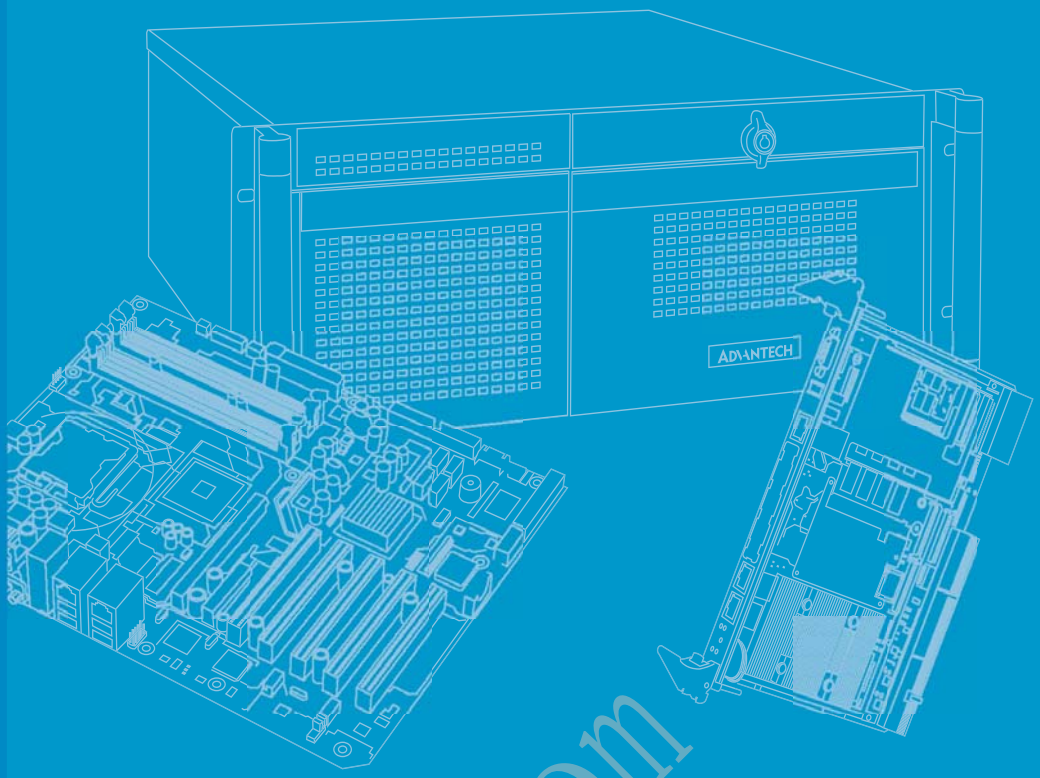


User Manual

PCE-9228

LGA2011-R3 Intel Xeon® E5-2600v3 series processors PICMG1.3 System Host board with C612, DDR4 /SATA3.0/ USB3.0/Dual GbE, IPMI (I Sku)

ADVANTECH

Enabling an Intelligent Planet

Copyright

Acknowledgements

AMIBIOS is a trademark of American Megatrends Inc.

Intel®, Core™i7/i5/i3, Pentium® and Xeon are trademarks of Intel® Corporation.

Nuvoton is a trademark of Nuvoton Technology Corp.

All other product names or trademarks are the properties of their respective owners.

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. 2006922800 Edition 1

June 2015

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.

Processor Support

Model	Architecture Lithography	Advantech P/N	CPU Processor Socket LGA2011	Smart cache	Base Freq. (GHz)	Cores/ Treads	TDP	DDR4 memory speed support
PCE-9228	22	-	E5-2618L v3	20	2.3	8/16	75W	1600/1866
		-	E5-2628L v3	25	2	10/20	75W	1600/1866
		-	E5-2648L V3	30	1.8	12/24	75W	1600/1866/2133
		96MPXE-2.2-30M20T	E5-2658 V3	30	2.2	12/24	105W	1600/1866/2133
		96MPXE-2.5-30M20T	E5-2680 V3	30	2.5	12/24	120W	1600/1866/2133

Memory Compatibility

Advantech PN	Brand	Capacity	Speed	Type	ECC	Vendor PN	Die Model
-	ADATA	4GB	DDR4 2133	DDR4	Y		SK hynix H5AN4G8NMFA
-	ATP	8GB	DDR4 2133	DDR4	Y	V4B2133C4SZ/8GQ	SEC 425 BCPB K4A4G045WD
-		16GB	DDR4 2133	DDR4	Y		SEC 425 BCPB K4A4G045WD
AQD-D4U4GR21-HG	AQD	4GB	DDR4 2133	DDR4	Y	AQD-D4U4GR21-HG	SKhynix H5AN4G8NMFR TFC 505V
AQD-D4U8GR21-HZ		8GB	DDR4 2133	DDR4	Y	AQD-D4U8GR21-HZ	SKhynix H5AN4G4NMFR TFC 427AA
AQD-D4U16R21-HZ		16GB	DDR4 2133	DDR4	Y	AQD-D4U16R21-HZ	SKhynix H5AN4G4NMFR TFC 427AA
-	Transcend	4GB	DDR4 2133	DDR4	Y	TS512MLH64V1H	SEC 446 BCPB K4A4G085WD
-		4GB	DDR4 2133	DDR4	Y	TS512MHR72V1H	SEC 449 BCPB K4A4G085WD
-		4GB	DDR4 2133	DDR4	Y	TS512MHR72V1H	MICRON 4LA77 Z9RGR
-		8GB	DDR4 2133	DDR4	Y	TS1GLH73V1H	SEC 443 BCPB K4A4G085WD
-		8GB	DDR4 2133	DDR4	Y	TS1GHR72V1Z	SEC 431 BCPB K4A4G045WD
-		8GB	DDR4 2133	DDR4	Y	TS1GHR72V1Z	SEC 449 BCPB K4A4G045WD
-		8GB	DDR4 2133	DDR4	Y		SEC 446 BCPB K4A4G085WD

SATA storage Compatibility

HDD SATA 3.5"	Capacity	Decreption	MPN
96HD500G-ST-SG7K12	500G	SEAGATE 500G 3.5" SATA 7KRPM 16M(G) 4K	ST500DM002
96HD250G-ST-SG7K12	250G	SEAGATE 250G 3.5" SATA 7KRPM 16M(G) 4K	ST250DM000
96HD1000G-ST-SG7K6	1T	SEAGATE 1T 3.5" SATA 7KRPM 64M(G) 4K	ST1000DM003
96HD1TB-ST-SG7KE	1T	SG 3.5 1TB 7KRPM SATAIII 128MB 24X7	ST1000NM0033
96HD1000G-ST-SG7K7	1T	SEAGATE 1T 3.5" SATA 7KRPM DVR 64M(G) 4K	ST1000VX000
96HD2000G-ST-SG7K2	2T	SEAGATE 2T 3.5" SATA 7KRPM 64M(G) 4K	ST2000DM001
96HD320G-ST-WD7K	320G	WD 320G 3.5" SATA 7KRPM 16M(G)	WD3200AAKX

(SSD) SATA 2.5" 7mm	Capacity	Decreption	MPN
96FD25-S80-INB	80G	IntelSSD DC S3500 80GB, 2.5" SATAIII, MLC 7mm	SSDSC2BB080G4
96FD25-S120-INB	120G	IntelSSD DC S3500 120GB, 2.5" SATAIII MLC 7mm	SSDSC2BB120G4
96FD25-S160-INB	160G	IntelSSD DC S3500 160GB, 2.5" SATAIII MLC 7mm	SSDSC2BB160G4
96FD25-S240-INB	240G	IntelSSD DC S3500 240GB, 2.5" SATAIII MLC 7mm	SSDSC1BB240G4
96FD25-S300-INB	300G	IntelSSD DC S3500 300GB, 2.5" SATAIII MLC 7mm	SSDSC2BB300G4
96FD25-S480-INB	480G	IntelSSD DC S3500 480GB, 2.5" SATAIII, MLC 7mm	SSDSC2BB480G4
96FD25-S600-INB	600G	IntelSSD DC S3500 600GB, 2.5" SATAIII MLC 7mm	SSDSC2BB600G4
96FD25-S032-TR7	32G	Transcend 370 SSD 32GB 2.5" SATAIII, M	TS32ASTMM0000A
96FD25-S064-TR7	64G	Transcend 370 SSD 64GB 2.5" SATAIII, M	TS64ASTMM0000A
96FD25-S128-TR7	128G	Transcend 370 SSD 128GB 2.5" SATAIII, M	TS128ASTMM0000A
96FD25-S256-TR7	256G	Transcend 370 SSD 256GB 2.5" SATAIII, M	TS256ASTMM0000A
96FD25-S512-TR7	512G	Transcend 370 SSD 512GB 2.5" SATAIII, MLC 7mm	TS512ASTMM0000A
96FD25-S1TB-TR7	IT	Transcend 370 SSD 1TB 2.5" SATAIII, MLC	TS000ASTMM0000A

Note:

Knew compatible issue devices	Capacity	Decreption	MPN
96HD500G-ST-WD7KE	500G	WD 3.5 500G 7KRPM 26.11mm SATAIII 64MB	WD5003ABYZ
96HD500G-ST-WD7K2	500G	WD 500G 3.5" SATA 7KRPM 16M(G)	WD5000AAKX
96HD250G-ST-WD7KE	250G	WD 3.5 250G 7KRPM 26.11mm SATAIII 64MB	WD2503ABYZ
SQF-S25M8-64G-S8C	64G	SQ Flash 64GB	
SQF-S25M8-64G-S8E	64G	SQ Flash 64GB	
96FD25-S032-PLG	32G	Plextor SSD 32GB, 2.5" SATAIII, MLC 7mm	PX-32G5Le-72
96FD25-S064-PLG	64G	Plextor SSD 64GB, 2.5" SATAIII, MLC 7mm	PX-64G5Le-72

Specification Comparison

Part Number	PCH	Memory	VGA	Backplane	LAN	SATA3.0	USB3.0	USB2.0 (4 for BP)	RAID	IPMI
PCE-9228G2I-00A1E	C612	ECC-REG	Yes	PCE-5BXX/7BXX	2 GbE	8	4	6	Yes	Yes
PCE-9228G2-00A1E	C612	ECC-REG	Yes	PCE-5BXX/7BXX	2 GbE	8	4	6	Yes	N/A

Backplane Support Matrix Table

Backplane / Model processor	PCE-5XXX	PCE-7XXX
PCE-9228G2(I)-00A1E	Yes	Yes (Except PCE-7B10-04A1E)

Note! *If PCE-9228 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.*

Initial Inspection

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

- 1 PCE-9228 PICMG 1.3 Single Host Board
- 1 PCE-9228 startup manual
- 1 CD with utility
- 2 Serial ATA HDD data cable
- 1 Serial ATA HDD power cable
- 1 jumper package
- 1 warranty card

If any of these items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected the PCE-9228 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-9228, 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-9228G2(I), is a PICMG 1.3 form-factor server board. It is the most advanced platform for IPC applications that require high-performance computing power & multi-expansion slots. This server board features Intel® C612 PCH supporting Intel Xeon E5-2600 v3 series processors and DDR4 2133/1866/1600 MHz memory capacity up to 256 GB. In addition, the PCE-9228G2I has dual Gigabit Ethernet LAN ports with a dedicated PCIe x1 bus design which offers bandwidth up to 500 MB/s to eliminate network bottlenecks. The third RJ-45 LAN connector of PCE-9228G2I is dedicated for IPMI function for out-of-band remote control.

PCE-9228G2(I) also has rich I/O interfaces offering 8 SATA III with software Raid 0,1,5,10, and supporting Advantech PCE-5BXX and 7BXX backplanes to offer various expansions such as PCI, PCI-X and PCIe interface. Four USB 3.0 ports reach 5Gbps high data rates, and one on-board RS-232 serial COM port are for industrial control applications. With outstanding performance and exceptional features, PCE-9228G2(I) is the ideal computing platform for advanced industrial applications.

1.2 Features

1.2.1 General

- **Intel Xeon(R) E5-2600 (v3) processor support:** PCE-9228G2(I) supports two Intel E5-2600 v3 series processors and DDR4 2133/1866/1600 ECC-REG memory capacity up to 256GB.
- **High performance I/O capability:** Dual Gigabit LAN, 8 x SATA3.0 w/ software raid 0,1,5,10 function, 2 x USB2.0, and 4 x USB3.0.
- **Flexible expansion:** PCE-9228G2(I) supports both PCE-5BXX and 7BXX series backplanes.
- **IPMI 2.0 support:** PCE-9228G2(I) features ASPEED 2400 BMC chip supporting IPMI 2.0 (Intelligent Platform Management Interface 2.0) via dedicated LAN port.
- **KVM over IP:** PCE-9228G2(I) KVM over IP function allows remote control of system through your own computer.

1.3 Specifications

1.3.1 System

- **CPU:** LGA 2011 Xeon E5-2600 v3 series processors
- **BIOS:** AMI SPI BIOS (128 Mb SPI)
- **System Chipset:** Intel C612
- **SATA interface:** Eight SATA3 support software raid 0,1,5,10

1.3.2 Memory

- Xeon processor supports DDR4 memory bus
- Total 8 memory slots provided
- Supports up to 256 GB memory
- Supports DDR4 2133/1866/1600/1333 MHz ECC-REG Modules
- Each memory slot supports 1GB, 2GB, 4GB, 8GB, 16GB and 32GB memory modules

1.3.3 Input/Output

PCIe bus:

PICMG1.3: One PCIe x16 or Two PCIe x8, PCIe x4 from PCH expansion board (ODM optional): Three PCIe x16 and two PCIe x8 (total 64 PCIe Links)

- **PCI bus:** Four PCI masters to the backplane, 32-bit, 33 MHz PCI 2.2 compliant.
- **Serial ports:** One 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 4 USB 3.0 ports with transfer rates of up to 5 Gbps(2 from pin-header).
- **LPC:** One LPC connector to support Advantech LPC modules.
- **GPIO:** Supports 8-bit GPIO from super I/O for general purpose control application (pin-header).

1.3.4 Graphics

- **Controller:** ASPEED 2400/1400
- **Display memory:** with 64 MB VGA memory provides basic 2D VGA function.
- **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® I210AT.

LAN 2: Intel® I210AT.

1.3.6 BMC LAN(PCE-9228G2I sku)

- One dedicated 10/100BASE RealTek 8201EL-VB PHY is connected to AST2400 for IPMI/IKVM

1.3.7 Mechanical and environmental specifications

- **Operating temperature:** 0 ~ 40° C, depending on CPU and thermal solution
- **Storage temperature:** -40 ~ 85° C (-40 ~ 185° F)
- **Operating Relative Humidity:** 10 ~ 90% (non-condensing)
- **Non-operating Relative Humidity:** 10% to 95% (non-condensing)
- **Power supply voltage:** +3.3 V, +5 V, +12 V, +5 VSB
- **Power consumption:** Processor: Intel E5-2680v3; Memory: DDR4 2133 ECC-REG 16GB x 8
- **Voltage/Current:** +3.3 V/2.61A, +5 V/1.07A, +12 V/26.73A, +5 VSB/0.07A, -12 V/0.01A

- **Board size:** 338.58 mm (L) x 126.39 mm (W) (13.3" x 4.98")
- **Board weight:** 1.2 kg (Net)

1.4 Jumpers and Connectors

Connectors on the PCE-9228 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 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
JOBS1	HW Monitor Alarm
JWDT1	Watchdog timer output selection
JCMOS1	CMOS clear
JME1	Clear ME data
JAT1	ATX / AT mode select
SGPIO1	SATA LED
SGPIO2	sSATA LED

Table 1.2: Connectors

BMC_LAN1	Realtek RTL8201 for IPMI function (optional)
JCASE1	Case Open
VGA1	VGA connector
COM1	RS-232 (9-pin Box Header)
GPIO1	GPIO pin header (SMD pitch-2.0 mm)
LPC1	LPC module expansion pin-header
JFP3 (Keyboard Lock and Power LED)	Power LED
	Suspend: Fast flash (ATX/AT)
	System On: ON (ATX/AT)
	System Off: OFF (ATX/AT)
JFP1 + JFP2	Power Switch / Reset connector / External speaker / SATA HDD LED connector
SATA0 ~ 3	Master Series ATA Port 0 ~ 3
sSATA0 ~ 3	Slave Series ATA Port 0 ~ 3
USB4_5	USB2 Port 4, 5; USB3 Port 3,4
LAN1	Intel I210AT
LAN2	Intel I210AT
USB3_0	USB2 Port 0; USB3 Port 1
USB3_1	USB2 Port 1; USB3 Port 2
USB11	USB2 Port 11
USB10	USB2 Port 10
CPUFAN0	CPU0 FAN Power connector
CPUFAN1	CPU1 FAN Power connector
HDAUD1	HD audio extension module connector
SGPIO1	HDD RAID status indicator for SATA0~3
SGPIO2	HDD RAID status indicator for SSATA0~3
ATX12V1	12V Power for CPU
LANLED1	LANLED

1.5 Board Layout: Jumper and Connector Locations

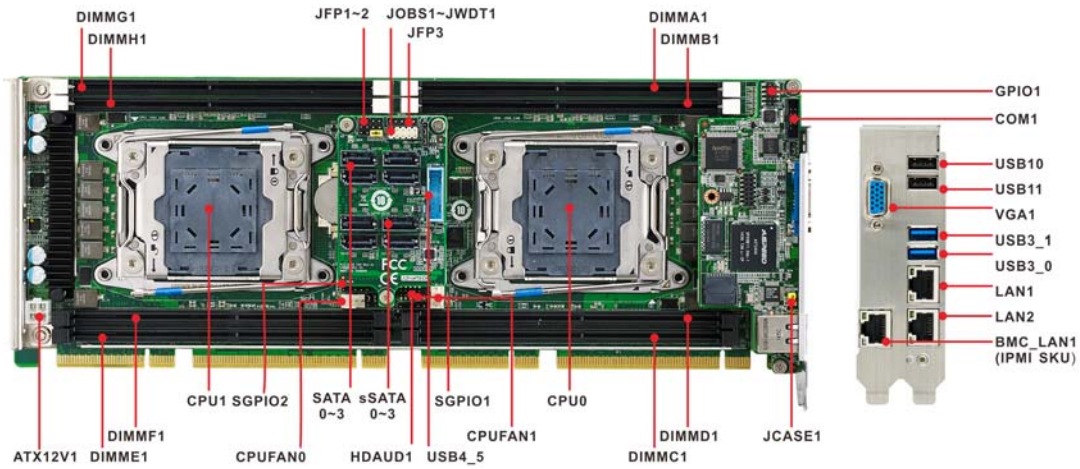


Figure 1.1 Jumper and connector locations

1.6 Block Diagram

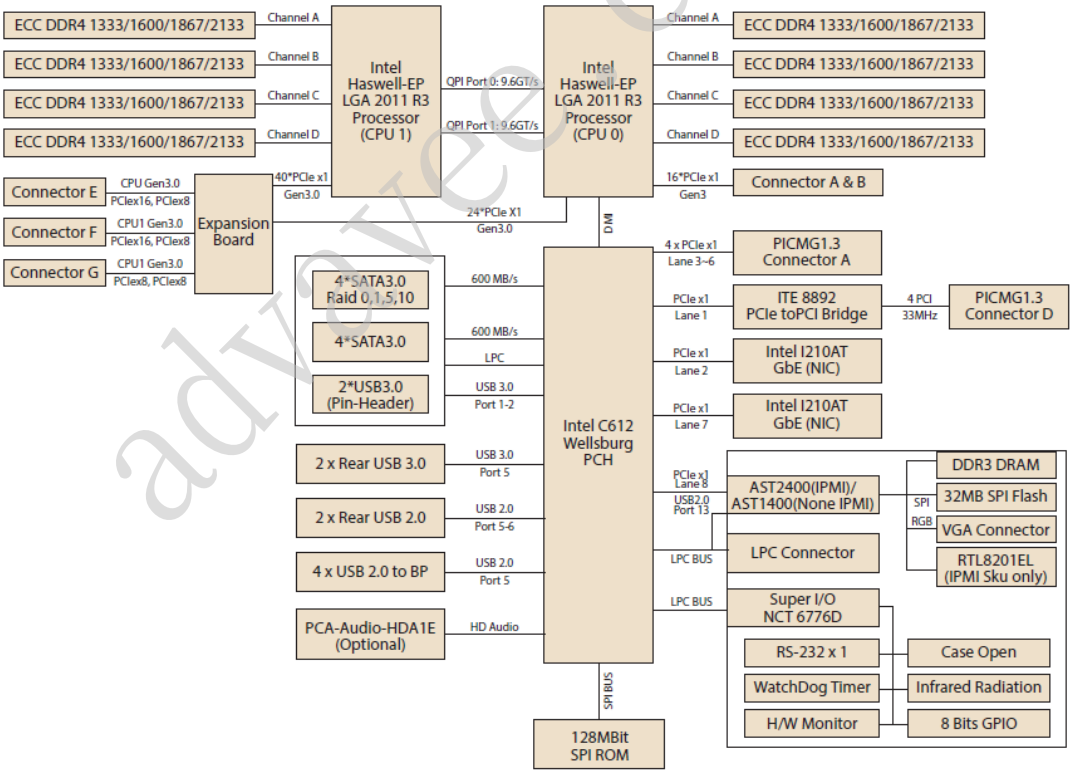


Figure 1.2 PCE-9228 block diagram

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.

