User Manual

EHL-35 Disk Size Motherboard

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EHL35 Motherboard

User Manual

(Version 0.5)



Version:		
NO.	Description	Issue Date:
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Chapter 1 Product Introduction

1.1 Brief Introduction

The EHL-35 motherboard is a 3.5" SBC (Single Board Computer) based on the Intel Elkhart Lake platform, which features a small form factor, low power consumption, and high performance.

1.2 Parameters

CPU: Intel® Celeron® Processor J6412, 4Cores 4Threads, Base Frequency: 2.00GHz, Burst Frequency: 2.60 GHz, TDP 10W

Memory: 1x SO-DIMM DDR4-3200, maximum capacity 32GB

GPU: Integrated Graphics based on CPU, display via 1x HDMI2.0, 1Xdp1.4,1x LVDs (eDP optional)

Storage: 1 x mSATA interface or 4G module. 1 x SATA3.0 standard interface,

USB: 4x USB3.2 Gen 2, 4x USB2.0

Ethernet: 2x Gigabyte Network Controllers on-board (RTL8111H)

Audio: High-Definition Audio Codec, supports 1xCTIA Line_out + Mic_in in one

Serial I/O: 6x RS232 COM (COM5, COM6*RS485 optional)

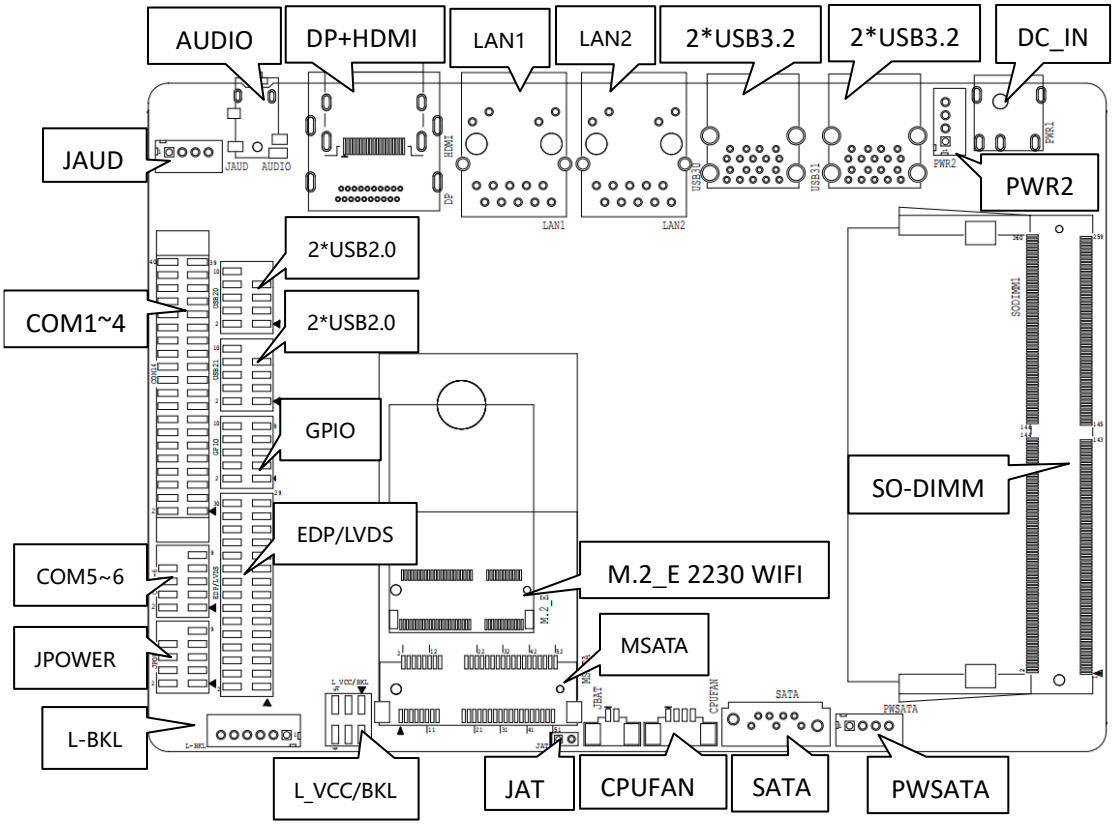
Other I/O: 1x M.2_Key E for 2230 Wi-Fi & BT, 1xJPOWER, 1xSIM Slot, 1 set of GPIO pins

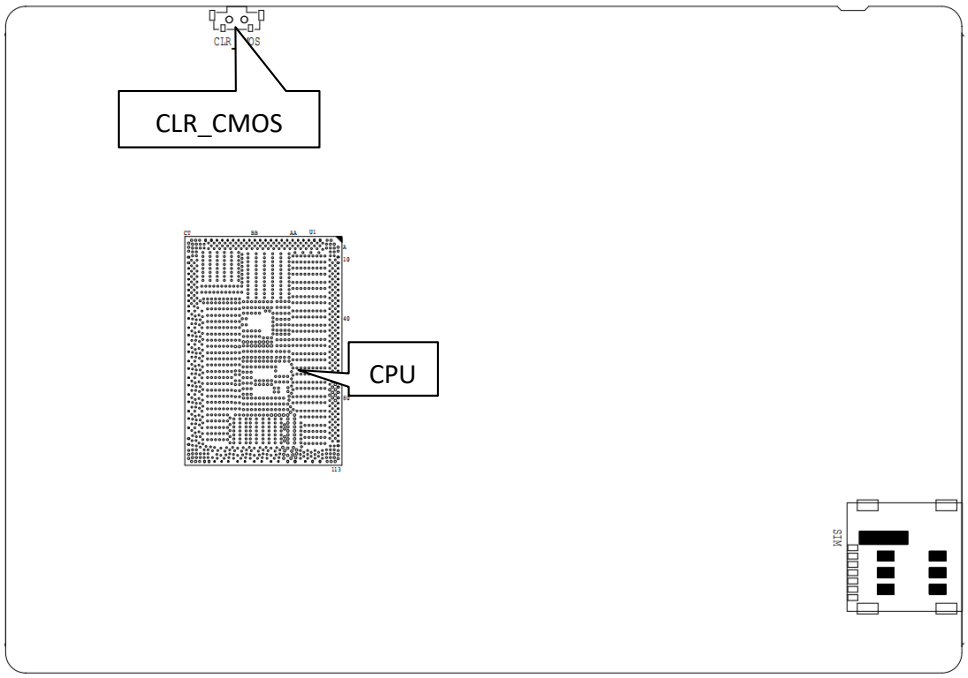
Dimension: 146mm x 102mm (3.5")

Power: 12V DC-in

Working Temperature: -20℃~60℃

1.3 Connector Diagram





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 EHL35 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 1 x SO-DIMM DDR4-3200 slot, maximum capacity of 32GB.

Attention: 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 Integrated Intel UHD graphics, supports 1xHDMI2.0b(HDCP2.3), 1xDP1.4, 4K resolution at 60Hz. 1x 24bit LVDs (Resolution:1920x1080, eDP optional).

2.4.1 LVDS (Screen printing: EDP/LVDS, L-BKL, L_VCC/BKL)

When it is configured as an LVDS function, the "EDP/LVDS" pin transmits LVDS signals, the " L_BKL" pin is the backlight adjustment jumper, and the "L_VCC/BKL" pin is the display working voltage adjustment jumper.

LVDS Data Pin (Screen printing: EDP/LVDS)

Signal	Pin		Signal
VCC	1	2	VCC
VCC	3	4	GND
GND	5	6	GND
A_DATA0_DN	7	8	A_DATA0_DP
A_DATA1_DN	9	10	A_DATA1_DP
A_DATA2_DN	11	12	A_DATA2_DP
GND	13	14	GND
A_CLK_DN	15	16	A_CLK_DP
A_DATA3_DN	17	18	A_DATA3_DP
B_DATA0_DN	19	20	B_DATA0_DP
B_DATA1_DN	21	22	B_DATA1_DP
B_DATA2_DN	23	24	B_DATA2_DP
GND	25	26	GND
B_CLK_DN	27	28	B_CLK_DP
B_DATA3_DN	29	30	B_DATA3_DP

LVDS Backlight Adjustment Pin (Screen printing: L-BKL)

Pin	Signal
1	GND
2	GND
3	LCD_BKL_ADJ
4	LCD_BKL_ON
5	12V
6	12V

LVDS Working Voltage Pin (Screen Printing: L_VCC/BKL)

Interface	Setting	Function
1-3	Close	VCC(+3.3V)
3-5	Close	VCC(+5V)
2-4	Close	REV (Backlight control reverse)
4-6	Close	STD (Backlight control standard)

Attention: When setting the LVDS display power supply jumper, it is adjustable between 5V/3.3V. The

customer can use a jumper cap to short-circuit the voltage pin according to the LVDS screen's voltage parameters. (Please do not short-circuit two or more different voltages pins at the same time).

