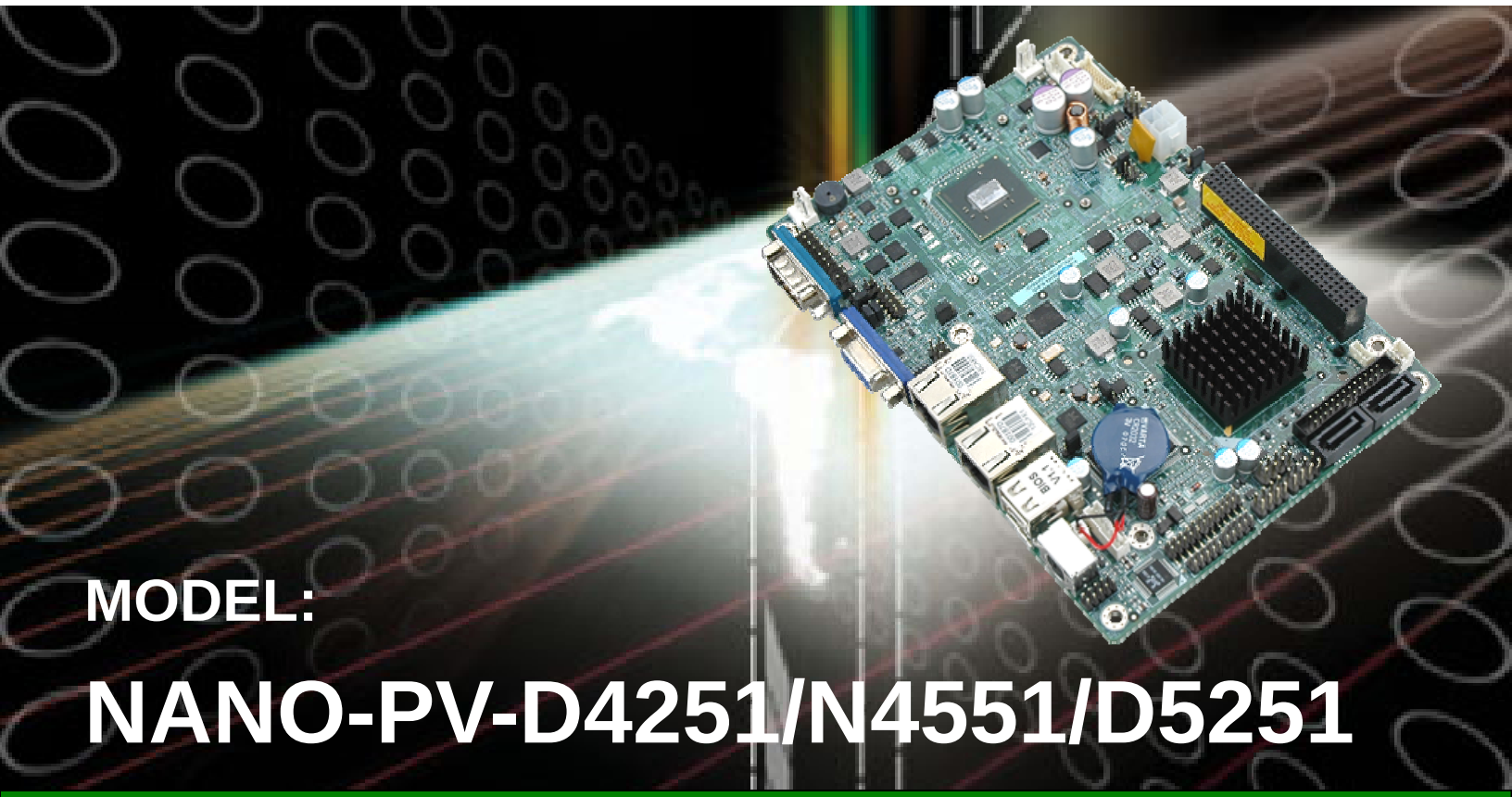
IEI Technology Corp.



MODEL:

NANO-PV-D4251/N4551/D5251

EPIC Motherboard with Intel® Atom™ processor D425/N455/D525, VGA, LVDS, Two GbE LAN, Eight USB 2.0, Two SATA 3Gb/s, Four RS-232, RS-232/422/485, PCIe mini, PCI-104, Parallel port, RoHS

User Manual

Rev. 1.00 – 28 October, 2010

RoHS Lead Free

Revision

Date	Version	Changes
28 October, 2010	1.00	Initial release

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Chapter

1

Introduction

1.1 Introduction

Figure 1-1: NANO-PV-D4251/N4551/D5251

The NANO-PV-D4251/N4551/D5251 EPIC motherboard is an Intel® Atom™ processor D525, D425 or N455 platform. Up to one 2.0 GB 800 MHz or 667 MHz DDR3 SDRAM SO-DIMM is supported by the NANO-PV-D4251/N4551/D5251.

The integrated Intel® ICH8M Chipset supports two GbE LAN port through two Realtek RTL8111E Ethernet controllers (with ASF 2.0 support). The NANO-PV-D4251/N4551/D5251 also supports two SATA 3Gb/s drives and provides 5 V SATA power.

The NANO-PV-D4251/N4551/D5251 supports dual display via VGA and an internal LVDS LCD connector. Eight USB 2.0 channels, one PCIe mini socket, one PCI-104 slot and internal one parallel port connector provide flexible expansion options. High Definition Audio (HDA) support ensures HDA devices can be easily implemented on the NANO-PV-D4251/N4551/D5251. Serial device connectivity is provided by a RS-232 serial port, three internal RS-232 and one internal RS-232/422/485 connectors.

1.2 Connectors

The connectors on the NANO-PV-D4251/N4551/D5251 are shown in the figure below.

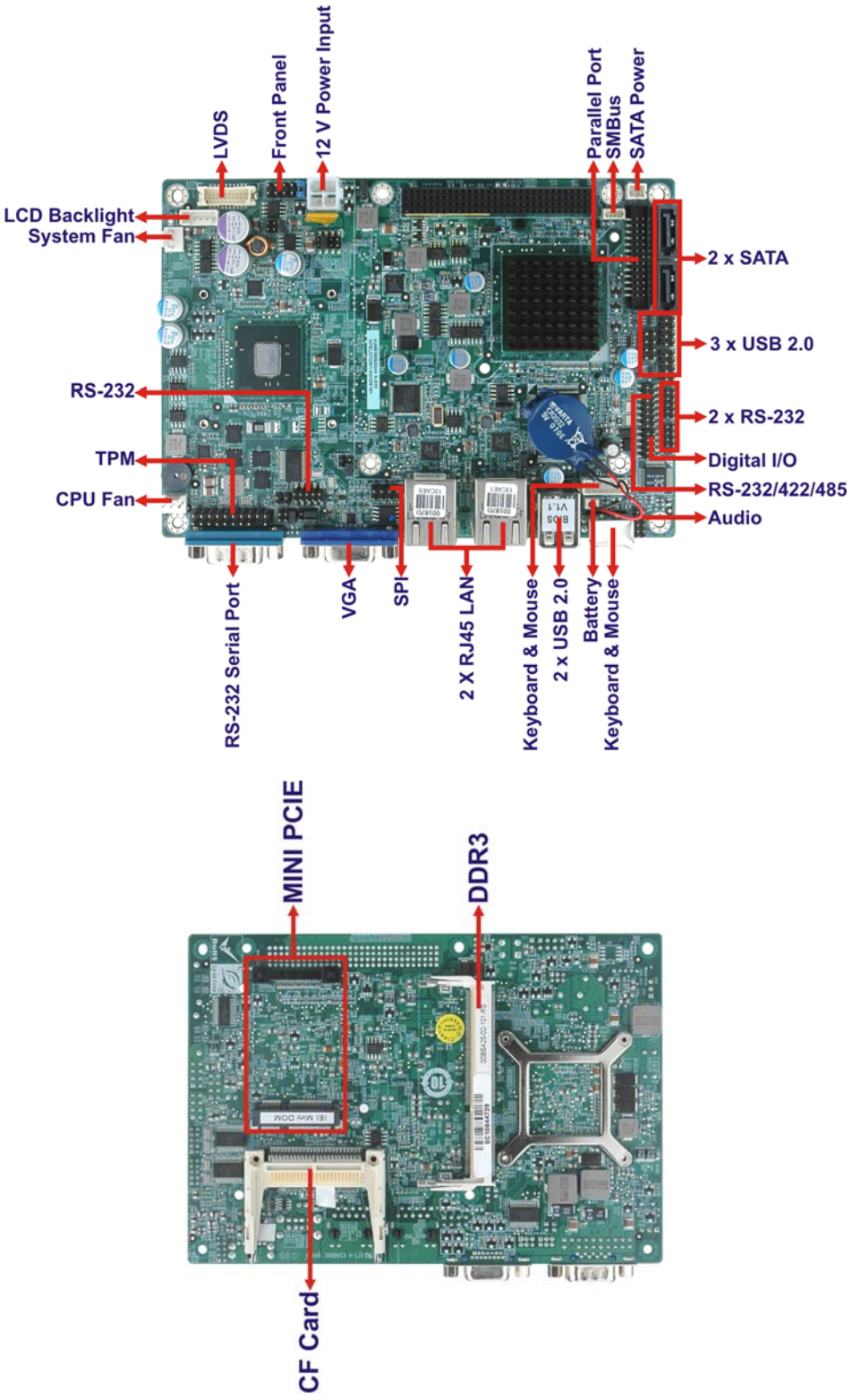


Figure 1-2: Connectors

1.3 Dimensions

The dimensions of the board are listed below:

- **Length**: 165 mm
- **Width**: 115 mm

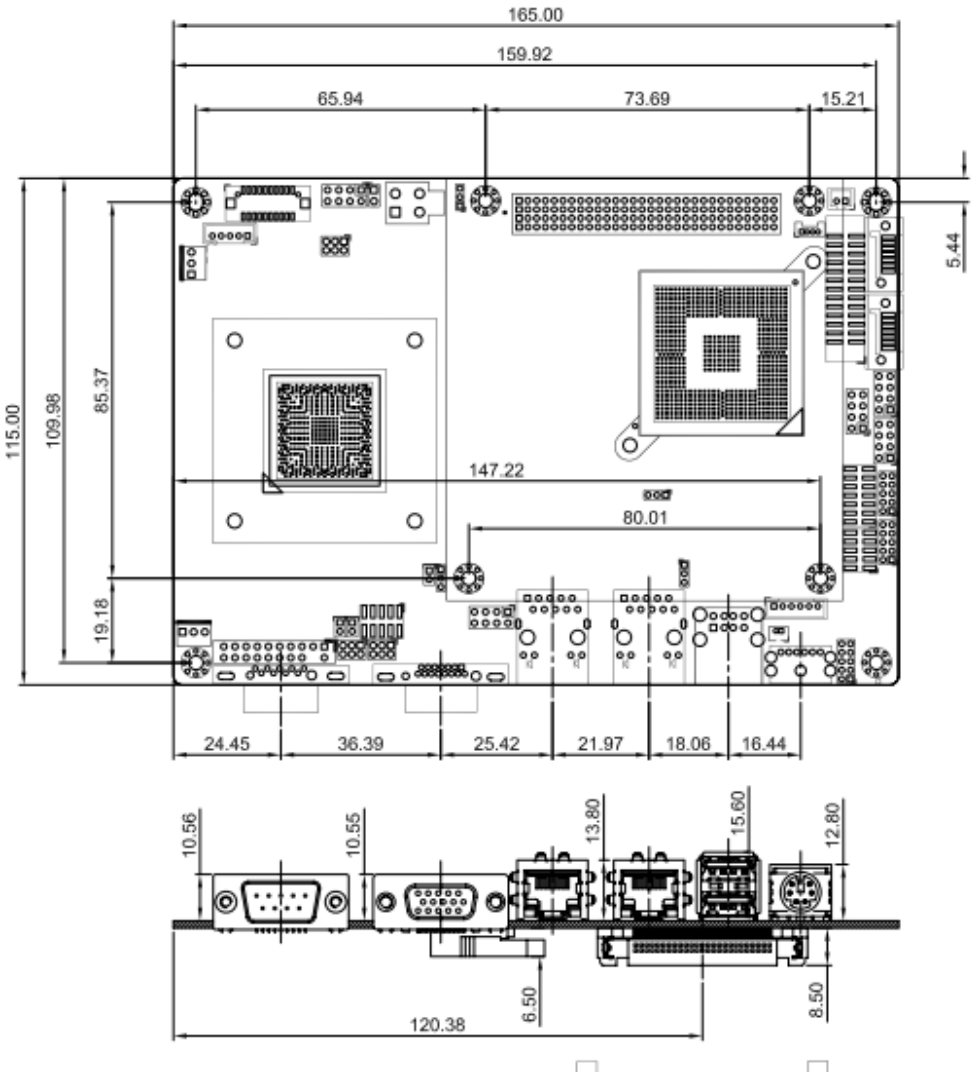


Figure 1-3: NANO-PV-D4251/N4551/D5251 Dimensions (mm)

1.4 Data Flow

Figure 1-4 shows the data flow between the two on-board chipsets and other components installed on the motherboard and described in the following sections of this chapter.

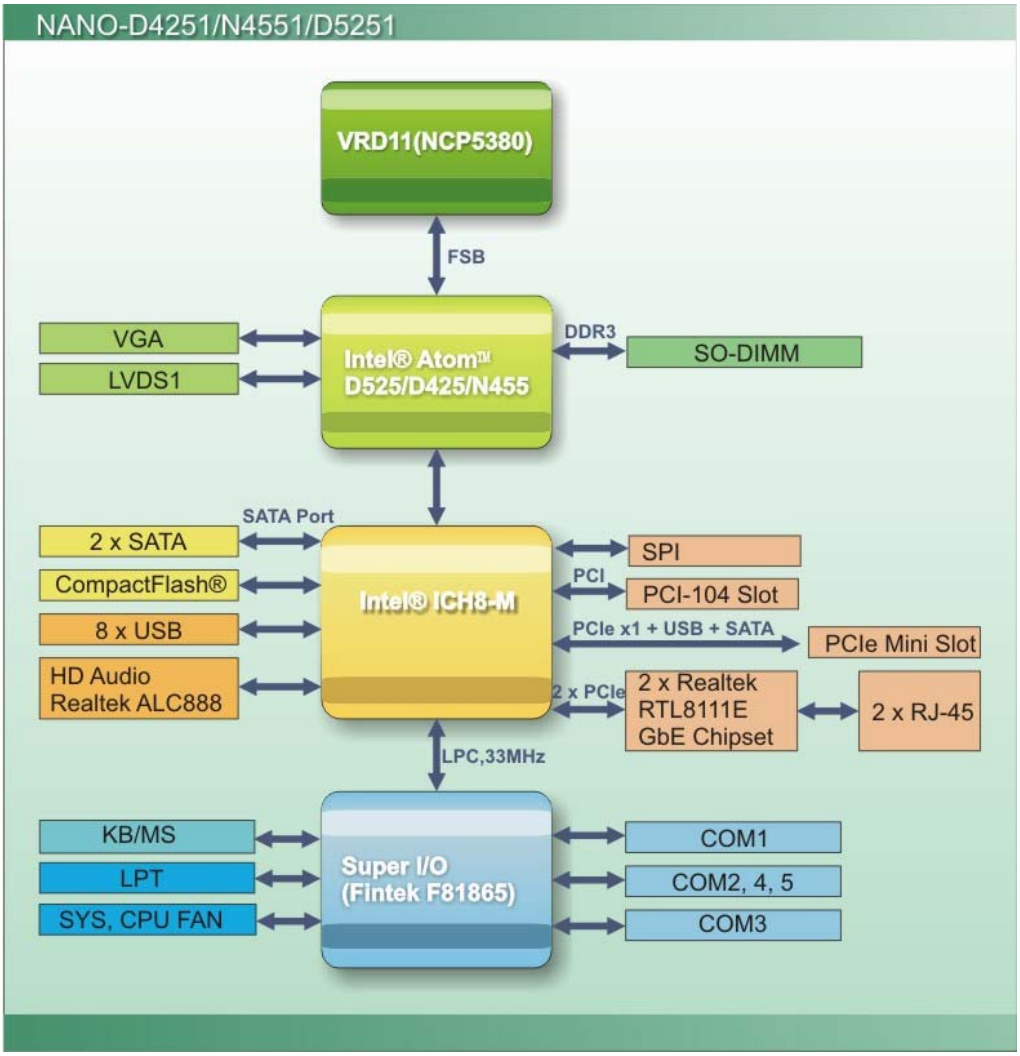


Figure 1-4: Data Flow Block Diagram

1.5 Technical Specifications

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

Specification	NANO-PV-D4251/N4551/D5251
Form Factor	EPIC
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 N455, 1.66 GHz/512 KB L2 cache
Express Chipset	Intel® ICH8M
Graphics Engine	GMA3150 Gen3.5 DX9, 400MHz for D525/D425 Gen3.5 DX9, 200MHz for N455
Memory	One 204-pin SO-DIMM sockets support one 800/667 MHz 2.0 GB (max.) DDR3 SDRAM SO-DIMM
Audio	Realtek ALC888 HD 7.1 channel audio codec
LAN	Two Realtek RTL8111E PCIe GbE controllers with ASF 2.0 support
Super I/O	Fintek F81865
Digital I/O	8-bit, 4-bit input/4-bit output
BIOS	AMI BIOS label
TPM	One LPC connector via 20-pin header
Watchdog Timer	Software programmable supports 1~255 sec. system reset
Expansion	
PCIe	One PCIe Mini slot
PCI	One PCI-104 slot
I/O Interface Connectors	
Audio Connector	One internal audio connector (10-pin header)

Specification	NANO-PV-D4251/N4551/D5251
Display Ports	One VGA port (up to 2048x1536 for D4251/D5251, up to 1400x1050 for N4551) One internal 18-bit single-channel LVDS connector (up to 1024 x 768 or 1366 x 768)
Ethernet	Two RJ-45 GbE ports
Serial Ports	One RS-232 serial port Three RS-232 via four 10-pin headers One RS-232/422/485 via 14–pin header
USB 2.0/1.1 Ports	Two external USB ports Six internal USB ports via three 8-pin headers
Parallel Ports	One LPT connector via 26-pin header
Storage	
Serial ATA	Two SATA 3.0 Gb/s connectors One 5 V SATA power connector
CompactFlash®	One CompactFlash® Type II socket
Environmental and Power Specifications	
Power Supply	12 V only ATX and AT power supported
Power Connector	One internal 4-pin power connector for power supply
Power Consumption	12 V @ 2.21A (Intel® Atom™ D525 with 2 GB 1066 Mhz DDR3) 12 V @ 2.11A (Intel® Atom™ D425 with 2 GB 1066 Mhz DDR3) 12 V @ 2.00A (Intel® Atom™ N455 with 2 GB 1066 Mhz DDR3)

Specification	NANO-PV-D4251/N4551/D5251
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)
Physical Specifications	
Dimensions	165 mm x 115 mm
Weight GW/NW	850 g / 350 g

Table 1-1: Technical Specifications

Chapter

2

Unpacking

2.1 Anti-static Precautions

WARNING!

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

Make sure to adhere to the following guidelines:

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

2.2 Unpacking Precautions

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

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

2.3 Packing List

NOTE:

If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the NANO-PV-D4251/N4551/D5251 was purchased from or contact an IEI sales representative directly by sending an email to sales@iei.com.tw.

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

Quantity	Item and Part Number	Image
1	NANO-PV-D4251/N4551/D5251-R10	
1	SATA and 5 V power cable (**P/N:** 32801000201-100-RS)	
1	KB/MS PS/2 Y-cable (**P/N**: 32000-133200-RS)	
2	RS-232 serial port cable (**P/N**: 32200-000049-RS)	
1	AT 12 V Cable (**P/N**: 32100-087100-RS)	
1	Audio cable (**P/N:** 32000-072100-RS)	
1	Dual USB cable (without bracket) (**P/N**: 32000-044300-RS)	

1	Mini jumper pack (2.0mm) (**P/N**: 33100-000033-RS)	
1	Utility CD	
1	Quick Installation Guide	

2.3.1 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	**Image**
LPT cable (wo bracket) (**P/N**: 32200-015100-RS)	
RS-232/422/485 cable (**P/N**: 32205-000300-100-RS)	
SATA power cable (**P/N**: 32100-000100-100-RS) (**P/N**: 32100-000100-200-RS)	
SATA cable (**P/N**: 32000-062800-RS)	

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

3.1.1 NANO-PV-D4251/N4551/D5251 Layout

The figures below show all the connectors and jumpers.

