IEI Technology Corp.

MODEL:

IEM-945GSE

ETX 3.0 Module
Intel® ATOM™ CPU, Dual SATA
RoHS Compliant

User Manual

Rev. 1.00 – 11 March, 2009

RoHS Lead Free

Revision

Date	Version	Changes
11 March, 2009	1.01	Updated product name
11 February, 2009	1.00	Initial release

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Packing List

NOTE:

If any of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the IEM-945GSE from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw

The items listed below should all be included in the IEM-945GSE package.

- 1 x IEM-945GSE
- 1 x Heatspreader
- 1 x Utility CD
- 1 x QIG (quick installation guide)

Images of the above items are shown in **Chapter 3**.

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Chapter

1

Introduction

1.1 Overview

Figure 1–1: IEM-945GSE

The IEM-945GSE ETX 3.0 module provides the main processing chips and is connected to a compatible ETX 3.0 carrier board. The IEM-945GSE is equipped with an 1.6 GHz Intel® ATOM™ N270 CPU, Intel® 945GSE Northbridge and Intel® ICH7M Southbridge and provides multiple legacy I/O options. SATA connectors on the IEM-945GSE provide modern alternative for hard drives, supplementing the legacy IDE channels provided through the ETX connectors. The ETX 3.0 standard allows the ETX 3.0 carrier board to be designed, while leaving the choice of processor till the later stages of design. The IEM-945GSE embedded module is designed for flexible integration by system developers into customized platform devices.

1.2 Applications

The IEM-945GSE is designed to a ETX 3.0 carrier board for being embedded in customized baseboards for flexible applications.

1.3 Benefits

Some of the IEM-945GSE embedded platform benefits include:

- Low power, high performance
- Easy integration into customized baseboards

- Easy upgrading
- Easy maintenance
- Easy design compatibility
- Low cost product development

1.4 Features

Some of the IEM-945GSE features are listed below:

- Complies with ETX 3.0 form factor
- Complies with RoHS
- Embedded 1.6 GHz Intel® ATOM™ N270 CPU
- Supports up to 2 GB of 400 MHz or 533 MHz of DDR2 memory
- Supports a single Fast Ethernet connection
- Support for four USB 2.0 devices
- Support for one IDE channel

1.5 Overview Picture

An overview of the IEM-945GSE embedded module can be seen in **Figure 1-2** and **Figure 1-3**.
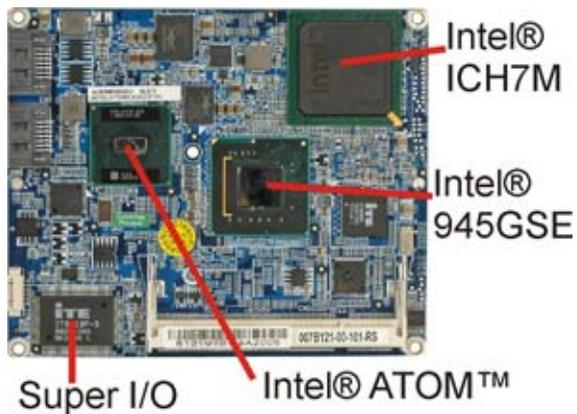
Figure 1-2: IEM-945GSE Overview (Front Side)
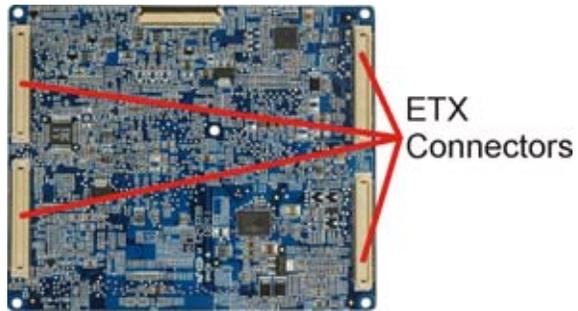
Figure 1-3: IEM-945GSE Overview (Reverse Side)

1.5.1 Connectors

The IEM-945GSE has the following interface connectors on-board:

- 4 x ETX connectors (X1, X2, X3 and X4)
- 1 x SO-DIMM socket
- 2 x SATA connectors

1.5.2 IO Interface Support

The IEM-945GSE embedded module supports the following IO interfaces on the baseboard:

- 1 x Audio
- 1 x Ethernet
- 1 x IDE
- 1 x ISA
- 1 x LPT
- 1 x LVDS
- 4 x PCI
- 1 x PS/2
- 2 x RS-232
- 1 x SDVO (Optional)
- 4 x USB 2.0
- 1 x VGA

1.5.3 Technical Specifications

IEM-945GSE technical specifications are listed in **Table 1-1**. Detailed descriptions of each specification can be found in the detailed specifications chapter.

Specification	Value
CPU	1.6 GHz Intel® ATOM™ N270
System Chipset	Intel® 945GSE Intel® ICH7M
Ethernet	Realtek RTL8102E
Memory	One DDR2 400/533 MHz SO-DIMM up to 2.0 GB
Graphics	VGA Dual-channel 18-bit LVDS SDVO
I/O Interfaces	1 x Audio 1 x Ethernet 1 x IDE 1 x ISA 1 x LPT 1 x LVDS 4 x PCI 1 x PS/2 2 x RS-232 1 x SDVO (Optional) 4 x USB 2.0 1 x VGA
BIOS	AMI
Power Support	AT/ATX power supported
Power Consumption	12 V @ 0.95 A 5 V @ 2.9 A
Watchdog Timer	Software programmable supports 1~255 sec. system reset
Physical Dimensions	115 mm x 95 mm

Specification	Value
Weight	GW: 600 g NW: 250 g
Operating Temperature	Minimum: 0°C (32°F) Maximum: 60°C (140°F)

Table 1-1: Technical Specifications

Chapter

2

Detailed Specifications

2.1 Dimensions

The dimensions of the board are listed below:

- **Length**:   115 mm
- **Width**:   95 mm

2.1.1 Main Dimensions

The figure below shows the dimensions from the top view.
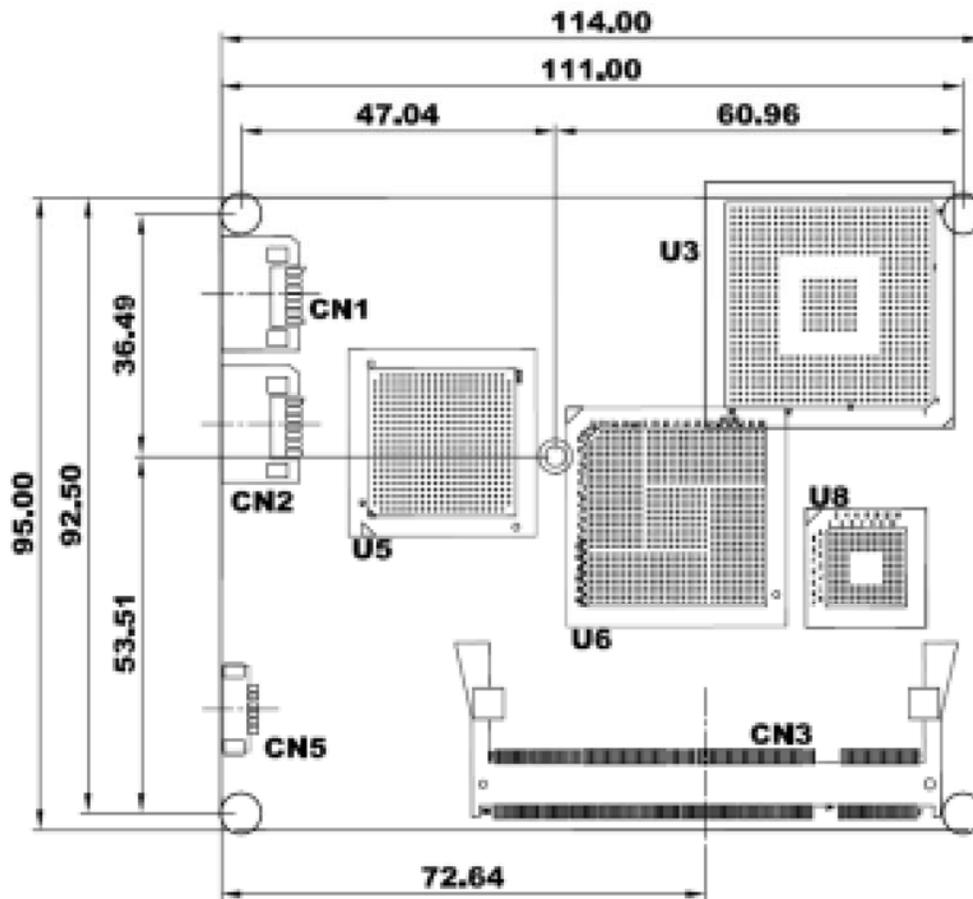
Figure 2-1: Main Dimensions (mm)

2.1.2 Side Dimensions

The figure below shows the dimensions as viewed from the side.
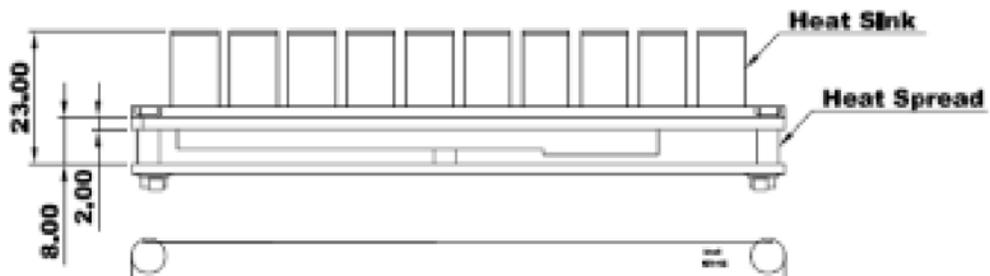
Figure 2-2: Side Dimensions (mm)

2.2 Data Flow

Figure 2-3 shows the data flow between the two on-board chipsets and other components installed on the motherboard and described in the following sections of this chapter.
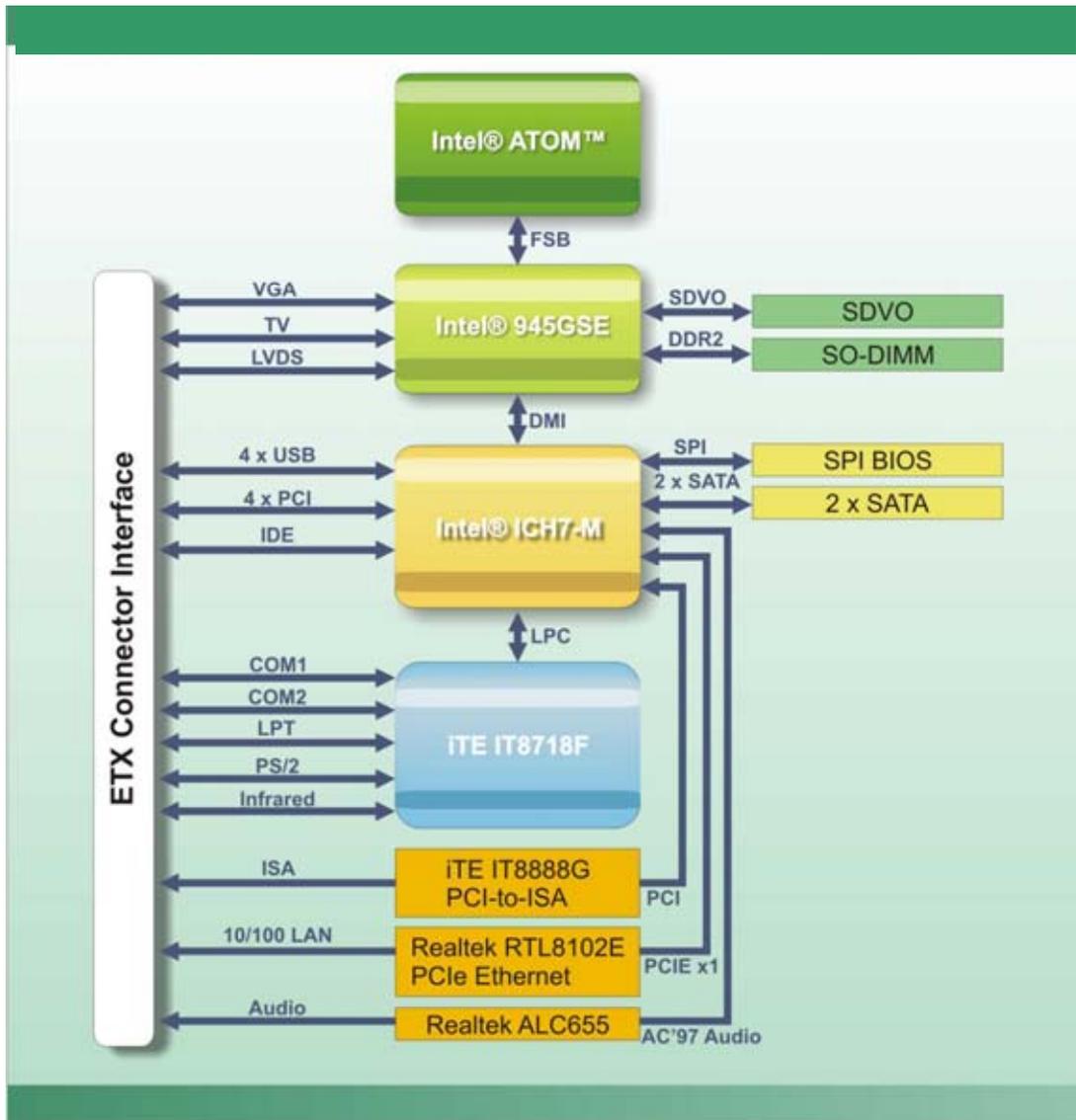
Figure 2-3: Data Flow Block Diagram

2.3 Embedded 1.6 GHz Intel® ATOM™ N270 Processor

The IEM-945GSE comes with an embedded 45 nm 1.6 GHz Intel® ATOM™ N270 processor. The processor connects to the Intel® 945GSE Northbridge through the FSB. The processor is shown in **Figure 2-4** below.
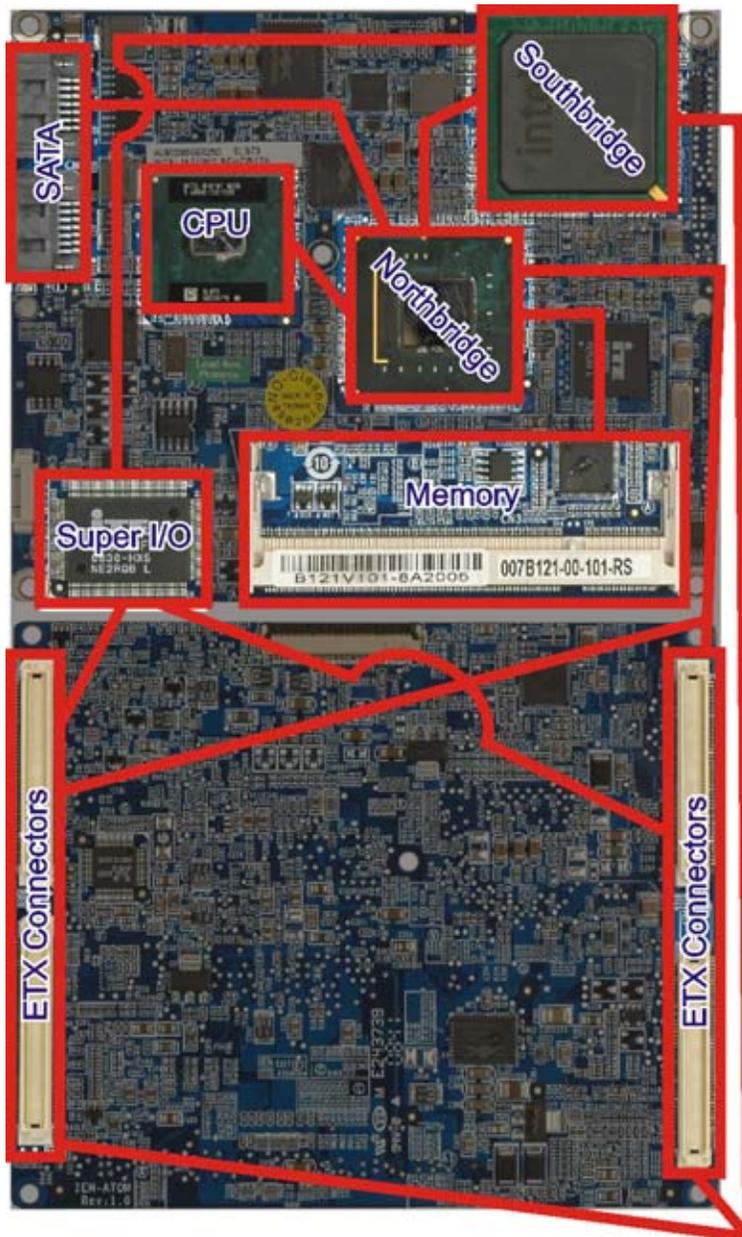
Figure 2-4: Connections

2.4 Intel® 945GSE Northbridge Chip

The Intel® 945GSE is connected to the 1.6 GHz Intel® ATOM™ N270 CPU through the FSB and to the Intel® ICH7M Southbridge through the DMI. The Intel® 945GSE is connected to the SO-DIMM and supports DDR2 memory. The Intel® 945GSE also provides graphics capabilities (described elsewhere). The Intel® 945GSE and its connections are shown in **Figure 2-4**.

2.4.1 DDR2 Controller

There is one 200-pin DDR2 SO-DIMM socket on the IEM-945GSE. The socket supports DDR2 SO-DIMM with the following specifications:

- Maximum Memory supported 2 GB
- Support for DDR2 at 400 MHz and 533 MHz
- No support for Dual-Channel Interleaved mode of operation

The SO-DIMM socket is shown in **Figure 2-4**.

2.4.2 Graphics

The Intel® 945GSE Northbridge chipset has an Intel® Gen. 3.5 integrated graphics engine that supports the following display devices through connectors on the carrier board:

- Analog CRT
- LVDS
- TV-Out
- SDVO ports

The graphics are interfaced to the carrier board through the ETX connectors shown in **Figure 2-4**.

2.4.2.1 Analog CRT (VGA)

The Intel® 945GSE internal graphics engine, with an integrated 400 MHz RAMDAC and hot plug CRT support, supports analog CRT monitors up to QXGA.

2.4.2.2 LVDS

The Intel® 945GSE internal graphics engine supports LVDS displays with the following features:

- Up to UXGA monitors with a maximum resolution of 1600 x 1200
- 18-bit 25 MHz to 112 MHz single-channel or dual-channel LVDS screens
- CPIS 1.5 compliant LVDS screens

2.4.2.3 TV Out

The Intel® 945GSE internal graphics engine has the following TV output features:

- Three integrated 10-bit DACs
- Overscaling
- NTSC and PAL formats supported
- Supports RCA or S-VIDEO connectivity
- Supports HDTV with the following resolutions:
  - ○ 480p
  - ○ 720p
  - ○ 1080i

2.4.2.4 SDVO

The SDVO port is connected to an SDVO connector on the IEM-945GSE. The Intel® 945GSE internal graphics engine has the following SDVO output features:

- Concurrent operation of PCIe x1 with SDVO
- One SDVO ports supported
  - ○ SDVO is muxed onto the PCIe pins
  - ○ DVI 1.0 support for external digital monitor
  - ○ Only Downstream HDCP support
  - ○ Supports TV and DVD formats
  - ○ Display hot plug support

2.5 Intel® ICH7M Southbridge Chipset

The Intel® ICH7M Southbridge chipset is connected to the Intel® 945GSE Northbridge through the chip-to-chip Direct Media Interface (DMI). The Intel® ICH7M provides the I/O capabilities to the system.

Many of the connections on the Intel® ICH7M are wired through the ETX 3.0 connectors to connectors on the carrier board. Some of the features of the Intel® ICH7M are listed below. The connections from the Intel® ICH7M are shown in **Figure 2-4**.

2.5.1 AC'97 Audio Controller

The AC'97 connection is connected to an AC'97 controller. The controller is connected to the ETX 3.0 connectors. AC'97 audio provides 5.1 channel audio output and audio input.

2.5.2 IDE Interface

The IDE interface can be connected to an IDE connector or to a CompactFlash® slot. The integrated IDE interface is able to support the following IDE HDDs:

- **Ultra ATA/100**, with data transfer rates up to 100 MB/s
- **Ultra ATA/66**, with data transfer rates up to 66 MB/s
- **Ultra ATA/33**, with data transfer rates up to 33 MB/s

Specification	Ultra ATA/100	Ultra ATA/66	Ultra ATA/33
IDE devices	2	2	2
PIO Mode	0 – 4	0 – 4	0 – 4
PIO Max Transfer Rate	16.6 MB/s	16.6 MB/s	16.6 MB/s
DMA/UDMA designation	UDMA 5	UDMA 4	UDMA 2
DMA/UDMA Max Transfer	100 MB/s	66 MB/s	33 MB/s
Controller Interface	5 V	5 V	5 V

Table 2-1: Supported HDD Specifications

2.5.3 Low Pin Count (LPC) Interface

The Intel® ICH7M LPC interface complies with the LPC 1.1 specifications. The LPC bus from the Intel® ICH7M can be connected to the following devices:

- Super I/O chipset

2.5.3.1 Super I/O

The super I/O chipset connects to the following devices through the ETX 3.0 connectors on the IEM-945GSE.

