AXIOMTEK

SHB130 Series

Intel® Socket 1150 Core™ i7 / Core™
i5 / Core™ i3 Processor
PICMG® v1.3 Full-size CPU Card

User's Manual

RoHS

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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.

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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Chapter 1
Introduction

The SHB130 PICMG® v1.3 full-size Single Board Computer supports LGA1150 socket for Intel® Core™ i7 desktop processor, i5 desktop processor, i3 desktop processor with 22nm technology and transfer rate 1333/1600MHz. The board integrates Intel® Q87 chipset that delivers outstanding system performance through high-bandwidth interfaces, multiple I/O functions for interactive applications and various embedded computing solutions. There are two 240-pin DDR3 DIMM sockets for dual channel DDR3/L 1333/1600 with maximum memory capacity up to 16GB. The board also features dual Gigabit Ethernet and six SATA 6Gb/s with SATA RAID 0/1/5/10 by PCH. Ten USB 2.0 and four USB 3.0 high speed compliant ports and built-in Intel® HD Audio Digital Header can achieve the best stability and reliability for industrial applications.

1.1   Features

- LGA1150 socket 4th Generation Intel® Core™ processors up to 65W
- Intel® Q87 PCH
- 2 DDR3/L unbuffered DIMM max. up to 16GB memory capacity
- Intel® iAMT 9.0 and TPM supported (optional)
- PCIe Gen. 3 at 8GT/s supported
- DVI-D and VGA or DisplayPort dual display
- USB 3.0 supported

1.2   Specifications

● **CPU**
  ■ Intel® Core™ i7 desktop processor.
  ■ Intel® Core™ i5 desktop processor.
  ■ Intel® Core™ i3 desktop processor.
  ■ CPU TDP up to 65W

● **System Chipset**
  ■ Intel® Q87.

● **CPU Socket**
  ■ LGA1150 Socket.

● **DRAM Transfer Rate**
  ■ 1333/1600MHz.

● **BIOS**
  ■ AMI BIOS via SPI interface with socket.

● **System Memory**
  ■ Two 240-pin DDR3/L 1333/1600MHz DIMM sockets.
  ■ Maximum up to 16GB DDR3/L memory.

● **L1, L2, L3 Cache: Integrated in CPU**

● **Onboard Multi I/O**
  ■ Parallel port: One 26-pin 2.54 pitch box-header, SPP/EPP/ECP supported.
  ■ Serial ports: Four RS-232 ports with 10-pin, 2.54 pitch box-header (COM2/3/4/5) and one RS-232/422/485 port with 10-pin, 2.54 pitch box-header (COM1).

● **USB Interface**
  ■ Four USB ports compliant with USB Spec. Rev. 3.0 (2 ports on rear I/O, 2 ports onboard).
  ■ Ten USB ports compliant with USB Spec. Rev. 2.0 (6 ports onboard, 4 ports on SHB connector-C golden fingers).

● **Onboard Graphic**
  ■ Intel® Arrandale integrated a Graphic processing unit processor which goes with Q87 chipset supporting VGA, DisplayPort (co-layout with VGA) and DVI-D.
  ■ Memory size: Intel® DVMT 5.0 supported; preallocated memory for frame buffer option as OS option:
  Windows® XP:
  For total system memory < 1GB,
  Graphics sharing memory = 128MB maximum;
  For 1GB to 1.5GB total system memory,
  Graphics sharing memory = 512MB maximum;
  For 1.5GB to 2GB total system memory,
  Graphics sharing memory = 768MB maximum;
  For 2GB and above total system memory,
  Graphics sharing memory = 1GB maximum.
  Windows® Vista:
  Graphics sharing memory maximum up to 0.5* (OS Ram size – 512).

- 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 15-pin D-Sub connector on the edge; CRT always ON supported.

- **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**
  - Six SATA 3.0 ports (6Gb/s performance) with SATA RAID 0/1/5/10 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 SHB130.

- **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.

- **Dimensions**
  - 338mm x 126mm.

- **Expansion Interface**
  - One PCI-Express x16 (Gen.3).
  - One PCI-Express x4 (or four PCI-Express x1) (Gen.2).
  - Four PCI.

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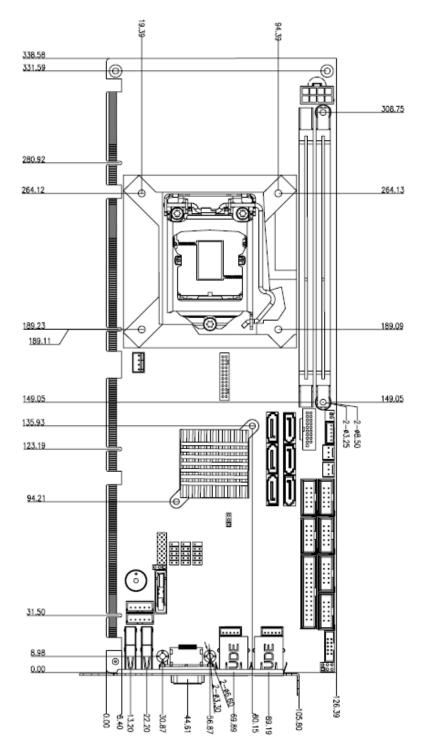
1.3   Utilities Supported

- Intel® Q87 utility and drivers
- VGA drivers
- Audio utility and drivers
- Ethernet utility and drivers
- RAID utility
- iAMT utility and drivers
- TPM utility
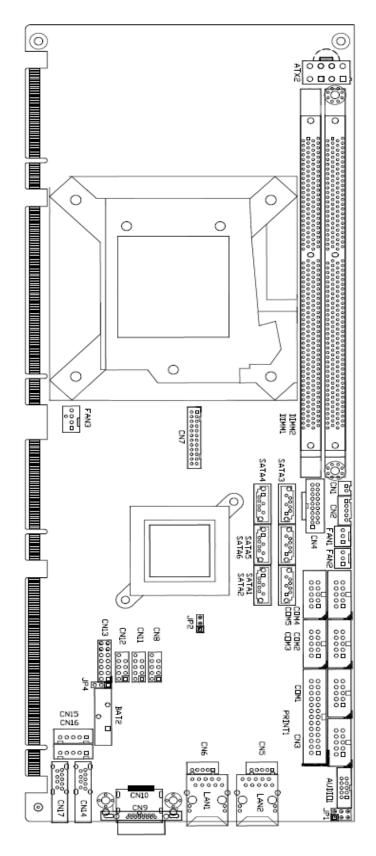
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Chapter 2
Board and Pin Assignments

2.1 Board Dimensions and Fixing Holes
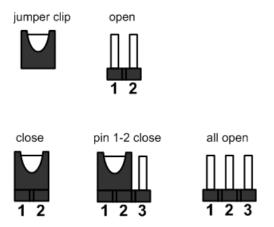
2.2 Board Layout

2.3   Jumper Settings

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. The following illustration shows how to set up jumper.

Before applying power to SHB130 Series, please make sure all of the jumpers are in factory default position. Below you can find a summary table and onboard default settings.

Jumper	Description	Setting
JP1	Audio Amplifier Selection Default: Disable	1-3, 2-4 Close
JP2	Restore BIOS Optimal Defaults Default: Normal Operation	1-2 Close
JP4	Auto Power On Default: Disable	1-2 Close

2.3.1 Audio Amplifier Selection (JP1)

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 (JP2)

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 (JP4)

If JP4 is enabled for AC power input, the system will be automatically power on without pressing soft power button. If JP4 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

2.4 Connectors

Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows all connectors on the hardware.

