

ASMB-788

**LGA 1700 Intel® 12th/13th/14th Gen.
Core™ ATX Server Board with
4 x DDR5, 5 x PCIe, 7 x USB 3.2,
4 x SATA3, Quad/Dual LANs,
and IPMI**

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This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for assistance.

Ordering Information

Part Number	Chipset	Memory	LAN	Display	IPMI
ASMB-788G4-00A1	W680	DDR5 288-pin ECC/non-ECC unbuffered DIMM	4	DVI, HDMI, VGA	Yes (AST-2600 onboard)
ASMB-788G2-00A1	W680	DDR5 288-pin ECC/non-ECC unbuffered DIMM	2	DVI, HDMI, VGA	-

Product Warranty (2 years)

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3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Initial Inspection

Before motherboard installation, ensure that the following items are included in your shipment:

- 1 x Startup manual
- 2 x Serial ATA HDD data cables
- 2 x Serial ATA HDD power cables
- 1 x COM cable (for connection to rear panel)
- 1 x I/O port bracket
- 1 x Warranty card
- 1 x Screw for M.2 device

If any of these items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected ASMB-788 mechanically and electrically before shipment. The product should be free of marks and scratches and in perfect working order upon receipt. When unpacking ASMB-788, check the product for signs of shipping damage (for example, damaged box, scratches, dents, etc.). If the product is damaged or fails to meet the specifications, notify our service department or your local sales representative immediately. Also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection, we will make arrangements to repair or replace the unit.

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Chapter 1

Hardware Configuration

1.1 Introduction

Advantech's ASMB-788 motherboard is equipped with the advanced Intel® W680 chipset for industrial server applications. It supports Intel® 12th, 13th, and 14th Gen Core™ i9/i7/i5/i3 processors with up to 128 GB of DDR5 (288-pin) 4400/4000/3600 MHz ECC/non-ECC memory. The ASMB-788 also provides Intel® HD graphics integrated into the processor. The graphics VRAM features 1 GB of shared memory when at least 2 GB of system memory is installed.

The ASMB-788 offers up to seven slots (1 x PCIe x16 Gen 5 slot via the processor, 3 x PCIe x4 Gen 4, 1 x PCIe x4 Gen 3, and 2 x PCI) through the Intel® W680 platform controller hub (PCH). Additionally, the ASMB-788 provides up to 4 x Gigabit Ethernet LAN via a dedicated PCIe bus with up to 500 MB/s bandwidth.

With the Intel® W680 chipset, the ASMB-788 supports 4 x onboard SATA III interfaces (600 MB/s bandwidth) with software RAID, 7 x USB 3.2 ports, 6 x USB 2.0 ports, and 1 x M.2 (PCIe).

The ASMB-788 features Advantech's patented sleep mode control circuit for AT power mode.

1.2 Features

- **Triple display:** 1 x VGA, 1 x DVI-D, and 1 x HDMI port, with support for three simultaneous display outputs.
- **PCIe architecture:** 1 x PCIe x16 (Gen 5 x16 link) slot via the processor, as well as 4 x PCIe x4 slots (3 x Gen 4 x4 links and 1 x Gen 3 x4 link) via the Intel® W680 PCH.
- **High-performance I/O:** Quad or dual Gigabit LAN via the PCIe bus, 7 x USB 3.2 ports (5 x Gen 2 and 2 x Gen 1, including one Type-A), 6 x USB 2.0 ports (including one Type-A port), and 4 x SATA III connectors.
- **Standard ATX form factor with industrial-grade features:** Long product life, wide operating temperature range, and watchdog timer functions.
- **Automatic power on after power failure:** Power resume after a system power failure. Advantech's industrial server board allows users to set the system to power on automatically. (Refer to Section 1.8.1.1 "ATX/AT mode selector" for additional details.)
- **Active management technology:** The hardware and firmware based solution is powered by the system auxiliary power plane to facilitate remote monitoring of networked systems. Intel® Active Management Technology (iAMT) stores hardware and software information in non-volatile memory. Built-in management provides out-of-band management capabilities, allowing remote discovery and KVM to repair systems after an OS failure. Alert and event logging features detect problems and reduce system downtime by pro-actively blocking incoming threats, quarantining infected clients, and notifying users when critical software agents are removed. To enable iAMT, refer to Section 3.3.4.1 "AMT Configuration" in the BIOS operation chapter.

1.3 Specifications

1.3.1 CPU

- Supports an Intel® 12th/13th/14th Gen Core™ i9/i7/i5/i3 CPU in an LGA1700 socket.
- Max. TDP support up to 125 W.

Note! For Microsoft Windows OS, Windows 10 (64-bit), Windows 11 (64-bit) and Windows Server 2022 (64-bit) are supported on this platform.



1.3.2 PCH

- **System chipset:** Intel® W680
- **SATA HDD interface:** 4 x on-board SATA III connectors support Advanced Host Controller Interface (AHCI) technology and Intel Rapid Storage Technology (RST) for software RAID 1, 0, 10, and 5 with data transmission rates of up to 600 MB/s.

1.3.3 Memory

- **RAM:** Up to 128 GB in 4 x 288-pin DIMM sockets; supports dual-channel DDR5 ECC/non-ECC 4400/4000/3600 unbuffered DIMMs.

- Note!**
1. Because of the inherent limitations of the PC architecture, the system may not detect the full 128 GB of RAM when 128 GB RAM is installed.
 2. When both channel 0 and channel 1 are occupied, memory works in dual-channel mode and improves performance. Therefore, also considering motherboard memory layout, the recommended DIMM configurations are:



Table 1.1: Quantity of memory modules installed

	1	2	4
Socket/Color			
DIMM A0 (Black)			V
DIMM A1 (Blue)	V	V	V
DIMM B0 (Black)			V
DIMM B1 (Blue)		V	V

Maximum memory frequency support:

- *4800 MT/s or higher
Only available for motherboard with 1DPC design, which is NOT supported.
- *4400 MT/s
Maximum frequency can be supported when installing 1 DIMM per channel, total 2 DIMMs installed on DIMMA1 & DIMMB1 slots.
- *4000 MT/s
Maximum frequency can be supported when installing 2 x 1R DIMM per channel, total 4 DIMMs on motherboard.

- ***3600 MT/s**
Maximum frequency can be supported when installing 2 x 2R DIMM per channel, total 4 DIMMs on motherboard.

If you need more information, please find the FAQ on the product page on Advantech's website.

1.3.4 Input/Output

- **PCIe slot:** 1 x PCIe x16 slot (GEN5 x16 link), plus 4 x PCIe x4 slots (3 x Gen4 x4 link and 1 x Gen 3 x4 link).
- **M.2 connector:** 1 x M.2 connector (PCIe Gen4 x4 link) provides 16 GT/s bandwidth.
- **Serial port:** 6 x serial port onboard headers (one can be used for the rear I/O port bracket via a COM cable connection), supports only RS-232.
- **USB:** 7 x USB 3.2 ports that support data transmission speeds of up to 10 Gbps and 6 x USB 2.0 ports that support transmission speeds of up to 480 Mbps.
- **SPI:** 1 x SPI connector supports Advantech TPM modules (P/N: PCA-TPMSPI-00A1).
- **GPIO:** ASMB-788 supports 8-bit GPIO super I/O for general-purpose control applications.
- **PCI slot:** 2 x PCI slot, 32-bit, 33 or 66 MHz PCI 2.2 compliant (clock speed can be selected by jumper JPCICLK1).

1.3.5 Graphics

- **Graphics processor:** Integrated Intel® HD Graphics.
- **Display memory:** 1 GB maximum shared memory with 2 GB and above system memory installed (BIOS default is 256 MB).
- **DVI-D:** Up to 1920x1200 resolution @ 60 Hz refresh rate.
- **D-Sub:** Up to 1920x1200 resolution @ 60 Hz refresh rate.
- **HDMI:** Supports HDMI 2.0 with up to 4096x2160 resolution @ 60 Hz refresh rate.

1.3.6 Ethernet LAN

- **Interface:** Supports 4 x 10/100/1000 Mbps Ethernet port (s) via PCIe bus which provides a 500 MB/s data transmission rate.
- **Controller:** LAN1: Intel® I219-LM; LAN2 ~ 4: Intel® I210-AT (LAN2 is BMC shared NIC and LAN3/4 is for G4 SKU).

1.3.7 Industrial Features

- **Watchdog timer:** The watchdog timer is programmable, with each unit equal to one second or minute (255 intervals), and can be used to generate a system reset or NC (Not Connected).
- **IPMI:** AST2600 BMC onboard support enables IPMI 2.0 features (G4 SKU only).

1.3.8 Mechanical and Environmental Specifications

- **Operating temperature:** 0 ~ 60°C (32 ~ 140°F) depending on CPU.
- **Storage temperature:** -40 ~ 85°C (-40 ~ 185°F).
- **Humidity:** 5 ~ 95% non-condensing.
- **Power supply:** +3.3 V, +5 V, ±12 V, 5 V_{SB}.

- **Power consumption:**
Max. load: +3.3 V @ 2.05 A, +5 V @ 1.69 A, +12 V @ 0.36 A, +12 V (8P) @ 13 A, +5 V_{SB} @ 0.1 A.
- **Board dimensions:** 304.8 x 244 mm (12 x 9.6 in).
- **Board weight:** 0.75 kg (1.65 lb).

1.4 Jumpers and Connectors

The ASMB-788 motherboard features connectors for integrating external devices, such as a hard disk drive or keyboard. Moreover, the board also has a number of jumpers that can be used to configure the system for specific applications.

The function of each jumper and connector is listed in the tables below. Instructions for setting jumpers are provided in subsequent sections. For information regarding connecting external devices to the motherboard, refer to Chapter 2.

Table 1.2: Jumper List

Label	Function
JCMOS1	CMOS clear
JFV1	VGA is forced on
JME1	Intel ME disable jumper for ME/BIOS update
JPCICLK1	PCI slot 66MHz clock: Enable (1-2)/Disable (2-3)
JPEG1	PCIEx16_SLOT6 PCIe link switch between x16 or x8x8 (for riser card)
JPSMB1, JPSMB2	PCIE SLOT SMBUS connector: to PCH (1-2)/to BMC (2-3)
JSMB1	For RD debugging
JTHR_SEL1	To select on board or external thermometer
JUSB_1	Rear window USB 3.2 Gen2 port power source switch between +5 V _{SB} and +5 V
JUSB_2	On board USB 2.0/3.2 Gen1 port power source switch between +5 V _{SB} and +5 V
JWDT1	Watchdog reset
PERSON1	AT(1-2)/ATX (2-3)

Table 1.3: Connector List

Label	Function
ATXPWR1	ATX 24-pin main power connector (for system)
ATX12V1	8-pin power connector (for CPU)
AUDIO2	Audio connector
BAT1	For RTC battery
BAT2	For optional battery kit
BIOS_SKT1	BIOS SPI ROM
BMC_DEBUG1	For RD debugging
BMC_SPI1	BMC image ROM
BMC_UART1	BMC debug message
BMC_VGA1	BMC VGA connector (G4 SKU)
COM1, COM2, COM3_4, COM5_6	Serial port: RS-232
CPUFAN0	CPU FAN connector

Table 1.3: Connector List

DIMMA0,DIMMA1, DIMMB0,DIMMB1	DDR5 288-pin slot
DVI1	DVI-D connector
ESPI1	For RD debugging
EX_THR1	For external thermistor cable kit
FPAUD1	Audio front panel header
GPIO1	8-bit GPIO header
HDMI1_VGA1	HDMI + VGA connector
JCASE1	Case open
JFP1	To support 1U chassis (Cable P/N: 1700031926-11) Power Switch/Power Reset/Power LED/LAN1LED/LAN2LED/ HDD LED Power LED Behavior: - Suspend: Fast flash (ATX/AT) - System On: ON (ATX/AT) - System Off: OFF (ATX/AT)
JFP1+JFP2	Power Switch/ Power Reset/ External Speaker/ HDD LED/ SMBus connector
JFP3	Keyboard Lock and Power LED: - Suspend: Fast flash (ATX/ AT) - System On: ON (ATX/ AT) - System Off: OFF (ATX/AT)
LAN1_USB3C1, LAN2_USB3C2	LAN1/USB 3.2 Gen2 port 1, 2 stack connector LAN2/USB 3.2 Gen2 port 3, 4 stack connector
LAN3_LAN4	LAN3 & LAN4 connector (G4 SKU)
M2_2280_1	M.2 2280 (PCIe)
PCI_SLOT1, PCI_SLOT2	PCI slot
PCIEX4_SLOT4	PCIe x4 slot (Gen3 x4)
PCIEX4_SLOT3, PCIEX4_SLOT5, PCIEX4_SLOT7	PCIe x4 slot (Gen4 x4)
PCIEX16_SLOT6	PCIe x16 slot (Gen5 x16)
PMBUS1	PMBUS connector to communicate with power supply
SATA0~3	SATA III (6 Gb/s)
SMBUS1	SMBus connector
SPDIF_OUT1	SPDIF audio output pin header
SPI_CN1	SPI flash card pin header (for RMA)
SPI_TPM1	SPI connector for Advantech TPM 2.0 module (P/N: PCA-TPM- SPI-00A1)
SYSFAN0,SYSFAN1, SYSFAN2,SYSFAN3	System FAN connector
SYS_LED1	System information LED connector
USB3A1	USB 3.2 Gen1 (USB Type-A)
USB2H1, USB2H2, USB2H3	USB 2.0 (Header)
USB3H1	USB 3.2 Gen1(Header)
VOLT1	Voltage detection

1.5 Jumper and Connector Locations

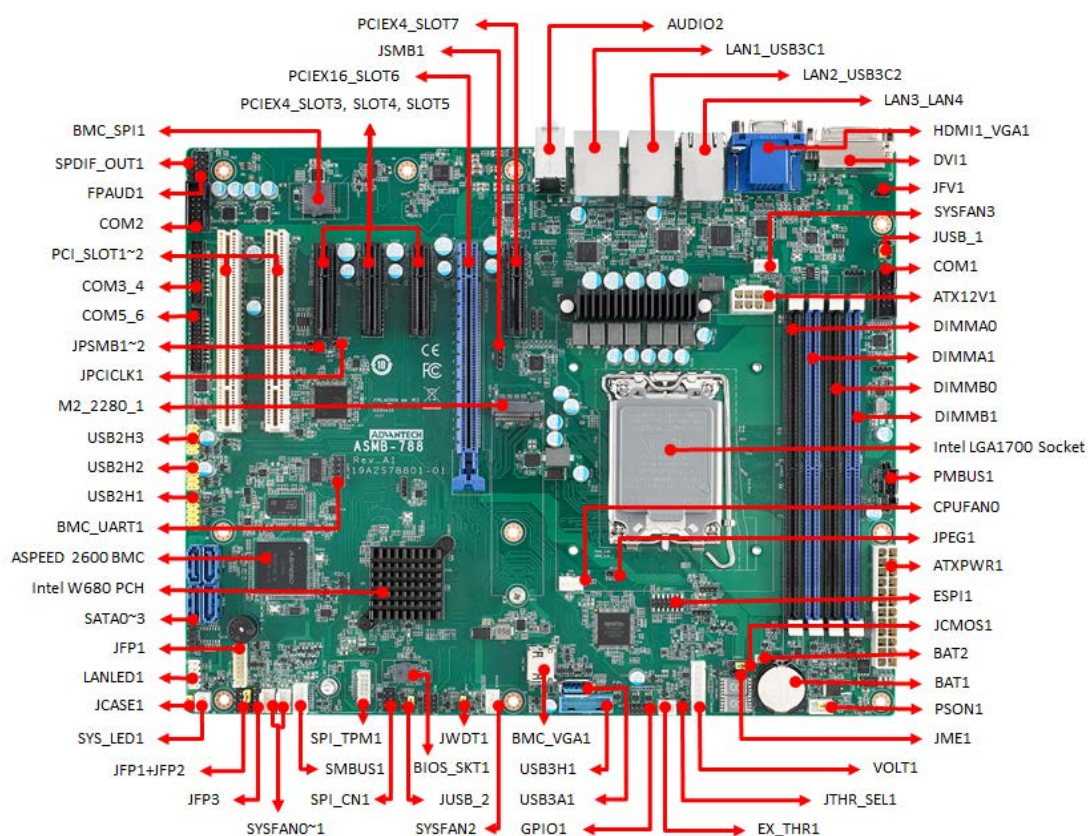


Figure 1.1 Jumper and Connector Locations

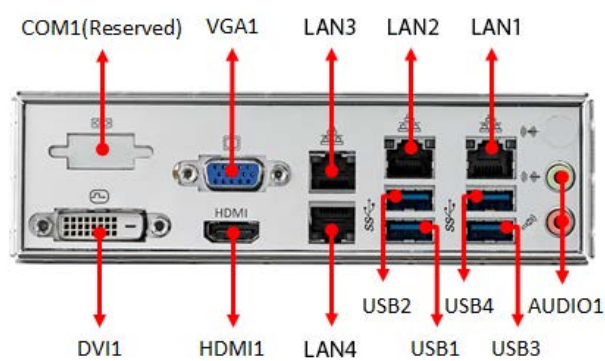
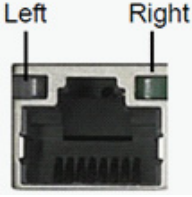


Figure 1.2 I/O Connectors (G4 SKU)

1.5.1 Onboard LAN LED Definition

Table 1.4: Onboard LAN LED Definition (LAN1 ~ LAN4)

10/100/1000 Mbps LAN Link/Activity LED Scheme

		Left LED	Right LED
10 Mbps	Link Active	Off Off	Green Blinking green
100 Mbps	Link Active	Amber Amber	Green Blinking green
1000 Mbps	Link Active	Green Green	Green Blinking green
No Link		Off	Off

1.5.2 Onboard LEDs (LED2, LED3, LED4)

ASMB-788 features an onboard power LED indicator for 5V Power, 5V Standby, and 3.3V AUX modes.

Table 1.5: Onboard LEDs (LED2, LED3, and LED4)

LED	Description	LED Definition	
		OFF	ON (Green)
5V_LED2	Power on LED	Power off	System is ON
5VSB_LED3	Standby LED	No input AC power	System is ON, in sleep mode, or in soft-off mode
3V3DSW_LED4	Deep sleep well LED	No input AC power, deep sleep mode enabled	System is ON, in sleep mode, in soft-off mode, or deep sleep mode disable

1.6 ASMB-788 Block Diagram

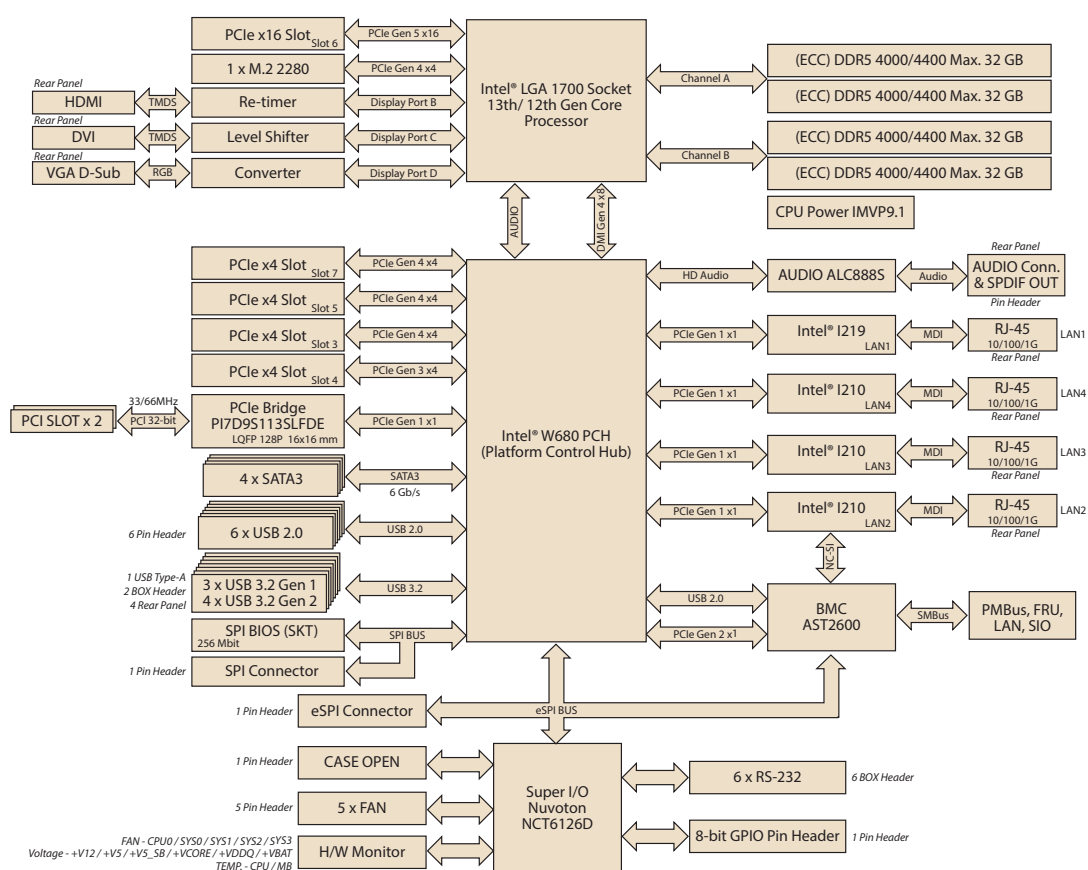


Figure 1.3 ASMB-788 Block Diagram

1.7 Safety Precautions

Warning! *Always completely disconnect the power cord from the chassis before manually handling the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.*



Caution! *Always ground yourself to remove any static charge before touching the motherboard. Modern electronic devices are very sensitive to static electric discharges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.*



Caution! *The computer is provided with a battery-powered real-time clock circuit. Batteries are at risk of exploding if incorrectly replaced. Replace only with same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*



Caution! *There is a danger of a new battery exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery.*



1.8 Jumper Settings

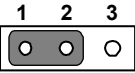
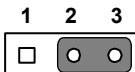
This section provides instructions on how to configure the motherboard by setting the jumpers. An explanation of the motherboard default settings and options for each jumper is also provided.

1.8.1 How to Set Jumpers

Users can configure the motherboard according to specific application needs by setting the jumpers. A jumper is a metal bridge that closes an electrical circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To “close” (or turn on) a jumper, connect the pins with the clip. To “open” (or turn off) a jumper, remove the clip. Some jumpers consist of a set of three pins labeled 1, 2, and 3. With these jumpers, either connect pins 1 and 2, or 2 and 3. A pair of needle-nose pliers may be useful when setting jumpers.

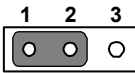
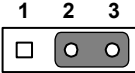
1.8.1.1 ATX/AT Mode Selector (PSON1)

The ASMB-788 is equipped with a jumper that can support ATX or AT modes. This jumper is set with pin 2-3 closed as the default. To change to AT mode, set PSON to 1-2 closed.

Table 1.6: ATX/AT Mode Selector (PSON1)	
Function	Jumper Setting
AT Mode	 1-2 closed
ATX Mode*	 2-3 closed
*Default setting	

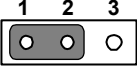
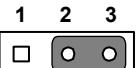
1.8.1.2 CMOS Clear (JCMOS1)

The ASMB-788 motherboard is equipped with a jumper that can erase CMOS data and reset the system BIOS information. This jumper is set with pins 1-2 closed as a default. To reset the CMOS data, set JCMOS1 to 2-3 closed for just a few seconds, and then move the jumper back to 1-2 closed. This will reset the CMOS to its default setting.

Table 1.7: CMOS Clear (JCMOS1)	
Function	Jumper Setting
Keep CMOS data*	 1-2 closed
Clear CMOS data	 2-3 closed
*Default setting	

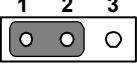
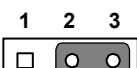
1.8.1.3 External Thermal Sensor (JTHR_SEL1)

The ASMB-788 is equipped with a jumper that can support on board thermistor or external thermistor cable. This jumper is set with pin 1-2 closed as the default. To change to external thermistor cable, set JTHR_SEL1 to 2-3 closed.

Table 1.8: External Thermal Sensor (JTHR_SEL1)	
Function	Jumper Setting
Onboard thermistor*	 1 and 2
External thermistor	 2 and 3
*Default setting	

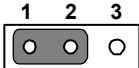
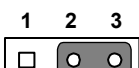
1.8.1.4 ME Update (JME1)

The ASMB-788 is equipped with a jumper that can update the ME firmware. This jumper is set with pin 1-2 closed as a default. To update the ME firmware, set JME1 to 2-3 closed to disable ME for new ME firmware updates.

Table 1.9: ME Update (JME1)	
Function	Jumper Setting
Lock ME update*	 1-2 closed
ME update	 2-3 closed
*Default setting	

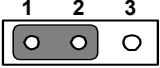
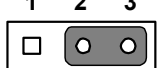
1.8.1.5 PCIe Link Switch (JPEGL)

The ASMB-788 is equipped with a jumper that can switch one PCIe x16 link on PCIEX16_SLOT6 for corresponding riser card. For details regarding the jumper settings to support a riser card, refer to Table 1.10: PCIEX16_SLOT6 Configuration for Riser Card (JPEGL).

Table 1.10: PCIe Link Switch (JPEGL)		
Function	JPEGL	Riser Card Support
Slot6 PCIe x16*	 1-2 closed	1U: ASMB-RF1F-10B1 2U: ASMB-RF2F-10B1
Slot6 PCIe x8/x8	 2-3 closed	2U: ASMB-RF28-20B1
*Default setting		

1.8.1.6 PCIe SMBus Connection Setting (JPSMB1, JPSMB2)

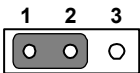
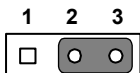
Please use configuration of (2-3: PCIe to BMC) on both JPSMB1&2 if there was RAID card and memory conflict issue.

Table 1.11: PCIe SMBus Connection Setting (JPSMB1, JPSMB2)	
Function	Jumper Setting
PCIe to PCH	 1-2 closed
PCIe to BMC*	 2-3 closed
*Default setting	

1.8.1.7 USB Power Switch (JUSB_1, JUSB_2)

The ASMB-788 is equipped with a jumper that supports a +5 V_{SB} or +5 V power source for onboard USB ports. The JUSB_1 jumper controls the USB 3.2 Gen2 ports of the rear window. The JUSB_2 jumper controls the USB 2.0 and USB 3.2 Gen1 ports of the onboard headers and connectors. The default setting is 1-2 closed, which supports USB standby power under S5. When the jumper is 2-3 closed, the onboard USB port power source will switch to +5 V to disable USB standby power under S5, and under 2-3 closed, which does not support S3 and S4 modes.

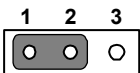
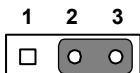
Table 1.12: USB Power Switch (JUSB_1, JUSB_2)

Function	Jumper Setting
+5 V _{SB} *	 1-2 closed
+5 V	 2-3 closed
*Default setting	

1.8.1.8 VGA Force Type (JFV1)

The ASMB-788 contains an optional VGA dummy load feature set by the JFV1 jumper. The default setting is disabled. If JFV1 is set to enable, a dummy monitor on the VGA port is created to prevent the on-board graphics from being switched off while no physical monitors are connected. This function is useful when you control the ASMB-788 via remote KVM (such as Intel® AMT) and do not intend to connect any monitors.

Table 1.13: VGA Force Type (JFV1)

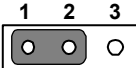
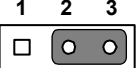
Function	Jumper Setting
VGA force on	 1 and 2 closed
Normal operation*	 2 and 3 closed
*Default setting	

Note! We recommend leaving this function to “Normal operation” if you use DVI/HDMI as your main display.



1.8.1.9 Watchdog Timer Output (JWDT1)

The ASMB-788 is equipped with a watchdog timer that will reset the CPU. This feature means that the ASMB-788 motherboard can recover from a software failure or EMI problem. The JWDT1 jumper settings control the actions taken in the event that the watchdog timer is tripped.

Table 1.14: Watchdog Timer Output (JWDT1)	
Function	Jumper Setting
Reset*	 1-2 closed
NC	 2-3 closed
*Default setting	

Note! The interrupt output of the watchdog timer is a low-level signal that remains low until the watchdog timer is reset.



1.9 System Memory

The ASMB-788 motherboard features four 288-pin memory sockets for DDR5 unbuffered ECC/non-ECC 4400/4000/3600 MHz memory modules and supports a maximum capacity of 128 GB (32 GB for each DIMM).

Note! ASMB-788 does NOT support registered DIMMs (RDIMMs).



Table 1.15: Quantity of memory module installed			
	1	2	4
Socket/Color			
DIMM A0 (Black)			V
DIMM A1 (Blue)	V	V	V
DIMM B0 (Black)			V
DIMM B1 (Blue)		V	V

Chapter 2

Connecting Peripherals

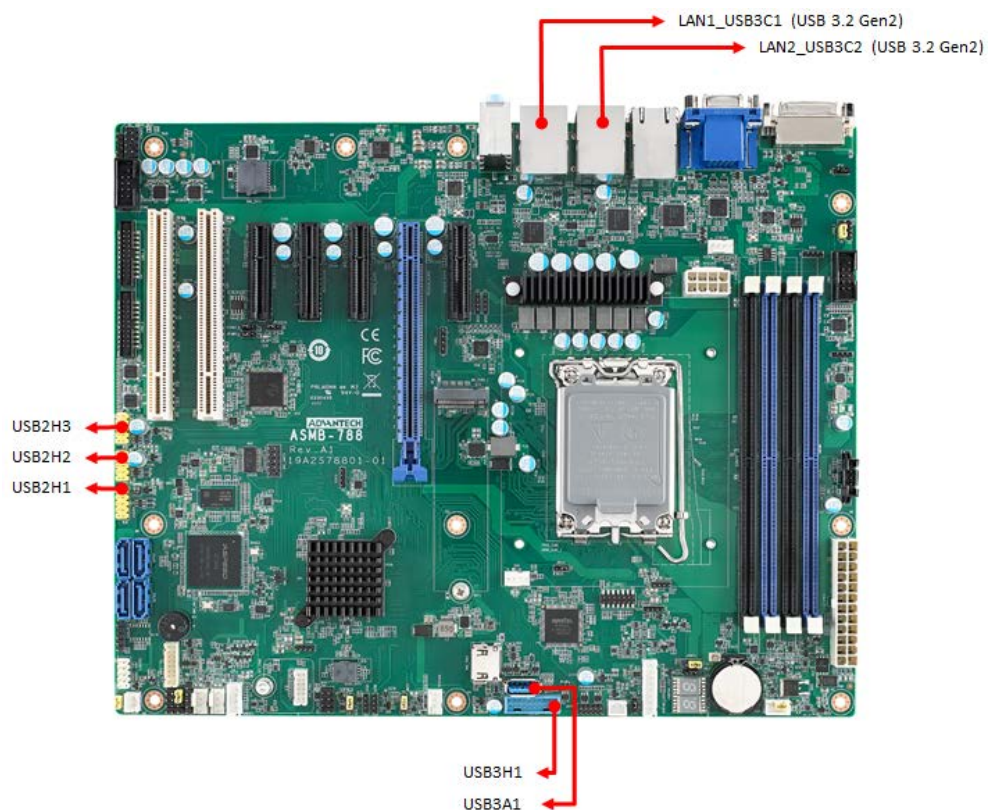
2.1 Introduction

Most connectors can be accessed from the top of the motherboard during installation in the chassis. If multiple cards are installed, users may need to partially remove one card in order to implement all the connections.

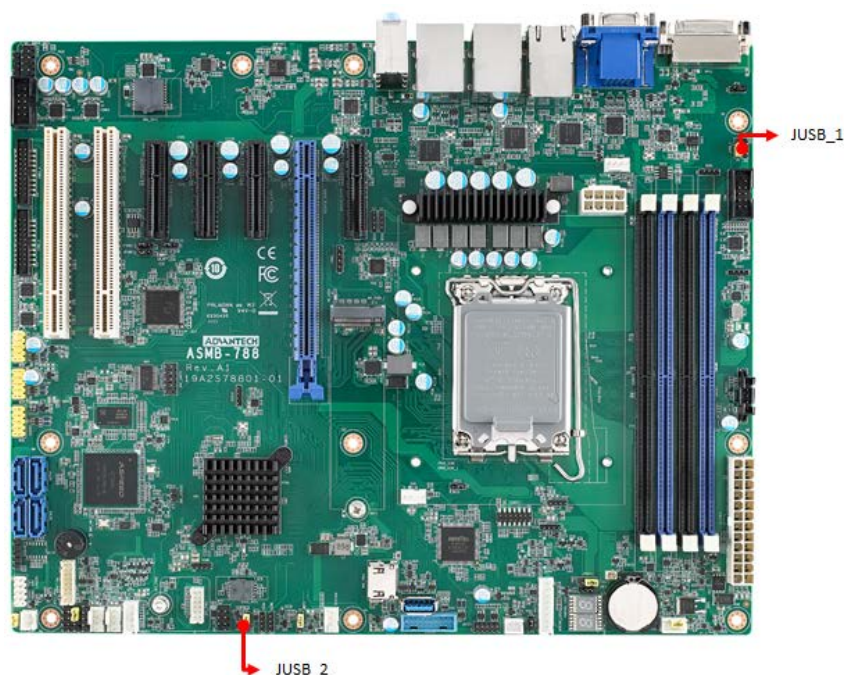
2.2 USB Ports (LAN1_USB3C1, LAN2_USB3C2, USB3A1, USB3H1, USB2H1, USB2H2, USB2H3)

The ASMB-788 provides up to 13 x USB ports. USB2H1~3 are USB 2.0 ports that support data transmission rates of up to 480 Mbps, USB3C1~2 are USB 3.2 Gen2 ports with transmission rates of up to 10 Gbps, and USB3H1 & USB3A1 are USB 3.2 Gen1 ports with transmission rates of up to 5 Gbps. These ports support plug-and-play functionality and hot swapping for up to 127 external devices, which can be disabled in the BIOS menu.

The ASMB-788 motherboard is equipped with two (G2 SKU) or four (G4 SKU) high-performance 1000 Mbps Ethernet LANs supported by all major network operating systems. The RJ-45 jacks on the rear plate provide convenient 1000 Mbps operation. If all USB ports are used, we recommend switching the USB power to +5 V instead of +5 V_{SB}.



2.3 USB Power Switch (JUSB_1, JUSB_2)



The ASMB-788 allows users to switch the USB power between $+5 V_{SB}$ and $+5 V$.

When the jumper is set as $+5 V$, the board does not support S3/S4. Refer to Section 1.8.1.7 “USB Power Switch” for information regarding the jumper settings.

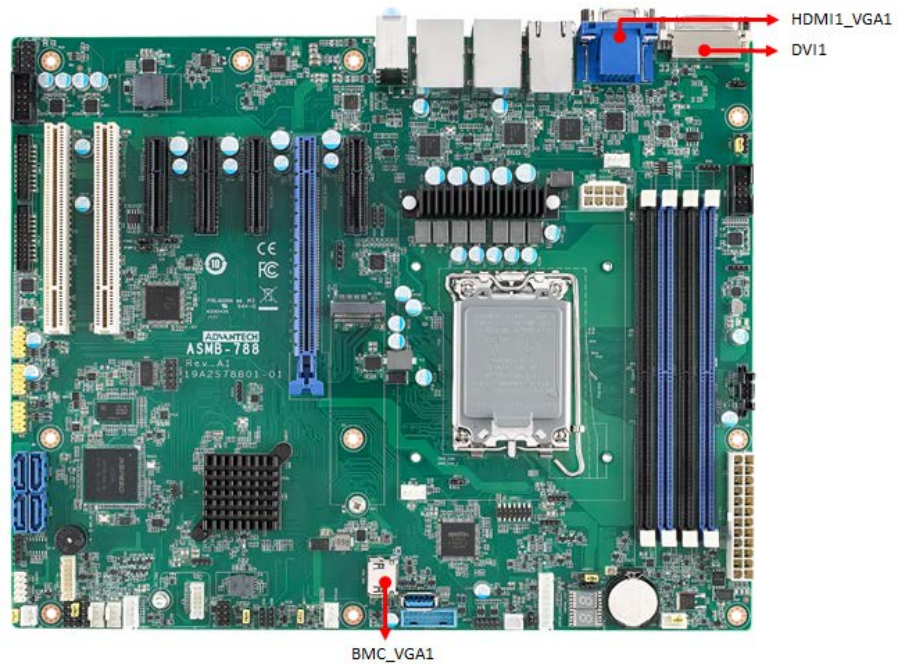
Table 2.1: USB Power Switch (JUSB_1, JUSB_2)

Jumper	USB Ports
JUSB1	Rear window USB 3.2 Gen2 port power source switch between $+5 V_{SB}$ and $+5 V$
JUSB2	Onboard USB 2.0/3.2 Gen1 port power source switch between $+5 V_{SB}$ and $+5 V$

Note! When the USB power is switched to $+5 V$, a powered KVM cannot be connected to the port.

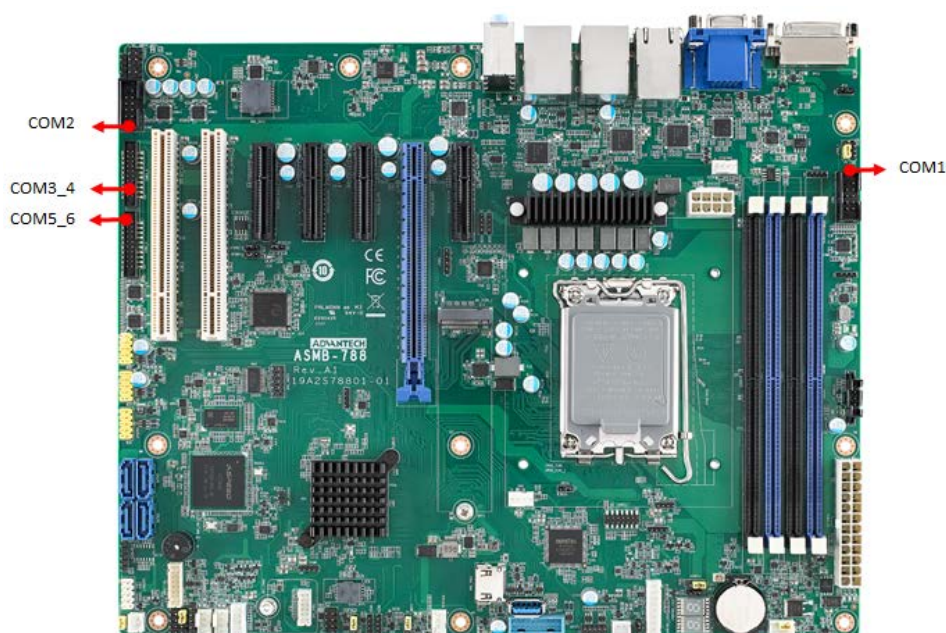


2.4 Display Connector (HDMI1_VGA1, DVI1, BMC_VGA1)



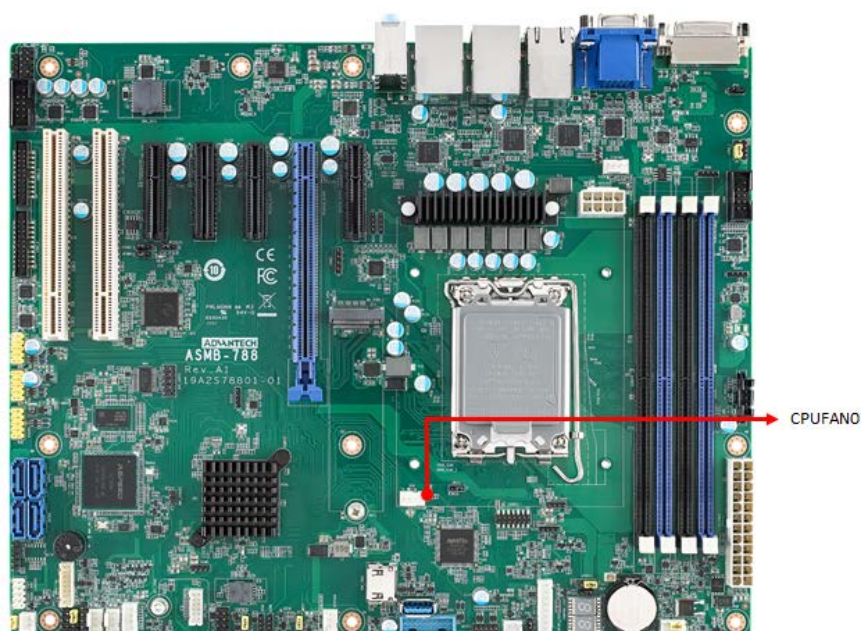
The ASMB-788 motherboard is equipped with VGA, DVI-D, and HDMI connectors to support triple display outputs. All display output ports can function simultaneously, however, the resulting performance may differ according to the OS. Additionally, one BMC VGA onboard connector (HDMI type) can support remote KVM displays with the inclusion of an optional VGA cable (P/N: 1700029038-01, for G4 SKU only). To enable this function, ensure that the BMC VGA driver is installed before connecting the VGA cable.

2.5 Serial Ports (COM1 ~ COM6)



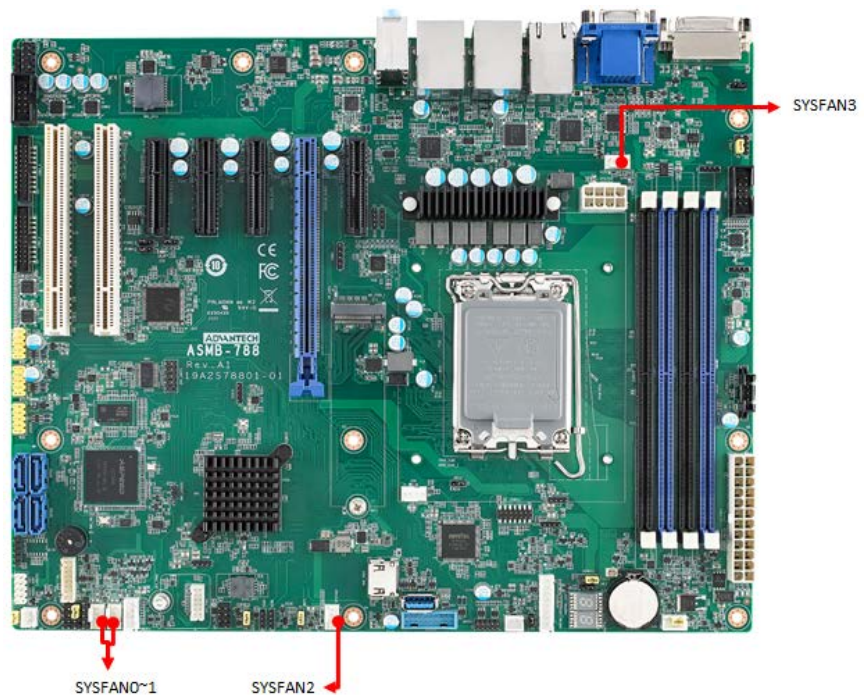
The ASMB-788 features six serial ports onboard (one can be connected to the rear panel using the dedicated COM cable kit provided in the accessory box) for connecting a serial mouse, printer, or communications network. The IRQ and address ranges for these ports are fixed. However, users can disable the ports or change their parameters via the system BIOS. Different devices implement the RS-232 standards in different ways.

