User Manual

AIMB-788

LGA1700 Intel$^®$ Core™ i9/i7/i5/i3 ATX Motherboard with DP/HDMI/ VGA, DDR4, USB 3.2, M.2

ADVANTECH

Enabling an Intelligent Planet

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A Message to the Customer

Advantech Customer Service

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We want you to get the maximum performance from your products. So if you run into technical difficulties, we are here to help. For the most frequently asked questions, you can easily find answers in your product documentation. These answers are normally a lot more detailed than the ones we can give over the phone.

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In addition, free technical support is available from Advantech engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products.

Declaration of Conformity

FCC

This device complies with the requirements in part 15 of the FCC rules:

Operation is subject to the following two conditions:

- This device may not cause harmful interference
- This device must accept any interference received, including interference that may cause undesired operation.

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 when the equipment is operated in a commercial environment. 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. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. The user is advised that any equipment changes or modifications not expressly approved by the party responsible for compliance would void the compliance to FCC regulations and therefore, the user's authority to operate the equipment.

Caution! *There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

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1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.

2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.

3. If your product is diagnosed as defective, obtain an return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.

4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Initial Inspection

Before you begin installing your motherboard, please make sure that the following materials have been shipped:

- 1 x AIMB-788 motherboard
- 1 x AIMB-788 startup manual
- 2 x Serial ATA HDD data cables
- 1 x I/O port bracket

If any of these items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected the AIMB-788 mechanically and electrically before shipment. It should be free of marks and scratches and in perfect working order upon receipt. As you unpack the AIMB-788, check it for signs of shipping damage. (For example, damaged box, scratches, dents, etc.) If it is damaged or it 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 AIMB-788 motherboard is an Intel® Q670E board for industrial applications that require high-performance computing. The motherboard supports 12th/13th generation Intel® Core™ i9/i7/i5/i3 processors and DDR4 3200 memory up to 128 GB. AIMB-788 delivers cost-effective integrated graphics with 1 GB max shared memory when 2 GB or more system memory is installed.

AIMB-788 is equipped with one PCIe x16 (Gen 4), one PCIe x8 (Gen3), three PCIe x4 (Gen3), and two PCI slots. It's triple display interfaces allow users to simultaneously connect monitors to the on-board DP, HDMI, and VGA ports. In addition, AIMB-788 provides dual Gigabit Ethernet LAN via dedicated PCIe x1 bus. This offers up to 500 MB/s bandwidth and eliminates network bottlenecks.

By using the Intel® Q670E chipset, the AIMB-788 offers a variety of features such as M.2 2280 M-key socket (PCIe Gen 4 x4 bandwidth), four on-board SATA 3.0 interfaces (bandwidth = 600 MB/s) with software RAID (0, 1, 5, 10), two USB 3.2 Gen 2 ports, four USB 3.2 Gen 1 ports, eight USB 2.0 ports, and HD Audio.

Advantech's AIMB-788 also adopts Advantech WISE-iBMC out-of-band management solution for remote power control, boot-up sequence change, BIOS POST code status, and one-key system recovery via NIC port, LAN2, while OS is abnormal.

1.2 Features

- **PCIe architecture:** 1 x PCIe x16, 1 x PCIe x8 (x4 link), 3 x PCIe x4 slots.
- **High performance I/O capability:** Dual Gigabit LAN via PCIe x1 bus, 1 x M.2 socket, 4 x SATA 3.0 (software RAID 0, 1, 5, 10), 2 x USB 3.2 Gen 2, 4 x USB 3.2 Gen 1, and 8 x USB 2.0.
- **Standard ATX form factor with industrial features:** AIMB-788 provides industrial features like long product life, reliable operation in wide temperatures, and watchdog timer functions.
- **Supports DDR4 3200 up to 128 GB:** DDR4 provides up to 50 percent increased performance and bandwidth while saving up to 40 percent more power.
- **SUSI API:** AIMB-788 supports SUSI API which helps customers develop their own remote management programs under Windows 10.
- **WISE-iBMC out-of-band power management:** AIMB-788 is equipped with Advantech WISE-iBMC solution that provides out-of-band management for power-on/power-off/reset/force-shutdown, boot-up sequence change, BIOS POST code status, and one-key system recovery in a remote way via LAN2 during operating system abnormalities.

> **Note!** *WISE-iBMC remote management function is operated on Advantech WISE-DeviceOn software. Before installation and setup of WISE-Agent program, changing device IP address to the same as your network IP via a utility tool is necessary. Please refer to product support website to download iBMC utility, DeviceOn software, and SOP/user manual.*

1.3 Specifications

1.3.1 System

- **CPU:** LGA1700 socket supporting 12th/13th Gen Intel® Core™ i9/i7/i5/i3 and Pentium®/Celeron® processor
- **Cache:** Refer to CPU specifications for detailed information
- **BIOS:** AMI SPI BIOS (256 Mbit)
- **System Chipset:** Intel® Q670E PCH

> *Note!* *Legacy platforms are not supported.*

1.3.2 Memory

- **RAM:** Up to 128 GB in four 288-pin DIMM sockets supporting dual-channel DDR4 3200 SDRAM. AIMB-788 supports non-ECC unbuffered DIMMs and does not support any memory configuration that mixes non-ECC with ECC unbuffered DIMMs.

1.3.3 Input/Output

- **PCIe slot:** 1 x PCIe x16 Gen 4, 1 x PCIe x8 (x4 Gen 3 link), 3 x PCIe x4 Gen 3 expansion slots
- **PCI bus:** 2 x PCI slots, 32-bit, 33 MHz PCI 2.2 compliant
- **Serial port:** 6 x serial ports. 1 x DB-9 connector with RS-232 located in rear panel, 1 x RS-232/422/485 header with hardware auto-flow control, and 4 x RS-232 headers
- **USB port:** 2 x USB 3.2 Gen 2 ports on rear with up to 10 Gb/s data rate, 4 x USB 3.2 Gen 1 ports (2 rear, 2 via header), 8 x USB 2.0 ports (4 x rear, 2 x via header, 2 x internal Type-A)
- **M.2 socket:** 1 x M.2 socket supports up to PCIe x4 Gen 4 M-key 2280 type storage devices
- **SATA port:** 4 x SATA 3.0 with software RAID 0, 1, 5, 10.
- **SPI interface:** Advantech-designed SPI connector supports optional dTPM 2.0 module
- **GPIO:** 8-bit GPIO from super I/O for general purpose control applications

1.3.4 Graphics

- **Controller:** Integrated Intel® HD Graphics
- **Display memory:** Shared memory is subject to OS (maximum 1 GB shared memory with 2 GB or above memory installed)
- **DisplayPort:** Resolution up to 4096 x 2304 @ 60 Hz refresh rate
- **HDMI:** Resolution up to 4096 x 2304 @ 30 Hz refresh rate
- **VGA:** Resolution up to 1920 x 1200 @ 60 Hz refresh rate

1.3.5 Ethernet LAN

- Supports dual 10/100/1000 Base-T Ethernet ports via PCIe x1 bus which provides a 500 MB/s data transmission rate
- **Interface:** 10/100/1000Base-T
- **Controller:** Intel® I219-LM(PHY) for LAN1, Intel® I210-AT(NIC) for LAN2 (supporting iBMC)

1.3.6 Industrial Features

- **Watchdog timer:** Can generate system reset or NC. The watchdog timer is programmable, with each unit equal to one second (255 levels)

1.3.7 Mechanical and Environmental Specifications

- **Operating temperature:** 0 ~ 60 °C (32 ~ 140 °F, depending on CPU speed and system thermal solution)
- **Storage temperature:** -40 ~ 85 °C (-40 ~ 185 °F)
- **Humidity:** 5 ~ 95% non-condensing
- **Power supply voltage:** +3.3 V, +5 V, ±12 V, +5 VSB
- **Power consumption:** Intel® Core™ i 65W; DDR4 32 GB x 4
  Maximum: +3.3 V at 1.41 A, +5 V at 2.42 A, +12 V at 9.3 A, +5 Vsb at 0.13 A, -12 V at 0.04 A, -5V at 0.05 A
- **Board size:** 304.8 x 244 mm (12 x 9.6 in)
- **Weight of board:** 0.7 kg (1.54 lb)

> *Note!* *All specifications are subject to the data-sheet on the official website. The information in this manual is subject to change without notice.*

1.4 Jumpers and Connectors

Connectors on the AIMB-788 motherboard link it to external devices such as hard disk drives and a keyboard. In addition, the board has a number of jumpers that are used to configure your system for your application.

The tables below list the function of each of the jumpers and connectors. Later sections in this chapter give instructions on setting jumpers. Chapter 2 gives instructions for connecting external devices to your motherboard.

Table 1.1: Jumpers	
Label	**Function**
JCMOS1	CMOS clearness
JME1	Intel® ME update
JWDT1	Watchdog timer reset
JOBS1	Hardware monitor alarm
PSON1	AT/ATX mode selection
JUSB_2	USB power source switch between +5 V and +5 V_ DUAL for on-board USB ports
JPCICLK1	PCI clock selection
JSETCOM3	COM3 RS-232/422/485 jumper setting
JT1, JR1	COM3 RS-422/485 termination resistor
JFV1	VGA dummy load setting
SMB1, SMB2	PCIe SMBus clock/data setting for PCIE2 ~ PCIE5 slots
SMB3, SMB4	PCIe SMBus clock/data setting for PCIE1 slot

Table 1.2: Connectors	
Label	**Function**
LAN1 ~ LAN2	GbE LAN
USB3C1	2 x USB 3.2 Gen 2 port
USB3C2	2 x USB 3.2 Gen 1 port
USB3H1	2 x USB 3.2 Gen 1 port (20-pin header)
USB2C1	4 x USB 2.0 port
USB2A1 ~ USB2A2	1 x USB 2.0 port (internal Type-A)
USB2H2	2 x USB 2.0 port (10-pin header)
COM1+VGA1	Serial port: RS-232 (DB-9 connector) / VGA connector
DP1+HDMI1	DP connector / HDMI connector
COM2, COM4 ~ COM6	Serial port: RS-232 (9-pin header)
COM3	Serial port: RS-232/422/485 (9-pin header)
CPUFAN1	CPU fan connector (4-pin)
SYSFAN1 ~ SYSFAN3	System fan connector (4-pin)
JFP3	Power LED Suspend: fast flash (ATX/AT) System on: on (ATX/AT) System off: off (ATX/AT)
JFP2	External speaker / HDD LED connector / SMBus connector
JFP1	Power switch / reset connector
AUDIO1+AUDIO2	Audio connector (Line Out, Mic In)
VOLT1	Alarm board power connector
JCASE1	Case open connector

Table 1.2: Connectors

LANLED1	Front panel LAN indicator connector
NVME1	M.2 2280 M-key socket (PCIe x4 Gen 4 link)
SATA4 ~ SATA7	Serial ATA 3.0 port
PCI1 ~ PCI2	PCI slot
PCIE1	PCIe x16 slot (x16 Gen 4 link)
PCIE2, PCIE4 ~ PCIE5	PCIe x4 slot (x4 Gen 3 link)
PCIE3	PCIe x8 slot (x4 Gen 3 link)
DIMMA1	Channel A DIMM1
DIMMA2	Channel A DIMM2
DIMMB1	Channel B DIMM1
DIMMB2	Channel B DIMM2
ATX12V1+ATX12V2	ATX 12 V auxiliary power connector (for CPU)
EATXPWR1	ATX 24-pin main power connector (for system)
SPDIF_OUT1	SPDIF audio out pin header
GPIO1	8 bit GPIO from super I/O
SMBUS1	SMBus connector from PCH
FPAUD1	Front panel audio connector
SPI_TPM1	Serial peripheral interface (SPI) connector

1.5 Board Layout: Jumper and Connector Locations
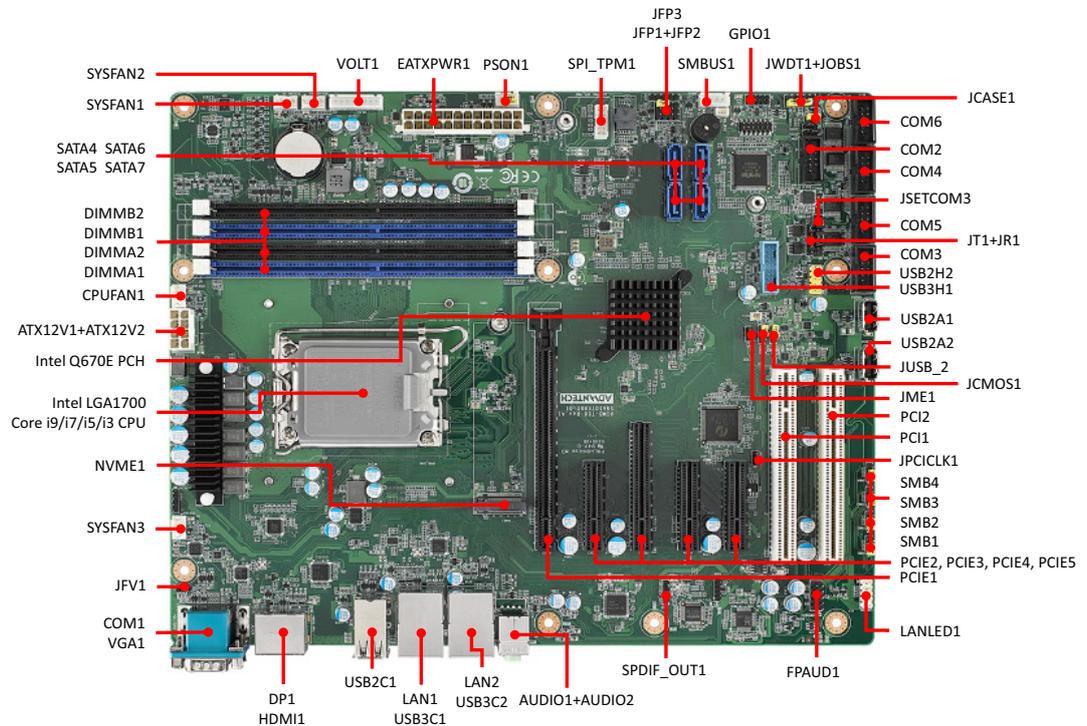
Figure 1.1 Jumper and Connector Locations
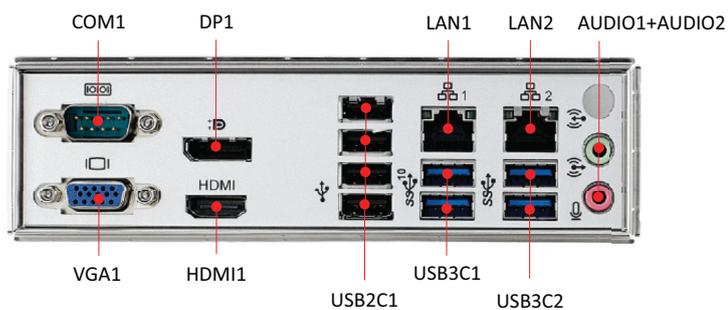
Figure 1.2 I/O Connectors

Note! *AIMB-788 is not compatible with 1U chassis due to the height of the rear USB 2.0 ports.*

1.6 Block Diagram
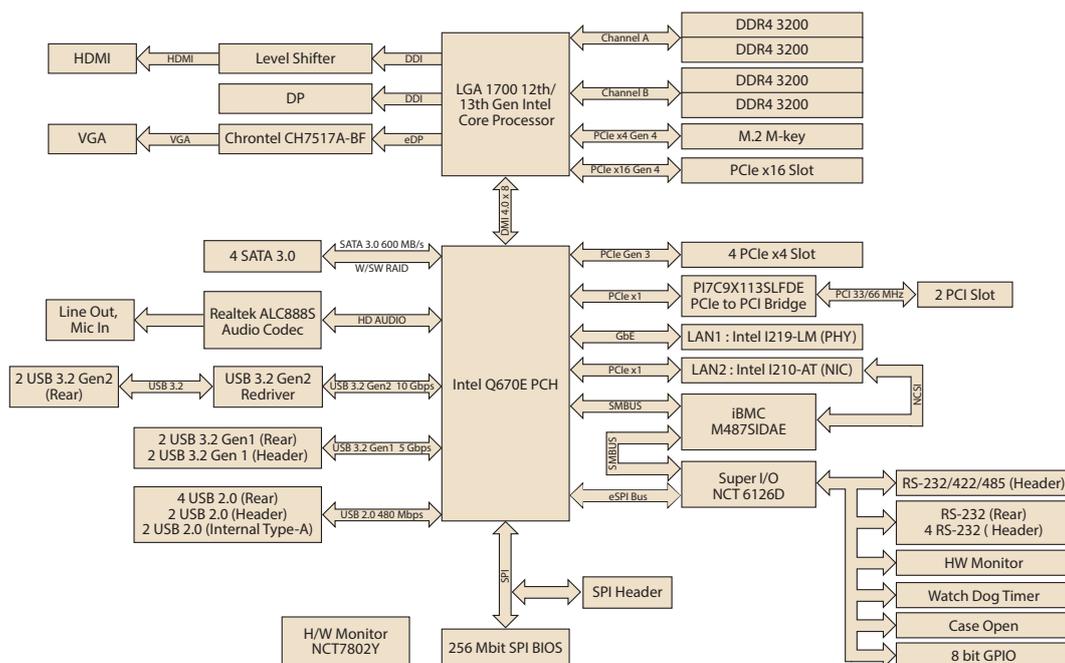
Figure 1.3 Block Diagram

1.7 Safety Precautions

Warning! *Always completely disconnect the power cord from your chassis when-ever you work with 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. There is a danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacturer. Discard used batteries according to manufacturer's instructions.*

Caution! *There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.*

1.8 Jumper Settings

This section provides instructions on how to configure your motherboard by setting the jumpers. It also includes the motherboard default settings and your options for each jumper.

1.8.1 How to set jumpers

You can configure your motherboard to match the needs of your application by setting 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, you connect the pins with the clip. To "open" (or turn off) a jumper, you remove the clip. Sometimes a jumper consists of a set of three pins, labeled 1, 2, and 3. In this case you connect either pins 1 and 2, or 2 and 3. A pair of needle-nose pliers may be useful when setting jumpers.

1.8.2 CMOS clear (JCMOS1) and Intel® ME update (JME1)

The AIMB-788 motherboard contains a jumper that can erase CMOS data and reset the system BIOS information. Normally this jumper should be set with pins 1-2 closed. If you want to reset the CMOS data, set JCMOS1 to pins 2-3 closed for just a few seconds, and then move the jumper back to pins 1-2 closed. This procedure will reset the CMOS to its default setting.

Table 1.3: CMOS clear (JCMOS1) & Intel® ME update (JME1)	
Function	**Jumper Setting**
* Keep CMOS data * ME normal mode	1-2 closed
Clear CMOS data ME recovery mode	2-3 closed
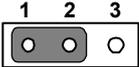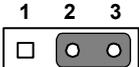
* default setting

1.8.3 Watchdog timer output and OBS alarm (JWDT1+JOBS1)

The AIMB-788 contains a watchdog timer that will reset the CPU. This feature means the AIMB-788 will recover from a software failure or an EMI problem. The JWDT1 jumper settings control the outcome of what the computer will do in the event the watchdog timer is tripped.

The 2-pin OBS alarm header (JOBS1) enables/disables hardware monitor alarm functions.

Table 1.4: WD timer output & OBS alarm (JWDT1+JOBS1)	
Function	**Jumper Setting**
Watchdog timer disable (2-4) OBS beep (8-10)	2-4, 8-10 closed
*Watchdog timer reset (4-6) OBS beep (8-10)	4-6, 8-10 closed
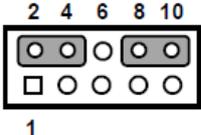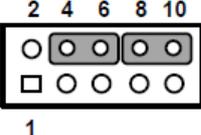
* default setting

1.8.4 ATX/AT mode selection (PSON1)

Table 1.5: ATX/AT mode selection (PSON1)	
Function	**Jumper Setting**
AT mode	1-2 closed
* ATX mode	2-3 closed
* default setting	
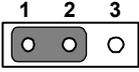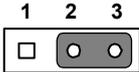
1.8.5 USB power source switch between +5V and +5V_DUAL for onboard USB ports (JUSB_2)

The AIMB-788 allows users to set USB power between +5 V_DUAL and +5 V. When the jumper is set as +5 V, the board doesn't support wake up from S3 via keyboard or mouse

Table 1.6: USB power source switch for onboard USB ports	
Function	**Jumper Setting**
*USB +5 V_DUAL power	1-2 closed
USB +5 V power	2-3 closed
* default setting	
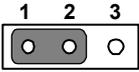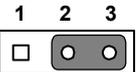
Note! *Switching to USB +5V_DUAL is recommended for higher stability while a KVM is used.*

1.8.6 PCI clock selection (JPCICLK1)

Pins 1-2 are closed as default. This supports most PCI cards whether the clock is 33 or 66 MHz. In the event of a rare compatibility issue, try changing to pins 2-3 closed.

Table 1.7: PCI clock selection (JPCICLK1)	
Function	**Jumper Setting**
*33/66 MHz auto-detected	1-2 closed
Fixed at 33 MHz	2-3 closed
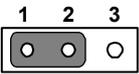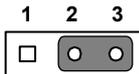
* default setting

1.8.7 COM3 RS-232/422/485 jumper setting (JSETCOM3)

Use JSETCOM3 to select the RS-232/422/485 mode for COM3. Refer to Chapter 3 for further selection of device mode in the BIOS menu. The default setting is RS-232.

Table 1.8: COM3 RS-232/422/485 jumper setting (JSETCOM3)	
Function	**Setting**
*RS-232	
RS-422	
RS-485	
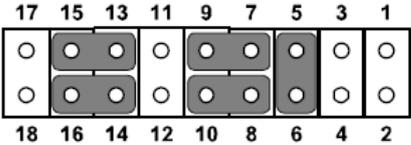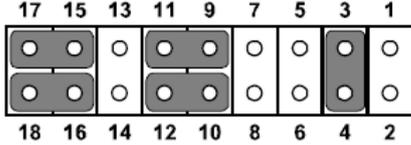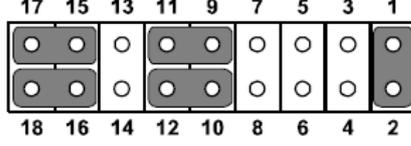
*default setting

1.8.8 COM3 RS-422/485 termination resistor (JT1, JR1)

To stabilize communications, JT1 and JR1 can enable or disable 120 ohm of termination resistor at board side for COM3 RS-422/485 mode to match impedance, depending on user's device application. JT1 is for TX signal line; JR1 is for RX signal line.

