

# PER33A

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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## Chapter 1: Product Introduction

### 1.1 Key Features

Intel® Core™ i7/i5 socket processor  
Mobile Intel® QM57 PCH  
Dual Intel® Gigabit Ethernet ports  
Dual VGA or VGA/DVI Independent Display  
3 x RS232 and 1 x RS232/422/485 with Auto Flow Control  
4 x Digital input & 4 Digital output  
On board DC to DC power design with 9 ~ 30V DC input  
Support ATX Power Mode and PXE/WOL

#### **Main Memory**

2 x 240 pin memory DIMM,  
Supports up to 4GB DDR3 800/1066 SDRAM memory module, unbuffered,  
non-ECC

#### **Expansion**

1 x PCI expansion slot  
Max Supported Add-on Card Length: 169mm

#### **I/O Interface - Front**

ATX Power on/off switch  
HDD access / Power status LEDs  
2 x USB2.0 ports  
2 x eSATA ports

#### **I/O Interface - Rear**

2-pin Remote Power on/off switch  
9 ~ 30V DC input  
1 x PS/2 for Keyboard/Mouse  
1 x DB15 male connector for GPIO (4x digital-input and 4x digital-output)  
1 x DB44 Serial Port for 4x RS232  
(COM2: RS232/422/485 with Auto Flow Control)  
2 x Gbe LAN ports  
4 x USB 2.0 ports  
1 x DB15 VGA port  
1 x DVI-I Port  
1 x Speaker-out  
1 x Mic-in

#### **Storage**

1 x 2.5" SATA HDD drive bay

**Power Requirements**

ATX Power mode

DC to DC power design onboard, supports 9~30V DC

19V, 65W power adapter (optional)

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

195 mm x 268 mm x 80 mm (7.7" x 10.5" x 3.1")

**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)

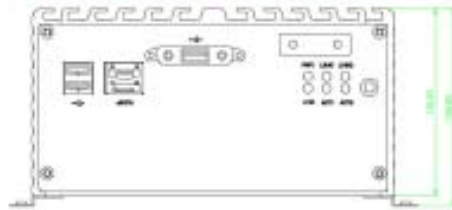
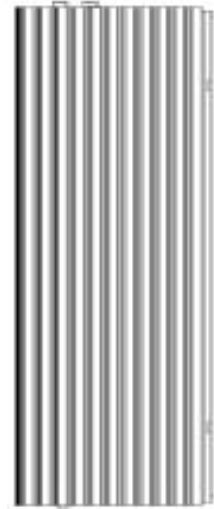
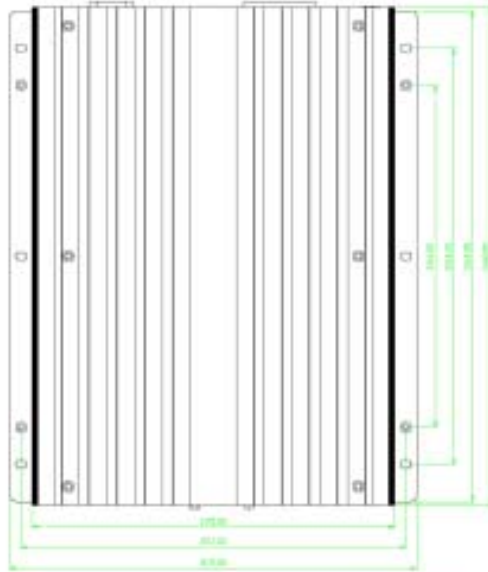
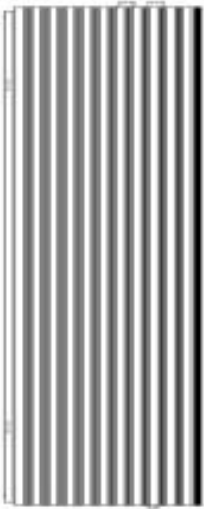
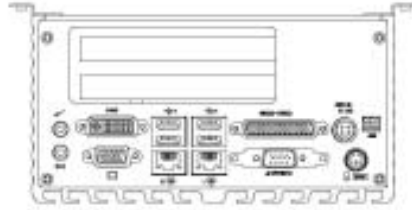
**Certifications**

CE approval

FCC Class A

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## 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 **PER33A** 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 and 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 correct screws and do not over tighten screws.

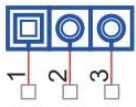


## 2.1 Jumper Settings

### 2.1.1 CMOS Clear pin header

Connector location: JP4

Pin	Signal	Jump Function Definition	
1	RTCRST# PU	*1-2	Normal
2	RTCRST#	2-2	CMOS_CLEAR
3	CLR_CLEAR	*=Default setting	




## Chapter 3: Onboard Connector

### 3.1 External Connectors

#### 3.1.1 USB Ports


Connector type: Dual USB port  
Connector location: CN10

Pin	Definition	Pin	Definition
1	+5V	7	USB 1 -
2	USB 0 -	8	GND
3	USB 0 +	9	GND
4	GND	10	GND
5	+5V	11	GND
6	USB 1 -	12	GND

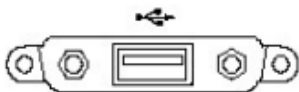


#### 3.1.2 eSATA Ports

Pin	Definition	Pin	Definition
1	GND	5	SATA RXN4
2	SATA TXP4	6	SATA RXP4
3	SATA TXN4	7	GND
4	GND		




#### 3.1.3 Lockable USB Port



#### 3.1.4 ATX Power On/Off Switch

Connector location: SW1

Pin	Definition
On	Blue light
Off	Red light

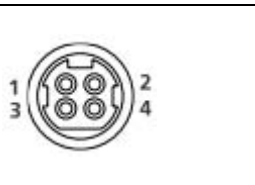


### 3.1.5 DC input connector (9~30V)

Connector type: Power F 90

Connector location: CN1

Pin	Definition	Pin	Definition
1	VIN	4	GND
2	VIN	5	GND
3	GND		




### 3.1.6: ATX Remote ON/OFF Switch

Connector type: 2-pin switch

Connector location: J3

Pin	Signal
1	GND
2	PBT PU

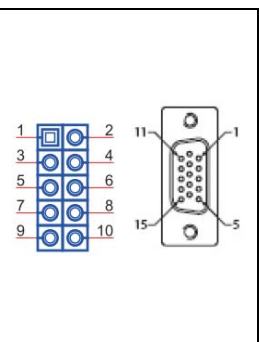


### 3.1.7 GPIO Connector (4 x digital input and 4 x digital output)

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

Connector location: JP2

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

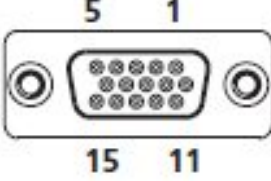


### 3.1.8 VGA Port

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

Connector location: CN9B

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




### 3.1.9 Speaker-out Jack

Connector type: 5-pin jack

Connector location: CN11B

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




### 3.1.10 Mic-in Jack

Connector type: 5-pin jack

Connector location: CN11A

Pin	Definition
1	AU GND
2	MIC Out - L
3	AU GND
4	MIC JD1
5	MIC Out - R



### 3.1.11 LAN1 and LAN2 Ports

Connector type: RJ45 port with LEDs

Connector location: CN3B & CN6B

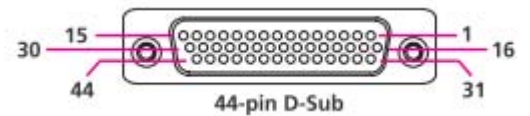
Act	Status	
Orange Blinking	Data Activity	
Orange Off	No Activity	
Green Always lighted	Linked	
Green Off	No Link	

Pin	Definition	Pin	Definition
09	LAN1 M0P	10	LAN1 M0N
11	LAN1 M1P	12	LAN1 M2P
13	LAN1 M2N	14	LAN1 M1N
15	LAN1 M3P	16	LAN1 M3N
17	LAN1 LED1P	18	LAN1 LED ACT#
19	LAN1 LED2P	20	LAN1 LINK#
21	GND	24	GND
25	GND	28	GND

