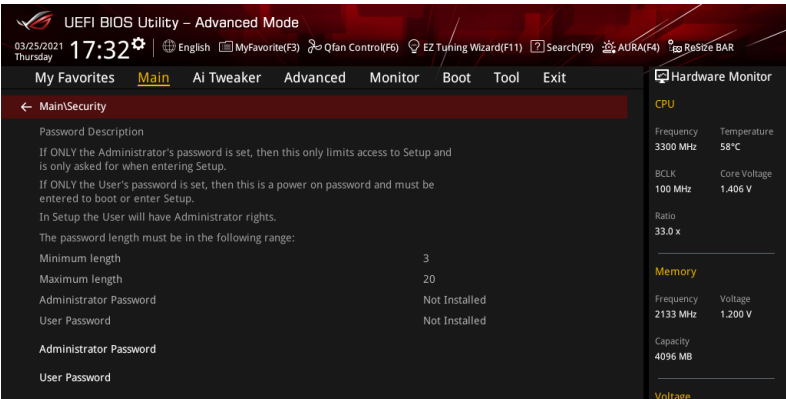
4. Main menu

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



Security

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



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

Administrator Password

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

To set an administrator password:

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

To change an administrator password:

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

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

User Password

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

To set a user password:

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

To change a user password:

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

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

5. Ai Tweaker menu

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

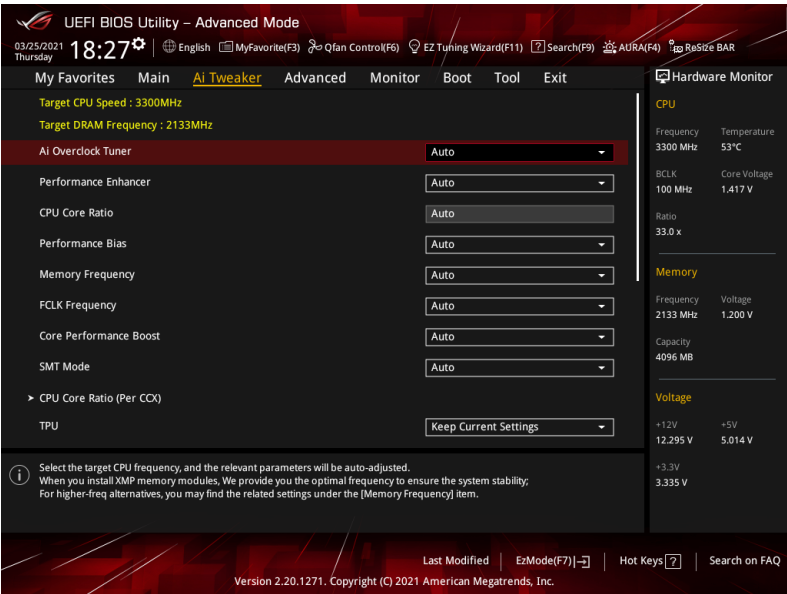


Be cautious when changing the settings of the Ai Tweaker menu items. Incorrect field values can cause the system to malfunction



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

Scroll down to display other BIOS items.



Ai Overclock Tuner

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

- [Auto] Loads the optimal settings for the system.
- [Manual] Allows you to individually set overclocking parameters.
- [D.O.C.P.] Allows you to select a DRAM O.C. profile, and the related parameters will be adjusted automatically.



The following items appear only when **Ai Overclocking Tuner** is set to **[Manual]** or any of the **[D.O.C.P.]** options.

BCLK Frequency

This item allows you to set the BCLK frequency to enhance the system performance. Use the <+> or <-> to adjust the value.

Configuration options: [Auto] [96] - [118]



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



The following item appears only when **Ai Overclocking Tuner** is set to any of the **[D.O.C.P.]** options.

D.O.C.P.

This item allows you to select your D.O.C.P. profile. Each profile has its own DRAM frequency, timing and voltage.

Performance Enhancer

This item allows the CPU to maintain boost frequencies longer, resulting in higher performance. Level 3/4 are overclocked settings which might not work with all CPUs, or may require additional voltage. Level 3/4 works best with the Balanced OS power profile.

Configuration options: [Auto] [Default] [Level 1] [Level 2] [Level 3 (OC)] [Level 4 (OC)]

CPU Core Ratio

This item allows you to set the CPU core ratios.

Configuration options: [Auto] [23.00] - [63.75]

Performance Bias

This item allows you to select different values to help different Software's performance.

Configuration options: [Auto] [None] [CBR15 Gentle] [Aida/Geekbench] [CBR15 Aggressive]

Memory Frequency

This item allows you to set the memory operating frequency. The configurable options vary with the BCLK (base clock) frequency setting. Select the auto mode to apply the optimized setting.

Configuration options: [Auto] [DDR4-1333MHz] - [DDR4-6000MHz]

FCLK Frequency

This item allows you to specify the FCLK frequency.

Configuration options: [Auto] [667MHz] - [3000MHz]

Core Performance Boost

This item allows you to enable or disable automatically overclocking the CPU and DRAM to enhance system performance.

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

Core Performance Boost

This item allows you to enable or disable automatically overclocking the CPU and DRAM to enhance system performance.

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

SMT Mode

This item allows you to enable or disable symmetric multithreading (SMT). Select **[Auto]** to enable SMT. A full reboot of the system is needed for the **[Auto]** option to take effect and re-enable SMT.

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



If SMT is set to **[Disabled]**, your system will not support S3 mode.

CPU Core Ratio (Per CCX)

This items in this submenu allow you to adjust Core Ratios for each CCX.

Core VID

This item allows you to specify a custom CPU core VID. Power savinf features for idle cores (e.g. cc6 sleep) remain active.

Configuration options: [Auto] [0.700] - [1.550]

CCD0

CCX0 Ratio

This item allows you to specify a custom Core Ratio for this CCX.

Configuration options: [Auto] [23.00] - [63.75]

CCX1 Ratio

This item allows you to specify a custom Core Ratio for this CCX.

Configuration options: [Auto] [23.00] - [63.75]

CCD1

CCX0 Ratio

This item allows you to specify a custom Core Ratio for this CCX.

Configuration options: [Auto] [23.00] - [63.75]

CCX1 Ratio

This item allows you to specify a custom Core Ratio for this CCX.

Configuration options: [Auto] [23.00] - [63.75]

TPU

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

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

[TPU I] Applies air cooling overclocking conditions.

[TPU II] Applies water cooling overclocking conditions.



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

Precision Boost Overdrive

The items in this sub-menu allow you to set the Precision Boost Overdrive settings.

PBO Fmax Enhancer

If this item is set to **[Enabled]**, it potentially improves the peak frequencies ('Fmax') during single threaded workloads. Incompatible with the so-called 'EDC tweak'.
Configuration options: [Auto] [Disabled] [Enabled]

PBO Fmax Enhancer

If this item is set to **[Enabled]**, it potentially improves the peak frequencies ('Fmax') during single threaded workloads. Incompatible with the so-called 'EDC tweak'.
Configuration options: [Auto] [Disabled] [Enabled]

Precision Boost Overdrive

This item allows you to manually set, disable, or enable the precision boost overdrive. If this item is set to **[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] [Manual]



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

PPT Limit

This item allows you to input the PPT Limit [W], Board Socket Power capability, which is adjustable up to the motherboard programmed PPT limit.
Configuration options: [0] - [65535]

TDC Limit

This item allows you to input the TDC Limit [A], Board thermally constrained current delivery capability, which is adjustable up to the motherboard programmed TDC limit.
Configuration options: [0] - [65535]

EDC Limit

This item allows you to input the EDC Limit [A], Board electrically constrained current delivery capability, which is adjustable up to the motherboard programmed EDC limit.
Configuration options: [0] - [65535]

Precision Boost Overdrive Scalar

This item allows you to manually set, or disable the part runs with a scalar of customized value.
Configuration options: [Auto] [Disabled] [Manual]



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

Customized Precision Boost Overdrive Scalar

The Precision Boost Overdrive Scalar 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: [2X] - [10X]

Max CPU Boost Clock Override

This item allows you to increase the maximum CPU frequency that may be automatically be achieved by the Precision Boost 2 algorithm.

Configuration options: [Auto] [0] - [2000]

Perform Thermal Throttle Limit

This item allows you to decrease the maximum allowed processor temperature (Celsius).

Configuration options: [Auto] [Manual]



The following item appears only when **Perform Thermal Throttle Limit** is set to **[Manual]**.

Perform Thermal Throttle Limit

This item allows you to decrease the maximum allowed processor temperature (Celsius).

Configuration options: [0] - [255]

DRAM Timing Control

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



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

Mem Over Clock Fail Count

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

DRAM CAS# Latency

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

DRAM RAS# to CAS# Read Delay

Configuration options: [Auto] [1] - [255]

DRAM RAS# to CAS# Write Delay

Configuration options: [Auto] [1] - [255]

DRAM RAS# PRE Time

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

DRAM RAS# ACT Time

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

Trc

Configuration options: [Auto] [29] - [135]

TrrdS

Configuration options: [Auto] [4] - [12]

TrrdL

Configuration options: [Auto] [4] - [12]

Tfaw

Configuration options: [Auto] [6] - [54]

TwtrS

Configuration options: [Auto] [2] - [14]

TwtrL

Configuration options: [Auto] [2] - [14]

Twr

Configuration options: [Auto] [10] - [81]

Trcpage

Configuration options: [Auto] [0] - [1023]

TrdrdScl

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

TwrrwrScl

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

Trfc

Configuration options: [Auto] [60] - [990]

Trfc2

Configuration options: [Auto] [60] - [990]

Trfc4

Configuration options: [Auto] [60] - [990]

Tcwl

Configuration options: [Auto] [9] - [22]

Trtp

Configuration options: [Auto] [1] - [14]

Trdwr

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

Twrrd

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

TwrrwrSc

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

TwrrwrSd

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

TwrrwrDd

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

TrdrdSc

Configuration options: [Auto] [1] - [11]

TrdrdSd

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

TrdrdDd

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

Tcke

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

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]

Cmd2T

Configuration options: [Auto] [1T] [2T]

Gear Down Mode

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

Power Down Enable

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

RttNom

Configuration options: [Auto] [Rtt_Nom Disable] [RZQ/4] [RZQ/2] [RZQ/6] [RZQ/1] [RZQ/5] [RZQ/3] [RZQ/7]

RttWr

Configuration options: [Auto] [Dynamic ODT Off] [RZQ/2] [RZQ/1] [Hi-Z] [RZQ/3]

RttPark

Configuration options: [Auto] [Rtt_PARK Disable] [RZQ/4] [RZQ/2] [RZQ/6] [RZQ/1] [RZQ/5] [RZQ/3] [RZQ/7]

MemAddrCmdSetup

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

MemCsOdtSetup

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

MemCkeSetup

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

MemCadBusClkDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

MemCadBusAddrCmdDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

MemCadBusCsOdtDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

MemCadBusCkeDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

DIGI+ VRM**VDDCR CPU Load Line Calibration**

Configuration options: [Auto] [Regular] [High]

VDDCR SOC Load-line Calibration

Configuration options: [Auto] [Regular] [High]

VDDCR CPU Power Phase Control

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

[Standard]	Set to standard mode.
[Optimized]	Set to the ASUS optimized phase tuning profile.
[Extreme]	Set to the full phase mode.

