



AXIOMTEK

SHB230

**Intel® LGA1150 Haswell processor
PICMG 1.3 Half-size board**

User's Manual



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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.

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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.

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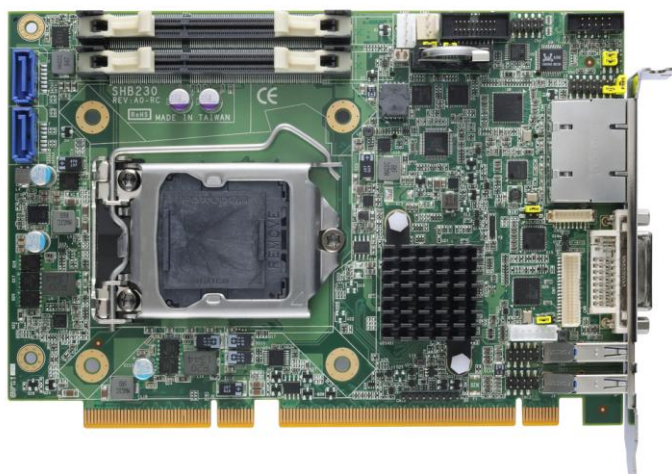
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Chapter 1

Introduction




The SHB230, a PICMG 1.3 Half-size CPU board, supports Intel® Haswell processors for Low Power desktop platform CPU. This board integrates Intel Haswell platform and delivers outstanding system performance through high-bandwidth interfaces, multiple I/O functions for interactive applications and various embedded computing solutions.

There are two 204-pin SO-DIMM sockets for single channel DDR3-1333/1600 MHz memory, maximum memory capacity up to 16GB. It also features two Gigabit/Fast Ethernet ports, two serial ATA channels for total two Serial ATA hard drives at maximum transfer rate up to 6Gb/sec, four USB 2.0 high-speed compliant and two USB 3.0 high-speed compliant that can achieve the best stability and reliability for industrial applications. Additionally, it provides embedded features, such as two serial ports that apply an extensive array of PC peripherals.

1.1 Features

- **Intel® Haswell processor for Low Power desktop platform, TDP up to 45W**
- **Intel Q87 Platform Controller Hub**
- **2 DDR3 SO-DIMM supports up to 16 GB memory capacity**
- **2 USB 3.0 ports (Rear I/O)**
- **SATA 6Gbs with RAID 0,1**
- **Dual Display(DVI-I and LVDS)**
- **ATX DC-in**
- **Supports iAMT9.0**

1.2 Specifications

- **CPU**
 - Intel® Core™ i7 desktop processor.
 - Intel® Core™ i5 desktop processor.
 - Intel® Core™ i3 desktop processor.
 - CPU TDP up to 45W
 - **System Chipset**
 - Intel® Q87
 - **BIOS**
 - AMI BIOS via SPI interface with socket
 - **System Memory**
 - Two 204-pin DDR3 1333/1600MHz SO-DIMM sockets
 - Maximum up to 16GB DDR3 memory
 - **Onboard Multi I/O**
 - Serial ports: two RS-232/422/485 ports with 20-pin, 1.27 pitch box-header (COM 1/2)
 - **CFast™ Socket**
 - One CFast™ Socket
-  **Note:** Due to Gen. 2 SSD with JMicron controller has compatibility issue with Intel Q87 PCH, we strongly recommend to use Gen. 3 SSD on SHB230.
- **L1, L2, L3 Cache: Integrated in CPU**
 - **USB Interface**
 - Four USB ports with fuse protection and complies with USB Spec. Rev. 2.0
 - Two USB ports with fuse protection and complies with USB Spec. Rev. 3.0
 - **Onboard Graphic**
 - Intel® Arrandale integrated a Graphic processing unit processor which goes with Q87 chipset supporting DVI-I and LVDS.
 - Memory size: Intel® DVMT 5.0 supported; preallocated memory for frame buffer option as OS option:

- Resolution: Analog output - the analog port utilizes an integrated 400MHz 24-bit RAMDAC that can directly drive a standard progressive scan analog monitor up to a resolution of 2048x1536 pixels with 32-bit color at 75Hz.
- Analog output interface: CRT from DAC output via 30-pin DVI-I connector on the edge; CRT always ON supported.
- **Display**
 - 1 x DVI-I connector
 - 1 x LVDS 24-bit dual channel
- **Ethernet**
 - LAN1 / LAN2: Intel® i217LM with iAMT 9.0 / Intel® i210AT Ethernet controller; support 1000/100/10Mb/s.



Note: The Intel® i217LM does not support S1 LAN Wake.

- **Serial ATA**
 - Two SATA 3.0 ports (6Gb/s performance) with SATA RAID 0/1 by Q87.
- Note:** Due to Gen. 2 SSD with JMicron controller has compatibility issue with Intel Q87 PCH, we strongly recommend to use Gen. 3 SSD on SHB230.
- **Audio**
 - 10-pin 2.0 box-header (Intel® HD Audio Digital Header)
 - **Hardware Monitoring**
 - Monitoring temperatures, voltages and cooling fan status.
 - **Watchdog Timer**
 - Reset supported; up to 256 levels.
 - **Power Management**
 - ACPI(Advanced Configuration and Power Interface)
 - **Expansion Interface**
 - One PCI-Express x16 (Gen.3)
 - One PCI-Express x4 (or four PCI-Express x1) (Gen.2)
 - **Form Factor**
 - PICMG 1.3 Half-size, 185 x 126 mm



Note: All specifications and images are subject to change without notice.

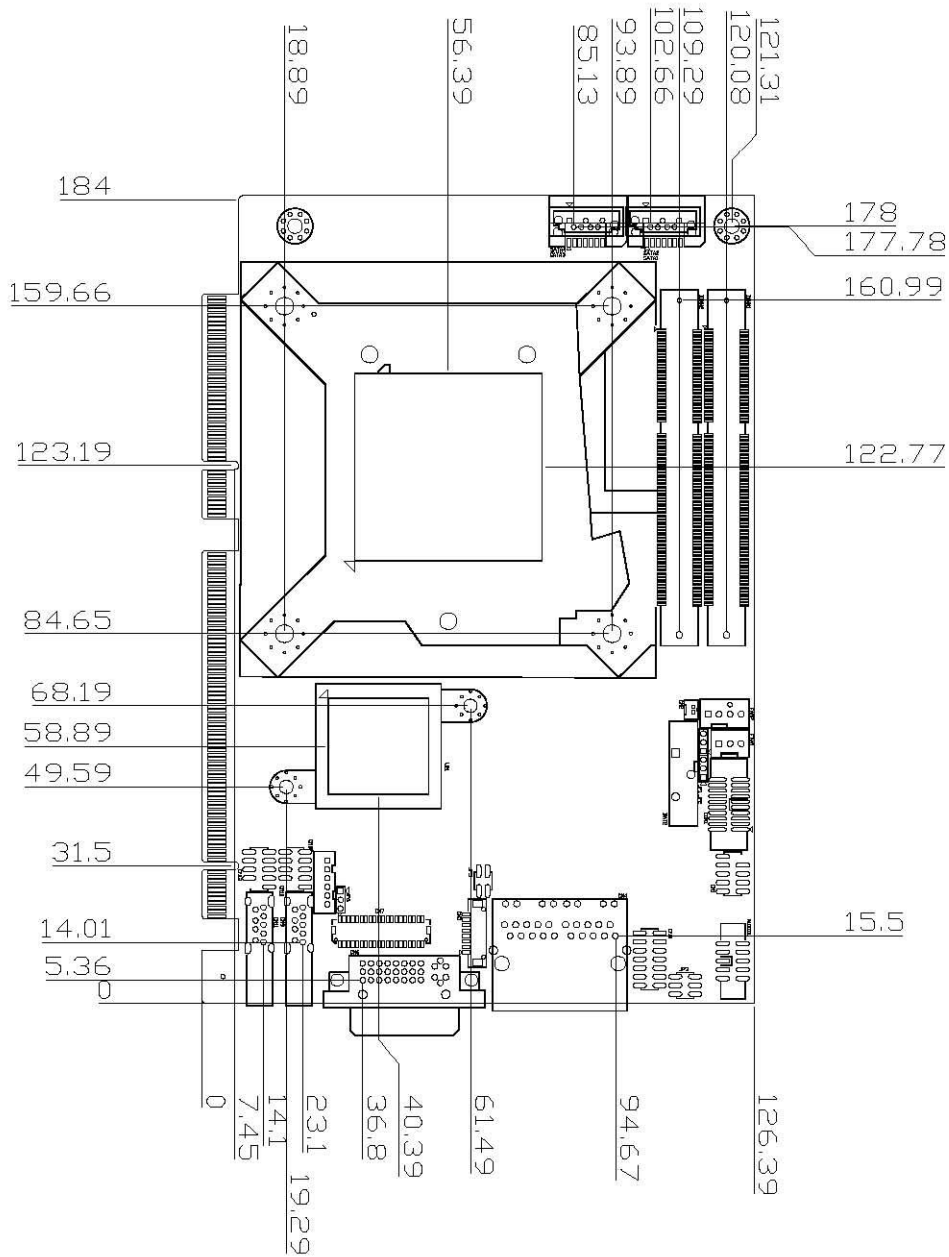
1.3 Utilities Supported

- Intel® Q87 utility and drivers
- Graphic drivers
- Audio utility and drivers
- Ethernet utility and drivers
- RAID utility
- iAMT utility and drivers

Chapter 2

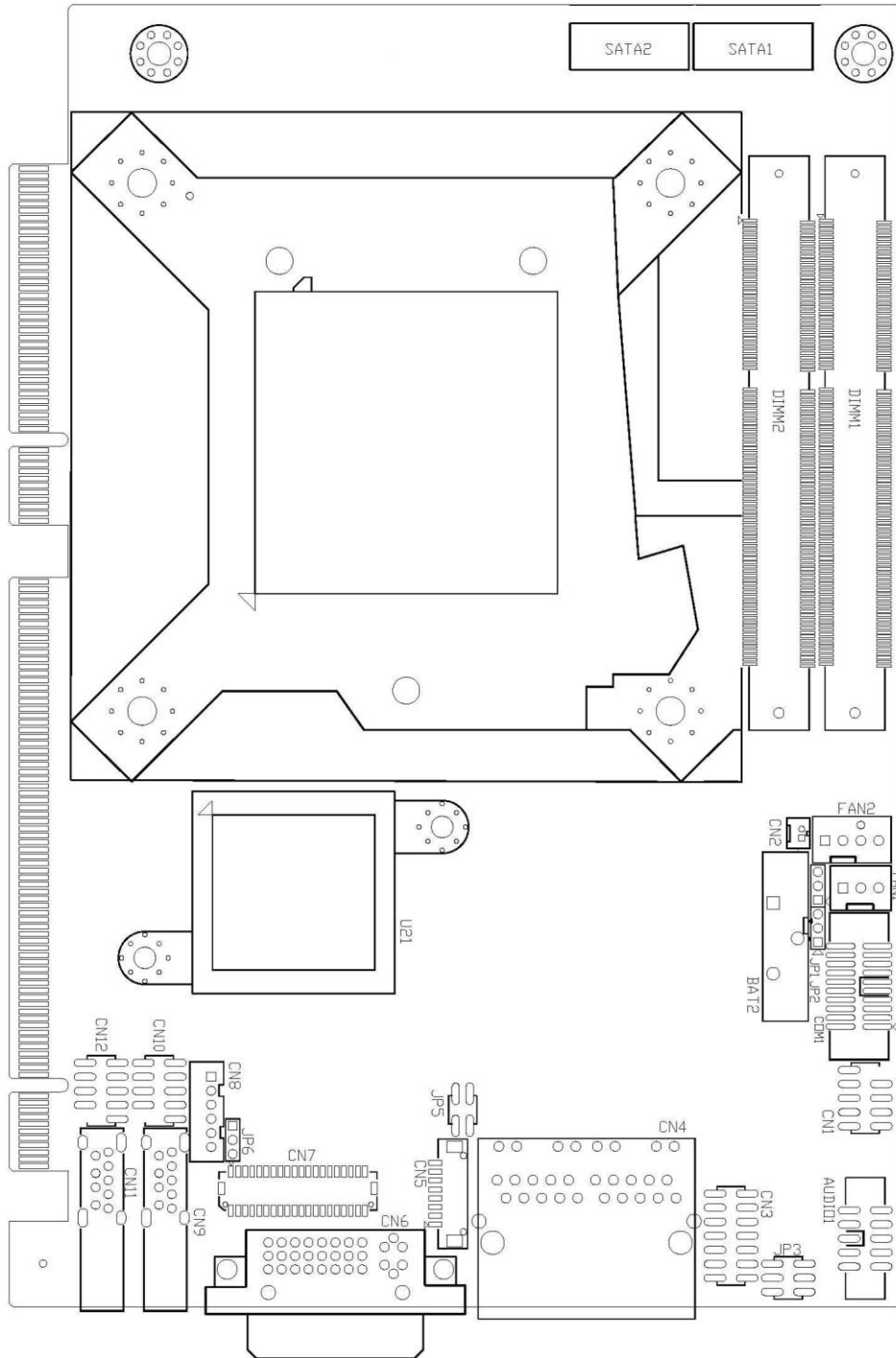
Board Layout and Pin Assignments

2.1 Board Dimensions and Fixing Holes

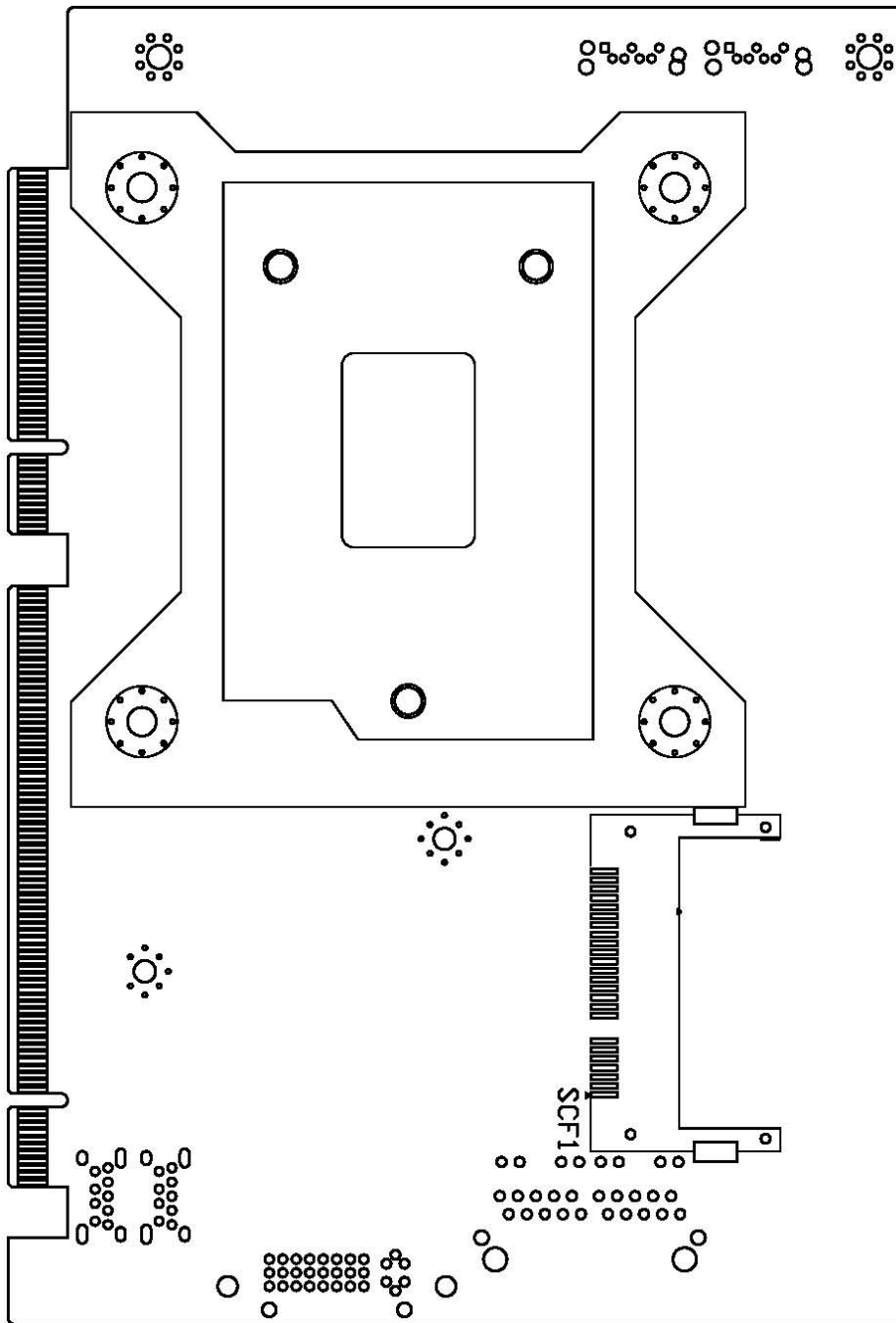


2.2 Board Layout

Top Side



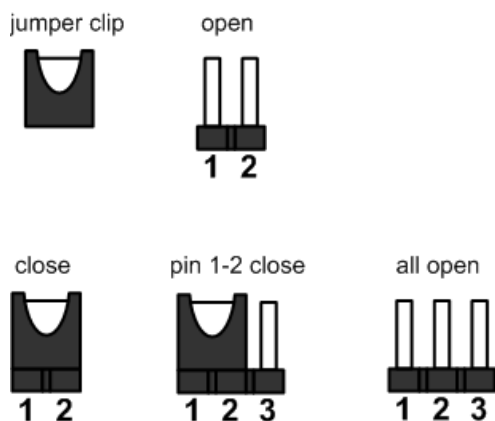
Button Side



2.3 Jumper Settings

Properly configure jumper settings on the SHB230 to meet your application purpose. Below you can find a summary table of all jumpers and onboard default settings.

Proper jumper settings configure the SHB230 to meet your application purpose. We are herewith listing a summary table of all jumpers and default settings for onboard devices, respectively.

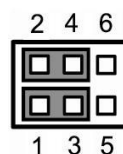


Jumper	Description	Jumper Setting
JP3	Audio Amplifier Selection : Disable	Short 1-3 , 2-4
JP1	Clear RTC : Normal	Short 1-2
JP2	Auto Power On : Off	Short 1-2
JP5	LVDS Brightness Control : PWM Mode	Short 1-2
JP6	LVDS Voltage Selection : 3.3V	Short 1-2

2.3.1 Audio Amplifier Selection (JP3)

This jumper is for enabling or disabling audio amplifier.

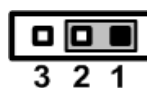
Function	Setting
Disable (Default)	1-3, 2-4 close
Enable	3-5, 4-6 close



2.3.2 Restore BIOS Optimal Defaults (JP1)

Put jumper clip to pin 2-3 for a few seconds then move it back to pin 1-2. Doing this procedure can restore BIOS optimal defaults.

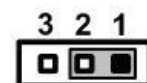
Function	Setting
Normal operation (Default)	1-2 close
Restore BIOS optimal defaults	2-3 close



2.3.3 Auto Power On (JP2)

If JP2 is enabled for AC power input, the system will be automatically power on without pressing soft power button. If JP2 is disabled for AC power input, it is necessary to manually press soft power button to power on the system.

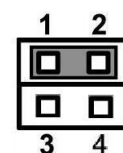
Function	Setting
Disable auto power on (Default)	1-2 close
Enable auto power on	2-3 close



2.3.4 LVDS Backlight Control Mode Setting (JP5)

This jumper is to select the Brightness Control for LVDS inverter interface.

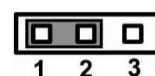
Function	Setting
PWM Mode(Default)	1-2 close
DC Mode	3-4 close



2.3.5 LVDS Voltage Selection Jumper (JP6)

This jumper is to select the voltage for LVDS interface.

Function	Setting
+3.3V (Default)	1-2 close
+5V	2-3 close



2.4 Connectors

Connectors connect this 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 shows you all connectors on the board.

Connector	Label
External Temperature Sensor Connector (Optional)	CN2
Digital I/O	CN1
DVI-I Connector	CN6
LVDS Connector	CN7
LVDS Inverter Connector	CN5
USB Port 3/4	CN10
USB Port 5/6	CN12
Axiomtek Front Panel	CN3
USB2.0/3.0 Port 1	CN11
PS2 Connector(Keyboard & Mouse)	CN8
USB2.0/3.0 Port 2	CN9
SYS FAN	FAN1
CPU FAN	FAN2
RJ45 (i217LM)	LAN1
RJ45 (i210AT)	LAN2
SATA 1 ~ 2 6Gb(SATA3)	SATA1~SATA2
CFast™ Connector	SCF1
COM1 ~ COM2 Connecters	COM1
Audio Connector	AUDIO1

2.4.1 External Temperature Sensor Connector (CN2) (Optional)

This is a 2-pin connector for external thermal diode/transistor temperature sensor interface.

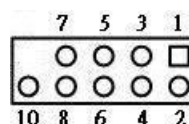
Pin	Signal
1	Sensor Input
2	GND



2.4.2 Digital I/O Connector (CN1)

The board is equipped with an 8-channel digital I/O connector that meets requirements for a system customary automation control. The digital I/O can be configured to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS), or perform store security control. You may use software programming to control these digital signals.

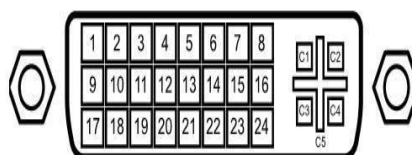
Pin	Signal	Pin	Signal
1	DIO 1	2	DIO 8
3	DIO2	4	DIO 7
5	DIO 3	6	DIO 6
7	DIO 4	8	DIO 5
9	NC	10	GND



2.4.3 DVI-I Connector (CN6)

The board comes with a high rise DVI-I (Digital Video Interface – Integrated) interface providing transmission of fast and high quality video signal between source device (e.g. graphic card) and display device (e.g. monitor). The DVI-I interface supports both digital and analog.

