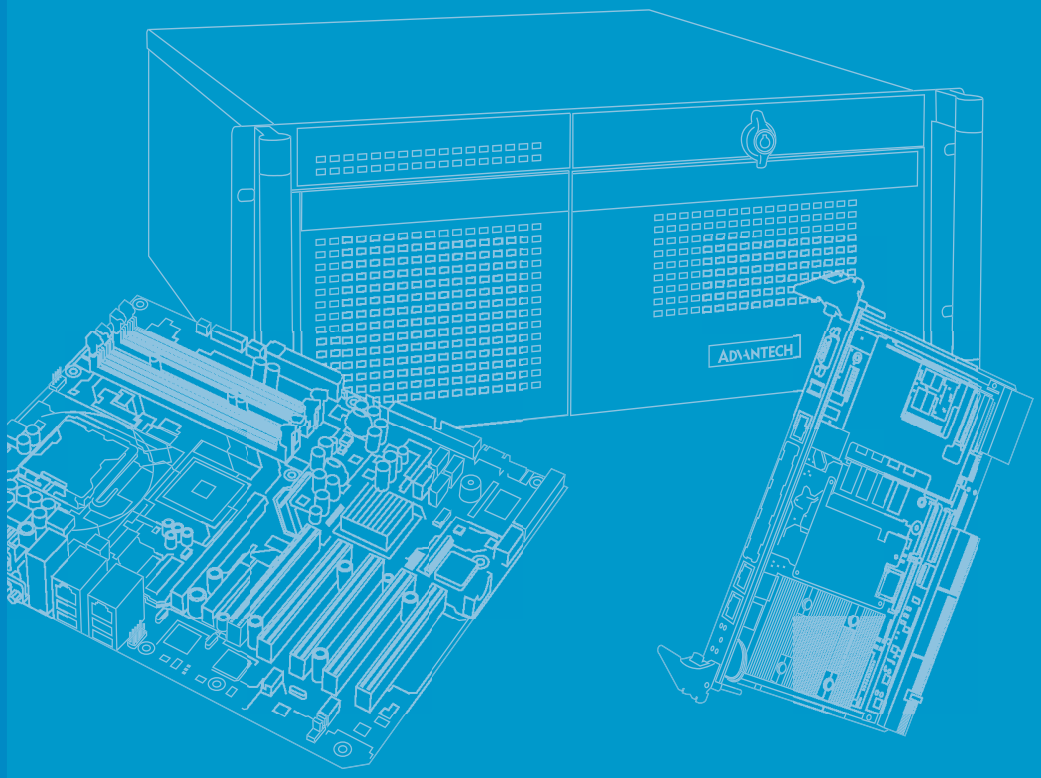



User Manual

# PCE-5133/5033

## LGA1700
## Intel® Core™ i9/i7/i5/i3/Pentium® PICMG 1.3 Single Host Board with VGA/DP/HDMI/DVI-D/M.2/ (ECC/non-ECC) DDR5 U-DIMM/ SATA3.0/USB3.2/2.5GbE

ADVANTECH
Enabling an Intelligent Planet

# Copyright



# Acknowledgments



# 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.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

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 onscreen 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 RMA (return merchandise authorization) 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.

Part No.2001513300 Edition 1

September 2024

# Declaration of Conformity

### FCC Class A

NOTE: This equipment has been tested and found to comply with the limits for a Class A 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 equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

***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.*

# A Message to the Customer

### Advantech Customer Services

Each and every Advantech product is built to the most exacting specifications to ensure reliable performance in the harsh and demanding conditions typical of industrial environments. Whether your new Advantech equipment is destined for the laboratory or the factory floor, you can be assured that your product will provide the reliability and ease of operation for which the name Advantech has come to be known.

Your satisfaction is our primary concern. Here is a guide to Advantech's customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

### Technical Support

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.

So please consult this manual first. If you still cannot find the answer, gather all the information or questions that apply to your problem, and with the product close at hand, call your dealer. Our dealers are well trained and ready to give you the support you need to get the most from your Advantech products. In fact, most problems reported are minor and are able to be easily solved over the phone.

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.

# Backplane Support Matrix Table

| Model \ Backplane | PCE-5XXX | PCE-7XXX |
|---|---|---|
| PCE-5033 | Yes | - |
| PCE-5133 | Yes | Yes |

***Note!*** *If the SBC is used on different backplanes which have different PCIe configurations. The message below will show the first time it powers on. So the user has to turn off the AC power and then turn it back on for PCIe re-configuration.*

***Caution!*** *PCIe configuration error! Please turn off AC power before re-configuration.*

# Initial Inspection

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

| | |
|---|---|
| ■ 1 PCE-5133/5033 PICMG 1.3 Single Host Board | |
| ■ 2 Serial ATA HDD data cable | PN: 1700003194 |
| ■ COM cable w/ BKT 40cm | PN: 1701090401 |
| ■ 1 Warranty card | PN: 2190000902 |
| ■ 1 Startup manual | PN: 2041513300 |

If any of these items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected the PCE-5133/5033 mechanically and electrically before shipment. It should be free of marks and scratches and in perfect working order upon receipt. As you unpack the PCE-5133/5033, 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.

# Contents

# Chapter 1

# Hardware Configuration

## 1.1 Introduction

PCE-5133/5033 is a PICMG 1.3 form-factor single host board which is designed with Intel® R680E(PCE-5133), and H610E(PCE-5033) PCH for industrial applications that need high computing power and diverse I/O capabilities. PCE-5133/5033 supports 10nm manufacturing technology, LGA1700 socket Intel® Core™ i9/i7/i5/i3, Pentium® processors that integrate memory and graphic controllers, and support for DDR5 4800 SDRAM up to 64 GB. Within advanced computing technology, PCE-5133/5033 is suitable for processor hungry industrial applications.

PCE-5133/5033 offers excellent graphics capability with its integrated Intel® UHD graphics core with a minimum 1 GB shared memory (requires a minimum 2 GB system memory). With this, PCE-5133/5033 provides strong 2D/3D graphics processing power without an additional graphic card to save extra cost, power consumption and thermal integration effort.

PCE-5133/5033 features a multiple I/O interface: M.2 which can support M.2 (2280) type-M for PCIE devices (PCE-5033 board do not support M.2), SATA 3.0 ports with SW RAID 0, 1, 5, 10 (PCE-5033 boards do not support RAID), integrated USB 3.2 controllers, 2 x RS-232 serial COM ports. Moreover, PCE-5133/5033 can support Advantech PCE-5BXX and PCE-7BXX (5133 only) series backplanes offering various combinations of expansion such as PCI, PCI-X and PCIe slots. With flexible I/O and graphic extensibility, PCE-5133/5033 is an excellent, cost effective graphic or I/O-oriented workstation class hardware platform. With outstanding performance and exceptional features, PCE-5133/5033 is the ideal computing platform for advanced industrial applications.

## 1.2 Features & Benefits

- **Processor Support:** Intel 14th generation family processors with the latest 10nm lithography.
- **Memory Capacity:** Supports (ECC; R680E) DDR5 5600 U-DIMM 32 GB per DIMM up to 64 GB memory capacity (Depends on CPU). DDR provides up to 50% increased performance and bandwidth while saving up to 50% power.
- **Memory Technology:** Supports up to 1024 M x 8 memory die.
- **Storage:** Supports M.2 (2280) type-M SSD module with PCIE interfaces (PCE-5033 boards do not support M.2), and SATA 3.0 ports with SW RAID 0, 1, 5, 10 support (PCE-5033 boards do not support RAID).
- **High-Performance I/O Capability:** Provides high transfer data performance interface; USB 3.2 data transfer rate is 5 Gbps which is 10 times faster than USB 2.0.
- **PCIe Architecture:** Processor supports 16 link PCI Express generation 3.0 and PCH support 4 links of PCI Express generation 3.0 to PICMG1.3 backplanes (PCE-5133/5033 only support generation 3.0 to PICMG1.3 backplanes).
- **SUSI API:** PCE-5133/5033 supports SUSI API which helps customers develop their own remote management programs under Windows 10.
- **2.5GbE:** Support dual 2.5GbE LAN, providing 2.5 times faster speed than 1GbE LAN.

# 1.3 Specifications

## 1.3.1 System

- **CPU:** LGA1700-socket Core i9/i7/i5/i3, Pentium series processors.
- **L2 cache:** Please refer to CPU specification for detailed information.
- **BIOS:** AMI SPI BIOS (256 Mb SPI).
- **System chipset:** Intel R680E (PCE-5133); Intel H610E (PCE-5033).
- **SATA hard disk drive interface:** Six (PCE-5133) or four (PCE-5033) SATA3 (600MB/s) ports are with blue connector. These interfaces can be enabled/disabled in the BIOS.
- **M.2 (2280) Type-M:** Supports up to PCIe x4 Gen 4 M-key 2280 type storage devices.

***Note!*** *PCE-5133/5033 does NOT support PATA (IDE) interface.*

## 1.3.2 Memory

- **RAM:**
  - PCE-5133: Up to 64 GB in two 288-pin DIMM sockets. Supports dual-channel DDR5 5600 (Depends on CPU) SDRAM with or without ECC function.
  - PCE-5033: Up to 64 GB in two 288-pin DIMM sockets. Supports dual-channel DDR5 5600 (Depends on CPU) SDRAM without ECC function.

***Note!*** *A 32-bit OS may not fully detect 4 GB of RAM when 4 GB is installed. Please select Intel ECC supported processor to enable ECC function.*

## 1.3.3 Input/Output

- **PCIe bus:** One PCIex16 or two PCIex8 from CPU and one PCIe x4 from PCH.
- **PCI bus:** Four PCI masters to the backplane, 32-bit, 33 MHz PCI 2.2 compliant.
- **Serial ports:** Two RS-232 serial ports.
- **USB port:** Supports 6 x USB 2.0 ports with transfer rates up to 480 Mbps. (2 ports are on the CPU card and 4 ports are on the backplane), and PCE-5133 supports up to 6 USB 3.2 (Gen1) ports with transfer rates of up to 5 Gbps, 2 USB 3.2 (Gen2), and PCE-5033 supports 4x USB3.2 (Gen1).
- **SPI interface:** Advantech-designed SPI connector supports optional TPM 2.0 module.
- **GPIO:** Supports 8-bit GPIO from super I/O for general purpose control application.
- **eSPI:** eSPI pin header supports optional expansion of COM module .

***Note!*** *Do not change the default settings unless an eSPI-interface COM module is installed; otherwise, the system will not turn on. To use the COM module, first power off the system and install the module. Then set jumpers JESPI1 and JESPI2 to the 2-3 pin closed position. Power the system back on and wait for the BIOS POST screen to appear. Afterward, turn off the AC power, and finally, turn the system on again.*

### 1.3.4 Graphics

- **Controller:** Intel® UHD Graphics embedded in the processor.
- **Display memory:** Shared memory is subject to OS (install 2 GB or above memory for basic system configuration).
- **VGA:** 2048 x 1152 @60 MHz.
- **DVI-D:** 1920 x 1200 @60 Hz.
- **Display port:** 4096 x 2160 @60 MHz, 24bpp.
- **HDMI:** 1920x1080 @60Hz
- **PCI express x16/x8 slot on the backplane:** An external graphic card can be installed in the PCIe x16 / x8 slot for high 2D/3D graphics capability.

### 1.3.5 Ethernet LAN

- Supports single/dual 10/100/1000/2500 Mbps Ethernet port(s) via the dedicated PCI Express x1 bus which provides 500 MB/s data transmission rate.
- **Controller:**
  - LAN 1: I226LM(PCE-5133); I226V(PCE-5033)
  - LAN 2: I226LM(PCE-5133); I226V(PCE-5033)

### 1.3.6 Industrial Features

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

### 1.3.7 Mechanical and Environmental Specifications

- **Operating temperature:** 0 ~ 60°C (32 ~ 140°F, depending on CPU and thermal solution).
- **Storage temperature:** -40 ~ 85°C (-40 ~ 185°F).
- **Humidity:** 20 ~ 95% non-condensing.
- **Power supply voltage:** +3.3 V, +5 V, +12 V, +5 $V_{SB}$.
- **Power requirements(Idle):**

| Voltage | + 3.3V | +5V | +12V |
|---|---|---|---|
| Current | 8.34A | 4.13A | 6.86A |

**Note:** Testing conditions:
CPU: Processor: Intel® i9-12900E
Memory: 2 DDR5 4800 32GB
Operating temperature: 0 ~ 60°C (depending on CPU)

- **Board size:** 338 mm (L) x 122 mm (W) (13.31" x 4.8").
- **Board weight:** 0.5 kg.

## 1.4 Jumpers and Connectors

Connectors on the PCE-5133/5033 single host board link it to external devices such as hard disk drives and a keyboard. In addition, the board has a number of jumpers used to configure the system for your application.

The tables below list the function of each of the board 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 clear |
| JME1 | Clear ME data |
| JWDT1+JOBS1 | Watchdog timer output selection and OBS alarm |
| JPCICLK | PCI clock selection |

**Table 1.2: Connectors**

| Label | Function |
|---|---|
| USB2C1 | USB2 port |
| USB3C1 | USB3 port |
| USB3C2 | USB3 port |
| LAN1 | Intel I226LM (PCE-5133); Intel I226V (PCE-5033) |
| LAN2 | Intel I226LM (PCE-5133); Intel I226V (PCE-5033) |
| VGA1 | VGA connector |
| KBMS2 | Internal PS/2 keyboard and mouse connector |
| HDAUD1 | Advantech HD audio module expansion pin-header |
| SPI_TPM1 | SPI expansion pin header for TPM module |
| Sysfan1 | 4 PIN fan power connector for supporting PWM or DC fan |
| LANLED1 | LANLED |
| USB2A1 | USB port |
| USB3H1 | USB3 port |
| USB3H2 | USB3 port (PCE-5133) |
| USB3H3 | USB3 port (PCE-5133) |
| COM1 | RS-232 (9-pin Box Header) |
| COM2 | RS-232 (9-pin Box Header) |
| eSPI | eSPI expansion pin header for COM module |
| SATA | SATA0~1 SATA4~7 (PCE-5133) SATA4~7(PCE-5033) |
| SPI_CN1 | CMOS flash jig pin-header |
| SPI1 | CMOS ROM |
| DP1 | Display port pin-header |
| DP2 | Display port pin-header |
| JCMOS1 | Clear CMOS |
| JME1 | Clear ME |
| JFP1 + JFP2 | Power Switch / Reset connector / External speaker / SATA HDD LED connector |
| NVMe M.2 | M.2 Key 2280 with PCIe Gen. 4 |

| Table 1.2: Connectors | |
|---|---|
| JFP3 (Keyboard Lock and Power LED) | Power LED |
| | Suspend: Fast flash (ATX/AT) |
| | System On: ON (ATX/AT) |
| | System Off: OFF (ATX/AT) |
| CPUFAN1 | CPU FAN Power connector |
| JCASE1 | Case Open pin-header |
| JCASEOP_SW1 | Case Open switch for always open or close |
| BAT1 | Button battery socket |
| BAT2 | External battery connector |
| GPIO1 | 8-bit GPIO pin header (SMD pitch-2.0 mm) |
| DIMMA1 | Memory connector channel A |
| DIMMB1 | Memory connector channel B |

## 1.5 Board Layout: Jumper and Connector Locations

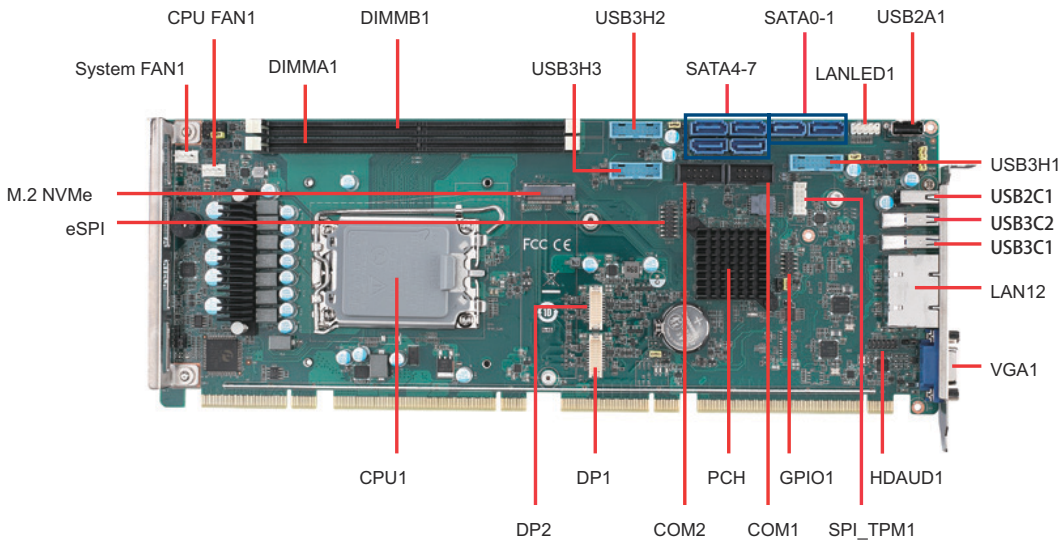



**Figure 1.1 PCE-5133 Jumper and Connector Locations**

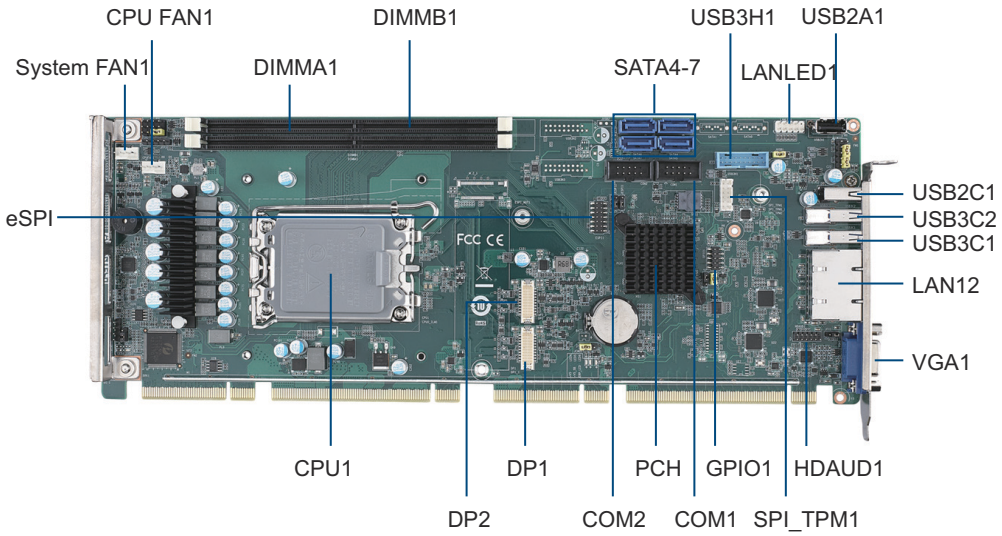



**Figure 1.2 PCE-5033 Jumper and Connector Locations**

## 1.6 Block Diagram

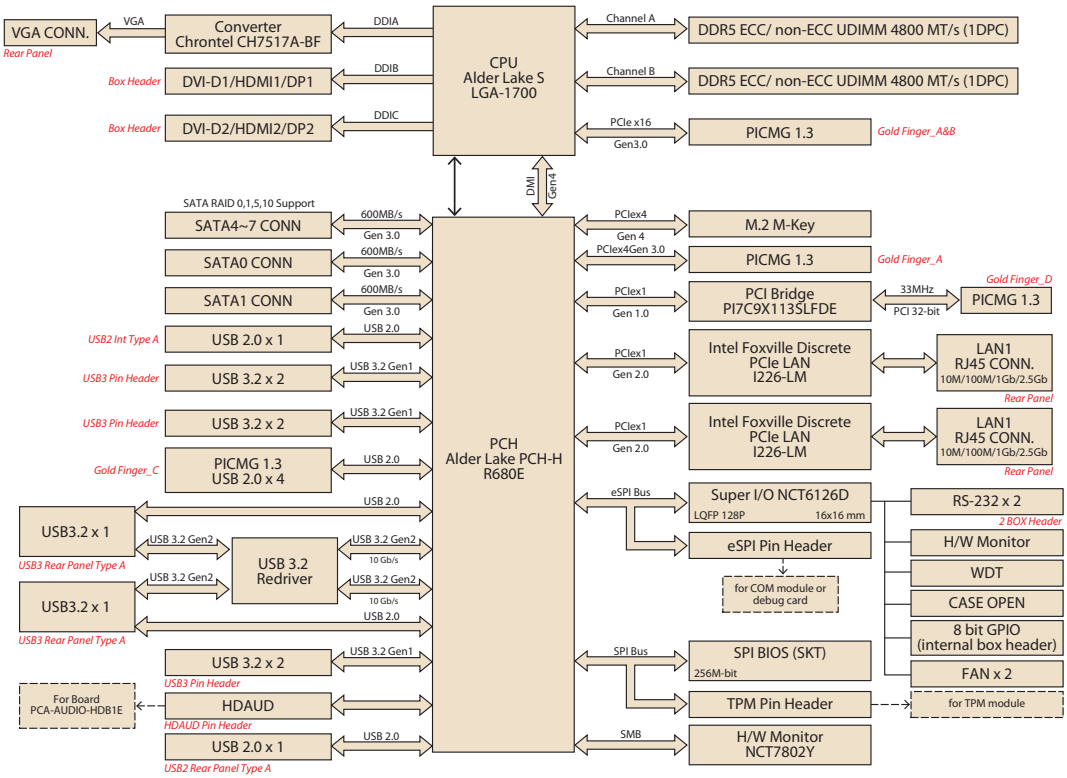



**Figure 1.3 PCE-5133 Block Diagram**

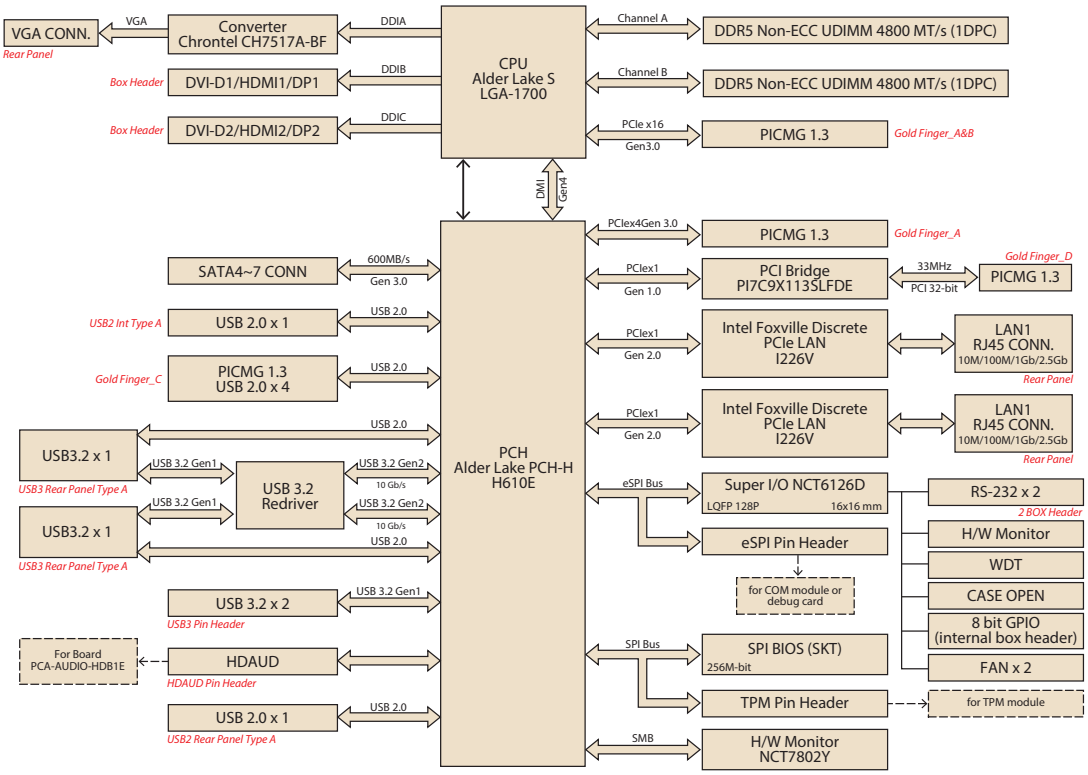



**Figure 1.4 PCE-5033 Block Diagram**

## 1.7 Safety Precautions

***Warning!*** *Always completely disconnect the power cord from your chassis whenever 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 electrical 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. 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's 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 the jumpers. A jumper is a metal bridge that closes an electrical circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" (or turn ON) a jumper, 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 BIOS CMOS (JCMOS1)

The SBC CPU card contains a jumper that can erase BIOS CMOS/ME data and reset the system BIOS information. Normally this jumper should be set with pins 1-2 closed. If you want to reset those data, set JCMOS1/JME1 to 2-3 closed for just a few seconds, and then move the jumper back to 1-2 closed. This procedure will reset the CMOS/ME to its last status or default setting.

**Table 1.3: JCMOS1/JME1: Clear CMOS/ME Data**

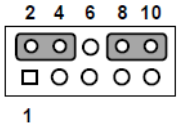
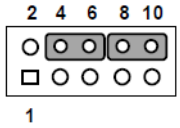
| Function | Jumper Setting |
|---|---|
| *Keep BIOS CMOS/ME data | 1  1-2 closed |
| Clear BIOS CMOS/ME data | 1  2-3 closed |

* default setting

### 1.8.3 Watchdog Timer Output and OBS alarm (JWDT1)

The SBC contains a watchdog timer that will reset the CPU in the event the CPU stops processing. This feature means the SBC 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.

**Table 1.4: Watchdog Timer Output (JWDT1+JOBS1)**

| Function | Jumper Setting | |
|---|---|---|
| Watchdog timer disable (2-4)<br>OBS beep (8-10) |  | 2-4, 8-10 closed |
| *Watchdog timer reset (4-6)<br>OBS beep (8-10) |  | 4-6, 8-10 closed |
| * default setting | | |

## 1.9 System Memory

PCE-5133/5033 has two 288-pin memory sockets for (ECC/non ECC) DDR5 4800MHz (Depends on CPU) memory modules with maximum capacity of 64GB. (Maximum 32GB for each DIMM).

PCE-5133 supports ECC and non-ECC DDR5 U-DIMM memory modules.

PCE-5033 supports non-ECC DDR5 U-DIMM memory modules.

***Note!*** *PCE-5133/5033 does NOT support registered DIMMs (RDIMMs).*

## 1.10 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. Then press the DIMM module right 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 PCE-5133 supports Intel Active Management Technology 11.0 (AMT12.0) which utilizes some memory space of channel 0, we suggest that the user should not leave channel 0 DIMM slots (DIMMA1) empty, or it may cause some system abnormality.*

## 1.11 Cache Memory

L3 memory cache size is subject to each Intel processor and please refer to the Intel datasheet for detailed information.

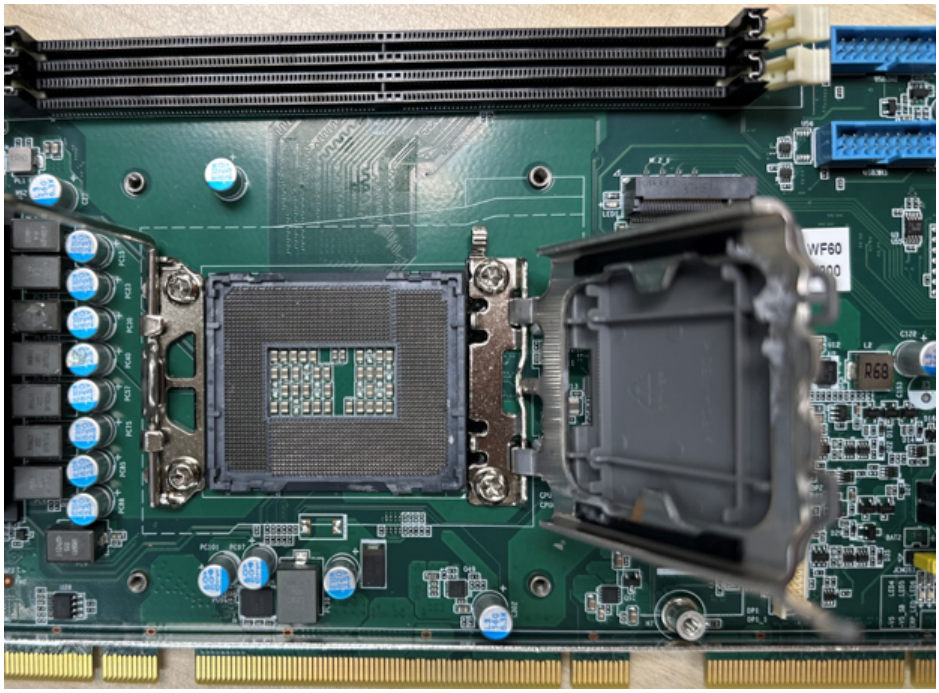
## 1.12 Processor Installation

***Warning!*** *Without a fan or heat sink, the processor will overheat and cause damage to both the processor and the single board computer. To install a processor, first turn off your system.*

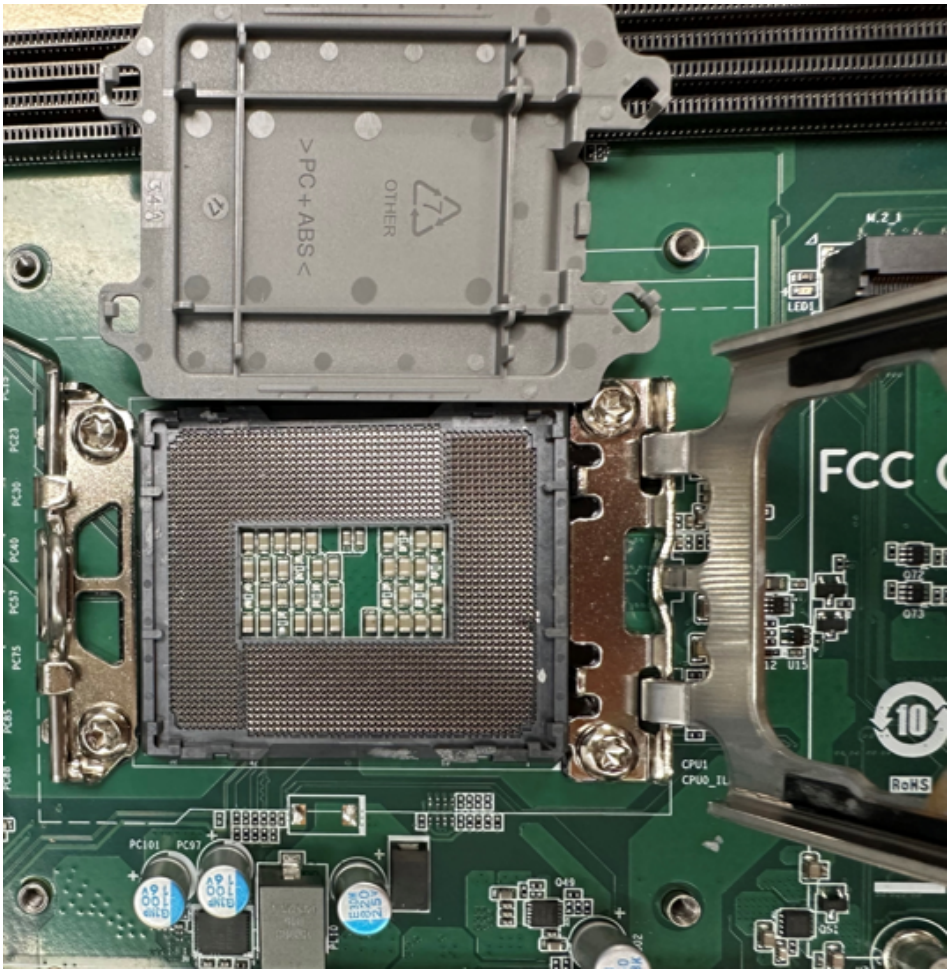
The PCE-5133/5033 is designed for Intel® LGA 1700 socket processors.

