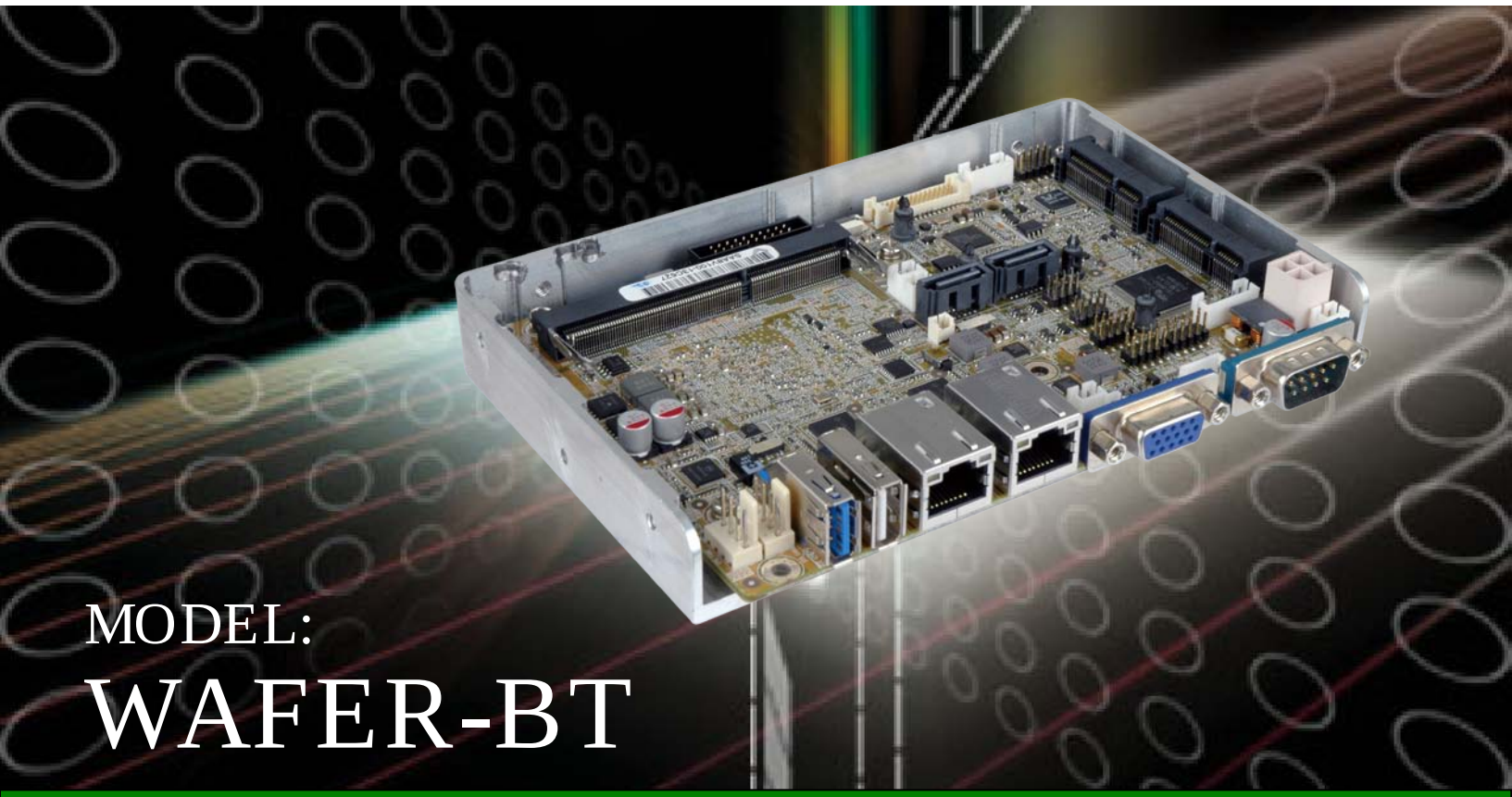
IEI Integration Corp.



MODEL:

WAFER-BT

3.5” SBC with Intel® 22nm Atom™/Celeron® on-board SoC, VGA/LVDS/iDP, Dual PCIe GbE, USB 3.0, PCIe Mini, SATA 3Gb/s, mSATA, COM, Audio and RoHS

User Manual

Rev. 1.00 - 7 July, 2014

RoHS Lead Free

Revision

Date	Version	Changes
7 July, 2014	1.00	Initial release

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Chapter

1

Introduction

1.1 Introduction

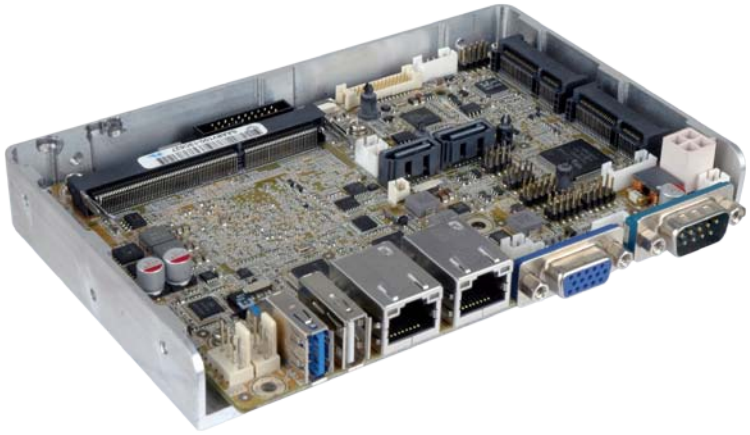


Figure 1-1: WAFER-BT

The WAFER-BT SBC motherboard is an Intel® Atom™/Celeron® processor platform. It supports one 204-pin 1066/1333 MHz single-channel DDR3L SO-DIMM supports up to 8GB (J1900, N2930, E3845, E3827, E3826) or 4GB (N2807, E3825, E3815).

The WAFER-BT includes a VGA connector, a LVDS connector and an iDP connector. Expansion and I/O include one USB 2.0 connector and one USB 3.0 connector on the rear panel, four USB 2.0 connectors by pin header and two SATA 3Gb/s connectors. Serial device connectivity is provided by two internal RS-232 connectors, one external RS-232 connector and one internal RS-422/485 connector. Two RJ-45 Ethernet connectors provide the system with smooth connections to an external LAN.

1.2 Model Variations

The model variations of the WAFER-BT Series are listed below.

Model No.	SoC
WAFER-BT-i1-J19001-R10	Intel® Celeron® quad-core J1900 (10W)
WAFER-BT-i1-N29301-R10	Intel® Celeron® quad-core N2930 (7.5W)
WAFER-BT-i1-N28071-R10	Intel® Celeron® dual-core N2807 (4.3W)
WAFER-BT-i1-E38XX1-R10	Intel® Atom™ E38XX

Table 1-1: WAFER-BT Model Variations

1.3 Features

Some of the WAFER-BT motherboard features are listed below:

- 3.5" SBC supports Intel® 22nm Atom™/Celeron® on-board SoC
- Dual independent display support
- One 204-pin 1066/1333 MHz single-channel DDR3L SO-DIMM supports up to 8GB (J1900, N2930, E3845, E3827, E3826) or 4GB (N2807, E3825, E3815)
- COM, USB 3.0, SATA 3Gb/s, PCIE mini, mSATA and Audio support
- IEI one key recovery solution allows you to create rapid OS backup and recovery

1.4 Connectors

The connectors on the WAFER-BT are shown in the figure below.

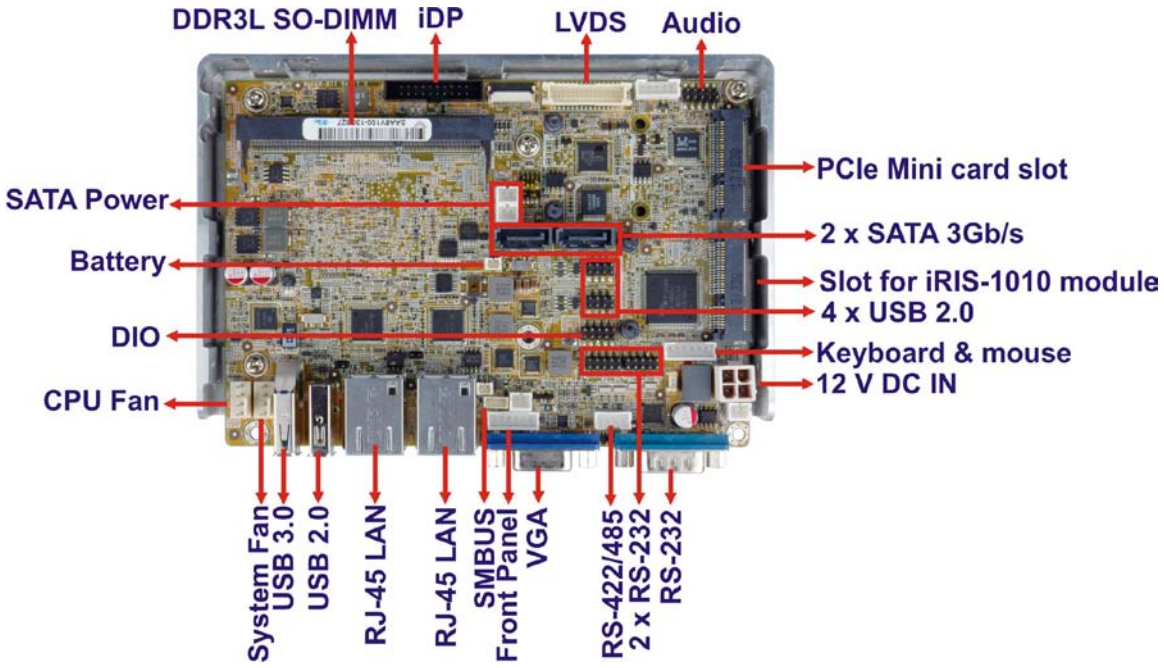


Figure 1-2: Connectors

1.5 Dimensions

The dimensions of the board are listed below:

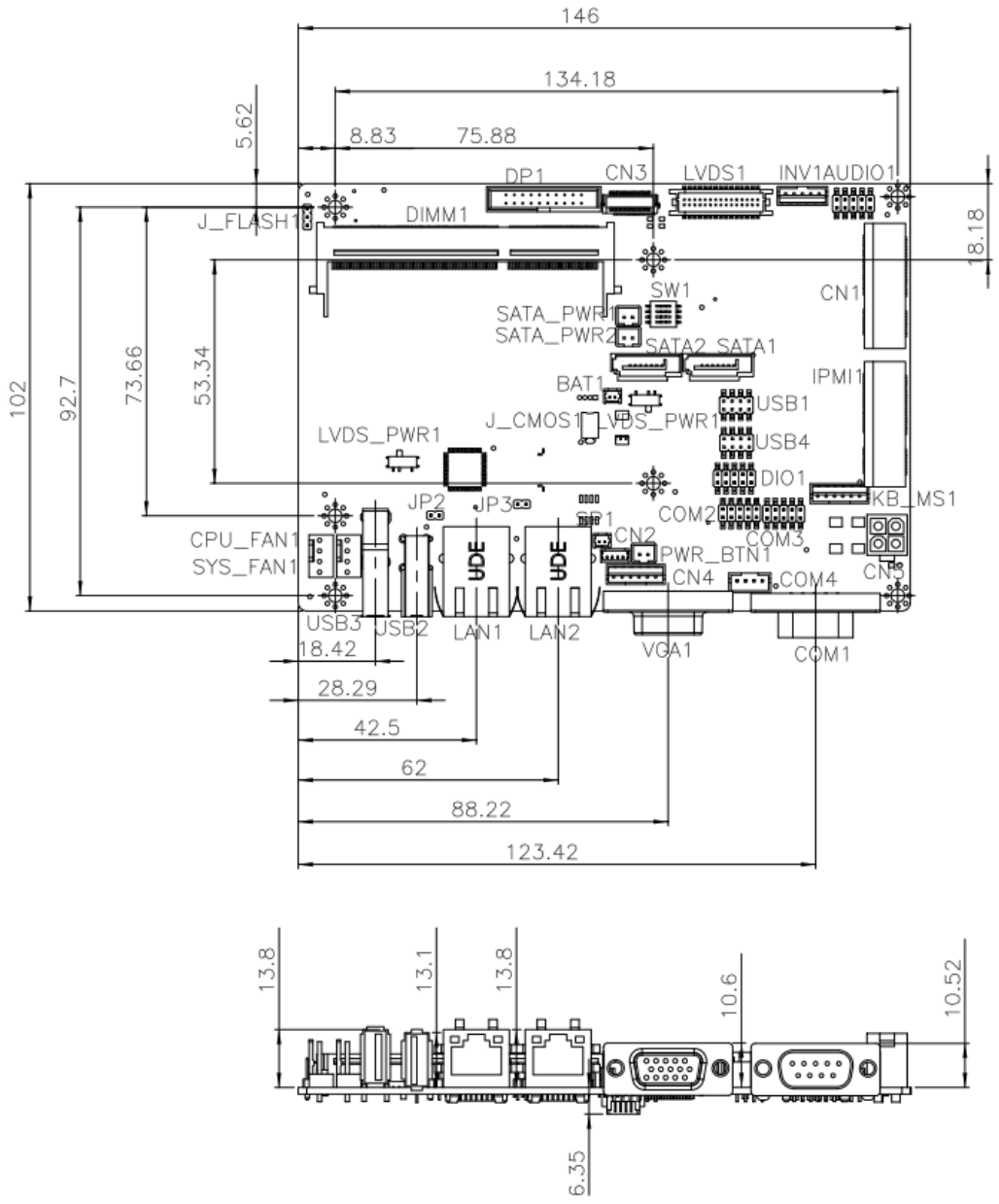


Figure 1-3: Dimensions (mm)

1.6 Data Flow

Figure 1-4 shows the data flow between the system chipset, the CPU and other components installed on the motherboard.

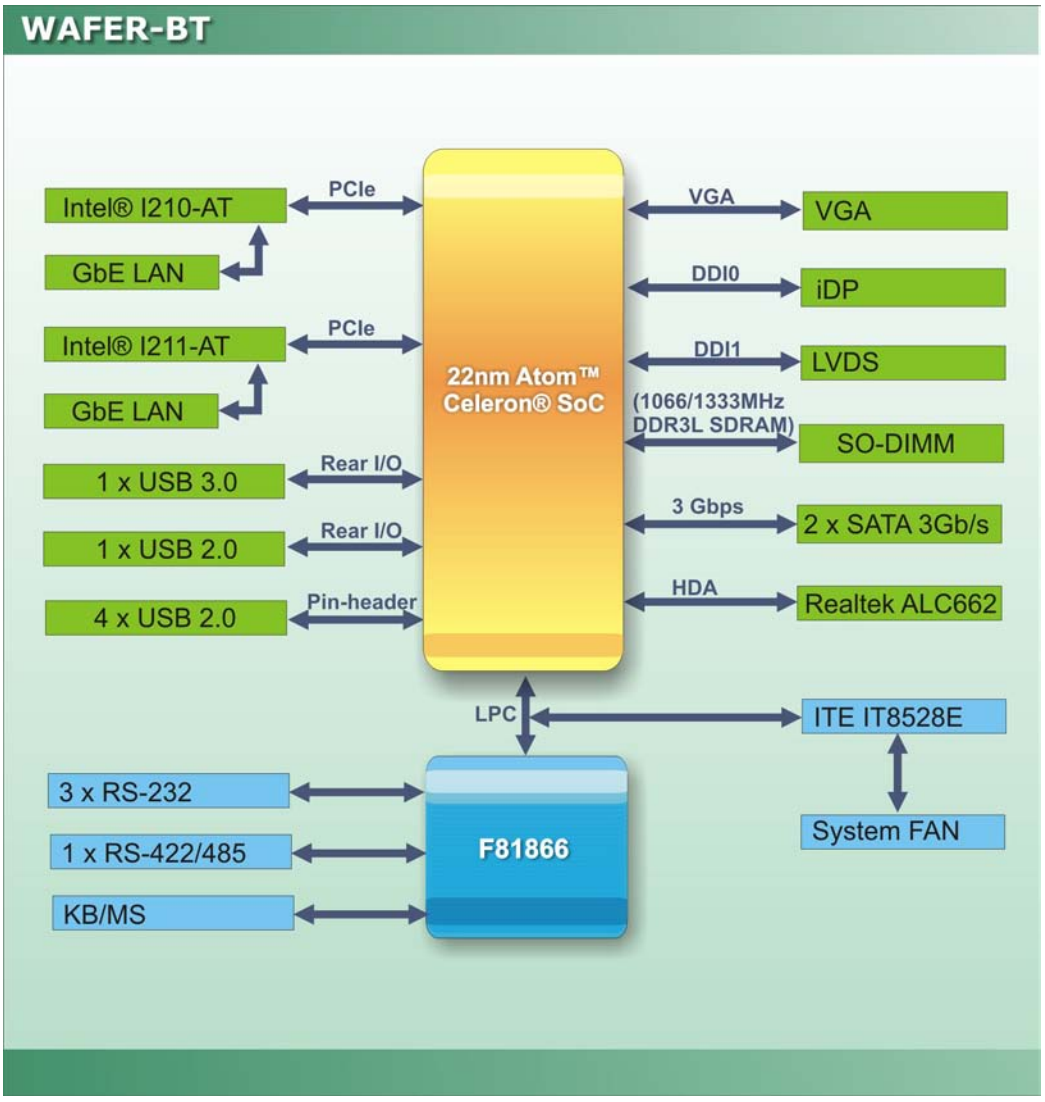


Figure 1-4: Data Flow Diagram

1.7 Technical Specifications

WAFER-BT technical specifications are listed below.