Pin	Signal	Pin	Signal
1	TX2-	2	TX2+
3	Ground	4	NC
5	NC	6	DVI_SPD_CLK
7	DVI_SPD DATA	8	CRT-VSYNC
9	TX1-	10	TX1+
11	Ground	12	NC
13	NC	14	VGAVCC
15	Ground	16	FPDETECT
17	TX0-	18	TX0+
19	Ground	20	NC
21	NC	22	Ground
23	TXC+	24	TXC-
C1	CRT-RED	C2	CRT-GREEN
C3	CRT-BLUE	C4	CRT-HSYNC
C5	VGAGND		

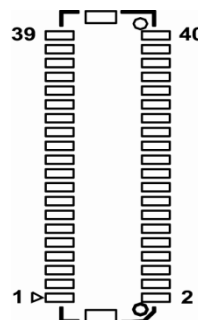


2.4.4 LVDS Connector (CN7)

This board has a 40-pin connector (CN7) for LVDS LCD interface. It is strongly recommended to use the matching JST SHDR-40VS-B 40-pin connector for LVDS interface. Pin 1~6 VCCM can be set to +3.3V or +5V level by JP6(see section 2.3.5).

18-bit single channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	EDID DATA	8	EDID CLK
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.
19	N.C.	20	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.
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



24-bit single channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	EDID DATA	8	EDID CLK
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.
19	N.C.	20	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	Channel A D3-
31	Channel A D1+	32	Channel A D3+
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

18-bit dual channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	EDID DATA	8	EDID CLK
9	GND	10	GND
11	N.C.	12	Channel B D0-
13	N.C.	14	Channel B D0+
15	GND	16	GND
17	Channel B CLK-	18	Channel B D1-
19	Channel B CLK+	20	Channel B D1+
21	GND	22	GND
23	Channel A D0-	24	Channel B D2-
25	Channel A D0+	26	Channel B D2+
27	GND	28	GND
29	Channel A D1-	30	N.C.
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

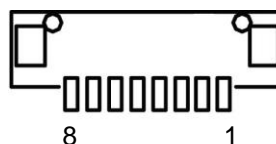
24-bit dual channel

Pin	Signal	Pin	Signal
1	VCCM	2	VCCM
3	VCCM	4	VCCM
5	VCCM	6	VCCM
7	EDID DATA	8	EDID CLK
9	GND	10	GND
11	Channel B D3-	12	Channel B D0-
13	Channel B D3+	14	Channel B D0+
15	GND	16	GND
17	Channel B CLK-	18	Channel B D1-
19	Channel B CLK+	20	Channel B D1+
21	GND	22	GND
23	Channel A D0-	24	Channel B D2-
25	Channel A D0+	26	Channel B D2+
27	GND	28	GND
29	Channel A D1-	30	Channel A D3-
31	Channel A D1+	32	Channel A D3+
33	GND	34	GND
35	Channel A D2-	36	Channel A CLK-
37	Channel A D2+	38	Channel A CLK+
39	GND	40	GND

2.4.5 Inverter Connectors (CN5)

The CN5 is DF13-8P-1.25V 8-pin connector for inverter. We strongly recommend you to use the matching DF13-8S-1.25C connector to avoid malfunction.

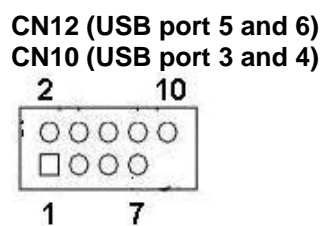
Pin	Signal
1	VBL1 (+12V level)
2	VBL1 (+12V level)
3	VBL2 (+5V level)
4	VBL_ENABLE
5	GND
6	GND
7	GND
8	LVDS_BRICTL



2.4.6 Internal USB 2.0 Connectors (CN10, CN12)

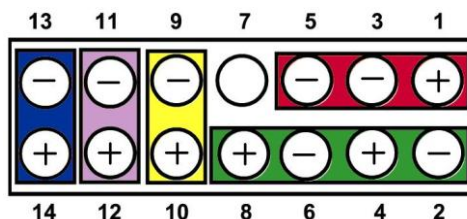
These are internal connectors for USB 2.0 interfaces.

Pin	Signal	Pin	Signal
1	USB_PWR	2	USB_PWR
3	USB -	4	USB -
5	USB +	6	USB +
7	GND	8	GND
		10	GND



2.4.7 Front Panel Connector (CN3)

Pin	Signal
1	PWRLED+
2	EXT SPK-
3	GND
4	Buzzer
5	PWRLED-
6	N.C.
7	N.C.
8	EXT SPK+
9	PWRSW-
10	PWRSW+
11	HW RST-
12	HW RST+
13	HDDLED-
14	HDDLED+



- **Power LED**

This 3-pin connector denoted as Pin 1 and Pin 5 connects the system power LED indicator to such a switch on the case. Pin 1 is assigned as +, and Pin 5 as -. The Power LED lights up when the system is powered ON. Pin 3 is defined as GND.

- **External Speaker and Internal Buzzer Connector**

Pin 2, 4, 6 and 8 can be connected to the case-mounted speaker unit or internal buzzer. While connecting the CPU card to an internal buzzer, please short pins 2-4; while connecting to an external speaker, you need to set pins 2-4 to Open and connect the speaker cable to pin 8 (+) and pin 2 (-).

- **ATX Power On/Off Button**

This 2-pin connector denoted as Pin 9 and 10 connects the front panel's ATX power button to the CPU card, which allows users to control ATX power supply to be power on/off.

- **System Reset Switch**

Pin 11 and 12 can be connected to the case-mounted reset switch that reboots your computer instead of turning OFF the power switch. It is a better way to reboot your system for a longer life of the system's power supply.

- **HDD Activity LED**

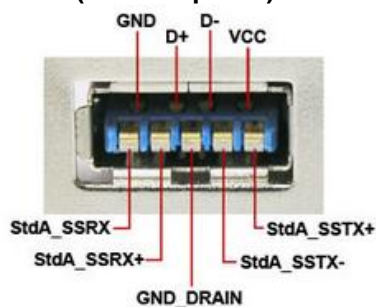
This connection is linked to hard drive activity LED on the control panel. LED flashes when HDD is being accessed. Pin 13 and 14 connect the hard disk drive to the front panel HDD LED, Pin 13 assigned as -, and Pin 14 as +.

2.4.8 External USB 3.0 Connectors (CN11 and CN9)

These are standard USB 3.0 connectors on rear I/O for installing USB 3.0 compliant interface peripherals.

Pin	Signal
1	VCC
2	D-
3	D+
4	GND
5	StdA_SSRX-
6	StdA_SSRX+
7	GND_DRAIN
8	StdA_SSTX-
9	StdA_SSTX+
10	Shield

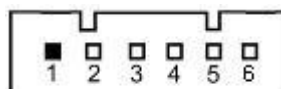
CN11 (USB 3.0 port 1),
CN9 (USB 3.0 port 2)



2.4.9 Internal Keyboard and Mouse Connectors (CN8)

The board comes with keyboard and mouse interfaces.

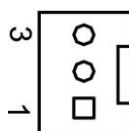
Pin	Signal
1	Mouse DATA
2	Mouse Clock
3	Keyboard DATA
4	Keyboard Clock
5	GND
6	5VSBY



2.4.10 FAN Connectors (FAN1, FAN2)

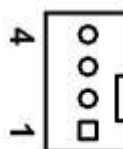
Fans are always needed for cooling down CPU and system temperature. The board has two fan connectors. You can find fan speed option(s) at BIOS Setup Utility if either fan is installed. For further information, see BIOS Setup Utility: Advanced\HW Monitor\PC Health Status. System and auxiliary fan interfaces are available through FAN1 and FAN2, see table below.

Pin	Signal
1	GND
2	+12V level
3	Rotation detection



CPU fan interface is available through FAN2, see table below.

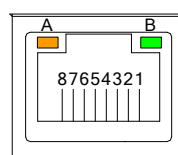
Pin	Signal
1	Ground
2	+12V
3	Rotation Detection
4	Speed Control



2.4.11 Ethernet Ports (LAN1 and LAN2)

The board has two RJ-45 connectors; LAN1 (for i217LM) and LAN2 (for i210AT). Ethernet connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end (phone jack) to a 1000/100/10-Base-T hub.

Pin	Signal
1	Tx+ (Data transmission positive)
2	Tx- (Data transmission negative)
3	Rx+ (Data reception positive)
4	RJ-1 (For 1000-Base-T only)
5	RJ-1 (For 1000-Base-T only)
6	Rx- (Data reception negative)
7	RJ-1 (For 1000-Base-T only)
8	RJ-1 (For 1000-Base-T only)
A	Active LED
B	Speed LED

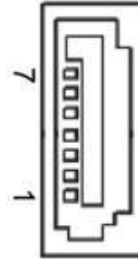


2.4.12 Serial ATA Connectors (SATA1~SATA2)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for high-speed SATA interfaces. They are computer bus interfaces for connecting to devices such as hard disk drives.

This board has two SATA 3.0 ports with 6Gb/s performance.

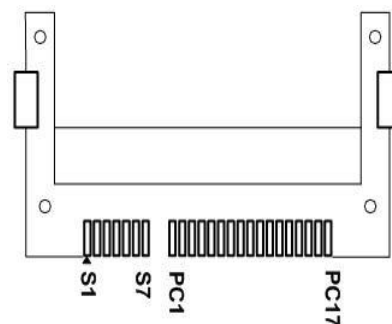
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



2.4.13 CFast™ Socket (SCF1)

The board is equipped with a CFast™ socket to support CFast™ card which is based on the Serial ATA bus. The socket is specially designed to avoid incorrect installation of CFast™ card. When installing or removing CFast™ card, please make sure system power is off. The CFast™ card by default identifies itself as C: or D: drive in your PC system.

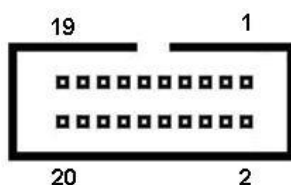
Pin	Signal	Pin	Signal
S1	GND	PC1	NC
S2	TX+	PC2	GND
S3	TX-	PC3	NC
S4	GND	PC4	NC
S5	RX-	PC5	NC
S6	RX+	PC6	NC
S7	GND	PC7	GND
		PC8	NC
		PC9	NC
		PC10	NC
		PC11	NC
		PC12	NC
		PC13	3.3V
		PC14	3.3V
		PC15	GND
		PC16	GND
		PC17	NC



2.4.14 COM Connectors (COM1~COM2)

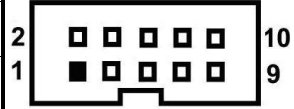
The COM port supports RS-232/RS-422/RS-485 mode operation, see table below for its pin assignments. You can change the transmission mode via BIOS setting.

Pin	RS-232	RS-422	RS-485
1	Data Carrier Detect (DCD1)	TX1-	DATA1-
2	Data Set Ready (DSR1)	No connector	No connector
3	Receive Data (RXD1)	TX1+	DATA1+
4	Request to Send (RTS1)	No connector	No connector
5	Transmit Data (TXD1)	RX1+	No connector
6	Clear to Send (CTS1)	No connector	No connector
7	Data Terminal Ready (DTR1)	RX1-	No connector
8	Ring Indicator (RI1)	No connector	No connector
9	Ground (GND)	GND	GND
10	Disconnect (NI)	NI	NI
11	Data Carrier Detect (DCD2)	TX2-	DATA2-
12	Data Set Ready (DSR2)	No connector	No connector
13	Receive Data (RXD2)	TX2+	DATA2+
14	Request to Send (RTS2)	No connector	No connector
15	Transmit Data (TXD2)	RX2+	No connector
16	Clear to Send (CTS2)	No connector	No connector
17	Data Terminal Ready (DTR2)	RX2-	No connector
18	Ring Indicator (RI2)	No connector	No connector
19	Ground (GND)	GND	GND
20	Disconnect (NI)	NI	NI



2.4.15 Intel® HD Audio Digital Header (AUDIO1)

Pin	Signal	Pin	Signal
1	MIC IN	2	GND
3	LINE_IN_L	4	GND
5	LINE_IN_R	6	GND
7	LINE_OUT_L	8	GND
9	LINE_OUT_R	10	GND



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Chapter 3

Hardware Installation

3.1 Installing the Processor

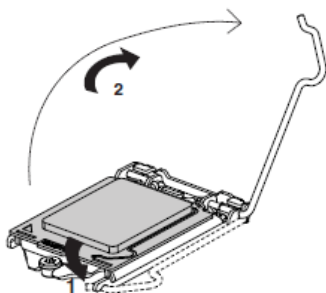
The LGA1150 processor socket comes with a cover to protect the processor. Please install the processor into the CPU socket step by step as below:



Note: Make sure that you install the correct CPU designed for LGA1150 socket only. DO NOT install a CPU designed for LGA1155 or LGA1156 sockets on LGA1150 socket.

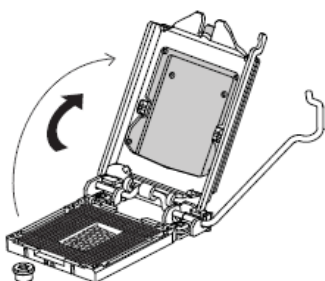
Step 1 Opening the socket:

- Disengage load lever by releasing down and out on the hook. This will clear retention tab.
- Rotate load lever to open position at approximately 135°.
- Rotate load plate to open position at approximately 150°.



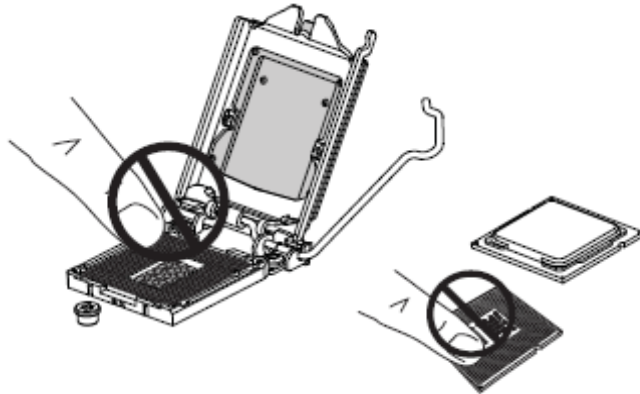
Step 2 Removing the socket protective cover:

- Place thumb against the front edge of the protective cover and rest index finger on the rear grip to maintain control of the cover.
- Lift the front edge of the protective cover to disengage from the socket. Keep control of the cover by holding the rear grip with index finger.
- Lift protective cover away from the socket, being careful not to touch the electrical contacts.



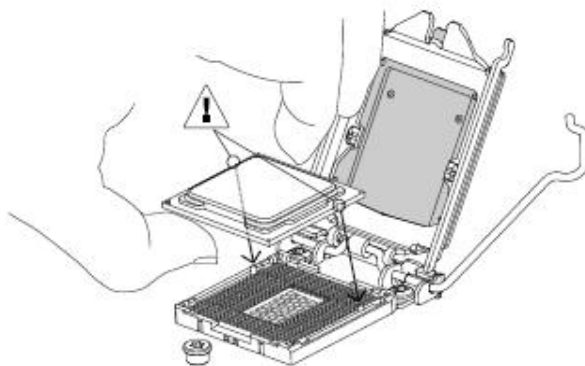
Step3 Processor installation:

- Lift processor package from shipping media by grasping the substrate edges.
- Scan the processor package gold pads for any presence of foreign material. If necessary, the gold pads can be wiped clean with a soft lint-free cloth and isopropyl alcohol.
- Locate connection 1 indicator on the processor which aligns with connection 1 indicator chamfer on the socket, and notice processor keying features that line up with posts along socket walls.



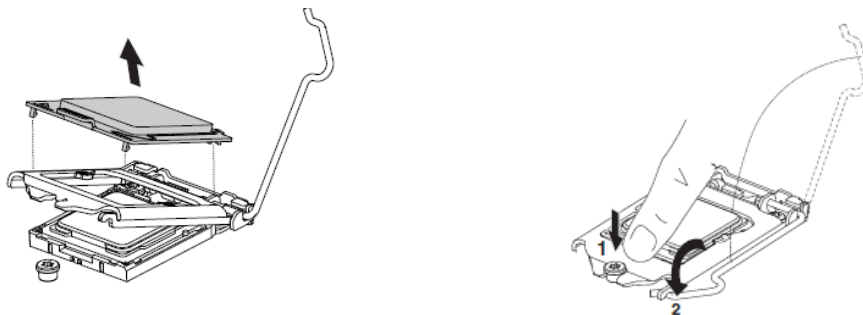
Note: *Never touch fragile socket contacts to avoid damage and do not touch processor sensitive contacts at any time during Installation.*

- Carefully place the processor into the socket body vertically (see image below).



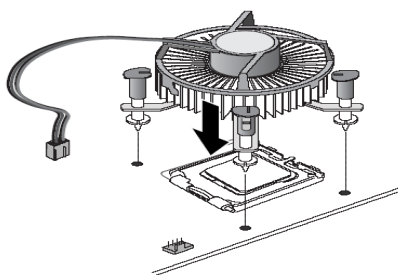
Step4 Close the socket (see image below):

- Gently lower the load plate.
- Make sure load plate's front edge slides under the shoulder screw cap as the lever is lowered.
- Latch the lever under the top plate's corner tab, being cautious not to damage the motherboard with the tip of the lever.

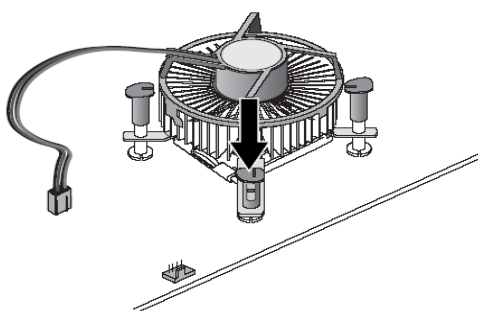


Step 5 Fan heat sink handling:

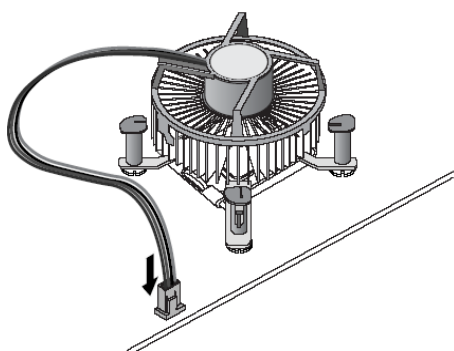
1. Orientate the CPU cooling fan to fixing holes on the board.



2. Screw the CPU cooling fan onto the board.



3. Make sure the CPU fan is plugged to the CPU fan connector.

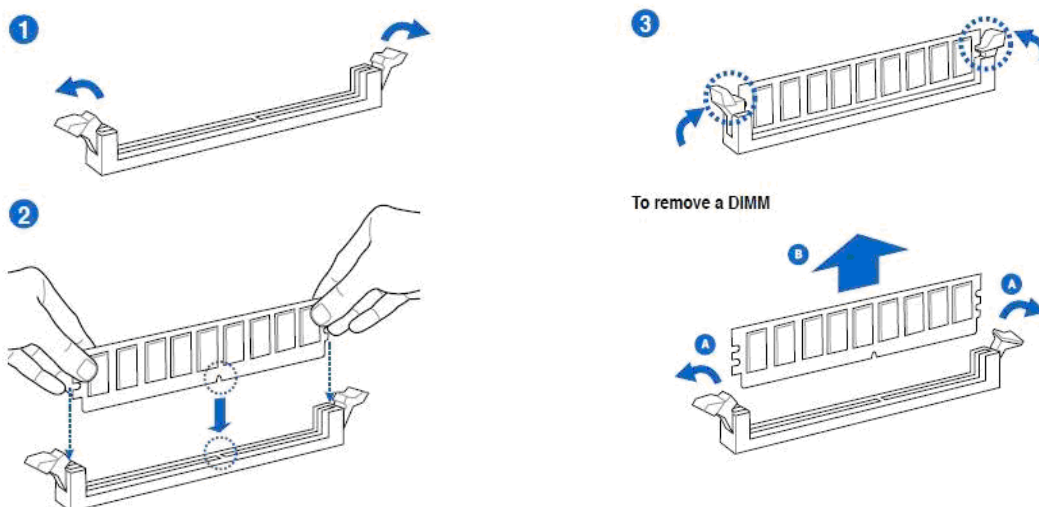


3.2 Installing the Memory

The board supports two 240-pin DDR3 SO-DIMM memory sockets with maximum memory capacity up to 16GB.

Please follow steps below to install the memory modules:

- Push down latches on each side of the DIMM socket.
- Align the memory module with the socket that notches of memory module must match the socket keys for a correct installation.
- Install the memory module into the socket and push it firmly down until it is fully seated. The socket latches are levered upwards and clipped on to the edges of the DIMM.
- Install any remaining DIMM modules.



Chapter 4

Hardware Description

4.1 Microprocessors

The SHB230 Series supports Intel® Core™ i7 / Core™ i5 / Core™ i3 processors, which enable your system to operate under Windows® 7, Windows® 8 and Linux environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for your installed microprocessor to prevent the CPU from damages.

4.2 BIOS

The SHB230 Series uses AMI Plug and Play BIOS with a single 64Mbit SPI Flash.






























4.3 System Memory

The SHB230 Series supports two 204-pin DDR3 SODIMM sockets for a maximum memory of 16GB DDR3 SDRAMs. The memory module comes in sizes of 2GB, 4GB and 8GB.

