

# User Manual

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MTN-AL50 Ultra Compact Mini PC

A decorative graphic consisting of multiple overlapping, wavy lines in shades of gray, creating a sense of motion and depth across the lower half of the page.

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# AL50

# User Manual

(Version 3.0)

Version:		
NO.	Description	Issue Date:
V0.5	Initial Version	2023/02/02
V3.0	1. Update TYPE C to full functioned and the CPU parameters 2. Update Audio interface to CTIA interface	2023/03/22

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## Chapter 1 Product Introduction

### 1.1 Brief Introduction

The MTN-AL50 compact mini pc is a 4x4 small form factor pc based on the Intel Alder Lake platform U/P/H series' processor with high performance.

### 1.2 Parameters

#### Intel Alder Lake-P Series:

- Intel® Core™ i7-1260P, 12Cores 16Threads, Max Turbo Frequency:4.70GHz, Processor Base Power:28W, Maximum Turbo Power: 64W.
- Intel® Core™ i5-1240P, 12Cores 16Threads, Max Turbo Frequency:4.40GHz, Processor Base Power:28W, Maximum Turbo Power: 64W.

**Memory:** 2x SO-DIMM DDR5-4800, support dual-channel, maximum capacity 64GB

**GPU:** Integrated Graphics based on CPU, display via 2x HDMI2.0b (Support HDCP2.3)

**Storage:** 1 x M.2 Key M slot, supports 2280 NVMe SSD (PCIe4.0 4X Signal), 1x SATA3.0 interface

**USB:** 2x USB3.2 Gen 2, 2x USB2.0

**Type C:** 1xUSB-C Full-functioned (supports USB3.2 Gen 2 upstream/Display Port 1.4 Alt Mode; supports PD protocol, 20V power input (power up to 90W).

**Ethernet:** Two RTL8125BG-CG Network Controllers on-board, Data Rate Per Port: 2.5Gbps

**Audio:** High-Definition Realtek Audio Codec,1xCTIA Audio Jack, supports Line-out+Mic-in.

**Expansion:** 1x M.2\_Key E type 2230 for Wi-Fi Modules (supports PCIe/USB2/CNVi)

**Other I/O:** 1x FP\_PWON Power button for wired switch (optional)

**Board Dimension:** 120mm x 120 mm

**Chassis Dimension:** 127mm x 127mm x 52mm

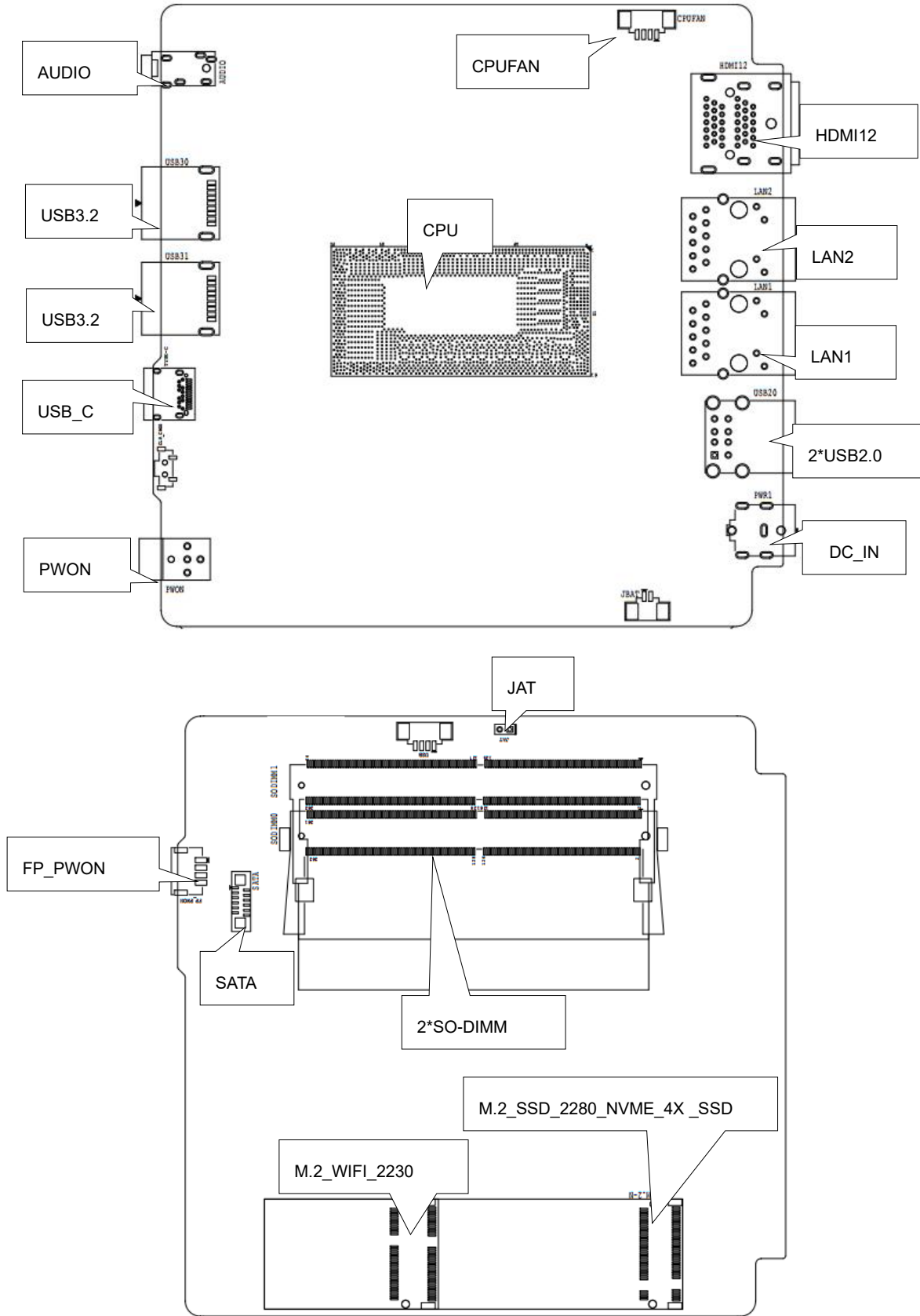
**Power:** 19V/20V DC-in

**Working Temperature:** -20°C~60°C

#### **IMPORTANT! Guidelines for using DC and Type C Power Supplies.**

1. When connecting power sources, both DC and TYPE C supplies can be inserted freely, either simultaneously or individually. Please ensure that the power adapter has a minimum rating of 90W.
2. If both supplies are connected simultaneously, always unplug the TYPE C supply before the DC supply. This rule applies during the shutdown as well. If the DC supply is removed first, the TYPE C port's protective mechanism will activate. To restore power, simply unplug and re-plug the TYPE C connection.

### 1.2 Connector Diagram



### 1.4 I/O Interface





## Chapter 2 Hardware

### 2.1 Installations

Please refer to the following steps for installations:

1. Read the user manual carefully to make sure all the adjustments on the AL50 are correct.
2. Installing the Memory:
  - Press the ejector tab of the memory slot outwards with your fingertips.
  - Hold the memory module and align the key to the module with that on the memory slot.
  - Gently push the module into the slot until the ejector levers return completely to the closed position, holding the module in place when the module touches the bottom of the slot. To remove the module, press the ejector levers outwards to unseat the module.
3. Installing the expansion cards:
  - Locate the expansion slots and remove the screw, insert the cards into the slot at a 45-degree angle then attach the screw to the expansion cards, gently press down on it then install the screw back.
4. Connect all signal wires, cables, panel control wiring, and power supplies.
5. Start the computer and complete the setup of the BIOS program.

The board's components are integrated circuits and can easily be damaged by Electrostatic Discharge or ESD; therefore, please follow the instructions:

- Hold the board's edge when handing, and do not touch onboard pins, components, or plug sockets.
- When touching integrated circuit components (such as CPU, RAM, etc.), please wear an anti-static wrist strap/glove to avoid electrostatic discharge damage to the board or other sensitive components.
- Before installing the integrated circuits/sensitive components, place the sensitive components in anti-static bags to keep them safe from ESD.
- Please make sure the power switch is OFF before plugging the power plug.

### 2.2 Jumper Setting

Please configure the jumpers according to your requirements before installing the hardware.

How to identify the first header of jumpers and pins: Observe the mark beside the jumper or pins and find the header marked by "1" or bold line or triangular symbol. Or observe the rear panel and the header with a square solder pad is the first header.

### 2.3 Memory Slots

The board provides 2x SO-DIMM DDR5-4800 for memory up to 64GB and supports dual channels.

Notes: Make sure to hold the memory module and align the key to the module with that on the memory slot. While choosing a memory module, please make sure the module matches the board's specifications.

### 2.4 Display Interfaces

The board features 2xHDMI2.0b interfaces, and supports HDCP2.3.

