IEI Technology Corp.

MODEL:

NANO-HM551

EPIC Motherboard Supports Socket G1 Intel® Core™ i3/i5/i7 CPU, VGA/HDMI/LVDS Dual Display, Dual GbE, Eight USB 2.0, Two SATA 3Gb/s, PCIe mini, RoHS

User Manual

Rev. 1.03 - 29 December, 2011

RoHS Lead Free

Revision

Date	Version	Changes
29 December, 2011	1.03	Minor update to Table 3-15: CPU 12V Power Connector Pinouts Updated Appendix B One Key Recovery
11 August, 2011	1.02	Updated Figure 3-12 LVDS Connector Location Updated Pins 11, 12, 23 and 24 in Table 3-13 LVDS LCD Connector Updated Table 4-6 LVDS Screen Resolution Jumper Settings
5 August, 2011	1.01	Added Section 4.5.5 LCD Panel Type Jumper
19 November, 2010	1.00	Initial release

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Chapter

1

Introduction

1.1 Introduction

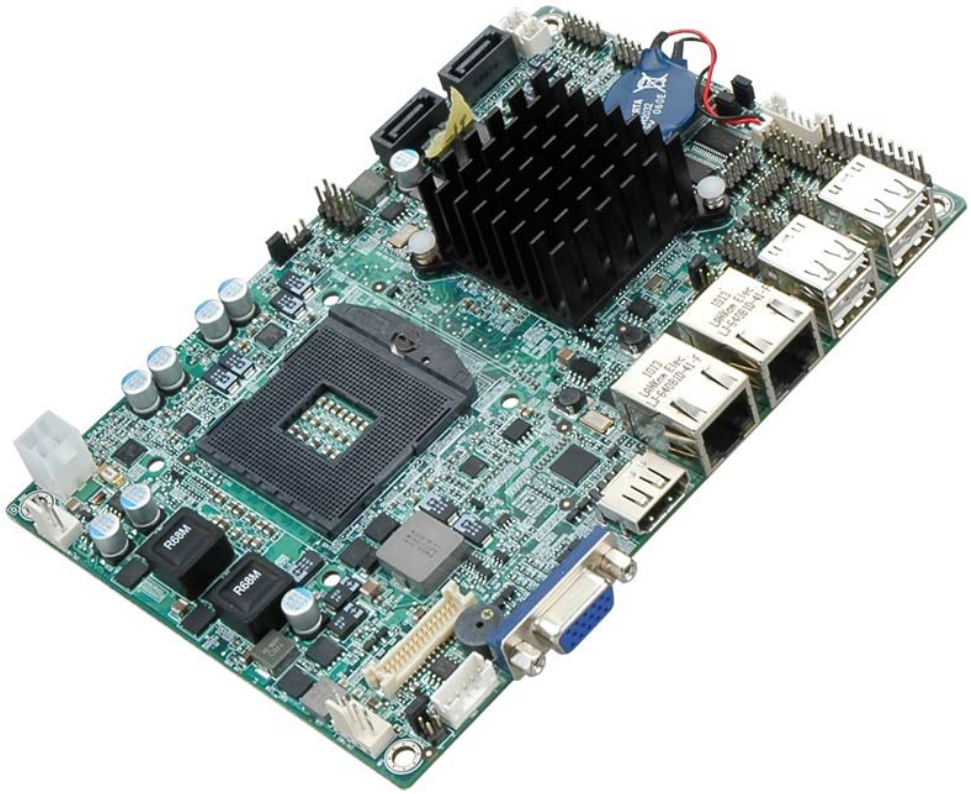


Figure 1-1: NANO-HM551

The NANO-HM551 EPIC motherboard is a Socket G1 32nm Intel® Core™ i3, i5 and i7 processor platform. Up to one 4.0 GB 800 MHz or 1066 MHz DDR3 SDRAM SO-DIMM is supported by the NANO-HM551.

The integrated Intel® HM55 Express Chipset supports two GbE LAN port through the dual Realtek RTL8111E Ethernet controllers (with ASF 2.0 support). The NANO-HM551 also supports two SATA 3Gb/s drives and provides 5 V SATA power.

The NANO-HM551 supports dual display via VGA, HDMI and an internal LVDS connector. Eight USB 2.0 channels and one expansion PCIe mini socket provide flexible expansion options. High Definition Audio (HDA) support ensures HDA devices can be easily implemented on the NANO-HM551. Serial device connectivity is provided by three internal RS-232 and one internal RS-232/422/485 connectors.

1.2 Connectors

The connectors on the NANO-HM551 are shown in the figure below.

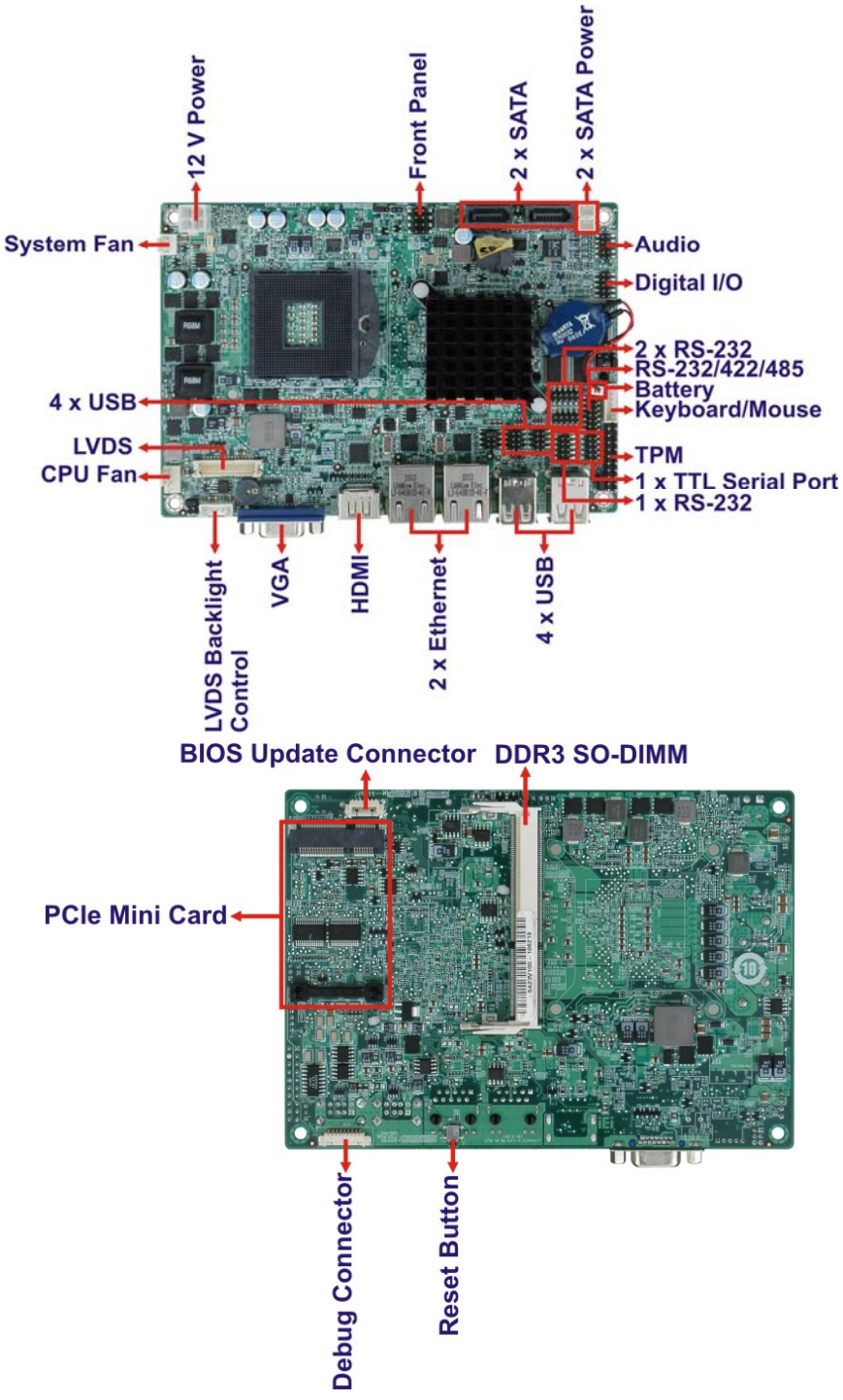


Figure 1-2: Connectors

1.3 Dimensions

The dimensions of the board are listed below:

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

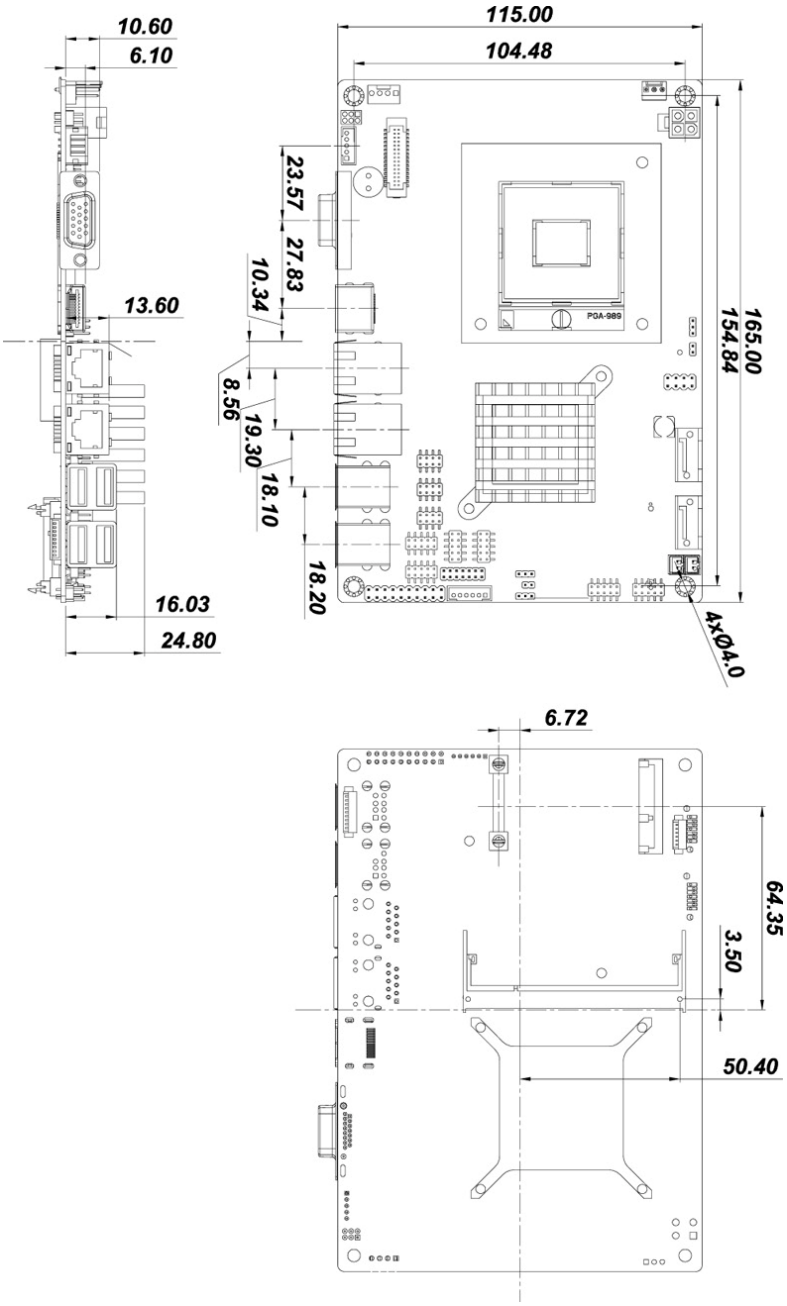


Figure 1-3: NANO-HM551 Dimensions (mm)

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.

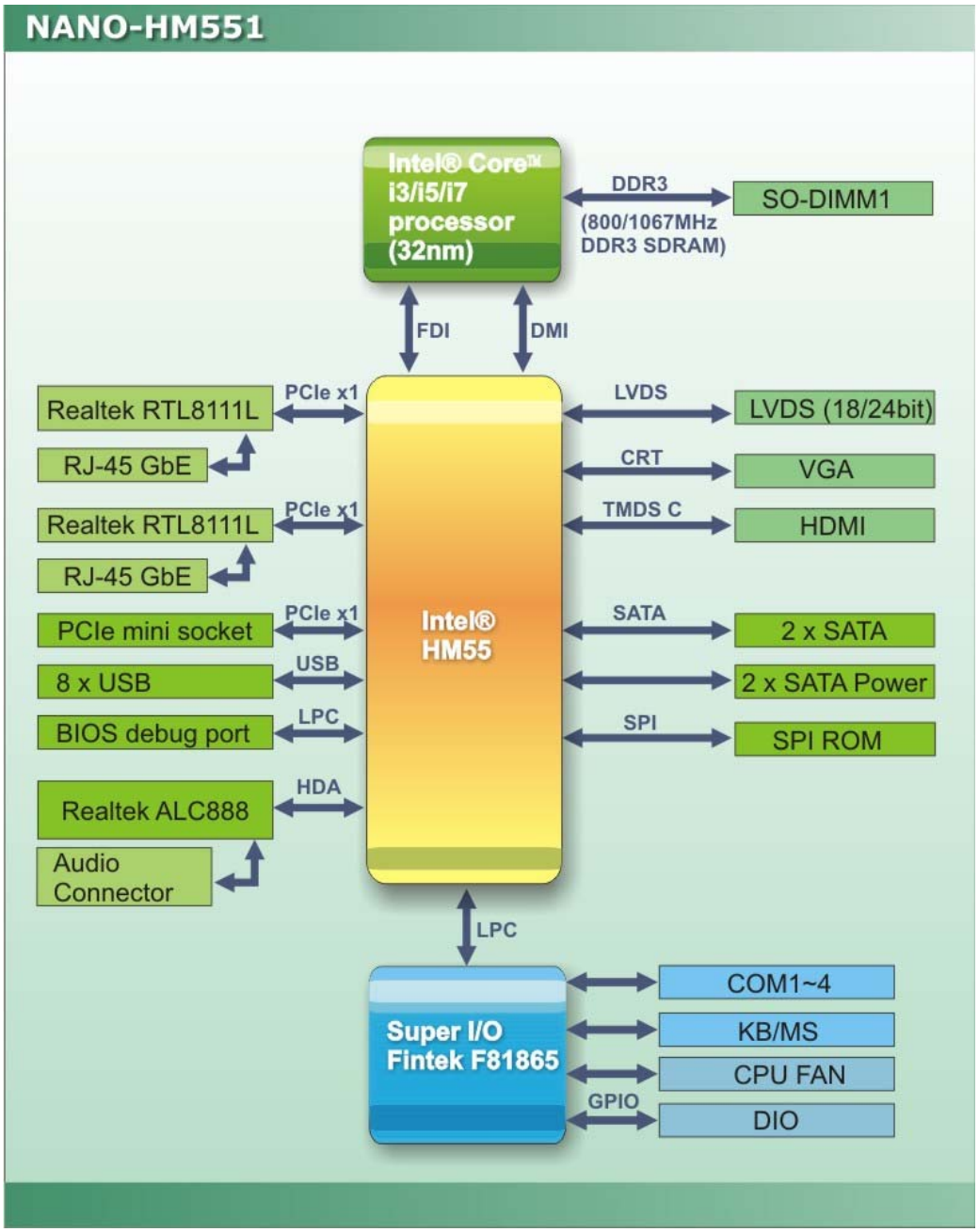


Figure 1-4: Data Flow Block Diagram

1.5 Technical Specifications

NANO-HM551 technical specifications are listed in table below.

Specification	NANO-HM551
Form Factor	EPIC
Socket	Socket G1 (rPGA988A)
CPU Supported	32 nm Intel® Core™ i3 processor 32 nm Intel® Core™ i5 processor 32 nm Intel® Core™ i7 processor (i7 processors without integrated graphics not supported)
Express Chipset	Intel® HM55
Memory	One 204-pin SO-DIMM sockets support one 800/1066 MHz 4.0 GB (max.) DDR3 SDRAM SO-DIMM (system max. 4 GB)
Audio	Realtek ALC888 HD 7.1 channel audio codec
LAN	Dual Realtek RTL8111E PCIe GbE controllers with ASF 2.0 support
Super I/O	Fintek F81865
BIOS	AMI BIOS label
Watchdog Timer	Software programmable supports 1~255 sec. system reset
Expansion	
PCIe	One PCIe Mini slot
I/O Interface Connectors	
Audio Connector	One internal audio connector (10-pin header)
Display Ports	One VGA port (2048x1536) One HDMI port (up to 1080p) One internal LVDS connector (1600x1200)
Ethernet	Two RJ-45 GbE ports

Specification	NANO-HM551
Serial Ports	Three RS-232 via four 10-pin headers One TTL serial connector via 10-pin header One RS-232/422/485 via 14–pin header
USB 2.0/1.1 Ports	Four external USB ports Four internal USB ports via two 8-pin headers
Storage	
Serial ATA	Two SATA 3.0 Gb/s connectors with RAID 0,1 support Two 5V SATA power connectors
Environmental and Power Specifications	
Power Supply	12 V only ATX and AT power supported
Power Connector	One internal 4-pin Molex power connector for power supply
Power Consumption	12V@3.8A (2.13 GHz Intel® Core™ i3 330M CPU with one 1066 MHz 1 GB DDR3 SO-DIMM), 5V@6.41A, Vcore_12V@2.52A, 3.3V@0.27A
Operating Temperature	-10ºC ~ 60ºC (requires cooler and silicone heat sink paste)
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-HM551 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-HM551 was purchased from or contact an IEI sales representative directly by sending an email to sales@iei.com.tw.

The NANO-HM551 is shipped with the following components:

Quantity	Item and Part Number	Image
1	NANO-HM551 motherboard	
1	SATA and 5 V power cable (**P/N:** 32000-114000-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	Mini jumper pack (2.0mm) (**P/N**: 33100-000033-RS)	
1	Utility CD	

1	One Key Recovery 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
CPU cooler for 55 W mobile processor (**P/N**: CF-989A-RS-R11)	
CPU cooler for 50 W mobile processor (**P/N**: CF-989B-RS)	
Dual USB cable (without bracket) (**P/N**: 32000-070301-RS)	
SATA power cable (**P/N**: 32100-000100-100-RS) (**P/N**: 32100-000100-200-RS) (**P/N**: 32100-000100-300-RS)	
SATA cable (**P/N**: 32000-062800-RS)	
SATA cable (**P/N**: 32000-112000-RS)	

Keyboard/Mouse cable (**P/N**: 32200-133200-RS)	

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

3.1.1 NANO-HM551 Layout

The figures below show all the connectors and jumpers.

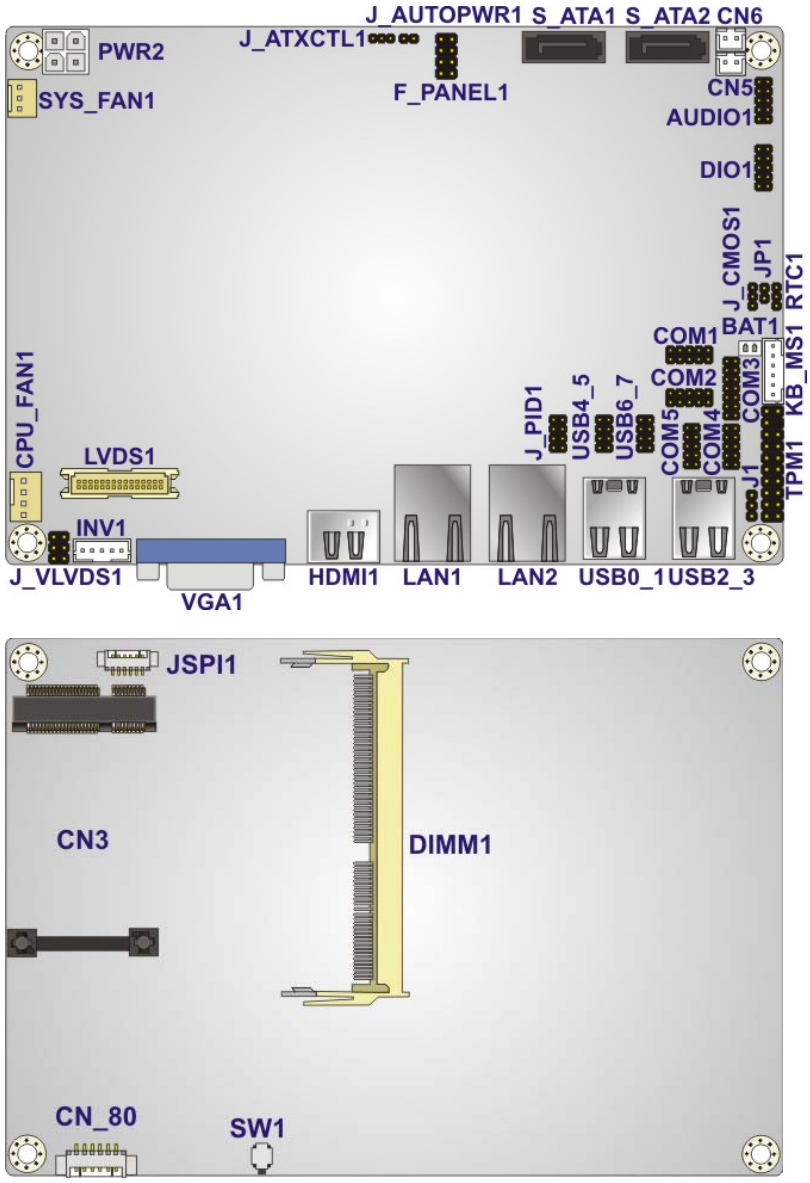


Figure 3-1: Connector and Jumper Locations

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
BIOS update connector	6-pin wafer	JSPI1
DDR3 SO-DIMM socket	204-pin socket	DIMM1
Debug port connector	9-pin	CN_80
Digital I/O connector	10-pin header	DIO1
Fan connector (CPU)	4-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
LVDS backlight inverter connector	5-pin wafer	INV1
LVDS LCD connector	30-pin crimp	LVDS1
PCIe Mini card slot	PCIe Mini card slot	CN3
Power connector (+12V, power supply)	4-pin connector	PWR2
RS-232 serial port connector	10-pin header	COM1
RS-232 serial port connector	10-pin header	COM2
RS-232 serial port connector	10-pin header	COM4
TTL 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	S_ATA1

Serial ATA (SATA) drive connector	7-pin SATA	S_ATA2
SATA power connector	2-pin wafer	CN1
SATA power connector	2-pin wafer	CN2
TPM connector	20-pin connector	TPM1
USB connector	8-pin header	USB4_5
USB connector	8-pin header	USB6_7

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
HDMI	HDMI port	HDMI1
VGA	15-pin Female	VGA1
Reset Switch	Switch	SW1
USB ports (dual)	USB port	USB0_1
USB ports (dual)	USB port	USB2_3

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the NANO-HM551.

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.

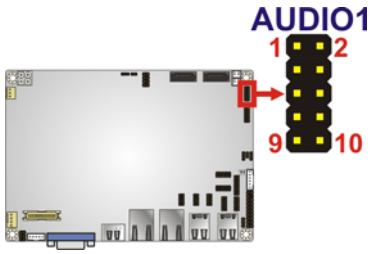


Figure 3-2: Audio Connector Location

PIN NO.	DESCRIPTION	PIN NO.	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.

