AXIOMTEK

SHB212 Series
Intel® Atom™ Processor
PICMG 1.3 Half-Size
Single Board Computer
User's Manual

RoHS

Disclaimers

This manual has been carefully checked and believed to contain accurate information. Axiomtek Co., Ltd. assumes no responsibility for any infringements of patents or any third party's rights, and any liability arising from such use.

Axiomtek does not warrant or assume any legal liability or responsibility for the accuracy completeness or usefulness of any information in this document. Axiomtek does not make any commitment to update the information in this manual.

Axiomtek reserves the right to change or revise this document and/or product at any time without notice.

No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Axiomtek Co., Ltd.

Caution

If you replace wrong batteries, it causes the danger of explosion. It is recommended by the manufacturer that you follow the manufacturer's instructions to only replace the same or equivalent type of battery, and dispose of used ones.

ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them

Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.

Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

Trademarks Acknowledgments

Axiomtek is a trademark of Axiomtek Co., Ltd.

Windows$^®$ is a trademark of Microsoft Corporation.

AMI is a registered of American Megatrends Inc.

IBM, PC/AT, PS/2, VGA are trademarks of International Business Machines Corporation.

Intel$^®$ and Atom™ are trademarks of Intel Corporation.

Winbond is a trademark of Winbond Electronics Corp.

Other brand names and trademarks are the properties and registered brands of their respective owners.

Table of Contents

MEMO:

CHAPTER 1

INTRODUCTION

The SHB212 is a PICMG1.3 half-size Single Board Computer to support Intel® Atom™ processor N455/D425/D525. The board integrates chipset ICH8-M that delivers outstanding system performance through high-band width interfaces, multiple I/O functions for interactive applications and various embedded computing solutions. There is one 204-pin unbuffered SO-DIMM socket for single channel DDR3-667/800 MHz memory, maximum memory capacity up to 4GB. (N455 is only for DDR3-667, maximum memory capacity up to 2GB). It also features two Gigabit/Fast Ethernet, two Serial ATA channels for total two Serial ATA hard drives at maximum transfer rate up to 150/300MB/sec, six USB 2.0 high speed compliant, built-in High Definition Audio Codec that can achieve the best stability and reliability for industrial applications.

1.1 Specifications

- **CPU**
  - Intel® Atom™ processor N455/D425/D525

- **System Chipset**
  - Intel® ICH8M

- **BIOS**
  - American Megatrends Inc. BIOS.
  - 16Mbit SPI Flash
  - PXE Ethernet Boot ROM.

- **System Memory**
  - One 204-pin unbuffered DDR3 SO-DIMM sockets
  - Maximum to 4GB DDR3 667/800 MHz memory for D425/D525
  - Maximum to 2GB DDR3 667 MHz memory for N455

- **IDE Interface**
  - One CompactFlash™ Type II Socket
  - Two SATA-150/300 connectors

- **USB Interface**
  - Six USB ports compliant with USB Spec. Rev. 2.0 (two on the rear I/O, and four ports via wafer connectors)

- **Onboard Multi I/O**
  - Controller: Winbond W83627DHG
  - One 26-pin 2.0 pitch box-header for Parallel port
  - One for RS-232/422/485 (COM1) and one port for RS-232 (COM2)

- **Display**
  - Support CRT and LVDS LCD output
  - 15-pin D-Sub connector as VGA connector
  - One 40-pin connector for 18 bit single channel LVDS and one 7-pin inverter connector

- **Expansion Interface**
    - One PCIe x4 or four PCIe x1 I/O Deivces

    There is no PCIex16 signal.

- **Watchdog Timer**
    - 1~255 seconds; up to 255 levels

- **Ethernet**
    - One port with INTEL 82567V for Gigabit/Fast Ethernet
    - One port with INTEL 82574L for Gigabit/Fast Ethernet

- **Audio**
    - HD Audio compliant via Realtek ALC662
    - Speaker-out/line-out & Line-in & MIC-in via Box Header connector

- **Power Management**
    - ACPI (Advanced Configuration and Power Interface)

- **Dimensions**
    - 185mm x 126.39mm

All specifications and images are subject to change without notice.

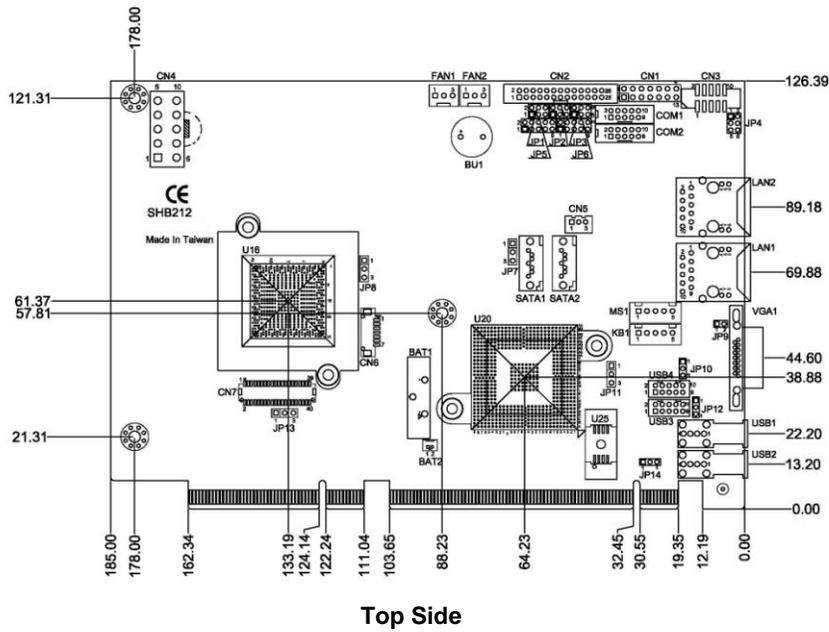## 1.2   Utilities Supported

- **Chipset Driver**
- **Graphic Driver**
- **Ethernet Driver**
- **Audio Driver**
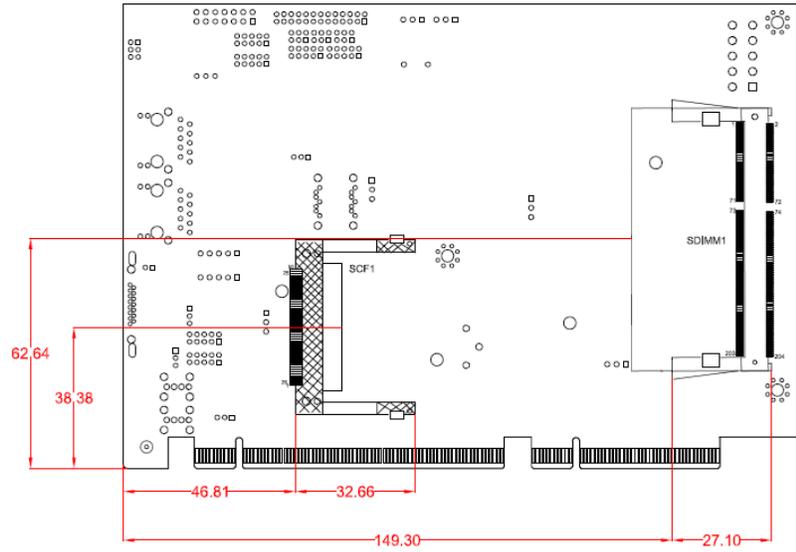- **AHCI Driver**

MEMO:

CHAPTER 2
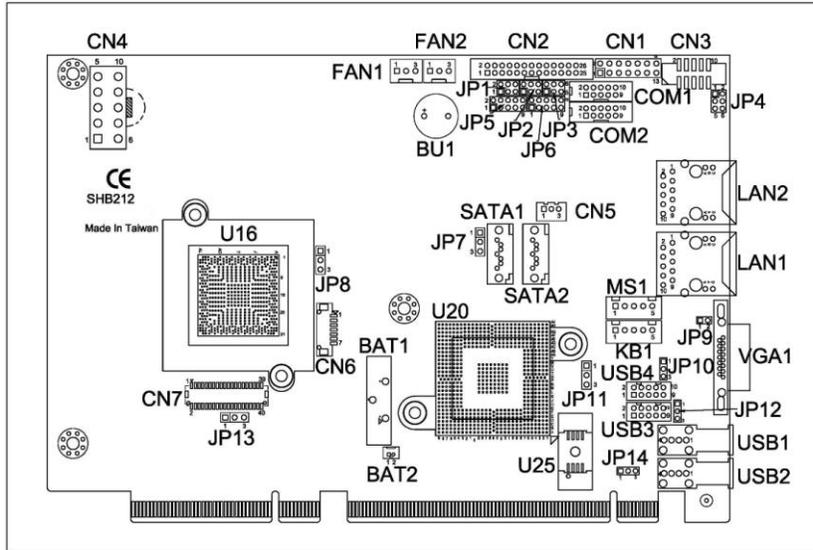
JUMPERS AND CONNECTORS

2.1   Board Dimensions and Fixing Holes

Top Side

Bottom Side

JUMPERS AND CONNECTORS

2.2   Board Layout

Top Side

Bottom Side

JUMPERS AND CONNECTORS
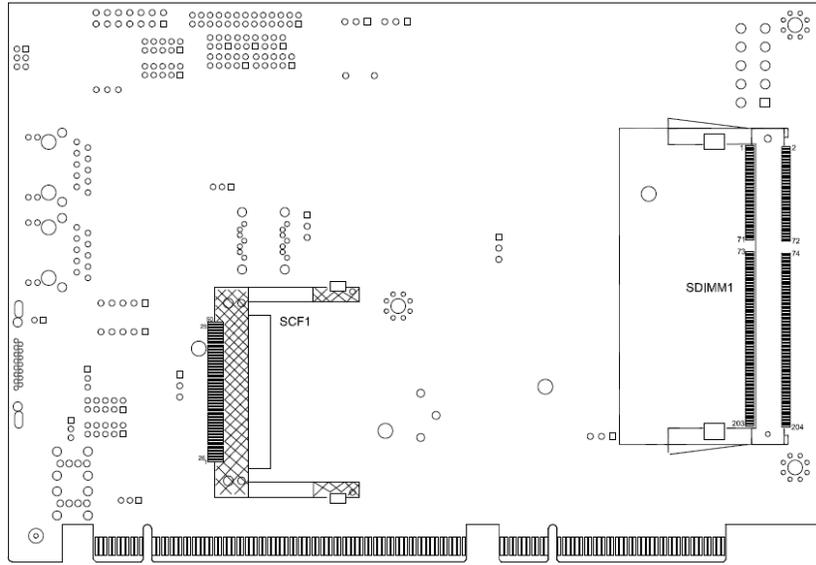
2.3   Jumper Settings

Proper jumer settings configure the SHB212 to meet your application purpose. We are here with listing a summary table of all jumpers and default settings for onboard devices, respectively.

