



User Manual

SOM-5790

ADVANTECH

Enabling an Intelligent Planet

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This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

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 B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Technical Support and Assistance

1. Visit the Advantech website at <http://support.advantech.com> 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.*



Document Feedback

To assist us in making improvements to this manual, we would welcome comments and constructive criticism. Please send all such - in writing to: support@advantech.com

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x SOM-5790 Module
- 1 x Heatspreader 125*95*11mm

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.
15. **DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.**
16. **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.**

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

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. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Chapter 1	General Information	1
1.1	Introduction	2
1.2	Specifications	2
1.2.1	Standard System On Module functions	2
1.2.2	Display Interface	3
1.2.3	Audio function	3
1.2.4	Ethernet	3
1.2.5	iManager	3
1.2.6	Mechanical and environmental	3
Chapter 2	Mechanical Information	5
2.1	Connectors	6
2.1.1	Board Connector	6
2.1.2	Fan Connector	6
2.2	Mechanical	7
2.2.1	Jumper and Connector Location	7
	Figure 2.1 Board Layout (component side)	7
	Figure 2.2 Board Layout (Solder side)	7
2.2.2	Board Dimension	8
	Figure 2.3 Board Dimension (Component side)	8
	Figure 2.4 Board Dimension (Solder side)	8
Chapter 3	BIOS Setup	9
3.1	BIOS Setup	10
	Figure 3.1 Setup program initial screen	10
3.2	Entering Setup	10
3.3	Main Setup	11
	Figure 3.2 Main setup screen	11
3.4	Advanced BIOS Features Setup	12
	Figure 3.3 Advanced BIOS features setup screen	12
3.4.1	ACPI Settings	13
	Figure 3.4 ACPI Setting	13
3.4.2	TPM Configuration	14
	Figure 3.5 TPM Configuration (enable and capture after reset)	14
3.4.3	CPU Configuration	15
	Figure 3.6 CPU Configuration	15
3.4.4	SATA Configuration	16
	Figure 3.7 SATA Configuration (select RAID and capture)	16
3.4.5	Intel TXT(LT) Configuration	17
	Figure 3.8 Intel TXT(LT) Configuration	17
3.4.6	PCH-FW Configuration	18
	Figure 3.9 PCH-FW Configuration	18
3.4.7	AMT Configuration	19
	Figure 3.10 AMT Configuration	19
3.4.8	USB Configuration	21
	Figure 3.11 USB Configuration	21
3.4.9	Embedded Controller Configuration	22
	Figure 3.12 Embedded Controller Configuration	22
3.4.10	Super IO Configuration	23
	Figure 3.13 Super IO Configuration setup screen	23
	Figure 3.14 Serial Port 0 Configuration setup screen	24

	Figure 3.15Serial Port 1 Configuration setup screen.....	25
	Figure 3.16Parallel Port Configuration setup screen.....	26
3.4.11	Serial Port Console Redirection.....	27
	Figure 3.17Serial Port Console Redirection	27
3.4.12	Switchable Graphics	28
	Figure 3.18Switchable Graphics.....	28
3.4.13	Sandybridge DTS Configuration	29
	Figure 3.19Sandybridge DTS Configuration.....	29
3.4.14	Sandybridge PPM Configuration	30
	Figure 3.20Sandybridge PPM (Processor Power Module) Configu- ration	30
3.5	Chipset.....	31
3.5.1	System Agent (SA) Configuration.....	31
	Figure 3.21System Agent (SA) Configuration	31
	Figure 3.22Intel IGFX Configuration.....	32
	Figure 3.23LCD Control.....	33
	Figure 3.24NB PCIe Configuration	34
3.5.2	PCH-IO Configuration.....	35
	Figure 3.25PCH-IO Configuration	35
	Figure 3.26USB Configuration.....	36
	Figure 3.27PCI Express Configuration	37
3.6	Boot Settings.....	38
	Figure 3.28Boot Setup Utility.....	38
3.7	Security Setup.....	39
	Figure 3.29Password Configuration	39
3.8	Save & Exit	40
	Figure 3.30Save & Exit.....	40
Chapter 4	S/W Introduction & Installation.....	43
4.1	S/W Introduction	44
4.2	Driver Installation	44
4.2.1	Windows XP professional.....	44
4.2.2	Other OS.....	44
Appendix A	Watchdog Timer.....	45
A.1	Programming the Watchdog Timer	46
Appendix B	Programming GPIO.....	47
B.1	GPIO Register.....	48
Appendix C	System Assignments.....	49
C.1	System I/O Ports.....	50
	Table C.1: System I/O ports.....	50
C.2	DMA Channel Assignments	51
	Table C.2: DMA channel assignments.....	51
C.3	Interrupt Assignments	51
	Table C.3: Interrupt assignments.....	51
C.4	1st MB Memory Map.....	52
	Table C.4: 1st MB memory map	52

Chapter 1

General Information

This chapter gives background information on the SOM-5790 CPU System on Module.

Sections include:

- Introduction
- Specification

1.1 Introduction

SOM-5790 is a COM-Express Basic Module with Type 2 pin-out that fully complies with the PCI Industrial Computer Manufacturers PICMG COM Express standard. The new CPU module integrates Intel 2nd Generation Core i7, i5, i3, and Celeron processors (code named Sandy Bridge) which support Intel 6th generation graphics core with AVC/VC1/MPEG2 HW decode. It also integrates QM67 (codename Cougar Point) chipset which provides state-of-the-art interface such as PCI Express Gen 2 and SATA Gen3. In a basic form factor of 125mm x 95mm, the SOM-5790 provides a scalable high performance and easy to integrate solution for customers' applications by utilizing a plug-in CPU module on an application-specific customer solution board. The SOM-5790 with advanced I/O capacity incorporates serial differential signaling technologies such as PCI Express, Serial ATA, USB 2.0, and LVDS interfaces, while maintaining digital parallel signal support such as PCI and IDE. SOM-5790 is the best choice for the customers looking for migration toward higher computing speeds and compatibility with older carrier board design.

SOM-5790 complies with the "Green Function" standard and supports Doze, Standby and Suspend modes. The small size (125 mm x 95 mm) and use of two high capacity connectors based on the proven COM-Basic form factor, allow the COM-Basic modules to be easily and securely mounted onto a customized solution board or our standard SOM-DB5700 development board.

The SOM-5790 provides excellent processing ability via its Intel 2nd Gen Core i processor, dual channel LVDS, DDR3 non-ECC memory up to 16 GB, and high definition audio interface.

1.2 Specifications

1.2.1 Standard System On Module functions

- **Processor:** Intel® Core™ i7/i5/i3 and Celeron processors
(For detailed CPU support information please contact your sales representative)
- **BIOS:** AMI EFI 8MB Flash
- **Chipset:** Intel® QM67 Chipset
- **Intel Smart Cache:**
 - Intel® Core i7: 6 MB (Quad Core) or 4 MB (Duo Core) Smart Cache
 - Intel® Core i5/i3: 3 MB Smart Cache
 - Intel® Celeron: 2 MB Smart Cache
- **System memory:** 2 x 204-pin SODIMM support non-ECC DDR3-1066/1333 up to 16 GB
- **Power management:** Supports enhanced Intel SpeedStep technology, S0, S3, S4, S5, C0, C1, C1E, C3, C6, C7, and ACPI/APM.
- **SATA interface:** 2 SATAIII channel up to 600MB/s and 2 SATAII channel up to 300MB/s
- **PATA interface:** 1 IDE channel
- **Watchdog timer:** 6554 levels timer interval, from 0 to 6553 sec multi-level and multi-option WatchDog Timer
- **USB interface:** Supports 8 USB 2.0 ports
- **Expansion Interface:** Supports PEG x16, 5 PCIe x1 (PCIe x4 option, PCIe to PCI, PCIe to IDE), PCI, LPC, SMBus, I²C

1.2.2 Display Interface

- **Chipset:** Intel Core i processor integrated 6th generation graphics core with 12 execution units. Support DX10.1, Open GL 3.0, full AVC/VC1/MPEG2 HW Decode
- **Display type:** VGA, LVDS
- **Display mode:**
 - VGA port: 2048x1536
 - LVDS: Dual Channel 18/24-bit
 - HDMI/DVI: 1920x1200
 - Displayport: 2560x1600
 - GMA driver supports up to 2 independent displays
 - Four independent display supported with hybrid multi-monitor capability (integrated and discrete graphics working simultaneously).

1.2.3 Audio function

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

1.2.4 Ethernet

- **Chipset:** Intel 82579LM Gigabit Ethernet. Base on IEEE 10BASE-T, 100BASE-TX and 1000BASE-T standard.

1.2.5 iManager

- Board information
- Multi-level stage WDT (IRQ, SCI, HW restart, and power off)
- Hardware monitor for +12 V, +5 VSB, CMOS Battery, CPU temperature
- Smart fan (full speed, manual speed, auto speed)
- SMBus/I²C Bus
- Deep Sleep Mode in S4/S5

1.2.6 Mechanical and environmental

- **Dimensions:** COM-Express Basic form-factor, 125 mm x 95 mm (4.92" x 3.74")
- **Power supply voltage:** +12 V power only (+5 VSB is needed for ACPI and ATX power)
- **Power requirement:** SOM-5790FG-U1A1E w/ DDR3-1333 2GB non-ECC Memory 5.34A @ +12V (Max) 0.95A @ +12V (Win Idle)
- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F)
- **Operating humidity:** 0% ~ 90% relative humidity, non-condensing
- **Weight:** 0.103 Kg (weight of total package)

Chapter 2

Mechanical Information

This chapter gives mechanical and connector information on the SOM-5790 CPU System on Module.

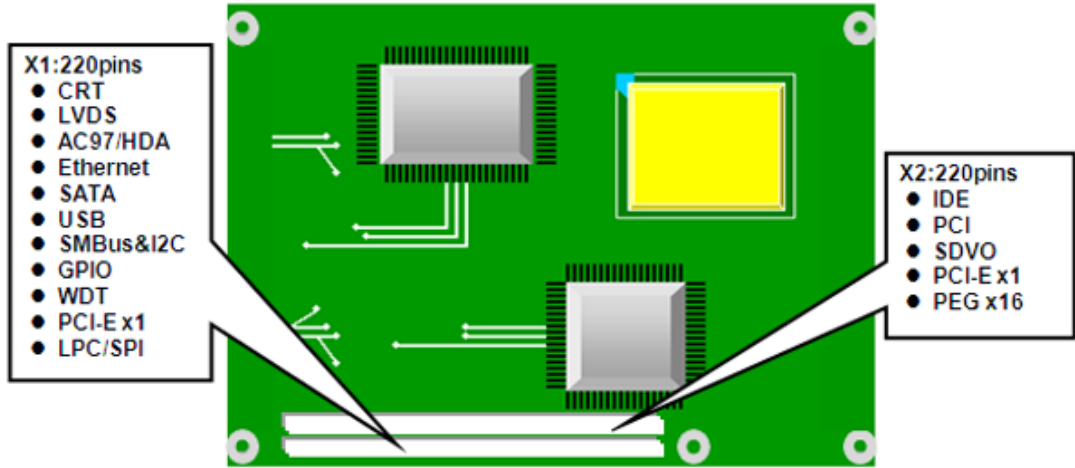
Sections include:

- Connector Information
- Mechanical Drawing

2.1 Connectors

2.1.1 Board Connector

There are two connectors at the rear side of SOM-5790 for connecting to carrier boards.



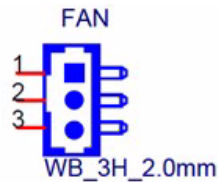
Pin Assignments for X1/X2 connector

Please refer to Advantech_COM_Express_Design Guide, Chapter 2.

You can download Advantech_COM_Express_Design Guide from <http://com.advantech.com/>

2.1.2 Fan Connector

FAN1	Fan
Description	Wafer 2.0 mm 3P 90D (M) DIP 2001-WR-03-LF W/Lock
Pin	Pin Name
1	Fan Tacho-Input
2	Fan Out
3	GND



2.2 Mechanical

2.2.1 Jumper and Connector Location

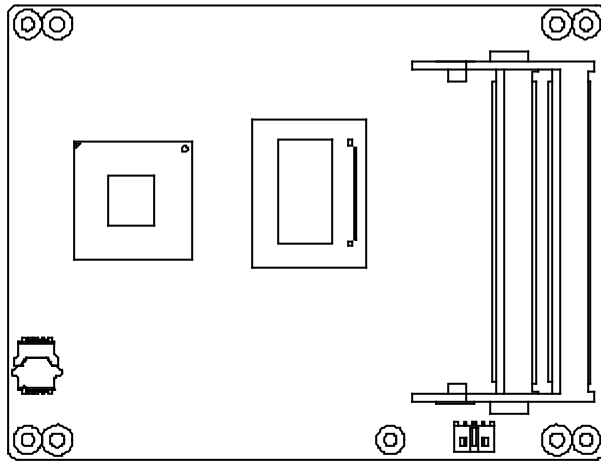


Figure 2.1 Board Layout (component side)

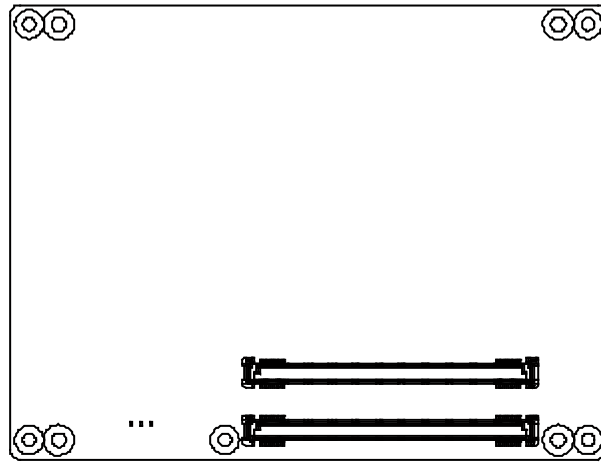


Figure 2.2 Board Layout (Solder side)

