IEI Technology Corp.

MODEL:

WAFER-OT-Z650/Z670

3.5" SBC with Intel® Atom™ Z650/Z670 Processor, On-board 1 GB DDR2 Memory, HDMI/LVDS, 10/100 Mbps LAN, USB 2.0, SATA 3Gb/s, Audio and RoHS

User Manual

Rev. 1.00 – 13 January, 2012

RoHS Lead Free

Revision

Date	Version	Changes
13 January, 2012	1.00	Initial release

Copyright

COPYRIGHT NOTICE

The information in this document is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

TRADEMARKS

All registered trademarks and product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective owners.

Table of Contents

1 INTRODUCTION 1

1.1 INTRODUCTION 2
1.2 MODEL VARIATIONS 2
1.3 CONNECTORS 3
1.4 DIMENSIONS 4
1.5 DATA FLOW 5
1.6 TECHNICAL SPECIFICATIONS 6

2 PACKING LIST 8

2.1 ANTI-STATIC PRECAUTIONS 9
2.2 UNPACKING PRECAUTIONS 9
2.3 PACKING LIST 10

3 CONNECTORS 12

3.1 PERIPHERAL INTERFACE CONNECTORS 13
3.1.1 WAFER-OT-Z650/Z670 Layout 13
3.1.2 Peripheral Interface Connectors 13
3.1.3 External Interface Panel Connectors 14
3.2 INTERNAL PERIPHERAL CONNECTORS 15
3.2.1 5 V SATA Power Connector 15
3.2.2 12 V Power Connector 15
3.2.3 Audio Connector 16
3.2.4 Backlight Inverter Connector 17
3.2.5 Battery Connector 18
3.2.6 LVDS Connector 19
3.2.7 Power & HDD LED Connector 20
3.2.8 Power Button Connector 21
3.2.9 Reset Button Connector 22
3.2.10 RS-232 Serial Port Connectors 23
3.2.11 SATA Drive Connector 24
3.2.12 SD Card Slot 25

3.2.13 USB Connector (4-Pin) *25*
3.2.14 USB Connector (8-Pin) *26*
3.3 EXTERNAL PERIPHERAL INTERFACE CONNECTOR PANEL 27
3.3.1 12 V Power Jack *27*
3.3.2 Ethernet Connector *28*
3.3.3 HDMI Connector *29*
3.3.4 Serial Port Connector (COM1) *29*
3.3.5 USB Connectors *30*

4 INSTALLATION 31

4.1 ANTI-STATIC PRECAUTIONS 32
4.2 INSTALLATION CONSIDERATIONS 32
4.3 SD CARD INSTALLATION 33
4.4 JUMPER SETTINGS 34
4.4.1 AT/ATX Power Select Jumper *35*
4.4.2 LVDS Voltage Selection *36*
4.5 CHASSIS INSTALLATION 37
4.5.1 Airflow *37*
4.5.2 Motherboard Installation *37*
4.6 INTERNAL PERIPHERAL DEVICE CONNECTIONS 37
4.6.1 Audio Kit Installation *38*
4.6.2 LVDS LCD Installation *39*
4.6.3 SATA Drive Connection *41*
4.6.4 Single RS-232 Cable *42*
4.6.5 USB Cable *43*
4.7 EXTERNAL PERIPHERAL INTERFACE CONNECTION 44
4.7.1 LAN Connection *44*
4.7.2 Serial Device Connection *45*
4.7.3 USB Connection (Dual Connector) *46*
4.7.4 HDMI Display Device Connection *47*

5 BIOS 49

5.1 INTRODUCTION 50
5.1.1 Starting Setup *50*
5.1.2 Using Setup *50*

5.1.3 Getting Help *51*
5.1.4 Unable to Reboot after Configuration Changes *51*
5.1.5 BIOS Menu Bar *51*
5.2 MAIN 52
5.3 ADVANCED 53
5.3.1 ACPI Settings *54*
5.3.2 CPU Configuration *55*
5.3.3 IDE Configuration *56*
5.3.4 USB Configuration *57*
5.3.5 F81216 Super IO Configuration *58*
5.3.5.1 Serial Port n Configuration 58
5.3.6 iWDD Hardware Monitor *62*
5.4 CHIPSET 63
5.4.1 North Bridge Configuration *64*
5.4.2 South Bridge Configuration *65*
5.5 BOOT 66
5.6 SECURITY 67
5.7 EXIT 67

6 SOFTWARE DRIVERS 69

6.1 AVAILABLE SOFTWARE DRIVERS 70
6.2 STARTING THE DRIVER PROGRAM 70
6.3 CHIPSET DRIVER INSTALLATION 71
6.4 VGA DRIVER INSTALLATION 75
6.5 LAN DRIVER INSTALLATION 79
6.6 AUDIO DRIVER INSTALLATION 86

A BIOS OPTIONS 89

B ONE KEY RECOVERY 91

B.1 ONE KEY RECOVERY INTRODUCTION 92
B.1.1 System Requirement *93*
B.1.2 Supported Operating System *94*
B.2 SETUP PROCEDURE FOR WINDOWS 95
B.2.1 Hardware and BIOS Setup *96*
B.2.2 Create Partitions *96*

B.2.3 Install Operating System, Drivers and Applications *100*
B.2.4 Build-up Recovery Partition *101*
B.2.5 Create Factory Default Image *103*
B.3 AUTO RECOVERY SETUP PROCEDURE 108
B.4 SETUP PROCEDURE FOR LINUX 113
B.5 RECOVERY TOOL FUNCTIONS 116
B.5.1 Factory Restore *118*
B.5.2 Backup System *119*
B.5.3 Restore Your Last Backup *120*
B.5.4 Manual *121*
B.6 RESTORE SYSTEMS FROM A LINUX SERVER THROUGH LAN 122
B.6.1 Configure DHCP Server Settings *123*
B.6.2 Configure TFTP Settings *124*
B.6.3 Configure One Key Recovery Server Settings *125*
B.6.4 Start the DHCP, TFTP and HTTP *126*
B.6.5 Create Shared Directory *126*
B.6.6 Setup a Client System for Auto Recovery *127*
B.7 OTHER INFORMATION 130
B.7.1 Using AHCI Mode or ALi M5283 / VIA VT6421A Controller *130*
B.7.2 System Memory Requirement *132*

C TERMINOLOGY 133

D WATCHDOG TIMER 137

E HAZARDOUS MATERIALS DISCLOSURE 140

E.1 HAZARDOUS MATERIALS DISCLOSURE TABLE FOR IPB PRODUCTS CERTIFIED AS ROHS COMPLIANT UNDER 2002/95/EC WITHOUT MERCURY 141

List of Figures

Figure 1-1: WAFER-OT-Z650/Z670 2
Figure 1-2: Connectors 3
Figure 1-3: WAFER-OT-Z650/Z670 Dimensions (mm) 4
Figure 1-4: External Interface Panel Dimensions (mm) 4
Figure 1-5: Data Flow Diagram 5
Figure 3-1: Connectors and Jumpers 13
Figure 3-2: 5 V SATA Power Connector Location 15
Figure 3-3: 12 V Power Connector Location 16
Figure 3-4: Audio Connector Location 17
Figure 3-5: Panel Backlight Connector Location 18
Figure 3-6: Battery Connector Location 19
Figure 3-7: LVDS Connector Location 20
Figure 3-8: Power & HDD LED Connector Location 21
Figure 3-9: Power Button Connector Location 22
Figure 3-10: Reset Button Connector Location 22
Figure 3-11: RS-232 Serial Port Connector Locations 23
Figure 3-12: SATA Drive Connector Location 24
Figure 3-13: SD Card Slot Location 25
Figure 3-14: 4-pin USB Connector Location 26
Figure 3-15: 8-pin USB Connector Location 26
Figure 3-16: External Peripheral Interface Connector 27
Figure 3-17: RJ-45 Ethernet Connector 28
Figure 3-18: COM1 Pinout Locations 30
Figure 4-1: SD Card Installation 34
Figure 4-2: AT/ATX Power Select Jumper Location 35
Figure 4-3: LVDS Voltage Selection Jumper Location 36
Figure 4-4: Audio Kit Cable Connection 38
Figure 4-5: LVDS Connector 40
Figure 4-6: Backlight Inverter Connection 41
Figure 4-7: SATA Drive Cable Connection 42

Figure 4-8: Single RS-232 Cable Installation 43
Figure 4-9: Dual USB Cable Connection 44
Figure 4-10: LAN Connection 45
Figure 4-11: Serial Device Connector 46
Figure 4-12: USB Connector 47
Figure 4-13: HDMI Connection 48
Figure 6-1: Chipset Driver Screen 71
Figure 6-2: Chipset Driver Welcome Screen 72
Figure 6-3: Chipset Driver License Agreement 73
Figure 6-4: Chipset Driver Read Me File 73
Figure 6-5: Chipset Driver Setup Operations 74
Figure 6-6: Chipset Driver Installation Finish Screen 75
Figure 6-7: VGA Driver Welcome Screen 76
Figure 6-8: VGA Driver License Agreement 77
Figure 6-9: VGA Driver Read Me File 77
Figure 6-10: VGA Driver Setup Operations 78
Figure 6-11: VGA Driver Installation Finish Screen 79
Figure 6-12: Access Windows Control Panel 79
Figure 6-13: Double Click the System Icon 80
Figure 6-14: Click the Device Manager Tab 80
Figure 6-15: Device Manager List 81
Figure 6-16: AX88772 Properties Window 82
Figure 6-17: Search Options Window 82
Figure 6-18: Driver Selection Window 83
Figure 6-19: Folder Selection Window 83
Figure 6-20: Driver Location Window 84
Figure 6-21: Driver Installation Window 84
Figure 6-22: Driver Installation Complete Window 85
Figure 6-23: Device Manager Window 85
Figure 6-24: Audio Driver Installation File Extraction 86
Figure 6-25: Audio Driver Welcome Screen 87
Figure 6-26: Audio Driver Installation 87
Figure 6-27: Audio Driver Installation Complete 88
Figure B-1: IEI One Key Recovery Tool Menu 92
Figure B-2: Launching the Recovery Tool 97

Figure B-3: Recovery Tool Setup Menu 97
Figure B-4: Command Mode 98
Figure B-5: Partition Creation Commands 99
Figure B-6: Launching the Recovery Tool 101
Figure B-7: Manual Recovery Environment for Windows 101
Figure B-8: Building the Recovery Partition 102
Figure B-9: Press Any Key to Continue 102
Figure B-10: Press F3 to Boot into Recovery Mode 103
Figure B-11: Recovery Tool Menu 103
Figure B-12: About Symantec Ghost Window 104
Figure B-13: Symantec Ghost Path 104
Figure B-14: Select a Local Source Drive 105
Figure B-15: Select a Source Partition from Basic Drive 105
Figure B-16: File Name to Copy Image to 106
Figure B-17: Compress Image 106
Figure B-18: Image Creation Confirmation 107
Figure B-19: Image Creation Complete 107
Figure B-20: Image Creation Complete 107
Figure B-21: Press Any Key to Continue 108
Figure B-22: Auto Recovery Utility 109
Figure B-23: Disable Automatically Restart 109
Figure B-24: Launching the Recovery Tool 110
Figure B-25: Auto Recovery Environment for Windows 110
Figure B-26: Building the Auto Recovery Partition 111
Figure B-27: Factory Default Image Confirmation 111
Figure B-28: Image Creation Complete 112
Figure B-29: Press any key to continue 112
Figure B-30: Partitions for Linux 114
Figure B-31: System Configuration for Linux 115
Figure B-32: Access menu.lst in Linux (Text Mode) 115
Figure B-33: Recovery Tool Menu 116
Figure B-34: Recovery Tool Main Menu 117
Figure B-35: Restore Factory Default 118
Figure B-36: Recovery Complete Window 118
Figure B-37: Backup System 119

Figure B-38: System Backup Complete Window 119
Figure B-39: Restore Backup 120
Figure B-40: Restore System Backup Complete Window 120
Figure B-41: Symantec Ghost Window 121
Figure B-42: Disable Automatically Restart 128

List of Tables

Table 1-1: WAFER-OT-Z650/Z670 Model Variations 2
Table 1-2: WAFER-OT-Z650/Z670 Specifications 7
Table 2-1: Packing List 11
Table 3-1: Peripheral Interface Connectors 14
Table 3-2: Rear Panel Connectors 14
Table 3-3: 5 V SATA Power Connector Pinouts 15
Table 3-4: 12 V Power Connector Pinouts 16
Table 3-5: Audio Connector Pinouts 17
Table 3-6: Panel Backlight Connector Pinouts 18
Table 3-7: Battery Connector Pinouts 19
Table 3-8: LVDS Connector Pinouts 20
Table 3-9: Power & HDD LED Connector Pinouts 21
Table 3-10: Power Button Connector Pinouts 22
Table 3-11: Reset Button Connector Pinouts 23
Table 3-12: RS-232 Serial Port Connector Pinouts 23
Table 3-13: SATA Drive Connector Pinouts 24
Table 3-14: 4-pin USB Connector Pinouts 26
Table 3-15: 8-pin USB Connector Pinouts 27
Table 3-16: 12 V Power Jack Pinouts 27
Table 3-17: LAN Pinouts 28
Table 3-18: RJ-45 Ethernet Connector LEDs 28
Table 3-19: HDMI Connector 29
Table 3-20: RS-232 Serial Port (COM 1) Pinouts 30
Table 3-21: USB Port Pinouts 30
Table 4-1: Jumpers 35
Table 4-2: AT/ATX Power Select Jumper Settings 35
Table 4-3: LVDS Voltage Selection Jumper Settings 36
Table 5-1: BIOS Navigation Keys 51

BIOS Menus

BIOS Menu 1: Main 52
BIOS Menu 2: Advanced 53
BIOS Menu 3: ACPI Configuration 54
BIOS Menu 4: CPU Configuration 55
BIOS Menu 5: IDE Configuration 56
BIOS Menu 6: USB Configuration 57
BIOS Menu 7: Super IO Configuration 58
BIOS Menu 8: Serial Port n Configuration Menu 58
BIOS Menu 9: iWDD Hardware Monitor 62
BIOS Menu 10: Chipset 63
BIOS Menu 11:Northbridge Chipset Configuration 64
BIOS Menu 12: Southbridge Chipset Configuration 65
BIOS Menu 13: Boot 66
BIOS Menu 14: Security 67
BIOS Menu 15:Exit 68
BIOS Menu 16: IEI Feature 113

Chapter

1

Introduction

1.1 Introduction

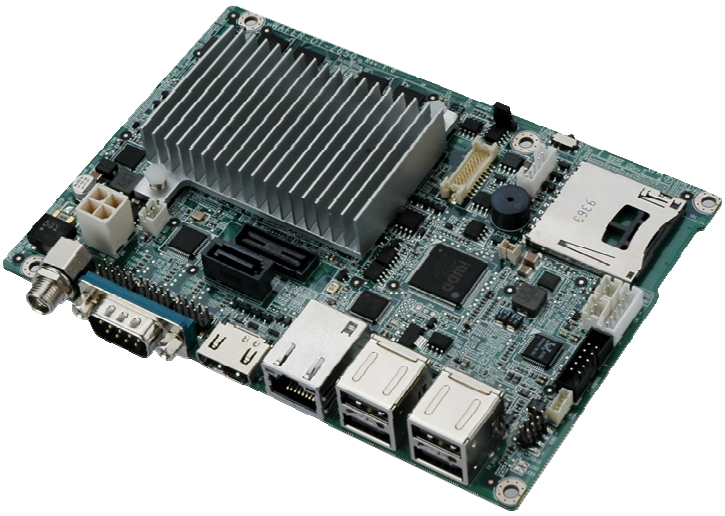


Figure 1-1: WAFER-OT-Z650/Z670

The WAFER-OT-Z650/Z670 3.5” motherboard is an Intel® Atom™ Z650/Z670 processor platform with on-board 1.0 GB DDR2 memory. The WAFER-OT-Z650/Z670 supports HDMI display output and comes with an LVDS connector supported 18-bit single-channel LVDS screens. Maximum seven USB ports, one SATA 3Gb/s connector, one SD card slot, four COM ports, and one audio connector provide flexible expansion options.

1.2 Model Variations

The model variations of the WAFER-OT-Z650/Z670 are listed below.

Model No.	CPU
WAFER-OT-Z670-R10	Intel® Atom™ Z670 1.5 GHz
WAFER-OT-Z650-R10	Intel® Atom™ Z650 1.2 GHz

Table 1-1: WAFER-OT-Z650/Z670 Model Variations

1.3 Connectors

The connectors on the WAFER-OT-Z650/Z670 are shown in the figure below.

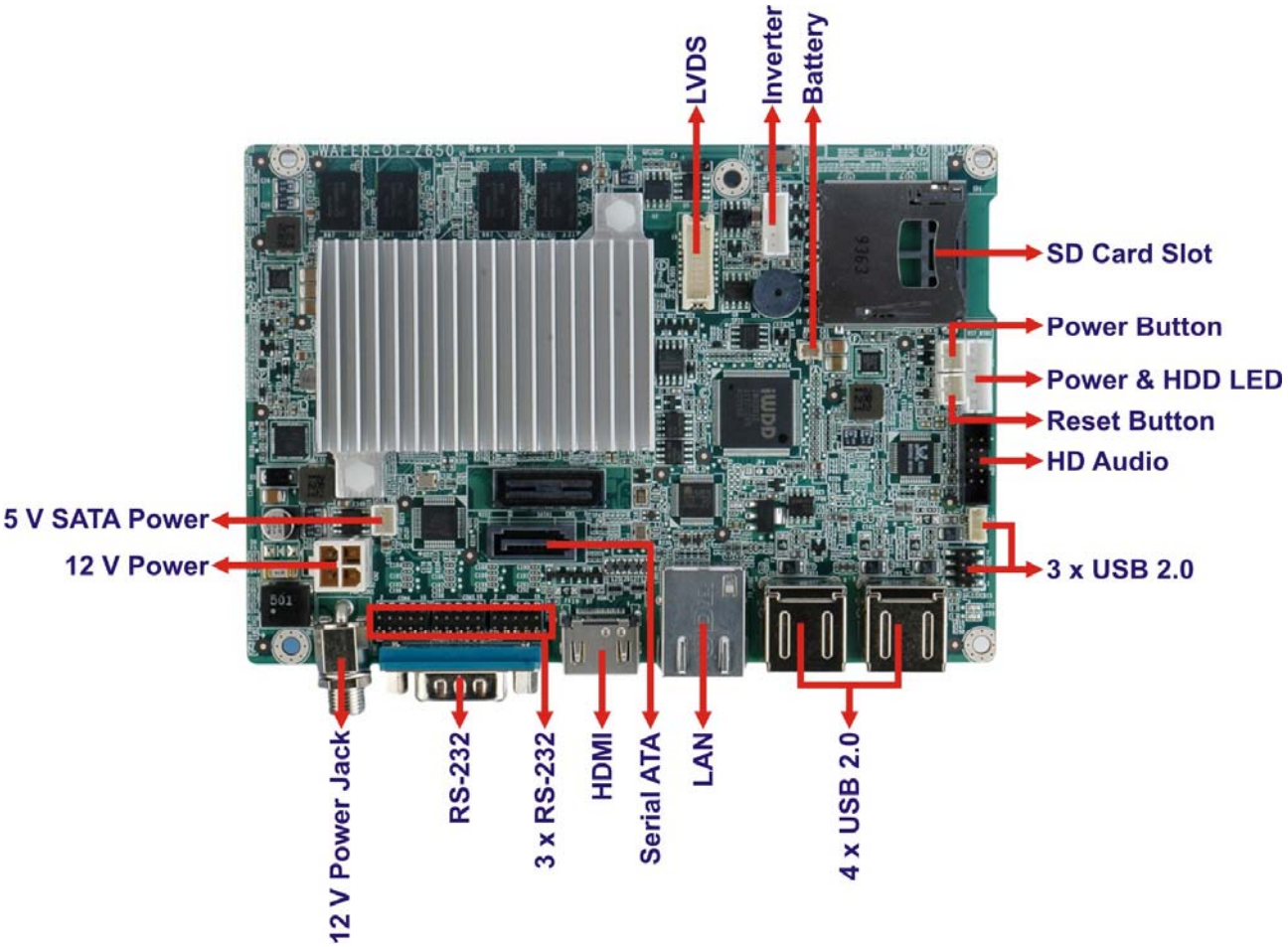


Figure 1-2: Connectors

1.4 Dimensions

The main dimensions of the WAFER-OT-Z650/Z670 are shown in the diagram below.

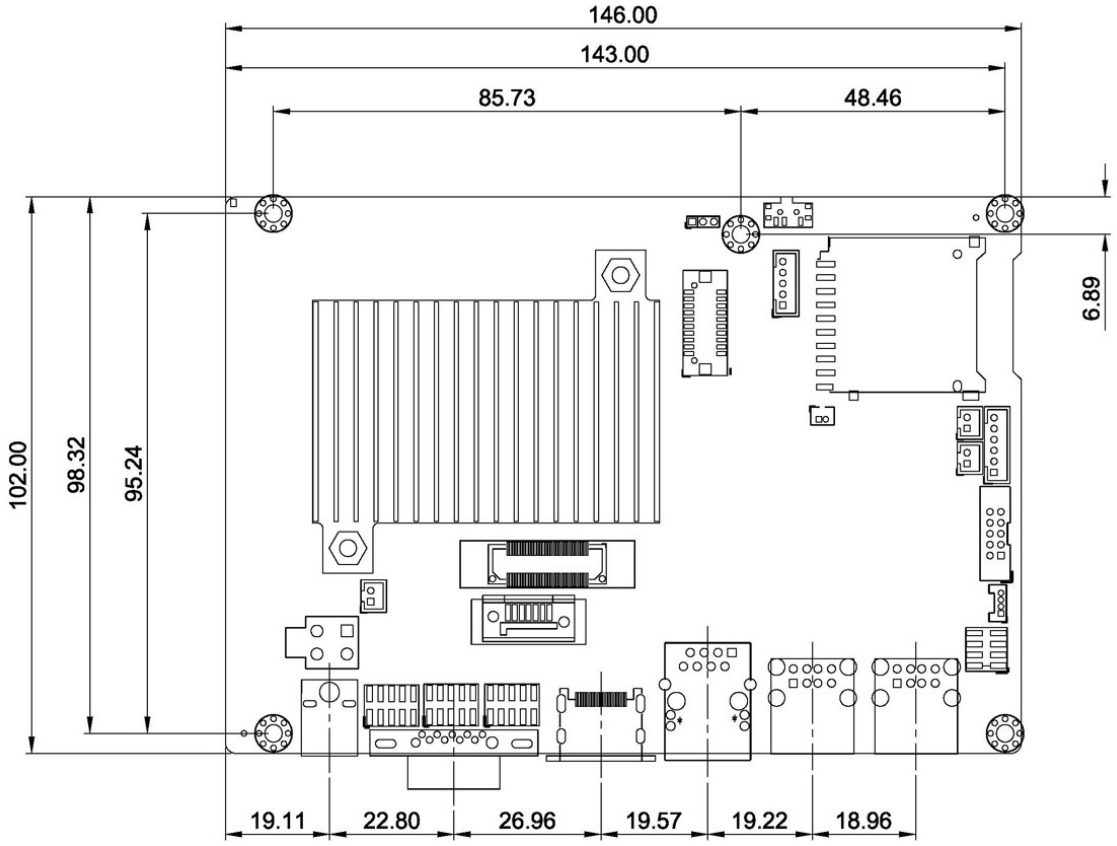


Figure 1-3: WAFER-OT-Z650/Z670 Dimensions (mm)

.

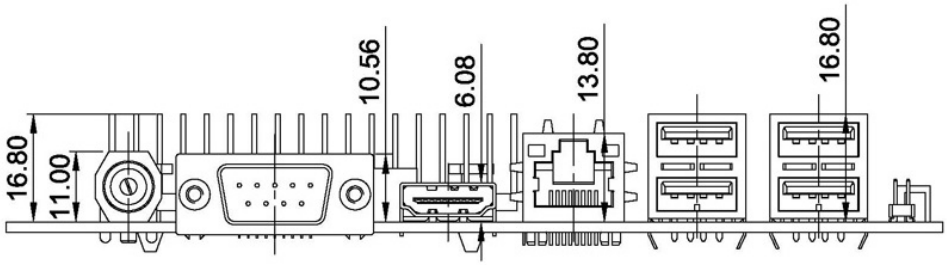


Figure 1-4: External Interface Panel Dimensions (mm)

1.5 Data Flow

Figure 1-5 shows the data flow between the system chipset, the CPU and other components installed on the motherboard.

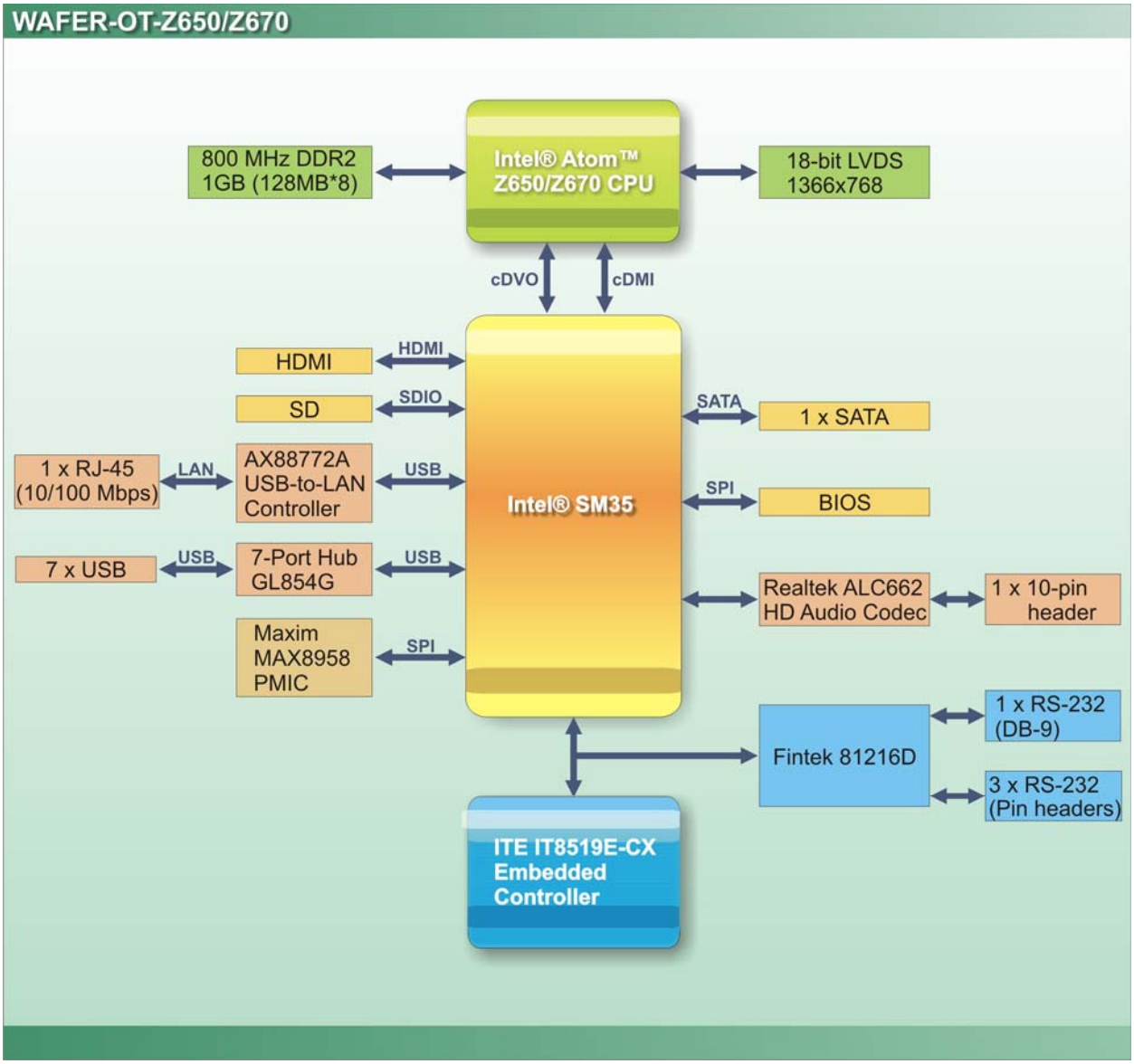


Figure 1-5: Data Flow Diagram

1.6 Technical Specifications

The WAFER-OT-Z650/Z670 technical specifications are listed below.

Specification/Model	WAFER-OT-Z650/Z670
Form Factor	3.5”
System CPU	1.2 GHz Intel® Atom™ Z650 processor or 1.5 GHz Intel® Atom™ Z670 processor
System Chipset	Intel® SM35
Memory	On-board 800 MHz 1.0 GB DDR2 SDRAM
Graphics	Intel® GMA 600 with a 400 MHz graphics core Supports MPEG2, H.264, VC-1/WMV9 up to 1080p decode
Display	HDMI 1.3a with up to 1080p resolution 18-bit single channel LVDS with up to 1366x768 resolution
BIOS	UEFI BIOS
Audio	Realtek ALC662 HD Audio codec
Ethernet	USB interface 10/100 Mbps LAN by AX88772A
COM	Four RS-232 serial ports
USB	Seven USB 2.0/1.1 devices supported: Three by on-board pin headers Four by external connectors
SATA	One SATA 3Gb/s port with 5V power
SD	One SD card slot
Watchdog Timer	Software programmable supports 1~255 sec. system reset
Power Supply	12 V input only AT and ATX support One external power jack One 4-pin (2x2) internal power connector
Power Consumption	12V @ 0.93 A (1.2 GHz Intel® Atom™ Z650) 12V @ 0.95 A (1.5 GHz Intel® Atom™ Z670)

Specification/Model	WAFER-OT-Z650/Z670
Operating Temperature	-10ºC ~ 60ºC
Storage Temperature	-20ºC ~ 70ºC
Humidity (Operating)	5% ~ 95% (non-condensing)
Dimensions (LxW)	146 mm x 102 mm
Weight (GW/NW)	450 g / 130 g

Table 1-2: WAFER-OT-Z650/Z670 Specifications

Chapter

2

Packing List

2.1 Anti-static Precautions

WARNING!

Static electricity can destroy certain electronics. Make sure to follow the ESD precautions to prevent damage to the product, and injury to the user.

Make sure to adhere to the following guidelines:

- ***Wear an anti-static wristband***: Wearing an anti-static wristband can prevent electrostatic discharge.
- ***Self-grounding***: Touch a grounded conductor every few minutes to discharge any excess static buildup.
- ***Use an anti-static pad***: When configuring any circuit board, place it on an anti-static mat.
- ***Only handle the edges of the PCB***: Don't touch the surface of the motherboard. Hold the motherboard by the edges when handling.

2.2 Unpacking Precautions

When the WAFER-OT-Z650/Z670 is unpacked, please do the following:

- Follow the antistatic guidelines above.
- Make sure the packing box is facing upwards when opening.
- Make sure all the packing list items are present.

2.3 Packing List

NOTE:

If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the WAFER-OT-Z650/Z670 was purchased from or contact an IEI sales representative directly by sending an email to sales@iei.com.tw.

The WAFER-OT-Z650/Z670 is shipped with the following components:

Quantity	Item and Part Number	Image
1	WAFER-OT-Z650/Z670 motherboard	
1	SATA and power cable (**P/N:** 32801-000201-100-RS)	
1	Audio cable (**P/N:** 32000-072100-RS)	
1	USB cable (**P/N:** 32001-002700-200-RS)	
3	RS-232 cable (**P/N**: 32205-002700-100-RS)	
1	Mini jumper pack (2.0mm) (**P/N**:33100-000033-RS)	

Quantity	Item and Part Number	Image
1	One Key Recovery CD	
1	Utility CD	
1	Quick Installation Guide	

Table 2-1: Packing List

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

3.1.1 WAFER-OT-Z650/Z670 Layout

The figure below shows all the connectors and jumpers.