## 2.5 Storage Interfaces (Screen Printing: SATA, M.2\_N)

The board provides 1 x M.2 Key M slot, supports 2280 NVMe SSD (PCIe4.0 4X Signal), 1x SATA3.0 interface.

### SATA Definition (Screen Printing: SATA)

Pin	Signal
1	GND
2	TX_N
3	TX_P
4	GND
5	RX_P
6	RX_N
7	GND
8	+5V
9	+5V
10	+5V
11	GND
12	GND

## 2.6 Expansion Slots (Screen Printing: M.2\_E)

Screen Printing M.2\_E: 1x M.2\_Key E type 2230 for Wi-Fi Modules (supports PCIe/USB2/CNVi)

## 2.7 USB Interfaces

The board supports 2x USB3.2 Gen2 and 2x USB2.0 interfaces.

## 2.8 Type-C Interface

The board supports 1xUSB-C Full-functioned (supports USB3.2 Gen 2 upstream/Display Port 1.4 Alt Mode; supports PD protocol, 20V power input (power up to 90W)).

## 2.9 LAN

The board features 2xRJ45 LAN interfaces with high-speed RTL8125BG-CG network controllers, data rate per ports: 2.5Gbps.

Both of the Ethernet interfaces supports network wake-up (Magic packet wake-up), and the LAN1 supports UEFI PXE network boot. To utilize UEFI PXE network boot, it is necessary to set (IPv4 PXE Support) to "Enabled" in the BIOS.

The board also provides a LAN\_LED pin header, enabling the extension of the (orange) status indicator light to the chassis panel.

### LED Status Indicators:

LI_LED Status (Green)	Function	ACT_LED Status (Orange)	Function
Always on	Network Connected	Flashing	Data transmission

## 2.10 Audio Interface

The board features a Realtek ALC897 High-Definition Audio Codec, 1xCTIA Audio Jack, supports Line-out + Mic-in.

## 2.11 Board Power Supply (Screen printing: PWR1)

The board supports 19V DC-IN for power supply with a DC specification of (5.5mm x 2.5mm).

## 2.12 Power Button (Screen printing: PWON, FP\_PWON)

The board features a power button with a power light indicator above (Blue LED); an optional FP\_PWON remote control switch (Screen printing: FP\_PWON).

### Optional Function FP\_PWON Remote (Wired) Control Switch (Screen Printing: FP\_PWON)

Pin	Signal
1	Power Switch Signal, Low Level for Power On/Off
2	GND
3	Negative Terminal of Power Indicator Light
4	Positive Terminal of Power Indicator Light

## 2.13 CPU Fan (Screen printing: CPUFAN)

The board features one auxiliary cooling fan socket (CPU fan socket powered at 5V by default).

### CPUFAN (Screen Printing: CPUFAN)

Pin	Signal
1	GND
2	VCC
3	TAC
4	CTL

## 2.14 CMOS Clearance/Retention (Screen printing: CLR\_CMOS)

CMOS is powered by onboard button batteries. Clearing CMOS will permanently remove the previous system settings and restore the board system to original settings (factory settings).

**Step 1:** Turn off the PC and disconnect the power.

**Step 2:** Press CLR\_CMOS for 15 seconds then disconnect.

**Step 3:** Restart the device, press the <DEL> button to enter the BIOS, load the optimal default value, save, and exit the settings.

### CMOS (Screen Printing: CLR\_CMOS)

Setting	Function
Close	Clear CMOS

 **Please do not clear COMS when the PC is connected to power in case board damages.**

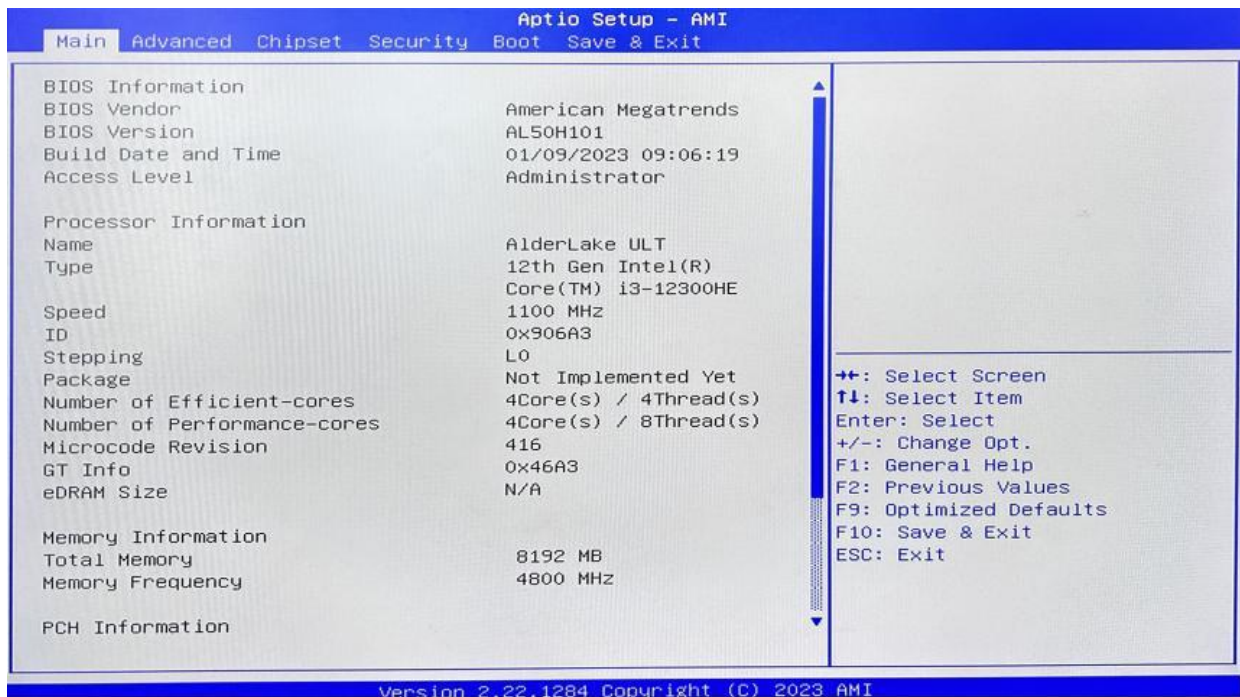
## Chapter 3 BIOS Setup

### 3.1 Entering the BIOS

1. Turn on the computer and press <Delete> entering the BIOS
2. After the computer is turned on, keep pressing F11, select enter Setup
3. BIOS Hotkeys:
  - F9: Restore to Factory setting.
  - F10: Save and Exit.
  - ESC: Exit

### 3.2 Main Setup (BIOS info, Date, Time)

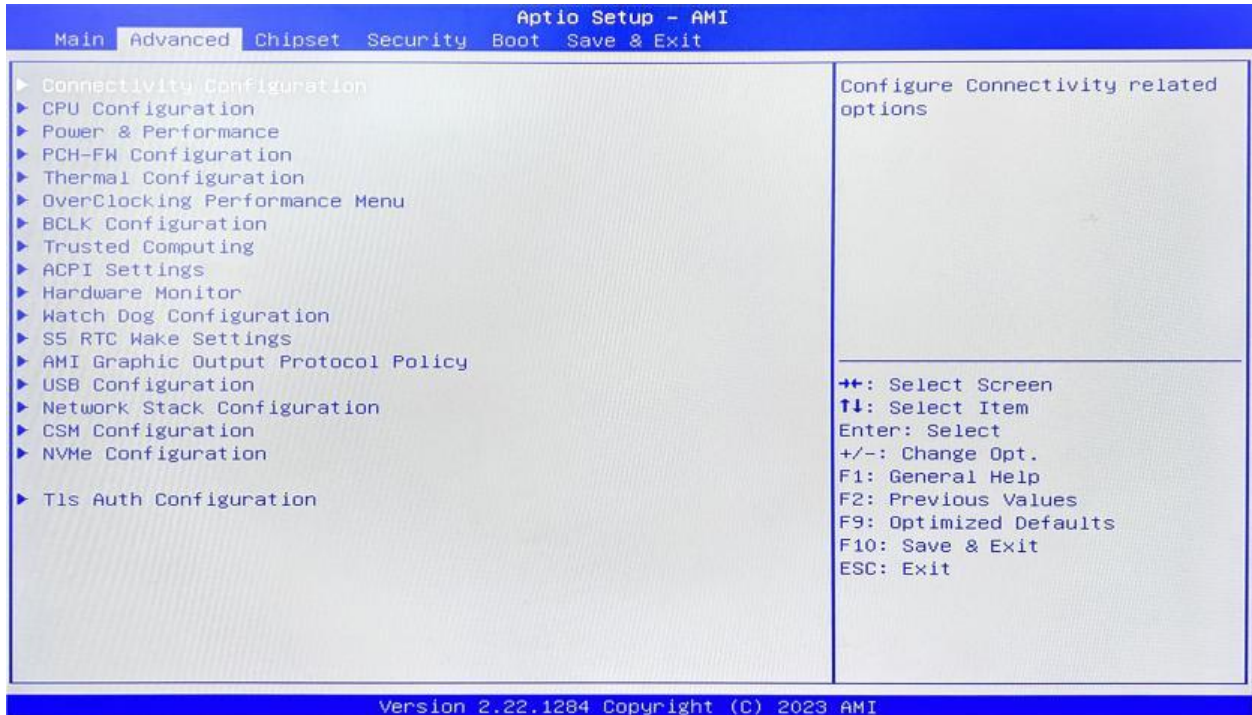
When you enter the BIOS Setup utility the first things you will encounter is the Main Setup screen. Shown below is the Main BIOS Setup screen. You can always return to the Main setup by selecting the Main tab.



