User Manual

AIIS-1440

USB3 CAM Control System

ADVANTECH

Enabling an Intelligent Planet

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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.

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.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   – Product name and serial number
   – Description of your peripheral attachments
   – Description of your software (operating system, version, application software, etc.)
   – A complete description of the problem
   – The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.*

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.

Note! *Notes provide optional additional information.*

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.

    If one of the following situations arises, get the equipment checked by service personnel:

    ■The power cord or plug is damaged.

    ■Liquid has penetrated into the equipment.

    ■The equipment has been exposed to moisture.

    ■The equipment does not work well, or you cannot get it to work according to the user's manual.

    ■The equipment has been dropped and damaged.

    ■The equipment has obvious signs of breakage.
14. Do not leave this equipment in an environment where the storage temperature may go below -40° C (-40° F) or above 85° C (185° F). This could damage the equipment. The equipment should be in a controlled environment.
15. CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer, discard used batteries according to the manufacturer's instructions.
16. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).
17. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.
18. DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Packing List

Before installation, please ensure the following items have been shipped:

- 1 x AIIS-1440 Unit
- 4 x Rubber foot
- 2 x Wall mount bracket
- 1 x CPU Cooler
- 1 x English & Simplified Chinese Startup Manual
- 1 x China RoHS
- 1 x Utility CD

Ordering information

Part Number	USB3 Vision	Display	USB 3.0/2.0	DIO	COM 232/422/485	COM 232
AIIS-1440-00A1E	4-CH	VGA+DVI-D	4 / 4	8-bit	2	4

Optional accessories

Part Number	Description
98R2124000E	DIN-Rail Kit
1757004518-01	220Watt 24Vdc Adapter
AIIS-DIO32-00A1E	32-bit DIO module

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Chapter 1

General Introduction

This chapter gives background information on the AIIS-1440 series.

1.1 Introduction

AIIS-1440 Box IPC is an ideal, application-ready, system platform solution. All electronics are protected in a compact sealed case for easy embedding in the customer's own housing, or as a stand-alone unit where space is limited.

AIIS-1440 features performance computing with significant USB 3.0 bandwidth, rich I/O interface, and extended product longevity, all in a compact form factor. These USB3 boxes use the latest, 3rd generation Intel® Core™ processors to deliver improved computing power and graphics performance. Already fully verified and certified, they offer system integrators a no-nonsense solution.

AIIS-1440 is designed with dedicated USB3 controller to make sure the significant bandwidth and a single USB cable can carry both data and electrical power. Compliant with USB 3.0 SuperSpeed, it is capable of transferring data up to 5 Gbps, whereas USB 2.0 can only provide up to 480 Mbps.

AIIS-1440 offers rich I/O interfaces such as eight USB 3.0 ports (four of them are designed with dedicated controller), max. 40-bit digital I/O, four USB 2.0, and six serial ports. The two serial ports on the front panel can be configured as RS-232, RS-422 or RS-485 via BIOS setting. These interfaces can support a number of various peripheral devices.

1.2 Product Features

- Intel® 3rd/2nd Core™ i7/i5/i3 CPU (LGA1155)
- 4-CH USB 3.0 with dedicated controller
    - Each channel compliant with SuperSpeed data rate (5 Gbps)
    - Verified by USB3 Camera
- Compact & thoughtful design
    - Volume less than 3 Litre
    - Easier Fan filter maintenance
    - Internal USB Type-A with lock design (Max. 49mm length)
    - Wall or DIN Rail mounting kit (optional)
    - Build in G-sensor for vibration detection

1.3 Product Specifications

1.3.1 Processor System

- LGA1155 Intel® Core™ i7/i5/i3/Pentium®/Celeron

CPU	Core i7-3770	Core i7-2600	Core i5-3550S	Core i5-2400	Core i3-3220	Core i3-2120	Core G2120	Core G850	Core G540
Core	4	4	4	4	2	2	2	2	2
Base Frequency	3.4 GHz	3.4 GHz	3.0 GHz	3.1 GHz	3.3 GHz	3.3 GHz	3.1 GHz	2.9 GHz	2.5 GHz
L3 Cache	8 MB	8 MB	6 MB	6 MB	3 MB	3 MB	3 MB	3 MB	2 MB
Chipset	H61								
BIOS	AMI 64Mb SPI Flash								

1.3.2 Memory
- Supports dual channel DDR3 1066/1333 8 GB per DIMM without ECC function; Max. capacity is up to 16 GB

1.3.3 Graphics
- **Chipset:** Intel® HD Graphics

1.3.4 USB3 Vision
- **Controller:** Renesas µPD720202 x 4
- **Compliant:** USB 3.0 SuperSpeed
- **Power Output:** 4.5 W per Channel

1.3.5 Ethernet
- **Interface:** 10/100/1000 Mbps
- **Controller:** LAN1: Intel® 82579V, LAN2: Intel® 82583V

1.3.6 Storage
- **Internal 2.5" HDD Bay:** 1
- **CFast:** 1

1.3.7 Front I/O
- **Display:** VGA+DVI-D
- **USB:** 4 USB3.0
- **Serial:** 2 (RS-232, RS-422 or RS-485 via BIOS setting)
- **DIO:** 8-bit (default), 32-bit (optional by AIIS-DIO32)

1.3.8 Rear I/O
- **USB:** 4 USB2.0
- **Serial:** 4 RS-232

1.3.9 Watchdog Timer
- **Output:** System reset
- **Interval:** Programmable 1~255 sec/min

1.3.10 Power Requirement
- **Power Type:** ATX
- **Power Input Voltage:** 19 VDC ~ 24 VDC
- **Minimum Power Input:** DC19-24V @ 8-6.3A
- **Normal Power Input:** DC19-24V @ 11.57-9.16A
- **Power Adapter:** AC to DC, DC24V/9.16A, 220W (Optional)

1.3.11 Cooling
- **System Fan:** 1 (6cm / 27.7 CFM)

1.3.12 Miscellaneous
- **LED Indicators:** Power, HDD, temperature
- **Control:** Power on/off switch

1.3.13 Environment

- **Operating Temperature:** 0 ~ 45ºC (32 ~ 113ºF)*
- **Non-operating Temperature:** -40 ~ 70ºC (-40 ~ 158ºF)
- **Operating Humidity:** 10 ~ 95% @ 40ºC, non-condensing
- **Non-operating Humidity:** 10 ~ 95% @ 60ºC, non-condensing

* Depends on CPU, i7 CPU supports 0 ~ 40ºC.

1.3.14 Physical Characteristics

- **Dimension (WxHxD):** 232 x 70 x 175 mm
- **Weight:** 2.5Kg

1.3.15 EMC

CE, FCC, CCC, BSMI

1.3.16 Safety

UL, CB, CCC, BSMI

1.4 Jumper Settings
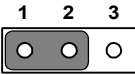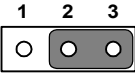
1.4.1 How to Set Jumpers

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.

1.4.2 BIOS CMOS (JCMOS1)

AIIS-1440 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 1.1: Clear BIOS CMOS (JCMOS1)	
Function	**Jumper Setting**
*Keep BIOS CMOS data	1-2 closed
Clear BIOS CMOS data	2-3 closed
*default setting	
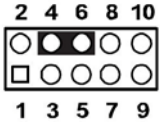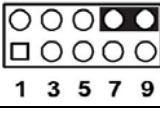
1.4.3 Hardware Monitor alarm (JOBS1) and Watchdog Timer Output (JWDT1)

AIIS-1440 contains a watchdog timer that will reset the CPU in the event the CPU stops processing. This feature means AIIS-1440 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.

AIIS-1440 also provides jumper: JOBS1 to enable or disable hardware monitor function.

Table 1.2: H/W Monitor Alarm and Watchdog Timer (JOBS1+JWDT1)	
Function	**Jumper Setting**
*Enable watchdog timer	2 4 6 8 10 / 1 3 5 7 9 (pins 4 and 6 shorted)
*Enable H/W monitor alarm	2 4 6 8 10 / 1 3 5 7 9 (pins 8 and 10 shorted)
*default setting	

Chapter 2

Hardware installation

This chapter introduces external IO and the installation of AIIS-1440 Hardware.

2.1 Front Panel Controls, Indicators & Connectors
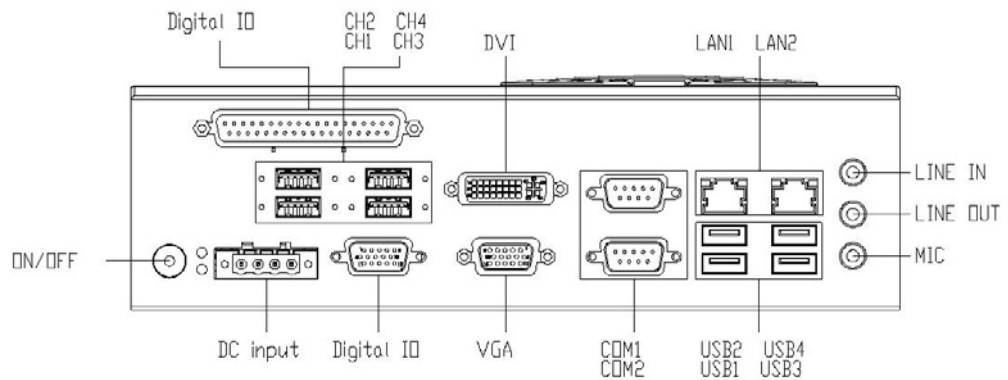
Figure 2.1 AIIS-1440 Front View

2.1.1 Power On/Off Button

AIIS-1440 has a Power On/Off button with LED indicators on the front side that show On status (Green LED) and Off/Suspend status (Orange LED). The Power button supports dual functions: Soft Power -On/Off (Instant off or Delay 4 Seconds then off), and Suspend.
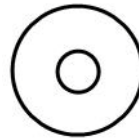
Figure 2.2 Power On/Off Button

Table 2.1: Power Button Connector Pin Assignment	
LED color	**Status**
Green	Power ON
Amber	S1/S4/S5

2.1.2 LED Indicators

There are two LEDs on the front panel that indicate system status: The thermal LED is for system thermal alarm status; and HDD LED is for HDD and Cfast disk status. In addition, there are four LEDs to indicate the connection of powered device via PoE port.
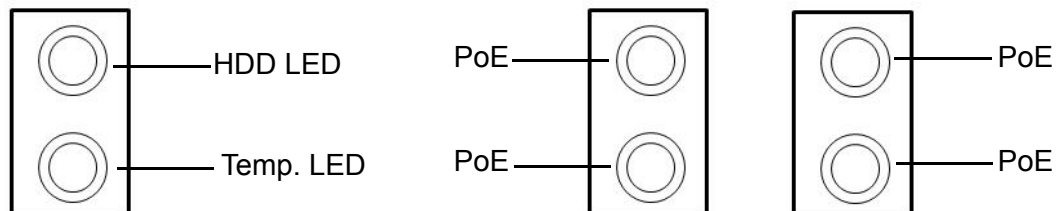
Figure 2.3 LED Indicators

Table 2.2: LED Indicators (Thermal & HDD)	
LED color	**Function**
Red	Over Temperature LED
Amber	SATA LED

Table 2.3: LED Indicator (PoE)	
LED color	**Function**
Red	Connected Powered Device

2.1.3 Power Input Connector

AIIS-1440 comes with a four pins header that carries 19 ~ 24 VDC external power input.
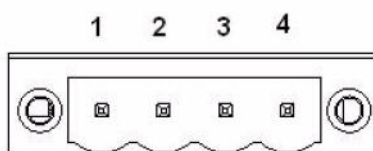
Figure 2.4 Power Input Connector

Table 2.4: Power Input Connector Pin Assignment	
Pin	**Signal**
1	GND
2	+19~24 VDC
3	+19~24 VDC
4	GND

2.1.4 Digital I/O

AIIS-1440 provides one DSUB-15 male connector which offers 4-ch digital input and 4-ch digital output with 2.5KV isolation. AIIS-1440F provides additional DSUB-male connector which offers 4-ch digital input and 4-ch digital output with 2.5KV isolation.

DSUB-15 Male Connector
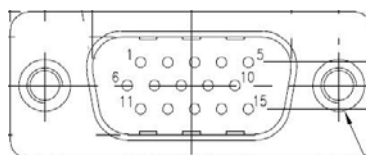
Figure 2.5 8-bit DIO Connector

Table 2.5: 8-bit DIO Connector Pin Assignment

Pin	Signal	Pin	Signal
1	GND	2	DI0
3	DI1	4	DI2
5	DI3	6	COM
7	DO0	8	DO1
9	DO2	10	DO3
11	GND	12	N/C
13	N/C	14	N/C
15	+5V		

DSUB-37 female connector
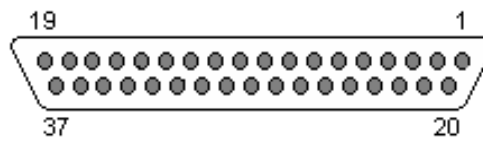
Figure 2.6 32-bit DIO Connector

Table 2.6: 32-bit DIO Connector Pin Assignment

Pin	Signal	Pin	Signal
1	DI0	2	DI2
3	DI4	4	DI6
5	DI8	6	DI10
7	DI12	8	DI14
9	GND	10	COM1
11	DO0	12	DO2
13	DO4	14	DO6
15	DO8	16	DO10
17	DO12	18	DO14
19	COM2	20	DI1
21	DI3	22	DI5
23	DI7	24	DI9
25	DI11	26	DI13
27	DI15	28	GND
29	GND	30	DO1
31	DO3	32	DO5
33	DO7	34	DO9
35	DO11	36	DO13
37	DO15		

2.1.5 VGA+DVI Connector

AIIS-1440 offers an integrated D-sub 24-pin female DVI-D Digital Visual Interface connector and a D-sub 15-pin VGA; DVI-D carries digital video signal. This supports high-speed, high-resolution digital displays and traditional analog displays.
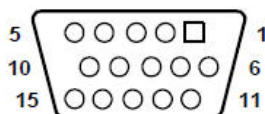
Figure 2.7 Figure 2.7 VGA Connector

Table 2.7: VGA Connector Pin Assignment			
Pin	Signal	Pin	Signal
1	RED	2	GREEN
3	BLUE	4	N/C
5	GND	6	GND
7	GND	8	GND
9	VCC	10	GND
11	N/C	12	SDT
13	H-SYNC	14	V-SYNC
15	SCK		
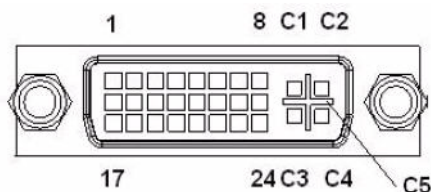
Figure 2.8 DVI Connector