4.4 I/O Port Address Map

The Intel® Core™ i7 / Core™ i5 / Core™ i3 processors communicate via I/O ports. Total 1KB port addresses are available for assigning to other devices via I/O expansion cards.




















































Input/output (IO)		
[CPU]	0000000000000000 - 000000000000001F	Direct memory access controller
[CPU]	0000000000000000 - 000000000000007F	PCI bus
[CPU]	0000000000000010 - 000000000000001F	Motherboard resources
[CPU]	0000000000000020 - 0000000000000021	Programmable interrupt controller
[CPU]	0000000000000022 - 000000000000003F	Motherboard resources
[CPU]	0000000000000024 - 0000000000000025	Programmable interrupt controller
[CPU]	0000000000000028 - 0000000000000029	Programmable interrupt controller
[CPU]	000000000000002C - 000000000000002D	Programmable interrupt controller
[CPU]	000000000000002E - 000000000000002F	Motherboard resources
[CPU]	0000000000000030 - 0000000000000031	Programmable interrupt controller
[CPU]	0000000000000034 - 0000000000000035	Programmable interrupt controller
[CPU]	0000000000000038 - 0000000000000039	Programmable interrupt controller
[CPU]	000000000000003C - 000000000000003D	Programmable interrupt controller
[CPU]	0000000000000040 - 0000000000000043	System timer
[CPU]	0000000000000044 - 000000000000005F	Motherboard resources
[CPU]	000000000000004E - 000000000000004F	Motherboard resources
[CPU]	0000000000000050 - 0000000000000053	System timer
[Keyboard]	0000000000000060 - 0000000000000060	Standard PS/2 Keyboard
[CPU]	0000000000000061 - 0000000000000061	Motherboard resources
[CPU]	0000000000000062 - 0000000000000063	Motherboard resources
[CPU]	0000000000000063 - 0000000000000063	Motherboard resources
[Keyboard]	0000000000000064 - 0000000000000064	Standard PS/2 Keyboard
[CPU]	0000000000000065 - 0000000000000065	Motherboard resources
[CPU]	0000000000000065 - 000000000000006F	Motherboard resources
[CPU]	0000000000000067 - 0000000000000067	Motherboard resources
[CPU]	0000000000000070 - 0000000000000070	Motherboard resources
[CPU]	0000000000000070 - 0000000000000077	System CMOS/real time clock
[CPU]	0000000000000072 - 000000000000007F	Motherboard resources
[CPU]	0000000000000080 - 0000000000000080	Motherboard resources
[CPU]	0000000000000080 - 0000000000000080	Motherboard resources
[CPU]	0000000000000081 - 0000000000000091	Direct memory access controller
[CPU]	0000000000000084 - 0000000000000086	Motherboard resources
[CPU]	0000000000000088 - 0000000000000088	Motherboard resources
[CPU]	000000000000008C - 000000000000008E	Motherboard resources
[CPU]	0000000000000090 - 000000000000009F	Motherboard resources
[CPU]	0000000000000092 - 0000000000000092	Motherboard resources
[CPU]	0000000000000093 - 000000000000009F	Direct memory access controller
[CPU]	00000000000000A0 - 00000000000000A1	Programmable interrupt controller
[CPU]	00000000000000A2 - 000000000000003F	Motherboard resources
[CPU]	00000000000000A4 - 00000000000000A5	Programmable interrupt controller
[CPU]	00000000000000A8 - 00000000000000A9	Programmable interrupt controller
[CPU]	00000000000000AC - 00000000000000AD	Programmable interrupt controller
[CPU]	00000000000000B0 - 00000000000000B1	Programmable interrupt controller
[CPU]	00000000000000B2 - 00000000000000B3	Motherboard resources
[CPU]	00000000000000B4 - 00000000000000B5	Programmable interrupt controller
[CPU]	00000000000000B8 - 00000000000000B9	Programmable interrupt controller
[CPU]	00000000000000BC - 00000000000000BD	Programmable interrupt controller
[CPU]	00000000000000C0 - 00000000000000DF	Direct memory access controller
[CPU]	00000000000000E0 - 00000000000000EF	Motherboard resources

-  [00000000000000F0 - 00000000000000F0] Numeric data processor
-  [0000000000000285 - 0000000000000294] Motherboard resources
-  [00000000000002F8 - 00000000000002FF] Communications Port (COM2)
-  [00000000000003B0 - 00000000000003BB] Intel(R) HD Graphics
-  [00000000000003C0 - 00000000000003DF] Intel(R) HD Graphics
-  [00000000000003F8 - 00000000000003FF] Communications Port (COM1)
-  [00000000000004D0 - 00000000000004D1] Motherboard resources
-  [00000000000004D0 - 00000000000004D1] Programmable interrupt controller
-  [0000000000000680 - 000000000000069F] Motherboard resources
-  [0000000000000A00 - 0000000000000A0F] Motherboard resources
-  [0000000000000D00 - 000000000000FFFF] PCI bus
-  [000000000000164E - 000000000000164F] Motherboard resources
-  [0000000000001800 - 00000000000018FE] Motherboard resources
-  [0000000000001854 - 0000000000001857] Motherboard resources
-  [0000000000001C00 - 0000000000001CFE] Motherboard resources
-  [0000000000001D00 - 0000000000001DFE] Motherboard resources
-  [0000000000001E00 - 0000000000001EFE] Motherboard resources
-  [0000000000001F00 - 0000000000001FFE] Motherboard resources
-  [000000000000E000 - 000000000000EFFF] Intel(R) 8 Series/C220 Series PCI Express Root Port #5 - 8C18
-  [000000000000F000 - 000000000000F03F] Intel(R) HD Graphics
-  [000000000000F040 - 000000000000F05F] Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
-  [000000000000F060 - 000000000000F07F] Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
-  [000000000000F0A0 - 000000000000F0A3] Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
-  [000000000000F0B0 - 000000000000F0B7] Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
-  [000000000000F0C0 - 000000000000F0C3] Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
-  [000000000000F0D0 - 000000000000F0D7] Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
-  [000000000000FFFF - 000000000000FFFF] Motherboard resources
-  [000000000000FFFF - 000000000000FFFF] Motherboard resources
-  [000000000000FFFF - 000000000000FFFF] Motherboard resources


































4.5 Interrupt Controller (IRQ) Map

The interrupt controller (IRQ) mapping list is shown as follows:

Interrupt request (IRQ)		
(ISA) 0x00000000 (00)	System timer	
(ISA) 0x00000001 (01)	Standard PS/2 Keyboard	
(ISA) 0x00000003 (03)	Communications Port (COM2)	
(ISA) 0x00000004 (04)	Communications Port (COM1)	
(ISA) 0x00000008 (08)	System CMOS/real time clock	
(ISA) 0x0000000C (12)	Microsoft PS/2 Mouse	
(ISA) 0x0000000D (13)	Numeric data processor	
(ISA) 0x00000051 (81)	Microsoft ACPI-Compliant System	
(ISA) 0x00000052 (82)	Microsoft ACPI-Compliant System	
(ISA) 0x00000053 (83)	Microsoft ACPI-Compliant System	
(ISA) 0x00000054 (84)	Microsoft ACPI-Compliant System	
(ISA) 0x00000055 (85)	Microsoft ACPI-Compliant System	
(ISA) 0x00000056 (86)	Microsoft ACPI-Compliant System	
(ISA) 0x00000057 (87)	Microsoft ACPI-Compliant System	
(ISA) 0x00000058 (88)	Microsoft ACPI-Compliant System	
(ISA) 0x00000059 (89)	Microsoft ACPI-Compliant System	
(ISA) 0x0000005A (90)	Microsoft ACPI-Compliant System	
(ISA) 0x0000005B (91)	Microsoft ACPI-Compliant System	
(ISA) 0x0000005C (92)	Microsoft ACPI-Compliant System	
(ISA) 0x0000005D (93)	Microsoft ACPI-Compliant System	
(ISA) 0x0000005E (94)	Microsoft ACPI-Compliant System	
(ISA) 0x0000005F (95)	Microsoft ACPI-Compliant System	
(ISA) 0x00000060 (96)	Microsoft ACPI-Compliant System	
(ISA) 0x00000061 (97)	Microsoft ACPI-Compliant System	
(ISA) 0x00000062 (98)	Microsoft ACPI-Compliant System	
(ISA) 0x00000063 (99)	Microsoft ACPI-Compliant System	
(ISA) 0x00000064 (100)	Microsoft ACPI-Compliant System	
(ISA) 0x00000065 (101)	Microsoft ACPI-Compliant System	
(ISA) 0x00000066 (102)	Microsoft ACPI-Compliant System	
(ISA) 0x00000067 (103)	Microsoft ACPI-Compliant System	
(ISA) 0x00000068 (104)	Microsoft ACPI-Compliant System	
(ISA) 0x00000069 (105)	Microsoft ACPI-Compliant System	
(ISA) 0x0000006A (106)	Microsoft ACPI-Compliant System	
(ISA) 0x0000006B (107)	Microsoft ACPI-Compliant System	
(ISA) 0x0000006C (108)	Microsoft ACPI-Compliant System	
(ISA) 0x0000006D (109)	Microsoft ACPI-Compliant System	
(ISA) 0x0000006E (110)	Microsoft ACPI-Compliant System	
(ISA) 0x0000006F (111)	Microsoft ACPI-Compliant System	
(ISA) 0x00000070 (112)	Microsoft ACPI-Compliant System	
(ISA) 0x00000071 (113)	Microsoft ACPI-Compliant System	
(ISA) 0x00000072 (114)	Microsoft ACPI-Compliant System	
(ISA) 0x00000073 (115)	Microsoft ACPI-Compliant System	
(ISA) 0x00000074 (116)	Microsoft ACPI-Compliant System	
(ISA) 0x00000075 (117)	Microsoft ACPI-Compliant System	
(ISA) 0x00000076 (118)	Microsoft ACPI-Compliant System	
(ISA) 0x00000077 (119)	Microsoft ACPI-Compliant System	
(ISA) 0x00000078 (120)	Microsoft ACPI-Compliant System	
(ISA) 0x00000079 (121)	Microsoft ACPI-Compliant System	
(ISA) 0x0000007A (122)	Microsoft ACPI-Compliant System	
(ISA) 0x0000007B (123)	Microsoft ACPI-Compliant System	
(ISA) 0x0000007C (124)	Microsoft ACPI-Compliant System	

 (ISA) 0x0000007D (125)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007E (126)	Microsoft ACPI-Compliant System
 (ISA) 0x0000007F (127)	Microsoft ACPI-Compliant System
 (ISA) 0x00000080 (128)	Microsoft ACPI-Compliant System
 (ISA) 0x00000081 (129)	Microsoft ACPI-Compliant System
 (ISA) 0x00000082 (130)	Microsoft ACPI-Compliant System
 (ISA) 0x00000083 (131)	Microsoft ACPI-Compliant System
 (ISA) 0x00000084 (132)	Microsoft ACPI-Compliant System
 (ISA) 0x00000085 (133)	Microsoft ACPI-Compliant System
 (ISA) 0x00000086 (134)	Microsoft ACPI-Compliant System
 (ISA) 0x00000087 (135)	Microsoft ACPI-Compliant System
 (ISA) 0x00000088 (136)	Microsoft ACPI-Compliant System
 (ISA) 0x00000089 (137)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008A (138)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008B (139)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008C (140)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008D (141)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008E (142)	Microsoft ACPI-Compliant System
 (ISA) 0x0000008F (143)	Microsoft ACPI-Compliant System
 (ISA) 0x00000090 (144)	Microsoft ACPI-Compliant System
 (ISA) 0x00000091 (145)	Microsoft ACPI-Compliant System
 (ISA) 0x00000092 (146)	Microsoft ACPI-Compliant System
 (ISA) 0x00000093 (147)	Microsoft ACPI-Compliant System
 (ISA) 0x00000094 (148)	Microsoft ACPI-Compliant System
 (ISA) 0x00000095 (149)	Microsoft ACPI-Compliant System
 (ISA) 0x00000096 (150)	Microsoft ACPI-Compliant System
 (ISA) 0x00000097 (151)	Microsoft ACPI-Compliant System
 (ISA) 0x00000098 (152)	Microsoft ACPI-Compliant System
 (ISA) 0x00000099 (153)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009A (154)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009B (155)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009C (156)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009D (157)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009E (158)	Microsoft ACPI-Compliant System
 (ISA) 0x0000009F (159)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A0 (160)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A1 (161)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A2 (162)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A3 (163)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A4 (164)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A5 (165)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A6 (166)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A7 (167)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A8 (168)	Microsoft ACPI-Compliant System
 (ISA) 0x000000A9 (169)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AA (170)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AB (171)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AC (172)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AD (173)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AE (174)	Microsoft ACPI-Compliant System
 (ISA) 0x000000AF (175)	Microsoft ACPI-Compliant System

SHB230 Intel LGA1150 Processor PICMG1.3 Half-size CPU Board

	(ISA) 0x000000B0 (176)	Microsoft ACPI-Compliant System
	(ISA) 0x000000B1 (177)	Microsoft ACPI-Compliant System
	(ISA) 0x000000B2 (178)	Microsoft ACPI-Compliant System
	(ISA) 0x000000B3 (179)	Microsoft ACPI-Compliant System
	(ISA) 0x000000B4 (180)	Microsoft ACPI-Compliant System
	(ISA) 0x000000B5 (181)	Microsoft ACPI-Compliant System
	(ISA) 0x000000B6 (182)	Microsoft ACPI-Compliant System
	(ISA) 0x000000B7 (183)	Microsoft ACPI-Compliant System
	(ISA) 0x000000B8 (184)	Microsoft ACPI-Compliant System
	(ISA) 0x000000B9 (185)	Microsoft ACPI-Compliant System
	(ISA) 0x000000BA (186)	Microsoft ACPI-Compliant System
	(ISA) 0x000000BB (187)	Microsoft ACPI-Compliant System
	(ISA) 0x000000BC (188)	Microsoft ACPI-Compliant System
	(ISA) 0x000000BD (189)	Microsoft ACPI-Compliant System
	(ISA) 0x000000BE (190)	Microsoft ACPI-Compliant System
	(PCI) 0x00000005 (05)	Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
	(PCI) 0x00000010 (16)	High Definition Audio Controller
	(PCI) 0x00000010 (16)	Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #2 - 8C2D
	(PCI) 0x00000010 (16)	Intel(R) Management Engine Interface
	(PCI) 0x00000013 (19)	Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
	(PCI) 0x00000016 (22)	High Definition Audio Controller
	(PCI) 0x00000017 (23)	Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #1 - 8C26
	(PCI) 0xFFFFFFF4 (-12)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFF5 (-11)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFF6 (-10)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFF7 (-9)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFF8 (-8)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFF9 (-7)	Intel(R) I210 Gigabit Network Connection
	(PCI) 0xFFFFFFFA (-6)	Intel(R) Ethernet Connection I217-LM
	(PCI) 0xFFFFFFF8 (-5)	Intel(R) USB 3.0 eXtensible Host Controller
	(PCI) 0xFFFFFFFC (-4)	Intel(R) HD Graphics
	(PCI) 0xFFFFFFF3 (-3)	Intel(R) 8 Series/C220 Series PCI Express Root Port #5 - 8C18
	(PCI) 0xFFFFFFF2 (-2)	Intel(R) 8 Series/C220 Series PCI Express Root Port #1 - 8C10

4.6 Memory Map

The memory mapping list is shown as follows:

Address Range	Device
[0000000000A0000 - 0000000000BFFFF]	Intel(R) HD Graphics 4600
[0000000000A0000 - 0000000000BFFFF]	PCI bus
[0000000000D0000 - 0000000000D3FFF]	PCI bus
[0000000000D4000 - 0000000000D7FFF]	PCI bus
[0000000000D8000 - 0000000000DBFFF]	PCI bus
[0000000000DC000 - 0000000000DFFFF]	PCI bus
[0000000000E0000 - 0000000000E3FFF]	PCI bus
[0000000000E4000 - 0000000000E7FFF]	PCI bus
[00000000DF20000 - 00000000FEAFFFF]	PCI bus
[00000000E000000 - 00000000EFFFFFF]	Intel(R) HD Graphics 4600
[00000000F780000 - 00000000F7BFFFF]	Intel(R) HD Graphics 4600
[00000000F7C0000 - 00000000F7CFFFF]	Intel(R) I210 Gigabit Network Connection
[00000000F7D0000 - 00000000F7DFFFF]	Intel(R) 8 Series/C220 Series PCI Express Root Port #5 - 8C18
[00000000F7D0000 - 00000000F7D03FFF]	Intel(R) I210 Gigabit Network Connection
[00000000F7E0000 - 00000000F7E1FFFF]	PCI Express standard Upstream Switch Port
[00000000F7E0000 - 00000000F7EFFFF]	Intel(R) 8 Series/C220 Series PCI Express Root Port #4 - 8C16
[00000000F7F0000 - 00000000F7F1FFFF]	Intel(R) Ethernet Connection I217-LM
[00000000F7F2000 - 00000000F7F2FFFF]	Intel(R) USB 3.0 eXtensible Host Controller
[00000000F7F3000 - 00000000F7F33FFF]	High Definition Audio Controller
[00000000F7F3400 - 00000000F7F37FFF]	High Definition Audio Controller
[00000000F7F3900 - 00000000F7F39FFF]	Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
[00000000F7F3A00 - 00000000F7F3A7FF]	Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
[00000000F7F3B00 - 00000000F7F3B3FF]	Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #1 - 8C26
[00000000F7F3C00 - 00000000F7F3C3FF]	Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #2 - 8C2D
[00000000F7F3D00 - 00000000F7F3DFFF]	Intel(R) Ethernet Connection I217-LM
[00000000F7F3E00 - 00000000F7F3EFFF]	Intel(R) Active Management Technology - SOL (COM6)
[00000000F7F4000 - 00000000F7F4000F]	Intel(R) Management Engine Interface
[00000000F7FEF00 - 00000000F7FEFFFF]	Motherboard resources
[00000000F7FF000 - 00000000F7FF0FFF]	Motherboard resources
[00000000F800000 - 00000000FBFFFFFF]	Motherboard resources
[00000000FED0000 - 00000000FED003FF]	High precision event timer
[00000000FED1000 - 00000000FED17FFF]	Motherboard resources
[00000000FED1800 - 00000000FED18FFF]	Motherboard resources
[00000000FED1900 - 00000000FED19FFF]	Motherboard resources
[00000000FED1C00 - 00000000FED1FFFF]	Motherboard resources
[00000000FED2000 - 00000000FED3FFFF]	Motherboard resources
[00000000FED4000 - 00000000FED44FFF]	Infineon Trusted Platform Module
[00000000FED4500 - 00000000FED8FFFF]	Motherboard resources
[00000000FED9000 - 00000000FED93FFF]	Motherboard resources
[00000000FEE0000 - 00000000FEEFFFF]	Motherboard resources
[00000000FF00000 - 00000000FFFFFFF]	Intel(R) 82802 Firmware Hub Device
[00000000FF00000 - 00000000FFFFFFF]	Motherboard resources

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Chapter 5

AMI BIOS Setup Utility

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.



Note: When you flash bios, please press power switch to reset your system.

5.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the key immediately.
2. After you press the key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

5.2 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>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.



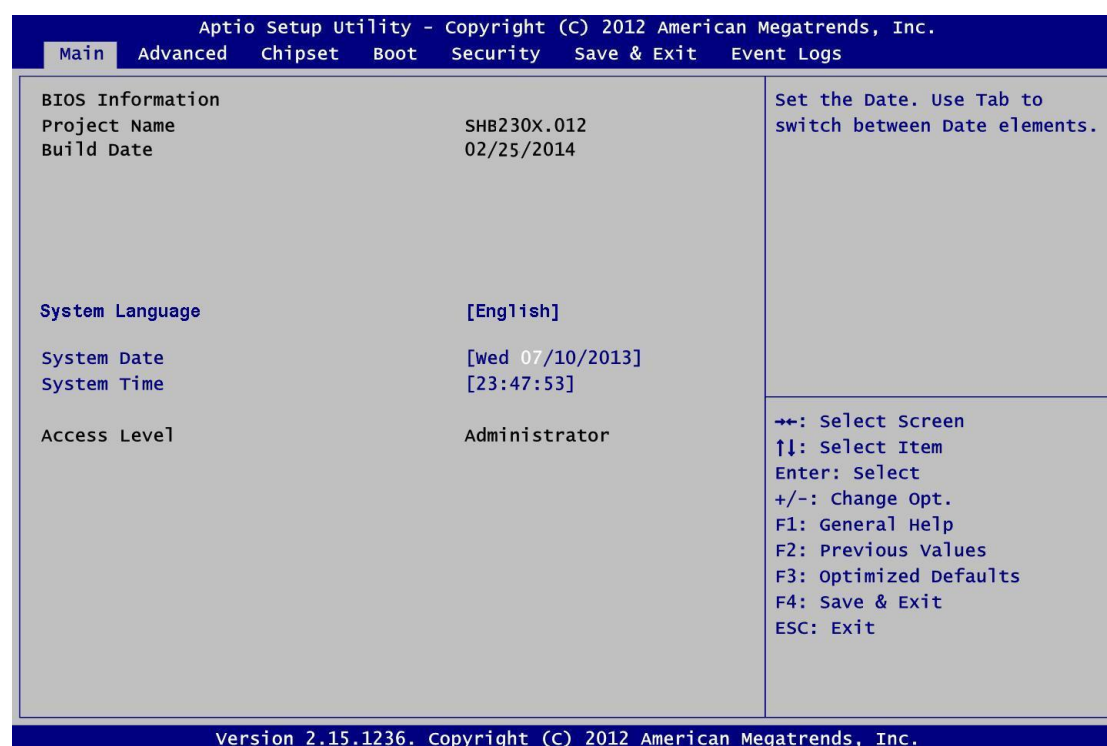
Note: Some of the navigation keys differ from one screen to another.

Hot Keys	Description
→← Left/Right	The Left and Right <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.
F2	The <F2> key allows you to Load Previous Values.
F3	The <F3> key allows you to Load Optimized Defaults.
F4	The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> 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.
--

5.3 Main Menu

The first time you 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. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.



BIOS Information

Display the auto-detected BIOS information.

System Date/Time

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.