Connector	Description
CN1	External Temperature Sensor Connector (Optional)
CN2	SMBus Connector
CN3	Digital I/O Connector
CN4	Internal USB 3.0 Port 1 and 2 Connector
CN5~CN6	LAN2~LAN1 External LED Connectors
CN7	DVI-D Connector
CN8, CN11, CN12	Internal USB 2.0 Port 6 and 7, Port 8 and 9, Port 2 and 3 Connectors
CN9	VGA Connector
CN10	DisplayPort Connector (Optional)
CN13	Front Panel Connector
CN14, CN17	External USB 3.0 Port 4 and 3 Connectors
CN15	Internal Mouse Connector
CN16	Internal Keyboard Connector
FAN1	System Fan Connector
FAN2	Auxiliary Fan Connector
FAN3	CPU Fan Connector
LAN1	Ethernet Port 1 (i217LM)
LAN2	Ethernet Port 2 (i210AT)
PRINT1	Parallel Port
SATA1~SATA6	Serial ATA 3.0 port 1~port 6 Connectors
COM1~COM5	COM1~COM5 Connectors
AUDIO1	Audio Connector
ATX2	Power Connector
DIMM1~DIMM2	DDR3/L DIMM Connectors

2.4.1   External Temperature Sensor Connector (CN1) (Optional)

This is a 2-pin connector for external temperature sensor (NTC thermistor) interface. The thermistor value should be 10K and its B value is 3435K.

Pin	Signal
1	Sensor Input
2	GND

2.4.2   SMBus Connector (CN2)

The SMBus interface is available through this connector.

Pin	Signal
1	CLOCK
2	N.C
3	GND
4	DATA
5	+5V

2.4.3   Digital I/O Connector (CN3)

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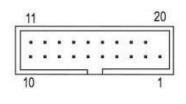
Pin	Signal	Pin	Signal
1	DIO 1	2	DIO 8
3	DIO 2	4	DIO 7
5	DIO 3	6	DIO 6
7	DIO 4	8	DIO 5
9	GND	10	GND

2.4.4   Internal USB 3.0 Connector (CN4)

The CN4 is an internal connector for USB 3.0 interface.

Pin	Signal	Pin	Signal
1	VBUS0		
2	SSRX0-	19	VBUS1
3	SSRX0+	18	SSRX1-
4	GND	17	SSRX1+
5	SSTX0-	16	GND
6	SSTX0+	15	SSTX1-
7	GND	14	SSTX1+
8	USB0-	13	GND
9	USB0+	12	USB1-
10	ID	11	USB1+

2.4.5   LAN External LED Connectors (CN5 and CN6)

The LAN2 and LAN1 external LED interfaces are available through CN5 and CN6, respectively.
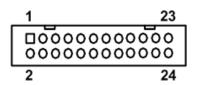
Pin	Signal
1	+3.3V
2	LINK_ACT LED(-)
3	100, Low Active
4	+3.3V
5	1000, Low Active

2.4.6   DVI-D Connector (CN7)

The board comes with a 24-pin box-header for DVI-D interface.

Pin	Signal	Pin	Signal
1	Data2-	2	Data2+
3	GND	4	N.C.
5	N.C.	6	DDC CLK
7	DDC Data	8	N.C.
9	Data1-	10	Data1+
11	GND	12	N.C.
13	N.C.	14	+5V
15	GND	16	HPD
17	Data0-	18	Data0+
19	GND	20	N.C.
21	N.C.	22	GND
23	Clock+	24	Clock-

2.4.7　　　Internal USB 2.0 Connectors (CN8, CN11 and CN12)

These are internal connectors for USB 2.0 interfaces.
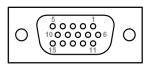
Pin	Signal	Pin	Signal
1	USB_PWR	2	USB_PWR
3	USB -	4	USB -
5	USB +	6	USB +
7	GND	8	GND
		10	GND

CN8(USB port 6 and 7),
CN11(USB port 8 and 9),
CN12(USB port 2 and 3)

2.4.8　　　VGA Connector (CN9)

The CN9 is a 15-pin D-Sub connector which is commonly used for CRT monitor.
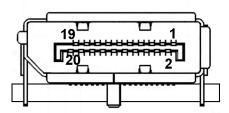
Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	N.C.
5	GND	6	DETECT
7	GND	8	GND
9	VCC	10	GND
11	N.C.	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync
15	DDC CLK		

2.4.9 DisplayPort Connector (CN10) (Optional)
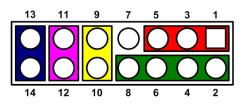
DisplayPort (digital display interface standard) is available through connector CN10. Note that connector CN10 is co-layout with VGA port (CN9).

Pin	Signal
1	LANE0
2	GND
3	LANE0#
4	LANE1
5	GND
6	LANE1#
7	LANE2
8	GND
9	LANE2#
10	LANE3
11	GND
12	LANE3#
13	HDMI_DET
14	GND
15	AUX CH
16	GND
17	AUX CH#
18	Hot Plug Detect
19	GND
20	DP_PWR(3.3V)

2.4.10   Front Panel Connector (CN13)

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
Pin 1 connects anode(+) of LED and pin 5 connects cathode(-) of LED. The power LED lights up when the system is powered on. The pin 3 is defined as GND.

External Speaker and Internal Buzzer
Pin 2, 4, 6 and 8 connect the case-mounted speaker unit or internal buzzer. While connecting the CPU board to an internal buzzer, please set pin 2 and 4 closed; while connecting to an external speaker, you need to set pins 2 and 4 opened and connect the speaker cable to pin 8(+) and pin 2(-).

Power On/Off Button
Pin 9 and 10 connect the power button on front panel to the CPU board, which allows users to turn on or off power supply.

System Reset Switch
Pin 11 and 12 connect the case-mounted reset switch that reboots your computer without turning off the power switch. It is a better way to reboot your system for a longer life of system 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 is assigned as cathode(-) and pin 14 is assigned as anode(+).

2.4.11 External USB 3.0 Connectors (CN14 and CN17)

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

CN14 (USB 3.0 port 4), CN17 (USB 3.0 port 3)

2.4.12 Internal Keyboard and Mouse Connectors (CN16 and CN15)

The board comes with keyboard (CN16) and mouse (CN15) interfaces.

Pin	Signal
1	Clock
2	DATA
3	No connector
4	GND
5	5VSBY

2.4.13 FAN Connectors (FAN1, FAN2 and FAN3)

Fans are always needed for cooling down CPU and system temperature. The board has three 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
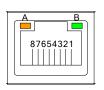
CPU fan interface is available through FAN3, see table below.

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

2.4.14 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

2.4.15 Parallel Port (PRINT1)

This board has a multi-mode parallel port supporting:

Standard Mode:
IBM PC/XT, PC/AT and PS/2^{TM} are compatible with bi-directional parallel port.
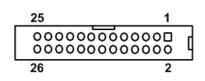
Enhanced Mode:
Enhance parallel port (EPP) is compatible with EPP 1.7 and EPP 1.9 (IEEE 1284 compliant).

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
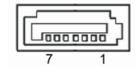
2.4.16 Serial ATA Connectors (SATA1~SATA6)

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 six 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

2.4.17 COM Connectors (COM1~COM5)

The COM1 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 (DCD)	TX-	DATA-
2	Data Set Ready (DSR)	No connector	No connector
3	Receive Data (RXD)	TX+	DATA+
4	Request to Send (RTS)	No connector	No connector
5	Transmit Data (TXD)	RX+	No connector
6	Clear to Send (CTS)	No connector	No connector
7	Data Terminal Ready (DTR)	RX-	No connector
8	Ring Indicator (RI)	No connector	No connector
9	Ground (GND)	GND	GND
10	Disconnect (NI)	NI	NI

The COM2~COM5 ports support RS-232 only, see table below.

Pin	Signal
1	Data Carrier Detect (DCD)
2	Data Set Ready (DSR)
3	Receive Data (RXD)
4	Request to Send (RTS)
5	Transmit Data (TXD)
6	Clear to Send (CTS)
7	Data Terminal Ready (DTR)
8	Ring Indicator (RI)
9	Ground (GND)
10	Disconnect (NI)

COM2,COM3,COM4,COM5

2.4.18   Audio Connector (AUDIO1)

The AUDIO1 is an internal audio connector.

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

2.4.19   Power Connector (ATX2)

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

External power supply plug fits into this connector in only one orientation. Properly press down power supply plug until it completely and firmly fits into this connector. Loose connection may cause system instability.

The ATX2 is a 8-pin ATX power connector. Its pin assignments are given in table below.

