

User Manual

AL-10 Mini-ITX Motherboard

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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AL10 Motherboard

User Manual

(Version 1.0)

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Chapter 1 Product Introduction

1.1 Brief Introduction

The AL-10 is a mini ITX motherboard based on the Intel Alder Lake-P series processor; features a small form factor, low power consumption, and high performance.

1.2 Parameters

CPU: Intel i7-1260P—12Cores 16Threads, Max Turbo Frequency 4.70 GHz, Processor Base Power 28W, Maximum Turbo Power 64W

Intel i5-1240P—12Cores 16Threads, Max Turbo Frequency 4.40 GHz, Processor Base Power 28W, Maximum Turbo Power 64W

Intel i3-1220P—10Cores 16Threads, Max Turbo Frequency 4.40 GHz, Processor Base Power 28W, Maximum Turbo Power 64W

Memory: 2x SO-DIMM DDR4-3200, supports dual-channel, maximum capacity: 64GB

GPU: Integrated Graphics based on CPU, display via 4x HDMI2.0b, 1x eDP(1.4b), 1xLVDS (eDP optional)

Storage: 1 x M.2 Key M slot for 2280 NVMe SSD, 1 x SATA3.0 standard interface

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

Ethernet: 2x Gigabyte Network Controllers onboard (Intel i219 Data Rate Per Port: 1.0GbEs + Intel 225/226 Data Rate Per Port: 2.5 GbE)

Audio: High-Definition Audio Codec, support Rear Line_out, Mic_in; front Line out, Mic-in on board; and power amplifier.

Serial I/O: 6x RS232 COM (Optional choice: COM1 can be set as RS485)

Expansion: 1x M.2_Key E, type 2230 (PCIe/USB2/CNVi).

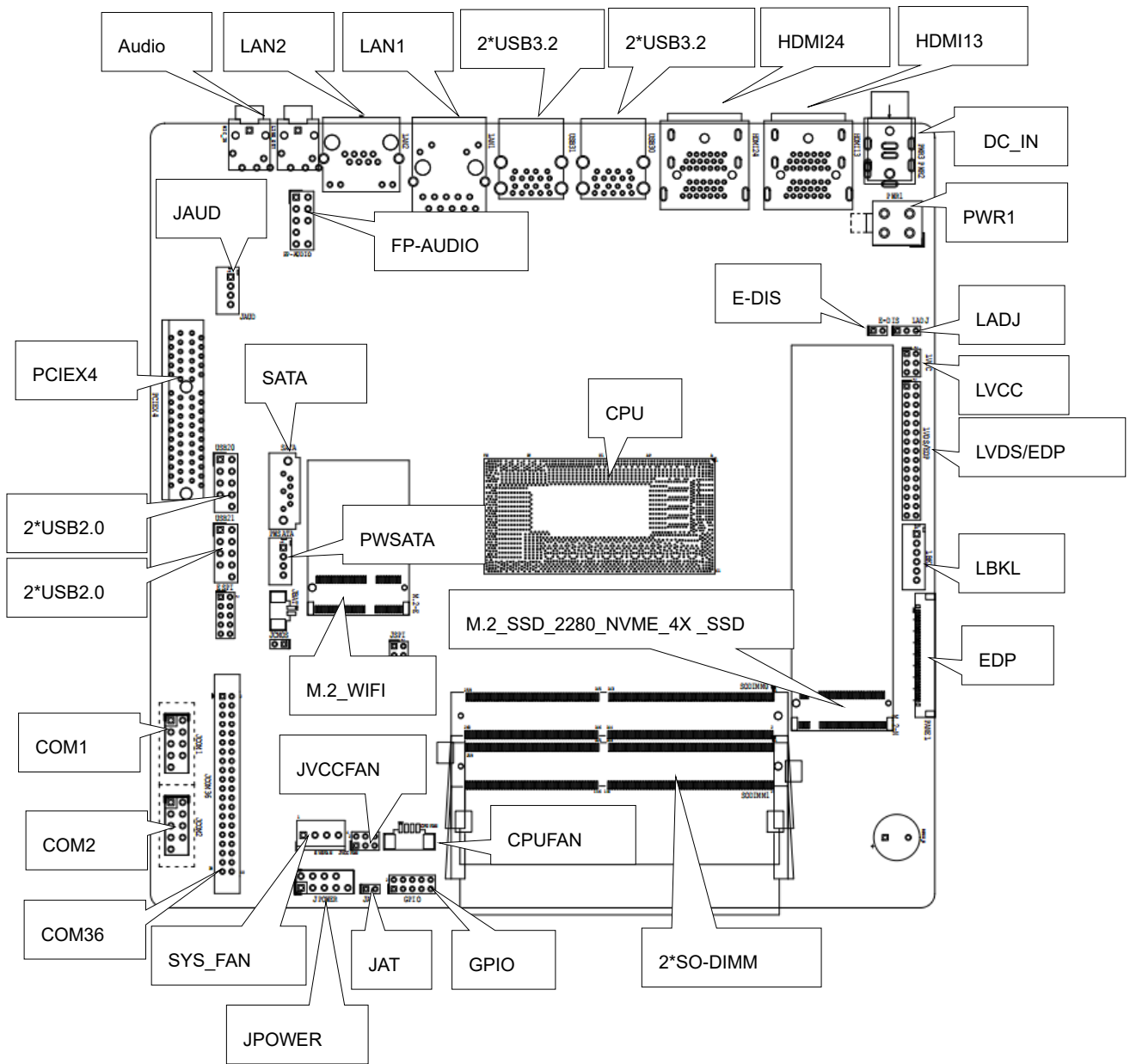
Other I/O: 1*PCIe4X, GPIO, JPOWER, 1x CPU FAN Socket, 1x SYSTEM FAN Socket

Dimension: 170mm x 170mm

Power: 12V/19V DC-in (Attention: When the PCIe4, PWSATA, and the LVCC jumper caps are located at 5-6 with 12V, the DC-in must be 12V as also. The input voltage for all three interfaces must be the same. 90W and above power adapter is recommended when the user is not using the built-in LVDS and use 120W and above power adapter when the built-in LVDS is in use.)

Operating Temperature: -20°C~60°C

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 AL10 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 2 x SO-DIMM DDR4-3200, supports dual-channel, maximum capacity: 64GB.

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 specification.

2.4 Display Interfaces

Integrated Intel UHD graphics. Display via 4xHDMI2.0b (supports HDCP2.3), 1x eDP (4Lane 40pin), 1x

LVDs optional with one 2Lane eDP 1.4b interface, supports 4K multiple displays.

2.4.1 LVDS/EDP

The board provides a group of LVDs pins (2.0mm spacing) that support dual-channel 24bit 1920x1080 outputs. Supports eDP functions through hardware changes; a group of LVDS power supply jumpers (screen printing: LVCC), standard reverse adjustment pins (screen printing: LADJ), and a group of backlight pins (screen printing: LBKL).

LVDS Data Pin (Screen printing: LVDS/EDP)

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 Pin (Screen printing: LBKL)

Pin	Signal
1	GND
2	GND
3	LCD_BKL_ADJ
4	LCD_BKL_ON
5	12V/19V (The output voltage is the same as the DC power supply)
6	12V/19V (The output voltage is the same as the DC power supply)

LVDS screen power supply jumper (Screen Printing: LVCC)

Interface	Setting	Function
1-2	Close	VCC 3.3V
3-4	Close	VCC 5V

5-6	Close	VCC 12V (The output voltage is the same as the DC power supply)
-----	-------	---

LVDS backlight two-way adjustment jumper (Screen Printing: LADJ)

Interface	Setting	Function
1-2	Close	REV (Backlight Control Reverse)
2-3	Close	STD (Backlight Control Standard)

2.4.2 eDP Optional (Screen Printing: LVDS/EDP)

Optional eDP function, the board supports a 2LANE eDP1.4b interface. When set as eDP functions, the pin transmits the eDP signal and disables the LVDS function. The screen power supply controls by the “LVCC” jumper, the screen backlight adjustment controls by the “LBKL” jumper, and the “LADJ” is for the Standard/Reverse control.

eDP Data Pin (Screen Printing: LVDS/EDP)

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: LBKL)

Pin	Signal
1	GND
2	GND

3	LCD_BKL_ADJ
4	LCD_BKL_ON
5	12V/19V (The output voltage is the same as the DC power supply)
6	12V/19V (The output voltage is the same as the DC power supply)

eDP working voltage and two-way adjustment jumper (Screen printing: LVCC)

Interface	Setting	Function
1-2	Close	VCC 3.3V
3-4	Close	VCC 5V
5-6	Close	VCC 12V (The output voltage is the same as the DC power supply)

eDP backlight two-way adjustment jumper (Screen Printing: LADJ)