2.2.2 Board Dimension

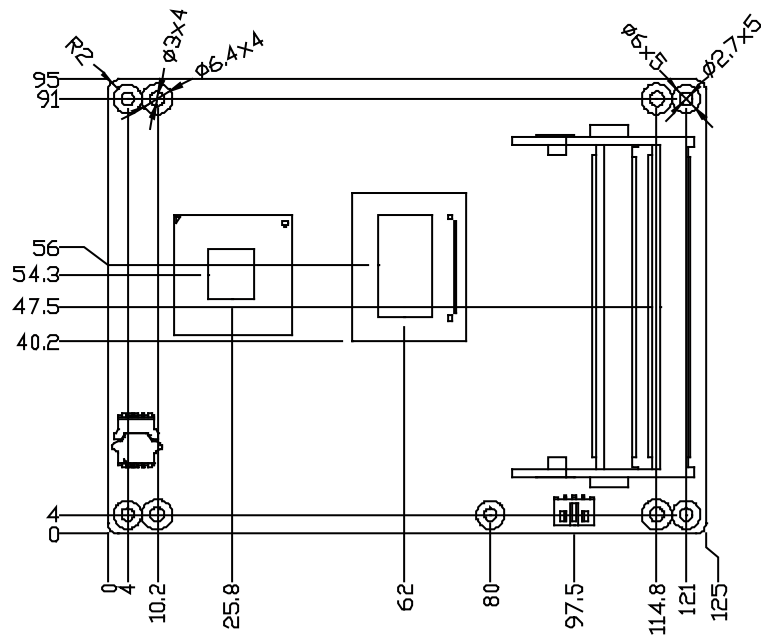


Figure 2.3 Board Dimension (Component side)

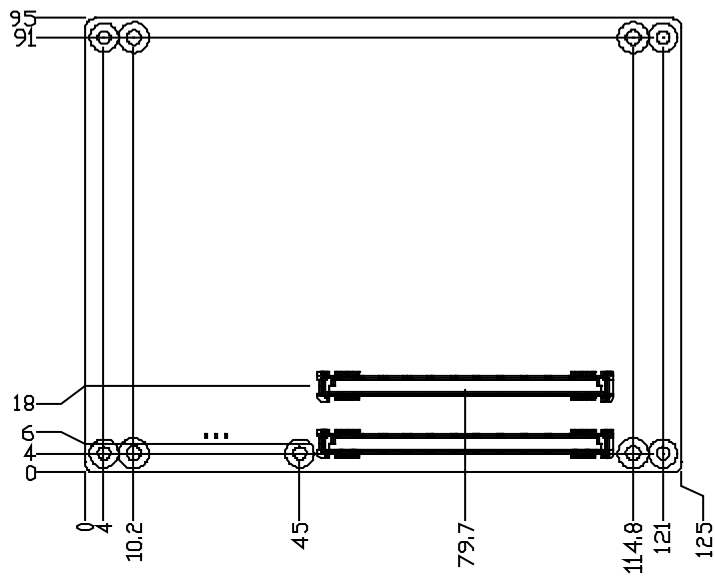


Figure 2.4 Board Dimension (Solder side)

Chapter 3

BIOS Setup

3.1 BIOS Setup

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-5790 BIOS setup screens.

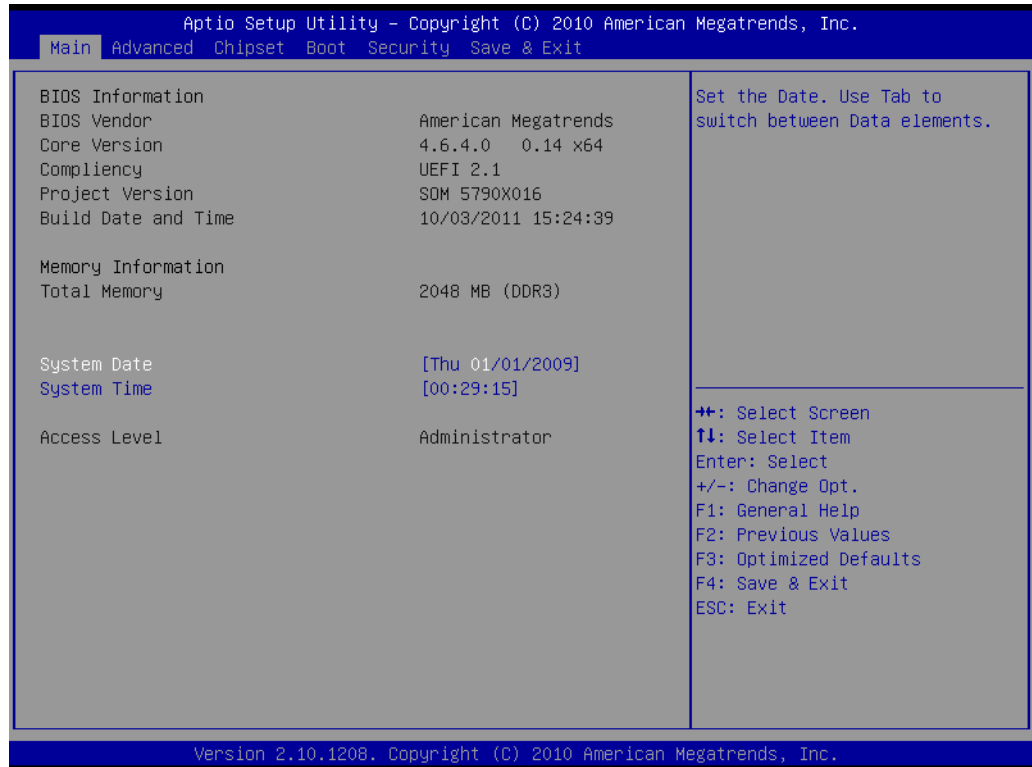


Figure 3.1 Setup program initial screen

AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in flash ROM 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 to enter Setup menu.

3.3 Main Setup

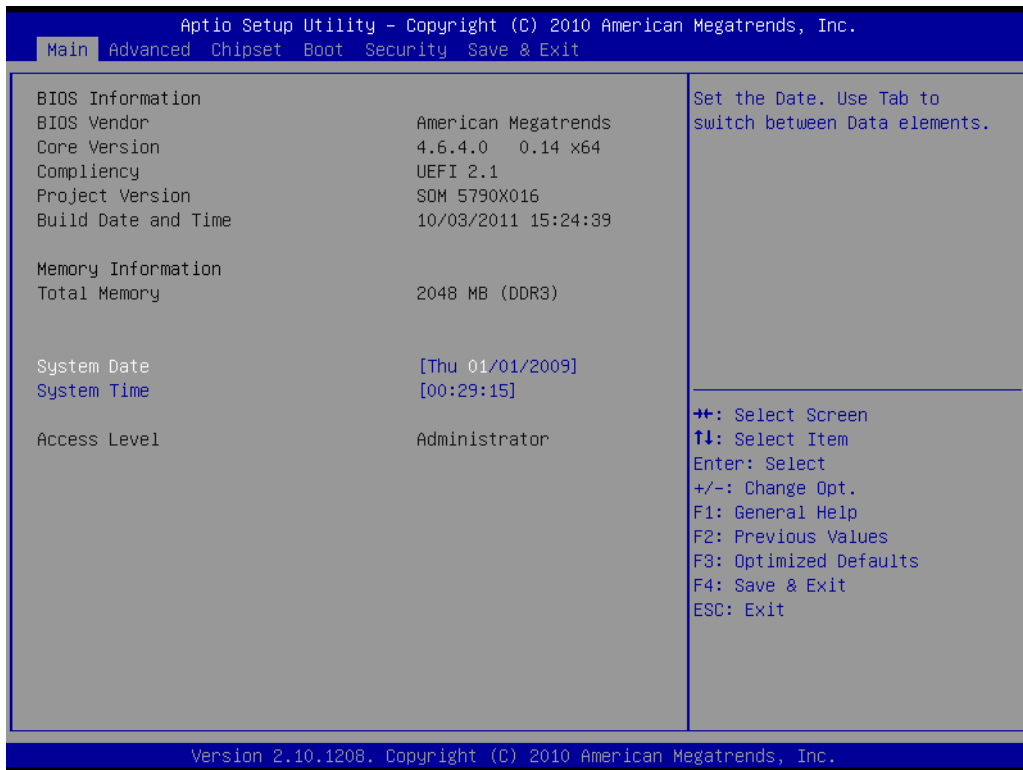


Figure 3.2 Main setup screen

■ System time / System date

Set the system time and date. 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.

3.4 Advanced BIOS Features Setup

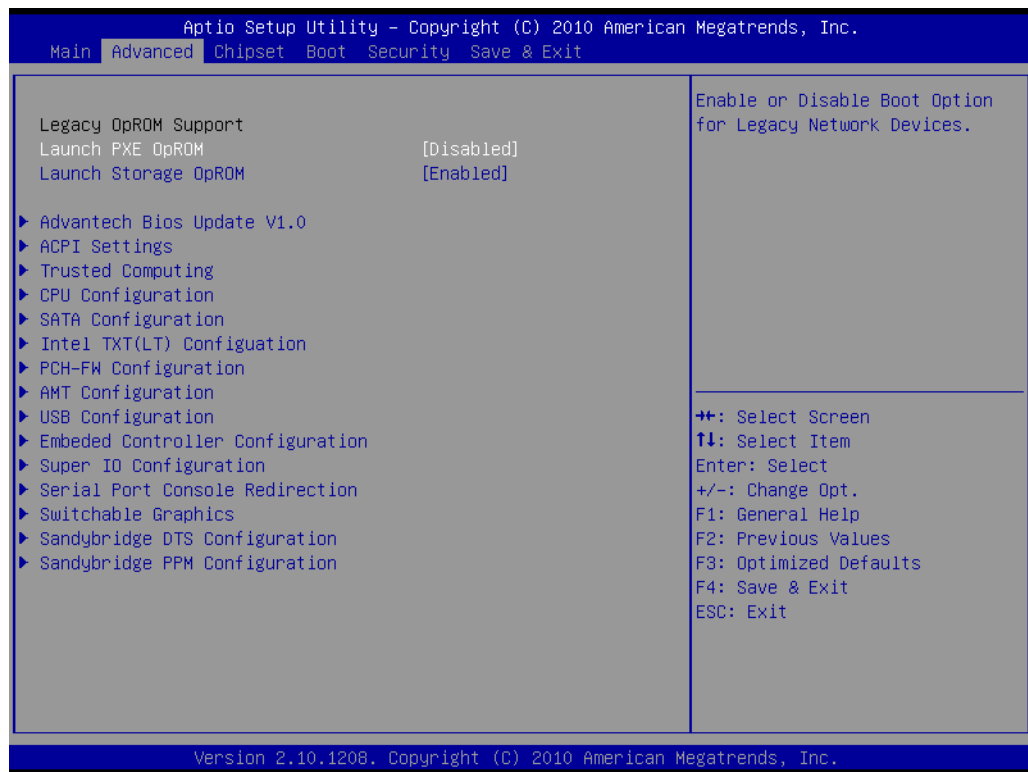


Figure 3.3 Advanced BIOS features setup screen

- **Launch PXE OpROM**
Enable or disable PXE option ROM for legacy network devices
[Enabled] **[Disabled]**
- **Launch Storage OpROM**
Enable or disable storage option ROM for legacy mass storage devices
[Enabled] [Disabled]

3.4.1 ACPI Settings

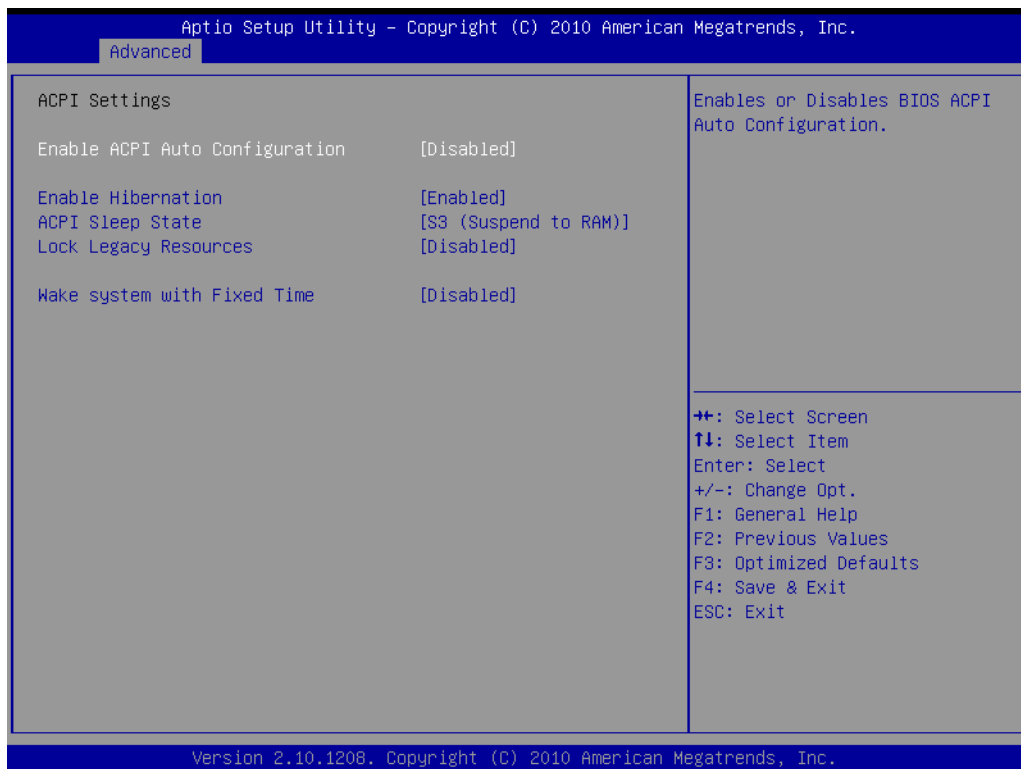


Figure 3.4 ACPI Setting

- **Enable ACPI Auto Configuration**
 This item allows users to enable or disable BIOS ACPI auto configuration.
 [Enabled] **[Disabled]**
- **Enable Hibernation**
 Enable or disable system ability to hibernate (S4 sleep state) This option may be not effective with some OS.
[Enabled] [Disabled]
- **ACPI Sleep State**
 This item allows users to set the ACPI sleep state when the suspend button is pressed.
 [Suspend Disabled] [S1 (CPU Stop Clock)] **[S3 (Suspend to RAM)]**
- **Lock Legacy Resources**
 This item allows users to lock legacy devices' resources.
 [Enabled] **[Disabled]**
- **Wake system with fixed time**
 Enable or disable system wake on alarm event. System will wake on the hr,min,sec specified
 [Enabled] **[Disabled]**
- **Wake up hour**
 Select 0-23. For example enter 3 for 3am and 15 for 3pm.
 Default 0
- **Wake up minute**
 Range from 0-59
 Default 0
- **Wake up second**
 Range from 0-59
 Default 0