2.6 CPU Fan Connector (CPUFAN0)



If a CPU fan is installed, this connector supports cooling fans that draw up to 2.5 A (30 W).

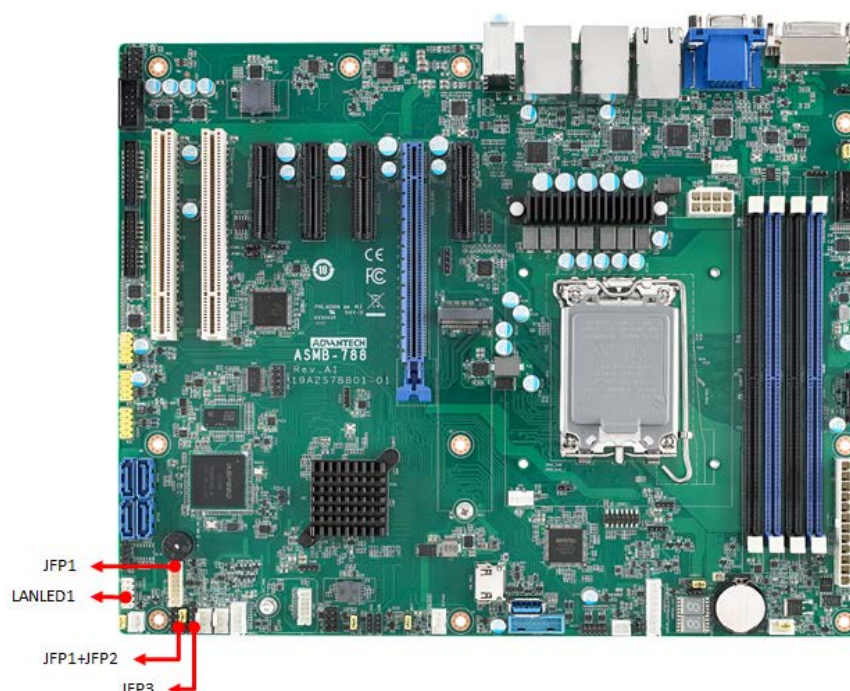
2.7 System FAN Connector (SYSFAN0 ~ SYSFAN3)



If a system fan is installed, this connector supports cooling fans that draw up to 2.5 A (30 W).

2.8 Front Panel Connectors (JFP1, JFP1+JFP2, JFP3, LANLED1)

Several external switches and LED indicators are provided for monitoring and controlling the ASMB-788 functions.



JFP1	3	6	9	12	PWRSW	RESET
&	2(+)	5(-)	8	11	HDDLED	SNMP SM_BUS
JFP2	1	4	7	10	SPEAKER	
JFP3	1	2	3	4	PWRLD & KEYLOCK	
	(+)	(-)				

2.0 mm JFP1 connector on board			
Description	Pin Number		Description
RST BTN	2	▼1	PWR BTN
RST GND	4	3	PWR GND
LAN1_LED+	5	6	LAN2_LED+
LAN1_LED-	8	7	LAN2_LED-
CRPS Detect (Reserved)	10	9	SYS_LED+ (Reserved)
GND	12	11	SYS_LED- (Reserved)
PWR_LED+	14	13	HDD_LED+
PWR_LED-	16	15	HDD_LED-

2.0 mm JFP1 connector to 2.54 mm Pitch Header			
Description	Pin Number		Description
(Red) PWR BTN	▼1	2	RST BTN (White)
(Black) PWR GND	3	4	RST GND (Black)
(Blue) LAN1_LED+	5	6	LAN2_LED+ (Brown)
(Red) LAN1_LED-	7	8	LAN2_LED- (Black)
		Key	
(Orang) HDD_LED+	13	14	PWR LED+ (Red)
(Black) HDD_LED-	15		
	Key	16	PWR LED- (Black)

2.8.1 ATX Soft Power Switch (JFP1 Pins 1 & 3, JFP1+JFP2 Pins 3 & 6)

If the computer case is equipped with an ATX power supply, users can connect the power on/off button on the computer case to pins 1 and 3 of JFP1, or pins 3 & 6 of JFP1+JFP2. This connection enables users to power the computer on and off.

2.8.2 Reset Connector (JFP1 Pins 2 & 4, JFP1+JFP2 Pins 9 & 12)

Many computer cases offer the convenience of a reset button. To enable this function, connect the reset button on the computer case to pins 2 and 4 of JFP1 or pins 9 & 12 of JFP1 + JFP2 .

2.8.3 Front Panel LAN Indicator Connector (JFP1 Pins 5~8, LANLED1)

Connect an LED to connector JFP1 to indicate when the LAN1 & LAN2 is active. Connect an LED to connector LANLED1 to indicate when the LAN1 ~ LAN4 is active.

2.8.4 HDD LED Connector (JFP1 Pins 13 & 15, JFP1+JFP2 Pins 2 & 5)

Users can connect an LED indicator to a JFP1 or JFP1 + JFP2 connector to show the HDD status.

2.8.5 Power LED (JFP1 Pins 14 & 16, JFP3 Pins 1 & 3)

Refer to Appendix B for detailed information regarding the pin assignments. If an ATX power supply is used, the system's power LED status will be as indicated as follows.

Table 2.2: Power LED (JFP1 Pins 14 & 16, JFP3 Pins 1 & 3)

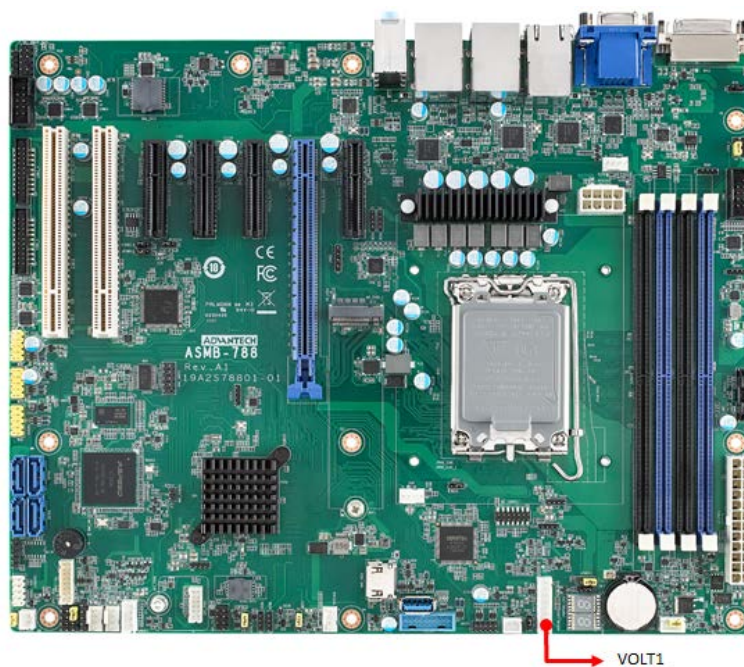
Power Mode	LED Status
System On	On
System Suspend	Fast flashing (S1, S3)/slow flashing (S4)
System Off	Off
System Off in Deep Sleep	Off

2.8.6 External Speaker (JFP1 + JFP2 Pins 1 & 4 & 7 & 10)

The JFP1 + JFP2 connector pins 1, 4, 7, and 10 are for integrating an external speaker.

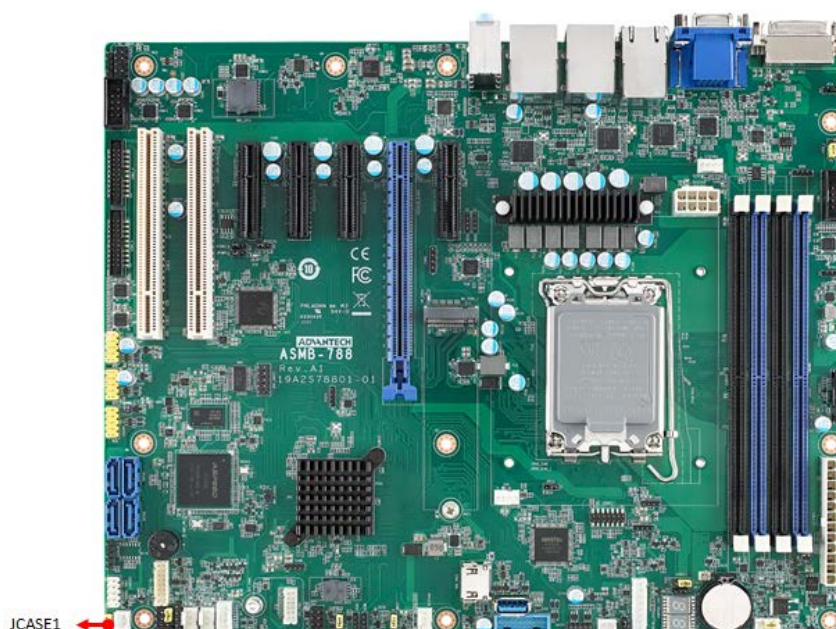
The ASMB-788 provides an on-board buzzer as an alternative. To enable the on-board buzzer, set pins 7-10 as closed.

2.9 Alarm Board Connector (VOLT1)



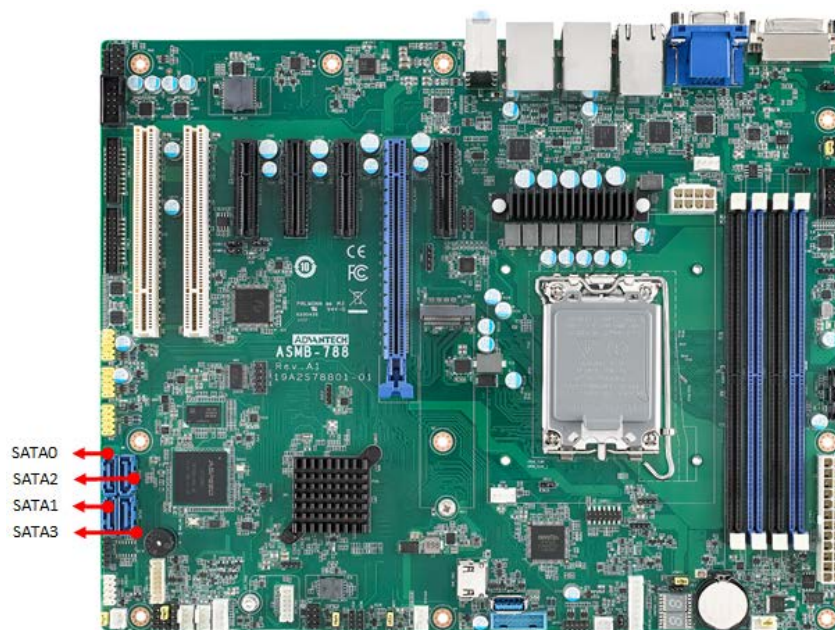
The 8-pin VOLT1 connector should be connected to the alarm board on the Advantech chassis. This alarm board monitors the input voltage at +12 V, +5 V, +5 V_{SB}, -5 V, +3.3 V and -12 V, and issues warning alerts if the power supply fails.

2.10 Case Open Connector (JCASE1)



JCASE1 is for a chassis with a case open sensor. The default setting for JCASE1 is shorted by a jumper and disabled in the BIOS. To enable JCASE1, remove the jumper and connect JCASE1 to the chassis using an appropriate cable. Then change the BIOS settings to enable the case open function. If the chassis is opened, the BIOS will issue a warning message alerting of a chassis intrusion during system reboot and post screen.

2.11 Serial ATA Interface (SATA0 ~ 3)

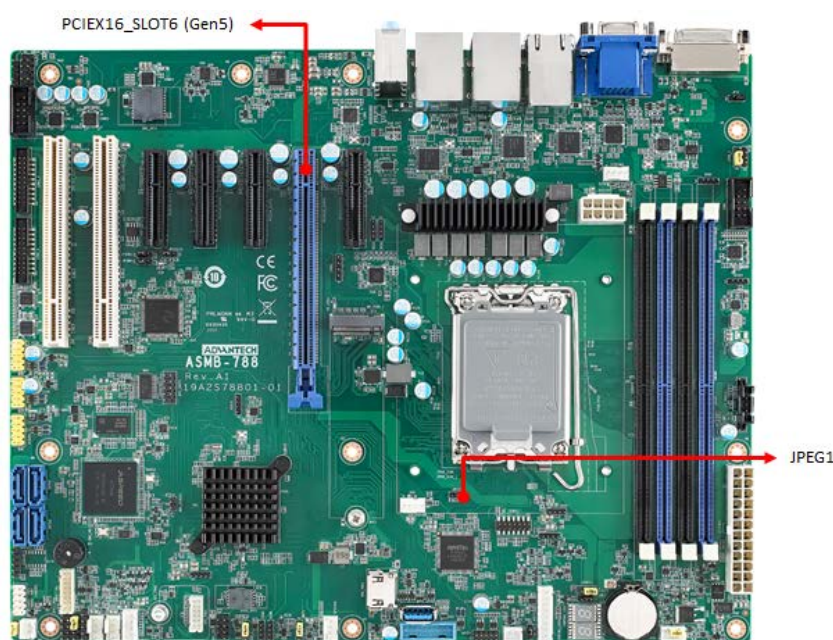


The ASMB-788 features eight high-performance serial ATA III interfaces (up to 600 MB/s) for massive storage applications. Software RAID 0, 1, 10, and 5 can be supported with Intel® RST (Rapid Storage Technology).

Table 2.3: SATA storage mapping table

Connector Label	BIOS Menu	Intel Rapid Storage Technology
SATA0	SATA4	Internal empty port 4
SATA1	SATA5	Internal empty port 5
SATA2	SATA6	Internal empty port 6
SATA3	SATA7	Internal empty port 7

2.12 PCIe x16 Expansion Slots (PCIEX16_SLOT6)

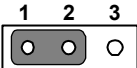
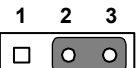


The ASMB-788 provides one PCIe x16 slot (Gen5 x16 link) for users to install additional VGA cards for applications that require increased graphics performance than that offered by the CPU embedded graphics controller, or that require high-bandwidth I/O cards, such as a frame grabber card, RAID card, or 10G LAN card.

Note!  Some legacy cards may be incompatible with Windows 10 when the BIOS CSM configuration is set to Legacy mode. Contact your local field application engineer for technical support.

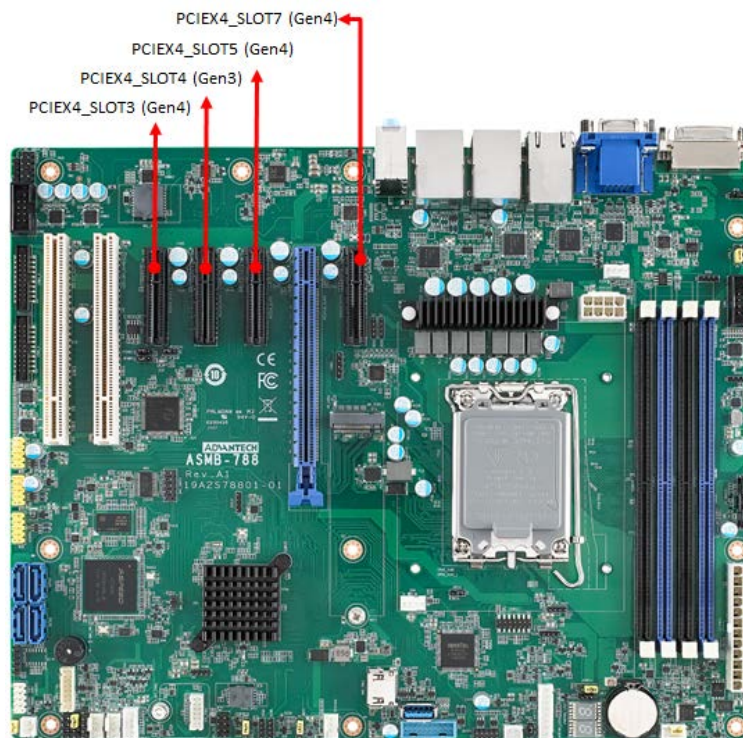
Change the JPEG1 jumper settings if support for a Slot 6 riser card is required.

Table 2.4: PCIe x16 Expansion Slots (PCIEX16_SLOT6)

Function	JPEG1	Riser Card Support
PCIe x16*	 1-2 closed	1U: ASMB-RF1F-10B1 2U: ASMB-RF2F-10B1
PCIe x8/x8	 2-3 closed	2U: ASMB-RF28-20B1
*Default setting		

Note!  *PCIe slot power budget:*
 PCIEX16_SLOT6 → 75W
 Due to there is a specific PCIe lane design for ASMB-RF28-20B1, the PCIe index number showing on PCB is reversed to BIOS setup page.

2.13 PCIe x4 Expansion Slots (PCIEX4_SLOT3~5, PCIEX4_SLOT7)



PCIEx4_SLOT3, PCIEx4_SLOT5 and PCIEx4_SLOT7 feature a Gen4 x4 link, PCIex4_SLOT4 features Gen3 x4 link. Cards with higher speeds can be installed but will have to be downgraded for the x4 link.

Note! *PCIe slot power budget:*



PCIEX4_SLOT3→25W

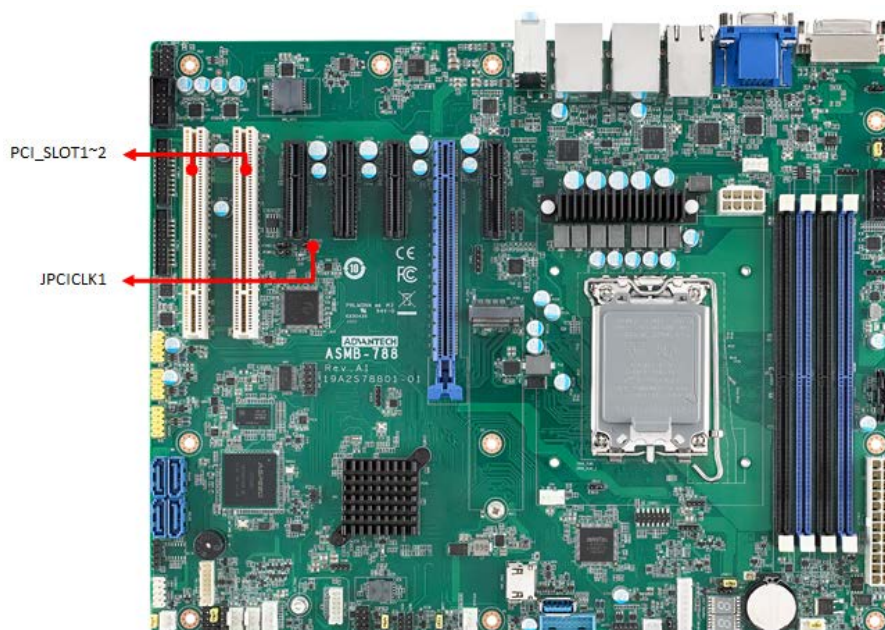
PCIEX4_SLOT4→25W

PCIEX4_SLOT5→25W

PCIEX4_SLOT7→25W

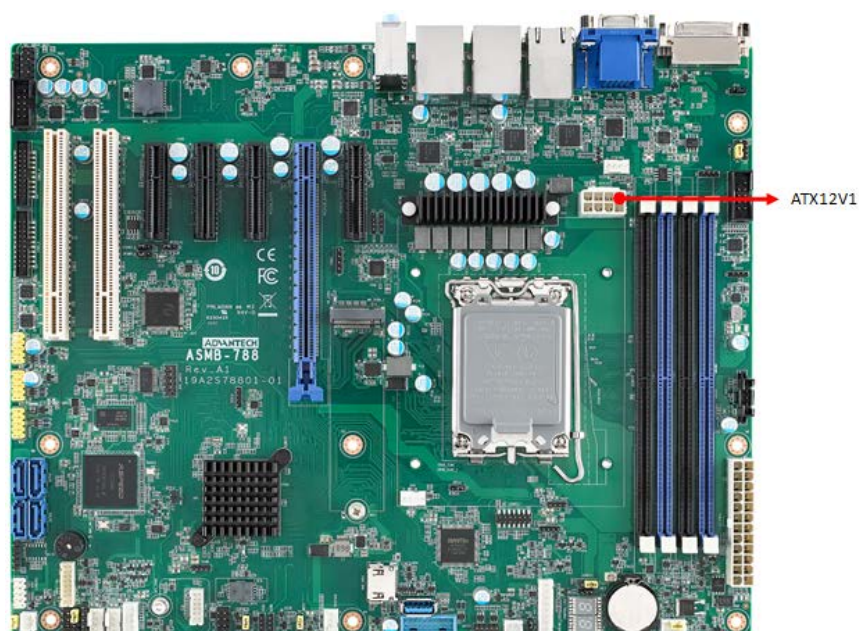
2.14 PCI Expansion Slots (PCI_SLOT1 ~ 2)

There are two 32-bit PCI slots on the ASMB-788, and the default clock is 33 Mhz. The PCI clock can be toggled between 33 or 66 MHz by the JPCICLK1 jumper.



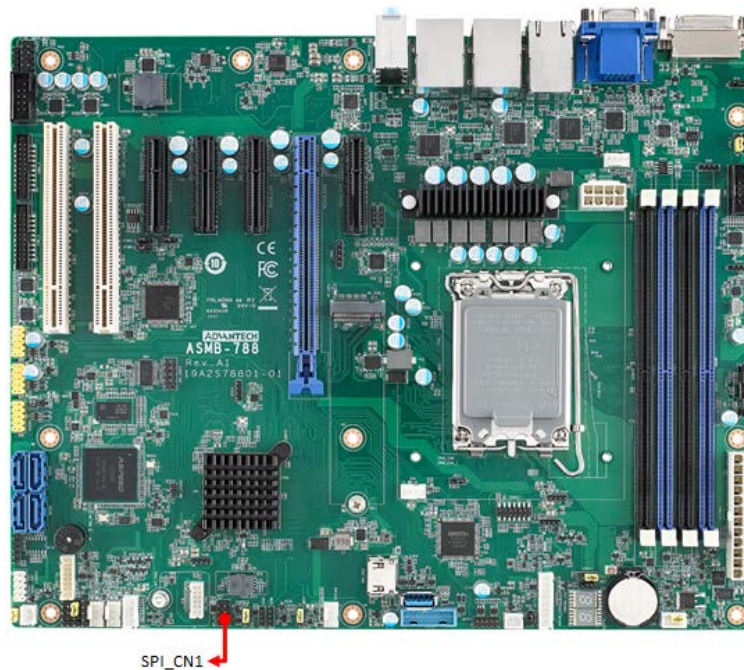
2.15 Auxiliary Power Connector (ATX12V1)

This power connector is used to supply energy to the processor. We recommend using a power supply unit (PSU) that complies with ATX 12V Specification 2.0 (or a later version). Remember to connect the 8-pin power plug, or a 4-pin-to-8-pin converter cable (P/N:1700019748).

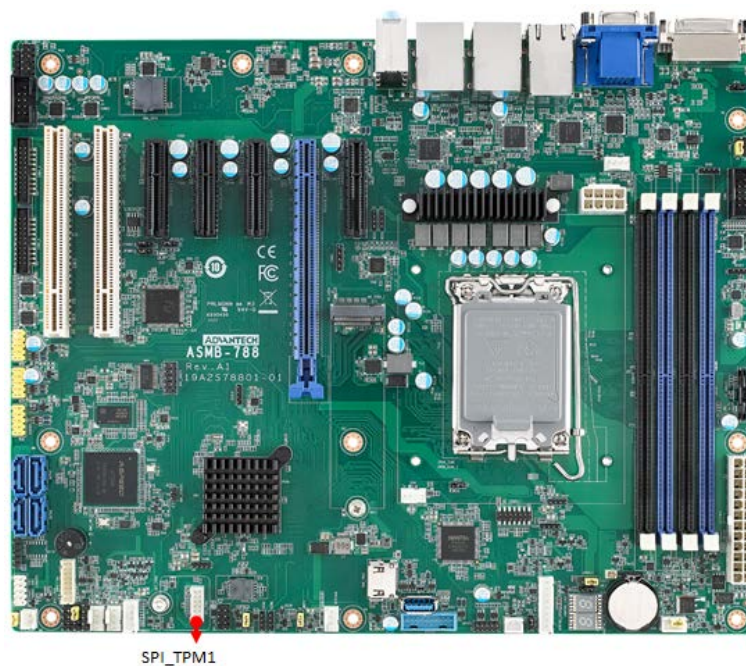


2.16 SPI Flash Connector (SPI_CN1)

The SPI flash programmer pin header (for RMA) can be connected to the BIOS-flashing tools for flashing the BIOS. Remember to power off the ASMB-788 motherboard before flashing the BIOS.



2.17 Serial Peripheral Interface Connector (SPI_TPM1)



The LPC connector on the ASMB-788 motherboard is reserved for Advantech's TPM module.

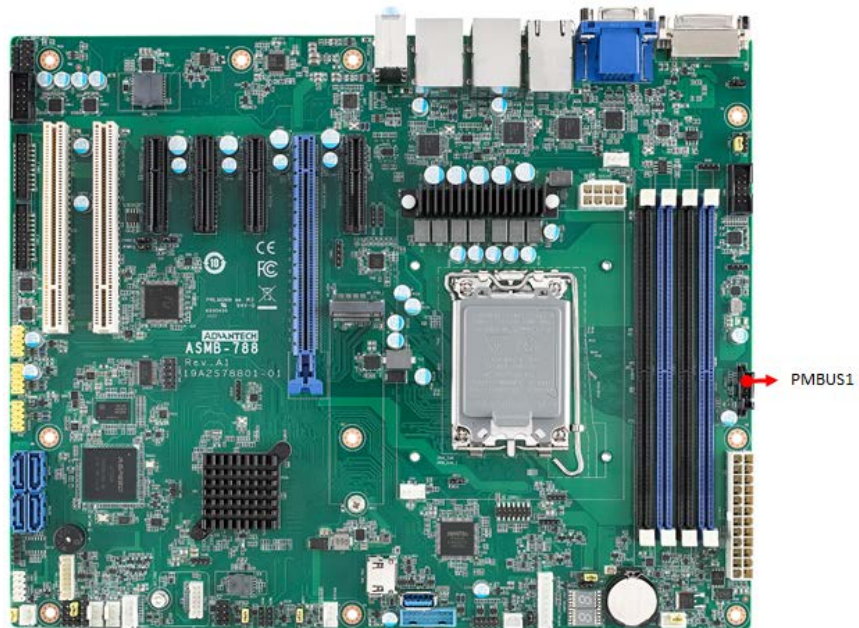
Table 2.5: Serial peripheral interface connector (SPI_TPM1)

Part Number	LPC Module
PCA-TPMSPI-00A1	TPM 2.0 module by SPI

2.18 PMBUS Connector (PMBUS1)

The PMBUS connector on the ASMB-788 is reserved for communicating with the power supply via BMC (G4 SKU).

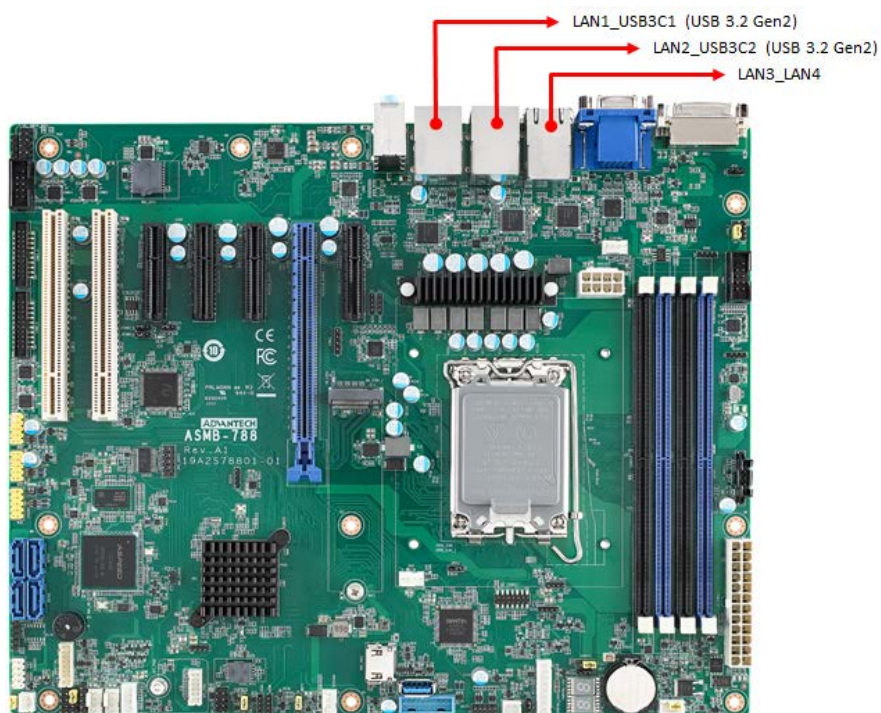
Note! *If you have any problem with PMbus and memory, please refer to FAQ 'Cannot Boot or Detect Some Memory Modules with Redundant Power Supply or PCIe Card Installed' or contact AE for further support.*



2.19 LAN Ports (LAN1_USB3C1, LAN2_USB3C2, LAN3_LAN4)

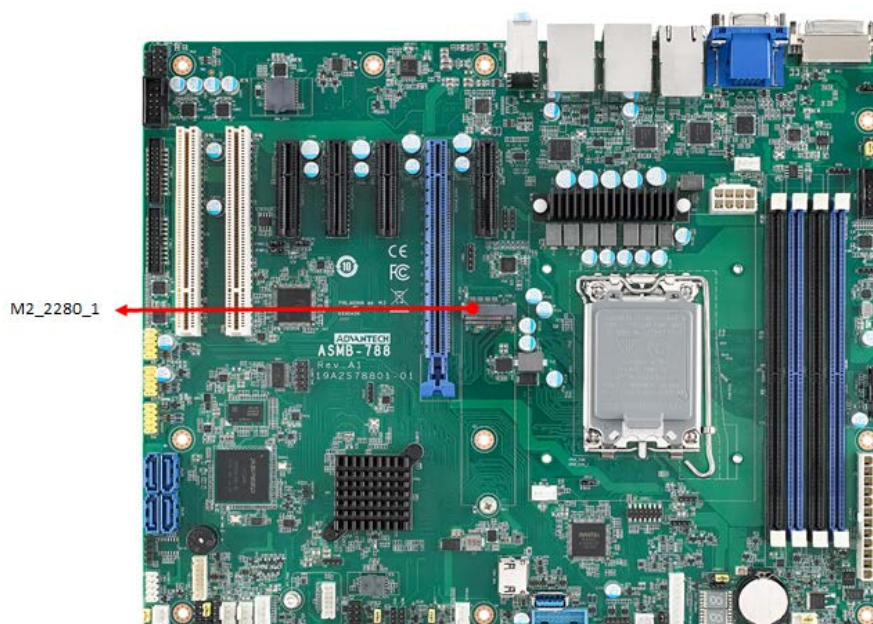
The ASMB-788 is equipped with two (G2 SKU) or four (G4 SKU) high-performance 1000 Mbps Ethernet LANs. They are supported by all major network operating systems.

The RJ-45 jacks on the rear plate provide convenient 1000 Mbps operation. If all USB ports will be used, USB power is recommended to switch to +5V instead of +5V_{SB}.



2.20 M.2 Socket (M2_2280_1)

The ASMB-788 is equipped with one M.2 socket to support up to PCIe Gen4 x4 link M-Key 2280 type storage devices. A screw to fasten the device is already installed on the nut.



Chapter 3

BIOS Operation

3.1 Introduction

With the AMI BIOS setup program, users can modify the BIOS settings and control the special system features. The setup program features a number of menus with multiple options for adjusting the configuration or enabling or disabling the special features. This chapter explains the basic navigation of the ASMB-788 BIOS setup screens.



Figure 3.1 Main BIOS Setup Screen

The AMI BIOS ROM features a built-in setup program that allows users to modify the basic system configuration. All configuration data is stored in NVRAM to ensure the setup information is retained when the power is turned off.

3.2 Entering BIOS Setup

Press or <Esc> during system bootup to access the AMI BIOS setup utility. Upon entering the utility, the main BIOS setup screen is displayed onscreen (as shown in Figure 3.2). Users can always return to the main setup screen by navigating to the Main tab. There are two main setup options, as explained in this section.

3.2.1 Main Menu

Press or <Esc> at system bootup to enter the AMI BIOS CMOS setup utility. Use the arrow keys to navigate among the items and press <Enter> to select an item or enter a sub-menu.

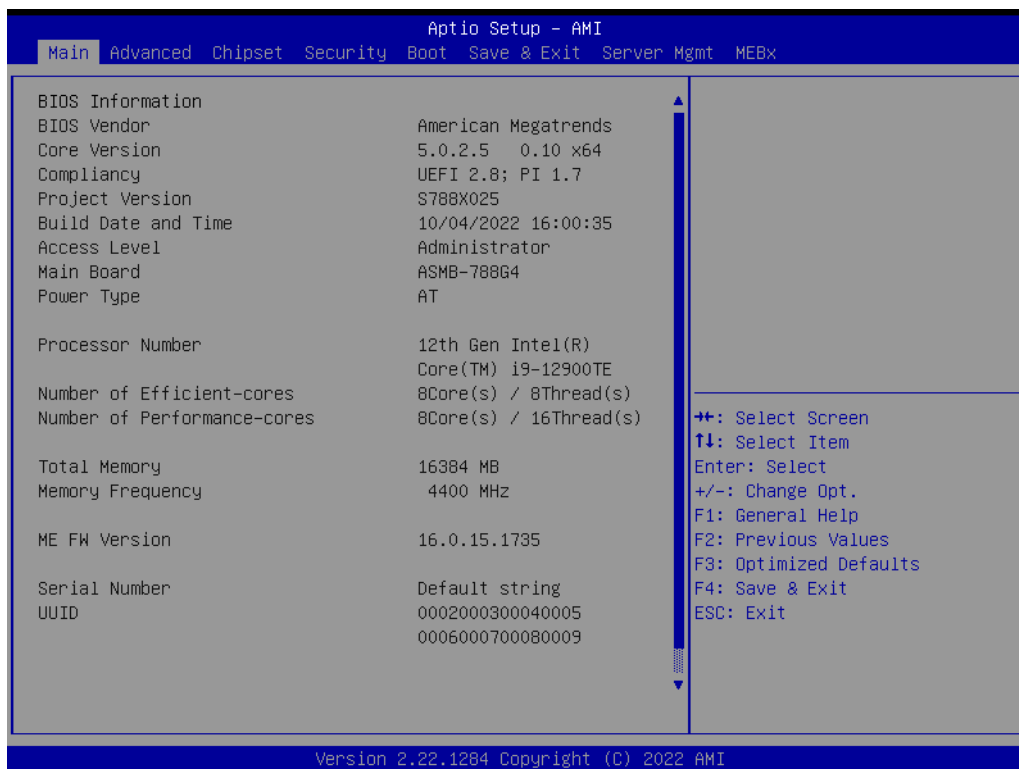


Figure 3.2 Main BIOS Setup Screen

The main BIOS setup screen is comprised of two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options shown in blue can be configured. The right frame displays the key legend. Above the key legend is an area reserved for text messages. When an option is selected in the left frame, the option will be highlighted in white and may have an accompanying text message.

3.2.2 System Time/System Date

Use this option to change the system time and date. Highlight the System Time or System Date options using the <Arrow> keys. Enter new values via the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

3.3 Advanced BIOS Features

Select the advanced tab of the BIOS setup menu to access the advanced BIOS setup options. Using the <Arrow> keys, select any of the items in the left frame of the screen, such as CPU configuration, to access the sub menu for that item.

This section describes all advanced BIOS setup options and their sub menus, and provides images of the advanced BIOS setup screens for the user reference.

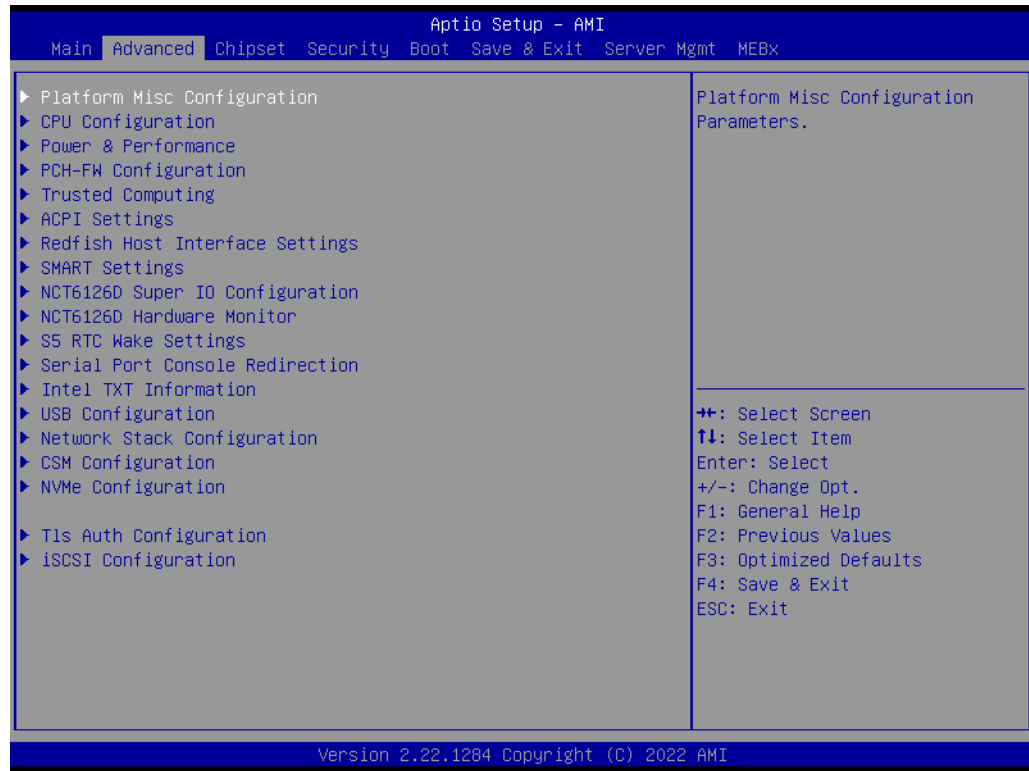


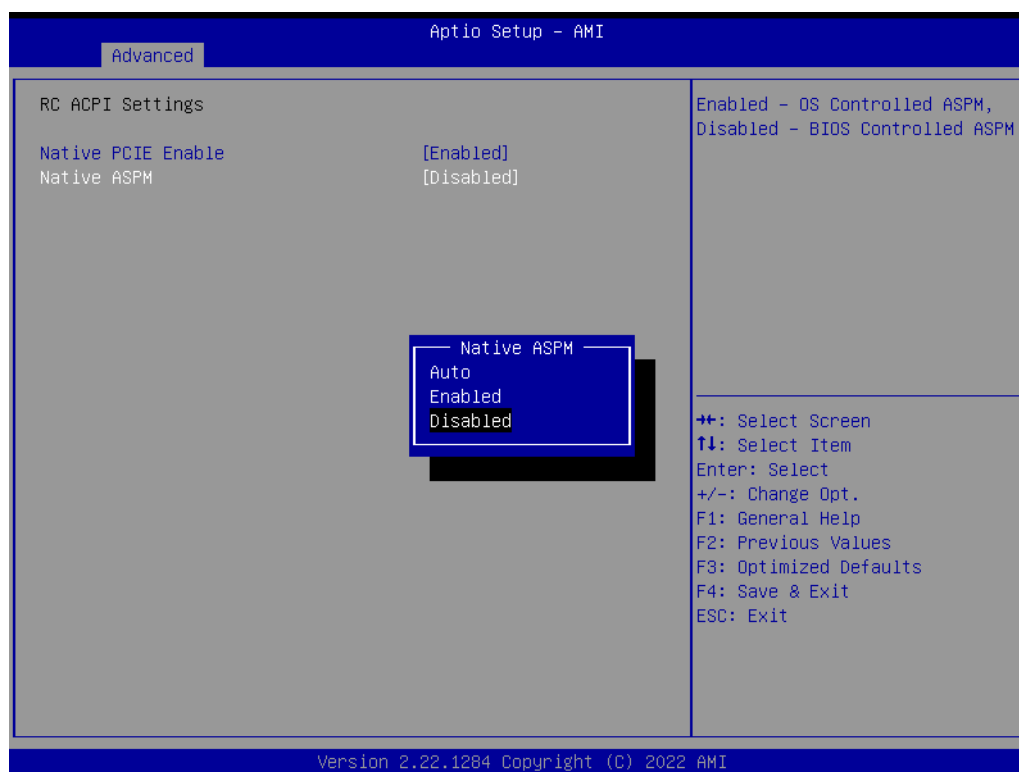
Figure 3.3 Advanced Tab of the BIOS Setup Screen

3.3.1 Platform Misc Configuration



Figure 3.4 Platform Misc Configuration Screen

- **Enable Native PCIe**
This item allows users to Enable/D
- PCIe native control. When this item is enabled, “Native ASPM” can be set as Enabled for OS control or Disabled for BIOS control. The default setting is Disabled for BIOS control.