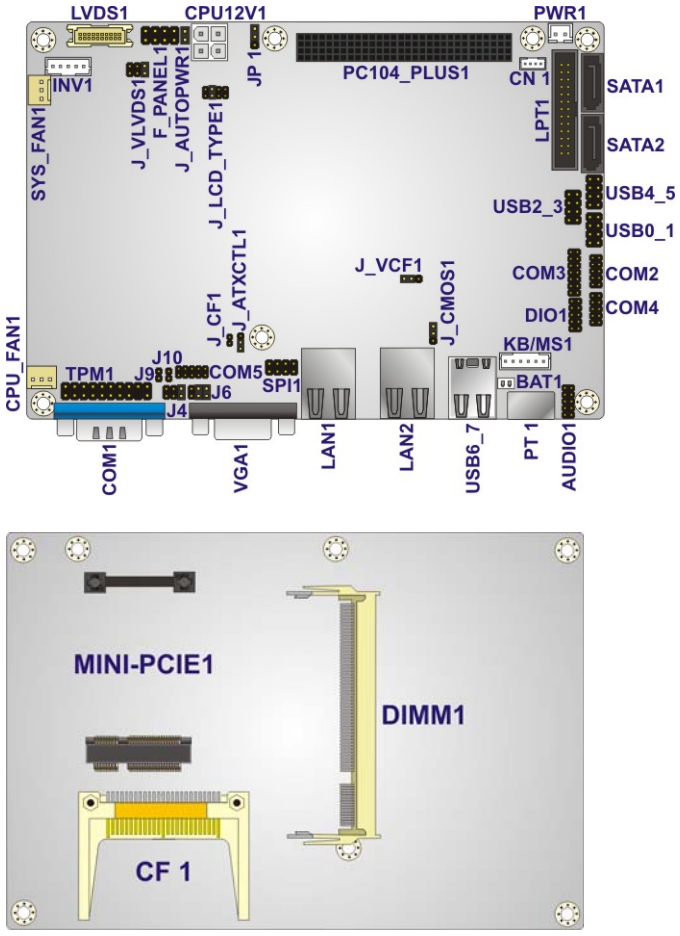


Figure 3-1: Connector and Jumper Locations

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
Audio connector	10-pin header	AUDIO1
Battery connector	2-pin wafer	BAT1
CompactFlash® slot	50-pin header	CF1
DDR3 SO-DIMM socket	204-pin socket	DIMM1
Digital I/O connector	10-pin header	DIO1
Fan connector (CPU)	3-pin wafer	CPU_FAN1
Fan connector (system)	3-pin wafer	SYS_FAN1
Front panel connector	8-pin header	F_PANEL1
Keyboard and mouse connector	6-pin wafer	KB/MS1
LVDS1 backlight inverter connector	5-pin wafer	INV1
LVDS LCD connector	20-pin crimp	LVDS1
Parallel port connector	26-pin header	LPT1
PCI-104 connector	PCI-104 connector	PC104_PLUS1
PCIe Mini card slot	PCIe Mini card slot	MINI_PCIE1
Power connector (+12V, power supply)	4-pin connector	CPU12V1
RS-232 serial port connector	10-pin header	COM2
RS-232 serial port connector	10-pin header	COM4
RS-232 serial port connector	10-pin header	COM5
RS-232/422/485 serial port connector	14-pin header	COM3
Serial ATA (SATA) drive connector	7-pin SATA	SATA1
Serial ATA (SATA) drive connector	7-pin SATA	SATA2
SATA power connector	2-pin wafer	PWR1
SMBus connector	4-pin wafer	CN1

Connector	Type	Label
SPI flash connector	8-pin header	SPI1
TPM connector	20-pin connector	TPM1
USB connector	8-pin header	USB0_1
USB connector	8-pin header	USB2_3
USB connector	8-pin header	USB4_5

Table 3-1: Peripheral Interface Connectors

3.1.3 External Interface Panel Connectors

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

Connector	Type	Label
Ethernet connector	RJ-45	LAN1
Ethernet connector	RJ-45	LAN2
Keyboard/Mouse connector	PS/2	PT1
VGA port connector	15-pin Female	VGA1
Serial port (RS-232) connector	9-pin male	COM1
USB ports (dual)	USB port	USB6_7

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the NANO-PV-D4251/N4551/D5251.

3.2.1 Audio Connector

CN Label: **AUDIO1**

CN Type: 10-pin header (2x5)

CN Location: See Figure 3-2

CN Pinouts: See Table 3-3

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

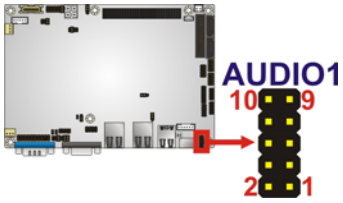


Figure 3-2: Audio Connector Location

Pin	Description	Pin	Description
1	LFRONT-R	2	LLINE-R
3	GND	4	GND
5	LFRONT-L	6	LLINE-L
7	GND	8	GND
9	LMIC1-CONN-R	10	LMIC1-CONN-L

Table 3-3: Audio Connector Pinouts

3.2.2 Battery Connector

CN Label: **BAT1**

CN Type: 2-pin wafer (1x2)

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

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

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

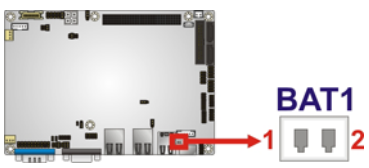


Figure 3-3: Battery Connector Location

Pin	Description
1	Battery+
2	Ground

Table 3-4: Battery Connector Pinouts

3.2.3 CompactFlash® Slot

CN Label: **CF1**

CN Type: CompactFlash® card slot

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

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

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

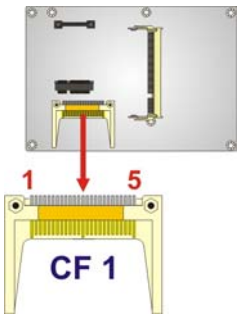


Figure 3-4: CompactFlash® Slot Location

Pin	Description	Pin	Description
1	GROUND	26	VCC-IN CHECK1
2	DATA 3	27	DATA 11
3	DATA 4	28	DATA 12
4	DATA 5	29	DATA 13
5	DATA 6	30	DATA 14
6	DATA 7	31	DATA 15
7	HDC_CS0#	32	HDC_CS1
8	N/C	33	N/C
9	GROUND	34	IOR#

Pin	Description	Pin	Description
10	N/C	35	IOW#
11	N/C	36	WE#
12	N/C	37	IRQ14
13	VCC_CF	38	VCC_CF
14	N/C	39	CSEL
15	N/C	40	N/C
16	N/C	41	HDD_RESET
17	N/C	42	IORDY
18	SA2	43	SDREQ
19	SA1	44	SDACK#
20	SA0	45	HDD_ACTIVE#
21	DATA 0	46	66DET
22	DATA 1	47	DATA 8
23	DATA 2	48	DATA 9
24	N/C	49	DATA 10
25	VCC-IN CHECK2	50	GROUND

Table 3-5: CompactFlash® Slot Pinouts

3.2.4 Digital I/O Connector

CN Label: **DIO1**

CN Type: 10-pin header

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

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

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.

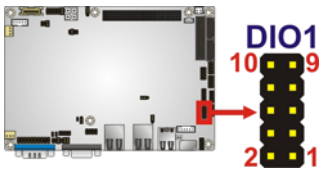


Figure 3-5: Digital I/O Connector Locations

Pin	Description	Pin	Description
1	GND	2	+5V
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 3-6: Digital I/O Connector Pinouts

3.2.5 Fan Connector (CPU)

CN Label: **CPU_FAN1**

CN Type: 3-pin wafer (1x3)

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

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

The fan connector attaches to a CPU cooling fan.

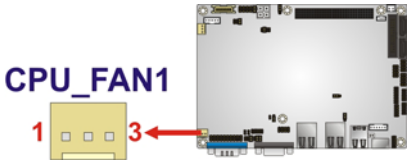


Figure 3-6: CPU Fan Connector Location

Pin	Description
1	FANIO1
2	FANOUT1

Pin	Description
3	GND

Table 3-7: CPU Fan Connector Pinouts

3.2.6 Fan Connector (System)

CN Label: **SYS_FAN1**

CN Type: 3-pin wafer (1x3)

CN Location: See Figure 3-7

CN Pinouts: See Table 3-8

The cooling fan connector provides a 12V, 500mA current to the cooling fan. The connector has a "rotation" pin to get rotation signals from fans and notify the system so the system BIOS can recognize the fan speed. Please note that only specified fans can issue the rotation signals.

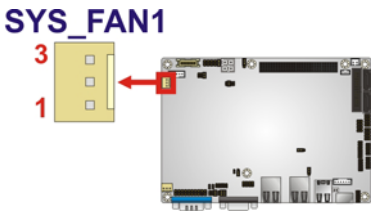


Figure 3-7: +12V Fan Connector Locations

Pin	Description
1	FANIO2
2	+12V
3	GND

Table 3-8: +12V Fan Connector Pinouts

3.2.7 Front Panel Connector

CN Label: **F_PANEL1**

CN Type: 8-pin header (2x4)

CN Location: See Figure 3-8

CN Pinouts: See Table 3-9

The front panel connector connects to external switches and indicators to monitor and controls the motherboard. These indicators and switches include:

- Power button
- Reset
- Power LED
- HDD LED

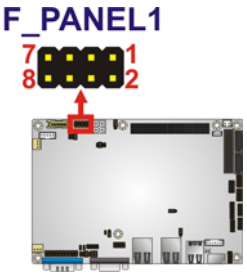


Figure 3-8: Front Panel Connector Location

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
Power Button	1	PWR_BTN+	Power LED	2	PWR LED
	3	GND		4	GND
SATA LED	5	SATA LED PWT	Reset	6	RESET
	7	SATA_LED#		8	GND

Table 3-9: Front Panel Connector Pinouts

3.2.8 Keyboard/Mouse Connector

CN Label: **KB/MS1**

CN Type: 6-pin wafer (1x6)

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

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

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

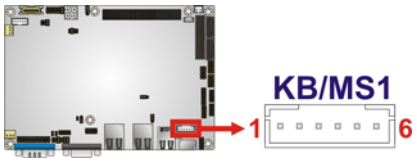


Figure 3-9: Keyboard/Mouse Connector Location

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

Table 3-10: Keyboard/Mouse Connector Pinouts

3.2.9 Backlight Inverter Connector

CN Label: **INV1**

CN Type: 5-pin wafer (1x5)

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

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

The backlight inverter connector provides power to an LCD panel.

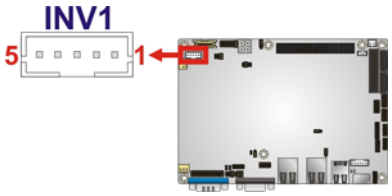


Figure 3-10: Backlight Inverter Connector Location

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

Table 3-11: Backlight Inverter Connector Pinouts

3.2.10 LVDS1 LCD Connector

CN Label: **LVDS1**

CN Type: 20-pin crimp (2x10)

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

CN Pinouts: See Table 3-12

The LVDS1 connector is for an LCD panel connected to the board.

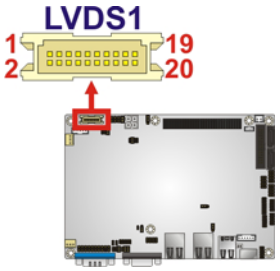


Figure 3-11: LVDS1 Connector Locations

Pin	Description	Pin	Description
1	GROUND	2	GROUND

Pin	Description	Pin	Description
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 3-12: LVDS2 Connector Pinouts

3.2.11 Parallel Port Connector

CN Label: **LPT1**

CN Type: 26-pin box header

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

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

The parallel port connector connects to a parallel port connector interface or some other parallel port device such as a printer.

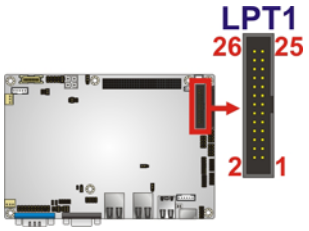


Figure 3-12: Parallel Port Connector Location

Pin	Description	Pin	Description
1	STB	2	AFD
3	PTD0	4	ERROR#
5	PTD1	6	INITIALIZE
7	PTD 2	8	SLIN

Pin	Description	Pin	Description
9	PTD3	10	GROUND
11	PTD 4	12	GROUND
13	PTD 5	14	GROUND
15	PTD 6	16	GROUND
17	PTD7	18	GROUND
19	ACK	20	GROUND
21	BUSY	22	GROUND
23	PE	24	GROUND
25	SLCT	26	NC

Table 3-13: Parallel Port Connector Pinouts

3.2.12 PCI-104 Connector

CN Label: **PCI-104_PLUS1**

CN Type: PCI-104 connector

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

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

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

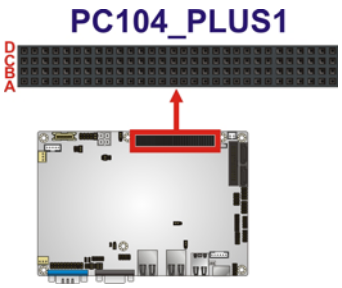


Figure 3-13: PCI-104 Connector Location

Pin	Description	Pin	Description	Pin
1	GND/5 V	TBD1	5 V	AD00
2	VI/O1	AD02	AD01	+5 V
3	AD05	GND	AD04	AD03

Pin	Description	Pin	Description	Pin
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
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 3-14: PCI-104 Connector Pinouts

3.2.13 PCIe Mini Card Slot

CN Label:	**MINI-PCIE1**
CN Type:	PCIe Mini card slot
CN Location:	See **Figure 3-14**
CN Pinouts:	See **Table 3-15**

The PCIe Mini card slot is for installing PCIe Mini expansion cards.

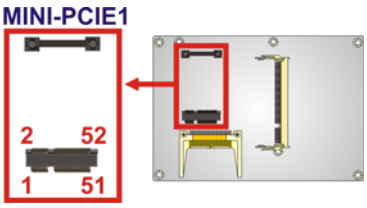


Figure 3-14: PCIe Mini Card Slot Location

Pin	Description	Pin	Description
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5 V
7	CLKREQ#	8	NC
9	GND	10	NC
11	CLK-	12	NC
13	CLK+	14	NC
15	GND	16	NC
17	PCIRST#	18	GND
19	LPC	20	VCC3
21	GND	22	PCIRST#
23	PERN2	24	3VDual
25	PERP2	26	GND
27	GND	28	1.5 V
29	GND	30	SMBCLK
31	PETN2	32	SMBDATA
33	PETP2	34	GND

Pin	Description	Pin	Description
35	GND	36	USBD-
37	GND	38	USBD+
39	VCC3	40	GND
41	VCC3	42	N/C
43	GND	44	RF_LINK#
45	SATATXP1	46	BLUELED#
47	SATATXN1	48	1.5 V
49	SATARXN1	50	GND
51	SATARXP1	52	VCC3

Table 3-15: PCIe Mini Card Slot Pinouts

3.2.14 12V Power Connector

CN Label: **CPU12V1**

CN Type: 4-pin Molex power connector (1x4)

CN Location: See Figure 3-15

CN Pinouts: See Table 3-16

The connector supports the 12V power supply.

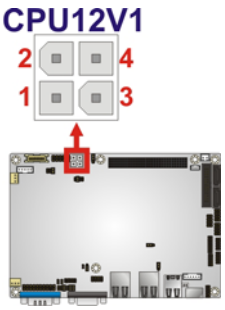


Figure 3-15: CPU 12V Power Connector Location

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

Table 3-16: CPU 12V Power Connector Pinouts

3.2.15 SATA Drive Connectors

CN Label:	**SATA1, SATA2**
CN Type:	7-pin SATA drive connectors
CN Location:	See Figure 3-16
CN Pinouts:	See Table 3-17

The two SATA 3Gb/s drive connectors are each connected to a SATA 3Gb/s drive. The SATA 3Gb/s drives transfer data at speeds as high as 3.0 Gb/s.

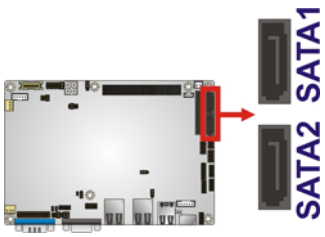


Figure 3-16: SATA Drive Connector Locations

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

Table 3-17: SATA Drive Connector Pinouts

3.2.16 SATA Power Connector

CN Label:	**PWR1**
CN Type:	2-pin wafer (1x2)
CN Location:	See Figure 3-17
CN Pinouts:	See Table 3-18

The SATA Power Connector provides +5V power output to the SATA connectors.

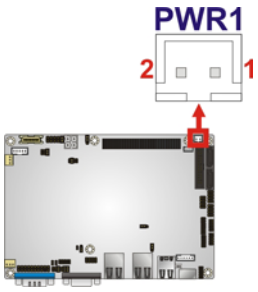


Figure 3-17: SATA Power Connector Locations

Pin	Description
1	+5V
2	GND

Table 3-18: SATA Power Connector Pinouts

3.2.17 Serial Port Connectors (RS-232)

CN Label: **COM2, COM4, COM5**

CN Type: 10-pin header (2x5)

CN Location: See Figure 3-18

CN Pinouts: See Table 3-19

These connectors provide RS-232 communications.

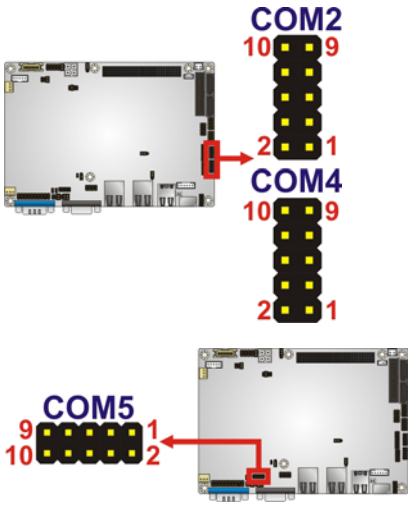


Figure 3-18: COM Connector Pinout Locations

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	GND

Table 3-19: COM Connector Pinouts

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

CN Label: **COM3**

CN Type: 14-pin header (2x7)

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

CN Pinouts: See **Table 3-20**

Used for RS-232/422/485 communications.

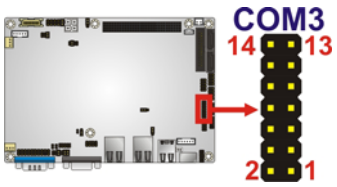


Figure 3-19: Serial Port Connector Location

Pin	Description	Pin	Description
1	DCD	2	DSR2
3	RXD	4	RTS2
5	TXD	6	CTS2
7	DTR	8	RI2
9	GND	10	N/A
11	RS422 TX2/485+	12	RS422 TX2/485-
13	RS422 RX2+	14	RS422 RX2-

Table 3-20: Serial Port Connector Pinouts

3.2.19 SMBus Connector

CN Label: **CN1**

CN Type: 4-pin wafer (1x4)

CN Location: See Figure 3-17

CN Pinouts: See Table 3-18

The SMBus Connector provides a connection to a SMBus (System Management Bus) device.

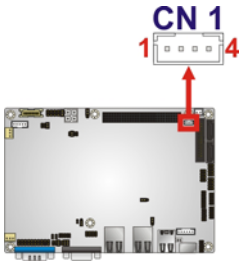


Figure 3-20: SMBus Connector Locations

Pin	Description
1	GND
2	SMBDATA
3	SMBCLK
4	VCC5S

Table 3-21: SMBus Connector Pinouts

3.2.20 SPI Flash Connector

CN Label: **SPI1**

CN Type: 8-pin header (2x4)

CN Location: See **Figure 3-21**

CN Pinouts: See **Table 3-22**

The 8-pin SPI Flash connector is used to flash the BIOS.

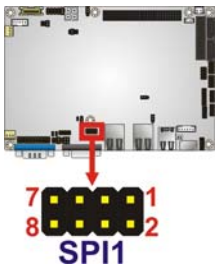


Figure 3-21: SPI Flash Connector

Pin	Description	Pin	Description
1	VCC	2	GND
3	CS#	4	CLOCK
5	SO	6	SI
7	NC	8	NC

Table 3-22: SPI Flash Connector Pinouts

3.2.21 TPM Connector

CN Label: **TPM1**

CN Type: 20-pin header (2x10)

CN Location: See Figure 3-22

CN Pinouts: See Table 3-23

The Trusted Platform Module (TPM) connector secures the system on bootup.

