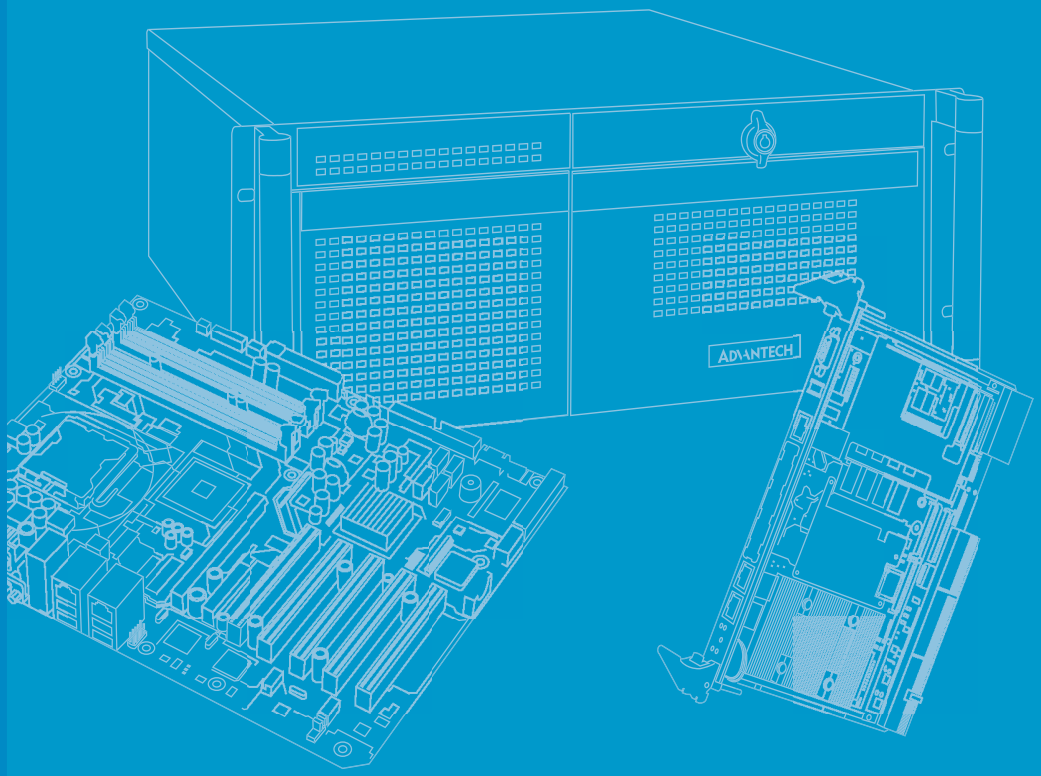

User Manual

PCE-3032/4132

LGA1200 Intel® Xeon, Core™ i9/ i7/i5/i3/Celeron®/Pentium® PICMG 1.3 Half-size System Host Board with VGA/DVI-D/DDR4/ SATA3.0/USB3.2/Dual GbE

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FCC Class A

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 this event, users are required to correct the interference at their own expense.

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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.

Backplane Support Matrix Table

Backplane / Model processor	PCE-3BXX	PCE-4BXX
PCE-3032G2-00A1E	Yes	-
PCE-4132G2-00A1E	Yes	Yes

Note! *If PCE-3032/4132 is used on different backplanes which has different PCIe configuration. Below message would be showed on first time power on, and user has to turn off AC power and then turn on for PCIe re-configuration.*

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

Specification Comparison

Part Number	PCH	Memory	VGA	DVI-D**	Backplane	LAN	SATAIII	m-SATA	USB 3.0	USB 2.0	S/W RAID	mini-PCIe*
PCE-3032G2-00A1E	H420E	Non-ECC	1	1	PCE-3BXX	2	3	0	4	6	No	0
PCE-4132G2-00A1E	W480E	ECC/ Non-ECC	1	1	PCE-3BXX/ PCE-4BXX	2	4	0	4	6	Yes	1

Note! ** Optional PCE-SA01-00A1E is required. PCE-SA01-00A1E is compatible with IPC-3026/IPC-6806S/ACP-4D00/ACP-4020 chassis, but not IPC-3012 chassis.*

*** Optional DVI-D cable 1700021831-01 is required.*

Initial Inspection

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

- 1 x PCE-3032 or 4132 PICMG 1.3 System Host Board
- 1 x PCE-3032/PCE-4132 start-up manual
- 1 x Serial ATA HDD data cable
- 1 x 2-port COM cable kit
- 1 x 4-port USB 2.0 cable kit
- 1 x 2-port USB 3.0 cable kit
- 1 x 1-port LPT cable kit
- Power converter (Connecting from peripheral power connector on power supply to PWR1 on board)
- 1 x Warranty card

If any of these items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected the PCE-3032/4132 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-3032/4132, 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

PCE-3032/4132 is a PICMG 1.3 half-size system host board which is designed with Intel® H420E (PCE-3032) or W480E (PCE-4132) PCH for industrial applications that 14nm manufacturing technology, LGA1200 socket Intel® Xeon or Core™ i7/i5/i3, Pentium® and Celeron® processors that integrate memory and graphic controllers and supports DDR4 2933 SDRAM up to 64 GB. With advanced computing technology, PCE-3032/4132 is the best high performance compact system solutions.

PCE-3032/4132 performs excellent graphic capability through its integrated Intel® HD Graphics core. With this, PCE-3032/4132 provides strong 2D/3D graphic processing power without an additional graphic card to save extra cost, power consumption and thermal integration effort. Besides, PCE-3032/4132 supports various display interfaces to enhance flexibility for system integrators.

PCE-3032/4132 also has rich expansion interfaces which support Advantech PCE-3BXX and 4BXX backplanes to offer both PCI and PCIe lanes. This fulfills different applications, such as manufacturing automation, factory automation, automatic optical inspection, and medical equipment.

In addition, PCE-3032/4132 provides new SATA Gen3 (600MB/sec) ports, satisfy high data applications, like storage and data management center. PCE-4132's SATA ports support software RAID 0, 1, 5, 10 as a cost-effective and reliable data solution. USB 3.0 ports reach 5 Gbps high data rates and RS-232. RS-422,RS-485 and parallel ports are for industrial control applications. With flexible I/O interfaces, PCE-3032/4132 can be an excellent, graphic or I/O processing platform with outstanding performance and exceptional features. They are also the most ideal computing cores for advanced compact-sized industrial next generation applications.

1.2 Features & Benefits

- **Processor support:** Intel 10th generation family processors with the latest 14nm lithography.
- **DDR4 2666/2933 up to 64 GB:** DDR4 provides up to 50 percent increased performance and bandwidth while saving up to 40 percent power.
- **Storage:** Support SATA 3.0 ports with SW raid 0, 1, 5, 10 support.
- **High Performance I/O capability:** Provides high transfer data performance interface; USB 3.0 data transfer rate is 5 Gbps which is 10 times faster than USB2.0.
- **PCIe architecture:** Processor support 16 links of PCI Express generation 3.0 and PCH support 4 links of PCI Express generation 3.0 to PICMG1.3 backplanes.
- **SUSI API:** Support SUSIAccess and Intelligent system module for remote management.

1.3 Specifications

1.3.1 System

- **CPU:** LGA1200-socket Core i9/i7/i5/i3, Pentium and Xeon W-1200 series processors.
- **L2 Cache:** Please refer to CPU specification for detailed information.
- **BIOS:** (PCE-3032) 128Mb SPI; (PCE-4132) 256Mb SPI.
- **System Chipset:** Intel W480E (PCE-4132); Intel H420E (PCE-3032).
- **SATA hard disk drive interface:** PCE-3032 supports three SATA 3.0 ports, and PCE-4132 supports four SATA 3.0 ports.

Note! *PCE-3032/4132 do NOT support PATA(IDE) interface.*



Only PCE-4132 supports Intel Xeon processors.

1.3.2 Memory

- **RAM:**
  - PCE-4132: Up to 64 GB in two 260-pin SO-DIMM sockets. Supports dual-channel DDR4 2666/2933 SDRAM WITH or WITHOUT ECC function.
  - PCE-3032: Up to 64 GB in two 260-pin SO-DIMM sockets. Supports dual-channel DDR4 2666/2933 SDRAM WITHOUT ECC function.

Note! *Due to the inherent limitations of the PC architecture, the system may not fully detect the exact capacity of RAM installed.*



Please select Intel ECC supported processor to enable ECC function.

1.3.3 Input/Output

- **PCIe bus:** One PCIe x16 or Two PCIe x8 from CPU and One PCIe x4 from PCH.
- **Serial ports:** Two RS-232 serial ports.
- **USB port:** 6 x USB 2.0 (480Mbps) and 4 x USB 3.0
- **LPC:** One LPC connector to support optional TPM (PCA-TPM-00B1E), COM-232 (PCA-COM232-00A1E), COM-422/485 (PCA-COM485-00A1E) modules.
- **GPIO:** Supports 8-bit GPIO from super I/O for general purpose control application.

1.3.4 Graphics

- **Controller:** Intel® HD Graphics embedded in the processor.
- **Display memory:** Shared memory is subject to OS (install 2 GB or above memory for basic system configuration).
- **CRT:** Up to 2048x1152 @ 60 Hz.
- **DVI-D:** Up to 1920X1200 @60Hz.
- **Other display:** Supports VGA + Display Port. Display type depends on optional stack board.
- **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 Mbps Ethernet port(s) via the dedicated PCI Express x1 bus which provides 500 MB/s data transmission rate.
- **Controller:**
  - LAN 1: Intel® I211AT (PCE-3032) or I210AT (PCE-4132).
  - LAN 2: Intel® I211AT(PCE-3032) or I210AT (PCE-4132).

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)
- **Operating humidity:** 40° C @ 85% RH, non-Condensing
- **Non-operating humidity:** 60° C @ 95% RH, non-Condensing
- **Power supply voltage:** +3.3 V, +5 V, +12 V, +5 V_{SB}
- **Board size:** 167.64 x126.39 mm (6.6" x 4.98")
- **Board weight:** 0.33 kg (Weight of board)

1.4 Jumpers and Connectors

Connectors on the PCE-3032/4132 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 your system for your application.

The tables below list the function of each of 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: Jumper List

Label	Function
JCMOS1	CMOS clear
JME1	Enable ME
JWDT1 JOBS1	Watchdog timer output selection and HW monitor alarm

Table 1.2: Connectors

Label	Function
LAN1	Intel I211AT (PCE-3032); Intel I210AT (PCE-4132)
LAN2	Intel I211AT (PCE-3032); Intel I210AT (PCE-4132)
VGA1	VGA connector
KBMS1	PS/2 keyboard and mouse connector
COM12	Serial port: COM1 (RS-232), and COM2 (RS-232)
FP1	HDD LED, power LED, SNMP SM_Bus, reset, power on/off
JCASE1	Case Open
CPUFAN1	CPU FAN connector (4-pin)
LANLED1	LAN1/2 LED extension connector
HDAUD1	HD audio extension module connector
USB3C1, USB3C2	USB 3.0 port 1,2 on rear I/O
USB3H1	USB 3.0 port 3, 4 with box header
USB2A1	USB 2.0 port 2 on rear I/O
USB2H1, USB2H2	USB 2.0 port 3-6 with box header
SATA0	Serial ATA0 (3.0)
SATA1	Serial ATA1 (3.0)
SATA2	Serial ATA2 (3.0)
SATA3	Serial ATA3 (PCE-4132: 3.0)
CPU1	CPU Socket
DIMMA1	Memory connector channel A
DIMMB1	Memory connector channel B
GPIO1	GPIO pin header (SMD pitch-2.0 mm)
LPC2	COM port module expansion pin-header
PWR1	12 V, 5 V, power connector
DVI1	Pin header to DVI connector (P/N: 1700021831-01)
DP1	Display pin header to stack board (Display type depends on optional stack board)
EXPCIE1	Mini PCIe pin header to stack board

1.5 Board Layout: Jumper and Connector Locations

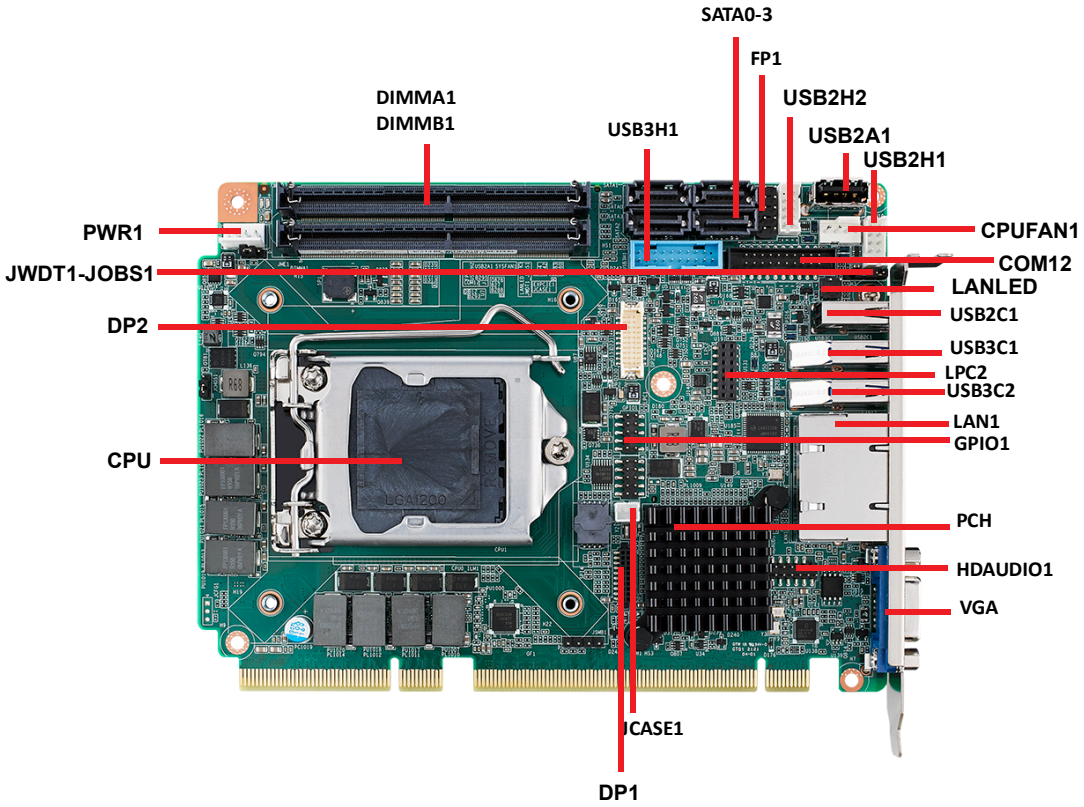


Figure 1.1 Jumper and Connector Locations

1.6 Block Diagram

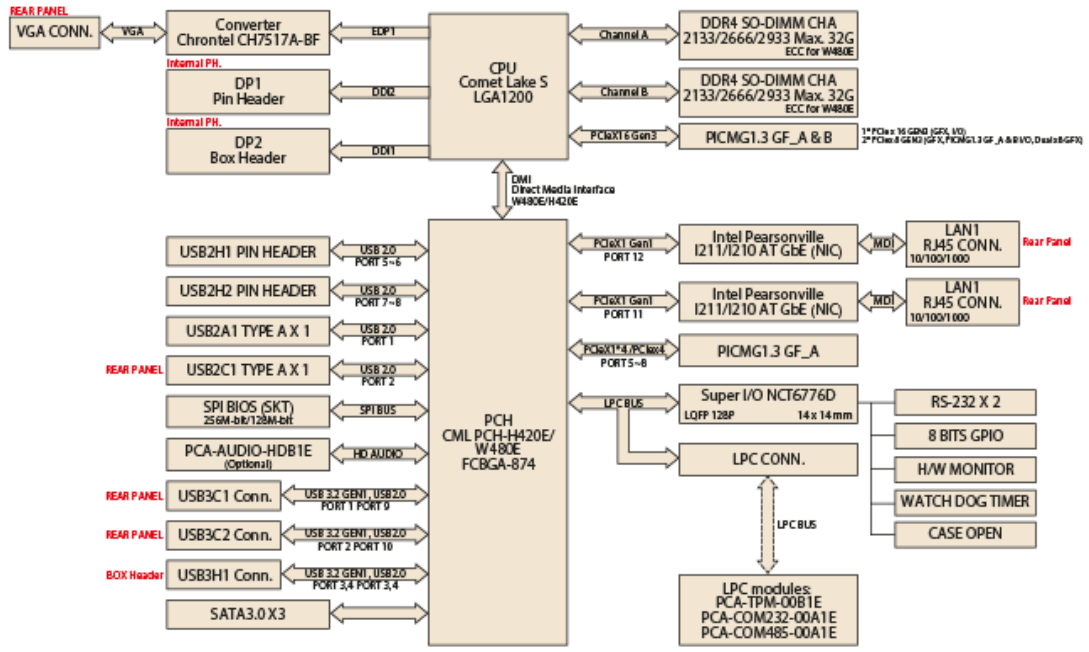


Figure 1.2 PCE-3032 Block Diagram

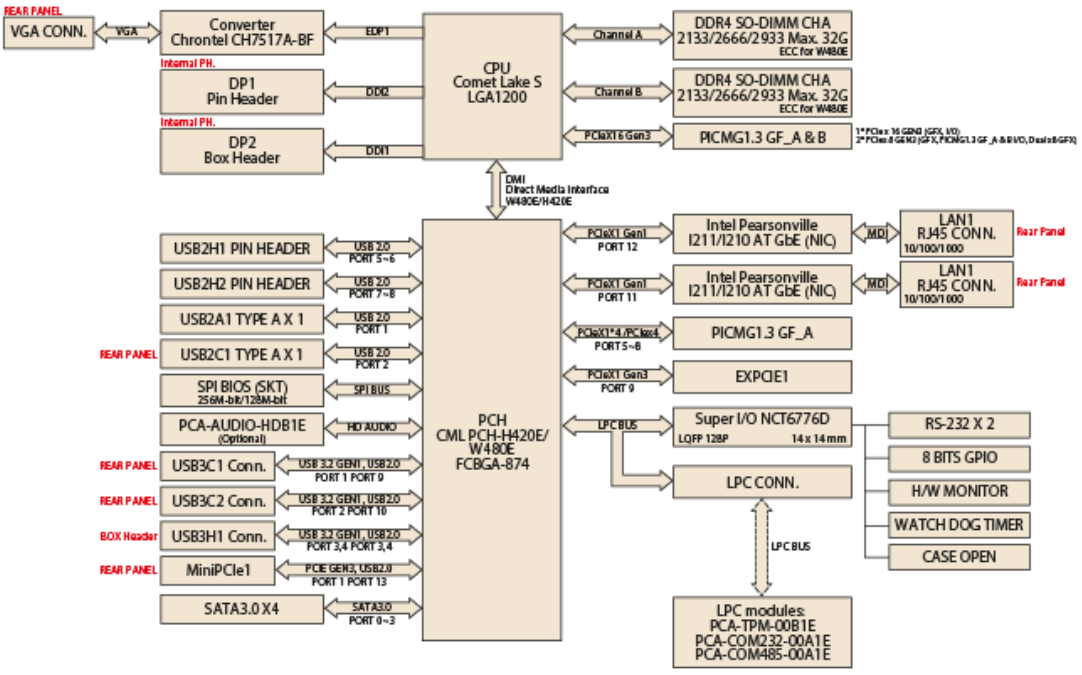


Figure 1.3 PCE-4132 Block Diagram

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.

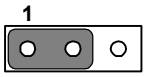
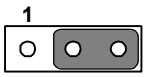
1.8.1 How to Set Jumpers

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 (JCMOS1)

PCE-3032/4132 CPU card contains a jumper that can erase BIOS CMOS 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 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 to its last status or default setting.

Table 1.3: Clear BIOS CMOS (JCMOS1)

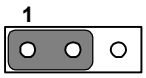
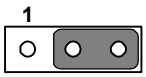
Function	Jumper Setting
*Keep BIOS CMOS data	 1-2 closed
Clear BIOS CMOS data	 2-3 closed

* default setting

1.8.3 ME Enable (JME1)

PCE-3032/4132 CPU card contains a jumper that can enable ME data. Normally this jumper should be set with pins 1-2 closed, then you can see ME information shows in BIOS menu. If you want to disable ME temporarily for firmware update, set JME1 to 2-3 closed.

Table 1.4: JCMOS1/JME1: ME FW Update

Function	Jumper Setting
* ME enable	 1-2 closed
ME disable	 2-3 closed

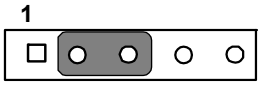
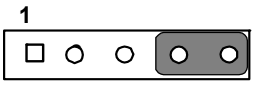
* default setting

1.8.4 Watchdog Timer Output (JWDT1) and Hardware Monitor Alarm (JOBS1)

PCE-3032/4132 contains a watchdog timer that will reset the CPU in the event the CPU stops processing. This feature means PCE-3032/4132 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.

