

# BIOS User Guide

H310MHD PRO / B360MHD PRO / B360MHD PRO2

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# BIOS Update

The BIOS can be updated using either of the following utilities:

- **BIOSTAR BIOS Flasher:** Using this utility, the BIOS can be updated from a file on a hard disk, a USB drive (a flash drive or a USB hard drive), or a CD-ROM.
- **BIOSTAR BIOS Update Utility:** It enables automated updating while in the Windows environment. Using this utility, the BIOS can be updated from a file on a hard disk, a USB drive (a flash drive or a USB hard drive), or a CD-ROM, or from the file location on the Web.

## BIOSTAR BIOS Flasher

### Note

- » This utility only allows storage device with FAT32/16 format and single partition.
- » Shutting down or resetting the system while updating the BIOS will lead to system boot failure.

Updating BIOS with BIOSTAR BIOS Flasher

1. Go to the website to download the latest BIOS file for the motherboard.
2. Then, copy and save the BIOS file into a USB flash (pen) drive. (Only supported FAT/FAT32 format)
3. Insert the USB pen drive that contains the BIOS file to the USB port.
4. Power on or reset the computer and then press <F12> during the POST process.

5. After entering the POST screen, the BIOS-FLASHER utility pops out. Choose <fs0> to search for the BIOS file.



6. Select the proper BIOS file, and a message asking if you are sure to flash the BIOS file. Click "Yes" to start updating BIOS.



7. A dialog pops out after BIOS flash is completed, asking you to restart the system. Press the <Y> key to restart system.



8. While the system boots up and the full screen logo shows up, press <DEL> key to enter BIOS setup.

After entering the BIOS setup, please go to the <Save & Exit>, using the <Restore Defaults> function to load Optimized Defaults, and select <Save Changes and Reset> to restart the computer. Then the BIOS Update is completed.

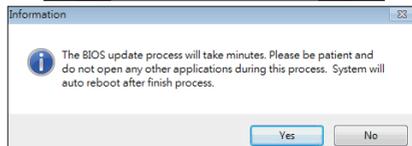
**BIOS Update Utility (through the Internet)**

1. Installing BIOS Update Utility from the DVD Driver.
2. Please make sure the system is connected to the internet before using this function.

3. Launch BIOS Update Utility and click the “Online Update” button on the main screen.



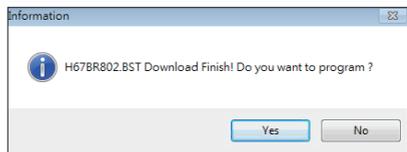
4. An open dialog will show up to request your agreement to start the BIOS update. Click “Yes” to start the online update procedure.



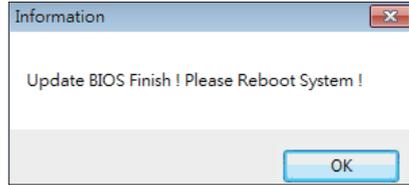
5. If there is a new BIOS version, the utility will ask you to download it. Click “Yes” to proceed.



6. After the download is completed, you will be asked to program (update) the BIOS or not. Click “Yes” to proceed.



7. After the updating process is finished, you will be asked you to reboot the system. Click “OK” to reboot.



8. While the system boots up and the full screen logo shows up, press <DEL> key to enter BIOS setup. After entering the BIOS setup, please go to the <Save & Exit>, using the <Restore Defaults> function to load Optimized Defaults, and select <Save Changes> and <Reset> to restart the computer. Then, the BIOS Update is completed.

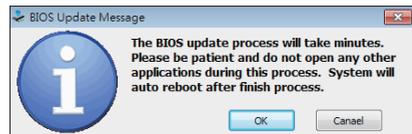
**BIOS Update Utility (through a BIOS file)**

- 1. Installing BIOS Update Utility from the DVD Driver.
- 2. Download the proper BIOS from <http://www.biostar.com.tw/>

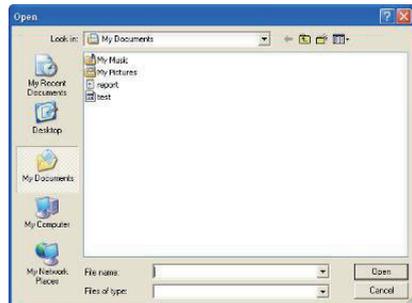
3. Launch BIOS Update Utility and click the “Update BIOS” button on the main screen.



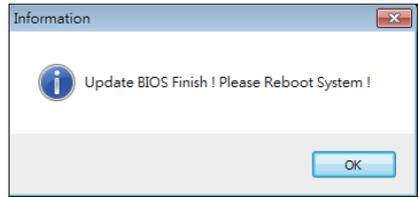
4. A warning message will show up to request your agreement to start the BIOS update. Click “OK” to start the update procedure.