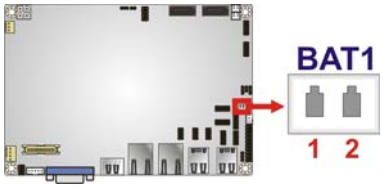


Figure 3-3: Battery Connector Location

Pin	Description
1	Battery+
2	Ground

Table 3-4: Battery Connector Pinouts

3.2.3 BIOS Update Connector

CN Label: **JSPI1**

CN Type: 6-pin wafer (1x6)

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

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

The connector is for BIOS updating only and is located on the solder side (back).

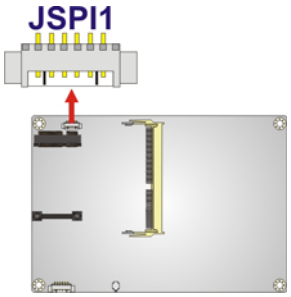


Figure 3-4: BIOS Update Connector Locations

Pin	Description	Pin	Description
1	+3.3V	2	SPI_CS#0_CN
3	SPI_SO0_CN	4	SPI_CLK0_CN
5	SPI_SI0_CN	6	GND

Pin	Description	Pin	Description

Table 3-5: BIOS Update Connector Pinouts

3.2.4 BIOS Debug Connector

CN Label: **CN_80**

CN Type: 9-pin wafer

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

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

The connector is for BIOS debug only.

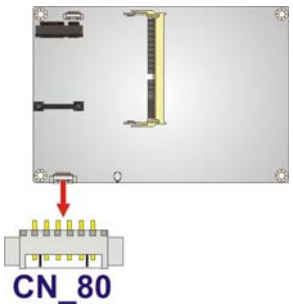


Figure 3-5: BIOS Debug Connector Locations

Pin	Description
1	+3.3 V
2	LFRAME
3	LAD0
4	LAD1
5	LAD2
6	LAD3
7	GND
8	CLK
9	RESET

Table 3-6: BIOS Debug Connector Pinouts

3.2.5 Digital I/O Connector

CN Label: **DIO1**

CN Type: 10-pin header

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

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

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

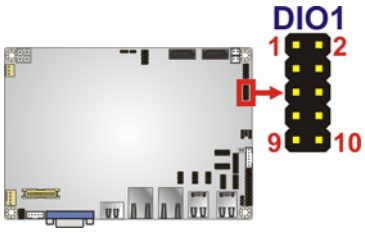


Figure 3-6: Digital I/O Connector Locations

Pin	Description	Pin	Description
1	GND	2	+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 3-7: Digital I/O Connector Pinouts

3.2.6 Fan Connector (CPU)

CN Label: **CPU_FAN1**

CN Type: 4-pin wafer (1x4)

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

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

The fan connector attaches to a CPU cooling fan.

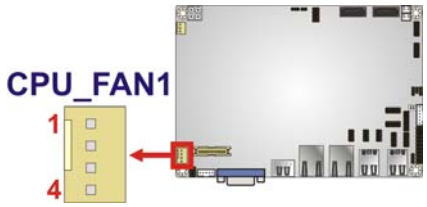


Figure 3-7: CPU Fan Connector Location

Pin	Description
1	GROUND
2	+12V
3	FANOUT1
4	FANIO1

Table 3-8: CPU Fan Connector Pinouts

3.2.7 Fan Connector (System)

CN Label: **SYS_FAN1**

CN Type: 3-pin wafer (1x3)

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

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

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.

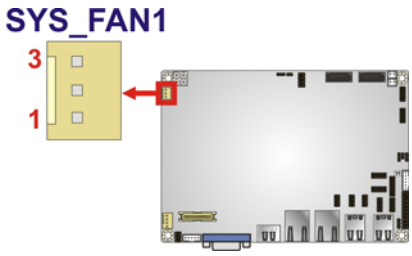


Figure 3-8: +12V Fan Connector Locations

PIN NO.	DESCRIPTION
1	N/C
2	+12V
3	GND

Table 3-9: +12V Fan Connector Pinouts

3.2.8 Front Panel Connector

CN Label: **F_PANEL1**

CN Type: 8-pin header (2x4)

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

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

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

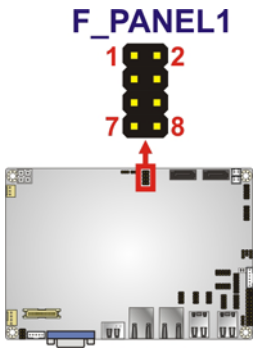


Figure 3-9: Front Panel Connector Location

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
Power Button	1	PWRBTN_SW#	Power LED	2	PWR LED
	3	GND		4	GND

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
SATA LED	5	SATA LED PWT	Reset	6	RESET
	7	SATA_LED#		8	GND

Table 3-10: Front Panel Connector Pinouts

3.2.9 Keyboard/Mouse Connector

CN Label: **KB_MS1**

CN Type: 6-pin wafer (1x6)

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

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

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

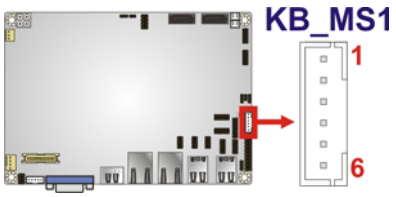


Figure 3-10: Keyboard/Mouse Connector Location

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

Table 3-11: Keyboard/Mouse Connector Pinouts

3.2.10 Backlight Inverter Connector

CN Label: **INV1**

CN Type: 5-pin wafer (1x5)

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

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

The backlight inverter connector provides power to an LCD panel.

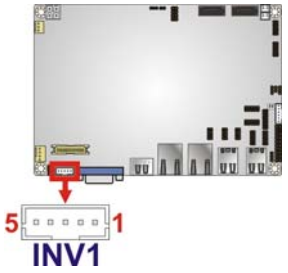


Figure 3-11: Backlight Inverter Connector Location

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

Table 3-12: Backlight Inverter Connector Pinouts

3.2.11 LVDS LCD Connector

CN Label: **LVDS1**

CN Type: 30-pin crimp (2x15)

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

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

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

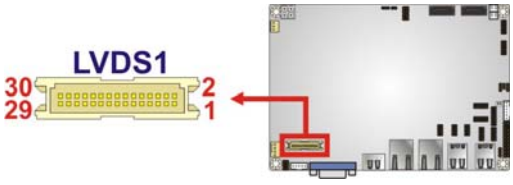


Figure 3-12: LVDS Connector Location

Pin	Description	Pin	Description
1	GROUND	2	GROUND
3	LVDSA_Y0+	4	LVDSA_Y0-
5	LVDSA_Y1+	6	LVDSA_Y1-
7	LVDSA_Y2+	8	LVDSA_Y2-
9	LVDSA_CLK+	10	LVDSA_CLK-
11	LVDSA_Y3+	12	LVDSA_Y3-
13	GROUND	14	GROUND
15	LVDSB_Y0+	16	LVDSB_Y0-
17	LVDSB_Y1+	18	LVDSB_Y1-
19	LVDSB_Y2+	20	LVDSB_Y2-
21	LVDSB_CLK+	22	LVDSB_CLK-
23	LVDSB_Y3+	24	LVDSB_Y3-
25	GROUND	26	GROUND
27	VCC_LVDS	28	VCC_LVDS
29	VCC_LVDS	30	VCC_LVDS

Table 3-13: LVDS Connector Pinouts

3.2.12 PCIe Mini Card Slot

CN Label: **CN3**

CN Type: PCIe Mini card slot

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

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

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

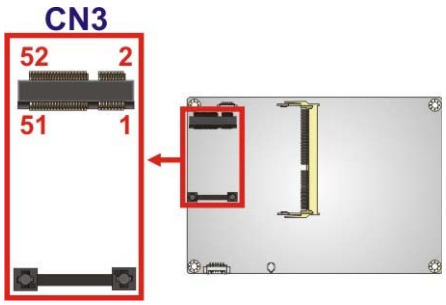


Figure 3-13: PCIe Mini Card Slot Location

Pin	Description	Pin	Description
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5 V
7	CLKREQ#	8	LFRAME#
9	GND	10	LAD3
11	CLK-	12	LAD2
13	CLK+	14	LAD1
15	GND	16	LAD0
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
35	GND	36	USBD-
37	GND	38	USBD+
39	VCC3	40	GND
41	VCC3	42	N/C
43	GND	44	RF_LINK#
45	SATATXP2/CL_CLK	46	BLUELED#
47	SATATXN2/CL_DATA	48	1.5 V

Pin	Description	Pin	Description
49	SATARXN2/CL_RST#	50	GND
51	SATARXP2	52	VCC3

Table 3-14: PCIe Mini Card Slot Pinouts

3.2.13 12V Power Connector

CN Label: **PWR2**

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

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

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

The connector supports the 12V power supply.

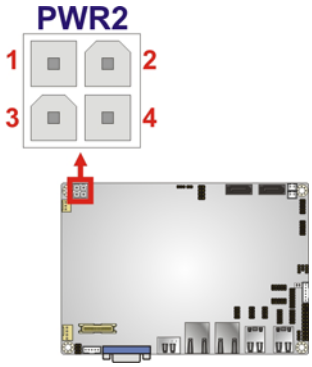


Figure 3-14: CPU 12V Power Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	GND
3	+12V	4	+12V

Table 3-15: CPU 12V Power Connector Pinouts

3.2.14 SATA Drive Connectors

CN Label: **S_ATA1**, **S_ATA2**

CN Type: 7-pin SATA drive connectors

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

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

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.

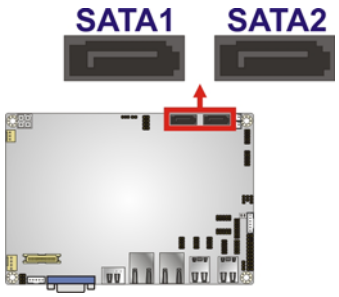


Figure 3-15: SATA Drive Connector Locations

PIN NO.	DESCRIPTION
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND

Table 3-16: SATA Drive Connector Pinouts

3.2.15 SATA Power Connectors

CN Label: **CN5**, **CN6**

CN Type: 2-pin wafer (1x2)

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

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

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

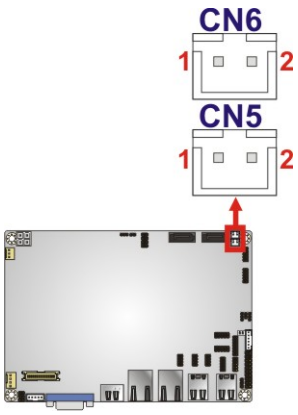


Figure 3-16: SATA Power Connector Locations

PIN NO.	DESCRIPTION
1	+5V
2	GND

Table 3-17: SATA Power Connector Pinouts

3.2.16 Serial Port Connectors (RS-232)

CN Label: **COM1, COM2, COM4**

CN Type: 10-pin header (2x5)

CN Location: See **Figure 3-17**

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

These connectors provide RS-232 communications.

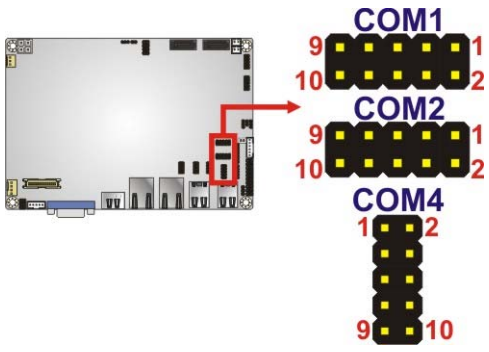


Figure 3-17: COM Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	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 3-18: COM Connector Pinouts

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

CN Label: **COM3**

CN Type: 14-pin header (2x7)

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

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

Used for RS-232/422/485 communications.

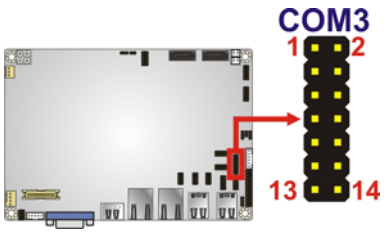


Figure 3-18: Serial Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	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 3-19: Serial Port Connector Pinouts

3.2.18 Serial Port Connectors (TTL)

CN Label:	**COM5**
CN Type:	10-pin header (2x5)
CN Location:	See **Figure 3-17**
CN Pinouts:	See **Table 3-18**

This connector provides TTL communications.

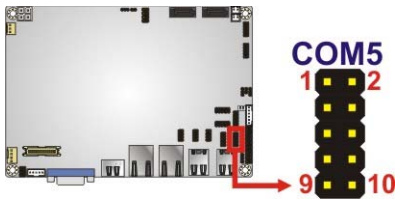


Figure 3-19: COM Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	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 3-20: COM Connector Pinouts

3.2.19 TPM Connector

CN Label:	**TPM1**
CN Type:	20-pin header (2x10)
CN Location:	See **Figure 3-20**
CN Pinouts:	See **Table 3-21**

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

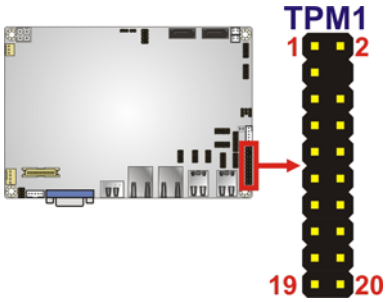


Figure 3-20: TPM Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	TPMCLK	2	GND
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 3-21: TPM Connector Pinouts

3.2.20 USB Connectors

CN Label: **USB4_5** and **USB6_7**

CN Type: 8-pin header (2x4)

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

CN Pinouts: See **Table** 3-26

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

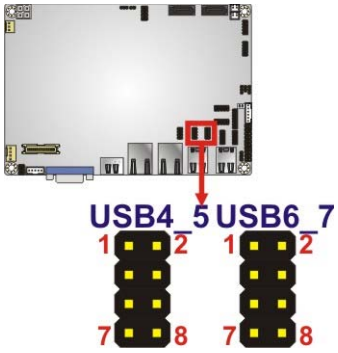


Figure 3-21: USB Connector Pinout Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	GND
3	DATA-	4	DATA+
5	DATA+	6	DATA-
7	GND	8	VCC

Table 3-22: USB Port Connector Pinouts

3.3 External Peripheral Interface Connector Panel

Figure 3-22 shows the NANO-HM551 external peripheral interface connector (EPIC) panel. The NANO-HM551 EPIC panel consists of the following:

- 2 x Ethernet connectors
- 1 x HDMI connectors
- 1 x Reset switch
- 4 x USB connectors
- 1 x VGA connector

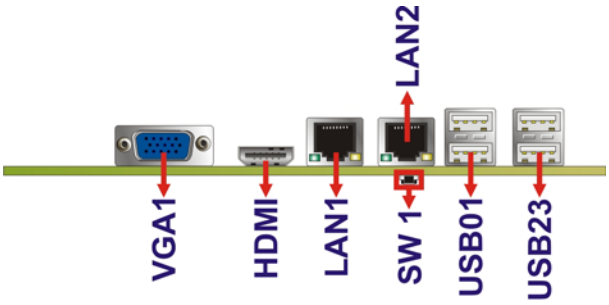


Figure 3-22: NANO-HM551 External Peripheral Interface Connector

3.3.1 Ethernet Connector

CN Label: **LAN1, LAN2**

CN Type: RJ-45

CN Location: See **Figure 3-22**

CN Pinouts: See **Table 3-23**

The NANO-HM551 is equipped with two built-in RJ-45 Ethernet controllers. Each controller can connect to the LAN through one RJ-45 LAN connector.

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 3-23: LAN Pinouts

The RJ-45 Ethernet connector has two status LEDs, one green and one yellow. The green LED indicates activity on the port and the yellow LED indicates the speed. See **Table 3-24**.

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 3-24: RJ-45 Ethernet Connector LEDs

Figure 3-23: RJ-45 Ethernet Connector

3.3.2 HDMI Connector

CN Label: **HDMI1**

CN Type: HDMI type A connector

CN Location: See **Figure 3-22**

CN Pinouts: See **Table 3-25**

The HDMI (High-Definition Multimedia Interface) connector connects to digital audio or video sources.

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

Table 3-25: HDMI Connector Pinouts

3.3.3 USB Connectors

CN Label: **USB0_1** and **USB2_3**

CN Type: USB port

CN Location: See **Figure 3-22**

CN Pinouts: See **Table 3-26**

The NANO-HM551 has four external USB 2.0 ports. The ports connect to both USB 2.0 and USB 1.1 devices.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	5	VCC
2	DATA-	6	DATA-
3	DATA+	7	DATA+
4	GROUND	8	GROUND

Table 3-26: USB Port Connector Pinouts

3.3.4 VGA Connector

CN Label: **VGA1**

CN Type: 15-pin Female

CN Location: See **Figure** 3-22

CN Pinouts: See **Figure 3-24** and **Table 3-27**

Connects to a monitor that accepts a standard VGA input.

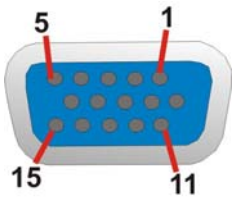


Figure 3-24: VGA Connector

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

PIN	DESCRIPTION	PIN	DESCRIPTION
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 3-27: VGA Connector Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the NANO-HM551 may result in permanent damage to the NANO-HM551 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the NANO-HM551. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the NANO-HM551 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-HM551, place it on an antic-static pad. This reduces the possibility of ESD damaging the NANO-HM551.
- ***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-HM551 is installed. All installation notices pertaining to the installation of the NANO-HM551 should be strictly adhered to. Failing to adhere to these precautions may lead to severe damage of the NANO-HM551 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-HM551, NANO-HM551 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-HM551 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-HM551 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-HM551 off:

- When working with the NANO-HM551, 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-HM551 **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-HM551 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-HM551 vendor reseller/vendor where the NANO-HM551 was purchased or contact an IEI sales representative.

4.4 CPU, CPU Cooling Kit and SO-DIMM Installation

WARNING:

A CPU should never be turned on without the specified cooling kit being installed. If the cooling kit (heat sink and fan) is not properly installed and the system turned on, permanent damage to the CPU, NANO-HM551 and other electronic components attached to the system may be incurred. Running a CPU without a cooling kit may also result in injury to the user.

The CPU, CPU cooling kit and DIMM are the most critical components of the NANO-HM551. If one of these component is not installed the NANO-HM551 cannot run.

4.4.1 Socket G1 CPU Installation

WARNING:

CPUs are expensive and sensitive components. When installing the CPU please be careful not to damage it in anyway. Make sure the CPU is installed properly and ensure the correct cooling kit is properly installed.

To install a socket G1 CPU onto the NANO-HM551, follow the steps below:

WARNING:

When handling the CPU, only hold it on the sides. DO NOT touch the pins at the bottom of the CPU.

Step 1: **Unlock the CPU retention screw.** When shipped, the retention screw of the CPU socket should be in the unlocked position. If it is not in the unlocked position, use a screwdriver to unlock the screw. See **Figure 4-1**.

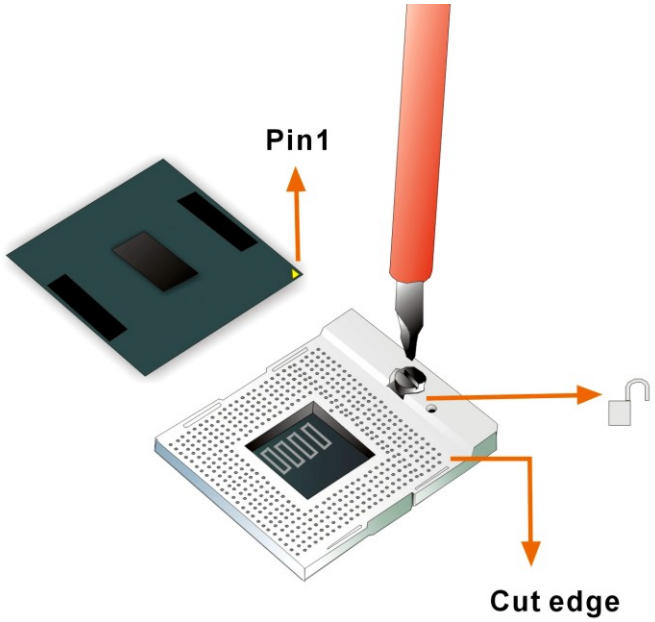


Figure 4-1: Make sure the CPU socket retention screw is unlocked

Step 2: **Inspect the CPU socket.** Make sure there are no bent pins and make sure the socket contacts are free of foreign material. If any debris is found, remove it with compressed air.

Step 3: **Correctly Orientate the CPU**. Make sure the IHS (integrated heat sink) side is facing upwards.

Step 4: **Correctly position the CPU.** Match the Pin 1 mark with the cut edge on the CPU socket. See **Figure 4-1**.

Step 5: **Align the CPU pins.** Carefully align the CPU pins with the holes in the CPU socket.

Step 6: **Insert the CPU.** Gently insert the CPU into the socket. If the CPU pins are properly aligned, the CPU should slide into the CPU socket smoothly.

Step 7: **Lock the retention screw.** Rotate the retention screw into the locked position. See **Figure 4-2**.

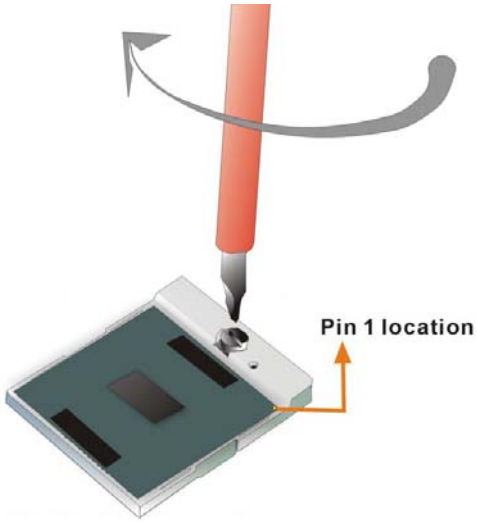


Figure 4-2: Lock the CPU Socket Retention Screw

4.4.2 Socket G1 Cooling Kit Installation

An IEI Socket G1 CPU cooling kit can be purchased separately. (See **Chapter 3**) The cooling kit comprises a CPU heat sink and a cooling fan.

WARNING:

Do not wipe off (accidentally or otherwise) the pre-sprayed layer of thermal paste on the bottom of the heat sink. The thermal paste between the CPU and the heat sink is important for optimum heat dissipation.

To install the cooling kit, please follow the steps below.

Step 1: **Install the cooling kit bracket**. A cooling kit bracket is installed on the rear of the motherboard. Align the bracket with the four retention holes at the back of the motherboard. Once properly aligned, insert four retention screws from the front of the motherboard.

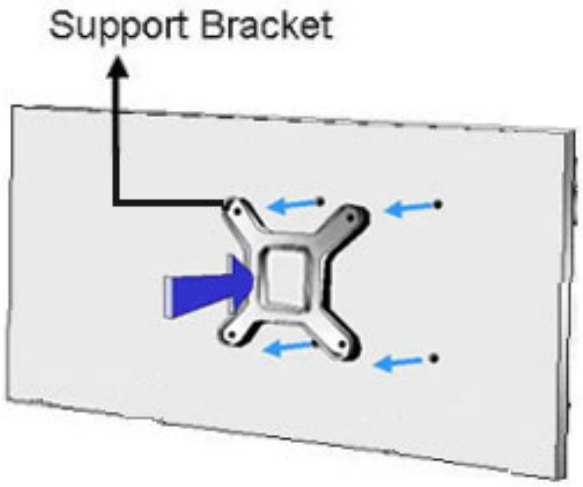


Figure 4-3: Cooling Kit Support Bracket

Step 2: **Open the lever at the top of the heat sink**. Lift the lever at the top of the cooling kit to loosen the cooling kit clamps.