### 3.1.12 Serial Interface ( COM1 ~ COM4 )

Connector size: 44 Pin D-Sub

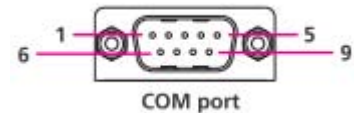
Connector location: CN4



Pin	Definition	Pin	Definition
1	GN10 1	2	GN10 2
3	GN10 3	4	GN10 4
5	GND	6	GN10 6
7	GN10 7	8	GN10 8
9	GN10 9	10	GND
11	GN10 11	12	GN10 12
13	GN10 13	14	GN10 14
15	GND	16	GN10 16
17	GN10 17	18	GN10 18
19	GN10 19	20	GND
21	GN10 21	22	GN10 22
23	GN10 23	24	GN10 24
25	GND	26	GN10 26
27	GN10 27	28	GN10 28
29	GN10 29	30	GND
31	GN10 31	32	GN10 32
33	GN10 33	34	GN10 34

35	GND	36	GN10 36
37	GN10 37	38	GN10 38
39	SP4 RI TI	40	GND
41	NC	42	NC
43	NC	44	NC

The 44-pin D-Sub connector connects to the following COM ports (A to D) through a DB44-pin cable.



COM 1 ( RS232 ) labeled " A "on DB9 Cable Connector					
DB44 pin #	DB9 pin #	Definitio n	DB44 pin #	DB9 pin #	Definitio n
1	1	DCD1	2	2	RXD1
3	3	TXD1	4	4	DTR1
5	5	GND	6	6	DSR1
7	7	RTS1	8	8	CTS1
9	9	RI1	10		GND

COM 2 ( RS232 ) labeled " B "on DB9 Cable Connector					
DB44 pin #	DB9 pin #	Definitio n	DB44 pin #	DB9 pin #	Definitio n
11	1	DCD2	12	2	RXD2
13	3	TXD2	14	4	DTR2
15	5	GND	16	6	DSR2
17	7	RTS2	18	8	CTS2
19	9	RI2	20		GND

COM 3 ( RS232 ) labeled " C "on DB9 Cable Connector					
DB44 pin #	DB9 pin #	Definitio n	DB44 pin #	DB9 pin #	Definitio n
21	1	DCD3	22	2	RXD3
23	3	TXD3	24	4	DTR3
25	5	GND	26	6	DSR3
27	7	RTS3	28	8	CTS3
29	9	RI3	30		GND

COM 4 ( RS232 ) labeled " D "on DB9 Cable Connector					
DB44 pin #	DB9 pin #	Definitio n	DB44 pin #	DB9 pin #	Definitio n
31	1	DCD4	32	2	RXD4
33	3	TXD4	34	4	DTR4

35	5	GND	36	6	DSR4
37	7	RTS4	38	8	CTS4
39	9	RI4	40		GND

**Note:** Pin 39 is defined as external power with selection for 5V or 12V through JP9.

COM 2 ( RS422 ) labeled " B "on DB9 Cable Connector					
DB44 pin #	DB9 pin #	Definition	DB44 pin #	DB9 pin #	Definition
11	1	TXD-	12	2	TXD+
13	3	RXD+	14	4	RXD-
15	5	GND	16	6	RTS-
17	7	RTS+	18	8	CTS+
19	9	CTS-	20		GND

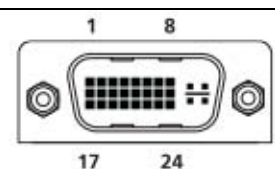
COM 2 ( RS485 ) labeled " B "on DB9 Cable Connector					
DB44 pin #	DB9 pin #	Definition	DB44 pin #	DB9 pin #	Definition
11	1	TXD-	12	2	TXD+
		RXD-			RXD+
13	3	Reserved	14	4	Reserved
15	5	Reserved	16	6	Reserved
17	7	Reserved	18	8	Reserved
19	9	Reserved	20		Reserved

### 3.1.13 DVI Port

Connector size: DB-9 port

Connector location: COM4

Pin	Definition	Pin	Definition
1	HDMI DATA2 N	2	HDMI DATA2 P
3	DVI GND	4	NC
5	NC	6	HDMI CTL CLK
7	HDMI CTL SDA	8	DC VSYNC VGA
9	HDMI DATA1 N	10	HDMI DATA1 P



11	DVI GND	12	NC
13	NC	14	HDMIC PWR S
15	DVI GND	16	HDMIC HPDET
17	HDMI DATA0 N	18	HDMI DATA0 P
19	DVI GND	20	DC DATA VGA
21	DC CLK VGA	22	NC
23	HDMI LKP	24	HDMI LKN
C1	DC RED VGA	C2	DC GREEN VGA
C3	DC BLUE VGA	C4	DC HSYNC VGA
C5A	DVI GND	C5B	DVI GND

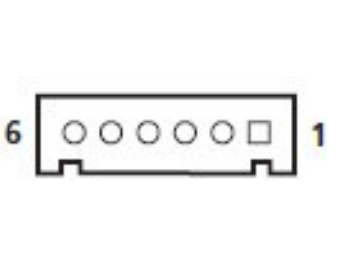
## 3.2 Internal Connectors

### 3.2.1 USB Connector

Connector size: 6-pin JST wafer (1x6), 2 mm pitch

Connector location: J12

Pin	Definition
1	+5V
2	USB 10-
3	USB 10+
4	USB 11-
5	USB 11+
6	GND

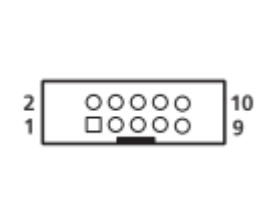


### 3.2.2 COM5 Connector

Connector type: 10-pin boxed header (2x5), 2.0 mm

Connector location: CN5

Pin	Definition	Pin	Definition
1	SP5_DCD	2	SP5_RXD
3	SP5_TXD	4	SP5_DTR
5	GND	6	SP5_DSR
7	SP5_RTS	8	SP5_CTS
9	SP5_RI	10	GND



### 3.2.3 Parallel Connector

Connector type: 26-pin boxed header (2x13), 2.0 mm

Connector location: CN4



Pin	Definition	Pin	Definition
1	LPT RP STB#	14	LPT AFD#R
2	LPT RP PRD0	15	LPT ERR#
3	LPT RP PRD1	16	LPT INIT#R
4	LPT RP PRD2	17	LPT SLIN#R
5	LPT RP PRD3	18	GND LPT
6	LPT RP PRD4	19	GND LPT
7	LPT RP PRD5	20	GND LPT
8	LPT RP PRD6	21	GND LPT
9	LPT RP PRD7	22	GND LPT
10	LPT ACK#R	23	GND LPT
11	LPT BUSY	24	GND LPT
12	LPT PE	25	GND LPT
13	LPT SLCT	26	NC

### 3.2.4 Reset Connector

Connector type: 2 pin header (1x2), JST 2.5 mm  
 Connector location: J2

Pin	Signal
1	RESET#
2	GND

### 3.2.5 CPU Fan Connector

Connector type: 4-pin Wafer (1x4), 2.54 mm M-180  
 Connector location: J1 & J14

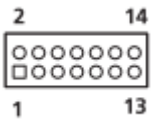
Pin	Signal
1	GND
2	VCC_12
3	CPU_FANIN P
4	CPU_FANOUT R

### 3.2.6 Internal Power/HDD/LAN Power/LAN Active LED

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

Connector location: J4

Pin	Definition	Pin	Definition
1	POWER_OK	2	VCC_LEDPOWER
3	HDD_LED#	4	HDD_LEDPOWER
5	LAN1_LINK#	6	LAN1LINK_LEDPOWE R
7	LAN1_ACT#	8	LAN1ACT_LEDPOWE R
9	LAN2_LINK#	10	LAN2LINK_LEDPOWE R
11	LAN2_ACT#	12	LAN2ACT_LEDPOWE R
13	H/W RESET	14	GND