- 2 x serial ports
- 1 x parallel port
- 1 x PS/2
- 1 x Infrared

2.5.4 PCI Bus

The PCI interface on the Intel® ICH7M is compliant with the PCI Revision 2.3 implementation. The PCI bus is connected to the following devices.

- PCI slots
- ISA slots (through a PCI-to-ISA chip)

2.5.5 PCIe Bus and Fast Ethernet

One PCIe lane is connected to the Realtek RTL8102E LAN chip. The LAN connections from the LAN chip are connected to the ETX 3.0 connectors.

2.5.6 Real Time Clock

The real time clock in integrated in the Intel® ICH7M. The RTC operates on a 3 V battery and 32.768 KHz crystal. The RTC keeps track of the time and stores system data even when the system is turned off.

2.5.7 SATA Controller

The integrated SATA controller on the Southbridge supports up to two SATA drives with independent DMA operations. The SATA connectors are located on the IEM-945GSE and not interfaced through the ETX 3.0 connectors. SATA controller specifications are listed below.

- Supports two SATA drives
- Supports 1.5 Gb/s data transfer speeds
- Supports Serial ATA Specification, Revision 1.0a

2.5.8 SPI Bus

The Serial Peripheral Interface is a short distance serial bus for communication with other devices on the motherboard. The SPI interface from the board is interfaced to the items below:

- SPI BIOS.

2.5.9 USB Controller

Up to eight high-speed, full-speed or low-speed USB devices are supported by the Intel® ICH7M on the IEM-945GSE. High-speed USB 2.0, with data transfers of up to 480 MB/s, is enabled with the Intel® ICH7M integrated Enhanced Host Controller Interface (EHCI) compliant host controller. USB full-speed and low-speed signaling is supported by the Intel® ICH7M integrated Universal Host Controller Interface (UHCI) controllers.

2.6 Environmental and Power Specifications

2.6.1 System Monitoring

The IEM-945GSE monitors the following temperatures:

- CPU temperature
- System temperature
- On-chip temperature

The IEM-945GSE monitors the following fan speeds:

- CPU (FAN1) speed
- System (FAN2) speed
- System (FAN3) speed

The IEM-945GSE monitors the following voltages:

- Vcore
- +12 V
- +3.30 V
- +5.00 V
- VBAT

The values for the above environmental parameters are all recorded in the BIOS Hardware Health Configuration menu.

2.6.2 Operating Temperature and Temperature Control

The maximum and minimum operating temperatures for the IEM-945GSE are listed below.

- Minimum Operating Temperature: 0ºC (32°F)
- Maximum Operating Temperature: 60°C (140°F)

A cooling fan and heat sink must be installed on the CPU. Thermal paste must be smeared on the lower side of the heat sink before it is mounted on the CPU. Heat sinks are also mounted on the Northbridge and Southbridge chipsets to ensure the operating temperature of these chips remain low.

2.6.3 Power Consumption

Table 2-2 shows the power consumption parameters for the IEM-945GSE running with a 1.6 GHz Intel® ATOM™ N270 with 2.0 GB DDR2 memory.

Voltage	Current
+5 V	2.9 A
+12 V	0.95 A

Table 2-2: Power Consumption

Chapter

3

Unpacking

3.1 Anti-static Precautions

> ![Warning icon] **WARNING:**
>
> Failure to take ESD precautions during the installation of the IEM-945GSE may result in permanent damage to the IEM-945GSE and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the IEM-945GSE. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the IEM-945GSE, or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- **Wear an anti-static wristband**: Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- **Self-grounding**: Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- **Use an anti-static pad**: When configuring the IEM-945GSE, place it on an antic-static pad. This reduces the possibility of ESD damaging the IEM-945GSE.
- **Only handle the edges of the PCB**: When handling the PCB, hold the PCB by the edges.

3.2 Unpacking

3.2.1 Unpacking Precautions

When the IEM-945GSE is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 3.1**.
- Make sure the packing box is facing upwards so the IEM-945GSE does not fall out of the box.
- Make sure all the components shown in **Section 3.3** are present.

3.3 Unpacking Checklist

![NOTE icon] **NOTE:**

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the IEM-945GSE from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

3.3.1 Package Contents

The IEM-945GSE is shipped with the following components:

Quantity	Item	Image
1	IEM-945GSE	
1	Heatspreader	
1	Quick Installation Guide	
1	Utility CD	

Table 3-1: Package List Contents

3.3.2 Optional Items

The following optional items are available:

Item	Image
Heatsink	
Thermal paste	
Screw set	

Table 3-2: Optional Items

Chapter

4

Connectors

4.1 Peripheral Interface Connectors

Section 4.1.1 shows interface connector locations. **Section 4.1.2** lists all the interface connectors seen in **Section 4.1.1**.

4.1.1 Layout

Figure 4-1 shows the on-board peripheral connectors, backplane peripheral connectors and on-board jumpers.
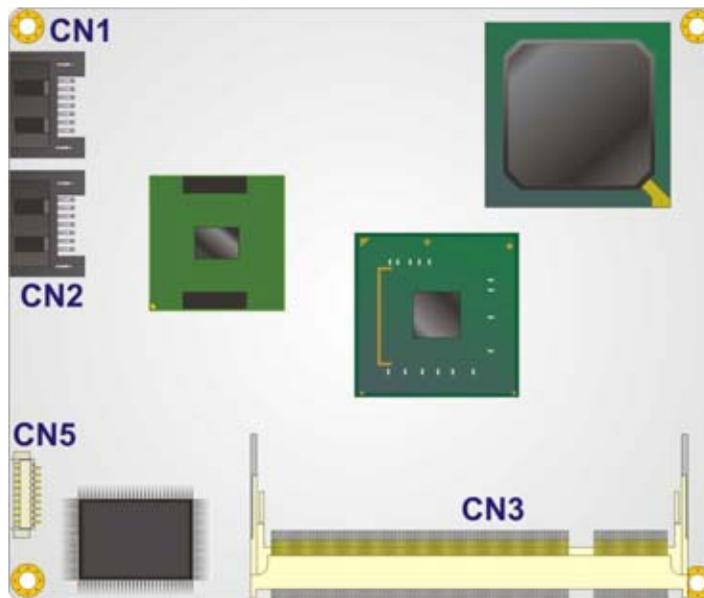
Figure 4-1: Connector and Jumper Locations (Front Side)
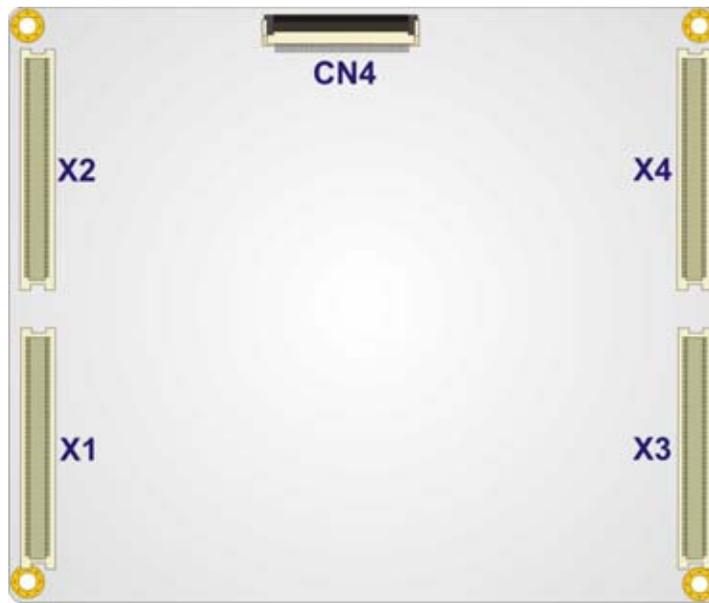
Figure 4-2: Connector and Jumper Locations

4.1.2 Peripheral Interface Connectors

Table 4-1 shows a list of the interface connectors on the IEM-945GSE Detailed descriptions of these connectors can be found in **Section 4.2**.

Connector	Type	Label
ETX connector	ETX connector	X1, X2, X3, X4
SATA connectors	SATA connector	CN1, CN2
SO-DIMM socket	SO-DIMM socket	CN3
SDVO connector	Flat connector	CN4
SPI programming connector	6-pin connector	CN5

Table 4-1: IEM-945GSE Interface Connectors

4.2 ETX Interface Connectors

The IEM-945GSE embedded module has standard four standard ETX interface connectors on the reverse side of the board. The location of the pins and the pinout descriptions are given below.

4.2.1 ETX Connector X1

CN Label:	X1
CN Type:	100-pin ETX 3.0 connector
CN Location:	See **Figure 4-3**
CN Pinouts:	See **Table 4-2**

The standard ETX 3.0 connector locations and pinouts are shown below.
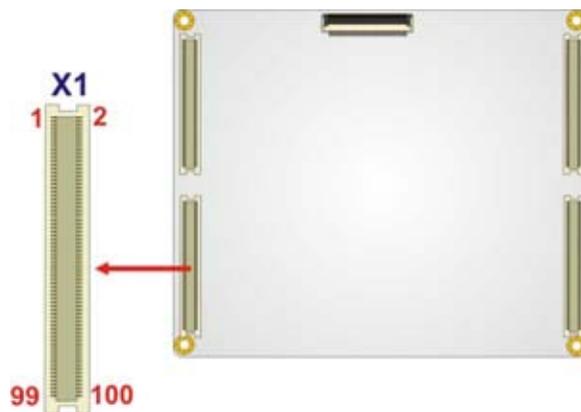
Figure 4-3: ETX 3.0 Connector X1 Location

Pin No.	Description	Pin No.	Description
1	GND	2	GND
3	PCICLK3	4	PCICLK4
5	GND	6	GND
7	PCICLK1	8	PCICLK2
9	REQ3#	10	GNT3#
11	GNT2#	12	VCC3
13	REQ2#	14	GNT1#
15	REQ1#	16	VCC3
17	GNT0#	18	RESERVED
19	VCC5	20	VCC5
21	SERIRQ	22	REQ0#
23	AD0	24	VCC3

Pin No.	Description	Pin No.	Description
25	AD1	26	AD2
27	AD4	28	AD3
29	AD6	30	AD5
31	CBE0#	32	AD7
33	AD8	34	AD9
35	GND	36	GND
37	AD10	38	AUX-L
39	AD11	40	MIC
41	AD12	42	AUX-R
43	AD13	44	ASVCC
45	AD14	46	SNDL
47	AD15	48	ASGND
49	CBE1#	50	SNDR
51	VCC5	52	VCC5
53	PAR	54	SERR#
55	PERR#	56	RESERVED
57	PME#	58	USB2#
59	LOCK#	60	DEVSEL#
61	TRDY#	62	USB3#
63	IRDY#	64	STOP#
65	FRAME#	66	USB2
67	GND	68	GND
69	AD16	70	CBE2#
71	AD17	72	USB3
73	AD19	74	AD18
75	AD20	76	USB0#
77	AD22	78	AD21
79	AD23	80	USB1#
81	AD24	82	CBE3#
83	VCC5	84	VCC5
85	AD25	86	AD26
87	AD28	88	USB0

Pin No.	Description	Pin No.	Description
89	AD27	90	AD29
91	AD30	92	USB1
93	PCIRST#	94	AD31
95	INTC#	96	INTD#
97	INTA#	98	INTB#
99	GND	100	GND

Table 4-2: ETX 3.0 Connector X1 Pin Definitions

4.2.2 ETX Connector X2

CN Label: X2

CN Type: 100-pin ETX 3.0 connector

CN Location: See **Figure 4-4**

CN Pinouts: See **Table 4-3**

The standard ETX 3.0 connector locations and pinouts are shown below.
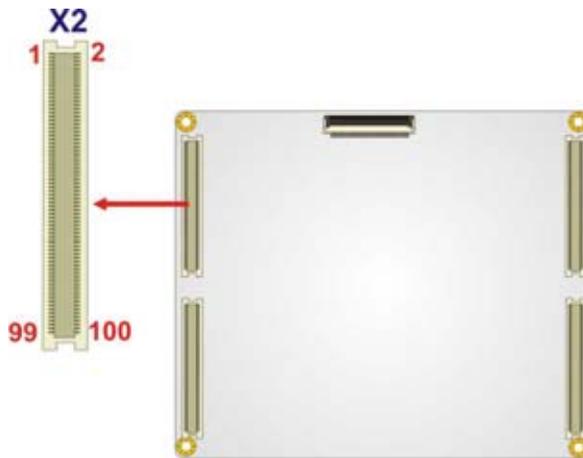
Figure 4-4: ETX 3.0 Connector X2 Location

Pin No.	Description	Pin No.	Description
1	GND	2	GND
3	SD14	4	SD15

Pin No.	Description	Pin No.	Description
5	SD13	6	MASTER#
7	SD12	8	DREQ7
9	SD11	10	DACK7#
11	SD10	12	DREQ6
13	SD9	14	DACK6#
15	SD8	16	DREQ5
17	MEMW#	18	DACK5#
19	MEMR#	20	DREQ0
21	LA17	22	DACK0#
23	LA18	24	IRQ14
25	LA19	26	IRQ15
27	LA20	28	IRQ12
29	LA21	30	IRQ11
31	LA22	32	IRQ10
33	LA23	34	IOCS16#
35	GND	36	GND
37	SBHE#	38	MEMCS16#
39	SA0	40	OSC
41	SA1	42	ALE#
43	SA2	44	TC
45	SA3	46	DACK2#
47	SA4	48	IRQ3
49	SA5	50	IRQ4
51	VCC5	52	VCC5
53	SA6	54	IRQ5
55	SA7	56	IRQ6
57	SA8	58	IRQ7
59	SA9	60	SYSCLK
61	SA10	62	REFRESH#
63	SA11	64	DREQ1
65	SA12	66	DACK1#
67	GND	68	GND

Pin No.	Description	Pin No.	Description
69	SA13	70	DREQ3
71	SA14	72	DACK3#
73	SA15	74	IOR#
75	SA16	76	IOW#
77	SA18	78	SA17
79	SA19	80	SMEMR#
81	IORDY	82	AEN
83	VCC5	84	VCC5
85	SD0	86	SMEMW#
87	SD2	88	SD1
89	SD3	90	0WS#
91	DREQ2	92	SD4
93	SD5	94	IRQ9
95	SD6	96	SD7
97	IOCHK#	98	RSTDRV
99	GND	100	GND

Table 4-3: ETX 3.0 Connector X2 Pin Definitions

4.2.3 ETX Connector X3

CN Label: X3

CN Type: 100-pin ETX 3.0 connector

CN Location: See **Figure 4-5**

CN Pinouts: See **Table 4-4**

The standard ETX 3.0 connector locations and pinouts are shown below.
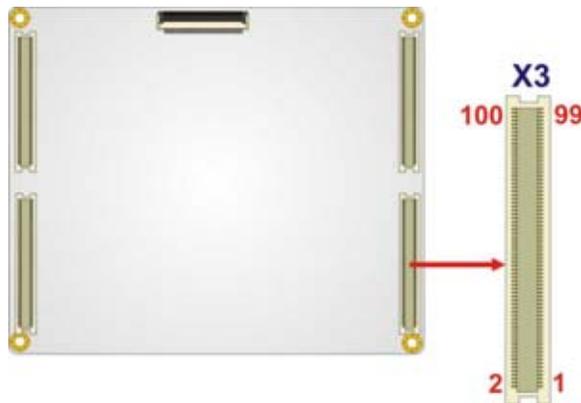
Figure 4-5: ETX 3.0 Connector X3 Location

Pin No.	Description	Pin No.	Description
1	GND	2	GND
3	VGA_R	4	VGA_B
5	HSYNC	6	VGA_G
7	VSYNC	8	DDCK
9	NC	10	DDDA
11	TTL_B6	12	DOTCLK
13	TTL_B7	14	LCD_EN
15	GND	16	GND
17	TTL_B3	18	TTL_B5
19	TTL_B2	20	TTL_B4
21	GND	22	GND
23	TTL_G4	24	TTL_G7
25	TTL_G5	26	TTL_G6
27	GND	28	GND
29	TTL_R6/LVD2-	30	TTL_G3/LVDCK+
31	TTL_R7/LVD2+	32	TTL_G2/LVDCK-
33	GND	34	GND
35	TTL_R3/LVD0+	36	TTL_R5/LVD1+
37	TTL_R2/LVD0-	38	TTL_R4/LVD1-
39	VCC5	40	VCC5
41	JILI_DAT	42	GPIO

Pin No.	Description	Pin No.	Description
43	JILI_CLK	44	BL_ON#
45	NC	46	VDD_EN
47	NC	48	NC
49	NC	50	NC
51	LPT(High)	52	NC
53	VCC5	54	GND
55	PRN_STB#	56	PRN_AFD#
57	NC	58	PRN_D7
59	IR_RXD	60	PRN_ERR#
61	IR_TXD	62	PRN_D6
63	RXD2	64	PRN_INIT#
65	GND	66	GND
67	RTS2#	68	PRN_D5
69	DTR2#	70	PRN_SLIN#
71	DCD2#	72	PRN_D4
73	DSR2#	74	PRN_D3
75	CTS2#	76	PRN_D2
77	TXD2	78	PRN_D1
79	RI2#	80	PRN_D0
81	VCC5	82	VCC5
83	RXD1	84	PRN_ACK#
85	RTS1#	86	PRN_BUSY
87	DTR1#	88	PRN_PE
89	DCD1#	90	PRN_SLCT
91	DSR1#	92	MSCLK
93	CTS1#	94	MSDAT
95	TXD1	96	KBCLK
97	RI1#	98	KBDAT
99	GND	100	GND

Table 4-4: ETX 3.0 Connector X3 Pin Definitions

4.2.4 ETX Connector X4

CN Label:	X4	
CN Type:	100-pin ETX 3.0 connector	
CN Location:	See **Figure 4-6**	
CN Pinouts:	See **Table 4-5**	

The standard ETX 3.0 connector locations and pinouts are shown below.
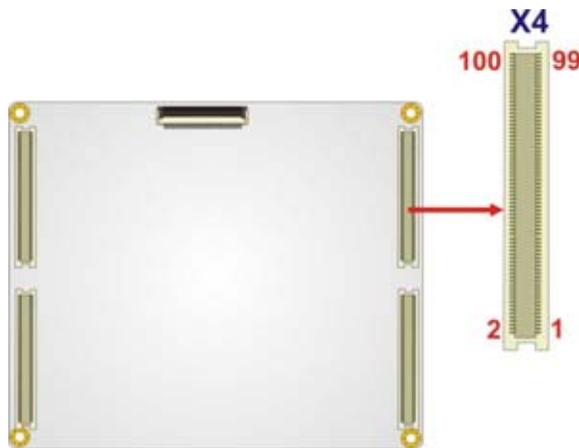
Figure 4-6: ETX 3.0 Connector X4 Location

Pin No.	Description	Pin No.	Description
1	GND	2	GND
3	5VSB	4	SYS_RST#
5	PSON#	6	PCBEEP
7	PWRBTN#	8	VBAT
9	NC	10	LILED#
11	RSMRST#	12	ACTLED#
13	NC	14	SPEEDLED#
15	NC	16	I2CLK
17	VCC5	18	VCC5
19	USB_OC#	20	NC
21	NC	22	I2DAT

Pin No.	Description	Pin No.	Description
23	SMBCLK	24	SMBDATA
25	NC	26	NC
27	NC	28	NC
29	NC	30	IDE_CS1#
31	NC	32	IDE_CS0#
33	GND	34	GND
35	NC	36	IDE_A2
37	NC	38	IDE_A0
39	NC	40	IDE_A1
41	BATLOW#	42	NC
43	NC	44	IDE_IRQ
45	NC	46	IDE_ACK
47	NC	48	IDE_RDY
49	VCC5	50	VCC5
51	NC	52	IDE_IOR
53	NC	54	IDE_IOW
55	NC	56	IDE_DRQ
57	NC	58	IDE_D15
59	NC	60	IDE_D0
61	NC	62	IDE_D14
63	NC	64	IDE_D1
65	GND	66	GND
67	NC	68	IDE_D13
69	NC	70	IDE_D2
71	NC	72	IDE_D12
73	NC	74	IDE_D3
75	NC	76	IDE_D11
77	NC	78	IDE_D4
79	NC	80	IDE_D10
81	VCC5	82	VCC5
83	NC	84	IDE_D5
85	NC	86	IDE_D9

Pin No.	Description	Pin No.	Description
87	NC	88	IDE_D6
89	RING#	90	CBLID
91	LAN_RX-	92	IDE_D8
93	LAN_RX+	94	NC
95	LAN_TX-	96	IDE_D7
97	LAN_TX+	98	HDRST#
99	GND	100	GND

Table 4-5: ETX 3.0 Connector X4 Pin Definitions

4.2.5 SATA Connector

CN Label: **CN1, CN2**

CN Type: SATA connector

CN Location: See **Figure 4-7**

The SATA connectors are for attaching SATA hard drives.
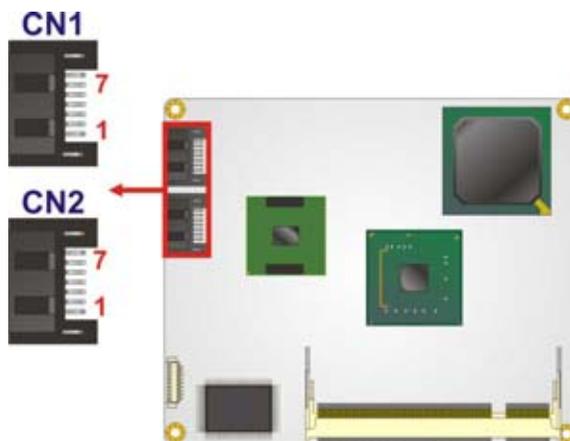
Figure 4-7: SATA Connector Location