VDDCR CPU Switching Frequency

Configuration options: [200] [250] [300] [350]



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

Tweaker's Paradise

Force OC Mode Disable

If this item is set to **[Enabled]**, OC Mode will be disabled rendering customized ratios useless. Used mainly for pure slight boost of BCLK while retaining XFR mode.

Configuration options: [Enabled] [Disabled]

VTDDR Voltage

This item allows you to set the termination voltage for the DRAM. Default is 1/2 of DRAM Voltage. Use the <+> or <-> to adjust the value. The values increment with an interval of 0.005V.

Configuration options [Auto] [16.58000V] - [16.78000V]

VPP_MEM Voltage

This item allows you to configure the voltage for the VPP_MEM. Use the <+> or <-> to adjust the value. The values increment with an interval of 0.005V.

Configuration options [Auto] [2.500V] - [2.800V]

CPU 1.80V Voltage

This item allows you to configure the voltage for the CPU 1.80V. Use the <+> or <-> to adjust the value. The values increment with an interval of 0.005V.

Configuration options [Auto] [1.80V] - [2.20V]

2.5V SB Voltage

This item allows you to configure the voltage for the 2.5V SB. Use the <+> or <-> to adjust the value. The values increment with an interval of 0.05V.

Configuration options [Auto] [2.5V] - [2.55V]

VDDP Standby Voltage

This item allows you to configure the voltage for the VDDP Standby Voltage. Use the <+> or <-> to adjust the value. The values increment with an interval of 0.005V.

Configuration options [Auto] [0.900V] - [1.050V]

CLDO VDDP voltage

This item allows you to configure the voltage for the CLDO VDDP. Use the <+> or <-> to adjust the value. The values increment with an interval of 0.001V.

Configuration options [Auto] [0.700V] - [1.800V]

CPU Core Voltage

Configures the mode of Voltage fed to the cores of the processor. Increase to help CPU Core Frequency overclock.

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



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

CPU Core Voltage Override

Allows you to configure the CPU Core voltage. Use the <+> or <-> to adjust the value.
Configuration options: [Auto] [0.750V] - [1.700V]



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

CPU Offset Mode Sign

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

CPU Core Voltage Offset

Use the <+> or <-> to adjust the value. The values increment with an interval of 0.00625V.
Configuration options: [Auto] [0.00625V] - [0.500V]

CPU SOC Voltage

Increase to help Memory Frequency overclock.
Configuration options: [Auto] [Manual Mode] [Offset Mode]



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

VDDSOC Voltage Override

Allows you to configure the CPU Core voltage. Use the <+> or <-> to adjust the value. The values increment with an interval of 0.00625V.
Configuration options: [Auto] [0.750V] - [1.800V]



The following items appear only when **CPU SOC Voltage** is set to **[Offset Mode]**.

VDDSOC Offset Mode Sign

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

VDDSOC Voltage Offset

Use the <+> or <-> to adjust the value. The values increment with an interval of 0.00625V.
Configuration options: [Auto] [0.00625V] - [0.500V]

DRAM Voltage

Increase to help Memory Frequency overclock. Use the <+> or <-> to adjust the value. The values increment with an interval of 0.00500V.
Configuration options: [Auto] [1.20000V] - [1.80000V]

VDDG CCD Voltage Control

VDDG CCD 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] [0.700] - [1.800]

VDDG IOD Voltage Control

VDDG IOD 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] [0.700] - [1.800]

1.05V SB Voltage

This item allows you to set the core voltage for the Southbridge. Use the <+> or <-> to adjust the value. The values increment with an interval of 0.05V.

Configuration options: [Auto] [1.05V] - [1.10V]

6. Advanced menu

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

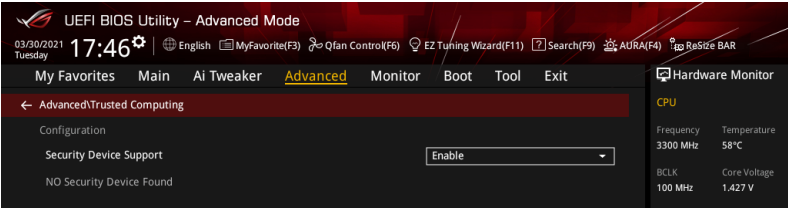


Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



6.1 Trusted Computing

The items in this menu show the Trusted Computing Settings.



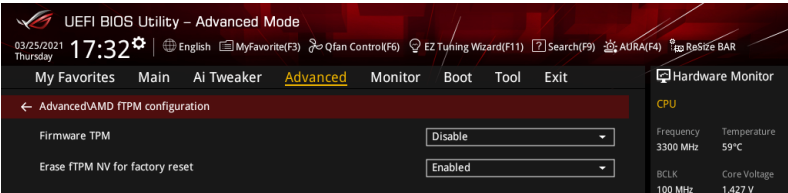
Configuration

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]

6.2 AMD fTPM configuration

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



AMD fTPM switch

This item allows you to enable or disable AMD CPU Firmware TPM.

[Enabled] Enables AMD CPU fTPM.

[Disabled] Disables AMD CPU fTPM.



When Firmware TPM is set to disabled all saved data on it will be lost.

Erase fTPM NV for factory reset

This item 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.

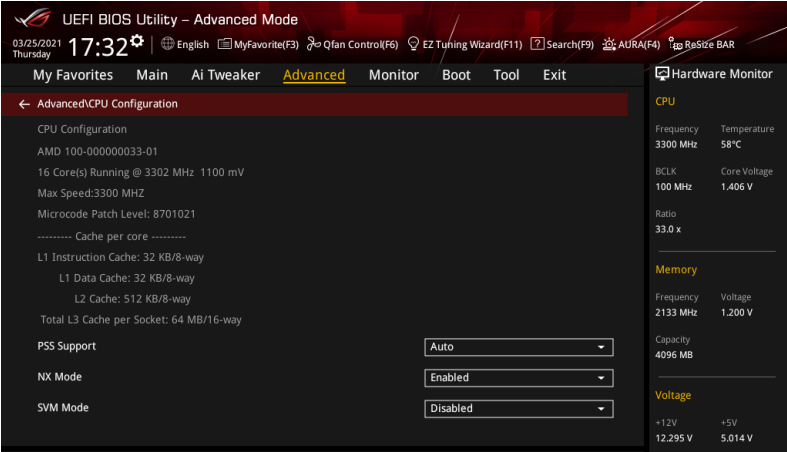
[Enabled] Reset fTPM, if you have Bitlocker or encryption-enabled system, the system will not boot without a recovery key.

6.3 CPU Configuration

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



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



PSS Support

This item allows you enable or disable the generation of ACPI_PPC, _PSS, and _PCT objects.

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

NX Mode

This item allows you enable or disable no-execute page protection function.

Configuration options: [Disabled] [Enabled]

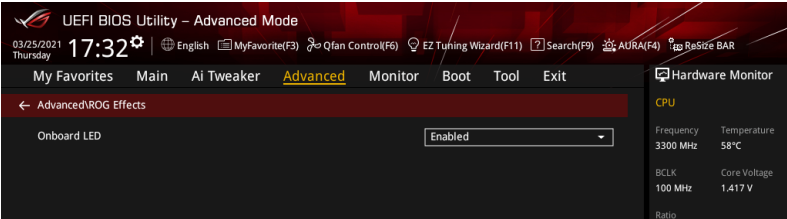
SVM Mode

This item allows you enable or disable CPU Virtualization.

Configuration options: [Disabled] [Enabled]

6.4 ROG Effects

The items in this menu allows you customize effect settings for a better ROG experience.



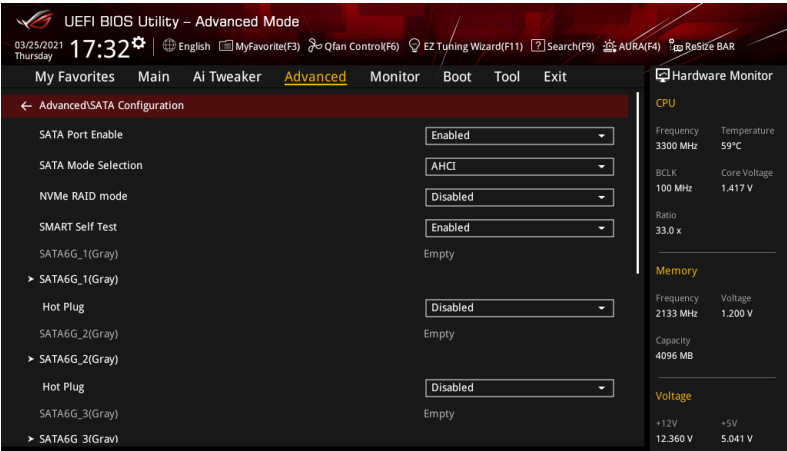
Onboard LED

This item allows you to enable or disable the F_Panel LEDs.

Configuration options: [Disabled] [Enabled]

6.5 SATA Configuration

While entering Setup, the BIOS automatically detects the presence of SATA devices. The SATA Port items show **Not Present** if no SATA device is installed to the corresponding SATA port. Scroll down to display other BIOS items.



SATA Port Enable

This item allows you to enable or disable the SATA Device.

Configuration options: [Disabled] [Enabled]



The following items appear only when **SATA Port Enable** is set to **[Enabled]**.

SATA Mode Selection

This item allows you to set the SATA configuration.

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

SATA6G_1(Gray) - SATA6G_6(Gray)

SATA6G_1(Gray) - SATA6G_6(Gray)

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

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

Hot Plug

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

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

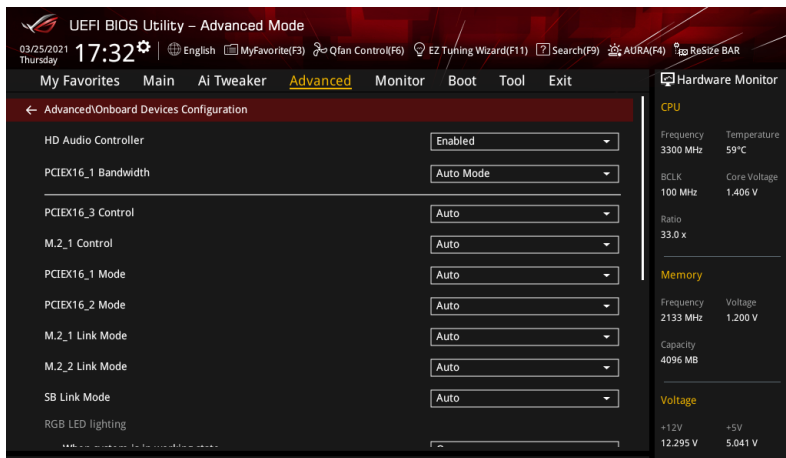
M.2(Gray)

M.2(Gray)

This item allows you to rename the AMD APU M.2 port.