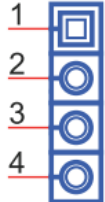


### 3.2.7: Line-in connector

Connector type: 4 pin header (1x4), 2.5 mm M-180

Connector location: J15

Pin	Definition
1	Line1 LP
2	GND
3	Line1 JD
4	Line1 RP

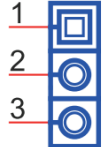


### 3.2.8 SMBus Pin Header

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

Connector location: J8

Pin	Signal
1	SMbus_CLK
2	SMbus_data
3	GND

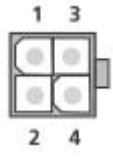


### 3.2.9 Power Output Connector

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

Connector location: CON1

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



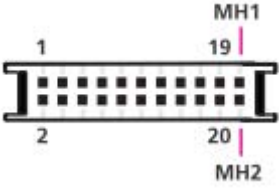
### 3.2.10 LVDS Connector

Channel A :

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

Connector location: CN7

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

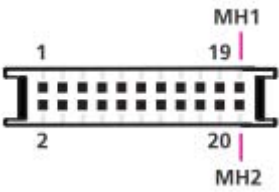


Channel B :

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

Connector location: CN8


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



### 3.2.11 LVDS Backlight Connector

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

### 3.2.12 SATA connector

Connector type: Standard SATA II 7P


Connector location: CN12 & CN13

Pin	Defintion	
1	GND	
2	SATA TXP1	
3	SATA TXN1	
4	GND	
5	SATA RXN1	
6	SATA RXP1	
7	GND	

### 3.2.13 SATA Power connector

Connector type: 4-pin Wafer, 2.54mm


Connector location: CN14 & CN15

Pin	Definition	
1	+12V	
2	GND	
3	GND	
4	VCC5	

### 3.2.14 SATA DOM Power connector

Connector type: 4-pin JST wafer (2x2), 2.54 mm

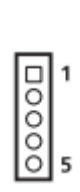
Connector location: J16 & J17

Pin	Definition	
1	+12V	
2	GND	

### 3.24 COM4 RI Pin header

Connector type: 5-pin header, 2.0mm

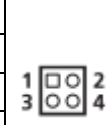
Connector location: J9

Pin	Definition	
1	VCC5	
2	SP4 RI T	
3	+12V	
4	SP4 RI T	
5	SP4 R	

### 3.24 GPIO LED connector

Connector type: 4-pin , 2.0 mm

Connector location: JP1

Pin	Definition	
1	GPO LED0	
2	GND	
3	GPO LED1	
4	GND	

## Chapter4: Getting Started

This chapter provides more information including information for the installation of components into the **PER33A** Embedded system. The installation of memory modules and an operating system are explained.

### 4.1 Installing System Memory

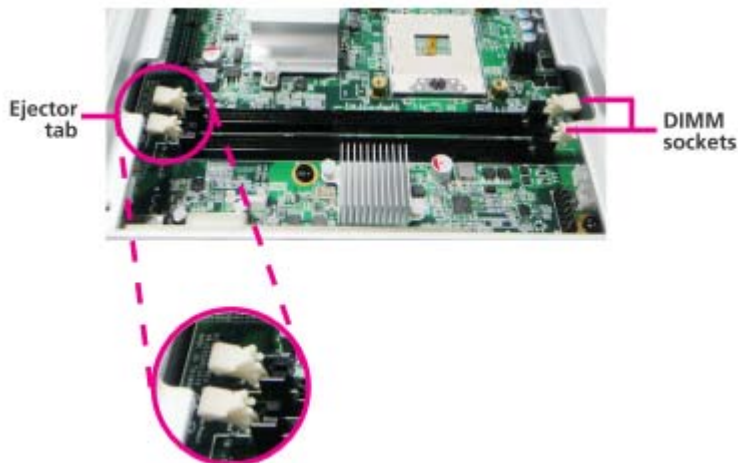
The **PER33A** supports DDR3 800 SODIMM (Maximum 2GB)



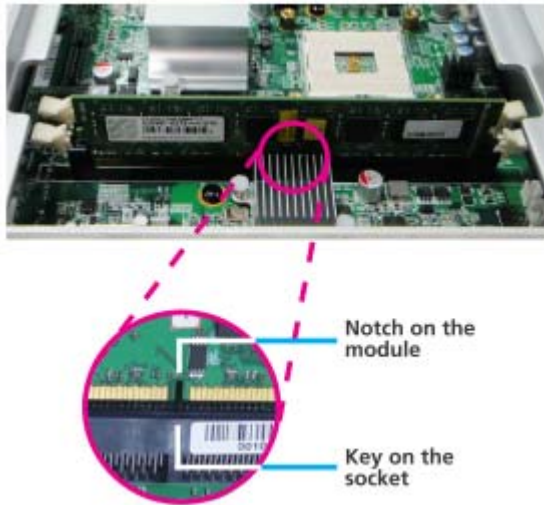
Disconnect all power supplies to the board before installing a memory module to prevent damage to the board and memory module.

To install a memory module:

Step 1: Locate the memory module slots and then push the ejector tab 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.



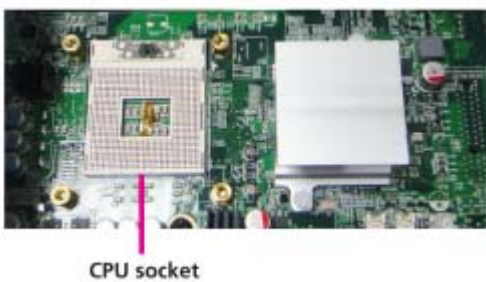
Step 3: Press the module down and then lower it down in place. Press the module by using the edges of the module.



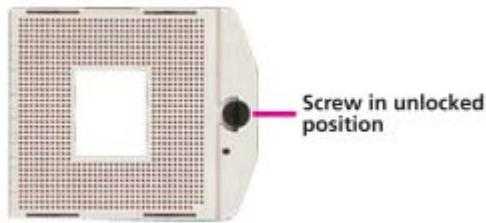
The retaining clips lock onto the module and the memory modules are secured in place.

## 4.2 Install the Processor

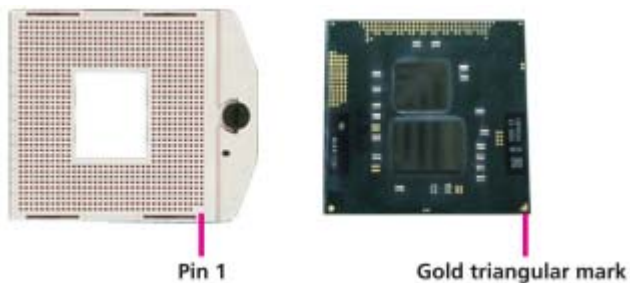
Step 1: Locate the processor (CPU) socket on the motherboard.



Step 2: Turn Socket Lock to the unlocked position.



Step 3: Align the Gold Triangular Mark over Pin 1, and install the CPU.

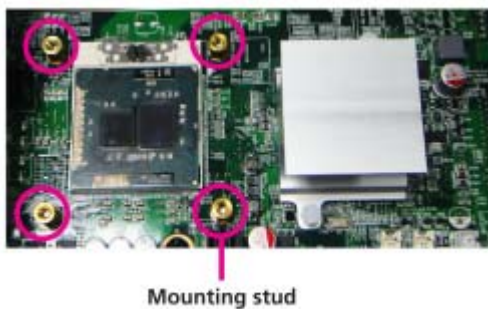


Step 4: Turn the Socket Lock to the locked position to secure in place.



Step 5: Apply thermal grease to the top of CPU.

Step 6: Align the heat sink over the processor mounting studs, then lower the heat sink in place. Secure the heat sink with the provided screws.