3.3.2 CPU Configuration

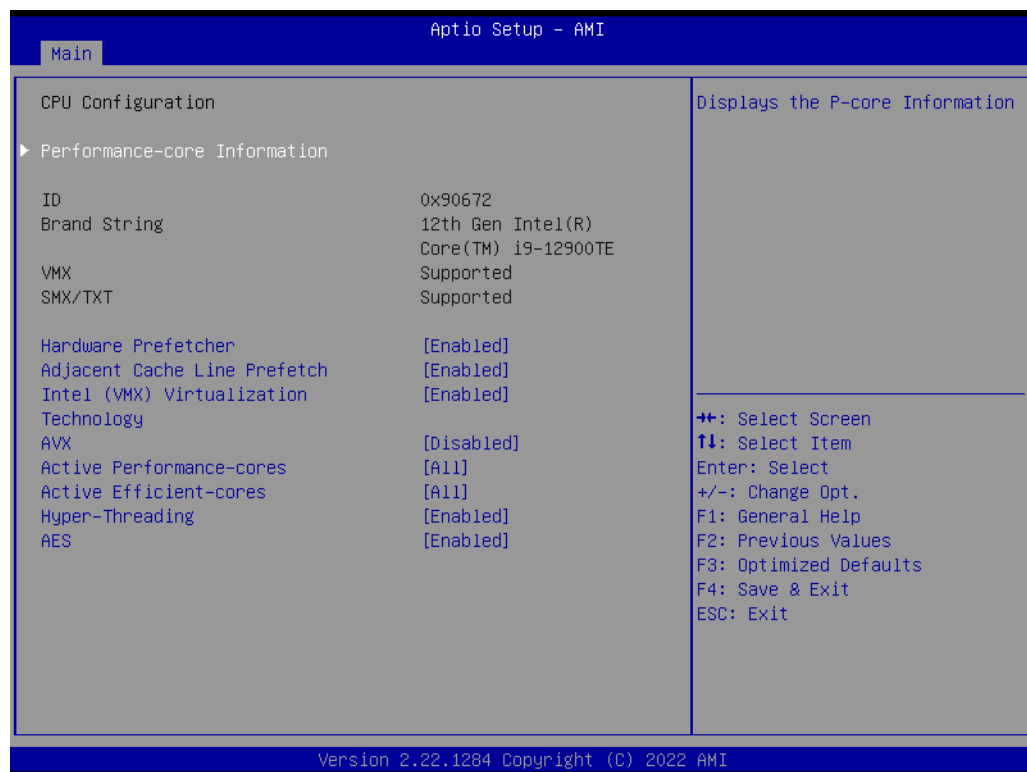


Figure 3.5 CPU Configuration Screen

- **Hardware Prefetcher**
This item allows users to Enable/Disable the MLC streamer prefetcher. Hardware-based prefetching is a technique that involves fetching instructions and/or data from the system memory to the CPU cache memory before it is actually needed to improve the load-to-use latency.
- **Adjacent Cache Line Prefetch**
This item allows users to Enable/Disable adjacent cache line prefetching. The Adjacent Cache Line Prefetch mechanism, like automatic hardware-based prefetching, operates without programmer intervention. When Enabled through the BIOS, two 64-byte cache lines are fetched into a 128-byte sector, regardless of whether the additional cache line has been requested or not.
- **Intel® (VMX) Virtualization Technology**
This item allows users to Enable/Disable the Intel® Virtualization Technology (ITV) extension. ITV allows multiple operating systems to run simultaneously on the same system by creating virtual machines, each running its own x86 operating system.
- **Active Performance-cores**
Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are 0,0, Pcode will enable all cores.
- **Active Efficient-cores**
Number of E-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are 0,0, Pcode will enable all cores.
- **Hyper-Threading**
Enable or Disable Hyper-Threading Technology.

- **Advanced Encryption Standard (AES)**

This item allows users to Enable/Disable the Advanced Encryption Standard instruction set.

3.3.3 Power and Performance



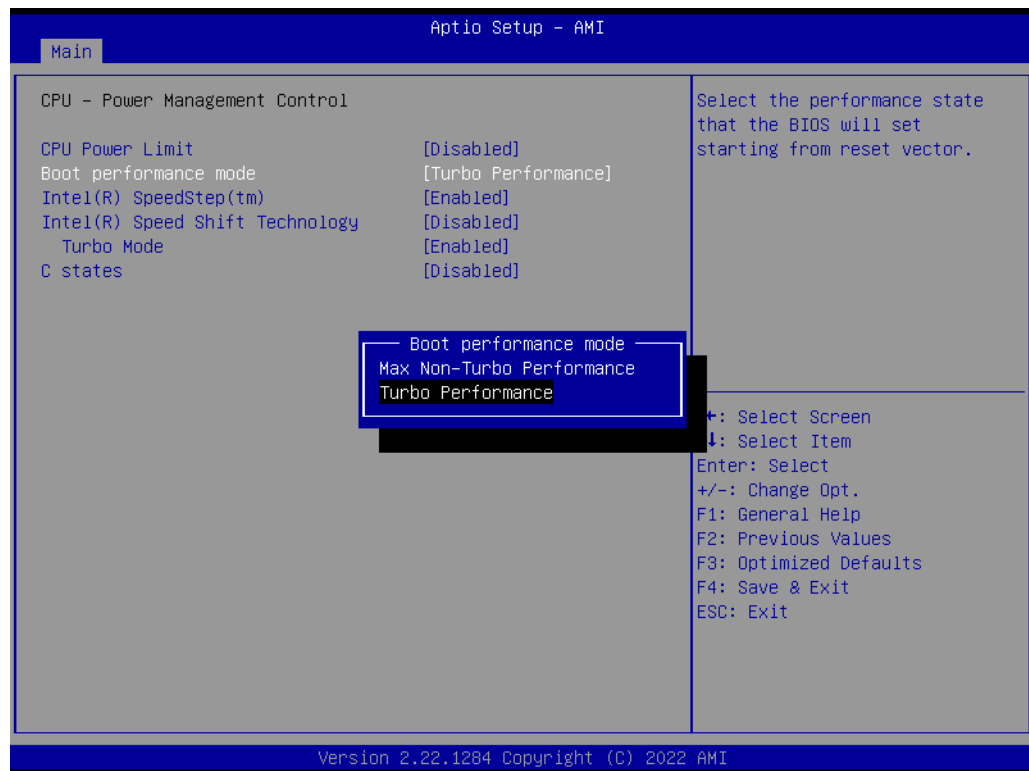
Figure 3.6 CPU - Power Management Control Screen

- **CPU Power Limit**

This item allows users to select when using 300W (or lower) PSU.

- **Boot Performance Mode**

This item allows users to select the performance state that the BIOS will set before OS hand off.



- **Intel® SpeedStep™**
This item allows users to Enable/Disable support for more than two frequency ranges.
- **Turbo Mode**
This item allows users to Enable/Disable turbo mode (Intel® SpeedStep™ or Intel® SpeedShift™ must be available and enabled).
- **C States**
This item allows users to Enable/Disable CPU power management. This function instructs the CPU to go into a C state when not 100% utilized.

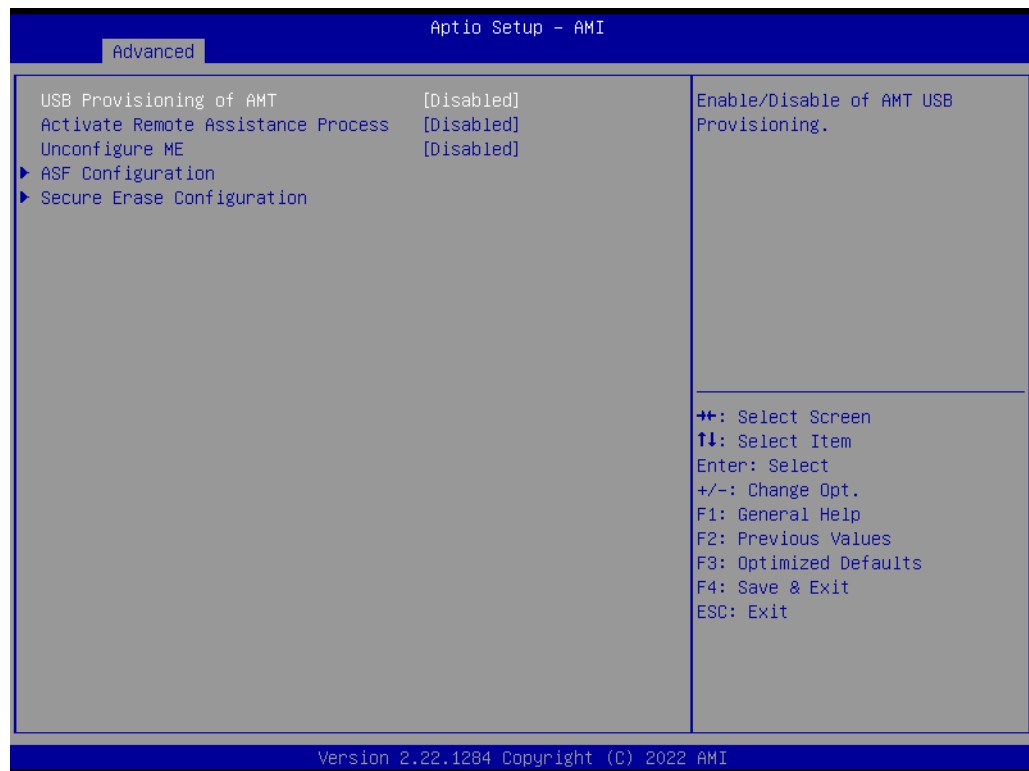
3.3.4 PCH-FW Configuration



Figure 3.7 PCH-FW Configuration Screen

This screen shows the Intel® Management Engine configuration settings.

3.3.4.1 AMT Configuration



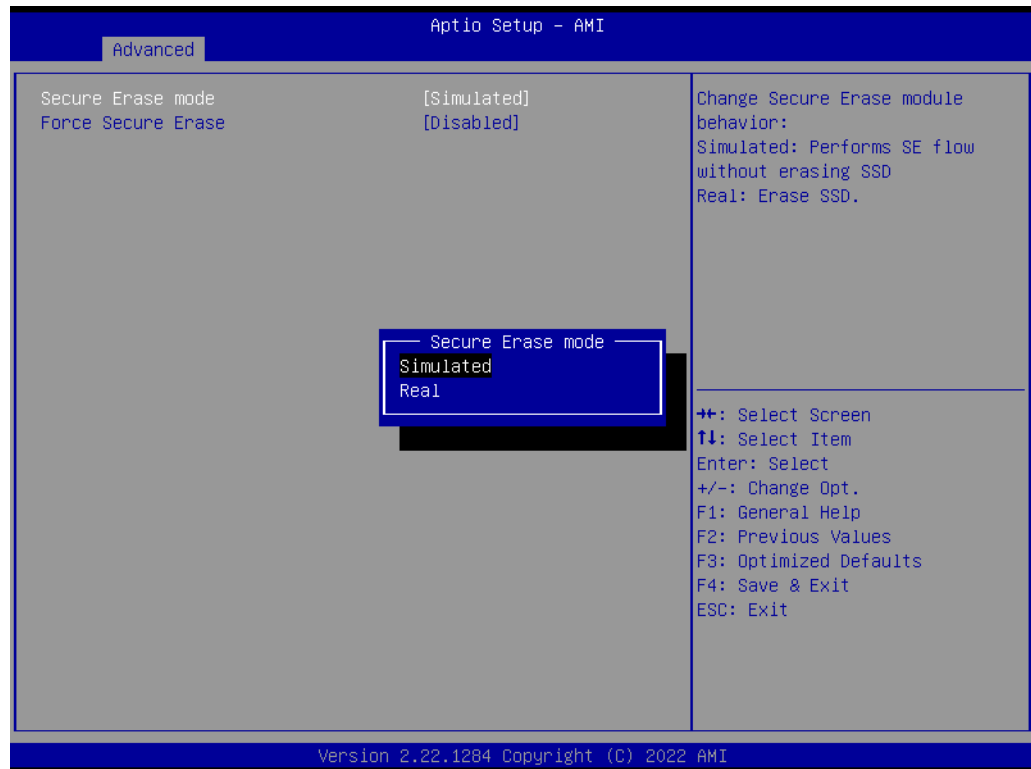
- **USB Provisioning of AMT**
This item allows users to Enable/Disable AMT USB provisioning.
- **Activate Remote Assistance Process**
Trigger CIRA boot. Network access must be activated first from the MEBx setup.
- **Unconfigure ME**
This item allows users to Enable/Disable to reconfigure the ME by resetting the MEBx password to the default.

3.3.4.2 ASF Configuration



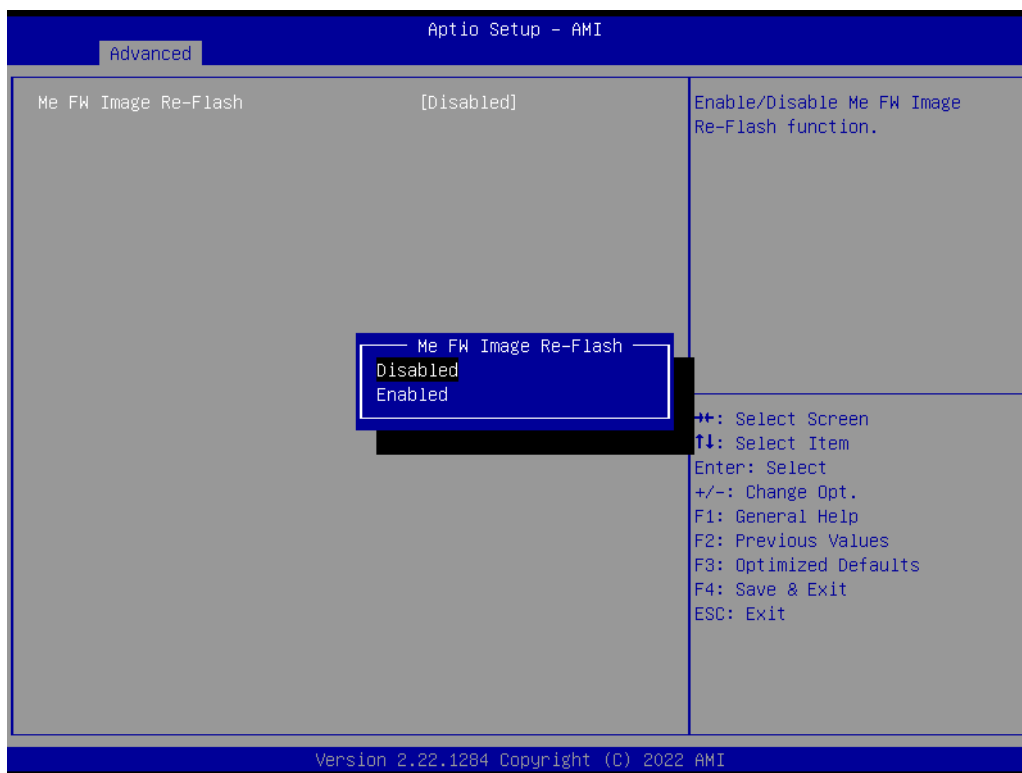
- **PET Progress**
This item allows users to Enable/Disable the PET Events Progress function in order to receive notification of PET events.
- **WatchDog**
This item allows users to enable or disable the WatchDog timer.
- **ASF Sensor Table**
This item allows users to add an ASF sensor table into an ASF ACPI table.

3.3.4.3 Secure Erase Configuration



- **Secure Erase Mode**
This item allows users to set the Secure Erase Mode as “Simulated” or “Real”.
- **Force Secure Erase**
This item allows users to Enable/Disable Force Secure Erase on the next boot-up.

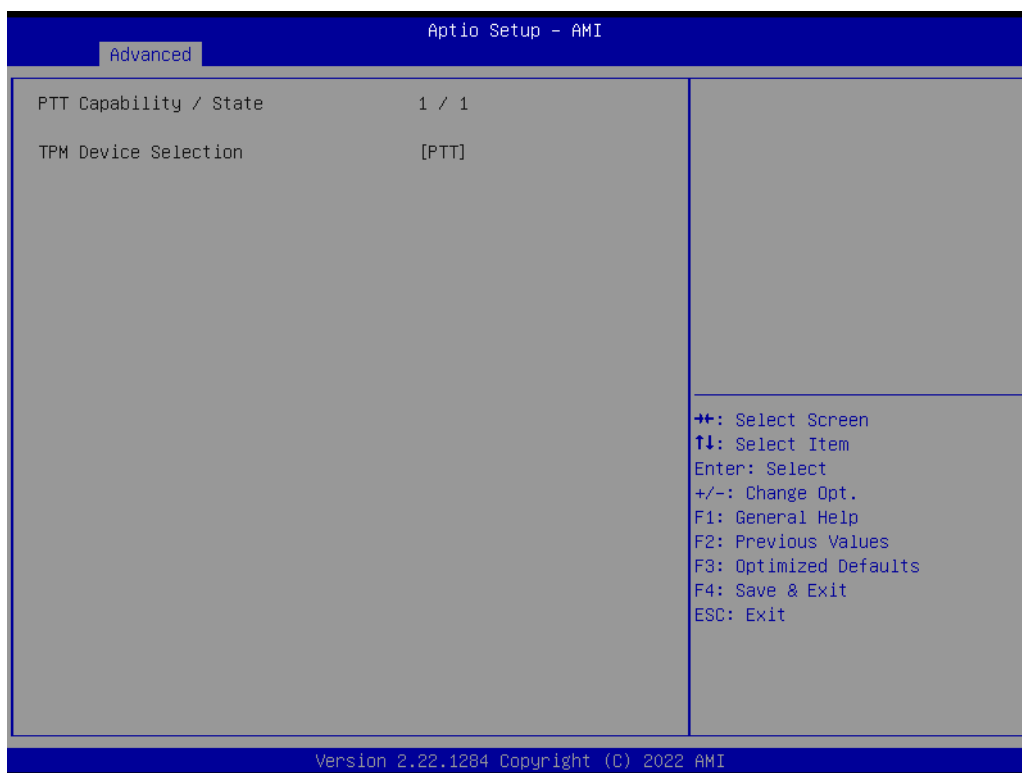
3.3.4.4 Firmware Update Configuration



■ ME FW Image Re-Flash

This item allows users to Enable/Disable the ME FW Image Re-Flash function.

3.3.4.5 PTT Configuration

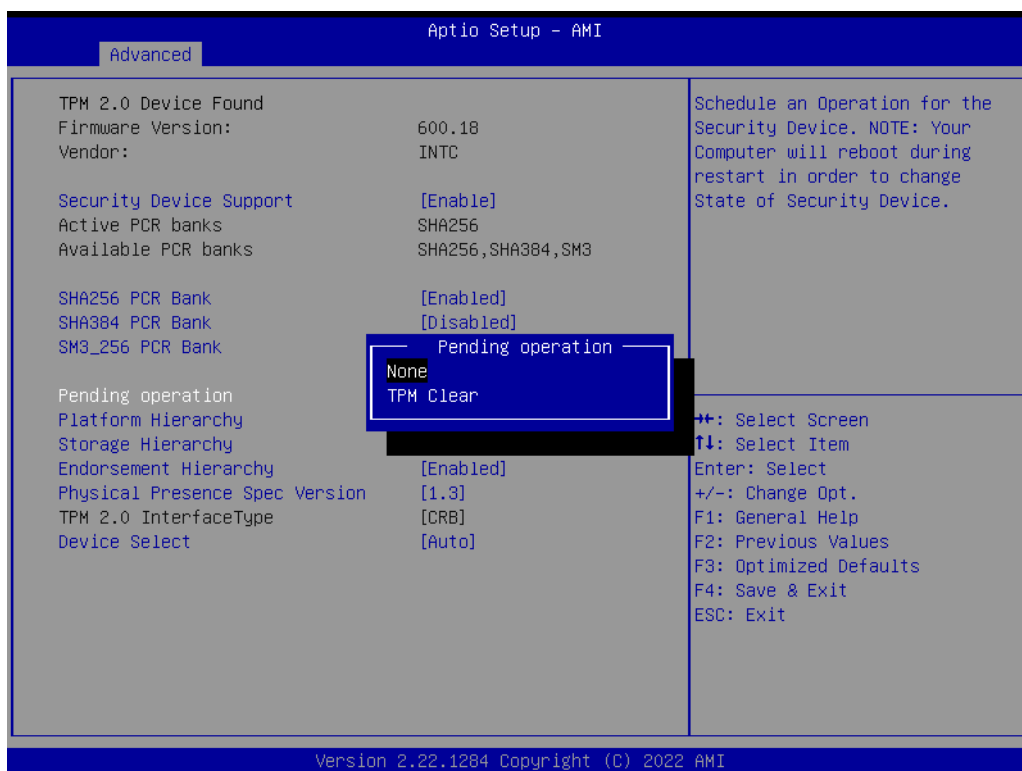


3.3.5 Trusted Computing

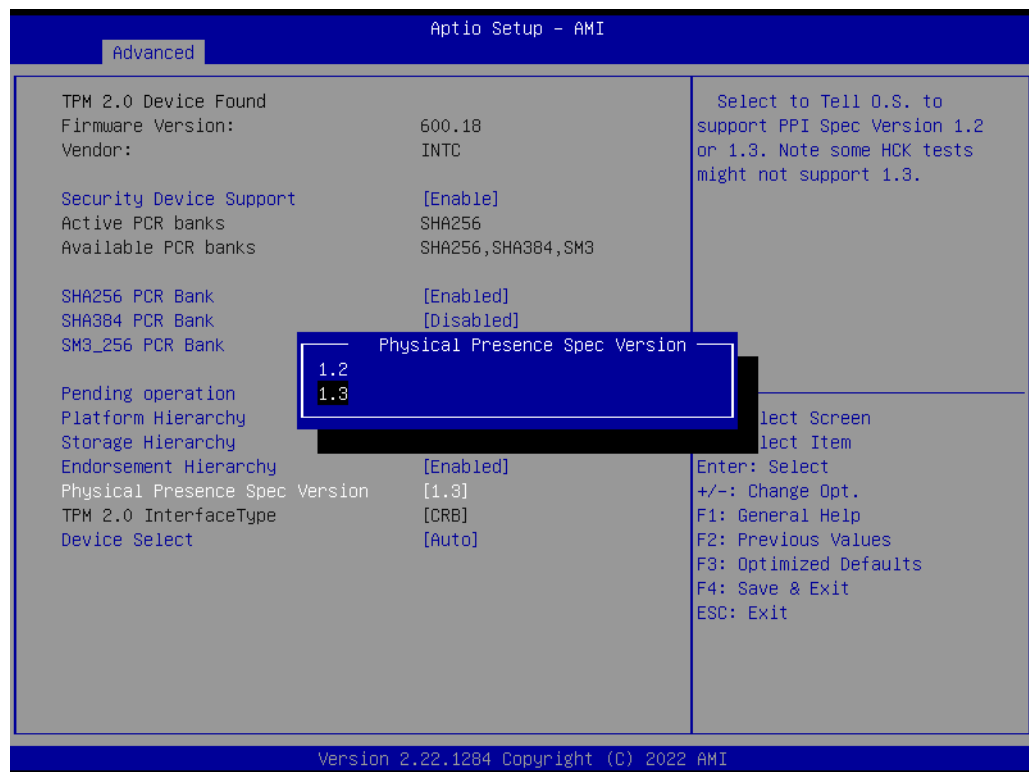


Figure 3.8 TPM Settings Screen

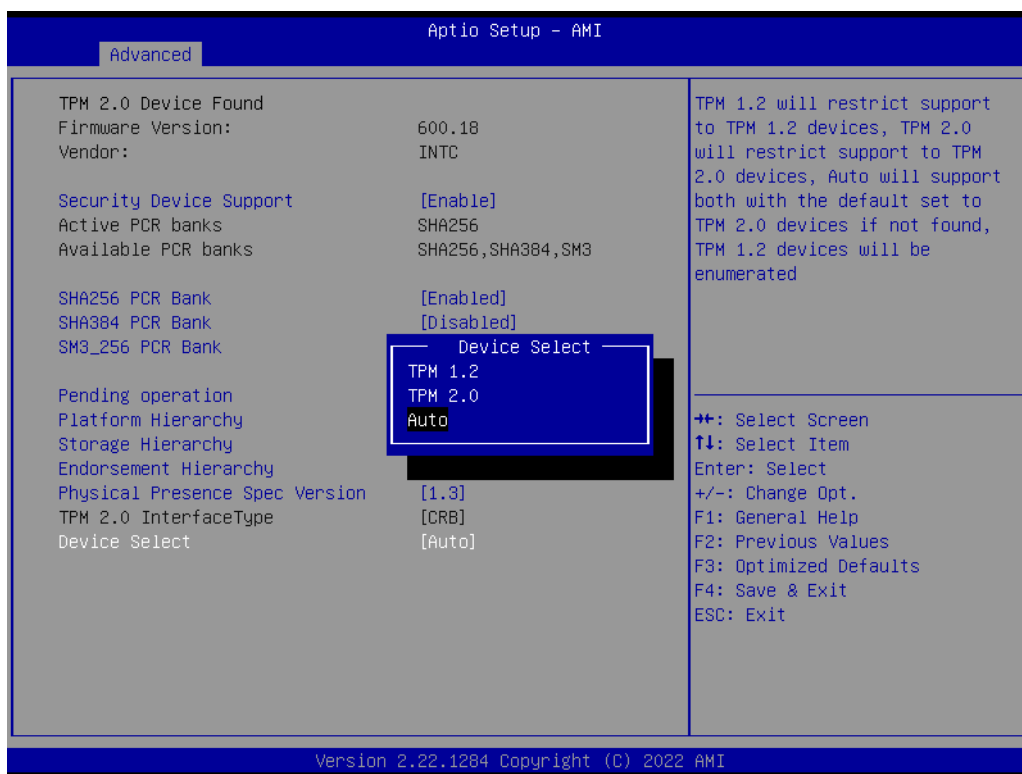
- **Security Device Support**
This item allows users to Enable/Disable TPM support. Additionally, users can integrate an Advantech LPC TPM module to enable TPM function.
- **SHA256 PCR Bank**
Enable/Disable SHA256 PCR Bank.
- **SHA384 PCR Bank**
Enable/Disable SHA384 PCR Bank.
- **SM3_256 PCR Bank**
Enable/Disable SM3_256 PCR Bank.



- **Pending operation**
Schedule an Operation for the Security Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device.
- **Platform Hierarchy**
Enable/Disable Platform Hierarchy.
- **Storage Hierarchy**
Enable/Disable Storage Hierarchy.
- **Endorsement Hierarchy**
Enable/Disable Endorsement Hierarchy.



- **Physical Presence Spec Version**
Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3. Note: some HCK tests might not support version 1.3.



■ Device Select

TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated.

3.3.6 ACPI Settings

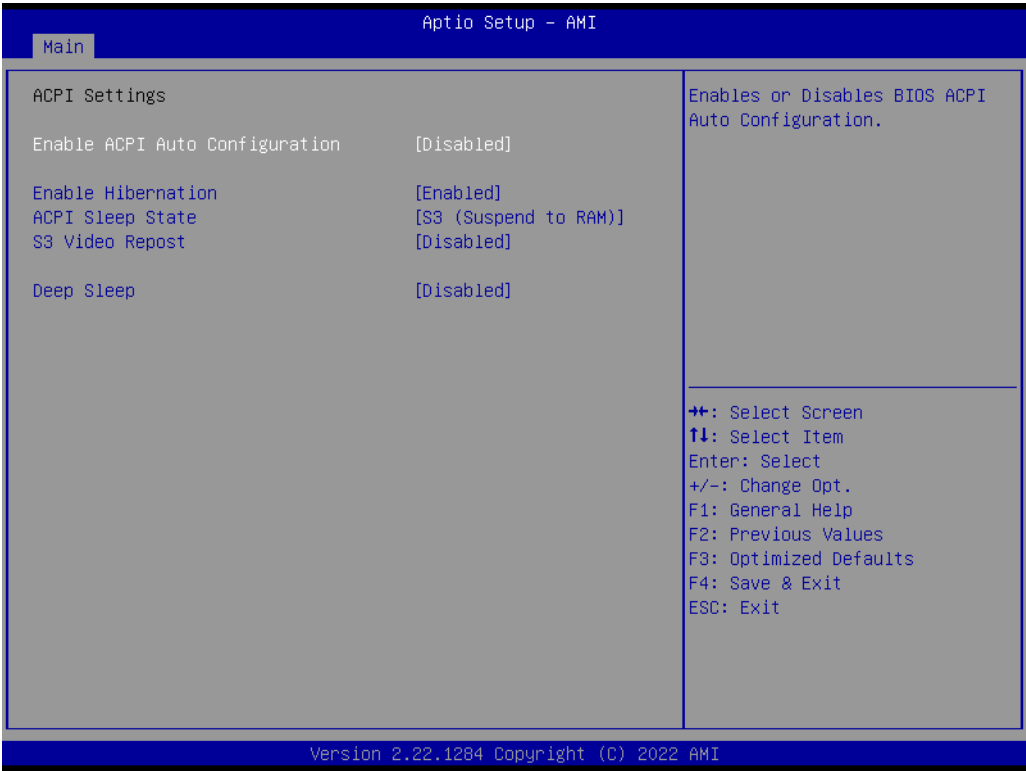
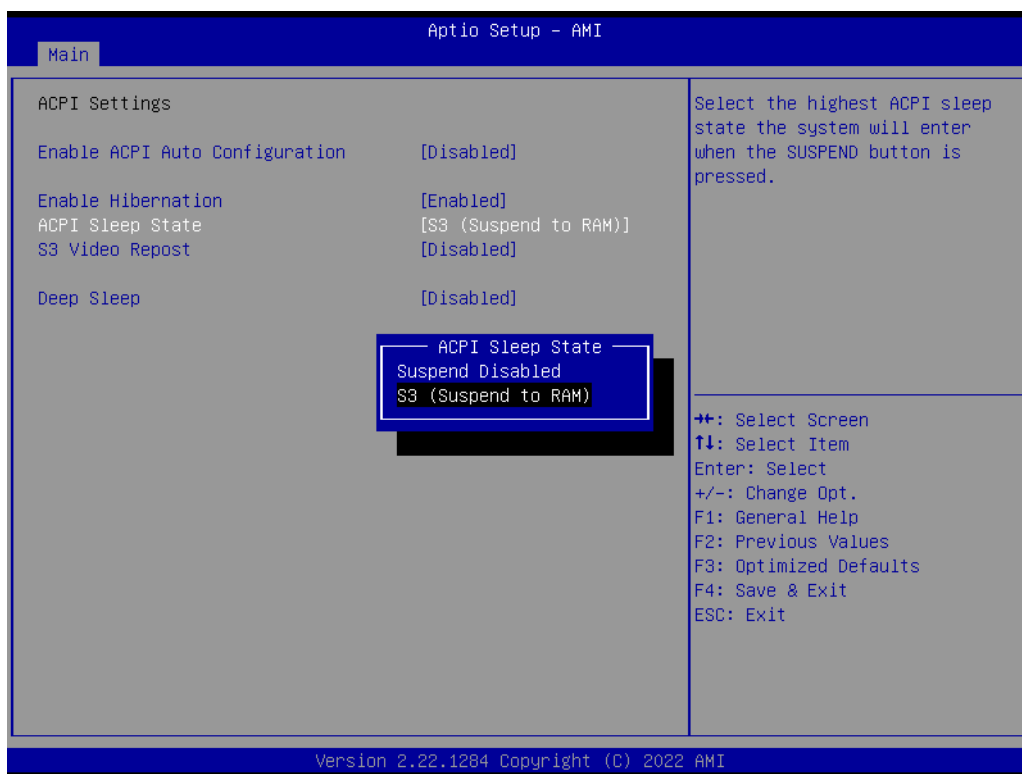


Figure 3.9 ACPI Settings Screen

- **Enable ACPI Auto Configuration**
This item allows users to Enable/Disable automatic BIOS ACPI configuration.
- **Enable Hibernation**
This item allows users to Enable/Disable hibernation (OS/S4 Sleep State). This function may not be available with certain OS.

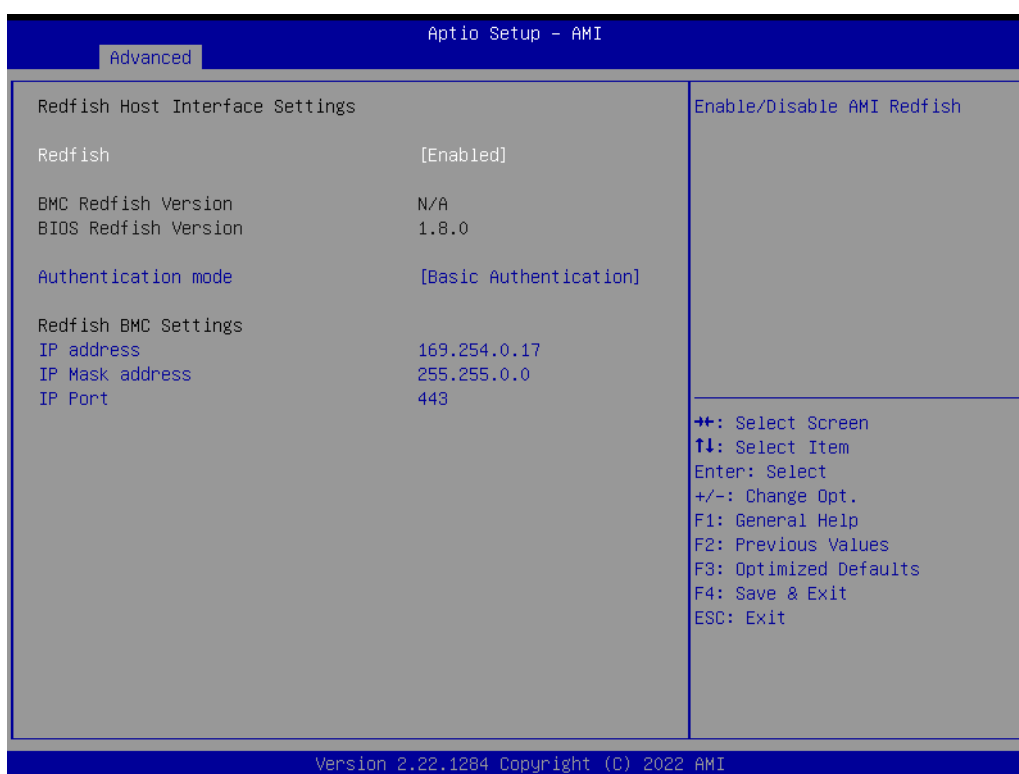


- **ACPI Sleep State**
This item allows users to specify the ACPI sleep state when the system enters Suspend mode.
- **S3 Video Repost**
This item allows users to Enable/Disable S3 video reposting.

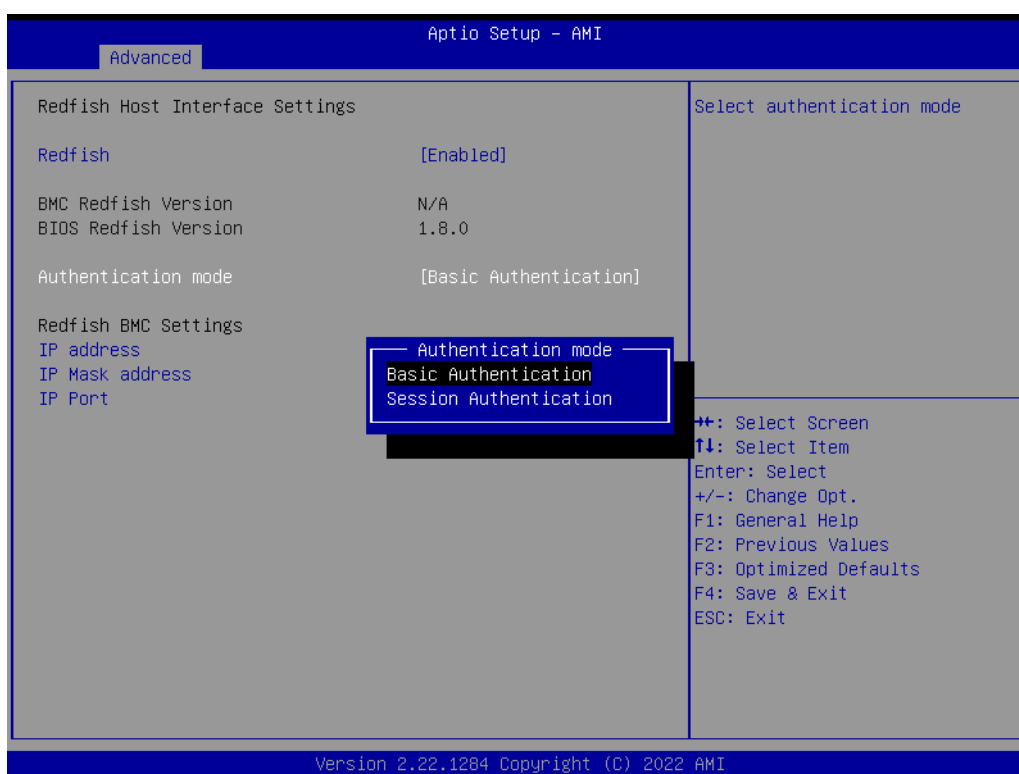


- **Deep Sleep**
Enable this function to cut off the power of peripherals during sleep state. To comply with EU ErP (Energy-related Product) regulations, please enable this function and C states function. (Path: Advanced -> Power & Performance -> CPU - Power Management -> C State Enabled)

3.3.7 Redfish Host Interface Settings



- **Redfish**
Enable/Disable AMI Redfish.



- **Authentication mode**
Select authentication mode

3.3.8 SMART Settings

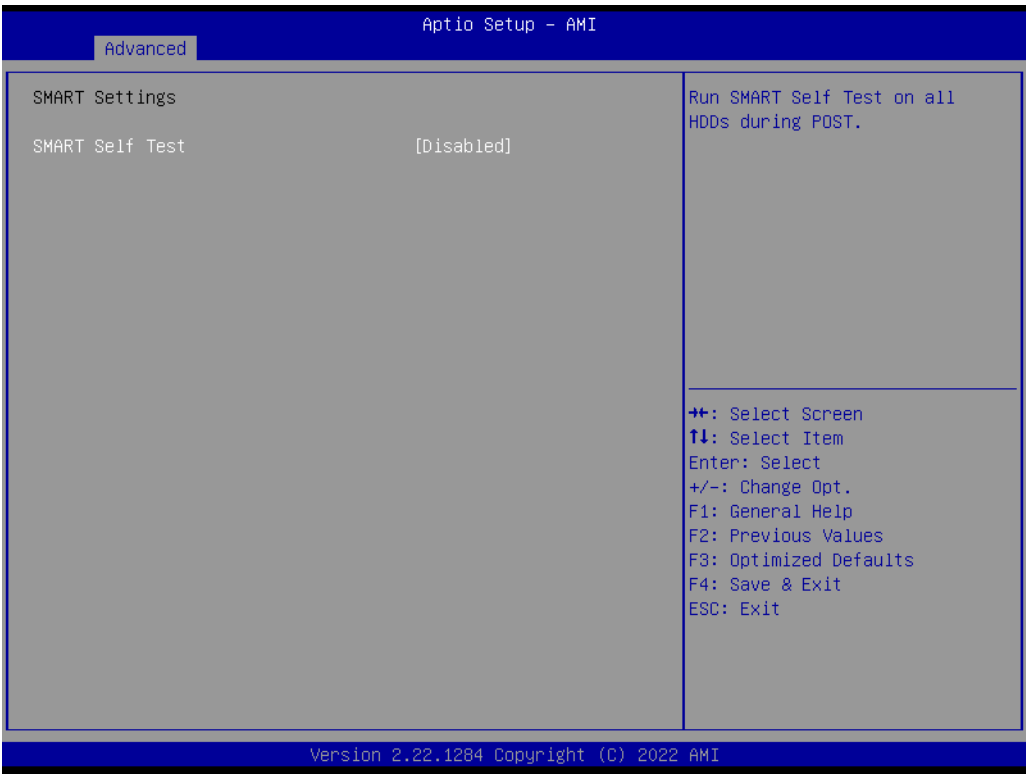


Figure 3.10 SMART Settings Screen

- **SMART Self-Test**
This item allows users to Enable/Disable SMART self-testing for all HDDs during POST.