Jumper	Description	Jumper Setting
JP1	COM1 RS-232/422/485 setting Default：RS-232	Short 1-2
JP2	COM1 RS-232/422/485 setting Default：RS-232	Short 3-5、4-6
JP3	COM1 RS-232/422/485 setting Default：RS-232	Short 3-5、4-6
JP4	HD Audio Line Out / Speaker Out Select Default：Line Out	Short 1-3、2-4
JP5	COM2 Data/Power Mode Select Default：RS-232 Data	Short 7-9、8-10
JP6	COM1 Data/Power Mode Select Default：Standby Power Mod	Short 7-9、8-10
JP7	CMOS Clear Default：Normal Operation	Short 1-2
JP8	Power On Control Mode Default：Power On control by Front Panel Connector	Short 1-2
JP10	USB 4,5 Port Power(5V) Selection Default：Standby Power Mode	Short 2-3
JP11	CompactFlash^{TM} Type Selection Default：3.3V type CompactFlash^{TM} Support	Short 1-2
JP12	USB 0,1 Port Power(5V) Selection Default：Main Power Mode	Short 1-2
JP13	LVDS LCD Type Support Selection Default：3.3V type LVDS LCD Support	Short 1-2
JP14	USB 2,3 Port Power(5V) Selection Default：Standby Power Mode	Short 2-3

2.3.1 COM1 RS-232/422/485 Mode Select (JP1, JP2, JP3)

These jumpers select the communication mode of COM1 port to operate RS-232 or RS-422 or RS-485. When these jumpers are selected to operate RS-422 or RS485, please make sure the COM1 is on Data mode.

Function	Jumper Setting		
	JP1	JP2	JP3
RS-232 (Default)			
RS-422			
RS-485			

2.3.2 COM1 Data / Power Mode Selection (JP6)

The COM1 port have +5V or +12V level power capability on DCD and +5V or +12V level power capability for RI, depending on the JP6 setting.

Function	Jumper Setting
COM1 Pin 1 is +12V level	1 3 5 7 9 / 2 4 6 8 10
COM1 Pin 1 is +5V level	1 3 5 7 9 / 2 4 6 8 10
COM1 Pin1 is DCD (Default)	1 3 5 7 9 / 2 4 6 8 10
COM1 Pin 8 is +12V level	1 3 5 7 9 / 2 4 6 8 10
COM1 Pin 8 is +5V level	1 3 5 7 9 / 2 4 6 8 10
COM1 Pin 8 is RI (Default)	1 3 5 7 9 / 2 4 6 8 10

2.3.3 COM2 Data / Power Mode Selection (JP5)

The COM2 port have +5V or +12V level power capability on DCD and +5V or +12V level power capability for RI, depending on the JP5 setting.

Function	Jumper Setting
COM2 Pin 1 is +12V level	
COM2 Pin 1 is +5V level	
COM2 Pin 1 is DCD (Default)	
COM2 Pin 8 is +12V level	
COM2 Pin 8 is +5V level	
COM2 Pin 8 is RI (Default)	

2.3.4 HD Audio Line Out / Speaker Out Select (JP4)

This jumper is to select which source for the audio output (CN3). When the Speaker Out is set, it delivers 2W/channel continuous into 8 Ohm loads.

Function	Jumper Setting
Line Out (Default)	
Speak Out with Amplifier	
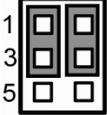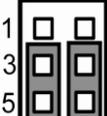
2.3.5 CMOS Clear (JP7)

You may need to use this jumper is to clear the CMOS memory if incorrect settings in the Setup Utility.

Function	Jumper Setting
Normal (Default)	
Clear CMOS	

2.3.6 Power On Control Mode (JP8)

The Power On Control mode provides two kinds of power on mode as follows,

Function	Jumper Setting
Power On control by Front Panel Connector (Default)	1 2 3
Power On control by Power Supply	1 2 3

2.3.7 USB0,1/USB2,3/USB4,5 Port Power Selection (JP12,JP14,JP10)

USB Power provides two kinds of mode as follows:

- ■ Main power Mode:

  USB device has power only when system power is on.

- ■ Standby Power Mode:

  USB device has power on both standby and power-on.

Function	Jumper Setting
Main Power Mode (Default)	1 2 3
Standby Power Mode	1 2 3

2.3.8 CompactFlash^{TM} Type Selection (JP11)

Function	Jumper Setting
3.3V type CompactFlash ^{TM} support (Default)	1 ▢ 2 ▣ 3 ▢
5V type Compact Flash ^{TM} support	1 ▢ 2 ▣ 3 ▣

2.3.9 LVDS LCD Type Support Selection (JP13)

The board supports 3.3V or 5V type LCD displays.

Function	Jumper Setting
3.3V type LVDS LCD support (Default)	1 ▣ 2 ▣ 3 ▢
5V type LVDS LCD support	1 ▢ 2 ▣ 3 ▣

2.4 Connectors

Connectors connect the board with other parts of the system. Loose or improper connection might cause problems.Make sure all connectors are properly and firmly connected. Here is a summary table which shows you all connectors on the SHB212 Series.

Connectors	Label
Front Panel Bezel Connector	CN1
Parallel Port Connector	CN2
High Definition Audio Connector	CN3
EPIC Power Connector	CN4
SMBus Connector	CN5
LVDS LCD Connector	CN6
LVDS LCD Backlight Connector	CN7
Serial Port1 Connector	COM1
Serial Port2 Connector	COM2
CPU Fan Connector	FAN1
System Fan Connector	FAN2
PS/2 Keyboard Internal Connector	KB1
PS/2 Mouse Internal Connector	MS1
LAN RJ45 Connector	LAN1
LAN RJ45 Connector	LAN2
SATA Connector	SATA1
SATA Connector	SATA2
CompactFlash[TM] TypeII Socket	SCF1

Connectors	Label
USB Connector	USB1
USB Connector	USB2
USB Connector	USB3
USB Connector	USB4
VGA Connector	VGA1

2.4.1 Front Panel Connector (CN1)
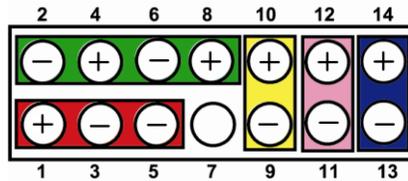
● **Power LED**

This 3-pin pin-header, designated at Pins 1 and 5 of CN1, connects the system power LED indicator to its respective switch on the case. Pin 1 is +, and pin 5 is assigned as -. The Power LED lights up when the system is powered ON.Pin 3 is defined as GND.

● **External Speaker and Internal Buzzer Connector**

Pins 2, 4, 6, and 8 of CN1 connect to the case-mounted speaker unit or internal buzzer. When connecting to an internal buzzer and Short pin2 and pin4. When connecting an external speaker, set these jumpers to Open and install the speaker cable on pin 8 (+) and pin 2 (-).

● **Power On/Off Button**

This 2-pin pin-header, designated at Pins 9 and 10 of CN1, connects the power button on the front panel to the CPU board, allowing user to control the power on/off state of the power supply.

● **System Reset Switch**

Pins 11 and 12 of CN1 connect to the case-mounted reset switch and allow rebooting of your computer instead of turning OFF the power switch. This is a preferred method of rebooting in order to prolong the life of the system's power supply.

● **HDD Activity LED**

This connector extends to the hard drive activity LED on the control panel. This LED will flash when the HDD is being accessed. Pins 13 and 14 of CN1 connect the hard disk drive and the front panel HDD LED. Pins 13 is -, and pin 14 is assigned as +.

2.4.2 Parallel Port Connector (CN2)

This board has a multi-mode parallel port to support the following modes:

1. Standard Mode

IBM PC/XT, PC/AT and PS/2™ are compatible with bi-directional parallel port.

2. Enhanced Mode

Enhanced parallel port (EPP) is compatible with EPP 1.7 and EPP 1.9 (IEEE 1284 compliant).

3. High Speed Mode

Microsoft and Hewlett Packard extended capabilities port (ECP) is IEEE 1284 compliant.

Pin	Signal	Pin	Signal
1	Strobe#	2	Auto Form Feed#
3	Data 0	4	Error#
5	Data 1	6	Initialize#
7	Data 2	8	Printer Select In#
9	Data 3	10	GND
11	Data 4	12	GND
13	Data 5	14	GND
15	Data 6	16	GND
17	Data 7	18	GND
19	Acknowledge#	20	GND
21	Busy	22	GND
23	Paper Empty#	24	GND
25	Printer Select	26	N.C

2.4.3 High Definition Audio Connector (CN3)

CN3 is a 10-pin 2.0pitch box-header to support the audio interface. Pin 7 and Pin 9 can be referred to JP13 Jumper Setting to set the audio source.

Pin	Signal	Pin	Signal
1	MIC-IN	2	GND
3	Line In L	4	GND
5	Line In R	6	GND
7	Audio Out L	8	GND
9	Audio Out R	10	GND
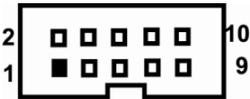
2.4.4 EPIC Power Connector (CN4)

Steady and sufficient power can be supplied to all components on the board through the power connector. Please make sure all components and devices are properly installed before connecting the power connector.

Pin	Signal	Pin	Signal
1	PS_ON	2	GND
3	GND	4	+12V
5	+3.3V	6	5VSB
7	N.C	8	N.C
9	N.C	10	GND
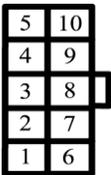
2.4.5 SMBus Connector (CN5)

Connector CN5 is for SMBus interface support.

Pin	Signal
1	CLOCK
2	DATA
3	GND
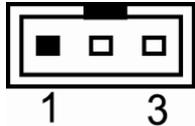
2.4.6 LVDS LCD Connector (CN6)

The board has a 40-pin connector CN6 for LVDS LCD Interface. It is strongly recommended to use the matching GLA1001WV-S-2X20P 40-pin connector for LVDS LCD on the board.Pin1~6 VCCM can be set +3.3V level or +5V level by JP14

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	N.C	8	N.C
9	GND	10	GND
11	N.C	12	N.C
13	N.C	14	N.C
15	GND	16	GND
17	N.C	18	N.C
21	GND	22	GND
23	Channel A D0-	24	N.C
25	Channel A D0+	26	N.C
27	GND	28	GND
29	Channel A D1-	30	N.C

Pin	Signal	Pin	Signal
31	Channel A D1+	32	N.C
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

2.4.7 LVDS LCD Backlight Connector (CN7)

The 7-pin inverter connector on the SHB212 is with Hirose connector. The matching connector is strongly recommended to use Hirose DF13-7S-1.25C.

