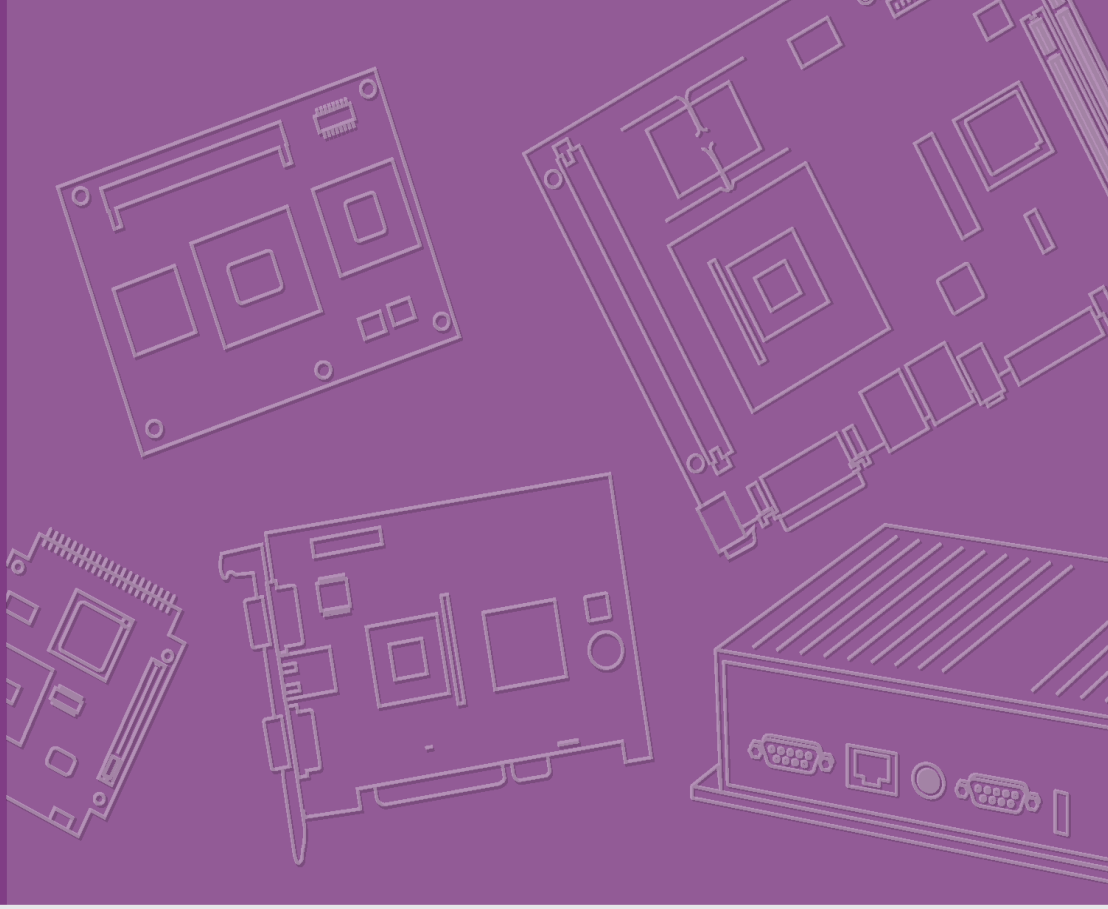

User Manual

SOM-7564

ADVANTECH

Enabling an Intelligent Planet

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Part No. 2006756400 Edition 1

Printed in Taiwan December 2011

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Advantech warrants to you, the original purchaser, that each of its products will befree from defects in materials and workmanship for two years from the date of purchase.

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

Declaration of Conformity

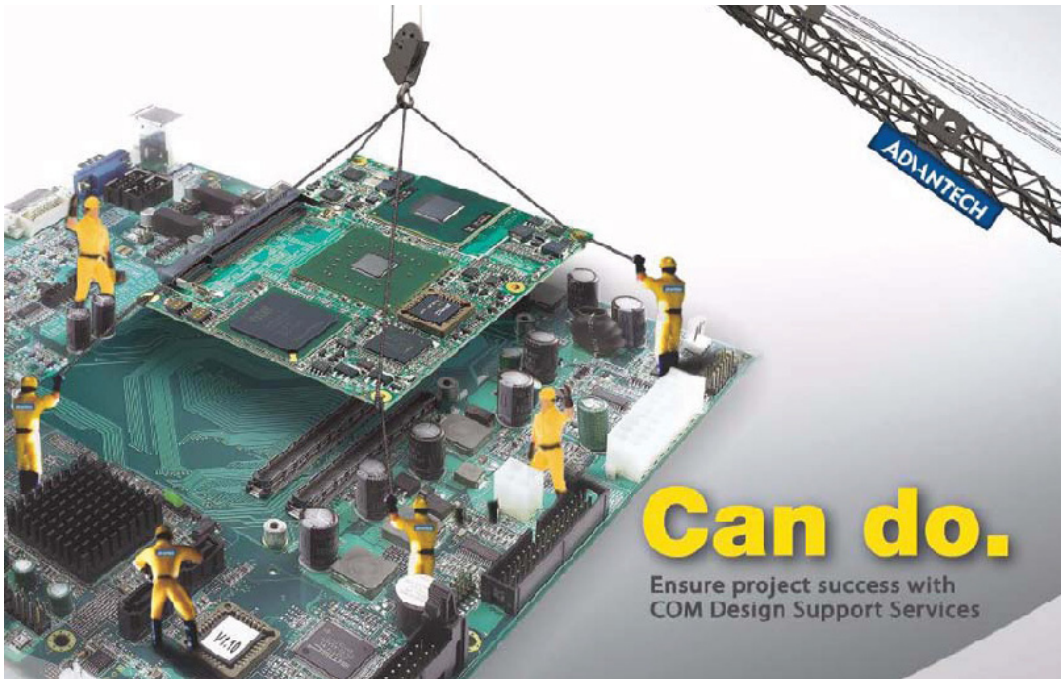
CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

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.

COM Design Support



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COM Design Support Zone: http://www.advantech.com

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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

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.
14. 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.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. Electrostatic discharge as you connect a jumper or install a card may damage sensitive electronic components.

Packing List

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

- 1 SOM-7564 module
- 1 heatspreader 84*55*11mm

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Chapter 1

General Information

This chapter gives background information on the SOM-7564 CPU Computer on Module.

Sections include:

- Introduction
- Specifications

1.1 Introduction

SOM-7564 is Advantech's first COM Express Mini module powered by the Intel® Atom® processor E6xx series (formerly codenamed Tunnel Creek). This is also Advantech's first COM module adopting the open PCI-Express standard that allows connection to third party chips giving developers even greater flexibility and functionality. It is compliant with the COM R2.0 type 10 specification for customers targeting ultra lower power consumption applications. The compact design (84 x 55 mm) is about the size of a business card making it suitable for portable applications in Point of Sale, transportation, medical and factory devices.

SOM-7564 is designed with only the CPU on module, which allows customers to pick an I/O hub specifically to fulfill their requirements. For customers looking for the Intel® EG20T (formerly codenamed Topcliff), Advantech specially designed the SOM-AB5500 application board with this IOH connected to the CPU on SOM-7564 through a PCIe x1 interface. SOM-AB5500 is a 3.5" carrier board with a smart battery manager which delivers ultra low power consumption and diverse I/O options.

1.2 Specifications

1.2.1 Standard Computer On Module Functions

- **CPU:** Onboard Intel® Atom™ E6xx Series (For detailed CPU support information please contact your sales representative)
- **BIOS:** AMI 8Mb Flash BIOS
- **Cache memory:** Intel® Atom™ E6xx processor integrated 512 KB L2 cache
- **System memory:** Onboard DDR2 667/800 1GB memory
- **Power management:** Supports power saving modes including Normal / Standby / Suspend modes. ACPI 3.0 compliant
- **SATA interface:** Depends on IOH connected
- **Watchdog timer:** 65536 level timer interval, from 0~65535 sec., multi-level, multi-option watchdog timer
- **USB interface:** Depends on IOH connected
- **Expansion interface:** Supports LPC, 3 PCIe x1, SPI, SMBus, I2C

1.2.2 VGA/Flat Panel Interface

- **Display type:**
  - Dual display supports SDVO and LVDS
  - Supports 24-bit single channel LVDS interface
- **Display mode:**
  - SDVO mode: Supports up to 1280 x 1024
  - LCD mode: Supports 800 x 600 and 1024 x 768

1.2.3 Audio Function

- **Audio interface:** Intel high definition audio interface

1.2.4 Ethernet

- **1000 Mbps:** Intel 82574L Gigabit Ethernet. Base on IEEE 10BASE-T, 100BASE-TX and 1000BASE-T standard.