4.2.6 SO-DIMM Connector

CN Label: **CN3**

CN Type: SO-DIMM connector

CN Location: See **Figure 4-8**

The SO-DIMM socket is for installing SO-DIMM memory.
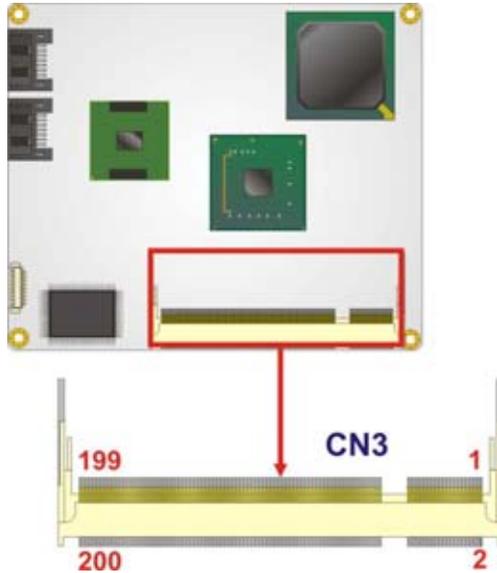
Figure 4-8: SO-DIMM Connector Location

4.2.7 SDVO Connector

CN Label: CN4

CN Type: 45-pin flat connector

CN Location: See **Figure 4-9**

CN Pinouts: See **Table 4-6**

The SDVO connector provides an external interface to the SDVO.
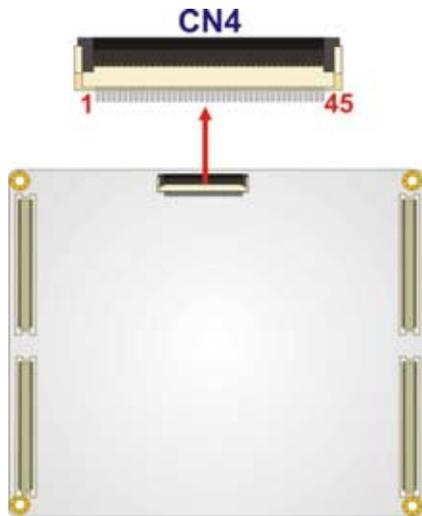
Figure 4-9: SDVO Connector Location

Pin No.	Description	Pin No.	Description
1	GND	2	NC
3	NC	4	GND
5	NC	6	SDVOB_BLUE#
7	GND	8	SDVOB_BLUE
9	NC	10	GND
11	NC	12	SDVOB_RED#
13	GND	14	SDVOB_RED
15	SDVOB_CLK#	16	GND
17	SDVOB_CLK	18	SDVO_FLDSTALL#
19	GND	20	SDVO_FLDSTALL
21	SDVOB_GREEN#	22	GND
23	SDVOB_GREEN	24	SDVO_TVCLKIN#
25	GND	26	SDVO_TVCLKIN
27	NC	28	GND
29	NC	30	SDVO_CLK
31	GND	32	SDVO_DATA
33	SDVOB_INT#	34	PCIRST#
35	SDVOB_INT	36	VCC5
37	GND	38	VCC5

Pin No.	Description	Pin No.	Description
39	NC	40	VCC5
41	NC	42	NC
43	GND	44	NC
45	NC		

Table 4-6: SDVO Connector Pin Definitions

4.2.8 SPI Connector

CN Label:	**CN5**
CN Type:	6-pin connector
CN Location:	See **Figure 4-10**
CN Pinouts:	See **Table 4-7**

The SPI connector is for flashing new BIOS onto the SPI BIOS chip.
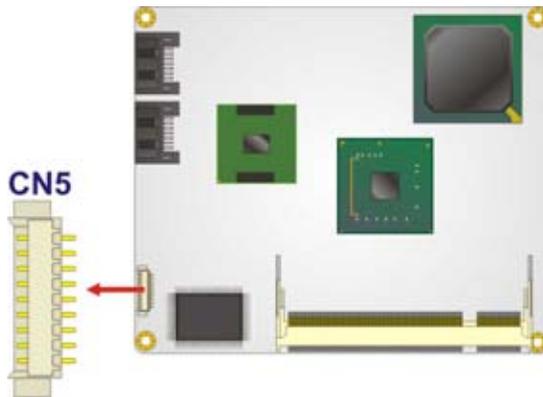
Figure 4-10: SPI Flash Connector Location

Pin No.	Description
1	SPI_VCC (+3.3 V)
2	SPI_CS#
3	SPI_MISO
4	SPI_CLK
5	SPI_MOSI

Pin No.	Description
6	GND

Table 4-7: SPI Flash Connector Pin Definitions

Chapter

5

Installation

5.1 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before the CPU module is installed. All installation notices pertaining to the installation of the CPU module should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the CPU module and injury to the person installing the CPU module.

Before and during the installation of the IEM-945GSE, please do the following:

- ▪ Read the user manual
  - ○ The user manual provides a complete description of the IEM-945GSE, installation instructions and configuration options.
- ▪ Wear an electrostatic discharge cuff (ESD)
  - ○ Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- ▪ Place the CPU module on an antistatic pad
  - ○ When installing or configuring the CPU module, place it on an antistatic pad. This helps to prevent potential ESD damage.
- ▪ Turn off all power to the IEM-945GSE
  - ○ When working with the CPU module, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the IEM-945GSE DO NOT:

- ▪ **DO NOT** remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- ▪ **DO NOT** use the product before verifying all the cables and power connectors are properly connected.
- ▪ **DO NOT** allow screws to come in contact with the PCB circuit, connector pins, or its components.

5.2 SO-DIMM Installation

To install a SO-DIMM into a SO-DIMM socket, please follow the steps below and refer to **Figure 5-1**.
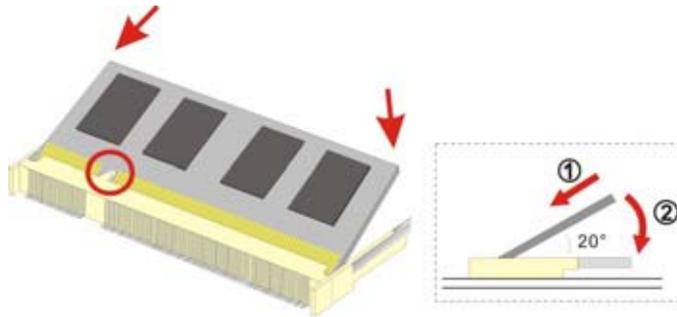
Figure 5-1: SO-DIMM Installation

Step 1:   **Locate the SO-DIMM socket**. Place the IEM-945GSE on an anti-static pad.

Step 2:   **Align the SO-DIMM with the socket**. The SO-DIMM must be oriented in such a way that the notch in the middle of the SO-DIMM must be aligned with the plastic bridge in the socket.

Step 3:   **Insert the SO-DIMM**. Push the SO-DIMM chip into the socket at an angle. (See **Figure 5-1**)

Step 4:   **Open the SO-DIMM socket arms**. Gently pull the arms of the SO-DIMM socket out and push the rear of the SO-DIMM down. (See **Figure 5-1**)

Step 5:   **Secure the SO-DIMM**. Release the arms on the SO-DIMM socket. They clip into place and secure the SO-DIMM in the socket.

5.3 Mounting the IEM-945GSE

WARNING!

Never run the embedded module without an appropriate heat sink.

![WARNING icon] **WARNING!**

The installation instructions must be carefully followed to avoid damage to the components and injury to the user.

![WARNING icon] **WARNING!**

Take anti-static precautions when installing the board and its components to avoid damage from an electrostatic discharge.

The ETX 3.0 connectors are connected on the reverse side of the IEM-945GSE. Align these connectors with those on the baseboard. Gently push the embedded module down to ensure a proper connection.

Baseboards can be designed by the end user, customized by IEI, or purchased from IEI. For more information visit the IEI website (www.ieiworld.com) or email sales@iei.com.tw to contact an IEI sales representative.

Chapter

6

BIOS Setup

6.1 Introduction

NOTE:

The BIOS items shown below are from a IEM-945GSE installed on the IEM-DB-7S-RS-R30 reference carrier board. The IEM-DB-7S-RS-R30 reference carrier board is available from iEi, contact sales@iei.com.tw or go to http://www.ieiworld.com for more information.

A licensed copy of AMI BIOS is preprogrammed into the ROM BIOS. The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options that may be changed.

6.1.1 Starting Setup

The AMI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the DELETE key as soon as the system is turned on or
2. Press the DELETE key when the "**Press Del to enter SETUP**" message appears on the screen.

If the message disappears before the DELETE key is pressed, restart the computer and try again.

6.1.2 Using Setup

Use the arrow keys to highlight items, press ENTER to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press ESC to quit. Navigation keys are shown in.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item

Key	Function
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
Page Up key	Increase the numeric value or make changes
Page Dn key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 /F3 key	Change color from total 16 colors.　F2 to select color forward.
F10 key	Save all the CMOS changes, only for Main Menu

Table 6-1: BIOS Navigation Keys

6.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

6.1.4 Unable to Reboot After Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the jumper described in **Chapter 5**.

6.1.5 BIOS Menu Bar

The **menu bar** on top of the BIOS screen has the following main items:

- **Main** Changes the basic system configuration.
- **Advanced** Changes the advanced system settings.
- **PCIPnP** Changes the advanced PCI/PnP Settings
- **Boot** Changes the system boot configuration.

- **Security** Sets User and Supervisor Passwords.
- **Chipset** Changes the chipset settings.
- **Power** Changes power management settings.
- **Exit** Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

6.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered. The **Main** menu gives an overview of the basic system information.

```
                         BIOS SETUP UTILITY
   Main   Advanced   PCIPnP   Boot   Security   Chipset   Exit

   System Overview                                Use [ENTER], [TAB] or
                                                  [SHIFT-TAB] to select
   AMIBIOS                                        a field.
   Version    :08.00.15
   Build Date:10/08/08                            Use [+] or [-] to
   ID         :E121MR13                           configure system
                                                  Time.
   Processor
   Intel® Atom (TM) CPU N270 @ 1.60GHz
   Speed      :1600MHz
   Count      :1

   System Memory                                  ←→    Select Screen
   Size       :504MB                              ↑↓    Select Item
                                                  +-    Change Field
   System Time                [14:20:27]          Tab   Select Field
   System Date                [Tue 05/06/2008]    F1    General Help
                                                  F10   Save and Exit
                                                  ESC   Exit

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```

BIOS Menu 1: Main

- **System Overview**

The **System Overview** lists a brief summary of different system components. The fields in **System Overview** cannot be changed. The items shown in the system overview include:

- **AMI BIOS**: Displays auto-detected BIOS information
  - o Version: Current BIOS version
  - o Build Date: Date the current BIOS version was made
  - o ID: Installed BIOS ID
- **Processor**: Displays auto-detected CPU specifications
  - o Type: Names the currently installed processor
  - o Speed: Lists the processor speed
  - o Count: The number of CPUs on the motherboard
- **System Memory**: Displays the auto-detected system memory.
  - o Size: Lists memory size

The System Overview field also has two user configurable fields:

- **System Time [xx:xx:xx]**

Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

- **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

6.3 Advanced

Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:

> ⚠ **WARNING:**
>
> Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

- CPU configuration
- IDE configuration

- Super IO configuration

- Hardware health configuration

- Power configuration

- Remote configuration

- USB configuration

```
                          BIOS SETUP UTILITY
 Main    Advanced   PCIPnP    Boot    Security    Chipset    Exit

 Advanced Settings                          Configure CPU

 WARNING: Setting wrong values in below sections
          may cause system to malfunction

 ▶ CPU Configuration
 ▶ IDE Configuration
 ▶ SuperIO Configuration
 ▶ Hardware Health Configuration
 ▶ Power Configuration
 ▶ Remote Access Configuration
 ▶ USB Configuration
                                            ←→    Select Screen
                                            ↑↓    Select Item
                                            Enter Go to SubScreen
                                            F1    General Help
                                            F10   Save and Exit
                                            ESC   Exit

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```

BIOS Menu 2: Advanced

6.3.1 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 3**) to view detailed CPU specifications and configure the CPU.

```
                        BIOS SETUP UTILITY
    Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

   Configure advanced CPU settings
    Module Version - 3F.10

   Manufacturer:Intel
   Intel® Atom(TM)CPU N270 @ 1.60GHz
   Frequency    :1.60GHz
   FSB Speed    :532MHz

   Cache L1     : 24 KB
   Cache L2     : 512 KB

   Ratio Actual Value: 12


                                                  ←→    Select Screen
                                                  ↑↓    Select Item
                                                  F1    General Help
                                                  F10   Save and Exit
                                                  ESC   Exit




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```

BIOS Menu 3: CPU Configuration

The CPU Configuration menu (**BIOS Menu 3**) lists the following CPU details:

- **Manufacturer**: Lists the name of the CPU manufacturer
- **Brand String**: Lists the brand name of the CPU being used
- **Frequency:** Lists the CPU processing speed
- **FSB Speed**: Lists the FSB speed
- **Cache L1**: Lists the CPU L1 cache size
- **Cache L2**: Lists the CPU L2 cache size
- **Ratio actual**: Lists the clock multiplier

6.3.2 IDE Configuration

Use the **IDE Configuration** menu (**BIOS Menu 4**) to change and/or set the configuration of the IDE devices installed in the system.

```
                        BIOS SETUP UTILITY
  Main   Advanced   PCIPnP   Boot   Security   Chipset   Exit

  IDE Configuration                                 Options

  ATA/IDE Configuration        [Compatible]         Disabled
     Legacy IDE Channels       [SATA Pri, PATA Sec] Compatible
                                                    Enhanced
▶ Primary IDE Master          : [Not Detected]
▶ Primary IDE Slave           : [Not Detected]
▶ Secondary IDE Master        : [Not Detected]
▶ Secondary IDE Slave         : [Not Detected]


                                                    ←→    Select Screen
                                                    ↑↓    Select Item
                                                    +-    Change Option
                                                    F1    General Help
                                                    F10   Save and Exit
                                                    ESC   Exit


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```

BIOS Menu 4: IDE Configuration

▪ **ATA/IDE Configurations [Compatible]**

Use the **ATA/IDE Configurations** option to configure the ATA/IDE controller.

➔ **Disabled**   Disables the on-board ATA/IDE controller.

➔ **Compatible**   Configures the on-board ATA/IDE controller to be in compatible mode. In this mode, a SATA channel will replace one of the IDE channels. This mode supports up to 4 storage devices.

➔ **Enhanced** DEFAULT Configures the on-board ATA/IDE controller to be in Enhanced mode. In this mode, IDE channels and SATA channels are separated. This mode supports up to 6 storage devices. Some legacy OS do not support this mode.

▪ **Legacy IDE Channels [SATA Pri, PATA Sec]**

➔ **SATA Only** Only the SATA drives are enabled.

➔ **SATA Pri, PATA Sec** DEFAULT The SATA drive are enabled on the primary IDE channel. The PATA drives are enabled on the secondary IDE channel.

➔ **PATA Only** The IDE drives are enabled on the primary and secondary IDE channels. SATA drives are disabled.

▪ **IDE Master and IDE Slave**

When entering setup, BIOS auto detects the presence of IDE devices. BIOS displays the status of the auto detected IDE devices. The following IDE devices are detected and are shown in the **IDE Configuration** menu:

- ▪ Primary IDE Master
- ▪ Primary IDE Slave
- ▪ Secondary IDE Master
- ▪ Secondary IDE Slave

The **IDE Configuration** menu (**BIOS Menu 4**) allows changes to the configurations for the IDE devices installed in the system. If an IDE device is detected, and one of the above listed four BIOS configuration options are selected, the IDE configuration options shown in **Section 876.3.2.1** appear.

6.3.2.1 IDE Master, IDE Slave

Use the **IDE Master** and **IDE Slave** configuration menu to view both primary and secondary IDE device details and configure the IDE devices connected to the system.

```
                        BIOS SETUP UTILITY
  Main   Advanced    PCIPnP    Boot   Security   Chipset    Exit

  Primary IDE Master                          Select the type of
  ─────────────────────────────────────      device connected to
  Device     :Not Detected                    the system.

  Type                         [Auto]
  LBA/Large Mode               [Auto]
  Block (Multi-Sector Transfer)  [Auto]
  PIO Mode                     [Auto]
  DMA Mode                     [Auto]
  S.M.A.R.T.                   [Auto]
  32Bit Data Transfer          [Enabled]

                                              ←→    Select Screen
                                              ↑↓    Select Item
                                              +-    Change Option
                                              F1    General Help
                                              F10   Save and Exit
                                              ESC   Exit

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```

BIOS Menu 5: IDE Master and IDE Slave Configuration

▪ **Auto-Detected Drive Parameters**

The "grayed-out" items in the left frame are IDE disk drive parameters automatically detected from the firmware of the selected IDE disk drive. The drive parameters are listed as follows:

▪ **Device**: Lists the device type (e.g. hard disk, CD-ROM etc.)
▪ **Type**: Indicates the type of devices a user can manually select
▪ **Vendor**: Lists the device manufacturer
▪ **Size**: List the storage capacity of the device.
▪ **LBA Mode**: Indicates whether the LBA (Logical Block Addressing) is a method of addressing data on a disk drive is supported or not.

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- **Block Mode**: Block mode boosts IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if block mode is not used. Block mode allows transfers of up to 64 KB per interrupt.
- **PIO Mode**: Indicates the PIO mode of the installed device.
- **Async DMA**: Indicates the highest Asynchronous DMA Mode that is supported.
- **Ultra DMA**: Indicates the highest Synchronous DMA Mode that is supported.
- **S.M.A.R.T.**: Indicates whether or not the Self-Monitoring Analysis and Reporting Technology protocol is supported.
- **32Bit Data Transfer**: Enables 32-bit data transfer.

- **Type [Auto]**

Use the **Type** BIOS option select the type of device the AMIBIOS attempts to boot from after the Power-On Self-Test (POST) is complete.

➔ **Not Installed** — BIOS is prevented from searching for an IDE disk drive on the specified channel.

➔ **Auto** DEFAULT — The BIOS auto detects the IDE disk drive type attached to the specified channel. This setting should be used if an IDE hard disk drive is attached to the specified channel.

➔ **CD/DVD** — The CD/DVD option specifies that an IDE CD-ROM drive is attached to the specified IDE channel. The BIOS does not attempt to search for other types of IDE disk drives on the specified channel.

➔ **ARMD** — This option specifies an ATAPI Removable Media Device. These include, but are not limited to:
ZIP
LS-120

▪ **LBA/Large Mode [Auto]**

Use the **LBA/Large Mode** option to disable or enable BIOS to auto detects LBA (Logical Block Addressing). LBA is a method of addressing data on a disk drive. In LBA mode, the maximum drive capacity is 137 GB.

➔ **Disabled**　　　　　　BIOS is prevented from using the LBA mode control on the specified channel.

➔ **Auto**　　DEFAULT　BIOS auto detects the LBA mode control on the specified channel.

▪ **Block (Multi Sector Transfer) [Auto]**

Use the **Block (Multi Sector Transfer)** to disable or enable BIOS to auto detect if the device supports multi-sector transfers.

➔ **Disabled**　　　　　　BIOS is prevented from using Multi-Sector Transfer on the specified channel. The data to and from the device occurs one sector at a time.

➔ **Auto**　　DEFAULT　BIOS auto detects Multi-Sector Transfer support on the drive on the specified channel. If supported the data transfer to and from the device occurs multiple sectors at a time.

▪ **PIO Mode [Auto]**

Use the **PIO Mode** option to select the IDE PIO (Programmable I/O) mode program timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases.

➔ **Auto**　DEFAULT　BIOS auto detects the PIO mode. Use this value if the IDE disk drive support cannot be determined.

➔ **0**　　　　　　　　　PIO mode 0 selected with a maximum transfer rate of 3.3 MB/s

➔ **1**　　　　　　　　　PIO mode 1 selected with a maximum transfer rate of 5.2 MB/s

➔ **2**　　　　　　　　　PIO mode 2 selected with a maximum transfer rate of 8.3 MB/s

➔ **3** PIO mode 3 selected with a maximum transfer rate of 11.1 MB/s

➔ **4** PIO mode 4 selected with a maximum transfer rate of 16.6 MB/s

(This setting generally works with all hard disk drives manufactured after 1999. For other disk drives, such as IDE CD-ROM drives, check the specifications of the drive.)

▪ **DMA Mode [Auto]**

Use the **DMA Mode** BIOS selection to adjust the DMA mode options.

➔ **Auto** DEFAULT BIOS auto detects the DMA mode. Use this value if the IDE disk drive support cannot be determined.

➔ **SWDMA0** Single Word DMA mode 0 selected with a maximum data transfer rate of 2.1 MB/s

➔ **SWDMA1** Single Word DMA mode 1 selected with a maximum data transfer rate of 4.2 MB/s

➔ **SWDMA2** Single Word DMA mode 2 selected with a maximum data transfer rate of 8.3 MB/s

➔ **MWDMA0** Multi Word DMA mode 0 selected with a maximum data transfer rate of 4.2 MB/s

➔ **MWDMA1** Multi Word DMA mode 1 selected with a maximum data transfer rate of 13.3 MB/s

➔ **MWDMA2** Multi Word DMA mode 2 selected with a maximum data transfer rate of 16.6 MB/s

➔ **UDMA1** Ultra DMA mode 0 selected with a maximum data transfer rate of 16.6 MB/s

➔ **UDMA1** Ultra DMA mode 1 selected with a maximum data transfer rate of 25 MB/s

➔ **UDMA2** Ultra DMA mode 2 selected with a maximum data transfer rate of 33.3 MB/s

è **UDMA3**   Ultra DMA mode 3 selected with a maximum data transfer rate of 44 MB/s (To use this mode, it is required that an 80-conductor ATA cable is used.)

è **UDMA4**   Ultra DMA mode 4 selected with a maximum data transfer rate of 66.6 MB/s (To use this mode, it is required that an 80-conductor ATA cable is used.)

è **UDMA5**   Ultra DMA mode 5 selected with a maximum data transfer rate of 99.9 MB/s (To use this mode, it is required that an 80-conductor ATA cable is used.)

▪ **S.M.A.R.T [Auto]**

Use the **S.M.A.R.T** option to auto-detect, disable or enable Self-Monitoring Analysis and Reporting Technology (SMART) on the drive on the specified channel. **S.M.A.R.T** predicts impending drive failures. The **S.M.A.R.T** BIOS option enables or disables this function.

è **Auto**   DEFAULT   BIOS auto detects HDD SMART support.

è **Disabled**   Prevents BIOS from using the HDD SMART feature.

è **Enabled**   Allows BIOS to use the HDD SMART feature

▪ **32Bit Data Transfer [Enabled]**

Use the **32Bit Data Transfer** BIOS option to enables or disable 32-bit data transfers.

è **Disabled**   Prevents the BIOS from using 32-bit data transfers.

è **Enabled**   DEFAULT   Allows BIOS to use 32-bit data transfers on supported hard disk drives.

6.3.3 Super IO Configuration

Use the **Super IO Configuration** menu (**BIOS Menu 6**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.

