Intel 700 series BIOS

USER GUIDE

Motherboard

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UEFI BIOS

MSI UEFI BIOS is compatible with UEFI (Unified Extensible Firmware Interface) architecture. UEFI has many new functions and advantages that traditional BIOS cannot achieve, and it will completely replace BIOS in the future. The MSI UEFI BIOS uses UEFI as the default boot mode to take full advantage of the new chipset's capabilities. However, it still has a CSM (Compatibility Support Module) mode to be compatible with older devices. That allows you to replace legacy devices with UEFI compatible devices during the transition.

Important

The term BIOS in this user guide refers to UEFI BIOS unless otherwise noted.

UEFI advantages

• Fast booting - UEFI can directly boot the operating system and save the BIOS self-test process. And also eliminates the time to switch to CSM mode during POST.

• Supports for hard drive partitions larger than 2 TB.

• Supports more than 4 primary partitions with a GUID Partition Table (GPT).

• Supports unlimited number of partitions.

• Supports full capabilities of new devices - new devices may not provide backward compatibility.

• Supports secure startup - UEFI can check the validity of the operating system to ensure that no malware tampers with the startup process.

Incompatible UEFI cases

• 32-bit Windows operating system - this motherboard supports only Windows 10/ Windows 11 64-bit operating system.

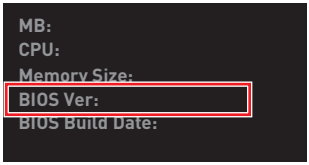
• Older graphics card - the system will detect your graphics card. When display a warning message There is no GOP (Graphics Output protocol) support detected in this graphics card.

Important

We recommend that you to replace with a GOP/UEFI compatible graphics card or using integrated graphics from CPU for having normal function.

How to find the BIOS version?

After entering the BIOS, find the BIOS version at the top of the screen.



BIOS Setup

The default settings offer the optimal performance for system stability in normal conditions. You should **always keep the default settings** to avoid possible system damage or failure booting unless you are familiar with BIOS.

Important

- *The BIOS setup screens, options and settings in this manual are for reference only and may vary from the motherboard you purchased. Please refer to the actual BIOS version of your system for detailed screens, settings and options.*
- *BIOS items are continuously updated for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be for reference only. You could also refer to the **HELP** information panel for the BIOS item description.*
- *The BIOS options and settings for each motherboard may vary slightly with the BIOS version, please refer to the actual BIOS of your system for settings and options.*

Entering BIOS Setup

Press **Delete** key, when the **Press DEL key to enter Setup Menu, F11 to enter Boot Menu** message appears on the screen during the boot process.

Function key

F1: General Help list

F2: Add/ Remove a favorite item

F3: Enter Favorites menu

F4: Enter CPU Specifications menu

F5: Enter Memory-Z menu

F6: Load optimized defaults

F7: Switch between Advanced mode and EZ mode

F8: Load Overclocking Profile

F9: Save Overclocking Profile

F10: Save Change and Reset*

F12: Take a screenshot and save it to USB flash drive (FAT/ FAT32 format only).

Ctrl+F: Enter Search page

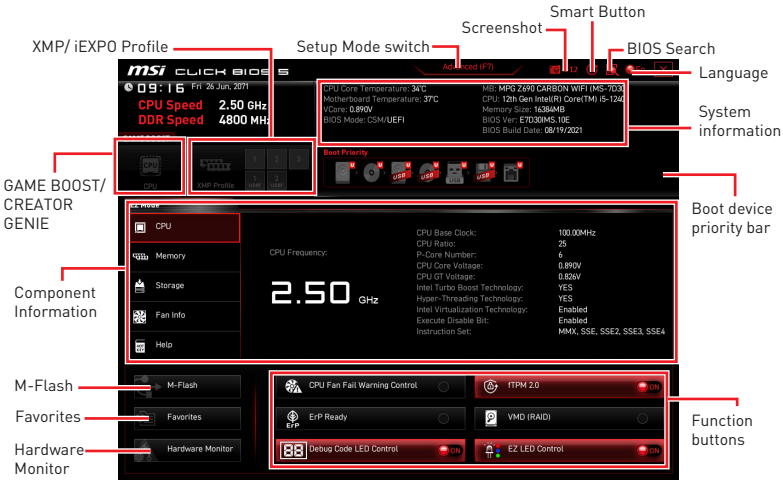
* When you press F10, a confirmation window appears and it provides the modification information. Select between Yes or No to confirm your choice.

BIOS Setting Mode

It provides two modes for you to configure BIOS: EZ mode and Advanced mode. Please press **F7** to switch between these two modes.

EZ Mode

At EZ mode, it provides the basic system information and allows you to configure the basic setting. To configure the advanced BIOS settings, please enter the Advanced Mode by pressing the Setup Mode switch or **F7** function key.



• **GAME BOOST** - click on it to toggle the GAME BOOST for overclocking. This function is only available when both of the motherboard and CPU are supporting this function.

Important

*Please don't make any changes in OC menu and don't load defaults to keep the optimal performance and system stability after activating the **GAME BOOST** function.*

• **CREATOR GENIE** - click on it to toggle the CREATOR GENIE for performance optimization.

Important

*Please don't make any changes in OC menu and don't load defaults to keep the optimal performance and system stability after activating the **CREATOR GENIE** function.*

• **XMP/ iEXPO Profile** - allows you to select the XMP/ iEXPO profile for memory to overclock. This function is only available when the system, memory and CPU are supporting this function.

• **Setup Mode switch** - press this tab or the F7 key to switch between Advanced mode and EZ mode.

• **Screenshot** - click on this tab or the F12 key to take a screenshot and save it to USB flash drive (FAT/ FAT32 format only).

• **BIOS Search** - click on this tab or the **Ctrl+F** keys to enter the search page. It allows you to search by BIOS item name. Move the mouse over a blank space and right click the mouse to exit the search page.

Important

*In search page, only the **F6**, **F10** and **F12** function keys are available.*

• **Smart Button** - it provides 4 function modes to be achieved by reset button of the computer chassis or by the smart button on the motherboard.

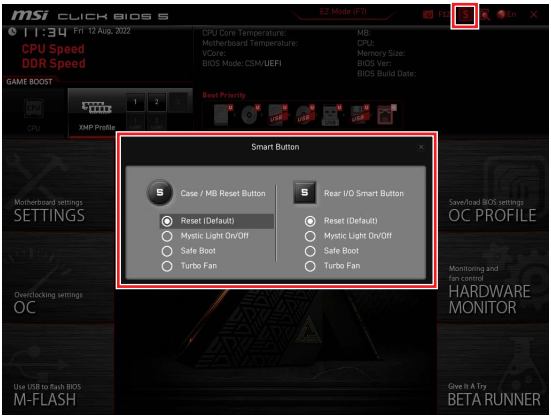
- **Reset** - press the reset/ smart button to reset the system.
- **Mystic Light on/ off** - press the reset/ smart button to turn on/ off all the onboard LEDs.

Important

*The **Mystic Light on/ off** function mode is unavailable when the LED_SW1 (EZ LED Control) switch turns **OFF**.*

- **Safe Boot** - click the reset/ smart button and start the system simultaneously to boot in Safe Boot mode. The system will boot with default and lower the PCIe (from CPU) mode.
- **Turbo Fan** - press the reset/ smart button for all fans to operate full speed or default speeds.
- **Configuring Smart Button**

1. Click on Smart Button and select a function mode.
2. Press **F10** to save the change and select **Yes** to restart the system.



- **Language** - allows you to select language of BIOS setup.

- **System information** - shows the CPU/ DDR speed, CPU/ MB temperature, MB/ CPU type, memory size, CPU/ DDR voltage, BIOS version and build date.

- **Boot device priority bar** - you can move the device icons to change the boot priority. The boot priority from high to low is left to right.

- **Component Information** - click on the **CPU**, **Memory**, **Storage**, **Fan Info** and **Help** buttons to show the information of the connected device.

- **Function buttons** - enable or disable the BIOS functions by clicking on these buttons. The button shows ON after enableing the function .

  - **CPU Fan Fail Warning Control** - enables or disables to show the CPU fan fail warning message on the POST.

  - **VMD (RAID)** - enables or disables the Intel VMD for RAID function.

  - **fTPM 2.0** - enables or disables the firmware TPM control.

  - **Thunderbolt Control** - enables or disables the thunderbolt I/O device support.

  - **ErP Ready** - enables or disables the system power consumption according to ErP regulation.

  - **Debug Code LED Control** - enables or disables the debug code LED.

  - **EZ LED Control** - turns on or turns off all the LEDs of motherboard.

  - **HD Audio Controller** - enables or disable the HD audio controller.

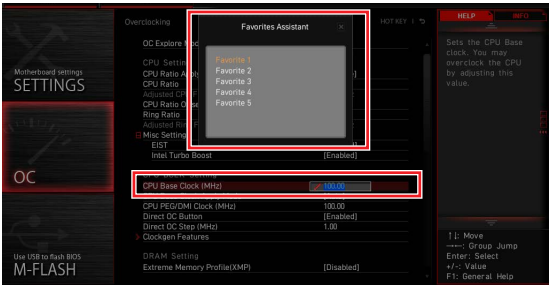
- **M-Flash** - click on this button to enter the M-Flash menu that provides the way to update BIOS with a USB flash drive.

- **Hardware Monitor** - click on this button to enter the Hardware Monitor menu that allows you to manually control the fan speed by percentage.

• **Favorites** - click on this button or press the **F3** key to show the Favorites window. It provides 5 menus for you to create personal BIOS menu where you can save and access favorite/ frequently-used BIOS setting items.

▪ **To add a BIOS item to a favorite menu**

1. Select a BIOS item not only on BIOS menu but also on search page.
2. Right-click or press **F2** key.
3. Choose a favorite page and click on **OK**.

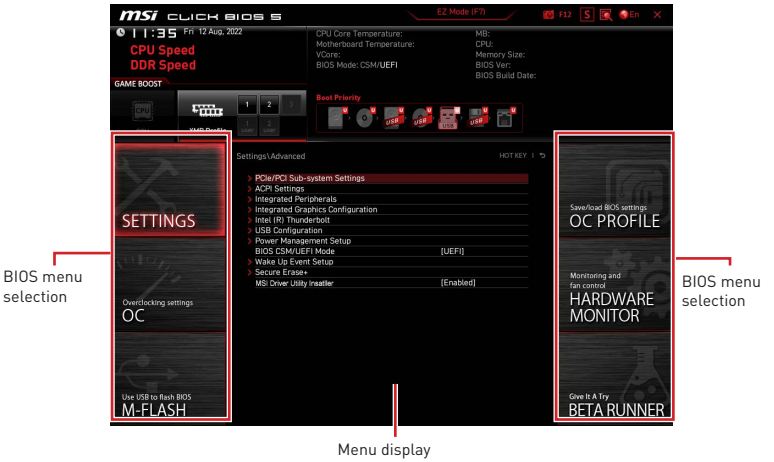


- **To delete a BIOS item from favorite menu**

1. Select a BIOS item on favorite menu.
2. Right-click or press **F2** key.
3. Choose Delete and click on **OK**.

Advanced Mode

Press Setup Mode switch or **F7** function key can switch between EZ Mode and Advanced Mode in BIOS setup.



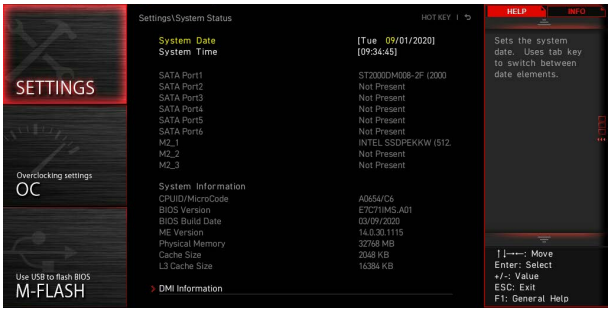
- **BIOS menu selection** - the following options are available:
  - **SETTINGS** - allows you to specify the parameters for chipset and boot devices.
  - **OC** - allows you to adjust the frequency and voltage. Increasing the frequency may get better performance.
  - **M-FLASH** - provides the way to update BIOS with a USB flash drive.
  - **OC PROFILE** - allows you to manage overclocking profiles.
  - **HARDWARE MONITOR** - allows you to set the speeds of fans and monitor voltages of system.
  - **BETA RUNNER** - provides the beta functions or features for the user who craves the new experience. However, we welcome and expect you to give us some more feedback on user experience. That will be helpful in improving the functions.
  - **SECURITY** - allows you to set the administrator password and the user password for system security.
- **Menu display** - provides BIOS setting items and information to be configured.