Table 1.9: COM3 RS-422/485 termination resistor (JT1, JR1)		
Function	**Jumper Setting**	
Disable termination	1 2 3	1-2 closed
*Enable termination	1 2 3	2-3 closed
* default setting		
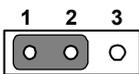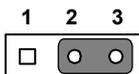
1.8.9 VGA dummy load setting (JFV1)

The AIMB-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 AIMB-788 via remote KVM (such as Intel® AMT) and do not intend to connect any monitors.

Table 1.10: VGA dummy load setting (JFV1)		
Function	**Jumper Setting**	
Enable VGA dummy load	1 2 3	1-2 closed
*Disable VGA dummy load	1 2 3	2-3 closed
* default setting		
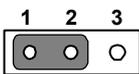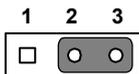
> **Note!** We recommend leaving this function disabled if you use HDMI/DP as your main display.

1.8.10 PCIe SMBus connection setting of clock (SMB1) and data (SMB2) for PCIE2 ~ PCIE5 slots

Some PCIe add-on cards or devices may have SMBus address conflicts with DIMM slots at slave address of 0xA6. In the case, users may disable the SMBus connection of clock (SMB1) and data (SMB2), while VPD (Vital Product Data) will not be accessed. The default setting is enabled. Please note that both SMB1 and SMB2 jumpers should be switched to the same setting, either pins 1-2 closed or pins 2-3 closed.

Table 1.11: PCIe SMBus connection setting of clock (SMB1) and data (SMB2) for PCIE2 ~ PCIE5 slots		
Function	**Jumper Setting**	
*Enable PCIe SMBus connection		1-2 closed
Disable PCIe SMBus connection		2-3 closed
* default setting		
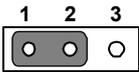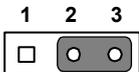
1.8.11 PCIe SMBus connection setting of clock (SMB3) and data (SMB4) for PCIE1 slot

Some PCIe add-on cards or devices may have SMBus address conflicts with DIMM slots at slave address of 0xA6. In the case, users may disable the SMBus connection of clock (SMB3) and data (SMB4), while VPD (Vital Product Data) will not be accessed. The default setting is enabled. Please note that both SMB3 and SMB4 jumpers should be switched to the same setting, either pins 1-2 closed or pins 2-3 closed.

Table 1.12: PCIe SMBus connection setting of clock (SMB3) and data (SMB4) for PCIE1 slot		
Function	**Jumper Setting**	
*Enable PCIe SMBus connection		1-2 closed
Disable PCIe SMBus connection		2-3 closed
* default setting		
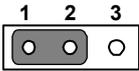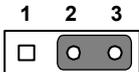
1.9 Memory Installation Procedures

To install DIMMs, first make sure the two handles of the DIMM socket are in the "open" position. i.e. The handles lean outward. Slowly slide the DIMM module along the plastic guides on both ends of the socket, and then press the DIMM module down into the socket, until you hear a click. This is when the two handles have automatically locked the memory module into the correct position of the DIMM socket. To remove the memory module, just push both handles outward, and the memory module will be ejected by the mechanism in the socket.

> **Note!** *Because AIMB-788 supports Intel Active Management Technology (iAMT) which utilizes some memory space of channel 0, we recommend installing at least one memory module on channel 0 DIMM slot (DIMMA1 or DIMMA2). Not doing so may cause system abnormalities.*
>
> *When both channel 0 and channel 1 are occupied, memories work in dual-channel mode and improve performance. Therefore, also considering motherboard memory layout, the recommended DIMM configurations are:*

	Number of memory modules installed			
	1	2	3	4
DIMMA1	V	V	V	V
DIMMA2			V	V
DIMMB1		V	V	V
DIMMB2				V

1.10 Processor Installation

> **Note!** *Do not remove the CPU socket's plastic cap before installing the processor.*

The AIMB-788 is equipped with LGA1700 socket supporting 12th/13th Gen Intel processor.

Step 1 Press down and push the release lever away to release it from the securing tab.

Step2 Lift the lever upward to lift the processor cover.

Step3 Align the pin-1 corner of the processor with the pin 1 corner of the processor socket, and then place the processor in the processor socket.

Step 4 When the processor is fully seated in the socket, close the processor cover, then remove the cover's cap.

Step 5 Press down and push the release lever under the securing tab to lock it.

Chapter 2

Connecting Peripherals

2.1 Introduction

You can access most of the connectors from the top of the board as it is being installed in the chassis. If you have a number of cards installed, you may need to partially remove a card to make all the connections.

2.2 LAN Port (LAN1, LAN2) and USB Port (USB3C1, USB3C2, USB3H1, USB2C1, USB2A1, USB2A2, USB2H2)
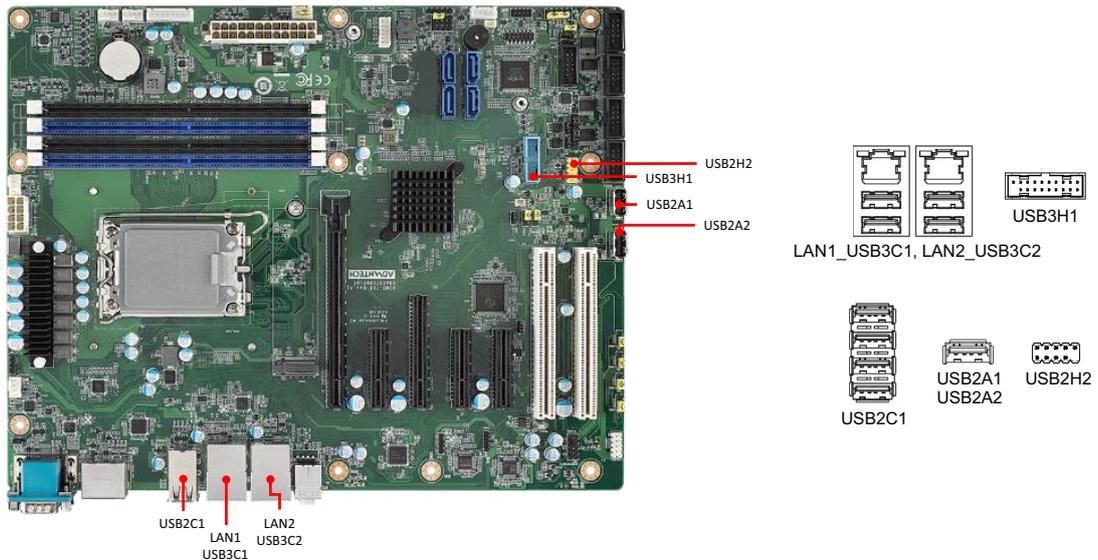
The AIMB-788 is equipped with two high-performance 1000 Mbps Ethernet LANs. They are supported by all major network operating systems. The RJ-45 jacks on the rear plate provide convenient 1000Base-T operation.

The AIMB-788 provides 14 USB ports. USB2C1, USB2A1, USB2A2 and USB2H2 are USB 2.0 ports supporting transmission rates up to 480 Mbps. USB3C2 and USB3H1 are USB 3.2 Gen 1 ports supporting transmission rates up to 5 Gbps. USB3C1 is USB 3.2 Gen 2 ports delivering data rates up to 10 Gbps. The USB interface can be disabled in the system BIOS setup menu.

2.3 VGA Connector (VGA1), HDMI Connector (HDMI1), and DisplayPort Connector (DP1)

VGA1

HDMI1

DP1
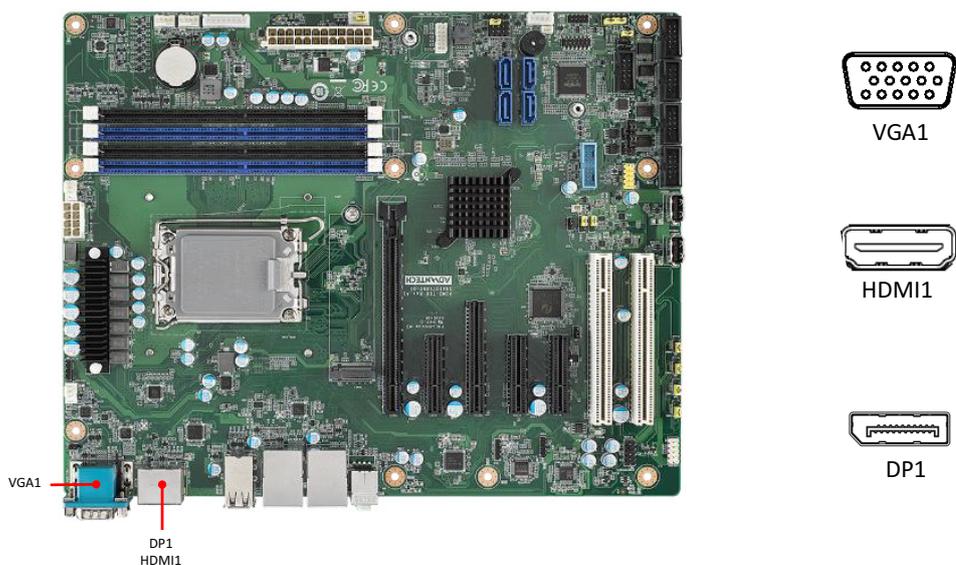
The AIMB-788 includes VGA, HDMI, and DisplayPort interface that can connect display devices. Pin assignments are detailed in Appendix B.

2.4 Serial Port (COM1 ~ COM6)

COM1

COM2 ~ COM6
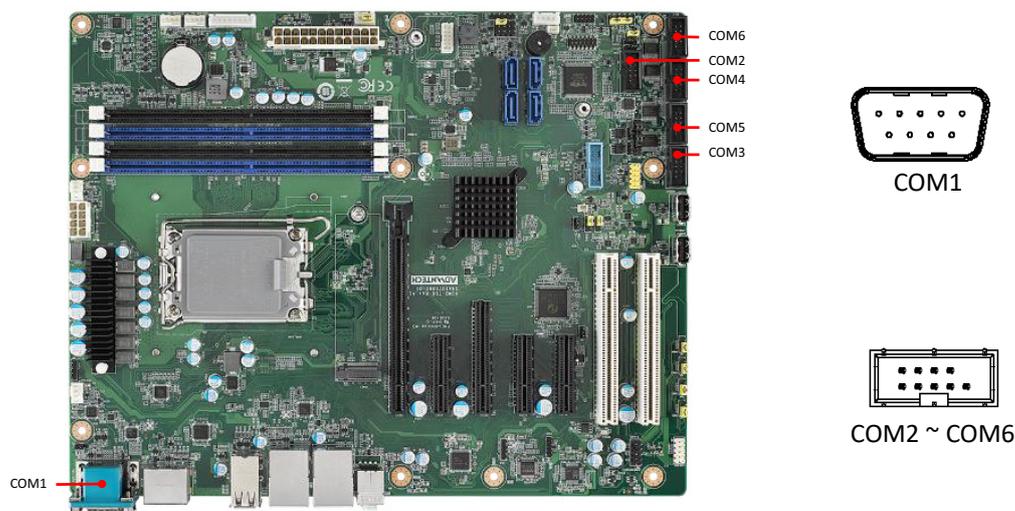
The AIMB-788 offers six serial ports (one on the rear panel and five on-board). COM3 can be configured as RS-232/422/485 by jumper settings (see Chapter 1) and BIOS selection (see Chapter 3). These ports can connect to a serial mouse, printer or communications network. The IRQ and address ranges for those ports are fixed. However, if you want to disable the port or change these parameters later, you can do this in the system BIOS setup. Different devices implement the RS-232/422/485 standards in different ways. If you are having problems with a serial device, please be sure to check the pin assignments for the connector.

2.5 CPU and System Fan Connector (CPUFAN1, SYSFAN1 ~ SYSFAN3)
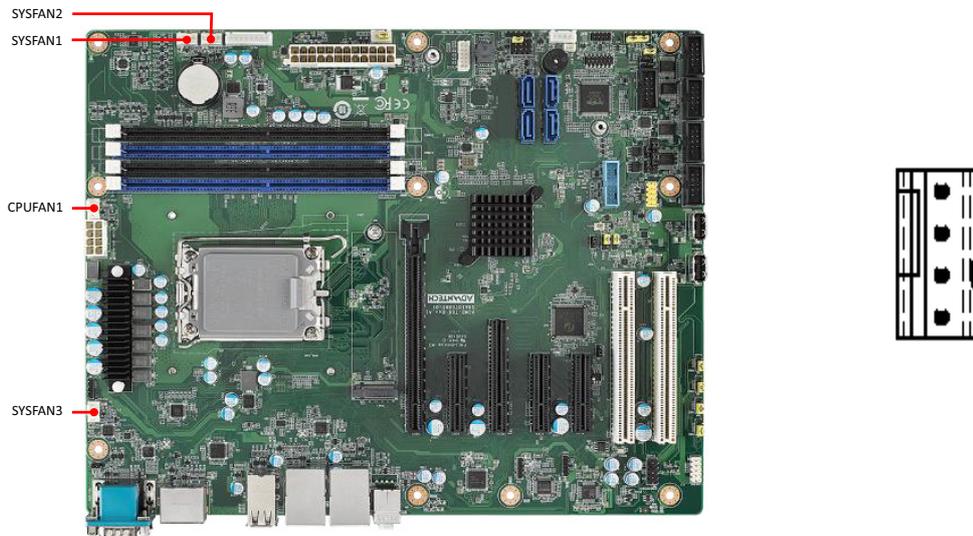
If a fan is used, this connector supports cooling fans that draw up to 500 mA (6 W).

2.6 Front Panel Connector (JFP1, JFP2, JFP3)
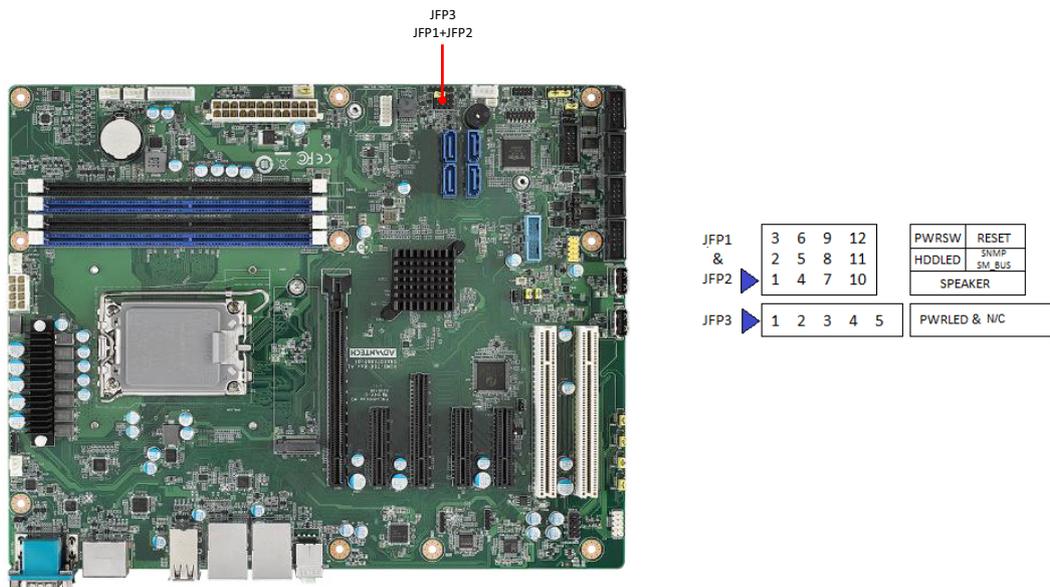
There are several external switches and LEDs that monitor and control the AIMB-788.

2.6.1 Power LED (JFP3 pins 1, 2, 3)

JFP3 is a 3-pin connector for the power LED. Refer to Appendix B for detailed information on the pin assignments. If a PS/2 or ATX power supply is used, the system's power LED status will be as indicated as follows.

Table 2.1: PS/2 or ATX power supply LED status		
Power mode	LED (PS/2 power)	LED (ATX power)
System On	On	On
System Suspend	Fast flashes	Fast flashes
System Off	Off	Off
System Off in deep sleep	Off	Off

2.6.2 External Speaker (JFP2 pins 1, 4, 7, 10)

JFP2 is a 8-pin connector for an external speaker. The AIMB-788 provides an onboard buzzer as an alternative. To enable the buzzer, set pins 7-10 as closed.

2.6.3 HDD LED Connector (JFP2 pins 2, 5)

You can connect a LED to pins 2 and 5 of JFP2 to indicate when the HDD is active.

2.6.4 SMBus Connector (JFP2 pins 8, 11)

The AIMB-788 supports the SAB-2000 module built inside some Advantech advanced-feature IPC chassis for providing a platform independent system management. When installing SAB-2000 module on the AIMB-788, please connect it to pins 8 and 11 of JFP2.

2.6.5 ATX Soft Power Switch (JFP1 pins 3, 6)

If your computer case is equipped with an ATX power supply, you should connect the power on/off button on your computer case to pins 3 and 6 of JFP1. This connection enables you to turn your computer on and off.

2.6.6 Reset Connector (JFP1 pins 9, 12)

Many computer cases offer the convenience of a reset button.

2.7 Line Out, Mic In Connector (AUDIO1+AUDIO2)

AUDIO1+AUDIO2
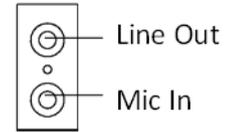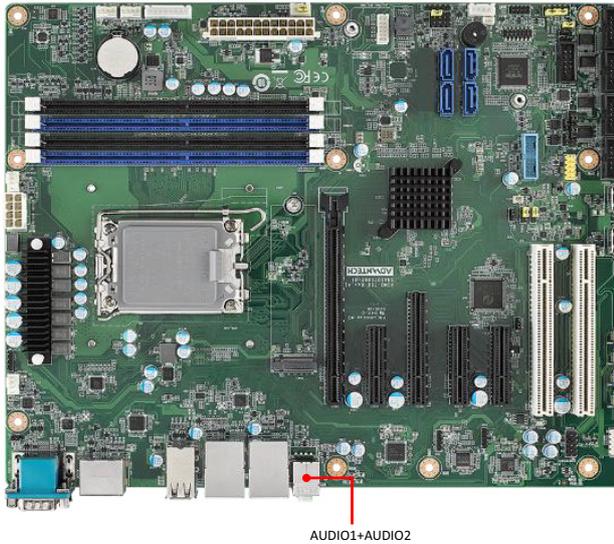
Line Out can be connected to external audio devices like speakers or headphones. Mic In can be connected to a microphone.

2.8 8-pin Alarm Board Connector (VOLT1)
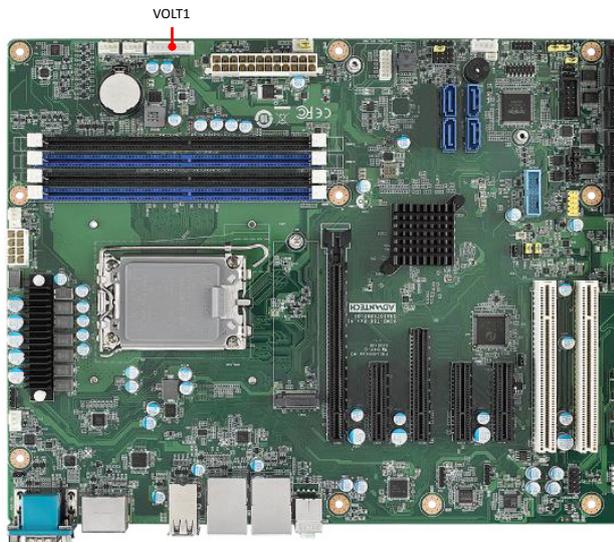
VOLT1

VOLT1 connects to the alarm board on the Advantech chassis. The alarm board gives warnings if a power supply or fan fails, the chassis overheats, or the backplane malfunctions.

2.9   Case Open Connector (JCASE1)
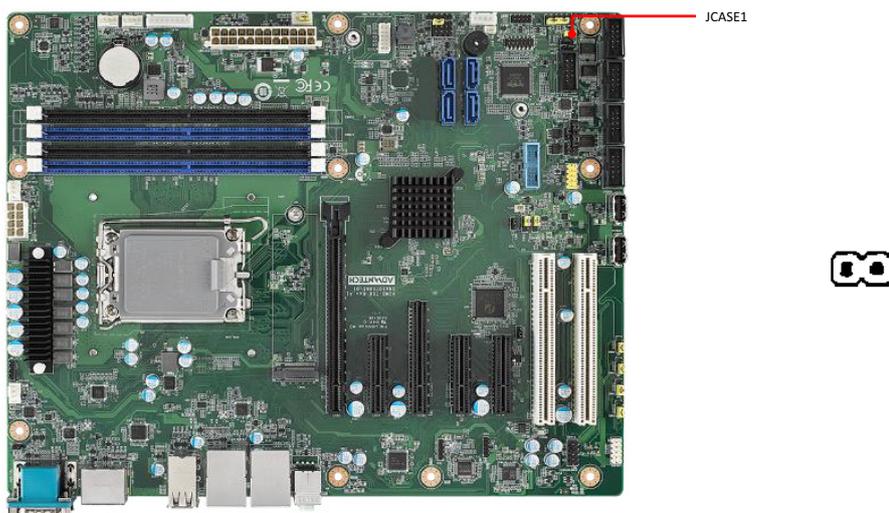
JCASE1 is for chassis with case open sensors. The buzzer on the motherboard sounds if the case is opened unexpectedly. The default function is disabled and pins 1-2 is bridged by a jumper cap.