1. Pull the off cover of CPU socket up.


2. Lift the bar beside the processor socket outward and lift it.



3. Lift the CPU socket retainer.



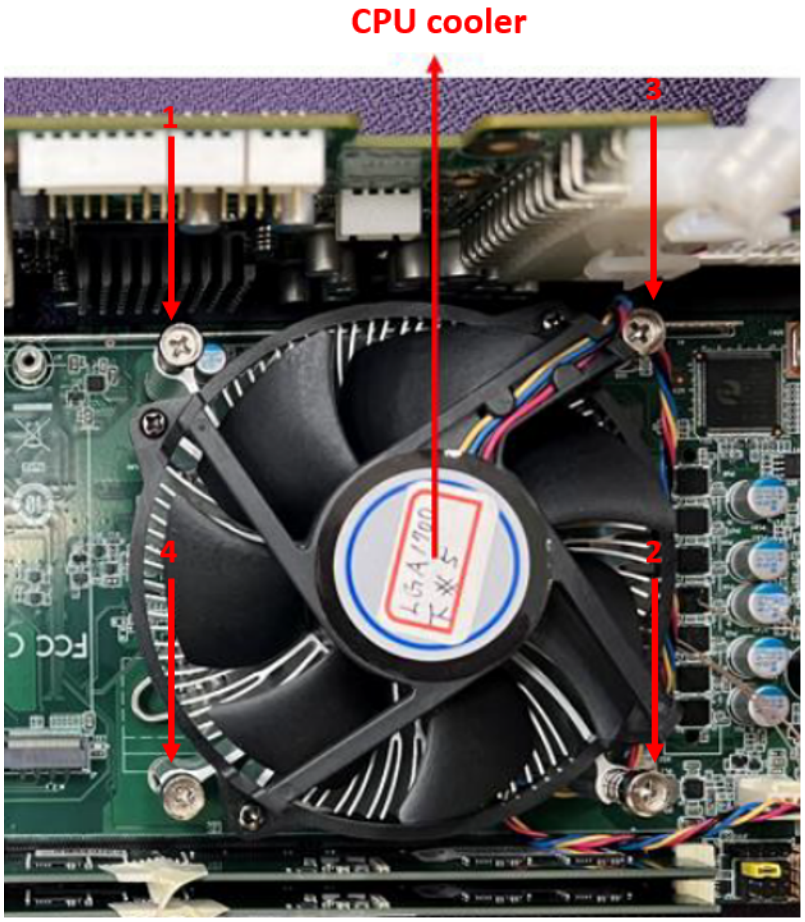

4. Align the cuts on the processor with the edges of the socket.

5. Replace the side bar and retainer of CPU socket.


## 1.13 Processor Cooler Installation

Purchasing PCE-5133/5033 optimized CPU cooler (P/N: 1970005349T000) from Advantech is a must. Other brand CPU coolers are NOT compatible with PCE-5133/5033. Advantech specially designed CPU cooler and CPU plate is for better heat dissipation efficiency and for enhancing rigidity of the CPU card (neither is it compatible with Intel boxed CPU cooler). Please install 1970005349T000 CPU cooler following these instructions.

Attach the CPU cooler on CPU card by fastening four screws of the CPU cooler into the steel back-plate on PCB.




Note the direction of CPU cooler, which must follow that shown above. Installing a CPU cooler in the wrong direction may cause poor heat dissipation that may damage the CPU card.

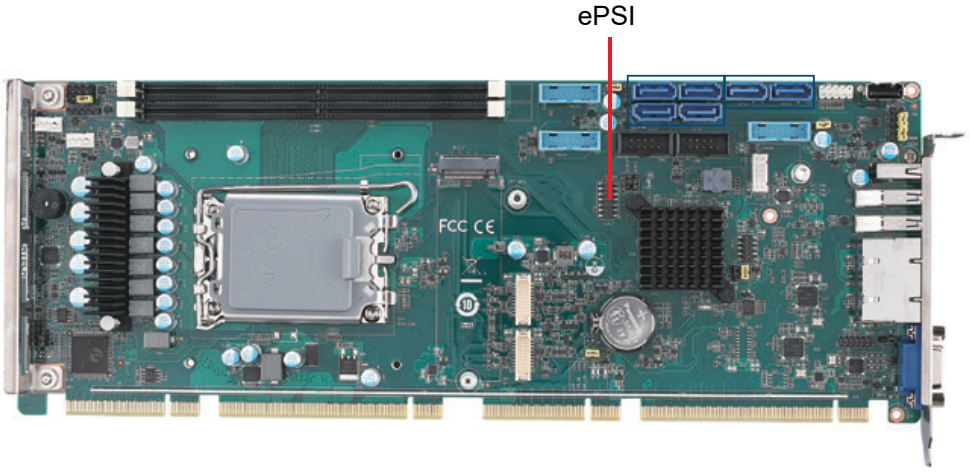
# Chapter 2

## Connecting Peripherals

## 2.1 Introduction

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

## 2.2 eSPI for COM expansion (eSPI1)




eSPI is used for the optional expansion of eSPI COM232/485 module developed by Advantech. Please refer to data sheet for respective part numbers.

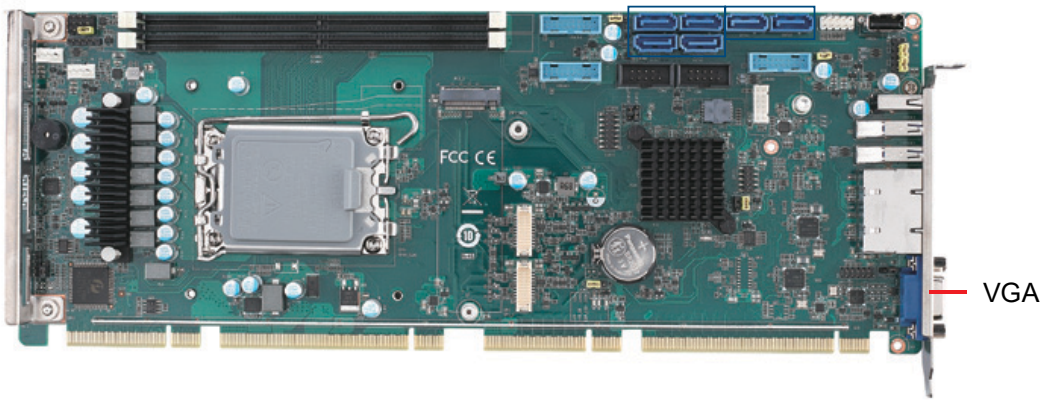
***Note!*** *Keep the default settings if an eSPI-interface COM module is not installed, as changing them will prevent the system from turning on. If you are installing the COM module, follow these steps to ensure the system boots correctly: power off the system, install the module, set JESPI1 and JESPI2 jumpers to the 2-3 pin closed position, power the system on until the BIOS POST screen appears, turn off the AC power, and then turn the system back on.*

## 2.3 USB Ports

Each SBC provides both USB 2.0 and USB 3.2 (Gen1/Gen2) on-board ports with complete Plug & Play and hot swap support for up to 127 external devices. These USB ports comply with USB Specification 2.0 and 3.2 (Gen1/Gen2), and supports transfer rates up to 480 Mbps (USB 2.0) and 5 Gbps/10 Gbps (USB 3.2). The USB controller can be disabled in the system BIOS setup.

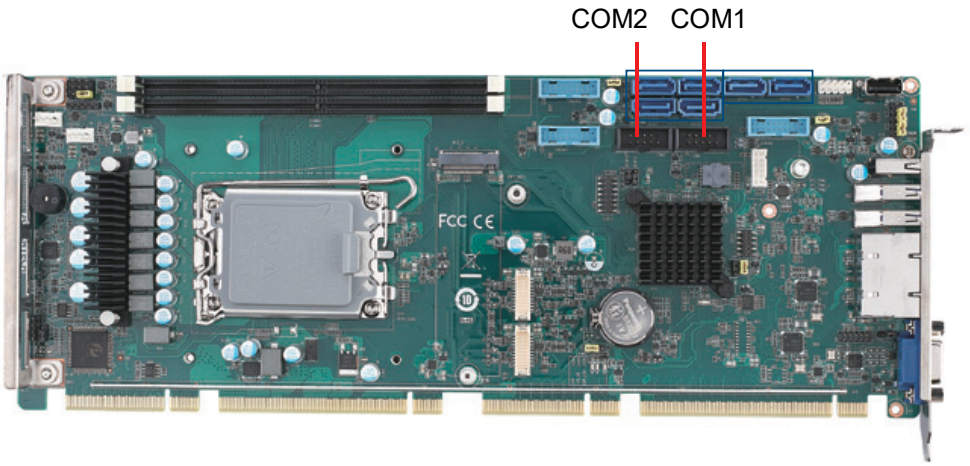
***Note!*** *Disabling USB controller in the BIOS menu will turn off all USB port functions.*

## 2.4 VGA Connectors (VGA1)




This CPU card has VGA outputs that can drive conventional CRT displays. VGA1 is a standard 15-pin D-SUB connector commonly used for VGA.

## 2.5 Serial Ports (COM1 & COM2)




These SBCs offer two serial ports. These ports can connect to serial devices, such as a mouse or a printer, or to a communications network.

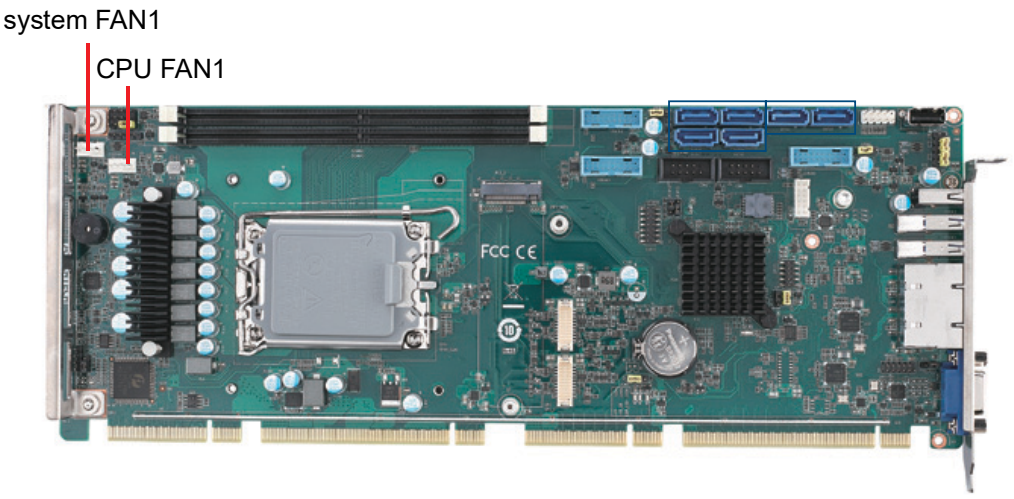
The IRQ and address ranges for both ports are fixed. However, if you want to disable the port or change these parameters later, you can do this in the system BIOS setup.

Please refer to data sheet for optional 1 & 2-port COM cable.

## 2.6 CPU and System Fan Connectors (CPUFAN1 and SYSFAN1)

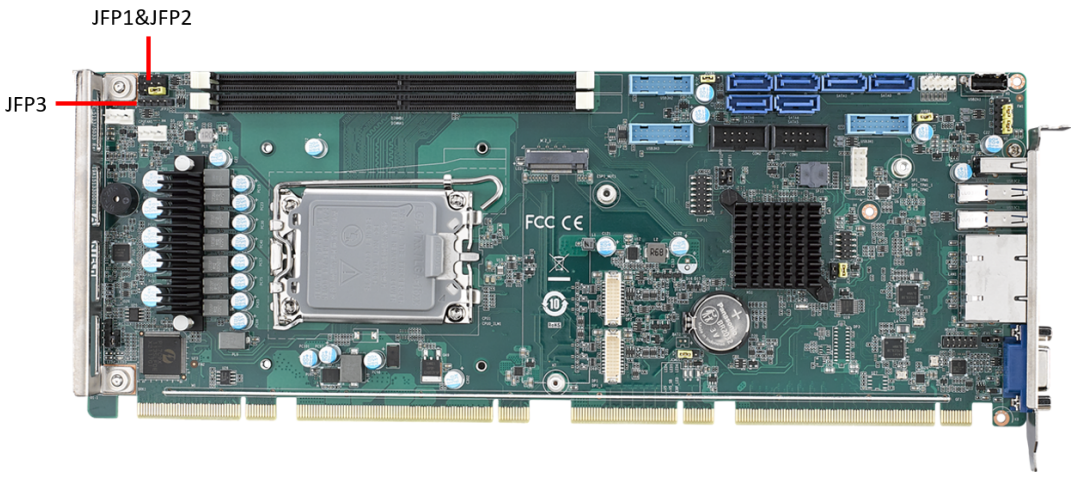
This fan connector supports 3-pin or 4-pin fan coolers and smart fan functions.

***Note!*** *CPU and system fan connectors can support both PWM and DC FAN. System fan connector can support one system fan.*




## 2.7 Front Panel Connectors (JFP1, JFP2 & JFP3)

There are several external switches to monitor and control the PCE-5133/5033.



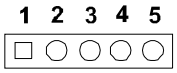
### 2.7.1 Power LED and Keyboard Lock (JFP3)

JFP3 is a 5-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 below.

**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 | Flashes | Flashes |
| System Off | Off | Off |

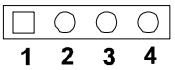
| | | |
|---|---|---|
| JFP1 | PWR_SW | Reset |
| JFP2 | HDD LED | SNMP |
| | Speaker | |
| JFP3 | PWR_LED & Key Lock | |




### 2.7.2 External Speaker (JFP2)

JFP2 is a 4-pin connector for an external speaker. The PCE-5133/5033 provides an onboard buzzer as an alternative to an external speaker. To enable the buzzer, set pins 3 and 4 as closed.

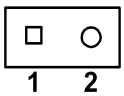
| | | |
|---|---|---|
| JFP1 | PWR_SW | Reset |
| JFP2 | HDD LED | SNMP |
| | Speaker | |
| JFP3 | PWR_LED & Key Lock | |




### 2.7.3 Reset Connector (JFP1)

Many computer cases offer the convenience of a reset button. Connect the wire from the reset button.

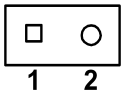
| | | |
|---|---|---|
| JFP1 | PWR_SW | Reset |
| JFP2 | HDD LED | SNMP |
| | Speaker | |
| JFP3 | PWR_LED & Key Lock | |




### 2.7.4 HDD LED Connector (JFP2)

You can connect an LED to connector JFP2 to indicate when the HDD is active.

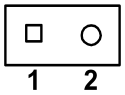
| | | |
|---|---|---|
| JFP1 | PWR_SW | Reset |
| JFP2 | HDD LED | SNMP |
| | Speaker | |
| JFP3 | PWR_LED & Key Lock | |



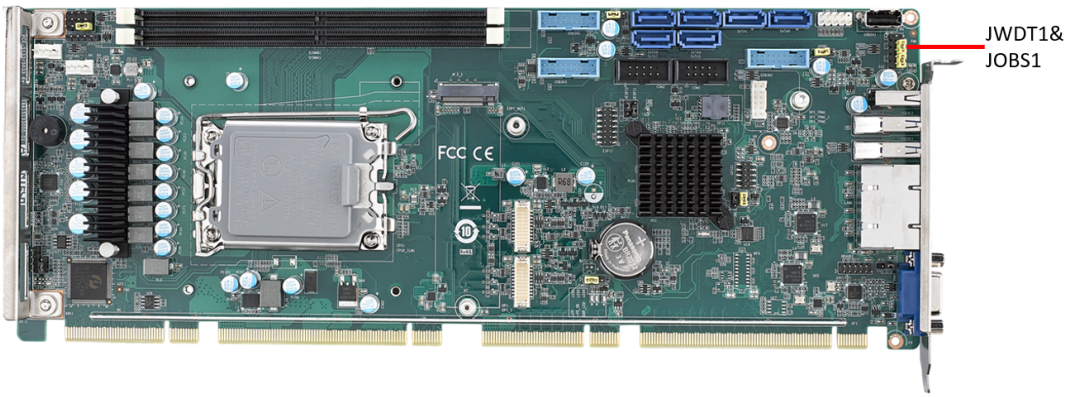
### 2.7.5 ATX Soft Power Switch (JFP1)

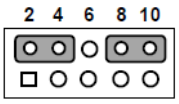
If your computer case is equipped with an ATX power supply, you should connect the power on/off button on your computer case to JFP1. This connection enables you to turn your computer on and off.

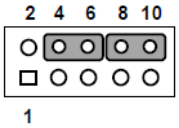
| JFP1 | PWR_SW | Reset |
|---|---|---|
| JFP2 | HDD LED | SNMP |
| | Speaker | |
| JFP3 | PWR_LED & Key Lock | |




## 2.8 H/W Monitor/Watchdog Timer




### 2.8.1 Watchdog timer output and H/W Monitor Alarm (JOBS1)

This 10-pin header is for enabling/disabling the Watchdog timer and H/W monitor alarm function.

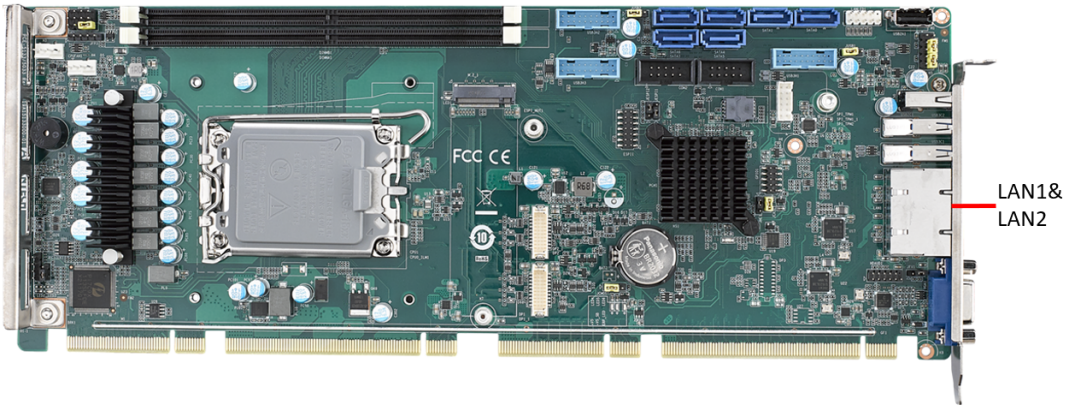
Closed: Enables OBS Alarm

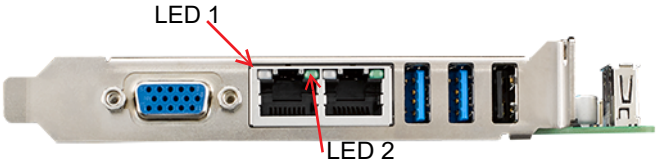
Open: Disables OBS Alarm

2-4 Pin Close: Disable

4-6 Pin Close: Reset

## 2.9 LAN Ports (LAN1 & LAN2) and Front Panel LAN Indicator Connector (LANLED1)



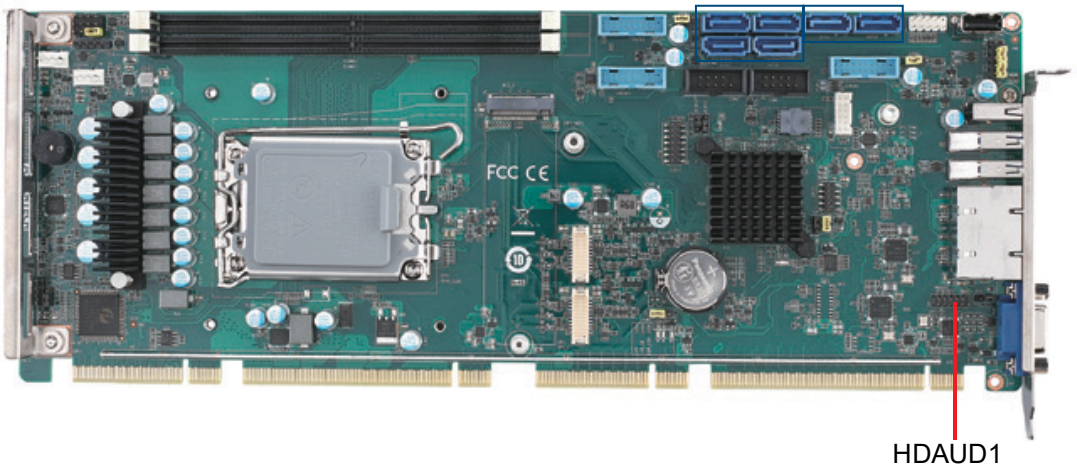




The SBC is equipped with one or two high-performance 1000 Mbps Ethernet LANs. They are supported by all major network operating systems. The RJ-45 jacks on the rear plate provide convenient connectivity.

**Table 2.2: LAN LED Indicators**

| LAN Mode | LED1 | LED2 |
|---|---|---|
| 1000Mbps Link On | Green On | On |
| 1000Mbps Active | Green on | Flash |
| 1000Mbps Link Off | Off | Off |
| 100Mbps Link On | Orange On | On |
| 100Mbps Active | Orange On | Flash |
| 100Mbps Link Off | Off | Off |
| 10Mbps Link On | Off | On |
| 10Mbps Active | Off | Flash |
| 10Mbps Link Off | Off | Off |

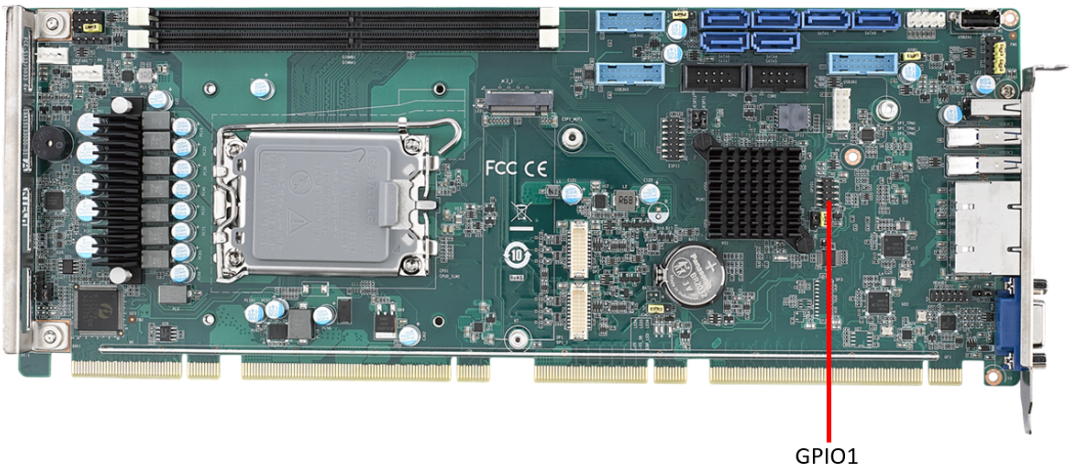
## 2.10 High Definition Audio Module Interface (HDAUD1)




This HDAUD1 pin header is the connection interface to Advantech's high definition audio module.

***Note!*** *Advantech high definition audio module ordering information.*
*P/N: PCA-AUDIO-HDB1E.*

## 2.11 GPIO Header (GPIO1)




Provides 10-pin header connector for 8-bit Digital I/O usage. Refer to Appendix B for detailed information on the pin assignments and programming guide in Appendix C.

## 2.12 Case Open Connector (JCASE1 and JCASEOP_SW1)

The SBC supports Case Open with both Normally Open (N.O.) and Normally Closed (N.C.) mode. Please follow below directions to install Case Open for your system.

1. Please consult with your chassis provider for which Case Open mode is supported.
2. Please refer to Table 1 setting JCASWOP_SW1 jumper at correct position.
3. Please enable Case Open warning in the BIOS menu. (BIOS menu: Advanced->H/W Monitor).

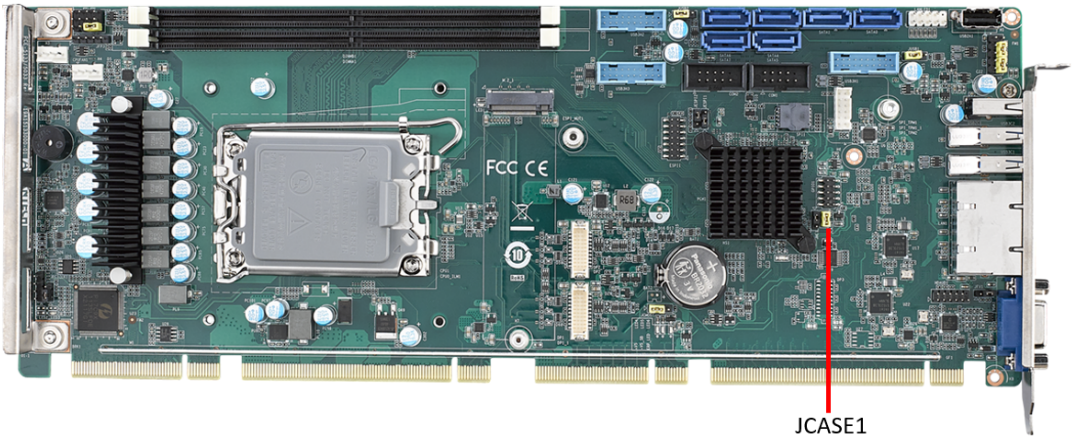



**Figure 2.1 Case Open Jumper Locations**

The 2-pin case open connector is for chassis with a case open sensor. When the case is open, the buzzer on motherboard will beep.

**Table 2.3: Case Open Mode Jumper**

| Case open mode/JCASE1 | JCASEOP_SW1 |
|---|---|
| Normally Open(N.O.) | 2-3 pin short |
| Normally Closed(N.C.) | 1-2 pin short |

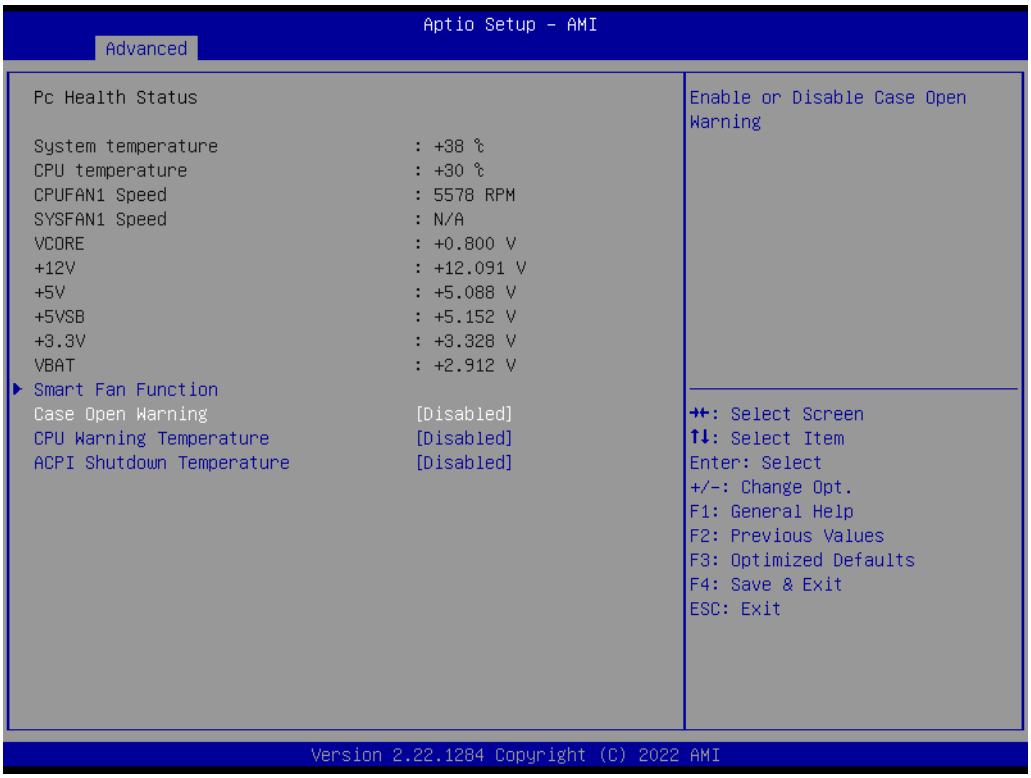
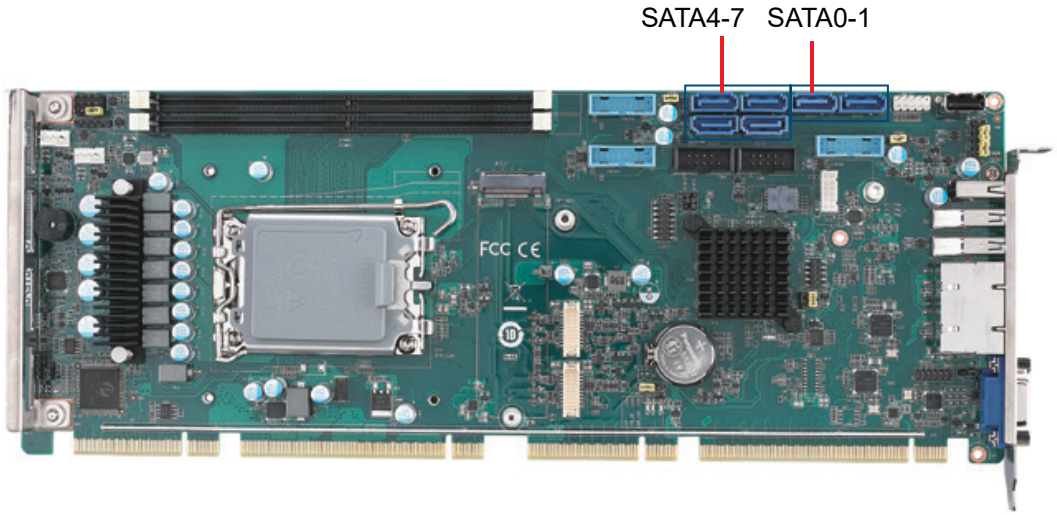



**Figure 2.2 Case Open Warning in BIOS Menu**

## 2.13 Serial ATA Interface (SATA0~1 SATA4~7 (PCE-5133), SATA 4~7 (PCE-5033))




The PCE-5133/5033 features high performance serial ATA interface (6*600MB/s (PCE-5133)/ 4*600MB/s (PCE-5033)) which eases cabling to hard drivers or CD/ DVD drivers with long cables. These six on-board SATA ports can be configured as RAID 0, 1, 10, or 5 (PCE-5033 does not support RAID). Please see the detailed BIOS setting instructions for this in Chapter 3.