3.4.2 TPM Configuration

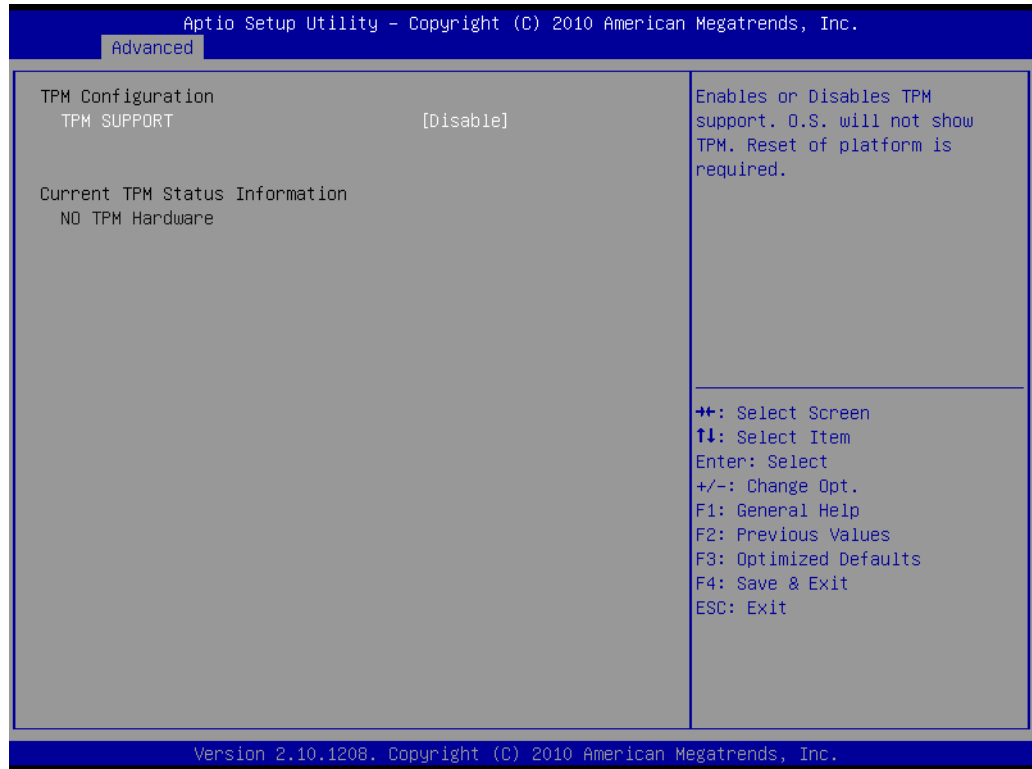


Figure 3.5 TPM Configuration (enable and capture after reset)

TPM Support

Disable or enable Trusted Platform Module (TPM) support (Reset of platform is required)

[Enabled] **[Disabled]**

TPM State (TPM hardware is required)

Turn TPM Enable/Disable. System will reboot after restart in order to change this option

[Enabled] **[Disabled]**

3.4.3 CPU Configuration

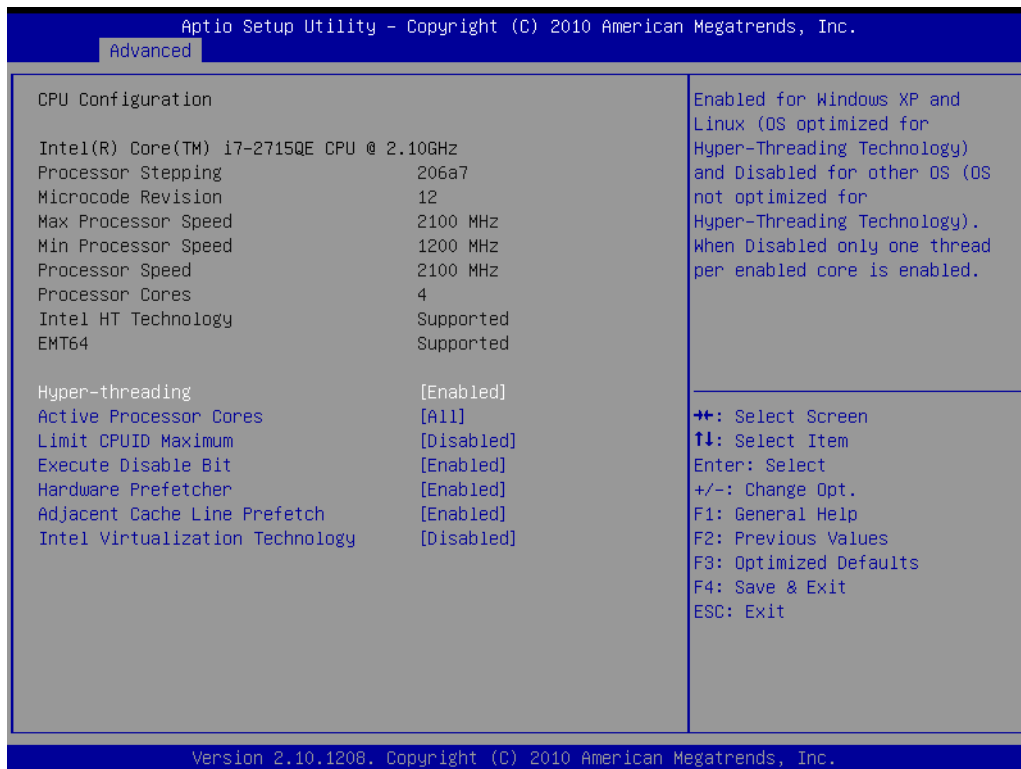


Figure 3.6 CPU Configuration

Hyper Threading Technology

Enabled for OS optimized for Intel Hyper-Threading Technology. If Disabled, only one thread per enabled core is enabled.

[Enabled] [Disabled]

- **Active Processor Cores**

This item allows users to set number of processor cores is active.

[1] [2]...**[ALL]**

- **Limit CPUID Maximum**

Disabled for Windows XP.

[Enabled] **[Disabled]**

- **Execute Disable Bit**

This item allows users to enable or disable the No-Execution page protection technology.

[Enabled] [Disabled]

- **Hardware Prefetcher**

This item allows users to enable or disable the Mid Level Cache (L2) prefetcher.

[Enabled] [Disabled]

- **Adjacent Cache Line Prefetch**

This item allows users to enable or disable the adjacent cache line prefetch feature.

[Enabled] [Disabled]

- **Intel Virtualization Technology**

This item allows users to enable or disable the Intel Virtualization Technology. When enabled, a Virtual Machine Manager (VMM) can utilize the additional hardware capabilities provided by Vanderpol Technology.

[Enabled] **[Disabled]**

3.4.4 SATA Configuration

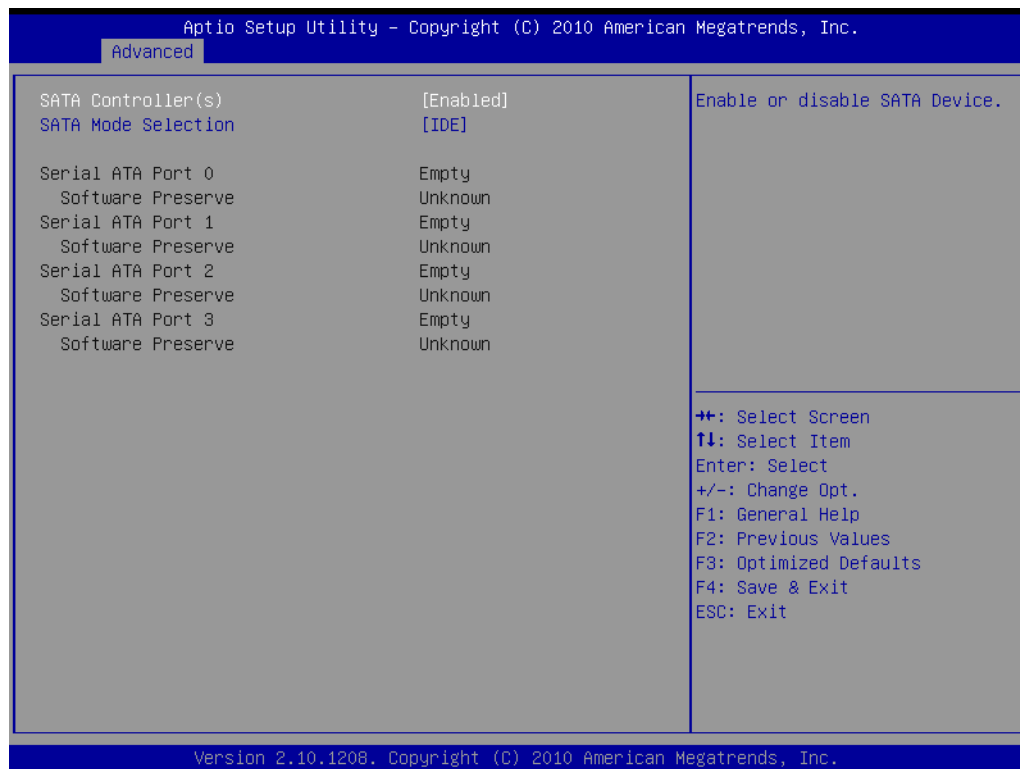


Figure 3.7 SATA Configuration (select RAID and capture)

- **SATA Controller(s)**
This item allows users to enable or disable the SATA controller(s).
[Enabled] [Disabled]
- **SATA Mode Selection**
This item allows users to select the operation mode of SATA controller(s)
[IDE] [AHCI] [RAID]
- **Aggressive LPM Support**
Enable PCH to aggressively enter link power state
[Enabled] [Disabled]
- **Software Feature Mask Configuration**
RAID option ROM or Rapid Storage Technology driver will refer to this configuration to control the storage features
- **Alternate ID**
Report alternate Device ID
[Enabled] **[Disabled]**
- **Port 0-3**
Enable or Disable SATA Port
[Enabled][Disabled]
- **Hot Plug**
Designates this port as Hot Pluggable
[Enabled] **[Disabled]**
- **External SATA**
External SATA support
[Enabled] **[Disabled]**

- **SATA Device Type**
Identify the SATA port is connected to Solid State Driver or Hard Disk Drive
[Hard Disk Driver] [Solid State Driver]
- **Spin up Device**
SATA Host Bus Adaptor (HBA) sequences disk drive initialization and spin-up. PHY communications is initiated via a host issued COMRESET.
[Enabled] **[Disabled]**

3.4.5 Intel TXT(LT) Configuration

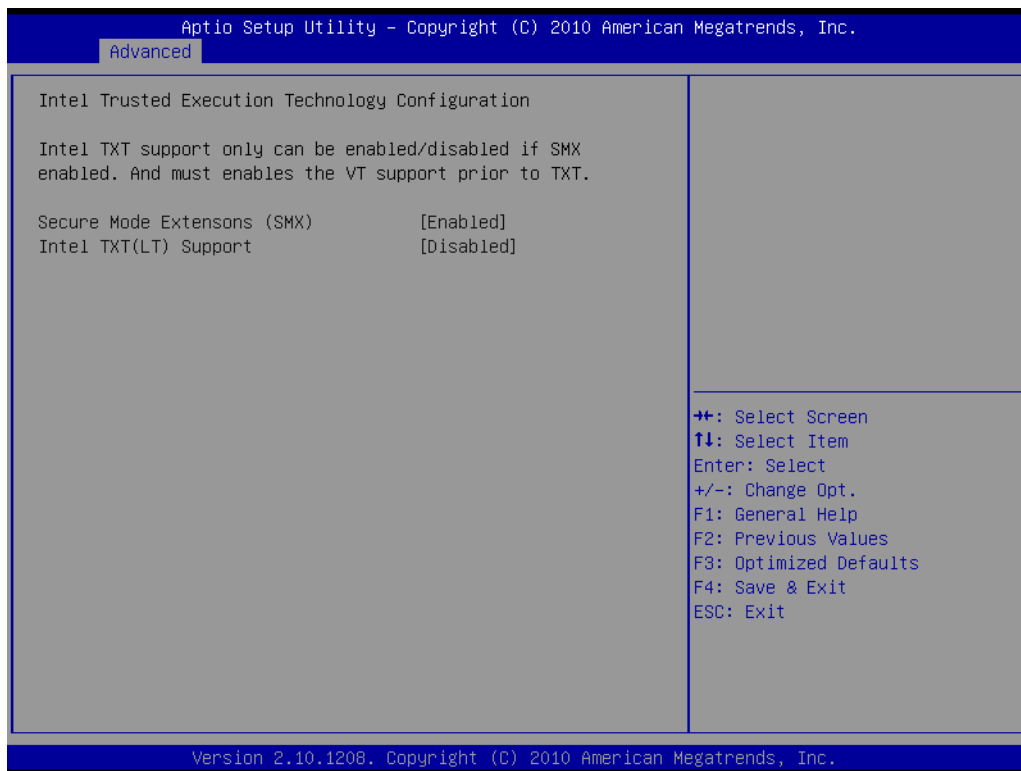


Figure 3.8 Intel TXT(LT) Configuration

Secure Mode Extensions (SMX)