**System Date:** Sets the date. MM/DD/YY format.

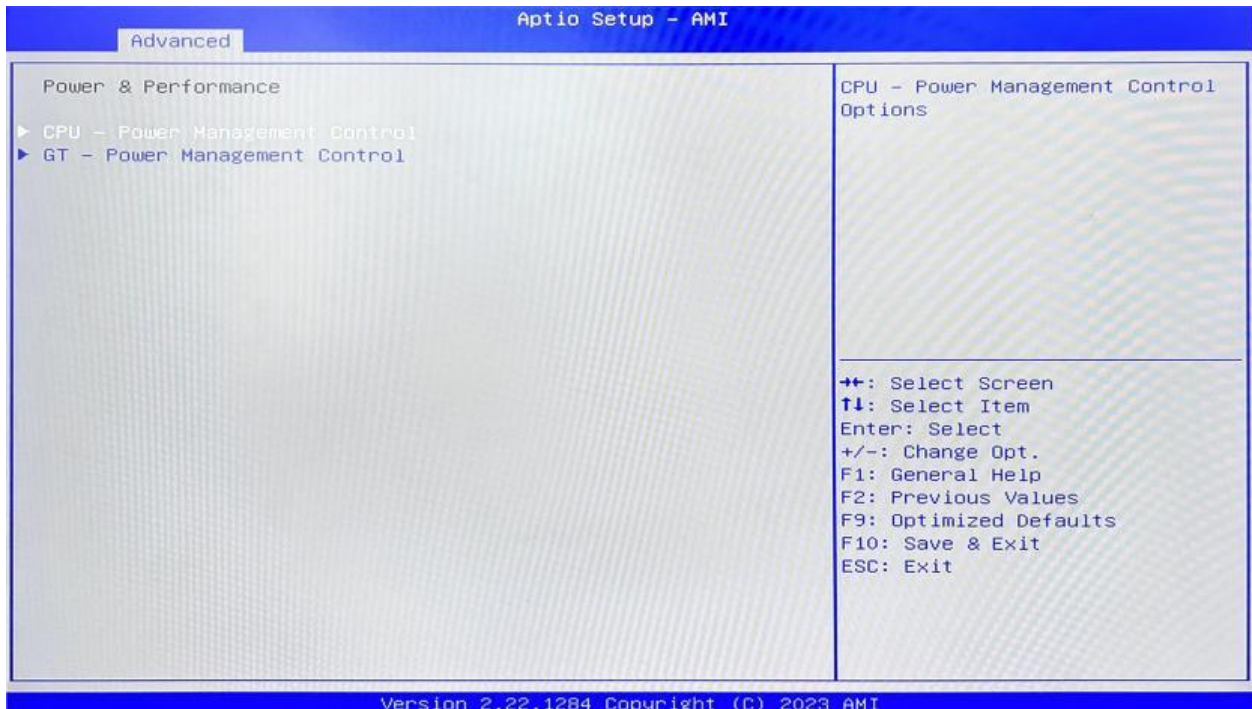
**System Time:** Set the time. HH:MM: SS format.

### 3.3 Advanced Settings



Select any of the items in the left frame of the screen. The advanced sections allow you to configure, improve and set up system features according to the preference of the CPU Configuration. All Advanced BIOS Setup options are described as follows.

#### 3.3.1 CPU-Power & Performance

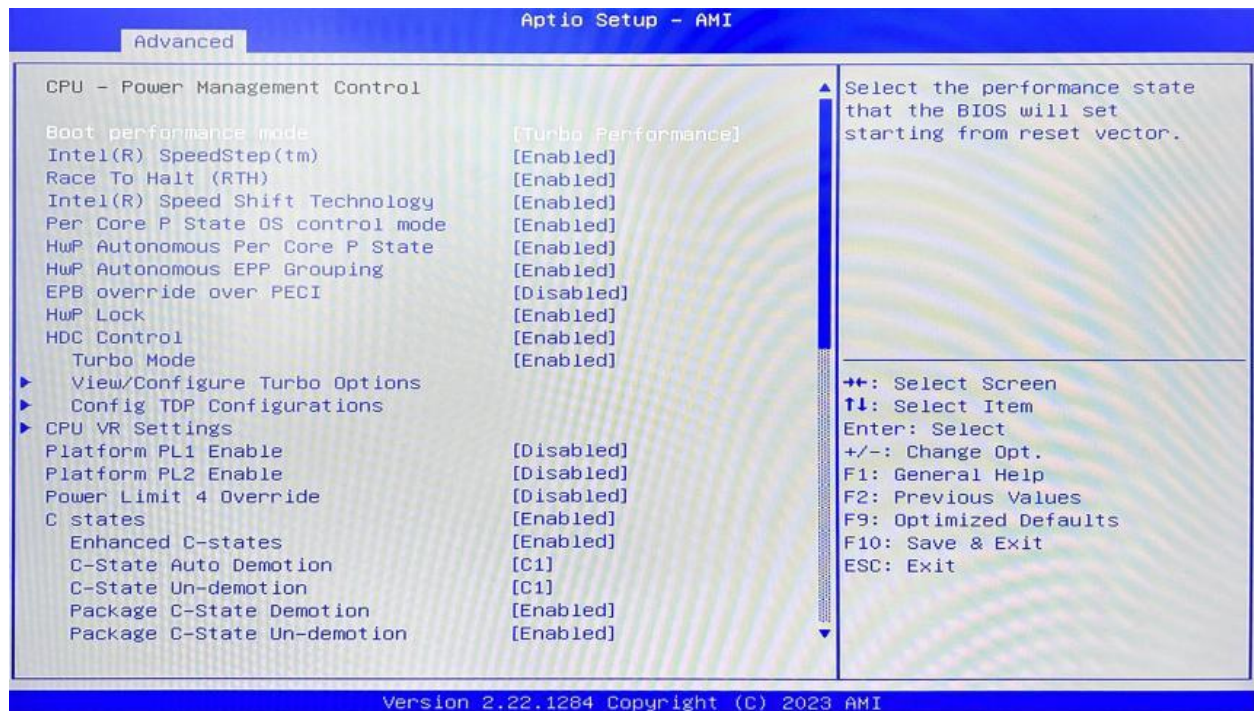


**CPU-Power Management Control**

**GT-Power Management Control**



### 3.3.2 CPU-Power Management Control



#### Intel® Speedstep®(TM):

Enhanced Intel SpeedStep® Technology enables the operating system to control multiple frequencies and voltage points for optimal performance and power efficiency.

#### Intel® Speed Shift Technology:

An energy-efficient frequency control method by the hardware rather than relying on OS control. Processor decision is based on the different system constraints for example Workload demand, and thermal limits while taking into consideration the minimum and maximum levels and activity window of performance requested by the operating system. Default enabled.

#### Turbo Mode

The Turbo mode refers to Nehalem’s “Integrated Power Gate” power management technology, which allows running off some cores and adding power to the others so that they run at a higher frequency. The capacity of the entire CPU remains unchanged, and the efficiency of the CPU is optimized. Default enabled.