6.6 Onboard Devices Configuration

The items in this menu allow you to switch between PCIe Lanes and configure onboard devices. Scroll down to display other BIOS items.



HD Audio Controller

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

Configuration options: [Disabled] [Enabled]

PCIEX16_1 Bandwidth

[Auto Mode]

The PCIe x16 slot runs at x16 mode.

[PCIe RAID Mode]

Up to four SSDs installed onto the Hyper M.2 X16 series card can be detected.



Use PCIe RAID Mode when installing the Hyper M.2 x16 card or other M.2 adapter cards. Installing other devices when using PCIe RAID Mode may cause your PC to fail to boot up.

PCIEX16_3 Control

[Auto]

If PCIEX16_3 is detected, run X4 mode and disable PCIEX1_1 + PCIEX1_2 + PCIEX1_3, otherwise enable PCIEX1_1 + PCIEX1_2 + PCIEX1_3.

[X1 mode]

PCIEX16_3 runs X1 mode and enable PCIEX1_1 + PCIEX1_2 + PCIEX1_3.

[X4 mode]

PCIEX16_3 runs X4 mode and disable PCIEX1_1 + PCIEX1_2 + PCIEX1_3.

M.2_1 Control

[Auto]

If M.2_1 is detected, run X4 mode or SATA mode and disable SATA56, otherwise enable SATA65.

[SATA65]

M.2_1 X3 mode and enable SATA65.

PCIEX16_1 Mode

This item allows you to set the link speed for the first VGA slot.

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

PCIEX16_2 Mode

This item allows you to set the link speed for the second VGA slot.

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

M.2_1 Link Mode

This item allows you to set the M.2_1 Device link speed.

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

M.2_2 Link Mode

This item allows you to set the M.2_1 Device link speed.

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

SB Link Mode

This item allows you to set the Southbridge link speed.

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

RGB LED lighting

When system is in working state

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

- [On]: Motherboard LEDs, RGB and ADD header(s) will light up in S0(working) state.
- [Off]: Motherboard LEDs, RGB and ADD header(s) will not light up in S0(working) state.



- The RGB Header(s) and Addressable Header(s) will only work under the S0 (working) state.
- When ErP Ready is enabled, LEDs, RGB and ADD header(s) will not light up in any state.

When system is in sleep, hibernate or soft off states

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

- [On]: Motherboard LEDs will light up in S3(sleep), S4(hibernate), and S5(soft off) states.
- [Off]: Motherboard LEDs will not light up in S3(sleep), S4(hibernate), and S5(soft off) states.



- The RGB Header(s) and Addressable Header(s) will only work under the S0 (working) state.
- When ErP Ready is enabled, LEDs, RGB and ADD header(s) will not light up in any state.

Intel LAN Controller

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

Configuration options: [Disabled] [Enabled]

Intel LAN OPROM

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

Configuration options: [Disabled] [Enabled]

Wi-Fi Controller

This item allows you to enable or disable the Wi-Fi controller.

Configuration options: [Disabled] [Enabled]

Bluetooth Controller

This item allows you to enable or disable the Bluetooth controller.

Configuration options: [Disabled] [Enabled]

CPU PCIE ASPM

Configuration options: [Disabled] [Enabled]

PM L1 SS

This item allows you to enable or disable PM L1 SS and ASPM L1 SS.

Configuration options: [Auto] [Disabled] [L1.1] [L1.2] [L1.1_L1.2]

USB power delivery in Soft Off state (S5)

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

Configuration options: [Disabled] [Enabled]

Serial Port Configuration

This submenu allows you to set parameters for Serial Port.



This item will only function if there is a serial port (COM) connector on your motherboard.

Serial Port

This item allows you to enable or disable the Serial port.

Configuration options: [Enabled] [Disabled]



The following item appears only when **Serial Port** is set to **[Enabled]**.

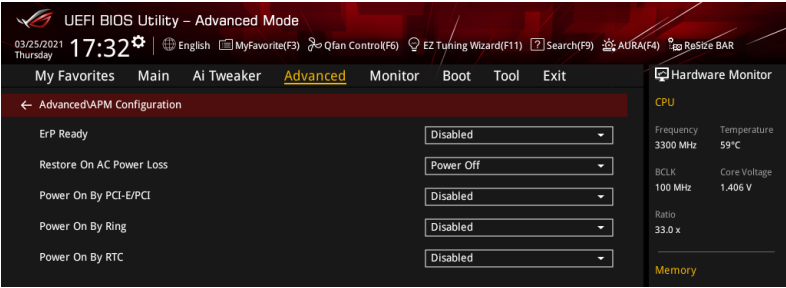
Change settings

This item allows you to select an optimal setting for super IO device.

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

6.7 APM Configuration

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



ErP Ready

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

Restore On AC Power Loss

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

Power On By PCI-E/PCI

This item allows you to enable or disable the Wake-on-LAN function of the onboard LAN controller or other installed PCI-E LAN cards.
Configuration options: **[Disabled]** **[Enabled]**

Power On By Ring

- [Disabled]** Disables the Ring devices to generate a wake event.
- [Enabled]** Enables the Ring devices to generate a wake event.



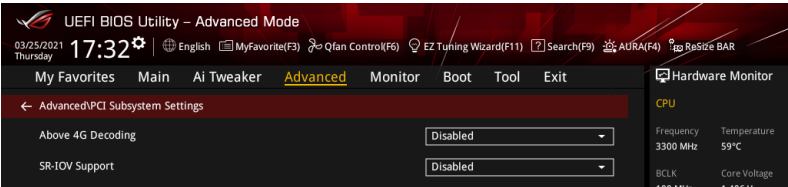
This item functions only if there is a serial port (COM1) connector on the motherboard.

Power On By RTC

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

6.8 PCI Subsystem Settings

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



Above 4G Decoding

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

Configuration options: [Disabled] [Enabled]

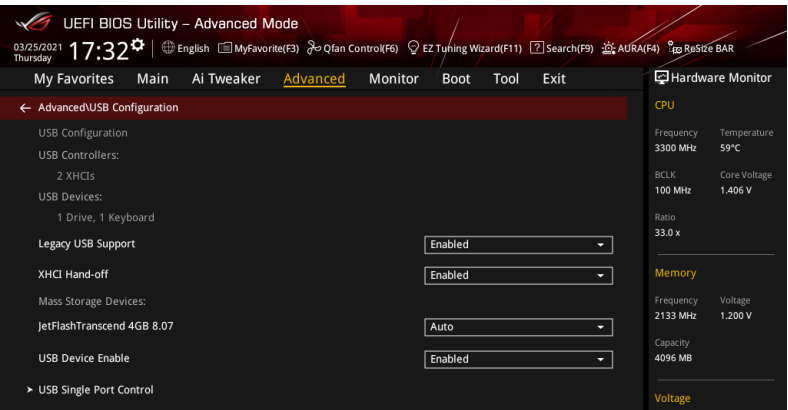
SR-IOV Support

This option enables or disables Single Root IO Virtualization Support if the system has SRIOV capable PCIe devices.

Configuration options: [Disabled] [Enabled]

6.9 USB Configuration

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



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

Legacy USB Support

- [Enabled] Your system supports the USB devices in legacy operating systems.
- [Disabled] Your USB devices can only be used for EFI applications.
- [Auto] Your system automatically detects the presence of USB devices at startup. If any USB devices are detected, the legacy USB support is enabled.

XHCI Hand-off

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

USB Device Enable

Configuration options: [Disabled] [Enabled]

USB Single Port Control

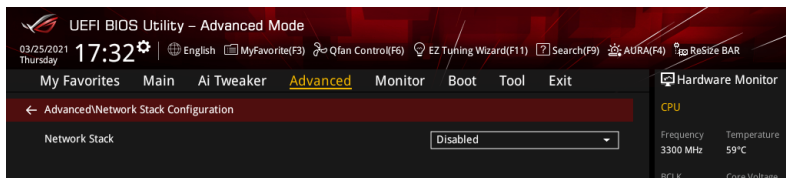
This item allows you to enable or disable the individual USB ports.



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

6.10 Network Stack Configuration

The items in this menu allow you to enable or disable the UEFI network stack



Network stack

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

Configuration options: [Disable] [Enable]



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

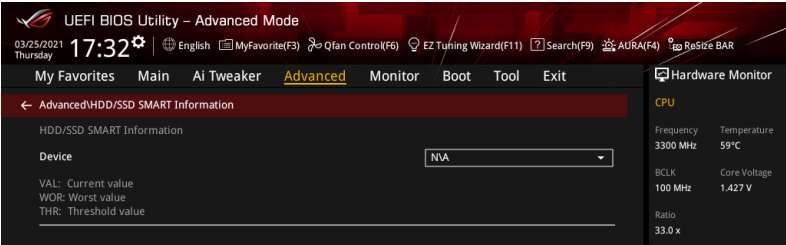
Ipv4/Ipv6 PXE Support

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

Configuration options: [Disabled] [Enabled]

6.11 HDD/SSD SMART Information

This menu displays the SMART information of the connected devices.



NVM Express devices do not support SMART information.

6.12 AMD Overclocking

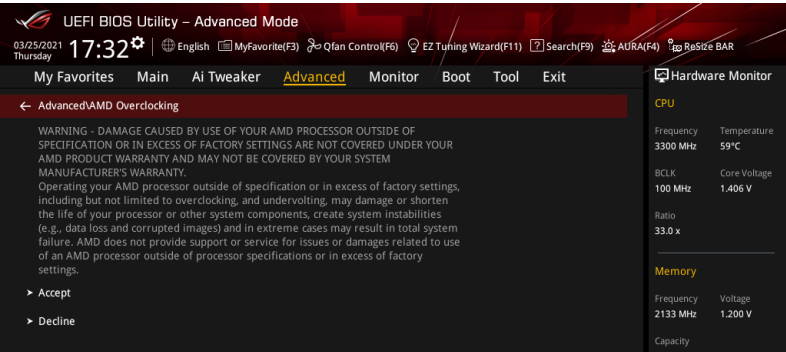
The items in this menu shows the AMD Overclocking Setup Page.



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.



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



Manual CPU Overclocking

The items in this submenu allow you to configure a custom GFX frequency and voltage.

CPU Frequency

This item allows you to specify a custom CPU core frequency. Must be combined with a custom CPU voltage. Power saving features for idle cores (e.g. cc6 sleep) remain active.

CPU Voltage

This item allows you to specify a custom CPU core voltage (mV). Must be combined with a custom CPU core frequency. Power saving features for idle cores (e.g. cc6 sleep) remain active.

CPU Core Count Control

The items in this submenu allow you to adjust core count by toggling active cores or SMT.