Table 2.8: DVI Connector Pin Assignment			
Pin	Signal	Pin	Signal
1	TMDS Data 2-	2	TMDS Data 2+
3	GND	4	N/C
5	N/C	6	DDC clock
7	DDC data	8	N/C
9	TMDS Data 1-	10	TMDS Data 1+
11	GND	12	N/C
13	N/C	14	+5 V
15	GND	16	Hot plug detect
17	TMDS Data 0-	18	TMDS Data 0+
19	GND	20	N/C
21	N/C	22	GND
23	TMDS clock +	24	TMDS clock -
C1	N/C	C2	N/C
C3	N/C	C4	N/C
C5	N/C		

2.1.6 COM Connectors

AIIS-1440 provides 2 D-sub 9-pin connectors that are serial communication interface ports. COM-1 & COM-2 support RS-232/422/485 mode by BIOS selection.
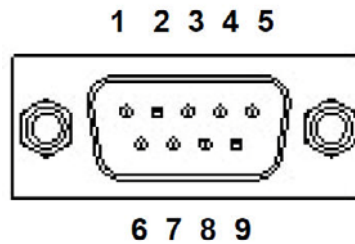
Figure 2.9 COM Connectors

Table 2.9: Front 2-COM Pin Assignment			
Pin	RS-232	RS-422	RS-485
1	DCD	TXD -	DATA -
2	SIN#	TXD +	DATA +
3	SOUT#	RXD +	NC
4	DTR	RXD -	NC
5	GND	GND	GND
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

2.1.7 Ethernet Connectors (LANs)

AIIS-1440 provides six RJ45 connectors for Gigabit LAN interfaces; two of them are equipped with Intel® 82579V and 82583V Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards, four of them are equipped with Intel® i210 Ethernet controllers that are fully compliant with IEEE 802.3af Power over Ethernet standard. The Ethernet ports provide standard RJ-45 jack connectors with LED indicators that show Active/Link status (Green LED) and Speed status (Yellow LED).
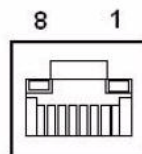
Figure 2.10 Figure 2.10 Ethernet Connectors

Table 2.10: Ethernet Connector Pin Assignment			
Pin	Signal	Pin	Signal
1	MDI0 +	2	MDI0 -
3	MDI1 +	4	MDI1 -
5	MDI2 +	6	MDI2 -
7	MDI3 +	8	MDI3 -

2.1.8 USB 3.0 Connectors

The USB channel 1~4 and port 1~4 support USB 3.0 interface, which give complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 3.0 compliant. Please refer to below table for its pin assignments. USB 3.0 connectors contain legacy pins to interface to USB 2.0 devices, and a new set of pins for USB 3.0 connectivity (both sets reside in the same connector).
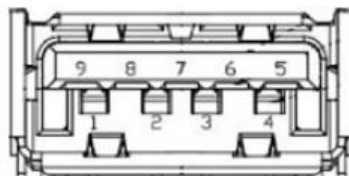
Figure 2.11 USB 3.0 Connectors

Table 2.11: USB3.0 Connector Pin Assignment			
Pin	**Signal**	**Pin**	**Signal**
1	+5V	2	USB Data -
3	USB Data +	4	GND
5	SSRX-	6	SSRX+
7	GND	8	SSTX-
9	SSTX+		

2.1.9 Audio Connector

AIIS-1440 offers stereo audio ports by three phone jack connectors of Line_Out, Line_In, Mic_In. The audio chip is controlled by ALC892, and it's compliant with Azalea standard.
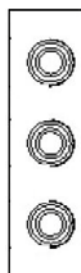
Figure 2.12 Audio Connector

Table 2.12: Audio Pin Assignment	
Color	**Function**
Blue	Line In
Green	Line Out
Pink	Mic In

2.2   Rear Panel Connectors
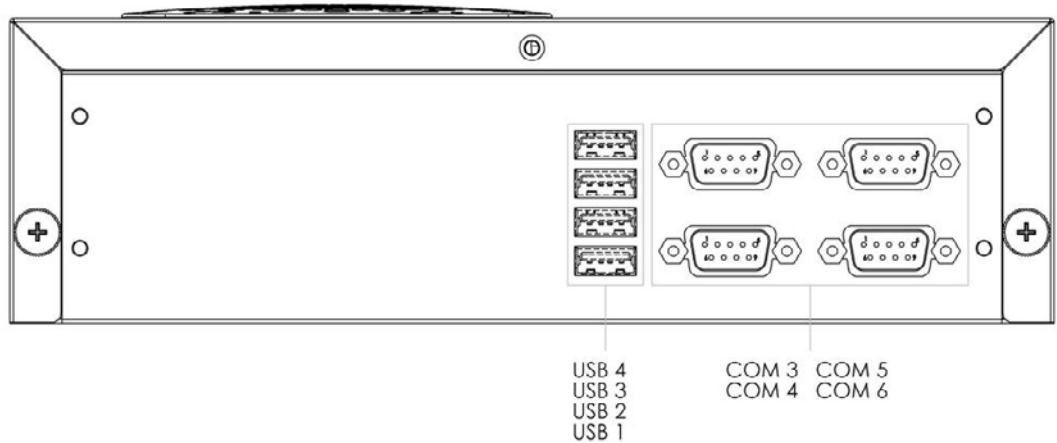
Figure 2.13 AIIS-1440 Rear View

2.2.1   COM Connectors

AIIS-1440 provides four D-sub 9-pin connectors in rear panel which offer RS-232 serial communication interface ports.
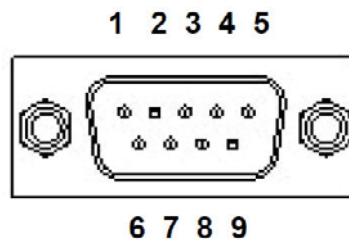
Figure 2.14 COM Connectors

Table 2.13: USB3.0 Connector Pin Assignment			
Pin	Signal	Pin	Signal
1	DCD	2	SIN#
3	SOUT#	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

2.2.2 USB 2.0 Connectors

AIIS-1440 provides four USB2.0 interface connectors, which give complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 2.0 compliant. The USB interface can be disabled in the system BIOS setup. Please refer to below table for its pin assignments. The USB connectors are used to connect any device that conforms to the USB interface. Most digital devices conform to this standard. The USB interface supports Plug and Play.
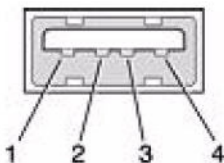
Figure 2.15 USB 2.0 Connectors

Table 2.14: USB2.0 Connector Pin Assignment			
Pin	Signal	Pin	Signal
1	+5V	2	USB Data -
3	USB Data +	4	GND

2.3 CPU Installation

1. Remove top cover.
2. Pull the handle beside the processor socket outward and lift it.
3. Remove the socket protection cap.
4. Align the cuts on the processor with the edges of the socket.
5. Replace the socket cap; lower the retainer handle and clip it shut.
6. Processor installation is complete.
7. Reinstall top cover.

2.4 CPU Cooler Installation

1. Remove top cover.
2. Attach the CPU cooler on the Motherboard.
3. Fastening four screws on the cooler into the steel back-plate on the PCB.
4. Reinstall top cover.
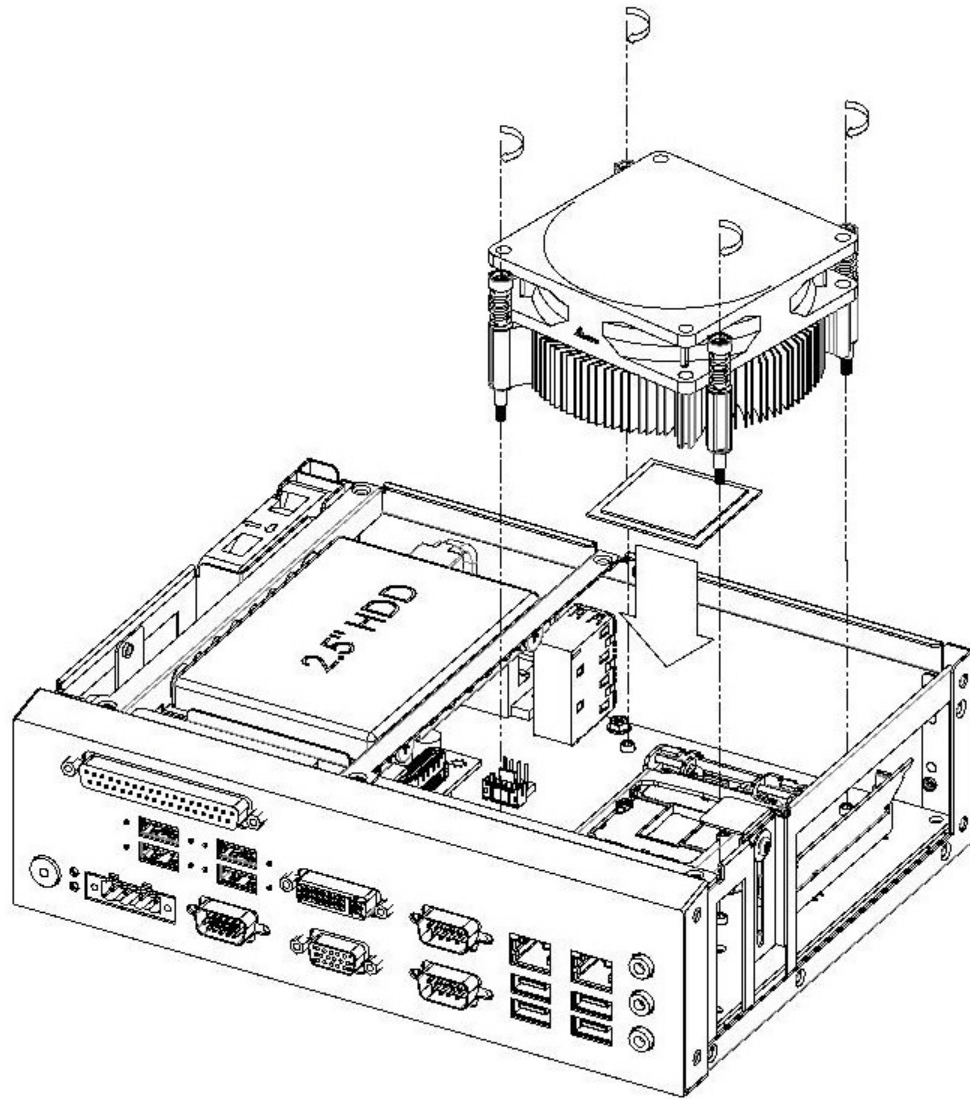
Figure 2.16 CPU & CPU Cooler Installation

2.5 Memory Installation

1. Remove top cover.
2. Insert the memory module into the SODIMM socket.
3. Reinstall top cover.
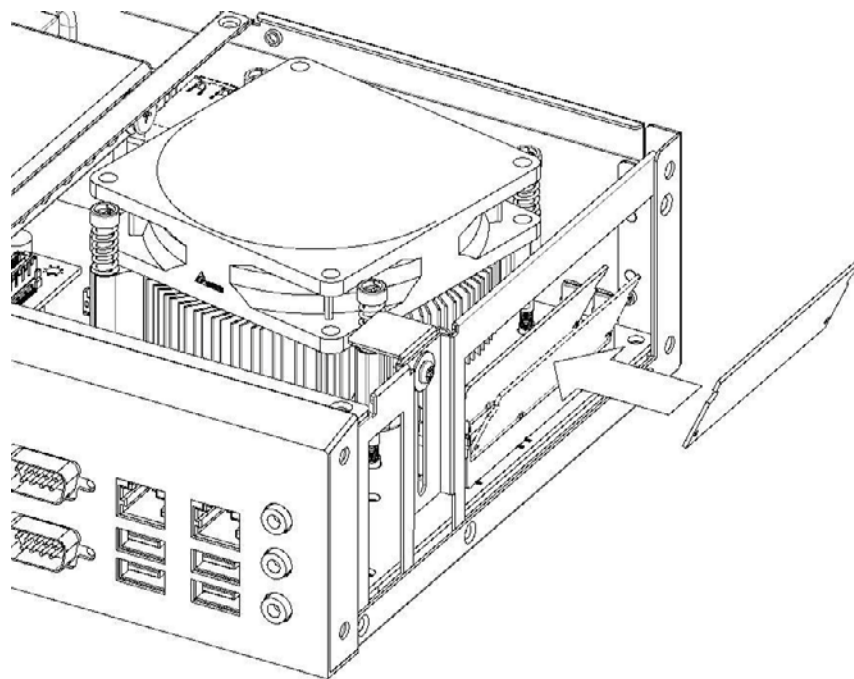
Figure 2.17 Memory Installation

