IEI Technology Corp.

MODEL:

PM-PV-D4251/N4551/D5251

PCI-104 with Intel® Atom™ Processor D425/N455/D525, Ethernet, USB, Audio, RS-232, RS-422/485, SATA, LVDS, CompactFlash®, RoHS Compliant

User Manual

Rev. 1.01 – 10 June, 2013

RoHS Lead Free

Revision

Date	Version	Changes
10 June, 2013	1.01	Updated Figure 3-13: PCI-104 Connector Location Modified Table 3-4: CompactFlash® Slot Pinouts, Table 3-6: Fan Connector Pinouts, Table 3-16: Serial Port Connector Pinouts (COM2) Added Section 3.2.8: LAN Connector
24 May, 2011	1.00	Initial release

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Chapter

1

Introduction

1.1 Introduction

Figure 1–1: PM-PV-D4251/N4551/D5251

The PCI-104 form factor PM-PV-D4251/N4551/D5251 is a highly integrated embedded computer specifically optimized for multi-media applications requiring minimum installation space. The PM-PV-D4251/N4551/D5251 is particularly suitable for low power and fan-less applications. The PM-PV-D4251/N4551/D5251 supports a full range of functions for an AT compatible industrial computer in a space-saving 96 mm x 100 mm profile. The PM-PV-D4251/N4551/D5251 is equipped with an on-board low-power consumption and high performance Intel® Atom™ D525, D425 or N455 processor. It also supports a single 204-pin 667/800 MHz DDR3 SO-DIMM (up to 2 GB).

1.2 Applications

The PM-PV-D4251/N4551/D5251 has been designed for use in industrial applications where board expansion is critical and operational reliability is essential.

1.3 Benefits

Some of the PM-PV-D4251/N4551/D5251 benefits include,

- Operating reliably in harsh industrial environments with ambient temperatures ranging from -20ºC ~ 60ºC
- Rebooting automatically if the BIOS watchdog timer detects that the system is no longer operating

1.4 Features

Some of the PM-PV-D4251/N4551/D5251 motherboard features are listed below:

- Complies with RoHS
- Embedded Intel® Atom™ D525, D425 or N455 processor
- Supports a single 204-pin 667/800 MHz DDR3 SO-DIMM (up to 2 GB)
- I/O support
  - 4 x USB 2.0
  - 1 x SATA 3Gb/s
  - 1 x RS-232
  - 1 x RS-232/422/485
  - 1 x CompactFlash® card slot
  - 1 x PS/2 for keyboard and mouse
- Supports LVDS 18-bit single-channel up to 1366 x 768 and VGA up to 2048 x 1536 @ 60 MHz

1.5 Overview

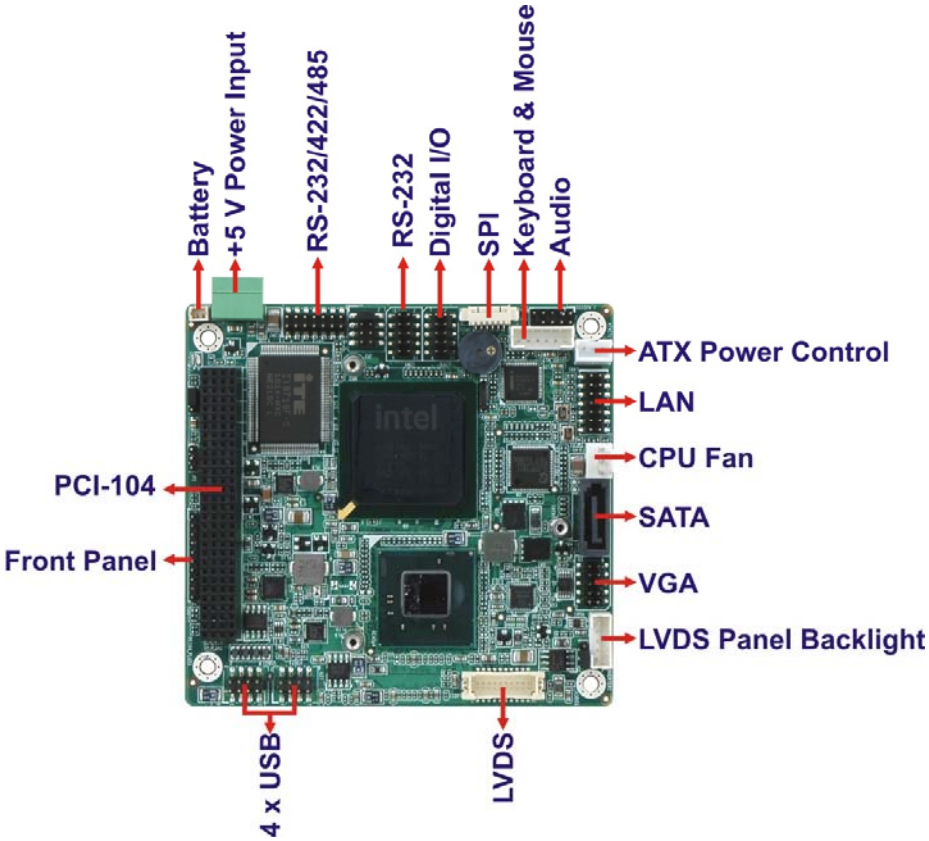


Figure 1-2: Overview

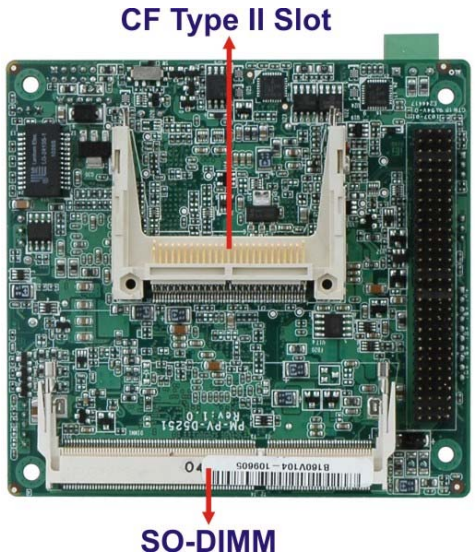


Figure 1-3: Solder Side Overview

1.6 Connectors

The PM-PV-D4251/N4551/D5251 has the following connectors on-board (described in **Chapter 3**):

- 1 x ATX Power Control Connector
- 1 x Audio Kit Connector
- 1 x CompactFlash® Slot
- 1 x Digital I/O Connector
- 1 x Fan Connector
- 1 x Front Panel Connector
- 1 x Keyboard/Mouse Connector
- 1 x LAN Connector
- 1 x LVDS LCD Connector
- 1 x LVDS Backlight Inverter Connector
- 1 x PCI-104 Connector
- 1 x Power Connector
- 1 x SATA Drive Connectors
- 1 x Serial Port Connector (RS-232)
- 1 x Serial Port Connector (RS-232/422/485)
- 2 x USB Connector
- 1 x VGA Connector

1.7 Dimensions

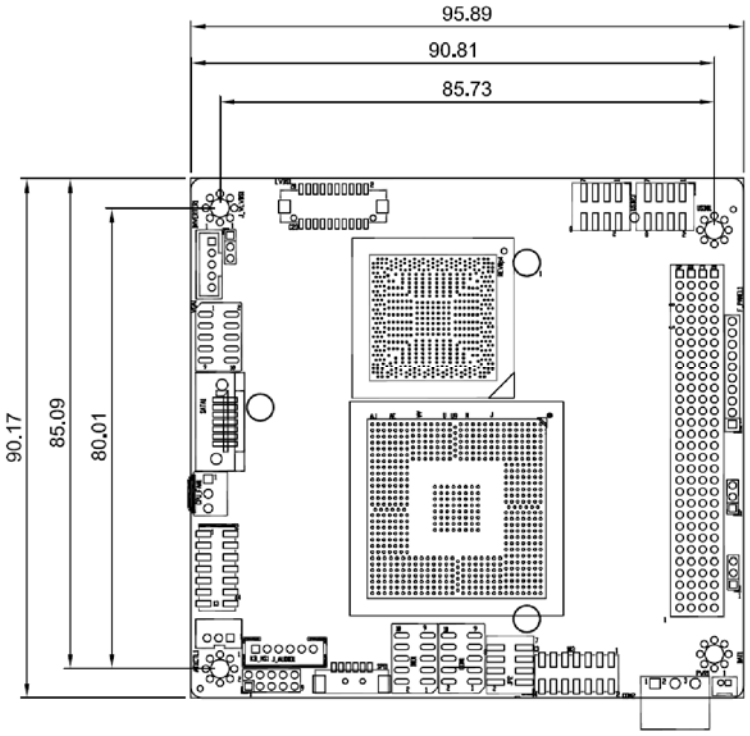


Figure 1-4: Dimensions (Top)

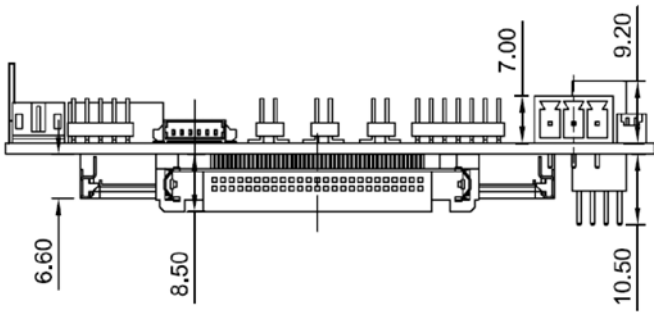


Figure 1-5: Dimensions (I/O)

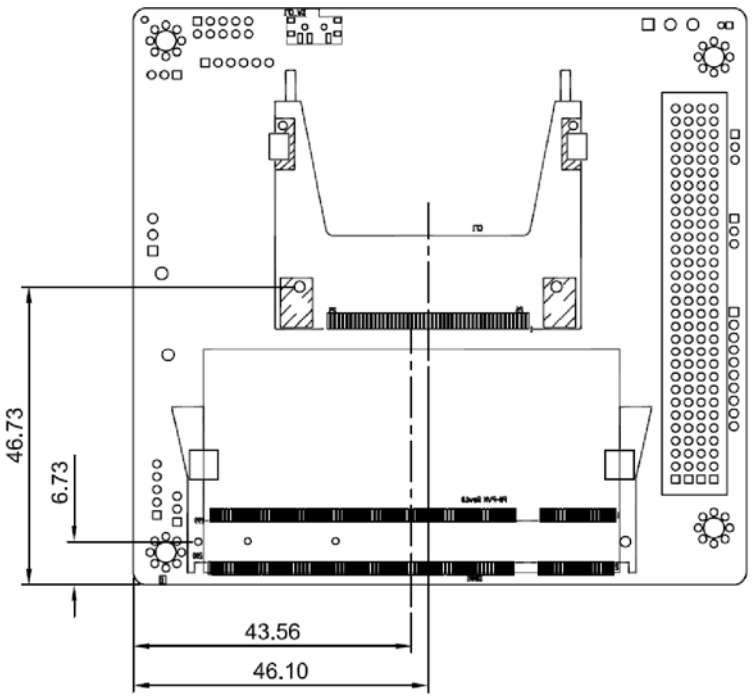


Figure 1-6: Dimensions (Bottom)

1.8 Data Flow

The data flow diagram for the PM-PV-D4251/N4551/D5251 is shown below.

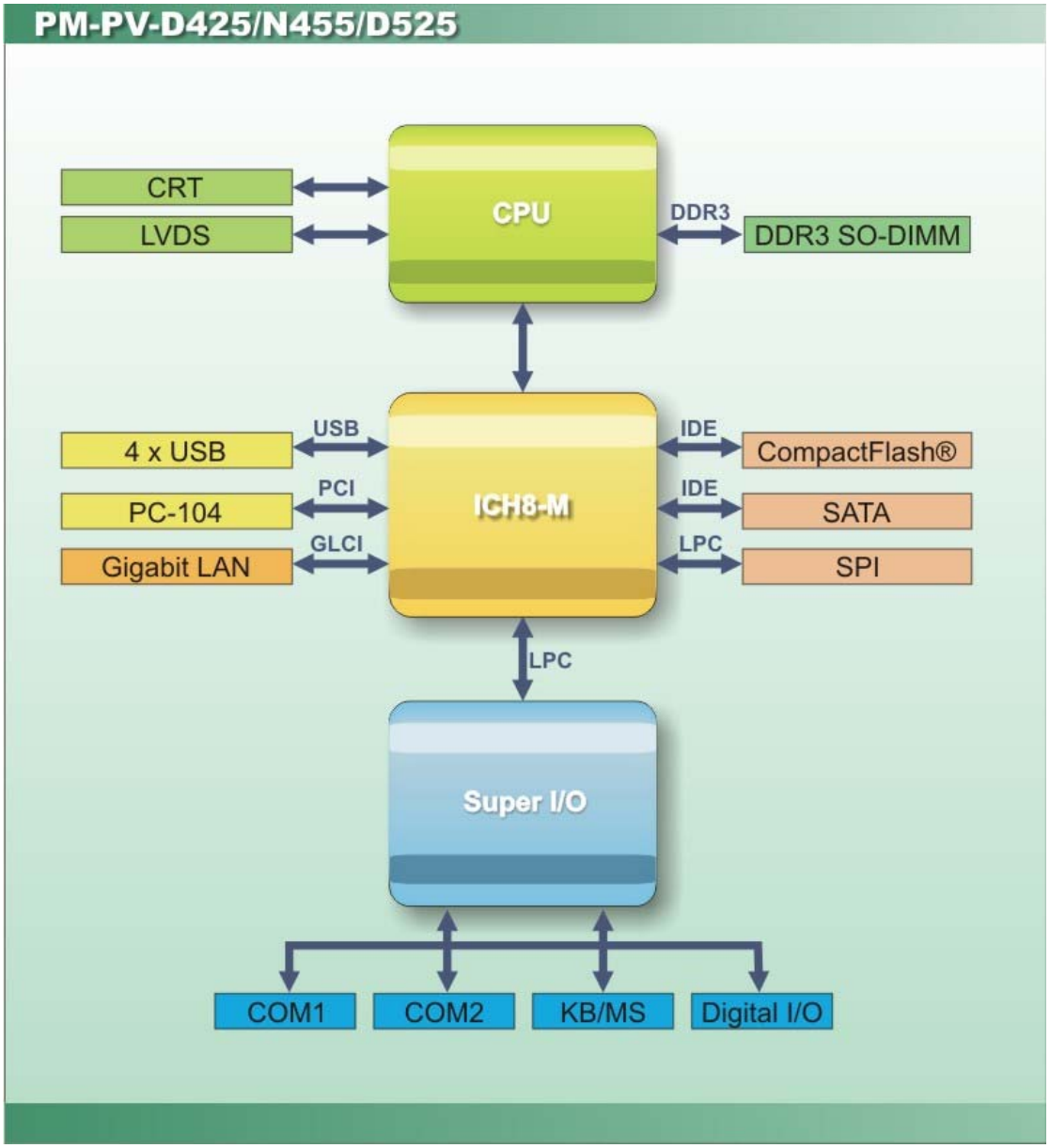


Figure 1-7: Data Flow Block Diagram

1.9 Technical Specifications

PM-PV-D4251/N4551/D5251 technical specifications are listed in the table below.

Specification/Model	Description
Form Factor	PCI-104
CPU Options	Intel® Atom™ processor D525, 1.8 GHz/1 MB L2 cache Intel® Atom™ processor D425, 1.8 GHz/512 KB L2 cache Intel® Atom™ processor D455, 1.66 GHz/512 KB L2 cache
Integrated Graphics	Intel® ICH8M
Memory	204-pin 667/800 MHz DDR3 SO-DIMM (up to 2 GB)
System Controller Hub Chipset	Intel® ICH8M
BIOS	AMI
Digital I/O	8-bit digital I/O (4-bit input, 4-bit output)
Ethernet Controller	Intel® 82567V GbE
Super I/O Controller	iTE IT8718F
Watchdog Timer	Software programmable supports 1~255 sec. system reset
PCI	One PCI-104
Audio	HD audio interface
Display	LVDS: 18-bit single-channel up to 1366 x 768 VGA: up to 2048 x 1536 @ 60 MHz
Ethernet	Intel® 82567V GbE
Connectors	4 x USB 1 x SATA 3gb/s 1 x RS-232 1 x RS-232/422/485 1 x CompactFlash® card slot 1 x PS/2 for keyboard and mouse
Power Supply	5 V only, AT/ATX support

Specification/Model	Description
Power Consumption	3.31 A @ 5 V, 0.09 @ 12 V, 0.03 A @ 5 Vsb (1.8 GHz Intel® Atom™ D525 with 1 GB 800 MHz DDR3)
Operating temperature	-20°C~60°C without cooler, -20°C~70°C with forced air for D525 processor -20°C~65°C without cooler, -20°C~70°C with forced air for D425 processor -20°C~70°C without cooler, -20°C~75°C with forced air for N455 processor
Humidity	5% ~ 95% non-condensing
Dimensions	96 mm x 100 mm
Weight GW/NW	600 g / 170 g

Table 1-1: Technical Specifications

Chapter

2

Unpacking

2.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation may result in permanent damage to the product and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the PM-PV-D4251/N4551/D5251. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PM-PV-D4251/N4551/D5251 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 PM-PV-D4251/N4551/D5251, place it on an antic-static pad. This reduces the possibility of ESD damaging the PM-PV-D4251/N4551/D5251.
- ***Only handle the edges of the PCB***: When handling the PCB, hold the PCB by the edges.

2.2 Unpacking Precautions

When the PM-PV-D4251/N4551/D5251 is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 2.1**.
- Make sure the packing box is facing upwards so the PM-PV-D4251/N4551/D5251 does not fall out of the box.
- Make sure all the components shown in the unpacking section are present.

2.3 Packing List

NOTE:

If some of the components listed in the checklist below are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the PM-PV-D4251/N4551/D5251 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

The PM-PV-D4251/N4551/D5251 is shipped with the following components:

Quantity	Item and Part Number	Image
1	PM-PV-D4251/N4551/D5251	
1	Serial port cable (**P/N**: 32200-000049-RS)	
1	SATA power cable (**P/N**: 32102-000100-100-RS) (**P/N**: 32102-000100-200-RS)	
1	Dual USB cable (wo bracket) (**P/N**: 32000-070301-RS)	
1	Keyboard/Mouse cable (**P/N**:32000-023800-RS)	
1	LAN cable (**P/N**: 32013-000400-100-RS)	

Quantity	Item and Part Number	Image
1	Power cable (**P/N**: 32000-130300-RS)	
1	VGA cable (P/N:32000-033804-RS)	
1	Mini jumper pack	
1	Quick Installation Guide	
1	Utility CD	

Table 2-1: Package List Contents

2.4 Optional Items

Item and part number	Image
ATX power cable (**P/N**: 32100-052100-RS)	
RS-232/422/485 cable (**P/N**: 32200-026500-RS)	
7.1 channel HD audio kit with Realtek ALC883 codec (**P/N**: AC-KIT883HD-R10)	

Table 2-2: Optional Packing List Items

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

The locations of the peripheral interface connectors are shown below.

3.1.1 Layout

Figure 3-1 shows the on-board peripheral connectors and jumpers on the front side of the board.

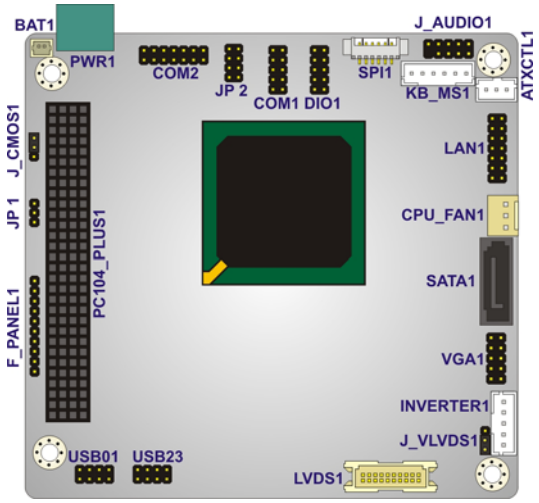


Figure 3-1: Connector and Jumper Locations (Front Side)

Figure 3-2 shows the onboard peripheral connectors on the solder side of the board.