SMT Control

This item can be used to disable symmetric multithreading. To re-enable SMT, a POWER CYCLE is needed after selecting [Auto].



S3 is NOT SUPPORTED on systems where SMT is disabled.

DDR and Infinity Fabric Frequency/Timings

The items in this submenu allow you to adjust memory frequencies and timings, as well as Infinity Fabric frequency and dividers.

DDR Frequency and Timings

The items in this submenu allow you to adjust DDR memory frequency and timings.

DRAM Timing Configuration

Overclock

Configuration options: [Auto] [Enabled]

DRAM Controller Configuration

DRAM Power Options

Power Down Enable

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

Cmd2T

Select between 1T and 2T mode on ADDR/CMD.
Configuration options: [Auto] [1T] [2T]

Gear Down Mode

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

CAD Bus Configuration

CAD Bus Timing User Controls

This item allows you to set the CAD bus signals to Auto or Manual.
Configuration options: [Auto] [Manual]



The following items appear only when **CAD Bus Timing User Controls** is set to [Manual].

AddrCmdSetup

This item allows you to setup time on CAD bus signals.

CsOdtSetup

This item allows you to setup time on CAD bus signals.

CkeSetup

This item allows you to setup time on CAD bus signals.

CAD Bus Drive Strength User Controls

This item allows you to set the CAD bus signals to Auto or Manual.

Configuration options: [Auto] [Manual]



The following items appear only when **CAD Bus Drive Strength User Controls** is set to **[Manual]**.

ClkDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

AddrCmdDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

CsOdtDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

CkeDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

Data Bus Configuration

Data Bus Configuration User Controls

This item allows you to specify the mode for drive strength.

Configuration options: [Auto] [Manual]



The following items appear only when **Data Bus Configuration User Controls** is set to **[Manual]**.

RttNom

Configuration options: [Rtt_Nom Disable] [RZQ/4] [RZQ/2] [RZQ/6] [RZQ/1] [RZQ/5] [RZQ/3] [RZQ/7] [Auto]

RttWr

Configuration options: [Dynamic ODT Off] [RZQ/2] [RZQ/1] [Hi-Z] [RZQ/3] [Auto]

RttPark

Configuration options: [Rtt_PARK Disable] [RZQ/4] [RZQ/2] [RZQ/6] [RZQ/1] [RZQ/5] [RZQ/3] [RZQ/7] [Auto]

Infinity Fabric Frequency and Dividers

Infinity Fabric frequency (FCLK) is automatically synchronized 1:1 with memory frequency (MCLK) for best performance.

Infinity Fabric Frequency and Dividers

Set Infinity Fabric frequency (FCLK) Auto: FCLK = MCLK. Manual: FCLK must be \leq 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] [667MHz] - [4000MHz]

ECO Mode

ECO Mode

Configuration options: [Disable] [Eco-Mode (65W)]

Precision Boost Overdrive

Precision Boost Overdrive

When this item is enabled, it allows the processor to run beyond the 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] [Enable] [Advanced]



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).



The following items appear only when **PBO Limits** is set to **[Manual]**.

PPT Limit [W]

This item allows you to adjust total CPU socket power delivery capability. Adjustable up to the limit supported by your motherboard.

Configuration options: [0] - [65535]

TDC Limit [A]

This item allows you to adjust peak current from your motherboard's CPU core VRM phases in thermally-limited scenarios. Adjustable up to the limit supported by your motherboard.

Configuration options: [0] - [65535]

EDC Limit [A]

This item allows you to adjust peak current from your motherboard's CPU core VRM phases in electrically-limited scenarios. Adjustable up to the limit supported by your motherboard.

Configuration options: [0] - [65535]

Precision Boost Overdrive Scalar

This item allows you to manually set, or disable the part runs with a scalar of customized value.

Configuration options: [Auto] [Disabled] [Manual]



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

Precision Boost Overdrive Scalar

This item overrides the AMD default silicon health management to potentially achieve higher sustained frequencies under CPU load.

Configuration options: [1X] - [10X]

Max CPU Boost Clock Override

This item allows you to increase the maximum CPU frequency that may be automatically be achieved by the Precision Boost 2 algorithm.

Configuration options: [0MHz] - [200MHz]

Perform Thermal Throttle Limit

This item allows you to decrease the maximum allowed processor temperature (Celsius).

Configuration options: [Auto] [Manual]



The following item appears only when **Perform Thermal Throttle Limit** is set to **[Manual]**.

Perform Thermal Throttle Limit

This item allows you to decrease the maximum allowed processor temperature (Celsius).

Configuration options: [0] - [255]

LN2 Mode

The sub-items in this menu allow you to enable settings that provide additional stability at extreme cold operating temperatures.

LN2 Mode

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

SoC Voltage

The item in this submenu allow you to specify 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. 'SoC/Uncore OC Mode' needs to be enabled to force this voltage.

SoC Voltage

Configuration options: [0] - [1550]

SoC/Uncore OC Mode

Forces CPU SoC/uncore components (e.g. Infinity Fabric, memory, and integrated graphic) to run at their maximum specified frequency at all times. May improve performance at the expense of idle power savings.

SoC/Uncore OC Mode

Configuration options: [Disabled] [Enabled]

VDDP Voltage Control

VDDP is a voltage for the DDR4 bus signaling (PHY), and it is derived from your DRAM Voltage (VDDIO_Mem). As a result, VDDP voltage in mV can approach but not exceed your DRAM Voltage.

VDDP Voltage Control

Configuration options: [Auto] [Manual]



The following item appears only when **VDDP Voltage Control** is set to **[Manual]**.

VDDP Voltage Control

Configuration options: [700] - [65535]

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.

VDDG Voltage Control

Configuration options: [Auto] [Manual]



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

VDDG CCD Voltage Control

Configuration options: [700] - [65535]

VDDG IOD Voltage Control

Configuration options: [700] - [65535]

Onboard Voltage Controls

VDDIO Voltage Control

This item allows you to adjust MEM VDDIO, stepping is 4mV. $Vddlo = 1.2V \pm N * 4 \text{ mV}$, input range is 0-31. Tuning range is $\pm 120 \text{ mV}$. The Stepping is 13mV on Turpan.

Configuration options: [Disabled] [Increase VDDIO] [Decrease VDDIO]



The following item appears only when **VDDIO Voltage Control** is set to **[Increase VDDIO]** or **[Decrease VDDIO]**.

Adjust MEM VDDIO Value

Configuration options: [0] - [31]

VTT Voltage Control

This item allows you to adjust VTT MEM, stepping is $VDDIO * (1/256)$. $VTT_MEM = VDDIO * (N / 256)$, input range is 113-143.

Configuration options: [Disabled] [Enabled]



The following item appears only when **VTT Voltage Control** is set to **[Enabled]**.

Adjust VTT MEM Value

Configuration options: [113] - [143]

NUMA nodes per socket

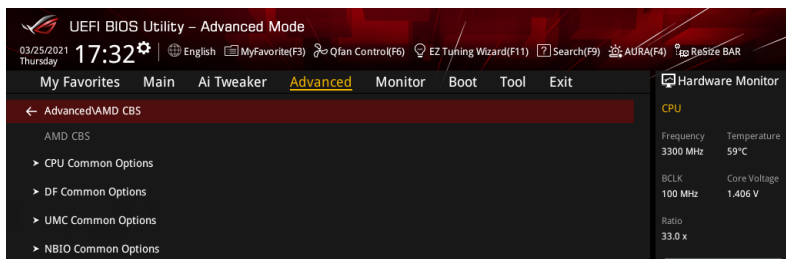
NUMA nodes per socket

Specifies the number of desired NUMA nodes per socket. Zero will attempt to interleave the two sockets together.

Configuration options: [Auto] [NPS0] [NPS1] [NPS2] [NPS4]

6.13 AMD CBS

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



CPU Common Options

Performance

Custom Core Pstates

This item allows you to enable custom P-states and throttling.



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.



The following items appear only when **[Accept]** is selected for **Custom Core Pstates**.

Custom Pstate0

Configuration options: [Auto] [Custom]



The following items appear only when **Custom Pstate0** is set to **[Custom]**.

Pstate0 Freq (MHz)

Specifies the core frequency(MHz).

Pstate0 VID

Specifies the core voltage.

Prefetcher settings

L1 Stream HW Prefetcher

This item allows you to enable or disable L1 Stream HW Prefetcher.
Configuration options: [Auto] [Disabled] [Enabled]

L2 Stream HW Prefetcher

This item allows you to enable or disable L2 Stream HW Prefetcher.
Configuration options: [Auto] [Disabled] [Enabled]

Core Watchdog

Core Watchdog Timer Enable

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



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

Core 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] [40.61ms] [82.53ms] [166.37ms] [334.05ms] [669.41ms] [1.340s] [2.681s] [5.364s] [10.730s] [21.461s]

Core Watchdog Timer Severity

Configuration options: [Auto] [No Error] [Transparent] [Corrected] [Deferred] [Uncorrected] [Fatal]

Core Performance Boost

This item allows you to Auto or disable Core Performance Boost.
Configuration options: [Auto] [Disabled]

Global C-state Control

This item allows you to control IO based C-state generation and DF C-states. There is another DF Cstate option which can be synchronized with this option if DF Cstate option is auto.

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

Power Supply Idle Control

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

SEV ASID Count

This field specifies the maximum valid ASID, which affects the maximum system physical address space. 16TB of physical address space is available for systems that support 253 ASIDs, while 8TB of physical address space is available for systems that support 509 ASIDs.

Configuration options: [253 ASIDs] [509 ASIDs] [Auto]

SEV-ES ASID Space Limit Control

Configuration options: [Auto] [Manual]



The following items appear only when **SEV-ES ASID Space Limit Control** is set to **[Manual]**.

SEV-ES ASID Space Limit

SEV VMs using ASIDs below the SEV-ES ASID Space Limit must enable the SEV-ES feature. The valid values for this field are from 0x1 (1) - 0x10 (16).

Configuration options: [1] - [510]

Streaming Stores Control

This item allows you to enable or disable the streaming stores functionality.

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

Local APIC Mode

Configuration options: [Compatibility] [xAPIC] [x2APIC] [Auto]

ACPI _CST C1 Declaration

This item allows you to enable or disable the C1 state declaration to the OS.

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

MCA error thresh enable

This item allows you to enable MCA error thresholding.

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



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

MCA error thresh count

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

PPIN Opt-in

This option allows you to turn on the PPIN feature.

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

Indirect Branch Prediction Speculation

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

DF Common Options

Scrubber

DRAM scrub time

This item allows you to set a number of hours to scrub memory.

Configuration options: [Disabled] [1 hour] - [48 hours] [Auto]

Poison scrubber control

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

Redirect scrubber control

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

Redirect scrubber limit

Controls the number of redirect scrubs allowed at any one time.

Configuration options: [2] [4] [8] [Infinite] [Auto]

Memory Addressing

NUMA nodes per socket

Specifies the number of desired NUMA nodes per socket. Zero will attempt to interleave the two sockets together.