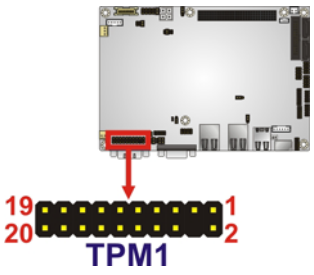


Figure 3-22: TPM Connector Pinout Locations

Pin	Description	Pin	Description
1	TPMCLK	2	GND

Pin	Description	Pin	Description
3	LPC_FRAME#	4	NC
5	LRESET#	6	VCC5S
7	LPC_AD3	8	LPC_AD2
9	VCC3S	10	LPC_AD1
11	LPC_AD0	12	GND
13	SMBCLK	14	SMBDATA
15	VCC3DUAL	16	SERIRQ
17	GND	18	NC
19	VCC3S	20	LDRQ#

Table 3-23: TPM Connector Pinouts

3.2.22 USB Connectors

CN Label: **USB0_1, USB2_3, USB4_5**

CN Type: 8-pin header (2x4)

CN Location: See **Figure 3-23**

CN Pinouts: See **Table** 3-28

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

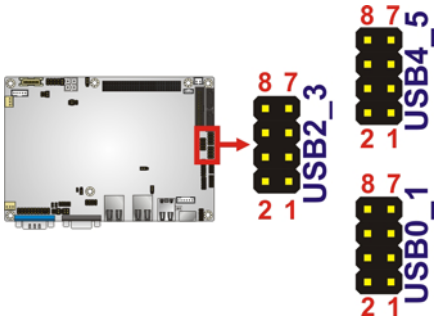


Figure 3-23: USB Connector Pinout Locations

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

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

Table 3-24: USB Port Connector Pinouts

3.3 External Peripheral Interface Connector Panel

Figure 3-24 shows the NANO-PV-D4251/N4551/D5251 external peripheral interface connector (EPIC) panel. The NANO-PV-D4251/N4551/D5251 EPIC panel consists of the following:

- 2 x Ethernet connector
- 1 x Keyboard/Mouse
- 1 x Serial port (RS-232)
- 2 x USB connectors
- 1 x VGA connector

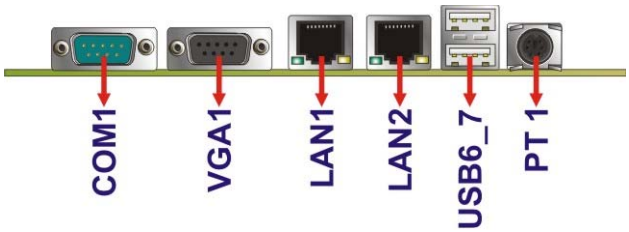


Figure 3-24: NANO-PV-D4251/N4551/D5251 External Peripheral Interface Connector

3.3.1 Ethernet Connector

CN Label: **LAN1, LAN2**

CN Type: RJ-45

CN Location: See Figure 3-24

CN Pinouts: See Table 3-25

The NANO-PV-D4251/N4551/D5251 is equipped with two built-in RJ-45 Ethernet controllers. The controllers can connect to the LAN through the RJ-45 LAN connectors.

Pin	Description	Pin	Description
1	LAN1_MDI0P	2	LAN1_MDI0N
3	LAN1_MDI1P	4	LAN1_MDI1N
5	+VCT_LAN1	6	GND
7	LAN1_MDI2P	8	LAN1_MDI2N
9	LAN1_MDI3P	10	LAN1_MDI3N

Table 3-25: LAN Pinouts

The RJ-45 Ethernet connectors have two status LEDs, one green and one yellow. The green LED indicates activity on the port and the yellow LED indicates the speed. See **Table 3-26**.

Speed LED		Activity/Link LED	
STATUS	**DESCRIPTION**	**STATUS**	**DESCRIPTION**
Off	10 Mbps connection	Off	No link
Green	100 Mbps connection	Yellow	Linked
Orange	Gbps connection	Blinking	TX/RX activity 1

Table 3-26: RJ-45 Ethernet Connector LEDs

Figure 3-25: RJ-45 Ethernet Connector

3.3.2 Keyboard/Mouse Connector

CN Label: **PT1**

CN Type: PS/2

CN Location: See Figure 3-24

CN Pinouts: See Figure 3-26 and Table 3-27

The keyboard and mouse connector is a standard PS/2 connector.

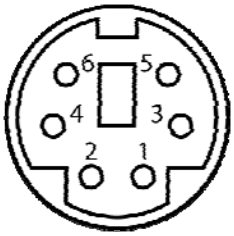


Figure 3-26: PS/2 Pinout and Configuration

Pin	Description
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB CLOCK
6	MS CLOCK

Table 3-27: Keyboard Connector Pinouts

3.3.3 USB Connectors

CN Label: **USB6_7**

CN Type: USB port

CN Location: See Figure 3-24

CN Pinouts: See 815HTable 3-28

The NANO-PV-D4251/N4551/D5251 has four external USB 2.0 ports. The ports connect to both USB 2.0 and USB 1.1 devices.

Pin	Description	Pin	Description
1	VCC	5	VCC
2	DATA-	6	DATA-
3	DATA+	7	DATA+
4	GROUND	8	GROUND

Table 3-28: USB Port Connector Pinouts

3.3.4 VGA Connector

CN Label: **VGA1**

CN Type: 15-pin Female

CN Location: See **Figure** 3-24

CN Pinouts: See **Figure 3-27** and **Table 3-29**

Connects to a monitor that accepts a standard VGA input.

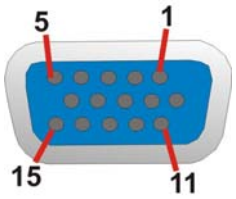


Figure 3-27: VGA Connector

Pin	Description	Pin	Description
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	VCC / NC	10	GND
11	NC	12	DDC DAT
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 3-29: VGA Connector Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

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

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

4.3 Unpacking

When the NANO-PV-D4251/N4551/D5251 is unpacked, please check all the unpacking list items listed in Chapter 3 are indeed present. If any of the unpacking list items are not available please contact the NANO-PV-D4251/N4551/D5251 vendor reseller/vendor where the NANO-PV-D4251/N4551/D5251 was purchased or contact an IEI sales representative.

4.4 SO-DIMM Installation

SO-DIMM is a critical component of the NANO-PV-D4251/N4551/D5251. If it is not installed the NANO-PV-D4251/N4551/D5251 cannot run.

4.4.1 SO-DIMM Installation

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

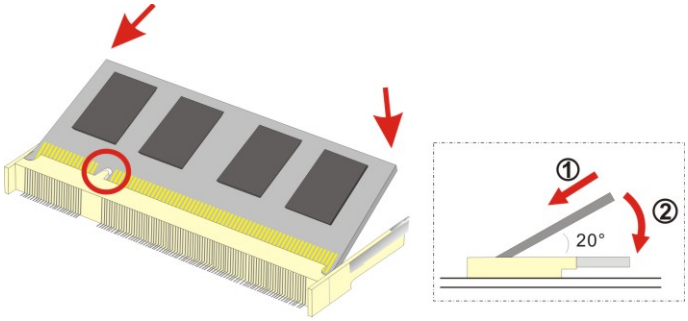


Figure 4-1: SO-DIMM Installation

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.

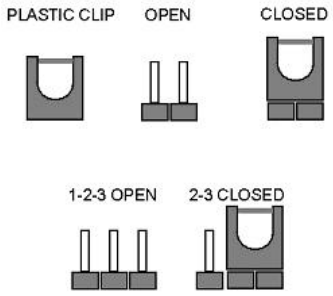
Step 3: **Insert the SO-DIMM**. Push the memory in at a 20º angle. (See **Figure 4-1**)

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

4.5 Jumper Settings

NOTE:

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



Before the NANO-PV-D4251/N4551/D5251 is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the NANO-PV-D4251/N4551/D5251 are listed in **Table 4-1**.

Description	Type	Label
AT Auto Button	2-pin header	J_AUTOPWR1
Clear CMOS	3-pin header	J_CMOS1
CompactFlash® Master/Slave function setting	2-pin header	JCF1
CompactFlash® voltage select	2-pin header	J_VCF1
COM3 RS-232/422/485 select	6-pin header	J4
COM3 RS-422/485 select	6-pin header	J6
COM3 RS-422 Termination select	J10	2-pin header
COM3 RS-485 Termination select	J9	2-pin header
LVDS LCD voltage select	6-pin header	J_VLVDS1
LVDS LCD panel type	8-pin header	J_LCD_TYPE1
PC-104 voltage setup	3-pin header	JP1

Table 4-1: Jumpers

4.5.1 AT Auto Button Power Select Jumper Settings

Jumper Label:	**J_AUTOPWR1**
Jumper Type:	2-pin header
Jumper Settings:	See Table 4-2
Jumper Location:	See Figure 4-2

The AT Auto Button Power Select jumper specifies the systems auto button power mode as AT or ATX.

Setting	Description
Short	Use AT power
Open	Use ATX power

Table 4-2: AT Auto Button Power Select Jumper Settings

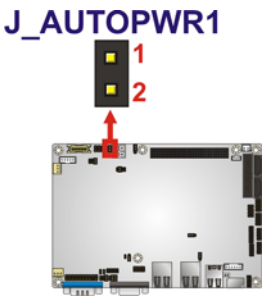


Figure 4-2: AT Auto Button Select Jumper Settings

4.5.2 AT/ATX Power Select Jumper Settings

Jumper Label:	**J_ATXCTL1**
Jumper Type:	3-pin header (1x3)
Jumper Settings:	See Table 4-3
Jumper Location:	See Figure 4-3

The AT/ATX Power Select jumper specifies the systems power mode as AT or ATX. AT/ATX Power Select jumper settings are shown in **Table 4-3**.

AT Power Select	Description	
Short 1 - 2	Use ATX power	

AT Power Select	Description	
Short 2 – 3	Use AT power	Default

Table 4-3: AT/ATX Power Select Jumper Settings

The location of the AT/ATX Power Select jumper is shown in **Figure 4-3** below.

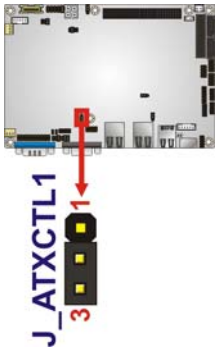


Figure 4-3: AT/ATX Power Select Jumper Location

4.5.3 Clear CMOS Jumper

Jumper Label:	**J_CMOS1**
Jumper Type:	3-pin header (1x3)
Jumper Settings:	See Table 4-4
Jumper Location:	See Figure 4-4

If the NANO-PV-D4251/N4551/D5251 fails to boot due to improper BIOS settings, the clear CMOS jumper clears the CMOS data and resets the system BIOS information. To do this, use the jumper cap to close pins 2 and 3 for a few seconds then reinstall the jumper clip back to pins 1 and 2.

If the “CMOS Settings Wrong” message is displayed during the boot up process, the fault may be corrected by pressing the F1 to enter the CMOS Setup menu. Do one of the following:

- Enter the correct CMOS setting
- Load Optimal Defaults
- Load Failsafe Defaults.

After having done one of the above, save the changes and exit the CMOS Setup menu.

The clear CMOS jumper settings are shown in **Table 4-4**.

Clear CMOS	Description	
Short 1 - 2	Keep CMOS Setup	Default
Short 2 - 3	Clear CMOS Setup	

Table 4-4: Clear CMOS Jumper Settings

The location of the clear CMOS jumper is shown in **Figure 4-4** below.

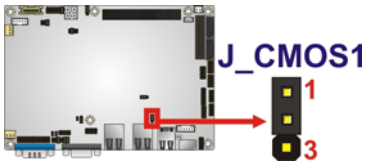


Figure 4-4: Clear CMOS Jumper

4.5.4 COM 3 Function Select Jumper

Jumper Label: **J4**

Jumper Type: 6-pin header

Jumper Settings: See Table 4-5

Jumper Location: See Figure 4-5

The COM 3 Function Select jumper sets the communication protocol used by the second serial communications port (COM 3) as RS-232, RS-422 or RS-485. The COM 3 Function Select settings are shown below.

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

Table 4-5: COM 3 Function Select Jumper Settings

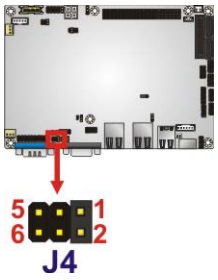


Figure 4-5: COM 3 Function Select Jumper Location

4.5.5 COM 3 RS-422/485 Function Select Jumper

Jumper Label:	**J6**
Jumper Type:	6-pin header
Jumper Settings:	See Table 4-5
Jumper Location:	See Figure 4-5

The COM 3 Function Select jumper sets the communication protocol used by the second serial communications port (COM 3) as RS-422 or RS-485. The COM 3 Function Select settings are shown below.

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

Table 4-6: COM 3 RS-422/485 Function Select Jumper Settings

Figure 4-6: COM 3 RS-422/485 Function Select Jumper Location

4.5.6 COM 3 RS-422/485 Termination Select Jumpers

Jumper Label:	**J9 and J10**
Jumper Type:	2-pin header
Jumper Settings:	See Table 4-5 and Table 4-7
Jumper Location:	See Figure 4-7

The COM 3 RS-422 and RS-485 Termination Select jumpers enable or disable the termination used by the serial COM 3 communications port as 120 ohm. The COM 3 RS-422 and RS-485 Termination Select settings are shown in **Table 4-5 and Table 4-7**.

RS-422 (J9) Setting	Description
Short	120 ohm termination
Open	No 120 ohm termination

Table 4-7: COM 3 RS-422 Termination Select Jumper Settings

RS-485 (J10) Setting	Description
Short	120 ohm termination
Open	No 120 ohm termination

Table 4-8: COM 3 RS-485 Termination Select Jumper Settings

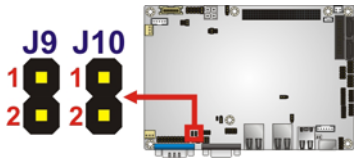


Figure 4-7: COM 3 RS-422 and RS-485 Termination Select Jumper Location

4.5.7 CompactFlash® Card Setup

Jumper Label:	**JCF1**
Jumper Type:	2-pin header
Jumper Settings:	See Table 4-9
Jumper Location:	See Figure 4-4

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

Setting	Description
Open	Slave
Closed	Master

Table 4-9: CompactFlash® Setup Jumper Settings

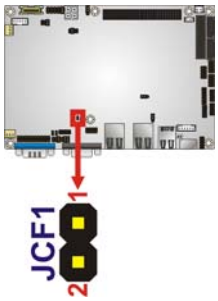


Figure 4-8: CompactFlash® Setup Jumper Location

4.5.8 CompactFlash® Voltage Selection

WARNING:

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

Jumper Label: **J_VCF1**

Jumper Type: 2-pin header

Jumper Settings: See Table 4-10

Jumper Location: See Figure 4-9

The CompactFlash® voltage selection jumper sets the voltage of the power supplied to the CF card.

Setting	Description
Open	+3.3 V (Default)

Setting	Description
Short	+5.0 V

Table 4-10: CompactFlash® Voltage Selection Jumper Settings

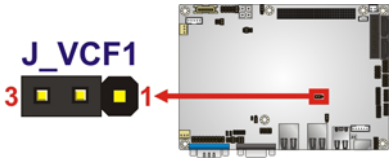


Figure 4-9: CompactFlash® Voltage Selection Jumper Location

4.5.9 LVDS1 Screen Resolution Selection

Jumper Label: **J_LCD_TYPE**

Jumper Type: 8-pin header

Jumper Settings: See Table 4-11

Jumper Location: See Figure 4-10

The **LVDS1 Screen Resolution Selection** jumper allows the LVDS screen voltage to be set. The **LVDS1 Screen Resolution Selection** jumper settings are shown in Table 4-12.

Pin	Description
Open	640 x 480
1-2	800 x 600
3-4	1024 x 768
1-2 and 3-4	1280 x 1024
7-8	1366 x 768
1-2 and 7-8	1920 x 1080

Table 4-11: LVDS1 Screen Resolution Jumper Settings

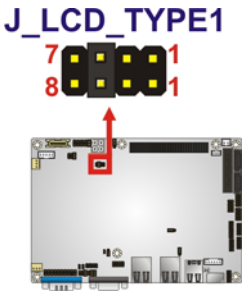


Figure 4-10: LVDS Screen Resolution Jumper Locations

4.5.10 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:	6-pin header
Jumper Settings:	See Table 4-12
Jumper Location:	See Figure 4-11

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

Setting	Description
1-2	+3.3 V (Default)
3-4	+5.0 V
5-6	+12 V

Table 4-12: LVDS Voltage Selection Jumper Settings

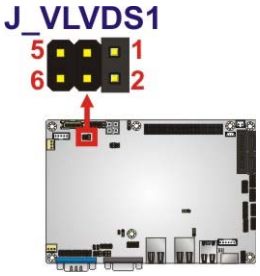


Figure 4-11: LVDS Voltage Selection Jumper Locations

4.5.11 PCI-104 Voltage Setup

Jumper Label:	**JP1**
Jumper Type:	3-pin header
Jumper Settings:	See Table 4-13
Jumper Location:	See Figure 4-12

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 4-13: PCI-104 Voltage Jumper Settings

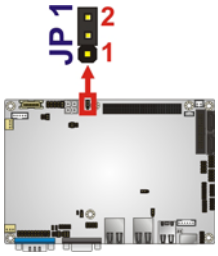


Figure 4-12: PCI-104 Voltage Jumper Location

4.6 Chassis Installation

4.6.1 Airflow

WARNING:

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

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

4.6.2 Motherboard Installation

To install the NANO-PV-D4251/N4551/D5251 motherboard into the chassis please refer to the reference material that came with the chassis.

4.7 Internal Peripheral Device Connections

This section outlines the installation of peripheral devices to the onboard connectors

4.7.1 AT/ATX Power Connection

Follow the instructions below to connect the NANO-PV-D4251/N4551/D5251 to an AT or ATX power supply.

WARNING:

Disconnect the power supply power cord from its AC power source to prevent a sudden power surge to the NANO-PV-D4251/N4551/D5251.

Step 5: **Locate the power cable**. The power cable is shown in the packing list in **Chapter 3**.

Step 6: **Connect the Power Cable to the Motherboard**. Connect the 4-pin (2x2) Molex type power cable connector to the AT/ATX power connector on the motherboard. See Figure 4-13.

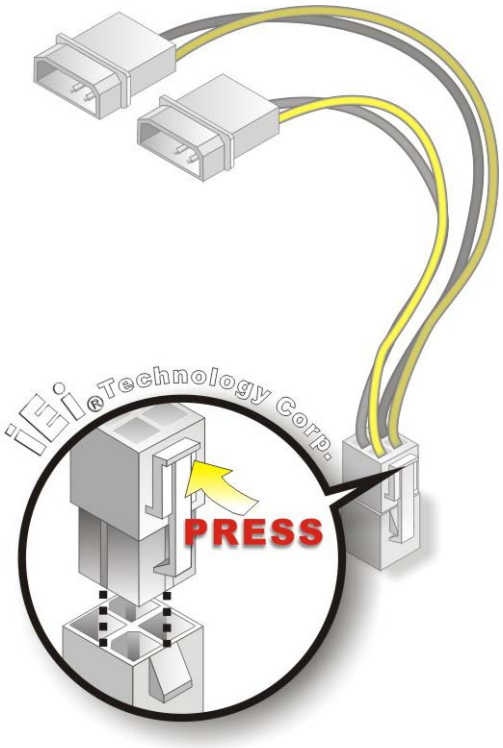


Figure 4-13: Power Cable to Motherboard Connection

Step 7: **Connect Power Cable to Power Supply**. Connect one of the 4-pin (1x4) Molex type power cable connectors to an AT/ATX power supply. See Figure 4-14.

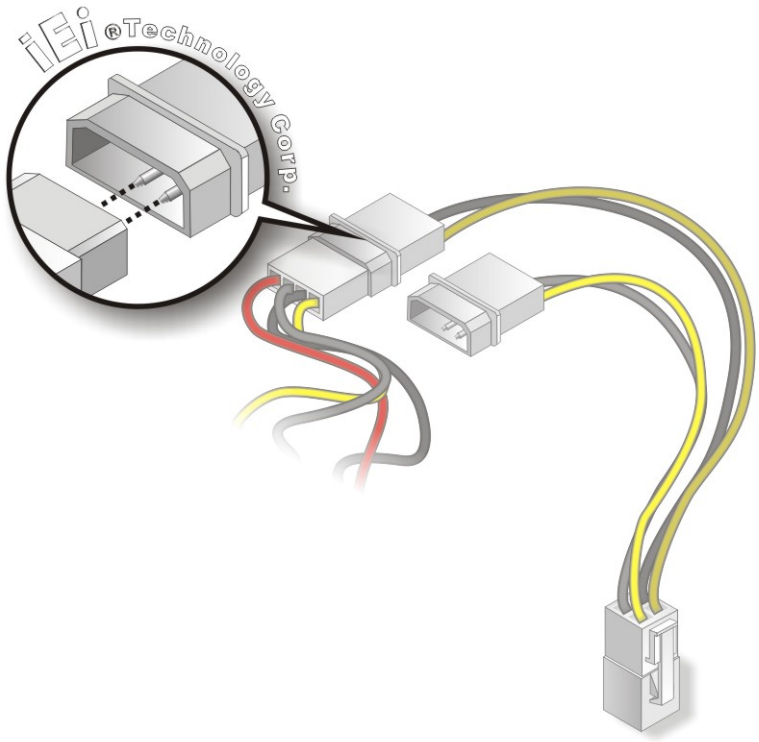


Figure 4-14: Connect Power Cable to Power Supply

4.7.2 Audio Kit Installation

The Audio Kit that came with the NANO-PV-D4251/N4551/D5251 connects to the audio connector on the NANO-PV-D4251/N4551/D5251. The audio kit consists of three audio jacks. Mic-in connects to a microphone. Line-in provides a stereo line-level input to connect to the output of an audio device. Line-out, a stereo line-level output, connects to two amplified speakers. To install the audio kit, please refer to the steps below:

Step 8: **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 9: **Align pin 1**. Align pin 1 on the on-board connector with pin 1 on the audio kit connector. Pin 1 on the audio kit connector is indicated with a white dot. See Figure 4-15.