1.2.5 Mechanical and Environmental

- **Dimensions:** COM Express Mini form-factor, 84 mm x 55 mm (3.3" x 2.17")
- **Power supply voltage:** +12 V power (+5 V_{SB} is needed for ACPI and ATX power)
- **Power requirements:**
  - SOM-7564FG-M0A1E: +12 V @ 0.4 A
  - SOM-7564FG-S3A1E: +12 V @ 0.47 A
  - SOM-7564FG-S6A1E: +12 V @ 0.82 A
- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F)
- **Operating humidity:** 0% ~ 90% relative humidity, non-condensing
- **Weight:** About 0.103 Kg (weight of total package)

Chapter 2

Mechanical Information

This chapter gives mechanical and connector information on the SOM-7564 CPU Computer on Module.

Sections include:

- Connector Information
- Mechanical Drawing

2.1 Connectors

2.1.1 Board Connector

There is one connector at the rear side of SOM-7564 for connecting to carrier board.

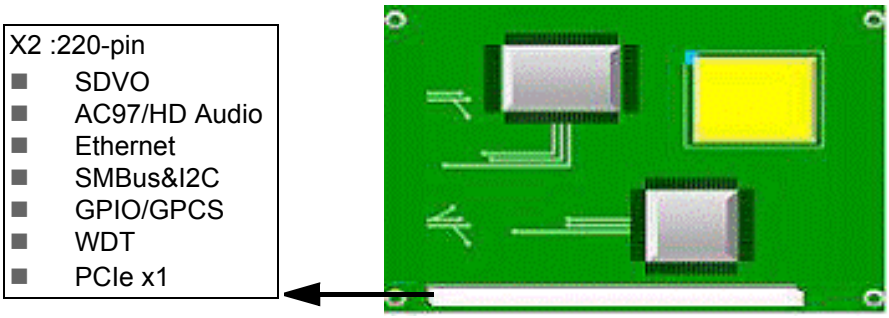

Figure 2.1 SOM-7564: Locating Connectors

Pin Assignments for X2 connector

Please refer to *Advantech_COM_Express_Design Guide*, *Chapter 2* (Available at: http://com.advantech.com).

2.2 Mechanical

2.2.1 Board Dimensions

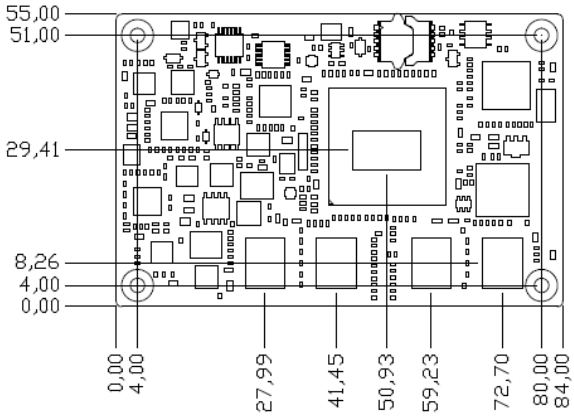

Figure 2.2 Board Dimensions (Component Side)

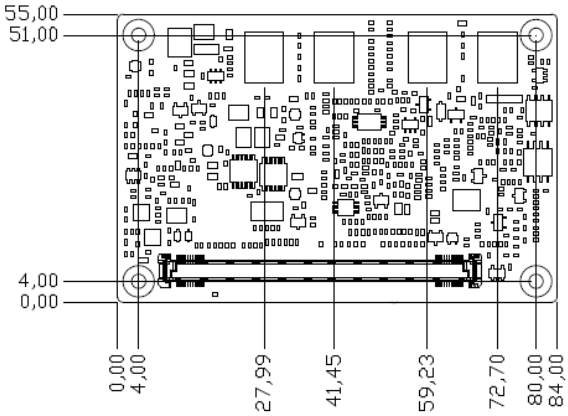

Figure 2.3 Board Dimensions (Solder Side)

Chapter 3

AMI BIOS

Sections include:

- **Introduction**
- **Entering Setup**

3.1 Introduction

AMIBIOS has been integrated into many motherboards for over a decade. With the AMIBIOS Setup program, users can modify BIOS settings and control various system features. This chapter describes the basic navigation of the SOM-7564 BIOS setup screens.

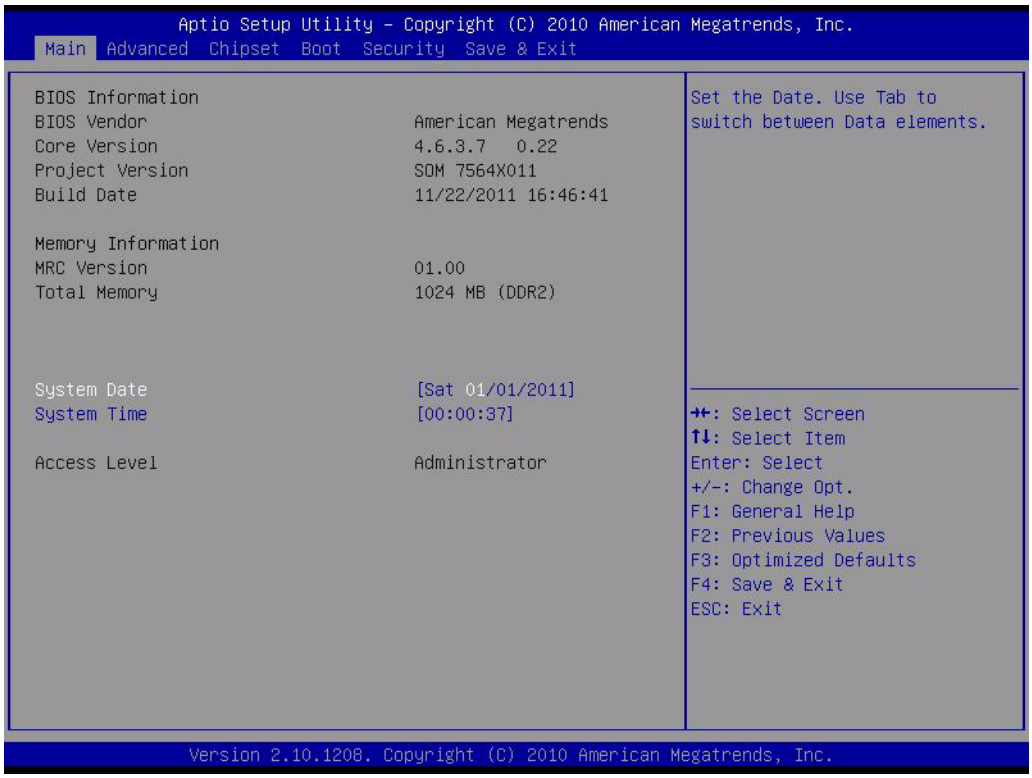

Figure 3.1 Setup Program Initial Screen

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

3.2 Entering Setup

Turn on the computer and then press <F2> or <DEL> to enter Setup menu.

3.2.1 Main Setup

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

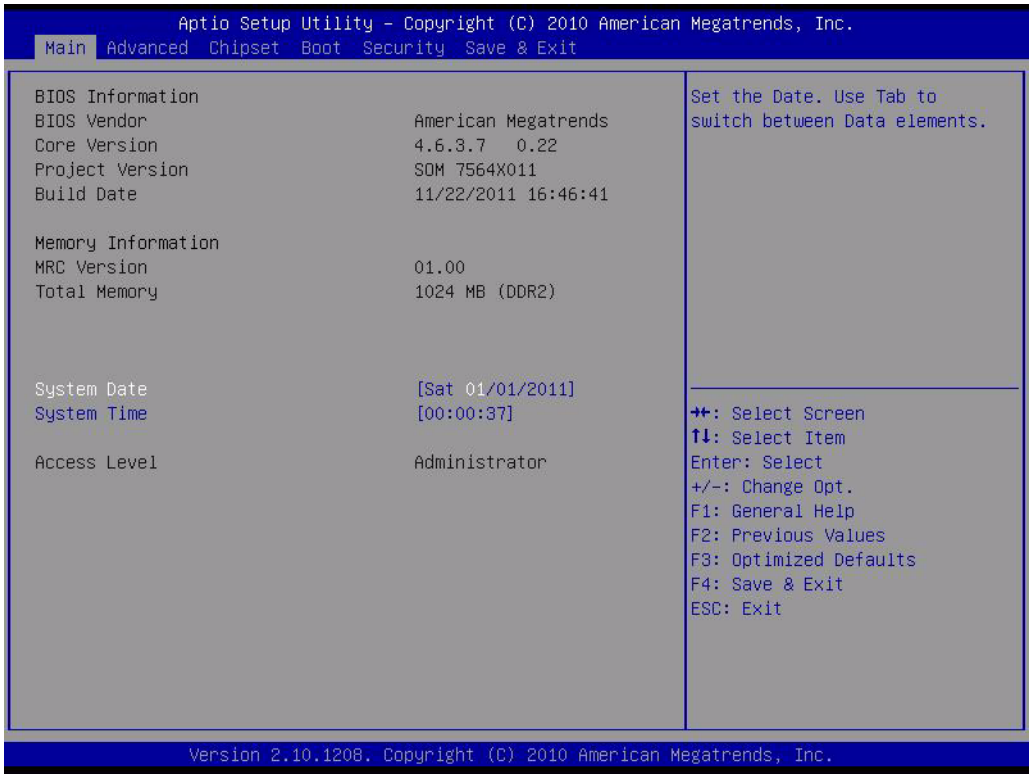

Figure 3.2 Main Setup Screen

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

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

3.2.1.1 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 SOM-7564 setup screen to enter the Advanced BIOS Setup screen. Users can select any item in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. Users 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 screens are shown below. The sub menus are described on the following pages.