Specification	WAFER-BT
SoC	Intel® Atom™ E3845 on-board SoC (1.91GHz, quad-core, 2MB cache, TDP=10W) Intel® Atom™ E3827 on-board SoC (1.75GHz, dual-core, 1MB cache, TDP=8W) Intel® Atom™ E3826 on-board SoC (1.46GHz, dual-core, 1MB cache, TDP=7W) Intel® Atom™ E3825 on-board SoC (1.33GHz, dual-core, 1MB cache, TDP=6W) Intel® Atom™ E3815 on-board SoC (1.46GHz, single-core, 512KB cache, TDP=5W) Intel® Celeron® J1900 on-board SoC (2GHz, quad-core, 2MB cache, TDP=10W) Intel® Celeron® N2930 on-board SoC (1.83GHz, quad-core, 2MB cache, TDP=7.5W) Intel® Celeron® N2807 on-board SoC (1.58GHz, dual-core, 2MB cache, TDP=4.3W)
BIOS	AMI UEFI BIOS
Memory	One 204-pin 1066/1333 MHz single-channel DDR3L SO-DIMM supports up to 8GB (J1900, N2930, E3845, E3827, E3826) or 4GB (N2807, E3825, E3815)
Graphics	Intel® HD Graphics Gen 7 Engines with 4 execution unit, supports DX11.1, OpenGL 4.2 and OpenCL1.2
Display Output	Dual Independent Display 1 x VGA (Resolution: 2560x1600@60Hz) 1 x 24-bit dual-channel LVDS connector (1920x1200@60Hz) 1 x iDP interface for HDMI, LVDS, VGA, DVI, DP (up to 3840x2160@60 Hz)

Specification	WAFER-BT
Ethernet	1 x PCIe GbE by Intel I210 controller (LAN1) 1 x PCIe GbE by Intel I211 controller (LAN2)
Super IO	Fintek F81866
Embedded Controller	ITE IT8528E
Audio	Realtek ALC662 HD codec
Watchdog Timer	Software programmable support 1~255 sec. system reset
I/O Interface	
Audio Connector	1 x Analog audio by 10-pin (2x5) header
Ethernet	Two RJ-45 ports
KB/MS	1 x PS/2 KB/MS
Serial Ports	1 x RS-422/485 (by pin header) 3 x RS-232 (1 on rear I/O, 2 by pin header)
USB Ports	1 x USB 3.0 (on rear I/O) 5 x USB 2.0 (1 on rear I/O, 4 by pin header)
Front Panel	1 x 6-pin (1x6) wafer for power LED & HDD LED 1 x 2-pin (1x2) wafer for power button 1 x 2-pin (1x2) wafer for power reset button
LAN LED	2 x 2-pin header for LAN1 Link LED, LAN2 Link LED
FAN	1 x 4-pin CPU fan connector 1 x 4-pin system fan connector
SMBus	1 x 4-pin (1x4) wafer
Expansion	1 x Full-size PCIe Mini card slot with mSATA support (SATA2 and mSATA share SATA signal)
iRIS Remote Management Module	1 x iRIS-1010 slot
Digital I/O	8-bit digital I/O (4-bit input, 4-bit output)
Storage	

Specification	WAFER-BT
Serial ATA	2 x SATA 3Gb/s with 5V SATA power connector (no RAID)
Environmental and Power Specifications	
Power Supply	12V DC input only (AT/ATX support)
Power Consumption	+12V@1.45A (Intel® Celeron® J1900 CPU, 1 x 8GB 1333 MHz DDR3 memory)
Operating Temperature	-20°C ~ 60°C
Storage Temperature	-30°C ~ 70°C
Humidity	5% ~ 95%, non-condensing
Physical Specifications	
Dimensions	146mm x 102mm
Weight GW/NW	600 g / 250 g

Table 1-2: Technical Specifications

Chapter

2

Unpacking

2.1 Anti-static Precautions

WARNING!

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

Make sure to adhere to the following guidelines:

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

2.2 Unpacking Precautions

When the WAFER-BT is unpacked, please do the following:

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

2.3 Packing List

NOTE:

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

The WAFER-BT is shipped with the following components:

Quantity	Item and Part Number	Image
1	1 x WAFER-BT single board computer with specific heat sink	
1	Audio cable (**P/N**: 32000-072100-RS)	
1	SATA with 5V output cable kit (**P/N**: 32801-000201-100-RS)	
1	Power cable (**P/N**: 32100-087100-RS)	
1	RS-232 cable (**P/N**: 32205-002700-100-RS)	

1	Utility CD	
1	One Key Recovery CD	
1	Quick Installation Guide	

2.4 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	Image
Dual-port USB cable without bracket (**P/N**: 32000-070301-RS)	
RS-422/485 cable (**P/N**: 32205-003800-300-RS)	
PS/2 KB/MS Y-cable without bracket (**P/N**: 32006-000300-100-RS)	

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

3.1.1 WAFER-BT Layout

The figures below show all the connectors and jumpers.

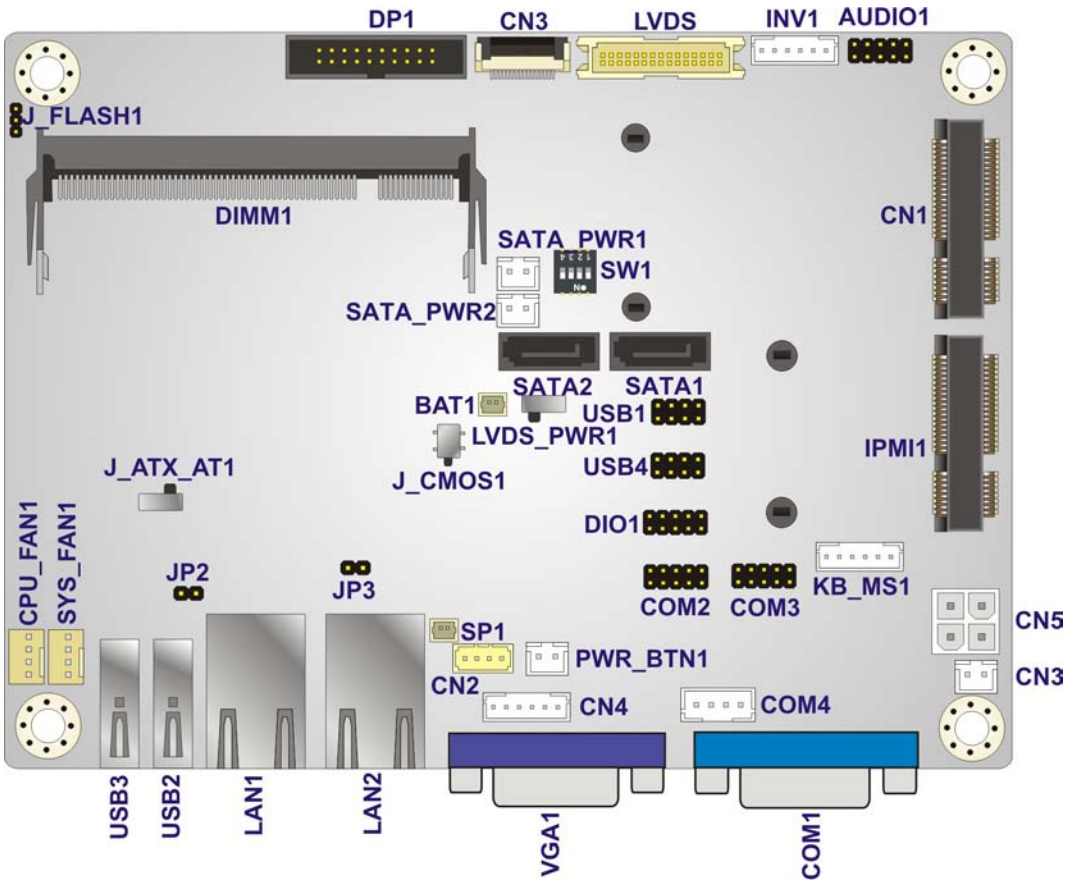


Figure 3-1: Connector and Jumper Locations (Front)

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
+12V DC-IN power connector	4-pin Molex	CN5
Audio connector	10-pin header	AUDIO1

Battery connector	2-pin wafer	BAT1
Buzzer connector	2-pin wafer	SP1
CPU fan connector	4-pin wafer	CPU_FAN1
System fan connector	4-pin wafer	SYS_FAN1
DDR3L SO-DIMM slot	DDR3L SO-DIMM slot	DIMM1
Digital I/O connector	10-pin header	DIO1
Display port connector	20-pin header	DP1
Front panel connector	6-pin wafer	CN4
iRIS-1010 module slot	iRIS-1010 module slot	IPMI1
Keyboard & mouse connector	6-pin wafer	KB_MS1
LVDS panel Connector	30-pin crimp	LVDS1
LCD panel backlight power connector	5-pin wafer	INV1
LAN LED connector	2-pin header	JP2, JP3
PCIe mini card slot	PCIe Mini card slot	CN1
Power button connector	2-pin wafer	PWR_BTN1
Reset button connector	2-pin wafer	RST_BTN1
RS-232 serial port connectors	10-pin header	COM2, COM3
RS-422/485 serial port connector	4-pin wafer	COM4
SATA 3Gb/s drive connectors	7-pin SATA connector	SATA1, SATA2
SATA power connectors	2-pin wafer	SATA_PWR1, SATA_PWR2
SMBUS connector	4-pin wafer	CN2
USB 2.0 connectors	8-pin header	USB1, USB4

Table 3-1: Peripheral Interface Connectors

3.1.3 External Interface Panel Connectors

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

Connector	Type	Label
LAN connector	RJ-45	LAN1
RS-232 serial port connector	DB-9 male	COM1
USB 2.0 connector	USB 2.0	USB2
USB 3.0 connector	USB 3.0	USB3
VGA Connector	15-pin female	VGA1

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the WAFER-BT.

3.2.1 +12V DC-IN Power Connector

CN Label: CN5

CN Type: 4-pin Molex

CN Location: See **Figure 3-2**

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

The connector supports the +12V power supply.