# Chapter 3

## AMI BIOS Setup

## 3.1 Introduction

With the AMI BIOS Setup program, you can modify BIOS settings and control the special features of your computer. The Setup program uses a number of menus for making changes and turning the special features on or off. This chapter describes the basic navigation of the PCE-5133/5033 setup screens.

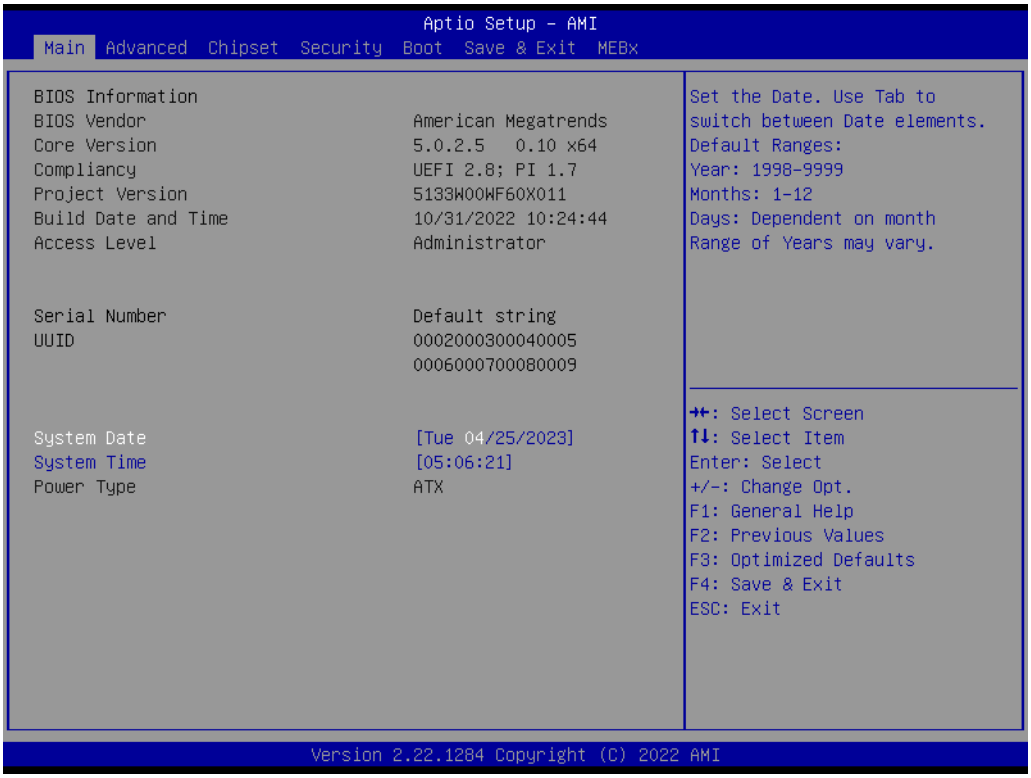



**Figure 3.1 Setup Program Initial Screen**

## 3.2 Entering Setup

Turn on the computer and the BIOS is activated as well. The setup program can be triggered by pressing “DEL” or “ESC” key.

***Note!*** *If the message disappears before you press the “DEL” or “ESC” key, please restart the computer and try again.*

### 3.2.1 Main Setup

When you first enter the BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.

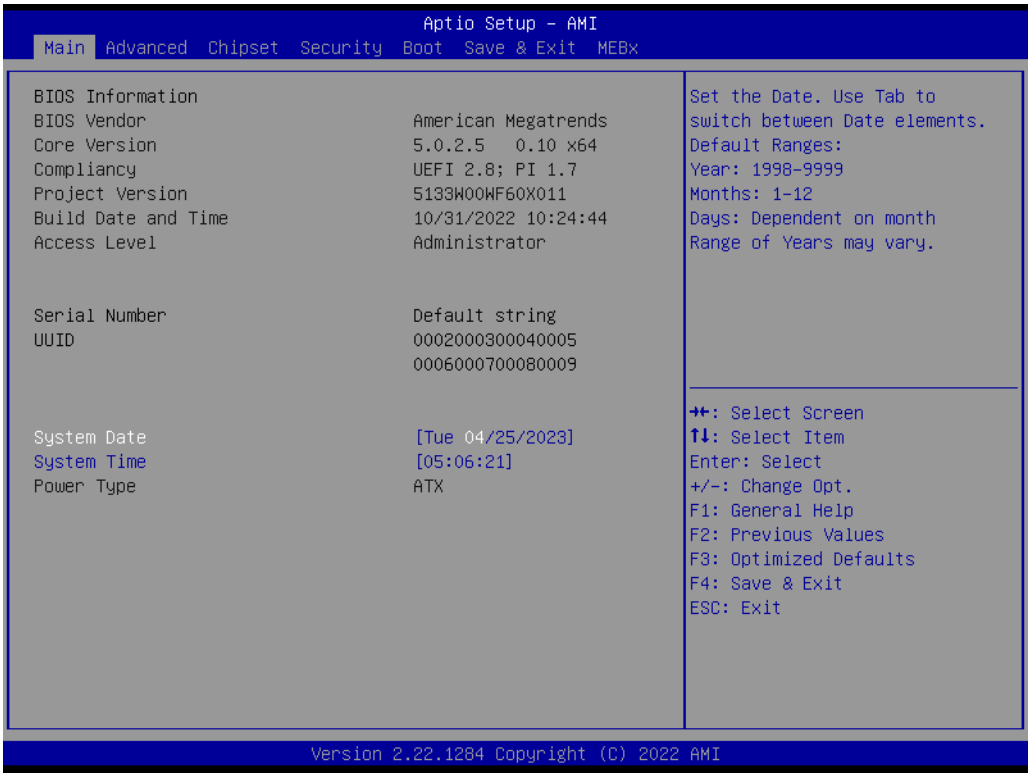



**Figure 3.2 Main Setup Screen**

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. The right frame displays the key legend.

Above the key legend 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.

- **Setup Item Hidden**
  Hidden Setup Item.
- **System Date**
  Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 1998-9999; Months: 1-12; Days: Dependent on month. Range of Years may vary.
- **System Time**
  Sets the Time. Use Tab to switch between Time elements.
- **Power Type**
  This item corresponds with your power supply type.

### 3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the PCE-5133/5033 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 screen is shown below, and the sub menus are described on the following pages.

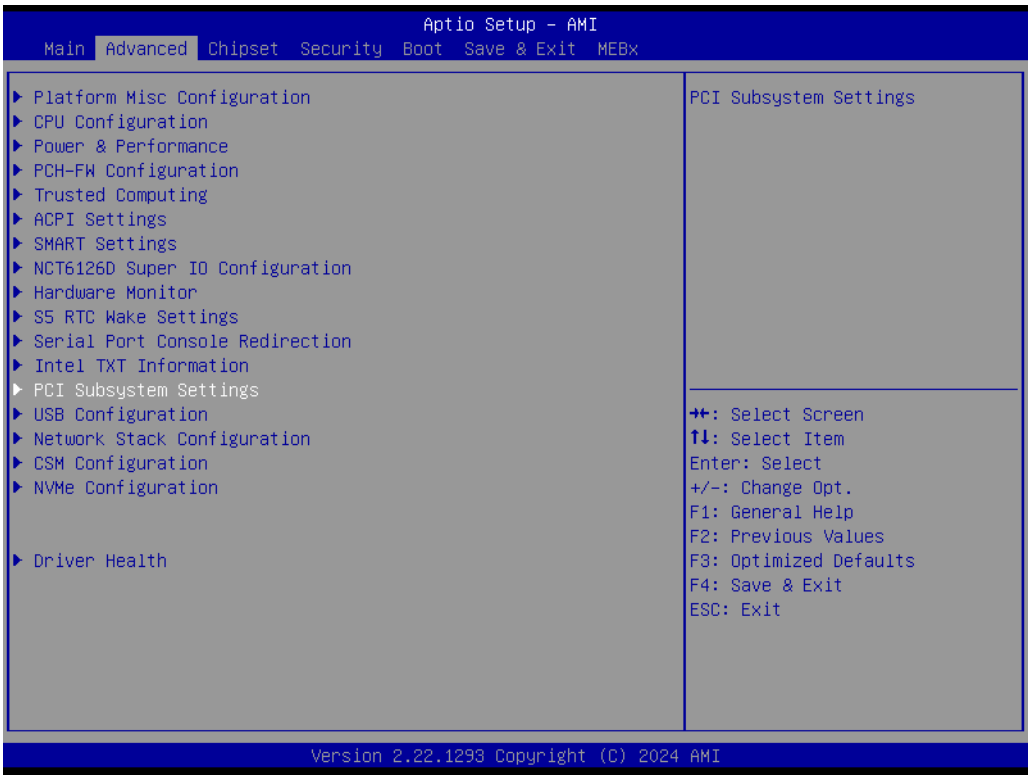



**Figure 3.3 Advanced BIOS Features Setup Screen**

- **Platform Misc Configuration**
  System ACPI Parameters.
- **CPU Configuration**
  CPU Configuration Parameters.
- **Power & Performance**
  Power & Performance Options.
- **PCH-FW Configuration**
  Configure Management Engine Technology Parameters.
- **Trusted Computing**
  Trusted Computing Settings.
- **ACPI Settings**
  System ACPI Parameters.
- **SMART Settings**
  System SMART Settings.
- **Super IO Configuration**
  System Super IO Chip Parameters.
- **HW Monitor**
  Monitors hardware status.

- **S5 RTC Wake Settings**
  Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr::min::sec specified. Select DynamicTime, System will wake on the current time + Increase minute(s).
- **Serial Port Console Redirection**
  Serial Port Console Redirection.
- **Intel TXT Information**
  Display Intel TXT information.
- **PCI Subsystem Setting**
  PCI Subsystem Setting
- **USB Configuration**
  USB Configuration settings.
- **Network Stack Configuration**
  Network Stack Settings.
- **CSM Configuration**
  CSM configuration: Enable/Disable, Option ROM execution settings, etc.
- **NVMe**
  NVMe Device Options Settings.
- **Intel® Rapid Storage Technology**
  Manage RAID volumes
- **Driver Health**
  Health status of drivers/ controllers

### 3.2.2.1 Platform Misc Configuration

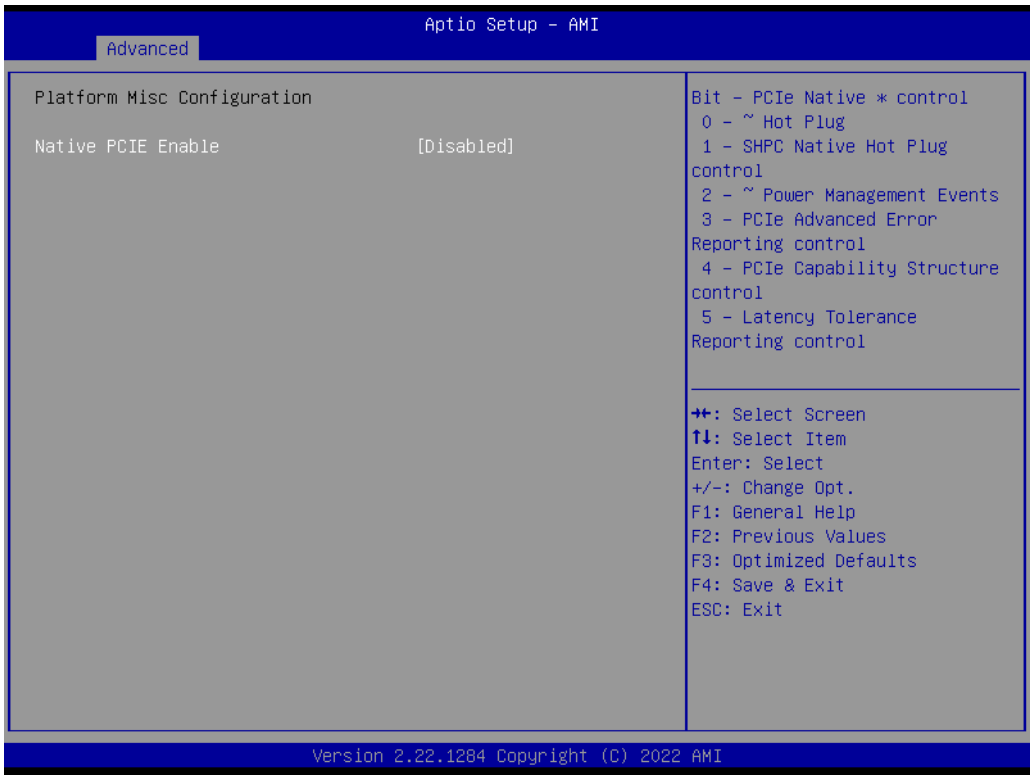



**Figure 3.4 Platform Misc Configuration**

- **Native PCIE Enable: Bit - PCIe Native * control**
  0 - ~ Hot Plug
  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

### 3.2.2.2 CPU Configuration

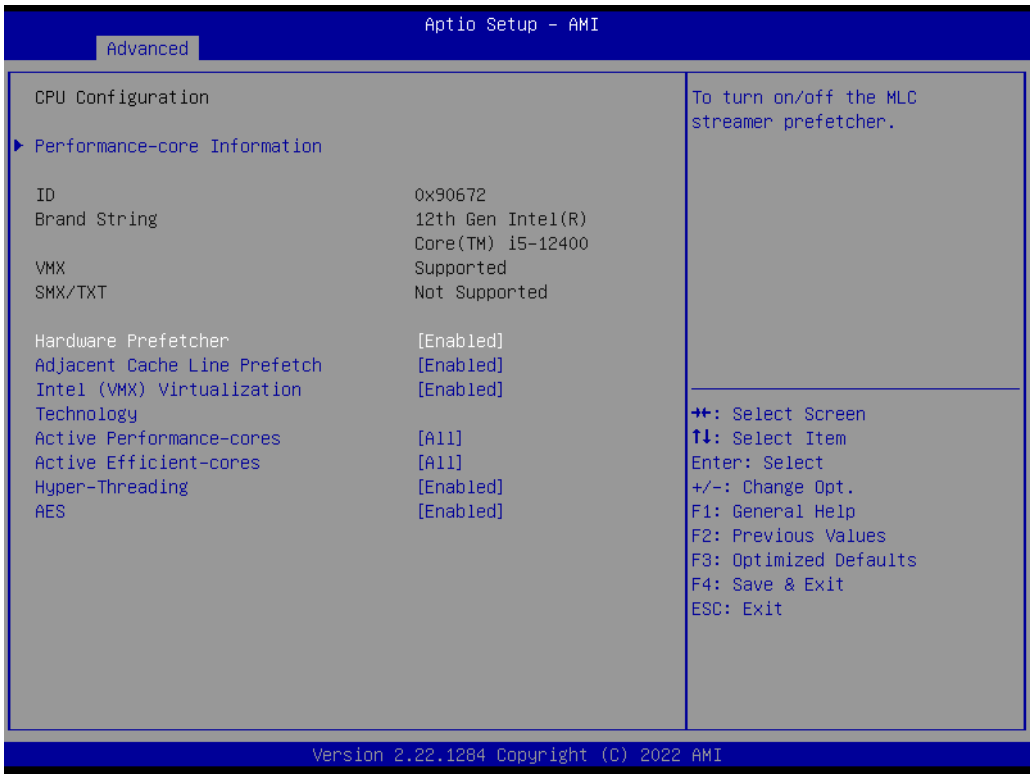



**Figure 3.5 CPU Configuration**

- **Hardware Prefetcher**
  Turns on/off the MLC streamer prefetcher.
- **Adjacent Cache Line Prefetch**
  Turns on/off prefetching of adjacent cache lines.
- **Intel (VMX) Virtualization**
  When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **Active Performance Cores**
  Number of P-cores to enable in each processor package.
- **Active Efficient-cores**
  Number of E-cores to enable in each processor package.
- **Hyper - Threading**
  Enable or Disable Hyper-Threading Technology.
- **AES:**
  Enable/Disable AES (Advanced Encryption Standard).

### 3.2.2.3 Power & Performance

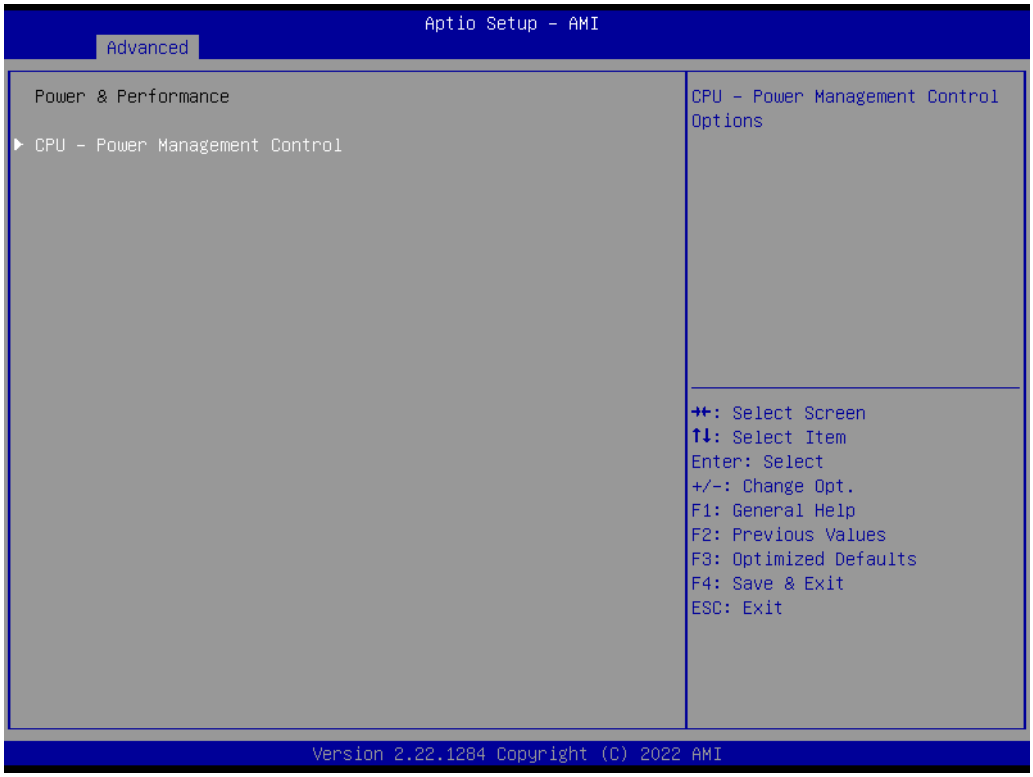



**Figure 3.6 Power & Performance**

- **CPU - Power Management Control**
  CPU - Power Management Control Options.

### 3.2.2.4 PCH-FW Configuration

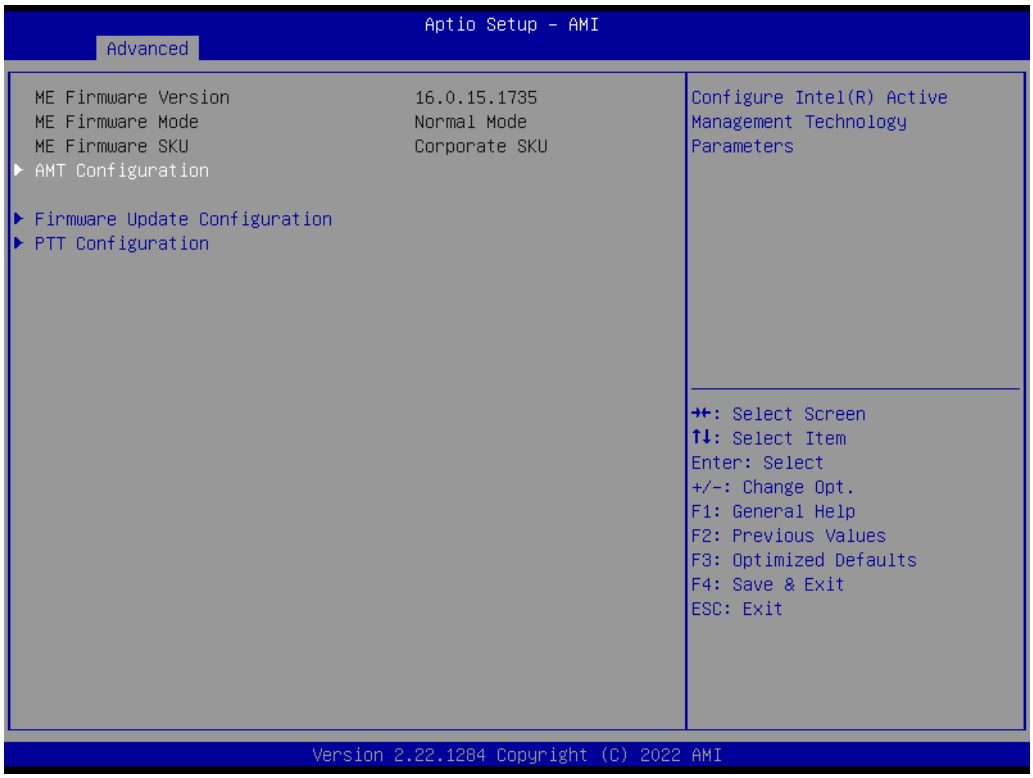



**Figure 3.7 PCH-FW Configuration**

- **AMT Configuration**
  Configure Intel(R) Active Management Technology Parameters.
- **Firmware Update Configuration**
  Configure Management Engine Technology Parameters.
- **PTT configuration**
  Configure PTT

### 3.2.2.5 Trusted Computing

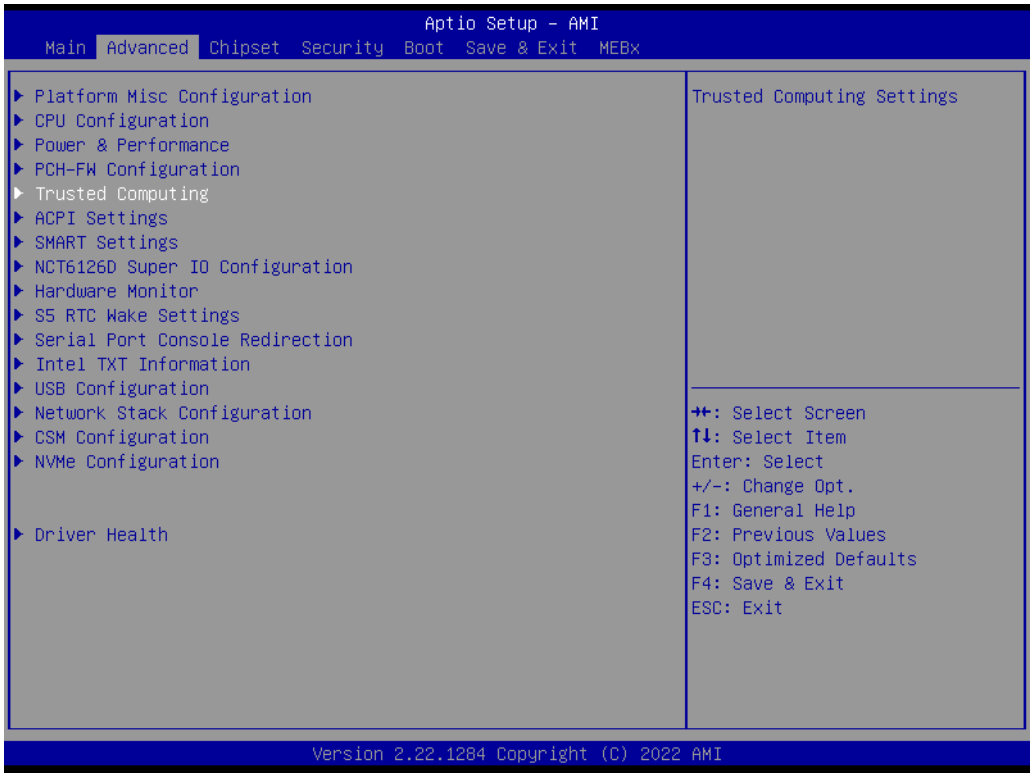



**Figure 3.8 Trusted Computing**

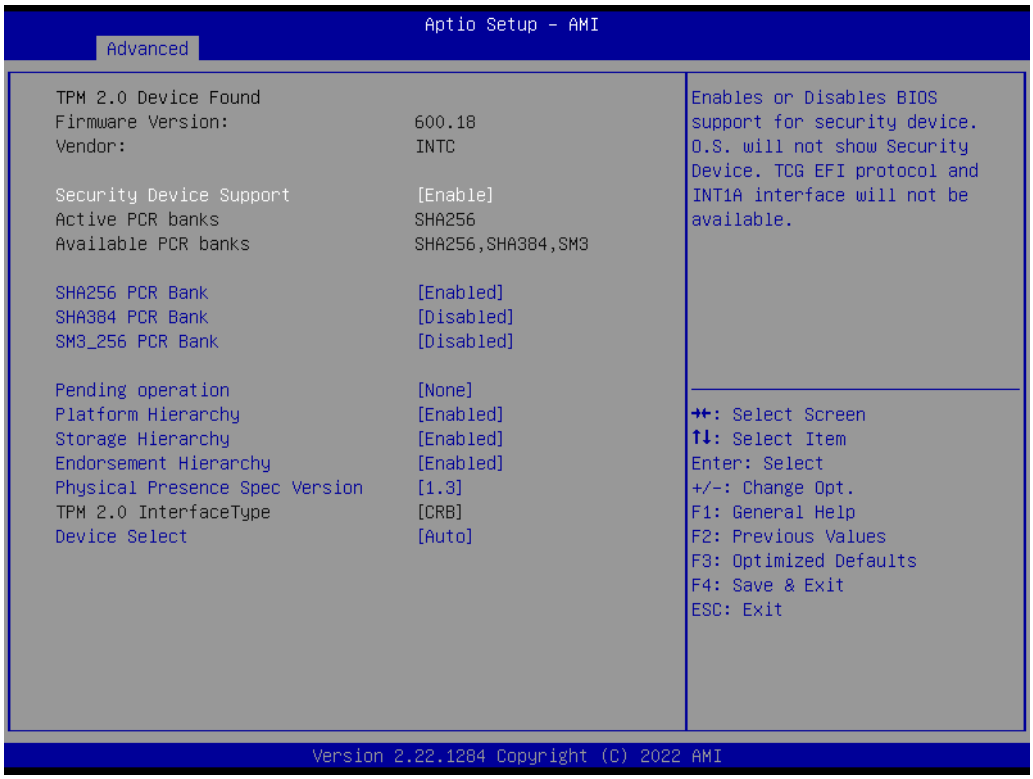



**Figure 3.9 Trusted Computing**

#### 3.2.2.6 Configuration

- **Security Device Support**
  Enable or disables BIOS support for security device. OS will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
- **SHA256 PCR Bank**
  Enable/disable SHA256 PCR Bank
- **SHA384 Hierarchy**
  Enable/disable SHA384 PCR Bank
- **SM3_256 PCR Bank**
  Enable/disable SM3_256 PCR Bank
- **Pending Operation**
  Schedule an operation for the security device.
- **Platform Hierarchy**
  Enable/disable Platform Hierarchy
- **Storage Hierarchy**
  Enable/disable Storage Hierarchy
- **Endorsement Hierarchy**
  Enable/ disable Endorsement Hierarchy
- **Physical Presence Spec Version**
  Select to Tell OS to support PPI spec Version 1.2 or 1.3.
- **TPM 2.0 InterfaceType**
  Select to support TPM 1.2, TPM 2.0 or Auto. Auto will support both TPM 1.2 and TPM 2.0