2.10   Front Panel LAN Indicator Connector (LANLED1)
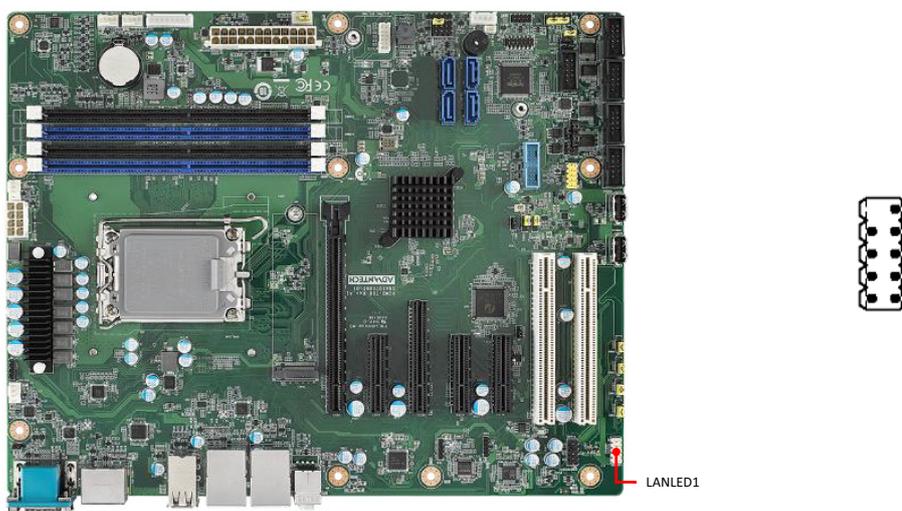
Table 2.2: Front Panel LAN Indicator Connector	
LAN Mode	**Indicator**
LAN Link ON	ON
LAN Active	Flash
LAN Link Off	OFF

2.11 M.2 Socket (NVME1)
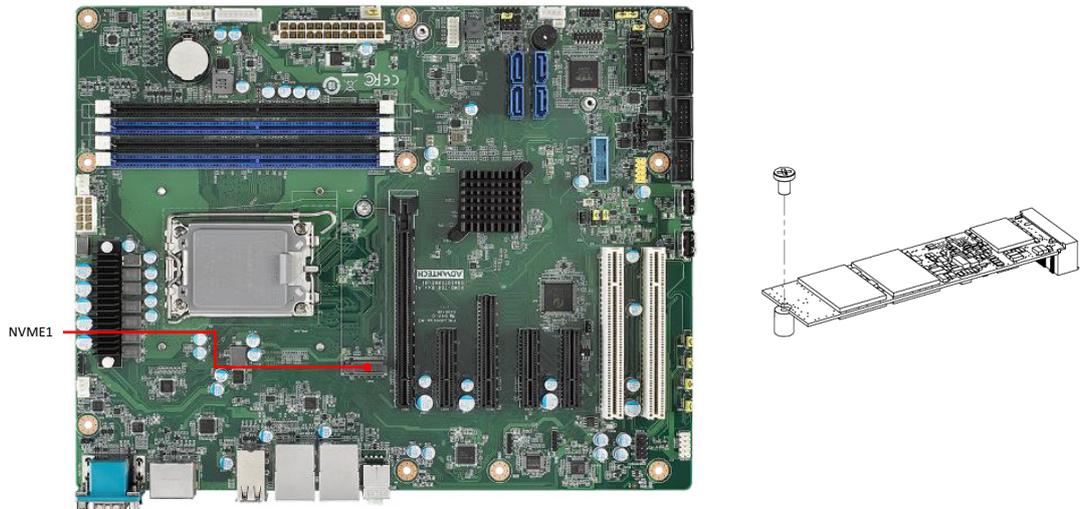
The AIMB-788 is equipped with one M.2 socket to support up to PCIe x4 M-key 2280 type storage devices. A screw to fasten the device is already installed on the nut.

2.12 Serial ATA Interface (SATA4 ~ SATA7)
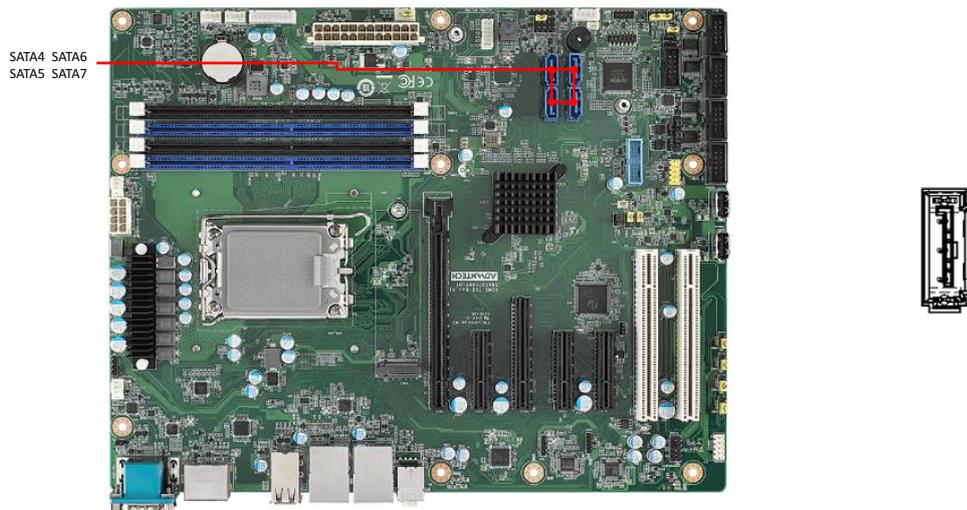
The AIMB-788 features four high performance serial ATA 3.0 interfaces (up to 600 MB/s) with long, thin, easy-to-run SATA cables.

2.13 PCI Slot (PCI1, PCI2)
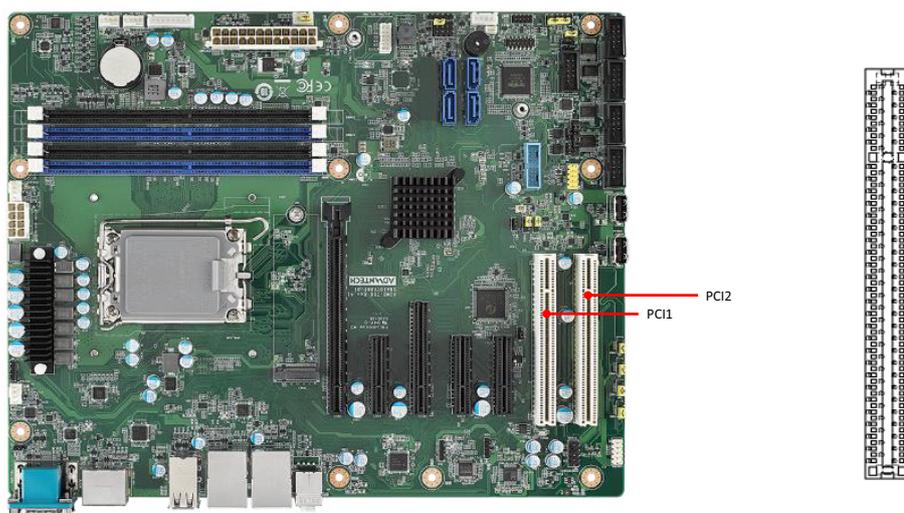
The AIMB-788 provides two 32-bit / 33 MHz PCI slots.

2.14 PCIe x16 Expansion Slot (PCIE1)
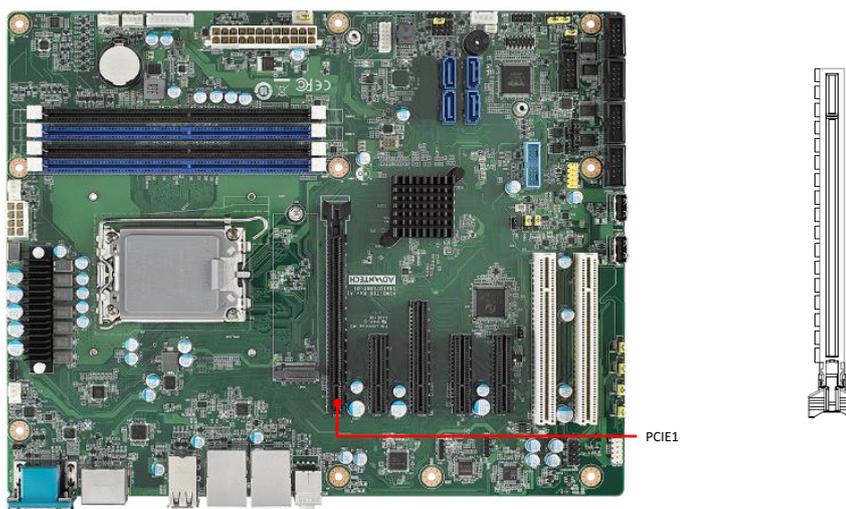
The AIMB-788 provides a PCIe x16 slot for users to install an add-on peripheral card for extension requirements. According to Intel's design specification, only graphic cards and storage cards (1x8 bifurcated PCIe 5.0, 1x4 PCIe 4.0) can be supported by the CPU PCIe port, PCIE1 slot. Other types of add-on cards installed on this slot may not have function.

2.14.1 Expansion Card Support List on PCIe x16 Slot

The PCIe x16 slot, from CPU, can only support graphic cards and storage cards according to the specification recommended by Intel. Other types of add-on cards might not work properly. For the compatible device list validated on the PCIe x16 slot, please refer to the table below.

Type	Brand	Model Name	Interface
PCIex16 Graphics	nVIDIA	WinFast RTX 3090	PCIe x16 (Gen 4)
PCIe x16 Graphics	nVIDIA	WinFast RTX 3050 Twin Edge OC	PCIe x8 (Gen 4)
PCIe x16 Graphics	nVIDIA	WinFast RTX 3050 Classic	PCIe x8 (Gen 4)
PCIe x16 Graphics	Mellanox	CX653105A 200GbE	PCIe x16 (Gen 4)
RAID	Adaptec	ASR-8805	PCIe x8 (Gen 2)
RAID	LSI	SAS9341?4i	PCIe x8 (Gen 3)
RAID	Adaptec	ASR-6805E (128MB)	PCIe x4
USB	JM Vision	4AU3X4	PCIe x4
USB	Advantech	PCE-USB4	PCIe x4
USB	Advantech	PCIE-1158-AE	PCIe x4
LAN	Intel Intel	Ethernet Server Adapter I350-T2	PCIe x4
LAN	Advantech	PCIE?2221NP?00A1E(Intel_X550)	PCIe x4
LAN	Advantech	PCEI?1674V(Intel I350)	PCIe x4
CXP	Euresys	1631 Coaxlink Duo	PCIe x4
LAN	Intel	EXPI9301CTBLK	PCIe x1 Gen 2

2.15 PCIe x8 Expansion Slot (PCIE3)
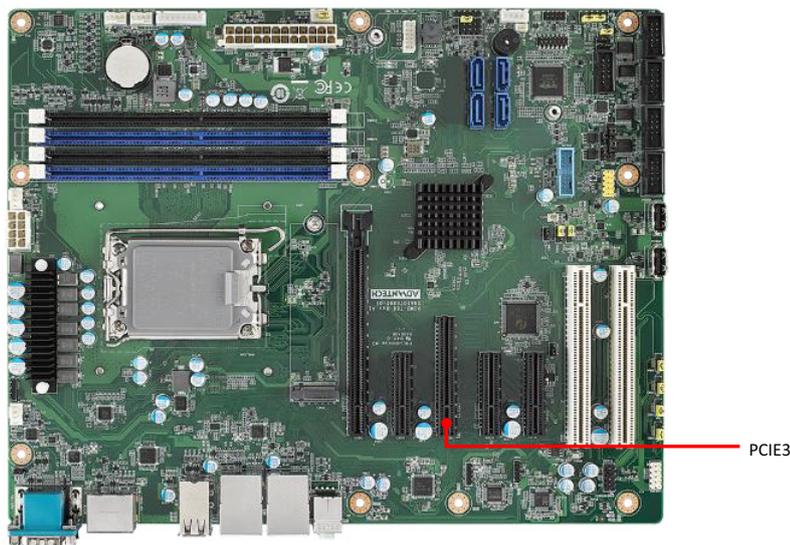
PCIE3

The AIMB-788 offers one PCIe x8 slot for users to install add-on cards for extension requirements. The link of PCIE3 slot is PCIe x4.

2.16 PCIe x4 Expansion Slot (PCIE2, PCI4, PCIE5)

PCIE2, PCIE4, PCIE5
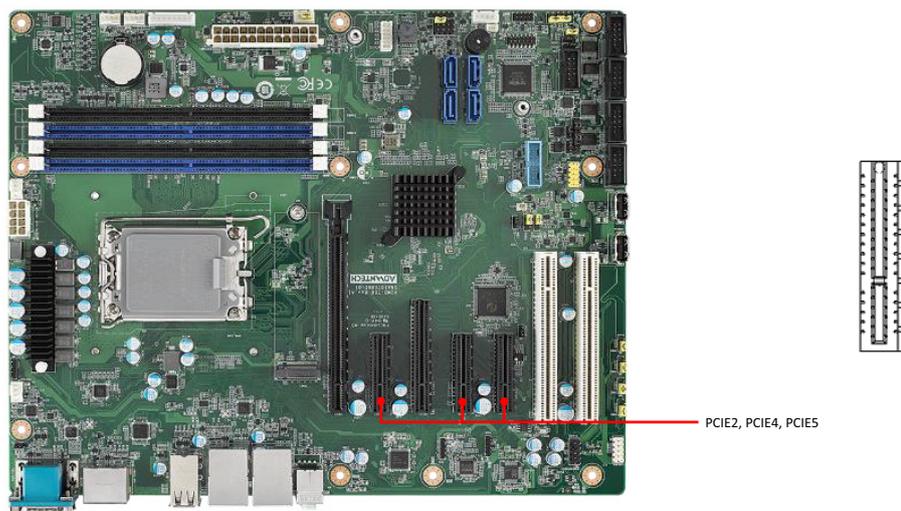
The AIMB-788 offers three PCIe x4 slots for users to install add-on cards for extension requirements.

2.17 Auxiliary 8-pin Power Connector (ATX12V1+ATX12V2)
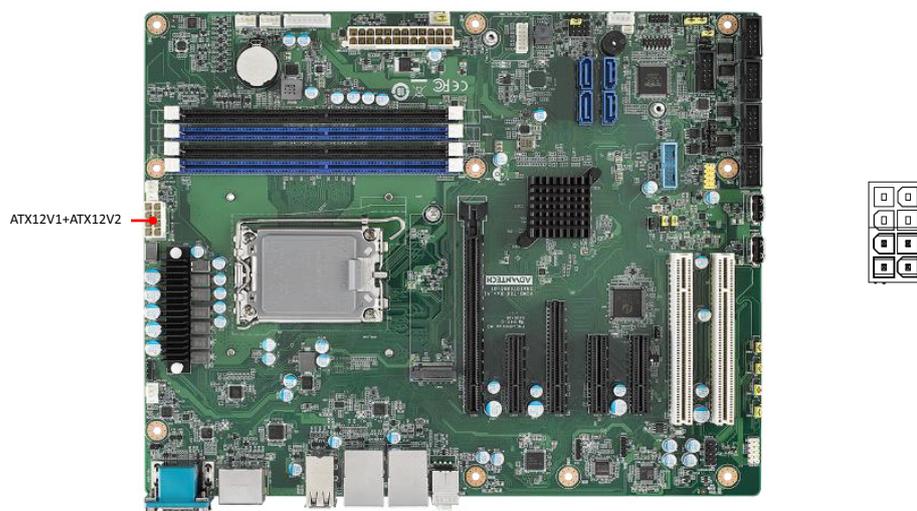
ATX12V1+ATX12V2

To ensure that the enough power is supplied to the CPU, one auxiliary 8-pin power connector is available on the AIMB-788. ATX12V1+ATX12V2 must be used to provide sufficient 12 V power to ensure the stable operation of the system.

2.18 GPIO Connector (GPIO1)
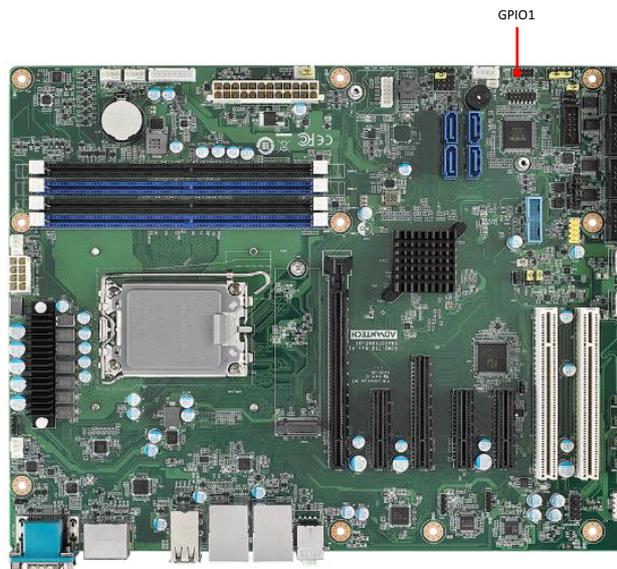
GPIO1 provides input and output connections based on your custom pin definitions.

2.19 SMBus Connector (SMBUS1)
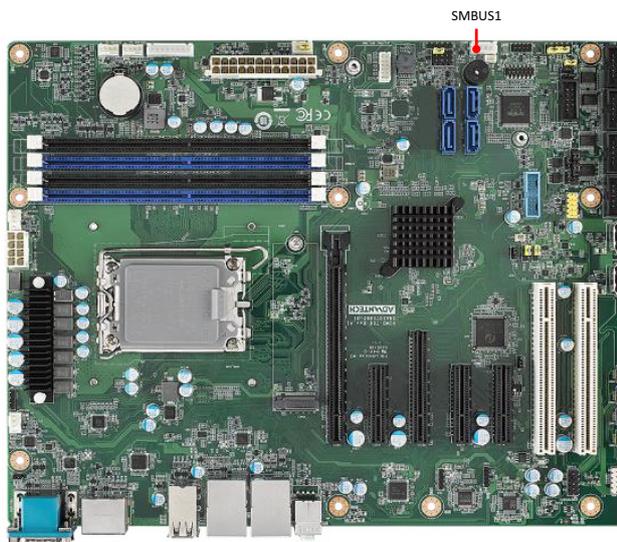
SMBus connects the AIMB-788 to the alarm board on the Advantech chassis.

2.20 Serial Peripheral Interface (SPI) Connector (SPI_TPM1)
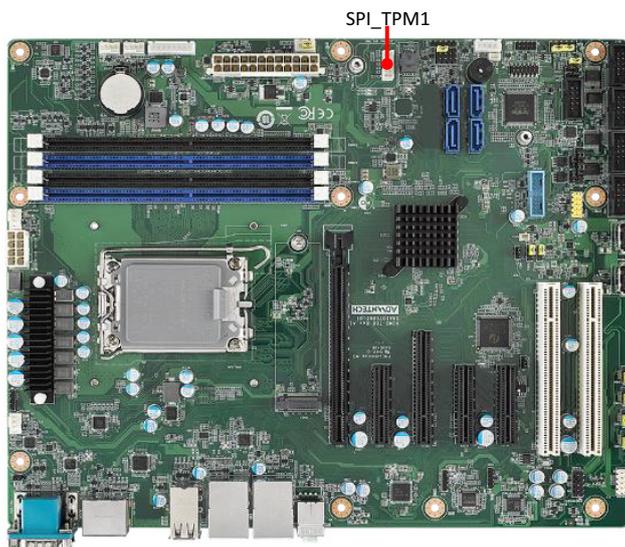
SPI_TPM1

Previous LPC bus is phased out by Intel. The AIMB-788 offers SPI connector to support optional Advantech dTPM 2.0 module.

