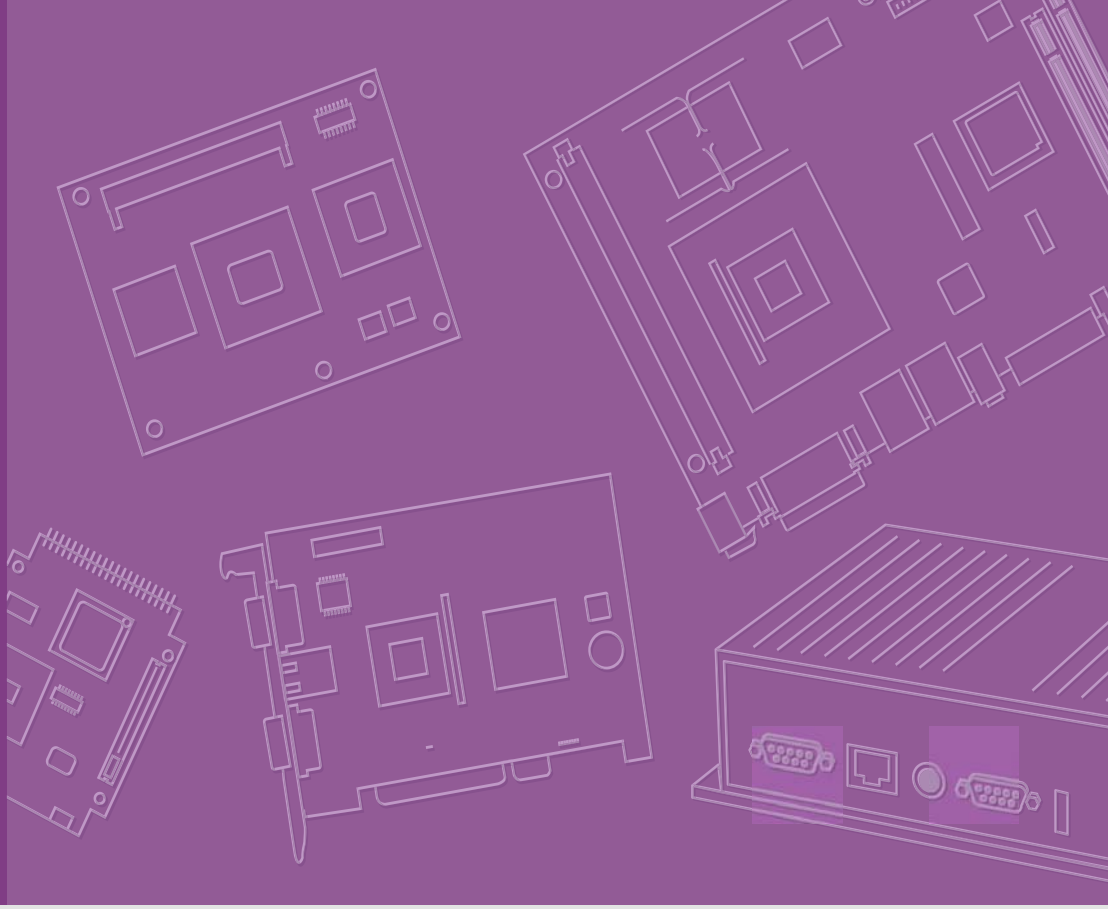

User Manual

SOM-5787/6787

Trusted ePlatform Services

ADVANTECH

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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 merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Part No. 2006578700 Edition 1

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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.

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

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.

- SOM-5787 or SOM-6787 module x1
- Heatspreader x1

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.

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Chapter 1

General Information

This chapter gives background information on the SOM-5787/ 6787 CPU System on Module.

Sections include:

- Introduction
- Specifications

1.1 Introduction

SOM-5787/6787 is an embedded COM Express Type 2 CPU module that fully complies with the PCI Industrial Computer Manufactures PICMG COM Express standard. The new CPU module supports Intel Core 2 Duo / Celeron M processor by Intel GS45/ICH9-M SFF chipset which supports faster integrated graphic engine, PCI Express and SATA interfaces. In a basic form factor of 95mm x 125mm for SOM-5787 and 95x95mm for SOM-6787, the SOM-5787/6787 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-5787/6787 with advanced I/O capacity incorporates serial differential signaling technologies such as PCI Express, Serial ATA, USB 2.0, LVDS, HD Audio and Serial DVO interfaces. SOM-5787/6787 offers design partners more choices for their own applications needing higher computing speeds while maintaining a compact form factor.

SOM-5787/6787 complies with the "Green Function" standard and supports Doze, Standby and Suspend modes. The small size (95 mm x 125 mm,95x95mm) and use of two high capacity connectors based on the proven SOM-Express form factor, allow the SOM-Express modules to be easily and securely mounted onto a customized solution board or our standard SOM-DB5700 development board.

The SOM-5787/6787 is a highly integrated multimedia SOM that combines audio, video, and network functions. It provides excellent calculated ability by Intel latest dual core process, high quality TV out, dual channel LVDS interface for large size TFT LCD display, DDR3 memory up to 8GB, high definition audio interface (AC97/ Azalia). Major on-board devices adopt PCIe/PCI technology, to achieve outstanding computing performance when customer adopts SOM-5787/6787 to establish their own application.

1.2 Specifications

1.2.1 Standard System On Module functions

- **CPU:** Onboard Intel® Core 2 Duo processor or Intel® Celeron® M processor ULV processor (Detail CPU support information please contact your sales representative)
- **BIOS:** Award 8Mb Flash BIOS
- **Chipset:** Intel® GS45 GMCH/ICH9-M SFF Chipset 800/1066 MHz FSB
- **Cache memory:** Intel® processor integrated L2 cache.
- **System memory:** 2 x 200 pin SODIMM sockets, DDR3 800/1066 up to 8 GB
- **Power management:** Supports power saving modes including Normal / Standby / Suspend modes. ACPI 2.0 compliant
- **Onboard Flash:** 2GB onboard flash for SOM-5787
- **SATA interface**: 4 SATAII Channels. (SOM-5787 only supports 3 SATAII, one used by Onboard flash)
- **Watchdog timer:** 256 levels timer interval, from 0 to 255 sec or min setup by software, jumper less selection, generates system reset
- **USB interface:** Support 8 USB 2.0 ports
- **Expansion Interface:** Supports PCIe x 16, PCI,LPC interface

1.2.2 VGA/flat panel Interface

- **Chipset:** Intel GS45 integrated 2D/3D graphic controller
- **Frame buffer:** Intel DVMT supported up to 768MB system memory
- **Display type:**
  Dual display supports each two of CRT / LVDS/TV-out/HDMI/SDVO.
  Supports 18/24-bit dual channel LVDS interface
- **Display mode:**
  CRT Mode: Support up to 2048 x 1536
  HDMI Mode: Support up to 1920x1080
  LCD Mode: Support up to 1600 x 1200

1.2.3 Audio function

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

1.2.4 Ethernet

- **Chipset:** 1000Mbps: Intel 82567LM Controller. Base on IEEE 10BASE-T, 100BASE-TX and 1000BASE-T standard.

1.2.5 Mechanical and environmental

- **Dimensions:** SOM-Express form-factor, 112.5 mm x 95 mm or 95 x 95mm (4.92" x 3.74" or 3.74" x 3.74")
- **Power supply voltage:** +12 V power only (+5 VSB is need for ACPI and ATX power)
- **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-5787/6787 CPU System on Module

Sections include:

- Connector Information
- Mechanical Drawing

2.1 Board Connector

There are two connectors at the rear side of SOM-5787/6787 for connecting to carrier board