PCE-3032/4132 also provide jumper: JOBS1 to enable or disable hardware monitor alarm.

Table 1.5: Watch Dog Timer (JWDT1) and Hardware Monitor Alarm (JOBS1)

Function	Jumper Setting	
*Enable watch dog timer		2-3 closed
*Enable hardware monitor alarm		4-5 closed

* default setting

1.9 System Memory

PCE-3032/4132 has two 260-pin memory sockets for DDR4 2666/2933 MHz memory modules with maximum capacity of 64 GB. (Maximum 32 GB for each DIMM)

Note! *Both PCE-3032 and PCE-4132 do NOT support registered DIMMs (RDIMMs).*

Chapter 2

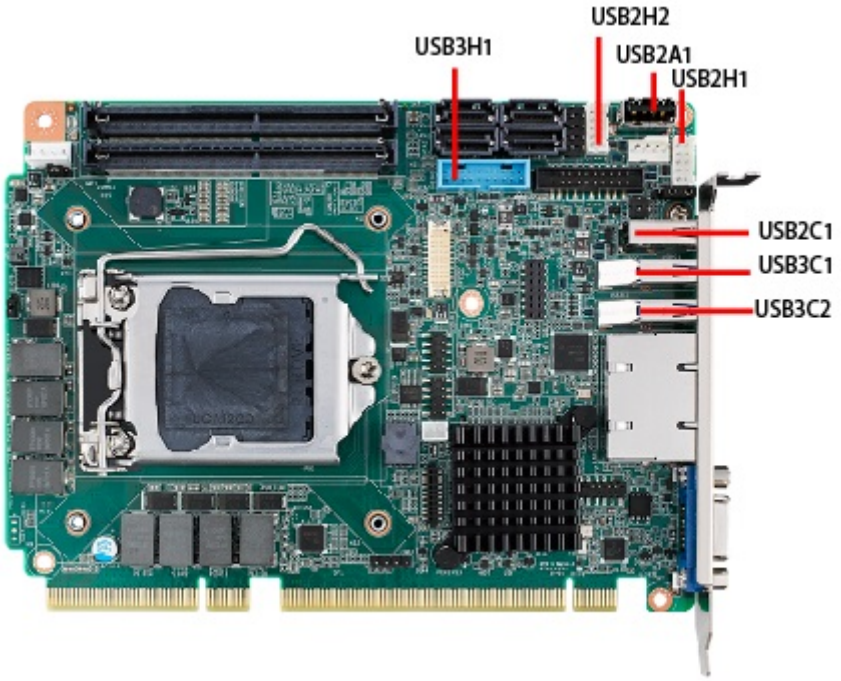
Connecting Peripherals

2.1 Introduction

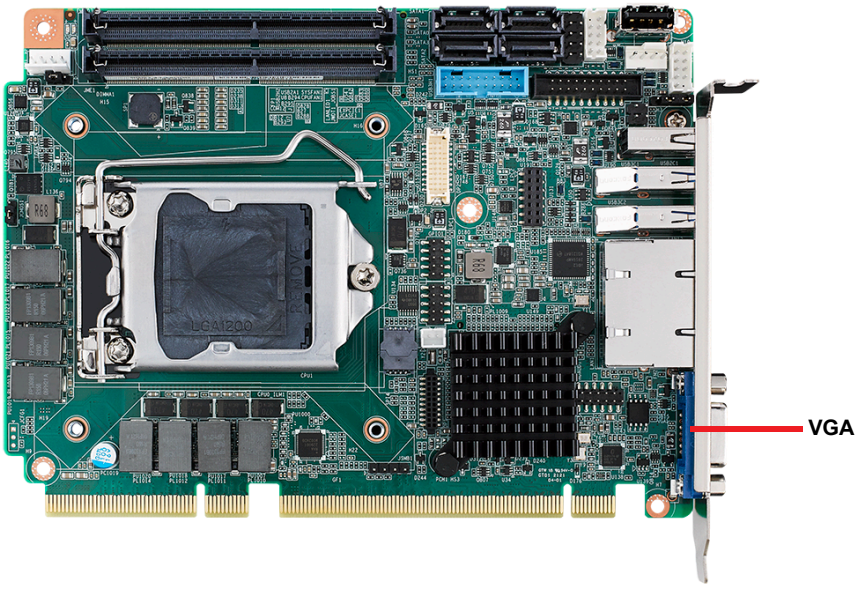
You can access most of the connectors from the top of the board. If you have a number of cards installed, you may need to partially remove a card to make all the connections.

2.2 USB Ports (USB2A1, USB2C1, USB3C1, USB3C2, USB2H1, USB2H2, USB3H1)

PCE-3032/4132 provides up to 10 x USB (Universal Serial Bus) on-board ports with complete Plug & Play and hot swap support. These USB ports comply with USB Specification 2.0 and 3.0, support transfer rates up to 480 Mbps (USB2.0), and 5 Gbps (USB3.0). 6 ports are located on board with box header (2* 3.0 + 4* 2.0), 1 port is a USB 2.0 type A internal connector, and 3 ports are located on rear I/O bracket (2* 3.0 + 1* 2.0).

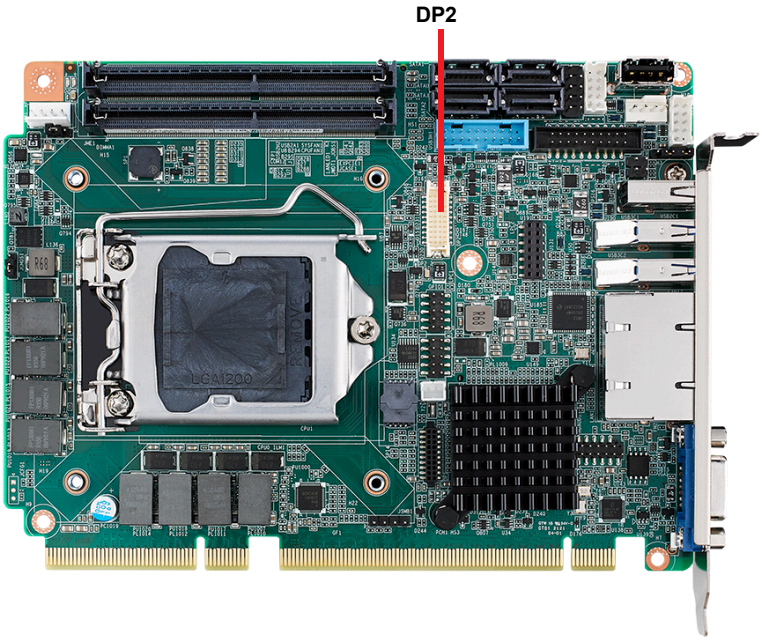


2.3 VGA Connector (VGA)



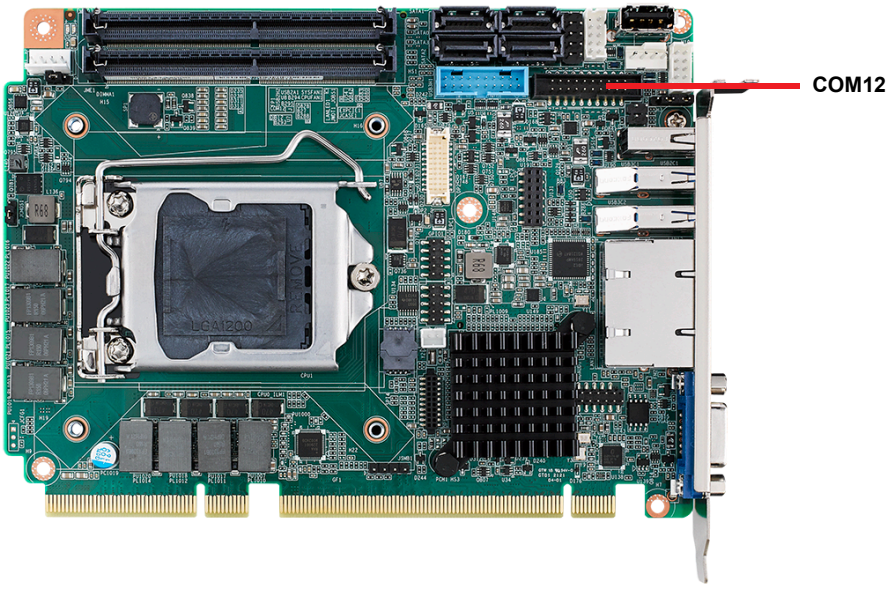
This CPU card has VGA outputs that can drive conventional CRT displays. VGA is a standard 15-pin D-SUB connector commonly used for VGA.

2.4 DP Connector (DP2)



DP2 is a 20-pin connector, supporting resolution up to 1920 x 1200. Please place order no. 1700021831-01 for standard DP connector on bracket.

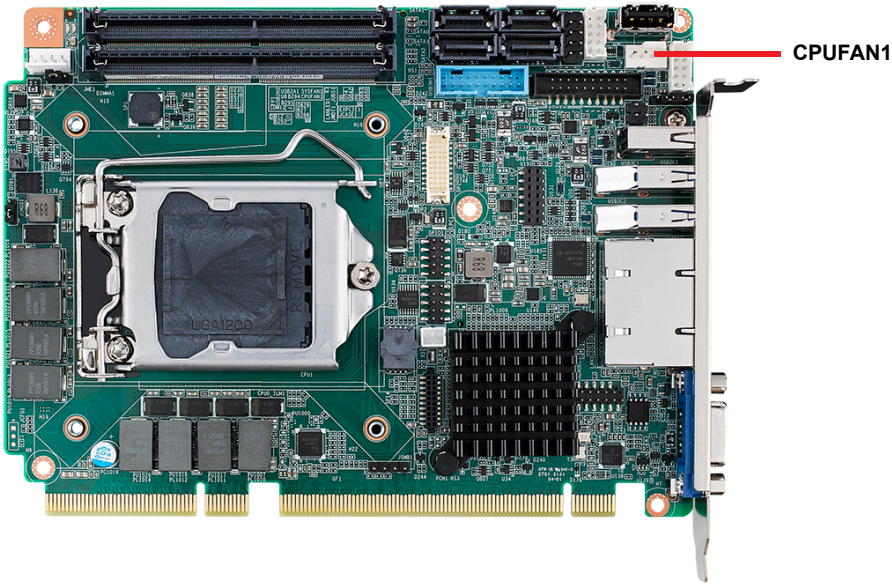
2.5 RS-232 Serial Ports (COM12)



PCE-3032/4132 offers 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.

2.6 CPU Fan Connector (CPUFAN1)

This connector supports cooling fans of 500 mA (6 W) or less, and it also supports smart fan control when using 4-pin or 3-pin cooler.



2.7 Front Panel Connectors (FP1)

FP1 is a 10-pin connector which connects to the front panel switch to control system HDD LED, power LED, SNMP SM_Bus, reset, power on/off.

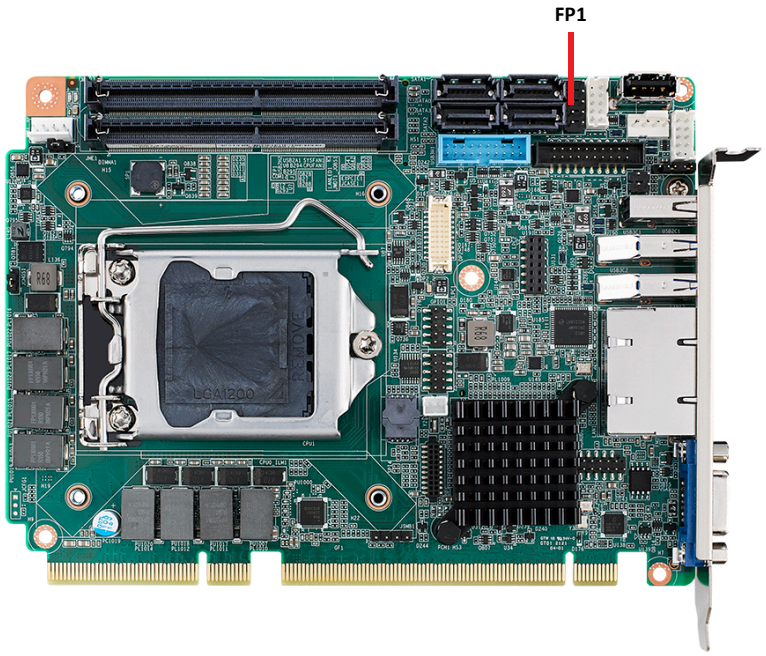
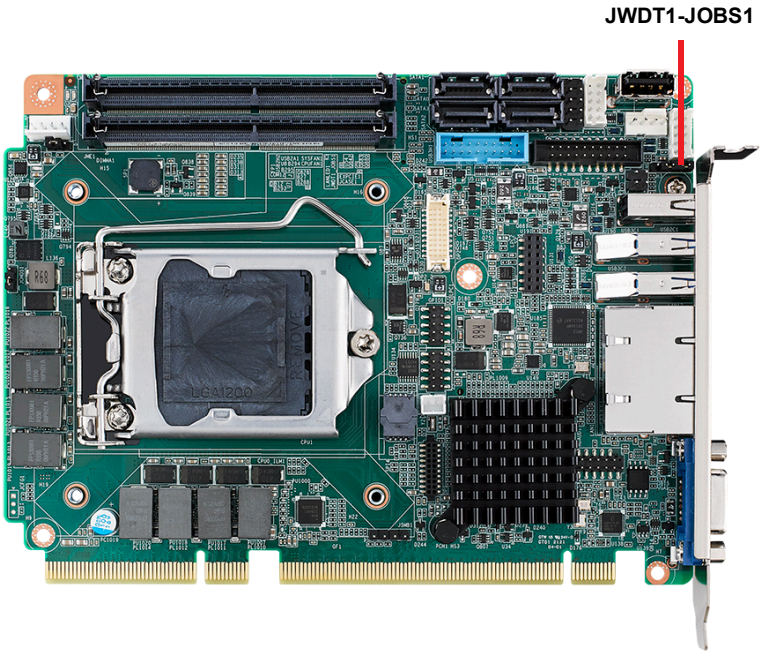
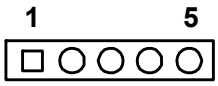


Table 2.1: Front Panel Connectors (FP1)				
Power status	**Power LED status**			
	AT		**ATX**	
	Deep S5 ON	**Deep S5 OFF**	**Deep S5 ON**	**Deep S5 OFF**
S0	On	On	On	On
S1	Flash(fast)	Flash(fast)	Flash(fast)	Flash(fast)
S2	-	-	-	-
S3	Flash(fast)	Flash(fast)	Flash(fast)	Flash(fast)
S4	Flash(slow)	Flash(slow)	Off	Flash(slow)
S5	Off	Off	Off	Off

2.8 H/W Monitor/Watchdog Timer





2.8.1 H/W Monitor Alarm (JOBS1)

This 2-pin header is for enabling/disabling H/W monitor alarm function.

4-5 Closed: Enables hardware monitor alarm (Default)

4-5 Open: Disables hardware monitor alarm

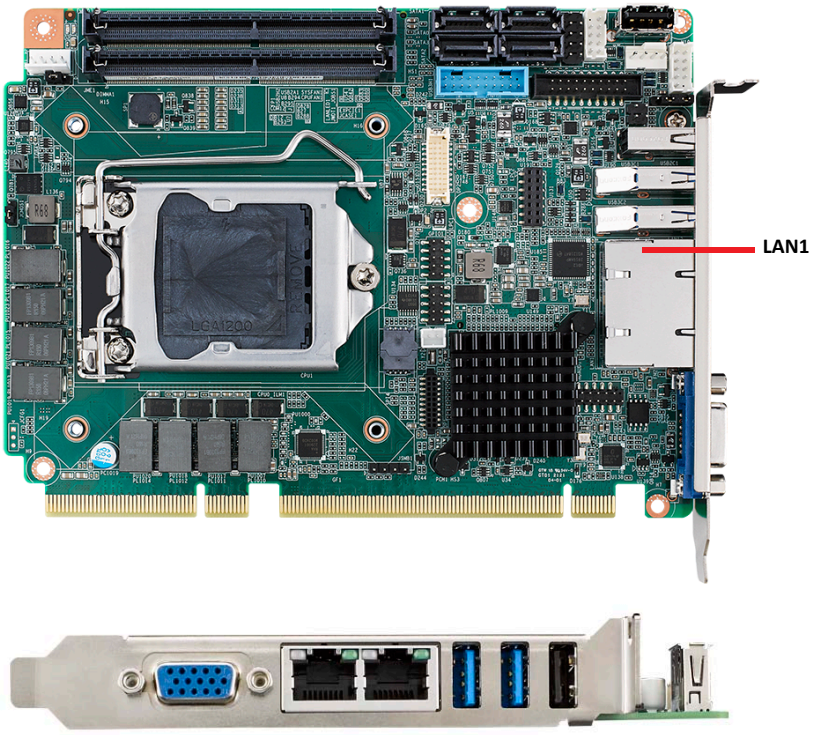
2.8.2 Watchdog Timer (JWDT1)

This is for an setting action trigger on the watchdog timer.

2-3 Close: Enable watchdog timer (Default)

2-3 Open: No action

2.9 LAN Ports (LAN1 & LAN2)

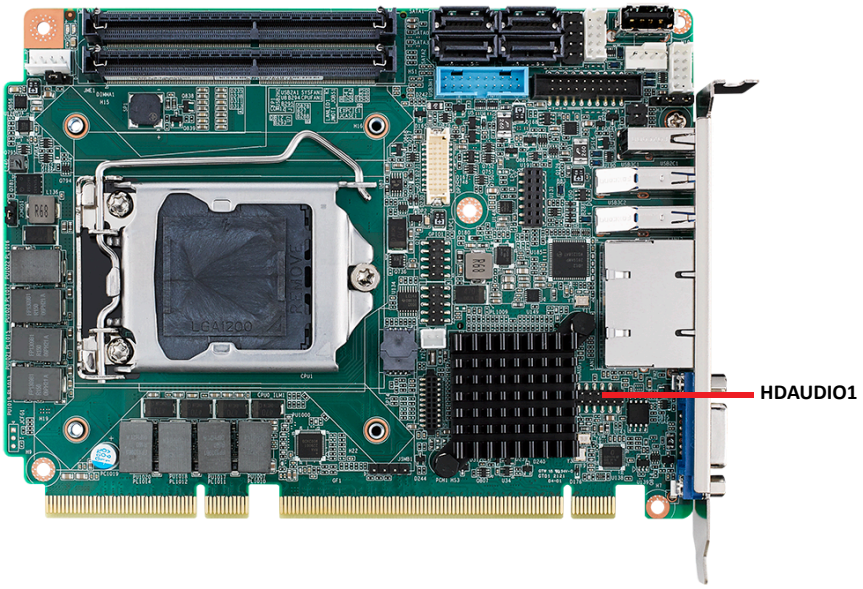


PCE-3032/4132 is equipped with two high-performance 1000 Mbps Ethernet LANs. They are supported by all major network operating systems. The RJ-45 jacks on the rear plate provide convenient connectivity.

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

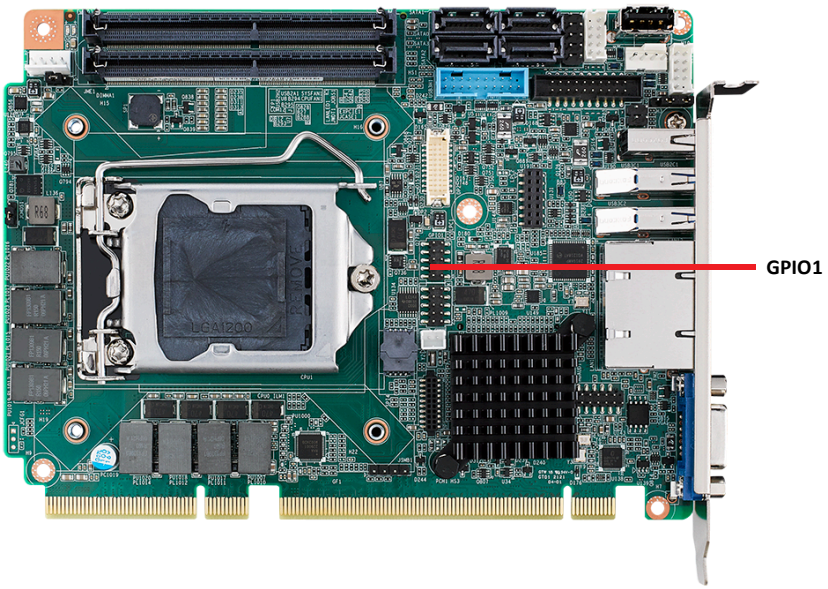
2.10 High Definition Audio Module Interface (HDAUD1)



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

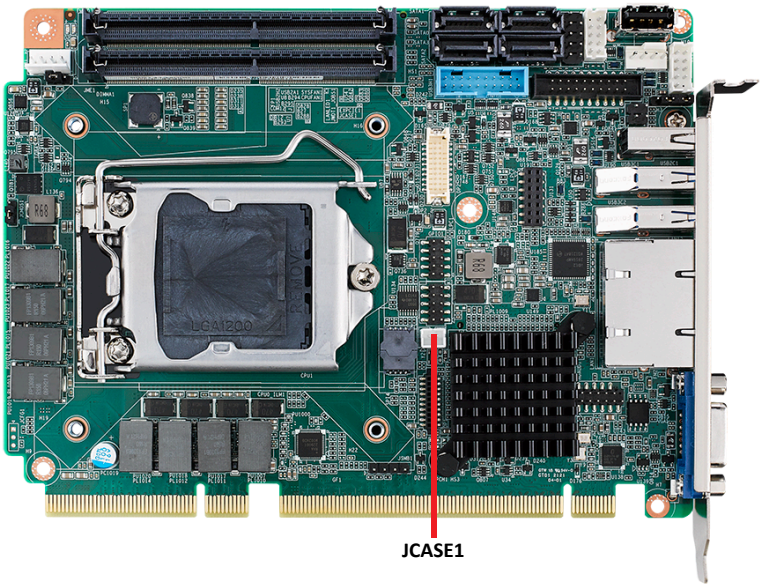
Note! *Advantech audio module ordering information.*
P/N: PCA-AUDIO-HDB1E.