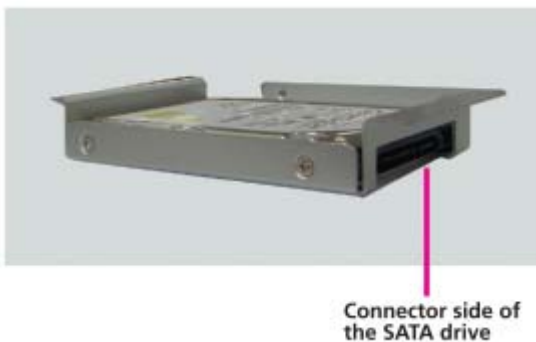


### 4.3 Installing a SATA Hard Drive

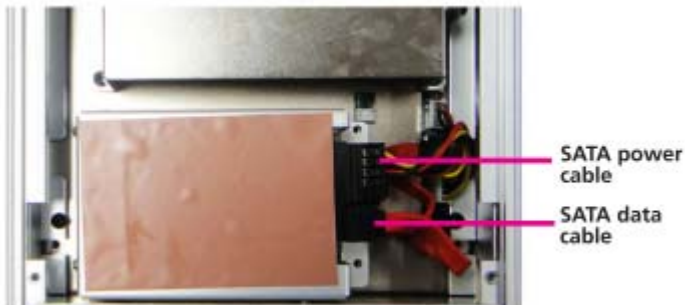
Step 1: Remove the mounting screw of the bottom cover.

Step 2: Remove the screws that secure the drive bay to the chassis.

Step 3: Secure the HDD as shown in the following image.



Step 4: Align the HDD assembly over the chassis and connect the SATA power and SATA data cables as shown in the following image.



Step 4: Secure the HDD drive bay on the chassis with provided screws.



## Chapter 5: BIOS Setup

This chapter describes how to use the BIOS setup program for the PER33A 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 auto-

matically 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 screen:

To enter setup, press <CTRL-ALT-ESC> and the <Del> key at the same time before booting (POST):

## Legends

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 sub-menus 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.

BIOS SETUP UTILITY						
Main	Advanced	PCIPnP	Boot	Security	Chipset	Exit
BIOS Information						Use [ENTER], [TAB] or [SHIFT-TAB] to select a field.
BIOS Vendor		American Megatrends				
Core Version		4.6.3.7				
Project Version		N350-010 x64				
Build Date		07/28/2010 16:52:57				Use [+] or [-] to configure system Time.
Memory Information						
Total Memory		1024 MB (DDR3 1066)				
System Date		[Wed 08/11/2010]				
System Time		[16:51:35]				
Access Level		Administrator				→ ←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save ESC: Exit
Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.						

#### BIOS Information:

Displays the detected BIOS information.

#### Memory information:

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.

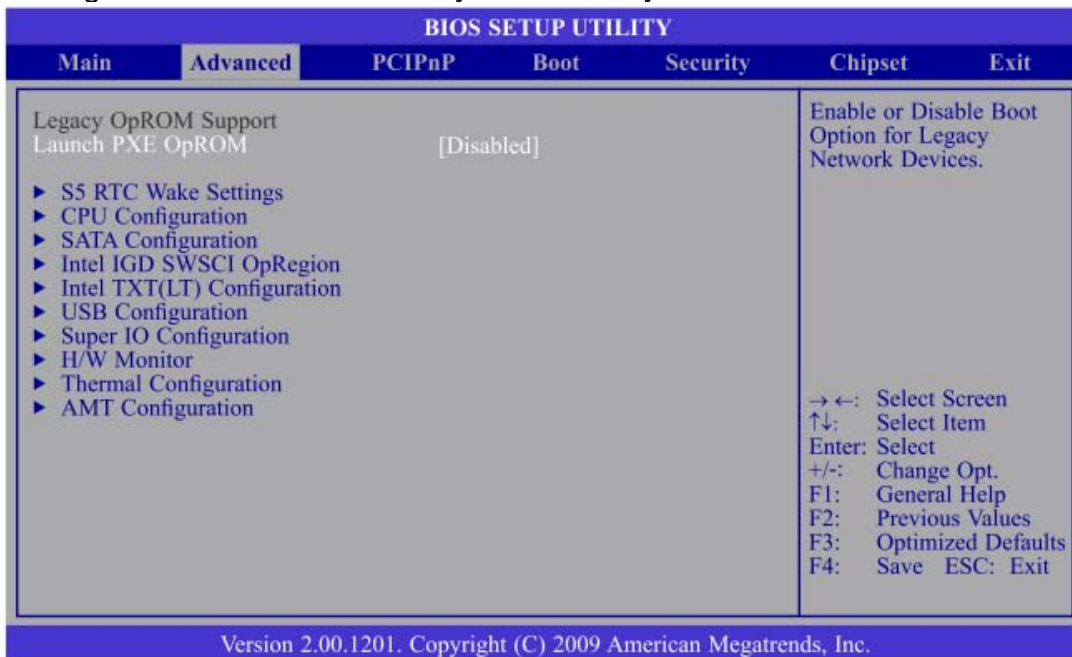
**System Date**

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.



**Launch PXE OpROM**

Enables or Disables the boot option for legacy network devices.

**S5 RTC Wake Settings**

Configure the S5 RTC wake up setting.

**CPU Configuration**

This section is used to configure the CPU. It also detects CPU information.

**SATA Configuration**

This section is used to configure the SATA drives.

### Intel IGD SWSCI OpRegion

Configures the Intel graphics display.

### Intel TXT(LT) Configuration

Configures the Intel Trusted Execution technology function.

### USB Configuration

Configures the USB devices.

### Super IO Configuration

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

### H/W Monitor

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

### Thermal Configuration

Configures the intelligent power sharing function.

### AMT Configuration

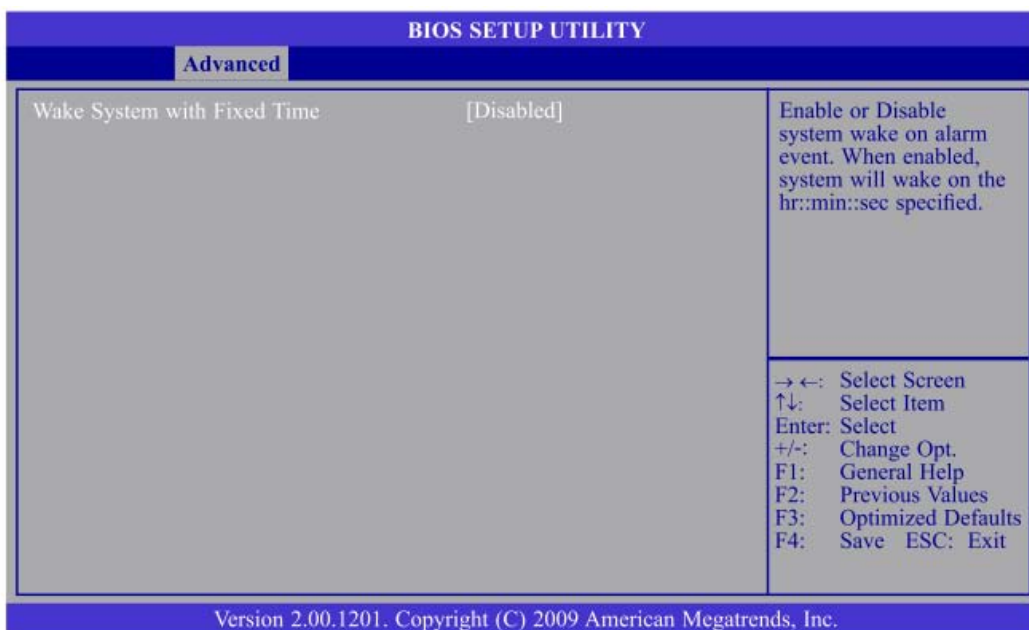
Configures the AMT function.

### S5 RTC Wake settings

This section is used to configure the wake up function.