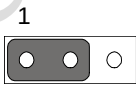
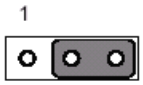
1.8.1 How to set jumpers

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/JME1)

The 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

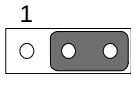
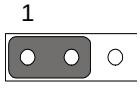
Function	Jumper Setting
*Keep BIOS CMOS/ME data	 1-2 closed
Clear BIOS CMOS/ME data	 2-3 closed

* default setting

1.8.3 Watchdog timer output (JWDT1)

The CPU card contains a watchdog timer that will reset the CPU in the event the CPU stops processing. This feature means the CPU board will be recovered 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)

Function	Jumper Setting
* Reset	 2-3 closed
Reserved	 1-2 closed

*default setting

Table 1.5: H/W monitor alarm (JOBS1)		
Function	**Jumper Setting**	
* Enabled		1-2 closed
Disabled		1-2 opened

(JOBS1) is a 2-pin connector for setting enable/disable alarm while the on-board security event acts.

1.9 System Memory

PCE-9228G2(I) has eight 288-pin memory slots for DDR4 1600/1866/2133 MHz memory modules with maximum capacity of 256 GB (Maximum 32 GB for each DIMM). PCE-9228G2(I) supports ECC-registered DIMMs memory module.

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.

1.11 Cache Memory

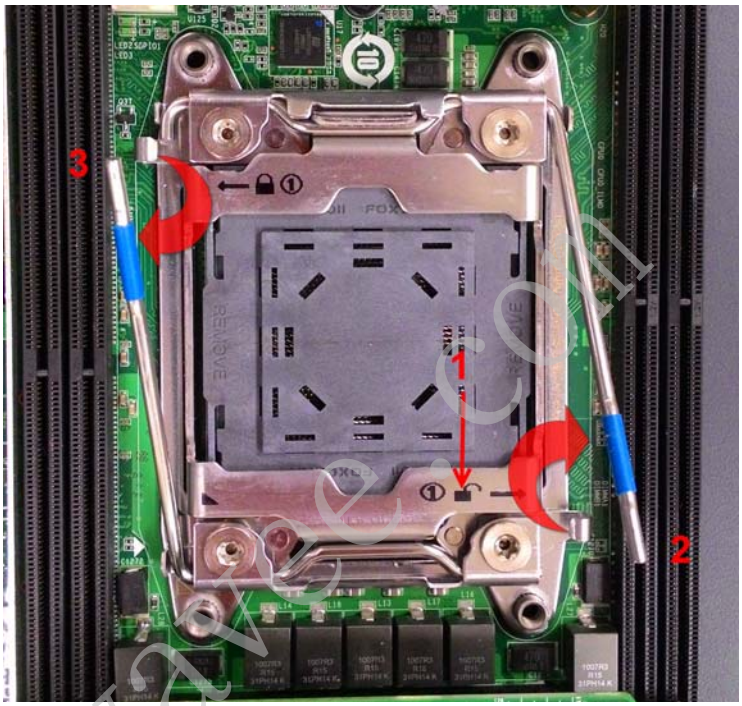
Intel smart cache is subject to each CPU and please refer to Intel CPU data sheet for detailed information.

1.12 Processor Installation

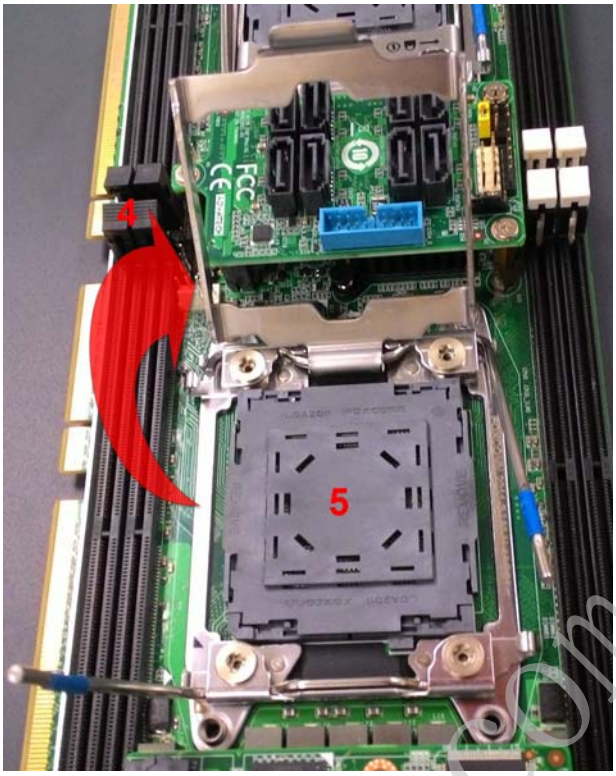
Warning! *Without a fan or heat sink, the processor will overheat and cause damage to both the processor and the single board computer. To install a processor, first turn off your system.*

PCE-9228G2(I) is designed for Intel (R) LGA2011-R3 Xeon E5-2600 v3 processor family.

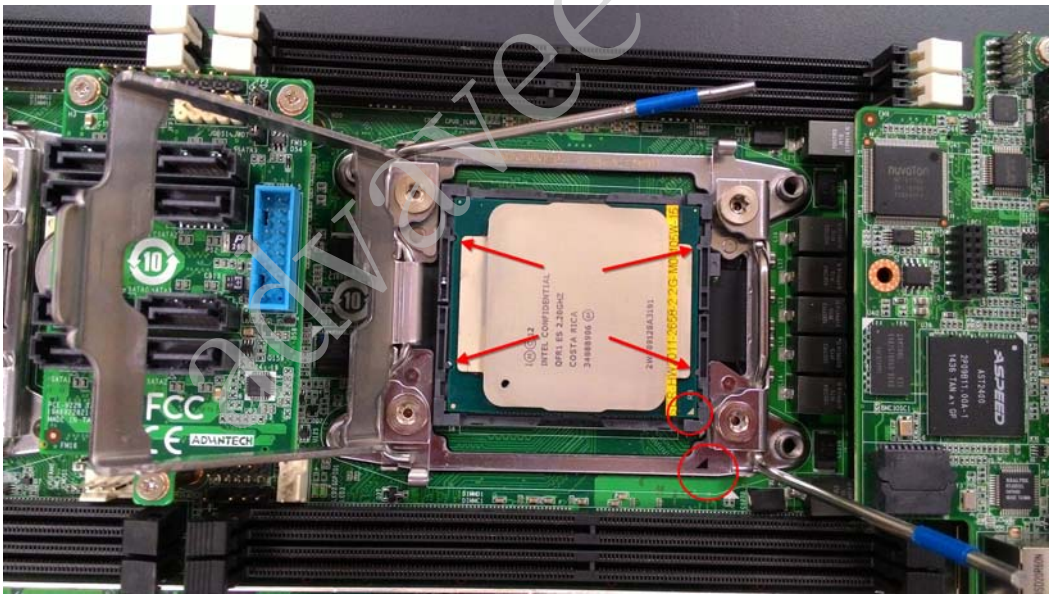
1. Find the unlock icon as the first lever and release it from the retention tab. Releasing the second lever from the retention tab after first lever released.



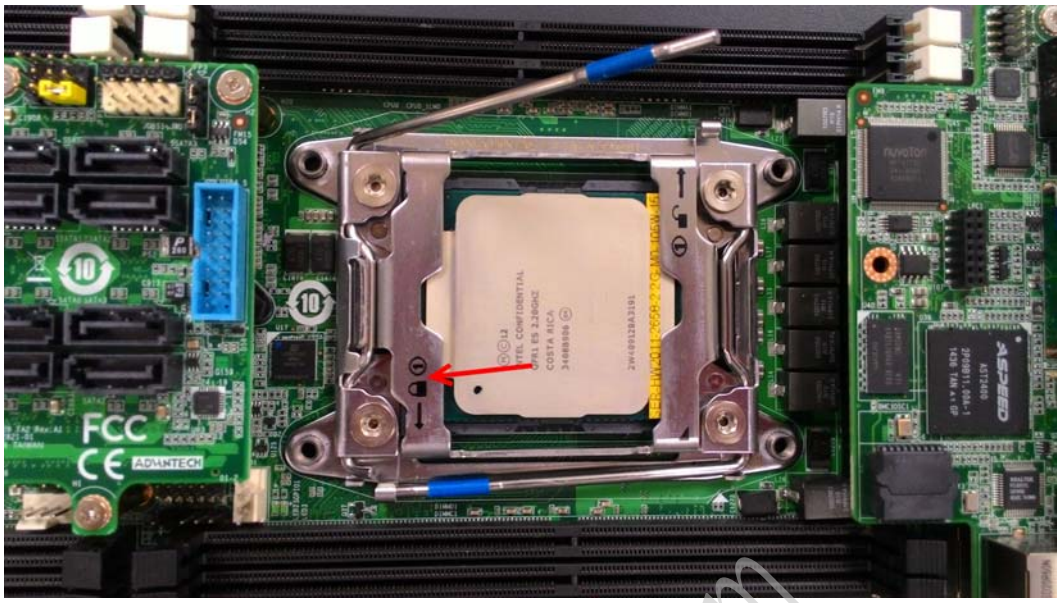
2. To left the load plate and to remove the socket protection cap.



3. Ensure both triangle mark and cuts of CPU and socket are aligned.



4. Find the lock icon as the first lever and push down both levers in order.Ensure both levers are secured by retention tabs.



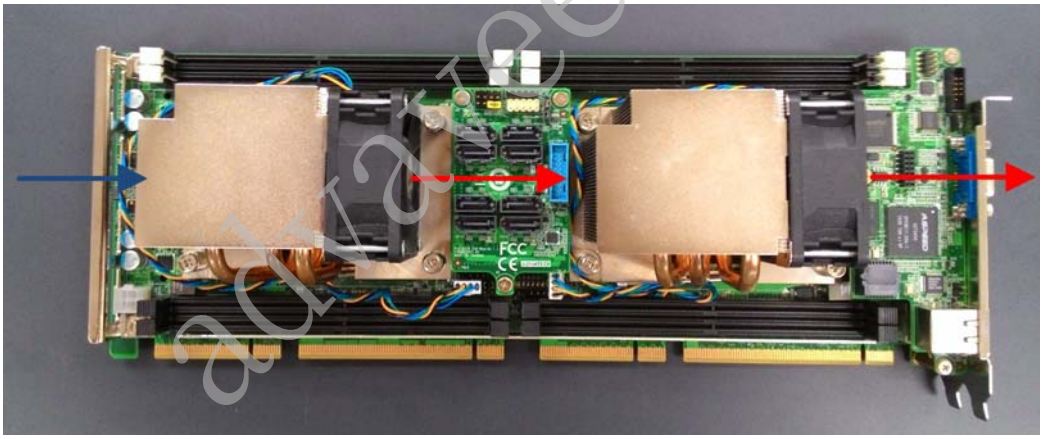
5. The finished processor installation.

1.13 Processor Cooler Installation

Advantech offers a puller CPU cooler design for better heat dissipation efficiency and enhancing rigidity of PCE-9228 - part number 1960063011N011.

Please install 1960063011N011 CPU cooler with following instructions:

1. Fastening four screws of each CPU with below order
2. Since 1960063011N011 is a puller fan, please follow below direction of CPU Fan.



Chapter 2

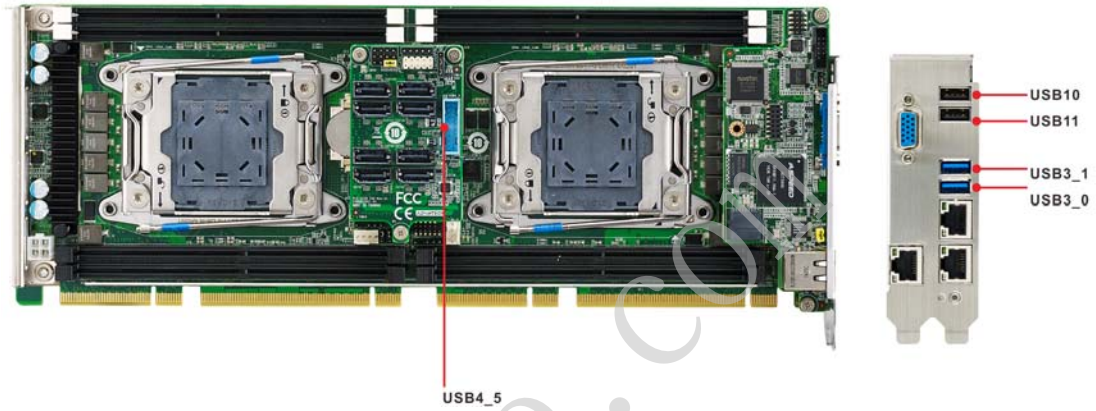
Connecting Peripherals

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 USB Ports (USB3_0, USB3_1, USB10, USB11, USB4_5)

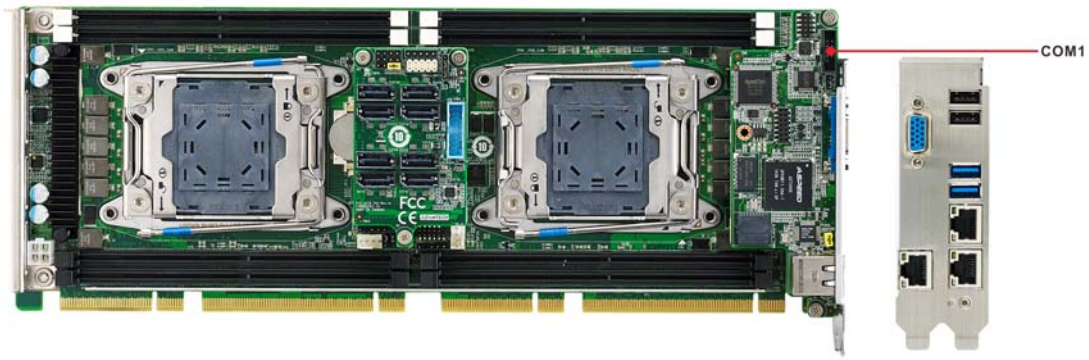
The USB ports comply with USB 2.0 & 3.0. Transmission rates could be up to 480Mbps (USB 2.0) / 5Gbps (USB 3.0). The USB interface can be disabled in the system BIOS setup.



2.3 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.

2.4 Serial Ports (COM1)



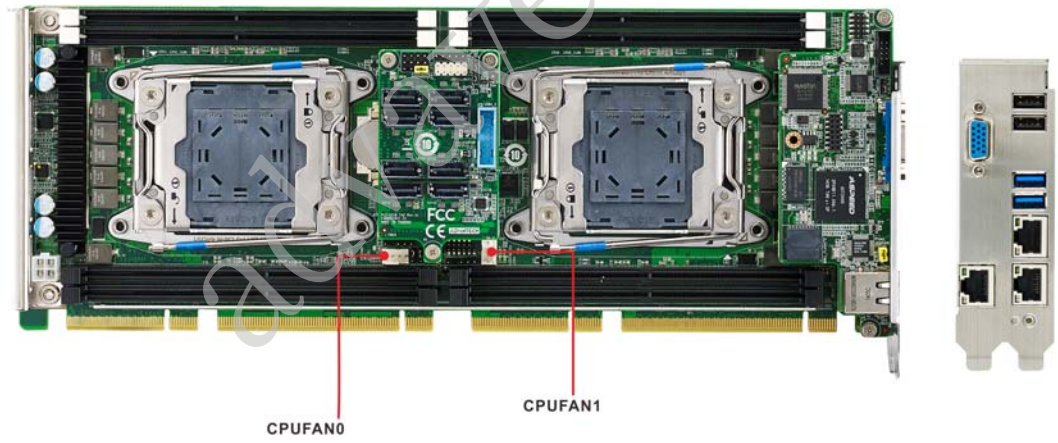
The PCE-9228 offers one RS232 serial ports and serial devices, such as a mouse or a printer, or to a communications network. The IRQ and address ranges is fixed; however, you can disable port in the system BIOS menu.

Note! **1700100250 is a optional one COM cable without bracket.*

**If you enable consult redirection in system BIOS menu, this function will occupy COM1.*

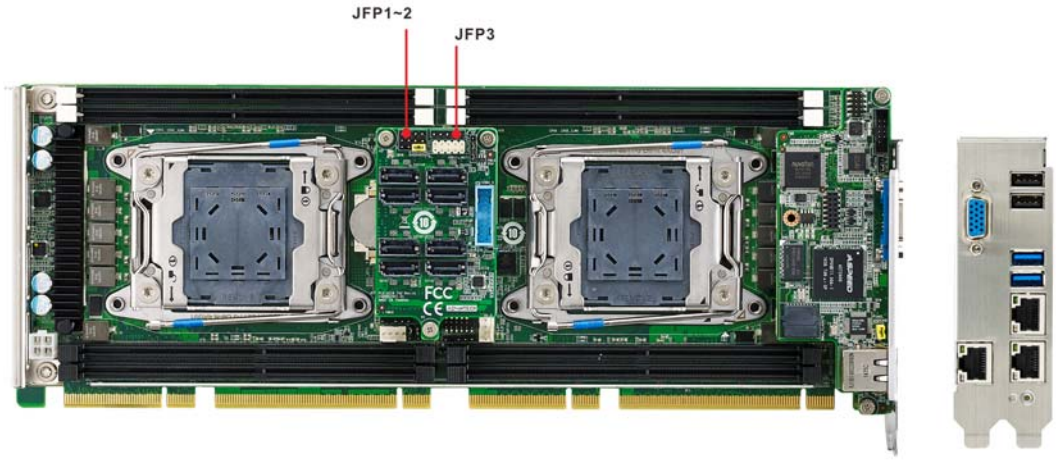
2.5 CPU Fan Connector (CPUFAN0 and CPUFAN1)

This fan connector supports 3-pin or 4-pin fan coolers and smart fan functions. Note: Fan speed is controlled by voltage.



