

# PER13A

Embedded System Low Power Platform  
User's Manual



## Safety information

### Electrical safety

To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.

When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.

Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.

Make sure that your power supply is set to the correct voltage in your area.

If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.

If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your local distributor.

### Operation safety

Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.

Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.

To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.

Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.

Place the product on a stable surface.

If you encounter any technical problems with the product, contact your local distributor

### Statement

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All product specifications are subject to change without prior notice

**Revision History**

Revision	Date (yyyy/mm/dd)	Changes
Version 1.0	2011/09/18	Initial release

**Packing list**

PER13A Fanless Embedded System

Driver CD

User's Manual

DC +19V 65W Power Adapter(Optional)

US / EU Power Cord (optional)

**Ordering information**

Model Number	Description
SPER13	Intel® Atom™ D525 1.8GHz Fanless System with DDR3 SO-DIMM socket and one PCI expansion



If any of the above items is damaged or missing, please contact your local distributor.

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# Chapter 1: Product Introduction

## 1.1 Key Features

Non-Standard Motherboard

Onboard Intel® Atom™ D525 dual core processor, 1.8GHz, 1M cache

Intel® ICH8M PCH

Main Memory

One DDR3 SODIMM socket

Supports up to 2GB DDR3 800 SDRAM memory module, unbuffered, non-ECC

Expansion

1 x PCI expansion slot

One Mini-PCIe socket (for optional WiFi or mobile wireless module)

I/O Interface - Front

ATX Power on/off switch

HDD access / Power status LEDs

1 x DB15 GPIO connector

4 x Serial ports (RS232)

4 x USB 2.0 ports

1 x CompactFlash socket

1 x external SIM card holder

2 x antenna holes (for optional WiFi or mobile wireless module)

I/O Interface - Rear

9~36V DC input

1 x 3-pin connector for remote power on/off switch

1 x DB15 VGA port

1 x speaker-out jack

2 x Intel® GbE LAN ports (NISE 2100A/2110A)

4 x USB 2.0 ports

4 x Serial ports (2x RS232 and 2x RS232/422/485 with auto-flow control: isolation protection on COM1 and COM2)

Storage

1 x 2.5" SATA HDD drive bay

1 x CF socket (external)

Power Requirements

ATX Power mode

DC to DC power design onboard, supports 9~36V DC

19V, 65W power adapter (optional)

**Dimensions** (W x D x H)

195mm x 200mm x 65mm (7.7" x 7.9" x 2.6")

## Construction

Fanless aluminum chassis design

## Environment

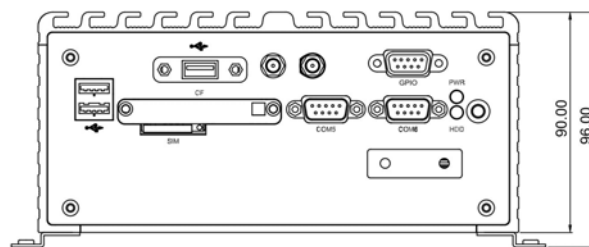
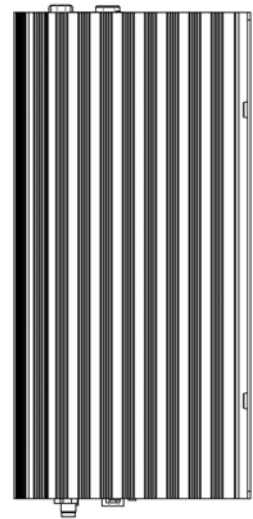
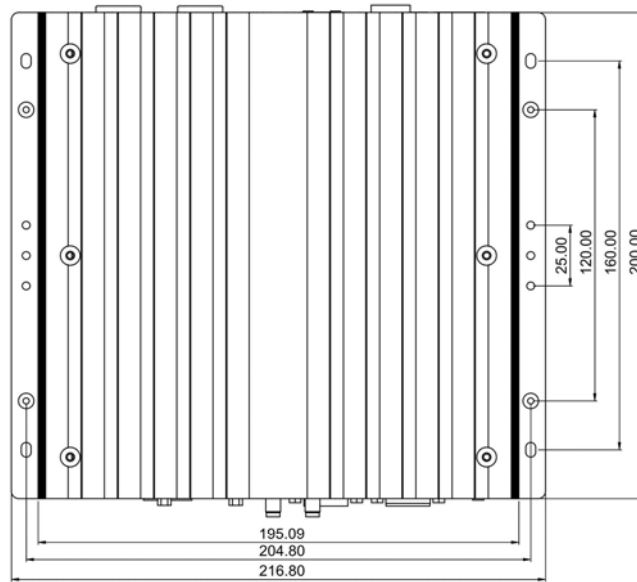
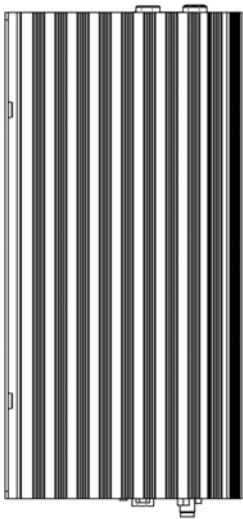
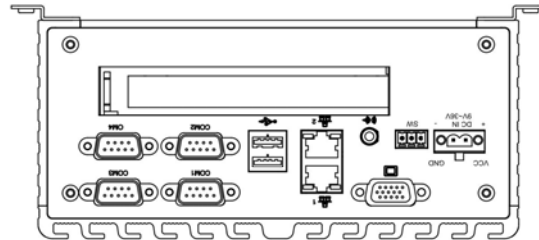
- Operating temperature - ambient with airflow:
- -20°C to 70°C with industrial grade devices  
(According to IEC60068-2-1, IEC60068-2-2, IEC60068-2-14)
- Storage temperature: -20°C to 80°C
- Relative humidity: 10% to 93% (Non-Condensing)

## Certifications

- CE approval
- FCC Class A

\* All specifications and photos are subject to change without notice\*

## 1.2 Mechanical Dimensions





## Chapter 2: Jumpers and Connectors Locations

This chapter describes the jumpers and connectors on the systems' motherboard. Note that the following procedures are generic for PER13A Embedded System

### Before You Begin

- Ensure you have a stable, clean working environment. Dust and dirt can get into components and cause a malfunction. Use containers to keep small components separated.
- Adequate lighting and proper tools can prevent you from accidentally damaging the internal components. Most of the procedures that follow require only a few simple tools, including the following:
  - A Philips screwdriver
  - A flat-tipped screwdriver
  - A set of jewelers Screwdrivers
  - A grounding strap
  - An anti-static pad
- Using your fingers can disconnect most of the connections. It is recommended that you do not use needle-nosed pliers to disconnect connections as these can damage the soft metal or plastic parts of the connectors.
- Before working on internal components, make sure that the power is off. Ground yourself before touching any internal components, by touching a metal object. Static electricity can damage many of the electronic components. Humid environment tend to have less static electricity than dry environments. A grounding strap is warranted whenever danger of static electricity exists.

### Precautions

Computer components and electronic circuit boards can be damaged by discharges of static electricity. Working on the computers that are still connected to a power supply can be extremely dangerous.

Follow the guidelines below to avoid damage to your computer or yourself:

- Always disconnect the unit from the power outlet whenever you are working inside the case.
- If possible, wear a grounded wrist strap when you are working inside the computer case.


Alternatively, discharge any static electricity by touching the bare metal chassis of the unit case, or the bare metal body of any other grounded appliance.

- Hold electronic circuit boards by the edges only. Do not touch the components on the board unless it is necessary to do so. Don't flex or stress the circuit board.
- Leave all components inside the static-proof packaging that they shipped with until they are ready for installation.
- Use provided screws and do not over tighten.

### Jumper Settings

#### 2.1 CMOS Clear pin header

Connector location: JP3

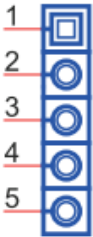
Pin	Signal	Jump Function Definition	
-----	--------	--------------------------	---

1	NC	*1-2	Normal
2	IRTCRST#	2-2	CMOS_CLEAR
3	GND	*=Default setting	

## 2.2: COM3 RS232 RI Pin Power Select

Connector location: J9

Pin	Signal	Jump Function Definition	
1	VCC5	1-2	+5V
2	RING_T	2-3	+12V
3	+12V	*4-5	RING
4	RING_T	*=Default setting	
5	RING		



## Chapter 3: Onboard Connector


### External Connectors

#### 3.1 USB Ports

Connector type: Dual USB port

Connector location: USB1

Pin	Definition	Pin	Definition
1	USB_VCC(5V)	5	USB_VCC(5V)
2	DATA_N	6	DATA_N
3	DATA_P	7	DATA_P
4	GND	8	GND



#### 3.2 COM5 Serial Port

Connector type: DB-9 port

Connector location: COM2

Pin	Definition	Pin	Definition
1	COM5_DCD	6	COM5_DSR
2	COM5_RXD	7	COM5_RTS
3	COM5_TXD	8	COM5_CTS
4	COM5_DTR	9	COM5_RI
5	GND		

#### 3.3 COM6 Serial Port


Connector type: DB-9 port

Connector location: COM1

Pin	Definition	Pin	Definition
1	COM6_DCD	6	COM6_DSR
2	COM6_RXD	7	COM6_RTS
3	COM6_TXD	8	COM6_CTS
4	COM6_DTR	9	COM6_RI
5	GND		

### 3.4 ATX Power On/Off Switch


Connector location: SW1

Pin	Definition	
On	Blue light	
Off	Red light	

### 3.5 DC input connector

Connector type: 2 Pin Phoenix contact


Connector location: CON2

Pin	Signal	
1	GND	
2	VIN (9~36V)	