Pin	Signal	Pin	Signal
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V

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Chapter 3
Hardware Installation

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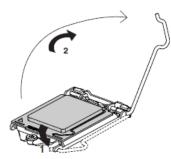
The LGA1150 processor socket comes with a cover to protect the processor. Please install the processor into the CPU socket step by step as below:

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.**
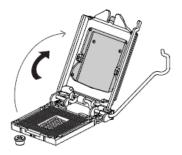
Step1 Opening the socket:

● 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°.
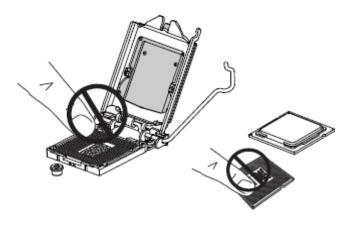
Step2 Removing the socket protective cover:

● 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:
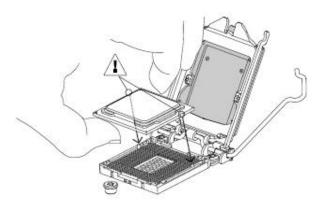
● Lift processor package from shipping media by grasping the substrate edges.
● Scan the processor package gold pads for any presence of foreign material. If necessary, the gold pads can be wiped clean with a soft lint-free cloth and isopropyl alcohol.
● Locate connection 1 indicator on the processor which aligns with connection 1 indicator chamfer on the socket, and notice processor keying features that line up with posts along socket walls.
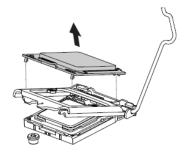
Note: ***Never touch fragile socket contacts to avoid damage and do not touch processor sensitive contacts at any time during Installation.***
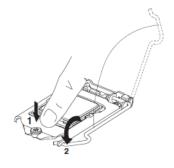
● Carefully place the processor into the socket body vertically (see image below).

Step4 Close the socket (see image below):
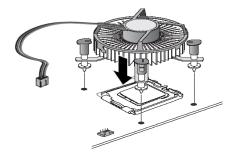
● Gently lower the load plate.
● Make sure load plate's front edge slides under the shoulder screw cap as the lever is lowered.
● Latch the lever under the top plate's corner tab, being cautious not to damage the motherboard with the tip of the lever.
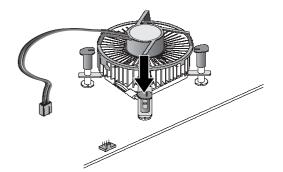
Step5 Fan heatsink handling:
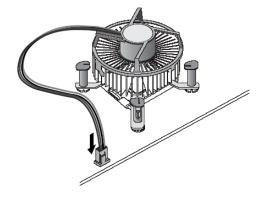
1. Orientate the CPU cooling fan to fixing holes on the board.

2. Screw the CPU cooling fan onto the board.

3. Make sure the CPU fan is plugged to the CPU fan connector.
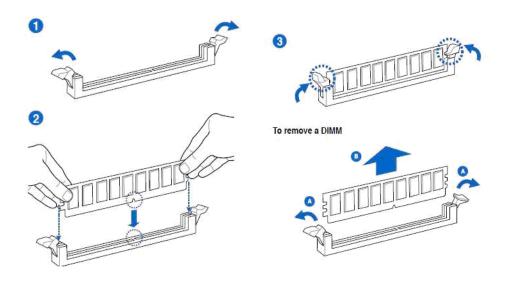
3.2   Installing the Memory

The board supports two 240-pin DDR3/L 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 SHB130 Series supports Intel$^®$ Core^{TM} i7 / Core^{TM} i5 / Core^{TM} 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 SHB130 Series uses AMI Plug and Play BIOS with a single 64Mbit SPI Flash.

4.3   System Memory

The SHB130 Series supports two 240-pin DDR3 DIMM 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)
      🖳 [0000000000000000 - 000000000000001F] Direct memory access controller
      🖳 [0000000000000000 - 0000000000000CF7] PCI bus
      🖳 [0000000000000010 - 000000000000001F] Motherboard resources
      🖳 [0000000000000020 - 0000000000000021] Programmable interrupt controller
      🖳 [0000000000000022 - 000000000000003F] Motherboard resources
      🖳 [0000000000000024 - 0000000000000025] Programmable interrupt controller
      🖳 [0000000000000028 - 0000000000000029] Programmable interrupt controller
      🖳 [000000000000002C - 000000000000002D] Programmable interrupt controller
      🖳 [000000000000002E - 000000000000002F] Motherboard resources
      🖳 [0000000000000030 - 0000000000000031] Programmable interrupt controller
      🖳 [0000000000000034 - 0000000000000035] Programmable interrupt controller
      🖳 [0000000000000038 - 0000000000000039] Programmable interrupt controller
      🖳 [000000000000003C - 000000000000003D] Programmable interrupt controller
      🖳 [0000000000000040 - 0000000000000043] System timer
      🖳 [0000000000000044 - 000000000000005F] Motherboard resources
      🖳 [000000000000004E - 000000000000004F] Motherboard resources
      🖳 [0000000000000050 - 0000000000000053] System timer
      ⌨ [0000000000000060 - 0000000000000060] Standard PS/2 Keyboard
      🖳 [0000000000000061 - 0000000000000061] Motherboard resources
      🖳 [0000000000000062 - 0000000000000063] Motherboard resources
      🖳 [0000000000000063 - 0000000000000063] Motherboard resources
      ⌨ [0000000000000064 - 0000000000000064] Standard PS/2 Keyboard
      🖳 [0000000000000065 - 0000000000000065] Motherboard resources
      🖳 [0000000000000065 - 000000000000006F] Motherboard resources
      🖳 [0000000000000067 - 0000000000000067] Motherboard resources
      🖳 [0000000000000070 - 0000000000000070] Motherboard resources
      🖳 [0000000000000070 - 0000000000000077] System CMOS/real time clock
      🖳 [0000000000000072 - 000000000000007F] Motherboard resources
      🖳 [0000000000000080 - 0000000000000080] Motherboard resources
      🖳 [0000000000000080 - 0000000000000080] Motherboard resources
      🖳 [0000000000000081 - 0000000000000091] Direct memory access controller
      🖳 [0000000000000084 - 0000000000000086] Motherboard resources
      🖳 [0000000000000088 - 0000000000000088] Motherboard resources
      🖳 [000000000000008C - 000000000000008E] Motherboard resources
      🖳 [0000000000000090 - 000000000000009F] Motherboard resources
      🖳 [0000000000000092 - 0000000000000092] Motherboard resources
      🖳 [0000000000000093 - 000000000000009F] Direct memory access controller
      🖳 [00000000000000A0 - 00000000000000A1] Programmable interrupt controller
      🖳 [00000000000000A2 - 00000000000000BF] Motherboard resources
      🖳 [00000000000000A4 - 00000000000000A5] Programmable interrupt controller
      🖳 [00000000000000A8 - 00000000000000A9] Programmable interrupt controller
      🖳 [00000000000000AC - 00000000000000AD] Programmable interrupt controller
      🖳 [00000000000000B0 - 00000000000000B1] Programmable interrupt controller
      🖳 [00000000000000B2 - 00000000000000B3] Motherboard resources
      🖳 [00000000000000B4 - 00000000000000B5] Programmable interrupt controller
      🖳 [00000000000000B8 - 00000000000000B9] Programmable interrupt controller
      🖳 [00000000000000BC - 00000000000000BD] Programmable interrupt controller
      🖳 [00000000000000C0 - 00000000000000DF] Direct memory access controller
      🖳 [00000000000000E0 - 00000000000000EF] Motherboard resources
```

[00000000000000F0 - 00000000000000F0] Numeric data processor
[00000000000002E8 - 00000000000002EF] Communications Port (COM4)
[00000000000002F0 - 00000000000002F7] Communications Port (COM5)
[00000000000002F8 - 00000000000002FF] Communications Port (COM2)
[0000000000000378 - 000000000000037F] Printer Port (LPT1)
[00000000000003B0 - 00000000000003BB] Intel(R) HD Graphics 4600
[00000000000003C0 - 00000000000003DF] Intel(R) HD Graphics 4600
[00000000000003E8 - 00000000000003EF] Communications Port (COM3)
[00000000000003F8 - 00000000000003FF] Communications Port (COM1)
[00000000000004D0 - 00000000000004D1] Motherboard resources
[00000000000004D0 - 00000000000004D1] Programmable interrupt controller
[0000000000000680 - 000000000000069F] Motherboard resources
[0000000000000A00 - 0000000000000A1F] Motherboard resources
[0000000000000A20 - 0000000000000A2F] 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 4600
[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
[000000000000F0E0 - 000000000000F0E7] Intel(R) Active Management Technology - SOL (COM6)
[000000000000F0F0 - 000000000000F0FF] Standard Dual Channel PCI IDE Controller
[000000000000F100 - 000000000000F103] Standard Dual Channel PCI IDE Controller
[000000000000F110 - 000000000000F117] Standard Dual Channel PCI IDE Controller
[000000000000F120 - 000000000000F123] Standard Dual Channel PCI IDE Controller
[000000000000F130 - 000000000000F137] Standard Dual Channel PCI IDE Controller
[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) 0x00000005 (05)   Communications Port (COM5)
      ▫ (ISA) 0x00000007 (07)   Communications Port (COM3)
      ▫ (ISA) 0x00000008 (08)   System CMOS/real time clock
      ▫ (ISA) 0x0000000A (10)   Communications Port (COM4)
      ▫ (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
(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) 0x0000000B (11)   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 - 8
(PCI) 0x00000010 (16)   Intel(R) Management Engine Interface
(PCI) 0x00000012 (18)   Standard Dual Channel PCI IDE Controller
(PCI) 0x00000013 (19)   Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
(PCI) 0x00000013 (19)   Intel(R) Active Management Technology - SOL (COM6)
(PCI) 0x00000013 (19)   PCI Express standard Upstream Switch Port
(PCI) 0x00000016 (22)   High Definition Audio Controller
(PCI) 0x00000017 (23)   Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #1 - 8
(PCI) 0xFFFFFFEE (-18)   Intel(R) I210 Gigabit Network Connection
(PCI) 0xFFFFFFEF (-17)   Intel(R) I210 Gigabit Network Connection
(PCI) 0xFFFFFFF0 (-16)   Intel(R) I210 Gigabit Network Connection
(PCI) 0xFFFFFFF1 (-15)   Intel(R) I210 Gigabit Network Connection
(PCI) 0xFFFFFFF2 (-14)   Intel(R) I210 Gigabit Network Connection
(PCI) 0xFFFFFFF3 (-13)   Intel(R) I210 Gigabit Network Connection
(PCI) 0xFFFFFFF4 (-12)   Intel(R) Ethernet Connection I217-LM
(PCI) 0xFFFFFFF5 (-11)   Intel(R) USB 3.0 eXtensible Host Controller
(PCI) 0xFFFFFFF6 (-10)   Intel(R) HD Graphics 4600
(PCI) 0xFFFFFFF7 (-9)   PCI Express standard Downstream Switch Port
(PCI) 0xFFFFFFF8 (-8)   PCI Express standard Downstream Switch Port
(PCI) 0xFFFFFFF9 (-7)   PCI Express standard Downstream Switch Port
(PCI) 0xFFFFFFFA (-6)   PCI Express standard Downstream Switch Port
(PCI) 0xFFFFFFFB (-5)   Intel(R) 8 Series/C220 Series PCI Express Root Port #7 - 8C1C
(PCI) 0xFFFFFFFC (-4)   Intel(R) 8 Series/C220 Series PCI Express Root Port #5 - 8C18
(PCI) 0xFFFFFFFD (-3)   Intel(R) 8 Series/C220 Series PCI Express Root Port #4 - 8C16
(PCI) 0xFFFFFFFE (-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:

```
▲ ▓ Memory
    ▆ [00000000000A0000 - 00000000000BFFFF]  Intel(R) HD Graphics 4600
    ▆ [00000000000A0000 - 00000000000BFFFF]  PCI bus
    ▆ [00000000000D0000 - 00000000000D3FFF]  PCI bus
    ▆ [00000000000D4000 - 00000000000D7FFF]  PCI bus
    ▆ [00000000000D8000 - 00000000000DBFFF]  PCI bus
    ▆ [00000000000DC000 - 00000000000DFFFF]  PCI bus
    ▆ [00000000000E0000 - 00000000000E3FFF]  PCI bus
    ▆ [00000000000E4000 - 00000000000E7FFF]  PCI bus
    ▆ [00000000DF200000 - 00000000FEAFFFFF]  PCI bus
    ▆ [00000000E0000000 - 00000000EFFFFFFF]  Intel(R) HD Graphics 4600
    ▆ [00000000F7800000 - 00000000F7BFFFFF]  Intel(R) HD Graphics 4600
    ▆ [00000000F7C00000 - 00000000F7CFFFFF]  Intel(R) I210 Gigabit Network Connection
    ▆ [00000000F7C00000 - 00000000F7DFFFFF]  Intel(R) 8 Series/C220 Series PCI Express Root Port #5 - 8C18
    ▆ [00000000F7D00000 - 00000000F7D03FFF]  Intel(R) I210 Gigabit Network Connection
    ▆ [00000000F7E00000 - 00000000F7E1FFFF]  PCI Express standard Upstream Switch Port
    ▆ [00000000F7E00000 - 00000000F7EFFFFF]  Intel(R) 8 Series/C220 Series PCI Express Root Port #4 - 8C16
    ▆ [00000000F7F00000 - 00000000F7F1FFFF]  Intel(R) Ethernet Connection I217-LM
    ▆ [00000000F7F20000 - 00000000F7F2FFFF]  Intel(R) USB 3.0 eXtensible Host Controller
    ▆ [00000000F7F30000 - 00000000F7F33FFF]  High Definition Audio Controller
    ▆ [00000000F7F34000 - 00000000F7F37FFF]  High Definition Audio Controller
    ▆ [00000000F7F39000 - 00000000F7F390FF]  Intel(R) 8 Series/C220 Series SMBus Controller - 8C22
    ▆ [00000000F7F3A000 - 00000000F7F3A7FF]  Intel(R) 8 Series/C220 Series SATA AHCI Controller - 8C02
    ▆ [00000000F7F3B000 - 00000000F7F3B3FF]  Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #1 - 8C26
    ▆ [00000000F7F3C000 - 00000000F7F3C3FF]  Intel(R) 8 Series/C220 Series USB Enhanced Host Controller #2 - 8C2D
    ▆ [00000000F7F3D000 - 00000000F7F3DFFF]  Intel(R) Ethernet Connection I217-LM
    ▆ [00000000F7F3E000 - 00000000F7F3EFFF]  Intel(R) Active Management Technology - SOL (COM6)
    ▆ [00000000F7F40000 - 00000000F7F4000F]  Intel(R) Management Engine Interface
    ▆ [00000000F7FEF000 - 00000000F7FEFFFF]  Motherboard resources
    ▆ [00000000F7FF0000 - 00000000F7FF0FFF]  Motherboard resources
    ▆ [00000000F8000000 - 00000000FBFFFFFF]  Motherboard resources
    ▆ [00000000FED00000 - 00000000FED003FF]  High precision event timer
    ▆ [00000000FED10000 - 00000000FED17FFF]  Motherboard resources
    ▆ [00000000FED18000 - 00000000FED18FFF]  Motherboard resources
    ▆ [00000000FED19000 - 00000000FED19FFF]  Motherboard resources
    ▆ [00000000FED1C000 - 00000000FED1FFFF]  Motherboard resources
    ▆ [00000000FED20000 - 00000000FED3FFFF]  Motherboard resources
    ▆ [00000000FED40000 - 00000000FED44FFF]  Infineon Trusted Platform Module
    ▆ [00000000FED45000 - 00000000FED8FFFF]  Motherboard resources
    ▆ [00000000FED90000 - 00000000FED93FFF]  Motherboard resources
    ▆ [00000000FEE00000 - 00000000FEEFFFFF]  Motherboard resources
    ▆ [00000000FF000000 - 00000000FFFFFFFF]  Intel(R) 82802 Firmware Hub Device
    ▆ [00000000FF000000 - 00000000FFFFFFFF]  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.