Configuration options: [Auto] [NPS0] [NPS1] [NPS2] [NPS4]

Memory interleaving

This item allows for disabling memory channel interleaving.

Configuration options: [Disabled] [Auto]

Memory interleaving size

This item controls the memory interleaving size. The valid values are AUTO, 256 bytes, 512 bytes, 1 Kbytes, or 2 Kbytes. This also determines the starting address of the interleave (bit 8, 9, 10, or 11).

Configuration options: [256 Bytes] [512 Bytes] [1 KB] [2 KB] [Auto]

1TB remap

Attempt to remap DRAM out of the space just below the 1TB boundary.

The ability to remap depends on DRAM configuration, NPS, and interleaving selection, and may not always be possible.

Configuration options: [Do not remap] [Attempt to remap] [Auto]

DRAM map inversion

Inverting the map will cause the highest memory channels to get assigned the lowest addresses in the system.

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

ACPI SLIT Distance Control

This option determines how the SLIT distances are declared.

Configuration options: [Auto] [Manual]



The following item appears only when **ACPI SLIT Distance Control** is set to **[Auto]**.

ACPI SLIT remote relative distance

This item allows you to set the remote socket distance for 2P systems as near (2.8) or far (3.2).

Configuration options: [Near] [Far] [Auto]



The following items appear only when **ACPI SLIT Distance Control** is set to **[Manual]**.

ACPI SLIT same socket distance

Specify the distance to other physical domains within the same socket.

ACPI SLIT remote socket distance

Specify the distance to domains the remote socket.

ACPI SLIT local SLink distance

Specify the distance to an SLink domain on the same socket.

ACPI SLIT remote SLink distance

Specify the distance to an SLink domain on the other socket.

ACPI SLIT local inter-SLink distance

Specify the distance between two SLink domains on the same socket.

ACPI SLIT remote inter-SLink distance

Specify the distance between two SLink domains, each on a different socket.

Link

GMI encryption control

This item allows you to control the GMI link encryption.

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

xGMI encryption control

This item allows you to control the xGMI link encryption.

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

CAKE CRC perf bounds control

Configuration options: [Auto] [Manual]



The following item appears only when **CAKE CRC perf bounds control** is set to **[Manual]**.

CAKE CRC perf bounds

This item specifies the amount of performance loss that is acceptable to enable CRC protection. Units are in 0.00001%, RangeL disabled (0) - 10% (1000000).

4-link xGMI max speed

Configuration options: [6.4Gbps] [7.467Gbps] [8.533Gbps] [9.6Gbps] [10.667Gbps] [11Gbps] [12Gbps] [13Gbps] [14Gbps] [15Gbps] [16Gbps] [17Gbps] [18Gbps] [19Gbps] [20Gbps] [21Gbps] [22Gbps] [23Gbps] [24Gbps] [25Gbps] [Auto]

3-link xGMI max speed

Configuration options: [6.4Gbps] [7.467Gbps] [8.533Gbps] [9.6Gbps] [10.667Gbps] [11Gbps] [12Gbps] [13Gbps] [14Gbps] [15Gbps] [16Gbps] [17Gbps] [18Gbps] [19Gbps] [20Gbps] [21Gbps] [22Gbps] [23Gbps] [24Gbps] [25Gbps] [Auto]

xGMI TXEQ Mode

This option allows you to select the XGMI TXEQ/RX viewing mode.

Configuration options: [TXEQ_Disabled] [TXEQ_Lane] [TXEQ_Link] [TXEQ_RX_Vet] [Auto]

PcsCG Control

Configuration options: [Auto] [Enable]

Disable DF to external downstream IP SyncFloodPropagation

Disables Error propagation to UMC or any downstream slaves e.g. 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]

CC6 memory region encryption

This item controls whether or not the CC6 save/restore memory is encrypted.

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

Memory Clear

When this item is set to **[Disabled]**, BIOS does not implement MemClear after memory training (only if non-ECC DIMMs are used).

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

UMC Common Options

DDR4 Common Options

DRAM Timing Configuration



The following item appears only when **[Accept]** is selected for **DRAM Timing Configuration**.

Overclock

This item allows you to select memory overclock settings.

Configuration options: [Auto] [Enabled]

Memory Clock Speed

Specifies the memory clock frequency.

Configuration options: [Auto] [667MHz] [800MHz] [933MHz] [1067MHz] [1200MHz] [1333MHz] [1367MHz] [1400MHz] [1433MHz] [1467MHz] [1500MHz] [1533MHz] [1567MHz] [1600MHz] [1633MHz] [1667MHz] [1700MHz] [1733MHz] [1767MHz] [1800MHz] [1833MHz] [1867MHz] [1900MHz] [1933MHz] [1967MHz] [2000MHz] [2033MHz] [2067MHz] [2100MHz] [2133MHz] [2167MHz] [2200MHz] [2233MHz] [2267MHz] [2300MHz] [2333MHz] [2367MHz] [2400MHz] [2433MHz] [2467MHz] [2500MHz] [2550MHz] [2600MHz] [2650MHz] [2700MHz] [2750MHz] [2800MHz] [2850MHz] [2900MHz] [2950MHz] [3000MHz] [3050MHz] [3100MHz] [3150MHz] [3200MHz] [3250MHz] [3300MHz] [3350MHz] [3400MHz] [3450MHz] [3500MHz] [3550MHz] [3600MHz] [3650MHz] [3700MHz] [3750MHz] [3800MHz] [3850MHz] [3900MHz] [3950MHz] [4000MHz] [333MHz] [400MHz] [533MHz] [1050MHz] [1066MHz]

Tcl

Specifies the CAS latency.

Configuration options: [Auto] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk] [10h Clk] [11h Clk] [12h Clk] [13h Clk] [14h Clk] [15h Clk] [16h Clk] [17h Clk] [18h Clk] [19h Clk] [1Ah Clk] [1Bh Clk] [1Ch Clk] [1Dh Clk] [1Eh Clk] [1Fh Clk] [20h Clk] [21h Clk]

Trcdrd

Specifies the RAS# Active to CAS# Read Delay Time.

Configuration options: [Auto] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk] [10h Clk] [11h Clk] [12h Clk] [13h Clk] [14h Clk] [15h Clk] [16h Clk] [17h Clk] [18h Clk] [19h Clk] [1Ah Clk] [1Bh Clk]

Trcdwr

Specifies the RAS# Active to CAS# Write Delay Time.

Configuration options: [Auto] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk] [10h Clk] [11h Clk] [12h Clk] [13h Clk] [14h Clk] [15h Clk] [16h Clk] [17h Clk] [18h Clk] [19h Clk] [1Ah Clk] [1Bh Clk]

Trp

Specifies the Row Precharge Delay Time.

Configuration options: [Auto] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk] [10h Clk] [11h Clk] [12h Clk] [13h Clk] [14h Clk] [15h Clk] [16h Clk] [17h Clk] [18h Clk] [19h Clk] [1Ah Clk] [1Bh Clk]

Tras

Specifies the Active to Precharge Delay Time.

Configuration options: [Auto] [15h Clk] [16h Clk] [17h Clk] [18h Clk] [19h Clk] [1Ah Clk] [1Bh Clk] [1Ch Clk] [1Dh Clk] [1Eh Clk] [1Fh Clk] [20h Clk] [21h Clk] [22h Clk] [23h Clk] [24h Clk] [25h Clk] [26h Clk] [27h Clk] [28h Clk] [29h Clk] [2Ah Clk] [2Bh Clk] [2Ch Clk] [2Dh Clk] [2Eh Clk] [2Fh Clk] [30h Clk] [31h Clk] [32h Clk] [33h Clk] [34h Clk] [35h Clk] [36h Clk] [37h Clk] [38h Clk] [39h Clk] [3Ah Clk]

Trc Ctrl

Specifies Trc.

Configuration options: [Auto] [Manual]



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

Trc

Specifies Active to Active/Refresh Delay Time. Valid values 87h-1Dh.

TrrdS

Specifies the Activate to Activate Delay Time, different back group (tRRD_S).

Configuration options: [Auto] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk]

TrrdL

Specifies the Activate to Activate Delay Time, same back group (tRRD_L).

Configuration options: [Auto] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk]

Tfaw Ctrl

Specifies Tfaw.

Configuration options: [Auto] [Manual]



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

Tfaw

Specifies the Four Activate Window Time. Valid values 36h-6h.

TwtrS

Specifies the Minimum Write to Read Time, different bank group.
Configuration options: [Auto] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk]

TwtrL

Specifies the Minimum Write to Read Time, same bank group.
Configuration options: [Auto] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk]

Twr Ctrl

Specifies Twr.
Configuration options: [Auto] [Manual]



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

Twr

Specifies the Minimum Write Recovery Time. Valid values 51h-Ah.

Trcpage Ctrl

Specifies Trcpage.
Configuration options: [Auto] [Manual]



The following item appears only when **Trcpage Ctrl** is set to **[Manual]**.

Trcpage

SDRAM Optional Features (tMAW MAC). Valid values 3FFh-0h.

TrdrdScL Ctrl

Specifies TrdrdScL.
Configuration options: [Auto] [Manual]



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 Fh-1h.

TwrrwrScL Ctrl

Specifies TwrrwrScL.
Configuration options: [Auto] [Manual]



The following item appears only when **TwrrwrScL Ctrl** is set to **[Manual]**.

TwrrwrScL

Specifies the CAS to CAS Delay Time, same bank group. Valid values 3Fh-1h.

Trfc Ctrl

Specifies Trfc.
Configuration options: [Auto] [Manual]



The following item appears only when **Trfc Ctrl** is set to **[Manual]**.

Trfc

Specifies the Refresh Recovery Delay Time (tRFC1). Valid values 3DEh-3Ch.

Trfc2 Ctrl

Specifies Trfc2.

Configuration options: [Auto] [Manual]



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

Trfc2

Specifies the Refresh Recovery Delay Time (tRFC2). Valid values 3DEh-3Ch.

Trfc4 Ctrl

Specifies Trfc4.

Configuration options: [Auto] [Manual]



The following item appears only when **Trfc4 Ctrl** is set to **[Manual]**.

Trfc4

Specifies the Refresh Recovery Delay Time (tRFC4). Valid values 3DEh-3Ch.

Tcwl

Specifies the CAS Write Latency.

Configuration options: [Auto] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Eh Clk] [10h Clk] [12h Clk] [14h Clk]

Trtp

Specifies the Read CAS# to Precharge Delay Time.

Configuration options: [Auto] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk]

Tcke

Specifies the CKE minimum high and low pulse width in memory clock cycles.

Configuration options: [Auto] [1 Clk] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk] [10h Clk] [11h Clk] [12h Clk] [13h Clk] [14h Clk] [15h Clk] [16h Clk] [17h Clk] [18h Clk] [19h Clk] [1Ah Clk] [1Bh Clk] [1Ch Clk] [1Dh Clk] [1Eh Clk] [1Fh Clk]

Trdwr

Specifies the Read to Write turnaround timing.