2.6 HDD Installation

1. Remove top cover and HDD bracket by unscrewing the 4 screws.
2. Install the 2.5" SATA HDD with the 4 HDD mounting screws. Make sure the PCB side of the HDD will be facing the bottom cover.
3. Connect the SATA signal cable and power cable to the HDD.
4. Reinstall the HDD bracket and top cover.
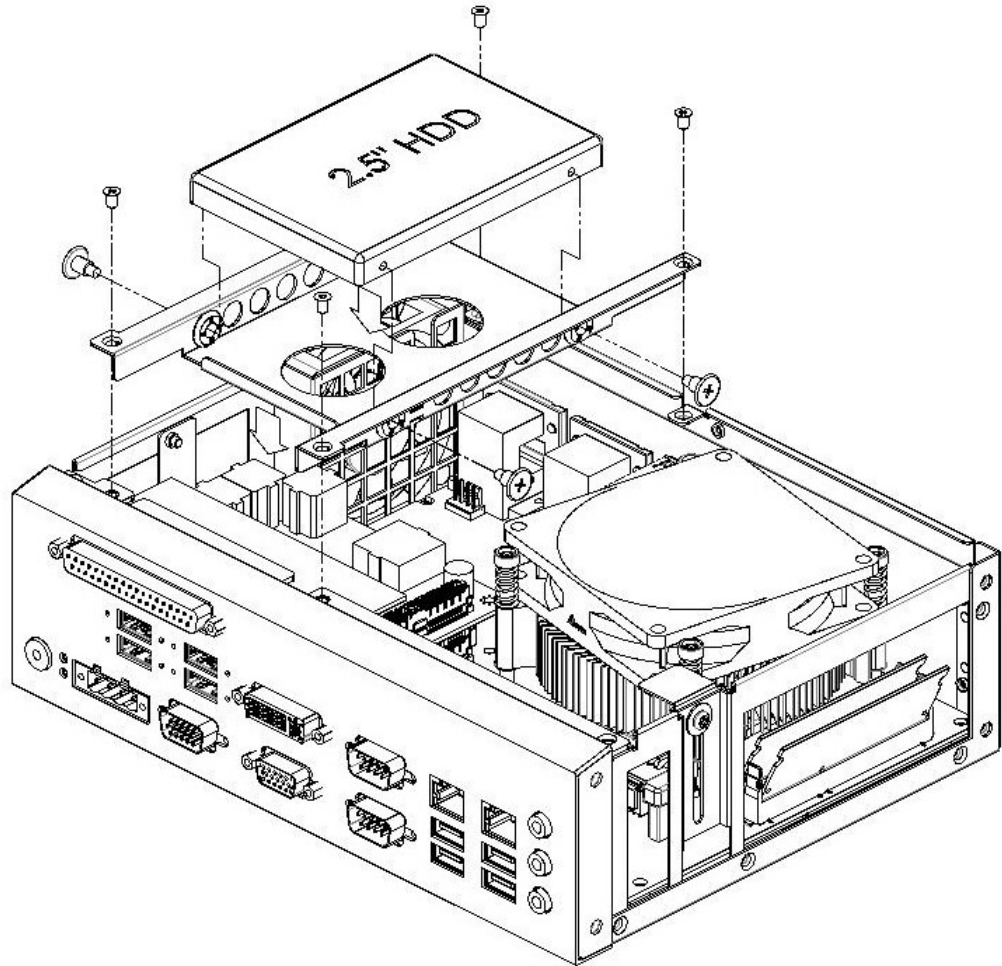
Figure 2.18 HDD Installation

2.7 Internal USB lock Installation

1. Remove top cover and USB lock-kit by unscrewing the single screw.
2. Install the USB dongle and adjust the position of the lock-kit properly.
3. Reinstall the USB lock-kit and top cover.
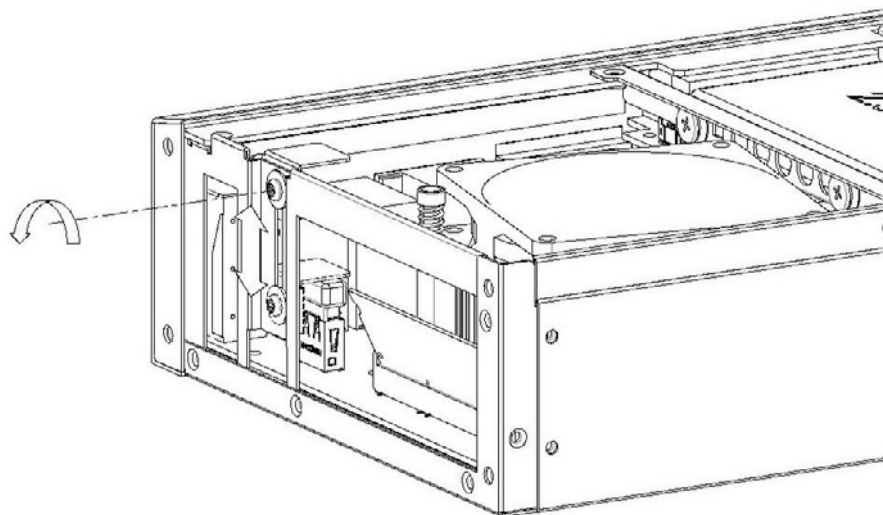
Figure 2.19 Internal USB lock Installation

2.8 Cfast Installation

1. Remove top cover.
2. Insert the Cfast card into socket.
3. Assemble the Cfast clamping to avoid the loosing.
4. Reinstall top cover.
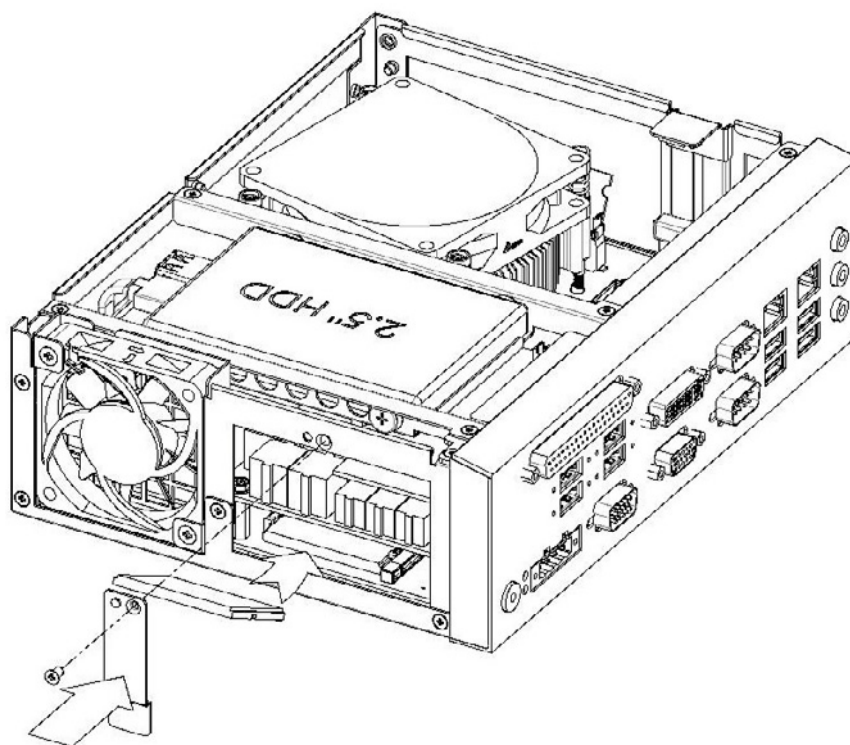
Figure 2.20 Cfast Installation

2.9 AIIS-DIO32 Installation

1. Remove top cover.
2. Install the AIIS-DIO32 with 2 stand-off and 2 screws.
3. Connecting main board USB12 connector with AIIS-DIO32 USB1 connector via DIO cable.
4. Reinstall top cover.
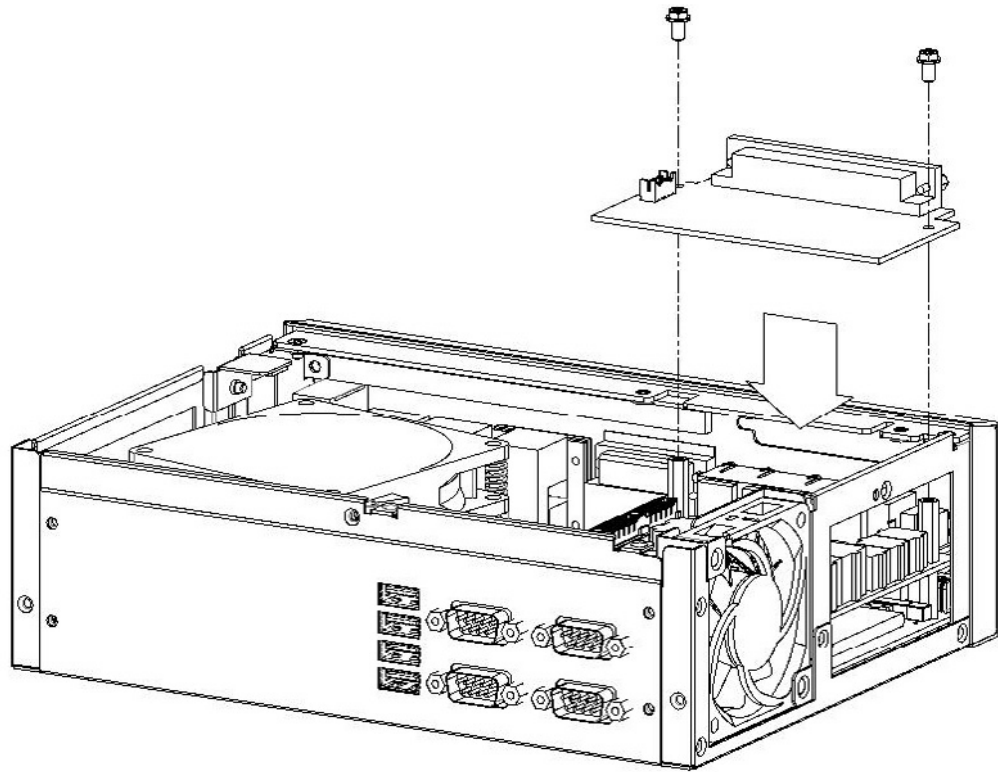
Figure 2.21 AIIS-DIO32 Installation

2.10 Wallmount Installation
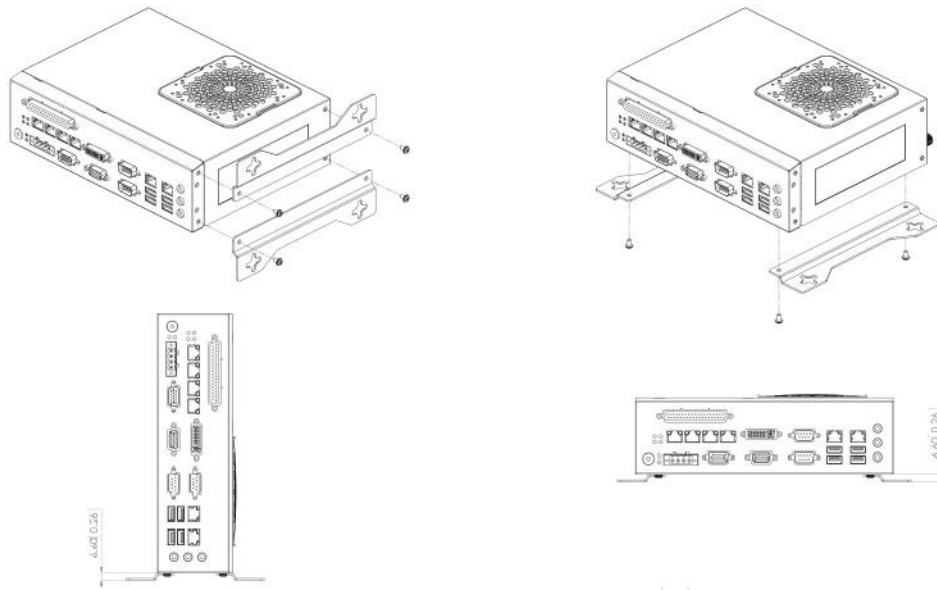
Figure 2.22 Wallmount Installation

Note! *This pair of wallmount bracket is designed for the side of chassis and bottom. Reverse installation is not permitted.*

2.11 DIN-Rail Installation
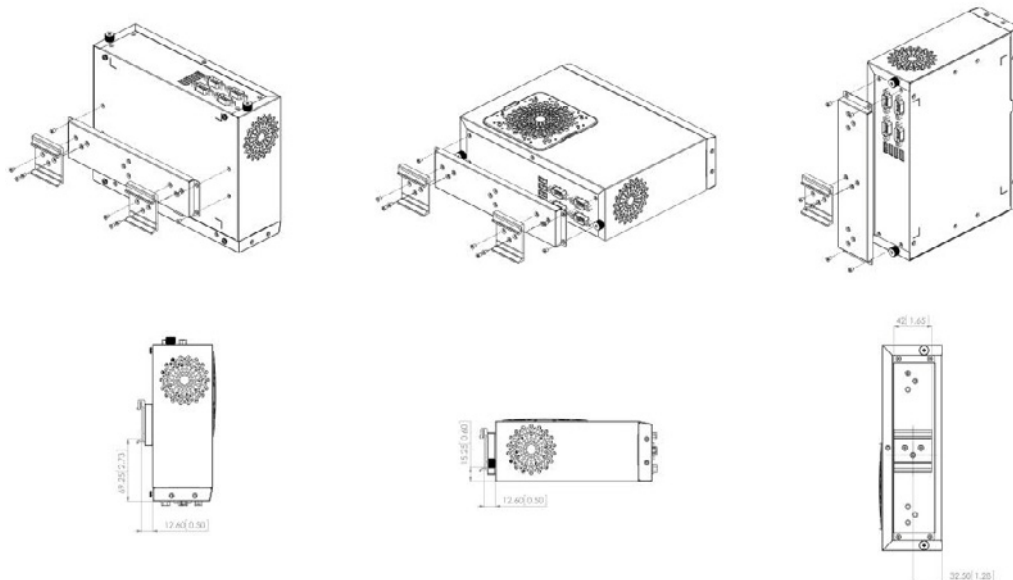
Figure 2.23 DIN-Rail Installation

Note! *This DIN-Rail bracket is designed for the rear side and bottom. Reverse installation is not permitted.*

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 special features on or off. This chapter describes the basic navigation of AIIS-1440 setup screens.

3.2 Entering Setup

Turn on the computer and during POST startup the BIOS 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) 2011 American Megatrends, Inc.
        Main  Advanced  Chipset  Boot  Security  Save & Exit

        BIOS Information                                             Set the Date. Use Tab to
        BIOS Vendor                   American Megatrends            switch between Date elements.
        Core Version                  4.6.5.3   0.18 x64
        Compliancy                    UEFI 2.3; PI 1.2
        Project Version               AIIS 1240X007
        Build Date and Time           06/26/2013 17:12:30

        Total Memory                  4096 MB (DDR3)


        System Date                   [Mon 07/15/2013]
        System Time                   [11:05:10]

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




          Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.1 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.

3.2.2.1 Advantech BIOS Update V1.3

Figure 3.3 Advantech BIOS Update V1.3

You can update the BIOS via a USB storage device in FAT32 format.