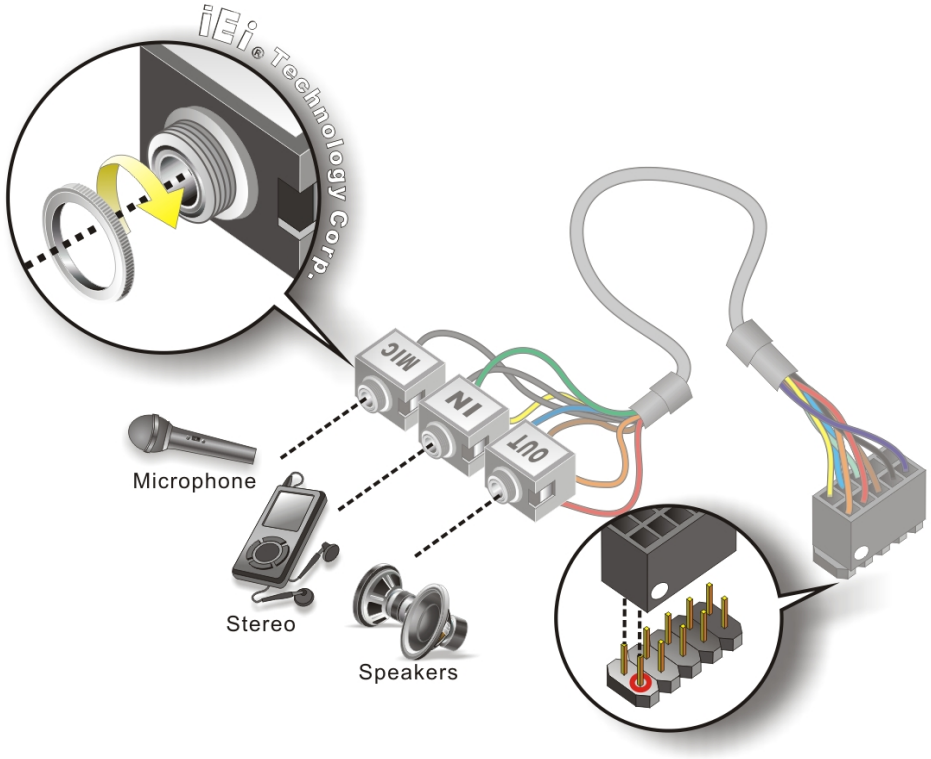


Figure 4-15: Audio Kit Cable Connection

Step 10: **Connect the audio devices**. Connect speakers to the line-out audio jack. Connect the output of an audio device to the line-in audio jack. Connect a microphone to the mic-in audio jack.

4.7.3 Single RS-232 Cable (w/o Bracket)

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

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

Step 2: **Insert the cable connector**. Insert the connector into the serial port box header. See Figure 4-16. A key on the front of the cable connectors ensures the connector can only be installed in one direction.

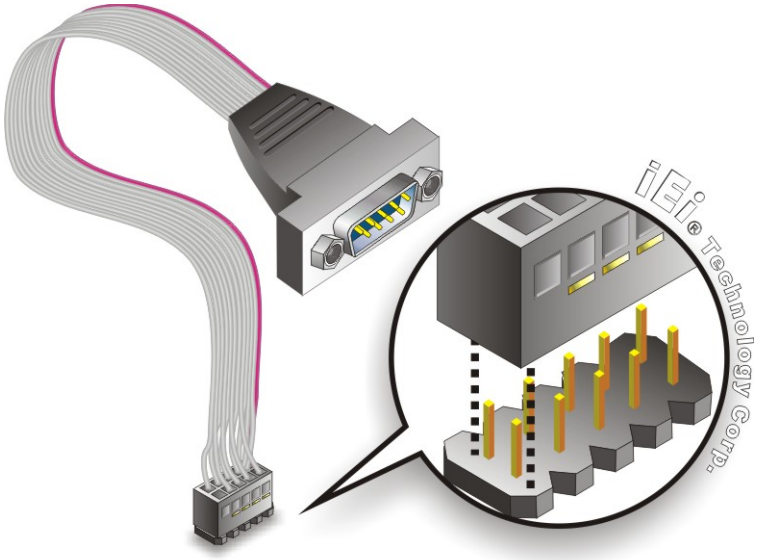


Figure 4-16: Single RS-232 Cable Installation

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

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

4.8 External Peripheral Interface Connection

The following external peripheral devices can be connected to the external peripheral interface connectors.

- Keyboard and mouse
- RJ-45 Ethernet cable connector
- Serial devices
- USB devices
- VGA monitor

To install these devices, connect the corresponding cable connector from the actual device to the corresponding NANO-PV-D4251/N4551/D5251 external peripheral interface connector making sure the pins are properly aligned.

4.8.1 LAN Connection (Single Connector)

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

Step 1: **Locate the RJ-45 connectors**. The location of the LAN connector is shown in **Chapter 4**.

Step 2: **Align the connectors.** Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the NANO-PV-D4251/N4551/D5251. See Figure 4-17.

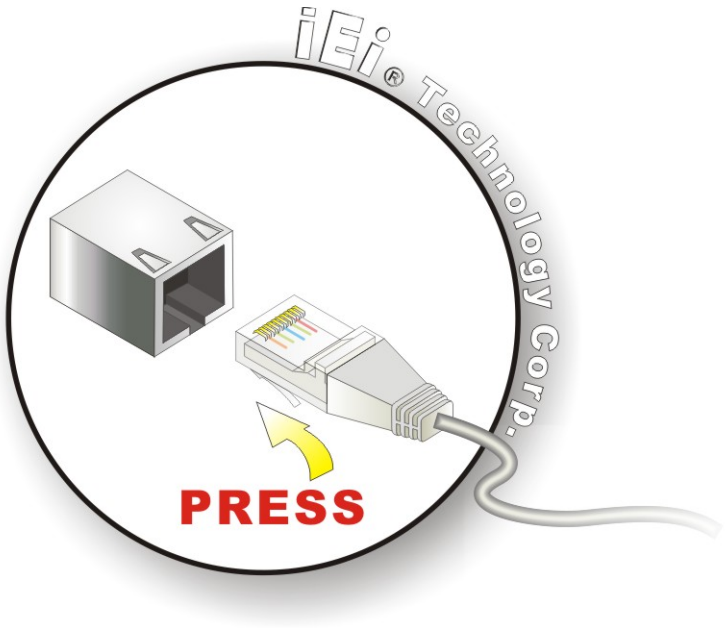


Figure 4-17: LAN Connection

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

4.8.2 PS/2 Y-Cable Connection

The NANO-PV-D4251/N4551/D5251 has a PS/2 connector on the external peripheral interface panel. The dual PS/2 connector is connected to the PS/2 Y-cable that came with the NANO-PV-D4251/N4551/D5251. One of the PS/2 cables is connected to a keyboard and the other to a mouse to the system. Follow the steps below to connect a keyboard and mouse to the NANO-PV-D4251/N4551/D5251.

Step 1: **Locate the dual PS/2 connector**. The location of the PS/2 connector is shown in **Chapter 3**.

Step 2: **Insert the keyboard/mouse connector**. Insert the PS/2 connector on the end of the PS/2 y-cable into the external PS/2 connector. See Figure 4-18.

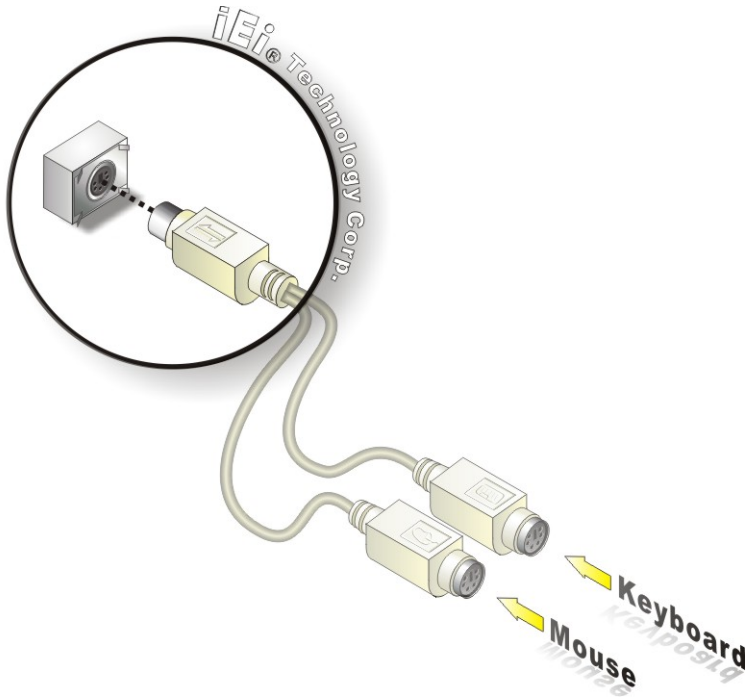


Figure 4-18: PS/2 Keyboard/Mouse Connector

Step 3: **Connect the keyboard and mouse**. Connect the keyboard and mouse to the appropriate connector. The keyboard and mouse connectors can be distinguished from each other by looking at the small graphic at the top of the connector.

4.8.3 Serial Device Connection

The NANO-PV-D4251/N4551/D5251 has a single female DB-9 connector on the external peripheral interface panel for a serial device. Follow the steps below to connect a serial device to the NANO-PV-D4251/N4551/D5251.

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

Step 2: **Insert the serial connector**. Insert the DB-9 connector of a serial device into the DB-9 connector on the external peripheral interface. See Figure 4-19.

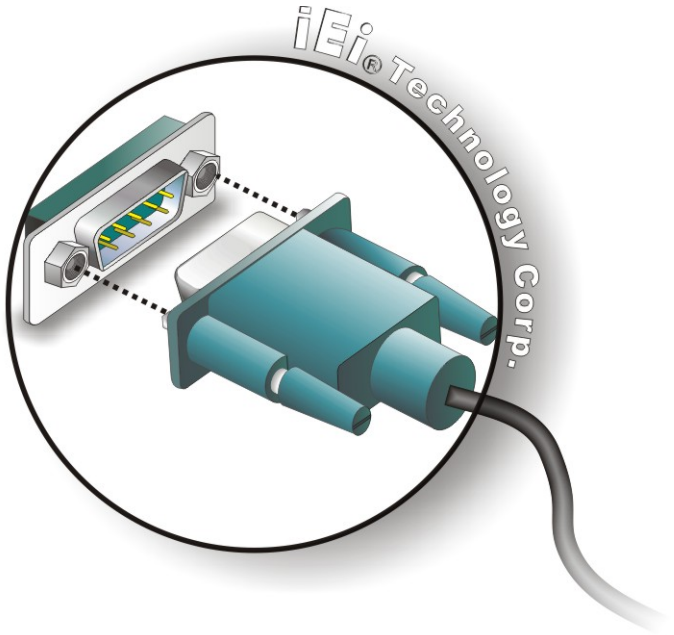


Figure 4-19: Serial Device Connector

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

4.8.4 USB Connection (Dual Connector)

The external USB Series "A" receptacle connectors provide easier and quicker access to external USB devices. Follow the steps below to connect USB devices to the NANO-PV-D4251/N4551/D5251.

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

Step 2: **Insert a USB Series "A" plug**. Insert the USB Series "A" plug of a device into the USB Series "A" receptacle on the external peripheral interface. See Figure 4-20.

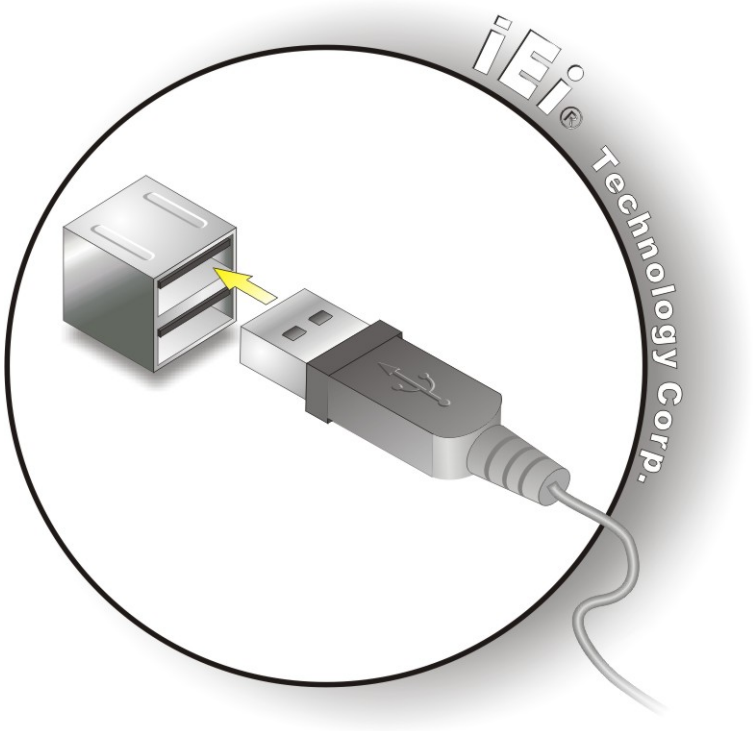


Figure 4-20: USB Connector

4.8.5 VGA Monitor Connection

The NANO-PV-D4251/N4551/D5251 has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the NANO-PV-D4251/N4551/D5251, please follow the instructions below.

Step 1: **Locate the female DB-15 connector**. The location of the female DB-15 connector is shown in **Chapter 3**.

Step 2: **Align the VGA connector**. Align the male DB-15 connector on the VGA screen cable with the female DB-15 connector on the external peripheral interface.

Step 3: **Insert the VGA connector** Once the connectors are properly aligned with the insert the male connector from the VGA screen into the female connector on the NANO-PV-D4251/N4551/D5251. See Figure 4-21.

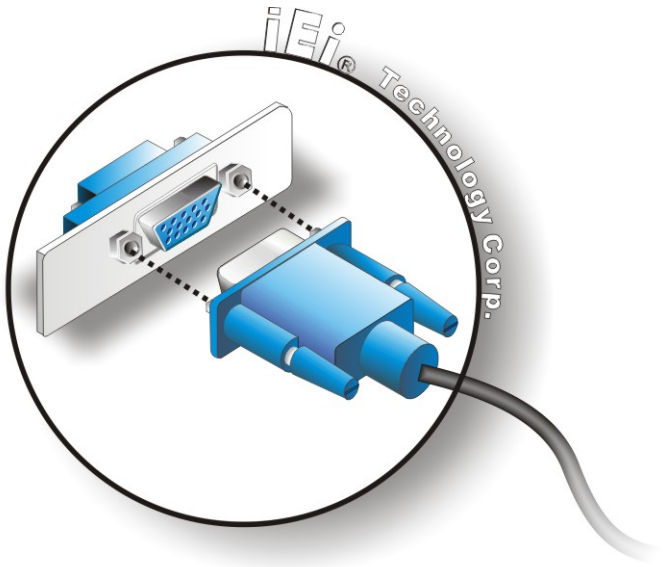


Figure 4-21: VGA Connector

Step 4: **Secure the connector**. Secure the DB-15 VGA connector from the VGA monitor to the external interface by tightening the two retention screws on either side of the connector.

4.9 Software Installation

All the drivers for the NANO-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 4-22**).

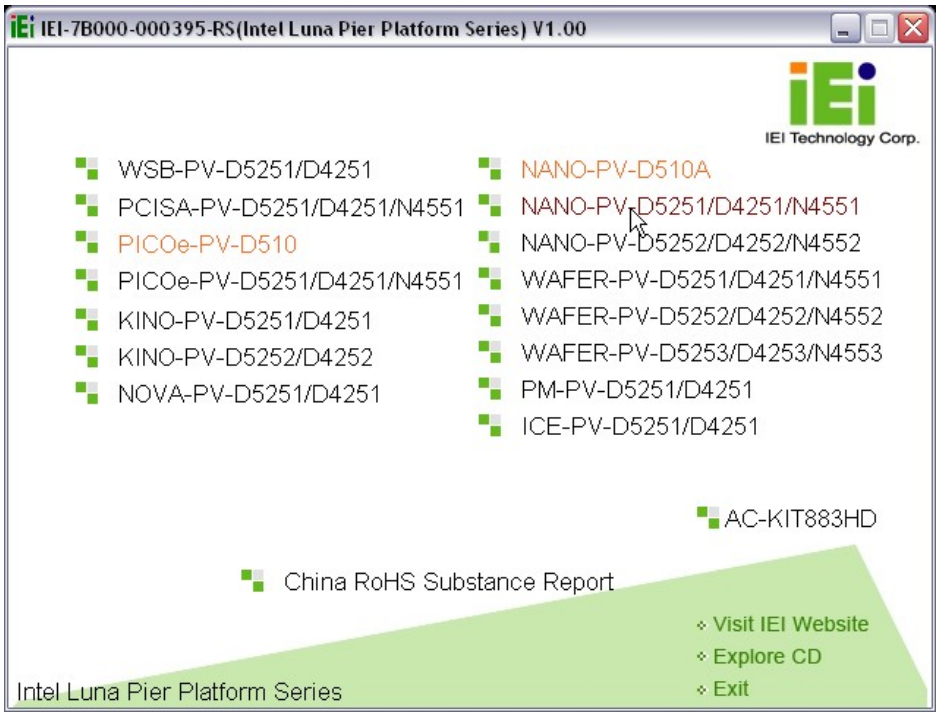


Figure 4-22: Introduction Screen

Step 3: Click **NANO-PV-D4251/N4551/D5251**.

Step 4: A new screen with a list of available drivers appears (**Figure 4-23**).

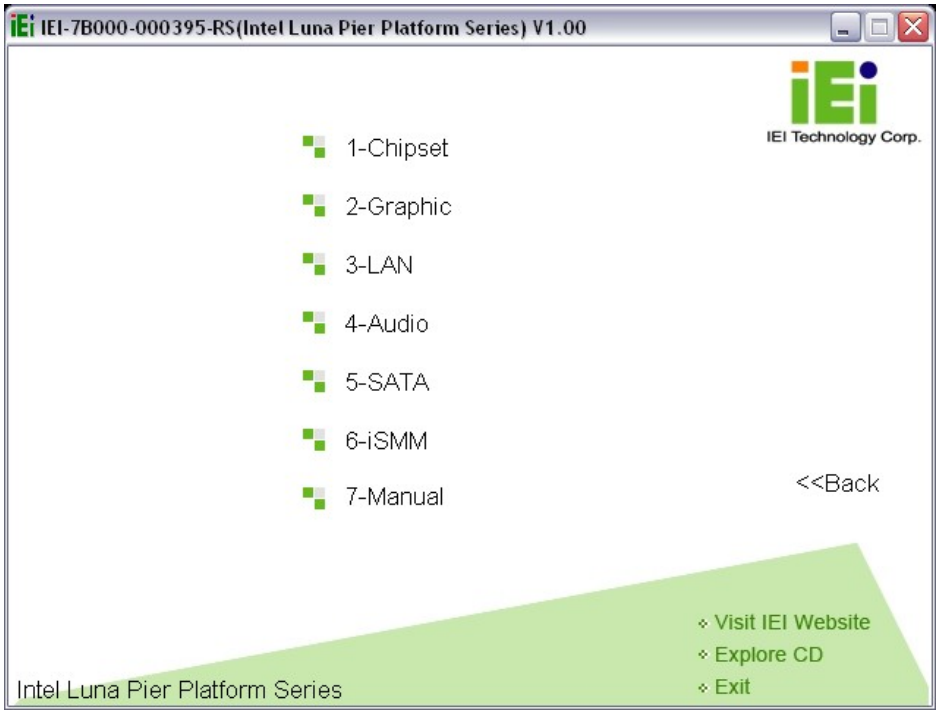


Figure 4-23: Available Drivers

Step 5: Install all of the necessary drivers in this menu.