5. Choose the location for your BIOS file in the system. Please select the proper BIOS file, and then click on “Open”. It will take several minutes, please be patient.



6. After the BIOS Update process is finished, click on “OK” to reboot the system.

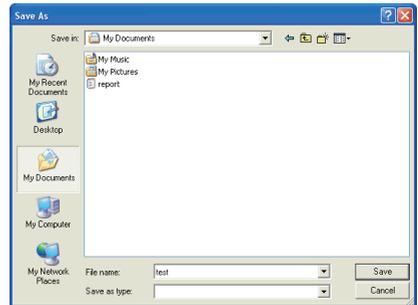


7. While the system boots up and the full screen logo shows up, press <DEL> key to enter BIOS setup.

After entering the BIOS setup, please go to the <Save & Exit>, using the <Restore Defaults> function to load Optimized Defaults, and select <Save Changes and Reset> to restart the computer. Then, the BIOS Update is completed.

### **Backup BIOS**

Click the Backup BIOS button on the main screen for the backup of BIOS, and select a proper location for your backup BIOS file in the system, and click “Save”.



# UEFI BIOS Setup

## Introduction

The purpose of this manual is to describe the settings in the AMI UEFI BIOS Setup program on this motherboard. The Setup program allows users to modify the basic system configuration and save these settings to NVRAM.

UEFI BIOS determines what a computer can do without accessing programs from a disk. This system controls most of the input and output devices such as keyboard, mouse, serial ports and disk drives. BIOS activates at the first stage of the booting process, loading and executing the operating system. Some additional features, such as virus and password protection or chipset fine-tuning options are also included in UEFI BIOS.

The rest of this manual will to guide you through the options and settings in UEFI BIOS Setup.

## Plug and Play Support

This AMI UEFI BIOS supports the Plug and Play Version 1.0A specification.

## EPA Green PC Support

This AMI UEFI BIOS supports Version 1.03 of the EPA Green PC specification.

## ACPI Support

AMI ACPI UEFI BIOS support Version 1.0/2.0 of Advanced Configuration and Power interface specification (ACPI). It provides ASL code for power management and device configuration capabilities as defined in the ACPI specification, developed by Microsoft, Intel and Toshiba.

## PCI Bus Support

This AMI UEFI BIOS also supports Version 2.3 of the Intel PCI (Peripheral Component Interconnect) local bus specification.

## Using Setup

When starting up the computer, press <Del> during the **Power-On Self-Test (POST)** to enter the UEFI BIOS setup utility.

In the UEFI BIOS setup utility, you will see **General Help** description at the top right corner, and this is providing a brief description of the selected item. **Navigation Keys** for that particular menu are at the bottom right corner, and you can use these keys to select item and change the settings.

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### Note

- » *The default UEFI BIOS settings apply for most conditions to ensure optimum performance of the motherboard. If the system becomes unstable after changing any settings, please load the default settings to ensure system's compatibility and stability. Use Load Setup Default under the Exit Menu.*
  - » *For better system performance, the UEFI BIOS firmware is being continuously updated. The UEFI BIOS information described in this manual is for your reference only. The actual UEFI BIOS information and settings on board may be slightly different from this manual.*
  - » *The content of this manual is subject to be changed without notice. We will not be responsible for any mistakes found in this user's manual and any system damage that may be caused by wrong-settings.*
-

# 1. Main Menu

Once you enter AMI UEFI BIOS Setup Utility, the Main Menu will appear on the screen providing an overview of the basic system information.



## BIOS Information

It shows system information including UEFI BIOS version, Project Code, Model Name, Build Date and etc.

## Total Memory

Shows system memory size, VGA shard memory will be excluded.

## Memory Frequency

Shows the system memory frequency.

## System Language

Choose the system default language.

## System Date

Set the system date. Note that the 'Day' automatically changes when you set the date.

## System Time

Set the system internal clock.

## 2. Advanced Menu

The Advanced Menu allows you to configure the settings of CPU, Super I/O, Power Management, and other system devices.

**Note**

» Beware of that setting inappropriate values in items of this menu may cause system to malfunction.



### CPU Configuration

This item shows CPU Information



**C6DRAM**

This item enables or disables moving of DRAM contents to PRM memory when CPU is in C6 state.

Options: Enabled (Default) / Disabled

**Software Guard Extensions (SGX)**

This item enables or disables Software Guard Extensions (SGX).

Options: Software Controlled (Default) / Enabled / Disabled

**PRMRR Size**

This item allows you to setting the PRMRR Size.