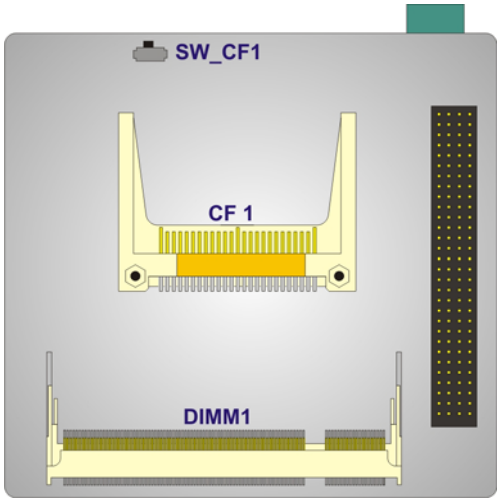


Figure 3-2: Connector and Jumper Locations (Solder Side)

3.1.2 Peripheral Interface Connectors

The table below shows a list of the peripheral interface connectors on the PM-PV-D4251/N4551/D5251. Detailed descriptions of these connectors can be found in the following section.

Connector	Type	Label
ATX Power Control Connector	3-pin wafer	ATXCTL1
Audio Kit Connector	9-pin header	J_AUDIO1
CompactFlash® Slot	CompactFlash® card slot	CF1
Digital I/O Connector	10-pin header	DIO1
Fan Connector	3-pin wafer	CPU_FAN1
Front Panel Connector	10-pin header	F_PANEL1
Keyboard/Mouse Connector	6-pin wafer	KB_MS1
LAN Connector	14-pin header	LAN1
LVDS LCD Connector	20-pin crimp	LVDS1
LVDS Backlight Inverter Connector	5-pin wafer	INVERTER1
PCI-104 Connector	PCI-104 connector	PC104_PLUS1
Power Connector	3-pin terminal block connector	PWR1
SATA Drive Connectors	7-pin SATA drive connectors	SATA1
Serial Port Connector (RS-232)	10-pin header	COM1
Serial Port Connector (RS-232/422/485)	14-pin header	COM2
USB Connector	8-pin header	USB01, USB23
VGA Connector	10-pin header	VGA1

Table 3–1: Internal Peripheral Connectors

3.2 Internal Peripheral Connectors

Internal peripheral connectors on the motherboard are only accessible when the motherboard is outside of the chassis. This section has complete descriptions of all the internal, peripheral connectors on the PM-PV-D4251/N4551/D5251.

3.2.1 ATX Power Control Connector

CN Label:	**ATXCTL1**
CN Type:	3-pin wafer (1x3)
CN Location:	See **Figure 3-3**
CN Pinouts:	See **Table 3-2**

The connector is for enabling an ATX power supply. When connected to the power supply, the power can be turned on and off with the front panel switch.

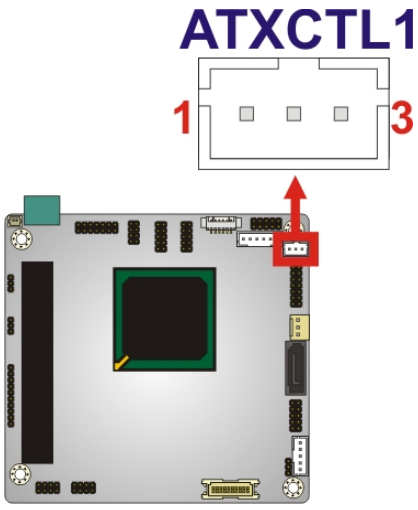


Figure 3-3: ATX Power Supply Enable Connector Location

Pin	Description
1	5VSB
2	GND
3	PS_ON#

Table 3-2: ATX Power Supply Enable Connector Pinouts

3.2.2 Audio Kit Connector

CN Label: **J_AUDIO1**

CN Type: 9-pin header (2x5)

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

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

This connector connects to an external audio kit.

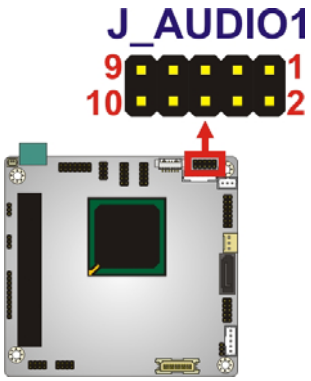


Figure 3-4: Audio Kit Connector Location

Pin	Description	Pin	Description
1	SYNC	2	BITCLK
3	SDOUT	4	PCBEEP
5	SDIN	6	RST#
7	VCC	8	GND
9	+12 V	10	GND

Table 3-3: Audio Kit Connector Pinouts

3.2.3 CompactFlash® Slot

CN Label: **CF1**

CN Type: CompactFlash® card slot

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

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

A CompactFlash® Type I/II card can be used in this slot.

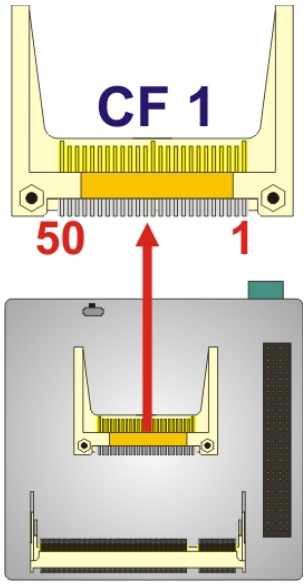


Figure 3-5: CompactFlash® Slot Location

Pin	Description	Pin	Description
1	GND	26	CD1#
2	D3	27	D11
3	D4	28	D12
4	D5	29	D13
5	D6	30	D14
6	D7	31	D15
7	CE#	32	CE2#
8	GND	33	N/C
9	GND	34	IOR#
10	GND	35	IOW#
11	GND	36	WE#
12	GND	37	IRQ14
13	VCC	38	VCC
14	GND	39	CSEL#
15	GND	40	N/C
16	GND	41	RESET#

Pin	Description	Pin	Description
17	GND	42	IDE_IORDY#
18	A2	43	IDE_REQ
19	A1	44	IDE_DACK#
20	A0	45	BVD2
21	D0	46	BVD1
22	D1	47	D8
23	D2	48	D9
24	N/C	49	D10
25	CD2#	50	GND

Table 3-4: CompactFlash® Slot Pinouts

3.2.4 Digital I/O Connector

CN Label: **DIO1**

CN Type: 10-pin header (2x5)

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

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

The digital I/O connector provides programmable input and output for external devices. The digital I/O provides 4-bit output and 4-bit input.

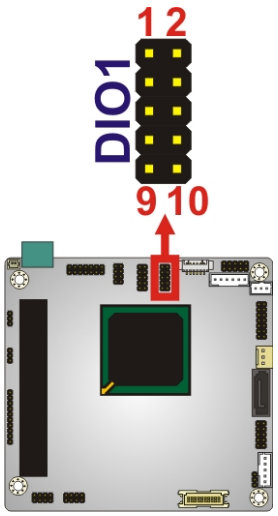


Figure 3-6: Digital I/O Connector Locations

Pin	Description	Pin	Description
1	GND	2	VCC
3	Output 3	4	Output 2
5	Output 1	6	Output 0
7	Input 3	8	Input 2
9	Input 1	10	Input 0

Table 3-5: Digital I/O Connector Pinouts

3.2.5 Fan Connector

CN Label: **CPU_FAN1**

CN Type: 3-pin wafer (1x3)

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

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

The fan connector attaches to a cooling fan.

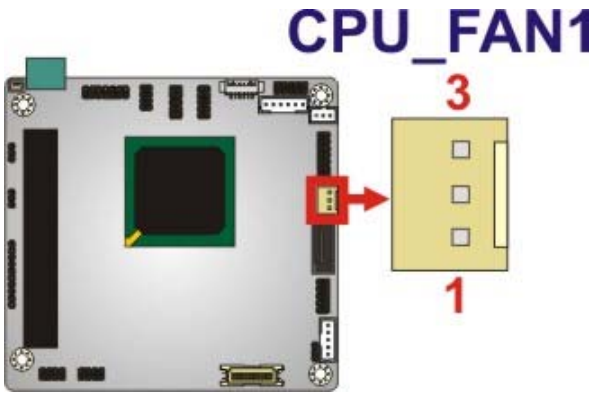


Figure 3-7: Fan Connector Location

Pin	Description
1	GND
2	+12V (PWM)
3	FANIO1

Table 3-6: Fan Connector Pinouts

3.2.6 Front Panel Connector

CN Label: **F_PANEL1**

CN Type: 10-pin header (1x10)

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

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

The front panel connector connects to the indicator LEDs and buttons on the computer's front panel.

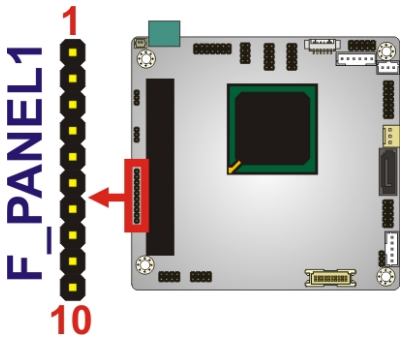


Figure 3-8: Front Panel Connector Location

Function	Pin	Description
5 V	1	VCC
	2	LED-
Power	3	PWR_LED+
LED	4	PWR_LED-
Hard drive	5	HDD_LED+
LED	6	HDD_LED-
Power	7	PWR_BTN+
Button	8	PWR_BTN-
Reset	9	RESET+
	10	RESET-

Table 3-7: Front Panel Connector Pinouts

3.2.7 Keyboard/Mouse Connector

CN Label:	**KB_MS1**
CN Type:	6-pin wafer (1x6)
CN Location:	See **Figure 3-9**
CN Pinouts:	See **Table 3-8**

The keyboard/mouse connector connects to a PS/2 Y-cable that can be connected to a PS/2 keyboard and mouse.

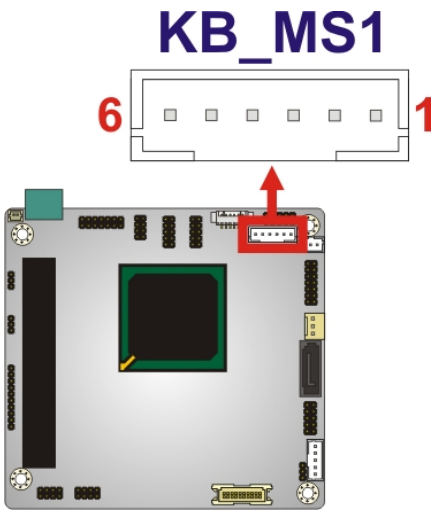


Figure 3-9: Keyboard/Mouse Connector Location

Pin	Description
1	+5 V KB DATA
2	MS DATA
3	MS CLK
4	KB DATA
5	KB CLK
6	GROUND

Table 3-8: Keyboard/Mouse Connector Pinouts

3.2.8 LAN Connector

CN Label: **LAN1**

CN Type: 14-pin header (2x7)

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

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

Use LAN cable to connect to LAN1 connector to provide gigabit LAN connection.

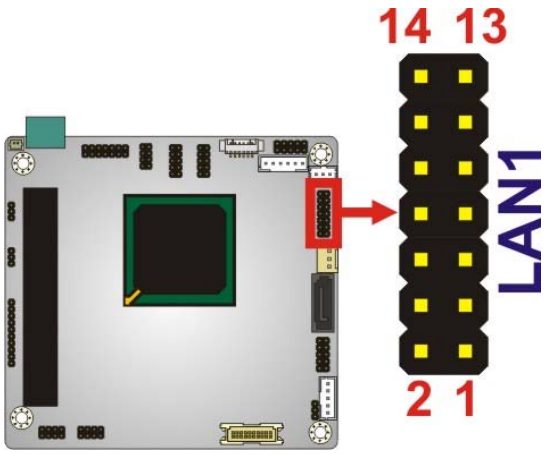


Figure 3-10: LAN Connector Location

Pin	Description	Pin	Description
1	MDX0+	2	MDX0-
3	MDX1+	4	MDX1-
5.	MDX2+	6	MDX2-
7.	MDX3+	8	MDX3-
9	GND	10	GND
11	LINKLED+	12	LINKLED-
13	SPEEDLED	14	SPEEDLED2

Table 3-9: LAN Connector Pinouts

3.2.9 LVDS LCD Connector

CN Label:	**LVDS1**
CN Type:	20-pin crimp (2x10)
CN Location:	See **Figure 3-11**
CN Pinouts:	See **Table 3-10**

The LVDS connector is for an LCD panel connected to the board.

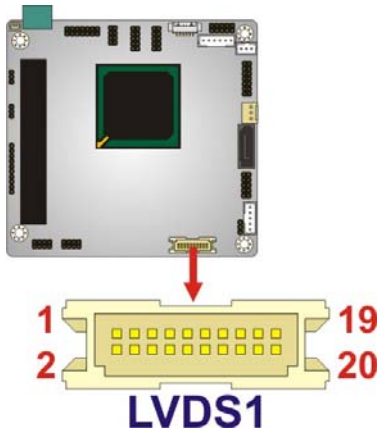


Figure 3-11: LVDS Connector Location

Pin	Description	Pin	Description
1	GROUND	2	GROUND
3	LVDSA_DATA0+	4	LVDSA_DATA0-
5	LVDSA_DATA1+	6	LVDSA_DATA1-
7	LVDSA_DATA2+	8	LVDSA_DATA2-
9	LVDSA_CLK+	10	LVDSA_CLK-
11	N/C	12	N/C
13	GROUND	14	GROUND
15	LDDC_DATA	16	LDDC_CLK
17	VCC_LCD	18	VCC_LCD
19	VCC_LCD	20	VCC_LCD

Table 3-10: LVDS Connector Pinouts

3.2.10 LVDS Backlight Inverter Connector

CN Label: **INVERTER1**

CN Type: 5-pin wafer (1x5)

CN Location: See **Figure 3-12**

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

The backlight inverter connector provides power to an LCD panel.

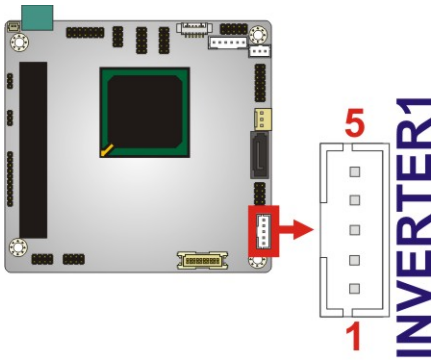


Figure 3-12: Backlight Inverter Connector Location

Pin	Description
1	BACKLIGHT ADJUST
2	GROUND
3	+12 V
4	GROUND
5	BACKLIGHT ENABLE

Table 3-11: Backlight Inverter Connector Pinouts

3.2.11 PCI-104 Connector

CN Label: **PC104_PLUS1**

CN Type: PCI-104 connector

CN Location: See **Figure 3-13**

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

The PCI-104 connector is for installing a PCI-104 expansion card.

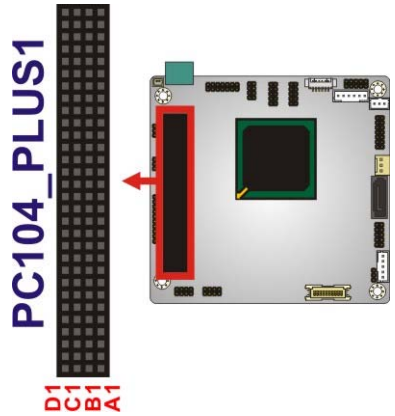


Figure 3-13: PCI-104 Connector Location

Pin	Row A	Row B	Row C	Row D
1	GND/5 V	TBD1	5 V	AD00
2	VI/O1	AD02	AD01	+5 V
3	AD05	GND	AD04	AD03
4	C/BE0#	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O2	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3 V	C/BE1#	AD15	+3.3 V
9	SERR#	GND	SB0#	PAR
10	GND	PERR#	+3.3 V	SDONE
11	STOP#	+3.3 V	LOCK#	GND
12	+3.3 V	TRDY#	GND	DEVSEL#
13	FRAME#	GND	IRDY#	+3.3 V
14	GND	AD16	+3.3 V	C/BE2#
15	AD18	+3.3 V	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3 V	AD23	AD22	+3.3 V
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	C/BE3#	VI/O1	IDSEL3

Pin	Row A	Row B	Row C	Row D
20	GND	AD26	AD25	GND
21	AD29	+5 V	AD28	AD27
22	+5 V	AD30	GND	AD31
23	REQ0#	GND	REQ1#	VI/O2
24	GND	REQ2#	+5 V	GNT0#
25	GNT1#	VI/O3	GNT2#	GND
26	+5 V	CLK0	GND	CLK1
27	CLK2	+5 V	CLK3	GND
28	GND	INTD#	+5 V	RST#
29	+12 V	INTA#	INTB#	INTC#
30	-12 V	TBD2	TBD	GND/3.3 V

Table 3-12: PCI-104 Connector Pinouts

3.2.12 Power Connector

CN Label: **PWR1**

CN Type: 3-pin terminal block connector

CN Location: See **Figure 3-14**

CN Pinouts: See **Table 3-13**

The PWR1 connector connects to the power source.

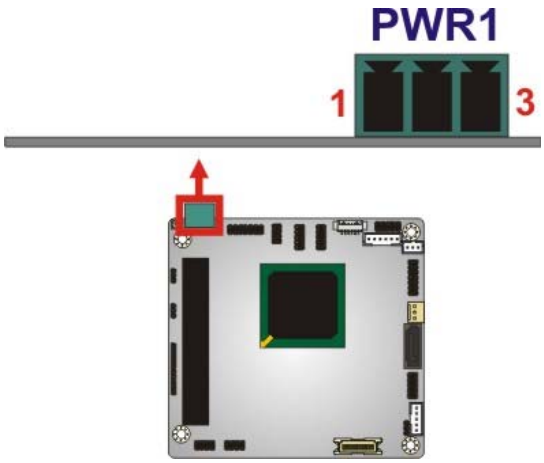


Figure 3-14: Power Connector Location

Pin	Description
1	+12 V
2	GND
3	+5 V

Table 3-13: Power Connector Pinouts

3.2.13 SATA Drive Connectors

CN Label: **SATA1**

CN Type: 7-pin SATA drive connectors

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

CN Pinouts: See **Table 3-14**

The SATA connectors connect to SATA hard drives or optical drives.

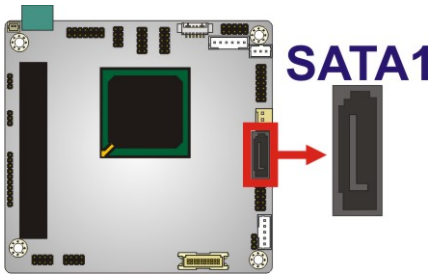


Figure 3-15: SATA Drive Connector Location

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

Table 3-14: SATA Drive Connector Pinouts

3.2.14 Serial Port Connector (RS-232)

CN Label:	**COM1**
CN Type:	10-pin header (2x5)
CN Location:	See **Figure 3-16**
CN Pinouts:	See **Table 3-15**

This connector provides RS-232 communications.

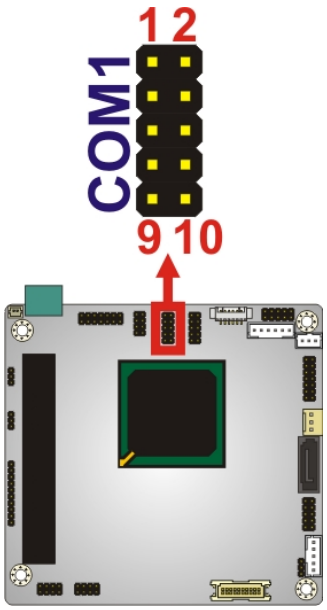


Figure 3-16: Serial Port Connector Location (COM1)

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

Table 3-15: Serial Port Connector Pinouts (COM1)

3.2.15 Serial Port Connector (RS-232/422/485)

CN Label:	**COM2**
CN Type:	14-pin header (2x7)
CN Location:	See **Figure 3-17**
CN Pinouts:	See **Table 3-16**

Used for RS-232/422/485 communications.

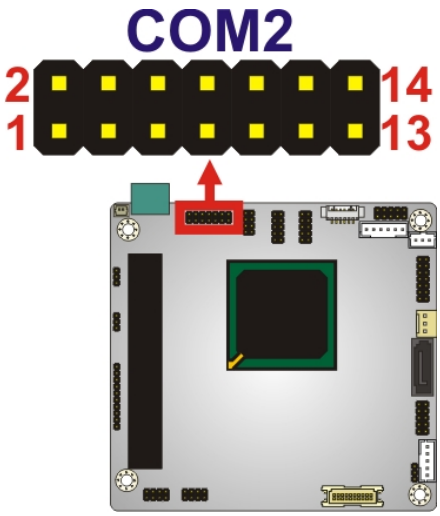


Figure 3-17: Serial Port Connector Location (COM2)

Pin	Description	Pin	Description
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	GND
11	TXD485+	12	TXD485-
13	RXD485+	14	RXD485-

Table 3-16: Serial Port Connector Pinouts (COM2)

3.2.16 USB Connector

CN Label: **USB01, USB23**

CN Type: 8-pin header (2x4)

CN Location: See **Figure 3-18**

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

The USB connectors connect to USB devices. Each pin header provides two USB ports.