3.3.9 NCT6126D Super IO Configuration

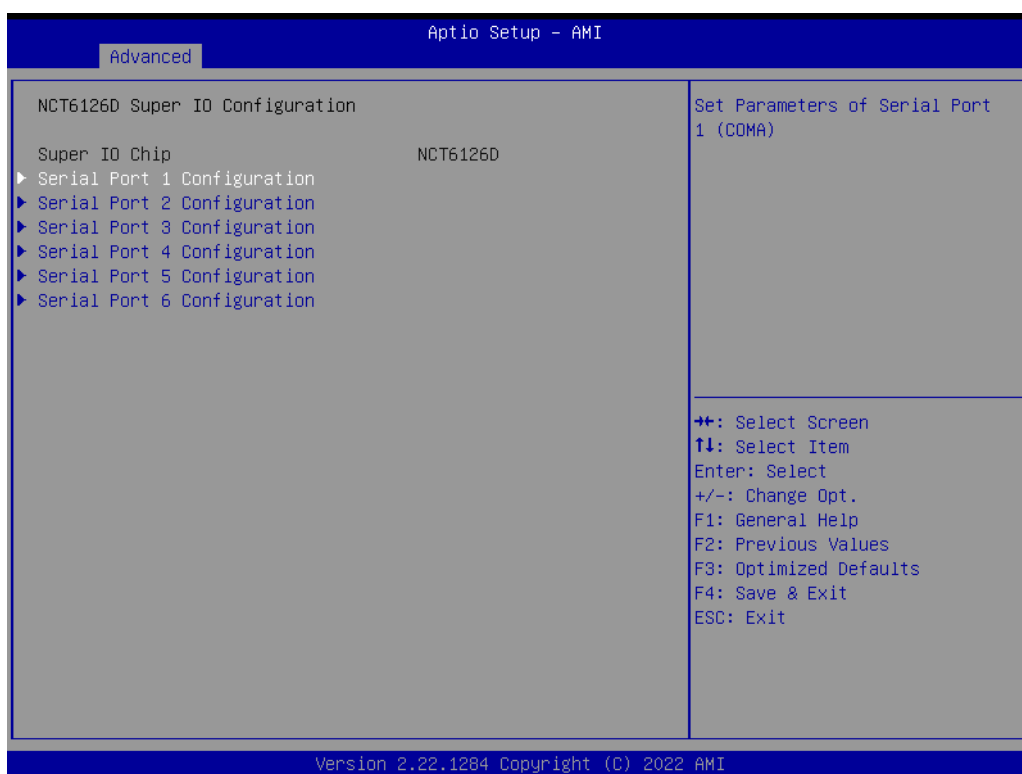
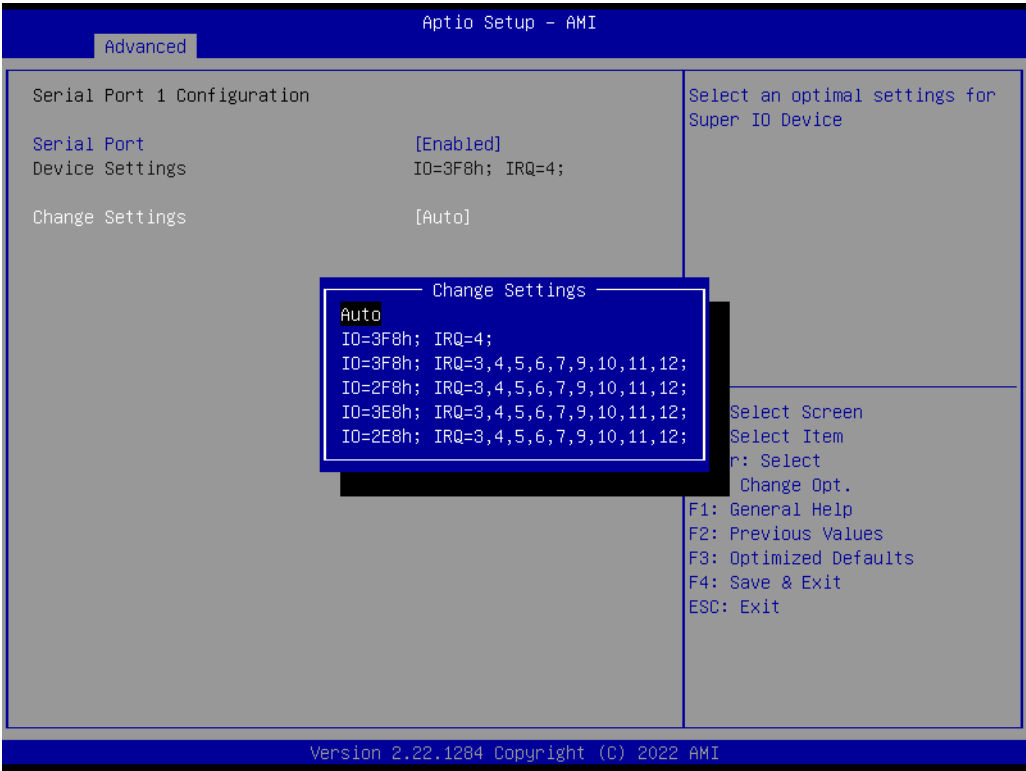
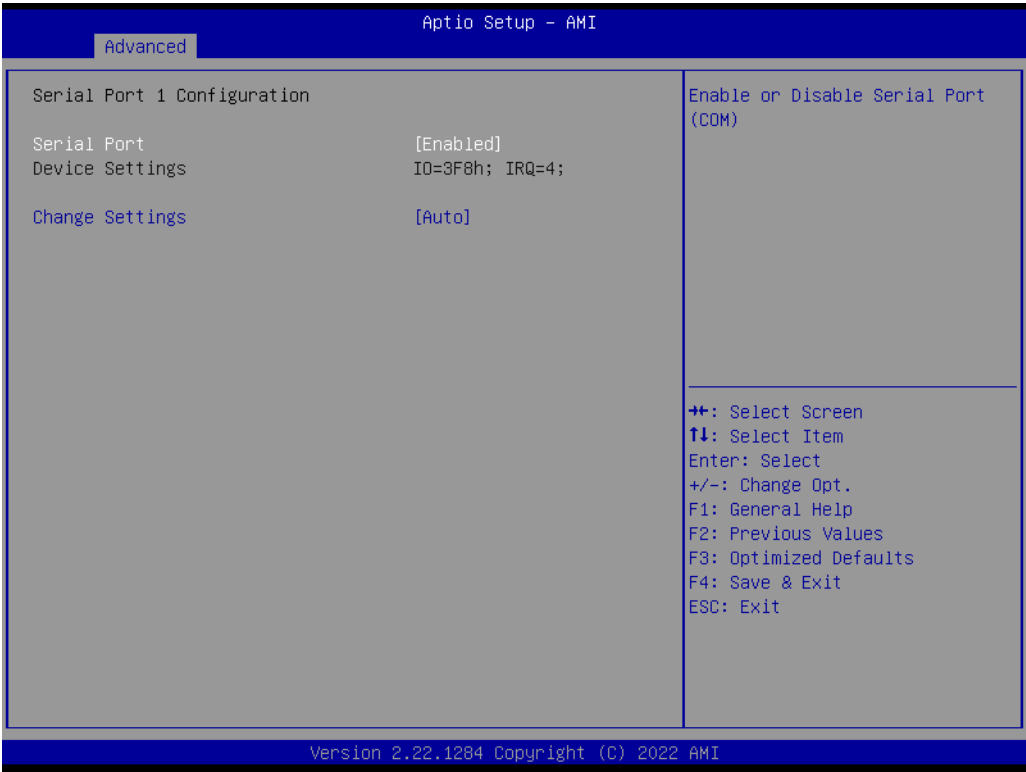


Figure 3.11 Serial Port Configuration Screen

3.3.9.1 Serial port Configuration (1~6)

- **Serial Port**
This item allows users to Enable/Disable each serial port.
- **Change Settings**
This item allows users to optimize the super I/O device settings.



3.3.10 NCT6126D Hardware Monitor

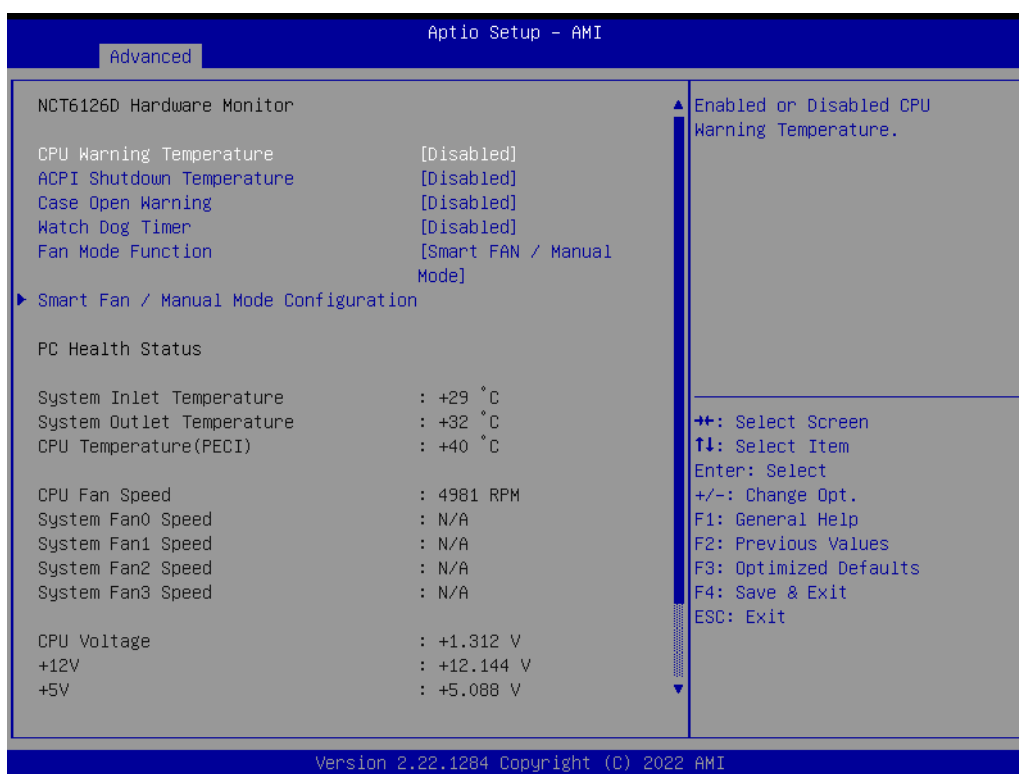
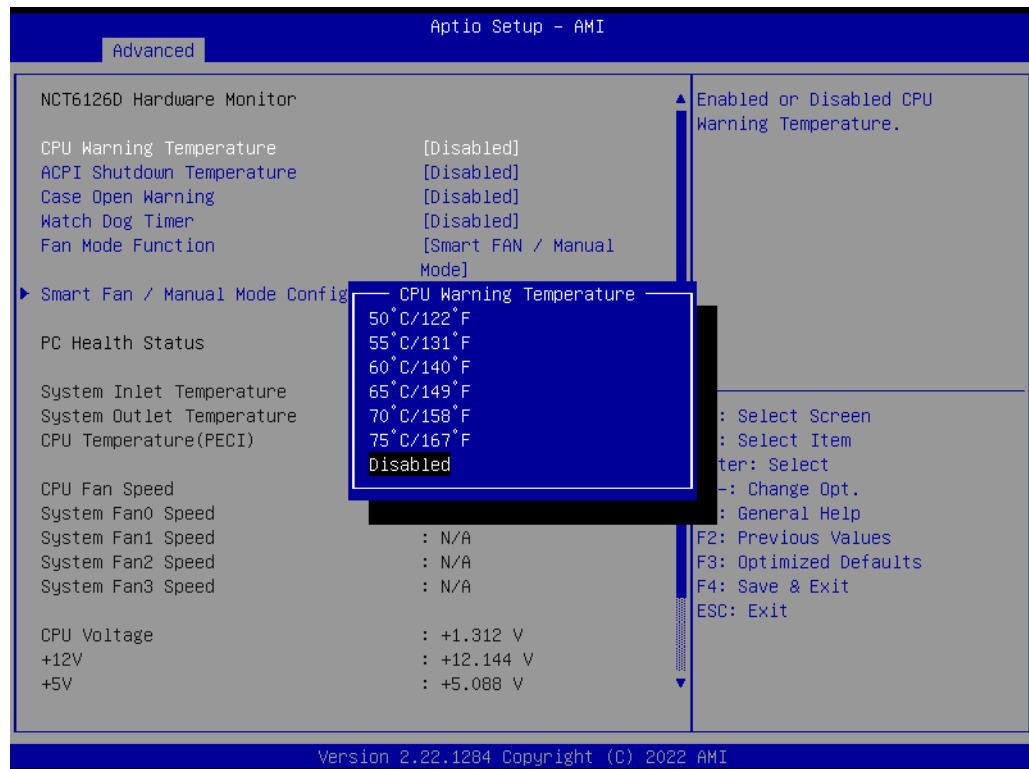


Figure 3.12 PC Health Status Screen

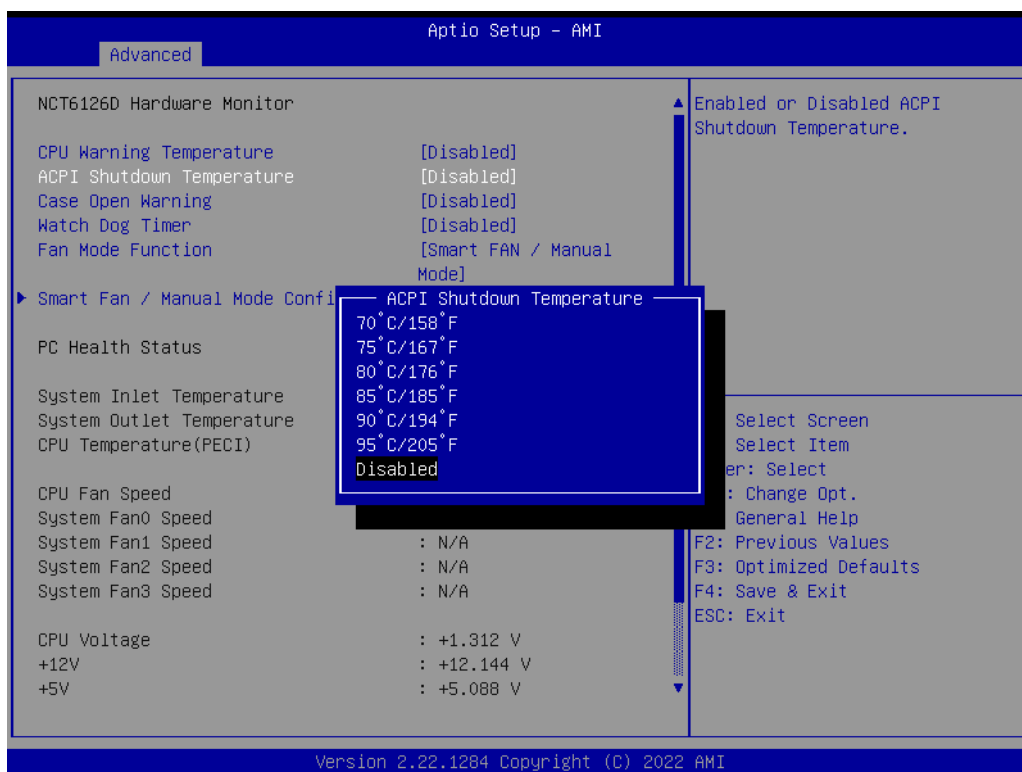
■ CPU Warning Temperature

This item allows users to set the CPU warning temperature threshold. When the system reaches the warning temperature, an alarm warning will be emitted.



■ **ACPI Shutdown Temperature**

This item allows users to set the ACPI shutdown temperature threshold. When the pre-specified shutdown temperature is reached, the system will be automatically shut down by the ACPI OS to prevent damage from overheating.



■ Case Open Warning

This item allows users to Enable/Disable chassis intrusion monitoring. When Enabled and the case is opened, a warning message will be displayed in the POST screen. Ensure that the board is paired with the chassis kit correctly to facilitate this function.

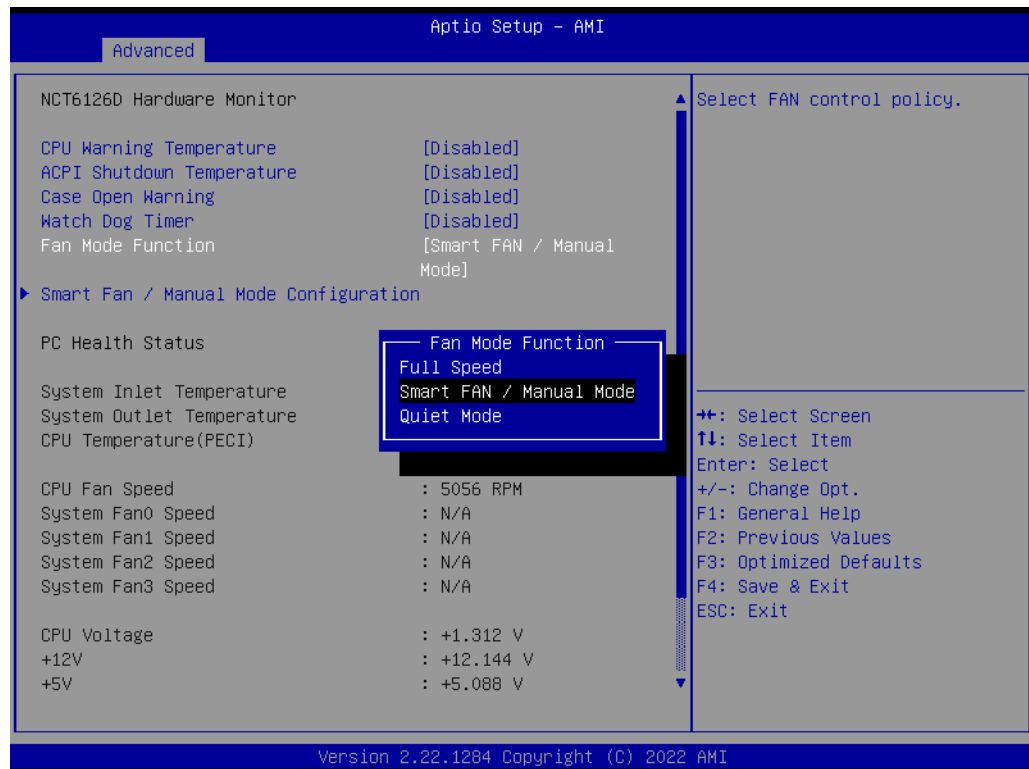
■ WatchDog Timer

This item allows users to Enable/Disable the watchdog timer.

■ Fan Mode Function

This item allows users to select between the three smart fan modes:

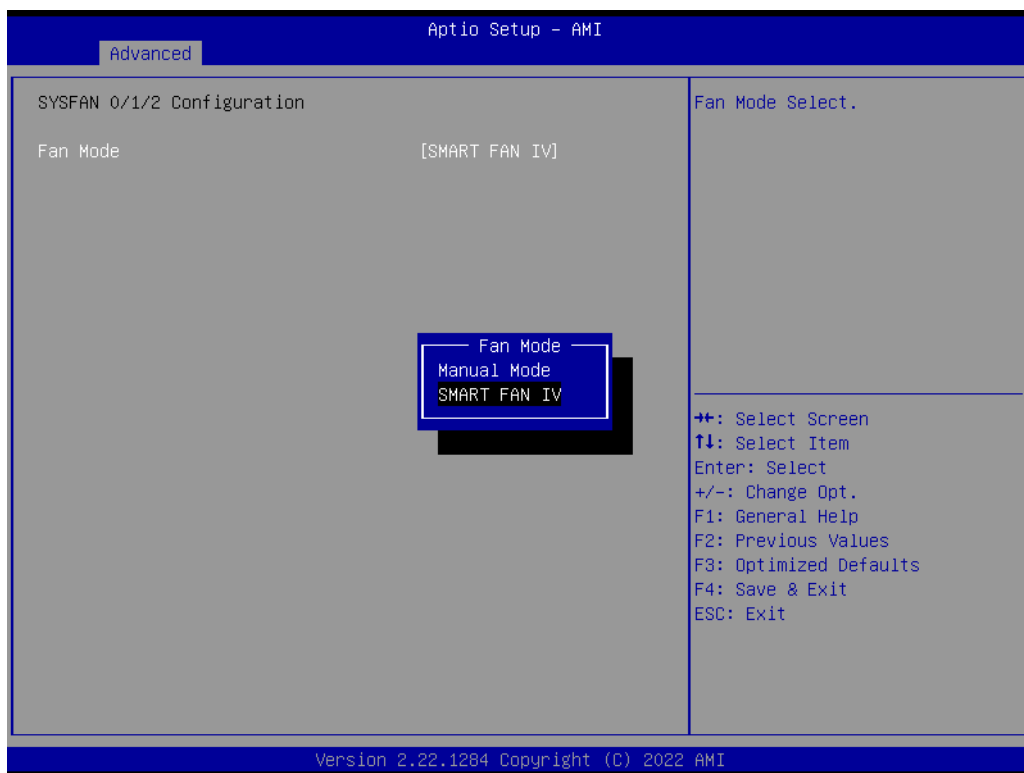
1. Full Speed - Smart control of fans is Disabled and all fans run at full speed.
2. Smart Fan/Manual Mode - The system will adjust the fan speed automatically.
3. Quiet Mode - The fan will rotate at the lowest speed to minimize noise.



3.3.10.1 Smart Fan/Manual Mode Configuration



- **SYSFAN 0/1/2 Configuration**
Select fan mode to Manual Mode or SMART FAN IV.
- **SYSFAN 3 Configuration**
Select fan mode to Manual Mode or SMART FAN IV.
- **CPUFAN 0 Configuration**
Select fan mode to Manual Mode or SMART FAN IV.



3.3.11 S5 RTC Wake Settings



Figure 3.13 S5 RTC Wake Settings Screen

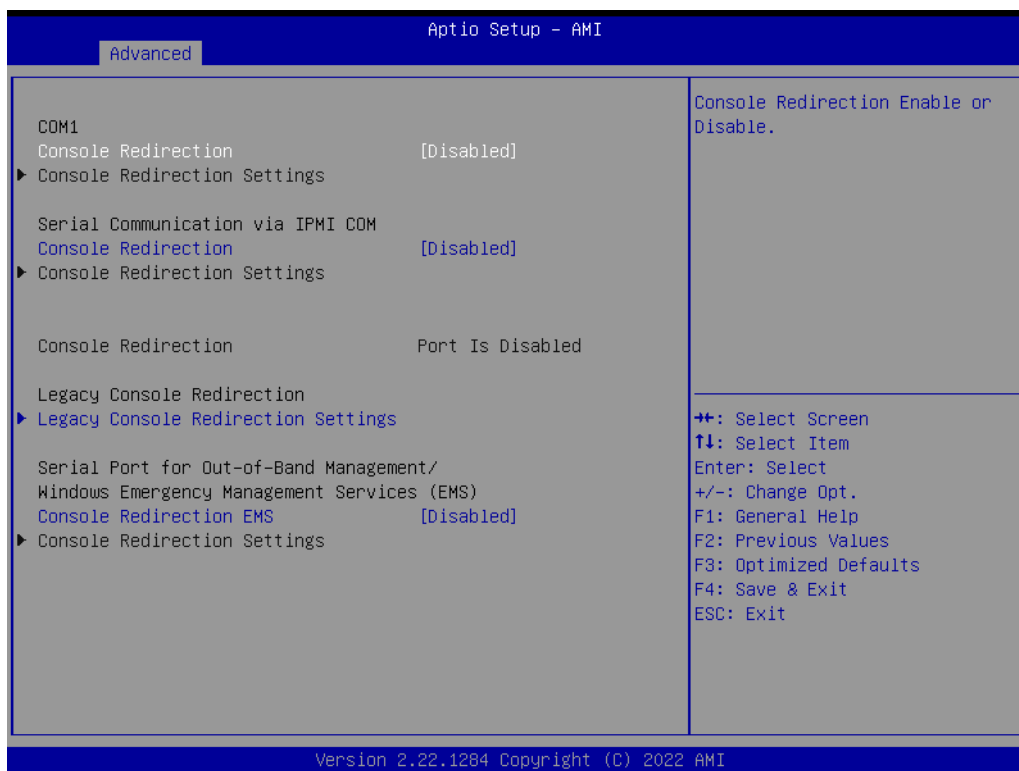
- **Wake system from S5**
Enable or disable system wake on alarm event. When enabled, system will wake on the hr:min:sec specified.

3.3.12 Serial Port Console Redirection



Figure 3.14 Serial Port Console Redirection Screen

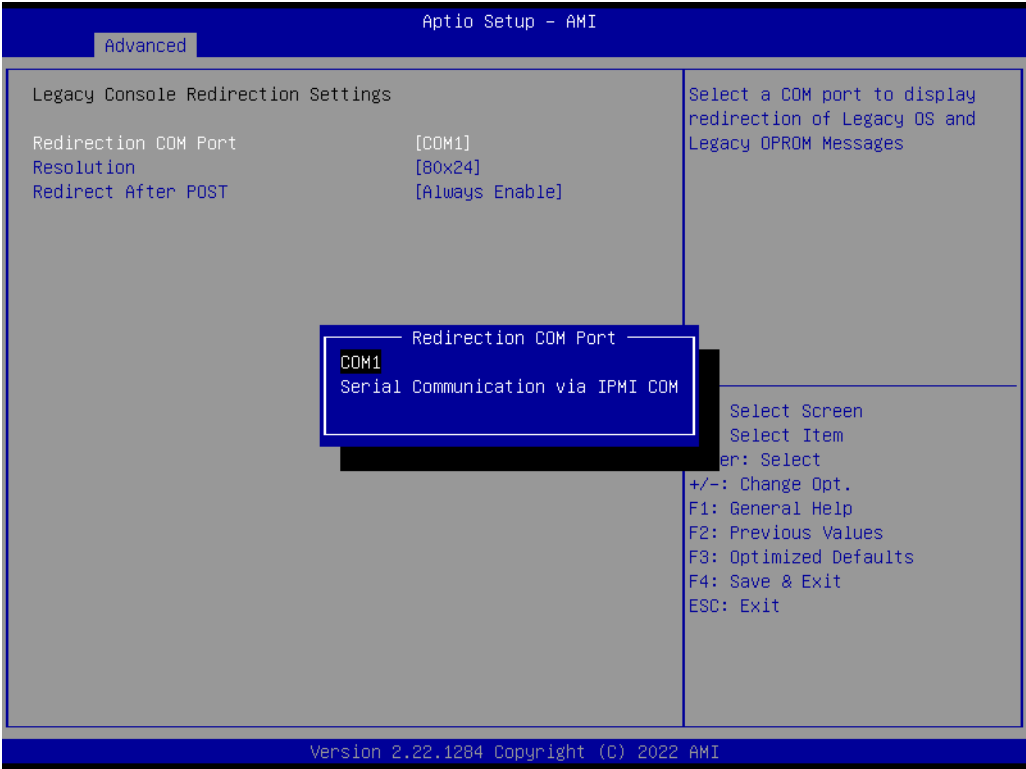
3.3.12.1 Console Redirection



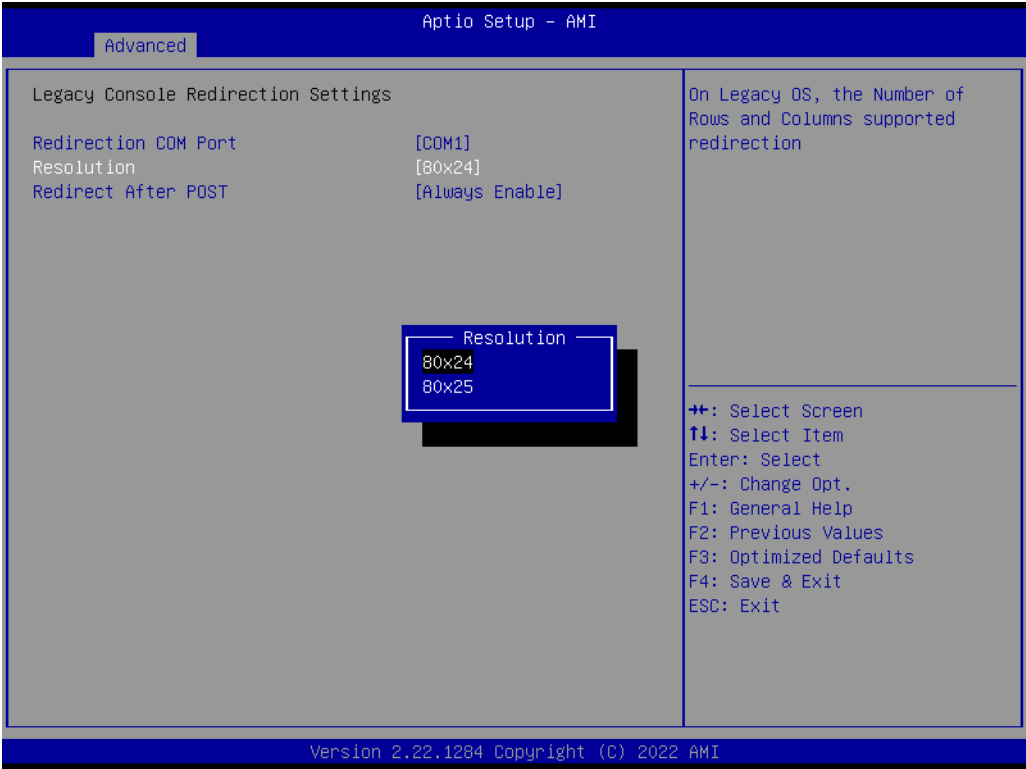
■ Console Redirection

This item allows users to Enable/Disable console redirection.

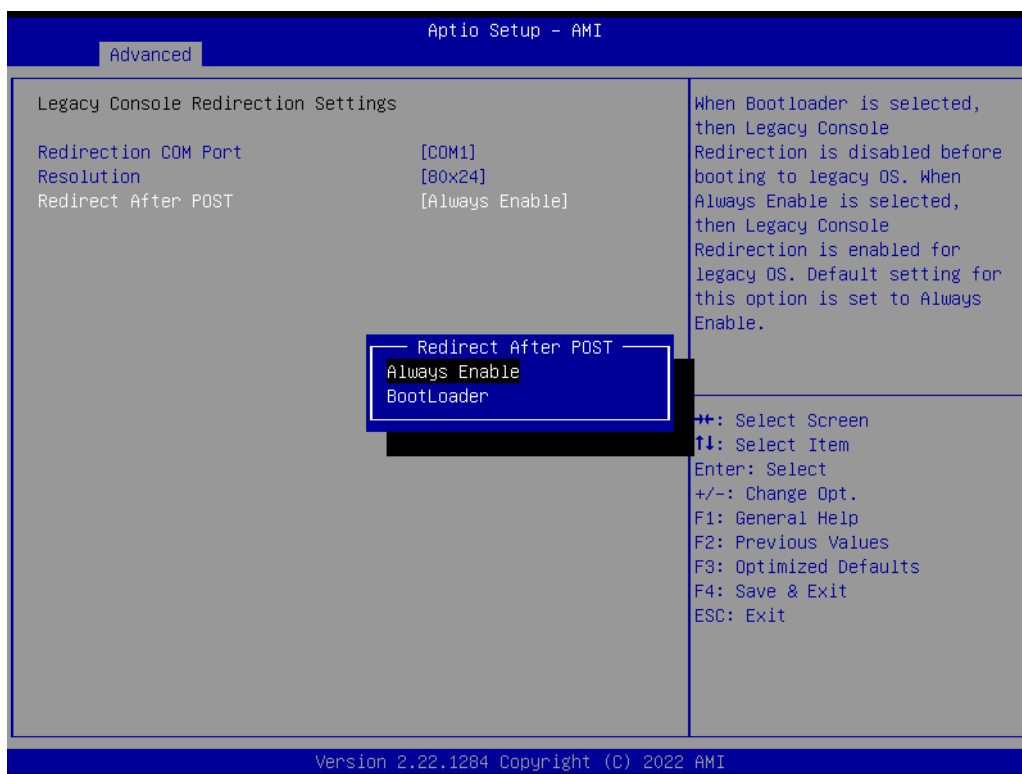
3.3.12.2 Legacy Console Redirection Settings



- **Redirection to COM Port**
This item allows users to set the COM port for displaying redirected legacy OS and legacy OPRM messages.



- **Resolution**
This item allows users to set the number of rows and columns that support redirection on legacy OS.



- **Redirect After POST**
This item allows users to Enable/Disable redirection after POST. When “Boot-loader” is selected, legacy console redirection is disabled before booting to legacy OS. When “Always Enable” is selected, legacy console redirection is Enabled for legacy OS.

3.3.13 Intel TXT Information

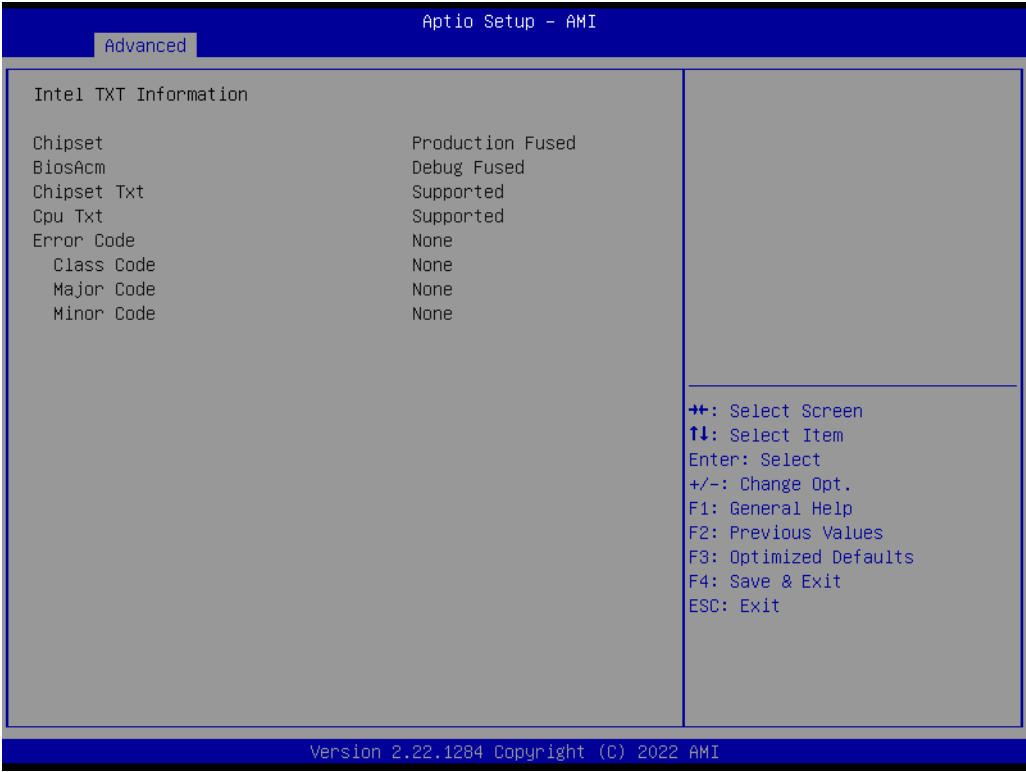


Figure 3.15 Intel® TXT Information Screen

3.3.14 USB Configuration

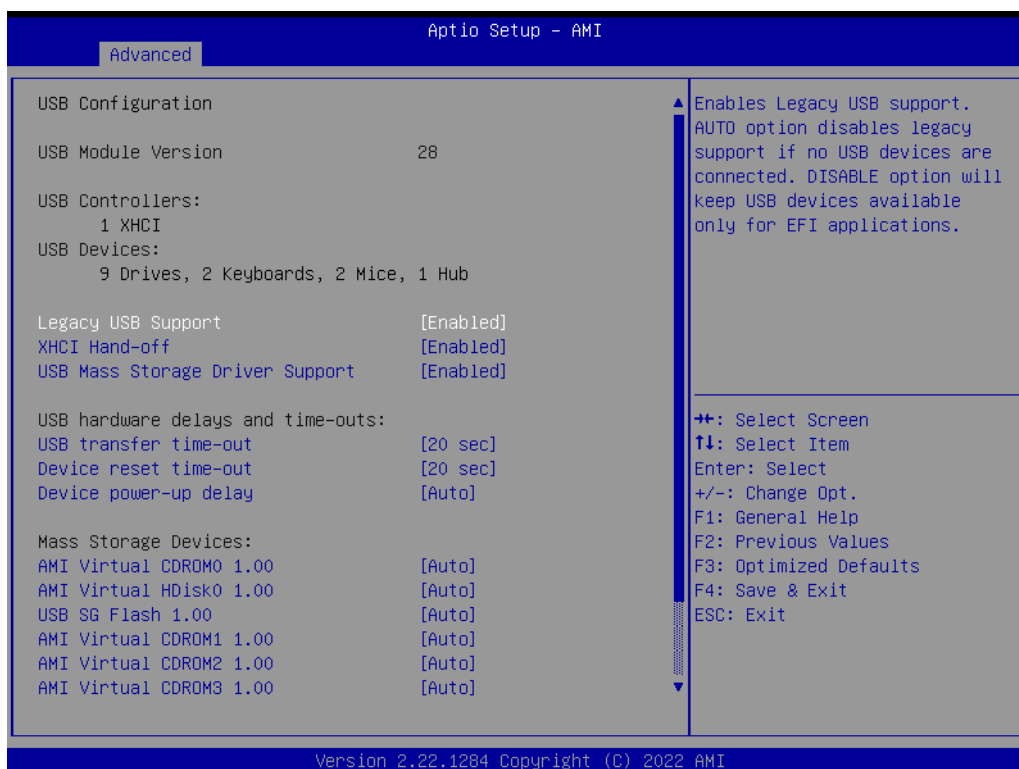
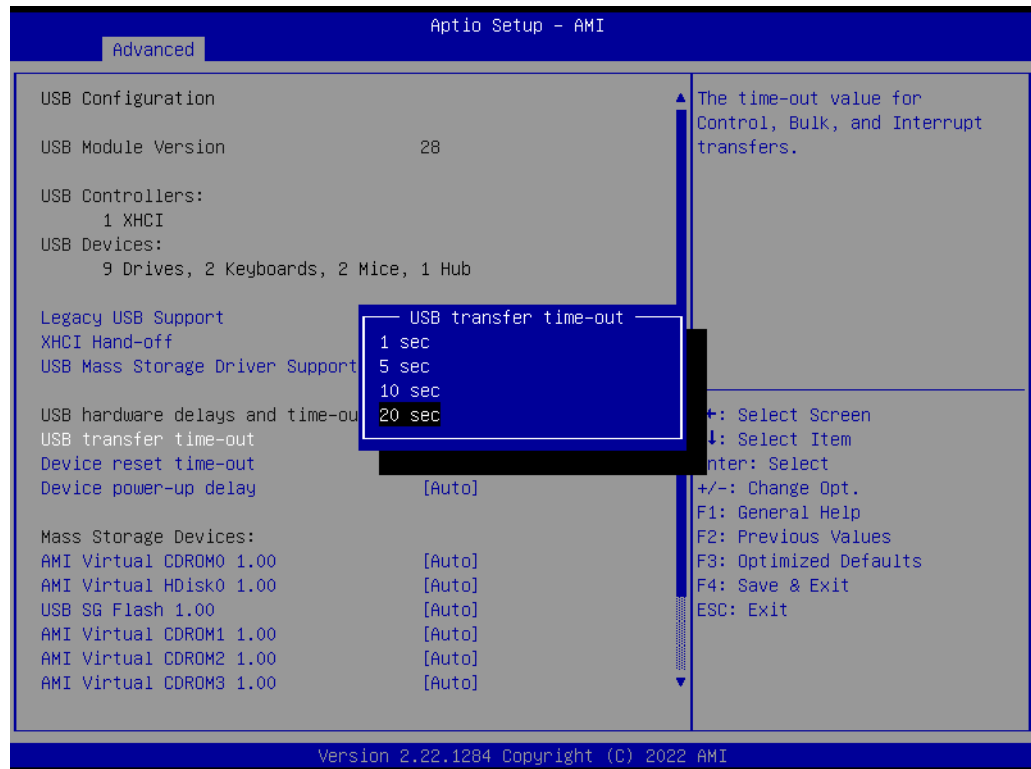


Figure 3.16 USB Configuration Screen

- **Legacy USB Support**
This item allows users to Enable/Disable legacy USB support. The Auto option disables legacy support if no USB devices are connected. When Disabled, USB devices will be reserved for EFI applications. This option is only available after the BIOS is set to Legacy from the default UEFI mode.
- **XHCI Hand-Off**
This item provides a workaround for OS without XHCI hand-off support. The XHCI ownership change should be claimed by the XHCI driver.
- **USB Mass Storage Driver Support**
This item allows users to Enable/Disable USB mass storage driver support.

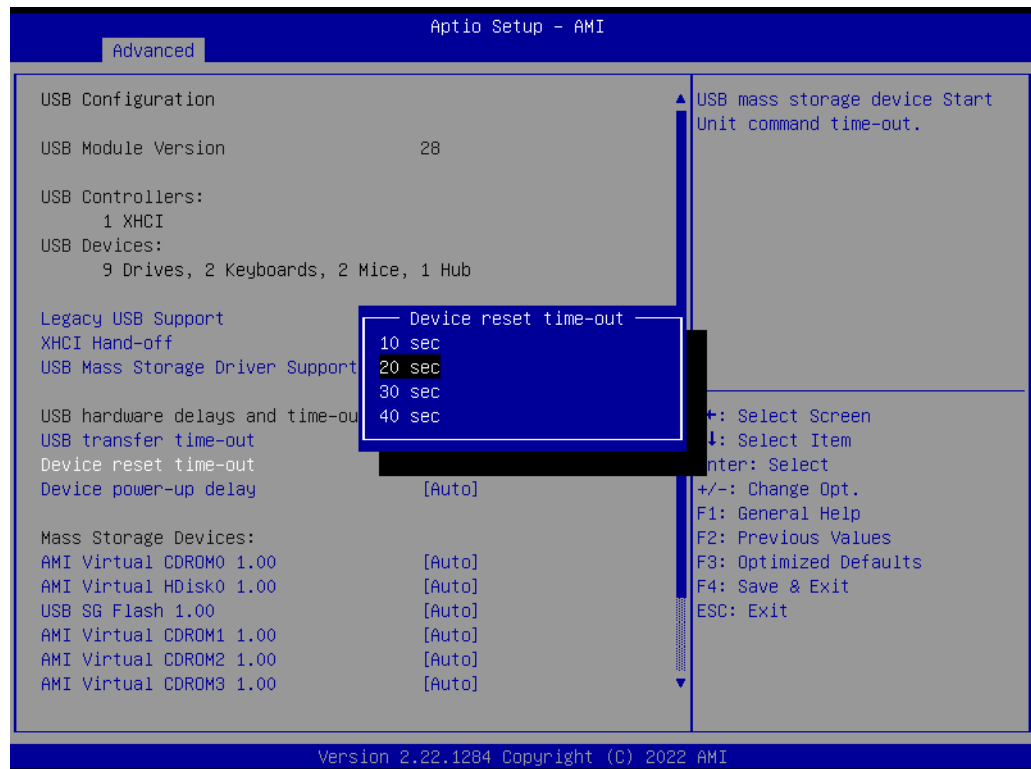
■ USB Transfer Timeout

This item allows users to set the timeout value for Control, Bulk, and Interrupt transfers.