#### 3.2.2.7 ACPI Setting

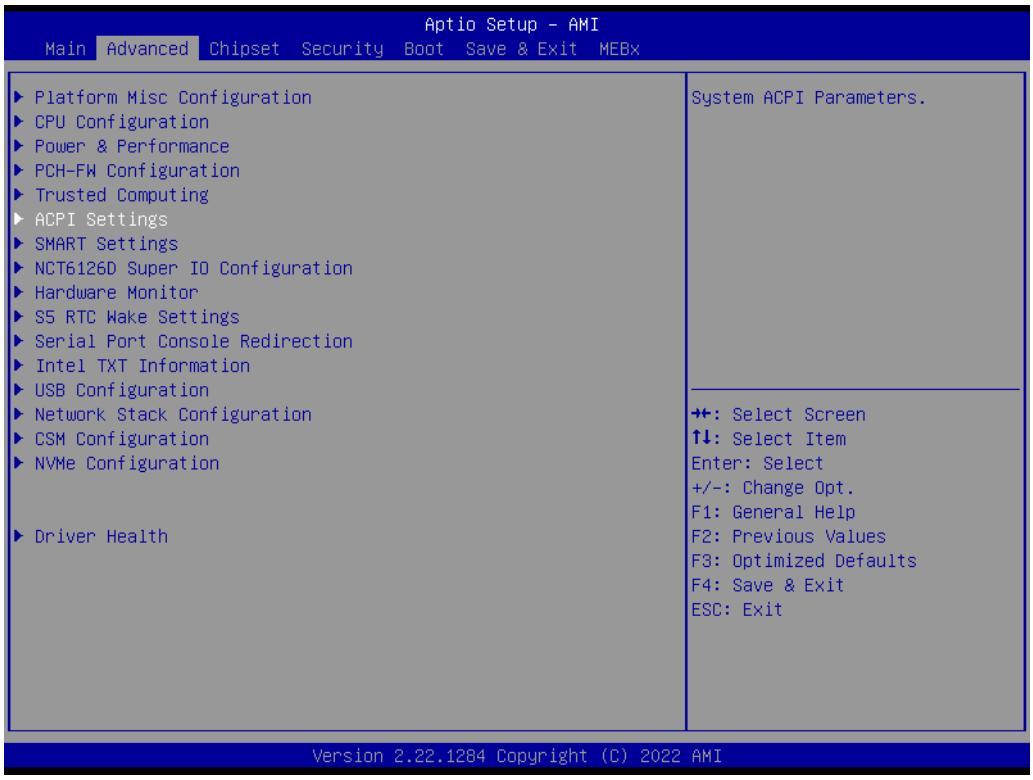



**Figure 3.10 ACPI Settings**

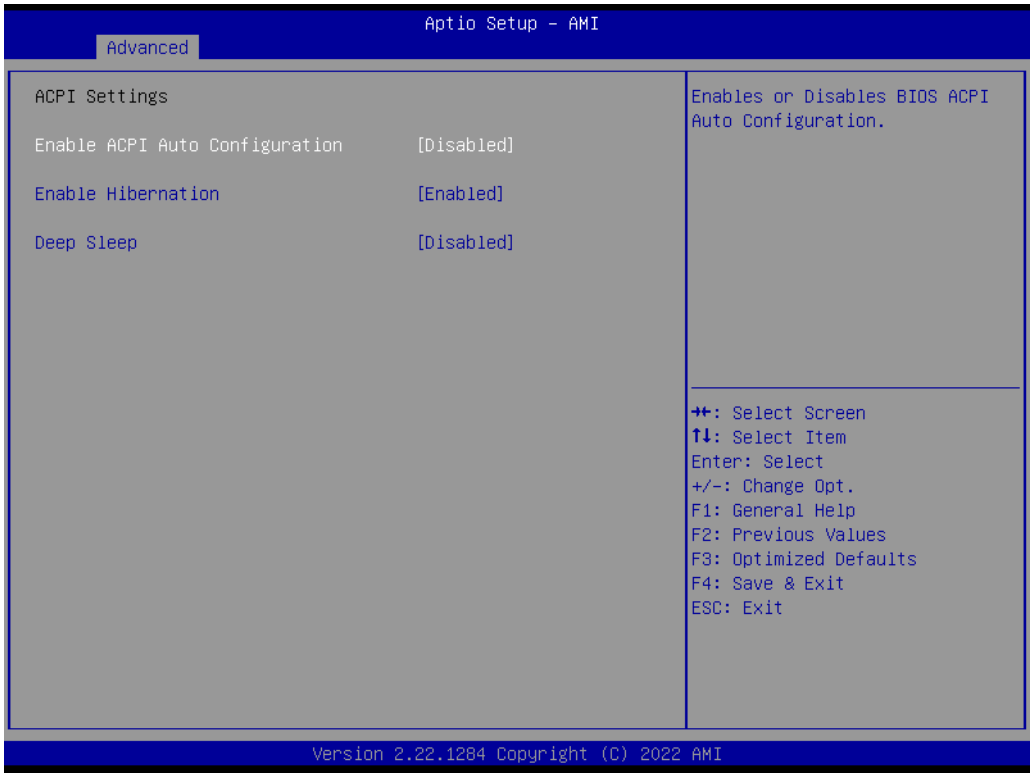



**Figure 3.11 ACPI Settings**

- **Enable ACPI Auto Configuration**
  Enable or Disable BIOS ACPI Auto Configuration.
- **Enable Hibernation**
  Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some operating systems.
- **Deep Sleep**
  Enable Deep Sleep to cut off the power of peripherals in sleep state to comply with EU ErP (Energy-related Product) regulations, please enable this function and C states function. (Path: Advanced --> Power & Performance --> CPU - Power Management --> C State --> Enable

### 3.2.2.8 Smart Settings

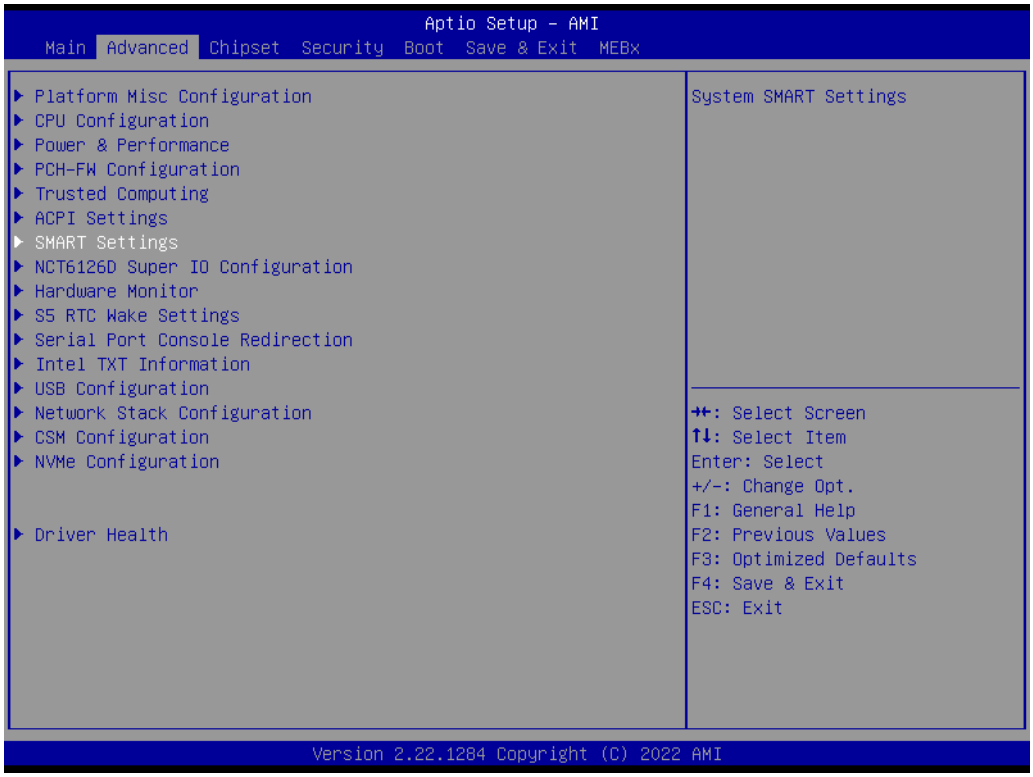



**Figure 3.12 Smart Settings**

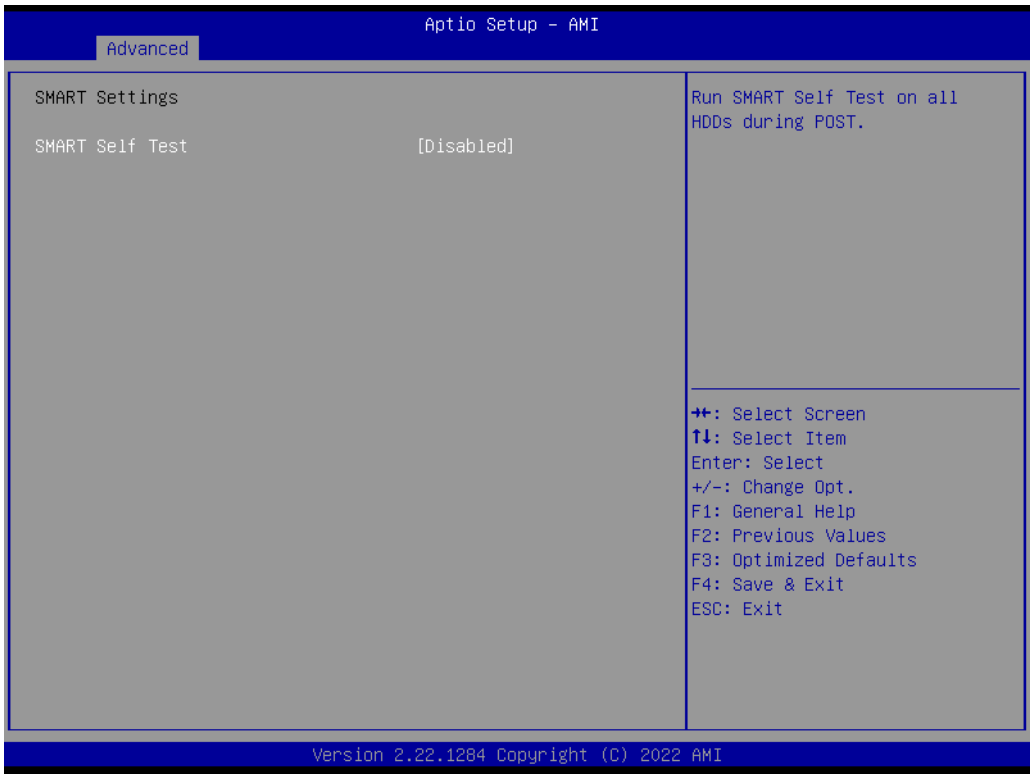



**Figure 3.13 Smart Settings**

- **SMART Self Test**
  Run SMART Self Test on all HDDs during POST.

### 3.2.2.9 Super I/O Configuration

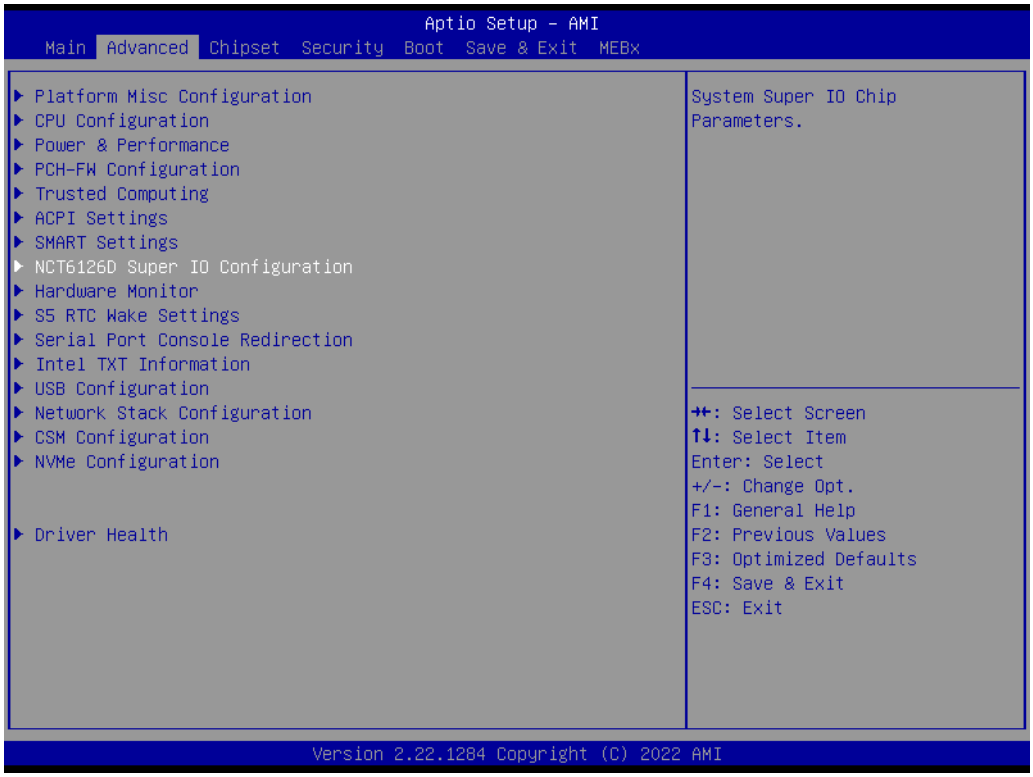



**Figure 3.14 Super IO Configuration**

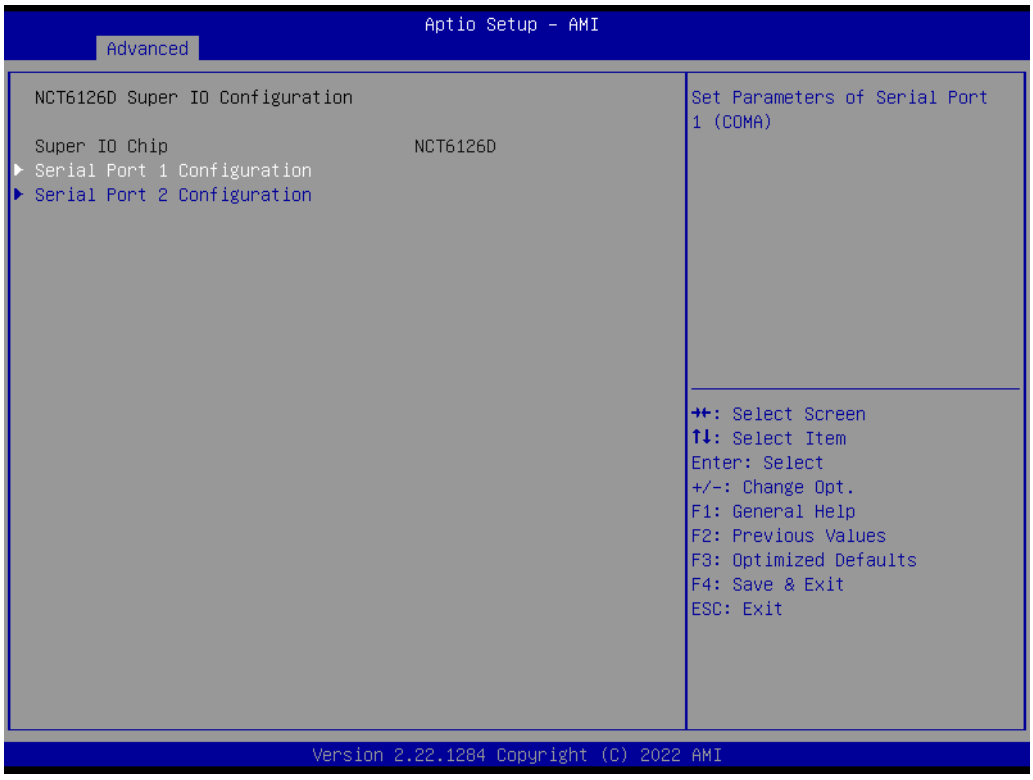



**Figure 3.15 Super IO Configuration**

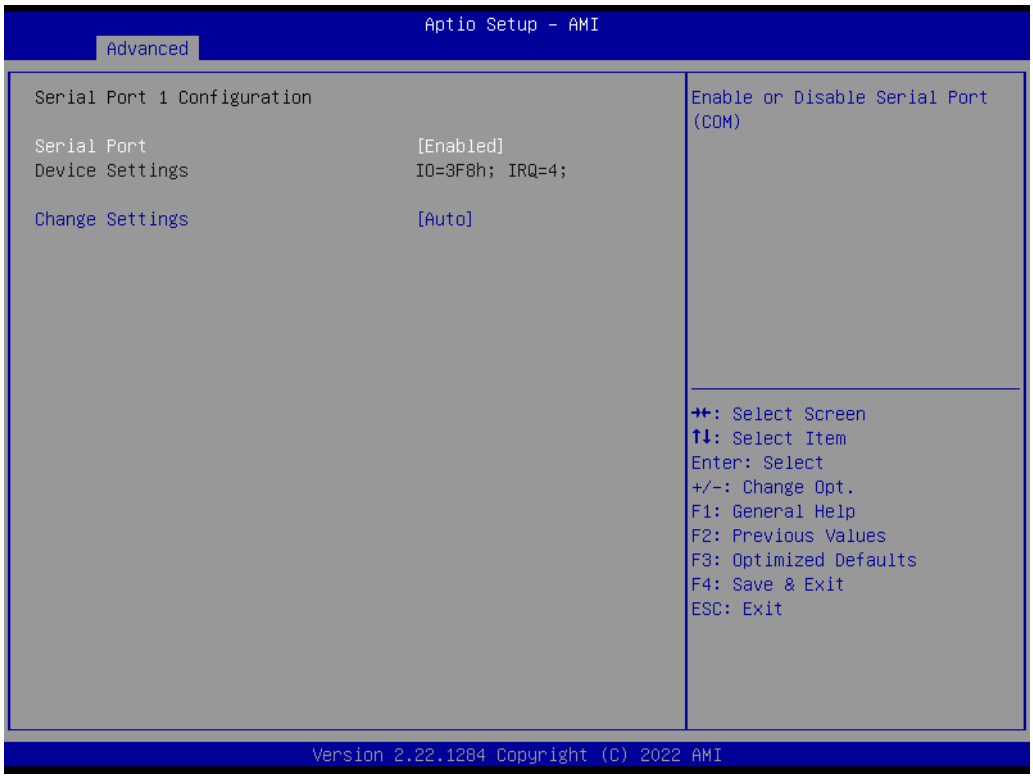



**Figure 3.16 Serial Port 1 Configuration**

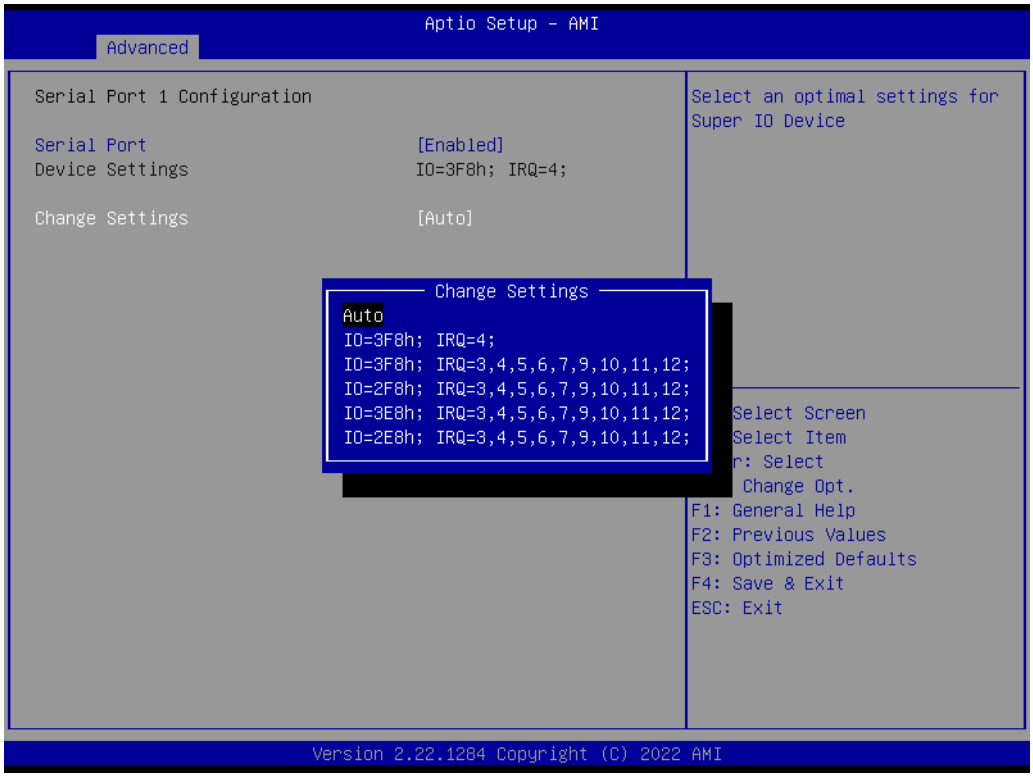



**Figure 3.17 Serial Port 1 Configuration**

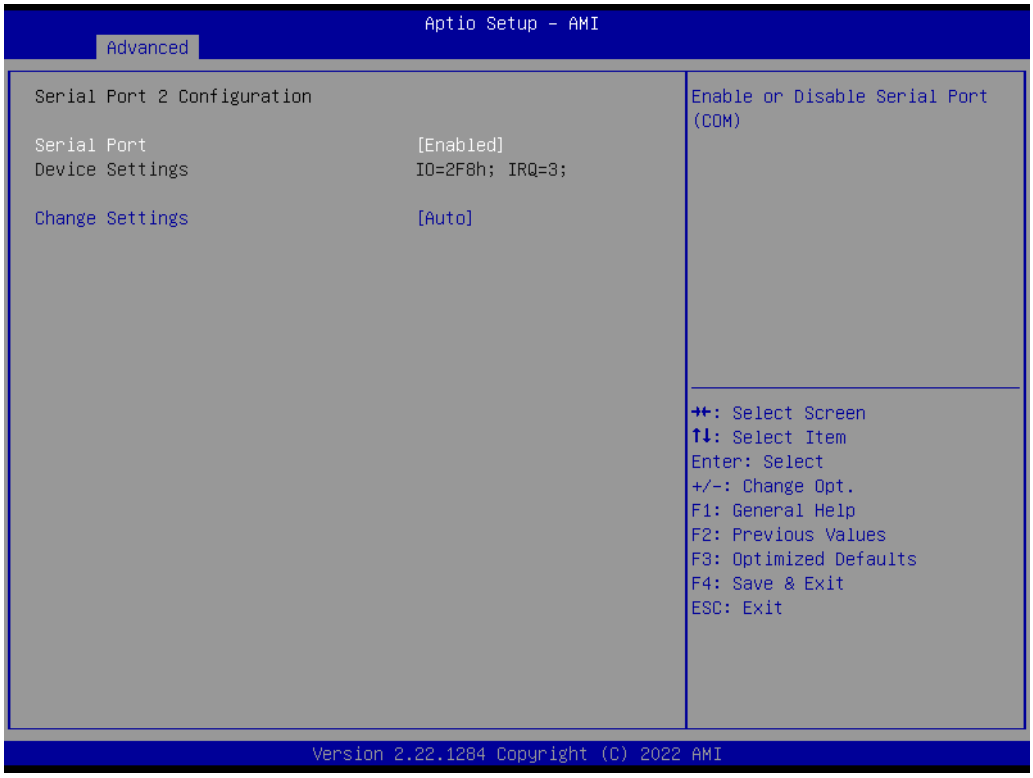



**Figure 3.18 Serial Port 2 Configuration**

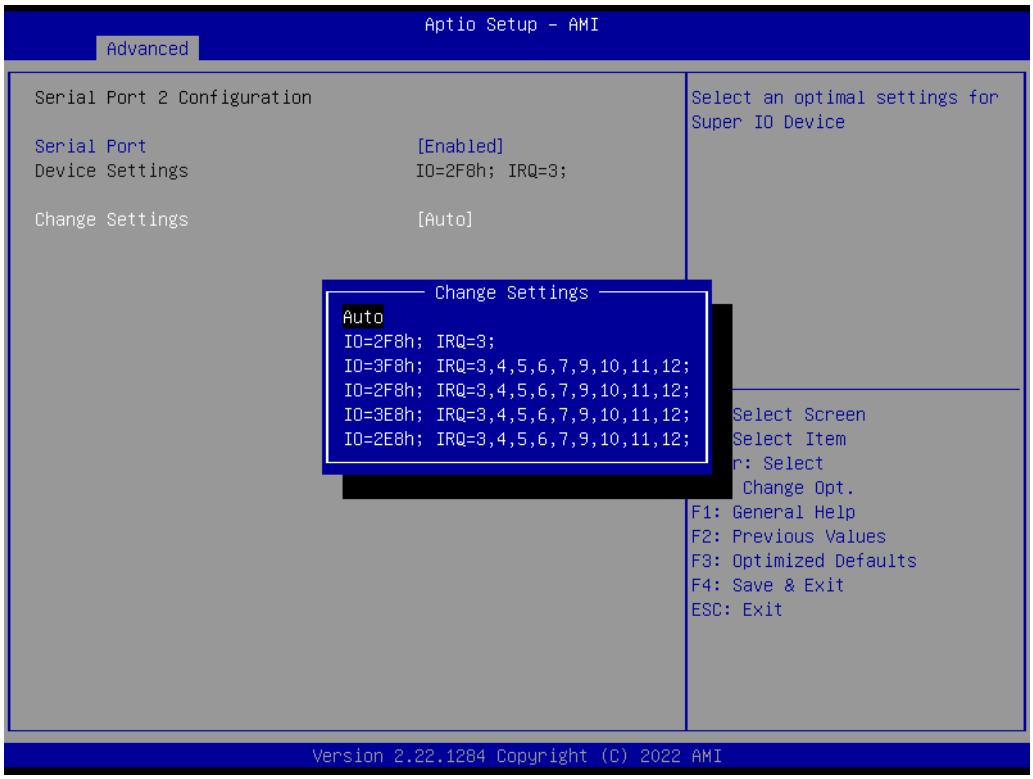



**Figure 3.19 Serial Port 2 Configuration**

- **Serial Port 1 Configuration**
  Sets Parameters of Serial Port 1(COMA).
- **Serial Port 2 Configuration**
  Sets Parameters of Serial Port 2(COMB).

### 3.2.2.10 HW Monitor

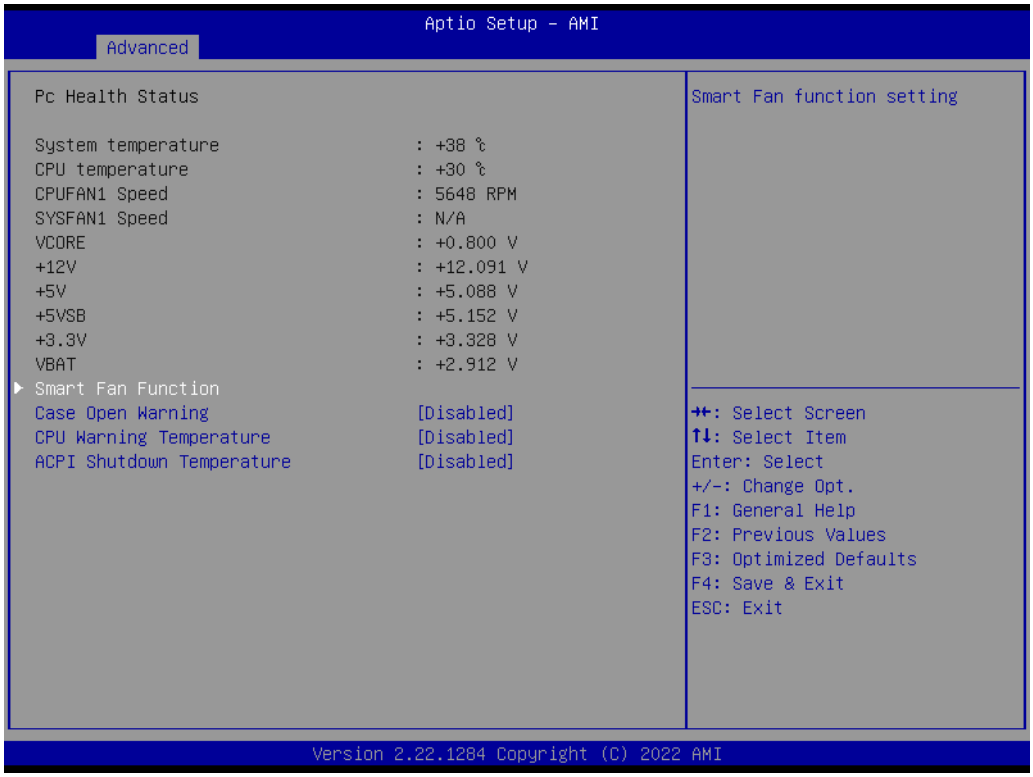
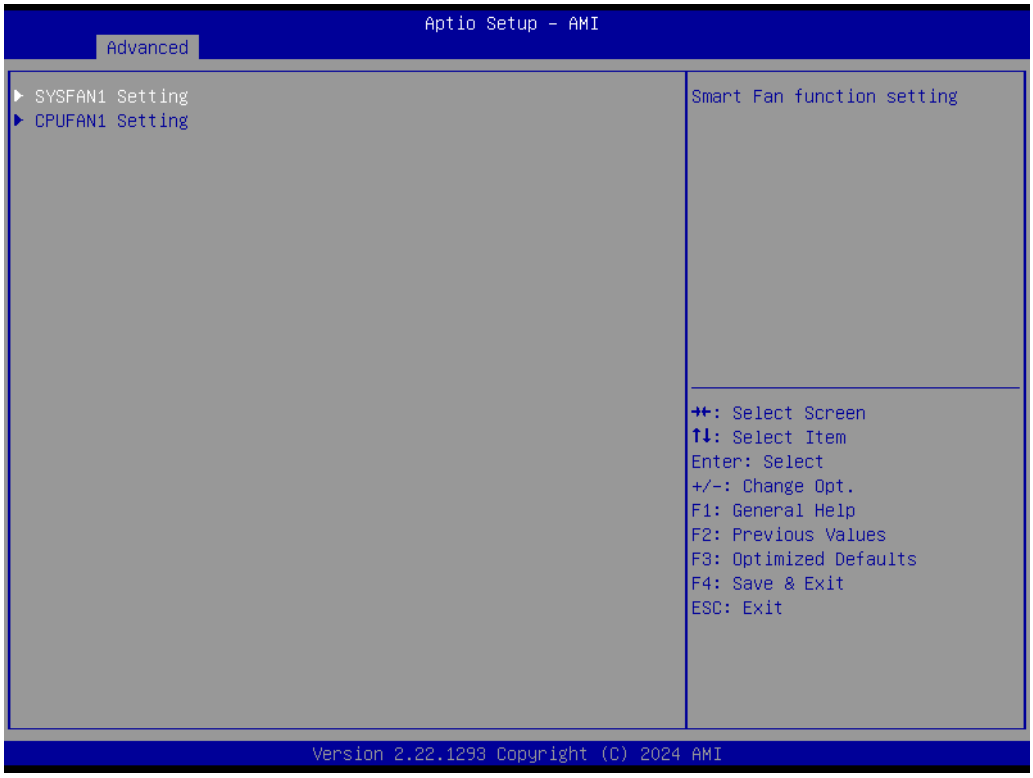



**Figure 3.20 HW Monitor**




**Smart Fan Function**

- **SYSFAN1 Smart Fan setting**
  Fan control mode setting.