### 3.6: ATX Remote ON/OFF Switch

Connector type: 3-pin switch

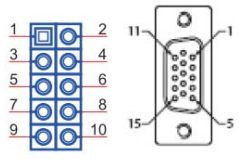
Connector location: J5 Pin Definition

Pin	Signal	
1	GND	
2	PWR_ON	
3	PS_ON	

### 3.7 GPIO Connector (4 x digital input and 4 x digital output)

Connector type: DB-15 port, 10-pin header (2x5), 2.0 mm-M-180

Connector location: J8

Pin # for DB15	Pin # for pin header	Signal	Pin # for DB15	Pin # for pin header	Signal	Pin # for DB15	Pin # for pin header	Signal	
1	2	GND	2	3	GPO1	3	5	GPO2	

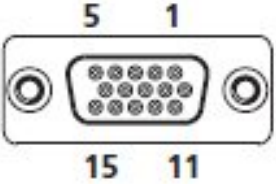
4	7	GPO3	5	9	GPO4	6	1	VCC5
7	4	GPI1	8	6	GPI2	9	8	GPI3
10	10	GPI4	11		N/A	12		N/A
	13	N/A	14		N/A	15		N/A

### 3.8 VGA Port

Connector type: DB-15 port, 15-pin D-Sub

Connector location: VGA1

Pin	Definition	Pin	Definition
1	RED_VGA	9	VGA_VCC(5V)
2	GREEN_VGA	10	GND
3	BLUE_VGA	11	NC
4	NC	12	DDCDATA_VGA
5	GND	13	HSYNC_VGA
6	VGADET	14	VSYNC_VGA
7	GND	15	DDCCLK_VGA
8	GND		




### 3.9 Speaker-out Jack

Connector type: 6-pin jack

Connector location: CN3

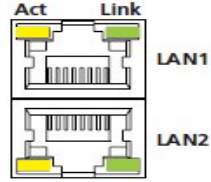
Pin	Definition
1	Speak Out - R
2	Speak Out - JD
3	NC
4	Speak Out - L
5	GND
6	GND



### 3.10 LAN1 and LAN2 Ports

Connector type: RJ45 port with LEDs

Connector location: LAN1

Act	Status	
Yellow Blinking	Data Activity	
Off	No Activity	

#### LAN1

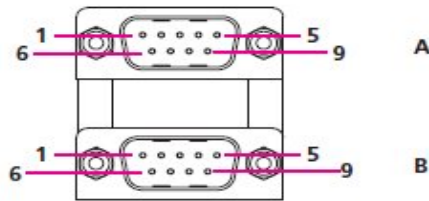
Pin	Definition	Pin	Definition
B1	LAN1M0P	B7	LAN1M3P
B2	LAN1M0N	B8	LAN1M3N
B3	LAN1M1P	B9	LAN1LINK
B4	LAN1M2P	B10	LAN1ACTP
B5	LAN1M2N	B11	LAN1ACT#
B6	LAN1M1N	B12	LAN1LINKP

#### LAN2

Pin	Definition	Pin	Definition
A1	LAN2M0P	A7	LAN2M3P
A2	LAN2M0N	A8	LAN2M3N
A3	LAN2M1P	A9	LAN2LINK
A4	LAN2M2P	A10	LAN2ACTP
A5	LAN2M2N	A11	LAN2ACT#
A6	LAN2M1N	A12	LAN2LINKP

### 3.11 COM1 and COM2 Ports

Connector size: DB-9 port  
 Connector location: COM3



#### COM1A

Pin	Definition	Pin	Definition
1	COM1_DCD	6	COM1_DSR
2	COM1_RXD	7	COM1_RTS
3	COM1_TXD	8	COM1_CTS
4	COM1_DTR	9	COM1_RI
5	GND		

#### COM2B

Pin	Definition	Pin	Definition
1	COM2_DCD	6	COM2_DSR
2	COM2_RXD	7	COM2_RTS
3	COM2_TXD	8	COM2_CTS
4	COM2_DTR	9	COM2_RI
5	GND		

#### RS485

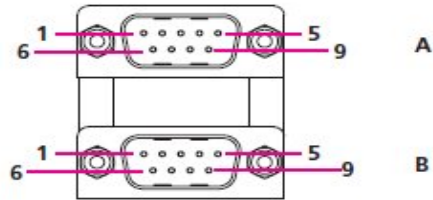
Pin	Definition	Pin	Definition
1	TXD-	6	Reserved
2	TXD+	7	Reserved
3	Reserved	8	Reserved
4	Reserved	9	Reserved
5	Reserved		

#### RS422

Pin	Definition	Pin	Definition
1	TXD-	6	RTS-
2	TXD+	7	RTS+
3	RXD+	8	CTS+
4	RXD-	9	CTS-
5	GND		

### 3.12 COM3 and COM4 Ports

Connector size: DB-9 port  
 Connector location: COM4



#### COM3

Pin	Definition	Pin	Definition
1	COM3_DCD	6	COM3_DSR
2	COM3_RXD	7	COM3_RTS
3	COM3_TXD	8	COM3_CTS
4	COM3_DTR	9	COM3_RI
5	GND		

#### COM4

Pin	Definition	Pin	Definition
1	COM4_DCD	6	COM4_DSR
2	COM4_RXD	7	COM4_RTS
3	COM4_TXD	8	COM4_CTS
4	COM4_DTR	9	COM4_RI
5	GND		

### 3.13 USB 8-9 Connector

Connector size: 6-pin JST wafer (1x6), 2.5 mm pitch  
 Connector location: J7

Pin	Definition
1	USB_VCC45
2	USB_8N
3	USB_8P
4	USB_9N
5	USB_9P
6	USB_GND

### Internal Connectors

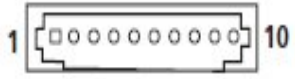


### 3.14 COM5 Connector

Connector type: 10-pin boxed header (2x5), 1.0mm

Connector location: J14

Pin	Definition	Pin	Definition
1	SIO_DCD#5	2	SIO_RXD5
3	SIO_TXD5	4	SIO_DTR#5
5	IO_GND	6	SIO_DSR#5
7	SIO_RTS#5	8	SIO_CTS#5
9	SIO_RI#5	10	IO_GND

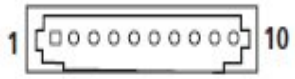


### 3.15 COM6 Connector

Connector type: 10-pin boxed header (2x5), 1.0mm

Connector location: J15

Pin	Definition	Pin	Definition
1	SIO_DCD#6	2	SIO_RXD6
3	SIO_TXD6	4	SIO_DTR#6
5	IO_GND	6	SIO_DSR#6
7	SIO_RTS#6	8	SIO_CTS#6
9	SIO_RI#6	10	IO_GND



### 3.16 Power switch

Connector type: 2 pin header (1x2), JST 2.0mm

Connector location: J3

Pin	Signal
1	PSON#
4	GND

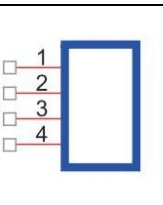


### 3.17 CPU Fan Connector

Connector type: 4-pin Wafer (1x4), 2.54mm-M-180

Connector location: J2

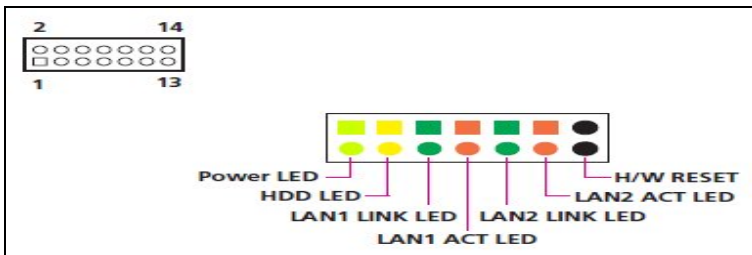
Pin	Signal
1	GND
2	VCC_12
3	CPU1_FAN_SPEED
4	CPU1_FANPWM



### 3.18 Internal Power/HDD/LAN Power/LAN Active LED (RTC Connector)

Connector type: 14-pin header (2x7), 2.54mm-M-180

Connector location: J4



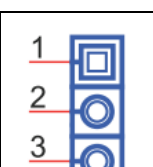
Pin	Description	Pin	Description
1	POWER_OK	2	VCC_LEDPOWER
3	HDD_LED#	4	HDD_LEDPOWER
5	LAN1_LINK#	6	LAN1LINK_LEDPOWER
7	LAN1_ACT#	8	LAN1ACT_LEDPOWER
9	LAN2_LINK#	10	LAN2LINK_LEDPOWER
11	LAN2_ACT#	12	LAN2ACT_LEDPOWER
13	H/W RESET	14	GND

### 3.19: Mic-in pin header

Connector type: 4 pin header (1x4), 2.54mm-M-180

Connector location: JP2

Pin	Signal
1	Mic-in L
2	Mic JD
3	GND






4	Mic-in R	
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### 3.20 SMBus Pin Header

Connector type: 3-pin header (1x3), 2.54mm-M-180

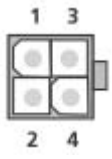
Connector location: JP4

Pin	Signal	
1	SMbus_CLK	1 
2	SMbus_data	2 
3	GND	3 

### 3.21 Power Output Connector

Connector type: 4-pin (2x2) AUX 3.5mm

Connector location: CON1

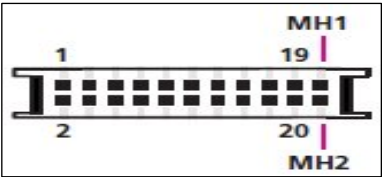
Pin	Signal	
1	GND	
2	GND	
3	VIN Power	
4	VIN Power	