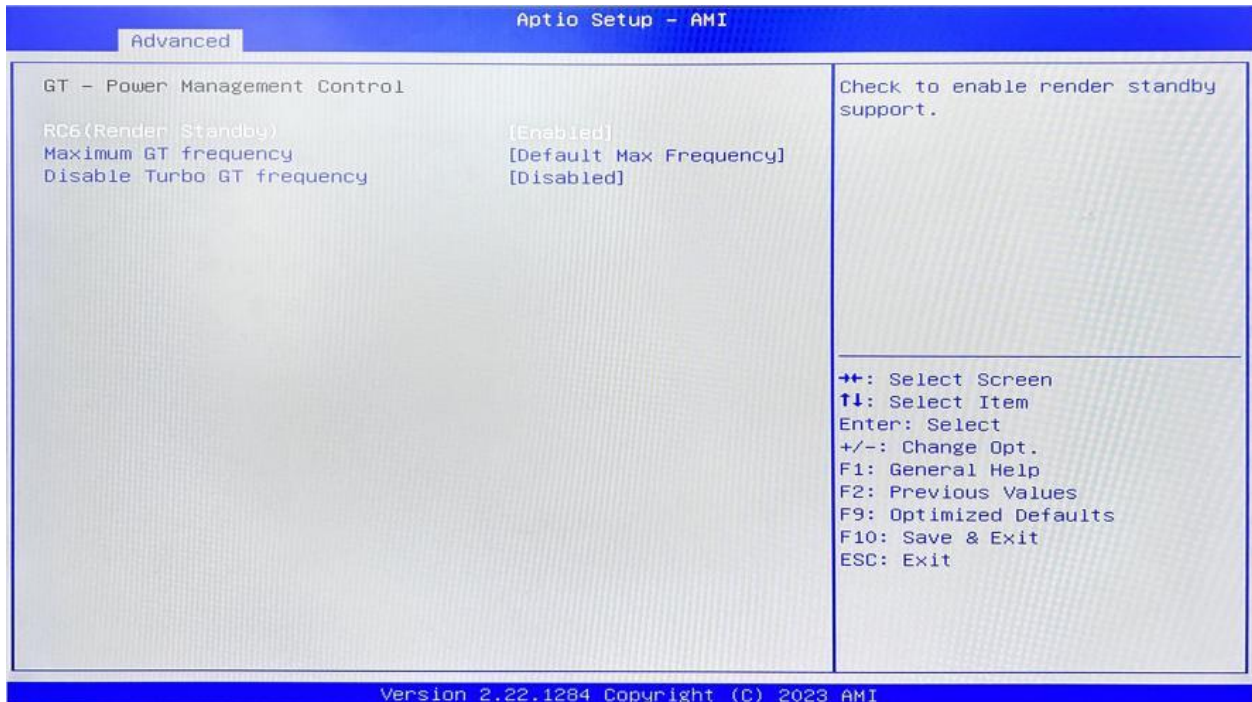
#### C states

Idle States (C-states) are used to save power when the processor is idle. C0 is the operational state, meaning that the CPU is doing useful work 100% load. C1 is the first idle state, C2 the second, and so on, where more power-saving actions are taken for numerically higher C-states. C1 to C3 cuts off the clock inside the CPU, and C4 to C6 reduces the CPU voltage. Default enabled.

#### Enhanced C states

C1 to C3 cuts the clock inside the CPU. C4 and C6 mode reduces CPU voltage. Features two way “Enhanced” mode, enable by default.

### 3.3.3 GT-Power Management Control



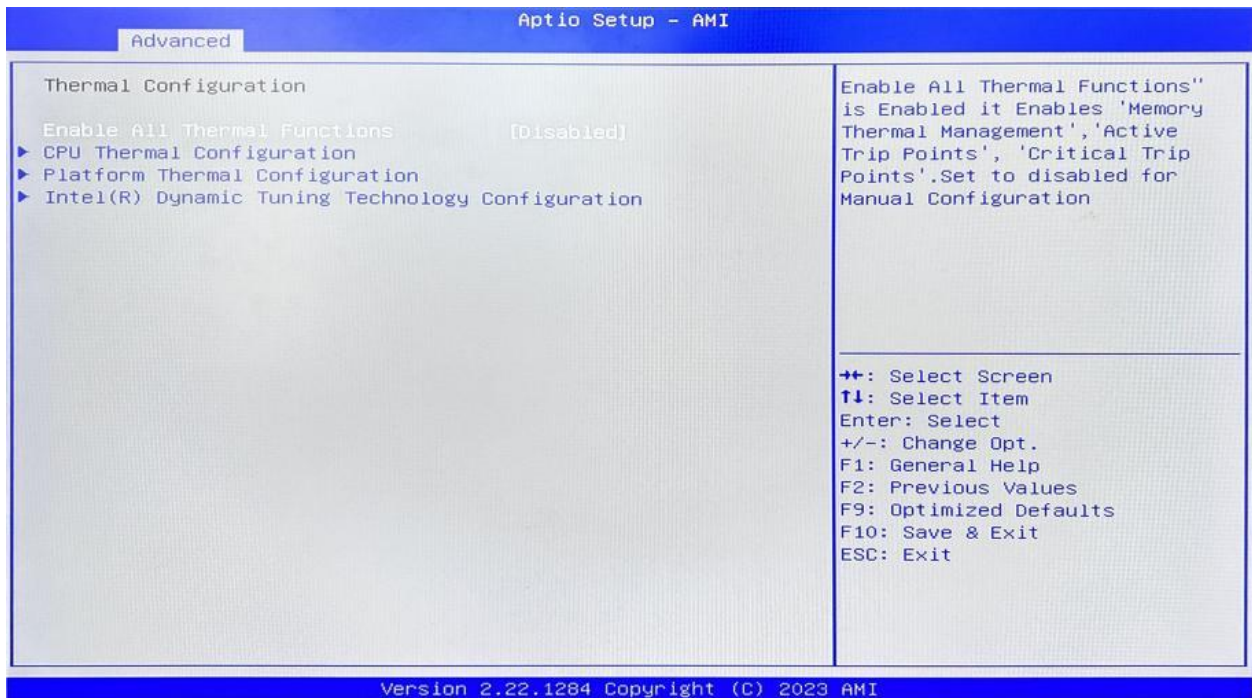
**Maximum GT frequency:**

Maximum GT Frequency, Default max frequency.

**Disable Turbo GT frequency:**

Disable Turbo GT Frequency mode, Default disabled.

### 3.3.4 Thermal Configuration



**Enable All Thermal Functions**

**CPU Thermal Configuration:**

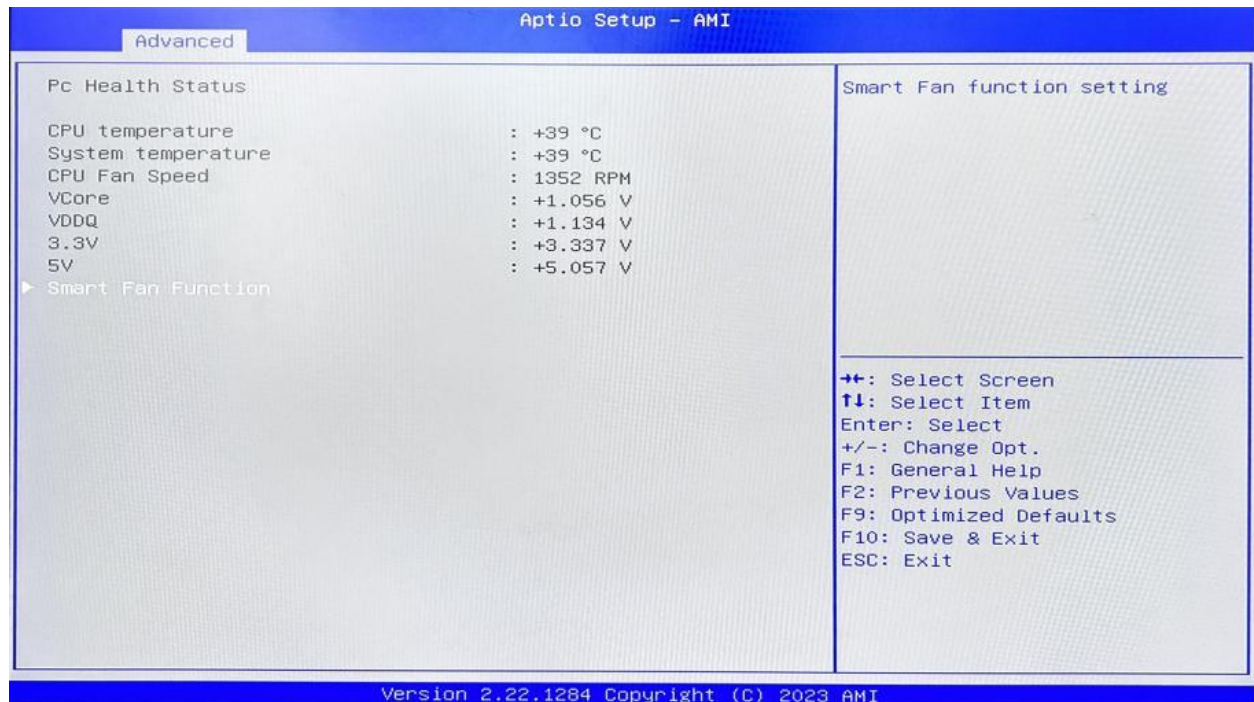
Unlocks the temperature setting, the “Tcc Activation Offset” is the temperature adjustment option, the

highest temperature is 105°C. Change the temperature by minus the number of degrees you wish to change. For example, minus 0(105-0) to set the temperature at 105°C, minus 20(105-20) to set the temperature at 85°C. (Please note the maximum supported temperature for the processor can be found on [ark.intel.com](http://ark.intel.com).)