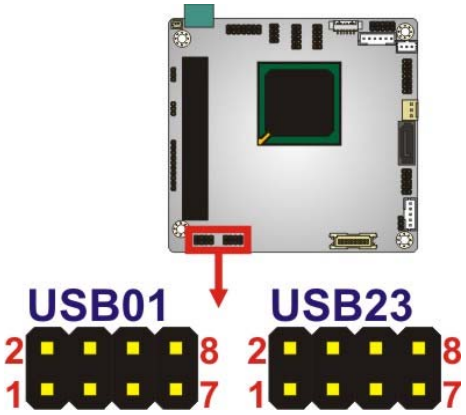


Figure 3-18: USB Connector Pinout Locations

Pin	Description	Pin	Description
1	VCC	2	GND
3	DATAN-	4	DATA1M+
5	DATAN+	6	DATAM-
7	GND	8	VCC

Table 3-17: USB Port Connector Pinouts

3.2.17 VGA Connector

CN Label: **VGA1**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 3-19**

CN Pinouts: See **Table 3-18**

The VGA connector connects to a monitor.

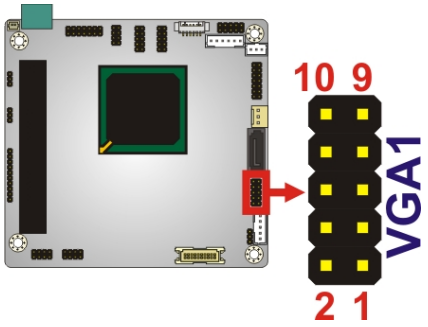


Figure 3-19: VGA Connector Location

Pin	Description	Pin	Description
1	L_RED	2	5 V_DDCLK
3	L_GREEN	4	5 V_DDCDA
5	L_BLUE	6	GND
7	5 VHSYNC	8	GND
9	5 VVSYNC	10	CRT_PLUG#

Table 3-18: VGA Connector Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the PM-PV-D4251/N4551/D5251 may result in permanent damage to the PM-PV-D4251/N4551/D5251 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including thePM-PV-D4251/N4551/D5251. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PM-PV-D4251/N4551/D5251 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 PM-PV-D4251/N4551/D5251, place it on an antic-static pad. This reduces the possibility of ESD damaging the PM-PV-D4251/N4551/D5251.
- ***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 the PM-PV-D4251/N4551/D5251 is installed. All installation notices should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the PM-PV-D4251/N4551/D5251 and injury to the person installing the motherboard.

4.2.1 Installation Notices

WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the PM-PV-D4251/N4551/D5251, PM-PV-D4251/N4551/D5251 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 PM-PV-D4251/N4551/D5251 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 PM-PV-D4251/N4551/D5251 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 PM-PV-D4251/N4551/D5251 off:

- When working with the PM-PV-D4251/N4551/D5251, 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 PM-PV-D4251/N4551/D5251 **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.

4.2.2 Installation Checklist

The following checklist is provided to ensure the PM-PV-D4251/N4551/D5251 is properly installed.

- All the items in the packing list are present
- A compatible memory module is properly inserted into the slot
- The CF Type I or CF Type II card is properly installed into the CF socket
- The jumpers have been properly configured
- The PM-PV-D4251/N4551/D5251 is inserted into a chassis with adequate ventilation
- The correct power supply is being used
- The following devices are properly connected
  - SATA drive
  - RS-232 devices
  - RS-422/485 devices
  - Keyboard and mouse
  - LAN
  - LCD backlight
  - Power
  - LVDS LCD screen
  - VGA display
  - USB port

WARNING:

A CPU should never be turned on without its heat sink being installed. If the heat sink is removed and the system turned on, permanent damage to the CPU, PM-PV-D4251/N4551/D5251 and other electronic components attached to the system may be incurred. Running a CPU without a heat sink may also result in injury to the user.

4.3 Unpacking

When the PM-PV-D4251/N4551/D5251 is unpacked, please do the following:

- Follow the anti-static precautions outlined in **Section 4.1**.
- Make sure the packing box is facing upwards so the PM-PV-D4251/N4551/D5251 does not fall out of the box.
- Make sure all the components in the unpacking list are present.

NOTE:

If some of the components listed in the unpacking list are missing, please do not proceed with the installation. Contact the IEI reseller or vendor you purchased the PM-PV-D4251/N4551/D5251 from or contact an IEI sales representative directly. To contact an IEI sales representative, please send an email to sales@iei.com.tw.

4.4 SO-DIMM Installation

To install an SO-DIMM, please follow the steps below and refer to Figure 4-1.

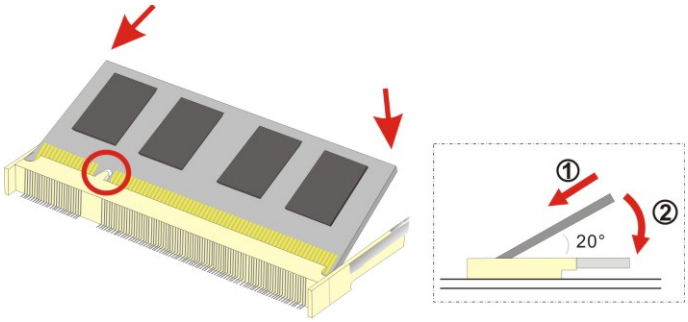


Figure 4-1: SO-DIMM Installation

Step 1: **Locate the SO-DIMM socket**. Place the board on an anti-static mat.

Step 2: **Align the SO-DIMM with the socket**. Align the notch on the memory with the notch on the memory socket.

Step 3: **Insert the SO-DIMM**. Push the memory in at a 20º angle. (See Figure 4-1)

Step 4: **Seat the SO-DIMM**. Gently push downwards and the arms clip into place. (See Figure 4-1)

4.5 CompactFlash® Card Installation

A CompactFlash® Type II (CF Type II) card slot is located on the solder side of the CPU board. When appropriately formatted, a CF Type II card can serve as a bootable hard drive in applications where installation space is limited. The CF Type II card occupies a secondary IDE channel. Configuration options can be found through the BIOS configuration utility.

To install a CF Type II card, follow the instructions below.

Step 1: Turn the CPU board over so that the CF Type II card socket is facing up.

Step 2: Gently push the CF Type II card into the socket until it clicks into place. (See **Figure 4-2**)

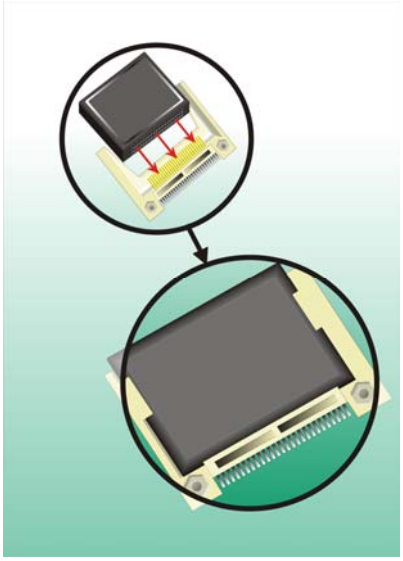
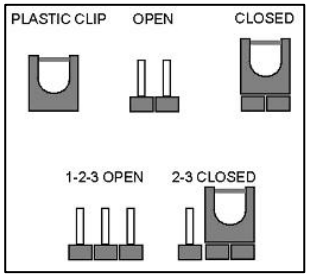


Figure 4-2: CompactFlash® Card Installation

4.6 Jumper Settings

NOTE:

A jumper is a metal bridge that is used to close an electrical circuit. It consists of two metal pins and a small metal clip (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.



Before the PM-PV-D4251/N4551/D5251 is installed in the system, the jumpers must be set in accordance with the desired configuration. There are three jumpers on the PM-PV-D4251/N4551/D5251. These three jumpers are listed in the table below.

Connector	Type	Label
AT/ATX Power Mode Jumper	3-pin header	JP1
Clear CMOS Jumper	3-pin header	J_CMOS1
CompactFlash® Setup	3-pin header	JP3
LVDS Voltage Selection	3-pin header	J_LVDS1
PCI-104 Voltage Setup	3-pin header	JP3
COM 2 Function Select Jumper	6-pin header	JP1

Table 4–1: Jumper Settings

4.6.1 AT/ATX Power Mode Jumper

Jumper Label: **ATXCTL1**

Jumper Type: 3-pin header

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

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

The AT Power Select jumper specifies the systems power mode as AT or ATX.

Setting	Description
2-3	Use AT power
Open	Use ATX power

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

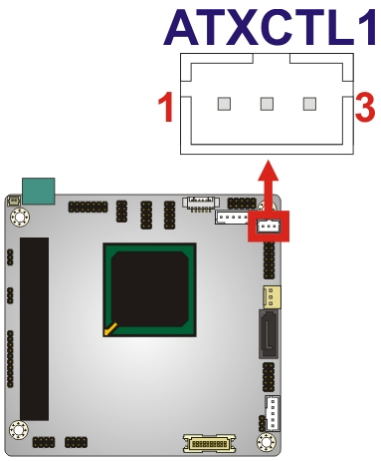


Figure 4-3: AT/ATX Power Mode Jumper Location

4.6.2 Clear CMOS Jumper

Jumper Label:	**J_CMOS1**
Jumper Type:	3-pin header
Jumper Settings:	See Table 4-3
Jumper Location:	See Figure 4-4

To reset the BIOS, move the jumper to the "Clear BIOS" position for 3 seconds or more, then move back to the default position.

Setting	Description
1-2	Keep current BIOS setup
2-3	Clear BIOS

Table 4-3: Clear BIOS Jumper Settings

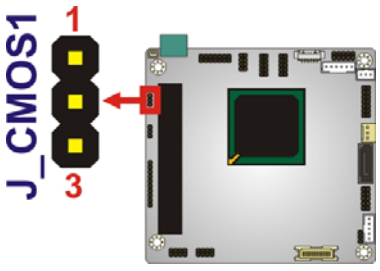


Figure 4-4: Clear BIOS Jumper Location

4.6.3 CompactFlash® Setup

Jumper Label:	**SW_CF1**
Jumper Type:	switch
Jumper Settings:	See Table 4-4
Jumper Location:	See Figure 4-5

The CompactFlash® slot is connected through an IDE connection. This switch sets the CompactFlash® card as the master or slave IDE device.

Setting	Description
Default position (marked on board)	Slave
Other position	Master

Table 4-4: CompactFlash® Setup Jumper Settings

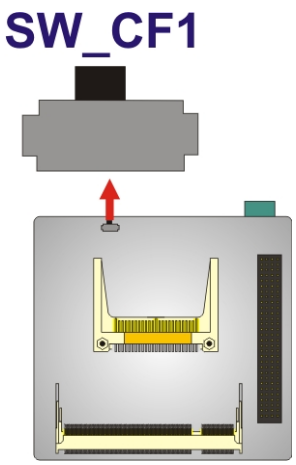


Figure 4-5: CompactFlash® Setup Jumper Location

4.6.4 LVDS Voltage Selection

WARNING:

Incorrect voltages can destroy the LCD panel. Make sure to select a voltage that matches the voltage required by the LCD panel.

Jumper Label: **J_VLVDS1**

Jumper Type: 3-pin header

Jumper Settings: See Table 4-5

Jumper Location: See Figure 4-6

The LCD voltage selection jumper sets the voltage of the power supplied ot the LCD panel.

Setting	Description
1-2	+3.3 V
2-3	+5.0 V

Table 4-5: LVDS Voltage Selection Jumper Settings

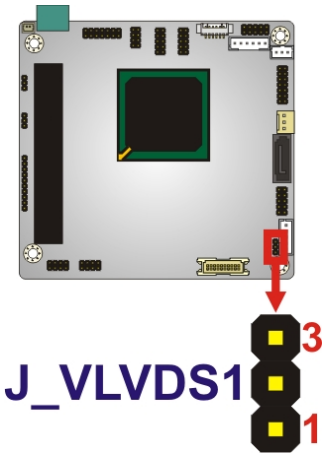


Figure 4-6: LVDS Voltage Selection Jumper Locations

4.6.5 PCI-104 Voltage Setup

Jumper Label: **JP1**

Jumper Type: 3-pin header

Jumper Settings: See Table 4-6

Jumper Location: See Figure 4-7

This jumper selects the voltage supplied to the PCI-104 expansion module.

Setting	Description
1-2	+5.0 V
2-3	+3.3 V

Table 4-6: PCI-104 Voltage Jumper Settings

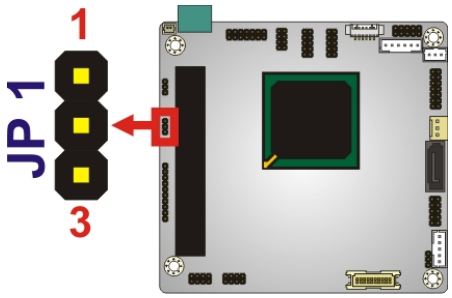


Figure 4-7: PCI-104 Voltage Jumper Location

4.6.6 COM 2 Function Select Jumper

Jumper Label: **JP2**

Jumper Type: 6-pin header

Jumper Settings: See Table 4-7

Jumper Location: See Figure 4-8

The COM 2 Function Select jumper sets the communication protocol used by the second serial communications port (COM 2) as RS-232, RS-422 or RS-485.

Setting	Description
1-2	RS-232
3-4	RS-422
5-6	RS-485

Table 4-7: COM 2 Function Select Jumper Settings

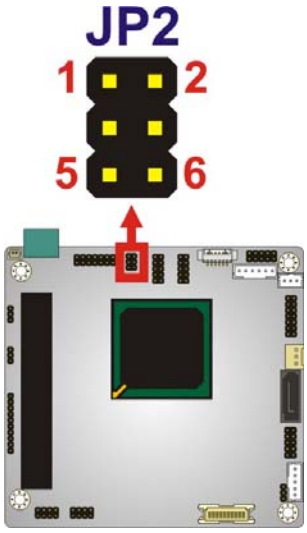


Figure 4-8: COM 2 Function Select Jumper Location

4.7 Chassis Installation

WARNING:

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the PM-PV-D4251/N4551/D5251 must have air vents to allow cool air to move into the system and hot air to move out.

The PM-PV-D4251/N4551/D5251 must be installed in a chassis with ventilation holes on the sides allowing air to flow through the heat sink surface. In a system with an individual power supply unit, the power supply cooling fan can help generate airflow through the board surface.

NOTE:

IEI has a wide range of backplanes available. Please contact your 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.

4.8 Internal Peripheral Device Connections

This section describes the installation of various peripheral connectors available for the PM-PV-D4251/N4551/D5251.

4.8.1 Keyboard/Mouse Y-cable Connector

The PM-PV-D4251/N4551/D5251 is shipped with a keyboard/mouse Y-cable connector. The keyboard/mouse Y-cable connector connects to a keyboard/mouse connector on the PM-PV-D4251/N4551/D5251 and branches into two cables that are each connected to a PS/2 connector, one for a mouse and one for a keyboard. To connect the keyboard/mouse Y-cable connector, please follow the steps below.

Step 1: Locate the connector. The location of the keyboard/mouse Y-cable connector is shown in Section 3.1.1.

Step 2: **Align the connectors**. Correctly align pin 1 on the cable connector with pin 1 on the PM-PV-D4251/N4551/D5251 keyboard/mouse connector. See **Figure 4-9**.

Step 3: **Insert the cable connectors** Once the cable connector is properly aligned with the keyboard/mouse connector on the PM-PV-D4251/N4551/D5251, connect the cable connector to the onboard connectors. See **Figure 4-9**.

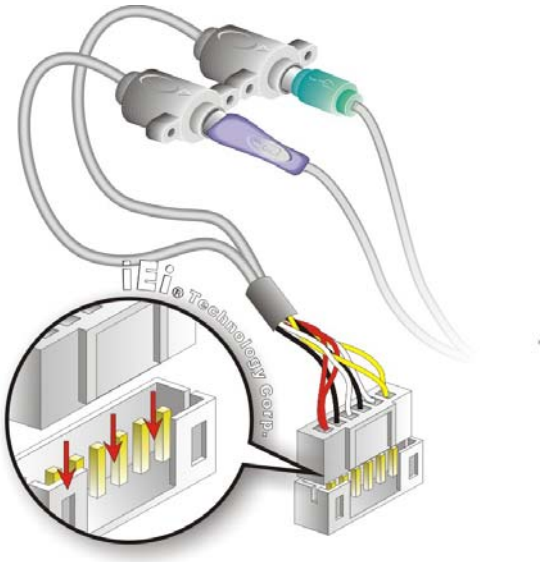


Figure 4-9: Keyboard/mouse Y-cable Connection

Step 4: **Attach PS/2 connectors to the chassis**. The keyboard/mouse Y-cable connector is connected to two PS/2 connectors. To secure the PS/2 connectors to the chassis please refer to the installation instructions that came with the chassis.

Step 5: **Connect the keyboard and mouse**. Once the PS/2 connectors are connected to the chassis, a keyboard and mouse can each be connected to one of the PS/2 connectors. The keyboard PS/2 connector and mouse PS/2 connector are both marked. Please make sure the keyboard and mouse are connected to the correct PS/2 connector.

4.8.2 LVDS LCD Installation

The PM-PV-D4251/N4551/D5251 can be connected to a TFT LCD screen through the 30-pin LVDS crimp connector on the board. To connect a TFT LCD to the PM-PV-D4251/N4551/D5251, 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 4-10**. 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.

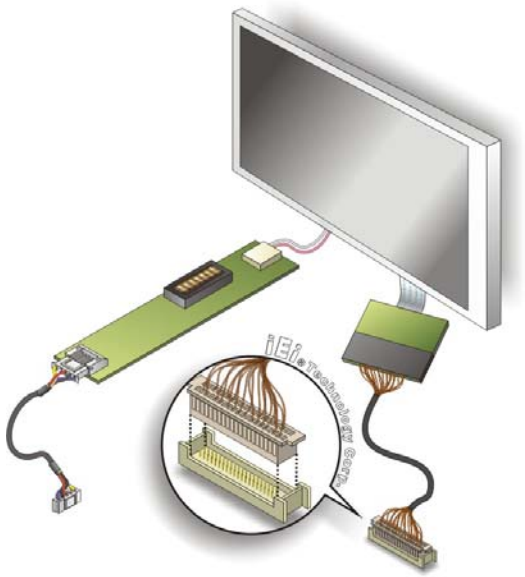


Figure 4-10: LVDS Connector

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 4-11**. When inserting the cable connector, make sure the pins are properly aligned.

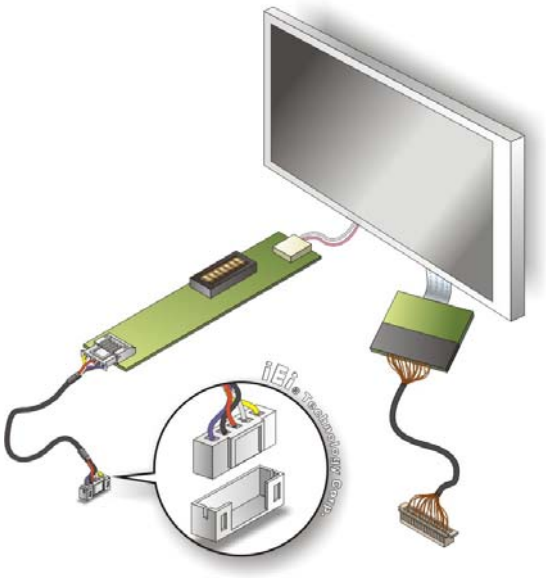


Figure 4-11: Backlight Inverter Connection

4.8.3 SATA Drive Connection

The PM-PV-D4251/N4551/D5251 is shipped with two SATA drive cables and one SATA drive power cable. To connect the SATA drives to the connectors, please follow the steps below.

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

Step 2: **Insert the cable connector**. Press the clip on the connector at the end of the SATA cable and insert the cable connector into the on-board SATA drive connector. See **Figure 4-12**.

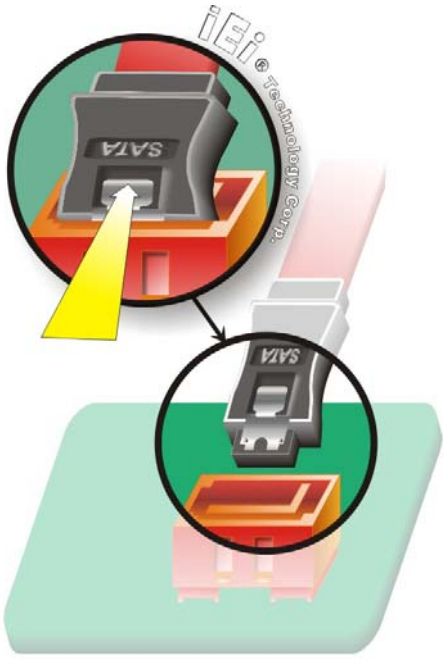


Figure 4-12: SATA Drive Cable Connection

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 4-13**.