SETTINGS Menu

This menu allows you to specify the parameters for system, chipset and boot devices.

System Status

The System Status sub-menu allows you to set the system clock and view system information.



▶ System Date

Sets the system date. Use tab key to switch between date elements.

The format is <day> <month> <date> <year>.

<day>	Day of the week, from Sun to Sat, determined by BIOS. Read-only.
<month>	The month from Jan. through Dec.
<date>	The date from 1 to 31 can be keyed by numeric function keys.
<year>	The year can be adjusted by users.

▶ System Time

Sets the system time. Use tab key to switch between time elements. The time format is <hour> <minute> <second>.

▶ SATA PortX/ M2_X/ U2_X

Shows the information of connected SATA/ M.2/ U.2 devices.

Important

If the connected SATA/ M.2/ U.2 device is not displayed, turn off computer and re-check SATA/ M.2/ U.2 cable and power cable connections of the device and motherboard.

▶ System Information

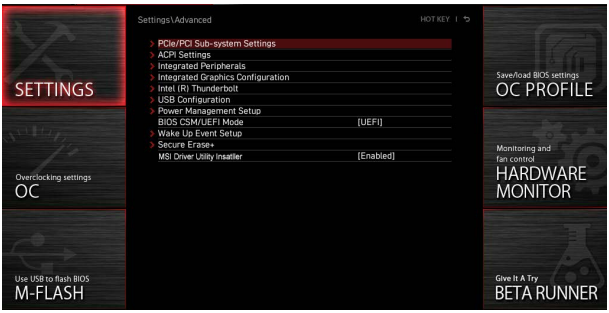
Shows detailed system information, including CPU type, BIOS version, and Memory (read only).

▶ DMI Information

Shows system information, desktop Board Information and chassis Information. (Read only).

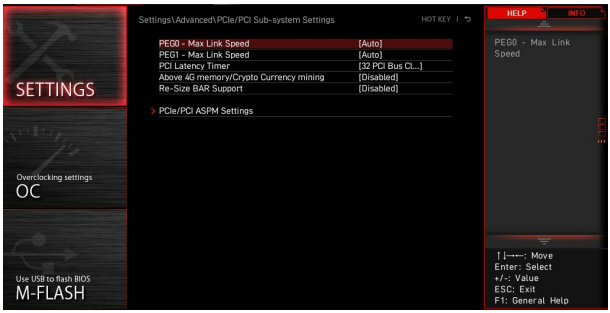
Advanced

The Advanced sub-menu allows you to adjust and set the parameters and behaviors of PCIe, ACPI, integrated peripherals, integrated graphics, USB, power management and Windows.



▶ PCIe/PCI Sub-system Settings

Sets PCI, PCI express interface protocol and latency timer. Press Enter to enter the sub-menu.



▶ M.2_1 - Max Link Speed

Sets PCI Express protocol for M2_1slot to match different installed M.2 devices.

[Auto]	This item will be configured automatically by BIOS.
[Gen1]	Enables PCIe Gen1 support only.
[Gen2]	Enables PCIe Gen2 support only.
[Gen3]	Enables PCIe Gen3 support only.
[Gen4]	Enables PCIe Gen4 support only.
[Gen5]	Enables PCIe Gen5 support only.

▶ PCIE_E1 - Max Link Speed

Sets PCI Express protocol for PCI_E1 slot to match different installed PCIe devices.

[Auto]	This item will be configured automatically by BIOS.
[Gen1]	Enables PCIe Gen1 support only.
[Gen2]	Enables PCIe Gen2 support only.
[Gen3]	Enables PCIe Gen3 support only.
[Gen4]	Enables PCIe Gen4 support only.
[Gen5]	Enables PCIe Gen5 support only.

▶ PCIE_E2 - Max Link Speed

Sets PCI Express protocol for PCI_E2 slot to match different installed PCIe devices.

[Auto]	This item will be configured automatically by BIOS.
[Gen1]	Enables PCIe Gen1 support only.
[Gen2]	Enables PCIe Gen2 support only.
[Gen3]	Enables PCIe Gen3 support only.
[Gen4]	Enables PCIe Gen4 support only.
[Gen5]	Enables PCIe Gen5 support only.

▶ CPU PCIe Lanes Configuration

Configures the PCIe lanes from CPU for adapting multiple PCIe devices usages.

▶ PCI Latency Timer

Sets latency timer for PCI interface device.

▶ Max TOLUD

Sets the maximum TOLUD (Top of Low Usable DRAM) value.

▶ Above 4G memory/ Crypto Currency mining

Enables this item to allow more memory address configuration space (requires 64 bit OS) with another optimized setting for better device compatibility and it might slightly affect the efficiency of PCIe-based devices.

[Enabled] Allows you to utilize more than 4x GPUs.

[Disabled] Disables this function.

▶ Re-Size BAR Support

Enables or disables the Resize BAR (Base Address Register) support. It is only available if the system supports 64-bit PCI/ PCIe decoding. If the system supports 64-bit PCI/ PCIe decoding, please enable this item for compatible PCIe devices.

▶ Native PCIE Enable

Enables or disables the PCIE native control.

▶ Native ASPM

If enabled, the native ASPM will be controlled by OS. If disabled, the native ASPM will be controlled by BIOS.

▶ PCIe/PCI ASPM Settings

Sets PCIe/ PCI ASPM (Active State Power Management) state for different installed devices. Press Enter to enter the sub-menu.

▶ PEG 0 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ PEG 1 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ PEG 2 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ PEG 3 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ PCI Express Root Port 1 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ PCI Express Root Port 5 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ PCI Express Root Port 7 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ PCI Express Root Port 8 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ PCI Express Root Port 9 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ PCI Express Root Port 21 ASPM

Sets PCI Express ASPM (Active State Power Management) state for power saving.

▶ ACPI Settings

Sets ACPI parameters of onboard power LED behaviors. Press Enter to enter the sub-menu.

▶ Power LED

Sets shining behaviors of the onboard Power LED.

[Dual Color] The power LED turns to another color to indicate the S3 state.

[Blinking] The power LED blinks to indicate the S3 state.

▶ CPU Over Temperature Alert

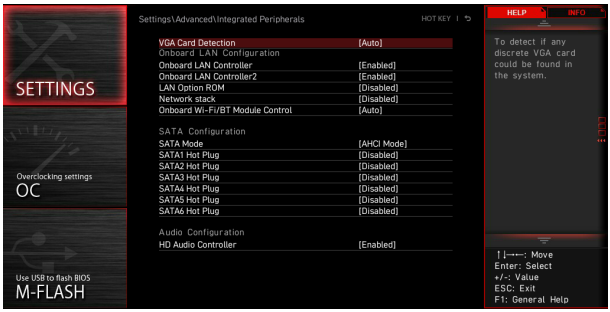
Enables or disables the CPU overheating alert sound and message when CPU temperature is over 80 and 94 degrees centigrade.

▶ Temperature Display On Debug Code

Selects a thermal detection point and then the detected temperature will display on the debug code LED when the system is on.

▶ Integrated Peripherals

Sets integrated peripherals' parameters, such as LAN, HDD, USB and audio. Press **Enter** to enter the sub-menu.



▶ VGA Detection

Allows the system to detect if there is any discrete VGA card or integrated graphics unit.

▶ Onboard LAN Controller

Enables or disables the onboard LAN controller.

▶ LAN Option ROM

Enables or disables the legacy network Boot Option ROM for detailed settings. This item will appear when **Onboard LAN Controller** is enabled.

[Enabled] Enables the onboard LAN Boot ROM.

[Disabled] Disables the onboard LAN Boot ROM.

▶ Network Stack

Sets UEFI network stack for optimizing IPv4 / IPv6 function. This item is available when **Onboard LAN Controller** is enabled.

[Enabled] Enables UEFI network stack.

[Disabled] Disables UEFI network stack.

▶ Ipv4 PXE Support

When Enabled, the system UEFI network stack will support Ipv4 protocol. This item will appear when **Network Stack** is Enabled.

[Enabled] Enables the Ipv4 PXE boot support.

[Disabled] Disables the Ipv4 PXE boot support.

▶ Ipv6 PXE Support

When Enabled, the system UEFI network stack will support Ipv6 protocol. This item will appear when **Network Stack** is enabled.

[Enabled] Enables the Ipv6 PXE boot support.

[Disabled] Disables the Ipv6 PXE boot support.

▶ BT Tile Mode

If enabled, this item allows you to locate your PC by the Tile APP on your smartphone.

▶ Onboard CNVi Module Control

Enables or disables the functions (WiFi and Bluetooth) of the Intel CNVi module.

▶ Onboard Wi-Fi/BT Module Control

Enables or disables the onboard WiFi and Bluetooth functions.

▶ Onboard IEEE1394 Controller

Enables or disables the onboard IEEE1394 controller.

▶ RAID Configuration (Intel VMD)

Enables or disables the RAID configuration. Press **Enter** to enter the sub-menu.

▶ Enable VMD Global Mapping

Enables or disables Intel VMD mapping. Intel VMD enables direct control and management of NVMe SSDs from the PCIe bus without additional hardware adapters.

▶ RAID0

Enables or disables RAID 0.

▶ RAID1

Enables or disables RAID 1.

▶ RAID5

Enables or disables RAID 5.

▶ RAID10

Enables or disables RAID 10.

▶ Intel Rapid Recovery Technology

Enables or disables Intel Rapid Recovery Technology. Intel® Rapid Recover Technology (Intel® RRT) is a feature of Intel® Rapid Storage Technology (Intel® RST). It uses RAID 1 (mirroring) functionality to copy data from a designated master drive to a designated recovery drive.

▶ RRT volumes can span internal and eSATA drives

Enables or disabled the RRT volumes to span internal and eSATA drives.

▶ ZPODD

Enables or disabled the ZPODD (Zero Power optical disk drive).

▶ SATA1 Hot Plug

Enables or disabled the SATA1 port hot plug support.

▶ SATA2 Hot Plug

Enables or disabled the SATA2 port hot plug support.

▶ SATA3 Hot Plug
Enables or disabled the SATA3 port hot plug support.

▶ SATA4 Hot Plug
Enables or disabled the SATA4 port hot plug support.

▶ SATA5 Hot Plug
Enables or disabled the SATA5 port hot plug support.

▶ SATA6 Hot Plug
Enables or disabled the SATA6 port hot plug support.

▶ SATAA Hot Plug
Enables or disabled the SATAA port hot plug support.

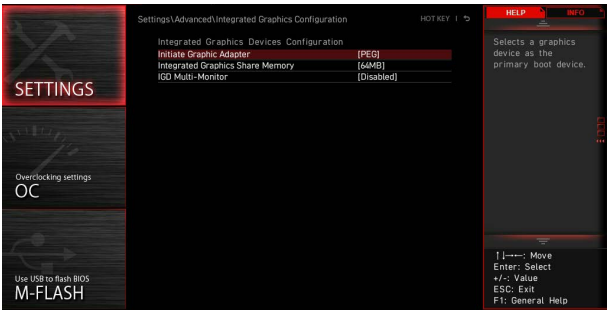
▶ SATAB Hot Plug
Enables or disabled the SATAB port hot plug support.

▶ Onboard E-SATA Controller Mode
Sets the operation mode of the onboard E-SATA controller.

▶ External SATA 6GB/s Controller Mode
Sets the operation mode of the external SATA controller.

▶ HD Audio Controller
Enables or disables the onboard High Definition Audio controller.

▶ Integrated Graphics Configuration
Adjusts integrated graphics settings for optimum system. Press **Enter** to enter the sub-menu. This sub-menu is only available with the CPU integrate with IGP.



▶ Initiate Graphic Adapter
Selects a graphics device as the primary boot device.

[IGD] Integrated Graphics Display.

[PEG] PCI-Express Graphics Device.

▶ Integrated Graphics Share Memory

Selects a fixed amount of system memory allocated to the onboard graphics. This item will appear when an external graphics card be installed and the **IGD Multi-Monitor** is enabled.

▶ IGD Multi-Monitor

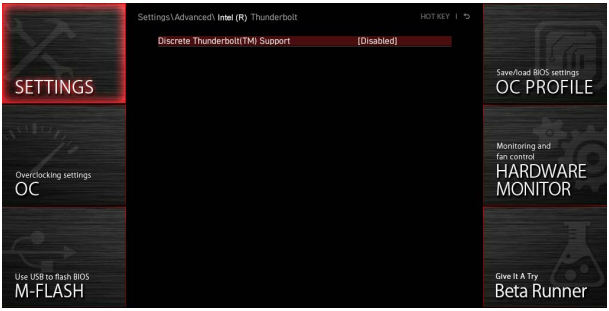
Enables or disables the multi-screen output from integrated graphics and external graphics card. This item appears when **Initiate Graphic Adapter** set to PEG.

