



# **Intel 500 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 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.

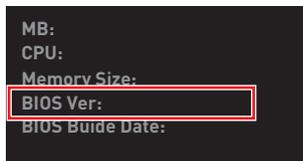


## **Important**

*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 Profile** - allows you to select the XMP 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**

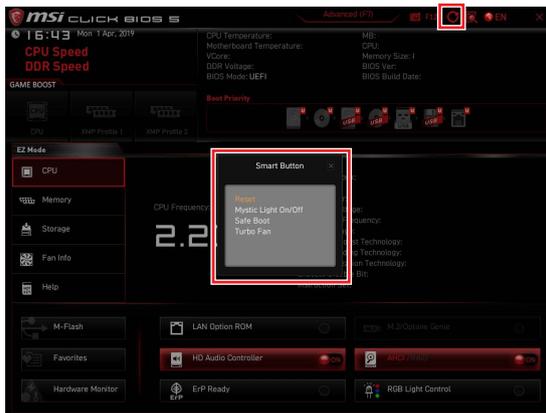
In search page, only the **F6**, **F10** and **F12** function keys are available.

- **Smart Button** - it provides 4 function modes to be achieved by reset button.
  - **Reset** - press the reset button to reset the system.
  - **Mystic Light on/ off** - press the reset 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** - press the reset button to reboot the system and the system will be forced into BIOS with the previous BIOS settings.
- **Turbo Fan** - press the reset 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.

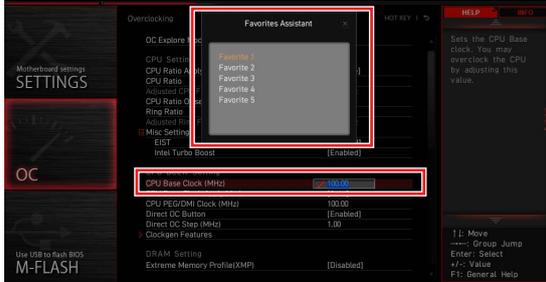


- **Language** - allows you to select language of BIOS setup.
- **System information** - shows the CPU/ DDR speed, CPU/ MB temperature, MB/ CPU type, memory size, CPU/ DDR voltage, BIOS version and build date.
- **Boot device priority bar** - you can move the device icons to change the boot priority. 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 enabling the function .
  - **CPU Fan Fail Warning Control** - enables or disables to show the CPU fan fail warning message on the POST.
  - **M.2/Optane Genie** - enables or disables the Optane function for NVMe or PCIe storage devices.
  - **Thunderbolt Control** - enables or disables the thunderbolt I/O device support.
  - **AHCI/RAID** - select either AHCI or RAID mode for SATA devices.
  - **ErP Ready** - enables or disables the system power consumption according to ErP regulation.
  - **Debug Code LED Control** - enables or disables the debug code LED.
  - **HD Audio Controller** - enables or disables the HD audio controller.
  - **EZ LED Control** - turns on or turns off all the LEDs of motherboard.
- **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**.



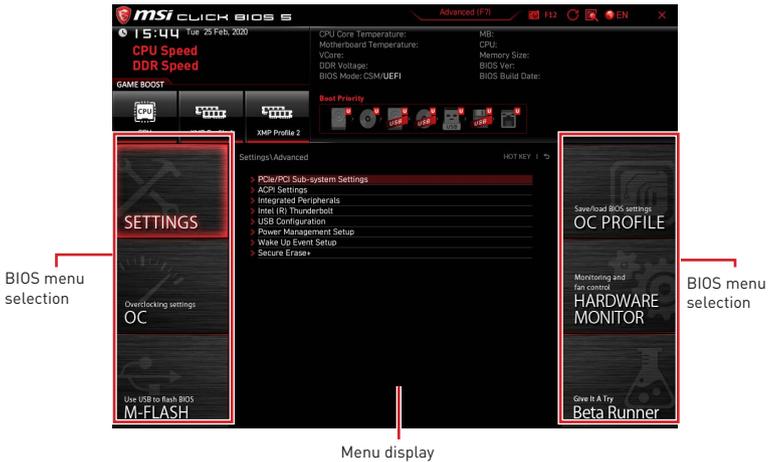
▪ **To delete a BIOS item from favorite menu**

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/ M.2\_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).