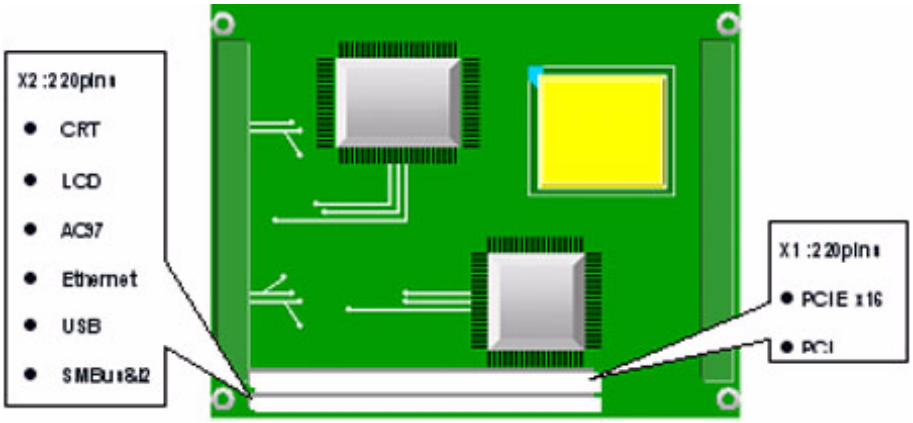

Figure 2.1 SOM-5787/6787 Locating Connectors

Pin Assignments for X1/2 connectors

Please refer to SOM-Express Design and Specification Guide, Chapter 2

2.2 Board Mechanical Drawing

2.2.1 Front Side

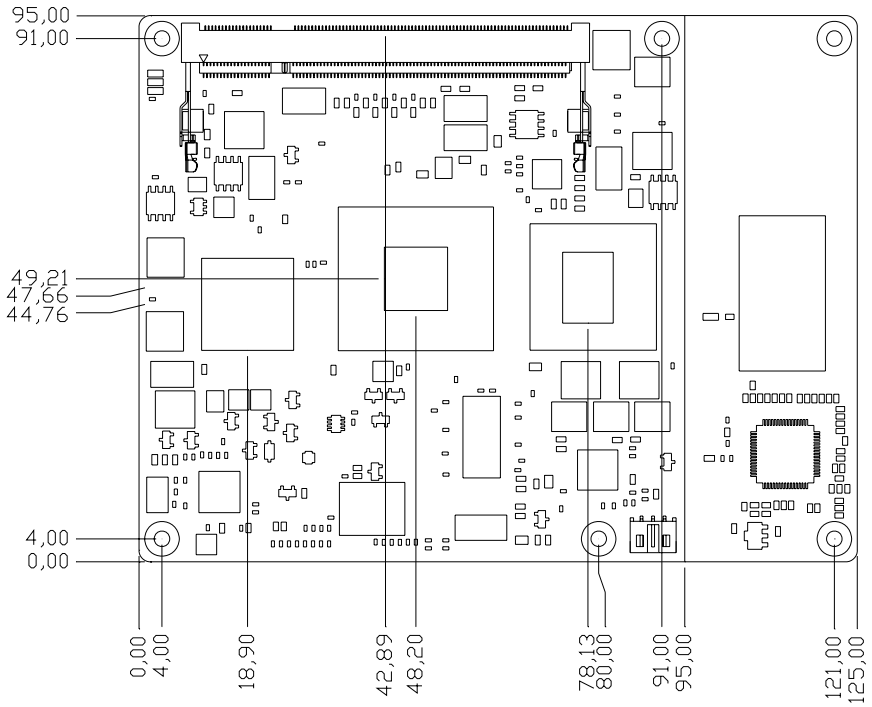

Figure 2.2 SOM-5787 Front Side Drawing

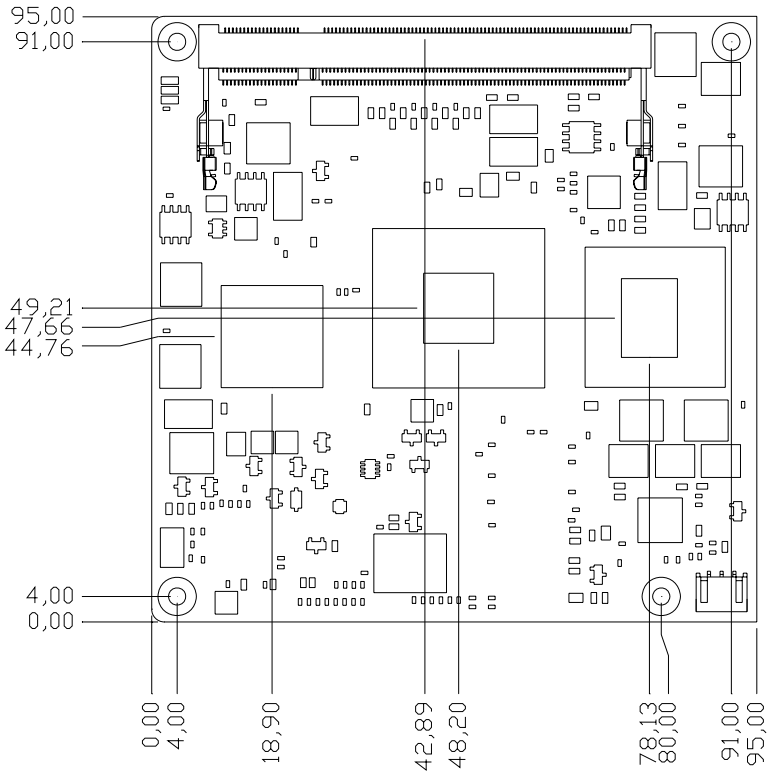

Figure 2.3 SOM-6787 Front Side Drawing

2.2.2 Rear Side

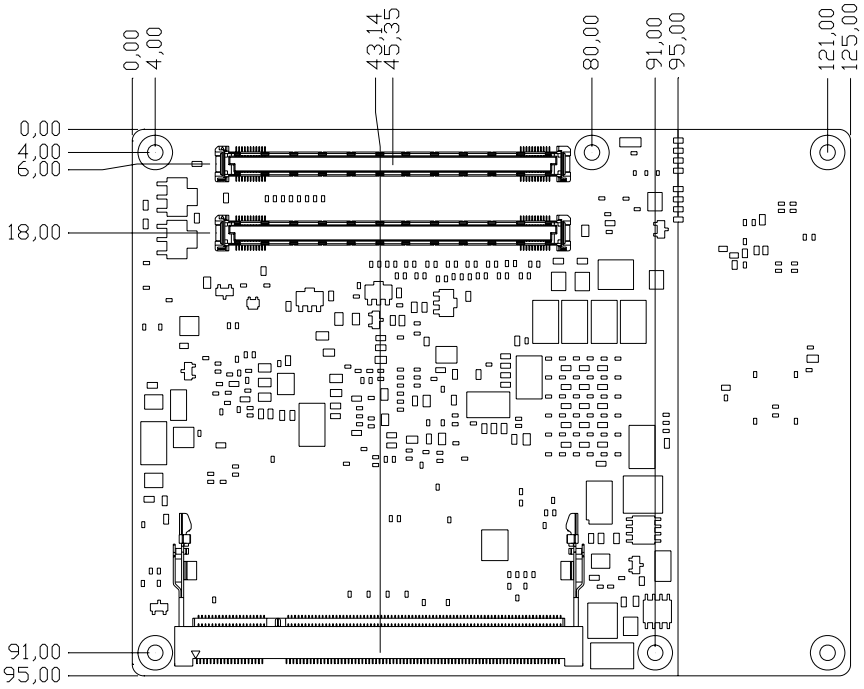

Figure 2.4 SOM-5787 Rear Side Drawing

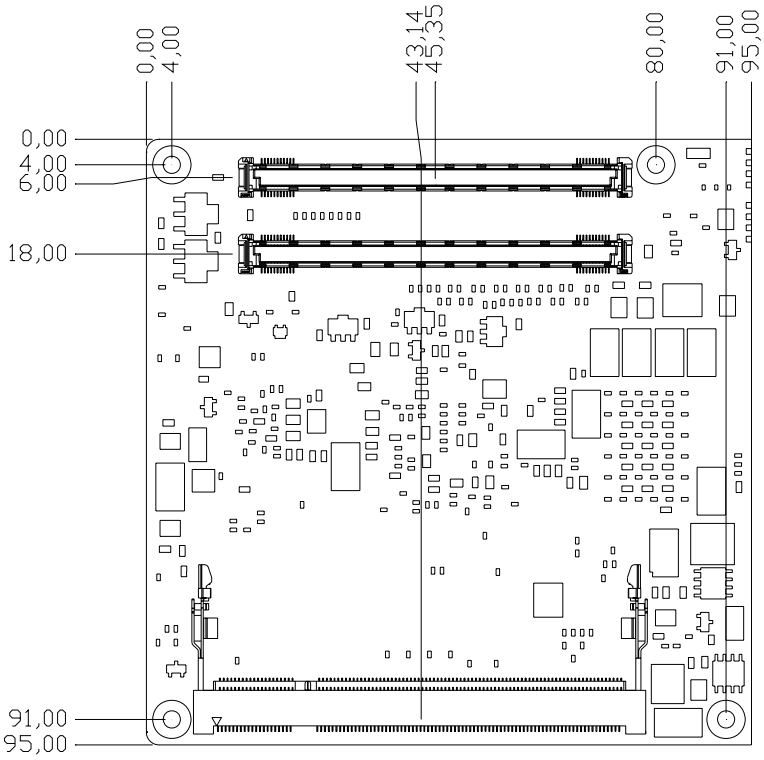

Figure 2.5 SOM-6787 Rear Side Drawing

Chapter 3

BIOS Setup Information

This chapter gives basic BIOS upgrade and Setup information on the SOM-5787/6787 CPU System on Module.Sections include:

- Safety Precautions
- BIOS Update
- Basic BIOS Setup

BIOS Setup Information AMIBIOS has been integrated into many motherboards for over a decade. With the AMIBIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the SOM-5787/6787 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.

3.1 Entering Setup

Turn on the computer and check for the -patch" code. If there is a number assigned to the patch code, it means that the BIOS supports your CPU. If there is no number assigned to the patch code, please contact an Advantech application engineer to obtain an up-to-date patch code file. This will ensure that your CPU's system status is valid. After ensuring that you have a number assigned to the patch code, press <DEL> and you will immediately be allowed to enter Setup.

3.2 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.

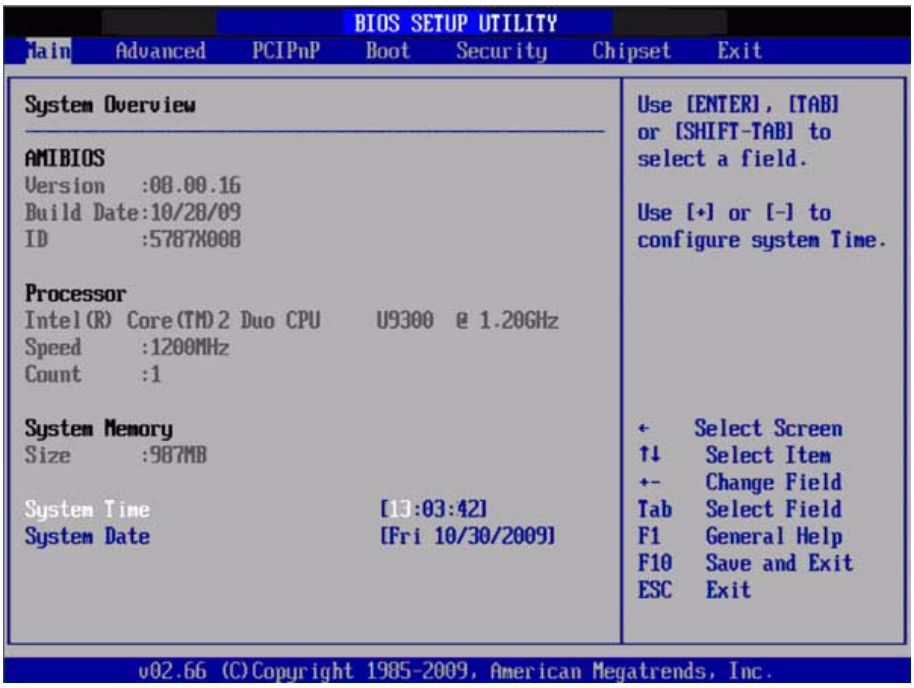

Figure 3.2 Main setup screen

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 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.

3.3 Advanced BIOS Features Setup

Select the Advanced tab from the SOM-5787/6787 setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens is shown below. The sub menus are described on the following pages.



Figure 3.3 Advanced BIOS features setup screen

3.3.1 CPU Configuration



Figure 3.4 CPU Configuration Setting

- **Hardware Prefetcher**
  This item allows you enable or disable CPU hardware prefetcher feature.
- **Adjacent Cache Line Prefetch**
  This item allows you enable or disable CPU adjacent cache line prefetch feature.
- **Max CPUID Value Limit**
  This item allows you to limit CPUID maximum value.
- **Intel® Virtualization Tech**
  This item allows you enable or disable CPU virtualization feature.
- **Execute-Disable Bit Capability**
  This item allows you to enable or disable the No-Execution page protection technology.
- **Core Multi-Processing**
  This item allows you to enable or disable CPU core multi-processing.
- **Intel® SpeedStep® tech**
  When set to disabled, the CPU runs at its default speed, when set to enabled, the CPU speed is controlled by the operating system.
- **Intel® C-STATE tech**
  This item allows the CPU to save more power under idle mode.
- **Enhanced C-States**
  CPU idle set to enhanced C-States, disabled by Intel® C-STATE tech item.

3.3.2 IDE Configuration

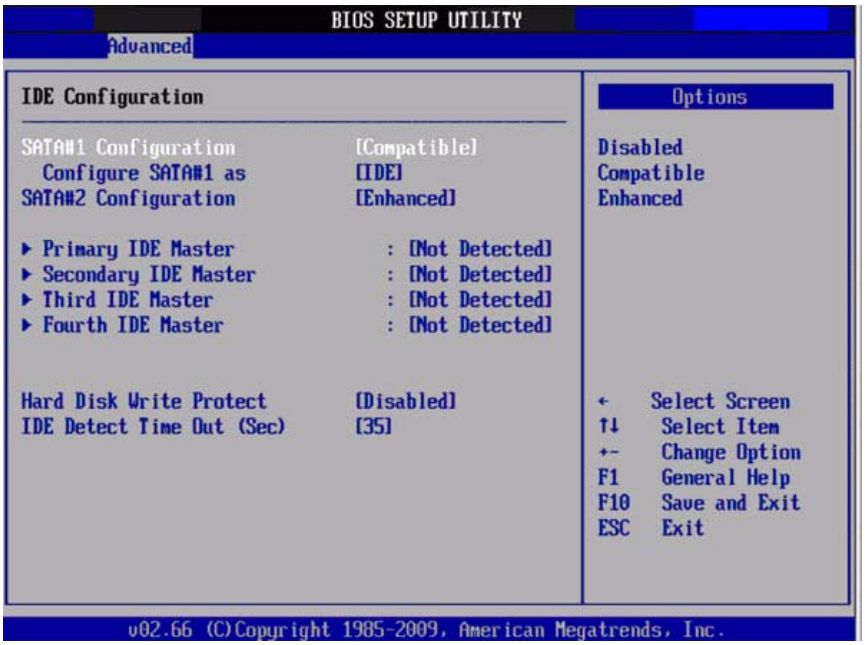

Figure 3.5 IDE Configuration

- **SATA#1 Configuration**
  This item allows you to select Disabled / Compatible / Enhanced.
- **Configure SATA#1 as**
  This item allows you to select IDE or AHCI mode.

- **SATA#2 Configuration**

  This item allows you to select Disabled / Enhanced.

- **Primary/Secondary/Third IDE Master**

  BIOS auto detects the presence of IDE device, and displays the status of auto detection of IDE device.

  - Type : Select the type of SATA driver.[Not Installed][Auto][CD/DVD][ARMD]
  - LBA/Large Mode : Enables or Disables the LBA mode.
  - Block (Multi-Sector Transfer) : Enables or disables data multi-sectors transfers.
  - PIO Mode : Select the PIO mode.
  - DMA Mode : Select the DMA mode.
  - S.M.A.R.T. : Select the smart monitoring, analysis, and reporting technology.
  - 32Bit Data Transfer : Enables or disables 32-bit data transfer.

- **Hard Disk Write Protect**

  Disable/Enable device write protection. This will be effective only if device is accessed through BIOS.

- **IDE Detect Time Out (Sec)**

  This item allows you to select the time out value for detecting ATA/ATAPI device(s).