[Enabled] Enables multi-screen function for both integrated and external graphics cards.

[Disabled] Disables this function.

▶ Intel (R) Thunderbolt

Sets the thunderbolt device function. Press **Enter** to enter the sub-menu.



▶ PCIE Tunneling over USB4

Enables or disables the PCI-E Tunnel protocol over USB4.

▶ Discrete Thunderbolt(TM) Support

Enables or disables the thunderbolt device support.

▶ Wake From Thunderbolt(TM) Device

Enables or disables the system wake up by thunderbolt device.

▶ Discrete Thunderbolt(TM) Configuration

Sets the thunderbolt device configuration. Press **Enter** to enter the sub-menu.

▶ Thunderbolt Boot Support

Enables or disables the system to boot from boot-able thunderbolt device.

▶ GPIO3 Force Pwr

Sets GPIO3 to 1/0.

▶ GPIO filter

Enables or disables GPIO filter. Enables GPIO filter to avoid electrical noise on chipset GPIOs during hotplug of 12V USB devices.

▶ DTBT Go2Sx Command

Enables or disables the DTBT to execute Go2Sx commands before the system going to Sx states.

▶ Windows 10 Thunderbolt support

Sets Windows 10 support level.

[Disabled] No OS native support.

[Enabled+RTD3]OS native support + RTD3.

▶ DTBT Controller 0 Configuration

Sets the DTBT configuration. Press **Enter** to enter the sub-menu.

▶ DTBT Controller 0

Enables or disables DTBT controller 0.

▶ TBT Host Router

Enables or disables the host router based on ports available.

▶ Extra Bus Reserved

Sets the extra bus for TBT ports.

[56] One port host.

[106] Two port host.

▶ Reserved Memory

Sets reserved memory for this root bridge.

▶ Memory Alignment

Sets the memory alignment.

▶ Reserved PMemory

Sets reserved prefetchable memory for this root bridge.

▶ PMemory Alignment

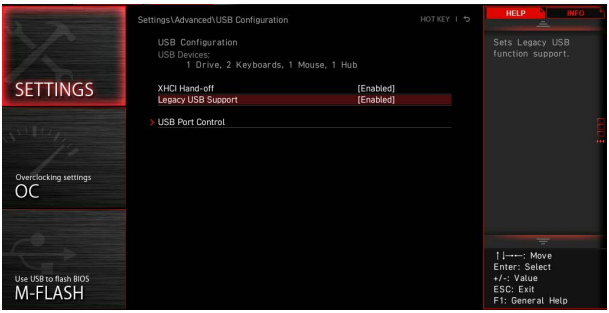
Sets prefetchable memory alignment.

▶ Reserved I/O

Sets reserved I/O.

▶ USB Configuration

Sets the onboard USB controller and device function. Press **Enter** to enter the sub-menu.



▶ XHCI Hand-off

Enables or disables XHCI hand-off support. Enables this item for the operating system without XHCI hand-off feature.

▶ Legacy USB Support

Sets Legacy USB function support.

[Auto]	The system will automatically detect if any USB device is connected and enable the legacy USB support.
[Enabled]	Enables the USB support under legacy mode.
[Disabled]	The USB devices will be unavailable under legacy mode.

▶ USB Port Control

Enables or disables the individual USB ports of the motherboard. Press **Enter** to enter the sub-menu.

▶ Super IO Configuration

Sets system Super I/O chip parameters including LPT and COM ports. Press **Enter** to enter the sub-menu.

▶ Serial (COM) Port 0/1 Configuration

Sets detailed configuration of serial(COM) port 0/1. Press **Enter** to enter the sub-menu.

▶ Serial (COM) Port 0/1

Enables or disables serial (COM) port 0/1.

▶ Serial (COM) Port 0/1 Settings

Sets serial (COM) port 0/1. If set to Auto, BIOS will set the IRQ automatically or you can set it manually.

▶ Parallel (LPT) Port Configuration

Sets detailed configuration of parallel port (LPT). Press Enter to enter the sub-menu.

▶ Parallel (LPT) Port

Enables or disables parallel(LPT) port.

▶ Parallel (LPT) Port Settings

Sets parallel port (LPT). If set to **Auto**, BIOS will optimize the IRQ automatically or you can set it manually.

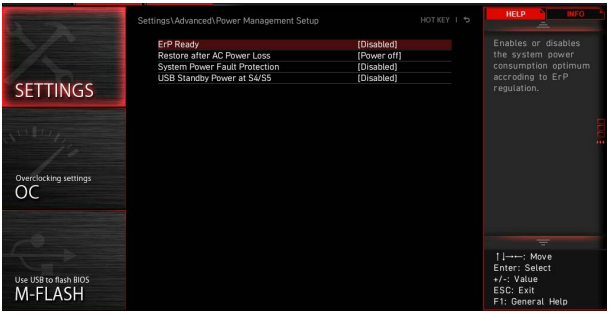
▶ Device Mode

Selects an operating mode for parallel port.

[STD Printer Mode]	Printer port mode
[SPP]	Standard Parallel Port mode
[EPP-1.9/ 1.7 + SPP]	Enhanced Parallel Port-1.9/ 1.7 mode + Standard Parallel Port mode.
[ECP]	Extended Capability Port mode
[ECP + EPP-1.9/ 1.7]	Extended Capability Port mode + Enhanced Parallel Port-1.9/ 1.7 mode.

▶ Power Management Setup

Sets system Power Management of ErP and AC Power Loss behaviors. Press **Enter** to enter the sub-menu.



▶ ErP Ready

Enables or disables the system power consumption according to ErP regulation.

[Enabled]	Optimize the system power consumption according to ErP regulation. It will not support S4 & S5 wake up by USB, PCI and PCIe devices.
[Disabled]	Disables this function.

▶ Restore after AC Power Loss

Sets the system behaviors while encountering the AC power loss.

[Power Off]	Leaves the system in power off state after restoring AC power.
[Power On]	Boot up the system after restoring AC power.
[Last State]	Restores the system to the last state.

▶ System Power Fault Protection

Enables or disables the protection (shut down status) for system when detecting abnormal voltage input.

[Enabled] Protect the system from unexpected power operation and remain the shut down status.

[Disabled] Disables this function.

▶ USB Standby Power at S4/S5

Enables or disables the standby power for all USB ports. This item will be available when **Resume By USB Device** is disabled.

▶ BIOS CSM/UEFI Mode

Select CSM (Compatibility Support Module) or UEFI mode to meet the system requirement.

[CSM] For the non-UEFI driver add-on devices or non-UEFI mode OS.

[UEFI] For the UEFI driver add-on devices and UEFI mode OS.

▶ Wake Up Event Setup

Sets system wake up behaviors for different sleep modes. Press Enter to enter the sub-menu.

▶ Wake Up Event By

Selects the wake up event by BIOS or operating system.

[BIOS] Activates the following items, set wake up events of these items.

[OS] The wake up events will be defined by OS.

▶ Resume By RTC Alarm

Disables or enables the system wake up by RTC Alarm.

[Enabled] Enables the system to boot up on a scheduled time/ date.

[Disabled] Disables this function.

▶ Date (of month) Alarm/ Time (hh:mm:ss) Alarm

Sets RTC alarm date/ Time. If Resume By RTC Alarm is set to [Enabled], the system will automatically resume (boot up) on a specified date/hour/minute/ second in these fields (using the **+** and **-** keys to select the date & time settings).

▶ Resume By PCI/ PCI-E/ Networking Device

Enables or disables the wake up function of installed PCI/ PCI-E expansion cards, integrated LAN controllers, onboard WiFi or USB devices which are supported by third party integrated chips.

[Enabled] Enables the system to be awakened from the power saving modes when activity or input signal of PCI/ PCIe/ LAN/ WiFi device is detected.

[Disabled] Disables this function.

▶ Resume By Intel Onboard LAN

Enables or disables the system wake up by Onboard Intel LAN.

[Enabled] Enables the system to be awakened from the power saving modes when activity or input signal of Intel LAN device is detected.

[Disabled] Disables this function.

▶ Resume By Intel Onboard LAN/CNVi

Enables or disables the system wake up by onboard Intel LAN/ CNVi wireless.

[Enabled] Enables the system to be awakened from the power saving modes when activity or input signal of Intel LAN/ CNVi device is detected.

[Disabled] Disables this function.

▶ Resume By Intel CNVi

Enables or disables the system wake up by Intel CNVi wireless module.

[Enabled] Enables the system to be awakened from the power saving modes when activity or input signal of Intel CNVi device is detected.

[Disabled] Disables this function.

▶ Resume by USB Device

Enables or disables the system wake up by USB devices.

[Enabled] Enables the system to be awakened from sleep state when activity of USB device is detected.

[Disabled] Disables this function.

▶ Resume From S3/S4/S5 by PS/2 Mouse

Enables or disables the system wake up by PS/2 mouse.

[Enabled] Enables the system to be awakened from S3/ S4/ S5 state when activity of PS/2 mouse is detected.

[Disabled] Disables this function.

▶ Resume From S3/S4/S5 by PS/2 Keyboard

Enables or disables the system wake up by PS/2 keyboard.

[Any Key] Enables the system to be awakened from S3/ S4/ S5 state when activity of any key on PS/2 keyboard is detected.

[Hot Key] Enables the system to be awakened from S3/ S4/ S5 state when activity of hot key on PS/2 keyboard is detected.

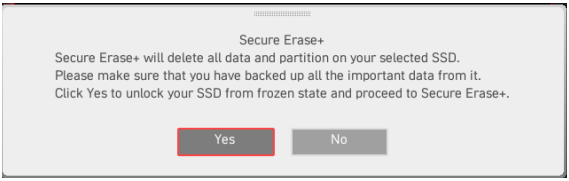
[Disabled] Disables this function.

▶ Hot Key

Selects a combination of keys as a hot key to wake the system. This item appears when the Resume From S3/S4/S5 by PS/2 Keyboard sets to Hot Key.

▶ Secure Erase+

Enables or disables Secure Erase+ function. Secure Erase+ is the best way to effectively wipe all data from a SSD. Please note that data of SSD will be **erased** after enabling Secure Erase+.



▶ MSI Driver Utility Installer

Enables or disables the MSI driver utility support. If enabled, platform drivers will be downloaded automatically through **Windows Update** after the first OS installation.

▶ M.2 XPANDER-Z GEN4 S Fan Control

You can set the fan duty percentage according LED color of the M.2 XPANDER-Z fan. If set to **Auto**, BIOS will set the fan duty automatically.

▶ Realtek PCIe GBE Family Controller

Shows driver information and configuration of the ethernet controller parameter. This item will appear when **Network Stack** is enabled.

▶ Intel (R) Ethernet Connection I219-V -(MAC

Shows driver information and configuration of the ethernet controller parameter. This item will appear when **Network Stack** is enable.

Boot

Sets the sequence of system boot devices.

▶ Full Screen Logo Display

Enables or disables to show the full screen logo while system **POST**.

[Enabled]	Shows the logo in full screen.
[Disabled]	Shows the POST messages.

▶ G02BIOS

Allows system to enter BIOS setup directly by pressing the Power button for 5 seconds upon bootup.

[Enabled]	The system boots straight to the BIOS setup by long pressing the power button about 5 seconds when the system is off (S5 state).
[Disabled]	Disables this function.

▶ Bootup NumLock State

Select the keyboard NumLock state while system is booting.

▶ Info Block effect

Sets to apply the sliding effect when entering the Graphical Setup Engine (GSE). To apply the sliding effect, please set it to Unlock.

[Unlock]	Sliding effect.
[Lock]	Fix the Help information block on the screen.

▶ POST Beep

Enables or disables the beep sound during system POST.

▶ MSI Fast Boot

MSI Fast Boot is the fastest way to boot the system. When enabled, the USB, PS2 and SATA devices will not be detected while booting.

[Enabled]	Enables the MSI Fast Boot function to speed up booting time. And the following Fast Boot field will be disabled and fixed.
[Disabled]	Disables MSI Fast Boot.

Important

When MSI Fast Boot is enabled, you are not allowed to enter BIOS setup until you to disable MSI Fast Boot in MSI Center.

▶ Fast Boot

Enables or disables the Windows 10 fast boot feature. This item will only be available when **MSI Fast Boot** is disabled.