2.6 Front Panel Connectors (JFP1, JFP2 & JFP3)

There are several external switches to monitor and control the PCE-9228.

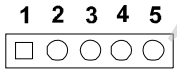


2.6.1 Power LED and keyboard lock (JFP3)

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

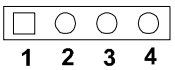
Power mode	LED (PS/2 power)	LED (ATX power)
System On	On	On
System Suspend	Flashes	Flashes
System Off	Off	Off



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

2.6.2 External speaker (JFP2)

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

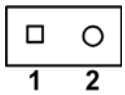


JFP1	PWR_SW	Reset
JFP2	HDD LED	SNMP
	Speaker	
JFP3	PWR_LED & Key Lock	

2.6.3 Reset connector (JFP1)

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

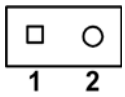
JFP1	PWR_SW	Reset
JFP2	HDD LED	SNMP
	Speaker	
JFP3	PWR_LED & Key Lock	



2.6.4 HDD LED connector (JFP2)

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

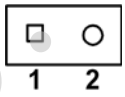
JFP1	PWR_SW	Reset
JFP2	HDD LED	SNMP
	Speaker	
JFP3	PWR_LED & Key Lock	



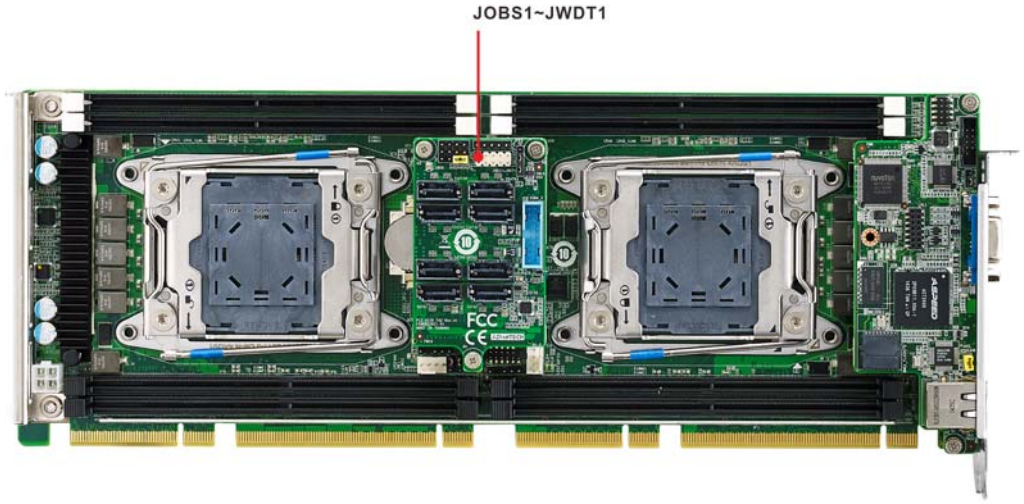
2.6.5 ATX soft power switch (JFP1)

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	



2.7 H/W Monitor/Watchdog Timer



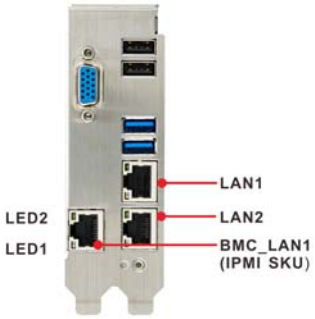
2.7.1 H/W monitor alarm (JOBS1)

This 2-pin header is for enabling/disabling H/W monitor alarm function.
Closed: Enables OBS Alarm (Default)
Open: Disables OBS Alarm

2.7.2 Watchdog timer (JWDT1)

This is for setting action trigger by watchdog timer.
1-2 Pin Close: No Action
2-3 Pin Close: System Reset (Default)

2.8 LAN Ports (LAN1, LAN2 and BMC_LAN1)



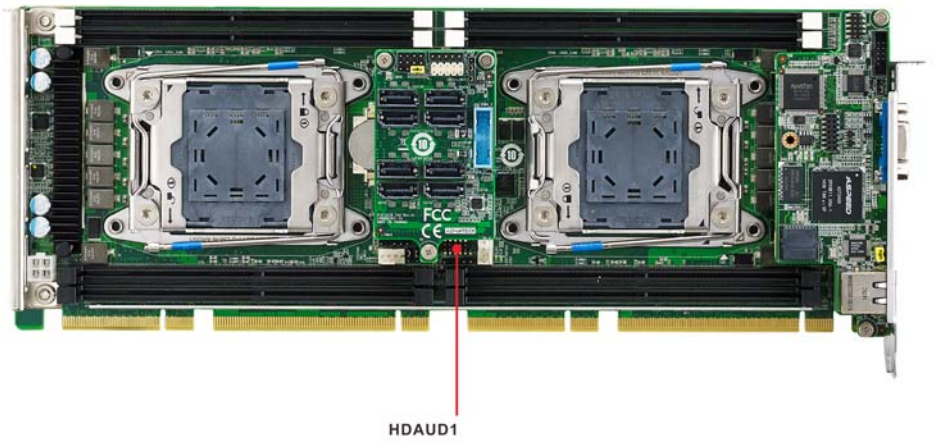
The PCE-9228 equips two high-performance 10/100/1000 Mbps Ethernet LANs and one dedicated 10/100Mbps LANs for IPMI(I sku only). They are supported by all major network operating systems and the RJ-45 jacks on the rear I/O bracket provides convenient connectivity.

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

Note! *BMC_LAN1 only support 10/100Mbps LED indicator behavior.*

2.9 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-HDA1E and PCA-AUDIO-00B1E

2.10 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.

2.11 Case Open Connector (JCASE1)

Case Open installation

PCE-9228 supports only Normally closed mode and please as well enable Case Open Warning in BIOS menu after install HW case open.

Figure 2.1 PCE-9228 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 alarm.

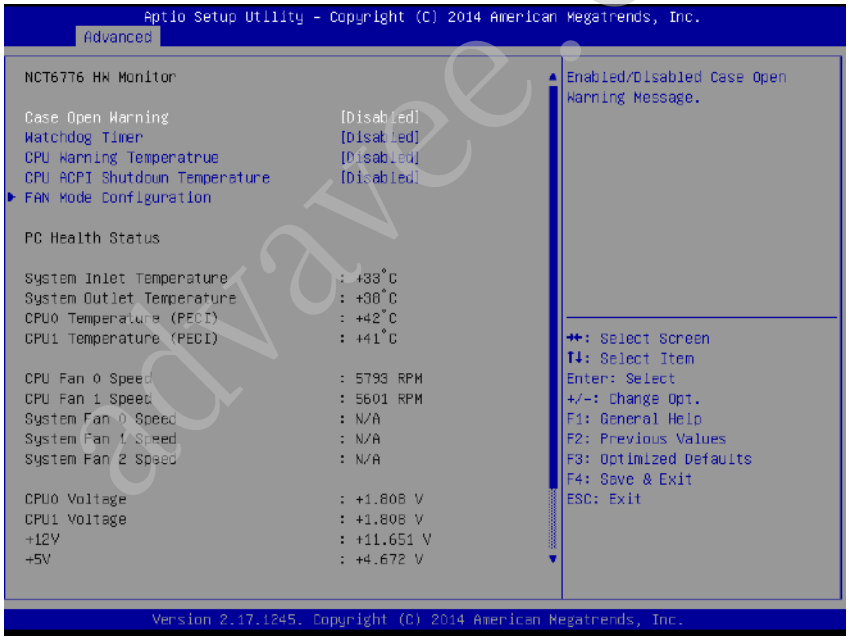
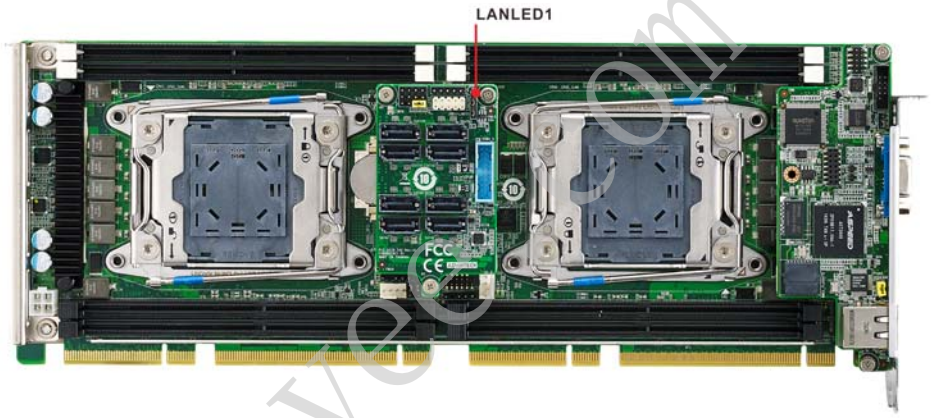


Figure 2.2 Case Open Warning in BIOS Menu

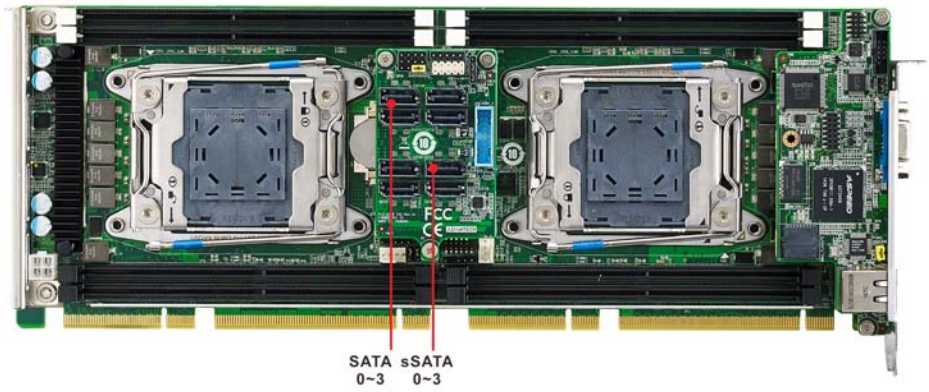
BIOS Menu>Advance BIOS Features Setup>NCT 6776 HW Monitor.

2.12 Front Panel LAN Indicator Connector (LANLED1)

Table 2.3: 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



2.13 Serial ATA Interface (SATA0~3 and sSATA0~3)



The PCE-9228 features 2 SATA3.0 controllers, SATA and sSATA, with eight SATA3.0 ports and these eight on-board SATA ports can be configured as RAID 0, 1, 10, or 5. Please see the detailed BIOS setting instructions in Chapter 3.

Note! *When you install Linux OS, we recommend you to set it to AHCI mode in BIOS setting. Otherwise it may not recognize any hard drives when you use IDE mode during Linux OS installation.*

2.14 LPC Extension Interface (LPC1)

LPC1 is a 14-pin female pin header for connection with an Advantech LPC module.

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-9228 setup screens.

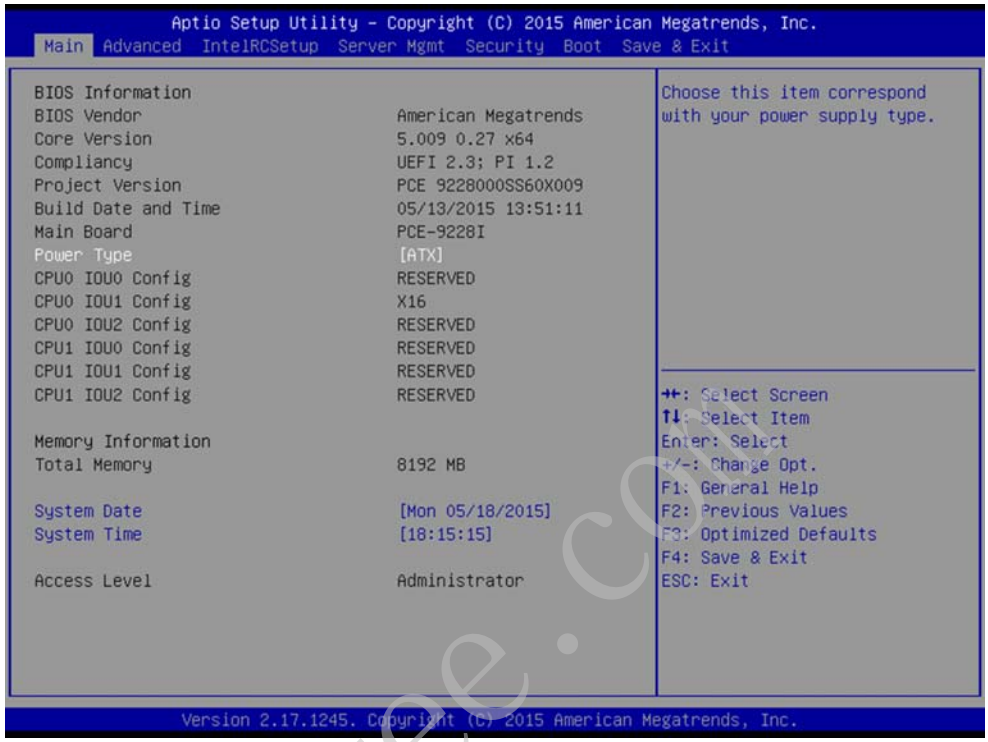


Figure 3.1 Setup program initial screen

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

Note! *The BIOS setup screens shown in this chapter are for reference only, they may not exactly match what you see on your display devices.*

3.2 Entering Setup

Turning on the computer will run the BIOS first. The setup program can be triggered by pressing the "DEL" or "F2" key.

Note! *If the message disappears before you press the "DEL" or "F2" keys, please restart the computer and try it again.*

3.2.1 Main Setup

Press <Del> or <F2> during bootup to enter AMI BIOS CMOS Setup Menu and the Main Menu will appear on the screen. Use the arrow keys to select items and press <Enter> to accept or enter the sub-menu.

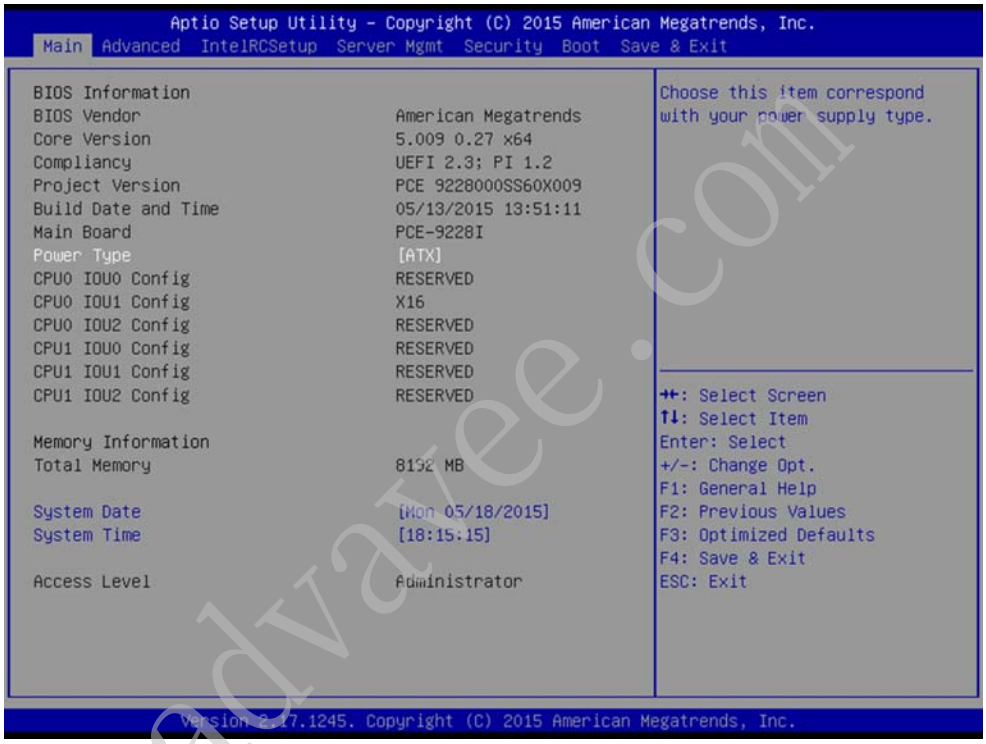


Figure 3.2 Main setup screen

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.

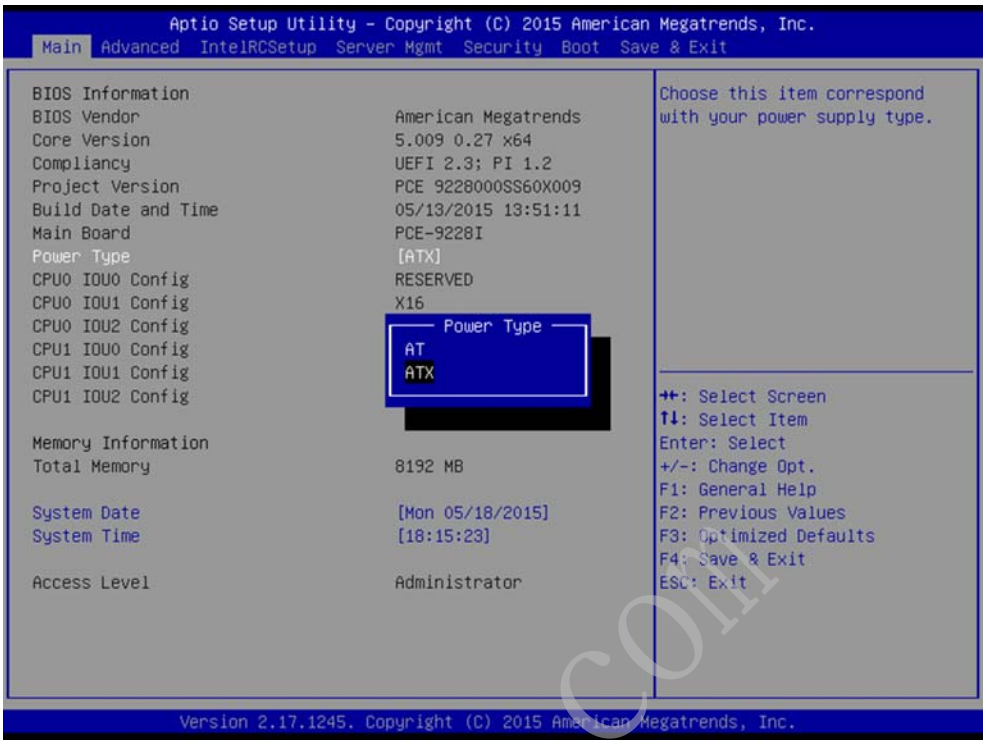
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

- **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 the item which corresponds with your power supply type.