Intel CPU SMX support

[Enabled] **[Disabled]**

- **Intel TXT(LT) Support**
Intel TXT support
[Enabled] **[Disabled]**

3.4.6 PCH-FW Configuration

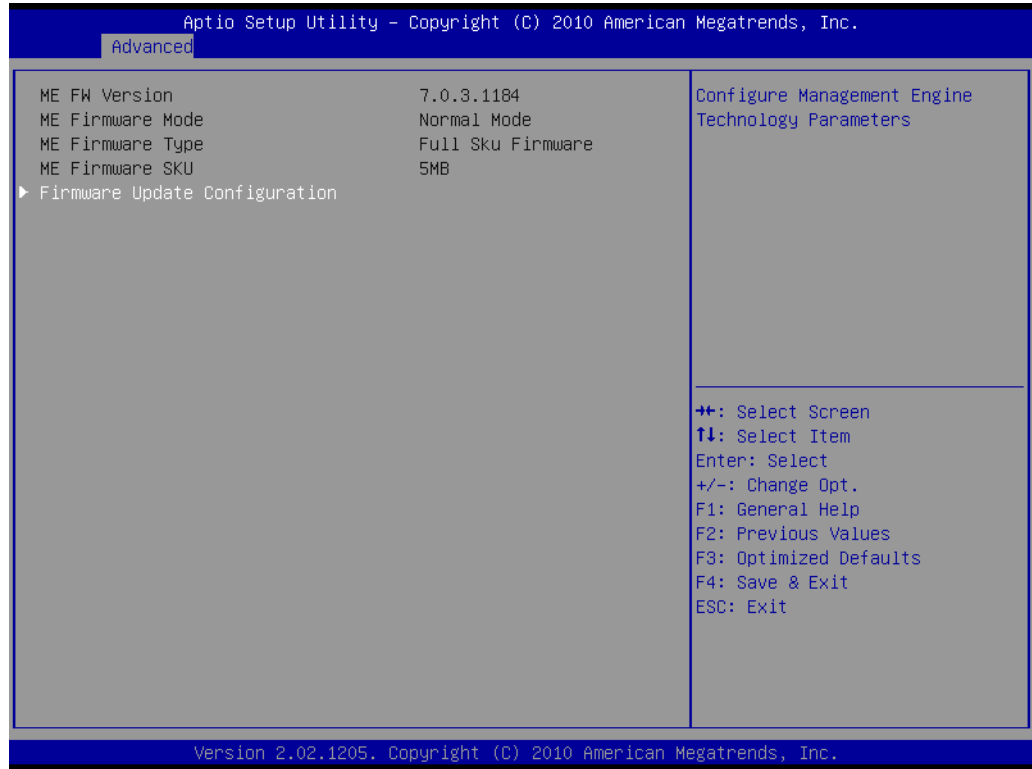


Figure 3.9 PCH-FW Configuration

- **Firmware Update Configuration**
This item allows users to Enable or disable Management Engine (ME) firmware re-flash function
[Enabled] **[Disabled]**

3.4.7 AMT Configuration

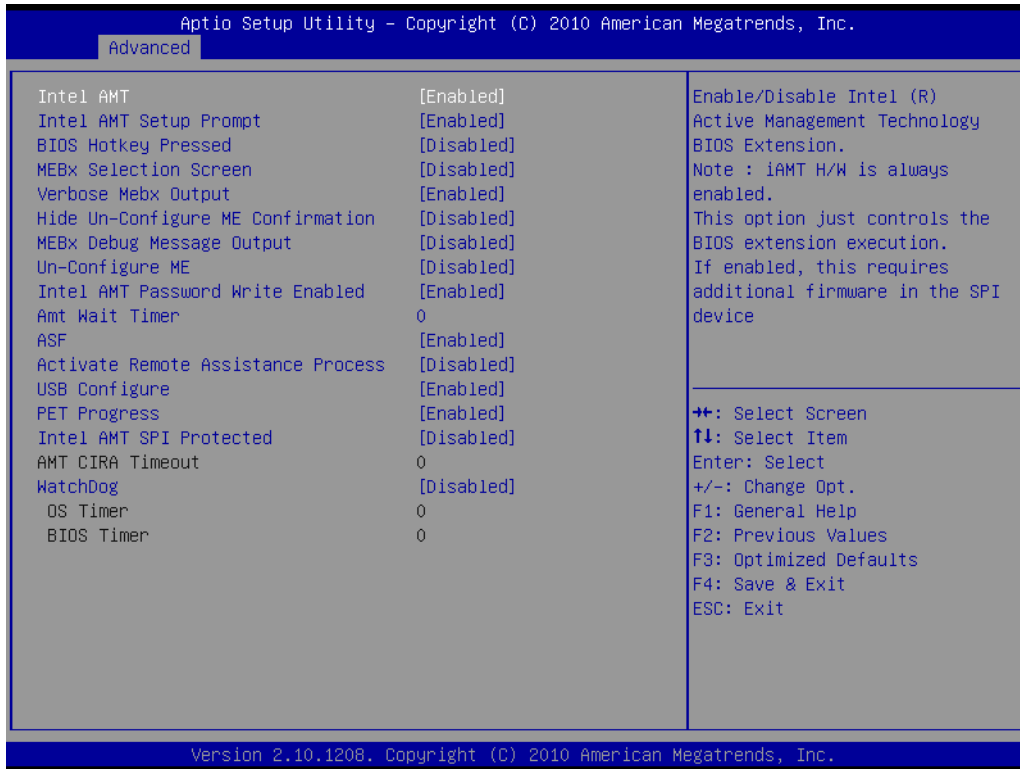


Figure 3.10 AMT Configuration

- **Intel AMT**
Enable or disable Intel Active Management Technology BIOS extension. AMT hardware is always enabled. This option just controls the BIOS extension execution.
[Enabled] [Disabled]
- **Intel AMT Setup Prompt**
Enable or disable AMT setup prompt to wait for hot-key to enter setup
[Enabled] [Disabled]
- **BIOS Hotkey Pressed**
This item allows users to enable or disable BIOS hotkey press.
[Enabled] **[Disabled]**
- **MEBx Selection Screen**
This item allows users to enable or disable Management Engine BIOS Extension (MEBx) selection screen.
[Enabled] **[Disabled]**
- **Verbose MEBx Output**
This item allows users to enable or disable MEBx verbose output.
[Enabled] [Disabled]
- **Hide Un-Configuration ME Confirmation**
Hide un-configure ME without password confirmation prompt.
[Enabled] **[Disabled]**
- **MEBx Debug Message Output**
This item allows users to enable or disable MEBx debug message.
[Enabled] **[Disabled]**

-
- **Un-Configure ME**
This item allows users to un-configure ME without password.
[Enabled] **[Disabled]**
 - **Intel AMT Password Write Enable**
This item allows users to enable or disable Intel AMT password write. Password is writable when set enable
[Enabled] [Disabled]
 - **Amt Wait Timer**
Set timer to wait before sending ASF_GET_BOOT_OPTIONS.
Default [0]
 - **ASF**
This item allows users to enable or disable Alert Specification Format.
[Enabled] [Disabled]
 - **Activate Remote Assistance Process**
This item allows users to enable or disable trigger Client Initiated Remote Access (CIRA) boot.
[Enabled] **[Disabled]**
 - **USB Configure**
This item allows users to enable or disable USB configure function.
[Enabled] [Disabled]
 - **PET Progress**
This item allows users to enable or disable PET events progress to receive PET (Platform Event Trap) events or not.
[Enabled] [Disabled]
 - **Intel AMT SPI Protected**
This item allows users to enable or disable Intel AMT SPI write protect.
[Enabled] [Disabled]
 - **AMT CIRA Timeout**
OEM defined timeout for Management Presence Server (MPS) connection to be established. 0 - use the default timeout value of 60 seconds. 255 - MEBx waits until the connection succeeds
Default [0]
 - **WatchDog**
This item allows users to enable or disable WatchDog Timer.
[Enabled] **[Disabled]**
 - **OS Timer**
Set OS watchdog timer.
Default [0]
 - **BIOS Timer**
Set BIOS watchdog timer.
Default [0]

3.4.8 USB Configuration

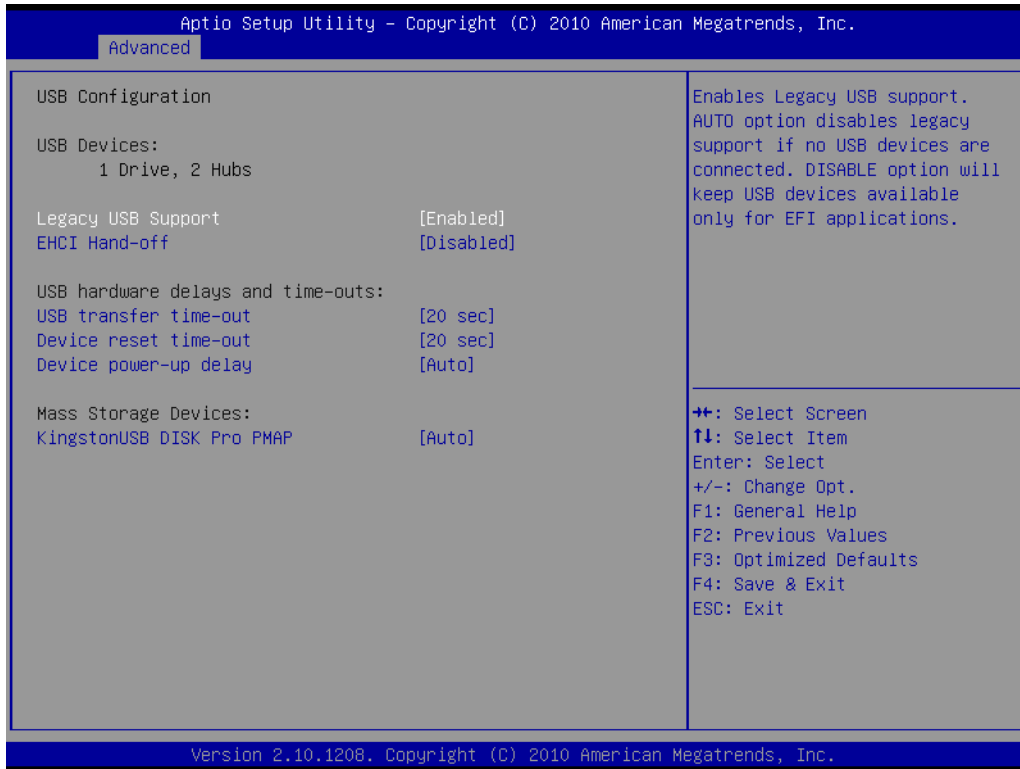


Figure 3.11 USB Configuration

- **Legacy USB Support**
 Enable the support for legacy USB. Auto option disables legacy support if no USB devices are connected.
[Enabled] [Disabled] [Auto]
- **EHCI Hand-Off**
 This is a workaround for the OS without Enhanced Host Controller Interface EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.
 [Enabled] **[Disabled]**
- **USB transfer time-out**
 Set the time-out value for Control, Bulk, and Interrupt transfers.
 [1 sec] [5 sec] [10 sec] **[20 sec]**
- **Device reset time-out**
 Set USB mass storage device Start Unit command time-out value.
 [10 sec] **[20 sec]** [30 sec] [40 sec]
- **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.
[Auto] [Manual]
- **Device power-up delay in seconds**
 Delay ranges from 1 to 40 seconds
 Default [5]

3.4.9 Embedded Controller Configuration



Figure 3.12 Embedded Controller Configuration

EC iManager WatchDog IRQ

This item allows users to set the IRQ number of EC WatchDog.

[Disabled] [IRQ 5] **[IRQ 7]** [IRQ 14]

■ EC Power Saving Mode

This item allows users to set board's power saving mode when system off.

[Normal] [Deep Sleep]

■ CPU Shutdown Temperature

This item allows users to set the value of CPU shutdown temperature.

[Disabled] [70° C] [75° C] [80° C] [85° C] [90° C] [95° C] [100° C] [105° C]

■ EC iManager Smart FAN

This item allows users to enable or disable Smart FAN feature.