## Platform Thermal Configuration

### DPTF Configuration

### 3.3.5 Hardware Monitor



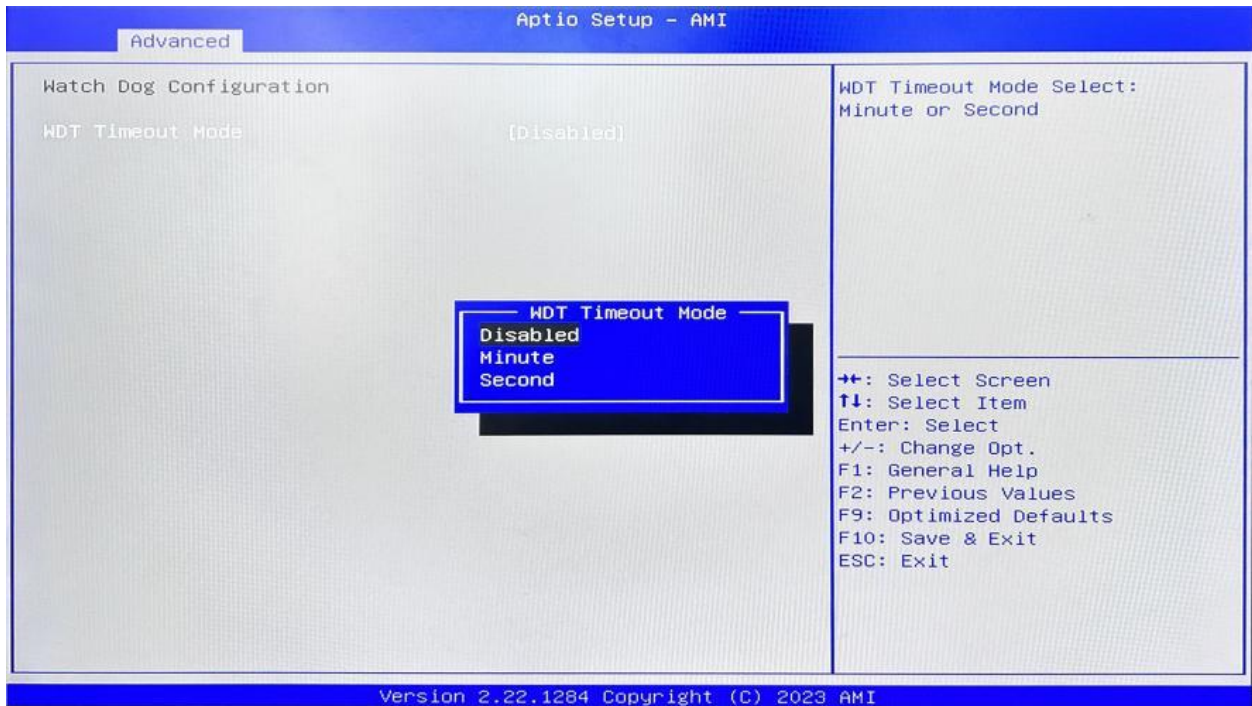
#### PC Health Status

The PC health status displays CPU temperature, system temperature, fan speed, and other relevant voltage values. The above parameters have a certain range, and the system cannot run beyond these ranges.

- CPU Temperature
- System Temperature
- CPU Fan Speed
- VCore: Core Voltage
- VDDQ: RAM Voltage
- +3.3V: 3.3V
- +5V: 5V
- Smart Fan Function:
  - Automatic Mode
  - Full on Mode
  - Manual Mode



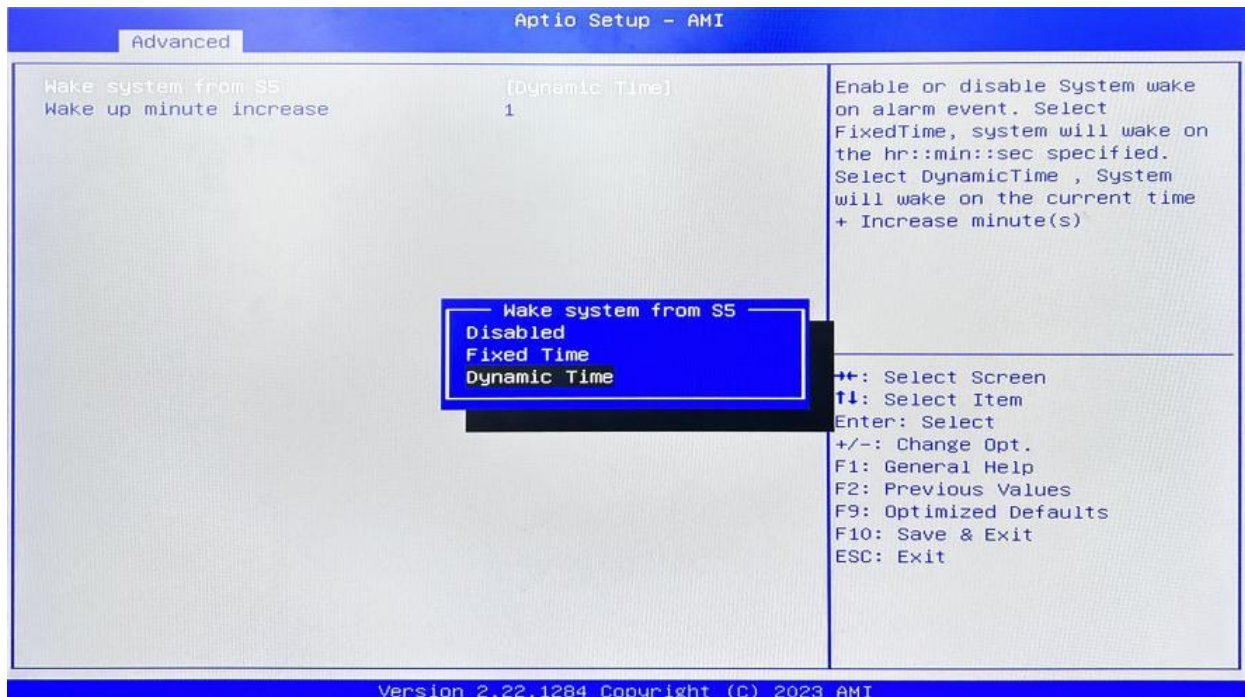
### 3.3.6 Watch Dog Configuration



#### Watch Dog Configuration

WDT Timeout Mode select: Minute or Second

### 3.3.8 S5 RTC Wake Settings

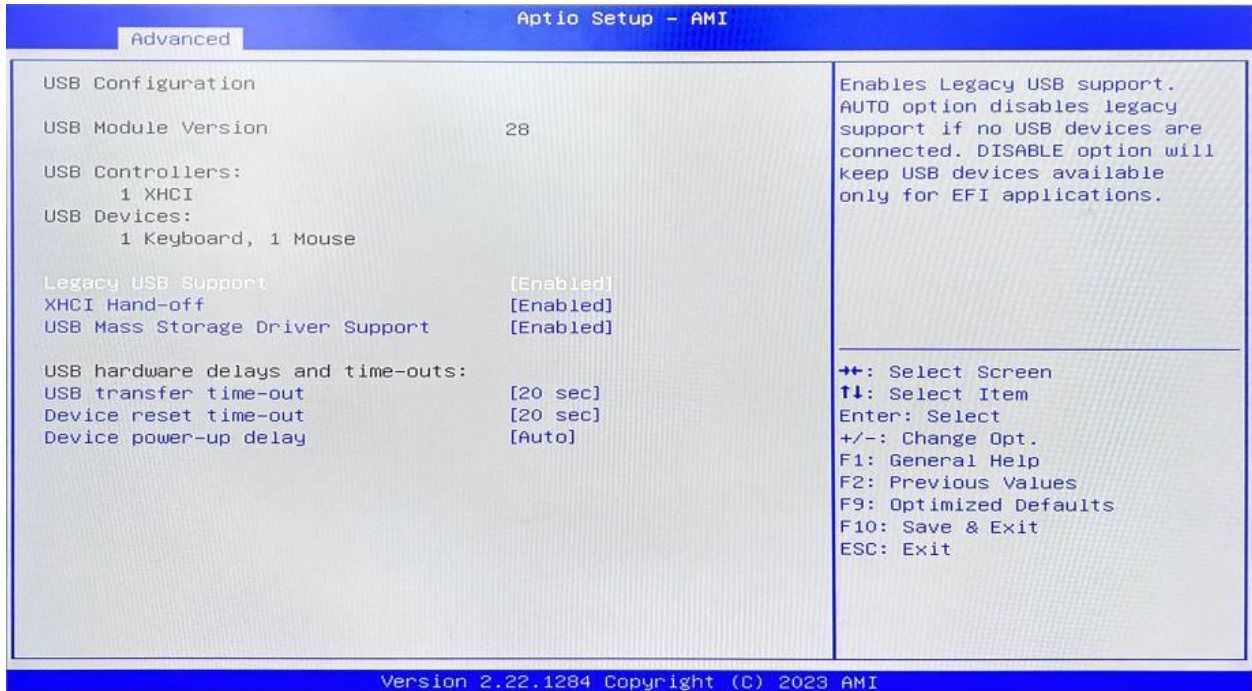


**Wake system From S5:** timing boot settings, disabled by default.

**Fixed Time:** Select Fixed Time and the system will wake on the Hr: Min: Sec specified.

**Dynamic Time:** Select Dynamic Time and the system will wake on a dynamic time.

### 3.3.8 USB Configuration



#### Legacy USB Support

Enable Legacy USB support. Disables legacy support if no USB devices are connected. Select enable will keep USB devices available under UEFI's support.