Options: INVALID PRMRR (Default) / 32MB / 64MB / 128MB

**Overclocking Lock**

This item enables or disables Overclocking Lock.

Options: Disabled (Default) / Enabled

**Hardware Prefetcher**

This item to turn on/off the MLC streamer prefetcher.

Options: Enabled (Default) / Disabled

**Adjacent Cache Line Prefetch**

This item to turn on/off prefetching of adjacent cache lines.

Options: Enabled (Default) / Disabled

**Intel (VMX) Virtualization Technology**

This item enables or disables Intel Virtualization Technology. When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Options: Enabled (Default) / Disabled

**Active Processor Cores**

This item sets number of cores to enable in each processor package.

Options: All (Default) / 1 / 2 / 3 / 4 / 5

**AES**

This item sets CPU Advanced Encryption Standard instructions.

Options: Enabled (Default) / Disabled

## SATA and RST Configuration

The BIOS will automatically detect the presence of SATA devices. There is a sub-menu for each SATA device. Select a device and press <Enter> to enter the sub-menu for detailed options.



### SATA Controller(s)

This item enables or disables Serial ATA Device.

Options: Enabled (Default) / Disabled

### SMART Self Test

This item runs SMART Self Test on all HDDs during POST.

Options: Disabled (Default) / Enabled

### SATA Hot Plug

This item enables or disables designates SATA port as Hot Pluggable.

Options: Disabled (Default) / Enabled

## Trusted Computing



## ACPI Settings



### Enable ACPI Auto Configuration

This item enables or disables BIOS ACPI auto configuration function.

Options: Disabled (Default) / Enabled

### Enable Hibernation

This item enables or disables system ability to hibernate (OS/S4 sleep state). This option may not be effective with some OSs.

Options: Enabled (Default) / Disabled

### ACPI Sleep State

This item Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

Options: S3 (Suspend to RAM) (Default) / Suspend Disabled

### **Lock Legacy Resources**

The item enables or disables Lock of Legacy Resources.

Options: Disabled (Default) / Enabled

### **S3 Video Repost**

The item enables or disables S3 Video Repost. On enabling, Video Option ROM will be dispatched during S3 resume.

Options: Disabled (Default) / Enabled

### **PS2 Keyboard PowerOn**

This item allows you to control the keyboard power on function.

Options: Disabled (Default) / Any Key / Stroke Key / Specific Key

#### **Stroke Keys**

This item will show only when Keyboard PowerOn is set "Stroke Key."

Options: Wake Key (Default) / Power Key / Ctrl+F1 / Ctrl+F2 / Ctrl+F3 / Ctrl +F4 / Ctrl+F5 / Ctrl+F6

#### **Specific Key**

This item will show only when Keyboard PowerOn is set "Specific Key." Press Enter to set Specific key.

### **PS2 Mouse PowerOn**

This item allows you to control the mouse power on function.

Options: Disabled (Default) / Enabled

### **Restore AC Power Loss**

Specify what state to go to when power is re-applied after a power failure.

Options: Power Off (Default) / Power On / Last State

### **PME Wake up from S5**

The item enables the system to wake from S5 using PME event.

Options: Disabled (Default) / Enabled

### **Wake system with Fixed Time**

This item enables or disables the system to wake on by alarm event. When this item is enabled, the system will wake on the hr::min::sec specified.

Options: Disabled (Default) / Enabled

#### **Wake up date**

You can choose which date the system will boot up.

#### **Wake up hour / Wake up minute / Wake up second**

You can choose the system boot up time, input hour, minute and second to specify.

## SMART FAN Control



### CPU Smart Fan1

This item allows you to control the CPU Smart Fan function.

Options: Auto (Default) / Disabled

### CPU Fan1 Calibrate

Press [ENTER] to calibrate CPU Fan1 speed.

### Control Mode

This item provides several operation modes of the fan.

Options: Aggressive (Default) / Quiet / Manual

#### Note

» The following items appear only when you set the Control Mode function to [Manual].

### Fan Ctrl OFF(°C)

When CPU temperature is lower than this value, the CPU fan will keep lowest RPM.

Options: 10 (°C) (default)

### Fan Ctrl On(°C)

When CPU temperature is higher than this value, the CPU fan controller will turn on.

Options: 20 (°C) (Default)

### Fan Ctrl Start Value

This item sets CPU FAN Start Speed Value.

Options: 50 (Default)

### Fan Ctrl Sensitive

The bigger the numeral is, the higher the FAN speed is.

Options: 30 (Default)

## Super IO Configuration



### Serial Port

This item enables or disables Serial Port (COM).

Options: Enabled (Default) / Disabled

### Change Settings

This item Select an optimal settings for Super IO Device.