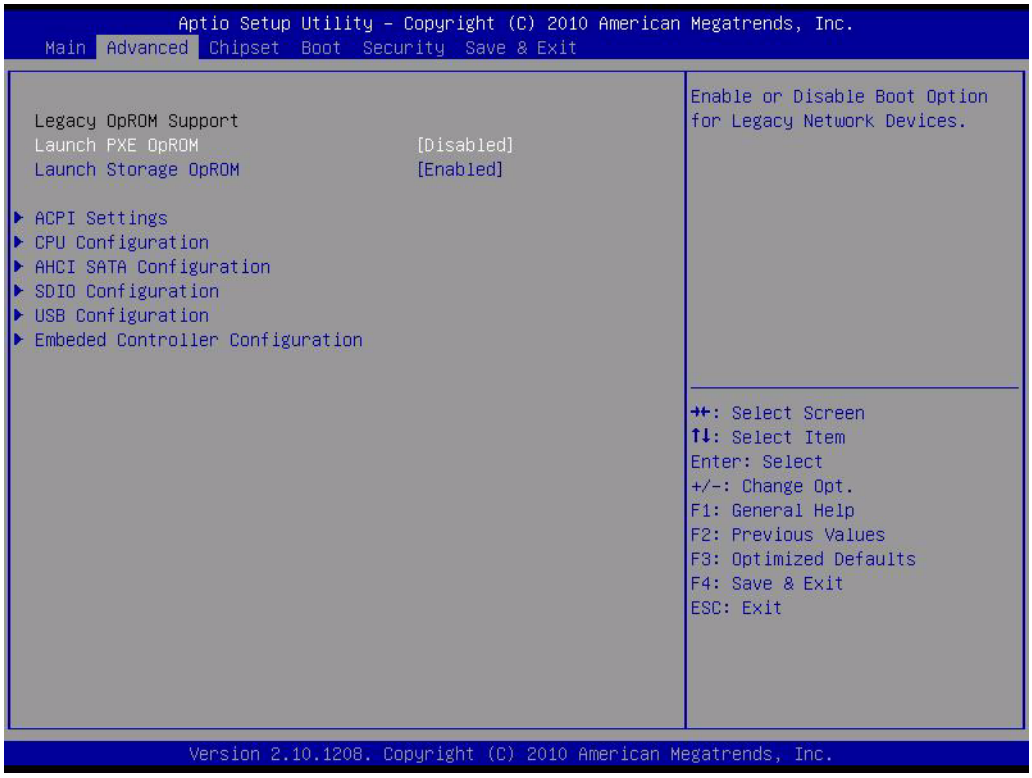

Figure 3.3 Advanced BIOS Features Setup Screen

3.2.2.1 Launch PXE OpROM

This item allows users to enable or disable launch PXE OpROM if available.

3.2.2.2 Launch Storage OpROM

This item allows users to enable or disable launch storage OpROM if available.

3.2.2.3 ACPI Settings

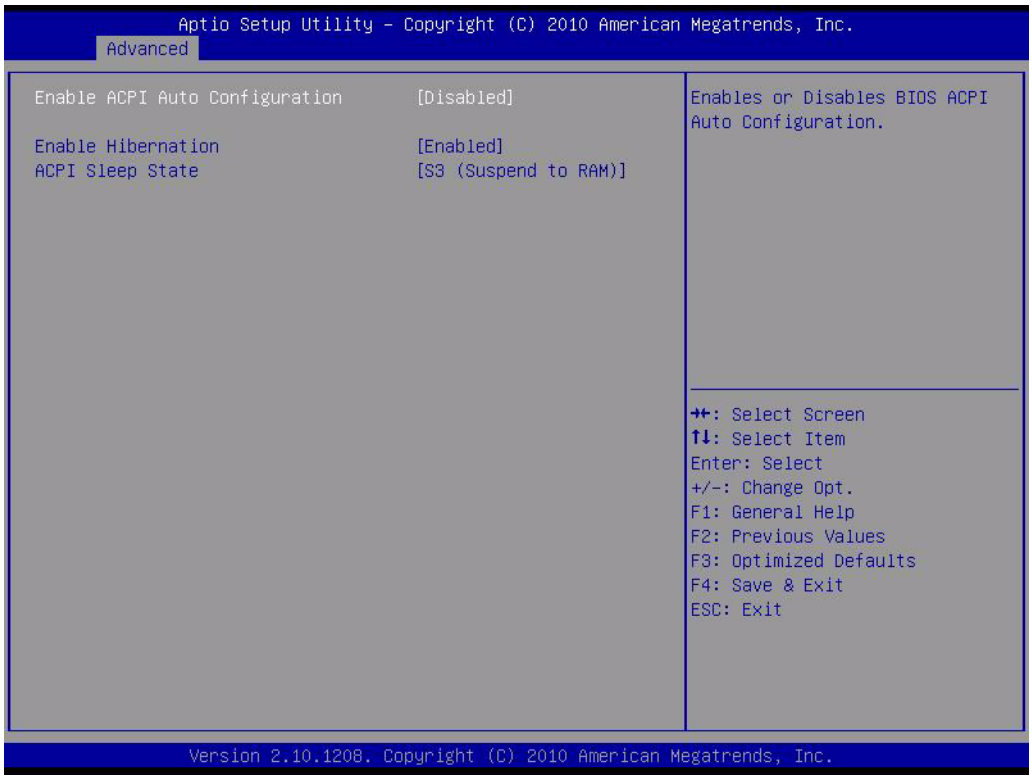

Figure 3.4 ACPI Settings

- **Enable ACPI Auto Configuration**
  This item allows users to enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**
  This item allows users to enable or disable hibernation.
- **ACPI Sleep State**
  This item allows users to set the ACPI sleep state.

3.2.2.4 CPU Configuration

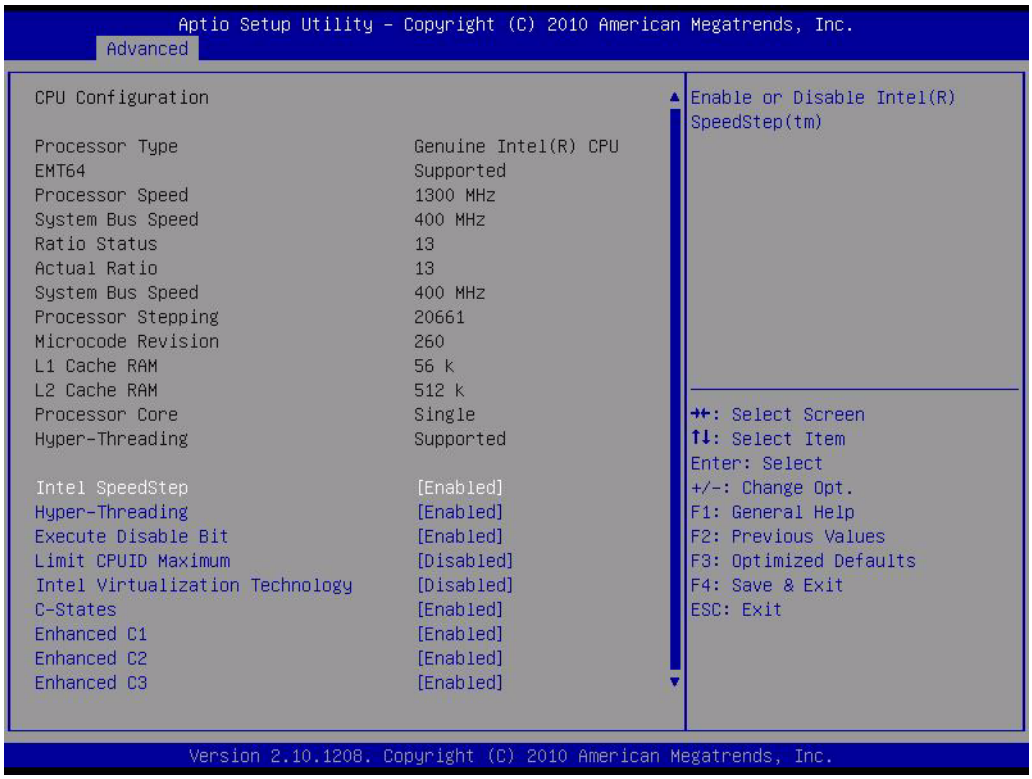

Figure 3.5 CPU Configuration Setting

- **Intel SpeedStep**
  This item allows users to enable or disable Intel® SpeedStep.
- **Hyper Threading Technology**
  This item allows users to enable or disable Intel® Hyper Threading technology.
- **Execute Disable Bit**
  This item allows users to enable or disable the No-Execution page protection technology.
- **Limit CPUID Maximum**
  This item allows users to limit the maximum value of CPUID.
- **Intel Virtualization Technology**
  This item allows users to enable or disable the intel virtualization technology.
- **C-States**
  This item allows the CPU to save more power in idle mode.
- **Enhanced C1 to C3**
  Enable / Disable Intel® C-STATE technology.