Pin	Signal
1	12V(Only for LCD)
2	12V(Only for LCD)
3	5V(Only for LCD)
4	ENABLE
5	GND
6	GND
7	GND

2.4.8 Serial Port 1 Connector (COM1)

COM1 is a 10-pin 2.0pitch box-header. This port is with +5V level or +12V level power capability for DCD and RI, depending on the JP6 jumper setting. The pin assignment of RS-232/RS-422/RS485 is listed on the following table. If you need COM1 port to support RS-422 or RS-485,

Pin	RS-232	RS-422	RS-485
1	Data Carrier Detect (DCD)	Transmit Data - (TX-)	Data -
2	Data Set Ready (DSR)	N.C	N.C
3	Receive Data (RX)	Transmit Data + (TX+)	Data +
4	Request to Send (RTS)	N.C	N.C
5	Transmit Data (TX)	Receive Data + (RX+)	N.C
6	Clear to Send (CTS)	N.C	N.C
7	Data Terminal Ready (DTR)	Receive Data - (RX-)	N.C
8	Ring Indicator (RI)	N.C	N.C
9	Ground (GND)	N.C	N.C
10	N.C	N.C	N.C

2.4.9 Serial Port 2 Connector (COM2)

COM2 is a 10-pin 2.0pitch box-header.This port is with +5V level or +12V level power capability for DCD and RI, depending on the JP5 jumper setting

Pin	Signal	Pin	Signal
1	Data Carrier Detect (DCD)	2	Data Set Ready (DSR)
3	Receive Data (RX)	4	Request to Send (RTS)
5	Transmit Data (TX)	6	Clear to Send (CTS)
7	Data Terminal Ready (DTR)	8	Ring Indicator (RI)
9	Ground (GND)	10	N.C
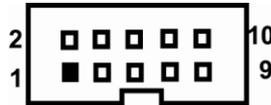
2.4.10 CPU & System Fan Connectors (FAN1, FAN2)

FAN1 is a fan connector for CPU and FAN2 for system. Pentium microprocessors require a fan for heat dispensing. The CPU/System fan connectors respectively provide power to the CPU/System fans. You can find the fan speed on the BIOS Setup Utility when the fan is installed. (See BIOS Setup Utility：Advanced → Hardware Health).

Pin	Signal
1	GND
2	Fan Power
3	Sensor

2.4.11 PS/2 Keyboard Internal Connector (KB1)

The board provides the Internal Keyboard interface with a 5-pin wafer connector.

Pin	Signal
1	Keyboard Clock
2	Keyboard Data
3	N.C
4	GND
5	Power For K/B

2.4.12 PS/2 Mouse Internal Connector (MS1)

The board provides the Internal Mouse interface with a 5-pin wafer connector.

Pin	Signal
1	Mouse Clock
2	Mouse Data
3	N.C
4	GND
5	Power For M/S

2.4.13 LAN RJ45 Connector (LAN1, LAN2)

To connect the board to a 1000/100/10 Base-T hub, just plug one end of the cable into LAN1/LAN2, and connect the other end to a 1000/100/10 Base-T hub.

Pin	Signal	Pin	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI2+
5	MDI2-	6	MDI1-
7	MDI3+	8	MDI3-
A	Active LED (Yellow)	B	100 LAN LED (Green)/ 1000 LAN LED (Orange)
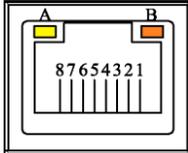
2.4.14 SATA Connectors (SATA1, SATA2)

The SATA connectors SATA1 and SATA2 are for high-speed SATA interface port and it can be connected to serial ATA hard disk devices.

Pin	Signal	Pin	Signal
1	GND	2	SATA TX+
3	SATA TX-	4	GND
5	SATA RX-	6	SATA RX+
7	GND		

2.4.15 CompactFlash^{TM} Socket (SCF1)

The board is equipped with a CompactFlash^{TM} disk type-II socket on the solder side to support an IDE interface CompactFlash^{TM} disk card with DMA mode supported. The socket is especially designed to avoid incorrect installation of the CompactFlash^{TM} disk card. When installing or removing the CompactFlash^{TM} disk card, please make sure the system power is off.

Pin13 and Pin38 power voltage can be referred to JP11 Jumper Setting

Pin	Signal	Pin	Signal
1	GND	2	Data 3
3	Data 4	4	Data 5
5	Data 6	6	Data 7
7	CS0-	8	GND
9	ATASEL	10	GND
11	GND	12	GND
13	VCC	14	GND
15	GND	16	GND
17	GND	18	Address 2
23	Data 2	24	IOCS16-
25	GND	26	CD1-
27	Data 11	28	Data 12
29	Data 13	30	Data 14
31	Data 15	32	CS1-
33	VS1-	34	IORD-
35	IOWR-	36	WE#

Pin	Signal	Pin	Signal
37	INTR	38	VCC
39	CSEL-	40	VS2-
41	RESET-	42	IORDY-
43	DMAREQ	44	DMAACK-
45	DASP-	46	PDIAG-
47	Data 8	48	Data 9
49	Data 10	50	GND
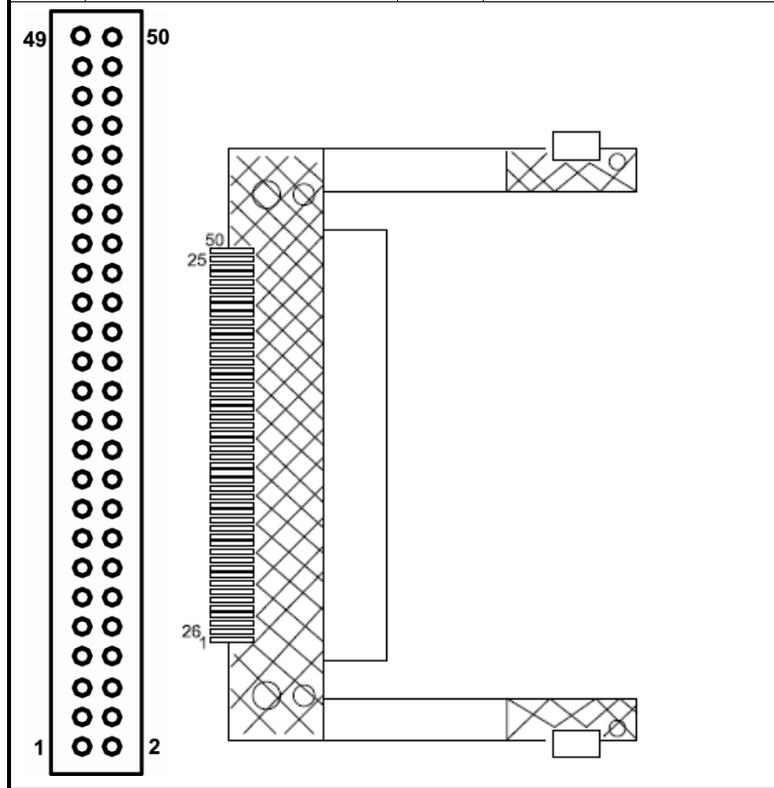
2.4.16 USB Connector (USB1, USB2)

The board features Universal Serial Bus (USB) connectors, compliant with USB 2.0 (480Mbps) that can be adapted to any USB peripherals, such as monitor, keyboard and mouse.

USB1, USB2 is a singal-deck USB port connector that consists of two 4-pin standard USB ports.

Pin	Signal	Pin	Signal
1	USB POWER	2	USB DATA-
3	USB DATA+	4	GND
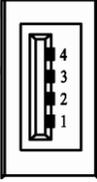
2.4.17 USB Connector (USB3, USB4)

The board features Universal Serial Bus (USB) connectors, compliant with USB 2.0 (480Mbps) that can be adapted to any USB peripherals, such as monitor, keyboard and mouse.

USB3 is a 10-pin 2.0pitch wafer connector.

Pin	Signal	Pin	Signal	
1	USB POWER	2	USB POWER	
3	USB DATA(A)-	4	USB DATA(B)-	
5	USB DATA(A)+	6	USB DATA(B)+	
7	GND	8	GND	
9	GND	10	GND	
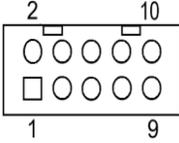
2.4.18 VGA Connector (VGA1)

VGA1 is a slim type 15-pin D-Sub connector which is common for CRT VGA display. The interface configuration can be configured via the software utility.

Pin	Signal	Pin	Signal	Pin	Signal
1	RED	2	GREEN	3	BLUE
4	N.C	5	GND	6	DETECT
7	GND	8	GND	9	Power
10	GND	11	N.C	12	DDC DATA
13	Horizontalync	14	Vertical Sync	15	DDC CLOCK
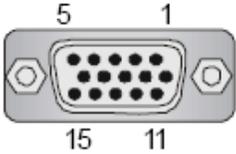
MEMO:

JUMPERS AND CONNECTORS

CHAPTER 3

HARDWARE DESCRIPTION

3.1 Microprocessors

The SHB212 Series supports Intel®Atom™ processor N455/D425/ D525, which make your system operated under Windows XP/Vista and Windows 7 environments. The system performance depends on the microprocessor.

3.2 BIOS

The SHB212 Series uses American Megatrends BIOS with 16Mbit SPI Flash, DMI, Plug and Play.

3.3 System Memory

The SHB212 Series industrial CPU card supports one 204-pin unbuffered DDR3 SO-DIMM socket for a maximum memory of 4GB DDR3 SDRAM (N455 is only for DDR3-667, maximum memory capacity up to 2GB).

3.4   I/O Port Address Map

There are total 1KB port addresses (under OS WinXP) available for assignment to other devices via I/O expansion cards.