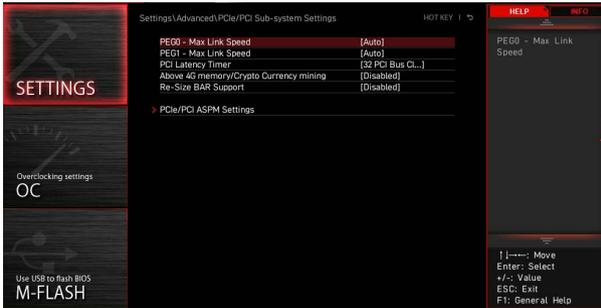
## Advanced

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.



### ► PEG0 - Max Link Speed

Sets PCI Express protocol for matching different installed 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. (optional)

### ► PEG1 - Max Link Speed

Sets PCI Express protocol for matching different installed 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. (optional)

### ► PEG2 - Max Link Speed

Sets PCI Express protocol for matching different installed 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. (optional)

### ▶ **PEG3 - Max Link Speed**

Sets PCI Express protocol for matching different installed 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. (optional)

### ▶ **CPU PCIe Lanes Configuration**

Sets PCIe lanes from CPU for the connected PCIe x16 slots to match different installed devices.

### ▶ **PCI Latency Timer**

Sets latency timer of PCI interface device.

### ▶ **Above 4G memory/ Crypto Currency mining**

Enables or disables 64-bit capable devices to be decoded in above 4G address space. It is only available if the system supports 64-bit PCI decoding.

- [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 device.

### ▶ **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**

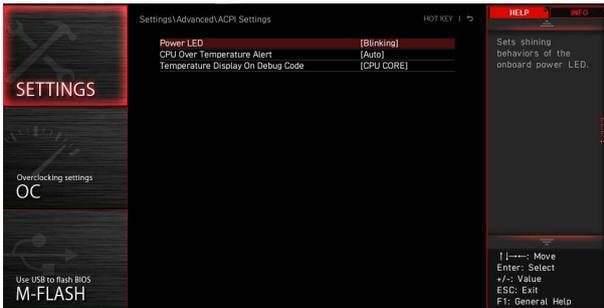
Sets PCI Express ASPM (Active State Power Management) state for power saving.

► **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**

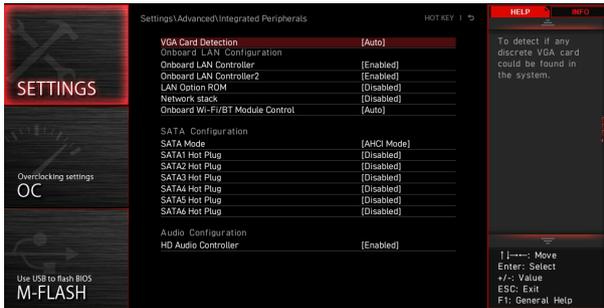
Enables or disables the CPU overheating alert sound and message when CPU temperature is over 80 and 94 degrees centigrade.

► **Temperature Display On Debug Code**

Selects a thermal detection point and its' temperature will show on the debug code LED.

## ► 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 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.

▶ **Onboard CNVi Module Control**

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

▶ **Onboard Wi-Fi/BT Module Control**

Enables or disables the onboard WiFi and Bluetooth functions.

▶ **SATA Mode**

Sets the operation mode of the onboard SATA controller.

[AHCI Mode] Specify the AHCI mode for SATA storage devices. AHCI (Advanced Host Controller Interface) offers some advanced features to enhance the speed and performance of SATA storage device, such as Native Command Queuing (NCQ) and hot-plugging.

[RAID/ Optane Mode] Enables RAID function for SATA storage devices and Optane function for NVMe or PCIe storage devices.

▶ **M2\_1-RST PCIe Storage Remapping**

Enables or disables M.2 PCIe storage remapping for Intel Rapid Storage.

▶ **M2\_2-RST PCIe Storage Remapping**

Enables or disables M.2 PCIe storage remapping for Intel Rapid Storage.

▶ **M2\_3-RST PCIe Storage Remapping**

Enables or disables M.2 PCIe storage remapping for Intel Rapid Storage.

▶ **M.2/Optane Genie**

Enables or disables M.2 storage/ Optane memory.