2.3.2 eDP (Optional)

When it is set as eDP functions, the "EDP/LVDS" pin transmits the eDP signal, the "L-BKL" is for the backlight adjustment jumper and the "L_VCC/BKL" is for the display working voltage adjustment jumper.

eDP Data Pin (Screen Printing: EDP/LVDS)

Signal	Pin		Signal
VCC	1	2	VCC
VCC	3	4	EDP_HPD
GND	5	6	GND
EDP_AUXN	7	8	EDP_AUXP
N/A	9	10	N/A
EDP_DATA0_P	11	12	EDP_DATA0_N
GND	13	14	GND
N/A	15	16	N/A
EDP_DATA1_P	17	18	EDP_DATA1_N
N/A	19	20	N/A
N/A	21	22	N/A
N/A	23	24	N/A
GND	25	26	GND
N/A	27	28	N/A
N/A	29	30	N/A

eDP Backlight Adjustment Pin (Screen Printing: L-BKL)

Pin	Signal
1	GND
2	GND
3	LCD_BKL_ADJ
4	LCD_BKL_ON
5	12V
6	12V

EDP Working Voltage Pin (L_VCC/BKL)

Interface	Setting	Functions
1-3	Close	VCC(+3.3V)
3-5	Close	VCC(+5V)
2-4	Close	REV (Backlight control reverse)
4-6	Close	STD (Backlight control standard)

Attention: When setting the eDP display power supply jumper it is adjustable between 5V/3.3V. Short-circuit pins of different voltages at the same time are strictly forbidden.

2.5 Storage (Screen Printing: MSATA, SATA1, PWSATA)

1x mSATA interface SATA2.0 onboard supports 4G module with standard Micro-SIM slot. 1x Standard SATA interface. 1xPWSATA disk power supply socket (2.0mm spacing).

SATA Power Supply (Screen Printing: PWSATA)

Pin	Signal
1	5V
2	GND
3	GND
4	12V (Same input voltage at the board)

2.6 Expansion Slot

The board provides 1xM.2 Key_E slot for 2230 Wi-Fi & Bluetooth.

2.7 USB Interface

The board supports 4x USB3.2 Gen2 and 4x USB2.0(2.0mm spacing).

Internal USB2.0 Pin (Screen Printing: USB20, USB21)

Signal	Pin		Signal
VCC 5V	1	2	VCC 5V
USB DATA-	3	4	USB DATA-
USB DATA+	5	6	USB DATA+
GND	7	8	GND
NC	9	10	(N/A)

2.8 LAN

The board features 2xRJ45 interfaces with high-speed Realtek 8111H Gigabit network controllers, supports Magic packet wake-up, and the LAN1 supports PXE network boot.

LED Status Indicators:

LI_LED Status (Green)	Function	ACT_LED Status (Orange)	Function
Always on	Network Connected	Blinking	Data transfer

2.9 COM

The board provides six RS232 onboard serial port headers (2.0mm spacing), and the COM5 and COM6 are RS485 optional; screen printing COM14 is electrified, and the voltage is the same as the board's input voltage.

RS232 COM (Screen Printing: COM14)

Signal	Pin		Signal
DCD#	1	2	RXD
TXD	3	4	DTR#

GND	5	6	DSR#
RTS#	7	8	CTS#
RI#	9	10	VCC (same as board's input voltage)
DCD#	11	12	RXD
TXD	13	14	DTR#
GND	15	16	DSR#
RTS#	17	18	CTS#
RI#	19	20	VCC (same as board's input voltage)
DCD#	21	22	RXD
TXD	23	24	DTR#
GND	25	26	DSR#
RTS#	27	28	CTS#
RI#	29	30	VCC (same as board's input voltage)
DCD#	31	32	RXD
TXD	33	34	DTR#
GND	35	36	DSR#
RTS#	37	38	CTS#
RI#	39	40	VCC (same as board's input voltage)

COM5_6 RS232 Default (Screen: COM5_6)

Signal	Pin		Signal
NC	1	2	NC
RX5	3	4	RX6
GND	5	6	GND
TX5	7	8	TX6
NC	9	10	(NC)

COM5_6 RS485 Optional (Screen Printing: COM5_6)

Signal	Pin		Signal
COM5_DATA-	1	2	COM6_DATA-
COM5_DATA+	3	4	COM6_DATA+
GND	5	6	GND
NC	7	8	NC
NC	9	10	(NC)

2.10 GPIO (Screen Printing: GPIO)

The board provides a set of 2x5Pin GPIO (2.0mm spacing) 8 programmable I/O lanes in total.

GPIO (Screen Printing: GPIO)

Signal	Pin		Signal
SIO_GP70	1	2	3.3V
SIO_GP71	3	4	SIO_GP74
SIO_GP72	5	6	SIO_GP75
SIO_GP73	7	8	SIO_GP76
GND	9	10	SIO_GP77

2.11 Board Power Supply (Screen Printing: PWR2)

The board provides a 5.5mm*2.5mm DC power interface, and a 2x2 ATX power supply interface supports 12V DC-in.

PWR2 (Screen Printing: PWR2)

Pin	Signal
1	VCC
2	VCC
3	GND
4	GND

2.12 Switch Button/Light Indicator (Screen Printing: JPOWER)

The board has a set of 2.0mm spacing pins that can be connected to a switch button, a system reset button, a hard disk read/write indicator, and a power-on indicator.

JPOWER (Screen Printing: JPOWER)

Signal	Pin		Signal
HDD_LED+	1	2	PWR_LED+
HDD_LED-	3	4	PWR_LED-
RSTBTN-	5	6	PWR_ON+
RSTBTN+	7	8	PWR_ON-
NC	9	10	(NC)

2.13 Audio Interface

The board features a Realtek HD audio codec, supports a 3.5mm Line-out/MIC two-in-one combo jack (CTIA American standard), and a built-in dual-channel power amplifier output socket for connecting passive speakers.

Two-in-one headphone jack:



JAUD (Screen Printing: JAUD)

Pin	Signal
1	L+
2	L-
3	R-
4	R+

2.14 Hardware Auto Start (Screen Printing: JAT)

JAT (Screen Printing: JAT)

Setting	JAT
Close	Hardware Auto Start

Please note that this jumper's function is similar to the BIOS's "State After G3" function. When the latter is set to "S0 State", the device will start automatically after being connected to power.

2.15 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 adapter.

Step 2: Press CLR_CMOS for 10 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	CLR_CMOS
Close	Clear CMOS

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

Chapter 3 BIOS Setup

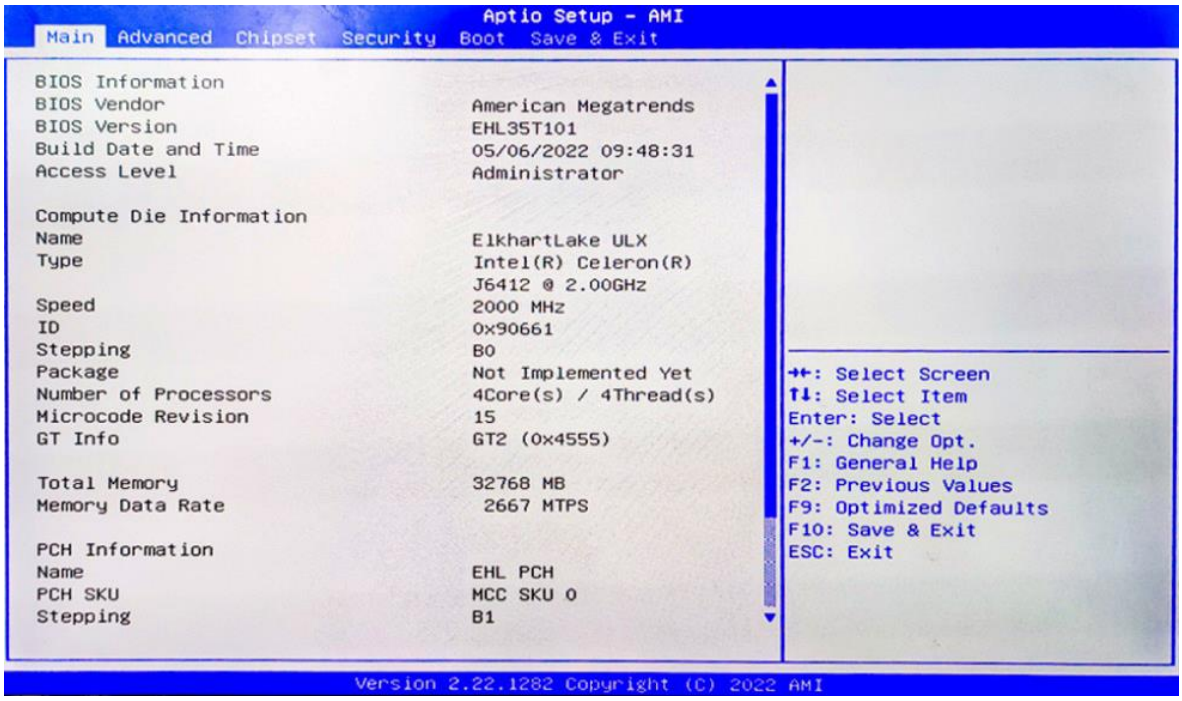
3.1 Entering the BIOS

1. Turn on the computer and press <Delete> entering the BIOS
2. After the computer is turned on, keep press F11, choose enter Setup
3. BIOS Hotkeys:

   F9: Restore to Factory setting; F10: Save and Exit; ESC: Exit

3.2 Main Setup (BIOS info, Date, Time）

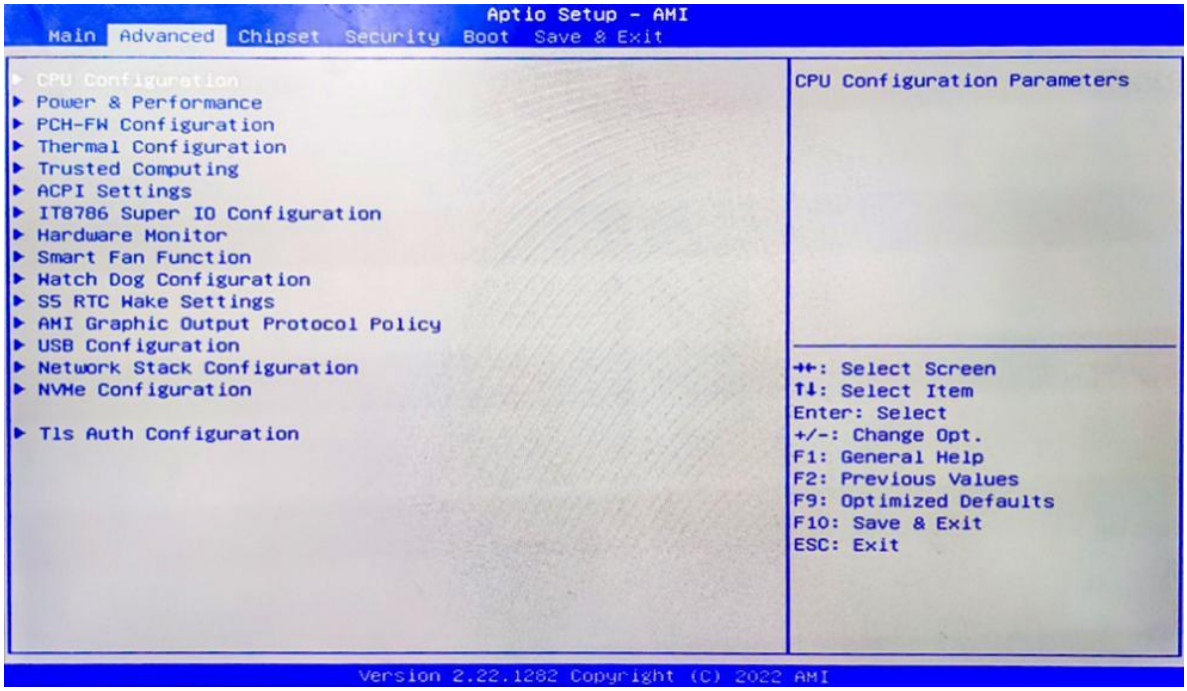
When you enter the BIOS Setup utility the first things you will encounter is the Main Setup screen. Shown below is the Main BIOS Setup screen. You can always return to the Main setup by selecting the Main tab.



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

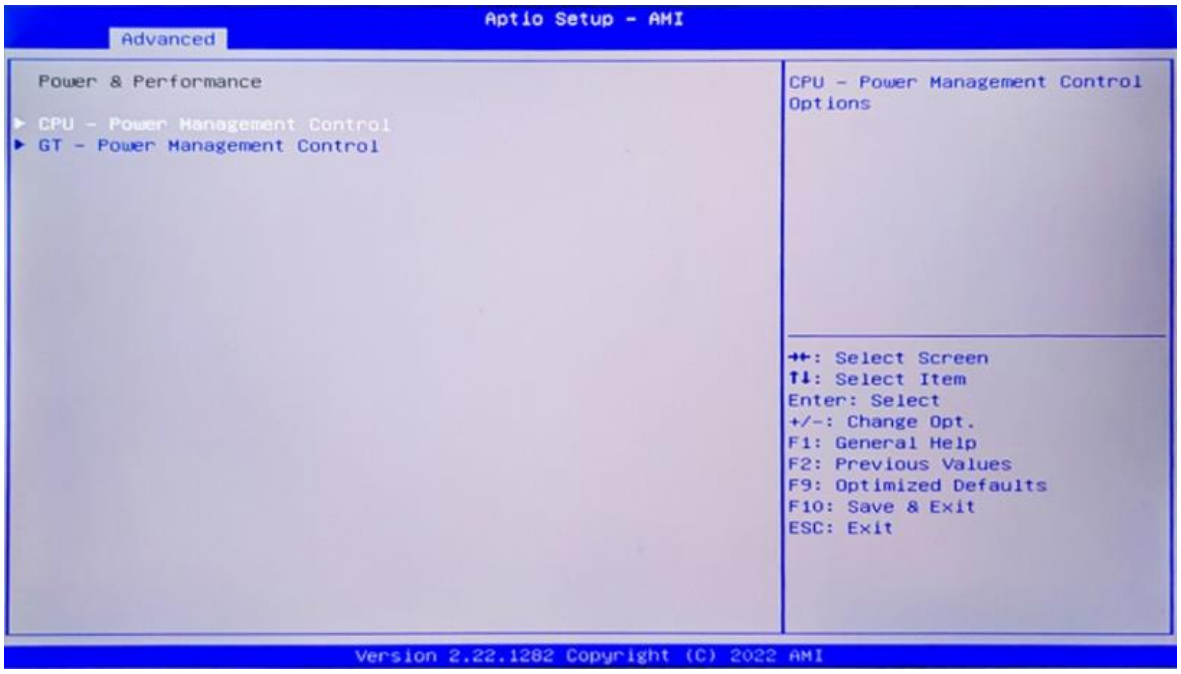
System Time: Set the time. HH:MM: SS format.

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.

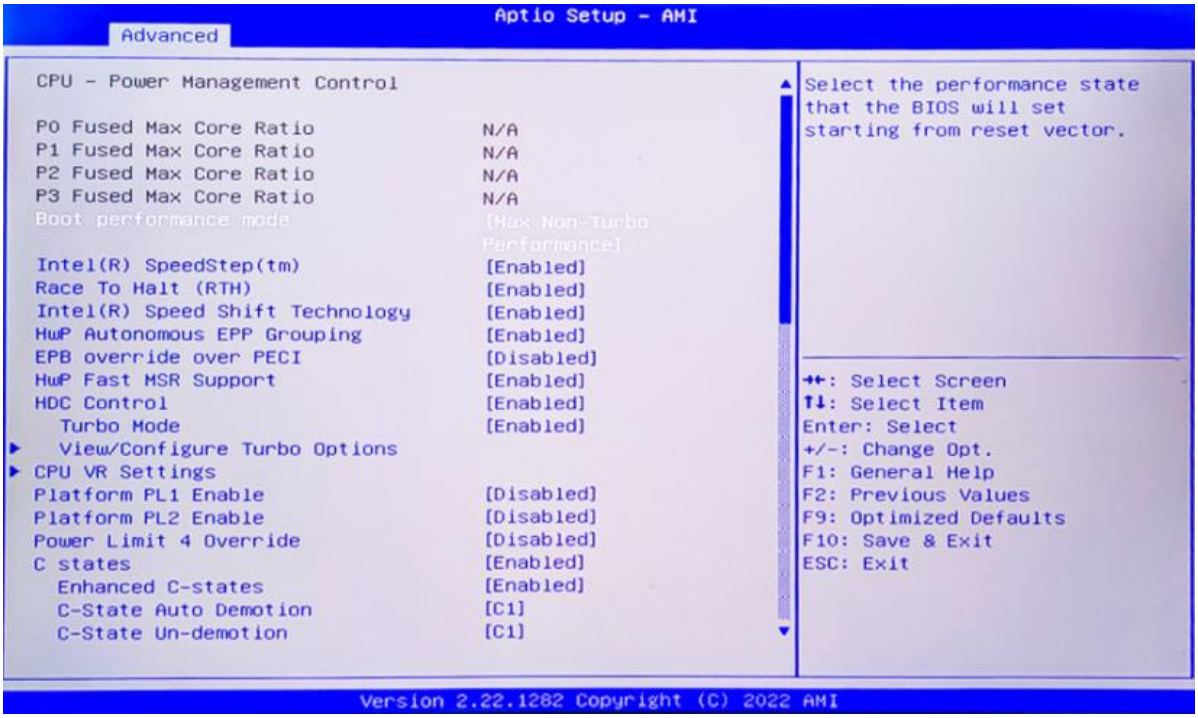
3.3.1 Power & Performance



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.