▶ Boot Option #1/ #2/ #3/ #4/ #5/ #6/ #7

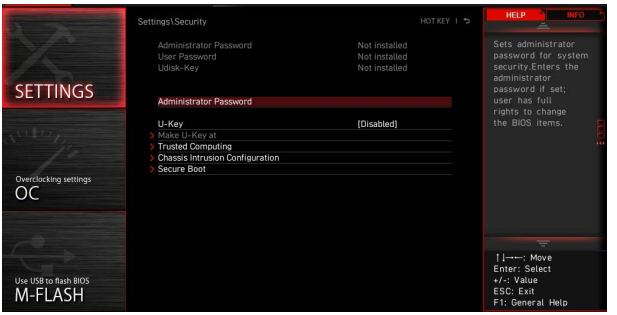
These items specify the boot device priority sequence.

▶ UEFI USB Key Drivers BBS Priorities

This item is used to prioritize the installed USB key drivers.

Security

Use this menu to set the administrator password and the user password for system security. This menu also allows you to set the TPM (Trusted Platform Module) function.



▶ Administrator Password

Sets administrator password for system security. User has full rights to change the BIOS items with administrator password. After setting the administrator password, the state of this item will show Installed.

▶ User Password

Sets User Password for system security. User has limited rights to change the BIOS items with user password. This item will be available when administrator password is set. After setting the user password, the state of this item will show Installed.

▶ Password Check

Selects a condition that will request the password.

[Setup] A password will be requested for entering the BIOS Setup.

[Boot] A password will be requested for booting the system.

▶ Password Clear

Enables or disables the clear CMOS behavior to clear a set password.

[Enabled] The password will be erased after clear CMOS.

[Disabled] The password will always be kept.

Important

*When selecting the **Administrator / User Password** items, a password box will appear on the screen. Type the password then press **Enter.** The password typed now will replace any previous set password from CMOS memory. You will be prompted to confirm the password. You may also press **Esc** key to abort the selection.*

*To clear a set password, press **Enter** when you are prompted to enter a new password. A message will confirm the password is being disabled. Once the password is disabled, you can enter the setup and OS without authorization.*

▶ U-Key
Enables or disables the USB flash drive as a key.

▶ Make U-Key at
Specify a USB flash drive as a key.

▶ Trusted Computing
Sets TPM (Trusted Platform Module) function.

▶ Security Device Support
Enables or disables the TPM function to build the endorsement key for accessing the system.

▶ TPM Device Selection
Selects TPM device: dTPM or fTPM 2.0.

[dTPM]	Select it for hardware TPM.
[fTPM 2.0]	Select it for software TPM.

▶ SHA256 PCR Bank
Enables or disables the SHA256 PCR bank.

▶ SHA384 PCR Bank
Enables or disables the SHA384 PCR bank.

▶ SM3_256 PCR Bank
Enables or disables the SM3_256 PCR bank.

▶ Pending operation
Sets the action of pending TPM operation.

[None]	Discard the selelction
[TPM Clear]	Clear all data secured by TPM.

▶ Platform Hierarchy
Enables or disables platform hierarchy.

▶ Storage Hierarchy
Enables or disables storage hierarchy.

▶ Endorsement Hierarchy
Enables or disables endorsement hierarchy.

▶ Physical Presence Spec Version
Selects the PPI (Physical Presence Interface) Spec version.

▶ Chassis Intrusion Configuration

Press **Enter** to enter the sub-menu.

▶ Chassis Intrusion

Enables or disables recording messages while the chassis is opened. This function is ready for the chassis equips a chassis intrusion switch.

[Enabled]	Once the chassis is opened, the system will record and issue a warning message.
[Reset]	Clear the warning message. After clearing the message, please return to Enabled or Disabled.
[Disabled]	Disables this funcion.

▶ Secure Boot

Press **Enter** to enter the sub-menu.

▶ Secure Boot

Secure Boot function can be enabled only when the Platform Key(PK) is enrolled and running accordingly.

▶ Secure Boot Mode

Selects the secure boot mode. This item appears when **Secure Boot** is enabled.

[Standard]	The system will automatically load the secure keys from BIOS.
[Custom]	Allows user to configure the secure boot settings and manually load the secure keys.

▶ Enroll all Factory Default keys

Allows you to install all factory default keys. The settings will be applied after reboot or at the next reboot. This item appears when "**Secure Boot Mode**" sets to **Custom**.

▶ Delete all Secure Boot variables

Allows you to delete all the Secure Boot keys(PK,KEK,db,dbt,dbx). The settings will be applied after reboot or at the next reboot. This item appears when "**Secure Boot Mode**" sets to **Custom**.

▶ Key Management

Press **Enter** to enter the sub-menu. Manage the secure boot keys. This item appears when "**Secure Boot Mode**" sets to **Custom**.

▶ Provision Factory Default keys

Enables or disables the factory default keys.

▶ Enroll all Factory Default keys

Allows you to install all factory default keys. The settings will be applied after reboot or at the next reboot.

▶ Delete all Secure Boot variables

Allows you to delete all the Secure Boot keys(PK,KEK,db,dbt,dbx). The settings will be applied after reboot or at the next reboot.

▶ Save all Secure Boot variables

Allows you to save all the Secure Boot keys(PK,KEK,db,dbt,dbx).

▶ Enroll Efi Image

Allows the image to run in Secure Boot mode. Enroll the SHA256 Hash certificate of a PE image into the authorized signature database (db).

▶ Platform Key(PK): ? ? ?

The Platform Key (PK) can protect the firmware from any un-authenticated changes. The system will verify the PK before your system enters the OS. Platform Key (PK) is used for updating KEK.

▶ Set New Key

Sets a new PK to your system.

▶ Delete Key

Deletes the PK from your system.

▶ Key Exchange Keys: ? ? ?

Key Exchange Key (KEK) is used for updating DB or DBX.

▶ Set New Key

Sets a new KEK to your system.

▶ Append Key

Loads an additional KEK from storage devices to your system.

▶ Delete Key

Deletes the KEK from your system.

▶ Authorized Signatures: ? ? ?

Authorized Signatures(DB) lists the signatures that can be loaded.

▶ Set New Key

Sets a new DB to your system.

▶ Append Key

Loads an additional DB from storage devices to your system.

▶ Delete Key

Deletes the DB from your system.

▶ Forbidden Signatures : ? ? ?

Forbidden Signatures (DBX) lists the forbidden signatures that are not trusted and cannot be loaded.

▶ Set New Key

Sets a new DBX to your system.

▶ Append Key

Loads an additional DBX from storage devices to your system.

▶ Delete Key

Deletes the DBX from your system.

▶ Authorized TimeStamps: ? ? ?

Authorized TimeStamps (DBT) lists the the authentication signatures with authorization time stamps.

▶ Set New Key

Sets a new DBT to your system.

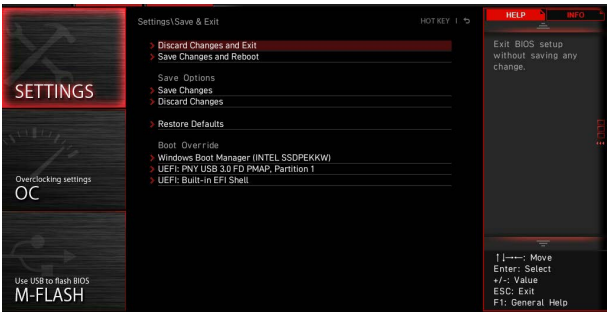
▶ Append Key

Loads an additional DBT from storage devices to your system.

▶ OsRecovery Singnatures: ? ? ?

Lists the available signatures for OS recovery.

Save & Exit



▶ Discard Changes and Exit

Exit BIOS setup without saving any change.

▶ Save Changes and Reboot

Save all changes and reboot the system.

▶ Save Changes

Save current changes.

▶ Discard Changes

Discard all changes and restore to the previous values.

▶ Restore Defaults

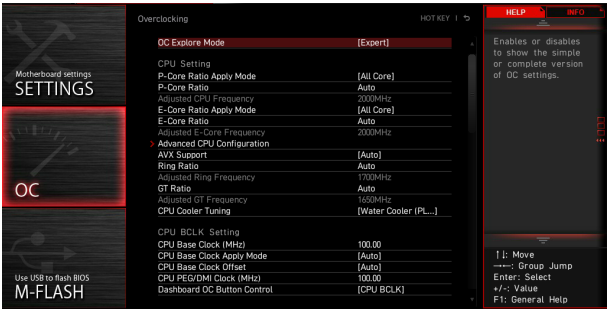
Restore or load all default values.

▶ Boot Override

The installed boot-able devices will appear on this menu, you can select one of them to be the boot device.

OC Menu

This menu allows you to configure the frequencies and voltages for overclocking. Please note that, higher frequency and voltage may benefit overclocking capability but cause system un-stability.



Important

- *Overclocking your PC manually is only recommended for advanced users.*
- *Overclocking is not guaranteed, and if done improperly, it could void your warranty or severely damage your hardware.*
- *If you are unfamiliar with overclocking, we advise you to use **GAME BOOST/ CREATOR GENIE** function or easy overclocking.*
- *The BIOS options and settings in OC menu will vary from the motherboard you purchased. Please refer to the actual BIOS of your system for the BIOS settings and options.*

▶ OC Explore Mode

Enables or disables to show the normal or expert mode of OC settings.

[Normal]	Provides the regular OC settings in BIOS setup.
[Expert]	Provides the advanced OC settings for OC expert to configure in BIOS setup.

▶ P-Core Ratio Apply Mode

Sets applied mode for P-Core ratio. This item only appears when a CPU that supports **Turbo Boost** is installed.

▶ P-Core Ratio

Sets the P-Core ratio that is used to determine CPU clock speed. This item only appears when **P-Core Ratio Apply Mode** set to **All Core**.

▶ Numbers of P-Core Cores of Group 1

Sets a number of P cores for group 1 to run target P-Core Turbo Ratio Group 1. The next group should be more than the former one in the P core number. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target P-Core Turbo Ratio Group 1

Sets the target P-Core Turbo ratio value for P-Core Group 1. The target ratio value should not be higher than the former one. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of P-Core Cores of Group 2

Sets a number of P cores for group 2 to run target P-Core Turbo Ratio Group 2. The next group should be more than the former one in the P core number. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target P-Core Turbo Ratio Group 2

Sets the target P-Core Turbo ratio value for P-Core Group 2. The target ratio value should not be higher than the former one. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of P-Core Cores of Group 3

Sets a number of P cores for group 3 to run target P-Core Turbo Ratio Group 3. The next group should be more than the former one in the P core number. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target P-Core Turbo Ratio Group 3

Sets the target P-Core Turbo ratio value for P-Core Group 3. The target ratio value should not be higher than the former one. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of P-Core Cores of Group 4

Sets a number of P cores for group 4 to run target P-Core Turbo Ratio Group 4. The next group should be more than the former one in the P core number. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target P-Core Turbo Ratio Group 4

Sets the target P-Core Turbo ratio value for P-Core Group 4. The target ratio value should not be higher than the former one. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of P-Core Cores of Group 5

Sets a number of P cores for group 5 to run target P-Core Turbo Ratio Group 5. The next group should be more than the former one in the P core number. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target P-Core Turbo Ratio Group 5

Sets the target P-Core Turbo ratio value for P-Core Group 5. The target ratio value should not be higher than the former one. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of P-Core Cores of Group 6

Sets a number of P cores for group 6 to run target P-Core Turbo Ratio Group 6. The next group should be more than the former one in the P core number. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target P-Core Turbo Ratio Group 6

Sets the target P-Core Turbo ratio value for P-Core Group 6. The target ratio value should not be higher than the former one. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of P-Core Cores of Group 7

Sets a number of P cores for group 7 to run target P-Core Turbo Ratio Group 7. The next group should be more than the former one in the P core number. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target P-Core Turbo Ratio Group 7

Sets the target P-Core Turbo ratio value for P-Core Group 7. The target ratio value should not be higher than the former one. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of P-Core Cores of Group 8

Sets a number of P cores for group 8 to run target P-Core Turbo Ratio Group 8. The next group should be more than the former one in the P core number. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target P-Core Turbo Ratio Group 8

Sets the target P-Core Turbo ratio value for P-Core Group 8. The target ratio value should not be higher than the former one. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Adjusted CPU Frequency

Shows the adjusted CPU frequency. Read-only. This item only appears when **P-Core Ratio Apply Mode** set to **All Core** or **Turbo Ratio**.

▶ Turbo Ratio Offset Value

Sets the P core Turbo ratio offset value. This item only appears when **P-Core Ratio Apply Mode** set to **Turbo Ratio Offset**.

▶ Per P-Core Ratio Limit

If set to manual, you can set every single P-core ratio manually with the following items.

▶ P-Core 0

Sets the ratio for this single P-core if the CPU supports this function. The target speed of each single P core in favored index may varied by different CPU. This item only appears when **P-Core Ratio Apply Mode** set to **Per Core**.