Configuration options: [Auto] [1 Clk] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk] [10h Clk] [11h Clk] [12h Clk] [13h Clk] [14h Clk] [15h Clk] [16h Clk] [17h Clk] [18h Clk] [19h Clk] [1Ah Clk] [1Bh Clk] [1Ch Clk] [1Dh Clk] [1Eh Clk] [1Fh Clk]

Twrrd

Specifies the Write to Read turnaround timing.

Configuration options: [Auto] [1 Clk] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk]

TwrrSc

Specifies the Write to Write turnaround timing in the same chipselect.

Configuration options: [Auto] [1 Clk] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk]

TwrrSd

Specifies the Write to Write turnaround timing in the same DIMM.

Configuration options: [Auto] [1 Clk] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk]

TwrrDd

Specifies the Write to Write turnaround timing in a different DIMM.

Configuration options: [Auto] [1 Clk] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk]

TrdrSc

Specifies the Read to Read turnaround timing in the same chipselect.

Configuration options: [Auto] [1 Clk] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk]

TrdrSd

Specifies the Read to Read turnaround timing in the same DIMM.

Configuration options: [Auto] [1 Clk] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk]

TrdrDd

Specifies the Read to Read turnaround timing in a different DIMM.

Configuration options: [Auto] [1 Clk] [2 Clk] [3 Clk] [4 Clk] [5 Clk] [6 Clk] [7 Clk] [8 Clk] [9 Clk] [0Ah Clk] [0Bh Clk] [0Ch Clk] [0Dh Clk] [0Eh Clk] [0Fh Clk]

ProcODT

Specifies the Processor ODT.

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]

DRAM Controller Configuration

DRAM Power Options

Power Down Enable

This item allows you to enable or disable power down mode.

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

Disable Burst/Postponed Refresh

Configuration options: [Auto] [Enabled]



The following items appear only when **Disable Burst/Postponed Refresh** is set to **[Enabled]**.

SubUrgRefLowerBound

Specifies the stored refresh limit to required enter sub-urgent refresh mode. Valid value: 6 ~ 1

UrgRefLimit

Specifies the stored refresh limit to required enter urgent refresh mode. Valid value: 6 ~ 1

DRAM Maximum Activate Count

Override DIMM SPD Byte 7 [3:0] Maximum Activate Count (MAC). Auto is based on SPD setting.

Configuration options: [Untested MAC] [700 K] [600 K] [500 K] [400 K] [300 K] [200 K] [Unlimited MAC] [Auto]

Cmd2T

Select between 1T and 2T mode on ADDR/CMD.

Configuration options: [Auto] [1T] [2T]

Gear Down Mode

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

CAD Bus Configuration

CAD Bus Timing User Controls

This item allows you to set the CAD bus signals to Auto or Manual.

Configuration options: [Auto] [Manual]



The following items appear only when you set CAD Bus Timing User Controls to **[Manual]**.

AddrCmdSetup

This item allows you to setup time on CAD bus signals. Valid values 3Fh - 0h.

Configuration options: [0] - [39]

CsOdtSetup

This item allows you to setup time on CAD bus signals. Valid values 3Fh - 0h.

Configuration options: [0] - [39]

CkeSetup

This item allows you to setup time on CAD bus signals. Valid values 3Fh - 0h.

Configuration options: [0] - [39]

CAD Bus Drive Strength User Controls

This item allows you to set the CAD bus signals to Auto or Manual.

Configuration options: [Auto] [Manual]



The following items appear only when **CAD Bus Drive Strength User Controls** is set to **[Manual]**.

ClkDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

AddrCmdDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

CsOdtDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

CkeDrvStren

Configuration options: [Auto] [120.0 Ohm] [60.0 Ohm] [40.0 Ohm] [30.0 Ohm] [24.0 Ohm] [20.0 Ohm]

Data Bus Configuration

Data Bus Configuration User Controls

This item allows you to specify the mode for drive strength.

Configuration options: [Auto] [Manual]



The following items appear only when **Data Bus Configuration User Controls** is set to **[Manual]**.

RttNom

Configuration options: [Auto] [Rtt_Nom Disable] [RZQ/4] [RZQ/2] [RZQ/6] [RZQ/1] [RZQ/5] [RZQ/3] [RZQ/7]

RttWr

Configuration options: [Auto] [Dynamic ODT Off] [RZQ/2] [RZQ/1] [Hi-Z] [80 Ohm]

RttPark

Configuration options: [Auto] [Rtt_PARK Disable] [RZQ/4] [RZQ/2] [RZQ/6] [RZQ/1] [RZQ/5] [RZQ/3] [RZQ/7]

Common RAS

Data Poisoning

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

DRAM Post Package Repair

Configuration options: [Enabled] [Disabled]

RCD Parity

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

DRAM Address Command Parity Retry

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



The following items appear only when **DRAM Address Command Parity Retry** is set to **[Enabled]**.

Max Parity Error Replay

Configuration options: [0] - [39]

Write CRC Enable

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

DRAM Write CRC Enable and Retry Limit

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



The following items appear only when **DRAM Write CRC Enable and Retry Limit** is set to **[Enabled]**.

Max Write CRC Error Replay

Configuration options: [0] - [39]

Disable Memory Error Injection

Configuration options: [True] [False]

ECC Configuration

DRAM ECC Symbol Size

Configuration options: [x4] [x8] [x16] [Auto]

DRAM ECC Enable

This option will allow you to enable or disable DRAM ECC. If you set **[Auto]** ECC will be enabled.

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

DRAM UECC Retry

This option will allow you to enable or disable DRAM UECC Retry.

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

Security

TSME

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

Data Scramble

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

Phy Configuration

PMU Training

DFE Read Training

Perform 2D Read Training with DFE on.

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

FFE Training

Perform 2D Write Training with DFE on.

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

PMU Pattern Bits Control

Configuration options: [Auto] [Manual]



The following item appears only when you set **PMU Pattern Bits Control** to **[Manual]**.

PMU Pattern Bits

Configuration options: [0] - [A]

MR6VrefDQ Control

Configuration options: [Auto] [Manual]



The following item appears only when you set **MR6VrefDQ Control** to **[Manual]**.

MR6VrefDQ

Configuration options: [0] - [7F]

CPU Vref Training Seed Control

Configuration options: [Auto] [Manual]



The following item appears only when you set **CPU Vref Training Seed Control** to **[Manual]**.

CPU Vref Training Seed

Configuration options: [0] - [FF]

DRAM Memory Mapping

Chipselect Interleaving

This item allows you to set interleave memory blocks across the DRAM chip selects for node 0.

Configuration options: [Disabled] [Auto]

BankGroupSwap

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



Please set **BankGroupSwapAlt** to **[Disabled]** if **BankGroupSwap** is set to **[Enabled]**.

BankGroupSwapAlt

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



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

Address Hash Bank 2 ColXor

Configuration options: [0] - [FFF]

Address Hash Bank

This item allows you to enable or disable bank address hashing.

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

Address Hash CS

This item allows you to enable or disable CS address hashing.
Configuration options: [Enabled] [Disabled] [Auto]

Address Hash Rm

This item allows you to enable or disable RM address hashing.
Configuration options: [Enabled] [Disabled] [Auto]

SPD Read Optimization

This item allows you to enable or disable SPD Read Optimization, if set to **[Enabled]**, SPD reads are skipped for Reserved fields and most of upper 256 Bytes. If set to **[Disabled]**, read all 512 SPD Bytes.
Configuration options: [Enabled] [Disabled] [Auto]

NVDIMM

Memory MBIST

MBIST Enable

This item allows you to enable or disable Memory MBIST.
Configuration options: [Enabled] [Disabled]



The following item appears only when **MBIST Enable** is set to **[Enabled]**.

MBIST Test Mode

This item allows you to select the MBIST Test Mode.

[Interface Mode]	Tests Single and Multiple CS Transactions and Basic Connectivity.
[Data Eye Mode]	Measures voltage vs. Timing.

MBIST Aggressors

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

MBIST Per Bit Slave Die Reporting

This item allows you to enable or disable MBIST per bit slave die result report.
Configuration options: [Enabled] [Disabled] [Auto]

Data Eye

Pattern Select

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

Pattern Length

This token helps to determine the pattern length.
Configuration options: [3] - [12]

Aggressor Channel

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

Aggressor Static Lane Control

Configuration options: [Disabled] [Enabled]



The following items appear only when **Aggressor Static Lane Control** is set to **[Enabled]**.

Aggressor Static Lane Select Upper 32 bits

Static Lane Select for Upper 32 bits. The bit mask represents the bits to be read.

Aggressor Static Lane Select Lower 32 bits

Static Lane Select for Lower 32 bits. The bit mask represents the bits to be read.

Aggressor Static Lane Select ECC

Static Lane Select for ECC Lanes. The bit mask represents the bits to be read.

Aggressor Static Lane Value

Target Static Lane Control

Configuration options: [Enabled] [Disabled]



The following items appear only when **Target Static Lane Control** is set to **[Enabled]**.

Target Static Lane Select Upper 32 bits

Static Lane Select for Upper 32 bits. The bit mask represents the bits to be read.

Target Static Lane Select Lower 32 bits

Static Lane Select for Lower 32 bits. The bit mask represents the bits to be read.

Target Static Lane Select ECC

Target Static Lane Value

Worst Case Margin Granularity

Configuration options: [Per Chip Select] [Per Nibble]

Read Voltage Sweep Step Size

This option determines the step size for Read Data Eye voltage sweep.
Configuration options: [1] [2] [4]

Read Timing Sweep Step Size

This option determines the step size for Read Data Eye.
Configuration options: [1] [2] [4]

Write Voltage Sweep Step Size

This option determines the step size for Write Data Eye voltage sweep.
Configuration options: [1] [2] [4]

Write Timing Sweep Step Size

This option determines the step size for write Data Eye.
Configuration options: [1] [2] [4]

NBIO Common Options

IOMMU

This item allows you to enable or disable IOMMU.

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

XFR Enhancement



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.



The following items appear only when **[Accept]** is selected for **XFR Enhancement**.

Precision Boost Overdrive

[Auto]	Auto.
[Disable]	Stock board values for standard IRM.
[Enable]	Loads board limits for EDC, TDC, and PPT.
[Manual]	Manual setting of PPT, EDC, and EDC.



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

PPT Limit

This item allows you to input the PPT Limit [W], Board Socket Power capability, which is adjustable up to the motherboard programmed PPT limit.

Configuration options: [0] - [65535]

TDC Limit

This item allows you to input the TDC Limit [A], Board thermally constrained current delivery capability, which is adjustable up to the motherboard programmed TDC limit.

Configuration options: [0] - [65535]

EDC Limit

This item allows you to input the EDC Limit [A], Board electrically constrained current delivery capability, which is adjustable up to the motherboard programmed EDC limit.