```
                        BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

   Configure Win627EHF Super IO Chipset          Allows BIOS to select
                                                 Serial Port1 Base
   Serial Port1 Address         [3F8/IRQ4]       Addresses.
     Serial Port1 Mode          [Normal]
   Serial Port2 Address         [2F8/IRQ3]
     Serial Port2 Mode          [Normal]
   Parallel Port Address        [378]
     Parallel Port Mode         [Normal]
     Parallel Port IRQ          [IRQ7]




                                                 ←→    Select Screen
                                                 ↑↓    Select Item
                                                 +-    Change Option
                                                 F1    General Help
                                                 F10   Save and Exit
                                                 ESC   Exit


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```

BIOS Menu 6: Super IO Configuration

▪ **Serial Port1 Address [3F8/IRQ4]**

Use the **Serial Port1 Address** option to select the I/O and IRQ base addresses.

➔ **Disabled**   No base address is assigned to Serial Port 1

➔ **3F8/IRQ4** DEFAULT   I/O port address is 3F8 and the interrupt address is IRQ4

➔ **3E8/IRQ4**   I/O port address is 3E8 and the interrupt address is IRQ4

➔ **2E8/IRQ3**   I/O port address is 2E8 and the interrupt address is IRQ3

▪ **Serial Port1 Mode [Normal]**

Use the **Serial Port1 Mode** option to select the transmitting and receiving mode.

- Normal   Default
- IrDA
- ASK IR

- **Serial Port2 Address [2F8/IRQ3]**

Use the **Serial Port2 Address** option to select the I/O and IRQ addresses.

➔ **Disabled**   No base address is assigned to Serial Port 2

➔ **2F8/IRQ3**   DEFAULT   I/O port address is 3F8 and the interrupt address is IRQ3

➔ **3E8/IRQ4**   I/O port address is 3E8 and the interrupt address is IRQ4

➔ **2E8/IRQ3**   I/O port address is 2E8 and the interrupt address is IRQ3

- **Serial Port2 Mode [Normal]**

Use the **Serial Port2 Mode** option to select the transmitting and receiving mode.

- Normal   Default
- IrDA
- ASK IR

6.3.4 W83627H Hardware Health

The **Hardware Health Configuration** menu (**BIOS Menu 7**) shows the operating temperature, fan speeds and system voltages.

```
                          BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security   Chipset    Exit

  Hardware Health Configuration

  CPU Temperature               :66C/150F
  System Temperature            :57C/134F

  CPU Core                      :1.152 V
  +1.05V                        :1.040 V
  +3.30V                        :3.248 V
  VCCP                          :4.972 V
  +1.5V                         :1.488 V
  +1.8V                         :1.808 V
  5VSB                          :4.865 V
  VBAT                          :3.296 V          ←→    Select Screen
                                                  ↑↓    Select Item
                                                  F1    General Help
                                                  F10   Save and Exit
                                                  ESC   Exit

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```

BIOS Menu 7: Hardware Health Configuration

The following system parameters and values are shown. The system parameters that are monitored are:

- **Temperature**:
  ○ CPU temperature
  ○ System temperature
- **Voltages**:
  ○ CPU core
  ○ +1.05V
  ○ +3.30V
  ○ VCCP
  ○ +1.5V

o +1.8V

o 5VSB

o VBAT

6.3.5 Power Configuration

The **Power Configuration** menu (BIOS Menu 8) configures the Advanced Configuration and Power Interface (ACPI) and Power Management (APM) options.

```
                         BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security   Chipset    Exit

                                                 Default set
                                                 AUTO is detect
  ───────────────────────────────────────        power supply status
  Select AT/ATX Power         [BY HARDWARE]
  Power Supply Status         [ATX Power]         If set AT Power
                                                 Power State will Auto
  ▶ APM Configuration                             set Power On




                                                 ←→    Select Screen
                                                 ↑↓    Select Item
                                                 +-    Change Option
                                                 F1    General Help
                                                 F10   Save and Exit
                                                 ESC   Exit



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```

BIOS Menu 8: Power Configuration

▪ **Select AT/ATX Power [BY HARDWARE]**

Use the **Select AT/ATX Power** option to set the power mode of the system.

➔ **BY HARDWARE** DEFAULT Automatically select according to attached power supply

➔ **AT Power** Use AT power

➔ **ATX Power** Use ATX power

▪ **Power Supply Status**

Shows the type of power supply currently connected to the system.

6.3.5.1 APM Configuration

The **APM Configuration** menu (**BIOS Menu 9**) allows the advanced power management options to be configured.

```
                         BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security   Chipset    Exit

   APM Configuration                           Options

   Restore on AC Power Loss       [Last State]    Power Off
   Power Button Mode              [On/Off]        Power On
                                                  Last State
   Advanced Resume Event Controls
     Resume On Keyboard/Mouse       [Disabled]
     Resume On Ring                 [Disabled]
     Resume on PME#                 [Disabled]
     Resume On PCI-Express WAKE#    [Enabled]
     Resume On RTC Alarm            [Disabled]


                                               ←→    Select Screen
                                               ↑↓    Select Item
                                               +-    Change Option
                                               F1    General Help
                                               F10   Save and Exit
                                               ESC   Exit


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```

BIOS Menu 9:Advanced Power Management Configuration

▪ **Restore on AC Power Loss [Last State]**

Use the **Restore on AC Power Loss** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

➔	**Power Off**		The system remains turned off
➔	**Power On**		The system turns on
➔	**Last State**	DEFAULT	The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off.

- **Power Button Mode [On/Off]**

  Use the **Power Button Mode** BIOS to specify how the power button functions.

  ➔ **On/Off**   D<small>EFAULT</small>   When the power button is pressed the system is either turned on or off

  ➔ **Suspend**   When the power button is pressed the system goes into suspend mode

- **Resume on Keyboard/Mouse [Disabled]**

  Use the **Resume on Keyboard/Mouse** BIOS option to enable activity on either the keyboard or mouse to rouse the system from a suspend or standby state. That is, the system is roused when the mouse is moved or a button on the keyboard is pressed.

  ➔ **Disabled**   D<small>EFAULT</small>   Wake event not generated by activity on the keyboard or mouse

  ➔ **Enabled**   Wake event generated by activity on the keyboard or mouse

- **Resume on Ring [Disabled]**

  Use the **Resume on Ring** BIOS option to enable activity on the RI (ring in) modem line to rouse the system from a suspend or standby state. That is, the system will be roused by an incoming call on a modem.

  ➔ **Disabled**   D<small>EFAULT</small>   Wake event not generated by an incoming call

  ➔ **Enabled**   Wake event generated by an incoming call

- **Resume on PCI-Express WAKE# [Enabled]**

  Use the **Resume PCI-Express WAKE#** BIOS option to enable activity on the PCI-Express WAKE# signal to rouse the system from a suspend or standby state.

  ➔ **Disabled**   Wake event not generated by PCI-Express WAKE# signal activity

➔ **Enabled** DEFAULT Wake event generated by PCI-Express WAKE# signal activity

▪ **Resume On RTC Alarm [Disabled]**

Use the **Resume On RTC Alarm** option to specify the time the system should be roused from a suspended state.

➔ **Disabled** DEFAULT The real time clock (RTC) cannot generate a wake event

➔ **Enabled** If selected, the following appears with values that can be selected:
- **RTC Alarm Date (Days)**
- **RTC Alarm Time**

After setting the alarm, the computer turns itself on from a suspend state when the alarm goes off.

6.3.6 Remote Configuration

Use the **Remote Access Configuration** menu (**BIOS Menu 10**) to configure remote access parameters. The **Remote Access Configuration** is an AMIBIOS feature and allows a remote host running a terminal program to display and configure the BIOS settings.

```
                        BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

 Configure Remote Access type and parameters          Select Remote Access
                                                      type.
 Remote Access                     [Disabled]




                                                      ←→    Select Screen
                                                      ↑↓    Select Item
                                                      +-    Change Option
                                                      F1    General Help
                                                      F10   Save and Exit
                                                      ESC   Exit


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```
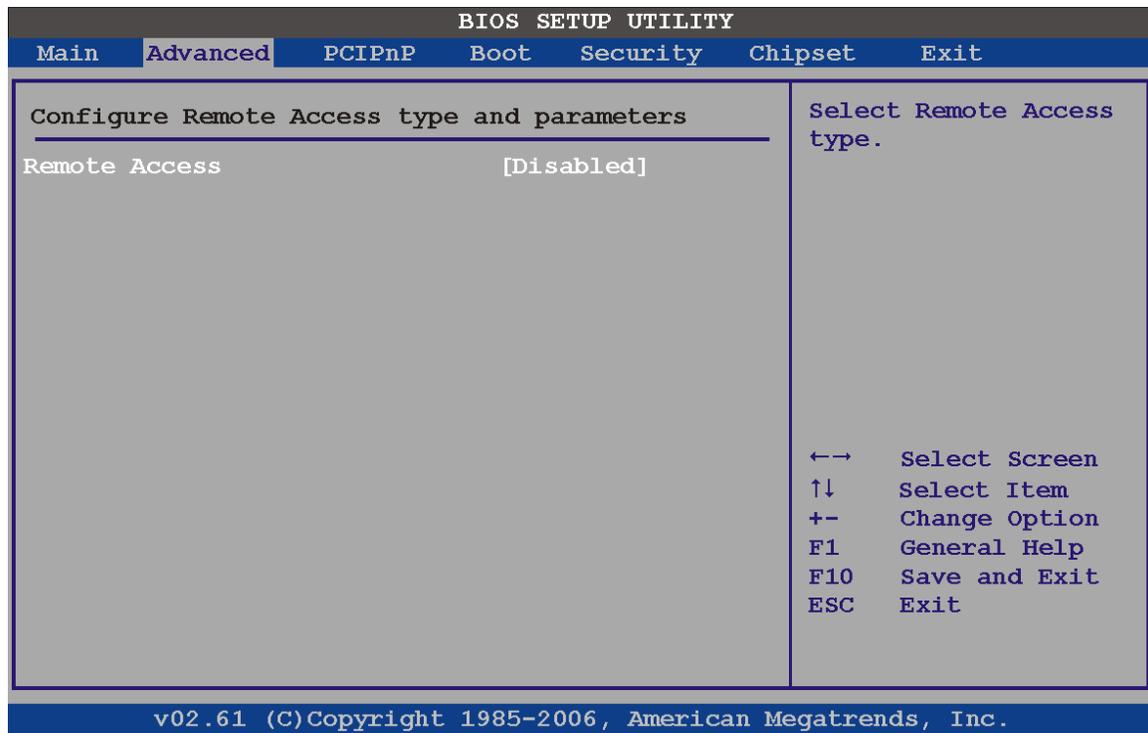
   BIOS Menu 10: Remote Access Configuration

▪ **Remote Access [Disabled]**

   Use the **Remote Access** option to enable or disable access to the remote functionalities of the system.

   ➔ **Disabled**   **DEFAULT**   Remote access is disabled.

➔ **Enabled**   Remote access configuration options shown below

appear:

- **Serial Port Number**
- **Serial Port Mode**
- **Flow Control**
- **Redirection after BIOS POST**
- **Terminal Type**
- **VT-UTF8 Combo Key Support**

These configuration options are discussed below.

▪ **Serial Port Number [COM1]**

Use the **Serial Port Number** option allows to select the serial port used for remote access.

➔ **COM1**   **DEFAULT**   System is remotely accessed through COM1

➔ **COM2**   System is remotely accessed through COM2

NOTE: Make sure the selected COM port is enabled through the Super I/O configuration menu.

▪ **Base Address, IRQ [2F8h,3]**

The **Base Address, IRQ** option cannot be configured and only shows the interrupt address of the serial port listed above.

▪ **Serial Port Mode [115200 8,n,1]**

Use the **Serial Port Mode** option to select baud rate through which the console redirection is made. The following configuration options are available

- 115200 8,n,1 DEFAULT
- 57600 8,n,1
- 38400 8,n,1
- 19200 8,n,1
- 09600 8,n,1

NOTE:

Identical baud rate setting musts be set on the host (a management computer running a terminal software) and the slave

▪ **Flow Control [None]**

Use the **Flow Control** option to report the flow control method for the console redirection application.

➔ **None**   DEFAULT   No control flow,

➔ **Hardware**   Hardware is set as the console redirection

➔ **Software**   Software is set as the console redirection

▪ **Redirection After BIOS POST [Always]**

Use the **Redirection After BIOS POST** option to specify when console redirection should occur.

➔ **Disabled**   The console is not redirected after POST

➔ **Boot Loader**   Redirection is active during POST and during Boot Loader

➔ **Always**   DEFAULT   Redirection is always active (Some OSes may not work if set to Always)

▪ **Terminal Type [ANSI]**

Use the **Terminal Type** BIOS option to specify the remote terminal type.

➔ **ANSI**   DEFAULT   The target terminal type is ANSI

➔ **VT100**   The target terminal type is VT100

➔ **VT-UTF8**   The target terminal type is VT-UTF8

▪ **VT-UTF8 Combo Key Support [Disabled]**

Use the **VT-UFT8 Combo Key Support** option to enable additional keys that are not provided by VT100 for the PC 101 keyboard.

The VT100 Terminal Definition is the standard convention used to configure and conduct emergency management tasks with UNIX-based servers. VT100 does not support all keys on the standard PC 101-key layout, however. The VT-UTF8 convention makes available additional keys that are not provided by VT100 for the PC 101 keyboard.

➔ **Disabled** DEFAULT Disables the VT-UTF8 terminal keys

➔ **Enabled** Enables the VT-UTF8 combination key. Support for ANSI/VT100 terminals

▪ **Sredir Memory Display Delay [Disabled]**

Use the **Sredir Memory Display Delay** option to select the delay before memory information is displayed. Configuration options are listed below

  ▪ No Delay DEFAULT
  ▪ Delay 1 sec
  ▪ Delay 2 sec
  ▪ Delay 4 sec

6.3.7 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 11**) to read USB configuration information and configure the USB settings.

```
                        BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security   Chipset    Exit

  USB Configuration                            Options

  Module Version - 2.24.3-13.4                 Disabled
                                               Enabled
  USB Devices Enabled :
            None

  USB Functions              [Enabled]
  USB 2.0 Controller         [Enabled]
  Legacy USB Support         [Enabled]
  USB 2.0 Controller Mode    [HiSpeed]

                                               ←→    Select Screen
                                               ↑↓    Select Item
                                               +-    Change Option
                                               F1    General Help
                                               F10   Save and Exit
                                               ESC   Exit

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```

BIOS Menu 11: USB Configuration

▪ **USB Functions [Enabled]**

Use the **USB Function** option to enable or disable the USB controllers.

➔ **Disabled**   USB controllers are enabled

➔ **Enabled**   DEFAULT   USB controllers are disabled

▪ **USB 2.0 Controller [Enabled]**

The **USB 2.0 Controller** BIOS option enables or disables the USB 2.0 controller

➔ **Disabled**   USB function disabled

➔ **Enabled** **DEFAULT** USB function enabled

▪ **USB2.0 Controller Mode [HiSpeed]**

The **USB2.0 Controller Mode** BIOS option sets the speed of the USB2.0 controller.

➔ **FullSpeed** The controller is capable of operating at full speed 12 Mb/s

➔ **HiSpeed** **DEFAULT** The controller is capable of operating at high speed 480 Mb/s

▪ **Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support.

Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

➔ **Disabled** Legacy USB support disabled

➔ **Enabled** **DEFAULT** Legacy USB support enabled

➔ **Auto** Legacy USB support disabled if no USB devices are connected

6.4 PCI/PnP

Use the PCI/PnP menu (**BIOS Menu 12**) to configure advanced PCI and PnP settings.

WARNING:

Setting wrong values for the BIOS selections in the PCIPnP BIOS menu may cause the system to malfunction.

```
                         BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  Advanced PCI/PnP Settings                        Available: Specified
                                                    IRQ is available to
  IRQ3                       [Reserved]             be use by PCI/PnP
  IRQ4                       [Reserved]             devices.
  IRQ5                       [Available]            Reserved: Specified
  IRQ7                       [Available]            IRQ is reserved for
  IRQ9                       [Available]            use by legacy ISA
  IRQ10                      [Available]            devices.
  IRQ11                      [Available]
  IRQ14                      [Available]
  IRQ15                      [Available]

  DMA Channel 0              [Available]            ←→    Select Screen
  DMA Channel 1              [Available]            ↑↓    Select Item
  DMA Channel 3              [Available]            +-    Change Option
  DMA Channel 5              [Available]            F1    General Help
  DMA Channel 6              [Available]            F10   Save and Exit
  DMA Channel 7              [Available]            ESC   Exit

  Reserved Memory Size       [Disabled]

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```

BIOS Menu 12: PCI/PnP Configuration

▪ **IRQ# [Available]**

Use the **IRQ#** address to specify what IRQs can be assigned to a particular peripheral device.

➔ **Available**   DEFAULT   The specified IRQ is available to be used by PCI/PnP devices

➔ **Reserved**   The specified IRQ is reserved for use by Legacy ISA devices

Available IRQ addresses are:

▪ IRQ3
▪ IRQ4
▪ IRQ5
▪ IRQ7
▪ IRQ9

- IRQ10
- IRQ 11
- IRQ 14
- IRQ 15

- **DMA Channel# [Available]**

Use the **DMA Channel#** option to assign a specific DMA channel to a particular PCI/PnP device.

➔ **Available**   **DEFAULT**   The specified DMA is available to be used by PCI/PnP devices

➔ **Reserved**   The specified DMA is reserved for use by Legacy ISA devices

Available DMA Channels are:

- DM Channel 0
- DM Channel 1
- DM Channel 3
- DM Channel 5
- DM Channel 6
- DM Channel 7

- **Reserved Memory Size [Disabled]**

Use the **Reserved Memory Size** BIOS option to specify the amount of memory that should be reserved for legacy ISA devices.

➔ **Disabled**   **DEFAULT**   No memory block reserved for legacy ISA devices

➔ **16K**   16 KB reserved for legacy ISA devices

➔ **32K**   32 KB reserved for legacy ISA devices

➔ **64K**   64 KB reserved for legacy ISA devices

6.5 Boot

Use the Boot menu (**BIOS Menu 13**) to configure system boot options.

```
                        BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  Boot Settings                             Configure Settings
                                            during System Boot

► Boot Settings Configuration

► Boot Device Priority
► Hard Disk Drives
► CD/DVD Drives
► Removable Drives

                                            ←→    Select Screen
                                            ↑↓    Select Item
                                            Enter Go to SubScreen
                                            F1    General Help
                                            F10   Save and Exit
                                            ESC   Exit

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```

BIOS Menu 13: Boot

6.5.1 Boot Settings Configuration

Use the Boot Settings Configuration menu (**BIOS Menu 13**) to configure advanced system boot options.

```
                              BIOS SETUP UTILITY
    Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

    Boot Settings Configuration                      Allows BIOS to skip
                                                     certain tests while
    Quick Boot                 [Enabled]             booting. This will
    Quiet Boot                 [Enabled]             decrease the time
    AddOn ROM Display Mode     [Force BIOS]          needed to boot the
    Bootup Num-Lock            [On]                  system.
    Boot From LAN              [Disabled]



                                                     ←→    Select Screen
                                                     ↑↓    Select Item
                                                     +-    Change Option
                                                     F1    General Help
                                                     F10   Save and Exit
                                                     ESC   Exit

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```

BIOS Menu 14: Boot Settings Configuration

▪ **Quick Boot [Enabled]**

Use the **Quick Boot** BIOS option to make the computer speed up the boot process.

➔ **Disabled**   No POST procedures are skipped

➔ **Enabled**   DEFAULT   Some POST procedures are skipped to decrease the system boot time

▪ **Quiet Boot [Disabled]**

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

➔ **Disabled**   DEFAULT   Normal POST messages displayed

➔ **Enabled**   OEM Logo displayed instead of POST messages

▪ **AddOn ROM Display Mode [Force BIOS]**

The **AddOn ROM Display Mode** option allows add-on ROM (read-only memory) messages to be displayed.