Options: Auto (Default) / IO=3F8h; IRQ=4 / IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12 / IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12 / IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12 / IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12

## H/W Monitor



## Shutdown Temperature

This item allows you to set up the CPU shutdown Temperature.

Options: Disabled (Default) / 70°C/158°F / 75°C/167°F / 80°C/176°F / 85°C/185°F / 90°C/194°F

## USB Configuration



### Legacy USB Support

The item allows you to enable Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

Options: Enabled (Default) / Disabled / Auto

### XHCI Hand-off

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

Options: Disabled (Default) / Enabled

### USB Mass Storage Driver Support

The item allows you to enable or disable USB Mass Storage Driver Support.

Options: Enabled (Default) / Disabled

### USB transfer time-out

The time-out value for Control, Bulk, and Interrupt transfers.

Options: 20 sec (Default) / 1 sec / 5 sec / 10 sec

### Device reset time-out

The item sets USB mass storage device Start Unit command time-out.

Options: 20 sec (Default) / 10 sec / 30 sec / 40 sec

## Device power-up delay

Maximum time the device will take before it properly reports itself to the Host Controller. "Auto" uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.

Options: Auto (Default) / Manual

### Note

» The following items appear only when you set the Device power-up delay function to [Manual].

### Device power-up delay in seconds

Delay range is 1 ~ 40 seconds, in one second increments.

Options: 5 (Default)

## USB FLASH DRIVE PMAP

Mass storage device emulation type. 'AUTO' enumerates devices according to their media format. Optical drives are emulated as 'CDROM', drives with no media will be emulated according to a drive type.

Options: Auto (Default) / Floppy / Forced FDD / Hard Disk / CD-ROM

## Network Stack Configuration



## Network Stack

This item enables or disables UEFI network stack

Options: Disabled (Default) / Enabled

### Note

» The following items appear only when you set the Network Stack function to [Enabled]

### IPv4 PXE Support

This item enables or disables IPv4 PXE Boot Support. If disabled IPv4 PXE boot support will not be available.

Options: Disabled (Default) / Enabled

**IPv4 HTTP Support**

This item enables or disables IPv4 HTTP Boot Support. If disabled IPv4 HTTP boot support will not be available.

Options: Disabled (Default) / Enabled

**IPv6 PXE Support**

This item enables or disables IPv6 PXE Boot Support. If disabled IPv6 PXE boot support will not be available.

Options: Disabled (Default) / Enabled

**IPv6 HTTP Support**

This item enables or disables IPv6 HTTP Boot Support. If disabled IPv6 HTTP boot support will not be available.

Options: Disabled (Default) / Enabled

**IPSEC Certificate**

This item enables or disables IPSEC certificate for Ikev.

Options: Enabled (Default) / Disabled

**PXE boot wait time**

Wait time to press ESC key to abort the PXE boot.

**Media detect count**

Wait time in sec to detect media.

**NVMe Configuration**

The item shows NVMe controller and driver information.



## Offboard PCIe SATA Controller



## 3. Chipset Menu

This section describes configuring the PCI bus system. PCI, or Personal Computer Interconnect, is a system which allows I/O devices to operate at speeds nearing the speed of the CPU itself uses when communicating with its own special components.

### Note

» Beware of that setting inappropriate values in items of this menu may cause system to malfunction.



### System Agent (SA) Configuration



### Internal Graphics

This item keeps IGFX enabled based on the setup options.

Options: Auto (Default) / Disabled / Enabled

### **Primary Display**

This item selects which of IGFX/PEG/PCI Graphics device should be Primary Display or select SG for Switchable Gfx.

Options: Auto (Default) / IGFX / PEG / PCI / SG

### **GTT Size**

This item selects GTT Size.

Options: 8MB (Default) / 4MB / 2MB

### **Aperture Size**

This item selects Aperture Size. Note : Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.

Options: 256MB (Default) / 128MB / 512MB / 1024MB / 2048MB

### **DVMT Pre-Allocated**

This item selects DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.

Options: 32M (Default) / 0M / 64M / 4M / 8M / 12M / 16M / 20M / 24M / 28M / 32M/F7 / 36M / 40M / 44M / 48M / 52M / 56M / 60M

### **DVMT Total Gfx Mem**

This item selects DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device.

Options: 256MB (Default) / 128MB / MAX

### **PAVP Enable**

This item enables or disables PAVP.

Options: Enabled (Default) / Disabled

### **Max TOLUD**

Maximum Value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.

Options: Dynamic (Default) / 1 GB / 1.25 GB / 1.5 GB / 1.75 GB / 2 GB / 2.25 GB / 2.5 GB / 2.75 GB / 3 GB / 3.25 GB / 3.5GB

### **VT-d**

This item enables or disables VT-d capability.