#### XHCI Hand-off

A workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by the USB XCHI driver.

#### USB Mass Storage Driver Support

Enable(default) or disable USB Mass Storage Driver Support.

#### USB transfer time-out

Time-out value for control, bulk, and interrupt transfers, default time:20 second.

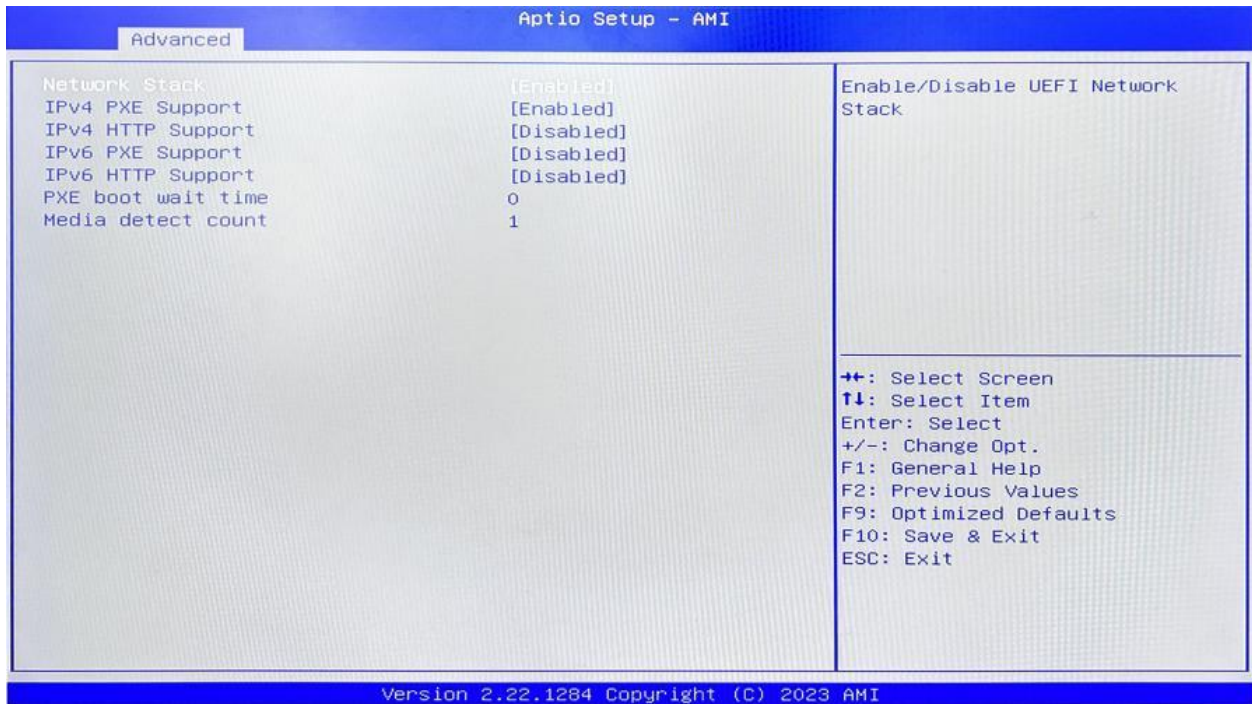
#### Device reset time-out

USB mass storage device start unit command time-out, default time:20 second.

#### Device Power-up Delay

Maximum time the device will take before it properly reports itself to the host controller.

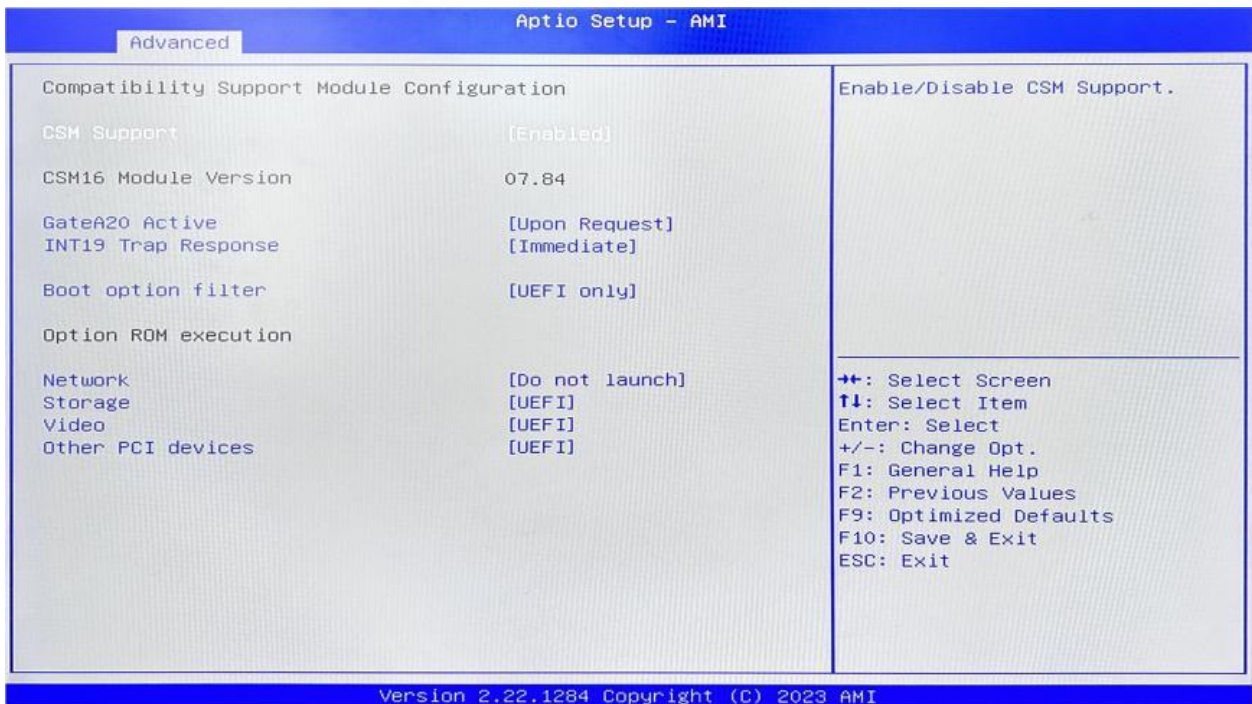
### 3.3.9 Network Stack Configuration



#### Network Stack

PXE Network boot setting, disabled by default.