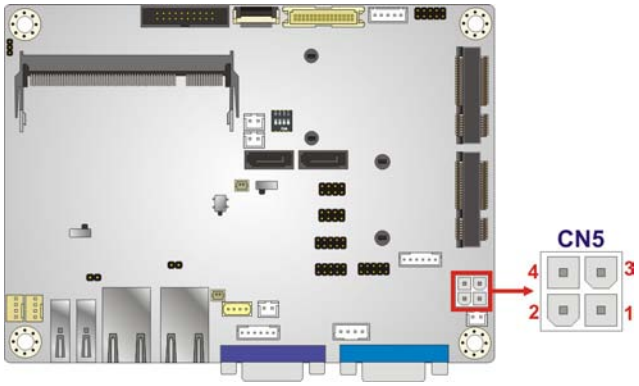


Figure 3-2: +12V DC-IN Power Connector Location

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

Table 3-3: +12V DC-IN Power Connector Pinouts

3.2.2 Audio Connector

CN Label: **AUDIO1**

CN Type: 10-pin header

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

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

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

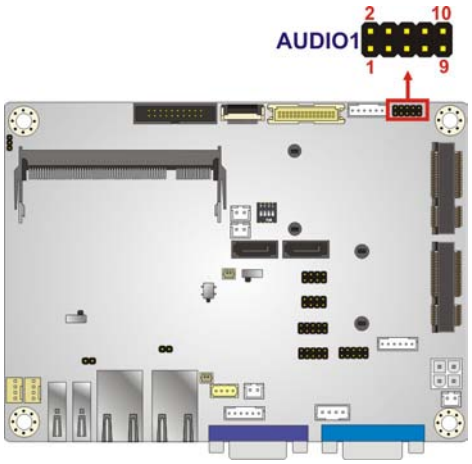


Figure 3-3: Audio Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	LINE_OUTR	2	LINEIN_R
3	Analog_GND	4	Analog_GND
5	LINE_OUTL	6	LINEIN_L
7	Analog_GND	8	Analog_GND
9	LMIC1-R	10	LMIC1-L

Table 3-4: Audio Connector Pinouts

3.2.3 Battery Connector

CN Label: **BAT1**

CN Type: 2-pin wafer

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

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

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

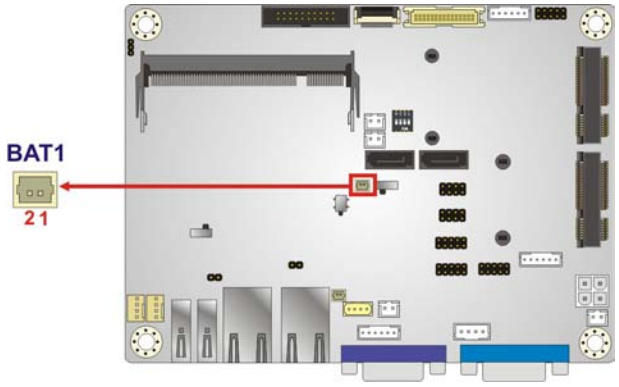


Figure 3-4: Battery Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VBATT	2	GND

Table 3-5: Battery Connector Pinouts

3.2.4 Buzzer Connector

CN Label: **SP1**

CN Type: 2-pin wafer

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

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

The buzzer connector is connected to the buzzer.

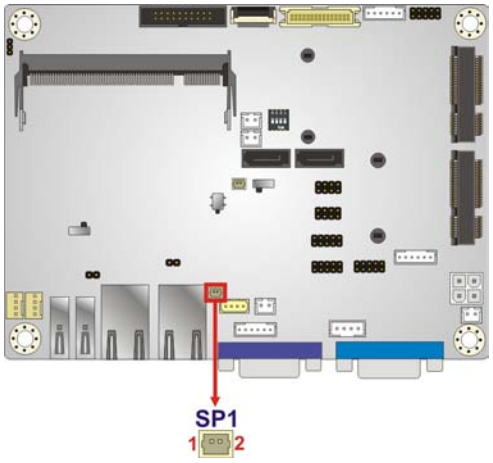


Figure 3-5: Buzzer Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	Buzzer +	2	Buzzer -

Table 3-6: Buzzer Connector Pinouts

3.2.5 CPU Fan Connector

CN Label: CPU_FAN1

CN Type: 4-pin wafer

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

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

The fan connector attaches to a cooling fan.

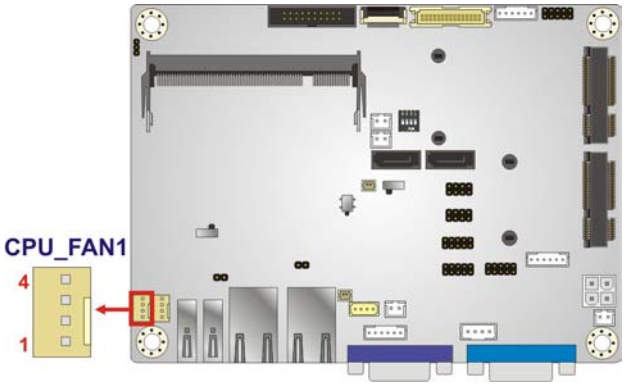


Figure 3-6: CPU Fan Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+12V
3	FANIO1	4	FANOUT1

Table 3-7: CPU Fan Connector Pinouts

3.2.6 DDR3L SO-DIMM Slot

CN Label: DIMM1

CN Type: DDR3L SO-DIMM slot

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

The DDR3L SO-DIMM slot is for DDR3L SO-DIMM memory module.

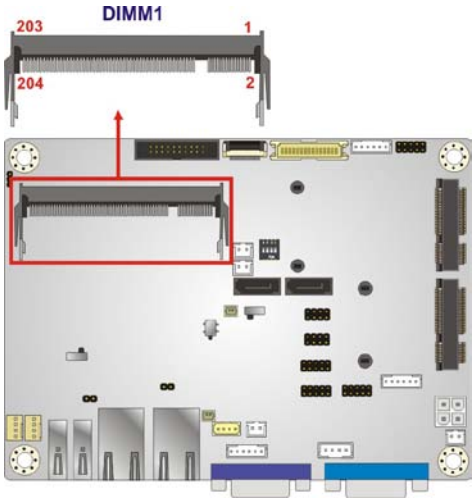


Figure 3-7: DDR3L SO-DIMM Slot Location

3.2.7 Digital I/O Connector

CN Label: DIO1

CN Type: 10-pin header

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

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

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

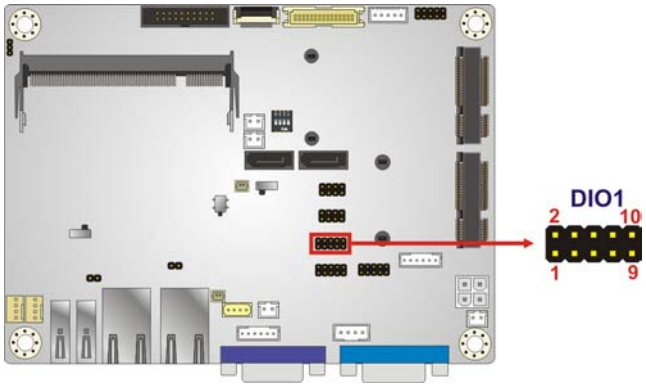


Figure 3-8: Digital I/O Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+5V

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
3	DGPO3	4	DGPO2
5	DGPO1	6	DGPO0
7	DGPI3	8	DGPI2
9	DGPI1	10	DGPI0

Table 3-8: Digital I/O Connector Pinouts

3.2.8 Display Port Connector

CN Label: DP1

CN Type: 20-pin box header

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

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

The disport port connector provides flexible display function that supports VGA, DVI, LVDS, HDMI and DisplayPort via the disport port convert board.

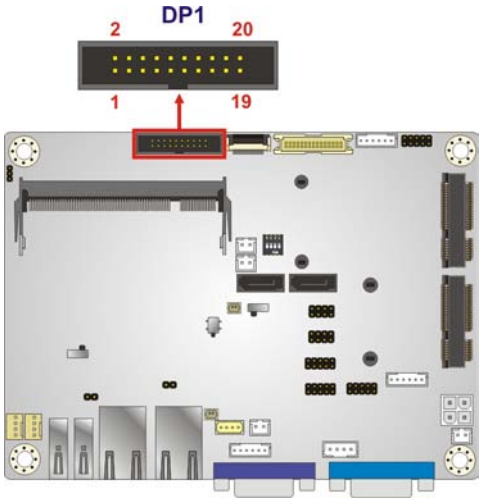


Figure 3-9: Display Port Connector Location

Pin	Description	Pin	Description
1	+5V	2	DPD_OB_LANE1_N
3	DPD_OB_LANE1_P	4	GND
5	DPD_OB_LANE3_N	6	DPD_OB_LANE3_P
7	GND	8	AUX_CTRL_DET_D

Pin	Description	Pin	Description
9	GND	10	DDI1_HPD#
11	DPD_AUX_CTRL_P2	12	DPD_AUX_CTRL_N2
13	GND	14	DPD_OB_LANE2_P
15	DPD_OB_LANE2_N	16	GND
17	DPD_OB_LANE0_P	18	DPD_OB_LANE0_N
19	+3.3V	20	NC

Table 3-9: Display Port Connector Pinouts

3.2.9 Front Panel Connector

CN Label: CN4

CN Type: 6-pin wafer

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

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

The front panel connector connects to the indicator LEDs on the system front panel.

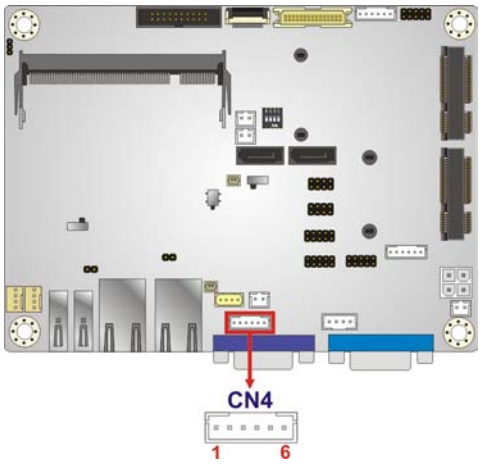


Figure 3-10: Front Panel Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	2	GND
3	PWR_LED+	4	PWR_LED-
5	HDD_LED+	6	HDD_LED-

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION

Table 3-10: Front Panel Connector Pinouts

3.2.10 iRIS-1010 module slot

CN Label: IPMI1

CN Type: IPMI 2.0 slot

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

The iRIS-1010 module slot allows installation of the iRIS-1010 module.