Note! *Note: Please note that AT mode is required to set the AT mode in the BIOS menu, PSON(1-2) setting on backplane, and JAT1(1-2) setting on CPU board.*

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the PCE-9228 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.

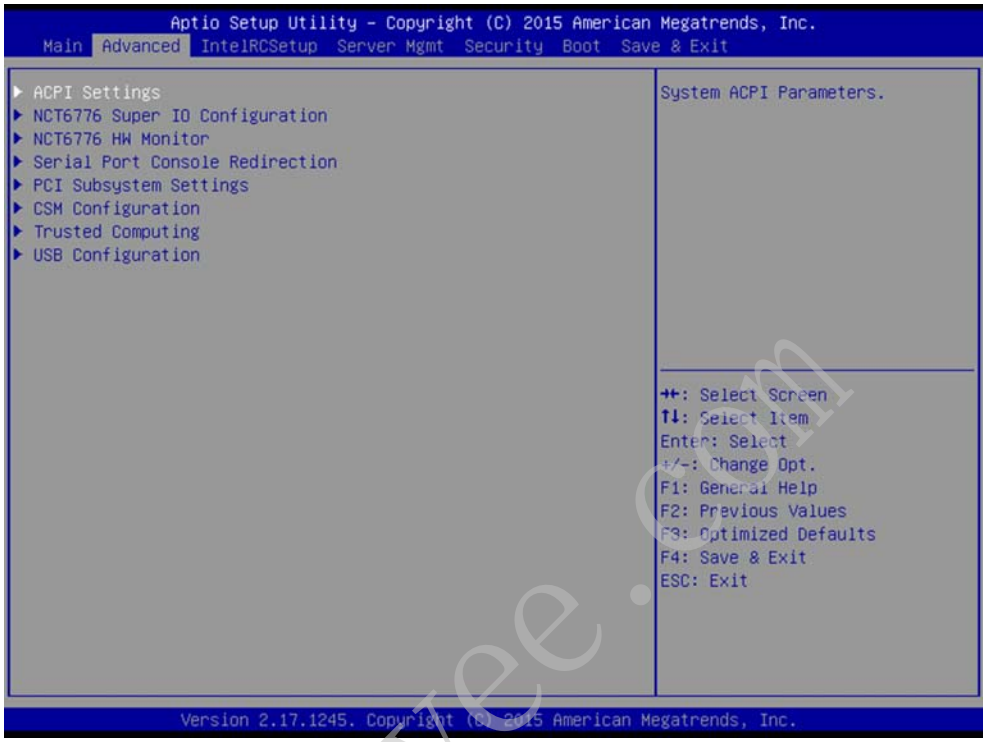


Figure 3.3 Advanced BIOS features setup screen

3.2.2.1 ACPI Settings

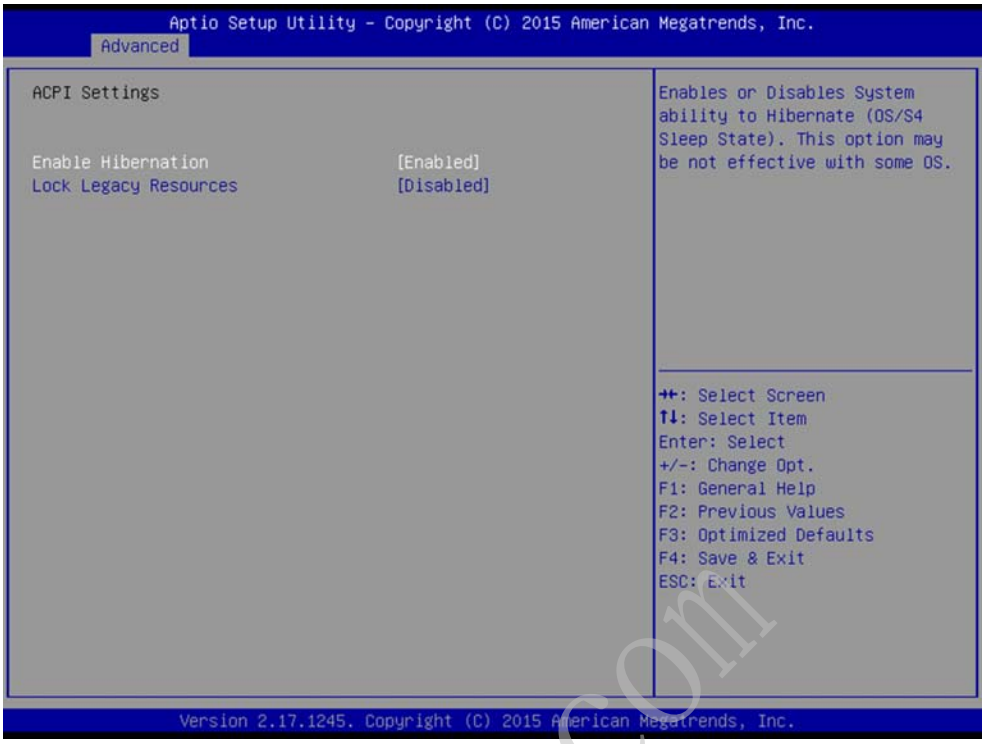
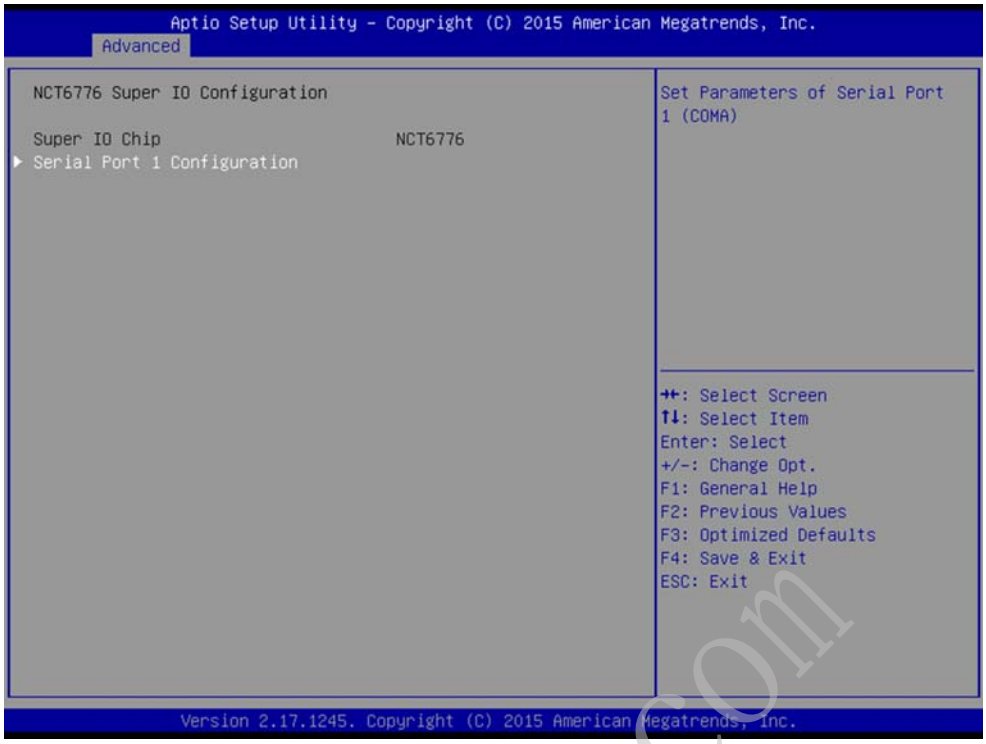


Figure 3.4 ACPI Settings

- **Enable Hibernation**
  "Enable or disable" Hibernate (OS/S4 Sleep State). This option may not be effective with some OS.
- **Lock Legacy Resources**
  "Enable" or "Disable" Lock Legacy Resources.

3.2.2.2 NCT6776 Super IO Configuration



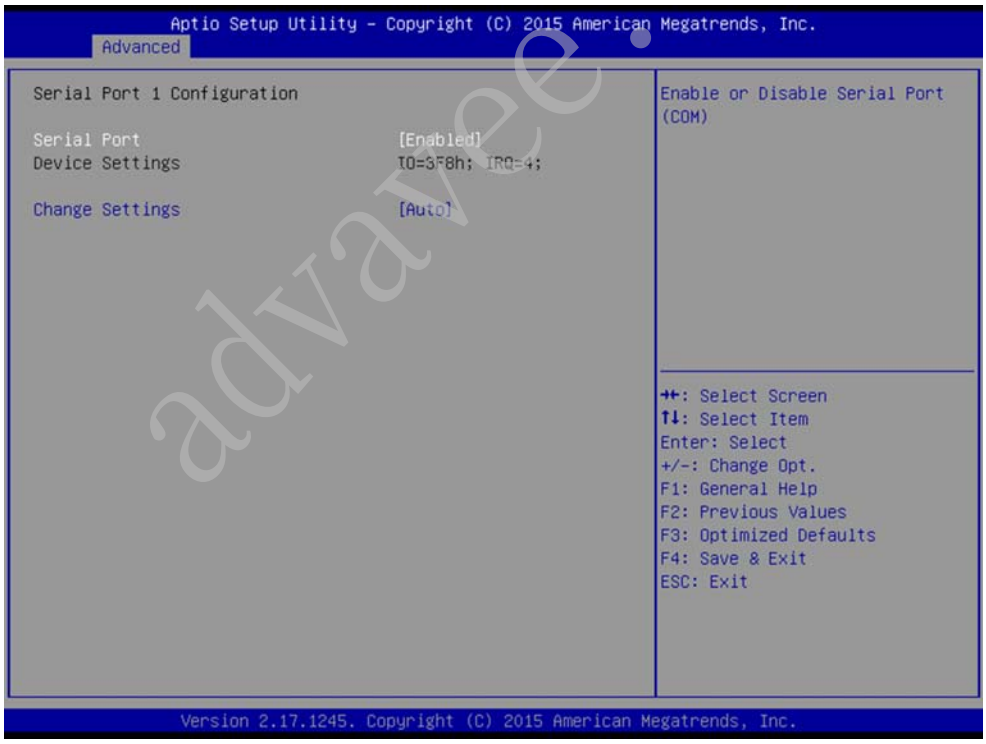


Figure 3.5 NCT6776 Super IO Configuration

- **Serial Port 1**
  "Enable or Disable" serial port.
- **Change Settings**
  To select an optimal setting for serial port 1.

3.2.2.3 NCT6776 HW Monitor

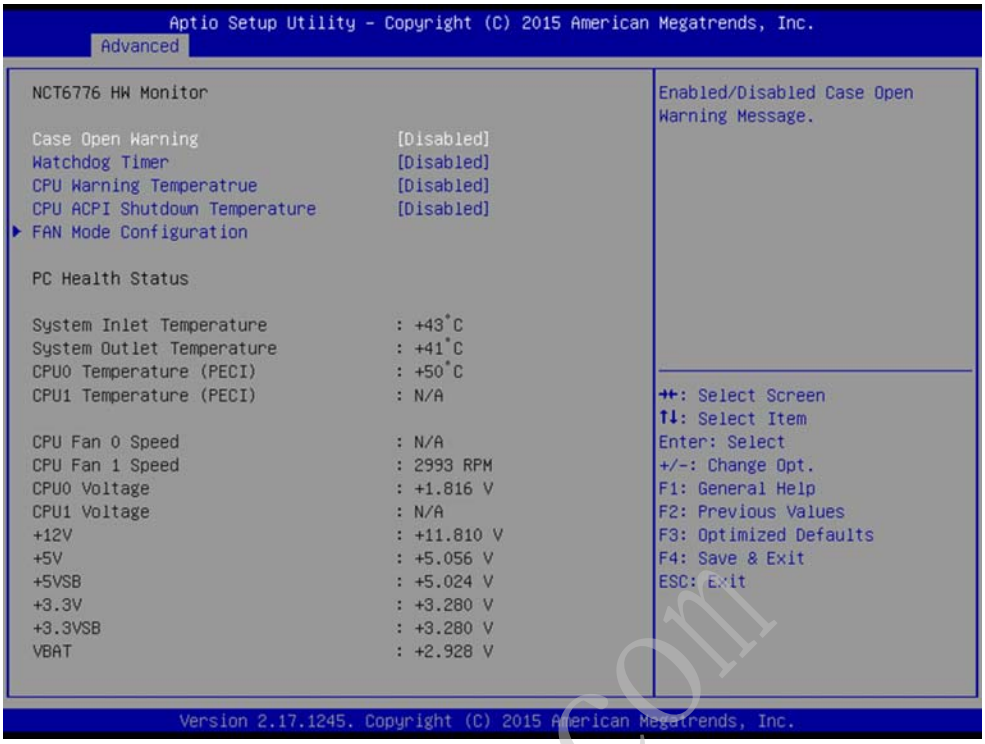
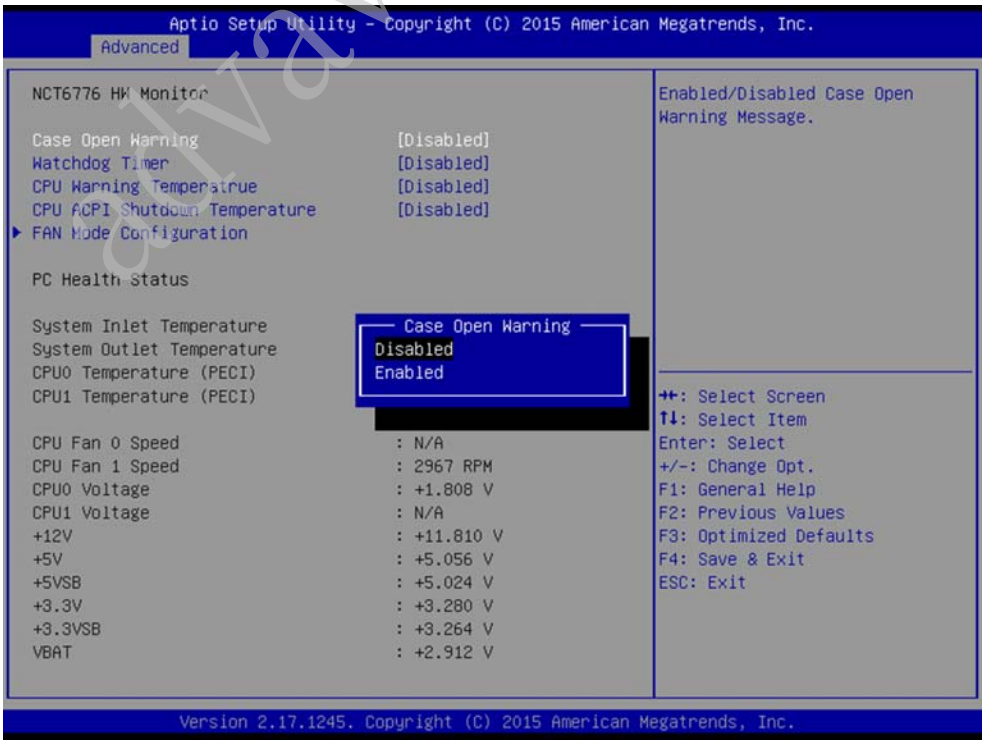


Figure 3.6 NCT6776 HW Monitor

- **Case Open Warning**

  Enable/Disable the Chassis Intrusion monitoring function. When enabled and the case is opened, the warning message will show in the POST screen.



- **Watchdog Timer**
  Enable and Disable the watchdog timer function.
- **CPU Warning Temperature**
  Set the CPU warning temperature threshold. When the system reaches the warning temperature, the speaker will beep.
- **ACPI Shutdown Temperature**
  Set the ACPI shutdown temperature threshold. When the system reaches the shutdown temperature, it will be automatically shut down by ACPI OS to protect the system from overheat damage.
- **Fan Mode Configuration**
  When set to manual mode, fan duty setting can be changed; the range is from 30%~100%, default setting is 50%.
- **Smart fan mode**
  When set to smart fan mode, fan follows Advantech's optimized setting.

3.2.2.4 PCI Subsystem Settings

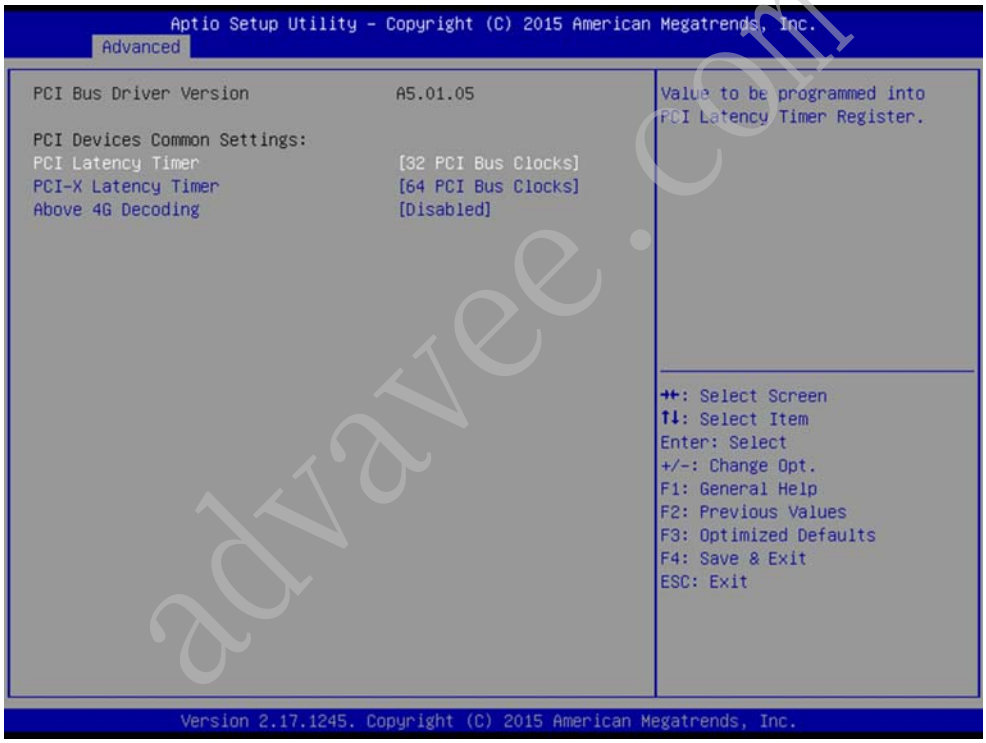


Figure 3.7 PCI Subsystem Settings

- **PCI / PCI-X Latency Timer**
  Value in units of PCI clocks for PCI device latency timer register.
- **Above 4G Decoding**
  Enables or disables 64-bit capability. Devices to be decoded in above 4G address space (Only if system supports 64-bit PCI decoding).