Step 4: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 4-13**.

Figure 4-13: SATA Power Drive Connection

4.8.4 USB Cable (Dual Port without Bracket)

The PM-PV-D4251/N4551/D5251 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 PM-PV-D4251/N4551/D5251 USB connector.

Step 3: **Insert the cable connectors**. Once the cable connectors are properly aligned with the USB connectors on the PM-PV-D4251/N4551/D5251, connect the cable connectors to the on-board connectors. See **Figure 4-14**.

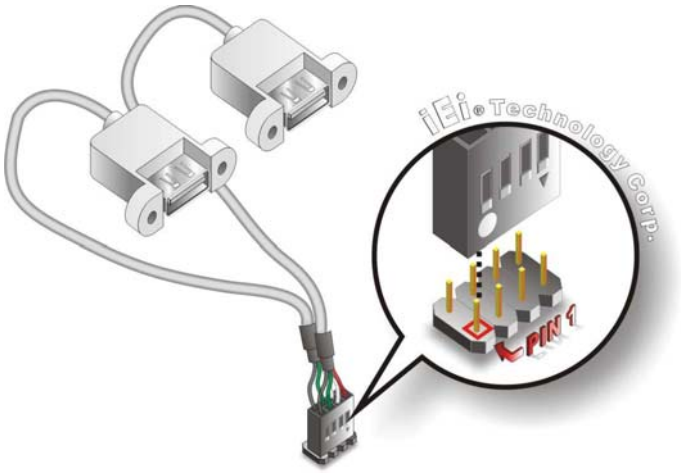


Figure 4-14: Dual USB Cable Connection

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

4.9 Software Installation

All the drivers for the PM-PV-D4251/N4551/D5251 are on the CD that came with the system. To install the drivers, please follow the steps below.

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

NOTE:

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

Step 2: The driver main menu appears (**Figure 4-15**).

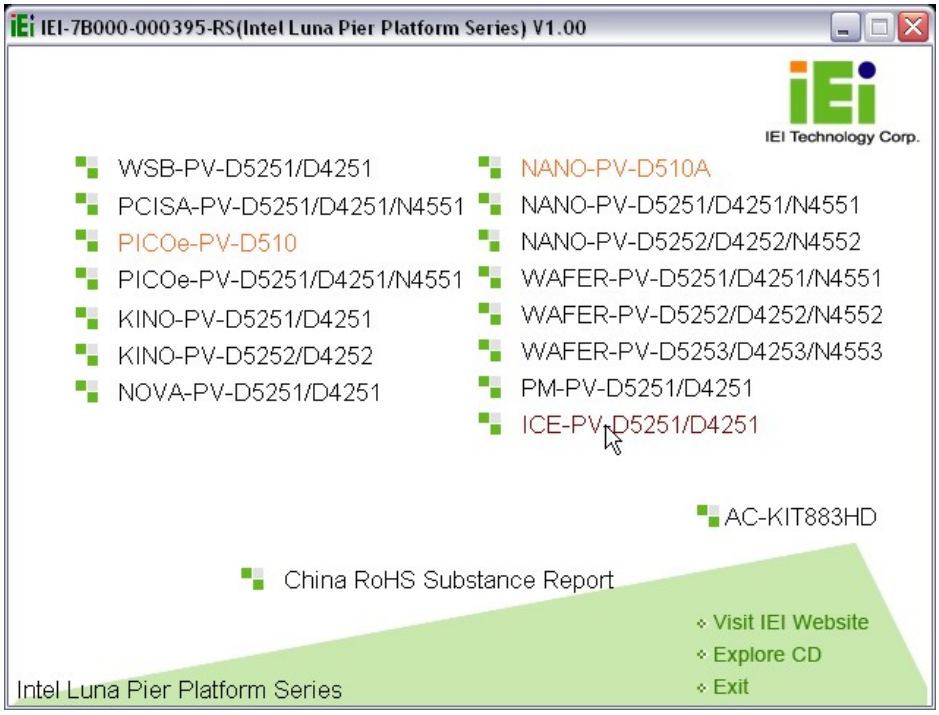


Figure 4-15: Introduction Screen

Step 3: Click PM-PV-D4251/N4551/D5251.

Step 4: Select OS.

Step 5: A new screen with a list of available drivers appears (**Figure 4-16**).

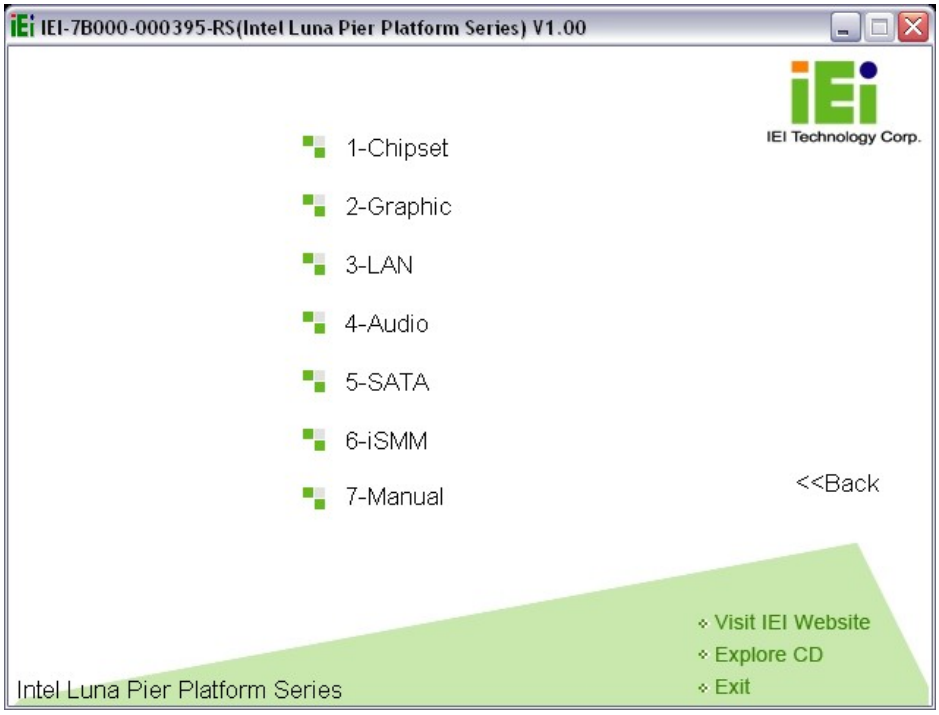


Figure 4-16: Available Drivers

Step 6: Install all of the necessary drivers in this menu.

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

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

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

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
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Load previous values.
F3 key	Load optimized defaults

Key	Function
F4 key	Save all the CMOS changes
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

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

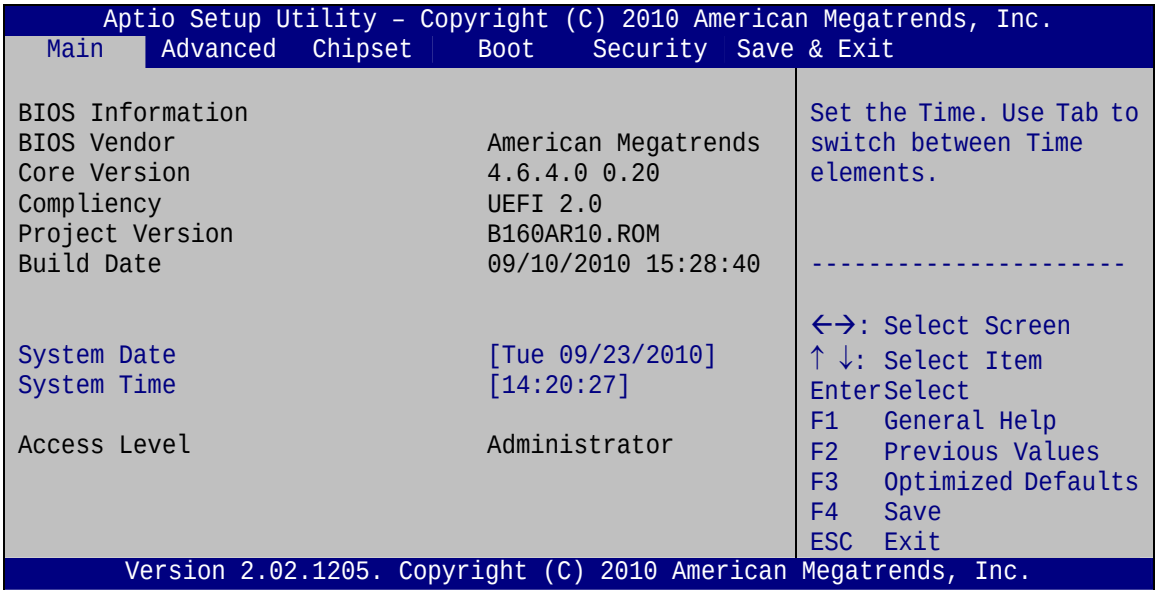
The **menu bar** on top of the BIOS screen has the following main items:

- 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

➔ **BIOS Information**

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:** Date the current BIOS version was made

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]**

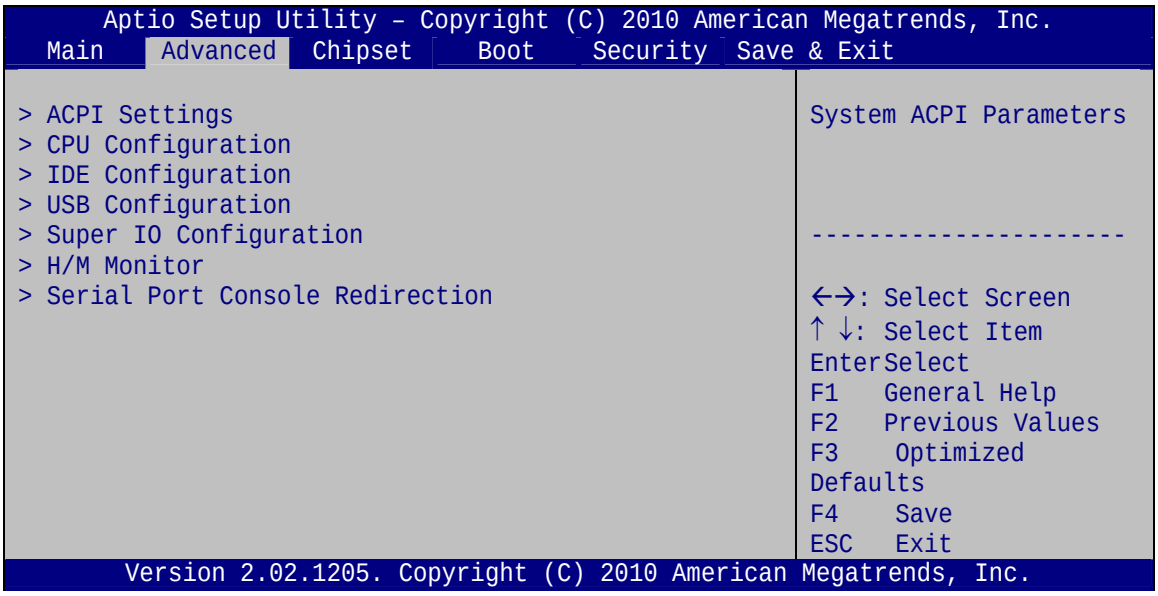
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

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

WARNING!

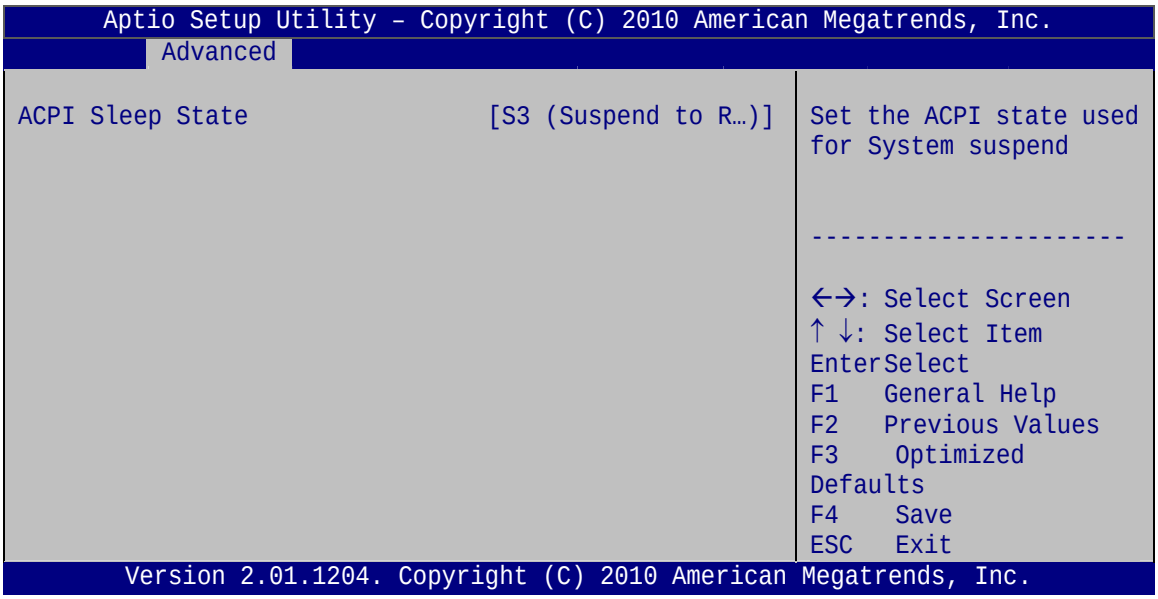
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.



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 Settings

➔ **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.

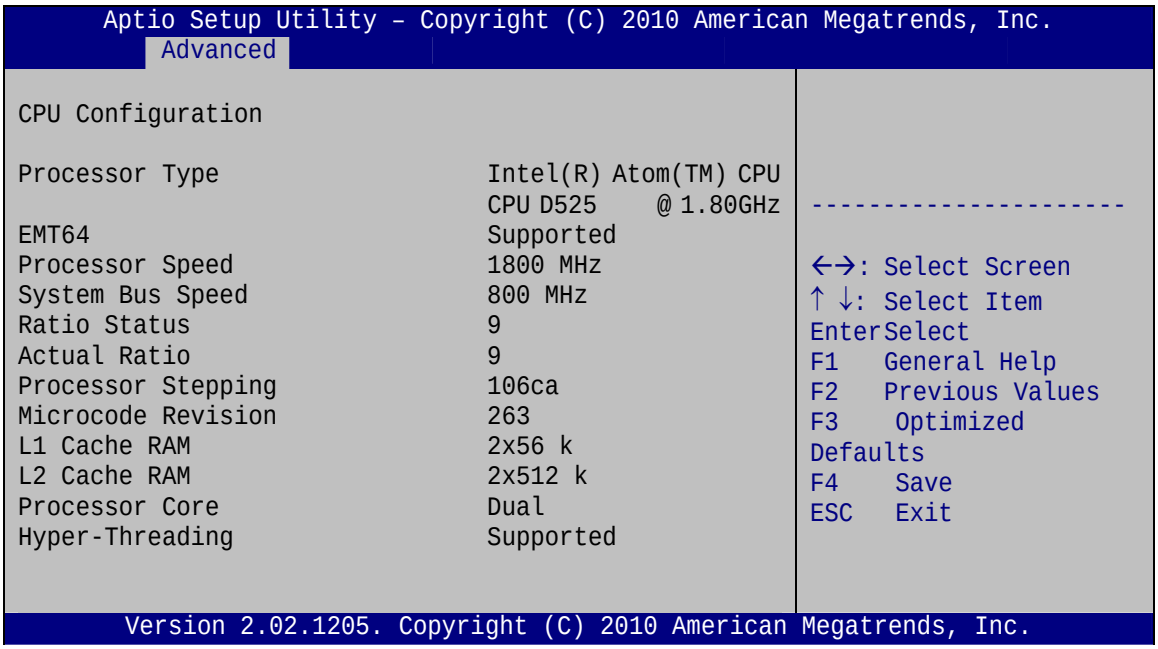
➔ **Suspend Disabled**

➔ **S1 (CPU Stop Clock)** The system enters S1(POS) sleep state. The system appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.

➔ **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.



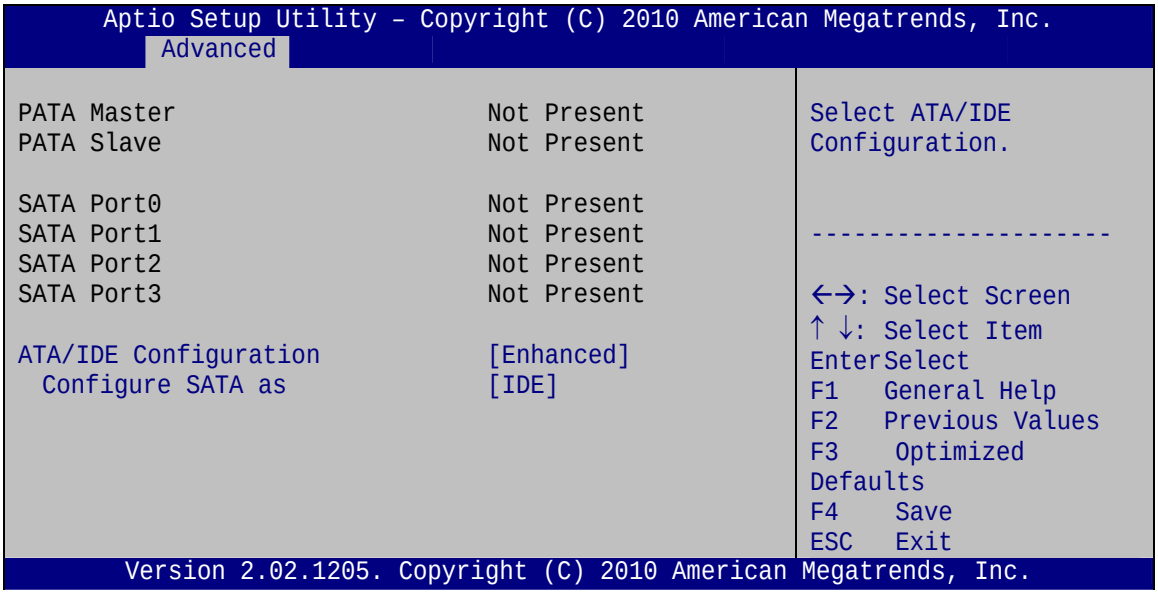
BIOS Menu 4: CPU Configuration

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

- Processor Type: Lists the brand name of the CPU being used
- EMT64: Indicates if the EM64T is supported by the CPU.
- Processor Speed: Lists the CPU processing speed
- System Bus: Lists the system bus
- Ratio Status: List the maximum FSB divisor
- Actual Ratio: Lists current FSB divisor
- Processor Stepping: Lists the CPU processing stepping
- Microcode Revision: Lists the microcode revision
- L1 Cache RAM: Lists the CPU L1 cache size
- L2 Cache RAM: Lists the CPU L2 cache size
- Processor Core: Lists the number of the processor core
- Hyper-Threading: Indicates if the Intel Hyper-Threading Technology is supported by the CPU.