2.11 GPIO Header (GPIO1)



Provides 10-Pin pin header 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)



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.

2.13 Front Panel LAN Indicator Connector (LANLED1)

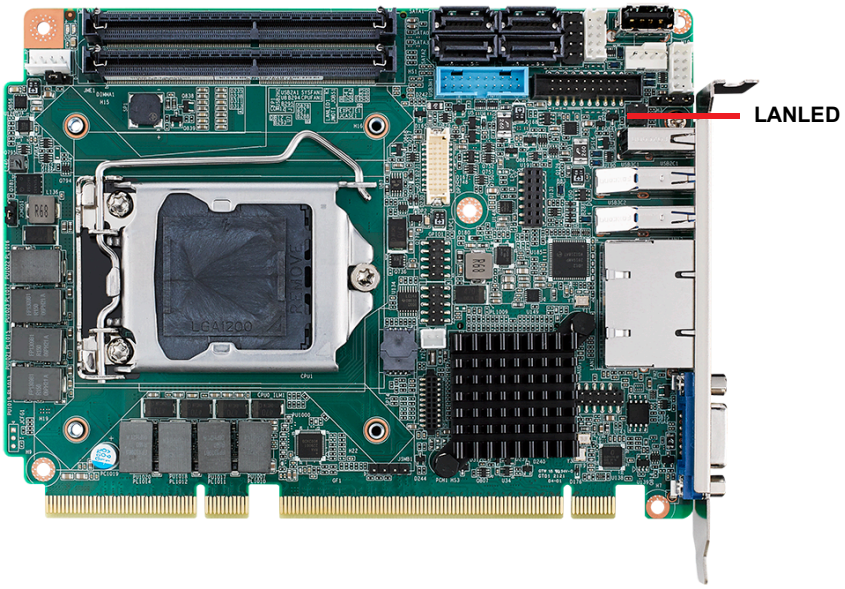
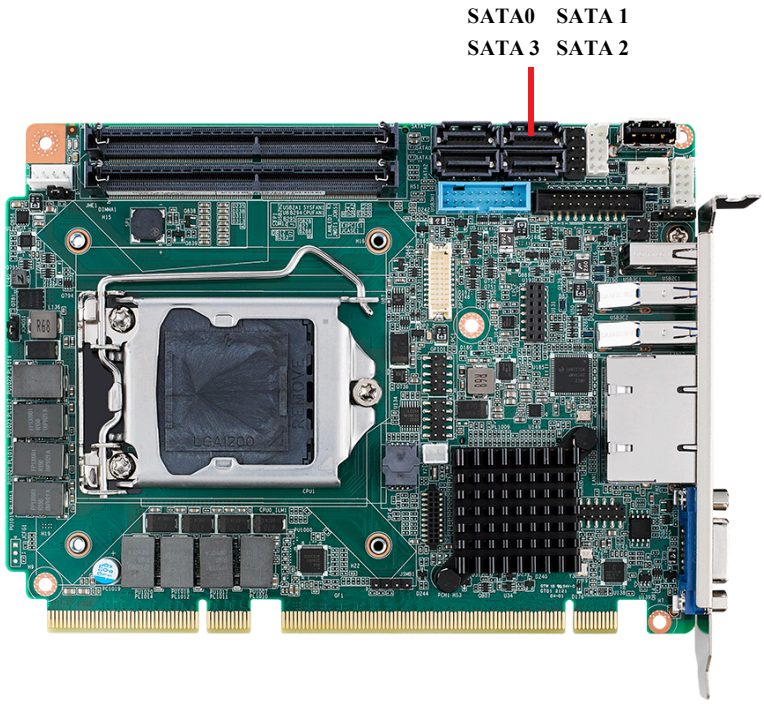


Table 2.3: LAN LED Indicators

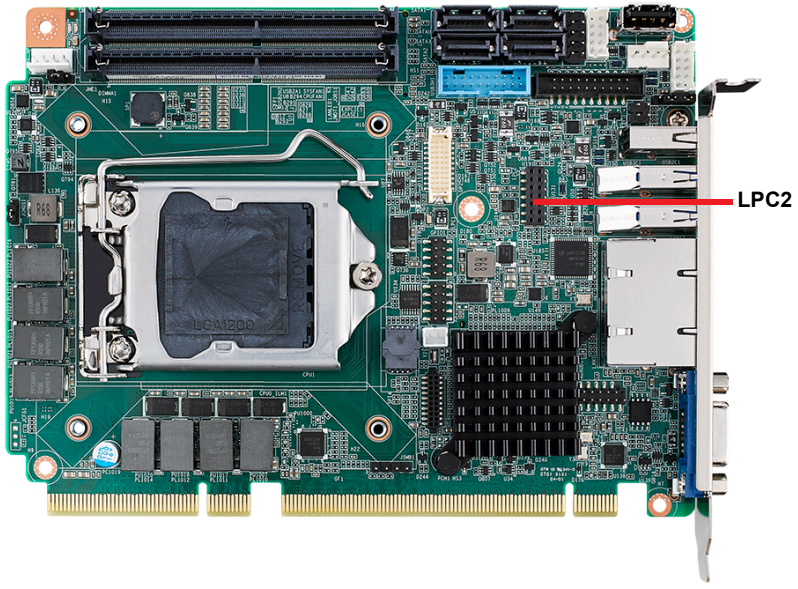
LAN Mode	LAN1 (1, 3 pin)	LAN2 (2, 4 pin)
1000Mbps Link On	On	On
1000Mbps Active	Flash	Flash
1000Mbps Link Off	Off	Off
100Mbps Link On	On	On
100Mbps Active	Flash	Flash
100Mbps Link Off	Off	Off
10Mbps Link On	On	On
10Mbps Active	Flash	Flash
10Mbps Link Off	Off	Off

2.14 Serial ATA Interface (SATA0~SATA3)



PCE-3032/4132 features high performance serial ATA 3.0 interface which eases cabling to hard drivers or CD/DVD drivers with long cables.

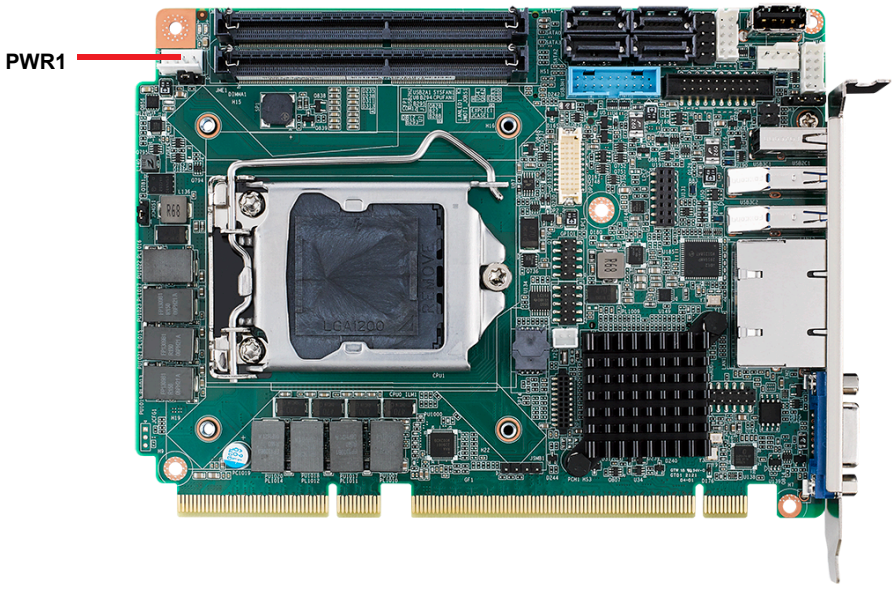
2.15 LPC Extension Interface (LPC2)



LPC2 is a 14-pin female pin header for adopting Advantech LPC module, such as PCA-COM232-00A1E, PCA-COM485-00A1E, PCA-TPM-00B1E.

Note! *When setting PCA-COM485 to RS-422 mode, BIOS auto-flow control need to be set at disable*

2.16 12/5V Power Connector (PWR1)



Due to no 5V supply from the golden fingers, please use a power converter: 1703040100 to connect from the peripheral power connector on the power supply to PWR1 on board.

Note! *Please note that if PWR1 is not connected, PCE-3032/4132 can not be powered on.*

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-3032/4132 setup screens.

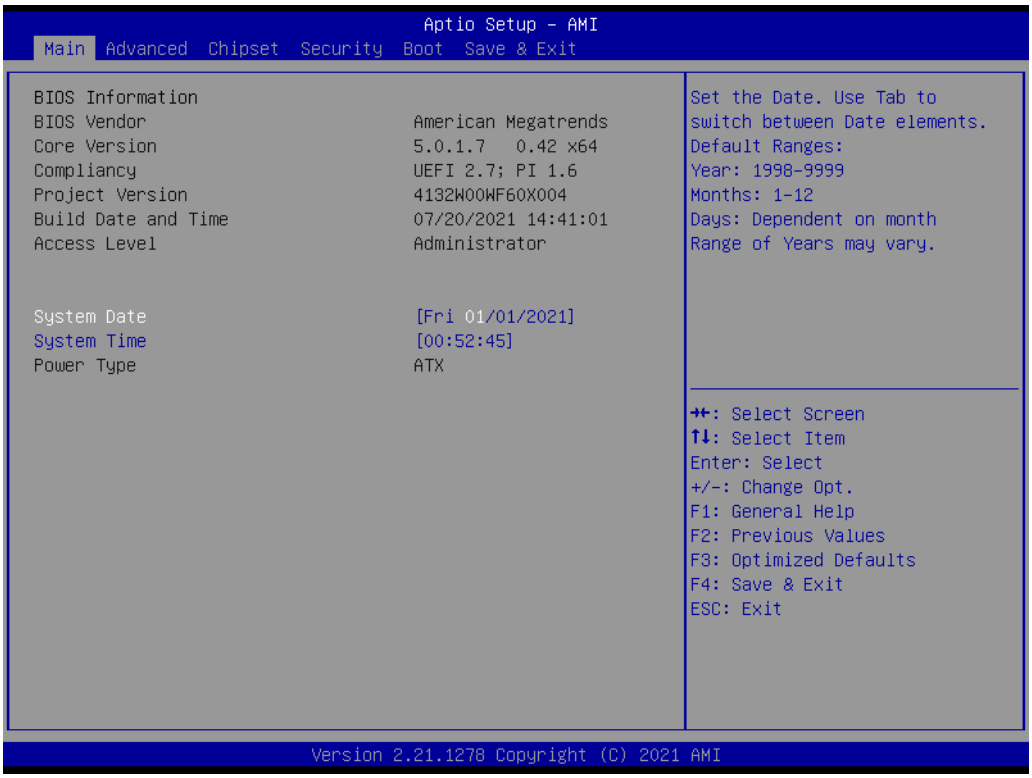


Figure 3.1 Setup Program Initial Screen

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 it 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.

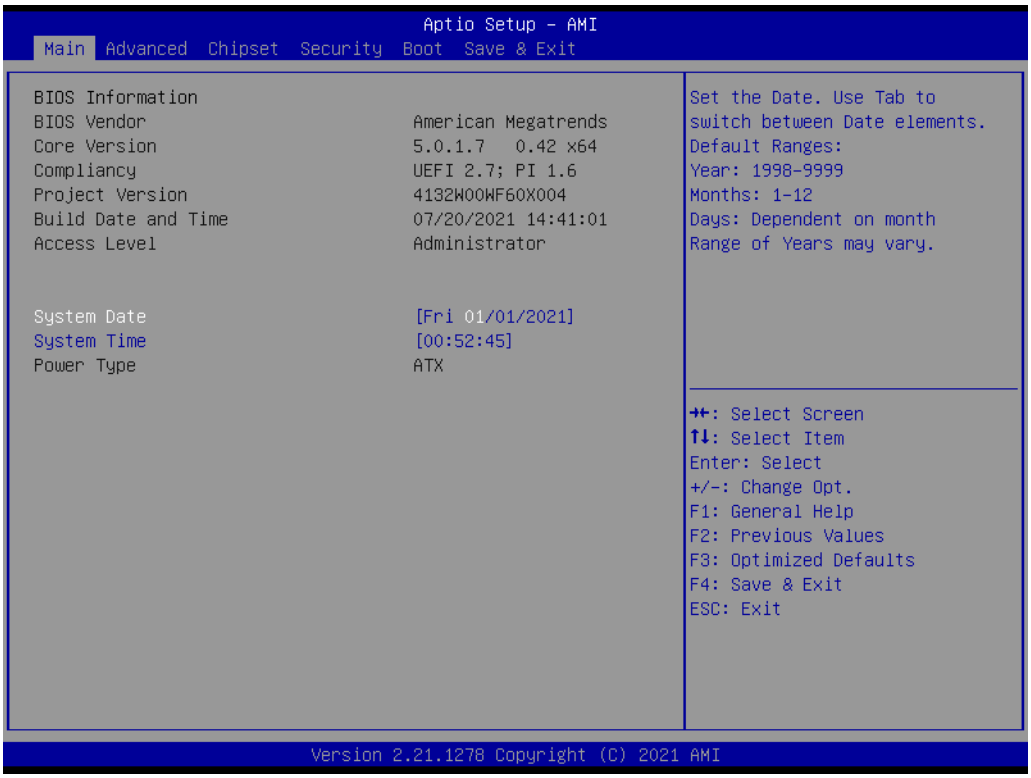


Figure 3.2 Main Setup Screen

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.

- **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.

- **Power Type**

  Choose this item correspond with your power supply type.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the PCE-3032/4132 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.