Note! *There are some graphic or GPU cards need to enable 4G Decoding.*

3.2.2.5 Trust Computing

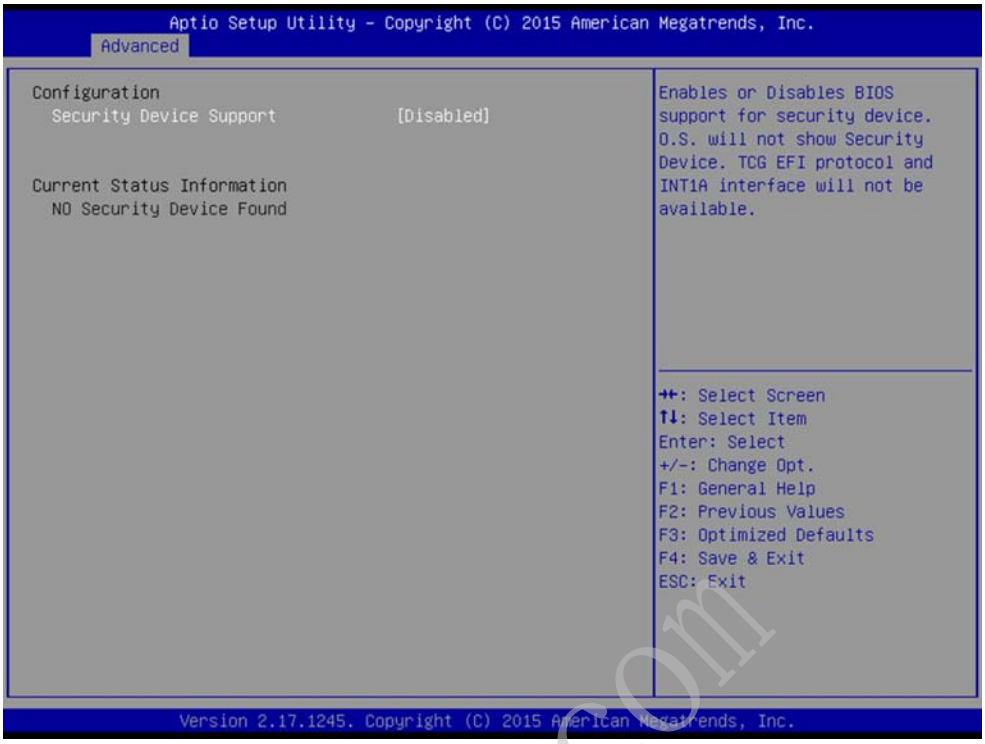


Figure 3.8 Trust Computing

- **Security Device Support**
  Enable or disable BIOS for security device support. You can purchase Advantech TPM (Trust Platform Module) PCA-TPM-00A1E for your security device.

3.2.2.6 USB Configuration

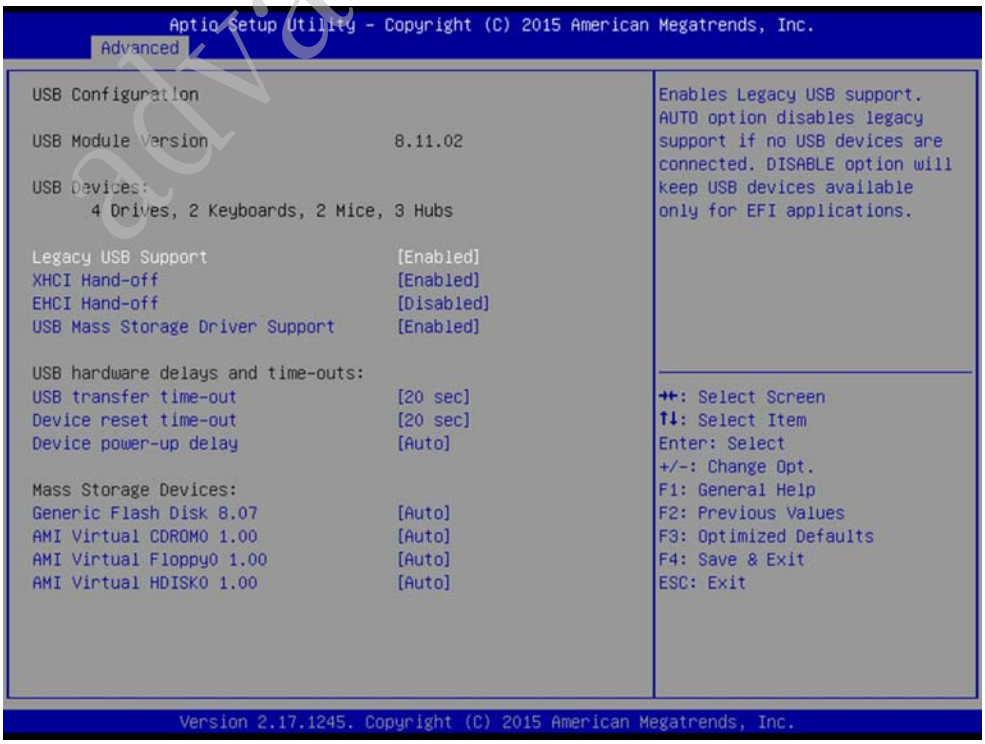


Figure 3.9 USB Configuration

- **Legacy USB Support**
  Supports USB devices under a legacy OS such as DOS. When choosing "AUTO", the system will automatically detect if any USB device is plugged into the computer and enable USB legacy mode when a USB device is plugged in and disable USB legacy mode when no USB device is detected.
- **XHCI Hand-off**
  This is a workaround for OS without XHCI hand-off support.
  The XHCI ownership change should be claimed by XHCI driver.
- **EHCI Hand-off**
  This is a workaround for OS without EHCI hand-off support.
  The EHCI ownership change should be claimed by EHCI driver.
- **USB Mass Storage Driver Support**
  Enable/Disable USB mass storage driver support.
- **USB Transfer Time-out**
  Selects the USB transfer time-out value. [1,5,10,20sec]
- **Device Reset Time-out**
  Selects the USB device reset time-out value. [10,20,30,40 sec]
- **Device Power-up Delay**
  This item appears only when Device power-up delay item is set to [manual].

3.2.2.7 Super IO Configuration

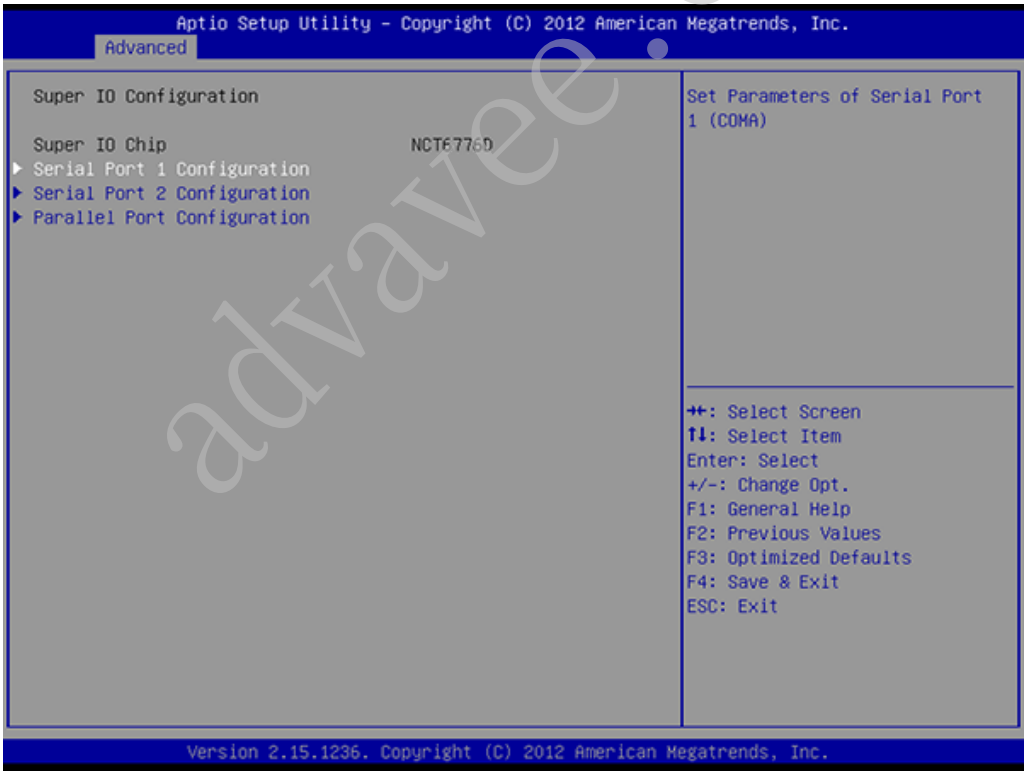


Figure 3.10 Super IO Configuration

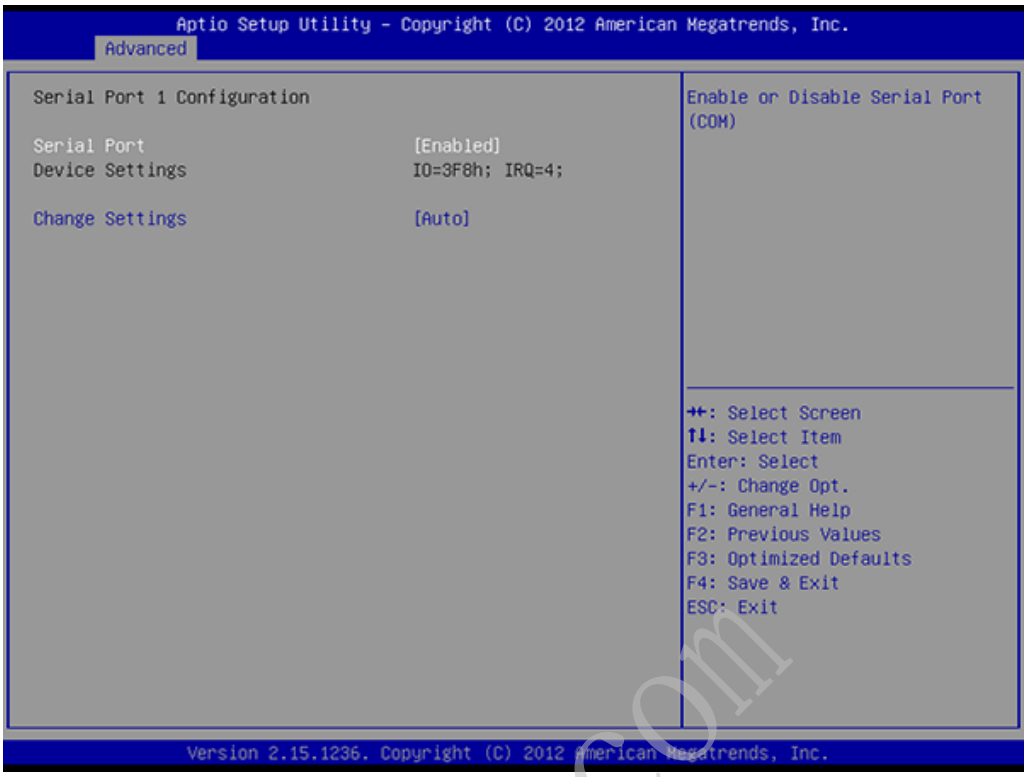


Figure 3.11 Serial Port 1 Configuration

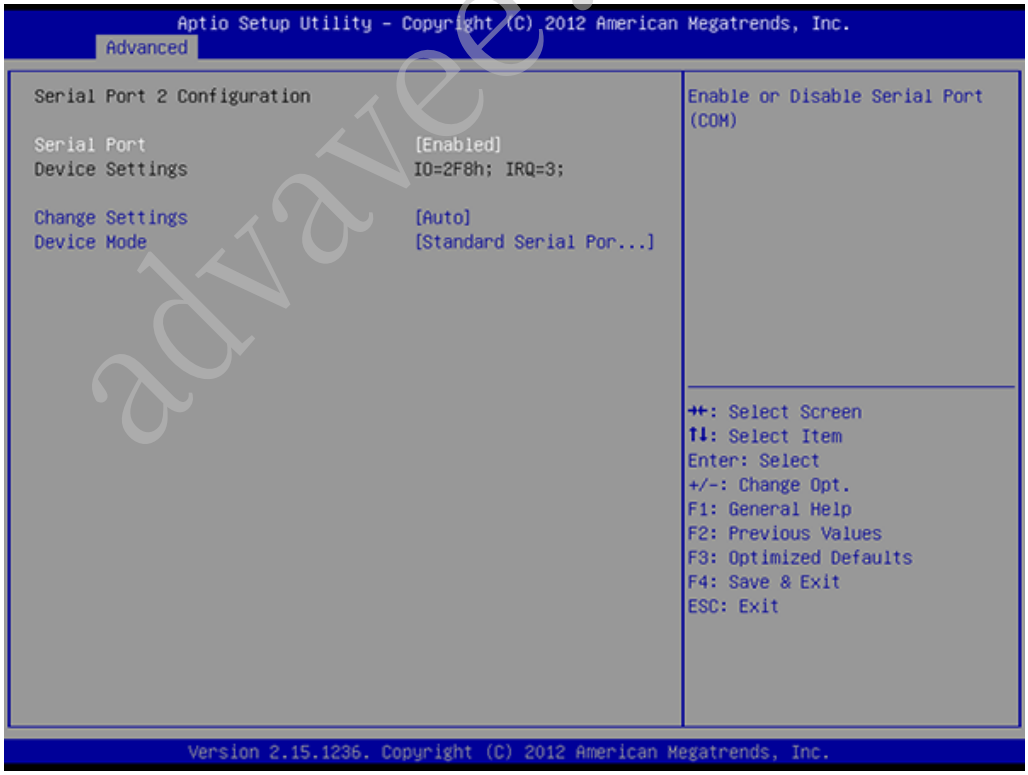


Figure 3.12 Serial Port 2 Configuration

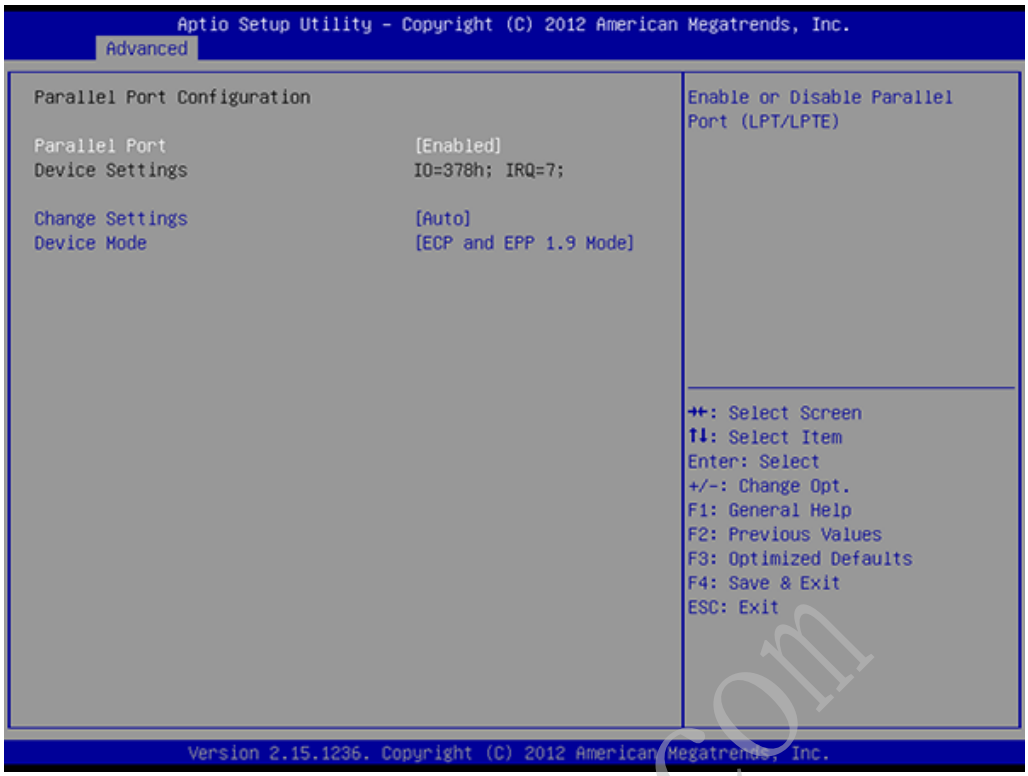


Figure 3.13 Parallel Configuration

- **Serial Port 1 -2 configuration**
  "Enable or Disable" serial port
- **Parallel Port configuration**
  "Enable or Disable" parallel port

3.2.2.8 H/W Monitor

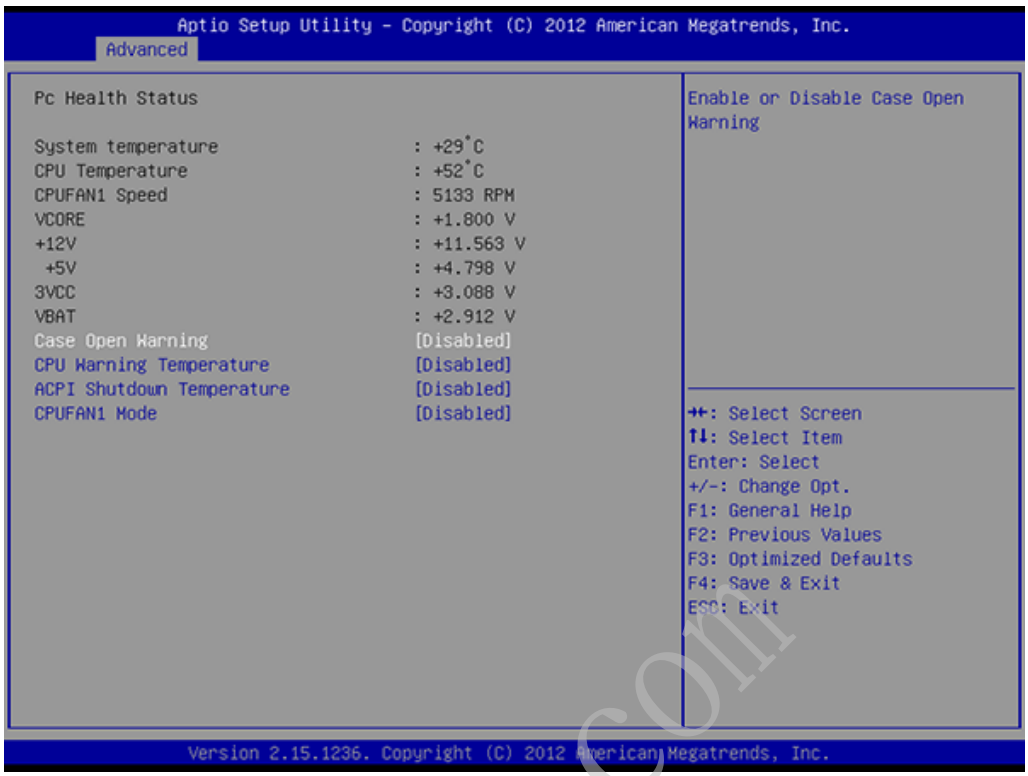


Figure 3.14 PC Health Status

- **Case Open Warning**
  Enable/Disable the chassis Intrusion monitoring function. When enabled and the case is opened, the speaker beeps.
- **CPU Warning Temperature**
  Use this to set the CPU warning temperature threshold. When the system reaches the warning temperature, the speaker will beep.
- **ACPI Shutdown Temperature**
  Use this to set the ACPI shutdown temperature threshold. When the system reaches the shutdown temperature, it will be automatically shut down by ACPI OS to protect the system from overheating damage.
- **CPUFAN1 Mode**
  Enable/Disable Smart Fan.