Options: Enabled (Default) / Disabled

### **Above 4GB MMIO BIOS assignment**

This item enables or disables above 4GB MemoryMappedIO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB.

Options: Disabled (Default) / Enabled

### **RC6 (Render Standby)**

This item enables or disables render standby support.

Options: Enabled (Default) / Disabled

### **PEX16\_1**

### **MAX Link Speed**

Configure PEX16\_1 Max Speed.

Options: Auto (Default) / Gen1 / Gen2 / Gen3

## PCH-IO Configuration



## PCI Express Configuration



### PEX1\_1/ PEX1\_2

This item Configure PCIe Speed

Options: Auto(Default) / Gen1 / Gen2 / Gen3

### HD Audio

Control Detection of the HD-Audio device. Disabled = HDA will be unconditionally disabled.

Enabled = HDA will be unconditionally enabled. Auto = HDA will be enabled if present, disabled otherwise.

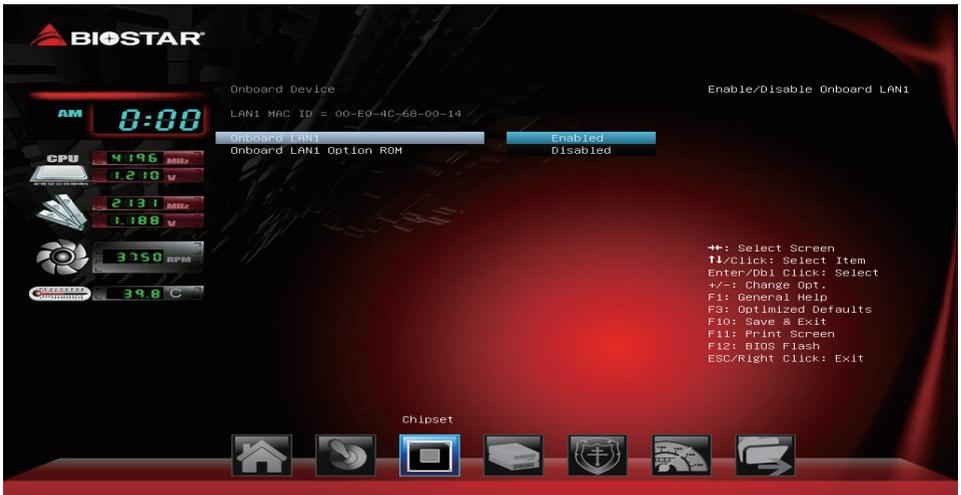
Options: Enabled (Default) / Disabled / Auto

## ErP Control

When ErP is enabled, the system will meet ErP requirement.

Options: Disabled (Default) / Enabled in S4-S5

## Onboard Device



### Onboard LAN1

This item enables or disables Onboard LAN1.

Options: Enabled (Default) / Disabled

### Onboard LAN1 Option ROM

This item enables or disables Onboard LAN1 Option ROM.

Options: Disabled (Default) / Enabled

## 4. Boot Menu

This menu allows you to setup the system boot options.



### Setup Prompt Timeout

This item sets number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.

Options: 1 (Default)

### Bootup NumLock State

This item selects the keyboard NumLock state.

Options: On (Default) / Off

### Full Screen Logo Display

This item enable or disable Full Screen Logo Show function.

Options: Enabled (Default) / Disabled

### Boot Success Beep

When this item is set to Enabled, BIOS will let user know boot success with beep.

Options: Enabled (Default) / Disabled

### BIOS Flash protection

While enabled, it can't flash write and flash erase by SMI.

Options: Enabled (Default) / Disabled

## Fast Boot

This item enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.

Options: Disabled (Default) / Enabled

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### Note

» *The following items appear only when you set the Fast Boot function to [Enabled]*

---

### SATA Support

If Last Boot HDD Only, Only last boot HDD device will be available in post. If all SATA devices, all SATA devices will be available in OS and post.

Options: Last Boot HDD Only (Default) / All Sata Devices

### VGA Support

If Auto, only install Legacy OpRom with Legacy OS and logo would NOT be shown during post. EFI driver will still be installed with EFI OS.

Options: EFI Driver (Default) / Auto

### USB Support

If Disabled, all USB devices will NOT be available until after OS boot. If Partial Initial, USB Mass Storage and specific USB port/device will NOT be available before OS boot. If Enabled, all USB devices will be available in OS and Post.

Options: Full Initial (Default) / Partial Initial / Disabled

### PS2 Devices Support

If Disabled, PS2 devices will be skipped.

Options: Enabled (Default) / Disabled

### Network Stack Driver Support

If Disabled, Network Stack Drivers will be skipped.

