User Manual

PCI-7032

Intel® Atom® J1900/N2930
PICMG 1.0 PCI Half-size
Single Board Computer
with DDR3L 1333/
Dual Independent Display/
Dual GbE LAN/ SATA/ USB/
m-SATA/ COM/ LPT

ADVANTECH

Enabling an Intelligent Planet

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

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January 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.

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.

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

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.

Battery Information

Batteries, battery packs, and accumulators should not be disposed of as unsorted household waste.

Please use the public collection system to return, recycle, or treat them in compliance with the local regulations.

Memory Compatibility

PCI-7032 Compatible Memory

Brand	Size	Speed	Type	ECC	Vendor PN	Memory	Advantech PN
AQD	2GB	DDR3 1600	SODIMM DDR3	N	665205-0397	SEC 310 XYKO K4B2G084GD	AQD-SD3L2GN16-SQ
AQD	2GB	DDR3 1600	SODIMM DDR3	N	201403504691	HYNIX H5TC2G83EFR	AQD-SD3L2GN16-HQ
AQD	4GB	DDR3 1600	SODIMM DDR3	N	665723-0556	SEC 401 XYKO K4B4G0846B	AQD-SD3L4GN16-SG
AQD	4GB	DDR3L 1600	SODIMM DDR3	N		MICRON 4CK72D9PSH	AQD-SD3L4GN16-MQ

Backplane Support Matrix Table

P/N	Segment	Slot	Size
PCA-6104P4-0B2E	1	4	110x180 mm (4.3"x7")
PCA-6105P5-0B2E	1	5	143x155 mm (5.6"x6")
PCA-6108P8-0A2E	1	8	182x185 mm (7.2"x7.3")

Specification Comparison

Model Name	SoC	Memory	DIMM Slot	Fan-less	Dual Independent Display	SATA/ m-SATA	USB	RS-232/ 422/ 485	LPT	LAN	COM Port
PCI-7032G2-00A1E	J1900	Dual channel DDR3L-1333 up to 8GB (204-pin SO-DIMM socket x2)	2	No	Choose 2 inter-faces from VGA/ DVI/LVDS	2	1 x USB 3.0 6 x USB 2.0	4	1	2	COM12, COM34
PCI-7032VG-00A1E	N2930	Dual channel DDR3L-1333 up to 8GB (204-pin SO-DIMM socket x1)	1	Yes	Choose 2 inter-faces from VGA/ DVI/LVDS	2	1 x USB 3.0 5 x USB 2.0	2	1	1	COM12

Operation System Support List

Win8 (32/64), Win8.1 (32/64), Win 7(32/64), Linux, WES7, WES8

Initial Inspection

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

- 1 PCI-7032 Single Board Computer
- 1 CD with utility   P/N: 2061703200
- 1 PCI-7032 Start-up Manual   P/N: 2001703200
- 1 Serial ATA HDD Data Cable   P/N: 1700003194
- 1 Serial ATA HDD Power Cable   P/N: 1700022749-11
- 2 2-port COM Cable Kit   P/N: 1700008762
- 1 4-port USB 2.0 Cable Kit   P/N: 1700014398-11
- 1 ATX feature cable   P/N: 1700002343
- 1 1-port LPT Cable Kit   P/N: 1700002223
- 1 Keyboard and Mouse Y Cable   P/N: 1700060202
- 1 Jumper Package   P/N: 9689000068
- 1 Warranty Card

If any of these items are missing or damaged, contact your distributor or sales representative immediately. We have carefully inspected the PCI-7032 mechanically and electrically before shipment. It should be free of marks and scratches and in perfect working order upon receipt. As you unpack the PCI-7032, 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 3   AMI BIOS Setup.............................. 27

Chapter 4   Value-Added Software Services49

Chapter 1

Hardware Configuration

1.1 Introduction

PCI-7032 is an Intel® based PICMG 1.0 half-size PCI interface single board computer. PCI-7032G2, with Intel® Celeron® J1900, offers a dual GbE LAN, high computing solution; PCI-7032VG, adopting Intel® Atom® N2930, provides a single GbE LAN and fanless computing core with high reliability that resists heat, dust, vibration and shock in any application environment.

Both J1900 and N2930 SoC are designed for the embedded market. Besides computing speed enhancement with quad core architecture, the SoCs integrate DDR3L memory controller, PCIe Gen2 expansion and storage/display/audio functions in low power BGA type chips, offering energy saving products with only 7.5W to 10W thermal design power, providing customers with low power and rugged embedded solutions. In addition, SoCs support embedded OS, such as WES7, WES8, and Linux, fulfilling a variety of applications, for example, machine tool, CNC, textile machine, factory inspection facility, factory motion controller, and data acquisition center.

PCI-7032 is rich in I/O interfaces: it has two SATA ports (300 MB/sec) for mainstream SSD (solid state disk), HDD, and ODD connections, and one of them can be configured as m-SATA for embedded OS installation as an economical, easy to maintain SSD device. Additionally, the dual Gigabit Ethernet LANs offer strong networking capability; PCI-7032G2 with four and PCI-7032VG with two serial ports (COM ports) can be used as reliable legacy device control interfaces, which can be configured into RS-232, RS-422, or RS-485 mode, helping system integrators to build safe and flexible legacy connections in factory. Users can also purchase Advantech's COM port upgrade module (P/N: PCA-COM485-00A1E/PCA-COM232-00A1E) to add four extra serial ports.

In addition to board-level products, Advantech also offers a series of wall-mount chassis; with PCI-7032 joining the product portfolio, Advantech now can provide compact-size, low-power and high-reliability system-level solutions for industrial customers. With outstanding performance, and flexible expansion capability, PCI-7032 is an ideal computing platform for modern industrial applications.

1.2 Features & Benefits

Features	Benefits
PCI-7032 supports Intel® Celeron® J1900 and N2930	The computing frequency of Intel® Celeron® J1900 and N2930 is up to 2GHz. The processor speed increases 20% compared to N450 and D510 (PCI-7031).
PCI-7032 supports DDR3L 1333 SDRAM, up to 8GB	Providing higher memory data transmission and processing efficiency, bringing higher system performance, and the cost of memory module decreases compared with DDR2 (G2 SKU: 2 Slots; VG SKU: 1 Slot).
Advantech SUSI APIs and Utilities support.	Reducing customer S/W development effort with more reliable S/W quality, also providing value-added utilities such as system monitor and panel backlight control.
m-SATA support	Supporting compact size storage device which is suitable for embedded OS, such as WES7, WES8. In addition, m-SATA device can prevent HDD error in vibration conditions.
USB 3.0 support	Providing high transfer data performance interface; USB 3.0 data transfer rate is 5Gbps which is 10 times faster than USB2.0.

	Users can choose two types of display interface from
Dual display	VGA, DVI, and LVDS. These features fulfill requirements in an abundance of different applications.

1.3 Specifications

1.3.1 System

■ CPU:
  – G2 SKU:Intel® Celeron® J1900
  – VG SKU:Intel® Celeron® N2930
■ **L2 Cache:** 2 MB
■ **BIOS:** AMI SPI BIOS (64 Mb SPI)
■ **SATA hard disk drive interface:** PCI-7032 has two SATA interface configuration:
  – Two SATA II (300 MB/s) connectors
  – One SATA II (300 MB/s) connector, and one SATA II (300 MB/s) m-SATA SO-015 socket
■ **ACPI Sleep State:** S4, S5

Note! *PCI-7032 does NOT support PATA(IDE) interface.*

Note! *J1900/N2930 does not support ACPI S1.*

1.3.2 Memory

■ **RAM:** PCI-7032 supports dual channel DDR3L 1333, up to 8GB with two 204-pin SO-DIMM socket (up to 4GB/DIMM. G2 SKU: 2 Slots; VG SKU: 1 Slot).

Note! 1. *Due to the inherent limitations of the PC architecture, the system may not fully detect 16 GB RAM when 16 GB of RAM is installed.*
2. *A 32-bit OS may not fully detect 4 GB of RAM when 4 GB is installed.*
3. *To power on the system with only one memory module, please insert the module in DIMMA1.*

1.3.3 Input/Output

- **PCI bus:** Four 32 bit/33 MHz PCI bus masters to backplane
- **Enhanced parallel port:** This EPP/SPP/ECP port can be configured to LPT1 or disabled. A standard DB-25 female connector provided.
- **Serial ports:** PCI-7032G2 with four and PCI-7032VG with two serial ports can be configured as RS-232, RS-422 or RS-485 (with auto flow control).
- **PS/2 keyboard and mouse connector:** One 6-pin mini-DIN connectors is located on the mounting bracket for easy connection to a PS/2 keyboard and mouse via the Y-cable included in the package.
- **USB port:**
  - G2 SKU: USB 3.0 *1 (5Gbps, rear I/O), and USB 2.0*6 (480 Mbps, pin headers)
  - VG SKU: USB 3.0*1 (5Gbps, rear I/O), and USB 2.0*5 (480 Mbps, 1x rear I/O, 4x pin headers)
- **LPC:** One LPC connector to support optional TPM (PCA-TPM-00A1E), 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
- **Dual display:** Choose two display interface from VGA, DVI, and LVDS
  - VGA: up to 2560x1600@60Hz
  - DVI: up to 2560x1600@60Hz
  - LVDS: 48 bit (dual channel 24-bit LVDS) up to 1920x1200@60Hz

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$^®$ I211 (VG and G2)
  - LAN 2: Intel$^®$ I211 (G2 only)

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:** +5 V, +12 V, +5 V_{SB}
- **Power consumption:**

PCI-7032G2-00A1E

Intel® Celeron® J1900 (2GHz), DDR3L 1333, 4GB SO-DIMM module*2

Voltage	5V	12V	5VSB
Current	0.737 A	0.298 A	0.044 A
Total		7.481 W	

- **Board size:** 185 mm x 122 mm (7.3" x 4.8")
- Board weight:
  - G2 SKU: 0.264 Kg
  - VG SKU:0.198 Kg

1.4 Jumpers and Connectors

Connectors on the PCI-7032 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
ATXF1	AT/ATX mode selection
JWDT1 + JOBS1	Watchdog timer output selection and HW monitor alarm
BZ1	Buzzer setting
JLVDS1, JLVDS2	LVDS panel voltage selection
JLVDS_VCON1	LVDS VESA, JEIDA format selection

Table 1.2: Connectors

Label	Function
LPT1	Parallel port, Parallel port x 1, supports SPP/EPP/ECP mode
LAN1	Intel® I211
LAN2 (G2 SKU)	Intel® I211
VGA1	VGA connector
KBMS1, KBMS2	PS/2 keyboard and mouse connector. KBMS1 in on rear I/O; KBMS2 connects chassis front panel.
COM12, COM34 (G2 SKU)	Serial port: RS-232/422/485
JFP1	Power Switch / Reset connector
JCASE1	Case Open
CPUFAN1	CPU FAN connector (4-pin)
LANLED1	LAN1/2 LED extension connector
HDAUD1	HD audio extension module connector
USB12, USB34	USB port 1-4 (USB 2.0, 480Mbps, pin header)
USB56 (G2 SKU)	USB port 5, 6 (USB 2.0, 480Mbps, pin header)
USB6 (VG SKU)	USB port 6 (USB 2.0, 480Mbps, rear I/O)
USB7	USB port 7 (USB 3.0, 5Gbps, rear I/O)
SATA1	Serial ATA1 (300 MB/s)
SATA2/MSATA1	SATA2 (300MB/s) and MSATA1(mSATA SO-015) share the same SATA port. m-SATA has higher priority when both of them connects with devices.
DIMMA1	Memory connector channel A
DIMMB1 (G2 SKU)	Memory connector channel B
GPIO1	GPIO pin header (SMD pitch-2.0 mm)
LPC1	COM port module expansion pin-header
ATX1	12 V, 5 V, 5VSB power connector
DVI1	DVI connector
LVDS1	LVDS connector
SMBUS1	SMBUS connector
INV1	LVDS inverter connector

1.5 Board Layout: Jumper and Connector Locations
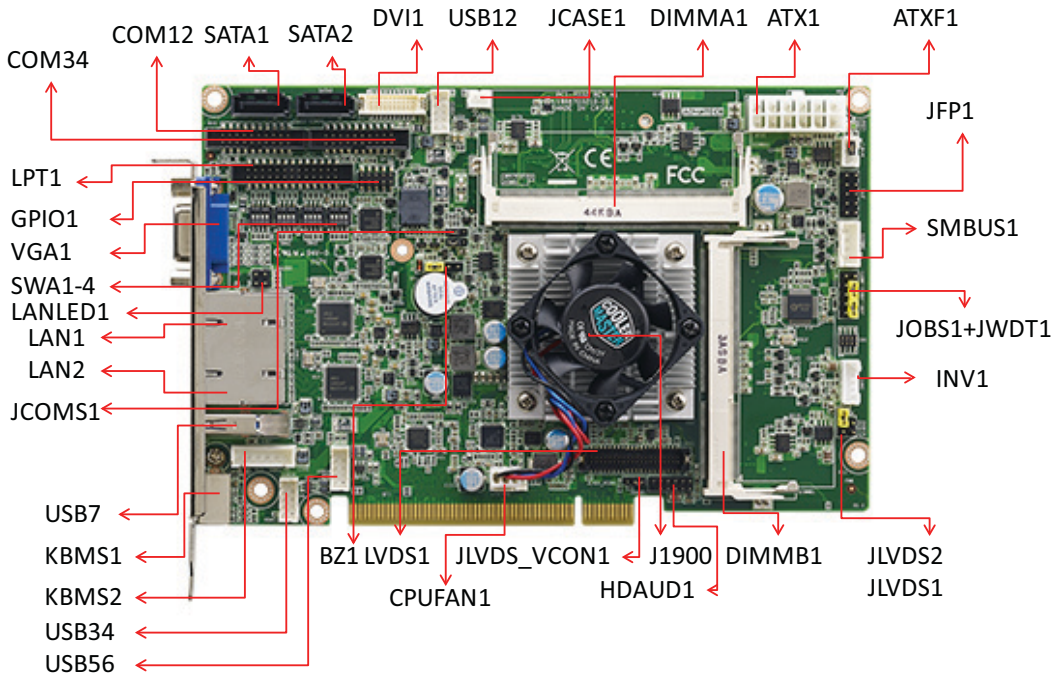
Figure 1.1 Jumper and connector locations (G2 SKU)
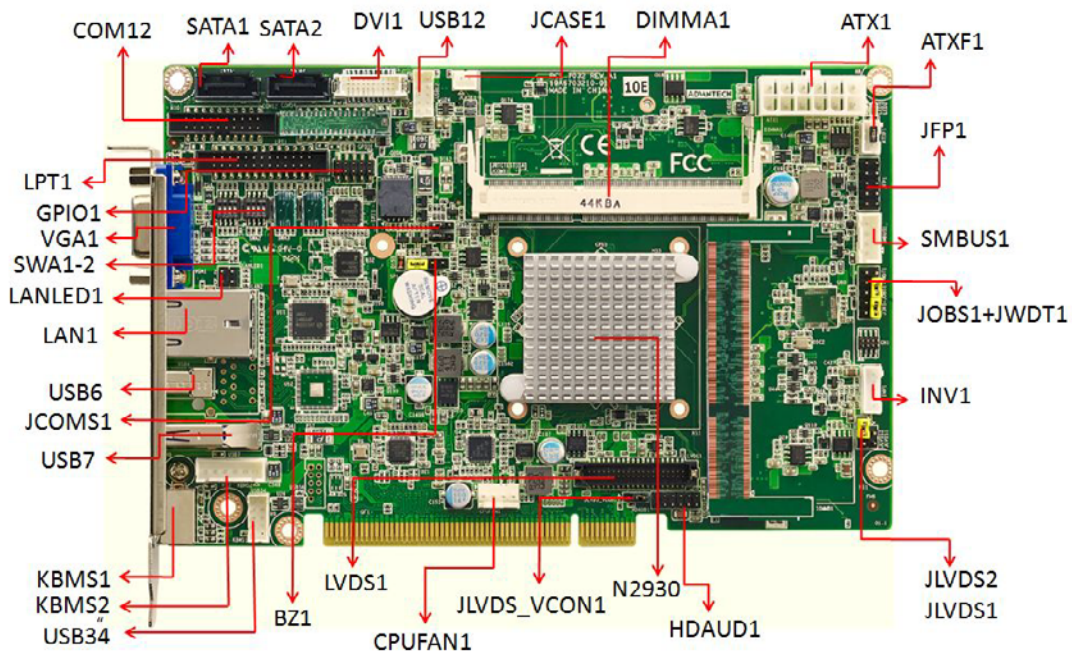
Figure 1.2 Jumper and connector locations (VG SKU)

MSATA1   LPC1
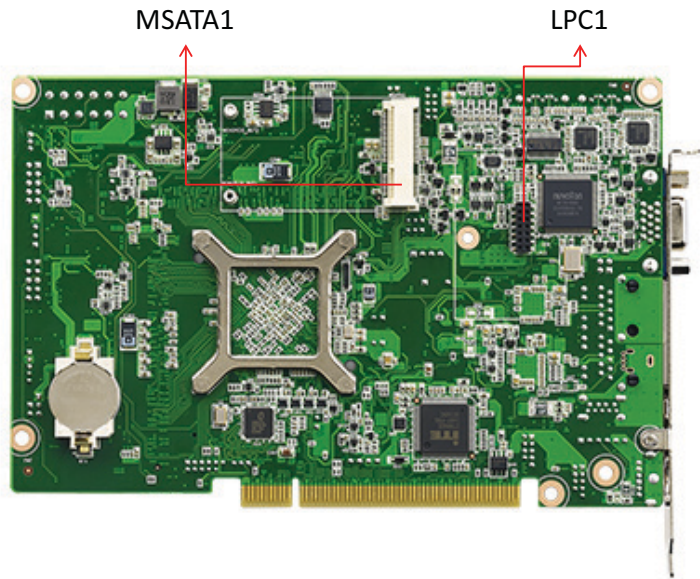
Figure 1.3 Jumper and connector locations (backside)