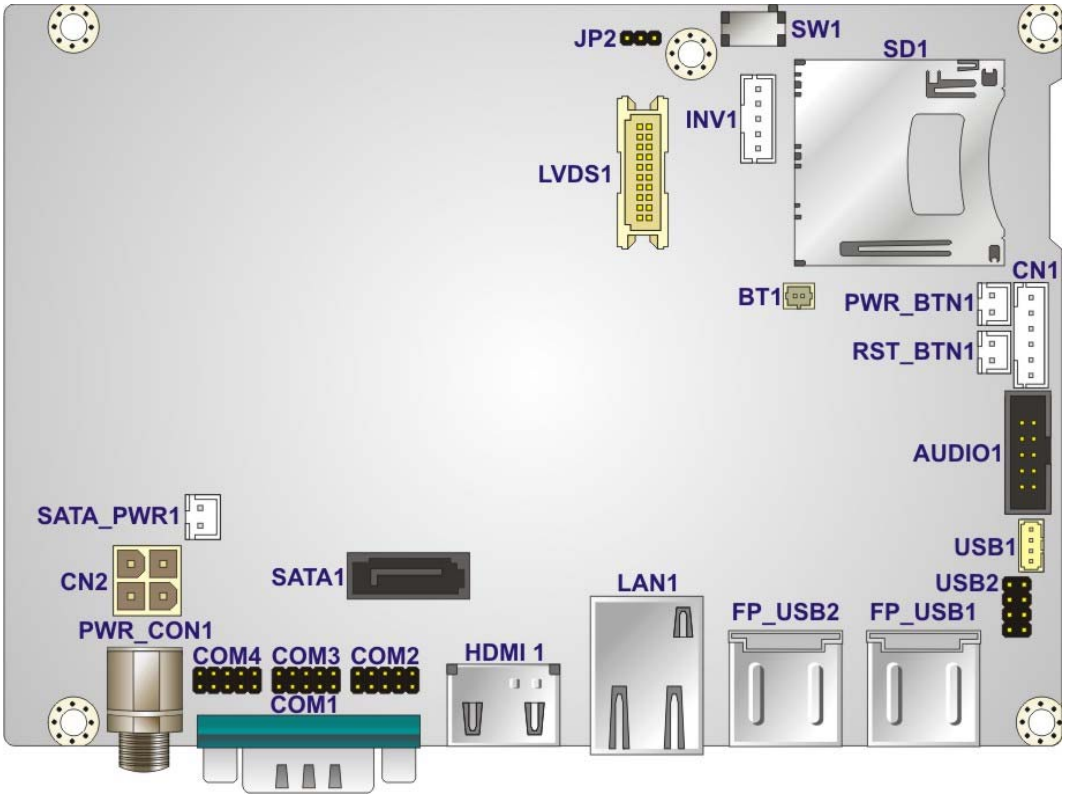


Figure 3-1: Connectors and Jumpers

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
5 V SATA power connector	2-pin wafer	SATA_PWR1
12 V power connector	4-pin Molex power connector	CN2

Connector	Type	Label
Audio connector	10-pin box header	AUDIO1
Backlight inverter connector	5-pin wafer	INV1
Battery connector	2-pin wafer	BT1
LVDS connector	20-pin crimp	LVDS1
Power & HDD LED connector	6-pin header	CN1
Power button connector	2-pin wafer	PWR_BTN1
Reset button connector	2-pin wafer	RST_BTN1
RS-232 serial port connectors	10-pin header	COM2, COM3, COM4
SD card slot	SD card slot	SD1
Serial ATA (SATA) drive connector	7-pin SATA	SATA1
USB 2.0 connector	4-pin wafer	USB1
USB 2.0 connector	8-pin header	USB2

Table 3-1: Peripheral Interface Connectors

3.1.3 External Interface Panel Connectors

The table below lists the connectors on the external I/O panel.

Connector	Type	Label
12 V power jack	Power jack	PWR_CON1
Dual USB ports	Dual USB port	FP_USB1, FP_USB2
HDMI connector	HDMI	HDMI_1
Ethernet connector	RJ-45	LAN1
RS-232 serial port connector	Male DB-9	COM1

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the WAFER-OT-Z650/Z670.

3.2.1 5 V SATA Power Connector

CN Label:	**SATA_PWR1**
CN Type:	2-pin wafer
CN Location:	See **Figure 3-2**
CN Pinouts:	See **Table 3-3**

Use the 5 V SATA power connector to connect to SATA device power connection.

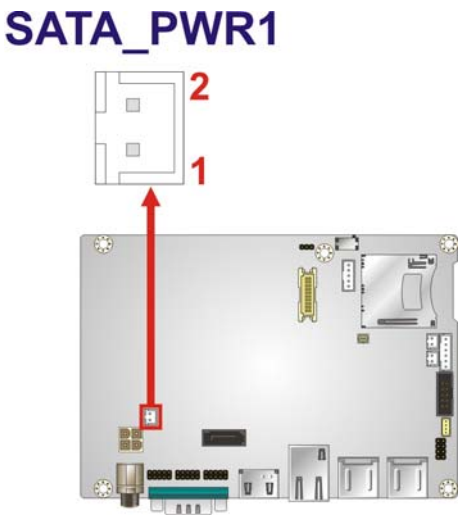


Figure 3-2: 5 V SATA Power Connector Location

Pin No.	Description
1	+5V Ground
2	Ground

Table 3-3: 5 V SATA Power Connector Pinouts

3.2.2 12 V Power Connector

CN Label:	**CN2**
CN Type:	4-pin Molex power connector

CN Location: See **Figure 3-3**

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

The ATX power connector connects to an ATX power supply.

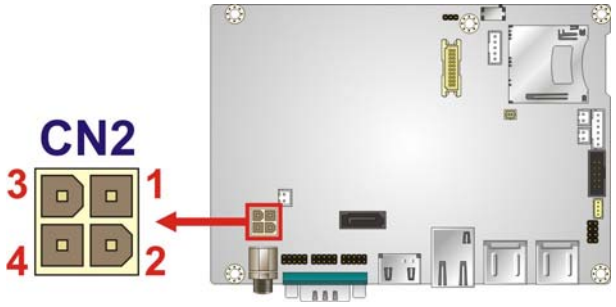


Figure 3-3: 12 V Power Connector Location

Pin	Description
1	GND
2	GND
3	+12V
4	+12V

Table 3-4: 12 V Power Connector Pinouts

3.2.3 Audio Connector

CN Label: **AUDIO1**

CN Type: 10-pin box header

CN Location: See **Figure 3-4**

CN Pinouts: See **Table 3-5**

The 10-pin audio connector is connected to external audio devices including speakers and microphones for the input and output of audio signals to and from the system.

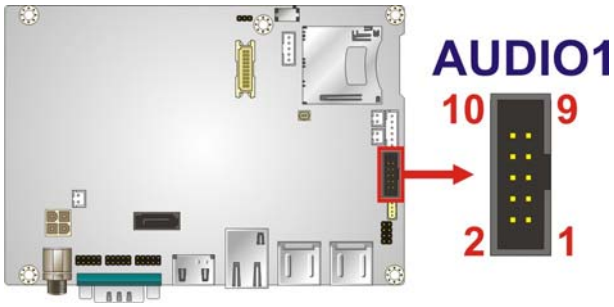


Figure 3-4: Audio Connector Location

Pin	Description	Pin	Description
1	Line-out_R	2	Line-in_R
3	AUD_GND	4	AUD_GND
5	Line-out _L	6	Line-in _L
7	AUD_GND	8	AUD_GND
9	MIC1_R	10	MIC1_L

Table 3-5: Audio Connector Pinouts

3.2.4 Backlight Inverter Connector

CN Label: **INV1**

CN Type: 5-pin wafer

CN Location: See **Figure 3-5**

CN Pinouts: See **Table 3-6**

The backlight inverter connector provides the backlights on the LCD display connected to the WAFER-OT-Z650/Z670 with +12V of power.

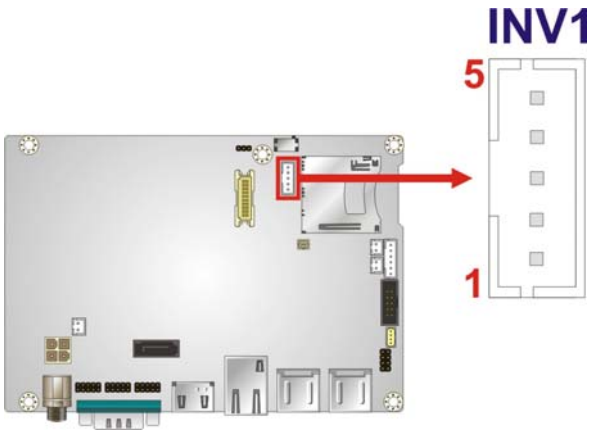


Figure 3-5: Panel Backlight Connector Location

Pin	Description
1	LCD_BKLTCTL
2	GROUND
3	VCC12
4	GROUND
5	LCD_BKLEN

Table 3-6: Panel Backlight Connector Pinouts

3.2.5 Battery Connector

CAUTION:

Risk of explosion if battery is replaced by and incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

CN Label: **BT1**

CN Type: 2-pin wafer

CN Location: See **Figure 3-6**

CN Pinouts: See **Table 3-7**

This is connected to the system battery. The battery provides power to the system clock to retain the time when power is turned off.

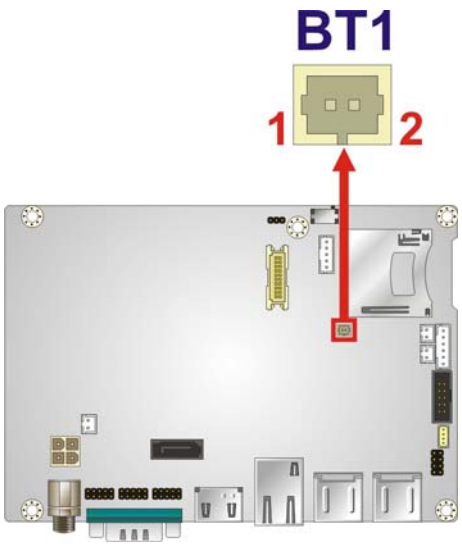


Figure 3-6: Battery Connector Location

Pin	Description
1	Battery+
2	GND

Table 3-7: Battery Connector Pinouts

3.2.6 LVDS Connector

CN Label: **LVDS1**

CN Type: 20-pin crimp

CN Location: See **Figure 3-7**

CN Pinouts: See **Table 3-8**

The 20-pin LVDS LCD connector can be connected to a single-channel18-bit LVDS panel.

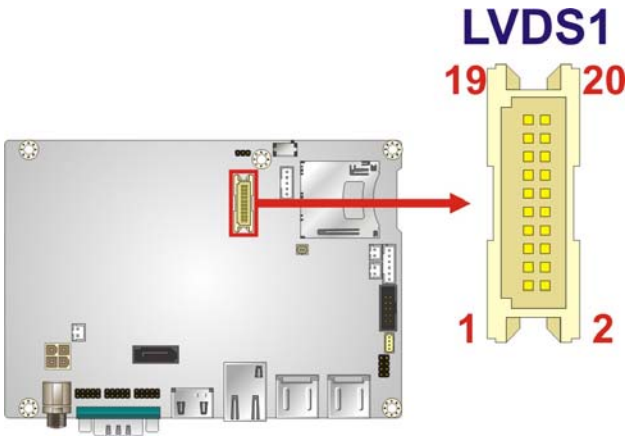


Figure 3-7: LVDS Connector Location

Pin	Description	Pin	Description
1	GND	2	GND
3	AY0+	4	AY0-
5	AY1+	6	AY1-
7	AY2+	8	AY2-
9	AYCLK+	10	AYCLK-
11	AY3+	12	AY3-
13	GND	14	GND
15	NC	16	NC
17	LCDVCC	18	LCDVCC
19	LCDVCC	20	LCDVCC

Table 3-8: LVDS Connector Pinouts

3.2.7 Power & HDD LED Connector

CN Label: **CN1**

CN Type: 6-pin wafer

CN Location: See **Figure 3-8**

CN Pinouts: See **Table 3-9**

The LED connector connects to an HDD indicator LED and a power LED on the system chassis to inform the user about HDD activity and the power on/off status of the system.

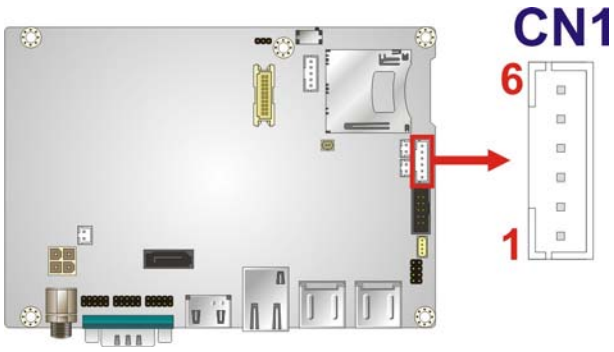


Figure 3-8: Power & HDD LED Connector Location

Pin	Description
1	+5V
2	GND
3	Power LED+
4	Power LED-
5	HDD LED+
6	HDD LED-

Table 3-9: Power & HDD LED Connector Pinouts

3.2.8 Power Button Connector

CN Label: **PWR_BTN1**

CN Type: 2-pin wafer

CN Location: See **Figure 3-9**

CN Pinouts: See **Table 3-10**

The power button connector is connected to a power switch on the system chassis to enable users to turn the system on and off.

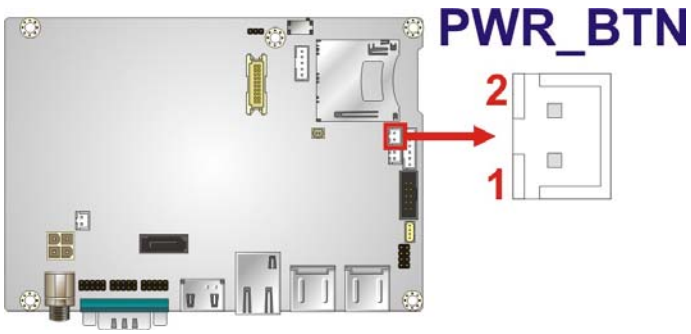


Figure 3-9: Power Button Connector Location

Pin	Description
1	PWR_BTN+
2	PWR_BTN-

Table 3-10: Power Button Connector Pinouts

3.2.9 Reset Button Connector

CN Label: **RST_BTN1**

CN Type: 2-pin wafer

CN Location: See **Figure 3-10**

CN Pinouts: See **Table 3-11**

The reset button connector is connected to a reset switch on the system chassis to enable users to reboot the system when the system is turned on.

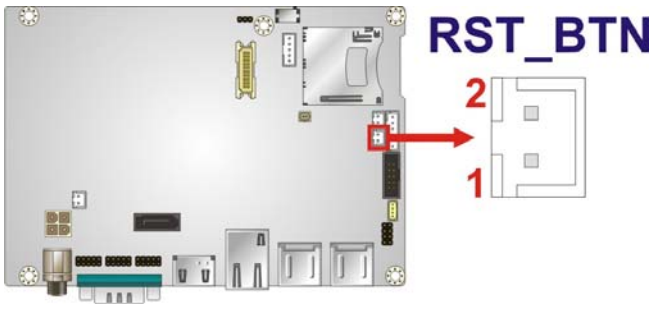


Figure 3-10: Reset Button Connector Location

Pin	Description
1	RESET+
2	RESET-

Table 3-11: Reset Button Connector Pinouts

3.2.10 RS-232 Serial Port Connectors

CN Label: **COM2, COM3, COM4**

CN Type: 10-pin header

CN Location: See **Figure 3-11**

CN Pinouts: See **Table 3-12**

Each of these connectors provides RS-232 connections.

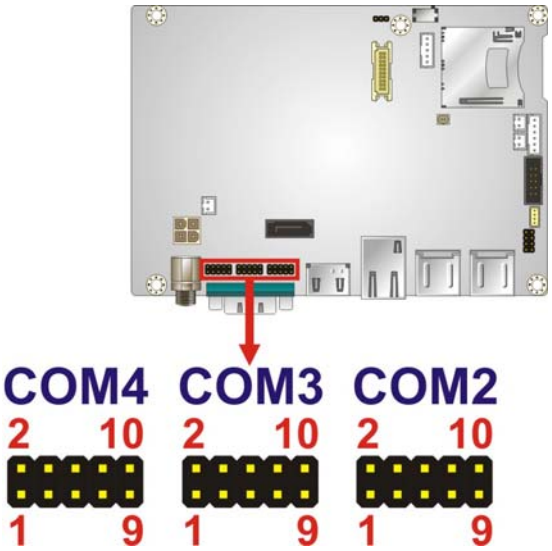


Figure 3-11: RS-232 Serial Port Connector Locations

Pin	Description	Pin	Description
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	GND

Table 3-12: RS-232 Serial Port Connector Pinouts

3.2.11 SATA Drive Connector

CN Label:	**SATA1**
CN Type:	7-pin SATA drive connector
CN Location:	See **Figure 3-12**
CN Pinouts:	See **Table 3-13**

The SATA drive connector can be connected to SATA drive and supports up to 3Gb/s data transfer rate.

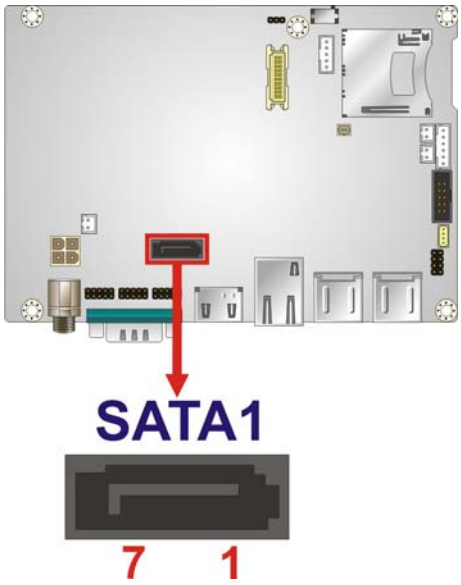


Figure 3-12: SATA Drive Connector Location

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

Table 3-13: SATA Drive Connector Pinouts

3.2.12 SD Card Slot

CN Label:	**SD1**
CN Type:	SD card slot
CN Location:	See **Figure 3-13**

An SD memory card can be inserted to the SD card slot on the WAFER-OT-Z650/Z670.

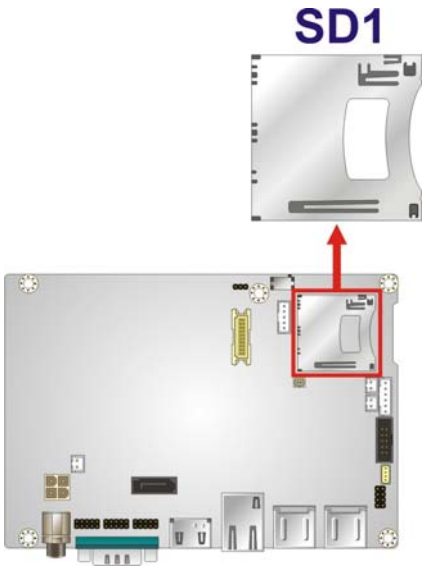


Figure 3-13: SD Card Slot Location

3.2.13 USB Connector (4-Pin)

CN Label:	**USB1**
CN Type:	4-pin wafer
CN Location:	See **Figure 3-14**
CN Pinouts:	See **Table 3-14**

The 4-pin USB connector provides connectivity to a USB 1.1/2.0 port.

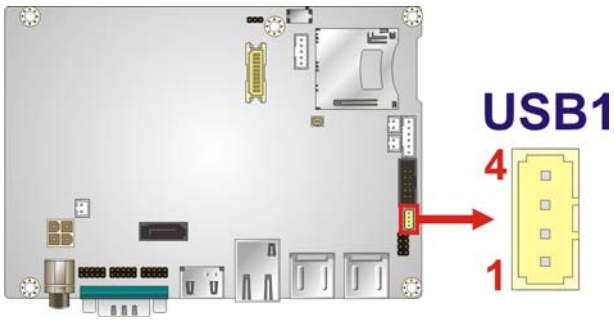


Figure 3-14: 4-pin USB Connector Location

Pin	Description	Pin	Description
1	+5V	2	-USB
3	+USB	4	GND

Table 3-14: 4-pin USB Connector Pinouts

3.2.14 USB Connector (8-Pin)

CN Label: **USB2**

CN Type: 8-pin header

CN Location: See **Figure 3-15**

CN Pinouts: See **Table 3-15**

The 8-pin USB connector provides connectivity to two USB 1.1/2.0 ports.

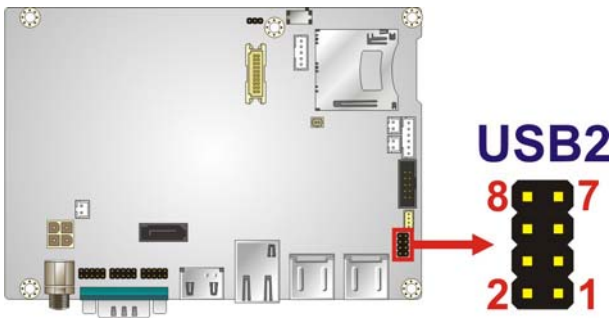


Figure 3-15: 8-pin USB Connector Location

Pin	Description	Pin	Description
1	USB_VCC	2	GND
3	DATA-	4	DATA+

Pin	Description	Pin	Description
5	DATA+	6	DATA-
7	GND	8	USB_VCC

Table 3-15: 8-pin USB Connector Pinouts

3.3 External Peripheral Interface Connector Panel

The figure below shows the external peripheral interface connector (EPIC) panel. The EPIC panel consists of the following:

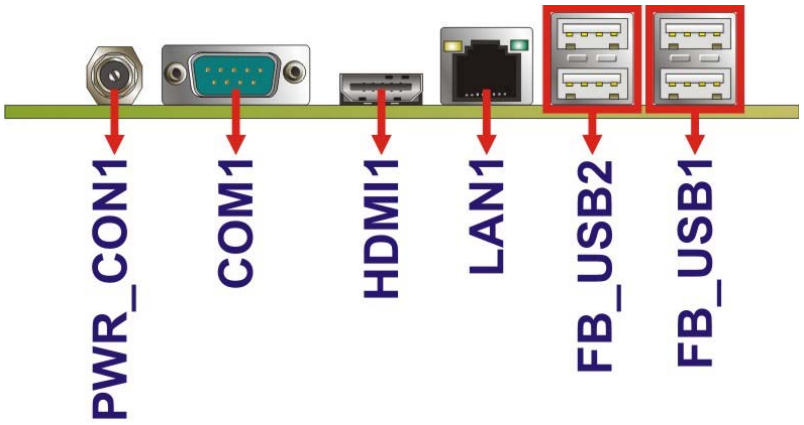


Figure 3-16: External Peripheral Interface Connector

3.3.1 12 V Power Jack

CN Label: **PWR_CON1**

CN Type: 12 V power jack

CN Location: See **Figure 3-16**

CN Pinouts: See **Table 3-16**

Use the rear panel 12 V power jack to connect the motherboard to a power source.

Pin	Description
1	+12V
2	GND
3	GND

Table 3-16: 12 V Power Jack Pinouts

3.3.2 Ethernet Connector

CN Label: **LAN1**

CN Type: RJ-45 connector

CN Location: See **Figure 3-16**

CN Pinouts: See **Table 3-17**

The WAFER-OT-Z650/Z670 is equipped with a built-in RJ-45 Ethernet controller. The controller can connect to the LAN through a RJ-45 LAN connector. There are two LEDs on the connector indicating the status of LAN. The pin assignments are listed in the following table:

Pin	Description	Pin	Description
1	LAN1_MDI0+	5	LAN1_MDI2+
2	LAN1_MDI0-	6	LAN1_MDI2-
3	LAN1_MDI1+	7	LAN1_MDI3+
4	LAN1_MDI1-	8	LAN1_MDI3-

Table 3-17: LAN Pinouts

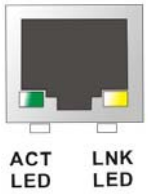


Figure 3-17: RJ-45 Ethernet Connector

The RJ-45 Ethernet connector has two status LEDs, one green and one yellow. The green LED indicates activity on the port and the yellow LED indicates the port is linked. See **Table 3-18**.

Status	Description	Status	Description
Green	Activity	Yellow	Linked

Table 3-18: RJ-45 Ethernet Connector LEDs

3.3.3 HDMI Connector

CN Label: **HDMI1**

CN Type: HDMI connector

CN Location: See **Figure 3-16**

CN Pinouts: See **Table 3-19**

Connects to a screen or device that accepts HDMI video input.

Pin	Description	Pin	Description
1	HDMI_DATA2	13	N/C
2	GND	14	N/C
3	HDMI_DATA2#	15	HDMI_SCL
4	HDMI_DATA1	16	HDMI_SDA
5	GND	17	GND
6	HDMI_DATA1#	18	+5V
7	HDMI_DATA0	19	HDMI_HPD
8	GND	20	HDMI_GND
9	HDMI_DATA0#	21	HDMI_GND
10	HDMI_CLK	22	HDMI_GND
11	GND	23	HDMI_GND
12	HDMI_CLK#		

Table 3-19: HDMI Connector

3.3.4 Serial Port Connector (COM1)

CN Label: **COM1**

CN Type: Male DB-9 connector

CN Location: See **Figure 3-16**

CN Pinouts: See **Table 3-20** and **Figure 3-18**

The serial port connects to a RS-232 serial communications device.

Pin	Description	Pin	Description
1	DATA CARRIER DETECT (DCD)	6	DATA SET READY (DSR)
2	RECEIVE DATA (RXD)	7	REQUEST TO SEND (RTS)
3	TRANSMIT DATA (TXD)	8	CLEAR TO SEND (CTS)
4	DATA TERMINAL READY (DTR)	9	RING INDICATOR (RI)
5	GND		

Table 3-20: RS-232 Serial Port (COM 1) Pinouts

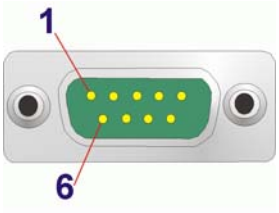


Figure 3-18: COM1 Pinout Locations

3.3.5 USB Connectors

CN Label: **FP_USB1, FP_USB2**

CN Type: Dual USB port

CN Location: See **Figure 3-16**

CN Pinouts: See **Table 3-21**

The ports connect to both USB 2.0 and USB 1.1 devices.

Pin	Description	Pin	Description
1	USB_VCC	2	USB_VCC
3	DATA-	4	DATA-
5	DATA+	6	DATA+
7	GND	8	GND

Table 3-21: USB Port Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the WAFER-OT-Z650/Z670 may result in permanent damage to the WAFER-OT-Z650/Z670 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-OT-Z650/Z670. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-OT-Z650/Z670 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 WAFER-OT-Z650/Z670, place it on an antic-static pad. This reduces the possibility of ESD damaging the WAFER-OT-Z650/Z670.
- ***Only handle the edges of the PCB***:-: When handling the PCB, hold the PCB by the edges.

4.2 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before installation. All installation notices must be strictly adhered to. Failing to adhere to these precautions may lead to severe damage and injury to the person performing the installation.

WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the components and injury to the user.

Before and during the installation please **DO** the following:

- Read the user manual:
  - The user manual provides a complete description of the WAFER-OT-Z650/Z670 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 WAFER-OT-Z650/Z670 on an antistatic pad:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- Turn all power to the WAFER-OT-Z650/Z670 off:
  - When working with the WAFER-OT-Z650/Z670, 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 WAFER-OT-Z650/Z670 **DO NOT:**

- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

4.3 SD Card Installation

To install the SD card onto the WAFER-OT-Z650/Z670, please follow the steps below:

Step 1: **Locate the SD card slot**. Place the WAFER-OT-Z650/Z670 on an anti-static pad. Locate the SD card slot.

Step 2: **Align the SD card**. Make sure the SD card is properly aligned with the SD card slot.

Step 3: **Insert the SD card**. Gently insert the SD card into the slot making sure the socket pins are properly inserted into the slot. See **Figure 4-1**.

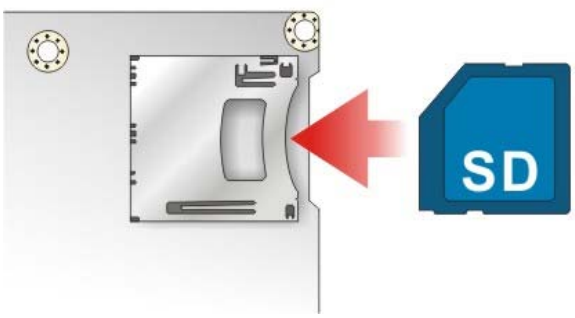
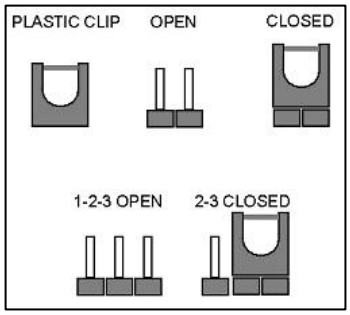


Figure 4-1: SD Card Installation

4.4 Jumper Settings

NOTE:



A jumper is a metal bridge used to close an electrical circuit. It consists of two or three metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To CLOSE/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.

The hardware jumpers must be set before installation. Jumpers are shown in **Table 4-1**.

Description	Label	Type
AT/ATX power mode setting	SW1	3-pin switch
LVDS1 voltage select	J_VLVDS1	3-pin header

Table 4-1: Jumpers

4.4.1 AT/ATX Power Select Jumper

Jumper Label: **SW1**

Jumper Type: 3-pin switch

Jumper Settings: See **Table 4-2**

Jumper Location: See **Figure 4-2**

The AT/ATX power select jumper specifies the system power mode as AT or ATX.

Setting	Description
Short 1-2	Use ATX power (Default)
Short 2-3	Use AT power

Table 4-2: AT/ATX Power Select Jumper Settings

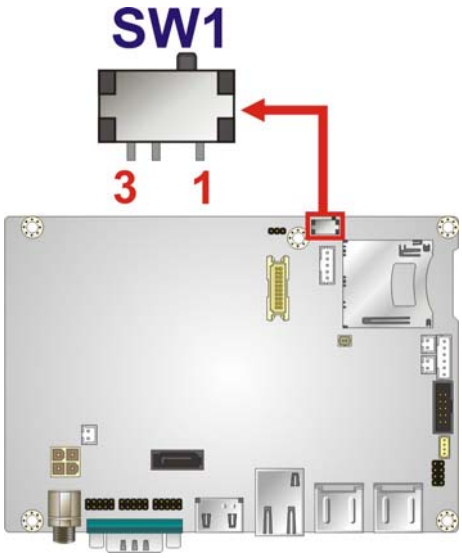


Figure 4-2: AT/ATX Power Select Jumper Location

4.4.2 LVDS Voltage Selection

WARNING:

Permanent damage to the screen and WAFER-OT-Z650/Z670 may occur if the wrong voltage is selected with this jumper. Please refer to the user guide that came with the monitor to select the correct voltage.

Jumper Label:	**JP2**
Jumper Type:	3-pin header
Jumper Settings:	See **Table 4-3**
Jumper Location:	See **Figure 4-3**

The LVDS Voltage Selection jumpers allow the LVDS screen voltages to be set.