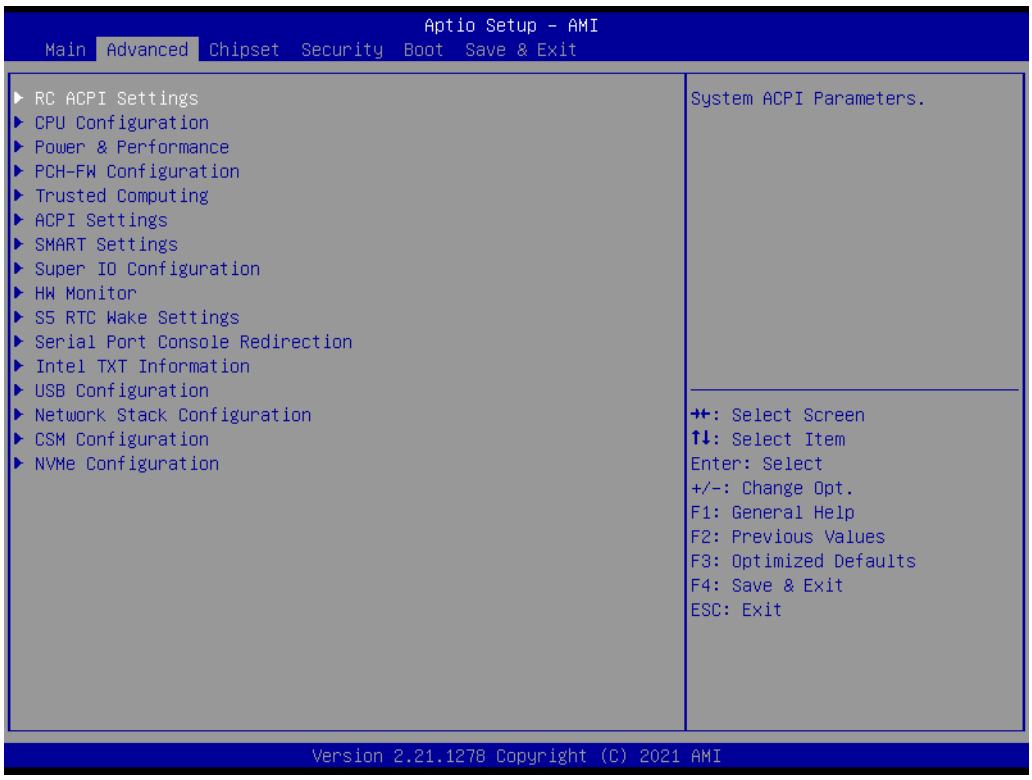


Figure 3.3 Advanced BIOS Features Setup

3.2.2.1 RC ACPI Settings

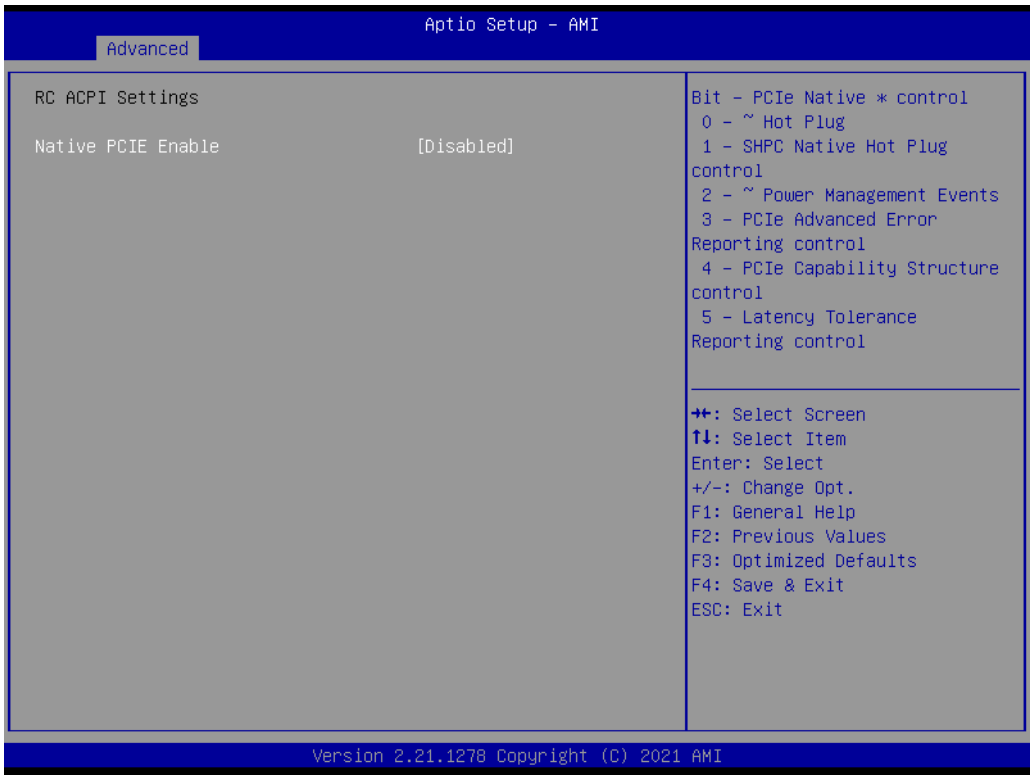


Figure 3.4 RC ACPI Settings

- **RC ACPI Settings**
  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

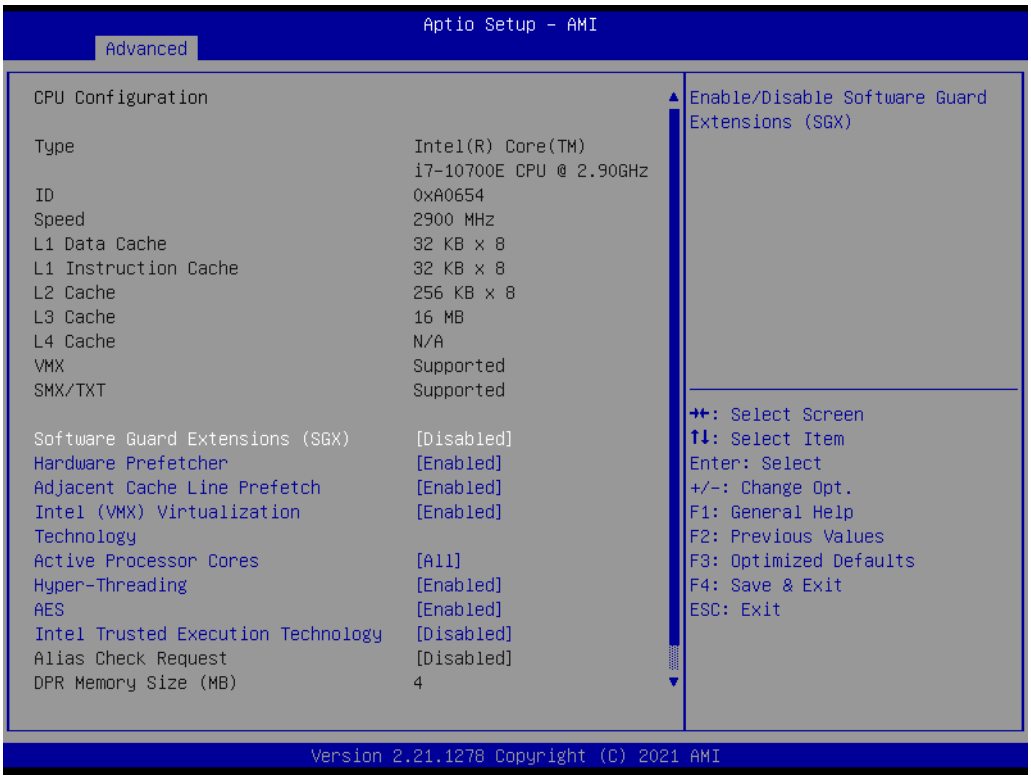
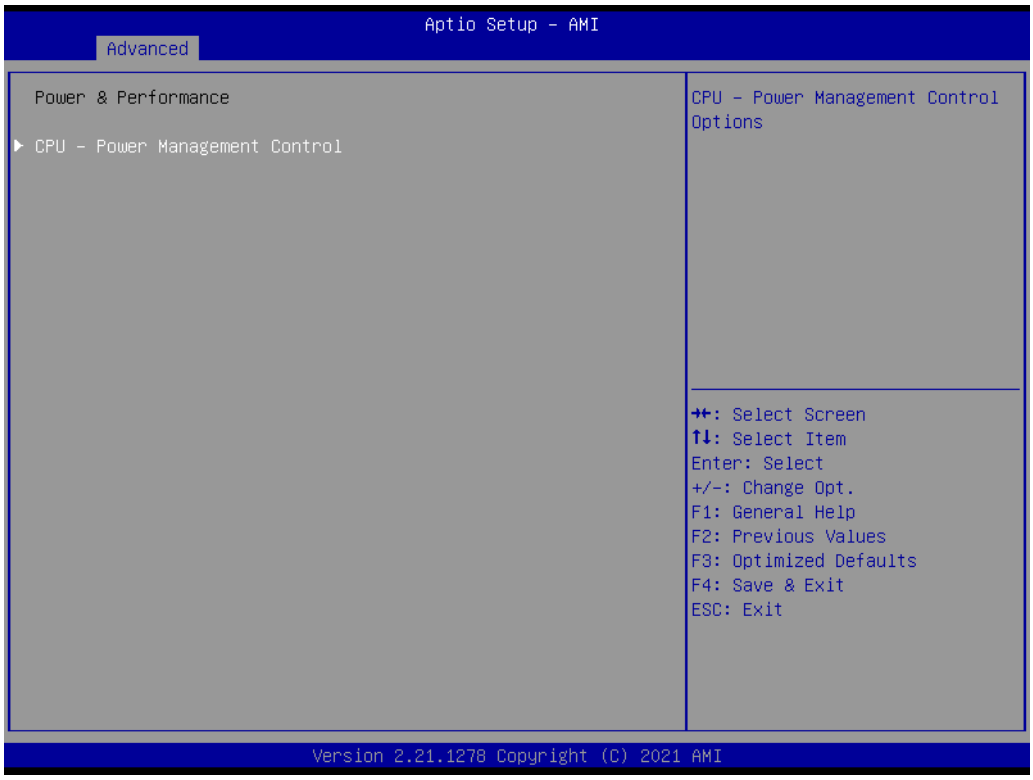
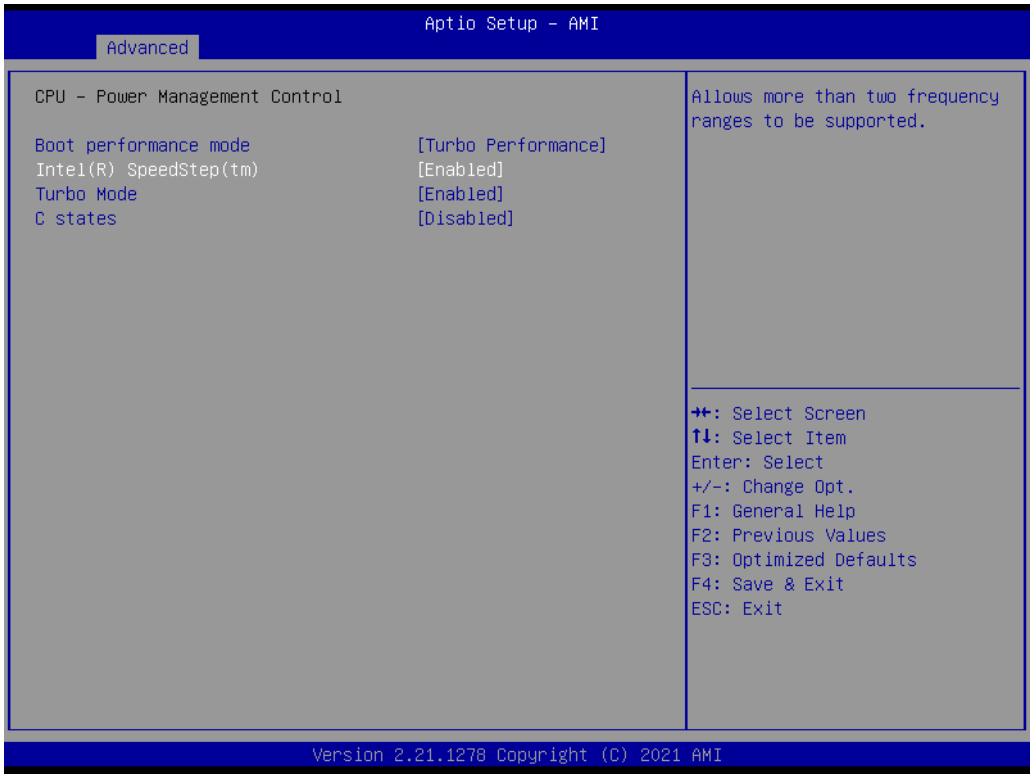


Figure 3.5 CPU Configuration

- **Software Guard Extensions (SGX)**
  Enable/Disable Software Guard Extensions (SGX).
- **Hardware Prefetcher**
  To turn on/off the MLC streamer prefetcher.
- **Adjacent Cathe Line Prefetch**
  To turn on/off prefetching of adjacent catch lines.
- **Intel (VMX) Virtualization Technology**
  When enabled, a VMM can utilized the additional hardware capabilities provided by Vanderpool Technology.
- **Hyper-Threading**
  Enable or Disable Hyper-Threading Technology.
- **AES**
  Enable/Disable AES (Advanced Encryption Standard).
- **Intel Trusted Execution Technology**
  Enables utilization of additional hardware capabilities provided by Intel Trusted Execution Technology. Changes require a full power cycle to take effect.

3.2.2.3 Power & Performance





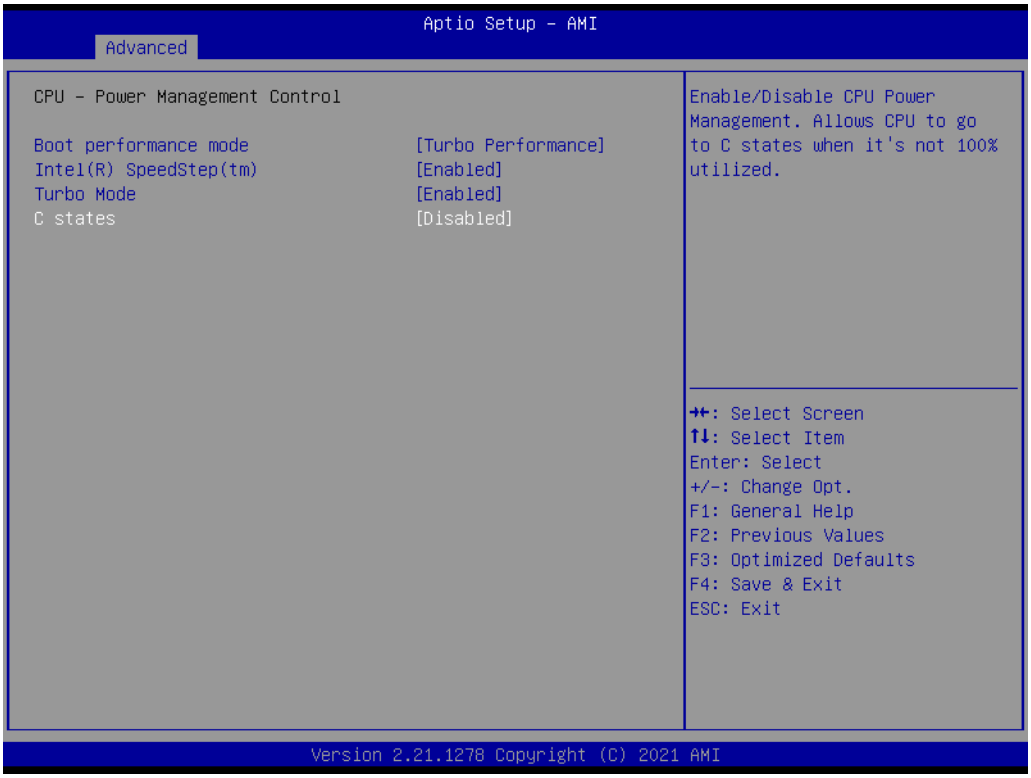


Figure 3.6 Power & Performance

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

3.2.2.4 PCH-FW Configuration



Figure 3.7 PCH-FW Configuration

3.2.2.5 Trusted Computing

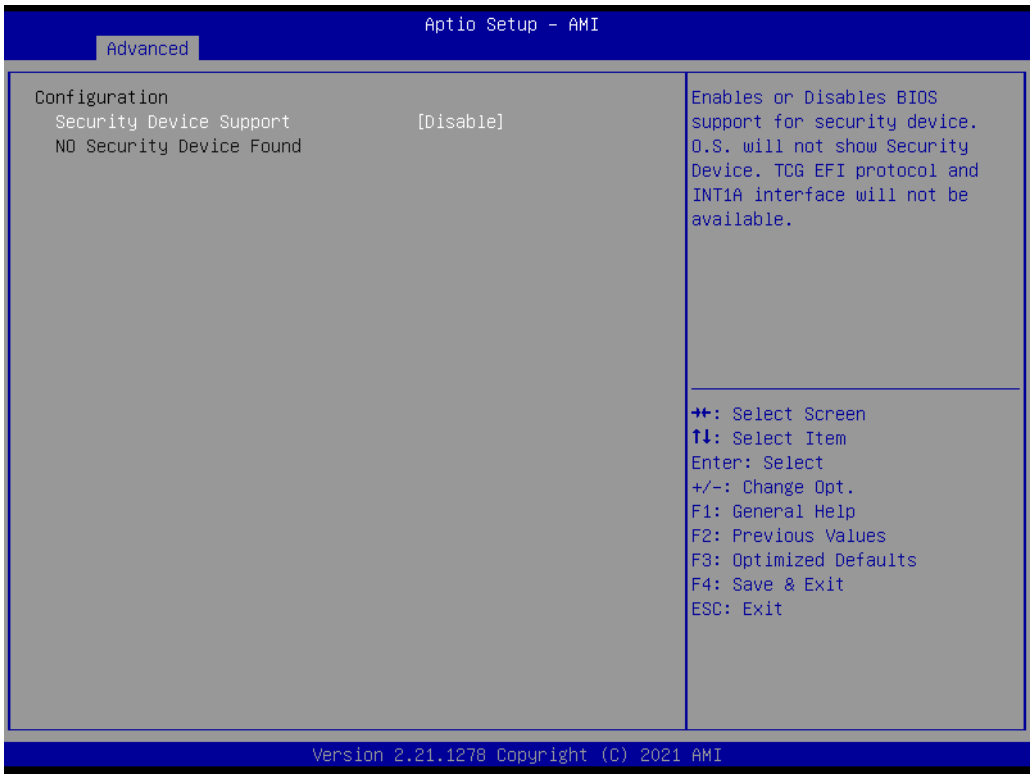
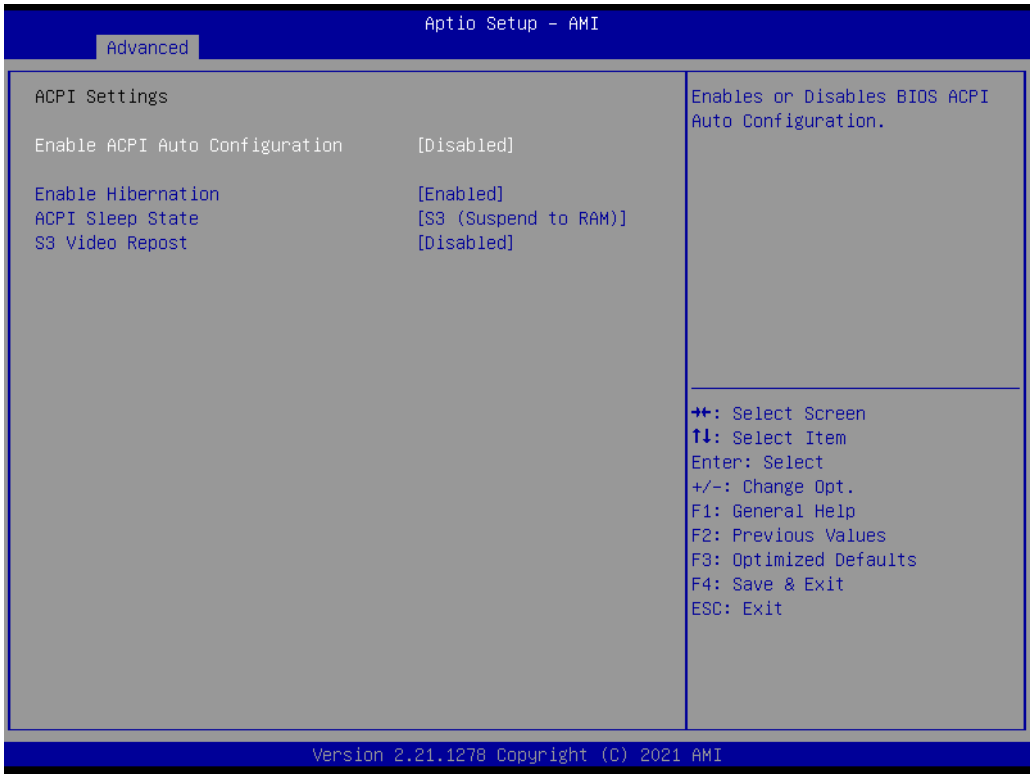
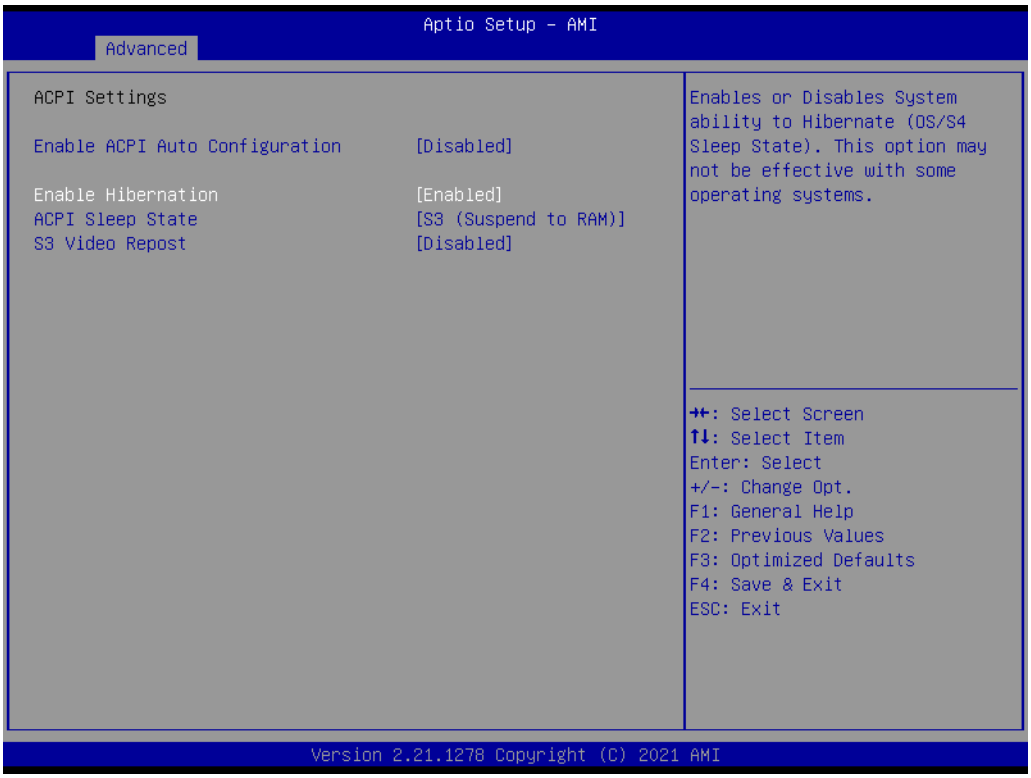


Figure 3.8 Trusted Computing

3.2.2.6 ACPI Settings





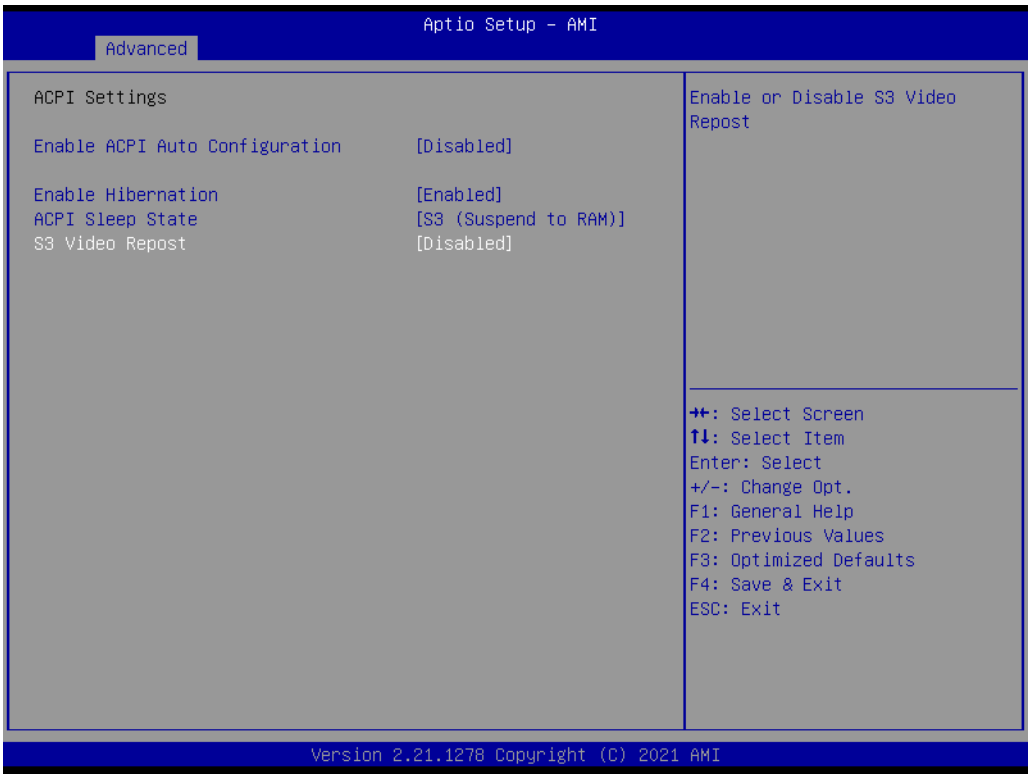


Figure 3.9 ACPI Settings

- **Enable ACPI Auto Configuration**
  Enables or Disabled 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.

- **S3 Video Repost**
  Enable or Disable S3 Video Repost.