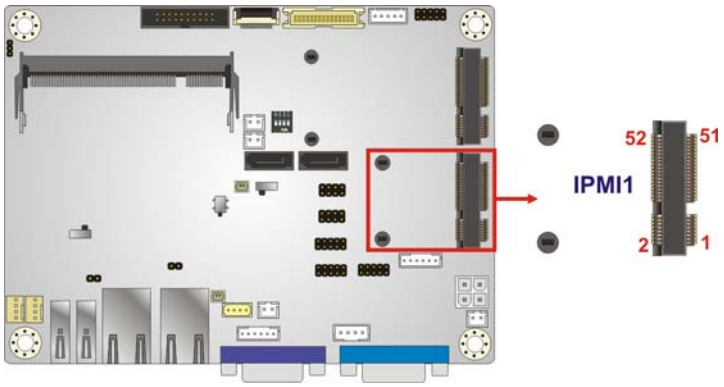


Figure 3-11: iRIS-1010 Module Slot Location

WARNING:

The iRIS-1010 module slot is designed to install the IEI iRIS-1010 IPMI 2.0 module. DO NOT install other modules into the iRIS-1010 module slot. Doing so may cause damage to the WAFER-BT.

3.2.11 Keyboard and Mouse Connector

CN Label: KB_MS1

CN Type: 6-pin wafer

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

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

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

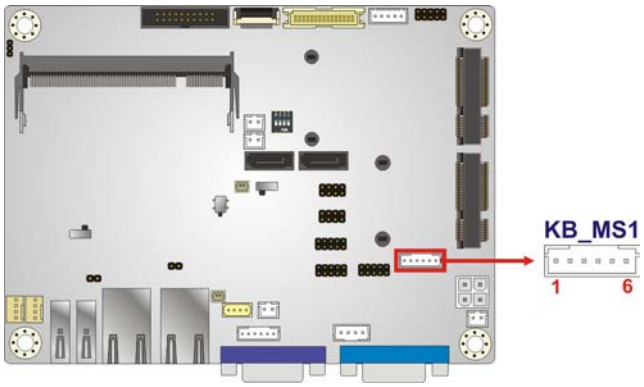


Figure 3-12: Keyboard and Mouse Location

Pin	Description
1	VCC
2	Mouse Data
3	Mouse Clock
4	Keyboard Data
5	Keyboard Clock
6	GND

Table 3-11: Keyboard and Mouse Connector Pinouts

3.2.12 LVDS Backlight Inverter Connector

CN Label: INV1

CN Type: 5-pin wafer

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

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

The backlight inverter connector provides power to an LCD panel.

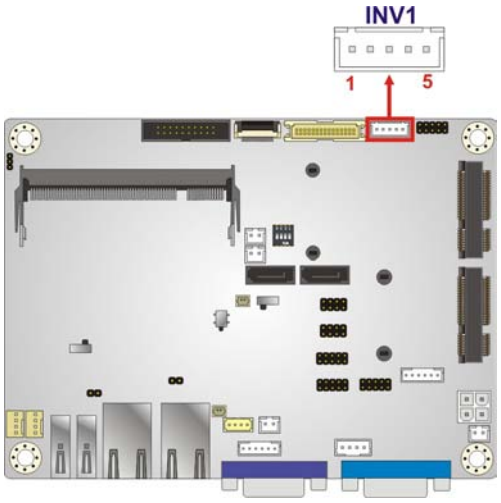


Figure 3-13: Backlight Inverter Connector Location

Pin	Description
1	BRIGHTNESS2
2	GND
3	12V
4	GND
5	ENABKL2

Table 3-12: Backlight Inverter Connector Pinouts

3.2.13 LVDS LCD Connector

CN Label: LVDS1

CN Type: 30-pin crimp

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

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

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

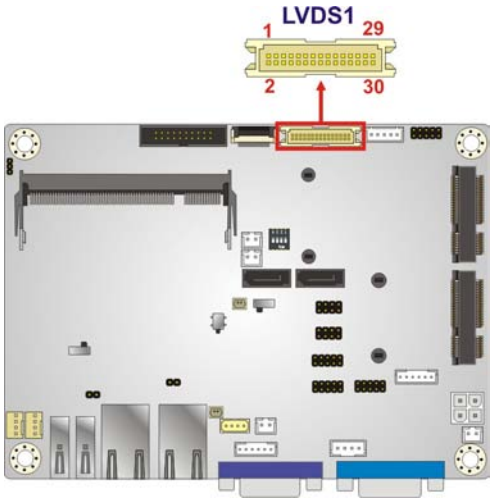


Figure 3-14: LVDS Connector Location

Pin	Description	Pin	Description
1	GND	16	LVDSB_DATA0#
2	GND	17	LVDSB_DATA1
3	LVDSA_DATA0	18	LVDSBDATA1#
4	LVDSA_DATA0#	19	LVDSB_DATA2
5	LVDSA_DATA1	20	LVDSB_DATA2#
6	LVDSA_DATA1#	21	LVDSB_CLK
7	LVDSA_DATA2	22	LVDSB_CLK#
8	LVDSA_DATA2#	23	LVDSB_DATA3
9	LVDSA_CLK	24	LVDSB_DATA3#
10	LVDSA_CLK#	25	GND
11	LVDSA_DATA3	26	GND
12	LVDSA_DATA3#	27	+3.3V
13	GND	28	+3.3V
14	GND	29	+3.3V
15	LVDSB_DATA0	30	+3.3V

Table 3-13: LVDS Connector Pinouts

3.2.14 LAN LED Connector

CN Label: JP2, JP3

CN Type: 2-pin header

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

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

The LAN LED connectors connect to the LAN link LEDs on the system.

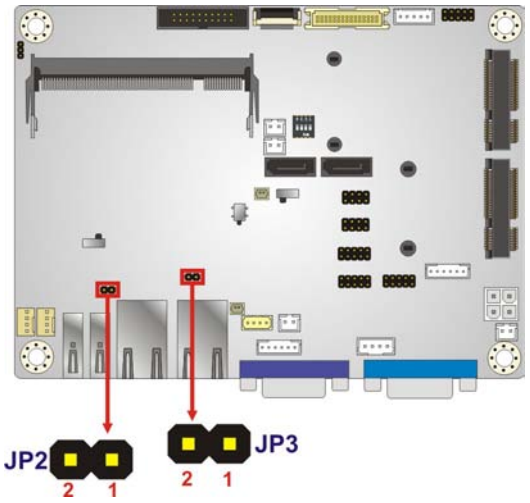


Figure 3-15: LAN LED Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+3.3VLAN	2	LAN_LED_LINK#

Table 3-14: LAN LED Connector Pinouts

3.2.15 PCIe Mini Card Slot

CN Label: CN1

CN Type: PCIe Mini card slot

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

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

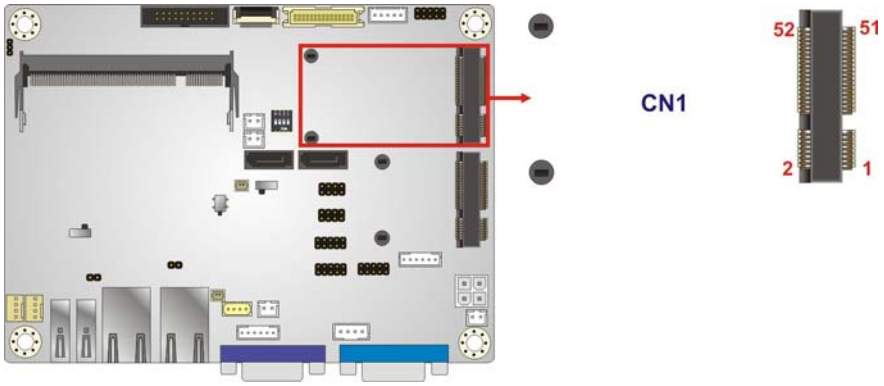


Figure 3-16: PCIe Mini Card Slot Location

3.2.16 Power Button Connector

CN Label:	PWR_BTN1
CN Type:	2-pin wafer
CN Location:	See **Figure 3-17**
CN Pinouts:	See **Table 3-15**

The power button connector is connected to a power switch on the system chassis to enable users to turn the system on and off.

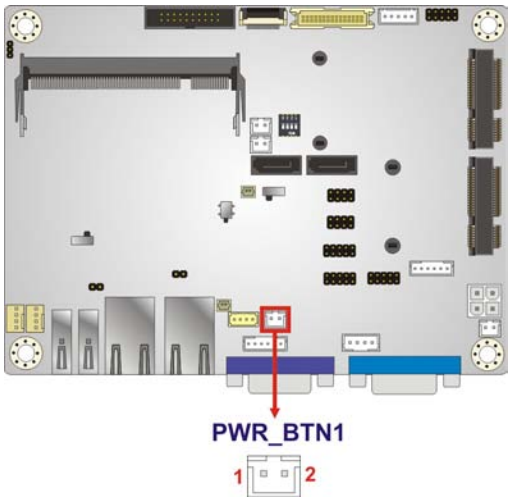


Figure 3-17: Power Button Connector Location

Pin	Description
1	PWRBTN_SW#

2	GND

Table 3-15: Power Button Connector Pinouts

3.2.17 Reset Button Connector

CN Label: RST_BTN1

CN Type: 2-pin wafer

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

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

The reset button connector is connected to a reset switch on the system chassis to enable users to reboot the system when the system is turned on.