3.3.3 Floppy Configuration

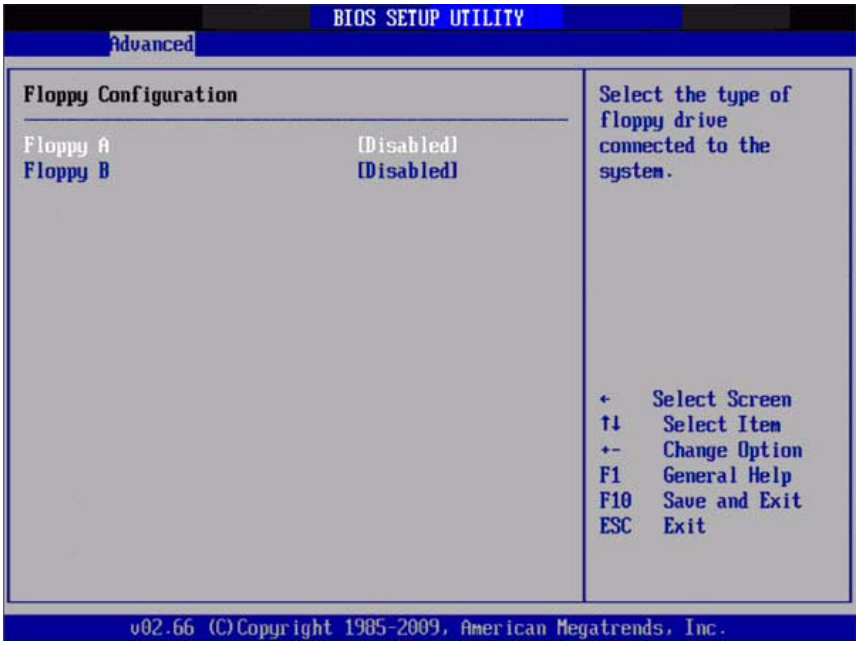

Figure 3.6 Floppy Configuration

- **Floppy A/B**

  Select the type of floppy drive, if any, connected to the system. We suggest you disable the floppy if installing Windows Vista without a floppy drive.

3.3.4 Super I/O Configuration

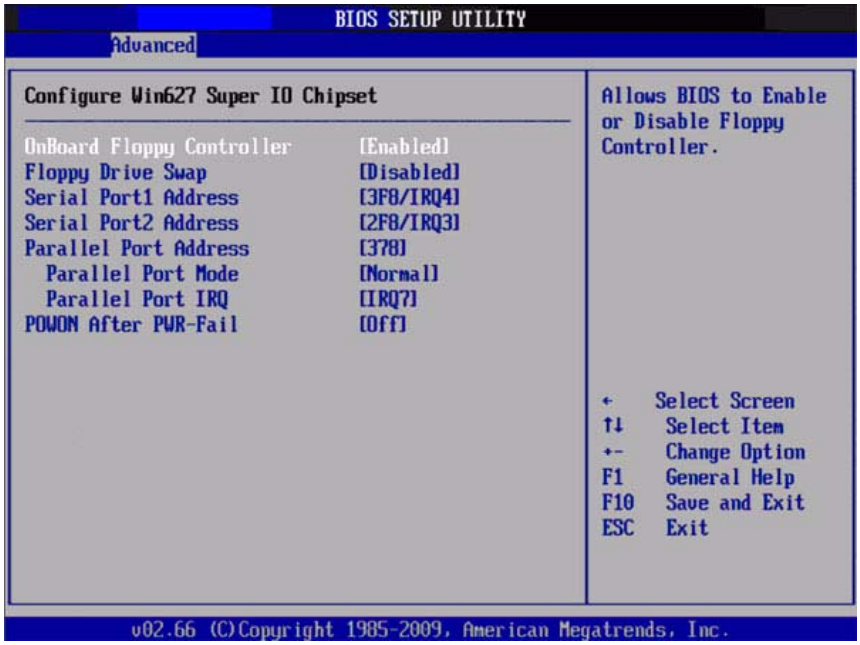

Figure 3.7 Super I/O Configuration

- **Parallel Port Address**
  This item allows you to select parallel port of base addresses.
- **Parallel Port Mode**
  This item allows you to select parallel port of mode.
- **Parallel Port IRQ**
  This item allows you to select parallel port of IRQ.

3.3.5 ACPI Settings

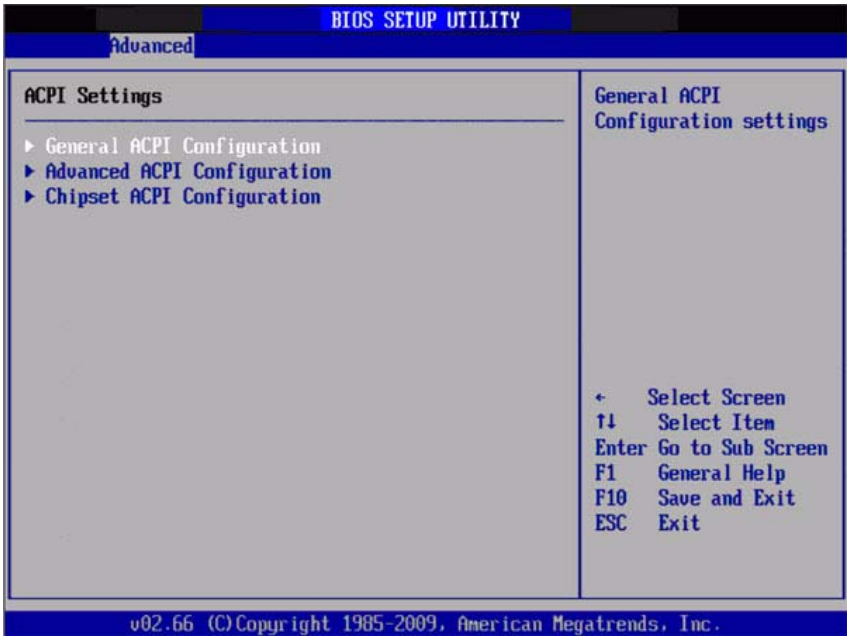

Figure 3.8 ACPI Settings

3.3.5.1 General ACPI Configuration

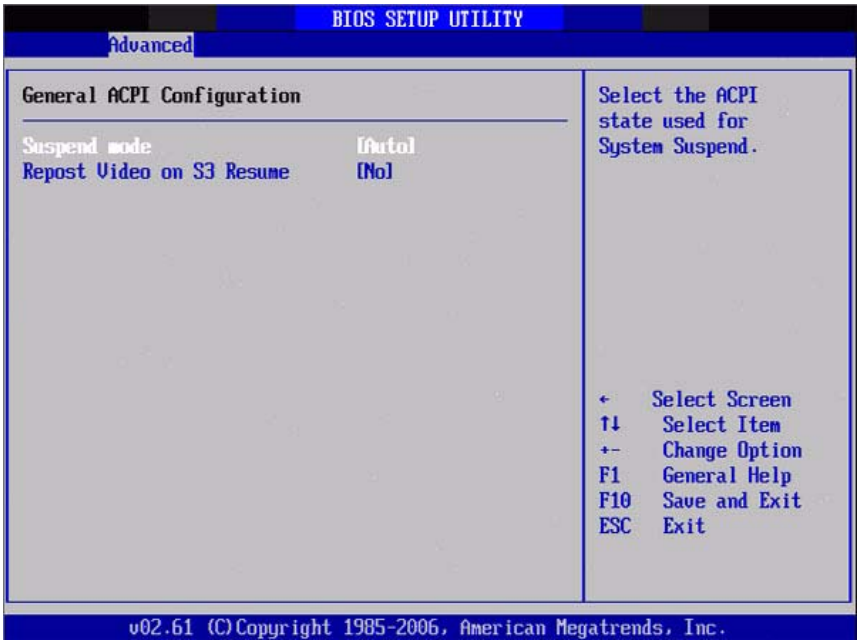

Figure 3.9 General ACPI Configuration

- **Suspend mode**
  Select the ACPI state used for system suspend.
- **Report Video on S3 Resume**
  This item allows you to invoke VGA BIOS POST on S3/STR resume.

3.3.5.2 Advanced ACPI Configuration

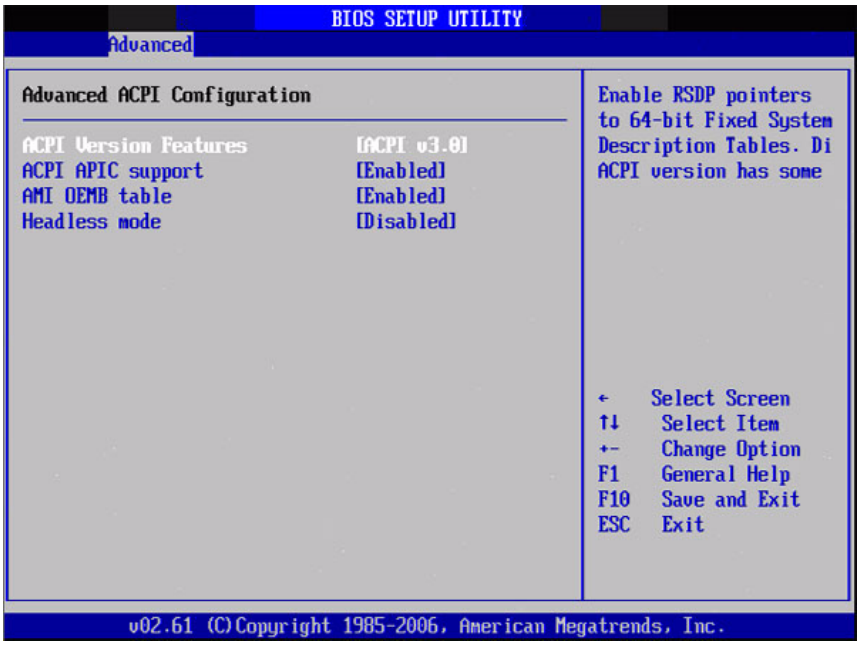

Figure 3.10 Advanced ACPI Configuration

- **ACPI Version Features**
  This item allows you to enable RSDP pointers to 64-bit fixed system description tables.
- **ACPI APIC support**
  Include APIC table pointer to RSDT pointer list.
- **AMI OEMB table**
  Include OEMB table pointer to R(x)SDT pointer lists.
- **Headless mode**
  Enable / Disable Headless operation mode through ACPI.

3.3.5.3 Chipset ACPI Configuration

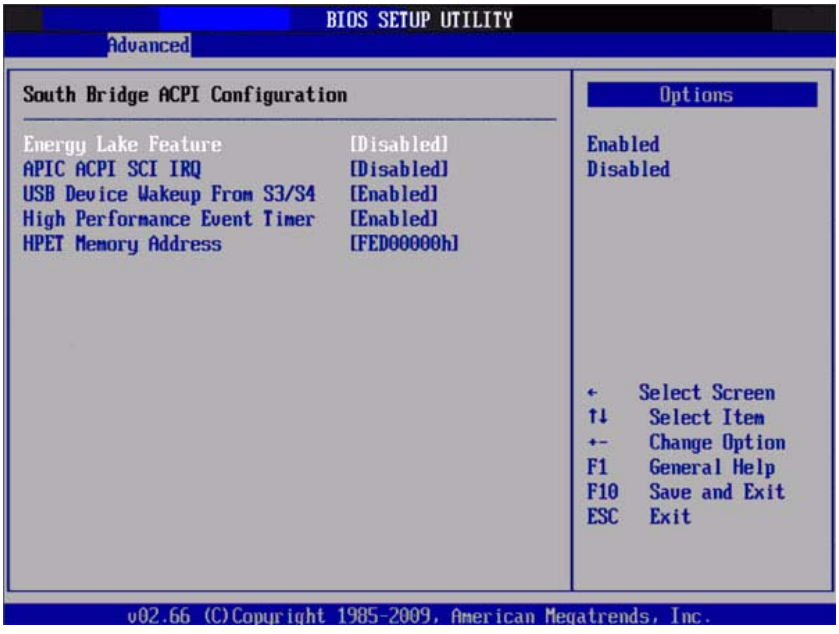

Figure 3.11 Chipset ACPI Configuration

- **Energy Lake Feature**
  Allows you to configure Intel® Energy Lake power management technology.
- **APIC ACPI SCI IRQ**
  Enable or disable APIC ACPI SCI IRQ.
- **USB Device Wakeup From S3/S4**
  Enable or disable USB Device Wakeup from S3/S4.
- **High Performance Event Timer**
  Enable or disable High Performance Event timer.
- **HPET Memory Address**
  Select HPET memory base address.