Setting	Description
Short 1-2	+3.3V LVDS (Default)
Short 2-3	+5V LVDS

Table 4-3: LVDS Voltage Selection Jumper Settings

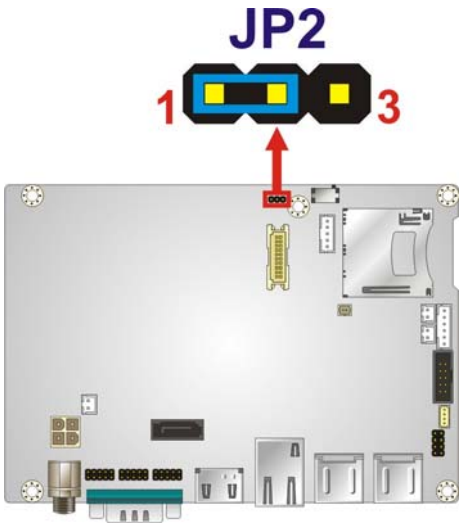


Figure 4-3: LVDS Voltage Selection Jumper Location

4.5 Chassis Installation

4.5.1 Airflow

WARNING:

Airflow is critical to the cooling of the CPU and other on-board components. The chassis in which the WAFER-OT-Z650/Z670 must have air vents to allow cool air to move into the system and hot air to move out.

The WAFER-OT-Z650/Z670 must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

NOTE:

IEI has a wide range of chassises available. Please contact your WAFER-OT-Z650/Z670 vendor, reseller or an IEI sales representative at sales@iei.com.tw or visit the IEI website (http://www.ieiworld.com.tw) to find out more about the available chassis.

4.5.2 Motherboard Installation

To install the WAFER-OT-Z650/Z670 motherboard into the chassis please refer to the reference material that came with the chassis.

4.6 Internal Peripheral Device Connections

This section outlines the installation of peripheral devices to the on-board connectors.

4.6.1 Audio Kit Installation

The Audio Kit that came with the WAFER-OT-Z650/Z670 connects to the 10-pin audio connector on the WAFER-OT-Z650/Z670. The audio kit consists of three audio jacks. One audio jack, Mic In, connects to a microphone. The remaining two audio jacks, Line-In and Line-Out, connect to two speakers. To install the audio kit, please refer to the steps below:

Step 1: **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 2: **Align pin 1**. Align pin 1 on the on-board connector with pin 1 on the audio kit connector. Pin 1 on the audio kit connector is indicated with a white dot. See **Figure 4-4**.

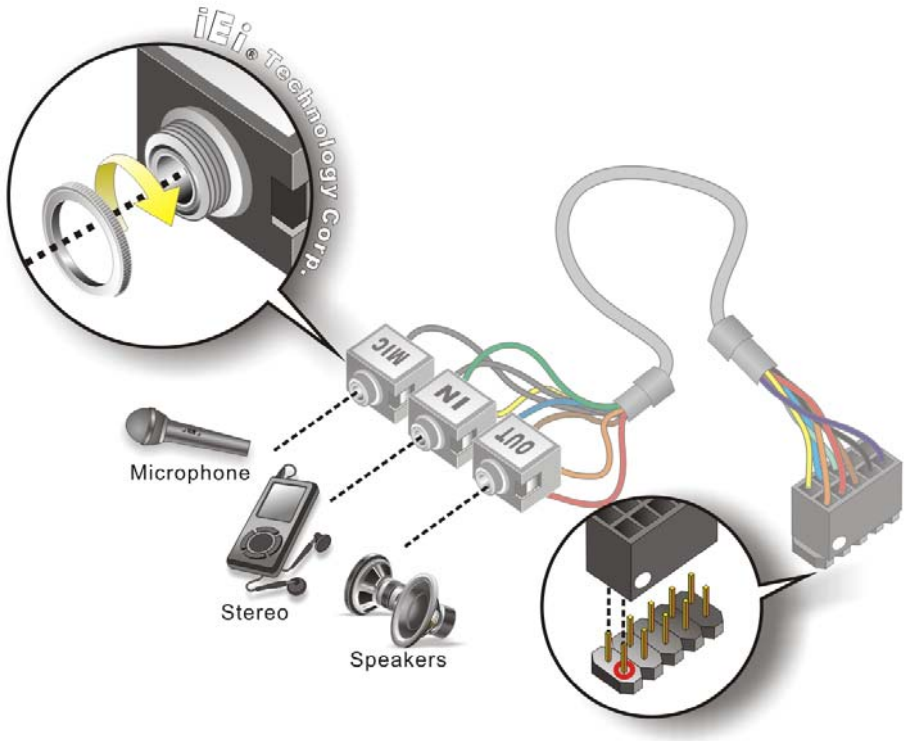


Figure 4-4: Audio Kit Cable Connection

Step 3: **Connect the audio devices**. Connect one speaker to the line-in audio jack, one speaker to the line-out audio jack and a microphone to the mic-in audio jack.

4.6.2 LVDS LCD Installation

The WAFER-OT-Z650/Z670 can be connected to a TFT LCD screen through the 20-pin LVDS crimp connector on the board. To connect a TFT LCD to the WAFER-OT-Z650/Z670, please follow the steps below.

Step 1: **Locate the connector**. The location of the LVDS connector is shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Insert the connector from the LVDS PCB driving board to the LVDS connector as shown in **Figure 4-5**. When connecting the connectors, make sure the pins are properly aligned.

WARNING:

The diagram below is merely for illustration. The configuration and connection of the cables from the TFT LCD screen being installed may be different. Please refer to the installation manual that came with the TFT LCD screen.

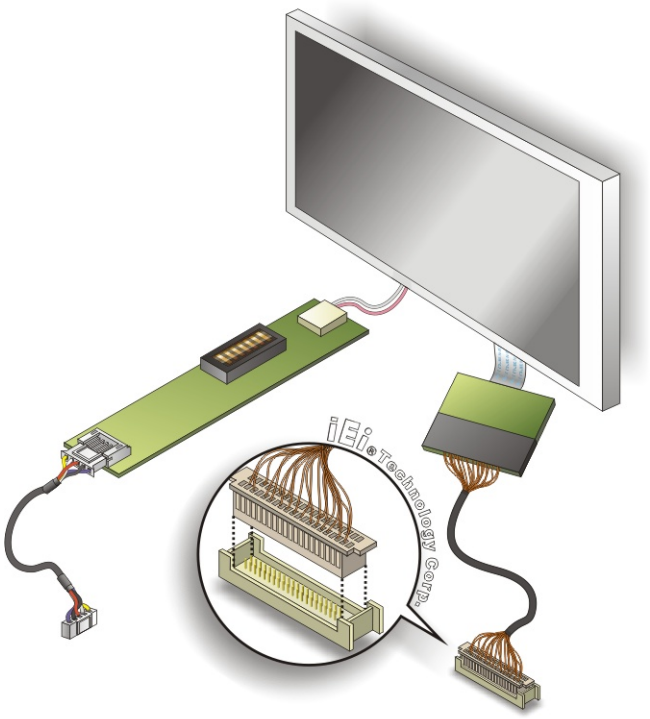


Figure 4-5: LVDS Connector

Step 3: **Locate the backlight inverter connector.** The location of the backlight inverter connector is shown in **Chapter 3**.

Step 4: **Connect backlight connector**. Connect the backlight connector to the driver TFT LCD PCB as shown in **Figure 4-6**. When inserting the cable connector, make sure the pins are properly aligned.

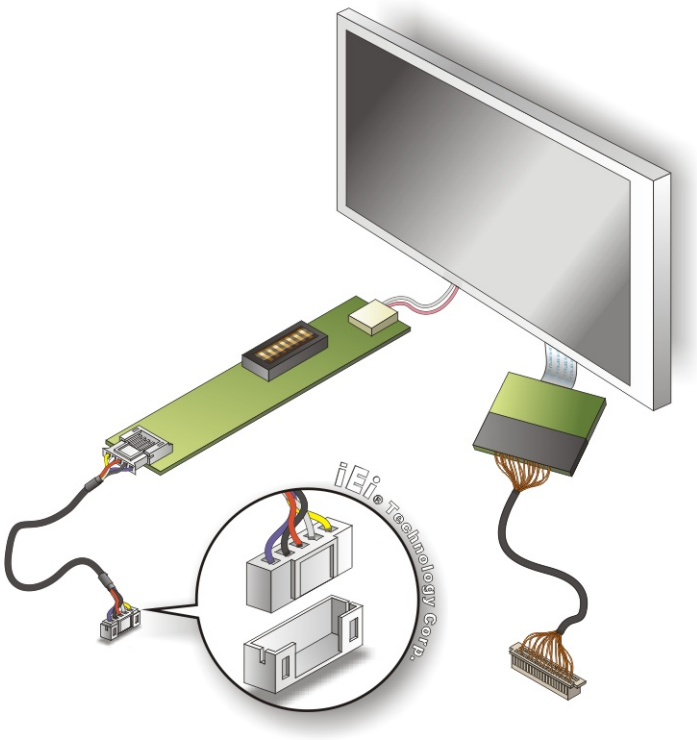


Figure 4-6: Backlight Inverter Connection

4.6.3 SATA Drive Connection

The WAFER-OT-Z650/Z670 is shipped with a SATA drive cable. To connect the SATA drive to the connector, please follow the steps below.

Step 1: **Locate the SATA connector and the SATA power connector**. The locations of the connectors are shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Insert the cable connector into the on-board SATA drive connector and the SATA power connector. See **Figure 4-7**.

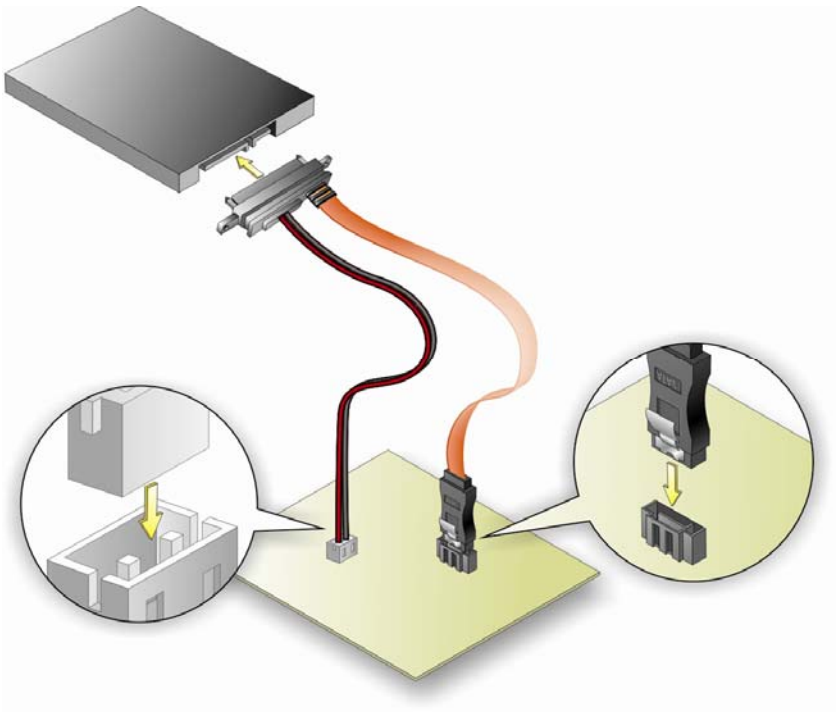


Figure 4-7: SATA Drive Cable Connection

Step 3: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 4-7**.

Step 4: To remove the SATA cable from the SATA connector, press the clip on the connector at the end of the cable.

4.6.4 Single RS-232 Cable

The single RS-232 cable consists of one serial port connector attached to a serial communications cable that is then attached to a D-sub 9 male connector. To install the single RS-232 cable, please follow the steps below.

Step 1: **Locate the connector**. The location of the RS-232 connector is shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Insert the connector into the serial port header. See **Figure 4-8**. A key on the front of the cable connectors ensures the connector can only be installed in one direction.

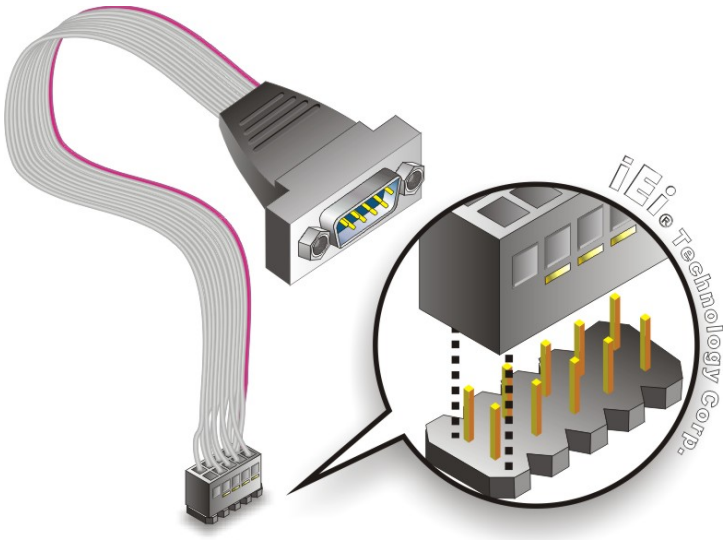


Figure 4-8: Single RS-232 Cable Installation

Step 3: **Secure the bracket**. The single RS-232 connector has two retention screws that must be secured to a chassis or bracket.

Step 4: **Connect the serial device**. Once the single RS-232 connector is connected to a chassis or bracket, a serial communications device can be connected to the system.

4.6.5 USB Cable

The WAFER-OT-Z650/Z670 is shipped with a dual port USB 2.0 cable. To connect the USB cable connector, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the USB connectors are shown in **Chapter 3**.

WARNING:

If the USB pins are not properly aligned, the USB device can burn out.

Step 2: **Align the connectors**. The cable has two connectors. Correctly align pin 1on each cable connector with pin 1 on the WAFER-OT-Z650/Z670 USB connector.

Step 3: **Insert the cable connectors**. Once the cable connectors are properly aligned with the USB connectors on the WAFER-OT-Z650/Z670, connect the cable connectors to the on-board connectors. See **Figure 4-9**.

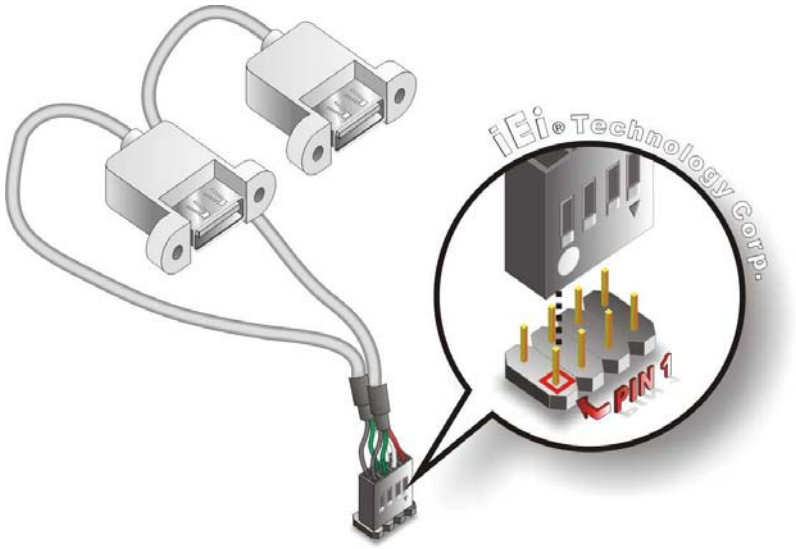


Figure 4-9: Dual USB Cable Connection

Step 4: **Attach the USB connectors to the chassis**. The USB 2.0 connectors each consists of two retention screw holes. To secure the connectors to the chassis, please refer to the installation instructions that came with the chassis.

4.7 External Peripheral Interface Connection

This section describes connecting devices to the external connectors on the WAFER-OT-Z650/Z670.

4.7.1 LAN Connection

The RJ-45 connector enables connection to an external network. To connect a LAN cable with an RJ-45 connector, please follow the instructions below.

Step 1: **Locate the RJ-45 connector**. The location of the RJ-45 connector is shown in **Chapter 3**.

Step 2: **Align the connectors.** Align the RJ-45 connector on the LAN cable with the RJ-45 connector on the WAFER-OT-Z650/Z670. See **Figure 4-10**.

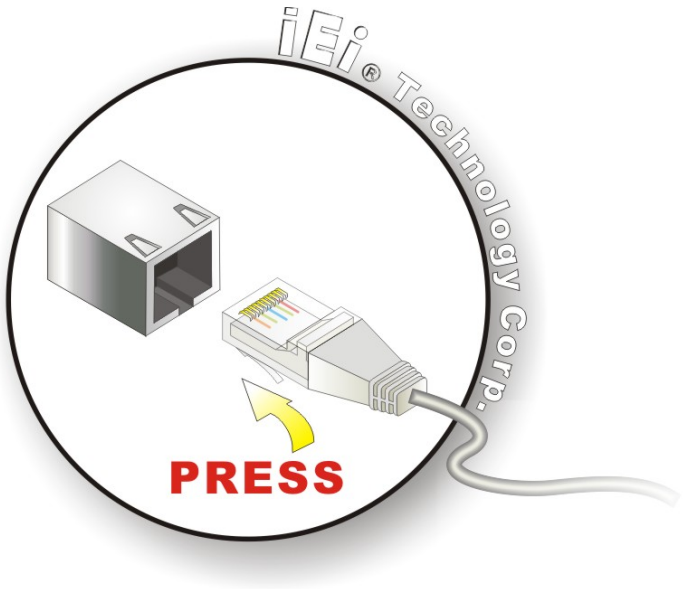


Figure 4-10: LAN Connection

Step 3: **Insert the LAN cable RJ-45 connector.** Once aligned, gently insert the LAN cable RJ-45 connector into the on-board RJ-45 connector.

4.7.2 Serial Device Connection

The WAFER-OT-Z650/Z670 has a single male DB-9 connector on the external peripheral interface panel for a serial device. Follow the steps below to connect a serial device to the WAFER-OT-Z650/Z670.

Step 1: **Locate the DB-9 connector**. The location of the DB-9 connector is shown in **Chapter 3**.

Step 2: **Insert the serial connector**. Insert the DB-9 connector of a serial device into the DB-9 connector on the external peripheral interface. See **Figure 4-11**.

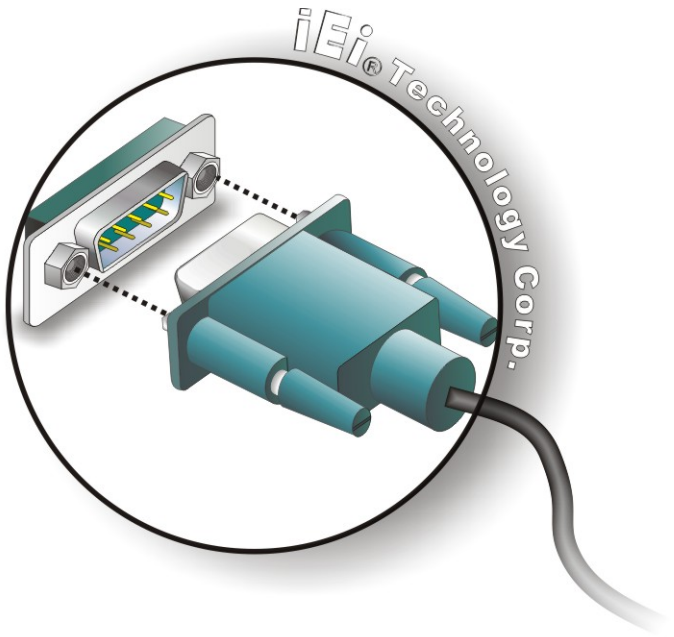


Figure 4-11: Serial Device Connector

Step 3: **Secure the connector**. Secure the serial device connector to the external interface by tightening the two retention screws on either side of the connector.

4.7.3 USB Connection (Dual Connector)

The external USB Series "A" receptacle connectors provide easier and quicker access to external USB devices. Follow the steps below to connect USB devices to the WAFER-OT-Z650/Z670.

Step 1: **Locate the USB Series "A" receptacle connectors**. The locations of the USB Series "A" receptacle connectors are shown in **Chapter 3**.

Step 2: **Insert a USB Series "A" plug**. Insert the USB Series "A" plug of a device into the USB Series "A" receptacle on the external peripheral interface. See **Figure 4-12**.

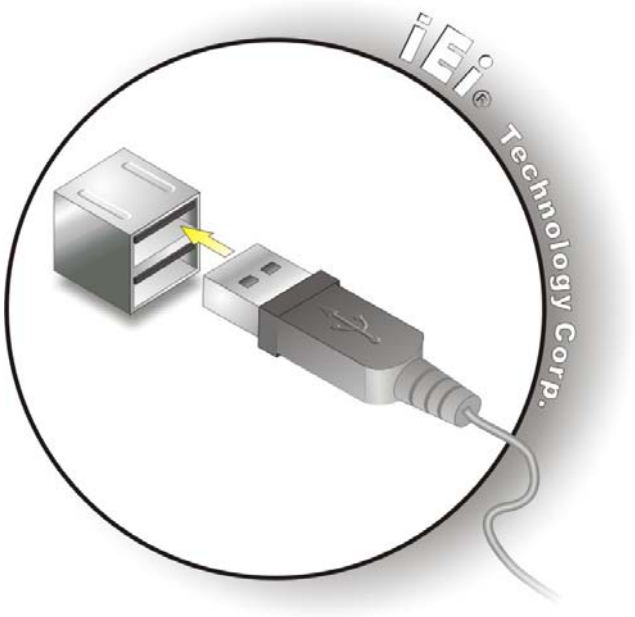


Figure 4-12: USB Connector

4.7.4 HDMI Display Device Connection

The HDMI connector transmits a digital signal to compatible HDMI display devices such as a TV or computer screen. To connect the HDMI cable to the WAFER-OT-Z650/Z670, follow the steps below.

Step 1: **Locate the HDMI connector**. The location is shown in **Chapter 3**.

Step 2: **Align the connector**. Align the HDMI connector with the HDMI port. Make sure the orientation of the connector is correct.

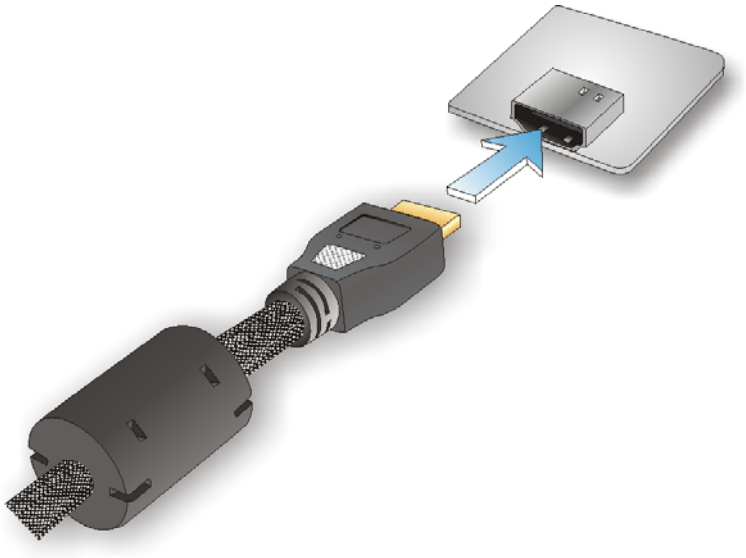


Figure 4-13: HDMI Connection

Step 3: **Insert the HDMI connector**. Gently insert the HDMI connector. The connector should engage with a gentle push. If the connector does not insert easily, check again that the connector is aligned correctly, and that the connector is being inserted with the right way up.

Chapter

5

BIOS

5.1 Introduction

The BIOS is programmed onto the BIOS chip. The BIOS setup program allows changes to certain system settings. This chapter outlines the options that can be changed.

5.1.1 Starting Setup

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

1. Press the **DEL** or **F2** key as soon as the system is turned on or
2. Press the **DEL** or **F2** key when the "**Press DEL or F2 to enter SETUP**" message appears on the screen.

If the message disappears before the **DEL or F2** key is pressed, restart the computer and try again.

5.1.2 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
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
+	Increase the numeric value or make changes
-	Decrease the numeric value or make changes
Page Up key	Increase the numeric value or make changes
Page Dn key	Decrease the numeric value or make changes

Key	Function
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
F1	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2	Previous values
F3	Load optimized defaults
F4	Save changes and Exit BIOS

Table 5-1: BIOS Navigation Keys

5.1.3 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.

5.1.4 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 **4**.

5.1.5 BIOS Menu Bar

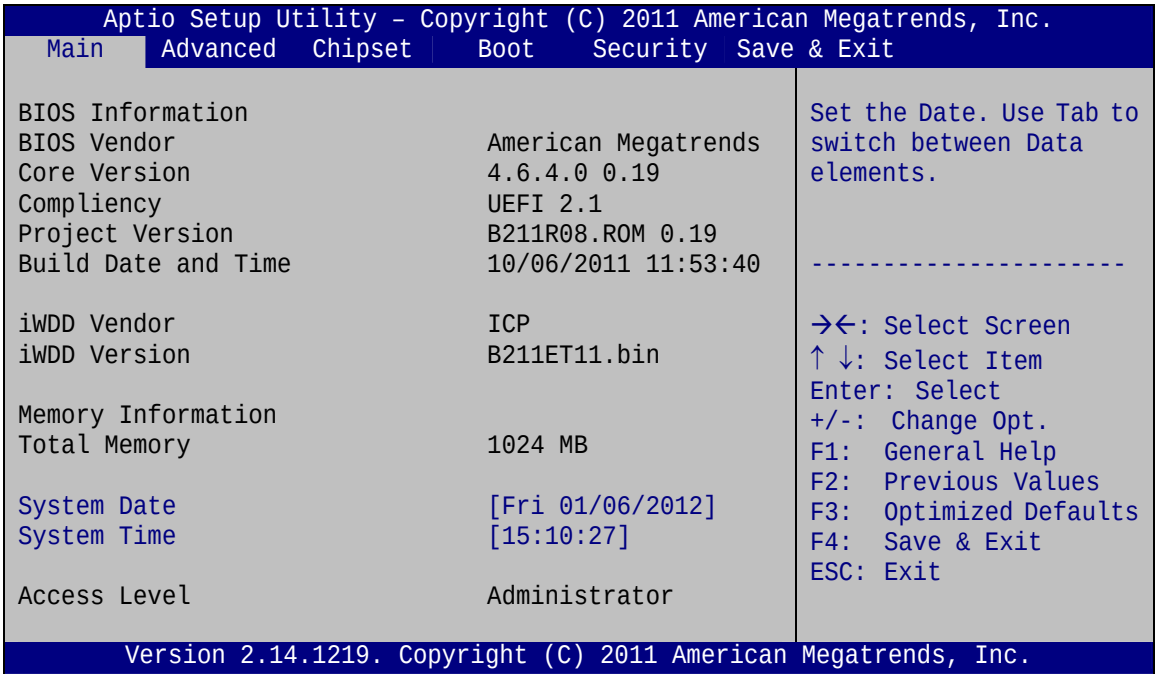
The **menu bar** on top of the BIOS screen has the following main items:

- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Boot – Changes the system boot configuration.
- Security – Sets User and Supervisor Passwords.
- Save & 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.

5.2 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 Menu 1: Main

➔ System Overview

The **BIOS Information** lists a brief summary of the BIOS. The fields in **BIOS Information** cannot be changed. The items shown in the system overview include:

- **BIOS Vendor:** Installed BIOS vendor
- **Core Version:** Current BIOS version
- **Project Version:** the board version
- **Build Date and Time:** Date and time the current BIOS version was made

➔ Memory Information

The **Memory Information** lists a brief summary of the on-board memory. The fields in **Memory Information** cannot be changed.

- Total Memory: Displays the auto-detected system memory size and type.

The System Overview field also has two user configurable fields:

➔ **System Date [xx/xx/xx]**

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

➔ **System Time [xx:xx:xx]**

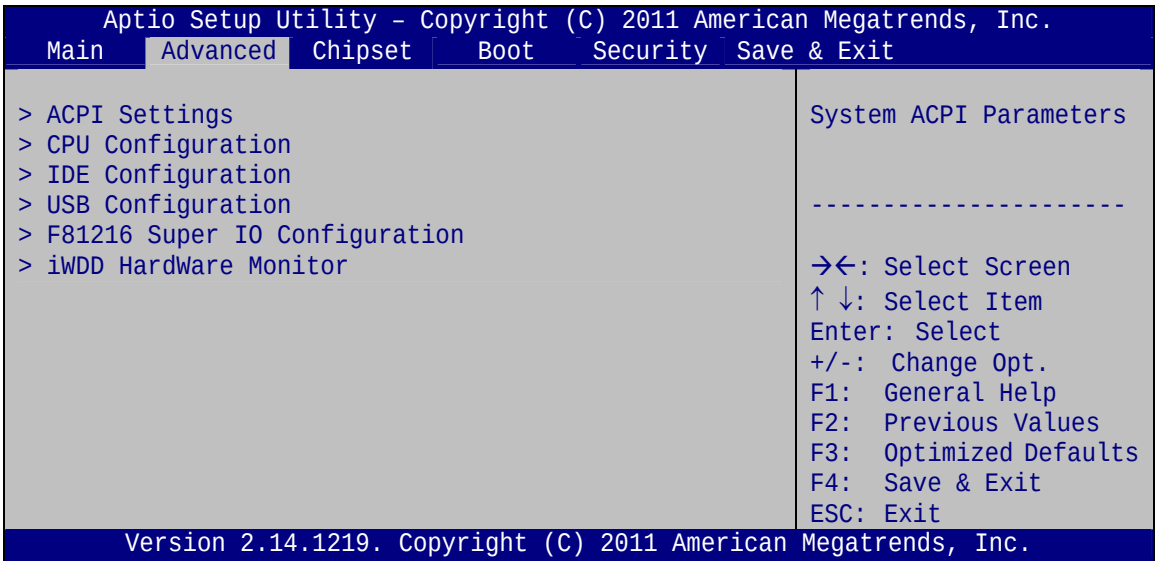
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

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

WARNING:

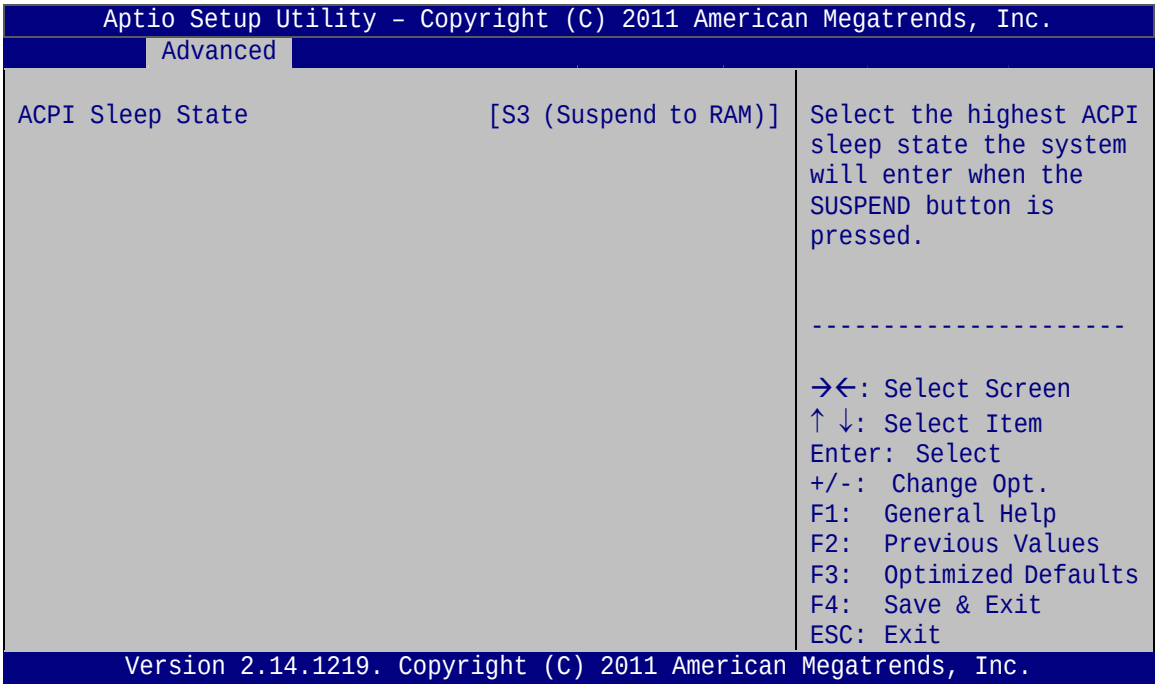
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.