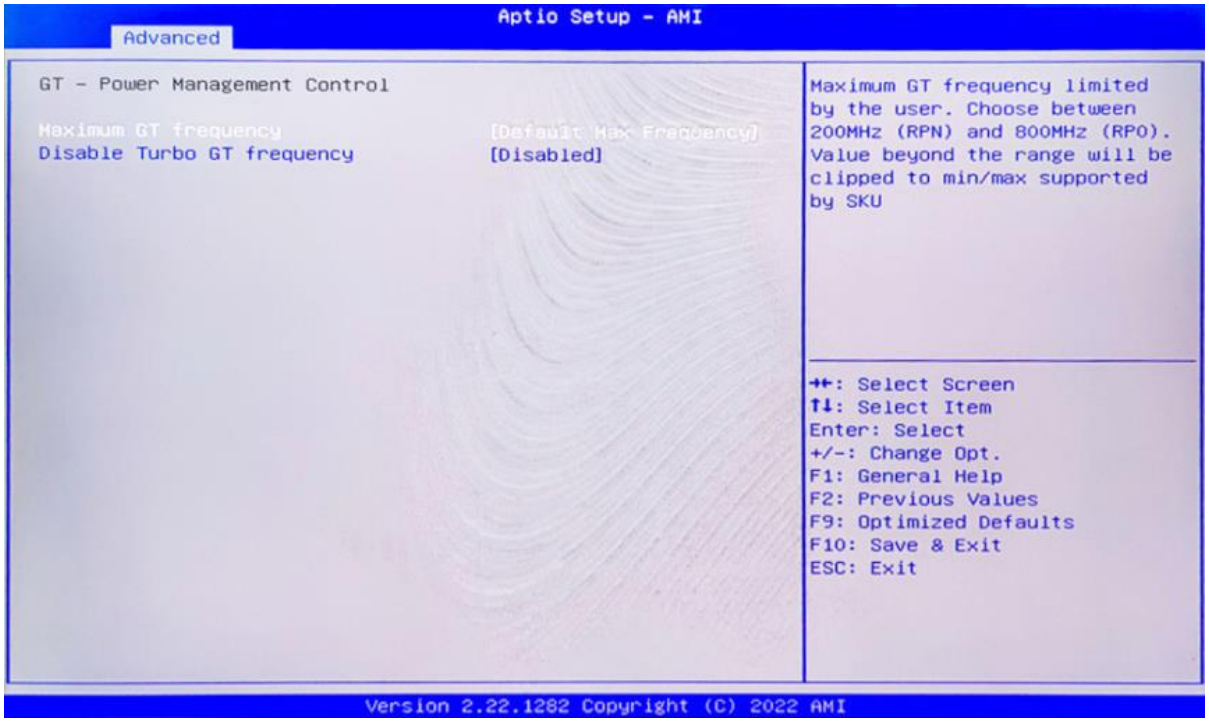
C states

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



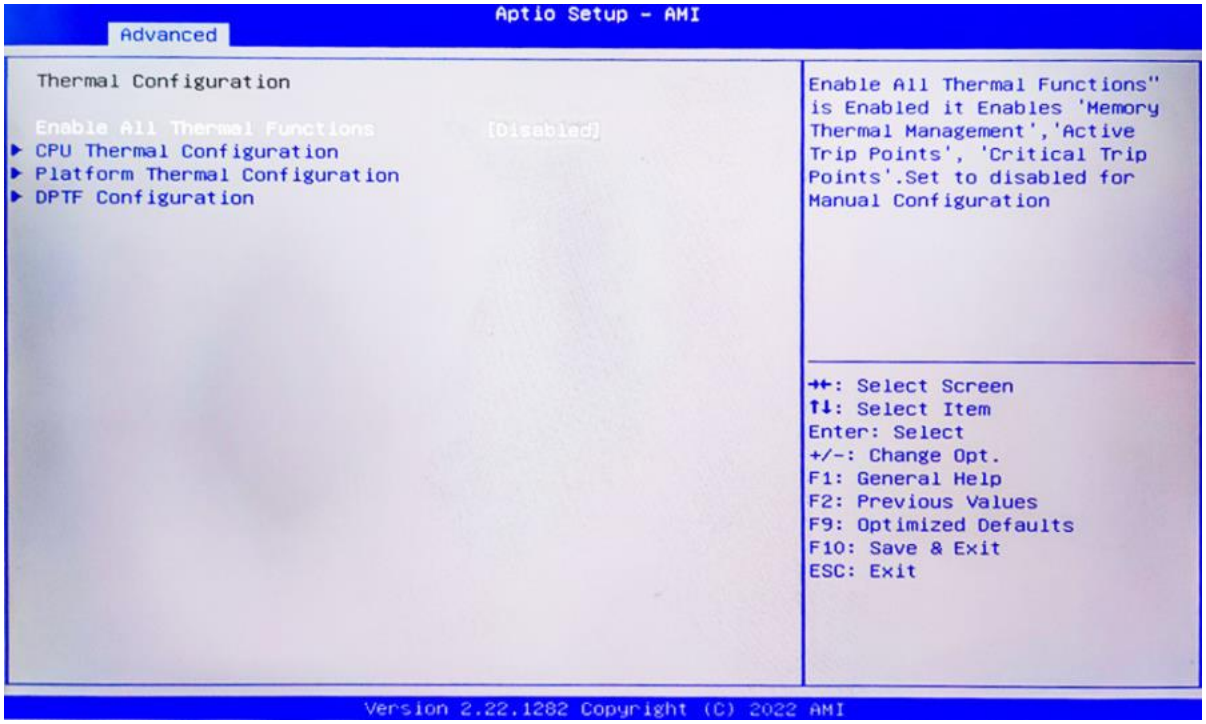
Maximum GT frequency：

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

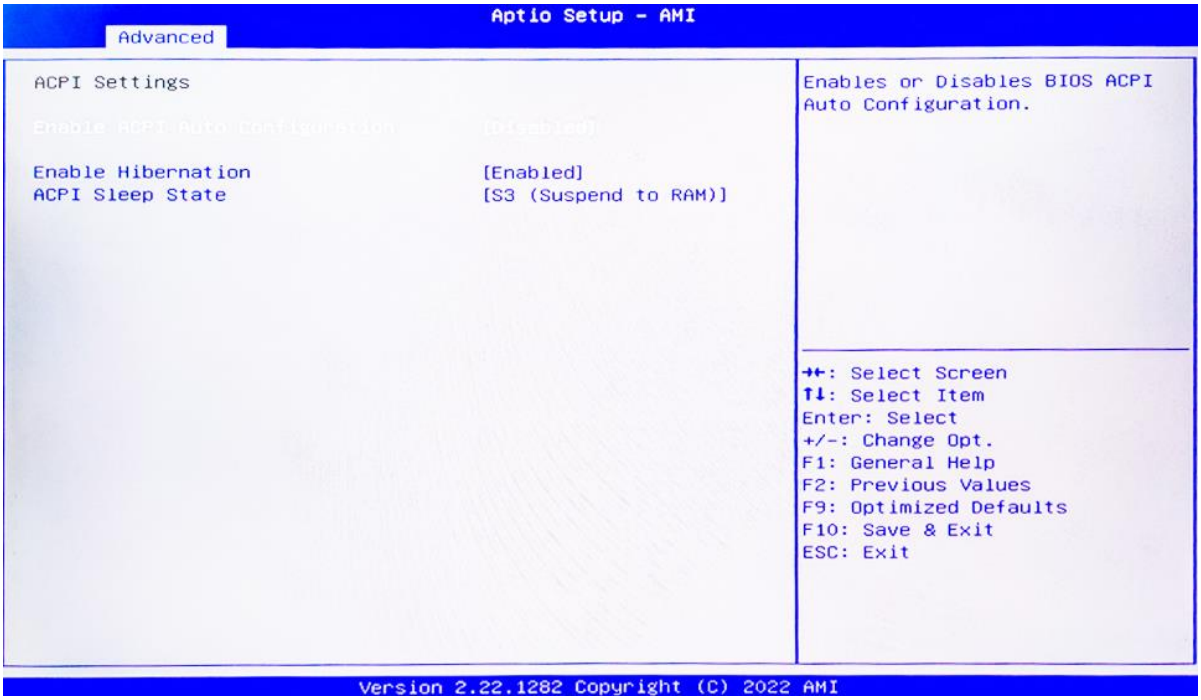
CPU Thermal Configuration:

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.