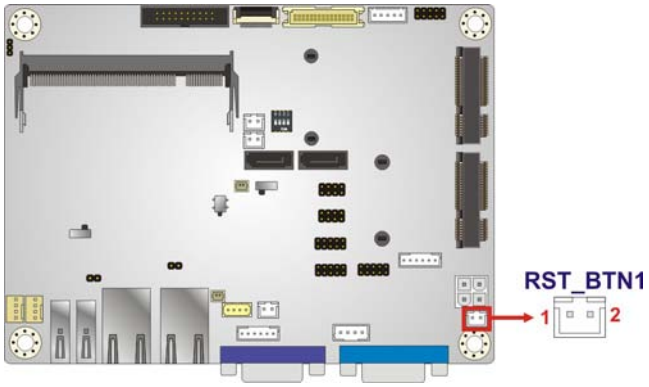


Figure 3-18: Reset Button Connector Location

Pin	Description
1	PM_SYSRST_R#
2	GND

Table 3-16: Reset Button Connector Pinouts

3.2.18 RS-232 Serial Port Connectors

CN Label: COM2, COM3

CN Type: 10-pin header

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

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

The serial connector provides RS-232 connection.

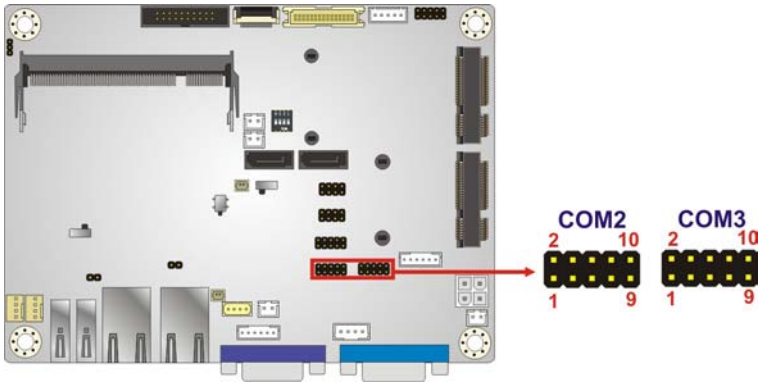


Figure 3-19: RS-232 Serial Port Connectors Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	NDCD	6	NDSR
2	NRXD	7	NRTS
3	NTXD	8	NCTS
4	NDTR	9	NRI
5	GND	10	GND

Table 3-17: RS-232 Serial Port Connector Pinouts

3.2.19 RS-422/485 Serial Port Connector

CN Label: COM4

CN Type: 4-pin wafer

CN Location: See **Figure 3-20**

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

This connector provides RS-422 or RS-485 communications.

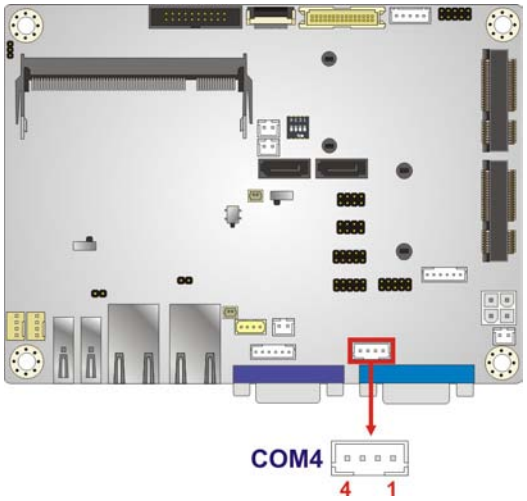


Figure 3-20: RS-422/485 Connector Location

Pin	Description	Pin	Description
1	RXD485#	2	RXD485+
3	TXD485+	4	TXD485#

Table 3-18: RS-422/485 Connector Pinouts

Use the optional RS-422/485 cable to connect to a serial device. The pinouts of the DB-9 connector are listed below.

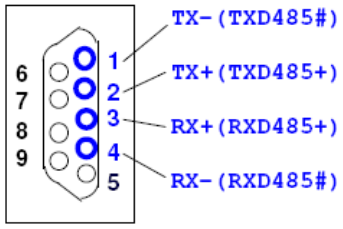
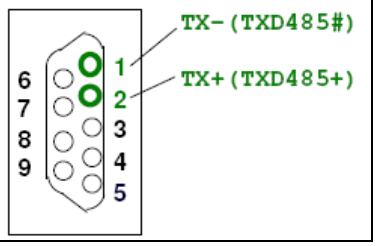
RS-422 Pinouts	RS-485 Pinouts
	

Table 3-19: DB-9 RS-422/485 Pinouts

3.2.20 SATA 3Gb/s Drive Connector

CN Label: **SATA1, SATA2**

CN Type: 7-pin SATA connector

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

The SATA 3Gb/s drive connector is connected to a SATA 3Gb/s drive. The SATA 3Gb/s drive transfers data at speeds as high as 3Gb/s.

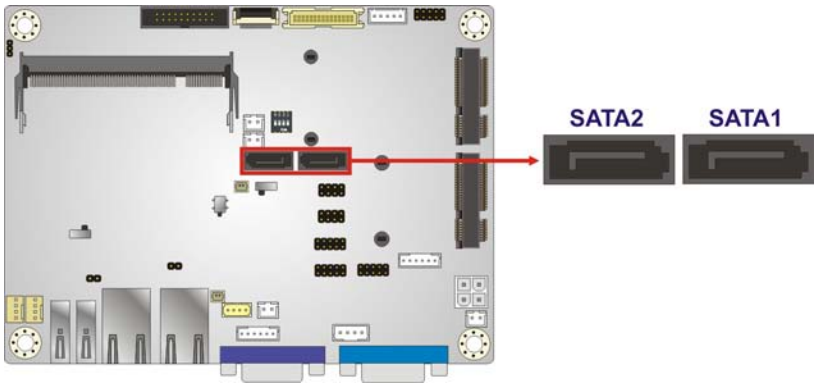


Figure 3-21: SATA 3Gb/s Drive Connectors Locations

3.2.21 SATA Power Connector

CN Label:	**SATA_PWR1**
CN Type:	2-pin wafer
CN Location:	See **Figure 3-22**
CN Pinouts:	See **Table 3-20**

The SATA power connector provides +5V power output to the SATA connector.

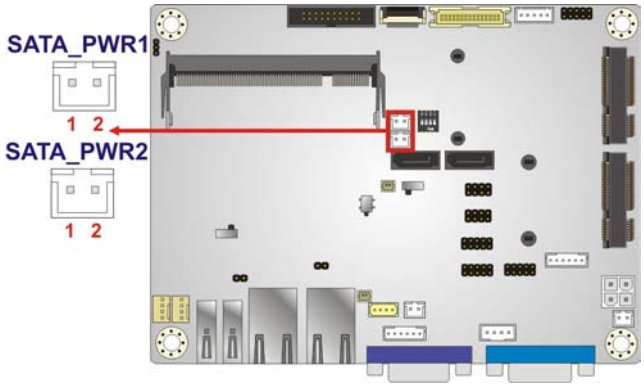


Figure 3-22: SATA Power Connector Location

PIN NO.	DESCRIPTION
1	+5V

PIN NO.	DESCRIPTION
2	GND

Table 3-20: SATA Power Connector Pinouts

3.2.22 SMBUS Connector

CN Label: CN2

CN Type: 4-pin wafer

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

CN Pinouts: See **Table 3-21**

The SMBUS (System Management Bus) connector provides low-speed system management communications.

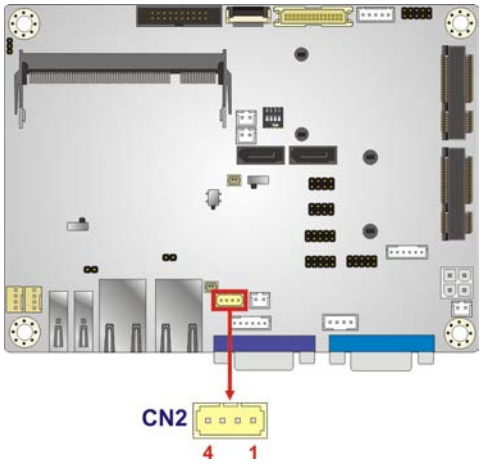


Figure 3-23: SMBUS Connectors Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	SMBDATA
3	SMBCLK	4	+5V

Table 3-21: SMBUS Connectors Pinouts

3.2.23 USB Connectors

CN Label: **USB1, USB4**

CN Type: 8-pin header

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

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

The USB connectors provides four USB 2.0 ports by dual-port USB cable.