Table 2.3: Advantech SPI TPM Module List	
P/N	Description
PCA-TPMSPI-00A1	dTPM 2.0 module by SPI

Chapter **3**

BIOS Operation

3.1 Introduction

With the AMI BIOS Setup Utility, you can modify BIOS settings and control the specific features of your computer. The Setup Utility uses a number of menus for making changes and turning the specific features on or off. This chapter describes the basic navigation of the AIMB-788 setup screens.

```
                          Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

   BIOS Information                                          Set the Date. Use Tab to
   BIOS Vendor              American Megatrends              switch between Date elements.
   Core Version             5.0.2.4   0.07 x64              Default Ranges:
   Compliancy               UEFI 2.8; PI 1.7                Year: 1998-9999
   Project Version          A788000QF60X022                 Months: 1-12
   Build Date and Time      06/24/2022 15:51:23             Days: Dependent on month
   Access Level             Administrator                   Range of Years may vary.


   Serial Number            AKK0287738
   UUID                     0000000000000000
                            0000C400ADD95346

                                                            →←: Select Screen
   System Date              [Mon 12/26/2022]                ↑↓: Select Item
   System Time              [14:29:35]                      Enter: Select
   Power Type               ATX                             +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit



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```

Figure 3.1 Main setup screen

AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in NVRAM area so it retains the Setup information when the power is turned off.

3.2 Entering BIOS Setup

Press <Del> at bootup to enter AMI BIOS Setup Utility, the Main Menu will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can be. The right frame displays the key legend.

The key legend above is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

3.2.1 Main Menu

When users first enter the BIOS Setup Utility, they enter the Main setup screen. Users can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options described in this section. The Main BIOS Setup screen is shown below.
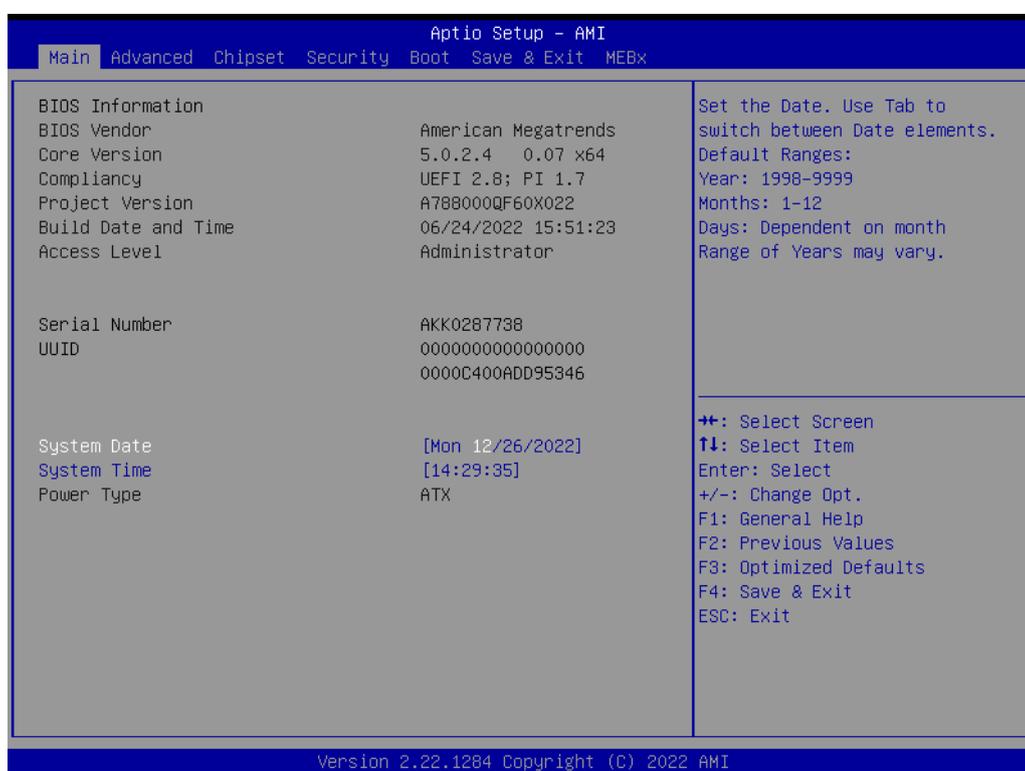
Figure 3.2 Main setup screen

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can be. The right frame displays the key legend.

The key legend above is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

■ **System time / System date**

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through 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.

■ **Serial Number**
The information is acquired from DMI table "Base Board (Type 2)" of the main board product. "Default string" is shown if no serial number is recorded on DMI table.

■ **UUID**
The information is acquired from DMI table "UUID" of the main board product. "Default string" is shown if no UUID is recorded on DMI table.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the AIMB-788 setup screen to enter the Advanced BIOS setup screen. You can select any of the items in the left frame of the screen, such as CPU configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub menus are described on the following pages.
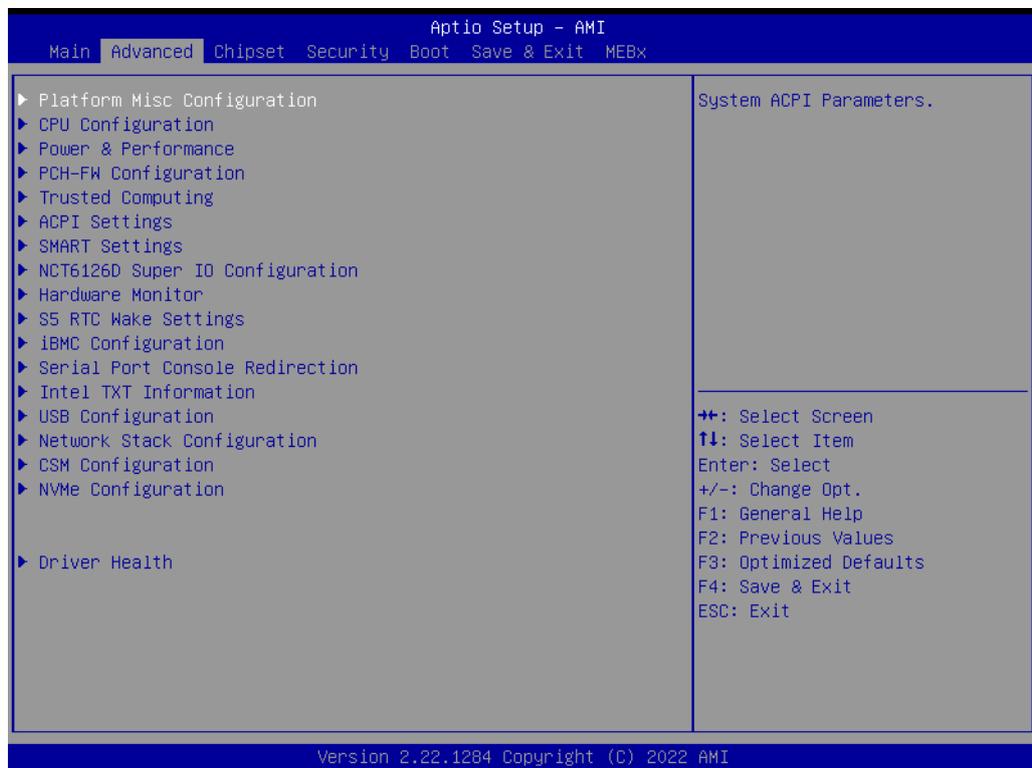
Figure 3.3 Advanced BIOS features setup screen

3.2.2.1 Platform Misc Configuration

```
                              Aptio Setup - AMI
  Advanced

 Platform Misc Configuration                        Bit - PCIe Native * control
                                                     0 - ~ Hot Plug
 Native PCIE Enable              [Disabled]          1 - SHPC Native Hot Plug
                                                    control
                                                     2 - ~ Power Management Events
                                                     3 - PCIe Advanced Error
                                                    Reporting control
                                                     4 - PCIe Capability Structure
                                                    control
                                                     5 - Latency Tolerance
                                                    Reporting control


                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit




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```

Figure 3.4 Platform Misc Configuration

■ **Native PCIE Enable**
 "Enable or Disable" PCI Express native support.

3.2.2.2 CPU Configuration
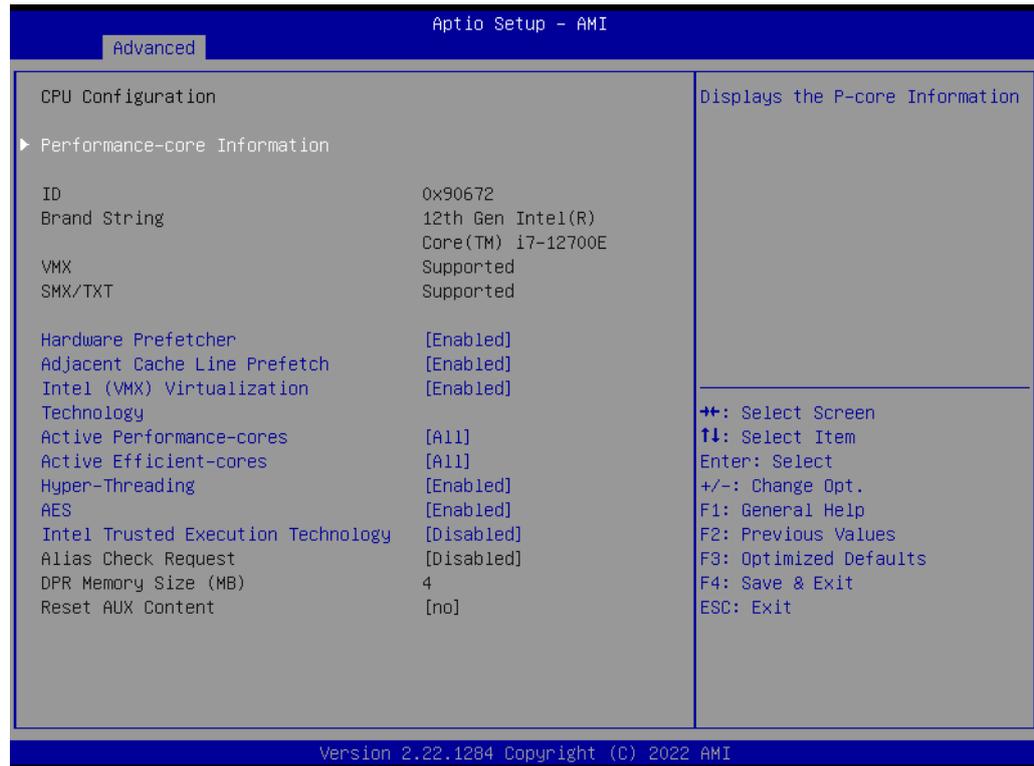
Figure 3.5 CPU Configuration

Figure 3.6 Performance-core Information

■ **Performance-core Information**
Performance-core (P-core) information of current CPU used is displayed here.

■ **Hardware Prefetcher**

Hardware Prefetcher is a technique that fetches instructions and/or data from memory into the CPU cache memory well before the CPU needs it to improve the load-to-use latency. You may choose to "Enable or Disable" it.

■ **Adjacent Cache Line Prefetch**

The Adjacent Cache-Line Prefetch mechanism, like automatic hardware prefetch, operates without programmer intervention. When it is 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. You may choose to "Enable or Disable" it.

■ **Intel® Virtualization Technology**

This feature is used to "Enable or Disable" Intel® Virtualization Technology (IVT) extension. It 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**

Use this item to select the number of performance-cores you want to activate when you are using a multi-core processor.

■ **Active Efficient-cores**

Use this item to select the number of efficient-cores you want to activate when you are using a multi-core processor.

■ **Hyper-Threading**

"Enable or Disable" Intel® Hyper Threading technology.

■ **AES**

"Enable or Disable" CPA advanced encryption standard instruction.

3.2.2.3 Power & Performance

Figure 3.7 Power & Performance

```
                                    Aptio Setup - AMI
            Advanced

         CPU - Power Management Control                         Select the performance state
                                                                that the BIOS will set
         Boot performance mode              [Max Non-Turbo      starting from reset vector.
                                             Performance]

         Intel(R) SpeedStep(tm)             [Enabled]
           Turbo Mode                       [Enabled]
         C states                           [Disabled]



                                                                ←→: Select Screen
                                                                ↑↓: Select Item
                                                                Enter: Select
                                                                +/-: Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
                                                                F3: Optimized Defaults
                                                                F4: Save & Exit
                                                                ESC: Exit



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```

Figure 3.8 CPU - Power Management Control

■ **Boot Performance**
Select the performance state that the BIOS will set before OS handoff.

■ **Intel® Speedstep™**
Allows more than two frequency ranges to be supported.

■ **Turbo Mode**
"Enable or Disable" processor turbo mode.

■ **C states**
Intel® C states setting for power saving.
suggest enable for ErP

3.2.2.4 PCH-FW Configuration


```
                          Aptio Setup - AMI
      Advanced

    ME Firmware Version        16.0.15.1620          Configure Intel(R) Active
    ME Firmware Mode           Normal Mode           Management Technology
    ME Firmware SKU            Corporate SKU         Parameters
  ▶ AMT Configuration

  ▶ Firmware Update Configuration
  ▶ PTT Configuration

                                                     ←→: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit


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```

Figure 3.9 PCH-FW Configuration

■ **PCH-FW Version**

   PCH-FW page shows Intel® ME FW information.

■ **AMT Configuration**

Figure 3.10 AMT Configuration

■ **ASF Configuration**
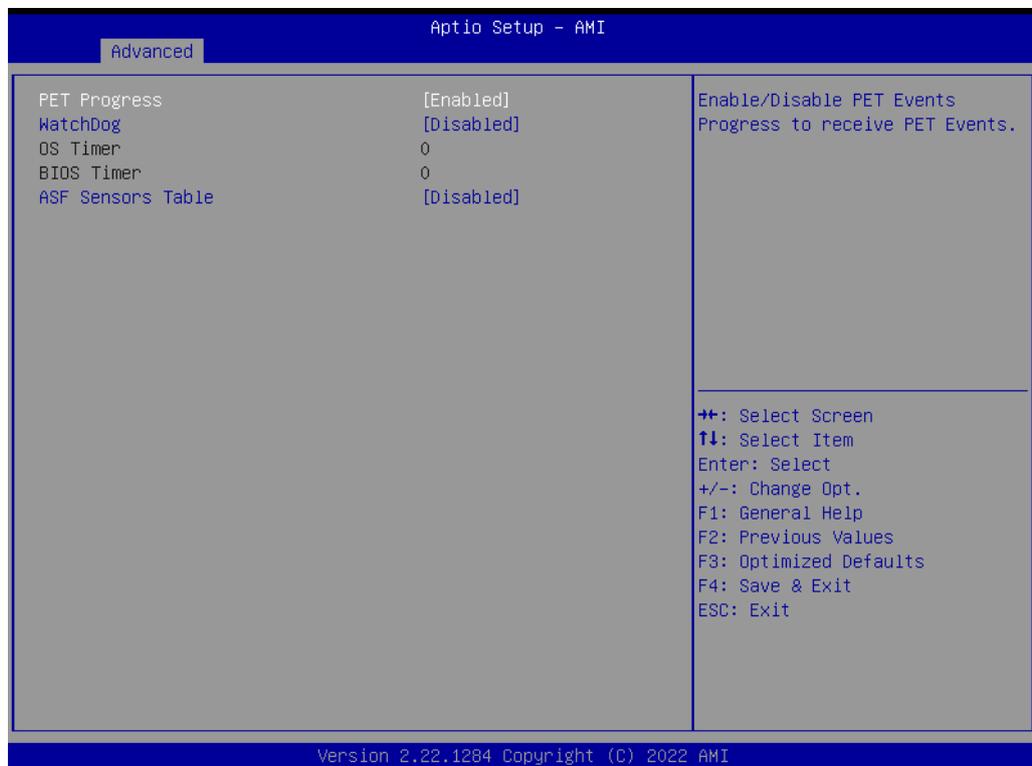
Figure 3.11 ASF Configuration

– **PET Progress**

"Enable or Disable" PET events Progress to receive PET events.

– **WatchDog**

"Enable or Disable" Watchdog Timer.

– **ASF Sensors Table**

"Enable or Disable" to add ASF Sensor Table into ASF ACPI Table.

■ **Secure Erase Configuration**

Figure 3.12 Secure Erase Configuration

– **Secure Erase mode**

Change Secure Erase module behavior as "Simulated or Real".

– **Force Secure Erase**

 "Enable or Disable" force Secure Erase on next boot.

■ **Firmware Update Configuration**

```
                        Aptio Setup - AMI
     Advanced

 Me FW Image Re-Flash              [Disabled]          Enable/Disable Me FW Image
                                                       Re-Flash function.




                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



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```
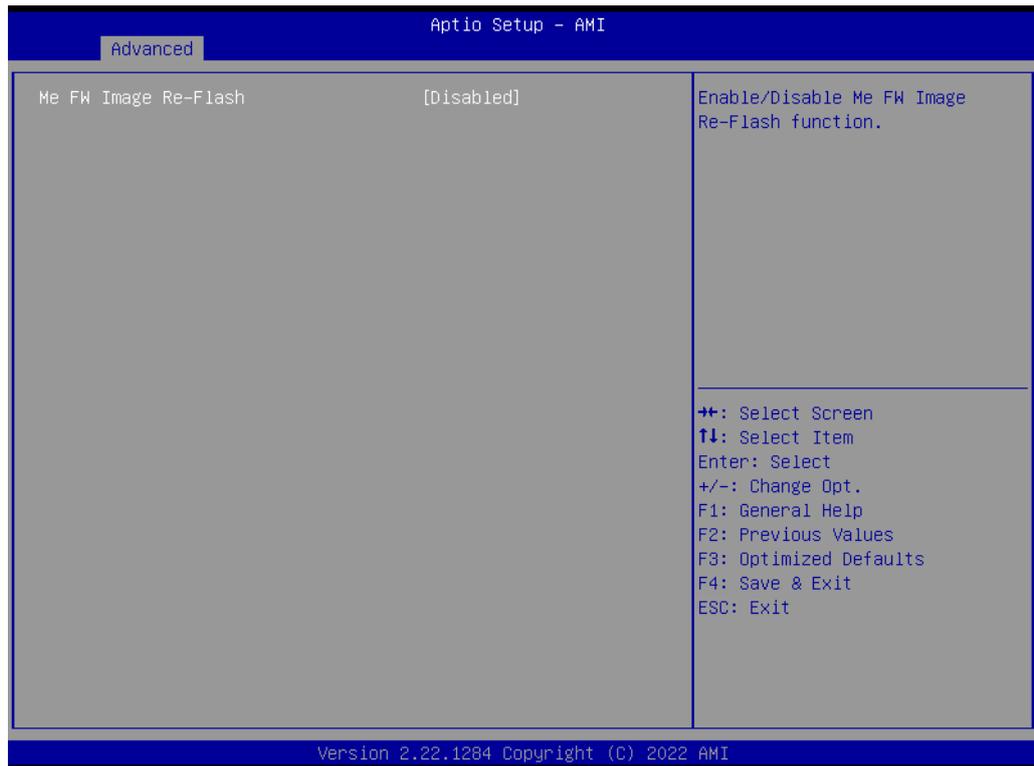
Figure 3.13 Firmware Update Configuration

– **ME FW Image Re-flash**

"Enable or Disable" ME firmware image re-flash function.

■ **PTT Configuration**

```
                        Aptio Setup - AMI
   Advanced

PTT Capability / State          1 / 1

TPM Device Selection            [PTT]



                                        →←: Select Screen
                                        ↑↓: Select Item
                                        Enter: Select
                                        +/-: Change Opt.
                                        F1: General Help
                                        F2: Previous Values
                                        F3: Optimized Defaults
                                        F4: Save & Exit
                                        ESC: Exit



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```
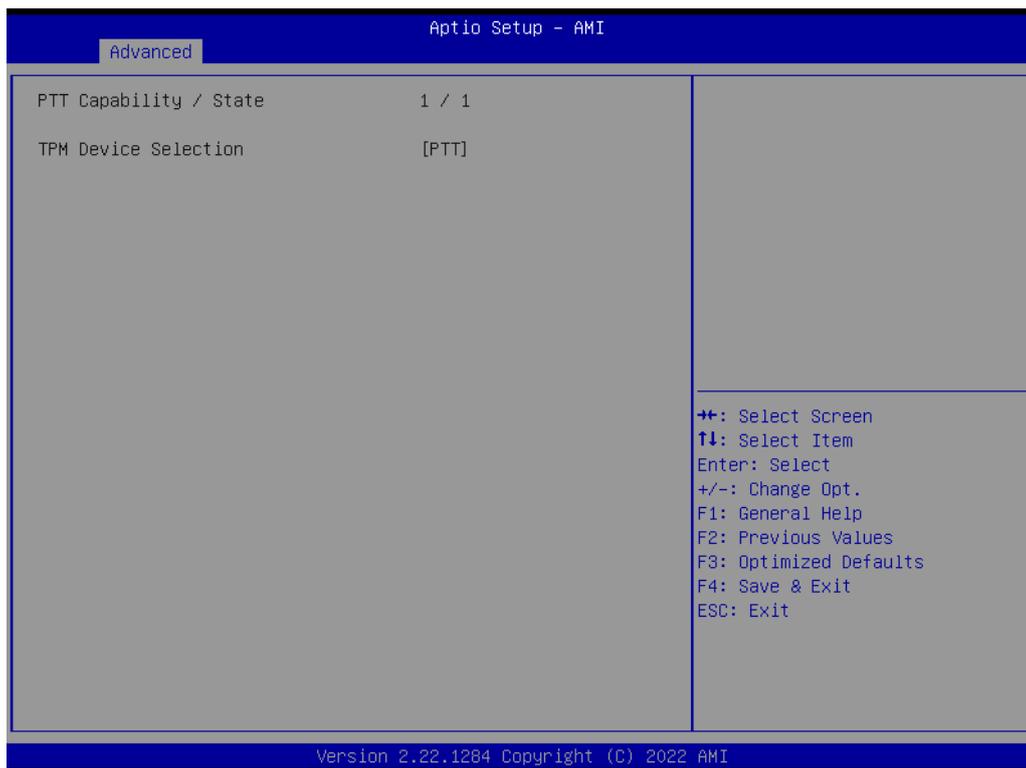
– **TPM Device Selection**
Select TPM device "dTPM or PTT". dTPM is selected for discrete TPM, dTPM module. PTT (Intel Platform Trust Technology) is a firmware TPM.

3.2.2.5 Trusted Computing
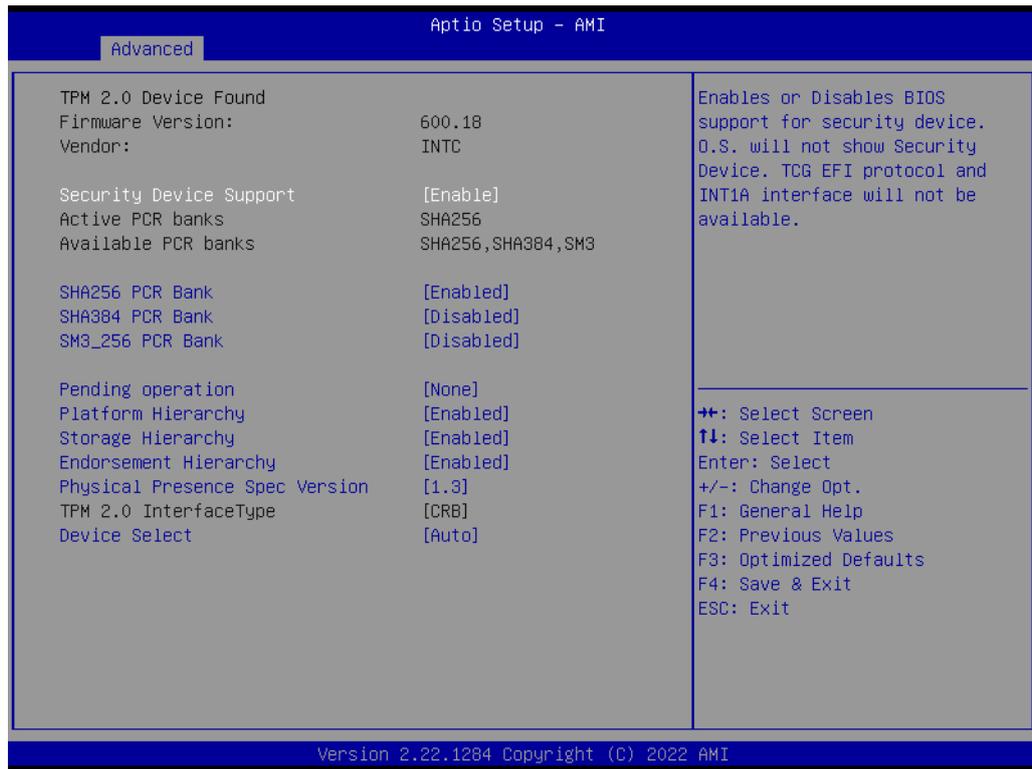
Figure 3.14 TPM Settings

■ **Security Device Support**

"Enable or Disable" TPM Support. You can purchase an Advantech-designed dTPM 2.0 module to enable TPM function. P/N: PCA-TPMSPI-00A1.