5.1   Starting

To enter the setup screens, follow the steps below:

1.   Turn on the computer and press the <Del> key immediately.
2.   After you press the <Del> 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.

```
            Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
     Main    Advanced   Chipset   Boot   Security   Save & Exit   Event Logs

    BIOS Information                                            Set the Date. Use Tab to
    BIOS Vendor                      American Megatrends        switch between Date elements.
    Core Version                     4.6.5.4
    Compliancy                       UEFI 2.3.1; PI 1.2
    Project Version                  1AQQW 0.24 x64
    Build Date and Time              07/08/2013 17:58:07
    Project Name                     SHB130X.011


    System Date                      [Wed 07/10/2013]
    System Time                      [23:47:53]

    Access Level                     Administrator
                                                               ➔←: 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.
```

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
- ► Trusted Computing
- ► CPU Configuration
- ► SATA Configuration
- ► PCH-FW Configuration
- ► AMT Configuration
- ► USB Configuration
- ► NCT6106D Super IO Configuration
- ► NCT6106D HW Monitor
- ► Intel RC Drivers Version Detail

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

```
              Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
     Main    Advanced    Chipset    Boot    Security    Save & Exit

 ► ACPI Settings                                              System ACPI Parameters.
 ► Trusted Computing
 ► CPU Configuration
 ► SATA Configuration
 ► PCH-FW Configuration
 ► AMT Configuration
 ► USB Configuration
 ► NCT6106D Super IO Configuration
 ► NCT6106D HW Monitor
 ► Intel RC Drivers Version Detail

                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit


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```

● **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.

```
              Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
        Advanced

  ACPI Settings                                         Enables or Disables BIOS ACPI
                                                        Auto Configuration.
  Enable ACPI Auto Configuration        [Disabled]

  ACPI Sleep State                      [S3 only(Suspend to ...]


                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



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```

Enable ACPI Auto Configuration
Enable or disable BIOS ACPI auto configuration.

ACPI Sleep State
Select the highest ACPI sleep state the system will enter when the suspend button is pressed. Configuration options are Suspend Disabled, S1 only (CPU Stop Clock), and S3 only (Suspend to RAM).

● **Trusted Computing**
This screen provides function for specifying the Trusted Computing.

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
      Advanced

 Configuration                                        Enables or Disables BIOS
    Security Device Support          [Disable]        support for security device.
                                                      O.S. will not show Security
 Current Status Information                           Device. TCG EFI protocol and
                                                      INT1A interface will not be
                                                      available.



                                                      →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit


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```

Security Device Support
Use this item to enable or disable BIOS support for security device.

Current Status Information
Display current Trusted Platform Module (TPM) status information.

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

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
     Advanced

  CPU Configuration                                      Enabled for Windows XP and
                                                         Linux (OS optimized for
  Intel(R) Core(TM) i3-4330 CPU @ 3.50GHz                Hyper-Threading Technology)
  CPU Signature                  306c3                   and Disabled for other OS (OS
  Microcode Patch                8                       not optimized for
  Max CPU Speed                  3500 MHz                Hyper-Threading Technology).
  Min CPU Speed                  800 MHz                 When Disabled only one thread
  CPU Speed                      3500 MHz                per enabled core is enabled.
  Processor Cores                2
  Intel HT Technology            Supported
  Intel VT-x Technology          Supported
  Intel SMX Technology           Not Supported
  64-bit                         Supported
  EIST Technology                Supported
  CPU C3 state                   Supported              →←: Select Screen
  CPU C6 state                   Supported              ↑↓: Select Item
  CPU C7 state                   Supported              Enter: Select
                                                        +/-: Change Opt.
  L1 Data Cache                  32 kB x 2              F1: General Help
  L1 Code Cache                  32 kB x 2              F2: Previous Values
  L2 Cache                       256 kB x 2            F3: Optimized Defaults
  L3 Cache                       4096 kB               F4: Save & Exit
                                                        ESC: Exit
  Hyper-threading                [Enabled]
  Intel Virtualization Technology [Enabled]

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```

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.

```
           Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
      Advanced

SATA Controller(s)                    [Enabled]               Enable or disable SATA Device.
SATA Mode Selection                   [AHCI]

Serial ATA Port 0                     Empty
  Software Preserve                   Unknown
Serial ATA Port 1                     Empty
  Software Preserve                   Unknown
Serial ATA Port 2                     Empty
  Software Preserve                   Unknown
Serial ATA Port 3                     Empty
  Software Preserve                   Unknown
Serial ATA Port 4                     Empty
  Software Preserve                   Unknown            →←: Select Screen
Serial ATA Port 5                     Empty              ↑↓: Select Item
  Software Preserve                   Unknown            Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit


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```

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.

```
           Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
      Advanced

 ME FW Version                    9.0.3.1347
 ME Firmware Mode                 Normal Mode
 ME Firmware Type                 Full Sku Firmware
 ME Firmware SKU                  5MB



                                                      →←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit


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```

● **AMT Configuration**
Use this screen to configure AMT parameters.

```
           Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
      Advanced

 Intel AMT                        [Enabled]              Enable/Disable Intel (R)
 Disable ME                       [Disabled]             Active Management Technology
                                                         BIOS Extension.
                                                         Note : iAMT H/W is always
                                                         enabled.
                                                         This option just controls the
                                                         BIOS extension execution.
                                                         If enabled, this requires
                                                         additional firmware in the SPI
                                                         device.


                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit


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```

Intel AMT
Enable or disable Intel® Active Management Technology BIOS Extension.

Disable ME
Enable or disable ME functionality.

● **USB Configuration**
This screen displays the USB Configuration information.

```
               Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
        Advanced

  USB Configuration

  USB Module Version                      8.10.27

  USB Devices:
        1 Keyboard, 1 Mouse, 2 Hubs




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



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```

USB Devices
Display all detected USB devices.

- **NCT6106D 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.

```
              Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
         Advanced

    NCT6106D Super IO Configuration                               Set Parameters of Serial Port
                                                                  1.
    NCT6106D Super IO Chip                    NCT6106D
  ► Serial Port 1 Configuration
  ► Serial Port 2 Configuration
  ► Serial Port 3 Configuration
  ► Serial Port 4 Configuration
  ► Serial Port 5 Configuration
  ► Parallel Port Configuration

                                                                →←: Select Screen
                                                                ↑↓: Select Item
                                                                Enter: Select
                                                                +/-: Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
                                                                F3: Optimized Defaults
                                                                F4: Save & Exit
                                                                ESC: Exit



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```
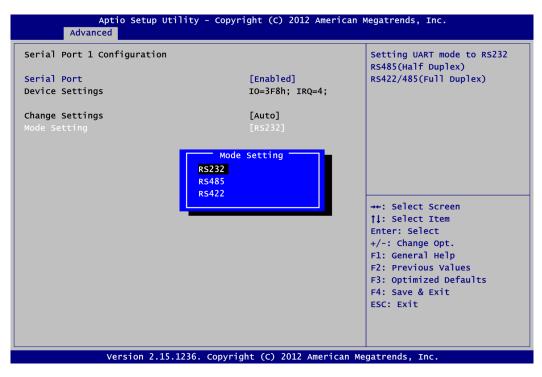
Serial Port 1~5 Configuration
Use this item to set parameters of serial port 1 to 5.

Parallel Port Configuration
This item allows you to determine the parallel port mode and I/O address for onboard parallel port.

● **Serial Port 1 Configuration**

```
              Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
          Advanced

 Serial Port 1 Configuration                                    Setting UART mode to RS232
                                                                RS485(Half Duplex)
 Serial Port                              [Enabled]             RS422/485(Full Duplex)
 Device Settings                          IO=3F8h; IRQ=4;

 Change Settings                          [Auto]
 Mode Setting                             [RS232]

                           ┌─────── Mode Setting ───────┐
                           │ RS232                      │
                           │ RS485                      │
                           │ RS422                      │
                           └────────────────────────────┘
                                                                →←: Select Screen
                                                                ↑↓: Select Item
                                                                Enter: Select
                                                                +/-: Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
                                                                F3: Optimized Defaults
                                                                F4: Save & Exit
                                                                ESC: Exit



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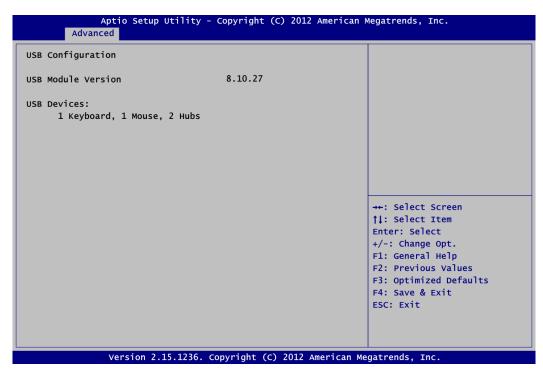
Serial Port
Enable or disable serial port 1. The optimal setting for base I/O address is 3F8h and for interrupt request address is IRQ4.