▶ **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**

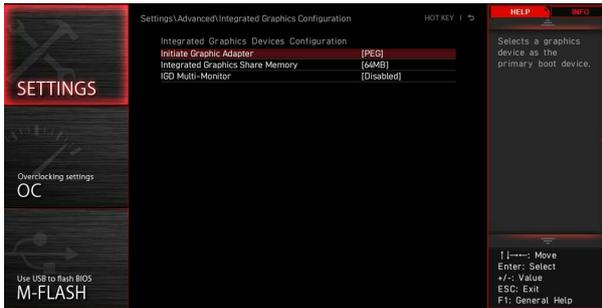
Enables or disabled the SATA6 port hot plug support.

▶ **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.



### ► 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.

### ► Native OS security for TBT

Enables or disables native OS security solution for Thunderbolt hosts.

### ► Discrete Thunderbolt(TM) Configuration

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

#### ► Thunderbolt USB Support

Enables or disables the system to boot from thunderbolt USB device.

#### ► Thunderbolt Boot Support

Enables or disables the system to boot from bootable thunderbolt device.

#### ► Titan Ridge Workaround for OSUP

Enables or disables the Titan Ridge workaround for OSUP.

#### ► Tbt Dynamic AC/DC L1

Enables or disables the Tbt Dynamic AC/DC L1 support.

#### ► GPIO3 Force Pwr

Sets GPIO3 to 1/0.

#### ► Wait time in ms after applying Force Pwr

After Force Pwr is asserted, sets the wait time before accessing the thunderbolt controller.

▶ **GPIO filter**

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

▶ **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.

▶ **Thunderbolt(TM) OS select**

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

▶ **Windows 10 Thunderbolt support**

Sets Windows 10 support level.

[Disabled]      No OS native support.

[Enabled+RTD3] OS native support + RTD3.

## ► 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 Support

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

## ► Super I/O Configuration

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

### ► Serial (COM) Port 0 Configuration

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

### ► Serial (COM) Port 0

Enables or disables serial (COM) port 0.

### ► Serial (COM) Port 0 Settings

Sets serial (COM) port 0. If set to Auto, BIOS will optimize 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.

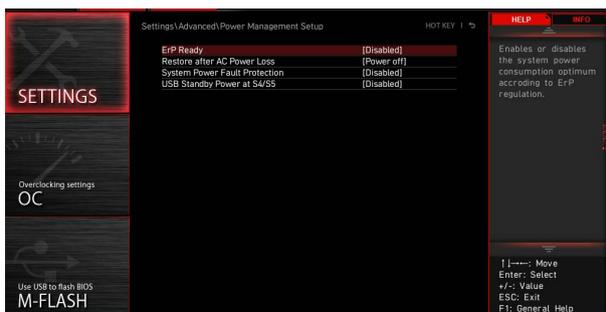
### ► Device Mode

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+.



## ► M.2 XPANDER-Z GEN4 S Fan Control

Sets the LED color and fan duty percentage of M.2 XPANDER-Z fan. Press **Enter** to enter the sub-menu.

## ► Realtek PCIe GBE Family Controller

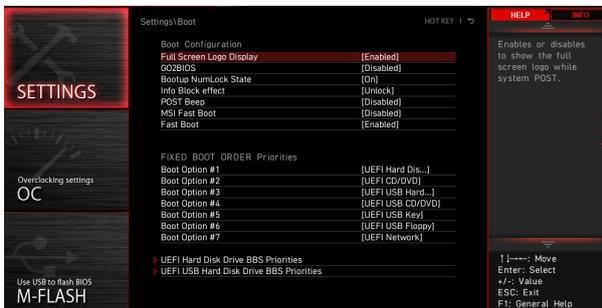
Shows driver information and configuration of the ethernet controller parameter. This item will appear when **Network Stack** is enabled.

## ► 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 sec 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 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 fast boot feature for Windows 10 fast boot feature. This item will only be available when **MSI Fast Boot** is disabled.