### 3.22 LVDS Connector

Connector type: 20-pin DF13-20DP 1.25mm

Connector location: CN1

Pin	Definition	Pin	Definition
1	LVDS_DDCCLK	2	LVDS_DDCDATA
3	VCC_LCD(5V Or3.3V)	4	LVDS_A0P
5	NC	6	LVDS_A0N
7	NC	8	VCC_LCD(5V Or3.3V)
9	GND	10	LVDS_A1P
11	LVDS_ACLKP	12	LVDS_A1N
13	LVDS_ACLKN	14	GND
15	GND	16	V_INV (12V)
17	LVDS_A2P	18	V_INV (12V)
19	LVDS_A2N	20	GND

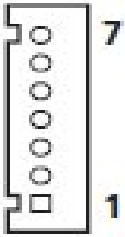


### 3.23 Panel CCFL Connector

Connector type: 7-pin header JST (1x7) - 2.5mm-M-180

Connector location: J1

Pin	Definition
1	Vcc5
2	V_INV (12V)
3	V_INV (12V)
4	CCFLBKLTCTRL
5	GND
6	GND
7	M_BKLTEN



### 3.24 CompactFlash socket

Connector type: CompactFlash Type I/II H: 6.3mm SMD

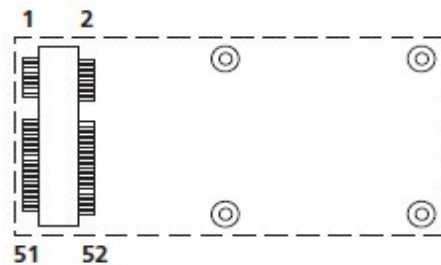
Connector location: IDE1

Pin	Description	Pin	Description
1	GND	2	SDD3A
3	SDD4A	4	SDD5A
5	SDD6A	6	SDD7A
7	SDCS#1	8	GND
9	GND	10	GND
11	GND	12	GND
13	VCC	14	GND
15	GND	16	GND
17	GND	18	SDA2A
19	SDA1A	20	SDA0A
21	SDD0A	22	SDD1A
23	SDD2A	24	NC
25	CF_CD2#	26	CF_CD1#
27	SDD11A	28	SDD12A
29	SDD13A	30	SDD14A
31	SDD15A	32	SDCS#3
33	NC	34	SDIOR#
35	SDIOW#	36	VCC
37	HDIRQ14	38	VCC
39	CF_SEL#	40	NC
41	IDERST#	42	SIORDY
43	SDREQ	44	SDDACK#
45	IDEACTP#	46	DIAG#
47	SDD8A	48	SDD9A
49	SDD10A	50	GND

### 3.25 Mini-PCle Slot

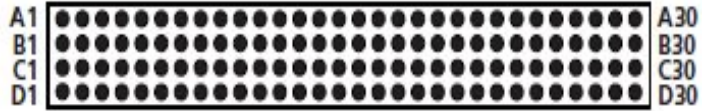
Connector location: CN5

Pin	Definition	Pin	Definition
1	PCIE_WAKE#	2	+V3.3A_MINI
3	NC	4	GND
5	NC	6	+V1.5S_MINI
7	PCIE_MINI_CLKREQ#1	8	SIM_PWER
9	GND	10	SIM_DATA
11	CLK_N	12	SIM_CLK
13	CLK_P	14	SIM_REST
15	GND	16	SIM_VCCP
17	NC	18	GND
19	NC	20	MINICARD1_DIS#
21	GND	22	PCI_RST
23	PCleRX_N	24	+V3.3A_MINI
25	PCleRX_P	26	GND
27	GND	28	+V1.5S_MINI
29	GND	30	SMB_CLK
31	PCleTX_N	32	SMB_DATA
33	PCleTX_P	34	GND
35	GND	36	USB_DATA_N
37	GND	38	USB_DATA_P
39	+V3.3A_MINI	40	GND
41	+V3.3A_MINI	42	NC
43	GND	44	LED_WLAN_N
45	NC	46	NC
47	NC	48	+V1.5S_MINI
49	NC	50	GND
51	NC	52	+V3.3A_MINI
M H1	GND	M H2	GND
M H3	GND	M H4	GND
M H6	GND		



### 3.26 PCI Slot (Low Profile)

Connector type: 120-pin H: 9.6mm  
180D GOLD FLASH DIP 5V  
Connector location: CN6



Definition					
Pin	A	B	Pin	A	B
1	TRST#	-12V	32	AD16	AD17
2	+12V	TCK	33	+3.3V	C/BE2#
3	TMS	GND	34	FRAME#	GND
4	TDI	TDO	35	GND	IRDY#
5	+5V	+5V	36	TRDY#	+3.3V
6	INTA#	+5V	37	GND	DEVSEL#
7	INTC#	INTB#	38	STOP#	GND
8	+5V	INTD#	39	+3.3V	LOCK#
9	RSV1	PRSNT1#	40	SMBCLK	PERR#
10	+5V	RSV5	41	SMBDAT	+3.3V
11	RSV2	PRSNT2#	42	GND	SERR#
12	GND	GND	43	PAR	+3.3V
13	GND	GND	44	AD15	C/BE1#
14	+3.3Vaux	RSV6	45	+3.3V	AD14
15	RST#	GRPIMD	46	AD13	GND
16	+5V	CLK	47	AD11	AD12
17	GNT#	GND	48	GND	AD10
18	GND	REQ#	49	AD9	GND
19	PME#	+5V	CONNECTOR KEY		
20	AD30	AD31			
21	+3.3V	AD29	52	C/BE0#	AD8
22	AD28	GND	53	+3.3V	AD7
23	AD26	AD27	54	AD6	+3.3V
24	GND	AD25	55	AD4	AD5
25	AD24	+3.3V	56	GND	AD3
26	IDSEL	C/BE3#	57	AD2	GND
27	+3.3V	AD23	58	AD0	AD1
28	AD22	GND	59	+5V	+5V
29	AD20	AD21	60	REQ64#	ACK64#
30	GND	AD19	61	+5V	+5V
31	AD18	+3.3V	62	+5V	+5V

## Chapter4: Getting Started

This chapter provides more detailed information and let you know how to install components into the PER13A Embedded system. Specifically, the installation of memory modules and operating system are explained.

### 4.1 Installing System Memory

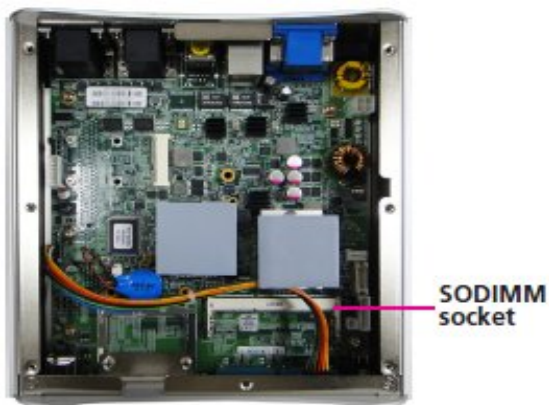
The PER13A supports DDR3 800 SO-DIMM (Maximum density is 2GB)



Disconnect all power supplies to the board before installing a memory module to prevent damage to the board and memory module.

To install a memory module:

Step 1: Locate the memory module slot (SODIMM socket) on the motherboard.

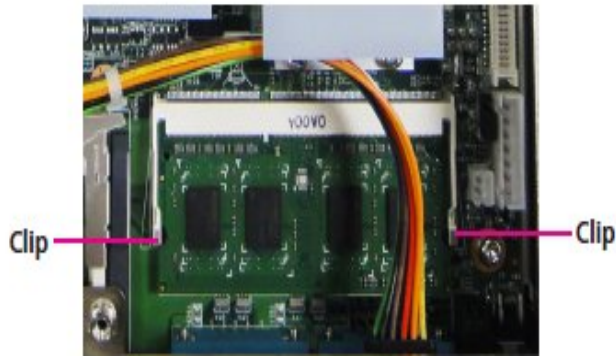


Step 2: Align the notch on the memory module and the socket slot, and insert the memory module until the connectors fully inserted.





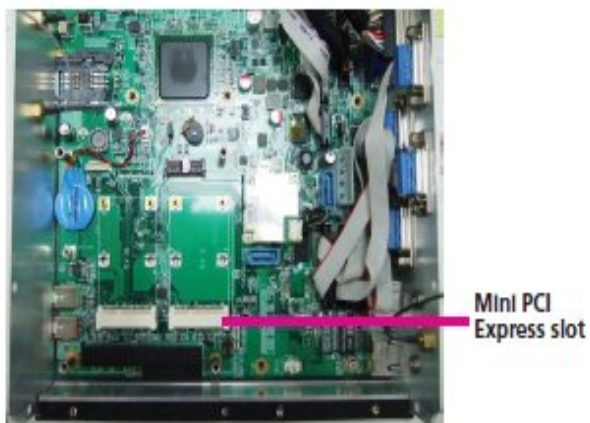
Step 3: Press the module down and then lower it down in place. Press the module by using the edges of the module.



The retaining clips lock onto the module and the memory modules are secured in place.

## 4.2 Mini-PCIe RF devices Installation

Step 1: Located the Mini-PCIe slots on the motherboard.



Step 2: Align the notch on the module and the express slot on the mainboard and insert the Mini-PCIe module in the slot.



GPRS/UMTS/  
HSDPA module

Mini PCI  
Express slot

Step 3: Insert two screws to secure the Mini-PCIe module & attach RF cable on the module



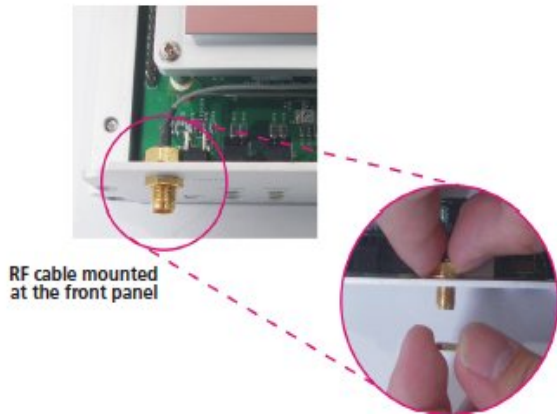
Attach RF cable  
to the module



Step 4: Insert the antenna cable into the front panel slot and secure with the provided nut.