Address	Devices
0000-000F 0081-0083 0087 0089-008B 008F 00C0-00DF	Direct Memory Access controller
0000-0CF7 0D00-FFFF	PCI Bus
0020-0021 00A0-00A1	Interrupt controller
0040-0043	System timer
0060 0064	Standard 101/102 Key or Microsoft Natural PS/2 Keyboard
0061	System speaker
0070-0071	System CMOS/Real time clock
01F0-01F7 03F6	Primary IDE Channel
0274-0277 0279 0A79	ISAPNP Read Data Port
02F8-02FF	Communications Port (COM2)
0378-037F	Printer Port (LPT1)

HARDWARE DESCRIPTION

Address	Devices
03B0-03BB 03C0-03DF C000-C007	Intel® Graphics Media Accelerator 3150
03F8-03FF	Communications Port (COM1)
0400-041F	Intel® ICH8 Family SMBus Controller
C080-C09F	Intel® 82567V-3 Gigabit Network Connection
C400-C41F C480-C49F C800-C81F C880-C89F CC00-CC1F	Intel® ICH8 Family USB Universal Host Controller
D080-D08F D400-D40F D480-D483 D800-D807 D880-D883 DC00-DC07	Intel® ICH8M 3Port Serial ATA Storage Controller
E000-EFFF	Intel® ICH8 Family PCI Express Root Port 5
EC00-EC1F	Intel® 82574L Gigabit Network Connection
FFA0-FFAF	Intel® ICH8M Family Ultra ATA Storage Controllers

3.5   Interrupt Controller

The SHB212 Series is a 100% PC compatible control board. It consists of 16 interrupt request lines, and four out of them can be programmable. The mapping list of the 16 interrupt request lines is shown as the following table.

IRQ	Parity check error
IRQ0	System timer output
IRQ1	Standard 101/102 Key or Microsoft Natural PS/2 Keyboard
IRQ3	Communication Port (COM2)
IRQ4	Communication Port (COM1)
IRQ8	System CMOS/Real time clock
IRQ9	Microsoft ACPI-Compliant System
IRQ11	Intel® ICH8 Family SMBus Controller
IRQ12	Microsoft PS/2 Mouse
IRQ13	Numeric data processor
IRQ14	Primary IDE Channel
IRQ16	Intel® 82574L Gigabit Network Connection
IRQ16	Intel® Graphics Media Accelerator 3150
IRQ16	Intel® ICH8 Family USB Universal Host Controller
IRQ18	Intel® ICH8 Family USB Universal Host Controller
IRQ18	Intel® ICH8 Family USB2 Enhanced Host Controller
IRQ18	Intel® ICH8M 3 Port Serial ATA Storage Controller
IRQ19	Intel® ICH8 Family USB Universal Host Controller
IRQ21	Intel® ICH8 Family USB Universal Host Controller
IRQ21	Microsoft UAA Bus Driver for High Definition Audio

IRQ	Parity check error
IRQ22	Intel® ICH8 Family PCI Express Root Port 1
IRQ22	Intel® ICH8 Family PCI Express Root Port 5
IRQ23	Intel® 82567V-3 Gigabit Network Connection
IRQ23	Intel® ICH8 Family USB Universal Host Controller
IRQ23	Intel® ICH8 Family USB2 Enhanced Host Controller

3.6 Memory Map

Address	Devices
00000000-0009FFFF	System board
000A0000-000BFFFF	Intel® Graphics Media Accelerator 3150
000A0000-000BFFFF	PCI Bus
000C0000-000CFFFF	System board
000D0000-000DFFFF	PCI Bus
000E0000-000FFFFF	System board
00100000-7F6FFFFF	System board
7F700000 DFFFFFFF	PCI Bus
D0000000-DFFFFFFF	Intel® Graphics Media Accelerator 3150
F0000000 FED8FFFF	PCI Bus
FE880000–FEA7FFFF	Intel® Graphics Media Accelerator 3150
FEAC0000–FEADFFFF	Intel® 82567V-3 Gigabit Network Connection
FEAF8000–FEAFBFFF	Microsoft UAA Bus Driver for High Definition Audio
FEAFF400–FEAFFBFF	Intel® ICH8 Family USB2 Enhanced Host Controller

Address	Devices
FEAFFC00–FEAFFCFF	Intel® ICH8 Family SMBus Controller
FEB00000–FEBFFFFF	Intel® ICH8 Family PCI Express Root Port 5
FEBDC000–FEBFFFFF	Intel® 82574L Gigabit Network Connection
FED14000-FED19FFF	System board
FED90000-FFFFFFFF	System board
FFB00000-FFBFFFFF	Intel® 82802 Firmware Hub Device
FFF00000-FFFFFFFF	Intel® 82802 Firmware Hub Device

MEMO:

HARDWARE DESCRIPTION

CHAPTER 4

AMI BIOS UTILITY

This chapter provides users with detailed description how to set up basic system configuration through the AMIBIOS8 BIOS setup utility.

4.1   Starting

To enter the setup screens, follow the steps below:

Turn on the computer and press the <Del> key immediately.

After you press the <Del**e**te> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Chipset and Power menus.

4.2   Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process.

These keys include <F1>, <F10>, <Enter>, <ESC>, <Arrow> keys, and so on.

 Some of navigation keys differ from one screen to another.

← **Left/Right**	The Left <Arrow> keys allow you to select a setup screen.
↑↓ **Up/Down**	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+− **Plus/Minus**	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F10	The <F10> key allows you to save any changes you have made and exit Setup. Press the <F10> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

4.3   Main Menu

When you first enter the 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.
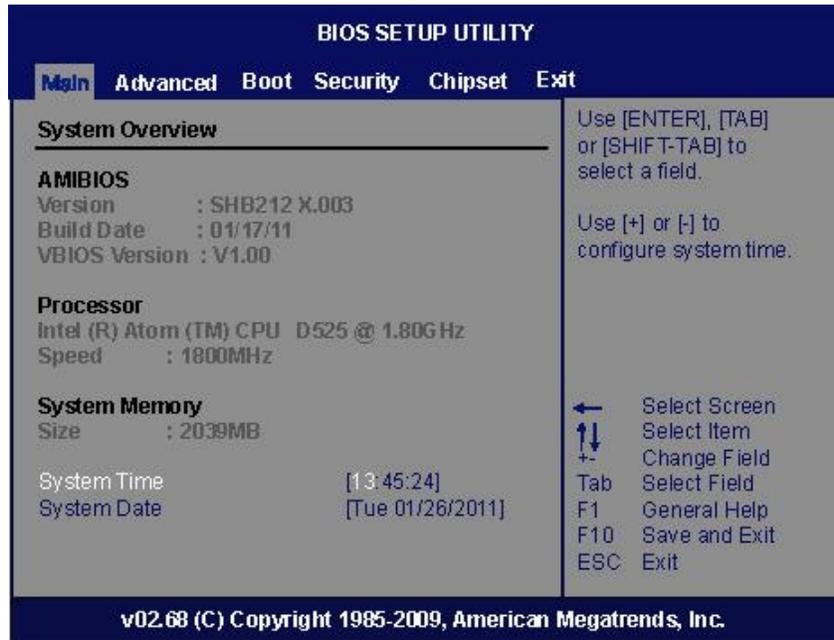
- **System Time/Date**

    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 is entered in HH:MM:SS format.

4.4 Advanced Menu

The Advanced menu allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:
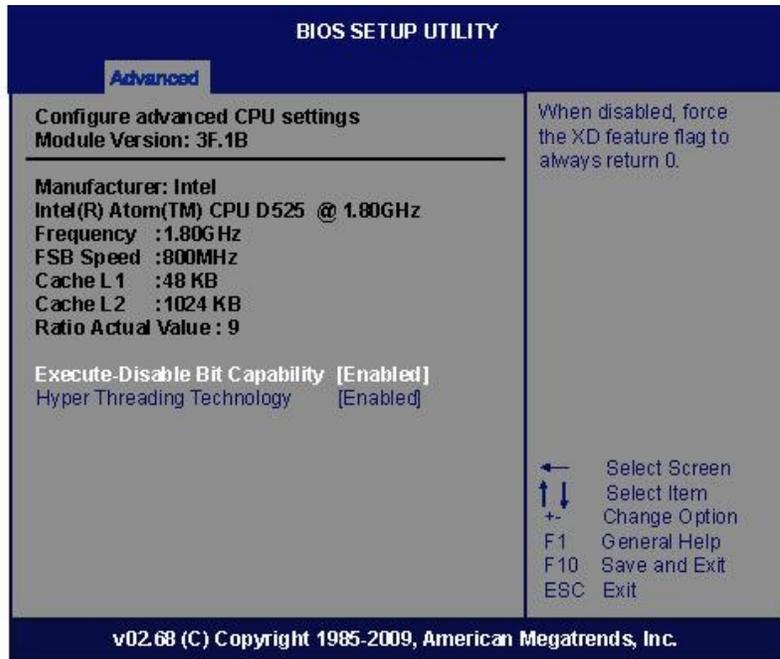
- **CPU Configuration**
- **IDE Configuration**
- **SuperIO Configuration**
- **Hardware Health Configuration**
- **ACPI Configuration**
- **AHCI Configuration**
- **APM Configuration**
- **USB Configuration**

For items marked with "►", please press <Enter> for more options.
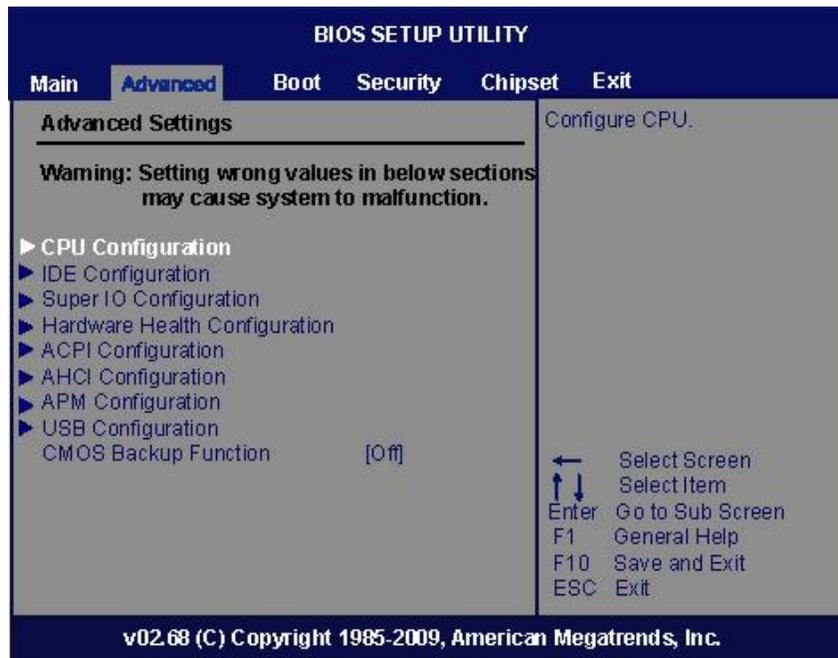
● **CPU Configuration**
This screen shows the CPU Configuration, and you can change the value of the selected option.

➢ Execute-Disable Bit Capability

This item helps you enable or disable the No-Execution Page Protection Technology

➢ Hyper Threading Technology

Use this item to enable or disable Hyper-Threading Technology, which makes a single physical processor perform multi-tasking function as two logical ones.