5.3.3 SATA Configuration

Use the **SATA 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

➔ **ATA/IDE Configurations [Enhanced]**

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

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

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

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

➔ **Configure SATA as [IDE]**

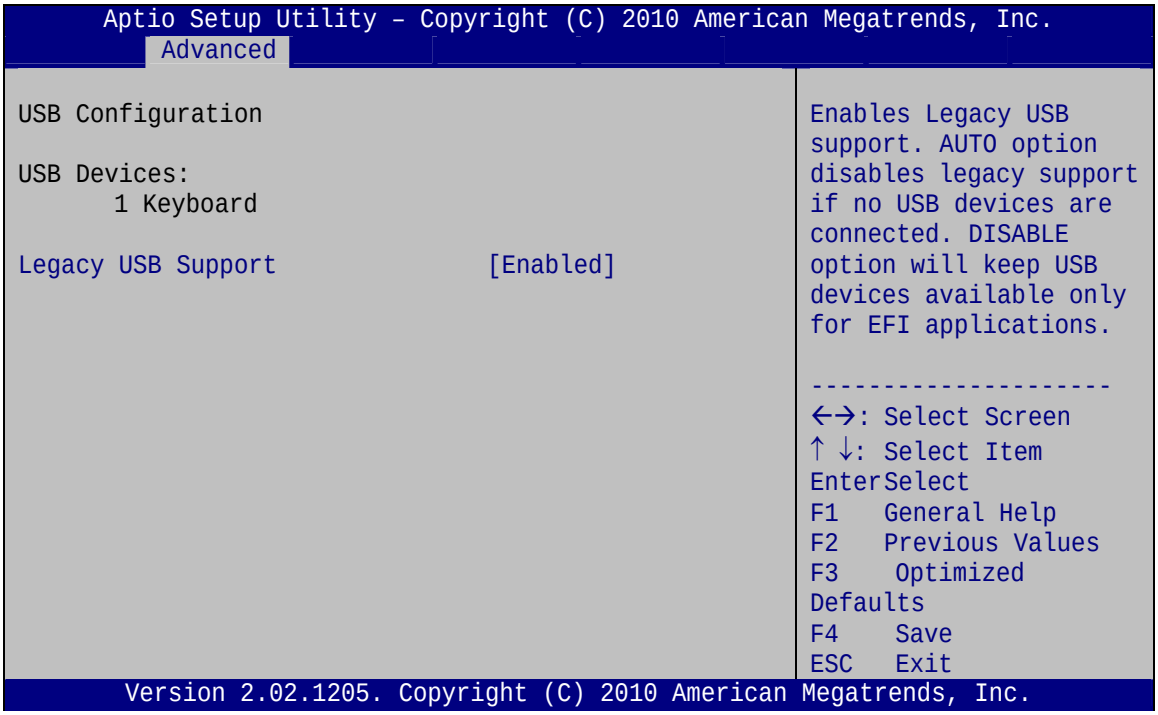
Use the **Configure SATA as** option to configure SATA devices as normal IDE devices.

➔ **IDE** **DEFAULT** Configures SATA devices as normal IDE device.

➔ **AHCI** Configures SATA devices as AHCI device.

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

➔ **USB Devices**

The **USB Devices Enabled** field lists the USB devices that are enabled on the system

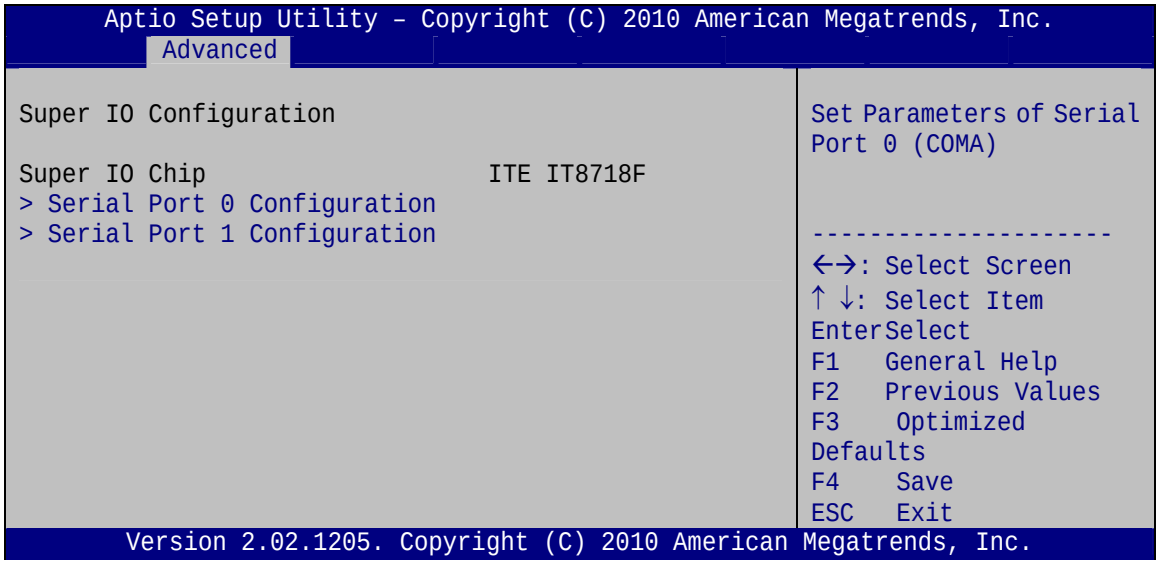
➔ **Legacy USB Support [Enabled]**

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.

➔ **Enabled**	**DEFAULT**	Legacy USB support enabled
➔ **Disabled**		Legacy USB support disabled
➔ **Auto**		Legacy USB support disabled if no USB devices are connected

5.3.5 Super IO Configuration

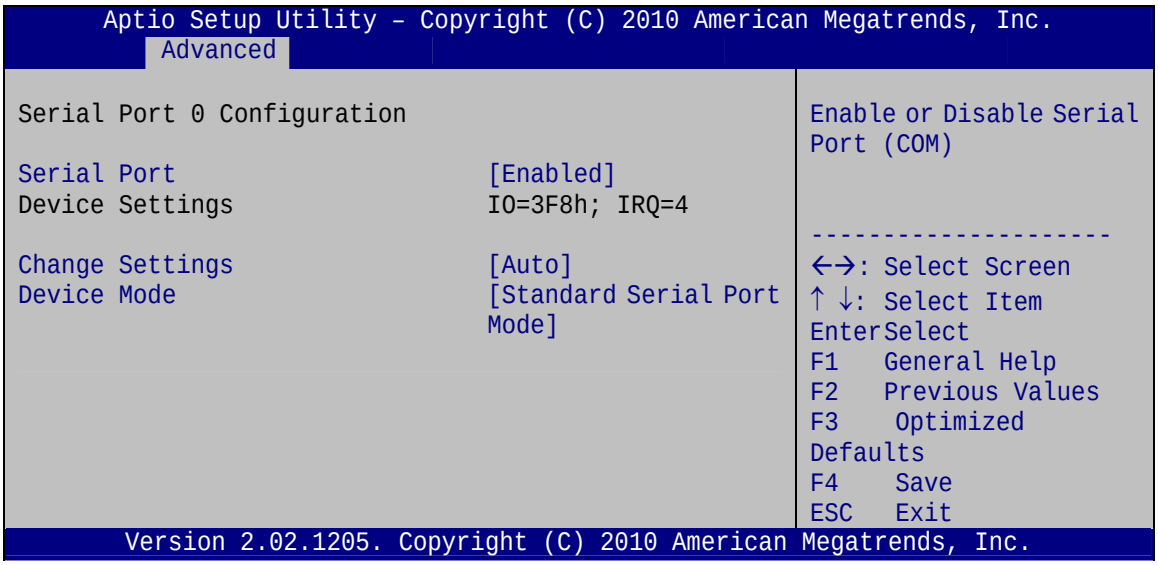
Use the **Super IO Configuration** menu (**BIOS Menu 7**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.



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 0 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, 5, 6, 7, 10, 11, 12**	Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**	Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**	Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**	Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12

➔ **Serial Port1 Mode [Standard Serial Port Mode]**

Use the **Serial Port1 Mode** option to select the transmitting and receiving mode for the first serial port.

➔ **Standard Serial Port Mode**	**DEFAULT**	Serial Port 1 mode is standard
➔ **IrDA 1.0**		Serial Port 1 mode is IrDA 1.0 (HP SIR)
➔ **ASKIR Mode**		Serial Port 1 mode is ASK IR

5.3.5.1.2 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=2F8h; IRQ=3**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3
➔ **IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 10, 11, 12

➔ **Serial Port1 Mode [Standard Serial Port Mode]**

Use the **Serial Port1 Mode** option to select the transmitting and receiving mode for the first serial port.

➔ **Standard Serial Port Mode**	**DEFAULT**	Serial Port 1 mode is standard
➔ **IrDA 1.0**		Serial Port 1 mode is IrDA 1.0 (HP SIR)
➔ **ASKIR Mode**		Serial Port 1 mode is ASK IR

5.3.6 H/W Monitor

The H/W Monitor menu (**BIOS Menu 9**) shows the operating temperature, fan speeds and system voltages.

```
 Aptio Setup Utility – Copyright (C) 2010 American Megatrends, Inc.
          Advanced

PC Health Status

CPU Smart Fan control              [Automatic Mode]
CPU Temperature Limit of OFF       60
CPU Temperature Limit of ON        40
CPU_Fan1 Start PWM                 70
Slope PWM                          [0.5    PWM]
                                                        ---------------------
CPU Core1 Temperature              :+39 C               ←→: Select Screen
CPU Core2 Temperature              :+39 C               ↑ ↓: Select Item
System Temperature                 :+40 C               EnterSelect
CPU_FAN1 Speed                     :4950 RPM            F1   General Help
CPU core                           :+1.152 V            F2   Previous Values
+1.05V                             :+1.056 V            F3    Optimized
+3.00V                             :+3.328 V            Defaults
+5.00V                             :+4.945 V            F4    Save
+12.0V                             :+12.096 V           ESC   Exit
+1.5V_DDR3                         :+1.504 V
+1.5V                              :+1.408 V
5VSB                               :+4.972 V
VBAT                               :+3.264 V

 Version 2.02.1205. Copyright (C) 2010 American Megatrends, Inc.
```

BIOS Menu 9: Hardware Health Configuration

➔ **PC Health Status**

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

- System Temperatures:
  - CPU Core1 Temperature
  - CPU Core2 Temperature
  - System Temperature
- Fan Speeds:
  - CPU Fan Speed
- Voltages:

- CPU core
- 1.05V
- 3.00V
- 5.00V
- 12.0V
- 1.5VDDR3
- 1.5V
- 5VSB
- VBAT

➔ **CPU_FAN1 Mode Setting [Full On Mode]**

Use the **Mode Setting** option to configure the second fan.

➔ **Full On Mode**	**DEFAULT**	Fan is on all the time
➔ **Automatic mode**		The fan adjusts its speed using these settings: CPU Temperature Limit of OFF CPU Temperature Limit of ON CPU_Fan1 Start PWM Slope PWM
➔ **PWM Manual mode**		The fan spins at the speed set in: CPU_Fan1 PWM control

➔ **CPU Temperature Limit of OFF [030]**

WARNING:

CPU failure can result if this value is set too high

The fan will turn off if the temperature falls below this value.

- Minimum Value: 0°C
- Maximum Value: 127°C

➔ **CPU Temperature Limit of ON [040]**

WARNING:

CPU failure can result if this value is set too high

When the fan is off, it will only start when the temperature exceeds this setting.

- Minimum Value: 0°C
- Maximum Value: 127°C

➔ **CPU_FAN1 Start PWM [070]**

This is the initial speed of the fan when it first starts spinning.

- PWM Minimum Mode: 0
- PWM Maximum Mode: 127

➔ **Slope PWM [1 PWM]**

A bigger value will increase the fan speed in big amounts. A smaller value will increase the speed more gradually.

- 0.125 PWM
- 0.25 PWM
- 0.5 PWM
- 1 PWM
- 2 PWM
- 4 PWM
- 8 PWM
- 16 PWM

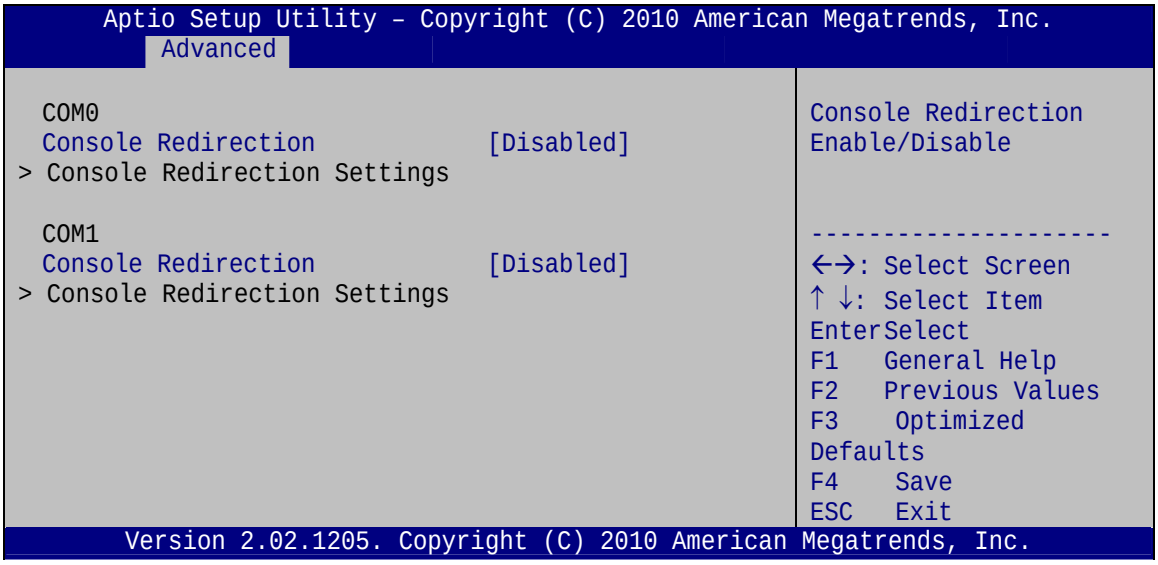
➔ **CPU_Fan1 PWM Control [070]**

This value specifies the speed of the fan.

- PWM Minimum Mode: 0
- PWM Maximum Mode: 127

5.3.7 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 10**) allows the console redirection options to be configured. Console redirection allows users to maintain a system remotely by re-directing keyboard input and text output through the serial port.



BIOS Menu 10: Serial Port Console Redirection

➔ **Console Redirection [Disabled]**

Use **Console Redirection** option to enable or disable the console redirection function.

➔ **Disabled** **DEFAULT** Disabled the console redirection function

➔ **Enabled** Enabled the console redirection function

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 11**) to access the Northbridge and Southbridge configuration menus

WARNING!

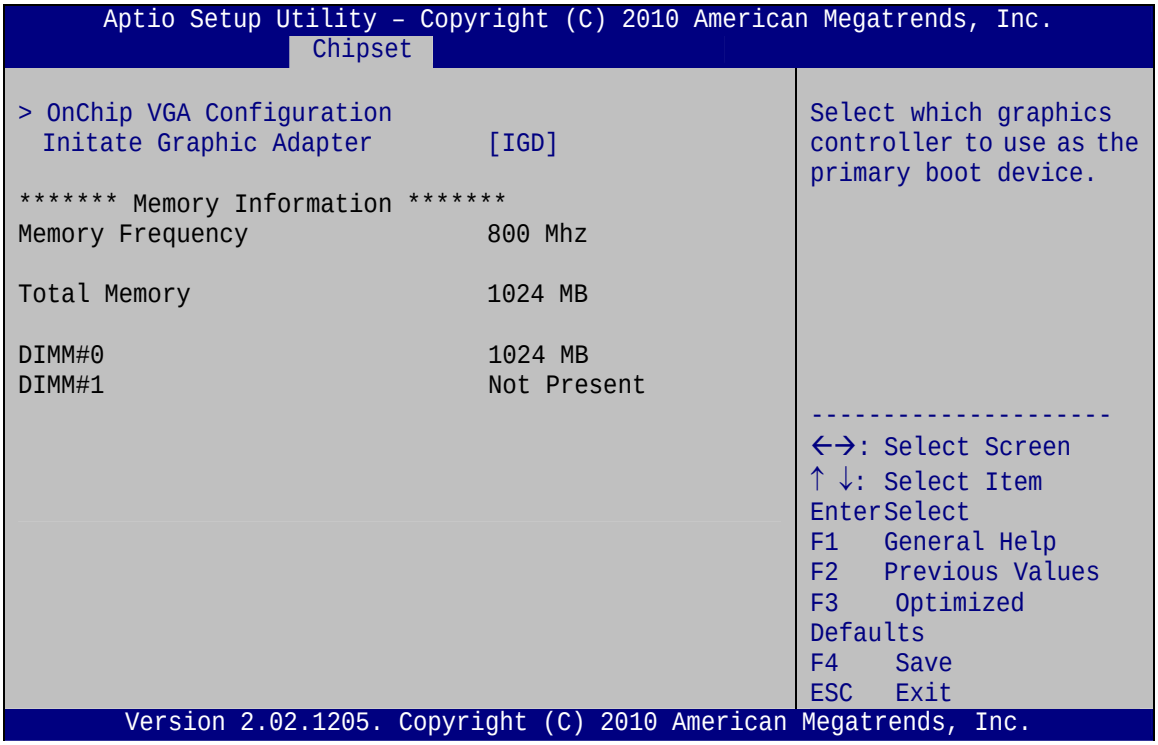
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

```
      Aptio Setup Utility – Copyright (C) 2010 American Megatrends, Inc.
  Main    Advanced  Chipset    Boot    Security  Save & Exit

> Host Bridge                                   North Bridge Parameters
> South Bridge
> Intel IGD SWSCI OpRegion                     ---------------------
                                                ←→: Select Screen
                                                ↑ ↓: Select Item
                                                EnterSelect
                                                F1   General Help
                                                F2   Previous Values
                                                F3    Optimized
                                                Defaults
                                                F4    Save
                                                ESC   Exit

        Version 2.02.1205. Copyright (C) 2010 American Megatrends, Inc.
```

BIOS Menu 11: Chipset

5.4.1 Host Bridge Configuration

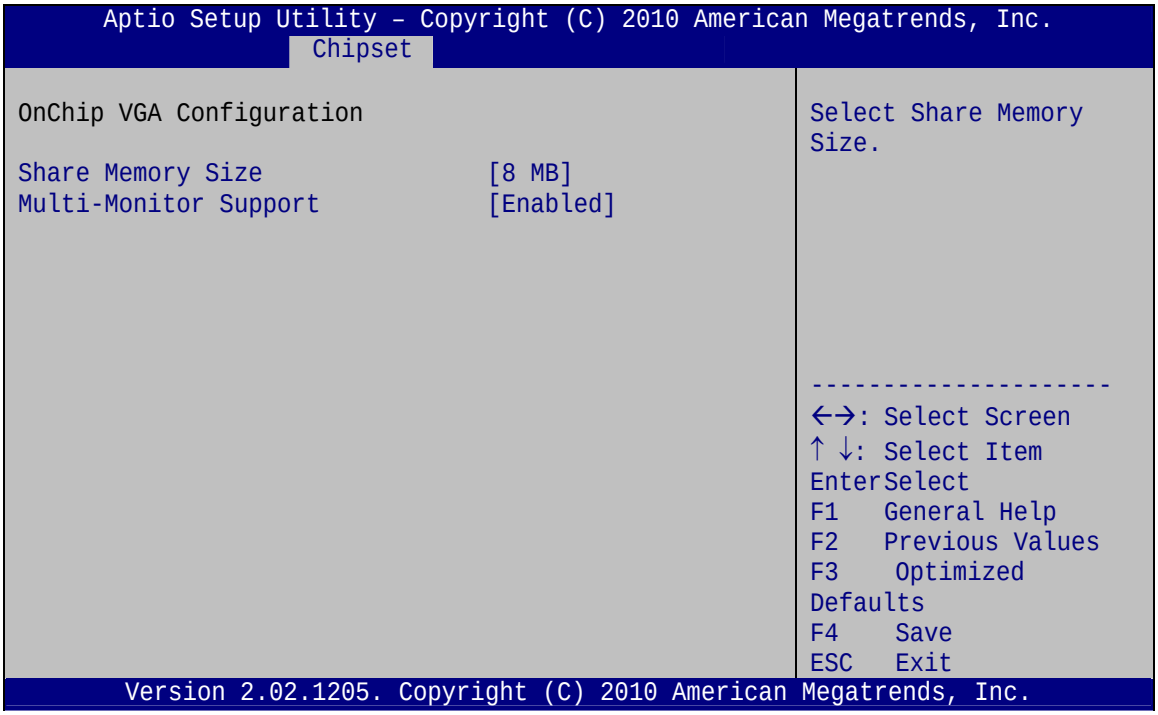
Use the **Host Bridge Configuration** menu (**BIOS Menu 12**) to configure the Northbridge chipset.



BIOS Menu 12: Host Bridge Chipset Configuration

5.4.1.1 OnChip VGA Configuration

Use the **OnChip VGA Configuration** menu (**BIOS Menu 12**) to configure the OnChip VGA.



BIOS Menu 13: OnChip VGA Configuration

➔ **Share Memory Size [8 MB]**

Use the **Share Memory Size** option to set the amount of system memory allocated to the integrated graphics processor when the system boots. The system memory allocated can then only be used as graphics memory, and is no longer available to applications or the operating system. Configuration options are listed below:

- Disabled
- 1 MB
- 8 MB **Default**

➔ **Multi-Monitor Support [Enabled]**

Use **Multi-Monitor Support** option to enable or disable the multi-monitor function.