Interface	Setting	Function
1-2	Close	REV (Backlight Control Reverse)
2-3	Close	STD (Backlight Control Standard)

2.5 eDP Function (screen printing: EDP)

The motherboard provides a 40PIN 4 Lane EDP interface, the screen power supply LCD_VCC defaults to 3.3V, and BL_PWR defaults to 12V (Note: the backlight output voltage is consistent with the DC power supply)

eDP 40PIN (screen printing: EDP)

Pin	Signal	Pin	Signal
1	NC-RESERVED	21	LCD_VCC
2	BL_PWR	22	LCD_VCC
3	BL_PWR	23	LCD_VCC
4	BL_PWR	24	H_GND
5	BL_PWR	25	AUX_CH_N
6	NC-RESERVED	26	AUX_CH_P
7	NC-RESERVED	27	H_GND
8	BL_PWR_DIM	28	Lane0_P
9	BL_ENABLE	29	Lane0_N
10	BL_GND	30	H_GND

11	BL_GND	31	Lane1_P
12	BL_GND	32	Lane1_N
13	BL_GND	33	H_GND
14	HPD	34	Lane2_P
15	LCD_GND	35	Lane2_N
16	LCD_GND	36	H_GND
17	LCD_GND	37	Lane3_P
18	LCD_GND	38	Lane3_N
19	LCD Self-Test or NC	39	H_GND
20	LCD_VCC	40	NC-RESERVED

Attention: While using the 40PIN eDP functions, all the power with GND headers must be connected.

2.6 Storage (screen printing: SATA, M.2-N, PWSATA)

The board features 1xM.2 key M for 2280 NVMe SSD (PCIe4.0 signal), 1x SATA interface and PWSATA a disk power supply socket; please note while using 3.5-inch hard drive devices the DC input must be set at 12V.

PWSATA (screen printing: PWSATA)

Pin	Signal
1	5V
2	GND
3	GND
4	VSYS (The output voltage is the same as the DC power supply)

2.7 Expansion Slot (screen printing: SATA, M.2-N, PWSATA)

Screen printing M.2_E: 1xM.2 key E, Type 2230 (PCIe/USB2/CNVi)

Screen printing PCIe4: It can be use for expansion network adapter, graphic card or other PICE devices, please ensure the DC input must be 12V while using those kinds of devices.

2.8 USB Interface

The board features 4x USB3.2 Gen2 rear ports and 4x USB2.0 onboard pins (2.54mm spacing).

USB (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

2.9 LAN

The board features 2xRJ45 interfaces with Intel high-speed Gigabit network controllers. One Intel i225 (LAN2) data rate per port: 2.5Gbps, the MAC address only can be used once and cannot be changed after used. One Intel i219(LAN1) data rate per port: 1.0 Gbps. LAN1 supports Magic packet wake up; LAN 2 supports UEFI PXE network boot, to use the PXE network boot functions IPv4 PXE supports must be set enabled under the BIOS.

LED Status Indicators:

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

2.10 Audio

The board features Realtek HD audio codec supports Line-out, Mic-in, front audio pin ("FP_AUDIO"2.54mm spacing) and power amplifier (JAUD). The rear interface colored green is the Line-out, colored red is Mic-in.

FP-AUDIO:

Signal	Pin		Signal
MIC2-L	1	2	AGND
MIC2-R	3	4	AVCC (NC)
FRO-R	5	6	MIC2-JD
F-IO-SEN(AGND)	7	8	N/A
FRO-L	9	10	LIN2-JD

JAUD:

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

2.11 COM

The board provides six RS232 onboard serial port headers (COM1 and COM2 spacing is 2.54mm, COM3-6 spacing is 2.0mm), COM1 can be changed to RS485 through hardware change.

COM1, COM2 (Screen Printing: JCOM1, JCOM2)

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

GND	5	6	DSR#
RTS#	7	8	CTS#
RI#	9		

COM36 (Screen Printing: JCOM36)

Signal	Pin		Signal
DCD#	1	2	RXD
TXD	3	4	DTR#
GND	5	6	DSR#
RTS#	7	8	CTS#
RI#	9	10	(NC)
DCD#	11	12	RXD
TXD	13	14	DTR#
GND	15	16	DSR#
RTS#	17	18	CTS#
RI#	19	20	(NC)
DCD#	21	22	RXD
TXD	23	24	DTR#
GND	25	26	DSR#
RTS#	27	28	CTS#
RI#	29	30	(NC)
DCD#	31	32	RXD
TXD	33	34	DTR#
GND	35	36	DSR#
RTS#	37	38	CTS#
RI#	39	40	(NC)

COM 1 RS485

Pin	RS232	RS485
1	DCD#	DATA-
2	RXD	DATA+
3	TXD	(NC)
4	DTR#	(NC)
5	GND	GND
6	DSR#	(NC)
7	RTS#	(NC)
8	CTS#	(NC)
9	RI#	(NC)

2.12 GPIO (Screen Printing: GPIO)

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

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

2.13 Board Power Supply (Screen Printing: PWR1, PWR2)

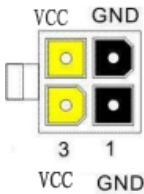
The board supports a 12V/19V DC-IN or ATX 12V supplementary power (2x2pin).

Attention: When the PCIe4, PWSATA, and the LVCC jumper caps are located at 5-6 with 12V, the DC-in must be 12V as also. The input voltage for all three interfaces must be the same. 90W and above power adapter is recommended when the user is not using the built-in LVDS and use 120W and above power adapter when the built-in LVDS is in use.

PWR2: DC-in



PWR1: ATX12V supplementary power supply socket (2x2PIN)



2.14 Switch Panel Pin (Screen Printing: JPOWER)

The front control panel interfaces are to connect the functional buttons and indicators on the front panel.

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	(N/A)
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2.15 System Fan/CPU Fan Socket (Screen Printing: CPUFAN, SYSFAN)

The board provides two auxiliary cooling fan sockets, the system fan’s default power supply is 12V and the CPU cooling fan socket’s default power supply is 5V. It also provides a set of pins which can be used to set the system fan and CPU fan power supply to 5V or 12V (Screen printing: JVCCFAN).

SYSFAN:

Pin	Signal
1	GND
2	VCC
3	TAC
4	CTL

CPUFAN:

Pin	Signal
1	VCC
2	GND
3	TAC
4	CTL

JVCCFAN:

JVCCFAN	5V	12V
CPUFAN	1-3	3-5
SYSFAN	2-4	4-6

2.16 CMOS Clearance/Retention

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: Use the jumper cap to connect the 1st and 2nd header of JCMOS for 15 seconds, then disconnect.

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

CMOS (Screen Printing: JCMOS)

Setting	Setting	JCMOS
Close	Close	Clear CMOS

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

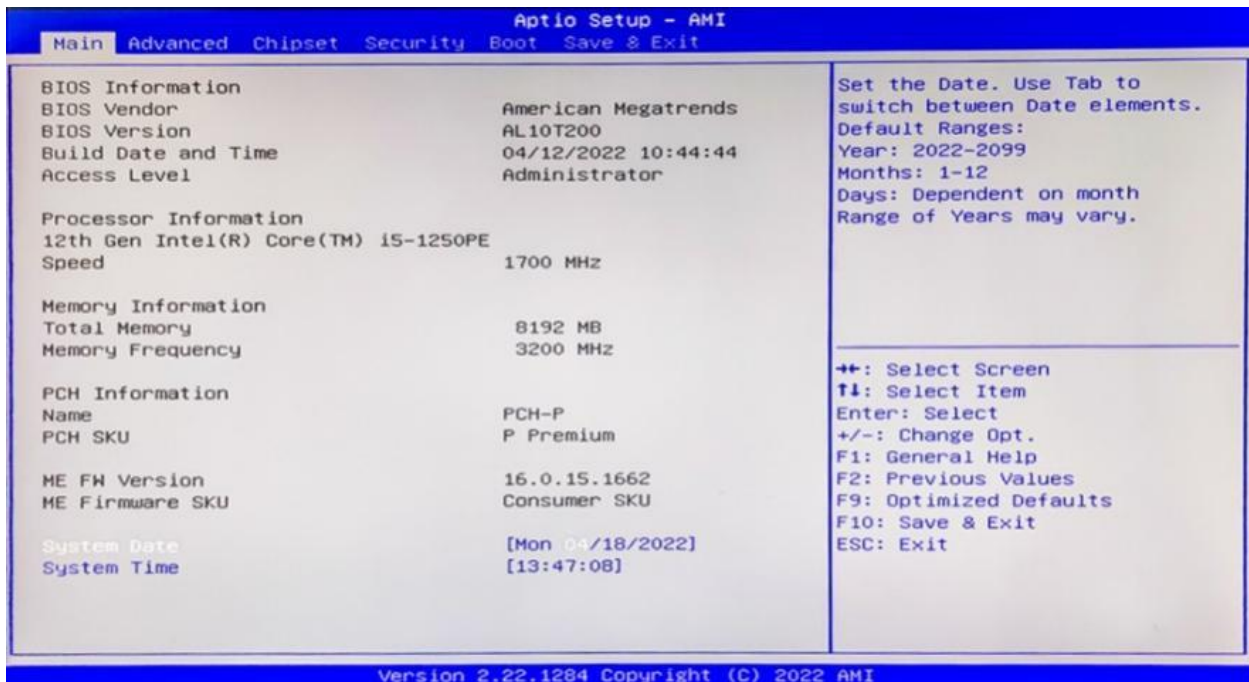
Chapter 3 BIOS Setup

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)

