Pro WS W680M-ACE SE

BIOS Manual

Motherboard

E22258
First Edition
September 2023

Contents

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

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

2. BIOS setup program

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

Entering BIOS at startup

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

Entering BIOS Setup after POST

To enter BIOS Setup after POST:

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

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

- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- 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.

3. Managing and updating your BIOS

The following utilities allow you to manage and update the motherboard Basic Input/Output System (BIOS) setup:

1. ASUS CrashFree BIOS 3

   To recover the BIOS using a bootable USB flash disk drive when the BIOS file fails or gets corrupted.

2. ASUS EzFlash

   Updates the BIOS using a USB flash disk.

3. BUPDATER

   Updates the BIOS in DOS mode using a bootable USB flash disk drive.

Refer to the corresponding sections for details on these utilities.

Save a copy of the original motherboard BIOS file to a bootable USB flash disk drive in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the BUPDATER utility.

3.1 ASUS CrashFree BIOS 3 utility

The ASUS CrashFree BIOS 3 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 update a corrupted BIOS file using a USB flash drive that contains the updated BIOS file.

Prepare a USB flash drive containing the updated motherboard BIOS before using this utility.

Recovering the BIOS from a USB flash drive

To recover the BIOS from a USB flash drive:

1. Insert the USB flash drive with the original or updated BIOS file to one USB port on the system.
2. The utility will automatically recover the BIOS. It resets the system when the BIOS recovery finished.

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

The recovered BIOS may not be the latest BIOS version for this motherboard. Visit the ASUS website at www.asus.com to download the latest BIOS file.

3.2 ASUS EzFlash Utility

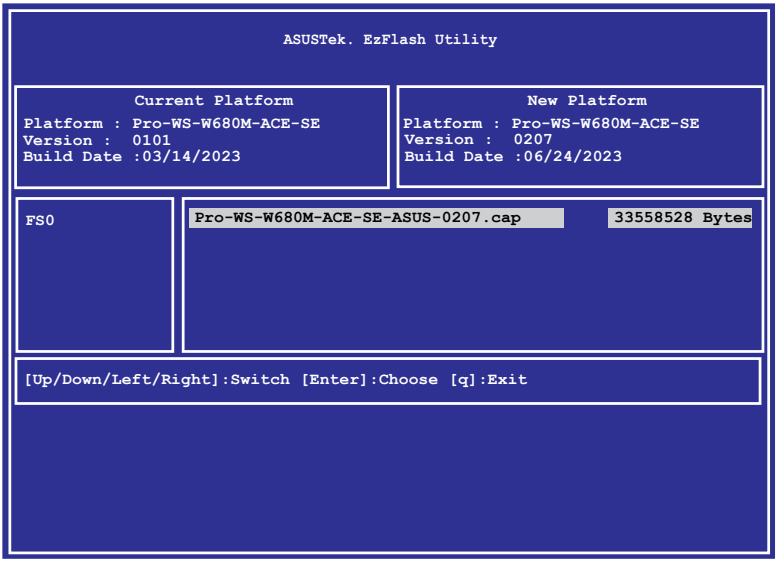
The ASUS EzFlash Utility feature allows you to update the BIOS using a USB flash disk without having to use a DOS-based utility.

Download the latest BIOS from the ASUS website at www.asus.com before using this utility.

The succeeding BIOS screens are for reference only. The actual BIOS screen displays may not be the same as shown.

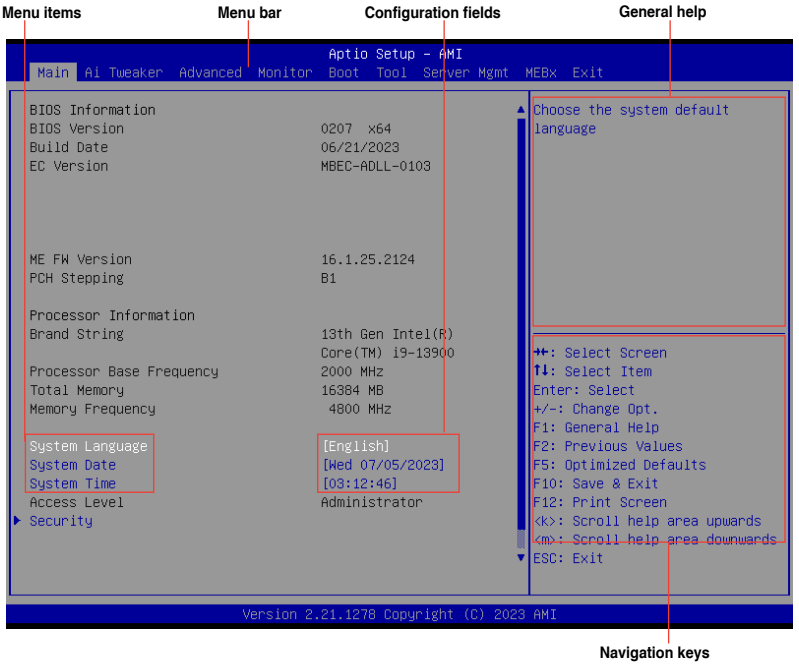
To update the BIOS using EzFlash Utility:

1. Insert the USB flash disk that contains the latest BIOS file to the USB port.
2. Enter the BIOS setup program. Go to the **Tool** menu to select **Start EzFlash** and press <Enter> to enable it.



3. Press the Left arrow key to switch to the **Drive** field.
4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS then press <Enter>.
5. Press the Right arrow key to switch to the **Folder Info** field.
6. Press the Up/Down arrow keys to find the BIOS file then press <Enter>.
7. Reboot the system when the update process is done.

4. BIOS menu screen



4.1 Menu bar

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

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
Server Mgmt	For configuring IPMI options
MEBx	For configuring Intel Management Engine BIOS Extension (MEBx) settings.
Exit	For selecting the save & exit options

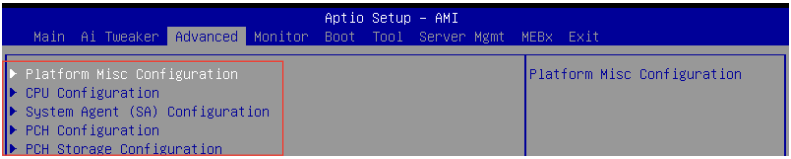
To select an item on the menu bar, press the right or left arrow key on the keyboard until the desired item is highlighted.

4.2 Menu items

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

4.3 Submenu items

A solid triangle before each item on any menu screen means that the item has a submenu. To display the submenu, select the item and press <Enter>.



4.4 Navigation keys

At the bottom right corner of a menu screen are the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

4.5 General help

At the top right corner of the menu screen is a brief description of the selected item.

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

4.7 Pop-up window

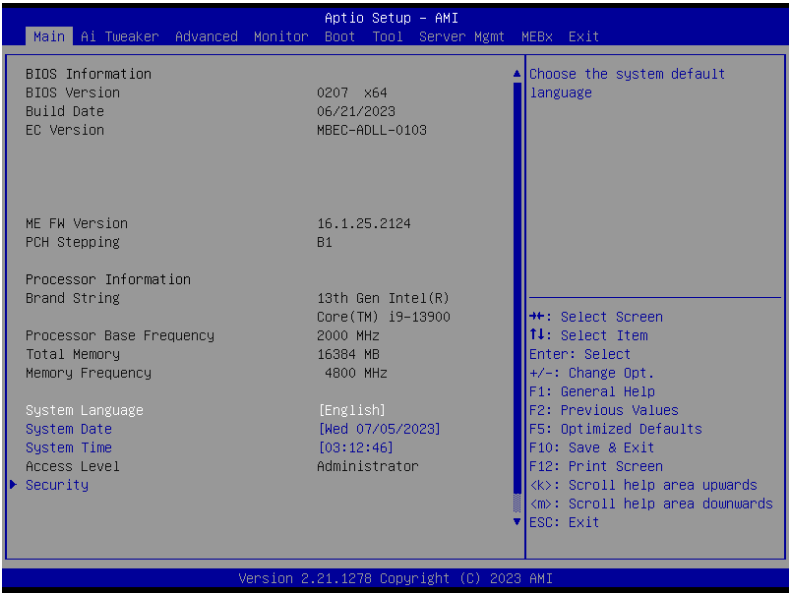
Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

4.8 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.

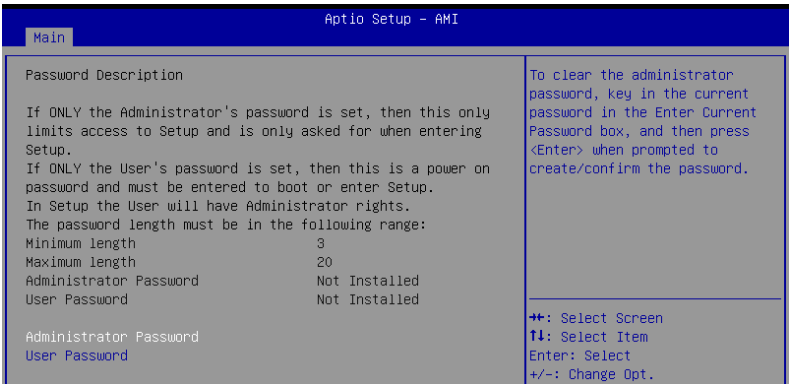
5. Main menu

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 the motherboard 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]**.

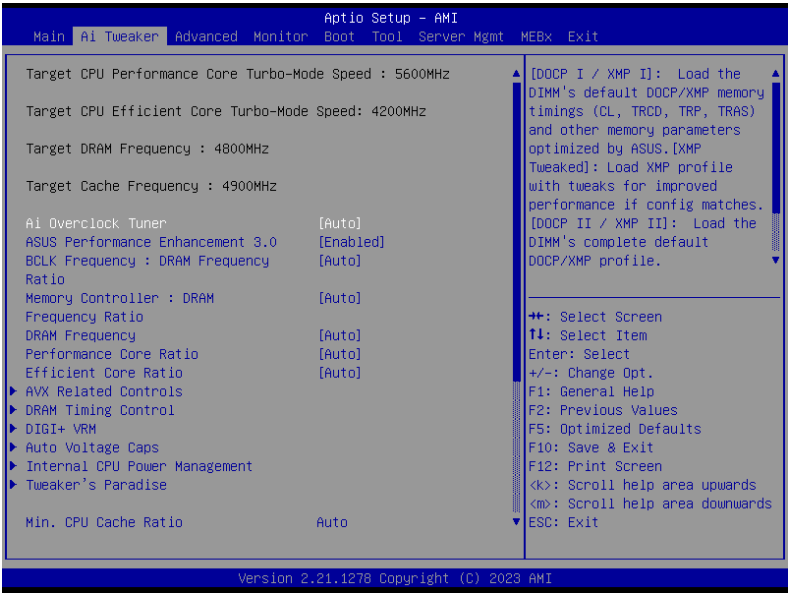
6. Ai Tweaker menu

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

[Auto] Loads the optimal settings for the system.

[AEMP] Loads the memory parameters profile which is optimized by ASUS if no DIMM profiles are detected.

[XMP I] Load the DIMM's default XMP memory timings (CL, TRCD, TRP, TRAS) and other memory parameters optimized by ASUS.

[XMP II] Load the DIMM's complete default XMP profile. Load the memory parameters profile optimized by ASUS if no DIMM profiles detected.

The configuration options for this item depends on the DIMM installed.

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

AEMP

Allows you to select your ASUS Enhanced Memory Profile (AEMP). Each profile has its own DRAM frequency, timing and voltage.

The following item appears only when **Ai Overclock Tuner** is set to **[XMP I]** or **[XMP II]**.

XMP

Allows you to select your XMP Profile. Each profile has its own DRAM frequency, timing and voltage.

Intel(R) Adaptive Boost Technology

Allows you to enable or disable IABT to improve performance by allowing higher multi-core turbo frequencies. Operating within system power and temperature specifications when current, power and thermal headroom exists, please ensure quality cooling for the CPU before enabling the ABT function.
Configuration options: [Auto] [Disabled] [Enabled]

BCLK Frequency : DRAM Frequency Ratio

[Auto]	The BCLK frequency to DRAM frequency ratio will be set to the optimized setting.
[100:133]	The BCLK frequency to DRAM frequency ratio will be set to 100:133.
[100:100]	The BCLK frequency to DRAM frequency ratio will be set to 100:100.

Memory Controller : DRAM Frequency Ratio

BCLK Frequency: DRAM Frequency Ratio of 100:133 tends to overclock better and 1:2 Memory Controller: DRAM Frequency Ratio only works with even numbered DRAM Ratios and not odd numbered ratios.
Configuration options: [Auto] [1:1] [1:2] [1:4]

DRAM Frequency

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] [DDR5-800MHz] - [DDR5-13333MHz]

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

The frequency ratios in grey are not recommended, use BCLK + ratios in white to reach your target frequency if needed.

Performance Core Ratio

[Auto] The system will adjust all Performance core ratios automatically.

[Sync All Cores] Configure a core ratio limit to synchronize all Performance cores.

[By Core Usage] Configure the ratio limits for active cores depending on how many Performance cores are being utilized.

The following item appears only when **Performance Core Ratio** is set to **[Sync All Cores]**.

ALL-Core Ratio Limit

Enter **[Auto]** to apply the CPU default Turbo Ratio setting or manually assign a Core ratio limit to synchronize all cores. Use the <+> or <-> to adjust the value.
Configuration options: [Auto] [8] - [45]

The following items appear only when **Performance Core Ratio** is set to **[By Core Usage]**.