Options: Disabled (Default) / Enabled

## Redirection Support

If disable, Redirection function will be disabled.

Options: Disabled (Default) / Enabled

## CSM Support

This option enables or disables CSM support.

Options: Disabled (Default) / Enabled

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### Note

» *The following items appear only when you set the CSM Support function to [Enabled]*

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## GateA20 Active

Upon Request – GA20 can be disabled using BIOS services. Always – do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.

Options: Upon Request (Default) / Always

## Option ROM Messages

This item sets the display mode for Option ROM.

Options: Force BIOS (Default) / Keep Current

## Boot option filter

This option controls Legacy/UEFI ROMs priority.

Options: UEFI and Legacy (Default) / Legacy only / UEFI only

## Network

This option controls the execution of UEFI and Legacy Network OpROM

Options: Legacy (Default) / UEFI / Do not launch

## Storage

This option controls the execution of UEFI and Legacy Storage OpROM

Options: Legacy (Default) / UEFI / Do not launch

## Video

This option controls the execution of UEFI and Legacy Video OpROM

Options: Legacy (Default) / UEFI / Do not launch

## Other PCI devices

This item determines OpROM execution policy for devices other than Network, Storage, or Video.

Options: UEFI (Default) / Legacy / Do not launch

## Boot Option Priorities

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

## New Boot Option Policy

This item controls the placement of newly detected UEFI boot options.

Options: Default (Default) / Place First / Place Last

## 5. Security Menu



### Administrator Password

This item sets Administrator Password.

### User Password

This item sets User Password.

### Secure Boot Menu



## Secure Boot

Secure Boot feature is active if Secure Boot is enabled, Platform Key(PK) is enrolled and the system is in user mode. The mode change requires platform reset.

Options: Disabled (Default) / Enabled

## Secure Boot Mode

Secure Boot mode options : Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.

Options: Custom (Default) / Standard

## Restore Factory Keys

Force System to User Mode. Install factory default Secure Boot Key databases.

## Restore To Setup Mode

Delete all Secure Boot Key databases from NVRAM.

## Key Management



### Factory Key Provision

This item install factory default Secure Boot Keys after the platform reset and while the system is in setup mode.

Options: Disabled (Default) / Enabled

### Install Factory Default Keys

Force System to User Mode - install all Factory Default Keys(PK, KEK, , dbt, dbx). Change takes effect after reboot.

### Reset To Setup Mode

This item delete all Secure Boot key databases from NVRAM.

### Export Secure Boot Variables

Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device.

### Enroll EFI Image

This item allows the image to run in Secure Boot mode. Enroll SHA256 hash certificate of a PE image into Authorized Signature Database(db).

**Remove 'UEFI CA' from DB**

Device Guard ready system must not list 'Microsoft UEFI CA' Certificate in Authorized Signature database(db).

**Restore DB defaults**

Restore DB variable to factory defaults.

**Platform Key (PK)**

Options: Details / Export / Update / Delete

**Key Exchange Keys**

Options: Details / Export / Update / Append / Delete

**Authorized Signatures**

Options: Details / Export / Update / Append / Delete

**Forbidden Signatures**

Options: Details / Export / Update / Append / Delete

**Authorized Timestamps**

Options: Update / Append

**OsRecovery Signatures**

Options: Update / Append

## 6. O.N.E Menu

This submenu allows you to change voltage and clock of various devices.

### Note

- » We suggest you use the default setting. Changing the voltage and clock improperly may damage the device.
- » The options and default settings might be different by RAM or CPU models.
- » Beware of that setting inappropriate values in items of this menu may cause system to malfunction.
  - Values in Red: Danger
  - Values in Yellow: Warning
  - Values in White: Normal



### Start Page

You can set the entrance page when you enter UEFI BIOS Setup.

Options: Page – Main (Default) / Page – Advanced / Page – Chipset / Page – Boot / Page – Security / Page –O.N.E / Page – Save & Exit

### CPU Ratio Mode

This item sets CPU Ratio Mode.

Options: Auto (Default) / ALL Cores / Per Core / Fixed

### Note

- » The following items appear only when you set the CPU Ratio Mode function to [All Cores] & [Fixed]

#### Core Max OC Ratio

This item sets the maximum OC Ratio for the CPU Core.

### Note

- » The following items appear only when you set the CPU Ratio Mode function to [Per Core]

#### 1/2/3/4/5/6-Core Ratio Limit Override

This item 1/2/3/4/5/6-Core Ratio Limit with range 0 to 83.

## Ring Max OC Ratio

This sets the maximum overclocking ratio for the CPU Ring.

## Memory Profile

Select DIMM timing profile. The below values start with the currently running values and don't auto populate.