1.6 Block Diagram
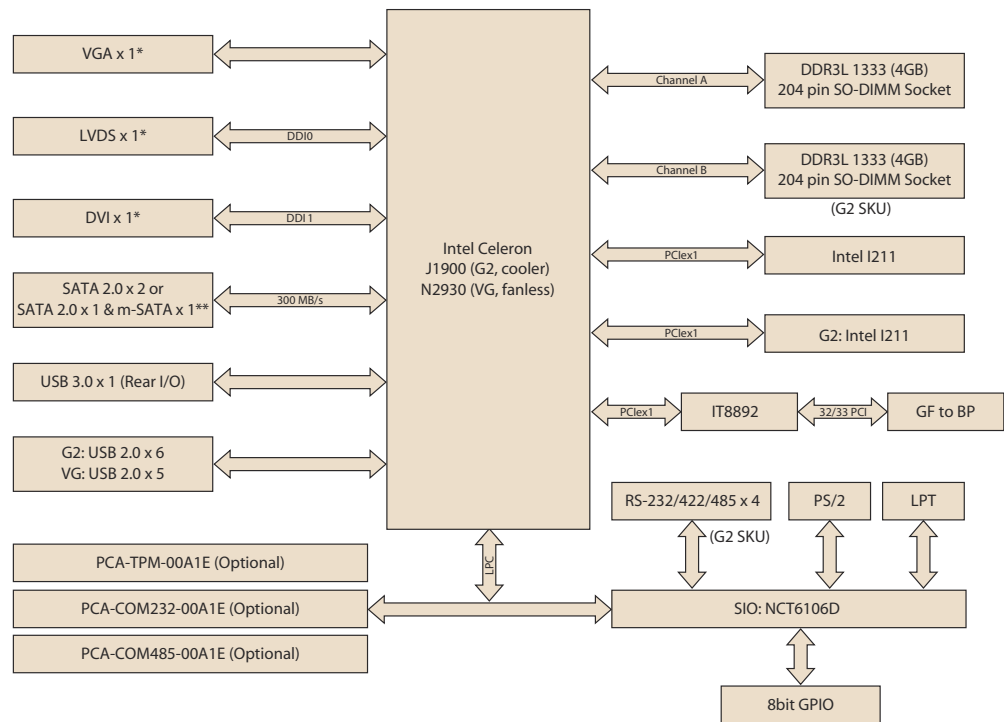
* Dual display, choose two interface from VGA (Default), DVI, and LVDS (Default)
** SATA2 connector can be configured as m-SATA.

Figure 1.4 PCI-7032 block diagram

1.7 Safety Precautions

Warning! *Always completely disconnect the power cord from your chassis when-ever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sud-den 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 man-ufacturer. 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.
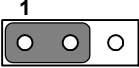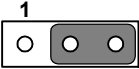
1.8.1 How to Set Jumpers

You can configure your motherboard to match the needs of your application by set-ting 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 set-ting jumpers.

1.8.2 BIOS (JCMOS1)

PCI-7032 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 Watchdog Timer Output (JWDT1) and Hardware Monitor Alarm (JOBS1)

PCI-7032 contains a watchdog timer that will reset the CPU in the event the CPU stops processing. This feature means PCI-7032 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.

PCI-7032 also provide jumper: JOBS1 to enable or disable hardware monitor alarm.
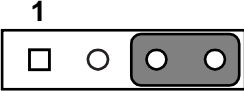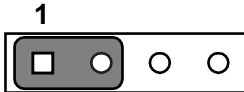
Table 1.4: Watch Dog Timer (JWDT1) and Hardware Monitor Alarm (JOBS1)	
Function	**Jumper Setting**
*Enable watch dog timer (2+3) *and* Enable Hardware Monitor Alarm (4+5)	2-3 closed AND 4-5 closed
* default setting	

1.9 Buzzer Setting

PCI-7032 provides jumpers for customer to enable buzzer via hardware settings.

Table 1.5: Buzzer Setting (BZ1)	
Function	**Jumper Setting**
*Enable buzzer	**3-4 closed**
Connect external speaker (Buzzer and speaker together: okay)	**external speaker: 1-2**
* default setting	
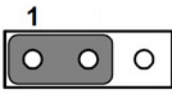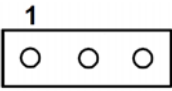
1.10 AT/ATX mode HW selection (ATXF1)

The PCI-7032 can support an advanced soft power switch function. When using an ATX power supply, please follow the instructions below to enable ATX functions.
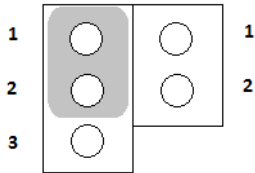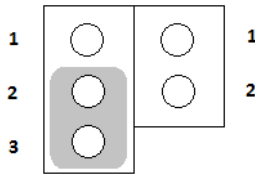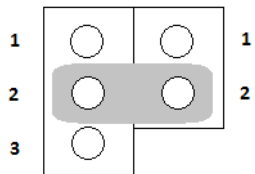
1. Find ATX feature cable (1700002343).
2. Connect the 3-pin plug of the cable to ATXF1 (ATX feature connector). And connect another plug to backplane HCN1 connector.
3. Connect the power on/off button cable of the chassis to pin 9 and pin 10 of JFP1. Default value is set ATXF1 to short pin 1,2 (do not short pin 2,3) to support AT power.

Table 1.6: AT/ATX Mode HW Selection (ATXF1)

Function	Jumper Setting	Jumper Setting
*AT mode		Short Pin 1,2
ATX mode		Connecting to backplane with cable: 1700002343

* Default setting

1.11 LVDS Panel Voltage Selection (JLVDS1, JLVDS2)

Table 1.7: LVDS Panel Voltage Selection (JLVDS1, JLVDS2)

Function	Jumper Setting
3.3 V*	
5 V	
12 V	

* Default setting

1.12 LVDS VESA, JEIDA Format Selection

Table 1.8: LVDS VESA, JEIDA Format Selection	
Function	**Jumper Setting**
Pull high to +3.3 V	1-2
Pull down to GND*	2-3
* Default setting	

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 connections.

2.2 Parallel Port (LPT1)
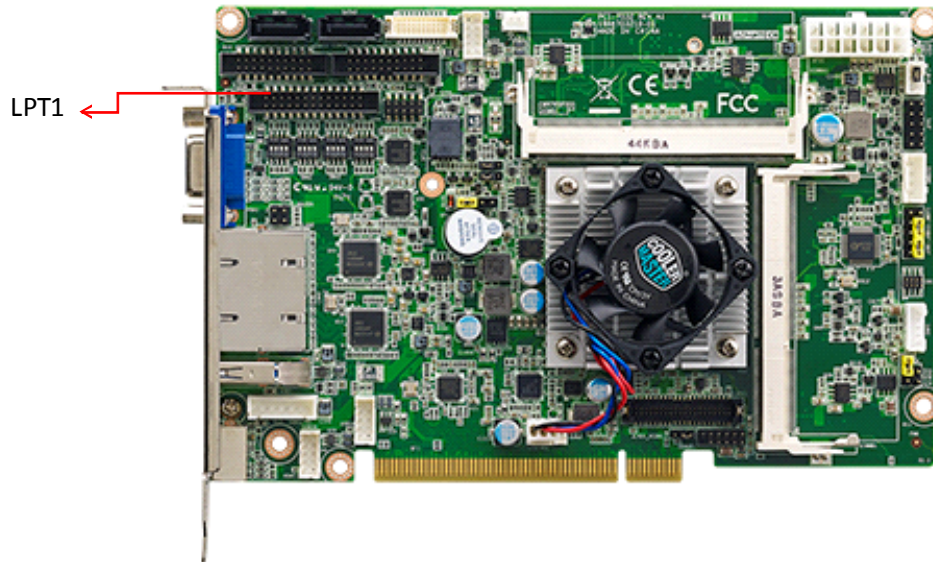
The parallel port is normally used to connect the motherboard to a printer. PCI-7032 includes an onboard parallel port, accessed through a 26-pin flat-cable connector, LPT1.

2.3 USB Ports (USB12, USB34, USB56, USB7)

PCI-7032 provides up to 7 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). For G2 SKU, USB 1-6 are USB 2.0 ports with pin header on board, and USB7 is a USB 3.0 port on rear I/O. For VG SKU, USB 1-4 are USB 2.0 ports with pin header, and USB6 (USB2.0)/ USB7 (USB 3.0) are on rear I/O bracket.
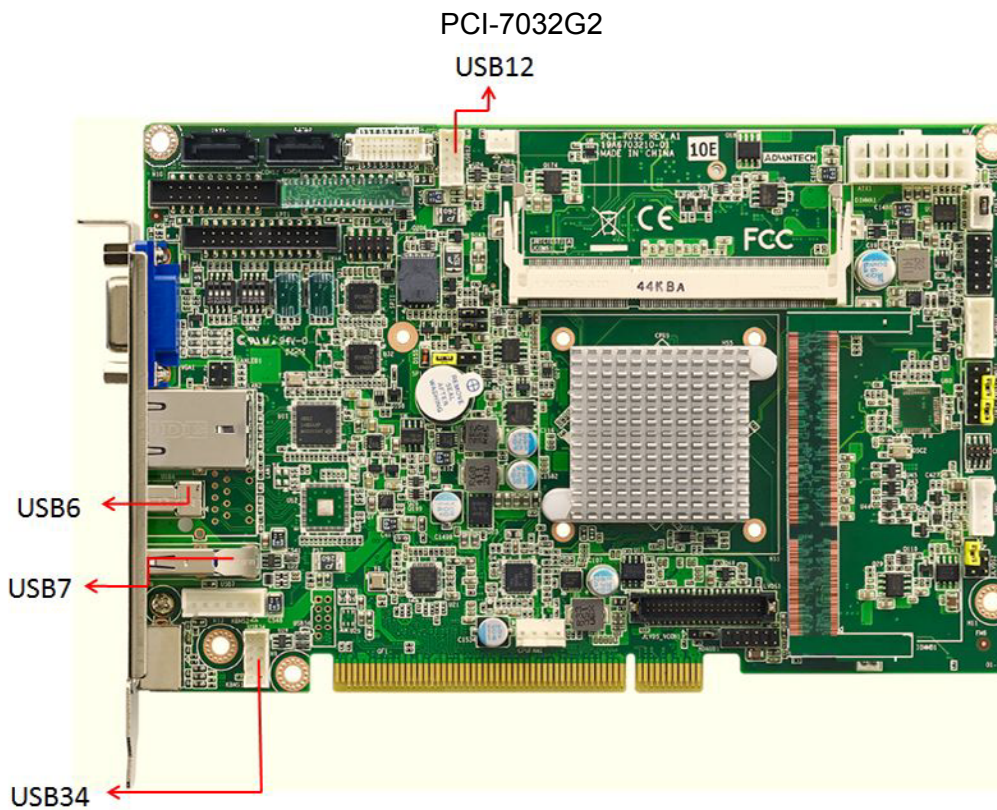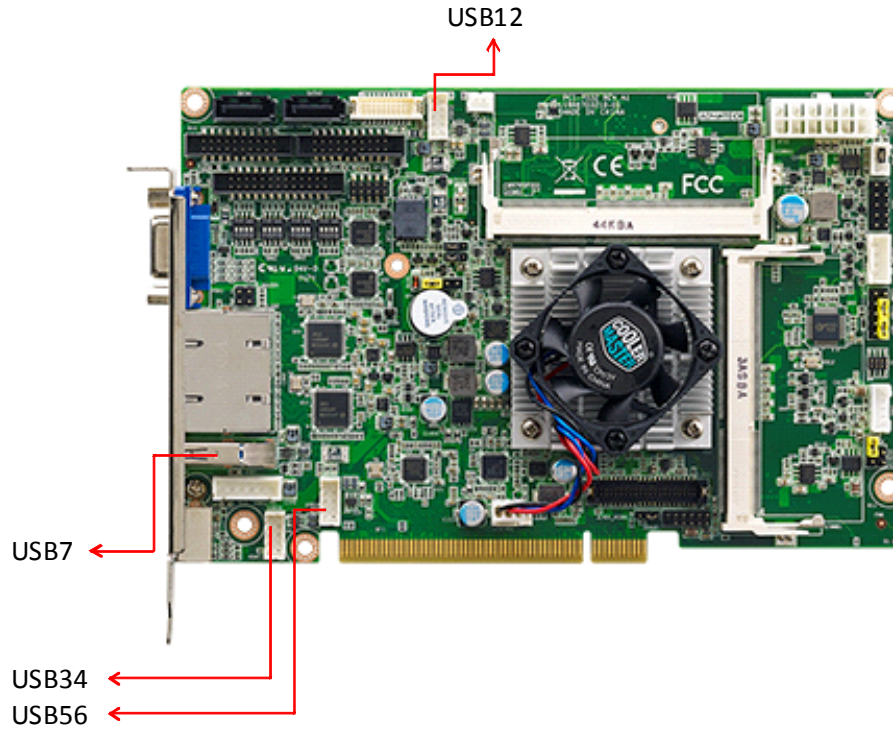
PCI-7032G2

PCI-7032VG

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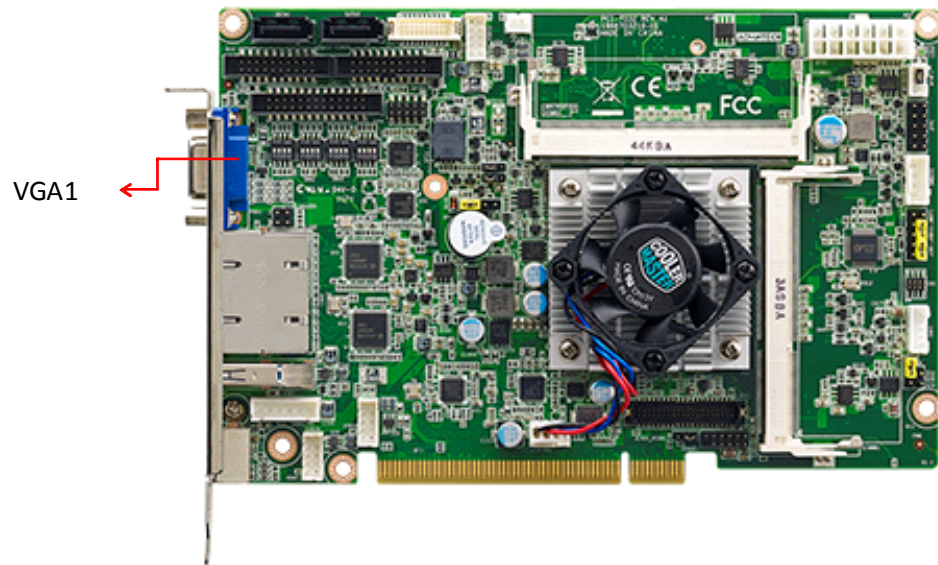
This CPU card has VGA outputs that can drive conventional CRT displays. VGA1 is a standard 15-pin D-SUB connector commonly used for VGA.

2.5 DVI Connector (DVI1)
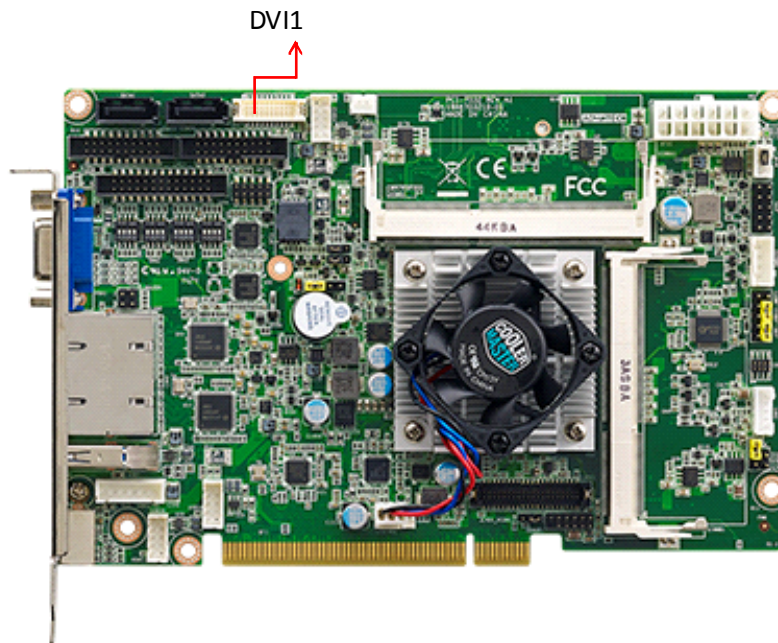
DVI1 is a 20-pin connector, supporting up to 2560 x 1600 @ 60Hz. Please place order no. 1700021831-01 for standard DVI connector on bracket.

2.6 LVDS (LVDS1)

LVDS1 for dual channel 24-bit LVDS panel. Please check the pin definitions before installing your panel.