3.3.6 AHCI Configuration

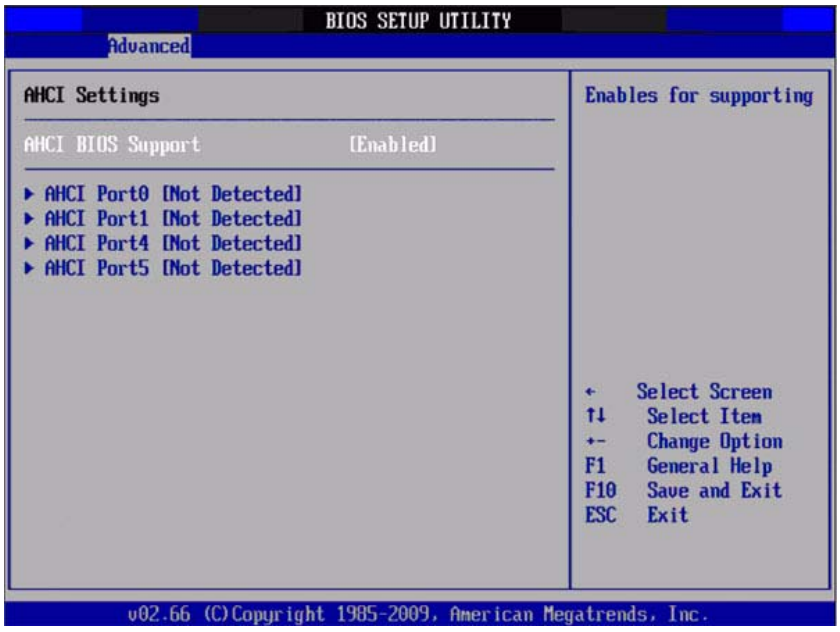

Figure 3.12 AHCI Configuration

- **AHCI BIOS Support**
  This item allows you to enable or disable AHCI BIOS function.
- **AHCI Ports0 / Port1 / Port4 / Port5**
  While entering setup, BIOS auto detects the presence of IDE devices. This displays the status of auto detection of IDE device.

3.3.7 ASF Configuration

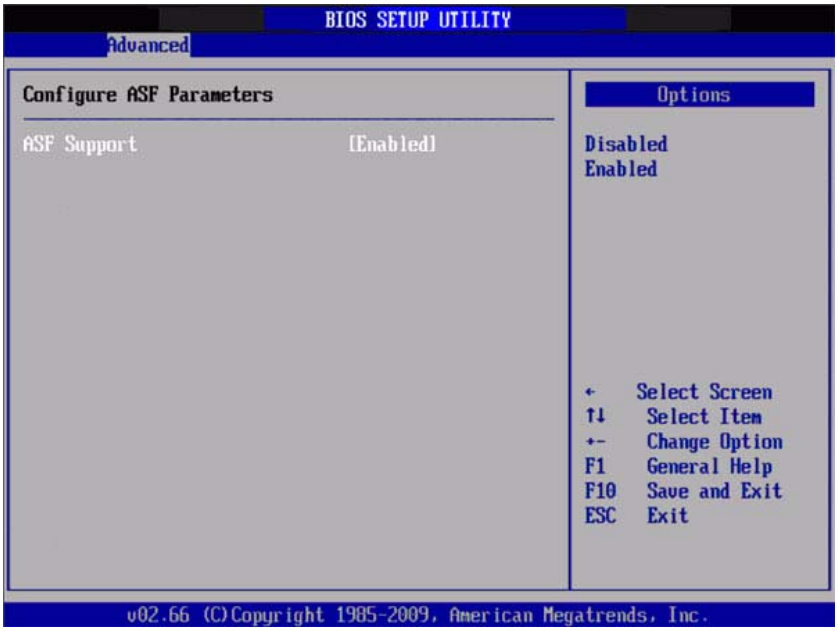

Figure 3.13 ASF Configuration

- **ASF Support**
  This item allows you to enable or disable ASF function.

3.3.8 Clock Generator Configuration

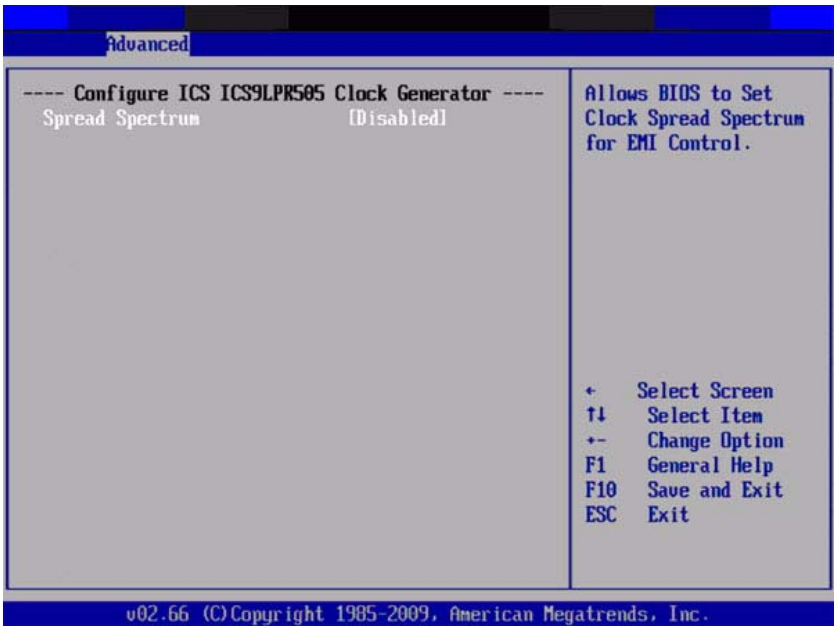

Figure 3.14 Clock Generator Configuration

- **Spread Spectrum**
  This item allows you to enable or disable spread spectrum.

3.3.9 Hardware Health Configuration

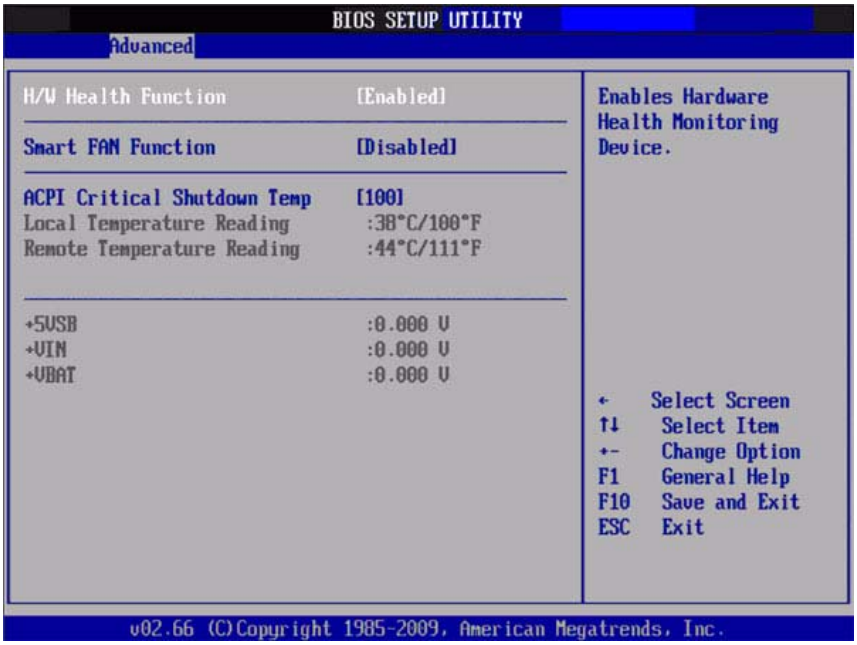

Figure 3.15 Hardware Health Configuration

- **H/W Health Function**
  This item allows you to control H/W monitor of showing.
- **Smart FAN Function**
  This item allows you to enable or disable smart FAN function.
- **ACPI Critical Shutdown Temp**
  This item allows you to set the CPU temperature to shutdown the system in ACPI OS.
- **Temperature & Voltage show**
  Local(System)/Remote(CPU) Temperature
  +5VSB / +VIN / +VBAT

3.3.10 Intel AMT Configuration

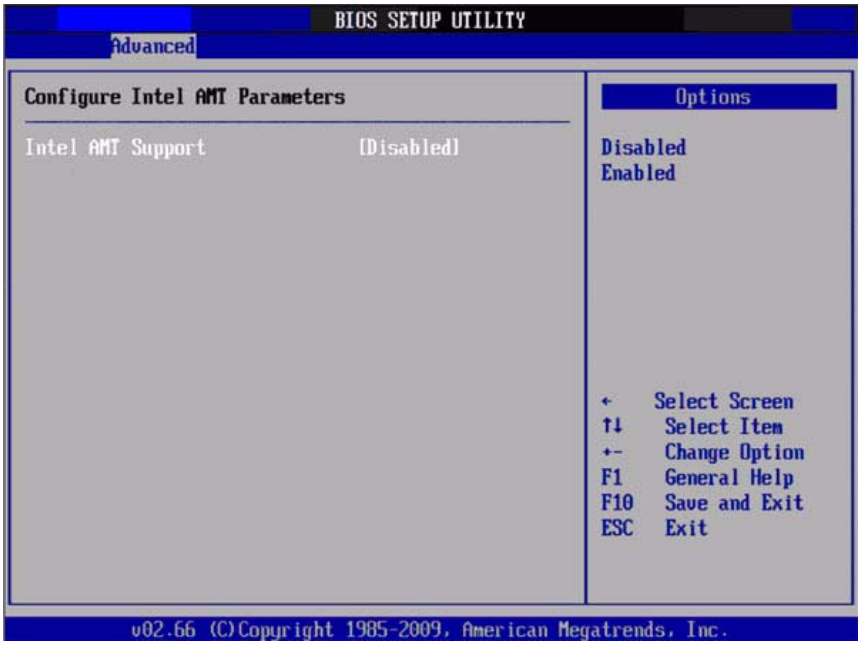

Figure 3.16 Intel AMT Configuration

- **Intel AMT Support**
  This item allows you to enable or disable iAMT function.

3.3.11 Intel TXT(LT) Configuration

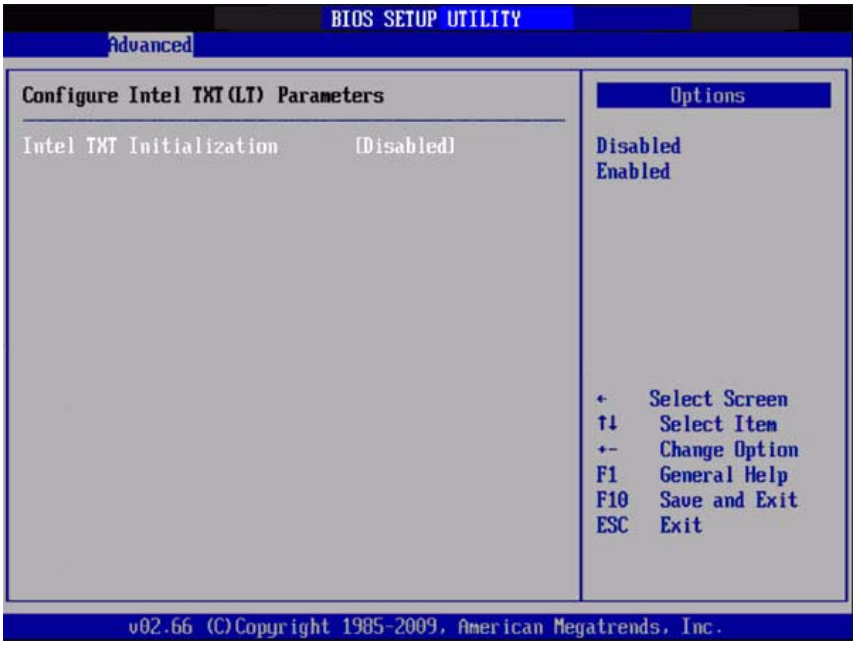

Figure 3.17 Intel TXT(LT) Configuration

- **Intel TXT(LT) Initialization**
  This item allows you to enable or disable initial Intel TXT(LT).