[Enabled] [Disabled]

■ Backlight Enable Polarity

Switch backlight enable polarity for Native or Invert

[Native] [Invert]

3.4.10 Super IO Configuration

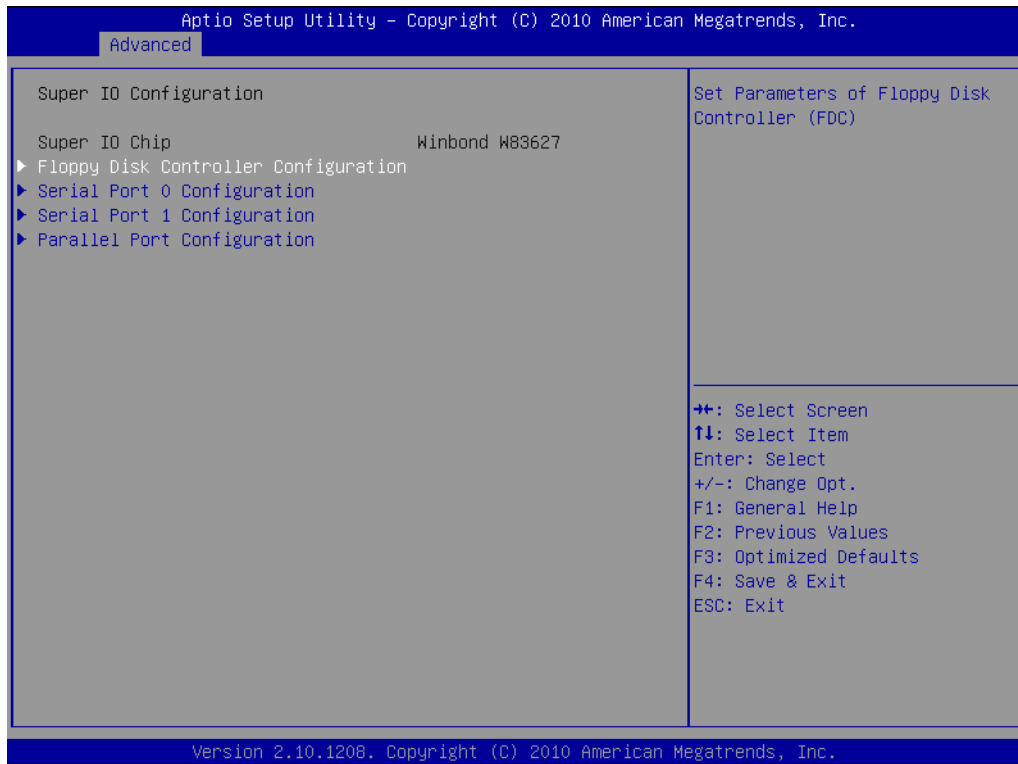


Figure 3.13 Super IO Configuration setup screen

- **Floppy Disk Controller Configuration**
Disable/Enable the floppy disk controller
[Enabled] [Disabled]
- **Change Setting**
Change an optimal setting floppy disk controller
- **[Auto]**
[IO=3f0h;IRQ=6;DMA=2]
[IO=3f0h;IRQ=3,4,5,6,7,10,12;DMA=1,2,3]
[IO=370h;IRQ=3,4,5,6,7,10,12;DMA=1,2,3]
- **Device Mode**
Change mode of floppy disk controller.
[Read Write] [Write Protect]

3.4.10.1 Serial Port 0 Configuration

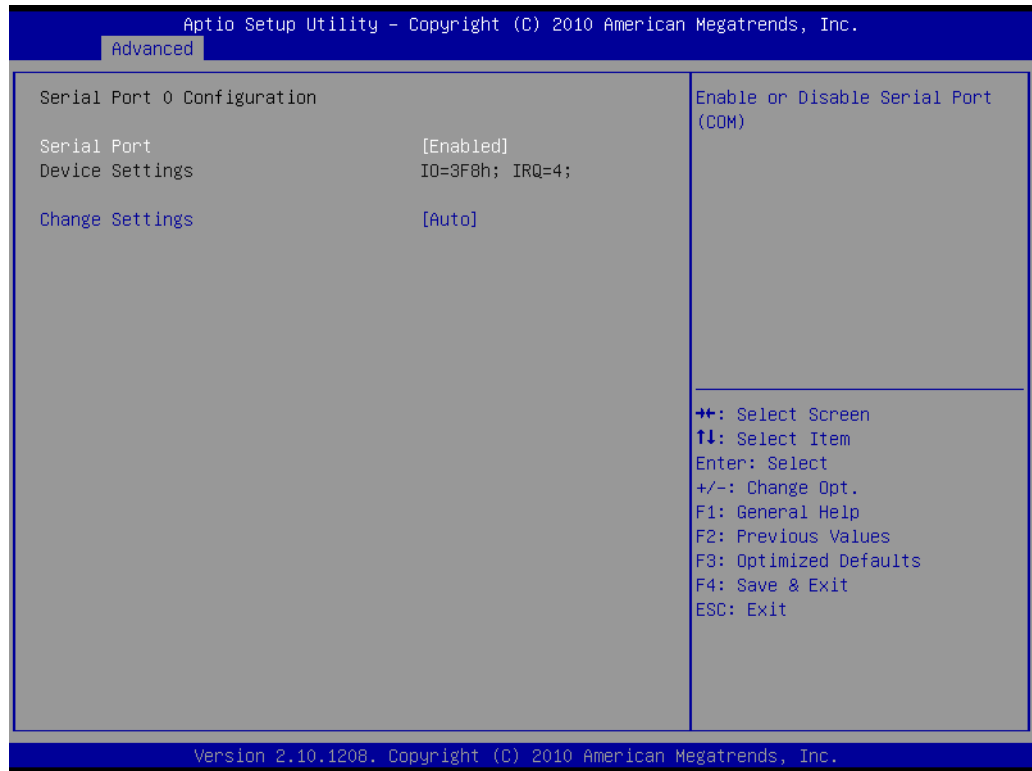


Figure 3.14 Serial Port 0 Configuration setup screen

- **Serial Port**
Enable or Disable Serial Port (COM)
[Enabled] [Disabled]
- **Change Settings**
Select an optimal setting for serial port 0
- **[Auto]**
[IO=3F8h;IRQ=4]
[IO=3F8h;IRQ=3,4,5,6,7,10,11,12]
[IO=2F8h;IRQ=3,4,5,6,7,10,11,12]
[IO=3E8h;IRQ=3,4,5,6,7,10,11,12]
[IO=2E8h;IRQ=3,4,5,6,7,10,11,12]

3.4.10.2 Serial Port 1 Configuration

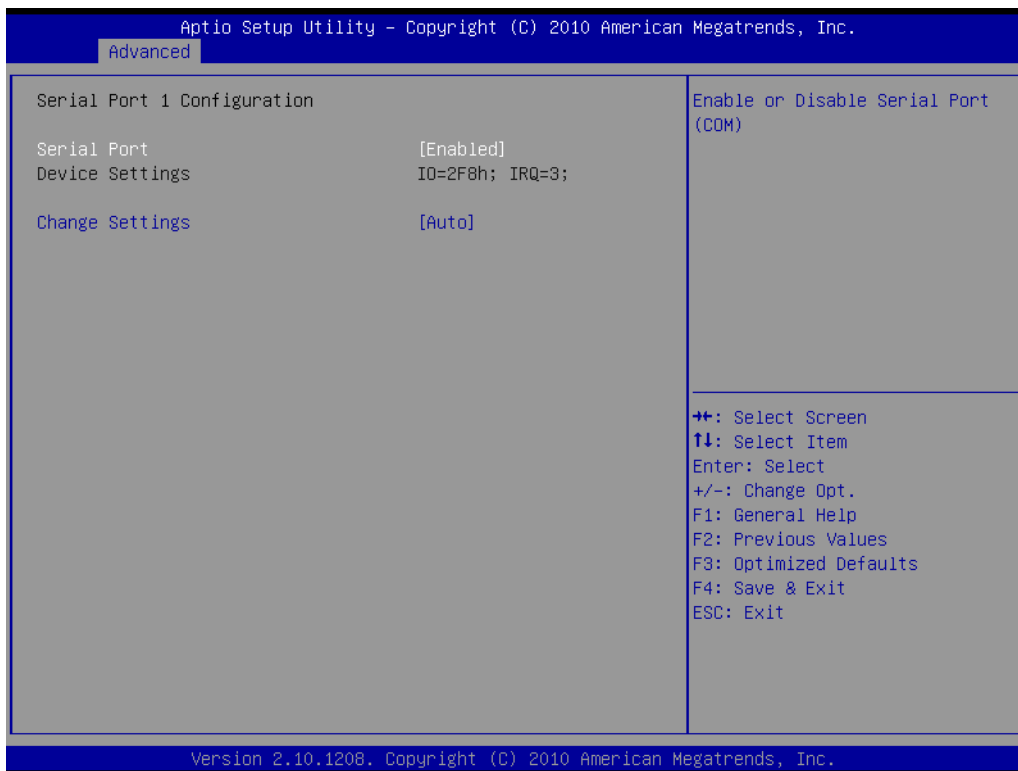


Figure 3.15 Serial Port 1 Configuration setup screen

Serial Port

Enable or Disable Serial Port (COM)

[Enabled] [Disabled]

- **Change Settings**

Select an optimal setting for serial port 0

- **[Auto]**

[IO=3E8h;IRQ=7]

[IO=2F8h;IRQ=3,4,5,6,7,10,11,12]

[IO=3F8h;IRQ=3,4,5,6,7,10,11,12]

[IO=2E8h;IRQ=3,4,5,6,7,10,11,12]

[IO=3E8h;IRQ=7;DMA=3]

[IO=3F8h;IRQ=3,4,5,6,7,10,11,12;DMA=1,2,3]

[IO=2F8h;IRQ=3,4,5,6,7,10,11,12;DMA=1,2,3]

[IO=3E8h;IRQ=3,4,5,6,7,10,11,12;DMA=1,2,3]

[IO=2E8h;IRQ=3,4,5,6,7,10,11,12;DMA=1,2,3]

3.4.10.3 Parallel Port Configuration

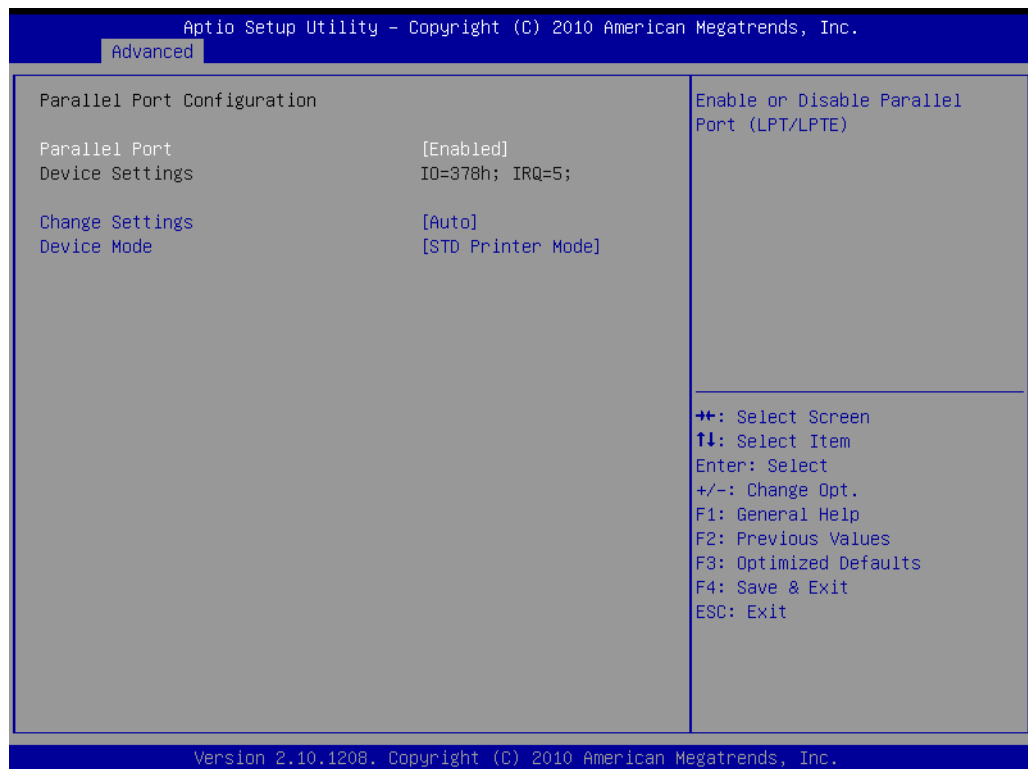


Figure 3.16 Parallel Port Configuration setup screen

- **Parallel Port**

Disable/Enable the Parallel port

[Enabled] [Disabled]

- **Change Settings**

Change Parallel port resource setting

- **[Auto]**

[IO=378h;IRQ=5]

[IO=378h;IRQ=3,4,5,6,7,10,11,12]

[IO=278h;IRQ=3,4,5,6,7,10,11,12]

[IO=3BCh;IRQ=3,4,5,6,7,10,11,12]

[IO=378h]

[IO=278h]

[IO=3BCh]

- **Device Mode**

Change Parallel port mode setting

[STD Printer Mode]

[SPP Mode]

[EPP-1.9 and SPP Mode]

[EPP-1.7 and SPP Mode]

[ECP Mode]

[ECP and EPP-1.9 Mode]

[ECP and EPP-1.7 Mode]

3.4.11 Serial Port Console Redirection

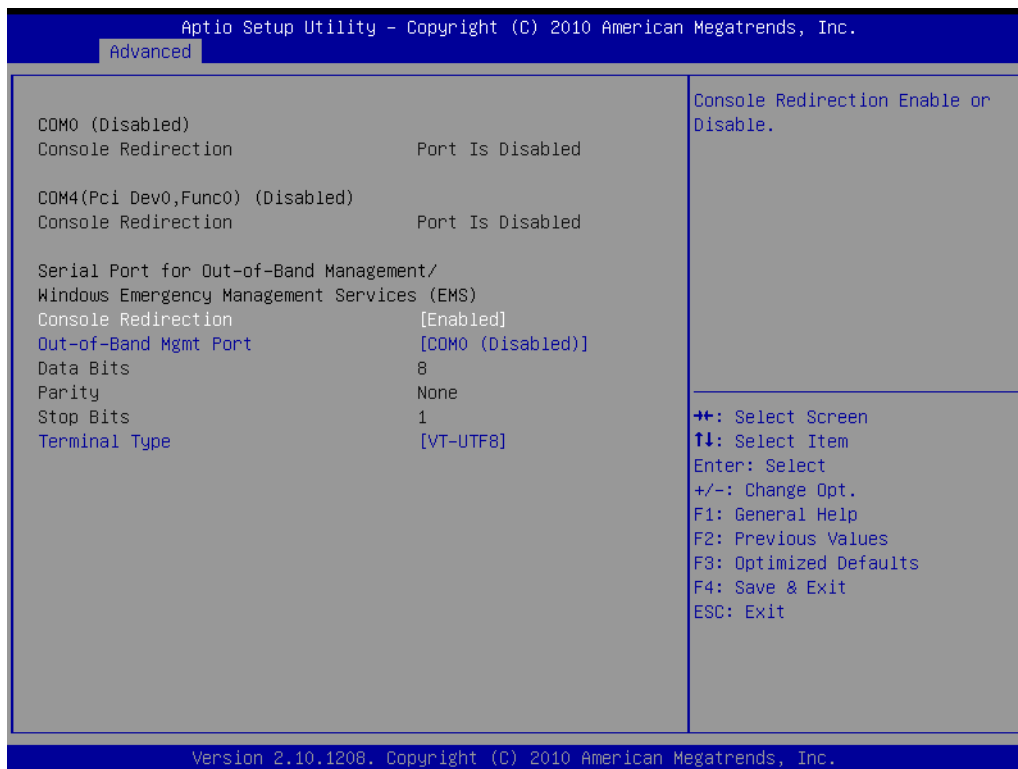


Figure 3.17 Serial Port Console Redirection

- **Console Redirection**
This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).
[Enabled] [Disabled]
- **Out-of-Band Mgmt Port**
Select the port for Microsoft Windows Emergency Management Services (EMS) to allow for remote management of a Windows Server OS.
[COM 0] [COM 4]
- **Terminal Type**
VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. See above, in Console Redirection Settings page, for more Help with Terminal Type/Emulation.
[VT100] [VT100+] [VT-UTF8] [ANSI]