### 3.3.10 CSM Configuration



#### Boot Option Filter

##### Option ROM execution:

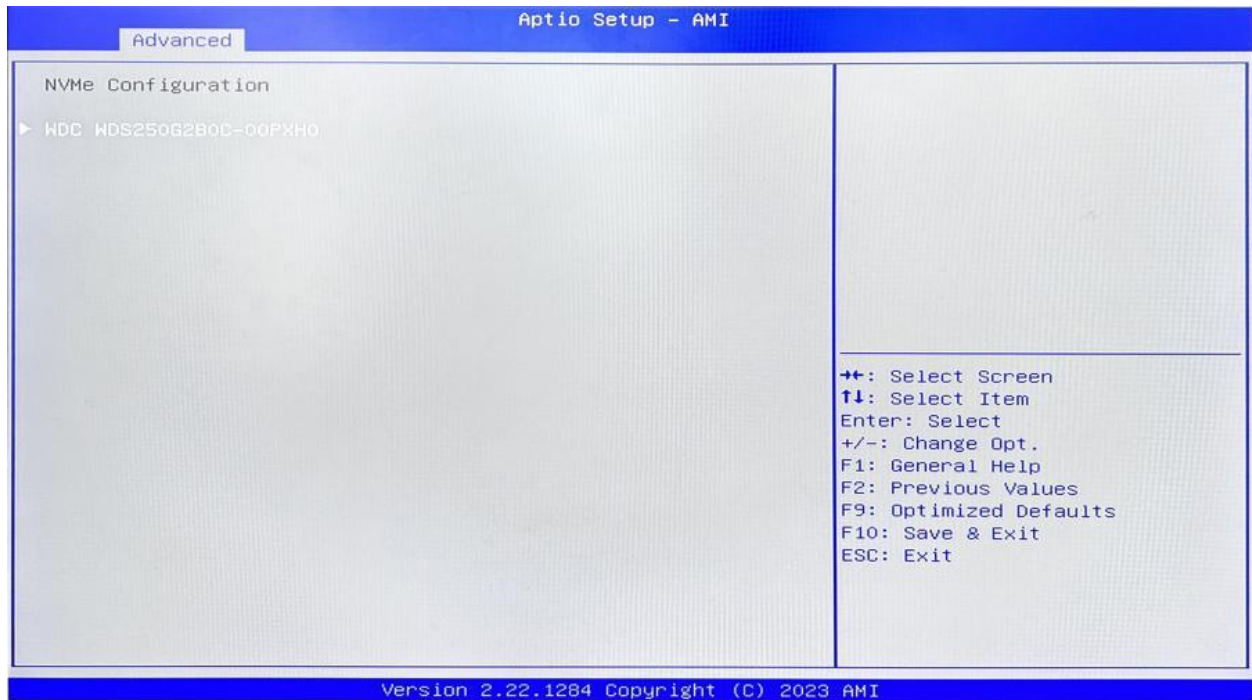
- Network
- Storage



Video

Other PCI devices

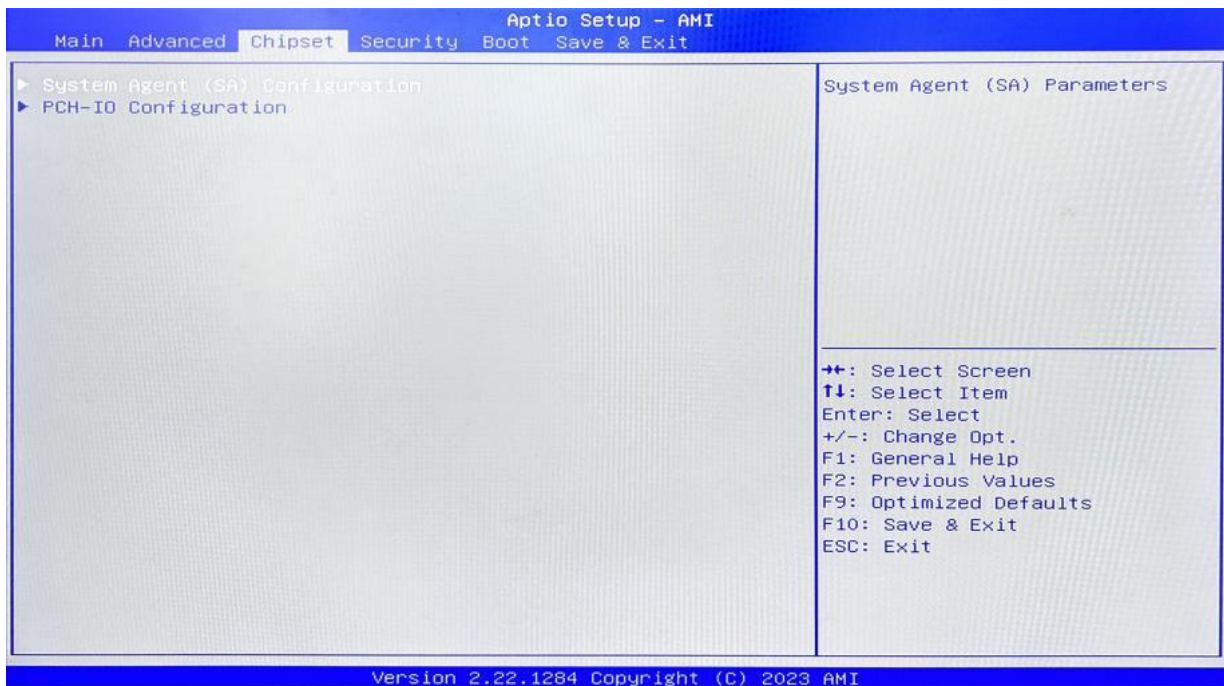
### 3.3.11 NVME Configuration



The capacity and model of the SSD will be displayed under the option after the NVMe protocol SSD has been installed.

### 3.4 Chipset

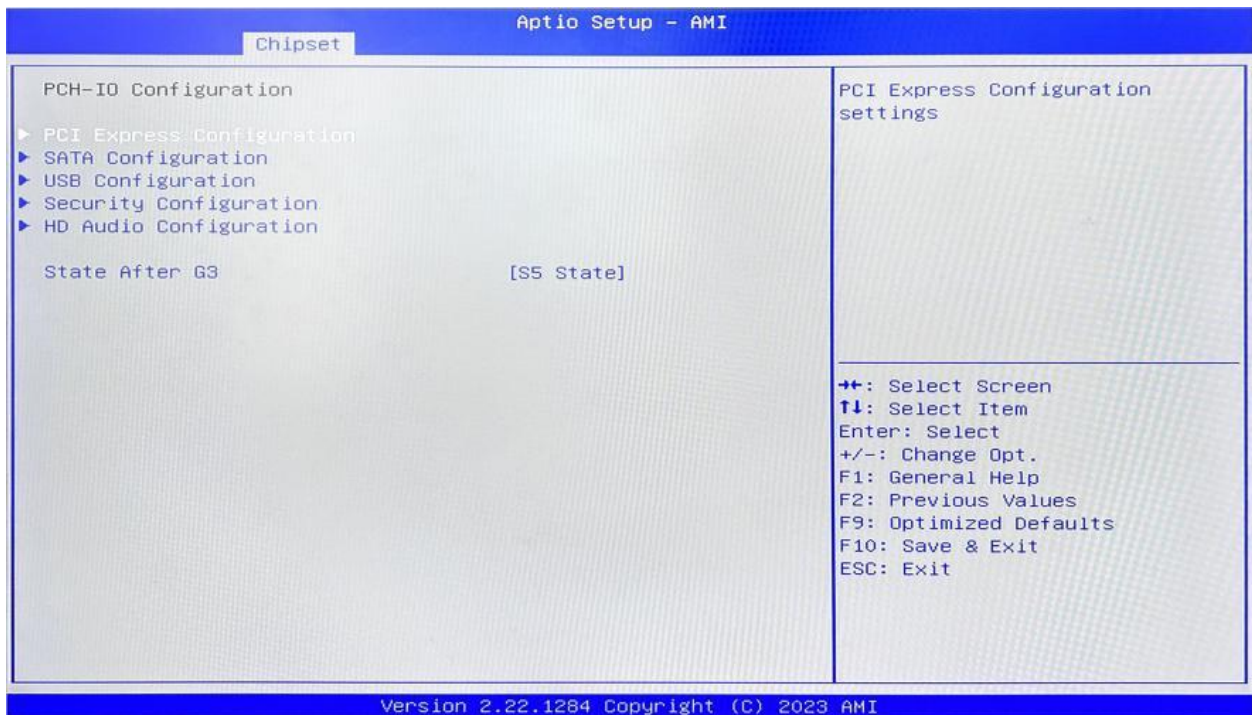
Select the chipset tab from the setup screen to enter the chipset BIOS Setup screen.



**System Agent (SA) Configuration:** Northbridge configuration options, including video memory, display devices, and other options.

**PCH-IO Configuration:** Southbridge configuration options, including hard disk, sound card equipment, and other options