Step 3: **Secure the cooling kit**. Gently place the heat sink and cooling kit onto the CPU. Make sure the hooks are properly secured to the bracket. To secure the cooling kit, close the top lever.

Step 4: **Connect the fan cable**. Connect the cooling kit fan cable to the fan connector on the NANO-HM551. Carefully route the cable and avoid heat generating chips and fan blades.

4.4.3 SO-DIMM Installation

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

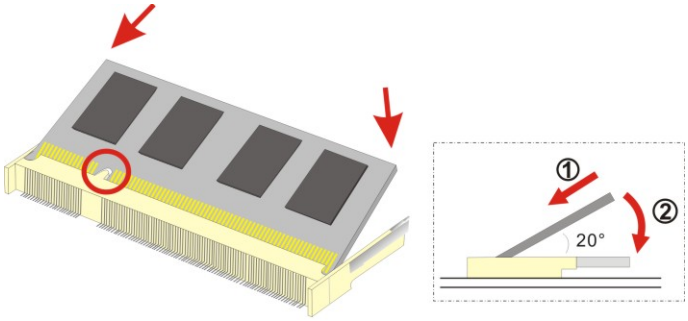


Figure 4-4: SO-DIMM Installation

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 4-4**)

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

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.

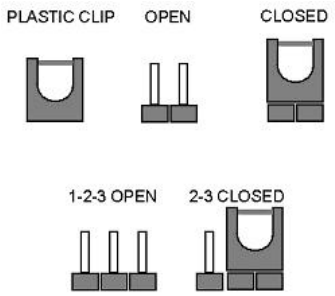


Figure 4-5: Jumper Locations

Before the NANO-HM551 is installed in the system, the jumpers must be set in accordance with the desired configuration. The jumpers on the NANO-HM551 are listed in **Table 4-1**.

Description	Type	Label
AT Auto Button	2-pin header	J_AUTOPWR1
AT/ATX Power Mode Setting	3-pin header	J_ATXCTL1
Clear CMOS	3-pin header	J_CMOS1
COM3 RS-232/422/485 select	3-pin header	J1
LCD Panel Type	8-pin header	J_PID1
LVDS LCD Voltage select	6-pin header	J_VLVDS1
ME RTC Register	3-pin header	ME_RTC1
ME RTC Security Override	2-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** 4-3

Jumper Location: See **Figure 4-6**

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

Setting	Description
Short	Use AT power

Setting	Description
Open	Use ATX power

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

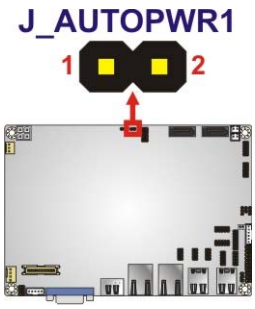


Figure 4-6: AT Auto Button Select Jumper Settings

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 4-7**

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	
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 4-7** below.

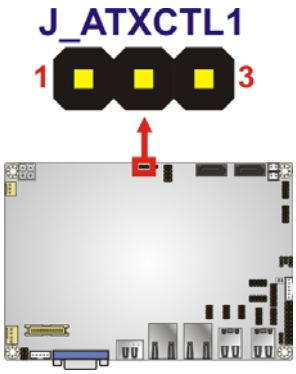


Figure 4-7: AT/ATX Power Select Jumper Location

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 4-8**

If the NANO-HM551 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 4-8** below.

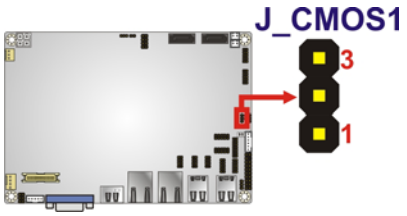


Figure 4-8: Clear CMOS Jumper

4.5.4 COM 3 Function Select Jumper

Jumper Label: **J1**

Jumper Type: 3-pin header

Jumper Settings: See Table 4-5

Jumper Location: See Figure 4-9

The COM 3 Function Select jumper sets the communication protocol used by the third serial communications port (COM 3) as RS-232, RS-422 or RS-485. The COM 2 Function Select settings are shown in the table below.

Setting	Description
1-2	RS-232 (Default)
2-3	RS-422/485

Table 4-5: COM 2 Function Select Jumper Settings

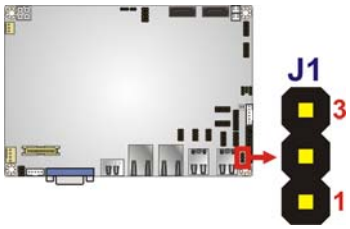


Figure 4-9: COM 2 Function Select Jumper Location

4.5.5 LCD Panel Type Jumper

Jumper Label:	**J_PID1**
Jumper Type:	8-pin header
Jumper Settings:	See **Table 4-6**
Jumper Location:	See **Figure 4-10**

The **LCD Panel Type** jumper allows the LCD panel type to be set. The **LCD Panel Type** jumper settings are shown in **Table 4-6.**

Pin	Description
Open	800 x 600 (18-bit)
1-2	1024 x 768 (18-bit)
3-4	1024 x 768 (24-bit)
1-2 and 3-4	1280 x 800 (18-bit)
5-6	1280 x 1024 (48-bit)
1-2 and 5-6	1366 x 768 (18-bit)
3-4 and 5-6	1400 x 1050 (48-bit)
1-2 and 3-4 and 5-6	1440x 900 (48-bit)
7-8	1600 x 900 (48-bit)
1-2 and 7-8	1600 x 1200 (48-bit)
3-4 and 7-8	1680 x 1050 (48-bit)
1-2 and 3-4 and 7-8	1920 x 1080 (48-bit)
5-6 and 7-8	1920 x 1200 (48-bit)
1-2 and 5-6 and 7-8	2048 x 1536 (48-bit)

Table 4-6: LVDS Screen Resolution Jumper Settings

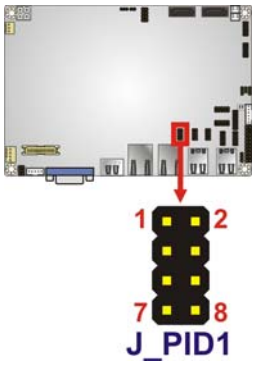


Figure 4-10: LVDS Screen Resolution Jumper Locations

4.5.6 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 4-7
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 4-7: LVDS Voltage Selection Jumper Settings

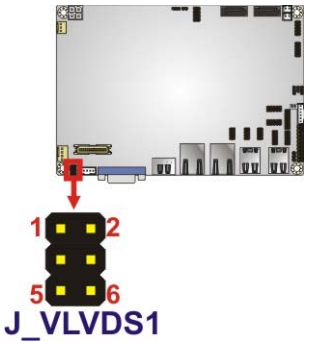


Figure 4-11: LVDS Voltage Selection Jumper Locations

4.5.7 ME RTC Register Jumper

Jumper Label: **ME_RTC1**

Jumper Type: 3-pin header

Jumper Settings: See **Table 4-8**

Jumper Location: See **Figure 4-12**

The ME RTC Register jumper saves or clears the ME RTC registers. The ME RTC Register jumper settings are shown in **Table 4-4**.

Setting	Description	
Short 1-2	Save ME RTC registers (normal operation)	Default
Short 2-3	Clear ME RTC registers	

Table 4-8: ME RTC Register Jumper Settings

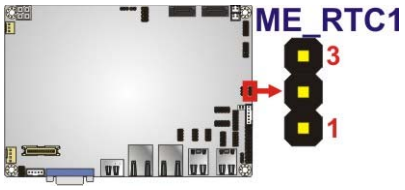


Figure 4-12: ME RTC Register Jumper Location

4.5.8 ME RTC Flash Security Override Jumper

Jumper Label: **JP1**

Jumper Type: 2-pin header

Jumper Settings: See **Table 4-9**

Jumper Location: See **Figure 4-13**

The ME RTC Security Override jumper protects or overrides the ME RTC Flash security registers. The ME RTC Security Override jumper settings are shown in **Table 4-4**.

Setting	Description	
Open	Flash Security On	Default
Short	Flash Security Override	

Table 4-9: ME RTC Security Override Jumper Settings

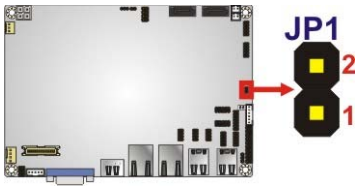


Figure 4-13: ME RTC Security Override Jumper Location

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-HM551 must have air vents to allow cool air to move into the system and hot air to move out.

The NANO-HM551 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-HM551 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-HM551 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-HM551.

Step 1: **Locate the power cable**. The power cable is shown in the packing list in **Chapter 3**.

Step 2: **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 4-14.

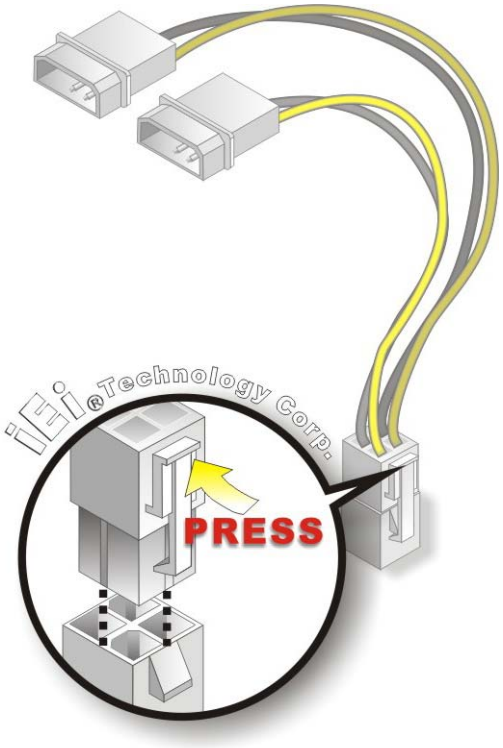


Figure 4-14: Power Cable to Motherboard Connection

Step 3: **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 4-15.

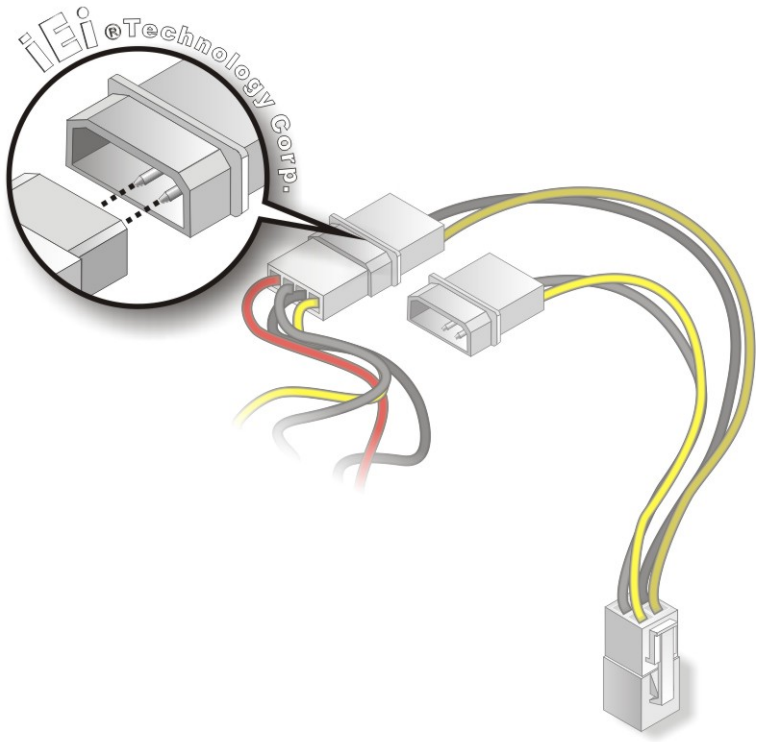


Figure 4-15: Connect Power Cable to Power Supply

4.7.2 Audio Kit Installation

The Audio Kit that came with the NANO-HM551 connects to the audio connector on the NANO-HM551. 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 1: **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 2: **Align pin 1**. Align pin 1 on the on-board connector with pin 1 on the audio kit connector. Pin 1 on the audio kit connector is indicated with a white dot. See Figure 4-16.

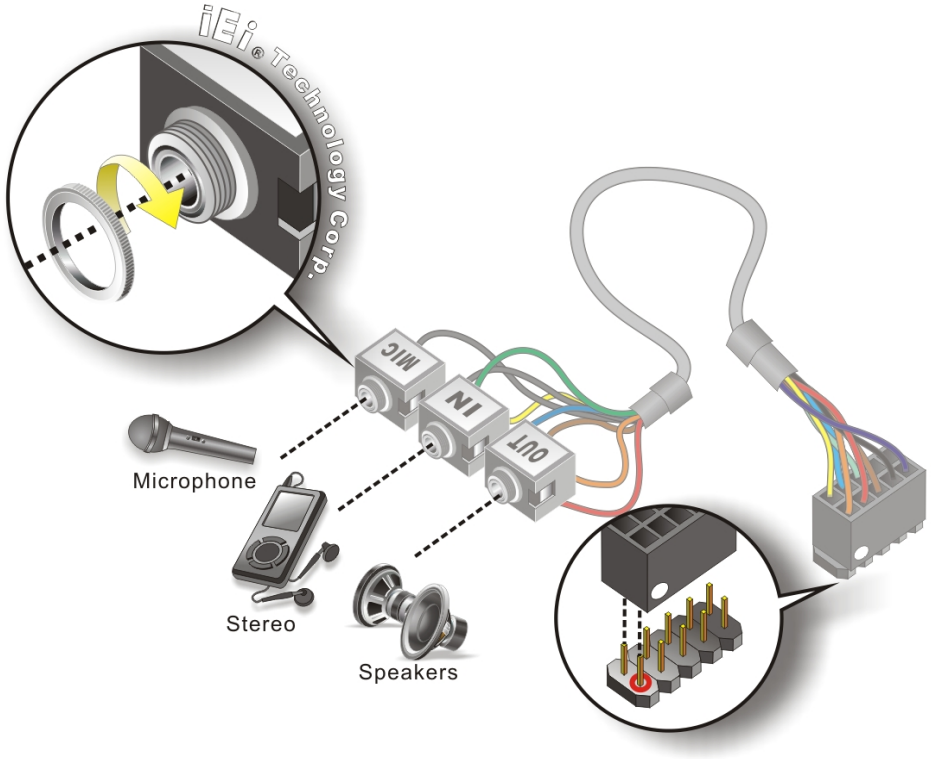


Figure 4-16: Audio Kit Cable Connection

Step 3: **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 4-17. A key on the front of the cable connectors ensures the connector can only be installed in one direction.

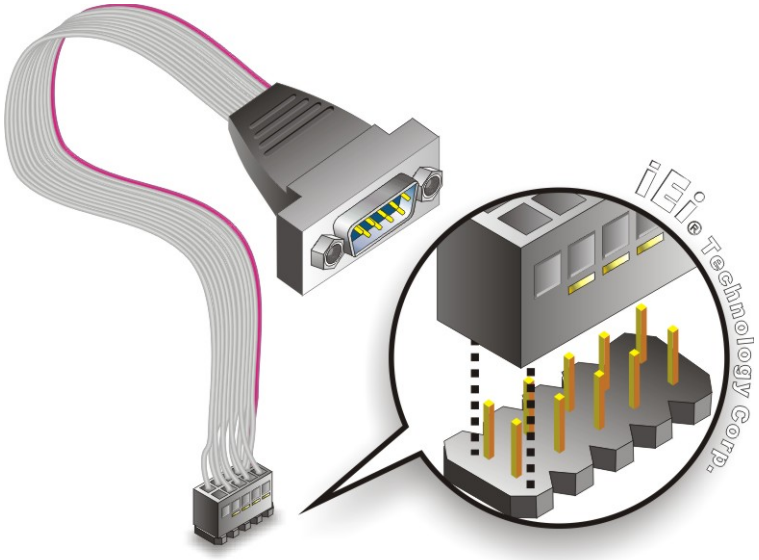


Figure 4-17: Single RS-232 Cable Installation

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.

- DVI devices
- RJ-45 Ethernet cable connector
- USB devices
- VGA monitor

To install these devices, connect the corresponding cable connector from the actual device to the corresponding NANO-HM551 external peripheral interface connector making sure the pins are properly aligned.

4.8.1 HDMI Display Device Connection

The NANO-HM551 has one female HDMI connector on the external peripheral interface panel. The HDMI connectors are connected to digital display devices. To connect a digital display device to the NANO-HM551, please follow the instructions below.

Step 1: **Locate the HDMI connector**. The location of the HDMI connector is shown in another chapter.

Step 2: **Align the HDMI connector**. Align the male HDMI connector on the digital display device cable with the female HDMI connector on the external peripheral interface.

Step 3: **Insert the HDMI connector** Once the connectors are properly aligned with the male connector, insert the male connector from the digital display device into the female connector on the NANO-HM551.

Step 4: **Secure the connector.** Secure the HDMI connector from the digital display device to the external interface by tightening the two retention screws on either side of the connector.

4.8.2 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-HM551. See Figure 4-18.

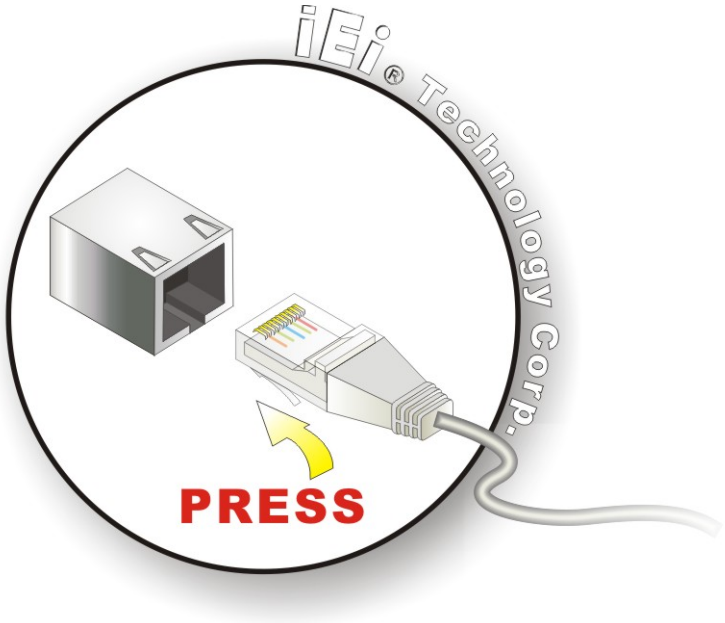


Figure 4-18: LAN Connection

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.

4.8.3 USB Connection (Dual Connector)

The external USB Series "A" receptacle connectors provide easier and quicker access to external USB devices. Follow the steps below to connect USB devices to the NANO-HM551.

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 4-19.

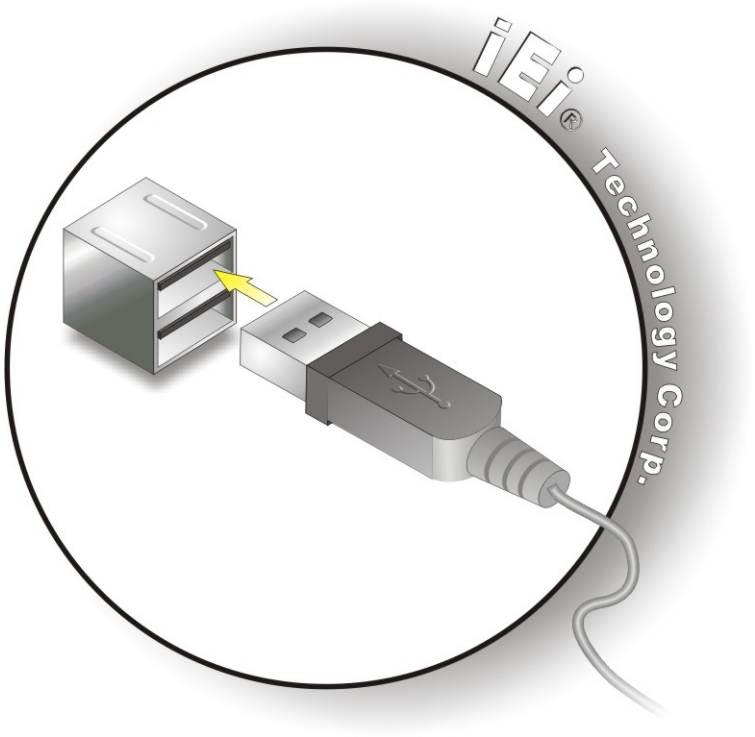


Figure 4-19: USB Connector

4.8.4 VGA Monitor Connection

The NANO-HM551 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-HM551, 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-HM551. See Figure 4-20.

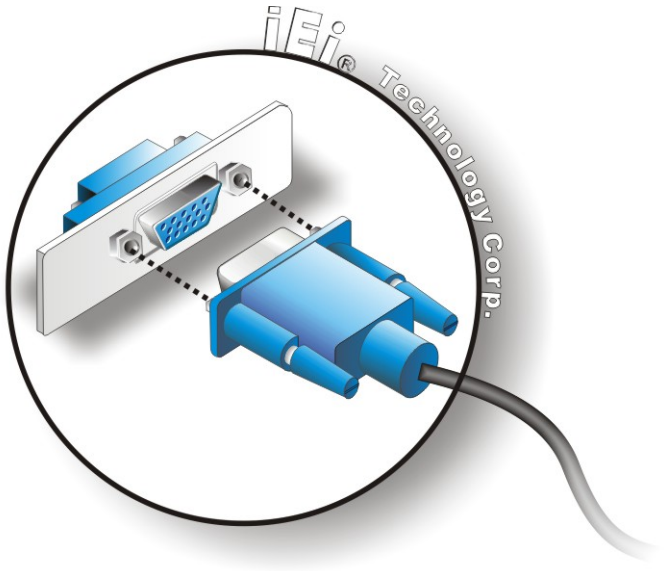


Figure 4-20: VGA Connector

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-HM551 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 4-21**).

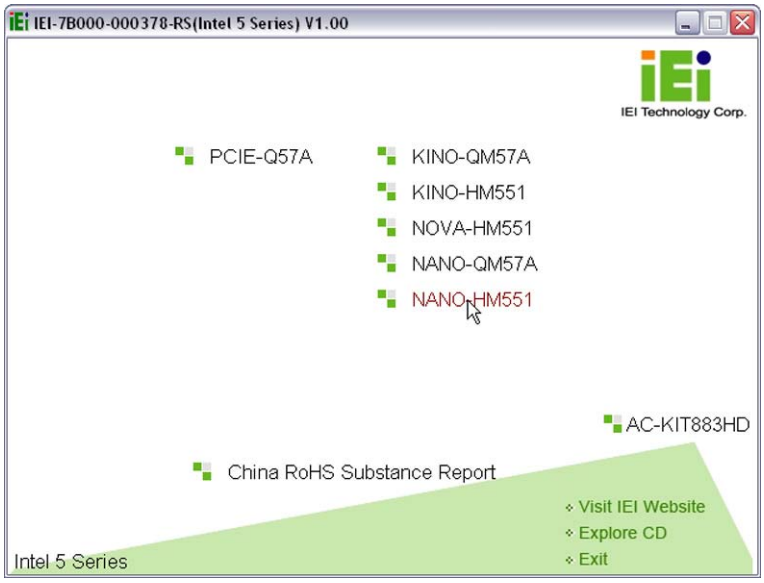


Figure 4-21: Introduction Screen

Step 3: Click **NANO-HM551**.