3.2.2.2 PCI Subsystem Settings
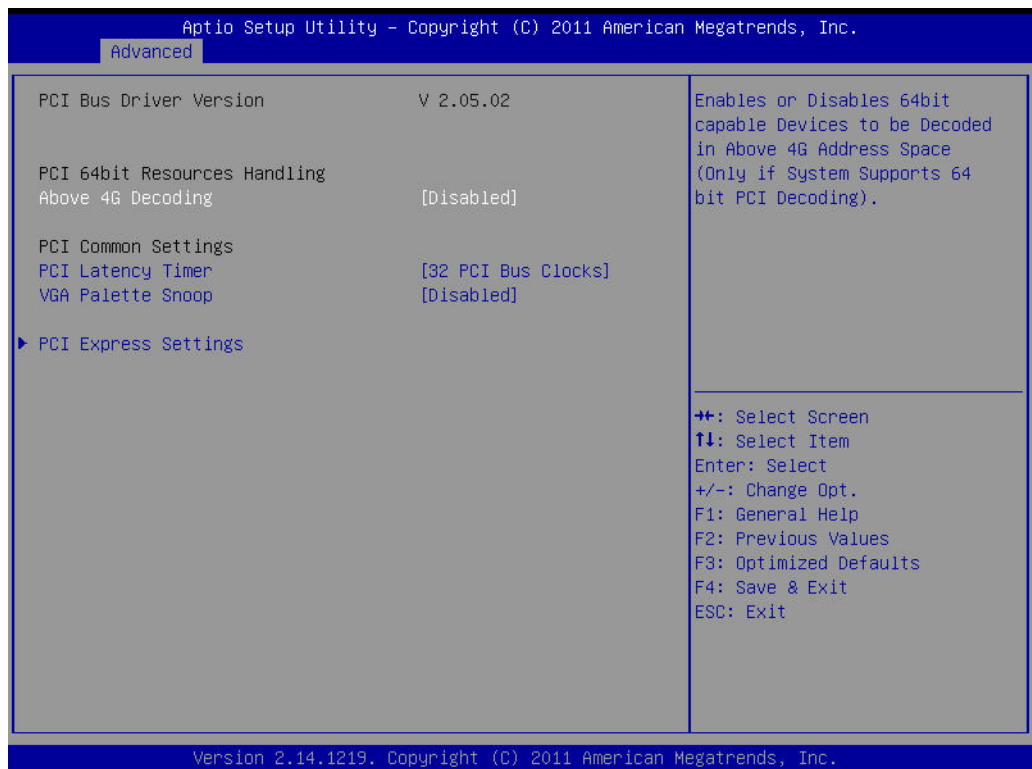
Figure 3.4 PCI Subsystem Settings

■ **PCI 64-bit Resources Handing**
Above 4G Decoding

Enable/Disable 64-bit capable devices to be decoded in above 4G address space (only if system supports 64-bit PCI decoding).

■ **PCI Common Settings**
PCI Latency Timer

Value to be programed into PCI Latency Timer Register.
VGA Palette Snoop

Enables/Disables VGA palette registers snooping.

```
          Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
  Advanced

  Link Training Retry            [5]              Defines number of Retry
  Link Training Timeout (uS)     100              Attempts software will take to
                                                  retrain the link if previous
                                                  training attempt was
                                                  unsuccessful.




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



          Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.5 PCI Express Settings

■ **Link Training Retry**

Defines number of retry attempts the software will take to retrain the link if previous training attempts were unsuccessful.

■ **Link Training Timeout**

Defines number of micro-seconds the software will wait before polling "Link Training" bit in the link status register. Values range from 10 to 1000 uS.

3.2.2.3 ACPI Settings

```
                 Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
  Advanced

  ACPI Settings                                               Choose this item correspond
                                                              with your power supply type.
  Power Type                          [ATX]
  Enable ACPI Auto Configuration      [Disabled]

  Enable Hibernation                  [Enabled]
  Lock Legacy Resources               [Disabled]
  PowerOn by Modem                    [Disabled]




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




                 Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.6 ACPI Settings

- **Power Type**

  Choose the item that corresponds with your power supply type: ATX or AT.

- **Enable ACPI AUTO configuration**

  Enable or disable ACPI auto configuration

- **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.

- **PowerOn by Modem**

  "Enable" or "Disable" PowerOn by Modem

3.2.2.4 Trust Computing

```
            Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
     Advanced

 Configuration                                              Enables or Disables BIOS
   Security Device Support           [Disable]              support for security device.
                                                            O.S. will not show Security
                                                            Device. TCG EFI protocol and
 Current Status Information                                 INT1A interface will not be
   NO Security Device Found                                 available.


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


            Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.7 Trust Computing

■ **Security Device Support**

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

3.2.2.5 S5 RTC Wake Setting
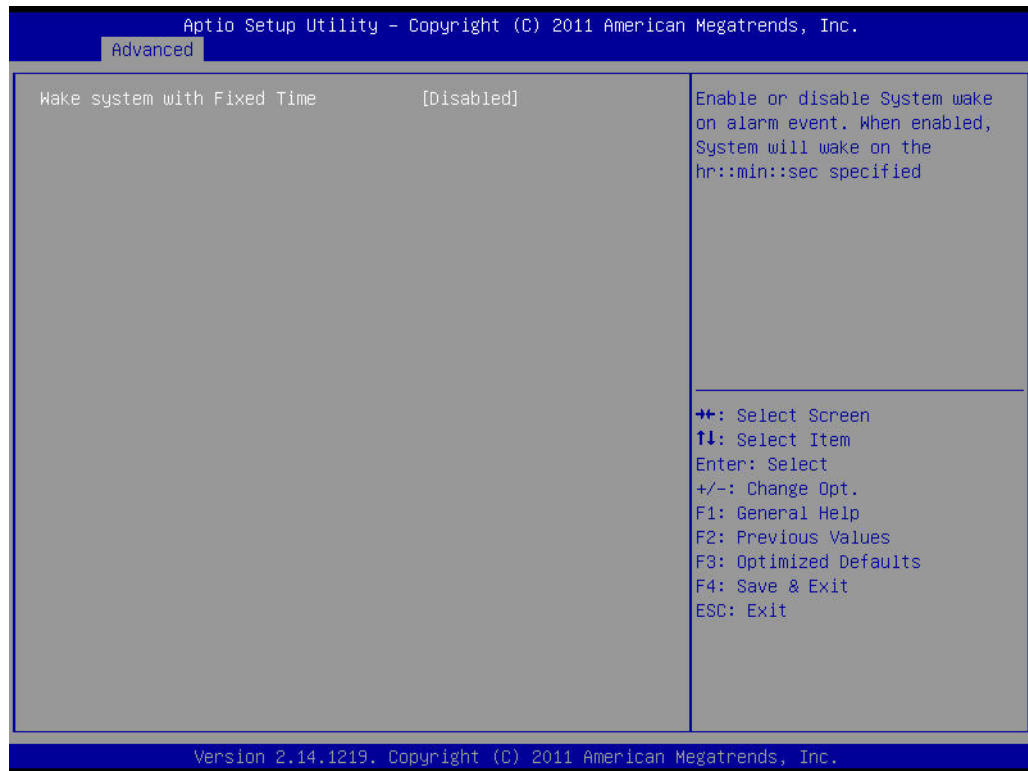
Figure 3.8 S5 RTC configuration

■ **Wake System with Fixed Time**

Enable or disable system wake on alarm event, When enabled, the system will wake on the hr:min:sec as specified.

3.2.2.6 CPU Configuration
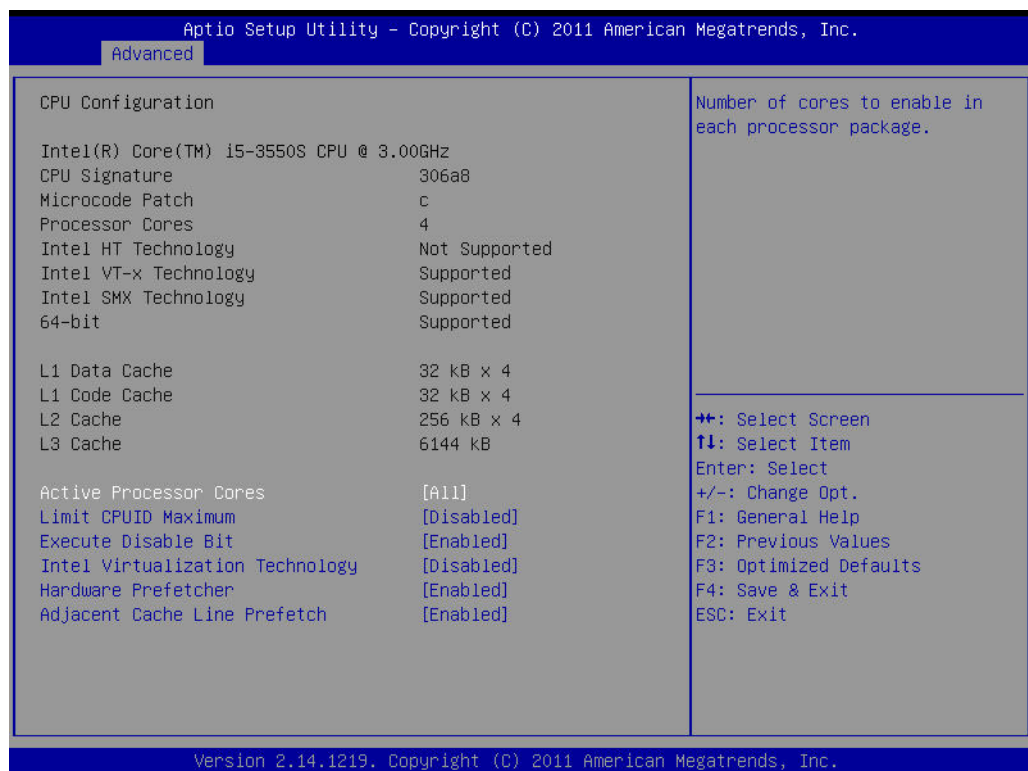
Figure 3.9 CPU Configuration

■ **Hyper-threading**

This item allows you to enable or disable Intel hyper-threading technology.

■ **Active Processor Core**

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

■ **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.

■ **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.

3.2.2.7 SATA Configuration
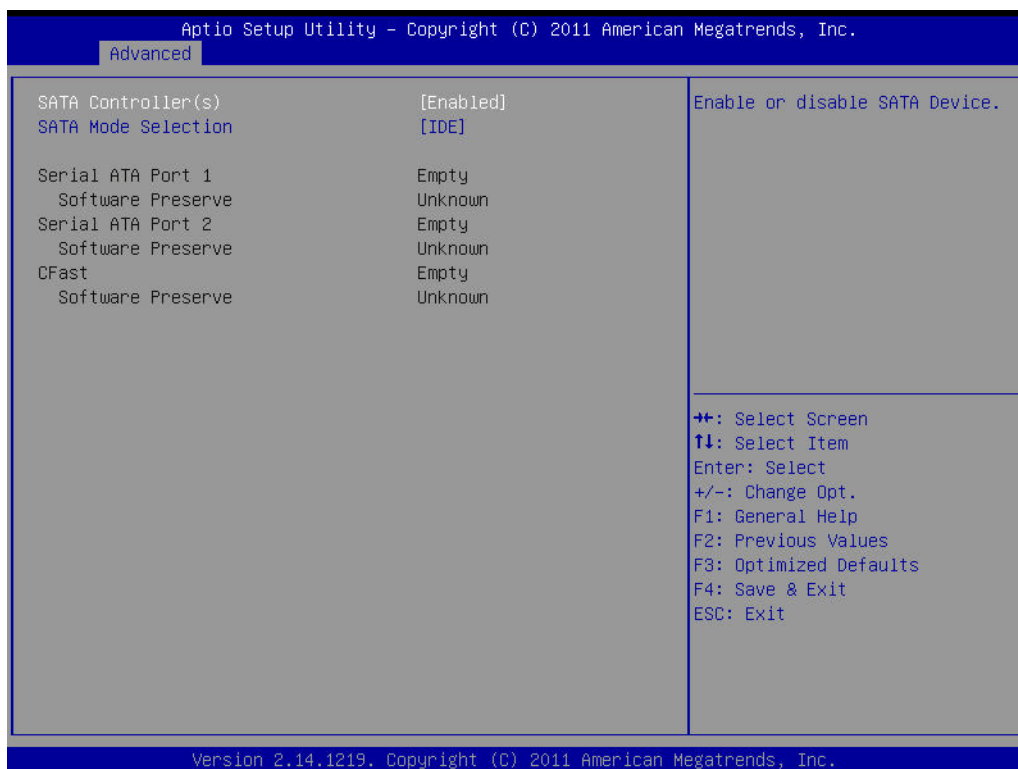
Figure 3.10 SATA Configuration

■ **SATA Controller(s)**
Enable or disable SATA Device

■ **SATA Mode**
This can be configured as IDE and AHCI.

Note! *Some OS request to install under AHCI mode so please consult your local OS vendor for more detailed information.*

3.2.2.8 Intel Trusted Execution Technology Configuration
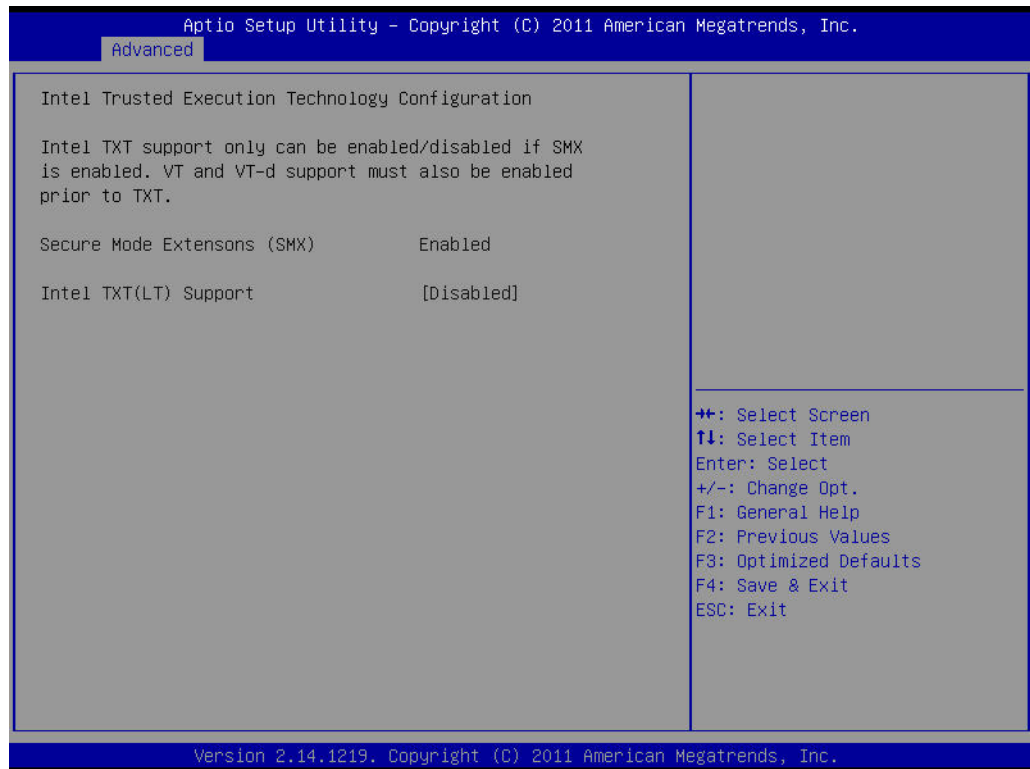
Figure 3.11 Intel Trusted Execution Technology Configuration

■ **Intel Trusted Execution Technology Configuration**
This enables or disables Intel® Trusted Execution Technology.

Note! *Your hardware platform should support Trusted Platform Module (TPM 1.2) to enable Intel Trusted Execution Technology. Please also ensure that Intel VT and Intel VT-d are enabled prior to TXT.*

3.2.2.9 USB Configuration

```
            Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
        Advanced

    USB Configuration                                      Enables Legacy USB support.
                                                           AUTO option disables legacy
    USB Devices:                                           support if no USB devices are
          1 Drive, 2 Hubs                                  connected. DISABLE option will
                                                           keep USB devices available
    Legacy USB Support                   [Enabled]         only for EFI applications.
    EHCI Hand-off                        [Disabled]

    USB hardware delays and time-outs:
    USB transfer time-out                [20 sec]
    Device reset time-out                [20 sec]
    Device power-up delay                [Auto]

    Mass Storage Devices:                                  ↔: Select Screen
    USB2.0 Flash Disk 8.07               [Auto]            ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit


            Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.12 USB Configuration

■ **Legacy USB Support**

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

■ **EHCI Hand-off**

This is a workaround for OS without EHCI hand-off support. The EHCI owner-ship change should be claimed by EHCI driver.