3.2.3 IntelRCSetup

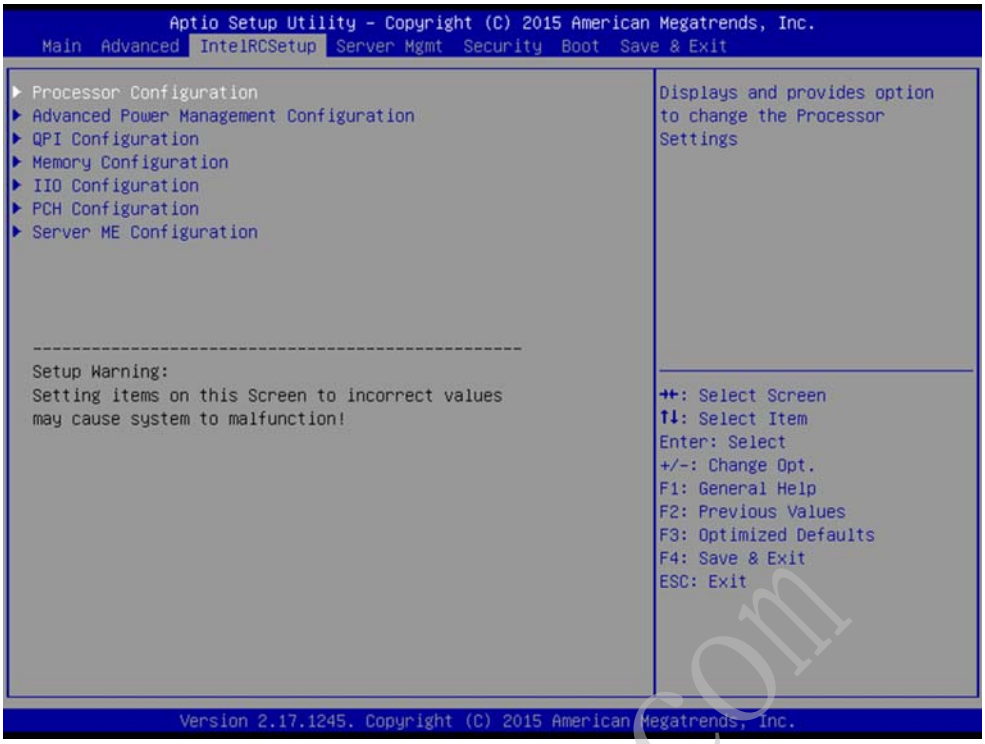


Figure 3.15 Chipset

3.2.3.1 Processor Configuration

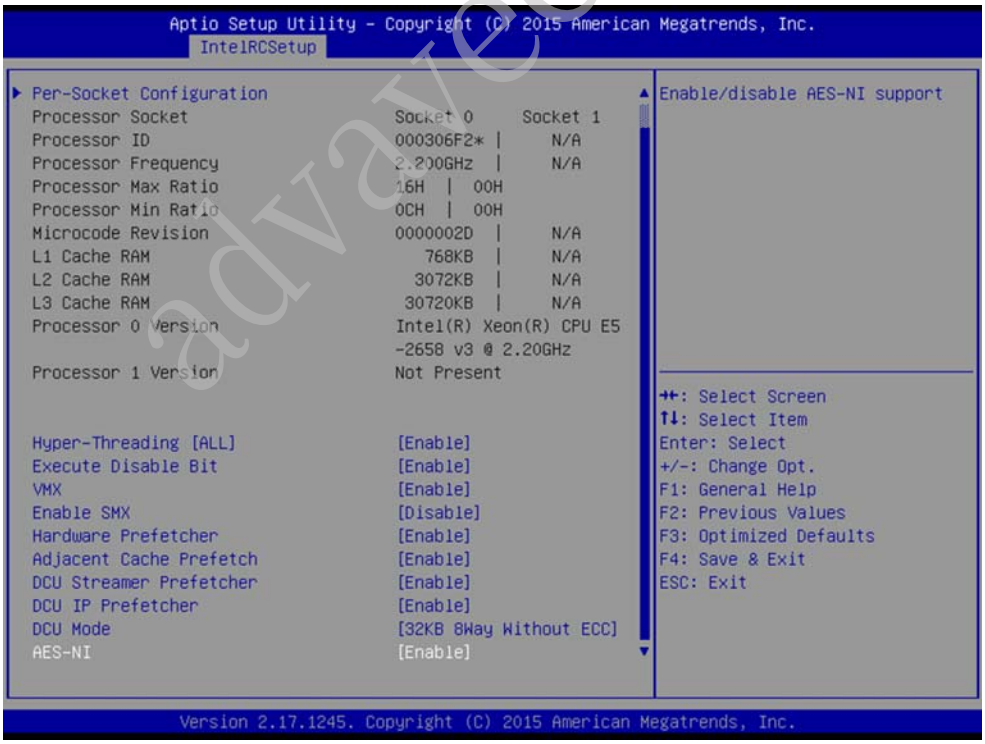


Figure 3.16 PCH IO Configuration

- **Per-Socket Configuration**

  Use this to select how many processor cores you want to activate when you are using a dual or quad core processor.

- **Hyper-threading**

  Enable or disable Intel Hyper Threading technology.

- **Execute Disable Bit**

  This item specifies the Execute Disable Bit Feature. The settings are Enabled and Disabled. The Optimal and Fail-Safe default setting is Enabled. If Disabled is selected, the BIOS forces the XD feature flag to always return to 0.

- **VMX**

  Enable or disable Intel Virtual Machine Extensions (VMX) for IA-32 processors that support Intel® Vanderpool Technology

- **SMX**

  Enable or disable the Safer Mode Extensions. Safer Mode Extensions (SMX) provide a means for system software to launch an MLE and establish a measured environment within the platform to support trust decisions by end users.

- **Hardware Prefetcher**

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

- **Adjacent Cache Line Prefetch**

  The Adjacent Cache-Line Prefetch mechanism, like automatic hardware prefetch, operates without programmer intervention. When enabled through the BIOS, two 64-byte cache lines are fetched into a 128-byte sector, regardless of whether the additional cache line has been requested or not. You may choose to enable or disable it.

- **DCU Streamer Prefetcher**

  Enable prefetch of next L1 data line based upon multiple loads in same cache line.

- **DCU IP Prefetcher**

  Enable prefetch of next L1 line based upon sequential load history.

- **DCU Mode**

  Change the data cache unit (DCU) mode.

- **AES-NI**

  This item is to enable or disable CPU advanced encryption standard instructions.

3.2.3.2 Advanced Power Management

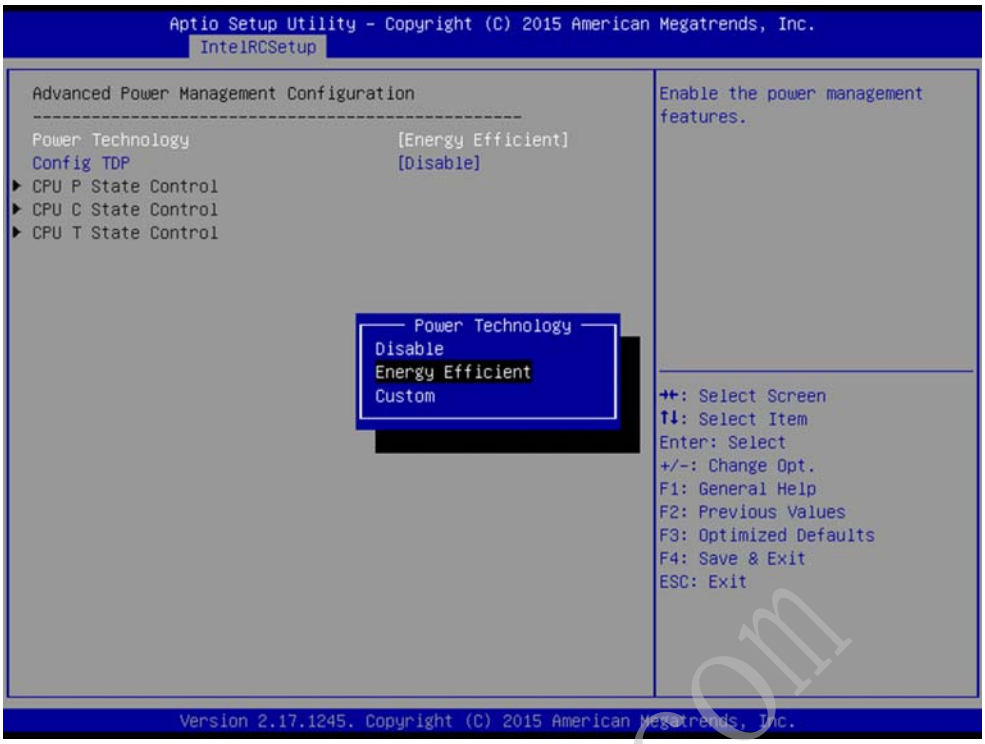
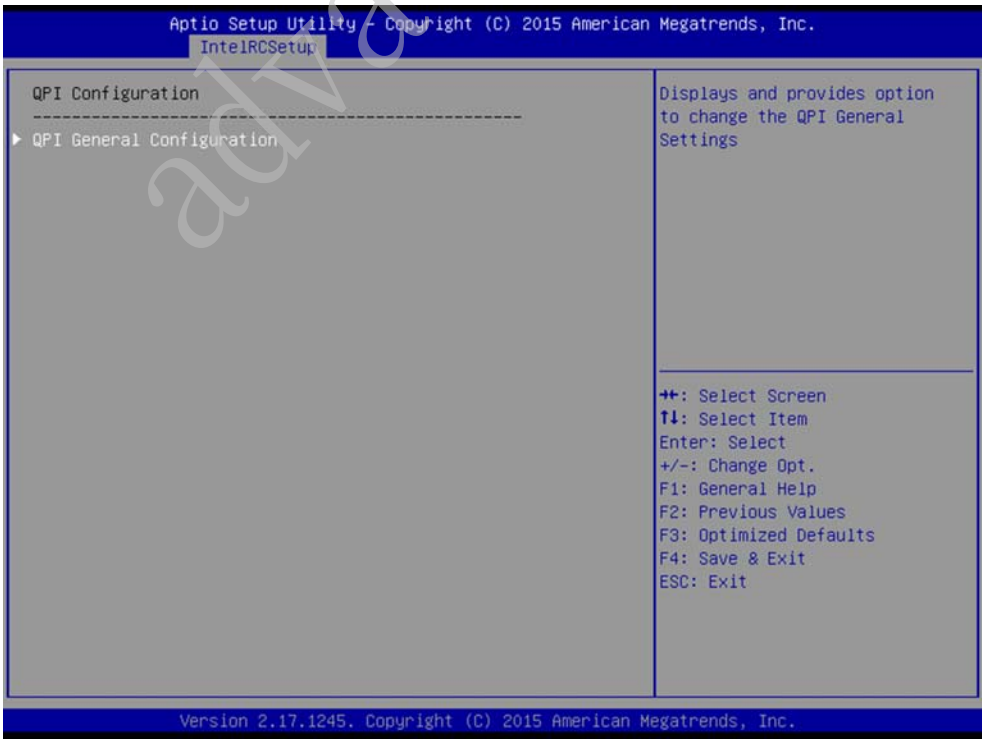


Figure 3.17 Advanced Power Management

- **Power Technology**

  Power technology default is "Energy Efficient". User can set "EIST", "P-STATE", "C3", "C6", "Package C State limit" under "Custom" Mode.

3.2.3.3 QPI Configuration



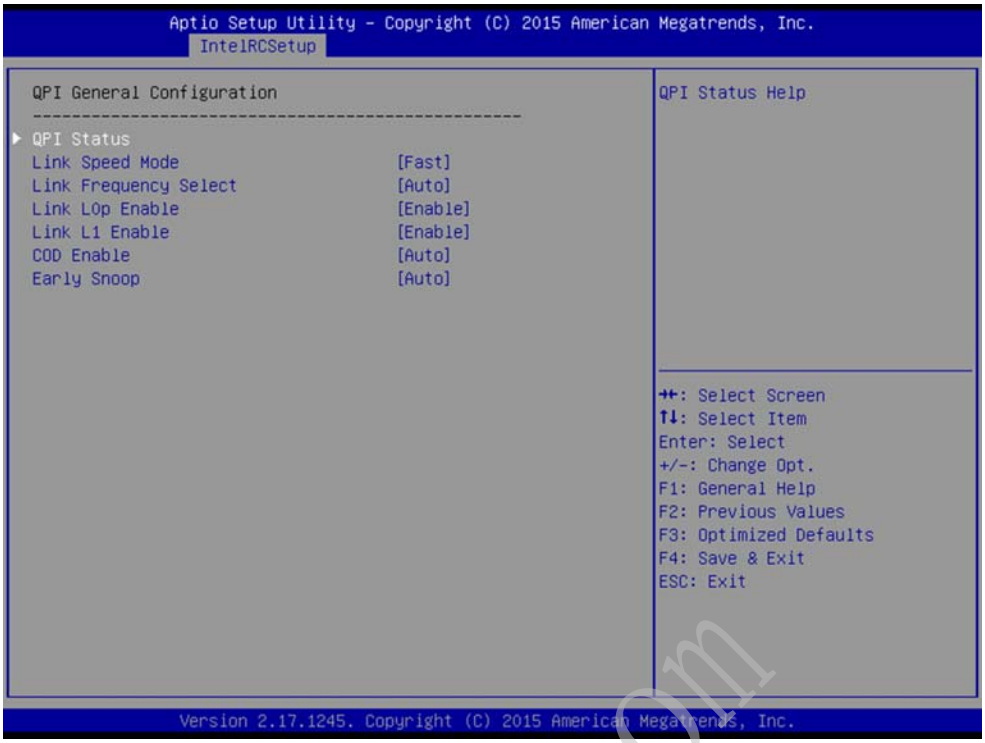


Figure 3.18 QPI Configuration

- **QPI Speed Mode**
  Select the QPI link speed as either the Fast mode or Slow Mode.
- **QPI Frequency Select**
  Allows for selecting the QPI Link frequency.
- **QPI Link0p**
  Enable/Disable QPI Link0p.
- **QPI Link1**
  Enable/Disable QPI Link1.
- **COD enable**
  Enable/Disable Cluster on Die.
- **Early Snoop**
  Enable/Disable Early Snoop.

Note!

1. Intel® recommends exposing all 3 snoop modes as BIOS options to the user due to the varying memory latency & bandwidth tradeoffs across SKUs for each snoop mode.

a). Intel® Xeon® Processor E5-2600 v3 Product Family supports up to 3 different snoop modes (Early Snoop, Home Snoop, Cluster on Die) to maintain memory coherency across the 2 sockets.

b). Choosing the optimal snoop mode setting is dependent on the work-load characteristics and the SKU that is used.

2. It is expected behavior for LCC SKUs (4-8 cores) in NUMA & Early Snoop mode to have low remote bandwidth.

a). For workloads on LCC SKUs that need high local & remote memory bandwidth, use NUMA & Home Snoop mode at the expense of higher memory latency (up to 1.07x).

b). For workloads on LCC SKUs that have mostly remote memory accesses, use UMA & either Early Snoop or Home Snoop mode.

3.2.3.4 Memory Configuration

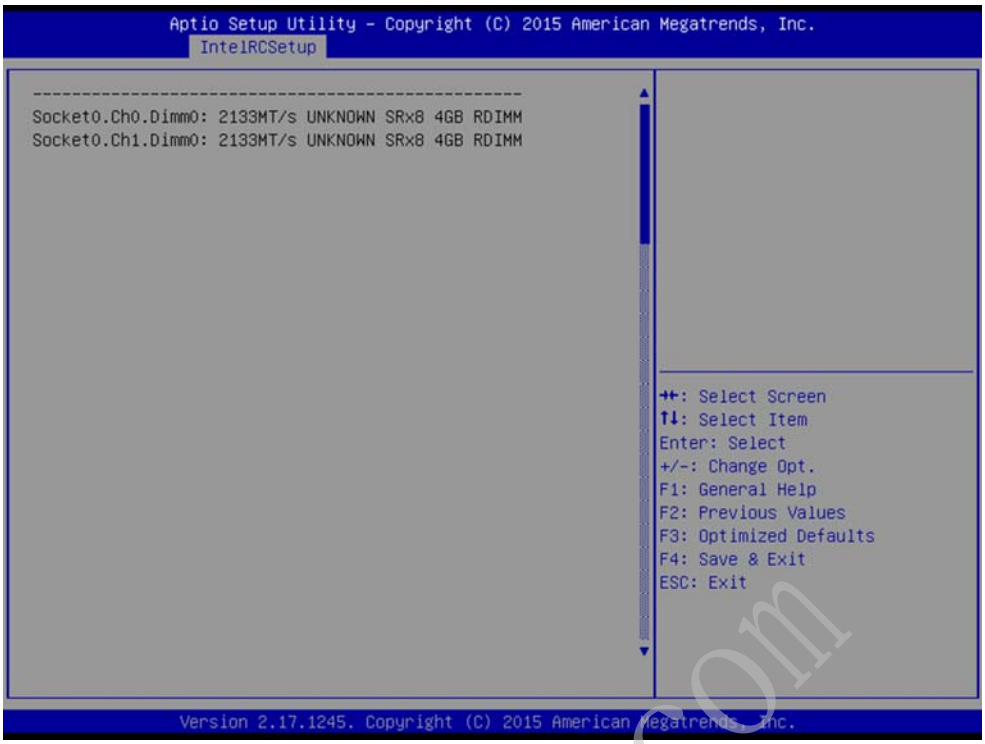


Figure 3.19 PCH Azalia Configuration

- **Data Scrabbling**
  Enable/Disable Data Scrambling.
- **Numa**
  Enable/Disable non uniform memory access (NUMA).
- **Memory Technology**
  Display memory topology with DIMM population information.