➔ **Disabled** Disabled the multi-monitor function

➔ **Enabled** **DEFAULT** Enabled the multi-monitor function

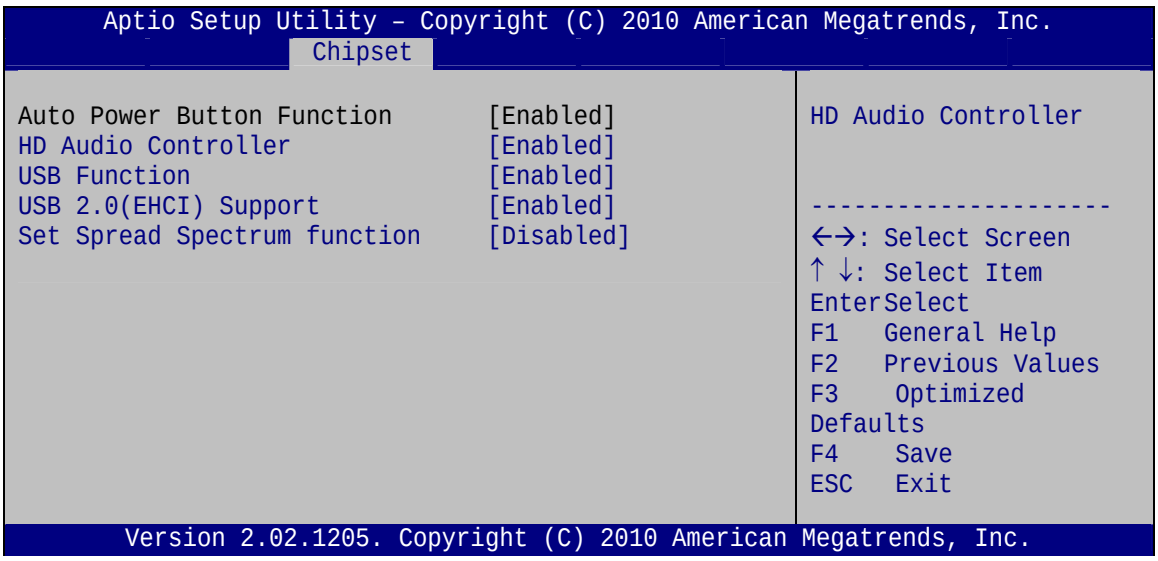
➔ **Initiate Graphic Adapter**

Use the **Initiate Graphic Adapter** option to select the graphics controller used as the primary boot device. Select either an integrated graphics controller (IGD) or a combination of PCI graphics controller or an IGD. Configuration options are listed below:

- IGD **DEFAULT**
- PCI/IGD

5.4.2 South Bridge Configuration

Use the **South Bridge Configuration** menu (**BIOS Menu 14**) to configure the Southbridge chipset.



BIOS Menu 14:South Bridge Chipset Configuration

➔ **HD Audio Controller [Enabled]**

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

- ➔ **Enabled** **DEFAULT** The onboard High Definition Audio controller automatically detected and enabled
- ➔ **Disabled** The onboard High Definition Audio controller is disabled

➔ **USB Function [Enabled]**

Use the **USB Function** BIOS option to enable or disable USB function support.

- ➔ **Disabled** USB function support disabled
- ➔ **Enabled** **DEFAULT** USB function support enabled

➔ **USB 2.0 (EHCI) Support [Enabled]**

Use the **USB 2.0 (EHCI) Support** BIOS option to enable or disable USB 2.0 support.

- ➔ **Enabled** **DEFAULT** USB 2.0 (EHCI) support enabled
- ➔ **Disabled** USB 2.0 (EHCI) support disabled

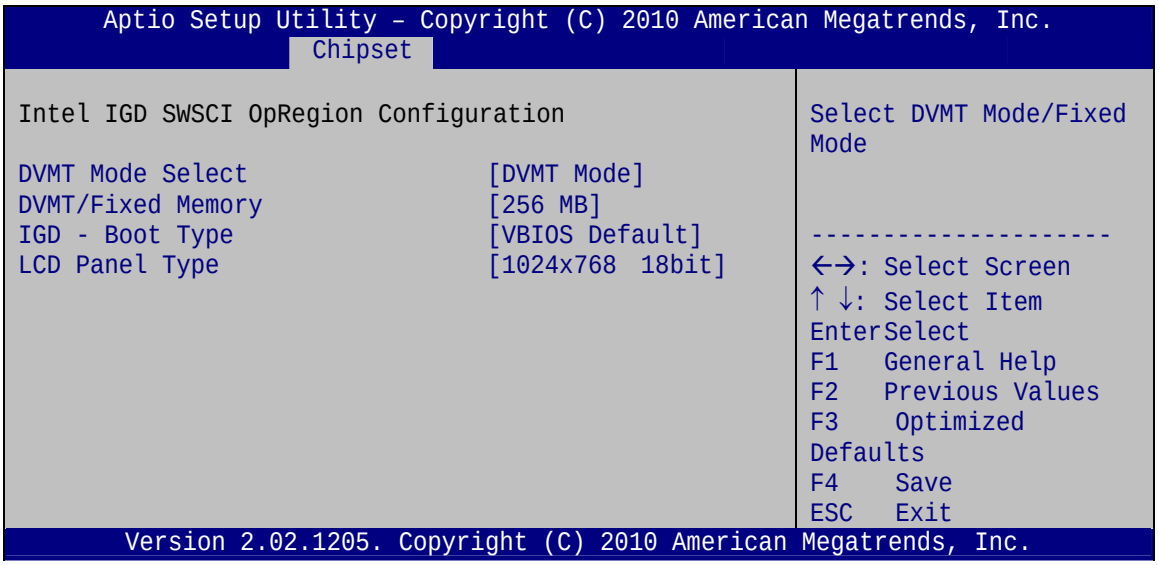
➔ **Set Spread Spectrum Function [Disabled]**

The **Set Spread Spectrum Function** option can help to improve CPU EMI issues.

- ➔ **Disabled** **DEFAULT** The spread spectrum mode is disabled
- ➔ **Enabled** The spread spectrum mode is enabled

5.4.3 Intel IGD SWSCI OpRegion

Use the **Intel IGD SWSCI OpRegion** menu to configure the video device connected to the system.



BIOS Menu 15:South Bridge Chipset Configuration

➔ **DVMT Mode Select [DVMT Mode]**

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

➔ **Fixed Mode**		A fixed portion of graphics memory is reserved as graphics memory.
➔ **DVMT Mode**	**DEFAULT**	Graphics memory is dynamically allocated according to the system and graphics needs.

➔ **DVMT/FIXED Memory [256 MB]**

Use the **DVMT/FIXED Memory** option to specify the maximum amount of memory that can be allocated as graphics memory. Configuration options are listed below.

- 128 MB
- 256 MB **Default**
- Maximum

➔ **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**
- CRT
- LFP
- CRT + LFP

➔ **LCD Panel Type [Select by Panel ID]**

Use the **LCD Panel Type** option to select the type of flat panel connected to the system. Configuration options are listed below.

- 640x480 18bit
- 800x480 18bit
- 800x600 18bit
- 1024x768 18bit **DEFAULT**
- 1280x1024 18bit
- 1366x768 18bit
- 1280x800 18bit
- 1280x600 18bit

5.5 Boot

Use the **Boot** menu (**BIOS Menu 16**) to configure system boot options.

```
      Aptio Setup Utility – Copyright (C) 2010 American Megatrends, Inc.
  Main    Advanced   Chipset    Boot    Security   Save & Exit

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

Quiet Boot                      [Enabled]
Launch PXE OpROM                [Disabled]  ---------------------
                                            ←→: Select Screen
Boot Option Priorities                      ↑ ↓: Select Item
                                            EnterSelect
                                            F1   General Help
                                            F2   Previous Values
                                            F3    Optimized
                                            Defaults
                                            F4    Save
                                            ESC   Exit
      Version 2.02.1205. Copyright (C) 2010 American Megatrends, Inc.
```

BIOS Menu 16: Boot

➔ **Bootup NumLock State [On]**

Use the **Bootup NumLock State** BIOS option to specify if the number lock setting must be modified during boot up.

➔ **On**	**DEFAULT**	Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.
➔ **Off**		Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.

➔ **Quiet Boot [Enabled]**

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

➔ **Disabled**		Normal POST messages displayed
➔ **Enabled**	**DEFAULT**	OEM Logo displayed instead of POST messages

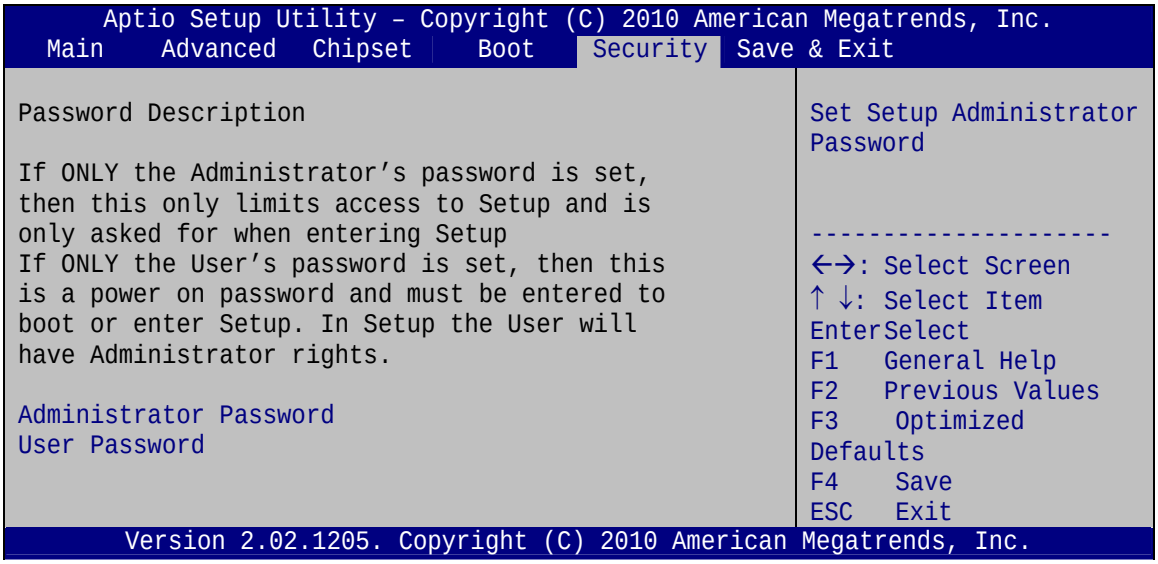
➔ **Launch PXE OpROM [Disabled]**

Use the **Launch PXE OpROM** option to enable or disable boot option for legacy network devices.

➔ **Disabled**	**DEFAULT**	Ignore all PXE Option ROMs
➔ **Enabled**		Load PXE Option ROMs.

5.6 Security

Use the **Security** menu (**BIOS Menu 17**) to set system and user passwords.



BIOS Menu 17: Security

➔ **Administrator Password**

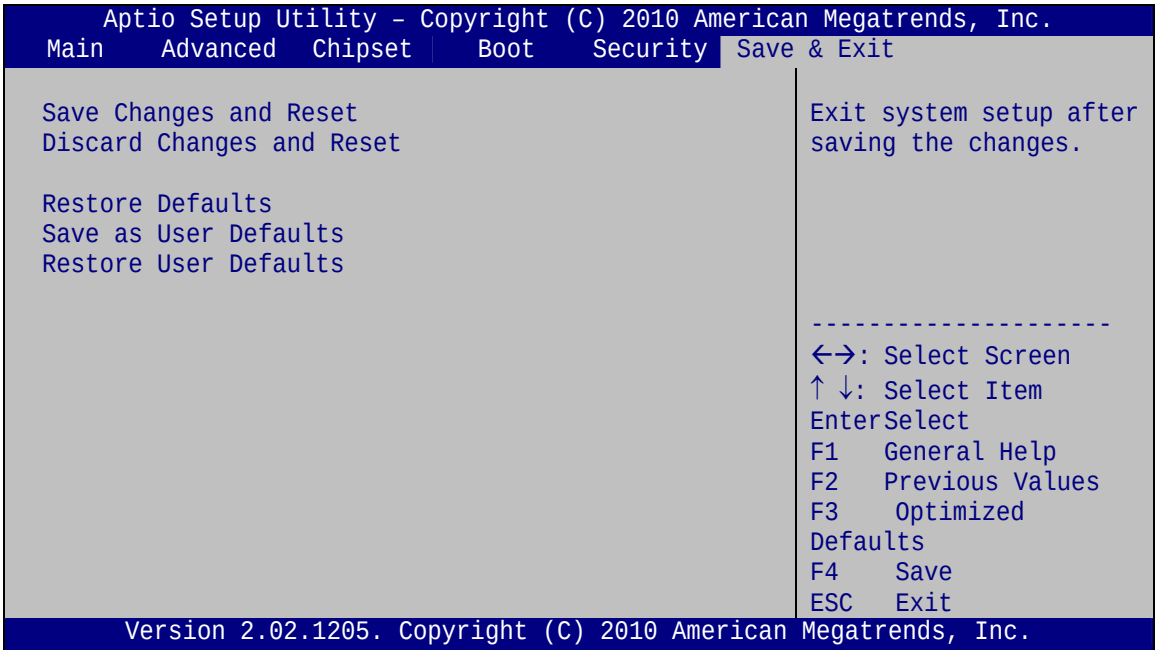
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

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

5.7 Exit

Use the **Exit** menu (**BIOS Menu 18**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 18:Exit

➔ **Save Changes and Reset**

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

➔ **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.

Appendix

A

BIOS Options

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

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. The one key recovery provides quick and easy shortcuts for creating a backup and reverting to that backup or for reverting to the factory default settings.

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.4**.

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 XP (Service Pack 2 or 3 required)
  - Windows Vista
  - Windows 7
  - Windows CE 5.0
  - Windows CE 6.0
  - Windows XP Embedded
- 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 Windows system, 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-up recovery partition (see **Section B.2.4**)

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 system, most setup procedures are the same with Microsoft Windows except for several steps which is 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!

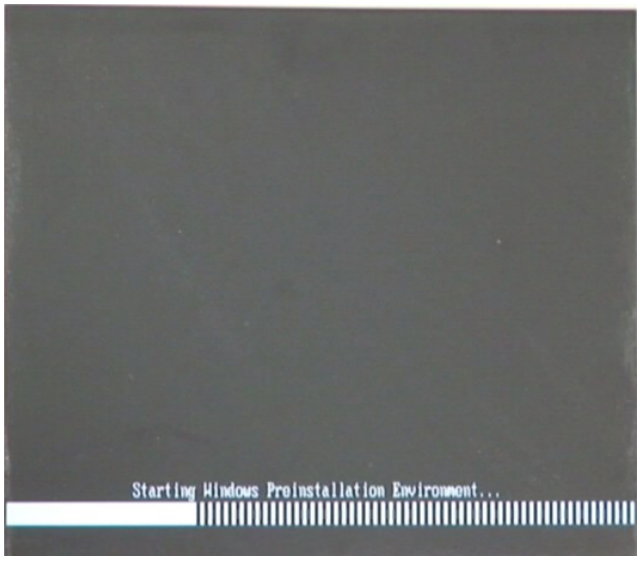


Figure B-2: Launching the Recovery Tool

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

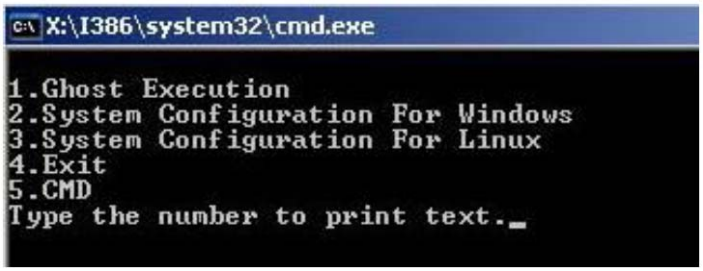


Figure B-3: Recovery Tool Setup Menu

Step 4: Press <**5**> then <Enter>.

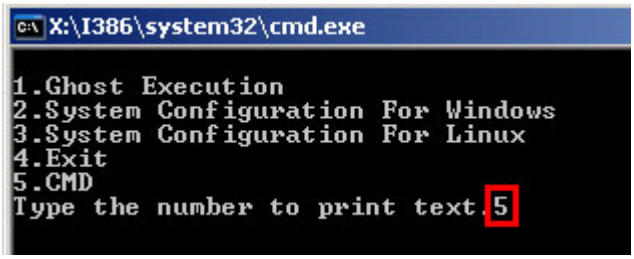


Figure B-4: Command Mode

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

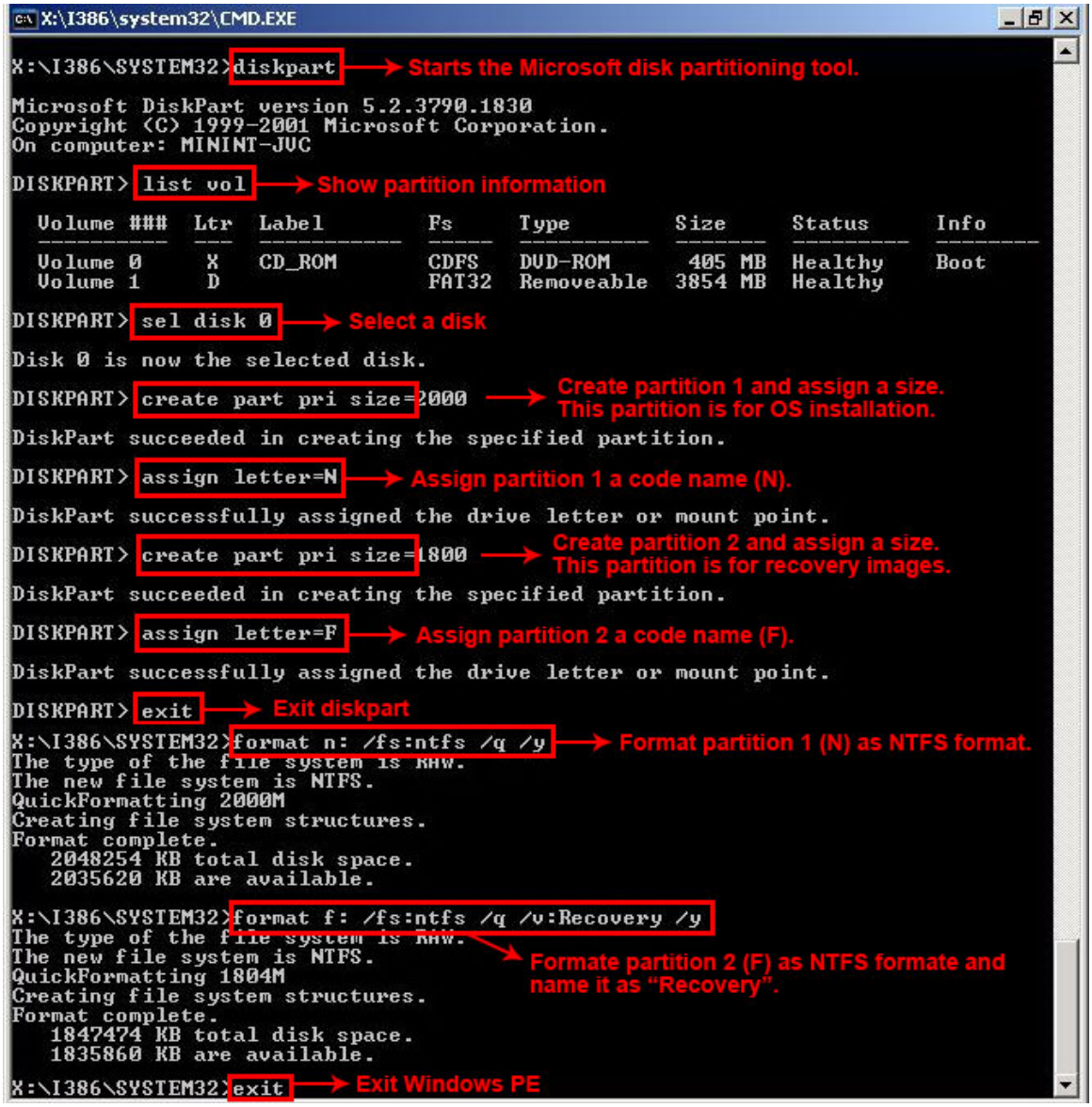
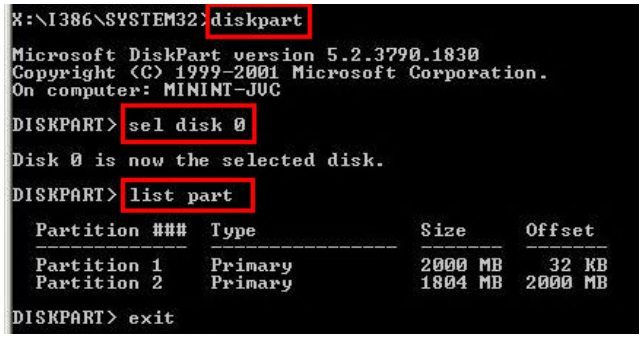


Figure B-5: Partition Creation Commands

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-up Recovery Partition.