LVDS1

1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39

2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40

Pin	Signal	Pin	Signal
1	VDD_LVDS1	21	LVDS1_A2P
2	VDD_LVDS1	22	LVDS1_A6P
3	LVDS1_DET#	23	GND
4	GND	24	GND
5	VDD_LVDS1	25	LVDS1_CLK1N
6	VDD_LVDS1	26	LVDS1_CLK2N
7	LVDS1_A0N	27	LVDS1_CLK1P
8	LVDS1_A4N	28	LVDS1_CLK2P
9	LVDS1_A0P	29	GND
10	LVDS1_A4P	30	GND
11	GND	31	LVDS1_SCD
12	GND	32	LVDS1_SDD
13	LVDS1_A1N	33	GND
14	LVDS1_A5N	34	GND
15	LVDS1_A1P	35	LVDS1_A3N
16	LVDS1_A5P	36	LVDS1_A7N
17	GND	37	LVDS1_A3P
18	GND	38	LVDS1_A7P
19	LVDS1_A2N	39	LVDS1_ENBKL1
20	LVDS1_A6N	40	LVDS1_VCON

2.7 Serial Ports (COM12)

COM12

COM34

PCI-7032G2 offers four serial ports and PCI-7032VG offers two serial ports. These ports can connect to serial devices, such as a mouse or a printer, or to a communications network. They can be configured as RS-232, RS-422, or RS-485 in the BIOS menu. The IRQ and address ranges for four 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.

2.8 PS/2 Keyboard and Mouse Connector (KBMS1)

KBMS1

KBMS2
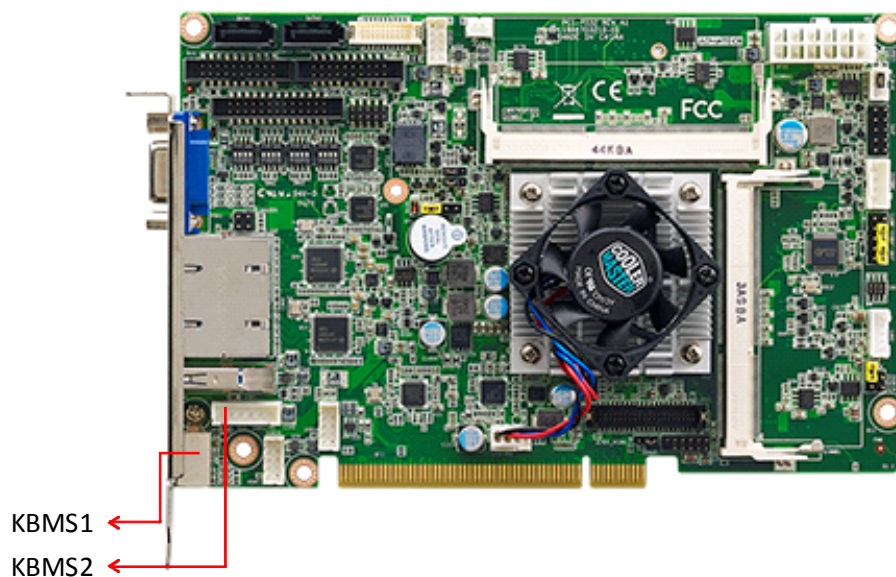
A 6-pin mini-DIN connectors (KBMS1) on rear I/O bracket provide connection to PS/2 keyboard.

An onboard 6-pin header connects to I/O board of chassis, providing a PS/2 connector on the chassis front panel.

2.9   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.

CPUFAN1
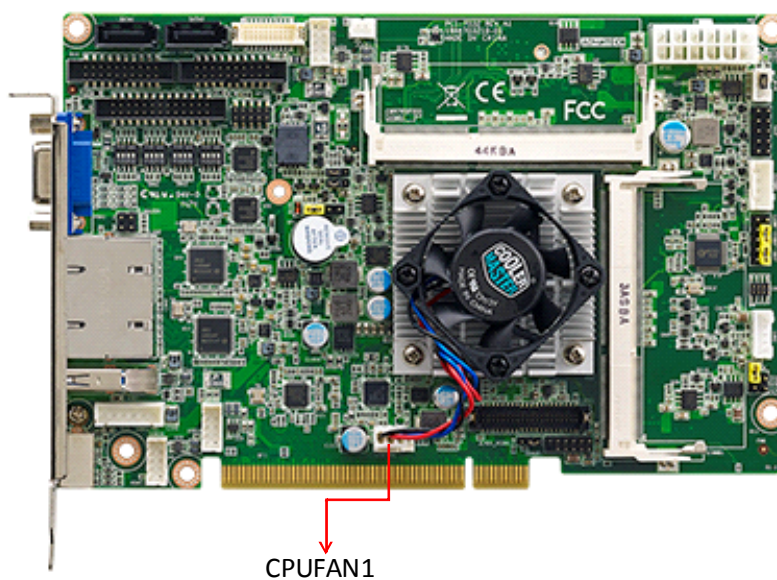
2.10   Front Panel Connectors (JFP1)

FP1 is a 10-pin connector which connects to the front panel switch to control system power on/off and reset.

JFP1

1		2	HDD LED
3		4	Power LED
5		6	SNMP
7		8	Reset button
9		10	Power button
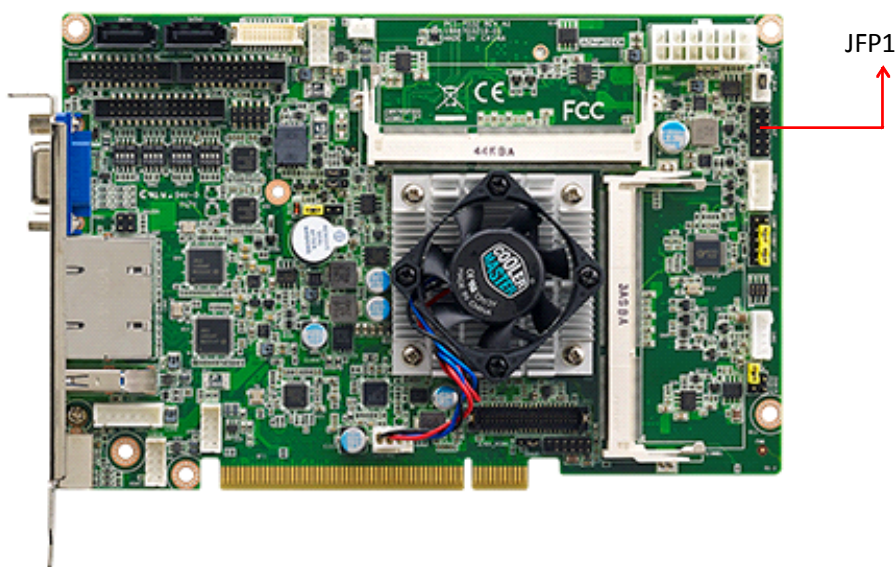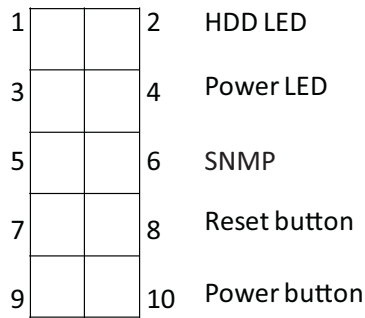
Table 2.1: Power LED status	
Power mode	**LED**
System On	On
System Suspend	Fast flashes
System Off	Off

2.11 H/W Monitor for G2 SKU/Watchdog Timer

JOBS1+JWDT1
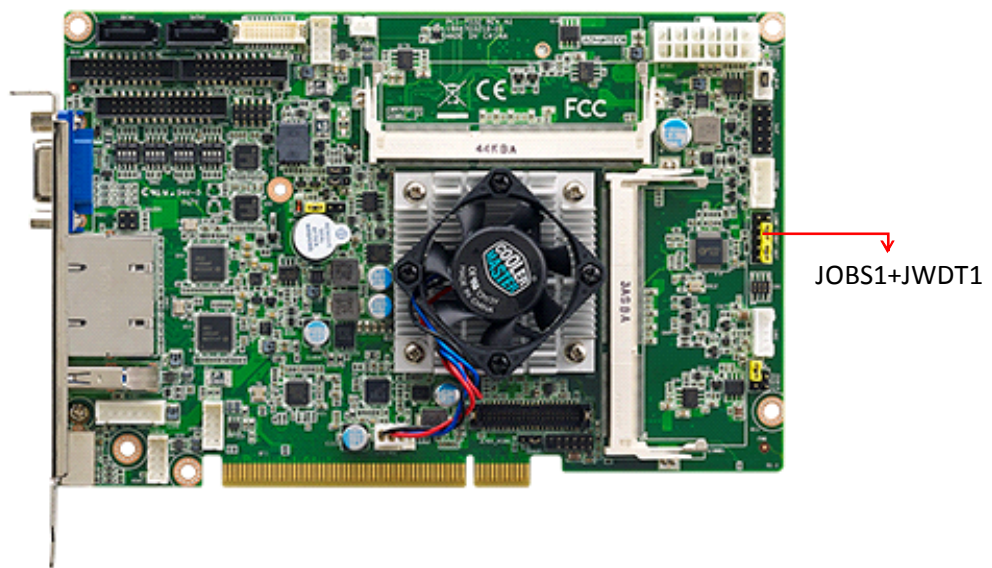
2.11.1 H/W monitor alarm for G2 SKU (JOBS1)

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

2.11.2 Watchdog timer (JWDT1)

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

2-3 Closed: Enable watchdog timer (Default)

2-3 Open: No action

2.12 LAN Ports (LAN1 & LAN2)
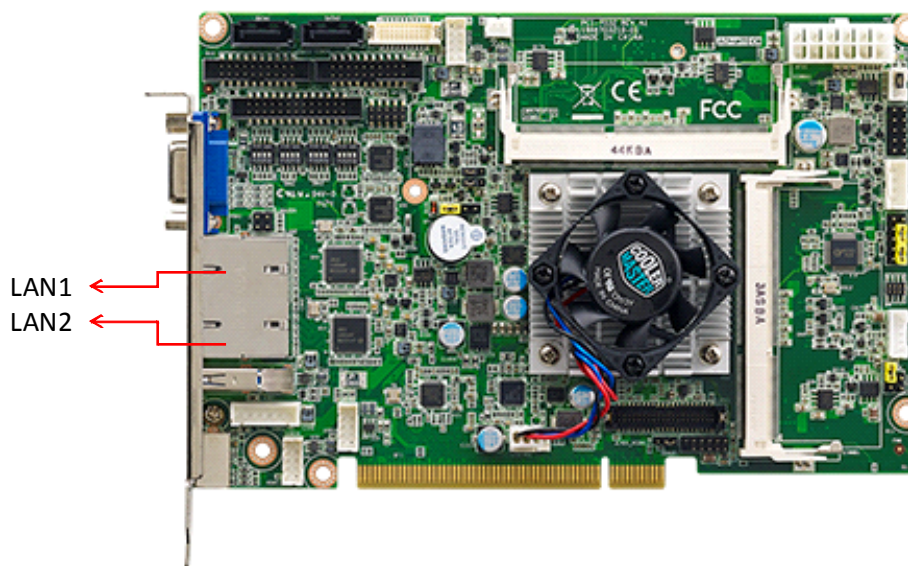
PCI-7032 is equipped with one or two high-performance 1000 Mbps Ethernet LANs. They are supported by all major network operating systems. The RJ-45 jacks on the rear plate provide convenient connectivity.

Table 2.2: LAN LED Indicators		
LAN Mode	**LED1**	**LED2**
1000Mbps Link On	Green On	On
1000Mbps Active	Green On	Flash
1000Mbps Link Off	Off	Off
100Mbps Link On	Orange On	On
100Mbps Active	Orange On	Flash
100Mbps Link Off	Off	Off
10Mbps Link On	Off	On
10Mbps Active	Off	Flash
10Mbps Link Off	Off	Off

Figure 2.1 Jumper and connector locations of PCA-AUDIO-HDA1E

PCI-7032 User Manual

2.13 GPIO Header (GPIO1)

GPIO1
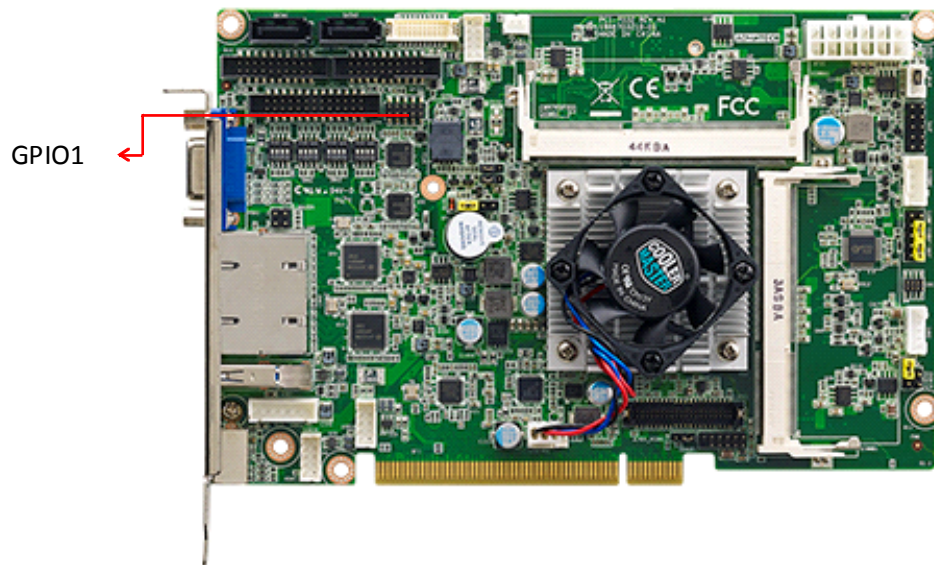
Provides a 10-pin header for 8-bit Digital I/O usage. Refer to Appendix B for detailed information on the pin assignments and the programming guide in Appendix C.

2.14 Case Open Connector (JCASE1)

JCASE1
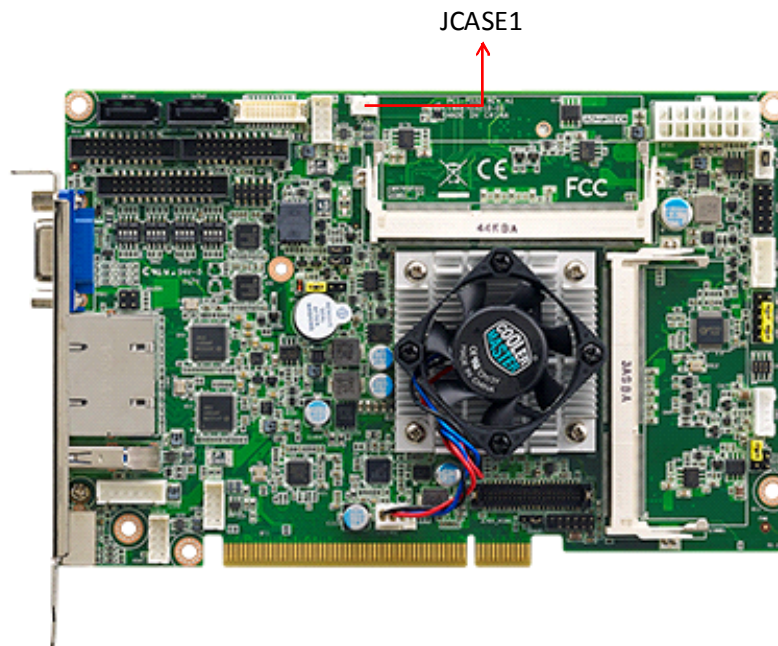
The 2-pin case open connector is for chassis with a case open sensor. When the case is open, the buzzer on motherboard will sound.

2.15 Front Panel LAN Indicator Connector (LANLED1)

LAN Mode	LAN1 (1,3 pin)	LAN2 (2, 4 pin)
Table 2.3: LAN LED Indicators		
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

LANLED1
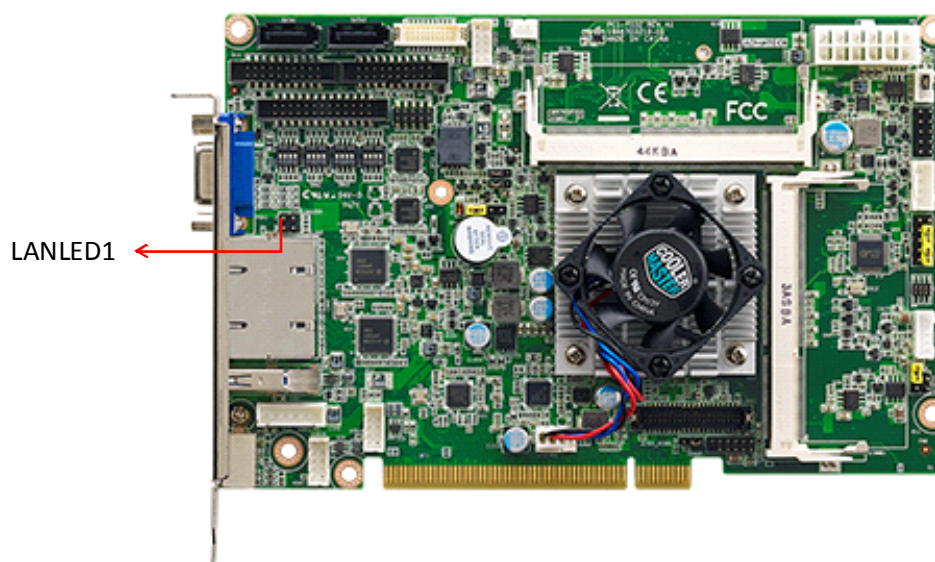
2.16 Serial ATA Interface (SATA1, SATA2)

SATA1   SATA2
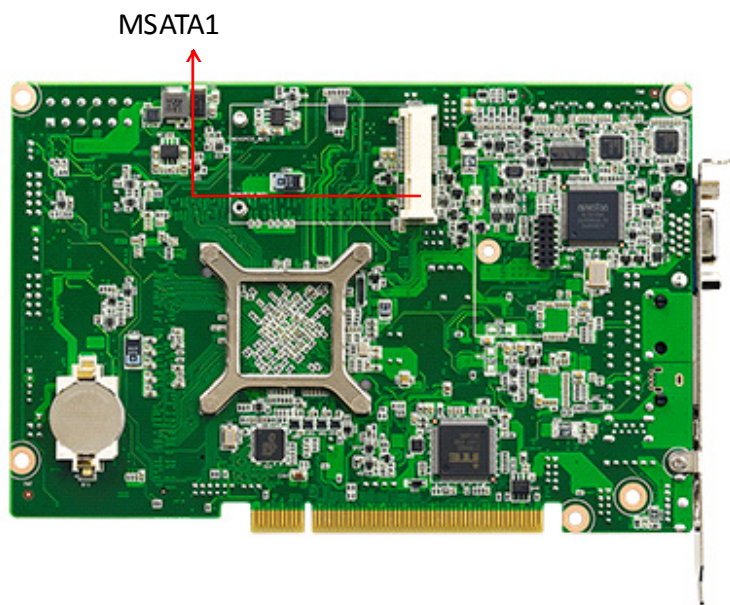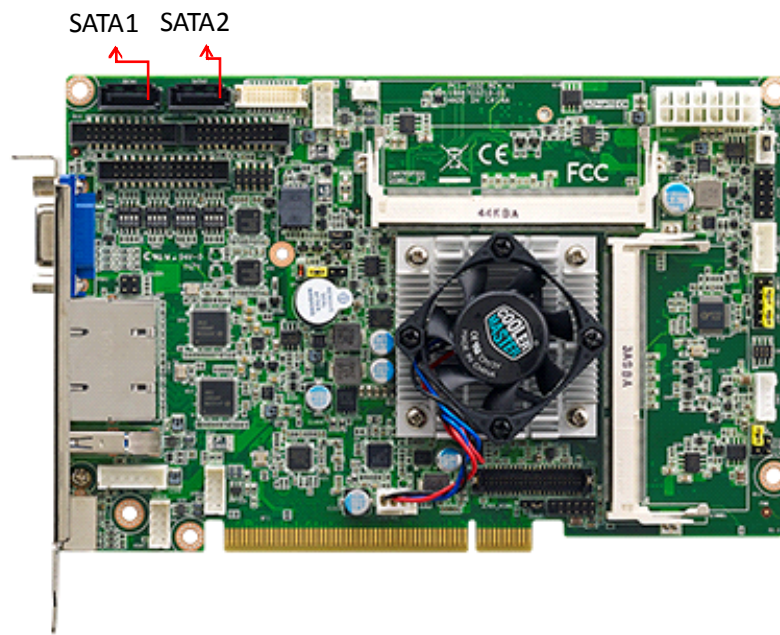
MSATA1

PCI-7032 features high performance serial ATA interface which eases cabling to hard drives or CD/DVD drives with long cables.