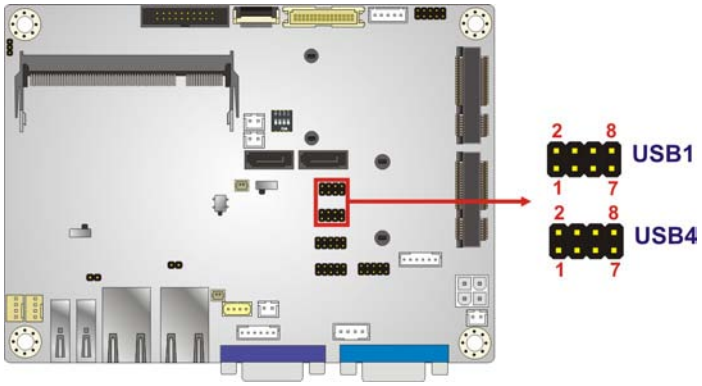


Figure 3-24: USB Connectors Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	2	GND
3	-DATA_USB1/3	4	-DATA_USB2/4
5	+DATA_USB1/3	6	+DATA_USB2/4
7	GND	8	+5V

Table 3-22: USB Connector Pinouts

3.3 External Peripheral Interface Connector Panel

Figure 3-25 shows the WAFER-BT external peripheral interface connector (EPIC) panel. The EPIC panel consists of the following:

- 2 x LAN connectors
- 1 x USB 3.0 connector
- 1 x USB 2.0 connector
- 1 x RS-232 serial port connector
- 1 x VGA connector

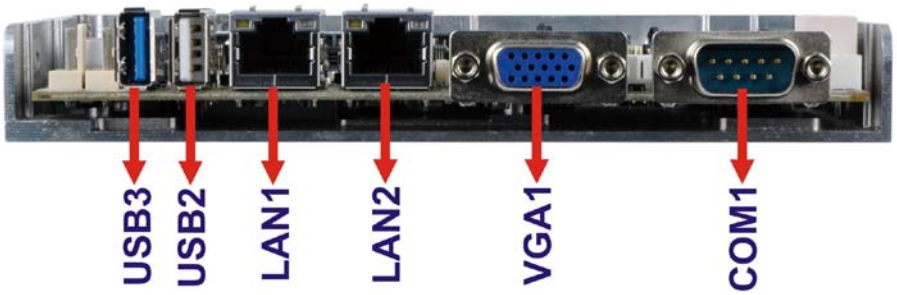


Figure 3-25: External Peripheral Interface Connector

3.3.1 LAN Connector

CN Label: LAN1, LAN2

CN Type: RJ-45

CN Location: See **Figure 3-25**

CN Pinouts: See **Figure 3-26** and **Table 3-23**

The LAN connector connects to a local network.

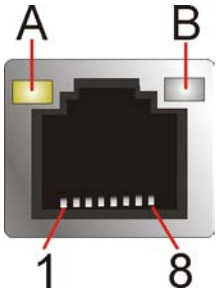


Figure 3-26: LAN Connector

Pin	Description	Pin	Description
1	MDIA3-	5	MDIA2+
2	MDIA3+	6	MDIA1+
3	MDIA1-	7	MDIA0-
4	MDIA2-	8	MDIA0+

Table 3-23: LAN Pinouts

LED	Description	LED	Description
A	on: linked blinking: data is being sent/received	B	off: 10 Mb/s green: 100 Mb/s orange: 1000 Mb/s

Table 3-24: Connector LEDs

3.3.2 USB Connectors

CN Label: USB2, USB3

CN Type: USB 2.0 & USB 3.0 ports

CN Location: See **Figure 3-25**

CN Pinouts: See Table 3-26

The WAFER-BT has one external USB 2.0 port and one external USB 3.0 port. The USB connector can be connected to a USB device. The pinouts of USB 2.0 port & USB 3.0 connectors are shown below.

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	2	-DATA_USB3
3	-DATA_USB4	4	GND

Table 3-25: USB 2.0 Port Pinouts

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+5V	2	USB2P0-
3	USB2P0+	4	GND
5	USB3P0_RXDN1	6	USB3P0_RXDP1
7	GND	8	USB3P0_TXDN1
9	USB3P0_TXDP1		

Table 3-26: USB 3.0 Port Pinouts

3.3.3 RS-232 Serial Port Connector

CN Label: **COM1**

CN Type: DB-9 Male

CN Location: See **Figure 3-25**

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

The serial port connects to a RS-232 serial communications device.

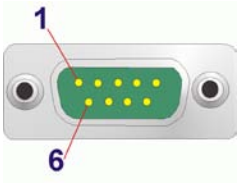


Figure 3-27: RS-232 Serial Port Connector

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	NDCD1#	6	NDSR1#
2	NRXD1	7	NRTS1#
3	NTXD1	8	NCTS1#
4	NDTR1#	9	NRI1#
5	GND		

Table 3-27: RS-232 Serial Port Connector Pinouts

3.3.4 VGA Connector

CN Label: VGA1

CN Type: 15-pin female (VGA)

CN Location: See **Figure 3-25**

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

The VGA port connects to a monitor that accepts a standard VGA input.

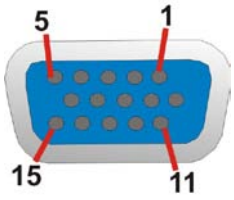


Figure 3-28: VGA Connector

PIN	DESCRIPTION	PIN	DESCRIPTION
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	VGAVCC	10	HOTPLUG
11	NC	12	DDCDAT
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 3-28: VGA Connector Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

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

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-BT. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-BT or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- ***Wear an anti-static wristband***: Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- ***Self-grounding***: Before handling the board, touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- ***Use an anti-static pad***: When configuring the WAFER-BT, place it on an antic-static pad. This reduces the possibility of ESD damaging the WAFER-BT.
- ***Only handle the edges of the PCB***: When handling the PCB, hold the PCB by the edges.

4.2 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before installation. All installation notices must be strictly adhered to. Failing to adhere to these precautions may lead to severe damage and injury to the person performing the installation.

WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the WAFER-BT, WAFER-BT components and injury to the user.

Before and during the installation please **DO** the following:

- Read the user manual:
  - The user manual provides a complete description of the WAFER-BT installation instructions and configuration options.
- Wear an electrostatic discharge cuff (ESD):
  - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- Place the WAFER-BT on an antistatic pad:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- Turn all power to the WAFER-BT off:
  - When working with the WAFER-BT, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the WAFER-BT **DO NOT:**

- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

4.3 SO-DIMM Installation

WARNING:

Using incorrectly specified SO-DIMM may cause permanently damage the WAFER-BT. Please make sure the purchased SO-DIMM complies with the memory specifications of the WAFER-BT. SO-DIMM specifications compliant with the WAFER-BT are listed in the specification table of Chapter 1.

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

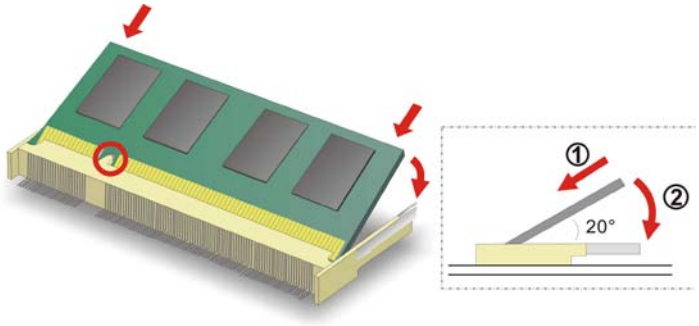


Figure 4-1: SO-DIMM Installation

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

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

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

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

4.4 System Configuration

The system configuration is controlled by buttons, jumpers and switches. The system configuration should be performed before installation.

4.4.1 AT/ATX Mode Select Switch

CN Label:	**J_ATX_AT1**
CN Type:	switch
CN Location:	See **Figure 4-2**
CN Settings:	See **Table 4-1**

The AT/ATX mode select switch specifies the systems power mode as AT or ATX. AT/ATX mode select switch settings are shown in **Table 4-1**.

Setting	Description
Short A-B	ATX Mode (Default)
Short B-C	AT Mode

Table 4-1: AT/ATX Mode Select Switch Settings

The location of the AT/ATX mode select switch is shown in **Figure 4-2** below.

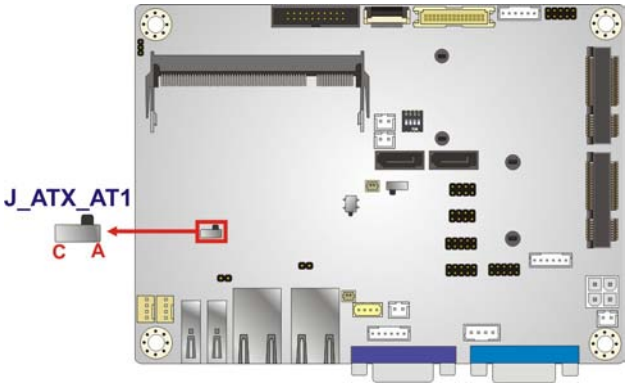


Figure 4-2: AT/ATX Mode Select Switch Location

4.4.2 Clear CMOS Button

CN Label:	J_CMOS1
CN Type:	button
CN Location:	See **Figure 4-3**
CN Settings:	See **Table 4-2**

If the WAFER-BT fails to boot due to improper BIOS settings, use the button to clear the CMOS data and reset the system BIOS information.

The clear CMOS button settings are shown in **Table 4-2**.

Setting	Description	
Open	Normal Operation	Default
Push	Clear CMOS Setup	

Table 4-2: Clear CMOS Button Settings

The location of the clear CMOS button is shown in **Figure 4-3**

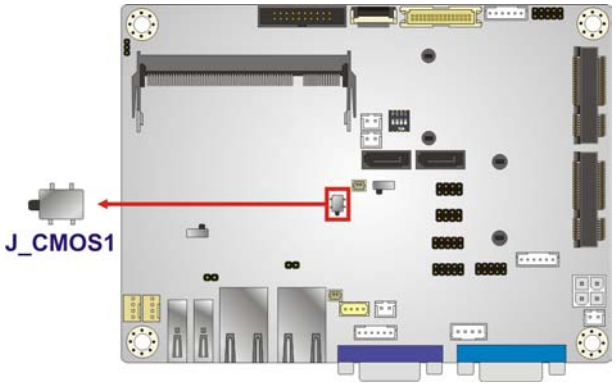


Figure 4-3: Clear CMOS Button Location

4.4.3 LVDS Panel Resolution Selection

Jumper Label:	SW1
Jumper Type:	DIP switch

Jumper Settings: See **Table 4-3**

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

Selects the resolution of the LCD panel connected to the LVDS connector.