- **CPUFAN1 Smart Fan setting**
  Fan control mode setting.
- **Case Open Warning**
  Enable or Disable Case Open Warning.
- **CPU Warning Temperature**
  Sets CPU Warning Temperature.
- **ACPI Shutdown Temperature**
  Sets ACPI Shutdown Temperature.

### 3.2.2.11 S5 RTC Wake Settings

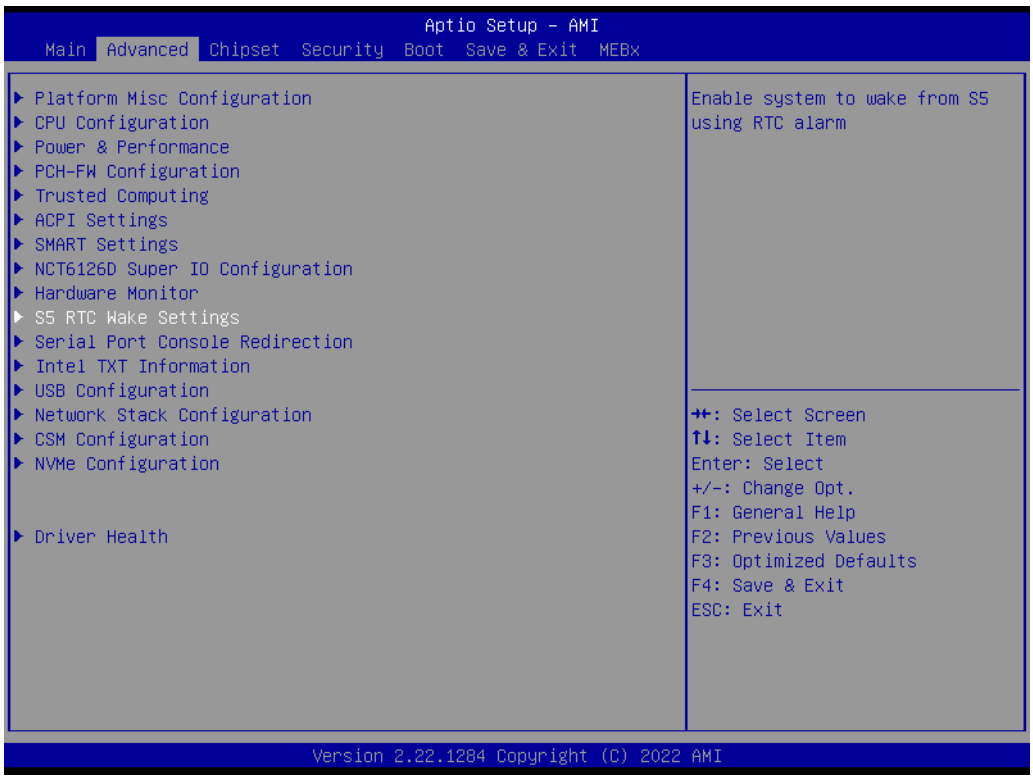
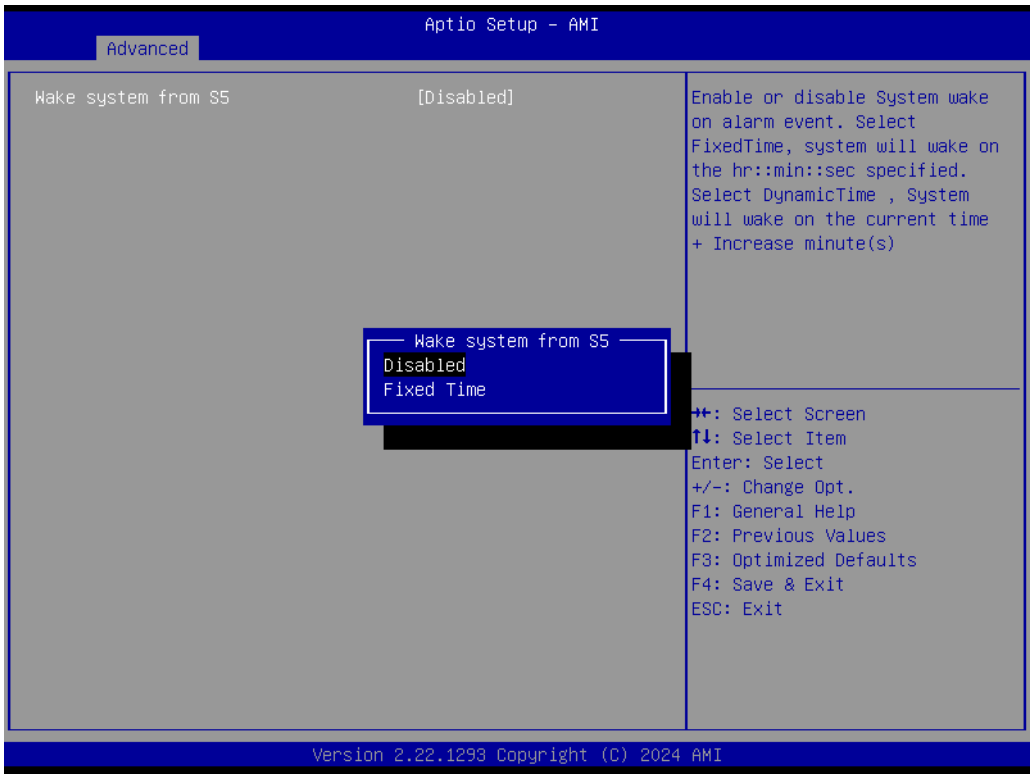
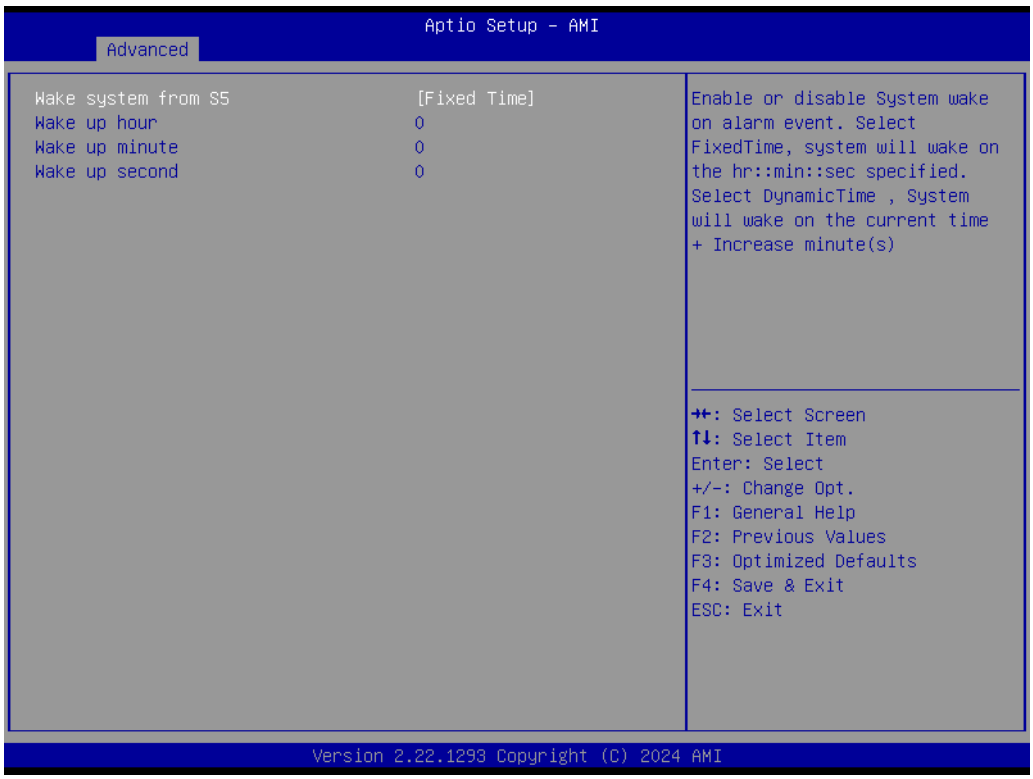



**Figure 3.21 S5 RTC Wake Settings**




- **Wake system from S5**
  Enable or disable System wake on alarm event.
- **Select FixedTime**
  System will wake on the hr::min::sec specified.

### 3.2.2.12 Serial Port Console Redirection

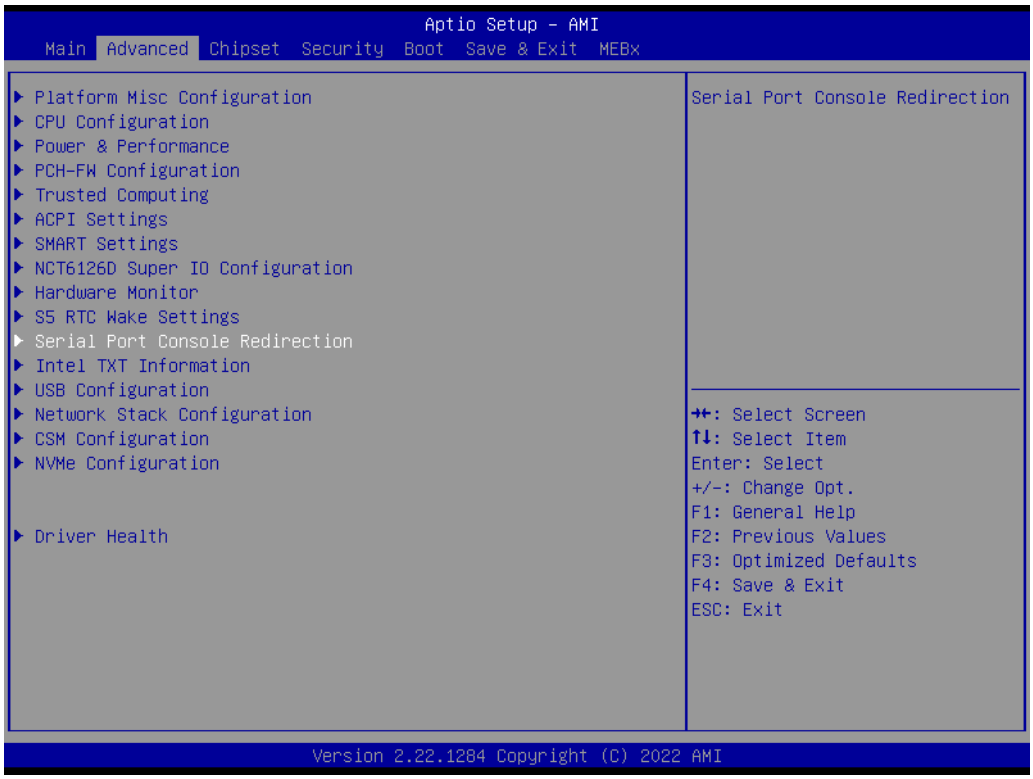



**Figure 3.22 Serial Port1 Console Redirection**

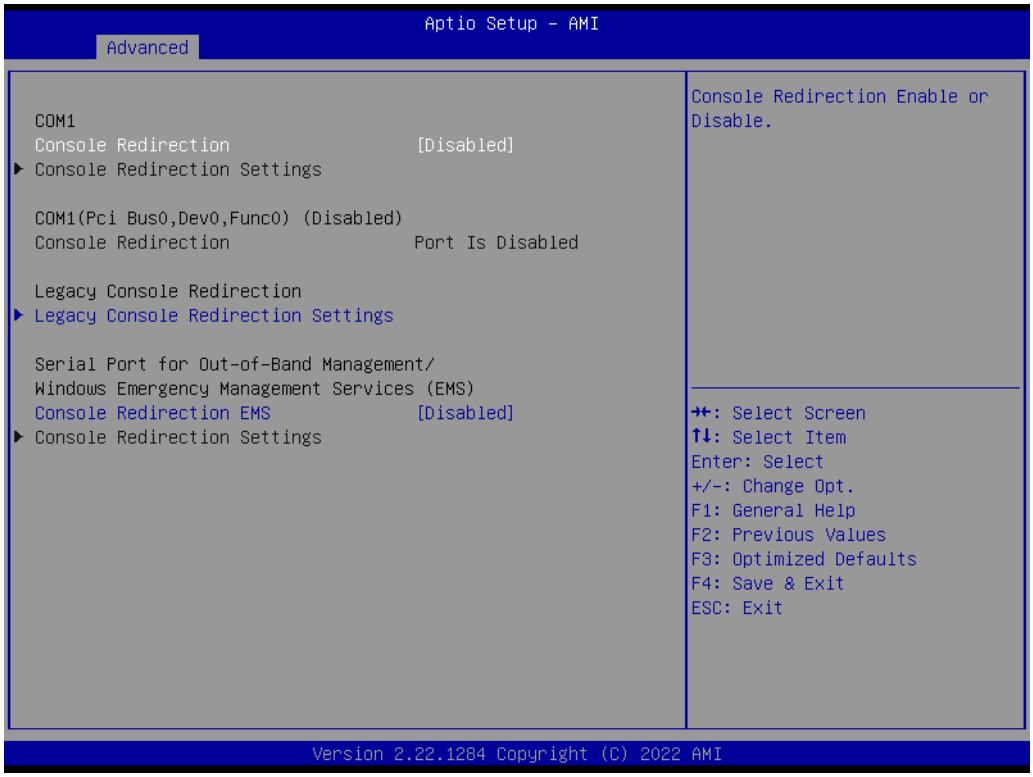



**Figure 3.23 Serial Port1 Console Redirection**

- **COM1 Console Redirection**
  Console Redirection Enable or Disable

- **Legacy Console Redirection Settings**
  - Redirection COM Port
  - Resolution
  - 80x24
  - 80x25
  - Redirect After POST
  - Always Enable
  - BootLoader
- **Console Redirection EMS**
  Console Redirection Enable or Disable.

### 3.2.2.13 Intel_TXT_Information

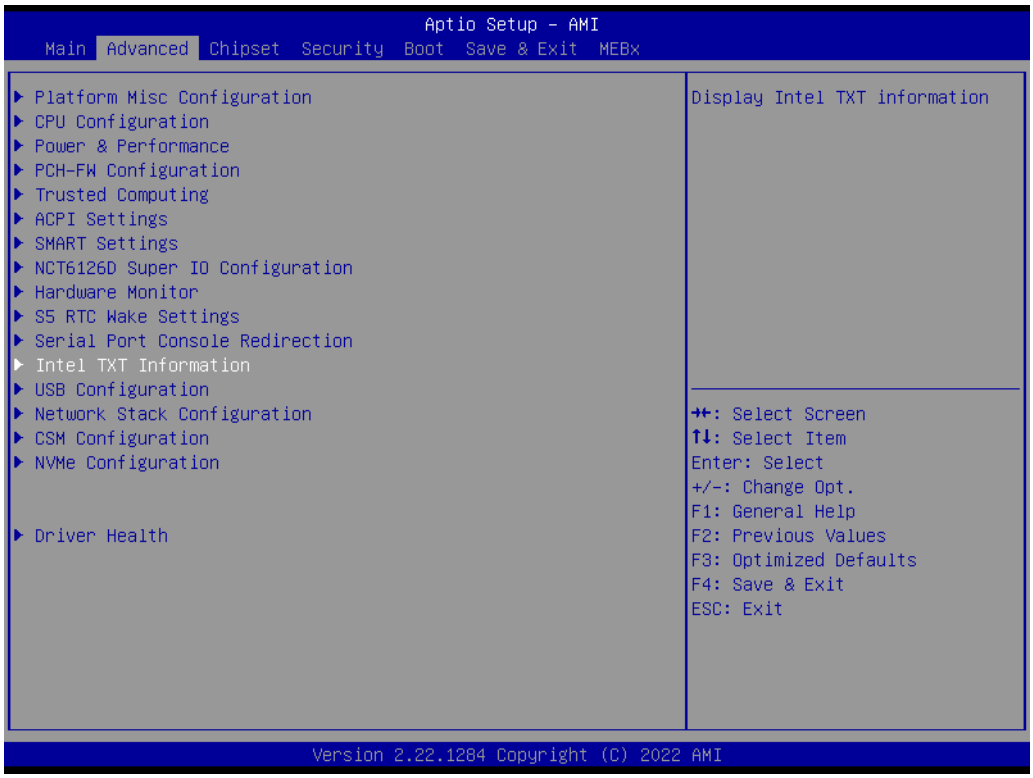



**Figure 3.24 Intel TXT Information**

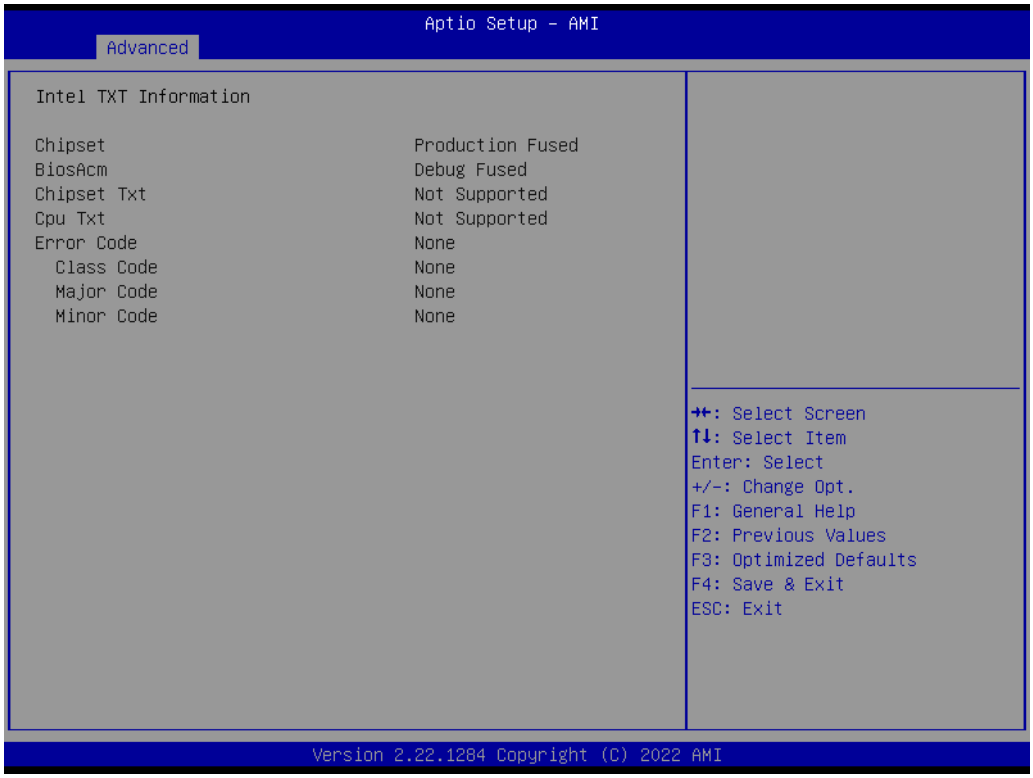



**Figure 3.25 Intel TXT Information**

Chipset, BiosAcm, Cpu Txt, and Error code information.