### ► FIXED BOOT ORDER Priorities

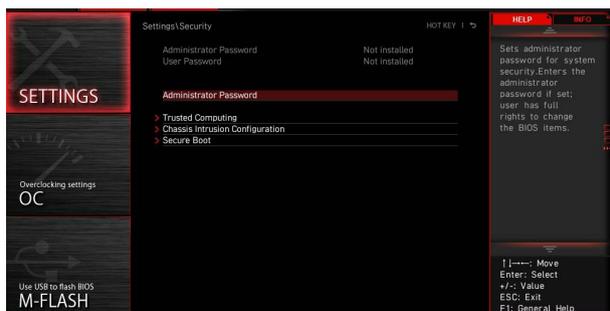
Sets device priority for system boot.

### ► Boot Option Priorities

These items are used to prioritize the installed boot devices.

## 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 [Setup]

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 [Enabled]

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.

## ► **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: PTT or dTPM.

[PTT]            Select it for Firmware TPM (Intel Platform Trust technology)

[dTPM]         Select it for Discrete TPM (Software TPM).

### ► **Pending operation [None]**

Sets the action of pending TPM operation.

[None]           Discard the selection

[TPM Clear]    Clear all data secured by TPM.

## ► **Chassis Intrusion Configuration**

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

### ► **Chassis Intrusion [Disabled]**

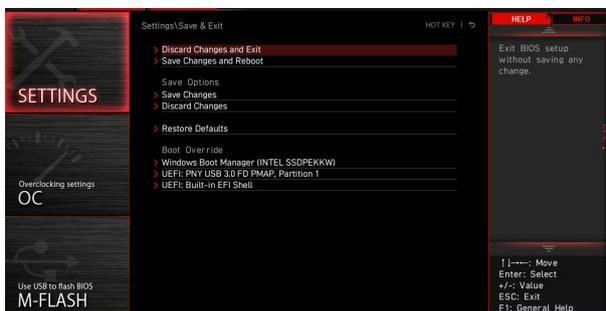
Enables or disables recording messages while the chassis is opened. This function is ready for the chassis equips a chassis intrusion switch.

[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 function.

## 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

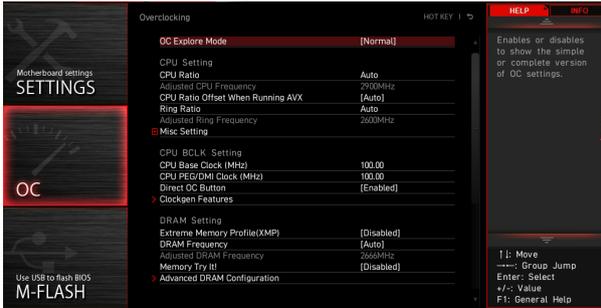
Restore or load all default values.

### ► Boot Override

The installed bootable 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 version 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.

#### ► CPU Ratio Apply Mode

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

#### ► CPU Ratio

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

#### ► 1-Core Ratio Limit

Allows you to set the CPU ratio for this single CPU core. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **2-Core Ratio Limit**

Allows you to set the CPU ratio for this single CPU core. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **3-Core Ratio Limit**

Allows you to set the CPU ratio for this single CPU core. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **4-Core Ratio Limit**

Allows you to set the CPU ratio for this single CPU core. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **5-Core Ratio Limit**

Allows you to set the CPU ratio for this single CPU core. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **6-Core Ratio Limit**

Allows you to set the CPU ratio for this single CPU core. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **7-Core Ratio Limit**

Allows you to set the CPU ratio for this single CPU core. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **8-Core Ratio Limit**

Allows you to set the CPU ratio for this single CPU core. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **Numbers of CPU Cores of Group 1**

Sets the number of CPU cores as a group1 to run target CPU Turbo Ratio Group 1. The next group should be more than former one in CPU core number. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **Target CPU Turbo Ratio Group 1**

Sets the target CPU Turbo ratio value for assigned CPU cores group 1. The target CPU Turbo Ratio value should not be higher than former one. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **Numbers of CPU Cores of Group 2**

Sets the number of CPU cores as a group1 to run target CPU Turbo Ratio Group 2. The next group should be more than former one in CPU core number. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **Target CPU Turbo Ratio Group 2**

Sets the target CPU Turbo ratio value for assigned CPU cores group 2. The target CPU Turbo Ratio value should not be higher than former one. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ▶ **Numbers of CPU Cores of Group 3**

Sets the number of CPU cores as a group1 to run target CPU Turbo Ratio Group 3. The next group should be more than former one in CPU core number. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Target CPU Turbo Ratio Group 3**