3.4.12 Switchable Graphics

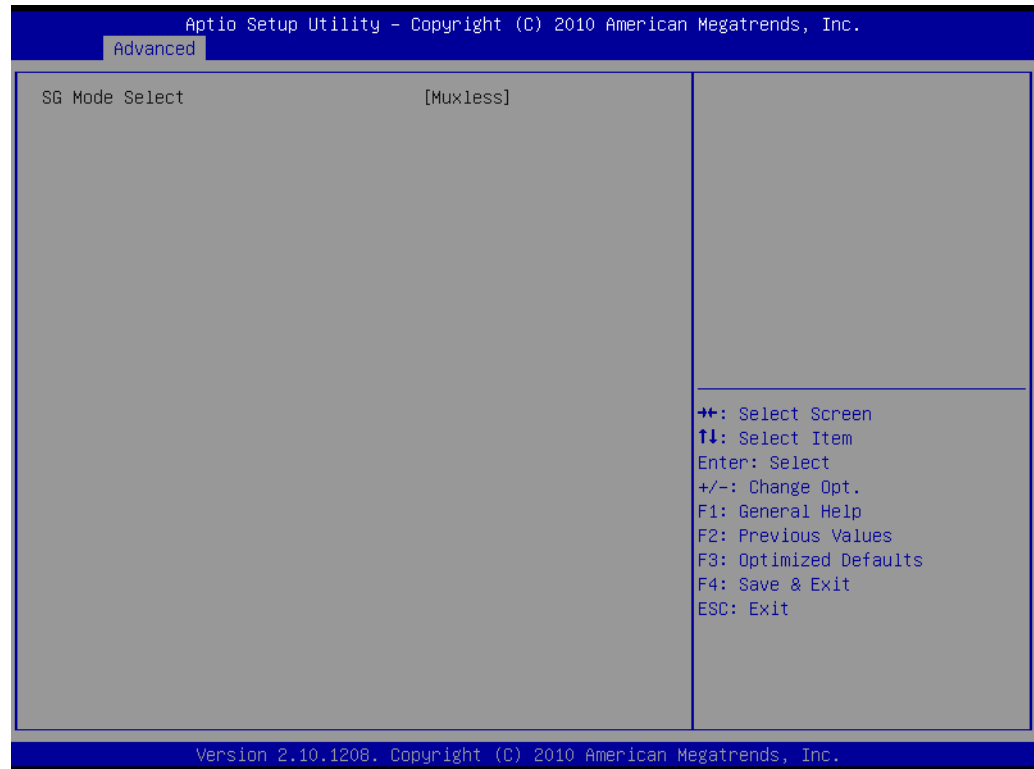


Figure 3.18 Switchable Graphics

- **SG Mode Select**
This item allows users to select switchable graphics mode. Either mode requires Primary Display set to "SG"
[MUXed] [MUXless]

3.4.13 Sandybridge DTS Configuration



Figure 3.19 Sandybridge DTS Configuration

- CPU DTS**
 This item allows users to configure ACPI thermal management. If enabled, ACPI thermal management uses a Digital Thermal Sensor (DTS) mechanism to obtain CPU temperatures. If disabled, ACPI thermal management uses EC reported temperature values.
 [Enabled] **[Disabled]**

3.4.14 Sandybridge PPM Configuration

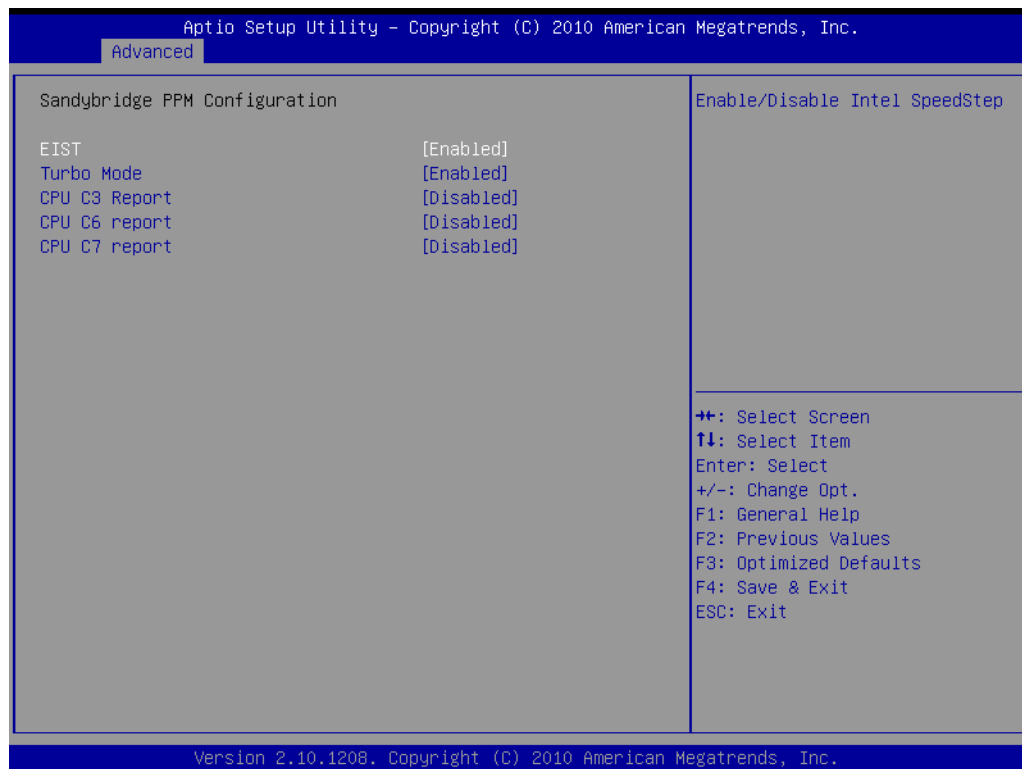


Figure 3.20 Sandybridge PPM (Processor Power Module) Configuration

- **EIST**
Configure Intel Enhanced Intel SpeedStep Technology. CPU runs at its default clock speed if disabled; CPU speed is controlled to be dynamically changed if enabled.
[Enabled] [Disabled]
- **Turbo Mode**
This item allows users to enable or disable Intel Turbo Mode Technology which can dynamically overclock processing cores to improve performance.
[Enabled] [Disabled]
- **CPU C3/C6/C7 Report**
This item allows users to enable or disable CPU C-state report to OS .
[Enabled] **[Disabled]**

3.5 Chipset

3.5.1 System Agent (SA) Configuration

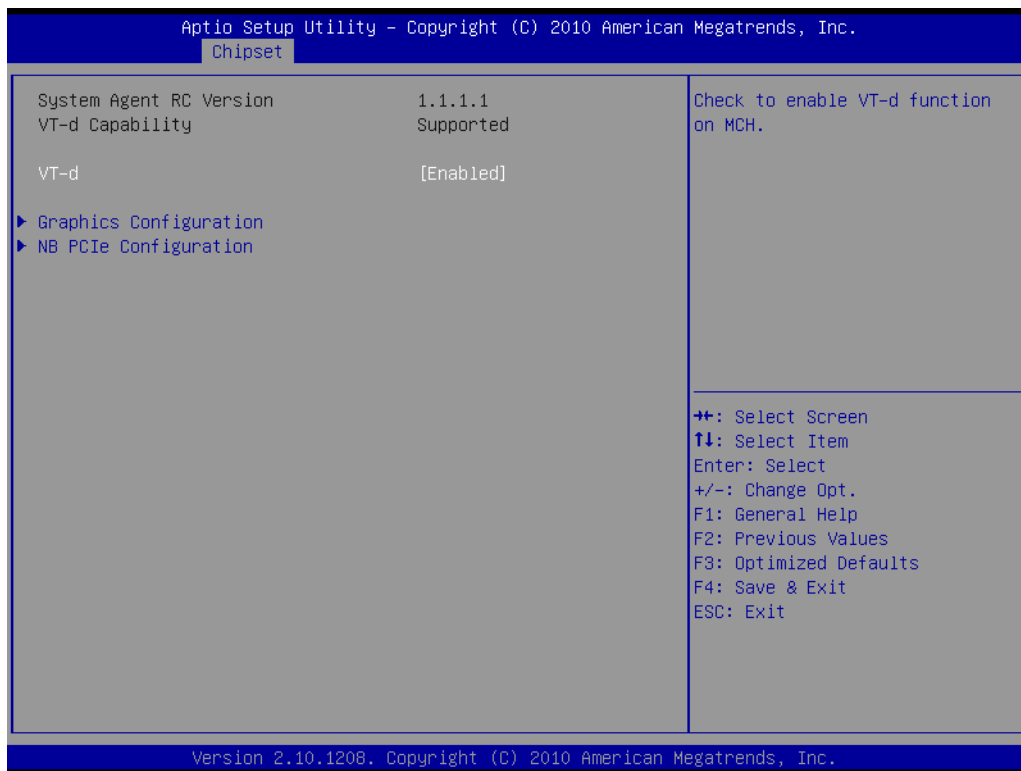


Figure 3.21 System Agent (SA) Configuration

- **VT-d**
 This item allows users to enable or disable Intel Virtualization Technology for Directed I/O (VT-d).
[Enabled] [Disabled]

3.5.1.1 Graphics Configuration

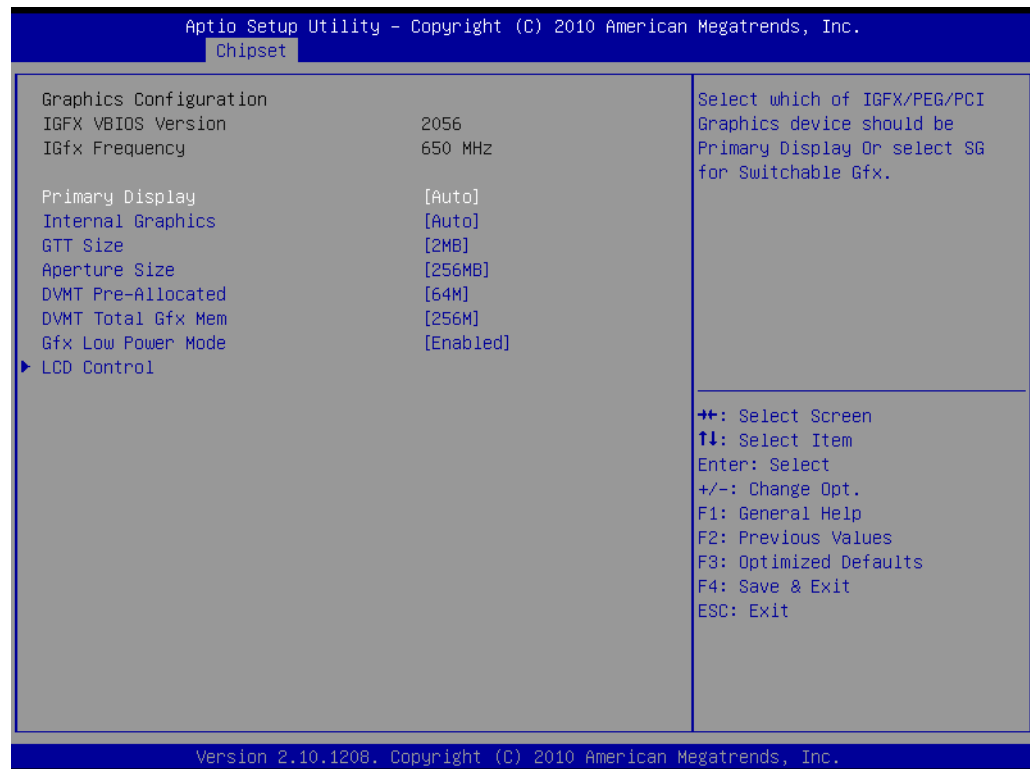


Figure 3.22 Intel IGFX Configuration

- **Primary display**
Select which IGFX/PEG/PCI graphics device should be Primary Display or select SG for Switchable graphics
[Auto] [IGFX] [PEG] [PCI] [SG]
- **Internal Graphics**
This item allows users to enable or disable Internal Graphics Device.
[Enabled] [Disabled] **[Auto]**
- **GTT (Graphics Translation Table) Size**
This item allows users to select the size of Translation Look aside Buffer (LTB).
[1MB] **[2MB]**
- **Aperture Size**
This item allows users to select graphics aperture size.
[128MB] **[256MB]** [512MB]
- **(DVMT) Pre-Allocated**
This item allows users to select **Dynamic Video Memory Technology (DVMT)** pre-allocated (Fixed) graphics memory size.
[0MB] [32MB] **[64MB]**...[480MB] [512MB]
- **DVMT Total Gfx Mem**
This item allows users to select
- **DVMT 5.0 total graphics memory size.**
[128MB] **[256MB]** [MAX]
- **Gfx Low Power Mode**
This option is applicable for small form factor only
[Enabled] [Disabled]