▶ P-Core 1

Sets the ratio for this single P-core if the CPU supports this function. The target speed of each single P core in favored index may varied by different CPU. This item only appears when **P-Core Ratio Apply Mode** set to **Per Core**.

▶ P-Core 2

Sets the ratio for this single P-core if the CPU supports this function. The target speed of each single P core in favored index may varied by different CPU. This item only appears when **P-Core Ratio Apply Mode** set to **Per Core**.

▶ P-Core 3

Sets the ratio for this single P-core if the CPU supports this function. The target speed of each single P core in favored index may varied by different CPU. This item only appears when **P-Core Ratio Apply Mode** set to **Per Core**.

▶ P-Core 4

Sets the ratio for this single P-core if the CPU supports this function. The target speed of each single P core in favored index may varied by different CPU. This item only appears when **P-Core Ratio Apply Mode** set to **Per Core**.

▶ P-Core 5

Sets the ratio for this single P-core if the CPU supports this function. The target speed of each single P core in favored index may varied by different CPU. This item only appears when **P-Core Ratio Apply Mode** set to **Per Core**.

▶ P-Core 6

Sets the ratio for this single P-core if the CPU supports this function. The target speed of each single P core in favored index may varied by different CPU. This item only appears when **P-Core Ratio Apply Mode** set to **Per Core**.

▶ P-Core 7

Sets the ratio for this single P-core if the CPU supports this function. The target speed of each single P core in favored index may varied by different CPU. This item only appears when **P-Core Ratio Apply Mode** set to **Per Core**.

▶ E-Core Ratio Apply Mode

Sets applied mode for E-core ratio. This item only appears when a CPU that supports **E-Core** and **Turbo Boost** is installed.

▶ E-Core Ratio

Sets the E-Core ratio that is used to determine CPU clock speed. This item appears when the CPU support E-Core.

▶ Numbers of E-Core of Group 1

Sets a number of E cores for group 1 to run target E-Core Turbo Ratio Group 1. The next group should be more than the former one in E core number. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target E-Core Turbo Ratio Group 1

Sets the target E-Core Turbo ratio value for E-Core group 1. The target Turbo Ratio value should not be higher than the former one. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of E-Core of Group 2

Sets a number of E cores for a group 2 to run target E-Core Turbo Ratio Group 2. The next group should be more than the former one in E core number. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target E-Core Turbo Ratio Group 2

Sets the target E-Core Turbo ratio value for E-Core group 2. The target Turbo Ratio value should not be higher than the former one. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of E-Core of Group 3

Sets a number of E cores for a group 3 to run target E-Core Turbo Ratio Group 3. The next group should be more than the former one in E core number. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target E-Core Turbo Ratio Group 3

Sets the target E-Core Turbo ratio value for E-Core group 3. The target Turbo Ratio value should not be higher than the former one. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of E-Core of Group 4

Sets a number of E cores for a group 4 to run target E-Core Turbo Ratio Group 4. The next group should be more than the former one in E core number. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target E-Core Turbo Ratio Group 4

Sets the target E-Core Turbo ratio value for E-Core group 4. The target Turbo Ratio value should not be higher than the former one. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of E-Core of Group 5

Sets a number of E cores for a group 5 to run target E-Core Turbo Ratio Group 5. The next group should be more than the former one in E core number. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target E-Core Turbo Ratio Group 5

Sets the target E-Core Turbo ratio value for E-Core group 5. The target Turbo Ratio value should not be higher than the former one. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of E-Core of Group 6

Sets a number of E cores for a group 6 to run target E-Core Turbo Ratio Group 6. The next group should be more than the former one in E core number. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target E-Core Turbo Ratio Group 6

Sets the target E-Core Turbo ratio value for E-Core group 6. The target Turbo Ratio value should not be higher than the former one. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of E-Core of Group 7

Sets a number of E cores for a group 7 to run target E-Core Turbo Ratio Group 7. The next group should be more than the former one in E core number. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target E-Core Turbo Ratio Group 7

Sets the target E-Core Turbo ratio value for E-Core group 7. The target Turbo Ratio value should not be higher than the former one. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Numbers of E-Core of Group 8

Sets a number of E cores for a group 8 to run target E-Core Turbo Ratio Group 8. The next group should be more than the former one in E core number. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Target E-Core Turbo Ratio Group 8

Sets the target E-Core Turbo ratio value for E-Core group 8. The target Turbo Ratio value should not be higher than the former one. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio**.

▶ Adjusted E-Core Frequency

Shows the adjusted E-Core frequency. Read-only. This item appears when **E-Core Ratio Apply Mode** set to **All Core** or **Turbo Ratio**.

▶ E-Core Turbo Ratio Offset Value

Sets the E-core Turbo ratio offset value. This item only appears when **E-Core Ratio Apply Mode** set to **Turbo Ratio Offset**.

▶ Per E-Core Ratio Limit

If set to manual, you can set E-core ratio manually with the following items.

▶ E-Core 0-3

Sets the ratio for E core 0~3.

▶ E-Core 4-7

Sets the ratio for E core 4~7.

▶ E-Core 8-11

Sets the ratio for E core 8~11.

▶ E-Core 12-15

Sets the ratio for E core 12~15.

▶ CPU Ratio Mode

Selects the CPU Ratio operating mode. This item will appear when you set the CPU ratio manually.

[Fixed Mode]	Fixes the CPU ratio.
[Dynamic Mode]	CPU ratio will be changed dynamically according to the CPU loading.

▶ Advanced CPU Configuration

Press **Enter** to enter the sub-menu. User can set the parameters about CPU power/current. The system may become unstable or un-bootable after changing the parameters. If it occurs, please clear the CMOS data and restore the default settings.

▶ CPU Force

It allows to show the CPU force illustration on the HELP window.

▶ Extreme OC Setup

Sets the optimal BIOS setting for extreme overclocking.

▶ BCLK 100MHz Lock On

If enabled, the BCLK will be locked on 100MHz.

▶ Hyper-Threading

Enables or disables Intel Hyper-Threading technology. Intel Hyper-Threading technology treats the multi cores inside the processor as multi logical processors that can execute instructions simultaneously. In this way, the system performance is highly improved. This item appears when the installed CPU supports this technology.

▶ Per P-Core Hyper-Threading Control

Allows you to set Hyper-Threading technology for individual CPU P-core.

▶ P-Core 0 Hyper-Threading

Enables or disable Hyper-Threading technology for this single P-core.

▶ P-Core 1 Hyper-Threading

Enables or disable Hyper-Threading technology for this single P-core.

▶ P-Core 2 Hyper-Threading

Enables or disable Hyper-Threading technology for this single P-core.

▶ P-Core 3 Hyper-Threading

Enables or disable Hyper-Threading technology for this single P-core.

▶ P-Core 4 Hyper-Threading

Enables or disable Hyper-Threading technology for this single P-core.

▶ P-Core 5 Hyper-Threading

Enables or disable Hyper-Threading technology for this single P-core.

▶ P-Core 6 Hyper-Threading
Enables or disable Hyper-Threading technology for this single P-core.

▶ P-Core 7 Hyper-Threading
Enables or disable Hyper-Threading technology for this single P-core.

▶ Per P-Core Control
Enables or disables every single P-core control.

▶ P-Core 0
Enables or disables the P-core 0.

▶ P-Core 1
Enables or disables the P-core 1.

▶ P-Core 2
Enables or disables the P-core 2.

▶ P-Core 3
Enables or disables the P-core 3.

▶ P-Core 4
Enables or disables the P-core 4.

▶ P-Core 5
Enables or disables the P-core 5.

▶ P-Core 6
Enables or disables the P-core 6.

▶ P-Core 7
Enables or disables the P-core 7.

▶ Per E-Core Control
Enables or disables every single E-core control.

▶ E-Core 0
Enables or disables the E-core 0.

▶ E-Core 1
Enables or disables the E-core 1.

▶ E-Core 2
Enables or disables the E-core 2.

▶ E-Core 3
Enables or disables the E-core 3.

▶ E-Core 4
Enables or disables the E-core 4.

▶ E-Core 5

Enables or disables the E-core 5.

▶ E-Core 6

Enables or disables the E-core 6.

▶ E-Core 7

Enables or disables the E-core 7.

▶ Active P-Cores

Allows you to select the number of active P-cores.

▶ Active E-Cores

Allows you to select the number of active E-cores.

▶ Legacy Game Compatibility Mode

Enables or disables the legacy game support.

▶ Intel Adaptive Thermal Monitor

Enables or disables the Intel adaptive thermal monitor function to protect the CPU from overheating.

[Enabled]	Throttles down the CPU core clock speed when the CPU is over the adaptive temperature.
[Disabled]	Disables this function.

▶ Intel C-State

Enables or disables the Intel C-state. C-state is a processor power management technology defined by ACPI.

[Auto]	This setting will be configured automatically by BIOS.
[Enabled]	Detects the idle state of system and reduce CPU power consumption accordingly.
[Disabled]	Disable this function.

▶ C1E Support

Enables or disables the C1E function for power-saving in halt state. This item appears when **Intel C-State** is enabled.

[Enabled]	Enables C1E function to reduce the CPU frequency and voltage for power-saving in halt state.
[Disabled]	Disables this function.

▶ Package C State Limit

This item allows you to select a CPU C-state level for power-saving when system is idle. The options of C-state depend on the installed CPU. This item appears when **Intel C-State** is enabled.

▶ Intel Speed Shift Technology

Enables or disables Intel Speed Shift Technology. It can optimize energy efficiency. This item is only available with the CPU that supports this technology.

▶ EIST

Enables or disables the Enhanced Intel® SpeedStep Technology.

[Enabled] Enables the EIST to adjust CPU voltage and core frequency dynamically. It can decrease average power consumption and average heat production.

[Disabled] Disables EIST.

▶ Intel Turbo Boost

Enables or disables the Intel® Turbo Boost. This item appears when a CPU that support **Turbo Boost** is installed.

[Enabled] Enables this function to boost CPU performance automatically over specification when system request the highest performance state.

[Disabled] Disables this function.

▶ Intel Turbo Boost Max Technology 3.0

Enables or disables the Intel® Turbo Boost Max 3.0. This item appears when a CPU that support **Turbo Boost Max 3.0** is installed.

▶ Enhanced Turbo

Enables or disables turbo function for all CPU cores to boost the CPU performance.

▶ Long Duration Power Limit (W)

Sets the long duration TDP power limit for CPU in Turbo Boost mode.

▶ Long Duration Maintained (s)

Sets the maintaining time for Long duration power Limit(W).

▶ Short Duration Power Limit (W)

Sets the short duration TDP power limit for CPU in Turbo Boost mode.

▶ CPU Current Limit (A)

Sets maximum current limit of CPU package in Turbo Boost mode. When the current is over the specified value, the CPU will automatically reduce the core frequency for reducing the current.

▶ GT Current Limit (A)

Sets maximum current limit of CPU GT package. When the current is over the specified value, the CPU will automatically reduce the integrated graphics frequency for reducing the current.

▶ CPU Lite Load Control

Sets the CPU Lite Load control mode. Higher mode loads the higher CPU voltage that could stabilize the system. Auto is recommended.

▶ CPU Lite Load

Sets the CPU Lite Load mode. Higher mode loads the higher CPU voltage that could stabilize the system and Auto is recommended. This item appears when **CPU Lite Load Control** sets to **Normal**.

▶ CPU AC Loadline

Sets the CPU AC load-line value. Higher value loads the higher CPU voltage that could stabilize the system. This item appears when **CPU Lite Load Control** sets to **Advanced**.

▶ CPU DC Loadline

Sets the CPU DC load-line value. Higher value loads the higher CPU voltage that could stabilize the system. This item appears when **CPU Lite Load Control** sets to **Advanced**.

▶ CPU Over Temperature Protection

Sets the temperature limit on CPU for over-temperature protection. The CPU frequency may be throttled when CPU temperature over the specified value. When set to Auto, BIOS will configure this settings. The higher temperature indicates less protection.

▶ CPU Under Voltage Protection

Sets the voltage limit for CPU under-voltage protection. If set to Auto, BIOS will configure this setting automatically. Higher voltage provides less protection and may damage the system

▶ CPU Ratio Extension

Enables or disables the CPU ratio extension for the corresponding CPU overclocking under LN2. When set to Auto, BIOS will configure this setting automatically.

▶ CPU PLL Banding Ratio

Configures the CPU PLL banding ratio for the corresponding CPU overclocking under LN2.

▶ CPU FLL OC Mode

Sets CPU FLL OC mode for extreme overclocking.

▶ TVB Ratio Clipping

If enabled, the CPU core frequency will be reduced when the CPU temperature reaches the threshold with the TVB (Thermal Velocity Boost) feature. If disabled, the core frequency may be achieved higher frequencies potentially when the temperature is high. This item appears when the installed CPU supports **TVB**.