Step 4: A new screen with a list of available drivers appears (**Figure 4-22**).

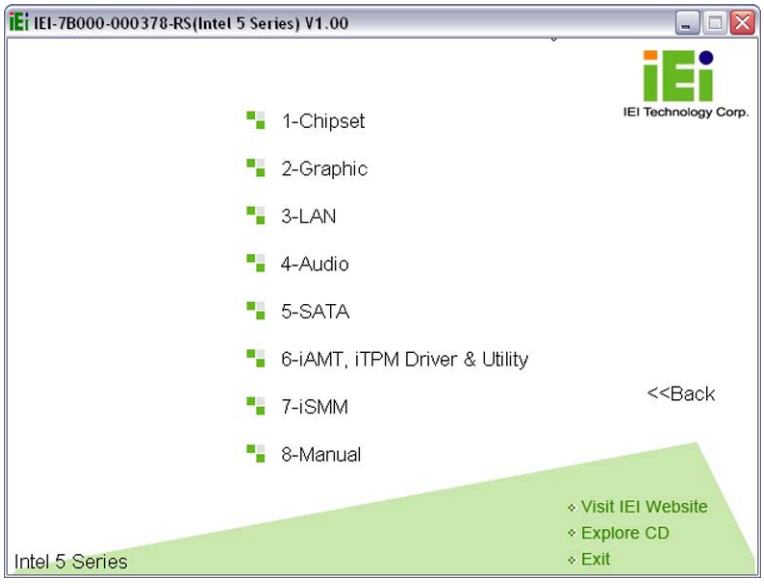


Figure 4-22: Available Drivers

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
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
F1 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

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 **5**.

5.1.5 BIOS Menu Bar

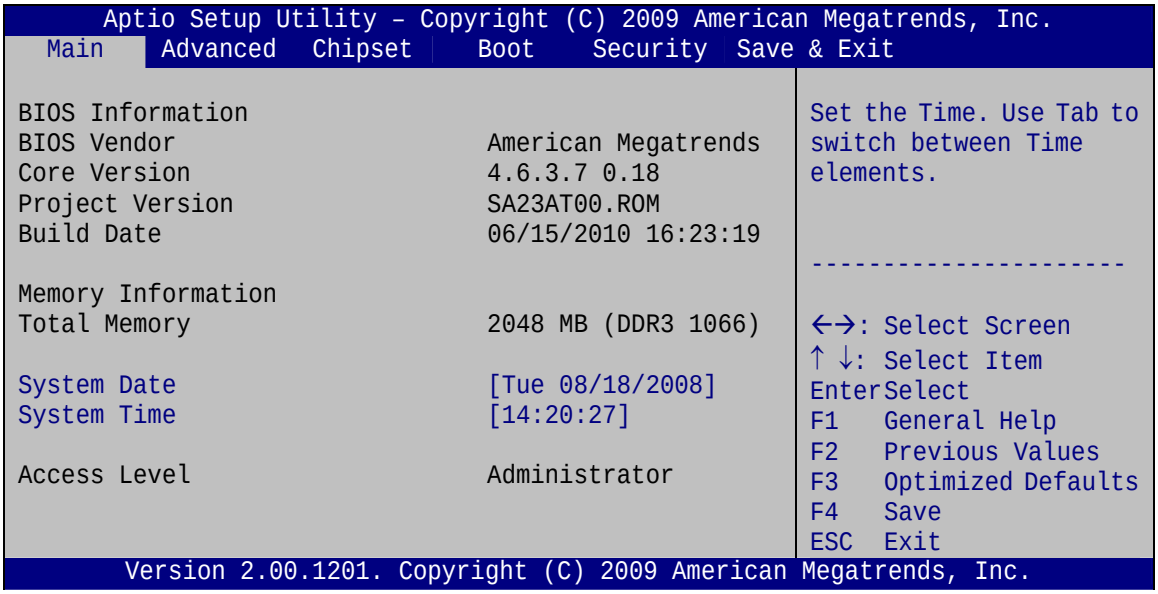
The **menu bar** on top of the BIOS screen has the following main items:

- 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

➔ Memory Information

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

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

The System Overview field also has two user configurable fields:

➔ **System Date [xx/xx/xx]**

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

➔ **System Time [xx:xx:xx]**

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

5.3 Advanced

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

WARNING!

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

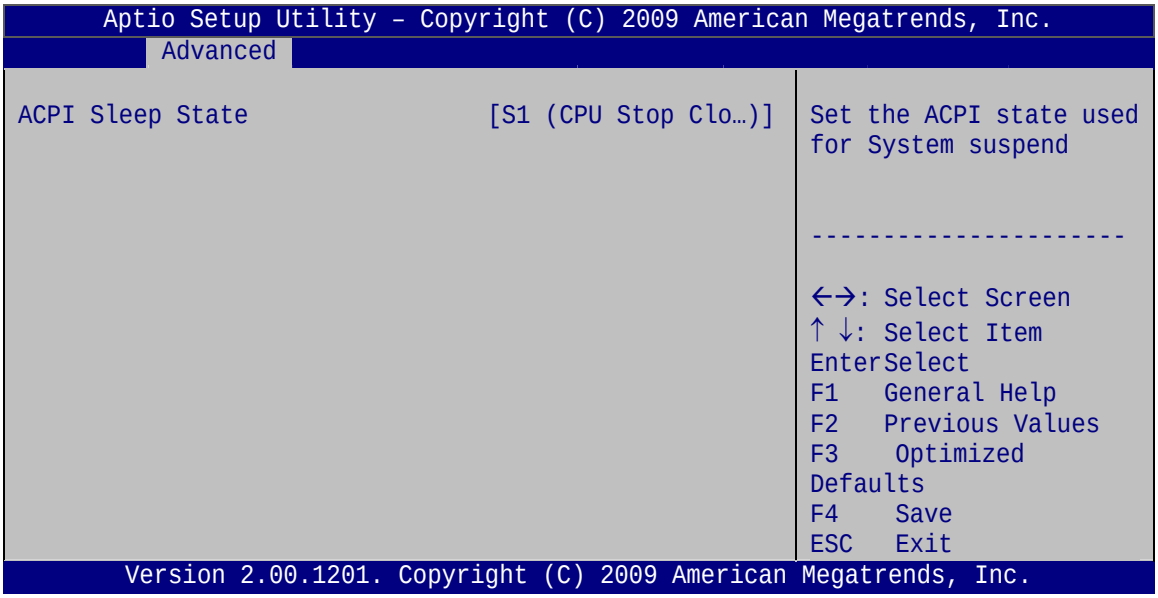
```
      Aptio Setup Utility – Copyright (C) 2009 American Megatrends, Inc.
  Main   Advanced   Chipset    Boot    Security   Save & Exit

> ACPI Settings                                  System ACPI Parameters
> CPU Configuration
> SATA Configuration
> USB Configuration
> Super IO Configuration                         ----------------------
> H/M Monitor
> Serial Port Console Redirection                ←→: Select Screen
                                                 ↑ ↓: Select Item
                                                 EnterSelect
                                                 F1   General Help
                                                 F2   Previous Values
                                                 F3    Optimized
                                                 Defaults
                                                 F4    Save
                                                 ESC   Exit
      Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

BIOS Menu 2: Advanced

5.3.1 ACPI Configuration

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



BIOS Menu 3: ACPI Configuration

➔ **ACPI Sleep State [S1 (CPU Stop Clock)]**

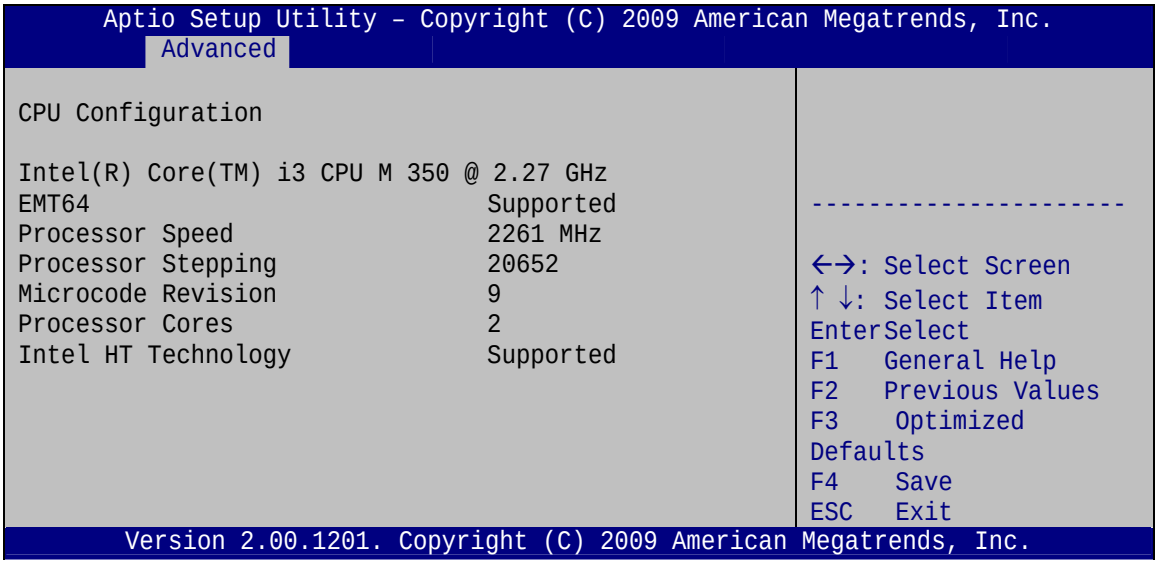
Use the **ACPI Sleep State** option to specify the sleep state the system enters when it is not being used.

➔ **S1 (CPU Stop Clock)** **DEFAULT** 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)** The caches are flushed and the CPU is powered off. Power to the RAM is maintained. The computer returns slower to a working state, but more power is saved.

5.3.2 CPU Configuration

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



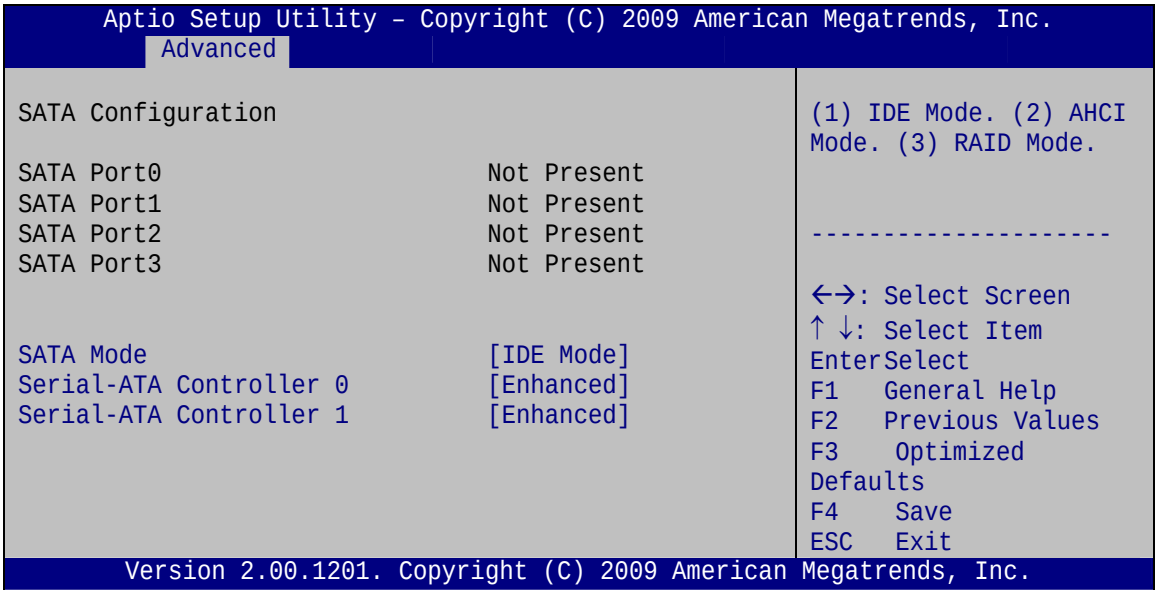
BIOS Menu 4: CPU Configuration

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

- Processor Type: Lists the brand name of the CPU being used
- EMT64: Indicates if the EM64T is supported by the CPU.
- Processor Speed: Lists the CPU processing speed
- Processor Stepping: Lists the CPU processing stepping
- Microcode Revision: Lists the microcode revision
- Processor Cores: Lists the number of the processor core
- Intel HT Technology: Indicates if the Intel HT Technology is supported by the CPU.

5.3.3 SATA Configuration

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



BIOS Menu 5: IDE Configuration

➔ **SATA Mode [IDE Mode]**

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

➔ **Disable**		Disables SATA devices.
➔ **IDE Mode**	**DEFAULT**	Configures SATA devices as normal IDE device.
➔ **AHCI Mode**		Configures SATA devices as AHCI device.
➔ **RAID Mode**		Configures SATA devices as RAID device.

➔ **Serial-ATA Controller 0/1 [Enhanced]**

Use the **Serial-ATA Controller** option to configure the Serial-ATA controller mode when the SATA mode is set to IDE Mode.

➔ **Disable**	Disables Serial-ATA controller.

➔ **Enhanced** **DEFAULT** Configures the Serial-ATA controller to be in enhanced mode. In this mode, IDE channels and SATA channels are separated. Some legacy OS do not support this mode.

➔ **Compatible** Configures the Serial-ATA controller to be in compatible mode. In this mode, a SATA channel will replace one of the IDE channels.

5.3.4 USB Configuration

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

```
Aptio Setup Utility – Copyright (C) 2009 American Megatrends, Inc.
        Advanced
USB Configuration                                  Enables Legacy USB
                                                   support. AUTO option
USB Devices:                                       disables legacy support
      2 Hubs                                       if no USB devices are
                                                   connected. DISABLE
All USB Devices                 [Enabled]          option will keep USB
Legacy USB Support              [Enabled]          devices available only
                                                   for EFI applications.
                                                   ---------------------
                                                   ←→: Select Screen
                                                   ↑ ↓: Select Item
                                                   EnterSelect
                                                   F1   General Help
                                                   F2   Previous Values
                                                   F3    Optimized
                                                   Defaults
                                                   F4    Save
                                                   ESC   Exit
        Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

BIOS Menu 6: USB Configuration

➔ **USB Devices**

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

➔ **All USB Devices [Enabled]**

Use the **All USB Devices** option to enable the USB devices.

➔ **Disabled**		All USB devices are disabled.
➔ **Enabled**	**DEFAULT**	All USB devices are enabled.

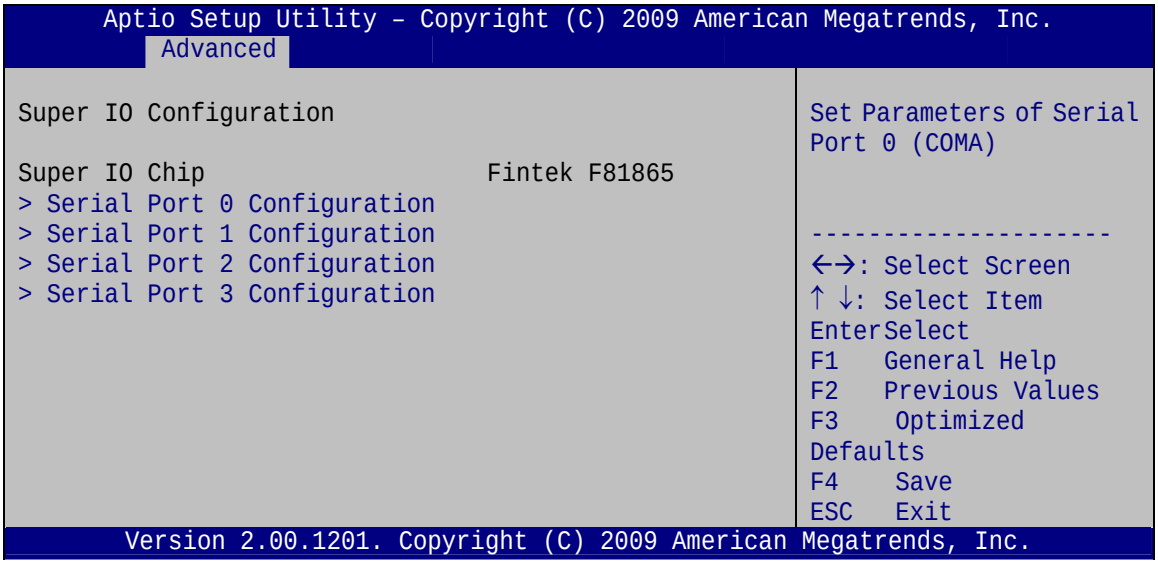
➔ **Legacy USB Support [Enabled]**

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

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

5.3.5 Super IO Configuration

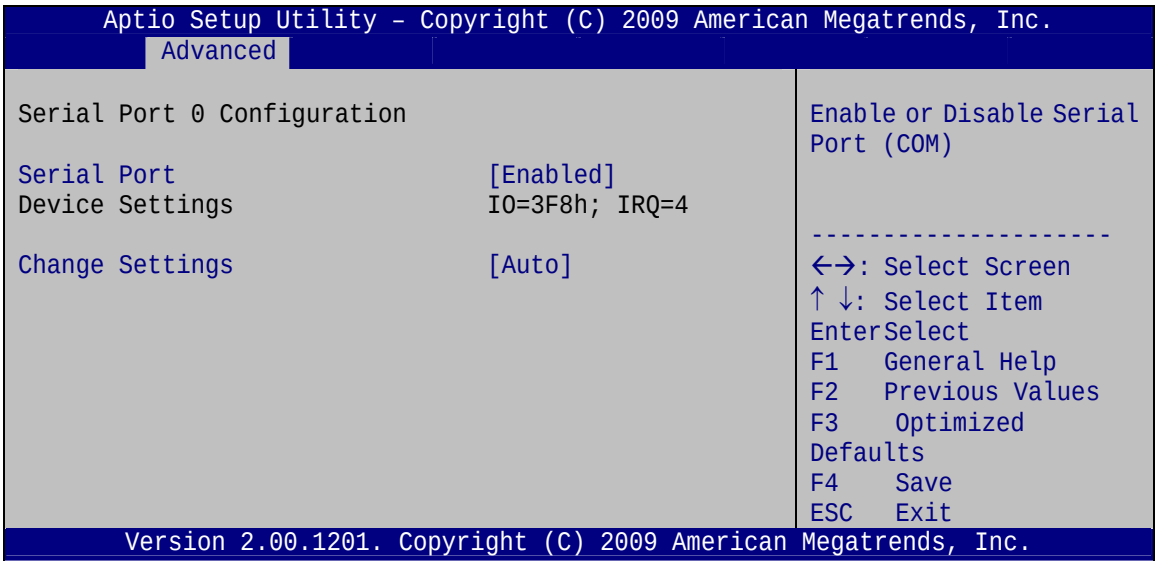
Use the **Super IO Configuration** menu (**BIOS Menu 7**) to set or change the configurations for the FDD controllers, parallel ports and serial ports.



BIOS Menu 7: Super IO Configuration

5.3.5.1 Serial Port n Configuration

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



BIOS Menu 8: Serial Port n Configuration Menu

5.3.5.1.1 Serial Port 0 Configuration

➔ **Serial Port [Enabled]**

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

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

➔ **Change Settings [Auto]**

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

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=3F8h; IRQ=4**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ4
➔ **IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

5.3.5.1.2 Serial Port 1 Configuration

➔ **Serial Port [Enabled]**

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

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

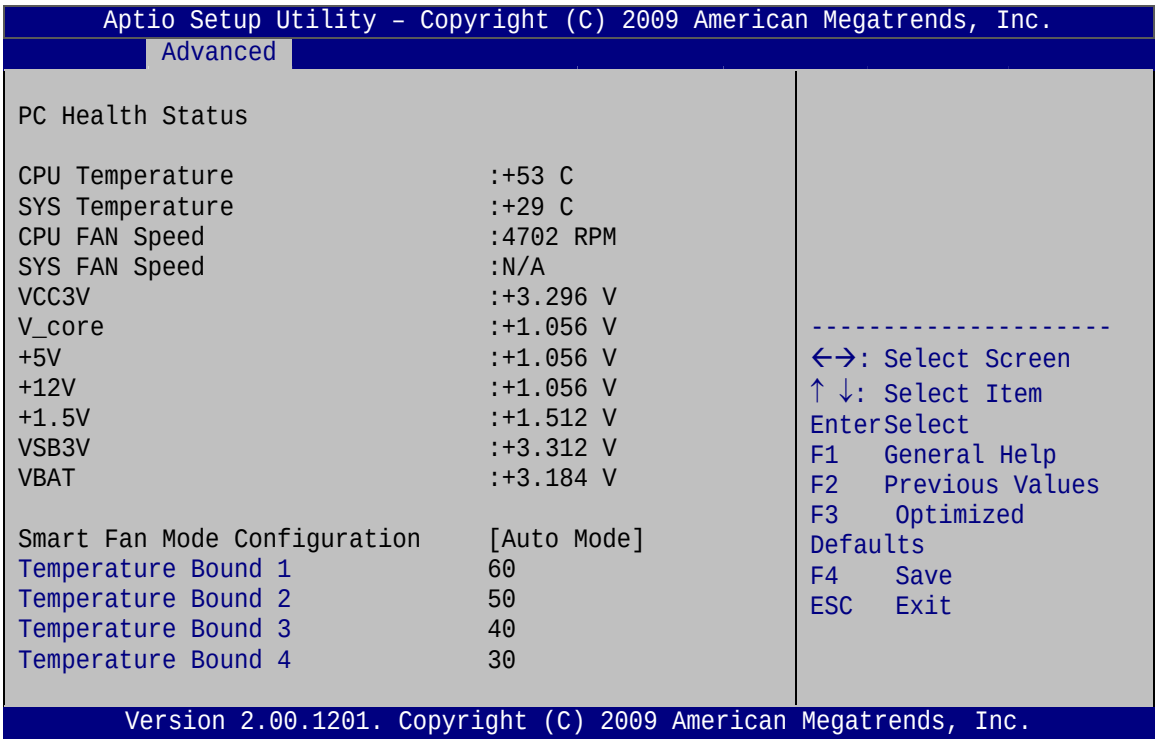
➔ **Change Settings [Auto]**

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

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=2F8h; IRQ=3**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3
➔ **IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12
➔ **IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 5, 6, 7, 9, 10, 11, 12

5.3.6 H/W Monitor

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



BIOS Menu 9: Hardware Health Configuration

➔ **Smart Fan Mode Configuration [Auto Mode]**

Use the **Smart Fan Mode Configuration** option to configure the CPU fan.

➔ **Auto RPM Mode** **DEFAULT** The fan adjusts its speed using these settings by RPM:

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
(Min=0, Max=100)

NOTE:

Smart fan functions are supported only when using a 4-pin fan. When using a 3-pin fan, the functions are not supported.