### 3.2.2.14 PCI Subsystem Setting

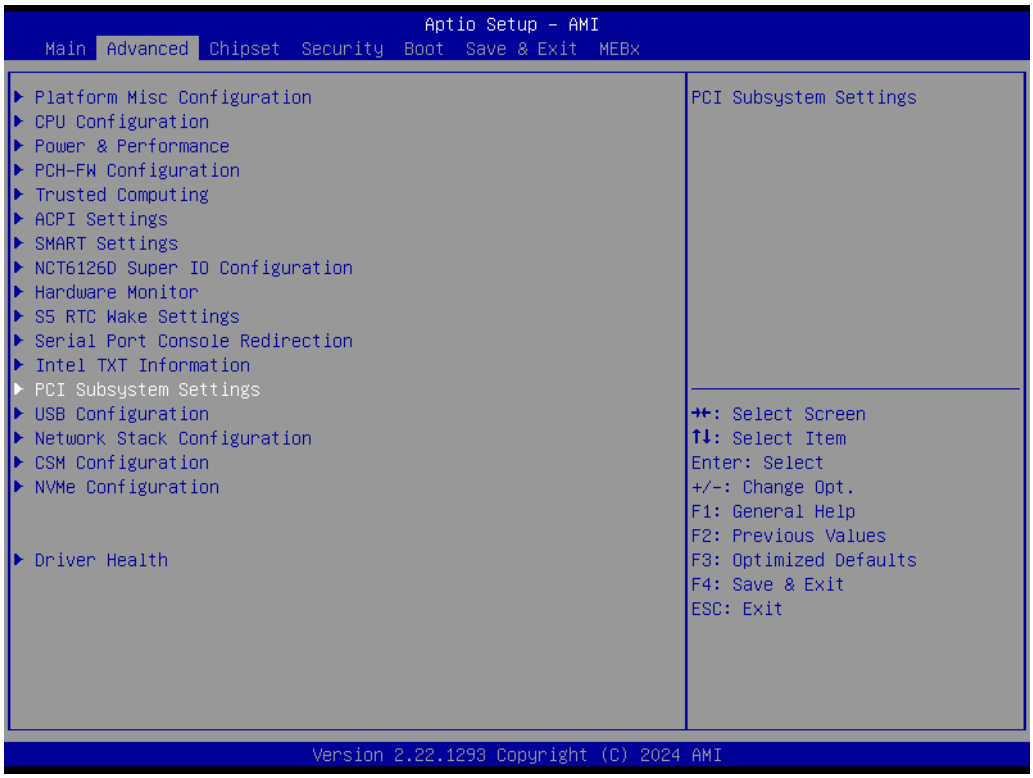



**Figure 3.26 PCI Subsystem Setting**


**Figure 3.27 PCI Subsystem Setting**

### 3.2.2.15 USB Configuration

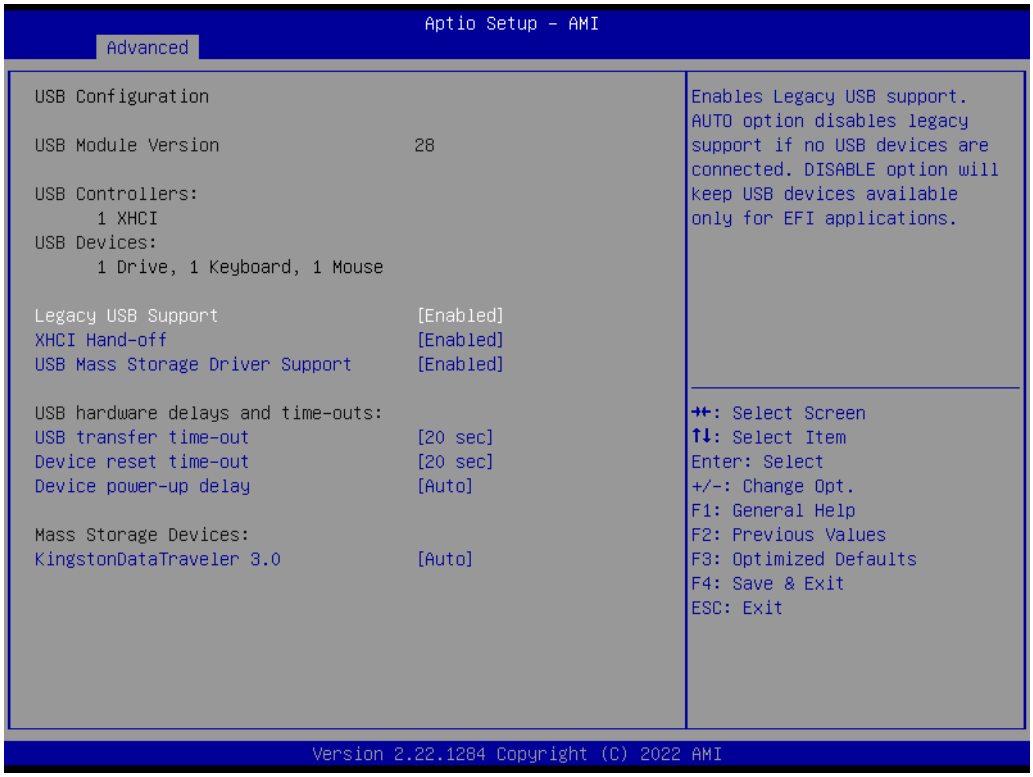



**Figure 3.28 USB Configuration**

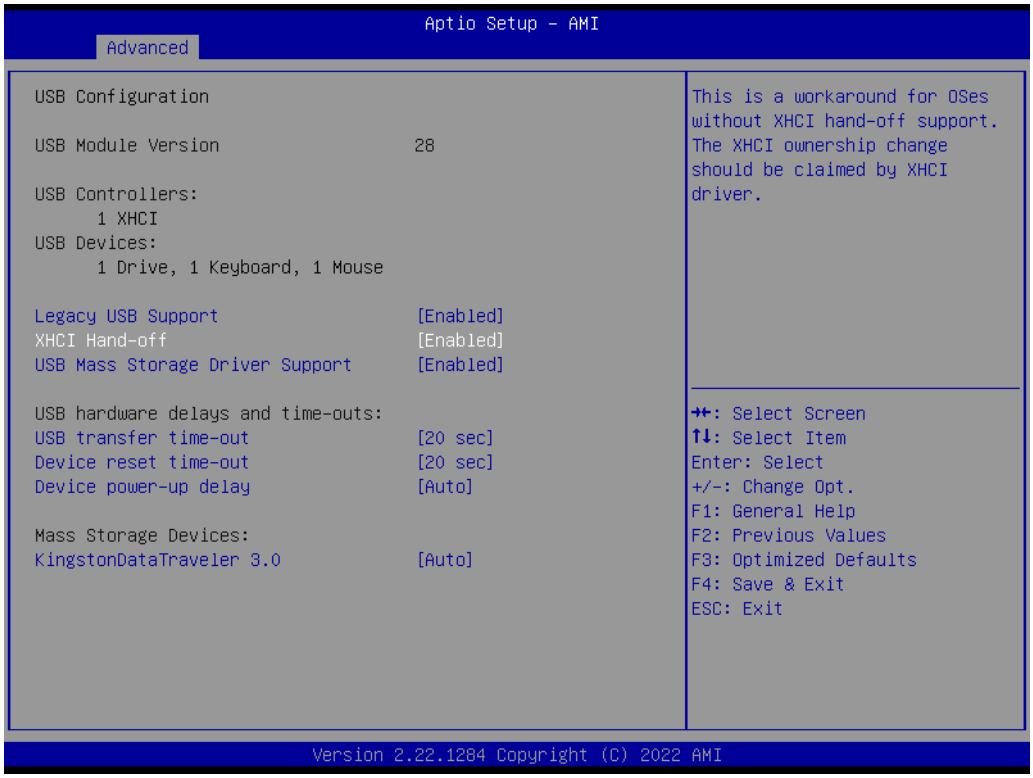



**Figure 3.29 USB Configuration**

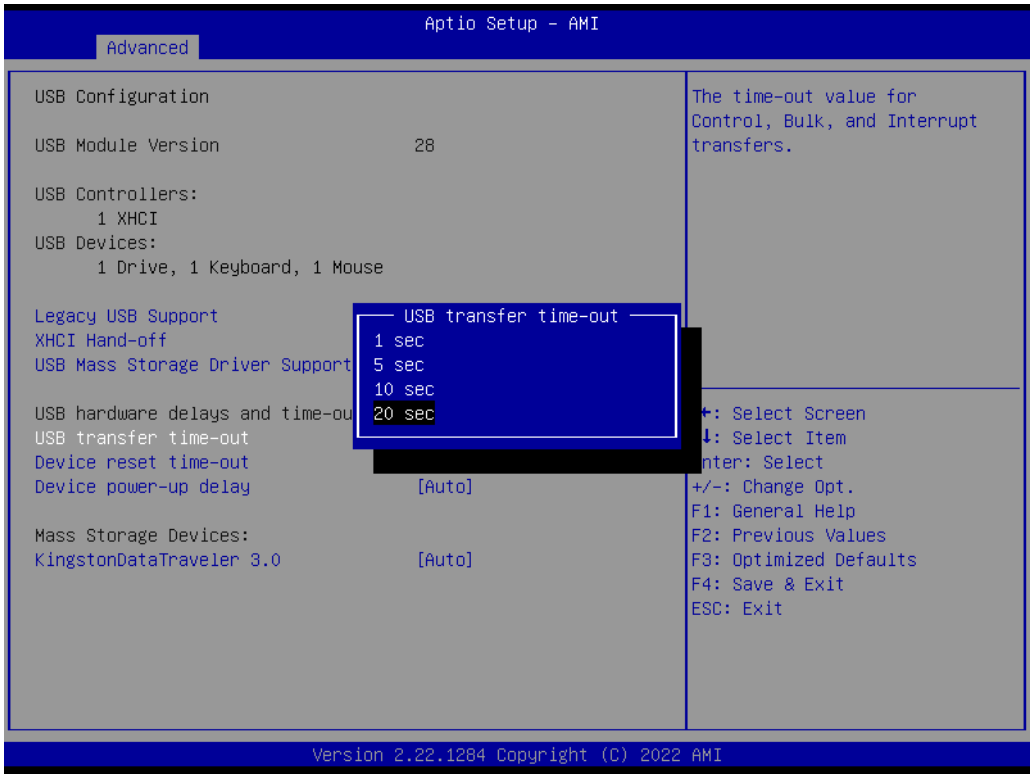



**Figure 3.30 USB Configuration**

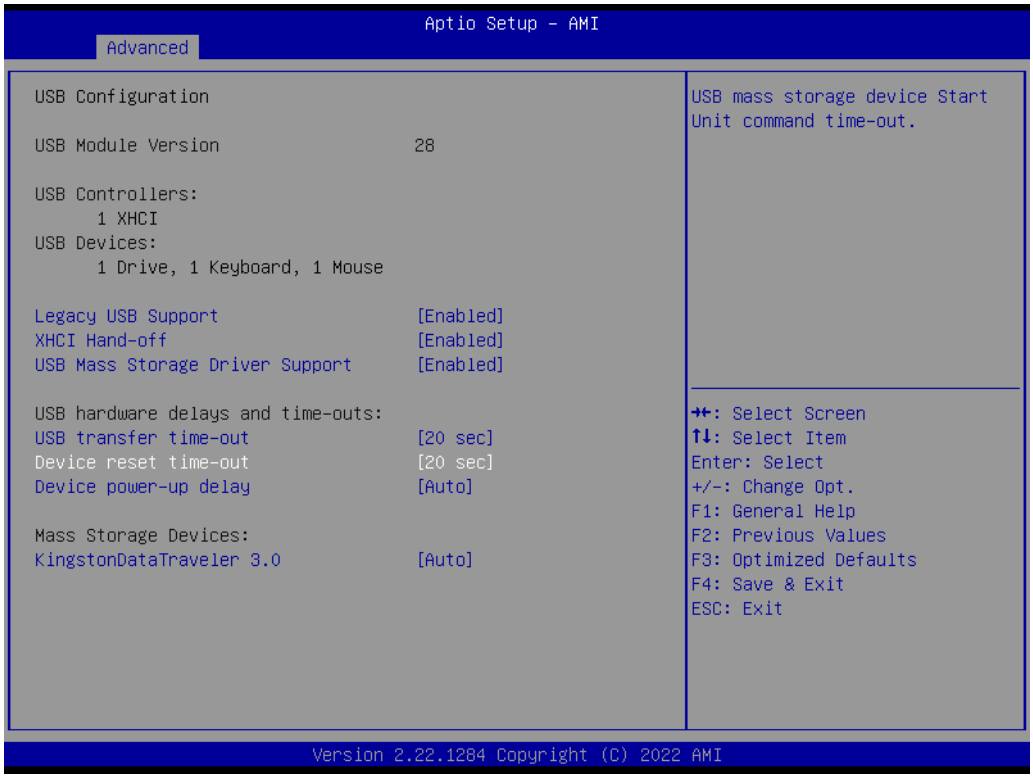



**Figure 3.31 USB Configuration**

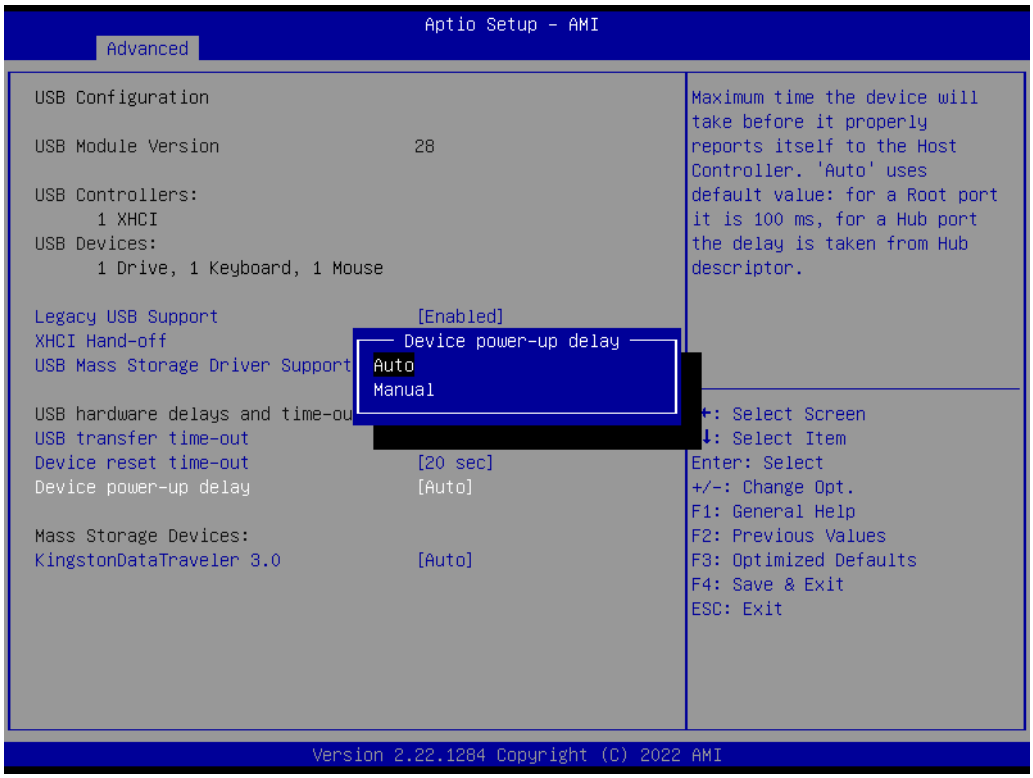



**Figure 3.32 USB Configuration**

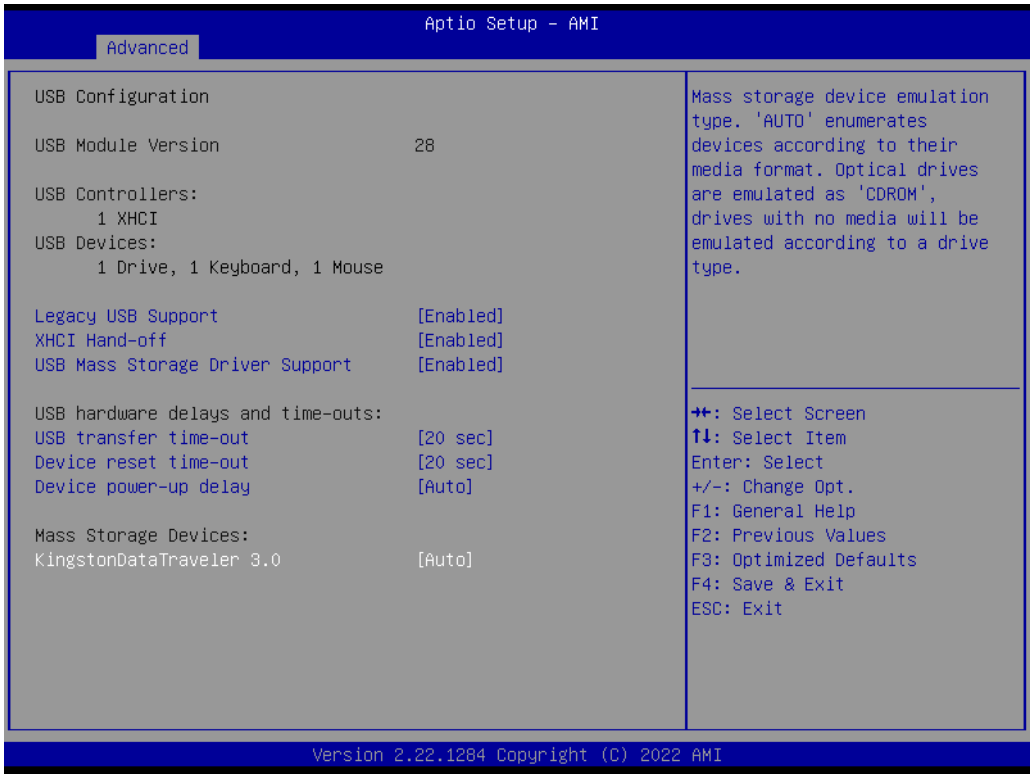



**Figure 3.33 USB Configuration**

- **Legacy USB Support**
  Enable Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

- **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**
  USB Mass Storage Driver Support.

- **USB transfer time-out**
  The time-out value for Control, Bulk, and Interrupt transfers.

- **Device reset time-out**
  USB mass storage device Start unit command time-out.

- **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 taken from Hub descriptor.

- **KingstonDataTraveler 3.0**
  Mass storage device emulation type. “AUTO” enumerates devices according to their media format. Optical drives are emulated as “CDROM”, drives with no media will be emulated according to a drive type.

### 3.2.3 Network Stack Configuration

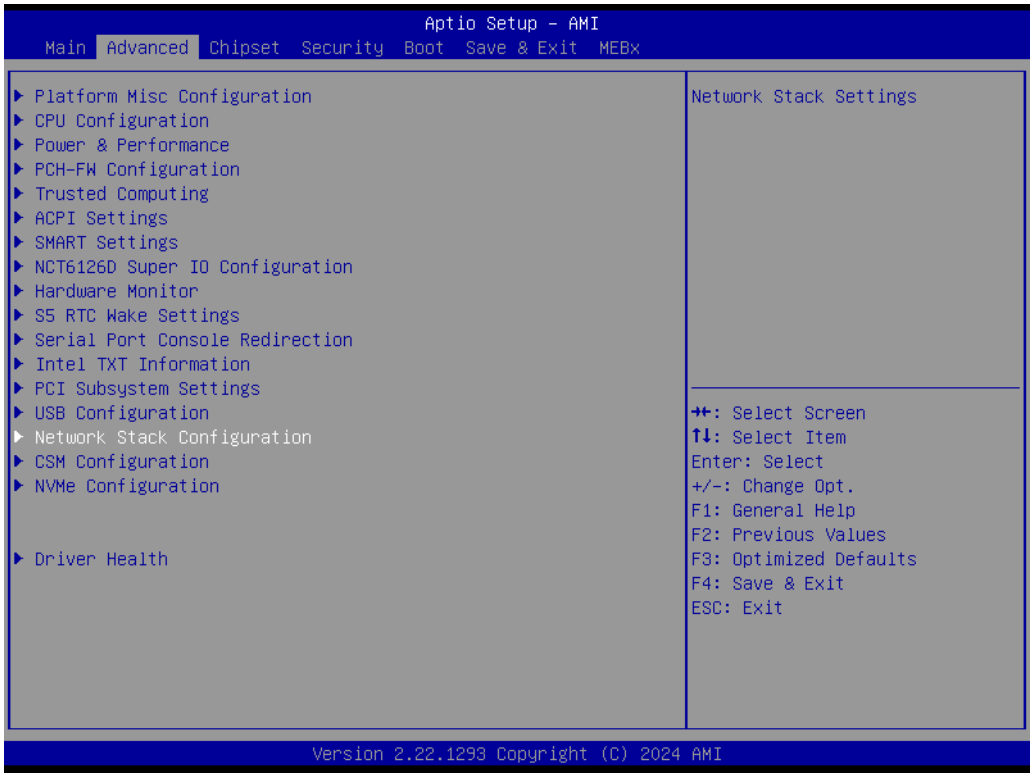



**Figure 3.34 Network Stack Configuration**

#### 3.2.3.1 Network Stack Settings

- **Network Stack**
  Enable/Disable UEFI Network Stack

### 3.2.3.2 CSM Configuration

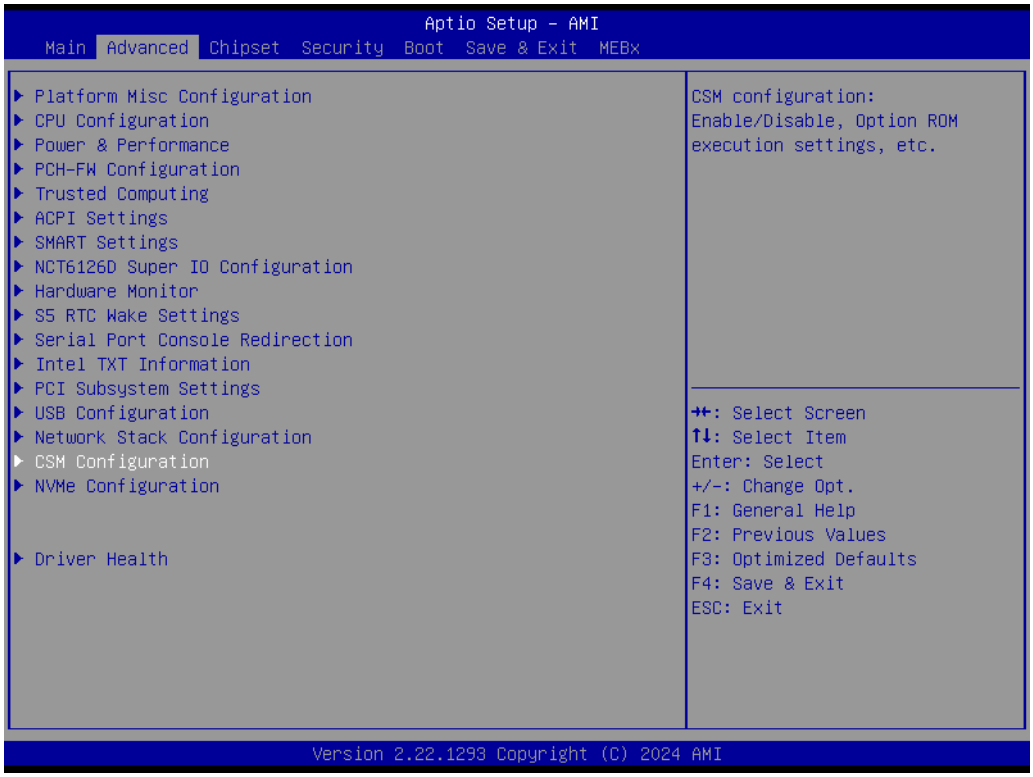



**Figure 3.35 CSM Configuration**

- **CSM Support**
  Enable/Disable CSM Support

### 3.2.3.3 NVME Configuration

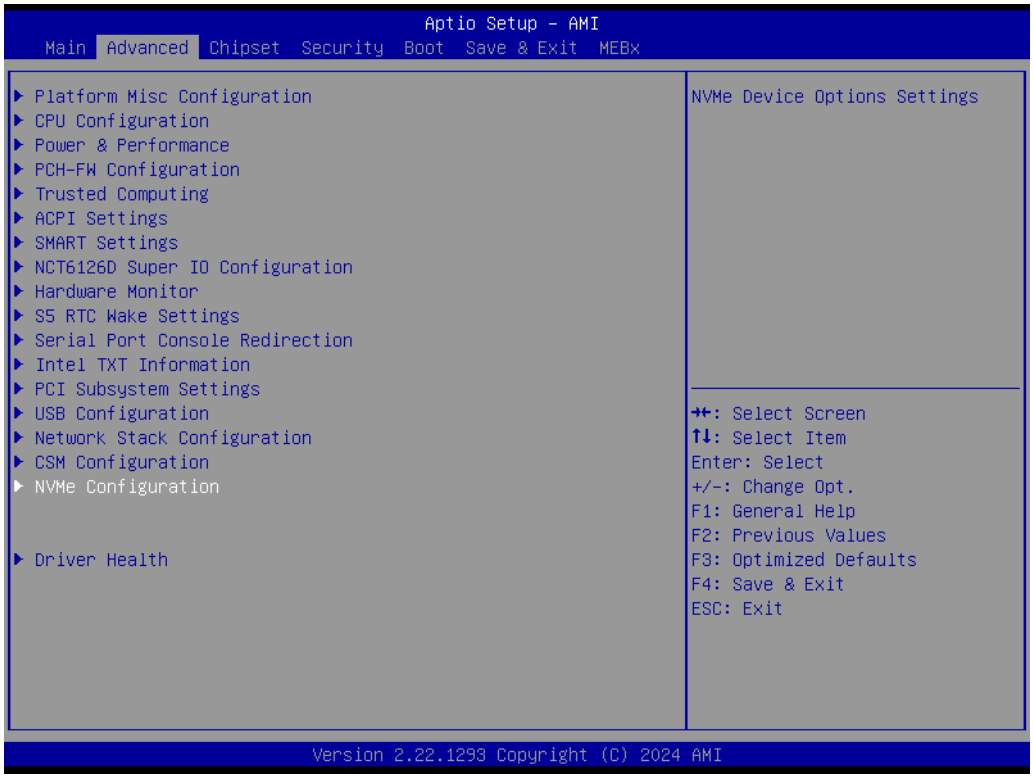



**Figure 3.36 NVME Configuration**

### 3.2.3.4 NVME Device Options Settings

- **Driver Health**
  Provides Health Status for the Drivers/Controllers

### 3.2.4 Chipset


**Figure 3.37 System Agent (SA) Configuration**

- **System Agent (SA) Parameters**
- **PCH-IO Configuration**
  PCH Parameters.

### 3.2.4.1 System Agent (SA) Configuration

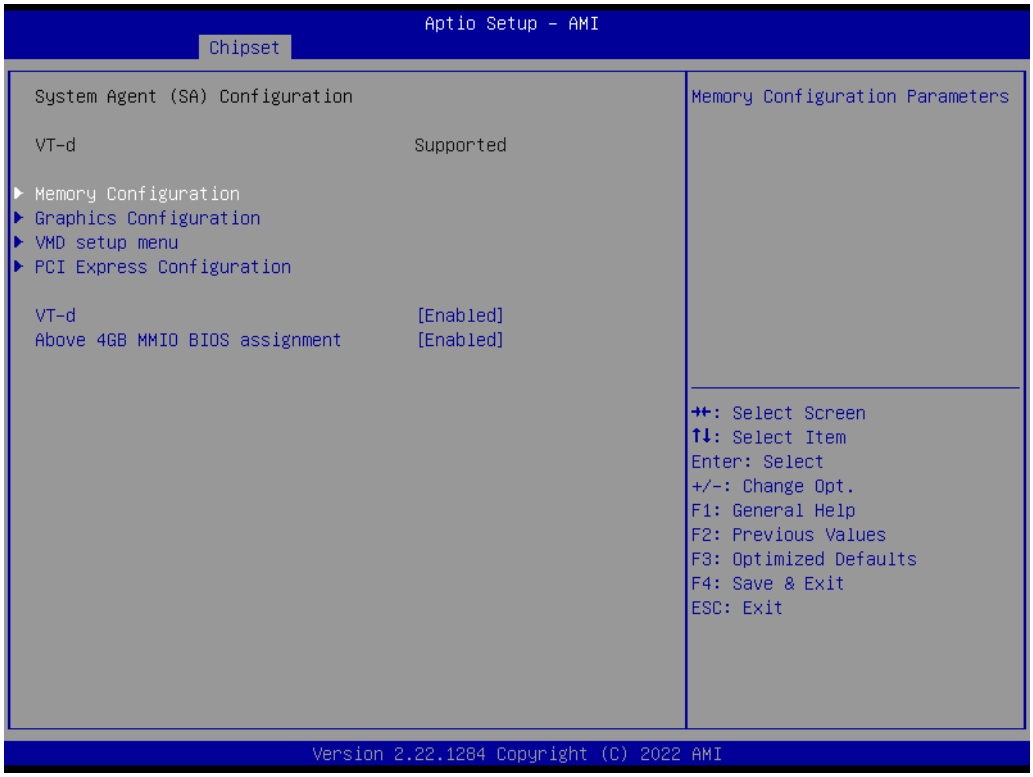



**Figure 3.38 System Agent (SA) Configuration**

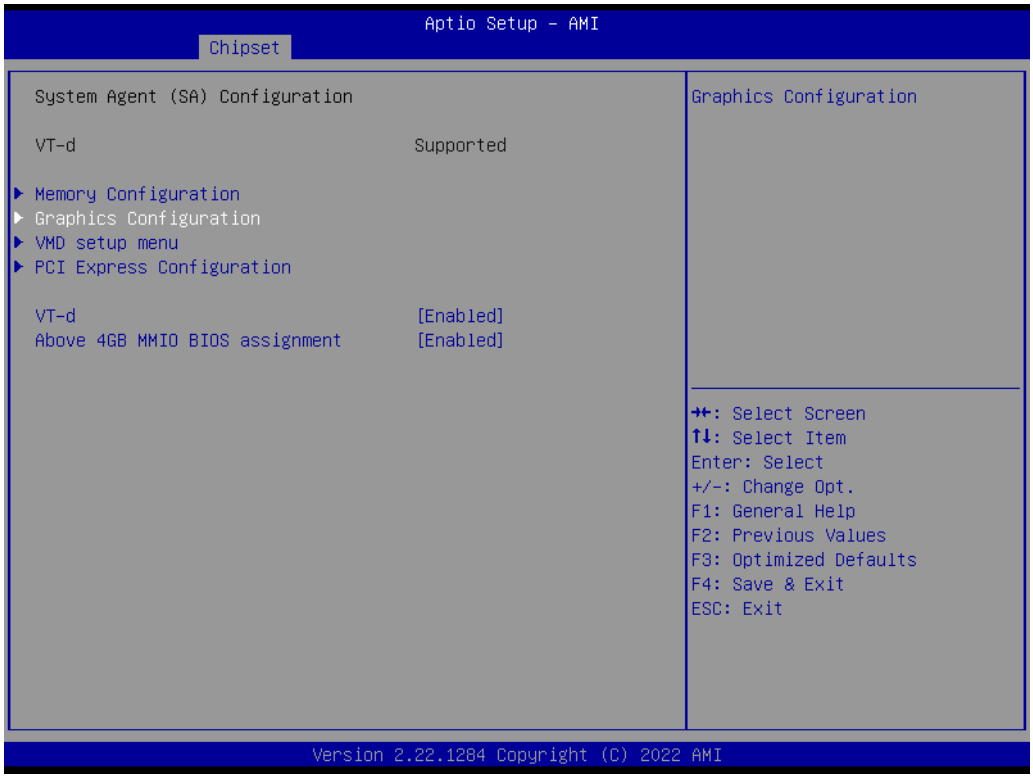



**Figure 3.39 System Agent (SA) Configuration**

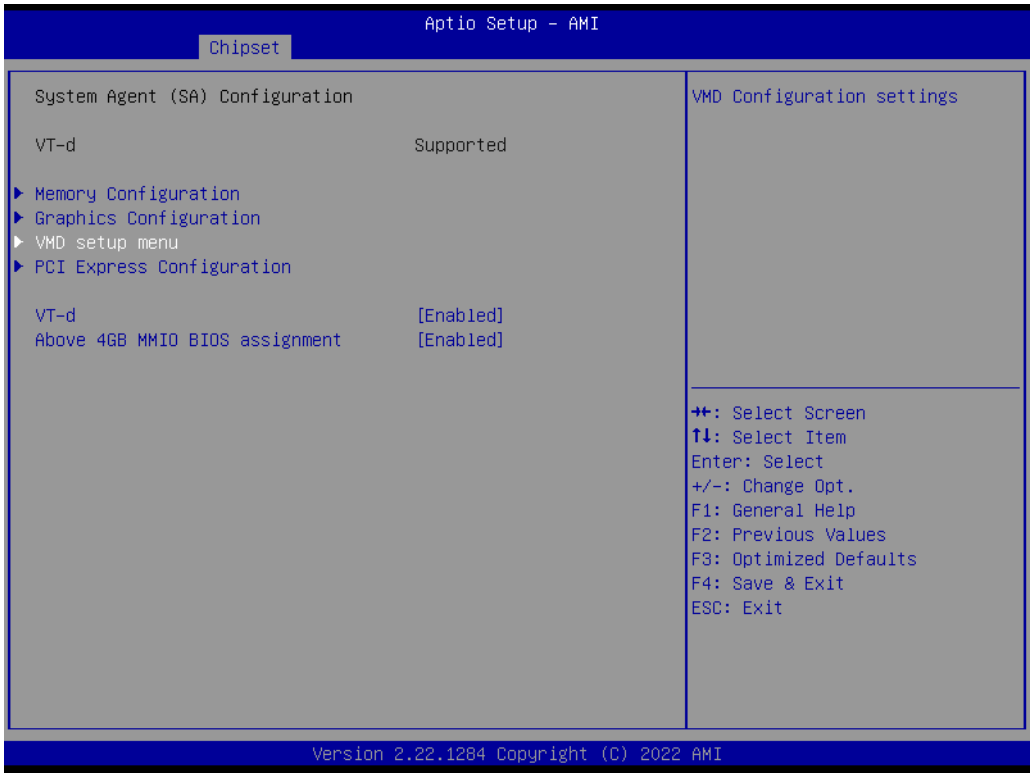



**Figure 3.40 System Agent (SA) Configuration**

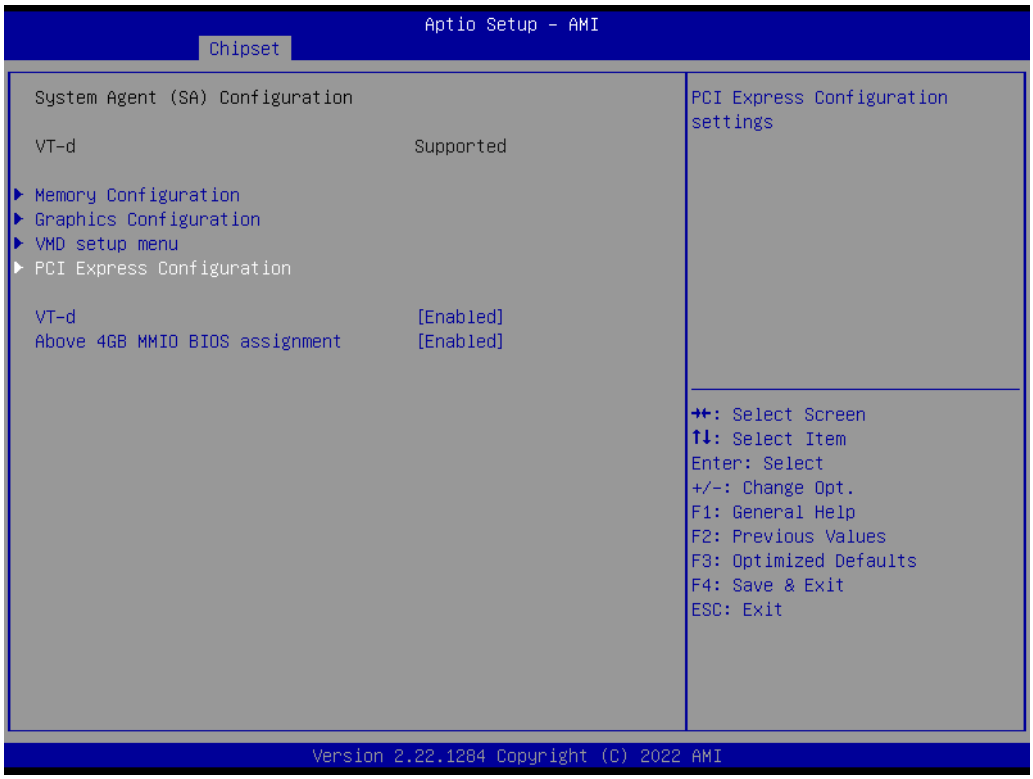



**Figure 3.41 System Agent (SA) Configuration**

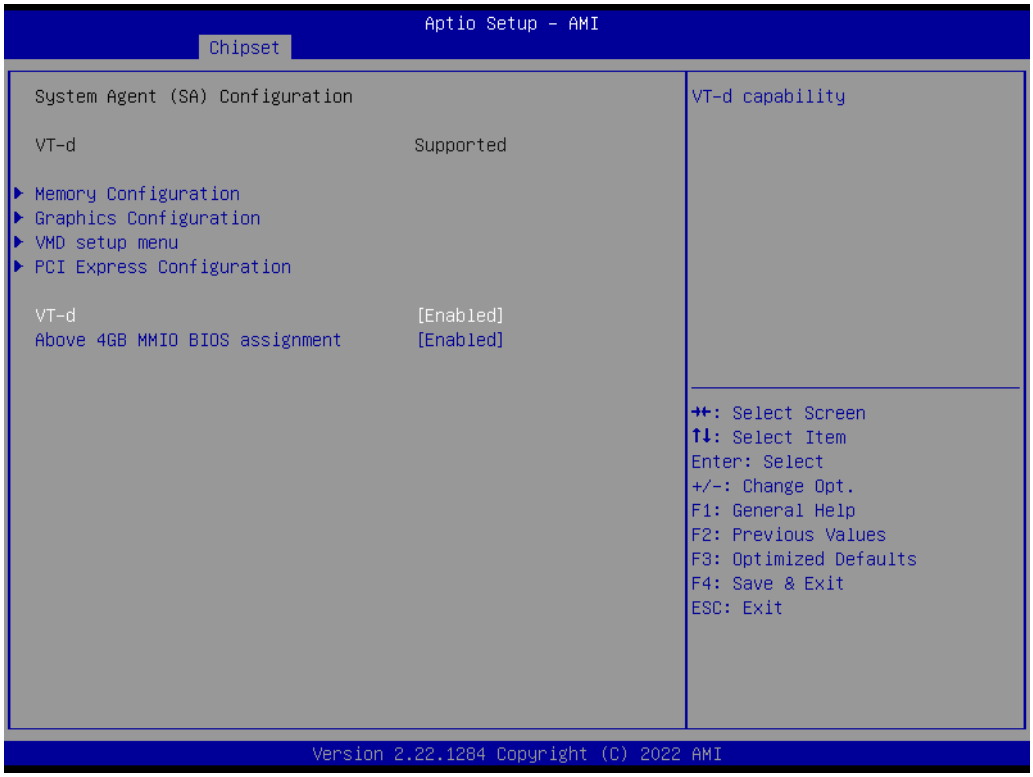



**Figure 3.42 System Agent (SA) Configuration**

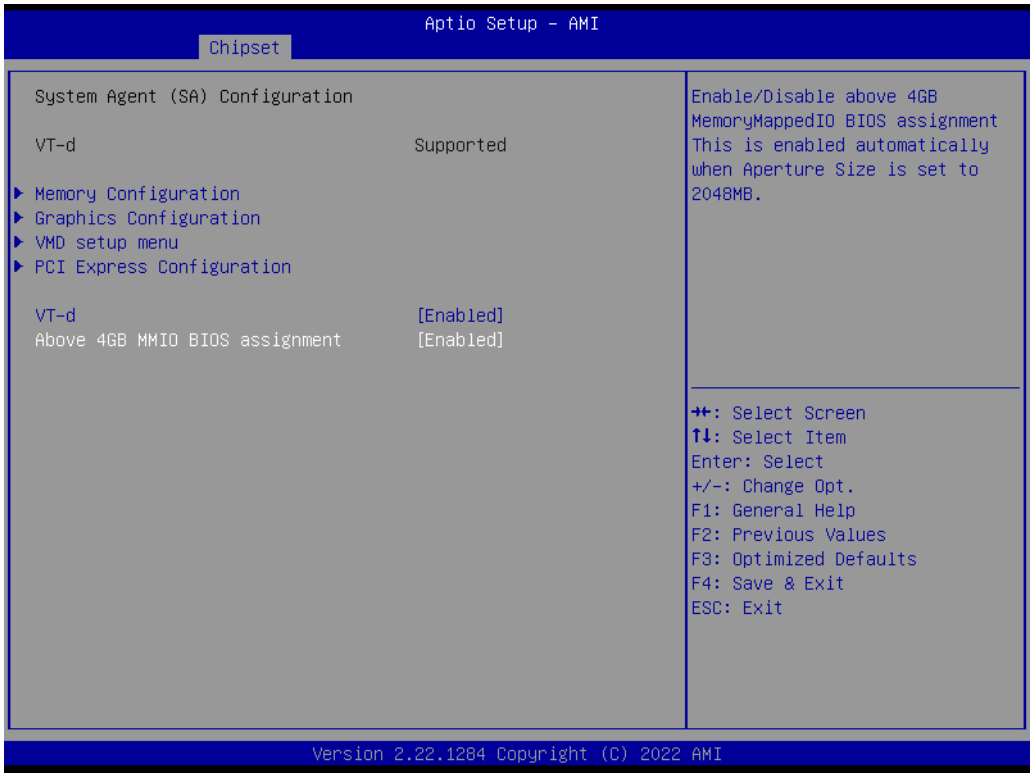



**Figure 3.43 System Agent (SA) Configuration**

- **Memory Configuration**
  Memory Configuration Parameters.
- **Graphics Configuration**
  Graphics Configuration.