3.2.3.5 IIO Configuration

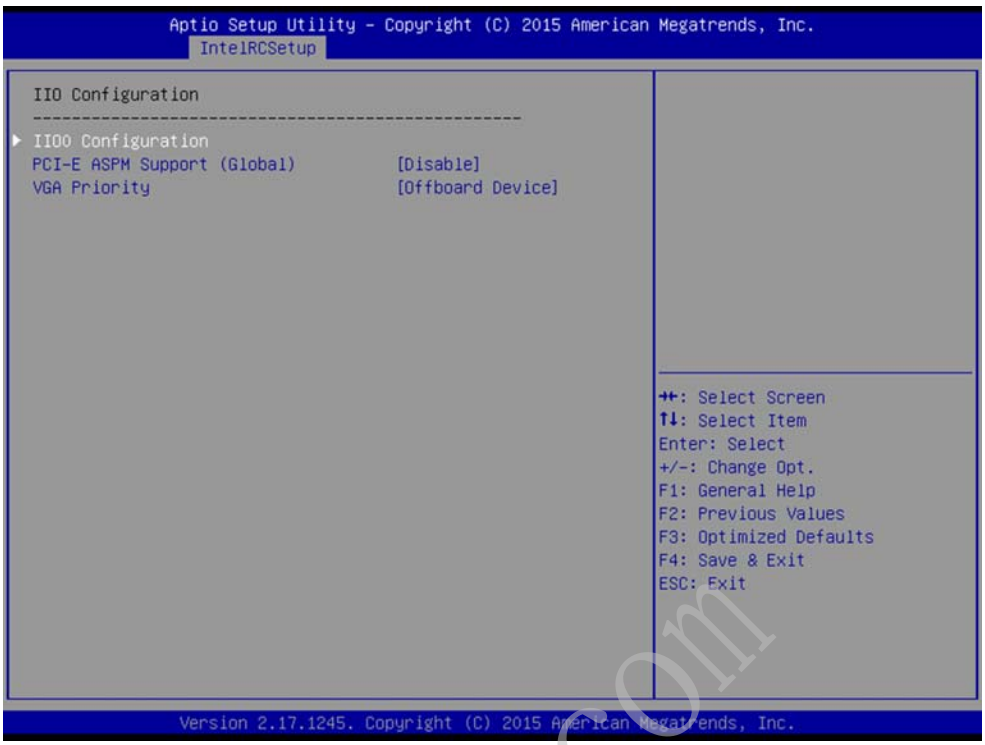


Figure 3.20 System Agent (SA) Configuration

- **CPU0/CPU1 PCIe Configuration**
  PCIe port bifurcation control and select target link speeds such as Gen1, Gen2, Gen3.
- **PCI-E ASPM Support**
  This item is to set the ASPM level. [Auto]: BIOS auto configure; [Force L0s]: Force all links to L0s state; [Disable]: To disable ASPM. [Extended Sync]: If this item is [Enable], it allows generation of extended synchronization patterns.
- **VGA Priority**
  Determines priority between onboard and 1st off-board video device found.

3.2.3.6 PCH Configuration

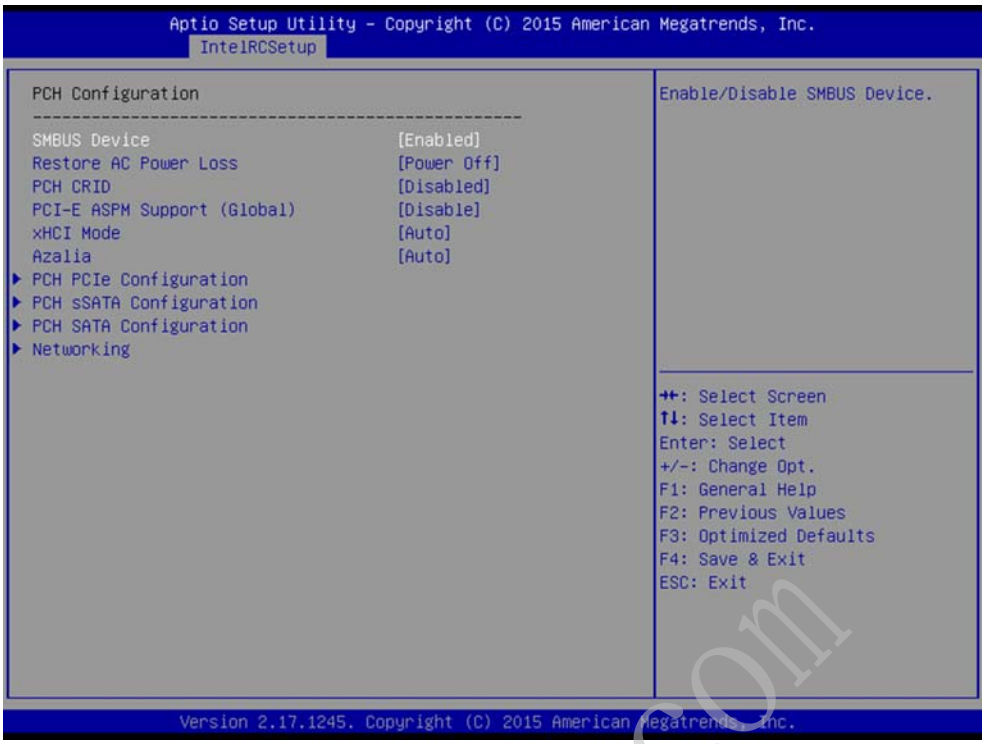
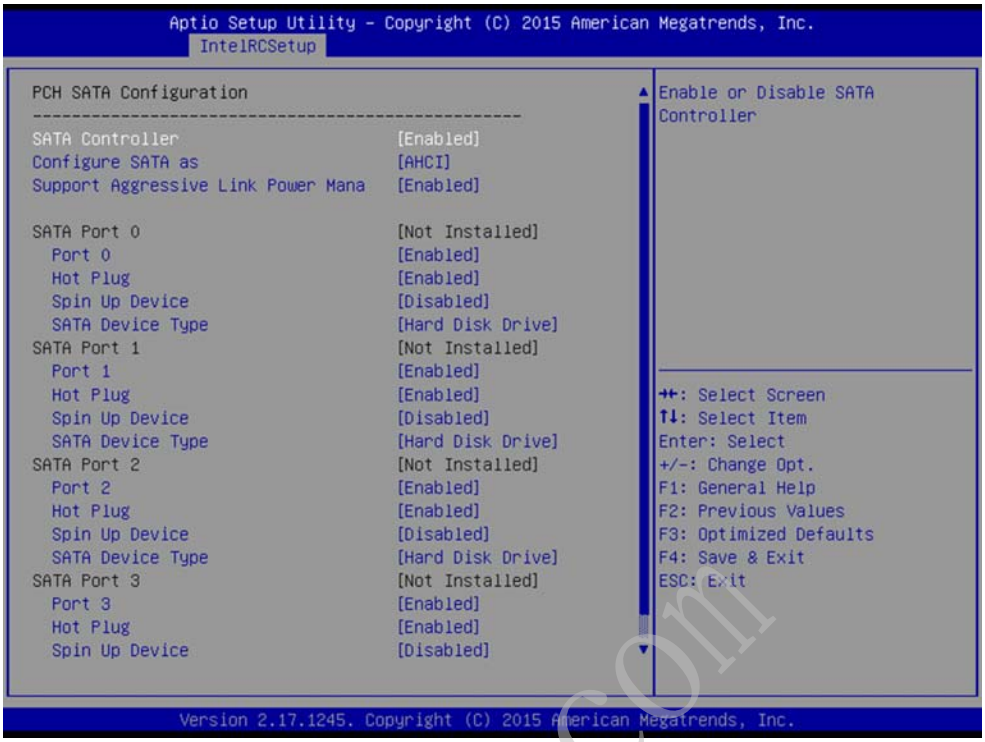
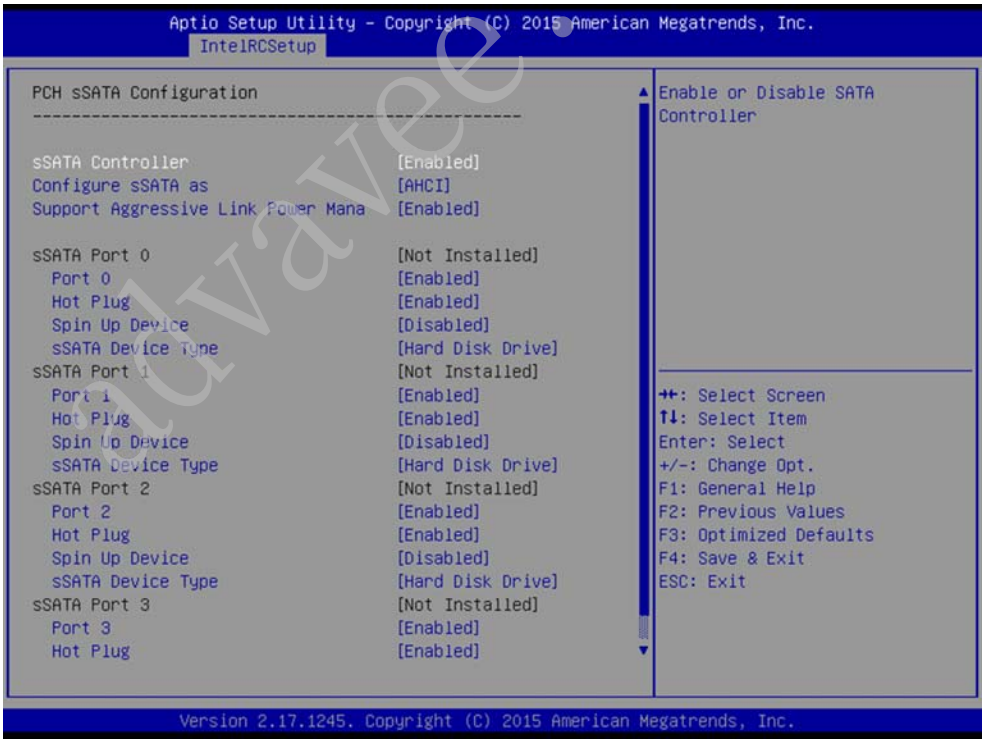


Figure 3.21 PCH Configuration

- **SMBus Controller**
  Enable/Disable SMBus controller.
- **Restore AC Power Loss**
  Specify what state to go to when power is re-applied after a power failure (G3 state).
- **PCH CRID**
  Enable/Disable PCH Compatibility Revision ID (CRID) Functionality.
- **PCI-E ASPM Support**
  To set ASPM level for PCI Express.
- **XHCI Mode**
  Mode of operation of XHCI controller.
- **Azalia HD Audio**
  Enable/Disable Azalia HD audio function.
- **PCH PCIe Configuration**
  To enable or disable PCI Express Slot 4 and select target link speed as Gen1, Gen2.

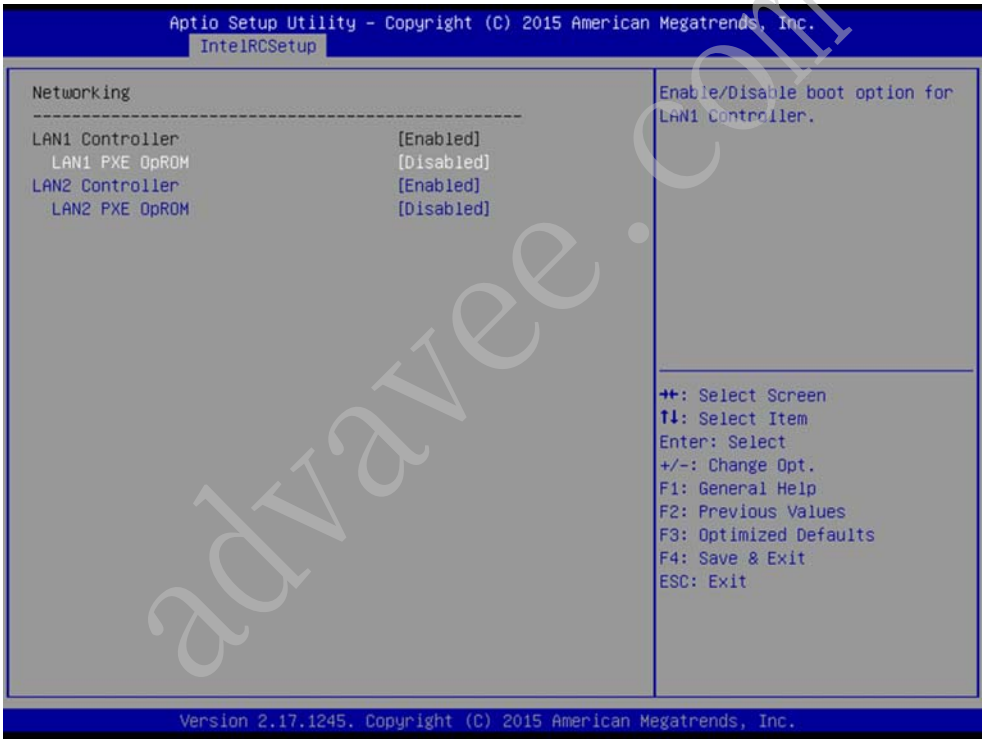
PCH SATA and sSATA Configuration





- **SATA Controller(s)**
  This item is to enable or disable SATA devices.
- **Configure SATA Mode**
  Set as IDE, AHCI, or RAID when SATA Controllers are enabled.
- **Support Aggressive Link Power Management**
  Enable or disable Aggressive Link Power Management (ALPM) protocol for Advanced Host Controller Interface-compliant (AHCI) Serial ATA (SATA) devices.
- **SATA Port 0~3 and sSATA Port 0~3**
  To enable or disable SATA/sSATA port 0~3.
- **SATA Port 0~3 and sSATA Port 0~3 Spin Up Device**
  On an edge detect from 0 to 1, the PCH starts a COMRESET initialization sequence to the device.
- **SATA Port 0~3 and sSATA Port 0~3 Device Type**
  To identify the SATA is connected to Solid State Drive or Hard Disk Drive.

■ **Networking**



- **LAN1 Controller**
  Always Enable.
- **LAN1 PXE OpROM**
  Enable/Disable Boot option for Intel I210 controller.
- **LAN2 Controller**
  Enable/Disable Intel I210 Controller support.
- **LAN2 PXE OpROM**
  Enable/Disable Boot option for Intel I210 controller.

3.2.4 Server Management

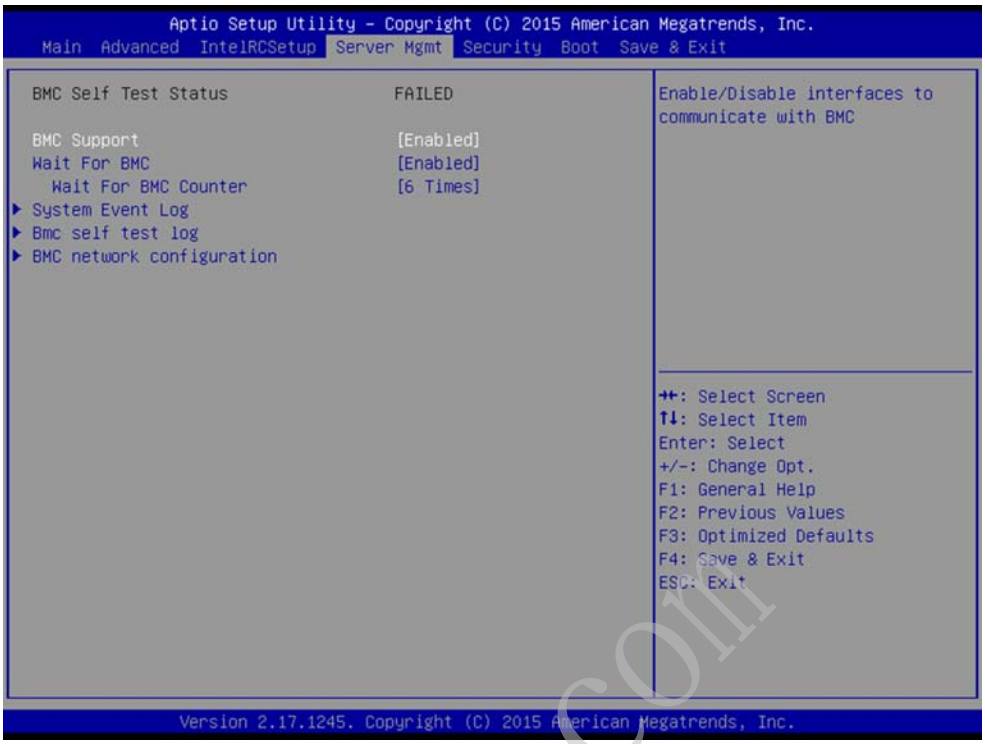


Figure 3.22 Server Management

- **BMC Support**
  Enable/Disable interfaces to communicate with BMC.
- **Wait for BMC**
  If enabled, the motherboard will wait 30 ~ 60 seconds until the BMC module boots up completely. After that, the normal BIOS post screen will be displayed.
  If disabled, the motherboard will not wait for the BMC module's response.
- **Wait for BMC counter**
  Wait for BMC counter for initialize host to BMC interfaces.
  The MB beeps every 5 seconds

3.2.4.1 System Event Log

- **SEL Components**
  Enable/Disable all features of system event logging during boot.
- **Erase SEL**
  Choose options for erasing SEL.
- **When SEL is Full**
  Choose options for reactions to a full SEL.
- **Log EFI Status Codes**
  Disable the logging of EFI status codes or log only error code or only progress code or both.

3.2.4.2 BMC Self Test Log

- **Erase Log**
  Erase log options.
- **When Log is Full**
  Select the action to be taken when the log is full.