Access Level

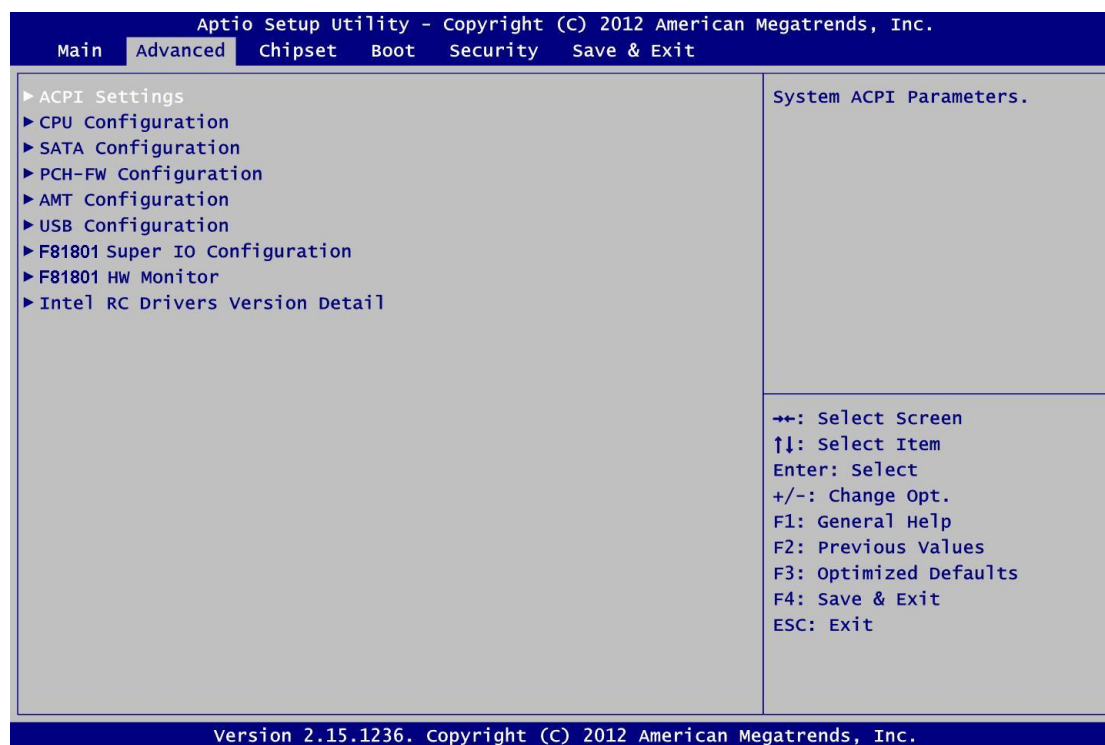
Display the access level of current user.

5.4 Advanced Menu

The Advanced menu also 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:

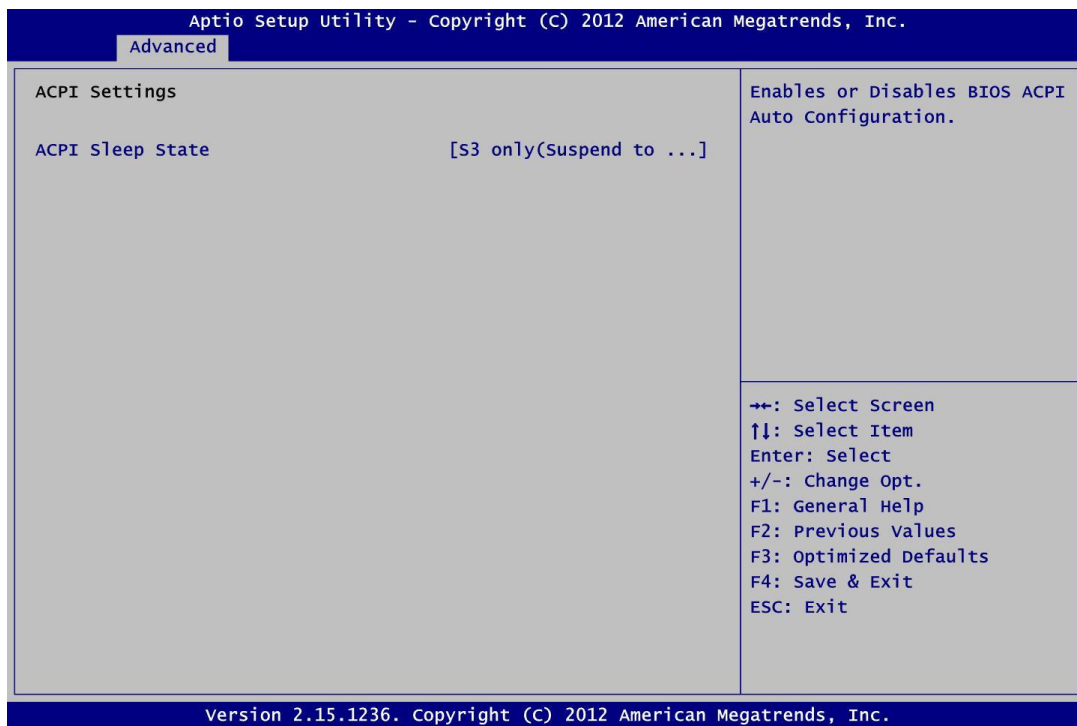
- ▶ ACPI Settings
- ▶ CPU Configuration
- ▶ SATA Configuration
- ▶ PCH-FW Configuration
- ▶ AMT Configuration
- ▶ USB Configuration
- ▶ F81801 Super IO Configuration
- ▶ F81801 HW Monitor
- ▶ Intel RC Drivers Version Detail

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



➤ **ACPI Settings**

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.

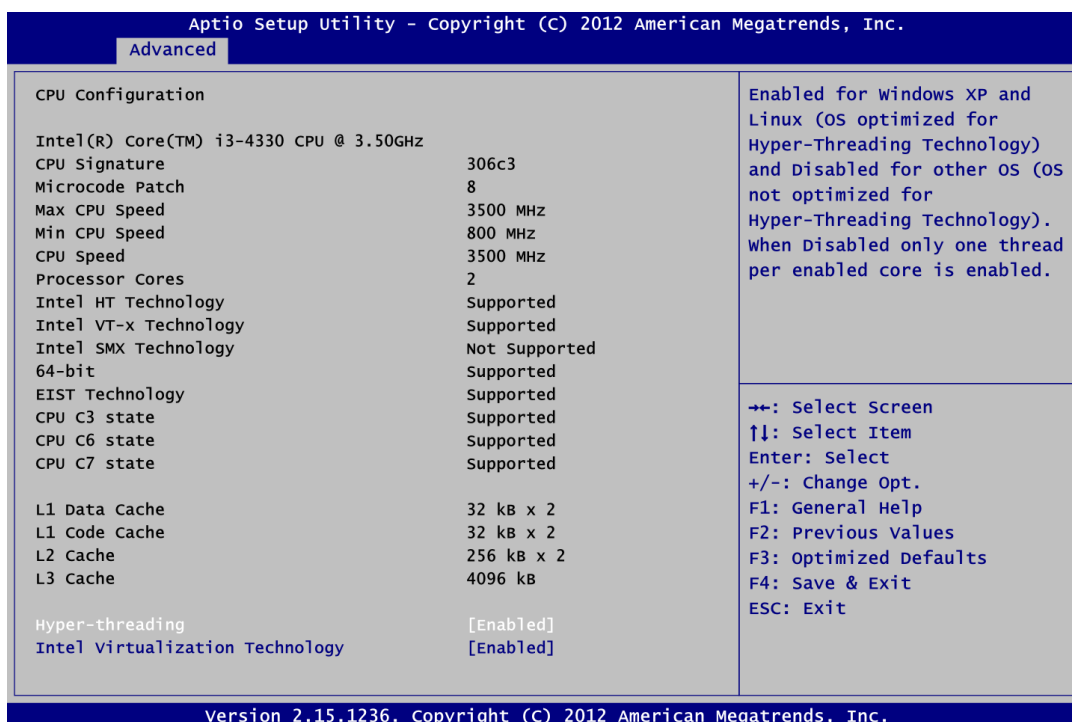


ACPI Sleep State

Select the highest ACPI sleep state the system will enter when the suspend button is pressed. Configuration options are Suspend S3 only (Suspend to RAM).

➤ **CPU Configuration**

This screen shows the CPU information, and you can change the value of the selected option.



Hyper-threading

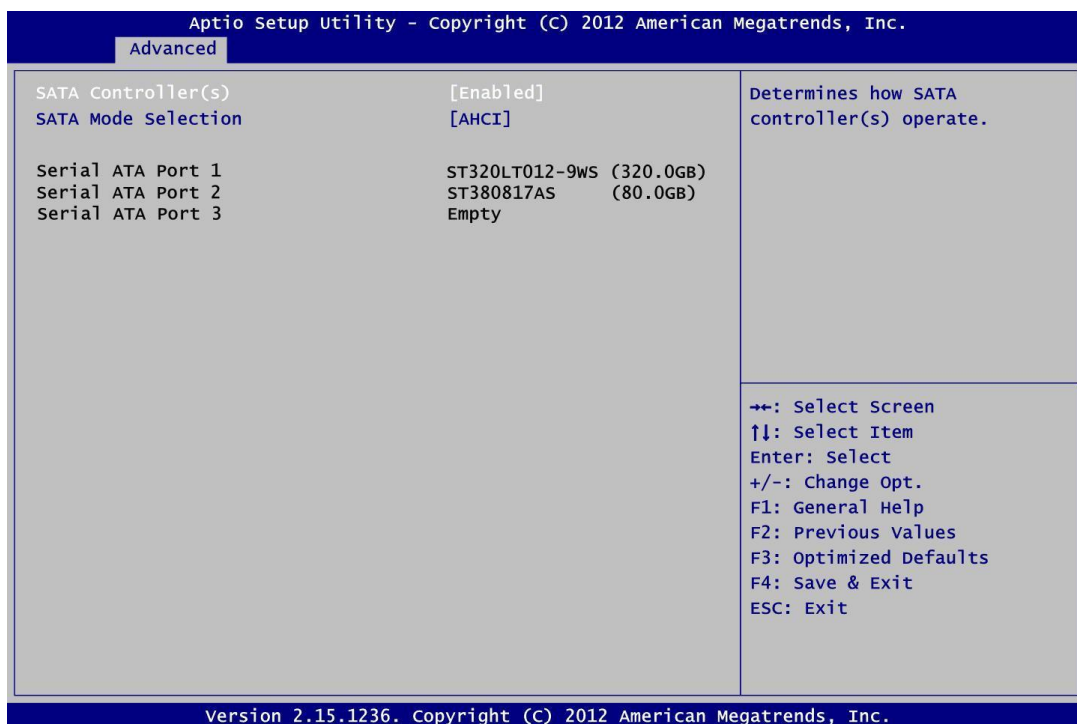
Use this item to enable or disable Hyper-Threading Technology, which makes a single physical processor perform multi-tasking function as two logical ones.

Intel Virtualization Technology

This item allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

➤ **SATA Configuration**

In this Configuration menu, you can see the currently installed hardware in the SATA ports. During system boot up, the BIOS automatically detects the presence of SATA devices.



SATA Controller(s)

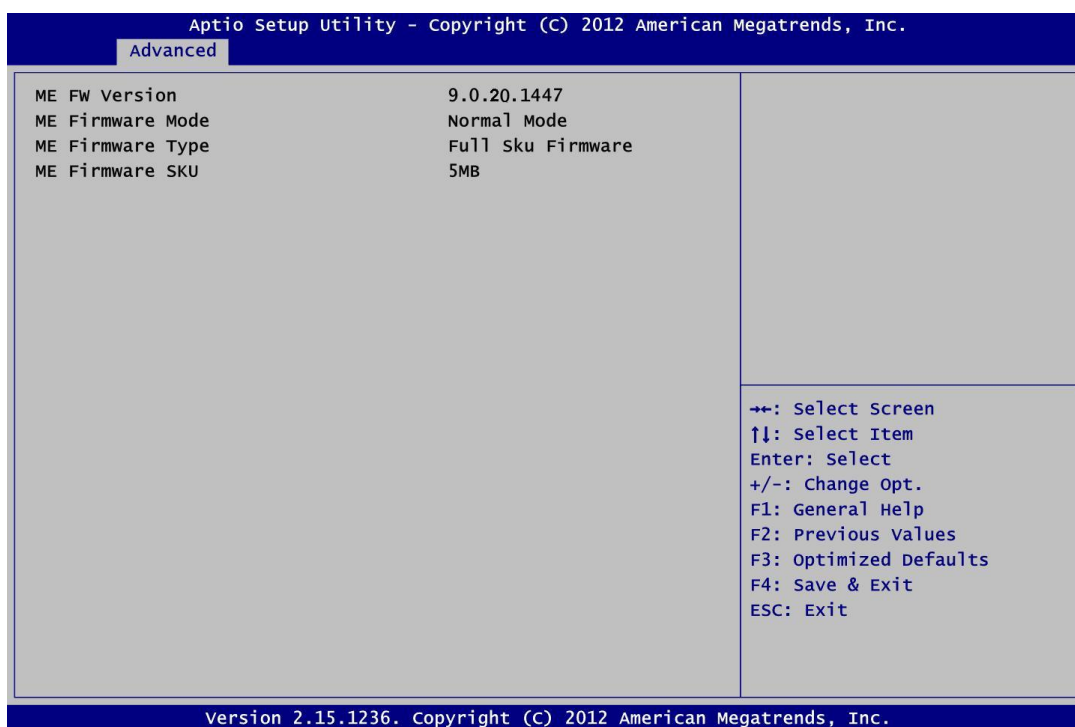
Enable or disable SATA device.

SATA Mode Selection

Determine how SATA controller(s) operate. Operation mode options are: IDE Mode, AHCI Mode and RAID Mode.

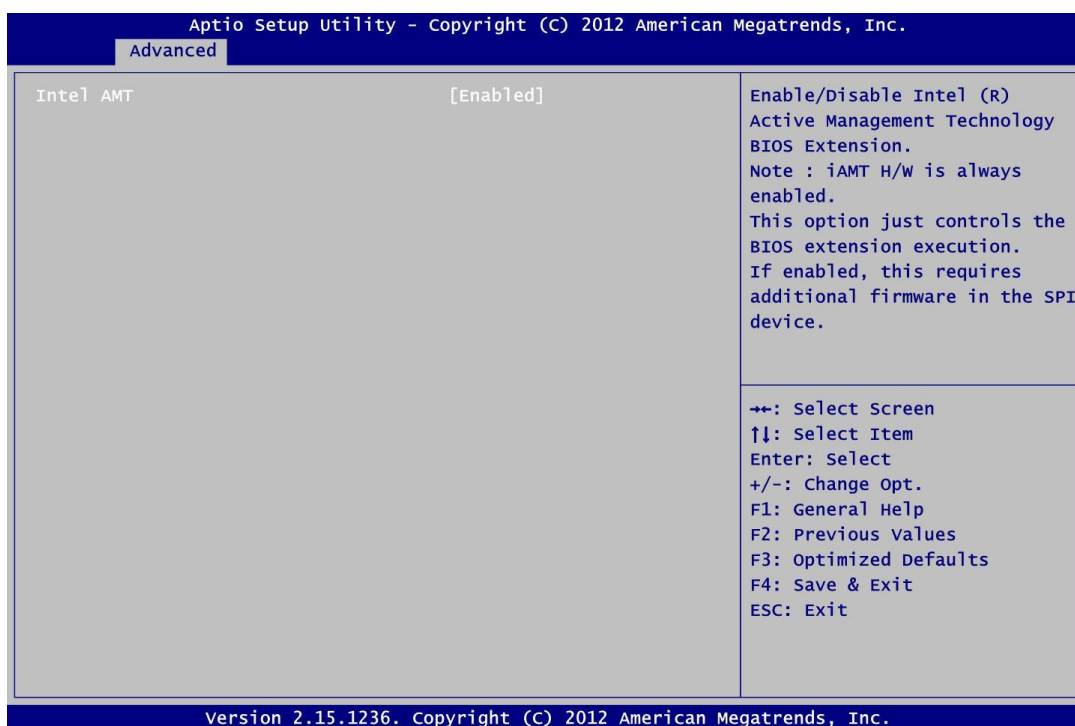
➤ **PCH-FW Configuration**

This screen displays Management Engine (ME) Firmware information.



➤ **AMT Configuration**

Use this screen to configure AMT parameters.

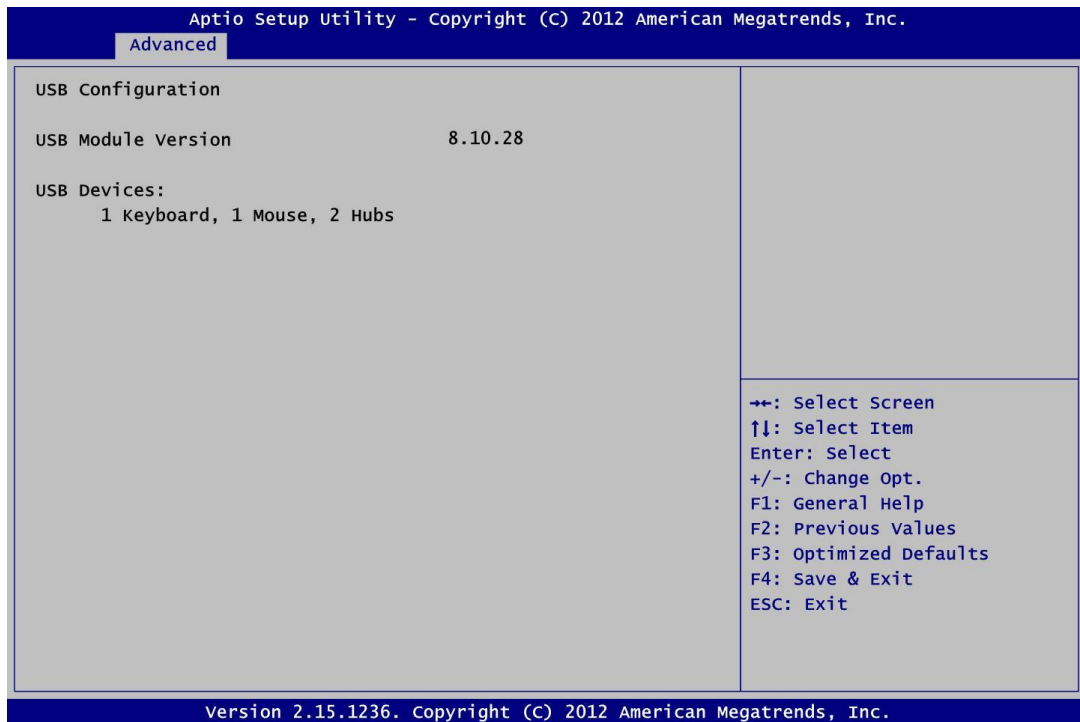


Intel AMT

Enable or disable Intel® Active Management Technology BIOS Extension.

➤ **USB Configuration**

This screen displays the USB Configuration information.

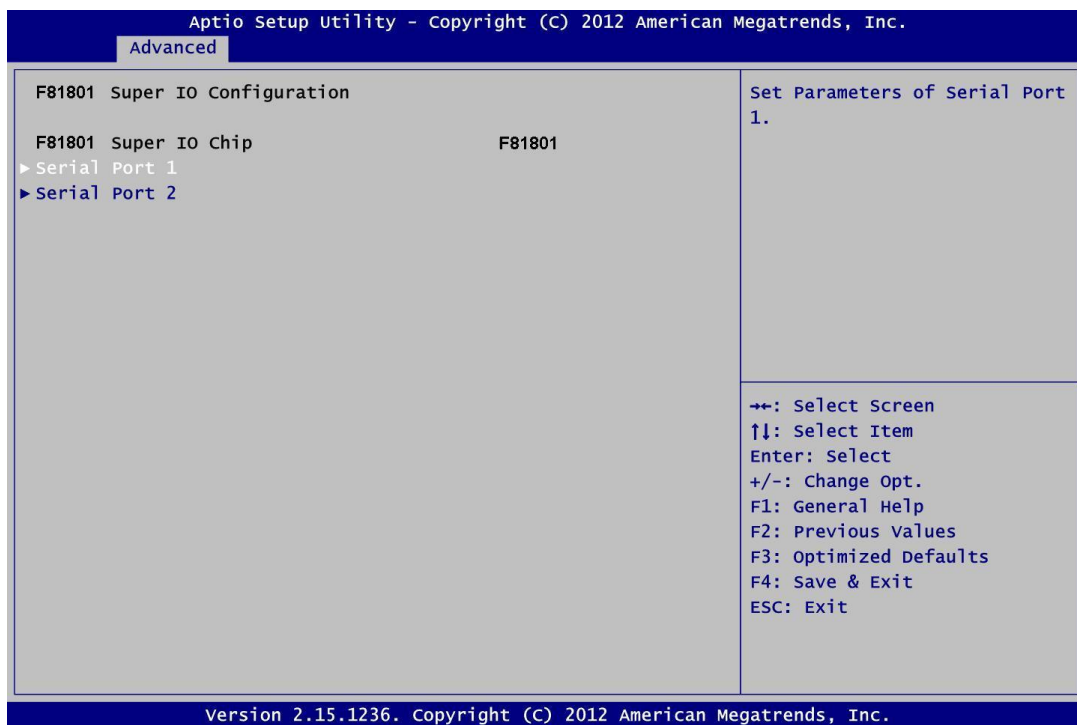


USB Devices

Display all detected USB devices.

➤ **F81801 Super IO Configuration**

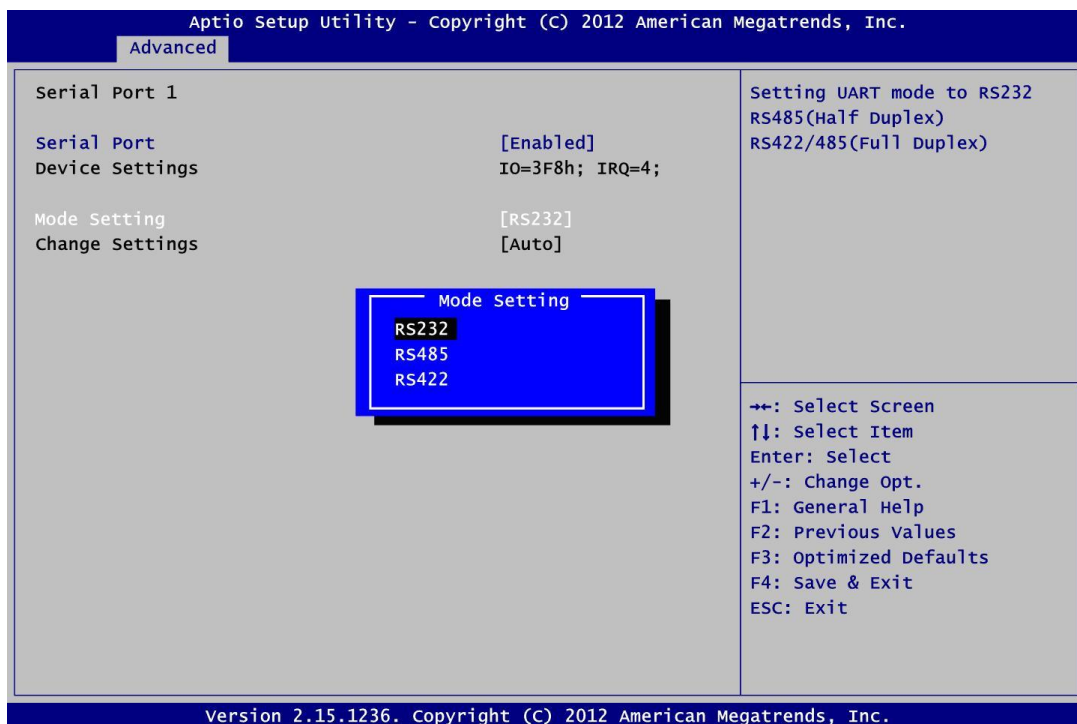
You can use this screen to select options for the Super IO Configuration, and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with “▶”, please press <Enter> for more options.