1-Core Ratio Limit / 2-Core Ratio Limit / 3-Core Ratio Limit / 4-Core Ratio Limit / 5-Core Ratio Limit / 6-Core Ratio Limit / 7-Core Ratio Limit / 8-Core Ratio Limit

The N-core ratio limit must be higher than or equal to the (N+1)-core ratio limit. (N stands for the number of CPU cores) The core ratio limit cannot be set to **[Auto]** when the core number is lower than N. The biggest core's ratio limit must be lower than or equal to the second biggest core's ratio limit. Use the <+> or <-> to adjust the value.
Configuration options: [Auto] [21] - [49]

Efficient Core Ratio

[Auto] The system will adjust all Efficient core ratios automatically.

[Sync All Cores] Configure a core ratio limit to synchronize all Efficient cores.

[By Core Usage] Configure the ratio limits for active cores depending on how many Efficient cores are being utilized.

[AI Optimized] Use AI to optimize the Efficient core ratios.

The following item appears only when **Efficient Core Ratio** is set to **[Sync All Cores]**.

ALL-Core Ratio Limit

Allows you to set the ratio limit for Efficient cores when N Efficient cores are loaded. Use the <+> or <-> to adjust the value.
Configuration options: [Auto] [8] - [34]

The following items appear only when **Performance Core Ratio** is set to **[By Core Usage]**.

Efficient 1-Core Ratio Limit / Efficient 2-Core Ratio Limit / Efficient 3-Core Ratio Limit / Efficient 4-Core Ratio Limit

Configuration options: [Auto] [16] - [36]

AVX Related Controls

AVX2

Allows you to enable or disable the AVX 2 Instructions.
Configuration options: [Auto] [Disabled] [Enabled]

DRAM Timing Control

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

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

Primary Timings

DRAM CAS# Latency

Configuration options: [Auto] [2] - [66]

DRAM RAS# to CAS# Delay Read

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

DRAM RAS# to CAS# Delay Write

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

DRAM RAS# PRE Time

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

DRAM RAS# ACT Time

Configuration options: [Auto] [1] - [511]

DRAM Command Rate

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

The following item appears only when **DRAM Command Rate** is set to **[N:1]**.

N to 1 ratio

Number of bubbles between each valid command cycle.
Configurations: [1] - [7]

Secondary Timings

DRAM RAS# to RAS# Delay L

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

DRAM RAS# to RAS# Delay S

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

DRAM REF Cycle Time

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

DRAM REF Cycle Time 2

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

DRAM REF Cycle Time Same Bank

Configuration options: [Auto] [0] - [2047]

DRAM Refresh Interval

Configuration options: [Auto] [1] - [262143]

DRAM WRITE Recovery Time

Configuration options: [Auto] [1] - [234]

DRAM READ to PRE Time

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

DRAM FOUR ACT WIN Time

Configuration options: [Auto] [1] - [511]

DRAM WRITE to READ Delay

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

DRAM WRITE to READ Delay L

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

DRAM WRITE to READ Delay S

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

DRAM CKE Minimum Pulse Width

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

DRAM Write Latency

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

Skew Control

DDRCRCOMPCTL0/1/2

Ctl0 dqvrefup

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

Ctl0 dqvrefdn

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

Ctl0 dqodtvrefup

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

Ctl0 dqodtvrefdn

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

Ctl1 cmdvrefup

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

Ctl1 ctlvrefup

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

Ctl1 clkvrefup

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

Ctl1 ckecsvrefup

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

Ctl2 cmdvrefdn

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

Ctl2 ctlvrefdn

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

Ctl2 clkvrefdn

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

Tc Odt Control

ODT_READ_DURATION

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

ODT_READ_DELAY

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

ODT_WRITE_DURATION

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

ODT_WRITE_DELAY

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

MC0 Dimm0 / MC0 Dimm1 / MC1 Dimm0 / MC1 Dimm1

DQ RTT WR

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

DQ RTT NOM RD

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

DQ RTT NOM WR

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

DQ RTT PARK

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

DQ RTT PARK DQS

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

GroupA CA ODT

Configuration options: [Auto] [0 DRAM Clock] [40 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock] [480 DRAM Clock]

GroupA CS ODT

Configuration options: [Auto] [0 DRAM Clock] [40 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock] [480 DRAM Clock]

GroupA CK ODT

Configuration options: [Auto] [0 DRAM Clock] [40 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock] [480 DRAM Clock]

GroupB CA ODT

Configuration options: [Auto] [0 DRAM Clock] [40 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock] [480 DRAM Clock]

GroupB CS ODT

Configuration options: [Auto] [0 DRAM Clock] [40 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock] [480 DRAM Clock]

GroupB CK ODT

Configuration options: [Auto] [0 DRAM Clock] [40 DRAM Clock] [60 DRAM Clock] [80 DRAM Clock] [120 DRAM Clock] [240 DRAM Clock] [480 DRAM Clock]

Pull-up Output Driver Impedance

Configuration options: [Auto] [34 DRAM Clock] [40 DRAM Clock] [48 DRAM Clock]

Pull-Down Output Driver Impedance

Configuration options: [Auto] [34 DRAM Clock] [40 DRAM Clock] [48 DRAM Clock]

RTL IOL Control

Round Trip Latency Init Value MC0-1 CHA-B

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

Round Trip Latency Max Value MC0-1 CHA-B

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

Round Trip Latency Offset Value Mode Sign MC0-1 CHA-B

Configuration options: [-] [+]

Round Trip Latency Offset Value MC0-1 CHA-B

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

Round Trip Latency MC0-1 CHA-B R0-7

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

Memory Training Algorithms

The items in this menu allows you to enable or disable different Memory Training Algorithms.

Early Command Training

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

SenseAmp Offset Training

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

Early ReadMPR Timing Centering 2D

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

Read MPR Training

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

Receive Enable Training

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

Jedec Write Leveling

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

Early Write Timing Centering 2D

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

Early Read Timing Centering 2D

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

Write Timing Centering 1D

Configuration options: [Disabled] [Enabled]

Write Voltage Centering 1D

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

Read Timing Centering 1D

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

Read Timing Centering with JR

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

Dimm ODT Training*

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

Max RTT_WR

Allows you to cap the maximum RTT_WR in power training.
Configuration options: [ODT OFF] [120 Ohms]

DIMM RON Training*

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

Write Drive Strength/Equalization 2D*

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

Write Slew Rate Training*

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

Read ODT Training*

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

Comp Optimization Training

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

Read Equalization Training*

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

Read Amplifier Training*

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

Write Timing Centering 2D

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

Read Timing Centering 2D

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

Command Voltage Centering

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

Early Command Voltage Centering

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

Write Voltage Centering 2D

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

Read Voltage Centering 2D

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

Late Command Training

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

Round Trip Latency

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

Turn Around Timing Training

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

CMD CTL CLK Slew Rate

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

CMD/CTL DS & E 2D

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

Read Voltage Centering 1D

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

TxDqTCO Comp Training*

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

ClkTCO Comp Training*

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

TxDqsTCO Comp Training*

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

VccDLL Bypass Training*

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

CMD/CTL Drive Strength Up/Dn 2D

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

DIMM CA ODT Training

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

PanicVttDnLp Training*

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

Read Vref Decap Traning*

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

Vddq Training

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

Duty Cycle Correction Training

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

Rank Margin Tool Per Bit

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

DIMM DFE Training

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

EARLY DIMM DFE Training

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

Tx Dqs Dcc Training

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

DRAM DCA Training

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

Write Driver Strength Training

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

Rank Margin Tool

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

Memory Test

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

DIMM SPD Alias Test

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

Receive Enable Centering 1D

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

Retrain Margin Check

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

Write Drive Strength Up/Dn independently

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

Margin Check Limit

Checks Margin to Limit to see if next boot memory needs to be retrained.
Configuration options: [Disabled] [L1] [L2] [Both]

The following item appears only when **Margin Check Limit** is set to **[L2]** or **[Both]**.

Margin Limit Check L2

L2 check threshold is scale of L1 check.
Configuration options: [1] - [100]

Third Timings

tRDRD_sg_Training

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

tRDRD_sg_Runtime

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

tRDRD_dg_Training

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

tRDRD_dg_Runtime

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

tRDWR_sg

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

tRDWR_dg

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

tWRWR_sg

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

tWRWR_dg

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

tWRRD_sg

Configuration options: [Auto] [0] - [511]

tWRRD_dg

Configuration options: [Auto] [0] - [511]

tRDRD_dr

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

tRDRD_dd

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

tRDWR_dr

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

tRDWR_dd

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

tWRWR_dr

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

tWRWR_dd

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

tWRRD_dr

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

tWRRD_dd

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

tRPRE

Configuration options: [Auto] [0] - [4]

tWPRE

Configuration options: [Auto] [0] - [4]

tWRPRE

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

tPRPDEN

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

tRDPDEN

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

tWRPDEN

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

tCPDED

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

tREFIX9

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

Ref Interval

Configuration options: [Auto] [0] - [8191]

tXPDLL

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

tXP

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

tPPD

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

tCCD_L_tDLLK

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

Misc.

MRC Fast Boot

Allows you to enable or disable the MRC fast boot.
Configuration options: [Disabled] [Enabled]

MCH Full Check

Enable this item to enhance the system stability. Setting this item to **[Disabled]** may enhance the DRAM overclocking capability.
Configuration options: [Auto] [Enabled] [Disabled]

Mem Over Clock Fail Count

Configuration options: [Auto] [1] - [254]

Training Profile

Allows you to select the DIMM training profile.
Configuration options: [Auto] [Standard Profile] [ASUS User Profile]

RxDfe

Allows you to set the DFE on SOC Rx.
Configuration options: [Auto] [Enabled] [Disabled]

Mrc Training Loop Count

Allows you to set the exponential number of loops to run the test.
Configuration options: [Auto] [0] - [32]

DRAM CLK Period

Allows you to set the DRAM clock period.
Configuration options: [Auto] [0] - [161]

Dll_bwsel

Try range of 22+ for OC.
Configuration options: [Auto] [0] - [63]

Controller 0, Channel 0 Control

Allows you to enable or disable Controller 0, Channel 0.
Configuration options: [Enabled] [Disabled]

Controller 0, Channel 1 Control

Allows you to enable or disable Controller 0, Channel 1.
Configuration options: [Enabled] [Disabled]

Controller 1, Channel 0 Control

Allows you to enable or disable Controller 1, Channel 0.
Configuration options: [Enabled] [Disabled]

Controller 1, Channel 1 Control

Allows you to enable or disable Controller 1, Channel 1.
Configuration options: [Enabled] [Disabled]

MC_Vref0-2

Configuration options: [Auto] [0] - [65533]

Fine Granularity Refresh mode

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

DRAM SPD Configuration

SDRAM Density Per Die

Configuration options: [Auto] [4 Gb] [8 Gb] [12 Gb] [16 Gb] [24 Gb] [32 Gb] [48 Gb] [64 Gb]

SDRAM Banks Per Bank Group

Configuration options: [Auto] [1 bank per bank group] [2 bank per bank group] [4 bank per bank group]

SDRAM Bank Groups

Configuration options: [Auto] [1 bank group] [2 bank groups] [4 bank groups] [8 bank groups]

Configure Memory Dynamic Frequency Switching

The following item appears only when **Realtime Memory Frequency** is set to **[Disabled]**.

Dynamic Memory Boost

Allows you to enable or disable Dynamic Memory Boost Feature. Allows automatic switching between default SPD Profile frequency and selected XMP profile frequency. Only valid if an XMP Profile is selected.
Configuration options: [Disabled] [Enabled]

The following item appears only when **Dynamic Memory Boost** is set to **[Disabled]**.

Realtime Memory Frequency

Allows you to enable or disable Memory Frequency feature. Allows manual switching between in runtime between default SPD Profile frequency and selected XMP profile frequency. Only valid if an XMP Profile is selected.
Configuration options: [Disabled] [Enabled]

SA GV

System Agent Geyserville. Can disable, fix to a specific point, or enable frequency switching. If enabled, we recommend you to leave options at parked values for best compatibility. Enabling this feature requires a longer boot time.
Configuration options: [Disabled] [Enabled] [Fixed to 1st Point] [Fixed to 2nd Point] [Fixed to 3rd Point] [Fixed to 4th Point]

The following items appear only when **SA GV** is set to **[Enabled]**, **[Fixed to 1st Point]**, **[Fixed to 2nd Point]**, **[Fixed to 3rd Point]**, or **[Fixed to 4th Point]**.

First Point Frequency

Allows you to specify the frequency for the given point. 0-MRC auto, else a specific frequency as an integer: 2000Mhz.
Configuration options: [0] - [65535]

First Point Gear

Allows you to set the gear ratio for this SAGV point. 0-Auto, 1-G1, 2-G2, 4-G4.
Configuration options: [0] - [4]

Second Point Frequency

Allows you to specify the frequency for the given point. 0-MRC auto, else a specific frequency as an integer: 2000Mhz.
Configuration options: [0] - [65535]

Second Point Gear

Allows you to set the gear ratio for this SAGV point. 0-Auto, 1-G1, 2-G2, 4-G4.
Configuration options: [0] - [4]

Third Point Frequency

Allows you to specify the frequency for the given point. 0-MRC auto, else a specific frequency as an integer: 2000Mhz.
Configuration options: [0] - [65535]

Third Point Gear

Allows you to set the gear ratio for this SAGV point. 0-Auto, 1-G1, 2-G2, 4-G4.
Configuration options: [0] - [4]

The Fourth Point Gear will always be the settings you set in the main menu, so configure the Fourth Point Gear there.