Platform Thermal Configuration

DPTF Configuration

3.3.5 ACPI Settings



Enable ACPI Auto Configuration

Enable or disable BIOS ACPI Auto Configuration.

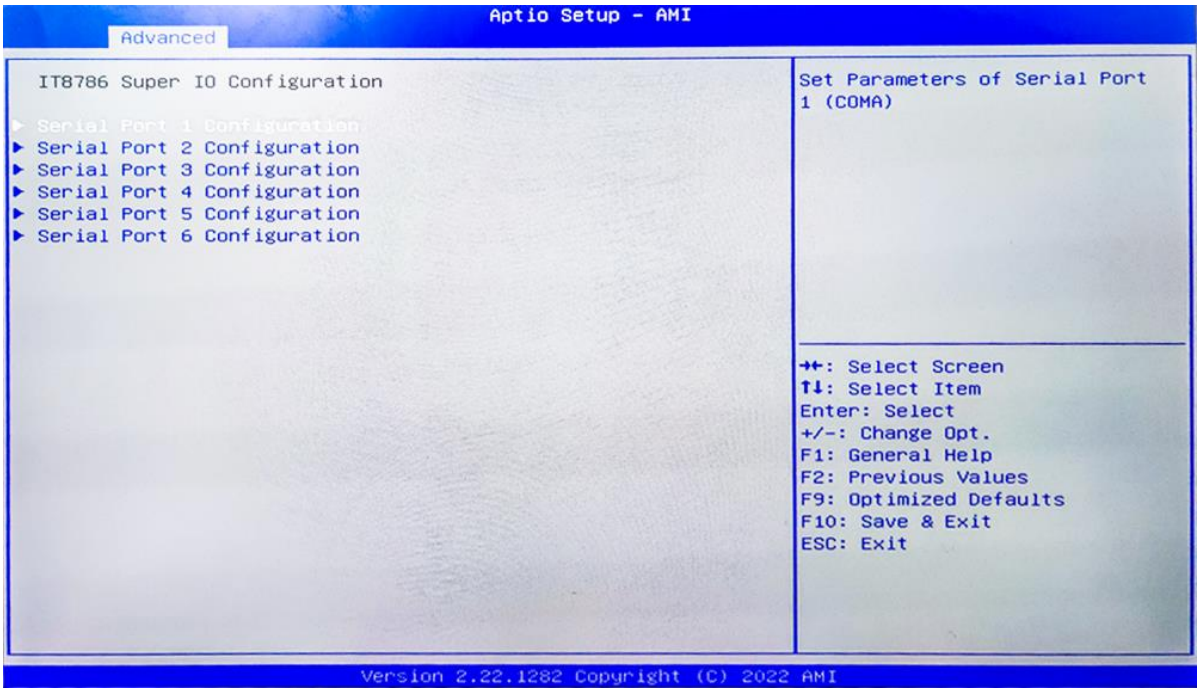
Enable Hibernation

Enable or disables the ability to hibernate.

ACPI Sleep State

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

3.3.6 IT8786 Super IO Configuration



Serial Port 1 Configuration

Set parameters of serial port 1.

Serial Port 2 Configuration

Set parameters of serial port 2.

Serial Port 3 Configuration

Set parameters of serial port 3.

Serial Port 4Configuration

Set parameters of serial port 4.

Serial Port 5 Configuration

Set parameters of serial port 5.

Serial Port 6 Configuration

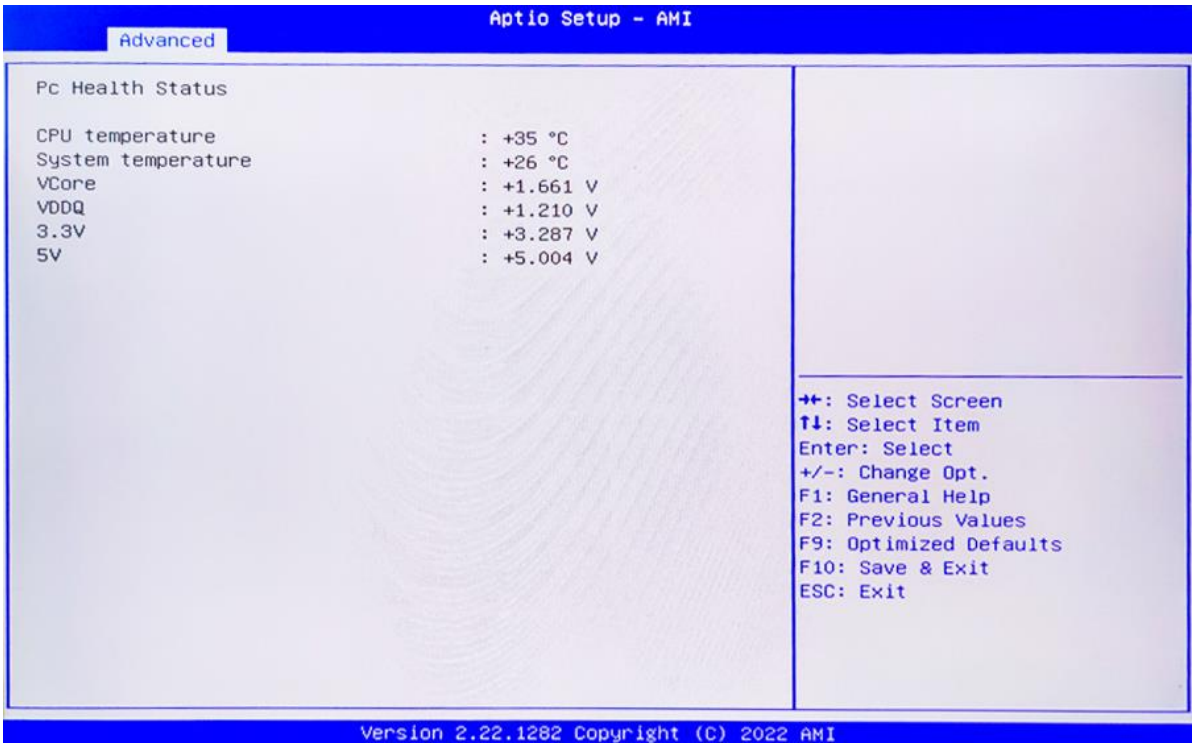
Set parameters of serial port 6.

Serial Port: Enable or disable serial port(COM).

Device Setting (Read-only): Displays serial ports' interrupt and location.

Change Setting: Change serial port settings and suggest setting "Auto" as default.