Serial Port 1~2 Configuration

Use this item to set parameters of serial port 1 to 2.

➤ **Serial Port 1 Configuration**



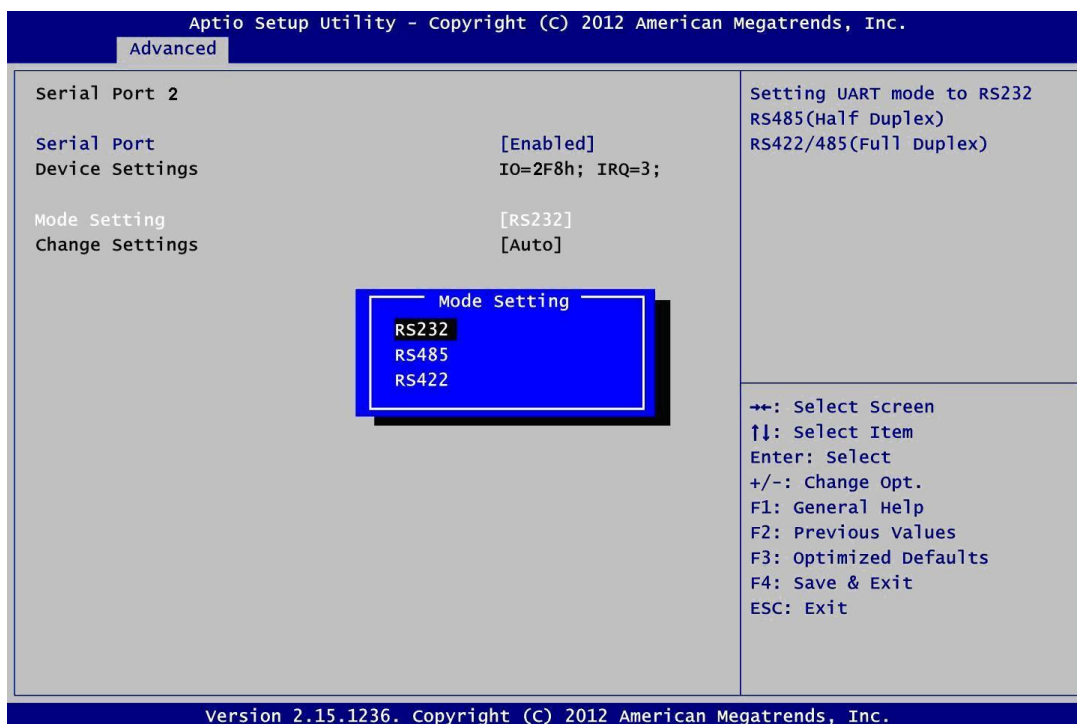
Serial Port

Enable or disable serial port 1. The optimal setting for base I/O address is 3F8h and for interrupt request address is IRQ4.

Mode Setting

Use this option to set RS-232/RS-422/RS-485 mode for serial port 1.

➤ **Serial Port 2 Configuration**



Serial Port

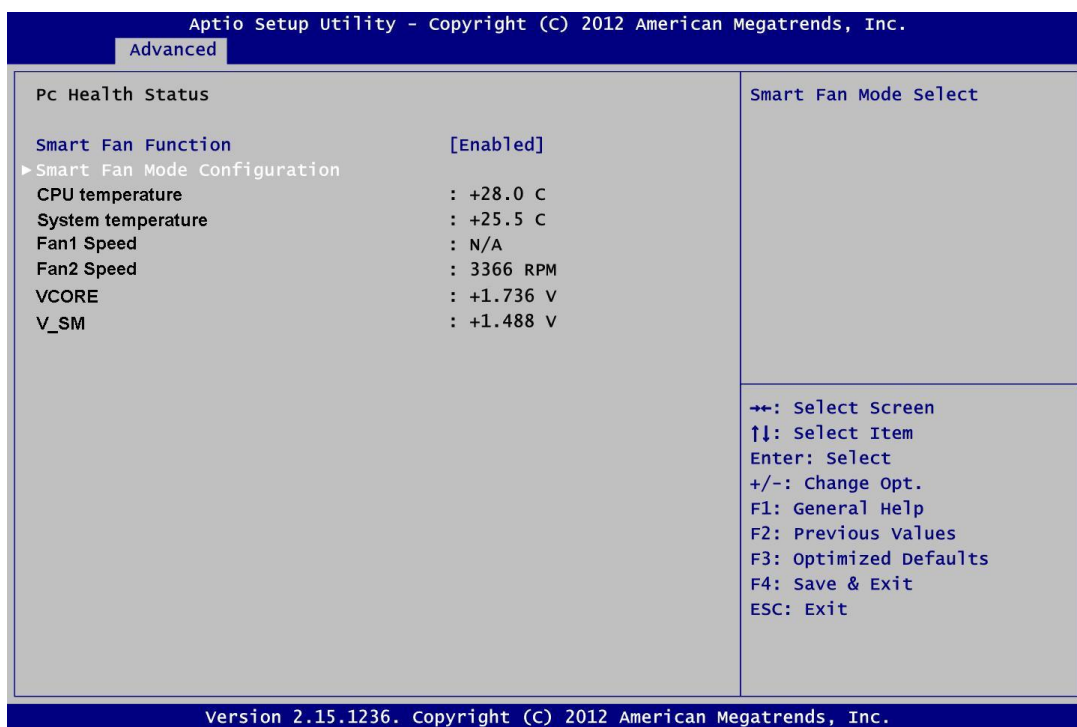
Enable or disable serial port 2. The optimal setting for base I/O address is 2F8h and for interrupt request address is IRQ3.

Mode Setting

Use this option to set RS-232/RS-422/RS-485 mode for serial port 2.

➤ **F81801 HW Monitor**

Use this screen for Smart Fan configuration and hardware health status monitoring.



This screen displays the temperature of system and CPU, cooling fan speed in RPM and system voltages (V CORE, V_SM).

Smart Fan Function

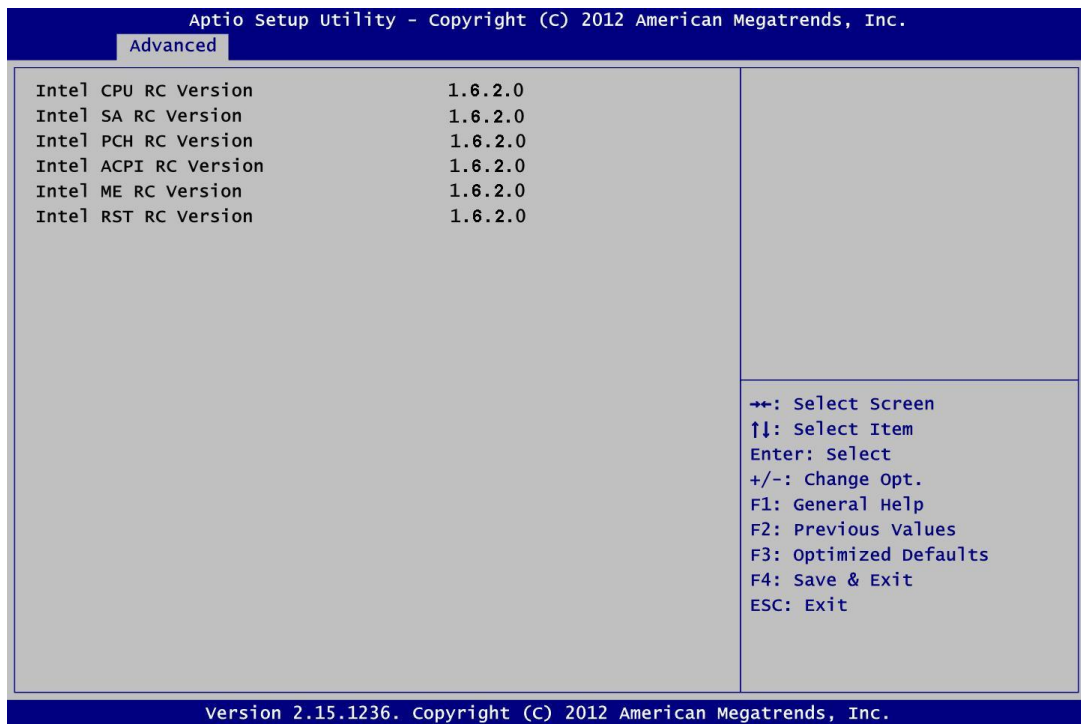
Enable or disable Smart Fan function.

Smart Fan Mode Configuration

Use this option for Smart Fan mode configuration.

➤ **Intel RC Drivers Version Detail**

This screen displays Intel RC drivers version information.

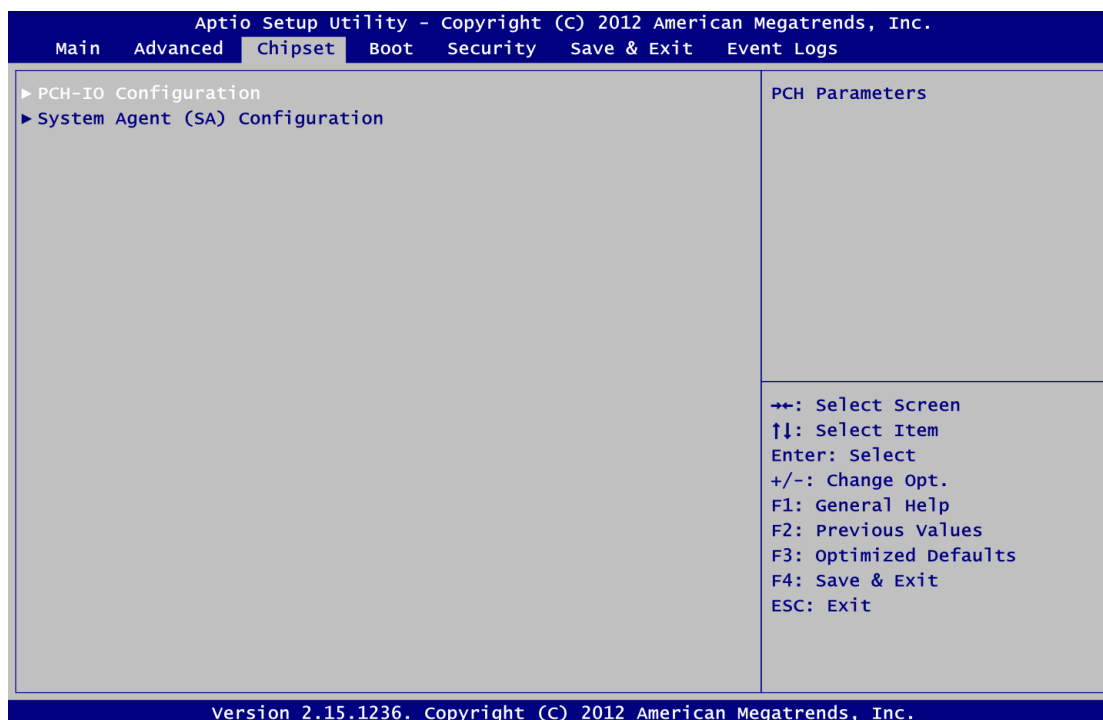


5.5 Chipset Menu

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:

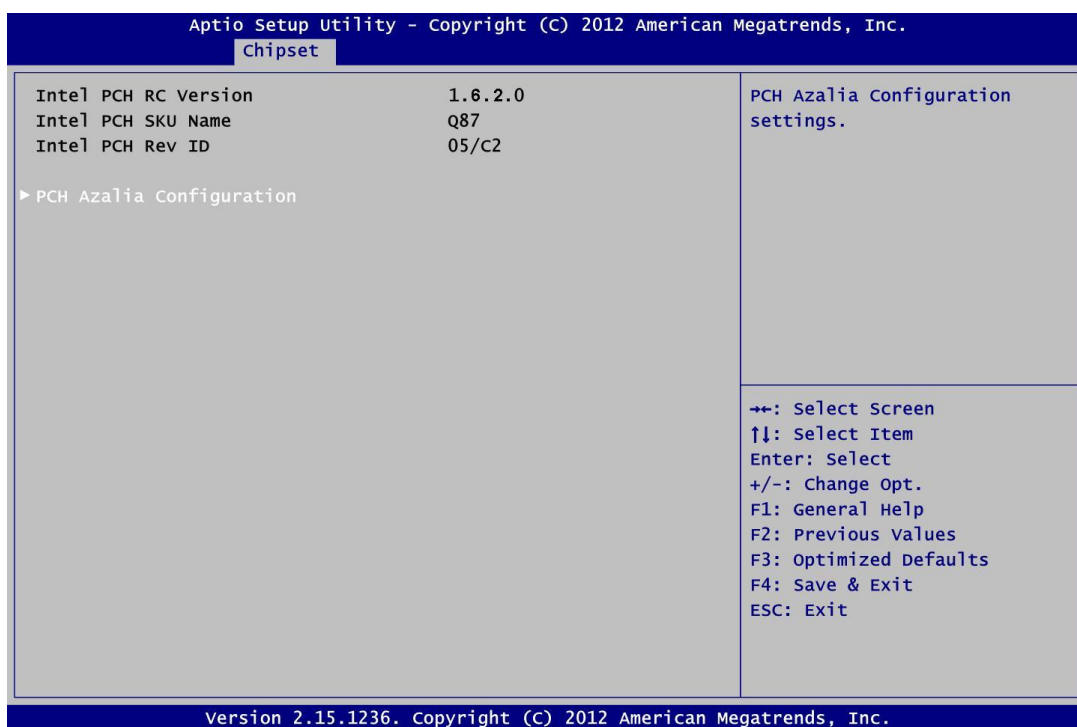
- ▶ PCH-IO Configuration
- ▶ System Agent (SA) Configuration

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



➤ **PCH-IO Configuration**

This screen allows you to set PCH parameters.

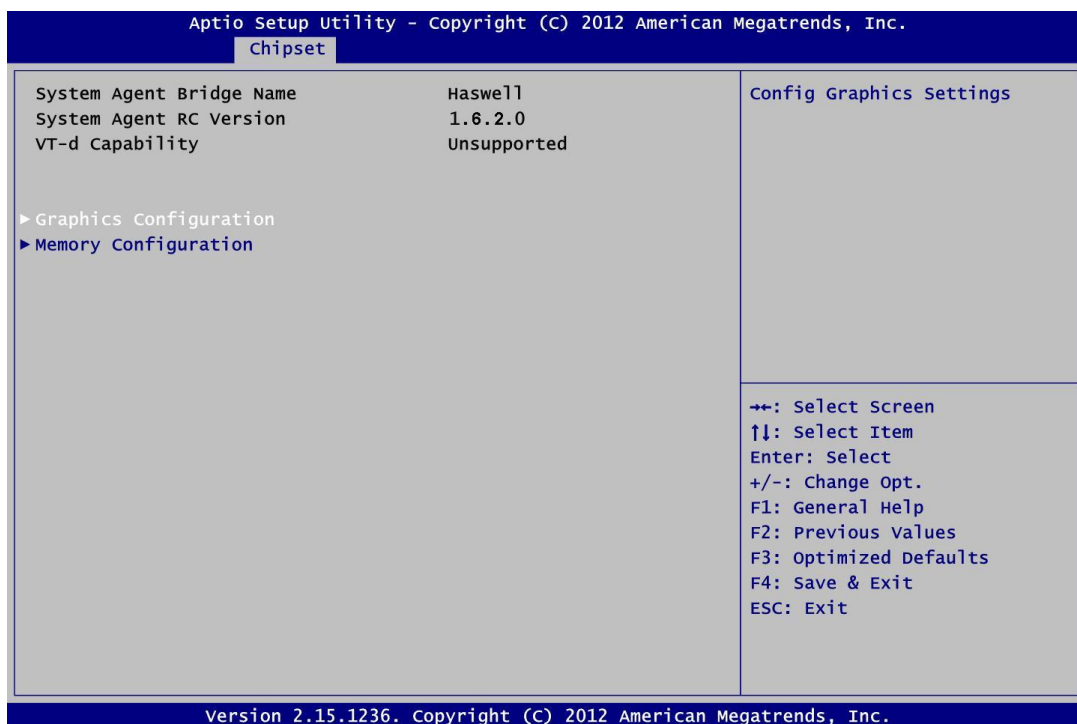


PCH Azalia Configuration

Use this item for PCH Azalia configuration settings.

➤ **System Agent (SA) Configuration**

This screen shows System Agent information and provides function for specifying related parameters. For items marked with “▶”, please press <Enter> for more options.



Graphics Configuration

Use this item for graphics configuration settings.

Memory Configuration

Use this item for memory configuration settings.

➤ **Graphic Configuration**

Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.		
Chipset		
Graphics Configuration		Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx.
IGFX VBIOS Version	2179	
IGFX Frequency	700 MHz	
Primary Display	[Auto]	
Internal Graphics	[Auto]	
Aperture Size	[256MB]	
DVMT Pre-Allocated	[32M]	
DVMT Total Gfx Mem	[256M]	
Gfx Low Power Mode	[Enabled]	
LVDS Panel Type	[800x600 18Bit]	
LVDS Brightness	[70%]	
Primary IGFX Boot Display	[DVI]	
Secondary IGFX Boot Display	[CRT]	
		→ ← : Select Screen ↑ ↓ : Select Item Enter : Select + / - : Change Opt. F1 : General Help F2 : Previous Values F3 : Optimized Defaults F4 : Save & Exit ESC : Exit
Version 2.15.1236 Copyright (C) 2012 American Megatrends, Inc.		

Primary Display

Allow you to select which graphics controller to use as the primary boot device.

Internal Graphic[Auto]

Keep IGD enable based on the setup option.
Configuration options: [Auto] [Disabled] [Enabled].

Aperture Size [256MB]

Set Aperture Size.
Configuration options: [128MB][256MB][512MB]

DVMT Pre-Allocated

Select DVMT pre-allocated memory size.

DVMT Total Gfx Mem

Select DVMT total memory size.

Gfx Low Power Mode[Disable]

This option is applicable for SFF only.
Configuration options: [Disabled] [Enabled].

LVDS Panel Type

Use this item to select LVDS panel used by internal graphics controller by selecting the appropriate setup item.

LVDS Brightness

Select LVDS brightness that ranges from 30% to 100%. The default setting is 70%.

Primary IGFX Boot Display

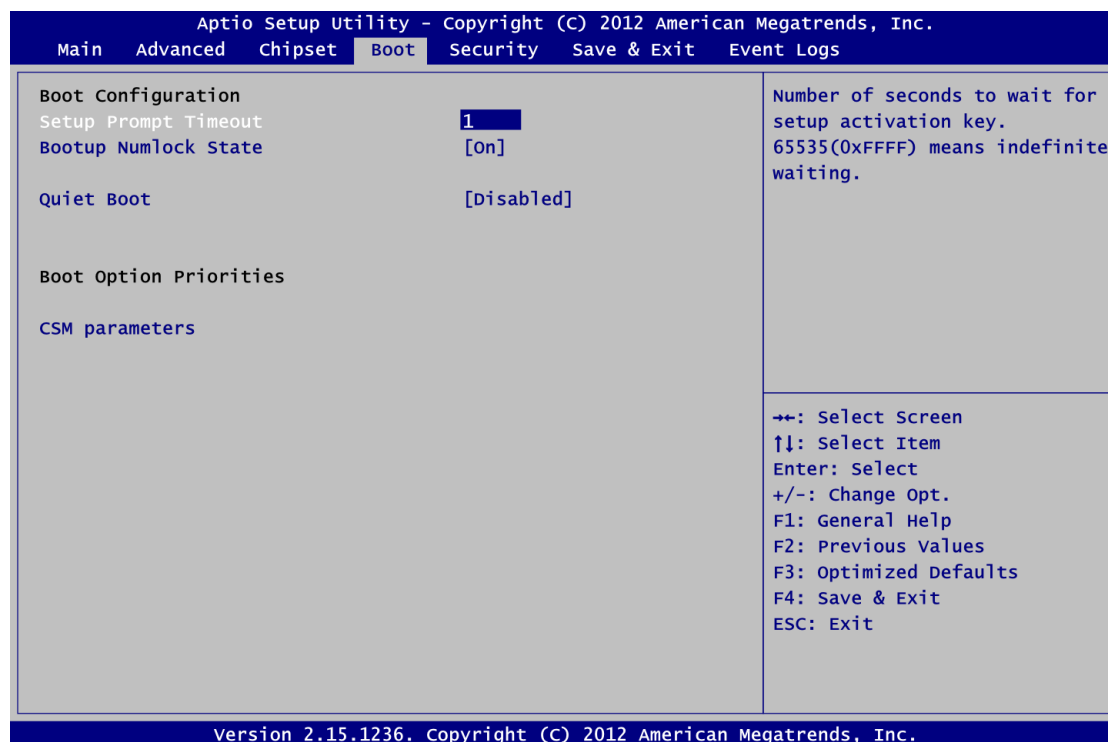
Allow you to select the display device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. Primary IGFX boot display options are: CRT, DVI, LVDS.

Secondary IGFX Boot Display

Use this item to select secondary display device. Secondary IGFX boot display options are: CRT, DVI, LVDS.

5.6 Boot Menu

The Boot menu allows users to change boot options of the system.



Setup Prompt Timeout

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

Bootup NumLock State

Use this item to select the power-on state for the keyboard NumLock.

Quiet Boot

Select to display either POST output messages or a splash screen during boot-up.

Boot Option Priorities

These are settings for boot priority. Specify the boot device priority sequence from the available devices

5.7 Security Menu

The Security menu allows users to change the security settings for the system.