➔ **Force BIOS**   DEFAULT   Allows the computer system to force a third party BIOS to display during system boot.

➔ **Keep Current**   Allows the computer system to display the information during system boot.

▪ **Bootup Num-Lock [Off]**

The **Bootup Num-Lock** BIOS option allows the Number Lock setting to be modified during boot up.

➔ **Off**   DEFAULT   Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.

➔ **On**   Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

▪ **Boot From LAN Support [Disabled]**

The **BOOT From LAN Support** option enables the system to be booted from a remote system.

➔ **Disabled**   DEFAULT   Cannot be booted from a remote system through the LAN

→ **Enabled** DEFAULT Can be booted from a remote system through the LAN

6.5.2 Boot Device Priority

Use the **Boot Device Priority** menu (**BIOS Menu 15**) to specify the boot sequence from the available devices. The following options are available:

- 1st Boot Device
- 2nd Boot Device
- 3rd Boot Device

```
                        BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

 Boot Device Priority                          Specifies the boot
 ───────────────────────                       sequence from the
 1st Boot Device          [1st Boot Device]     available devices.
 2nd Boot Device          [2nd Boot Device]
 3rd Boot Device          [3rd Boot Device]




                                               ←→    Select Screen
                                               ↑↓    Select Item
                                               +-    Change Option
                                               F1    General Help
                                               F10   Save and Exit
                                               ESC   Exit


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```
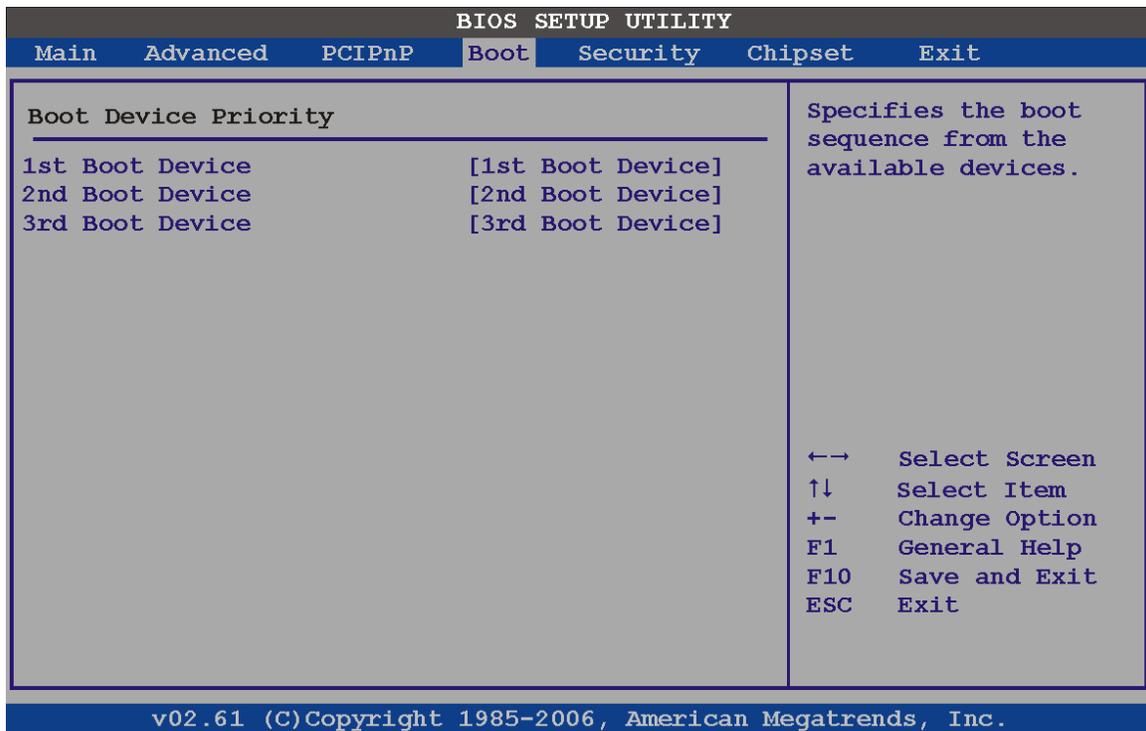
BIOS Menu 15: Boot Device Priority Settings

6.5.3 Hard Disk Drives

Use the **Hard Disk Drives** menu to specify the boot sequence of the available HDDs. When the menu is opened, the HDDs connected to the system are listed as shown below:

- 1st Drive
- 2nd Drive

- 3rd Drive

NOTE:

Only installed drives are shown in the list.

```
                         BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security   Chipset    Exit

 Hard Disk Drives                             Specifies the boot
 ─────────────────────────────────────       sequence from the
 1st Drive                 [Hard Drive 1]     available devices.
 2nd Drive                 [Hard Drive 2]
 3rd Drive                 [Hard Drive 3]




                                             ←→    Select Screen
                                             ↑↓    Select Item
                                             +-    Change Option
                                             F1    General Help
                                             F10   Save and Exit
                                             ESC   Exit

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```

BIOS Menu 16: Hard Disk Drives

6.5.4 CD/DVD Drives

Use the **CD/DVD Drives** menu to specify the boot sequence of the available CD/DVD drives. When the menu is opened, the CD drives and DVD drives connected to the system are listed as shown below:

- 1st Drive
- 2nd Drive
- 3rd Drive

NOTE:

Only installed CD and DVD drives are shown in the list

```
                        BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  CD/DVD Drives                                    Specifies the boot
                                                   sequence from the
  1st Drive                   [CD/DVD 1]           available devices.
  2nd Drive                   [CD/DVD 2]
  3rd Drive                   [CD/DVD 3]




                                                   ←→    Select Screen
                                                   ↑↓    Select Item
                                                   +-    Change Option
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit


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```

BIOS Menu 17: CD/DVD Drives

6.5.5 Removable Drives

Use the **Removable Drives** menu (**BIOS Menu 18**) to specify the boot sequence of the available FDDs. When the menu is opened, the FDDs connected to the system are listed as shown below:
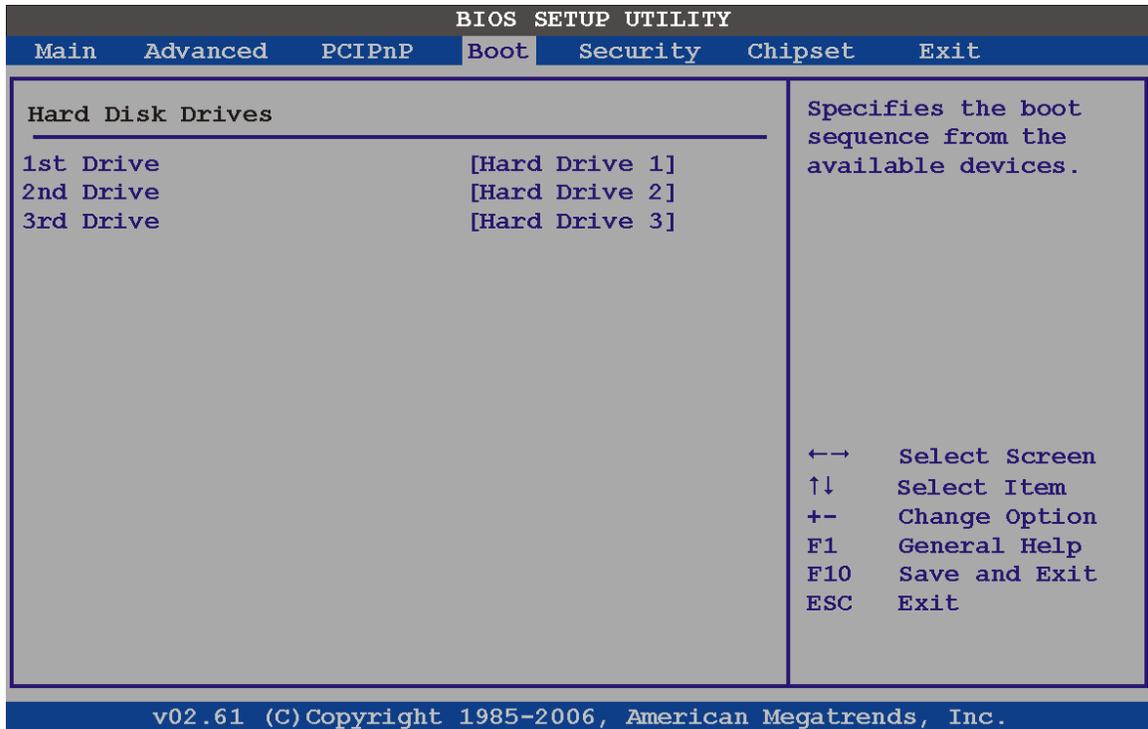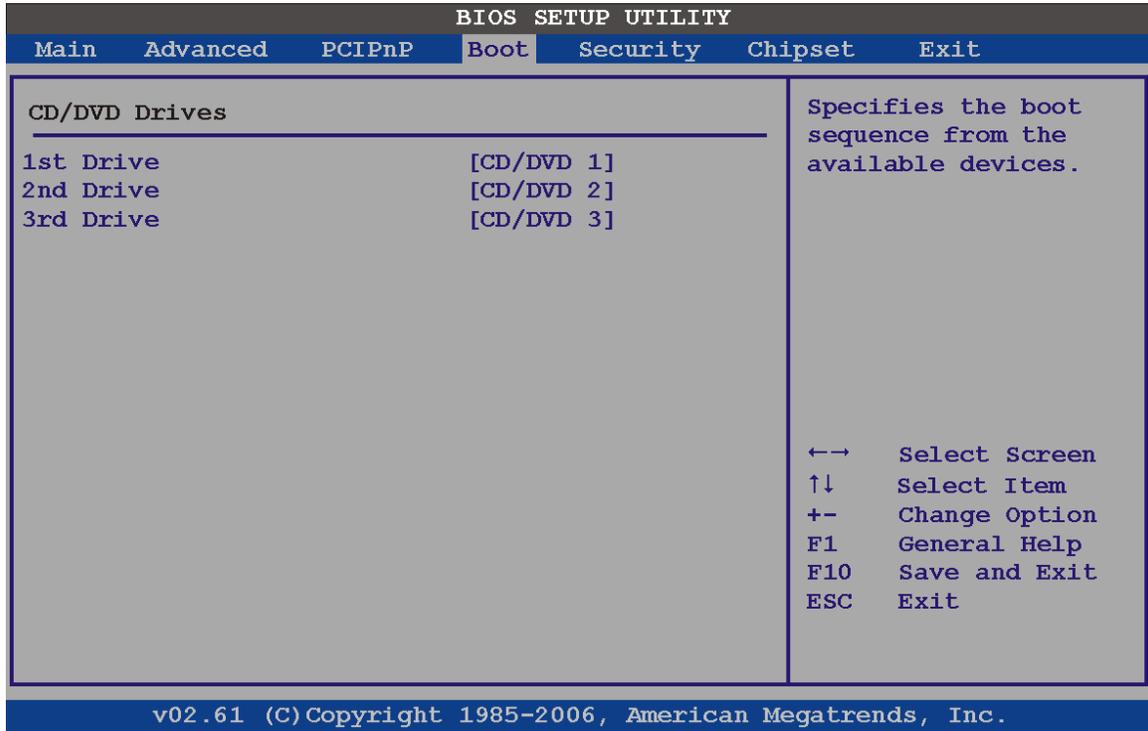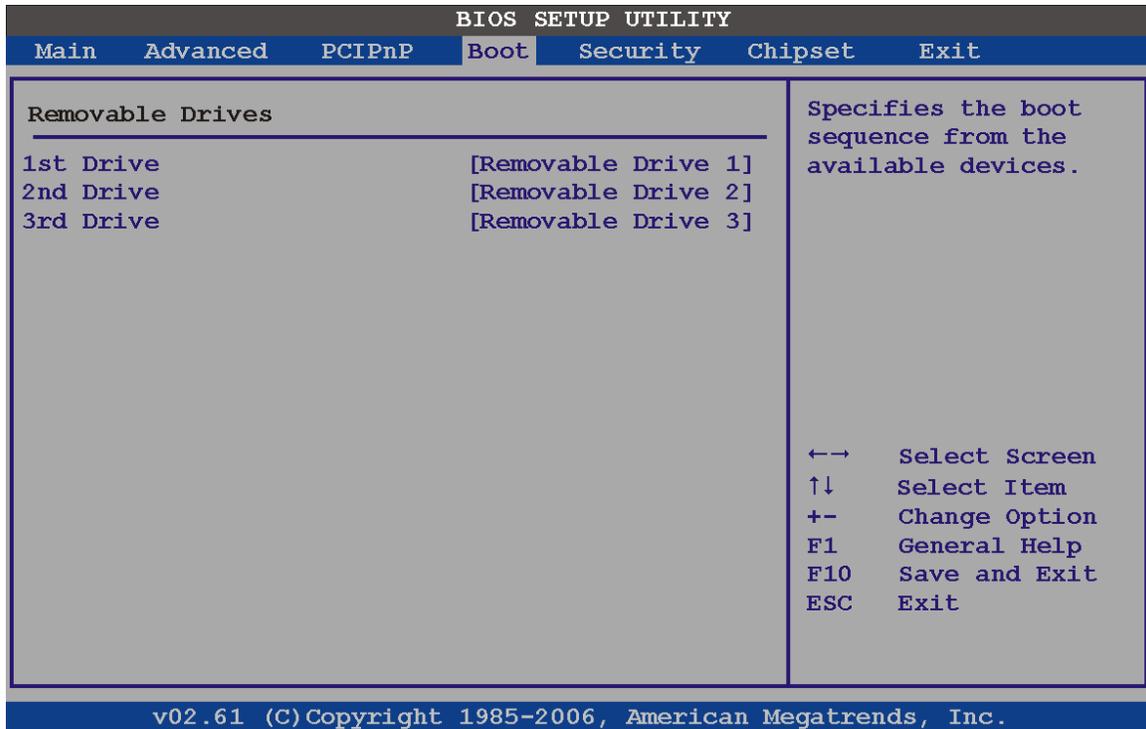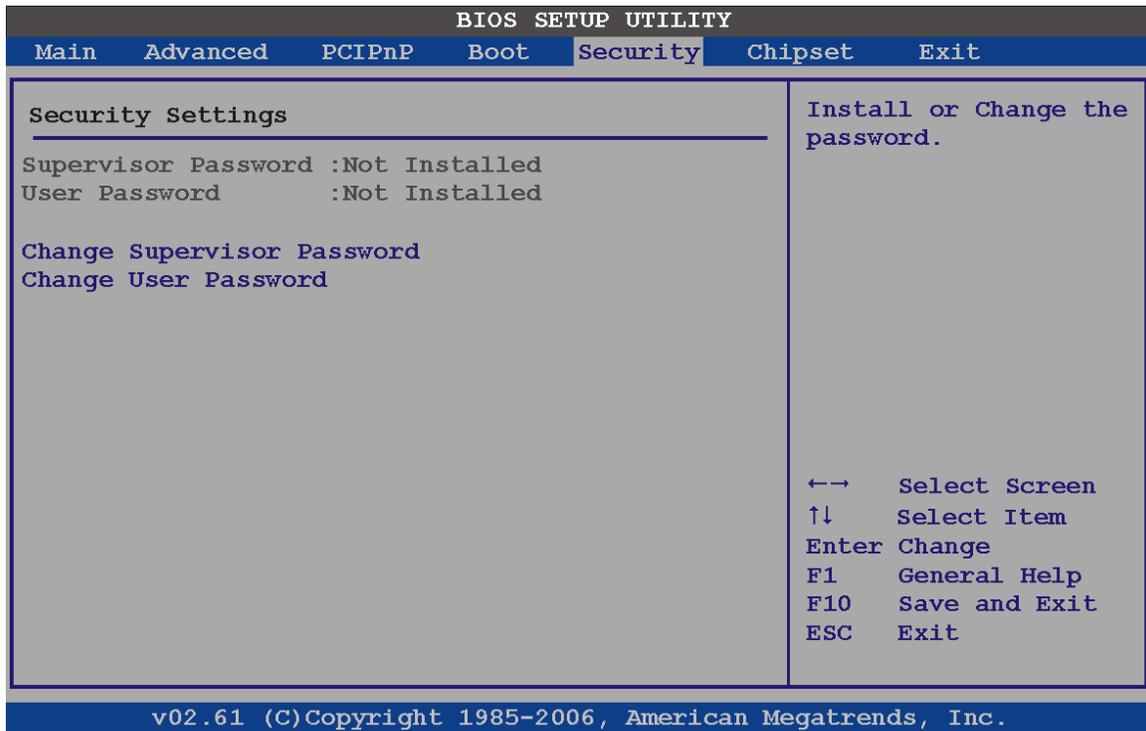
- 1st Drive
- 2nd Drive

![NOTE icon] **NOTE:**

Only installed removable drives are shown in the list. This menu does
not show if there are no removable drives.

```
                        BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

  Removable Drives                                 Specifies the boot
  ────────────────────────────                     sequence from the
  1st Drive                  [Removable Drive 1]    available devices.
  2nd Drive                  [Removable Drive 2]
  3rd Drive                  [Removable Drive 3]




                                                   ←→    Select Screen
                                                   ↑↓    Select Item
                                                   +-    Change Option
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit


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```

BIOS Menu 18: Removable Drives

6.6 Security

Use the Security menu (**BIOS Menu 19**) to set system and user passwords.

```
                          BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot   Security   Chipset    Exit

   Security Settings                            Install or Change the
                                                password.
   Supervisor Password :Not Installed
   User Password       :Not Installed

   Change Supervisor Password
   Change User Password



                                                ←→    Select Screen
                                                ↑↓    Select Item
                                                Enter Change
                                                F1    General Help
                                                F10   Save and Exit
                                                ESC   Exit

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```

BIOS Menu 19: Security

▪ **Change Supervisor Password**

Use the **Change Supervisor Password** to set or change a supervisor password. The default for this option is **Not Installed**. If a supervisor password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change Supervisor Password**.

▪ **Change User Password**

Use the **Change User Password** to set or change a user password. The default for this option is **Not Installed**. If a user password must be installed, select this field and enter the password. After the password has been added, **Install** appears next to **Change User Password**.
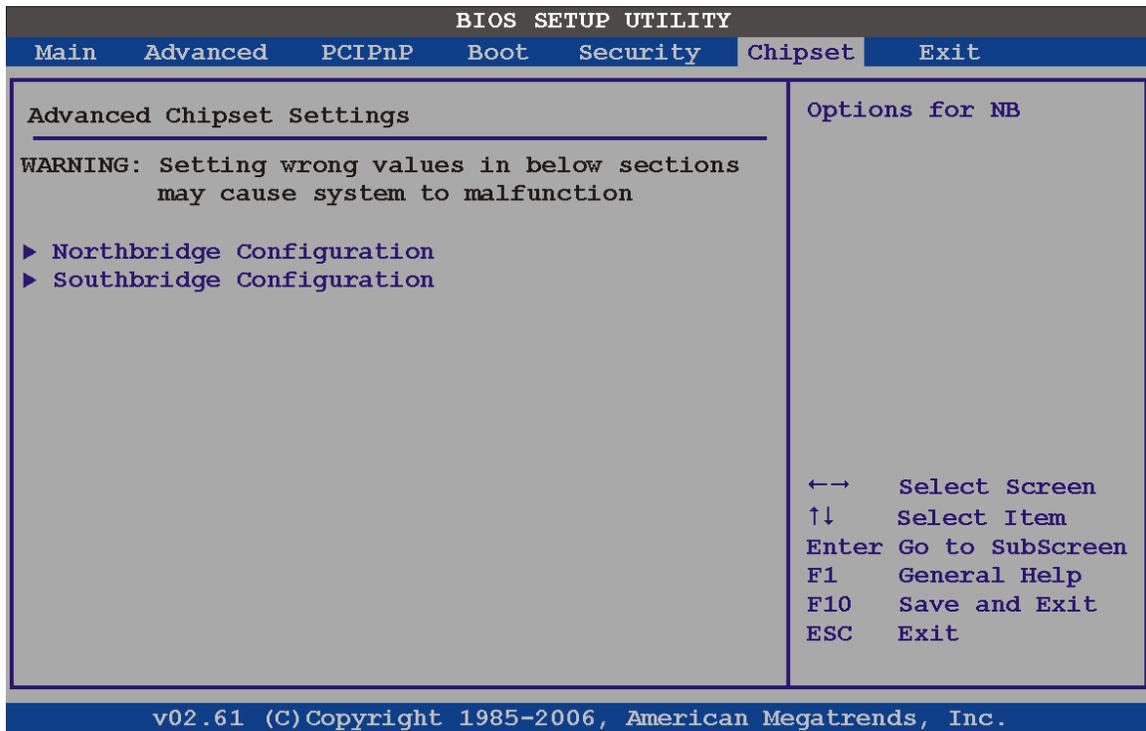
6.7 Chipset

Use the **Chipset** menu (**BIOS Menu 20**) to access the Northbridge and Southbridge configuration menus
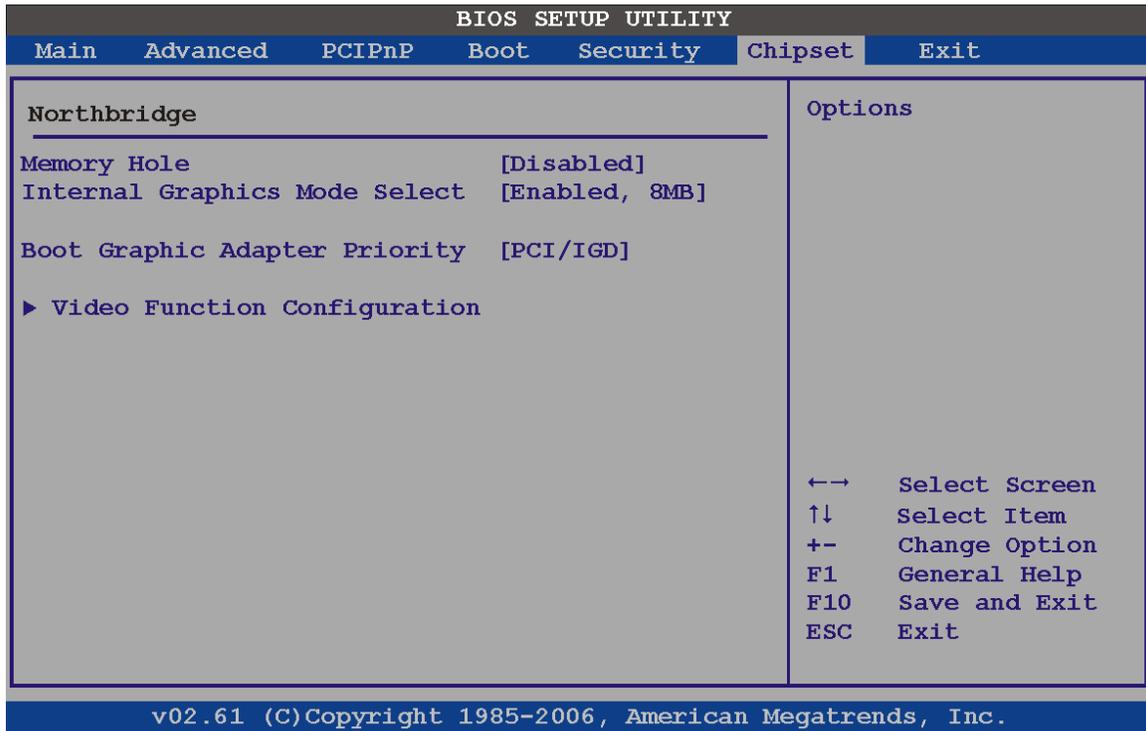
 WARNING!

Setting the wrong values for the Chipset BIOS selections in the Chipset
BIOS menu may cause the system to malfunction.