3.2.2.6 ACPI Settings

```
                          Aptio Setup - AMI
    Advanced

ACPI Settings                                          Enables or Disables BIOS ACPI
                                                       Auto Configuration.
Enable ACPI Auto Configuration    [Disabled]

Enable Hibernation                [Enabled]
ACPI Sleep State                  [S3 (Suspend to RAM)]
S3 Video Repost                   [Disabled]

Deep Sleep                        [Disabled]



                                                       ++: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



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```

Figure 3.15 ACPI Settings

■ **Enable ACPI Auto Configuration**

"Enable or Disable" ACPI auto configuration.

■ **Enable Hibernation**

"Enable or Disable" Hibernation (OS/S4 Sleep State). This option may not be applied in some OS.

■ **ACPI Sleep State**

"Suspend Disabled" or "S3 (Suspend to RAM)" ACPI Sleep State.

■ **S3 Video Repost**

"Enable or Disable" S3 Video Repost.

■ **Deep Sleep**
Select "Disabled" or "Enable (S4+S5)" or "Enable (S5 only)" sleep mode.
Enable this function to cut off the power of peripherals in sleep state. Please enable this function to comply with EU ErP (Energy-related Product) regulations if required. If "Enable (S5 only)" is chosen, only power button can turn on system (fast startup must be disabled under OS)

3.2.2.7 SMART Settings
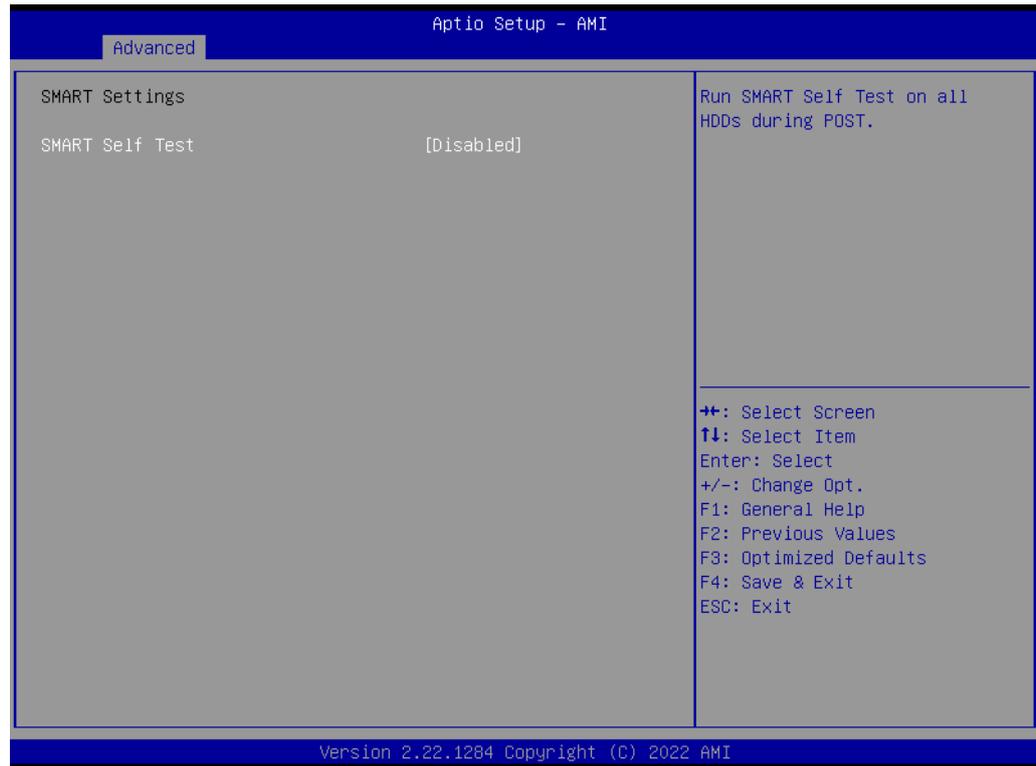
Figure 3.16 SMART Settings

- **SMART Self Test**

  "Enable or Disable" SMART Self Test on all HDDs during POST.

3.2.2.8 NCT6126D Super IO Configuration

```
                        Aptio Setup – AMI
   Advanced

  NCT6126D Super IO Configuration                      Set Parameters of Serial Port
                                                       1 (COMA)
  Super IO Chip                    NCT6126D
▶ Serial Port 1 Configuration
▶ Serial Port 2 Configuration
▶ Serial Port 3 Configuration
▶ Serial Port 4 Configuration
▶ Serial Port 5 Configuration
▶ Serial Port 6 Configuration


                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



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```

Figure 3.17 NCT6126D Super IO Configuration

```
                        Aptio Setup – AMI
   Advanced

  Serial Port 1 Configuration                          Enable or Disable Serial Port
                                                       (COM)
  Serial Port                      [Enabled]
  Device Settings                  IO=3F8h; IRQ=4;

  Change Settings                  [Auto]




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



              Version 2.22.1284 Copyright (C) 2022 AMI
```
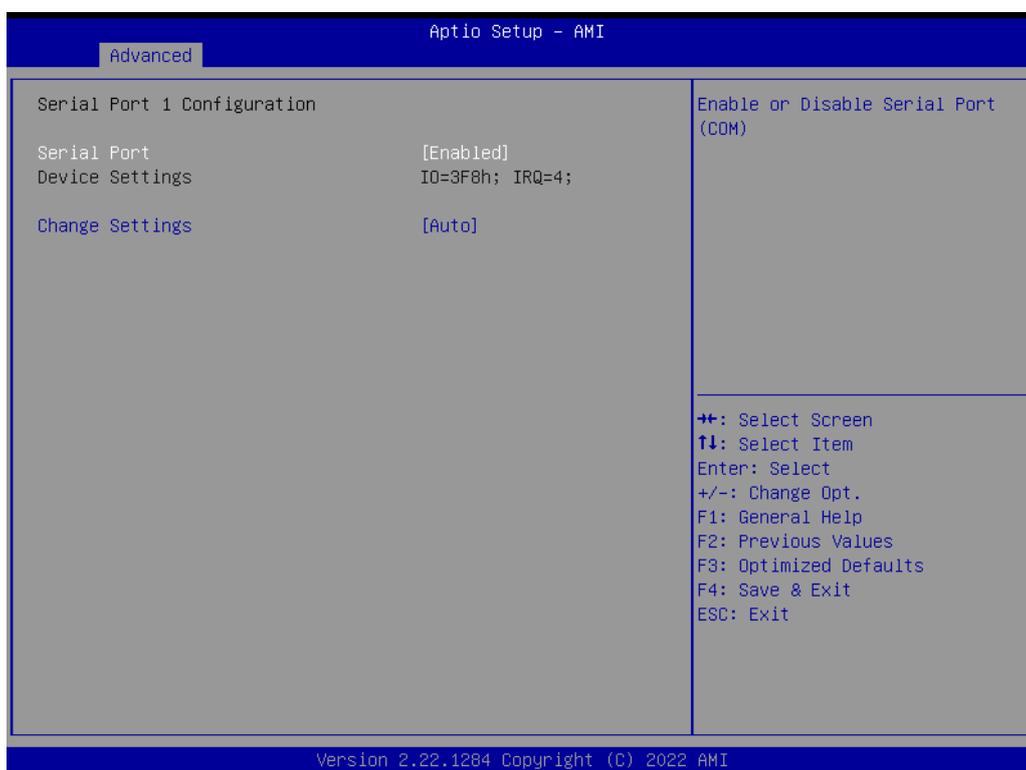
Figure 3.18 Serial Port 1 Configuration
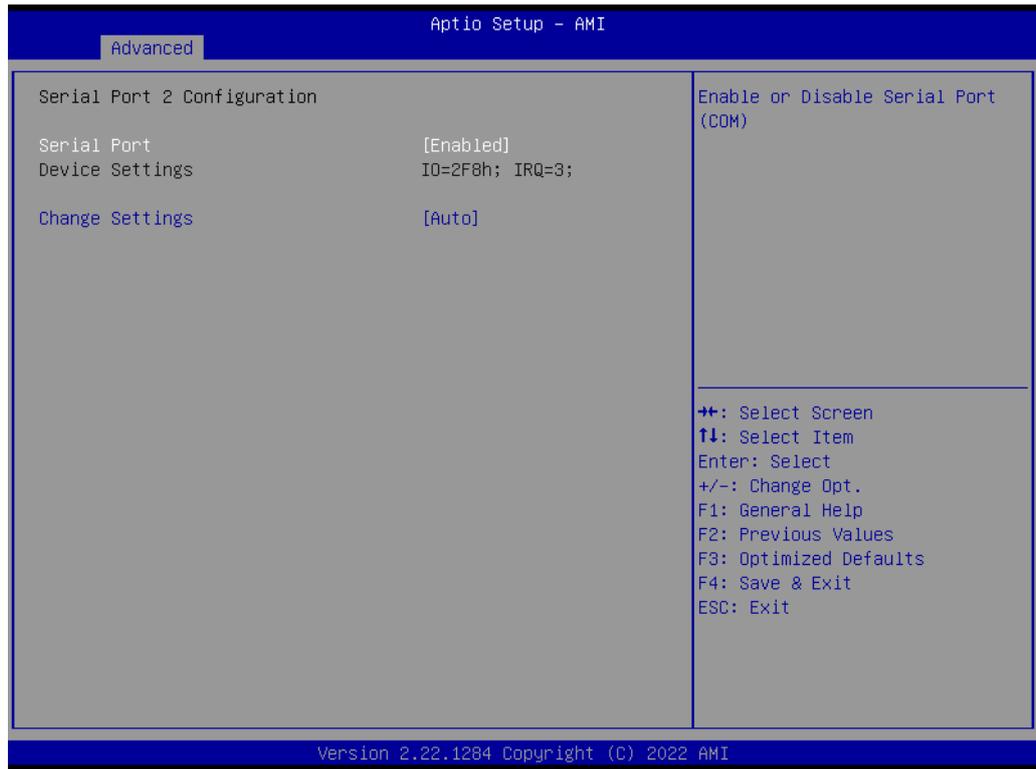
Figure 3.19 Serial Port 2 Configuration

■ **Serial Port 1 Configuration**
  – **Serial Port**
    "Enable or Disable" Serial Port 1.
  – **Change Settings**
    Select an optimal setting for serial port 1.
■ **Serial Port 2 Configuration**
  – **Serial Port**
    "Enable or Disable" Serial Port 2.
  – **Change Settings**
    Select an optimal setting for serial port 2.

```
                                Aptio Setup - AMI
        Advanced

Serial Port 3 Configuration                             Enable or Disable Serial Port
                                                        (COM)
Serial Port                      [Enabled]
Device Settings                  IO=3E8h; IRQ=5;

Change Settings                  [Auto]
Device Mode                      [RS-232]




                                                        ↔: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit




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```

Figure 3.20 Serial Port 3 Configuration

■ **Serial Port 3 Configuration**
  – **Serial Port**
    "Enable or Disable" serial port 3.
  – **Change Settings**
    Select an optimal setting for serial port 3.
  – **Device Mode**
    When serial port 3 (connector COM3) is set to RS-232, RS-422, or RS-485 via jumper JSETCOM3, this BIOS item should be selected as its corresponding one, "RS-232" or "RS-422 (Full Duplex)" or "RS-485 (Half Duplex)".
    . Default for this Device Mode is "RS-232".
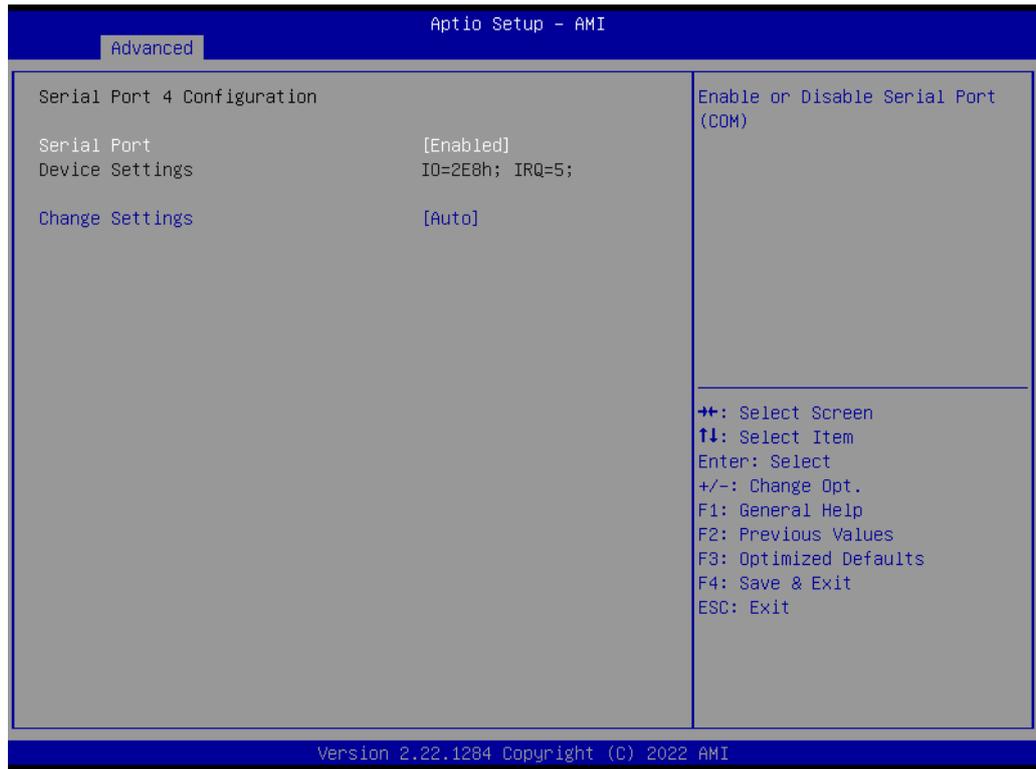
Figure 3.21 Serial Port 4 Configuration

Figure 3.22 Serial Port 5 Configuration

```
                              Aptio Setup - AMI
        Advanced

  Serial Port 6 Configuration                          Enable or Disable Serial Port
                                                       (COM)
  Serial Port                      [Enabled]
  Device Settings                  IO=228h; IRQ=10;

  Change Settings                  [Auto]


                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit




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```
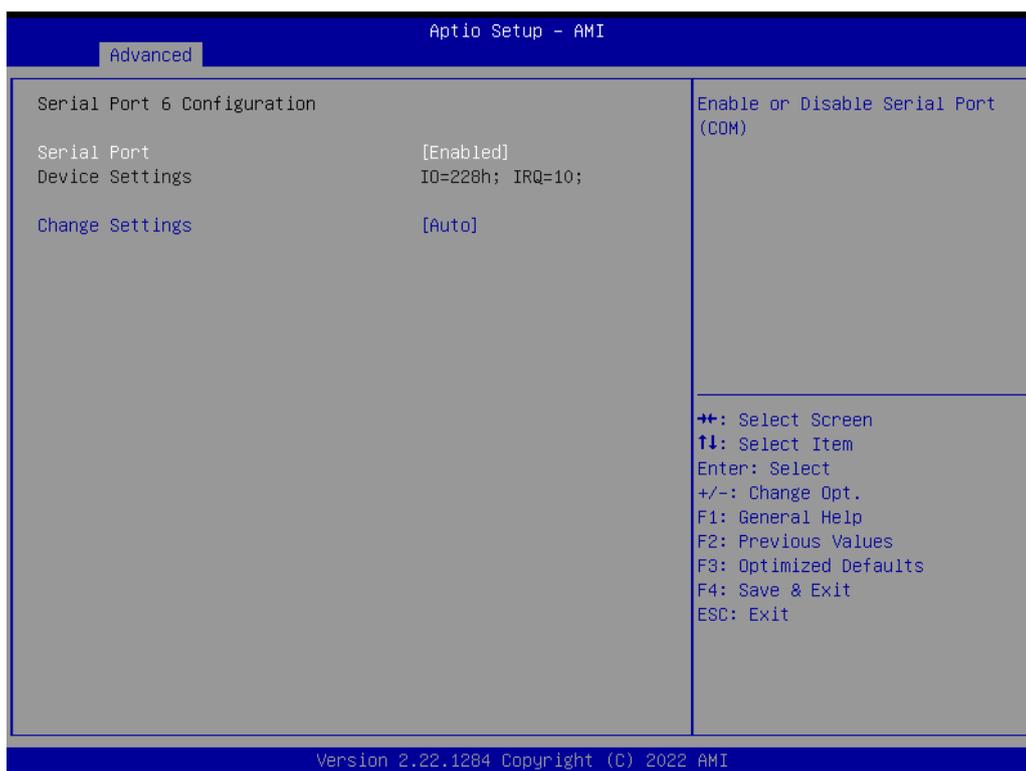
Figure 3.23 Serial Port 6 Configuration

■ **Serial Port 4 configuration**
  – **Serial Port**
    "Enable or Disable" serial port 4.
  – **Change Settings**
    Select an optimal setting for serial port 4.

■ **Serial Port 5 configuration**
  – **Serial Port**
    "Enable or Disable" serial port 5.
  – **Change Settings**
    Select an optimal setting for serial port 5.

■ **Serial Port 6 configuration**
  – **Serial Port**
    "Enable or Disable" serial port 6.
  – **Change Settings**
    Select an optimal setting for serial port 6.

3.2.2.9 Hardware Monitor
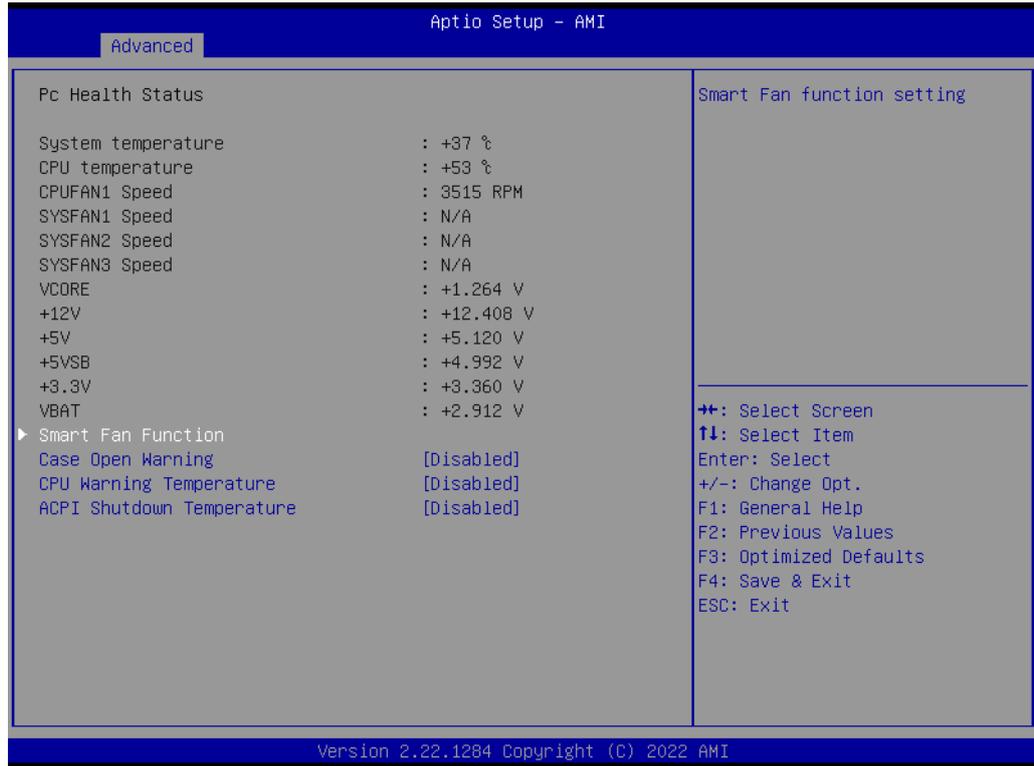
Figure 3.24 Hardware Monitor
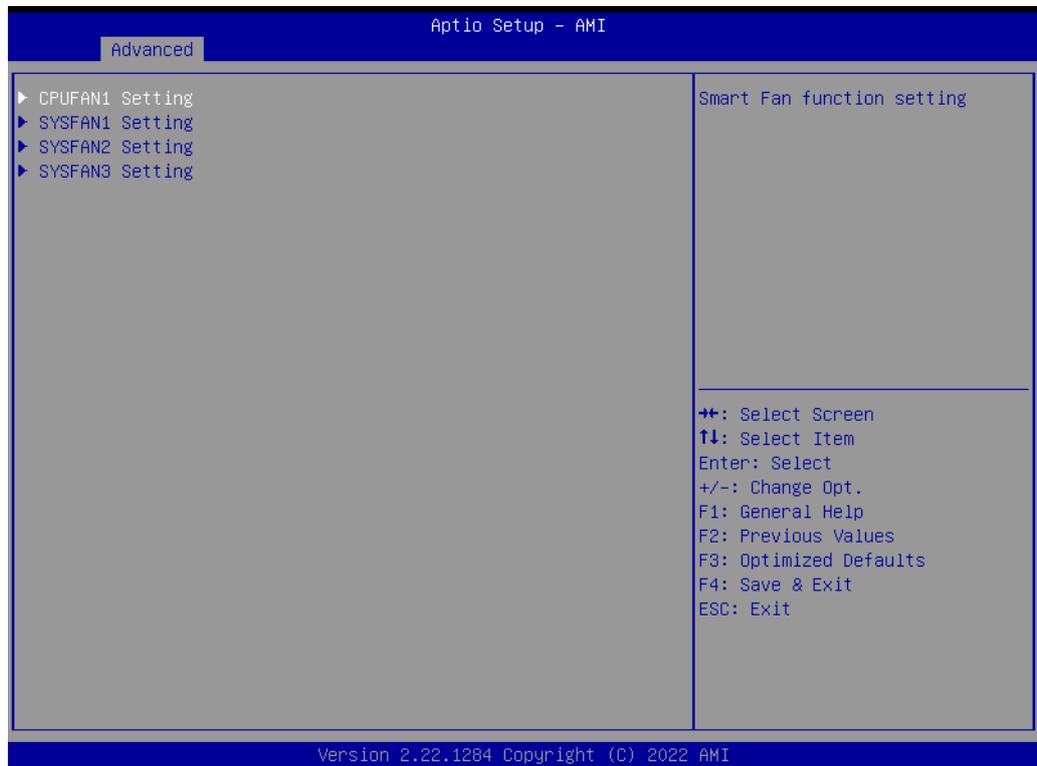
Figure 3.25 Smart Fan Function

```
                          Aptio Setup - AMI
        Advanced

SYSFAN1 Setting                                        Fan control mode select
SYSFAN1 Smartfan Setting           [Enabled]




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit


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```

Figure 3.26 SYSFAN1~3/CPUFAN1 Setting

■ **Smart Fan Function**
 – **CPUFAN1 Setting**
  "Enable or Disable" SYSFAN1 control mode to Smartfan Setting.
 – **SYSFAN1 Setting**
  "Enable or Disable" CPUFAN1 control mode to Smartfan Setting.
 – **SYSFAN2 Setting**
  "Enable or Disable" SYSFAN2 control mode to Smartfan Setting.
 – **SYSFAN3 Setting**
  "Enable or Disable" SYSFAN3 control mode to Smartfan Setting.

■ **Case Open Warning**

"Enable or Disable" the Chassis Intrusion monitoring function. When it is enabled and the case is opened, the speaker beeps.

■ **CPU Warning Temperature**

Use this item to set the CPU warning temperature. When the system reaches the warning temperature, the speaker will beep.

■ **ACPI Shutdown Temperature**

Use this item to set the ACPI shutdown temperature. When the system reaches the shutdown temperature, it will be automatically shut down by ACPI OS to protect the system from overheat damage.

3.2.2.10 S5 RTC Wake Settings
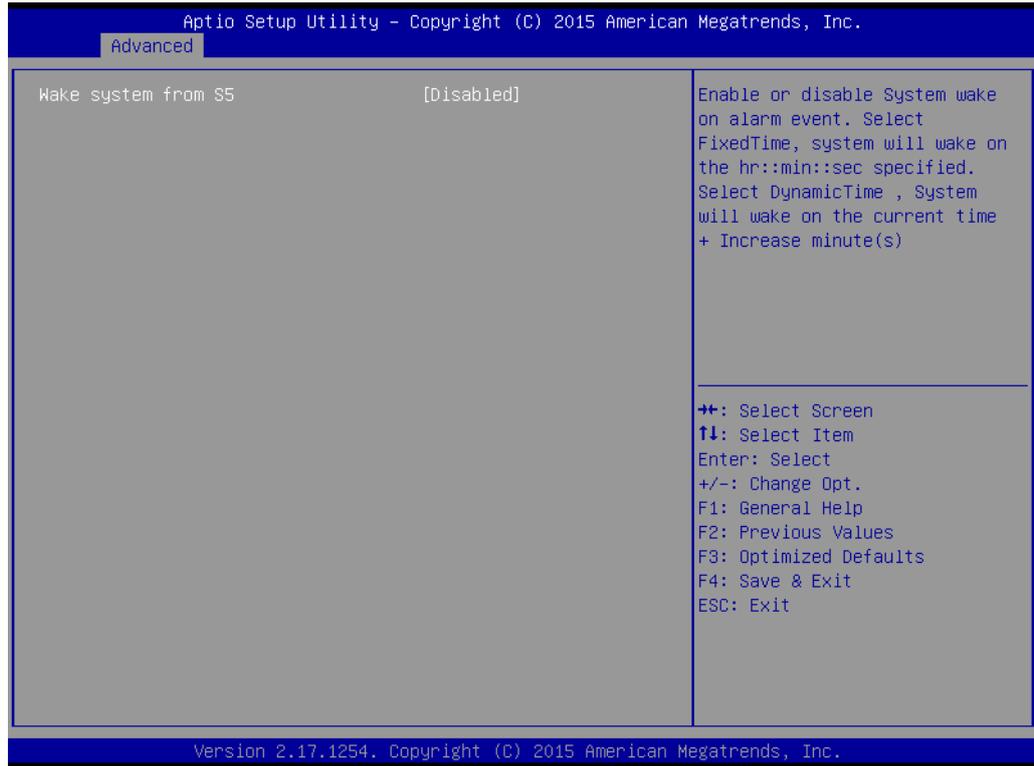
Figure 3.27 S5 RTC Wake Settings

■ **Wake system with Fixed Time**

"Enable or Disable" System wake on alarm event. The system will wake on the hr:min:sec as specified.

3.2.2.11 iBMC Configuration