BIOS Menu 2: Advanced

5.3.1 ACPI Settings

The **ACPI Settings** menu (**BIOS Menu 3**) configures the Advanced Configuration and Power Interface (ACPI) options.



BIOS Menu 3: ACPI Configuration

➔ **ACPI Sleep State [S3 (Suspend to RAM)]**

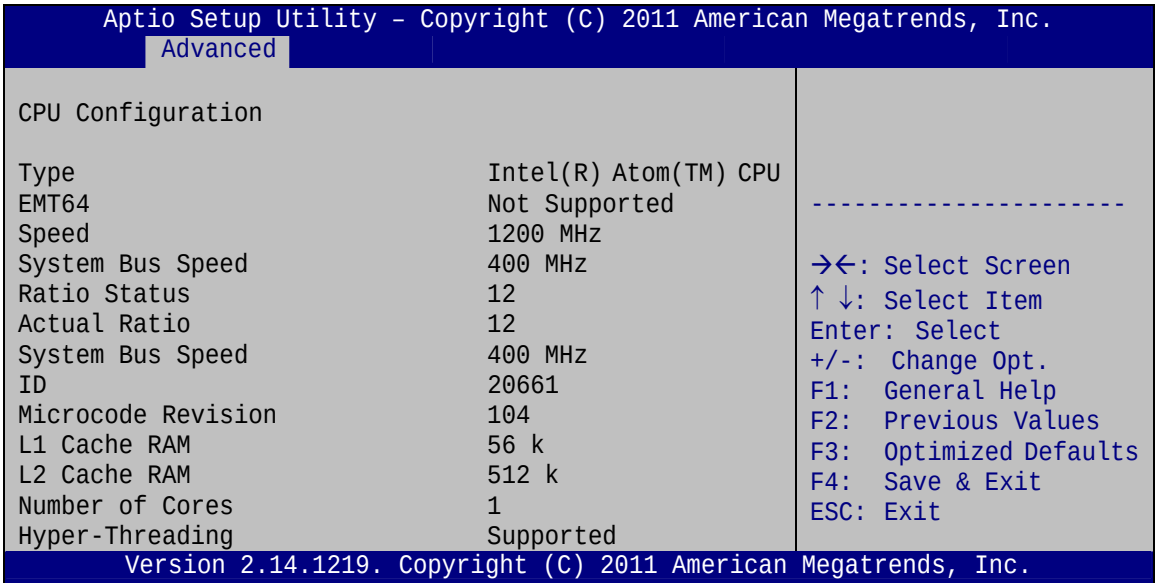
Use the **ACPI Sleep State** option to specify the sleep state the system enters when it is not being used.

➔ **Suspend Disabled**

➔ **S3 (Suspend to RAM)** **DEFAULT** The caches are flushed and the CPU is powered off. Power to the RAM is maintained. The computer returns slower to a working state, but more power is saved.

5.3.2 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 4**) to view detailed CPU specifications and configure the CPU.



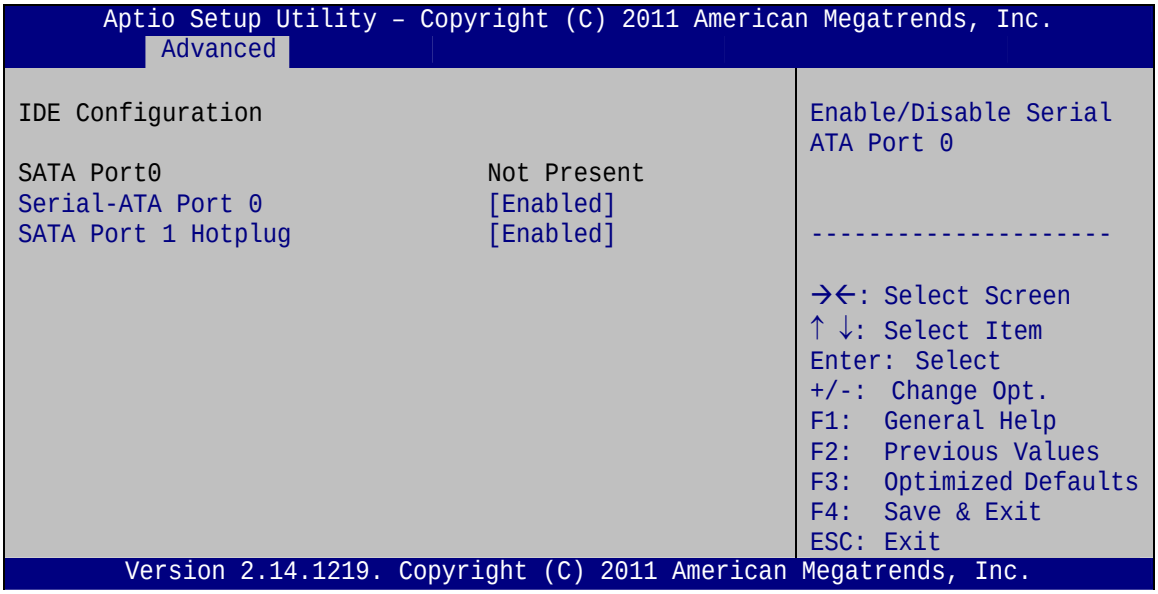
BIOS Menu 4: CPU Configuration

The CPU Configuration menu (**BIOS Menu 4**) lists the following CPU details:

- **Type**: Lists the brand name of the CPU being used.
- **EMT64**: Indicates if EMT64 is supported by the CPU.
- **Speed**: Lists the CPU processing speed.
- **System Bus Speed**: Lists the system bus speed.
- **Ratio Status**: Lists the ratio status.
- **Actual Ratio**: Lists the ratio of the frequency to the clock speed
- **ID**: Lists the CPU ID.
- **Microcode Revision**: Lists the microcode revision.
- **L1 Cache RAM**: Lists the CPU L1 cache size.
- **L2 Cache RAM**: Lists the CPU L2 cache size.
- **Number of Cores**: Lists the number of the processor core
- **Hyper-Threading**: Indicates if Intel HT Technology is supported by the CPU.

5.3.3 IDE Configuration

Use the **IDE Configuration** menu (**BIOS Menu 5**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 5: IDE Configuration

➔ **Serial-ATA Port 0 [Enabled]**

Use the **Serial-ATA Port 0** option to configure the serial ATA port 0.

➔ **Disabled**		Disables the serial ATA port 0.
➔ **Enabled**	**DEFAULT**	Enables the serial ATA port 0.

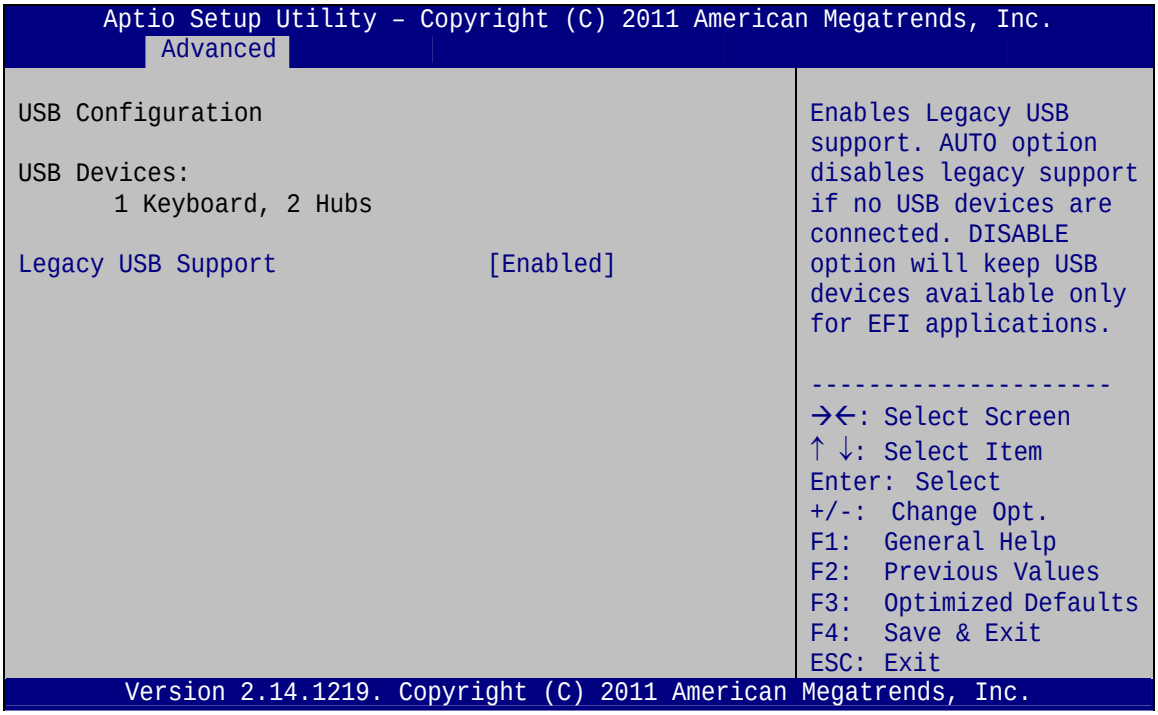
➔ **SATA Port 1 Hotplug [Enabled]**

Use the **SATA Port 1 Hotplug** option to configure the hotplug function for the serial ATA port 1.

➔ **Disabled**		Disables the hotplug function for the serial ATA port 1.
➔ **Enabled**	**DEFAULT**	Enables the hotplug function for the serial ATA port 1. This function is applicable only if both ports are populated.

5.3.4 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 6**) to read USB configuration information and configure the USB settings.



BIOS Menu 6: USB Configuration

➔ **Legacy USB Support [Enabled]**

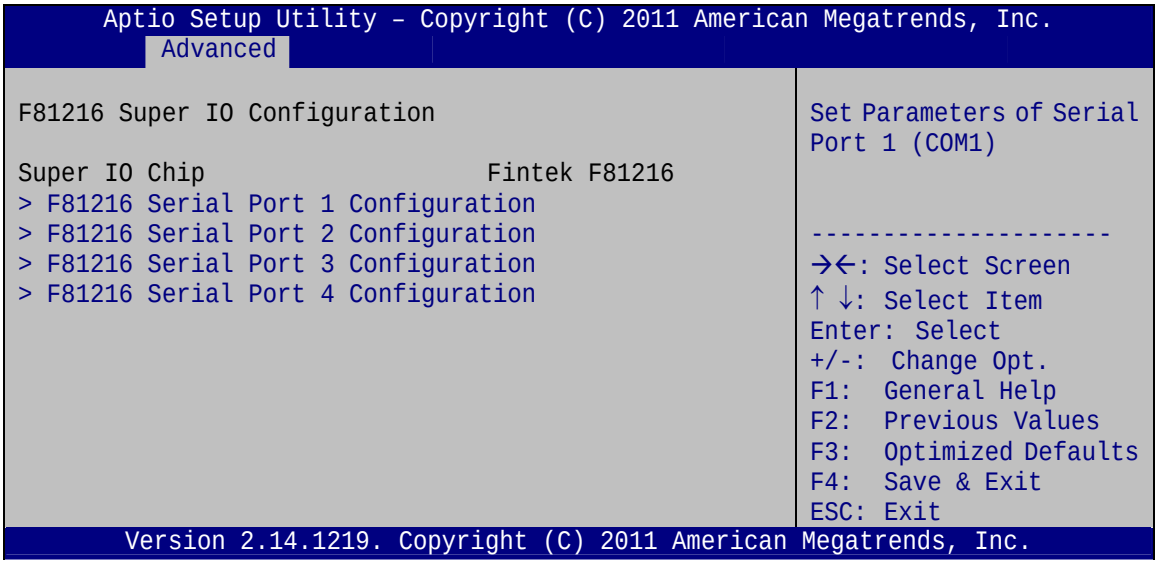
Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support.

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

5.3.5 F81216 Super IO Configuration

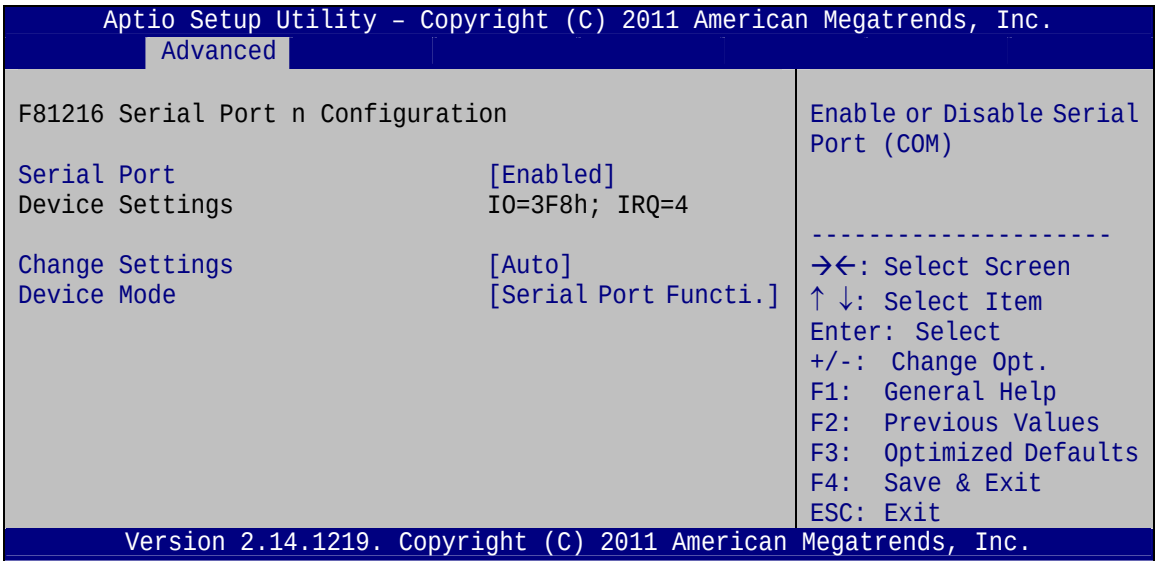
Use the **F81216 Super IO Configuration** menu (**BIOS Menu 7**) to set or change the configurations for the serial ports.



BIOS Menu 7: Super IO Configuration

5.3.5.1 Serial Port n Configuration

Use the **Serial Port n Configuration** menu (**BIOS Menu 8**) to configure the serial port n.



BIOS Menu 8: Serial Port n Configuration Menu

5.3.5.1.1 Serial Port 1 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=3F8h; IRQ=4**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ4
➔ **IO=3F8h; IRQ=3, 4**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4
➔ **IO=2F8h; IRQ=3, 4**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4
➔ **IO=3E8h; IRQ=10, 11**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ10, 11
➔ **IO=2E8h; IRQ=10, 11**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10, 11

➔ **Device Mode [Serial Port Function Mode]**

Use the **Device Mode** option to configure the serial port mode.

- Serial Port Function Mode **DEFAULT**
- IR Mode, Pusle 1.6us, Full Duplex
- IR Mode, Pusle 1.6us, Half Duplex
- IR Mode, Pusle 3/16 Bit Time, Full Duplex
- IR Mode, Pusle 3/16 Bit Time, Half Duplex

5.3.5.1.2 F81216 Serial Port 2 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=2F8h; IRQ=3**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3
➔ **IO=3F8h; IRQ=3, 4**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4
➔ **IO=2F8h; IRQ=3, 4**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4
➔ **IO=3E8h; IRQ=10, 11**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ10, 11
➔ **IO=2E8h; IRQ=10, 11**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10, 11

5.3.5.1.3 F81216 Serial Port 3 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=3E8h; IRQ=11**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ11
➔ **IO=3E8h; IRQ=10, 11**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ10, 11
➔ **IO=2E8h; IRQ=10, 11**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10, 11
➔ **IO=2D0h; IRQ=10, 11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ10, 11
➔ **IO=2D8h; IRQ=10, 11**		Serial Port I/O port address is 2D8h and the interrupt address is IRQ10, 11
➔ **IO=2D0h; IRQ=10, 11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ10, 11

5.3.5.1.4 F81216 Serial Port 4 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**		Disable the serial port
➔ **Enabled**	**DEFAULT**	Enable the serial port

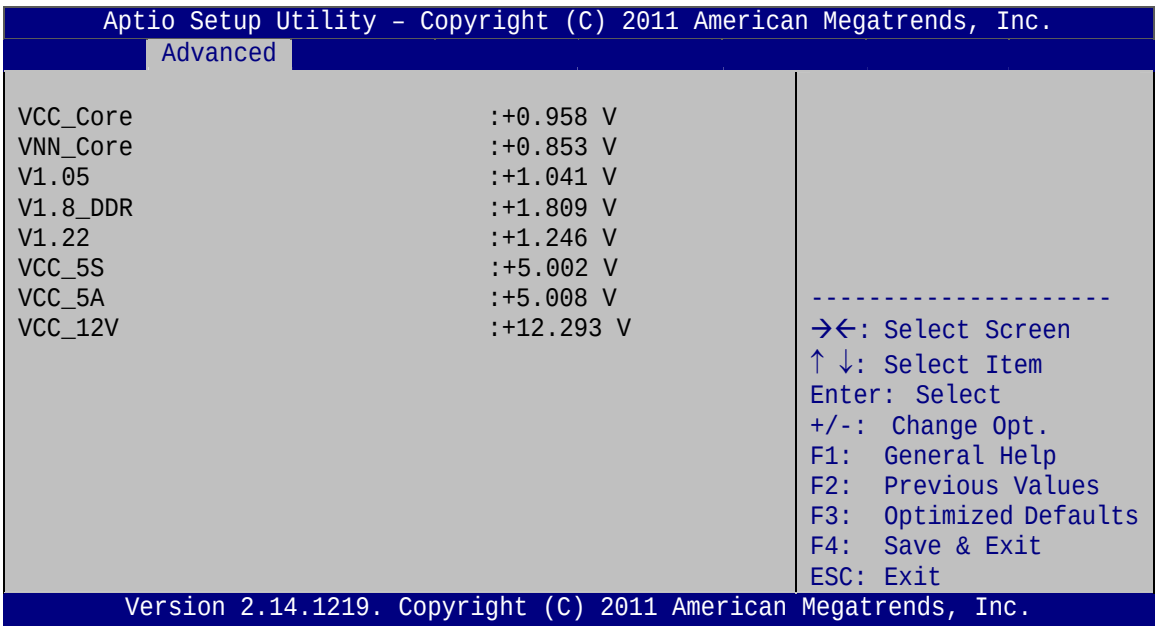
➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=2E8h; IRQ=10**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10
➔ **IO=3E8h; IRQ=10, 11**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ10, 11
➔ **IO=2E8h; IRQ=10, 11**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10, 11
➔ **IO=2E0h; IRQ=10, 11**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ10, 11
➔ **IO=2D8h; IRQ=10, 11**		Serial Port I/O port address is 2D8h and the interrupt address is IRQ10, 11
➔ **IO=2D0h; IRQ=10, 11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ10, 11

5.3.6 iWDD Hardware Monitor

The **iWDD Hardware Monitor** menu (**BIOS Menu 9**) shows the system voltages.



BIOS Menu 9: iWDD Hardware Monitor

The following system voltages are monitored

- VCC_Core
- VNN_Core
- V1.05
- V1.8_DDR
- V1.22
- VCC_5S
- VCC_5A
- VCC_12V

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 10**) to access the Northbridge and Southbridge configuration menus.

WARNING!

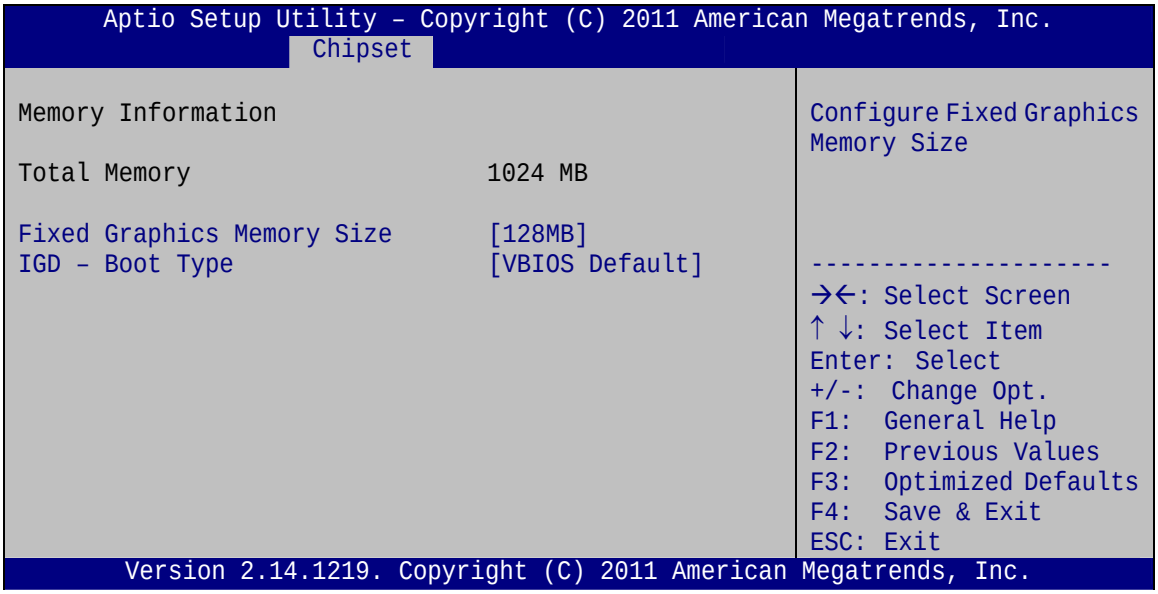
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

```
      Aptio Setup Utility – Copyright (C) 2011 American Megatrends, Inc.
  Main    Advanced  Chipset    Boot    Security  Save & Exit

> North Bridge                                  North Bridge Parameters
> South Bridge


                                                ---------------------
                                                →←: Select Screen
                                                ↑ ↓: Select Item
                                                Enter:  Select
                                                +/-:  Change Opt.
                                                F1:   General Help
                                                F2:   Previous Values
                                                F3:   Optimized Defaults
                                                F4:   Save & Exit
                                                ESC:  Exit
        Version 2.14.1219. Copyright (C) 2011 American Megatrends, Inc.
```

BIOS Menu 10: Chipset

5.4.1 North Bridge Configuration

Use the **North Bridge Configuration** menu (**BIOS Menu 11**) to configure the Northbridge chipset.



BIOS Menu 11:Northbridge Chipset Configuration

➔ **Fixed Graphics Memory Size [128MB]**

Use the **Fixed Graphics Memory Size** option to specify the maximum amount of memory that can be allocated as graphics memory. Configuration options are listed below.

- 128MB **DEFAULT**
- 256MB

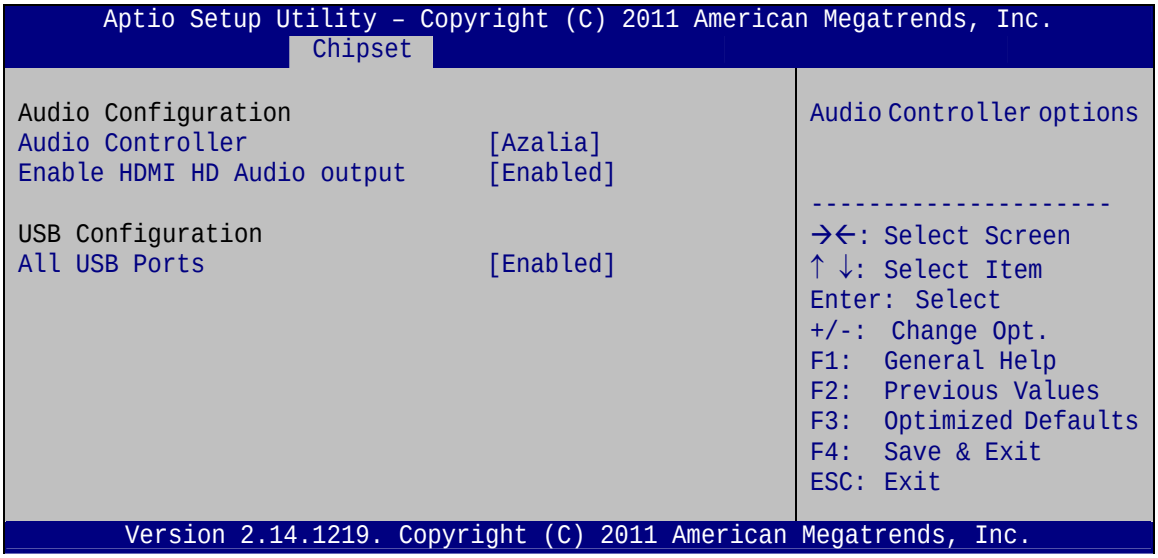
➔ **IGD - Boot Type [VBIOS Default]**

Use the **IGD - Boot Type** option to select the display device used by the system when it boots. Configuration options are listed below.

- VBIOS Default **DEFAULT**
- HDMI
- LVDS

5.4.2 South Bridge Configuration

Use the **South Bridge Configuration** menu (**BIOS Menu 12**) to configure the Southbridge chipset.



BIOS Menu 12: Southbridge Chipset Configuration

➔ **Audio Controller [Azalia]**

Use the **Audio Controller** option to enable or disable the High Definition Audio controller.

- ➔ **Disabled** The on-board High Definition Audio controller is disabled
- ➔ **Azalia** **DEFAULT** The on-board High Definition Audio controller is detected automatically and enabled

➔ **Enable HDMI HD Audio output [Enabled]**

Use the **Enable HDMI HD Audio output** option to enable or disable the internal HDMI codec for High Definition Audio.

- ➔ **Disabled** Disables the internal HDMI codec for High Definition Audio
- ➔ **Enabled** **DEFAULT** Enables the internal HDMI codec for High Definition Audio

➔ **All USB Ports [Enabled]**

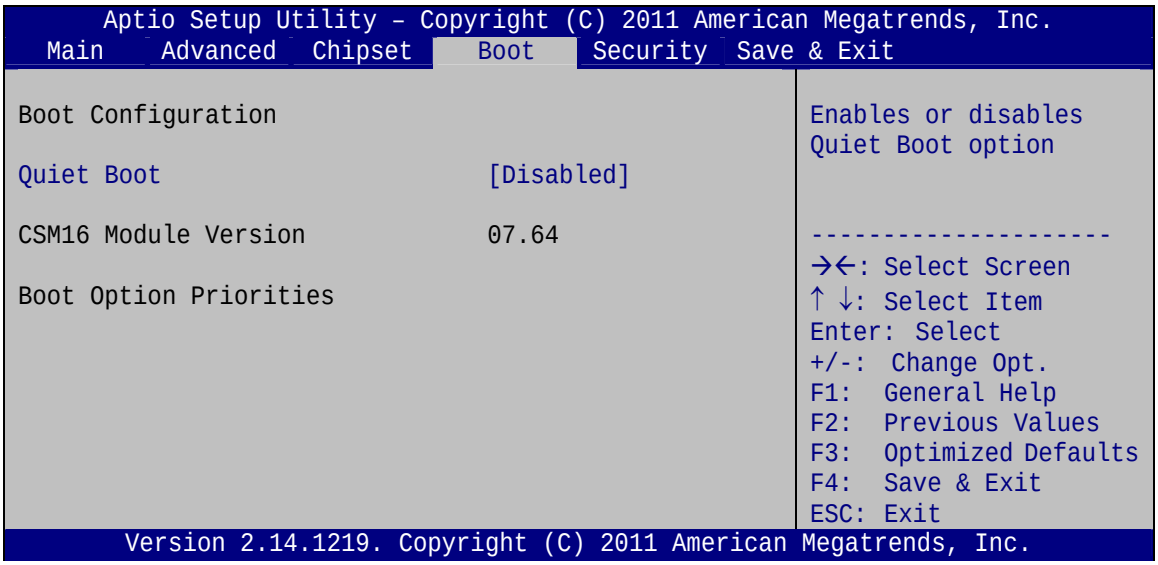
Use the **All USB Ports** option to enable or disable all the USB ports on the system.

➔ **Disabled** USB ports disabled

➔ **Enabled** **DEFAULT** USB ports enabled

5.5 Boot

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



BIOS Menu 13: Boot

➔ **Quiet Boot [Disabled]**

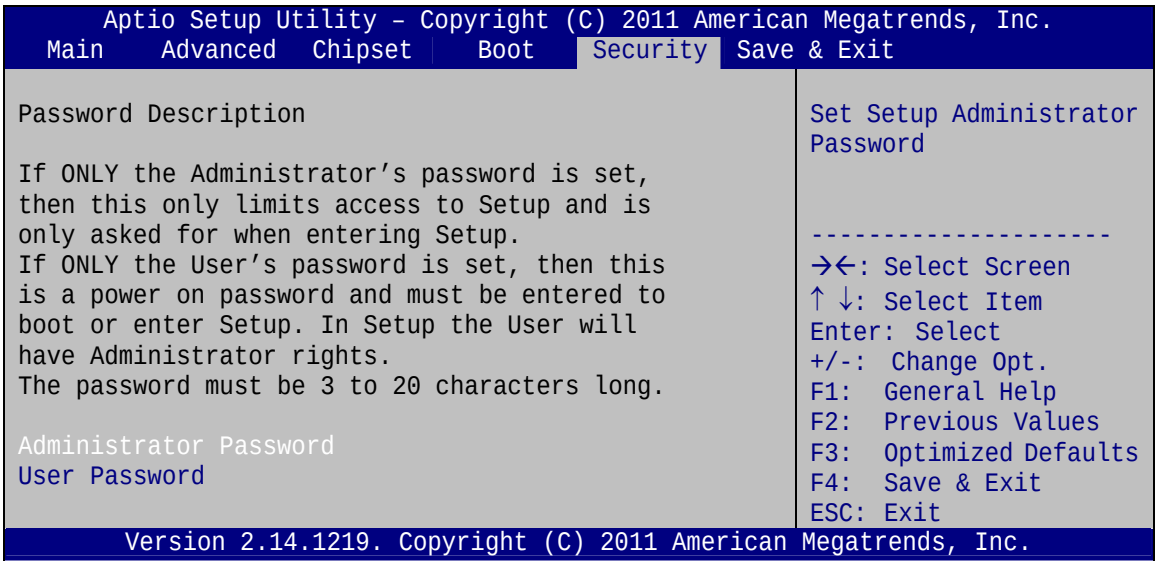
Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

➔ **Disabled** **DEFAULT** Normal POST messages displayed

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

5.6 Security

Use the **Security** menu (**BIOS Menu 14**) to set system and user passwords.