3.2.2.7 SMART Settings

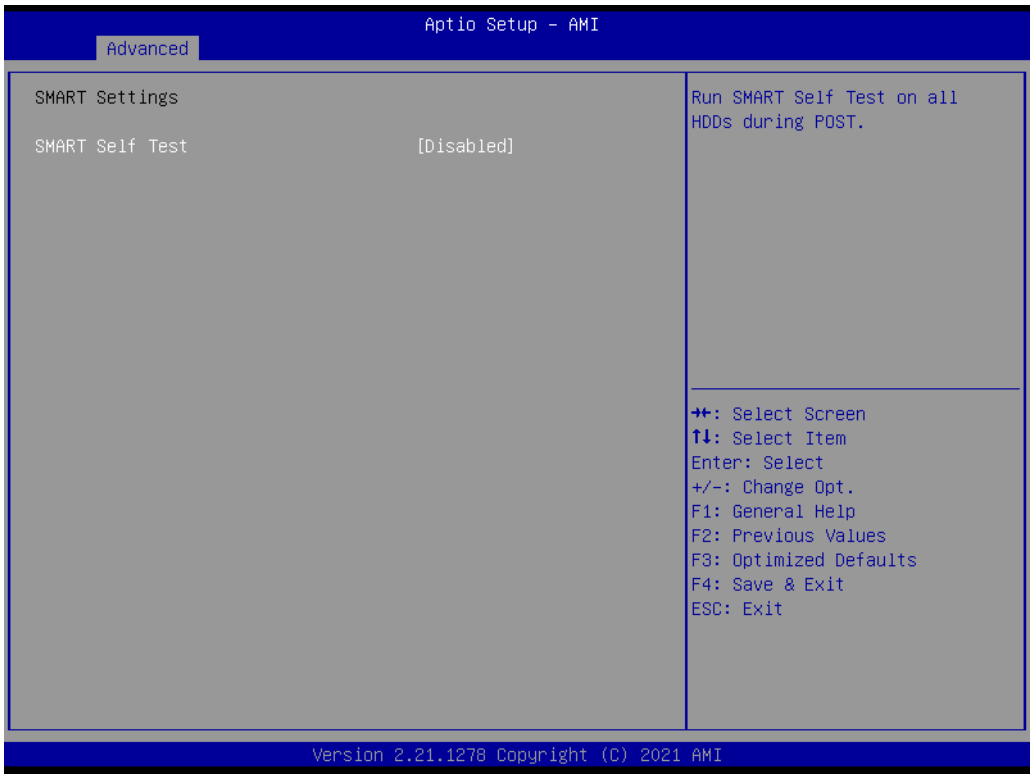
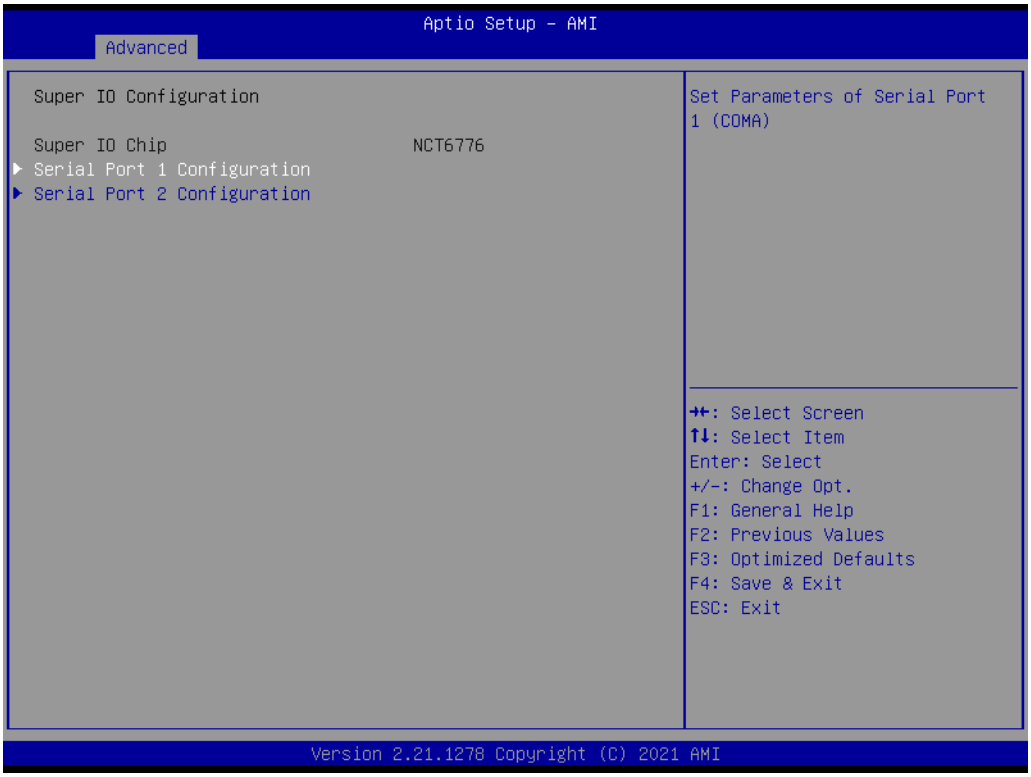


Figure 3.10 SMART Settings

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

3.2.2.8 Super IO Configuration



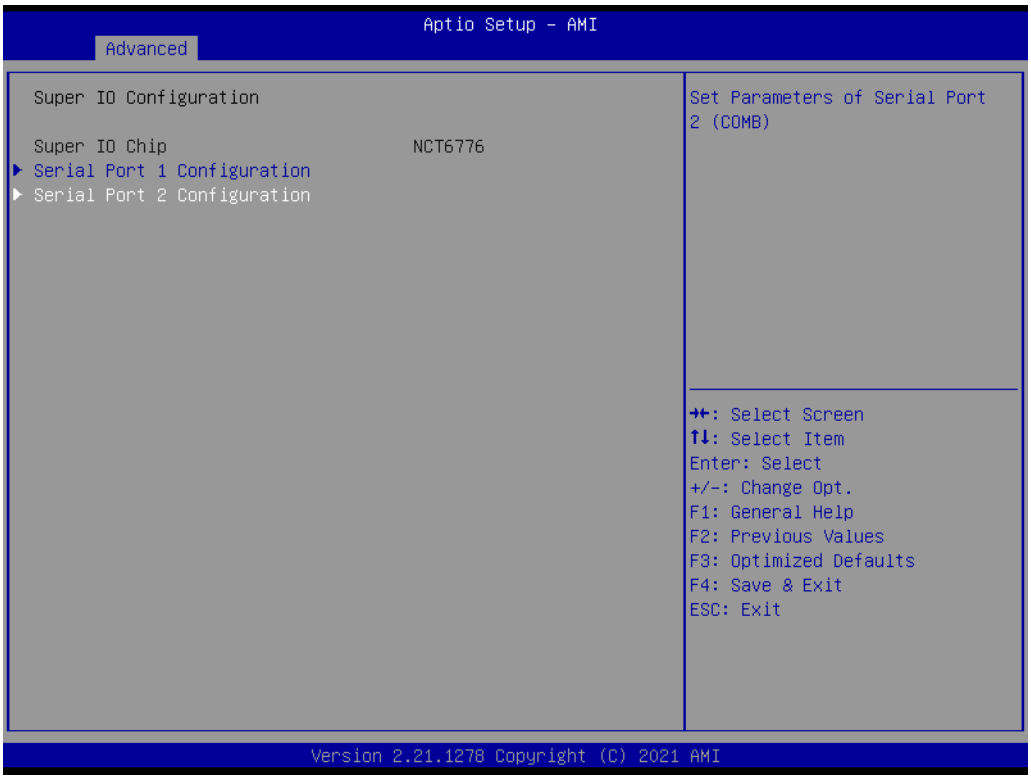


Figure 3.11 Super IO Configuration

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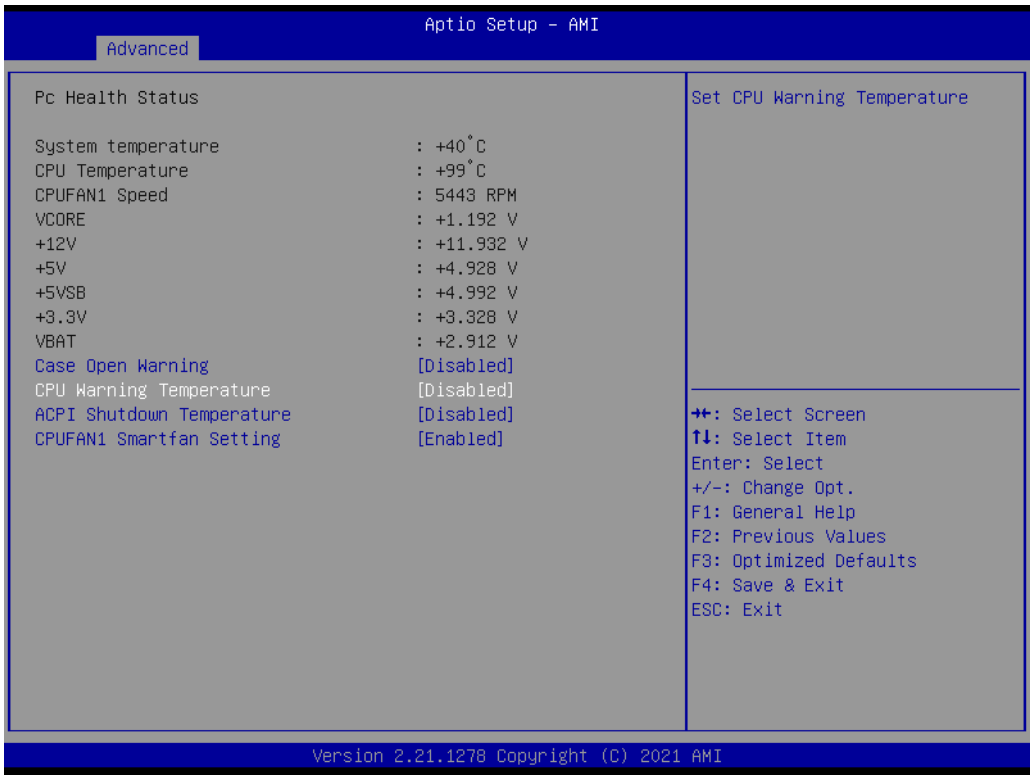
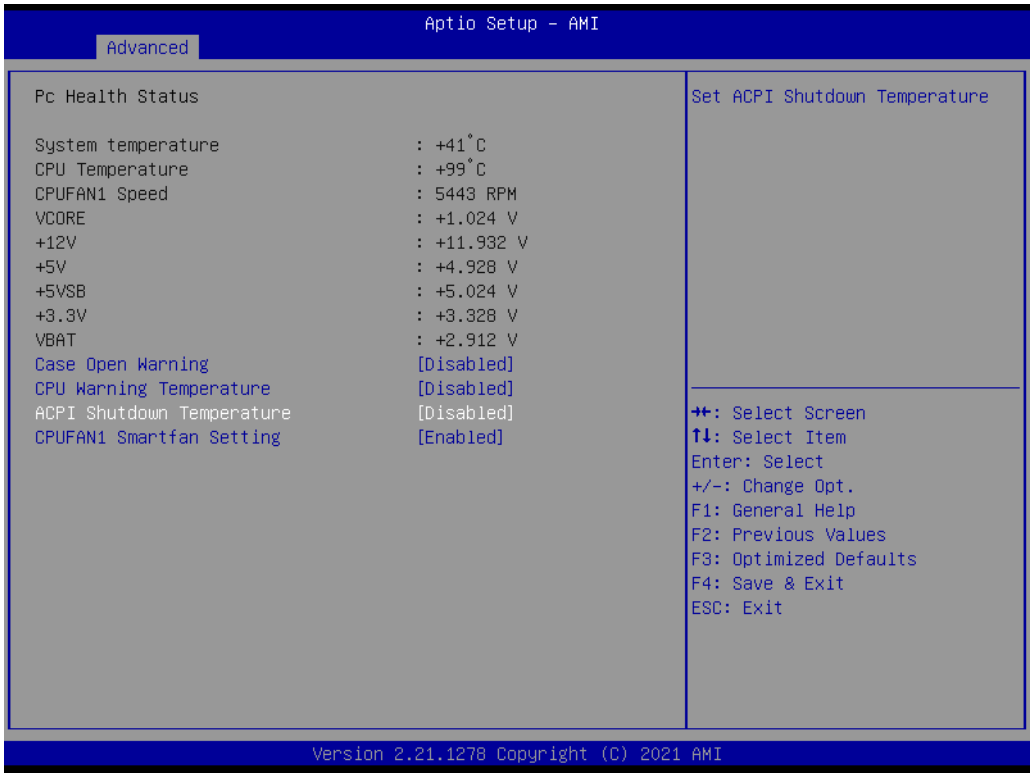
- **Serial Port 1 Configuration**
  Set Parameters of Serial Port 1 (COMA).
- **Serial Port 2 Configuration**
  Set Parameters of Serial Port 2 (COMB).

3.2.2.9 HW Monitor





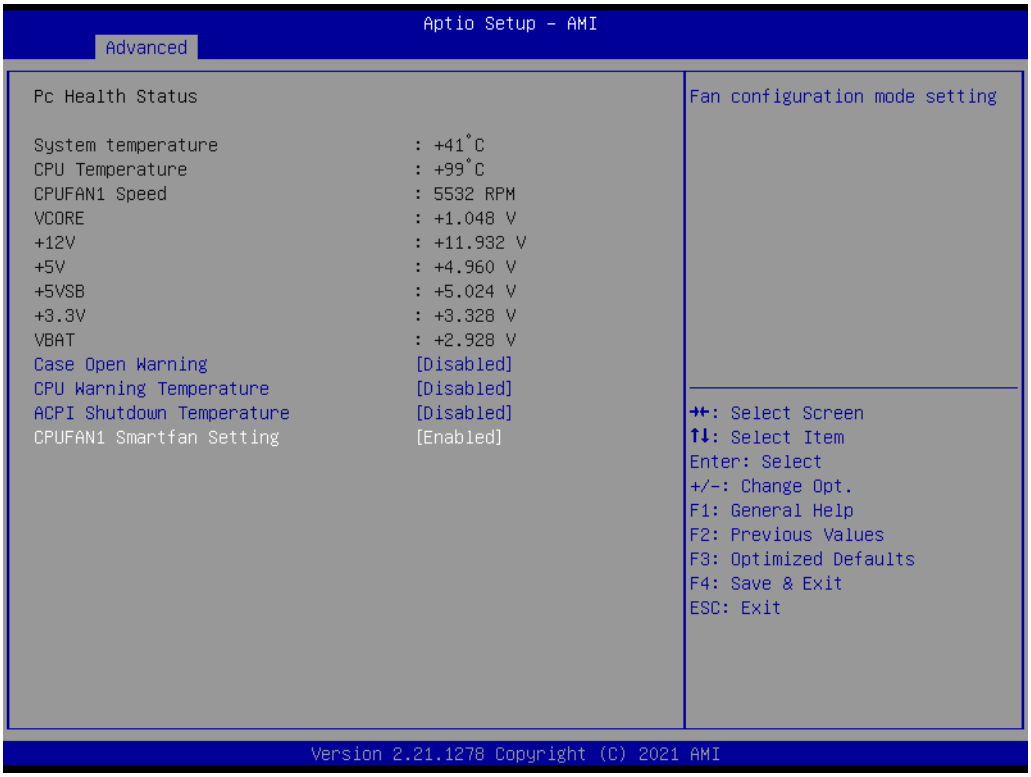


Figure 3.12 HW Monitor

- **CPU Warning Temperature**
  Set CPU Warning Temperature.
- **ACPI Shutdown Temperature**
  Set ACPI Shutdown Temperature.
- **CPUFAN1 Smartfan Setting**
  Fan configuration mode setting.

3.2.2.10 S5 RTC Wake Settings



Figure 3.13 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.

Select DynamicTime, System will wake on the current time + Increase minute(s).

3.2.2.11 Serial Port Console Redirection

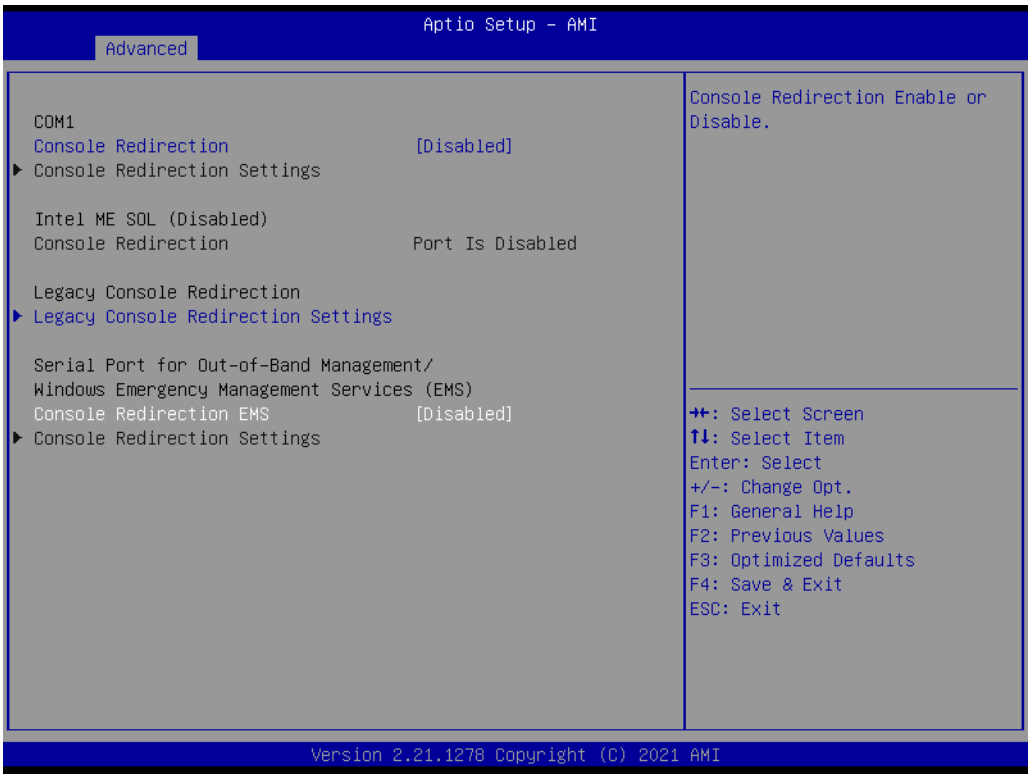


Figure 3.14 Serial Port Console Redirection

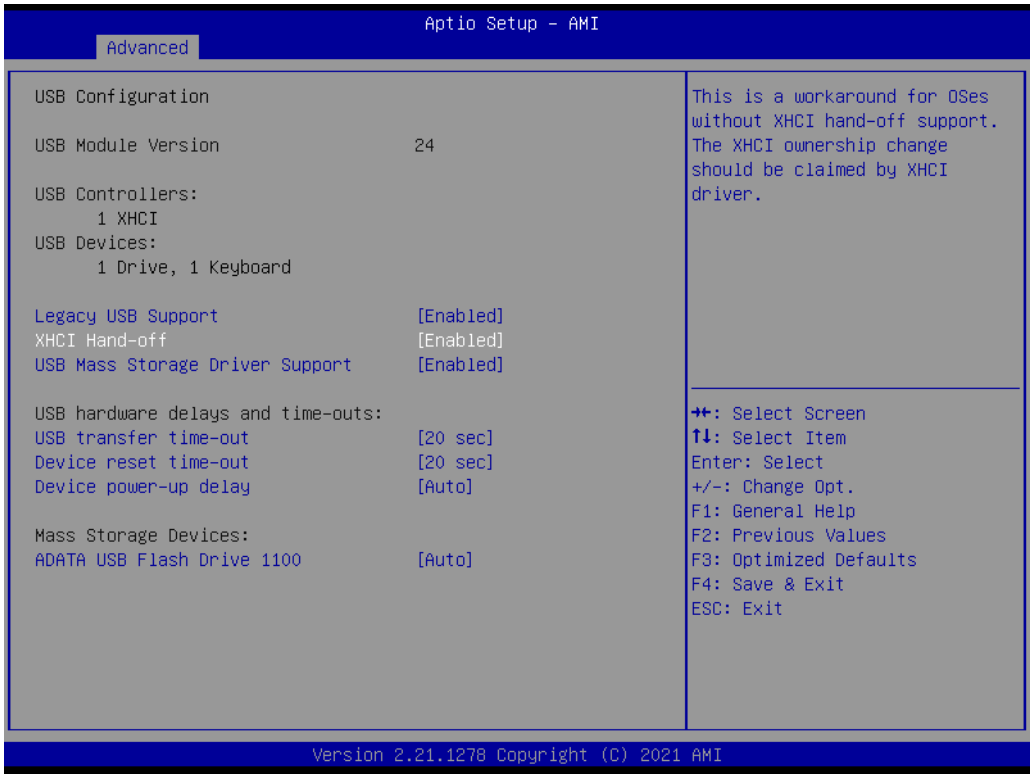
- **Console Redirection EMS**
  Console Redirection Enable or Disable.