Chapter

5

BIOS Screens

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

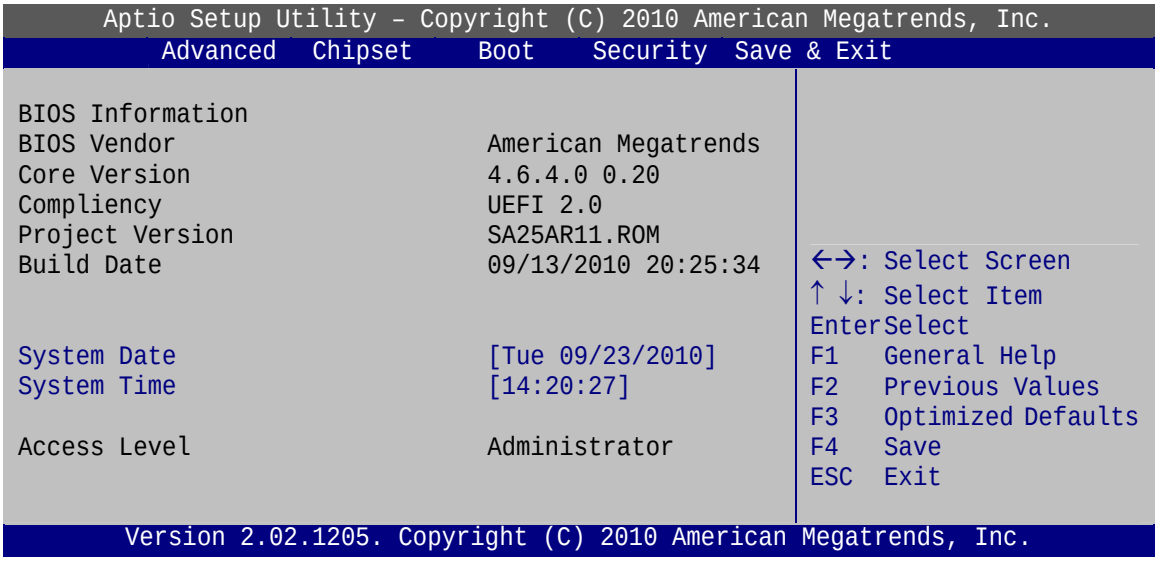
The **menu bar** on top of the BIOS screen has the following main items:

- 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]**

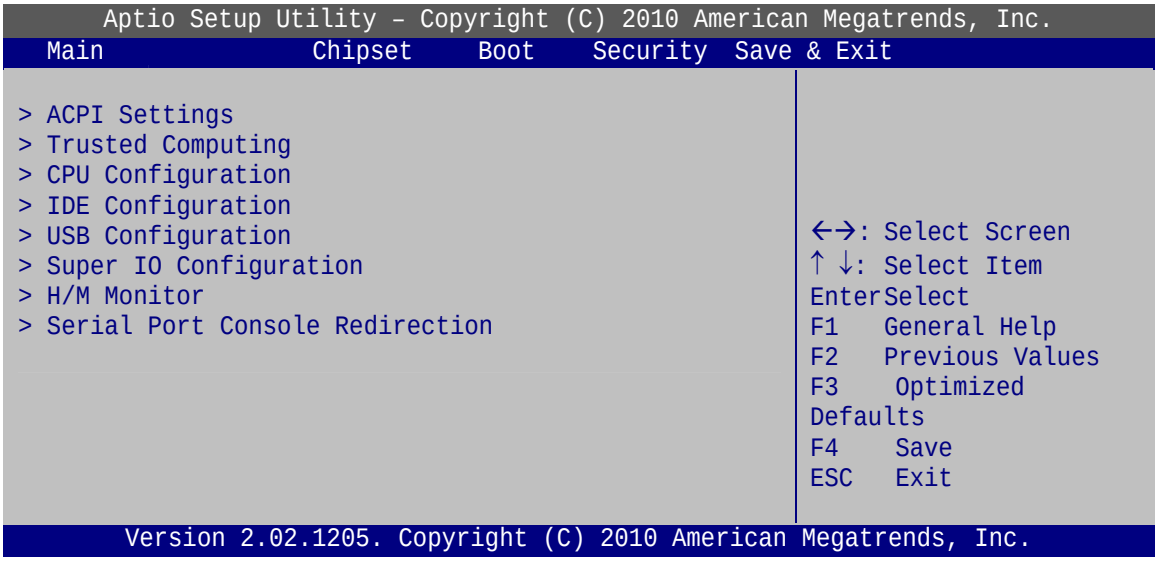
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

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

WARNING!

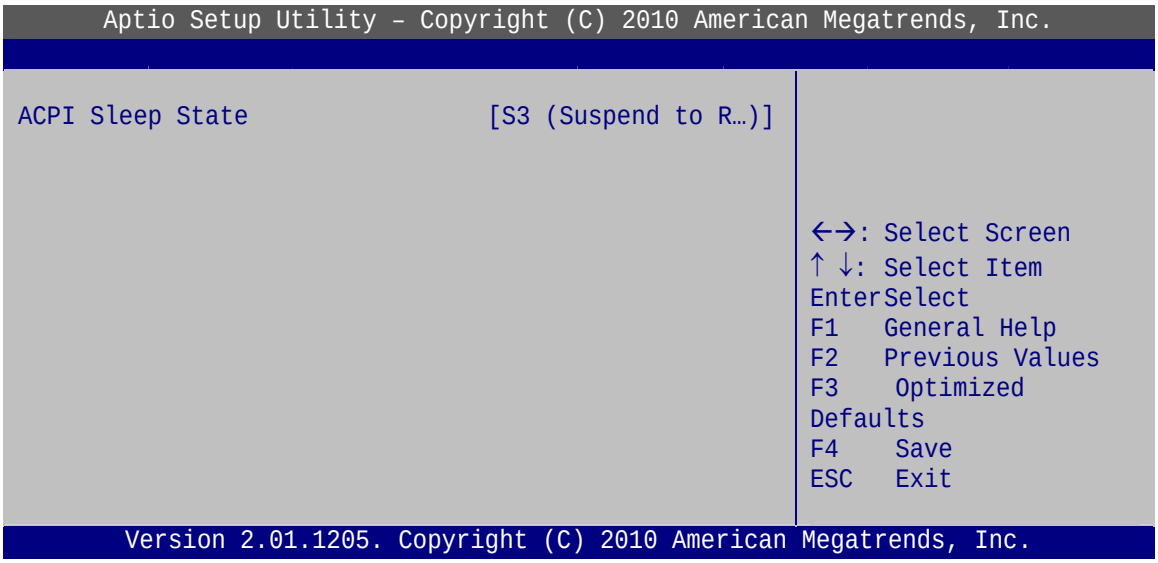
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.



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.

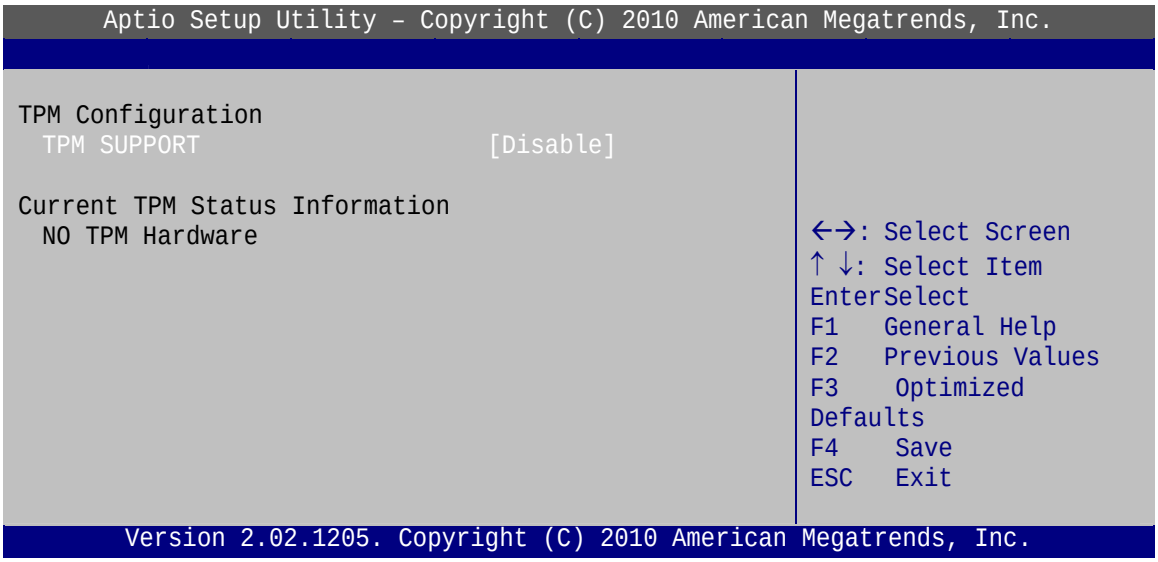
➔ **Suspend Disabled**

➔ **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 Trusted Computing

Use the **Trusted Computing** menu (**BIOS Menu 4**) to configure settings related to the Trusted Computing Group (TCG) Trusted Platform Module (TPM).



BIOS Menu 4: TPM Configuration

➔ **TPM Support [Disable]**

Use the **TPM Support** option to configure support for the TPM.

➔ **Disable** **DEFAULT** TPM support is disabled.

➔ **Enable** TPM support is enabled.

5.3.3 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 5**) to view detailed CPU specifications and configure the CPU.

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

CPU Configuration

Processor Type                  Intel(R) Atom(TM) CPU
                                CPU D425     @ 1.80GHz
EMT64                           Supported
Processor Speed                 1800 MHz
System Bus Speed                800 MHz
Ratio Status                    9
Actual Ratio                    9
Processor Stepping              106ca
Microcode Revision              263
L1 Cache RAM                    56 k
L2 Cache RAM                    512 k
Processor Core                  Single
Hyper-Threading                 Supported

                                ←→: 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.
```

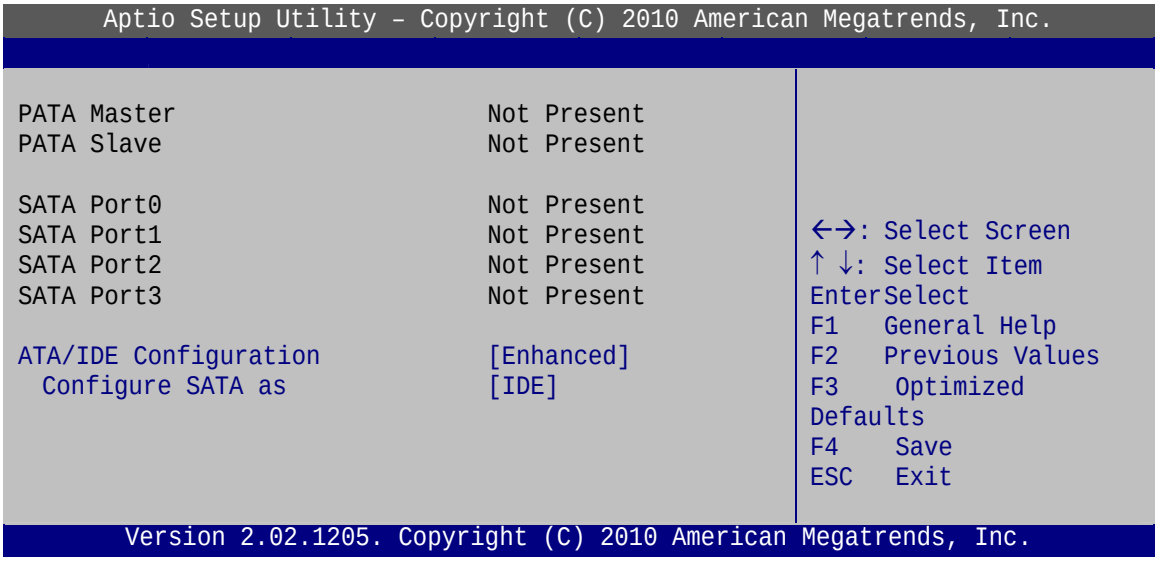
BIOS Menu 5: CPU Configuration

The CPU Configuration menu (**BIOS Menu 5**) 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.

5.3.4 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 6**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 6: 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.

5.3.5 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 7**) to read USB configuration information and configure the USB settings.

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

USB Configuration                                  |
                                                   |
USB Devices:                                       |
      1 Keyboard                                   |
                                                   |  ←→: Select Screen
Legacy USB Support              [Enabled]          |  ↑ ↓: Select Item
                                                   |  Enter Select
                                                   |  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 7: 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

5.3.6 Super IO Configuration

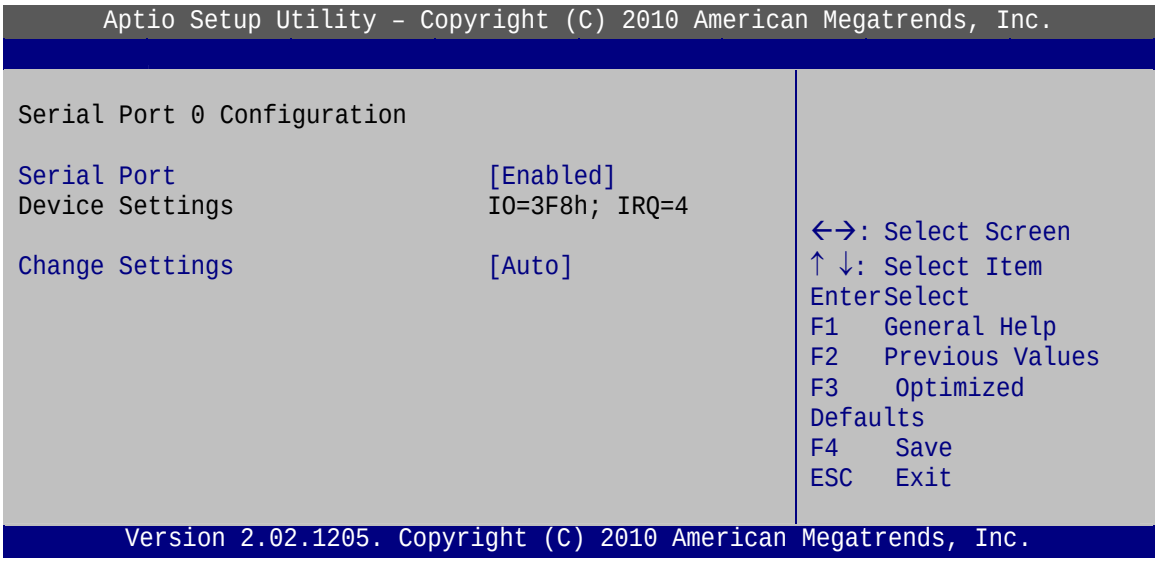
Use the **Super IO Configuration** menu (**BIOS Menu 8**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.

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

Super IO Configuration                    |
                                          |
Super IO Chip                  Finteck F81865
> Serial Port 0 Configuration             |
> Serial Port 1 Configuration             |  ←→: Select Screen
> Serial Port 2 Configuration             |  ↑ ↓: Select Item
> Serial Port 3 Configuration             |  Enter Select
> Serial Port 4 Configuration             |  F1   General Help
> IrDA Configuration                      |  F2   Previous Values
> Parallel Port Configuration             |  F3    Optimized
                                          |  Defaults
                                          |  F4    Save
                                          |  ESC   Exit

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

BIOS Menu 8: Super IO Configuration

5.3.6.1 Serial Port n Configuration

Use the **Serial Port n Configuration** menu (**BIOS Menu 9**) to configure the serial port n.



BIOS Menu 9: Serial Port n Configuration Menu

5.3.6.1.1 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**	Serial Port I/O port address is 3F8h and the interrupt address is IRQ3 and IRQ4
➔ **IO=2F8h; IRQ=3, 4**	Serial Port I/O port address is 2F8h and the interrupt address is IRQ3 and IRQ4
➔ **IO=2C0h; IRQ=3, 4**	Serial Port I/O port address is 2C0h and the interrupt address is IRQ3 and IRQ4
➔ **IO=2C8h; IRQ=3, 4**	Serial Port I/O port address is 2C8h and the interrupt address is IRQ3 and IRQ4

5.3.6.1.2 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**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3 and IRQ4
➔ **IO=2F8h; IRQ=3, 4**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3 and IRQ4
➔ **IO=2C0h; IRQ=3, 4**		Serial Port I/O port address is 2C0h and the interrupt address is IRQ3 and IRQ4

➔ **IO=2C8h; IRQ=3, 4**		Serial Port I/O port address is 2C8h and the interrupt address is IRQ3 and IRQ4

5.3.6.1.3 Serial Port 2 Configuration

➔ **Serial Port [Enabled]**

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

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

➔ **Change Settings [Auto]**

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

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

➔ **Serial Port 2 Mode [RS232]**

Use the **Serial Port 2 Mode** option to set the Serial Port 2 signaling mode.

- **RS232** **DEFAULT** Serial Port 2 signaling mode is RS-232
- **RS422/RS485** Serial Port 2 signaling mode is RS-422/RS-485

5.3.6.1.4 Serial Port 3 Configuration

➔ **Serial Port [Enabled]**

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

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

➔ **Change Settings [Auto]**

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

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

5.3.6.1.5 Serial Port 4 Configuration

➔ **Serial Port [Enabled]**

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

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

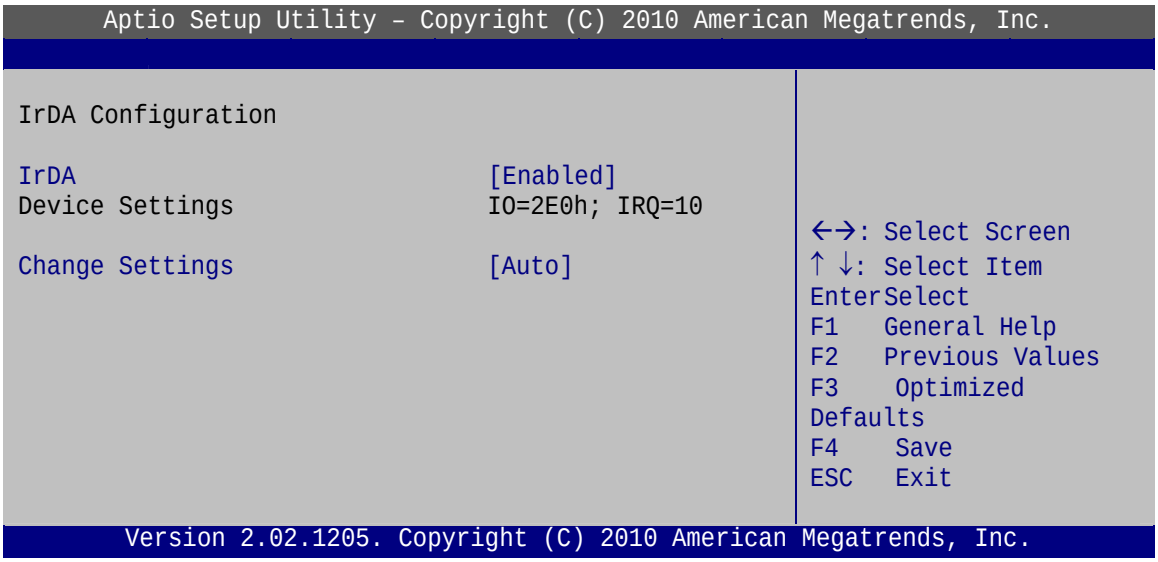
➔ **Change Settings [Auto]**

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

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=2C0h; IRQ=10**		Serial port I/O port address is 2E8h and the interrupt address is IRQ10
➔ **IO=2C0h; IRQ=10, 11**		Serial port I/O port address is **2C0**h and the interrupt address is IRQ10, 11
➔ **IO=2C8h; IRQ=10, 11**		Serial port I/O port address is 2C8h and the interrupt address is IRQ10, 11
➔ **IO=2D0h; IRQ=10, 11**		Serial port I/O port address is 2D0h and the interrupt address is IRQ10 and IRQ11
➔ **IO=2D8h; IRQ=10, 11**		Serial port I/O port address is DC8h and the interrupt address is IRQ10 and IRQ11
➔ **IO=2E0h; IRQ=10, 11**		Serial port I/O port address is 2E0h and the interrupt address is IRQ10 and IRQ11

5.3.6.2 IrDA Configuration

Use the **IrDA Configuration** menu (**BIOS Menu 9**) to configure the serial port n.



BIOS Menu 10: IrDA Configuration Menu

➔ **IrDA [Enabled]**

Use the **IrDA** option to enable or disable the infrared function.

➔ **Disabled**		Disable the infrared function
➔ **Enabled**	**DEFAULT**	Enable the infrared function

➔ **Change Settings [Auto]**

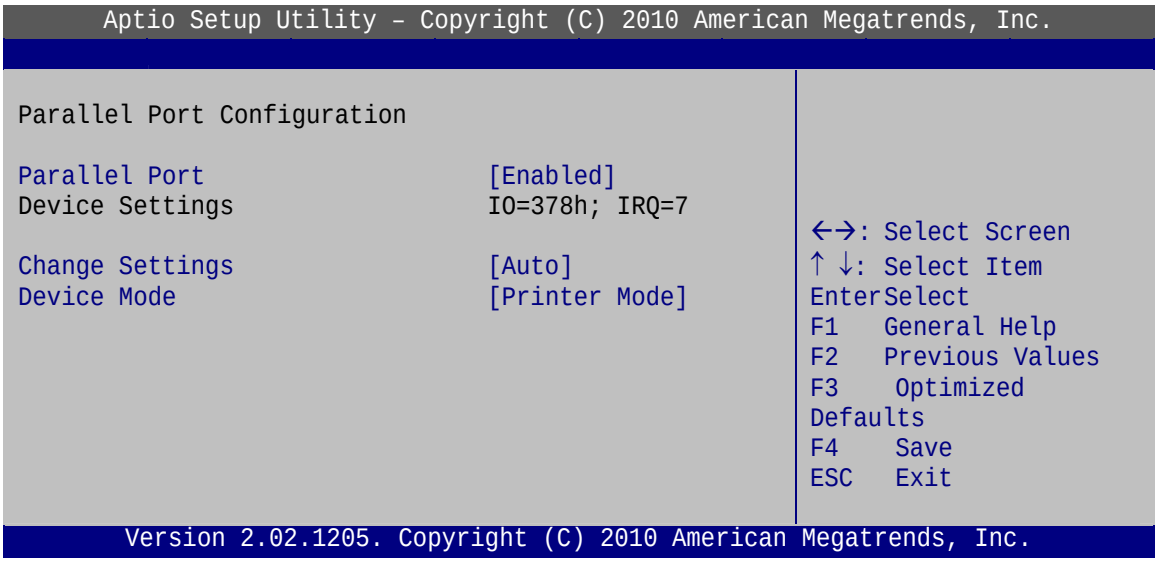
Use the **Change Settings** option to change the IrDA I/O port address and interrupt address.

➔ **Auto**	**DEFAULT**	The IrDA I/O port address and interrupt address are automatically detected.
➔ **IO=2E0h; IRQ=10**		IrDA I/O port address is 2E0h and the interrupt address is IRQ10
➔ **IO=2C0h; IRQ=10, 11**		IrDA I/O port address is 2C0h and the interrupt address is IRQ10, 11

➔	**IO=2C8h; IRQ=10, 11**	IrDA I/O port address is 2C8h and the interrupt address is IRQ10, 11
➔	**IO=2D0h; IRQ=10, 11**	IrDA I/O port address is 2D0h and the interrupt address is IRQ10 and IRQ11
➔	**IO=2D8h; IRQ=10, 11**	IrDA I/O port address is 2D8h and the interrupt address is IRQ10 and IRQ11
➔	**IO=2E0h; IRQ=10, 11**	IrDA I/O port address is 2E0h and the interrupt address is IRQ10 and IRQ11

5.3.6.3 Parallel Port Configuration

Use the **Parallel Port Configuration** menu (**BIOS Menu 9**) to configure the serial port n.



BIOS Menu 11: Parallel Port Configuration Menu

➔ **Parallel Port [Enabled]**

Use the **Parallel Port** option to enable or disable the parallel port.

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

➔ **Change Settings [Auto]**

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

➔ **Auto**	**DEFAULT**	The parallel port IO port address and interrupt address are automatically detected.
➔ **IO=378h; IRQ=7**		Parallel Port I/O port address is 378h and the interrupt address is IRQ7
➔ **IO=278h; IRQ=7**		Parallel Port I/O port address is 278h and the interrupt address is IRQ7
➔ **IO=3BCh; IRQ=7**		Parallel Port I/O port address is 3BCh and the interrupt address is IRQ7
➔ **IO=378h**		Parallel Port I/O port address is 378h
➔ **IO=278h**		Parallel Port I/O port address is 278h
➔ **IO=3BCh**		Parallel Port I/O port address is 3BCh

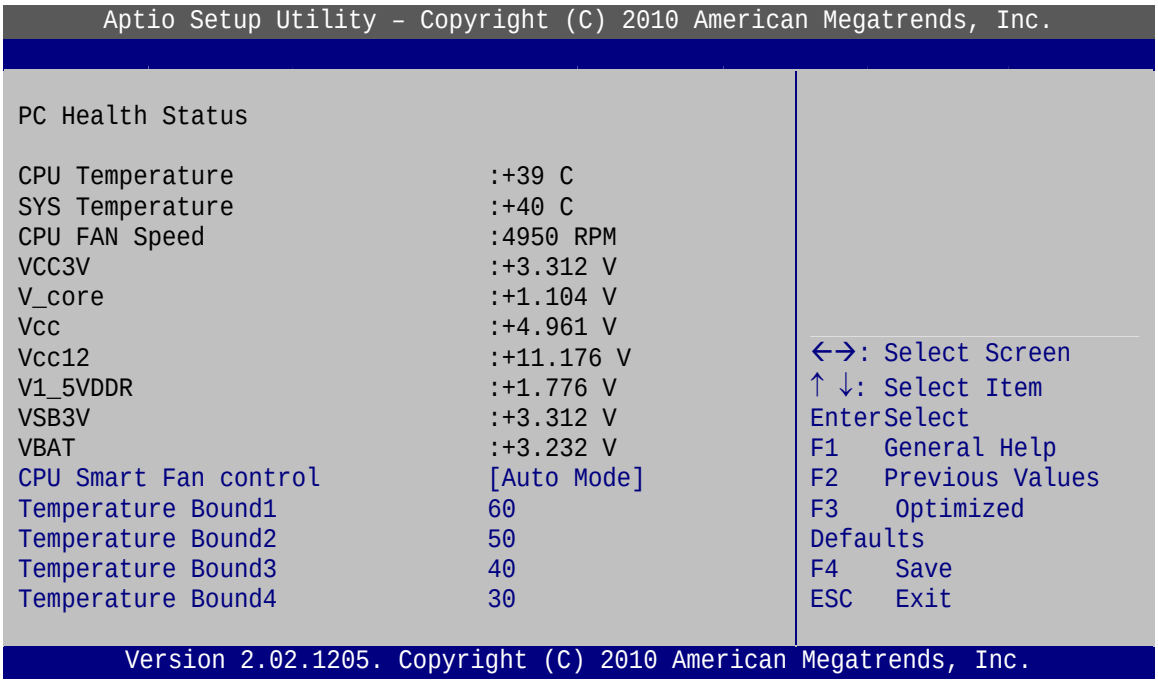
➔ **Device Mode [Printer Mode]**

Use the **Device Mode** option to select the mode the parallel port operates in. Configuration options are listed below.

- Printer Mode **Default**
- SPP Mode
- EPP-1.9 and SPP Mode
- EPP-1.7 and SPP Mode
- ECP Mode
- ECP and EPP 1.9 Mode
- ECP and EPP 1.7 Mode

5.3.7 H/W Monitor

The H/W Monitor menu (**BIOS Menu 12**) shows the operating temperature, fan speeds and system voltages.



BIOS Menu 12: Hardware Health Configuration

➔ PC Health Status

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

- System Temperatures:
  - CPU Temperature
  - System Temperature
- Fan Speeds:
  - CPU Fan Speed
- Voltages:
  - V_core
  - Vcc
  - Vcc12
  - V1_5VDDR
  - VSB3V
  - VBAT

➔ **CPU Smart Fan control [Auto Mode]**

Use the **CPU Smart Fan control** option to configure the CPU fan.

➔ **Auto Mode**	The fan adjusts its speed using these settings: Temperature Bound 1 Temperature Bound 2 Temperature Bound 3 Temperature Bound 4
➔ **Manual Mode**	The fan spins at the speed set in: Manual Duty Cycle Setting

5.3.8 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 13**) 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.

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

  COM0                                                  |
  Console Redirection            [Disabled]             |
> Console Redirection Settings                         |
                                                       |
  COM1                                                 |
  Console Redirection            [Disabled]            |
> Console Redirection Settings                         |
                                                       |  ←→: Select Screen
  COM2                                                 |  ↑ ↓: Select Item
  Console Redirection            [Disabled]            |  EnterSelect
> Console Redirection Settings                         |  F1   General Help
                                                       |  F2   Previous Values
  COM3                                                 |  F3    Optimized
  Console Redirection            [Disabled]            |  Defaults
> Console Redirection Settings                         |  F4    Save
                                                       |  ESC   Exit
      Version 2.02.1205. Copyright (C) 2010 American Megatrends, Inc.
```