SATA2 can be configured as m-SATA. The socket is on the back side of the board.

2.17 LPC Extension Interface (LPC1)
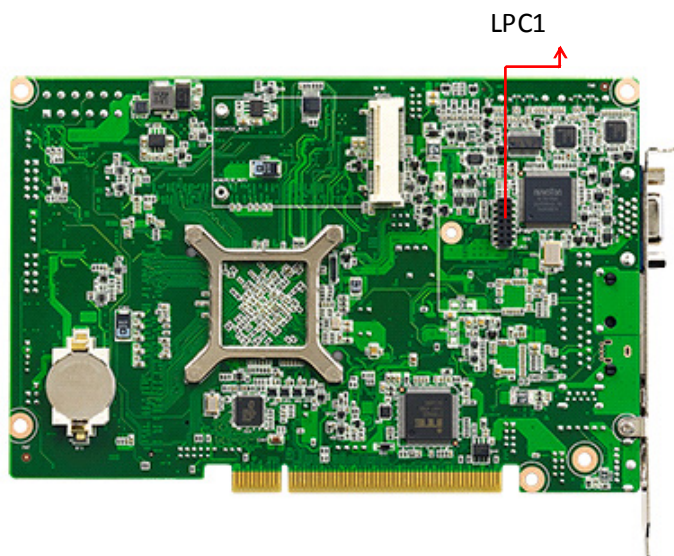
LPC1

LPC1 is a 14-pin female pin header for adopting Advantech LPC module, such as PCA-COM232-00A1E, PCA-COM485-00A1E, or PCA-TPM-00A1E.

2.18 12V/5V/5VSB Power Connector (ATX1)
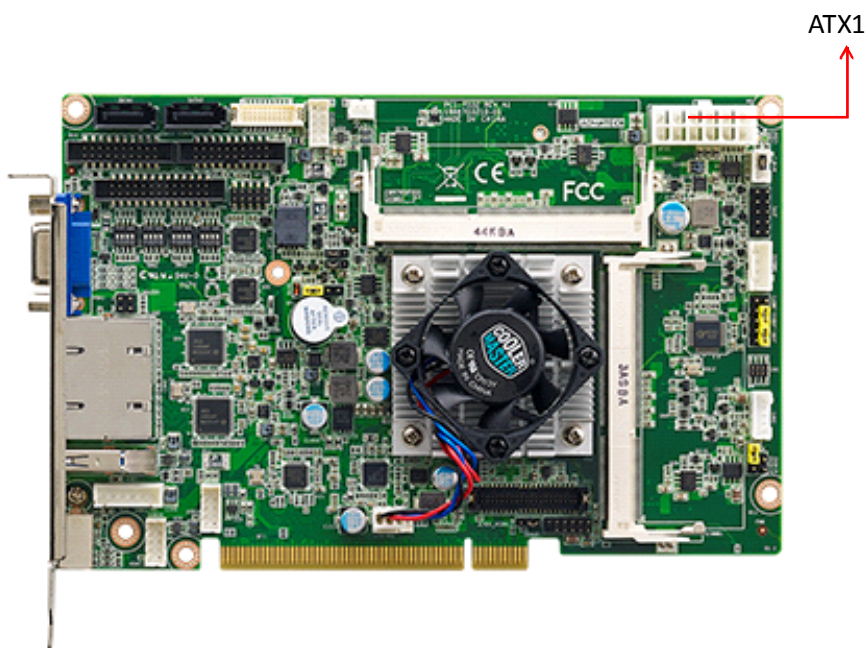
ATX1

PCI-7032 supports ATX power supply. ATX1 supplies main power (5V,12V, 5VSB) via a 6x2 power connector.

Chapter 3

AMI BIOS Setup

3.1 Introduction

AMI BIOS has been integrated into motherboards for decades. In the past, people often referred to the AMI BIOS setup menu as BIOS, BIOS setup or CMOS setup.

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 special features on or off. This chapter describes the basic navigation of the PCI-7032 setup screens.

```
             Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

     BIOS Information                                        Set the Date. Use Tab to
     BIOS Vendor                 American Megatrends         switch between Date elements.
     Core Version                5.0.0.9   0.15 x64
     Compliancy                  UEFI 2.3.1; PI 1.2
     Project Version             7032000DS60X001
     Build Date and Time         11/25/2014 11:58:42
     Project Board Version       PCI-7032 VG

     Memory Information
     Memory Frequency            1333 MHz
     Total Memory                4096 MB (LPDDR3)

     System Date                 [Fri 12/05/2014]
     System Time                 [19:33:43]          →←: Select Screen
                                                     ↑↓: Select Item
     Access Level                Administrator        Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



             Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

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 "F2" key.

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

3.2.1   Main Setup

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

```
                Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
        Main  Advanced  Chipset  Security  Boot  Save & Exit

        BIOS Information                                              Set the Date. Use Tab to
        BIOS Vendor                   American Megatrends             switch between Date elements.
        Core Version                  5.0.0.9   0.15 x64
        Compliancy                    UEFI 2.3.1; PI 1.2
        Project Version               7032000DS60X001
        Build Date and Time           11/25/2014 11:58:42
        Project Board Version         PCI-7032 VG

        Memory Information
        Memory Frequency              1333 MHz
        Total Memory                  4096 MB (LPDDR3)

        System Date                   [Fri 12/05/2014]
        System Time                   [19:33:43]                      →←: Select Screen
                                                                      ↑↓: Select Item
        Access Level                  Administrator                   Enter: Select
                                                                      +/-: Change Opt.
                                                                      F1: General Help
                                                                      F2: Previous Values
                                                                      F3: Optimized Defaults
                                                                      F4: Save & Exit
                                                                      ESC: Exit



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```

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.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the PCI-7032 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, and press Enter 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.

```
                  Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
      Main  Advanced  Chipset  Security  Boot  Save & Exit

   ▶ ACPI Settings                                        System ACPI Parameters.
   ▶ NCT6106D Super IO Configuration
   ▶ NCT6106D Configuration
   ▶ S5 RTC Wake Settings
   ▶ Serial Port Console Redirection
   ▶ CPU Configuration
   ▶ PPM Configuration
   ▶ IDE Configuration
   ▶ Miscellaneous Configuration
   ▶ PCI Subsystem Settings
   ▶ Network Stack Configuration
   ▶ CSM Configuration
   ▶ USB Configuration
   ▶ Security Configuration
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit



                  Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

Figure 3.3 Advanced BIOS Features Setup Screen

3.2.2.1 ACPI Settings


```
                 Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
        Advanced

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

Enable Hibernation                  [Enabled]
Lock Legacy Resources               [Disabled]




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




                 Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

Figure 3.4 ACPI Settings

■ **Enable ACPI Auto Configuration**

■ **Enable Hibernation**

"Enable or Disable" Hibernate (OS/S4 Sleep State). This option may not be effective with some OSs.

■ **Lock Legacy Resources**

Enable or disable lock of legacy resources.

3.2.2.2 NCT6106D Super IO Configuration
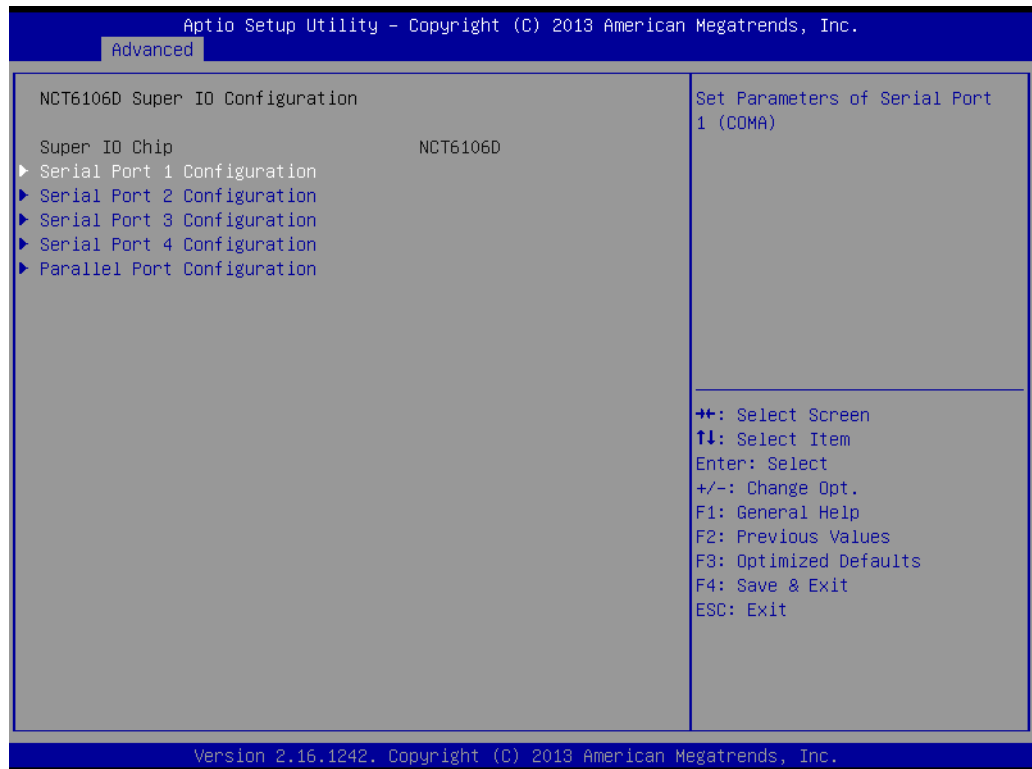
Figure 3.5 NCT6106D Super IO Configuration

■ **Serial Port 1 Configuration**

Figure 3.6 Serial Port 1 Configuration

■ **Serial Port 2 Configuration**
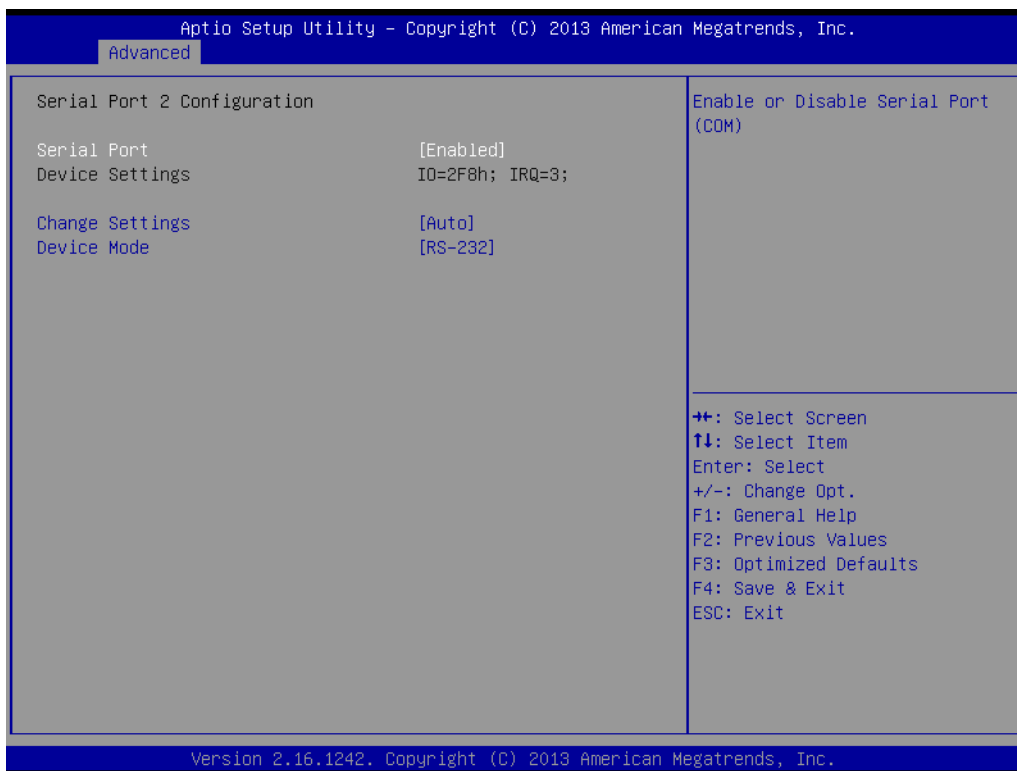
Figure 3.7 Serial Port 2 Configuration

■ **Serial Port 3 Configuration**
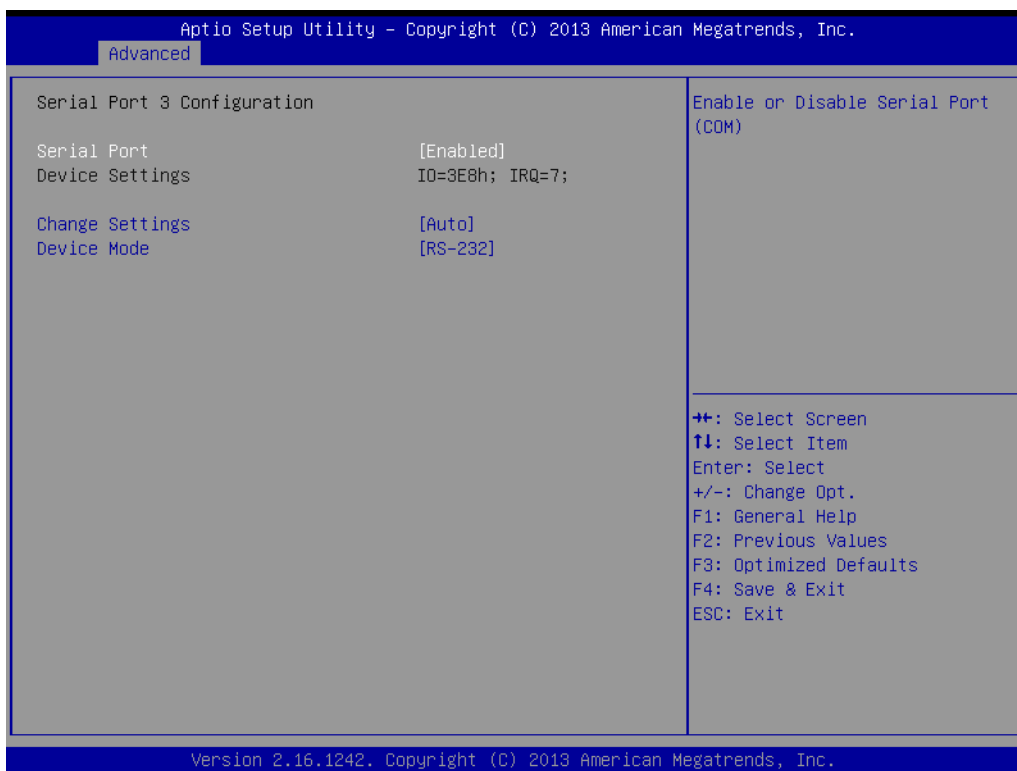
Figure 3.8 Serial Port 3 Configuration