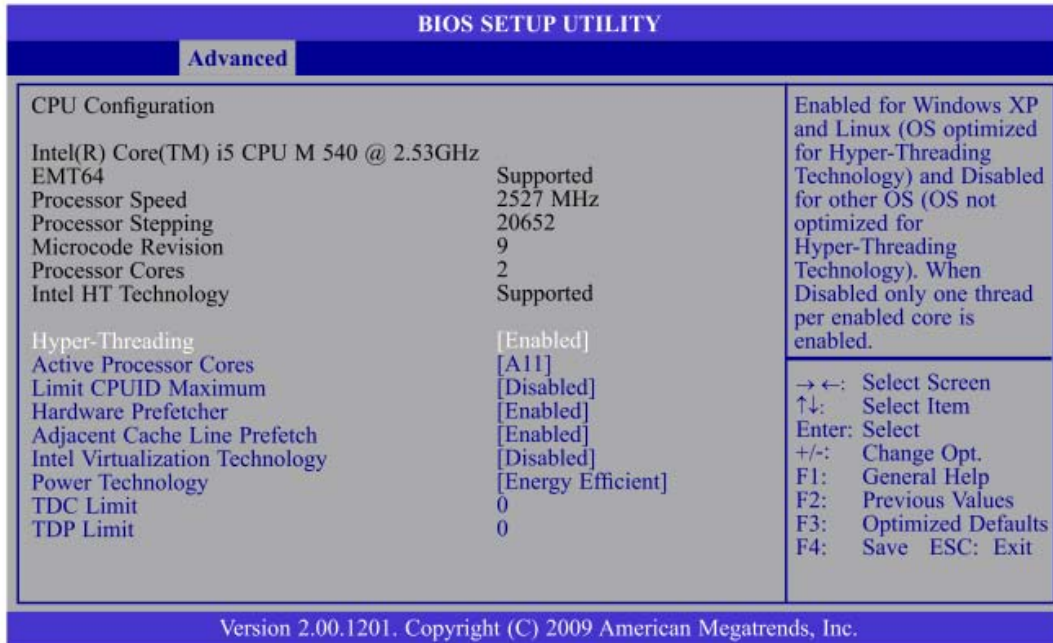
### Wake System with Fixed Time

Enables and disables the system's wake on alarm event. When enabled, the system will wake up on the specified time.



### CPU Configuration

This section is used to configure the CPU. It displays detected CPU information.



### Hyper-Threading

Enable this field for Windows XP and Linux which are optimized for Hyper Threading technology. Select disabled for other operating systems not optimized for Hyper-Threading technology. When disabled, only one thread per enabled core is enabled.

### Active Processor Cores

Used to enter the number of cores to enable in each processor package.

### Limit CPUID Maximum

The CPUID instruction of some newer CPUs returns a value greater than 3. The default is **Disabled** because this problem does not exist in the Windows series operating systems. If you are using an operating system other than Windows, this problem may occur. To avoid this problem, enable this field to limit the return value to 3 or less than 3.

### Hardware Prefetcher

Turns on or off the MLC streamer prefetcher.

### Adjacent Cache Line Prefetch

Enables or disables the adjacent cache line prefetch.

### Intel Virtualization Technology

When this field is set to Enabled, the VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

### Power Technology

Configures the power management features.

### TDC Limit

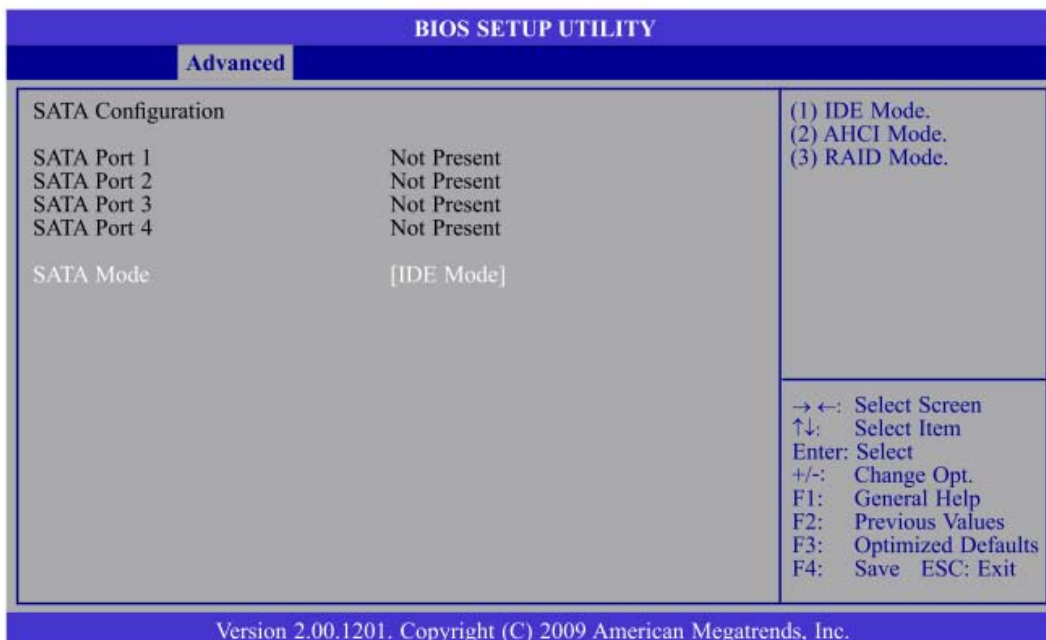
Used to select the TDC limit.

### TDP Limit

Used to select the TDP limit.

### SATA Configuration

This section is used to configure the SATA devices,



### SATA Mode

**IDE Mode** This option configures the Serial ATA drives as Parallel ATA storage devices.

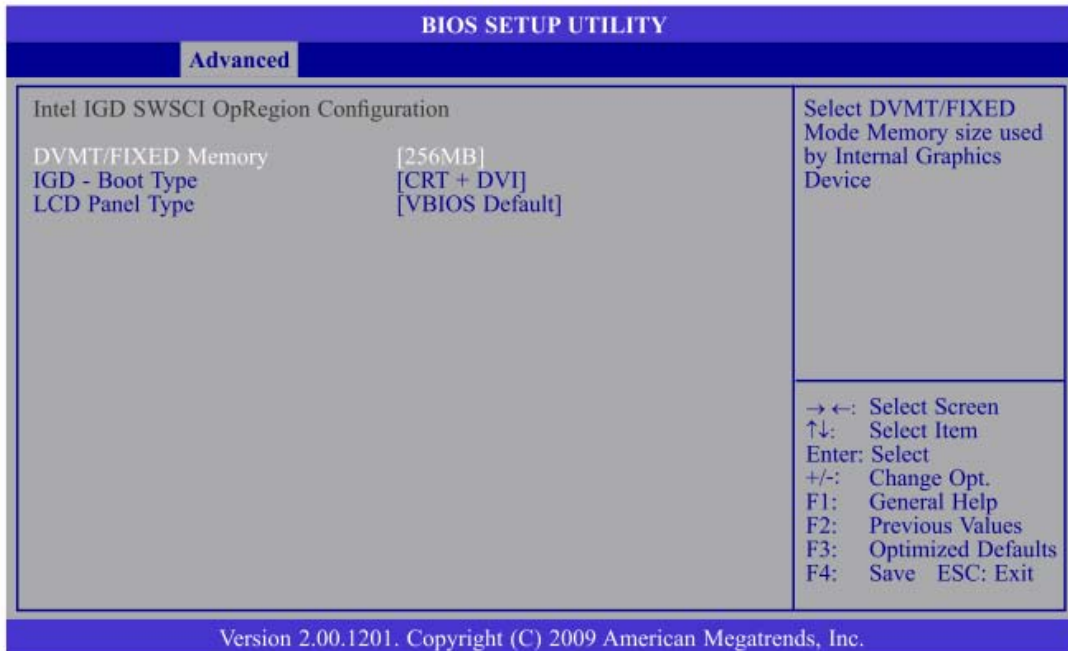
**AHCI Mode** This option allows the Serial ATA devices to use AHCI ( Advanced Host Controller Interface )

**RAID Mode** This option allows you to create RAID or Intel Matrix Storage configuration on Serial ATA devices.

### Intel IGD SWSCI OpRegion

This section is used to configure the Intel graphics display.





### DVMT/ FIXED Memory

Selects the DVMT/FIXED mode memory size used by the internal graphics devices.