■ **USB transfer time-out**

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

■ **Device reset time-out**

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

■ **Device power-up delay**

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

3.2.2.10 Smart Setting
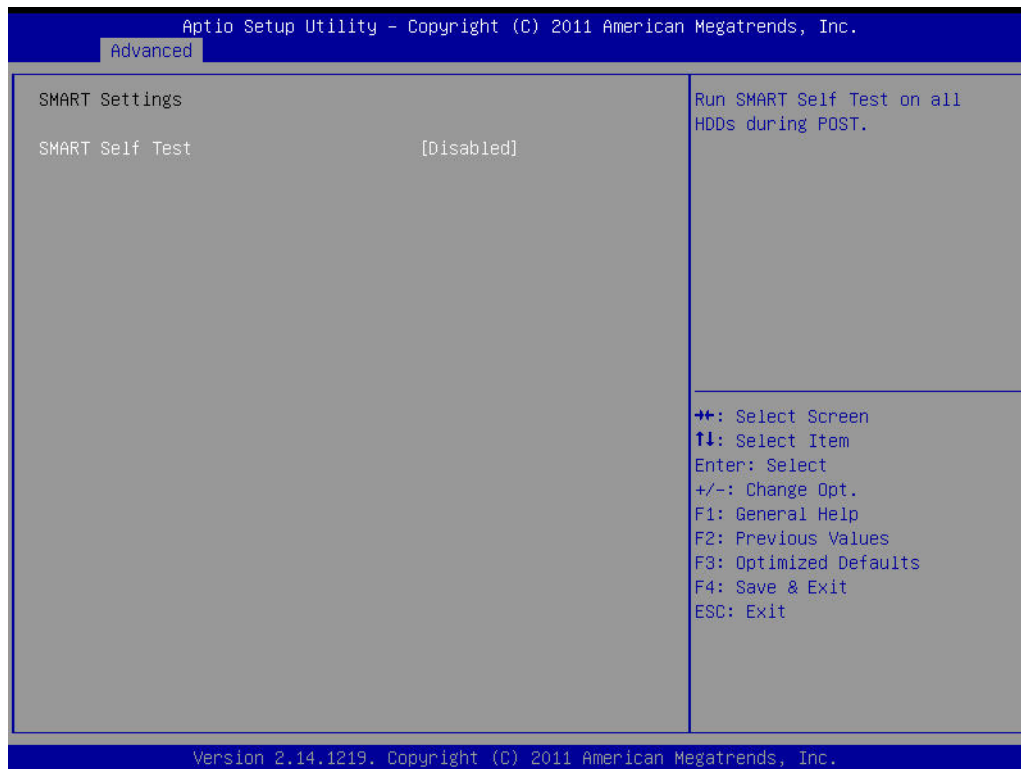
Figure 3.13 Smart Setting

- ■ **Smart self test**
  Run SMART Self Test on all HDDs during POST.

3.2.2.11 Super IO Configuration
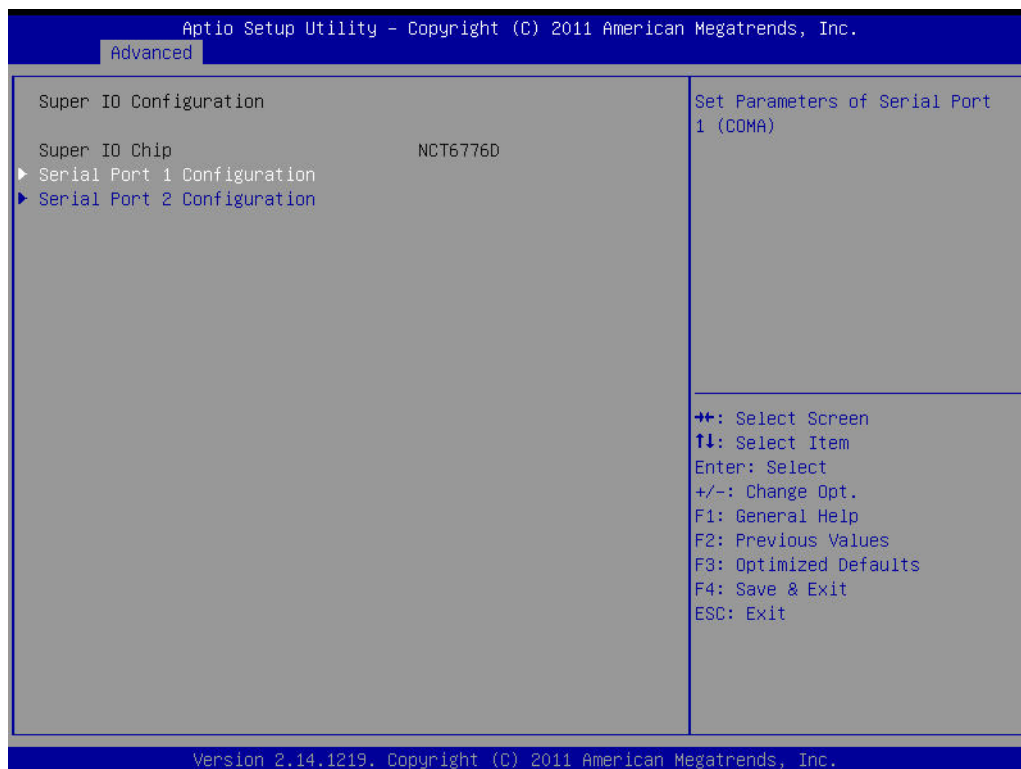
Figure 3.14 Super IO Configuration

```
              Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
      Advanced

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

  Change Settings                    [Auto]
  Device Mode                        [Standard Serial Po...]




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


              Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.15 Serial Port 1 Configuration

```
              Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
      Advanced

  Serial Port 2 Configuration                                  Enable or Disable Serial Port
                                                               (COM)
  Serial Port                        [Enabled]
  Device Settings                    IO=2F8h; IRQ=3;

  Change Settings                    [Auto]
  Device Mode                        [Standard Serial Po...]




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


              Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.16 Serial Port 2 Configuration

■ **Serial Port 1 -2 configuration**
  "Enable or Disable" Serial Port.

■ **Change settings**
  Select optimal settings for serial port 1 &2

■ **Device mode**

Serial port 1: could be selected as [Standard Serial Port Mode], RS-485 Half Duplex, or RS-422 Full Duplex.

Serial port 2: could be selected as [Standard Serial Port Mode], [IrDA 1.0 (HP SIR) Mode], [ASKIR Mode], RS-485 Half Duplex, or RS-422 Full Duplex.