Sets the target CPU Turbo ratio value for assigned CPU cores group 3. The target CPU Turbo Ratio value should not be higher than former one. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Numbers of CPU Cores of Group 4**

Sets the number of CPU cores as a group1 to run target CPU Turbo Ratio Group 4. The next group should be more than former one in CPU core number. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Target CPU Turbo Ratio Group 4**

Sets the target CPU Turbo ratio value for assigned CPU cores group 4. The target CPU Turbo Ratio value should not be higher than former one. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Numbers of CPU Cores of Group 5**

Sets the number of CPU cores as a group1 to run target CPU Turbo Ratio Group 5. The next group should be more than former one in CPU core number. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Target CPU Turbo Ratio Group 5**

Sets the target CPU Turbo ratio value for assigned CPU cores group 5. The target CPU Turbo Ratio value should not be higher than former one. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Numbers of CPU Cores of Group 6**

Sets the number of CPU cores as a group1 to run target CPU Turbo Ratio Group 6. The next group should be more than former one in CPU core number. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Target CPU Turbo Ratio Group 6**

Sets the target CPU Turbo ratio value for assigned CPU cores group 6. The target CPU Turbo Ratio value should not be higher than former one. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Numbers of CPU Cores of Group 7**

Sets the number of CPU cores as a group1 to run target CPU Turbo Ratio Group 7. The next group should be more than former one in CPU core number. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Target CPU Turbo Ratio Group 7**

Sets the target CPU Turbo ratio value for assigned CPU cores group 7. The target CPU Turbo Ratio value should not be higher than former one. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

▶ **Numbers of CPU Cores of Group 8**

Sets the number of CPU cores as a group1 to run target CPU Turbo Ratio Group 8. The next group should be more than former one in CPU core number. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ► **Target CPU Turbo Ratio Group 8**

Sets the target CPU Turbo ratio value for assigned CPU cores group 8. The target CPU Turbo Ratio value should not be higher than former one. These items only appear when **CPU Ratio Apply Mode** set to **Turbo Ratio**.

### ► **Adjusted CPU Frequency**

Shows the adjusted CPU frequency. Read-only. These items only appear when **CPU Ratio Apply Mode** set to **All Core** or **Turbo Ratio**.

### ► **Core 0 1st of 8 xxxx MHz**

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

### ► **Core 1 2nd of 8 xxxx MHz**

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

### ► **Core 2 3rd of 8 xxxx MHz**

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

### ► **Core 3 4th of 8 xxxx MHz**

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

### ► **Core 4 5th of 8 xxxx MHz**

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

### ► **Core 5 6th of 8 xxxx MHz**

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

### ► **Core 6 7th of 8 xxxx MHz**

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

### ► **Core 7 8th of 8 xxxx MHz**

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

### ► **Turbo Ratio Offset Value**

Sets the CPU Turbo ratio offset value. This item only appears when **CPU Ratio Apply Mode** set to **Turbo Ratio Offset**.

### ▶ 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 unbootable after changing the parameters. If it occurs, please clear the CMOS data and restore the default settings.

#### ▶ Extreme OC Setup

Sets the optimal BIOS setting for extreme overclocking.

#### ▶ 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 Core Hyper-Threading Control

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

##### ▶ Core 0 Hyper-Threading

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

##### ▶ Core 1 Hyper-Threading

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

##### ▶ Core 2 Hyper-Threading

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

##### ▶ Core 3 Hyper-Threading

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

##### ▶ Core 4 Hyper-Threading

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

##### ▶ Core 5 Hyper-Threading

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

##### ▶ Core 6 Hyper-Threading

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

##### ▶ Core 7 Hyper-Threading

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

##### ▶ Core 8 Hyper-Threading

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

### ► Core 9 Hyper-Threading

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

### ► Active Processor Cores

Allows you to select the number of active CPU cores.

### ► 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.

### ► 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.

▶ **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.

▶ **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.

▶ **TVB Ratio Clipping**

Enables or disables the TVB (Thermal Velocity Boost) ratio clipping. For overclocking, it is recommend to disable this item. 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.

▶ **FCLK Frequency**

Sets FCLK Frequency for early power on. Lower FCLK frequency may help you to set higher base clock frequency.

▶ **DMI Link Speed**

Sets DMI speed.