➔ **First Boundary Temperature [60]**

WARNING:

CPU failure can result if this value is set too high

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

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

➔ **Second Boundary Temperature [50]**

WARNING:

CPU failure can result if this value is set too high

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

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

➔ **Third Boundary Temperature [40]**

WARNING:

CPU failure can result if this value is set too high

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

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

➔ **Fourth Boundary Temperature [30]**

WARNING:

CPU failure can result if this value is set too high

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

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

➔ **PC Health Status**

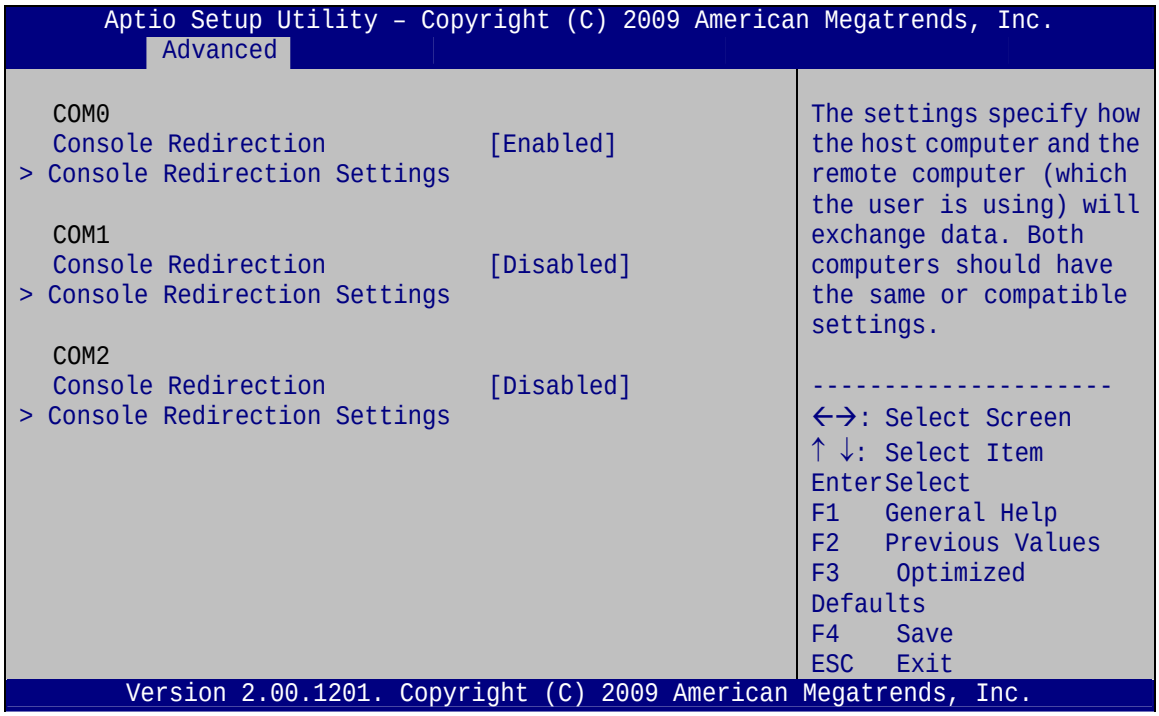
The following system parameters and values are shown. The system parameters that are monitored are:

- System Temperatures:
  - CPU Temperature
  - System Temperature
- Fan Speeds:
  - CPU Fan Speed
  - System Fan Speed
- Voltages:
  - VCC3V
  - V_core

- +5V
- +12 V
- +1.5V
- VSB3V
- VBAT

5.3.7 Serial Port Console Redirection

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



BIOS Menu 10: Serial Port Console Redirection

➔ **Console Redirection**

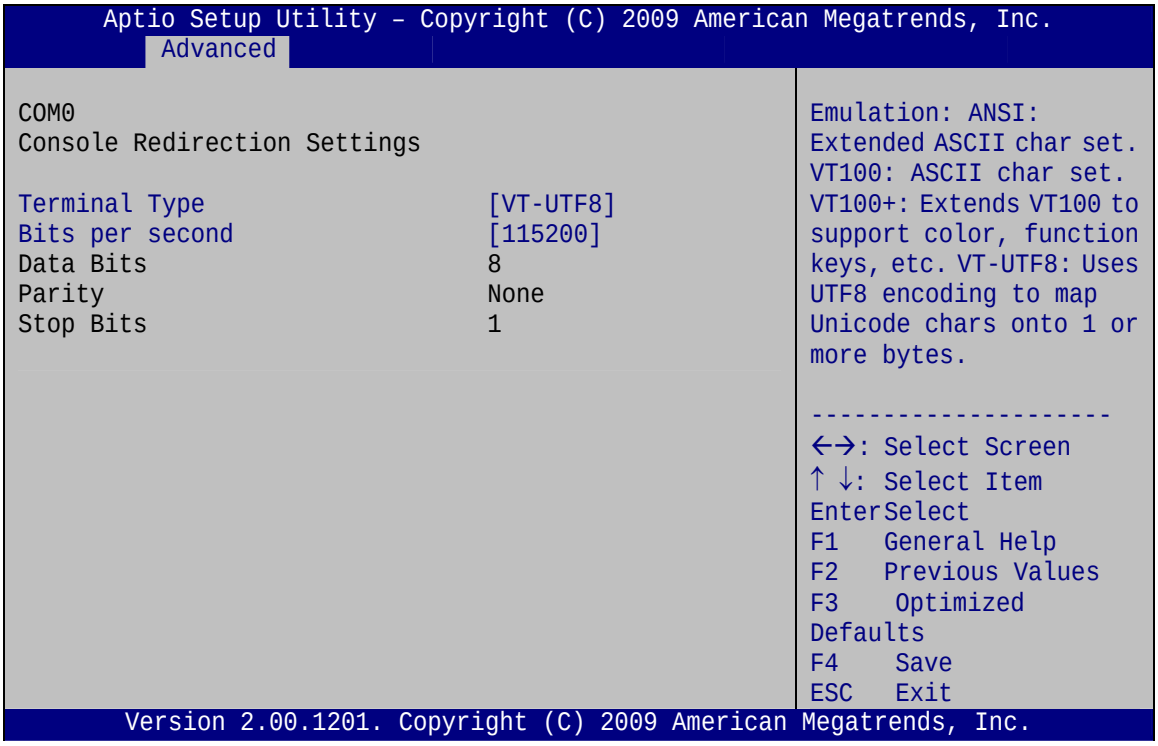
Use **Console Redirection** option to enable or disable the console redirection function.

➔ **Disabled** Disabled the console redirection function

➔ **Enabled** Enabled the console redirection function

5.3.7.1 Console Redirection Settings

The **Console Redirection Settings** menu (**BIOS Menu 11**) allows the console redirection options to be configured. The option is active when Console Redirection option is enabled.



BIOS Menu 11: Console Redirection Settings

➔ **Terminal Type [ANSI]**

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

➔ **VT100**		The target terminal type is VT100
➔ **VT100+**		The target terminal type is VT100+
➔ **VT-UTF8**		The target terminal type is VT-UTF8
➔ **ANSI**	**DEFAULT**	The target terminal type is ANSI

➔ **Bits per second [115200]**

Use the **Bits per second** option to specify the transmission speed of the serial port.

➔	**9600**		The transmission speed is 9600
➔	**19200**		The transmission speed is 19200
➔	**57600**		The transmission speed is 57600
➔	**115200**	**DEFAULT**	The transmission speed is 115200

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 12**) 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) 2009 American Megatrends, Inc.
  Main    Advanced  Chipset    Boot    Security  Save & Exit

> North Bridge                                  North Bridge Parameters
> South Bridge
> Intel IDG SWSCI OpRegion


                                                ---------------------
                                                ←→: Select Screen
                                                ↑ ↓: Select Item
                                                EnterSelect
                                                F1   General Help
                                                F2   Previous Values
                                                F3    Optimized
                                                Defaults
                                                F4    Save
                                                ESC   Exit

        Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

BIOS Menu 12: Chipset

5.4.1 Northbridge Configuration

Use the **Northbridge Chipset Configuration** menu (**BIOS Menu 13**) to configure the Northbridge chipset.

```
Aptio Setup Utility – Copyright (C) 2009 American Megatrends, Inc.
                    Chipset

Memory Information                          Select which graphics
                                            controller to use as the
CPU Type                    Arrandale       primary boot device.

Total Memory                2048 MB (DDR3 1066)

Memory Slot0                2048 MB (DDR3 1066)
Memory Slot2                   0 MB (DDR3 1066)

CAS# Latency(tCL)           8
RAS# Active Time(tRAS)      20              ---------------------
Row Precharge Time(tRP)     8               ←→: Select Screen
RAS# to CAS# Delay(tRCD)    8               ↑ ↓: Select Item
Write Recovery Time(tWR)    8               EnterSelect
Row Refresh Cycle Timea(tRFC) 60            F1   General Help
Write to Read Delay(tWTR)   4               F2   Previous Values
Active to Active Delay      4               F3    Optimized
Read CAS# Precharge(tRTP)   5               Defaults
                                            F4    Save
IGD Memory                  [32M]           ESC   Exit

Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

BIOS Menu 13:Northbridge Chipset Configuration

➔ **Initiate Graphics Adapter [PEG/IGD]**

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

- IGD
- PEG/IGD **DEFAULT**

➔ **IGD Memory [32 MB]**

Use the **IGD Memory** option to specify the amount of system memory that can be used by the Internal graphics device.

➔ **Disable**

➔ **32 MB** **DEFAULT** 32 MB of memory used by internal graphics device

➔ **64 MB** 64 MB of memory used by internal graphics device

5.4.2 Southbridge Configuration

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

```
Aptio Setup Utility – Copyright (C) 2009 American Megatrends, Inc.
                    Chipset

Auto Power Button Function      [Disabled]      Restore AC Power Loss
Restore AC Power Loss           [Last State]    help.

Audio Configuration
Azalia HD Audio                 [Enabled]       ---------------------
Set Spread Spectrum function    [Disabled]      ←→: Select Screen
                                                ↑ ↓: Select Item
                                                EnterSelect
                                                F1   General Help
                                                F2   Previous Values
                                                F3    Optimized
                                                Defaults
                                                F4    Save
                                                ESC   Exit
Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

BIOS Menu 14:Southbridge Chipset Configuration

➔ **Auto Power Button Function [Disabled]**

Use the

➔ **Restore AC Power Loss [Power Off]**

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

➔ **Power Off** The system remains turned off

➔ **Power On** **DEFAULT** The system turns on

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

➔ **Azalia HD Audio [Enabled]**

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

➔ **Disabled** The onboard High Definition Audio controller is disabled

➔ **Enabled** **DEFAULT** The onboard High Definition Audio controller automatically detected and enabled

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

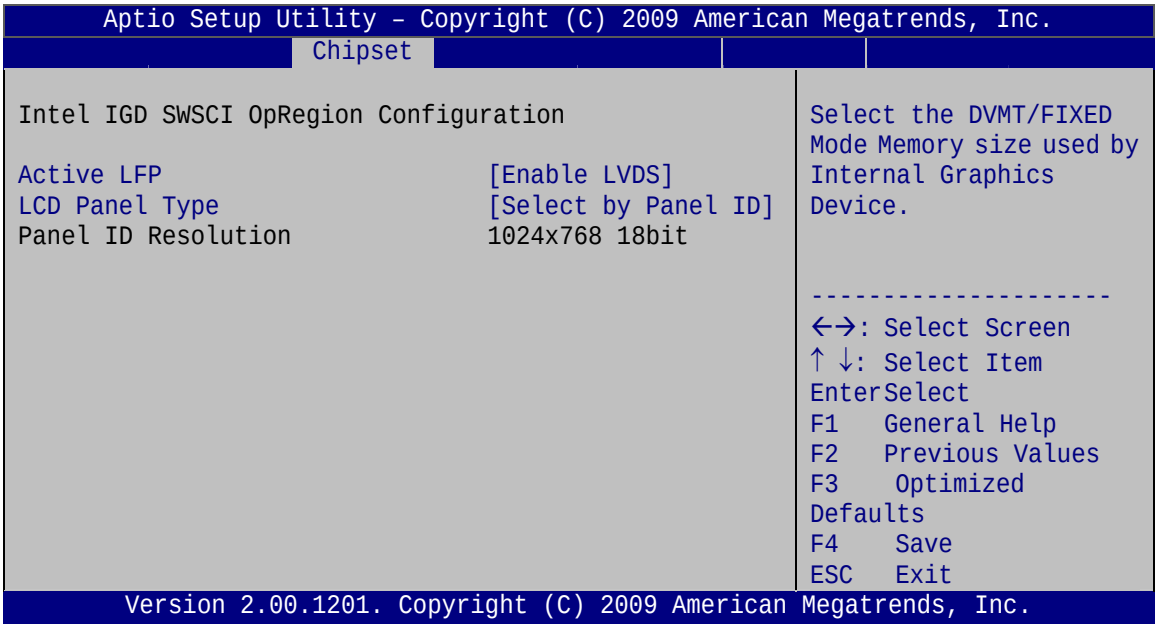
Use the **Set Spread Spectrum function** option to reduce the EMI. Excess EMI is generated when the system clock generator pulses have extreme values. Spreading the pulse spectrum modulates changes in the extreme values from spikes to flat curves, thus reducing the EMI. This benefit may in some cases be outweighed by problems with timing-critical devices, such as a clock-sensitive SCSI device.

➔ **Disabled** **DEFAULT** EMI not reduced

➔ **Enabled** EMI reduced

5.4.3 Intel IGD SWSCI OpRegion

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



BIOS Menu 15: Intel IGD SWSCI OpRegion

➔ **Active LFP [Enable LVDS]**

Use the **Active LFP** option to enable the LVDS connector. Configuration options are listed below.

- Enable LVDS Default
- Disable LVDS

➔ **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.

- Select by Panel ID **DEFAULT**
- 800x600 18bit
- 1024x768 18bit
- 1024x768 24bit

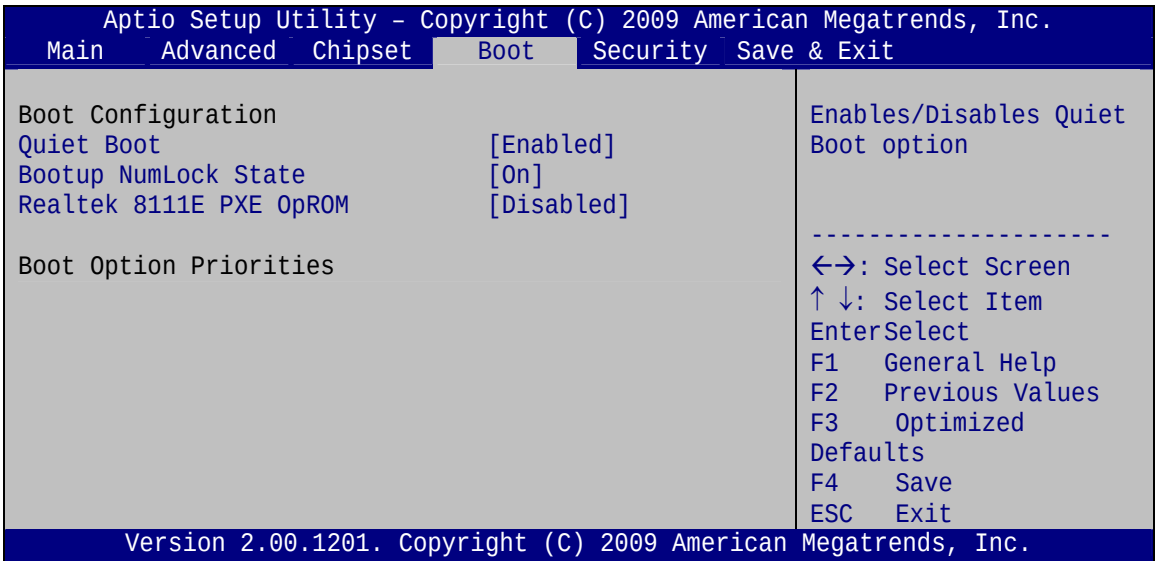
- 1280x800 18bit
- 1280x1024 48bit
- 1366x768 18bit
- 1400x1050 48bit
- 1440x900 48bit
- 1600x900 48bit
- 1600x1200 48bit
- 1680x1050 48bit
- 1920x1080 48bit
- 1920x1200 48bit
- 2048x1536 48bit

➔ **Panel ID Resolution**

Displays the panel resolution detected by the BIOS.

5.5 Boot

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



BIOS Menu 16: Boot

➔ **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

➔ **Bootup NumLock [On]**

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

➔ **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.

➔ **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.

➔ **Realtek 8111E PXE OpROM [Disabled]**

Use the **Realtek 8111E PXE OpROM** option to enable the Realtek 8111E PCIe GbE controller to boot the system.

➔ **Disabled** **DEFAULT** Cannot be booted from a remote system through the Realtek 8111E PCIe GbE controller

➔ **Enabled** Can be booted from a remote system through the Realtek 8111E PCIe GbE controller

➔ **Option ROM Messages [Force BIOS]**

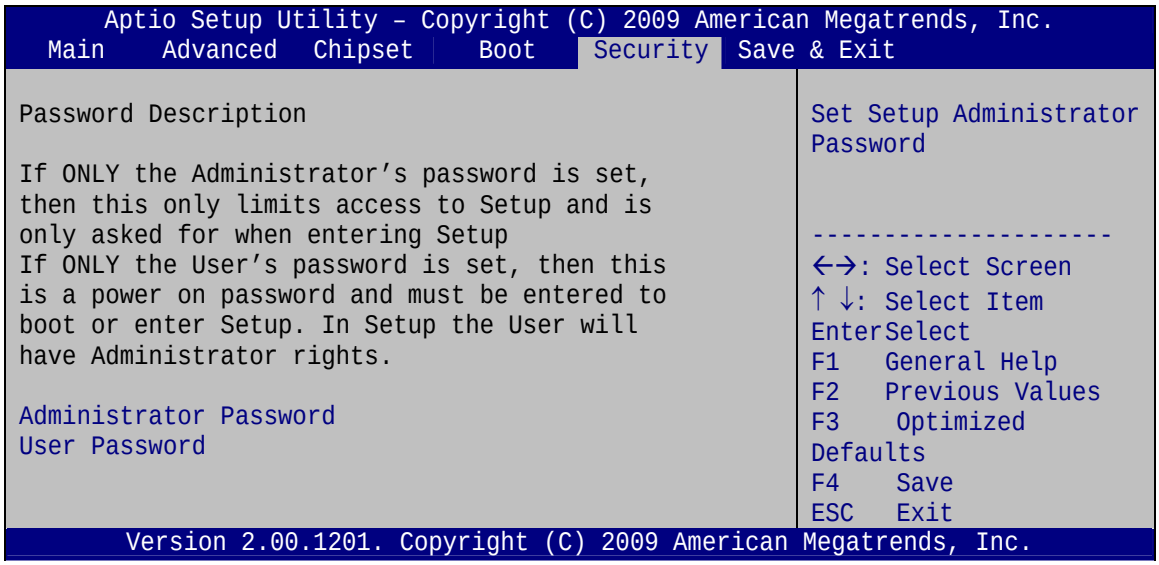
Use the **Option ROM Messages** option to allow add-on ROM (read-only memory) messages to be displayed.

➔ **Force BIOS** **DEFAULT** The system forces third party BIOS to display during system boot.

➔ **Keep Current** The system displays normal information during system boot.

5.6 Security

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



BIOS Menu 17: Security

➔ **Administrator Password**

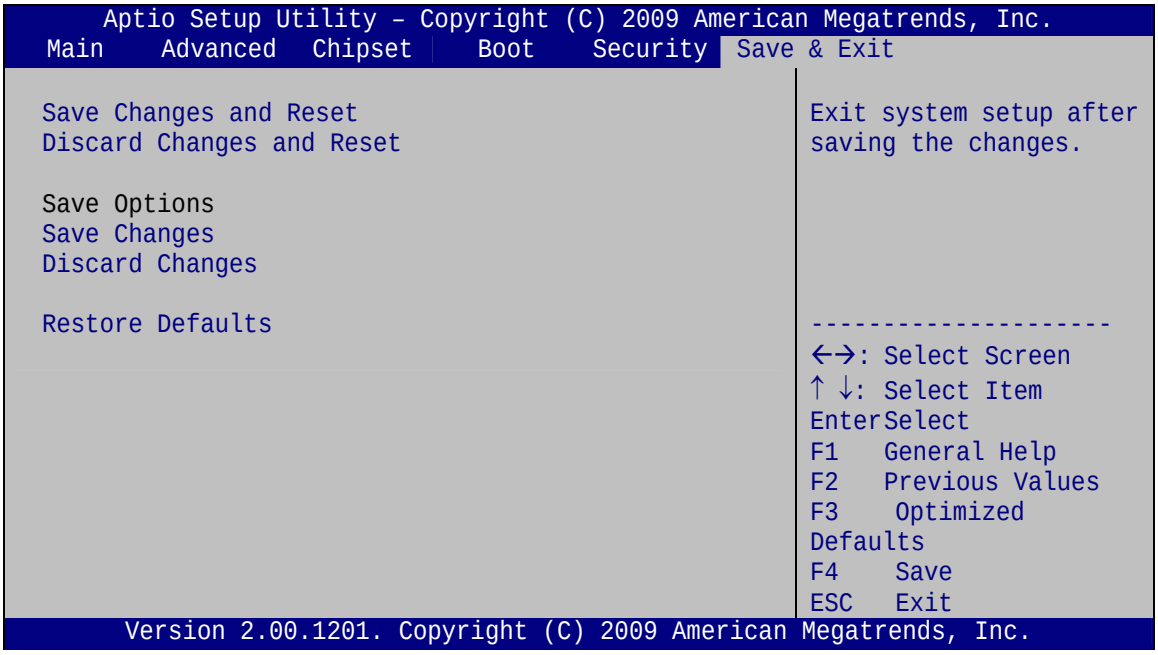
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

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

5.7 Exit

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



BIOS Menu 18:Exit

➔ **Save Changes and Reset**

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

➔ **Discard Changes and Reset**

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

➔ **Save Changes**

Use the **Save Changes** option to save the changes made to the BIOS options.

➔ **Discard Changes**

Use the **Discard Changes** option to discard the changes and remain in 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.**

Appendix

A

BIOS Menu Options

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Appendix

B

One Key Recovery

B.1 One Key Recovery Introduction

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

NOTE:

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

The IEI One Key Recovery tool menu is shown below.

Figure B-1: IEI One Key Recovery Tool Menu

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

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

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

NOTE:

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

B.1.1 System Requirement

NOTE:

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

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

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

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

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

NOTE:

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

B.1.2 Supported Operating System

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

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

NOTE:

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

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

NOTE:

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

B.2 Setup Procedure for Windows

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

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

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

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

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

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

The detailed descriptions are described in the following sections.

NOTE:

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

B.2.1 Hardware and BIOS Setup

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

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

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

Step 4: Turn on the system.