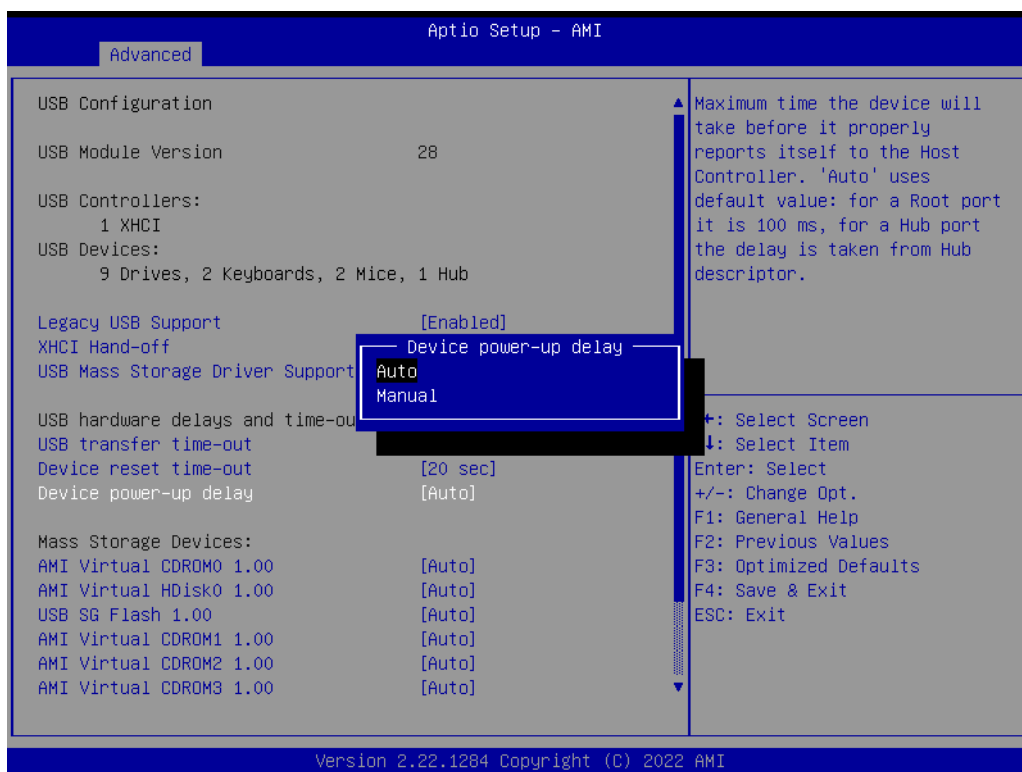
■ Device Reset Timeout

This item allows users to set the USB mass storage device start unit command timeout value.



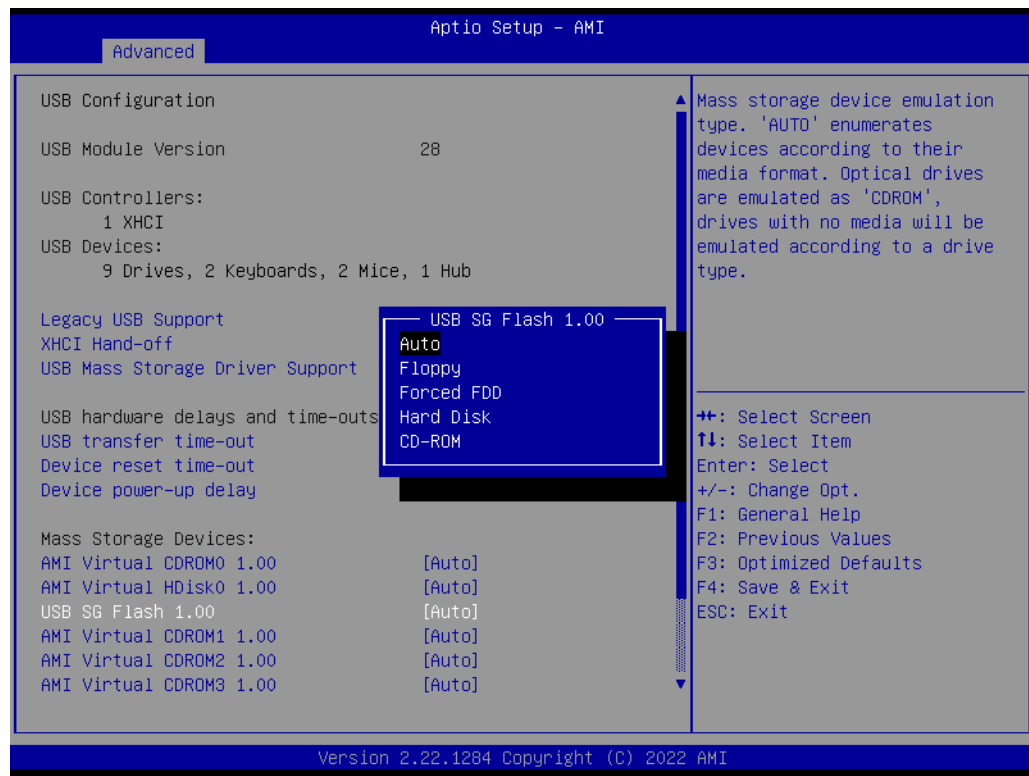
■ Device Power-Up Delay

This item allows users to set the maximum time the device will take before reporting to the host controller. The Auto option uses the default value, which is 100 ms for a root port; for a Hub port, the delay time is determined via the hub descriptor.



■ Mass Storage Devices

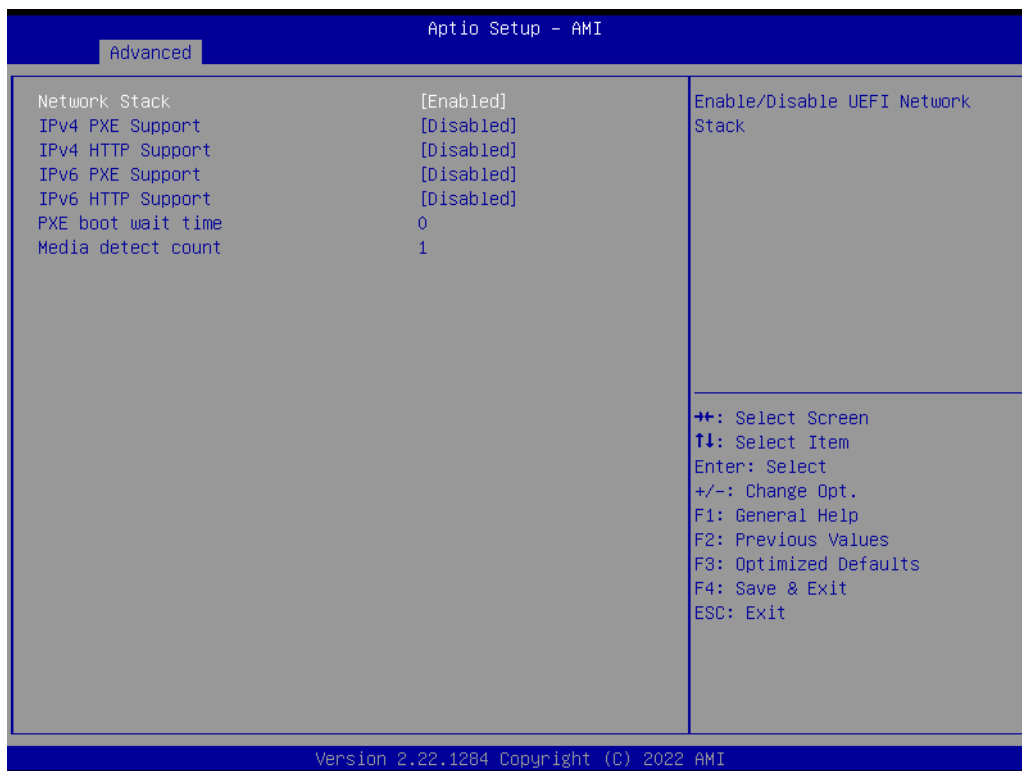
This item allows users to configure the mass storage device emulation type. The Auto emulates devices according to their media format. Optical drives are emulated as CDROM and drives with no media are emulated according to the drive type.



3.3.15 Network Stack Configuration



Figure 3.17 UEFI Network Stack Configuration Screen



- **UEFI Network Stack**
This item allows users to Enable/Disable the UEFI network stack.
- **IPv4/IPv6 PXE Support**
This item allows users to Enable/Disable IPv4/IPv6 PXE boot support.
- **PXE Boot Wait Time**
This item allows users to specify the wait time in seconds for pressing the <ESC> key to abort PXE bootup.
- **Media Detect Count**
This item allows users to specify the number of times the system will search for media.

3.3.16 CSM Configuration

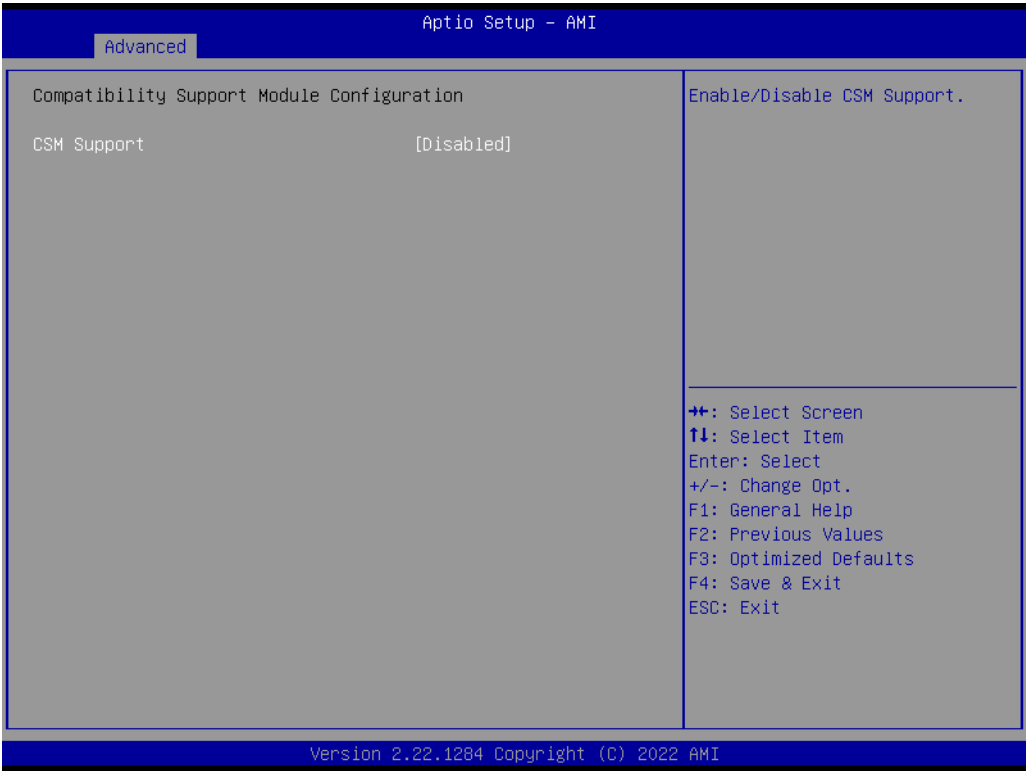
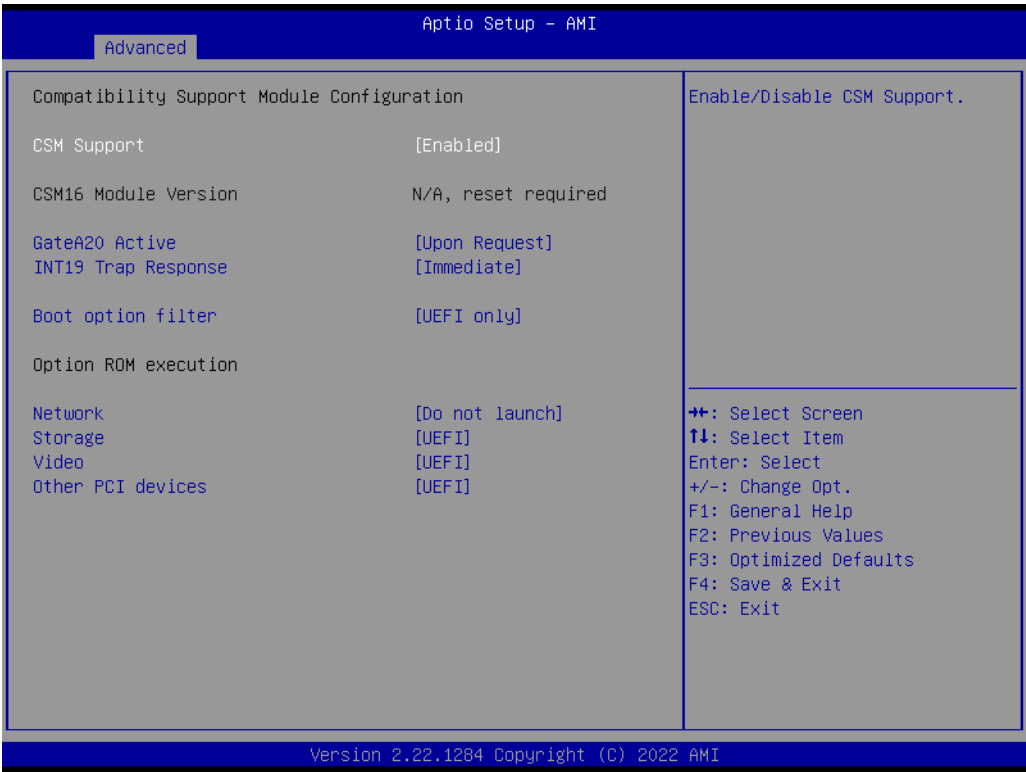


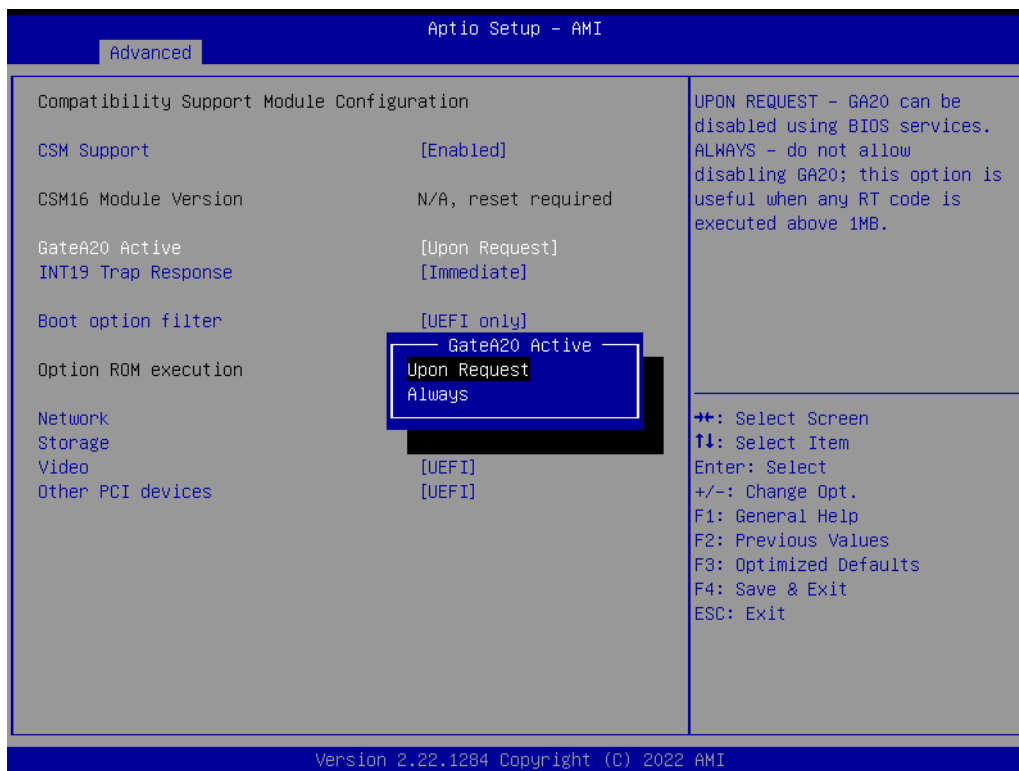
Figure 3.18 CSM Configuration Screen

- **CSM Support**
This item allows users to Enable/Disable CSM support. When set as Disabled, the system can only support UEFI mode.



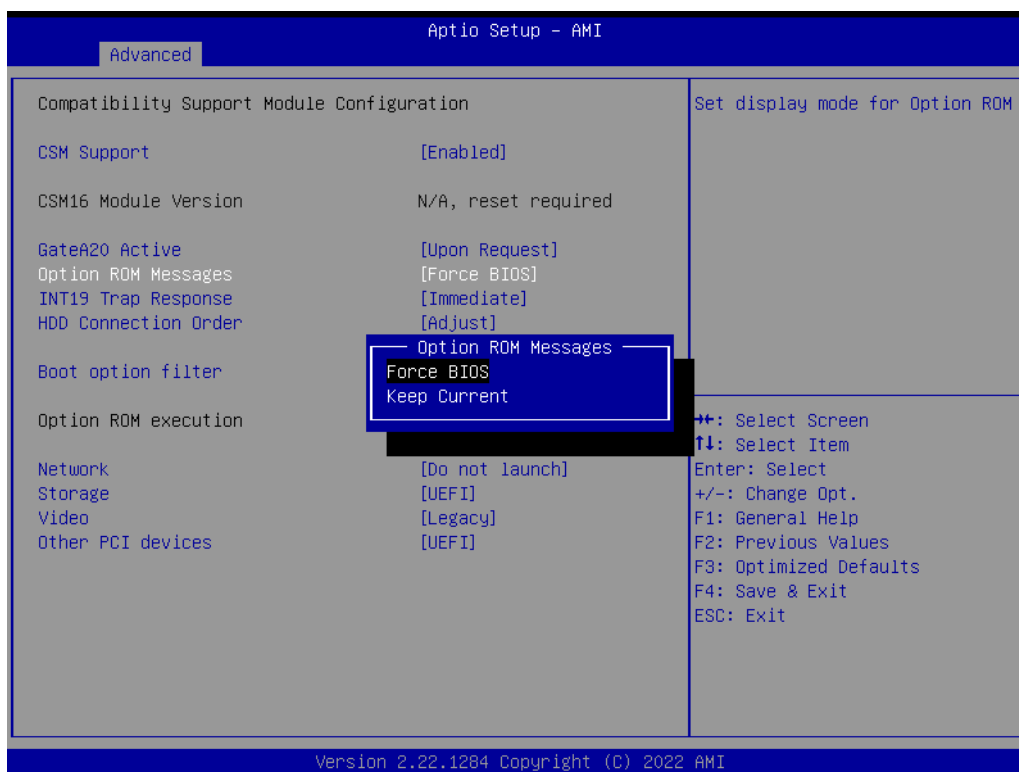
■ GateA20 Active

This item allows users to configure the GA20 settings when RT code is executed above 1 MB. When set as “Upon Request”, GA20 can be disabled via the BIOS. When set as “Always”, GA20 disabling is not allowed.



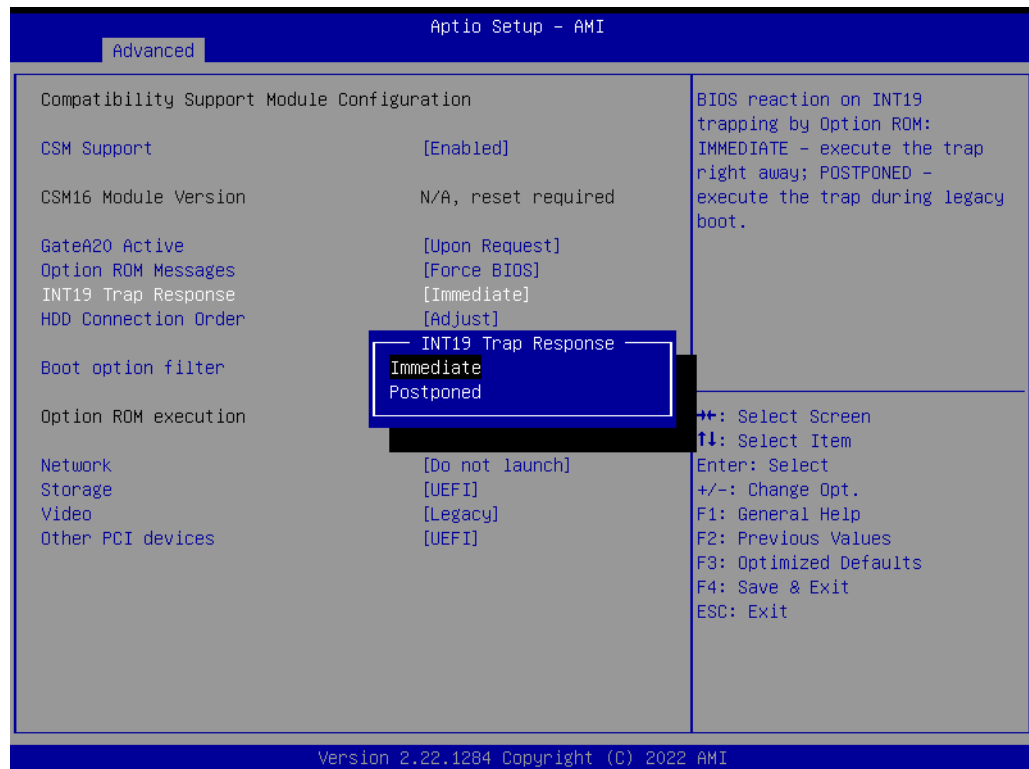
■ Option ROM Messages

Set display mode for Option ROM.



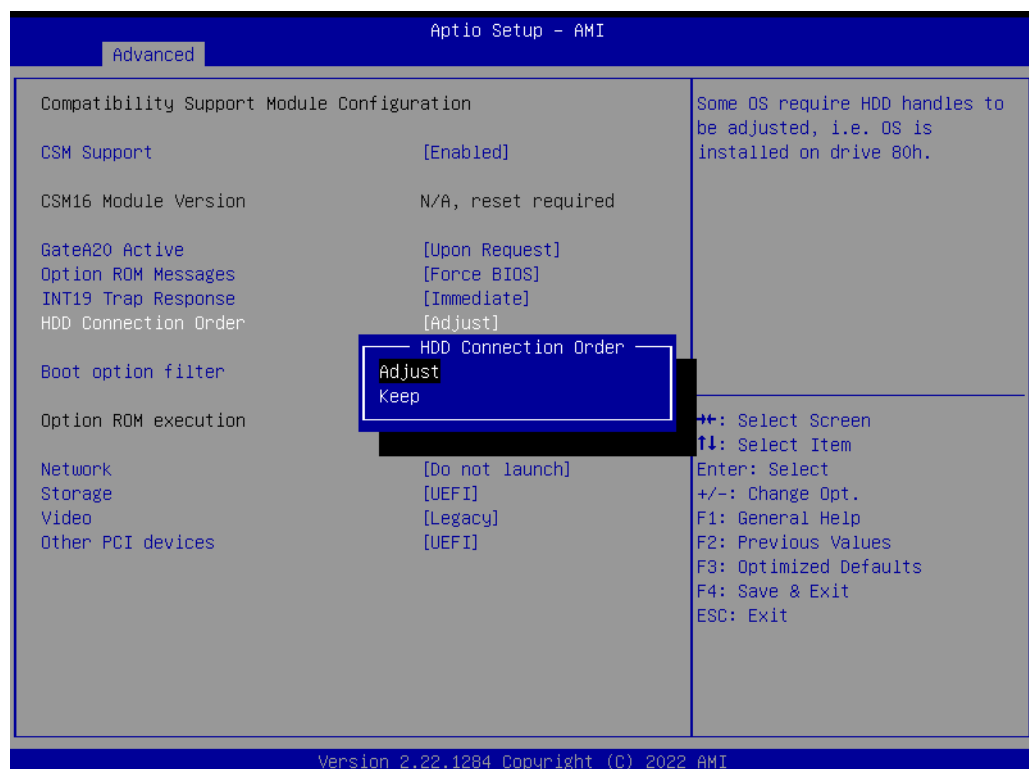
■ INT19 Trap Response

This item allows users to configure the BIOS reaction to INT19 trapping by Option ROM execution. When set as “Immediate”, the trap is executed right away. When set as “Postponed”, the trap is executed during legacy boot.



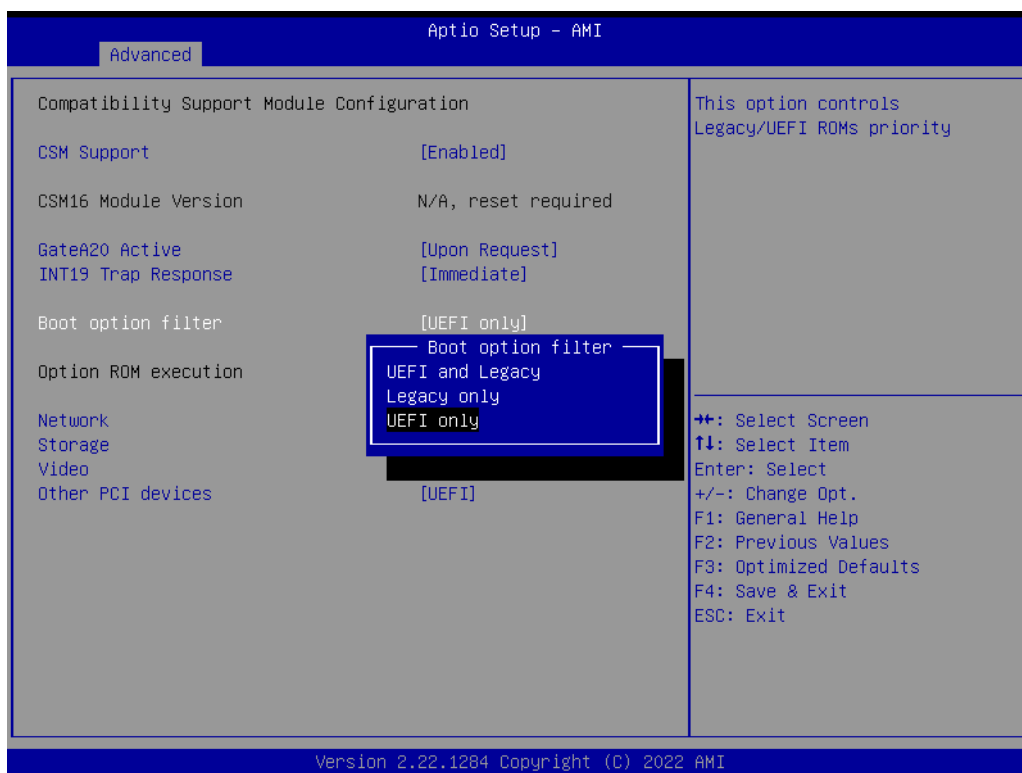
■ HDD Connection Order

Some OS require HDD handles to be adjusted, i.e. the OS is installed on drive 80h.



■ Boot Option Filter

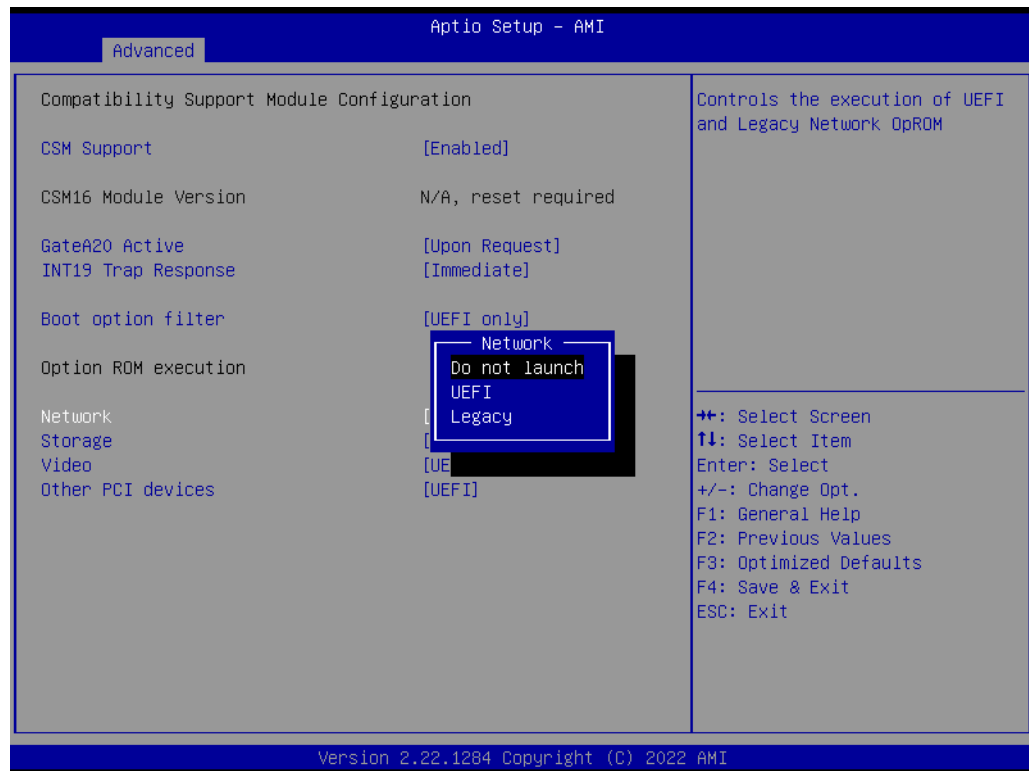
This item allows users to set the priority for legacy/UEFI ROMs.



■ Option ROM Execution

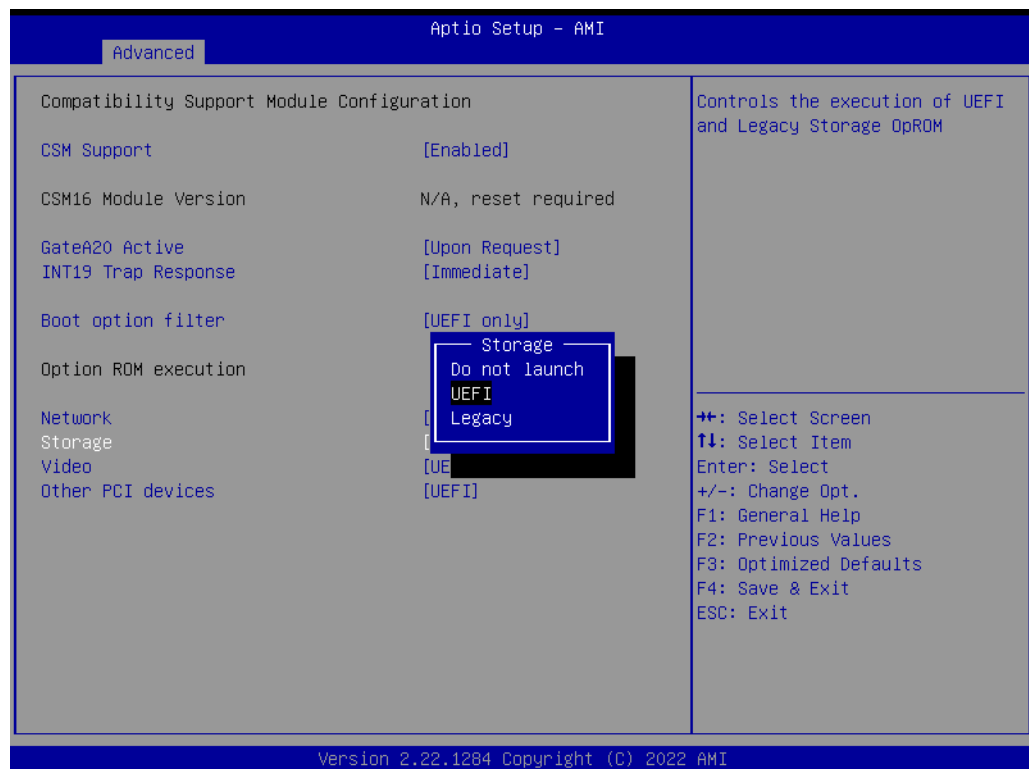
■ Network

This item allows users to control the execution of UEFI and the legacy PXE Option ROM.



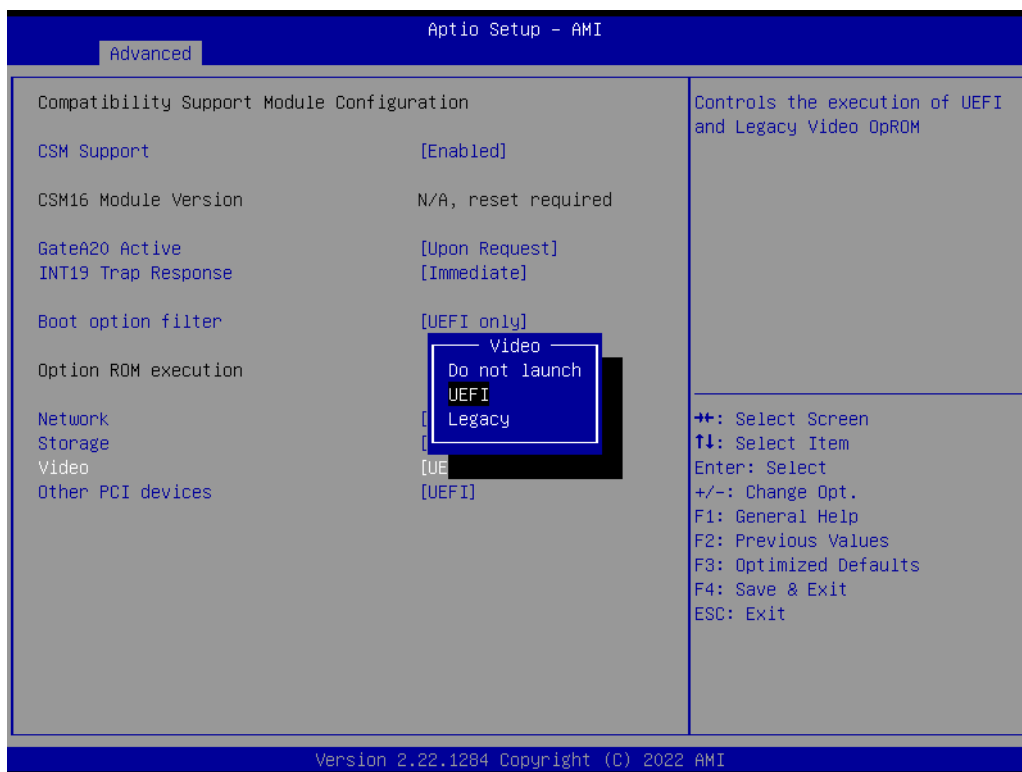
■ Storage

This item allows users to control the execution of UEFI and the legacy storage Option ROM.



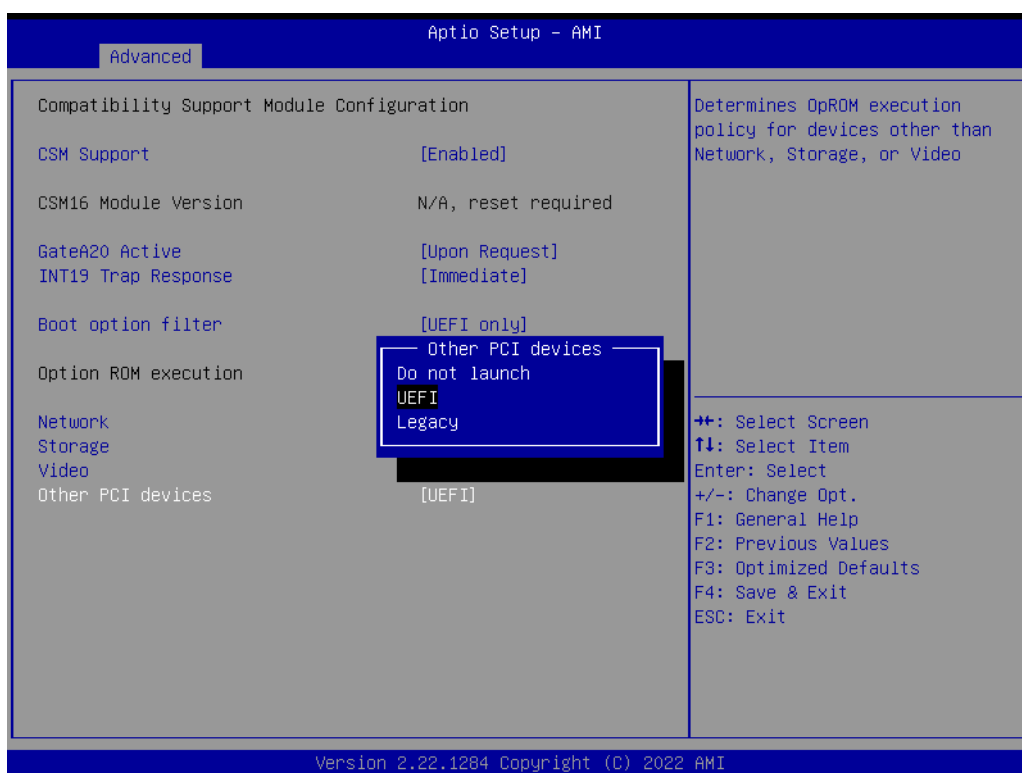
■ Video

This item allows users to control the execution of UEFI and the legacy video Option ROM.

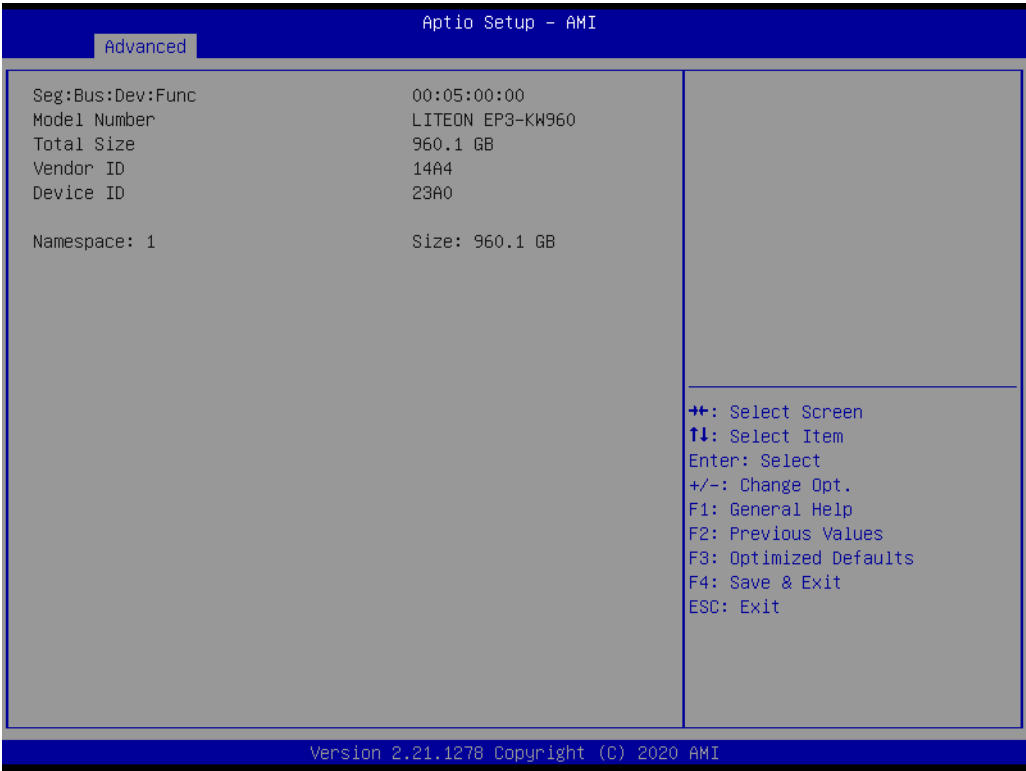
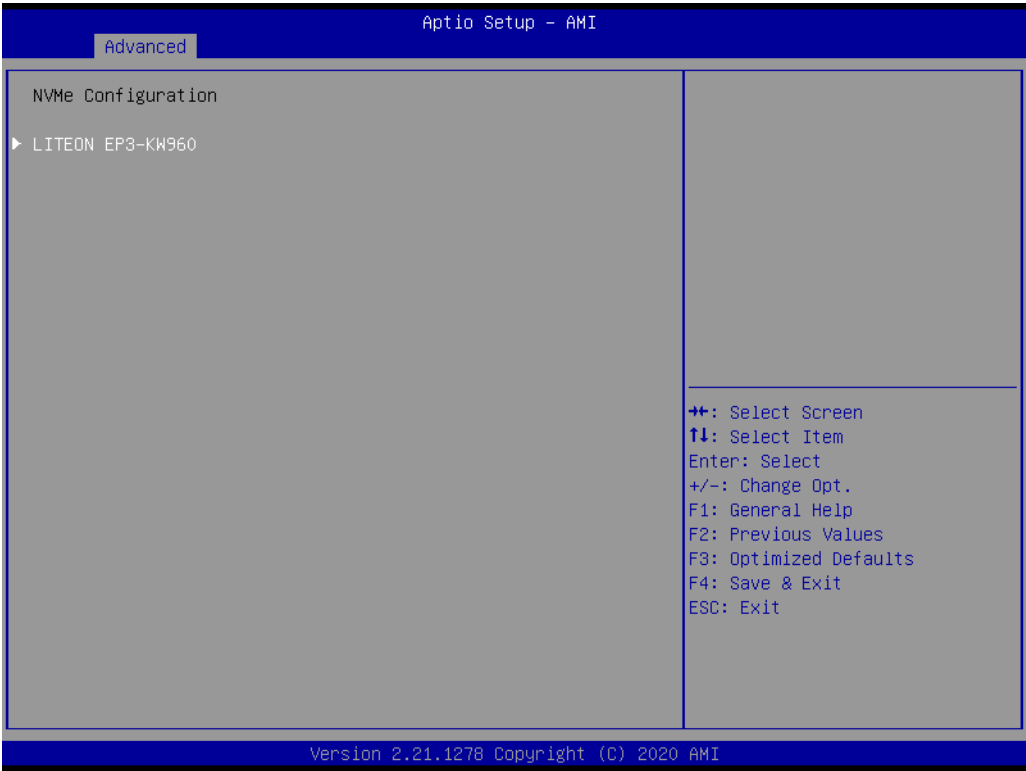


■ Other PCI Devices

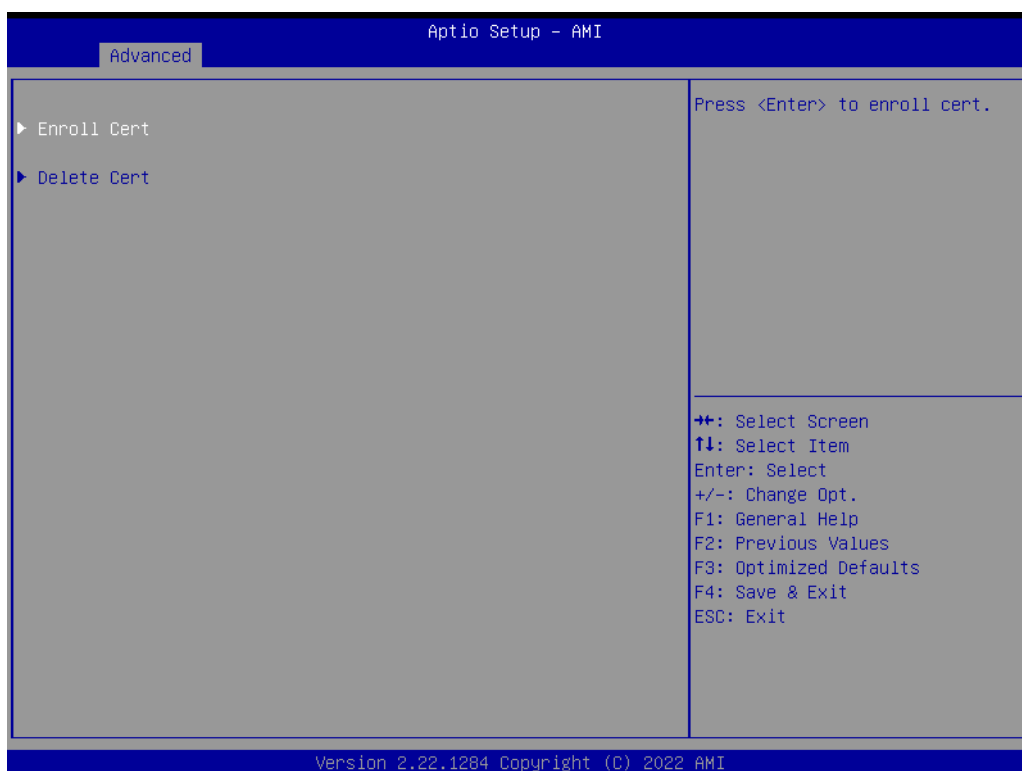
This item allows users to control the execution of the Option ROM policy for devices other than network, storage, or video.