Administrator Password

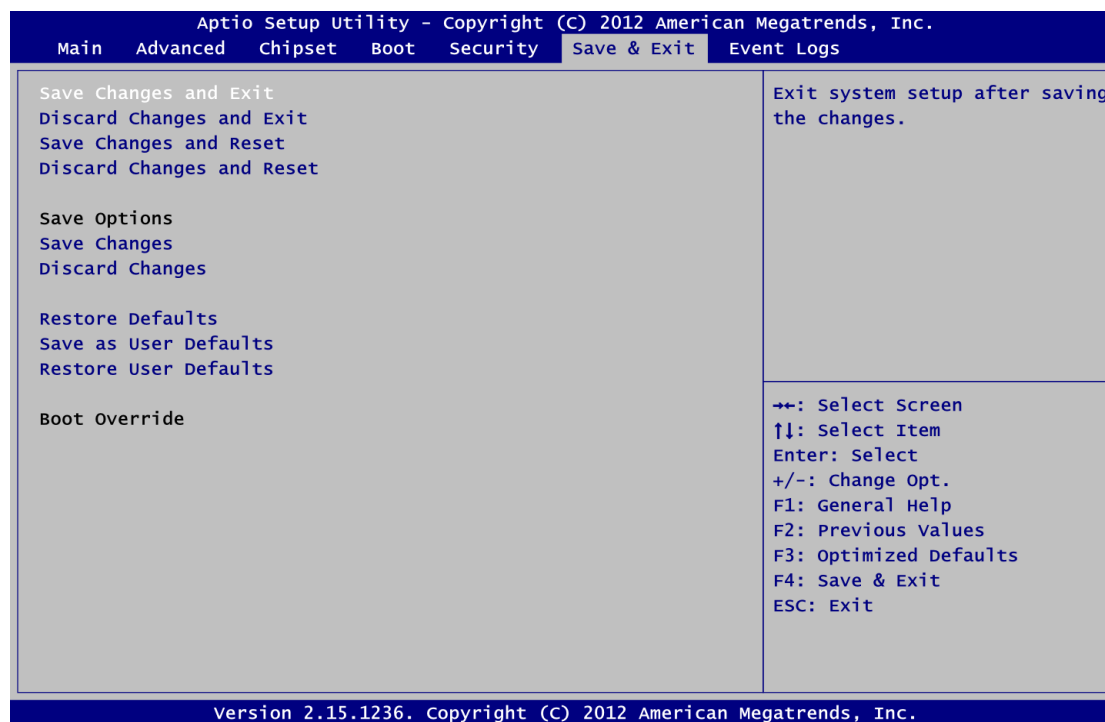
This item indicates whether an administrator password has been set (installed or uninstalled).

User Password

This item indicates whether an user password has been set (installed or uninstalled).

5.8 Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.



Save Changes and Exit

When you have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

Save Changes and Reset

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 Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

Discard Changes and Reset

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

Save Changes

When you have completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

Discard Changes

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

Restore Defaults

It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

Save as User Defaults

Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

Restore User Defaults

It automatically sets all Setup options to a complete set of User Defaults when you select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

Boot Override

Select a drive to immediately boot that device regardless of the current boot order..

Appendix A

Watchdog Timer

About Watchdog Timer

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.

How to Use Watchdog Timer

Start

↓

1. Enable Configuration:

-O 2E 87
-O 2E 87

↓

2. Select Logic device:

-O 2E 07
-O 2F 07

↓

3. Enable WDT:

-O 2E 30
-O 2F 01

↓

4. Activate WDT:

-O 2E F0
-O 2F 80

↓

5. Set base timer:

-O 2E F6
-O 2F 0A ; Set reset time. Ex: A->reset time=10sec

↓

6. Set timer unit (second or minute):

-O 2E F5
-O 2F 71 ; Set timer unit.
; Ex: 1->timer unit=second, 9->timer unit=minute

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Appendix B

Digital I/O

Digital I/O Software Programming

- I2C to GPIO PCA9554PW GPIO[3:0] is input, GPIO[7:4] is output.
- I2C address: 0b0100100x.
- IOBASE: 0xF040
- Registers:

Command byte

Command	Protocol	Function
0	Read byte	Input port register
1	Read/write byte	Output port register
2	Read/write byte	Polarity inversion register
3	Read/write byte	Configuration register

The command byte is the first byte to follow the address byte during a write transmission. It is used as a pointer to determine which of the following registers will be written or read.

Register 0: Input port register.

This register is a read-only port. It reflects the incoming logic levels of the pins, regardless of whether the pin is defined as an input or an output by Register 3. Writes to this register have no effect.

The default 'X' is determined by the externally applied logic level, normally '1' when no external signal externally applied because of the internal pull-up resistors.

Bit	Symbol	Access	Value	Description
7	I7	Read only	X	Determined by externally applied logic level.
6	I6	Read only	X	
5	I5	Read only	X	
4	I4	Read only	X	
3	I3	Read only	X	
2	I2	Read only	X	
1	I1	Read only	X	
0	I0	Read only	X	

Register 1: Output port register.

This register reflects the outgoing logic levels of the pins defined as outputs by Register 3. Bit values in this register have no effect on pins defined as inputs. Reads from this register return the value that is in the flip-flop controlling the output selection, not the actual pin value.

Bit	Symbol	Access	Value	Description
7	O7	R	1*	Reflects outgoing logic levels of pins defined as outputs by Register 3.
6	O6	R	1*	
5	O5	R	1*	
4	O4	R	1*	
3	O3	R	1*	
2	O2	R	1*	
1	O1	R	1*	
0	O0	R	1*	

* : Default value

Register 3: Configuration register.

This register configures the directions of the I/O pins. If a bit in this register is set, the corresponding port pin is enabled as an input with high-impedance output driver. If a bit in this register is cleared, the corresponding port pin is enabled as an output. At reset, the I/Os are configured as inputs with a weak pull-up to V_{DD} .

Bit	Symbol	Access	Value	Description
7	C7	R/W	1*	Configure the directions of the I/O pins. 0 = Corresponding port pin enabled as an output. 1 = Corresponding port pin configured as input (default value).
6	C6	R/W	1*	
5	C5	R/W	1*	
4	C4	R/W	1*	
3	C3	R/W	1*	
2	C2	R/W	1*	
1	C1	R/W	1*	
0	C0	R/W	1*	

* : Default value

Appendix C

Configuring SATA for RAID

Configuring SATA Hard Drive(s) for RAID (Controller: Intel® Q87)

Before you begin the SATA configuration, please prepare:

- Two SATA hard drives (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). If you do not want to create RAID with the SATA controller, you may prepare only one hard drive.

Please follow up the steps below to configure SATA hard drive(s):

1. Install SATA hard drive(s) in your system.
2. Enter the BIOS Setup to configure SATA controller mode and boot sequence.
3. Configure RAID by the RAID BIOS.

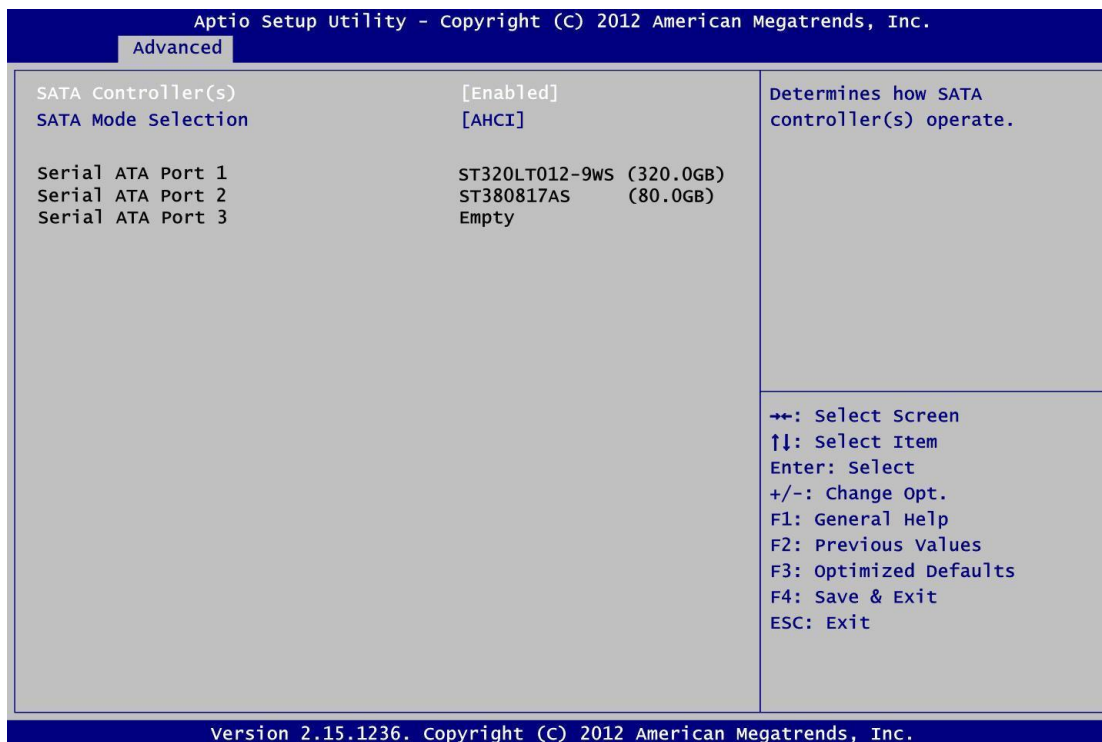
1. Installing SATA hard drive(s) in your system.

Connect one end of the SATA signal cable to the rear of the SATA hard drive, and the other end to available SATA port(s) on the board. Then, connect the power connector of power supply to the hard drive.

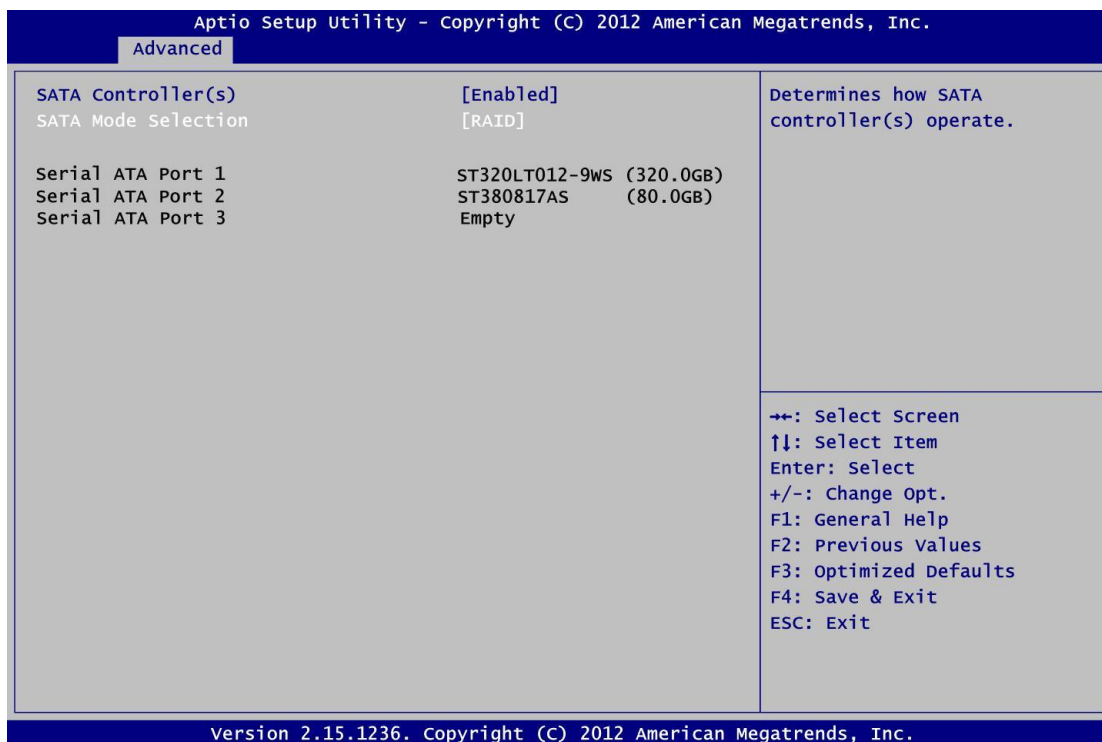
2. Configuring SATA controller mode and boot sequence by the BIOS Setup.

You have to make sure whether the SATA controller is configured correctly by system BIOS Setup and set up BIOS boot sequence for the SATA hard drive(s).

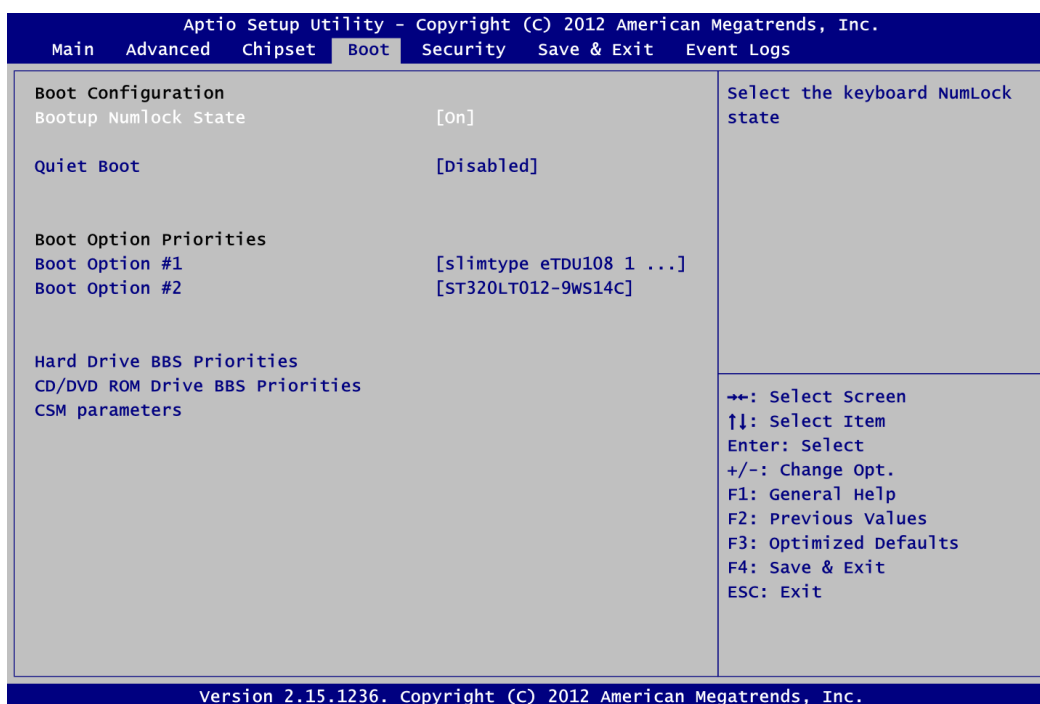
- 2.1. Turn on your system, and then press the button to enter BIOS Setup during running POST (Power-On Self Test). If you want to create RAID, just go to the Advanced Settings menu/SATA Configuration, select the "SATA Mode Selection", and press <Enter> for more options.



A list of options appears, please select "RAID".



2.2. Set DVD-ROM for First Boot Option under the Boot Settings menu to boot DVD-ROM after system restarts.



2.3. Save and exit the BIOS Setup.

3. Configuring RAID by the RAID BIOS.

Enter the RAID BIOS setup utility to configure a RAID array. Skip this step and proceed if you do not want to create a RAID.

- 3.1. After the POST memory testing and before the operating system booting, a message "Press <Ctrl-I> to enter Configuration Utility" shows up, accordingly, press <Ctrl + I> to enter the RAID BIOS setup utility.

```
Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.

RAID Volumes:
ID      Name          Level          Strip          Size  Status  Bootable
0       Volume1        RAID0(Stripe) 128KB         149.1GB Normal  Yes

Physical Devices:
ID      Device Model    Serial #          Size  Type/Status(Vol ID)
4       ST320LT012-9WS14  WOV20YPA        298.0GB Member Disk(0)
5       ST380817AS      5MR1BSS7        74.5GB Member Disk(0)
Press <CTRL-I> to enter Configuration Utility...
```

- 3.2. After you press <Ctrl + I>, the Create RAID Volume screen will appear. If you want to create a RAID array, select the Create RAID Volume option in the Main Menu and press <Enter>.

```
Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.

[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Recovery Volume Options
5. Acceleration Options
6. Exit

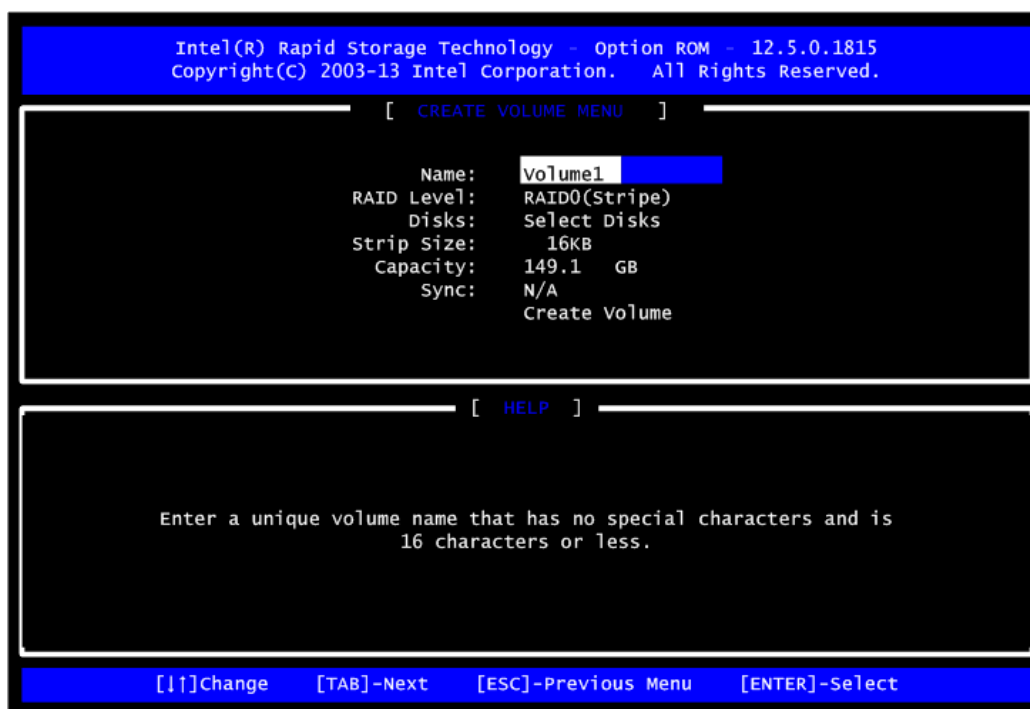
[ DISK/VOLUME INFORMATION ]

RAID Volumes:
None Defined.

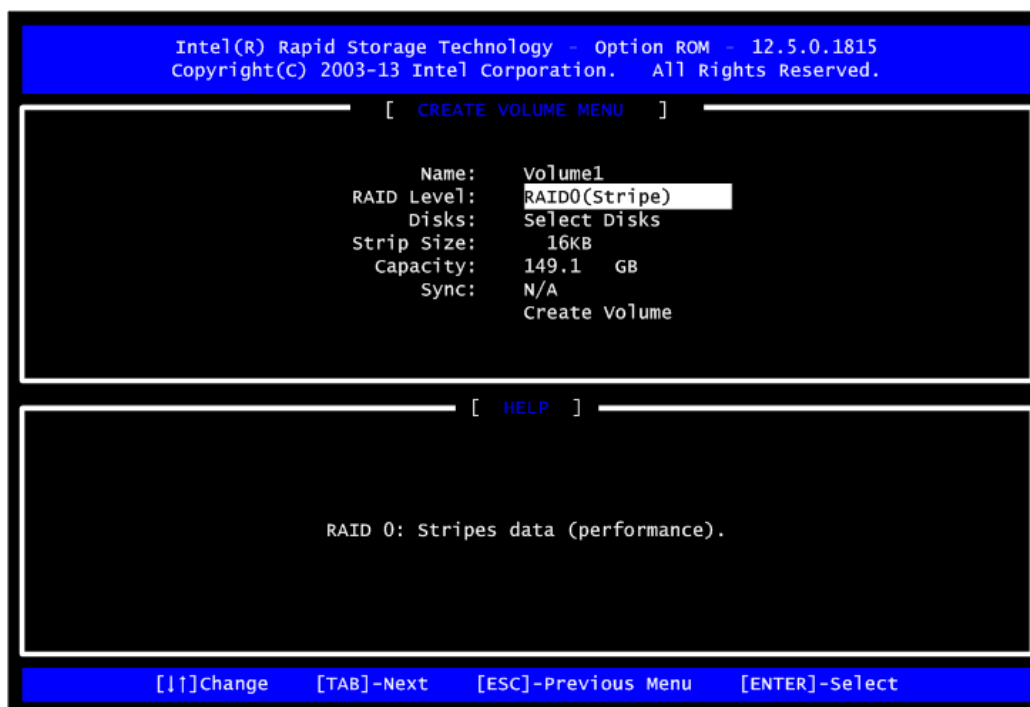
Physical Devices:
ID      Device Model    Serial #          Size  Type/Status(Vol ID)
4       ST320LT012-9WS14  WOV20YPA        298.0GB Non-RAID Disk
5       ST380817AS      5MR1BSS7        74.5GB Non-RAID Disk

[↑↓]-Select [ESC]-Exit [Enter]-Select Menu
```

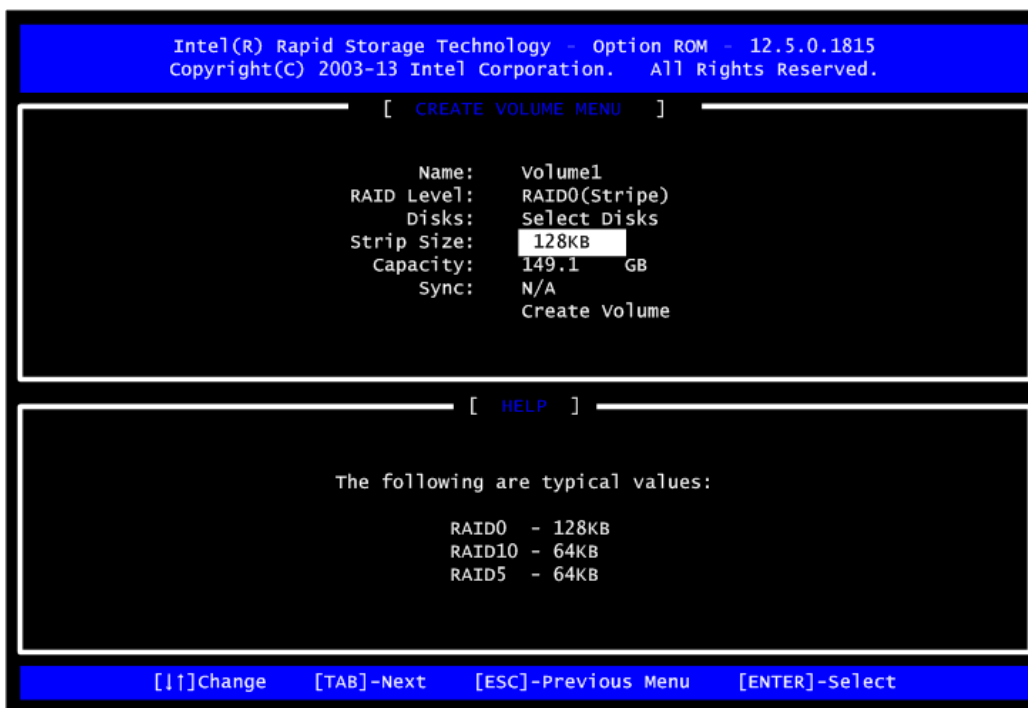

- 3.3. After entering the Create Volume Menu screen, you can type the disk array name with 1~16 letters (letters cannot be special characters) in the item "Name".