3.2.2.5 AHCI SATA Configuration

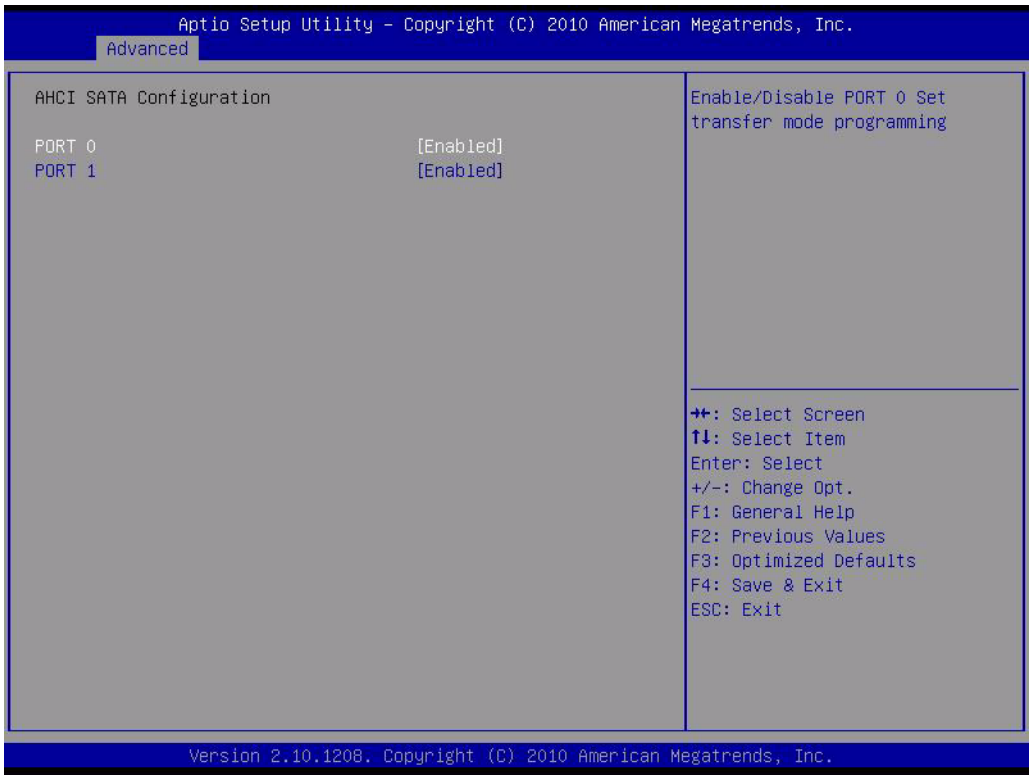

Figure 3.6 AHCI SATA Configuration

- **Port 0**
  This item allows users to enable or disable the SATA Port 0.
- **Port 1**
  This item allows users to enable or disable the SATA Port 1.

3.2.2.6 SDIO Configuration

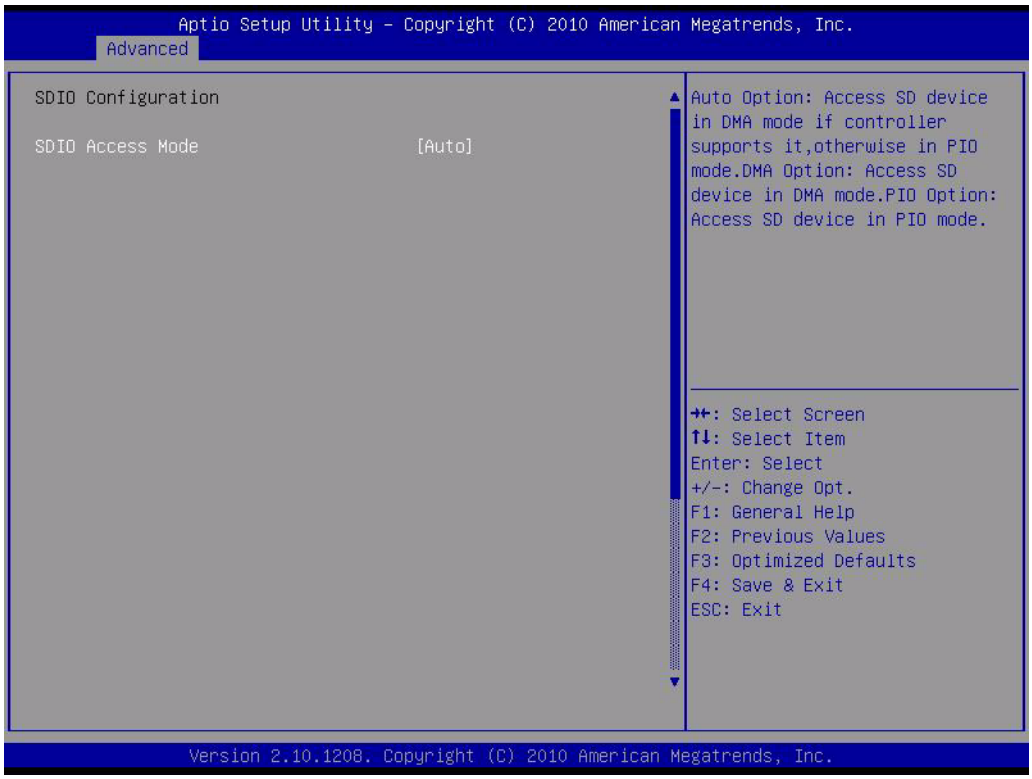

Figure 3.7 SDIO Configuration

- **SDIO Access Mode**
  This allows user to choose the access mode.

3.2.2.7 USB Configuration

Figure 3.8 USB Configuration

- **Legacy USB Support**

  Enable the support for legacy USB. Auto option disables legacy support if no USB devices are connected.

- **EHCI Hand-Off**

  This is a workaround for the OS without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.

- **USB Transfer Time-Out**

  Set the time-out value for Control, Bulk, and Interrupt transfers.

- **Device Reset Time-Out**

  Set USB mass storage device Start Unit command time-out value.

- **Device Power-Up Delay**

  Set the maximum time of 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.

3.2.2.8 Embedded Controller Configuration

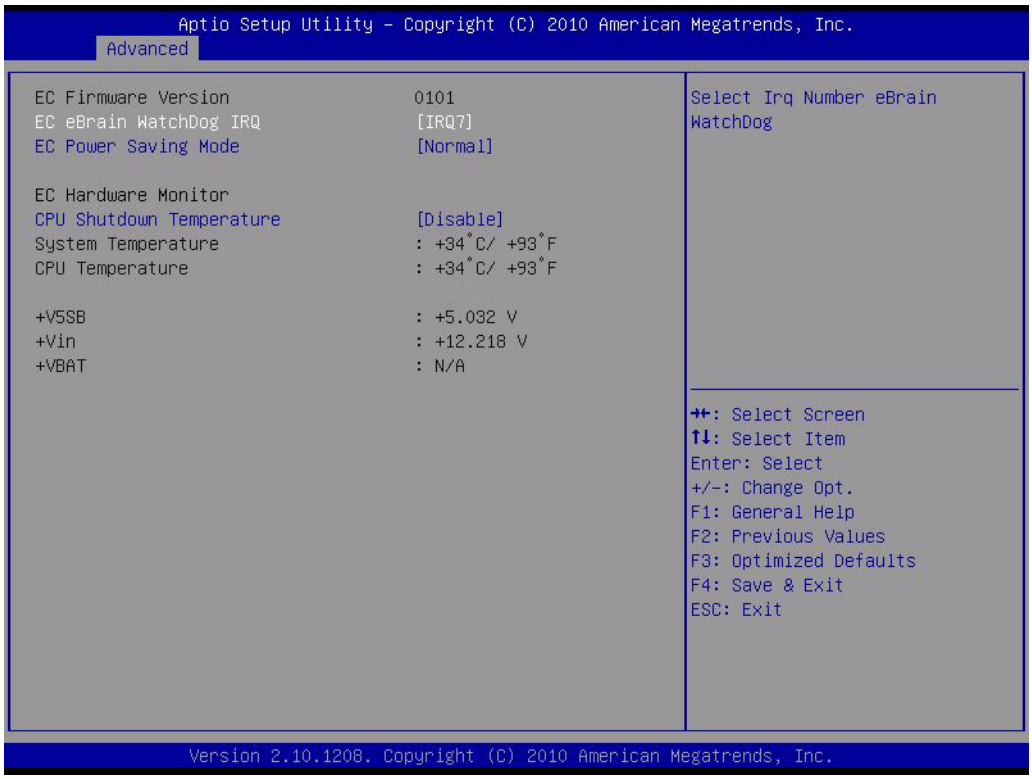

Figure 3.9 Embedded Controller Configuration

- **EC iManager WatchDog IRQ**
  This item allows users to set the IRQ number of EC watchdog.
- **EC Power Saving Mode**
  This item allows users to set board's power saving mode when off.
- **CPU Shutdown Temperature**
  This item allows users to set the value of CPU shutdown temperature.