3.2.2.12 H/W Monitor

```
           Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
     Advanced

 ▶ Smart Fan Mode Configuration                              Smart Fan Mode Select
   Pc Health Status

   System temperature               : +44°C
   CPU Temperature                  : +52°C
   SYSFAN1 Speed                    : N/A
   CPUFAN1 Speed                    : 5172 RPM
   VCORE                            : +0.928 V
   +12V                             : +12.038 V
    +5V                             : +5.054 V
   DC IN VOLTAGE                    : +23.520 V
   DC IN CURRENT                    : +1.037 A
   3VCC                             : +3.296 V
   VBAT                             : +2.976 V
   Case Open Warning                [Disabled]               →←: Select Screen
   CPU Warning Temperature          [Disabled]               ↑↓: Select Item
   ACPI Shutdown Temperature        [Disabled]               Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit


           Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.17 PC Health Status

■ **Smart Fan Mode Configuration**

Enable or disable Smart fan

■ **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.

3.2.2.13 PCA-COM232 Super IO Configuration
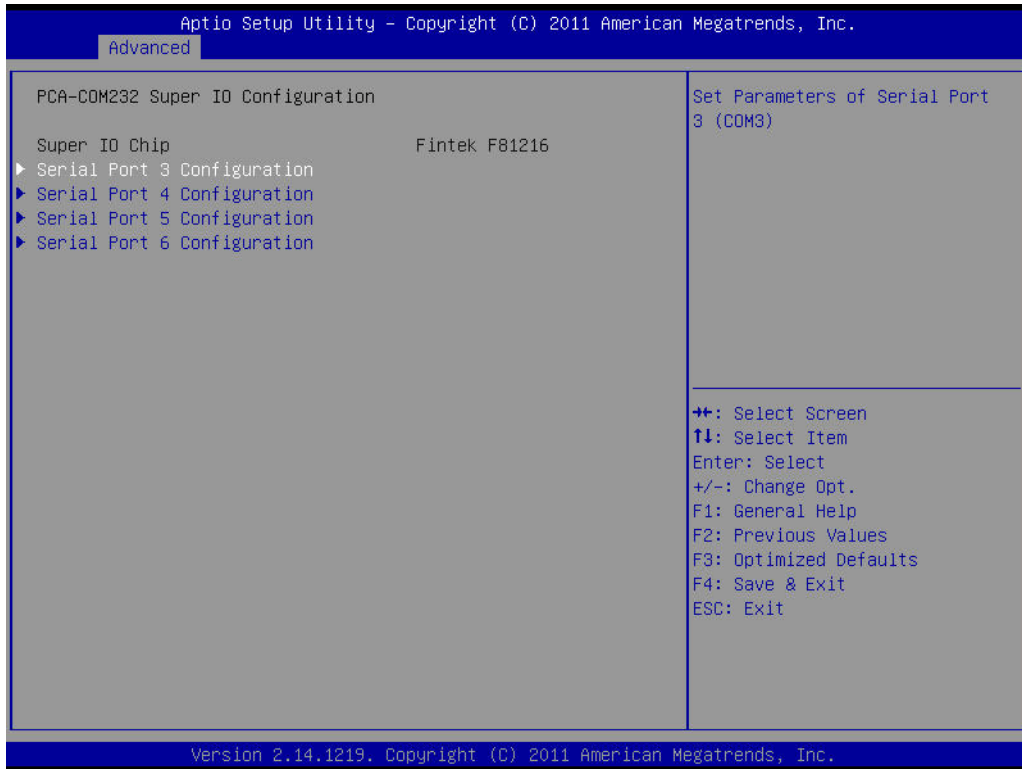
Figure 3.18 PCA-COM232 Super IO Configuration
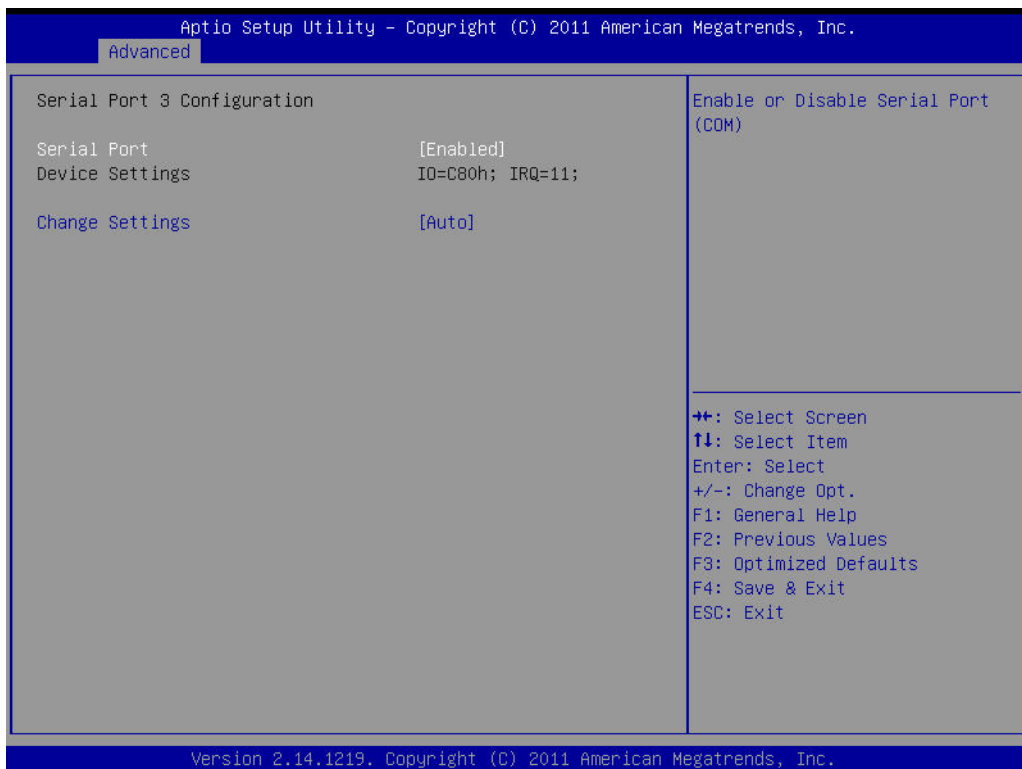
Figure 3.19 Serial Port 3 Configuration
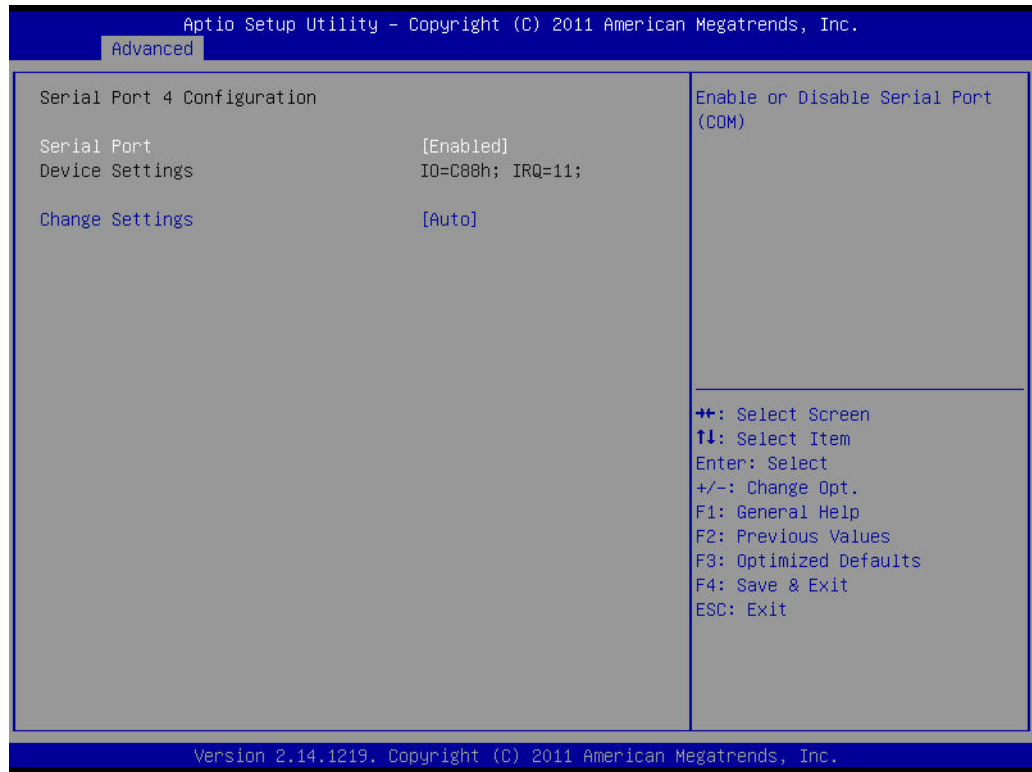
Figure 3.20 Serial Port 4 Configuration

Figure 3.21 Serial Port 5 Configuration
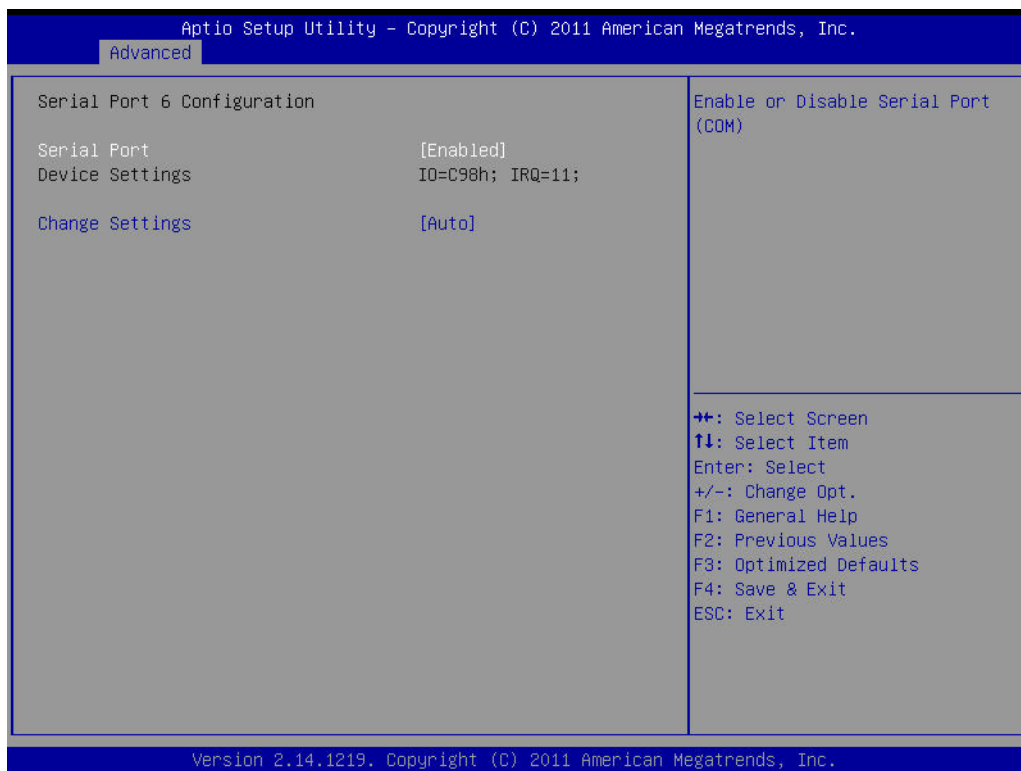
Figure 3.22 Serial Port 6 Configuration

■ **Serial Port 3 - 6 configuration**
   "Enable or Disable" Serial Port.
■ **Change settings**
   Select optimal settings for serial port 3, 4, 5 &6

3.2.2.14 Serial Port Console Redirection
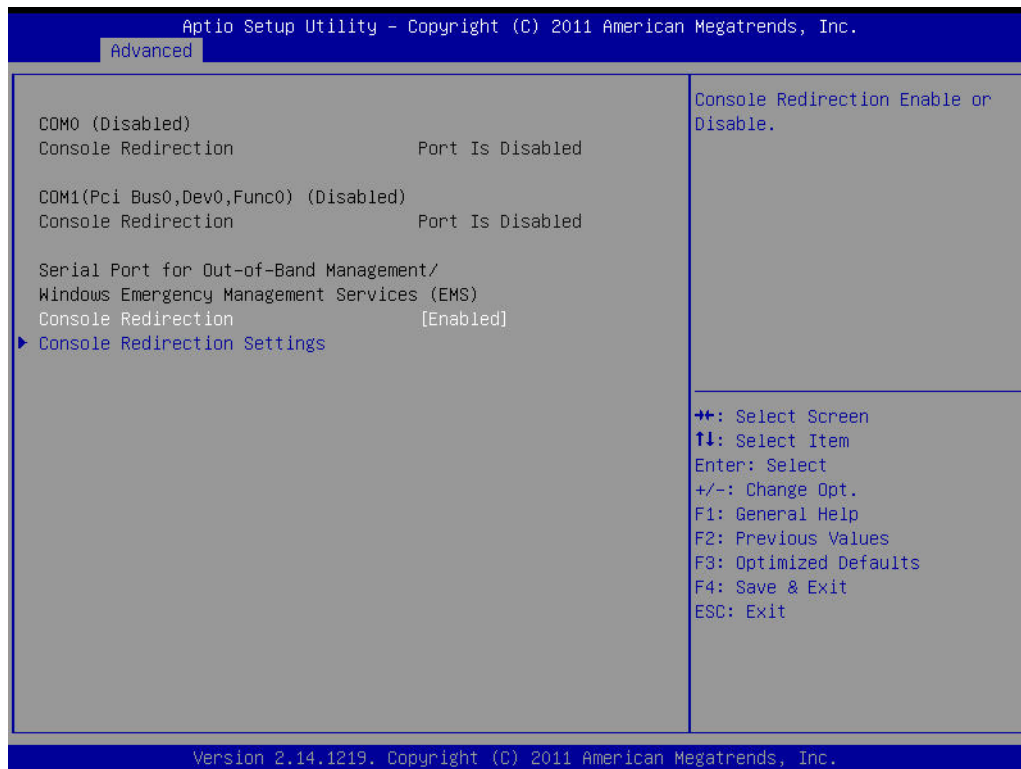
Figure 3.23 Serial Port Console Redirection

3.2.2.15 CPU PPM Configuration
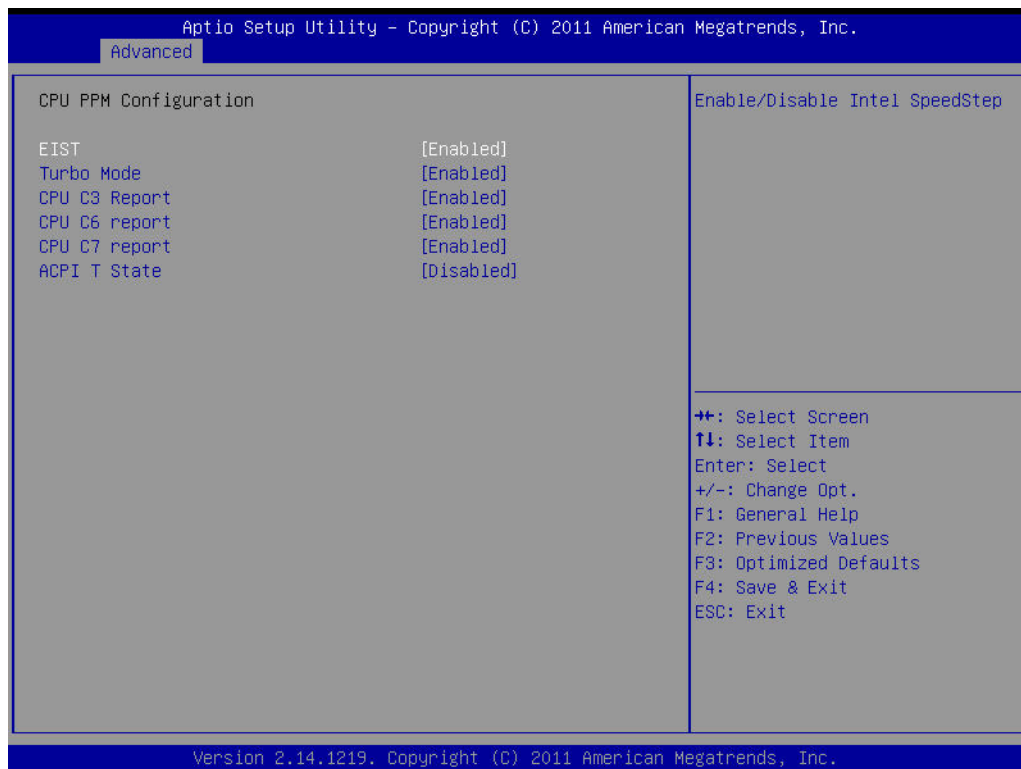
Figure 3.24 CPU PPM Configuration

■ **EIST**
Enable/Disable Intel Speedstep.

■ **Turbo mode**
Enable or disable turbo mode.

■ **CPU C3 report**
Enable/Disable CPU C3 (ACPI C2) report to OS.

■ **CPU C6 report**
Enable/Disable CPU C6 (ACPI C2) report to OS.

■ **CPU C7 report**
Enable/Disable CPU C7 (ACPI C2) report to OS.

■ **ACPI T state**
Enable/Disable ACPI T state support.

3.2.3 Chipset

```
               Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
      Main  Advanced  Chipset  Boot  Security  Save & Exit

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




















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


               Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.25 Chipset

3.2.3.1 PCH-IO Configuration

```
              Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
                    Chipset

   Intel PCH RC Version            1.1.0.0                  PCI Express Configuration
   Intel PCH SKU Name              H61                      settings
   Intel PCH Rev ID                05/B3

 ▶ PCI Express Configuration
 ▶ USB Configuration
 ▶ PCH Azalia Configuration

   LAN1 Controller                 [Enabled]
     LAN1 Option-ROM               [Disabled]
     Wake on LAN1 from S5          [Disabled]
   LAN2 Controller                 [Enabled]
     LAN2 Option-ROM               [Disabled]
   PCIE Wake                       [Disabled]               ➔←: Select Screen
                                                            ↑↓: Select Item
   High Precision Event Timer Configuration                 Enter: Select
                                                            +/-: Change Opt.
   High Precision Timer            [Enabled]                F1: General Help
                                                            F2: Previous Values
   SLP_S4 Assertion Width          [4-5 Seconds]            F3: Optimized Defaults
   Restore AC Power Loss           [Power Off]              F4: Save & Exit
                                                            ESC: Exit




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```

Figure 3.26 PCH IO Configuration

3.2.3.1.1 PCI Express Configuration

```
              Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
                    Chipset

   PCI Express Configuration                                Enable or disable PCI Express
                                                            Subtractive Decode.
   Subtractive Decode              [Disabled]
 ▶ PCI Express Root Port 1
 ▶ PCI Express Root Port 2
 ▶ PCI Express Root Port 3
 ▶ PCI Express Root Port 4
   PCIE Port 5 is assigned to LAN
 ▶ PCI Express Root Port 6
 ▶ PCI Express Root Port 7
 ▶ PCI Express Root Port 8


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



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```

Figure 3.27 PCI Express Configuration

- **Subtractive decode**
  Enable or disable PCI Express subtractive decode.
- **PCI Express Configuration**
  PCI Express Root Port 1 to 8 Setting.