### IGD – Boot Type

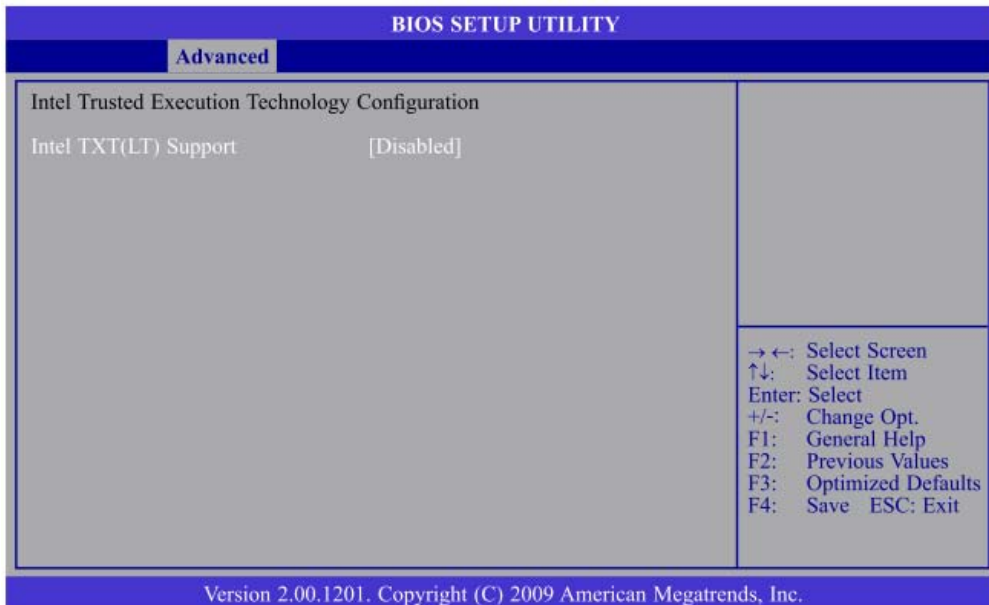
Selects the Video device that will be activated during POST. This will not affect any external graphics that may be present.

### LCD Panel Type

Selects the LCD panel used by the internal graphics device.

### Intel TXT( LT) Configuration

This section is used to configure the Intel Trusted Execution technology.



### Intel TXT( LT) Support

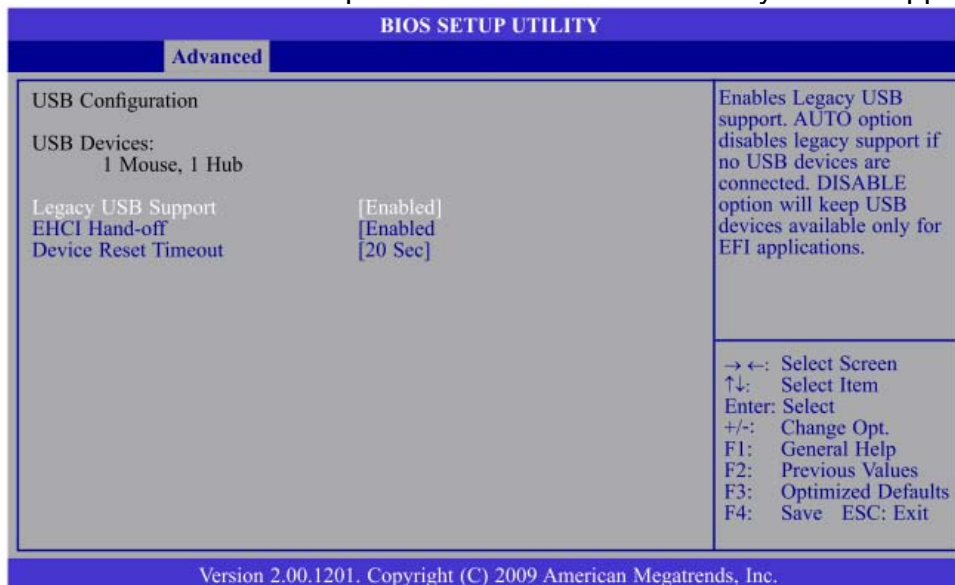
The options are Enabled and Disabled.

### USB Configuration

This section is used to configure USB devices.

### Legacy USB Support

- Enable            Enabled legacy USB
- Auto             Disables support for legacy when no USB devices are connected.
- Disable          Keeps USB devices available only for EFI applications.



## EHCI Hand-off

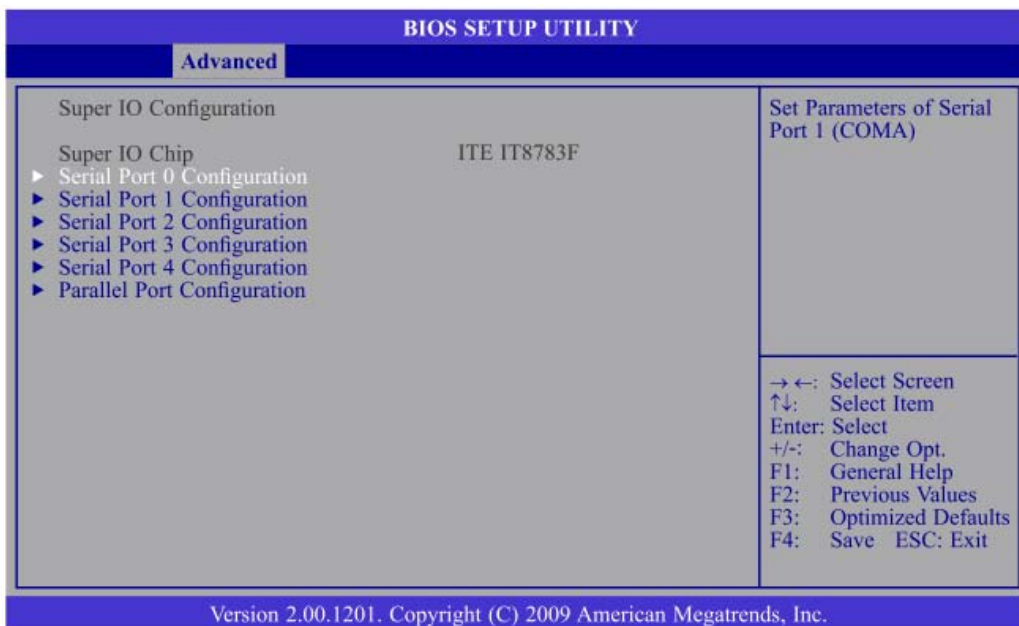
This is a workaround for operating systems that do not support EHCI hand-off. The EHCI ownership is claimed by the EHCI driver.

## Device Reset Timeout

Selects the USB mass storage device start unit command timeout.

## Super IO Configuration

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



## Serial Port 0 to 4 Configuration

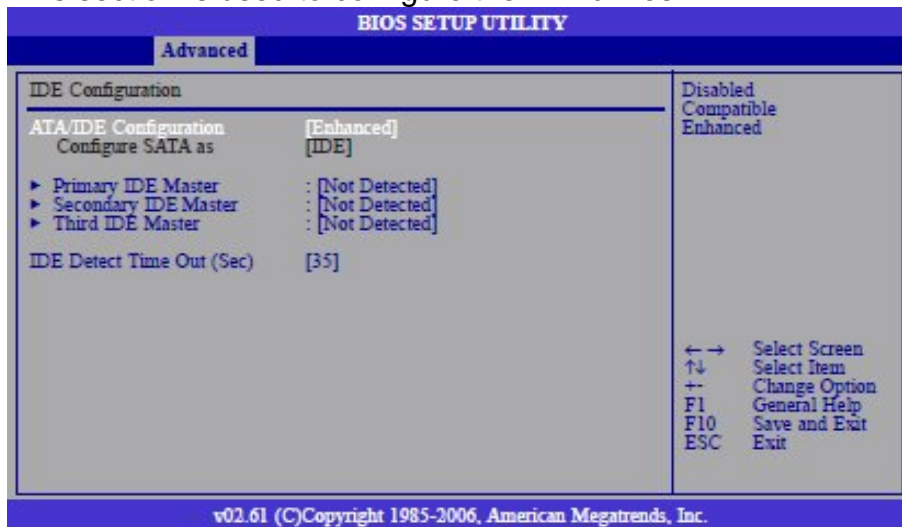
Selects the IO/IRQ setting of the I/O devices.