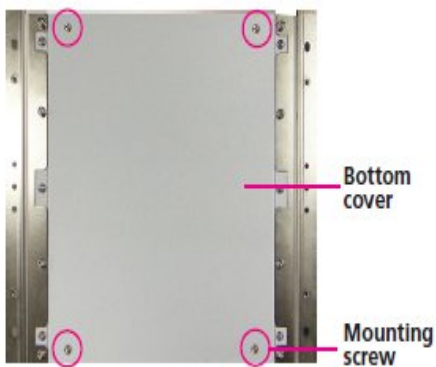
Note: It may be necessary to grip the cable end from the connector to fasten the nut.

**Attention:** Do NOT twist the cable to prevent damage.

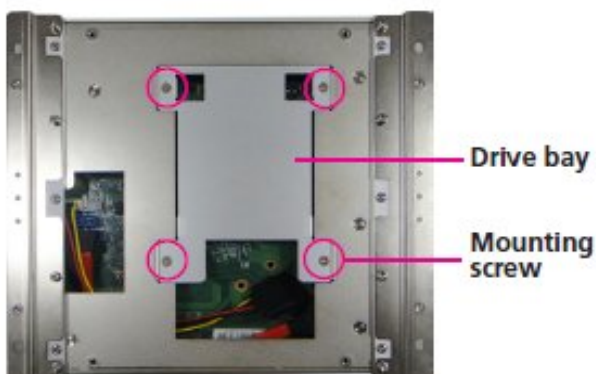


### 4.3 Installing a SATA Hard Drive

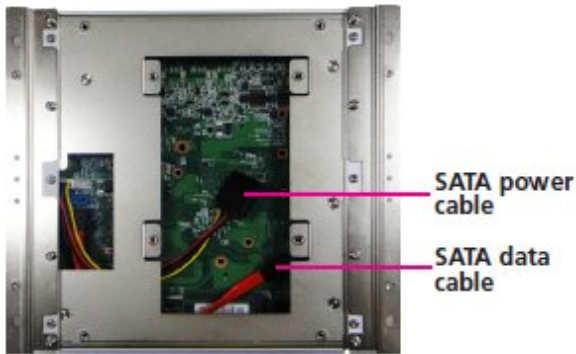
Step 1: Remove the four mounting screws from the bottom cover.



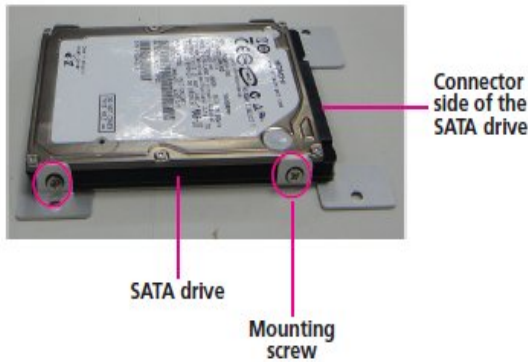
Step 2: Remove the four mounting screws from the drive bay as illustrated in the following image.



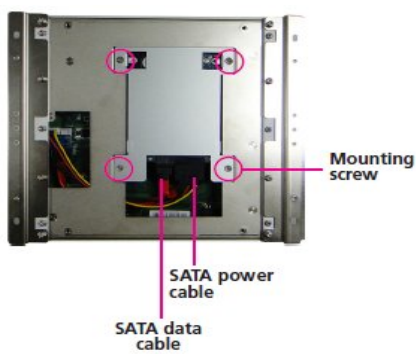
Step 3: Connect the power cable and data cable as illustrated in the following image.



Step 4: Secure the HDD on the drive bay with mounting screw

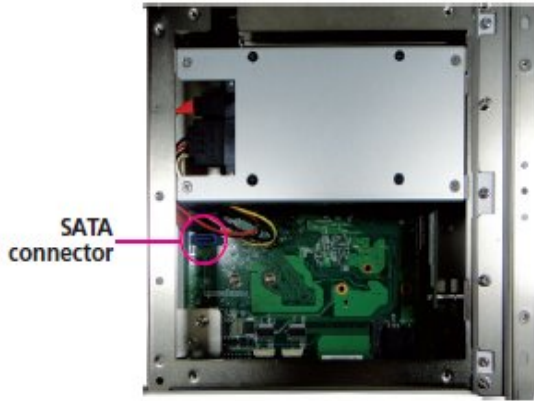


Step 4: Plug the SATA cables & secure the drive bay on the bottom cover with mounting screws

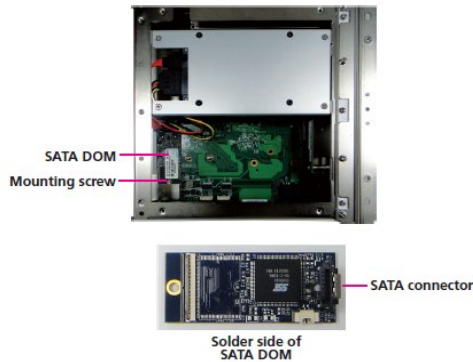


### 4.4 Installing a SATA DOM

Step 1: Locate the SATA connector through the chassis, see the following image.



Step 2: Align the SATA DOM with the connector and insert in place.  
 Step 3: Secure the DOM with the supplied screw.



### 4.5 Installing Industrial CF card

Step 1: Remove the mounting screws from the CompactFlash slot cover



Step 2: Insert the CompactFlash card until it locks in place. See the following image.





## Chapter 5: BIOS Setup

This chapter describes how to use the BIOS setup program for the PER13A Embedded system. The BIOS screens provided in this chapter are for reference only and may change if the BIOS is updated in the future.

### About BIOS Setup

The BIOS (Basic Input and Output System) Setup program is a menu driven utility that enables you to make changes to the system configuration and tailor your system to suit your individual work needs. It is a ROM-based configuration utility that displays the system's configuration status and provides you with a tool to set system parameters.

These parameters are stored in non-volatile battery-backed-up CMOS RAM that saves this information even when the power is turned off. When the system is turned back on, the system is configured with the values found in CMOS.

With easy-to-use pull down menus, you can configure such items as:

- Hard drives, diskette drives, and peripherals
- Video display type and display options
- Password protection from unauthorized use
- Power management features

The settings made in the setup program affect how the computer performs. It is important, therefore, first to try to understand all the Setup options, and second, to make settings appropriate for the way you use the computer.

### When to Configure the BIOS

This program should be executed under the following conditions:

- When changing the system configuration
- When a configuration error is detected by the system and you are prompted to make changes to the Setup program
- When resetting the system clock
- When redefining the communication ports to prevent any conflicts
- When making changes to the Power Management configuration
- When changing the password or making other changes to the security setup

Normally, CMOS setup is needed when the system hardware is not consistent with the information contained in the CMOS RAM, whenever the CMOS RAM has lost power, or the system features need to be changed.

### Default Configuration

Most of the configuration settings are either predefined according to the Load Optimal Defaults settings which are stored in the BIOS or are automatically detected and configured without requiring any actions. There are a few settings that you may need to change depending on your system configuration.

## Entering Setup

When the system is powered on, the BIOS will enter the Power-On Self Test (POST) routines. These routines perform various diagnostic checks; if an error is encountered, the error will be reported in one of two different ways:

- If the error occurs before the display device is initialized, a series of beeps will be transmitted.
  - If the error occurs after the display device is initialized, the screen will display the error message.
- Powering on the computer and immediately pressing <Del> allows you to enter Setup. Another way to enter Setup is to power on the computer and wait for the following message during the POST: To enter the POST setup menu, press <CTRL-ALT-ESC> then press the <Del>.

### Key Legend

Key	Function
Right and Left arrows	Moves the highlight left or right to select a menu.
Up and Down arrows	Moves the highlight up or down between submenus or fields.
<Esc>	Exits to the BIOS Setup Utility.
+ (plus key)	Scrolls forward through the values or options of the highlighted field.
- (minus key)	Scrolls backward through the values or options of the highlighted field.
Tab	Selects a field.
<F1>	Displays General Help.
<F10>	Saves and exits the Setup program.
<Enter>	Press <Enter> to enter the highlighted submenu.

### Scroll Bar

When a scroll bar appears to the right of the setup screen, it indicates that there are more available fields not shown on the screen. Use the up and down arrow keys to scroll through all the available fields.

### Submenu

When “u” appears on the left of a particular field, it indicates that a submenu which contains additional options are available for that field. To display the submenu, move the highlight to that field and press <Enter>.

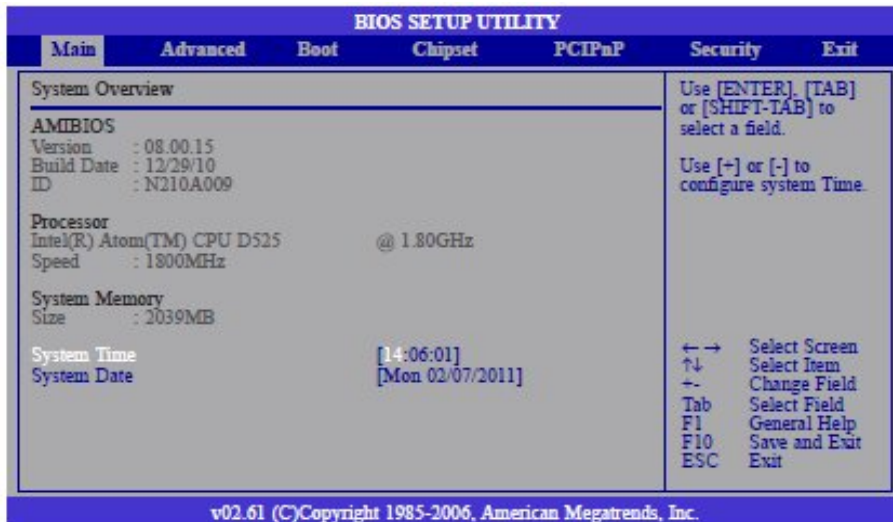
### BIOS Setup Utility

Once you enter the AMI BIOS Setup Utility, the Main Menu will appear on the screen. The main menu allows you to select from six setup functions and one exit choices. Use arrow keys to select among the items and press <Enter> to accept or enter the submenu.