3.3.12 Intel VT-d Configuration

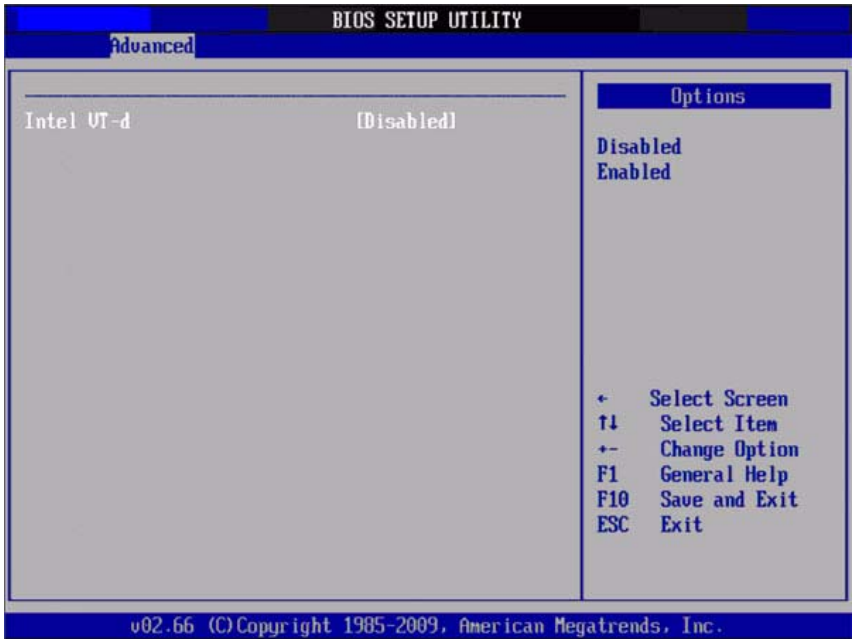

Figure 3.18 Intel VT-d Configuration

- **Intel VT-d**
  This item allows you to enable or disable Intel VT-d function.

3.3.13 MPS Configuration

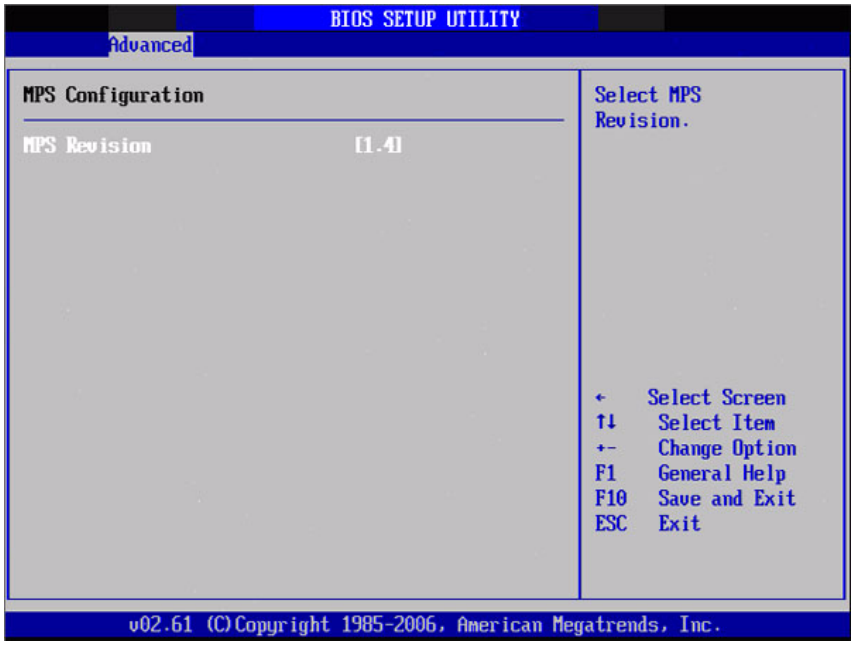

Figure 3.19 MPS Configuration

- **MPS Revision**
  This item allows you to select MPS reversion.

3.3.14 PCI Express Configuration



Figure 3.20 PCI Express Configuration

- **Active Stats Power-Management**
  This item allows you to enable or disable ASPM function.

3.3.15 Smbios Configuration



Figure 3.21 Smbios Configuration

- **Smbios Smi Support**
  SMBIOS SMI wrapper support for PnP function 50h-54h.

3.3.16 Remote Access Configuration

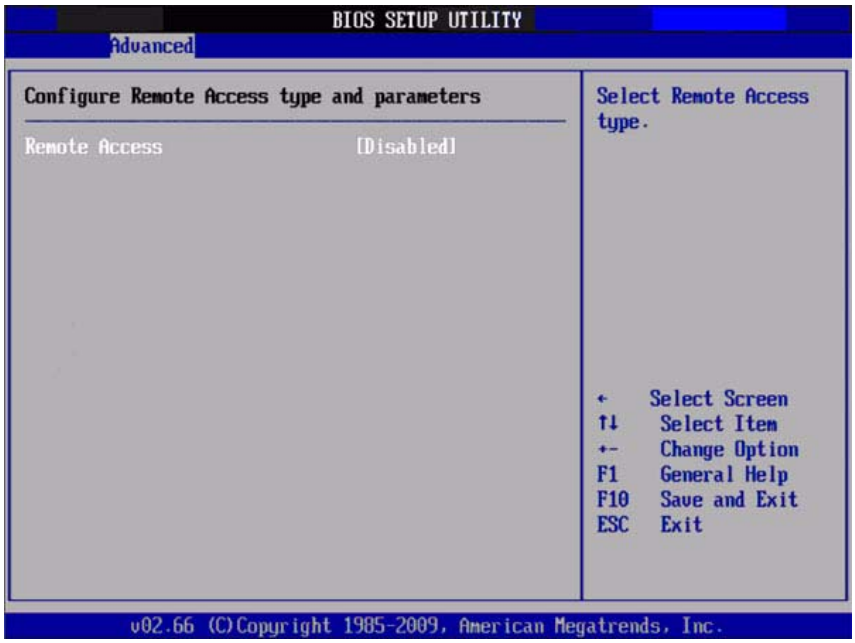

Figure 3.22 Remote Access Configuration

- **Remote Access**

  This item allows you to enable or disable remote access function and set parameters.

3.3.17 Trusted Computing

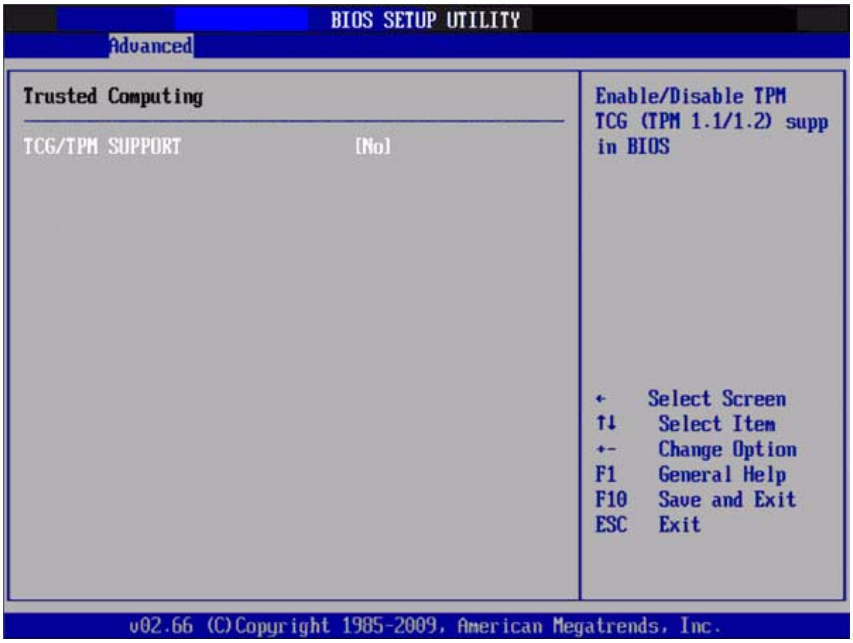

Figure 3.23 Remote Access Configuration

- **TCG/TPM SUPPORT**

  This item allows you to enable or disable TCG/TPM function.

3.3.18 USB Configuration

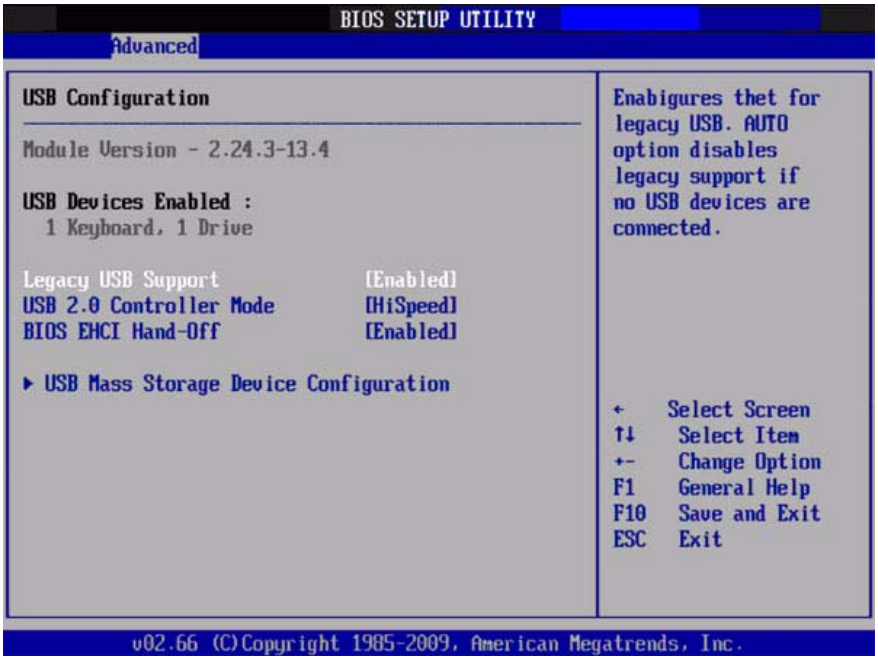

Figure 3.24 USB Configuration

- **Legacy USB Support**

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

- **USB 2.0 Controller Mode**

  This item allows you to select HiSpeed(480Mbps) or FullSpeed (12Mpbs).

- **BIOS EHCI Hand-Off**

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

  - **USB Mass Storage Device Configuration**

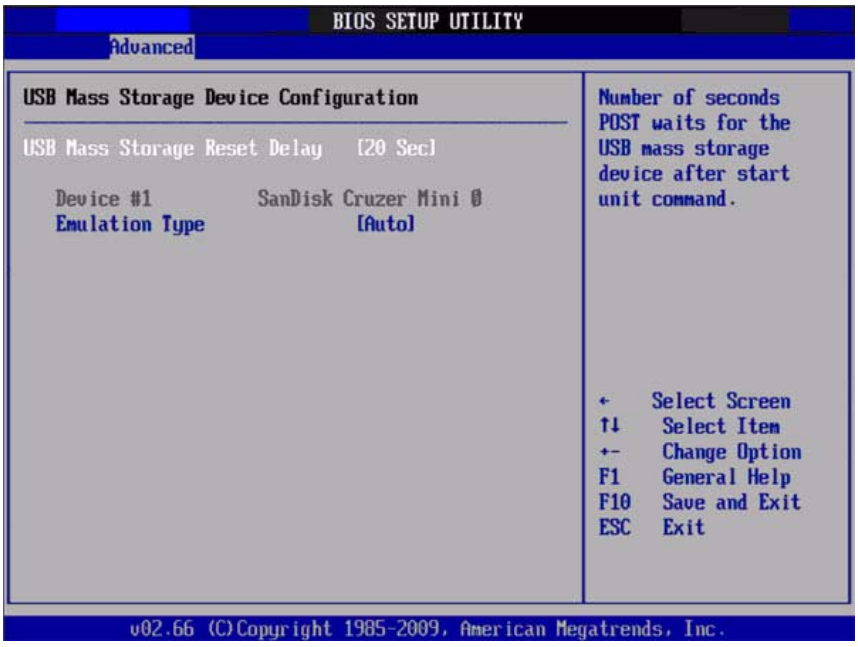

Figure 3.25 USB Mass storage Device Configuration

- **USB Mass Storage Reset Delay**

  Number of seconds when POST wait for the USB mass storage device after start unit command.