3.2.3.1.2 USB Configuration

```
           Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
              Chipset

  USB Configuration                                    Control the USB EHCI (USB 2.0)
                                                       functions.
                                                       One EHCI controller must
  EHCI1                         [Enabled]              always be enabled.

  EHCI2                         [Enabled]

  USB Ports Per-Port Disable Control   [Disabled]



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



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```

Figure 3.28 USB Configuration

- **EHCI1**
  Control the USB EHCI (USB2.0) functions. One EHCI controller must always be enabled.
- **EHCI2**
  Control the USB EHCI(USB2.0) functions. One EHCI controller must always be enabled.
- **USB Ports Pre-port Disable Control**
  Control each of the USB ports (0-13) disabling.

3.2.3.1.3 PCH Azalia Configuration

Figure 3.29 PCH Azalia Configuration

- ■ **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.

- ■ **LAN1 Controller**

  Enable or Disable LAN1 Controller.

- ■ **LAN 1 Option-ROM**

  Enable or Disable LAN 1 boot option for legacy network devices.

- ■ **Wake on LAN1 from S5**

  Enable or Disable LAN1 to wake the system. (The wake on LAN cannot be disabled if ME is on at Sx state).

- ■ **LAN2 Controller**

  Enable or Disable LAN2 Controller.

- ■ **LAN 2 Option-ROM**

  Enable or Disable LAN 2 boot option for legacy network devices.

- ■ **PCIE Wake**

  Enable or Disable PCIE to wake the system from S5.

- ■ **High precision Timer**

  Enable or Disable high precision event timer.

- ■ **SLP_S4 Assertion Width**

  Select a minimum assertion width of the SLP_S4# signal.

- ■ **Restore AC Power Loss**

  Power Off, power On or Last State to restore AC power loss

3.2.3.2 System Agent (SA) Configuration
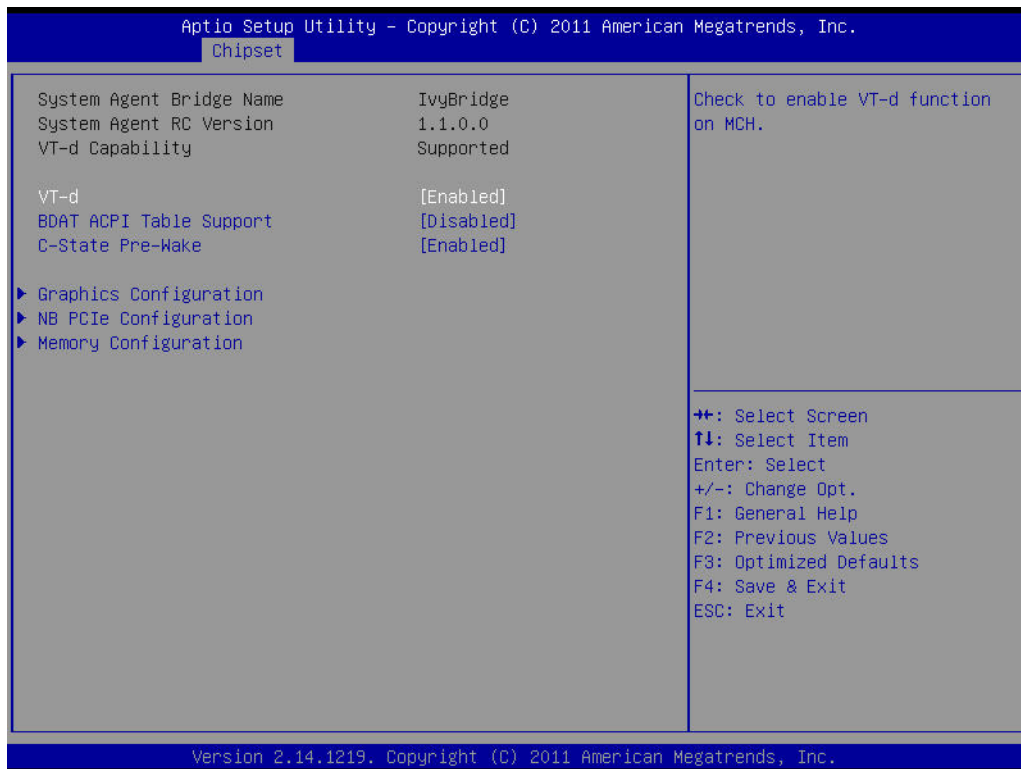
Figure 3.30 System Agent (SA) Configuration

- **VT-d**
  Check to enable VT-d function on MCH.
- **BDAT ACPI Table support**
  Enable support for the BDAT ACPI table.
- **C-State Pre-Wake**
  Enable support for C-Sate Pre-Wake.

3.2.3.3 Graphics Configuration

```
             Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
                 Chipset
    ┌─────────────────────────────────────────────────┬──────────────────────────────┐
    │ Graphics Configuration                           │ Select which of IGFX/PEG/PCI │
    │ IGFX VBIOS Version          2126                 │ Graphics device should be    │
    │ IGfx Frequency              350 MHz              │ Primary Display Or select SG │
    │                                                  │ for Switchable Gfx.          │
    │ Primary Display             [Auto]               │                              │
    │ Internal Graphics           [Auto]               │                              │
    │ GTT Size                    [2MB]                │                              │
    │ Aperture Size               [256MB]              │                              │
    │ DVMT Pre-Allocated          [64M]                │                              │
    │ DVMT Total Gfx Mem          [256M]               │                              │
    │ Gfx Low Power Mode          [Enabled]            │                              │
    │ Primary IGFX Boot Display   [VBIOS Default]      │                              │
    │                                                  │                              │
    │                                                  │ →←: Select Screen            │
    │                                                  │ ↑↓: Select Item              │
    │                                                  │ Enter: Select                │
    │                                                  │ +/-: Change Opt.             │
    │                                                  │ F1: General Help             │
    │                                                  │ F2: Previous Values          │
    │                                                  │ F3: Optimized Defaults       │
    │                                                  │ F4: Save & Exit              │
    │                                                  │ ESC: Exit                    │
    │                                                  │                              │
    └─────────────────────────────────────────────────┴──────────────────────────────┘
             Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.31 Graphics Configuration

■ **Primary Display**

Select which IGFX/PEG/PCI graphics device should be primary display or select SG for switchable GFX.

■ **Internal Graphics**

Keep IGD enabled based on the setup options.

■ **GTT Size**

Select the GTT size.

■ **Aperture Size**

Select the aperture size.

■ **DVMT Pre-Allocated**

Select DVMT5.0 pre-allocated (fixed) graphics memory size, up to 1024 M, used by the internal graphics device.

■ **DVMT Total Gfx Mem**

Select 128 M, 256 M or MAX DVMT5.0 total graphics memory size used by the internal graphics device.

■ **Gfx Low Power Mode**

This option is applicable for SFF only.

■ **Primary IGFX Display**

Select the video device which will be activated during POST. This has no effect if external graphics are present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display. Note: In DOS mode, only either VGA or DVI single output are supported.

3.2.3.4 NB PCIe Configuration

```
                Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
                 Chipset

 NB PCIe Configuration                                          Configure PEG0 B0:D1:F0
 PEG0                            Not Present                    Gen1-Gen3
   PEG0 - Gen X                  [Auto]
   PEG0 ASPM                     [Auto]

 Enable PEG                      [Auto]
 De-emphasis Control             [-3.5 dB]




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




                Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.32 NB PCIe Configuration

■ **PEG0-Gen X**

Configure auto, Gne1, Gen2, or Gen 3.

■ **PEG0 ASPM**

Control ASPM support for the PEG: Device 1 Function 0. This has no effect if PEG is not the currently active device.

■ **Enable PEG**

Enable/Disable/Auto the PEG.

■ **De-emphasis Control**
Configure the De-emphasis control on PEG.

3.2.3.5 Memory Configuration
Overview memory detail information.

```
            Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
                   Chipset

    Memory Information

    Memory RC Version                 1.1.0.0
    Memory Frequency                  1333 Mhz
    Total Memory                      4096 MB (DDR3)
    DIMMA1                            Not Present
    DIMMB1                            4096 MB (DDR3)
    CAS Latency (tCL)                 9
    Minimum delay time
        CAS to RAS (tRCDmin)          9
        Row Precharge (tRPmin)        9
        Active to Precharge (tRASmin) 24

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

            Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```
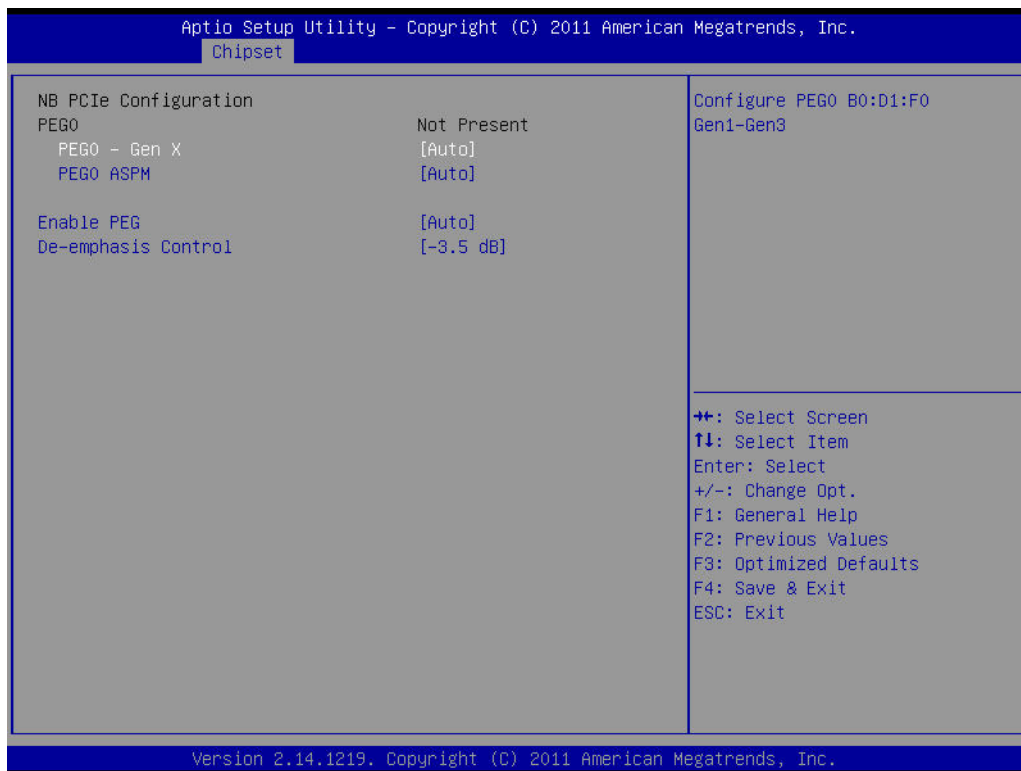
Figure 3.33 Memory Information

3.2.4 Boot

```
            Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
     Main  Advanced  Chipset  Boot  Security  Save & Exit

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

    CSM16 Module Version            07.69

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

    Boot Option Priorities
    Boot Option #1                  [USB2.0 Flash Disk ...]   ↔: Select Screen
    Boot Option #2                  [UEFI: USB2.0 Flash...]   ↑↓: Select Item
                                                              Enter: Select
    Hard Drive BBS Priorities                                 +/-: Change Opt.
                                                              F1: General Help
                                                              F2: Previous Values
                                                              F3: Optimized Defaults
                                                              F4: Save & Exit
                                                              ESC: Exit

            Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```
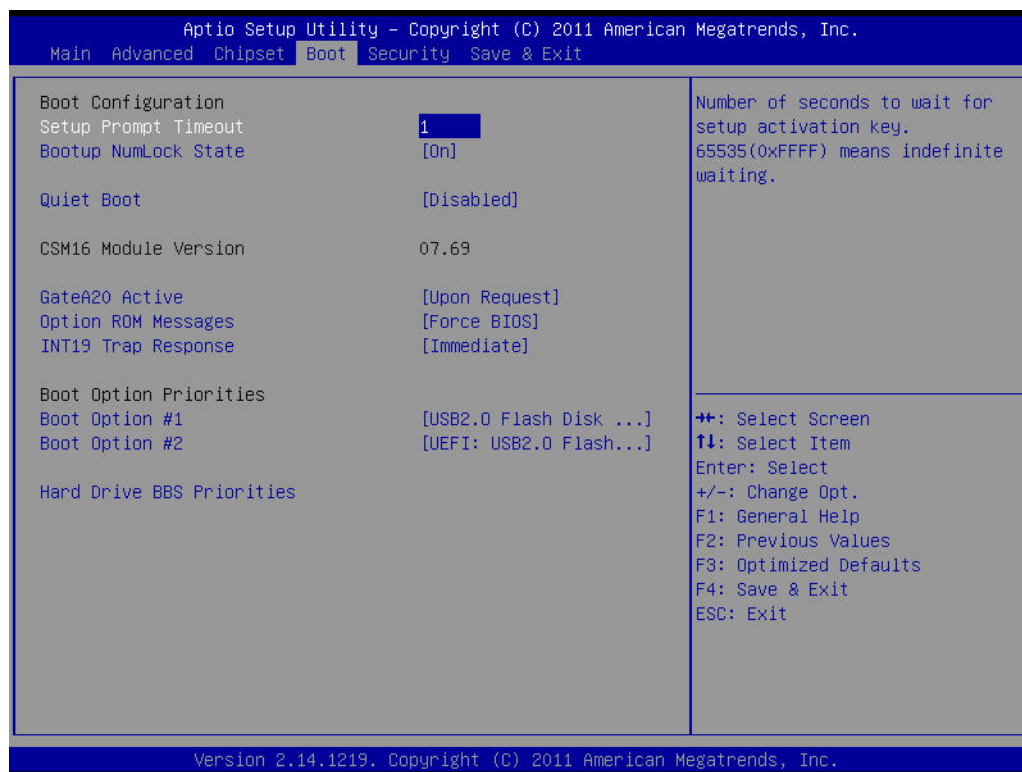
Figure 3.34 Boot

■ **Setup Prompt timeout**

Number of seconds to wait for setup activation key.

■ **Bootup NumLock State**

Select the keyboard Numlock state.

■ **Quiet Boot**

Enable/Disable Quiet Boot option.

■ **GateA20 Active**

Upon request-GA20 can be disabled using BIOS services.

Always-do not allow disabling GA20; this option is useful when any RT code is executed above 1 MB.

■ **Option Rom Messages**

Set display mode for option ROM.

■ **INT19 Trap Response**

BIOS reaction on INT19 trapping by option ROM:

IMMEDATE-execute the trap right away.

POSTPONED-execute the trap during legacy boot.

■ **Boot Option Priorities**

you can see the information of boot priority option of devices.

3.2.5 Security

```
               Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
     Main  Advanced  Chipset  Boot  Security  Save & Exit

  Password Description                                     Set Administrator Password

  If ONLY the Administrator's password is set,
  then this only limits access to Setup and is
  only asked for when entering Setup.
  If ONLY the User's password is set, then this
  is a power on password and must be entered to
  boot or enter Setup. In Setup the User will
  have Administrator rights.
  The password length must be
  in the following range:
  Minimum length                      3
  Maximum length                      20