▶ TVB Ratio Clipping Enhanced

If enabled, the core frequency will be reduced when the CPU temperature reaches the threshold with the enhanced TVB (Thermal Velocity Boost) feature. If disabled, the core frequency may be achieved higher frequencies potentially when the temperature is high. This item appears when the installed CPU supports **TVB**.

▶ TVB Voltage Optimizations

Enables or disables the TVB (Thermal Velocity Boost) voltage optimization for processor. This item appears when the installed CPU supports **TVB**.

▶ TVB Points Configuration

Press **Enter** to enter the sub-menu. User can configure the CPU ratio offset for every point temperature of TVB (Thermal Velocity Boost). This sub-menu appears when the installed CPU supports **TVB**.

▶ TVB Points Temperature(°C)

Sets the point temperature of TVB.

▶ TVB Points Ratio Offset

Sets the CPU offset ratio for the TVB point temperature set above.

▶ PVD Ratio Threshold

Sets PVD ratio threshold for BCLK overclocking.

▶ SA PLL Frequency

Sets SA PLL frequency for BCLK overclocking.

▶ Core HW Fixup During TSC Copy

Enables or disables core hardware fix-up during TSC copy for BCLK overclocking.

▶ IA CEP Support

Enables or disables IA CEP (Current Excursion Protection) support.

▶ GT CEP Support

Enables or disables GT CEP (Current Excursion Protection) support.

▶ DMI Link Speed

Sets DMI speed Gen1/ Gen2/ Gen3/ Gen4.

▶ +CPU AVX Control

▶ AVX Support

Enables or disables AVX (Advanced Vector Extensions) support.

▶ CPU Ratio Offset When Running AVX

Sets a offset value to lower the CPU core ratio. It could be helpful for heat dissipation when running AVX instructions. When set to Auto, BIOS will configure this setting automatically. This item appears when the installed CPU and chipset support this function.

▶ AVX Voltage Guardband Scale

Sets the extra voltage for fine-tuning CPU core voltage when running AVX.

▶ Ring Ratio

Sets the ring ratio. The valid value range depends on the installed CPU.

▶ Adjusted Ring Frequency

Shows the adjusted Ring frequency. Read-only.

▶ GT Ratio

Sets the integrated graphics ratio along with preset GT voltage. The valid value range depends on the installed CPU.

▶ Adjusted GT Frequency

Shows the adjusted integrated graphics frequency. Read-only.

▶ CPU Cooler Tuning

Selects the CPU cooler type, and CPU power limit profile will be configured automatically according the cooler type by BIOS.

▶ CPU Base Clock (MHz)

Sets the CPU Base clock. You may overclock the CPU by adjusting this value. Please note that overclocking behavior and stability is not guaranteed. This item appears when a CPU that support this function is installed.

▶ CPU Base Clock Apply Mode

Sets the applying mode for adjusted CPU base clock.

[Auto]	This setting will be configured automatically by BIOS.
[Next Boot]	CPU will run the adjusted CPU base clock next boot.
[Immediate]	CPU runs the adjusted CPU base clock immediately.

▶ CPU Base Clock Offset

Sets the offset value of CPU Base clock.

▶ Dashboard OC Button Control

Specifies the base clock or the CPU ratio for the OC button to overclock CPU in real time.

▶ Dashboard OC Button Step (MHz)

Sets the increase or decrease step for base clock when the OC button (+ or -) is pressed each time.

▶ Direct OC Button

Specifies the base clock or the CPU ratio for the OC button/ header to overclock CPU in real time.

▶ Direct OC Step (MHz)

Sets the increase or decrease step for base clock when the OC button (+ or -) is pressed each time.

▶ Extreme Memory Profile (XMP)

XMP (Extreme Memory Profile) is the overclocking technology by memory module. Please enable XMP or select a profile of the memory module for overclocking the memory. This item will be available when the memory modules that support **XMP** are installed.

▶ iEXPO

Selects and loads memory profile with optimized timing and voltage settings supported by installed memory module.

▶ DRAM Reference Clock

Sets the DRAM reference clock. The valid value range depends on the installed CPU. This item appears when a CPU that supports this adjustment is installed.

▶ CPU IMC : DRAM Clock

Selects the DRAM gear type for CPU IMC (Integrated Memory Controller). This item appears when a CPU that supports this adjustment is installed.

[Gear 1]	Higher bandwidth and lower latency time.
[Gear 2]	Balance both of bandwidth and latency time.
[Gear 4]	Lower bandwidth and higher latency time.

▶ DRAM Frequency

Sets the DRAM frequency. Please note the overclocking behavior is not guaranteed.

▶ Adjusted DRAM Frequency

Shows the adjusted DRAM frequency. Read-only.

▶ Load Memory Presets

Load OC Memory Preset will optimize the timing, voltage of installed memory module.

▶ Memory Try It !

It can improve memory compatibility or performance by choosing optimized memory preset.

▶ DRAM Timing Mode

Selects the memory timing mode.

[Auto]	The setting will be configured automatically by BIOS.
[Link]	Allows user to configure the DRAM timing for all memory channel.
[UnLink]	Allows user to configure the DRAM timing for respective memory channel.

▶ Advanced DRAM Configuration

Press Enter to enter the sub-menu. You can set the memory timing for each/ all memory channel. The system may become unstable or unbootable after changing memory timing. If it occurs, please clear the CMOS data and restore the default settings. (Refer to the **Clear CMOS jumper/ button** section in motherboard user guide to clear the CMOS data, and enter the BIOS to load the default settings.)

▶ Memory Force

It allows showing the memory force illustration on the HELP window.

▶ Lucky Mode

Enabling the lucky mode may enhance memory overclocking ability.

▶ XMP User Profile

Press Enter to enter the sub-menu, you can set memory profile manually for XMP user profile.

▶ SA GV

Enables or disables the SAGV (System Agent Geyserville). SAGV can dynamically tunes the memory frequencies depending on system conditions.

▶ Dynamic Memory Boost

Enables or disables the memory boost feature.

▶ Realtime Memory Frequency

Enables or disables the real-time memory frequency.

▶ DRAM Training Configuration

You can enable or disable the different DRAM training algorithms in this sub-menu. When set to **Auto**, BIOS will configure this setting automatically.

▶ DRAM PMIC Features

▶ Special PMIC Unlock

Enables or disables the unofficial voltage adjusting method for PMIC power control.

▶ VDD Current Limit

Sets VDD current limit.

▶ VDD Switching Mode

Sets VDD switching mode.

▶ VDD Switching Frequency

Sets VDD switching frequency.

▶ VDDQ Current Limit

Sets VDDQ current limit.

▶ VDDQ Switching Mode

Sets VDDQ switching mode.

▶ VDDQ Switching Frequency

Sets VDDQ switching frequency.

▶ VPP Current Limit

Sets VPP current limit.

▶ VPP Switching Mode

Sets VPP switching mode.

▶ VPP Switching Frequency

Sets VPP switching frequency.

▶ Command Rate
Sets the command rate.

▶ tCL
Sets the CAS (Column Address Strobe) latency time.

▶ tRCD
Sets the RAS to CAS delay time.

▶ tRP
Sets the row precharge time.

▶ tRAS
Sets the RAS (Row Address strobe) active time.

▶ tRFC
Sets the refresh to active/ refresh cycle time.

▶ +Sub Timing Configuration

▶ tRFCPB
Sets the refresh to active/ refresh cycle time per bank.

▶ tREFI
Sets the REFI time.

▶ tWR
Sets the write recover time.

▶ tWTR
Sets the write to read delay time.

▶ tWTR_L
Sets the internal write transaction to internal read command time .

▶ tRRD
Sets the RAS to RAS delay time.

▶ tRRD_L
Sets the RAS to RAS delay time in different bank of the same rank.

▶ tRTP
Sets read to precharge command delay time.

▶ tFAW
Sets the time window in which four activates are allowed the same rank.

▶ tCWL
Sets CAS write latency time.

▶ tCKE
Sets CKE minimum time.

▶ tCCD
Sets CCD time.

▶ tCCD_L
Sets CCD time.

▶ +Turn Around Timing Configuration

▶ Turn Around Timing Setting Mode
Selects the memory turn around timing mode.

▶ tRDRDSG
Sets the read to read delay time between different rank separation parameter.

▶ tRDRDDG
Sets the read to read delay time between different module.

▶ tRDRDDR
Sets the read to read delay time between different rank separation parameter.

▶ tRDRDDD
Sets the read to read delay time between different module.

▶ tWRWRSG
Sets the write to write delay time between different rank separation parameter.

▶ tWRWRDG
Sets the write to write delay time between different module.

▶ tWRWRDR
Sets the write to write delay time between different rank separation parameter.

▶ tWRWRDD
Sets the write to write delay time between different module.

▶ tRDWRSG
Sets the read to write delay time between different rank separation parameter.

▶ tRDWRDG
Sets the read to write delay time between different module.

▶ tRDWRDR
Sets the read to write delay time between different rank separation parameter.

▶ tRDWRDD
Sets the read to write delay time between different module.

▶ tWRRDSG
Sets the write to read delay time between different rank separation parameter.

▶ tWRRDDG
Sets the write to read delay time between different module.

▶ tWRRDDR
Sets the write to read delay time between different rank separation parameter.

▶ tWRRDDD
Sets the write to read delay time between different module.

▶ +Advanced Timing Configuration

▶ tWPRE
Sets the tWPRE time.

▶ tRPRE
Sets the tRPRE time.

▶ tWRPRE
Sets the tWRPRE time.

▶ tRDPRE
Sets the tRDPRE time.

▶ tXP
Sets the tXP time.

▶ tXPDLL
Sets the tXPDLL time.

▶ tXPDLL
Sets the tXPDLL time.

▶ tPRPDEN
Sets the tPRPDEN time.

▶ tRDPDEN
Sets the tRDPDEN time.

▶ tWRPDEN
Sets the tWRPDEN time.

▶ tCPDED
Sets the tCPDED time.

▶ tAONPD
Sets the tAONPD time.

▶ tREFIx9
Sets the tREFIx9 time.

▶ tXSDLL
Sets the tXSDLL time.

▶ tZQOPER
Sets the tZQOPER time.

▶ tMOD
Sets the tMOD time.

▶ tZQCS
Sets the tZQCS time.

▶ tZQCAL
Sets the tZQCAL time.

▶ tXSR
Sets the tXSR time.

▶ tREFSBRD
Sets the tREFSBRDS time.

▶ tCSH
Sets the tCSH time.

▶ tCSL
Sets the tCSL time.

▶ tCA2CS
Sets the tCA2CS time.

▶ tCKCKEH
Sets the tCKCKEH time.

▶ tCSCKEH
Sets the tCSCKEH time.

▶ tRFM
Sets the tRFM time.

▶ OREFRI
Sets the OREFRI time.

▶ +Latency Timing Configuration tRTL/tIOL

▶ Latency Timing Setting Mode
Selects the latency timing mode.

▶ RTL Init Value (CHA)
Sets the initial RTL value (Round Trip Latency) for memory channel A.

▶ RTL Init Value (CHB)
Sets the initial RTL value (Round Trip Latency) for memory channel B.

▶ tRTL (CHA/D0/R0)
Sets the round trip latency time for channel A, DIMM0, RANK0.

▶ tRTL (CHA/D0/R1)
Sets the round trip latency time for channel A, DIMM0, RANK1.

▶ tRTL (CHA/D1/R0)
Sets the round trip latency time for channel A, DIMM1, RANK0.

▶ tRTL (CHA/D1/R1)
Sets the round trip latency time for channel A, DIMM1, RANK1.

▶ tRTL (CHB/D0/R0)
Sets the round trip latency time for channel B, DIMM0, RANK0.

▶ tRTL (CHB/D0/R1)
Sets the round trip latency time for channel B, DIMM0, RANK1.

▶ tRTL (CHB/D1/R0)
Sets the round trip latency time for channel B, DIMM1, RANK0.

▶ tRTL (CHB/D1/R1)
Sets the round trip latency time for channel B, DIMM1, RANK1.

▶ +Misc Item

▶ Safe Boot Retry
Enables this item to meet the best memory compatibility while booting.

▶ DRAM Voltage Boost
Sets the voltage for memory training. Higher voltage may benefit memory overclocking capability but cause system unstable.

▶ ODT Finetune (CHA)
Sets the ODT (ON-die termination) value for improving the overclocking capability and stability of memory channel A.

▶ ODT Finetune (CHB)
Sets the ODT (ON-die termination) value for improving the overclocking capability and stability of memory channel B.

▶ Rx Equalization
Sets the Rx Equalization value.