### 3.4.1 PCH-IO Configuration



**PCI Express Configuration**

**SATA Configuration**

**USB Configuration**

**Security Configuration**

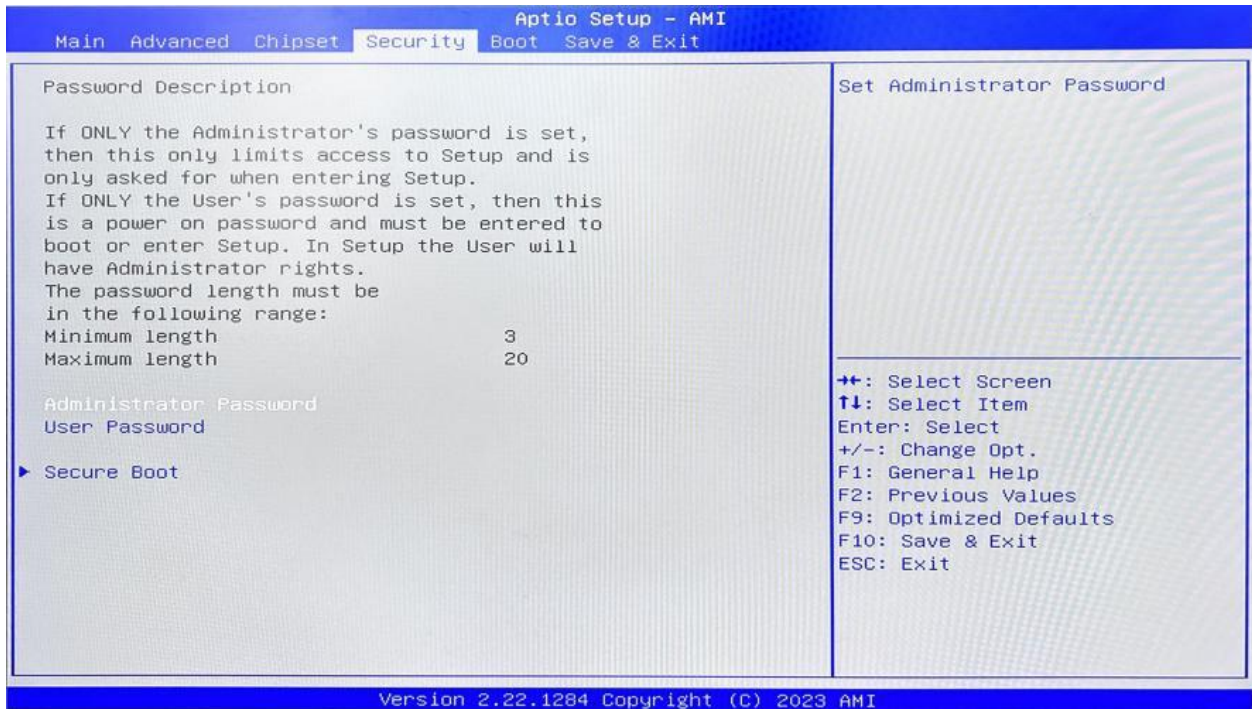
**HD Audio Configuration**

**State After G3:**

S0 State

S5 State

### 3.5 Security

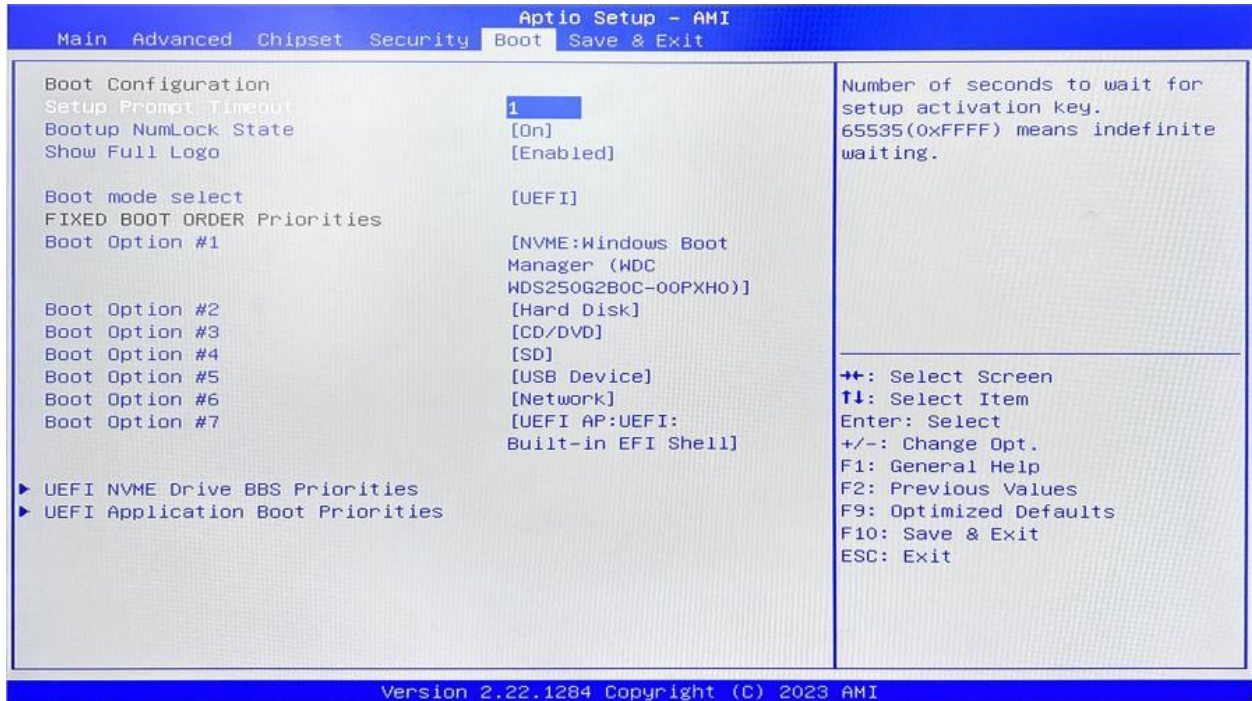


**Administrator Password:** Set the Administrator Password.

**User Password:** Set User Password.

**Secure Boot:** Secure boot

### 3.6 Boot



**Setup Prompt Timeout:**

Number of seconds that the firmware will wait before initiating the original default boot selection. A value of 0 indicates that the default boot selection is to be initiated immediately on boot. A value of 65535(0xFFFF) indicates that firmware will wait for user input before booting. This means the default boot selection is not automatically started by the firmware.

**Bootup NumLock State:**

Select the keyboard NumLock state

**Show Full Logo:**

Enabled/Disabled Displays customized boot logo.

**Boot Option #1~#7:**

Set the system boot order from Number 1 to Number 7.

**UEFI Hard Disk Drive BBS Priorities:**

UEFI hard drive boot priorities setting.

**UEFI USB Drive BBS Priorities:**

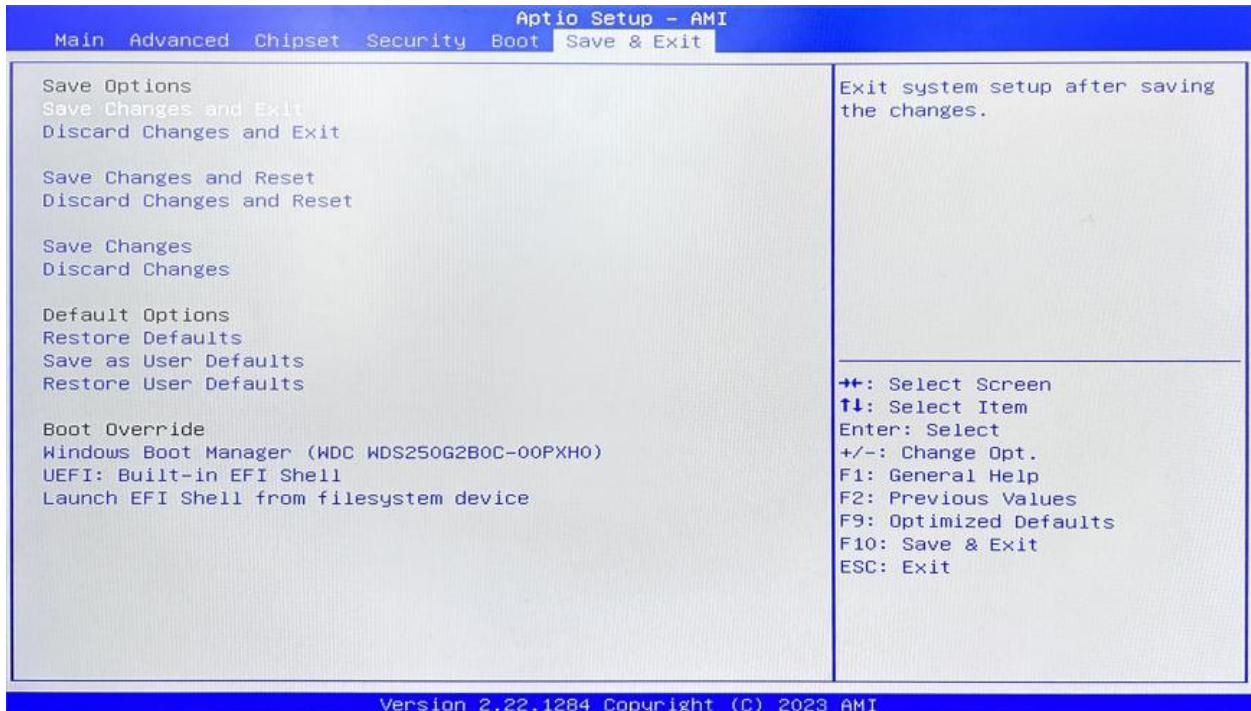
UEFI USB device boot priorities setting.

**UEFI Application boot Priorities:**

UEFI application boot priority.



### 3.7 Save & Exit



**Save Changes and Exit:**

Exit the system setup after saving the changes and continue to start the computer.

**Discard Changes and Exit:**

Exit the system setup without saving any changes and continue to start the computer.

**Save Changes and Reset:**

Reset the system after saving the changes.

**Discard changes and Reset:**

Reset the system without saving any changes.

**Save Changes:**

Save changes done so far to any of the options.

**Discard Changes:**

Discard changes done so far to any of the options.

**Restore Defaults:**

Restore/load default values for all the options.

**Save as User Defaults:**

Save the changes done so far as the user defaults.

**Restore User Defaults:**

Restore the user defaults to all the options.

**Boot Override:**

Boot device selection can override your boot priority. Select the specified boot device such as SATA, USB Flash Disk, EFI Shell, PXE, etc., and boot directly. Or press F11 boot by selecting the specified boot device.