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

● **NCT6106D HW Monitor**
Use this screen for Smart Fan configuration and hardware health status monitoring.

```
              Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
        Advanced

    Pc Health Status                                         Smart Fan Mode Select

    Smart Fan Function                  [Enabled]
  ►Smart Fan Mode Configuration

    SYS Thermistor Temp                 : +28.0 C
    CPU Diode Temp                      : +25.5 C
    SysFan Speed                        : N/A
    CpuFan Speed                        : 3366 RPM
    AuxFan Speed                        : N/A
    VCORE                               : +1.736 V
    +1.5V                               : +1.488 V
    +12V                                : +12.192 V            →←: Select Screen
    +5V                                 : +5.024 V             ↑↓: Select Item
                                                               Enter: Select
                                                               +/-: Change Opt.
                                                               F1: General Help
                                                               F2: Previous Values
                                                               F3: Optimized Defaults
                                                               F4: Save & Exit
                                                               ESC: Exit




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```

This screen displays the temperature of system and CPU, cooling fan speed in RPM and system voltages (VCORE, +1.5V, +12V and +5V).

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.

```
             Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
      Advanced

  Intel CPU RC Version            1.4.0.0
  Intel SA RC Version             1.4.0.0
  Intel PCH RC Version            1.4.0.0
  Intel ACPI RC Version           1.4.0.0
  Intel ME RC Version             1.4.0.0
  Intel RST RC Version            1.4.0.0




                                                   →←: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F3: Optimized Defaults
                                                   F4: Save & Exit
                                                   ESC: Exit



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```

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.

```
            Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
      Main    Advanced   Chipset   Boot    Security   Save & Exit   Event Logs

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




                                                        →←: 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.
```

● **PCH-IO Configuration**
This screen allows you to set PCH parameters.

```
                Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
                 Chipset

 Intel PCH RC Version              1.4.0.0                     PCH Azalia Configuration
 Intel PCH SKU Name                Q87                         settings.
 Intel PCH Rev ID                  05/C2

▶ PCH Azalia Configuration

                                                              →←: Select Screen
                                                              ↑↓: Select Item
                                                              Enter: Select
                                                              +/-: Change Opt.
                                                              F1: General Help
                                                              F2: Previous Values
                                                              F3: Optimized Defaults
                                                              F4: Save & Exit
                                                              ESC: Exit


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```

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.

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
               Chipset

   System Agent Bridge Name          Haswell              Config Graphics Settings
   System Agent RC Version           1.4.0.0
   VT-d Capability                   Unsupported


  ► Graphics Configuration
  ► Memory Configuration

                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit



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```

Graphics Configuration
Use this item for graphics configuration settings.

Memory Configuration
Use this item for memory configuration settings.

5.6   Boot Menu

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

```
             Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
    Main    Advanced    Chipset    Boot    Security    Save & Exit

  Boot Configuration                                        Select the keyboard NumLock
  Bootup Numlock State                 [On]                 state

  Quiet Boot                           [Disabled]

  Boot Option Priorities

  CSM parameters

                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit



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```

● **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.

```
              Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
   Main    Advanced    Chipset    Boot    Security    Save & Exit    Event Logs

  Password Description                              Set Administrator Password

  If ONLY the Administrator's password is set,
  then this only limits access to Setup and is
  only asked for when entering Setup.
  If ONLY the User's password is set, then this
  is a power on password and must be entered to
  boot or enter Setup. In Setup the User will
  have Administrator rights.
  The password length must be
  in the following range:
  Minimum length            3
  Maximum length            20                      →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
  Administrator Password                            +/-: Change Opt.
  User Password                                     F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit


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```

● **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.

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
    Main    Advanced    Chipset    Boot    Security    Save & Exit    Event Logs

   Save Changes and Exit                                  Exit system setup after saving
   Discard Changes and Exit                               the changes.
   Save Changes and Reset
   Discard Changes and Reset

   Save Options
   Save Changes
   Discard Changes

   Restore Defaults
   Save as User Defaults
   Restore User Defaults                                  →←: Select Screen
                                                          ↑↓: Select Item
   Boot Override                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit



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```

- **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
↓
Un-Lock WDT:

    O 2E 87 ; Un-lock super I/O
    O 2E 87 ; Un-lock super I/O

↓
Select Logic device:

    O 2E 07
    O 2F 08

↓
Set Second or Minute:

    O 2E F0

    O 2F N   ; N=00 or 08 (See _Note_ below)

↓
Set base timer:

    O 2E F1
    O 2F M   ; M=00,01,02,…FF(Hex) ,Value=0 to 255

↓
WDT counting re-set timer:

    O 2E F1

    O 2F M   ; M=00,01,02,…FF (See _Note_ below)

↓
IF No re-set timer:

    ; WDT time-out, generate RESET

;IF to disable WDT:

    O 2E 30
    O 2F 00   ; Can be disabled at any time

- Timeout Value Range
    - 1 to 255
    - Minute / Second

 Note:

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

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

Appendix B
Digital I/O

About Digital I/O

The onboard GPIO (digital I/O) has 8 bits. Each bit can be set to function as input or output by software programming. In default, DIO1~8 are pulled high with +5V level (according to main power). The BIOS default settings are 8 outputs where all of these pins are set to 1. Use these GPIO signals to control cash drawers and sense warning signals from an Uninterrupted Power System (UPS) or perform store security control.

How to Use Digital I/O

Start
↓
1. Enable configuration:

                  -O 2E 87
                  -O 2E 87

↓
2. Function selection:

                  -O 2E 1C
                  -O 2F 1C

↓
3. Select Logic device:

                  -O 2E 07
                  -O 2F 07

↓
4. Set DIO mode:

                  -O 2E E8
                  -O 2F FF   **; Set DIO1~8 to Input or Output mode**
                                  ; If set FF(11111111) DIO1~8 are all input
                                  ; If set 00(00000000) DIO1~8 are all output
                                  ;   (1 1 1 1 1 1 1 1)
                                  ;   ↓   ↓
                                  ;   DIO8   DIO1

↓
5. Set Output level:

                  -O 2E E9
                  -O 2F FF   **; Set DIO1~8 Output level.**
                                  ; If set FF(11111111) DIO1~8 Output levels are all High
                                  ; If set 00(00000000) DIO1~8 Output levels are all Low
                                  ;   (1 1 1 1 1 1 1 1)
                                  ;   ↓   ↓
                                  ;   DIO8   DIO1

This page is intentionally left blank.

Appendix C
PCI IRQ Routing

PICMG® PCI IRQ Routing

Device	ID	Slot	Int
PCI Slot 0	31	0	BCDA
PCI Slot 1	30	1	CDAB
PCI Slot 2	29	2	DABC
PCI Slot 3	28	3	ABCD

This page is intentionally left blank.

Appendix D
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 <Del> 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.

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
     Advanced

 SATA Controller(s)                 [Enabled]              Determines how SATA
 SATA Mode Selection                [IDE]                  controller(s) operate.

 Serial ATA Port 0                  Empty
   Software Preserve                Unknown
 Serial ATA Port 1                  Empty
   Software Preserve                Unknown
 Serial ATA Port 2                  Empty
   Software Preserve                Unknown
 Serial ATA Port 3                  Empty
   Software Preserve                Unknown
 Serial ATA Port 4                  ST320LT012-9WS (320.0GB)
   Software Preserve                SUPPORTED              →←: Select Screen
 Serial ATA Port 5                  ST380817AS    (80.0GB) ↑↓: Select Item
   Software Preserve                NOT SUPPORTED          Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit



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```

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

```
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     Advanced

 SATA Controller(s)                 [Enabled]              Determines how SATA
 SATA Mode Selection                [RAID]                 controller(s) operate.