## Parallel Port Configuration

Configures the parallel port.

## 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

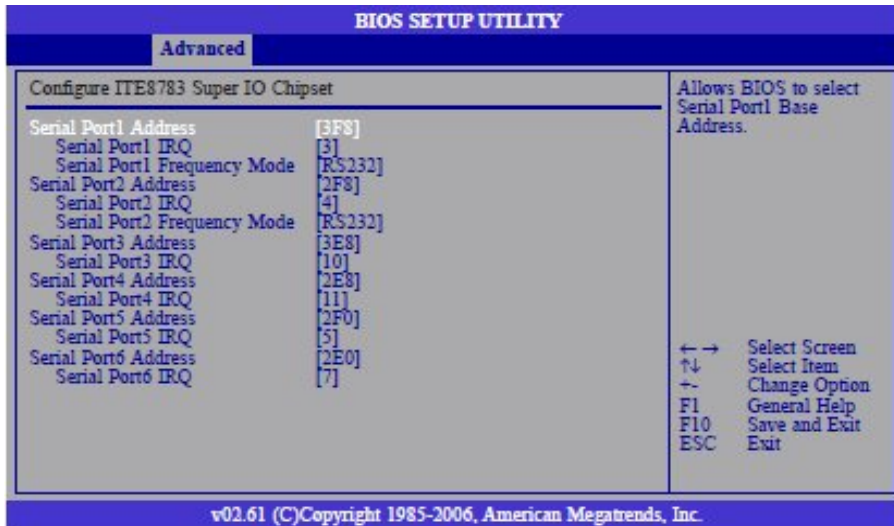
Enable this field when using operating systems without the EHCI hand-off support.

### 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 to Port6 Address

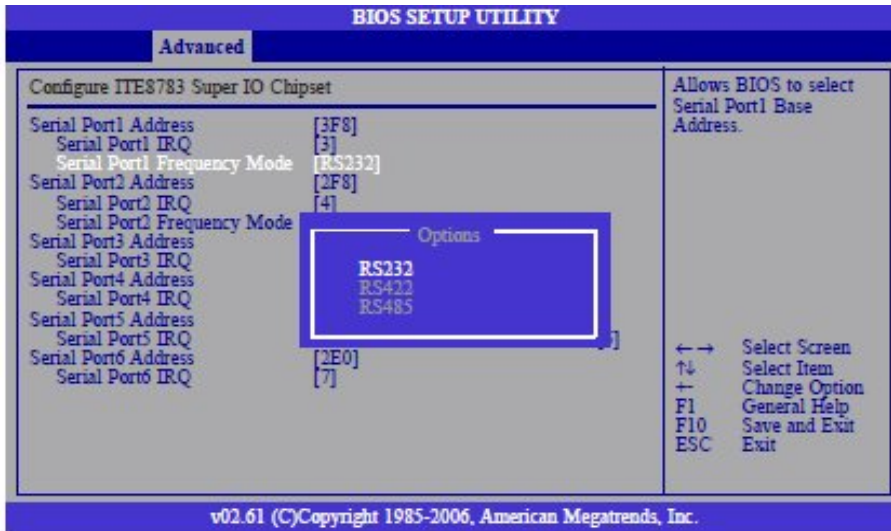
Auto The system will automatically select an I/O address for the onboard serial port. 3F8, 2F8, 3E8, 2E8, 2F0, 2E0 Allows you to manually select an I/O address for the onboard serial port. Disabled Disables the onboard serial port.

### 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.

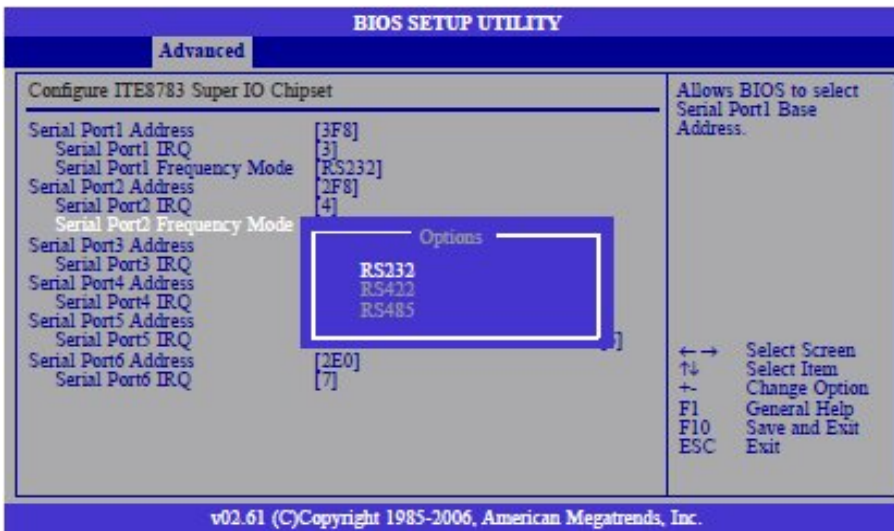
### Serial Port1 Frequency Mode

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

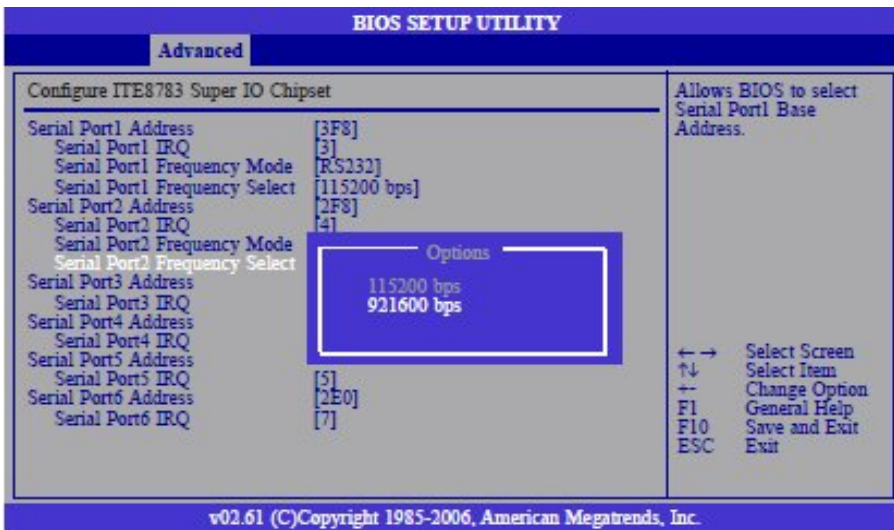


### Serial Port2 Frequency Mode

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

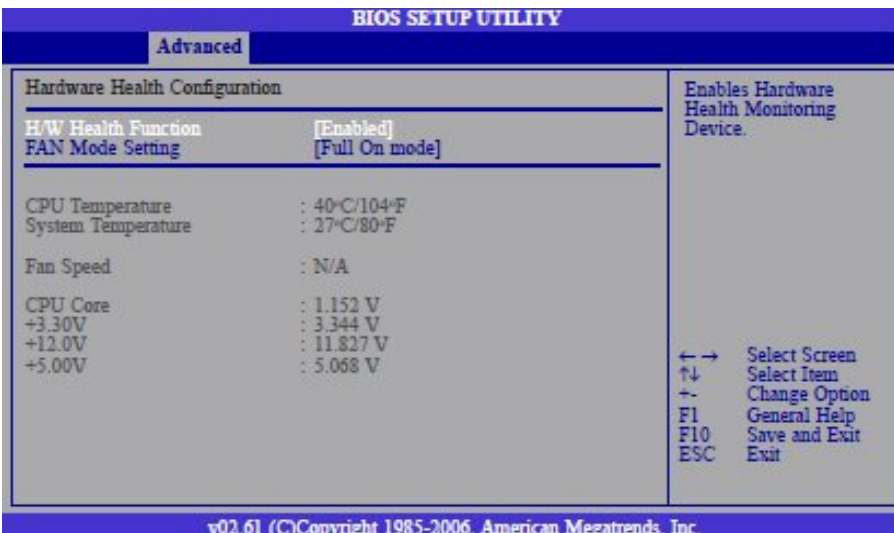


If you selected RS422 or RS485 in the “Serial Port1 Frequency Mode” and/or “Serial Port2 Frequency Mode” field, the “Serial Port1 Frequency Select” and/or “Serial Port2 Frequency Select” field will appear prompting you to select the frequency setting. The options are 115200 bps and 921600 bps.