```
                      BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security   Chipset    Exit

  Advanced Chipset Settings              Options for NB

  WARNING: Setting wrong values in below sections
           may cause system to malfunction

  ▶ Northbridge Configuration
  ▶ Southbridge Configuration



                                          ←→    Select Screen
                                          ↑↓    Select Item
                                          Enter Go to SubScreen
                                          F1    General Help
                                          F10   Save and Exit
                                          ESC   Exit

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```

BIOS Menu 20: Chipset

6.7.1 Northbridge Chipset Configuration

Use the **Northbridge Chipset Configuration** menu (**BIOS Menu 20**) to configure the Northbridge chipset settings.

```
                          BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security   Chipset    Exit

   Northbridge                                 Options

   Memory Hole                   [Disabled]
   Internal Graphics Mode Select [Enabled, 8MB]

   Boot Graphic Adapter Priority [PCI/IGD]

   ▶ Video Function Configuration




                                              ←→     Select Screen
                                              ↑↓     Select Item
                                              +-     Change Option
                                              F1     General Help
                                              F10    Save and Exit
                                              ESC    Exit


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```

BIOS Menu 21: Northbridge Chipset Configuration

- **Memory Hole [Disabled]**

The **Memory Hole** reserves the memory space between 15 MB and 16 MB for ISA expansion cards that require a specified area of memory to work properly. If an older ISA expansion card is used, please refer to the documentation that came with the card to see if it is necessary to reserve the space.

➔ **Disabled**   **DEFAULT**   Memory is not reserved for ISA expansion cards

➔ **Enabled**   Memory is reserved for ISA expansion cards

▪ **Internal Graphics Mode Select [Enable, 8 MB]**

The **Internal Graphic Mode Select** option determines the amount of system memory that can be used by the Internal graphics device.

➔ **Disable**

➔ **Enable, 1 MB**   1 MB of memory used by internal graphics device

➔ **Enable, 8 MB**   DEFAULT   8 MB of memory used by internal graphics device

▪ **Boot Graphic Adapter Priority [PCI/IGD]**

The **Boot Graphic Adapter Priority** setting determines the priority of the attached graphics devices.

➔ **IGD**   Only the internal graphics devices are checked, these include VGA, LVDS, TV and SDVO.

➔ **PCI/IGD**   DEFAULT   Graphics cards connected to the PCI expansion card slots on the backplane are checked first for graphics cards. Next, the internal devices, mentioned above, are checked.

6.7.1.1 Video Function Configuration

Use the **Video Function Configuration** menu to configure the video device connected to the system.

```
                          BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security   Chipset    Exit

   Video Function Configuration                  Options

   DVMT Mode Select                [DVMT Mode]
     DVMT/FIXED Memory             [128MB]

   Boot Display Device             [Auto]
   LVDS1 Panel Type                [1024x768 18b]

   TV Standard                     [VBIOS-Default]


                                                 ←→     Select Screen
                                                 ↑↓     Select Item
                                                 +-     Change Option
                                                 F1     General Help
                                                 F10    Save and Exit
                                                 ESC    Exit

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```

BIOS Menu 22: Video Function Configuration

▪ **DVMT Mode Select [DVMT Mode]**

Use the **DVMT Mode Select** option to select the Intel Dynamic Video Memory Technology (DVMT) operating mode.

➔ **Fixed Mode**   A fixed portion of graphics memory is reserved as graphics memory.

➔ **DVMT Mode**   DEFAULT   Graphics memory is dynamically allocated according to the system and graphics needs.

➔ **Combo Mode**

A fixed portion of graphics memory is reserved as graphics memory. If more memory is needed, graphics memory is dynamically allocated according to the system and graphics needs.

▪ **DVMT/FIXED Memory**

Use the **DVMT/FIXED Memory** option to specify the maximum amount of memory that can be allocated as graphics memory. This option can only be configured for if **DVMT Mode** or **Fixed Mode** is selected in the **DVMT Mode Select** option. If **Combo Mode** is selected, the maximum amount of graphics memory is 128 MB. Configuration options are listed below.

- ▪ 64 MB
- ▪ 128 MB **DEFAULT**
- ▪ Maximum DVMT

▪ **Boot Display Device [Auto]**

The **Boot Display Device** BIOS option selects the display device the system uses when it boots. The available options are listed below:

- ▪ Auto **DEFAULT**
- ▪ CRT
- ▪ TV
- ▪ EFP
- ▪ LFP

▪ **LVDS1 Panel Type**

Use the **LVDS Panel Type** to determine the LCD panel resolution. Configuration options are listed below:

- ▪ 640 x 480 18-bit
- ▪ 800 x 480 18-bit
- ▪ 800 x 600 18-bit
- ▪ 1024 x 768 18-bit Default

- 1280 x 1024 36-bit
- 1400 x 1050 36-bit
- 1440 x 900 36-bit
- 1600 x 1200 36-bit
- by H/W

- **TV Standard**

The **TV Standard** option specifies the TV type connected to the system.

- VBIOS   Default
- NTSC
- PAL
- SECAM
- SMPTE240M
- ITU-R television
- SMPTE295M
- SMPTE296M
- EIA-770.2
- EIA-770.3

6.7.2 Southbridge Configuration

The **Southbridge Configuration** menu (**BIOS Menu 23**) allows the Southbridge chipset to be configured.

```
                        BIOS SETUP UTILITY
  Main    Advanced    PCIPnP    Boot    Security   Chipset    Exit

  Southbridge                                      Options

  Audio Controller              [Enabled]          Enabled
                                                   Disabled
  PCIE Ports Configuration
    Onboard PCIE LAN            [Enabled]




                                                   ←→    Select Screen
                                                   ↑↓    Select Item
                                                   +-    Change Option
                                                   F1    General Help
                                                   F10   Save and Exit
                                                   ESC   Exit


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```
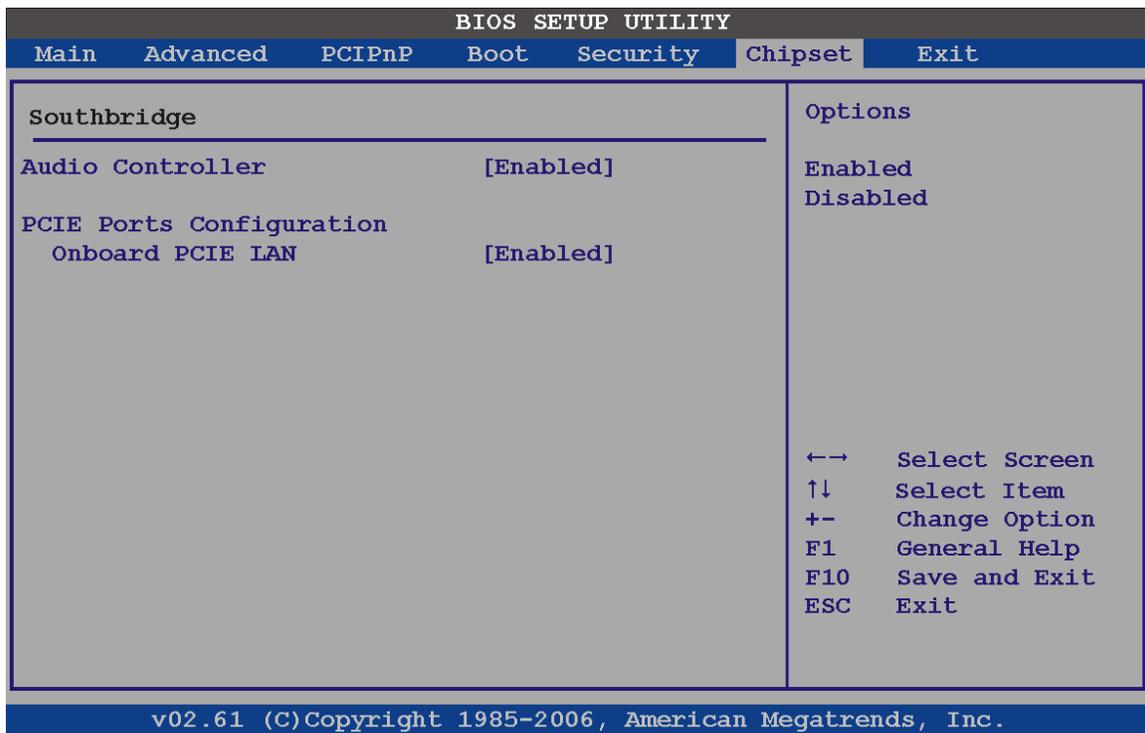
BIOS Menu 23: Southbridge Chipset Configuration

▪ **Audio Controller [Enabled]**

The **Audio Controller** option enables or disables the audio controller.

▪ Enabled   DEFAULT

▪ Disabled

▪ **Onboard PCIE LAN [Enabled]**

The **Audio Controller** option enables or disables the audio controller.

➔ **Azalia**   DEFAULT   High Definition Audio is enabled

➔ **AC'97 Audio Only**   AC'97 audio is enabled

➔ **All Disabled**   Audio is disabled

6.8 Exit

Use the **Exit** menu (**BIOS Menu 24**) to load default BIOS values, optimal failsafe values and to save configuration changes.

```
                            BIOS SETUP UTILITY
   Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

 Exit Options                                     Exit system setup
                                                  after saving the
 Save Changes and Exit                            changes.
 Discard Changes and Exit
 Discard Changes                                  F10 key can be used
                                                  for this operation.
 Load Optimal Defaults
 Load Failsafe Defaults




                                                  ←→    Select Screen
                                                  ↑↓    Select Item
                                                  Enter Go to SubScreen
                                                  F1    General Help
                                                  F10   Save and Exit
                                                  ESC   Exit

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```

BIOS Menu 24: Exit

- **Save Changes and Exit**

Use the **Save Changes and Exit** option to save the changes made to the BIOS options and to exit the BIOS configuration setup program.

- **Discard Changes and Exit**

Use the **Discard Changes and Exit** option to exit the BIOS configuration setup program without saving the changes made to the system.

- **Discard Changes**

Use the **Discard Changes** option to discard the changes and remain in the BIOS configuration setup program.

- ▪ **Load Optimal Defaults**

   Use the **Load Optimal Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F9 key can be used for this operation.**

- ▪ **Load Failsafe Defaults**

   Use the **Load Failsafe Defaults** option to load failsafe default values for each of the parameters on the Setup menus. **F8 key can be used for this operation.**

Chapter

7

Software Installation

7.1 Available Software Drivers

> **NOTE:**
>
> The content of the CD may vary throughout the life cycle of the product
> and is subject to change without prior notice. Visit the IEI website or
> contact technical support for the latest updates.

The following drivers can be installed on the system:

- Chipset driver installation
- VGA driver installation
- LAN driver installation
- Audio driver installation
- iSMM installation

Installation instructions are given below.

7.2 Starting the Driver Program

To access the driver installation programs, please do the following.

Step 1: Insert the CD-ROM that came with the system into a CD-ROM drive attached to
the system.

Step 2: The screen in **Figure 7-1** appears.

Figure 7-1: Start Up Screen

Step 3: Click **IEM-945GSE**.

Step 4: The screen in **Figure 7-2** appears.

Figure 7-2: Select Operating System

Step 5: Select the operating system installed on the IEM-945GSE system. This manual

describes the installation for a **Windows XP** operating system.

Step 6: The list of drivers in **Figure 7-3** appears.
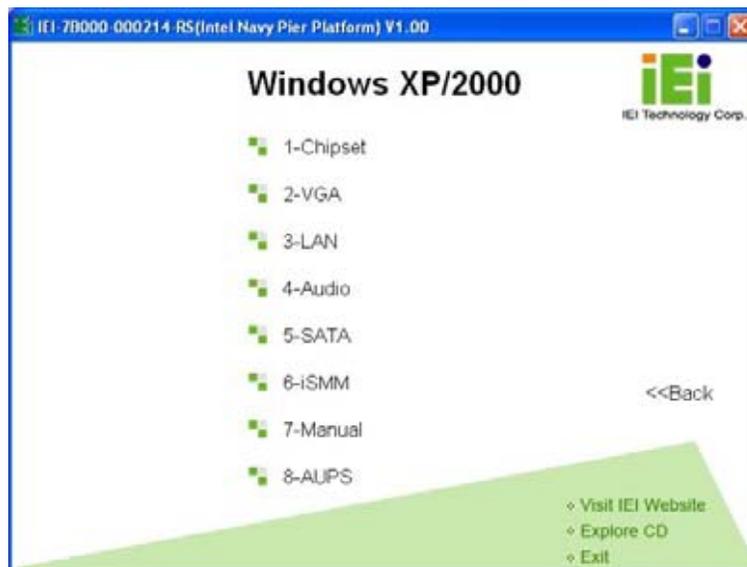
Figure 7-3: Drivers

7.3 Chipset Driver Installation

To install the chipset driver, please do the following.

Step 7: Access the driver list shown in **Figure 7-3**. (See **Section 7.2**)

Step 8: Click "**1-Chipset Driver**"

Step 9: When the setup files are completely extracted the **Welcome Screen** in

Figure 7-4 appears.

Figure 7-4: Chipset Driver Welcome Screen

Step 10: Click **Next** to continue.

Step 11: The license agreement in **Figure 7-5** appears.

Figure 7-5: Chipset Driver License Agreement

Step 12: Read the **License Agreement**.

Step 13: Click the YES button to accept the license agreement and continue.

Step 14: The Read Me file in **Figure 7-6** appears.

Figure 7-6: Chipset Driver Read Me File

Step 15: Click NEXT to continue.

Step 16: **Setup Operations** are performed as shown in **Figure 7-7**.

Figure 7-7: Chipset Driver Setup Operations

Step 17: Once the **Setup Operations** are complete, click the NEXT icon to continue.

Step 18: The **Finish** screen appears.

Figure 7-8: Chipset Driver Installation Finish Screen

Step 19: Select "**Yes, I want to restart the computer now**" and click the **Finish** icon.

See **Figure 7-8**.

7.4 VGA Driver Installation

To install the VGA driver, please do the following.

Step 20: Access the driver list shown in **Figure 7-3**. (See **Section 7.2**)

Step 21: Click "**2-VGA**"

Step 22: The VGA Read Me file in **Figure 7-9** appears.
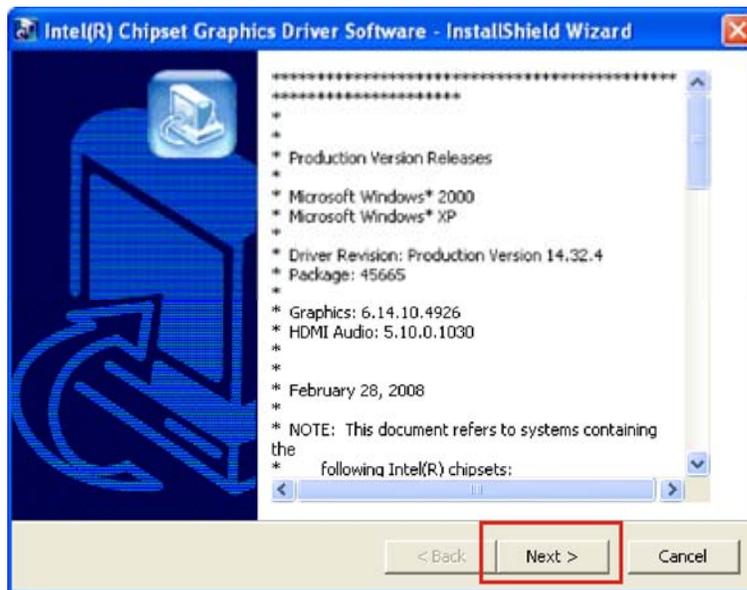
Figure 7-9: VGA Driver Read Me File

Step 23: Click NEXT to continue.

Step 24: The installation files are extracted. See **Figure 7-10**.
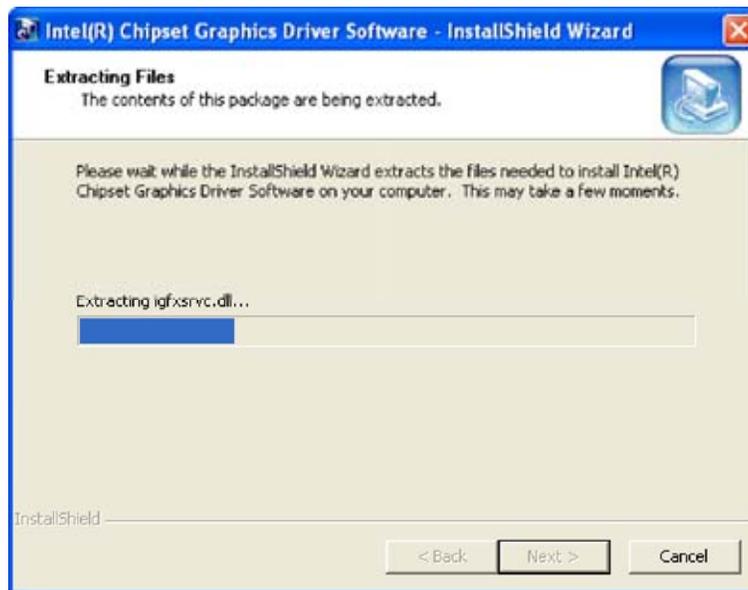
Figure 7-10: VGA Driver Setup Files Extracted

Step 25: The **Welcome Screen** in **Figure 7-11** appears.

Figure 7-11: VGA Driver Welcome Screen

Step 26: Click Nᴇxᴛ to continue.

Step 27: The license agreement in **Figure 7-12** appears.
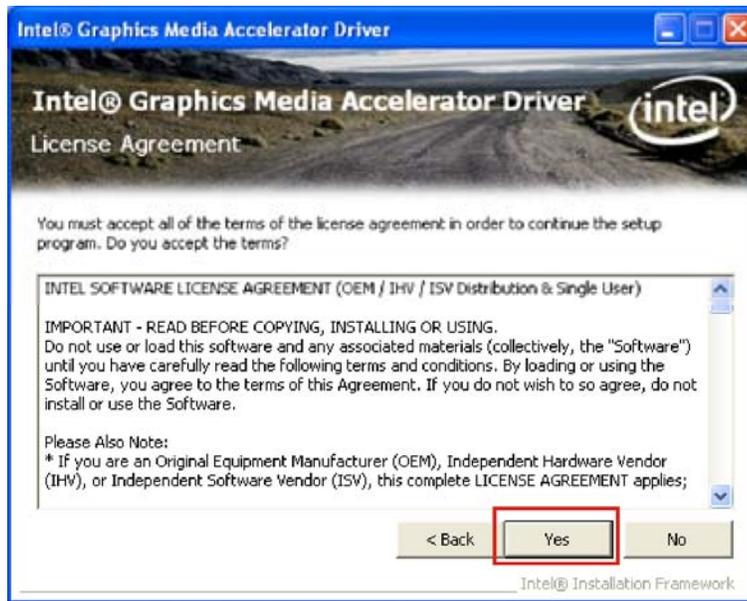
Figure 7-12: VGA Driver License Agreement

Step 28: Read the **License Agreement**.

Step 29: Click **YES** to accept the license agreement and continue.