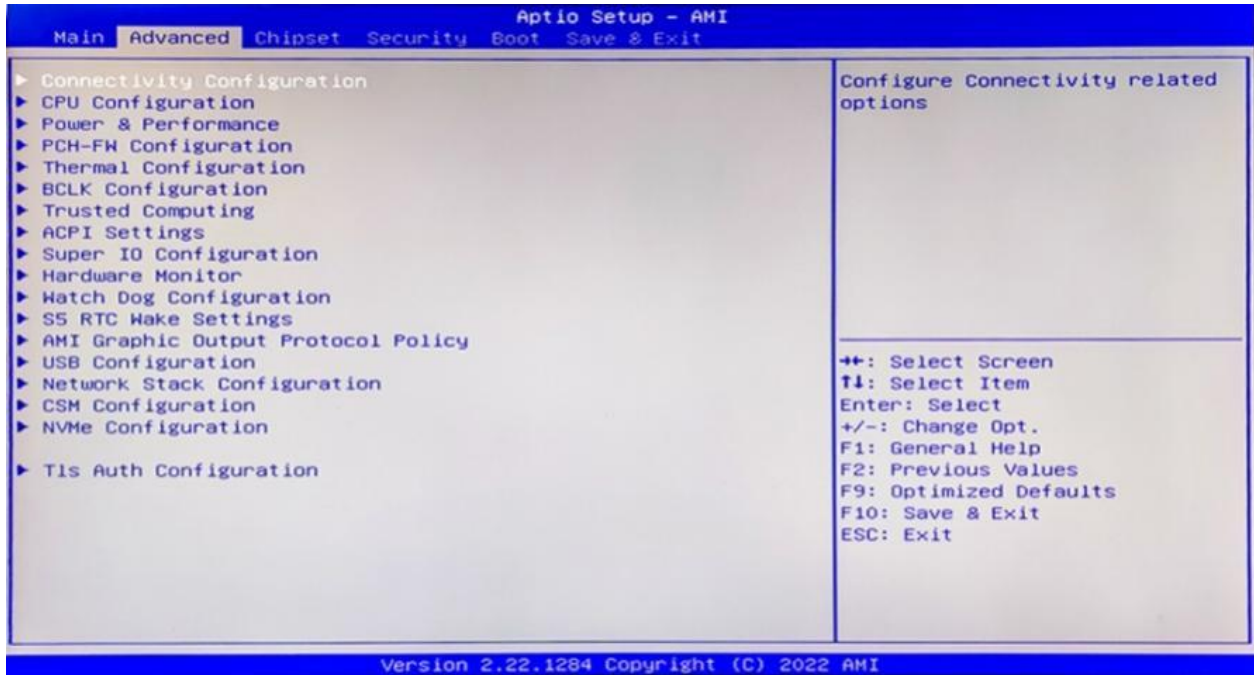
When you enter the BIOS Setup utility the first things you will encounter is the Main Setup screen. Shown below is the Main BIOS Setup screen. You can always return to the Main setup by selecting the Main tab.



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

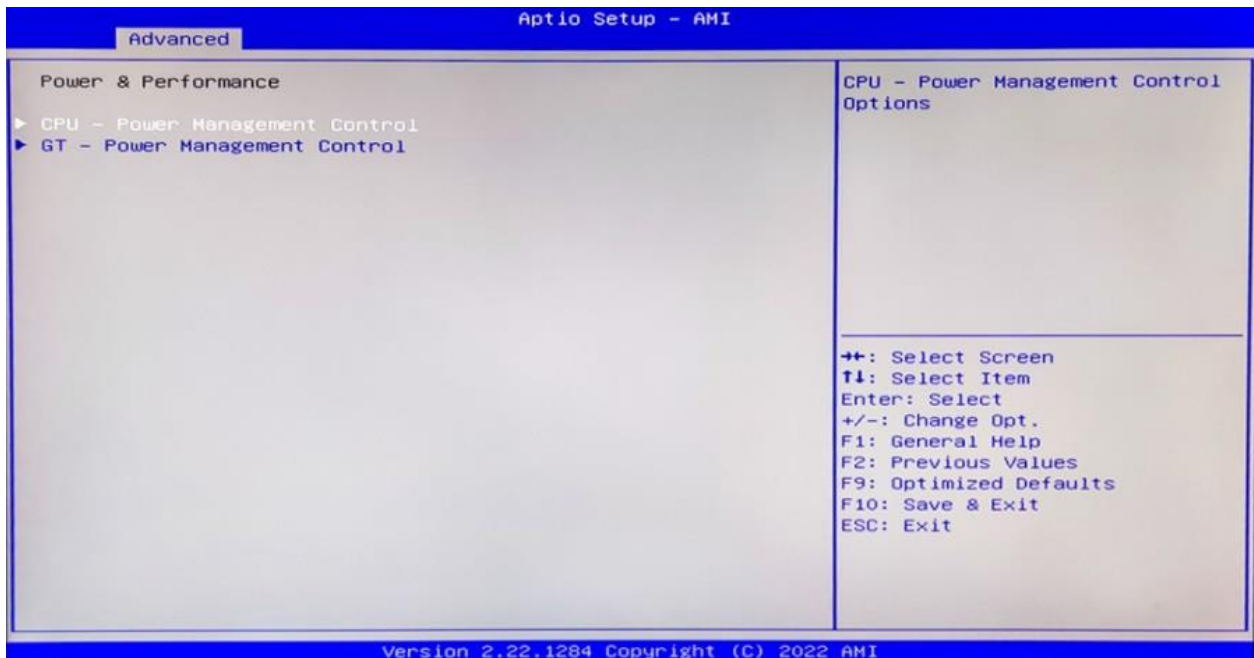
System Time: Set the time. HH:MM: SS format.

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.

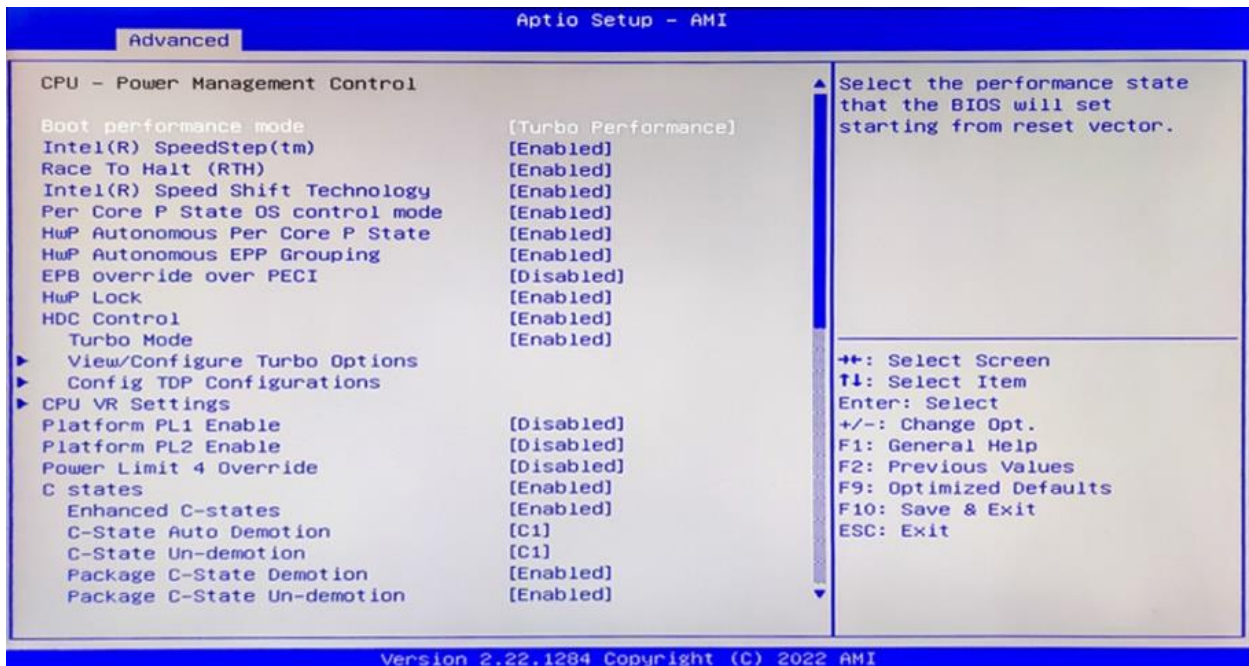
3.3.1 CPU-Power & Performance



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.