● **IDE Configuration**

You can use this screen to select options for the IDE Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.
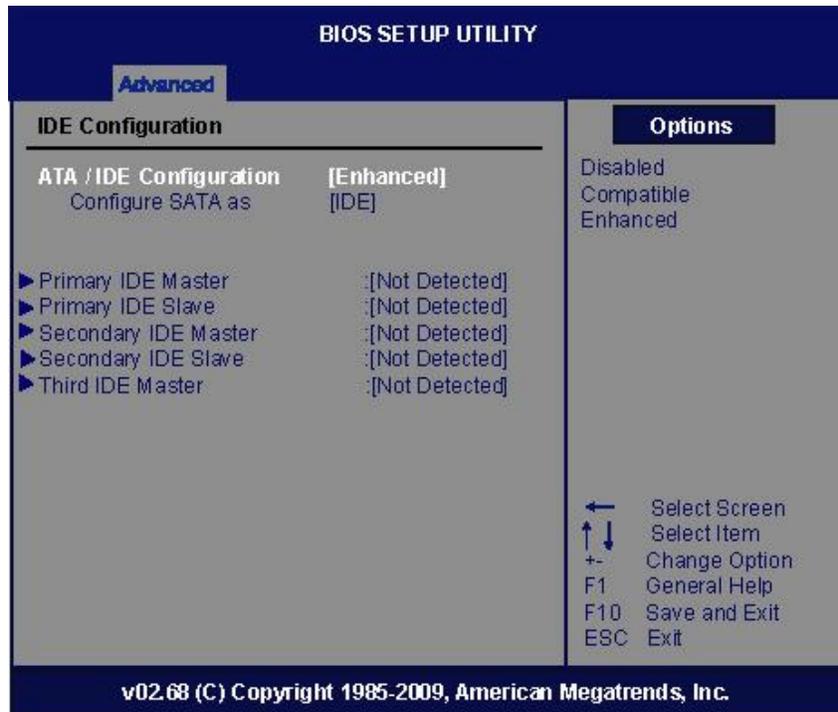

➢ ATA/IDE Configuration

Use this item to specify the integrated IDE controller. There are three options for your selection: *Disabled, Compatible* and *Enhanced*.

➢ Primary/Secondary /Third IDE Master/Slave

Select one of the hard disk drives to configure IDE devices installed in the system by pressing <Enter> for more options.

● **SuperIO Configuration**

You can use this screen to select options for the SuperIO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.
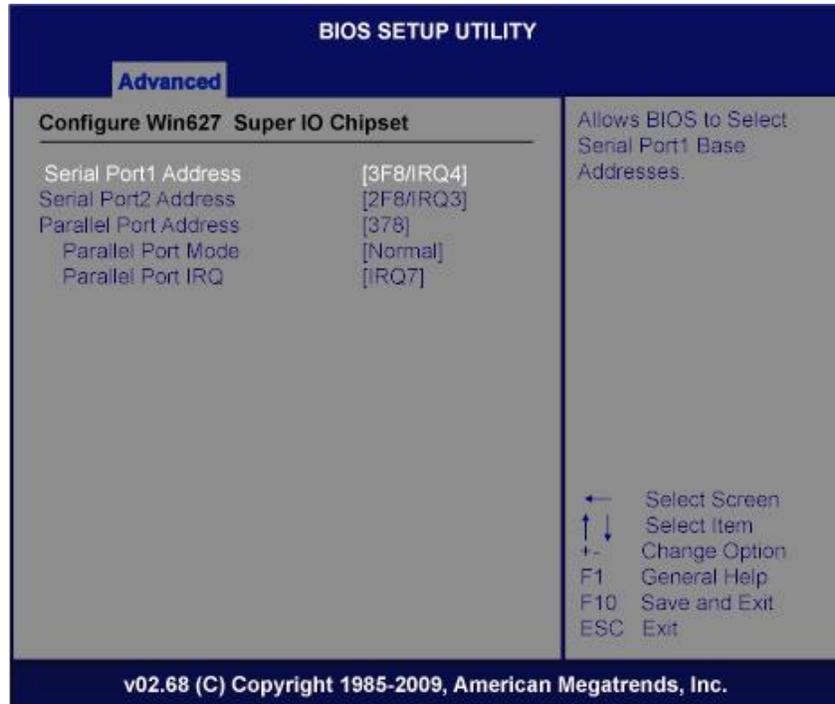
➢ OnBoard Floppy Controller

Use this item to enable or disable the onboard floppy drive controller.

➢ Serial Port1 Address

This item specifies the base I/O port address and Interrupt Request address of serial port 1. The Optimal setting is 3F8/IRQ4. The Fail-Safe default setting is *disabled.*

➢ Serial Port2 Address

This item specifies the base I/O port address and Interrupt Request address of serial port 2. The Optimal setting is 2F8/IRQ3. The Fail-Safe setting is disabled.

➢ Parallel Port Address

This item allows you to determine the I/O address for onboard parallel port. There are several options for your selection.

➢ Parallel Port Mode

Select an operating mode for the onboard parallel (printer) port.

➢ Parallel Port IRQ

Use this item to set up the IRQ for onboard parallel port.

● **Hardware Health Configuration**

This screen shows the Hardware Health CPU Configuration, and a description of the selected item appears on the right side of the screen.

```
                    BIOS SETUP UTILITY

  Advanced

  Hardware Health Configuration

  System Temperature          :32ºC/89ºF
  CPU Temperature             :59ºC/138ºF

  CPUFAN Speed                :6250 RPM

  Vcore                       :1.176 V
  VTTIN                       :1.048 V
  +3.3V                       :3.168 V
  +5V                         :5.088 V
  +12V                        :11.264 V
                                              ←→   Select Screen
                                              ↑↓   Select Item
                                              +-   Change Option
                                              F1   General Help
                                              F10  Save and Exit
                                              ESC  Exit

         v02.68 (C) Copyright 1985-2009, American Megatrends, Inc.
```
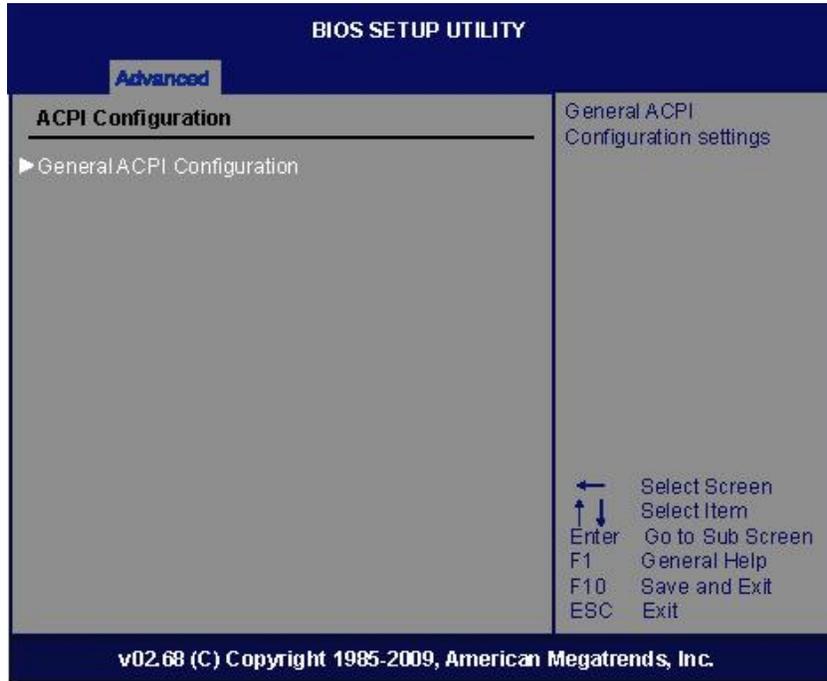
➢ System Temperature/CPU Temperature

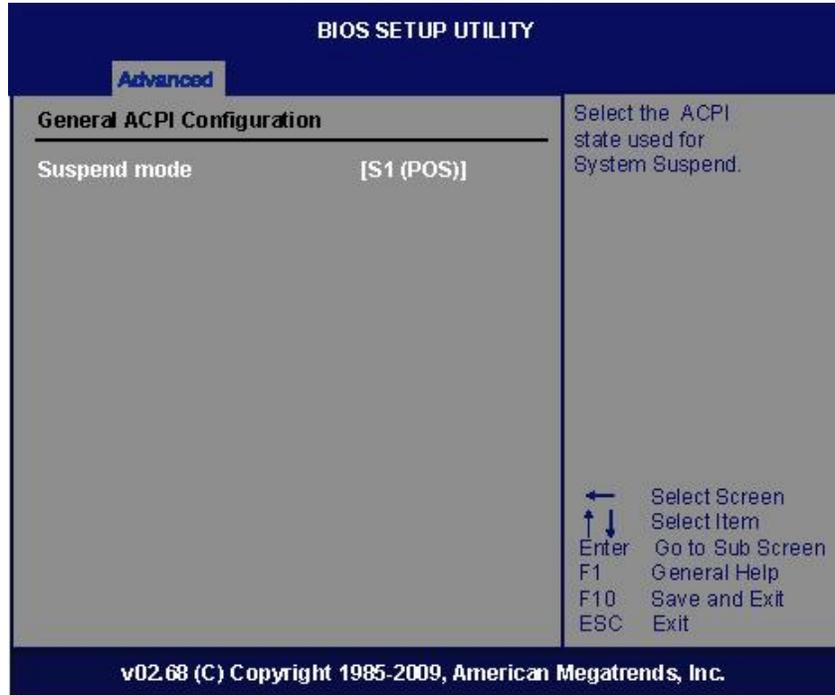These items display the temperature of CPU and System, Vcore, etc