■ **Serial Port 4 Configuration**
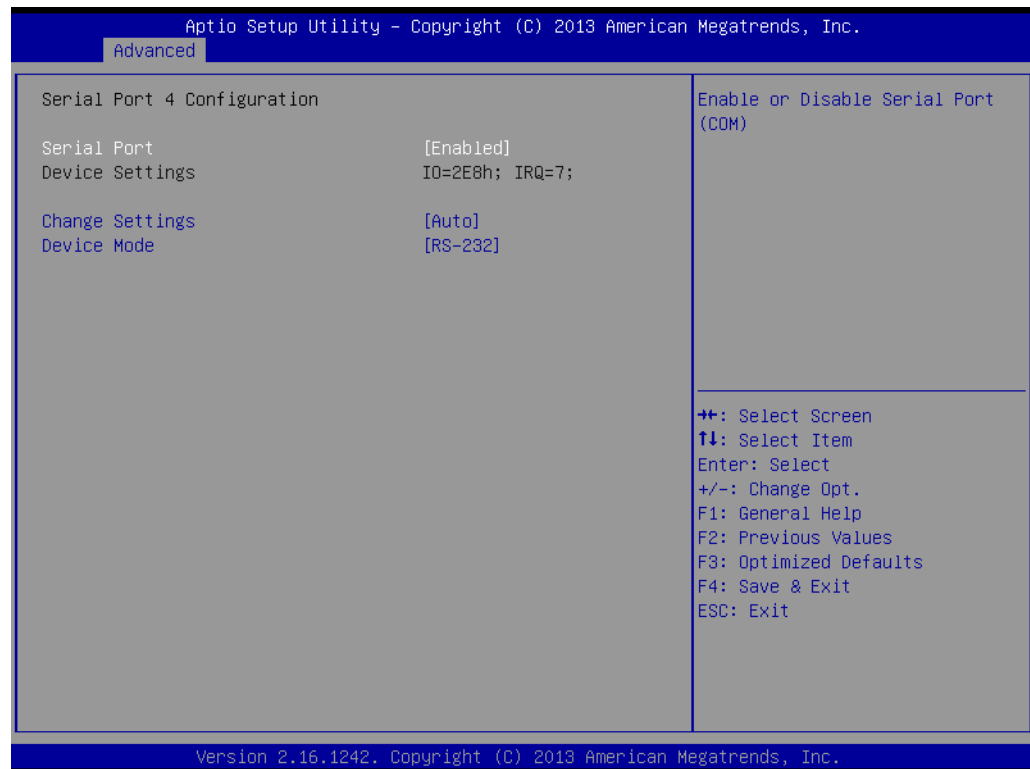
Figure 3.9 Serial Port 4 Configuration

■ **Parallel Port Configuration**
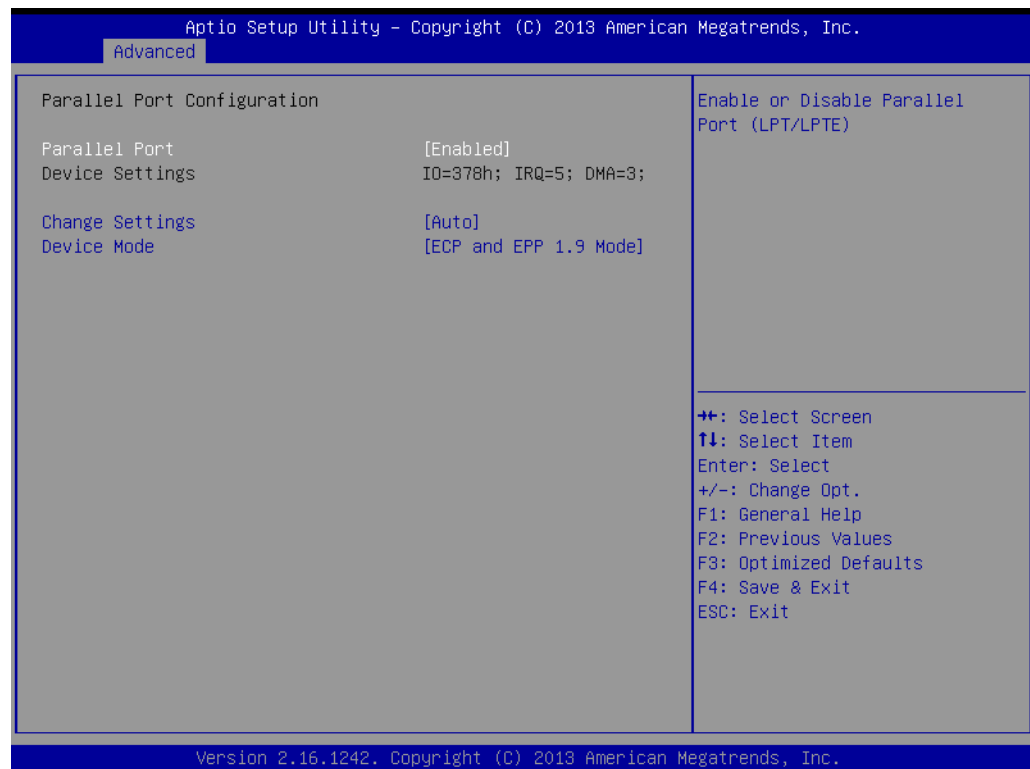
Figure 3.10 Parallel Port Configuration

3.2.2.3 NCT6106D Configuration

```
          Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
              Advanced

 PC Health Status                                            Enable or Disable Smart Fan

 System temperature               : +29°C
 CPU temperature                  : +29°C
 CPUFAN1 Speed                    : N/A
 VCORE                            : +0.824 V
 +5VSB                            : +4.900 V
 +5V                              : +4.939 V
 +12V                             : +12.384 V
 AVCC                             : +3.360 V
 3VSB                             : +3.312 V
 3VVCC                            : +3.360 V
 VBAT                             : +2.944 V
                                                             →←: Select Screen
 Smart Fan Function               [Enabled]                  ↑↓: Select Item
 ▶ Digital I/O Configuration                                 Enter: Select
                                                             +/-: Change Opt.
 CPU Warning Temperature          [Disabled]                 F1: General Help
 ACPI Shutdown Temperature        [Disabled]                 F2: Previous Values
 Case Open Warning                [Disabled]                 F3: Optimized Defaults
 Wake On Ring                     [Disabled]                 F4: Save & Exit
 Watch Dog Timer                  [Disabled]                 ESC: Exit



          Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

Figure 3.11 NCT6106D Configuration

3.2.2.4 S5 RTC Wake Setting

```
          Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
              Advanced

 Wake system from S5             [Disabled]                  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)




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



          Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

Figure 3.12 S5 RTC configuration

3.2.2.5 Serial Port Console Redirection
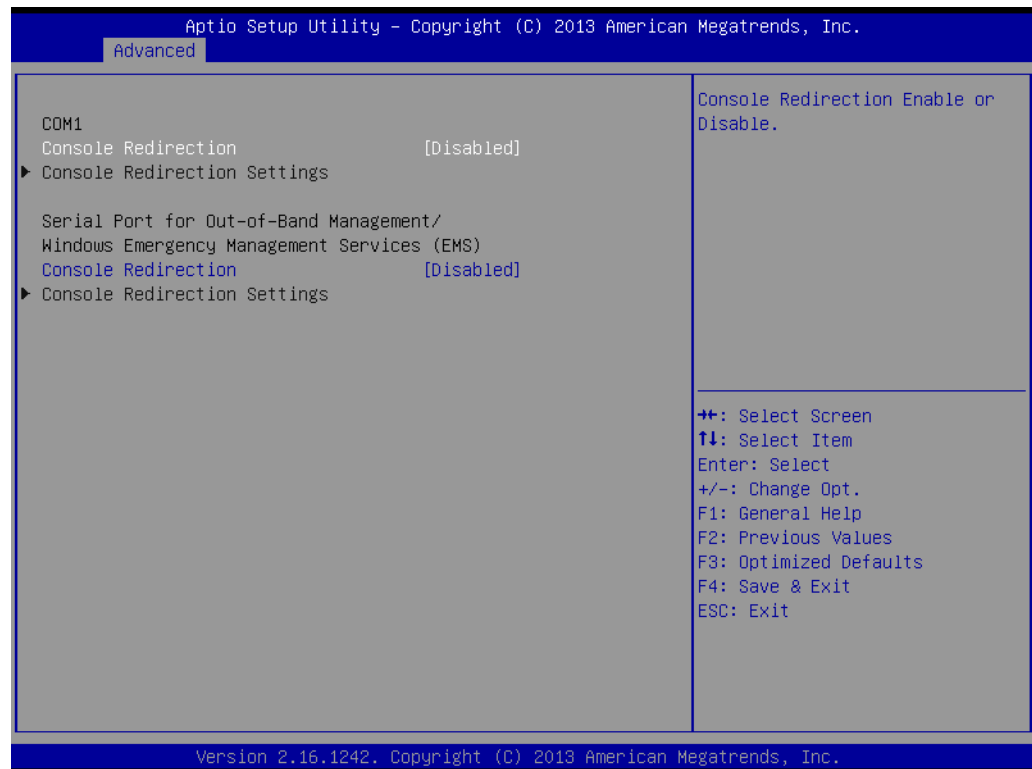
Figure 3.13 Serial Port Console Redirection

3.2.2.6 CPU Configuration
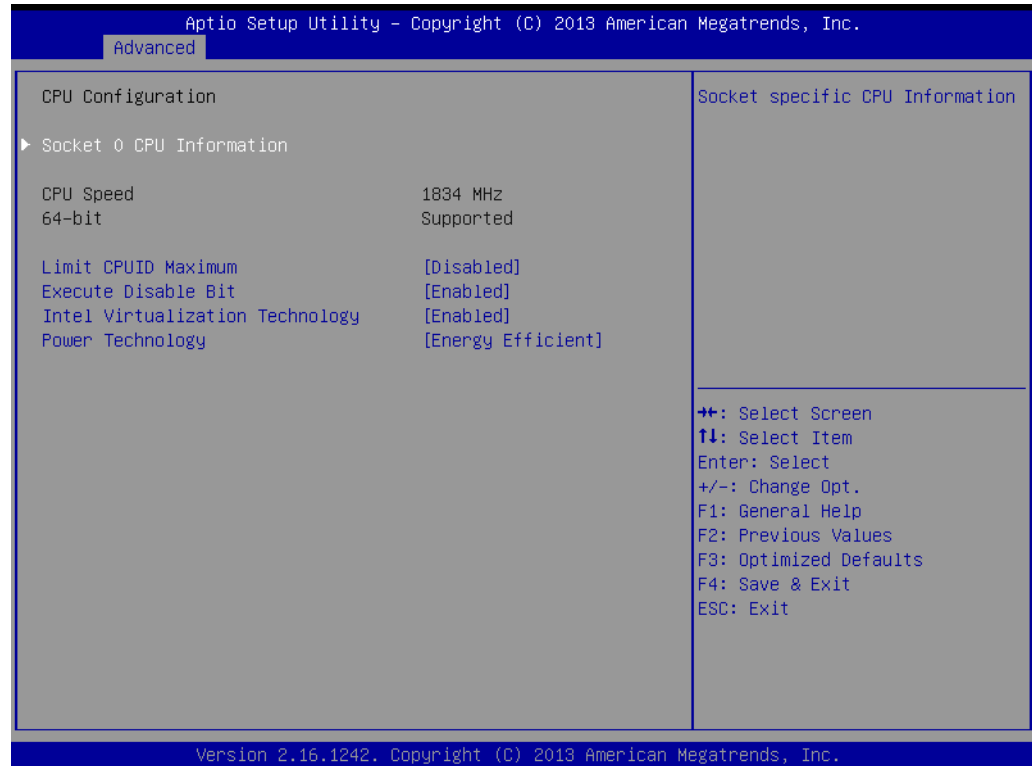
Figure 3.14 CPU Configuration

■ **Limit CPUID Maximum**

Setting this item to [Enable] allows legacy operating systems to boot even without support for CPUs with extended CPUID functions.

■ **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.

■ **Intel Virtualization Technology**

This feature is used to enable or disable the Intel Virtualization Technology (IVT) extension. It allows multiple operating systems to run simultaneously on the same system. It does this by creating virtual machines, each running its own x86 operating system.

■ **Power Technology**

3.2.2.7 PPM Configuration

```
              Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
     Advanced

   PPM Configuration                                           Enable/Disable Intel SpeedStep

   EIST                               [Disabled]
   CPU C state Report                 [Disabled]




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


              Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```
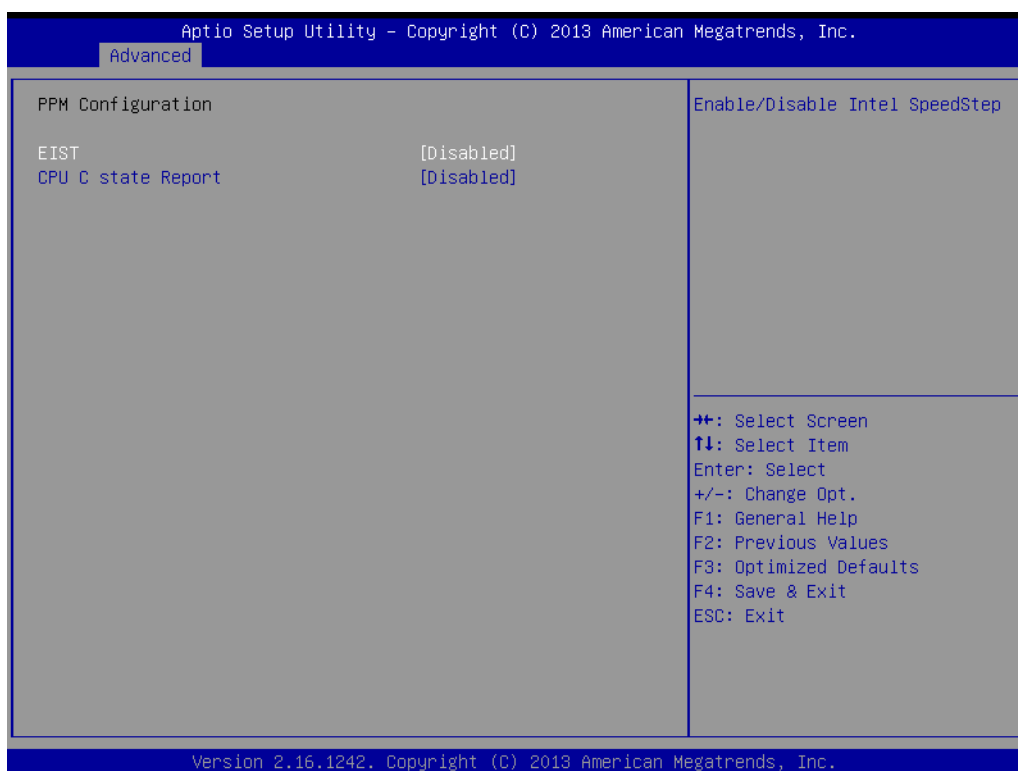
Figure 3.15 PPM Configuration

3.2.2.8 IDE Configuration
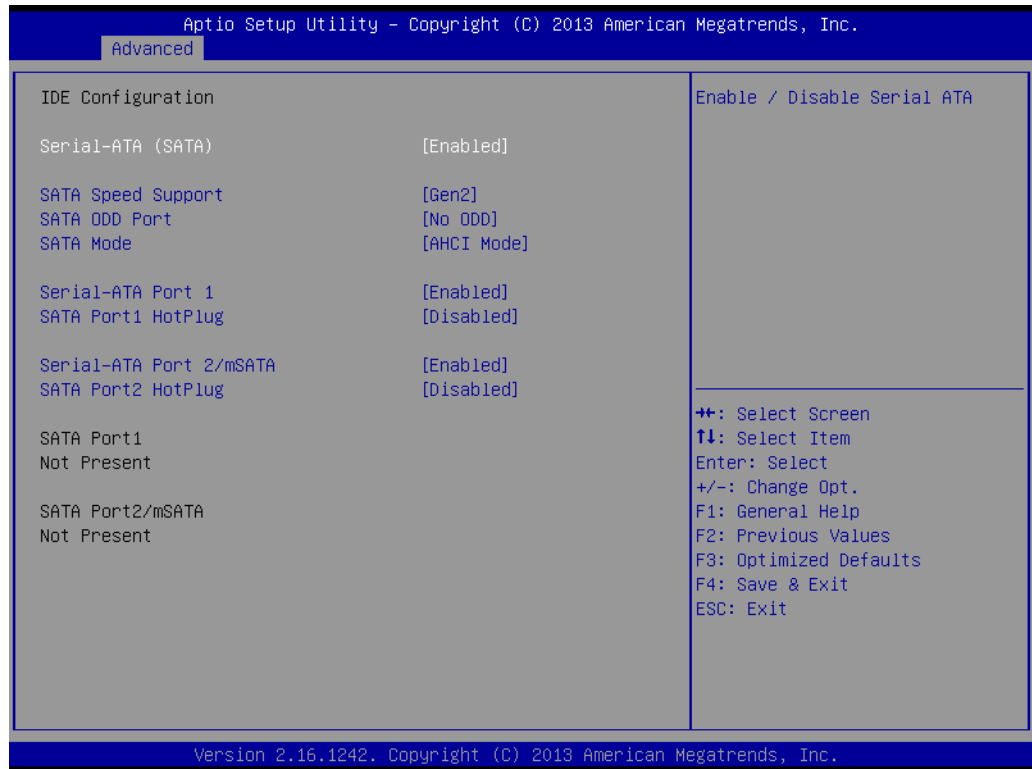
Figure 3.16 IDE Configuration

3.2.2.9 Miscellaneous Configuration

Figure 3.17 Miscellaneous Configuration

3.2.2.10 PCI Subsystem Settings

Figure 3.18 PCI Subsystem Settings

3.2.2.11 Network Stack Configuration

Figure 3.19 Network Stack Configuration

3.2.2.12 CSM Configuration

```
              Aptio Setup Utility – Copyright (C) 2013 American Megatrends, Inc.
    Advanced

  Compatibility Support Module Configuration        Enable/Disable CSM Support.