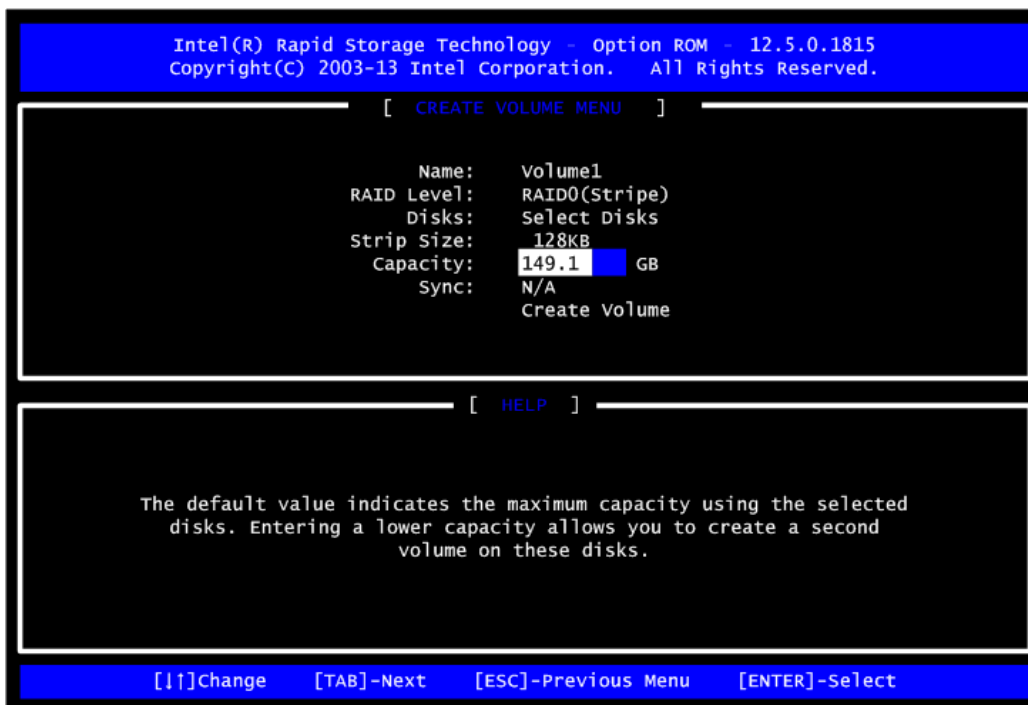
- 3.4. When finished, press <Enter> to select a RAID level. There are three RAID levels: RAID0, RAID1 and RAID5 and RAID10. Select a RAID level and press <Enter>.



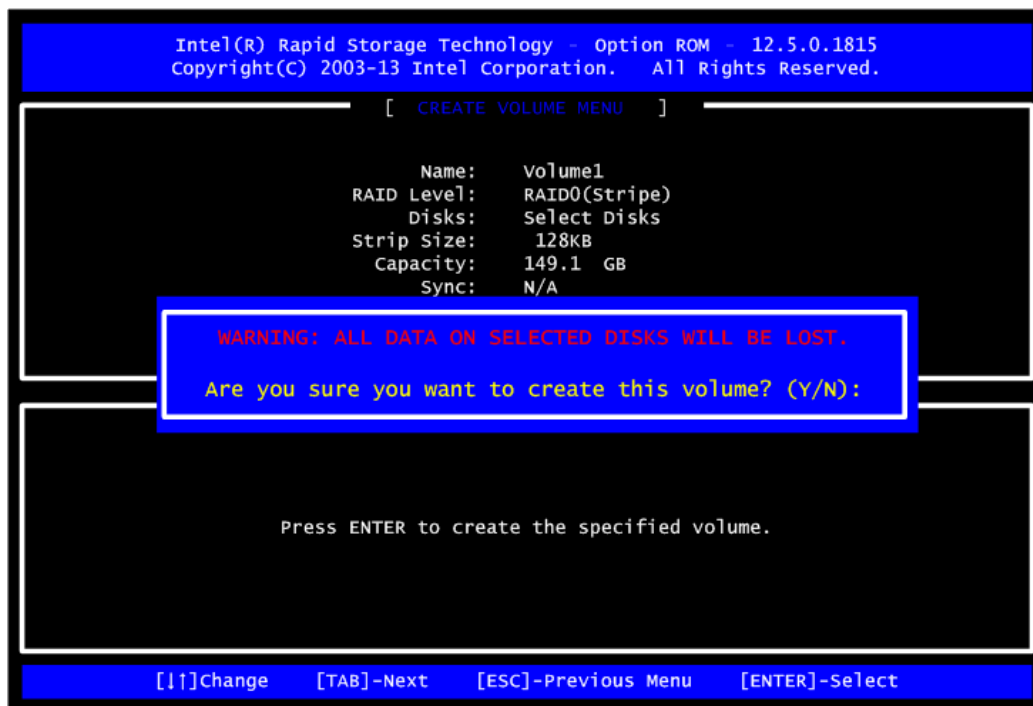
- 3.5. Set the stripe block size. The KB is the standard unit of stripe block size. The stripe block size can be 4KB to 128KB. After the setting, press <Enter> for the array capacity.



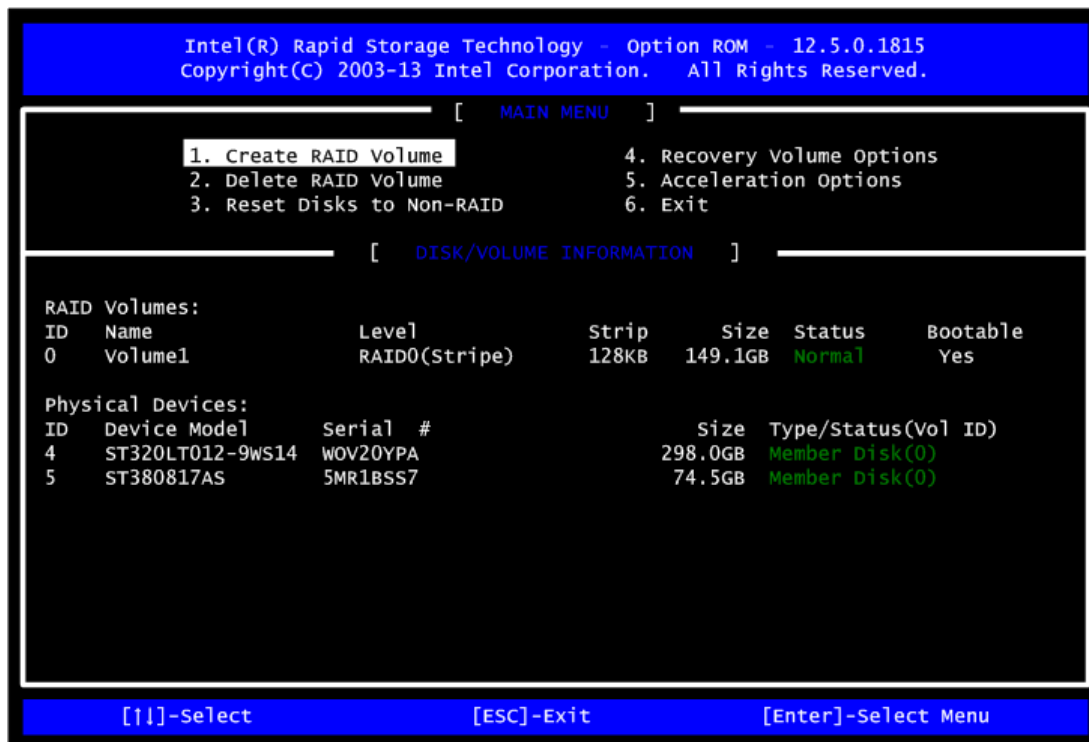
- 3.6. After setting all the items on the menu, select Create Volume and press <Enter> to start creating the RAID array.



3.7. When prompting the confirmation, press <Y> to create this volume, or <N> to cancel the creation.

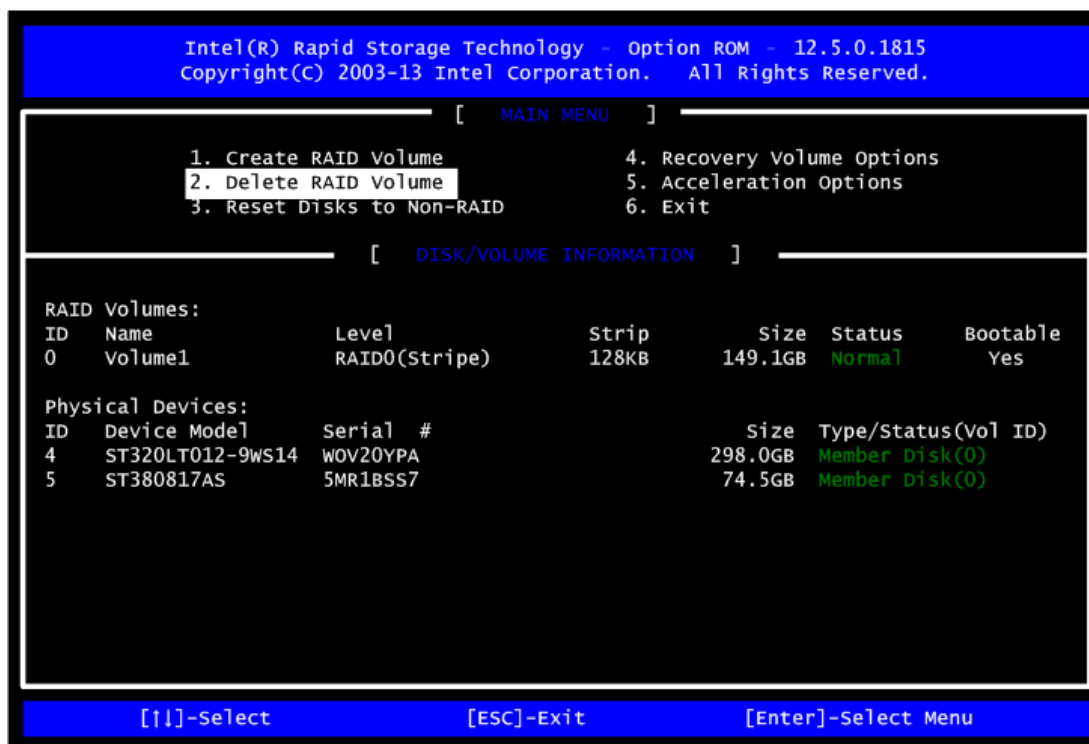


After the creation is completed, you can see detailed information about the RAID Array in the Disk/Volume Information section, including RAID mode, disk block size, disk name, and disk capacity, etc.



Delete RAID volume

If you want to delete a RAID volume, select the Delete RAID Volume option in Main Menu. Press <Enter> and follow on-screen instructions.



Please press <Esc> to exit the RAID BIOS utility. Now, you can proceed to install a SATA driver controller and the operating system.

Appendix D

iAMT Settings

The Intel® Active Management Technology (Intel® iAMT) has decreased a major barrier to IT efficiency that uses built-in platform capabilities and popular third-party management and security applications to allow IT a better discovering, healing, and protection their networked computing assets.

In order to utilize Intel® iAMT you must enter the ME BIOS (<Ctrl + P> during system startup), change the ME BIOS password, and then select “Intel® iAMT” as the manageability feature.

Entering MEBx

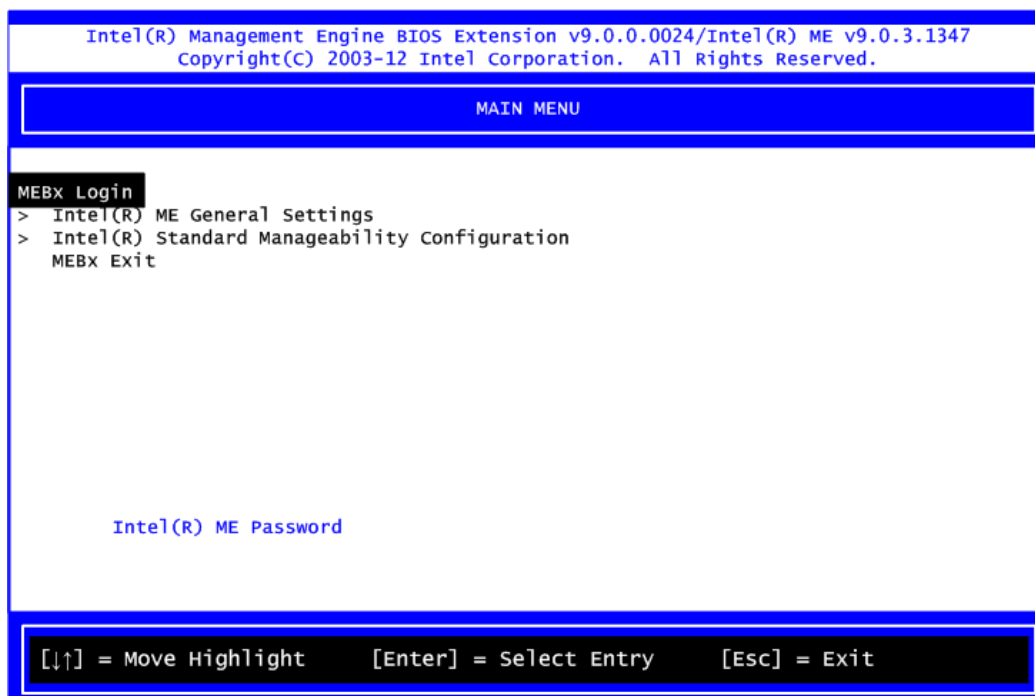
1. You must go to BIOS to enable iAMT function.
2. Exit from BIOS after starting iAMT, and press <Ctrl + P> to enter MEBx Setting.



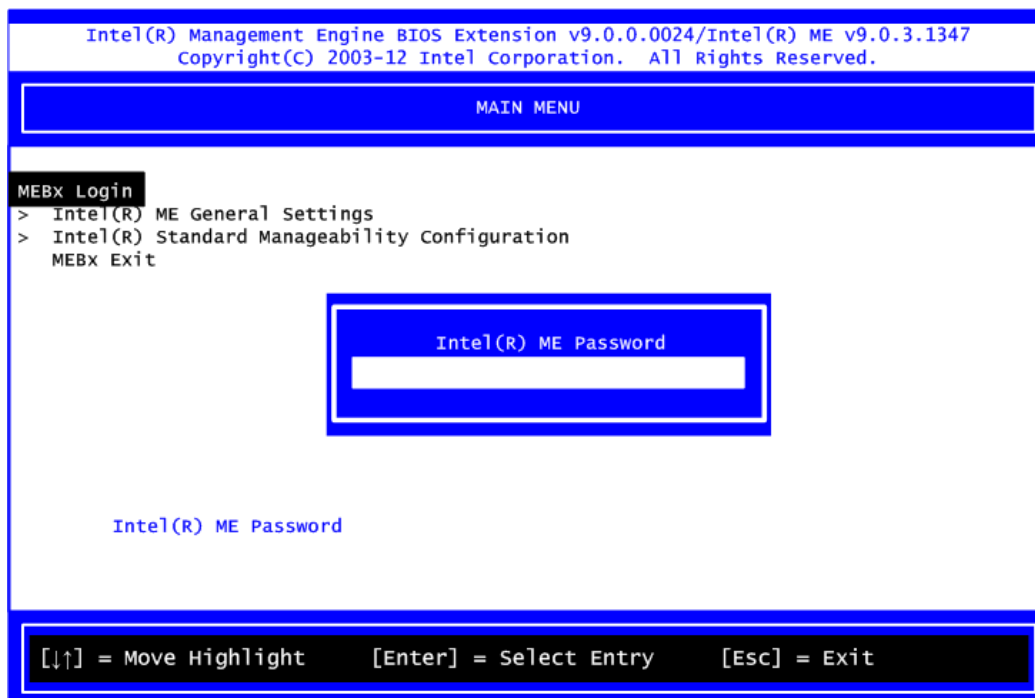
Note: It is better to press <Ctrl + P> before the screen popping out.

Set and Change Password

1. You will be asked to set a password when first log in. The default password is “admin”.



- You will be asked to change the password before setting ME.



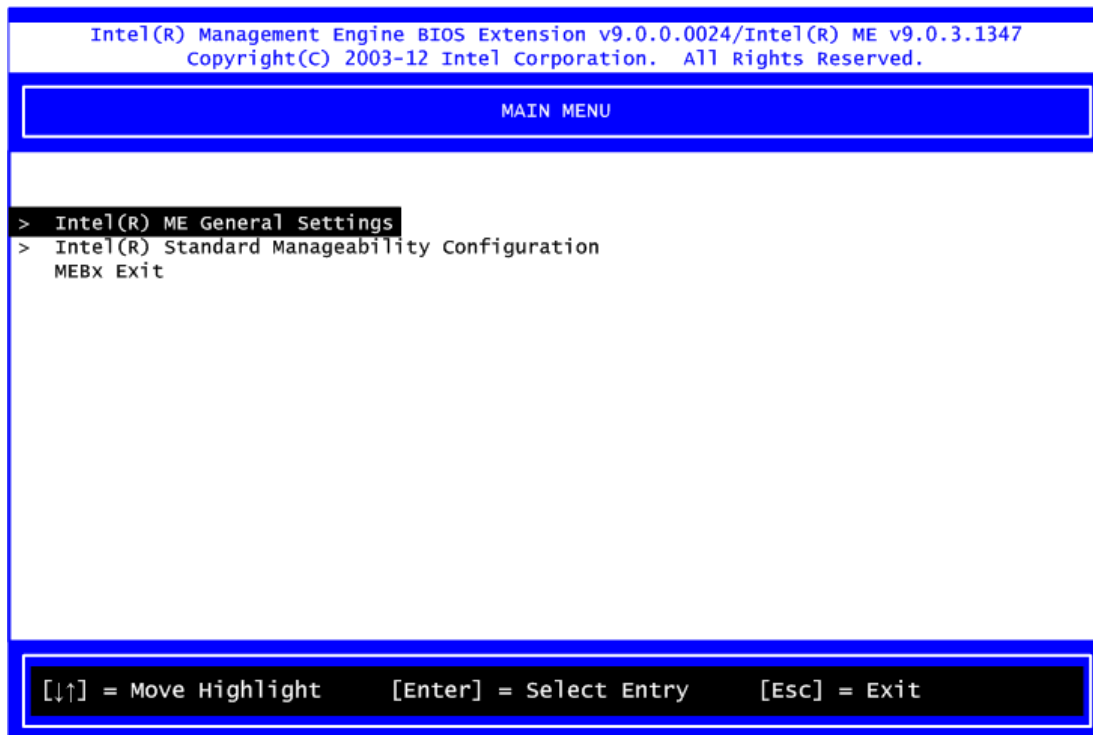
- You must confirm your new password while revising. The new password must contain: (example: **!!11qqQQ**) (default value).