Digi+ VRM

VRM Intialization Check

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

CPU Input Voltage Load-line Calibration

Configuration options [Auto] [Level 1] [Level 2] [Level 3]

CPU Load-line Calibration

The load-line is defined by the Intel VRM specification and affects the level of voltage supplied to the processor. Higher load-line calibration settings result in reduced VDroop at the expense of voltage overshoot and will increase CPU temperatures due to higher voltage under load. Select from level 1 to 7 to adjust the load-line slope. Level 1 = greater VDroop, Level 7 = minimum VDroop.
Configuration options [Auto] [Level 1] [Level 2] [Level 3] [Level 4:Recommended for OC] [Level 5] [Level 6] [Level 7]

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

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

Synch ACDC Loadline with VRM Loadline

Enable this item to allow the VRM Loadline to be adjusted automatically to match the AC/DC Loadline.
Configuration options: [Disabled] [Enabled]

CPU Current Capability

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

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

CPU VRM Switching Frequency

This item affects the VRM transient response speed and the component thermal production. Select [**Manual**] to configure a higher frequency for a quicker transient response speed. Setting a higher switching frequency will result in better transient response at the expense of higher VRM temperatures. Active cooling of the VRM heatsink is recommended when running high CPU voltage and high load-line calibration values.
Configuration options: [Auto] [Manual]

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

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

VRM Spread Spectrum

Allows you to reduce the magnitude of peak noise from the VRM. Enable to reduce peak noise. Disable this setting when overclocking.
Configuration options: [Auto] [Disabled] [Enabled]

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

Fixed CPU VRM Switching Frequency(KHz)

Allows you to set a higher frequency for a quicker transient response speed. The values range from 250 KHz to 500 KHz with an interval of 50 KHz.

CPU Power Duty Control

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

[Auto]	Sets to the default setting.
[T. Probe]	Sets the buck controller to balance VRM FET temperatures
[Extreme]	Select to set the VRM current balance mode.

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

CPU Power Phase Control

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

[Auto]	Automatically selects the power phase control.
[Standard]	The number of active phases is controlled by the CPU.
[Extreme]	Sets full phase mode.

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

Boot Voltages

CPU Core/Cache Boot Voltage

Allows you to set the CPU voltage at initial boot up. Use the <+> or <-> to adjust the value. The values range from 0.600V to 1.700V with an interval of 0.005V.
Configuration options: [Auto] [0.60000] - [1.70000]

CPU Input Boot Voltage

Allows you to set the CPU Input Voltage at initial boot up. Use the <+> or <-> to adjust the value. The values range from 1.500V to 2.100V with an interval of 0.010V.
Configuration options: [Auto] [1.50000] - [2.10000]

PLL Termination Boot Voltage

Allows you to set the PLL Termination voltage at initial boot up. Use the <+> or <-> to adjust the value. The values range from 0.800V to 1.800V with an interval of 0.010V.
Configuration options: [Auto] [0.80000] - [1.80000]

CPU Standby Boot Voltage

Allows you to set the CPU Standby voltage at initial bootup. Use the <+> or <-> to adjust the value. The values range from 0.800V to 1.800V with an interval of 0.010V.
Configuration options: [Auto] [0.80000] - [1.80000]

Memory Controller Boot Voltage

Allows you to set the Memory Controller voltage at initial bootup. Use the <+> or <-> to adjust the value. The values range from 1.000V to 2.000V with an interval of 0.00625V.
Configuration options: [Auto] [1.00000] - [2.00000]

Auto Voltage Caps

CPU Core Auto Voltage Cap

Setting this to a specific value will set a ceiling for CPU Core Auto Voltage. When not in manual mode, it's effectiveness is subject to other factors such as AC/DC Loadline values and CPU's native VID. Use the <+> or <-> to adjust the value. The values range from 0.600V to 1.700V with an interval of 0.005V.
Configuration options: [Auto] [0.60000] - [1.70000]

CPU Input Auto Voltage Cap

Setting this to a specific value will set a ceiling for CPU Input Auto Voltage. Use the <+> or <-> to adjust the value. The values range from 1.500V to 2.100V with an interval of 0.010V.
Configuration options: [Auto] [1.50000] - [2.10000]

Memory Controller Auto Voltage Cap

Setting this to a specific value will set a ceiling for Memory Controller Auto Voltage. Use the <+> or <-> to adjust the value. The values range from 1.000V to 2.000V with an interval of 0.00625V.
Configuration options: [Auto] [1.00000] - [2.00000]

Internal CPU Power Management

The items in this submenu allow you to set the CPU ratio and features.

Tcc Activation Offset

Offse from factory set Tcc activation temperature at which the Thermal Control Circuit must be activated. Tcc will be activated at: Tcc Activation Temp - Tcc Activation Offset. Use the <+> or <-> to adjust the value.
Configuration options: [Auto] [0] - [63]

IVR Transmitter VDDQ ICCMAX

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

CPU Core/Cache Current Limit Max.

Allows you to configure a current limit for frequency or power throttling when overclocking. Can be set to maximum value (511.75) to prevent throttling when overclocking. Use the <+> and <-> keys to adjust the value.
Configuration options: [Auto] [0.00] - [511.75]

Long Duration Package Power Limit

An Intel parameter known as [power limit 1] and specified in Watts. The defualt value is defined by TDP of the processor. Increasing the value will allow the Turbo ratio to be maintained for a longer duration under higher current loads.
Configuration options: [Auto] [1] - [4095]

Package Power Time Window

An Intel parameter of [power limit 1] and specified in seconds. The applied value indicates how long the Turbo ratio can be active when TDP is exceeded.
Configuration options: [Auto] [1] [2] [3] [4] [5] [6] [7] [8] [10] [12] [14] [16] [20] [24] [28] [32] [40] [48] [56] [64] [80] [96] [112] [128] [160] [192] [224] [256] [320] [384] [448]

Short Duration Package Power Limit

An Intel parameter known as [power limit 2] and specified in Watts. It is the second Intel power limit which provides protection when package power exceeds power limit 1. The default setting is 1.25 times power limit 1. According to Intel, the platform must support this value for up to 10msec when power consumption exceeds power limit 2. ASUS motherboards are engineered to support this duration for a longer time as required to facilitate overclocking.
Configuration options: [Auto] [1] - [4095]

Dual Tau Boost

Allows you to enable or disable Dual Tau Boost feature. This is only applicable for Desktop 35W/65W/12W sku. When DPTF is enabled this feature is ignored.
Configuration options: [Disabled] [Enabled]

IA AC Load Line

Allows you to set the AC loadline defined in mOhms. Use the <+> and <-> keys to adjust the value.
Configuration options: [Auto] [0.01] - [62.49]

IA DC Load Line

Allows you to set the DC loadline defined in mOhms. Use the <+> and <-> keys to adjust the value.
Configuration options: [Auto] [0.01] - [62.49]

IA CEP Enable

Allows you to enable or disable IA CEP (Current Excursion Protection) Support. Uses pCode Mailbox Command 0x37, Sub-command 0x1. Set Databit2 to 1.
Configuration options: [Auto] [Disabled] [Enabled]

SA CEP Enable

Allows you to enable or disable SA CEP (Current Excursion Protection) Support. Uses pCode Mailbox Command 0x37, Sub-command 0x1. Set Databit3 to 1.
Configuration options: [Auto] [Disabled] [Enabled]

IA SoC Iccmax Reactive Protector

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

Inverse Temperature Dependency Throttle

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

IA VR Voltage Limit

Voltage Limit (VMAX). This value represents the Maximum instantaneous voltage allowed at any given time. Range is 0 - 7999mV. Uses BIOS VR mailbox command 0x8.
Configuration options: [Auto] [0] - [7999]

CPU SVID Support

Disable this item to stop the CPU from communicating with the external voltage regulator.
Configuration options: [Auto] [Disabled] [Enabled]

Tweaker's Paradise

Realtime Memory Timing

Allows you to enable or disable realtime memory timing. When set to **[Enabled]**, the system will allow performing realtime memory timing changes after MRC_DONE.
Configuration options: [Disabled] [Enabled]

SPD Write Disable

Allows you to enable or disable setting SPD Write Disable. For security recommendations, SPD write disable bit must be set.
Configuration options: [TRUE] [FALSE]

PVD Ratio Threshold

For the Core Domain PLL, the threshold to switch to lower post divider is 15 by default. You can set a value lower than 15 when pushing high BCLK so that Digitally Controlled Oscillator (DCO) remains at reasonable frequency.
Configuration options: [Auto] [1] - [40]

SA PLL Frequency Override

Allows you to configure Sa PLL Frequency.
Configuration options: [Auto] [3200 MHz] [1600 MHz]

BCLK TSC HW Fixup

Allows you to enable or disable BCLK TSC HW Fixup disable during TSC copy from PMA to APIC.
Configuration options: [Enabled] [Disabled]

FLL OC mode

Configuration options: [Auto] [Disabled] [Normal] [Elevated] [Extreme Elevated]

UnderVolt Protection

When UnderVolt Protection is enabled, user will not be able to program under voltage in OS runtime. Recommended to keep it enabled by default.

[Disabled]	No UnderVolt Protection in Runtime.
[Enabled]	Allow BIOS undervolting, but enable UnderVolt Protection in Runtime.

Core PLL Voltage

Allows you to configure the offset for the Core PLL VCC Trim. The values range from 0.900V to 1.845V with an interval of 0.015V.
Configuration options: [Auto] [0.90000] - [1.84500]

GT PLL Voltage

Allows you to configure the offset for the GT PLL VCC Trim. The values range from 0.900V to 1.845V with an interval of 0.015V.
Configuration options: [Auto] [0.90000] - [1.84500]

Ring PLL Voltage

Allows you to configure the offset for the Ring PLL VCC Trim. The values range from 0.900V to 1.845V with an interval of 0.015V.
Configuration options: [Auto] [0.90000] - [1.84500]

System Agent PLL Voltage

Allows you to configure the offset for the System Agent PLL VCC Trim. The values range from 0.900V to 1.845V with an interval of 0.015V.
Configuration options: [Auto] [0.90000] - [1.84500]

Memory Controller PLL Voltage

Allows you to configure the offset for the Memory Controller PLL VCC Trim. The values range from 0.900V to 1.845V with an interval of 0.015V.
Configuration options: [Auto] [0.90000] - [1.84500]

CPU 1.8V Small Rail

Allows you to configure the voltage for the CPU 1.8V Small Rail. The values range from 1.500V to 2.300V with an interval of 0.010V.
Configuration options: [Auto] [1.50000] - [2.30000]

PLL Termination Voltage

Allows you to configure the voltage for the PLL Termination. The values range from 0.800V to 1.800V with an interval of 0.010V.
Configuration options: [Auto] [0.80000V] - [1.80000V]

CPU Standby Voltage

Allows you to configure the voltage for the CPU Standby. Use the <+> and <-> keys to adjust the value. The values range from 0.800V to 1.800V with an interval of 0.010V.
Configuration options: [Auto] [0.80000] - [1.80000]

PCH 1.05V Voltage

Allows you to configure the voltage for the PCH 1.05V. Use the <+> and <-> keys to adjust the value. The values range from 0.800V to 1.600V with an interval of 0.010V.
Configuration options: [Auto] [0.80000] - [1.60000]

PCH 0.82V Voltage

Allows you to configure the voltage for the PCH 0.82V. Use the <+> and <-> keys to adjust the value. The values range from 0.700V to 1.000V with an interval of 0.010V.
Configuration options: [Auto] [0.70000] - [1.00000]

CPU Input Voltage Reset Voltage

Allows you to configure the voltage for the CPU Input when reset. Use the <+> and <-> keys to adjust the value. The values range from 1.500V to 2.100V with an interval of 0.010V.
Configuration options: [Auto] [1.50000] - [2.10000]

Min. CPU Cache Ratio

Allows you to set the minimum possible CPU cache ratio. Use the <+> and <-> keys to adjust the value.
Configuration options: [Auto] [8] - [56]

Max. CPU Cache Ratio

Allows you to set the maximum possible CPU cache ratio. Use the <+> and <-> keys to adjust the value.
Configuration options: [Auto] [8] - [56]

Actual VRM Core Voltage

Allows you to configure the VRM output rail for Core Voltage. Manual mode allows users-defined values. Offset mode modifies the values by SVID.
Configuration options: [Auto] [Manual Mode] [Offset Mode]

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

CPU Core Voltage Override

Allows you to configure the input voltage for the CPU by the external voltage regulator. Use the <+> and <-> keys to adjust the value. The values range from 0.600V to 1.700V with an interval of 0.005V.
Configuration options: [Auto] [0.60000] - [1.70000]

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

Offset Mode Sign

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

CPU Core Voltage Offset

Allows you to configure the input voltage for the CPU by the external voltage regulator. Use the <+> or <-> to adjust the value. The values range from 0.005V to 0.635V with an interval of 0.005V.
Configuration options: [Auto] [0.00500] - [0.63500]

Global Core SVID Voltage

Allows you to configure the global Core Voltage requested by the cores. Result may be influenced by Actual VRM Core Voltage.
Configuration options: [Auto] [Manual Mode]

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

CPU Core Voltage Override

Allows you to configure the input voltage for the CPU by the external voltage regulator. Use the <+> and <-> keys to adjust the value. The values range from 0.600V to 1.700V with an interval of 0.005V.
Configuration options: [Auto] [0.60000] - [1.70000]

Cache SVID Voltage

Allows you to configure the Cache Voltage requested by the Ring Domain. Result may be influenced by Actual VRM Core Voltage.
Configuration options: [Auto] [Manual Mode]

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

Cache Voltage Override

Allows you to configure the voltage for the Cache. Use the <+> and <-> keys to adjust the value. The values range from 0.600V to 1.700V with an interval of 0.001V.
Configuration options: [Auto] [0.60000] - [1.70000]

CPU L2 Voltage

Allows you to configure the voltage for the CPU L2. This may help for sustaining high clock speeds.
Configuration options: [Auto] [Manual Mode]

The following item appears only when **CPU L2 Voltage** is set to **[Manual Mode]**.