3.3.7 Hardware Monitor

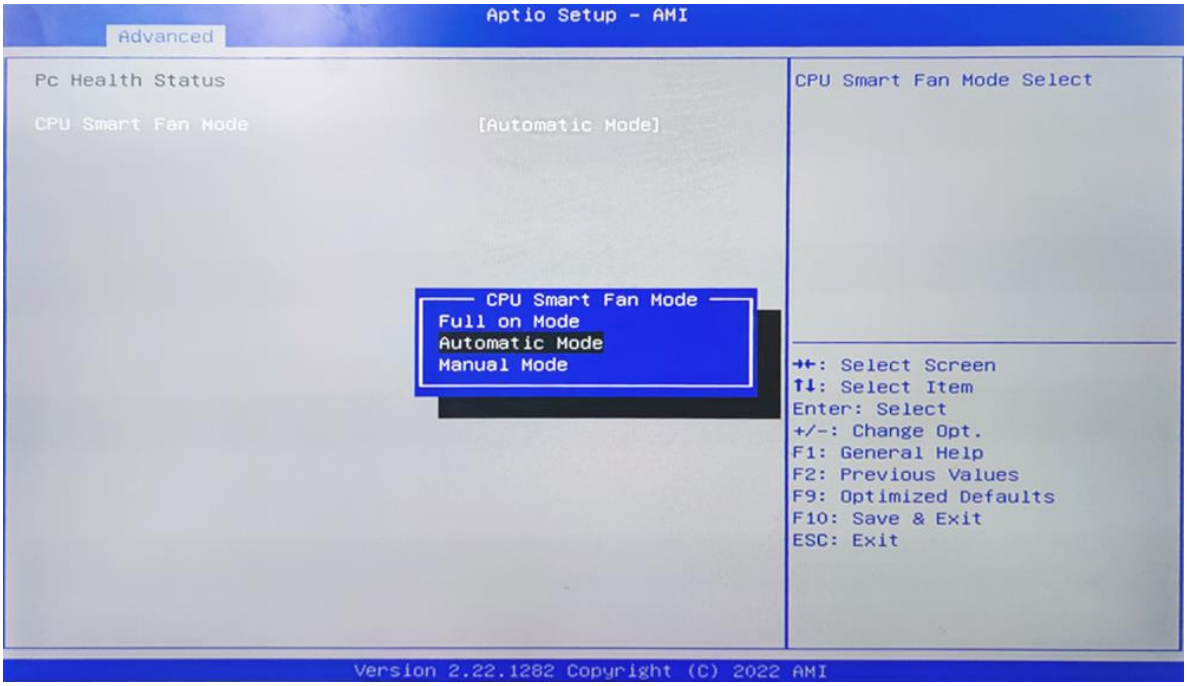


PC Health Status

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
- VCore: Core Voltage
- VDDQ: RAM Voltage
- +3.3V: 3.3V
- +5V: 5V

3.3.8 Smart Fan Function



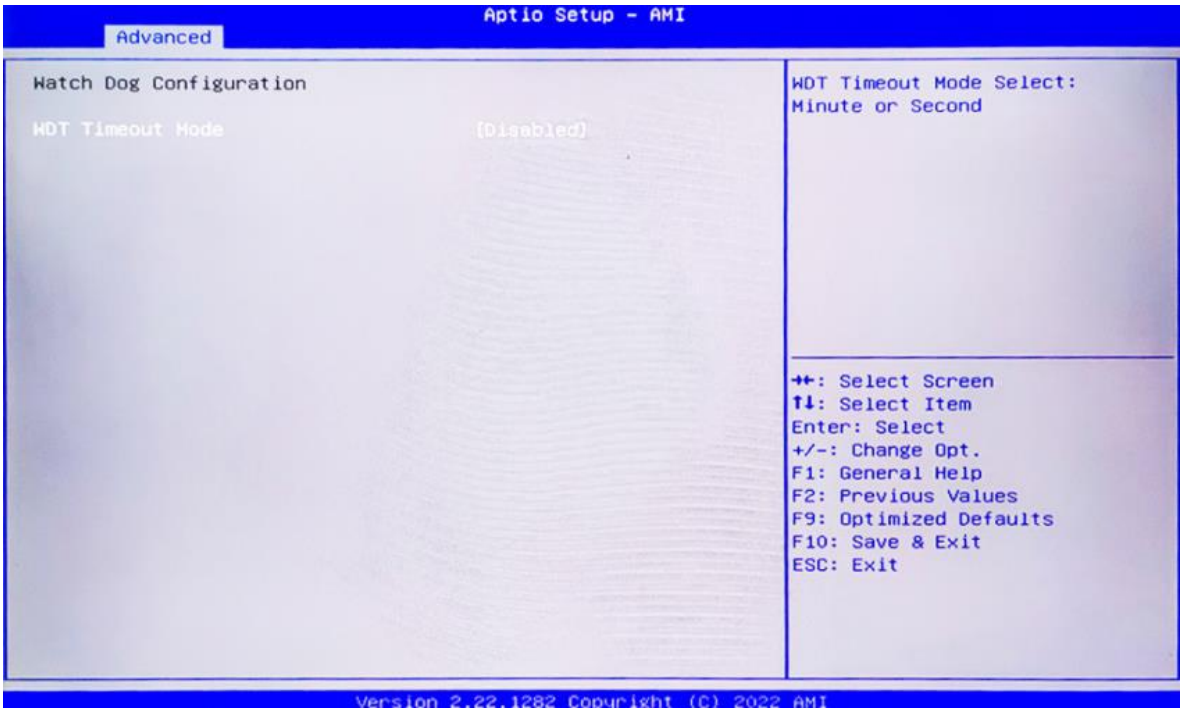
Smart Fan Mode

Automatic Mode

Full-on Mode

Manual Mode

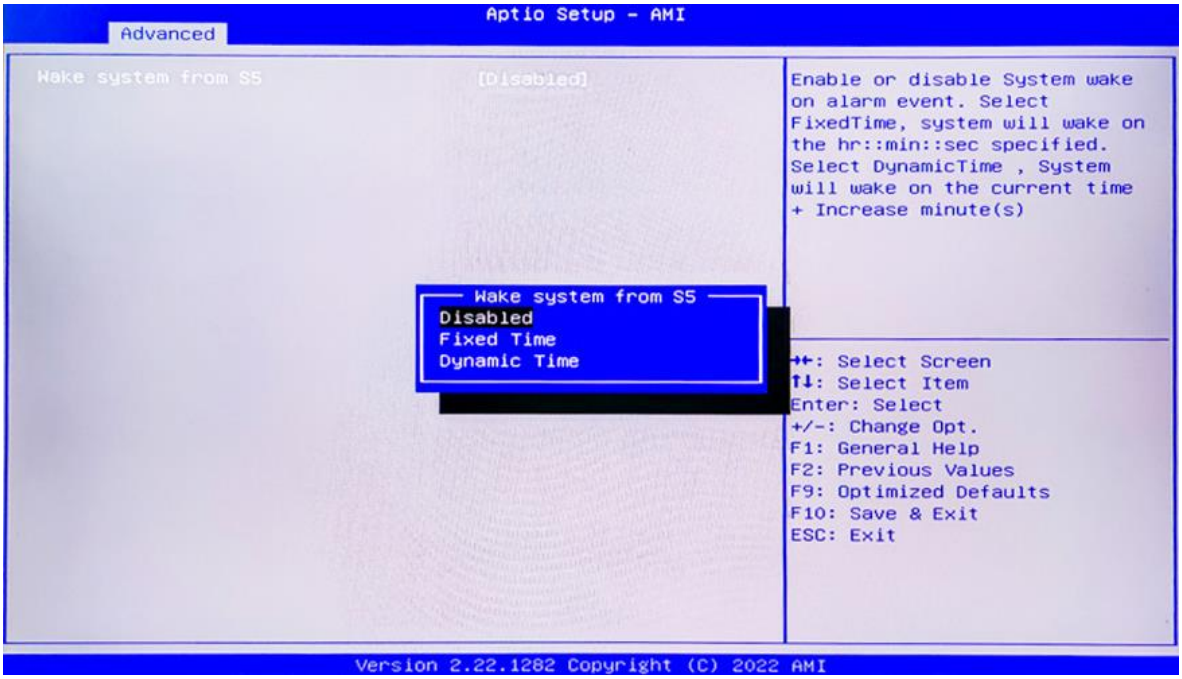
3.3.9 Watch Dog Configuration



Watch Dog Configuration

WDT Timeout Mode select: Minute or Second

3.3.10 S5 RTC Wake Settings

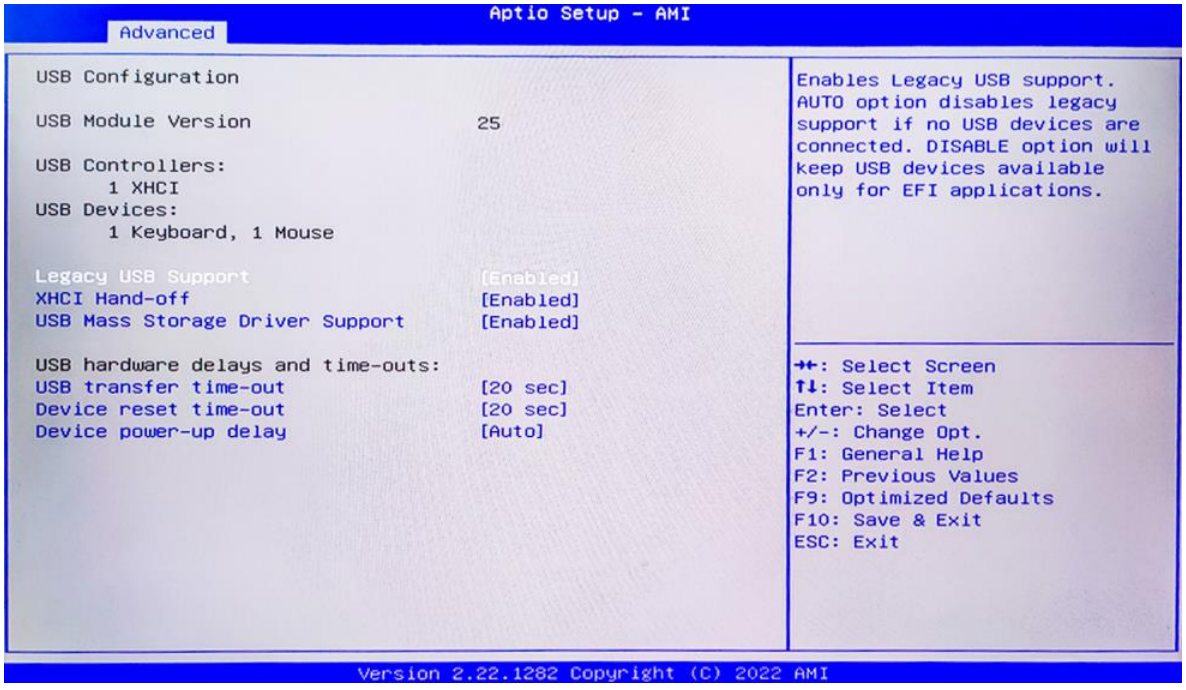


Wake system From S5: timing boot settings, disabled by default.