Options: Default profile (Default) / Custom profile

### Note

» *The following items appear only when you set the Memory Profiles function to [Custom profile]*

### Memory Ratio

Automatic or the frequency will equal ratio times reference clock. Set to Auto to recalculate memory timings listed below.

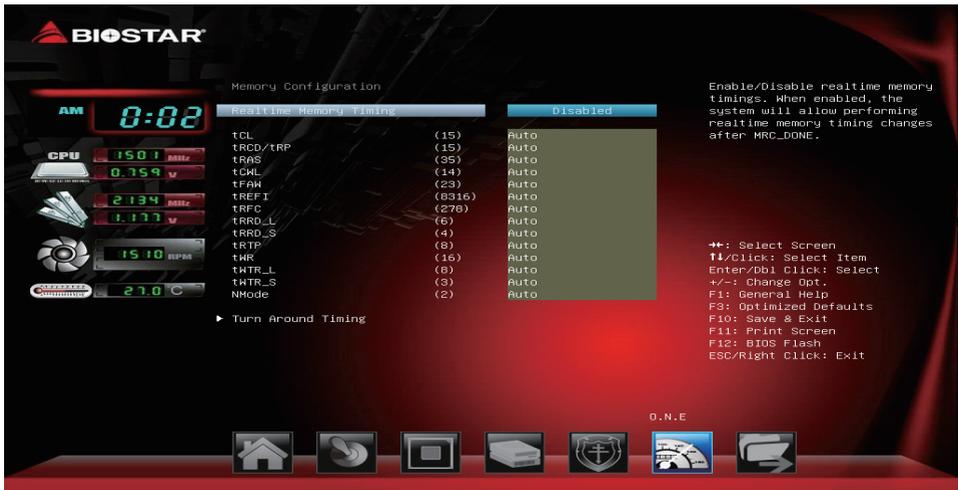
Options: Auto (Default) / DDR4 800MHz / DDR4 1066MHz / DDR4 1333MHz / DDR4 1600MHz / DDR4 1866MHz / DDR4 2133MHz / DDR4 2400MHz / DDR4 2666MHz

### QCLK Odd Ratio

Adds 133 or 100 MHz to QCLK frequency, depending on RefClk.

Options: Disabled (Default) / Enabled

## Memory Timing Configuration



### tCL

This item allows you to select CAS Latency, 0: AUTO, max: 31

Options: Auto (Default)

### tRCD/tRP

This item allows you to select RAS to CAS delay time and Row Prechrg delay time, 0: AUTO, max: 63

Options: Auto (Default)

### tRAS

This item allows you to select Row Active Time, 0: AUTO, max: 64

Options: Auto (Default)

**tCWL**

This item allows you to select Minimum CAS Write Latency Delay, 0: AUTO, max: 20

Options: Auto (Default)

**tFAW**

This item allows you to select Four Activate Window Delay Time, 0: AUTO, max: 63

Options: Auto (Default)

**tREFI**

This item allows you to select Refresh Interval, 0: AUTO, max: 65535

Options: Auto (Default)

**tRFC**

This item allows you to select Min Refresh Recovery Delay Time, 0: AUTO, max: 1023

Options: Auto (Default)

**tRRD\_L**

This item allows you to select Min Row Active to Row Active Delay Time for Same Bank Group, 0: AUTO, max: 31

Options: Auto (Default)

**tRRD\_S**

This item allows you to select Min Row Active to Row Active Delay Time for Different Bank Group, 0: AUTO, max: 31

Options: Auto (Default)

**tRTP**

This item allows you to select Min Internal Read to Precharge Command Delay Time. 0: AUTO, max: 15. DDR4 legal values: 5, 6, 7, 8, 9, 10, 12

Options: Auto (Default)

**tWR**

This item allows you to select Min Write Recovery Time, 0: AUTO, legal values: 5, 6, 7, 8, 10, 12, 14, 16, 18, 20, 24, 30, 34, 40

Options: Auto (Default)

**tWTR\_L**

This item allows you to select Min Internal Write to Read Command Delay Time for Same Bank Group, 0: AUTO, max: 60

Options: Auto (Default)

**tWTR\_S**

This item allows you to select Min Internal Write to Read Command Delay Time for Different Bank Group, 0: AUTO, max: 28

Options: Auto (Default)

**NMode**

This item allows you to select System command rate, range 0-2, 0 means auto, 1 = 1N, 2 = 2N

Options: Auto (Default)

## Turn Around Timing



### **tRD2RD\_SG**

This item delay between Read-to-Read commands in the same Bank Group, Range 4-54.