## 5.1 Main menu

The Main menu is the first screen that you will see when you enter the BIOS Setup Utility.



### AMI BIOS

Displays the detected BIOS information.

### Processor

Displays the detected processor information.

### System Memory

Displays the detected system memory information.

### System Time

The time format is <hour>, <minute>, <second>. The time is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Hour displays hours from 00 to 23. Minute displays minutes from 00 to 59. Second displays seconds from 00 to 59.

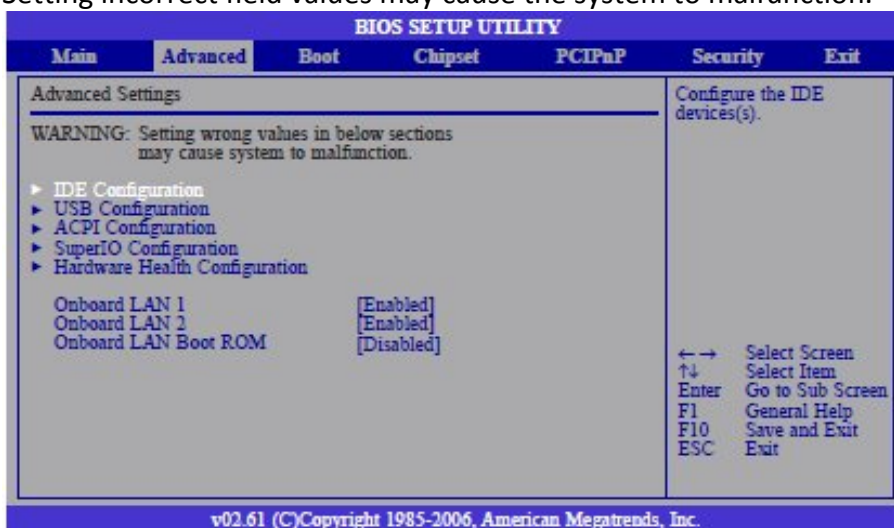
### System Date

The date format is <day>, <month>, <date>, <year>. Day displays a day, from Sunday to Saturday. Month displays the month, from January to December. Date displays the date, from 1 to 31. Year displays the year, from 1999 to 2099.

## 5.2 Advanced

The Advanced menu allows you to configure your system for basic operation. Some entries are defaults required by the system board, while others, if enabled, will improve the performance of your system or let you set some features according to your preference.

Setting incorrect field values may cause the system to malfunction.



### IDE Configuration

This section is used to configure the IDE drives.

### USB Configuration

This section is used to configure USB devices.

### ACPI Configuration

This section is used to configure the Advanced ACPI configuration.

### Super IO Configuration

This section is used to configure the I/O functions supported by the onboard Super I/O chip.

### Hardware Health Configuration

This section is used to configure the hardware monitoring events such as temperature, fan speed and voltages.

### Onboard LAN 1 and Onboard LAN 2

This section is used to enable or disable the onboard LAN.

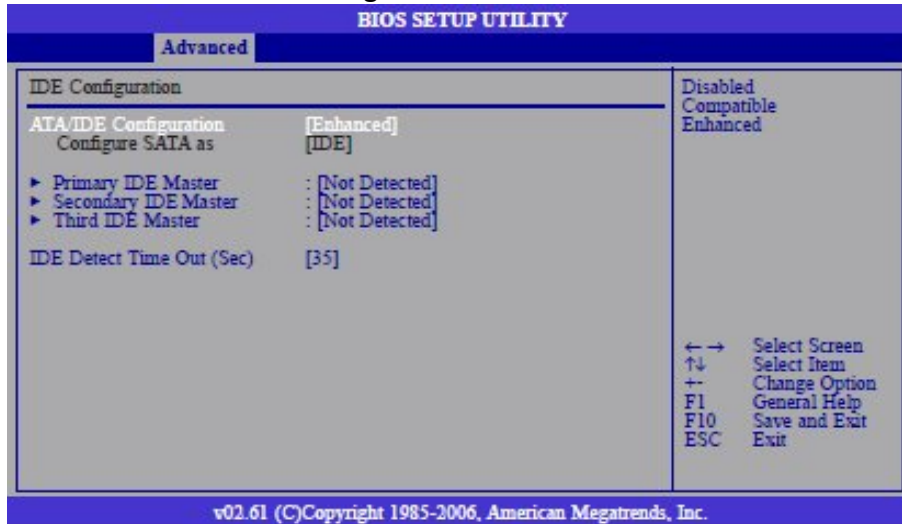
### Onboard LAN Boot ROM

Enable this field if you wish to use the boot ROM (instead of a disk drive) to boot-up the system and access the local area network directly.

If you wish to change the boot ROM’s settings, type the <Shift> and <F10> keys simultaneously when prompted during boot-up. Take note: you will be able to access the boot ROM’s program (by typing <Shift> + <F10>) only when this field is enabled.

## IDE Configuration

This section is used to configure the IDE drives.



### ATA/IDE Configuration

This field is used to configure the IDE drives. The options are Disabled, Compatible and Enhanced.

Configure SATA As

IDE This option configures the Serial ATA drives as Parallel ATA physical storage device.

AHCI This option configures the Serial ATA drives to use AHCI (Advanced Host Controller Interface).

AHCI allows the storage driver to enable the advanced Serial ATA features which will increase storage performance.

Primary IDE Master to Third IDE Master

When you enter the BIOS Setup Utility, the BIOS will auto detect the existing IDE devices then displays the status of the detected devices. To configure an IDE drive, move the cursor to a field then press <Enter>.

### IDE Detect Time Out (Sec)

Selects the time out value for detecting ATA/ATAPI devices.

## USB Configuration

This section is used to configure USB devices.



### Legacy USB Support

Due to the limited space of the BIOS ROM, the support for legacy USB keyboard (in DOS mode) is by default set to Disabled. With more BIOS ROM space available, it will be able to support more advanced features as well as provide compatibility to a wide variety of peripheral devices.

If a PS/2 keyboard is not available and you need to use a USB keyboard to install Windows (installation is performed in DOS mode) or run any program under DOS, set this field to Enabled.

### USB 2.0 Controller Mode

Sets the USB 2.0 controller mode to HiSpeed (480 Mbps) or FullSpeed (12 Mbps).

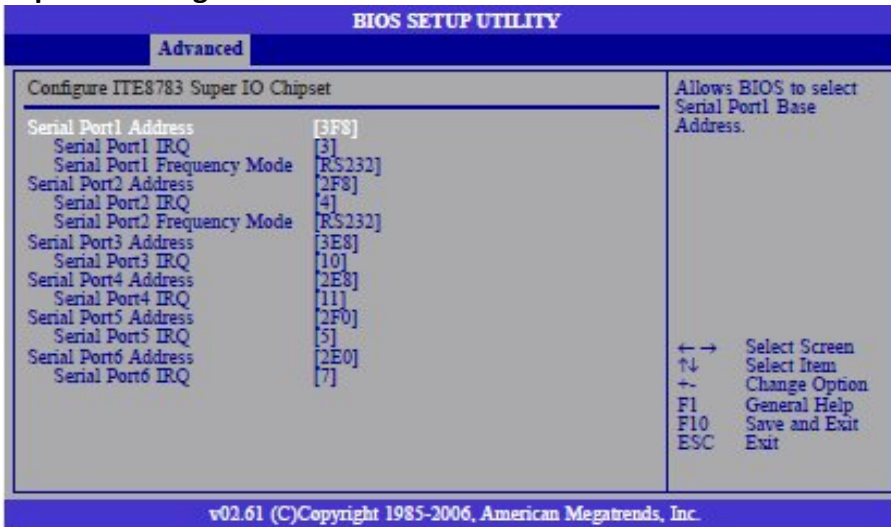
### BIOS EHCI Hand-Off

Enable this field when using operating systems without the EHCI hand-off support.

### Hotplug USB FDD Support

Enables support for USB FDD hot plug.

## Super IO Configuration



This section is used to configure the I/O functions supported by the onboard Super I/O chip.

### Serial Port1 Address to Serial Port6 Address

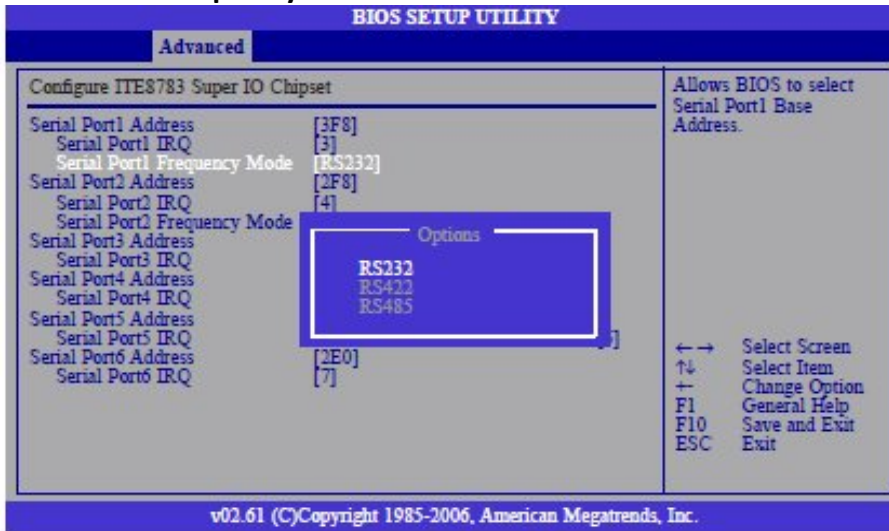
**Auto** The system will automatically select an I/O address for the onboard serial port. 3F8, 2F8, 3E8, 2E8, 2F0, 2E0 Allows you to manually select an I/O address for the onboard serial port.