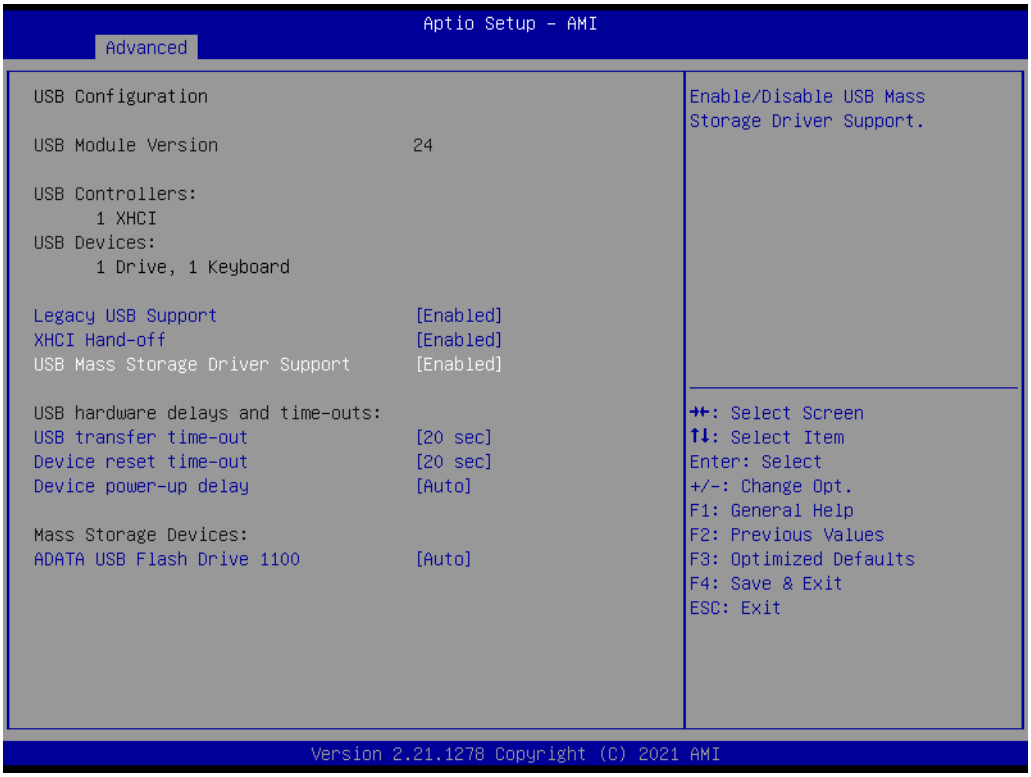
3.2.2.12 Intel TXT Information

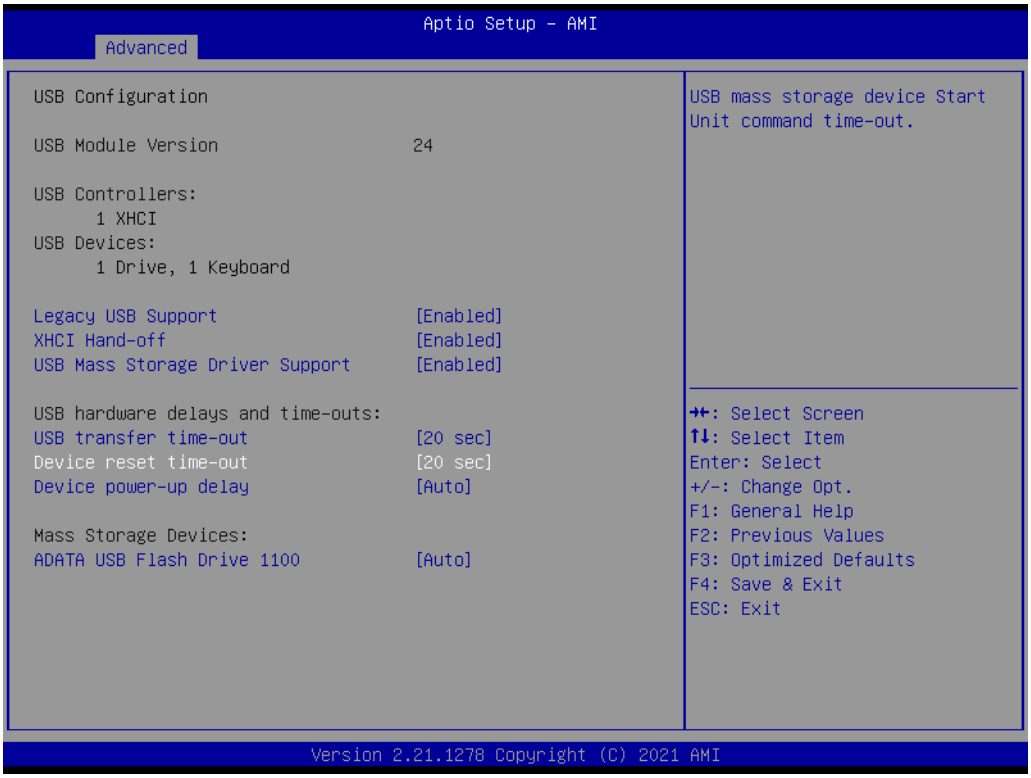


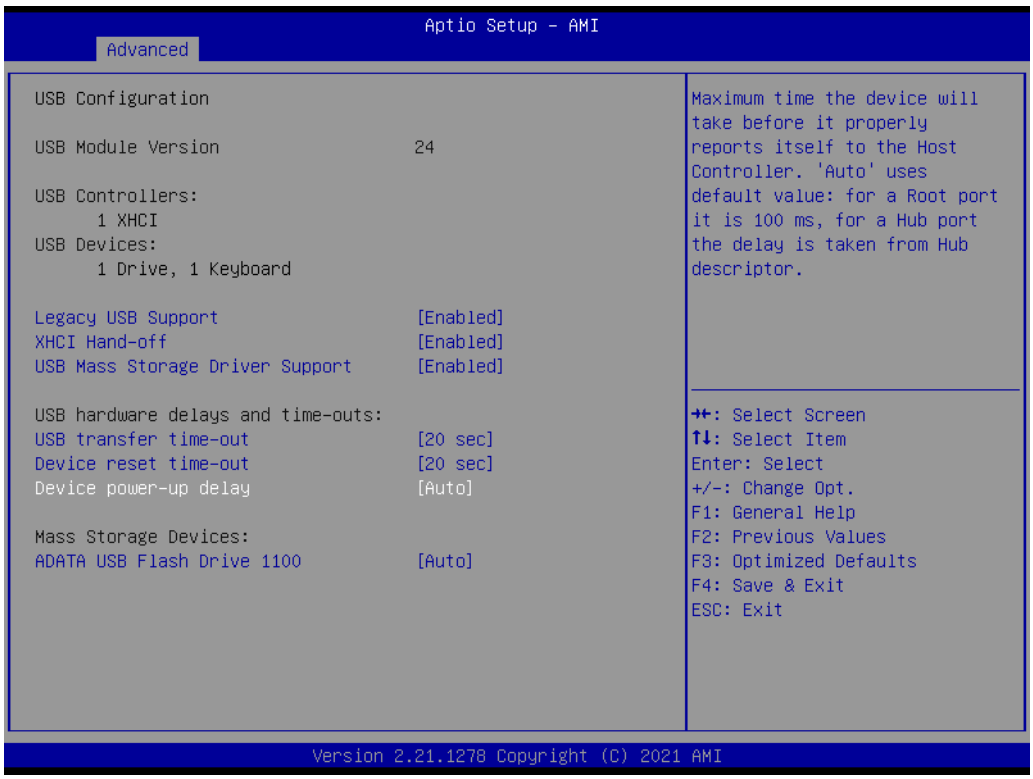
Figure 3.15 Intel TXT Information

3.2.2.13 USB Configuration




Aptio Setup – AMI
Advanced
USB Configuration
USB Module Version 24
USB Controllers:
1 XHCI
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:
USB transfer time-out [20 sec]
Device reset time-out [20 sec]
Device power-up delay [Auto]
Mass Storage Devices:
ADATA USB Flash Drive 1100 [Auto]
Enable/Disable USB Mass Storage Driver Support.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1278 Copyright (C) 2021 AMI


Aptio Setup – AMI
Advanced
USB Configuration
USB Module Version 24
USB Controllers:
1 XHCI
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:
USB transfer time-out [20 sec]
Device reset time-out [20 sec]
Device power-up delay [Auto]
Mass Storage Devices:
ADATA USB Flash Drive 1100 [Auto]
USB mass storage device Start Unit command time-out.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.21.1278 Copyright (C) 2021 AMI



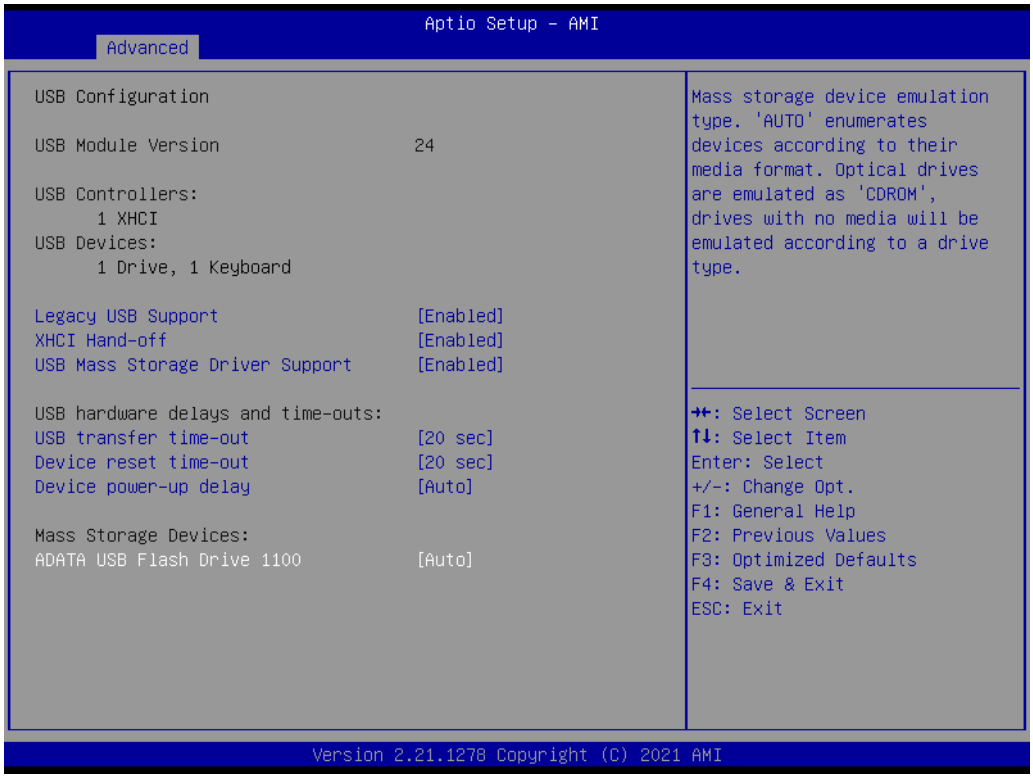


Figure 3.16 USB Configuration

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

- **USB Mass Storage Driver Support**
  Enable/Disable USB Mass Storage Driver Support.
- **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.

3.2.2.14 Network Stack Configuration



Figure 3.17 Network Stack Configuration

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

3.2.2.15 CSM Configuration

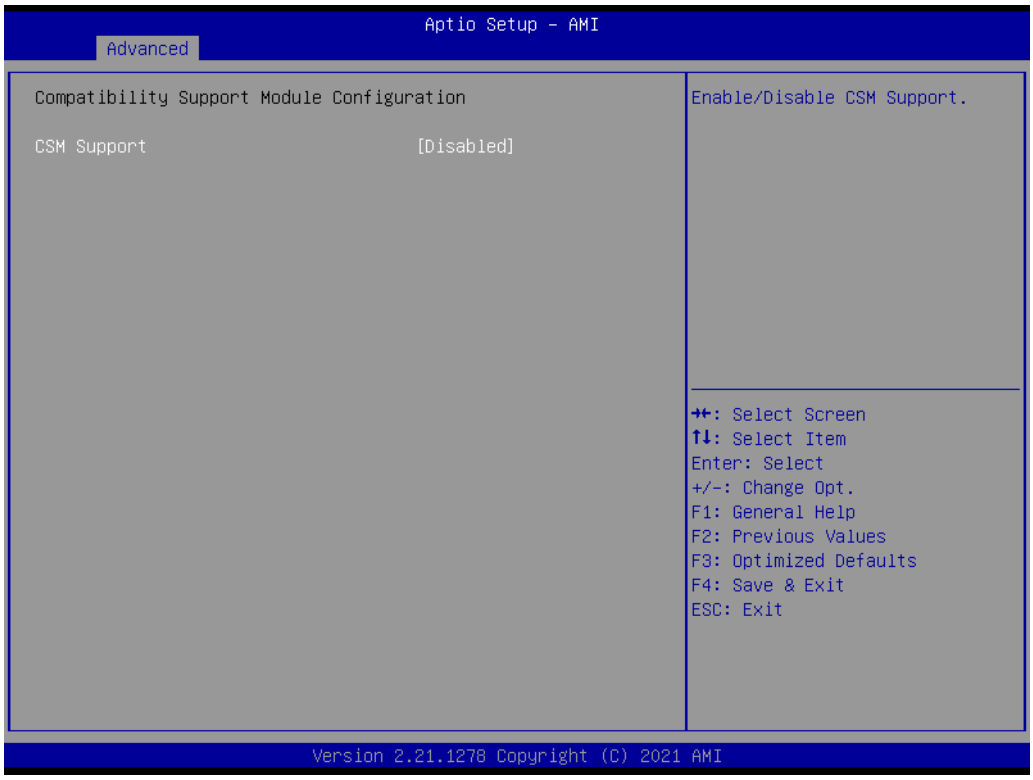


Figure 3.18 CSM Configuration

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

3.2.2.16 NVME Configuration



Figure 3.19 NVME Configuration

3.2.3 Chipset



Figure 3.20 Chipset

3.2.3.1 System Agent (SA) Configuration

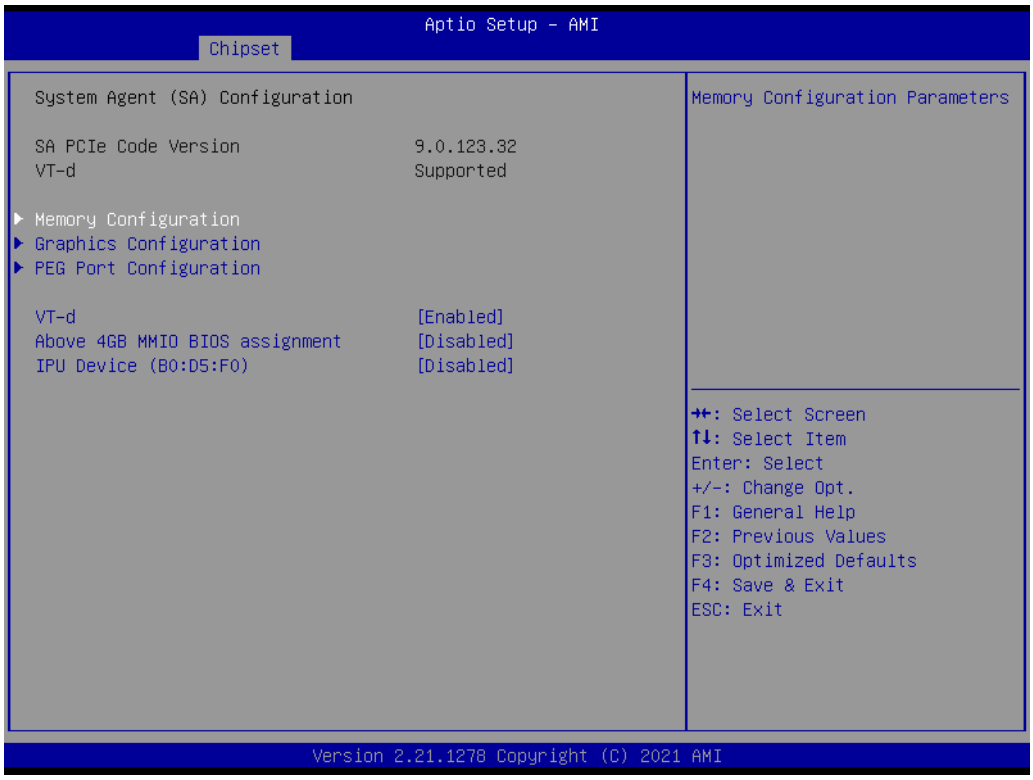
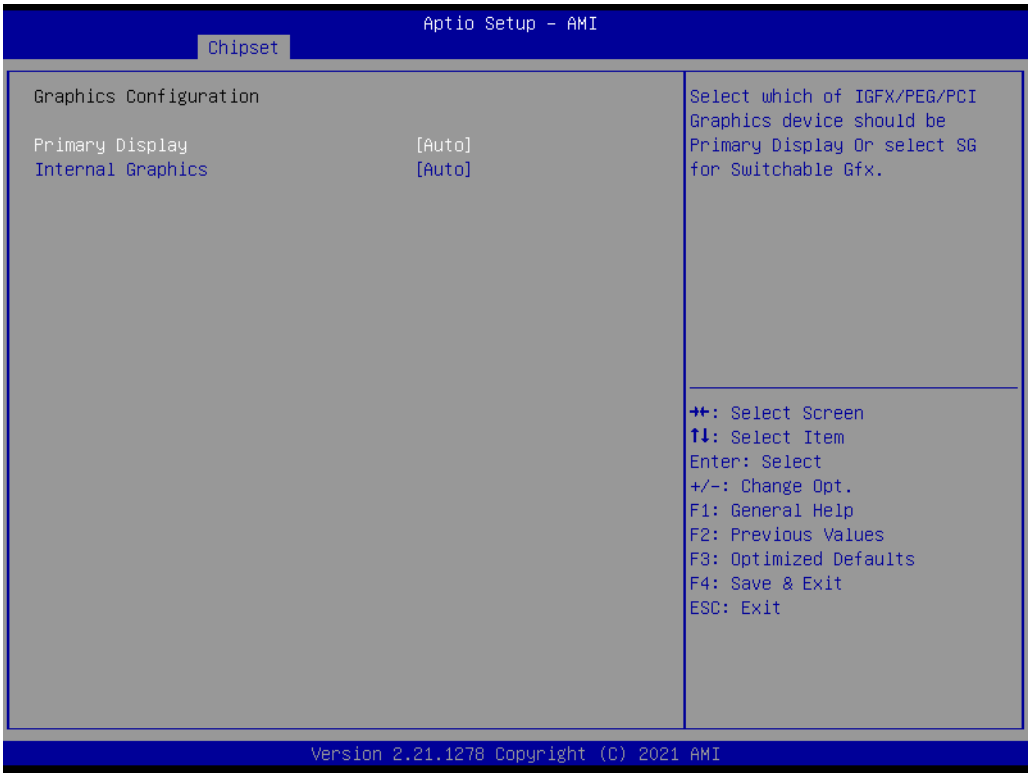


Figure 3.21 System Agent (SA) Configuration

- **VT-d**
  Check to enable VT-d function on MCH.

3.2.3.2 Graphics Configuration



- **Primary Display**
  Select which of IGFX/PEG/PCI Graphics device should be Primary Display or select SG for Switchable Gfx.
- **Internal Graphics**
  Keep IGFX enabled based on the setup options.

3.2.3.3 PEG Port Configuration

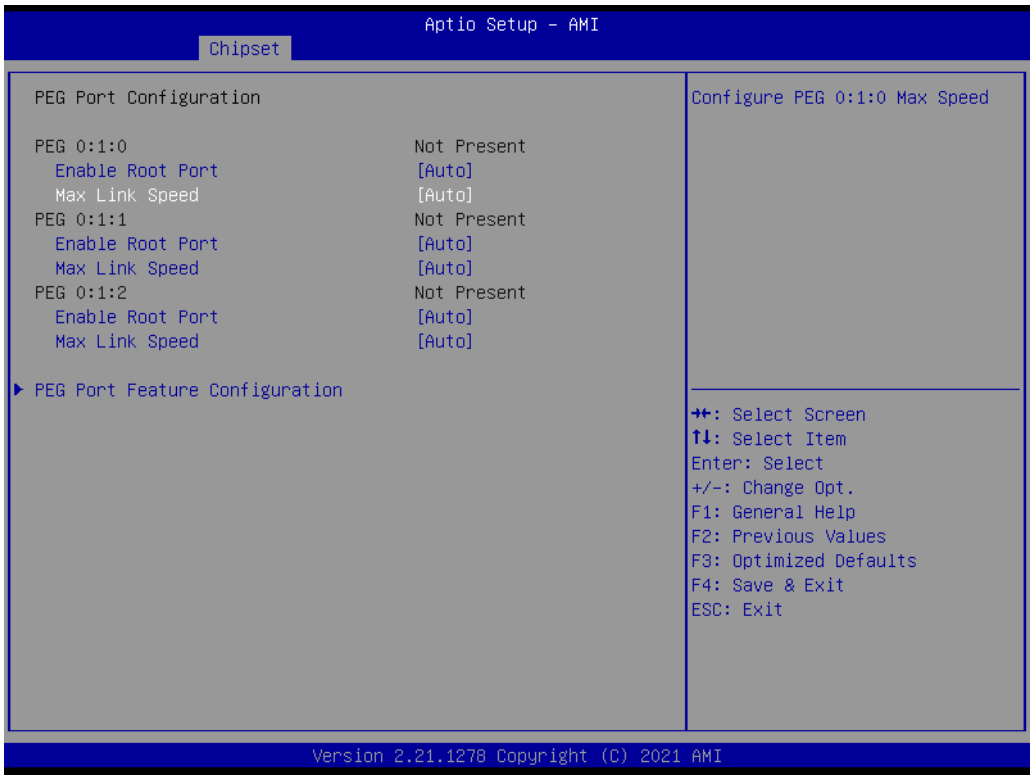


Figure 3.22 PEG Port Configuration

- **Enable Root Port**
  Enable or Disable the Root Port.
- **Max Link Speed**
  Configure PEG 0:1:0 Max Speed.
- **Max Link Speed**
  Configure PEG 0:1:1 Max Speed.
- **Enable Root Port**
  Enable or Disable the Root Port.
- **Max Link Speed**
  Configure PEG 0:1:2 Max Speed.
- **PEG Port Feature Configuration**
  PEG Port Feature Configuration.