### 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.

### Fan Speed

Not applicable

### 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.



### 1<sup>st</sup> to 3<sup>rd</sup> Boot Device

Selects the drive to boot first, second and third, respectively. The BIOS will boot the operating system according to the sequence of the drive selected.

## 5.4 Chipset

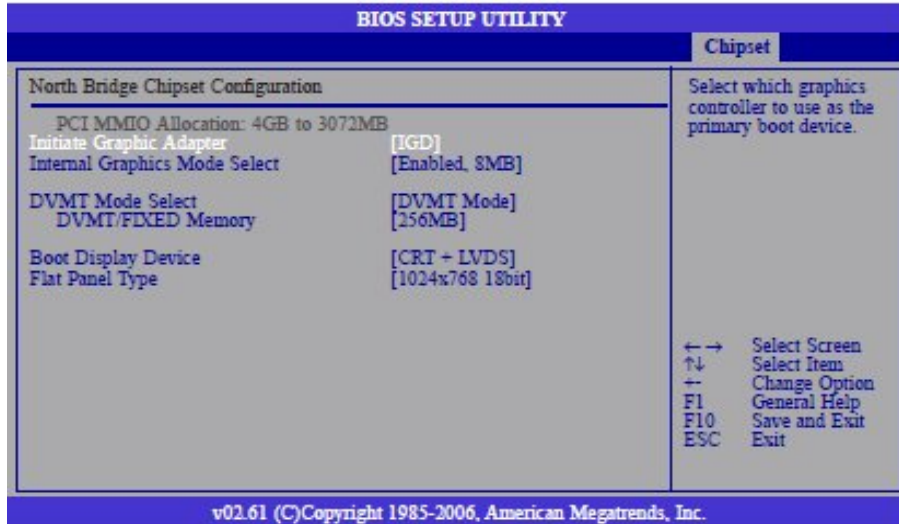
This section is used to configure the system based on the specific features of the chipset.

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.

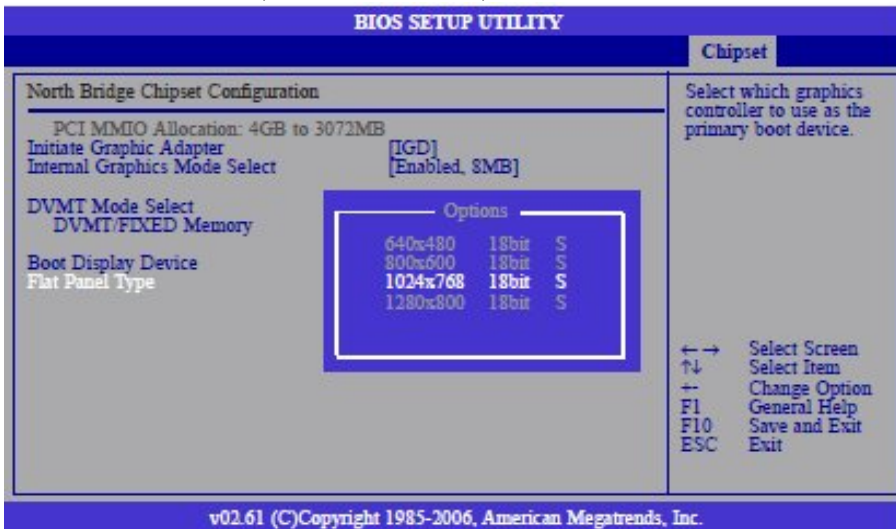
**DVMT/Fixed Memory** This field is used to select the graphics memory size used by DVMT/Fixed mode.

### Boot Display Device

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

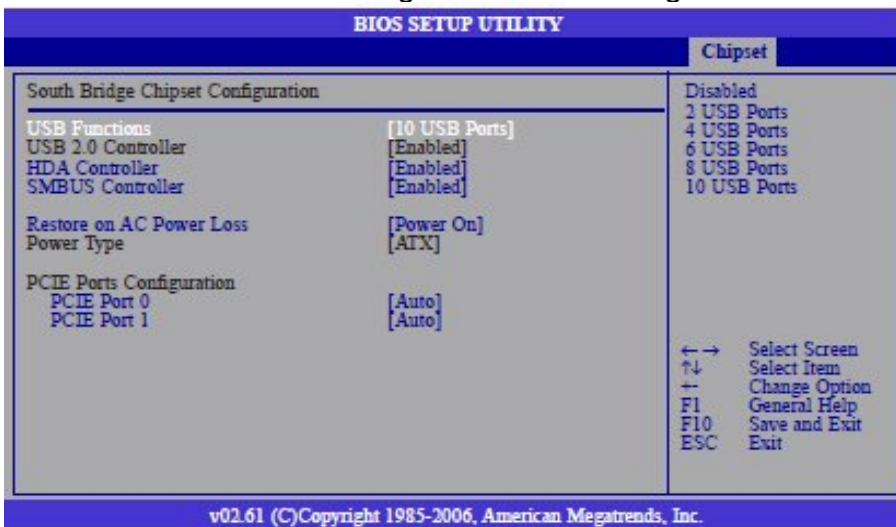
### Flat Panel Type

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).

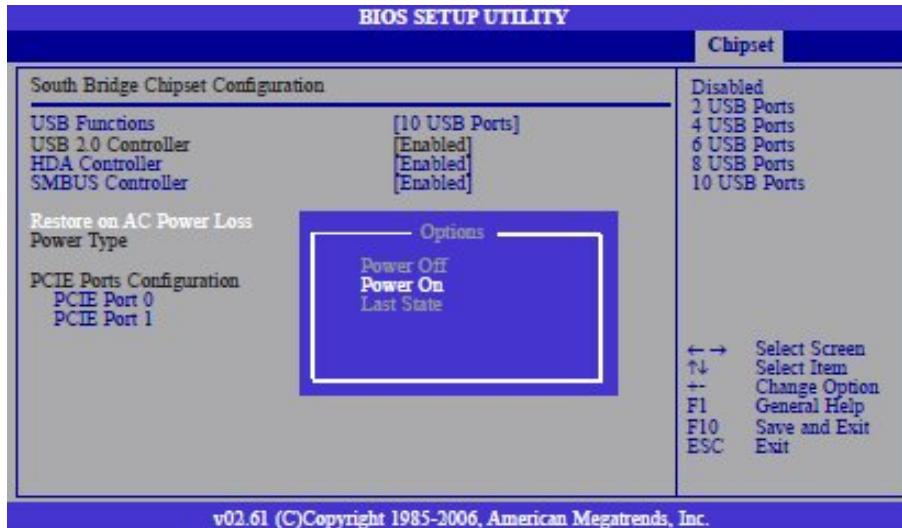
#### HDA Controller

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 33A Embedded system
CPU	Intel <sup>®</sup> 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	PER33A 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: GPIO Programming guide

GPIO (General Purpose Input/Output) pins are provided for custom system design. This appendix provides definitions and its default setting for the ten GPIO pins in the **PER33A**. The pin definition is shown in the following table:

Pin	GPIO/Mode	Power On Default	Addresses	Pin	GPIO/Mode	Power On Default	Addresses
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 - GPIO 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.

#### GPIO 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 outportb(GPIO_PORT, 0x10)
#define GPO3_LO outportb(GPIO_PORT, 0x00)
#define GPO5_HI outportb(GPIO_PORT, 0x20)
#define GPO5_LO outportb(GPIO_PORT, 0x00)
#define GPO7_HI outportb(GPIO_PORT, 0x40)
#define GPO7_LO outportb(GPIO_PORT, 0x00)
#define GPO9_HI outportb(GPIO_PORT, 0x80)
#define GPO9_LO outportb(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

### ITE8783 WatchDog Programming Guide

```
#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
```