**Disabled** Disables the onboard serial port.

### Serial Port1 IRQ to Serial Port6 IRQ

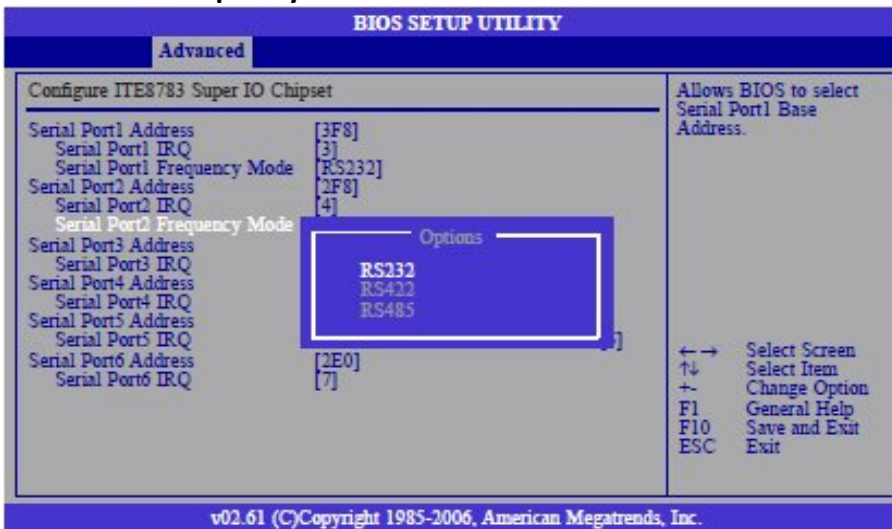
These fields are used to select an IRQ for the onboard serial port 1, 2, 3, 4, 5 or 6.

### Serial Port1 Frequency Mode



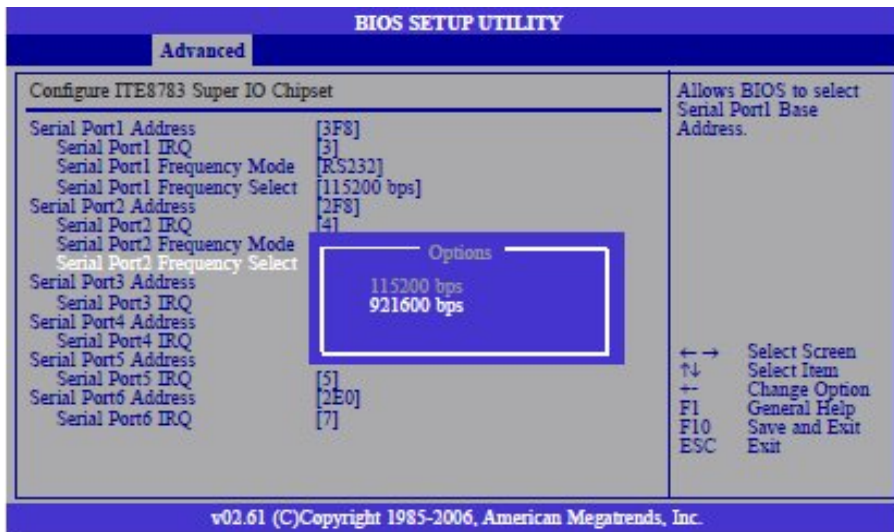
This field is used to select the frequency mode of serial port 1. The options are RS232, RS422 and RS485.

### Serial Port2 Frequency Mode



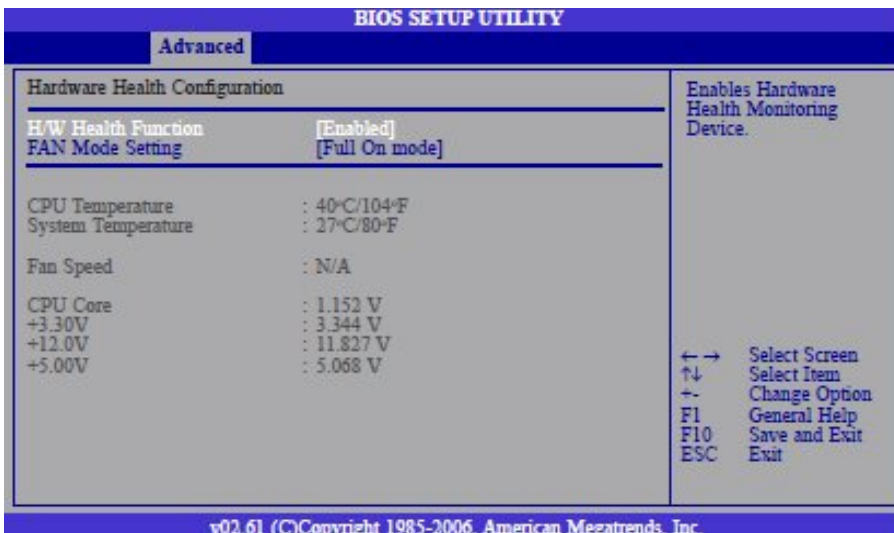
This field is used to select the frequency mode of serial port 2. The options are RS232, RS422 and RS485.

If you selected RS422 or RS485 in the "Serial Port1 Frequency Mode" and/or "Serial Port2 Frequency Mode" field, the "Serial Port1 Frequency Select" and/or "Serial Port2 Frequency Select" field will appear prompting you to select the frequency setting. The options are 115200 bps and 921600 bps.



### Hardware Health Configuration

This section is used to configure the hardware monitoring events such as temperature, fan speed and voltages



#### H/W Health Function

Enables or disables the hardware monitoring function.

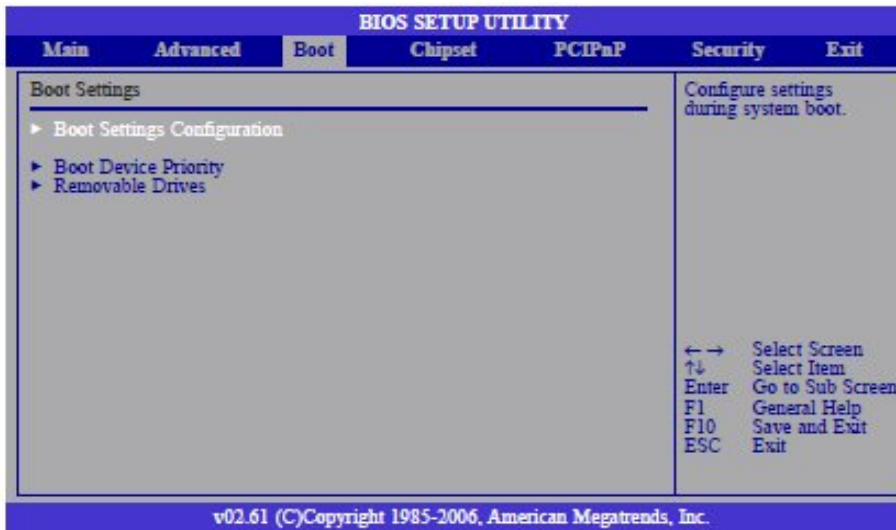
#### CPU Temperature and System Temperature

Detects and displays the current temperature of the CPU and the internal temperature of the system.

#### CPU Core to +5.00V

Detects and displays the output voltages.

## 5.3 Boot



### Boot Settings Configuration

This section is used to configure settings during system boot.

### Boot Device Priority

This section is used to select the boot priority sequence of the devices.

### Removable Drives

This section is used to select the boot priority sequence of the removable drives.



## Boot Settings Configuration

This section is used to configure settings during system boot.



### Quick Boot

When Enabled, the BIOS will shorten or skip some check items during POST. This will decrease the time needed to boot the system.

### Quiet Boot

Enabled Displays OEM logo instead of the POST messages.

Disabled Displays normal POST messages.

### Bootup Num-Lock

This allows you to determine the default state of the numeric keypad. By default, the system boots up with NumLock on wherein the function of the numeric keypad is the number keys. When set to Off, the function of the numeric keypad is the arrow keys.

### PS/2 Mouse Support

The options are Auto, Enabled and Disabled.

### System Keyboard

Detects the system keyboard.