3.2.3.4 Memory Configuration

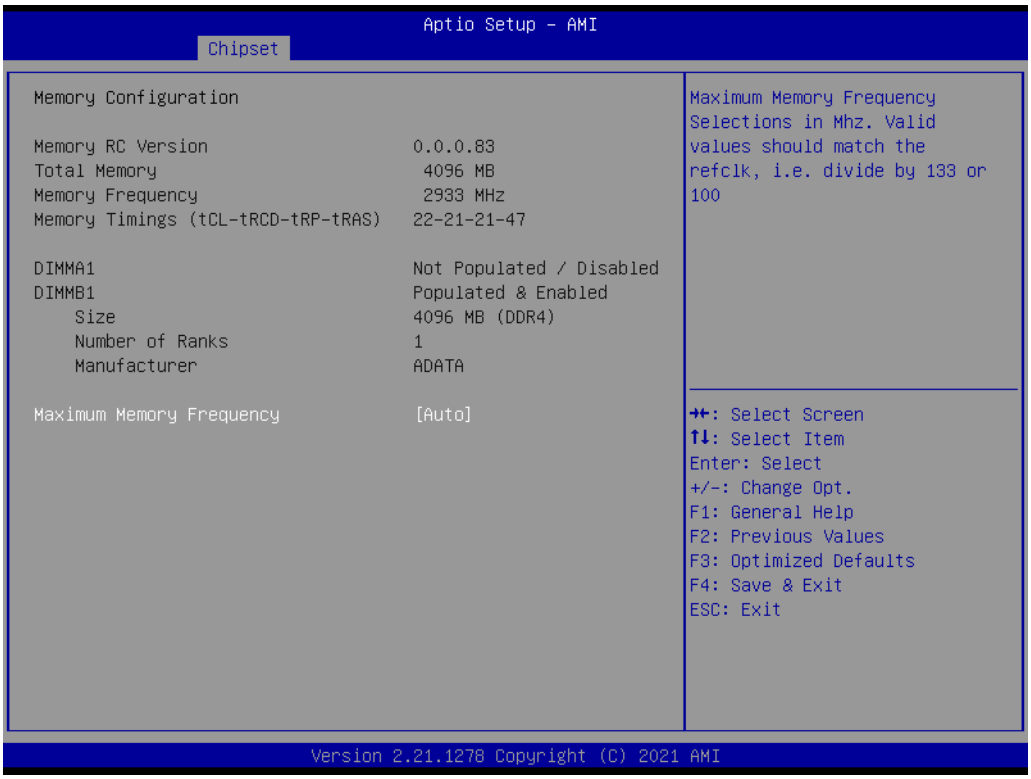


Figure 3.23 Memory Information

- **Maximum Memory Frequency**
  Maximum memory frequency selections in MHz. Valid values should match the refclk, i.e. divide by 133 or 100.

3.2.3.5 PCH-IO Configuration

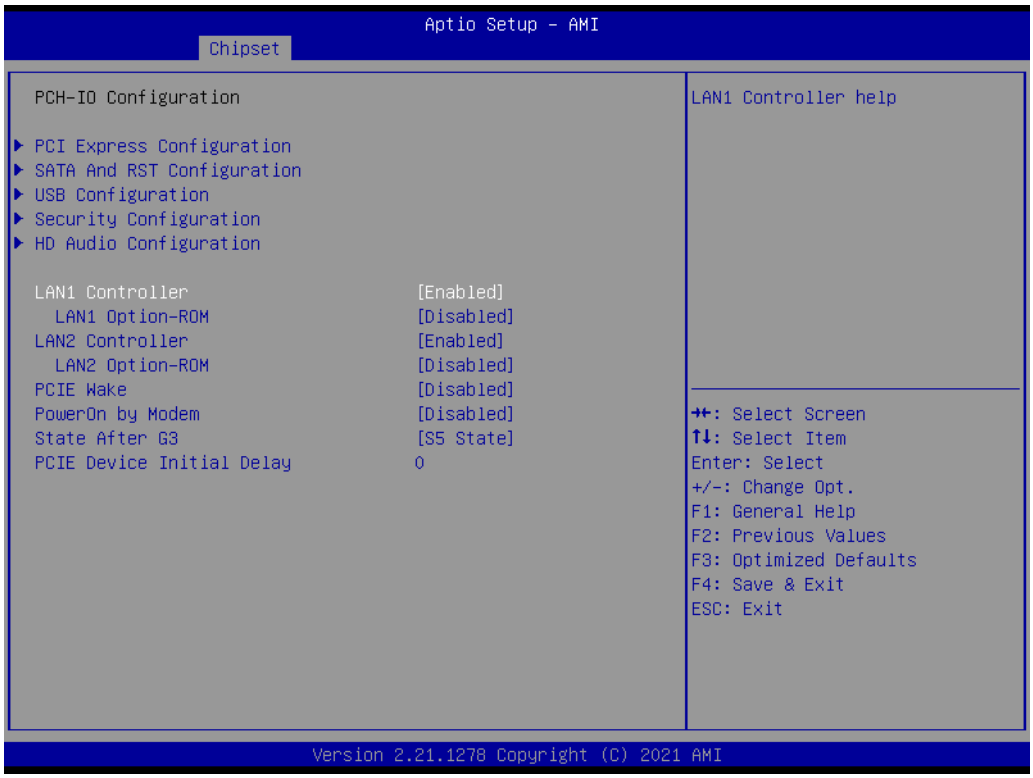


Figure 3.24 PCH IO Configuration

- **LAN1 Controller**
  LAN1 Controller help.
- **LAN1 Option-ROM**
  Enable or disable boot options for legacy network devices.
- **LAN2 Controller**
  LAN2 Controller help.
- **LAN2 Option-ROM**
  LAN2 Controller help.
- **PowerOn by Modem**
  Enable or disable PowerOn by Modem.
- **State After G3**
  Specify what state to go to when power is re-applied after a power failure (G3 state).
- **PCIE Device Initial Delay**
  The PCIE device initial delay 0~30 second.

3.2.3.6 PCI Express Configuration

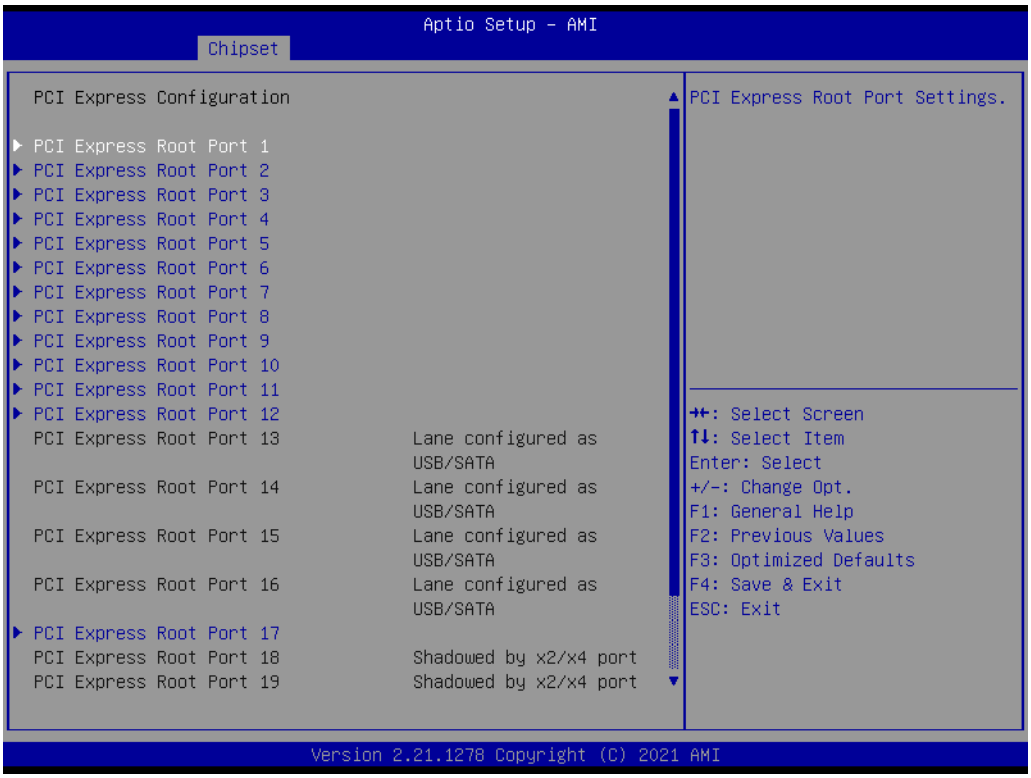


Figure 3.25 PCI Express Configuration

- **PCI Express Root Port 1~24 status**

3.2.3.7 USB Configuration

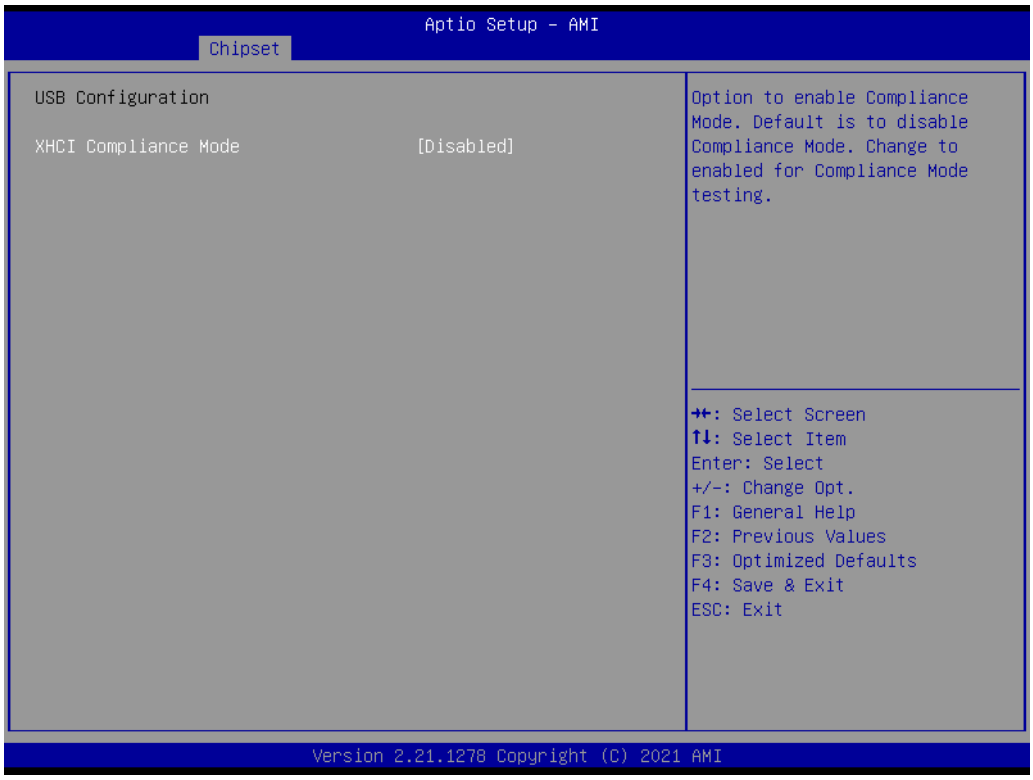


Figure 3.26 USB Configuration

- **XHCI Compliance Mode**
  Option to enable Compliance Mode. Default is to disable Compliance Mode. Change to enable for Compliance Mode testing.

3.2.3.8 HD Audio Configuration



Figure 3.27 PCH Azalia Configuration

- **HD Audio**
  Control detection of the HD Audio device.
  Disable=HDA will be unconditionally disabled.
  Enable=HDA will be unconditionally enabled.
  Auto=HDA will be enabled if present, disabled otherwise.

3.2.4 Security

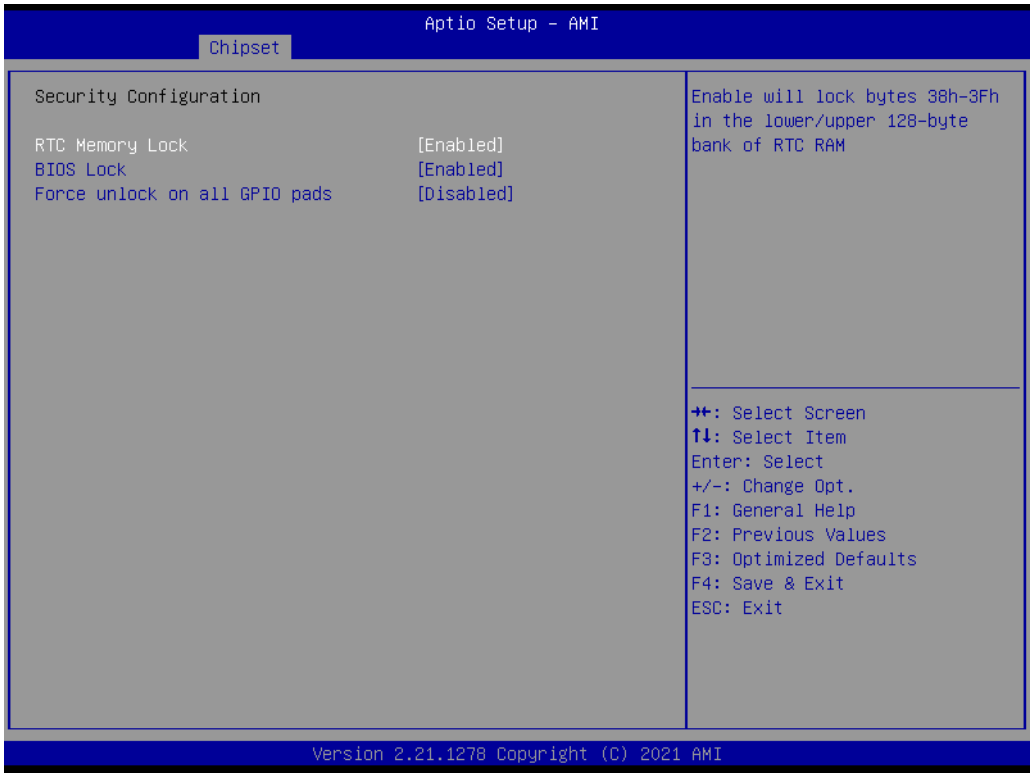


Figure 3.28 Security

- **RTC Memory Lock**
  Enable will lock bytes 38h-3Fh in the lower/upper 128-byte bank of RTC RAM.
- **BIOS Lock**
  Enable/Disable the PCH BIOS lock enable feature. Required to be enabled to ensure SMM protection of flash.

3.2.5 Boot

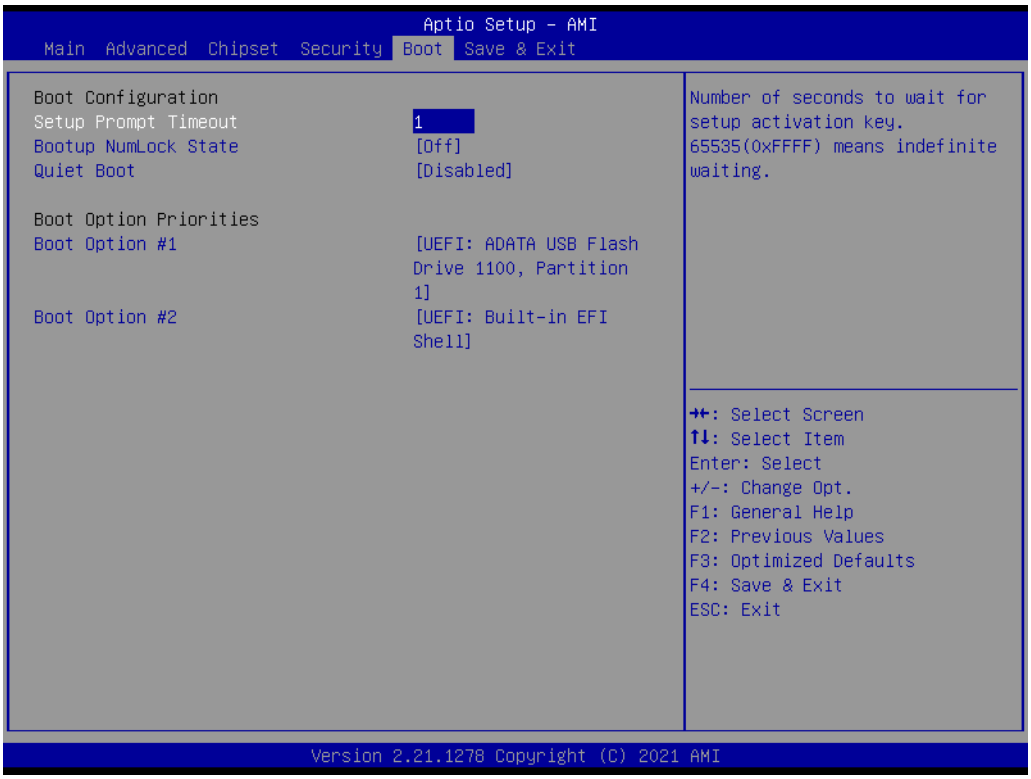


Figure 3.29 Boot

- **Setup Prompt timeout**
  Number of seconds to wait for setup activation key.
- **Bootup NumLock State**
  Select the keyboard Numlock state.
- **Quiet Boot**
  Enable/Disable Quiet Boot option.
- **Boot Option #1**
  Set the system boot order.
- **Boot Option #2**
  Set the system boot order.

3.2.6 Save & Exit

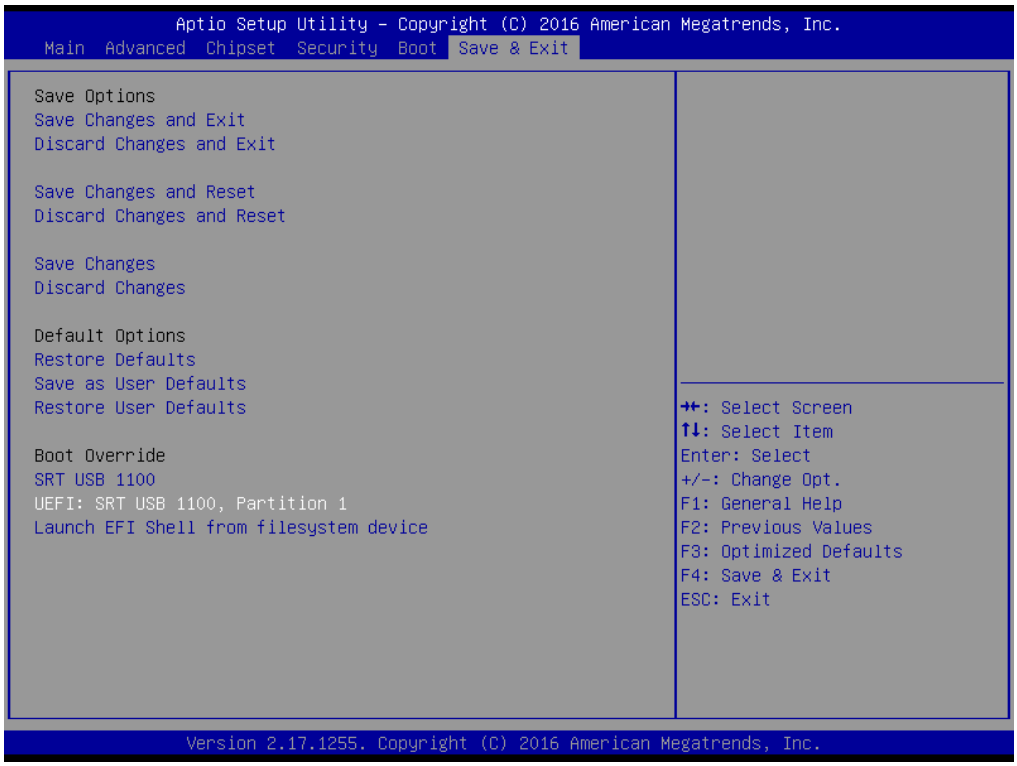


Figure 3.30 Save & Exit

- **Save changes and exit***
  When you have completed system configuration, select this option to save your changes.
- **Discard changes and exit**
  Select this option to quit Setup without making any permanent changes to the system configuration.
- **Save changes and Reset**
  When you have completed system configuration, select this option to save your changes, exit BIOS setup and reboot into the computer so the new system configuration parameters can take effect.
- **Discard changes and Reset**
  Select this option to quit setup and reset computer without making any permanent changes to the system configuration.
- **Save Changes**
  Select this option to save your changes.
- **Discard Changes**
  Select this option to discard your changes.
- **Restore Defaults**
  Select this option to restore BIOS configuration as origin.
- **Save as User Defaults**
  Select this option to save user's configuration.
- **Restore User Defaults**
  Select this option to restore BIOS to user's configuration.