Options: Auto (Default)

### **tRD2RD\_DG**

This item delay between Read-to-Read commands in different Bank Group for DDR4. All other DDR technologies should set this equal to SG. 0-Auto, Range 4-54.

Options: Auto (Default)

### **tRD2RD\_DR**

This item delay between Read-to-Read commands in different Ranks. 0-Auto, Range 4-54.

Options: Auto (Default)

### **tRD2RD\_DD**

This item delay between Read-to-Read commands in different DIMMs. 0-Auto, Range 4-54.

Options: Auto (Default)

### **tRD2WR\_SG**

This item delay between Read-to-Write commands in the same Bank Group. 0-Auto, Range 4-54.

Options: Auto (Default)

### **tRD2WR\_DG**

This item delay between Read-to-Write commands in different Bank Group for DDR4. All other DDR technologies should set this equal to SG. 0-Auto, Range 4-54.

Options: Auto (Default)

### **tRD2WR\_DR**

This item delay between Read-to-Write commands in different Ranks. 0-Auto, Range 4-54.

Options: Auto (Default)

### **tRD2WR\_dd**

This item delay between Read-to-Write commands in different DIMMs. 0-Auto, Range 4-54.

Options: Auto (Default)

### **tWR2RD\_SG**

This item delay between Write-to-Read commands in the same Bank Group. 0-Auto, Range 4-86.

Options: Auto (Default)

**tWR2RD\_DG**

This item delay between Write-to-Read commands in different Bank Group for DDR4. All other DDR technologies should set this equal to SG. 0-Auto, Range 4-54.

Options: Auto (Default)

**tWR2RD\_DR**

This item delay between Write-to-Read commands in different Ranks. 0-Auto, Range 4-54.

Options: Auto (Default)

**tWR2RD\_DD**

This item delay between Write-to-Read commands in different DIMMs. 0-Auto, Range 4-54.

Options: Auto (Default)

**tWR2WR\_SG**

This item delay between Write-to-Write commands in the same Bank Group. 0-Auto, Range 4-54.

Options: Auto (Default)

**tWR2WR\_DG**

This item delay between Write-to-Write commands in different Bank Group for DDR4. All other DDR technologies should set this equal to SG. 0-Auto, Range 4-54.

Options: Auto (Default)

**tWR2WR\_DR**

This item delay between Write-to-Write commands in different Ranks. 0-Auto, Range 4-54.

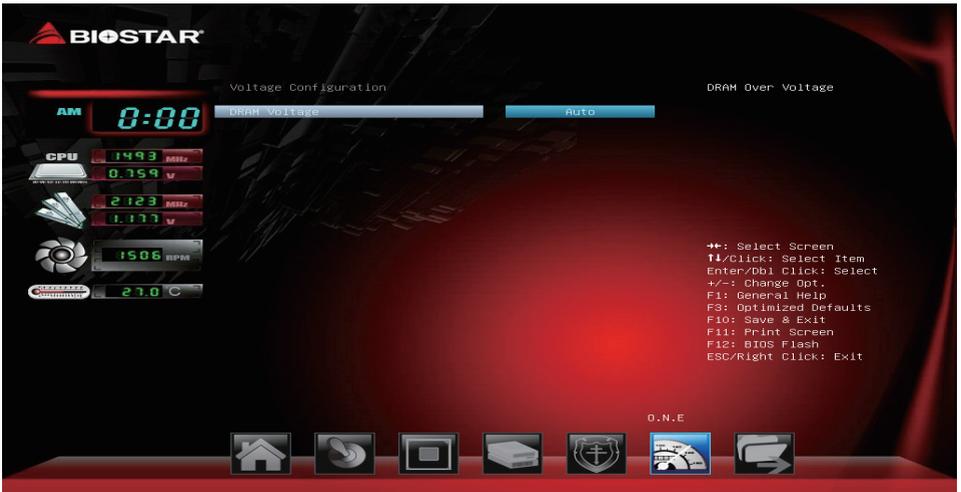
Options: Auto (Default)

**tWR2WR\_DD**

This item delay between Write-to-Write commands in different DIMMs. 0-Auto, Range 4-54.

Options: Auto (Default)

**Voltage Configuration**



**DRAM Voltage**

This item sets DRAM Over Voltage.

Options: Auto (Default) / 1.20V / 1.35V

# Memory Insight



## DIMM Profile

These items display memory information.



## 7. Exit Menu

This menu allows you to load the optimal default settings, and save or discard the changes to the BIOS items.



### Discard Changes and Exit

Abandon all changes made during the current session and exit setup.

### Save Changes and Reset

Reset the system after saving the changes.

### Restore Defaults

This selection allows you to reload the BIOS when problem occurs during system booting sequence. These configurations are factory settings optimized for this system.