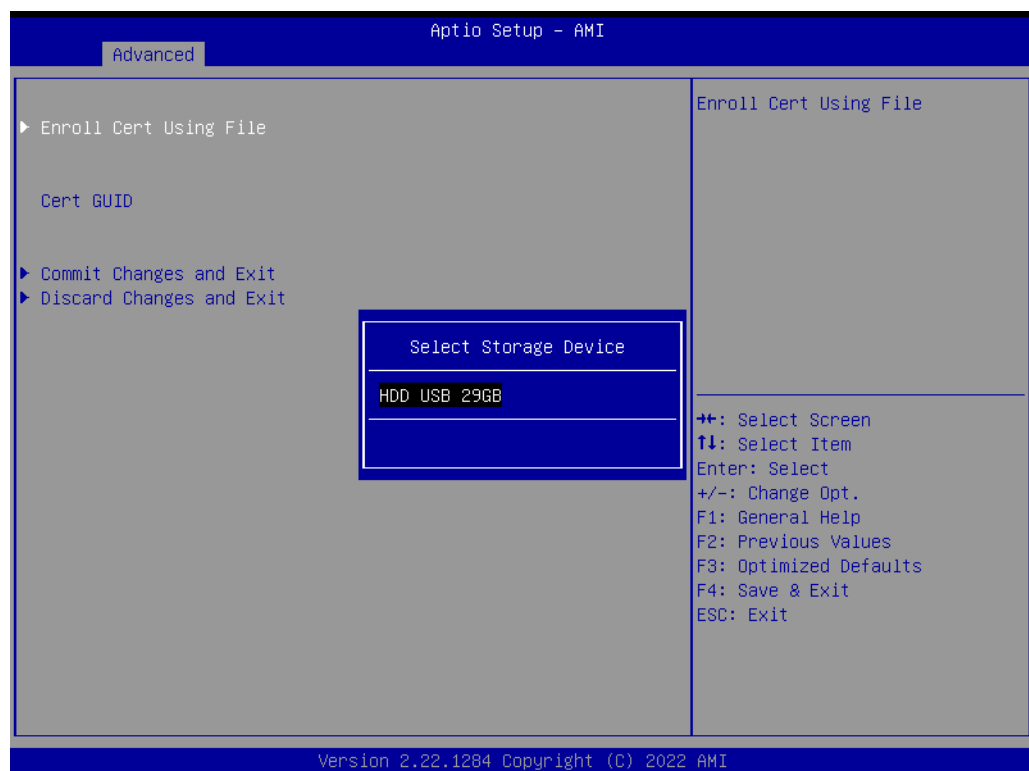


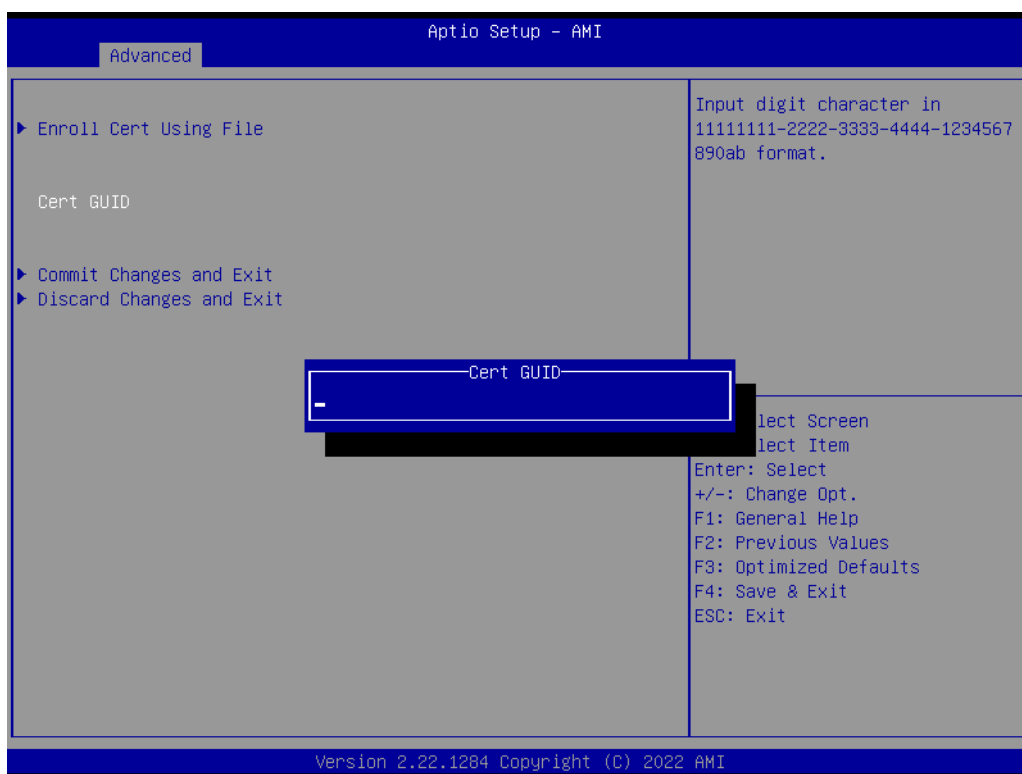
3.3.17 NVMe Configuration



3.3.18 Tls Auth Configuration

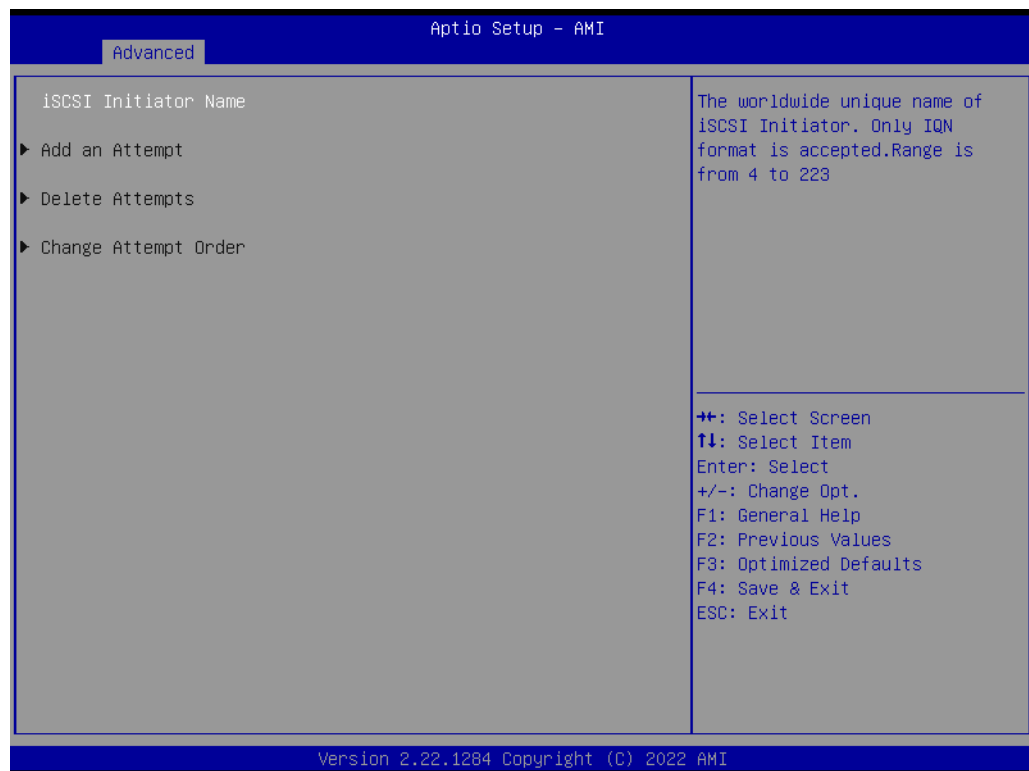






3.3.19 iSCSI Configuration





3.4 Chipset



Figure 3.19 Chipset Configuration Screen

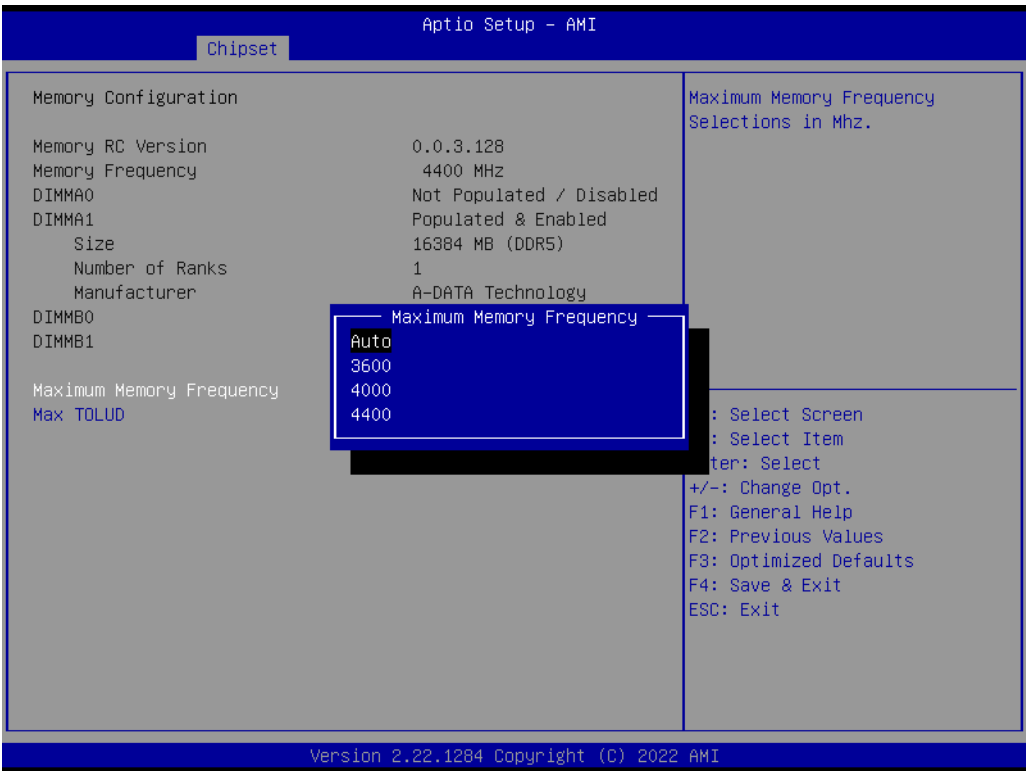
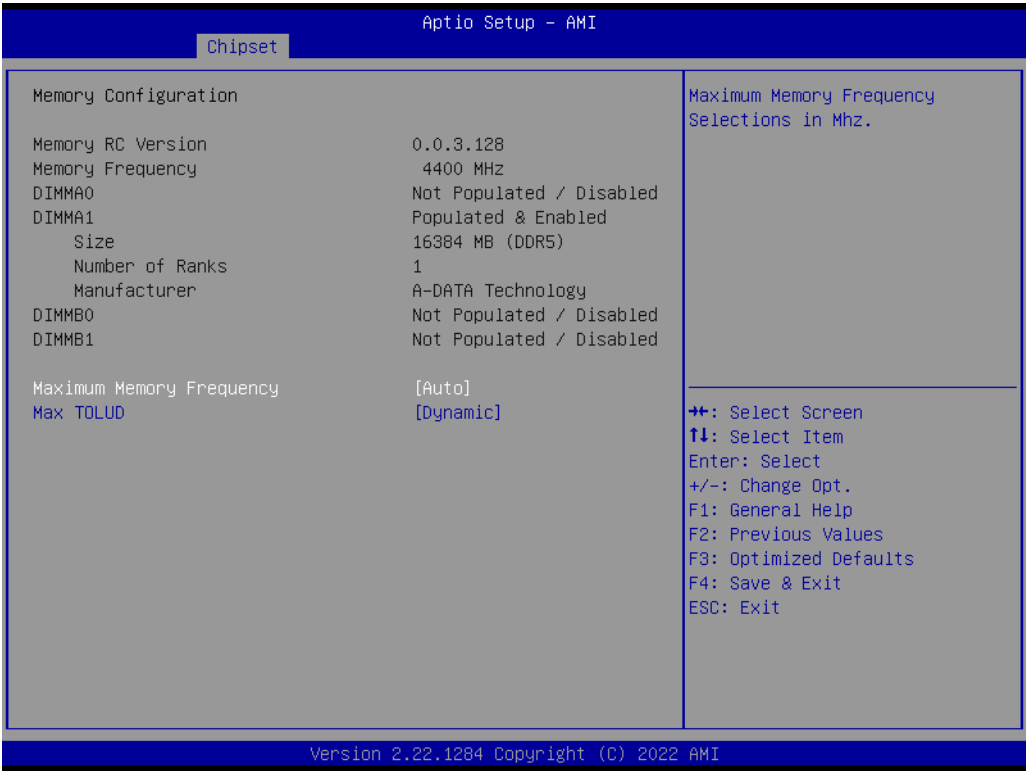
3.4.1 System Agent (SA) Configuration



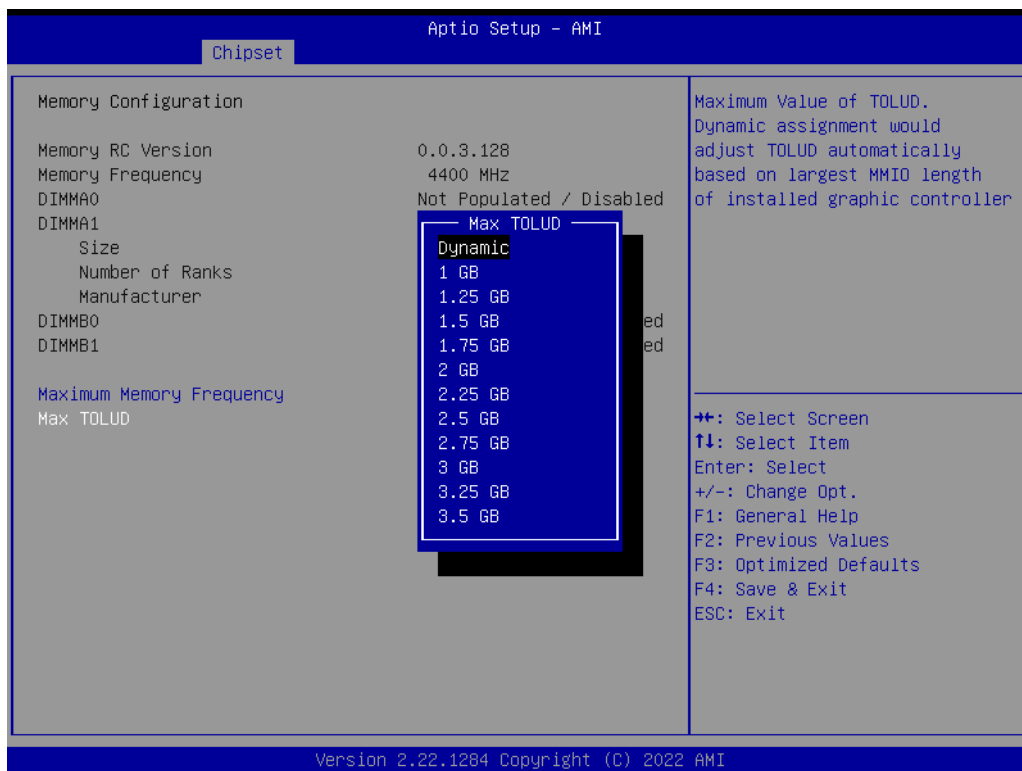
Figure 3.20 SA Configuration Screen

- **VT-d**
This item allows users to Enable/Disable VT-d function on the memory controller hub (MCH).
- **CRID Support**
This item allows users to Enable/Disable CRID control for the Intel® Stable Image Platform Program (SIPP).
- **Above 4G MMIO BIOS Assignment**
This item allows users to Enable/Disable the automatic BIOS assignment of above 4 GB memory-mapped I/O. This function is disabled automatically when the aperture size is set to 2048 MB.
Please set "Disabled" when installing VMWare under CSM Disabled.

3.4.1.1 Memory Configuration



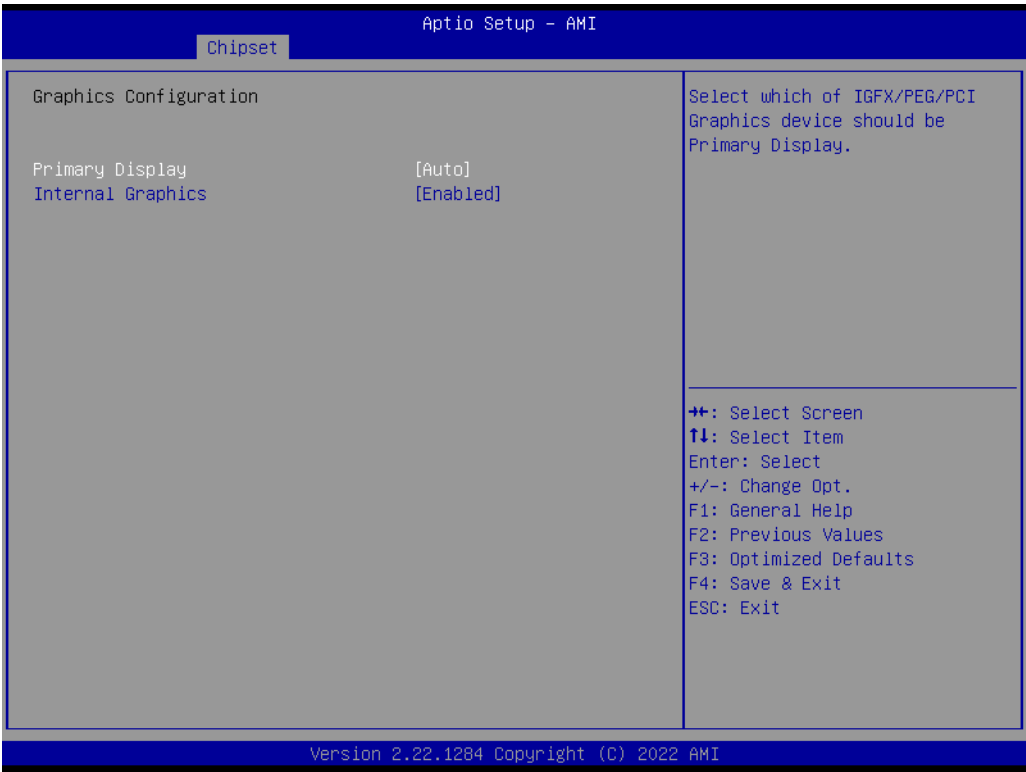
- **Maximum Memory Frequency**
Maximum Memory Frequency selections in Mhz.



■ Max TOLUD

This item allows users to set the maximum TOLUD value. When the dynamic assignment option is elected, TOLUD is automatically adjusted according to the largest MMIO length of the installed add-on cards.

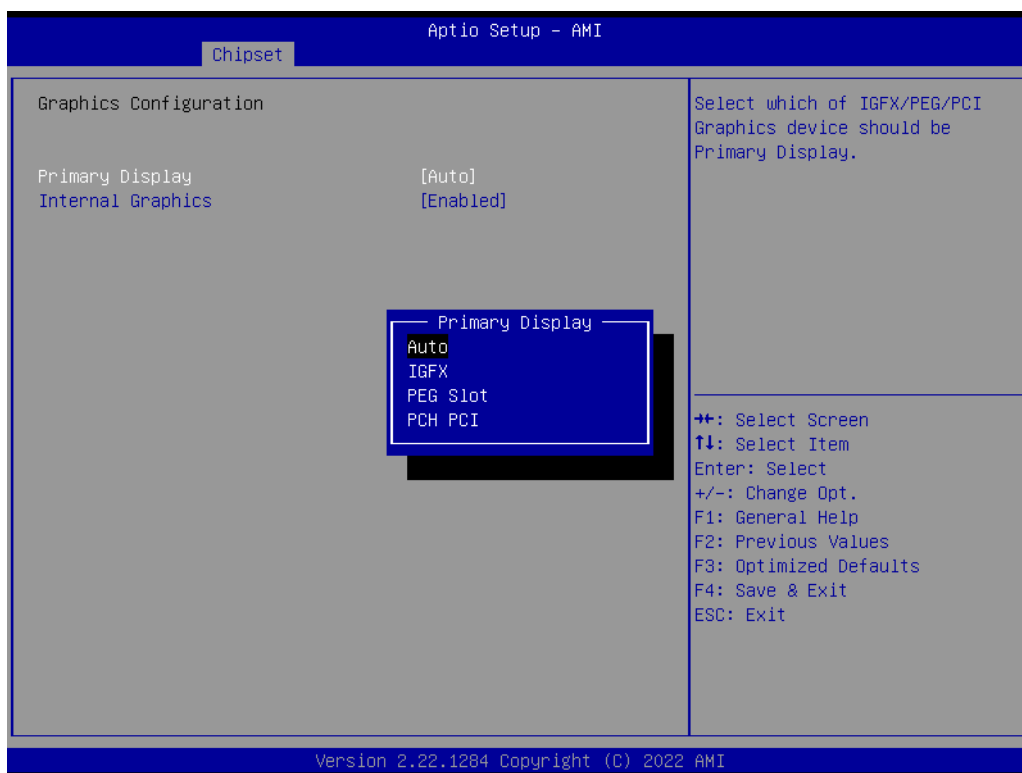
3.4.1.2 Graphics Configuration



- **Primary Display**
This item allows users to configure primary display settings. Options include Auto, IGFX, PEG, and PCI Graphics.

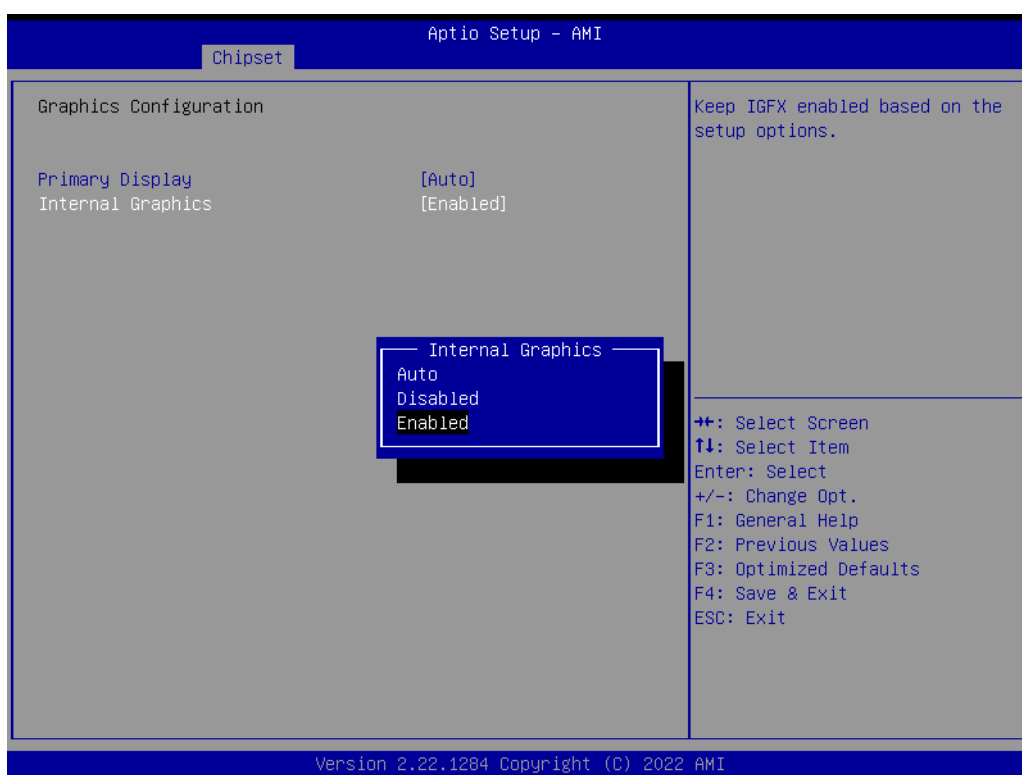
Note! When “Auto” is selected, the display priority is add-on cards > BMC VGA (with cable) > onboard VGA. For G4 SKU, BMC VGA can be set as primary by changing the “Auto” default setting to “PCI”.



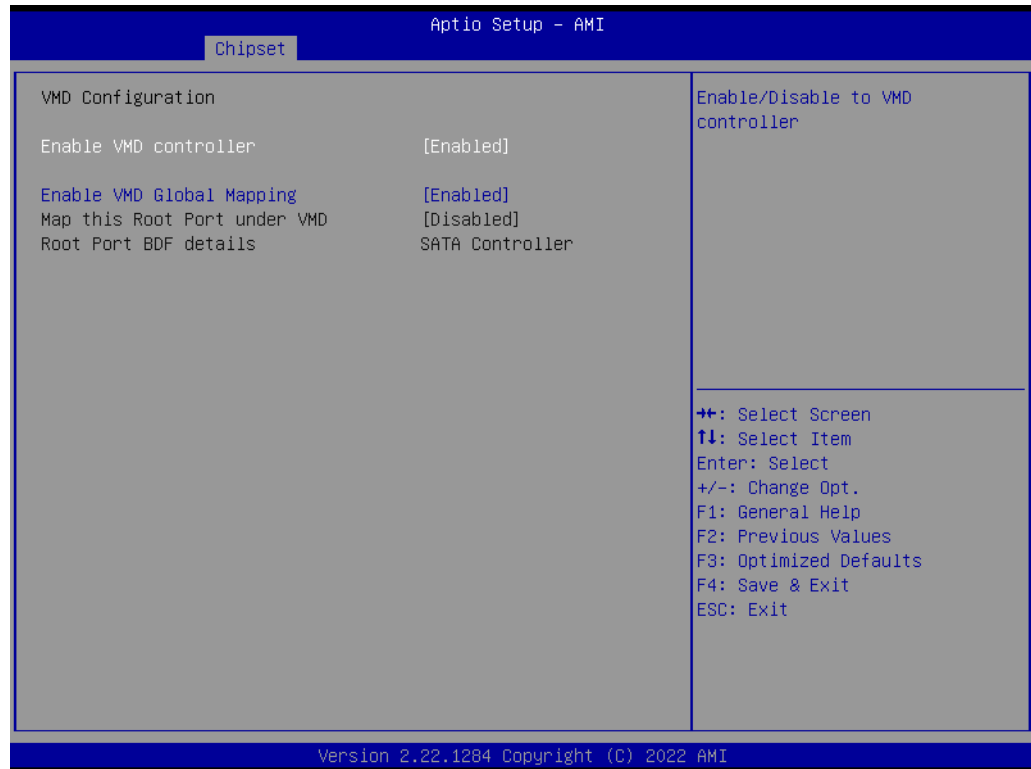


■ Internal Graphics

Keep IGFX enabled based on the setup options.

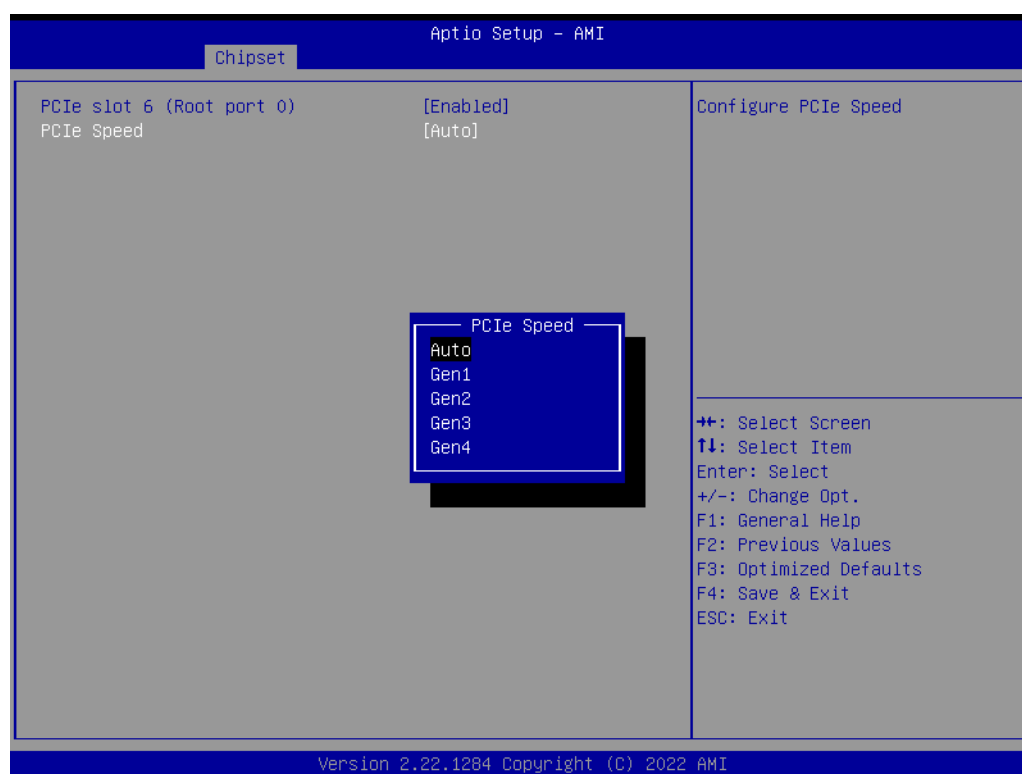


3.4.1.3 VMD Setup Menu



- **Enable VMD controller**
Enable/disable VMD controller.
- **Enable VMD Global Mapping**
Enable/disable VMD global mapping.
- **Map this Root Port under VMD**
Map/unmap this root port under VMD.

3.4.1.4 PCI Express Configuration



- **PCIe Slot6 (Root port0)**
Enable Root Port: Auto/Disabled/Enabled.
Max Link Speed: Configure Max Speed for PCIe Slot6 (Root port0).
- **PCIe Slot6 (Root port1)**
Enable Root Port: Auto/Disabled/Enabled.
Max Link Speed: Configure Max Speed for PCIe Slot6 (Root port1).

3.4.2 PCH-IO Configuration

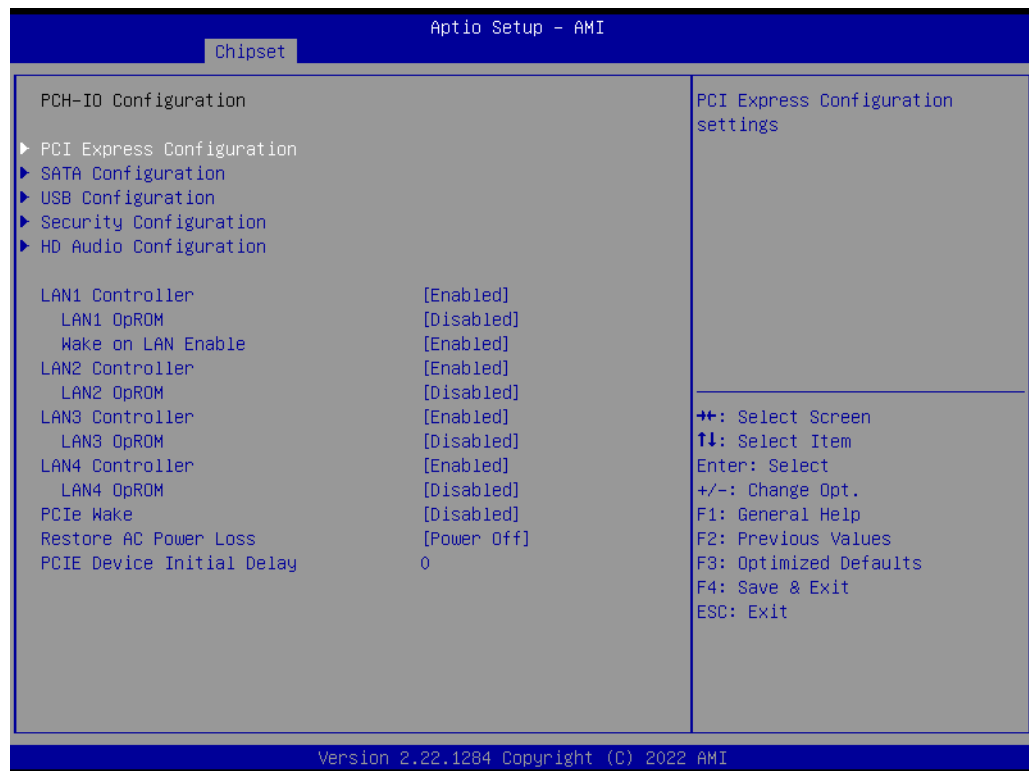


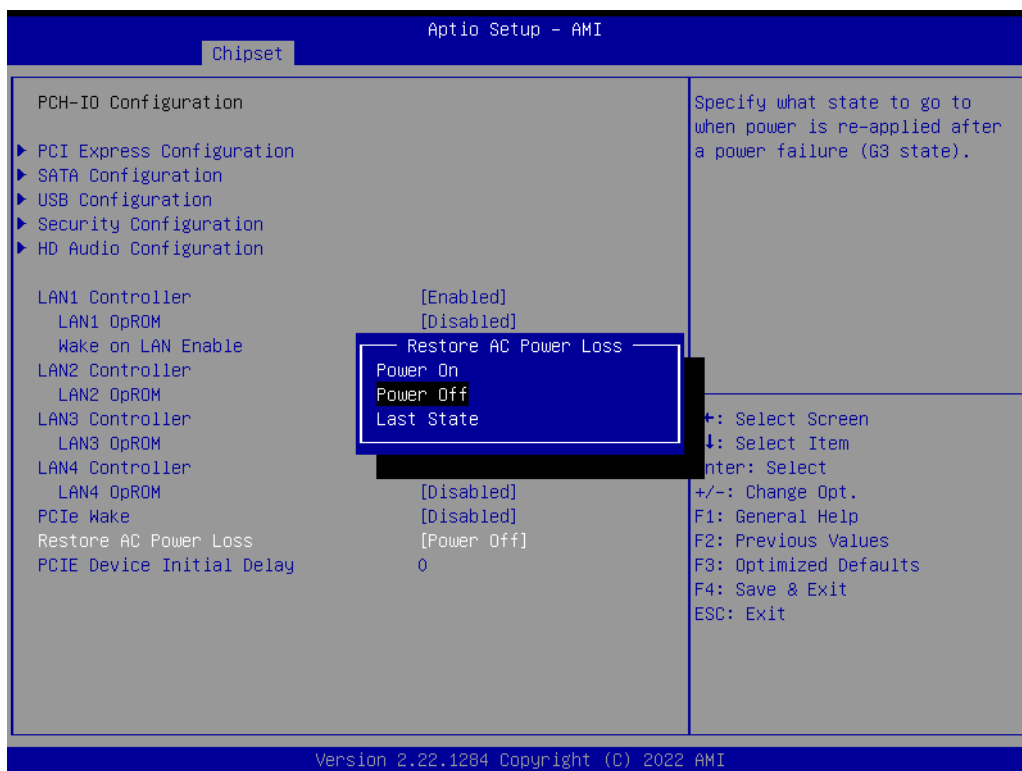
Figure 3.21 PCH-IO Configuration Screen

- **LAN1 Controller**
This item allows users to Enable/Disable the onboard NIC.
- **LAN1 Option ROM**
This item allows users to Enable/Disable boot options for the LAN1 controller.
- **Wake on LAN Enable**
Enable or Disable integrated LAN to wake the system.
- **LAN2 Controller**
This item allows users to Enable/Disable the onboard LAN2.
- **LAN2 Option ROM**
This item allows users to Enable/Disable boot options for the LAN2 controller.
- **LAN3 Controller**
This item allows users to Enable/Disable the onboard LAN3.
- **LAN3 Option ROM**
This item allows users to Enable/Disable boot options for the LAN3 controller.
- **LAN4 Controller**
This item allows users to Enable/Disable the onboard LAN4.
- **LAN4 Option ROM**
This item allows users to Enable/Disable boot options for the LAN4 controller.
- **PCIe Wake**
This item allows users to Enable/Disable “PCIe Wake From S5” functionality.
- **AC Power Loss**
This item allows users to set the preferred state for when power is restored after a power failure (G3 state).

■ PCIE Device Initial Delay

Note!  When a system enters G3 status with deep S5 enabled, for some power supplies, $5V_{SB}$ will not decline for at least 30 seconds. When set as Power On, the system will not boot up for 30 seconds after a power failure. We recommend users wait for more than 30 seconds to power the system back on after a power failure.

However, the system will automatically power back on if the power supply is restored within 30 seconds, before the $5V_{SB}$ drops, even when configured as Power Off.



3.4.2.1 PCI Express Configuration

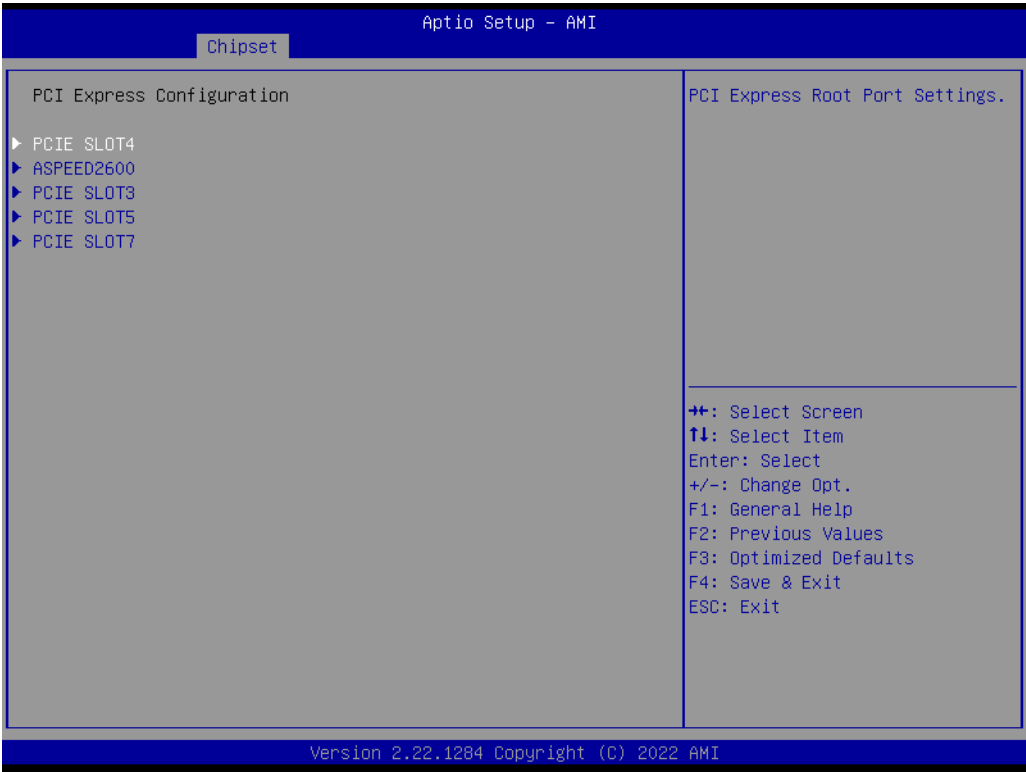
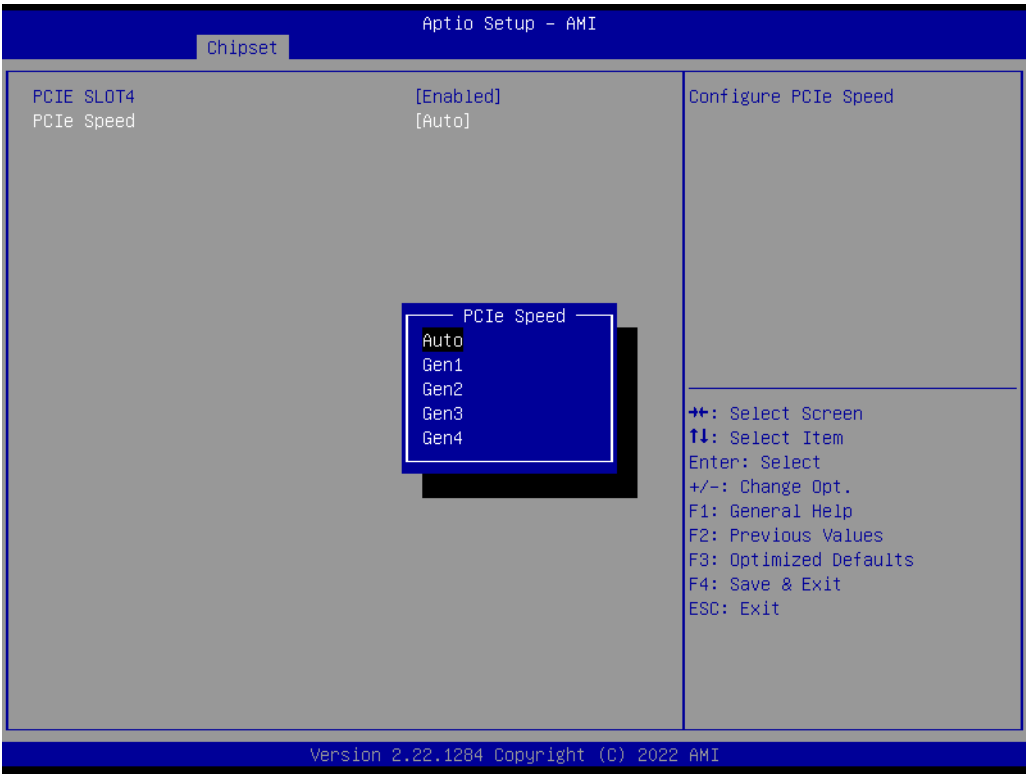


Figure 3.22 PCI Express Configuration Screen



- **PCIe SLOT3/4/5/7**
This item allows users to control the PCI express root port.
- **AST2600 PCIe Root Port**
This item allows users to control the PCI express root port.