BIOS Menu 14: Security

➔ **Administrator Password**

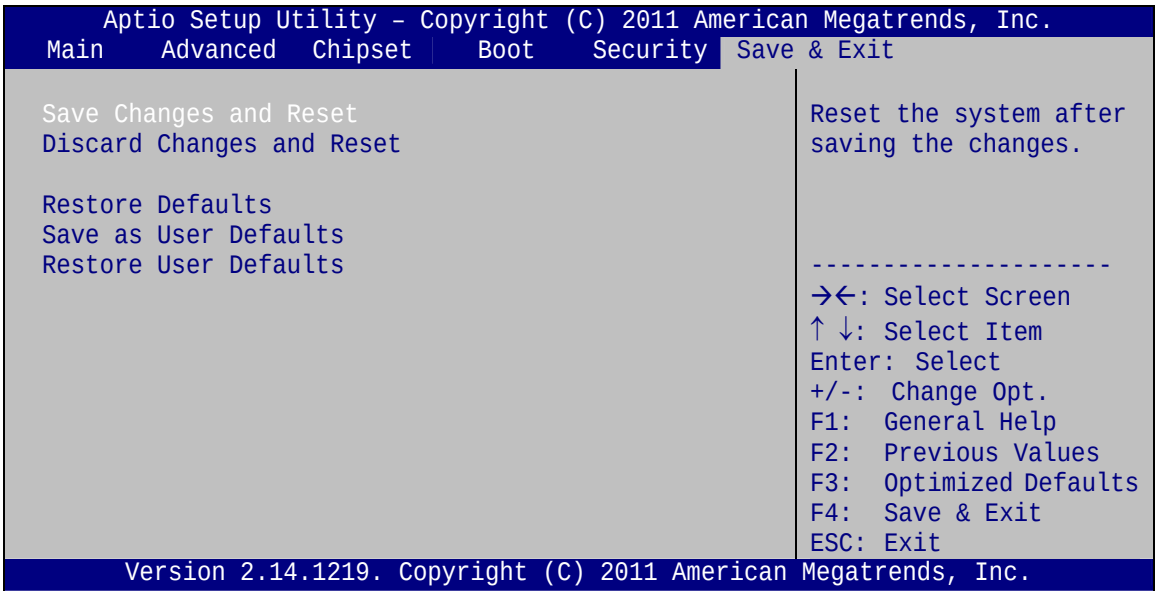
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

Use the **User Password** to set or change a user password.

5.7 Exit

Use the **Exit** menu (**BIOS Menu 15**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 15:Exit

➔ **Save Changes and Reset**

Use the **Save Changes and Reset** option to save the changes made to the BIOS options and reset the system.

➔ **Discard Changes and Reset**

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

➔ **Restore Defaults**

Use the **Restore Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F3 key can be used for this operation.**

➔ **Save as User Defaults**

Use the **Save as User Defaults** option to save the changes done so far as user defaults.

➔ **Restore User Defaults**

Use the **Restore User Defaults** option to restore the user defaults to all the setup options.

Chapter

6

Software Drivers

6.1 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
- VGA
- LAN
- Audio

Installation instructions are given below.

6.2 Starting the Driver Program

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

Step 1: Insert the CD that came with the system into a CD drive connected to the system.

NOTE:

If the installation program doesn't start automatically:
Click "Start->Computer->CD Drive->autorun.exe"

Step 2: The driver main menu appears. Click WAFER-OT-Z650/Z670.

Step 3: The list of drivers appears.

6.3 Chipset Driver Installation

To install the chipset driver, please do the following.

Step 1: Access the driver list. (See **Section 6.2**)

Step 2: Click "**1-Chipset**"

Step 3: The setup files are extracted as shown in **Figure 6-1**.

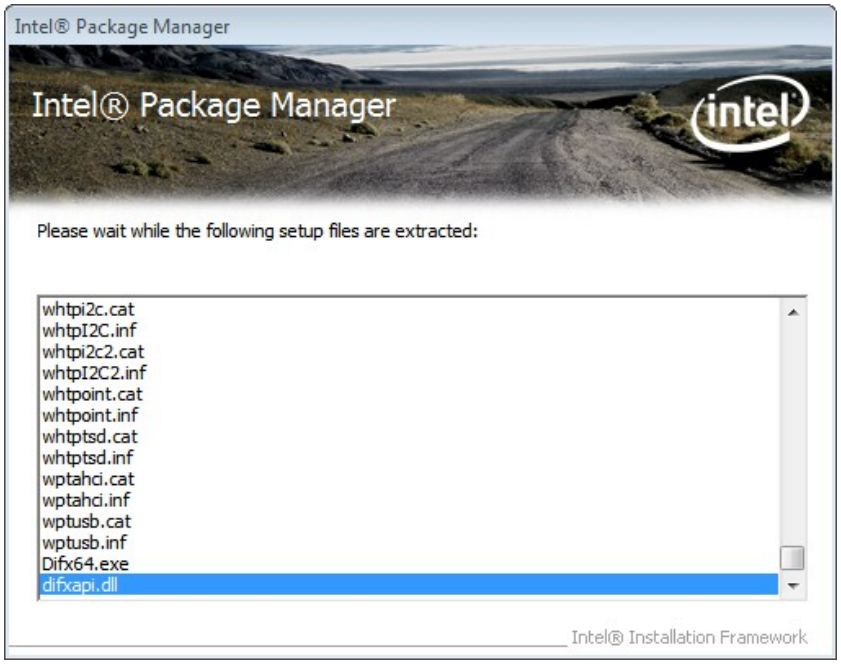


Figure 6-1: Chipset Driver Screen

Step 4: When the setup files are completely extracted, the **Welcome Screen** in **Figure 6-2** appears.

Figure 6-2: Chipset Driver Welcome Screen

Step 5: Click **Next** to continue.

Step 6: The license agreement in **Figure 6-3** appears.

Step 7: Read the **License Agreement**.

Step 8: Click **Yes** to continue.

Figure 6-3: Chipset Driver License Agreement

Step 9: The Read Me file in **Figure 6-4** appears.

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

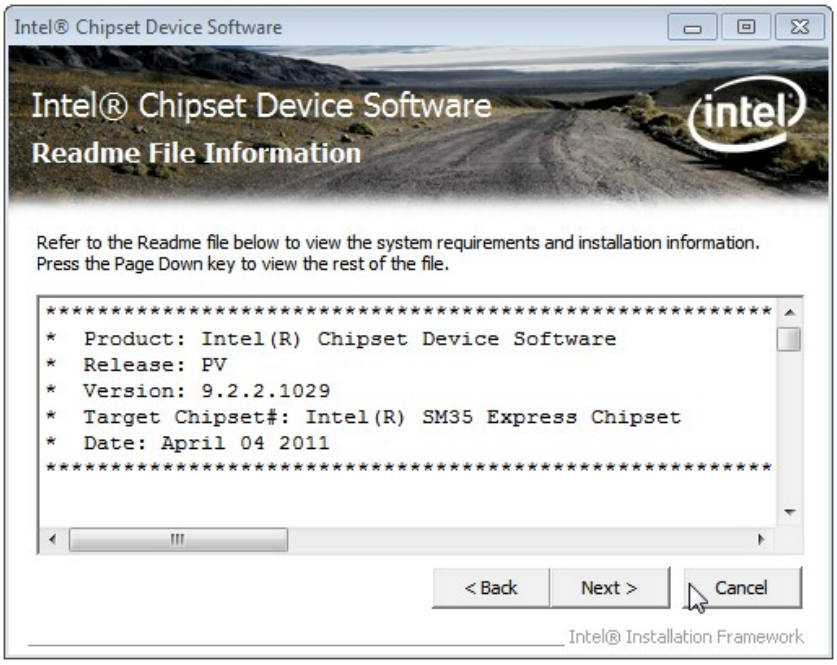


Figure 6-4: Chipset Driver Read Me File

Step 11: **Setup Operations** are performed as shown in **Figure 6-5**.

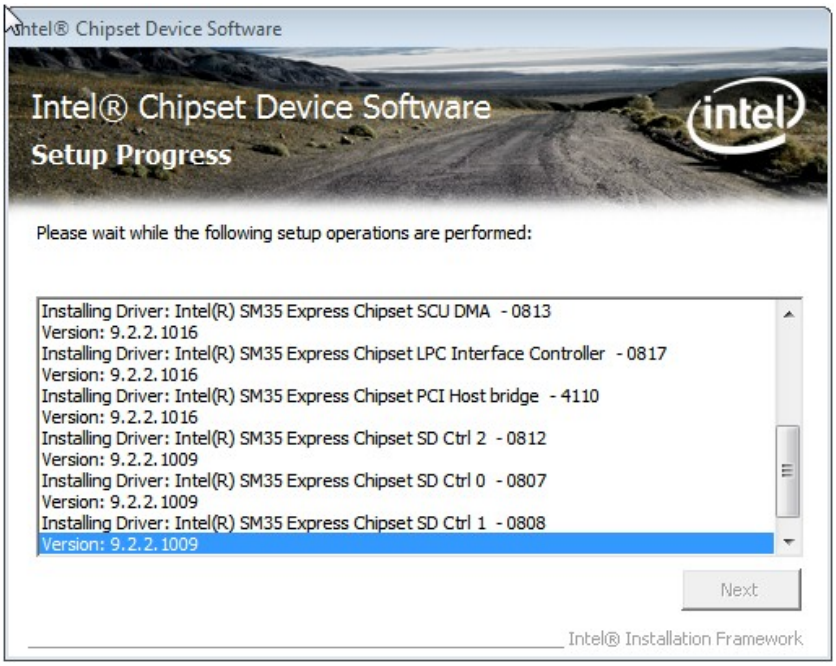


Figure 6-5: Chipset Driver Setup Operations

Step 12: Once the **Setup Operations** are complete, click **Next** to continue.

Step 13: The **Finish** screen appears.

Step 14: Select "**Yes, I want to restart the computer now**" and click the **Finish** icon.

See **Figure 6-6**.

Figure 6-6: Chipset Driver Installation Finish Screen

6.4 VGA Driver Installation

To install the VGA driver, please do the following.

Step 1: Access the driver list. (See **Section 6.2**)

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

Step 3: The **Welcome Screen** in **Figure 6-7** appears.

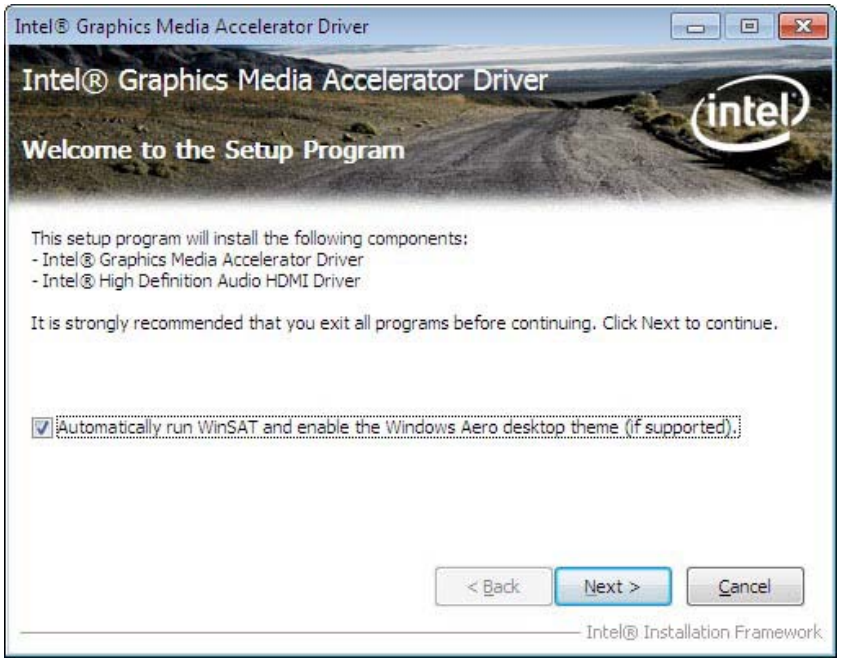


Figure 6-7: VGA Driver Welcome Screen

Step 4: Click **Next** to continue.

Step 5: The license agreement in **Figure 6-8** appears.

Step 6: Read the **License Agreement**.

Step 7: Click the **Yes** icon to continue.

Figure 6-8: VGA Driver License Agreement

Step 8: The Read Me file in **Figure 6-9** appears.

Step 9: Click **Next** to continue.

Figure 6-9: VGA Driver Read Me File

Step 10: **Setup Operations** are performed as shown in **Figure 6-10**.

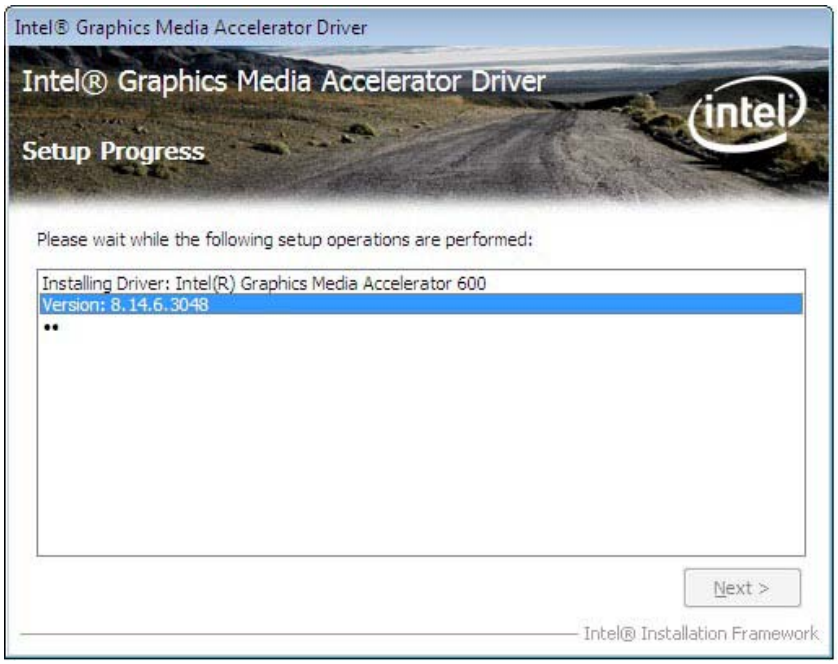


Figure 6-10: VGA Driver Setup Operations

Step 11: Once the **Setup Operations** are complete, click the **Next** icon to continue.

Step 12: The **Finish** screen appears.

Step 13: Select "**Yes, I want to restart the computer now**" and click the **Finish** icon.

See **Figure 6-11**.

Figure 6-11: VGA Driver Installation Finish Screen

6.5 LAN Driver Installation

To install the LAN driver, please do the following.

Step 1: Open Windows Control Panel from the Start menu (**Figure 6-12**).

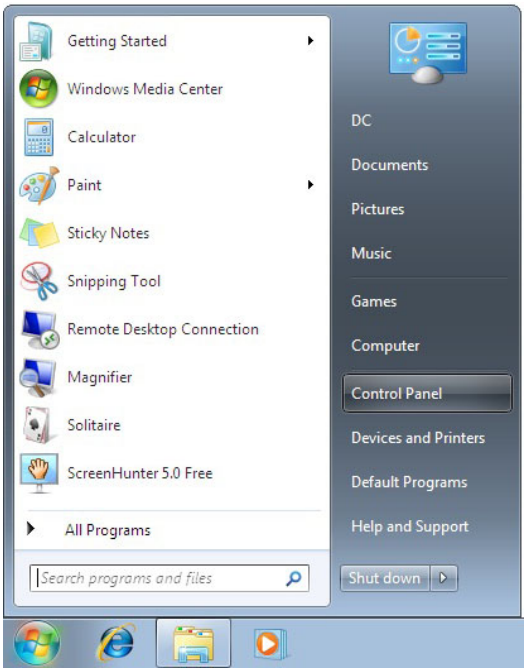


Figure 6-12: Access Windows Control Panel

Step 2: Double-click the **System** icon (**Figure 6-13**).

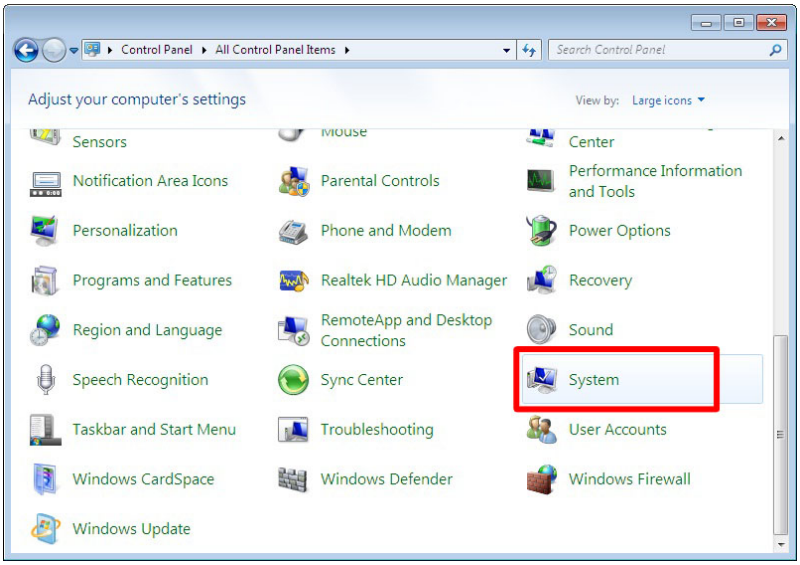


Figure 6-13: Double Click the System Icon

Step 3: Click the **Device Manager** tab (**Figure 6-14**).

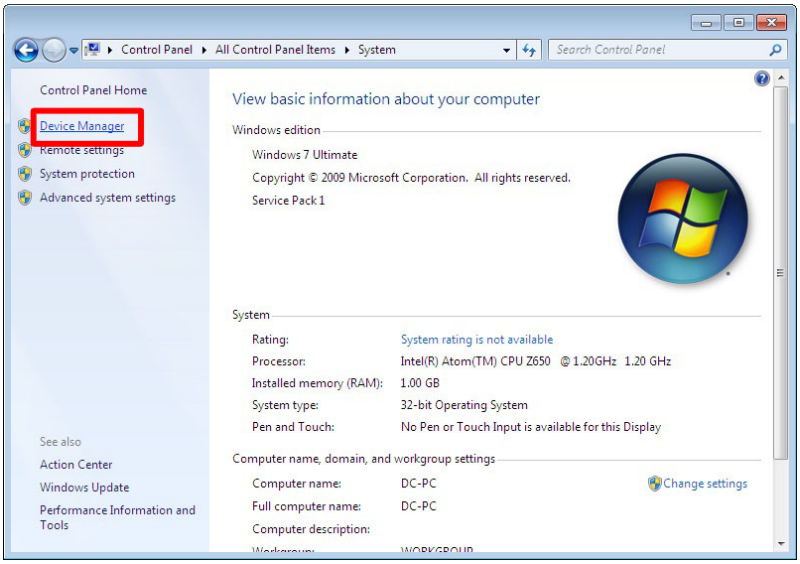


Figure 6-14: Click the Device Manager Tab

Step 4: A list of system hardware devices appears (**Figure 6-15**).

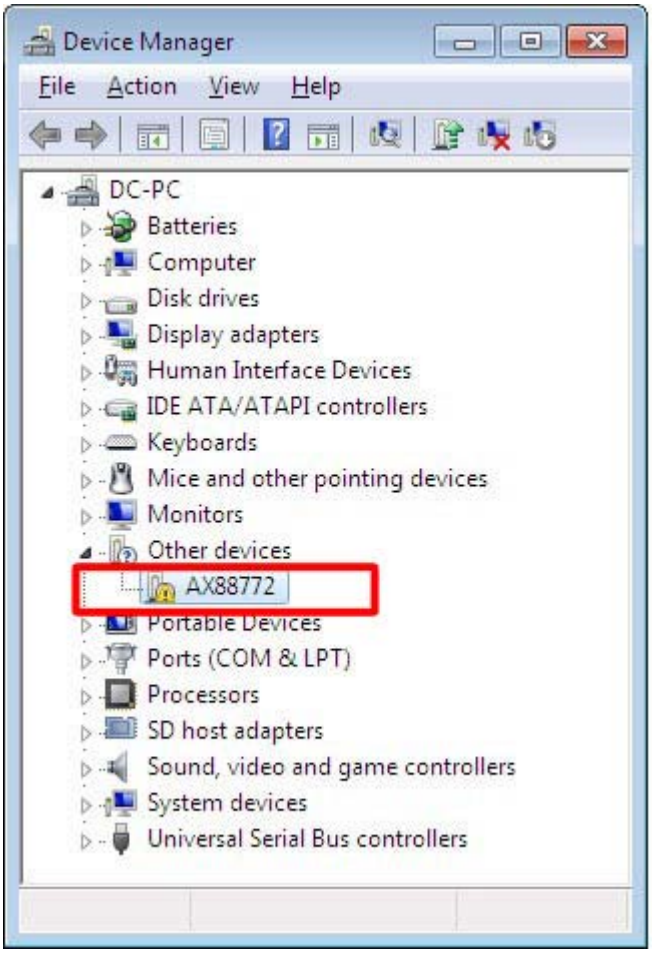


Figure 6-15: Device Manager List

Step 5: Double-click the **AX88772** device.

Step 6: The **AX88772 Properties** window appears (**Figure 6-16**).

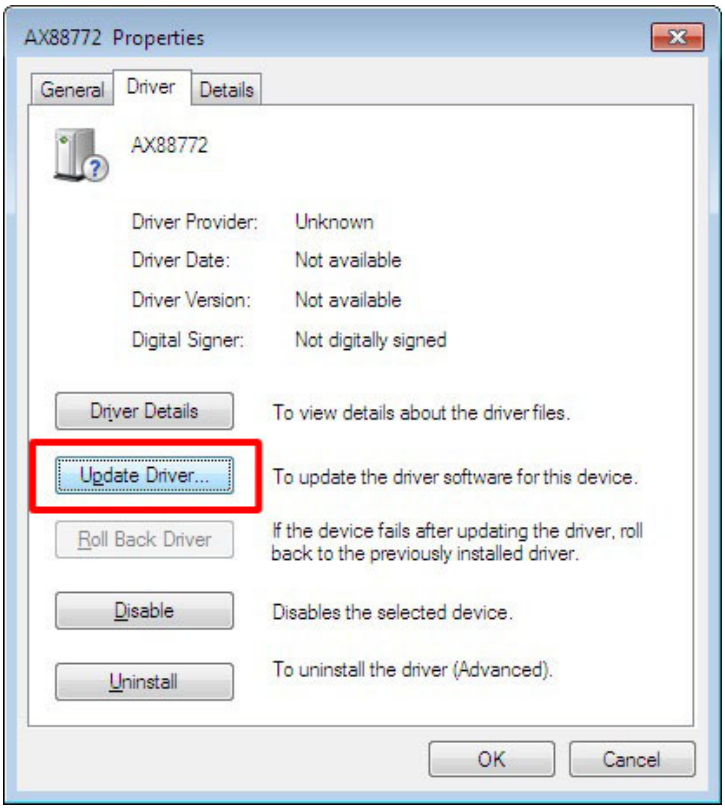


Figure 6-16: AX88772 Properties Window

Step 7: Click the **Update Driver** button in the **Driver** tab.

Step 8: The following window (**Figure 6-17**) appears.

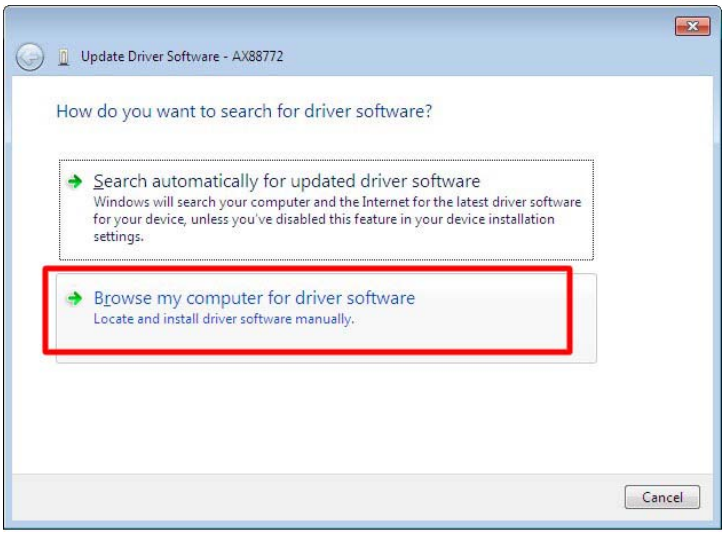


Figure 6-17: Search Options Window

Step 9: Click "**Browse my computer for driver software**".

Step 10: The following window (**Figure 6-18**) appears.

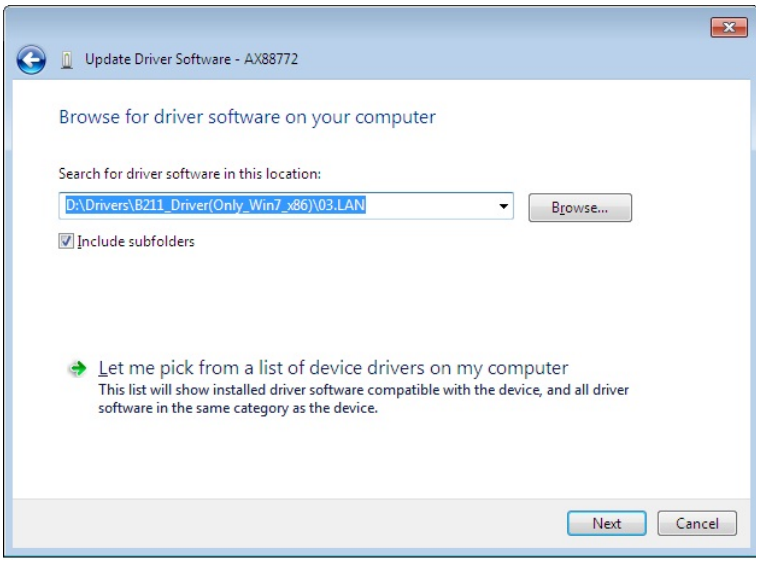


Figure 6-18: Driver Selection Window

Step 11: Select "**Include subfolders**," and click **Browse** to continue.

Step 12: The following window (**Figure 6-19**) appears.

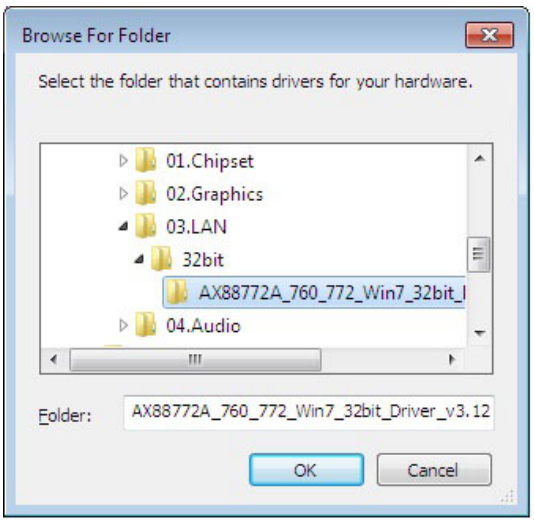


Figure 6-19: Folder Selection Window

Step 13: Select the proper driver folder under the "**X:\03.LAN**" directory in the folder selection window, where "**X:\"** is the system CD drive, and click **OK** to continue.

Step 14: The following window (**Figure 6-20**) appears.

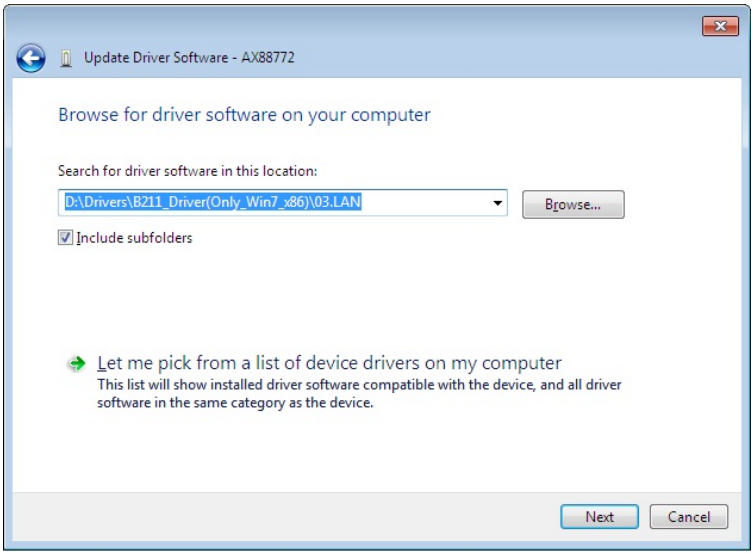


Figure 6-20: Driver Location Window

Step 15: Click **Next** to continue.

Step 16: The following window (**Figure 6-21**) appears as the driver is installed.

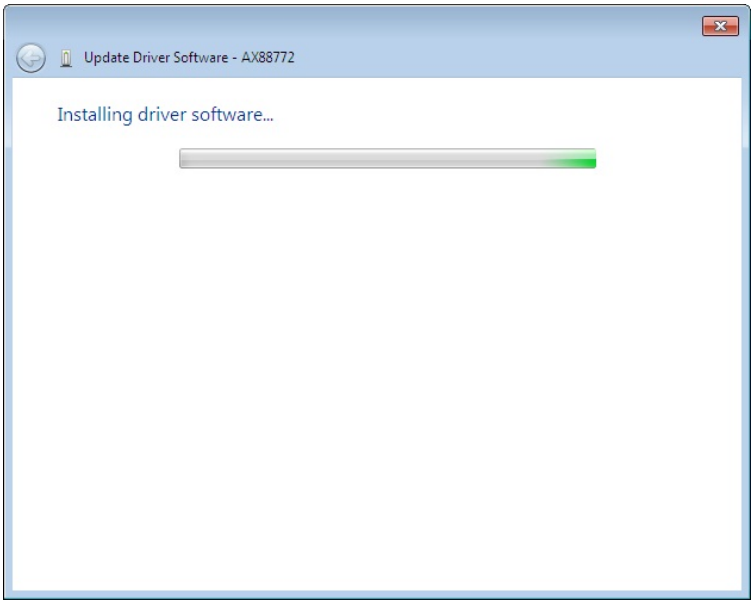


Figure 6-21: Driver Installation Window

Step 17: After the driver installation process is complete, a confirmation screen appears (**Figure 6-22**).

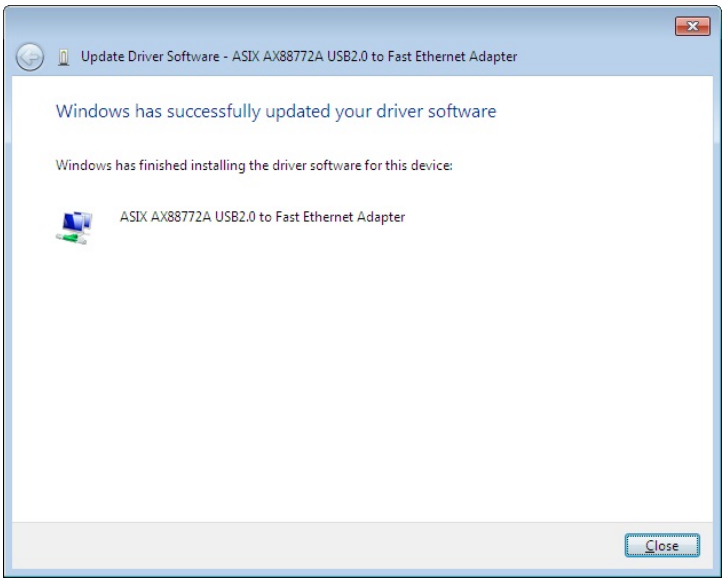


Figure 6-22: Driver Installation Complete Window

Step 18: Click **Close** to exit the program.

Step 19: The **Device Manager Window** now shows the installed LAN driver (**Figure 6-23**).

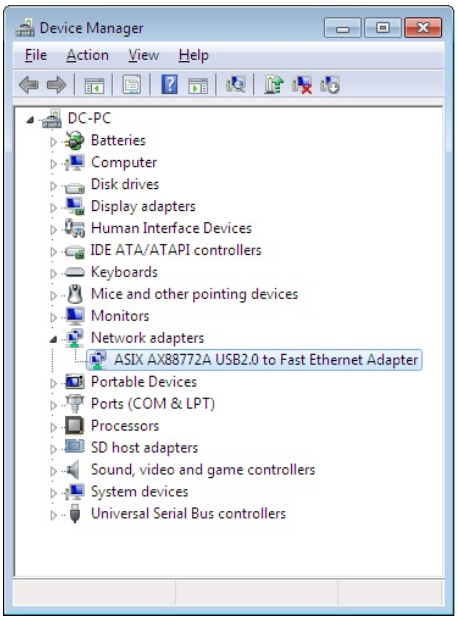


Figure 6-23: Device Manager Window

6.6 Audio Driver Installation

To install the Audio driver, please do the following.