▶ VTT ODT
Enables or disables the VTT ODT function.

▶ Enhanced Interleave
Enables or disables the Enhanced Interleave support.

▶ +On-Die Termination Configuration

▶ Rtt Wr (CHA/D0)
Sets ODT RTT_WR for channel A, DIMM0.

▶ Rtt Nom Rd(CHA/D0)
Sets ODT RTT_NOM_RD time for channel A, DIMM0.

▶ Rtt Nom Wr(CHA/D0)
Sets ODT RTT_NOM_WR time for channel A, DIMM0.

▶ Rtt Park (CHA/D0)
Sets ODT RTT_PARK for channel A, DIMM0.

▶ Rtt Park Dqs (CHA/D0)
Sets ODT RTT_PARK DQS for channel A, DIMM0.

▶ Rtt Wr (CHA/D1)
Sets ODT RTT_WR for channel A, DIMM1.

▶ Rtt Nom Rd(CHA/D1)
Sets ODT RTT_NOM_RD time for channel A, DIMM1.

▶ Rtt Nom Wr(CHA/D1)
Sets ODT RTT_NOM_WR time for channel A, DIMM1.

▶ Rtt Park (CHA/D1)
Sets ODT RTT_PARK for channel A, DIMM1.

▶ Rtt Park Dqs (CHA/D1)
Sets ODT RTT_PARK DQS for channel A, DIMM1.

▶ Rtt Wr (CHB/D0)
Sets ODT RTT_WR for channel B, DIMM0.

▶ Rtt Nom Rd(CHB/D0)
Sets ODT RTT_NOM_RD time for channel B, DIMM0.

▶ Rtt Nom Wr(CHB/D0)
Sets ODT RTT_NOM_WR time for channel B, DIMM0.

▶ Rtt Park (CHB/D0)
Sets ODT RTT_PARK for channel B, DIMM0.

▶ Rtt Park Dqs (CHB/D0)

Sets ODT RTT_PARK DQS for channel B, DIMM0.

▶ Rtt Wr (CHB/D1)

Sets ODT RTT_WR for channel B, DIMM1.

▶ Rtt Nom Rd(CHB/D1)

Sets ODT RTT_NOM_RD time for channel B, DIMM1.

▶ Rtt Nom Wr(CHB/D1)

Sets ODT RTT_NOM_WR time for channel B, DIMM1.

▶ Rtt Park (CHB/D1)

Sets ODT RTT_PARK for channel B, DIMM1.

▶ Rtt Park Dqs (CHB/D1)

Sets ODT RTT_PARK DQS for channel B, DIMM1.

▶ Memory Fast Boot

Enables or disables the initiation and training for memory every booting.

[Auto]	The setting will be configured automatically by BIOS.
[Enabled]	System will completely keep the archives of first intiation and training for memory. And then the memory will not be initialed and trained when booting to accelerate the system booting time.
[Disabled]	The memory will be initialed and trained every booting.
[No Training]	The memory will not be trained every booting.
[SlowTraining]	The memory will be trained every booting.

▶ Memory Fast Boot When OC Fail

Enables or disables the initiation and training for memory when OC fails.

▶ DigitALL Power

Press Enter to enter the sub-menu. In the sub-menu, you can setup some protecting conditions about voltage/ current/ temputure for CPU.

▶ CPU Loadline Calibration Control

The CPU voltage will decrease proportionally according to CPU loading. Higher load-line calibration could get higher voltage and good overclocking performance, but increase the temperature of the CPU and VRM. If set to **Auto**, BIOS will configure this setting automatically.

▶ CPU Loadline Saturation Control

Enables or disables CPU loadline saturation control. If set to **Auto**, BIOS will configure this setting automatically.

▶ CPU Loadline Saturation level(A)

Sets the CPU loadline saturation level. If set to **Auto**, BIOS will configure this setting automatically.

▶ CPU Over Voltage Protection

Sets the voltage limit for CPU over-voltage protection. If set to **Auto**, BIOS will configure this setting automatically. Higher voltage provides less protection and may damage the system.

▶ CPU Over Current Protection

Sets the current limit for CPU over-current protection. If set to **Auto**, BIOS will configure this setting automatically.

[Auto] This setting will be configured automatically by BIOS.

[Enhanced] Extends the current range for over-current protection.

▶ CPU Switching Frequency

Sets the PWM working speed to stabilize CPU Core voltage and minimize ripple range. Increasing the PWM working speed will cause higher temperature of MOSFET. So please make sure a cooling solution is well-prepared for MOSFET before you increase the value. If set to Auto, BIOS will configure this setting automatically.

▶ CPU VRM Over Temperature Protection

Enables or disables the CPU VRM over temperature protection.

▶ CPU GT Loadline Calibration Control

The voltage of the GPU embedded in CPU will decrease proportionally according to GPU loading. Higher load-line calibration could get higher voltage and good overclocking performance, but increase the temperature of the CPU and VRM.

▶ CPU GT Over Current Protection

Sets the current limit on CPU GT for over-current protection. If set to **Auto**, BIOS will configure this setting 0utomatically.

[Auto] This setting will be configured automatically by BIOS.

[Enhanced] Extends the current range for over-current protection.

▶ CPU GT Switching Frequency

Sets the PWM working speed to stabilize CPU GT voltage and minimize ripple range. Increasing the PWM working speed will cause higher temperature of MOSFET. So please make sure a cooling solution is well-prepared for MOSFET before you increase the value. If set to **Auto**, BIOS will configure this setting automatically.

▶ CPU AUX Loadline Calibration Control

The CPU AUX voltage will decrease proportionally according to CPU loading. Higher load-line calibration could get higher voltage and good overclocking performance, but increase the temperature of the CPU and VRM.

▶ CPU Core Voltage Monitor

Selects the target item for monitoring CPU core voltage.

▶ CPU Core Voltage Mode

Sets the CPU Core voltage mode.

[Auto]	This setting will be configured automatically by BIOS.
[Adaptive Mode]	Sets the adaptive voltage automatically for optimizing the system performance.
[Override Mode]	Allows you to set the voltage manually.
[Offset Mode]	Allows you to set the offset voltage and select the voltage offset mode.
[Adaptive + Offset]	Sets the adaptive voltage automatically and allows you to set the offset voltage.
[Advanced Offset]	Allows you to set the voltage and the offset voltage in the sub-menu manually.
[Adaptive+Advanced Offset]	Allows you to set the adaptive voltage and the offset voltage in the sub menu manually.

▶ CPU Core Voltage

Sets the CPU core voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ CPU Core Voltage Offset Mode

Selects the CPU Core voltage offset mode.

▶ CPU Core Voltage Offset

Sets the offset value for CPU core voltage.

▶ Advanced Offset Mode

Press Enter to enter the sub-menu.

▶ Set Voltage Offset When Running CPU Ratio x8

▶ Voltage Offset Control

Selects the voltage offset mode.

▶ Voltage Offset Target

Sets the offset value.

▶ Set Voltage Offset When Running CPU Ratio x25

▶ Voltage Offset Control

Selects the voltage offset mode.

▶ Voltage Offset Target

Sets the offset value.

▶ Set Voltage Offset When Running CPU Ratio x35

▶ Voltage Offset Control

Selects the voltage offset mode.

▶ **Voltage Offset Target**
Sets the offset value.

▶ **Set Voltage Offset When Running CPU Ratio x43**

▶ **Voltage Offset Control**
Selects the voltage offset mode.

▶ **Voltage Offset Target**
Sets the offset value.

▶ **Set Voltage Offset When Running CPU Ratio x48**

▶ **Voltage Offset Control**
Selects the voltage offset mode.

▶ **Voltage Offset Target**
Sets the offset value.

▶ **Set Voltage Offset When Running CPU Ratio x50**

▶ **Voltage Offset Control**
Selects the voltage offset mode.

▶ **Voltage Offset Target**
Sets the offset value.

▶ **Set Voltage Offset When Running CPU Ratio x51**

▶ **Voltage Offset Control**
Selects the voltage offset mode.

▶ **Voltage Offset Target**
Sets the offset value.

▶ **CPU GT Voltage Mode**
Sets the CPU GT voltage mode.

[Auto]	This setting will be configured automatically by BIOS.
[Adaptive Mode]	Sets the adaptive voltage automatically for optimizing the system performance.
[Override Mode]	Allows you to set the voltage manually.
[Offset Mode]	Allows you to set the offset voltage and select the voltage offset mode.
[Adaptive + Offset]	Sets the adaptive voltage automatically and allows you to set the offset voltage.
[Advanced Offset]	Allows you to set the voltage and the offset voltage in the sub-menu manually.

▶ CPU GT Voltage

Sets the CPU GT voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ CPU GT Voltage Offset Mode

Selects the CPU GT voltage offset mode.

▶ CPU GT Voltage Offset

Sets the offset voltage for CPU GT voltage.

▶ CPU E-Core L2 Voltage Mode

Sets the CPU E-core L2 voltage mode.

[Auto]	This setting will be configured automatically by BIOS.
[Adaptive Mode]	Sets the adaptive voltage automatically for optimizing the system performance.
[Override Mode]	Allows you to set the voltage manually.
[Offset Mode]	Allows you to set the offset voltage and select the voltage offset mode.
[Adaptive + Offset]	Sets the adaptive voltage automatically and allows you to set the offset voltage.
[Advanced Offset]	Allows you to set the voltage and the offset voltage in the sub-menu manually.

▶ CPU E-Core L2 Voltage

Sets the CPU E-core L2 voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ CPU E-Core L2 Voltage Offset Mode

Selects the CPU E-core L2 voltage offset mode.

▶ CPU E-Core L2 Voltage Offset

Sets the offset voltage for CPU E-core L2 voltage.

▶ CPU SA Voltage Mode

Sets the CPU SA voltage mode.

[Auto]	This setting will be configured automatically by BIOS.
[Adaptive Mode]	Sets the adaptive voltage automatically for optimizing the system performance.
[Override Mode]	Allows you to set the voltage manually.
[Offset Mode]	Allows you to set the offset voltage and select the voltage offset mode.
[Adaptive + Offset]	Sets the adaptive voltage automatically and allows you to set the offset voltage.
[Advanced Offset]	Allows you to set the voltage and the offset voltage in the sub-menu manually.

▶ CPU SA Voltage

Sets the CPU SA voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ CPU SA Voltage Offset Mode

Selects the CPU SA voltage offset mode.

▶ CPU SA Voltage Offset

Sets the offset voltage for CPU SA voltage.

▶ CPU VDDQ Voltage

Sets the CPU VDDQ Voltage.

▶ CPU VDD2 Voltage

Sets the CPU VDD2 voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ CPU 1.05 Voltage

Sets the CPU 1.05 voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ CPU 1.8 Voltage

Sets the CPU 1.8 voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ CPU AUX Voltage

Sets the CPU AUX voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ CPU PLL SFR Voltage

Sets the CPU PLL SFR voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ GT PLL SFR Voltage

Sets the GT PLL SFR voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ Ring PLL SFR Voltage

Sets the Ring PLL SFR voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ SA PLL SFR Voltage

Sets the SA PLL SFR voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ E-Core L2 PLL SFR Voltage

Sets the E-core L2 PLL SFR voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ MC PLL SFR Voltage

Sets the MC PLL SFR voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM Voltage

Sets the DRAM voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ Eventual DRAM Voltage

Sets the eventual voltage. This voltage is the DRAM boot voltage after the training phase of the boot sequence. If **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM VTT Voltage

Sets the DRAM VTT voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM VPP Voltage

Sets the DRAM VPP voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM VREF Voltage Control

Selects DRAM VREF voltage to be controlled by CPU or HW.

▶ DRAM DIMMA1 VREF Voltage

Sets the DIMMA1 VREF voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMA2 VREF Voltage

Sets the DIMMA2 VREF voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMB1 VREF Voltage

Sets the DIMMB1 VREF voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMB2 VREF Voltage

Sets the DIMMB2 VREF voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM Voltage Mode

Selects the DRAM voltage mode.

[Link]	Allows you to configure the DRAM voltage for all memory channels.
[UnLink]	Allows you to configure the DRAM voltage for the respective memory channel.