 Serial ATA Port 0                  Empty
   Software Preserve                Unknown
 Serial ATA Port 1                  Empty
   Software Preserve                Unknown
 Serial ATA Port 2                  Empty
   Software Preserve                Unknown
 Serial ATA Port 3                  Empty
   Software Preserve                Unknown
 Serial ATA Port 4                   (320.0GB)
   Software Preserve                SUPPORTED              →←: Select Screen
 Serial ATA Port 5                  ST380817AS    (80.0GB) ↑↓: Select Item
   Software Preserve                NOT SUPPORTED          Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit



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```

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

```
                 Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
        Main    Advanced   Chipset   Boot   Security   Save & Exit   Event Logs

     Boot Configuration                                      Select the keyboard NumLock
     Bootup Numlock State              [On]                  state

     Quiet Boot                        [Disabled]


     Boot Option Priorities
     Boot Option #1                    [slimtype eTDU108 1 ...]
     Boot Option #2                    [ST320LT012-9WS14C]


     Hard Drive BBS Priorities
     CD/DVD ROM Drive BBS Priorities                         →←: Select Screen
     CSM parameters                                          ↑↓: 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.
```

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          4. Recovery Volume Options
       2. Delete RAID Volume          5. Acceleration Options
       3. Reset Disks to Non-RAID     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".

```
Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
========================= [ CREATE VOLUME MENU ]  ========================

                        Name:    Volume1
                  RAID Level:    RAID0(Stripe)
                       Disks:    Select Disks
                  Strip Size:      16KB
                    Capacity:    149.1   GB
                        Sync:    N/A
                                 Create Volume

=============================== [ HELP ]  ================================



          Enter a unique volume name that has no special characters and is
                            16 characters or less.




=========================================================================
        [↓↑]Change     [TAB]-Next     [ESC]-Previous Menu     [ENTER]-Select
```

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>.

```
Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
========================= [ CREATE VOLUME MENU ]  ========================

                        Name:    Volume1
                  RAID Level:    RAID0(Stripe)
                       Disks:    Select Disks
                  Strip Size:      16KB
                    Capacity:    149.1   GB
                        Sync:    N/A
                                 Create Volume

=============================== [ HELP ]  ================================




                 RAID 0: Stripes data (performance).




=========================================================================
        [↓↑]Change     [TAB]-Next     [ESC]-Previous Menu     [ENTER]-Select
```

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.

```
        Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
        Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
    ━━━━━━━━━━━━━━━━━━━━━━ [  CREATE VOLUME MENU   ] ━━━━━━━━━━━━━

                        Name:     Volume1
                  RAID Level:     RAID0(Stripe)
                       Disks:     Select Disks
                  Strip Size:      128KB
                    Capacity:     149.1    GB
                        Sync:     N/A
                                  Create Volume

    ━━━━━━━━━━━━━━━━━━━━━━━━━━ [  HELP  ] ━━━━━━━━━━━━━━━━━━━━━━━

                     The following are typical values:

                           RAID0  - 128KB
                           RAID10 - 64KB
                           RAID5  - 64KB

    ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━

        [↓↑]Change     [TAB]-Next    [ESC]-Previous Menu    [ENTER]-Select
```

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

```
        Intel(R) Rapid Storage Technology - Option ROM - 12.5.0.1815
        Copyright(C) 2003-13 Intel Corporation.   All Rights Reserved.
    ━━━━━━━━━━━━━━━━━━━━━━ [  CREATE VOLUME MENU   ] ━━━━━━━━━━━━━

                        Name:     Volume1
                  RAID Level:     RAID0(Stripe)
                       Disks:     Select Disks
                  Strip Size:      128KB
                    Capacity:     149.1      GB
                        Sync:     N/A
                                  Create Volume

    ━━━━━━━━━━━━━━━━━━━━━━━━━━ [  HELP  ] ━━━━━━━━━━━━━━━━━━━━━━━

            The default value indicates the maximum capacity using the selected
             disks. Entering a lower capacity allows you to create a second
                              volume on these disks.

    ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━

        [↓↑]Change     [TAB]-Next    [ESC]-Previous Menu    [ENTER]-Select
```

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.

```
         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         4. Recovery Volume Options
          2. Delete RAID Volume         5. Acceleration Options
          3. Reset Disks to Non-RAID    6. Exit

     ━━━━━━━━━━━━━━━━ [   DISK/VOLUME INFORMATION   ] ━━━━━━━━━━━━━━━━
     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)



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

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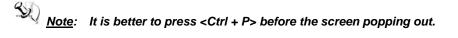
Appendix E
iAMT Settings

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.
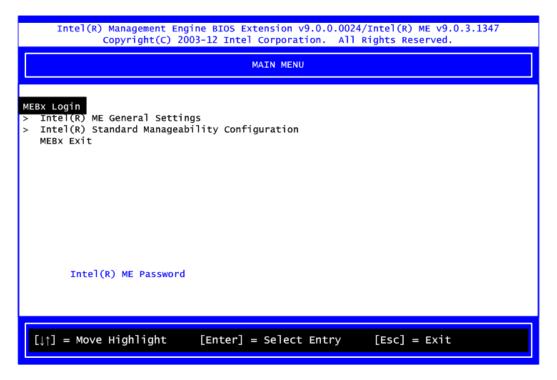
Entering MEBx

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".

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

3. 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>.

```
Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347
            Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.

┌─────────────────────────────────────────────────────────────────────────┐
│                               MAIN MENU                                   │
└─────────────────────────────────────────────────────────────────────────┘


>  Intel(R) ME General Settings
>  Intel(R) Standard Manageability Configuration
   MEBx Exit




[↓↑] = Move Highlight      [Enter] = Select Entry      [Esc] = Exit
```

1.   Select Network Setup to configure iAMT.

```
Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347
            Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.

┌─────────────────────────────────────────────────────────────────────────┐
│             INTEL (R) STANDARD MANAGEABILITY CONFIGURATION                │
└─────────────────────────────────────────────────────────────────────────┘


   Manageability Feature Selection          <Enabled>
>  SOL/IDER
>  User Consent
   Password Policy                          <Anytime>
>  Network Setup
   Activate Network Access
   Unconfigure Network Access               <Full Unprovision>
>  Remote Setup And Configuration
>  Power Control




[↓↑] = Move Highlight      [Enter] = Select Entry      [Esc] = Exit
```

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

```
Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347
           Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.

                        INTEL (R) ME NETWORK SETUP


   Intel(R) ME Network Name Settings
>  TCP/IP Settings













  [↓↑] = Move Highlight     [Enter] = Select Entry     [Esc] = Exit
```

```
Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347
           Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.

                        WIRED LAN IPV4 CONFIGURATION

  DHCP Mode                                  <Enabled>









        Enable/Disable IPV4 DHCP Mode



  [↓↑] = Move Highlight     [Enter] = Select Entry     [Esc] = Exit
```

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

    ● IP address
    ● Subnet mask

```
Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347
              Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.

                              WIRED LAN IPV4 CONFIGURATION


    DHCP Mode                                <Disabled>
    IPV4 Address                             10.1.40.214
    Subnet Mask Address                      255.255.255.0
    Default Gateway Address                  0.0.0.0
    Preferred DNS Address                    0.0.0.0
    Alternate DNS Address
                                 Subnet mask (e.g. 255.255.255.0)
                                 255.255.255.0_




                       <Enter> = Complete Entry     [Esc] = Discard Changes
```

4. Go back to Intel® iAMT Configuration, then select Activate Network Access and press <Enter>.
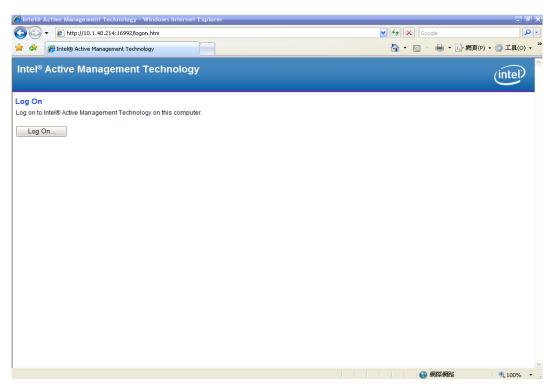
```
Intel(R) Management Engine BIOS Extension v9.0.0.0024/Intel(R) ME v9.0.3.1347
              Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.