3.2.3 Chipset

Select the Chipset tab from the SOM-7564 setup screen to enter the Chipset BIOS Setup screen. You can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

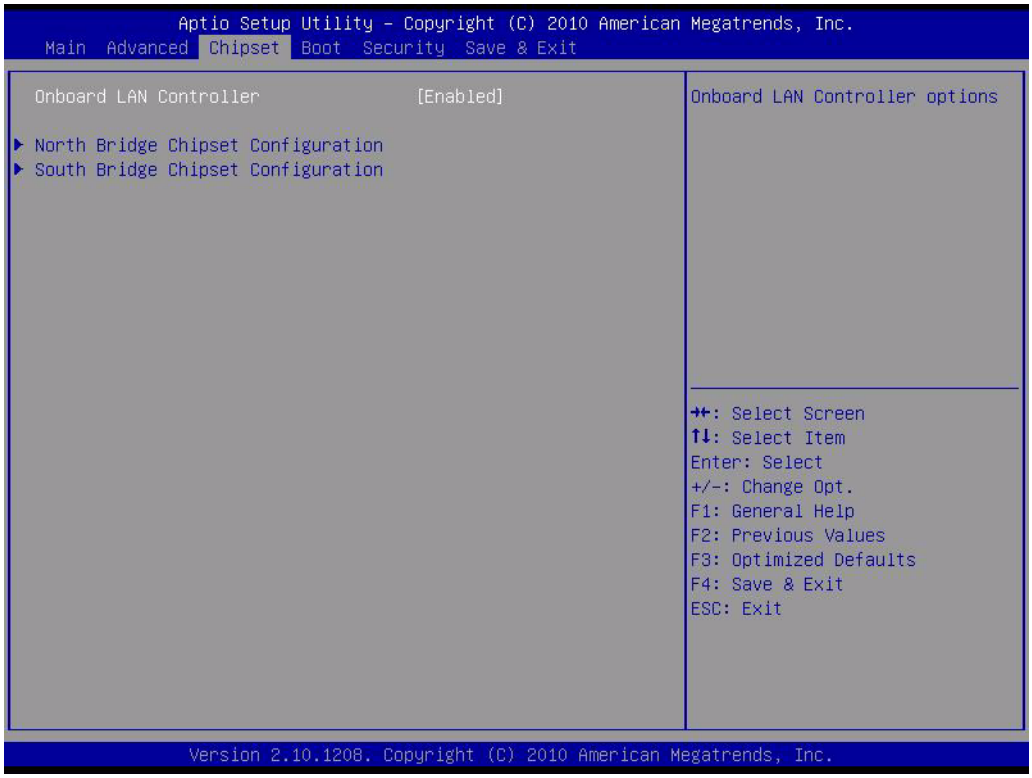

Figure 3.10 Chipset Setup

3.2.3.1 Onboard LAN Controller

This item enable/disable the onboard LAN controller.

3.2.3.2 North Bridge Chipset Configuration

Figure 3.11 North Bridge Chipset Configuration

- **IGD Mode Select**
  This item allows users to select the amount of system memory used by IGD.
- **MSAC Mode Select**
  This item allows users to select the amount of system memory used by MSAC.

Boot Display Configuration

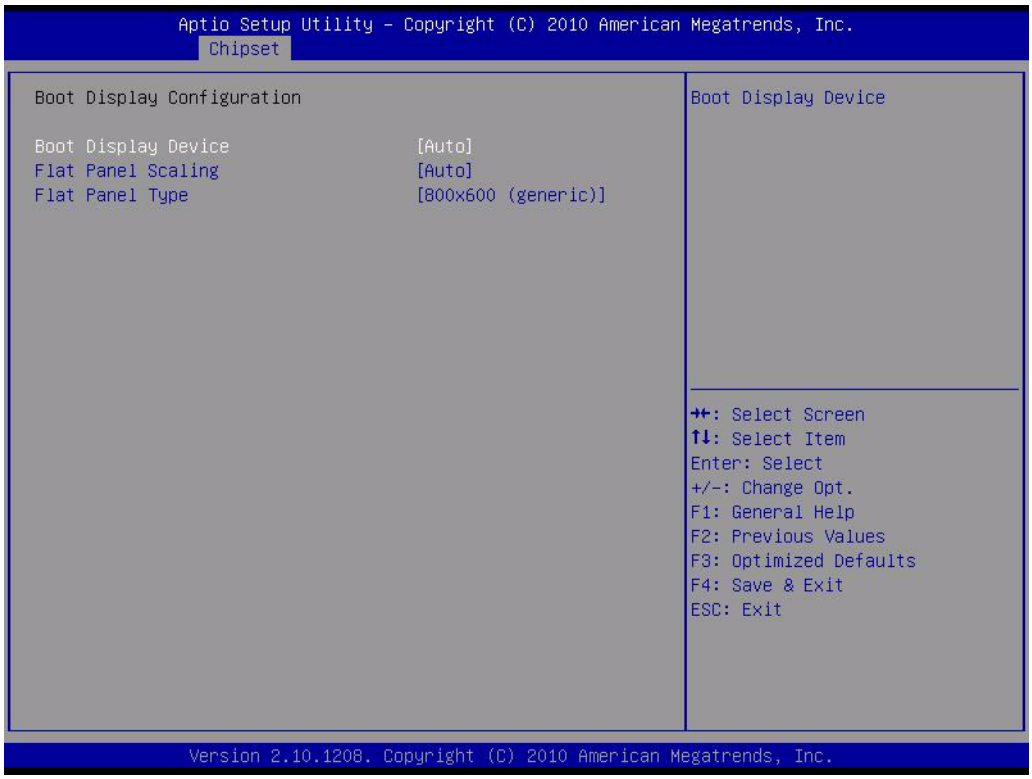

Figure 3.12 Boot Display Configuration

- **Boot Display Device**
  This item allows users to adjust the boot display device.
- **Flat Panel Scaling**
  This item allows users to adjust the scale of flat panel.
- **Flat Panel Type**
  This item allows users to select panel type

3.2.3.3 South Bridge Chipset Configuration

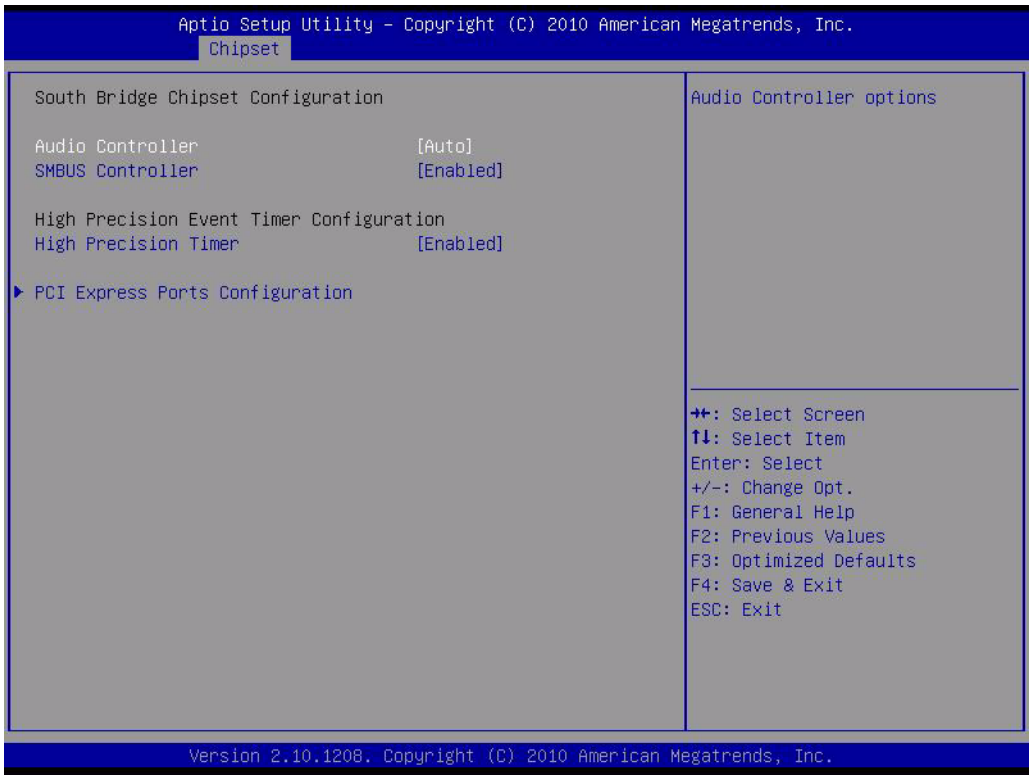

Figure 3.13 South Bridge Chipset Configuration

- **Audio Controller**
  This item allows users to select audio controller.
- **SMBus Controller**
  This item allows users to enable/disable SMBus controller.
- **High Precision Timer**
  This item allows users to enable or disable High Precision Timer.