3.5.1.2 LCD Control

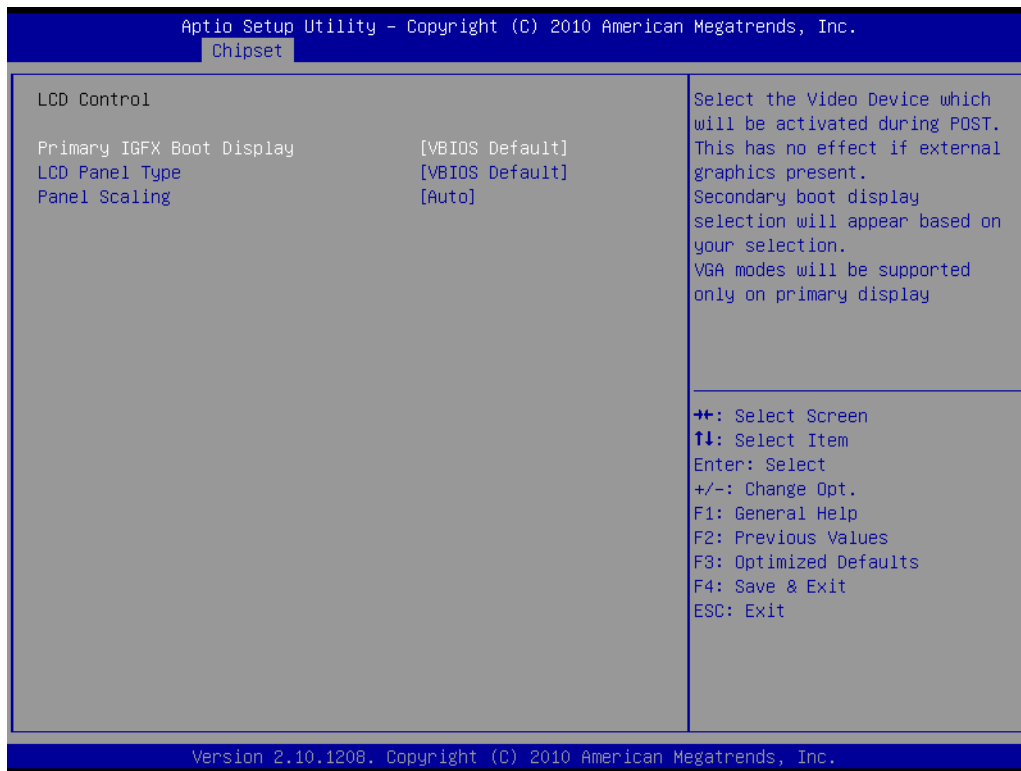


Figure 3.23 LCD Control

Primary IGFX Boot Display

Selects Integrated Graphics Video Device at POST stage. This has no effect if external graphics are present. VGA modes will be supported only on primary display

[VBIOS Default] [CRT] [LFP]

■ Secondary IGFX Boot Display

Select secondary display device

[Disabled] [CRT] [LFP]

■ LCD Panel Type

This item allows users to select appropriate resolution and color depth for LCD panels. Supported resolution may refer to BIOS setting and others based on request.

[VBIOS Default]

■ Panel Scaling

This item allows users to enable or disable panel scaling.

[Auto] [Force Scaling] [Off]

3.5.1.3 NB PCIe Configuration

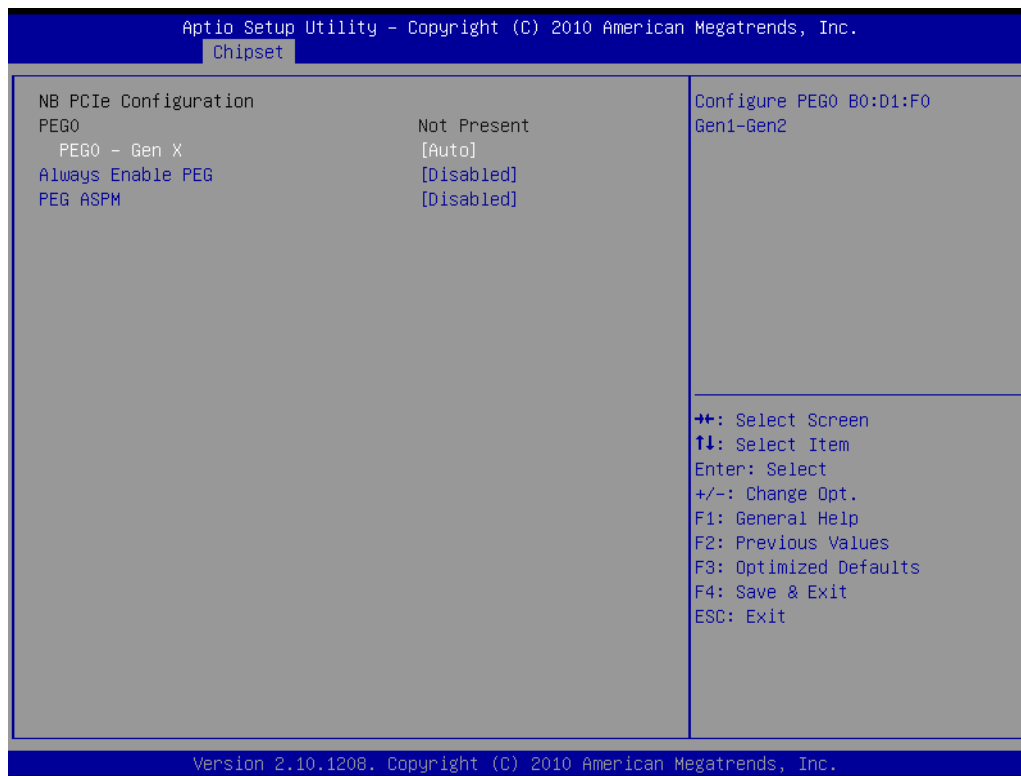


Figure 3.24 NB PCIe Configuration

PEG0 - Gen x

Select NorthBridge PCI-Express B0:D1:F0 standard from generation 1 or 2.

[Auto] [Gen1] [Gen2]

■ Always Enable PEG

Force PEG slot to be enabled or detect hardware signal

[Enabled] [Disabled]

■ PEG ASPM

This item allows users to enable or disable PEG Active State Power Management (ASPM). This has no effect if PEG is not the currently active device

[Disabled] [Auto] [ASPM L0s] [ASPM L1] [ASPM L0sL1]

3.5.2 PCH-IO Configuration

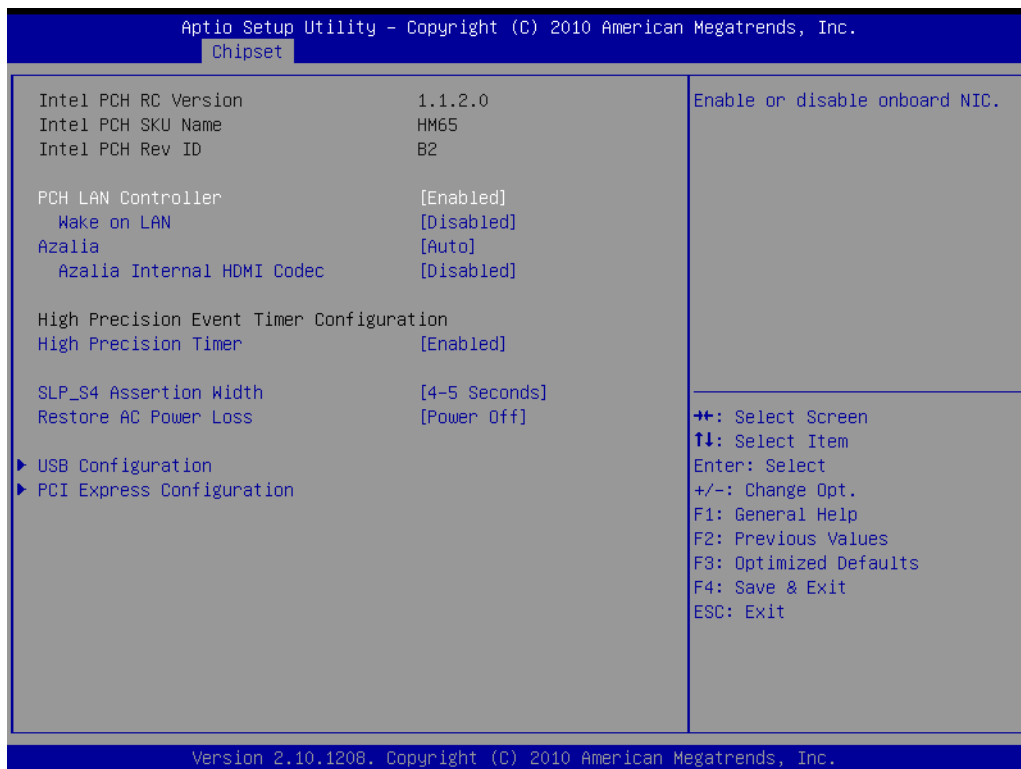


Figure 3.25 PCH-IO Configuration

- **PCH LAN controller**
Enable or disable onboard Network Interface Card (NIC)
[Enabled] [Disabled]
- **Wake on LAN**
Enable or disable integrated LAN to wake the system
[Enabled] **[Disabled]**
- **Azalia**
Controls detection of the Azalia (High Definition Audio) device. Choices are: Disabled or Enabled. If Auto is selected, Azalia will be enabled if present.
[Enabled] [Disabled] **[Auto]**
- **Azalia Internal HDMI codec**
Enable or disable the Azalia internal HDMI/DisplayPort codec.
[Enabled] **[Disabled]**
- **High Precision Timer**
Enable or disable the High Precision Event Timer.
[Enabled] [Disabled]
- **SLP_S4 Assertion Width**
Select a minimum assertion width of the SLP_S4# signal
[1-2 Seconds] [2-3 Seconds] [3-4 Seconds] **[4-5 Seconds]**
- **Restore AC Power Loss**
Select AC power state when power is re-applied after a power failure
[Power Off] [Power On] [Last State]

3.5.2.1 USB Configuration

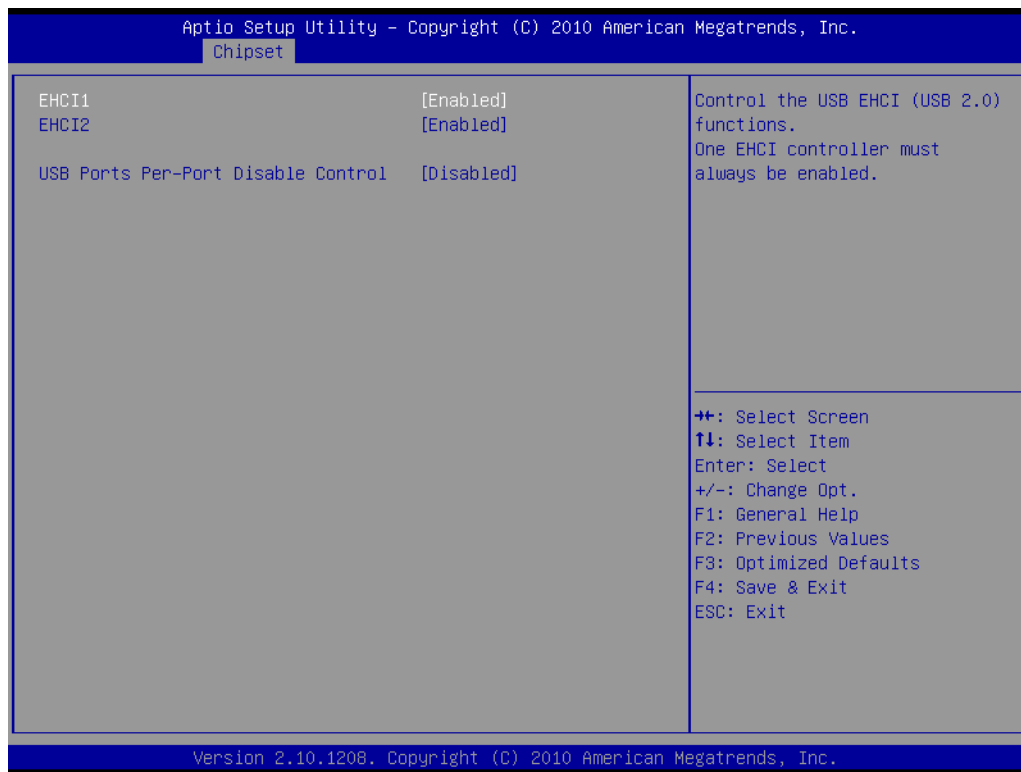


Figure 3.26 USB Configuration

EHCI1/EHCI2

Control the USB Enhanced Host Controller Interface (EHCI) functions.

[Enabled] **[Disabled]**

- **USB Ports Per-Port Disable Control**

Controls each of the USB ports (0~7) individually.

[Enabled] **[Disabled]**

- **USB Port#0/1/2/3/4/5/6/7 Disable**

Disable USB port.