▶ DRAM Voltage

Sets the DRAM voltage for all memory channels. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMA1 Voltage

Sets the DRAM DIMMA1 voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMA2 Voltage

Sets the DRAM DIMMA2 voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMB1 Voltage

Sets the DRAM DIMMB1 voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMB2 Voltage

Sets the DRAM DIMMB2 voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM VDDQ Voltage

Sets the DRAM VDDQ voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMA1 VDDQ Voltage

Sets the DRAM DIMMA1 VDDQ voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMA2 VDDQ Voltage

Sets the DRAM DIMMA2 VDDQ voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMB1 VDDQ Voltage

Sets the DRAM DIMMB1 VDDQ voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMB2 VDDQ Voltage

Sets the DRAM DIMMB2 VDDQ voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM VPP Voltage

Sets the DRAM VPP voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMA1 VPP Voltage

Sets the DRAM DIMMA1 VPP voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMA2 VPP Voltage

Sets the DRAM DIMMA2 VPP voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMB1 VPP Voltage

Sets the DRAM DIMMB1 VPP voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM DIMMB2 VPP Voltage

Sets the DRAM DIMMB2 VPP voltage separately. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ PCH 0.82 Voltage

Sets the PCH 0.82 voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ Memory OC Retry Count

Sets the count of memory OC retry. When memory OC retry fails and reaches the set retry count, the system will boot with the last available memory settings.

▶ CPU Memory Changed Detect

Enables or disables the system to issue a warning message during boot when the CPU or memory has been replaced.

[Enabled]	The system will issue a warning message during boot and then you have to load the default settings for new devices.
[Disabled]	Disables this function and keeps the current BIOS settings.

▶ OC Quick View Timer

Sets the duration of OC setting values showed on the screen. If set to **Disabled**, BIOS will not show the variations of OC setting.

▶ CPU Specifications

Press **Enter** to enter the sub-menu. This sub-menu displays the information of installed CPU. You can also access this information menu at any time by pressing **F4**. Read only.

▶ CPU Technology Support

Press **Enter** to enter the sub-menu. The sub-menu shows the key features of installed CPU. Read only.

▶ MEMORY-Z

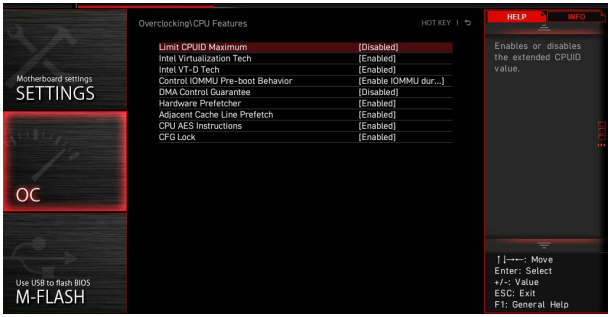
Press **Enter** to enter the sub-menu. This sub-menu displays all the settings and timings of installed memory. You can also access this information menu at any time by pressing **F5**.

▶ DIMMx Memory SPD

Press Enter to enter the sub-menu. The sub-menu displays the information of installed memory. Read only.

▶ CPU Features

Press **Enter** to enter the sub-menu.



▶ Limit CPUID Maximum

Enables or disables the extended CPUID value.

[Enabled] BIOS limits the maximum CPUID input value to circumvent boot problems with older operating system that do not support the processor with extended CPUID value.

[Disabled] Use the actual maximum CPUID input value.

▶ Intel Virtualization Tech

Enables or disables Intel Virtualization technology.

[Enabled] Enables Intel Virtualization technology and allows a platform to run multiple operating systems in independent partitions. The system can function as multiple systems virtually.

[Disabled] Disables this function.

▶ Intel VT-D Tech

Enables or disables Intel VT-D (Intel Virtualization for Directed I/O) technology.

▶ Control IOMMU Pre-boot Behavior

Enables or disables the IOMMU (I/O Memory Management Unit) in pre-boot environment. This item is available when the Intel VT-D sets to **Enabled**.

▶ DMA Control Guarantee

Enables or disables the DMA (Direct Memory Access) control guarantee. This item is available when the Intel VT-D sets to **Enabled**.

▶ Hardware Prefetcher

Enables or disables the hardware prefetcher (MLC Streamer prefetcher).

[Enabled] Allows the hardware prefetcher to automatically pre-fetch data and instructions into L2 cache from memory for tuning the CPU performance.

[Disabled] Disables the hardware prefetcher.

▶ Adjacent Cache Line Prefetch

Enables or disables the CPU hardware prefetcher (MLC Spatial prefetcher).

[Enabled] Enables adjacent cache line prefetching for reducing the cache latency time and tuning the performance to the specific application.

[Disabled] Enables the requested cache line only.

▶ CPU AES Instructions

Enables or disables the CPU AES (Advanced Encryption Standard-New Instructions) support. This item appears when a CPU supports this function.

▶ CFG Lock

Lock or un-lock the MSR 0xE2[15], CFG lock bit.

[Enabled] Locks the CFG lock bit.

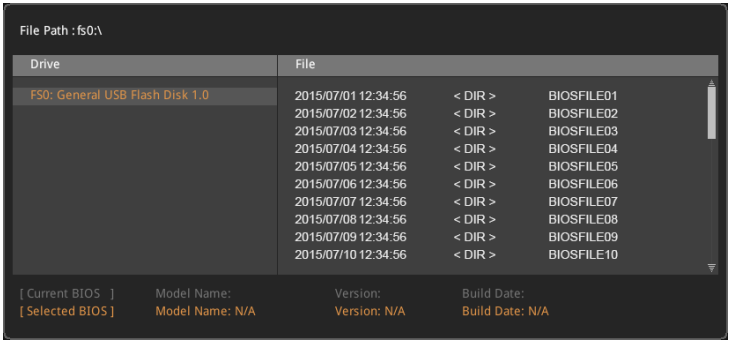
[Disabled] Un-locks the CFG lock bit.

M-FLASH Menu

M-FLASH provides the way to update BIOS with a USB flash drive. Please download the latest BIOS file that matches your motherboard model from MSI website, save the BIOS file into your USB flash drive. And then follow the steps below to update BIOS.

1. Insert the USB flash drive that contains the update file into the computer.
2. Click on **M-FLASH** tab, a demand message will be prompted. Click on **Yes** to reboot and enter the flash mode.

3. The system will enter the flash mode and a file selection menu will appear after rebooting.



4. Select a BIOS file to perform the BIOS update process.
5. After the flashing process is 100% completed, the system will reboot automatically.

OC PROFILE Menu

This menu allows you to set the BIOS profiles.

▶ Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6 management. Press **Enter** to enter the sub-menu.

▶ Set Name for Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Name the current overclocking profile.

▶ Save Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Save the current overclocking profile.

▶ Load Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Load the current overclocking profile.

▶ Clear Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Clear the current overclocking profile.

▶ OC Profile Load from ROM

Load OC profile from BIOS ROM.

▶ OC Profile Save to USB

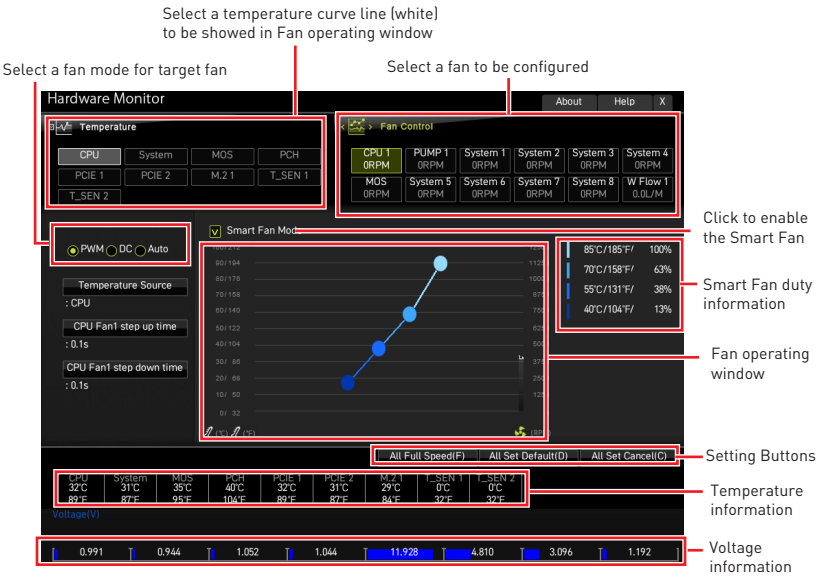
Save OC profile to the USB flash drive. The USB flash drive should be FAT/ FAT32 format only.

▶ OC Profile Load from USB

Load OC profile from the USB flash drive. The USB flash drive should be FAT/ FAT32 format only.

HARDWARE MONITOR Menu

This menu allows you to adjust the fan speed manually and monitor CPU/ system voltage.



• **Smart Fan** - This setting enables/disables the Smart Fan function. Smart Fan is an excellent feature which will adjust the CPU/system fan speed automatically depending on the current CPU/system temperature, avoiding the overheating to damage your system.

▶ Settings Buttons

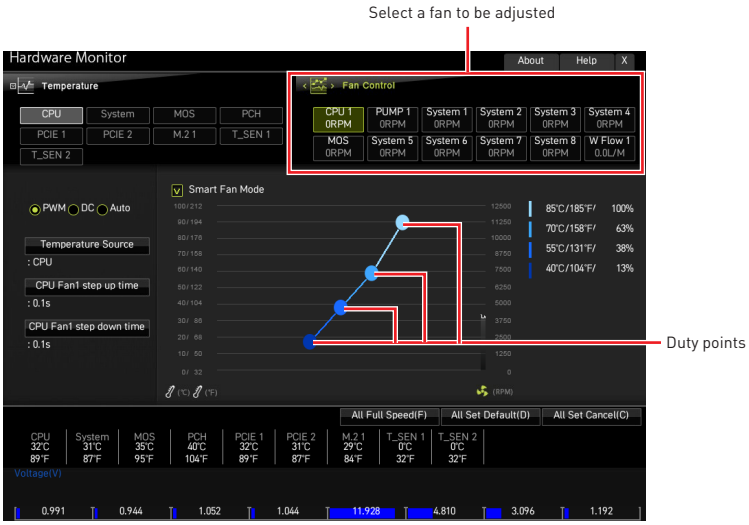
- **All Full Speed** - configures all fans to run at full operating speed.
- **All Set Default** - configures all fans' speeds return the BIOS default values.
- **All Set Cancel** - discards current changes and restores previous settings for all fan .

Important

Make sure fans are working properly after adjusting the fan speed and switching the fan mode.

Adjusting fans

1. Selects a fan that you want to adjust and to display the fan duty curve line (yellow) in fan operating windows.
2. Click and drag the duty points to adjust the fan speed.



Resetting BIOS

You might need to restore the default BIOS setting to solve certain problems. There are several ways to reset BIOS:

- Go to BIOS and press **F6** to load optimized defaults.
- Short the Clear CMOS jumper on the motherboard.
- Press the Clear CMOS button (optional) on the rear I/O panel.

Important

Be sure the computer is off before clearing CMOS data. Please refer to the Clear CMOS jumper/ button section in the user guide for resetting BIOS.

Updating BIOS

Updating BIOS with M-FLASH

Before updating:

Please download the latest BIOS file that matches your motherboard model from MSI website. And then save the BIOS file into the USB flash drive.

Updating BIOS:

1. Switch to the target BIOS ROM by Multi-BIOS switch. Skip this step if your motherboard does not have this switch.
2. Insert the USB flash drive that contains the update file into the USB port.
3. Please refer the following methods to enter flash mode.
   - Reboot and press **Ctrl + F5** key during **POST** and click on Yes to reboot the system.
   - Reboot and press **Del** key during **POST** to enter BIOS. Click the M-FLASH button and click on Yes to reboot the system.
4. Select a BIOS file to perform the BIOS update process.
5. When prompted click on **Yes** to start recovering BIOS.
6. After the flashing process is 100% completed, the system will reboot automatically.

Updating the BIOS with MSI Center

Before updating:

• Make sure the LAN driver is already installed and the internet connection is set properly.

• Please close all other application software before updating the BIOS.

To update BIOS:

1. Install and launch MSI Center and go to **Support** page.
2. Select **Live Update** and click on the **Advanced** button.
3. Select the BIOS file and click on the **Install** button.
4. The installation reminder will appear, then click the **Install** button on it.
5. The system will automatically restart to update BIOS.
6. After the flashing BIOS process is 100% completed, the system will restart automatically.

Updating BIOS with Flash BIOS Button

1. Please download the latest BIOS file that matches your motherboard model from the MSI® website.
2. **Rename** the BIOS file to **MSI.ROM**, and save it to the root of your USB flash drive.
3. Connect the power supply to **CPU_PWR1** and **ATX_PWR1**. (No need to install CPU and memory.)
4. Plug the USB flash drive that contains the **MSI.ROM** file into the **Flash BIOS Port** on the rear I/O panel.
5. Press the **Flash BIOS Button** to flash BIOS, and the LED starts flashing.
6. The LED will be turned off when the process is completed.

Notices

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Revision History

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