● **ACPI Configuration**

You can use this screen to select options for the ACPI Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.
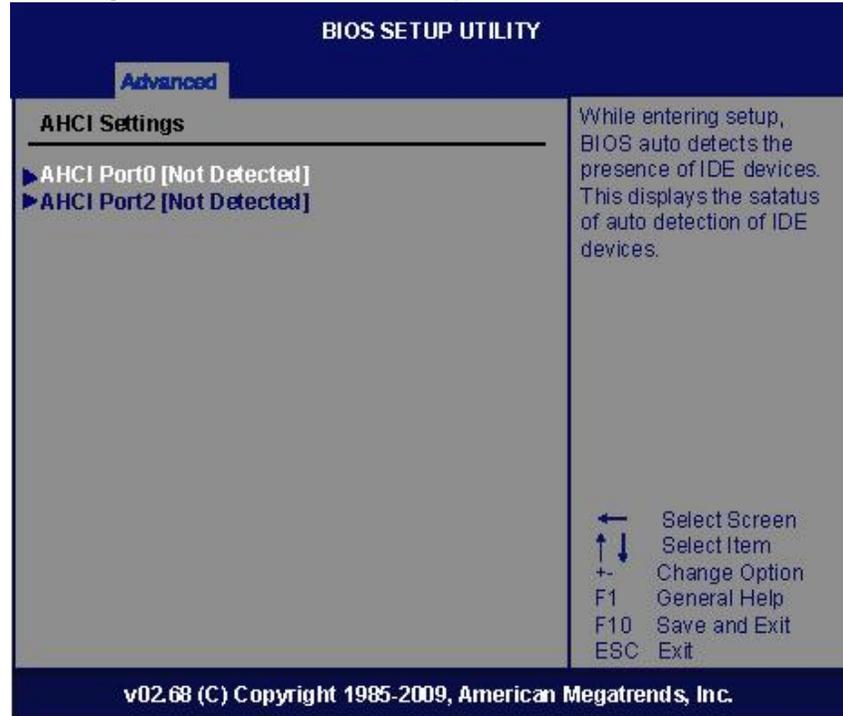
● **General ACPI Configuration**

Scroll to this item and press <Enter> to view the General ACPI Configuration sub menu, which contains General ACPI (Advanced Configuration and Power Management Interface) options for your configuration.
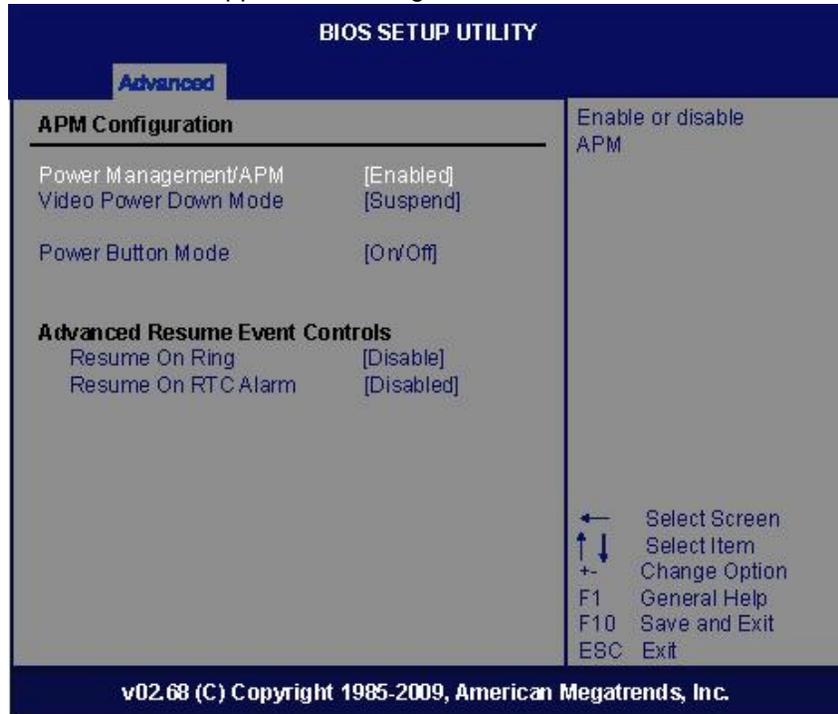
● **AHCI Configuration**

Use this screen to select options for the AHCI Configuratio and change the value of the selected option.

● **APM Configuration**

You can use this screen to select options for the APM Configuration, and change the value of the selected option.A description of the selected item appears on the right side of the screen.

➢ Power Management/APM

Set this item to allow Power Management/APM support.The default setting is Enabled.

Disabled	Set this item to prevent the chipset power management and APM (Advanced Power Management) features.
Enabled	Set this item to allow the chipset power management and APM (Advanced Power Management) features. This is the default setting.

➢ Video Power Down Mode

This option specifies the Power State that the video subsystem enters when the BIOS places it in a power saving state after the specified period of display inactivity has expired. The default setting is Suspend.

| Disabled	This setting prevents the BIOS from initiating any power saving modes concerned with the video display or monitor.
Suspend	This option places the monitor into suspend mode after the specified period of display inactivity has expired. This means the monitor is not off. The screen will appear blacked out. The standards do not cite specific power ratings because they vary from monitor to monitor, but this setting use less power than Standby mode. This is the default setting.

➢ Power Button Mode

This option specifies how the externally mounted power button on the front of the computer chassis is used.The default setting is On/Off.

On/Off	Pushing the power button turns the computer on or off. This is the default setting. This is the default setting.
Suspend	Pushing the power button places the computer in Suspend mode or Full On power mode.

***** Advanced Resume Event Controls *****

> ➢ Resume On Ring

   This item enables or disables the function of Resume On Ring that resumes the system through incoming calls.

> ➢ Resume On RTC Alarm

   You can set "Resume On RTC Alarm" item to enabled and key in Data/time to power on system.

● **USB Configuration**
   You can use this screen to select options for the USB Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen.
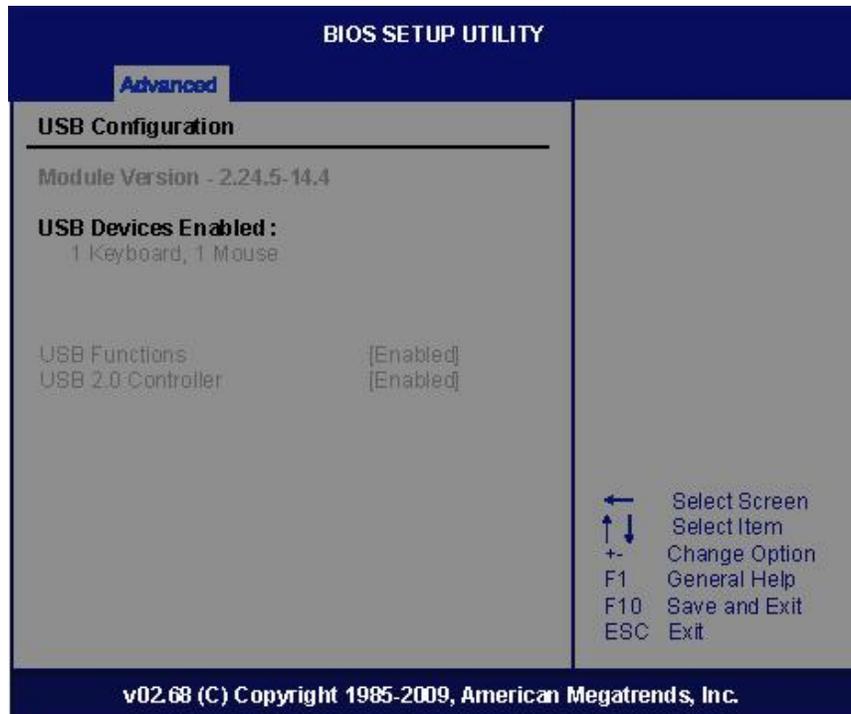

> ➢ USB Fuction

   Use this item to enable or disable USB function.

> ➢ USB 2.0 Controller Mode
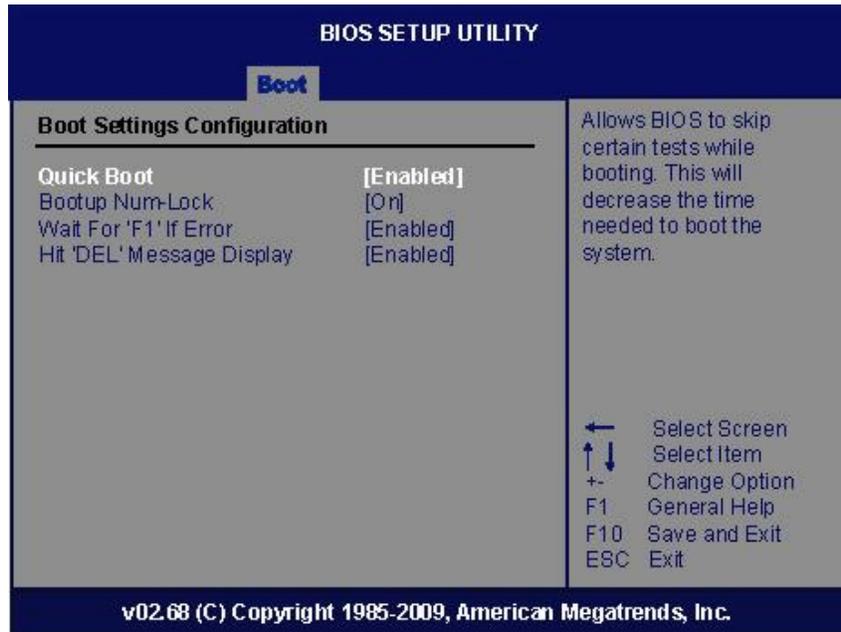   Use this item to configure the USB 2.0 controller.

4.5　Boot Menu

The Boot menu allows users to change boot options of the system. You can select any of the items in the left frame of the screen to go to the sub menus:

- **Boot Settings Configuration**
- **Lan Boot Option**

For items marked with "▶", please press <Enter> for more options.

　　　　　　　　　　　　　　　　　　　　　　　　　　AMI BIOS UTILITY
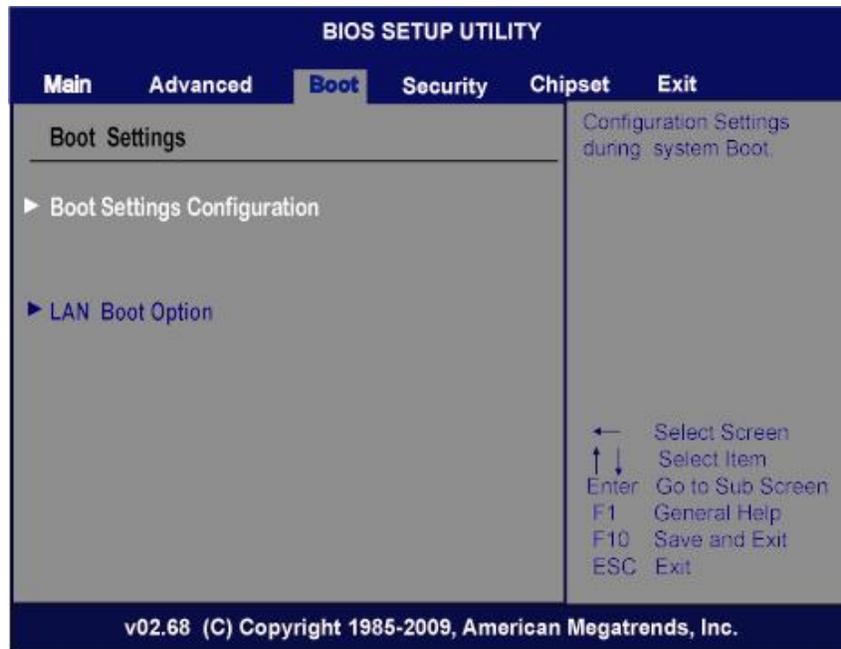
● **Boot Settings Configuration**

➣ Quick Boot

Enabling this item lets the BIOS skip some power on self tests (POST).The default setting is Enabled.