PCI Express Configuration

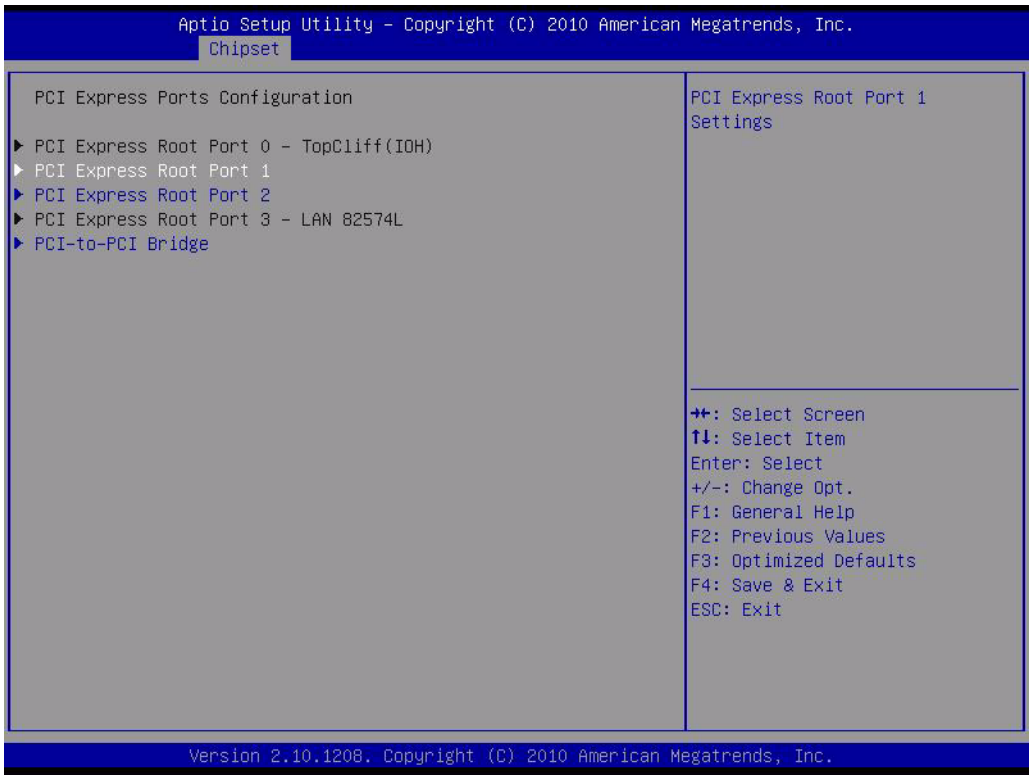

Figure 3.14 PCI Express Configuration

– **PCI Express Root Port 1, 2**
This item allows users to configure PCI express ports.

3.2.4 Boot Settings

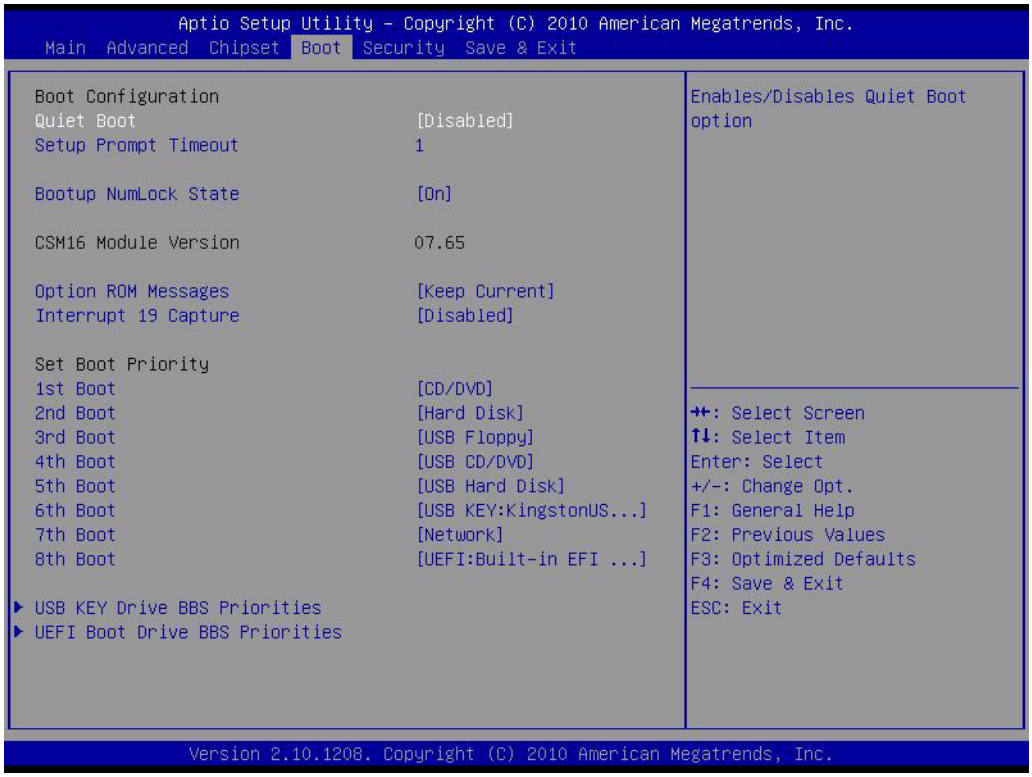

Figure 3.15 Boot Configuration

- **Quiet Boot**
  If this option is set to Disabled, the BIOS displays normal POST messages. If Enabled, an OEM Logo is shown instead of POST messages.
- **Setup Prompt Timeout**
  This item allows users to select the number of seconds to wait for setup activation key.
- **Bootup NumLock State**
  Select the Power-on state for Numlock.
- **Option ROM Message**
  Set display mode for option ROM.
- **Interrupt 19 Capture**
  This item allows option ROMs to trap interrupt 19.
- **1st/2nd/3rd/4th/5th/6th/7th/8th Boot**
  This item allows users to set boot device priority.

3.2.5 Security

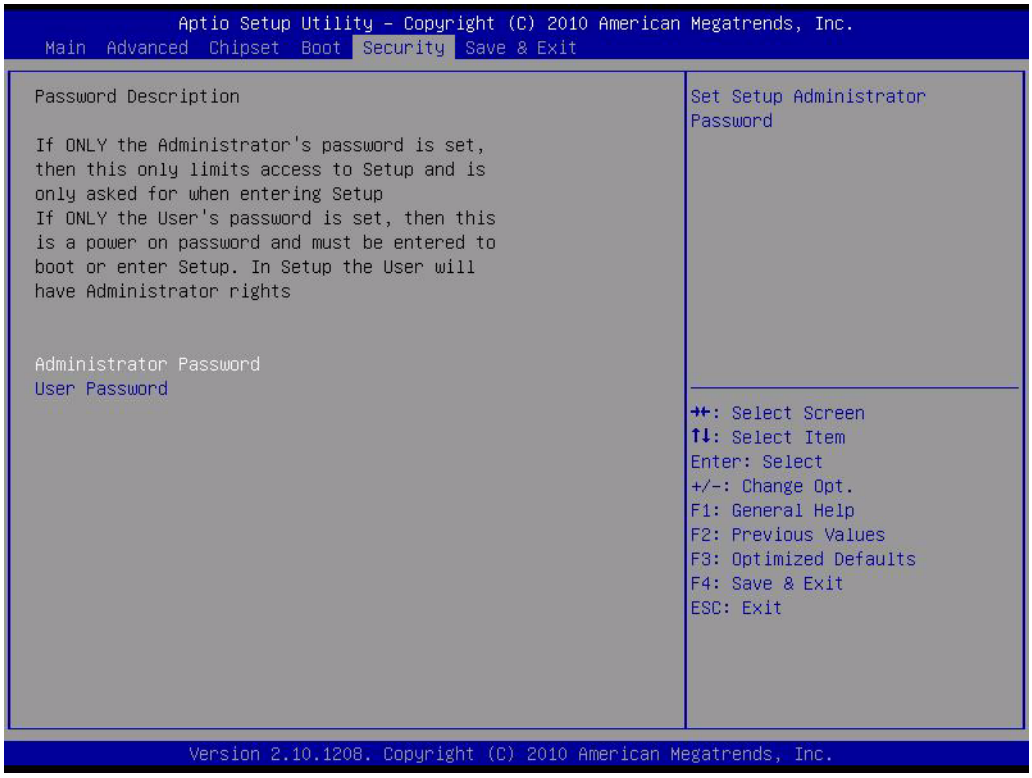

Figure 3.16 Password Description

Select Security Setup from the SOM-7564 Setup main BIOS setup menu. All Security Setup options, such as password protection is described in this section. To access the sub menu for the following items, select the item and press <Enter>:

Change Administrator / User Password: Select this option and press <ENTER> to access the sub menu, and then type in the password.

3.2.6 Save & Exit

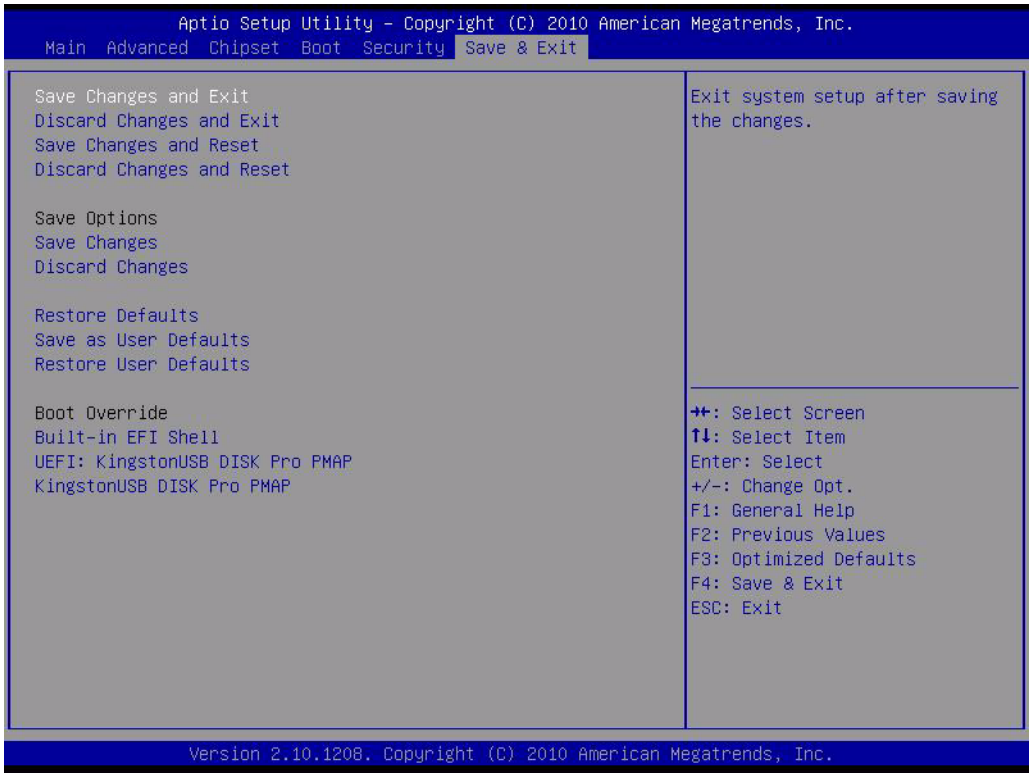

Figure 3.17 Save & Exit

3.2.6.1 Save Changes and Exit

When users have completed system configuration, select this option to save changes, exit BIOS setup menu and reboot the computer if necessary to take effect all system configuration parameters.

3.2.6.2 Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration.

3.2.6.3 Save Changes and Reset

When users have completed system configuration, select this option to save changes, exit BIOS setup menu and reboot the computer to take effect all system configuration parameters.

3.2.6.4 Discard Changes and Reset

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer.

3.2.6.5 Save Changes

When users have completed system configuration, select this option to save changes without exit BIOS setup menu.

3.2.6.6 Discard Changes

Select this option to discard any current changes and load previous system configuration.

3.2.6.7 Restore Defaults

The SOM-7564 automatically configures all setup items to optimal settings when users select this option. Optimal Defaults are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Defaults if the user's computer is experiencing system configuration problems.

3.2.6.8 Save User Defaults

When users have completed system configuration, select this option to save changes as user defaults without exit BIOS setup menu.

3.2.6.9 Restore User Defaults

The users can select this option to restore user defaults.

Chapter 4

S/W Introduction & Installation

Sections include:

- S/W Introduction
- Driver Installation

4.1 S/W Introduction

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft Windows embedded technology." We enable Windows Embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (Hardware suppliers, System integrators, Embedded OS distributor) for projects. Our goal is to make Windows Embedded Software solutions easily and widely available to the embedded computing community.

4.2 Driver Installation

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.

4.2.1 Windows XP Professional

To install the drivers please download from the product website, select the drivers that are needed to install, then run .exe (setup) file under each chipset folder and follow Driver Setup instructions to complete the installation.

4.2.2 Other OSs

To install the drivers for Other Windows OSs or Linux, please download the drivers to run the setup file under each chipset folder.

Appendix A

Watchdog Timer

This appendix gives you the information about the watchdog timer programming on the SOM-7564 CPU Computer on Module.

Sections include:

- Watchdog Timer Programming

A.1 Programming the Watchdog Timer

Trigger Event	Note
IRQ	IRQ7, 9, 11 (default disable) IRQ can be set in BIOS
NMI	N/A
SCI	Power button event
Power Off	Support
H/W Restart	Support
External WDT	N/A

For details, please refer to *iManager & Software API User Manual*.

Appendix B

Programming GPIO

This Appendix illustrates the General Purpose Input and Output pin settings.

Sections include:

- System I/O Ports

B.1 GPIO Registers

GPIO Byte Mapping	H/W Pin Name
BIT0	GPO0
BIT1	GPO1
BIT2	GPO2
BIT3	GPO3
BIT4	GPI0
BIT5	GPI1
BIT6	GPI2
BIT7	GPI3

For details, please refer to *iManager & Software API User Manual*.

Appendix C

System Assignments

This appendix provides information about system resource allocation on the SOM-7564 CPU Computer on Module

Sections include:

- System I/O ports
- DMA Channel Assignments
- Interrupt Assignments
- First MB Memory Map

C.1 System I/O Ports

Table C.1: System I/O Ports

Addr.range (Hex)	Device
0000 - 000F	Direct memory access controller
0000 - 0CF7	PCI bus
0010 - 001F	Motherboard resources
0020 - 0021	Programmable interrupt controller
0022 - 003F	Motherboard resources
0024 - 025F	Programmable interrupt controller
0028 - 029F	Programmable interrupt controller
002C – 02DF	Programmable interrupt controller
0030 - 031F	Programmable interrupt controller
0034 - 035F	Programmable interrupt controller
0038 - 039F	Programmable interrupt controller
003C – 03DF	Programmable interrupt controller
0040 - 0043	System timer
0044 - 005F	Motherboard resources
0050 - 0053	System timer
0060 – 0060	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
0061 – 0061	System speaker
0062 – 0062	Microsoft ACPI-Compliant Embedded Controller
0063 – 0063	Motherboard resources
0064 – 0064	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
0065 – 0065	Motherboard resources
0066 – 0066	Microsoft ACPI-Compliant Embedded Controller
0067 – 006F	Motherboard resources
0070 – 0077	System CMOS/real time clock
0072 - 007F	Motherboard resources
0080 – 0080	Motherboard resources
0081 – 0083	Direct memory access controller
0084 – 0086	Motherboard resources
0087 – 0087	Direct memory access controller
0088 – 0088	Motherboard resources
0089 - 008B	Direct memory access controller
008C - 008E	Motherboard resources
008F - 008F	Direct memory access controller
0090 - 009F	Motherboard resources
00A0 - 00A1	Programmable interrupt controller
00A2 - 00BF	Motherboard resources
00A4 – A5F	Programmable interrupt controller
00A8 – A9F	Programmable interrupt controller
00AC – ADF	Programmable interrupt controller
00B0 – 0B1F	Programmable interrupt controller
00B4 – 0B5F	Programmable interrupt controller
00B8 – 0B9F	Programmable interrupt controller
00BC – 0BDF	Programmable interrupt controller