▶ **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.

▶ **PCIE Spread Spectrum**

Enables or disables PCIE spread spectrum. This item appears when the motherboard supports this function.

[Enabled] Enables the spread spectrum function to reduce the EMI (Electromagnetic Interference) problem.

[Disabled] Enhances the overclocking ability of CPU Base clock.

▶ **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.

▶ **+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 finetuning CPU core voltage when running AVX.

▶ **CPU Ratio Offset When Running AVX-512**

Sets a offset value to lower the CPU core ratio. It could be helpful for heat dissipation when running AVX-512 instructions. When set to Auto, BIOS will configure this setting automatically. This item appears when the installed CPU and chipset support this function.

▶ **AVX-512 Voltage Guardband Scale**

Sets the extra voltage for finetuning CPU core voltage when running AVX-512 instruction.

▶ **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. 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.

▶ **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.

▶ **Clockgen Features**

Press Enter to enter the sub-menu. Sets the detailed clockgen features.

▶ **Dynamic Frequency Search**

Enables or disables to run the optimized dynamic BCLK.

### ► **Dynamic Frequency Search Mode**

Sets the search mode of the dynamic BCLK. This item is available when the Dynamic Frequency Search is enabled.

[Once] Run once in the next system boot.

[Each Power On] Run in every time when system is powered on.

### ► **Dynamic Frequency Search Step (MHz)**

Sets the increase for running the dynamic BCLK. If set to Auto, BIOS will configure this setting automatically. This item is available when the **Dynamic Frequency Search** is enabled.

### ► **BCLK Amplitude**

Sets the value for BCLK Amplitude for overclocking. Higher value might benefit to get higher overclocking.

### ► **BCLK Slew Rate**

Sets the value for BCLK Slew Rate for overclocking. The value might vary depending on the actual overclocking scenario.

### ► **BCLK ORT Duration**

Sets the value for BCLK ORT duration for overclocking. The value might vary depending on the actual overclocking scenario.

### ► **Extreme Memory Profile (XMP)**

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

### ► **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.

### ► **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 [Disabled]**

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



### **Important**

*Manual tweaking or fine-tune preferred parameter is still recommended due to different memory module manufacturing quality.*

### ► **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 shows the illustration of memory force at HELP window.

#### ► **Lucky Mode**

Enabling the lucky mode may enhance memory overclocking ability.

#### ► **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.

#### ► **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**

#### ► **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**

▶ **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.

▶ **Latency Timing Configuration tRTL/tIOL**

▶ **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.

▶ **tIOL (CHA/D0/R0)**

Sets the IO latency time for channel A, DIMM0, RANK0.

▶ **tIOL (CHA/D0/R1)**

Sets the IO latency time for channel A, DIMM0, RANK1.

▶ **tIOL (CHA/D1/R0)**

Sets the IO latency time for channel A, DIMM1, RANK0.

▶ **tIOL (CHA/D1/R1)**

Sets the IO latency time for channel A, DIMM1, RANK1.

▶ **tIOL (CHB/D0/R0)**

Sets the IO latency time for channel B, DIMM0, RANK0.

▶ **tIOL (CHB/D0/R1)**

Sets the IO latency time for channel B, DIMM0, RANK1.

▶ **tIOL (CHB/D1/R0)**

Sets the IO latency time for channel B, DIMM1, RANK0.

▶ **tIOL (CHB/D1/R1)**

Sets the IO latency time for channel B, DIMM1, RANK1.

▶ **+Misc Item**

▶ **DLL Bandwidth**

Sets DLL (Delay Locked Loop) bandwidth.

▶ **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.

▶ **Round Trip Latency Optimize**

Enables or disables to optimize the latency time between the memory read and execution. When disabled, the default latency time will be applied. The latency time will be shortened while enabled.

▶ **IO Compensation (CHA)**

Sets the IO compensation for memory channel A. The higher IO Compensation, the tighter memory latency timing; the lower, the looser.

▶ **IO Compensation (CHB)**

Sets the IO compensation for memory channel B. The higher IO Compensation, the tighter memory latency timing; the lower, the looser.

▶ **IOL Init Value (CHA)**

Sets the initial IOL (IO Latency) for memory channel A. The higher value, the looser memory latency timing; the lower, the tighter.