Step 1: Access the driver list. (See **Section 6.2**)

Step 2: Click "**4-Audio**".

Step 3: The installation files are extracted as shown in **Figure 6-24**.

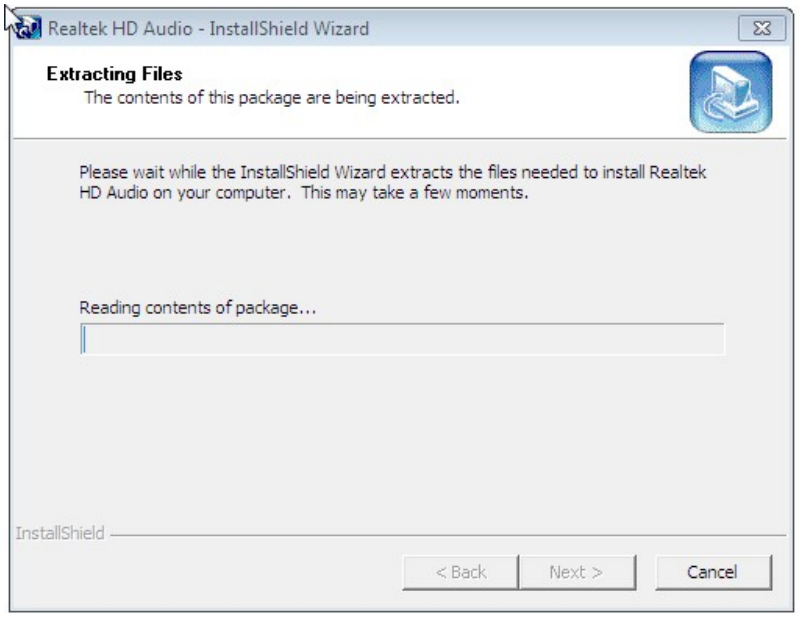


Figure 6-24: Audio Driver Installation File Extraction

Step 4: The **Welcome** screen in **Figure 6-25** appears.

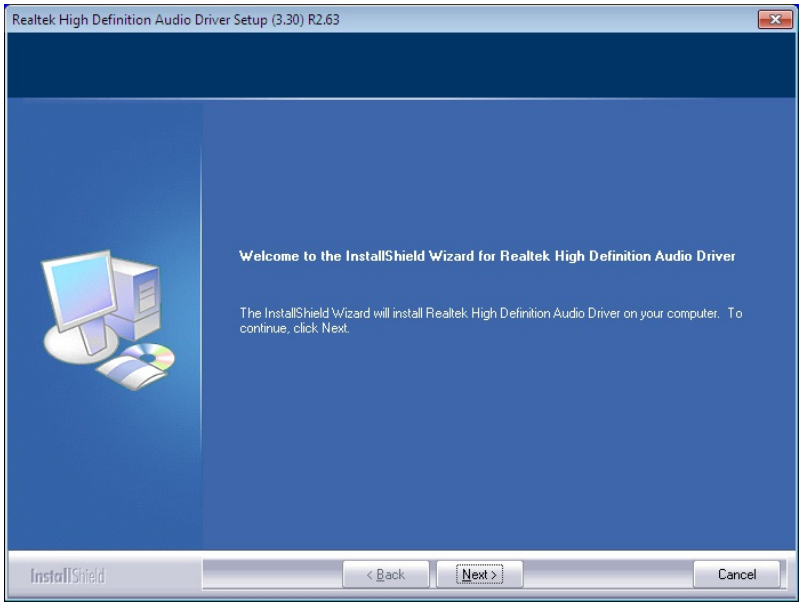


Figure 6-25: Audio Driver Welcome Screen

Step 5: Click **Next** to continue.

Step 6: The program begins to install.

Step 7: The installation progress can be monitored in the progress bar shown in **Figure 6-26**.

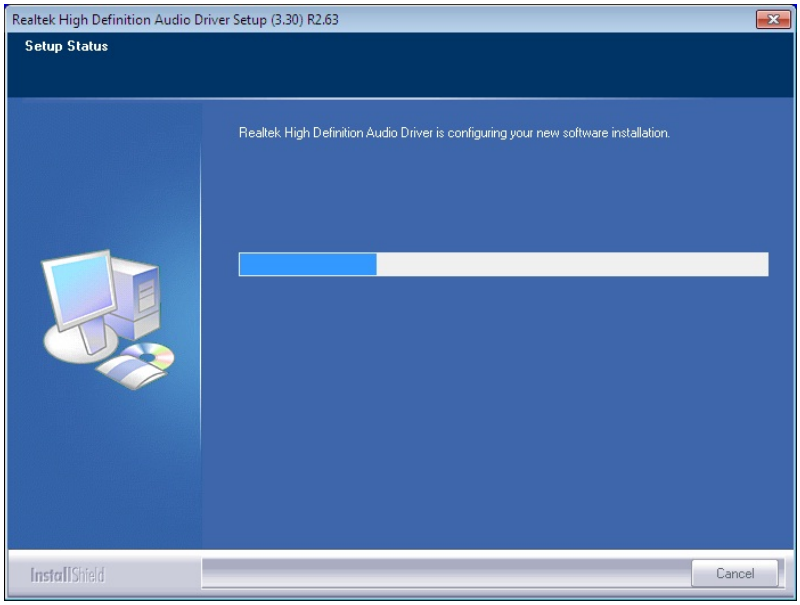


Figure 6-26: Audio Driver Installation

Step 8: When the driver installation is complete, the screen in **Figure 6-27** appears.

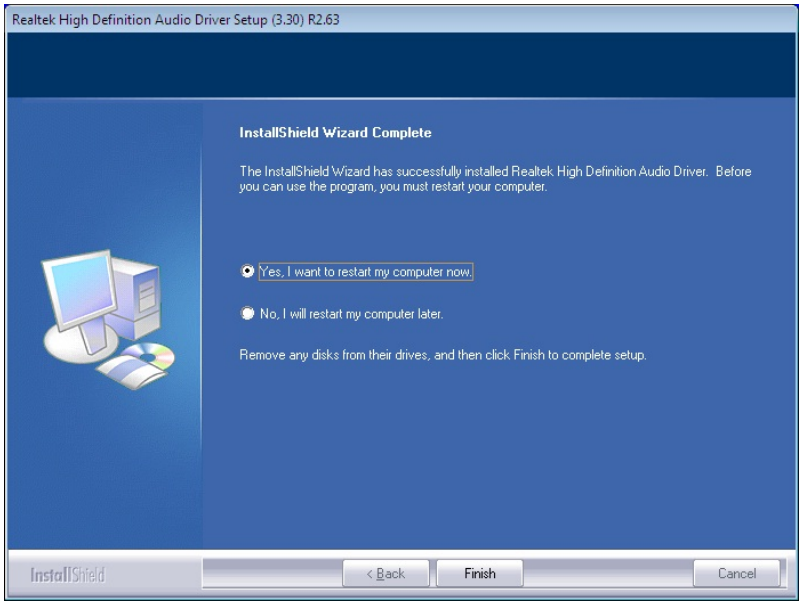


Figure 6-27: Audio Driver Installation Complete

Step 9: Select "**Yes, I want to restart my computer now**" and click **Finish**.

Step 10: The system reboots.

Appendix

A

BIOS Options

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

System Overview 52
Memory Information 52
System Date [xx/xx/xx] 53
System Time [xx:xx:xx] 53
ACPI Sleep State [S3 (Suspend to RAM)] 54
Serial-ATA Port 0 [Enabled] 56
SATA Port 1 Hotplug [Enabled] 56
Legacy USB Support [Enabled] 57
Serial Port [Enabled] 59
Change Settings [Auto] 59
Device Mode [Serial Port Function Mode] 59
Serial Port [Enabled] 60
Change Settings [Auto] 60
Serial Port [Enabled] 60
Change Settings [Auto] 61
Serial Port [Enabled] 61
Change Settings [Auto] 61
Fixed Graphics Memory Size [128MB] 64
IGD - Boot Type [VBIOS Default] 64
Audio Controller [Azalia] 65
Enable HDMI HD Audio output [Enabled] 65
All USB Ports [Enabled] 66
Quiet Boot [Disabled] 66
Administrator Password 67
User Password 67
Save Changes and Reset 68
Discard Changes and Reset 68
Restore Defaults 68
Save as User Defaults 68
Restore User Defaults 68

Appendix

B

One Key Recovery

B.1 One Key Recovery Introduction

The IEI one key recovery is an easy-to-use front end for the Norton Ghost system backup and recovery tool. This tool provides quick and easy shortcuts for creating a backup and reverting to that backup or reverting to the factory default settings.

NOTE:

The latest One Key Recovery software provides an auto recovery function that allows a system running Microsoft Windows OS to automatically restore from the factory default image after encountering a Blue Screen of Death (BSoD) or a hang for around 10 minutes. Please refer to Section B.3 for the detailed setup procedure.

The IEI One Key Recovery tool menu is shown below.

Figure B-1: IEI One Key Recovery Tool Menu

Prior to using the IEI One Key Recovery tool (as shown in **Figure B-1**) to backup or restore Windows system, five setup procedures are required.

1. Hardware and BIOS setup (see Section **B.2.1**)
2. Create partitions (see **Section B.2.2**)
3. Install operating system, drivers and system applications (see **Section B.2.3**)
4. Build-up recovery partition (see **Section B.2.4**)
5. Create factory default image (see **Section B.2.5**)

After completing the five initial setup procedures as described above, users can access the recovery tool by pressing <**F3**> while booting up the system. The detailed information of each function is described in **Section B.5**.

NOTE:

The initial setup procedures for Linux system are described in **Section B.3**.

B.1.1 System Requirement

NOTE:

The recovery CD can only be used with IEI products. The software will fail to run and a warning message will appear when used on non-IEI hardware.

To create the system backup, the main storage device must be split into two partitions (three partitions for Linux). The first partition will be for the operating system, while the second partition will be invisible to the operating system and contain the backup made by the one key recovery software.

The partition created for recovery images must be big enough to contain both the factory default image and the user backup image. The size must be calculated before creating the

partitions. Please take the following table as a reference when calculating the size of the partition.

	OS	OS Image after Ghost	Compression Ratio
Windows® 7	7 GB	5 GB	70%
Windows® XPE	776 MB	560 MB	70%
Windows® CE 6.0	36 MB	28 MB	77%

NOTE:

Specialized tools are required to change the partition size if the operating system is already installed.

B.1.2 Supported Operating System

The recovery CD is compatible with both Microsoft Windows and Linux operating system (OS). The supported OS versions are listed below.

- Microsoft Windows
  - Windows 2000
  - Windows XP (Service Pack 2 or 3 required)
  - Windows Vista
  - Windows 7
  - Windows CE 5.0
  - Windows CE 6.0
  - Windows XP Embedded
  - Windows Embedded Standard 7

NOTE:

The auto recovery function (described in Section B.3) and the restore through LAN function (described in Section B.6) are not supported in the Windows CE 5.0/6.0 operating system environment.

- Linux
  - Fedora Core 12 (Constantine)
  - Fedora Core 11 (Leonidas)
  - Fedora Core 10 (Cambridge)
  - Fedora Core 8 (Werewolf)
  - Fedora Core 7 (Moonshine)
  - RedHat RHEL-5.4
  - RedHat 9 (Ghirke)
  - Ubuntu 8.10 (Intrepid)
  - Ubuntu 7.10 (Gutsy)
  - Ubuntu 6.10 (Edgy)
  - Debian 5.0 (Lenny)
  - Debian 4.0 (Etch)
  - SuSe 11.2
  - SuSe 10.3

NOTE:

Installing unsupported OS versions may cause the recovery tool to fail.

B.2 Setup Procedure for Windows

Prior to using the recovery tool to backup or restore, a few setup procedures are required.

Step 1: Hardware and BIOS setup (see Section **B.2.1**)

Step 2: Create partitions (see **Section B.2.2**)

Step 3: Install operating system, drivers and system applications (see **Section B.2.3**)

Step 4: Build the recovery partition (see **Section B.2.4**) or build the auto recovery partition (see **Section B.3**)

Step 5: Create factory default image (see **Section B.2.5**)

The detailed descriptions are described in the following sections.

NOTE:

The setup procedures described below are for Microsoft Windows operating system users. For Linux, most of the setup procedures are the same except for several steps described in **Section B.3**.

B.2.1 Hardware and BIOS Setup

Step 1: Make sure the system is powered off and unplugged.

Step 2: Install a hard drive or SSD in the system. An unformatted and unpartitioned disk is recommended.

Step 3: Connect an optical disk drive to the system and insert the recovery CD.

Step 4: Turn on the system.

Step 5: Press the <**DELETE**> key as soon as the system is turned on to enter the BIOS.

Step 6: Select the connected optical disk drive as the 1st boot device. (**Boot → Boot Device Priority → 1st Boot Device**).

Step 7: Save changes and restart the computer. Continue to the next section for instructions on partitioning the internal storage.

B.2.2 Create Partitions

To create the system backup, the main storage device must be split into two partitions (three partitions for Linux). The first partition will be for the operating system, while the second partition will be invisible to the operating system and contain the backup made by the one key recovery software.

Step 1: Put the recovery CD in the optical drive of the system.

Step 2: **Boot the system from recovery CD**. When prompted, press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient!

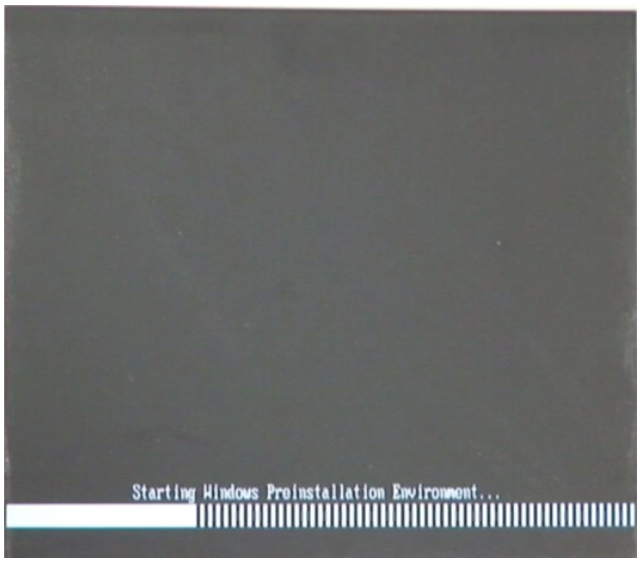


Figure B-2: Launching the Recovery Tool

Step 3: The recovery tool setup menu is shown as below.

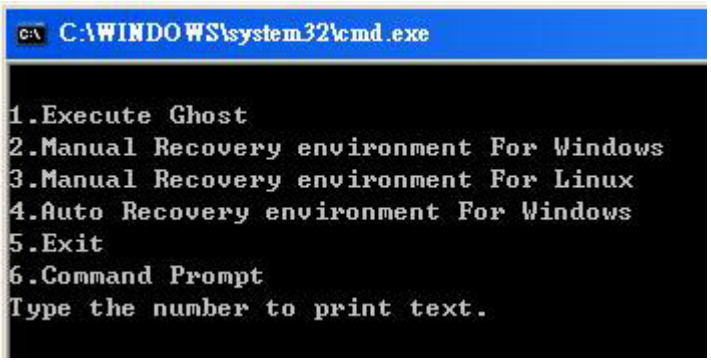


Figure B-3: Recovery Tool Setup Menu

Step 4: Press <**6**> then <Enter>.

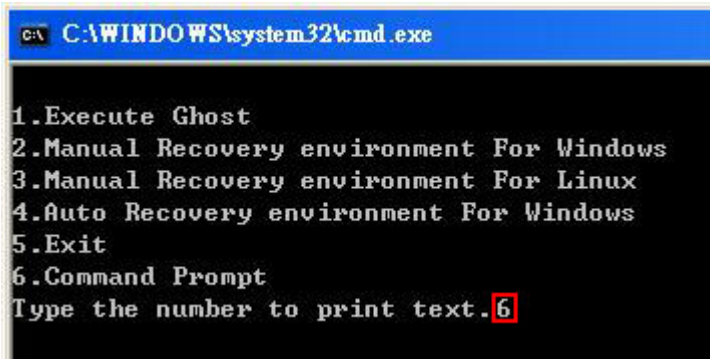


Figure B-4: Command Mode

Step 5: The command prompt window appears. Type the following commands (marked in red) to create two partitions. One is for the OS installation; the other is for saving recovery files and images which will be an invisible partition.

(Press <Enter> after entering each line below)

system32>diskpart

DISKPART>list vol

DISKPART>sel disk 0

DISKPART>create part pri size= ___

DISKPART>assign letter=N

DISKPART>create part pri size= ___

DISKPART>assign letter=F

DISKPART>exit

system32>format N: /fs:ntfs /q /y

system32>format F: /fs:ntfs /q /v:Recovery /y

system32>exit

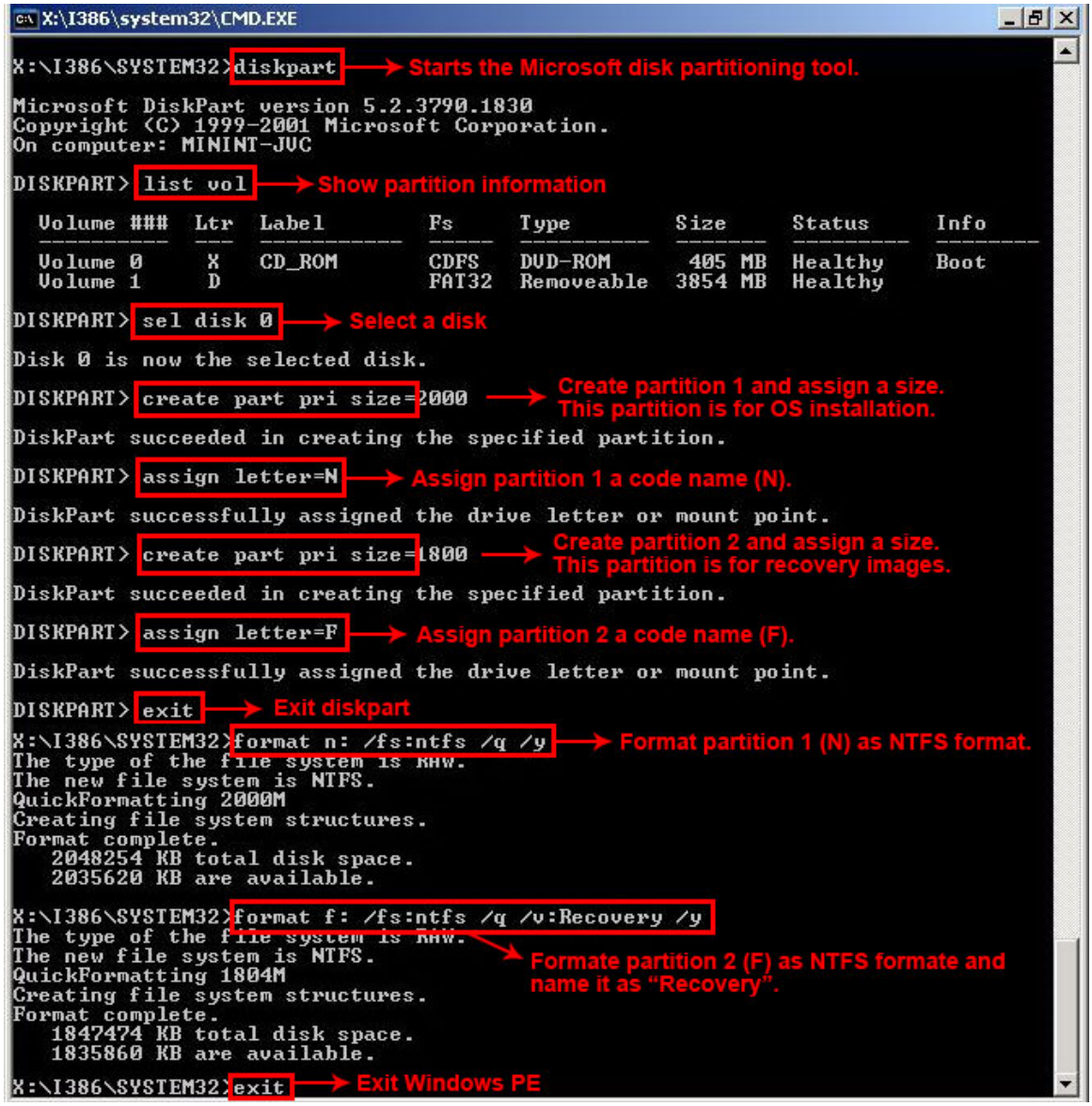
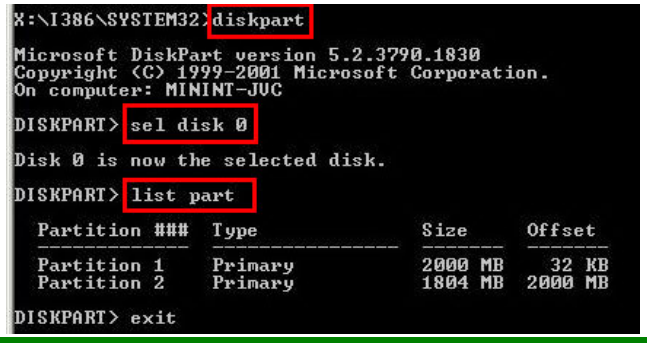


Figure B-5: Partition Creation Commands

NOTE:

Use the following commands to check if the partitions were created successfully.



Step 6: Press any key to exit the recovery tool and automatically reboot the system.

Please continue to the following procedure: Build the Recovery Partition.

B.2.3 Install Operating System, Drivers and Applications

Install the operating system onto the unlabelled partition. The partition labeled "Recovery" is for use by the system recovery tool and should not be used for installing the operating system or any applications.

NOTE:

The operating system installation program may offer to reformat the chosen partition. DO NOT format the partition again. The partition has already been formatted and is ready for installing the new operating system.

To install the operating system, insert the operating system installation CD into the optical drive. Restart the computer and follow the installation instructions.

B.2.4 Build-up Recovery Partition

Step 1: Put the recover CD in the optical drive.

Step 2: Start the system.

Step 3: **Boot the system from the recovery CD**. When prompted, press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient!

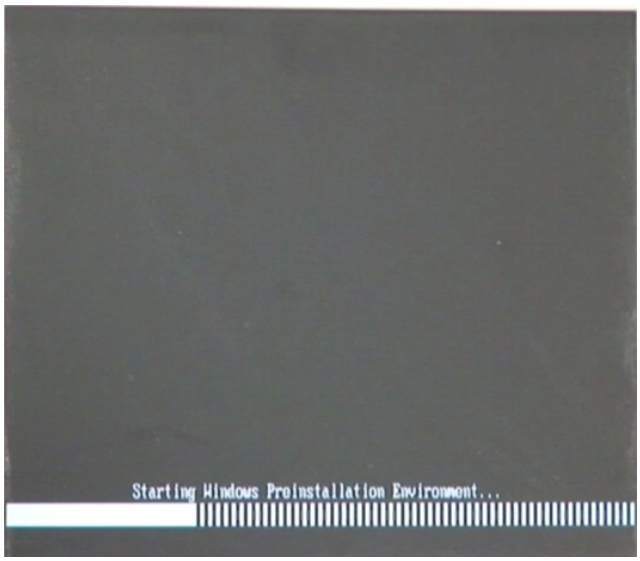


Figure B-6: Launching the Recovery Tool

Step 4: When the recovery tool setup menu appears, press <**2**> then <Enter>.

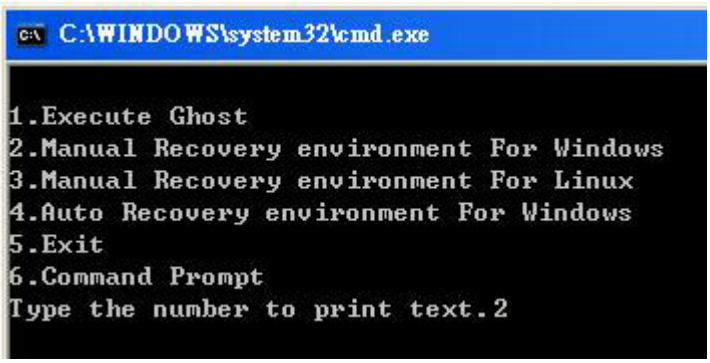


Figure B-7: Manual Recovery Environment for Windows

Step 5: The Symantec Ghost window appears and starts configuring the system to build a recovery partition. In this process the partition created for recovery files in **Section B.2.2** is hidden and the recovery tool is saved in this partition.

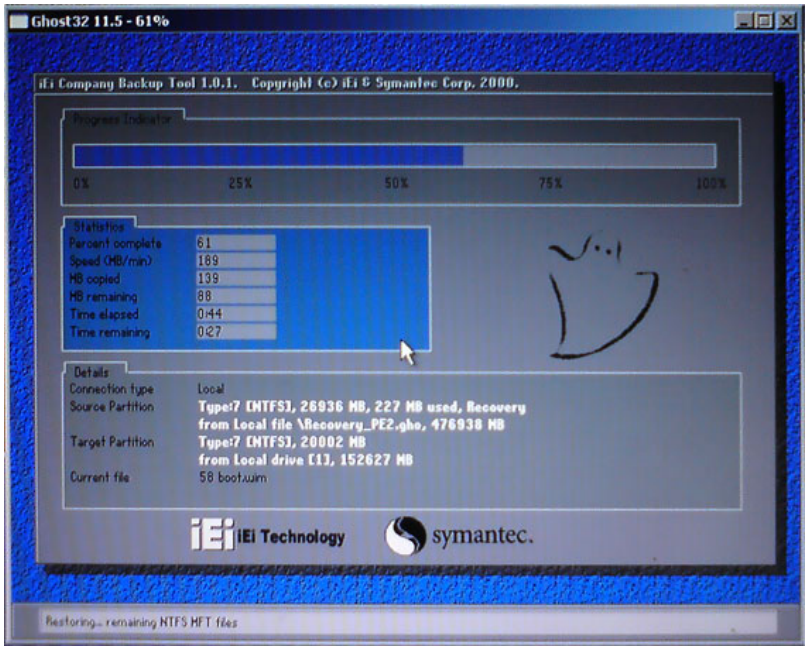


Figure B-8: Building the Recovery Partition

Step 6: After completing the system configuration, press any key in the following window to reboot the system.

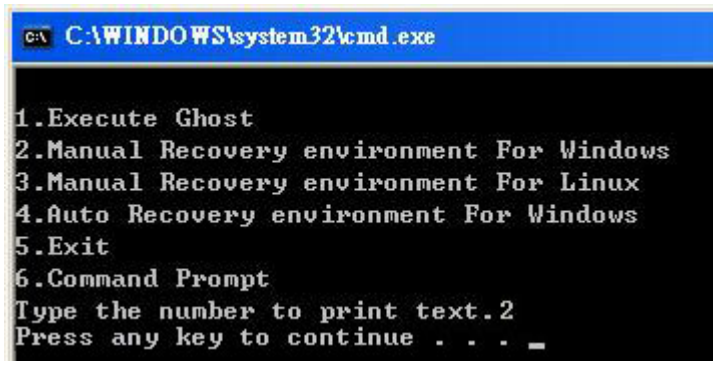


Figure B-9: Press Any Key to Continue

Step 7: Eject the recovery CD.

B.2.5 Create Factory Default Image

NOTE:

Before creating the factory default image, please configure the system to a factory default environment, including driver and application installations.

To create a factory default image, please follow the steps below.

Step 1: Turn on the system. When the following screen displays (**Figure B-10**), press the <**F3**> key to access the recovery tool. The message will display for 10 seconds, please press F3 before the system boots into the operating system.

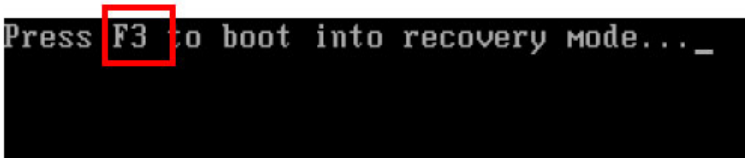


Figure B-10: Press F3 to Boot into Recovery Mode

Step 2: The recovery tool menu appears. Type <**4**> and press <**Enter**>. (**Figure B-11**)

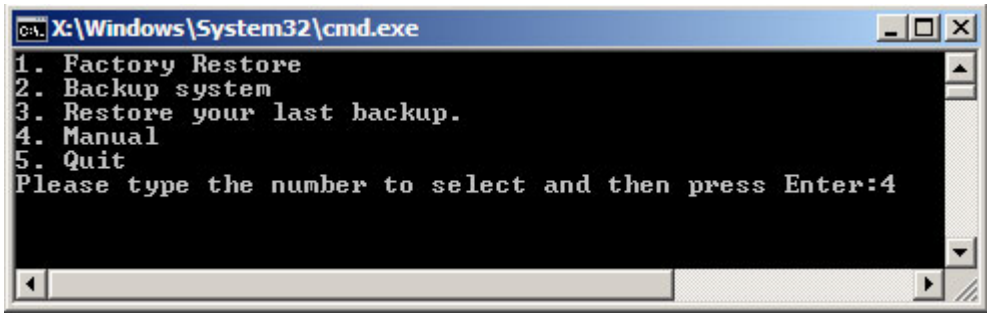


Figure B-11: Recovery Tool Menu

Step 3: The About Symantec Ghost window appears. Click **OK** button to continue.

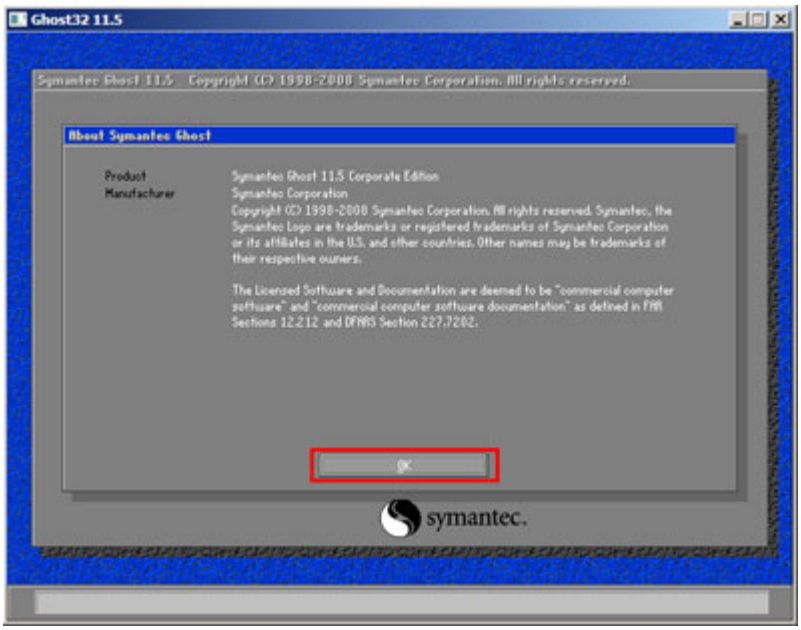


Figure B-12: About Symantec Ghost Window

Step 4: Use mouse to navigate to the option shown below (**Figure B-13**).

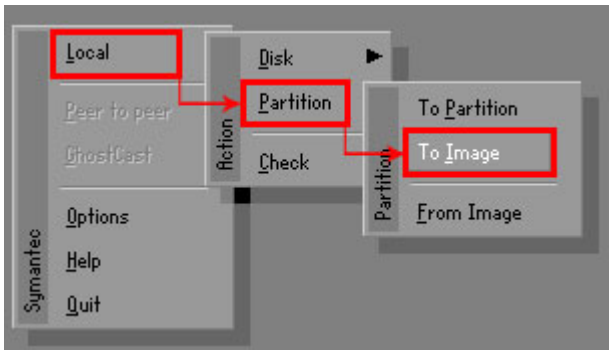


Figure B-13: Symantec Ghost Path

Step 5: Select the local source drive (Drive 1) as shown in **Figure B-14**. Then click OK.