- **Enable VMD controller**
  "Enable or Disable" VMD controller. Enable VMD controller to active "Intel Rapid Storage Technology" option and setup RAID.
- **PCI Express Configuration**
  PCI Express Configuration
- **VT-d**
  VT-d capability
- **Above 4GB MMIO BIOS assignment**
  Enable/Disable above 4GB MemoryMapped BIOS assignment. This is enable automatically when aperture size is set to 2048MB.

### 3.2.4.2 PCH-IO Configuration

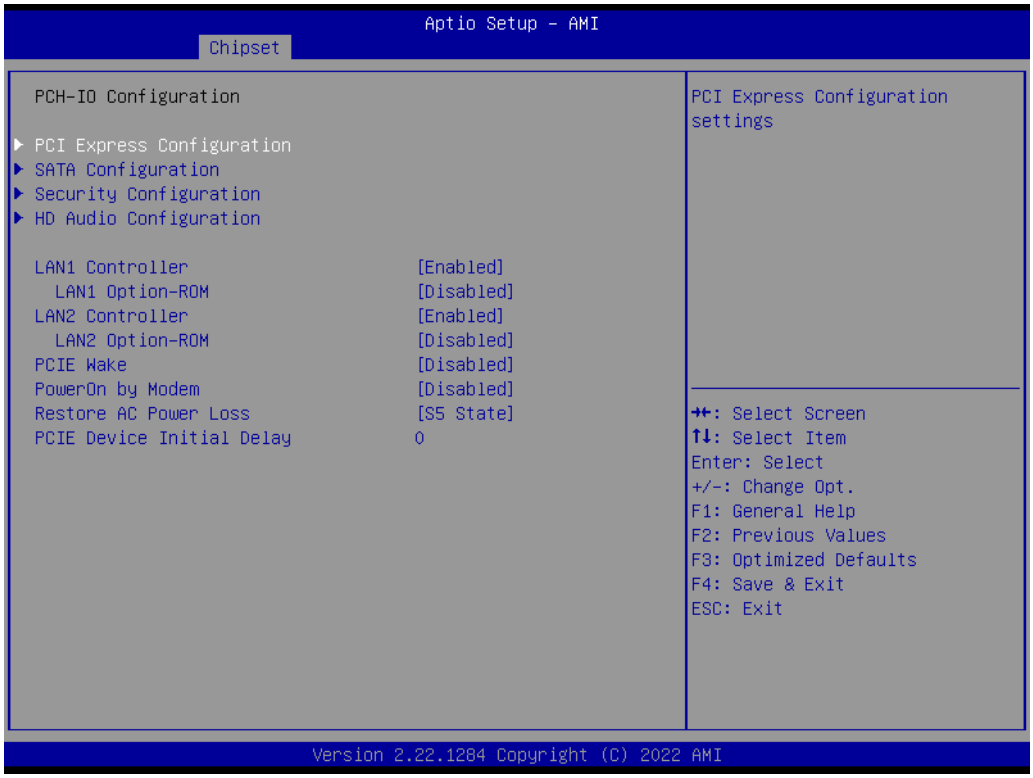



**Figure 3.44 PCH-IO Configuration**

- **PCI Express Configuration**
  PCI Express Configuration settings.
- **SATA And RST Configuration**
  SATA Device Options Settings.
- **Security Configuration**
  Security Configuration Settings.
- **HD Audio Configuration**
  HD Audio Configuration Settings.

### 3.2.4.3 Security

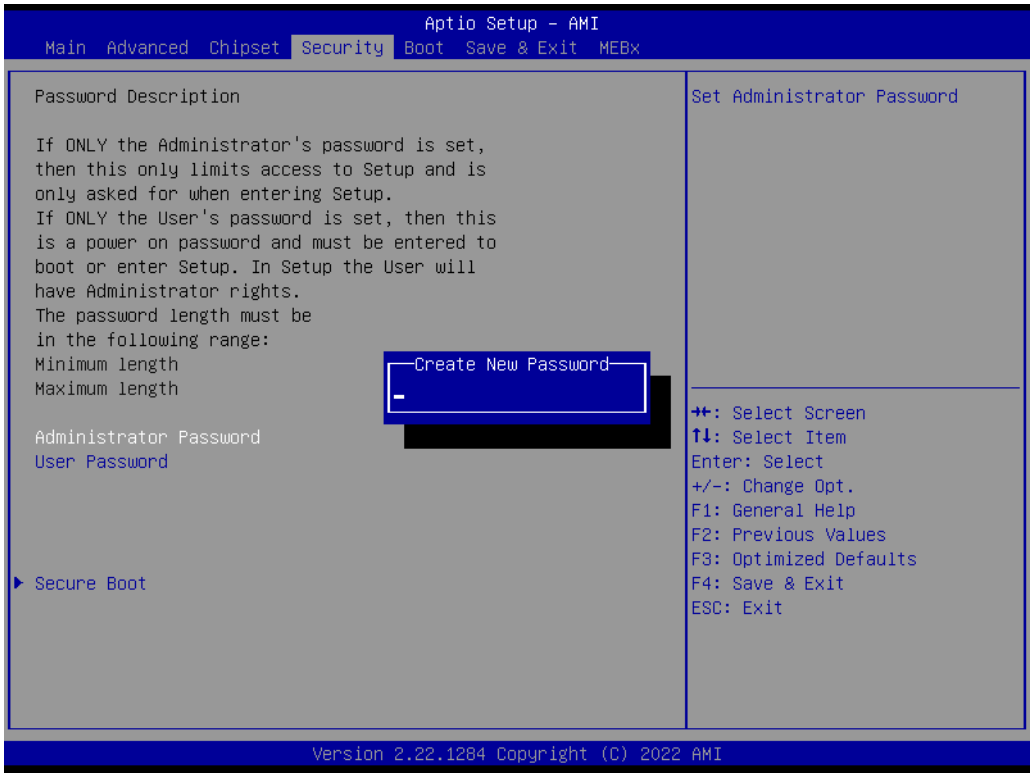



**Figure 3.45 Security**

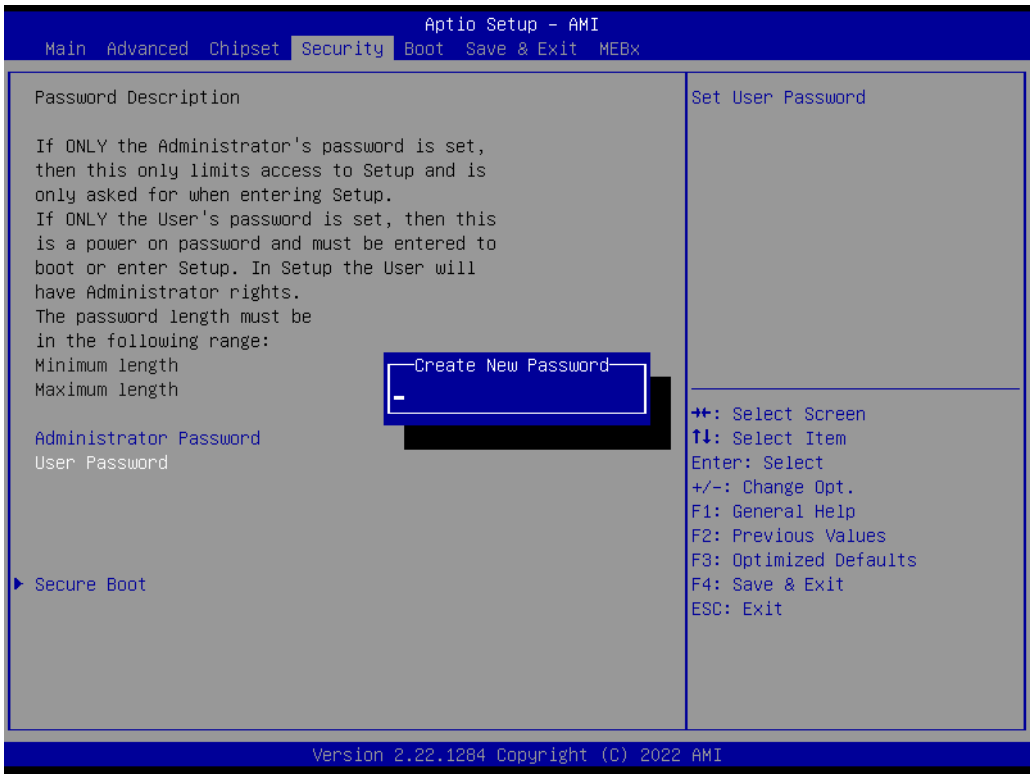



**Figure 3.46 Security**

- **Administrator Password**
  Set Administrator Password.
- **User Password**
  Set User Password.

### 3.2.4.4 Boot

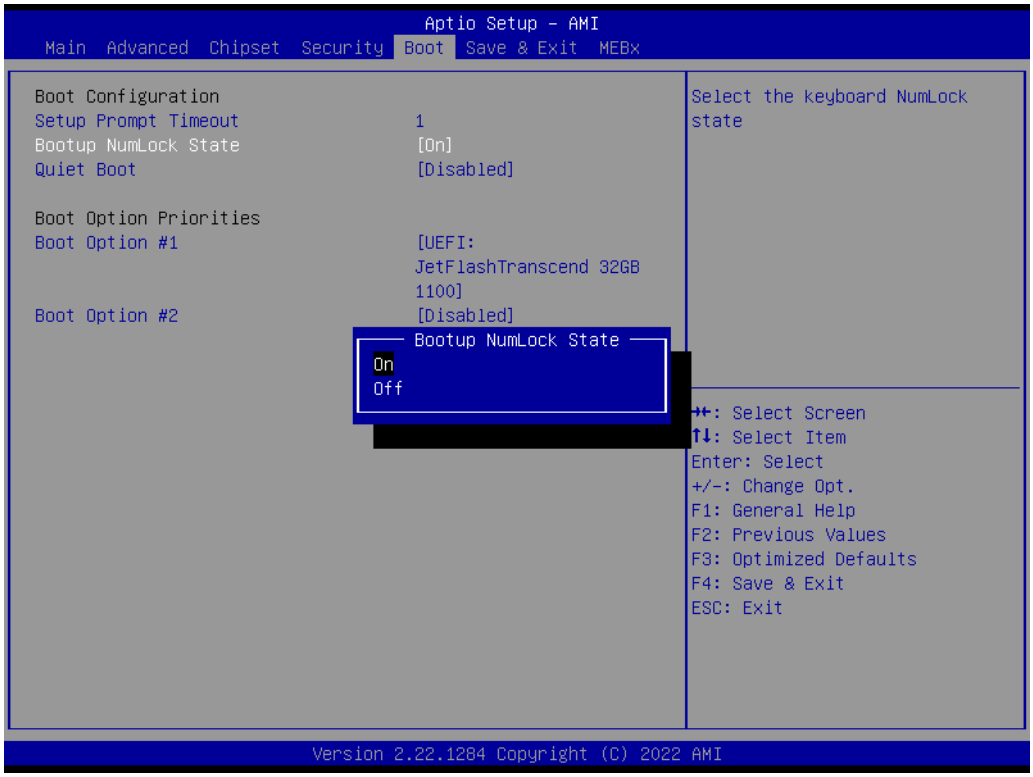



**Figure 3.47 Boot**

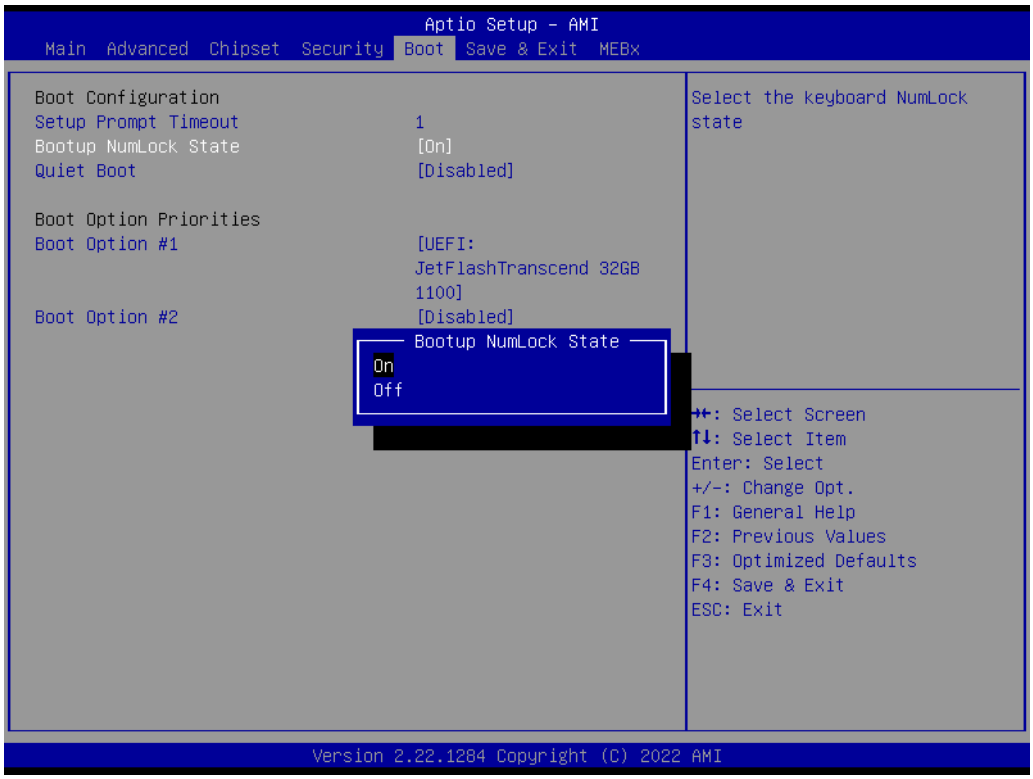



**Figure 3.48 Boot**

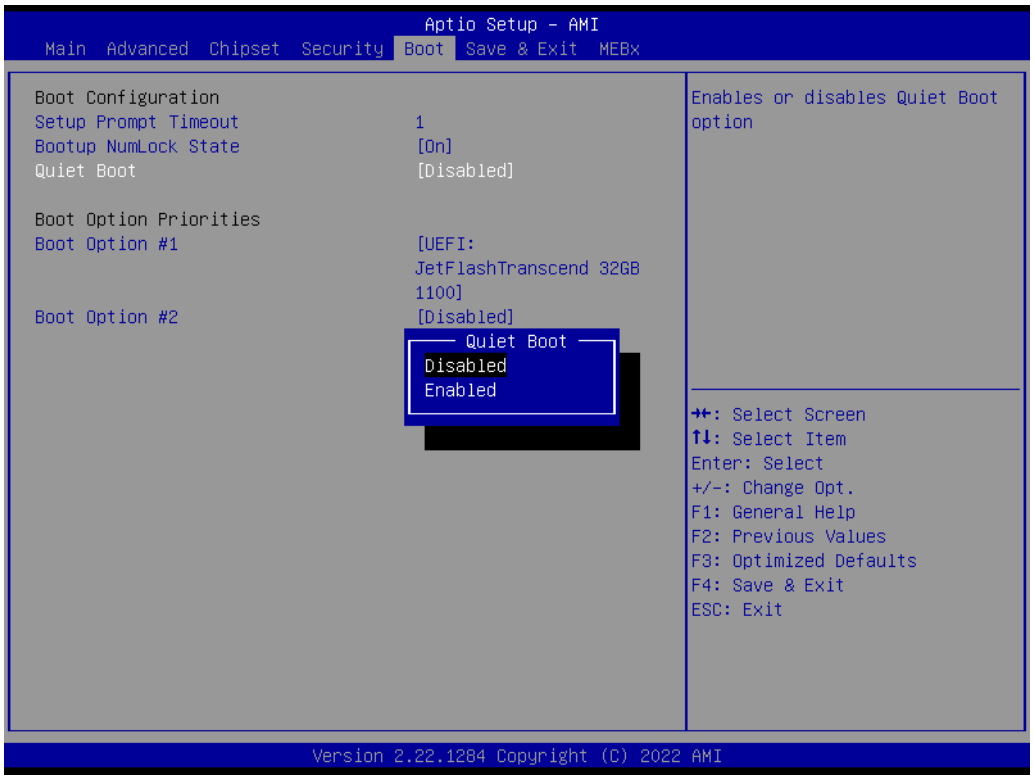



**Figure 3.49 Boot**

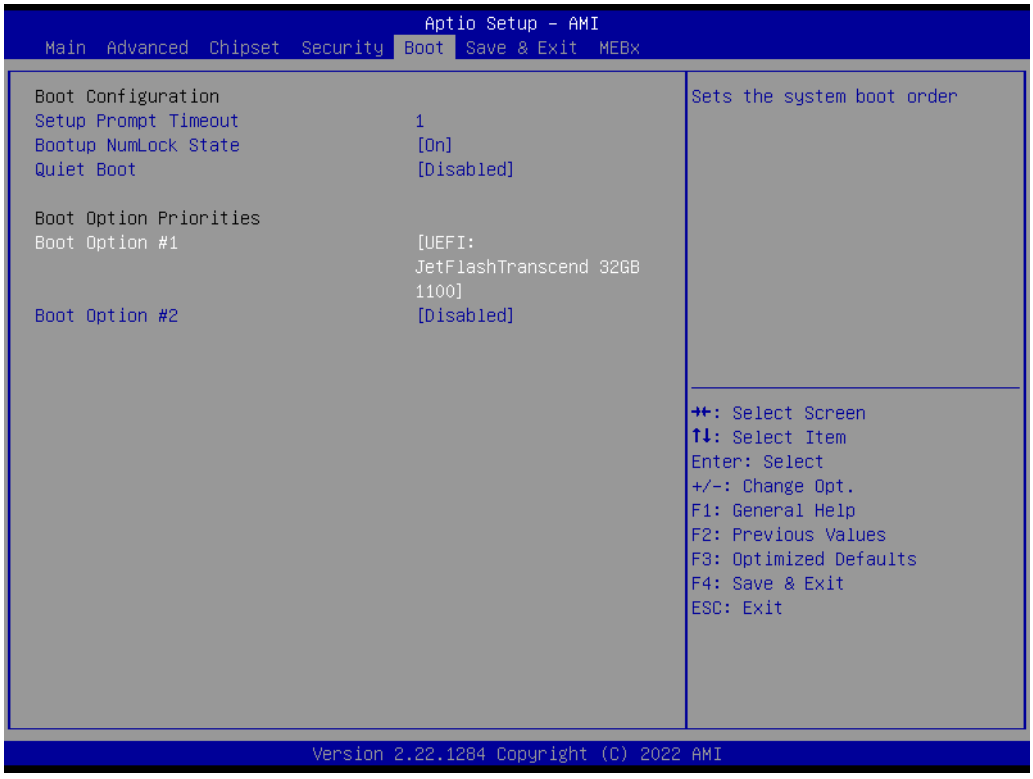



**Figure 3.50 Boot**

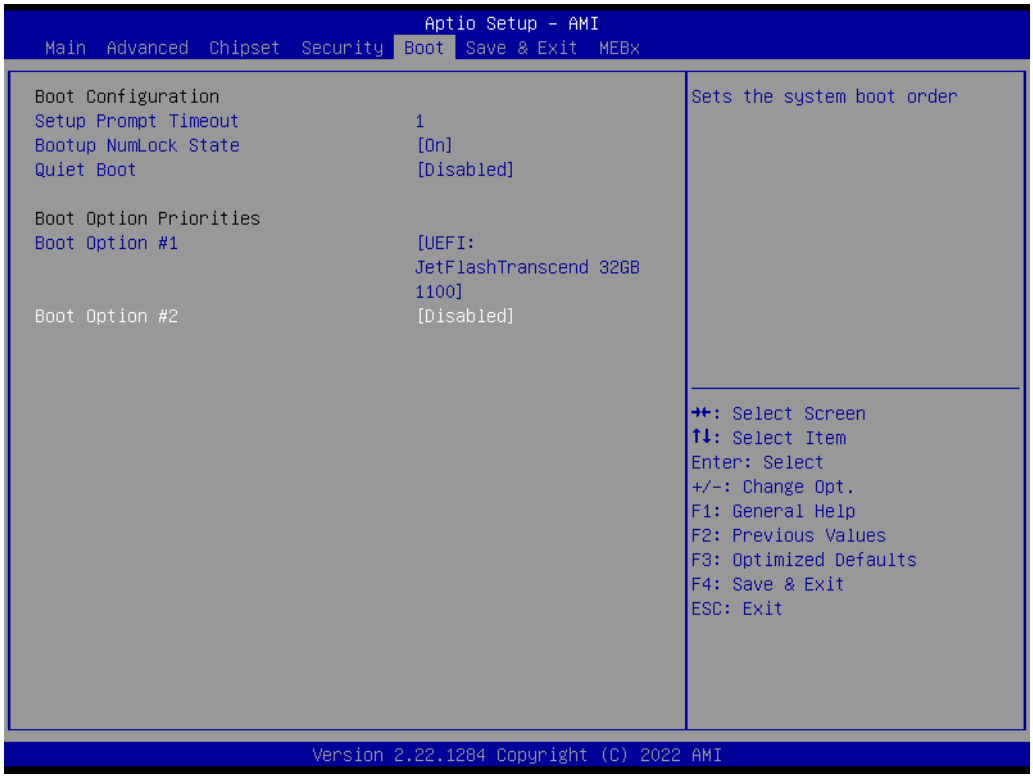



**Figure 3.51 Boot**

- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
- **Bootup NumLock State**
  Select the keyboard NumLock state.
- **Quiet Boot**
  Enables or disables Quiet Boot.
- **Boot Option #1**
  Sets the system boot order.
- **Boot Option #2**
  Sets the system boot order.