Step 30: The Readme file in **Figure 7-13** appears.
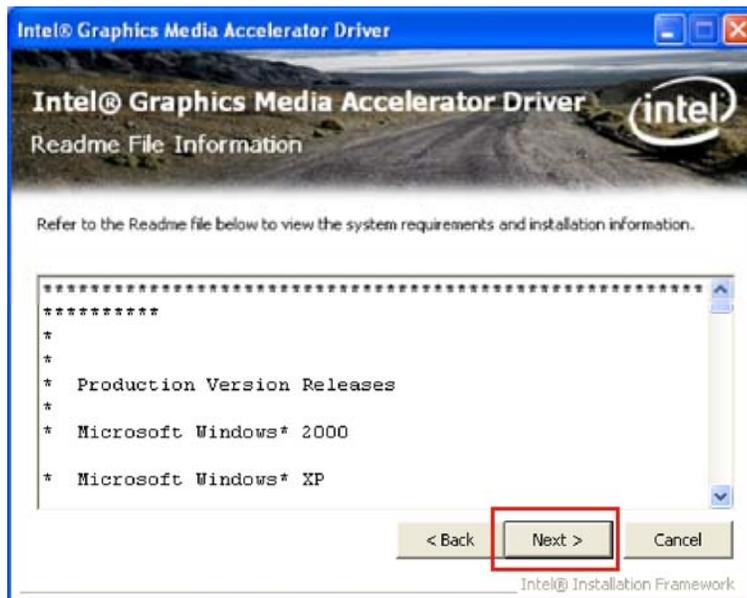
Figure 7-13: VGA Driver Read Me File

Step 31: Click NEXT to continue.

Step 32: **Setup Operations** are performed as shown in **Figure 7-14**.

![NOTE icon] **NOTE:**

The "Found New Hardware Wizard" will appear and then disappear during this step. Do not adjust any settings in the "Found New Hardware Wizard" window.

Figure 7-14: VGA Driver Setup Operations

Step 33: Once the **Setup Operations** are complete, click NEXT to continue.

Step 34: The **Finish** screen appears.
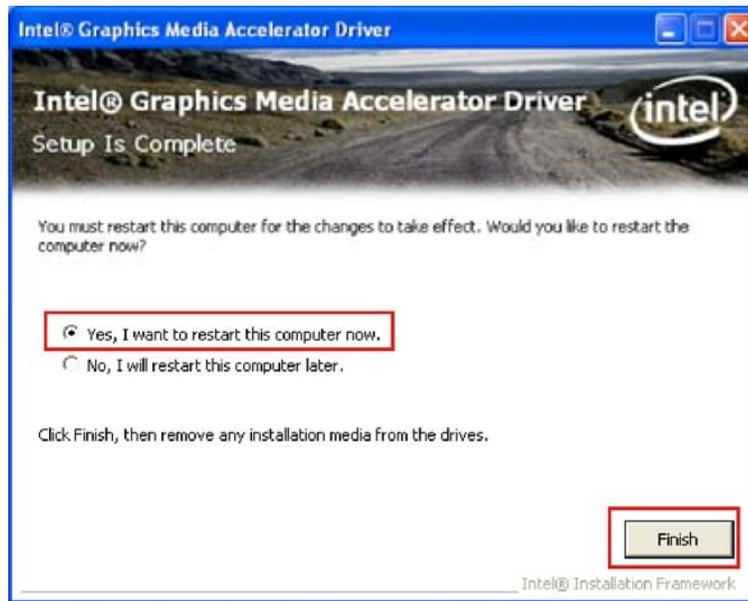
Figure 7-15: VGA Driver Installation Finish Screen

Step 35: Select "**Yes, I want to restart the computer now**" and click FINISH . See

Figure **7-15**.

7.5 LAN Driver Installation

To install the chipset driver, please do the following.

Step 36: Access the driver list shown in **Figure 7-3**. (See **Section 7.2**)

Step 37: Click "**3-LAN**"

Step 38: The **Welcome** screen in **Figure 7-16** appears.
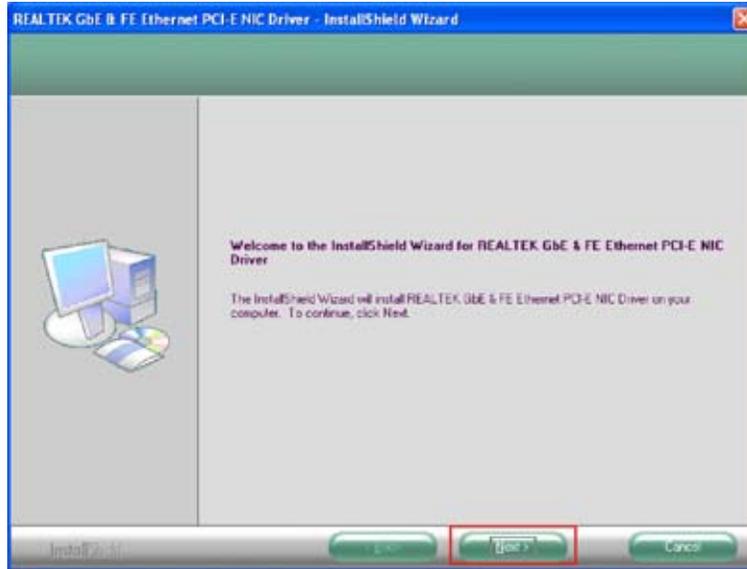
Figure 7-16: LAN Driver Welcome Screen

Step 39: Click NEXT to continue.

Step 40: The **Ready to Install** screen in **Figure 7-17** appears.
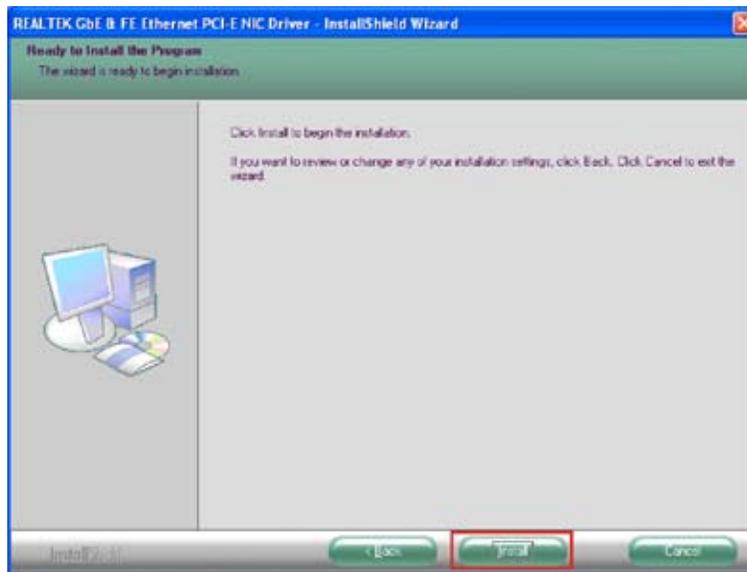
Figure 7-17: LAN Driver Welcome Screen

Step 41: Click NEXT to proceed with the installation.

Step 42: The program begins to install.

Step 43: The installation progress can be monitored in the progress bar shown in

Figure 7-18.
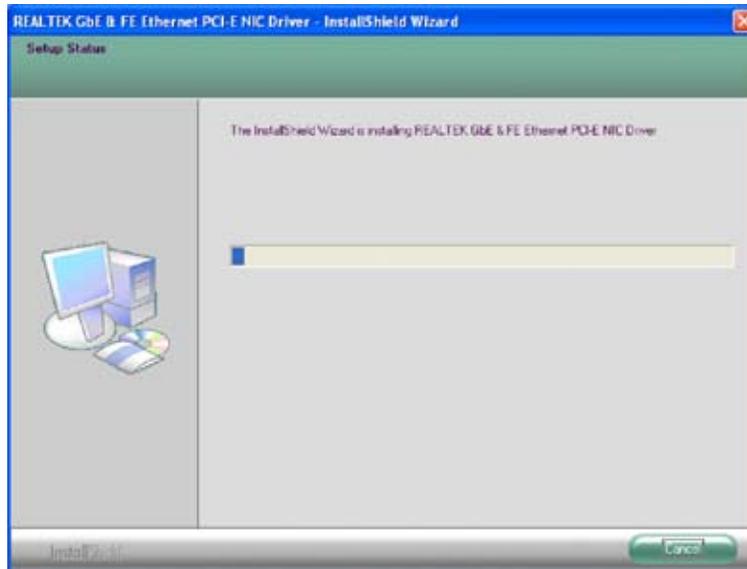
Figure 7-18: LAN Driver Installation

Step 44: When the driver installation is complete, the screen in **Figure 7-19** appears.
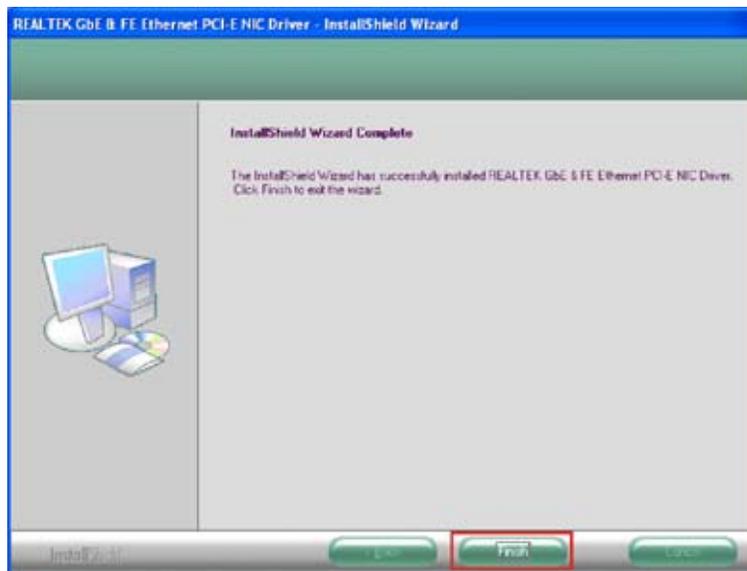
Figure 7-19: LAN Driver Installation Complete

Step 45: Click FINISH to exit the InstallShield Wizard (**Figure 7-19**).

7.6 Audio Driver Installation

There is no audio driver on the IEM-945GSE. To add audio capabilities to the IEM-945GSE, connect a HD Audio kit or AC'97 audio kit available from IEI. Follow the installation applicable to the installed audio kit.

7.6.1 AC'97 Driver Installation

To install the chipset driver, please do the following.

Step 46: Access the driver list shown in **Figure 7-3**. (See **Section 7.2**)

Step 47: Click "**4-Audio**"
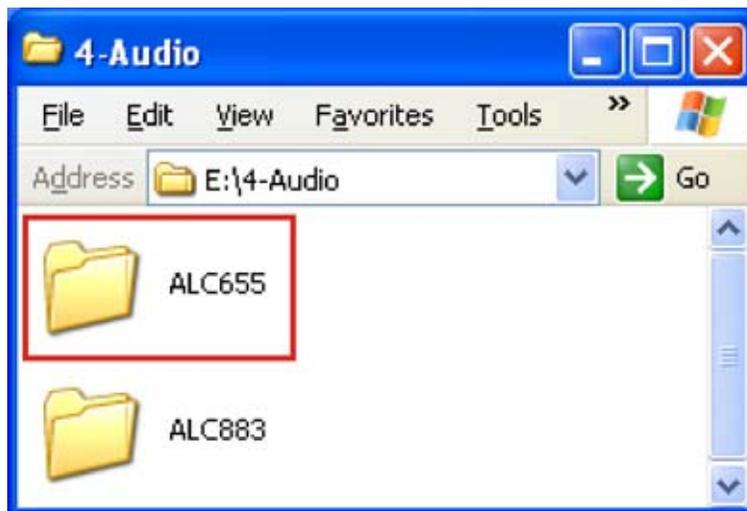
Figure 7-20: AC'97 Audio

Step 48: Browse to "**E:\4-Audio\ALC665\Windows\Windows 98Gold, 98se, Me, 2000,**

XP, 2003(32,64 bits)\A3.84" **Figure 7-21**
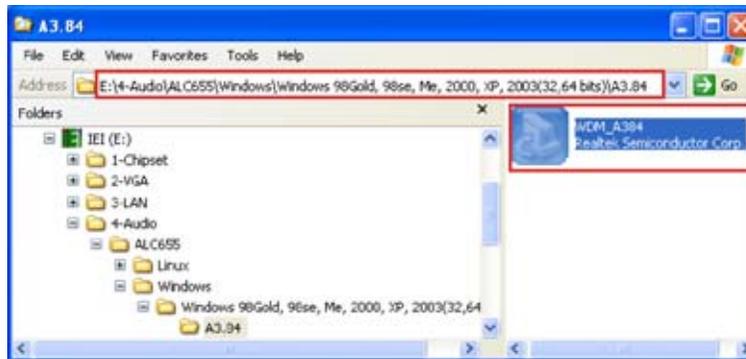
Figure 7-21: AC'97 Audio Driver Options

**Step 49:** Double-click the installation file in **Figure 7-21**.

Step 50: The AC'97 Driver Installation screen in **Figure 7-22** appears.
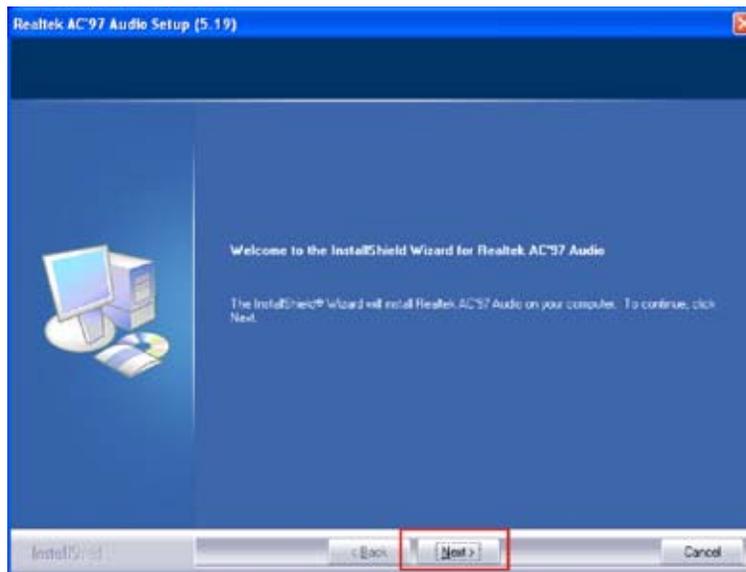
Figure 7-22: AC'97 Driver Installation Welcome Screen

Step 51: Click NEXT to continue.

Step 52: The Verification window in **Figure 7-23** may appear.

Figure 7-23: AC'97 Driver Installation Verification

Step 53: Click CONTINUE ANYWAY.

Step 54: When the driver is installed, the driver installation finish screen in **Figure 7-24**

appears.
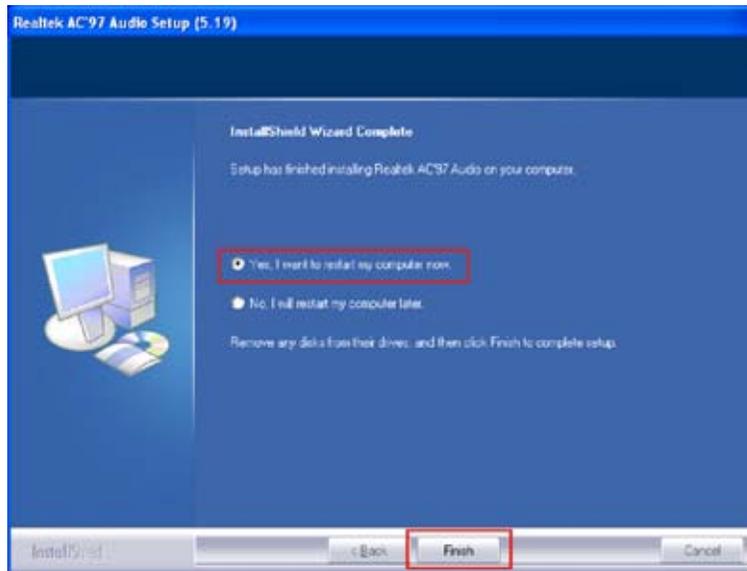
Figure 7-24: AC'97 Driver Installation Complete

Step 55: Select "**Yes, I wish to restart my computer now**" And click FINISH to exit the

InstallShield Wizard and restart the computer.

7.6.2 HD Audio Driver Installation

To install the chipset driver, please do the following.

Step 1: Access the driver list shown in **Figure 7-3**. (See **Section 7.2**)

Step 2: Click "**4-Audio**"
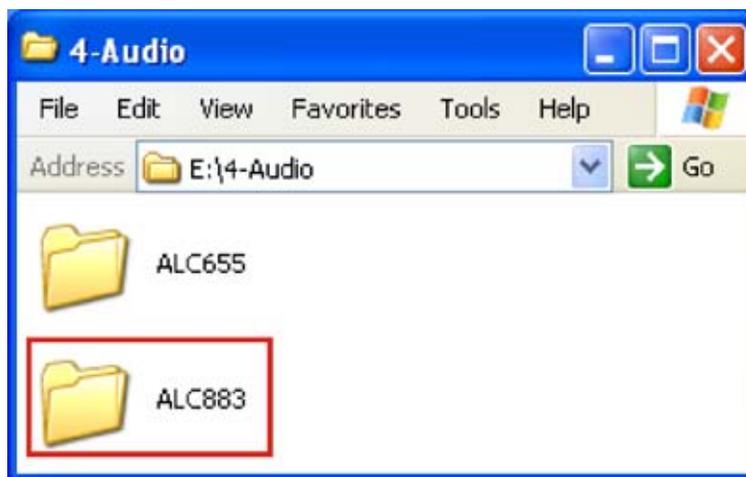
Figure 7-25: HD Audio

Step 3: Browse to "**E:\4-Audio\ALC883\Windows\Windows 2000, XP, 2003(32,64**

bits)" **Figure 7-26**
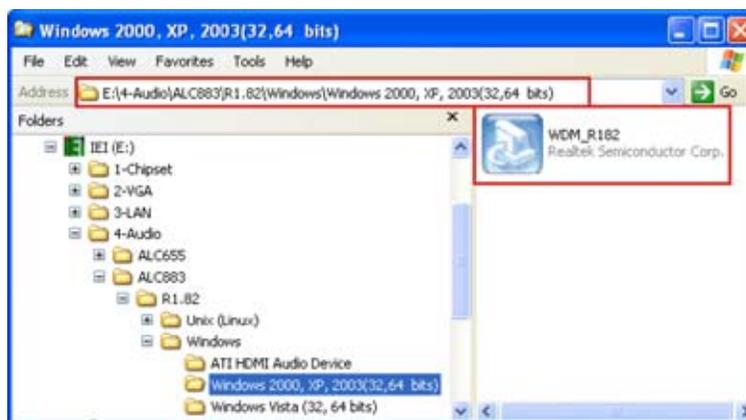
Figure 7-26: HD Audio Driver Options

Step 4: Double-click the installation file in **Figure 7-26**.

Step 5: The AC'97 Driver Installation screen in **Figure 7-27** appears.
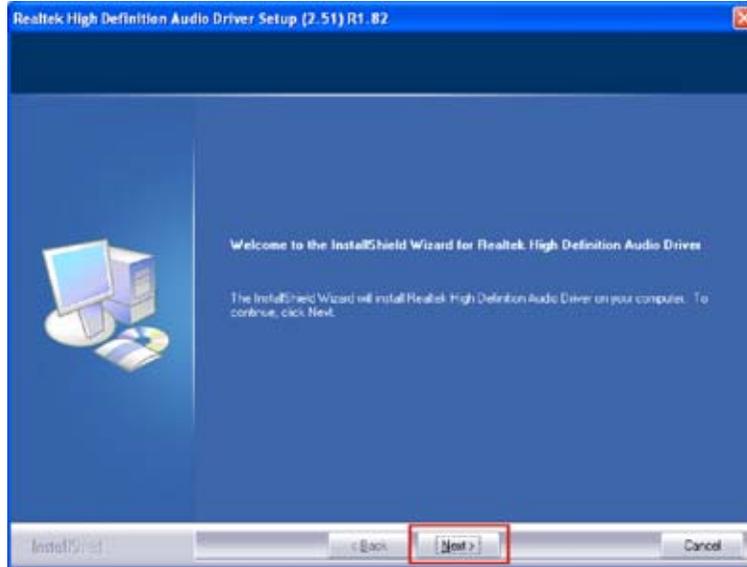
Figure 7-27: HD Audio Driver Installation Welcome Screen

Step 6: Click **NEXT** to continue.

Step 7: When the driver is installed, the driver installation finish screen in **Figure 7-28** appears.
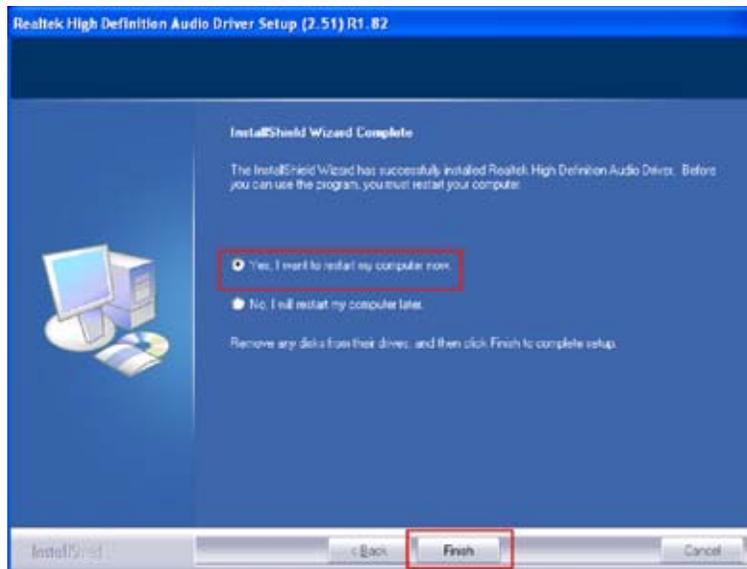
Figure 7-28: HD Audio Driver Installation Complete

Step 8: Select "**Yes, I wish to restart my computer now**" And click FINISH to exit the InstallShield Wizard and restart the computer.