BIOS Menu 13: 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 14**) 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             Boot    Security  Save & Exit

> Host Bridge
> 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 14: Chipset

5.4.1 Host Bridge Configuration

Use the **Host Bridge Configuration** menu (**BIOS Menu 15**) to configure the Northbridge chipset.

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

> OnChip VGA Configuration

******* Memory Information *******
Memory Frequency                800 Mhz

Total Memory                    1024 MB

DIMM#0                          1024 MB
DIMM#1                          Not Present

                                ←→: 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 15: Host Bridge Chipset Configuration

5.4.1.1 OnChip VGA Configuration

Use the **OnChip VGA Configuration** menu (**BIOS Menu 15**) to configure the OnChip VGA.

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

OnChip VGA Configuration

Share Memory Size               [8 MB]
Multi-Monitor Support           [Enabled]

                                ←→: 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 16: 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]**

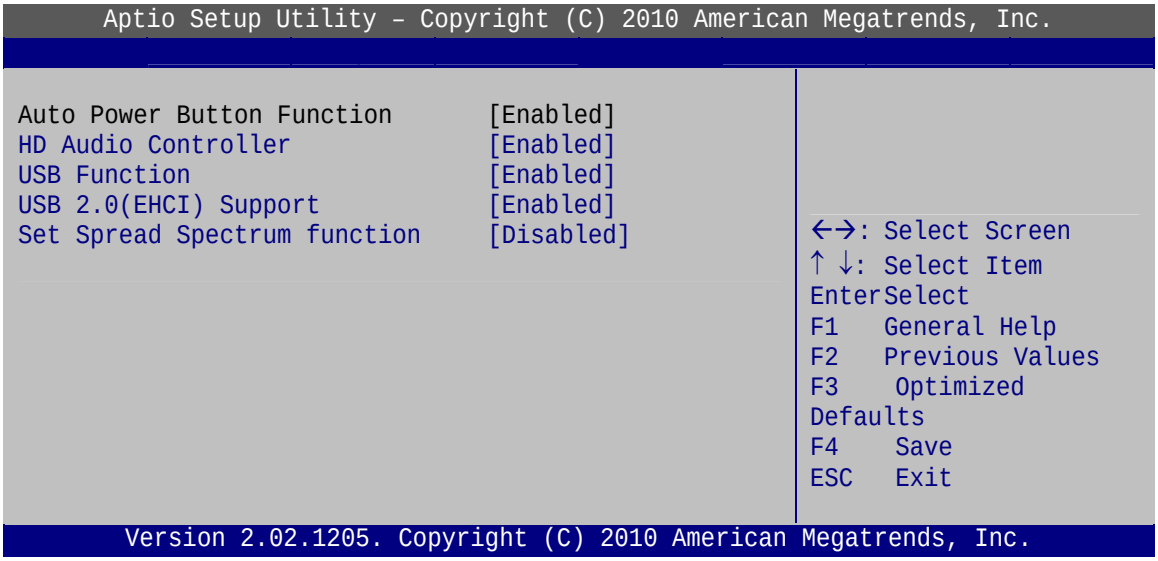
Use **Multi-Monitor Support** option to enable or disable the multi-monitor function.

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

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

5.4.2 South Bridge Configuration

Use the **South Bridge Configuration** menu (**BIOS Menu 17**) to configure the Southbridge chipset.



BIOS Menu 17: 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]**

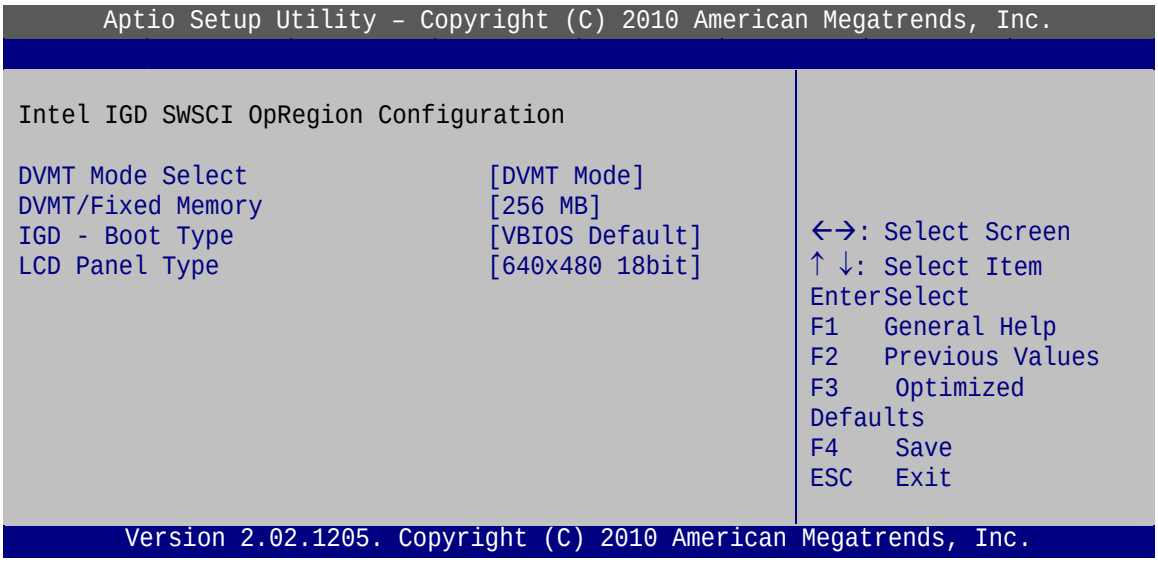
The **Set Spread Spectrum Function** option can help to improve CPU EMI issues.

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

5.5 Boot

Use the **Boot** menu (**BIOS Menu 19**) to configure system boot options.

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

Boot Configuration
Boot NumLock State              [On]

Quiet Boot                      [Enabled]
Launch PXE OpROM                [Disabled]

Boot Option Priorities

                                          ←→: 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 19: 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

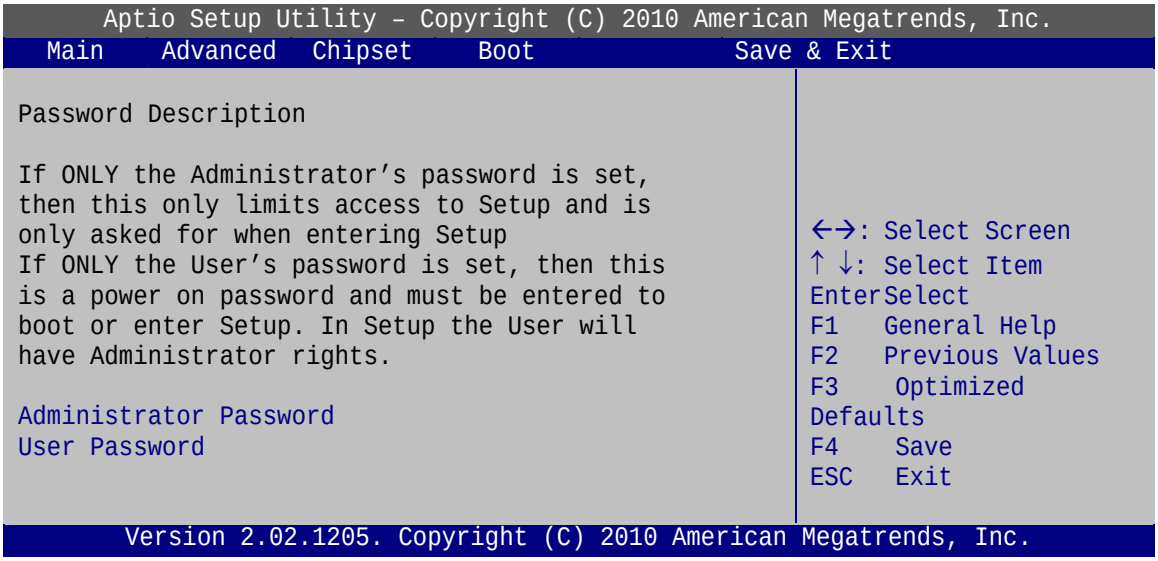
➔ **Launch PXE OpROM [Disabled]**

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 20**) to set system and user passwords.



BIOS Menu 20: Security

➔ **Administrator Password**

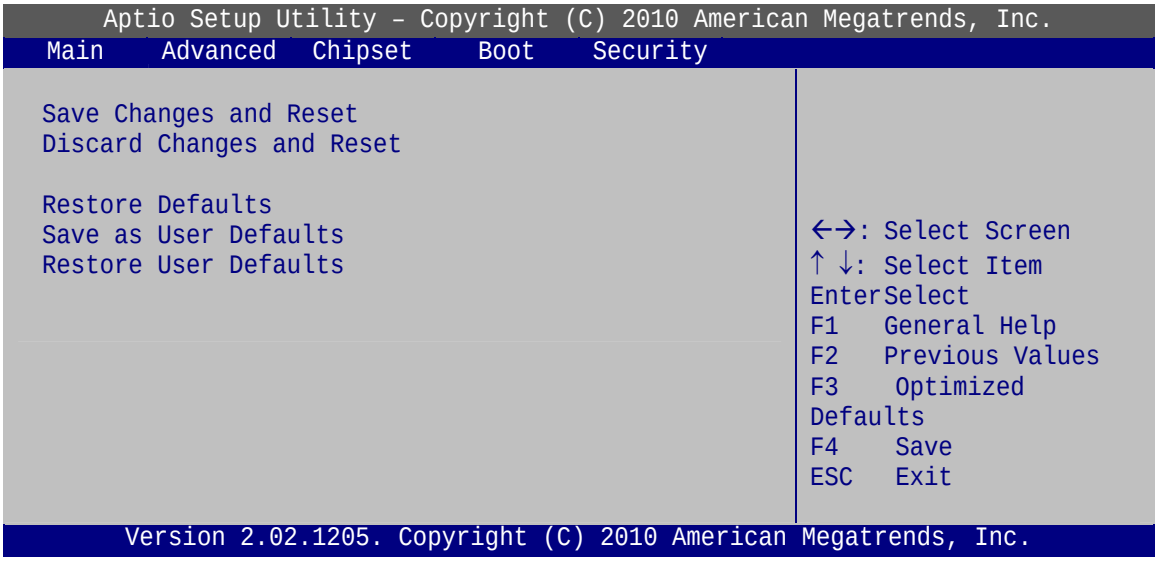
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

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

5.7 Exit

Use the **Exit** menu (**BIOS Menu 21**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 21: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!