[Enabled] [Disabled]

3.5.2.2 PCI Express Configuration

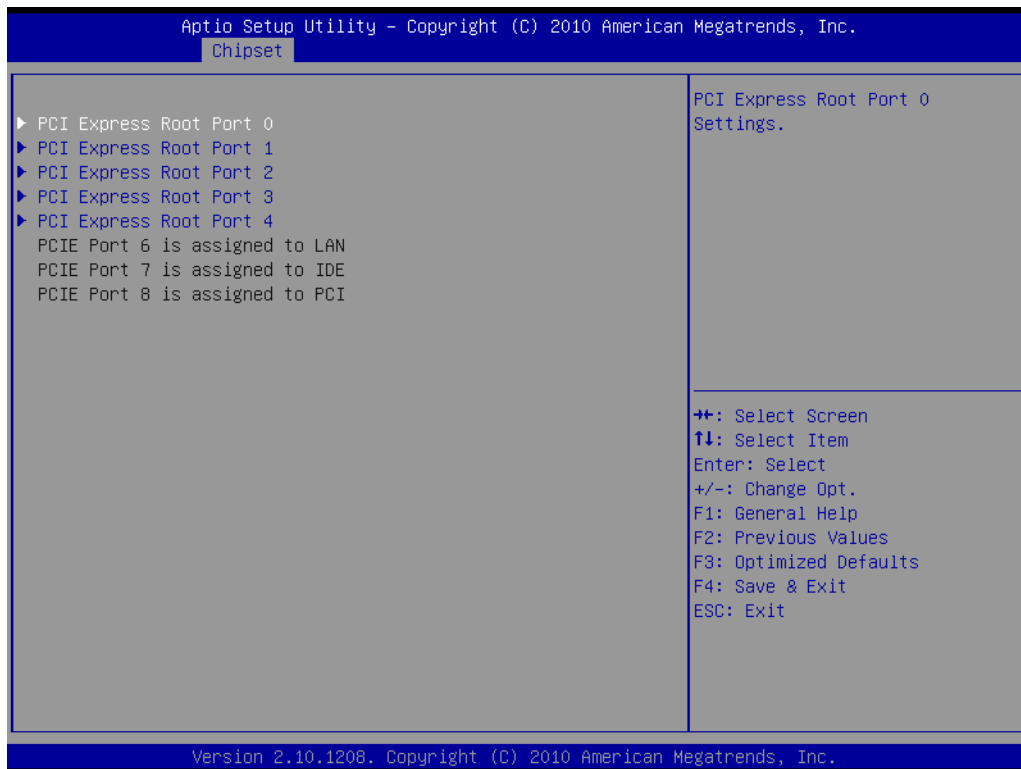


Figure 3.27 PCI Express Configuration

- **PCI Express Root Port x**
This item allows users to configure PCI Express root ports.
- **PCI Express Root Port**
Controls the PCI Express root port
[Enabled] [Disabled]
- **ASPM Support**
Sets Active Power State Management level
[Disabled] [L0] [L1] [L0sL1] [Auto]
- **URR**
Enable or disable Unsupported Request Reporting
[Enabled] [Disabled]
- **NFER**
Enable or disable device Non-Fatal Error Reporting
[Enabled] [Disabled]
- **CER**
Enable or disable device Correctable Error Reporting
[Enabled] [Disabled]
- **CTO**
Enable or disable Completion Timer TO
[Enabled] [Disabled]
- **SEFE**
Enable or disable System Error on Fatal Error
[Enabled] [Disabled]
- **SENFE**

- Enable or disable System Error on Non-Fatal Error
[Enabled] **[Disabled]**
- **SECE**
Enable or disable System Error on Correctable Error
[Enabled] **[Disabled]**
- **PME SCI**
Enable or Disable Power Management Event - System Control Interrupt
[Enabled] **[Disabled]**
- **Hot Plug**
Enable or Disable Hot Plug
[Enabled] [Disabled]
- **Extra Bus Reserved**
Extra Bus Reserved (0-7) for bridges behind this root bridge
Default [0]
- **Reserved Memory**
Reserved Memory and Prefetchable (1-20MB) range for this root bridge
Default [10]
- **Reserved I/O**
Reserved I/O (4K/8K/12K/16K/20K) range for this root bridge
Default [4K]

3.6 Boot Settings

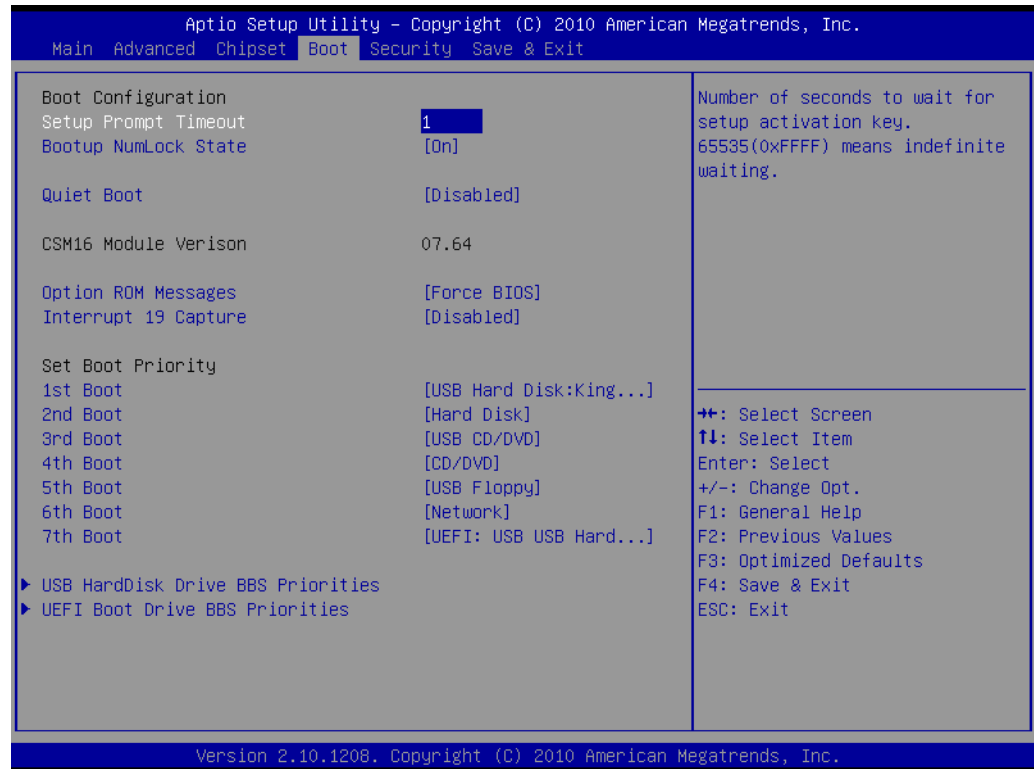


Figure 3.28 Boot Setup Utility

- **Setup Prompt Timeout**

Selects number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting

Default [1]

- **Bootup NumLock State**

Selects the Power-On state for NumLock.

[Off] [On]

- **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.

[Enabled] [Disabled]

- **Option ROM Message**

Sets display mode for optional ROM message.

[Force BIOS] [Keep Current]

- **Interrupt 19 Capture**

This item allows optional ROM messages to trap Interrupt 19.

[Enabled] [Disabled]

- **1st/2nd/3rd/4th/5th/6th/7th Boot**

This item allows users to set boot device order.

- **Floppy Drive (Other Drives) BBS Priorities**

Specifies the BIOS Boot Specification priority sequence from available floppy drivers (other drives)

3.7 Security Setup

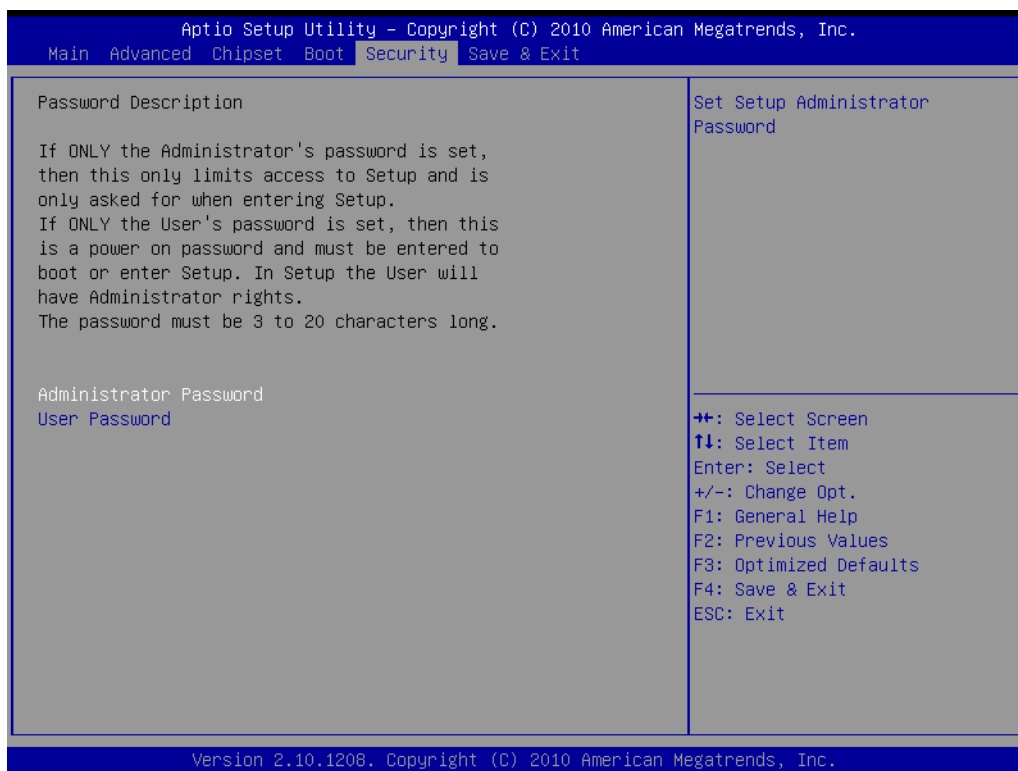


Figure 3.29 Password Configuration

Administrator/User Password: Sets administrator or user password. Please refer to Password Description in BIOS Setup

3.8 Save & Exit

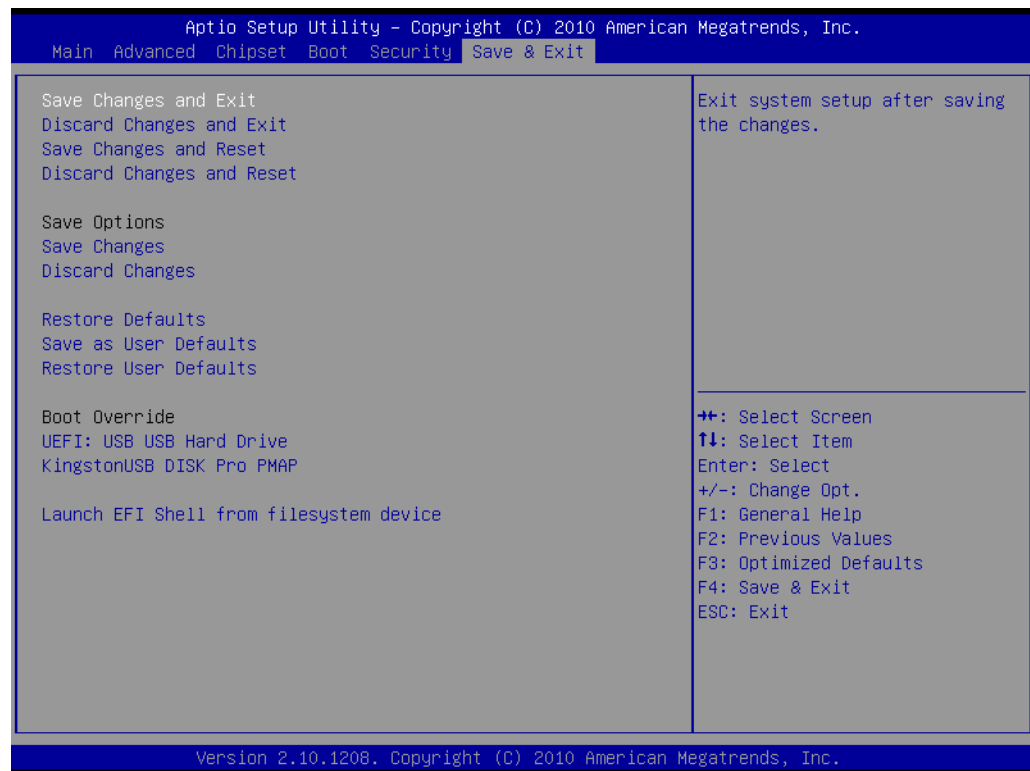


Figure 3.30 Save & Exit

■ 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 of all system configuration parameters.

■ Discard Changes and Exit

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

■ Save Changes and Reset

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

■ Discard Changes and Reset

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

■ Save Changes

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

■ Discard Changes

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

■ Restore Defaults

The SOM-5890 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.

- **Save User Defaults**

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

- **Restore User Defaults**

The users can select this option to restore user defaults.

Chapter 4

S/W Introduction &
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 connect to the website <http://support.advantech.com.tw>, download the drivers that you want to install and follow Driver Setup instructions to complete the installation.

4.2.2 Other OS

To install the drivers for other Windows OS or Linux, please connect to the website <http://support.advantech.com.tw> to download the setup file.

Appendix **A**

Watchdog Timer

This appendix gives you the information about the watchdog timer programming on the SOM-5790 CPU System 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* Chapter 6. Programming Overview 6.2 Watchdog (WDog) Functions Class.

Appendix **B**

Programming GPIO

This Appendix gives the illustration of the General Purpose Input and Output pin setting.

Sections include:

- System I/O ports

B.1 GPIO Register

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* Chapter 6. Programming Overview 6.3 GPIO (I/O) Functions

Appendix **C**

System Assignments

This appendix gives you the information about the system resource allocation on the SOM-5790 CPU System on Module.

Sections include:

- System I/O ports
- DMA Channel Assignments
- Interrupt Assignments
- 1st 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
0040 - 0043	System timer
0044 - 005F	Motherboard resources
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 - 0071	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
00C0 - 00DF	Direct memory access controller
00E0 - 00EF	Motherboard resources
00F0 - 00FF	Numeric data processor
01F0 - 01F7	Primary IDE Channel
0274 - 0277	ISAPNP Read Data Port
0279 - 0279	ISAPNP Read Data Port
02F8 - 02FF	Communications Port (COM2)
0378 - 037F	Printer Port (LPT1)
03B0 - 03BB	Intel(R) HD Graphic
03C0 - 03DF	Intel(R) HD Graphic
03F6 - 03F6	Primary IDE Channel
03F8 - 03FF	Communications Port (COM1)
0400 - 041F	Motherboard resources
04D0 - 04D1	Motherboard resources
0500 - 053F	Motherboard resources
0800 - 087F	Motherboard resources

Table C.1: System I/O ports

0A00 - 0A0F	Motherboard resources
0A79 - 0A79	ISAPNP Read Data Port
0D00 - FFFF	PCI bus

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
NMI	Parity error detected
IRQ 0	System timer
IRQ 1	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
IRQ 2	Available
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 5	Available
IRQ 6	Available
IRQ 7	Available
IRQ 8	System CMOS/real time clock
IRQ 9	Microsoft ACPI-Compliant System
IRQ 10	Available
IRQ 11	Available
IRQ 12	PS/2 Compatible Mouse
IRQ 13	Numeric data processor
IRQ 14	Primary IDE Channel
IRQ 15	Available

C.4 1st MB Memory Map

Table C.4: 1st MB memory map

Addr. range (Hex)	Device
00000000 - 0009FFFF	System board
000A0000 - 000BFFFF	Intel(R) HD Graphic
000A0000 - 000BFFFF	PCI Bus
000C0000 - 000CFFFF	System board
000D0000 - 000DFFFF	PCI bus
000E0000 - 000FFFFF	System board

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