7.7 iSMM Installation

The iSMM (Intelligent System Management Module) allows hardware functions to be monitored from within the operating system. The iSMM can be set to sound an alarm when voltages, temperatures or fan speeds rise above or fall below the set limits.

Step 1: Access the driver list shown in **Figure 7-3**. (See **Section 7.2**)

Step 2: Click "**6-iSMM**"

Step 3: The iSMM directory appears. (**Figure 7-29**)
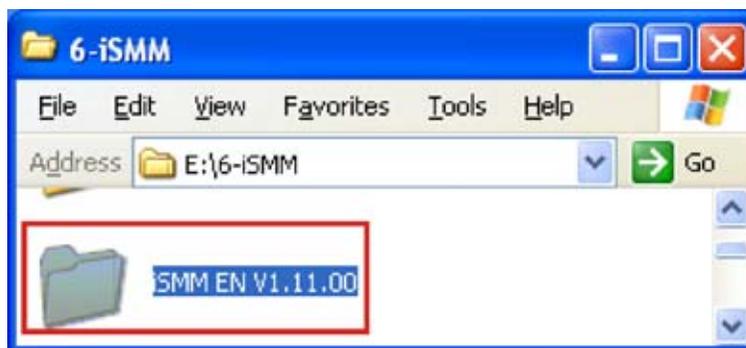
Figure 7-29: iSMM Directory

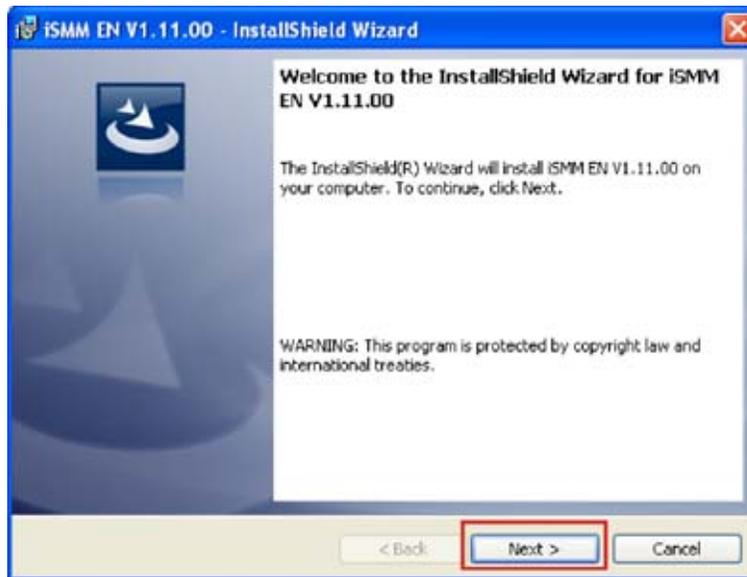**Step 4:** Double click the **iSMM EN V1.11.00** directory icon. (**Figure 7-29**)

Step 5: The contents of the directory are displayed. (**Figure 7-30**)
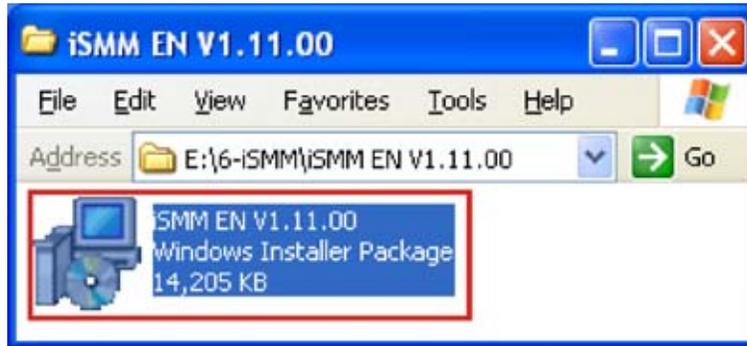
Figure 7-30: iSMM Installation File

Step 6: Double click the **iSMM EN V1.11.00** setup file. (**Figure 7-30**)

Step 7: The **iSMM InstallShield Welcome Screen** appears. (**Figure 7-31**)

Figure 7-31: iSMM InstallShield Welcome Screen

Step 8: Click NEXT to continue.

Step 9:   The **License Agreement** screen appears. (**Figure 7-32**)
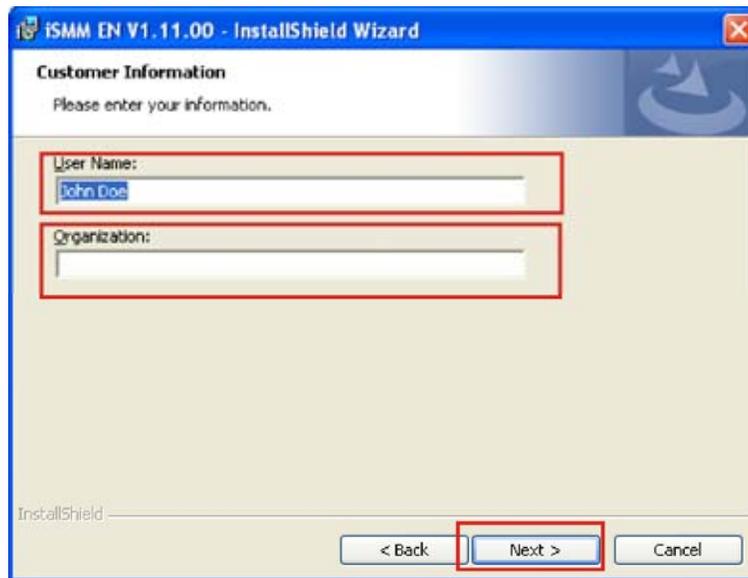

Figure 7-32: iSMM License Agreement

Step 10: Select "**I accept the terms of the license agreement.**" (**Figure 7-32**)

Step 11: Click NEXT to continue.(**Figure 7-32**)

Step 12: The **Customer Information** screen appears.(**Figure 7-33**)

Figure 7-33: iSMM Customer Information

Step 13: Fill in the "User Name" and "Organization" fields, which will be automatically

filled with the settings for the current user.(**Figure 7-33**)

Step 14: Click **Next** to continue.(**Figure 7-33**)

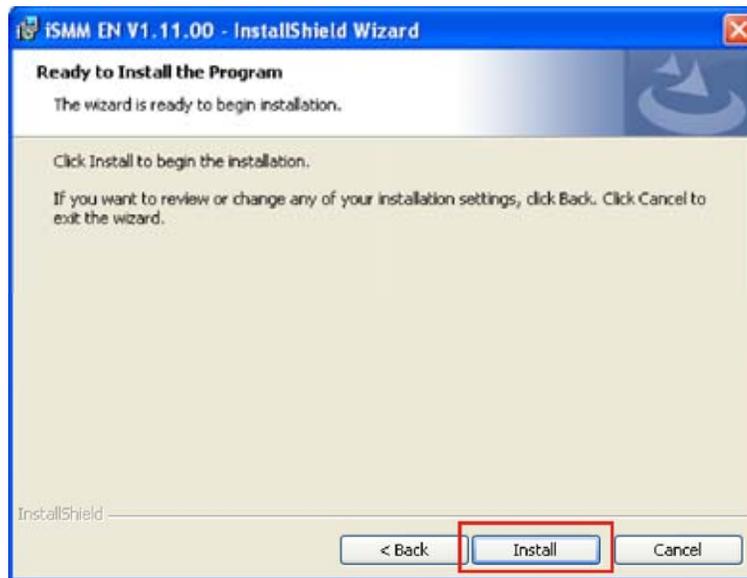**Step 15:** The **Setup Type** screen appears. (**Figure 7-34**)

Figure 7-34: iSMM Setup Type

Step 16: Select "**Complete**" (**Figure 7-34**)

Step 17: Click NEXT to continue. (**Figure 7-34**)

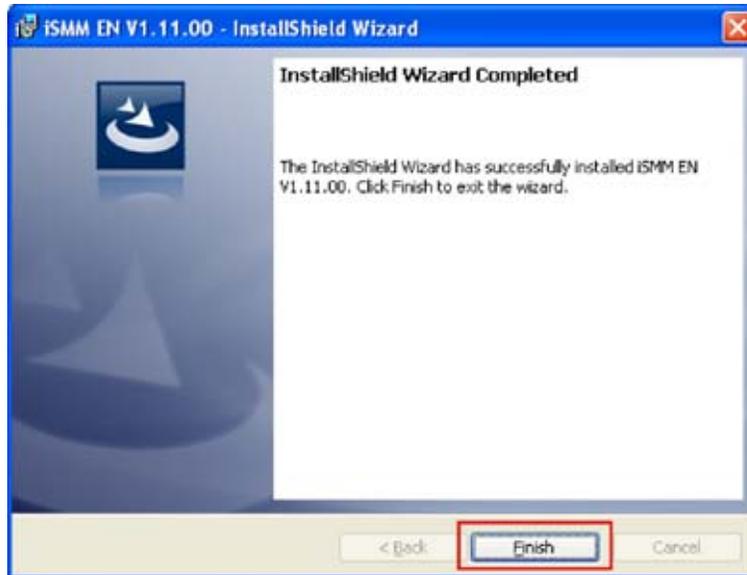Step 18: The **Installation Confirmation** screen appears. (**Figure 7-35**)

Figure 7-35: iSMM Installation Confirmation

Step 19: Click INSTALL to begin installing the drivers. (**Figure 7-35**)

Step 20: The InstallShield Wizard Completed appears when the drivers are finished

installing. (**Figure 7-36**)

Figure 7-36: iSMM InstallShield Wizard Complete

Step 21: Click FINISH to exit the installation program.(**Figure 7-36**)

Step 22: The **Restart Confirmation** screen appears.(**Figure 7-37**)

Figure 7-37: iSMM Restart Confirmation

Step 23: Select YES to restart the system, or NO to restart the system manually later.

Appendix

A

BIOS Options

Below is a list of BIOS configuration options in the BIOS chapter.

- **System Overview** 47
- **System Time [xx:xx:xx]** 48
- **System Date [xx/xx/xx]** 48
- **ATA/IDE Configurations [Compatible]**..51
- **Legacy IDE Channels [SATA Pri, PATA Sec]**..52
- **IDE Master and IDE Slave**..52
- **Auto-Detected Drive Parameters**...53
- **Type [Auto]** 54
- **LBA/Large Mode [Auto]**...55
- **Block (Multi Sector Transfer) [Auto]**..55
- **PIO Mode [Auto]**..55
- **DMA Mode [Auto]**..56
- **S.M.A.R.T [Auto]**..57
- **32Bit Data Transfer [Enabled]**..57
- **Serial Port1 Address [3F8/IRQ4]** 58
- **Serial Port1 Mode [Normal]**..58
- **Serial Port2 Address [2F8/IRQ3]** 59
- **Serial Port2 Mode [Normal]**..59
- **Select AT/ATX Power [BY HARDWARE]**...61
- **Power Supply Status** 62
- **Restore on AC Power Loss [Last State]**...62
- **Power Button Mode [On/Off]**..63
- **Resume on Keyboard/Mouse [Disabled]**...63
- **Resume on Ring [Disabled]** 63
- **Resume on PCI-Express WAKE# [Enabled]**...63
- **Resume On RTC Alarm [Disabled]**..64
- **Remote Access [Disabled]**..65
- **Serial Port Number [COM1]**..66
- **Base Address, IRQ [2F8h,3]**..66
- **Serial Port Mode [115200 8,n,1]**...66
- **Flow Control [None]**...67
- **Redirection After BIOS POST [Always]** 67
- **Terminal Type [ANSI]**...67

Appendix

B

Terminology

AC '97 Audio Codec 97 (AC'97) refers to a codec standard developed by Intel® in 1997.

ACPI Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.

AHCI Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.

ATA The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.

ARMD An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.

ASKIR Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude ("volume") of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.

BIOS The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user

CODEC The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.

CompactFlash® CompactFlash® is a solid-state storage device. CompactFlash® devices use flash memory in a standard size enclosure. Type II is thicker than Type I, but a Type II slot can support both types.

CMOS Complimentary metal-oxide-conductor is an integrated circuit used in chips like static RAM and microprocessors.

COM COM refers to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal computer is usually a male DB-9 connector.

DAC The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.

DDR Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.

DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
DIO	The digital inputs and digital outputs are general control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
EIDE	Enhanced IDE (EIDE) is a newer IDE interface standard that has data transfer rates between 4.0 MB/s and 16.6 MB/s.
EIST	Enhanced Intel® SpeedStep Technology (EIST) allows users to modify the power consumption levels and processor performance through application software. The application software changes the bus-to-core frequency ratio and the processor core voltage.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
GbE	Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gb/s and complies with the IEEE 802.3-2005 standard.
GPIO	General purpose input
HDD	Hard disk drive (HDD) is a type of magnetic, non-volatile computer storage device that stores digitally encoded data.
ICH	The Input/Ouput Controll Hub (ICH) is an Intel® Southbridge chipset.
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.

LCD	Liquid crystal display (LCD) is a flat, low-power display device that consists of two polarizing plates with a liquid crystal panel in between.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
RAM	Random Access Memory (RAM) is volatile memory that loses data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gb/s and the SATA II bus has data transfer speeds of up to 3.0 Gb/s.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.
USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12 Mb/s data transfer rates and USB 2.0 supports 480 Mb/s data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

C

Watchdog Timer

NOTE:

The following discussion applies to DOS environment. IEI support is contacted or the IEI website visited for specific drivers for more sophisticated operating systems, e.g., Windows and Linux.

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMIs or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer.

INT 15H:

AH – 6FH Sub-function:	
AL – 2:	Sets the Watchdog Timer's period.
BL:	Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

Table C-1: AH-6FH Sub-function

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. When the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

NOTE:

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system resets.

EXAMPLE PROGRAM:

; INITIAL TIMER PERIOD COUNTER

;
W_LOOP:
;

```
        MOV         AX, 6F02H           ;setting the time-out value
        MOV         BL, 30              ;time-out value is 48 seconds
        INT     15H
```

;
; ADD THE APPLICATION PROGRAM HERE
;

```
        CMP         EXIT_AP, 1          ;is the application over?
        JNE     W_LOOP              ;No, restart the application

        MOV         AX, 6F02H           ;disable Watchdog Timer
        MOV         BL, 0           ;
        INT     15H
```

;
; EXIT ;

Appendix

D

Address Mapping

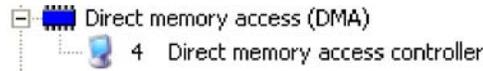## D.1 Direct Memory Access (DMA)

Figure D-1: Direct Memory Access (DMA)
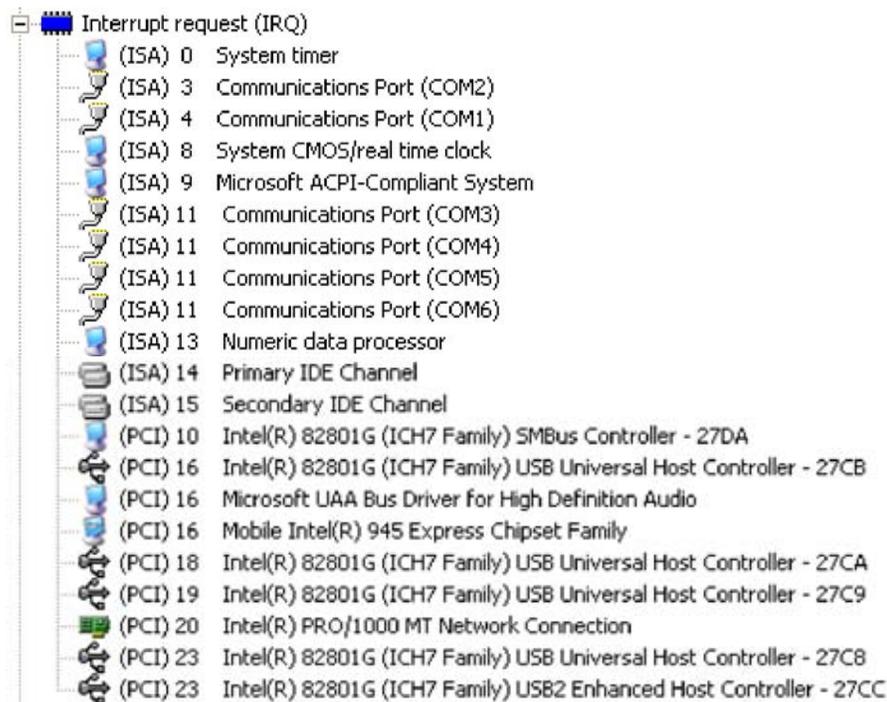
D.2 Input/Output (IO)

Figure D-2: Input/Output (IO) (1 of 2)

Figure D-3: Input/Output (IO) (2 of 2)

D.3 Interrupt Request (IRQ)

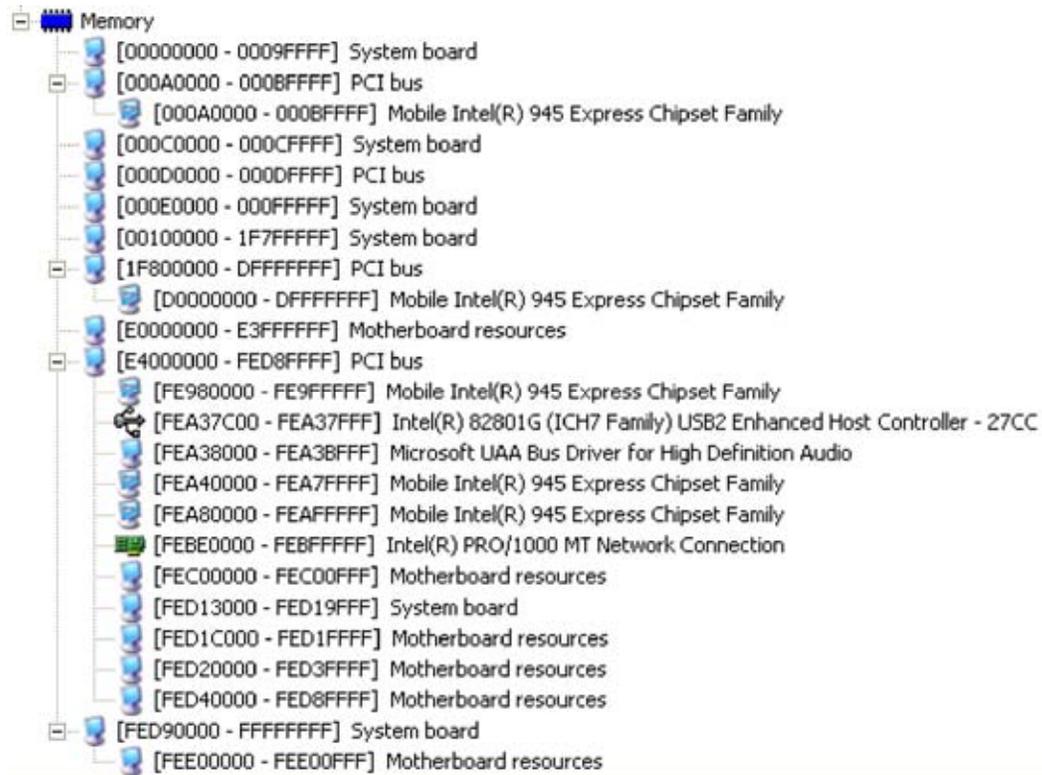**Figure D-4: Interrupt Request (IRQ)**

D.4 Memory

Figure D-5: Memory

Appendix

E

Compatibility

NOTE:

The compatible items described here have been tested by the IEI R&D team and found to be compatible with the IEM-945GSE

E.1 Compatible Operating Systems

The following operating systems have been successfully run on the IEM-945GSE.

- Microsoft® Windows Vista
- Microsoft® Windows XP (32-bit)
- Microsoft® Windows 2000
- Fedora 7

E.2 Compatible Processors

The following processors have been successfully tested on the IEM-945GSE

CPU	FSB	Frequency
Intel® ATOM™ N270	533 MHz	1.6 GHz

Table E-1: Compatible Processors

E.3 Compatible Memory Modules

![NOTE icon] **NOTE:**

The memory modules listed below have been tested on the IEM-945GSE other memory modules that comply with the specifications may also work on the IEM-945GSE but have not been tested.

The following memory modules have been successfully tested on the IEM-945GSE.

Manufacturer	Capacity	Speed	Type
Transcend	2.0 GB	667 MHz	DDR2

Table E-2: Compatible Memory Modules

<div style="text-align: right;">

Appendix

F

</div>

Hazardous Materials

Disclosure

F.1 Hazardous Materials Disclosure Table for IPB Products Certified as RoHS Compliant Under 2002/95/EC Without Mercury

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated "Environmentally Friendly Use Period" (EFUP). This is an estimate of the number of years that these substances would "not leak out or undergo abrupt change." This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	X	O	O	O	O	X
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O
O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006 X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006						

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	X	O	O	O	O	X
显示	X	O	O	O	O	X
印刷电路板	X	O	O	O	O	X
金属螺帽	X	O	O	O	O	O
电缆组装	X	O	O	O	O	X
风扇组装	X	O	O	O	O	X
电力供应组装	X	O	O	O	O	X
电池	O	O	O	O	O	O
O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。 X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。						