Configuration options: [0] - [65535]

Precision Boost Overdrive Scalar

This item allows you to manually set, or disable the part runs with a scalar of customized value.

Configuration options: [Auto] [Disabled] [Manual]



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

Customized Precision Boost Overdrive Scalar

The Precision Boost Overdrive Scalar 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]

FCLK Frequency

This item allows you to specify the FCLK frequency.

Configuration options: [Auto] [667MHz] - [4000MHz]

SOC OVERCLOCK VID

Specifies the Voltage ID (VID) value for VDDR_SOC to support overclocking.

Configuration options: [0] - [99]

UCLK DIV1 MODE

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

VDDP Voltage Control

This item allows you to set a customized VDDP voltage.

Configuration options: [Auto] [Manual]



The following item appears only when **VDDP Voltage Control** is set to **[Manual]**.

VDDP Voltage

VDDP is a voltage for the DDR4 bus signaling ('PHY'), and it is derived from your DRAM Voltage ('VDDIO_Mem'). As a result, VDDP (input in mV) can approach but not exceed your DRAM Voltage.

VDDG Voltage Control

This item allows you to set a customized VDDG voltage.

Configuration options: [Auto] [Manual]



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

VDDG Voltage

VDDG represents voltage for the data portion of the Infinity Fabric. It is derived from the CPU SoC/Uncore Voltage (VDD_SOC). VDDG (input in mV) can approach but not exceed VDD_SOC.

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] [Disabled] [Enabled]

LN2 Mode

Send a message to SMU to help with cold boot and operating under LN2 conditions for GMI2.

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

ACS Enable

AER must be enabled for ACS enable to work.

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

PCIe ARI Support

This item allows you to enable Alternative Routing-ID Interpretation.

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

PCIe ARI Enumeration

ARI Forwarding Enable for each downstream port.

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

PCIe Ten Bit Tag Support

This item enables PCIe ten bit tags for supported devices. [Auto] = [Disabled].

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

SMU Common Options

Max Voltage Offset

This item allows you to limit maximum CPU voltage for compact coolers, small form factor, or performance tuning.

Configuration options: [Auto] [25] [50] [75] [100]

cTDP Control

[Auto] Use the fused TDP.

[Manual] User can set customized TDP.



TDP is used to define the RC thermal model only.



The following item appears only when **cTDP Control** is set to **[Manual]**.

cTDP

This item allows you to customize cTDP.

EfficiencyModeEn

[Auto] Use performance optimized CCLK DPM settings.

[Enabled] Use performance optimized CCLK DPM settings.

Power Package Limit Control

[Auto] Use the fused PPT.

[Manual] User can set customized PPT.



The following item appears only when **Power Package Limit Control** is set to **[Manual]**.

Power Package Limit

This item allows you to customize PPT.

APBDIS

[0] Not APBDIS (mission mode)

[1] APBDIS

[Auto] Auto

DF Cstates

This item allows you to enable or disable DF C-states.

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

CPPC

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

CPPC Preferred Cores

- [Enabled] CPPC highest capability register of each thread will have a different value to express the AMD recommended scheduling order to OS. CPPC must be enabled for this parameter to have effect.
- [Disabled] Does not declare AMD preferred scheduling order to OS.
- [Auto] Auto.

NBIO LCLK DPM

NBIO DPM Control

This setting controls how the NBIO Power Management is controlled.

- [Auto] Default SMU control.
- [Manual] Allows individual NBIO DPM Levels to be set.



The following items appear only when **NBIO DPM Control** is set to **[Manual]**.

Socket 0-1 NBIO 0-3 Target DPM Level

- [Auto] Default SMU Control for the specified NBIO.
- [1] DPM Value for specified NBIO is 300 MHz.
- [2] DPM Value for specified NBIO is 600 MHz.

Early Link Speed

This item allows you to set Early Link Speed.

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

Presence Detect Select mode

This item allows you to control the Presence Detect Select mode.

Configuration options: [OR] [AND] [Auto]

Preferred IO

- [Auto] Default.
- [Manual] Set Bus number manually.



The following items appear only when **Preferred IO** is set to **[Manual]**.

Preferred IO Bus

Configure the preferred IO bus number.

CV test

Set this to **[Enabled]** to support running PCIECV tool. Selecting **[Auto]** will preserve h/w defaults.

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

Loopback Mode

This item allows you to enable or disable PCIe Loopback Mode.

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

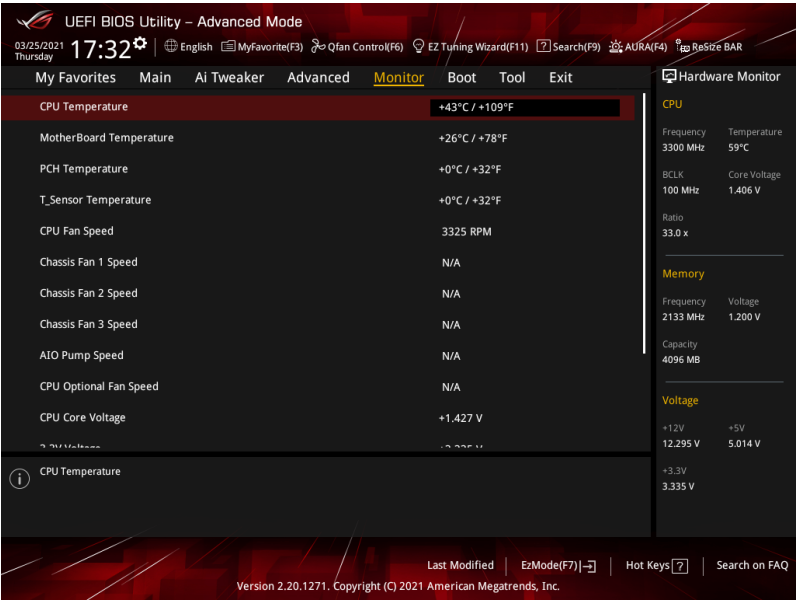
SRIS

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

7. Monitor menu

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

Scroll down to display the other BIOS items.



CPU Temperature, MotherBoard Temperature, PCH Temperature, T_Sensor Temperature [xxx°C/xxx°F]

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

CPU Fan Speed, CPU Optional Fan Speed, Chassis Fan Speed, AIO PUMP Speed [xxxx RPM]

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

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

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

Q-fan Configuration

Q-fan Tuning

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

CPU Fan Q-Fan Control

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

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



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

CPU Fan Step Up/Down

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

Configuration options: [0 sec] [2.6 sec] [3.8 sec] [5.1 sec] [6.4 sec] [7.7 sec] [15.9 sec] [31.9 sec] [63.8 sec] [255 sec]

CPU Fan Speed Low Limit

This item allows you to set the lower speed limit for assigned fan/pump. A warning message will appear when the limit is reached. Select **[Ignore]** if you do not wish to see the warning message in the future.

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

CPU Fan Profile

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

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



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

CPU Fan Upper Temperature

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



The fan/pump upper temperature cannot be lower than the fan/pump lower temperature.

CPU Fan Max. Duty Cycle (%)

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

CPU Fan Middle Temperature

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

CPU Fan Middle. Duty Cycle (%)

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

CPU Fan Lower Temperature

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

CPU Fan Min. Duty Cycle(%)

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

Chassis Fan(s) Configuration

Chassis Fan 1-3 Q-Fan Control

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

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



The following items appear only when **Chassis Fan 1-3 Q-Fan Control** is set to **[Auto]**, **[PWM Mode]**, or **[DC Mode]**.

Chassis Fan 1-3 Q-Fan Source

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

Configuration options: [CPU] [MotherBoard] [PCH] [T_Sensor] [Multiple Sources]



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

Chassis Fan 1-3 Step Up/Down

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

Configuration options: [0 sec] [2.6 sec] [3.8 sec] [5.1 sec] [6.4 sec] [7.7 sec] [15.9 sec] [31.9 sec] [63.8 sec] [255 sec]

Chassis Fan 1-3 Speed Low Limit

This item allows you to set the lower speed limit for assigned fan/pump. A warning message will appear when the limit is reached. Select **[Ignore]** if you do not wish to see the warning message in the future.

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

Chassis Fan 1-3 Profile

This item allows you to set the appropriate performance level of the Chassis Fan.

[Standard] Sets to **[Standard]** to make the Chassis Fan automatically adjust depending on the chassis temperature.

[Silent] Sets to **[Silent]** to minimize the fan speed for quiet Chassis Fan operation.

[Turbo] Sets to **[Turbo]** to achieve maximum Chassis Fan speed.

[Manual] Sets to **[Manual]** to assign detailed fan speed control parameters.



- The following items appear only when **Chassis Fan 1-3 Profile** is set to **[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.

Chassis Fan 1-3 Upper Temperature

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



The fan/pump upper temperature cannot be lower than the fan/pump lower temperature.

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

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

Chassis Fan 1-3 Middle Temperature

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

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

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

Chassis Fan 1-3 Lower Temperature

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

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

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

AIO PUMP Q-Fan Control

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



- The following items appear only when **AIO PUMP Q-Fan Control** is set to **[Auto]**, **[DC mode]** or **[PWM mode]**.
- 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.

AIO PUMP Upper Temperature

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



The fan/pump upper temperature cannot be lower than the fan/pump lower temperature.

AIO PUMP Max. Duty Cycle (%)

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

AIO PUMP Middle Temperature

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

AIO PUMP Middle. Duty Cycle (%)

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

AIO PUMP Lower Temperature

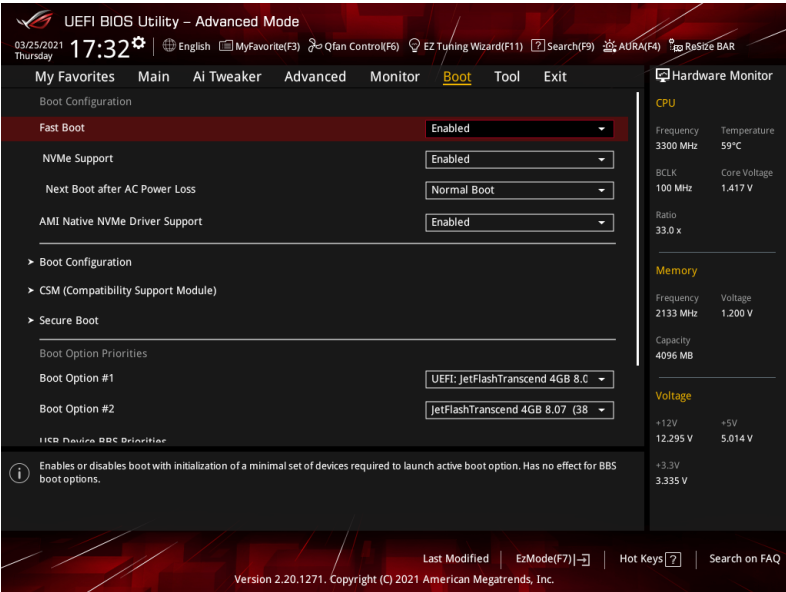
Use the <+> or <-> keys to adjust the lower limit of the AIO PUMP temperature. The fan/pump will operate at the minimum duty cycle when the temperature is lower than the limit.