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

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

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

B.2.2 Create Partitions

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

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

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

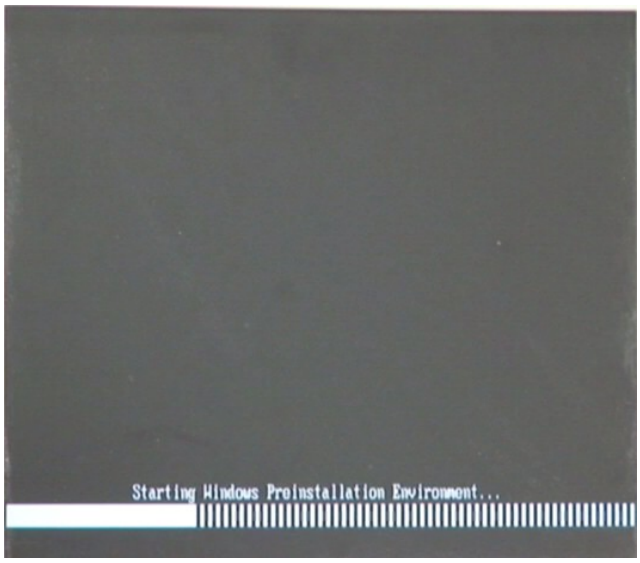


Figure B-2: Launching the Recovery Tool

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

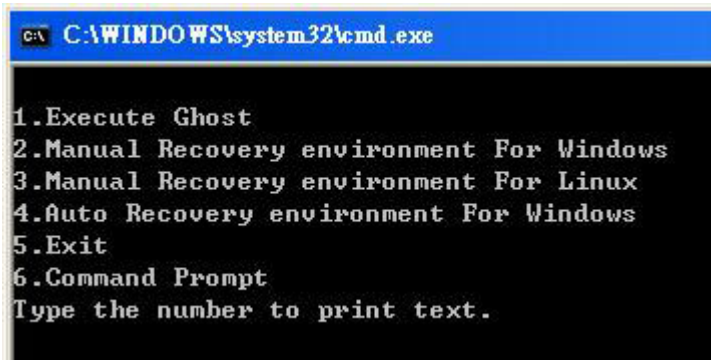


Figure B-3: Recovery Tool Setup Menu

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

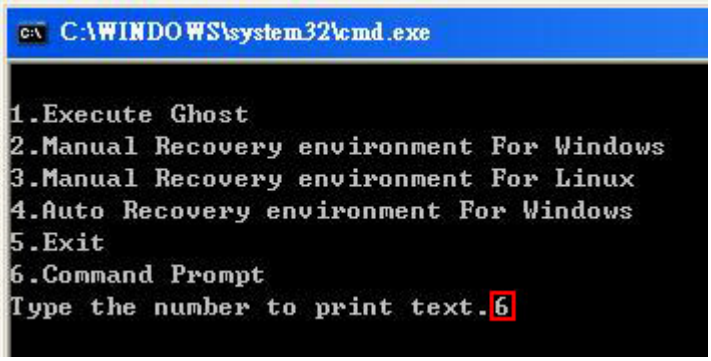


Figure B-4: Command Prompt

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

(Press <Enter> after entering each line below)

system32>diskpart

DISKPART>list vol

DISKPART>sel disk 0

DISKPART>create part pri size= ___

DISKPART>assign letter=N

DISKPART>create part pri size= ___

DISKPART>assign letter=F

DISKPART>exit

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

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

system32>exit

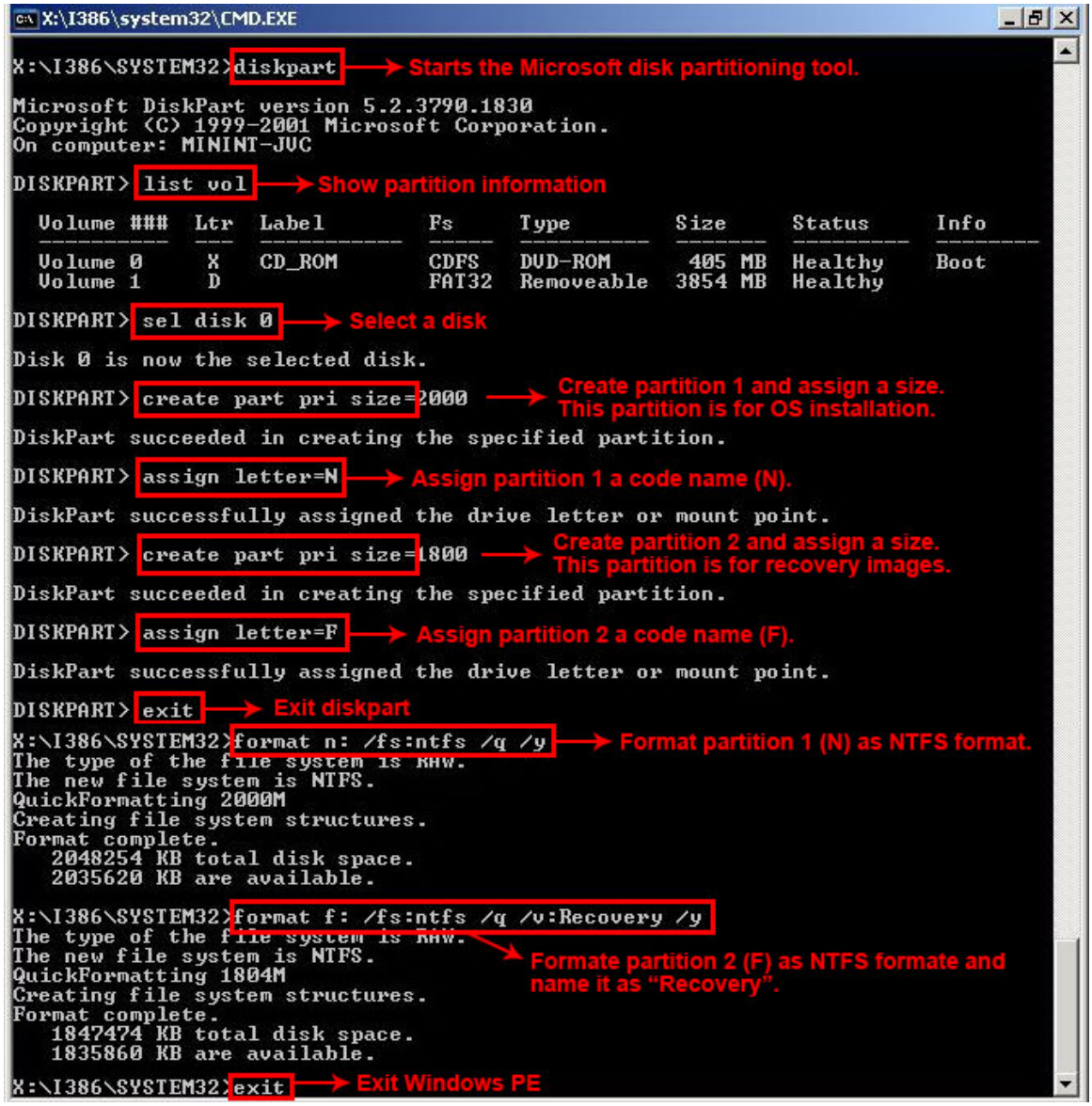
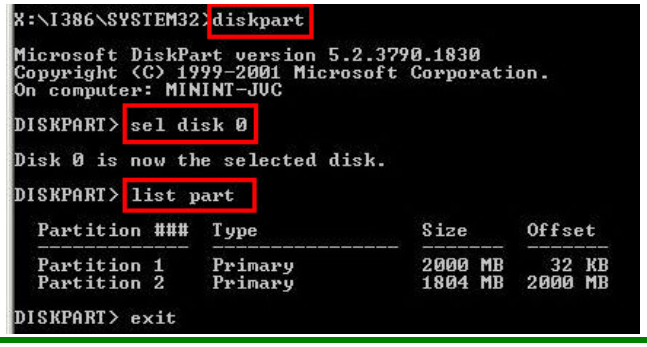


Figure B-5: Partition Creation Commands

NOTE:

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



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

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

B.2.3 Install Operating System, Drivers and Applications

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

NOTE:

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

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

B.2.4 Building the Recovery Partition

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

Step 2: Start the system.

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

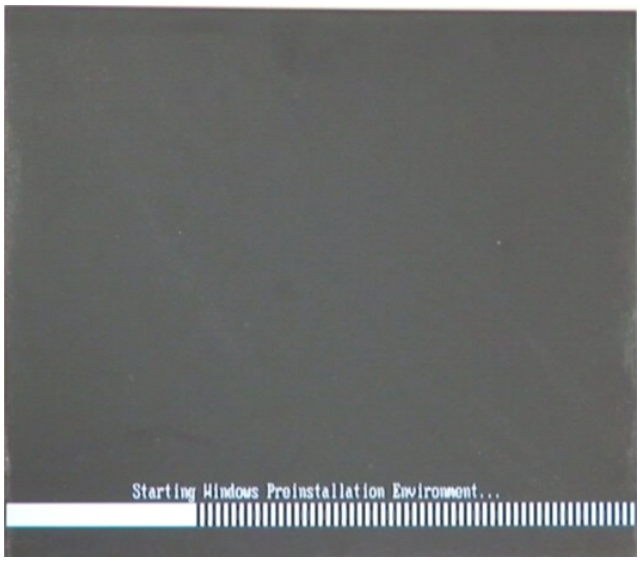


Figure B-6: Launching the Recovery Tool

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

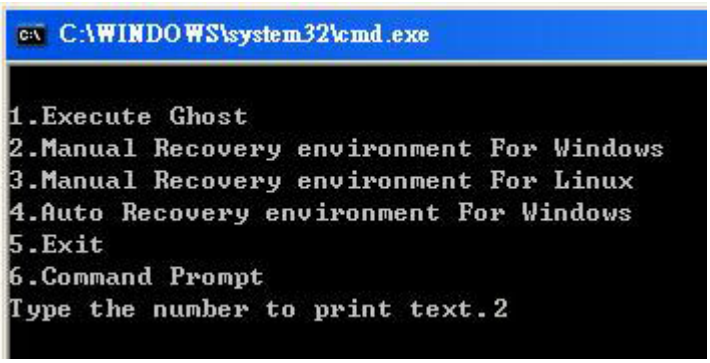


Figure B-7: Manual Recovery Environment for Windows

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

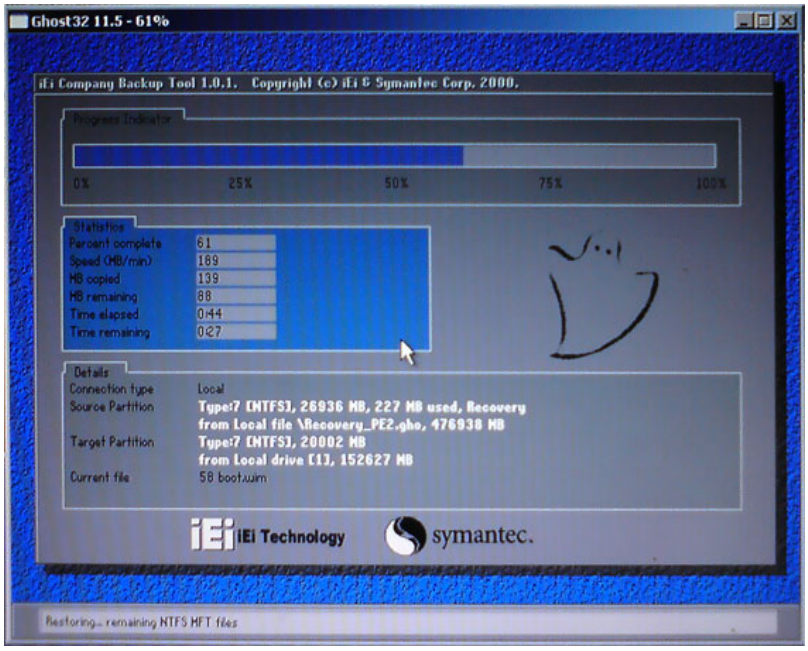


Figure B-8: Building the Recovery Partition

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

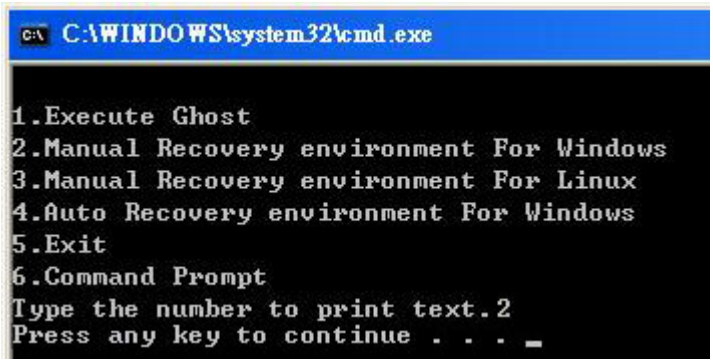


Figure B-9: Press Any Key to Continue

Step 7: Eject the recovery CD.

B.2.5 Create Factory Default Image

NOTE:

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

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

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

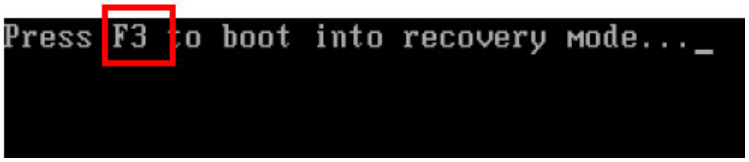


Figure B-10: Press F3 to Boot into Recovery Mode

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

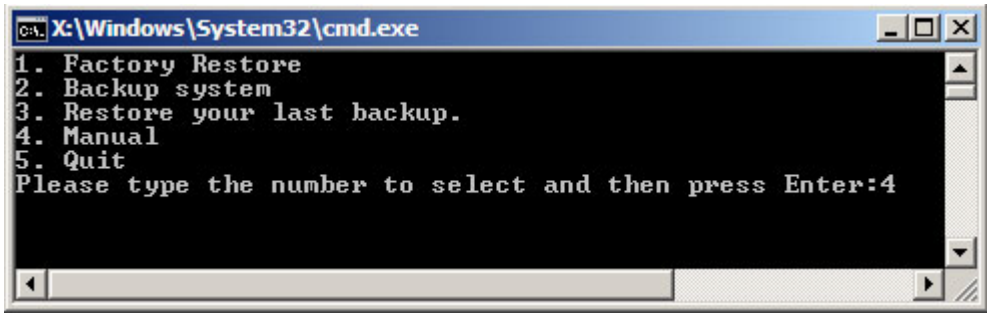


Figure B-11: Recovery Tool Menu

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

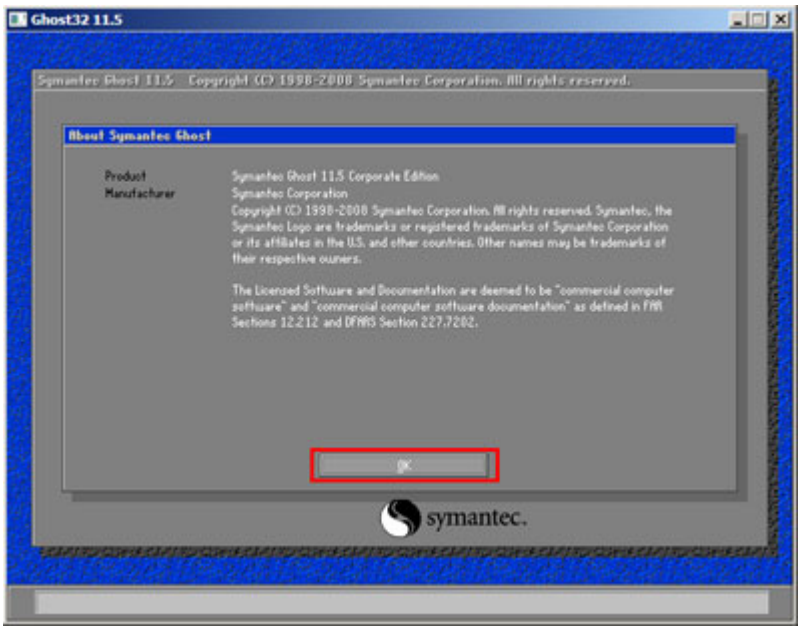


Figure B-12: About Symantec Ghost Window

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

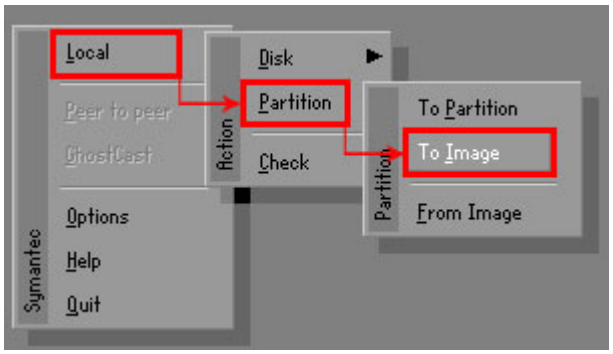


Figure B-13: Symantec Ghost Path

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

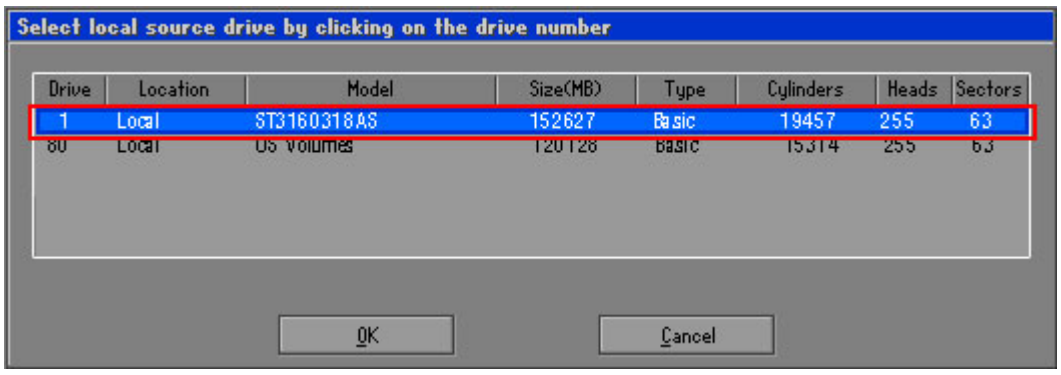


Figure B-14: Select a Local Source Drive

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

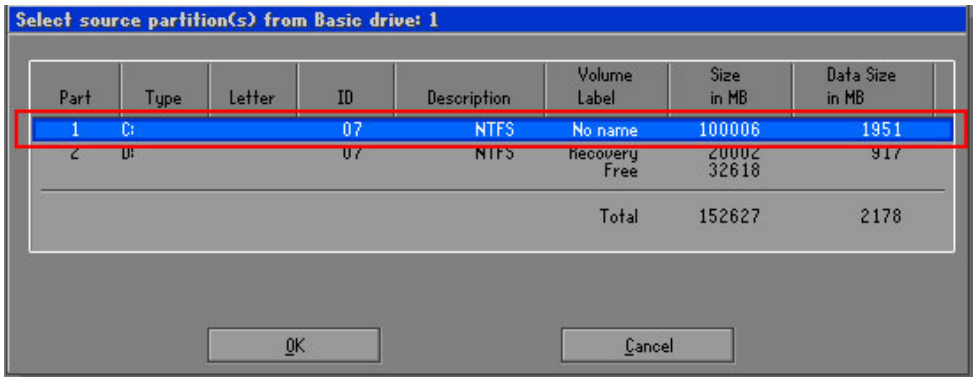


Figure B-15: Select a Source Partition from Basic Drive

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

WARNING:

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

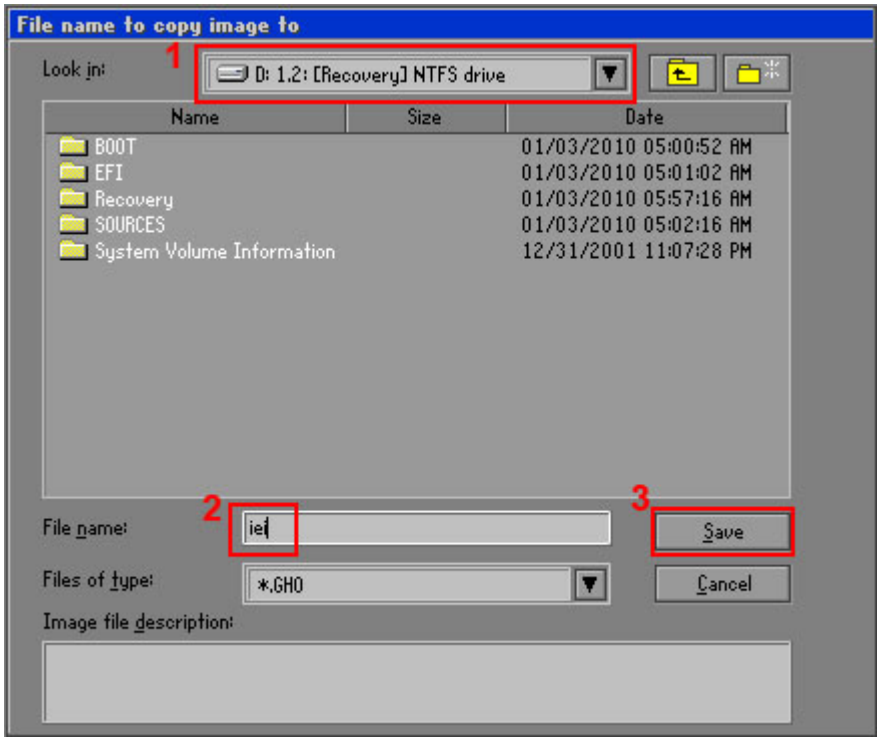


Figure B-16: File Name to Copy Image to

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

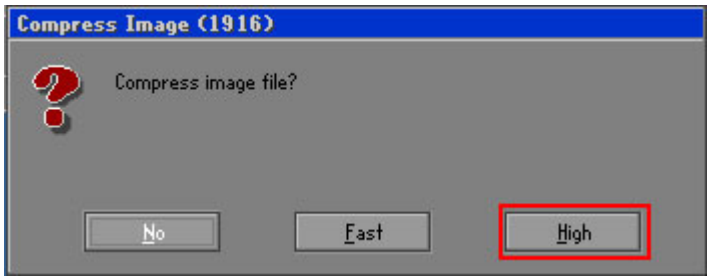


Figure B-17: Compress Image

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

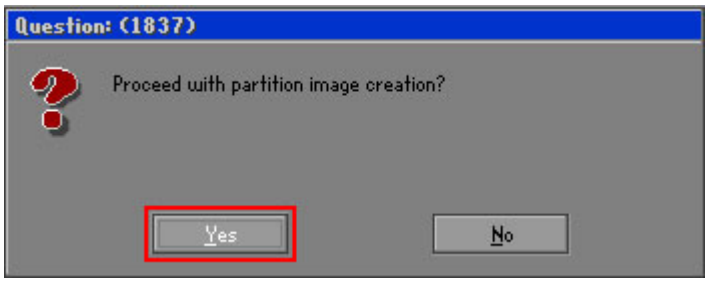


Figure B-18: Image Creation Confirmation

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

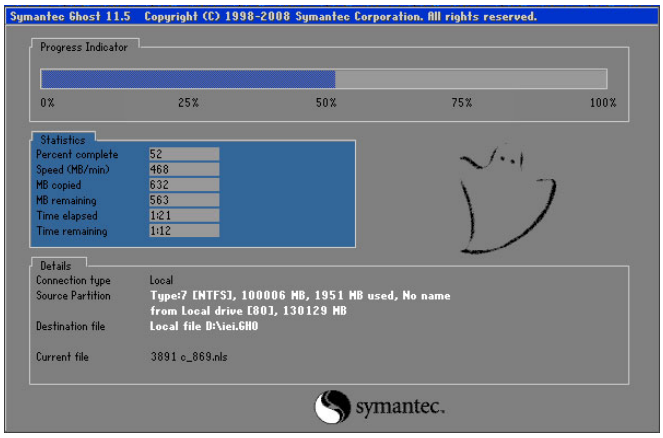


Figure B-19: Image Creation Complete

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

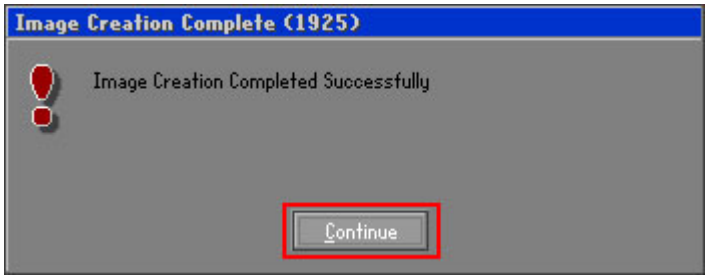


Figure B-20: Image Creation Complete

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

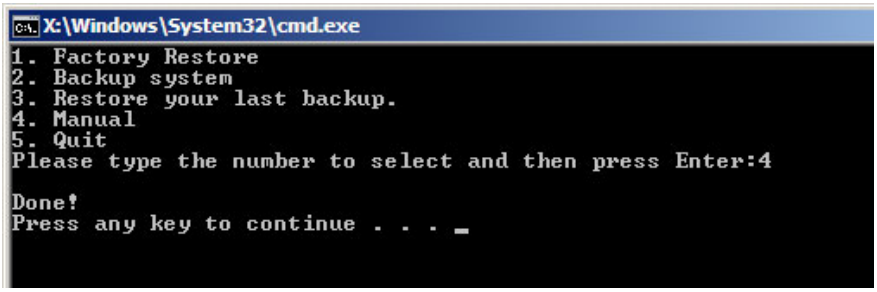


Figure B-21: Press Any Key to Continue

B.3 Auto Recovery Setup Procedure

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

CAUTION:

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

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

CAUTION:

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

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

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

Figure B-22: Auto Recovery Utility

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

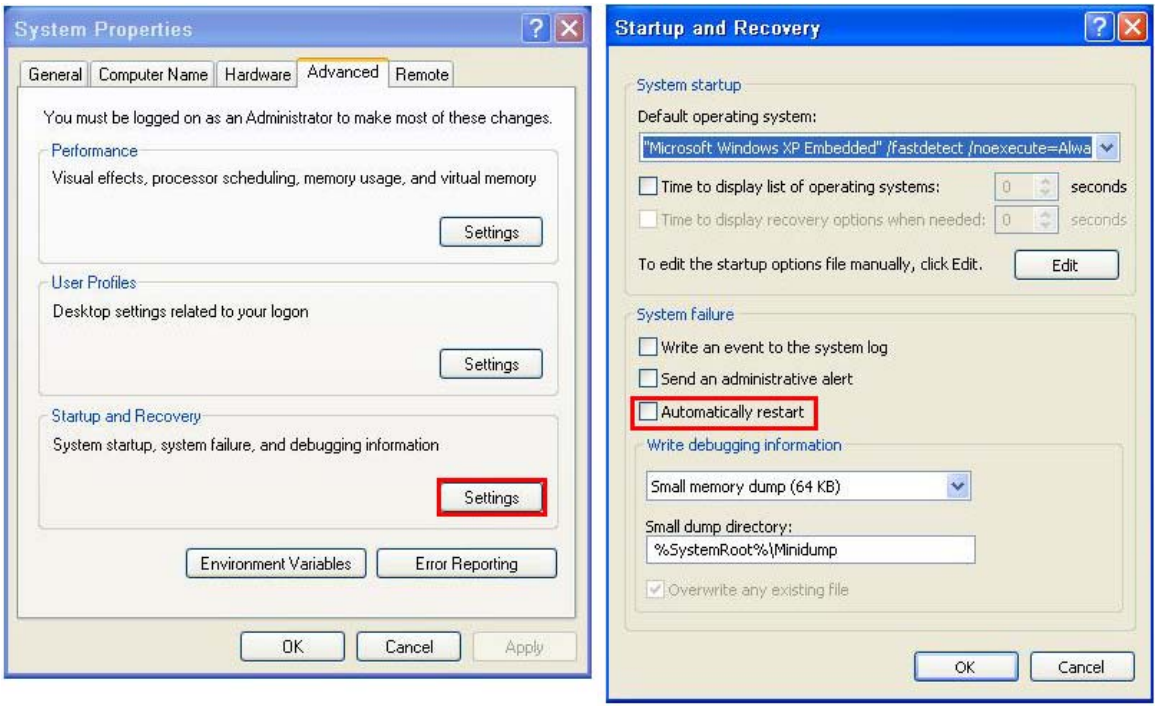


Figure B-23: Disable Automatically Restart

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

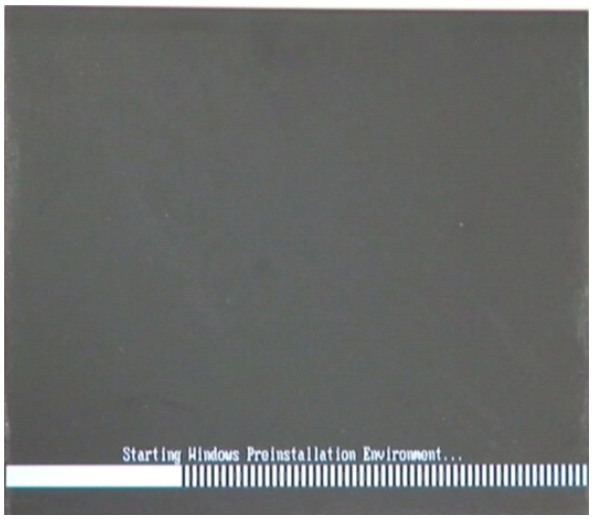


Figure B-24: Launching the Recovery Tool

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

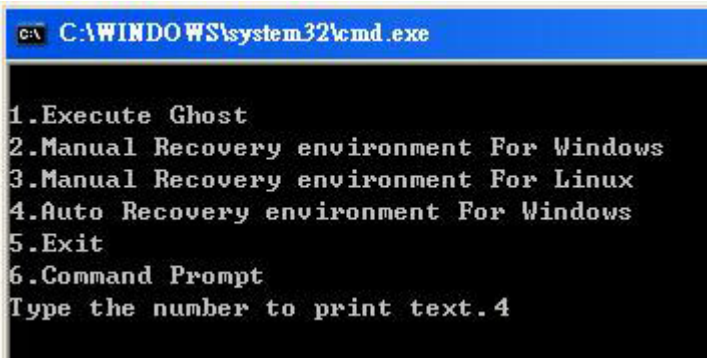


Figure B-25: Auto Recovery Environment for Windows

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

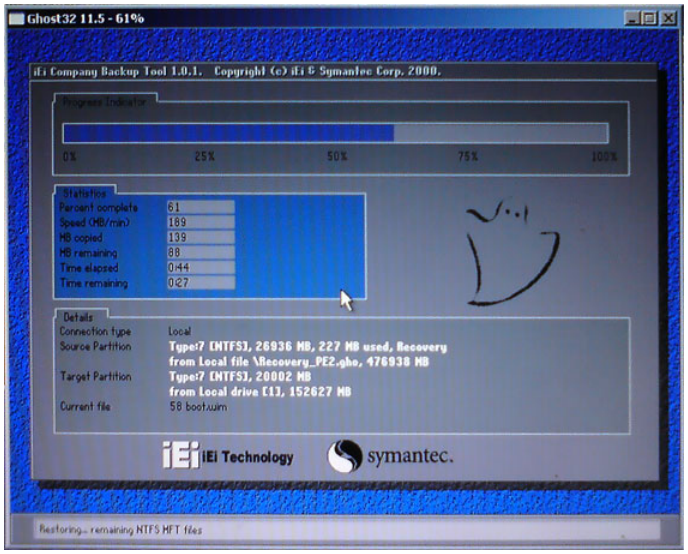


Figure B-26: Building the Auto Recovery Partition

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

Figure B-27: Factory Default Image Confirmation

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

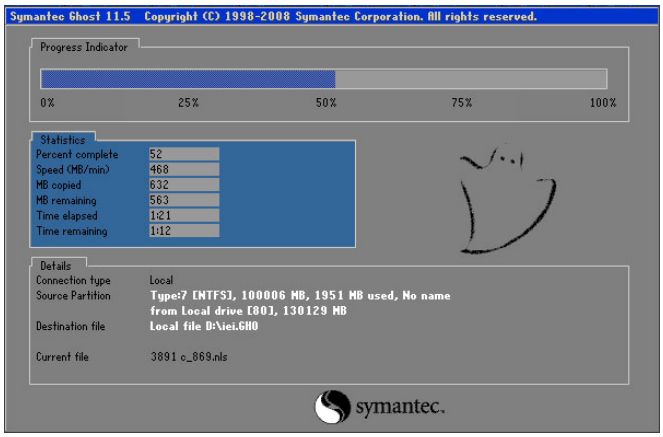


Figure B-28: Image Creation Complete

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

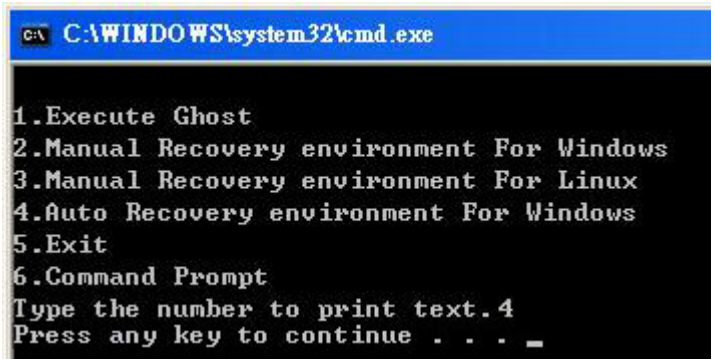
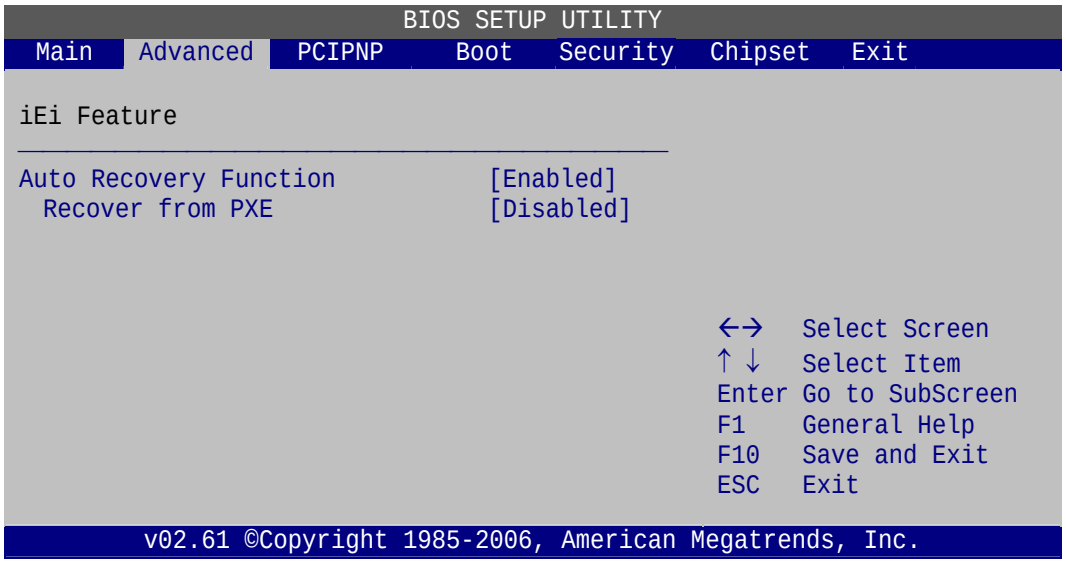


Figure B-29: Press any key to continue

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

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

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



BIOS Menu 19: IEI Feature

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

B.4 Setup Procedure for Linux

The initial setup procedure for Linux system is 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.

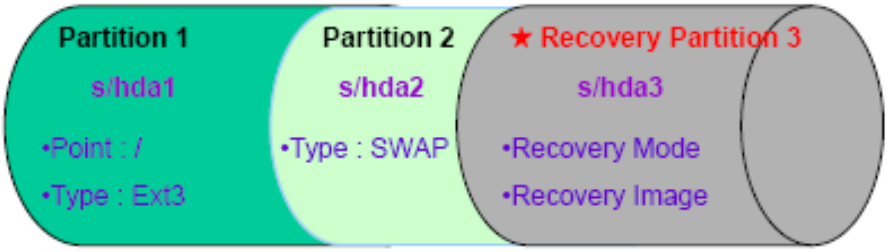


Figure B-30: Partitions for Linux

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

system32>diskpart

DISKPART>list vol

DISKPART>sel disk 0

DISKPART>create part pri size= ___

DISKPART>assign letter=N

DISKPART>exit

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

system32>exit

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

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

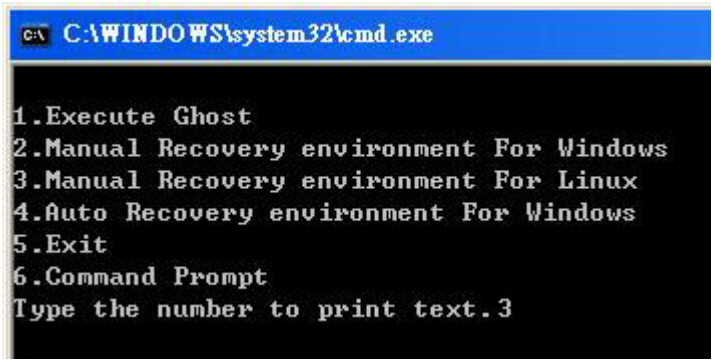


Figure B-31: Manual Recovery Environment for Linux

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

cd /boot/grub

vi menu.lst

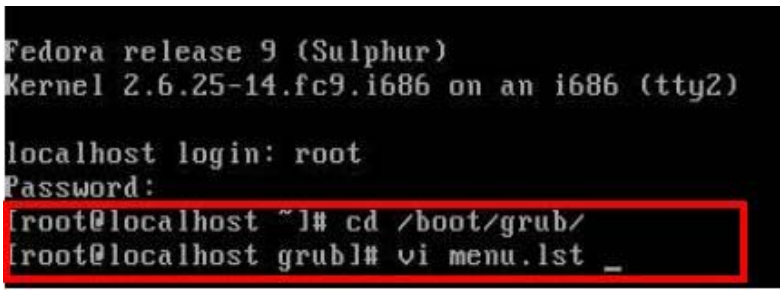
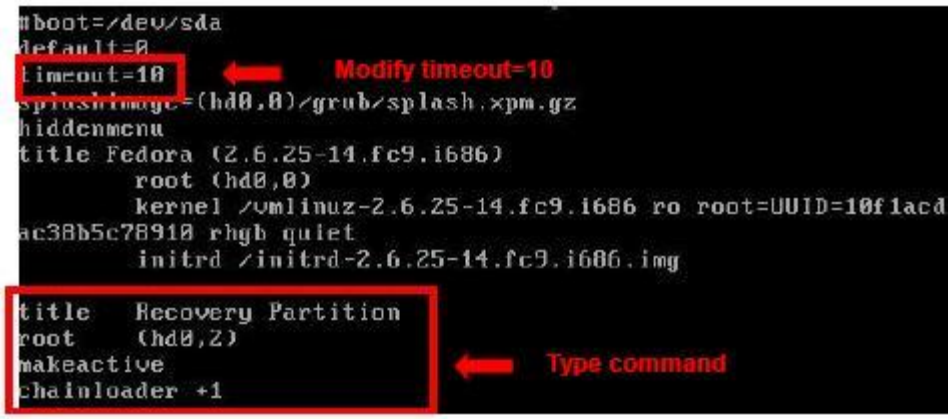


Figure B-32: Access menu.lst in Linux (Text Mode)

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



- Type command:

  title Recovery Partition

  root (hd0,2)

  makeactive

  chainloader +1

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

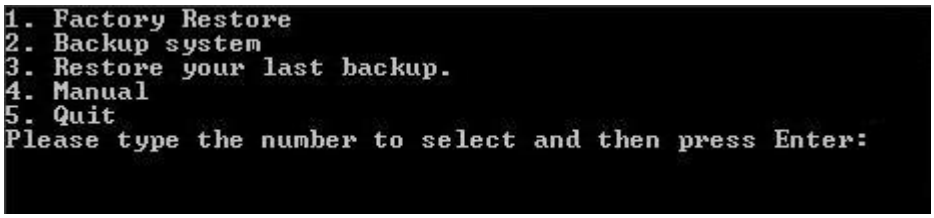


Figure B-33: Recovery Tool Menu

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

B.5 Recovery Tool Functions

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

Figure B-34: Recovery Tool Main Menu

The recovery tool has several functions including:

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

WARNING:

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

WARNING:

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

B.5.1 Factory Restore

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

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

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

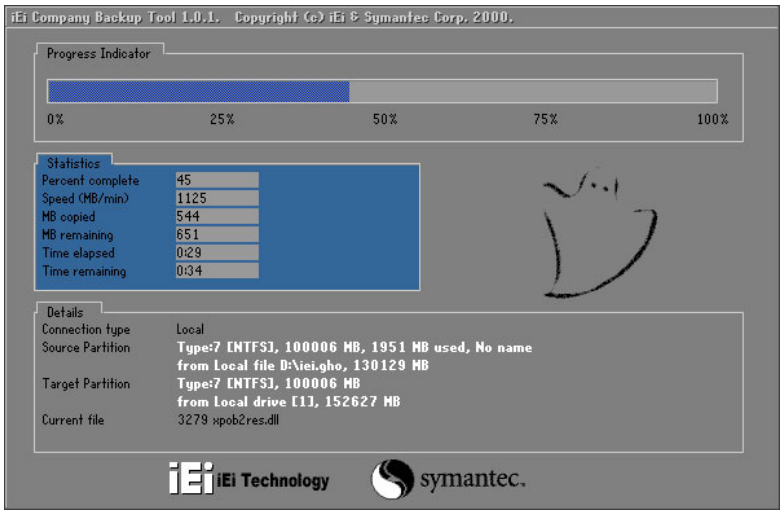


Figure B-35: Restore Factory Default

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

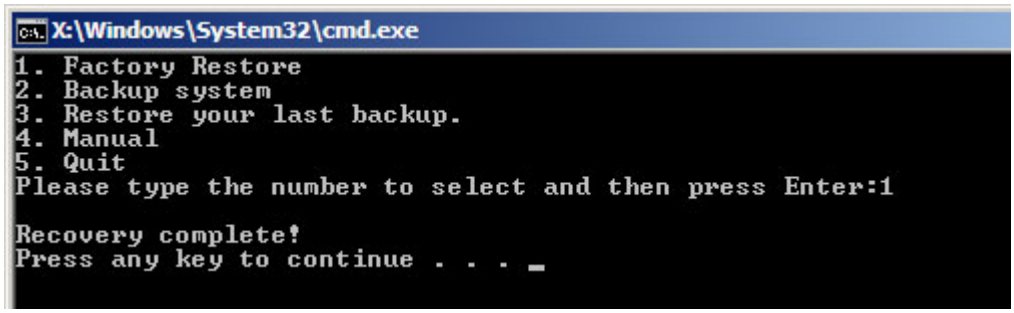


Figure B-36: Recovery Complete Window

B.5.2 Backup System

To backup the system, please follow the steps below.

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

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

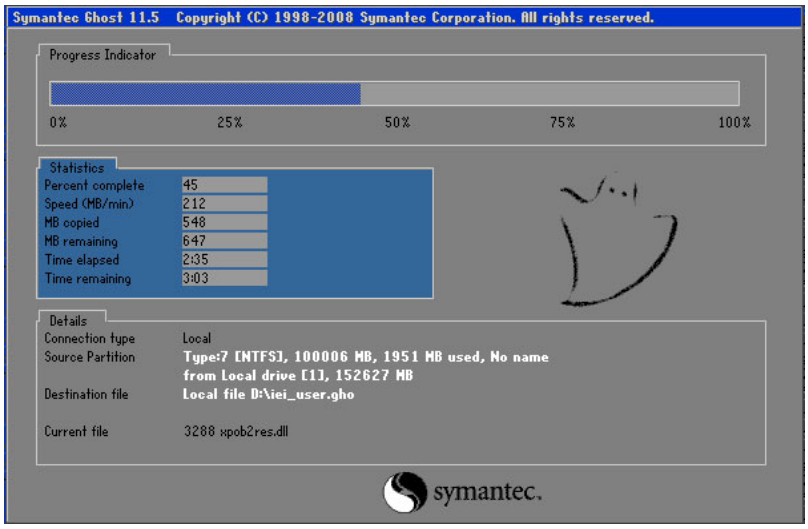


Figure B-37: Backup System

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

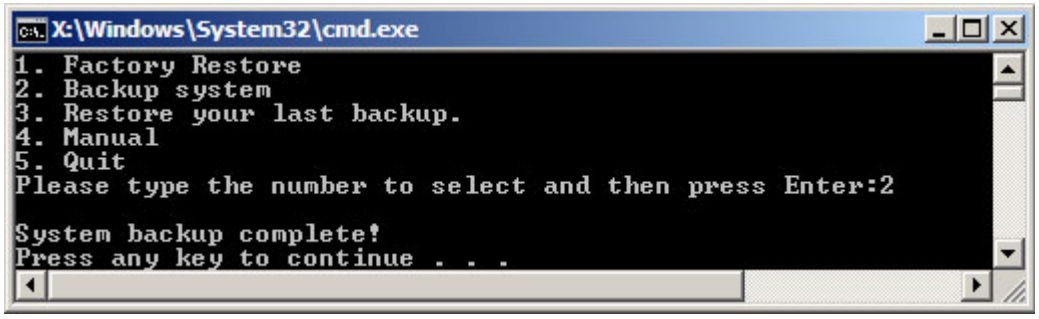


Figure B-38: System Backup Complete Window

B.5.3 Restore Your Last Backup

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

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

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

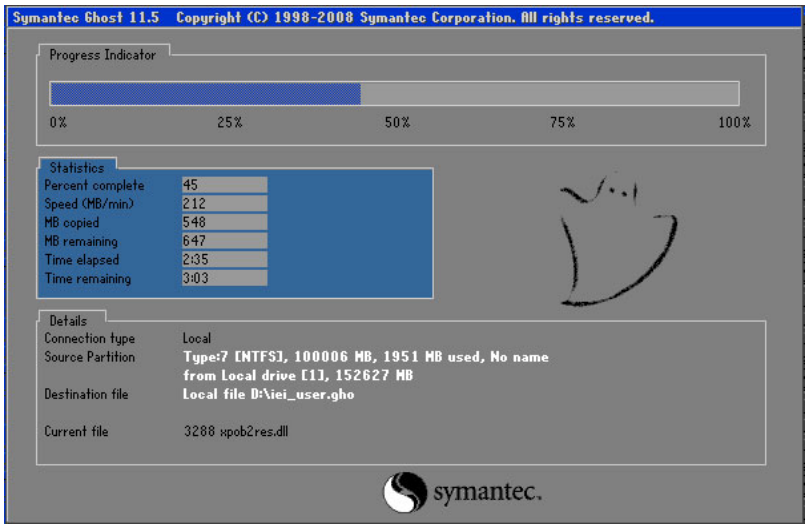


Figure B-39: Restore Backup

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

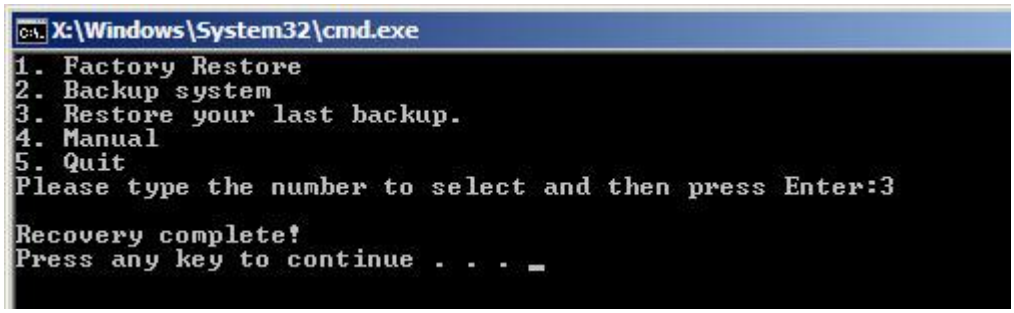


Figure B-40: Restore System Backup Complete Window

B.5.4 Manual

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

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

Step 5: The Symantec Ghost window appears. Use the Ghost program to backup or recover the system manually.