- **Emulation Type**

  If Auto, USB devices less than 530MB will be emulated as Floppy and remaining as hard drive. Force FDD option can be used to force a FDD formatted drive to boot as FDD (Ex. ZIP drive).

3.4 Advanced PCI/PnP Settings

Select the PCI/PnP tab from the SOM-5787/6787 setup screen to enter the Plug and Play BIOS Setup screen. You can display a Plug and Play 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.

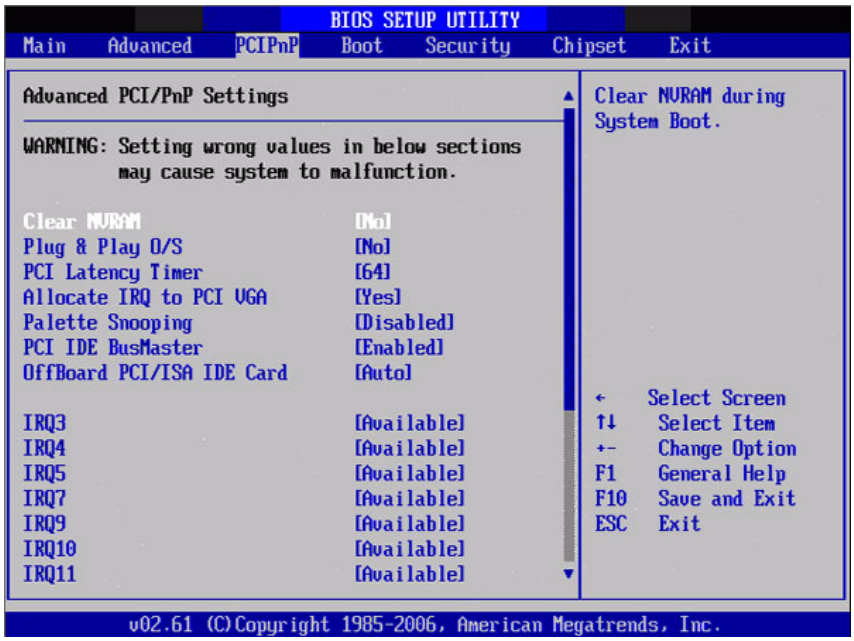

Figure 3.26 PCI/PNP Setup

- **Clear NVRAM**

  Set this value to force the BIOS to clear the Non-Volatile Random Access Memory (NVRAM).The Optimal and Fail-Safe default setting is No.

- **Plug & Play O/S**

  When set to No, BIOS configures all the device in the system. When set to Yes and if you install a Plug and Play operating system, the operating system configures the Plug and Play device not required for boot.

- **PCI Latency Timer**

  Value in units of PCI clocks for PCI device latency timer register.

- **Allocate IRQ to PCI VGA**

  When set to Yes, it will assign IRQ to PCI VGA card if card requests IRQ. When set to No, it will not assign IRQ to PCI VGA card even if card requests an IRQ.

- **Palette Snooping**

  This item is designed to solve problems caused by some non-standard VGA card.

- **PCI IDE BusMaster**

  When set to enabled BIOS uses PCI busmastering for reading/writing to IDE drives.

- **OffBoard PCI/ISA IDE Card**

  Some PCI IDE cards may require this to be set to the PCI slot number that is holding the card. When set to Auto, it will work for most PCI IDE cards.

- **IRQ3 / 4 / 5 / 7 / 9 / 10 /11**

  This item allows you respectively assign an interruptive type for IRQ-3, 4, 5, 7, 9, 10, 11.

- **DMA Channel0 / 1 / 3 / 5 / 6 / 7**

  When set to svailable, it will specify DMA is available to be used by PCI/PnP devices. When set to Reserved, it will specify DMA will be reserved for use by legacy ISA devices.

- **Reserved Memory Size**

  This item allows you to reserve size of memory block for legacy ISA device.

3.5 Boot Settings

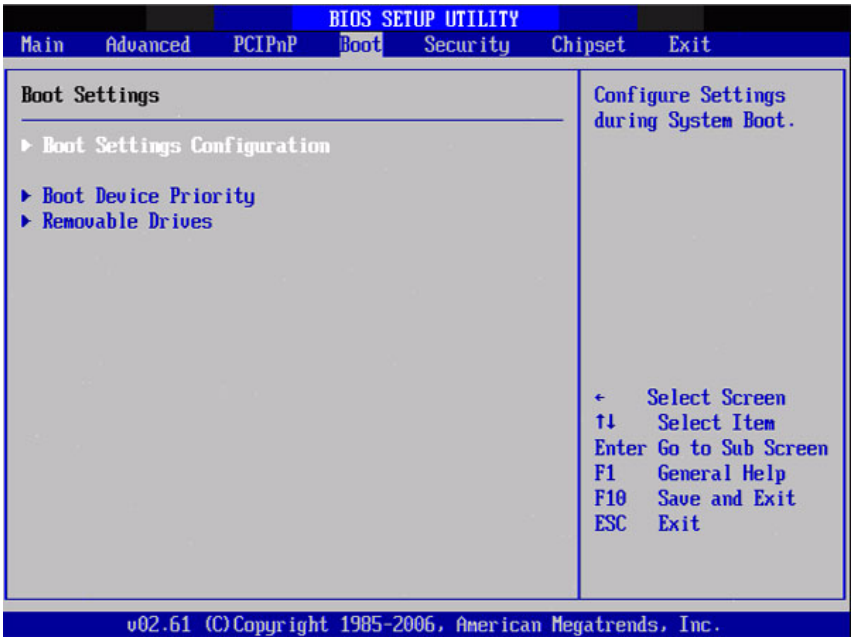

Figure 3.27 Boot Setup Utility

3.5.1 Boot settings Configuration

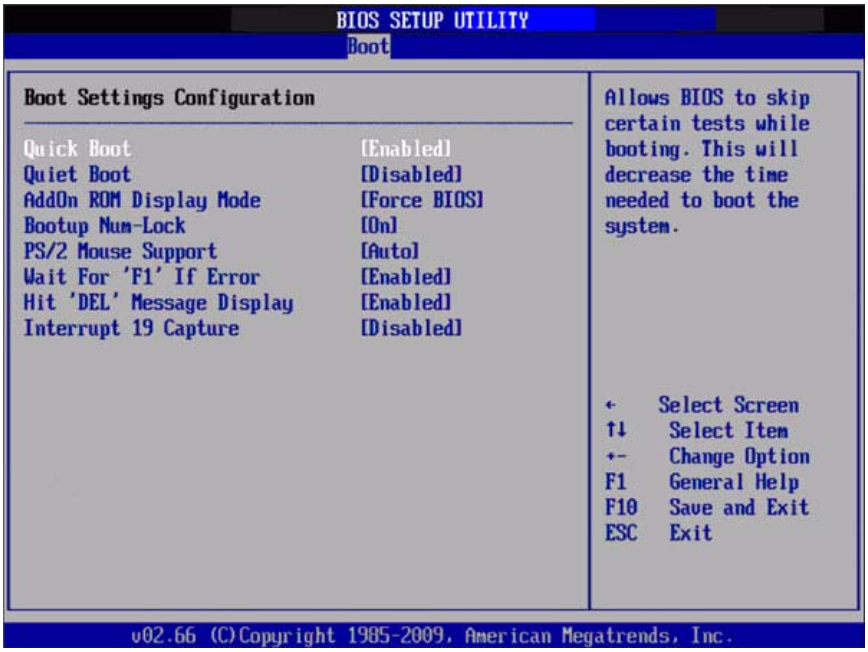

Figure 3.28 Boot Setting Configuration

- **Quick Boot**
  This item allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.
- **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.
- **AddOn ROM Display Mode**
  Set display mode for option ROM.
- **Bootup Num-Lock**
  Select the Power-on state for Numlock.
- **PS/2 Mouse Support**
  Select support for PS/2 Mouse.
- **Wait For "F1" If Error**
  Wait for the F1 key to be pressed if an error occurs.
- **Hit 'DEL' Message Display**
  Displays "Press DEL to run Setup" in POST.
- **Interrupt 19 Capture**
  This item allows option ROMs to trap interrupt 19.

3.6 Security Setup



3.6.1 Password Configuration

Select Security Setup from the SOM-5787/6787 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub menu for the following items, select the item and press <Enter>:

Change Supervisor / User Password

Boot sector Virus protection: The boot sector virus protection will warn if any program tries to write to the boot sector.

3.7 Advanced Chipset Settings



Figure 3.29 Advanced Chipset Settings

3.7.1 North Bridge Chipset Configuration

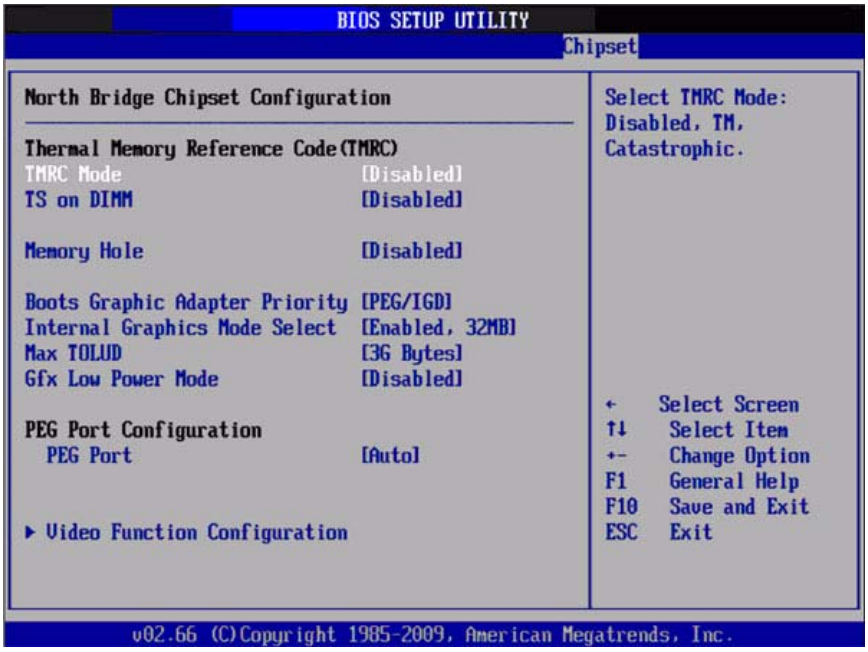

Figure 3.30 North Bridge Configuration

- **TMRC Mode**
  This item allows you to enable or disable TMRC mode.
- **TS on DIMM**
  This item allows you to enable or disable thermal sensor on DIMM function.
  Memory Hole
  This item allows you to free 15MB-16MB of memory size for some ISA devices.

- **Boots Graphic Adapter Priority**
  This item allows you to select which graphics controller to use as the primary boot device.
- **Internal Graphics Mode Select**
  Select the amount of system memory used by the Internal graphics device.
- **Max TOLUD**
  Set maximum value of TOLUD.
- **Gfx Low Power Mode**
  This item allows you to enable or disable internal graphics low power mode.
- **PEG Port**
  This item allows you to control PCI Expressx16 port.