*When you make some critical changes, the system will still reboot even if you chose "Save changes and exit".

Chapter 4

Value-Added Software Services

4.1 Value-Added Software Services

Software API are interface 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. APIs 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 XP (32/64 bit), Win7 (32/64bit), and Win8 (32/64bit), so if users needs Linux version API and utility, then contact an Advantech representative for support. For Windows systems, please install the .Net Framework v 3.5 in the driver CD.

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.

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-3032/4132 are located on the software installation CD. The driver in the folder of the driver CD 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 software installation CD 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

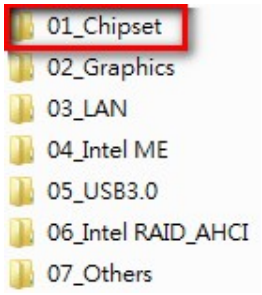
The Intel® Chipset Software Installation (CSI) utility installs the Windows INF files that outline to the operating system how the chipset components will be configured. This is needed for the proper functioning of the following features:

- PCIe Support
- SATA Storage Support
- USB Support
- Identification of Intel(R) Chipset Components in device manager

5.3 Windows 10 Driver Setup

Insert the driver CD into your system's CD-ROM drive. You can see the driver folder items. Navigate to the "01_Chipset" folder, choosing the operating system, and click "infinst_autol.exe" to complete the installation of the driver.

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



Chapter 6

Integrated Graphic Device Setup

6.1 Introduction

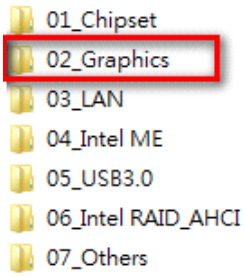
10th generation Intel CPUs have integrated graphics controllers. To achieve full graphics performance, you need to install the VGA driver.

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 chipset driver.*

Insert the driver CD into your system's CD-ROM drive. You can see the driver folder items. Navigate to the "02_Graphic" folder, choosing the operating system and click "setup.exe" to complete the installation of the driver.

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



Chapter 7

LAN Configuration

7.1 Introduction

PCE-3032/4132 has dual Gigabit Ethernet LANs via dedicated PCI Express x1 lanes (For PCE-3032, LAN1 and LAN2 are Intel I211AT; for PCE-4132, LAN1 and LAN2 are Intel I210AT) that offer bandwidth of up to 500 MB/sec, eliminating network data flow bottlenecks and incorporating Gigabit Ethernet at 1000 Mbps.

7.2 Installation

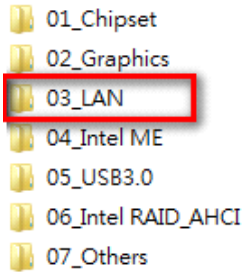
Note! *Before installing the LAN drivers, make sure the Chipset driver has been installed on your system. See Chapter 5 for information on installing the Chipset driver.*

PCE-3032/4132 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)

Insert the driver CD into your system's CD-ROM drive. Navigate to the "03_LAN" folder and click "Autorun.exe" to complete the installation of the driver.

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



Chapter 8

Intel ME

8.1 Introduction

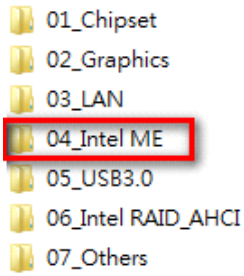
The Intel® ME software components that need to be installed depend on the system's specific hardware and firmware features. The installer detects the system's capabilities and installs the relevant drivers and applications.

8.2 Installation

Insert the driver CD into your system's CD-ROM drive. Navigate to the "04_Intel ME" folder to complete the installation of the 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

SATA RAID Setup

9.1 Introduction

To support demanding disk I/O, PCE-4132 with Intel chipset integrates 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.

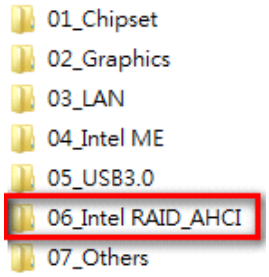
9.2 SATA RAID Driver and Utility Setup

The driver is in the CD's "06_Intel RAID_AHCI" folder. Go to the directory and follow Intel's installation guide to install the driver and utility.

Note! *For the detailed installation instructions for the SATA RAID driver and utility, please check the User Guide in the driver CD.*

Note! *Before you install the Intel Rapid Storage Technology, please read the "readme.txt".*

PCE-3032 don't support SATA RAID mode.



Appendix A

Programming the Watchdog Timer

A.1 Introduction

The PCE-3032/4132'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 NCT6776D 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).

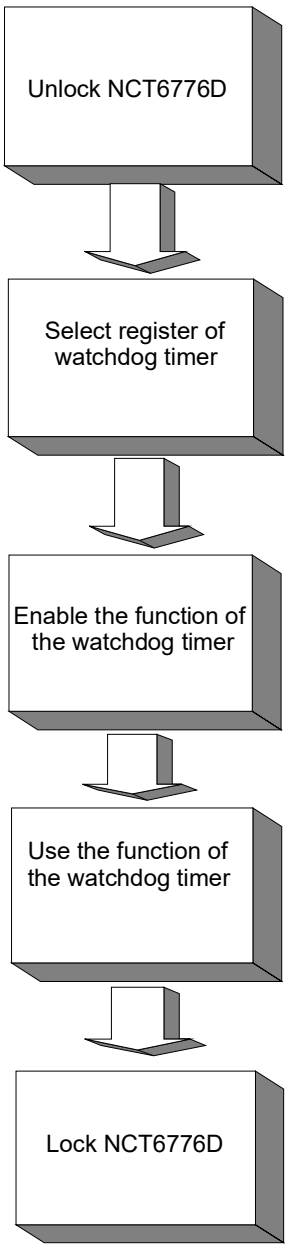


Table A.1: Watchdog Timer Registers

Address of register (2E)	Attribute Read/Write	Value (2F)& description
87 (hex)	-----	Write this address to I/O address port 2E (hex) twice to unlock the NCT6776D
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. Disabled is set as default.
F5 (hex)	write	Set seconds or minutes as units for the timer. Write 0 to bit 3: set second as counting unit. [default]. Write 1 to bit 3: set minutes as counting unit Write 1 to bit 4: Watchdog timer count mode is 1000 times faster. If bit 3 is 0, the count mode is 1/1000 seconds mode. If bit 3 is 1, the count mode is 1/1000 minutes mode.

F6 (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 F5 (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.
F7 (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 the NCT6776D.

A.1.3 Example Program

1. Enable watchdog timer and set 10 sec. as timeout interval.

```
;--------------------------------------------------------
Mov dx,2eh          ; Unlock NCT6776D
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h          ; Select registers of watchdog timer
Out     dx,al
Inc     dx
Mov     al,08h
Out     dx,al
;--------------------------------------------------------
Dec dx              ; Enable the function of watchdog timer
Mov     al,30h
Out     dx,al
Inc     dx
In      al,dx
Or      al,01h
Out     dx,al
;--------------------------------------------------------
Dec dx              ; Set second as counting unit
Mov     al,0f5h
Out     dx,al
Inc     dx
In      al,dx
And al,not 08h
Out     dx,al
;--------------------------------------------------------
Dec dx              ; Set timeout interval as 10 seconds and start counting
Mov     al,0f6h
```

```
Out     dx,al
Inc     dx
Mov     al,10       ; 10 seconds
Out     dx,al
;--------------------------------------------------------
Dec dx              ; Lock NCT6776D
Mov     al,0aah
Out     dx,al
```

2. Enable watchdog timer and set 5 minutes as timeout interval.

```
;--------------------------------------------------------
Mov dx,2eh          ; Unlock NCT6776D
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h          ; Select registers of watchdog timer
Out     dx,al
Inc     dx
In        al,dx
Or      al,08h
Out     dx,al
;--------------------------------------------------------
Dec dx              ; Enable the function of watchdog timer
Mov     al,30h
Out     dx,al
Inc     dx
Mov     al,01h
Out     dx,al
;--------------------------------------------------------
Dec dx              ; Set minute as counting unit
Mov     al,0f5h
Out     dx,al
Inc     dx
In      al,dx
Or      al,08h
Out     dx,al
;--------------------------------------------------------
Dec dx              ; Set timeout interval as 5 minutes and start counting
Mov     al,0f6h
Out     dx,al
Inc     dx
Mov     al,5        ; 5 minutes
Out     dx,al
;--------------------------------------------------------
```

```
Dec dx                ; Lock NCT6776D
Mov     al,0aah
Out     dx,al
```

3. Enable watchdog timer to be reset by mouse.

```
;--------------------------------------------------------
Mov dx,2eh            ; Unlock NCT6776D
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h            ; Select registers of watchdog timer
Out     dx,al
Inc     dx
Mov     al,08h
Out     dx,al
;--------------------------------------------------------
Dec dx                ; Enable the function of watchdog timer
Mov     al,30h
Out     dx,al
Inc     dx
In      al,dx
Or      al,01h
Out     dx,al
;--------------------------------------------------------
Dec dx                ; Enable watchdog timer to be reset by mouse
Mov     al,0f7h
Out     dx,al
Inc     dx
In      al,dx
Or   al,80h
Out     dx,al
;--------------------------------------------------------
Dec dx                ; Lock NCT6776D
Mov     al,0aah
Out     dx,al
```

4. Enable watchdog timer to be reset by keyboard.

```
;--------------------------------------------------------
Mov dx,2eh          ; Unlock NCT6776D
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h            ; Select registers of watchdog timer
```

```
Out     dx,al
Inc     dx
Mov     al,08h
Out     dx,al
;--------------------------------------------------------
Dec dx                  ; Enable the function of watchdog timer
Mov     al,30h
Out     dx,al
Inc     dx
Mov     al,01h
Out     dx,al
;--------------------------------------------------------
Dec dx                  ; Enables watchdog timer to be strobe reset by keyboard
Mov     al,0f7h
Out     dx,al
Inc     dx
In      al,dx
Or   al,40h
Out     dx,al
;--------------------------------------------------------
Dec dx                  ; Lock NCT6776D
Mov     al,0aah
Out     dx,al
```

5. Generate a time-out signal without timer counting.

```
;--------------------------------------------------------
Mov dx,2eh          ; Unlock NCT6776D
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h          ; Select registers of watchdog timer
Out     dx,al
Inc     dx
Mov     al,08h
Out     dx,al
;--------------------------------------------------------
Dec dx              ; Enable the function of watchdog timer
Mov     al,30h
Out     dx,al
Inc     dx
Mov     al,01h
Out     dx,al
;--------------------------------------------------------
Dec dx                  ; Generate a time-out signal
```

```
Mov     al,0f7h
Out     dx,al       ;Write 1 to bit 5 of F7 register
Inc     dx
In      al,dx
Or  al,20h
Out     dx,al
;-------------------------------------------------------------
Dec dx              ; Lock NCT6776D
Mov     al,0aah
Out     dx,al
```

Appendix B

I/O Pin Assignments

B.1 VGA Connector (VGA1)

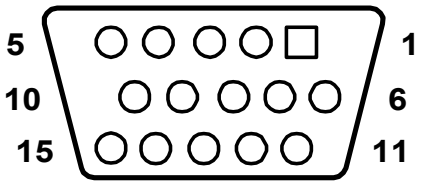


Table B.1: VGA Connector (VGA1)			
Pin	**Signal**	**Pin**	**Signal**
1	RED	9	VCC
2	GREEN	10	GND
3	BLUE	11	N/C
4	N/C	12	SDT
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	SCK
8	GND		

B.2 RS 232 Serial Port (COM12)

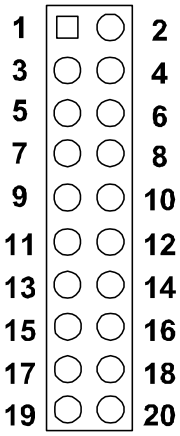


Table B.2: RS-232 Serial Port (COM12)

Pin	Signal
1	COM1_DCD
2	COM1_DSR
3	COM1_SIN
4	COM1_RTS
5	COM1_SOUT
6	COM1_CTS
7	COM1_DTR
8	COM1_RI
9	GND
10	GND
11	COM2_DCD
12	COM2_DSR
13	COM2_SIN
14	COM2_RTS
15	COM2_SOUT
16	COM2_CTS
17	COM2_DTR
18	COM2_RI
19	GND
20	GND

B.3 USB 3.0 Header (USB3H1)

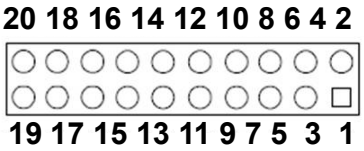


Table B.3: USB 3.0 Header (USB23~USB89)

Pin	Signal	Pin	Signal
1	+5V	11	USB_P+_P2
2	USB3.0_RXN_P1	12	USB_P-_P2
3	USB3.0_RXP_P1	13	GND
4	GND	14	USB3.0_TXP_P2
5	USB3.0_TXN_P1	15	USB3.0_TXN_P2
6	USB3.0_TXP_P1	16	GND
7	GND	17	USB3.0_RXP_P2
8	USB_P-_P1	18	USB3.0_RXN_P2
9	USB_P+_P1	19	+5V
10	Reserve		

B.4 PS/2 Keyboard/Mouse Connector (KBMS1)

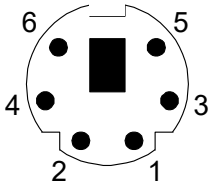


Table B.4: PS/2 Keyboard/Mouse Connector (KBMS1)

Pin	Signal
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB CLOCK
6	MS CLOCK

B.5 CPU Fan Power Connector (CPUFAN1)

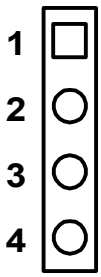


Table B.5: CPU Fan Power Connector (CPUFAN1)	
Pin	**Signal**
1	GND
2	+12V
3	Detect
4	FAN1_PWMOUT

B.6 Front Panel Connector (FP1)

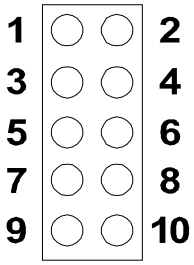


Table B.6: Front Panel Connector (FP1)	
Pin	**Signal**
1	HDD_LED+
2	HDD_LED-
3	PW_LED
4	GND
5	SNMP_SCL
6	SNMP_SDA
7	RESET#
8	GND
9	PWR-BTN
10	GND

B.7 High-definition Audio Link Connector (HDAUD1)

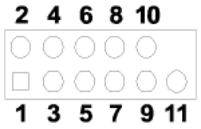


Table B.7: High-definition Audio Link Connector (HDAUD1)

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.8 LAN1 and LAN2 LED Connector (LANLED1)



Table B.8: LAN1 and LAN2 LED Connector (LANLED1)

Pin	Signal
1	#LAN1_ACT
2	#LAN2_ACT
3	V33_AUX
4	V33_AUX

B.9 GPIO Header (GPIO1)

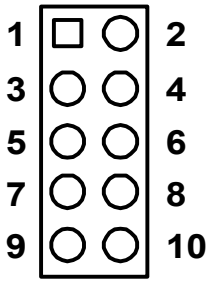


Table B.9: GPIO Header (GPIO1)	
Pin	**Signal**
1	SIO_GPIO0
2	SIO_GPIO4
3	SIO_GPIO1
4	SIO_GPIO5
5	SIO_GPIO2
6	SIO_GPIO6
7	SIO_GPIO3
8	SIO_GPIO7
9	VCC_GPIO
10	GND

B.10 JWDT1 and JOBS1

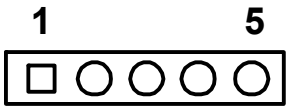


Table B.10: JWDT1 and JOBS1	
Pin	**Signal**
1	N/C
2	SIO_WG#
3	SRST#
4	ERR_BEEP
5	OBS_BEEP

B.11 JCASE1

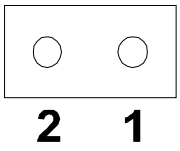


Table B.11: JCASE1

Pin	Signal
1	CASEOP#
2	GND

B.12 LPC2

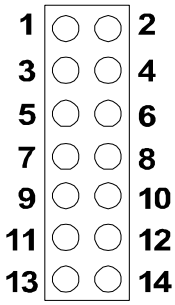


Table B.12: LPC2

Pin	Signal
1	CLK33M_LPC0
2	LPC_AD1
3	PLTRST_LPC0#
4	LPC_AD0
5	LPC_FRAME#
6	3.3V
7	LPC_AD3
8	GND
9	LPC_AD2
10	LPC1_SMB_CLK
11	PCI_SERIRQ
12	LPC1_SMB_DATA
13	5VSB
14	5VSB

B.13 PWR1

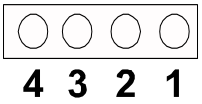


Table B.13: PWR1	
Pin	**Signal**
1	5V
2	GND
3	GND
4	12V

B.14 DP1

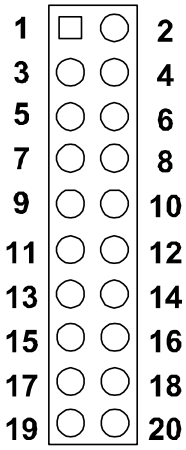


Table B.14: DP1	
Pin	**Signal**
1	GND
2	GND
3	DDPB TX0- B
4	DDPB TX3- B
5	DDPB TX0+ B
6	DDPB TX3+ B
7	GND
8	N/C
9	DDPB TX1- B
10	N/C
11	DDPB TX1+ B
12	TMDS0_DDB_DAT(PCE-4128) DDPB_AUX- (PCE-3028)
13	GND
14	TMDS0_DDB_CLK (PCE-4128) DDPB_AUX+ (PCE-3028)

Table B.14: DP1	
15	DDPB TX2- B
16	GND
17	DDPB TX2+ B
18	DDPB_HPD_Q
19	VCC_DP1
20	VCC_DP1

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

Table B.15: Fixed I/O Ranges Decoded by 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
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

B.16 System I/O Ports

Table B.16: System I/O Ports

I/O Address (Hex)	Device
A10h-A1Fh	H/W Monitor
2F8h-2FFh	Communication Port (COM2)
378h-37Fh	ECP Printer Port (LPT1)
3B0h-3BBh	Graphics
3C0h-3DFh	Graphics
3F8h-3FFh	Communication Port (COM1)
1800h-18FFh	PMBASE
778h-77Fh	ECP Printer Port
240h-25Fh	Communication Port for PCA-COM232/485 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	Not available
IRQ7	Available
IRQ8	System COMS/Real-time clock
IRQ9	SCI IRQ
IRQ10	Available
IRQ11	Communication port for PCA-COM232 module
IRQ12	PS/2 mouse
IRQ13	Numeric data processor
IRQ14	Not available
IRQ15	Not available

B.18 1 MB Memory Map

Table B.18: 1 MB Memory Map	
Address Range	**Device**
E8000h - FFFFFh	BIOS
D0000h - E7FFFh	Unused
C0000h - CFFFFh	VGA BIOS
A0000h - BFFFFh	Video Memory
00000h - 9FFFFh	Base memory

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

Table C.1: GPIO Registers

Bank	Offset	Description
09h	30h	Write 1 to bit 7 to enable GPIO
07h	E0h	GPIO I/O Register When set to a '1', respective GPIO port is programmed as an input port. When set to a '0', respective GPIO port is programmed as an output port.
07h	E1h	GPIO Data Redister If a port is programmed to be an output port, then its respective bit can be read/written. If a port is programmed to be an input port, then its respective bit can only be read.
07h	E2h	GPIO Inversion Register When set to a '1', the incoming/outgoing port value is inverted. 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,AC
DEC DX
MOV AL,30H
OUT DX,AL
INC DX
IN AL,DX
OR AL,10000000B
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
```

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