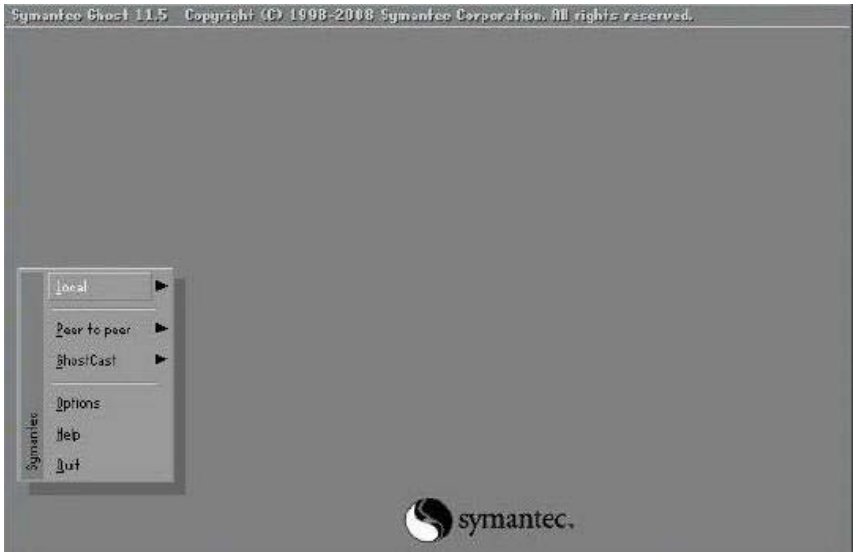
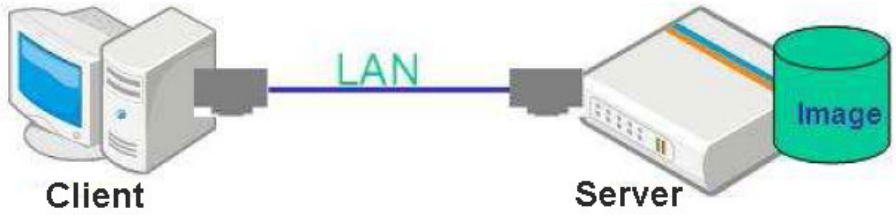


Figure B-41: Symantec Ghost Window

Step 6: When backup or recovery is completed, press any key to reboot the system.

B.6 Restore Systems from a Linux Server through LAN

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



CAUTION:

The supported client OS includes:

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

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

Step 1: Configure DHCP server settings

Step 2: Configure TFTP settings

Step 3: Configure One Key Recovery server settings

Step 4: Start DHCP, TFTP and HTTP

Step 5: Create a shared directory

Step 6: Setup a client system for auto recovery

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

B.6.1 Configure DHCP Server Settings

Step 7: Install the DHCP

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

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

Step 8: Confirm the operating system default settings: dhcpd.conf.

CentOS

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

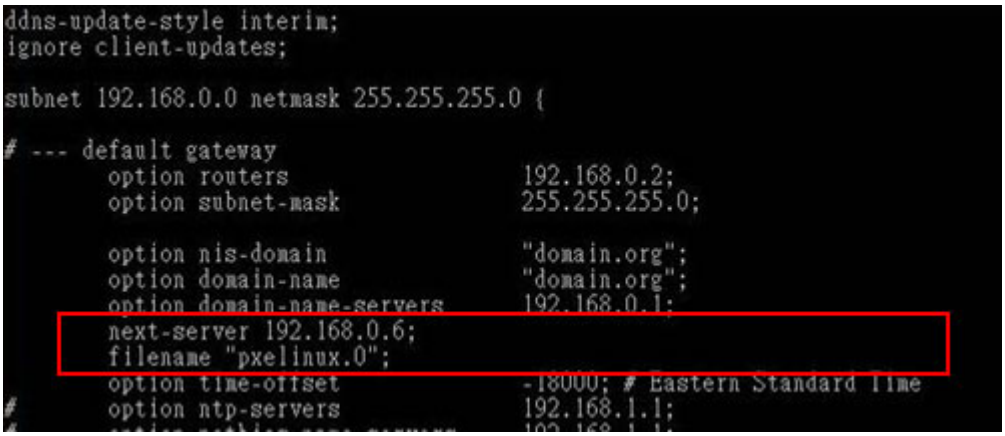
#vi /etc/dhcpd.conf

The DHCP server sample location is shown as below:

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

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

#vi /etc/dhcpd.conf



Debian

#vi /etc/dhcpd.conf

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

next-server PXE server IP address;

filename “pxelinux.0”;

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

subnet 192.168.0.0 netmask 255.255.255.0 {

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

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

B.6.2 Configure TFTP Settings

Step 9: Install the tftp, httpd and syslinux.

#yum install tftp-server httpd syslinux (CentOS)

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

Step 10: Enable the TFTP server by editing the “/etc/xinetd.d/tftp” file and make it use the remap file. The “-vvv” is optional but it could definitely help on getting more information while running the remap file. For example:

CentOS

#vi /etc/xinetd.d/tftp

Modify:

disable = no

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

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

Debian

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

#vi /etc/inetd.conf

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

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

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

#vi /etc/xinetd.d/tftp

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

B.6.3 Configure One Key Recovery Server Settings

Step 11: Copy the **Utility/RECOVERYR10.TAR.BZ2** package from the One Key Recovery CD to the system (server side).

Step 12: Extract the recovery package to /.

#cp RecoveryR10.tar.bz2 /

#cd /

#tar –xvjf RecoveryR10.tar.bz2

Step 13: Copy “pxelinux.0” from “syslinux” and install to “/tftboot”.

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

B.6.4 Start the DHCP, TFTP and HTTP

Start the DHCP, TFTP and HTTP. For example:

CentOS

#service xinetd restart

#service httpd restart

#service dhcpd restart

Debian

#/etc/init.d/xinetd reload

#/etc/init.d/xinetd restart

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

B.6.5 Create Shared Directory

Step 14: Install the samba.

#yum install samba

Step 15: Create a shared directory for the factory default image.

#mkdir /share

#cd /share

#mkdir /image

#cp iei.gho /image

WARNING:

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

Step 16: Confirm the operating system default settings: smb.conf.

#vi /etc/samba/smb.conf

Modify:

[image]

comment = One Key Recovery

path = /share/image

browseable = yes

writable = yes

public = yes

create mask = 0644

directory mask = 0755

Step 17: Edit “/etc/samba/smb.conf” for your environment. For example:

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

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

Step 18: Modify the hostname

#vi /etc/hostname

Modify: RecoveryServer

```
RecoveryServer
~
```

B.6.6 Setup a Client System for Auto Recovery

Step 19: **Disable the automatically restart function before creating the factory default image**. Go to: My Computer → Properties → Advanced. Click the Settings button of Startup and Recovery. Deselect “Automatically restart”. Click OK to save the settings and exit. (See Figure B-23)

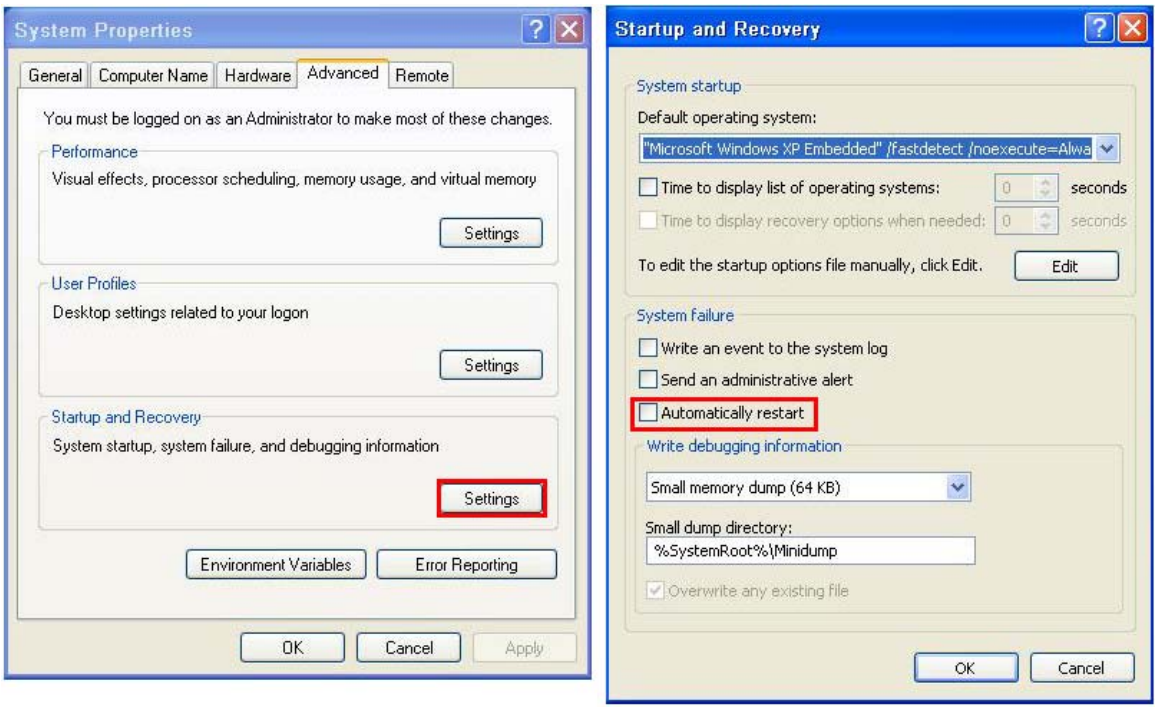


Figure B-42: Disable Automatically Restart

Step 20: Configure the following BIOS options of the client system.

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

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

Boot → Launch PXE OpROM → **Enabled**

Step 21: Continue to configure the **Boot Option Priorities** BIOS option of the client system:

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

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

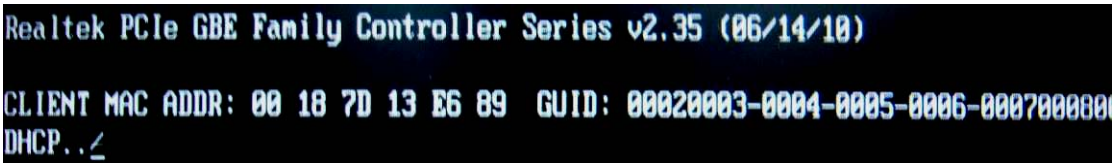
Step 22: Save changes and exit BIOS menu.

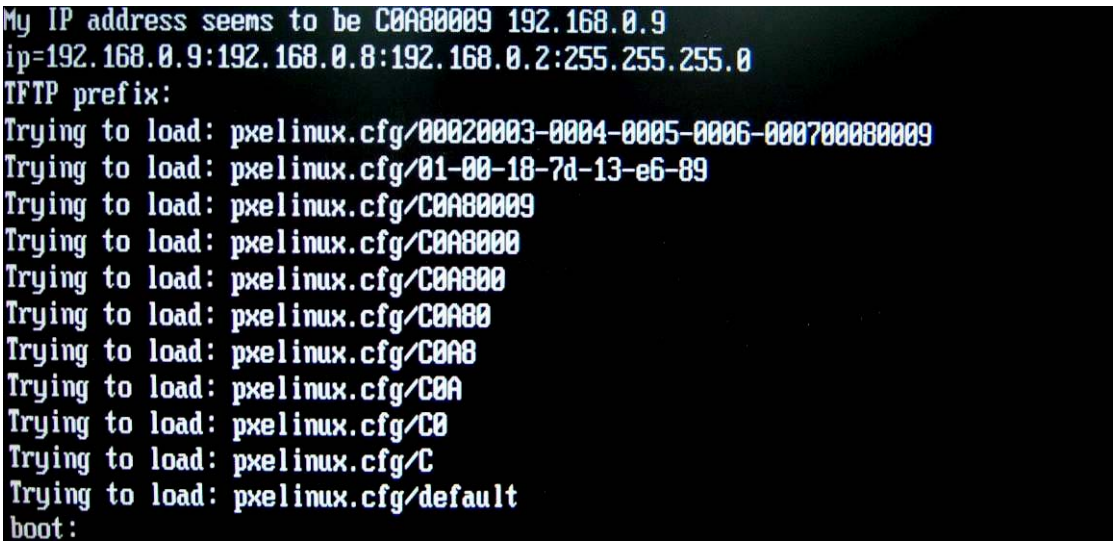
Exit → **Save Changes and Exit**

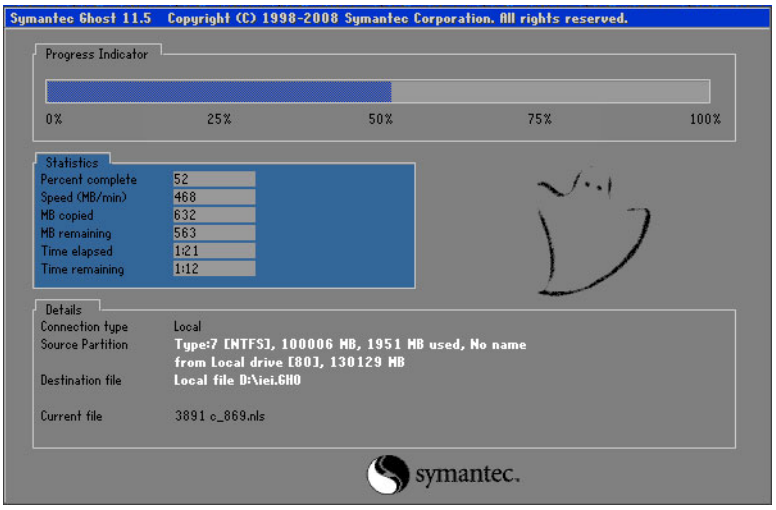
Step 23: Install the auto recovery utility into the system by double clicking the **Utility/AUTORECOVERY-SETUP.exe** in the One Key Recovery CD. This utility

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

Step 24: Restart the client system from LAN. If the system encounters a Blue Screen of Death (BSoD) or a hang for around 10 minutes, it will automatically restore from the factory default image. The following screens will show when the system starts auto recovering.







NOTE:

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

B.7 Other Information

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

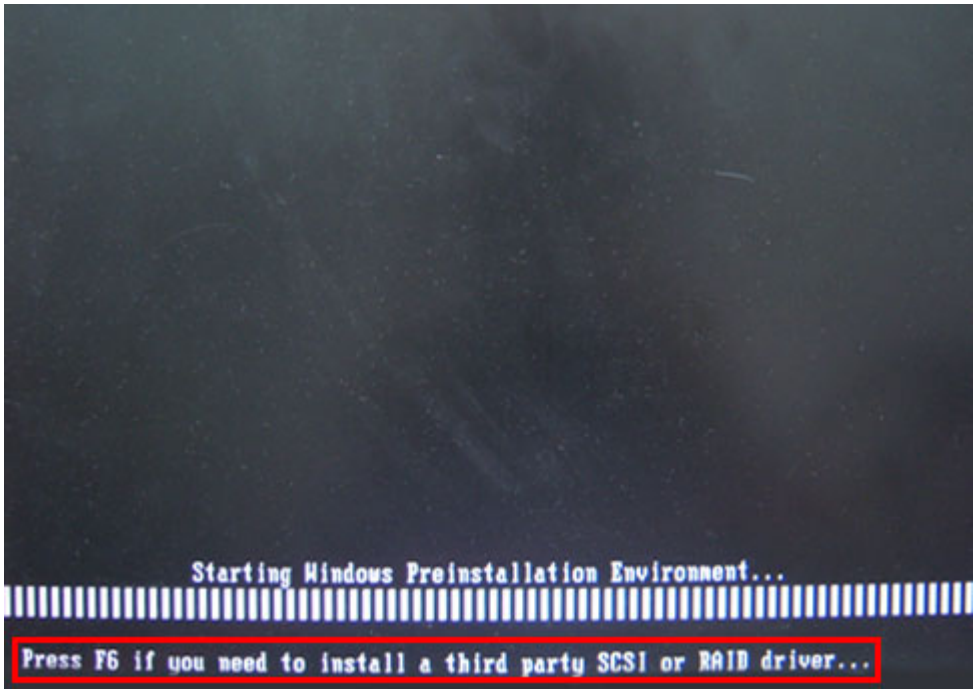
When the system uses AHCI mode or some specific SATA controllers such as ALi M5283 or VIA VT6421A, the SATA RAID/AHCI driver must be installed before using one key recovery. Please follow the steps below to install the SATA RAID/AHCI driver.

Step 25: 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.

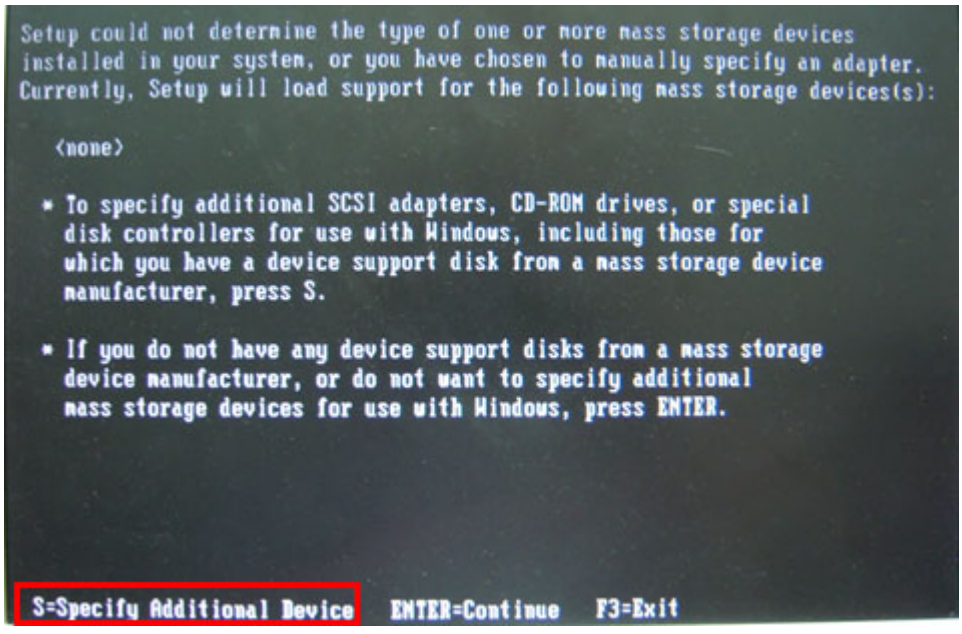
Step 26: Connect the USB floppy disk drive to the system.

Step 27: Insert the One Key Recovery CD into the system and boot the system from the CD.

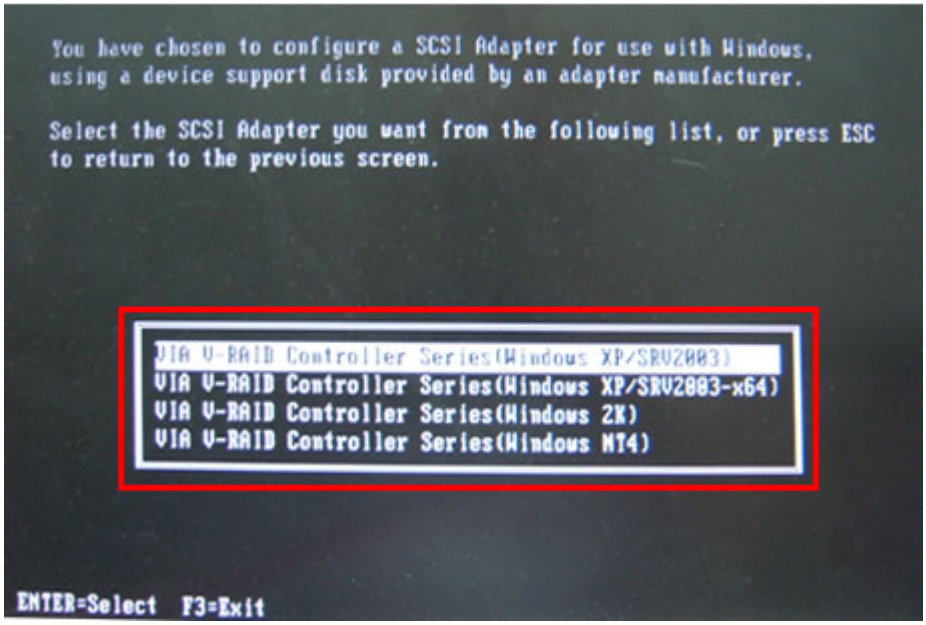
Step 28: When launching the recovery tool, press <**F6**>.



Step 29: When the following window appears, press <**S**> to select “Specify Additional Device”.



Step 30: 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 31: After pressing <Enter>, the system will get into the recovery tool setup menu. Continue to follow the setup procedure from **Step 4** in **Section B.2.2 Create Partitions** to finish the whole setup process.

B.7.2 System Memory Requirement

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

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

Appendix

C

Terminology

AC ’97	Audio Codec 97 (AC’97) refers to a codec standard developed by Intel® in 1997.
ACPI	Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.
AHCI	Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
APM	The Advanced Power Management (APM) application program interface (API) enables the inclusion of power management in the BIOS.
ARMD	An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.
ASKIR	Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude (“volume”) of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.
BIOS	The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user
CODEC	The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.
CMOS	Complimentary metal-oxide-conductor is a type of integrated circuit used in chips like static RAM and microprocessors.
COM	COM is used to refer to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal

	computer is usually a male DE-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.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
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
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.
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.
MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.

PCIe	PCI Express (PCIe) is a communications bus that uses dual data lines for full-duplex (two-way) serial (point-to-point) communications between the SBC components and/or expansion cards and the SBC chipsets. Each line has a 2.5 Gbps data transmission rate and a 250 MBps sustained data transfer rate.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
QVGA	Quarter Video Graphics Array (QVGA) refers to a display with a resolution of 320 x 240 pixels.
RAM	Random Access Memory (RAM) is a form of storage used in computer. RAM is volatile memory, so it loses its 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 3Gb/s 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, while

	USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

D

Watchdog Timer

NOTE:

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

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

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

INT 15H:

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

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

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

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

NOTE:

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

Example program:

```
; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30H             ;time-out value is 48 seconds
        INT      15H
 ;
; ADD THE APPLICATION PROGRAM HERE
;
        CMP      EXIT_AP, 1         ;is the application over?
        JNE       W_LOOP        ;No, restart the application

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

Appendix

E

Hazardous Materials Disclosure

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

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

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

Please refer to the table on the next page.

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

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

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

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

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

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	X	O	O	O	O	X
显示	X	O	O	O	O	X
印刷电路板	X	O	O	O	O	X
金属螺帽	X	O	O	O	O	O
电缆组装	X	O	O	O	O	X
风扇组装	X	O	O	O	O	X
电力供应组装	X	O	O	O	O	X
电池	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。