CPU L2 Voltage Override

Allows you to configure the voltage for the CPU L2. Use the <+> or <-> to adjust the value. The values range from 0.700V to 1.800V with an interval of 0.001V.
Configuration options: [Auto] [0.70000] - [1.80000]

CPU System Agent Voltage

Allows you to configure the voltage for the CPU System Agent.
Configuration options: [Auto] [Manual Mode] [Offset Mode]

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

CPU System Agent Voltage Override

Allows you to configure the input voltage for the CPU by the external voltage regulator. Use the <+> and <-> keys to adjust the value. The values range from 0.700V to 1.800V with an interval of 0.001V.
Configuration options: [Auto] [0.70000] - [1.80000]

The following item appears only when **CPU System Agent Voltage** is set to **[Offset Mode]**.

CPU System Agent Voltage Offset

Allows you to configure the CPU System Agent Voltage offset value. Use the <+> or <-> to adjust the value. The values range from 0.001V to 0.999V with an interval of 0.001V.
Configuration options: [Auto] [0.00100] - [0.99900]

You need to save the changes and reset the system for the changes to take effect.

CPU Input Voltage

Allows you to configure the voltage for the CPU Input. Use the <+> or <-> to adjust the value. The values range from 1.500V to 2.100V with an interval of 0.010V.
Configuration options: [Auto] [1.50000] - [2.10000]

High DRAM Voltage Mode

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

DRAM VDD Voltage

Power for the DRAM ICs' VDD portion. Use the <+> or <-> to adjust the value. The values range from 0.800V to 1.435V with an interval of 0.005V.
Configuration options: [Auto] [0.80000] - [1.43500]

DRAM VDDQ Voltage

Power for the DRAM ICs' VDD Data portion. Use the <+> or <-> to adjust the value. The values range from 0.800V to 1.435V with an interval of 0.005V.
Configuration options: [Auto] [0.80000] - [1.43500]

Advanced Memory Voltages

IVR Transmitter VDDQ Voltage

Allows you to set the voltage for the internal transmitter voltage for the Memory Controller. Use the <+> or <-> to adjust the value. The values range from 0.700V to 2.200V with an interval of 0.005V.
Configuration options: [Auto] [0.70000] - [2.20000]

Memory Controller Voltage

Allows you to set the voltage for the Memory Controller. Use the <+> or <-> to adjust the value. The values range from 1.000V to 2.000V with an interval of 0.00625V.
Configuration options: [Auto] [1.00000] - [2.00000]

MC Voltage Calculation Voltage Base

Allows you to set the base MC Voltage used for calculations. Use the <+> or <-> to adjust the value. The values range from 0.700V to 2.200V with an interval of 0.005V.
Configuration options: [Auto] [0.70000] - [2.20000]

VDD Calculation Voltage Base

Allows you to set the base VDD Voltage used for calculations. Use the <+> or <-> to adjust the value. The values range from 0.700V to 2.200V with an interval of 0.005V.
Configuration options: [Auto] [0.70000] - [2.20000]

PMIC Voltages

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

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

SPD HUB VLDO (1.8V)

Allows you to set the main power for the SPD Hub Logic. Default set to 1.8V. Use the <+> or <-> to adjust the value. The values range from 1.700V to 2.000V with an interval of 0.100V.
Configuration options: [Auto] [1.70000] - [2.00000]

SPD HUB VDDIO (1.0V)

Allows you to set the main power for the SPD Hub side-band interface. Default set to 1.0V. Use the <+> or <-> to adjust the value. The values range from 0.900V to 1.200V with an interval of 0.100V.
Configuration options: [Auto] [0.90000] - [1.20000]

DRAM VDD Voltage

Allows you to set the power for the DRAM IC's VDD portion. Use the <+> or <-> to adjust the value. The values range from 0.800V to 1.435V with an interval of 0.005V.
Configuration options: [Auto] [0.80000] - [1.43500]

DRAM VDDQ Voltage

Allows you to set the power for the DRAM IC's Data portion. Use the <+> or <-> to adjust the value. The values range from 0.800V to 1.435V with an interval of 0.005V.
Configuration options: [Auto] [0.80000] - [1.43500]

DRAM VPP Voltage

Allows you to set the power for the DRAM Activating Power Supply. Use the <+> or <-> to adjust the value. The values range from 1.500V to 2.135V with an interval of 0.005V.
Configuration options: [Auto] [1.50000] - [2.13500]

DRAM VDD Switching Frequency

Allows you to set the switching frequency of DRAM VDD regulator in MHz. Use the <+> or <-> to adjust the value. The values range from 0.750MHz to 1.500MHz with an interval of 0.250MHz.
Configuration options: [Auto] [0.75000] - [1.50000]

DRAM VDDQ Switching Frequency

Allows you to set the switching frequency of DRAM VDDQ regulator in MHz. Use the <+> or <-> to adjust the value. The values range from 0.750MHz to 1.500MHz with an interval of 0.250MHz.
Configuration options: [Auto] [0.75000] - [1.50000]

DRAM VPP Switching Frequency

Allows you to set the switching frequency of DRAM VPP regulator in MHz. Use the <+> or <-> to adjust the value. The values range from 0.750MHz to 1.500MHz with an interval of 0.250MHz.
Configuration options: [Auto] [0.75000] - [1.50000]

DRAM Current Capability

Allows you to set the current capability for the switching regulators in Amps. Use the <+> or <-> to adjust the value. The values range from 0.125A to 7.875A with an interval of 0.125A.
Configuration options: [Auto] [0.12500] - [7.87500]

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

PMIC0-3 SPD HUB VLDO (1.8V)

Allows you to set the main power for the SPD Hub Logic. Default set to 1.8V. Use the <+> or <-> to adjust the value. The values range from 1.700V to 2.000V with an interval of 0.100V.
Configuration options: [Auto] [1.70000] - [2.00000]

PMIC0-3 SPD HUB VDDIO (1.0V)

Allows you to set the main power for the SPD Hub side-band interface. Default set to 1.0V. Use the <+> or <-> to adjust the value. The values range from 0.900V to 1.200V with an interval of 0.100V.
Configuration options: [Auto] [0.90000] - [1.20000]

PMIC0-3 DRAM VDD Voltage

Allows you to set the power for the DRAM IC's VDD portion. Use the <+> or <-> to adjust the value. The values range from 0.800V to 1.435V with an interval of 0.005V.
Configuration options: [Auto] [0.80000] - [1.43500]

PMIC0-3 DRAM VDDQ Voltage

Allows you to set the power for the DRAM IC's Data portion. Use the <+> or <-> to adjust the value. The values range from 0.800V to 1.435V with an interval of 0.005V.
Configuration options: [Auto] [0.80000] - [1.43500]

PMIC0-3 DRAM VPP Voltage

Allows you to set the power for the DRAM Activating Power Supply. Use the <+> or <-> to adjust the value. The values range from 1.500V to 2.135V with an interval of 0.005V.
Configuration options: [Auto] [1.50000] - [2.13500]

PMIC0-3 DRAM VDD Switching Frequency

Allows you to set the switching frequency of DRAM VDD regulator in MHz. Use the <+> or <-> to adjust the value. The values range from 0.750MHz to 1.500MHz with an interval of 0.250MHz.
Configuration options: [Auto] [0.75000] - [1.50000]

PMIC0-3 DRAM VDDQ Switching Frequency

Allows you to set the switching frequency of DRAM VDDQ regulator in MHz. Use the <+> or <-> to adjust the value. The values range from 0.750MHz to 1.500MHz with an interval of 0.250MHz.
Configuration options: [Auto] [0.75000] - [1.50000]

PMIC0-3 DRAM VPP Switching Frequency

Allows you to set the switching frequency of DRAM VPP regulator in MHz. Use the <+> or <-> to adjust the value. The values range from 0.750MHz to 1.500MHz with an interval of 0.250MHz.
Configuration options: [Auto] [0.75000] - [1.50000]

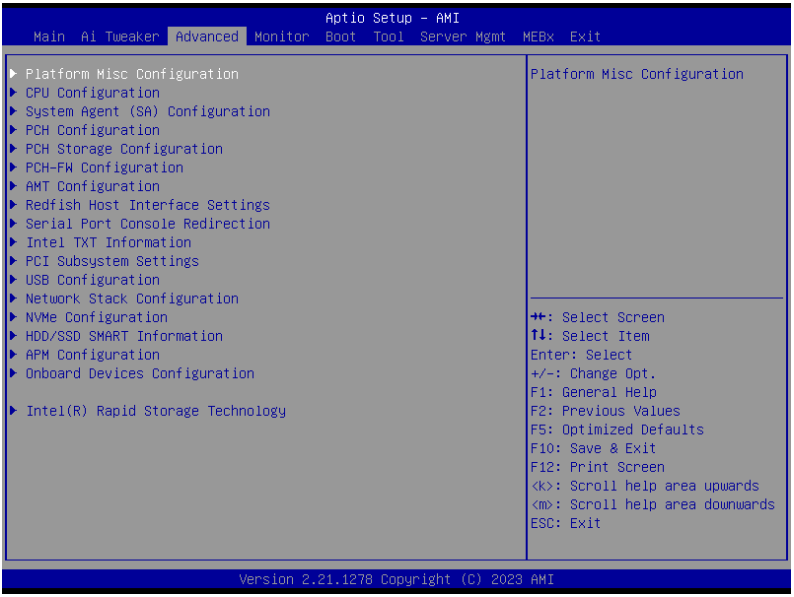
PMIC0-3 DRAM Current Capability

Allows you to set the current capability for the switching regulators in Amps. Use the <+> or <-> to adjust the value. The values range from 0.125A to 7.875A with an interval of 0.125A.
Configuration options: [Auto] [0.12500] - [7.87500]

7. Advanced menu

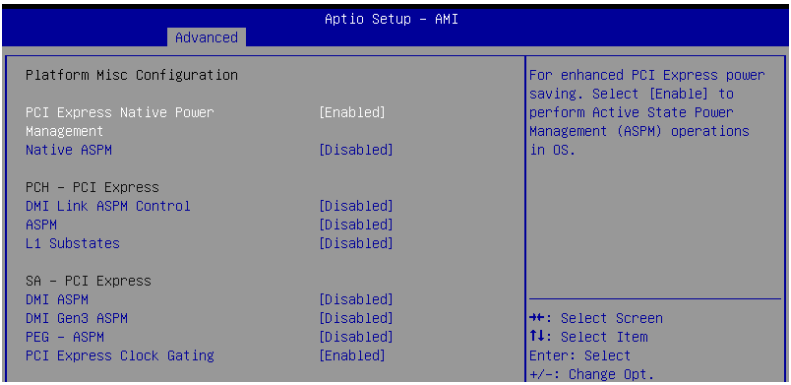
The Advanced menu items allow you to change the settings for the CPU and other system devices. Scroll down to display other BIOS items.