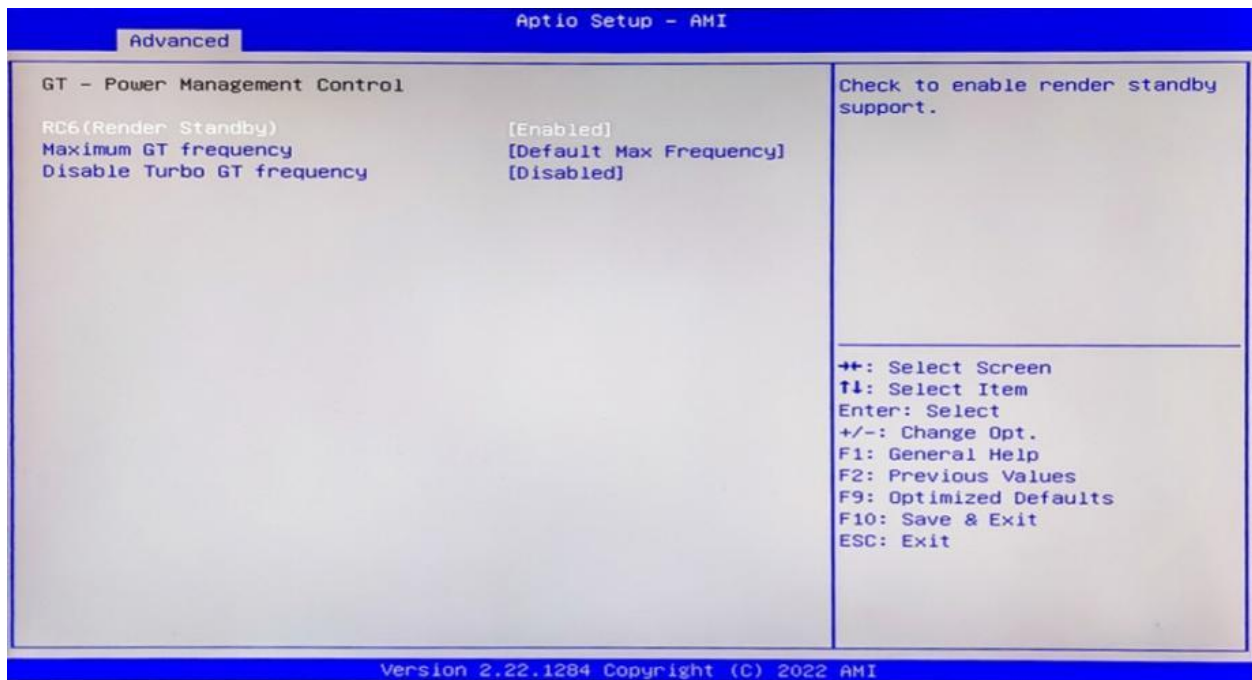
C states

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



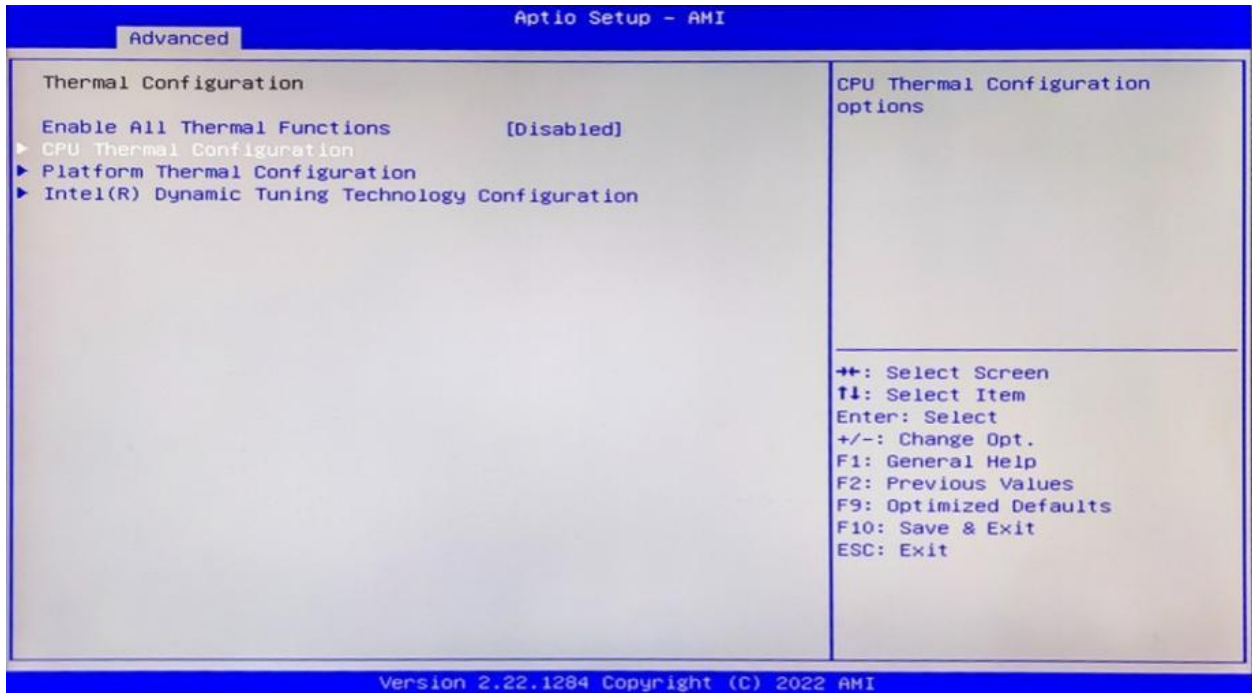
Maximum GT frequency:

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

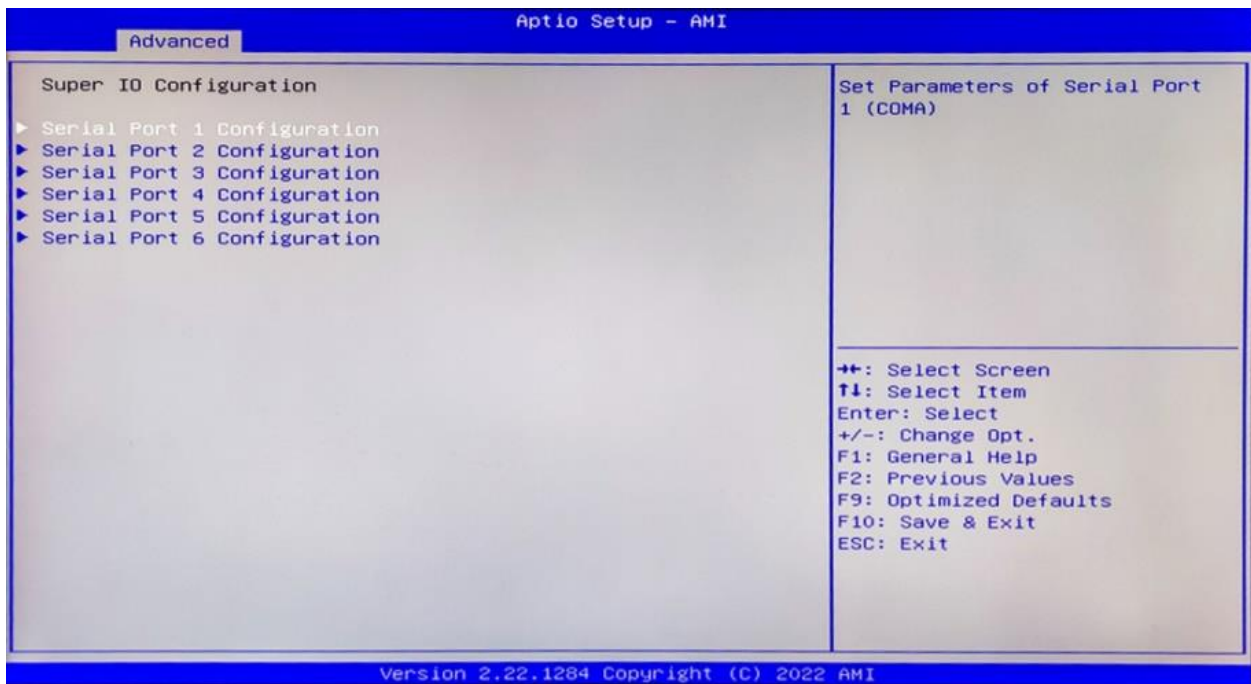
CPU Thermal Configuration:

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.