B.2.3 Install Operating System, Drivers and Applications

Install the operating system onto the unlabelled partition. The partition labeled as "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 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!

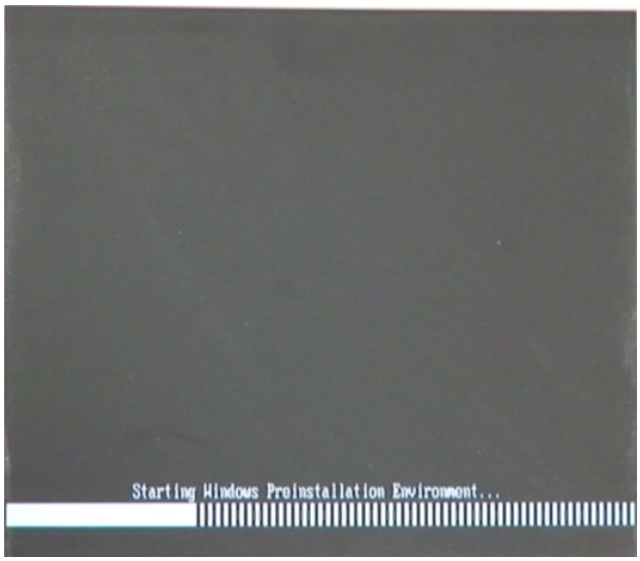


Figure B-6: Launching the Recovery Tool

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

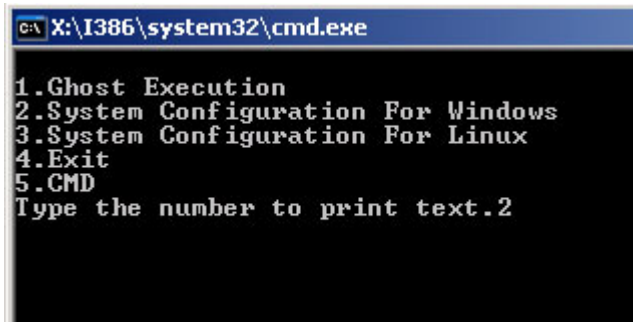


Figure B-7: System Configuration for Windows

Step 5: The Symantec Ghost window appears and starts configuring the system to build-up a recovery partition. In this process, the partition which is created for

recovery files in **Section B.2.2** is hidden and the recovery tool is saved in this partition.

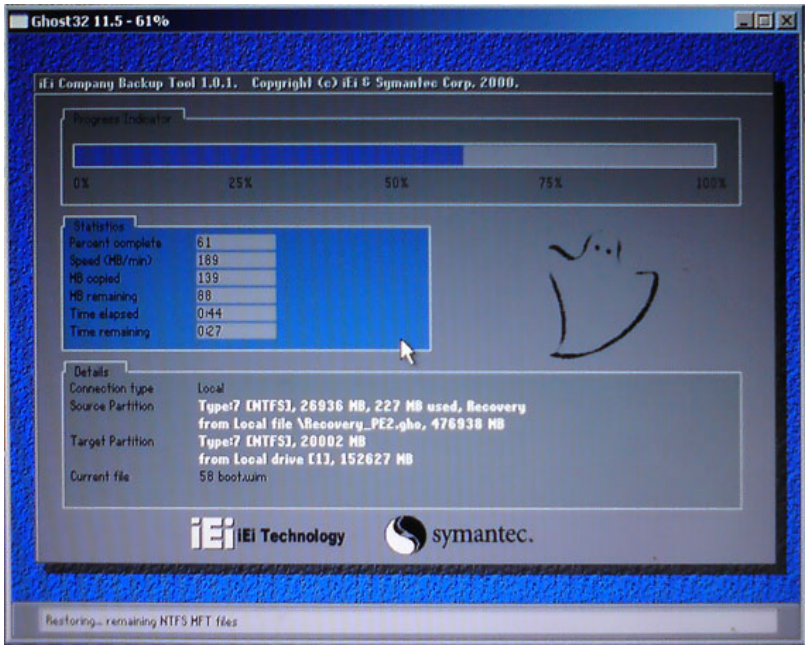


Figure B-8: Build-up Recovery Partition

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

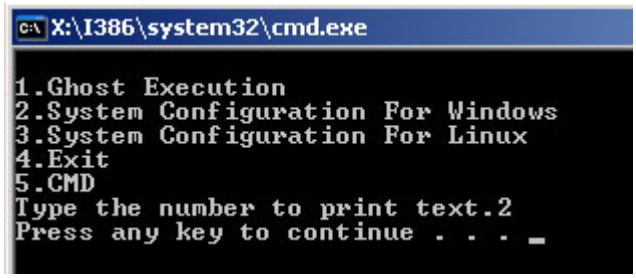


Figure B-9: Press any key to continue

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.

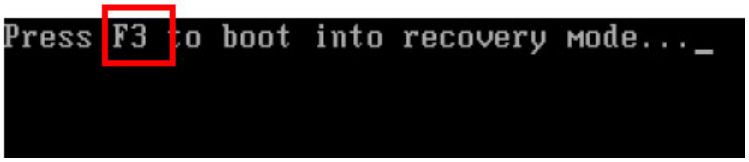


Figure B-10: Press F3 to Boot into Recovery Mode

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

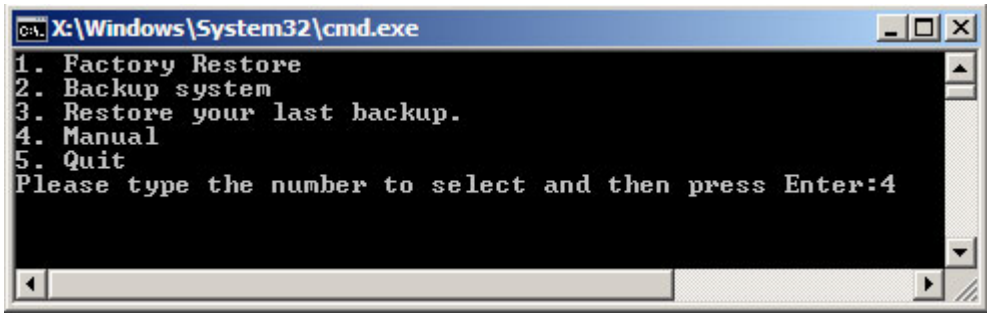


Figure B-11: Recovery Tool Menu

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

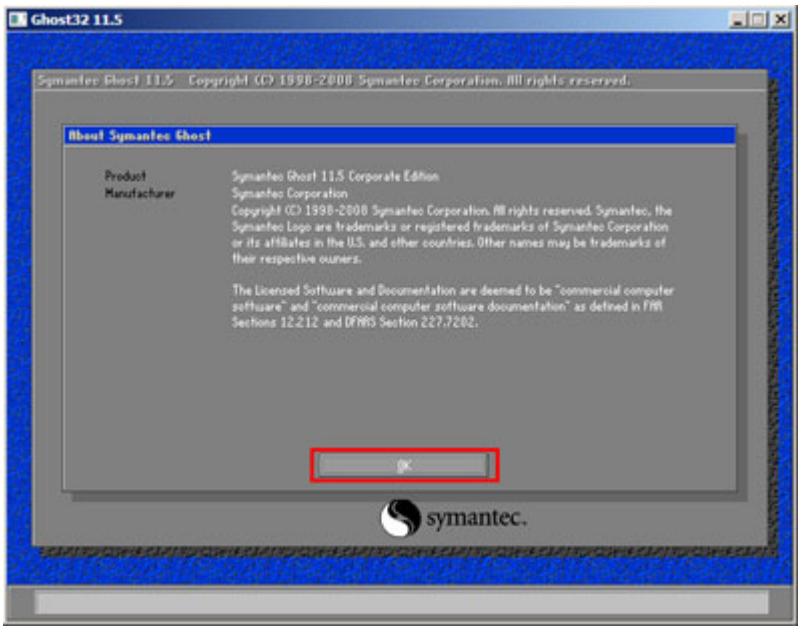


Figure B-12: About Symantec Ghost Window

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

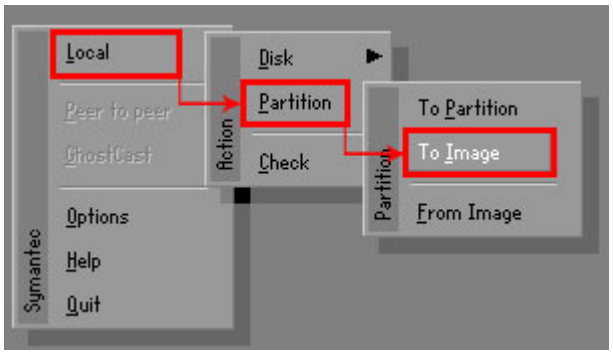


Figure B-13: Symantec Ghost Path

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

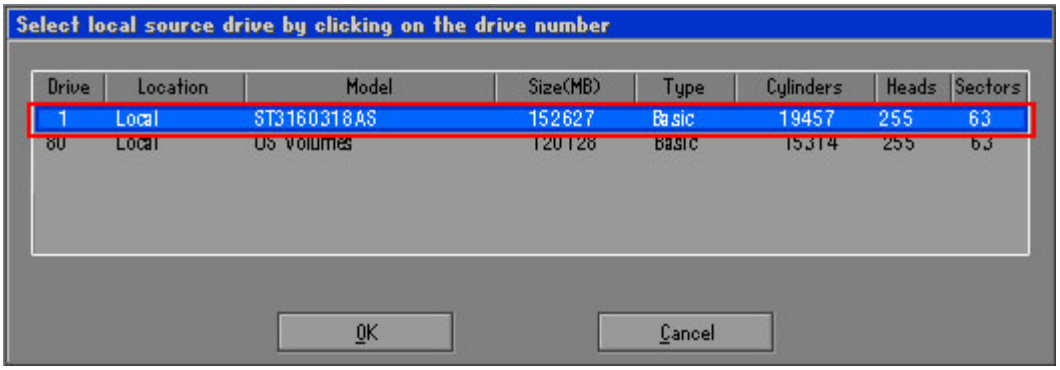


Figure B-14: Select a Local Source Drive

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

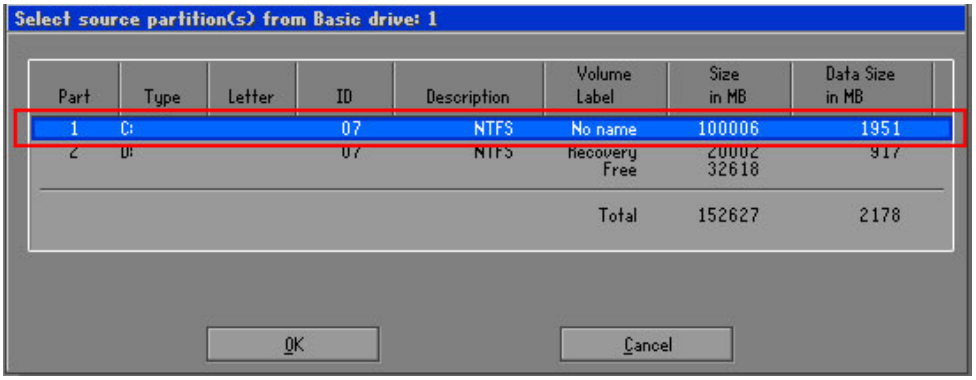


Figure B-15: Select a Source Partition from Basic Drive

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.

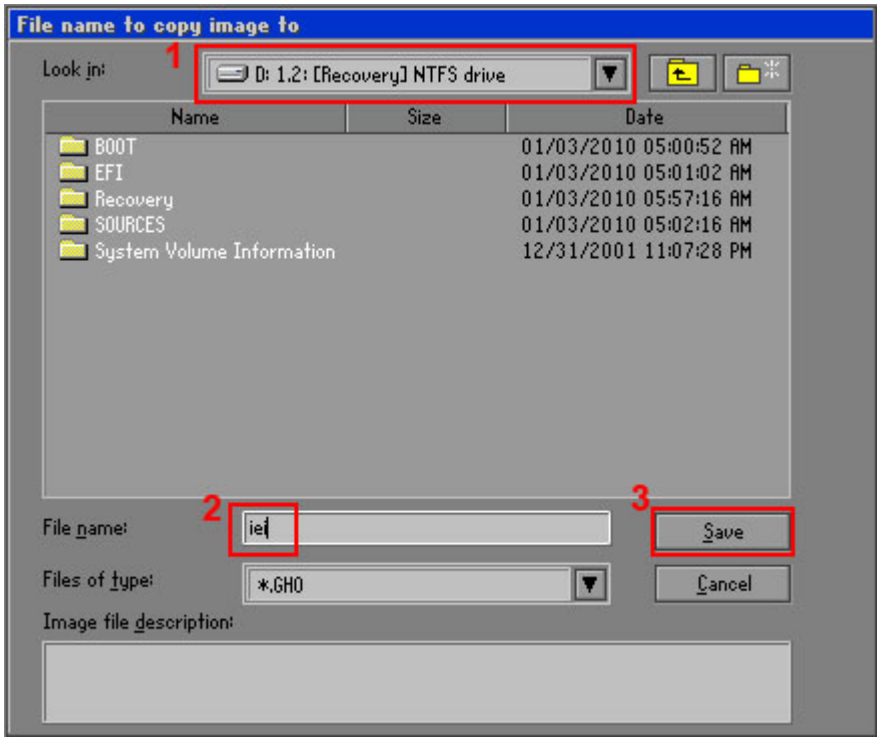


Figure B-16: File Name to Copy Image to

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

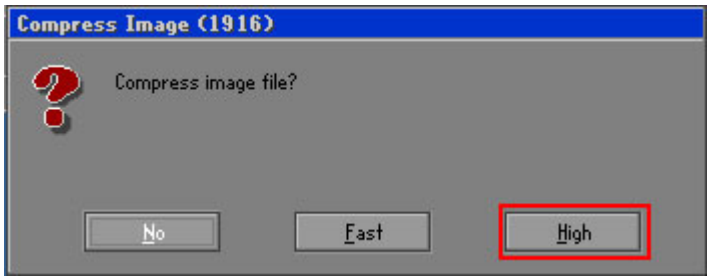


Figure B-17: Compress Image

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

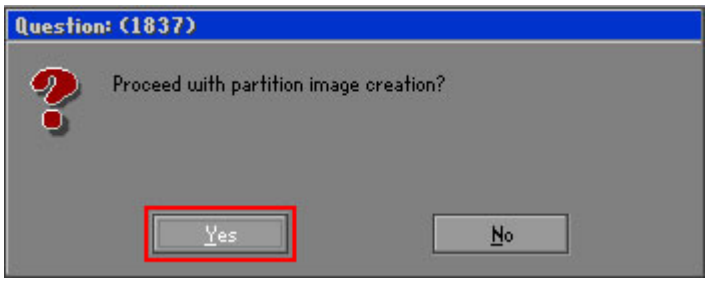


Figure B-18: Image Creation Confirmation

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

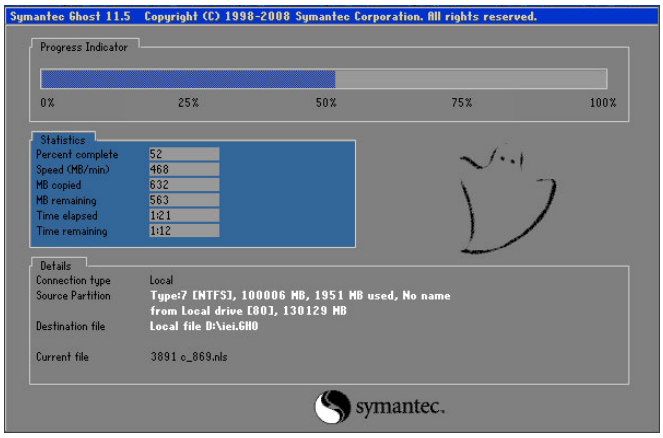


Figure B-19: Image Creation Complete

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.

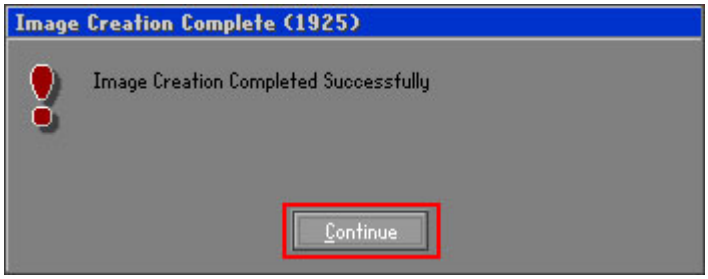


Figure B-20: Image Creation Complete

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

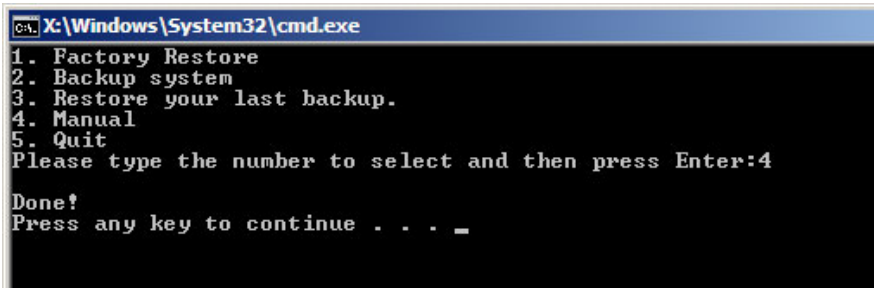


Figure B-21: Press Any Key to Continue

B.3 Setup Procedure for Linux

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

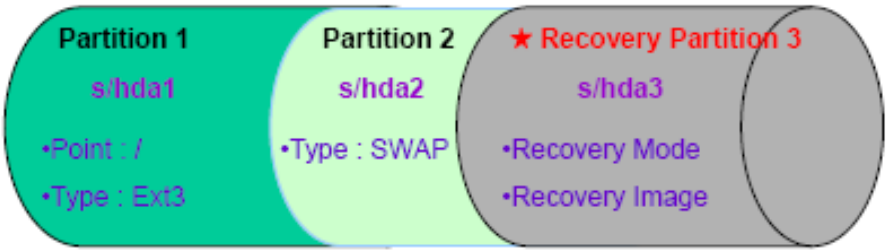


Figure B-22: Partitions for Linux

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-23**). 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.

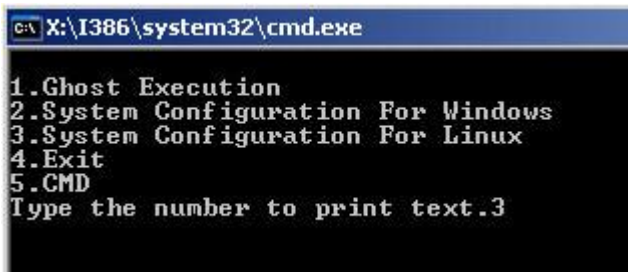


Figure B-23: System Configuration for Linux

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 system, enter Administrator (root). When prompt appears, type:

cd /boot/grub

vi menu.lst

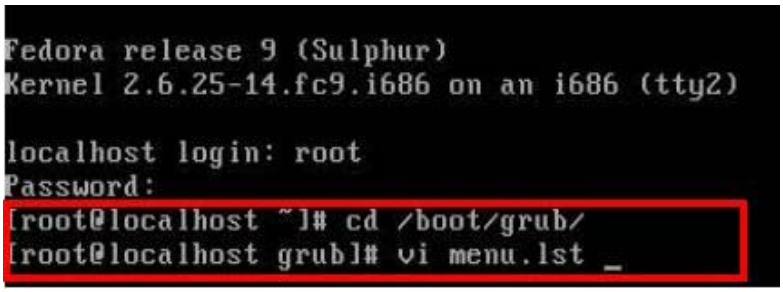
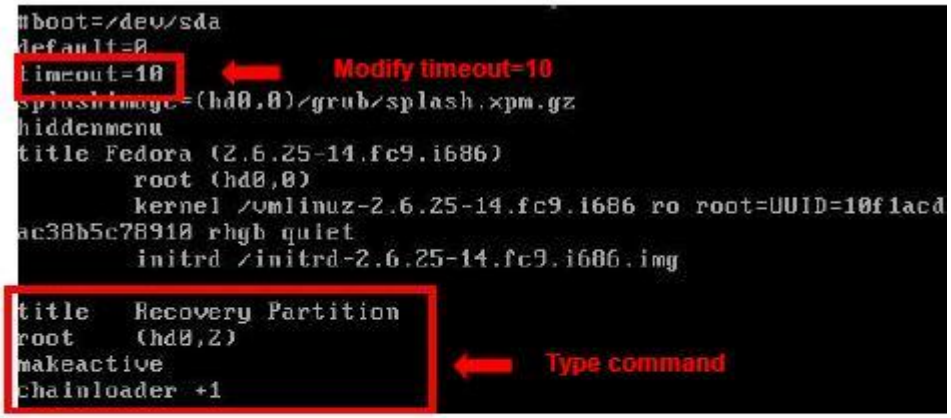


Figure B-24: Access menu.lst in Linux (Text Mode)

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-25**)

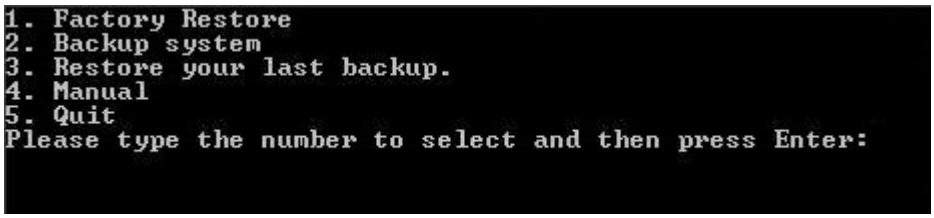


Figure B-25: Recovery Tool Menu

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.4 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. The main menu of the recovery tool is shown below.