00C0 - 00DF	Direct memory access controller
00E0 - 00EF	Motherboard resources
00F0 - 00FF	Numeric data processor
0274 - 0277	ISAPNP Read Data Port
0279 - 0279	ISAPNP Read Data Port
03B0 - 03BB	Intel® Atom® E6xx Intel® Embedded Media and Graphics Driver Function0
03C0 - 03DF	Intel® Atom® E6xx Intel® Embedded Media and Graphics Driver Function0
0400 - 043F	System board
0480 – 04BF	System board
04D0 - 04D1	Motherboard resources
04D0 - 04D1	Programmable interrupt controller
0900 - 097F	System board
09C0 – 9FFF	System board
0A79 - 0A79	ISAPNP Read Data Port
0D00 - DFFF	PCI bus
D000 – D01F	Intel® Gigabit CT Desktop Adapter
D000 – DFFF	PCI Standard PCI-to-PCI bridge
E000 – E01F	Intel® Platform controller Hub EG20T SATA AHCI Controller-880B
E000 – EFFF	PCI Standard PCI-to-PCI bridge
E040 – E047F	Intel® Platform controller Hub EG20T UART Controller-8814(COM10)
E050 – E057F	Intel® Platform controller Hub EG20T UART Controller-8813(COM9)
E060 – E067F	Intel® Platform controller Hub EG20T UART Controller-8812(COM8)
E070 – E077F	Intel® Platform controller Hub EG20T UART Controller-8811(COM7)
F000 – F007F	Intel® Atom® E6xx Intel® Embedded Media and Graphics Driver Extension.
F010 – F017	Intel® Atom® E6xx Intel® Embedded Media and Graphics Driver Function0

C.2 DMA Channel Assignments

Table C.2: DMA Channel Assignments

Channel	Function
0	Available
1	Available
2	Available
3	Available
4	Direct memory access controller
5	Available
6	Available
7	Available

C.3 Interrupt Assignments

Table C.3: Interrupt Assignments

Interrupt#	Interrupt Source
IRQ 0	System timer
IRQ 1	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
IRQ2	Available
IRQ3	Available
IRQ 4	Available
IRQ 5	Intel® Platform controller Hub EG20T DMA Controller #2-8815
IRQ 6	Available
IRQ 7	Available
IRQ 8	System CMOS/real time clock
IRQ 9	Microsoft ACPI-Compliant System
IRQ 10	Available
IRQ 11	Intel® Atom® E6xx Intel® Embedded Media and Graphics Driver Extension.
IRQ 12	Microsoft PS/2 Mouse
IRQ 13	Numeric data processor
IRQ 14	Available
IRQ 15	Available
IRQ 16	Intel® Atom® E6xx Intel® Embedded Media and Graphics Driver Function0
IRQ 16	Intel® Platform controller Hub EG20T General Purpose IO Controller-8803
IRQ 16	Microsoft UAA Bus Driver for High Definition Audio
IRQ 16	PCI Standard PCI-to-PCI bridge
IRQ 16	Standard Enhanced PCI to USB Host Controller
IRQ 16	Standard OpenHCD USB Host Controller
IRQ 17	Intel® Platform controller Hub EG20T SATA AHCI Controller-880B
IRQ 18	Intel® Platform controller Hub EG20T controller Area Network (CAN) Controller-8818
IRQ 18	Intel® Platform controller Hub EG20T controller I2C Controller-8817
IRQ 18	Intel® Platform controller Hub EG20T controller IEE1588 Hardware Assist-8819
IRQ 18	Intel® Platform controller Hub EG20T controller Series Peripheral Interface Bus-8816
IRQ 18	SDA Standard Compliant SD Host Controller
IRQ 19	Intel® Gigabit CT Desktop Adapter
IRQ 19	Intel® Platform controller Hub EG20T DMA Controller #1-8810
IRQ 19	Intel® Platform controller Hub EG20T UART Controller - 8811(COM7)
IRQ 19	Intel® Platform controller Hub EG20T UART Controller - 8812(COM8)
IRQ 19	Intel® Platform controller Hub EG20T UART Controller - 8813(COM9)

IRQ 19	Intel® Platform controller Hub EG20T UART Controller - 8814(COM10)
IRQ 19	Intel® Platform controller Hub EG20T USB Client Controller -8808
IRQ 19	Standard Enhance PCI to USB Host Controller
IRQ 19	Standard OpenHCD USB Host Controller

C.4 First MB Memory Map

Table C.4: First MB Memory Map

Addr. range (Hex)	Device
000A0000 – 000BFFFF	Intel® Atom® E6xx Intel® Embedded Media and Graphics Driver Function 0
000A0000 - 000BFFFF	PCI Bus
000C0000 – 000DFFFF	System board
000E0000 – 000EFFFF	System board
000F0000 – 000FFFFF	System board
3F6F0000 – 3F6FFFFF	System board
3F7F0000 – 3F7FFFFF	System board
3F8F0000 – 3FFFFFFF	System board
40000000 - FFFFFFFF	PCI Bus
B0000000 - BFFFFFFF	Intel® Atom® E6xx Intel® Embedded Media and Graphics Driver Extension.
C0000000 - CFFFFFFF	Intel® Atom® E6xx Intel® Embedded Media and Graphics Driver Function0
D0000000 – D00FFFFF	Intel® E6xx Intel® Embedded Media and Graphics Driver Function0
D0100000 – D01FFFFF	PCI Standard PCI-to-PCI bridge
D0100000 – D02FFFFF	PCI Standard PCI-to-PCI bridge
D0140000 – D0141FFF	Intel® Platform controller Hub EG20T USB Client Controller - 8808
D0142000 – D01420FF	Intel® Platform controller Hub EG20T controller IEE1588 Hard-ware Assist-8819
D0143000 – D01431FF	Intel® Platform controller Hub EG20T controller Area Network (CAN) Controller-8818
D0144000 – D01440FF	Intel® Platform controller Hub EG20T controller I2C Controller-8817
D0145000 – D014501F	Intel® Platform controller Hub EG20T controller Series Peripheral Interface Bus-8816
D0146000 – D01460FF	Intel® Platform controller Hub EG20T DMA Controller #2-8815
D0147000 – D014700F	Intel® Platform controller Hub EG20T UART Controller - 8814(COM10)
D0148000 – D014800F	Intel® Platform controller Hub EG20T UART Controller - 8813(COM9)
D0149000 – D014900F	Intel® Platform controller Hub EG20T UART Controller - 8812(COM8)
D014A000 – D014A00F	Intel® Platform controller Hub EG20T UART Controller - 8811(COM7)

D014B000 – D014B0FF	Intel® Platform controller Hub EG20T DMA Controller #1-8810
D014C000 – D014C0FF	Standard Enhanced PCI to USB Host Controller
D014D000 – D014D0FF	Standard OpenHCD USB Host Controller
D014E000 – D014E0FF	Standard OpenHCD USB Host Controller
D014F000 – D014F0FF	Standard OpenHCD USB Host Controller
D0150000 – D01503FF	Intel® Platform controller Hub EG20T SATA AHCI Controller-880B
D0151000 – D01511FF	SDA Standard Compliant SD Host Controller
D0152000 – D01521FF	SDA Standard Compliant SD Host Controller
D0153000 – D01530FF	Standard Enhanced PCI to USB Host Controller
D0154000 – D01540FF	Standard OpenHCD USB Host Controller
D0155000 – D01550FF	Standard OpenHCD USB Host Controller
D0156000 – D01560FF	Standard OpenHCD USB Host Controller
D0157000 – D015703F	Intel® Platform controller Hub EG20T General Purpose IO Controller-8803
D0159000 – D01597FF	Intel® Platform controller Hub EG20T Packet Hub -8801
D0300000 – D03FFFFF	PCI Standard PCI-to-PCI bridge
D0340000 – D035FFFF	Intel® Gigabit CT Desktop Adapter
D0360000 – D0363FFF	Intel® Gigabit CT Desktop Adapter
D0400000 – D047FFFF	Intel® Corporation Atom® E6xx Intel® Embedded Media and Graphics Driver Extension.
D0480000 – D04BFFFF	Intel® Corporation Atom® E6xx Intel® Embedded Media and Graphics Driver Extension.
D04C0000 – D04FFFFF	Intel® Corporation Atom® E6xx Intel® Embedded Media and Graphics Driver Function0
D0500000 – D0503FFF	Microsoft UAA Bus Driver for High Definition Audio
E0000000 – EFFFFFFF	System board
FEC00000 – FEC85FFF	System board
FED00000 – FED003FF	High precision event timer
FED1C000 – FED1FFFF	System board
FEE00000 – FEEFFFFF	System board
FF800000 – FFFFFFFF	System board

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