Platform Thermal Configuration

DPTF Configuration

3.3.5 IT8786 Super IO Configuration



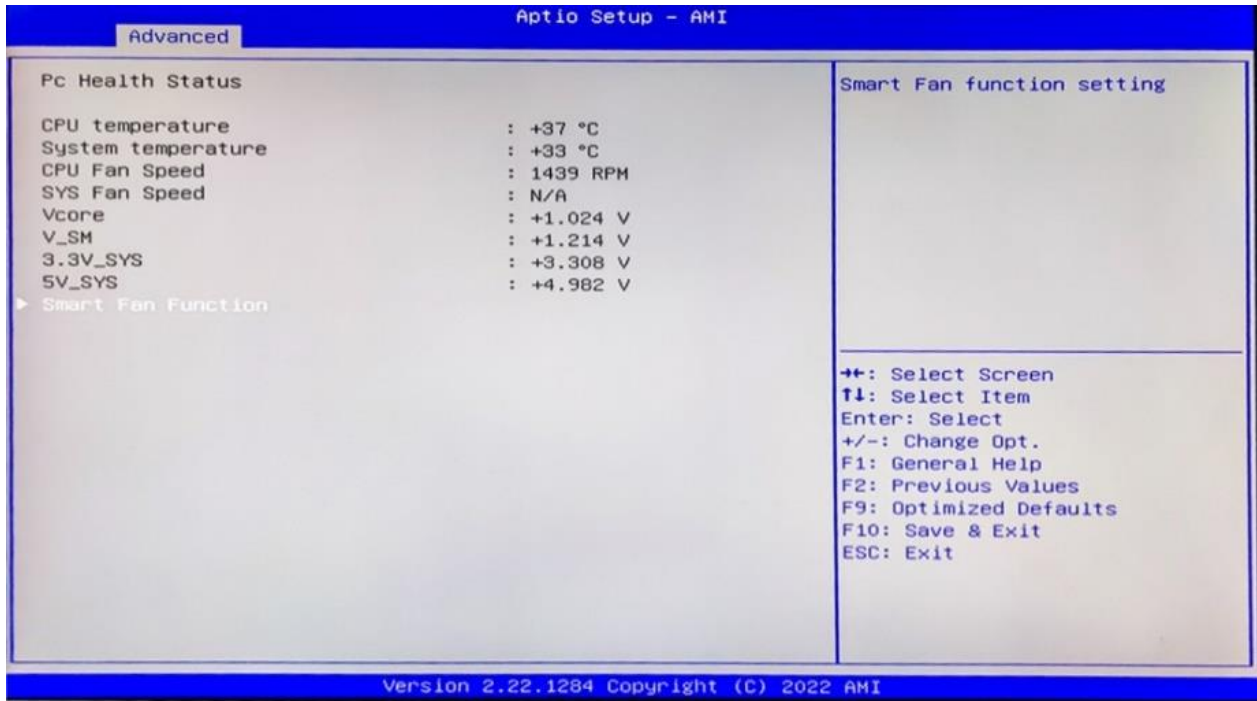
Serial Port 1~6 Configuration

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.