### Hit 'DEL' Message Display

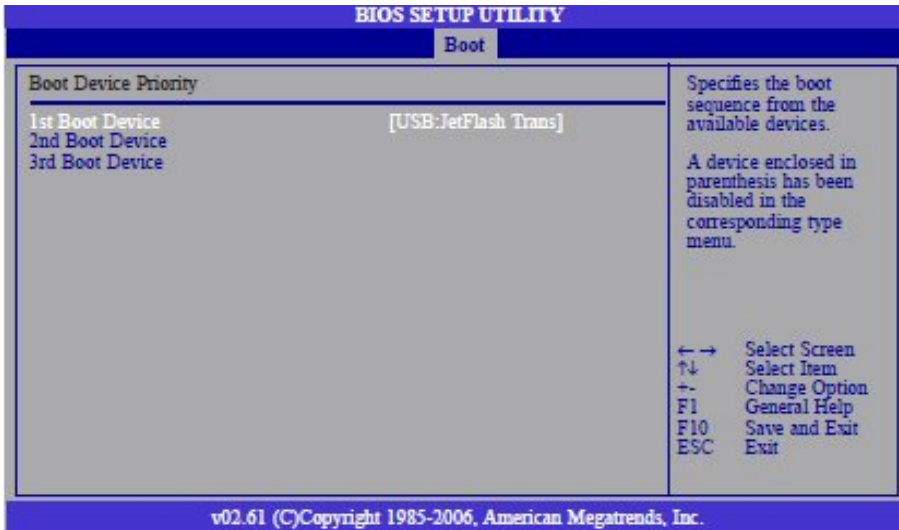
When enabled, the system displays the "Press DEL to run Setup" message during POST.

### Interrupt 19 Capture

When enabled, it allows the optional ROM to trap interrupt 19.

### Boot Device Priority

This section is used to select the boot priority sequence of the devices.



**1st Boot Device to 3rd Boot Device**

Selects the drive to boot first, second and third in the “1st Boot Device”, “2nd Boot Device” and “3rd Boot Device” fields respectively. The BIOS will boot the operating system according to the sequence of the drive selected.

**Removable Drives**

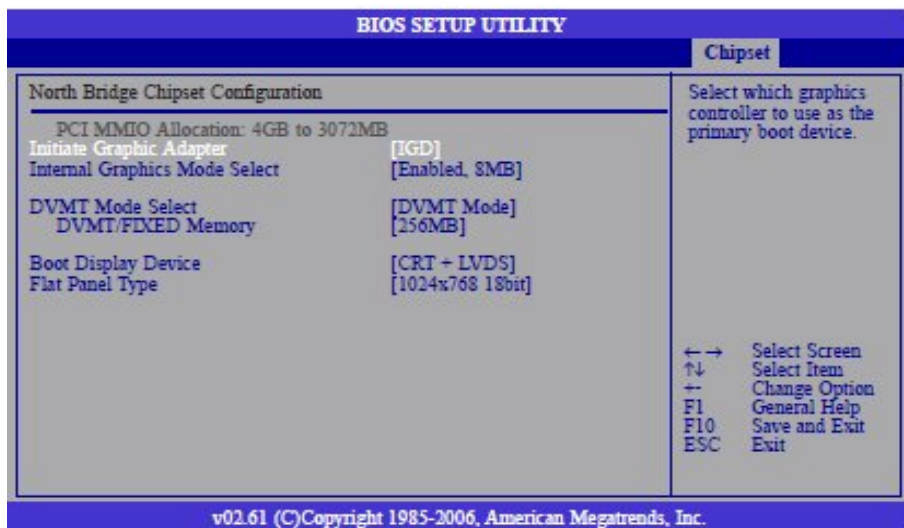
**5.4 Chipset**

This section is used to configure the system based on the specific features of the chipset. Setting incorrect field values may cause the system to malfunction.



**North Bridge Configuration**

This section is used to configure the north bridge features.



**Initiate Graphic Adapter**

Selects the graphics controller to use as the primary boot device.

**Internal Graphics Mode Select**

Selects the amount of system memory used by the internal graphics device.

**DVMT Mode Select**

The options are Fixed mode and DVMT mode.

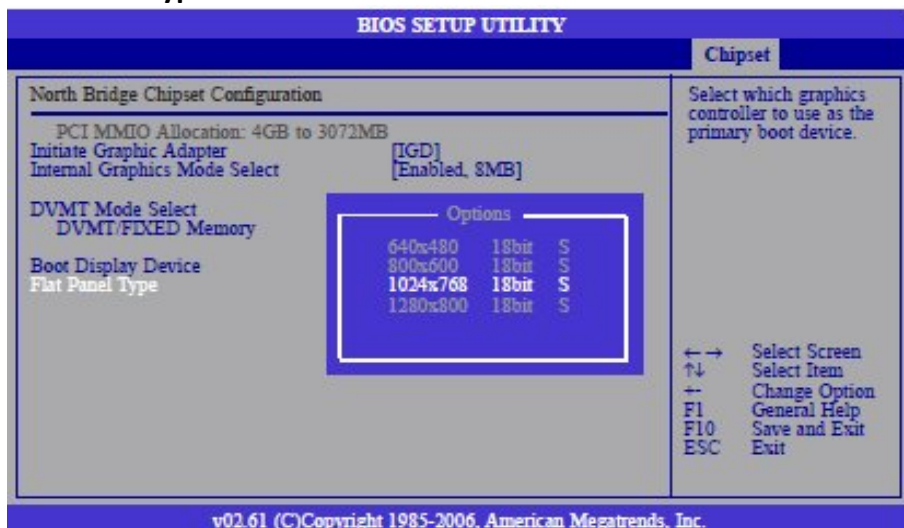
**DVMT/Fixed Memory**

This field is used to select the graphics memory size used by DVMT/Fixed mode.

**Boot Display Device**

This field is used to select the type of display to use when the system boots.

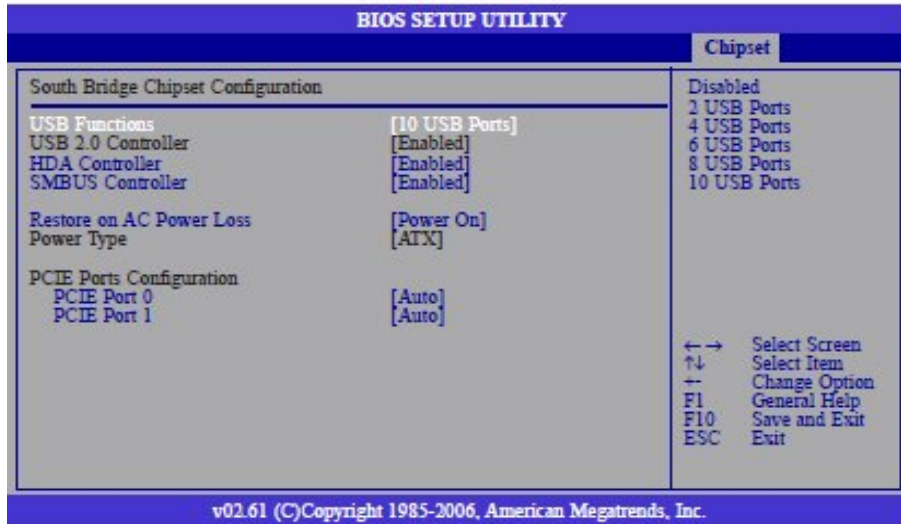
**Flat Panel Type**



Selects the type of flat panel connected to the system. The supported LVDS are 640x480 18bit, 800x600 18bit, 1024x768 18bit and 1280x800 18bit.

## South Bridge Configuration

This section is used to configure the south bridge features.



### USB Functions

Enables or disables USB devices.

### USB 2.0 Controller

This field is used to enable or disable the Enhanced Host Controller Interface (USB 2.0).

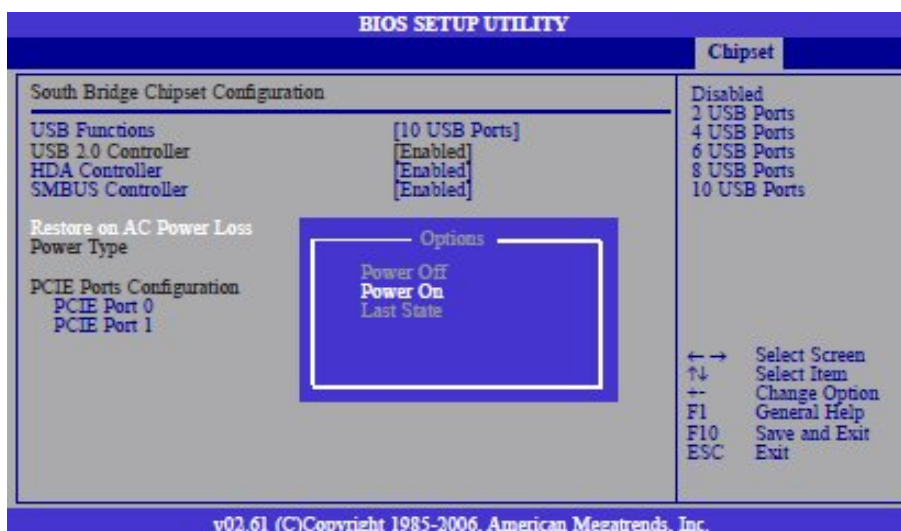
### HDA Controller

Enables or disables the onboard audio.

### SMBUS Controller

Enables or disables the SMBUS.

### Restore On AC Power Loss



**Power Off** When power returns after an AC power failure, the system’s power is off. You must press the Power button to power-on the system.

**Power On** When power returns after an AC power failure, the system will automatically power-on.

**Last State** When power returns after an AC power failure, the system will return to the state where you left off before power failure occurs. If the system’s power is off when AC power failure occurs, it will remain off when power returns. If the system’s power is on when AC power failure occurs, the system will power-on when power returns.

**Power Type**

Selects the type of power used.