➣ Boot Num-Lock

Use this item to select the power-on state for the NumLock. The default setting is On.

➣ Wait For 'F1' Of Error

If this item is enabled, the system waits for the F1 key to be pressed when error occurs. The default setting is Enabled.

➣ Hit 'DEL' Message Display

If this item is enabled, the system displays the message "Press DEL to run Setup" during POST. The default setting is *Enabled*.

● **Boot Device Priority**

The Boot Device Priorityh screen specifies the boot device priority sequence from the available devices.
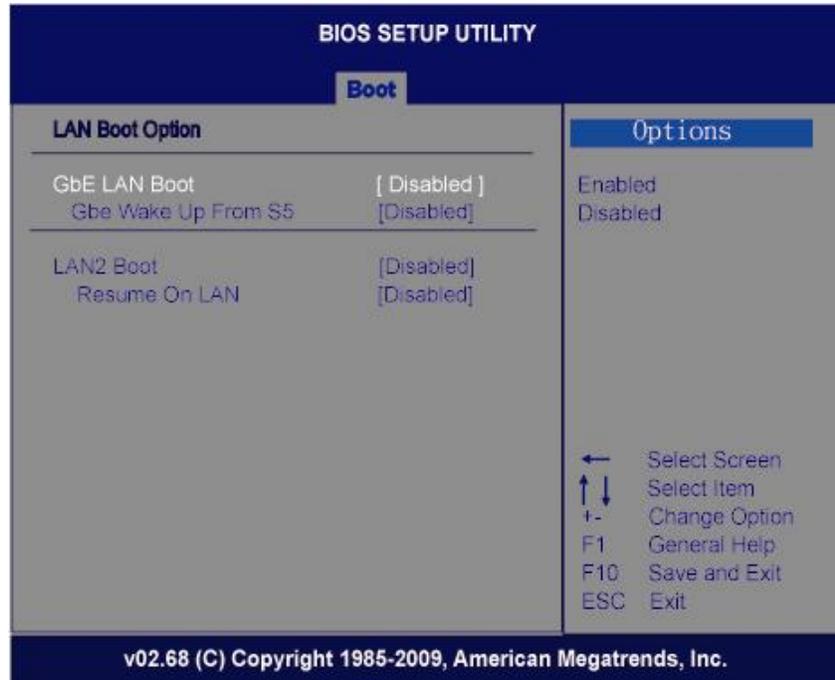
● **LAN Boot Option**

Use these items to enable or disable the Boot ROM function of the onboard LAN chip when the system boots up.Available options of the selected item appear on the right side of the screen.

➢ LAN1 GbE Controller

This item allows you to *Enabled* or *Disabled* Intel® LAN Contrller.

➢ GbE LAN Boot

This item allows you to *Enabled* or *Disabled* Intel® WG82567V LAN Boot ROM

.

> ➢ GbE Wake Up From S5

This item specifies whether the system will be awakened from the S5 power.

> ➢ LAN 2 Boot

This item allows you to *Enabled* or *Disabled* Intel® WG82574L LAN Boot ROM.

4.6   Security Menu

The Security menu allows users to change the security settings for the system.
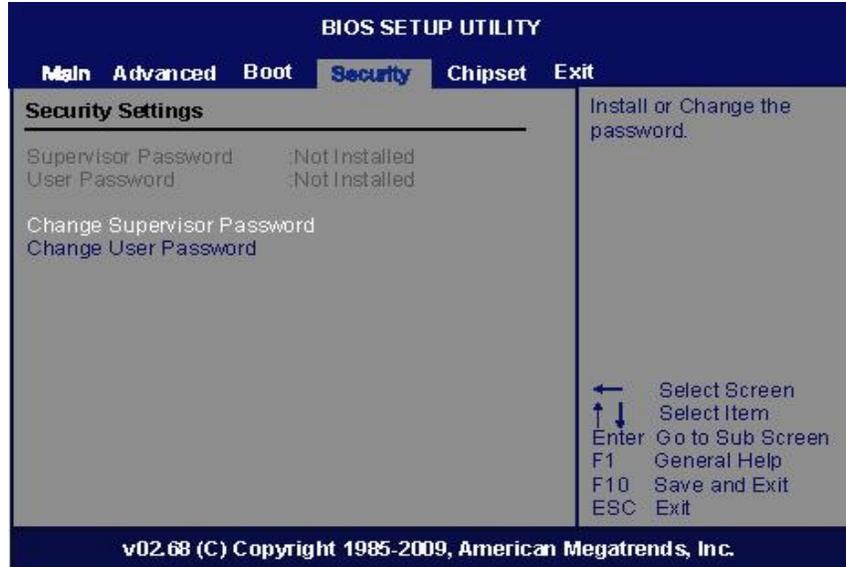
> ➢   Supervisor Password
>
>   This item indicates whether a supervisor password has been set. If the password has been installed, Installed 」 displays. If not, 「Not Installe 」 displays

> ➢   User Password
>
>   This item indicates whether a user password has been set. If the password has been installed, 「Installed 」 displays. If not, 「Not Installed 」 displays.

> ➢   Change Supervisor Password
>
>   Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the supervisor password.

> ➢   Change User Password
>
>   Select this option and press <Enter> to access the sub menu. You can use the sub menu to change the user password.

AMI BIOS UTILITY
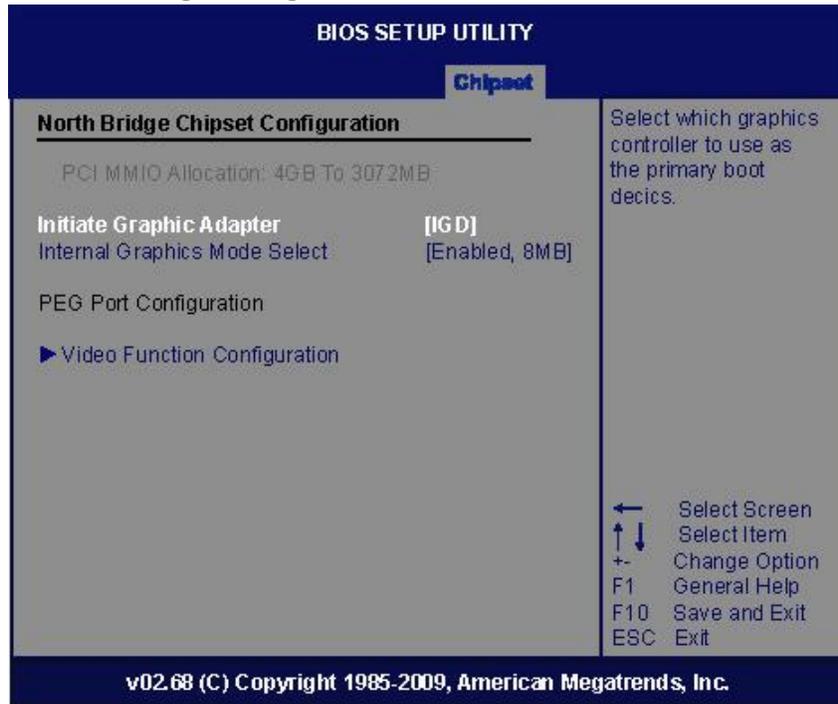
4.7   Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

● **North Bridge Configuration**

● **South Bridge Configuration**

For items marked with "►", please press <Enter> for more options.
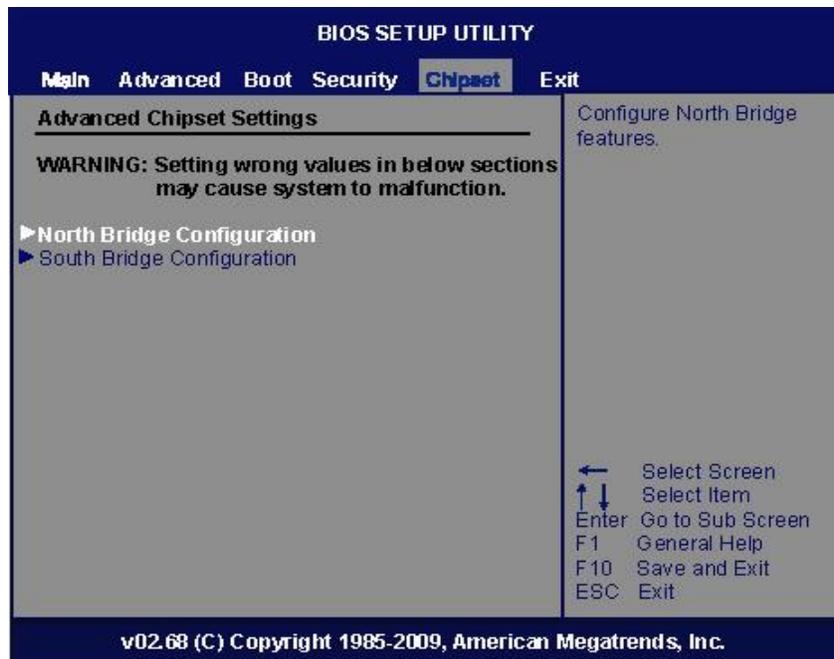
● **North Bridge Configuration**

> ➢ Initiate Graphic Adapter
>
> When using multiple graphics cards, this item can select which graphics controller to be the primary display device during boot.

> ➢ Internal Graphics Mode Select
>
> This item allows you to select the amount of system memory used by the internal graphics device.

> ➢ Video Function Configuration
>
> Press <Enter> for the sub-menu for setting up video function.