3.3.6 Hardware Monitor

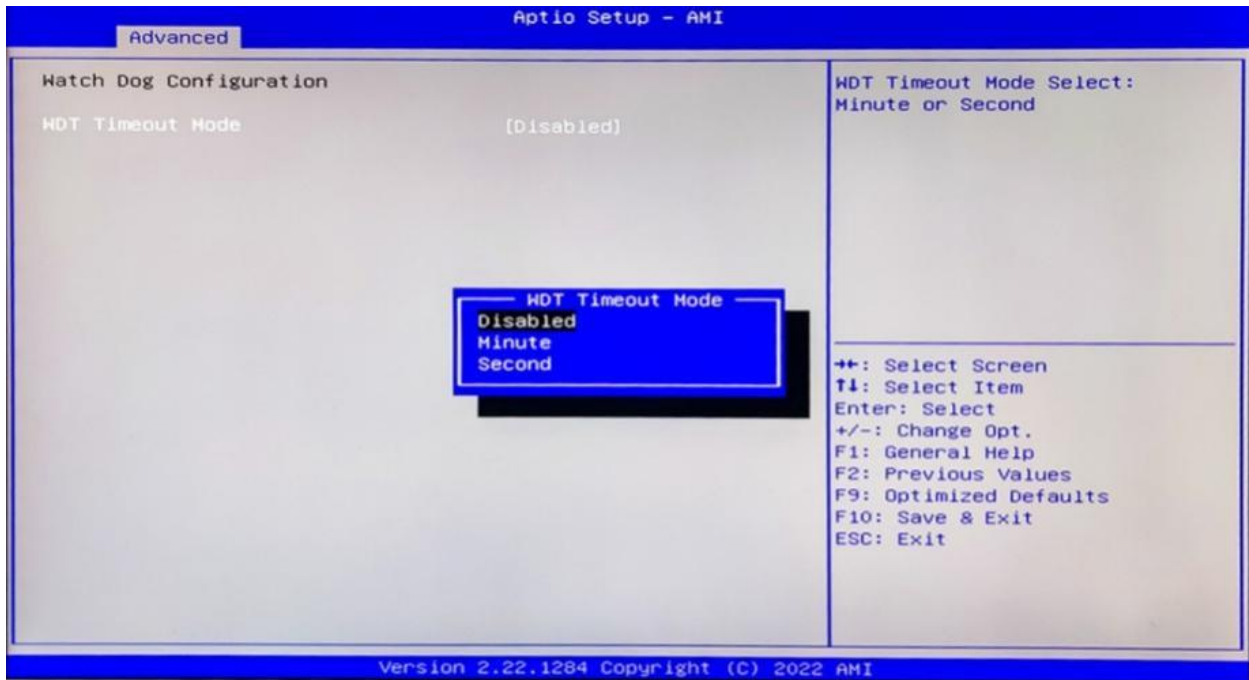


PC Health Status

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

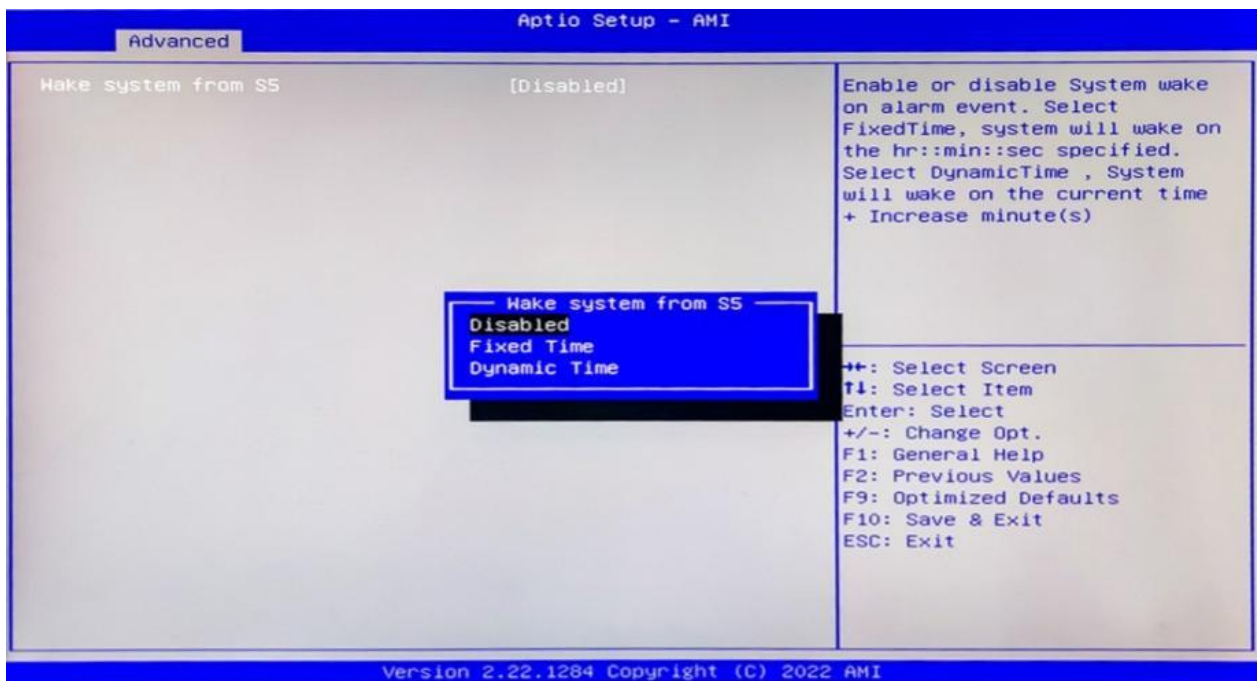
3.3.7 Watch Dog Configuration



Watch Dog Configuration

WDT Timeout Mode select: Minute or Second

3.3.8 S5 RTC Wake Settings

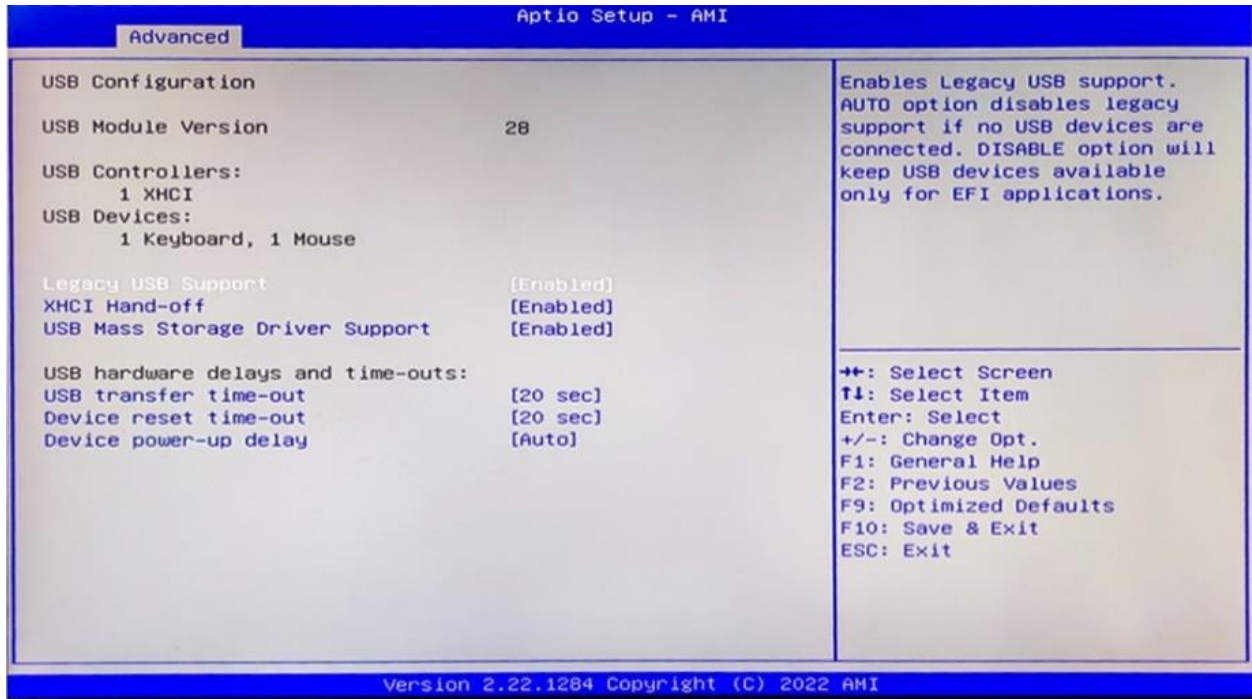


Wake system From S5: timing boot settings, disabled by default.

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.

3.3.9 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.

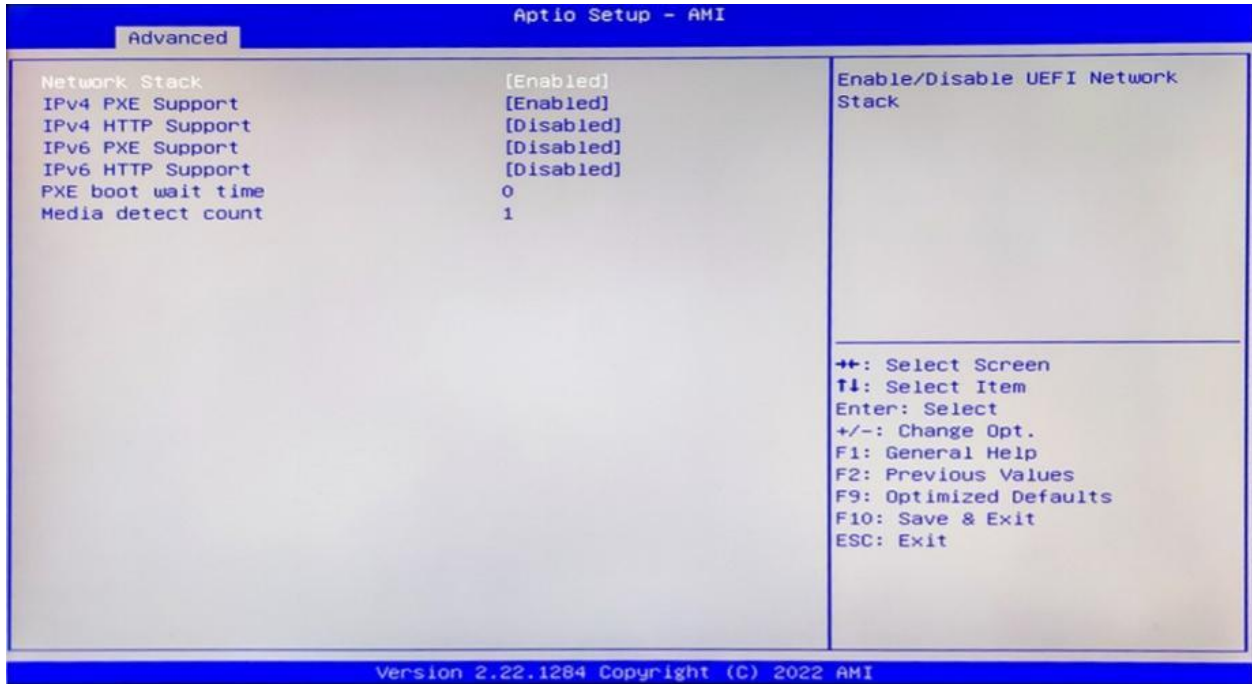
Device reset time-out

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.

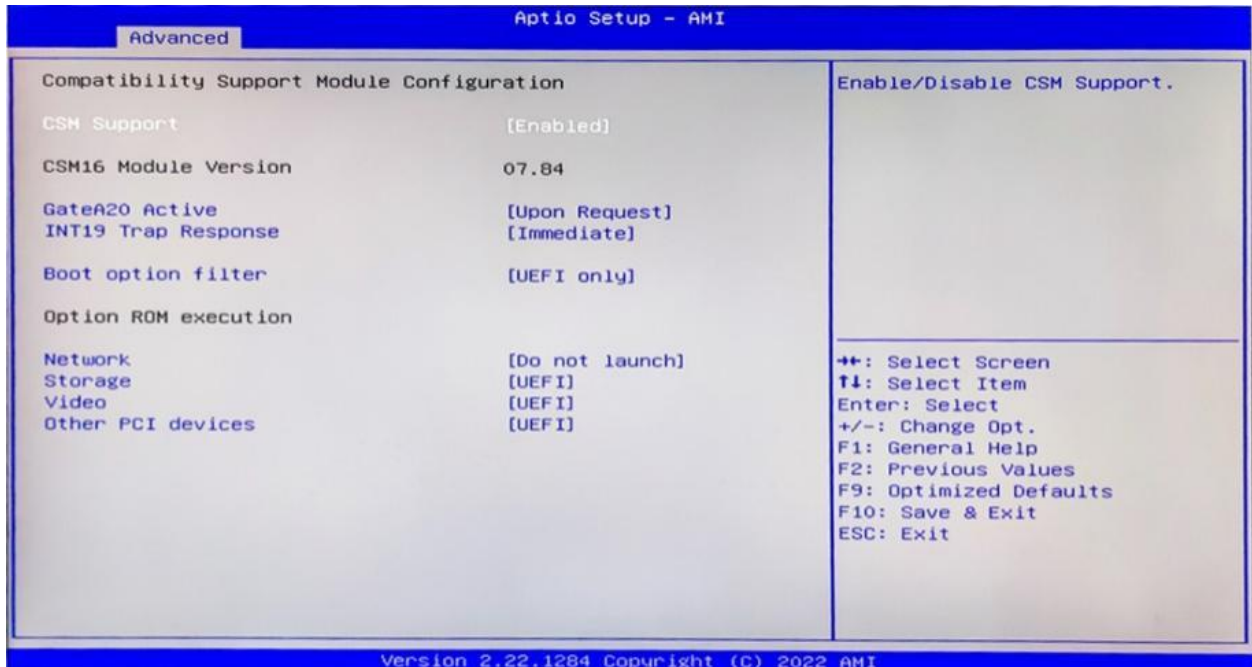
3.3.10 Network Stack Configuration



Network Stack

PXE Network boot setting, disabled by default.