```
                          Aptio Setup - AMI
   Advanced

iBMC Out-of-Band Management                              iBMC function control

iBMC Vendor ID                 0000
iBMC Device ID                 0000
iBMC Version                   0000
iBMC BIOS Capability           00000000

iBMC                           [Enabled]
Apacer Coresnapshot            Not Found
BIOS POST STEP                 [Disabled]
Recovery mode                  [Disabled]
Change bootorder               [Disabled]
                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit




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```

Figure 3.28 iBMC Configuration

■ **iBMC**

"Enable or Disable" iBMC controller's hardware communication. The default setting is "Enabled". iBMC controller/function can be disabled if the item is selected as "Disabled".

3.2.2.12 Serial Port Console Redirection

```
                          Aptio Setup - AMI
     Advanced

                                                   Console Redirection Enable or
                                                   Disable.
  COM1
  Console Redirection              [Disabled]
▶ Console Redirection Settings

  COM1(Pci Bus0,Dev0,Func0) (Disabled)
  Console Redirection              Port Is Disabled

  Legacy Console Redirection
▶ Legacy Console Redirection Settings

  Serial Port for Out-of-Band Management/
  Windows Emergency Management Services (EMS)
  Console Redirection EMS          [Disabled]         →←: Select Screen
▶ Console Redirection Settings                        ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



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```

Figure 3.29 Serial Port Console Redirection

```
                          Aptio Setup - AMI
     Advanced

  Legacy Console Redirection Settings             Select a COM port to display
                                                   redirection of Legacy OS and
  Redirection COM Port             [COM1]          Legacy OPROM Messages
  Resolution                       [80x24]
  Redirect After POST              [Always Enable]













                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit


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```

Figure 3.30 Legacy Console Redirection Settings

■ **COM1**
  – **Console Redirection Settings**
    Console Redirection "Enable or Disable".

- **Legacy Console Redirection**
  - **Legacy Console Redirection Settings**
    Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.
- **Serial Port for Out-of-Band Management/ Windows Emergency Management services (EMS)**
  - **Console Redirection Settings**
    Console Redirection "Enable or Disable".

3.2.2.13 Intel® TXT Information

```
                              Aptio Setup - AMI
    Advanced

 Intel TXT Information

 Chipset                          Production Fused
 BiosAcm                          Debug Fused
 Chipset Txt                      Not Supported
 Cpu Txt                          Not Supported
 Error Code                       None
   Class Code                     None
   Major Code                     None
   Minor Code                     None




                                                   →←: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F3: Optimized Defaults
                                                   F4: Save & Exit
                                                   ESC: Exit




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```

Figure 3.31 Intel® TXT Information

3.2.2.14 USB Configuration

```
                        Aptio Setup - AMI
       Advanced
┌─────────────────────────────────────────────────┬──────────────────────────┐
│ USB Configuration                                │ Enables Legacy USB support.│
│                                                  │ AUTO option disables legacy│
│ USB Module Version              28               │ support if no USB devices are│
│                                                  │ connected. DISABLE option will│
│ USB Controllers:                                 │ keep USB devices available │
│     1 XHCI                                       │ only for EFI applications. │
│ USB Devices:                                     │                            │
│     1 Drive, 1 Keyboard                          │                            │
│                                                  │                            │
│ Legacy USB Support              [Enabled]        │                            │
│ XHCI Hand-off                   [Enabled]        │                            │
│ USB Mass Storage Driver Support [Enabled]        │                            │
│                                                  │                            │
│ USB hardware delays and time-outs:               │ →←: Select Screen          │
│ USB transfer time-out           [20 sec]         │ ↑↓: Select Item            │
│ Device reset time-out           [20 sec]         │ Enter: Select              │
│ Device power-up delay           [Auto]           │ +/-: Change Opt.           │
│                                                  │ F1: General Help           │
│                                                  │ F2: Previous Values        │
│                                                  │ F3: Optimized Defaults     │
│                                                  │ F4: Save & Exit            │
│                                                  │ ESC: Exit                  │
│                                                  │                            │
│                                                  │                            │
│                                                  │                            │
└─────────────────────────────────────────────────┴──────────────────────────┘
             Version 2.22.1284 Copyright (C) 2022 AMI
```

Figure 3.32 USB Configuration

■ **Legacy USB Support**

This supports USB device under legacy OS such as DOS. When choosing "AUTO", the system will automatically detect if any USB device is plugged into the computer and enable USB legacy mode when a USB device is plugged in and disable USB legacy mode when no USB device is plugged in.

■ **XHCI Hand-off**

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

■ **USB Mass Storage Driver Support**

"Enable or Disable" USB Mass Storage driver support.

■ **USB transfer time-out**

Allows you to select the USB transfer time-out value. [1,5,10,20sec]

■ **Device reset time-out**

Allows you to select the USB device reset time-out value. [10,20,30,40sec]

■ **Device power-up delay**

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

3.2.2.15 Network Stack Configuration


```
                            Aptio Setup – AMI
      Advanced

   Network Stack                   [Disabled]          Enable/Disable UEFI Network
                                                       Stack




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit




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```

Figure 3.33 Network Stack Configuration

■ **Network Stack**
"Enable or Disable" UEFI Network Stack.

3.2.2.16 CSM Configuration
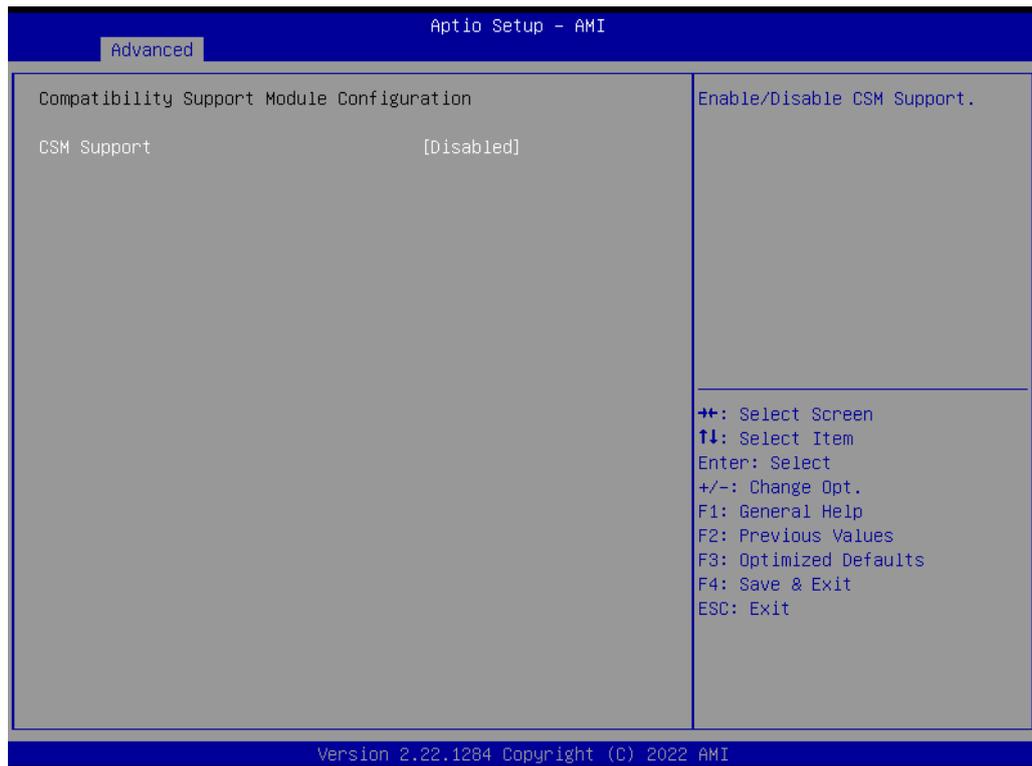
Figure 3.34 CSM Configuration
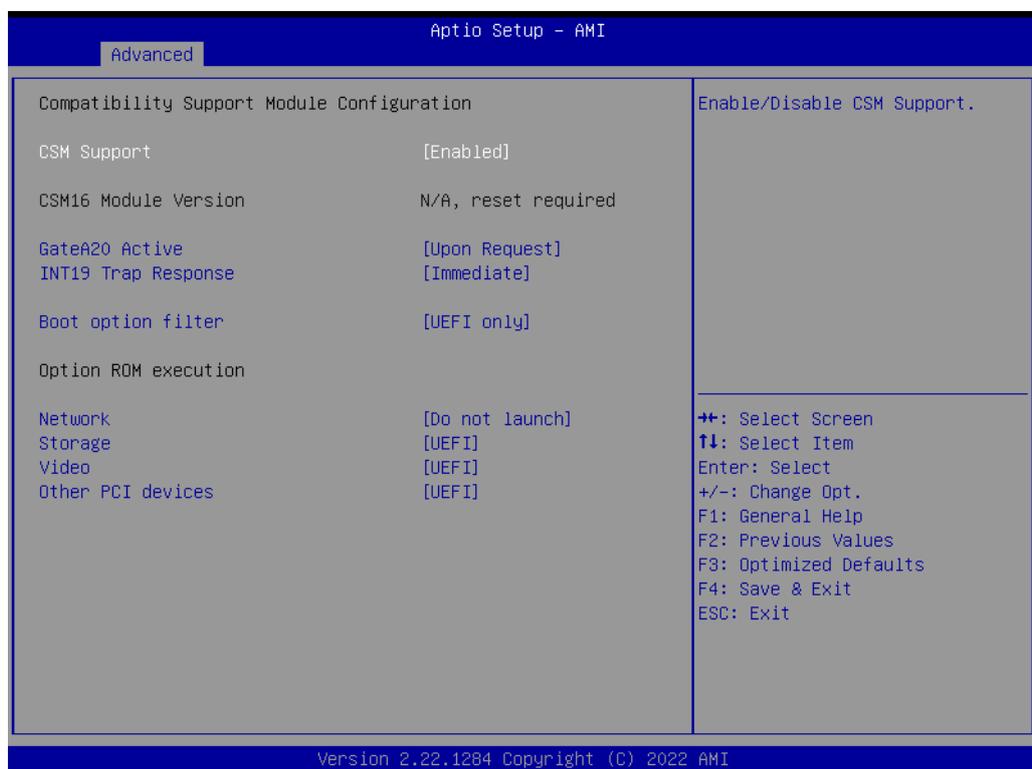
Figure 3.35 CSM Configuration (CSM Support "Enabled"

■ **Compatibility Support Module Configuration**
  – **CSM Support**

"Enable or Disable" CSM Support. The default setting is "Disabled". If your graphics card does not support UEFI mode, make sure to select "Enabled" to allow non-UEFI boot mode before installing the graphics card to turn on the computer.

3.2.2.17 NVMe Configuration
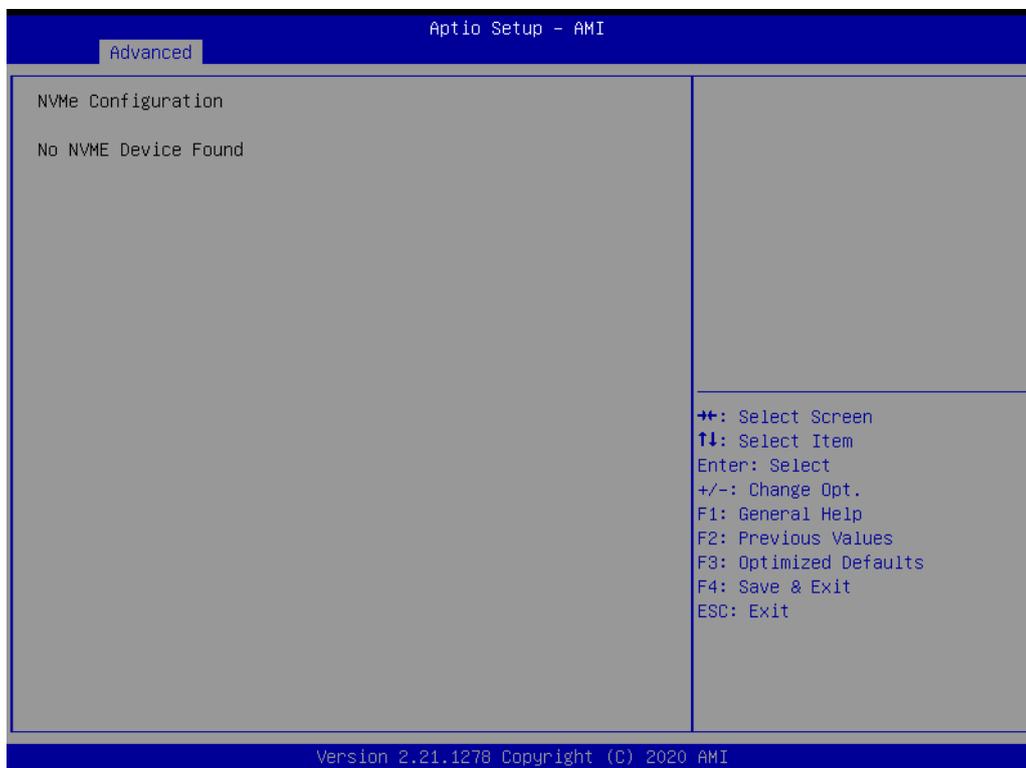
Figure 3.36 NVMe Configuration

■ **NVMe Configuration**
Supports NVMe M.2 storage device.

3.2.2.18 Driver Health

```
                         Aptio Setup - AMI
    Advanced

▶ Intel(R) PRO/1000 6.3.27 PCI-E     Healthy              Provides Health Status for the
                                                          Drivers/Controllers




                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit



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```

3.2.3 Chipset

```
                         Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

▶ System Agent (SA) Configuration                         System Agent (SA) Parameters
▶ PCH-IO Configuration




                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit



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```

Figure 3.37 Chipset

This page provides information on the AIMB-788 chipset.

3.2.3.1 System Agent (SA) Configuration

```
                            Aptio Setup - AMI
         Chipset
─────────────────────────────────────────────────────────────────────────
 System Agent (SA) Configuration                    Memory Configuration Parameters

 VT-d                              Supported

▶ Memory Configuration
▶ Graphics Configuration
▶ VMD setup menu
▶ PCI Express Configuration

 VT-d                              [Enabled]
 Above 4GB MMIO BIOS assignment    [Enabled]

                                                    ↔: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit

─────────────────────────────────────────────────────────────────────────
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```

Figure 3.38 System Agent (SA) Configuration

■ **VT-d**
  "Enable or Disable" VT-d function.

■ **Above 4GB MMIO BIOS assignment**
  "Enable or Disable" above 4GB MemoryMappedIO BIOS assignment.

3.2.3.2 Memory Configuration

```
                           Aptio Setup - AMI
          Chipset

Memory Configuration                                     Maximum Memory Frequency
                                                         Selections in Mhz.
Memory RC Version                 0.0.3.58
Memory Frequency                   2133 MHz
tCL-tRCD-tRP-tRAS                 15-15-15-36
DIMMA1                            Populated & Enabled
    Size                          4096 MB (DDR4)
    Number of Ranks               1
    Manufacturer                  InnoDisk Corporation
DIMMA2                            Populated & Enabled
    Size                          4096 MB (DDR4)
    Number of Ranks               1
    Manufacturer                  InnoDisk Corporation     ─────────────────────────
DIMMB1                            Populated & Enabled
    Size                          4096 MB (DDR4)           →←: Select Screen
    Number of Ranks               1                        ↑↓: Select Item
    Manufacturer                  InnoDisk Corporation     Enter: Select
DIMMB2                            Populated & Enabled      +/-: Change Opt.
    Size                          4096 MB (DDR4)           F1: General Help
    Number of Ranks               1                        F2: Previous Values
    Manufacturer                  InnoDisk Corporation     F3: Optimized Defaults
                                                           F4: Save & Exit
Maximum Memory Frequency          [Auto]                   ESC: Exit
Max TOLUD                         [Dynamic]



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```

Figure 3.39 Memory Configuration

■ **Maximum Memory Frequency**
Maximum memory frequency selections in MHz.

3.2.3.3 Graphics Configuration

```
                         Aptio Setup - AMI
        Chipset

Graphics Configuration                              Select which of IGFX/PEG/PCI
                                                    Graphics device should be
                                                    Primary Display.
Primary Display                  [Auto]
Internal Graphics                [Auto]




                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit




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```

Figure 3.40 Graphics Configuration

■ **Primary Display**

Set Primary Display to "Auto", "IGFX", "PEG", "PCI", or "SG".

■ **Internal Graphics**

Set Internal Graphics to "Auto", "Disable" or "Enable". "Auto" will disable internal graphics when a GPU card is installed. If GPU and internal graphics outputs are required at the same time, set this item to "Enable".

3.2.3.4 VMD Setup Menu

```
                              Aptio Setup - AMI
        Chipset

 VMD Configuration                                   Enable/Disable to VMD
                                                     controller
 Enable VMD controller            [Disabled]




                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit


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```
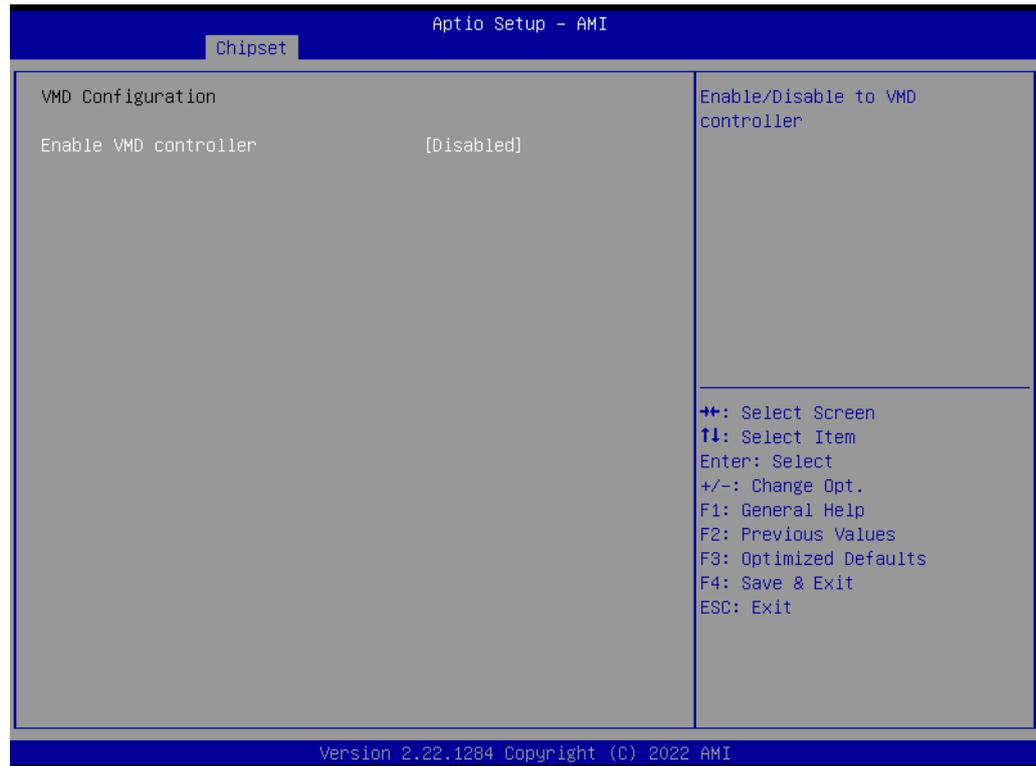
Figure 3.41 VMD Setup Menu

■ **Enable VMD controller**
"Enable or Disable" VMD controller. Enable VMD controller to active "Intel Rapid Storage Technology" option and setup RAID.