► **IOL Init Value (CHB)**

Sets the initial IOL (IO Latency) for memory channel B. The higher value, the looser memory latency timing; the lower, the tighter.

► **RTL Init Value (CHA)**

Sets the initial RTL value (Round Trip Latency) for memory channel A. The higher the value, the looser the round trip memory latency timing; the lower, the tighter.

► **RTL Init Value (CHB)**

Sets the initial RTL value (Round Trip Latency) for memory channel B. The higher the value, the looser the round trip memory latency timing; the lower, the tighter.

► **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.

► **VDDQ ODT**

Enables or disables the VDDQ ODT function.

► **Rank Interleave**

Enables or disables the Rank Interleave support.

► **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 (CHA/D0)**

Sets ODT RTT\_NOM for channel A, DIMM0.

► **Rtt Park (CHA/D0)**

Sets ODT RTT\_PARK for channel A, DIMM0.

► **Rtt Wr (CHA/D1)**

Sets ODT RTT\_WR for channel A, DIMM1.

► **Rtt Nom (CHA/D1)**

Sets ODT RTT\_NOM for channel A, DIMM1.

► **Rtt Park (CHA/D1)**

Sets ODT RTT\_PARK for channel A, DIMM1.

► **Rtt Wr (CHB/D0)**

Sets ODT RTT\_WR for channel B, DIMM0.

► **Rtt Nom (CHB/D0)**

Sets ODT RTT\_NOM for channel B, DIMM0.

► **Rtt Park (CHB/D0)**

Sets ODT RTT\_PARK for channel B, DIMM0.

► **Rtt Wr (CHB/D1)**

Sets ODT RTT\_WR for channel B, DIMM1.

► **Rtt Nom (CHB/D1)**

Sets ODT RTT\_NOM for channel B, DIMM1.

► **Rtt Park (CHB/D1)**

Sets ODT RTT\_PARK 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 initiation and training for memory. And then the memory will not be initiated and trained when booting to accelerate the system booting time.

[Disabled] The memory will be initiated and trained every booting.

[No Training] The memory will not be trained every booting.

[SlowTraining]The memory will be trained every booting.

► **DigitALL Power**

Press Enter to enter the sub-menu. In the sub-menu, you can setup some protecting conditions about voltage/ current/ tempature 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 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 Voltage Protection

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

### ▶ 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 automatically.

[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 GT VRM Over Temperature Protection

Enables or disables the CPU GT VRM for over-temperature protection. The CPU GT frequency may be throttled when VRM temperature over the specified value.

### ▶ CPU SA Loadline Calibration Control

The CPU SA 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 SA Switching Frequency

Sets the PWM working speed to stabilize CPU SA 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 Core Voltage Monitor

Selects the target item for monitoring CPU core voltage.

### ► CPU Core/ GT Voltage Mode

Sets the CPU Core/ 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 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.

### ► 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**

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 SA Voltage**

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

► **CPU IO Voltage**

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

► **CPU IO 2 Voltage (RKL Memory)**

Sets the CPU IO 2 voltage. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually. This item appears when a CPU that supports this adjustment is installed.

► **CPU PLL Voltage**

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

► **CPU PLL OC Voltage**

Sets the CPU PLL OC 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.

► **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.

▶ **CPU ST Voltage**

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

▶ **CPU STG Voltage**

Sets the CPU STG 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.

▶ **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 VTT 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.

▶ **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**.

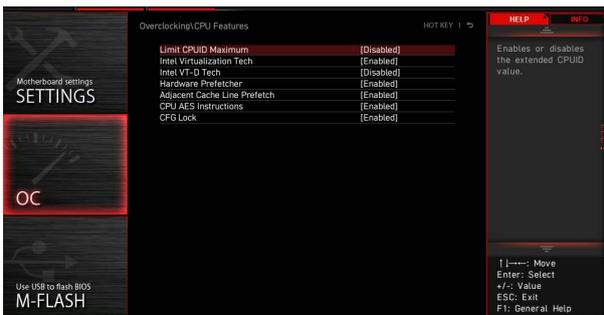


### ► DIMMx Memory SPD

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.

► **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.