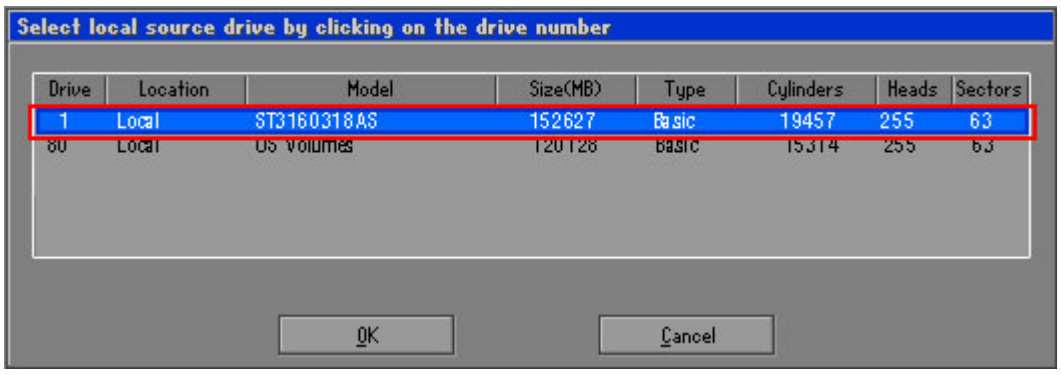


Figure B-14: Select a Local Source Drive

Step 6: Select a source partition (Part 1) from basic drive as shown in **Figure B-15**. Then click OK.

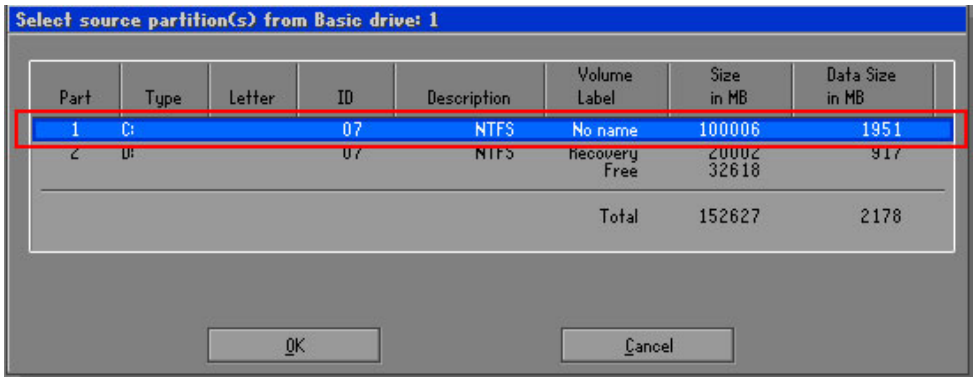


Figure B-15: Select a Source Partition from Basic Drive

Step 7: Select **1.2: [Recovery] NTFS drive** and enter a file name called **iei** (**Figure B-16**). Click **Save**. The factory default image will then be saved in the selected recovery drive and named IEI.GHO.

WARNING:

The file name of the factory default image must be **iei.GHO**.

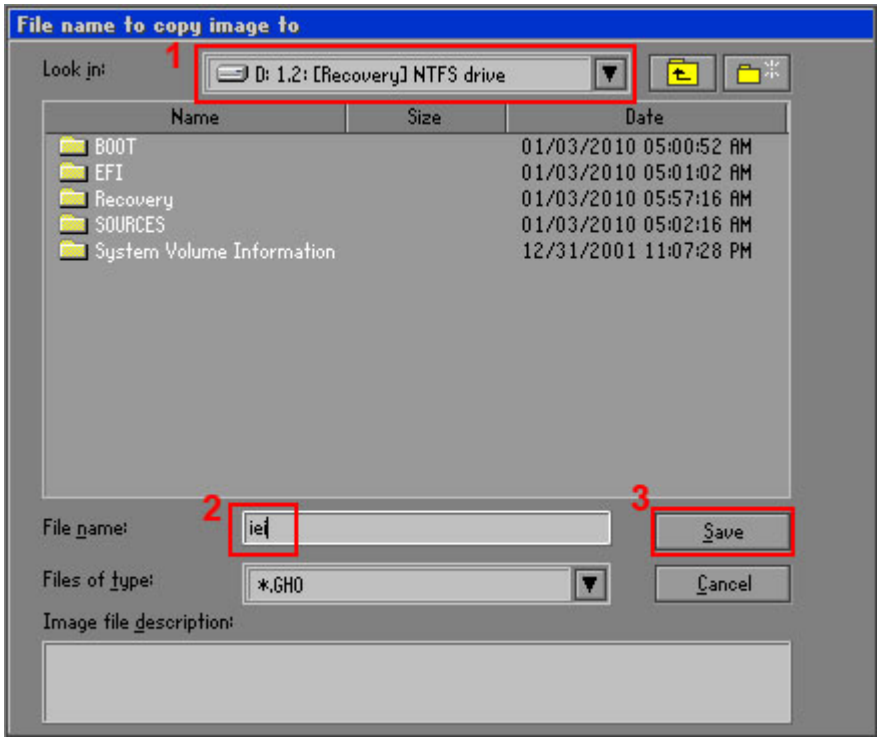


Figure B-16: File Name to Copy Image to

Step 8: When the Compress Image screen in **Figure B-17** prompts, click **High** to make the image file smaller.

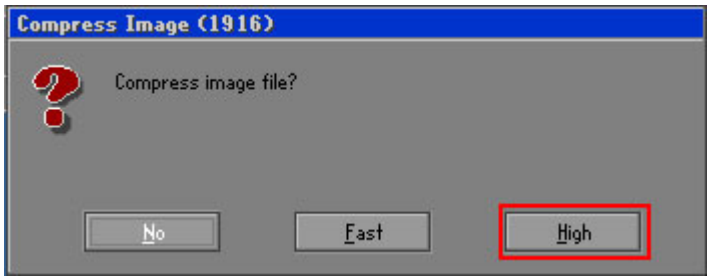


Figure B-17: Compress Image

Step 9: The Proceed with partition image creation window appears, click **Yes** to continue.

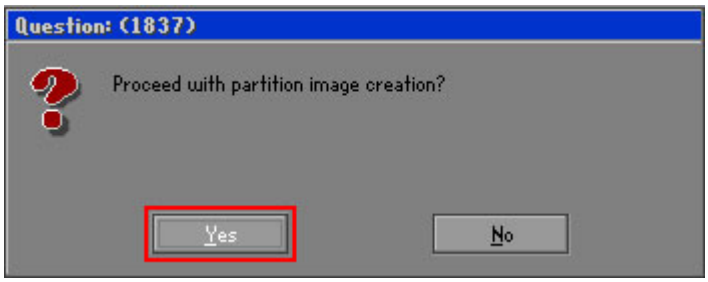


Figure B-18: Image Creation Confirmation

Step 10: The Symantec Ghost starts to create the factory default image (**Figure B-19**).

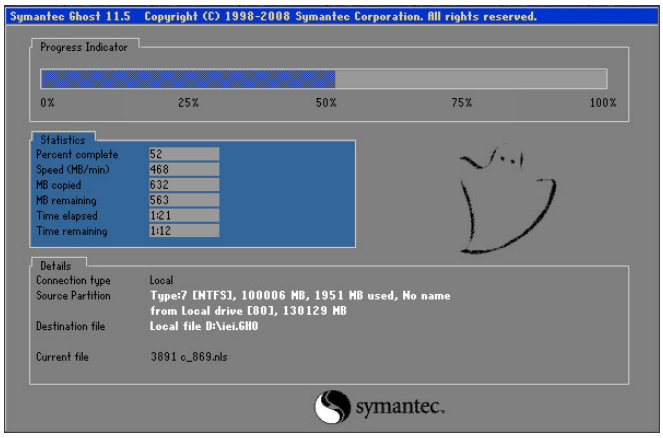


Figure B-19: Image Creation Complete

Step 11: When the image creation completes, a screen prompts as shown in **Figure B-20**. Click **Continue** and close the Ghost window to exit the program.

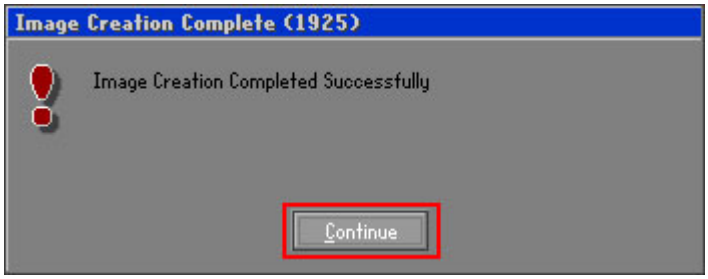


Figure B-20: Image Creation Complete

Step 12: The recovery tool main menu window is shown as below. Press any key to reboot the system.

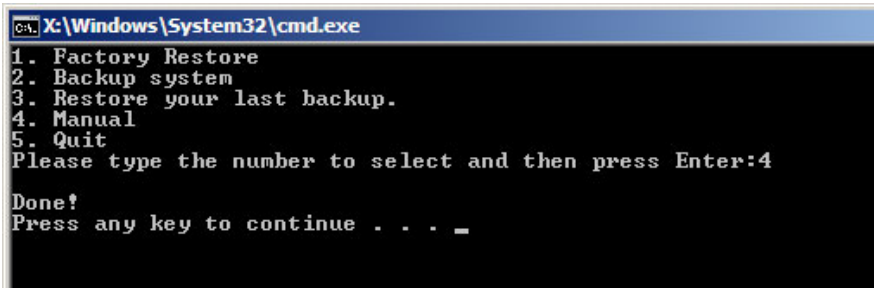


Figure B-21: Press Any Key to Continue

B.3 Auto Recovery Setup Procedure

The auto recovery function allows a system to automatically restore from the factory default image after encountering a Blue Screen of Death (BSoD) or a hang for around 10 minutes. To use the auto recovery function, follow the steps described in the following sections.

CAUTION:

The auto recovery function can only run on a Microsoft Windows system with the following OS versions:

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Windows XP Embedded
- Windows Embedded Standard 7

CAUTION:

The setup procedure may include a step to create a factory default image. It is suggested to configure the system to a factory default environment before the configuration, including driver and application installations.

Step 1: Follow the steps described in **Section B.2.1 ~ Section B.2.3** to setup BIOS, create partitions and install operating system.

Step 2: Install the auto recovery utility into the system by double clicking the **Utility/AUTORECOVERY-SETUP.exe** in the One Key Recovery CD. This utility MUST be installed in the system, otherwise, the system will automatically restore from the factory default image every ten (10) minutes.

Figure B-22: Auto Recovery Utility

Step 3: **Disable the automatically restart function before creating the factory default image**. Go to: My Computer → Properties → Advanced. Click the Settings button of Startup and Recovery. Deselect “Automatically restart”. Click OK to save the settings and exit. (See Figure B-23)

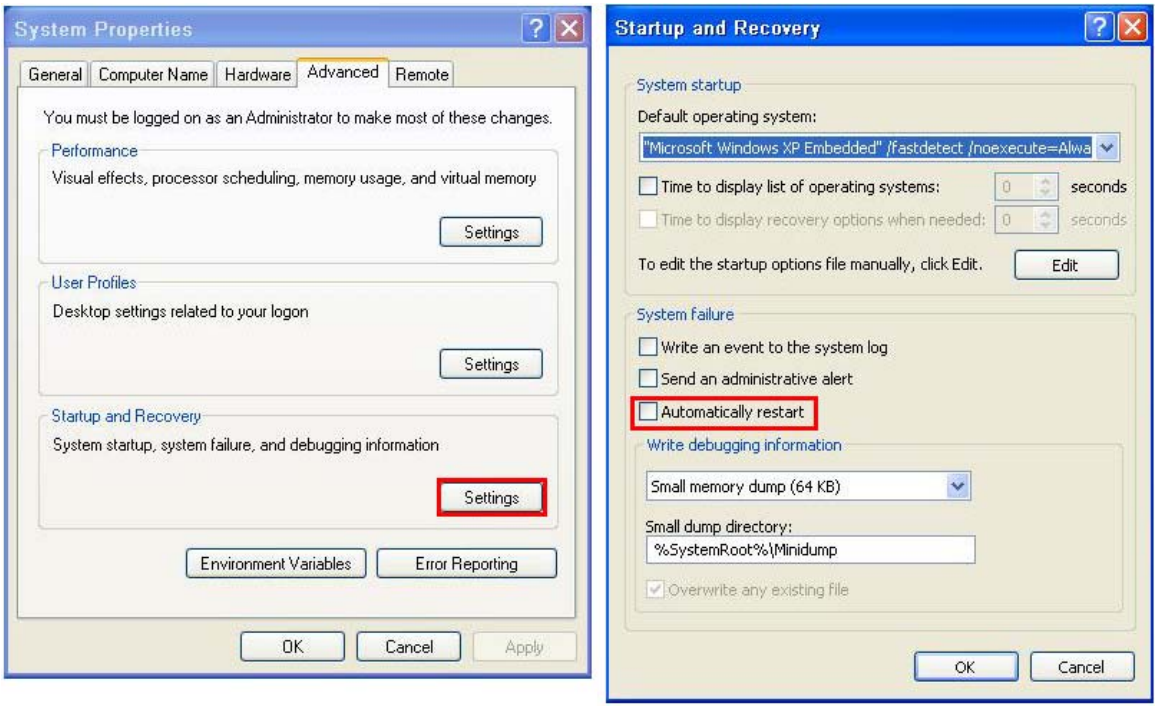


Figure B-23: Disable Automatically Restart

Step 4: Reboot the system from the recovery CD. When prompted, press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient!

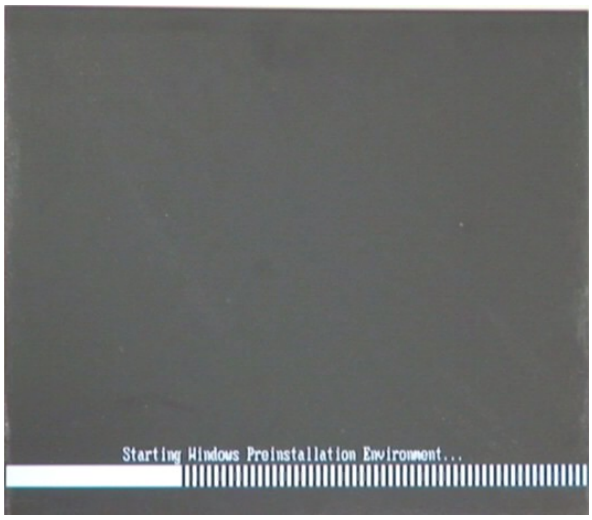


Figure B-24: Launching the Recovery Tool

Step 5: When the recovery tool setup menu appears, press <**4**> then <Enter>.

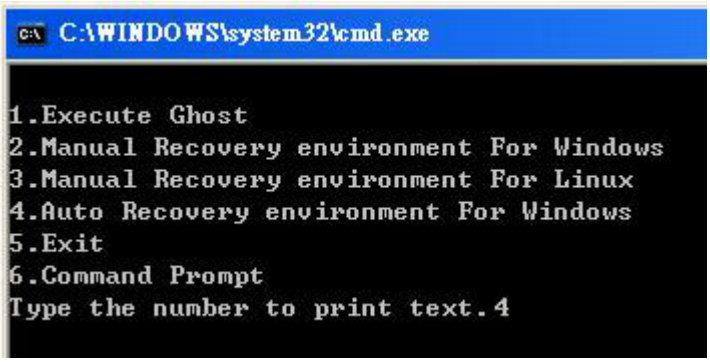


Figure B-25: Auto Recovery Environment for Windows

Step 6: The Symantec Ghost window appears and starts configuring the system to build an auto recovery partition. In this process the partition created for recovery files in **Section B.2.2** is hidden and the auto recovery tool is saved in this partition.

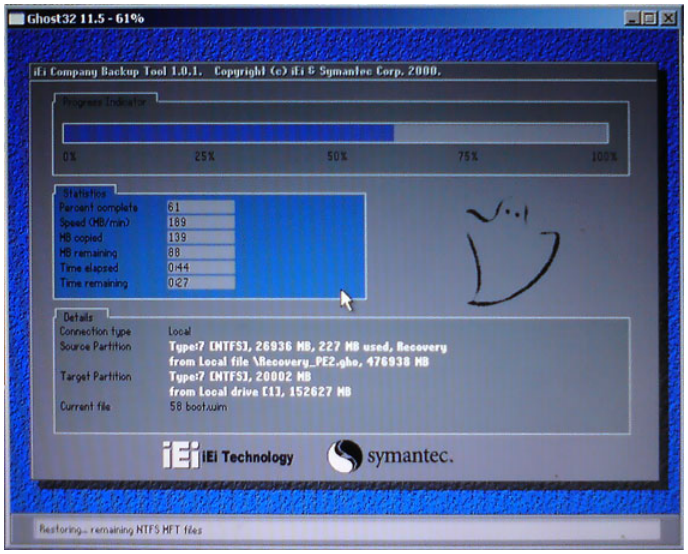


Figure B-26: Building the Auto Recovery Partition

Step 7: After completing the system configuration, the following message prompts to confirm whether to create a factory default image. Type **Y** to have the system create a factory default image automatically. Type **N** within 6 seconds to skip this process (The default option is YES). It is suggested to choose YES for this option.

Figure B-27: Factory Default Image Confirmation

Step 8: The Symantec Ghost starts to create the factory default image (**Figure B-28**).

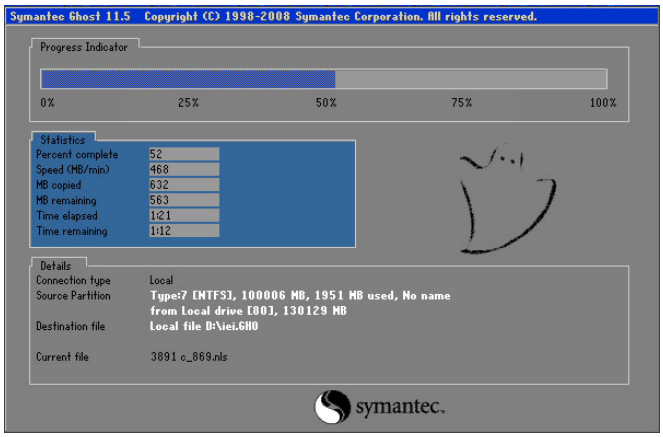


Figure B-28: Image Creation Complete

Step 9: After completing the system configuration, press any key in the following window to restart the system.

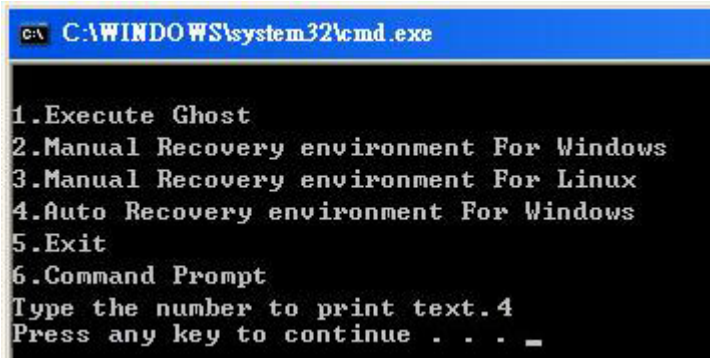
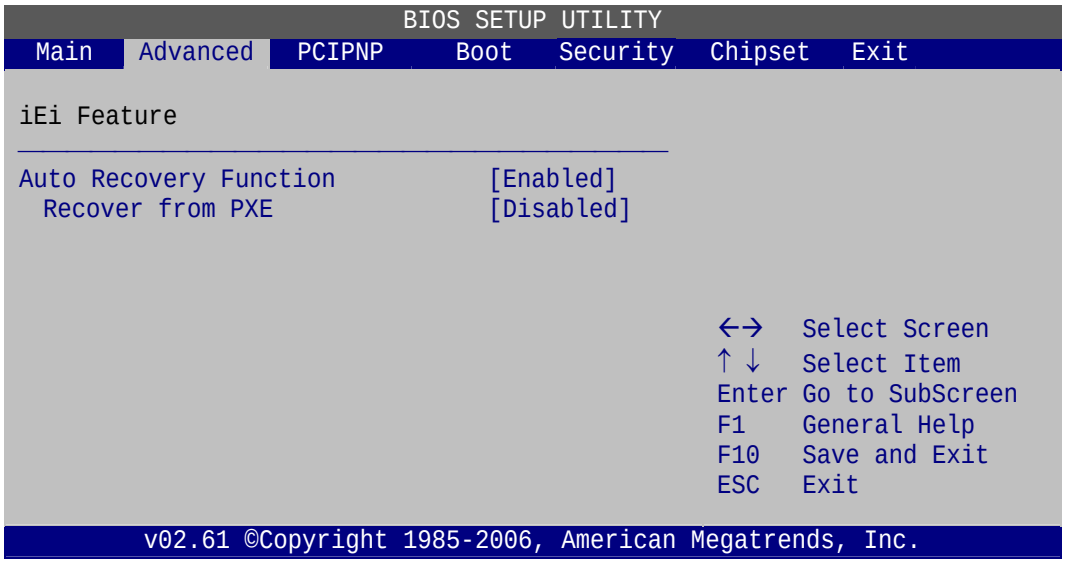


Figure B-29: Press any key to continue

Step 10: Eject the One Key Recovery CD and restart the system.

Step 11: Press the <**DELETE**> key as soon as the system is turned on to enter the BIOS.

Step 12: Enable the Auto Recovery Function option (**Advanced → iEi Feature → Auto Recovery Function**).



BIOS Menu 16: IEI Feature

Step 13: Save changes and restart the system. If the system encounters a Blue Screen of Death (BSoD) or a hang for around 10 minutes, it will automatically restore from the factory default image.

B.4 Setup Procedure for Linux

The initial setup procedures for a Linux system are mostly the same with the procedure for Microsoft Windows. Please follow the steps below to setup the recovery tool for Linux OS.

Step 1: Hardware and BIOS setup. Refer to **Section B.2.1**.

Step 2: **Install Linux operating system**. Make sure to install GRUB (v0.97 or earlier) MBR type and Ext3 partition type. Leave enough space on the hard drive to create the recover partition later.

NOTE:

If the Linux OS is not installed with GRUB (v0.97 or earlier) and Ext3, the Symantec Ghost may not function properly.

While installing Linux OS, please create two partitions:

- Partition 1: **/**
- Partition 2: **SWAP**

NOTE:

Please reserve enough space for partition 3 for saving recovery images.

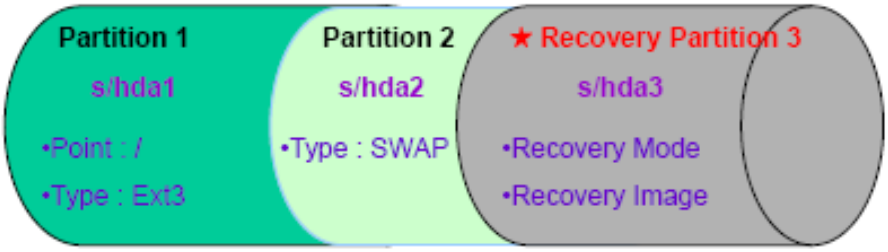


Figure B-30: Partitions for Linux

Step 3: **Create a recovery partition**. Insert the recovery CD into the optical disk drive. Follow **Step 1** ~ **Step 3** described in **Section B.2.2**. Then type the following commands (marked in red) to create a partition for recovery images.

system32>diskpart

DISKPART>list vol

DISKPART>sel disk 0

DISKPART>create part pri size= ___

DISKPART>assign letter=N

DISKPART>exit

system32>format N: /fs:ntfs /q /v:Recovery /y

system32>exit

Step 4: **Build-up recovery partition**. Press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient. When the recovery tool setup menu appears, type <**3**> and press <Enter> (**Figure B-31**). The Symantec Ghost window appears and starts configuring the system to build-up a

recovery partition. After completing the system configuration, press any key to reboot the system. Eject the recovery CD.

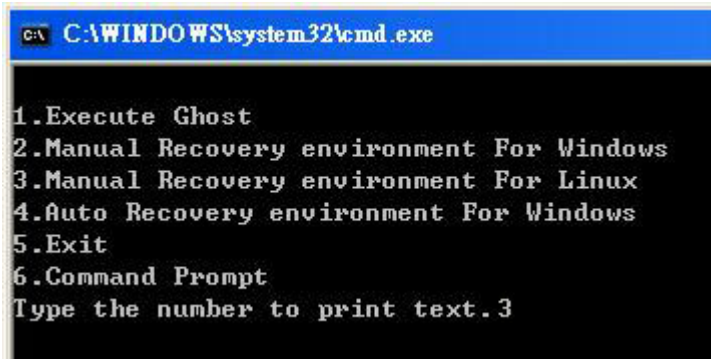


Figure B-31: System Configuration for Linux

Step 5: **Access the recovery tool main menu by modifying the "menu.lst"**. To first access the recovery tool main menu, the menu.lst must be modified. In Linux, enter Administrator (root). When prompt appears, type:

cd /boot/grub

vi menu.lst

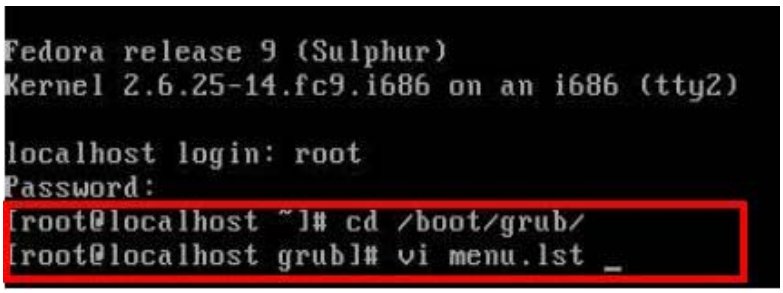
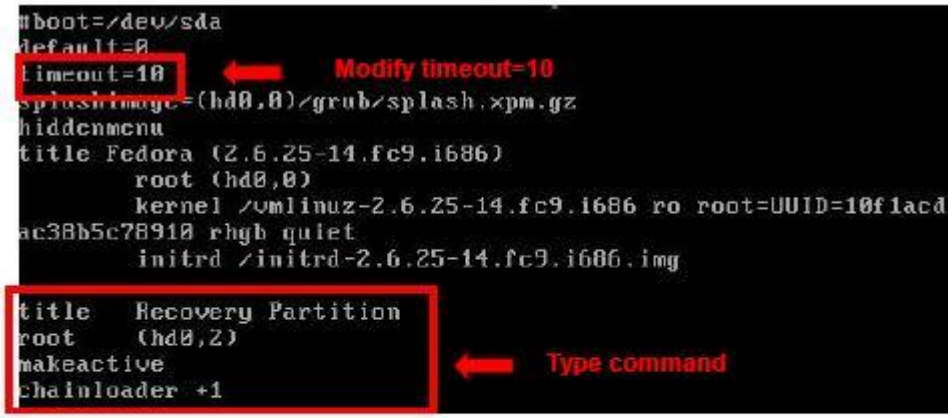


Figure B-32: Access menu.lst in Linux (Text Mode)

Step 6: Modify the menu.lst as shown below.



- Type command:

  title Recovery Partition

  root (hd0,2)

  makeactive

  chainloader +1

Step 7: The recovery tool menu appears. (**Figure B-33**)

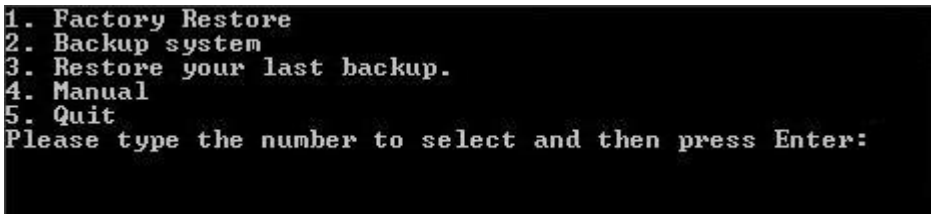


Figure B-33: Recovery Tool Menu

Step 8: **Create a factory default image**. Follow **Step 2** ~ **Step 12** described in **Section B.2.5** to create a factory default image.

B.5 Recovery Tool Functions

After completing the initial setup procedures as described above, users can access the recovery tool by pressing <**F3**> while booting up the system. However, if the setup procedure in Section B.3 has been completed and the auto recovery function is enabled, the system will automatically restore from the factory default image without pressing the F3 key. The recovery tool main menu is shown below.

Figure B-34: Recovery Tool Main Menu

The recovery tool has several functions including:

1. Factory Restore: Restore the factory default image (iei.GHO) created in Section B.2.5.
2. **Backup system**: Create a system backup image (iei_user.GHO) which will be saved in the hidden partition.
3. **Restore your last backup**: Restore the last system backup image
4. **Manual**: Enter the Symantec Ghost window to configure manually.
5. **Quit**: Exit the recovery tool and restart the system.

WARNING:

Please do not turn off the system power during the process of system recovery or backup.

WARNING:

All data in the system will be deleted during the system recovery. Please backup the system files before restoring the system (either Factory Restore or Restore Backup).

B.5.1 Factory Restore

To restore the factory default image, please follow the steps below.

Step 1: Type <**1**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears and starts to restore the factory default. A factory default image called **iei.GHO** is created in the hidden Recovery partition.

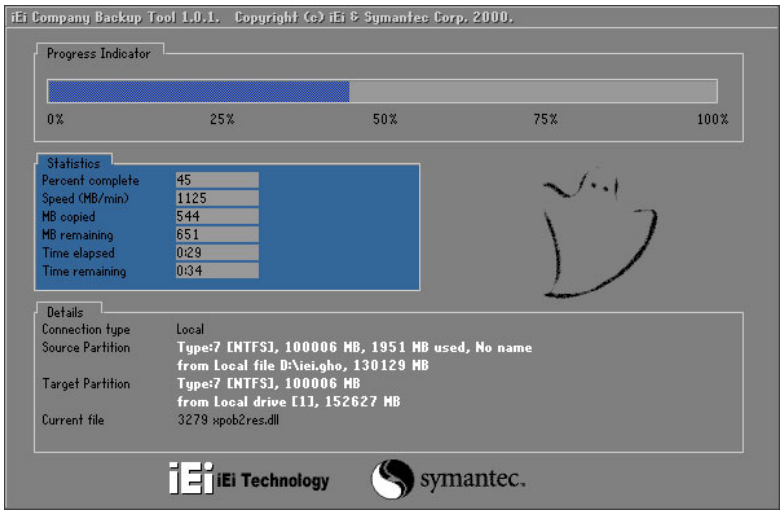


Figure B-35: Restore Factory Default

Step 3: The screen is shown in **Figure B-36** appears when completed. Press any key to reboot the system.

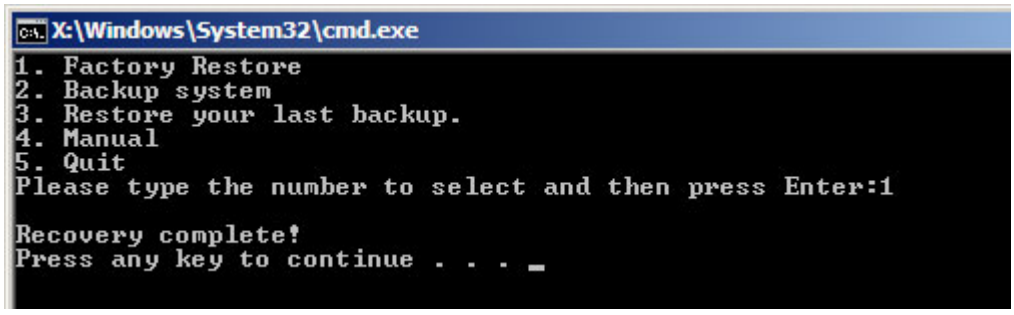


Figure B-36: Recovery Complete Window

B.5.2 Backup System

To backup the system, please follow the steps below.