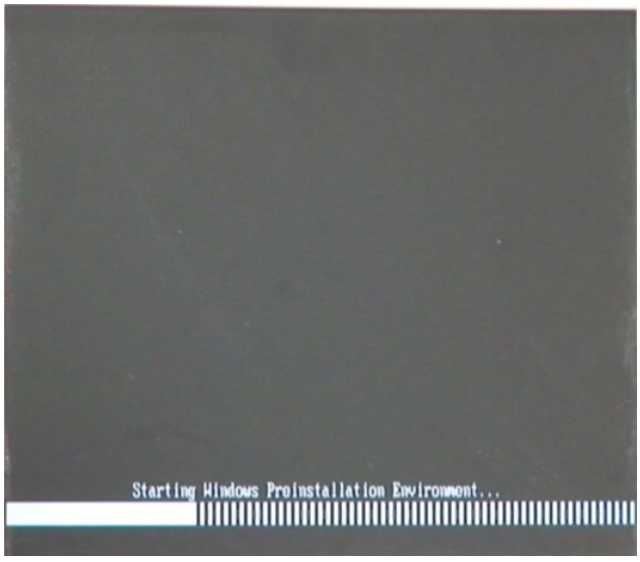


Figure B-2: Launching the Recovery Tool

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

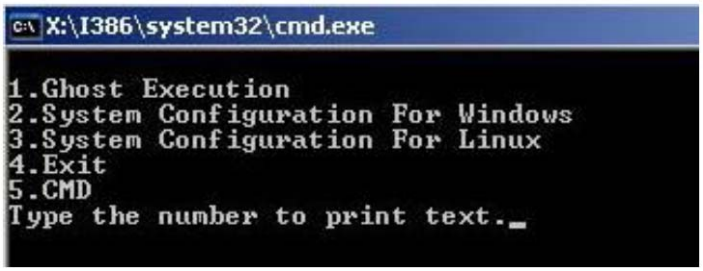


Figure B-3: Recovery Tool Setup Menu

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

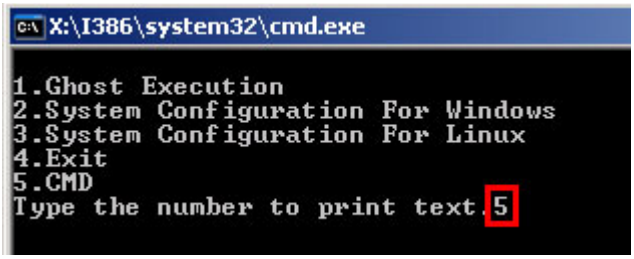


Figure B-4: Command Mode

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
```

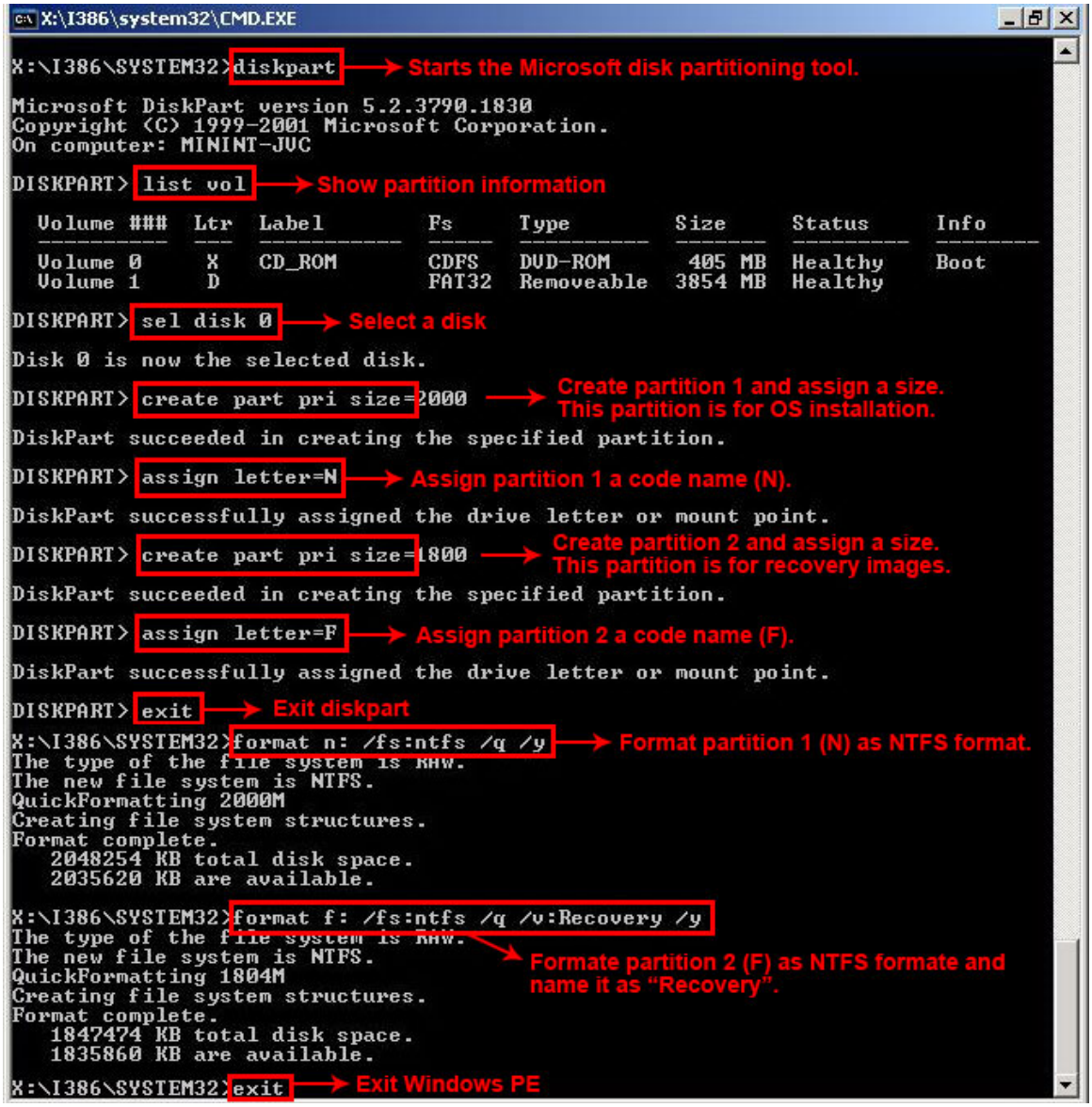
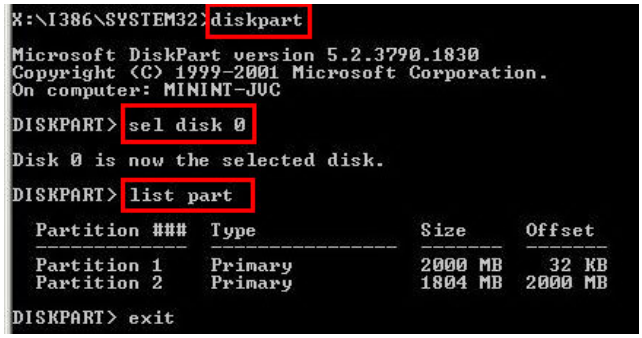


Figure B-5: Partition Creation Commands

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!

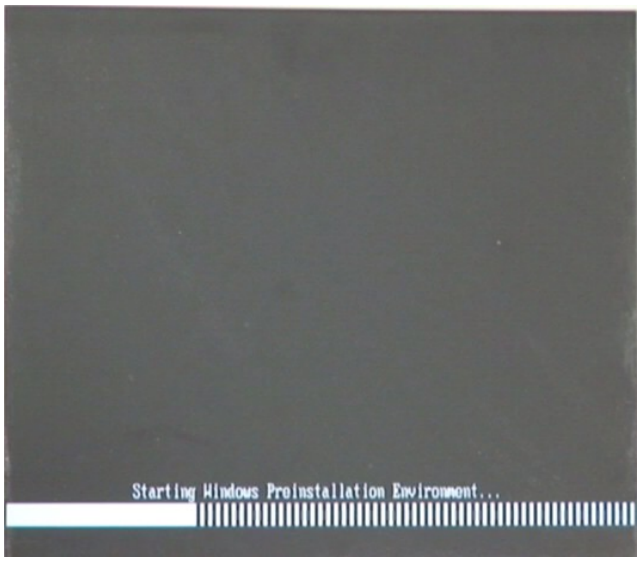


Figure B-6: Launching the Recovery Tool

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

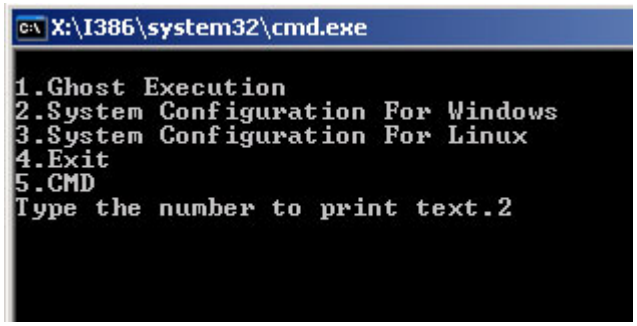


Figure B-7: System Configuration for Windows

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.

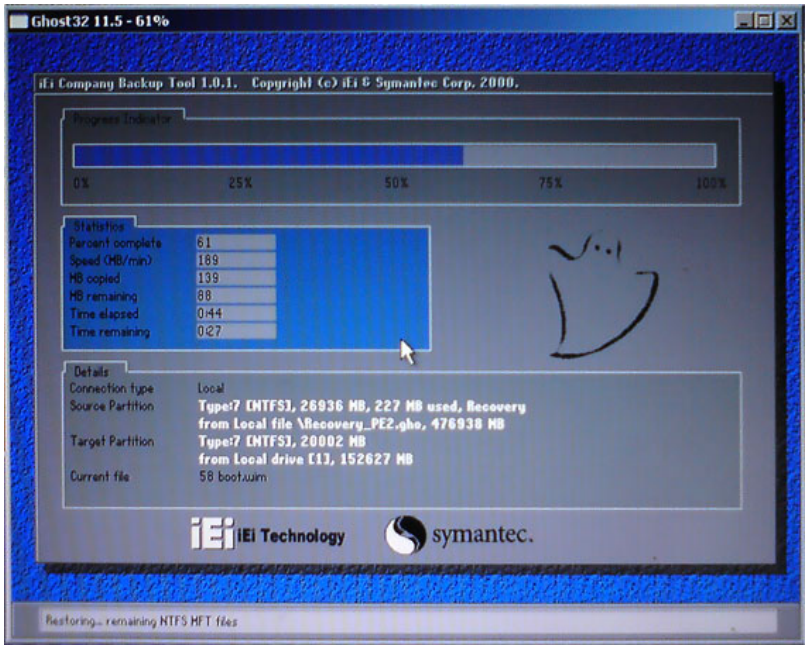


Figure B-8: Build-up Recovery Partition

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

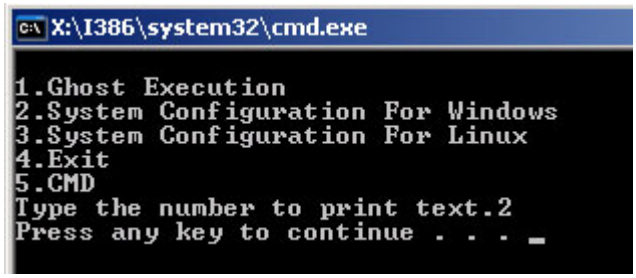


Figure B-9: Press any key to continue

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.

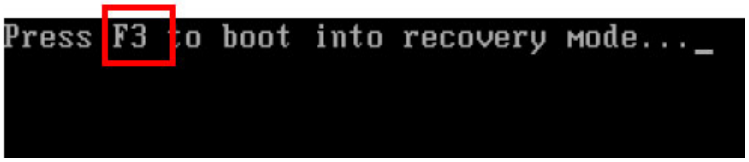


Figure B-10: Press F3 to Boot into Recovery Mode

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

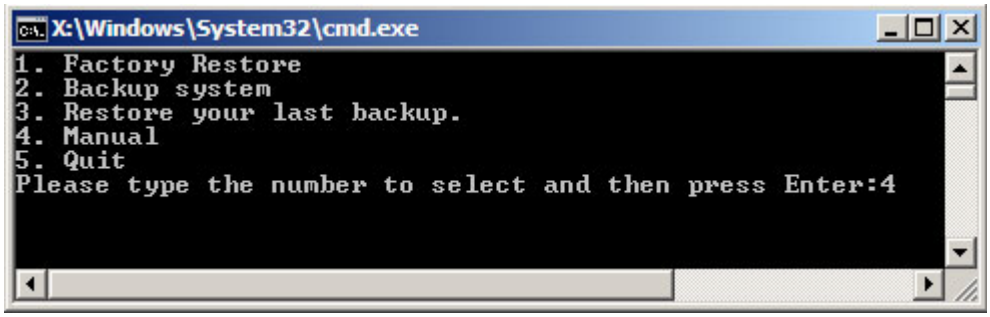


Figure B-11: Recovery Tool Menu

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

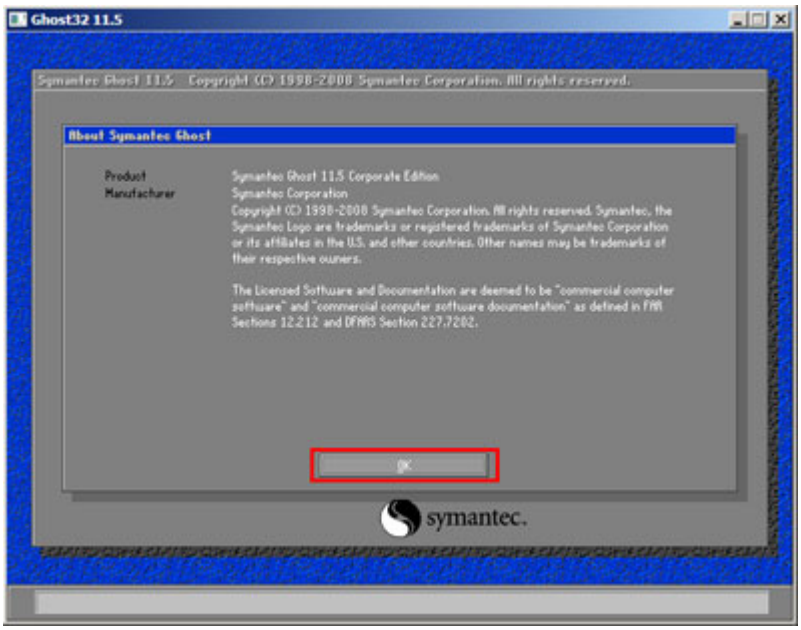


Figure B-12: About Symantec Ghost Window

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

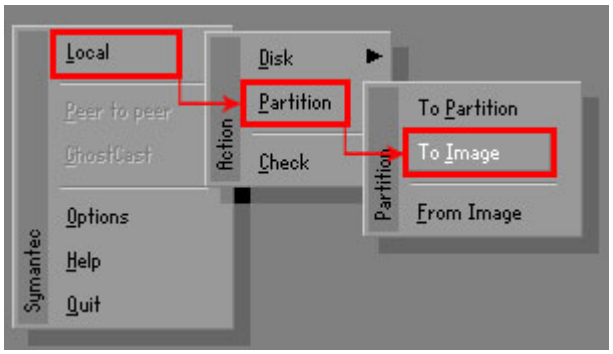


Figure B-13: Symantec Ghost Path

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

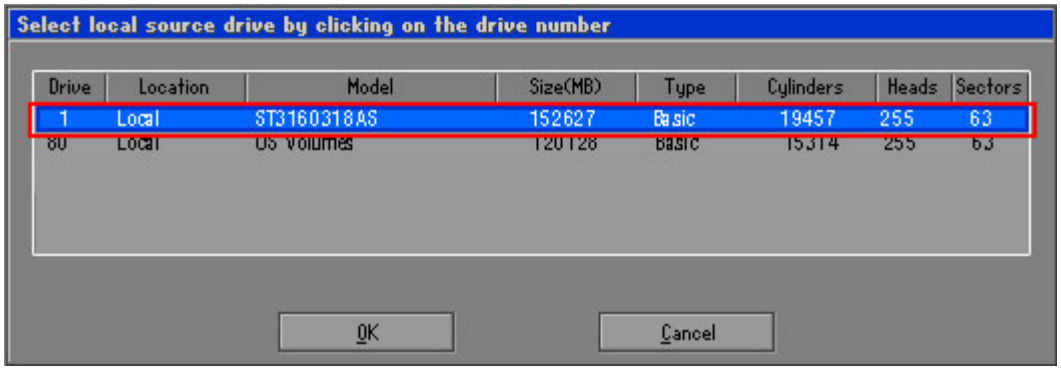


Figure B-14: Select a Local Source Drive

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

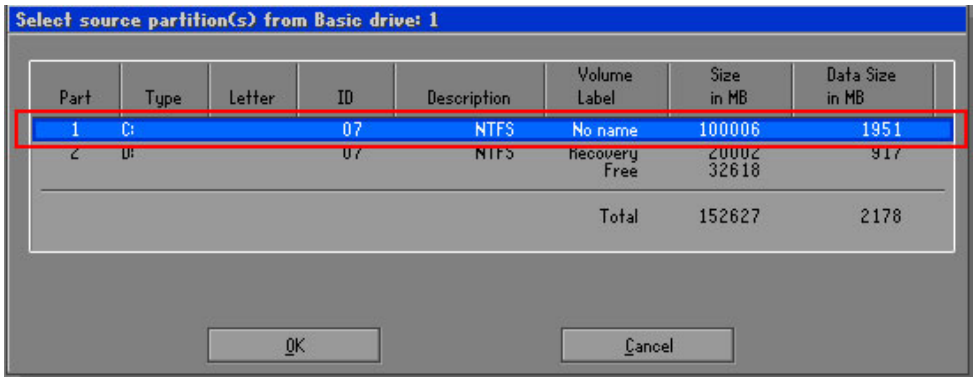


Figure B-15: Select a Source Partition from Basic Drive

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.

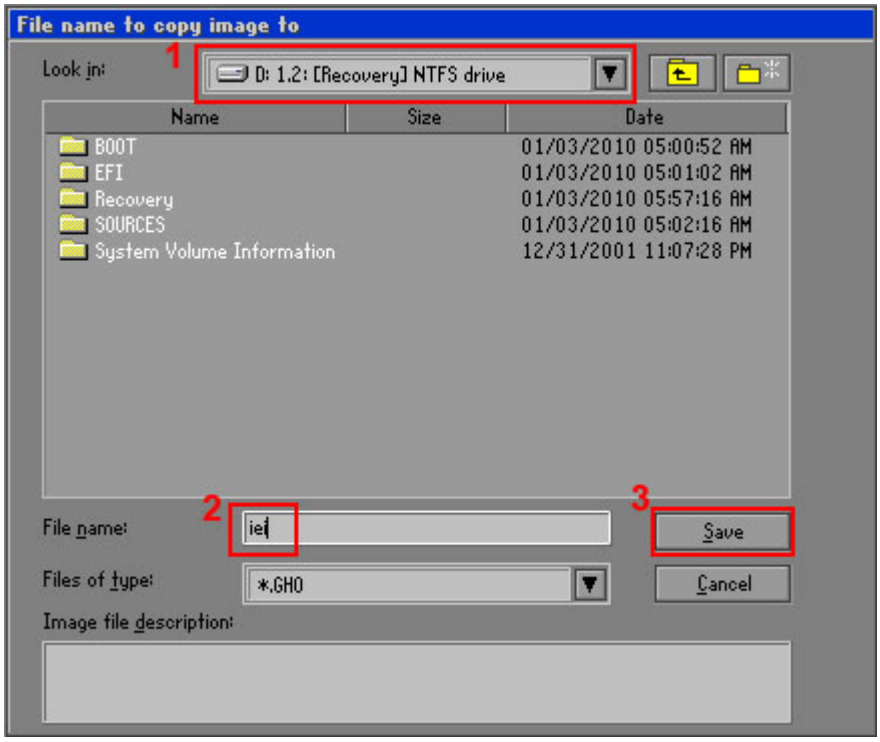


Figure B-16: File Name to Copy Image to

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

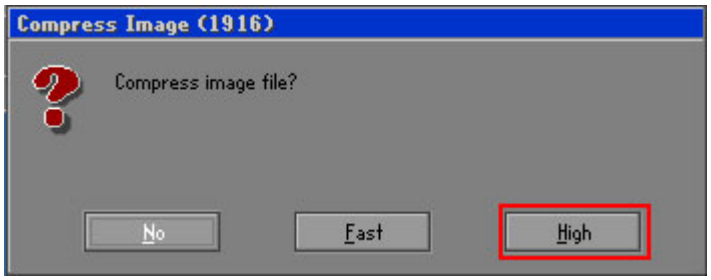


Figure B-17: Compress Image

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

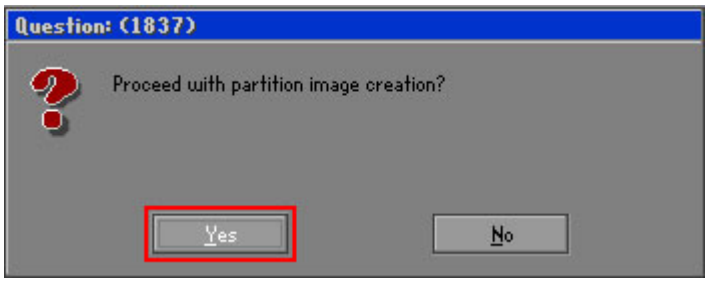


Figure B-18: Image Creation Confirmation

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

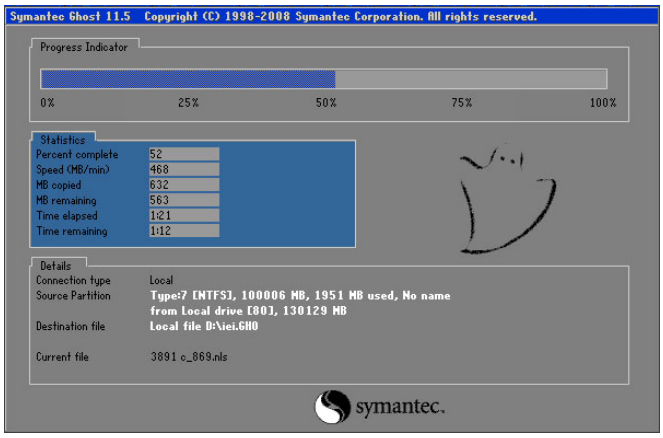


Figure B-19: Image Creation Complete

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.

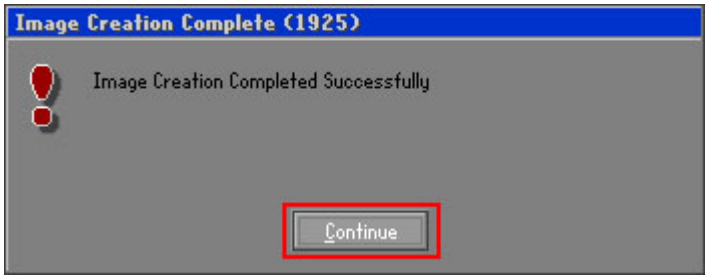


Figure B-20: Image Creation Complete

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

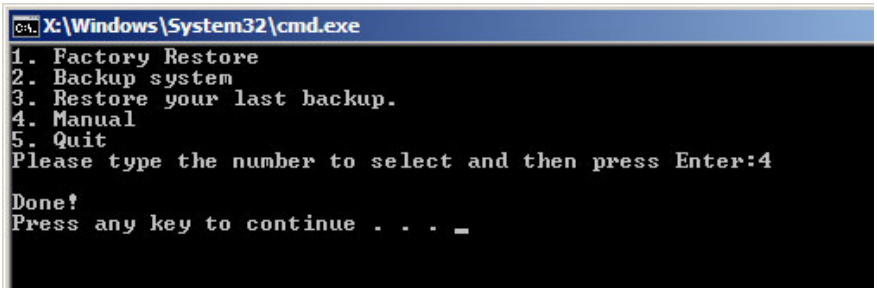


Figure B-21: Press Any Key to Continue

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.

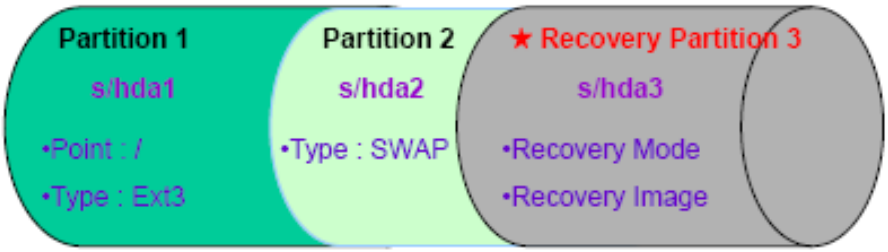


Figure B-22: Partitions for Linux

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.

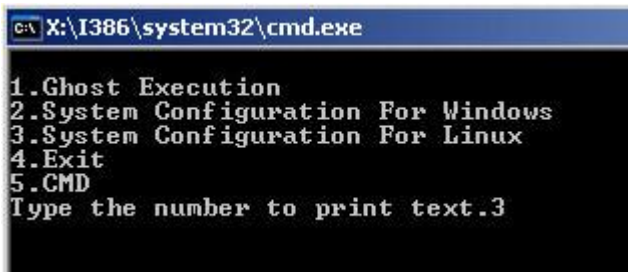