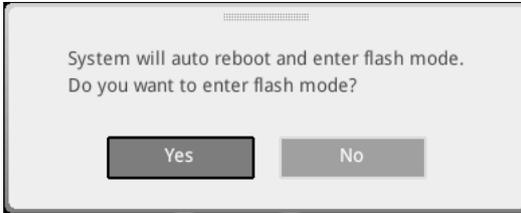
[Enabled] Locks the CFG lock bit.

[Disabled] Un-locks the CFG lock bit.

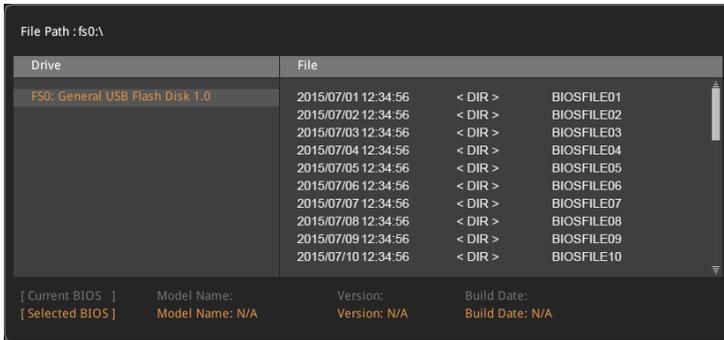
## M-FLASH Menu

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.

Select a temperature curve line (white) to be showed in Fan operating window

Select a fan mode for target fan

Select a fan to be configured

Click to enable the Smart Fan

Smart Fan duty information

Fan operating window

Setting Buttons

Temperature information

Voltage information

CPU	System	MOS	PCH	PCI-E 1	PCI-E 2	M.2 1	T_SEN 1	T_SEN 2
32°C / 89°F	31°C / 87°F	35°C / 95°F	40°C / 104°F	32°C / 89°F	31°C / 87°F	29°C / 84°F	0°C / 32°F	0°C / 32°F

CPU 1	PUMP 1	System 1	System 2	System 3	System 4	System 5	System 6	System 7	System 8	W Flow 1
0RPM	0RPM	0RPM	0RPM	0RPM	0RPM	0RPM	0RPM	0RPM	0RPM	0.0L/M

85°C/185°F	100%
70°C/158°F	63%
55°C/131°F	38%
40°C/104°F	13%

Setting Buttons
All Full Speed(F) All Set Default(D) All Set Cancel(C)

Temperature information
CPU 32°C / 89°F System 31°C / 87°F MOS 35°C / 95°F PCH 40°C / 104°F PCI-E 1 32°C / 89°F PCI-E 2 31°C / 87°F M.2 1 29°C / 84°F T_SEN 1 0°C / 32°F T_SEN 2 0°C / 32°F

Voltage information
0.991 0.944 1.052 1.044 11.928 4.810 3.096 1.192

- **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

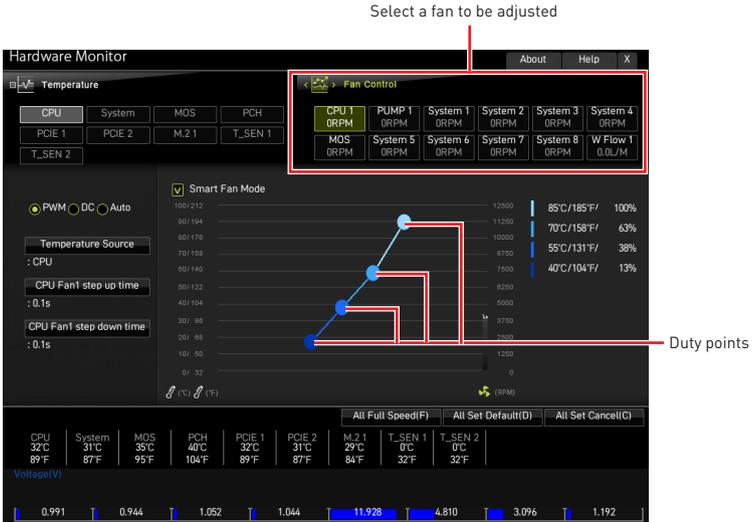
- **All Full Speed** - configures all fans to run at full operating speed.
- **All Set Default** - configures all fans' speeds return the BIOS default values.
- **All Set Cancel** - discards current changes and restores previous settings for all fan .

## 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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