AIO PUMP Min. Duty Cycle(%)

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

8. Boot menu

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



Fast Boot

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



The following item appears only when you set **Fast Boot** to **[Enabled]**.

NVMe Support

If this item is set to **[Disabled]**, NVMe device will be skipped.
Configuration options: [Disabled] [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.

AMI Native NVMe Driver Support

This item allows you to enable or disable AMI Native NVMe driver.
Configuration options: [Disabled] [Enabled]

Boot Configuration

Boot Logo Display

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



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

Post Delay Time

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



This feature only works when set under normal boot.



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

Post Report

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

Boot up NumLock State

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

Wait For 'F1' If Error

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

Option ROM Messages

[Force BIOS]	The Option ROM Messages will be shown during the POST.
[Keep Current]	Only the ASUS logo will be shown during the POST.

Interrupt 19 Capture

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

Setup Mode

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

CSM (Compatibility Support Module)

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

Launch CSM

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



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

Boot Device Control

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

Configuration options: [UEFI and Legacy OPROM] [Legacy OPROM only] [UEFI only]

Boot from Network Devices

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

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

Boot from Storage Devices

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

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

Boot from PCI-E/PCI Expansion Devices

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

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

Secure Boot

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

OS Type

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

Key Management

Install Default Secure Boot keys

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

Clear Secure Boot keys

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

Save all Secure Boot variables

This item allows you to save the PK (Platform Keys) to a USB storage device.

PK Management

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

Details

This item allows you to view the details of the PK.

Save to file

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

Set New key

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

Delete key

This item allows you to delete the PK from your system. Once the PK is deleted, all the system's Secure Boot keys will not be active.
Configuration options: [Yes] [No]



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

KEK Management

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



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

Details

This item allows you to view the details of the KEK.

Save to file

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

Set New key

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

Append Key

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

Delete key

This item allows you to delete the KEK from your system.
Configuration options: [Yes] [No]



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

DB Management

The 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

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

Set New key

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

DBX Management

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

Details

This item allows you to view the details of the dbx.

Save to file

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

Set New key

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

Append Key

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

Delete key

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

Configuration options: [Yes] [No]



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

Boot Option Priorities

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



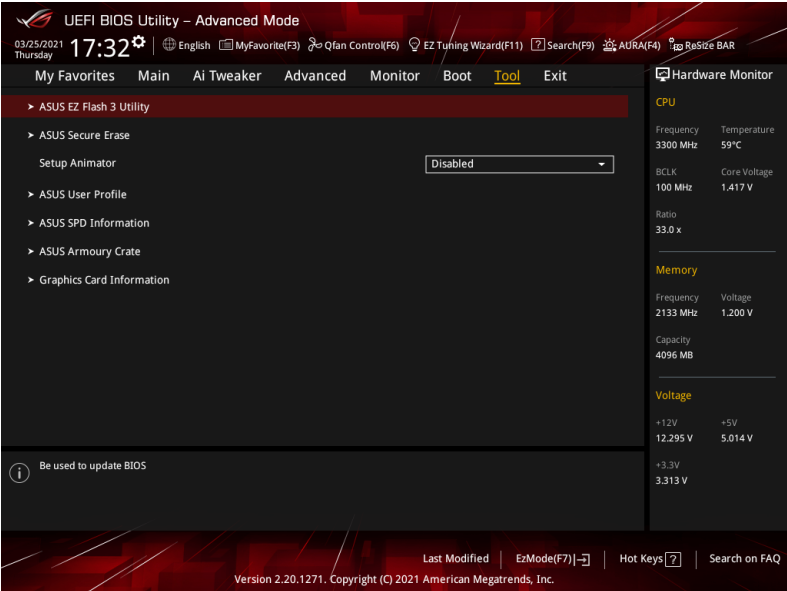
- To access Windows® OS in Safe Mode, press <F8 > after POST (Windows® 8 not supported).
 - To select the boot device during system startup, press <F8> when ASUS Logo appears.
-

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.



Setup Animator

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.



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 > Secure Erase** on the Advanced mode menu.



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

Displays the available SSDs

Port #	SSD Name	Status	Total Capacity
P2	ADATA S90 Turbo	Frozen	64GB

SSD speed performance may degrade over time due to accumulated files and frequent data writing. Secure Erase completely erases your SSD and restores it to its factory settings.
Warning! Erase that you run Secure Erase on a compatible SSD. Running Secure Erase on an incompatible SSD will render the SSD totally unusable.
NOTE: For the list of Secure Erase-compatible SSDs, visit the ASUS Support Site at www.asus.com/support

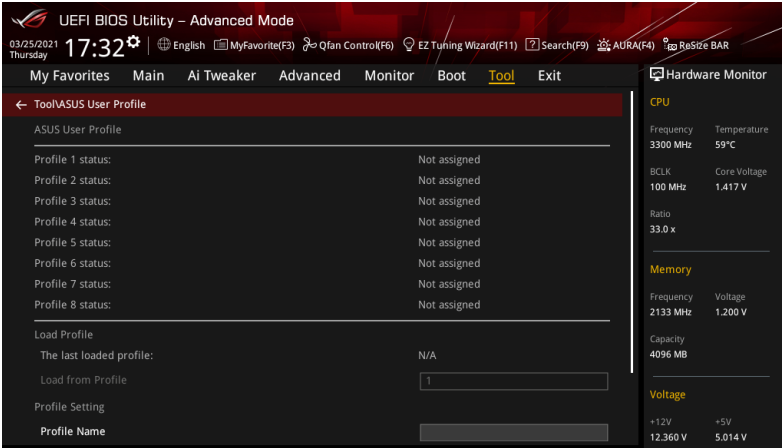


Status definition:

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

9.3 ASUS User Profile

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



Load from Profile

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



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

Profile Name

This item allows you to key in a profile name.

Save to Profile

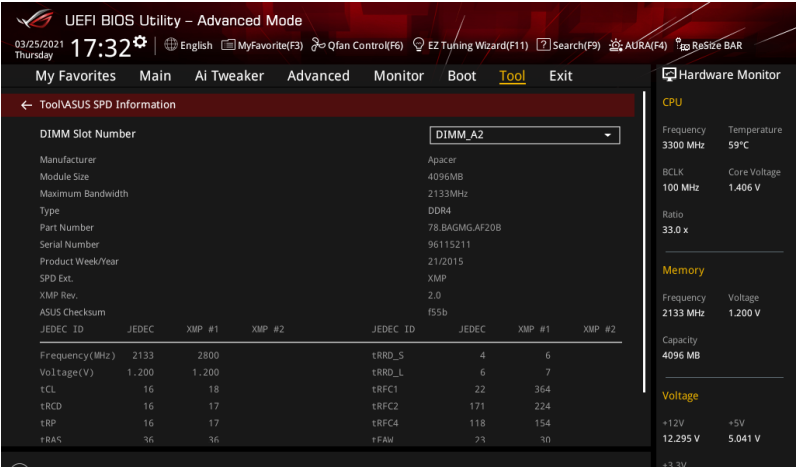
This item allows you to save the current BIOS settings to the BIOS Flash, and create a profile. Key in a profile number from one to eight, press <Enter>, and then select **Yes**.

Load/Save Profile from/to USB Drive

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

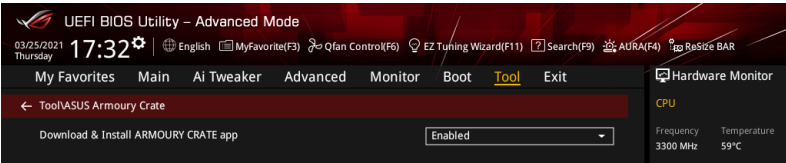
9.4 ASUS SPD Information

This item allows you to view the DRAM SPD information.



9.5 ASUS Armoury Crate

This item allows you to enable or disable downloading and installing of the Armoury Crate app in the Windows® OS. The Armoury Crate app can help you manage and download the latest ROG drivers and utilities for your motherboard.



Download & Install ARMOURY CRATE app

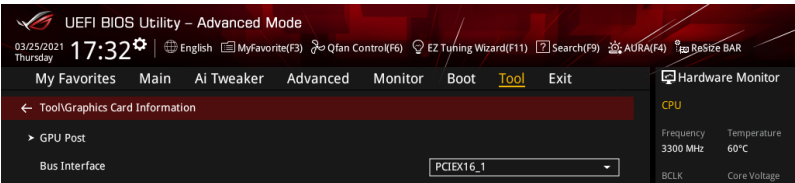
Configuration options: [Disabled] [Enabled]

9.6 Graphics Card Information

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



This feature is only supported on selected ASUS graphics cards.

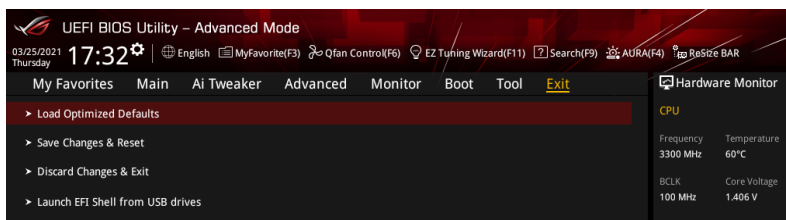


GPU Post

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

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.



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

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

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

11.1 EZ Update

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

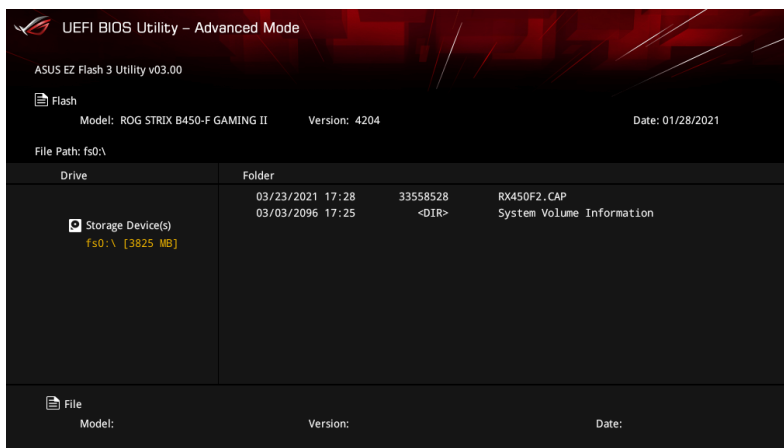


- EZ Update requires an Internet connection either through a network or an ISP (Internet Service Provider).
 - This utility is available in the support DVD that comes with the motherboard package
-

11.2 Updating BIOS

ASUS EZ Flash 3 allows you to download and update to the latest BIOS using a USB drive.

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 the 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** Info 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.



11.3 ASUS CrashFree BIOS 3

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



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

Recovering the BIOS

To recover the BIOS:

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



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