Step 1: Type <**2**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears and starts to backup the system. A backup image called **iei_user.GHO** is created in the hidden Recovery partition.

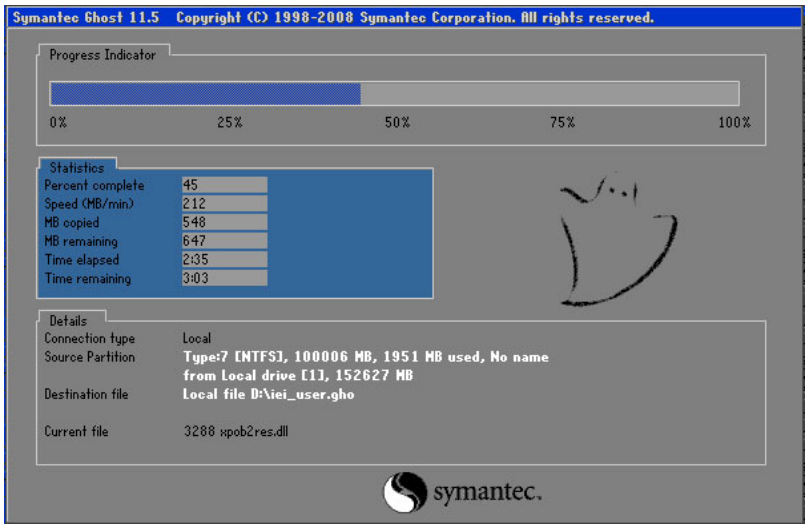


Figure B-37: Backup System

Step 3: The screen is shown in **Figure B-38** appears when system backup is complete. Press any key to reboot the system.

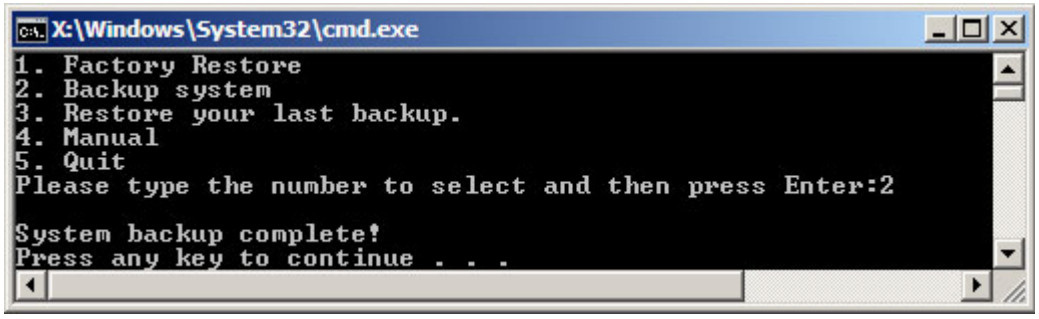


Figure B-38: System Backup Complete Window

B.5.3 Restore Your Last Backup

To restore the last system backup, please follow the steps below.

Step 1: Type <**3**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears and starts to restore the last backup image (iei_user.GHO).

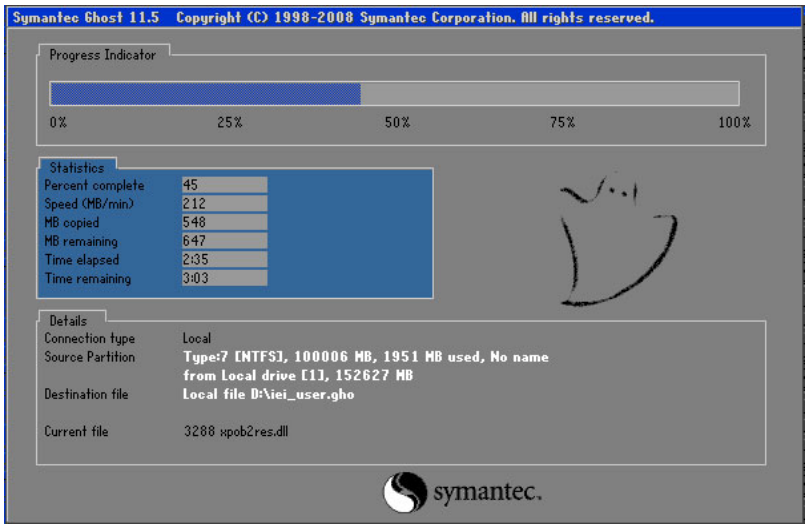


Figure B-39: Restore Backup

Step 3: The screen shown in **Figure B-40** appears when backup recovery is complete. Press any key to reboot the system.

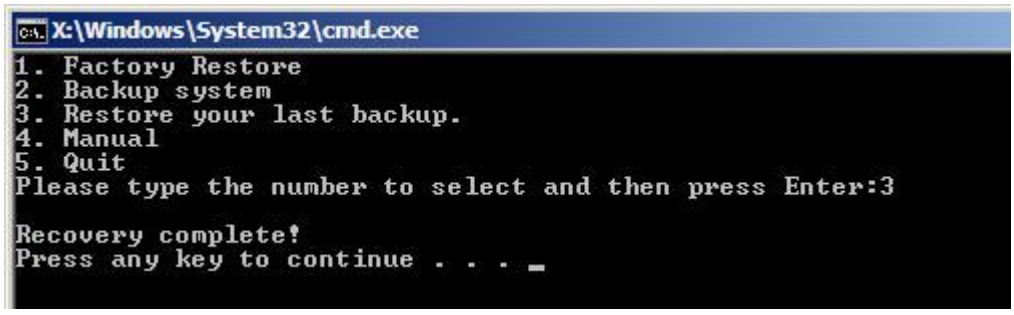


Figure B-40: Restore System Backup Complete Window

B.5.4 Manual

To restore the last system backup, please follow the steps below.

Step 1: Type <**4**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears. Use the Ghost program to backup or recover the system manually.

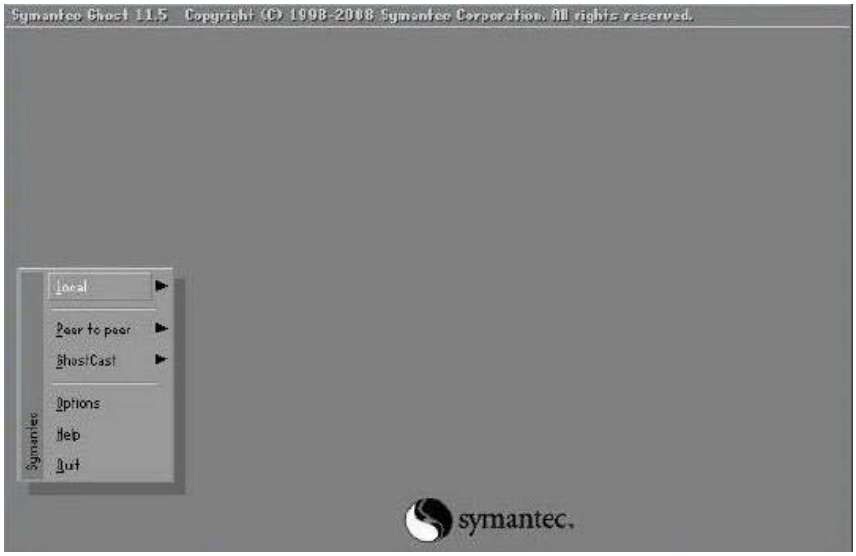
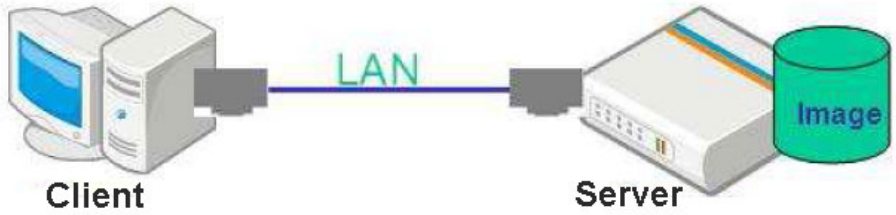


Figure B-41: Symantec Ghost Window

Step 3: When backup or recovery is completed, press any key to reboot the system.

B.6 Restore Systems from a Linux Server through LAN

The One Key Recovery allows a client system to automatically restore to a factory default image saved in a Linux system (the server) through LAN connectivity after encountering a Blue Screen of Death (BSoD) or a hang for around 10 minutes. To be able to use this function, the client system and the Linux system MUST reside in the same domain.



CAUTION:

The supported client OS includes:

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Windows XP Embedded
- Windows Embedded Standard 7

Prior to restoring client systems from a Linux server, a few setup procedures are required.

Step 1: Configure DHCP server settings

Step 2: Configure TFTP settings

Step 3: Configure One Key Recovery server settings

Step 4: Start DHCP, TFTP and HTTP

Step 5: Create a shared directory

Step 6: Setup a client system for auto recovery

The detailed descriptions are described in the following sections. In this document, two types of Linux OS are used as examples to explain the configuration process – CentOS 5.5 (Kernel 2.6.18) and Debian 5.0.7 (Kernel 2.6.26).

B.6.1 Configure DHCP Server Settings

Step 1: Install the DHCP

#yum install dhcp (CentOS, commands marked in red)

#apt-get install dhcp3-server (Debian, commands marked in blue)

Step 2: Confirm the operating system default settings: dhcpd.conf.

CentOS

Use the following command to show the DHCP server sample location:

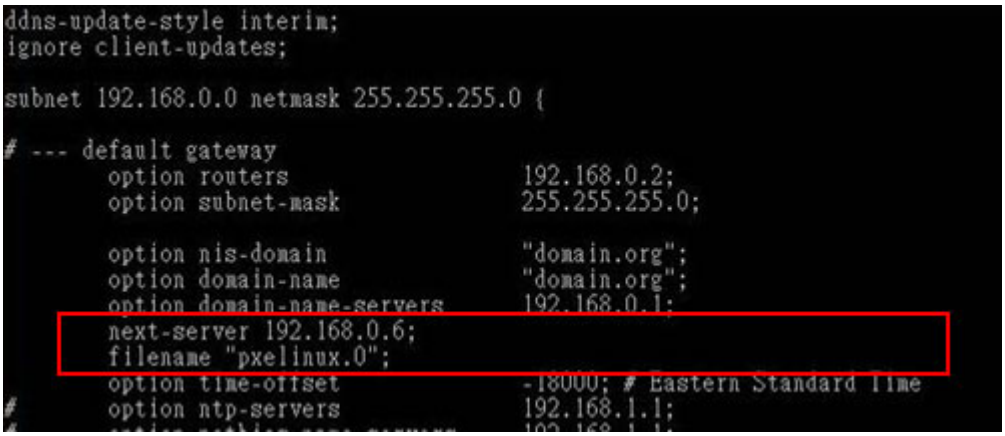
#vi /etc/dhcpd.conf

The DHCP server sample location is shown as below:

Use the following command to copy the DHCP server sample to etc/dhcpd.conf:

#cp /usr/share/doc/dhcp-3.0.5/dhcpd.conf.sample /etc/dhcpd.conf

#vi /etc/dhcpd.conf



Debian

#vi /etc/dhcpd.conf

Edit “/etc/dhcpd.conf” for your environment. For example, add

next-server PXE server IP address;

filename “pxelinux.0”;

```
ddns-update-style interim;
ignore client-updates;

subnet 192.168.0.0 netmask 255.255.255.0 {

# --- default gateway
        option routers                  192.168.0.2;
        option subnet-mask              255.255.255.0;

        option nis-domain               "domain.org";
        option domain-name              "domain.org";
        option domain-name-servers      192.168.0.1;
        next-server 192.168.0.6;
        filename "pxelinux.0";
        option time-offset              -18000; # Eastern Standard Time
#       option ntp-servers              192.168.1.1;
```

B.6.2 Configure TFTP Settings

Step 1: Install the tftp, httpd and syslinux.

#yum install tftp-server httpd syslinux (CentOS)

#apt-get install tftpd-hpa xinetd syslinux (Debian)

Step 2: Enable the TFTP server by editing the “/etc/xinetd.d/tftp” file and make it use the remap file. The “-vvv” is optional but it could definitely help on getting more information while running the remap file. For example:

CentOS

#vi /etc/xinetd.d/tftp

Modify:

disable = no

server_args = -s /tftpboot –m /tftpboot/tftpd.remap -vvv_

```
        socket_type             = dgram
        protocol                = udp
        wait                    = yes
        user                    = root
        server                  = /usr/sbin/in.tftpd
        server_args             = -s /tftpboot -m /tftpboot/tftpd.remap -vvv
        disable                 = no
        per_source              = 11
        cps                     = 100 2
        flags                   = IPv4
```

Debian

Replace the TFTP settings from “inetd” to “xinetd” and annotate the “inetd” by adding “#”.

#vi /etc/inetd.conf

Modify: #tftp dgram udp wait root /usr/sbin..... (as shown below)

```
#:BOOT: TFTP service is provided primarily for booting.  Most sites
#       run this only on machines acting as "boot servers."

#tftp           dgram   udp     wait    root  /usr/sbin/in.tftpd /usr/sbin/in.tftpd -s
 /var/lib/tftpboot
```

#vi /etc/xinetd.d/tftp

```
        socket_type             = dgram
        protocol                = udp
        wait                    = yes
        user                    = root
        server                  = /usr/sbin/in.tftpd
        server_args             = -s /tftpboot -m /tftpboot/tftpd.remap -vvv
        disable                 = no
        per_source              = 11
        cps                     = 100 2
        flags                   = IPv4
```

B.6.3 Configure One Key Recovery Server Settings

Step 1: Copy the **Utility/RECOVERYR10.TAR.BZ2** package from the One Key Recovery CD to the system (server side).

Step 2: Extract the recovery package to /.

#cp RecoveryR10.tar.bz2 /

#cd /

#tar –xvjf RecoveryR10.tar.bz2

Step 3: Copy “pxelinux.0” from “syslinux” and install to “/tftboot”.

#cp /usr/lib/syslinux/pxelinux.0 /tftpboot/

B.6.4 Start the DHCP, TFTP and HTTP

Start the DHCP, TFTP and HTTP. For example:

CentOS

#service xinetd restart

#service httpd restart

#service dhcpd restart

Debian

#/etc/init.d/xinetd reload

#/etc/init.d/xinetd restart

#/etc/init.d/dhcp3-server restart

B.6.5 Create Shared Directory

Step 1: Install the samba.

#yum install samba

Step 2: Create a shared directory for the factory default image.

#mkdir /share

#cd /share

#mkdir /image

#cp iei.gho /image

WARNING:

The file name of the factory default image must be **iei.gho**.

Step 3: Confirm the operating system default settings: smb.conf.

#vi /etc/samba/smb.conf

Modify:

[image]

comment = One Key Recovery

path = /share/image

browseable = yes

writable = yes

public = yes

create mask = 0644

directory mask = 0755

Step 4: Edit “/etc/samba/smb.conf” for your environment. For example:

```
# "security = user" is always a good idea. This will require a Unix account
# in this server for every user accessing the server. See
# /usr/share/doc/samba-doc/htmldocs/Samba3-HOWTO/ServerType.html
# in the samba-doc package for details.
   security = share
```

```
[image]
   comment = One Key Recovery
   path = /share/image
   browseable = yes
   writable = yes
   public = yes
   create mask = 0644
   directory mask = 0755
```

Step 5: Modify the hostname

#vi /etc/hostname

Modify: RecoveryServer

```
RecoveryServer
~
```

B.6.6 Setup a Client System for Auto Recovery

Step 1: **Disable the automatically restart function before creating the factory default image**. Go to: My Computer → Properties → Advanced. Click the Settings button of Startup and Recovery. Deselect “Automatically restart”. Click OK to save the settings and exit. (See Figure B-23)

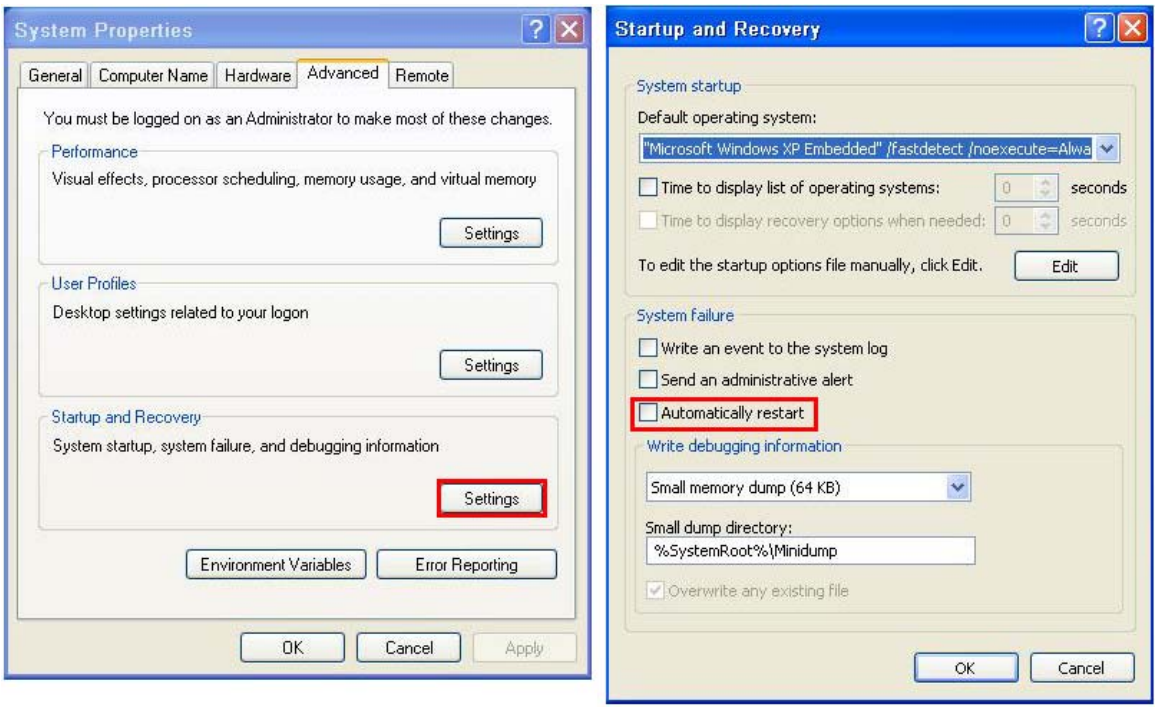


Figure B-42: Disable Automatically Restart

Step 2: Configure the following BIOS options of the client system.

Advanced → iEi Feature → Auto Recovery Function → **Enabled**

Advanced → iEi Feature → Recover from PXE → **Enabled**

Boot → Launch PXE OpROM → **Enabled**

Step 3: Continue to configure the **Boot Option Priorities** BIOS option of the client system:

Boot Option #1 → remain the default setting to boot from the original OS.

Boot Option #2 → select the boot from LAN option.

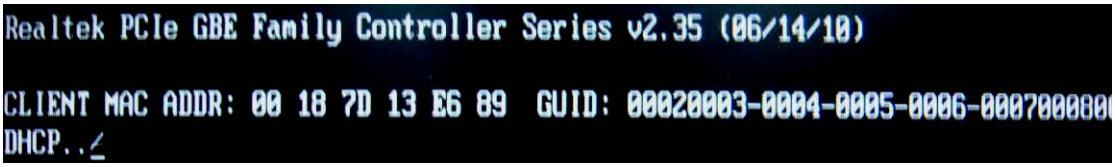
Step 4: Save changes and exit BIOS menu.

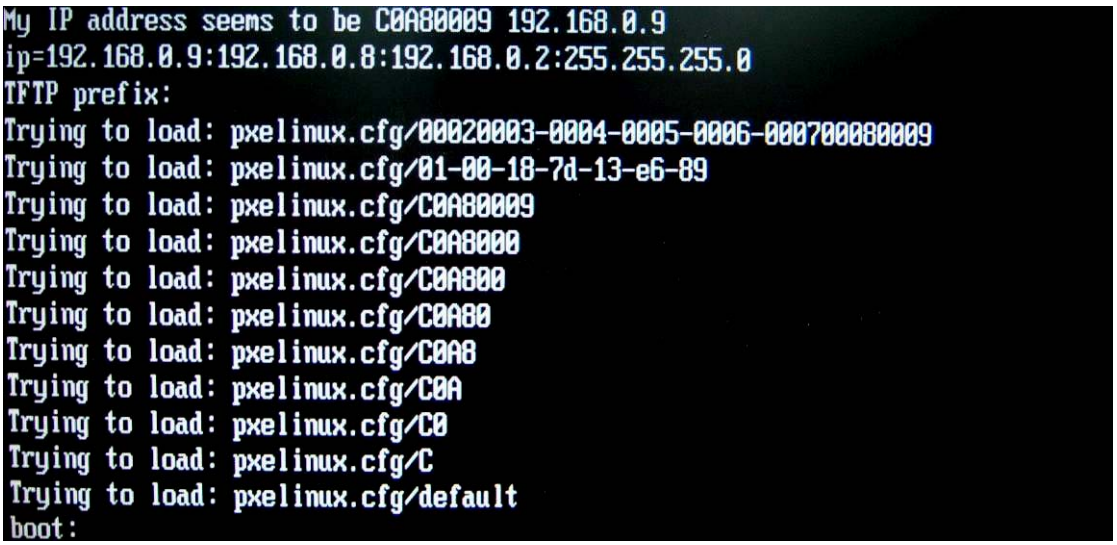
Exit → **Save Changes and Exit**

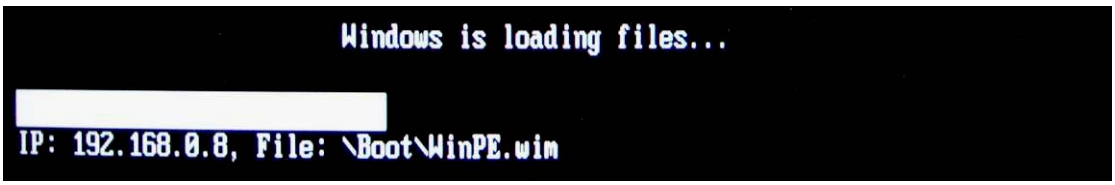
Step 5: Install the auto recovery utility into the system by double clicking the **Utility/AUTORECOVERY-SETUP.exe** in the One Key Recovery CD. This utility

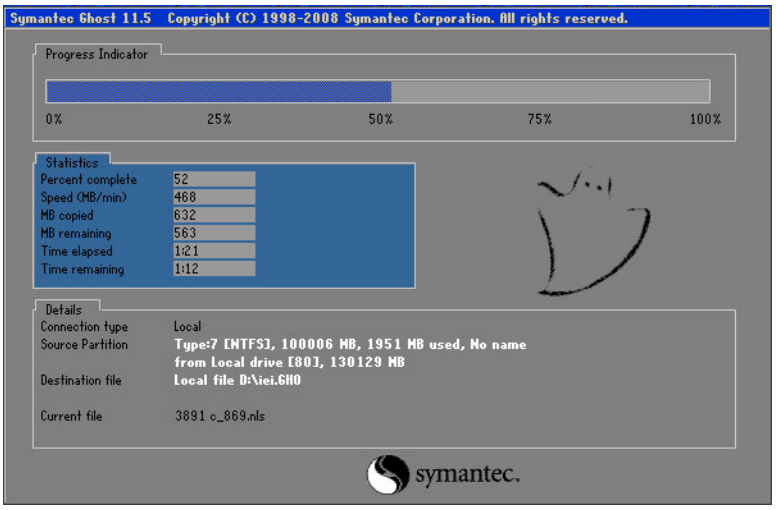
MUST be installed in the system, otherwise, the system will automatically restore from the factory default image every ten (10) minutes.

Step 6: Restart the client system from LAN. If the system encounters a Blue Screen of Death (BSoD) or a hang for around 10 minutes, it will automatically restore from the factory default image. The following screens will show when the system starts auto recovering.









NOTE:

A firewall or a SELinux is not in use in the whole setup process described above. If there is a firewall or a SELinux protecting the system, modify the configuration information to accommodate them.

B.7 Other Information

B.7.1 Using AHCI Mode or ALi M5283 / VIA VT6421A Controller

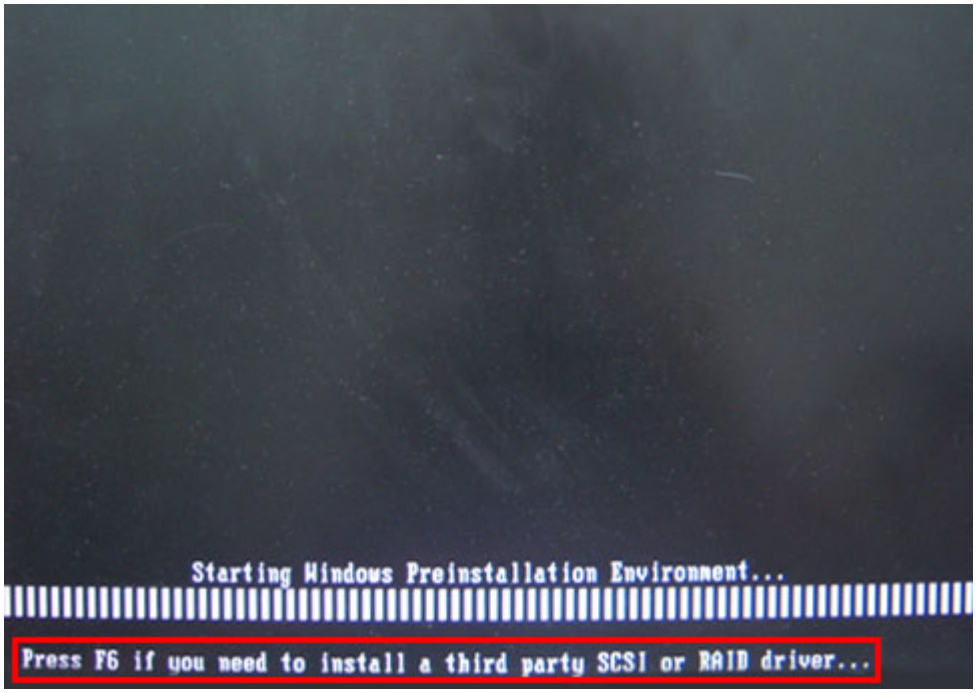
When the system uses AHCI mode or some specific SATA controllers such as ALi M5283 or VIA VT6421A, the SATA RAID/AHCI driver must be installed before using one key recovery. Please follow the steps below to install the SATA RAID/AHCI driver.

Step 1: Copy the SATA RAID/AHCI driver to a floppy disk and insert the floppy disk into a USB floppy disk drive. The SATA RAID/AHCI driver must be especially designed for the on-board SATA controller.

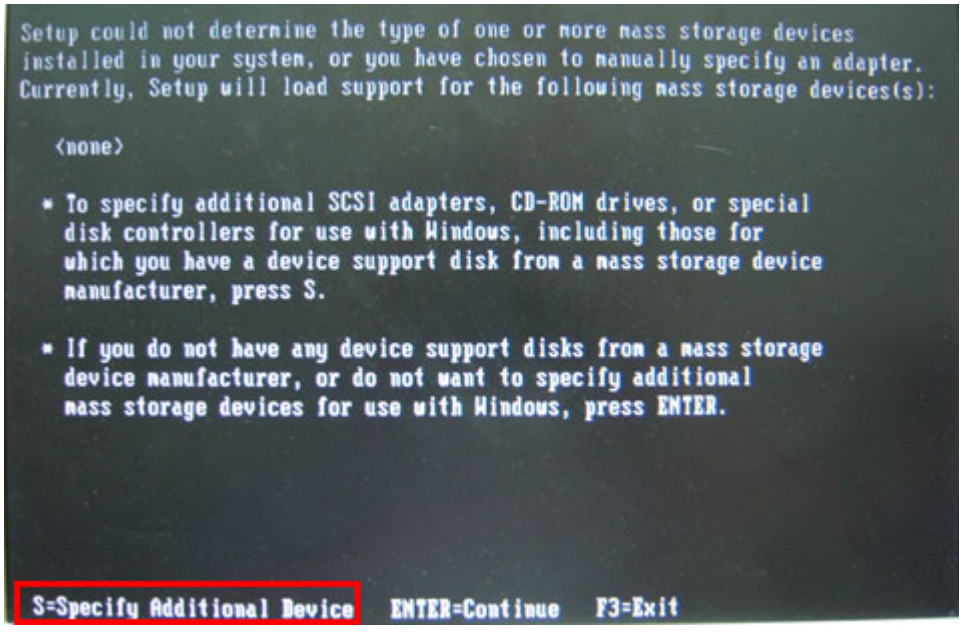
Step 2: Connect the USB floppy disk drive to the system.

Step 3: Insert the One Key Recovery CD into the system and boot the system from the CD.

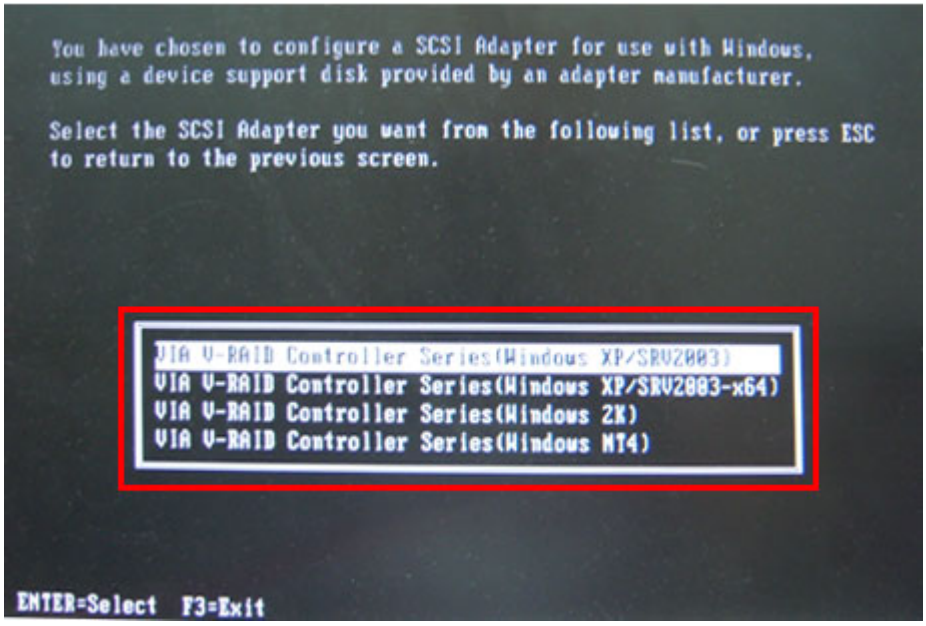
Step 4: When launching the recovery tool, press <**F6**>.



Step 5: When the following window appears, press <**S**> to select “Specify Additional Device”.



Step 6: In the following window, select a SATA controller mode used in the system. Then press <**Enter**>. The user can now start using the SATA HDD.



Step 7: After pressing <Enter>, the system will get into the recovery tool setup menu. Continue to follow the setup procedure from **Step 4** in **Section B.2.2 Create Partitions** to finish the whole setup process.

B.7.2 System Memory Requirement

To be able to access the recovery tool by pressing <**F3**> while booting up the system, please make sure to have enough system memory. The minimum memory requirement is listed below.

- **Using Award BIOS**: 128 MB system memory
- **Using AMI BIOS**: 512 MB system memory.

Appendix

C

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.
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 MBps and 16.6 MBps.
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 Gbps 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/Output Control 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 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
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 12Mbps data transfer rates and USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

D

Watchdog Timer

NOTE:

The following discussion applies to DOS environment. Contact IEI support or visit the IEI website for specific drivers for other operating systems.

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 D-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

E

Hazardous Materials Disclosure

E.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。