  CSM Support                        [Enabled]

  CSM16 Module Version               07.75

  GateA20 Active                     [Upon Request]
  Option ROM Messages                [Force BIOS]
  INT19 Trap Response                [Immediate]

  Boot option filter                 [UEFI and Legacy]

  Option ROM execution
                                                     ➜←: Select Screen
  Network                            [Legacy]        ↑↓: Select Item
  Storage                            [Legacy]        Enter: Select
  Video                              [Legacy]        +/-: Change Opt.
  Other PCI devices                  [Legacy]        F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit




              Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

Figure 3.20 CSM Configuration

3.2.2.13 USB Configuration

```
              Aptio Setup Utility – Copyright (C) 2013 American Megatrends, Inc.
       Advanced

  USB Configuration                                         Enables Legacy USB support.
                                                            AUTO option disables legacy
  USB Module Version              8.11.01                   support if no USB devices are
                                                            connected. DISABLE option will
  USB Devices:                                              keep USB devices available
          1 Drive, 1 Hub                                    only for EFI applications.

  Legacy USB Support              [Enabled]
  XHCI Hand-off                   [Enabled]
  EHCI Hand-off                   [Disabled]
  USB Mass Storage Driver Support [Enabled]

  USB hardware delays and time-outs:                        →←: Select Screen
  USB transfer time-out           [20 sec]                  ↑↓: Select Item
  Device reset time-out           [20 sec]                  Enter: Select
  Device power-up delay           [Auto]                    +/-: Change Opt.
                                                            F1: General Help
  Mass Storage Devices:                                     F2: Previous Values
  ADATA USB Flash Drive 0.00      [Auto]                    F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit

              Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

Figure 3.21 PCI-7032 USB Configuration

3.2.2.14 Security Configuration

```
              Aptio Setup Utility – Copyright (C) 2013 American Megatrends, Inc.
       Advanced

  Intel(R) TXE Configuration                                Send EOP Message Befor Enter OS
  TXE                             [Enabled]
  TXE HMRFPO                      [Disabled]
  TXE Firmware Update             [Enabled]
  TXE EOP Message                 [Enabled]
  TXE Unconfiguration Perform




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

              Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```
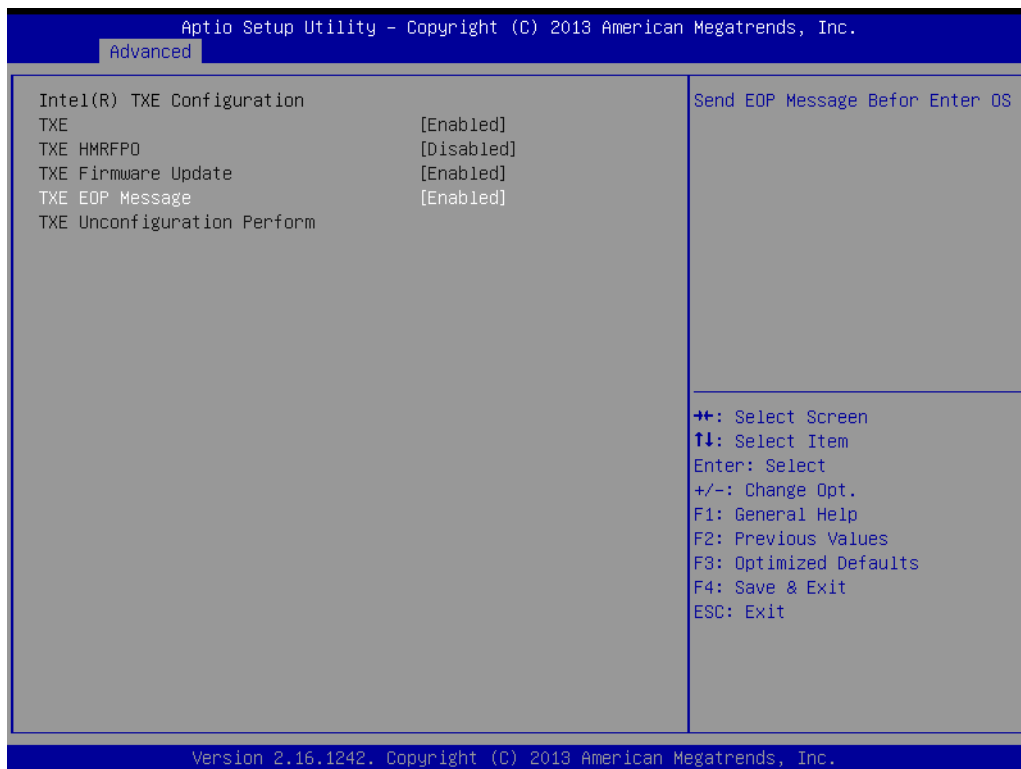
Figure 3.22 Security Configuration
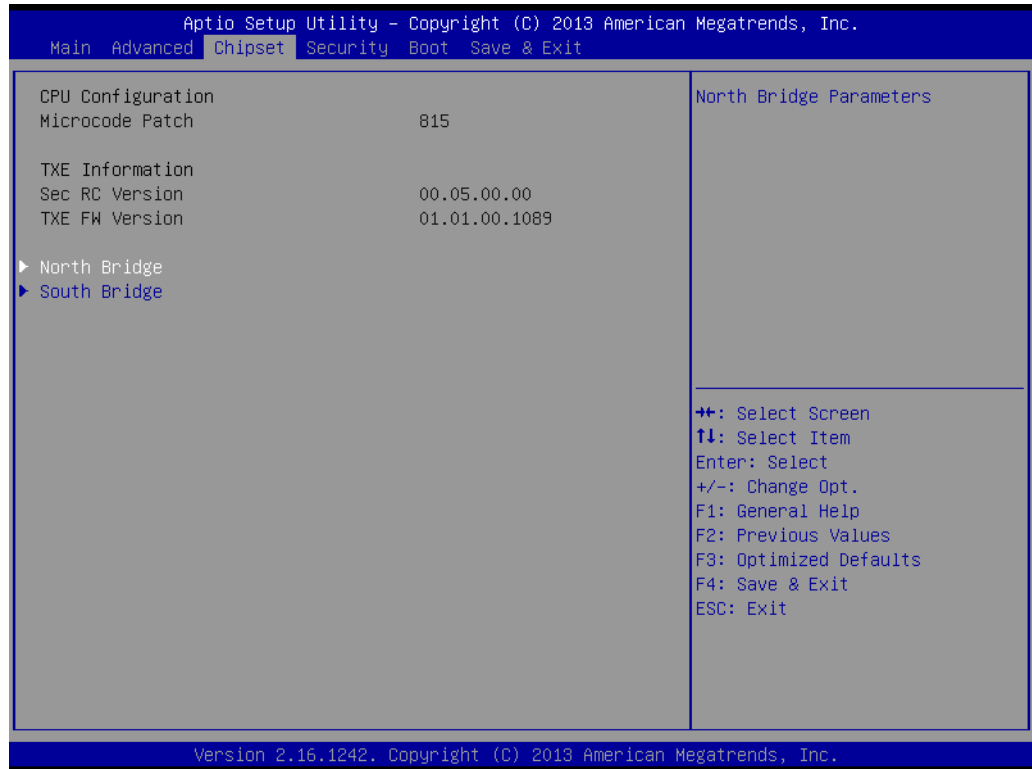
3.2.3 Chipset

Figure 3.23 Chipset
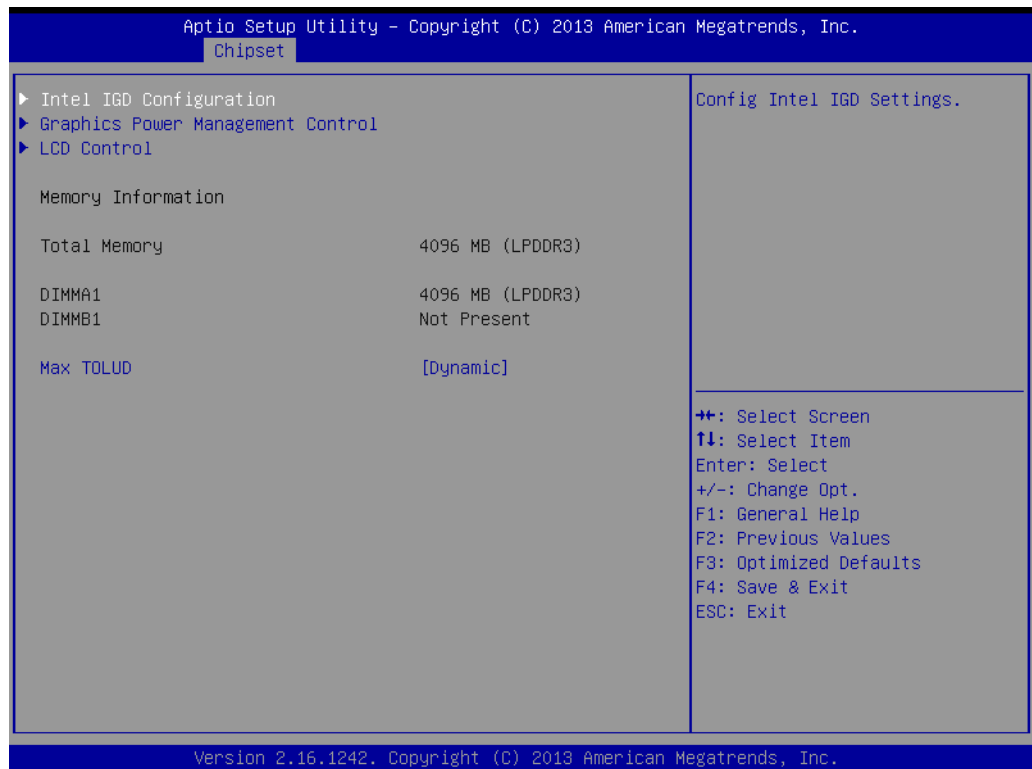
3.2.3.1 North Bridge
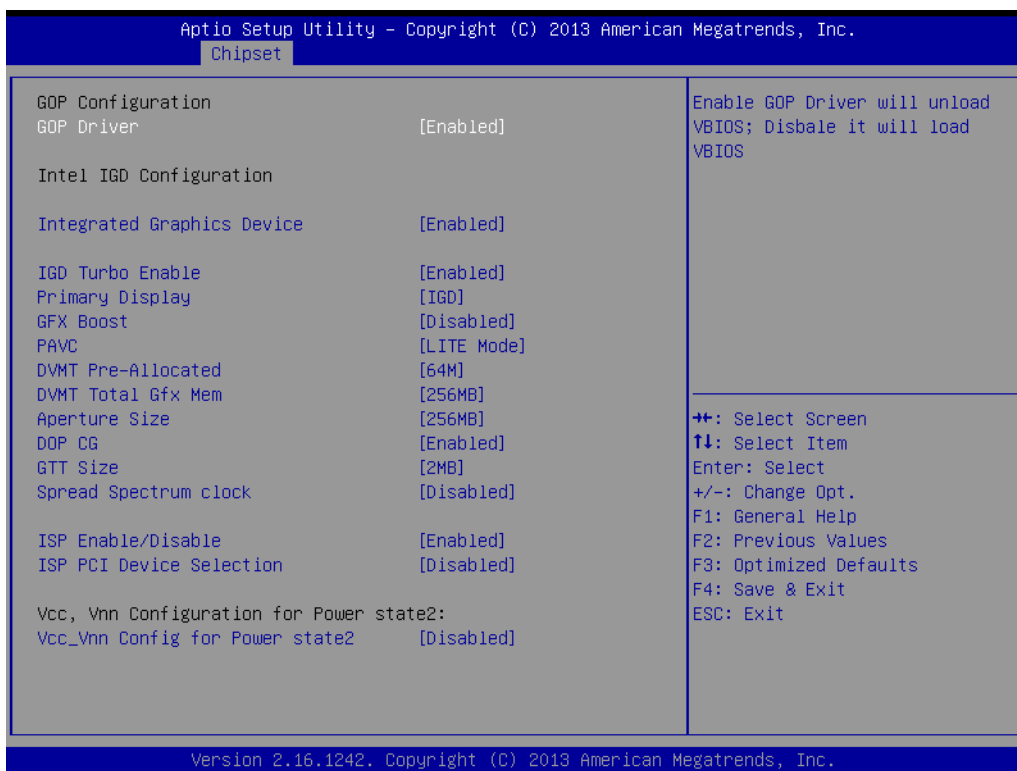

Figure 3.24 North Bridge
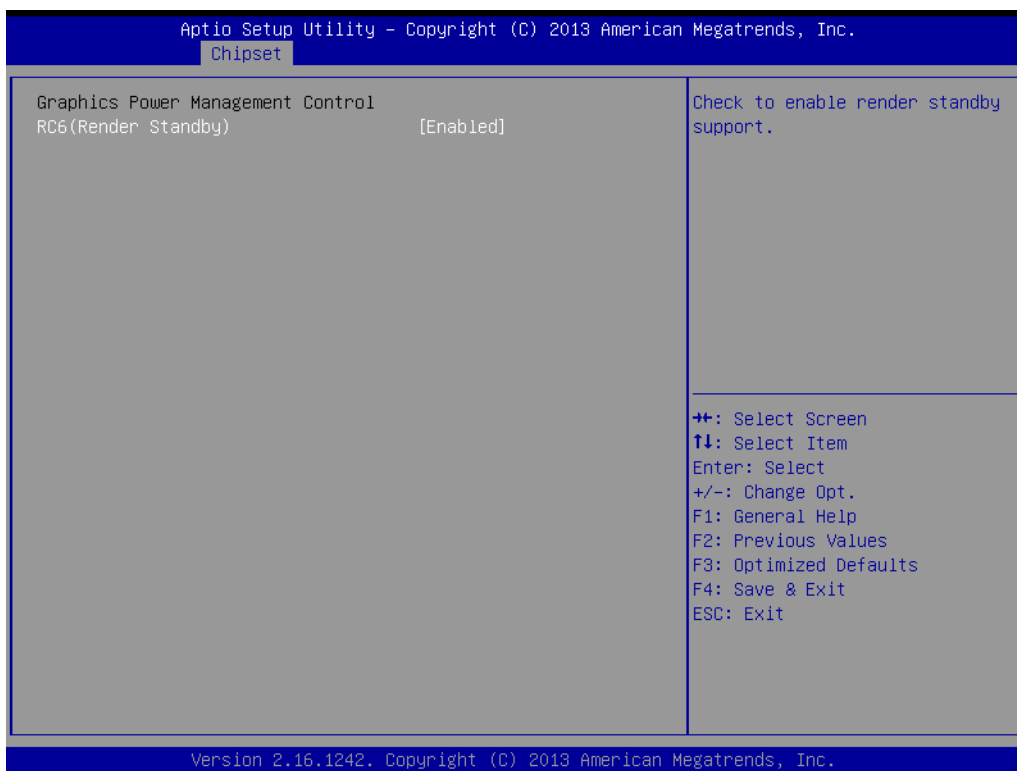
Figure 3.25 Intel IGD Configuration

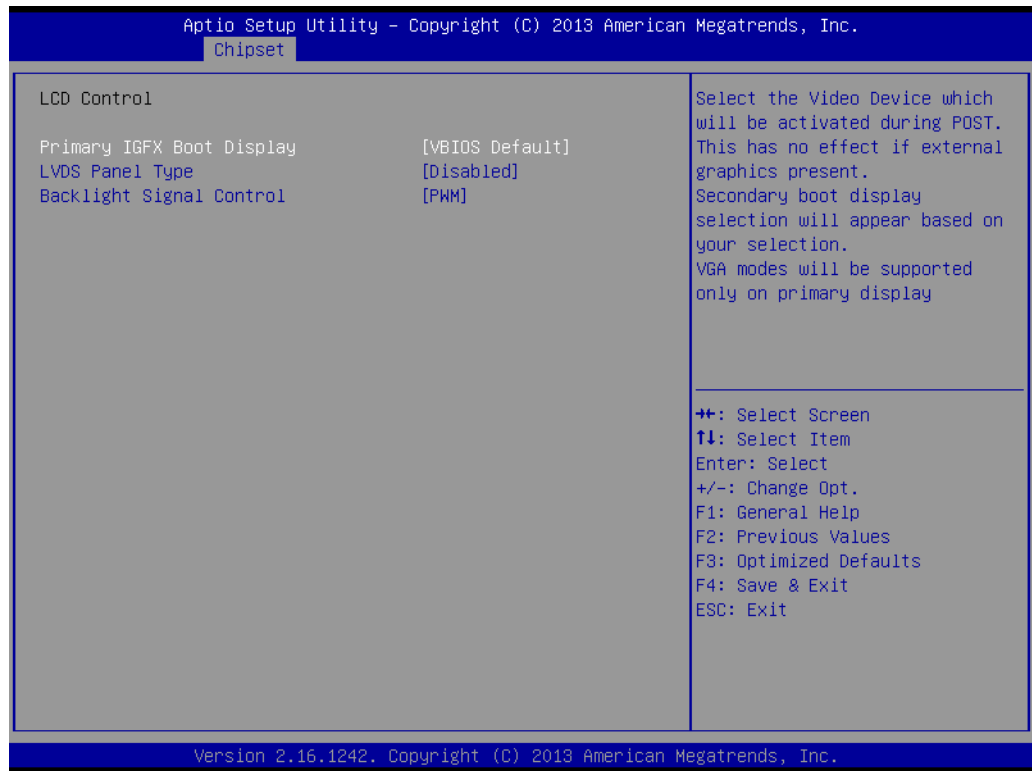**Figure 3.26 Graphics Power Management Control**