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



7.1 Platform Misc Configuration

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



PCI Express Native Power Management

Allows you to enhance the power saving feature of PCI Express and perform Active State Power Management (ASPM) operations in the operating system when set to **[Enabled]**.
Configuration options: [Disabled] [Enabled]

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

Native ASPM

Set this item to **[Enabled]** for OS Controlled ASPM, or set this item to [Disabled] for BIOS controlled ASPM.
Configuration options: [Auto] [Enabled] [Disabled]

PCH - PCI Express

DMI Link ASPM Control

Allows you to control the Active State Power Management of the DMI Link.
Configuration options: [Disabled] [L1] [Auto]

ASPM

Allows you to select the ASPM state for energy-saving conditions.
Configuration options: [Disabled] [L1] [Auto]

L1 Substates

Allows you to select the PCI Express L1 Substates settings.
Configuration options: [Disabled] [L1.1] [L1.1 & L1.2]

SA - PCI Express

DMI ASPM

Allows you to set the DMI ASPM Support.
Configuration options: [Disabled] [Auto] [ASPM L1]

DMI Gen3 ASPM

Allows you to set the DMI Gen3 ASPM Support.
Configuration options: [Disabled] [Auto] [ASPM L1]

PEG - ASPM

Allows you to control the ASPM support for the PEG 0. This has no effect if PEG is not the currently active device.
Configuration options: [Disabled] [L0s] [L1] [L0sL1]

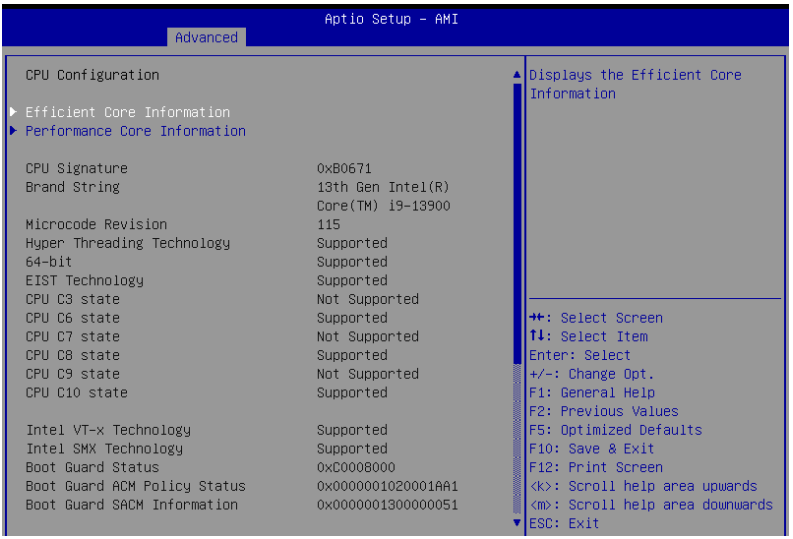
PCI Express Clock Gating

Allows you to enable or disable PCI Express Clock Gating for each root port.
Configuration options: [Disabled] [Enabled]

7.2 CPU Configuration

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

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



Efficient Core Information

This submenu displays the Efficient Core Information.

Performance Core Information

This submenu displays the Performance Core Information.

Hardware Prefetcher

Allows you to enable or disable the MLC streamer prefetcher.
Configuration options: [Disabled] [Enabled]

Adjacent Cache Line Prefetch

Allows you to prefetch adjacent cache lines, reducing the DRAM loading time and improving the system performance.
Configuration options: [Disabled] [Enabled]

Intel (VMX) Virtualization Technology

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

The following items appear only when **Intel Trusted Execution Technology** is set to **[Disabled]**.

Active Performance Cores

Allows you to select the number of CPU cores to activate in each processor package.
Configuration options: [All] [1] - [7]

Active Efficient Cores

Allows you to select the number of Efficient cores to activate in each processor package.
Configuration options: [All] [0] - [3]

Number of Cores and Efficient Cores are looked at together. When both are {0,0}, Pcode will enable all cores.

Hyper-Threading

Allows a hyper-threading processor to appear as two logical processors, allowing the operating system to schedule two threads or processes simultaneously.

[Enabled] For two threads per activated core.

[Disabled] For only one thread per activated core.

The following item appears only when **Intel (VMX) Virtualization Technology** is set to **[Enabled]**.

Intel Trusted Execution Technology

Allows you to enable utilization of additional hardware capabilities provided by Intel(R) Trusted Execution Technology.
Configuration options: [Disabled] [Enabled]

Changes require a full power cycle to take effect.

The following items appear only when **Intel Trusted Execution Technology** is set to **[Enabled]**.

Alias Check Request

Enables Txt Alias Checking capability.
Configuration options: [Disabled] [Enabled]

- Changes require full Txt capability before it will take effect.
- This is a one time only change, and will be reset on the next reboot.

DPR Memory Size (MB)

Reserve DPR memory size (0-255) MB.
Configuration options: [0] - [255]

Reset AUX Content

Reset TPM Aux Content. Txt may not be functional after AUX content gets reset.

Total Memory Encryption

Allows you to configure the Total Memory Encryption (TME) to protect DRAM data from physical attacks.
Configuration options: [Disabled] [Enabled]

Legacy Game Compatibility Mode

When set to [Enabled], pressing the scroll lock key will toggle the Efficient-cores between being parked when Scroll Lock LED is on and un-parked when LED is off.
Configuration options: [Disabled] [Enabled]

CPU - Power Management Control

The items in this submenu allow you to manage and configure the CPU's power.

Boot performance mode

Allows you to select the performance state that the BIOS will set starting from the reset vector.
Configuration options: [Max Battery] [Max Non-Turbo Performance] [Turbo Performance] [Auto]

Intel(R) SpeedStep(tm)

Allows more than two frequency to be supported.
Configuration options: [Disabled] [Enabled]

Intel(R) Speed Shift Technology

Allows you to disable or enable Intel(R) Speed Shift Technology support. When enabled, CPPC v2 interface allows hardware controlled P-states.
Configuration options: [Disabled] [Enabled]

Intel(R) Turbo Boost Max Technology 3.0

Allows you to disable or enable Intel(R) Turbo Boost Max Technology 3.0 support. Disabling will report the maximum ratio of the slowest core in _CPC object.
Configuration options: [Disabled] [Enabled]

Turbo Mode

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

Acoustic Noise Settings

The items in this submenu allow you to configure Acoustic Noise Settings for IA, GT, and SA domains.

Acoustic Noise Settings

Acoustic Noise Mitigation

Enabling this option will help mitigate acoustic noise on certain SKUs when the CPU is in deeper C state.
Configuration options: [Disabled] [Enabled]

The following items appear only when **Acoustic Noise Mitigation** is set to **[Enabled]**.

Pre Wake Time

Allows you to set the maximum Pre Wake randomization time in micro ticks. This is for acoustic noise mitigation Dynamic Periodicity Alteration (DPA) tuning. Use the <+> or <-> to adjust the value.
Configuration options: [0] - [255]

Ramp Up Time

Allows you to set the maximum Ramp Up randomization time in micro ticks. This is for acoustic noise mitigation Dynamic Periodicity Alteration (DPA) tuning. Use the <+> or <-> to adjust the value.
Configuration options: [0] - [255]

Ramp Down Time

Allows you to set the maximum Ramp Down randomization time in micro ticks. This is for acoustic noise mitigation Dynamic Periodicity Alteration (DPA) tuning. Use the <+> or <-> to adjust the value.
Configuration options: [0] - [255]

IA VR Domain

Disable Fast PKG C State Ramp for IA Domain

This option needs to be configured to reduce acoustic noise during deeper C states.

[FALSE] Don't disable Fast ramp during deeper C states.

[TRUE] Disable Fast ramp during deeper C state.

Slow Slew Rate for IA Domain

Set VR IA Slow Slew Rate for Deep Package C State ramp time; Slow slew rate equals to Fast divided by number, the number is 2, 4, 8 to slow down the slew rate to help minimize acoustic noise.
Configuration options: [Fast/2] [Fast/4] [Fast/8]

GT VR Domain

Disable Fast PKG C State Ramp for GT Domain

This option needs to be configured to reduce acoustic noise during deeper C states.

[FALSE] Don't disable Fast ramp during deeper C states.

[TRUE] Disable Fast ramp during deeper C state.

Slow Slew Rate for GT Domain

Set VR GT Slow Slew Rate for Deep Package C State ramp time; Slow slew rate equals to Fast divided by number, the number is 2, 4, 8 to slow down the slew rate to help minimize acoustic noise.
Configuration options: [Fast/2] [Fast/4] [Fast/8]

CPU C-states

Allows you to enable or disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.
Configuration options: [Auto] [Disabled] [Enabled]

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

Enhanced C-States

Allows you to enable or disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
Configuration options: [Enabled] [Disabled]

Package C State Limit

Allows you to set the C-state limit for the CPU package. Setting to **[CPU Default]** will leave it as the Factory default value. Setting to **[Auto]** will initialize the deepest available Package C State Limit.
Configuration options: [C0/C1] [C2] [C3] [C6] [C7] [C7s] [C8] [C9] [C10] [CPU Default] [Auto]

Thermal Monitor

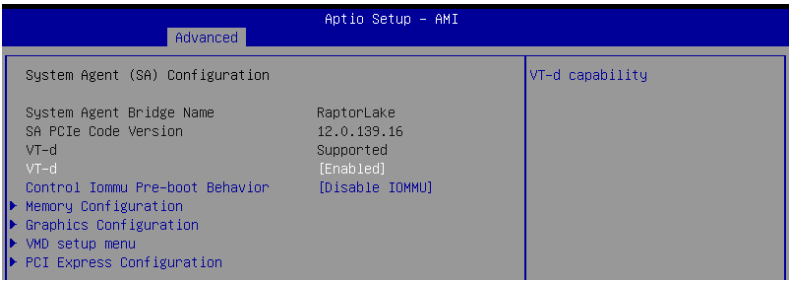
Allows you to enable or disable the Thermal Monitor.
Configuration options: [Disabled] [Enabled]

Dual Tau Boost

Allows you to enable Dual Tau Boost feature. This is only applicable for Desktop 35W/65W/125W sku. When DPTF is enabled this feature is ignored.
Configuration options: [Disabled] [Enabled]

7.3 System Agent (SA) Configuration

The items in this menu allow you to change the System Agent (SA) parameters.



VT-d

Allows you to enable virtualization technology function on memory control hub.
Configuration options: [Enabled] [Disabled]

The following item appears only when **VT-d** is set to **[Enabled]**.

Control Iommu Pre-boot Behavior

Allows you to enable IOMMU in Pre-boot environment (if DMAR table is installed in DXE and if VTD_INFO_PPI is installed in PEI).
Configuration options: [Disable IOMMU] [Enable IOMMU during boot]

Memory Configuration

The items in this submenu allow you to set memory configuration parameters.

Memory Remap

Allows you to enable or disable memory remap above 4GB.
Configuration options: [Enabled] [Disabled]

Graphics Configuration

The items in this submenu allow you to select a primary display from CPU Graphics, PEG Graphics devices, or PCIe Graphics devices.

Primary Display

Allows you to select the primary display from CPU Graphics / PEG Graphics / PCIe Graphics device.
Configuration options: [Auto] [CPU Graphics] [PEG Slot] [PCIE]

iGPU Multi-Monitor

Set this item to [Enabled] to empower both integrated and discrete graphics for multi-monitor output. iGPU shared system memory size will be fixed at 64M.
Configuration options: [Disabled] [Enabled]

VMD setup menu

The items in this submenu allow you to set the VMD configuration settings.

Enable VMD controller

Allows you to enable or disable the VMD controller.
Configuration options: [Disabled] [Enabled]

Setting Enable VMD controller to **[Disabled]** may result in data loss.

The following items appear only when **Enable VMD controller** is set to **[Enabled]**.

Map PCIE Storage under VMD

Allows you to map or unmap PCIE Storage to VMD.
Configuration options: [Disabled] [Enabled]

Ensure to set **Map SATA Controller under VMD** to **[Disabled]** if you set **Map PCIE Storage under VMD** to **[Enabled]**.

Map SATA Controller under VMD

Allows you to map or unmap this Root Port to VMD.
Configuration options: [Disabled] [Enabled]

Ensure to set **Map PCIE Storage under VMD** to **[Disabled]** if you set **Map SATA Controller under VMD** to **[Enabled]**.

PCI Express Configuration

The items in this submenu allow you to configure the PCIe Speeds for the different onboard slots.

M.2_1 Link Speed

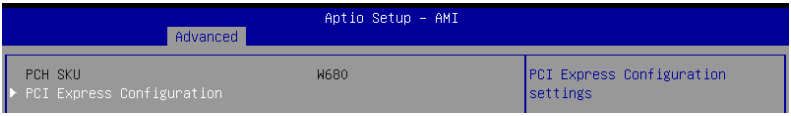
Allows you to configure the PCIe speed for this slot.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3] [Gen4]

PCIEX16(G5) Link Speed

Allows you to configure the PCIe speed for this slot.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3] [Gen4] [Gen5]

7.4 PCH Configuration

The items in this menu allow you to change the PCIe configurations for slots supported by the PCH.



PCI Express Configuration

The items in this submenu allow you to configure the PCIe Speeds for the different onboard slots supported by the PCH.

PCIEX1(G3) Link Speed

Allows you to configure the PCIe speed for this slot.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

M.2_2 Link Speed

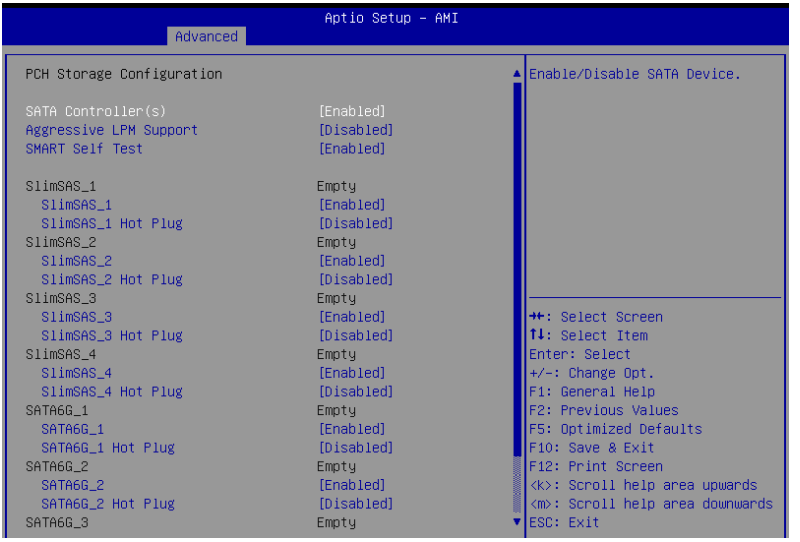
Allows you to configure the PCIe speed for this slot.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3] [Gen4]

PCIEX4(G4) Link Speed

Allows you to configure the PCIe speed for this slot.
Configuration options: [Auto] [Gen1] [Gen2] [Gen3] [Gen4]

7.5 PCH Storage Configuration

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



SATA Controller(s)

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

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

Aggressive LPM support

Allows PCH to aggressively enter link power state.
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]

SLIMSAS_1~4

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

SLIMSAS_1~4 Hot Plug

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

SATA6G_1~4

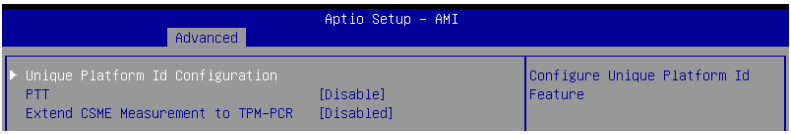
Allows you to enable or disable the selected port.
Configuration options: [Disabled] [Enabled]

SATA6G_1~4 Hot Plug

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

7.6 PCH-FW Configuration

The items in this menu allows you to configure the firmware TPM.