■ PCIe Speed

This item allows users to set the PCIe speed for PCIe slots.

3.4.2.2 SATA Configuration

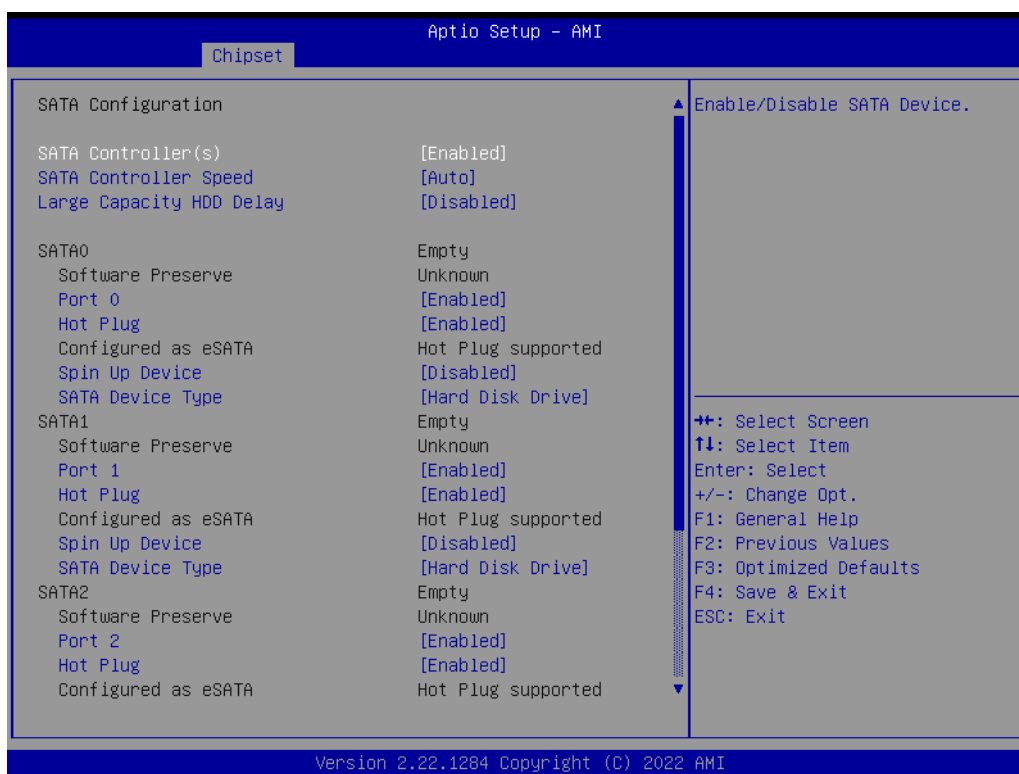
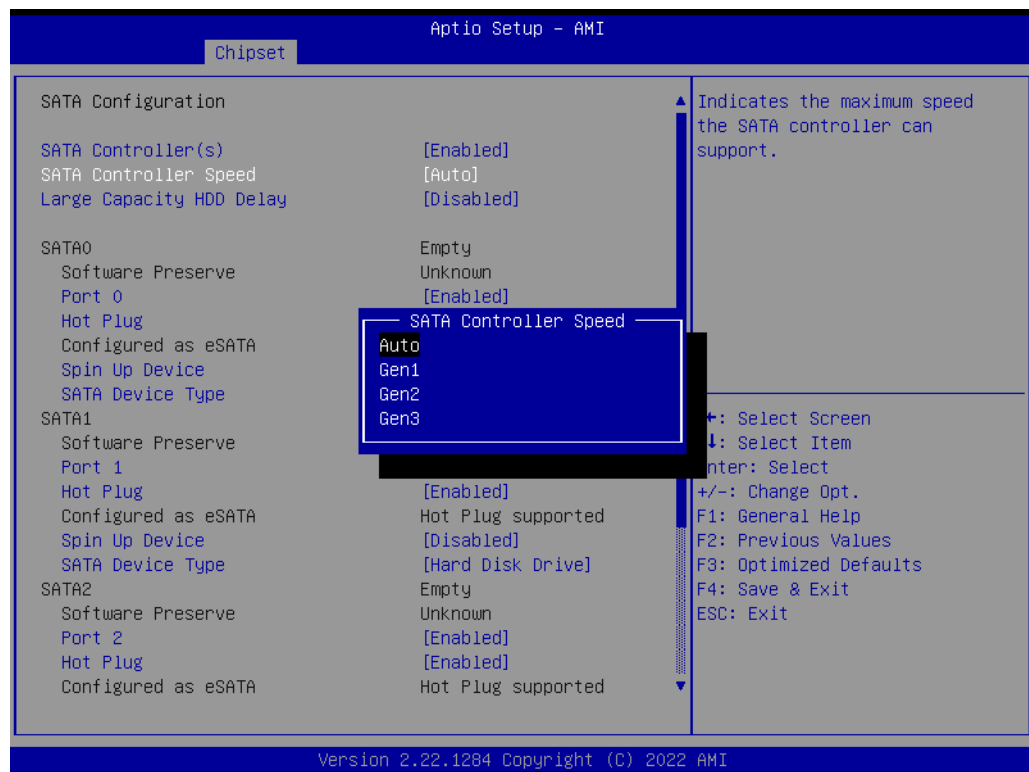


Figure 3.23 SATA and RST Configuration Screen

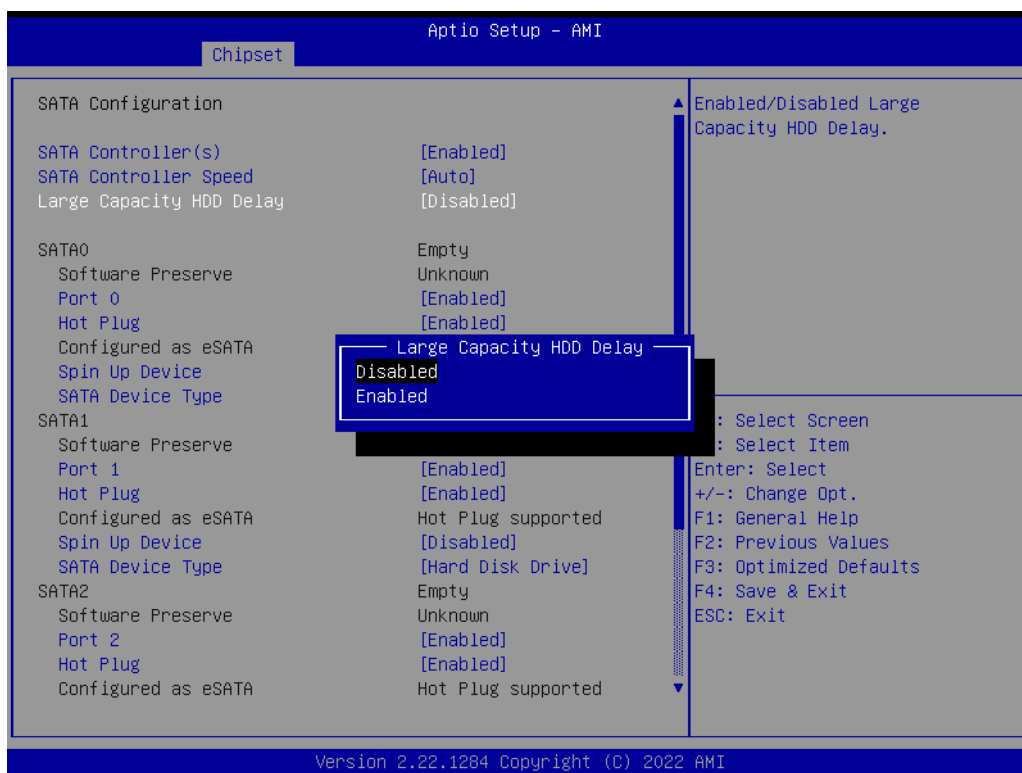
■ SATA Controller(s)

This item allows users to Enable/Disable SATA controllers.

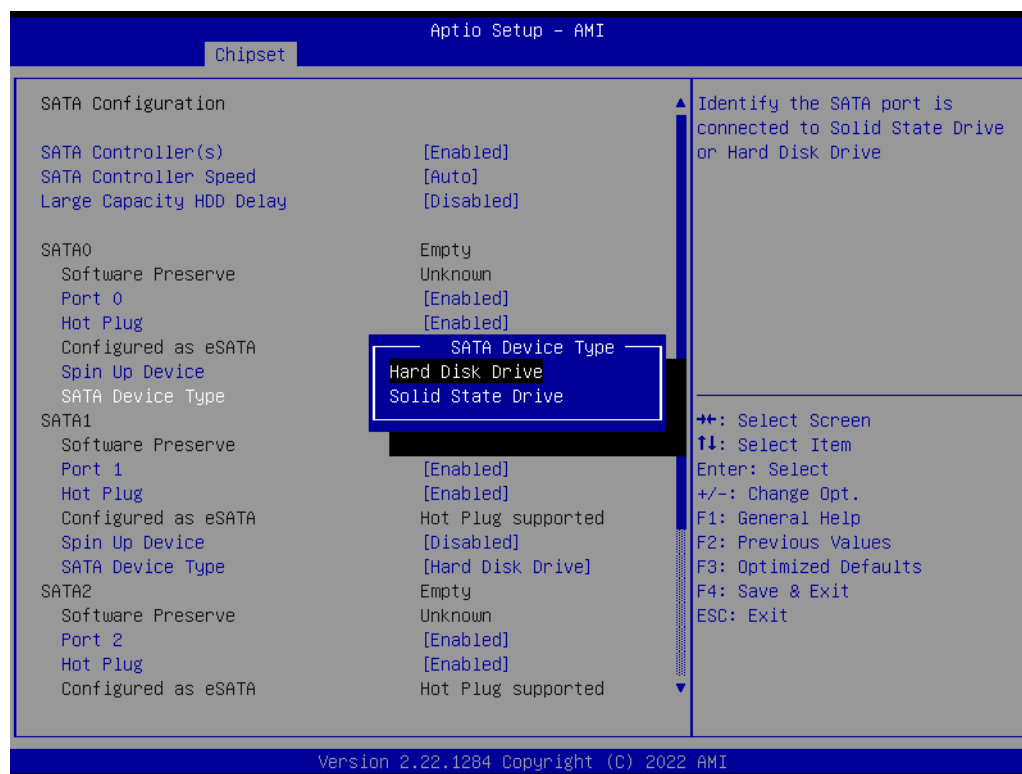


■ **SATA Controller Speed**

This item allows users to set the maximum SATA controller speed.



- **Large capacity HDD delay**
This item allows users to set the power-on delay time when using large capacity HDD.
- **Port 0~4**
This item allows users to Enable/Disable SATA ports 0~4.
- **Hot-Plugging**
This item allows users to Enable/Disable hot-plugging port functionality.
- **Spin Up Device**
This item allows users to Enable/Disable device spinup. If enabled for any port, staggered spinup at boot is performed for drives with this option enabled. If this item is configured as disabled, all drives will spinup at boot.



■ SATA Device Type

This item allows users to determine whether the SATA port is connected to a SSD or HDD.

3.4.2.3 USB Configuration

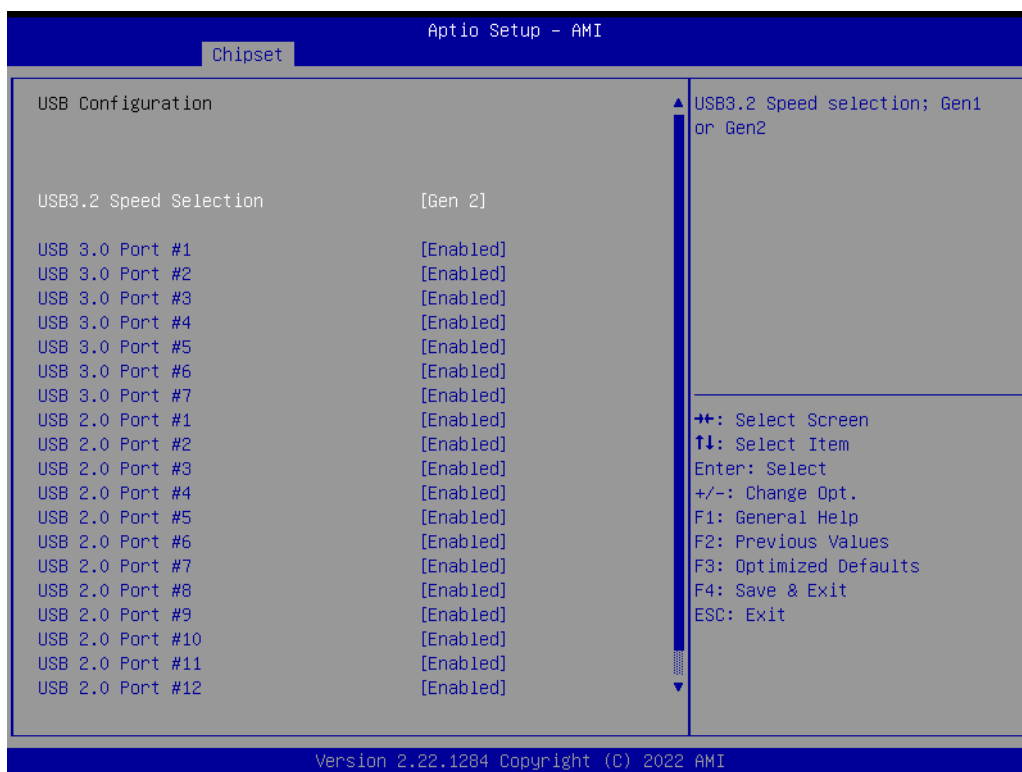
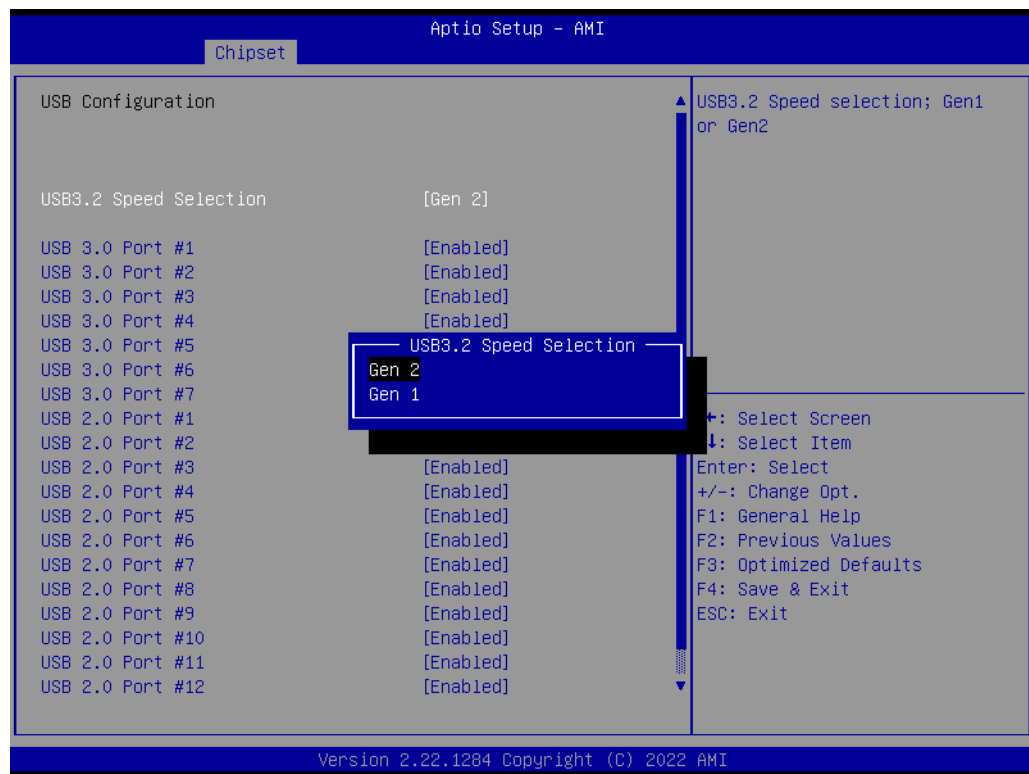


Figure 3.24 USB Configuration Screen

■ USB3.2 Speed Selection

This item allows users to set the maximum USB3.2 speed.



- **USB 3.0 port1~7, USB 2.0 port 1~14**
Enable/Disable this USB physical connector (physical port). Once disabled, any USB devices plug into the connector will not be detected by BIOS or OS.

3.4.2.4 Security Configuration



Figure 3.25 Security Configuration Screen

- **RTC Memory Lock**
This item allows users to Enable/Disable RTC memory locking. When Enabled, bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM will be locked.
- **BIOS Lock**
This item allows users to Enable/Disable PCH BIOS locking. This item must be Enabled to ensure flash protection in SMM.
- **Force Unlock on All GPIO Pads**
This item allows users to Enable/Disable forced unlocking of all GPIO pads. When Enabled, the BIOS will force all GPIO pads to the unlocked state.

3.4.2.5 HD Audio Configuration

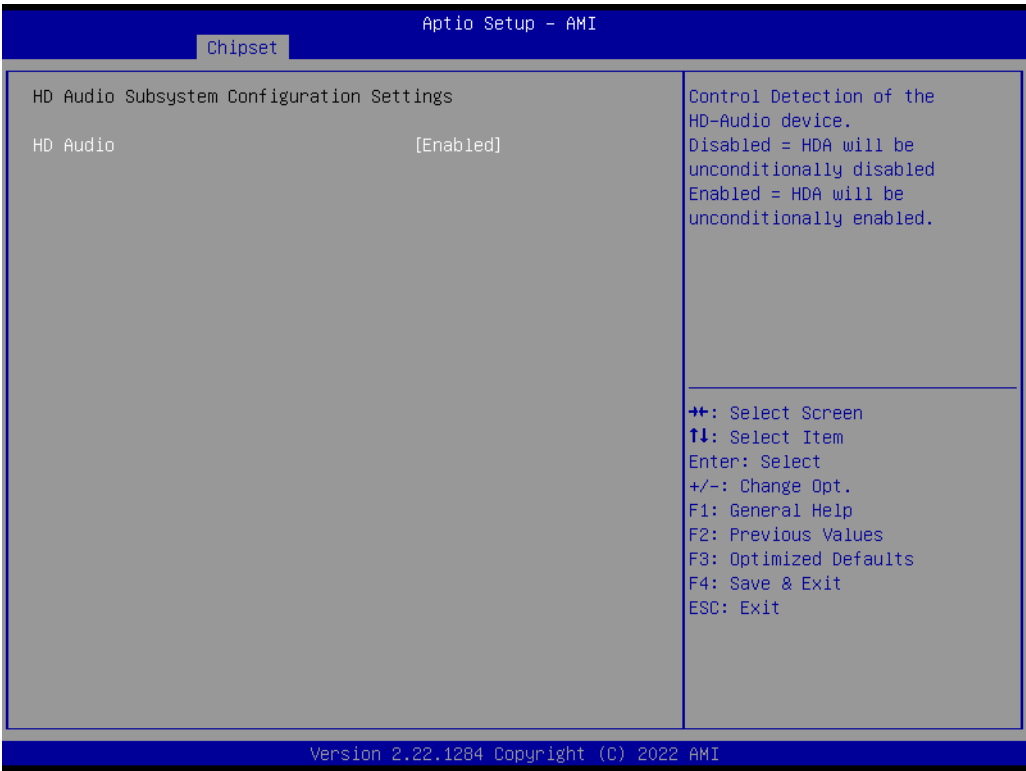


Figure 3.26 HD Audio Configuration Screen

- **HD Audio**
This item allows users to control the detection of HD audio devices.

3.5 Security

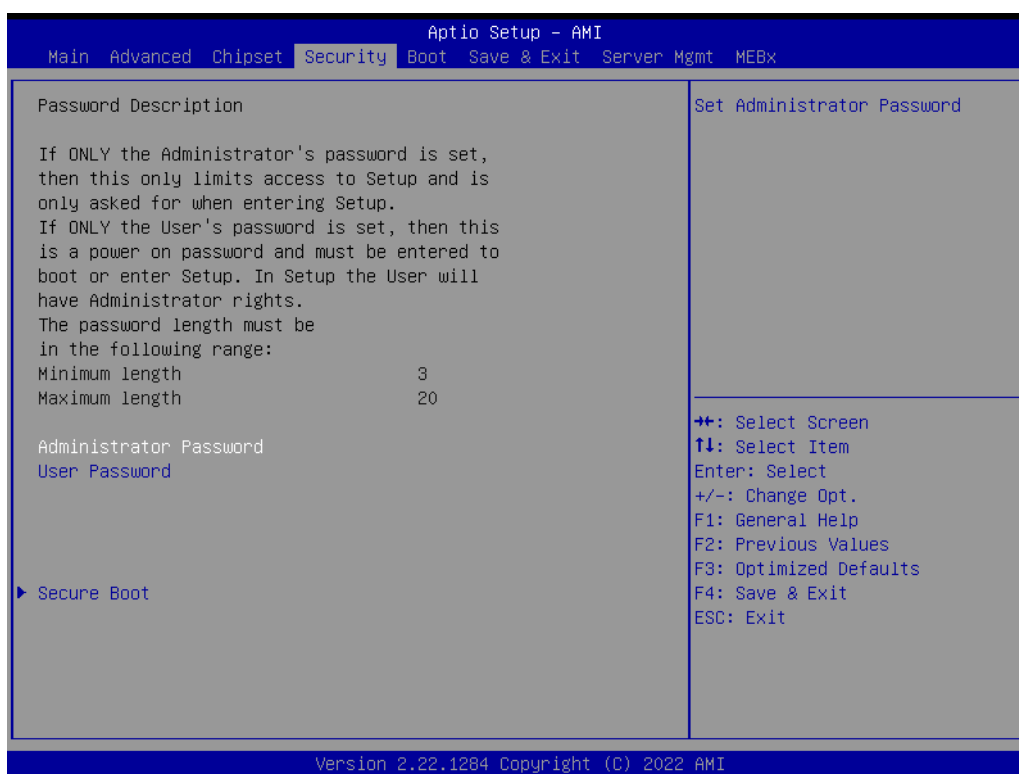


Figure 3.27 Security Configuration Screen



Select the security tab from the main BIOS Setup menu. All security menu items, such as password protection, are described in this section. To access the sub menu of any item, navigate to the item using the <Arrow> keys and press <Enter>.

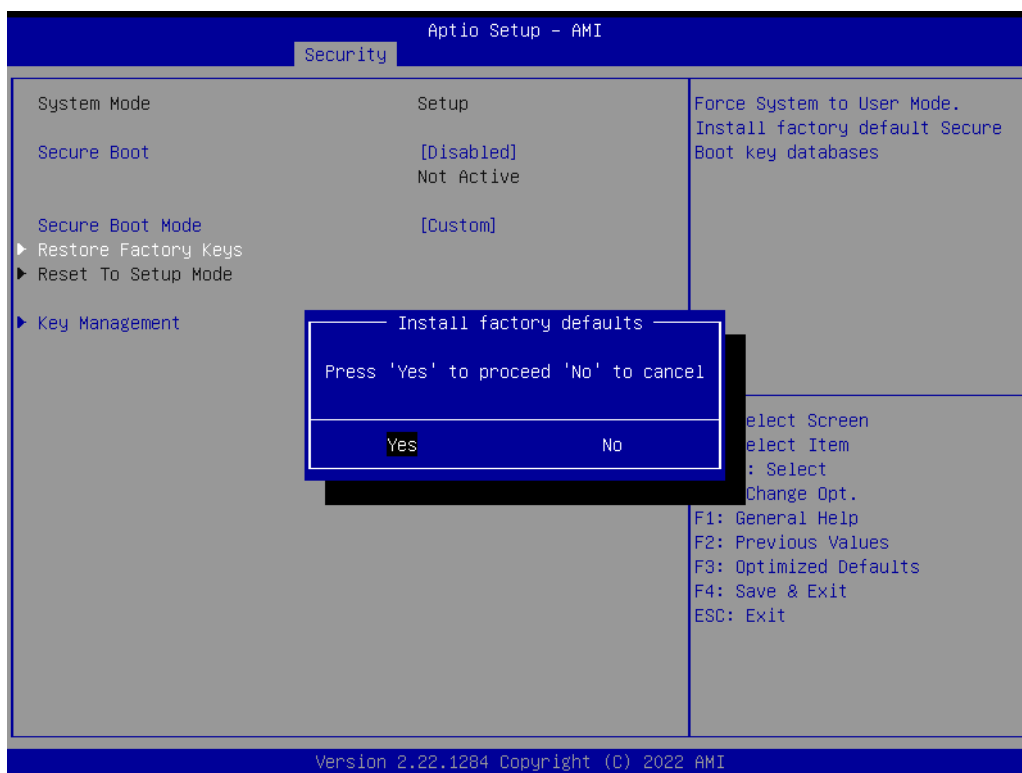
3.5.1 Secure Boot



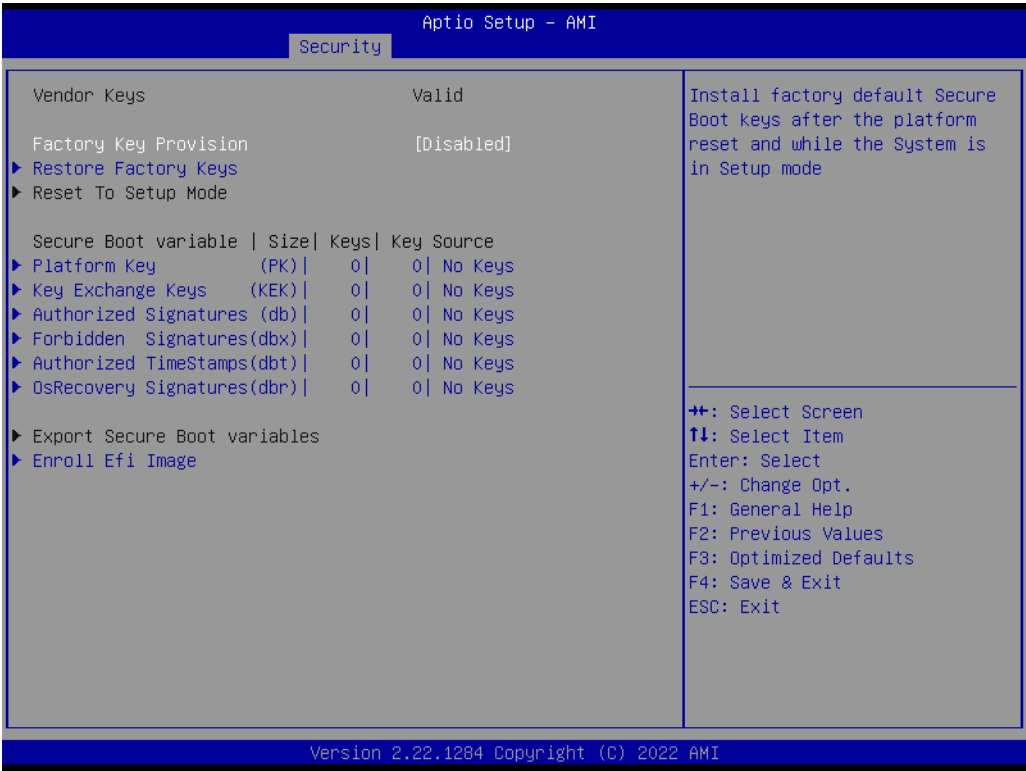
- **Secure Boot**
Secure Boot feature is active if Secure Boot is enabled, the Platform Key (PK) is enrolled and the system is in user mode. The mode change requires a platform reset.
- **Secure Boot Mode**
Secure Boot mode options: Standard or Custom. In Custom mode, the Secure Boot policy variables can be configured by a physically present user without full authentication.



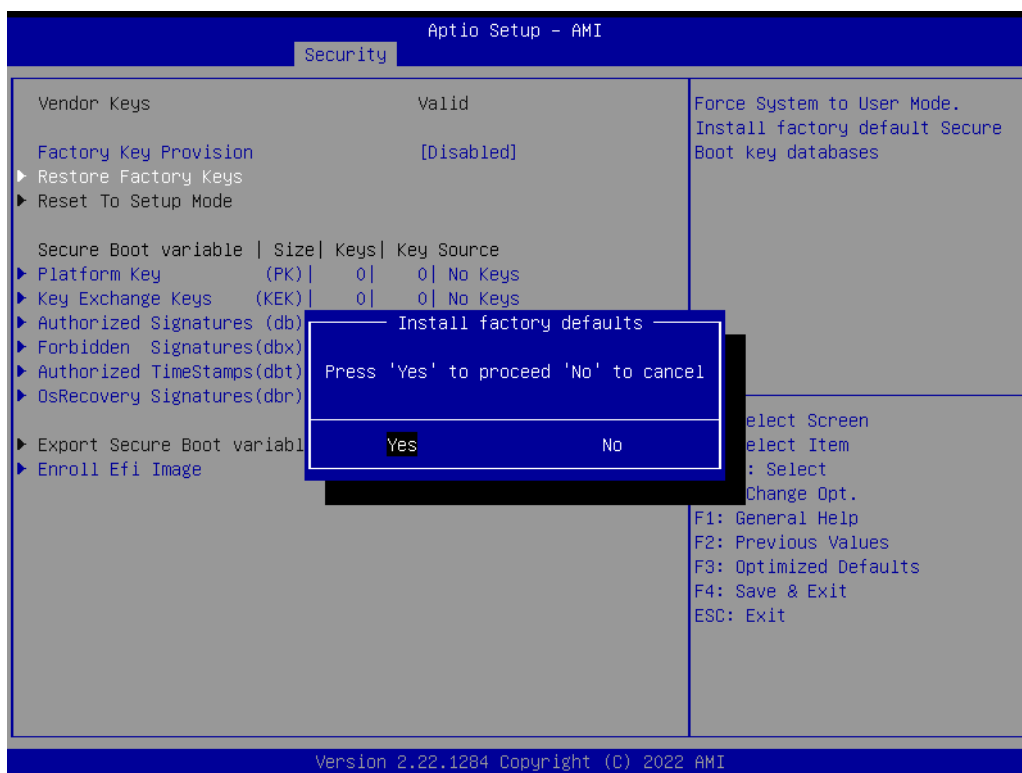
- **Restore Factory Keys**
Force System to User Mode. Install factory default Secure Boot key databases.



3.5.1.1 Key Management



- **Factory Key Provision**
Install factory default Secure Boot keys after the platform reset and while the system is setup mode.
- **Restore Factory Keys**
Force system to user mode. Install factory default Secure Boot key databases.



- **Platform Key**
- **Key Exchange Keys**
- **Authorized Signatures**
- **Forbidden Signatures**
- **Authorized TimeStamps**
- **OsRecovery Signatures**

Enroll Factory Defaults or load certificates from a file:

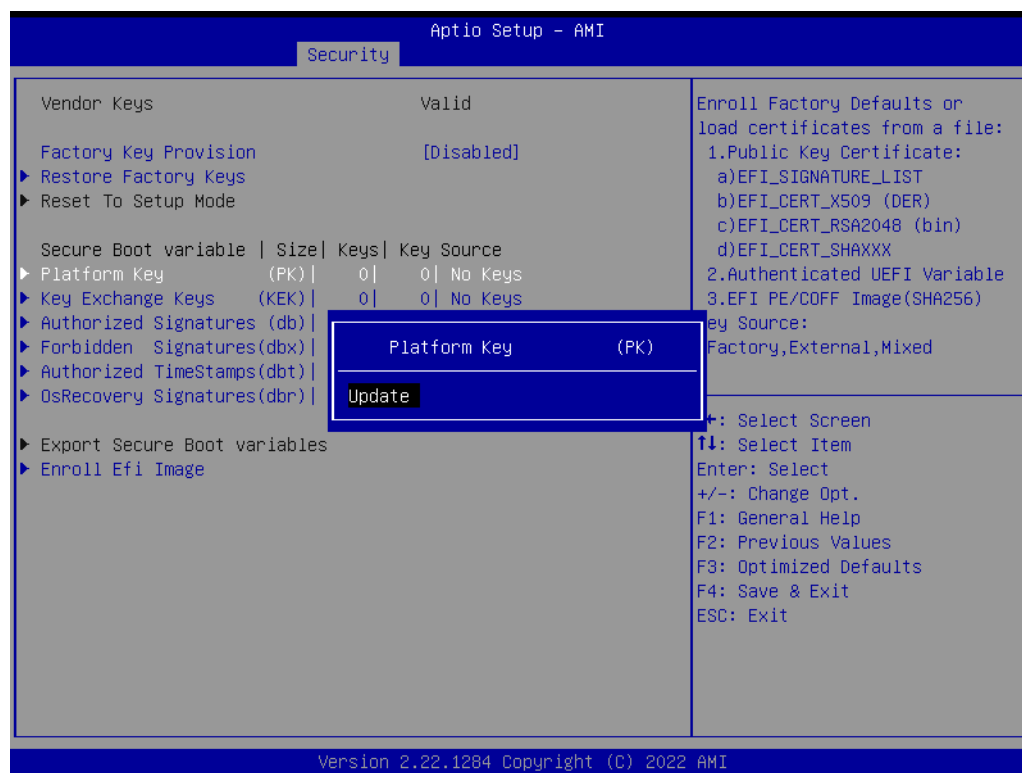
1. Public Key Certificate:

- a) EFI_SIGNATURE_LIST
- b) EFI_CERT_X509 (DER)
- c) EFI_CERT_RSA2048 (bin)
- d) EFI_CERT_SHAXXX

2. Authenticated UEFI Variable

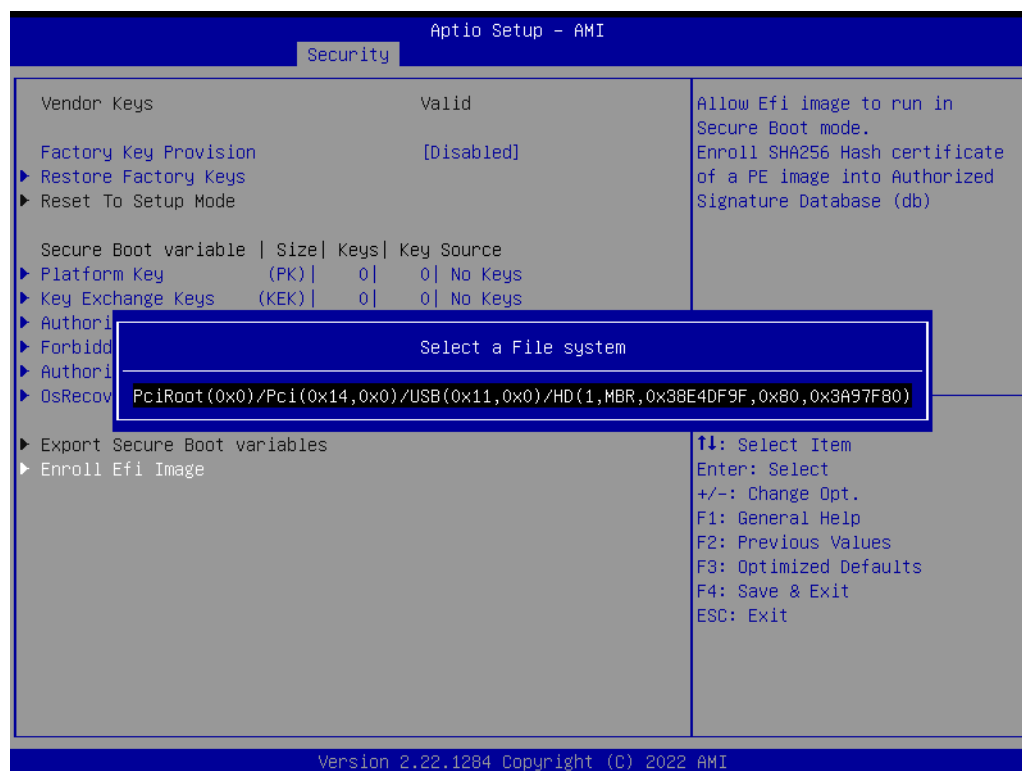
3. EFI PE/COFF Image(SHA256)

Key Source: Factory, External, Mixed



■ Enroll Efi Image

Allow Efi image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db).



3.6 Boot



Figure 3.28 Boot Configuration Screen

■ Setup Prompt Timeout

This item allows users to set the setup prompt timeout time in seconds. Use the <+> and <-> keys to adjust the number of seconds the system will wait for a setup activation key.

■ Bootup NumLock State

This item allows users to Enable/Disable the NumLock state at system boot up.

■ Quiet Boot

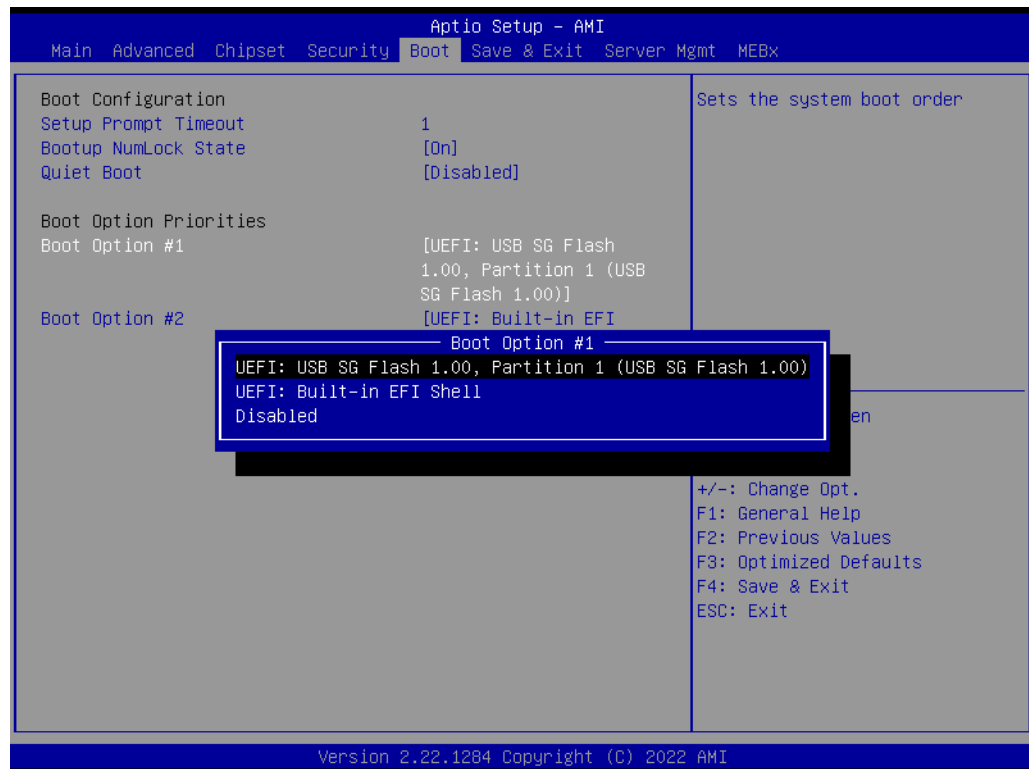
This item allows users to Enable/Disable quiet bootup. If set as disabled, the BIOS displays normal POST messages. If enabled, an OEM Logo is displayed instead of POST messages.

■ Boot Option Priorities

This item allows users to set the boot priority for devices.