Figure 3.27 LCD Control
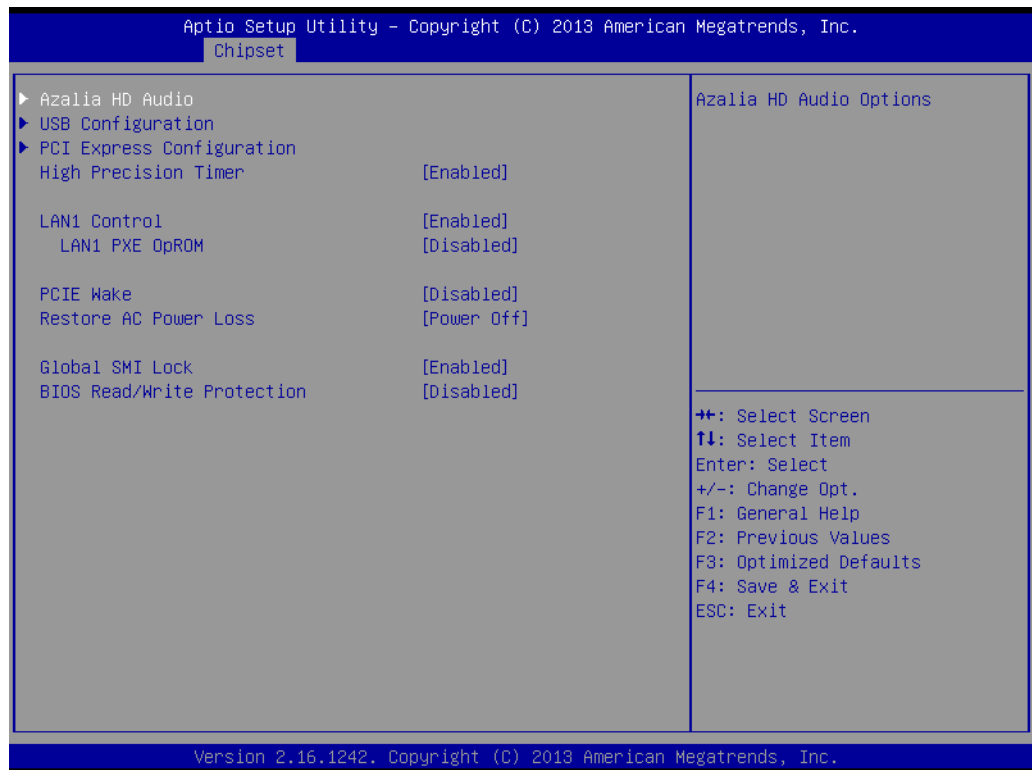
3.2.3.2 South Bridge
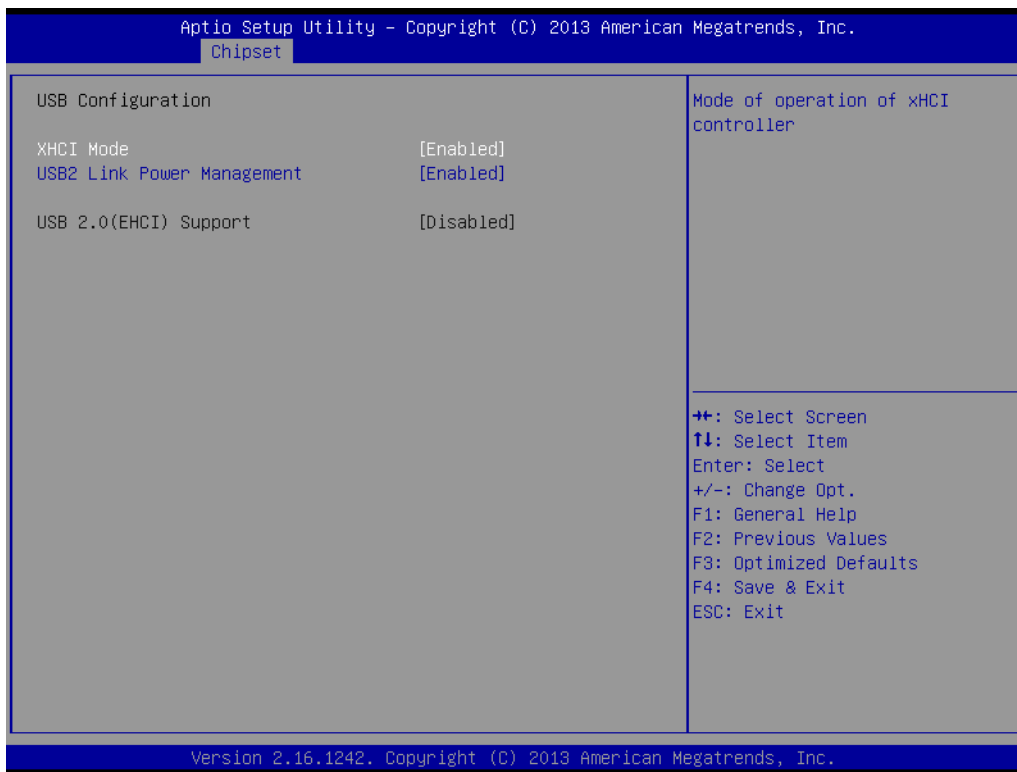

Figure 3.28 South Bridge

■ **Azalia**

Control detection of the Azalia device.

Disable=Azalia will be unconditionally disabled

Enable=Azalia will be unconditionally enabled

Auto=Azalia will be enabled if present, disabled otherwise.

```
               Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.
                 Chipset

 USB Configuration                                          Mode of operation of xHCI
                                                            controller
 XHCI Mode                          [Enabled]
 USB2 Link Power Management         [Enabled]

 USB 2.0(EHCI) Support              [Disabled]




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



               Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

■ **XHCI Mode**

Select Smart auto, Auto, Enable, and Disable mode of operation of XHCI controller.

Note!   *Smart auto setting remembers last setting, but auto mode does not.*
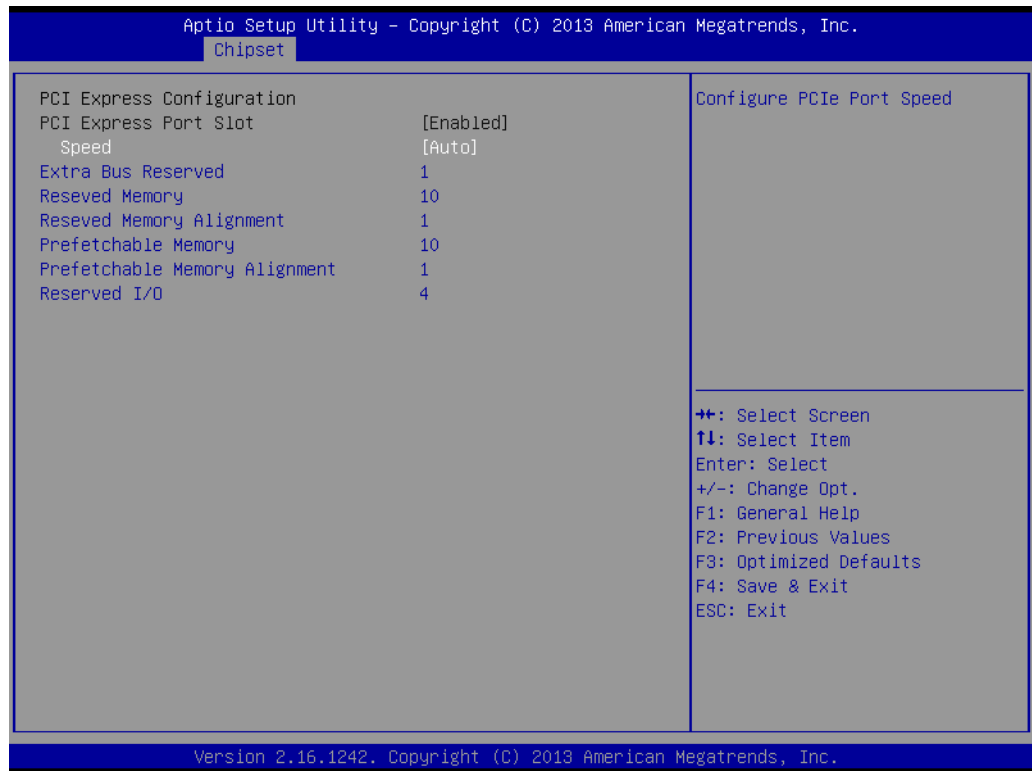
Figure 3.29 PCI Express Configuration
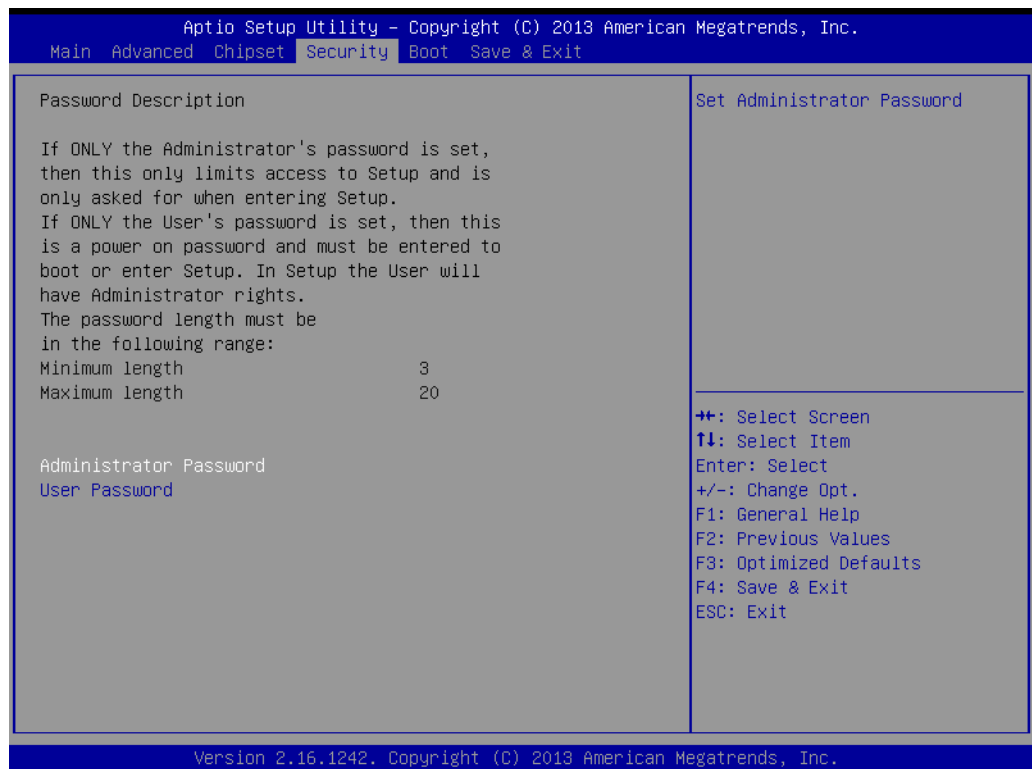
3.2.4 Security

Figure 3.30 Security

Select Security Setup from the PCI-7032 setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub menu for the following items, select the item and press <Enter>.
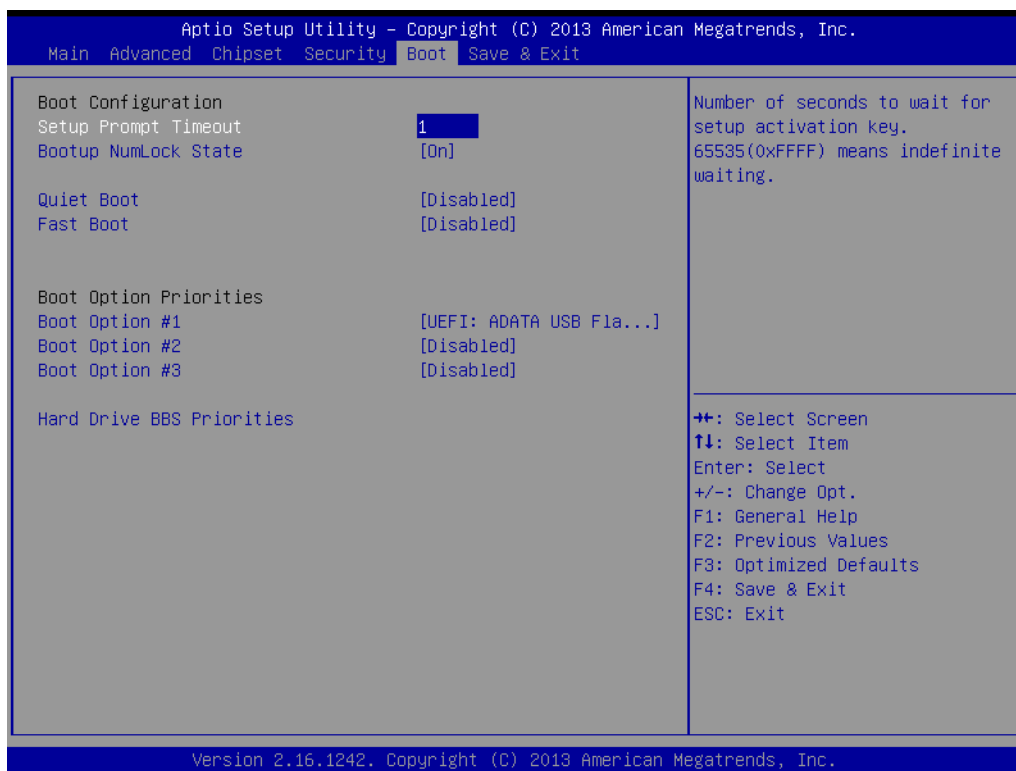
3.2.5 Boot

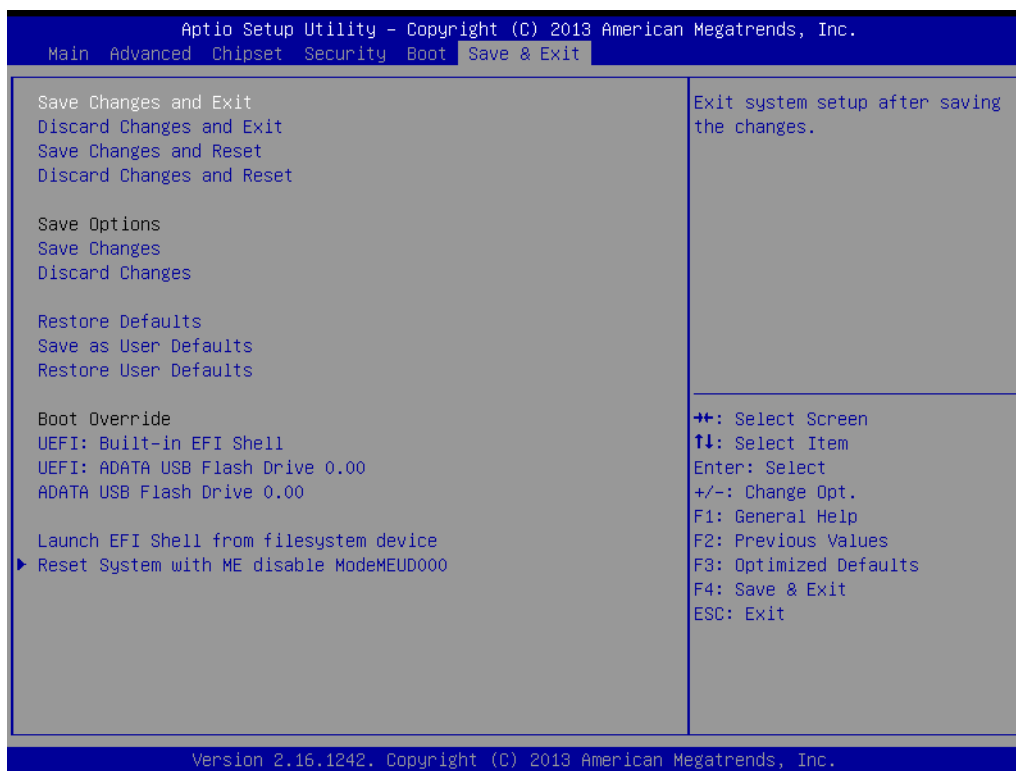**Figure 3.31 Boot**

3.2.6 Save & Exit

Figure 3.32 Save & Exit

Save changes and exit*

When you have completed system configuration, select this option to save your changes, exit BIOS setup and boot into the OS so the new system configuration parameters can take effect.

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.

Launch EFI Shell from file system device

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

*If you do certain critical changes, the system will reboot, even if you choose "Save changes and exit".

Chapter 4

Value-Added
Software Services

4.1 Value-Added Software Services

Software APIs are interfaces that define the ways in which an application program may request services from libraries and/or operating systems. They provide not only the underlying drivers required but also a rich set of user-friendly, intelligent and integrated interfaces, which speed development, enhance security and offer add-on value for Advantech platforms. 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 utilities, please contact an Advantech representative for support. For Windows systems, please install the .NET Framework v 3.5 from 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. It 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 PCI-7032 are located on the software installation CD. The drivers 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.
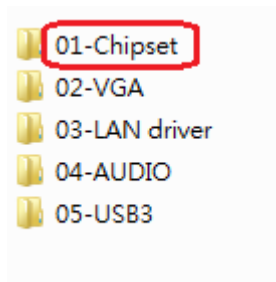
5.2 Introduction

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® Chipset Components in device manager

5.3 Windows 7/8 Driver Setup

1. 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 "SetupChipset.exe" to complete the installation of the driver.

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