Unique Platform Id Configuration

Configure Unique Platform Id Feature.

Upid State

Allows you to enable or disable Upid Feature.
Configuration options: [Disabled] [Enabled]

Upid OS Control State

Allows OS to enable or disable the Upid feature state.
Configuration options: [Disabled] [Enabled]

PTT

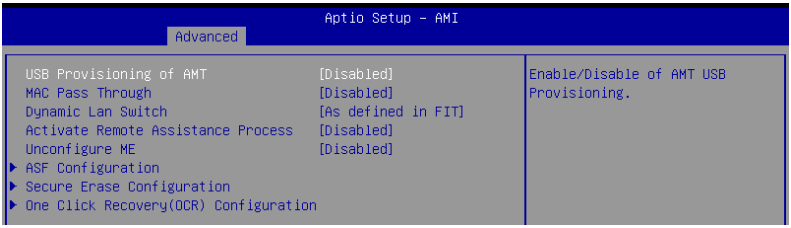
Allows you to enable or disable PTT in SkuMgr.
Configuration options: [Disable] [Enable]

Extend CSME Measurement to TPM-PCR

Allows you to enable or disable Extend CSME Measurements to TPM-PCR[0] and AMR Config to TPM-PCR[1].
Configuration options: [Disabled] [Enabled]

7.7 AMT Configuration

The items in this menu allow you to configure Intel(R) Active Management Technology parameters.



USB Provisioning of AMT

Allows you to enable or disable AMT USB provisioning.
Configuration options: [Disabled] [Enabled]

MAC Pass Through

Allows you to enable or disable MAC Pass Through function.
Configuration options: [Disabled] [Enabled]

Dynamic Lan Switch

Allows switching AMT support from Integrated LAN to Discrete LAN.
Configuration options: [As defined in FIT] [Integrated LAN] [Discrete LAN]

Activate Remote Assistance Process

Allows you to trigger CIRA boot.
Configuration options: [Disabled] [Enabled]

Network Access must be activated first from MEBx Setup.

Unconfigure ME

Unconfigure ME with resetting MEBx password to default on next boot.
Configuration options: [Disabled] [Enabled]

ASF Configuration

The items in this submenu allow you to configure Alert Standard Format parameters.

PET Progress

Allows you to enable or disable PET Events Progress to receive PET Events.
Configuration options: [Disabled] [Enabled]

WatchDog

Allows you to enable or disable WatchDog Timer.
Configuration options: [Disabled] [Enabled]

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

OS Timer

Allows you to set OS watchdog timer.
Configuration options: [0] - [65535]

BIOS Timer

Allows you to set BIOS watchdog timer.
Configuration options: [0] - [65535]

ASF Sensors Table

Adds ASF Sensor Table into ASF! ACPI Table.
Configuration options: [Disabled] [Enabled]

Secure Erase Configuration

The items in this submenu allow you to configure secure erase.

Secure Erase mode

Change the Secure Erase module behavior.

[Simulated]	Performs SE flow without erasing SSD.
[Real]	Erase SSD.

Force Secure Erase

Allows you to force Secure Erase on next boot.
Configuration options: [Disabled] [Enabled]

One Click Recovery (OCR) Configuration

The items in this submenu allow you to configure settings for One Click Recovery. This will allow access for AMT to boot a recovery OS application.

OCR Https Boot

Allows you to enable or disable One Click Recovery Https Boot.
Configuration options: [Disabled] [Enabled]

OCR PBA Boot

Allows you to enable or disable One Click Recovery PBA Boot.
Configuration options: [Disabled] [Enabled]

OCR Windows Recovery Boot

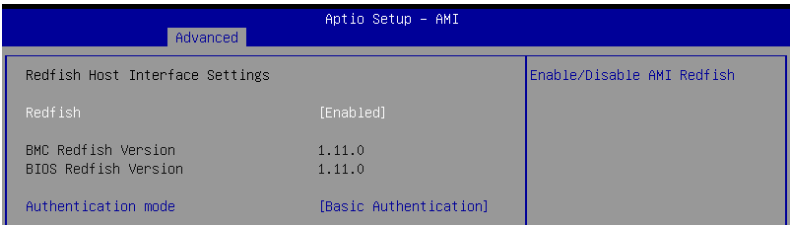
Allows you to enable or disable One Click Recovery Windows Recovery Boot.
Configuration options: [Disabled] [Enabled]

OCR Disable Secure Boot

Allows CSME to request Secure Boot to be disabled for One Click Recovery.
Configuration options: [Disabled] [Enabled]

7.8 Redfish Host Interface Settings

The items in this menu allow you to configure Redfish Host Interface Settings.



Redfish

Allows you to enable or disable AMI Redfish.
Configuration options: [Disabled] [Enabled]

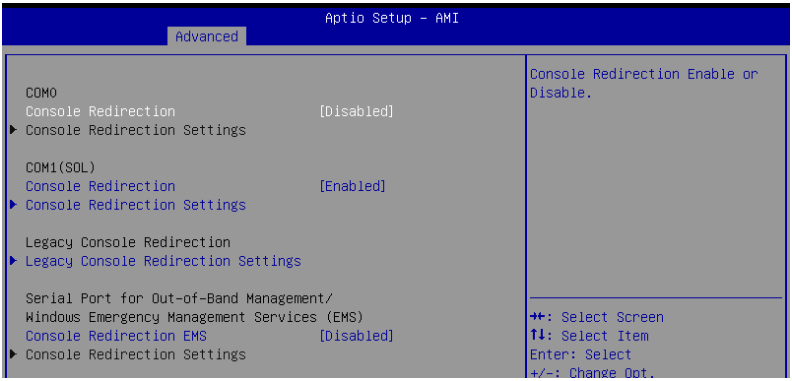
The following items appear only when **Redfish** is set to **[Enabled]**.

Authentication mode

Allows you to select the authentication mode.
Configuration options: [Basic Authentication] [Session Authentication]

7.9 Serial Port Console Redirection

The items in this menu allow you to configure serial port console redirection settings.



COM0 / COM1(SOL)

Console Redirection

Allows you to enable or disable the console redirection feature.
Configuration options: [Disabled] [Enabled]

The following item appears only when **Console Redirection** is set to **[Enabled]**.

Console Redirection Settings

These items become configurable only when you enable the Console Redirection item. The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

Terminal Type

Allows you to set the terminal type.

[VT100]	ASCII char set.
[VT100+]	Extends VT100 to support color, function keys, etc.
[VT-UTF8]	Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
[ANSI]	Extended ASCII char set.

Bits per second

Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Configuration options: [9600] [19200] [38400] [57600] [115200]

Data Bits

Configuration options: [7] [8]

Parity

A parity bit can be sent with the data bits to detect some transmission errors. [Mark] and [Space] parity do not allow for error detection. They can be used as an additional data bit.

[None]	None
[Even]	Parity bit is 0 if the num of 1's in the data bits is even.
[Odd]	Parity bit is 0 if num of 1's in the data bits is odd.
[Mark]	Parity bit is always 1.
[Space]	Parity bit is always 0.

Stop Bits

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning.) The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Configuration options: [1] [2]

Flow Control

Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
Configuration options: [None] [Hardware RTS/CTS]

VT -UTF8 Combo Key Support

This allows you to enable the VT -UTF8 Combination Key Support for ANSI/VT100 terminals.
Configuration options: [Disabled] [Enabled]

Recorder Mode

With this mode enabled only text will be sent. This is to capture Terminal data.
Configuration options: [Disabled] [Enabled]

Resolution 100x31

This allows you enable or disable extended terminal solution.
Configuration options: [Disabled] [Enabled]

Putty Keypad

This allows you to select the FunctionKey and Keypad on Putty.
Configuration options: [VT100] [LINUX] [XTERMR6] [SCO] [ESCN] [VT400]

Legacy Console Redirection Settings

Redirection COM Port

Allows you to select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.
Configuration options: [COM0] [COM1(SOL)]

Resolution

This allows you to set the number of rows and columns supported on the Legacy OS.
Configuration options: [80x24] [80x25]

Redirection After POST

This setting allows you to specify if Bootloader is selected than Legacy console redirection.
Configuration options: [Always Enable] [Bootloader]

Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS)

Console Redirection EMS

Allows you to enable or disable the console redirection feature.
Configuration options: [Disabled] [Enabled]

The following item appears only when **Console Redirection EMS** is set to **[Enabled]**.

Console Redirection Settings

The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

Out-of-Band Mgmt Port

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.
Configuration options: [COM0] [COM1(SOL)]

Terminal Type EMS

VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+, and then VT100. See above, in Console Redirection Settings page for more help with Terminal Type/Emulation.
Configuration options: [VT100] [VT100+] [VT-UTF8] [ANSI]

Bits per second EMS

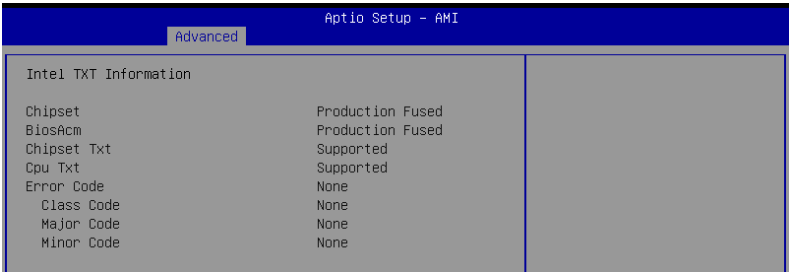
Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Configuration options: [9600] [19200] [57600] [115200]

Flow Control EMS

Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a “stop” signal can be sent to stop the data flow. Once the buffers are empty, a “start” signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
Configuration options: [None] [Hardware RTS/CTS] [Software Xon/Xoff]

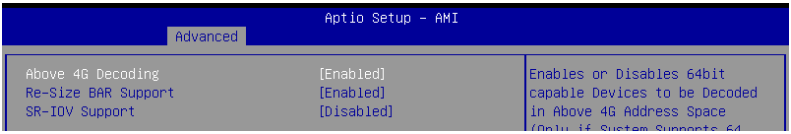
7.10 Intel TXT Information

You may view the Intel TXT information in this menu.



7.11 PCI Subsystem Settings

The items in this menu allows you to configure PCI, PCI-X, and PCI Express Settings.



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]

Only enabled under 64bit operating system.

The following item appears only when **Above 4G Decoding** is set to **[Enabled]**.

Re-Size BAR Support

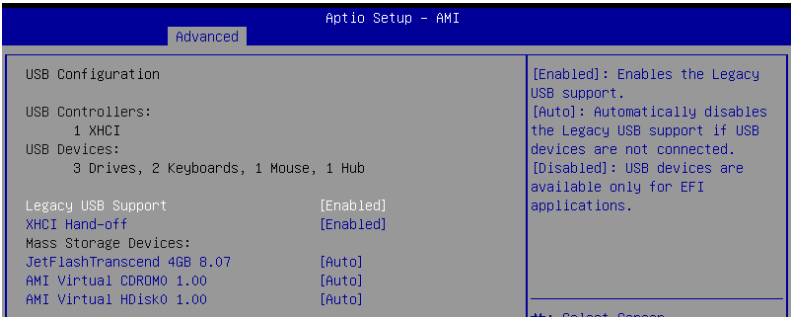
If system has Resizable BAR capable PCIe Devices, this option enables or disables Resizable BAR Support.
Configuration options: [Disabled] [Enabled]\

SR-IOV Support

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

7.12 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] Enabled the Legacy USB support.

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

[Auto] Automatically disabled the Legacy USB support if no USB devices are connected.

XHCI Hand-off

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

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

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

Mass Storage Devices:

Allows you to select the mass storage device emulation type for devices connected. **[Auto]** enumerates devices according to their media format. Optical drives are emulated as **[CD-ROM]**, drives with no media will be emulated according to a drive type.
Configuration options: [Auto] [Floppy] [Forceg/4vu84d FDD] [Hard Disk] [CD-ROM]

USB Single Port Control

Allows you to enable or disable the individual USB ports.

Refer to section **Rear panel features** in your motherboard's user manual for the location of the USB ports.