Figure B-26: 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.4.1 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.

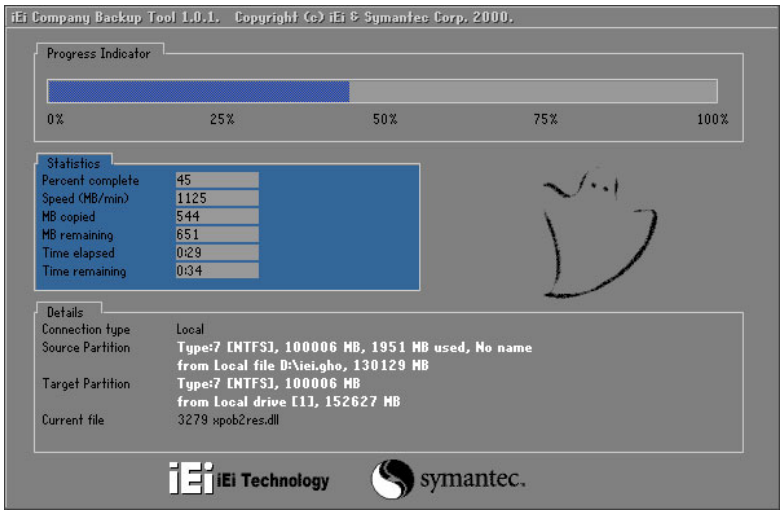


Figure B-27: Restore Factory Default

Step 3: The screen is shown as in **Figure B-28** when completed. Press any key to reboot the system.

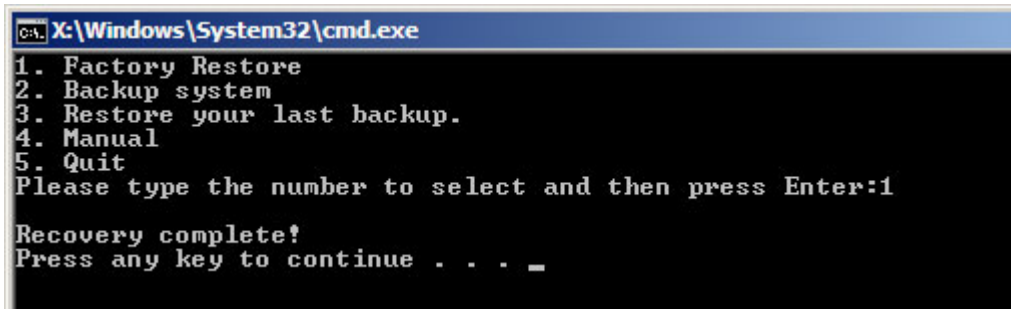


Figure B-28: Recovery Complete Window

B.4.2 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.

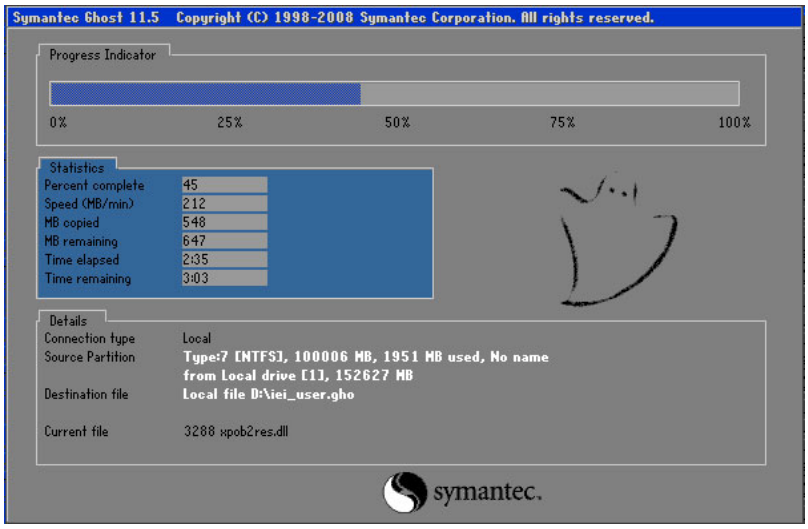


Figure B-29: Backup System

Step 3: The screen is shown as in **Figure B-30** when system backup is completed. Press any key to reboot the system.

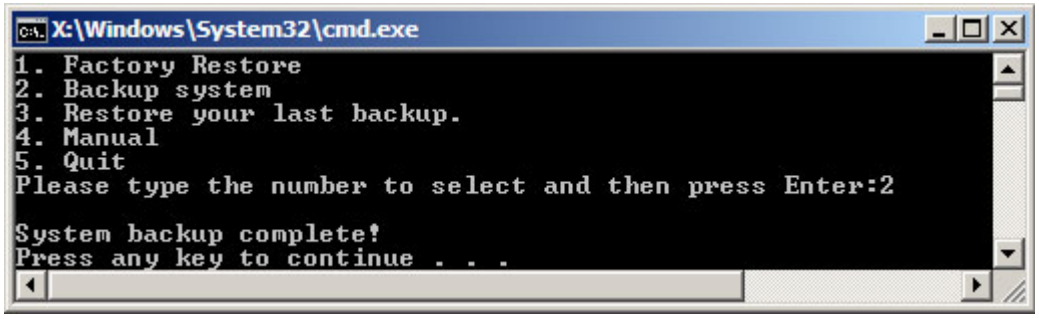


Figure B-30: System Backup Complete Window

B.4.3 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).

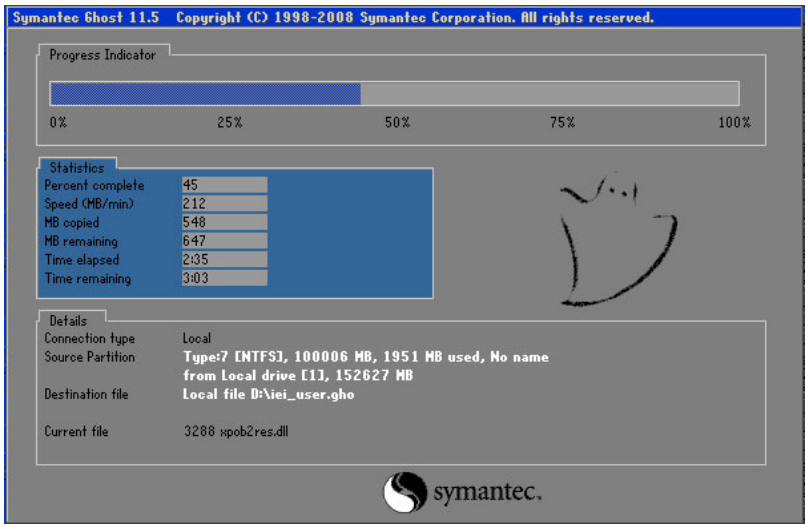


Figure B-31: Restore Backup

Step 3: The screen is shown as in **Figure B-32** when backup recovery is completed. Press any key to reboot the system.

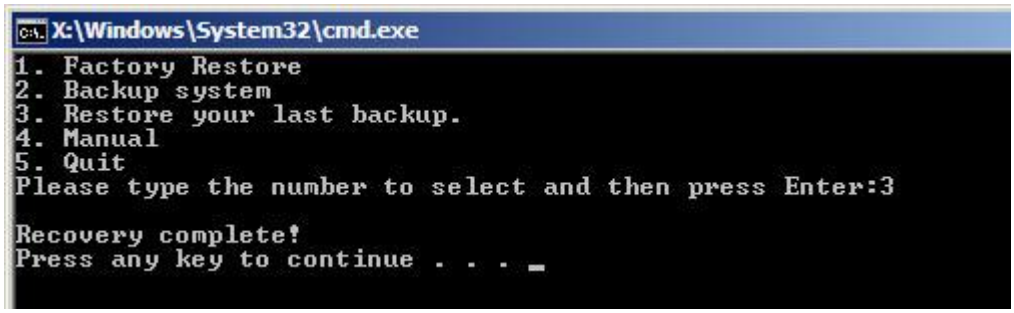


Figure B-32: Restore System Backup Complete Window

B.4.4 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.

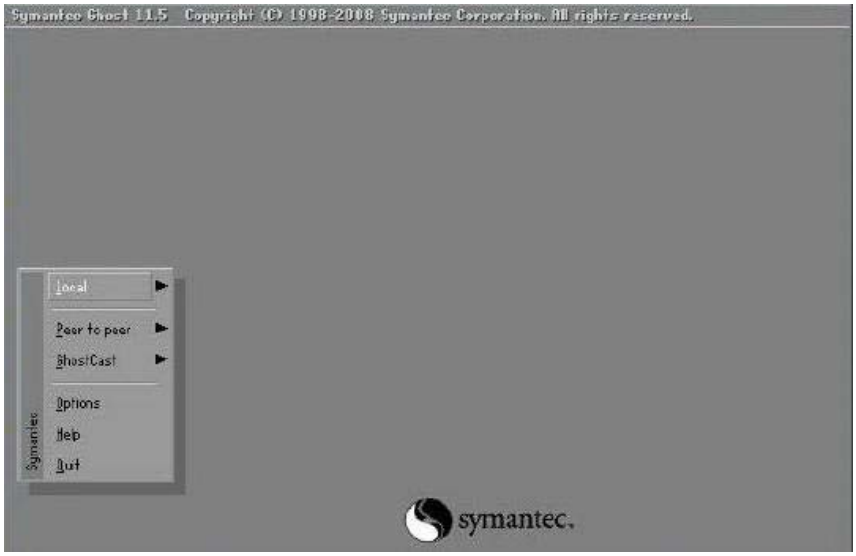


Figure B-33: Symantec Ghost Window

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

B.5 Other Information

B.5.1 Using AHCI Mode or ALi M5283 / VIA VT6421A Controller

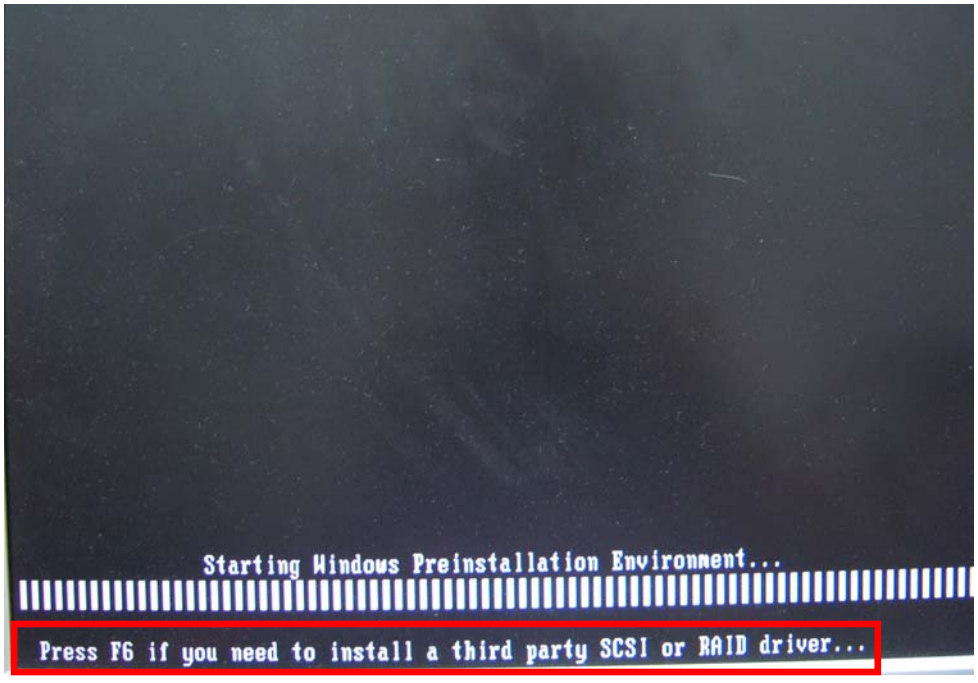
When the system uses AHCI mode or some specific SATA controllers such as ALi M5283 or VIA VT6421A, the SATA RAID/AHCI driver must be installed before using one key recovery. Please follow the steps below to install the SATA RAID/AHCI driver.

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.

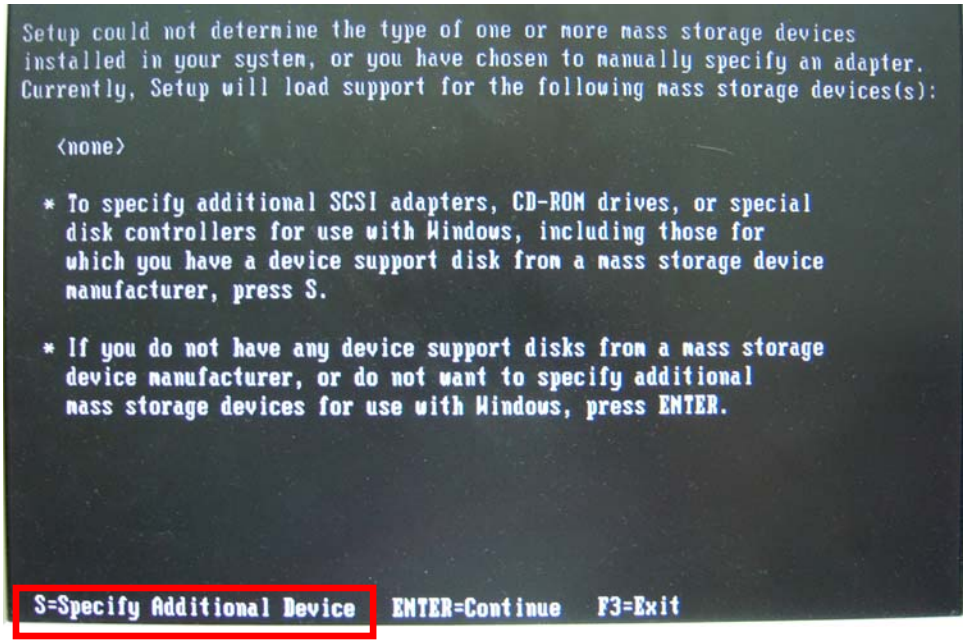
Step 2: Connect the USB floppy disk drive to the system.

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

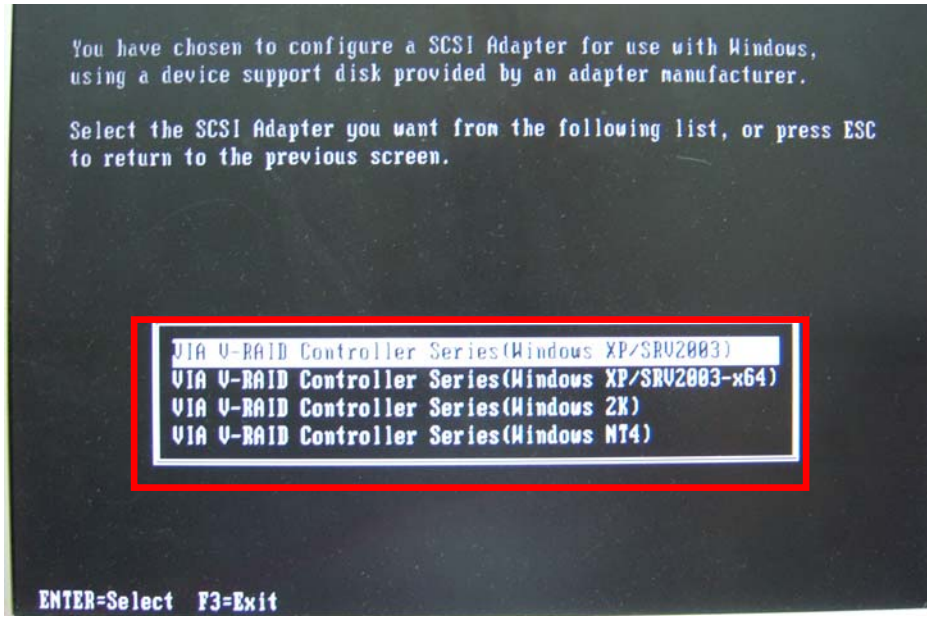
Step 4: When launching the recovery tool, press <**F6**>.



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.5.2 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.
CompactFlash®	CompactFlash® is a solid-state storage device. CompactFlash® devices use flash memory in a standard size enclosure. Type II is thicker than Type I, but a Type II slot can support both types.
CMOS	Complimentary metal-oxide-conductor is an integrated circuit used in chips like static RAM and microprocessors.
COM	COM refers to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal computer is usually a male DB-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.

DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
DIO	The digital inputs and digital outputs are general control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
EIDE	Enhanced IDE (EIDE) is a newer IDE interface standard that has data transfer rates between 4.0 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/Ouput Controll Hub (ICH) is an Intel® Southbridge chipset.
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.

LCD	Liquid crystal display (LCD) is a flat, low-power display device that consists of two polarizing plates with a liquid crystal panel in between.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
RAM	Random Access Memory (RAM) is volatile memory that loses data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 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

Digital I/O Interface

D.1 Introduction

The DIO connector on the PM-PV-D4251/N4551/D5251 is interfaced to GPIO ports on the Super I/O chipset. The DIO has both 4-bit digital inputs and 4-bit digital outputs. The digital inputs and digital outputs are generally 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.

NOTE:

For further information, please refer to the datasheet for the Super I/O chipset.

D.2 DIO Connector Pinouts

The following table describes how the DIO connector pins are connected to the Super I/O GPIO port 1.

Pin	Description	Super I/O Pin	Super I/O Pin Description
1	Ground	N/A	N/A
2	VCC	N/A	N/A
3	Output 3	GP27	General purpose I/O port 2 bit 7.
4	Output 2	GP26	General purpose I/O port 2 bit 6.
5	Output 1	GP25	General purpose I/O port 2 bit 5.
6	Output 0	GP24	General purpose I/O port 2 bit 4.
7	Input 3	GP23	General purpose I/O port 2 bit 3.
8	Input 2	GP22	General purpose I/O port 2 bit 2
9	Input 1	GP21	General purpose I/O port 2 bit 1
10	Input 0	GP20	General purpose I/O port 2 bit 0

Table D-1: Digital I/O Connector Pinouts

D.3 Assembly Language Samples

D.3.1 Enable the DIO Input Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O input functions is listed below.

MOV	**AX, 6F08H**	Sets the digital port as input
INT	**15H**	Initiates the INT 15H BIOS call

D.3.2 Enable the DIO Output Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O output functions is listed below.

MOV	**AX, 6F09H**	Sets the digital port as output
MOV	**BL, 09H**	
INT	**15H**	Initiates the INT 15H BIOS call

Appendix

E

Watchdog Timer

NOTE:

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

The Watchdog Timer is a hardware-based timer that attempts to restart the system when it stops working. The system may stop working because of external EMI or software bugs. The Watchdog Timer ensures that standalone systems like ATMs will automatically attempt to restart in the case of system problems.

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 E-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:

The Watchdog Timer is activated through software. The software application that activates the Watchdog Timer must also deactivate it when closed. If the Watchdog Timer is not deactivated, the system will automatically restart after the Timer has finished its countdown.

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

F

Hazardous Materials Disclosure

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

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

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

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	X	O	O	O	O	X
Display	X	O	O	O	O	X
Printed Circuit Board	X	O	O	O	O	X
Metal Fasteners	X	O	O	O	O	O
Cable Assembly	X	O	O	O	O	X
Fan Assembly	X	O	O	O	O	X
Power Supply Assemblies	X	O	O	O	O	X
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006

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

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

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