### 3.2.4.5 Save & Exit

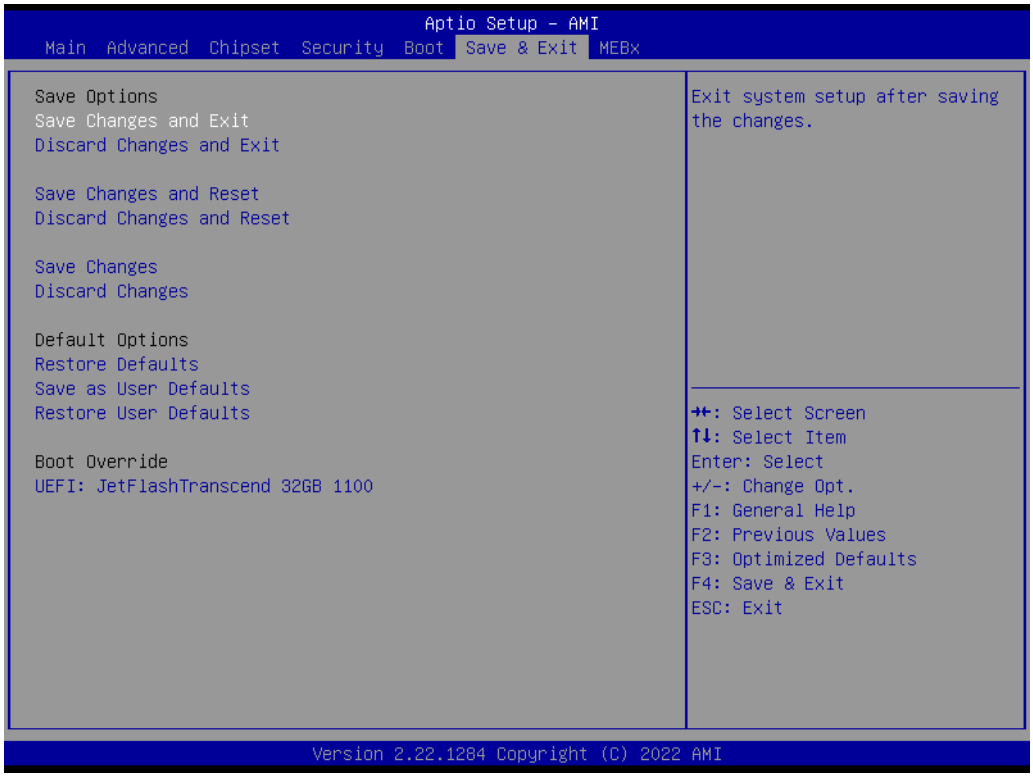



**Figure 3.52 Save & Exit**

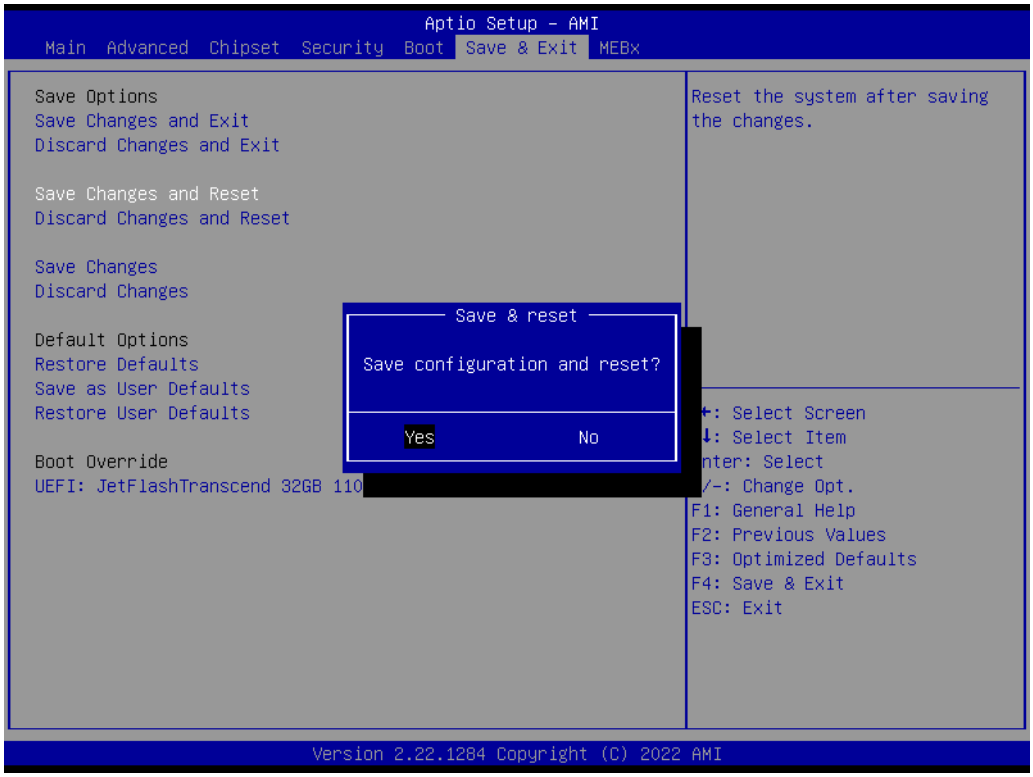



**Figure 3.53 Save & Exit**

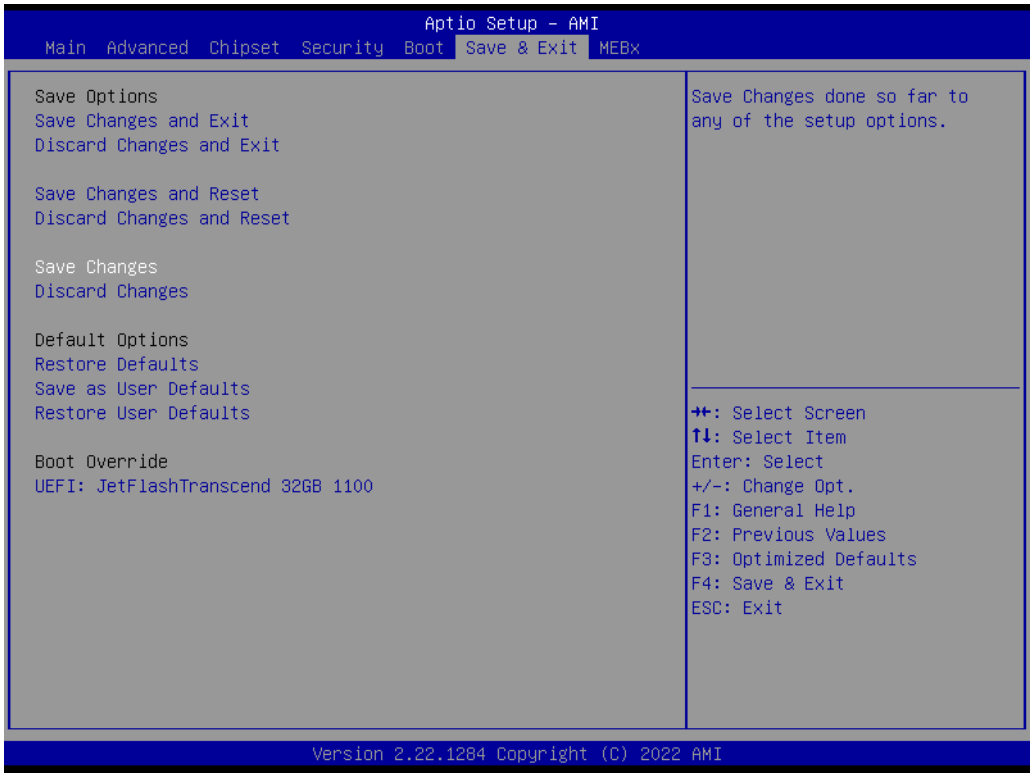



**Figure 3.54 Save & Exit**

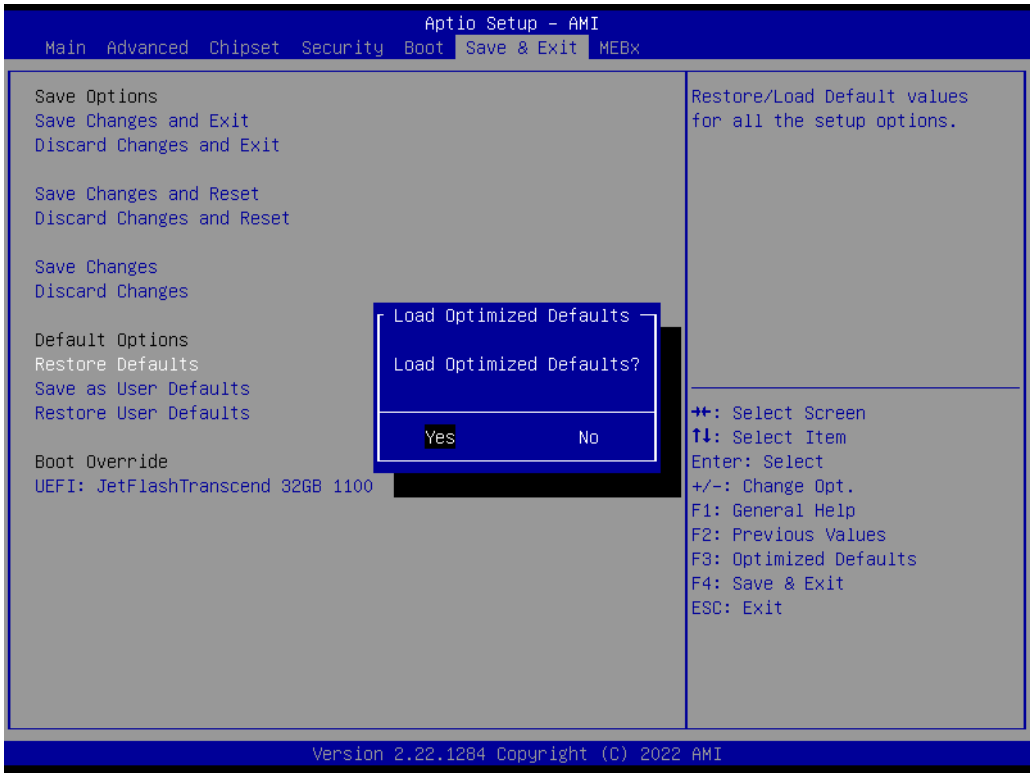



**Figure 3.55 Save & Exit**

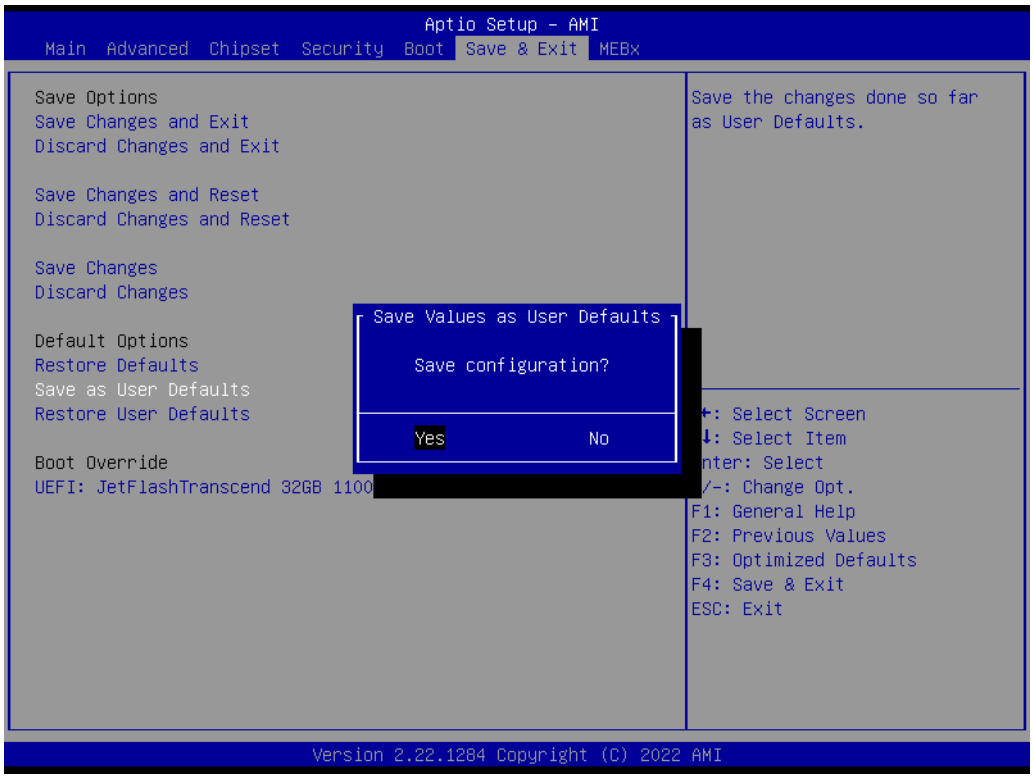



**Figure 3.56 Save & Exit**


**Figure 3.57 Save & Exit**

- **Save Changes and Exit**
  Exit system setup after saving the changes.
- **Discard Changes and Exit**
  Exit system setup without saving any changes.
- **Save Changes and Reset**
  Reset the system after saving the changes.
- **Discard Changes and Reset**
  Resets system setup without saving any changes.
- **Save Changes**
  Saves Changes done so far to any of the setup options.
- **Restore Defaults**
  Restore/Load Default values for all the setup options.
- **Save as User Defaults**
  Saves the changes done so far as User Defaults.

# Chapter 4

## Value-Added Software Services

# 4.1 Value-Added Software Services

Software API are interfaces that define the ways in which an application program may request services from libraries and/or operating systems. They provide not only the underlying drivers required but also a rich set of user-friendly, intelligent and integrated interfaces, which speed development, enhance security and offer add-on value for Advantech platforms. API plays the role of catalyst between developer and solution, and make Advantech embedded platforms easier and simpler to adopt and operate with customer applications. This API and utility is only for Microsoft Windows desktop OS, so if users need Linux version API and utility, contact an Advantech representative for support.

## 4.1.1 Software API

### 4.1.1.1 Control

**GPIO**

General Purpose Input/Output is a flexible parallel interface that allows a variety of custom connections. allows users to monitor the level of signal input or set the output status to switch on/off the device. Our API also provides Programmable GPIO, which allows developers to dynamically set the GPIO input or output status.

### 4.1.1.2 Monitor

**Watchdog**

A watchdog timer (WDT) is a device that performs a specific operation after a certain period of time if something goes wrong and the system does not recover on its own. A watchdog timer can be programmed to perform a warm boot (restarting the system) after a certain number of seconds.

**Hardware Monitor**

The Hardware Monitor (HWM) API is a system health supervision API that inspects certain condition indexes, such as fan speed, temperature and voltage.

## 4.1.2 Software Utility

**Monitoring**

The Monitoring utility allows the customer to monitor system health, including voltage, CPU and system temperature and fan speed. These items are important to a device; if critical errors happen and are not solved immediately, permanent damage may be caused.

# Chapter 5

## Chipset Software Installation Utility

## 5.1 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 PCE-5133/5033 are located on the Advantech Website. The driver in the folder will guide and link you to the utilities and drivers for Windows. Updates are provided via Service Packs from Microsoft®.

***Note!*** *The files on the Advantech Website are compressed. Do not attempt to install the drivers by copying the files manually. You must use the supplied SETUP program to install the drivers.*

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.

## 5.2 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.
- USB 1.1/2.0/3.0/3.1/3.2 support.
- Identification of Intel® chipset components in the Device Manager.
- Integrates superior video features. These include filtered sealing of 720 pixel DVD content, and MPEG-2 motion compensation for software DVD.

***Note!*** *Wrong driver installation may cause unexpected system instability.*

## 5.3 Windows 10 Driver Setup

1. Enter the Advantech support website, then search by product PCE-5133/5033. If you cannot see the driver contact Advantech.

# Chapter 6

# Integrated Graphics Device Setup

## 6.1 Introduction

Intel 12th generation Intel CPUs have integrated graphics controllers. You need to install the VGA driver to enable this function, which includes the following features:

- **Optimized integrated graphic solution:** Intel Graphics Flexible Display Interface supports versatile display options and 3D graphics engine. Triple independent display, enhanced display modes for widescreen flat panels for extended, twin, and clone dual display modes, and optimized 3D support delivers an intensive and realistic visual experience.

## 6.2 Windows 10 Driver Setup

***Note!*** *Before installing this driver, make sure the INF driver has been installed in your system. See Chapter 5 for information on installing the INF driver.*

Enter the Advantech support website, then search product by PCE-5133/5033. If you cannot see the driver contact Advantech..

***Note!*** *Intel only support x86_64 graphics driver for Windows 10.*

# Chapter 7

## LAN Configuration

## 7.1 Introduction

PCE-5133/5033 has dual/single Gigabit Ethernet LANs with dedicated PCI Express x1 lanes. Intel I226LM (LAN1 & 2 of PCE-5133) and I226V (LAN1 & 2 of PCE-5033) offer bandwidths of up to 500 MB/sec, eliminating network bottlenecks in data flow. It incorporates Gigabit Ethernet at 2500 Mbps.

## 7.2 Installation

***Note!*** *Before installing the LAN drivers, make sure the CSI utility has been installed on your system. See Chapter 5 for information on installing the CSI utility.*

Intel I226LM (LAN1 & 2 of PCE-5133) and I226V (LAN1 & 2 of PCE-5033) Gigabit integrated controllers support all major network operating systems. However, the installation procedure varies from system to system. Please find and use the section that provides the driver setup procedure for the operating system you are using.

## 7.3 Windows 10 Driver Setup (LAN)

Enter the Advantech support website, then search product PCE-5133/5033. You can see driver inside.

***Note!*** *Wrong driver installation may cause unexpected system instability.*

# Chapter 8

## Intel ME

## 8.1 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.

## 8.2 Installation

Before install ME driver under Windows 10, please upgrade Kernel-Mode Driver Framework version 1.11 update first and you can find the file in the folder of Window 7 update and please reboot your device. After bootup, navigate to the 03_ME folder and click MEISetup.exe to complete the installation of ME driver.

***Note!*** *If the Intel® Management Engine (Intel® ME) driver has not been successfully installed, you may see an error on a "PCI Simple Communications Controller" in Device Manager.*

# Chapter 9

## Intel USB 3.2

## 9.1 Introduction

PCE-5133/5033 provides Intel® USB 3.2 (Gen2) and the data transfer rates of USB 3.2 (Gen2) (10 Gbps) which is 2 times faster that USB 3.2 (Gen1) (5 Gbps).

# Chapter 10

## SATA RAID Setup

## 10.1 Introduction

To support demanding disk I/O, R680E chipset integrates six Serial ATA controllers with software RAID 0, 1, 5, 10 capabilities.

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

RAID 1 mirroring protects valuable data that 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.

## 10.2 SATA RAID Driver and Utility Setup

Enter the Advantech support website, then search product PCE-5133(PCE-5033 does not Support RAID). You can see driver inside.

# Appendix A

## Programming the Watchdog Timer

# A.1 Introduction

The PCE-5133/5033's watchdog timer can be used to monitor system software operation 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.

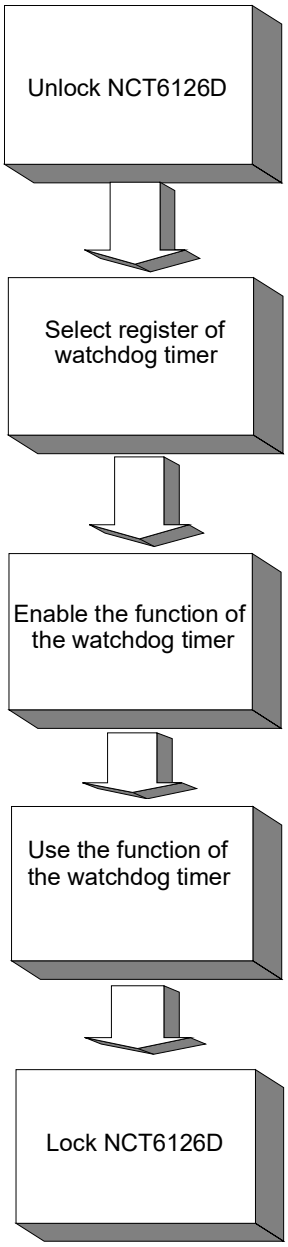
## A.1.1 Watchdog Timer Overview

The watchdog timer is built in to the NCT6126D super I/O controller. It provides the following user programmable functions:

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

## A.1.2 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), then write/read data to/from the assigned register through data port 2F (hex).

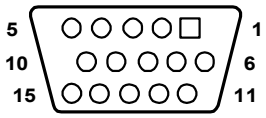


| Table A.1: Watchdog timer registers | | |
|---|---|---|
| Address of register (2E) | Read/ Write | Value (2F) & description. |
| 87 (hex) | - | Write this address to I/O address port 2E (hex) twice to unlock the NCT6126D. |
| 07 (hex) | write | Write 08 (hex) to select register of watchdog timer. |
| 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]<br>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]<br>Bit 5: Write 1 to generate a timeout signal immediately and automatically return to 0. [default=0]<br>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

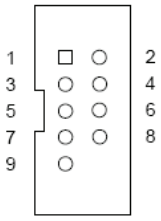
## I/O Pin Assignments

## B.1 VGA Connector (VGA1)



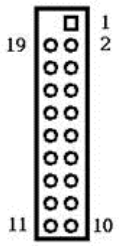

| Table B.1: VGA Connector (VGA1) | | | |
|---|---|---|---|
| **Pin** | **Signal** | **Pin** | **Signal** |
| 1 | Red | 9 | VCC |
| 2 | Green | 10 | GND |
| 3 | Blue | 11 | N/C |
| 4 | N/C | 12 | SDT |
| 5 | GND | 13 | H-SYNC |
| 6 | GND | 14 | V-SYNC |
| 7 | GND | 15 | SCK |
| 8 | GND | | |

## B.2 RS-232 Serial Port (COM12)



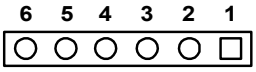

| Table B.2: RS-232 Serial Port (COM2) | |
|---|---|
| **Pin** | **Signal** |
| 1 | DCD |
| 2 | DSR |
| 3 | SIN |
| 4 | RTS |
| 5 | SOUT |
| 6 | CTS |
| 7 | DTR |
| 8 | RI |
| 9 | GND |

## B.3 USB3.2 Header (USB 12)




| Table B.3: USB 3.2 Header (USB 12) | | | |
|---|---|---|---|
| **Pin** | **Signal** | **Pin** | **Signal** |
| 1 | USB1_VCC5 | 11 | USB_P+_P2 |
| 2 | USB3.1_RXN_P1 | 12 | USB_P-_P2 |
| 3 | USB3.1_RXP_P1 | 13 | GND |
| 4 | GND | 14 | USB3.1_TXP_P2 |
| 5 | USB3.1_TXN_P1 | 15 | USB3.1_TXN_P2 |
| 6 | USB3.1_TXP_P1 | 16 | GND |
| 7 | GND | 17 | USB3.1_RXP_P2 |
| 8 | USB_P-_P1 | 18 | USB3.1_RXN_P2 |
| 9 | USB_P+_P1 | 19 | USB2_VCC5 |
| 10 | Reserve | | |

## B.4 External Keyboard Connector (KBMS2)

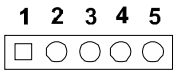



| Table B.4: External Keyboard Connector (KBMS2) | |
|---|---|
| **Pin** | **Signal** |
| 1 | KBCLK |
| 2 | KBDAT |
| 3 | MSDAT |
| 4 | GND |
| 5 | MSVCC |
| 6 | MSCLK |

## B.5 CPU and System Fan Power Connector (CPUFAN1 /SYSFAN1)

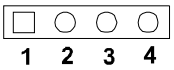

| Table B.5: CPU and System Fan Power Connector (CPUFAN1) | |
|---|---|
| **Pin** | **Signal** |
| 1 | GND |
| 2 | +12V |
| 3 | Detect |
| 4 | FAN1_PWMOUT |

## B.6 Power LED and Keyboard Lock Connector (JFP3/PWR_LED and KEY LOCK)



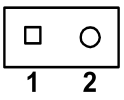

| Table B.6: Power LED and Keyboard Lock Connector (JFP3/PWR_LED and KEY LOCK) | |
|---|---|
| **Pin** | **Signal** |
| 1 | LED power (+3.3 V) |
| 2 | NC |
| 3 | GND |

## B.7 External Speaker Connector (JFP2/SPEAKER)



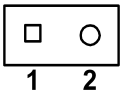

| Table B.7: External Speaker Connector (JFP2/SPEAKER) | |
|---|---|
| **Pin** | **Signal** |
| 1 | SPK_CN17P1 |
| 2 | SPK_CN17P2 |
| 3 | SPK_CN17P3 |
| 4 | SPK_CN17P4 |

## B.8 Reset Connector (JFP1 / RESET)




| Table B.8: Reset Connector (JFP1/RESET) | |
|---|---|
| **Pin** | **Signal** |
| 1 | RESET # |
| 2 | GND |

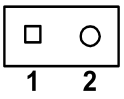
## B.9 HDD LED (JFP2/HDDLED)




-

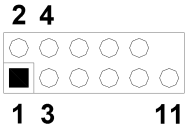
| Table B.9: HDD LED (JFP2/HDDLED) | |
|---|---|
| **Pin** | **Signal** |
| 1 | HDD_LED+ |
| 2 | HDD_LED- |

## B.10 ATX Soft Power Switch (JFP1/PWR_SW)



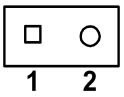

| Table B.10: ATX Soft Power Switch (JFP1 / PWR_SW) | |
|---|---|
| **Pin** | **Signal** |
| 1 | 3.3 VSB |
| 2 | PWR-BTN |

## B.11 HD Audio Link Connector (HDAUD1)



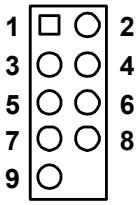

| Table B.11: HD Audio Link Connector (HDAUD1) | | | |
|---|---|---|---|
| **Pin** | **Signal** | **Pin** | **Signal** |
| 1 | ACZ_VCC | 2 | GND |
| 3 | ACZ_SYNC | 4 | ACZ_BITCLK |
| 5 | ACZ_SDOUT | 6 | ACZ_SDIN0 |
| 7 | ACZ_SDIN1 | 8 | -ACZ_RST |
| 9 | ACZ_12V | 10 | GND |
| 11 | GND | 12 | N/C |

## B.12 SM Bus Connector (JFP2/SNMP)



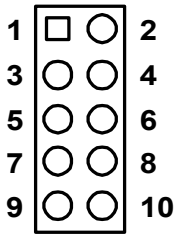

| Table B.12: SM Bus Connector (JFP2/SNMP) | |
|---|---|
| **Pin** | **Signal** |
| 1 | SMB_DATA |
| 2 | SMB_CLK |

## B.13 LAN1 and LAN2 LED Connector (LANLED1)




| Table B.13: LAN1 and LAN2 LED Connector (LANLED1) | |
|---|---|
| **Pin** | **Signal** |
| 1 | #LAN1_ACT |
| 2 | #LAN2_ACT |
| 3 | V33_AUX |
| 4 | V33_AUX |
| 5 | #LAN1_LINK1000 |
| 6 | #LAN2_LINK1000 |
| 7 | #LAN1_LINK100 |
| 8 | #LAN2_LINK100 |
| 9 | V33_AUX |

## B.14 GPIO Header (GPIO1)




| Table B.14: GPIO Header (GPIO1) | |
|---|---|
| **Pin** | **Signal** |
| 1 | SIO_GPIO0 |
| 2 | SIO_GPIO4 |
| 3 | SIO_GPIO1 |
| 4 | SIO_GPIO5 |
| 5 | SIO_GPIO2 |
| 6 | SIO_GPIO6 |
| 7 | SIO_GPIO3 |
| 8 | SIO_GPIO7 |
| 9 | +5V_Dual_GPIO |
| 10 | GND |

## B.15 Fixed I/O Ranges Decoded by Intel PCH

| Table B.15: Fixed I/O Ranges Decoded by Intel PCH | | | |
|---|---|---|---|
| **I/O Address** | **Read Target** | **Write Target** | **Internal Unit** |
| 20h - 21h | Interrupt controller | Interrupt controller | Interrupt |
| 24h - 25h | Interrupt controller | Interrupt controller | Interrupt |
| 28h - 29h | Interrupt controller | Interrupt controller | Interrupt |
| 2Ch - 2Dh | Interrupt controller | Interrupt controller | Interrupt |
| 2Eh - 2Fh | LPC/eSPI | LPC/eSPI | Forwarded to LPC/eSPI |
| 30h - 31h | Interrupt controller | Interrupt controller | Interrupt |
| 34h - 35h | Interrupt controller | Interrupt controller | Interrupt |
| 38h - 39h | Interrupt controller | Interrupt controller | Interrupt |
| 3Ch - 3Dh | Interrupt controller | Interrupt controller | Interrupt |
| 40h | Timer/Counter | Timer/Counter | 8254 Timer |
| 42h - 43h | Timer/Counter | Timer/Counter | 8254 Timer |
| 4Eh - 4Fh | LPC/eSPI | LPC/eSPI | Forwarded to LPC/eSPI |
| 50h | Timer/Counter | Timer/Counter | 8254 Timer |
| 52h - 53h | Timer/Counter | Timer/Counter | 8254 Timer |
| 60h | LPC/eSPI | LPC/eSPI | Forwarded to LPC/eSPI |
| 61h | NMI controller | NMI controller | Processor I/F |
| 62h | Microcontroller | Microcontroller | Forwarded to LPC/eSPI |
| 63h | NMI controller | NMI controller | Processor I/F |
| 64h | Microcontroller | Microcontroller | Forwarded to LPC/eSPI |
| 65h | NMI controller | NMI controller | Processor I/F |

| Table B.15: Fixed I/O Ranges Decoded by Intel PCH | | | |
|---|---|---|---|
| 66h | Microcontroller | Microcontroller | Forwarded to LPC/eSPI |
| 67h | NMI controller | NMI controller | Processor I/F |
| 70h | RTC controller | NMI and RTC controller | RTC |
| 71h | RTC controller | RTC controller | RTC |
| 72h | RTC controller | RTC controller | RTC |
| 73h | RTC controller | RTC controller | RTC |
| 74h | RTC controller | RTC controller | RTC |
| 75h | RTC controller | RTC controller | RTC |
| 76h - 77h | RTC controller | RTC controller | RTC |
| 80h | LPC/eSPI or PCIe | LPC/eSPI or PCIe | LPC/eSPI or PCIe |
| 84h - 86h | Reserved | LPC/eSPI or PCIe | LPC/eSPI or PCIe |
| 88h | Reserved | LPC/eSPI or PCIe | LPC/eSPI or PCIe |
| 8Ch - 8Eh | Reserved | LPC/eSPI or PCIe | LPC/eSPI or PCIe |
| 90h | (Alias to 80h) | (Alias to 80h) | Forwarded to LPC/eSPI |
| 92h | Reset generator | Reset generator | Processor I/F |
| 94h - 96h | (Alias to 80h) | (Alias to 80h) | Forwarded to LPC/eSPI |
| 98h | (Alias to 80h) | (Alias to 80h) | Forwarded to LPC/eSPI |
| 9Ch - 9Eh | (Alias to 80h) | (Alias to 80h) | Forwarded to LPC/eSPI |
| A0h - A1h | Interrupt controller | Interrupt controller | Interrupt |
| A4h - A5h | Interrupt controller | Interrupt controller | Interrupt |
| A8h - A9h | Interrupt controller | Interrupt controller | Interrupt |
| ACh - Adh | Interrupt controller | Interrupt controller | Interrupt |
| B0h - B1h | Interrupt controller | Interrupt controller | Interrupt |
| B2h - B3h | Power management | Power management | Power management |
| B4h - B5h | Interrupt controller | Interrupt controller | Interrupt |
| B8h - B9h | Interrupt controller | Interrupt controller | Interrupt |
| BCh - BDh | Interrupt controller | Interrupt controller | Interrupt |
| 200 - 207h | Gameport low | Gameport low | Forwarded to LPC/eSPI |
| 208-20Fh | Gameport low | Gameport low | Forwarded to LPC/eSPI |
| 4D0h -4D1h | Interrupt controller | Interrupt controller | Interrupt controller |
| CF9h | Reset generator | Reset generator | Interrupt controller |

***Note!*** *If the Port 61 alias enable bit (GCS.P61AE) bit is set. Otherwise, the target is PCI.*

## B.16 System I/O Ports

| Table B.16: System I/O Ports | |
|---|---|
| **I/O Address (Hex)** | **Device** |
| 090h-097h | SATA AHCI controller |
| 070h-077h | System CMOS/real-time clock |
| 2F8h-2FFh | Communication port (COM2) |
| 378h-37Fh | ECP printer port (LPT1) |
| 3B0h-3BBh | Graphics |
| 3C0h-3DFh | Graphics |
| 3F8h-3FFh | Communication port (COM1) |
| 600h-67Fh | PCA-COM485 module I/O used |
| 778h-77Fh | ECP printer port (LPT1) |
| C80h-C9Fh | Communication port (COM3-6) for PCA-COM232 module |
| CA0h-CBFh | Communication port (COM8-11) for PCA-COM485 module |

## B.17 Interrupt Assignments

| Table B.17: Interrupt Assignments | |
|---|---|
| **Interrupt#** | **Interrupt source** |
| IRQ0 | System timer |
| IRQ1 | Keyboard |
| IRQ2 | Interrupt from controller 2 (cascade) |
| IRQ3 | Communication port (COM2) |
| IRQ4 | Communication port (COM1) |
| IRQ5 | Available |
| IRQ6 | Communication port (COM8-11) for PCA-COM485 module |
| IRQ7 | Parallel port |
| IRQ8 | System COMS/real-time clock |
| IRQ9 | Available |
| IRQ10 | Available |
| IRQ11 | Communication port (COM3-6) for PCA-COM232 module |
| IRQ12 | PS/2 mouse |
| IRQ13 | Numeric data processor |
| IRQ14 | Available |
| IRQ15 | Available |

## B.18 1 MB Memory Map

| Table B.18: 1 MB Memory Map | |
|---|---|
| **Address Range** | **Device** |
| E8000h - FFFFFh | BIOS |
| CFB00H - DFFFFh | Unused |
| C0000h - CBFFFh | VGA BIOS |
| A0000h - BFFFFh | Video memory |
| 00000h - 9FFFFh | Base memory |

# B.19 PCI Bus Map

**Table B.19: PCI Bus Map**

| Signal | IDSEL | INT#PIN | GNT | REQ |
|---|---|---|---|---|
| PCI slot 1 | AD31 | INT B, C, D, A | GNT A | REQ A |
| PCI slot 2 | AD30 | INT C, D, A, B | GNT B | REQ B |
| PCI slot 3 | AD29 | INT D, A, B, C | GNT C | REQ C |
| PCI slot 4 | AD28 | INT A, B, C, D | GNT D | REQ D |

# Appendix C

## Programming the GPIO

## C.1 Supported GPIO Register

Below are the detailed descriptions of the GPIO addresses and a programming sample.

## C.2 GPIO Registers

| Bank Logical Device | Offset | Description |
|---|---|---|
| 09h | 30h | Write 1 to bit 7 to enable GPIO |
| 07h | E0h | GPIO I/O Register<br>When set to a '1', respective GPIO port is programmed as an input port.<br>When set to a '0', respective GPIO port is programmed as an output port. |
| 07h | E1h | GPIO Data Register<br>If a port is programmed to be an output port, then its respective bit can be read/written.<br>If a port is programmed to be an input port, then its respective bit can only be read. |
| 07h | E2h | GPIO Inversion Register<br>When set to a '1', the incoming/outgoing port value is inverted.<br>When set to a '0', the incoming/outgoing port value is the same as in data register. |

## C.3 GPIO Example Program-1

```
-----------------------------------------------
 Enter the extended function mode, interruptible double-write
-----------------------------------------------
MOV DX,2EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
-----------------------------------------------------------------
Configure logical device, configuration register CRE0,CRE1,CRE2
-----------------------------------------------------------------
MOV DX,2EH
MOV AL,09H
OUT DX,AL
DEC DX
MOV AL,30H
OUT DX,AL
INC DX
IN AL,DX
OR AL,10000000B; GPIO7 is active
DEC DX
MOV AL,07H
```

```
OUT DX,AL
INC DX
MOV AL,07H; Select logical device 7
OUT DX,AL ;
DEC DX
MOV AL,E0H
OUT DX,AL
INC DX
MOV AL,00H  ; 1:Input  0:output  for  GPIO respective
OUT DX,AL
DEC DX
MOV AL,E2H ;
OUT DX,AL
INC DX
MOV AL,00H    ;Set GPIO is normal not inverter
OUT DX,AL;
DEC DX
MOV AL,E1H
OUT DX,AL
INC DX
MOV AL,??H ;  Put the output value into AL
OUT DX,AL
-----------------------------------------
 Exit extended function mode |
-----------------------------------------
MOV DX,2EH
MOV AL,AAH
OUT DX,AL
```

ADVANTECH

*Enabling an Intelligent Planet*

## www.advantech.com

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