● **Video Function Configuration**
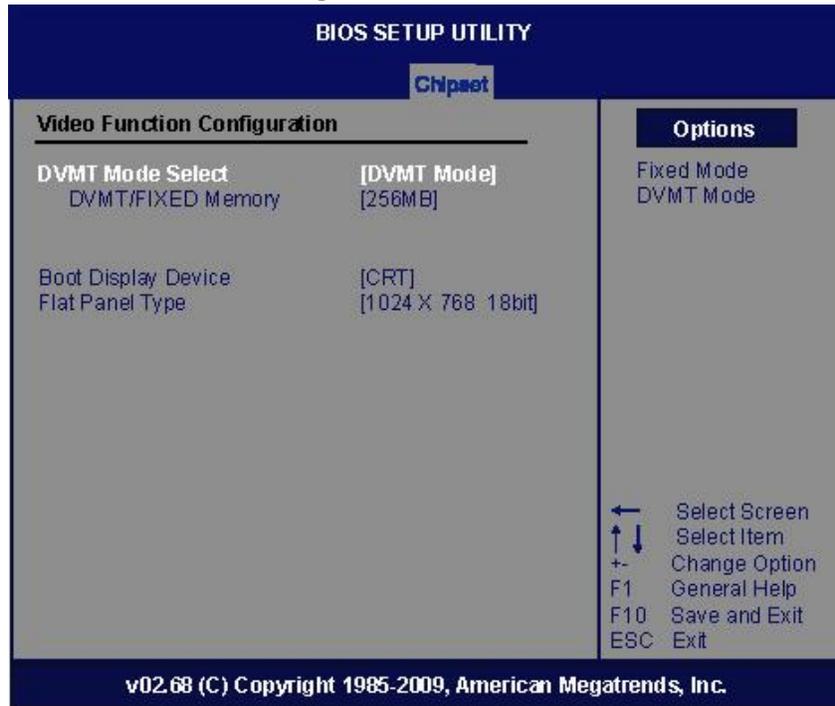
➢ DVMT Mode Select

Allow you to select DVMT (Dianomic Video Memory Technology) mode and Fixed Mode.

➢ DVMT/FIXED Memory

Allow you to allocate a fixed amount of system memory as graphics memory. Here are the options for your selection, 128MB, 256MB and Maximum DVMT

● **South Bridge Configuration**
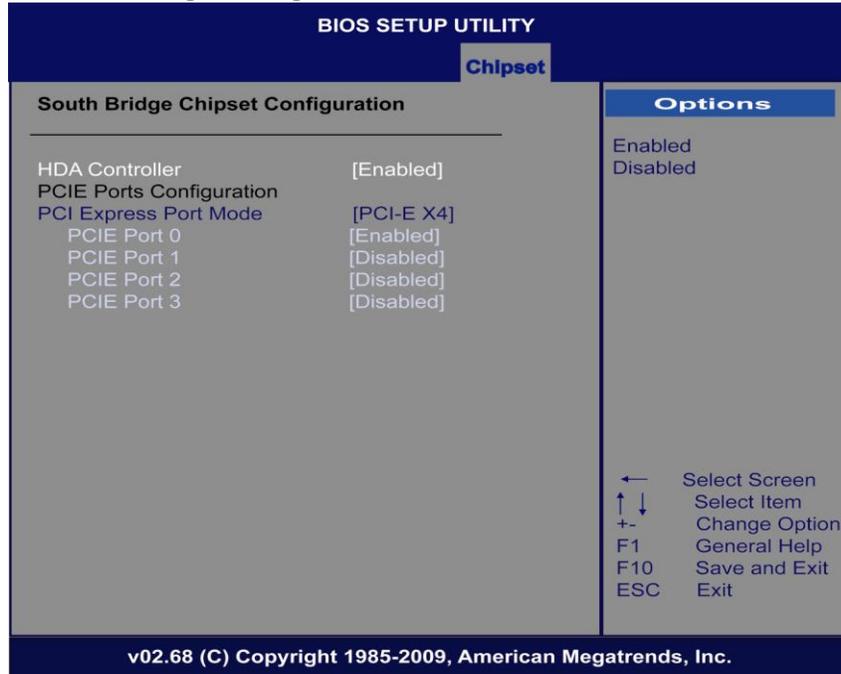
➢ HDA Controller

This item allows you to *Enable* or *Disable* the HD audio support.

➢ PCIE Port Configuration

This item allows you to set or disable the PCI Express Ports.

➢ PCI Express Port Mode

This item allows choosing the X1 or X4 on PCIE 0 to PCIE3

4.8   Exit Menu

The Exit menu allows users to load your system configuration with optimal or failsafe default values.
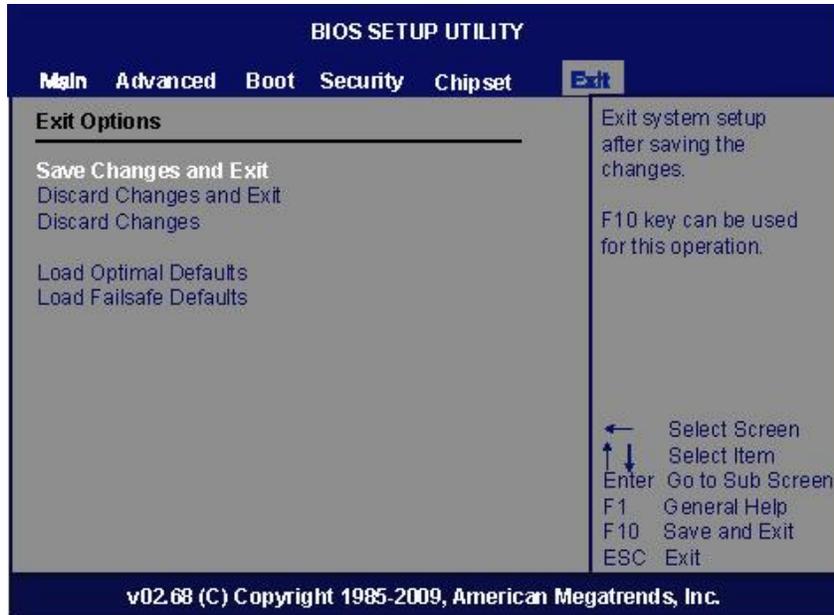
> ➢ Save Changes and Exit

> When you have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select *Save Changes and Exit* from the Exit menu and press <Enter>. Select Ok to save changes and exit.

> ➢ Discard Changes and Exit

> Select this option to quit Setup without making any permanent changes to the system configuration. Select *Discard Changes and Exit* from the Exit menu and press <Enter>. Select Ok to discard changes and exit.

> ➢ Load Optimal Defaults

It automatically sets all Setup options to a complete set of default settings when you select this option. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Setup options if your computer is experiencing system configuration problems. Select Load Optimal Defaults from the Exit menu and press <Enter>.

> ➢ Load Fail-Safe Defaults

It automatically sets all Setup options to a complete set of default settings when you select this option. The Fail-Safe settings are designed for maximum system stability, but not maximum performance. Select the Fail-Safe Setup options if your computer is experiencing system configuration problems. Select Load Fail-Safe Defaults from the Exit menu and press <Enter>. Select Ok to load Fail-Safe defaults.

APPENDIX A

# WATCHDOG TIMER

Watchdog Timer Setting

After the system stops working for a while, it can be auto-reset by the Watchdog Timer. The integrated Watchdog Timer can be set up in the system reset mode by program.

● **Sample of Watchdog application**

Assume there is program A which needs to maintain running in a system. The value of Watchdog Timer must be set bigger than the running time of program A. Then, after the running time of program A is finished, either to disable or to reset watchdog timer.

When program A has problems to make system shut down, the system can be rebooted by Watchdog timer when the value of watchdog timer is countdowned to 0.

The below flowchart can be referred to edit program A.
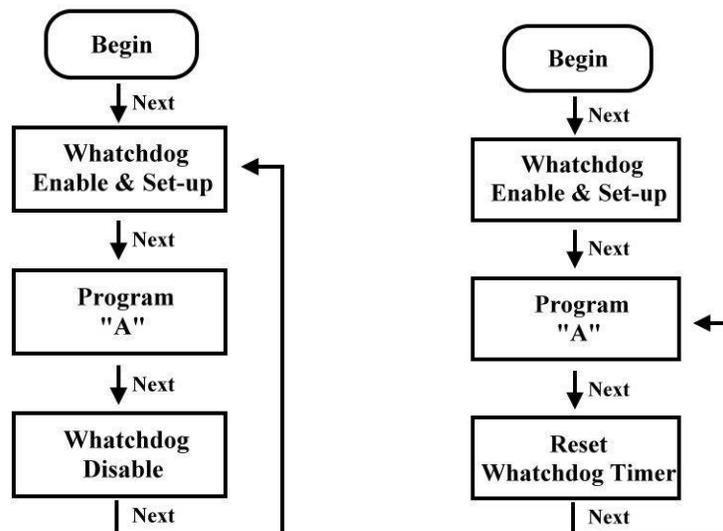
Using the Watchdog Function

● **Assembler Sample Code**

;Enable WDT：

```
Mov      dx , 2Eh
Mov      al , 87h
Out      dx , al
Out      dx , al
```

;Select Logic device：

```
Mov      dx , 2Eh
Mov      al , 07h
Out      dx , al
Mov      dx , 2Fh
Mov      al , 08h
Out      dx , al
```

;Set WDT Function：

```
Mov      dx , 2Eh
Mov       al , 2Dh
Out      dx , al
Mov      dx , 2Fh
Mov      al , 20h
Out      dx , al
```

;Activate WDT：

```
Mov      dx , 2Eh
Mov      al , 30h
Out      dx , al
Mov      dx , 2Fh
Mov      al , 01h
Out      dx , al
```

;Set Second or Minute：

```
Mov      dx , 2Eh
Mov      al , F5h
Out      dx , al
Mov      dx , 2Fh

Mov      al , Nh  ;N=00 or 08(See below      )
Out      dx      al
```

;Set base timer：
```
Mov      dx , 2Eh
Mov      al , F6h
Out      dx , al
Mov      dx , 2Fh
Mov      al , Mh      M=00,01,02,…FF(Hex) ,Value=0 to 255
Out      dx , al  ; (See below        )
```

; IF to disable WDT:
```
Mov      dx , 2Eh
Mov      al , 30h
Out      dx , al
Mov      dx , 2Fh
Mov      al , 00h      ; Can be disable at any time
Out      dx , al
```

- **imeout Value Range**
    - 1 to 255
    - Minute / Second

- **Program Sample**

Watchdog Timer can be set to system reset after 5-second timeout.

:

When N's value is 00h , the time base is set second.
```
M = 00h:    Time-out Disable.
M = 01h:    Time-out occurs after 1 second.
M = 02h:    Time-out occurs after 2 seconds.
M = 03h:    Time-out occurs after 3 seconds..
M = FFh:    Time-out occurs after 255 seconds.
```

When N's value is 08h , the time base is set minute.
```
M = 00h:    Time-out Disable.
M = 01h:    Time-out occurs after 1 minute.
M = 02h:    Time-out occurs after 2 minutes.
M = 03h:    Time-out occurs after 3 minutes.
M = FFh:    Time-out occurs after 255 minutes.
```