U32G2_1

Allows you to enable or disable this USB port.
Configuration options: [Disabled] [Enabled]

U32G2_C2

Allows you to enable or disable this USB port.
Configuration options: [Disabled] [Enabled]

U32G1_3~8

Allows you to enable or disable this USB port.
Configuration options: [Disabled] [Enabled]

U32G2x2_C9

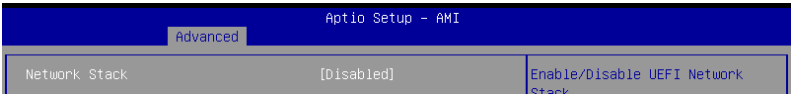
Allows you to enable or disable this USB port.
Configuration options: [Disabled] [Enabled]

USB11~14

Allows you to enable or disable this USB port.
Configuration options: [Disabled] [Enabled]

7.13 Network Stack Configuration

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



Network stack

Configuration options: [Disable] [Enable]

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

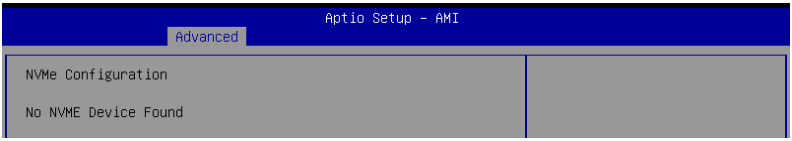
Ipv4/Ipv6 PXE Support

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

7.14 NVMe Configuration

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

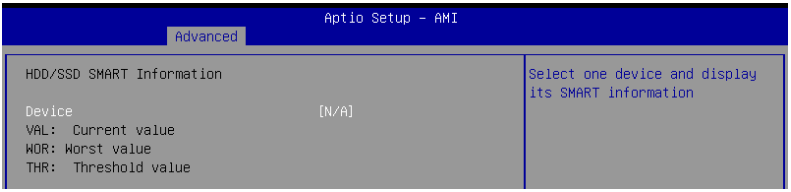
The options displayed in this menu may vary depending on the devices connected to your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.



7.15 HDD/SSD SMART Information

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

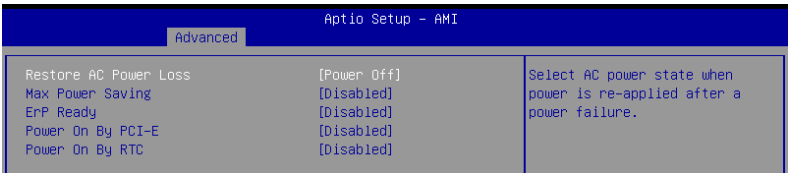
The options displayed in this menu may vary depending on the devices connected to your motherboard. Please refer to the BIOS of your motherboard for the actual settings and options.



NVM Express devices do not support SMART information.

7.16 APM Configuration

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



Restore AC Power Loss

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]

Max Power Saving

Configuration options: [Disabled] [Enabled]

ErP Ready

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. RGB LEDs and RGB/Addressable RGB Headers will also be disabled.
Configuration options: [Disabled] [Enabled (S4+S5)] [Enabled (S5)]

Power On By PCI-E

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

Power On By RTC

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]

The following items appear only when **Power On By RTC** is set to **[Enabled]**.

RTC Alarm Date (Days)

Sets RTC Alarm Date in days. 0: Everyday.
Configuration options: [0] - [31]

- Hour

Configuration options: [0] - [23]

- Minute

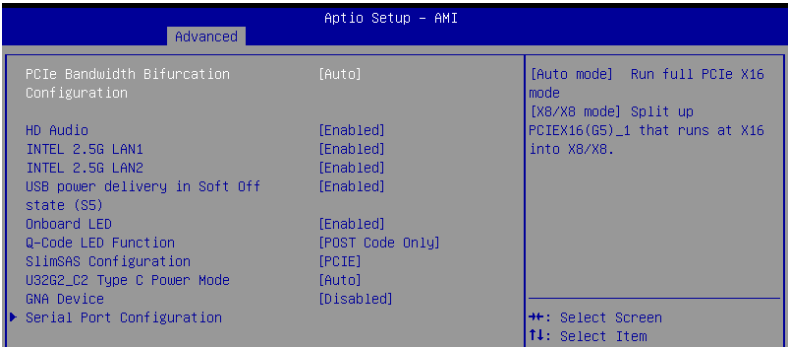
Configuration options: [0] - [59]

- Second

Configuration options: [0] - [59]

7.17 Onboard Devices Configuration

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



PCIe Bandwidth Bifurcation Configuration

[Auto]	Run full PCIe X16 mode.
[X8/X8]	Split up PCIEX16(G5)_1 that runs at X16 into X8/X8.

HD Audio

[Disabled]	HDA will be unconditionally disabled.
[Enabled]	HDA will be unconditionally enabled.

Intel 2.5G LAN1~2

Configuration options: [Disabled] [Enabled]

USB power delivery in Soft Off state (S5)

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

Onboard LED

Allows you to turn on or off the HDD and PLED LEDs.
Configuration options: [Disabled] [Enabled]

Q-Code LED Function

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

SlimSAS Configuration

[SATA mode]	Only supports SlimSAS SATA devices.
[PCIE mode]	Only supports SlimSAS PCIE devices.

U32G2_C2 Type C Power Mode

[Auto] Power will be provided to USB 3.2 Gen 2 Type-C ports automatically when a device is detected.

[Enabled] Power will always be on for USB 3.2 Gen 2 Type-C ports.

Improper connection may damage the system permanently.

GNA Device

Configuration options: [Enabled] [Disabled]

Serial Port Configuration

This submenu allows you to set parameters for Serial Port.

Serial Port

Configuration options: [Enabled] [Disabled]

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

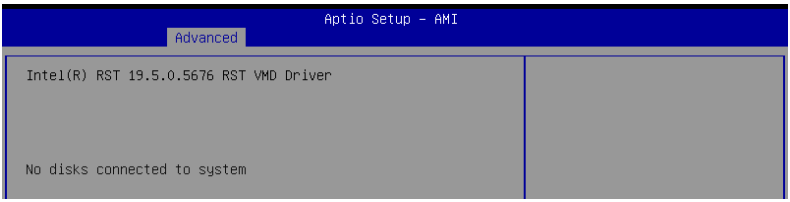
Change settings

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]

7.18 Intel(R) Rapid Storage Technology

The items in this menu allow you manage RAID volumes on the Intel(R) RAID Controller.

- The settings and options of this menu may vary depending on the storage devices connected. Please refer to the BIOS of your motherboard for the actual settings and options.
- Ensure to set the VMD configuration settings before using Intel(R) Rapid Storage Technology to create a RAID set.



8. 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.

Temperature Monitor

MotherBoard Temperature, VRM Temperature, Chipset Temperature, T_Sensor Temperature, DIMM A1-2 Temperature, DIMM B1-2 Temperature [xxx°C/xxx°F]

The onboard hardware monitor automatically detects and displays the temperatures for the different components. Select **[Ignore]** if you do not wish to display the detected temperatures.

Fan Speed Monitor

CPU Fan Speed, CPU Optional Fan Speed, Chassis Fan 1-3 Speed, Water Pump+ Speed [xxxx RPM]

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

Voltage and Current Monitor

CPU Core Voltage, 12V Voltage, 5V Voltage, 3.3V Voltage, Memory Controller Voltage [x.xxx V]

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

CPU Core Current [xx A]

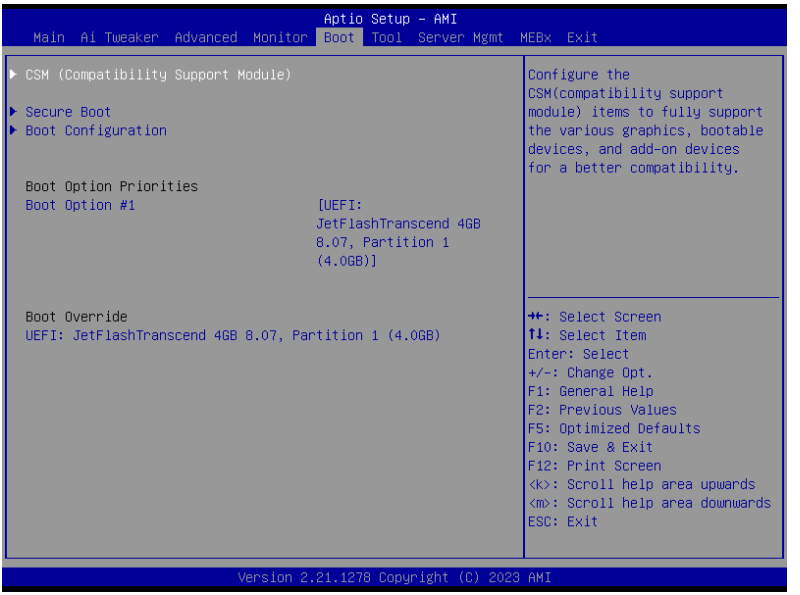
The onboard hardware monitor automatically detects the current output. Select **[Ignore]** if you do not want to detect this item.

Chassis Intrusion Detection Support

Set this item to **[Enabled]** to enable the chassis intrusion detection function.
Configuration options: [Enabled] [Disabled]

9. Boot menu

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



CSM (Compatibility Support Module)

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

Secure Boot

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

OS Type

[Windows UEFI Mode] This item allows you to select your installed operating system. Execute the Microsoft® Secure Boot check. Only select this option when booting on Windows® UEFI mode or other Microsoft® Secure Boot compliant OS.

[Other OS] Get the optimized function when booting on Windows® non-UEFI mode. Microsoft® Secure Boot only supports Windows® UEFI mode.

The Microsoft secure boot can only function properly on Windows UEFI mode.

Secure Boot Mode

This option allows you to select the Secure Boot mode from between Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.
Configuration options: [Standard] [Custom]

The following item appears only when **Secure Boot Mode** is set to **[Custom]**.

Key Management

Install Default Secure Boot keys

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

Clear Secure Boot keys

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

Save all Secure Boot variables

Allows you to save all secure boot keys to a USB storage device.

PK Management

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

Save To File

Allows you to save the PK to a USB storage device.

Set New key

Allows you to load the downloaded PK from a USB storage device.

Delete key

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

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

KEK Management

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

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

Save to file

Allows you to save the KEK to a USB storage device.

Set New key

Allows you to load the downloaded KEK from a USB storage device.

Append Key

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

Delete key

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

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

DB Management

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

Save to file

Allows you to save the db to a USB storage device.

Set New key

Allows you to load the downloaded db from a USB storage device.

Append Key

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

Delete key

Allows you to delete the db file from your system.
Configuration options: [Yes] [No]

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

DBX Management

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

Save to file

Allows you to save the dbx to a USB storage device.

Set New key

Allows you to load the downloaded dbx from a USB storage device.

Append Key

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

Delete key

Allows you to delete the dbx file from your system.
Configuration options: [Yes] [No]

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

Boot Configuration

Fast Boot

Allows you to enable or disable boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
Configuration options: [Disabled] [Enabled]

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

Next Boot after AC Power Loss

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

Boot Logo Display

[Auto]	Automatically adjust the boot logo size for Windows requirements.
[Full Screen]	Maximize the boot logo size.
[Disabled]	Hide the logo during POST.

The following item appears only when **Boot Logo Display** is set to **[Auto]** or **[Full Screen]**.

POST Delay Time

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

This feature only works when set under normal boot.

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

Post Report

Allows you to select a desired POST report waiting time or until ESC is pressed.
Configuration options: [1 sec] - [10 sec] [Until Press ESC]

Boot up NumLock State

Allows you to select the keyboard NumLock state.
Configuration options: [On] [Off]

Wait For 'F1' If Error

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

Option ROM Messages

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

Interrupt 19 Capture

Enable this item to allow the option ROMs to trap the interrupt 19.
Configuration options: [Enabled] [Disabled]

AMI Native NVMe Driver Support

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

Boot Sector (MBR/GPT) Recovery Policy

[Auto Recovery] Follow UEFI Rule.
[Local User Control] You can enter setup page and select Boot Sector (MBR/GPT) Recovery Policy to recovery MBR/GPT on the next boot time.

The following item appears only when **Boot Sector (MBR/GPT) Recovery Policy** is set to **[Local User Control]**.

Next Boot Recovery Action

Choose the (MBR/GPT) recovery action on the next boot.
Configuration options: [Skip] [Recovery]

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.

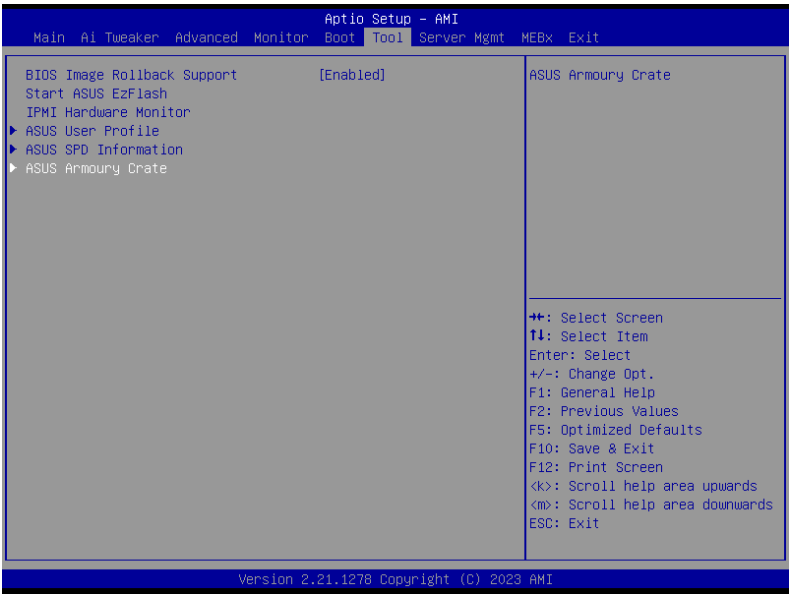
- To access Windows® OS in Safe Mode, press <F8 > after POST (Windows® 8 not supported).
- To select the boot device during system startup, press <F8> when ASUS Logo appears.