- Eight characters
- One upper case
- One lower case
- One number
- One special symbol, such as ! , ` \$ or ; , (, " , , excepted)

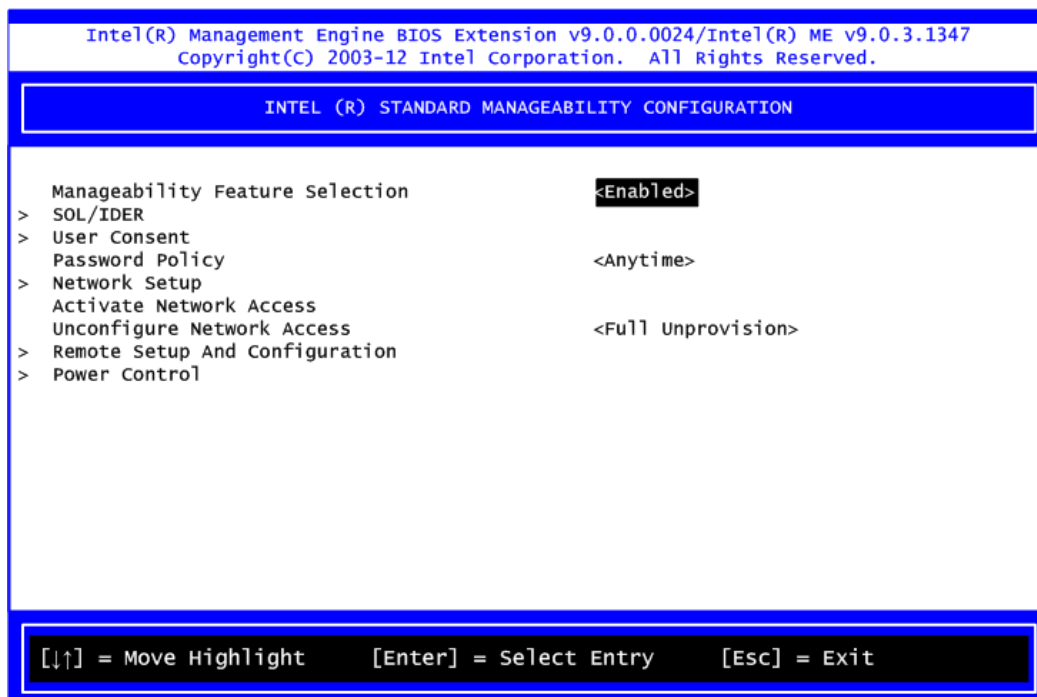
Underline (_) and space are valid characters for password, but they won't make higher complexity.

iAMT Settings

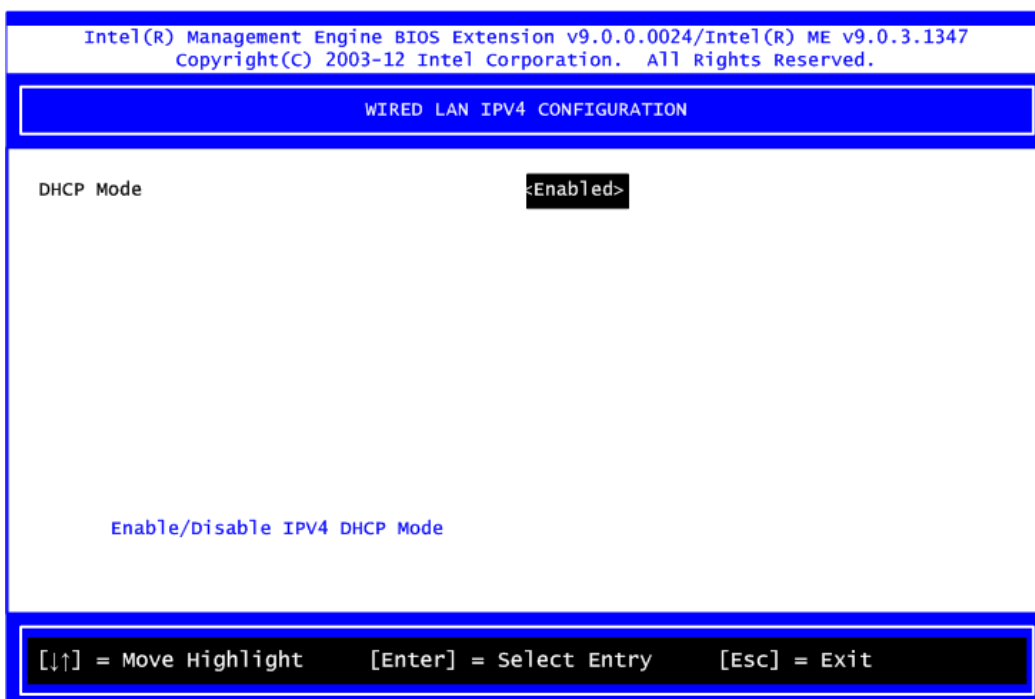
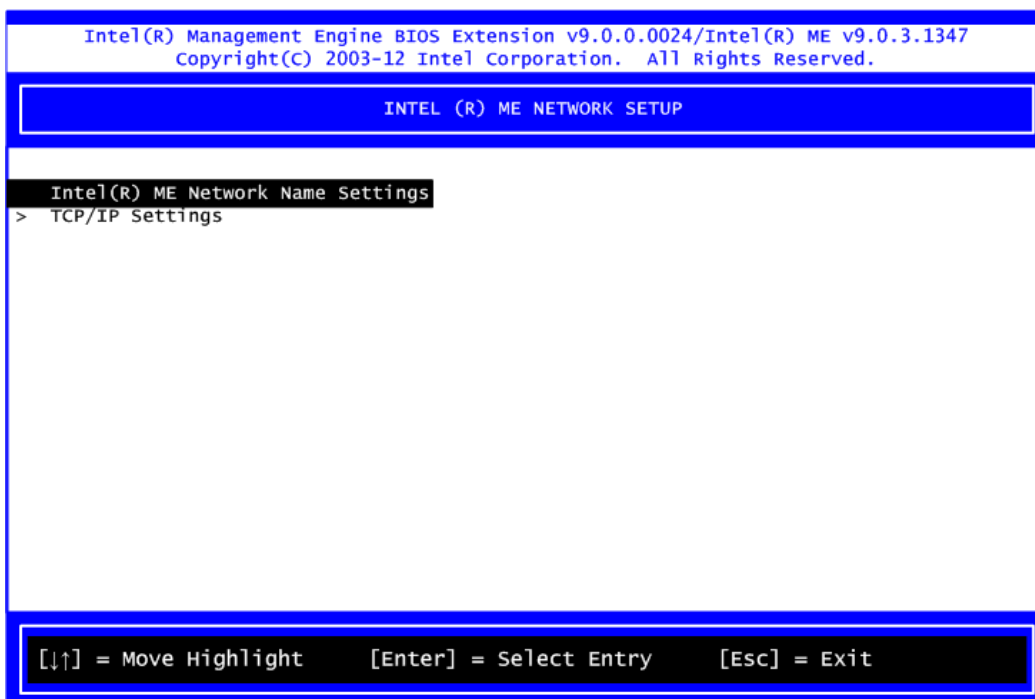
Select Intel® iAMT configuration and press <Enter>.



1. Select Network Setup to configure iAMT.

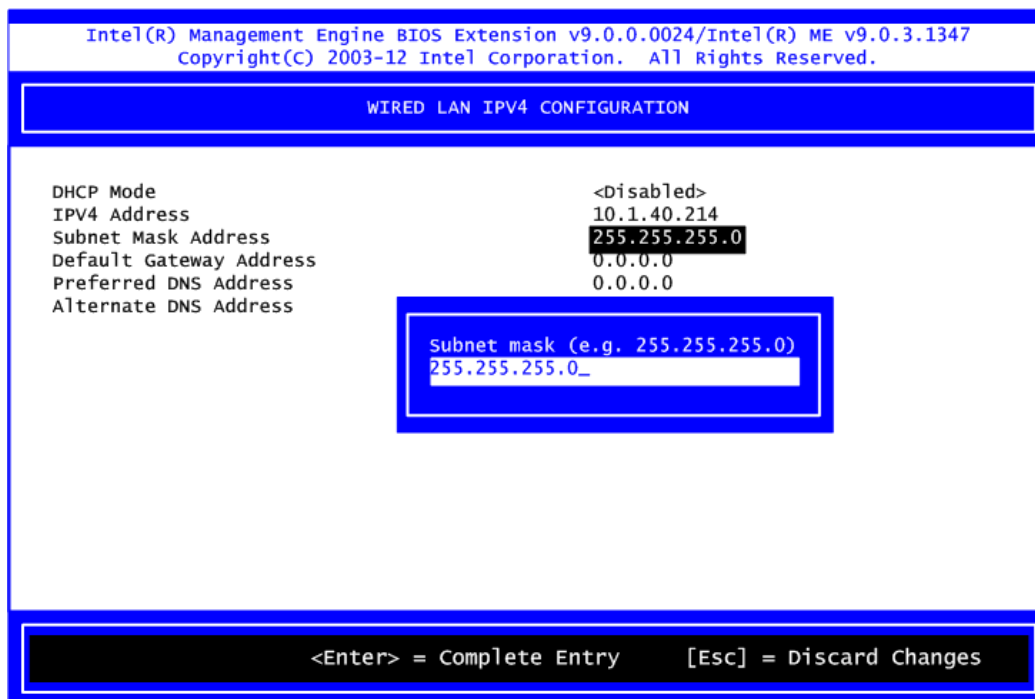


2. Select TCP/IP to get into Network interface and set it to Enabled. Get into DHCP Mode and set it to Disabled.

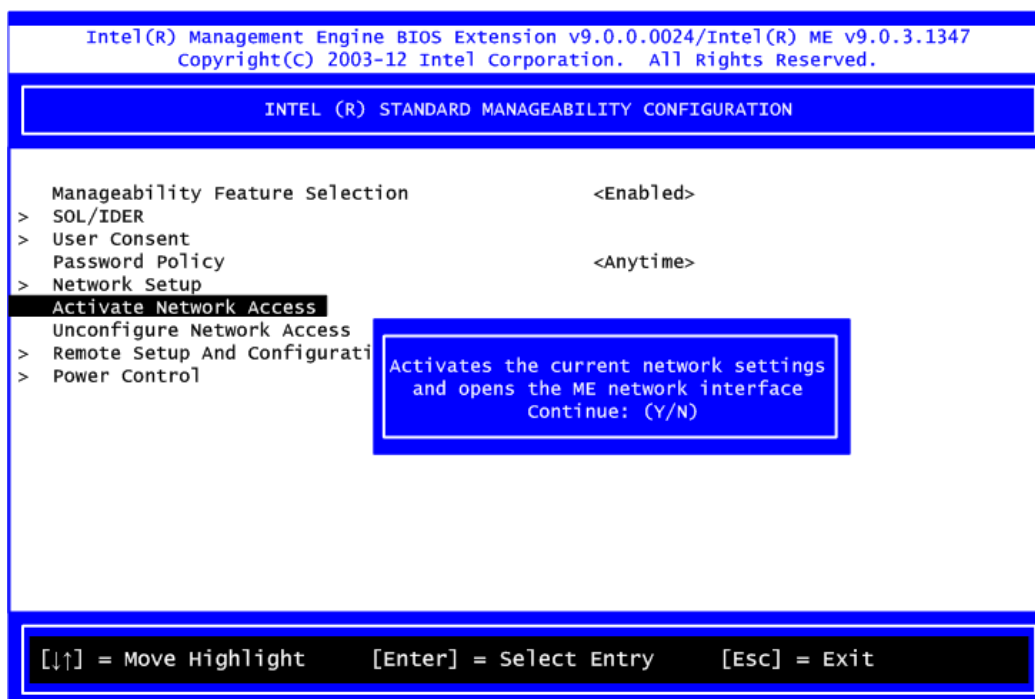


3. If DHCP Mode is disabled, set the following settings:

- IP address
- Subnet mask



4. Go back to Intel® iAMT Configuration, then select Activate Network Access and press <Enter>.

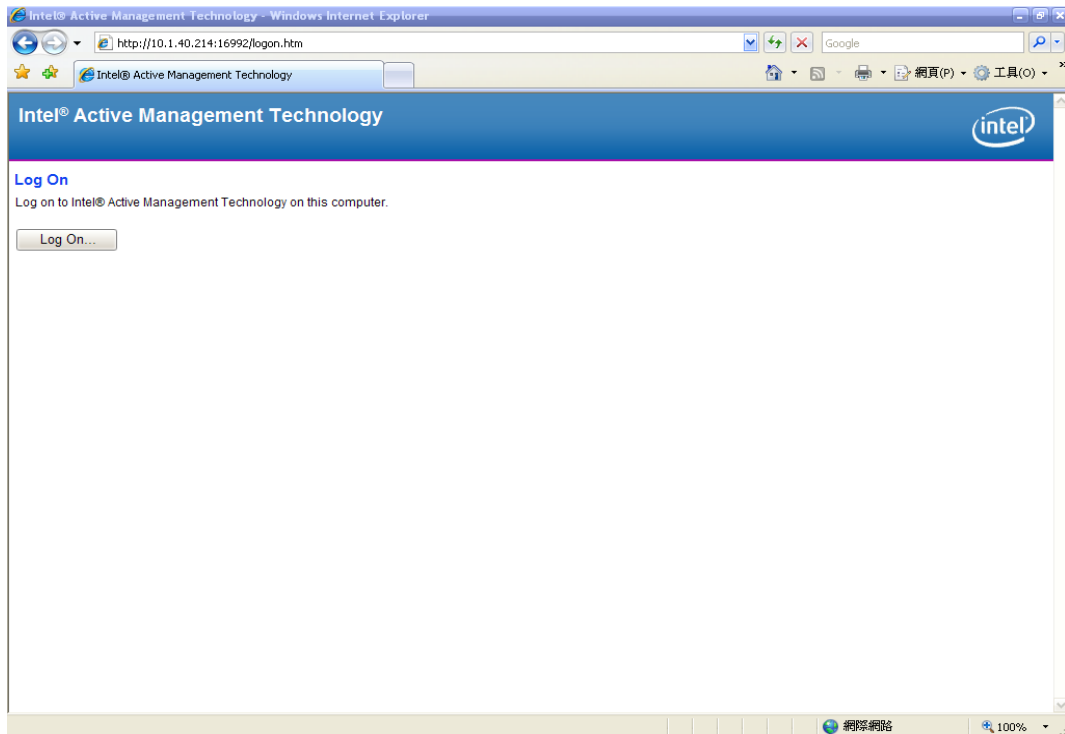


5. Exit from MEBx after completing the iAMT settings.

iAMT Web Console

1. From a web browser, please type [http://\(IP ADDRESS\):16992](http://(IP ADDRESS):16992), which connects to iAMT Web.

Example: <http://10.1.40.214:16992>

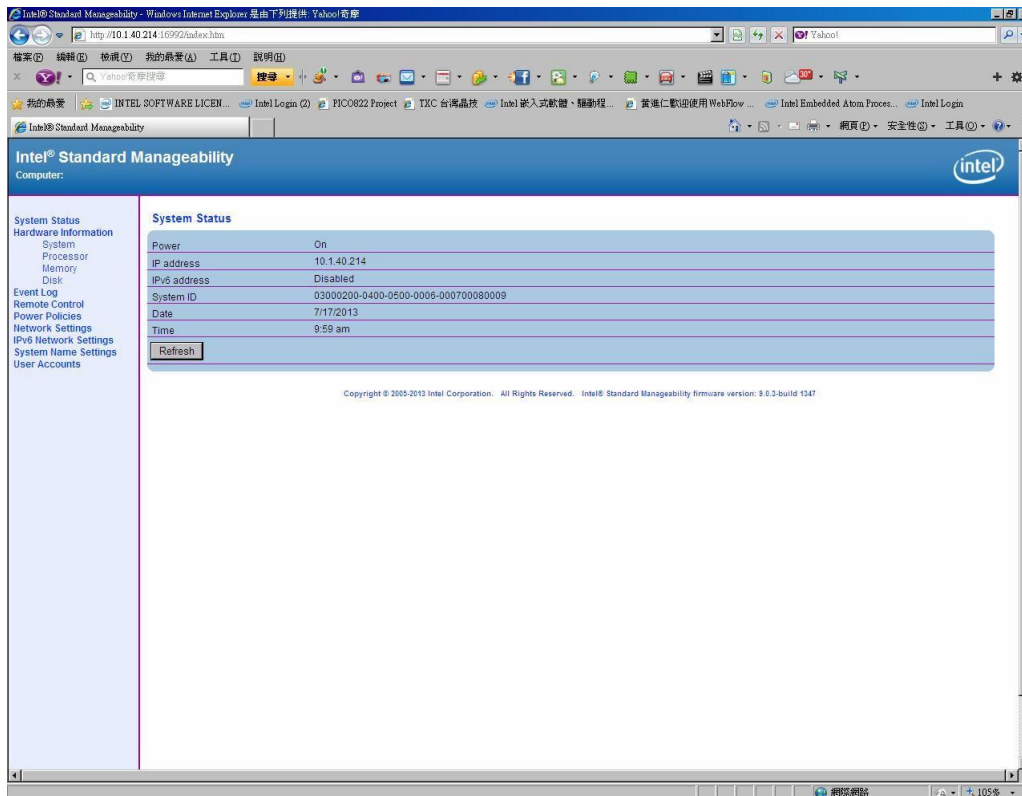


2. To log on, you will be required to type in username and password for access to the Web.

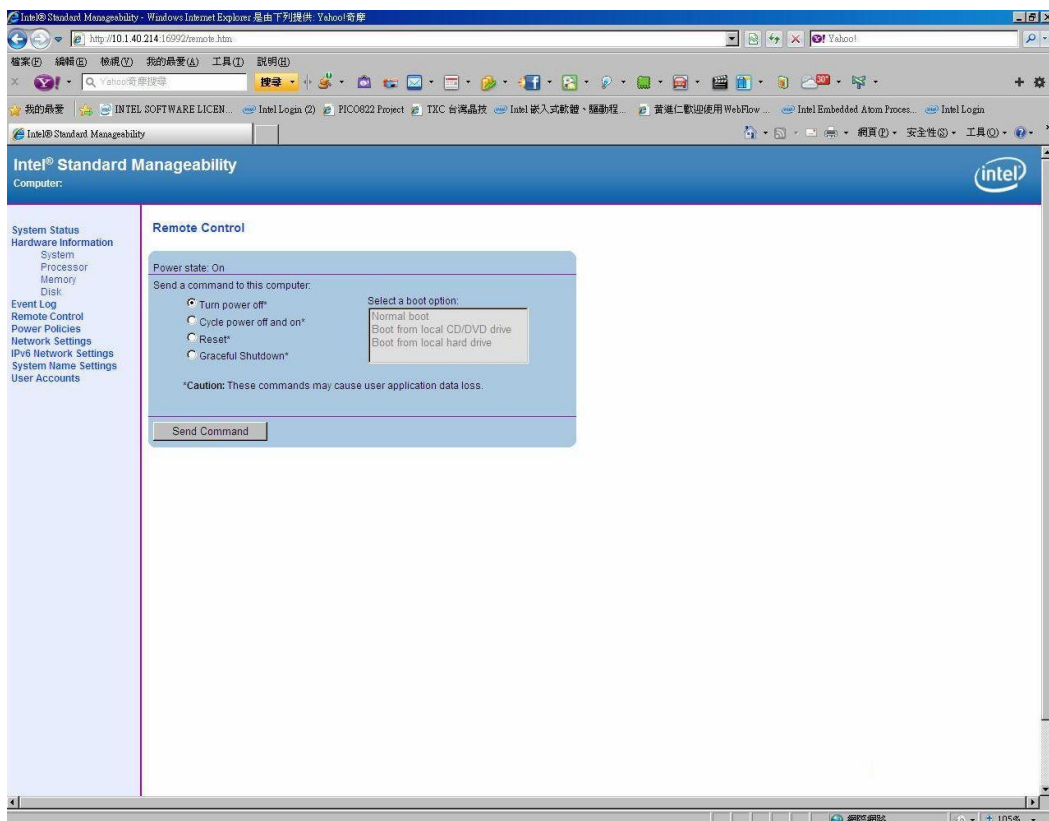
USER: admin (default value)

PASS: (MEBx password)

3. Enter the iAMT Web.



4. Click Remote Control, and select commands on the right side.



5. When you have finished using the iAMT Web console, close the Web browser.

Appendix E

PICMG[®] v1.3 Interface Definition

x16 PCIe Connector A			X8 PCIe Connector B		
No.	Side B	Side A	No.	Side B	Side A
1	N.C	N.C	1	+5Vaux	+5Vaux
2	GND	GND	2	GND	N.C
3	N.C	N.C	3	a_PETp8	GND
4	N.C	N.C	4	a_PETn8	GND
5	N.C	WAKE#	5	GND	a_PERp8
6	PWRBT#	PME#	6	GND	a_PERn8
7	PWRGD	PSON#	7	a_PETp9	GND
8	SHB_RST#	PERST#	8	a_PETn9	GND
9	CFG0	CFG1	9	GND	a_PERp9
10	CFG2	CFG3	10	GND	a_PERn9
11	RSVD	GND	11	N.C	GND
Mechanical Key			Mechanical Key		
12	GND	N.C	12	GND	N.C
13	b_PETp0	GND	13	a_PETp10	GND
14	b_PETn0	GND	14	a_PETn10	GND
15	GND	b_PERp0	15	GND	a_PERp10
16	GND	b_PERn0	16	GND	a_PERn10
17	b_PETp1	GND	17	a_PETp11	GND
18	b_PETn1	GND	18	a_PETn11	GND
19	GND	b_PERp1	19	GND	a_PERp11
20	GND	b_PERn1	20	GND	a_PERn11
21	b_PETp2	GND	21	a_PETp12	GND
22	b_PETn2	GND	22	a_PETn12	GND
23	GND	b_PERp2	23	GND	a_PERp12
24	GND	b_PERn2	24	GND	a_PERn12
25	b_PETp3	GND	25	a_PETp13	GND
26	b_PETn3	GND	26	a_PETn13	GND

Mechanical Key			27	GND	a_PERp13
27	GND	b_PERp3	28	GND	a_PERn13
28	GND	b_PERn3	Mechanical Key		
29	REFCLK0+	GND	29	a_PETp14	GND
30	REFCLK0-	GND	30	a_PETn14	GND
31	GND	REFCLK1+	31	GND	a_PERp14
32	RSVD	REFCLK1-	32	GND	a_PERn14
33	REFCLK2+	GND	33	a_PETp15	GND
34	REFCLK2-	GND	34	a_PETn15	GND
35	GND	REFCLK3+	35	GND	a_PERp15
36	RSVD	REFCLK3-	36	GND	a_PERn15
37	REFCLK4+	GND	37	N.C	GND
38	REFCLK4-	GND	38	N.C	N.C
39	GND	N.C	39	GND	GND
40	RSVD	N.C	40	GND	GND
41	N.C	GND	41	GND	GND
42	N.C	GND	42	GND	GND
43	GND	N.C	43	GND	GND
44	GND	N.C	44	+12V	+12V
45	a_PETp0	GND	45	+12V	+12V
46	a_PETn0	GND	46	+12V	+12V
47	GND	a_PERp0	47	+12V	+12V
48	GND	a_PERn0	48	+12V	+12V
49	a_PETp1	GND	49	+12V	+12V
50	a_PETn1	GND			
51	GND	a_PERp1			
52	GND	a_PERn1			
53	a_PETp2	GND			
54	a_PETn2	GND			
55	GND	a_PERp2			
56	GND	a_PERn2			
57	a_PETp3	GND			

Mechanical Key		
58	a_PETn3	GND
59	GND	a_PERp3
60	GND	a_PERn3
61	a_PETp4	GND
62	a_PETn4	GND
63	GND	a_PERp4
64	GND	a_PERn4
65	a_PETp5	GND
66	a_PETn5	GND
67	GND	a_PERp5
68	GND	a_PERn5
69	a_PETp6	GND
70	a_PETn6	GND
71	GND	a_PERp6
72	GND	a_PERn6
73	a_PETp7	GND
74	a_PETn7	GND
75	GND	a_PERp7
76	GND	a_PERn7
77	N.C	GND
78	+3.3V	+3.3V
79	+3.3V	+3.3V
80	+3.3V	+3.3V
81	+3.3V	+3.3V
82	RSVD	RSVD



Note: Please contact your vendor to get the backplane design guide if it's required. The backplane design guide is NDA required.

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