Note! *UEFI devices can be recognized as a default. Enable device recognition in the CSM Configuration settings to support legacy devices when needed.*





3.7 Save and Exit

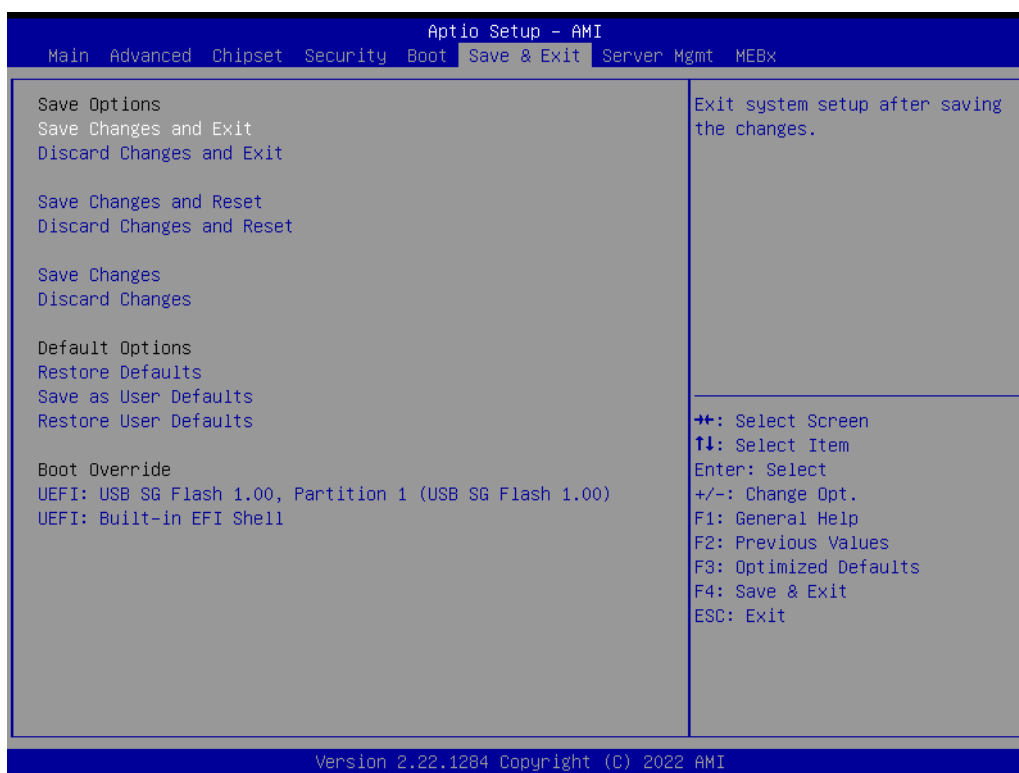


Figure 3.29 Save and Exit Screen

- **Save Changes and Exit**
This item allows users to save all configuration changes and exit the BIOS Setup utility. After exiting, proceed with the OS bootup to allow the new system configuration settings to take effect. If critical changes have been made, the entire system will reboot automatically.
- **Discard Changes and Exit**
This item allows users to exit the BIOS Setup utility without making any permanent changes to the system configuration.
- **Save Changes and Reset**
This item allows users to save all configuration changes, exit the BIOS Setup utility, and reboot the system.
- **Discard Changes and Reset**
This item allows users to exit the BIOS Setup utility and reboot the system without making any permanent changes to the system configuration.
- **Save Changes**
This item allows users to save all changes to the system configuration.
- **Discard Changes**
This item allows users to discard all changes to the system configuration.
- **Restore Defaults**
This item allows users to restore all BIOS configuration settings to the original defaults.
- **Save as User Defaults**
This item allows users to save all configuration settings as a user default.

- **Restore User Defaults**

This item allows users to restore all BIOS configuration settings to a specific user's default settings.

- **UEFI: Built-In EFI Shell**

This item allows users to launch the EFI Shell application (shellx64.efi) from one of the available file system devices.

3.8 Server Management

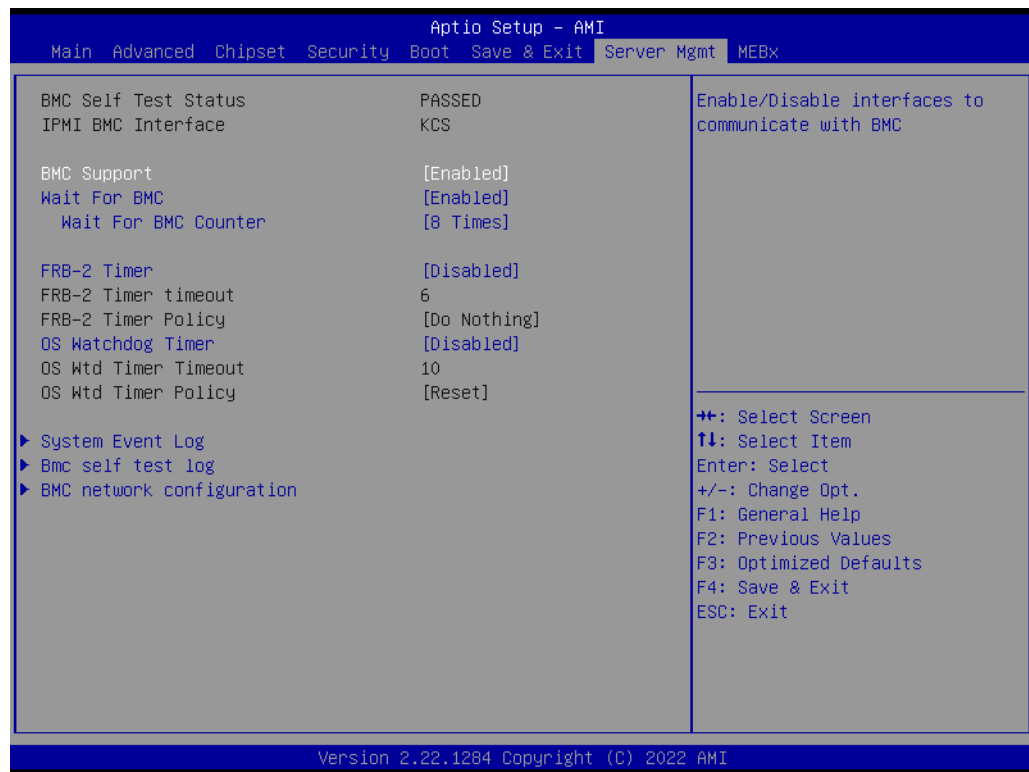


Figure 3.30 Server Management Screen

- **BMC Support**

This item allows users to Enable/Disable interface communication with the board management controller (BMC).

- **Wait for BMC**

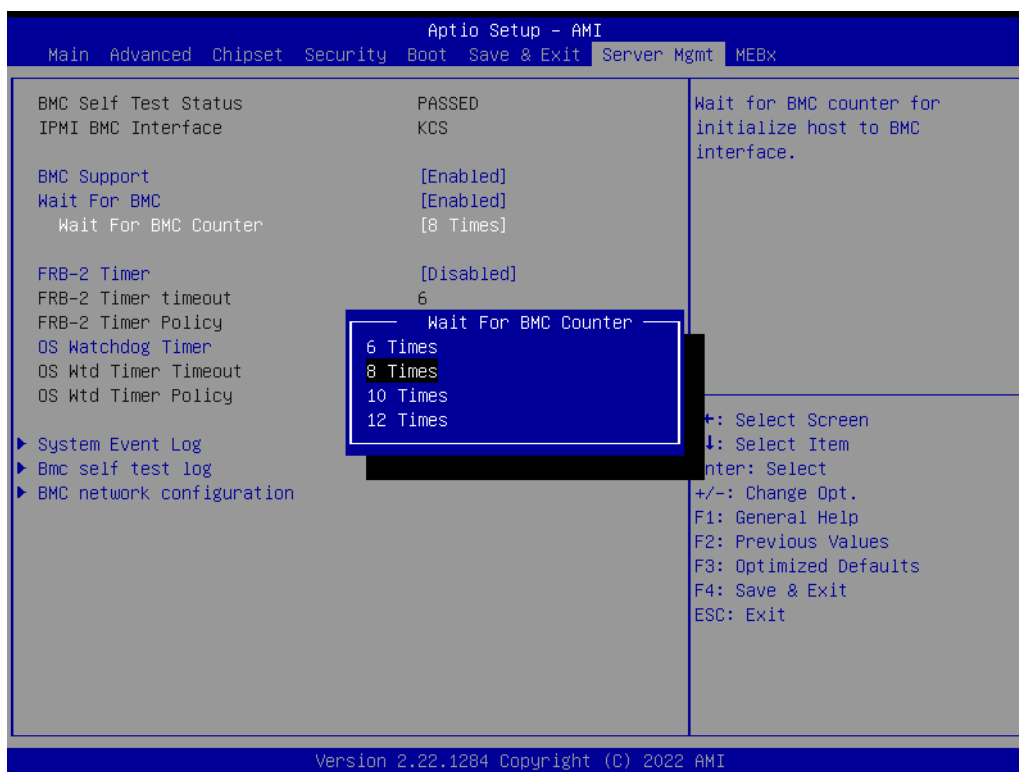
This item allows users to configure the system to wait for a BMC response for a specified duration. The BMC is initialized at the same time as the BIOS when the system is powered on. The host-to-BMC interface takes approximately 30 seconds to initialize. The system will emit a beep sound but no display will be output to the monitor until the interface initialization is complete.

Note! This item is only available for the G4 SKU with onboard IPMI.



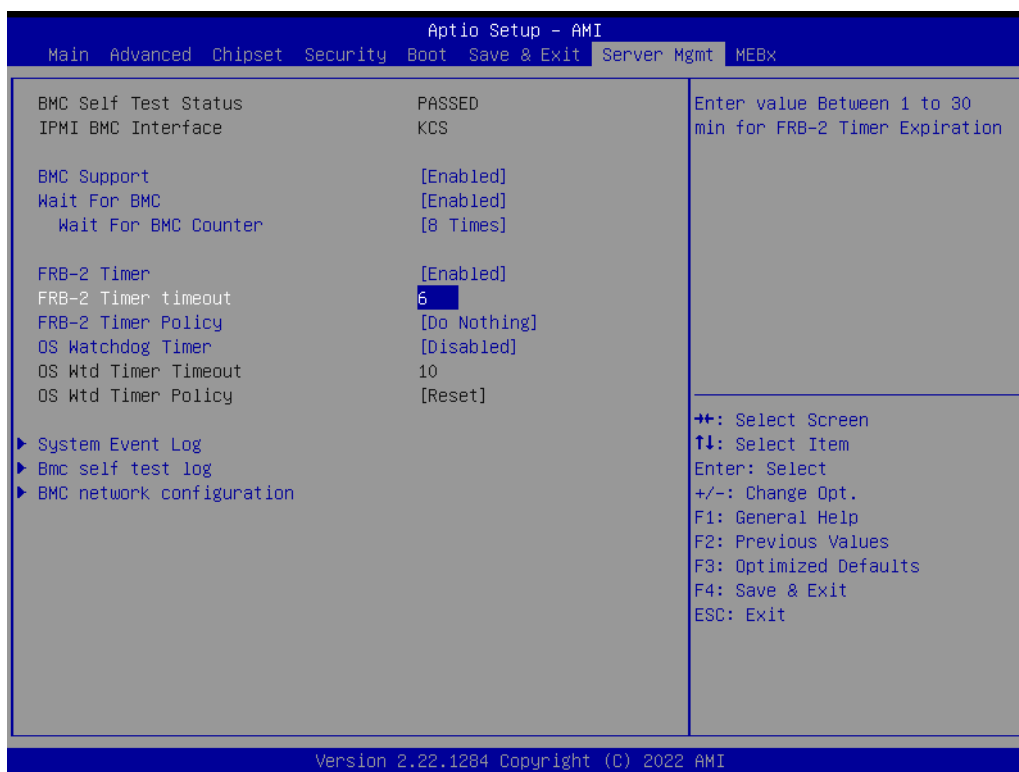
■ Wait for BMC Counter

This item allows users to set the BMC counter value as either 6, 8, 10, or 12.

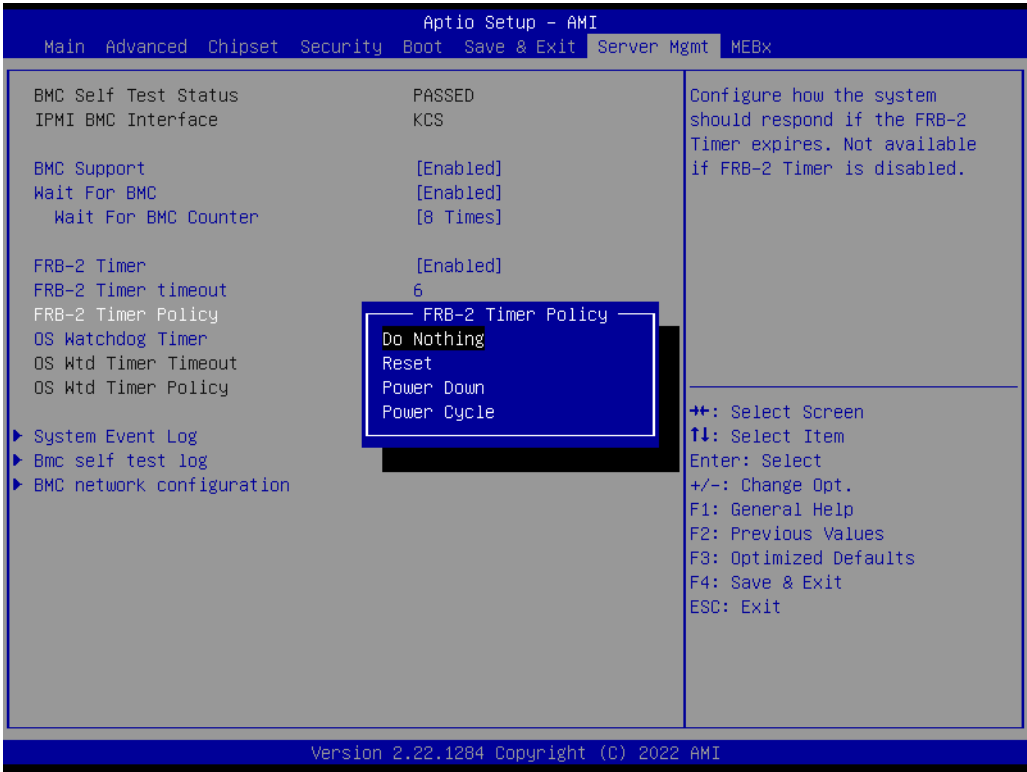


■ FRB-2 Timer timeout

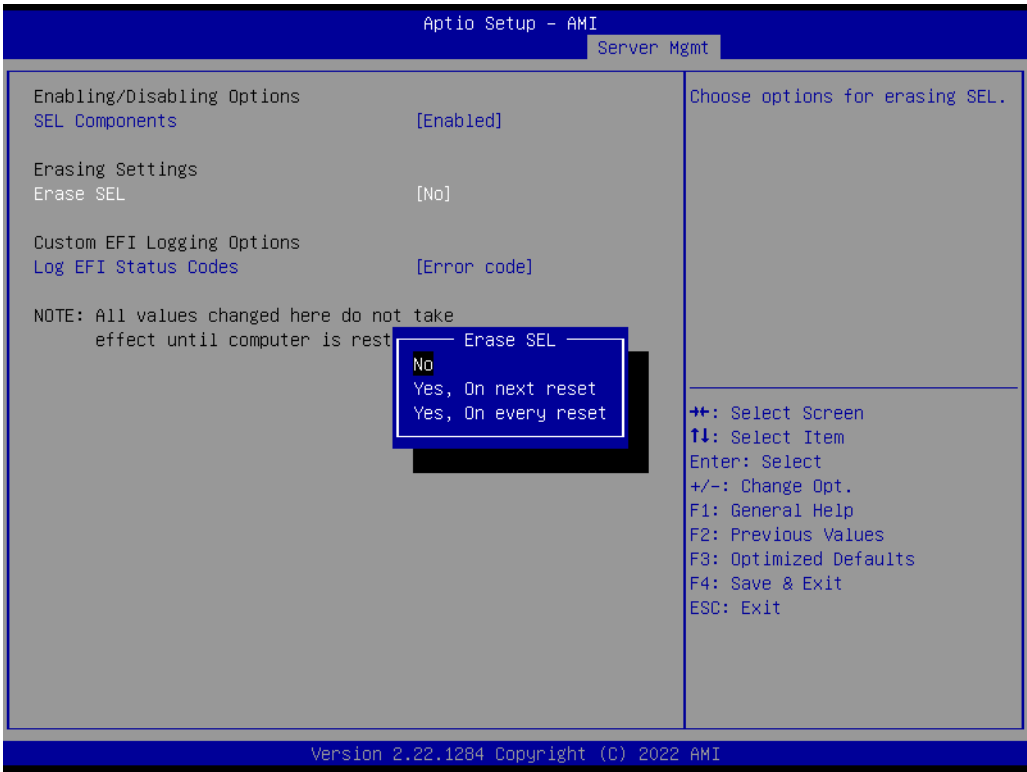
Enter value between 1 to 30 min for FRB-2 timer expiration value.

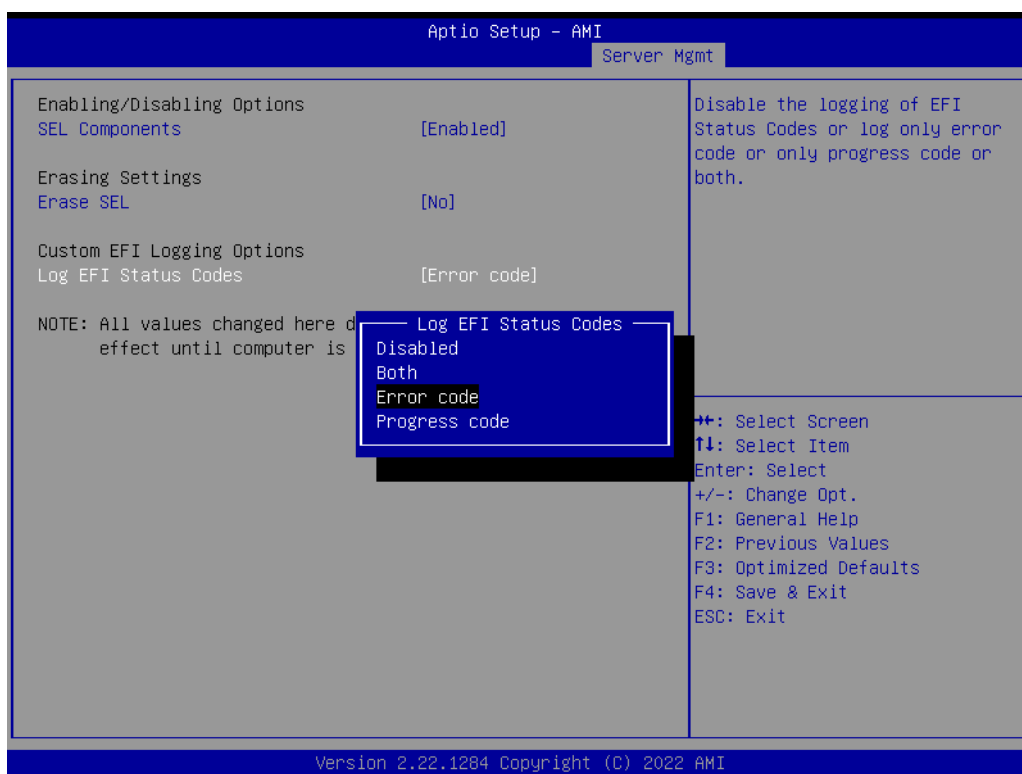


Configure how the system should respond if the FRB-2 Timer expires. Not available if FRB-2 Timer disabled.



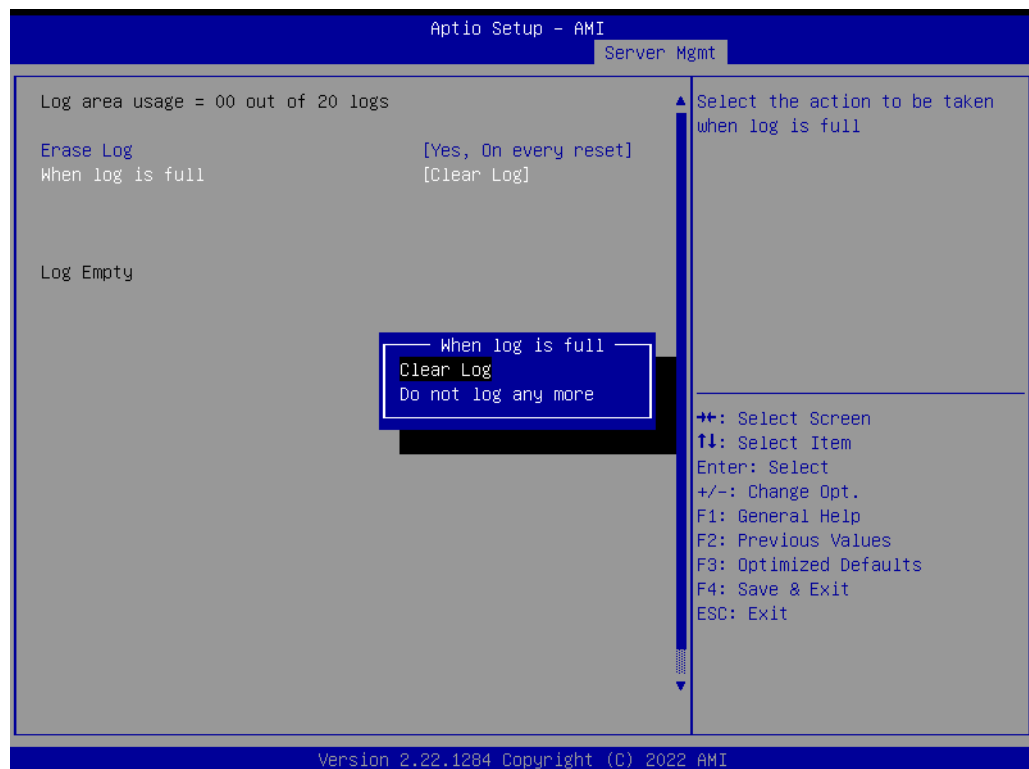
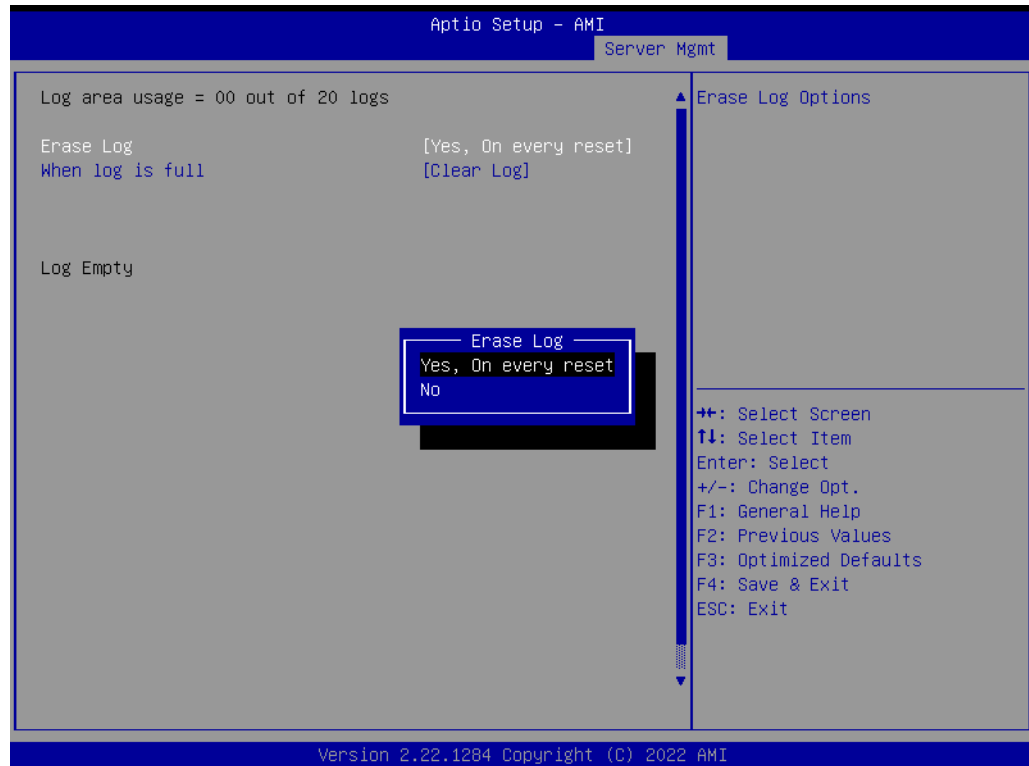
3.8.1 System Event Log





- **SEL Components**
This item allows users to Enable/Disable event logging for error/progress codes during bootup.
- **Erase SEL**
This item allows users to set the parameters for erasing SEL.
- **Log EFI Status Codes**
This item allows users to Enable/Disable logging of EFI status codes or to log only error codes or progress codes.

3.8.2 BMC Self-Test Log



- **Erase Log**
This item allows users to Enable/Disable log erasing upon system reset.
- **When Log is Full**
This item allows users to specify the system actions in response to a full log.

Chapter 4

Driver Installation

4.1 Before Installation

To ensure all ASMB-788 drivers are up-to-date, the drivers are available online for download from the Advantech support website at <https://advtech.ch/asmb788>.

Most display drivers must have the relevant software application already installed in the system before the enhanced display drivers can be installed. Additionally, many of the installation procedures assume that users are familiar with both the relevant software applications and OS commands.

We recommend that users review the relevant OS commands and sections of the application software user manual before beginning driver installation.

Note! *To ensure system stability, we strongly recommend installing drivers according to in the following sequence:*



- Chipset
- Graphics
- ME
- Other drivers

4.2 Introduction

4.2.1 Chipset

The Intel® Chipset Software Installation (CSI) utility installs the Windows INF files that instruct the OS how to configure the chipset components. This is needed for the proper functioning of the following features:

- Serial ATA interface support
- USB 1.1/2.0/3.2 support
- Identification of Intel® chipset components by the Device Manager

Note! *The chipset driver must be installed before any other driver can be installed. The chipset driver supports the following versions of Windows.*



- Windows® Server 2022 (64-bit)
- Windows® 10 IoT Enterprise 21H2 (64-bit)
- Windows® 11 IoT Enterprise 21H2 (64-bit)

4.2.2 Graphics

The Intel® 12th Gen Intel® Core™ i3/i5/i7/i9 series processors are embedded with an integrated graphics controller. The VGA driver must be installed to enable this optimized integrated graphics solution. The included Intel® Graphics Flexible Display Interface provides versatile display options and a 3D graphics engine to support triple display outputs, enhanced display modes for widescreen flat panels (such as extend, twin, and clone dual display), and optimized 3D support in order to deliver rich and realistic visuals.

Note! *For G4 SKU BMC VGA driver, AST2600 only support OS version after windows 10 1903.*



4.2.3 LAN

The ASMB-788 is equipped with up to four Gigabit Ethernet LANs via dedicated PCI Express x1 lanes (GbE LAN1: Intel® I219LM; GbE LAN2~4: Intel® I210-AT) that offer bandwidths of up to 500 MB/sec to eliminate network bottlenecks while incorporating Gigabit Ethernet at 1000 Mbps.

The key features include

- 10/100/1000 Mbps Ethernet controller
- 10/100/1000 Mbps triple-speed MAC
- Full duplex at 10, 100, or 1000 Mbps and half duplex at 10 or 100 Mbps
- Wake-on-LAN (WOL) support
- PCIe x1 host interface

The integrated Intel® Gigabit Ethernet controller supports all major network operating systems. However, the installation procedures vary for different OS. For installation advice or guidance, contact a local FAE for technical support.

Note! Before installing the LAN drivers, ensure that the CSI utility has been installed on the system.



4.2.4 HD Audio

The ASMB-788 is equipped with a Realtek ALC888s audio chip that supports Line-Out and Microphone functions for related applications.

4.2.5 Intel® ME

The Intel® ME software components that must be installed vary according to the system's specific hardware and firmware features. The installer detects the system capabilities and installs the relevant drivers and applications.

Note! If the Intel® ME driver has not been successfully installed, the PCI Simple Communications Controller may show an error in the Device Manager.



4.2.6 SATA RAID

To support demanding disk I/O, the Intel® W680 chipset integrates five Serial ATA controllers with software RAID 0, 1, 5, 10 capabilities.

RAID 0 striping increases the storage performance and is designed to speed up data transfer rates for disk-intensive applications.

RAID 1 mirroring protects valuable data that may be lost in the event of a hard drive failure.

RAID 5 arrays contain three or more hard drives, where data is divided into manageable blocks called stripes. Parity is a mathematical method for recreating data lost from a single drive. In order to increase fault tolerance, the data and parity are striped across all the hard drives in the array. The parity is striped in a rotating sequence to reduce bottlenecks associated with parity calculations.

RAID 10 arrays use four hard drives to create a combination of RAID levels 0 and 1. The data is striped across a two-drive array forming the RAID 0 component. Each of the drives in the RAID 0 array is then mirrored by a RAID 1 component.

Note! *SATA RAID driver utility: When installing the RST driver, please keep BIOS hot plug as default setting. ([Chipset]->[PCH-IO configuration]->[SATA and RST configuration]-> [SATA Hot plug] ->[Enable])*



Appendix **A**

Watchdog Timer

The ASMB-788 watchdog timer can be used to monitor system software operations and implement corrective actions if the software fails to function within the programmed period. This chapter describes the operation of the watchdog timer and provides programming instructions.

A.1 Watchdog Timer Overview

The watchdog timer is built into the NCT6126D super I/O controller and provides the following functions:

- Can be Enabled/Disabled from a program
- Timer intervals ranging from 1 to 255 sec/min. can be set
- An interrupt or reset signal is generated if the software fails to reset the timer before timeout

A.2 Programming the Watchdog Timer

The I/O port address of the watchdog timer is 2E (hex) and 2F (hex). 2E (hex) is the address port, 2F (hex) is the data port. An address value must be written into address port 2E (hex) first before conducting data write/read operations to/from the assigned register through data port 2F (hex).

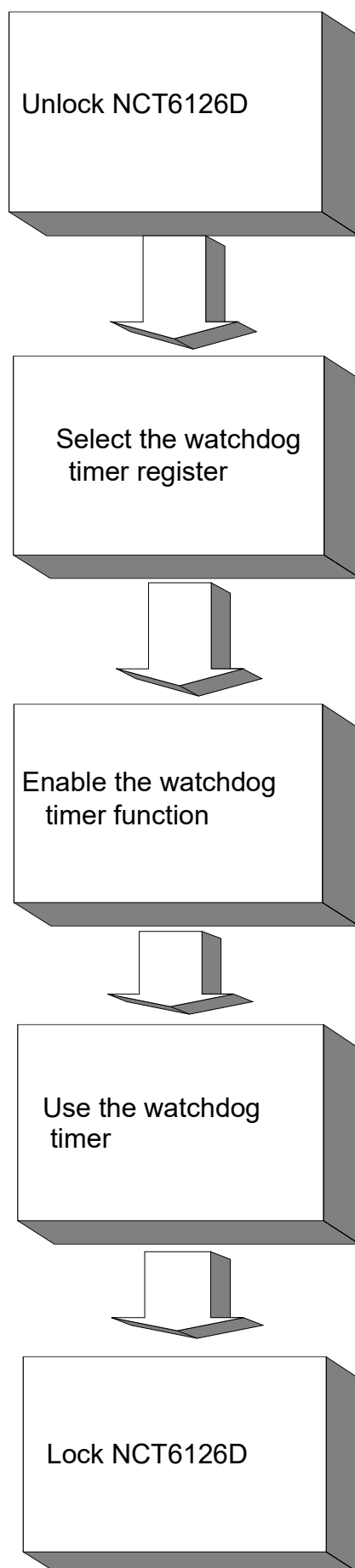


Table A.1: Watchdog Timer Registers

Address Register (2E)	Read/Write	Value (2F) and Description
87 (hex)	-	Write this address to I/O address port 2E (hex) twice to unlock NCT6126D.
07 (hex)	write	Write 08 (hex) to select the register of the watchdog timer.
30 (hex)	write	Write 01 (hex) to enable the watchdog timer function. The default setting is Disabled.
F0 (hex)	write	Set seconds or minutes as units for the timer. Write 0 to Bit 3: set seconds as the counting unit (default). Write 1 to Bit 3: set minutes as the counting unit.
F1 (hex)	write	0: Stop timer (default) 01 ~ FF (hex): The amount of the count, in seconds or minutes, depends on the value set in register F0 (hex). This number decides how long the watchdog timer waits for strobe before generating an interrupt or reset signal. Writing a new value to this register can reset the timer to count from the new value.
F2 (hex)	read/write	Bit 6: Write 1 to enable timer reset via the keyboard, or 0 to disable (default). Bit 5: Write 1 to generate a timeout signal immediately and automatically return to 0 (the default setting is 0). Bit 4: Read the watchdog timer status. 1 means the timer has reached timeout.
AA (hex)	-	Write this address to I/O port 2E (hex) to lock NCT6126D.

A.2.1 Example Programs

Enable the watchdog timer and set the timeout interval as 10 seconds

```

;-----
Mov dx,2eh ; Unlock NCT6126D
Mov al,87h
Out dx,al
Out dx,al
;-----
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
in al,dx
Or al,08h
Out dx,al
;-----
Dec dx; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;-----
Dec dx ; Set second as counting unit
Mov al,0f5h
Out dx,al
Inc dx
In al,dx
And al,not 08h
Out dx,al
;-----
Dec dx ; Set timeout interval as 10 seconds and start counting
Mov al,0f6h
Out dx,al
Inc dx
Mov al,10; 10 minutes
Out dx,al
;-----
Dec dx ; lock NCT6126D
Mov al,0aah
Out dx,al
Enable watchdog timer and set 5 minutes as the timeout interval
;-----
Mov dx,2eh ; unlock NCT6126D
Mov al,87h
Out dx,al

```

```

Out dx,al
;-----
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
In al,dx
Or al,08h
Out dx,al
;-----
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;-----
Dec dx ; Set minute as counting unit
Mov al,0f5h
Out dx, al
Inc dx
In al,dx
Or al, 08h
Out dx,al
;-----
Dec dx ; Set timeout interval as 5 minutes and start counting
Mov al,0f6h
Out dx,al
Inc dx
Mov al,5; 5 minutes
Out dx,al
;-----
Dec dx ; lock NCT6126D
Mov al,0aah
Out dx,al
Enable watchdog timer to be reset by mouse
;-----
Mov dx,2eh ; unlock NCT6126D
Mov al,87h
Out dx,al
Out dx,al
;-----
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h

```

```

Out dx,al
;-----
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
In al,dx
Or al,01h
Out dx,al
;-----
Dec dx ; Enable watchdog timer to be reset by mouse
Mov al,0f7h
Out dx,al
Inc dx
In al,dx
Or al,80h
Out dx,al
;-----
Dec dx ; lock NCT6126D
Mov al,0aah
Out dx,al
Enable watchdog timer to be reset by keyboard
;-----
Mov dx,2eh ; unlock NCT6126D
Mov al,87h
Out dx,al
Out dx,al
;-----
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;-----
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;-----
Dec dx ; Enable watchdog timer to be strobed reset by keyboard
Mov al,0f7h
Out dx,al
Inc dx

```

```

In al,dx
Or al,40h
Out dx,al
;-----
Dec dx ; lock NCT6126D
Mov al,0aah
Out dx,al
Generate a time-out signal without timer counting
;-----
Mov dx,2eh ; unlock NCT6126D
Mov al,87h
Out dx,al
Out dx,al
;-----
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;-----
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
In al,dx
Or al,01h
Out dx,al
;-----
Dec dx ; Generate a time-out signal
Mov al,0f7h
Out dx,al ;Write 1 to bit 5 of F7 register
Inc dx
In al,dx
Or al,20h
Out dx,al
;-----
Dec dx ; lock NCT6126D
Mov al,0aah
Out dx,al

```

Appendix **B**

I/O Pin Assignments

B.1 USB 2.0 Header (USB7 ~ 12)

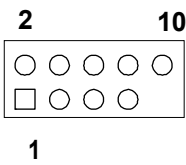


Table B.1: USB 2.0 Header (USB7 ~ 12)

Pin	Signal	Pin	Signal
1	+5V_USB	2	+5V_USB
3	USB2_D1-	4	USB2_D2-
5	USB2_D1+	6	USB2_D2+
7	GND	8	GND
9	Key	10	N/C

B.2 USB 3.2 Header (USB5_6)

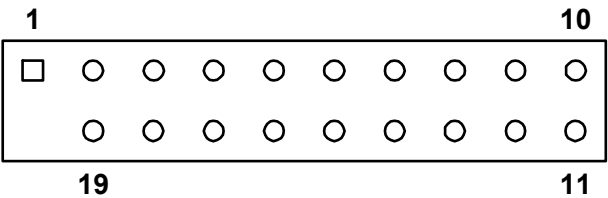


Table B.2: USB 3.1 Header (USB5_6)

Pin	Signal	Pin	Signal
1	+5V_USB	20	Key
2	USB3_RX_D1-	19	+5V_USB
3	USB3_RX_D1+	18	USB3_RX_D2-
4	GND	17	USB3_RX_D2+
5	USB3_TX_D1-	16	GND
6	USB3_TX_D1+	15	USB3_TX_D2-
7	GND	14	USB3_TX_D2+
8	USB2_D1-	13	GND
9	USB2_D1+	12	USB2_D2-
10	USB_OC	11	USB2_D2+

B.3 VGA Connector (VGA1)

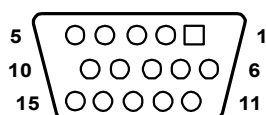


Table B.3: VGA Connector (VGA1)

Pin	Signal	Pin	Signal
1	Red	9	VCC
2	Green	10	GND
3	Blue	11	N/C
4	N/C	12	SDA
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	SCL
8	GND		

B.4 RS-232 Interface (COM1 ~ 6)

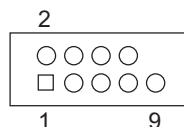


Table B.4: RS-232 Interface (COM1/COM2)

Pin	Signal
1	DCD
2	DSR
3	RXD
4	RTS
5	TXD
6	CTS
7	DTR
8	RI
9	GND

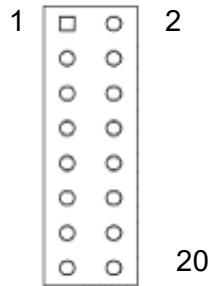


Table B.5: RS-232 Interface (COM3_4, COM5_6)

Pin	Signal
1	DCD (COM3/COM5)
2	DSR (COM3/COM5)
3	RXD (COM3/COM5)
4	RTS (COM3/COM5)
5	TXD (COM3/COM5)
6	CTS (COM3/COM5)
7	DTR (COM3/COM5)
8	RI (COM3/COM5)
9	GND
10	GND
11	DCD (COM4/COM6)
12	DSR (COM4/COM6)
13	RXD (COM4/COM6)
14	RTS (COM4/COM6)
15	TXD (COM4/COM6)
16	CTS (COM4/COM6)
17	DTR (COM4/COM6)
18	RI (COM4/COM6)
19	GND
20	GND

B.5 System Fan Power Connector (SYSFAN0 ~ 3)



Table B.6: System Fan Power Connector (SYSFAN0 ~ 3)

Pin	Signal
1	GND
2	+12 V
3	Detect
4	PWM

B.6 ATX Soft Power Switch (JFP1)

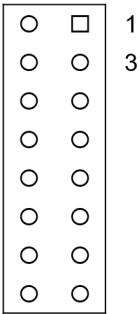


Table B.7: ATX Soft Power Switch (JFP1)

Pin	Signal
1	PWR BTN
3	PWR GND

B.7 Reset Connector (JFP1)

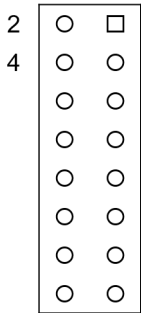


Table B.8: Reset Connector (JFP1)

Pin	Signal
2	RST BTN
4	RST GND

B.8 Front Panel LAN LED Connector (JFP1)

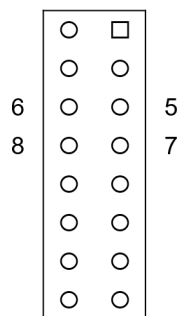


Table B.9: Front Panel LAN LED Connector (JFP1)

Pin	Signal
5	LAN2_LED+
6	LAN1_LED+
7	LAN2_LED-
8	LAN1_LED-

B.9 HDD LED Connector (JFP1)

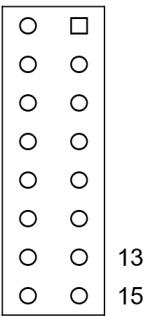


Table B.10: SNMP SMBus Connector (JFP1)

Pin	Signal
13	HDD_LED+
15	HDD_LED-

B.10 Power LED (JFP1)

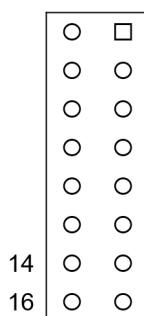


Table B.11: Power LED (JFP1)

Pin	Signal
14	PWR LED+
16	PWR LED-

B.11 Front Panel Audio Connector (FPAUD1)

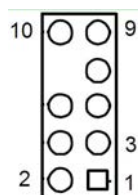


Table B.12: Front Panel Audio Connector (FPAUD1)

Pin	Signal	Pin	Signal
1	MIC2_L	2	AGND
3	MIC2_R	4	PRESENSE
5	LINE2_R	6	MIC2_JD
7	FRONT-IO_JD	8	Key
9	LINE2_L	10	LINE2_JD

B.12 8-Pin Alarm Board Connector (VOLT1)

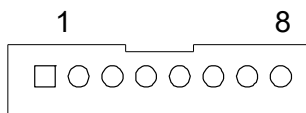


Table B.13: 8-Pin Alarm Board Connector (VOLT1)

Pin	Signal	Pin	Signal
1	5V _{SB}	5	VCC
2	GND	6	VCC3
3	GND	7	-12V
4	-5V	8	+12V

B.13 Case Open Connector (JCASE1)

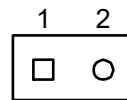


Table B.14: Case Open Connector (JCASE1)

Pin	Signal
1	CASEOP
2	GND

B.14 SPI Flash Card Pin Connector (SPI_CN1)

Table B.15: SPI Flash Connector (SPI_CN1)

Pin	Signal	Pin	Signal
1	+3V _{SB}	2	GND
3	SPI_CS#	4	SPI_CLK
5	SPI_MISO	6	SPI_MOSI
7	N/A	8	NC

B.15 GPIO Connector (GPIO1)

Table B.16: GPIO Connector (GPIO1)

Pin	Signal	Pin	Signal
1	SIO_GPIO0	2	SIO_GPIO4
3	SIO_GPIO1	4	SIO_GPIO5
5	SIO_GPIO2	6	SIO_GPIO6
7	SIO_GPIO3	8	SIO_GPIO7
9	VCC_GPIO0	10	GND

B.16 SMBUS Connector (SMBUS1)

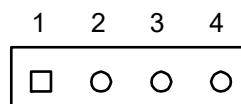


Table B.17: SMBUS Connector (SMBUS1)

Pin	Signal
1	+5V
2	Clock
3	Data
4	GND

B.17 PMBUS Connector (PMBUS1)

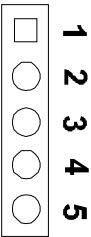


Table B.18: PMBUS Connector (PMBUS1)	
Pin	Signal
1	SMB_SCL_PM
2	SMB_SDA_PM
3	SMB_ALT_PM
4	GND
5	+3.3V

Appendix C

Reference

C.1 Processor Installation

Installation manuals, videos, tool, software, and guides.

www.intel.com/processorinstall

www.advantech.com

Please verify specifications before quoting. This guide is intended for reference purposes only.

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