3.2.4.3 BMC Network Configuration

- **Configuration Address Source**

  Select to configure LAN channel parameters statically or dynamically (by BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

3.2.5 Security

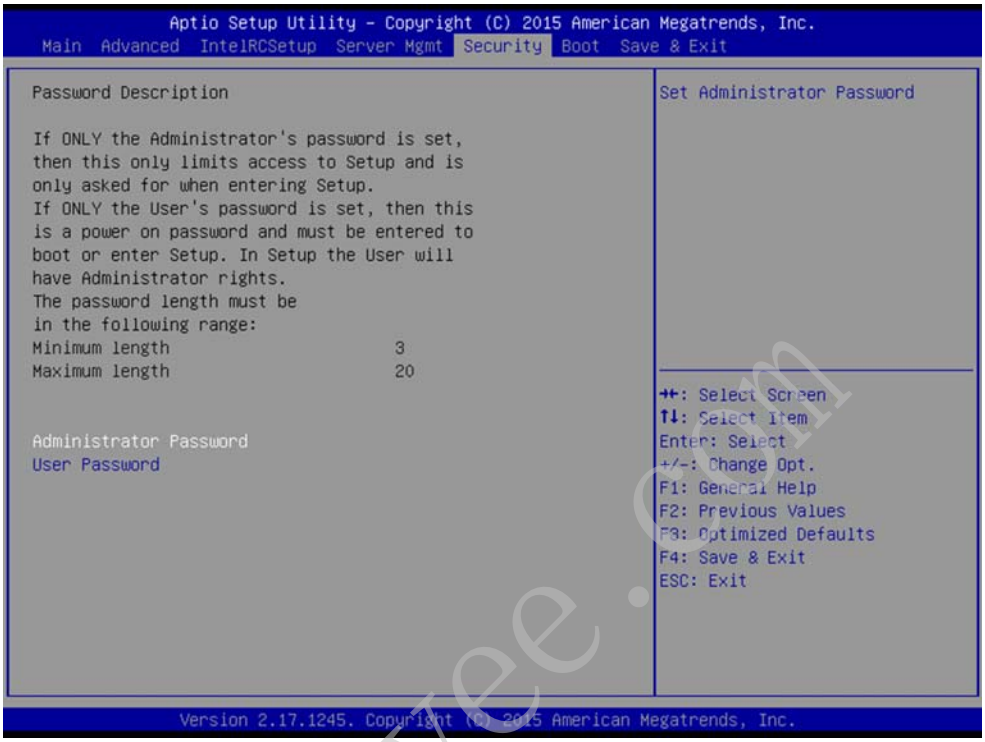


Figure 3.23 Security

Note! *With AC power & Battery. Short CMOS1 Jumper:*
Date/Time & Password: Keep
Setting: reset to default
AC power and CMOS battery are removed. Short CMOS1 Jumper:
Date/Time: reset to default
Password: Keep
Setting: reset to default

3.2.6 Boot

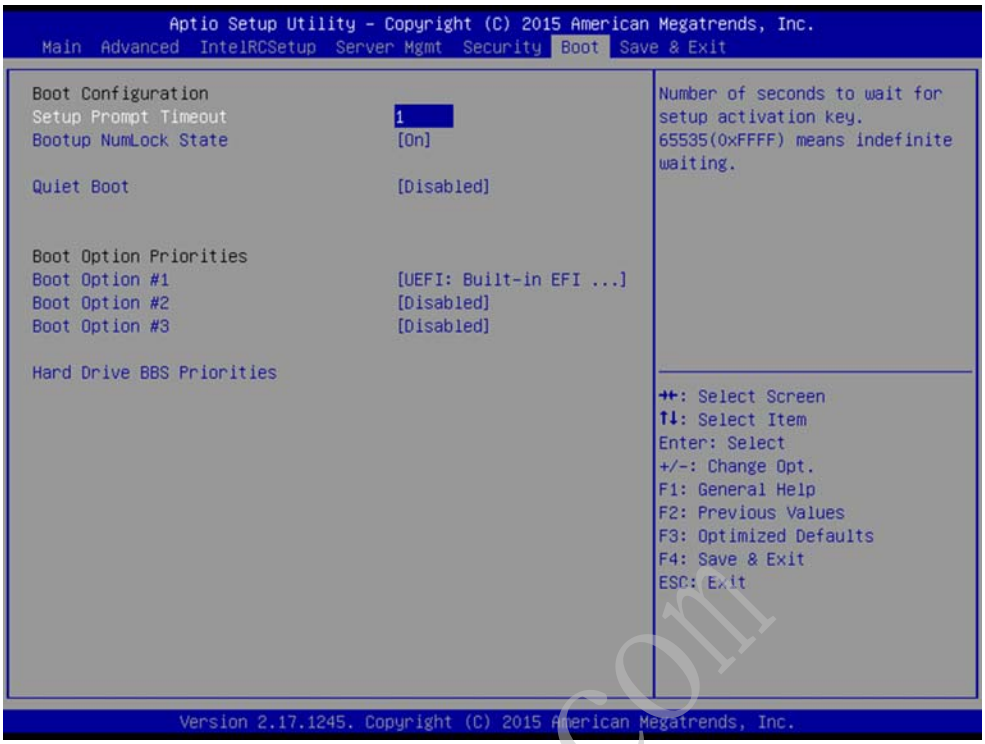


Figure 3.24 Boot

- **Setup Prompt Timeout**
  Number of seconds to wait for setup activation key. 16 (0x10) means indefinite waiting.
- **Bootup NumLock State**
  Select the keyboard NumLock state.
- **Quiet Boot**
  Enable/Disable quiet boot option.
- **Boot Option Priorities**
  Sets the system boot priorities.

3.2.7 Save & Exit

Figure 3.25 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 changes.
- **Discard Changes and Reset**
  Reset system setup without saving any changes.
- **Save Changes**
  Save changes done so far to any of the setup options.
- **Discard Changes**
  Discard 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**
  Save the changes done so far as user defaults.
- **Restore User Defaults**
  Restore the user defaults to all the setup options.

Chapter 4

Chipset Software Installation Utility

4.1 Before You Begin

To facilitate the installation of the enhanced display drivers and utility software, read the instructions in this chapter carefully. The drivers for the PCE-9228 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®.

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.

4.2 Introduction

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

- Core PCI PnP services
- Serial ATA interface support
- USB 1.1/2.0/3.0 support
- Identification of Intel® chipset components in the Device Manager

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.*

**The chipset driver is used for the following versions of Windows, and it has to be installed before installing all the other drivers:*

Windows Server 2012 R2 Standard X64

Windows Server 2008 Enterprise Edition R2(SP1) X64

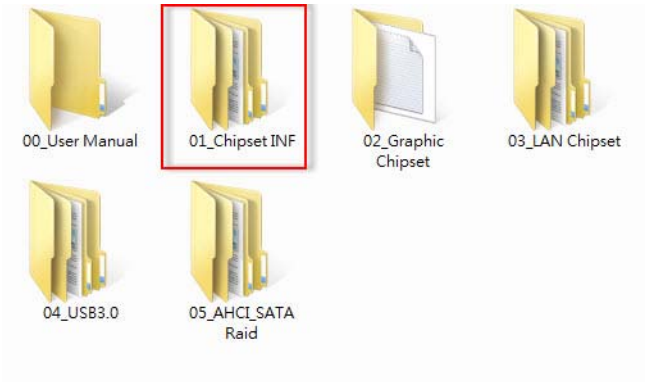
Windows 7(Ultimate SP1) X64/X86

Windows 8.1 Ultimate X64/86

**It is necessary to update all the latest Microsoft hotfix files when using this OS.*

4.3 Windows® 7 & 8 and Server 2008 & 2012

1. Insert the driver CD into your system's CD-ROM drive. You can see the driver folder items. Navigate to the "\01_Chipset INF\Intel® Chipset_9.4.2.1019\" folder and click "infinst_autol.exe" to complete the installation of the driver.



Chapter 5

Graphic Device Setup

5.1 Introduction

Install the ASPEED VGA driver to enable this function, which includes the following features:

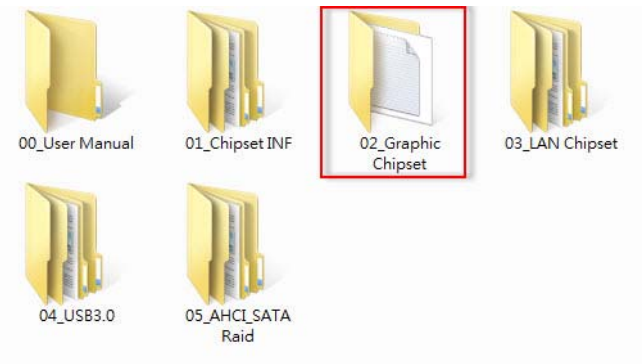
- 32-bit 2D graphics engine on board for normal use.
- Supports up to 64 MB frame buffer and reach up to 1920 x 1200 pixels resolution.

5.2 Windows Series Driver Setup

Insert the driver CD into your system's CD-ROM drive. When the folder is displayed, navigate to the "02_Graphic chipset" folder and click the executable file to complete the installation of the drivers for OS that you need.

Note!

1. *If PCE-9228 carries discrete graphics card for VGA output, please set this additional graphic card as "major output" under the "Display properties" of OS.*
2. *Please use the driver file from "Windows WDDM" folder as first choice.*
3. *XDDM and WDDM Driver Selection for Win7/Vista/2008/2008R2 OS.*
   – In general, we strongly recommend our customers to use XDDM driver, not WDDM driver. ASPEED's WDDM driver is only for the motherboard which supports multi-adapters function. Multi-adapter function means the mother board has 2 different VGA chips (or add-on cards) on-board, one is the 3rd party VGA chip, another is ASPEED VGA chip, and the 3rd party VGA chip only provides WDDM driver.
4. *ASPEED Graphics WDDM Driver Limitation on Vista/Windows7/ Server2008/Server2008R2.*
   – It is non-WHQL certified driver because ASPEED VGA is a 2D VGA, it cannot meet the WHQL requirement of WDDM driver which requires 3D VGA function.
   – Because it is non-WHQL certified driver, it may meet some compatible issues with some specific applications
5. *ASPEED Graphics WDDM Driver Limitation on Windows 8/2012:*
   – Does not support modes with different display frequencies



Chapter 6

LAN Configuration

6.1 Introduction

The PCE-9228 has two Gigabit Ethernet LAN connections via dedicated PCI Express x1 lanes: GbE LAN1 - Intel I210; GbE LAN2 - I210. They offer bandwidth of up to 500 MB/sec, eliminating the bottleneck of network data flow and incorporating Gigabit Ethernet at 1000 Mbps.

Features:

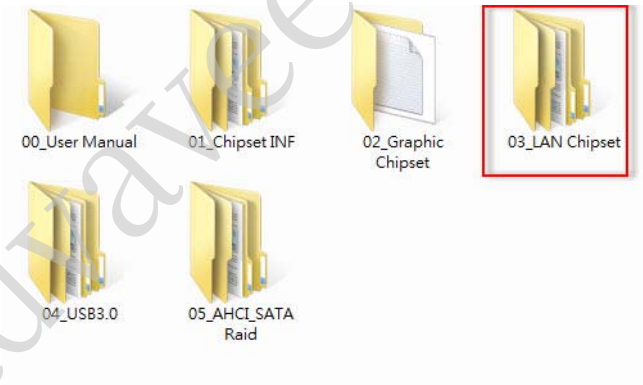
- 10/100/1000Base-T Ethernet controller
- 10/100/1000Base-T triple-speed MAC
- Full duplex at 10, 100, or 1000 Mbps and half duplex at 10 or 100 Mbps
- Wake-on-LAN (WOL) support
- PCIe x1 host

6.2 Installation

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

6.3 Windows Series Driver Setup (LAN)

Insert the driver CD into your system's CD-ROM drive. Select folder "03_Lan chipset" then click the proper Lan driver for the OS.



Chapter 7

Intel USB 3.0

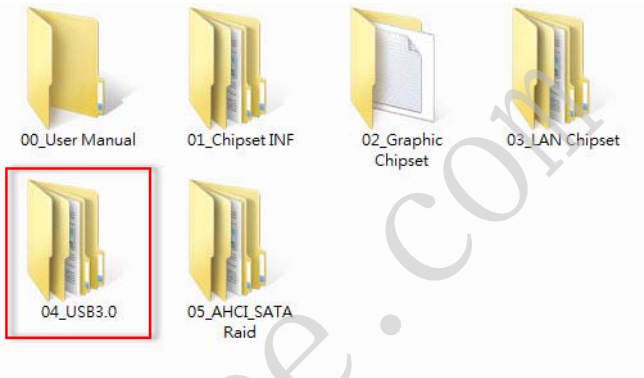
7.1 Introduction

PCE-9228 provides Intel® USB 3.0 and the data transfer rates of USB 3.0 (5 Gbps) which is 10 times faster that USB 2.0 (480Mbps).

7.2 Installation

Insert the driver CD into your system's CD-ROM drive. Navigate to the "04_USB3.0" folder and click "setup.exe" to complete the installation of the driver.

Note! *For operating systems, please ensure your BIOS settings have the xHCI Mode set to "Auto" or "Smart Auto". This will reconfigure the USB 3.0 ports to function as USB 2.0 ports using the native Windows* EHCI driver.*



Chapter 8

SATA RAID Setup

8.1 Introduction

To support demanding disk I/O, Intel C612 chipset integrates 8 SATA3.0 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.

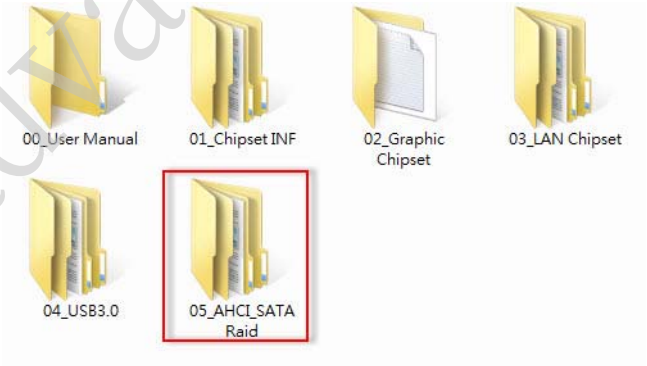
RAID 5 array contains three or more hard drives where the data is divided into manageable blocks called strips. Parity is a mathematical method for recreating data that was lost from a single drive, which increases fault-tolerance. The data and parity are striped across all the hard drives in the array. 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.

8.2 SATA RAID Driver and Utility Setup

The driver is in the CD's "05_AHCI_SATA Raid" folder. Go to the directory and follow Intel's installation guide to install the driver and utility.

1. Please visit the Intel download center for "Intel Rapid Storage Technology enterprise for Microsoft Windows Operating System software User's Guide" file download, The download address is:
   http://download.intel.com/support/motherboards/server/sb/g40440_005_rste_swug_r1_5.pdf
2. For the hotfix file download, please visit:
   http://support.microsoft.com/kb/932755/en-us



Appendix A

Programming the Watchdog Timer

A.1 Introduction

The PCE-9228'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).

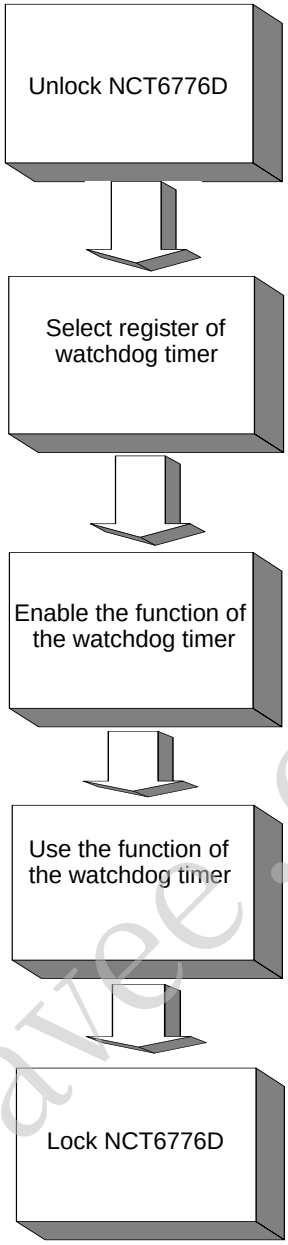


Table A.1: Watchdog timer registers

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)

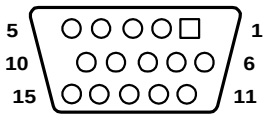


Table B.1: VGA connector (VGA1)			
Pin	**Signal**	**Pin**	**Signal**
1	RED	9	VCC
2	GREEN	10	GND
3	BLUE	11	N/C
4	N/C	12	SDT
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	SCK
8	GND		

B.2 RS 232 Serial Port (COM1)

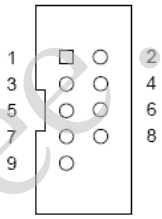


Table B.2: RS-232 serial port (COM1)	
Pin	**Signal**
1	DCD
2	DSR
3	SIN
4	RTS
5	SOUT
6	CTS
7	DTR
8	RI
9	GND

B.3 USB3.0 Header (USB12)

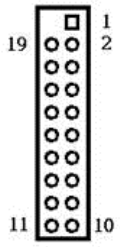


Table B.3: USB 3.0 Header (USB12)			
Pin	**Signal**	**Pin**	**Signal**
1	USB1_VCC5	11	USB_P+_P2
2	USB3.0_RXN_P1	12	USB_P-_P2
3	USB3.0_RXP_P1	13	GND
4	GND	14	USB3.0_TXP_P2
5	USB3.0_TXN_P1	15	USB3.0_TXN_P2
6	USB3.0_TXP_P1	16	GND
7	GND	17	USB3.0_RXP_P2
8	USB_P-_P1	18	USB3.0_RXN_P2
9	USB_P+_P1	19	USB2_VCC5
10	Reserve		

B.4 CPU Fan Power Connector (CPUFAN1)

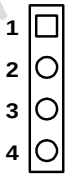


Table B.4: CPU fan power connector (CPUFAN1)	
Pin	**Signal**
1	GND
2	+12V
3	Detect
4	NC

B.5 Power LED and Keyboard Lock Connector (JFP3 / PWR_LED & KEY LOCK)

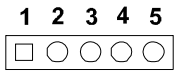


Table B.5: Power LED and keyboard lock connector (JFP3 / PWR_LED & KEY LOCK)

Pin	Signal
1	LED power (+3.3 V)
2	NC
3	GND
4	KEYLOCK#
5	GND

B.6 External Speaker Connector (JFP2 / SPEAKER)

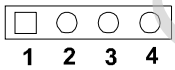


Table B.6: External speaker connector (JFP2 / SPEAKER)

Pin	Signal
1	SPK_CN17P1
2	SPK_CN17P2
3	SPK_CN17P3
4	SPK_CN17P4

B.7 Reset Connector (JFP1 / RESET)

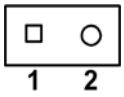


Table B.7: Reset connector (JFP1 / RESET)

Pin	Signal
1	RESET #
2	GND

B.8 HDD LED (JFP2 / HDDLED)

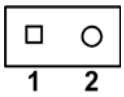


Table B.8: HDD LED (JFP2 / HDDLED)	
Pin	**Signal**
1	HDD LED
2	SATA LED

B.9 ATX Soft Power Switch (JFP1 / PWR_SW)

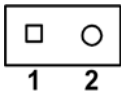


Table B.9: ATX soft power switch (JFP1 / PWR_SW)	
Pin	Signal
1	3.3 VSB
2	PWR-BTN

B.10 Hi-definition Audio Link Connector (HDAUD1)

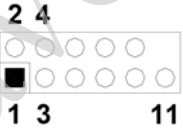


Table B.10: Hi-definition audio link connector (HDAUD1)			
Pin	**Signal**	**Pin**	**Signal**
1	ACZ_VCC	2	GND
3	ACZ_SYNC	4	ACZ_BITCLK
5	ACZ_SDOUT	6	ACZ_SDIN0
7	ACZ_SDIN1	8	-ACZ_RST
9	ACZ_12V	10	GND
11	GND	12	N/C

B.11 SM Bus Connector (JFP2 / SNMP)

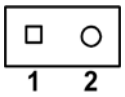


Table B.11: SM bus connector (JFP2 / SNMP)	
Pin	**Signal**
1	SMB_DATA
2	SMB_CLK

B.12 LAN1 and LAN2 LED Connector (LANLED1)

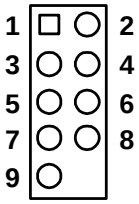


Table B.12: LAN1 and LAN2 LED connector (LANLED1)	
Pin	**Signal**
1	#LAN1_ACT
2	#LAN2_ACT
3	V33_AUX
4	V33_AUX
5	#LAN1_LINK1000
6	#LAN2_LINK1000
7	#LAN1_LINK100
8	#LAN2_LINK100
9	V33_AUX

B.13 GPIO Header (GPIO1)

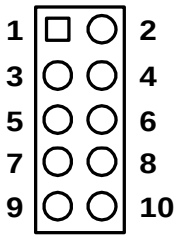


Table B.13: GPIO header (GPIO1)	
Pin	**Signal**
1	SIO_GPIO0
2	SIO_GPIO4
3	SIO_GPIO1
4	SIO_GPIO5
5	SIO_GPIO2
6	SIO_GPIO6
7	SIO_GPIO3
8	SIO_GPIO7
9	VCC_GPIO
10	GND

B.14 PCI Bus Map

Table B.14: 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	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
```

ADVANTECH

Enabling an Intelligent Planet

www.advantech.com

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

All product specifications are subject to change without notice.