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



               Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```
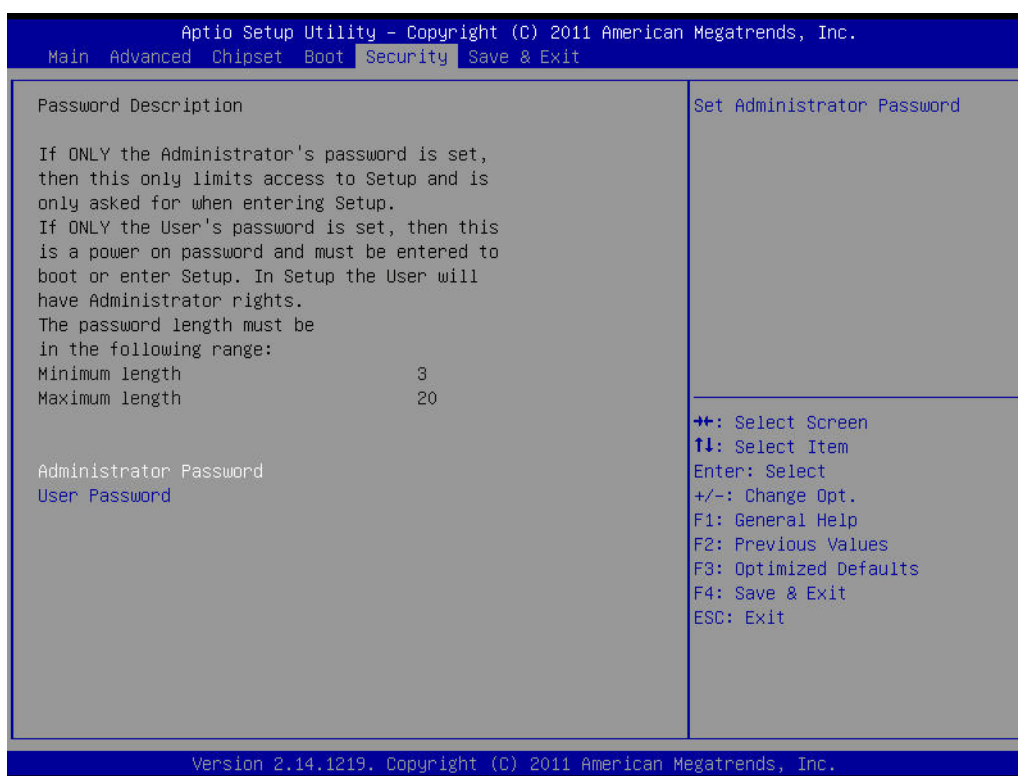
Figure 3.35 Security

Select Security Setup from AIIS-1440Setup 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>
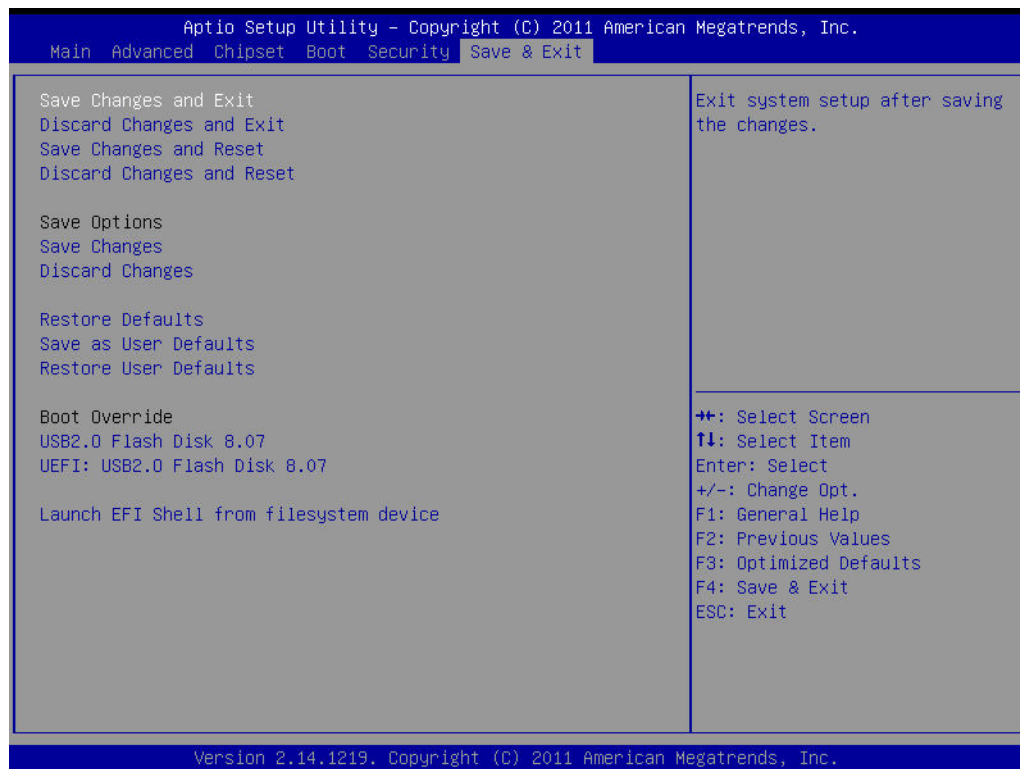
3.2.6 Save & Exit


```
           Aptio Setup Utility - Copyright (C) 2011 American Megatrends, Inc.
   Main  Advanced  Chipset  Boot  Security  Save & Exit

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

   Save Options
   Save Changes
   Discard Changes

   Restore Defaults
   Save as User Defaults
   Restore User Defaults

   Boot Override                                  →←: Select Screen
   USB2.0 Flash Disk 8.07                         ↑↓: Select Item
   UEFI: USB2.0 Flash Disk 8.07                   Enter: Select
                                                  +/-: Change Opt.
   Launch EFI Shell from filesystem device        F1: General Help
                                                  F2: Previous Values
                                                  F3: Optimized Defaults
                                                  F4: Save & Exit
                                                  ESC: Exit


           Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

Figure 3.36 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.

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

Appendix A

Programming the Watchdog Timer

A.1 Introduction

The AIIS-1440'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).
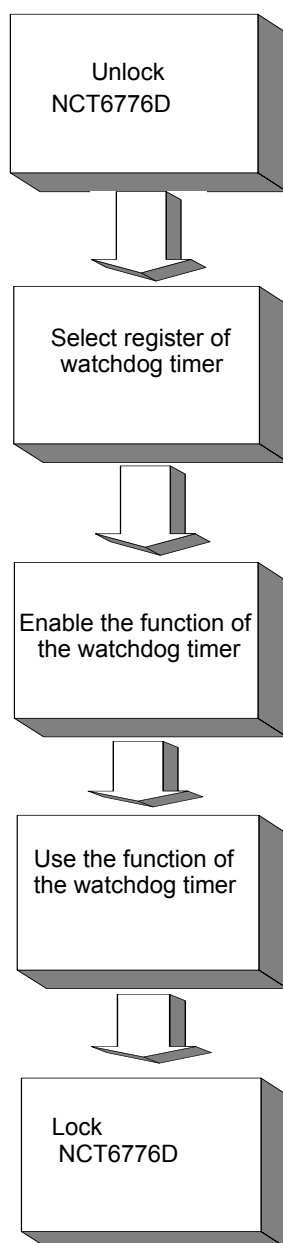
Table A.1: Watchdog timer registers

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
;---------------------------------------------------------
Mov      al,0f7h
Out      dx,al        ;Write 1 to bit 5 of F7 register
Inc      dx
In       al,dx
```

Appendix B

Programming 8-bit
DIO (GPIO)

B.1 Supported GPIO Register

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

B.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 Register 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.

B.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
```

Appendix C

32-bit DIO Signal Connections

C.1 Overview

Maintaining good signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly. A good signal connection can avoid unnecessary and costly damage to your PC and other hardware devices.

C.2 Isolated Digital I/O Connections

C.2.1 Dry/Wet Contact Support for Digital Input

Each digital input channel accepts either dry contact or 0 ~ 5 VDC wet contact inputs. Dry contact capability allows the channel to respond to changes in external circuitry (e.g., the closing of a switch in the external circuitry) when no voltage is present in the external circuit. Figure 3-1 shows external circuitry with both wet and dry contact components, connected as an input source to one of the card's digital input channels.
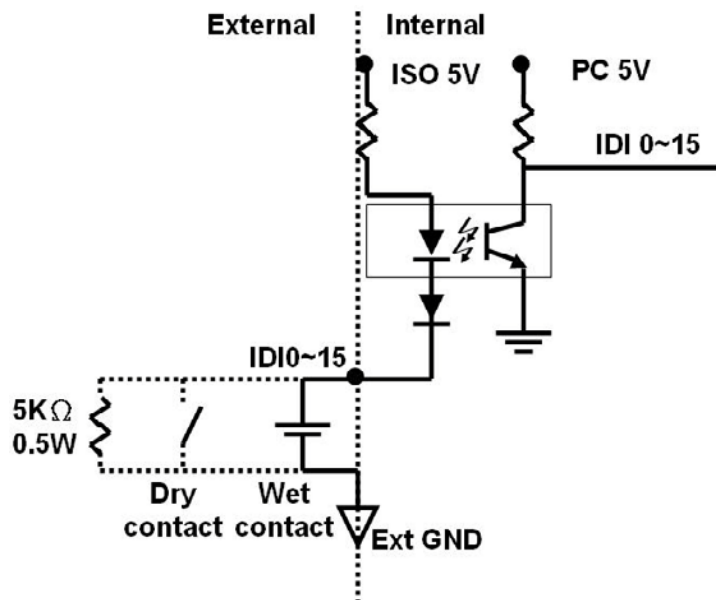
Figure C.1 Isolated Digital Input Connections

C.2.2 Isolated Digital Output Connections

Each of 8 isolated digital output channels comes equipped with a Darlington transistor. Every 8 output channels share common collectors and integral suppression diodes for inductive loads. Channels 0 ~ 7 use COM0, and channels 8 ~ 15 use COM1 as a common pin. If an external voltage (5 ~ 40 V) is applied to an isolated output channel (IDO 0 ~ IDO 15) while it is being used as an output channel, the current will flow from the external voltage source to the card. Please take care that the current through each GND pin not exceed 100 mA.
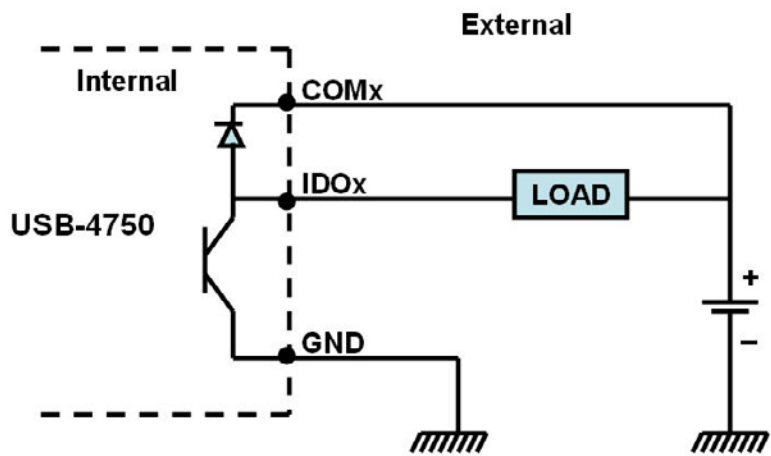
Figure C.2 Isolated Digital Output Connections

Appendix D

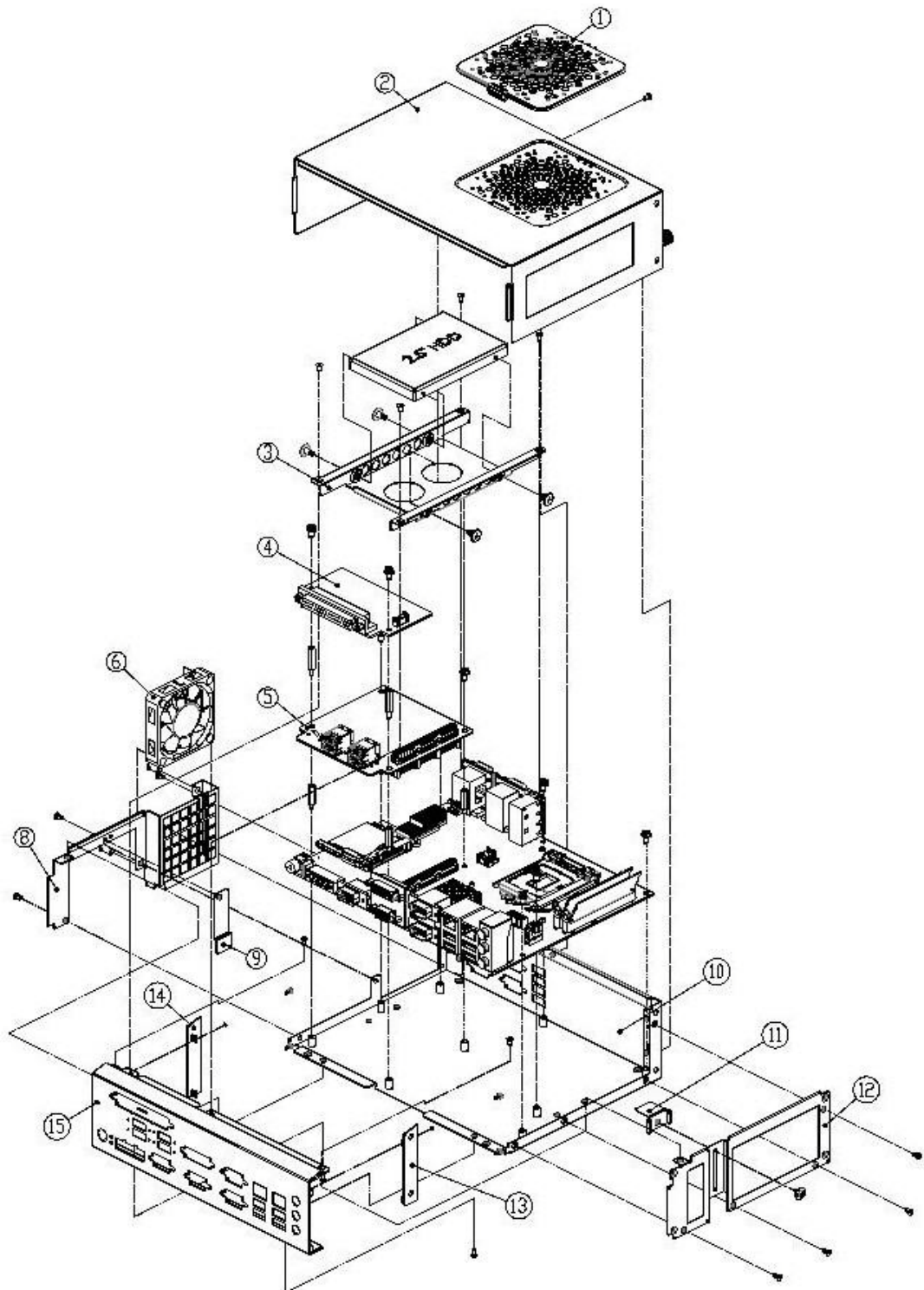## Explored Diagram & Parts List

D.1 Explored Diagram

Figure D.1 Explored Diagram

Table D.1: Parts List			
1	Fan filter	9	CFast card clamps bracket
2	Top cover	10	Chassis assembly
3	HDD tray	11	USB clamps bracket
4	DIO board	12	Side bracket
5	USB board	13	Side cover R
6	SYS fan	14	Side cover L
7	Main board	15	Front IO panel
8	Fan bracket		

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