3.2.3.5 PCI Express Configuration
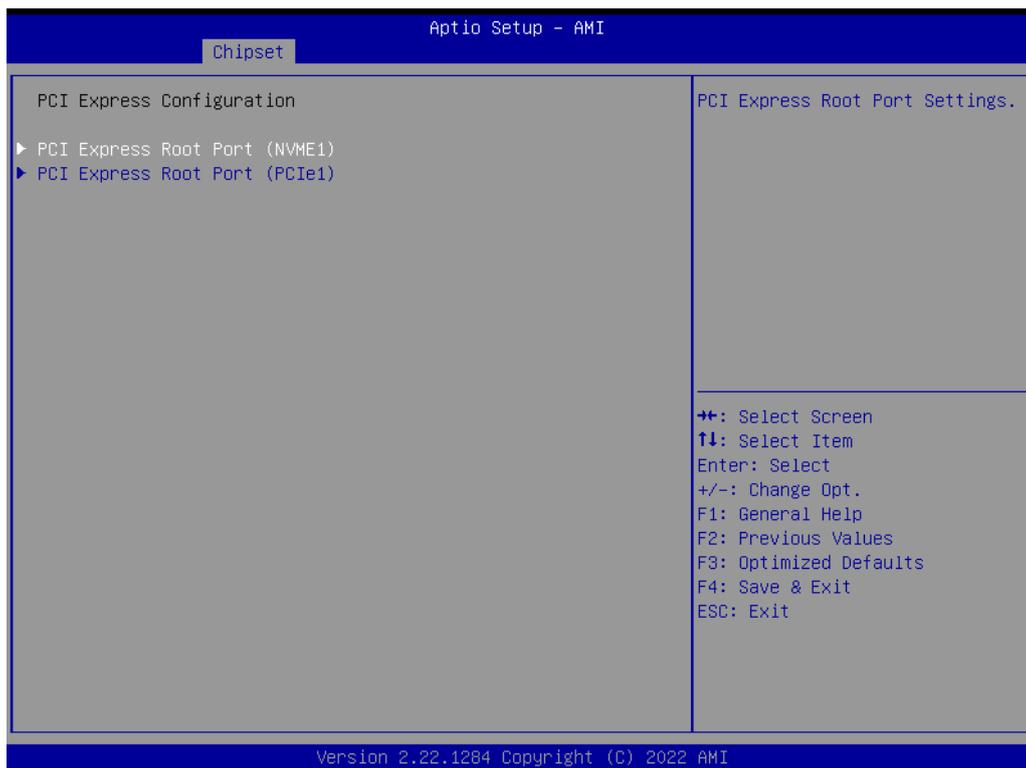
Figure 3.42 PCI Express Configuration

Figure 3.43 PCI Express Root Port (NVME1)

```
                                    Aptio Setup – AMI
              Chipset

PCI Express Root Port (PCIe1)        [Enabled]          Control the PCI Express Root
PCIe Speed                           [Auto]             Port.








                                                        ←→: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



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```
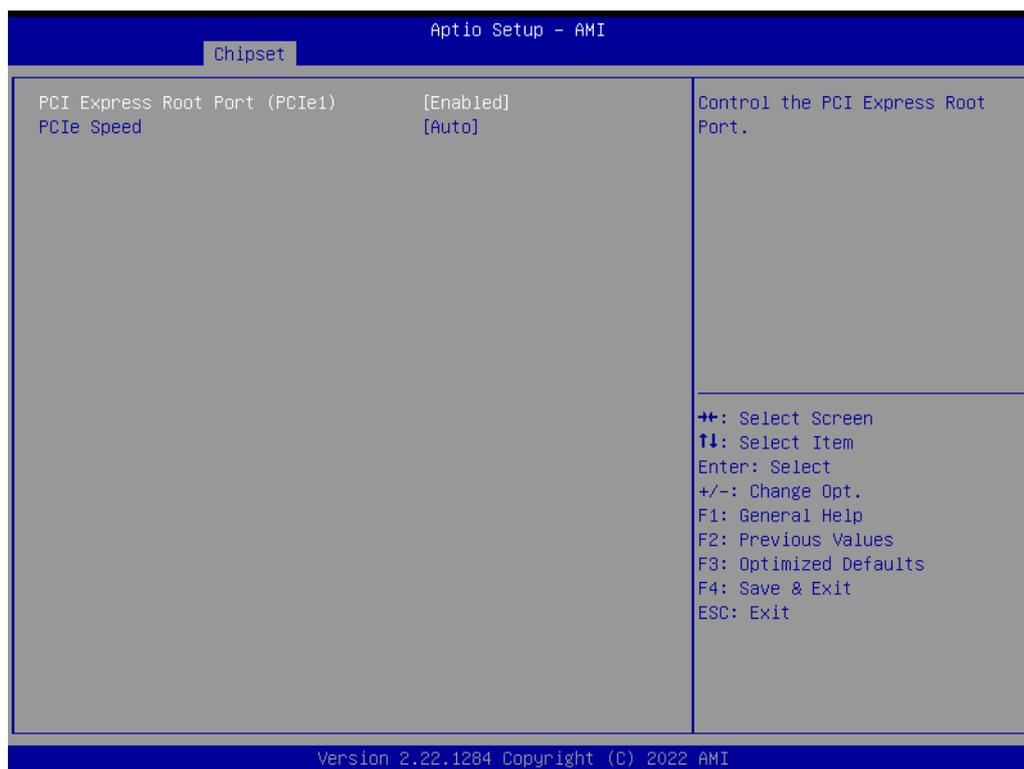
Figure 3.44 PCI Express Root Port (PCIe1)

■ **PCI Express Root Port (NVME1)**
– **PCI Express Root Port (NVME1)**
"Enable or Disable" PCI Express root port.
– **PCIe Speed**
Select "Auto, Gen1, Gen2, Gen 3" for PCIe Speed.
■ **PCI Express Root Port (PCIe1)**
– **PCI Express Root Port (PCIe1)**
"Enable or Disable" PCI Express root port.
– **PCIe Speed**
Select "Auto, Gen1, Gen2, Gen 3, Gen 4" for PCIe Speed.

3.2.3.6 PCH-IO Configuration

```
                        Aptio Setup - AMI
        Chipset

   PCH-IO Configuration                              PCI Express Configuration
                                                     settings
 ▶ PCI Express Configuration
 ▶ SATA Configuration
 ▶ Security Configuration
 ▶ HD Audio Configuration

   PCH LAN Controller              [Enabled]
     LAN1 Option-ROM               [Disabled]
   LAN2 Controller                 [Enabled]
     LAN2 Option-ROM               [Disabled]
   PCIE Wake                       [Disabled]
   PowerOn by Modem                [Disabled]
   Restore AC Power Loss           [S5 State]       ↔: Select Screen
   PCIE Device Initial Delay       0                ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



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```

Figure 3.45 PCH-IO Configuration

■ **PCH LAN Controller**

"Enable or Disable" PCH LAN (LAN1) controller.

■ **LAN1 Option-ROM**

"Enable or Disable" LAN1 boot option for legacy network devices.

■ **LAN2 Controller**

"Enable or Disable" LAN2 controller.

■ **LAN2 Option-ROM**

"Enable or Disable" LAN2 boot option for legacy network devices.

■ **PCIE Wake**

"Enable or Disable" PCIE to wake the system from S5. When this item is selected as "Disabled", Wake on LAN2 function is also disabled.

■ **PowerOn by Modem**

"Enable and Disable" PowerOn by Modem

■ **Restore AC Power Loss**

Select behavior when recovering from AC power loss: "S0 State" (power on), "S5 State" (power off), or "Last State".

■ **PCIE Device Initial Delay**

Users can set seconds to delay PCIE device initial time.

3.2.3.7 PCI Express Configuration
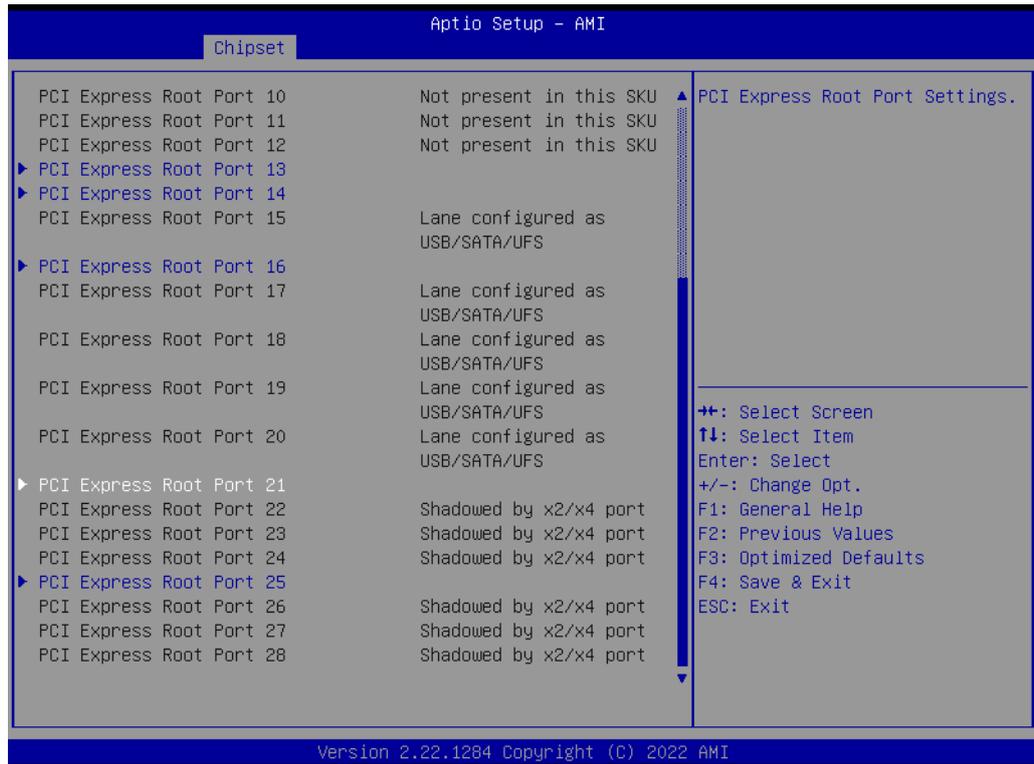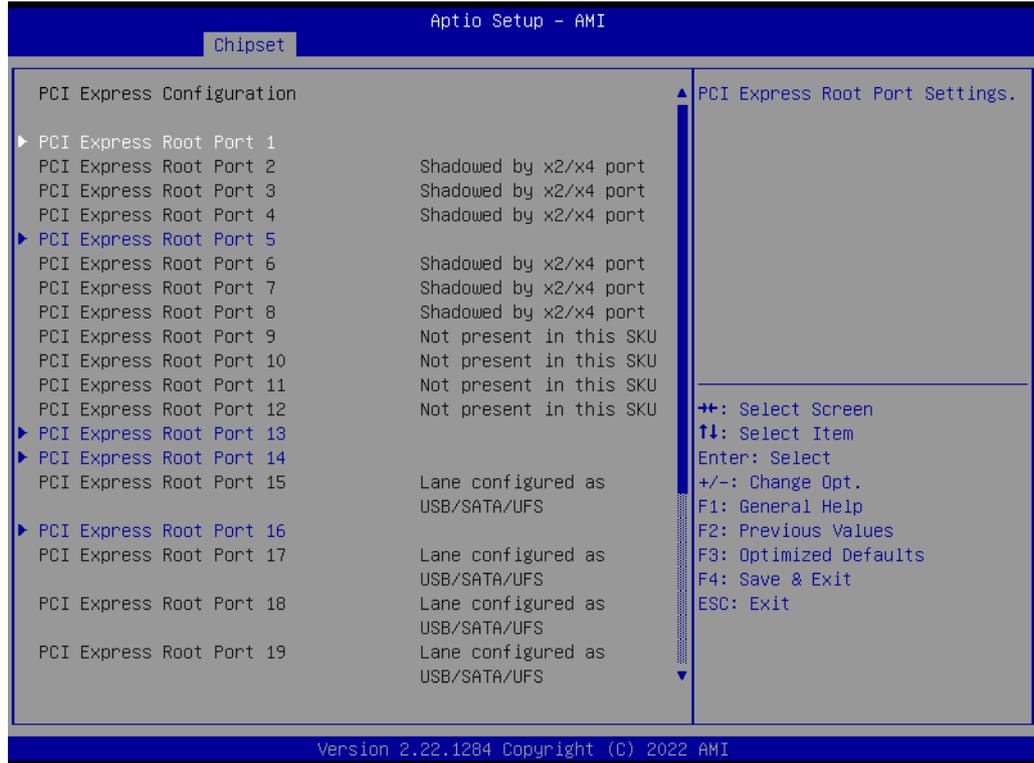
Figure 3.46 PCI Express Configuration

```
                              Aptio Setup - AMI
        Chipset

PCI Express Root Port 1              [Enabled]              Control the PCI Express Root
PCIe Speed                           [Auto]                 Port.




                                                            ↔: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit



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```
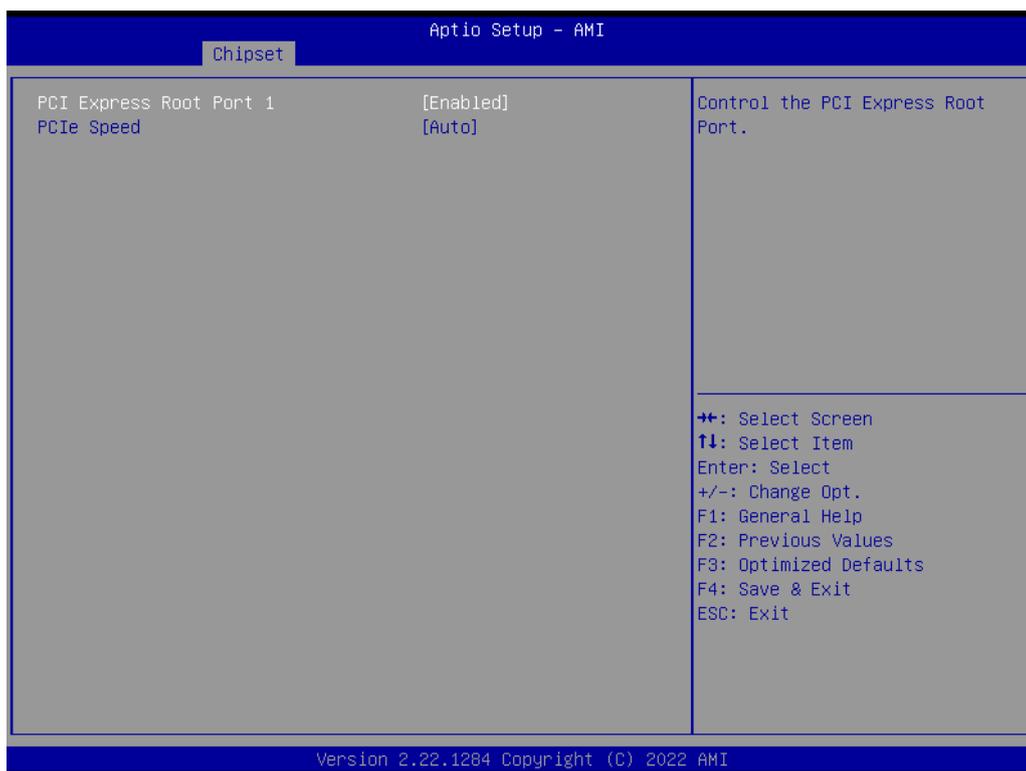
Figure 3.47 PCI Express Root Port

◼ **PCI Express Root Port 1**
"Enable or Disable" PCI Express Root Port.

◼ **PCIe Speed**
Select "Auto, Gen1, Gen2, Gen 3" for PCIe Speed.

◼ **Detect Non-compliance Device**
If enable, it will take more time at POST time.

3.2.3.8 SATA and RST Configuration
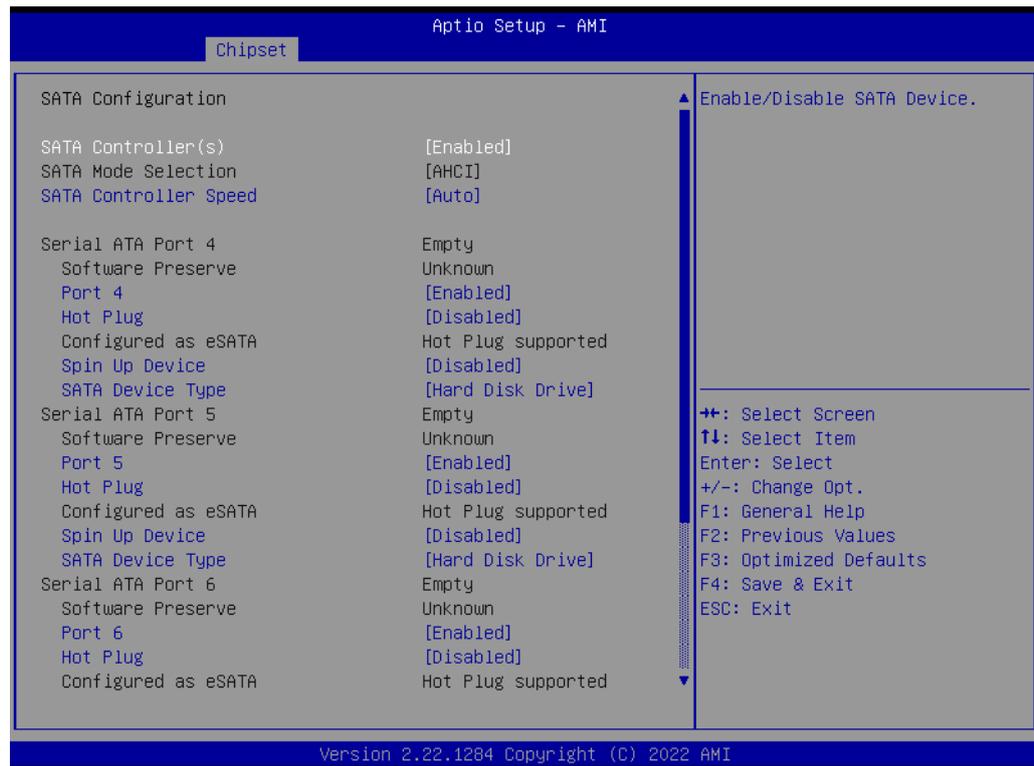
Figure 3.48 SATA and RST Configuration

- ■ **SATA Controller(s)**

  "Enable or Disable" SATA controller.

- ■ **SATA Mode Selection**

  This is fixed as 'AHCI'.

- ■ **SATA Controller Speed**

  Select "Auto, Gen2, Gen3" of SATA controller speed.

- ■ **Port 4~7**

  "Enable or Disable" SATA port 4~7.

- ■ **Hot Plug**

  "Enable or Disable" SATA Hot-Plug.

- ■ **Spin Up Device**

  "Enable or Disable" spin up device.

- ■ **SATA Device Type**

  To identify the SATA that is connected to a "Solid State Drive or Hard Disk Drive".

3.2.3.9 Security Configuration
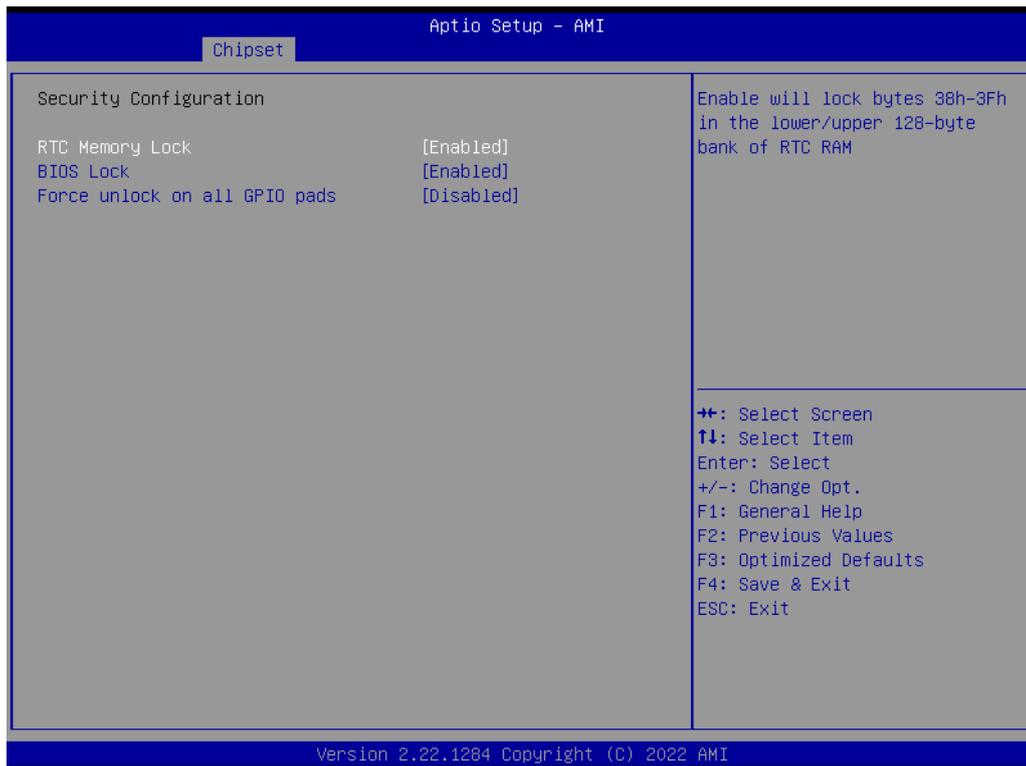
Figure 3.49 Security Configuration

■ **RTC Memory Lock**

Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.

■ **BIOS Lock**

"Enable or Disable" the PCH BIOS Lock Enable feature. Needs to be enabled to ensure SMM protection of flash.

■ **Force unlock on all GPIO pads**

If Enabled, BIOS will force all GPIO pads into an unlocked state.

3.2.3.10 HD Audio Configuration

```
                          Aptio Setup - AMI
          Chipset

HD Audio Subsystem Configuration Settings          Control Detection of the
                                                   HD-Audio device.
HD Audio                        [Enabled]          Disabled = HDA will be
                                                   unconditionally disabled
                                                   Enabled = HDA will be
                                                   unconditionally enabled.