3.3.11 CSM Configuration

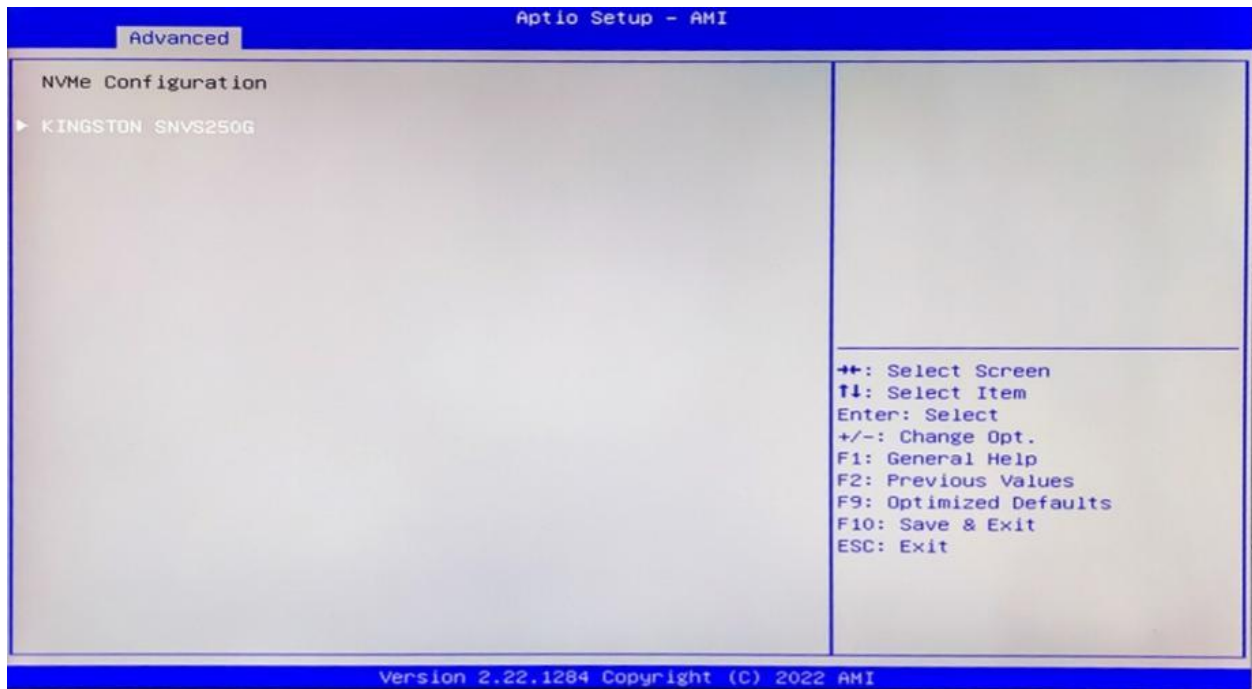


Boot Option Filter

Option ROM Execution

- Network
- Storage
- Video
- Other PCI Devices

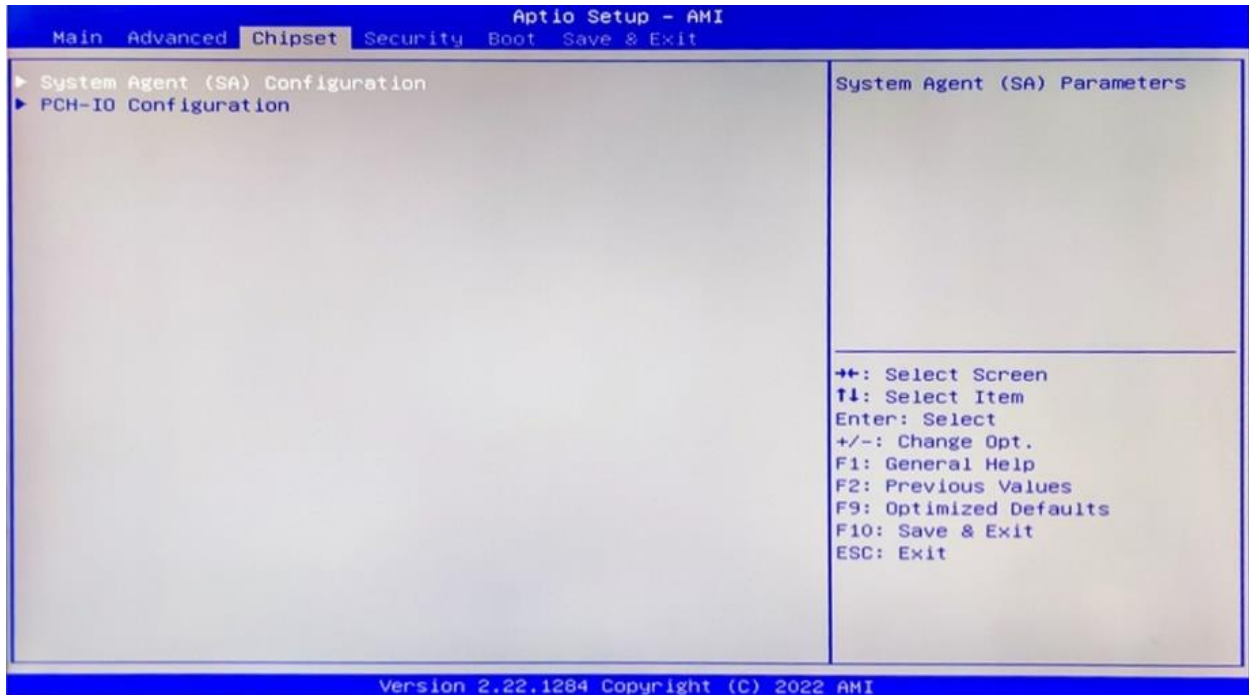
3.3.12 NVMe Configuration



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

3.4 Chipset

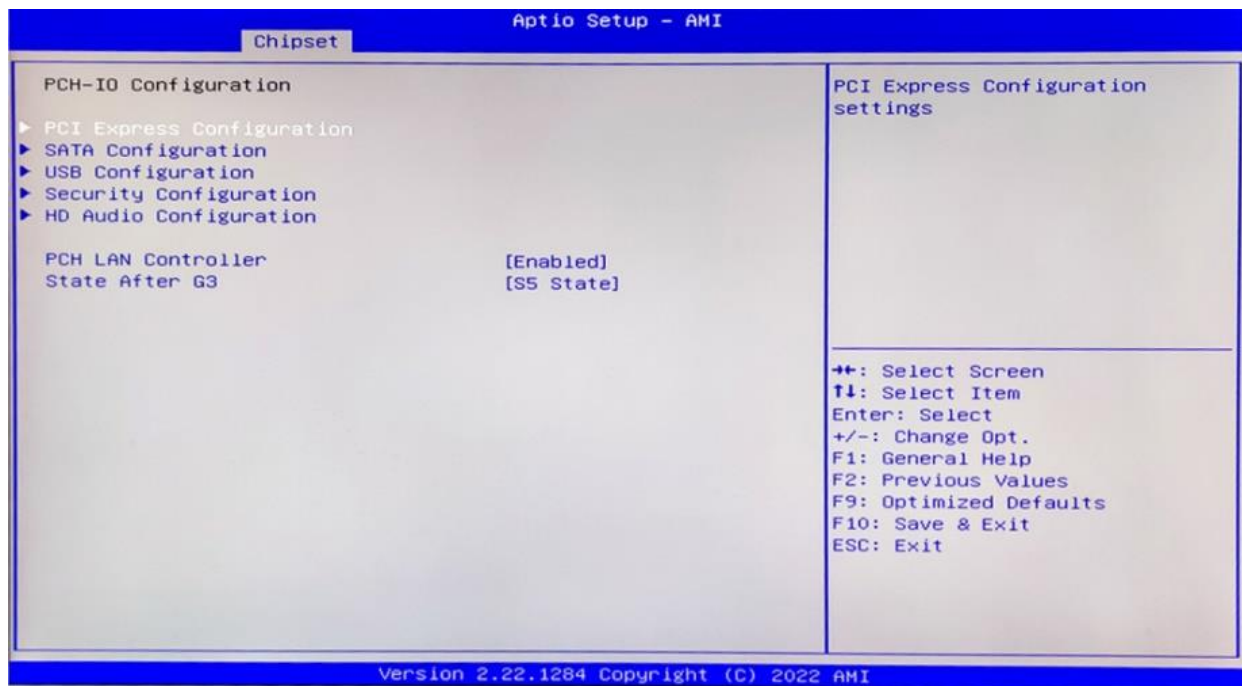
Select the chipset tab from the setup screen to enter the chipset BIOS Setup screen.