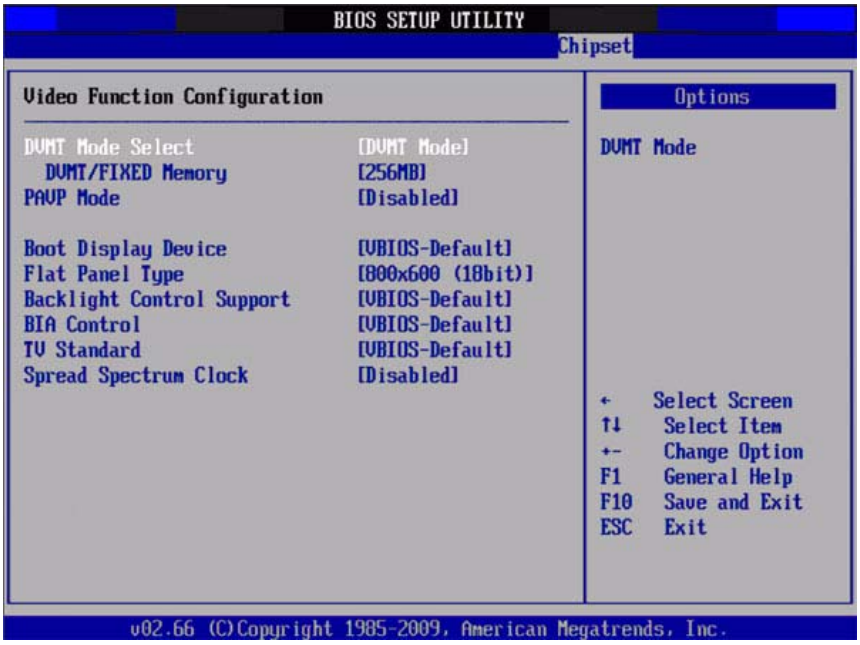

Figure 3.31 Video function Configuration

- **DVMT Mode Select**
  Displays the active system memory mode.
- **DVMT/FIXED Memory**
  Specify the amount of DVMT / FIXED system memory to allocate for video memory.
- **PAVP Mode**
  This item allows you to enable or disable PAVP BIOS support.
- **Boot Display Device**
  Select boot display device at post stage.
- **Flat Panel Type**
  This item allows you to select which panel resolution you wants.
- **Backlight Control Support**
  This item allows you to configure the way to control backlight.
- **BIA Control**
  This item allows you to configure BIA.
- **TV Standard**
  This item allows you to set TV standard.

- **Spread Spectrum Clock**
  This item allows you to enables or disables spread spectrum clock.

3.7.2 South Bridge Chipset Configuration

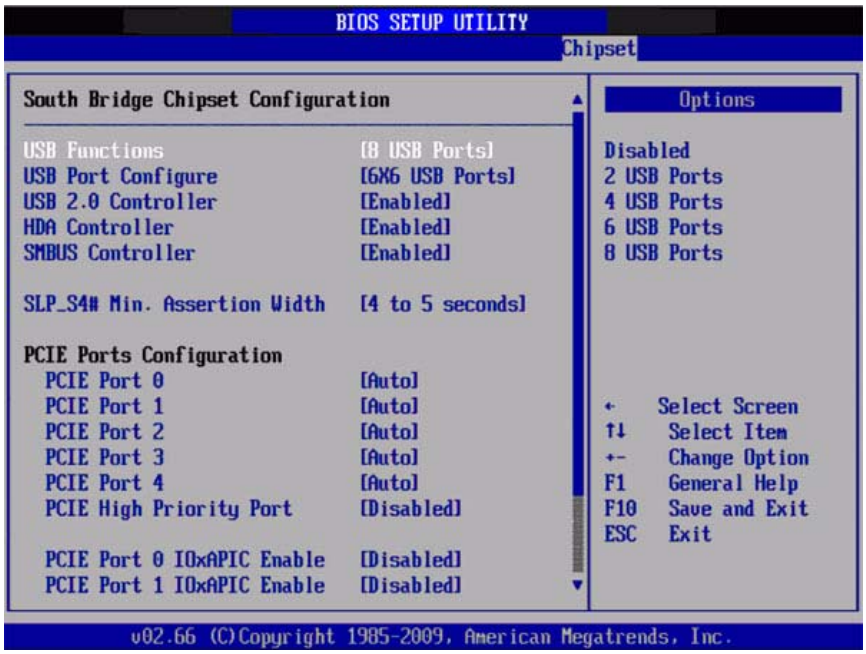

Figure 3.32 South Bridge Configuration

- **USB Functions**
  Disabled, 2 USB Ports, 4 USB Ports, 6 USB Ports or 8 USB Ports.
- **USB Port Configure**
  6X6 or 8X4 USB ports.
- **USB 2.0 Controller**
  This item allows you to enable or disable the USB 2.0 controller.
- **HDA Controller**
  This item allows you to enable or disable the HDA controller.
- **SMBUS Controller**
  This item allows you to enable or disable the SMBUS controller.
- **SLP_S4# Min. Assertion Width**
  This item allows you to set a delay of sorts.
- **PCIE Port 0 / 1 / 2 / 3 / 4**
  This item allows you to configure PCIE port
- **PCIE High Priority Port**
  This item allows you to set the highest priority PCIE port.
- **PCIE Port 0 / 1 / 2 / 3 / 4 IOxAPIC**
  This item allows you to enable or disable PCIE port's IOxAPIC.

3.8 Exit Option

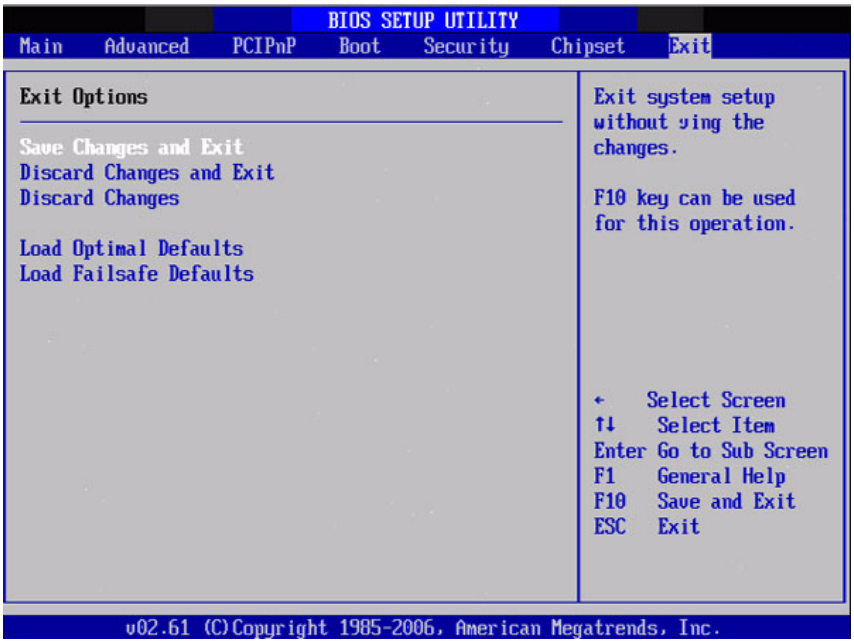

Figure 3.33 Exit Option

3.8.1 Save Changes and Exit

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

1. Select Exit Saving Changes from the Exit menu and press <Enter>.
   The following message appears: Save Configuration Changes and Exit Now? [Ok] [Cancel]
2. Select Ok or cancel.

3.8.2 Discard Changes and Exit

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

1. Select Exit Discarding Changes from the Exit menu and press <Enter>.
   The following message appears: Discard Changes and Exit Setup Now? [Ok] [Cancel]
2. Select Ok to discard changes and exit.

3.8.3 Load Optimal Defaults

The SOM-5787/6787 automatically configures all setup items to optimal settings when you 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 your computer is experiencing system configuration problems. Select Load Optimal Defaults from the Exit menu and press <Enter>.

3.8.4 Load Fail-Safe Defaults

The SOM-5787/6787 automatically configures all setup options to fail-safe settings when you select this option. Fail-Safe Defaults are designed for maximum system stability, but not maximum performance. Select Fail-Safe Defaults if your computer is experiencing system configuration problems.

1. Select Load Fail-Safe Defaults from the Exit menu and press <Enter>.
   The following message appears: Load Fail-Safe Defaults? [OK] [Cancel]
2. Select OK to load Fail-Safe defaults.

Chapter 4

Driver Installation

This chapter gives you the driver installation information on the SOM-5787/6787 CPU System on Module.

Sections include:

- **Driver Information**
- **Driver Installation**

4.1 Driver Introduction

The CD shipped with SOM-5787/6787 should contain below drivers, please follow below sequence to complete the driver installation.

1. Install Intel RAID Disk Driver for Windows XP/2000
   (This Step is required to be done before installing Microsoft Windows)
2. Install Intel INF Update Driver for Windows XP/2000
3. Install Intel Graphic Driver for Windows XP/2000
4. Install Audio Driver for Windows XP/2000
5. Install Intel Ethernet Driver for Windows XP/2000

Note! *For Windows XP Embedded, Windows CE 5.0 and Linux support, please contact sales representative or technical person.*

Note! *Downloading the update for Windows XP or Windows 2000 may be required for enabling USB 2.0 function. Details information please refers to below web link.*

http://www.microsoft.com/whdc/system/bus/USB/USB2support.mspx

4.2 Driver Installation

Insert the SOM-5787/6787 CD into the CD-ROM device, and follow below installation process from Step 1 to Step 5 or 6.

4.2.1 Step 1- Install Intel RAID Disk Driver for Windows XP/2000

1. To install Intel RAID Disk Driver, you need to make a utility floppy disk before installing Microsoft Windows on SOM-5787/6787, please makes this floppy disk on your another Windows base PC.
2. Click on the "**Storage**" folder and double click the "**F6flpy32.exe**" file and system will ask for a floppy to be inserted for making the utility floppy disk. Follow the instruction till the disk is done.
3. Insert the floppy utility disk and start to install Microsoft Windows on SOM-5787/6787 then press "**F6**" to install Intel RAID Disk Driver.



4. At the prompt, press "**S**" to select the RAID driver.
5. Follow the instruction and complete RAID driver installation.

4.2.2 Step 2- Install Intel INF Update Driver for Windows XP/2000

1. Click on the "**Chipset**" folder and double click the "***.exe**" file.
2. Follow the instructions that the driver installation wizard shows
3. The system will help you to complete the driver installation.

4.2.3 Step 3- Install Intel Graphic Driver for Windows XP/2000

1. Click on the "**VGA**" folder and double click the "***.exe**" file.
2. Follow the instructions that the driver installation wizard shows
3. The system will help you to complete the driver installation.

Note! *There are several hot key to allow you to switch between different displays.*



Mode	Key 1	Key 2	Key 3
CRT	CTRL	ALT	F1
LCD	CTRL	ALT	F3
Graphic Control Panel	CTRL	ALT	F12

Press Key1+Key2+Key3 at the same time to change the display mode

4.2.4 Step 4- Install Audio Driver for Windows XP/2000

1. Click on the "**Audio**" folder and double click the "***.exe**" file.
2. Follow the instructions that the driver installation wizard shows
3. The system will help you to complete the driver installation.

4.2.5 Step 5- Install Intel Ethernet Driver for Windows XP/2000

1. Click on the "**LAN**" folder and double click the "***.exe**" file.
2. Follow the instructions that the driver installation wizard shows
3. The system will help you to complete the driver installation.

Appendix A

System Assignments

This appendix gives you the information about the watchdog timer programming on the SOM-5787 CPU System on Module.

Sections include:

- Programming the Watchdog Timer

A.1 Programming the Watchdog Timer

1. SMBus Address: Pin 3 internal pull up 100K = 09C.
2. Enable Watchdog Function: Configuration and function select register Index-01h.

Table A.1: Index-01h

Bit	Name	P/W	PWR	Description
5	EN_WDT10	R/W	VSB3V	Enable Rest Out. If set to 1, enable WDTOUT10#. Default is disable

3. Watchdog Control: Watchdog pulse width, output level, and status Control Register - Index 34h
   Power-on default [7:0] =0000_0000b

Table A.2: Watchdog Timer Index 34h

Bit	Name	P/W	PWR	Description
7-3	Reserved	RO		
2	SEL_RST_2S	R/W	VSB3V	When set this bit to 1, the WDTOUT10 low pulse width is 2 second, if set to 0, the low pulse width is 100ms.
1	WDTOUT10_OINV	R/W	VSB3V	WDTOUT10# output level inverting. When write to1, the output pin will be inverted. Default is low active when time is out.
0	STS_WDTOUT10	R/W	VSB3V	Indicate WDTOUT10 is occurred. Write 1 to clear this bit. Writing 0 is invalid.