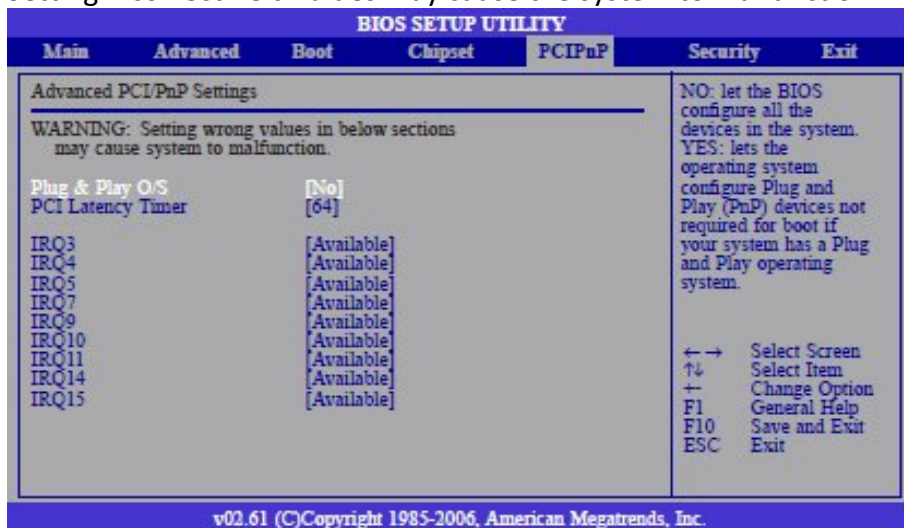
**PCIe Port 0 and PCIe port 1**

Configures the PCIe ports.

**5.5 PCIPnP**

This section is used to configure settings for PCI/PnP devices.

Setting incorrect field values may cause the system to malfunction.



**Plug & Play O/S**

**Yes** Configures Plug and Play (PnP) devices that are not required to boot in a Plug and Play supported operating system.

**No** The BIOS configures all the devices in the system.

**PCI Latency Timer**

This feature is used to select the length of time each PCI device will control the bus before another takes over. The larger the value, the longer the PCI device can retain control of the bus. Since each access to the bus comes with an initial delay before any transaction can be made, low values for the PCI Latency Timer will reduce the effectiveness of the PCI bandwidth while higher values will improve it.

**IRQ3 to IRQ15**

**Available:** The specified IRQ is available for PCI/PnP devices.

Reserved: The specified IRQ is reserved for Legacy ISA devices.

## 5.6 Security



### Change Supervisor Password

This field is used to set or change the supervisor password.

To set a new password:

Step 1: Select the Change Supervisor Password field then press <Enter>.

Step 2: Type your password in the dialog box then press <Enter>. You are limited to eight letters/numbers.

Step 3: Press <Enter> to confirm the new password.

Step 4: When the Password Installed dialog box appears, select OK. To change the password, repeat the same steps above.

To clear the password, select Change Supervisor Password then press <Enter>. The Password Uninstalled dialog box will appear.

If you forgot the password, you can clear the password by erasing the CMOS RTC (Real Time Clock) RAM using the RTC Clear jumper. Refer to chapter 2 for more information.

### Change User Password

This field is used to set or change the user password.

To set a new password:

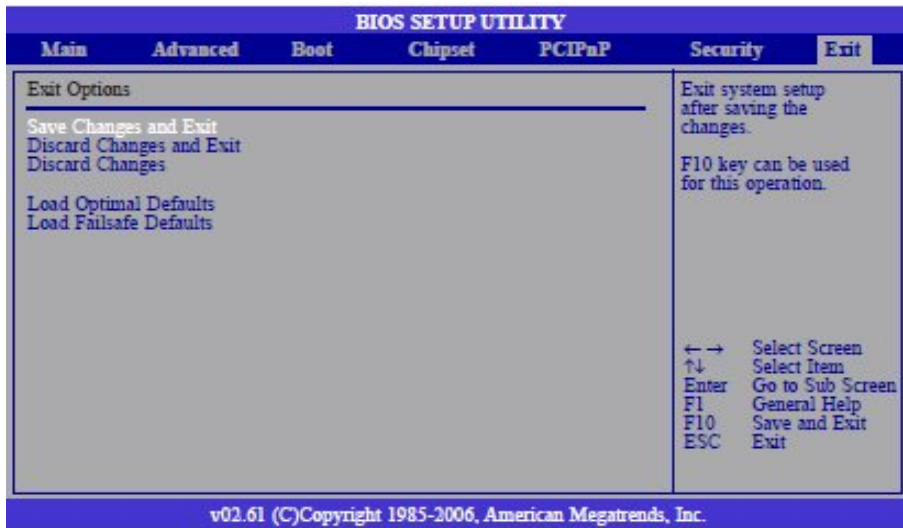
Step 1: Select the Change User Password field then press <Enter>.

Step 2: Type your password in the dialog box then press <Enter>. You are limited to eight letters/numbers.

Step 3: Press <Enter> to confirm the new password.

Step 4: When the Password Installed dialog box appears, select OK. To change the password, repeat the same steps above.

## 5.7 Exit



### Save Changes and Exit

To save the changes and exit the Setup utility, select this field then press <Enter>. A dialog box will appear. Confirm by selecting Yes. You can also press <F10> to save and exit Setup.

### Discard Changes and Exit

To exit the Setup utility without saving the changes, select this field then press <Enter>. You may be prompted to confirm again before exiting. You can also press <ESC> to exit without saving the changes.

### Discard Changes

To discard the changes, select this field then press <Enter>. A dialog box will appear. Confirm by selecting Yes to discard all changes made and restore the previously saved settings.

### Load Optimal Defaults

Loads the optimal default values from the BIOS ROM.

### Load Failsafe Defaults

Loads the fail-safe default values from the BIOS ROM.

## Appendix A: Power Consumption

### Test Configuration

System Configuration	Sys#1
Chassis	PER 13A Embedded system
CPU	Intel Atom™ processor D525 (1M Cache, 1.80 GHz)
Memory	Apacer 1GB SOD PC3-10600 (industrial)
HDD	N/A
FDD	N/A
CD-ROM	N/A
CompactFlash device	Apacer 8G (industrial)
Power Supply	POWER ADAPTER SPI:G.P FSP65-AAB(N091)
Add-on Card	N/A
CPU Cooler	PER13A HEATSINK
System Fan	N/A
Keyboard	LEMEL B-5201-P
Mouse	GENIVS EASY MOUSE PS/2

### Power Consumption Measurement

#### Purpose

The purpose of the power consumption test is to verify the power dissipation of the system and the load of the power supply.

#### Test Equipment

PROVA CM-07 AC/DC CLAMP METER

#### Device Under Test

DUT: Sys #1

#### Test Procedure

1. Power up the DUT and then boot Windows XP.
2. Enter the standby mode (HDD power down).
3. Measure the power consumption and record it.
4. Run the Burn-in test program to apply 100% full loading.
5. Run the Intel Kpower program.
6. Run the LAN Packet Counter and Receive program.



**Test Data**

Sys #1	
+12V	
Full-Loading Mode	2.18A
Total	26.16W
Standby Mode	0.9A
Total	10.8W

## Appendix B: GPI/O Programming guide

GPI/O (General Purpose Input/Output) pins are provided for custom system design. This appendix provides definitions and its default setting for the ten GPI/O pins in the PER13A. The pin definition is shown in the following table:

Pin	GPI/O Mode	Power On Default	Address	Pin	GPI/O Mode	Power On Default	Address
1	VCC	-	-	2	GND	-	-
3	GPO	Low	284h (Bit4)	4	GPI	High	284h (Bit0)
5	GPO	Low	284h (Bit5)	6	GPI	High	284h (Bit1)
7	GPO	Low	284h (Bit6)	8	GPI	High	284h (Bit2)
9	GPO	Low	284h (Bit7)	10	GPI	High	284h (Bit3)

### J8 - GPI/O connector

Control the GPO pin (3/5/7/9) level from I/O port 284h bit (4/5/6/7).  
The bit Set/Clear indicated output High/Low.

#### GPI/O Programming Sample Code

```
#define GPIO_PORT 0x284
#define GPO3 (0x01 << 4)
#define GPO5 (0x01 << 5)
#define GPO7 (0x01 << 6)
#define GPO9 (0x01 << 7)
#define GPO3_HI outputb(GPIO_PORT, 0x10)
#define GPO3_LO outputb(GPIO_PORT, 0x00)
#define GPO5_HI outputb(GPIO_PORT, 0x20)
#define GPO5_LO outputb(GPIO_PORT, 0x00)
#define GPO7_HI outputb(GPIO_PORT, 0x40)
#define GPO7_LO outputb(GPIO_PORT, 0x00)
#define GPO9_HI outputb(GPIO_PORT, 0x80)
#define GPO9_LO outputb(GPIO_PORT, 0x00)
void main(void)
{
GPO3_HI;
GPO5_LO;
GPO7_HI;
GPO9_LO;
```

## Appendix C: Watchdog Timer Setting

Start

Step 1

See "SetupWDT" procedure

#Setup Watchdog Timer Environment

Step 2

See "TimeBaseWDT" procedure

#Initial Watchdog Timer

Users can select second or minute

Step 3

See "TimeCountWDT" procedure

#Set Watchdog Timer Time-out Value

Users can set time-out value

Step 4

See Exit Setup procedure

#Exit Setup Environment

End

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```
#define SUPERIO_PORT 0x2E
```

```
#define WDT_SET 0x72
```

```
#define WDT_VALUE 0x73
```

```
void main(void)
```

```
{
```

```
#Enter SuperIO Configuration
```

```
outportb(SUPERIO_PORT, 0x87);
```

```
outportb(SUPERIO_PORT, 0x01);
```

```
outportb(SUPERIO_PORT, 0x55);
```

```
outportb(SUPERIO_PORT, 0x55);
```

```
# Set LDN
```

```
outportb(SUPERIO_PORT,0x07);
```

```
outportb(SUPERIO_PORT+1 ,0x07);
```

```
# Set WDT setting
```

```
outportb(WDT_SET,0xC0); # Use the second to come down
```

```
# If choose the Minute, change value to 0x40
```

```
# Set WDT sec/min
```

```
outportb(WDT_VALUE,0x05); #Set 5 seconds
```