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.

10. Tool menu

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



BIOS Image Rollback Support

[Enabled] Support roll back your BIOS to a previous version, but this setting violates the NIST SP 800-147 requirement.

[Disabled] Only support updating your BIOS to a newer version, and this setting meets the NIST SP 800-147 requirement.

Start ASUS EzFlash

Allows you to run ASUS EzFlash BIOS ROM Utility when you press <Enter>. Refer to the **ASUS EzFlash Utility** section for details.

IPMI Hardware Monitor

Allows you to view the IPMI Hardware Monitor when you press <Enter>.

10.1 ASUS User Profile

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

Load from Profile

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

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

Profile Name

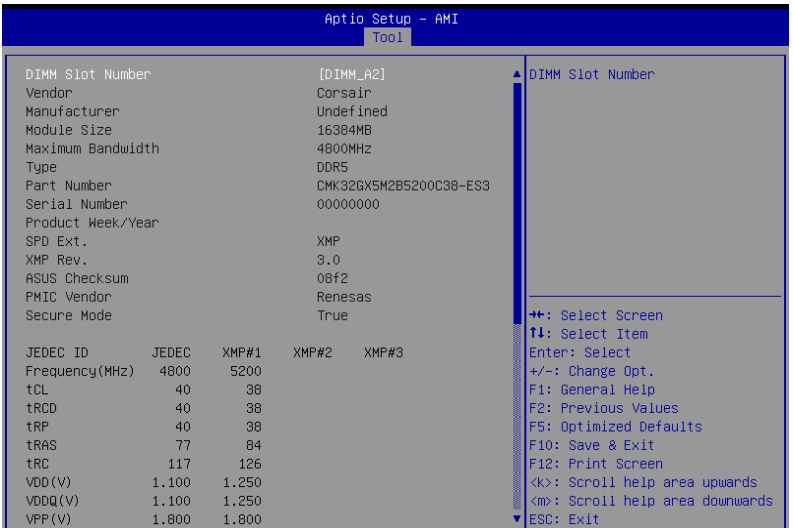
Allows you to key in a profile name.

Save to Profile

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

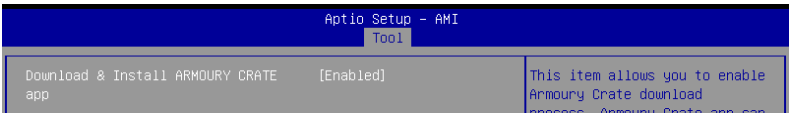
10.2 ASUS SPD Information

This item allows you to view the DRAM SPD information.



10.3 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 drivers and utilities for your motherboard.

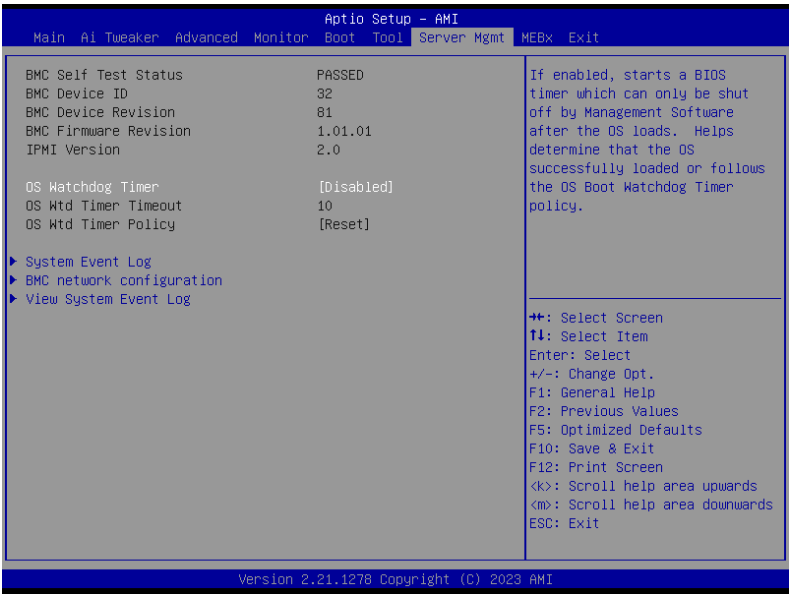


Download & Install ARMOURY CRATE app

Configuration options: [Disabled] [Enabled]

11. Server Mgmt menu

The Server Mgmt menu items allow you to configure IPMI settings.



OS Watchdog Timer

When this option is set to **[Enabled]** it starts a BIOS timer which can only be shut off by Management Software after the OS loads. Helps determine if the OS successfully loaded or follows the OS Boot Watchdog Timer policy.
Configuration options: [Enabled] [Disabled]

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

OS Wtd Timer Timeout

Enter a value between 1 and 30 min for OS Boot Watchdog Expiration, Not available if OS Boot Watchdog Timer is disabled.
Configuration options: [1] - [30]

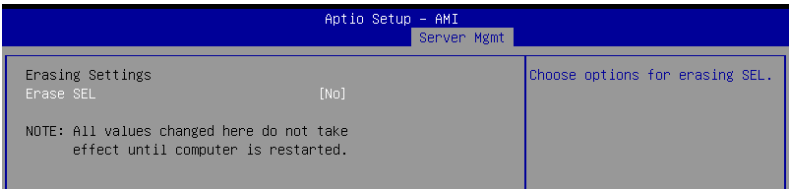
OS Wtd Timer Policy

This item allows you to configure the how the system should respond if the OS Boot Watch Timer expires.
Configuration options: [Do Nothing] [Reset] [Power Down] [Power Cycle]

11.1 System Event Log

Allows you to change the SEL event log configuration.

All values changed here do not take effect until computer is restarted.

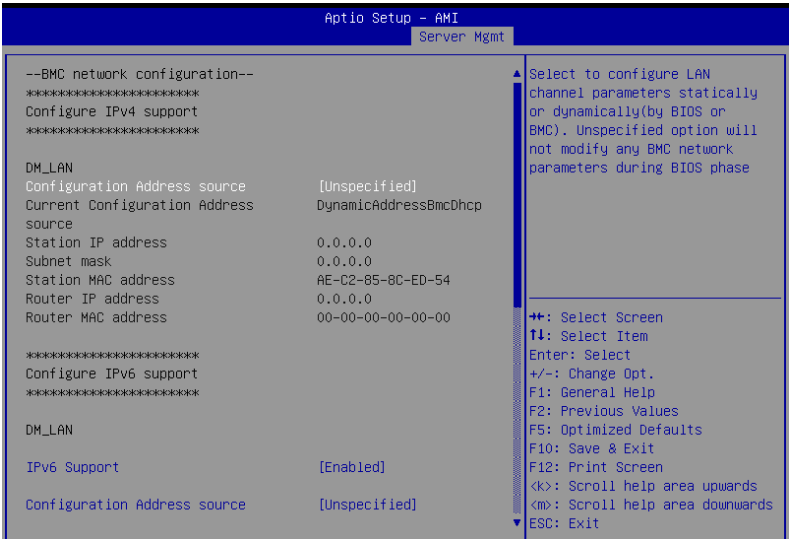


Erase SEL

Allows you to choose options for erasing SEL.
Configuration options: [No] [Yes, On next reset] [Yes, On every reset]

11.2 BMC network configuration

The sub-items in this configuration allow you to configure the BMC network parameters.



Configure IPV4 support

DM_LAN

Configuration Address source

This item allows you to configure LAN channel parameters statistically or dynamically (by BIOS or BMC). **[Unspecified]** option will not modify any BMC network parameters during BIOS phase.
Configuration options: [Unspecified] [Static] [DynamicBmcDhcp] [DynamicBmcNonDhcp]

The following items are available only when **Configuration Address source** is set to **[Static]**.

Station IP address

Allows you to set the station IP address.

Subnet mask

Allows you to set the subnet mask. We recommend that you use the same Subnet Mask you have specified on the operating system network for the used network card.

Router IP Address

Allows you to set the router IP address.

Router MAC Address

Allows you to set the router MAC address.

Configure IPV6 support

DM_LAN

IPV6 support

Allows you to enable or disable IPV6 support.
Configuration options: [Enabled] [Disabled]

The following items appear only when **IPV6 support** is set to **[Enabled]**.

Configuration Address source

Allows you to set the LAN channel parameters statically or dynamically (by BIOS or by BMC). **[Unspecified]** option will not modify any BMC network parameters during BIOS phase.
Configuration options: [Unspecified] [Static] [DynamicBmcDhcp]

The following items are available only when **Configuration Address source** is set to [Static].

Station IPV6 address

Allows you to set the station IPV6 address.

Prefix Length

Allows you to set the prefix length (maximum of Prefix Length is 128).

Configuration Router Lan Address source

Allows you to set the LAN channel parameters statically or dynamically (by BIOS or by BMC). **[Unspecified]** option will not modify any BMC network parameters during BIOS phase.
Configuration options: [Unspecified] [Static] [DynamicBmcDhcp]

The following items are available only when **Configuration Router Lan1 Address source** is set to **[Static]**.

IPV6 Router1 IP Address

Allows you to set the IPV6 Router1 IP address.

IPV6 Router1 Prefix Length Lan1

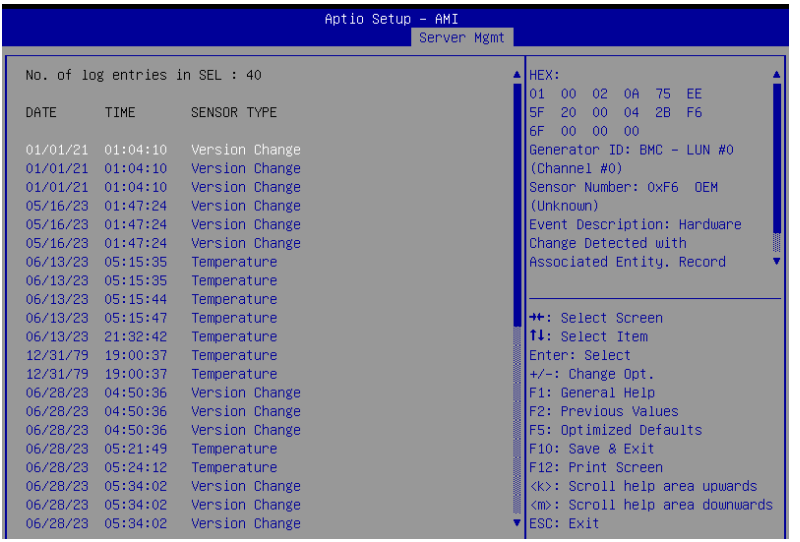
Allows you to set the IPV6 Router1 prefix length (maximum of Prefix Length is 128).

IPV6 Router1 Prefix Value Lan1

Allows you to set the IPV6 Router1 prefix value.

11.3 View System Event Log

This item allows you to view the system event log records.

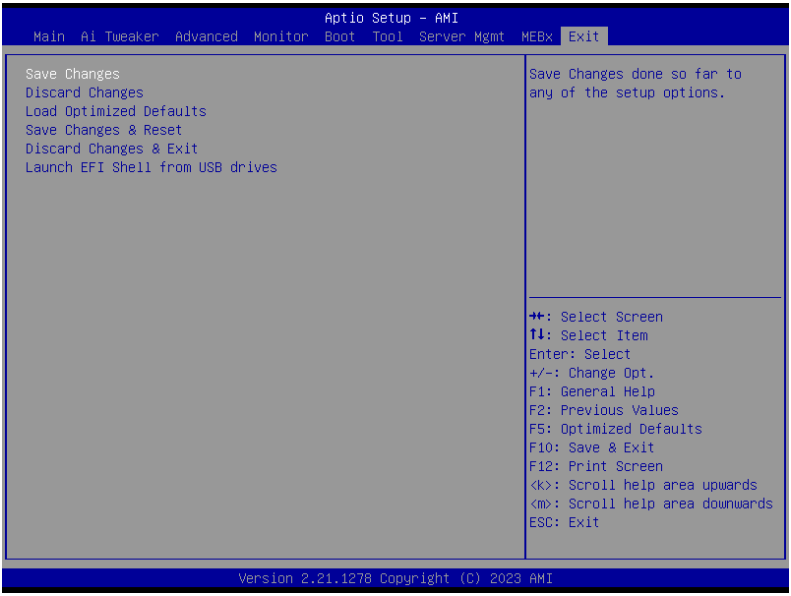


12. MEBx menu

The Intel Management Engine BIOS Extension (MEBx) menu allows you to configure MEBx settings.

13. 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.



Save Changes

Save changes done so far to any of the setup options.

Discard Changes

Discard changes done so far to any of the setup options.

Load Optimized Defaults

Restores/loads the default values for all the setup options. When you select this option or if you press <F5>, a confirmation window appears. Select **OK** to load the default values.

Save Changes & Reset

Resets the system after saving the changes made. 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.