4. Watchdog Timer Setup: Watchdog timer range setting and enable Register - Index 35h
   Power-on default [7:0] =0000_0000b

Table A.3: Watchdog Timer Range - Index 35h

Bit	Name	P/W	PWR	Description
7	WDT10_ENABLE	R/W	VSB3V	Enable WDTOUT10 output timer. If set to 1, the WDTOUT10 timer will be started. When WDTOUT10# is asserted, low pulse is occurred.
6-0	WD1_PTIME	R/W	VSB3V	WDTOUT10 Pre-counter time in second. 000_0000b - 0 second (default) 000_0001b - 1 second 000_0010b - 2 seconds : 111_1111b - 127 seconds

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

B.1.1 Configuration and function select Register - Index 04h

Table B.1: Index 04h

Bit	Name	P/W	PWR	Description
7	PIN20_MODE	RW	VSB3V	0: GPIO27 1: LED27 IN this mode can use REG Ox09(bit7, 6) to select LED frequency.
4	PIN8_MODE	RW	VSB3V	0: GPIO22 1: LED22 IN this mode can use REG Ox08(bit5, 4) to select LED frequency.
3	PIN7_MODE	RW	VSB3V	0: GPIO21 1: LED21 IN this mode can use REG Ox08(bit3, 2) to select LED frequency.
2	PIN6_MODE	RW	VSB3V	0: GPIO20 1: LED20 IN this mode can use REG Ox08(bit1, 0) to select LED frequency.

B.1.2 Configuration and function select Register - Index 05h

Table B.2: Index 05h

Bit	Name	P/W	PWR	Description
3	PIN24_MODE	RW	VSB3V	0: GPIO23 1: LED23 IN this mode can use REG Ox08(bit7, 6) to select LED frequency.
2	PIN23_MODE	RW	VSB3V	0: GPIO24 1: LED24 IN this mode can use REG Ox09(bit1, 0) to select LED frequency.
1	PIN22_MODE	RW	VSB3V	0: GPIO25 1: LED25 IN this mode can use REG Ox09(bit3, 2) to select LED frequency.
0	PIN21_MODE	RW	VSB3V	0: GPIO26 1: LED26 IN this mode can use REG Ox09(bit5, 4) to select LED frequency.

B.1.3 GPIO2x Output Control Register - Index 20h

Table B.3: Index 20h

Bit	Name	P/W	PWR	Description
7	GP27_O CTRL	RW	VSB3V	GPIO 27 output control. Set to 1 for output function. Set to 0 for input function (default).
6	GP26_O CTRL	RW	VSB3V	GPIO 26 output control. Set to 1 for output function. Set to 0 for input function (default).
5	GP25_O CTRL	RW	VSB3V	GPIO 25 output control. Set to 1 for output function. Set to 0 for input function (default).
4	GP24_O CTRL	RW	VSB3V	GPIO 24 output control. Set to 1 for output function. Set to 0 for input function (default).
3	GP23_O CTRL	RW	VSB3V	GPIO 23 output control. Set to 1 for output function. Set to 0 for input function (default).
2	GP22_O CTRL	RW	VSB3V	GPIO 22 output control. Set to 1 for output function. Set to 0 for input function (default).
1	GP21_O CTRL	RW	VSB3V	GPIO 21 output control. Set to 1 for output function. Set to 0 for input function (default).
0	GP20_O CTRL	RW	VSB3V	GPIO 20 output control. Set to 1 for output function. Set to 0 for input function (default).

B.1.4 GPIO2x Output Data Register - Index 21h

Table B.4: Index 21h

Bit	Name	P/W	PWR	Description
7	GP27_O DATA	RW	VSB3V	GPIO 27 output data.
6	GP26_O DATA	RW	VSB3V	GPIO 26 output data.
5	GP25_O DATA	RW	VSB3V	GPIO 25 output data.
4	GP24_O DATA	RW	VSB3V	GPIO 24 output data.
3	GP23_O DATA	RW	VSB3V	GPIO 23 output data.
2	GP22_O DATA	RW	VSB3V	GPIO 22 output data.
1	GP21_O DATA	RW	VSB3V	GPIO 21 output data.
0	GP20_O DATA	RW	VSB3V	GPIO 20 output data.

B.1.5 GPIO2x Input Status Register - Index 22h

Table B.5: Index 22h

Bit	Name	P/W	PWR	Description
7	GP27_PSTS	RW	VSB3V	Read the GPIO27 data on the pin
6	GP26_PSTS	RW	VSB3V	Read the GPIO26 data on the pin
5	GP25_PSTS	RW	VSB3V	Read the GPIO25 data on the pin
4	GP24_PSTS	RW	VSB3V	Read the GPIO24 data on the pin
3	GP23_PSTS	RW	VSB3V	Read the GPIO23 data on the pin
2	GP22_PSTS	RW	VSB3V	Read the GPIO22 data on the pin
1	GP21_PSTS	RW	VSB3V	Read the GPIO21 data on the pin
0	GP20_PSTS	RW	VSB3V	Read the GPIO20 data on the pin

Appendix C

System Assignments

This appendix gives you the information about the system resource allocation on the SOM-5787 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 - 0063	Motherboard resources
0064 - 0064	Standard 101/102-Key or Microsoft Natural PS/2 Keyboard
0065 - 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
0170 - 0177	Secondary IDE Channel
01F0 - 01F7	Primary IDE Channel
0274 - 0277	ISAPNP Read Data Port
0279 - 0279	ISAPNP Read Data Port
02F8 - 02FF	Communications Port (COM2)
0376 - 0376	Secondary IDE Channel
0378 - 037F	Printer Port (LPT1)
03B0 - 03BB	Mobile Intel 4 Series Express Chipset Family
03C0 - 03DF	Mobile Intel 4 Series Express Chipset Family
03F0 - 03F5	Standard floppy disk controller
03F6 - 03F6	Primary IDE Channel
03F7 - 03F7	Standard floppy disk controller
03F8 - 03FF	Communications Port (COM1)
0400 - 041F	Intel ICH9 Family SMBus Controller - 2930
04D0 - 04D1	Motherboard resources

Table C.1: System I/O ports	
0500 - 057F	
Motherboard resources	
0800 - 087F	Motherboard resources
0A00 - 0A0F	Motherboard resources
0A79 - 0A79	ISAPNP Read Data Port
0D00 - FFFF	PCI bus
C000 - C007	Mobile Intel 4 Series Express Chipset Family
C080 - C087	Intel Active Management Technology - SOL (COM3)
C400 - C40F	Standard Dual Channel PCI IDE Controller
C480 - C483	Standard Dual Channel PCI IDE Controller
C800 - C807	Standard Dual Channel PCI IDE Controller
C880 - C883	Standard Dual Channel PCI IDE Controller
CC00 - CC07	Standard Dual Channel PCI IDE Controller
D000 - D01F	Intel 82567LM Gigabit Network Connection
D080 - D09F	Intel ICH9 Family USB Universal Host Controller - 2939
D400 - D41F	Intel ICH9 Family USB Universal Host Controller - 2938
D480 - D49F	Intel ICH9 Family USB Universal Host Controller - 2937
D800 - D81F	Intel ICH9 Family USB Universal Host Controller - 2936
D880 - D89F	Intel ICH9 Family USB Universal Host Controller - 2935
DC00 - DC1F	Intel ICH9 Family USB Universal Host Controller - 2934
E000 - E00F	Intel ICH9M/M-E 2 port SATA Controller 2 - 292D
E080 - E08F	Intel ICH9M/M-E 2 port SATA Controller 2 - 292D
E400 - E403	Intel ICH9M/M-E 2 port SATA Controller 2 - 292D
E480 - E487	Intel ICH9M/M-E 2 port SATA Controller 2 - 292D
E800 - E803	Intel ICH9M/M-E 2 port SATA Controller 2 - 292D
E880 - E887	Intel ICH9M/M-E 2 port SATA Controller 2 - 292D
FF90 - FF9F	Intel ICH9M/M-E 2 port SATA Controller 1 - 2928
FFA0 - FFAF	Intel ICH9M/M-E 2 port SATA Controller 1 - 2928

C.2 DMA Channel Assignments

Table C.2: DMA channel assignments	
Channel	**Function**
0	Available
1	Available
2	Standard floppy disk controller
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	Standard floppy disk controller
IRQ 7	Available
IRQ 8	System CMOS/real time clock
IRQ 9	Microsoft ACPI-Compliant System
IRQ 10	Available
IRQ 11	Intel ICH9 Family SMBus Controller - 2930
IRQ 12	PS/2 Compatible Mouse
IRQ 13	Numeric data processor
IRQ 14	Primary IDE Channel
IRQ 15	Secondary IDE Channel
IRQ 16	Intel ICH9 Family USB Universal Host Contrller - 2937*
IRQ 16	Intel Management Engine Interface
IRQ 16	Mobile Intel 4 Series Express Chipset Family
IRQ 17	Intel Active Management Technology - SOL
IRQ 18	Intel ICH9 Family USB Universal Host Contrller - 2936*
IRQ 18	Intel ICH9 Family USB2 Enhanced Host Controller - 293C*
IRQ 18	Standard Dual Channel PCI IDE Controller
IRQ 19	Intel ICH9 Family USB Universal Host Contrller - 2939*
IRQ 19	Intel ICH9 Family USB Universal Host Contrller - 2935*
IRQ 19	Intel ICH9M/M-E 2 port SATA Controller 2 - 292D
IRQ 20	Intel 82567LM Gigabit Network Connection*
IRQ 21	Intel ICH9 Family USB Universal Host Contrller - 2938*
IRQ 22	Microsoft UAA Bus Driver for High Definition Audio
IRQ 23	Intel ICH9 Family USB Universal Host Contrller - 2934*
IRQ 23	Intel ICH9 Family USB2 Enhanced Host Controller - 293A*

*USB and Ethernet IRQ is automatically set by the system

C.4 1st MB Memory Map

Table C.4: 1st MB memory map

Addr. range (Hex)	Device
00000000 - 0009FFFF	System board
000A0000 - 000BFFFF	Mobile Intel 4 Series Express Chipset Family
000A0000 - 000BFFFF	PCI Bus
000C0000 - 000CFFFF	System board
000D0000 - 000DFFFF	PCI bus
000E0000 - 000FFFFF	System board
00100000 - 79BFFFFF	System board
79C00000 - DFFFFFFF	PCI Bus
D0000000 - DFFFFFFF	Mobile Intel 4 Series Express Chipset Family
E0000000 - EFFFFFFF	Motherboard resource
F0000000 - FED8FFFF	PCI Bus
FE400000 - FE7FFFFF	Mobile Intel 4 Series Express Chipset Family
FEA00000 - FEAFFFFF	Mobile Intel 4 Series Express Chipset Family
FEBC0000 - FEBDFFFF	Intel 82567LM Gigabit Network Connection
FEBF8000 - FEBFBFFF	Microsoft UAA Bus Driver for High Definition Audio
FEBFD000 - FEBFDFFF	Intel Active Management Techbnology - SOL (COM3)
FEBFE000 - FEBFEFFF	Intel 82567LM Gigabit Network Connection
FEBFF000 - FEBFF00F	Intel Management Engine Interface
FEBFF400 - FEBFF7FF	Intel ICH9 Family USB2 Enhanced Host Controller - 293C
FEBFF800 - FEBFFBFF	Intel ICH9 Family USB2 Enhanced Host Controller - 293A
FEBFFC00 - FEBFFCFF	Intel ICH9 Family SMBus Controller - 2930
FEC00000 - FEC00FFF	Motherboard resources
FED00000 - FED003FF	High precision event timer
FED10000 - FED19FFF	Motherboard resources
FED1C000 - FED1FFFF	Motherboard resources
FED20000 - FED3FFFF	Motherboard resources
FED40000 - FED44FFF	Intel Trust Platform Module
FED45000 - FED8FFFF	Motherboard resources
FED90000 - FFFFFFFF	System board
FEE00000 - FEE00FFF	Motherboard resources
FFB00000 - FFBFFFFF	Intel 82802 Firmware Hub Device
FFC00000 - FFEFFFFF	Motherboard resources
FFF00000 - FFFFFFFF	Intel 82802 Firmware Hub Device

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