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.

3.3.11 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.

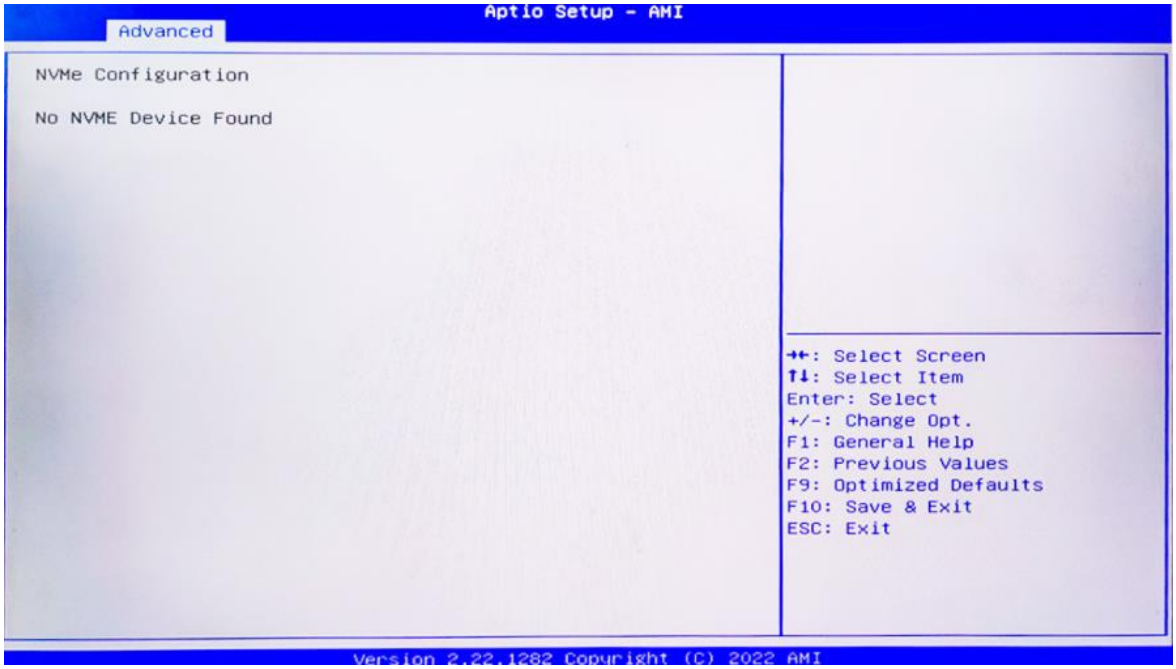
3.3.12 Network Stack Configuration



Network Stack

PXE Network boot setting, disabled by default.

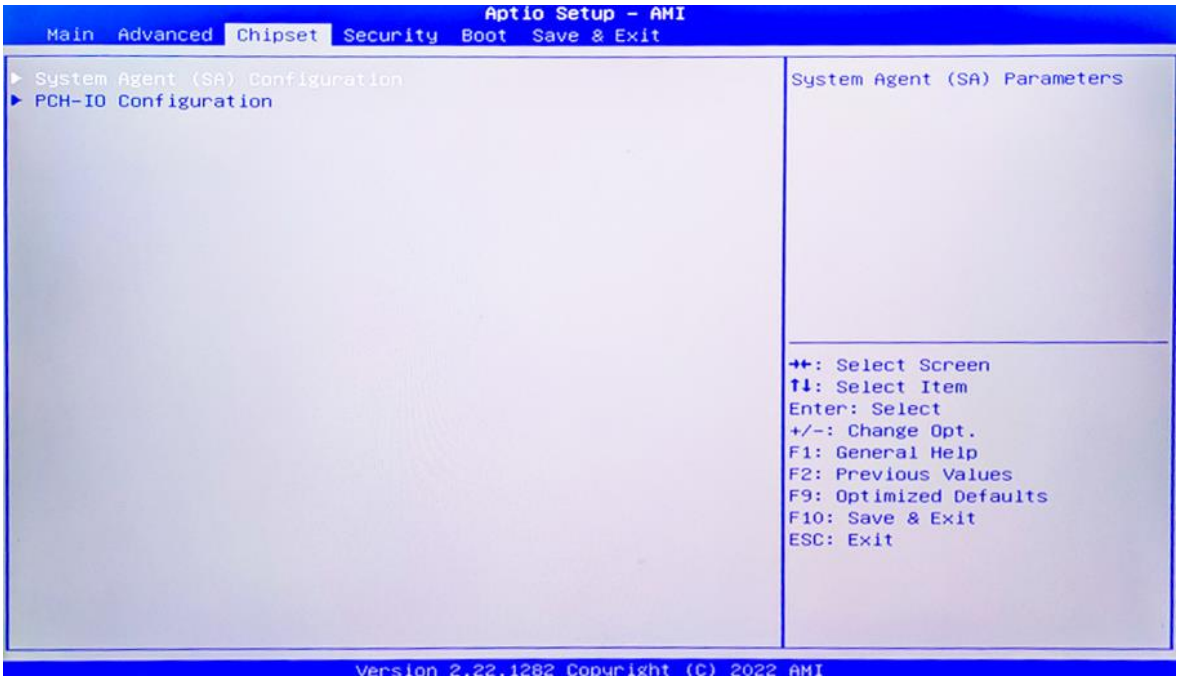
3.3.13 NVME Configuration



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

3.4 Chipset

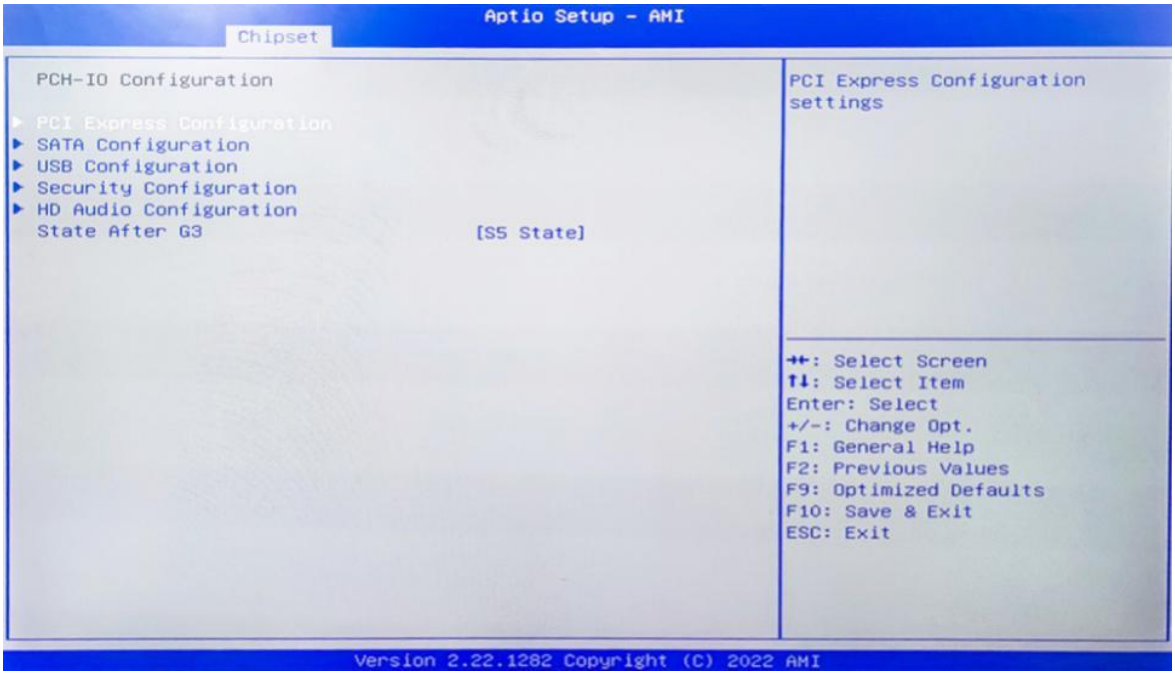
Select the chipset tab from the setup screen to enter the chipset BIOS Setup screen.