                     INTEL (R) STANDARD MANAGEABILITY CONFIGURATION


       Manageability Feature Selection            <Enabled>
    >  SOL/IDER
    >  User Consent
       Password Policy                            <Anytime>
    >  Network Setup
       Activate Network Access
       Unconfigure Network Access
    >  Remote Setup And Configurati   Activates the current network settings
    >  Power Control                    and opens the ME network interface
                                               Continue: (Y/N)





            [↓↑] = Move Highlight     [Enter] = Select Entry      [Esc] = Exit
```

5. Exit from MEBx after completing the iAMT settings.

iAMT Web Console

1. From a web browser, please type 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 F
PICMG® v1.3 Interface Definition

x16 PCIe Connector A			x16 PCIe Connector C		
No.	Side B	Side A	No.	Side B	Side A
1	N.C	N.C	1	USB0P	GND
2	GND	GND	2	USB0N	GND
3	N.C	N.C	3	GND	USB1P
4	N.C	N.C	4	GND	USB1N
5	N.C	WAKE#	5	USB2P	GND
6	PWRBT#	PME#	6	USB2N	GND
7	PWRGD	PSON#	7	GND	USB3P
8	SHB_RST#	PERST#	8	GND	USB3N
9	CFG0	CFG1	9	USBOC0#	GND
10	CFG2	CFG3	10	GND	USBOC1#
11	RSVD	GND	11	USBOC2#	GND
Mechanical Key					
12	GND	N.C	12	GND	USBOC3#
13	b_PETp0	GND	13	N.C	GND
14	b_PETn0	GND	14	N.C	GND
15	GND	b_PERp0	15	GND	N.C
16	GND	b_PERn0	16	GND	N.C
17	b_PETp1	GND	17	N.C	GND
18	b_PETn1	GND	18	N.C	GND
19	GND	b_PERp1	19	GND	N.C
20	GND	b_PERn1	20	GND	N.C
21	b_PETp2	GND	21	N.C	GND
22	b_PETn2	GND	22	N.C	GND
23	GND	b_PERp2	23	GND	N.C
24	GND	b_PERn2	24	GND	N.C
25	b_PETp3	GND	25	N.C	GND
26	b_PETn3	GND	26	N.C	GND

Mechanical Key				
27	GND	b_PERp3	27	GND	N.C
28	GND	b_PERn3	28	GND	N.C
29	REFCLK0+	GND	29	N.C	GND
30	REFCLK0-	GND	30	N.C	GND
31	GND	REFCLK1+	31	N.C	N.C
32	RSVD	REFCLK1-	32	N.C	N.C
33	REFCLK2+	GND	33	N.C	N.C
34	REFCLK2-	GND	34	N.C	GND
35	GND	REFCLK3+	35	N.C	GND
36	RSVD	REFCLK3-	36	GND	N.C
37	REFCLK4+	GND	37	GND	N.C
38	REFCLK4-	GND	38	N.C	GND
39	GND	N.C	39	N.C	GND
40	RSVD	N.C	40	GND	N.C
41	N.C	GND	41	GND	N.C
42	N.C	GND	42	+3.3V	+3.3V
43	GND	N.C	43	+3.3V	+3.3V
44	GND	N.C	44	+3.3V	+3.3V
45	a_PETp0	GND	45	+3.3V	+3.3V
46	a_PETn0	GND	46	+3.3V	+3.3V
47	GND	a_PERp0	47	+3.3V	+3.3V
48	GND	a_PERn0	48	+3.3V	+3.3V
49	a_PETp1	GND	49	+3.3V	+3.3V
50	a_PETn1	GND	50	+3.3V	+3.3V
51	GND	a_PERp1	51	GND	GND
52	GND	a_PERn1	52	GND	GND
53	a_PETp2	GND	53	GND	GND
54	a_PETn2	GND	54	GND	GND
55	GND	a_PERp2	55	GND	GND
56	GND	a_PERn2	56	GND	GND
57	a_PETp3	GND	57	GND	GND

	Mechanical Key				
58	a_PETn3	GND	58	GND	GND
59	GND	a_PERp3	59	+5V	+5V
60	GND	a_PERn3	60	+5V	+5V
61	a_PETp4	GND	61	+5V	+5V
62	a_PETn4	GND	62	+5V	+5V
63	GND	a_PERp4	63	GND	GND
64	GND	a_PERn4	64	GND	GND
65	a_PETp5	GND	65	GND	GND
66	a_PETn5	GND	66	GND	GND
67	GND	a_PERp5	67	GND	GND
68	GND	a_PERn5	68	GND	GND
69	a_PETp6	GND	69	GND	GND
70	a_PETn6	GND	70	GND	GND
71	GND	a_PERp6	71	GND	GND
72	GND	a_PERn6	72	GND	GND
73	a_PETp7	GND	73	+12V	+12V
74	a_PETn7	GND	74	+12V	+12V
75	GND	a_PERp7	75	+12V	+12V
76	GND	a_PERn7	76	+12V	+12V
77	N.C	GND	77	+12V	+12V
78	+3.3V	+3.3V	78	+12V	+12V
79	+3.3V	+3.3V	79	+12V	+12V
80	+3.3V	+3.3V	80	+12V	+12V
81	+3.3V	+3.3V	81	+12V	+12V
82	RSVD	RSVD	82	+12V	+12V

No.	Side B	Side A	No.	Side B	Side A
	x8 PCIe Connector B			**x8 PCIe Connector D**	

x8 PCIe Connector B			**x8 PCIe Connector D**		
No.	Side B	Side A	No.	Side B	Side A
1	+5Vaux	+5Vaux	1	INTB#	INTA#
2	GND	N.C	2	INTD#	INTC#
3	a_PETp8	GND	3	GND	N.C
4	a_PETn8	GND	4	REQ3#	GNT3#
5	GND	a_PERp8	5	REQ2#	GNT2#
6	GND	a_PERn8	6	PCI_RST#	GNT1#
7	a_PETp9	GND	7	REQ1#	GNT0#
8	a_PETn9	GND	8	REQ0#	SERR#
9	GND	a_PERp9	9	N.C	+3.3V
10	GND	a_PERn9	10	GND	N.C
11	N.C	GND	11	N.C	GND
	Mechanical Key				
12	GND	N.C	12	CLKC	CLKD
13	a_PETp10	GND	13	GND	+3.3V
14	a_PETn10	GND	14	CLKA	CLKB
15	GND	a_PERp10	15	+3.3V	GND
16	GND	a_PERn10	16	AD31	GND
17	a_PETp11	GND	17	AD29	+3.3V
18	a_PETn11	GND	18	N.C	AD30
19	GND	a_PERp11	19	AD27	AD28
20	GND	a_PERn11	20	AD25	GND
21	a_PETp12	GND	21	GND	AD26
22	a_PETn12	GND	22	C/BE3#	AD24
23	GND	a_PERp12	23	AD23	+3.3V
24	GND	a_PERn12	24	GND	AD22
25	a_PETp13	GND	25	AD21	AD20
26	a_PETn13	GND	26	AD19	N.C
27	GND	a_PERp13	27	+5V	AD18
28	GND	a_PERn13	28	AD17	AD16

Mechanical Key					
29	a_PETp14	GND	29	C/BE2#	GND
30	a_PETn14	GND	30	PCI_PRST#	FRAME#
31	GND	a_PERp14	31	IRDY#	TRDY#
32	GND	a_PERn14	32	DEVSEL#	+5V
33	a_PETp15	GND	33	LOCK#	STOP#
34	a_PETn15	GND	34	PERR#	GND
35	GND	a_PERp15	35	GND	C/BE1#
36	GND	a_PERn15	36	PAR	AD14
37	N.C	GND	37	N.C	GND
38	N.C	N.C	38	GND	AD12
39	GND	GND	39	AD15	AD10
40	GND	GND	40	AD13	GND
41	GND	GND	41	GND	AD09
42	GND	GND	42	AD11	C/BE0#
43	GND	GND	43	AD08	GND
44	+12V	+12V	44	GND	AD06
45	+12V	+12V	45	AD07	AD05
46	+12V	+12V	46	AD04	GND
47	+12V	+12V	47	GND	AD02
48	+12V	+12V	48	AD03	AD01
49	+12V	+12V	49	AD00	GND

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