```
01-Chipset
02-VGA
03-LAN driver
04-AUDIO
05-USB3
```

Chapter 6

Integrated Graphic
Device Setup

6.1 Introduction

4th generation Intel® CPUs have integrated graphics controllers. You need to install the VGA driver to enable this function.

6.2 Windows 7/8 Driver Setup

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

Insert the driver CD into your system's CD-ROM drive. You can see the driver folder items. Navigate to the "02_VGA" 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

PCI-7032 has dual Gigabit Ethernet LANs via dedicated PCI Express x1 lanes (For PCI-7032, LAN1 is Intel® I211, and LAN2 is I211) 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 CSI utility has been installed on your system. See Chapter 5 for information on installing the CSI utility.

PCI-7032 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 7/8 Driver Setup (LAN)

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

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

01-Chipset
02-VGA
03-LAN driver
04-AUDIO
05-USB3
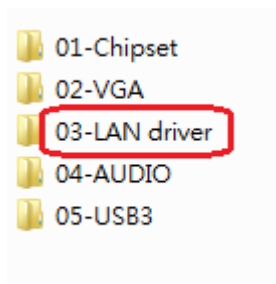
Chapter 8

Intel® USB 3.0

8.1 Introduction

PCI-7032 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).

8.2 Installation

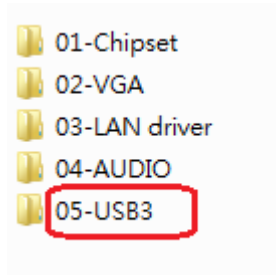Insert the driver CD into your system's CD-ROM drive. Navigate to the "05_USB3" folder and click "setup.exe" to complete the installation of the driver.

Appendix A

Programming the Watchdog Timer

A.1 Programming the Watchdog Timer

The PCI-7032'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 into the super I/O controller NCT6106D. It provides the following user-programmable functions:

- Can be enabled and disabled by user program.
- Timer can be set from 1 to 255 seconds or 1 to 255 minutes.
- Generates an interrupt or 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 assign the address of register by writing an address value into address port 2E (hex), then write/read data to/from the assigned register through data port 2F (hex).
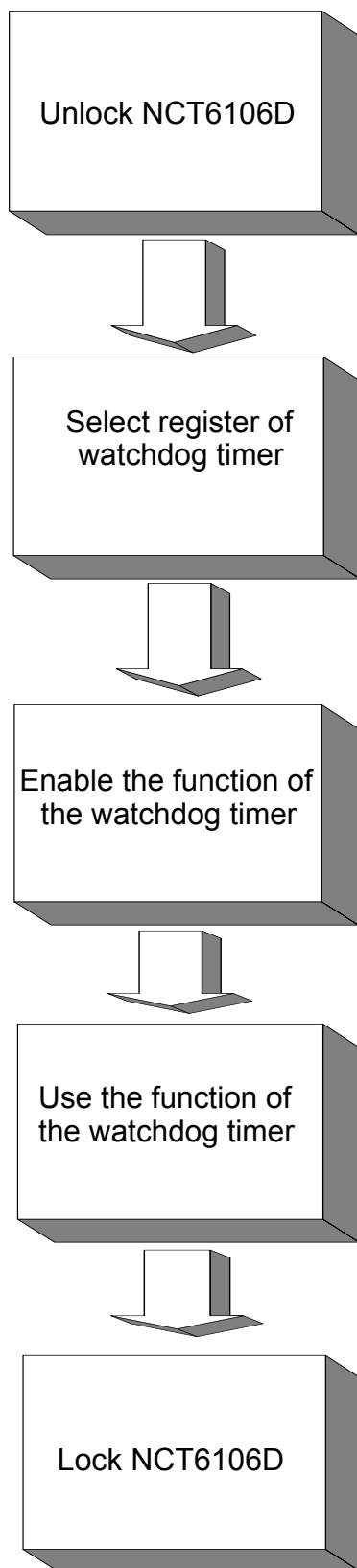
Unlock NCT6106D

Select register of watchdog timer

Enable the function of the watchdog timer

Use the function of the watchdog timer

Lock NCT6106D

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 NCT6106D.
07 (hex)	write	Write 08 (hex) to select register of watchdog timer.
30 (hex)	write	Write 01 (hex) to enable the function of the watch-dog timer. Disabled is set as default.
F0 (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.
F1 (hex)	write	0: stop timer [default] 01~FF (hex): The amount of the count, in seconds or minutes, depends on the value set in register F5 (hex). This number decides how long the watch-dog timer waits for strobe before generating an interrupt or reset signal. Writing a new value to this register can reset the timer to count with the new value.
F2 (hex)	read/write	Bit 7:Write 1 to enable mouse to reset the timer, 0 to disable [default]. 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 watchdog timer 2.

A.1.3 Example Program

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

```
;--------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
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 ; Set second as counting unit
Mov al,0f0h
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,0f1h
Out dx,al
Inc dx
Mov al,10
Out dx,al
;--------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```

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

```
;--------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
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 ; Set minute as counting unit
Mov al,0f0h
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,0f1h
Out dx,al
Inc dx
Mov al,5
Out dx,al
;---------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```
3. Enable watchdog timer to be reset by mouse
```
;---------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
Mov al,87h
Out dx,al
Out dx,al
;---------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
```

```
;--------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable watchdog timer to be reset by mouse
Mov al,0f2h
Out dx,al
Inc dx
In al,dx
Or al,80h
Out dx,al
;--------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```

4.   Enable watchdog timer to be reset by keyboard

```
;--------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
Mov al,87h
Out dx,al
Out dx,al
;--------------------------------------------------------
Mov al,07h ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;--------------------------------------------------------
Dec dx ; Enable watchdog timer to be strobed reset by keyboard
Mov al,0f2h
Out dx,al
Inc dx
In al,dx
Or al,40h
```

```
Out dx,al
;-------------------------------------------------------
Dec dx ; Lock NCT6106D
Mov al,0aah
Out dx,al
```

5.   Generate a time-out signal without timer counting

```
;-------------------------------------------------------
Mov dx,2eh ; Unlock NCT6106D
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,0f2h
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 NCT6106D
Mov al,0aah
Out dx,al
```

Appendix B

I/O Pin Assignments

B.1 Parallel Port Connector (LPT1)

```
25 23                          3  1
┌─────────────────────────────────┐
│ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ □ │
│ ● ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ │
└─────────────────────────────────┘
26 24                          4  2
```
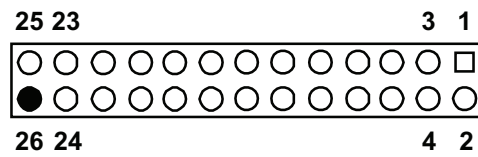
Table B.1: Parallel Port Connector (LPT1)			
Pin	**Signal**	**Pin**	**Signal**
1	STROBE*	2	AUTOFD*
3	D0	4	GND
5	D1	6	INIT*
7	D2	8	SLCTINI*
9	D3	10	GND
11	D4	12	GND
13	D5	14	GND
15	D6	16	GND
17	D7	18	GND
19	ACK*	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	N/C
* low active			

B.2 VGA Connector (VGA1)

```
    5 ┌○ ○ ○ ○ □┐ 1
   10 │ ○ ○ ○ ○ ○ │ 6
   15 └ ○ ○ ○ ○ ○ ┘ 11
```
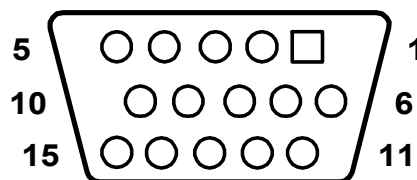
Table B.2: VGA Connector (VGA1)			
Pin	**Signal**	**Pin**	**Signal**
1	RED	9	VCC
2	GREEN	10	GND
3	BLUE	11	NC
4	GND	12	VGA1_b_DDAT
5	GND	13	VGA1_c_HS
6	VGA1_FOC_ON	14	VGA1_c_VS
7	GND	15	VGA1_b_DCLK
8	GND		

B.3 RS 232 Serial Port (COM12/COM34)

```
 1 | □ ○ |  2
 3 | ○ ○ |  4
 5 | ○ ○ |  6
 7 | ○ ○ |  8
 9 | ○ ○ | 10
11 | ○ ○ | 12
13 | ○ ○ | 14
15 | ○ ○ | 16
17 | ○ ○ | 18
19 | ○ ○ | 20
```
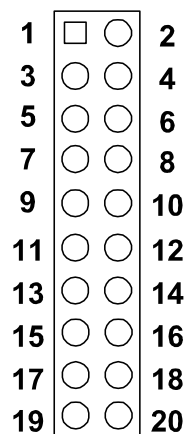
Table B.3: RS-232 Serial Port (COM12/COM34)	
Pin	**Signal**
1	COM1_DCD
2	COM1_DSR
3	COM1_SIN
4	COM1_RTS
5	COM1_SOUT
6	COM1_CTS
7	COM1_DTR
8	COM1_RI
9	GND
10	GND
11	COM2_DCD
12	COM2_DSR
13	COM2_SIN
14	COM2_RTS
15	COM2_SOUT
16	COM2_CTS
17	COM2_DTR
18	COM2_RI
19	GND
20	GND

B.4 USB 2.0 Header (USB12-USB56)

```
1  □ ○  2
3  ○ ○  4
5  ○ ○  6
7  ○ ○  8
9  ○ ○  10
```
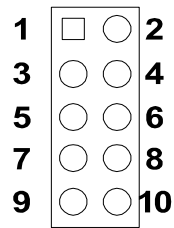
Table B.4: USB Header (USB12-USB56)			
Pin	**Signal**	**Pin**	**Signal**
1	USB_VCC5	6	USB2_D+
2	USB_VCC5	7	GND
3	USB1_D-	8	GND
4	USB2_D-	9	NC
5	USB1_D+	10	Key

B.5 PS/2 Keyboard/Mouse Connector (KBMS1)

```
6        5
   4  ■  3
   2     1
```
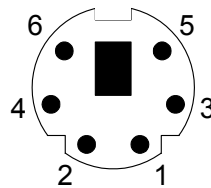
Table B.5: PS/2 Keyboard/Mouse Connector (KBMS1)	
Pin	**Signal**
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB CLOCK
6	MS CLOCK

B.6 CPU Fan Power Connector (CPUFAN1)
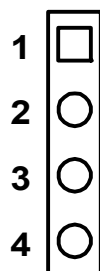
Table B.6: CPU Fan Power Connector (CPUFAN1)	
Pin	Signal
1	GND
2	+12V
3	Detect
4	NC

B.7 Reset Connector (JFP1)
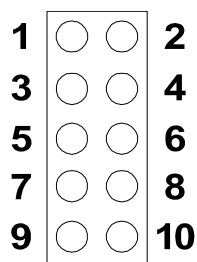
Table B.7: Reset Connector (JFP1 / RESET)	
Pin	Signal
1	HDD_LED+
2	HDD_LED-
3	PW_LED
4	GND
5	SNMP_SCL
6	SNMP_SDA
7	RESET#
8	GND
9	PWR-BTN
10	GND

B.8 High-definition Audio Link Connector (HDAUD1)

```
   2  4  6  8  10
  ┌─────────────────┐
  │ ○  ○  ○  ○  ○   │
  │ □  ○  ○  ○  ○  ○ │
  └─────────────────┘
   1  3  5  7  9  11
```
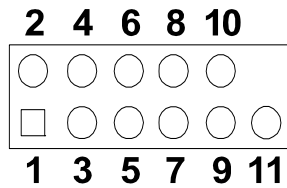
Pin	Signal	Pin	Signal
Table B.8: High-definition Audio Link Connector (HDAUD1)			
1	ACZ_VCC	2	GND
3	ACZ_SYNC	4	ACZ_BITCLK
5	ACZ_SDOUT	6	ACZ_SDIN0
7	ACZ_SDIN1	8	-ACZ_RST
9	ACZ_12V	10	GND
11	GND	12	N/C

B.9 LAN1 and LAN2 LED Connector (LANLED1)

```
  1 ┌ □  ○ ┐ 2
  3 └ ○  ○ ┘ 4
```
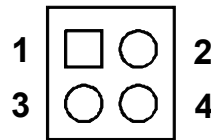
Pin	Signal
Table B.9: LAN1 and LAN2 LED Connector (LANLED1)	
1	#LAN1_ACT
2	#LAN2_ACT
3	V33_AUX
4	V33_AUX

B.10 GPIO Header (GPIO1)

```
  1 ┌ □  ○ ┐ 2
  3 │ ○  ○ │ 4
  5 │ ○  ○ │ 6
  7 │ ○  ○ │ 8
  9 └ ○  ○ ┘ 10
```
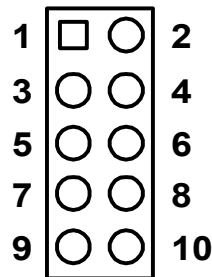
Table B.10: GPIO Header (GPIO1)	
Pin	Signal
1	SIO_GPIO0 (3.3v logic)
2	SIO_GPIO4 (3.3v logic)
3	SIO_GPIO1 (3.3v logic)
4	SIO_GPIO5 (3.3v logic)
5	SIO_GPIO2 (3.3v logic)
6	SIO_GPIO6 (3.3v logic)
7	SIO_GPIO3 (3.3v logic)
8	SIO_GPIO7 (3.3v logic)
9	VCC_GPIO (5.0v)
10	GND

B.11 JWDT1 and JOBS1
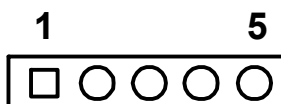
Table B.11: JWDT1 and JOBS1	
Pin	Signal
1	N/C
2	SIO_WG#
3	SRST#
4	ERR_BEEP
5	OBS_BEEP

B.12 JCASE1
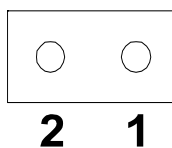
Table B.12: JCASE1	
Pin	Signal
1	CASEOP#
2	GND

B.13 LPC1

```
 1 ○ ○ 2
 3 ○ ○ 4
 5 ○ ○ 6
 7 ○ ○ 8
 9 ○ ○ 10
11 ○ ○ 12
13 ○ ○ 14
```
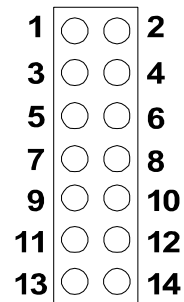
Table B.13: LPC1	
Pin	**Signal**
1	CLK25M_LPC
2	LPC_AD1
3	PLTRST_LPC0#
4	LPC_AD0
5	LPC_FRAME#
6	3.3V
7	LPC_AD3
8	GND
9	LPC_AD2
10	LPC1_SMB_CLK
11	PCI_SERIRQ
12	LPC1_SMB_DATA
13	5VSB
14	5V

B.14 PWR1

```
○ ○ ○ ○
4 3 2 1
```
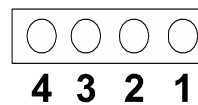
Table B.14: PWR1	
Pin	**Signal**
1	5V
2	GND
3	GND
4	12V

B.15 DVI1

1	□ ○	2
3	○ ○	4
5	○ ○	6
7	○ ○	8
9	○ ○	10
11	○ ○	12
13	○ ○	14
15	○ ○	16
17	○ ○	18
19	○ ○	20
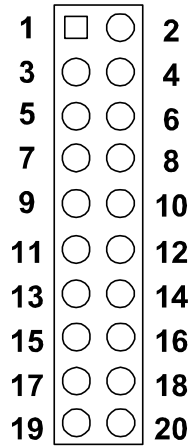
Table B.15: DVI1	
Pin	Signal
1	GND
2	GND
3	DDPB TX0- B
4	DDPB TX3- B
5	DDPB TX0+ B
6	DDPB TX3+ B
7	GND
8	N/C
9	DDPB TX1- B
10	N/C
11	DDPB TX1+ B
12	DDPB_AUX-
13	GND
14	DDPB_AUX+
15	DDPB TX2- B
16	GND
17	DDPB TX2+ B
18	DDPB_HPD_Q
19	VCC_DP1
20	VCC_DP1

B.16 Fixed I/O Ranges Decoded by Intel PCH

Device	IO Address	Comments
8259 Master	20h-21h, 24h-25h, 28h-29h, 2Ch-2Dh, 30h-31h, 34h-35h, 38h-39-, 3Ch-3Dh	
8254s	40h-43h, 50h-53h	
PS2 Control	60h, 64h	
NMI Controller	61h, 63h, 65h, 67h	
RTC	70h-77h	
Port 80h	80h-83h	
Init Register	92h	
8259 Slave	A0h-A1h, A4h-A5h, A8h-A9h, ACh-ADh, B0h-B1h,B4h-B5h, B8h-B9h, BCh-BDh, 4D0h-4D1h	
PCU UART	3F8h-3FFh	
Reset Control	CF9h	Overlaps PCI IO registers
Active Power Management	B2h-B3h	

Table B.16: Fixed I/O Ranges Decoded by Intel PCH

B.17 System I/O Ports

I/O Address (Hex)	Device
290h-29Fh	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)
800h~87Fh	PMBASE
C00h~C7Fh	GPIOBASE
600h-67Fh	PCA-COM485 Module I/O used
778h-77Fh	ECP Printer Port(LPT1)
240-258	Communication port (COM3-6) for PCA-COM232 module
270-298	Communication port (COM8-11) for PCA-COM485 module

Table B.17: PCI-7032 System I/O Ports

B.18 Interrupt Assignments

Table B.18: Interrupt Assignments	
Interrupt#	**Interrupt source**
IRQ0	System timer
IRQ1	Keyboard
IRQ2	Interrupt from controller 2 (cascade)
IRQ3	Communication port (COM2)
IRQ4	Communication port (COM1)
IRQ5	Available
IRQ6	Communication port (COM8-11) for PCA-COM485 module
IRQ7	LPT
IRQ8	System COMS/Real-time clock
IRQ9	Available
IRQ10	Intel 8/C220 series SMBus Controller
IRQ11	Communication port (COM3-6) for PCA-COM232 module
IRQ12	PS/2 mouse
IRQ13	Numeric data processor
IRQ14	Available
IRQ15	Available

B.19 1 MB Memory Map

Table B.19: 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 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
```

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