                                                   →←: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F3: Optimized Defaults
                                                   F4: Save & Exit
                                                   ESC: Exit



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```

Figure 3.50 HD Audio Configuration

■ **HD Audio**
Control detection of the HD-Audio device.
Disable = HDA will be unconditionally disabled.
Enable=HDA will be unconditionally enabled.

3.2.4 Security

```
                        Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

  Password Description                          Secure Boot configuration

  If ONLY the Administrator's password is set,
  then this only limits access to Setup and is
  only asked for when entering Setup.
  If ONLY the User's password is set, then this
  is a power on password and must be entered to
  boot or enter Setup. In Setup the User will
  have Administrator rights.
  The password length must be
  in the following range:
  Minimum length                3
  Maximum length                20
                                               ++: Select Screen
                                               ↑↓: Select Item
  Administrator Password                       Enter: Select
  User Password                                +/-: Change Opt.
                                               F1: General Help
                                               F2: Previous Values
                                               F3: Optimized Defaults
  ▶ Secure Boot                                F4: Save & Exit
                                               ESC: Exit




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```

Figure 3.51 Security

Select Security Setup from the AIMB-788 BIOS setup menu. All Security Setup options, such as password protection and Secure Boot, are displayed in this section.

> **Note!** *If only one user password is set, the user will have Administrator rights. Setting an administrator password is strongly recommended if you have security concerns.*

3.2.5 Boot

```
                        Aptio Setup – AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

   Boot Configuration                              Number of seconds to wait for
   Setup Prompt Timeout          1                 setup activation key.
   Bootup NumLock State          [On]              65535(0xFFFF) means indefinite
   Quiet Boot                    [Disabled]        waiting.

   Boot Option Priorities
   Boot Option #1               [UEFI: USB Mass
                                Storage Device 1.00,
                                Partition 1 (USB Mass
                                Storage Device 1.00)]

   Boot Option #2               [UEFI: Built-in EFI
                                Shell]
                                                   ↔: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/−: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F3: Optimized Defaults
                                                   F4: Save & Exit
                                                   ESC: Exit

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```

Figure 3.52 Boot

- ■ **Setup Prompt Timeout**
  Directly key in the number, or use the <+> and <-> keys to adjust the number of seconds to wait for setup activation key.
- ■ **Bootup NumLock State**
  Default state for the NumLock key during power on.
- ■ **Quiet Boot**
  "Enable or Disable" Quiet Boot option. When enabled, BIOS logo will show in place of POST screen.
- ■ **Boot Option Priorities**
  Set the boot order.

3.2.6 Save & Exit

```
                         Aptio Setup - AMI
    Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

   Save Options                                 Exit system setup after saving
   Save Changes and Exit                        the changes.
   Discard Changes and Exit

   Save Changes and Reset
   Discard Changes and Reset

   Save Changes
   Discard Changes

   Default Options
   Restore Defaults
   Save as User Defaults                        →←: Select Screen
   Restore User Defaults                        ↑↓: Select Item
                                                Enter: Select
   Boot Override                                +/-: Change Opt.
   UEFI: Built-in EFI Shell                     F1: General Help
   UEFI: USB Mass Storage Device 1.00, Partition 1 (USB Mass   F2: Previous Values
   Storage Device 1.00)                         F3: Optimized Defaults
                                                F4: Save & Exit
                                                ESC: Exit


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```

Figure 3.53 Save & Exit

Save Changes and Exit

When you complete system configuration, select this option to save your changes, exit BIOS setup and reboot the computer so the new system configuration parameters can take effect.

1. Select Exit Saving Changes from the Exit menu and press <Enter>. The following message appears:

    Save Configuration Changes and Exit Now?

    [Yes] [No]

2. Select Yes or No.

Discard changes and exit

Select this option to quit Setup without making any permanent changes to the system configuration.

1. Select Exit Discarding Changes from the Exit menu and press <Enter>. The following message appears:

    Quit without saving?

    [Yes] [No]

2. Select Yes to discard changes and exit.

Discard Changes

Select Discard Changes from the Exit menu and press <Enter>.

Chapter 4

Chipset Software
Installation Utility

4.1 Before you begin

To facilitate the installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully. The drivers for the AIMB-788 are located on Advantech support website (http://www.advantech.com/support). Updates are provided via Service Packs from Microsoft.

Before you begin, it is important to note that most display drivers need to have the relevant software application already installed in the system prior to installing the enhanced display drivers. In addition, many of the installation procedures assume that you are familiar with both the relevant software applications and operating system commands. Review the relevant operating system commands and the pertinent sections of your application software's user manual before performing the installation.

> **Note!** For system stability, installing the drivers in the following sequence is highly recommended:
> - *Chipset*
> - *Graphics*
> - *ME*
> - *Other drivers*

4.2 Introduction

The Intel® Chipset Software Installation (CSI) utility installs the Windows INF files that outline to the operating system how the chipset components will be configured. This is needed for the proper functioning of the following features:

- Core PCI PnP services
- Serial ATA interface support
- Identification of Intel® chipset components in the Device Manager

> **Note!** The chipset driver is used for the following versions of Windows, and it has to be installed before installing all the other drivers.
> - *Windows 10 (64-bit)*

4.3 Windows Driver Setup

Enter the Advantech support website, then search product AIMB-788. You can see "Chipset" driver inside.

Chapter 5

Integrated Graphic
Device Setup

5.1 Introduction

The Intel® processors are embedded with integrated graphics controllers. You need to install the VGA driver to enable their function. The VGA driver provides graphics, computing, media, and display capabilities.

5.2 Windows Driver Setup

Note! *Before installing this driver, make sure the INF driver has been installed in your system. See Chapter 4 for information on installing the INF driver.*

Go to the Advantech support website and search for AIMB-788. You can find the "Graphics" drivers inside.

Chapter **6**

Intel® ME

6.1 Introduction

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

6.2 Installation

Go to the Advantech support website and search for AIMB-788. You can find the "ME" drivers inside.

Chapter 7

LAN Configuration

7.1 Introduction

The AIMB-788 has dual Gigabit Ethernet LANs via dedicated PCI Express x1 lanes (Intel® I219LM (LAN1) and I210AT (LAN2)) that offer bandwidth of up to 500 MB/sec, eliminating the bottleneck of network data flow and incorporating Gigabit Ethernet at 1000 Mbps.

7.2 Features

- 10/100/1000Base-T Ethernet controller
- 10/100/1000Base-T 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

7.3 Installation

> *Note!* *Before installing the LAN drivers, make sure the CSI utility have been installed on your system. See Chapter 4 for information on installing the CSI utility.*

The integrated Intel® gigabit Ethernet controller supports all major network operating systems. However, the installation procedure varies with different operating systems. In the following sections, refer to the one that provides the driver setup procedure for the operating system you are using.

7.4 Windows Driver Setup

Go to the Advantech support website and search for AIMB-788. You can find "LAN" drivers inside.

Chapter 8

SATA RAID Setup

8.1 Introduction

To support demanding disk I/O, Intel® Q670E chipset integrates four serial ATA controllers with software RAID 0, 1, 5, 10 capabilities.

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

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

RAID 5 array contains three or more hard drives where the data is divided into manageable blocks called strips. Parity is a mathematical method for recreating data that was lost from a single drive, which increases 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 the parity calculations.

RAID 10 array uses 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.

8.2 SATA RAID Driver and Utility Setup

Go to the Advantech support website and search for AIMB-788. There you will see the "RAID_ADCI" folder containing the VMD driver.

Chapter 9

HD Audio

9.1 Introduction

AIMB-788 is equipped with a Realtek ALC892 Audio chip. It provides "Line-out" & "Microphone" ports for varying applications.

9.2 Installation

Go to the Advantech support website and search for the AIMB-788. You will find the "Audio" drivers inside.

Appendix A

**Programming the
Watchdog Timer**

The AIMB-788's watchdog timer can be used to monitor system software operations and take corrective action if the software fails to function within the programmed period. This section describes the operation of the watchdog timer and how to program it.

A.1 Watchdog timer overview

The watchdog timer is built into the super I/O controller NCT6126D. It provides the following functions for user programming:

- Can be enabled and disabled via the user's program.
- The timer can be set from 1 to 255 seconds/minutes.
- Generates an interrupt or reset signal if the software fails to reset the timer before time-out.

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. You must first write an address value into address port 2E (hex), and then write/read data to/from the assigned register through data port 2F (hex).

```
┌─────────────────────────┐
│                         │
│    Unlock NCT6126D      │
│                         │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│     Select register of  │
│     watchdog timer      │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Enable the function of │
│  the watchdog timer     │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│   Use the function of   │
│   the watchdog timer    │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│                         │
│     Lock NCT6126D       │
│                         │
└─────────────────────────┘
```
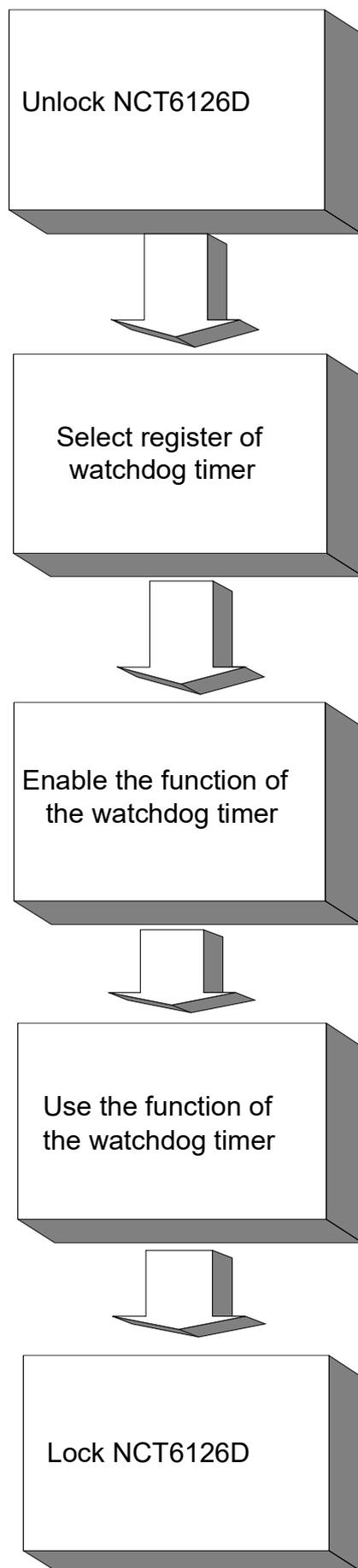
Table A.1: Watchdog timer registers		
Address of register (2E)	Read/ Write	Value (2F) & description.
87 (hex)	-	Write this address to I/O address port 2E (hex) twice to unlock the NCT6126D.
07 (hex)	write	Write 08 (hex) to select register of watchdog timer.
30 (hex)	write	Write 01 (hex) to enable the function of the watchdog timer. Enabled is set as default.
F0 (hex)	write	Set seconds or minutes as units for the timer. Write 0 to bit 3: set seconds as counting unit. [default]. Write 1 to bit 3: set minutes as 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 with the new value.
F2 (hex)	read/ write	Bit 6: Write 1 to enable keyboard to reset the timer, 0 to disable.[default] Bit 5: Write 1 to generate a timeout signal immediately and automatically return to 0. [default=0] Bit 4: Read status of watchdog timer, 1 means timer is "timeout".
AA (hex)	-	Write this address to I/O port 2E (hex) to lock NCT6126D.

Appendix B

I/O Pin Assignments

# B.1 LAN Port and USB 3.2 Port (LAN1_USB3C1, LAN2_USB3C2)

```
8                  1
9                  5
1                  4
9                  5
1                  4
```
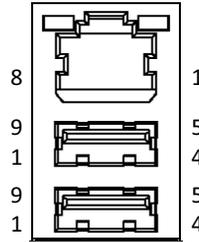
Table B.1: LAN Port (LAN1, LAN2)			
Pin	**Signal**	**Pin**	**Signal**
1	DA+	5	DC+
2	DA-	6	DC-
3	DB+	7	DD+
4	DB-	8	DD-

Table B.2: USB 3.2 Port (USB3C1, USB3C2)	
Pin	**Signal**
1	+5V
2	D-
3	D+
4	GND
5	STDA_SSRX−
6	STDA_SSRX+
7	Shield GND_DRAIN
8	STDA_SSTX−
9	STDA_SSTX+

B.2 USB 2.0 Port (USB2C1, USB2A1, USB2A2)

```
1
```
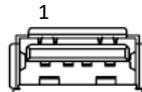
Table B.3: USB 2.0 Port (USB2C1, USB2A1, USB2A2)	
Pin	**Signal**
1	+5V
2	D-
3	D+
4	GND

B.3 USB 3.2 Header (USB3H1)
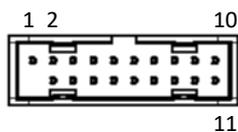
Pin	Signal	Pin	Signal
Table B.4: USB 3.2 Header (USB3H1)			
Pin	Signal	Pin	Signal
1	+5V	2	STDA_SSRX-
3	STDA_SSRX+	4	GND
5	STDA_SSTX-	6	STDA_SSTX+
7	GND	8	D-
9	D+	10	OC#
11	D+	12	D-
13	GND	14	STDA_SSTX+
15	STDA_SSTX-	16	GND
17	STDA_SSRX+	18	STDA_SSRX-
19	+5V		

B.4 USB 2.0 Header (USB2H2)
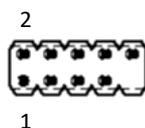
Pin	Signal	Pin	Signal
Table B.5: USB 2.0 Header (USB2H2)			
Pin	Signal	Pin	Signal
1	+5V	2	+5V
3	D-	4	D-
5	D+	6	D+
7	GND	8	GND
9	N/A	10	N/C

B.5 VGA Connector (VGA1)
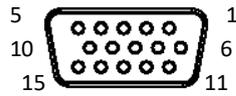
Pin	Signal	Pin	Signal
Table B.6: VGA Connector (VGA1)			
Pin	Signal	Pin	Signal
1	RED	9	KEY/PWR
2	GREEN	10	GND
3	BLUE	11	ID0/RES
4	ID2/RES	12	ID1/SDA
5	GND	13	HSYNC
6	RED_RTN	14	VSYNC
7	GREEN_RTN	15	ID3/SCL
8	BLUE_RTN		

B.6 HDMI Connector (HDMI1)
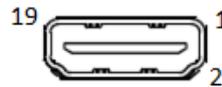
Pin	Signal	Pin	Signal
Table B.7: HDMI Connector (HDMI1)			
Pin	Signal	Pin	Signal
1	TMDS Data 2+	11	TMDS Clock Shield
2	TMDS Data 2 Shield	12	TMDS Clock-
3	TMDS Data 2-	13	CEC
4	TMDS Data 1+	14	N.C.
5	TMDS Data 1 Shield	15	SCL
6	TMDS Data 1-	16	SDA
7	TMDS Data 0+	17	DDC/CEC GND
8	TMDS Data 0 Shield	18	+5V Power
9	TMDS Data 0-	19	Hot Plug Detect
10	TMDS Clock+		

B.7 DisplayPort Connector (DP1)
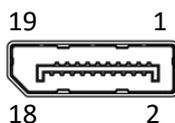
Table B.8: DisplayPort Connector (DP1)			
Pin	Signal	Pin	Signal
1	TMDS D2+	11	GND
2	GND	12	TMDS CLK-
3	TMDS D2-	13	N/C
4	TMDS D1+	14	N/C
5	GND	15	SCL
6	TMDS D1-	16	SDA
7	TMDS D0+	17	GND
8	GND	18	VCC (+5V)
9	TMDS D0-	19	Hot plug detect
10	TMDS CLK+		

B.8 RS-232 and COM3 Interface (COM1 ~ COM6)
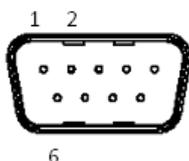
Table B.9: RS-232 DB-9 Connector (COM1)	
Pin	Signal
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI
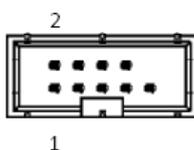
Table B.10: RS-232 Header (COM2, COM4 ~ COM6)

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

Table B.11: RS-232/422/485 Header (COM3)

Pin	Signal
1	422/485 TX-
2	DSR
3	422/485 TX+
4	RTS
5	RX+
6	CTS
7	RX-
8	RI
9	GND

Table B.12: COM Brackets Connectors (1701090401/1701092300)

Pin	RS-232	RS-422	RS-485
1	DCD	Tx-	Data-
2	RxD	Tx+	Data+
3	TxD	Rx+	-
4	DTR	Rx-	-
5	GND	GND	GND
6	DSR	RTS-	-
7	RTS	RTS+	-
8	CTS	CTS+	-
9	RI	CTS-	-

B.9 CPU and System Fan Power Connector (CPUFAN1, SYSFAN1 ~ SYSFAN3)
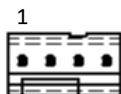
Table B.13: CPU and System Fan Power Connector (CPUFAN1, SYSFAN1 ~ SYSFAN3)	
Pin	Signal
1	GND
2	+12 V
3	SENSE
4	PWM

B.10 Power LED (JFP3)

Table B.14: Power LED (JFP3)	
Pin	Function
1	POWER_LED+
2	N/C
3	GND
4	N/C
5	N/C

B.11 External Speaker Connector (JFP2)

Table B.15: External Speaker Connector (JFP2)	
Pin	Function
1	EXTENAL_SPK_P1
4	EXTENAL_SPK_2
7	INTENAL_SPK_P3
10	INTENAL_SPK_P4

B.12 HDD LED Connector (JFP2)

2   5

Table B.16: HDD LED Connector (JFP2)

Pin	Signal
2	HDD_LED+
5	HDD_LED-

B.13 SMBus Connector (JFP2)

8   11

Table B.17: SMBus Connector (JFP2)

Pin	Signal
8	SMB_SNMP_SDAT
11	SMB_SNMP_SCLK

B.14 ATX Soft Power Switch (JFP1)

3   6

Table B.18: ATX Soft Power Switch (JFP1)

Pin	Signal
3	PANSWIN#
6	GND

B.15 Reset Connector (JFP1)

9   12

Table B.19: Reset Connector (JFP1)

Pin	Signal
9	SYSTEM RESET#
12	GND

B.16 8-pin Alarm Board Connector (VOLT1)

Table B.20: 8-pin Alarm Board Connector (VOLT1)			
Pin	Signal	Pin	Signal
1	+5V_STBY	5	+5 V
2	GND	6	+3.3 V
3	GND	7	-12 V
4	-5 V	8	+12 V

B.17 Case Open Connector (JCASE1)

Table B.21: Case Open Connector (JCASE1)	
Pin	Signal
1	CASEOP
2	GND

B.18 Front Panel LAN Indicator Connector (LANLED1)
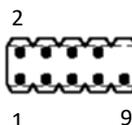
Table B.22: Front Panel LAN Indicator Connector (LANLED1)			
Pin	Signal	Pin	Signal
1	LAN1_LED_ACT#	2	LAN2_LED_ACT#
3	+3.3V	4	+3.3V
5	LAN1_LED_1G#	6	LAN2_LED_1G#
7	LAN1_LED_100M#	8	LAN2_LED_100M#
9	+3.3V		

B.19 GPIO Connector (GPIO1)
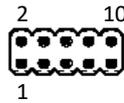
Table B.23: GPIO Connector (GPIO1)			
Pin	Signal	Pin	Signal
1	GPIO0	2	GPIO4
3	GPIO1	4	GPIO5
5	GPIO2	6	GPIO6
7	GPIO3	8	GPIO7
9	+5V_DUAL_GPIO	10	GND

B.20 SMBus Connector (SMBUS1)
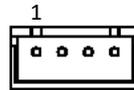
Table B.24: SMBus Connector (SMBUS1)	
Pin	Signal
1	+V5
2	SMB CLK
3	SMB DAT
4	GND

B.21 Front Panel Audio Connector (FPAUD1)
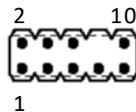
Table B.25: Front Panel Audio Connector (FPAUD1)	
Pin	Signal
1	MIC-L
2	GND
3	MIC-R
4	PRESENSE#
5	LINE-R
6	MIC-JD
7	SENSE
8	N/A
9	LINE-L
10	LINE-JD

B.22 Serial Peripheral Interface (SPI) Connector (SPI_TPM1)

Table B.26: Serial Peripheral Interface(SPI) Connector (SPI_TPM1)			
Pin	Signal	Pin	Signal
1	CS#	7	MISO
2	PRSNT#	8	N.C.
3	CLK	9	IRQ#
4	GND	10	GND
5	MOSI	11	RESET#
6	GND	12	+3.3V POWER

B.23 Watchdog Timer Output and HW Monitor Alarm (JWDT1+JOBS1)
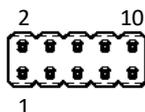
Table B.27: Watchdog Timer Output and HW Monitor Alarm (JWDT1+JOBS1)			
Pin	Signal	Pin	Signal
1	+5V	6	SYSTEM RESET#
2	N/C	7	GND
3	N/C	8	ERROR_BEEP
4	WG#	9	IR TXD
5	IR RXD	10	OBS_BEEP

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