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

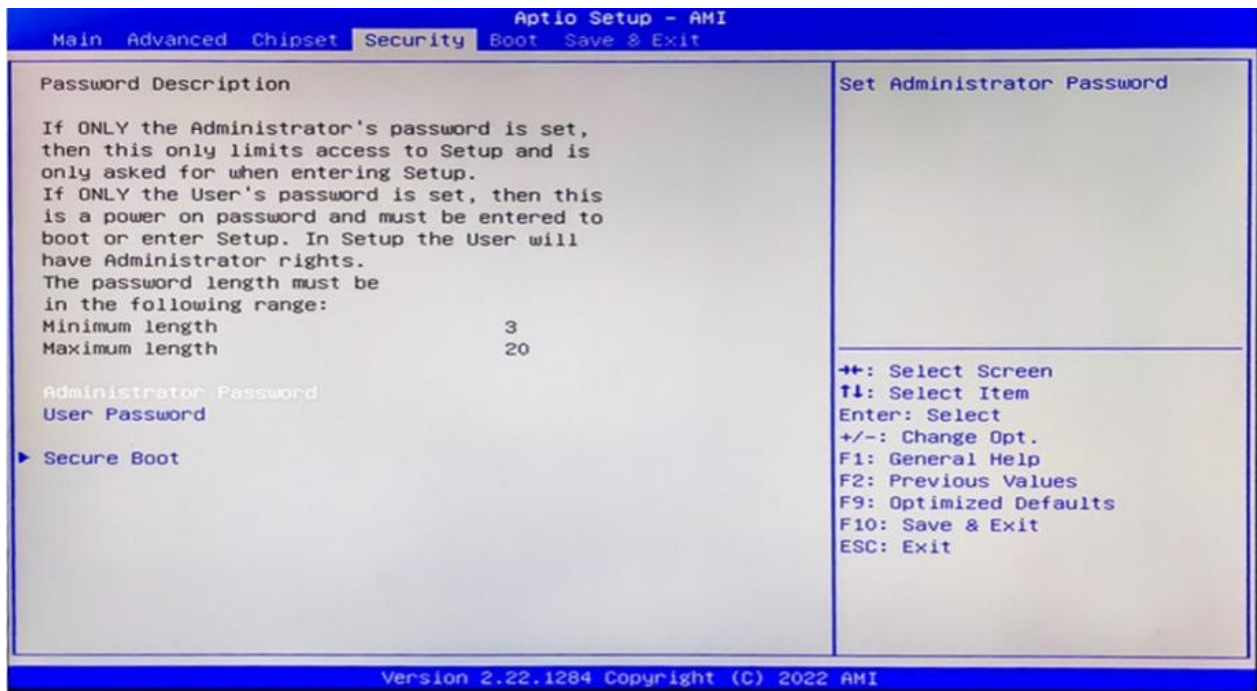
Security Configuration

HD Audio Configuration

PCH LAN Controller

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

3.5 Security

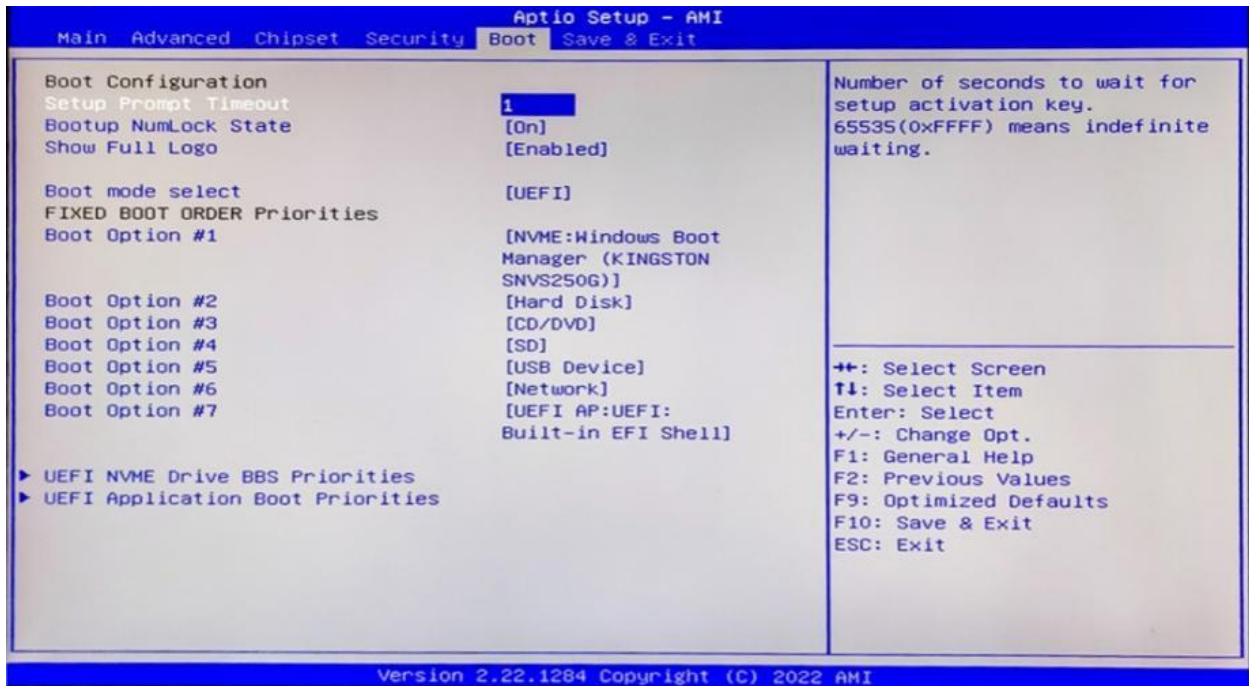


Administrator Password: Set the Administrator Password.

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~#7:

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

UEFI Hard Disk Drive BBS Priorities:

UEFI hard drive boot priorities setting.

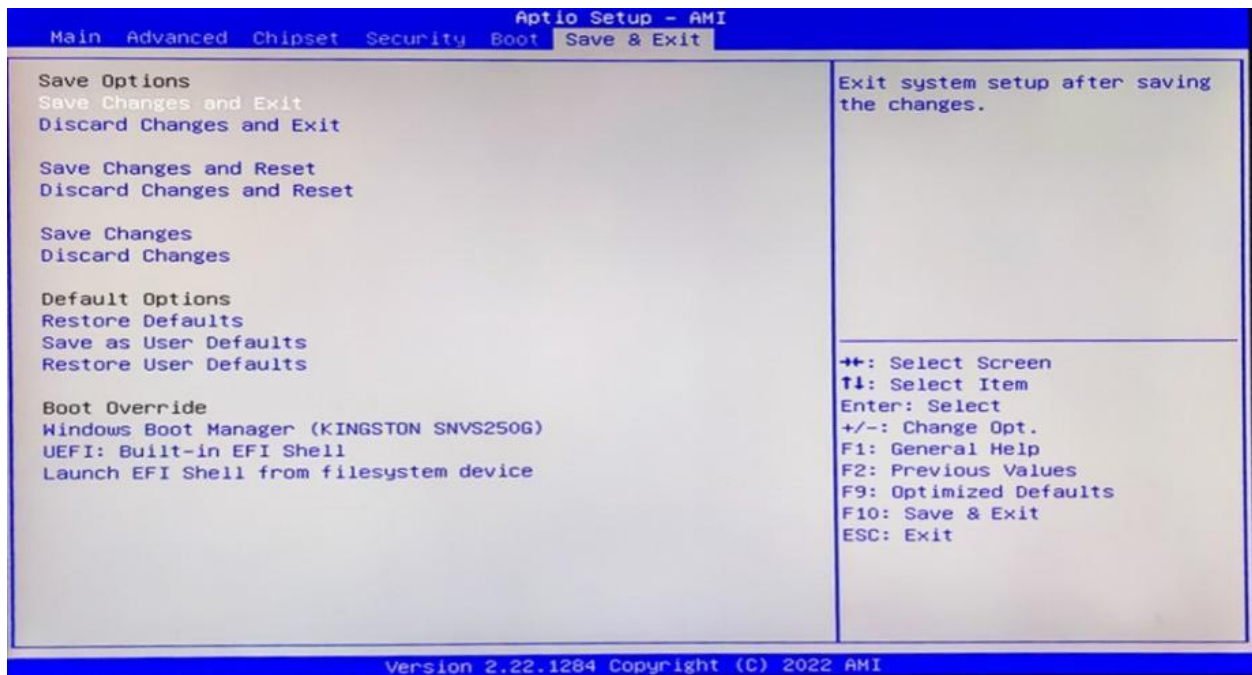
UEFI USB Drive BBS Priorities:

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.