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

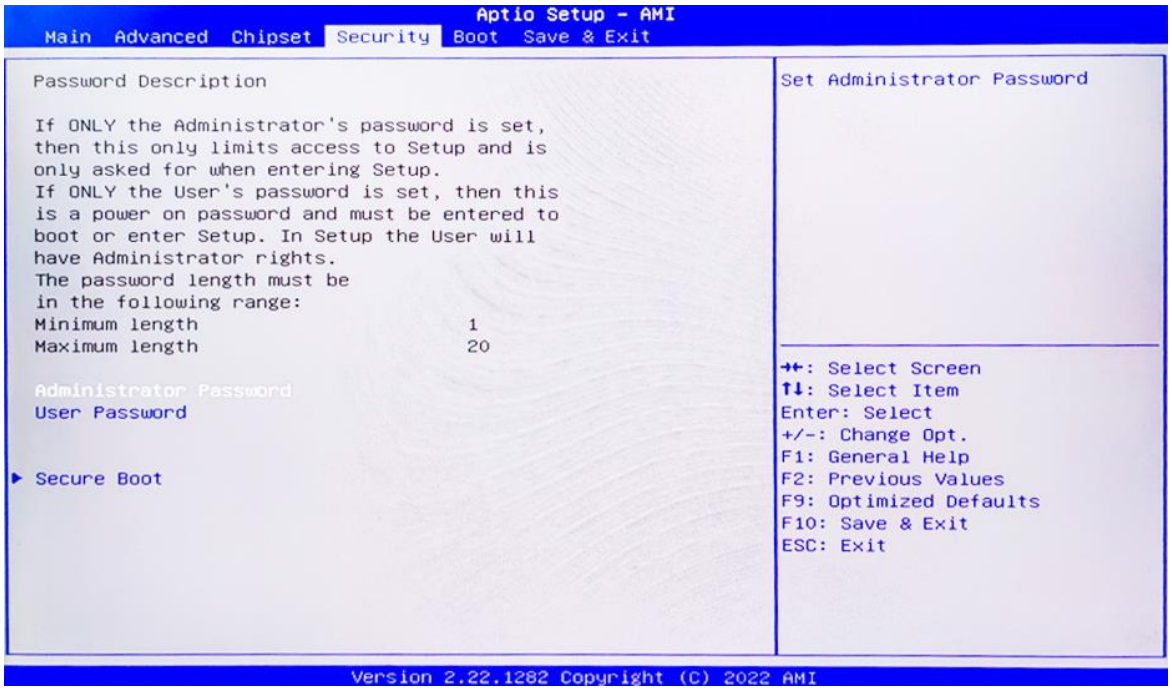
PCH-IO Configuration: Southbridge configuration options, including hard disk, sound card equipment, and other options

3.4.1 State After G3



State After G3 is set to S0 State (auto-start after power-on)

3.5 Security

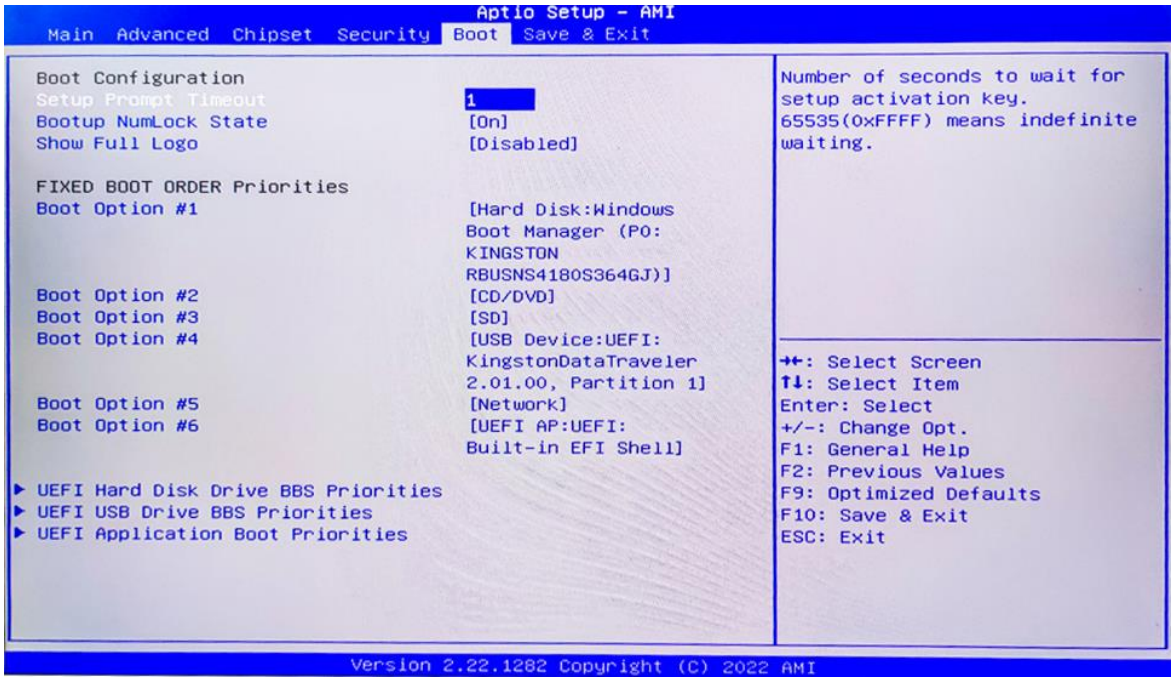


Administrator Password: Set the Administrator Password.

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~#6:

Set the system boot order from Number 1 to Number 6.

UEFI Hard Disk Drive BBS Priorities:

UEFI hard drive boot priorities setting.

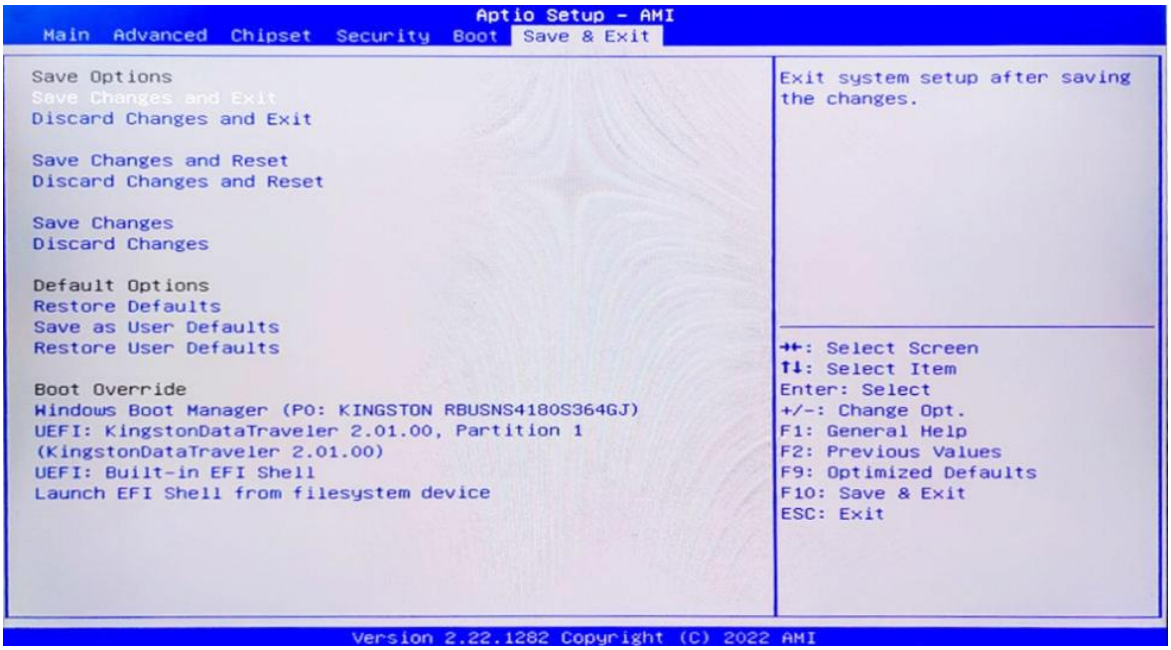
UEFI USB Drive BBS Priorities:

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.