Figure B-23: System Configuration for Linux

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

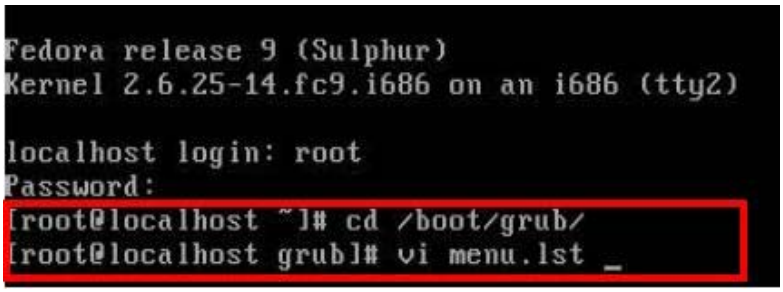
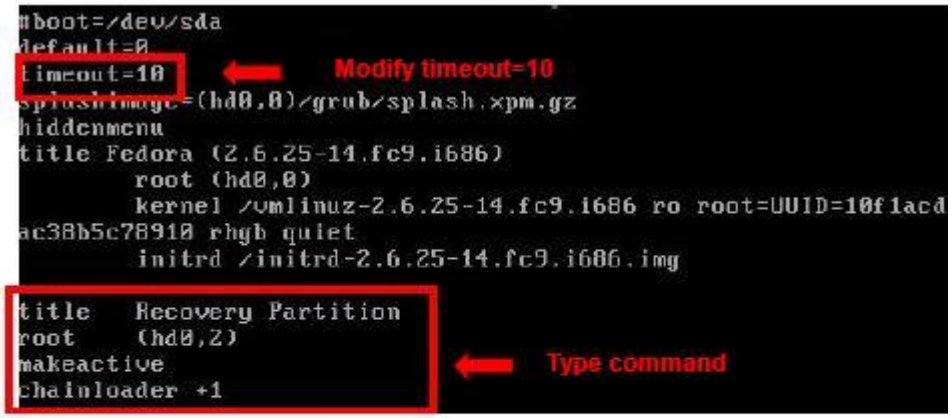


Figure B-24: Access menu.lst in Linux (Text Mode)

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**)

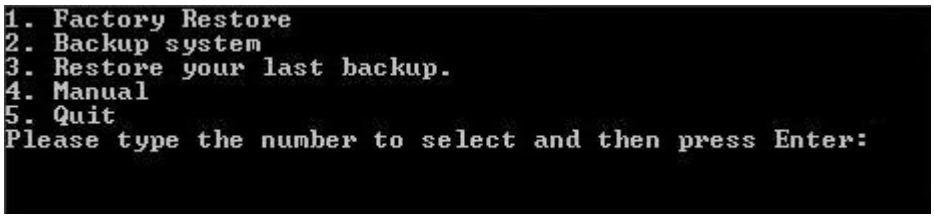


Figure B-25: Recovery Tool Menu

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.

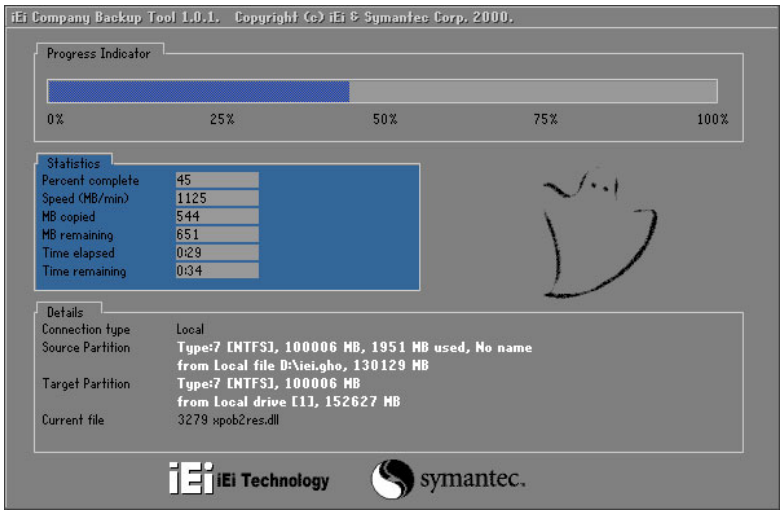


Figure B-27: Restore Factory Default

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

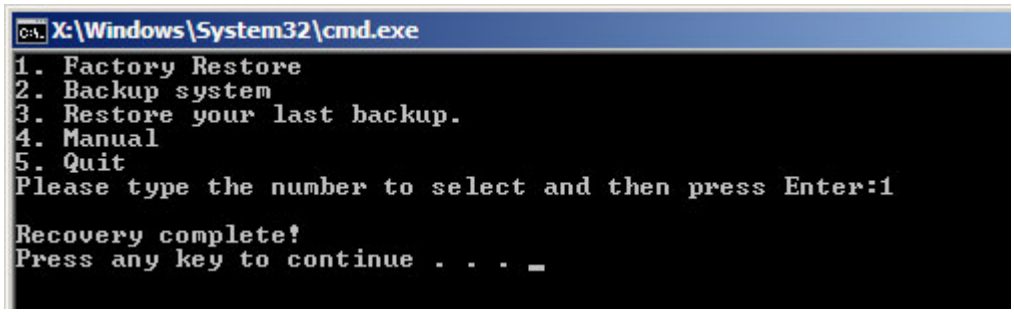


Figure B-28: Recovery Complete Window

B.4.2 Backup System

To backup the system, please follow the steps below.

Step 4: Type <**2**> and press <**Enter**> in the main menu.

Step 5: 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.

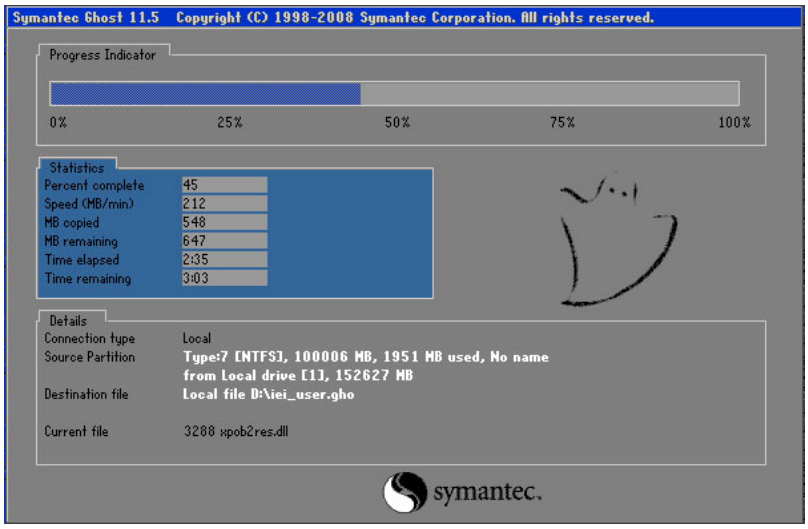


Figure B-29: Backup System

Step 6: The screen is shown as in **Figure B-30** when system backup is completed. Press any key to reboot the system.

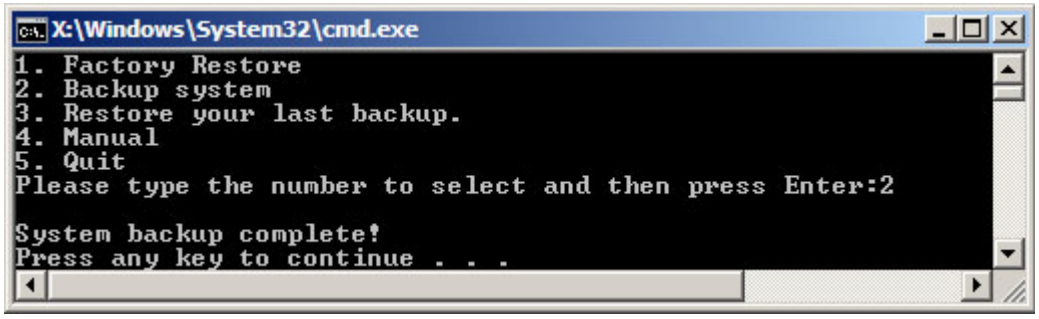


Figure B-30: System Backup Complete Window

B.4.3 Restore Your Last Backup

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

Step 7: Type <**3**> and press <**Enter**> in the main menu.

Step 8: The Symantec Ghost window appears and starts to restore the last backup image (iei_user.GHO).

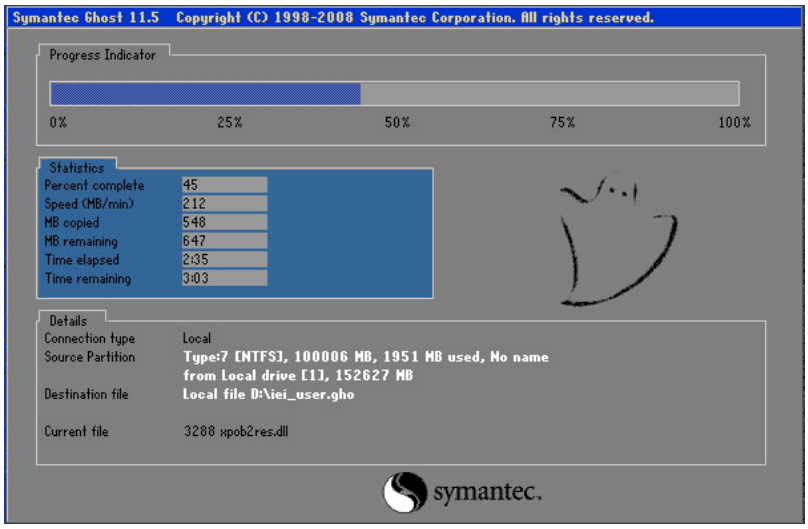


Figure B-31: Restore Backup

Step 9: The screen is shown as in **Figure B-32** when backup recovery is completed. Press any key to reboot the system.

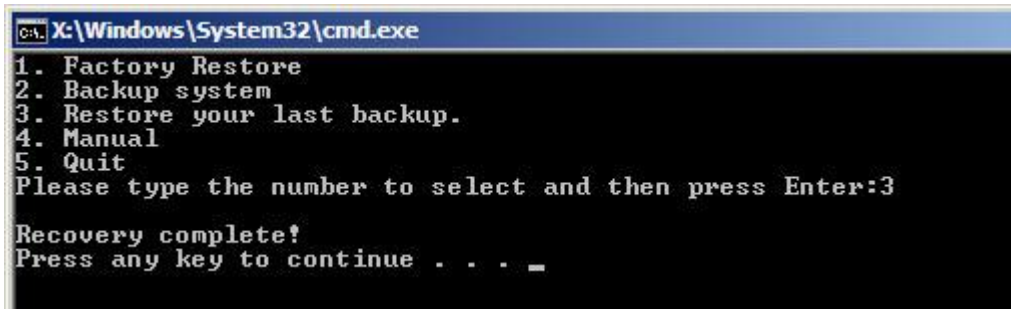


Figure B-32: Restore System Backup Complete Window

B.4.4 Manual

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

Step 10: Type <**4**> and press <**Enter**> in the main menu.

Step 11: The Symantec Ghost window appears. Use the Ghost program to backup or recover the system manually.

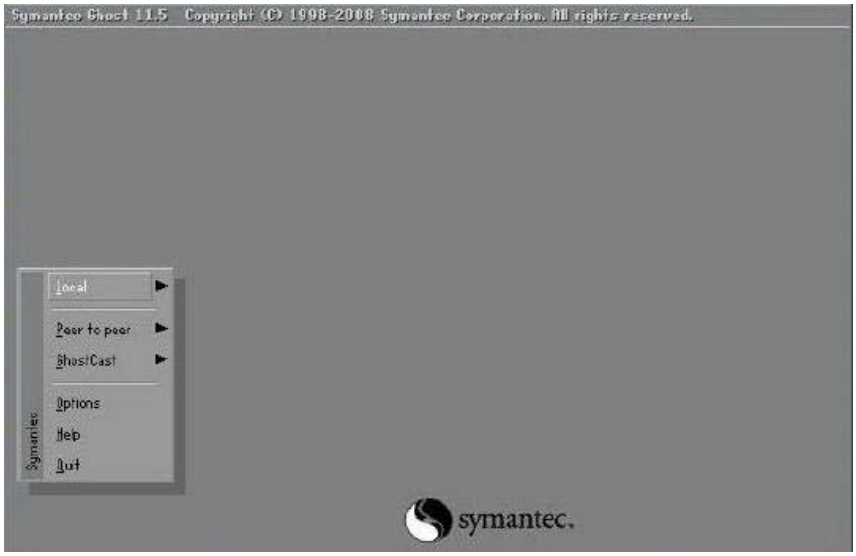


Figure B-33: Symantec Ghost Window

Step 12: 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

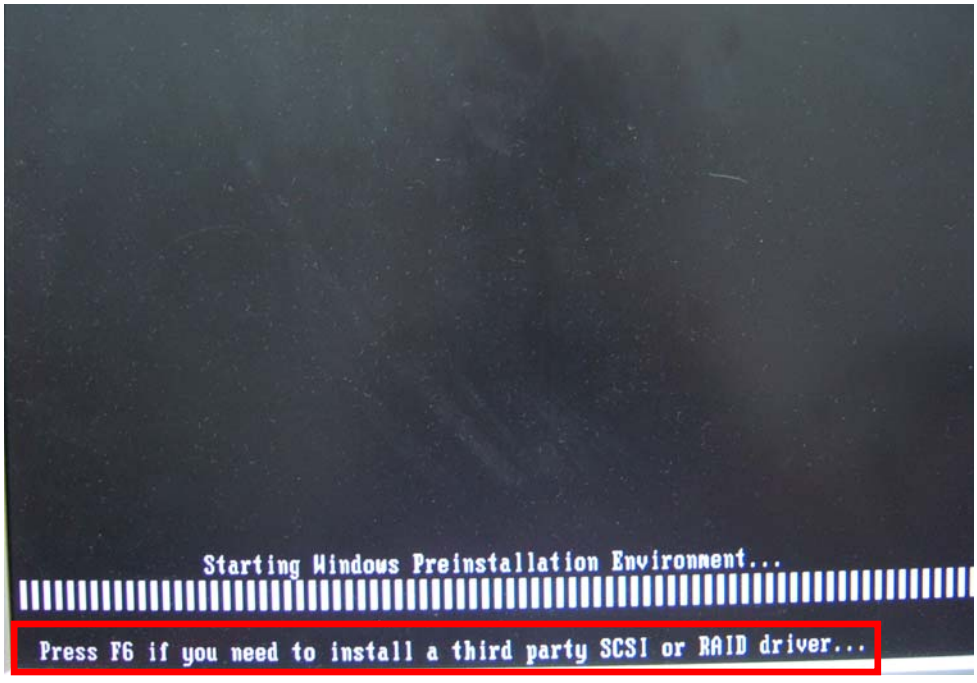
When the system uses AHCI mode or some specific SATA controllers such as ALi M5283 or VIA VT6421A, the SATA RAID/AHCI driver must be installed before using one key recovery. Please follow the steps below to install the SATA RAID/AHCI driver.

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.

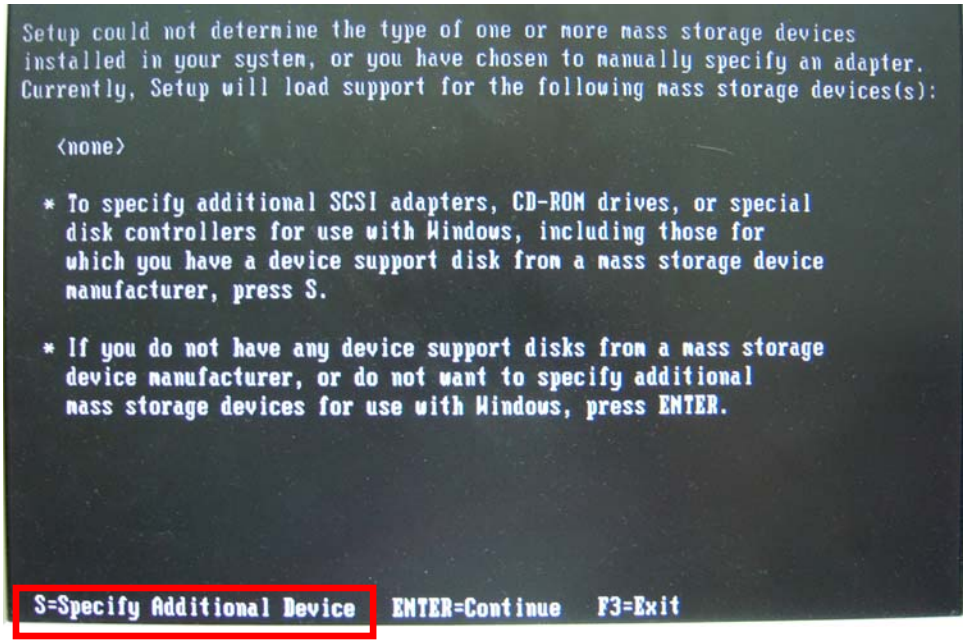
Step 2: Connect the USB floppy disk drive to the system.

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

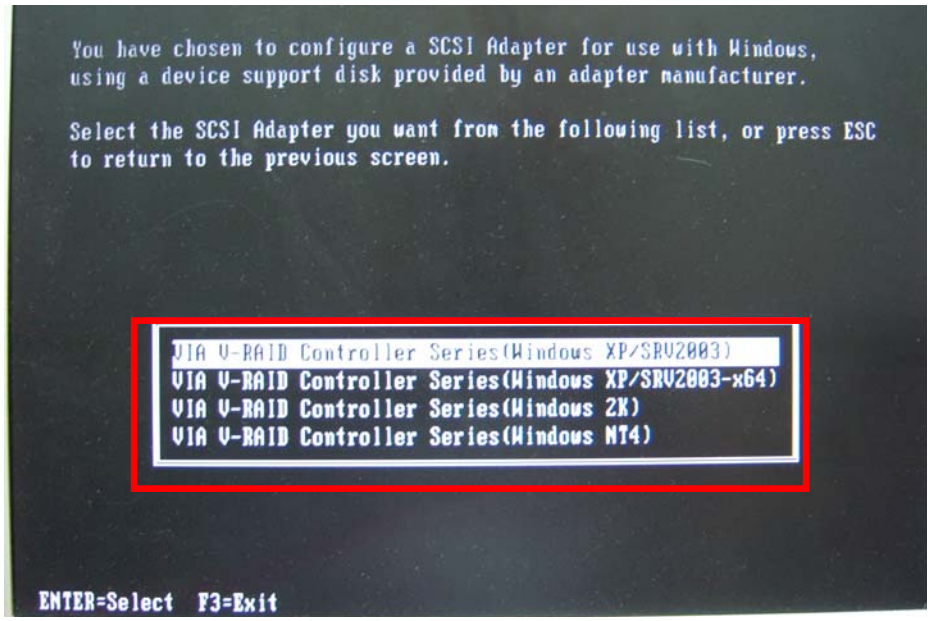
Step 4: When launching the recovery tool, press <**F6**>.



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 NANO-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	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.

AH – 6FH Sub-function:	
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	XXXX	O	O	O	O	XXXX
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。