* ON=0, OFF=1; Single=S, Dual=D

SW1 (4-3-2-1)	Description
0000	800x600 18-bit S (default)
0001	1024x768 18-bit S
0010	1024x768 24-bit S
0011	1280x768 18-bit S
0100	1280x800 18-bit S
0101	1280x960 18-bit S
0110	1280x1024 24-bit D
0111	1366x768 18-bit S
1000	1366x768 24-bit S
1001	1440x960 24-bit D
1010	1400x1050 24-bit D
1011	1600x900 24-bit D
1100	1680x1050 24-bit D
1101	1600x1200 24-bit D
1110	1920x1080 24-bit D
1111	1920x1200 24-bit D

Table 4-3: LVDS Panel Resolution Selection

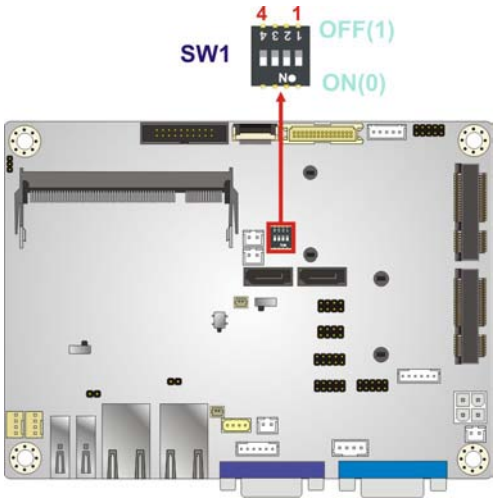


Figure 4-4: LVDS Panel Resolution Selection Switch Location

4.4.4 LVDS Voltage Selection

WARNING:

Permanent damage to the screen and WAFER-BT may occur if the wrong voltage is selected with this jumper. Please refer to the user guide that came with the monitor to select the correct voltage.

Jumper Label:	**J_LCD_PWR1**
Jumper Type:	switch
Jumper Settings:	See **Table 4-4**
Jumper Location:	See **Figure 4-5**

The LVDS voltage selection jumper allows setting the voltage provided to the monitor connected to the LVDS connector.

Setting	Description
Short A-B	+3.3V (Default)
Short B-C	+5V

Table 4-4: LVDS Voltage Selection Jumper Settings

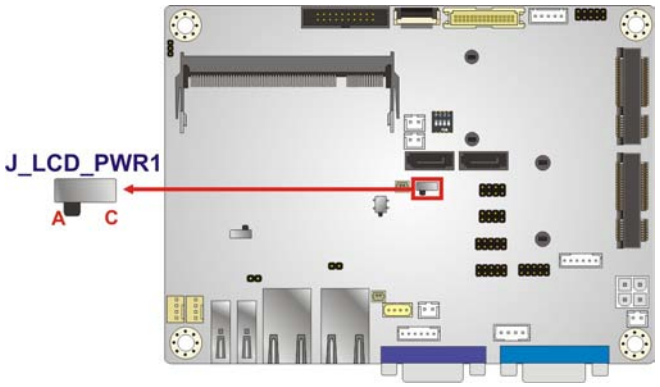


Figure 4-5: LVDS Voltage Selection Jumper Location

4.4.5 Flash Descriptor Security Override Jumper

Jumper Label:	J_FLASH1
Jumper Type:	3-pin header
Jumper Settings:	See **Table 4-5**
Jumper Location:	See **Figure 4-6**

The Flash Descriptor Security Override jumper specifies whether to override the flash descriptor.

Setting	Description
Short 1-2	No override (Default)
Short 2-3	Override

Table 4-5: Flash Descriptor Security Override Jumper Settings

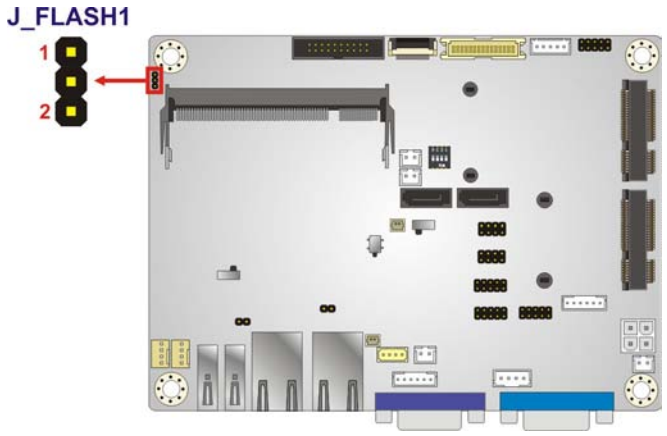


Figure 4-6: Flash Descriptor Security Override Jumper Location

4.5 Internal Peripheral Device Connections

This section outlines the installation of peripheral devices to the on-board connectors

4.5.1 Audio Kit Installation

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

Step 1: **Locate the audio connector**. The location of the 10-pin audio connector is shown in **Chapter 3**.

Step 2: **Align pin 1**. Align pin 1 on the on-board connector with pin 1 on the audio kit connector. Pin 1 on the audio kit connector is indicated with a white dot. See Figure 4-7.

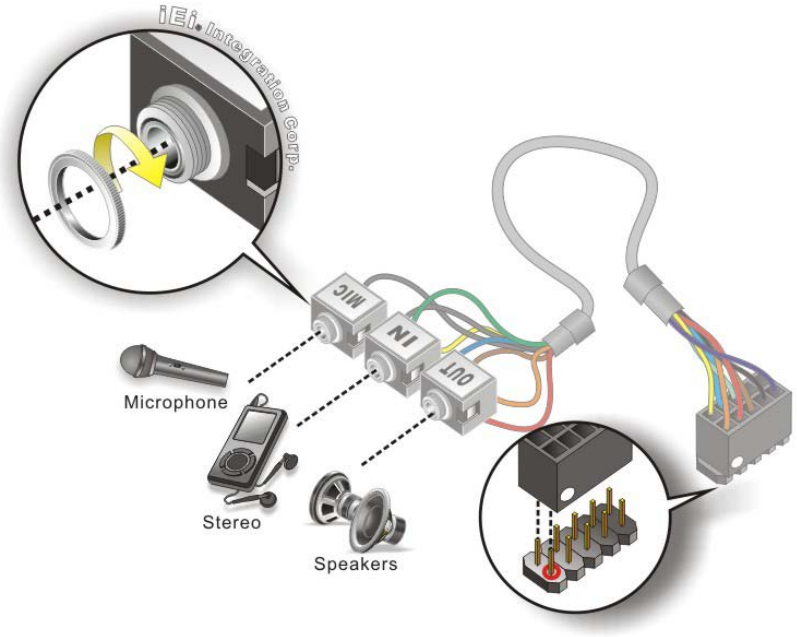


Figure 4-7: Audio Kit Cable Connection

Step 3: **Connect the audio devices**. Connect speakers to the line-out audio jack. Connect the output of an audio device to the line-in audio jack. Connect a microphone to the mic-in audio jack.

4.5.2 SATA Drive Connection

The WAFER-BT is shipped with a SATA drive cable. To connect the SATA drive to the connector, please follow the steps below.

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

Step 2: **Insert the cable connector**. Insert the cable connector into the on-board SATA drive connector and the SATA power connector. See **Figure 4-8**.

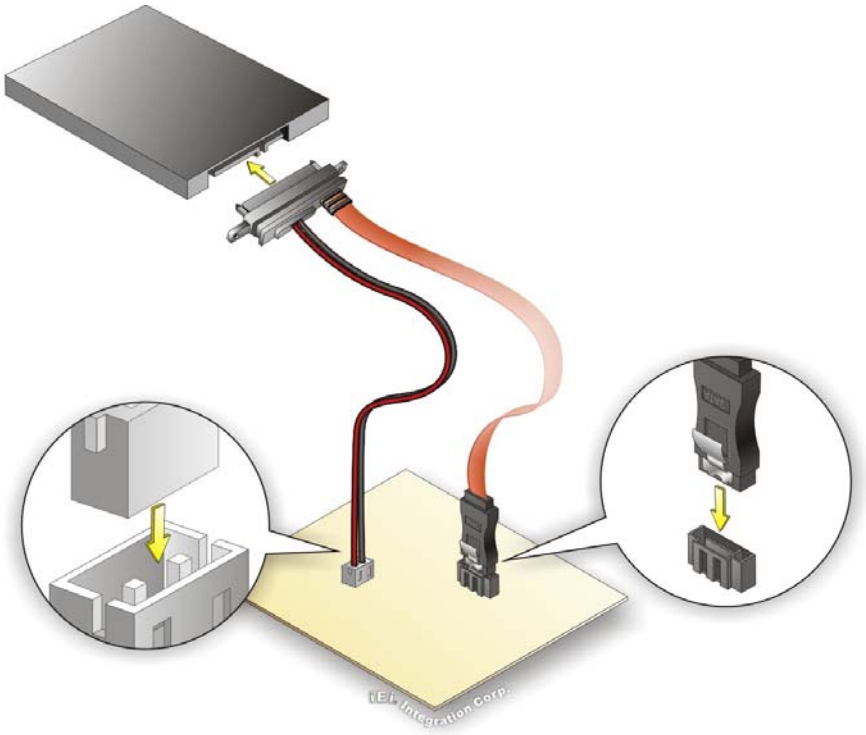


Figure 4-8: SATA Drive Cable Connection

Step 3: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 4-8**.

Step 4: To remove the SATA cable from the SATA connector, press the clip on the connector at the end of the cable.

4.5.3 Single RS-232 Cable

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

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

Step 2: **Insert the cable connector**. Insert the connector into the serial port box header. See Figure 4-9. A key on the front of the cable connectors ensures the connector can only be installed in one direction.

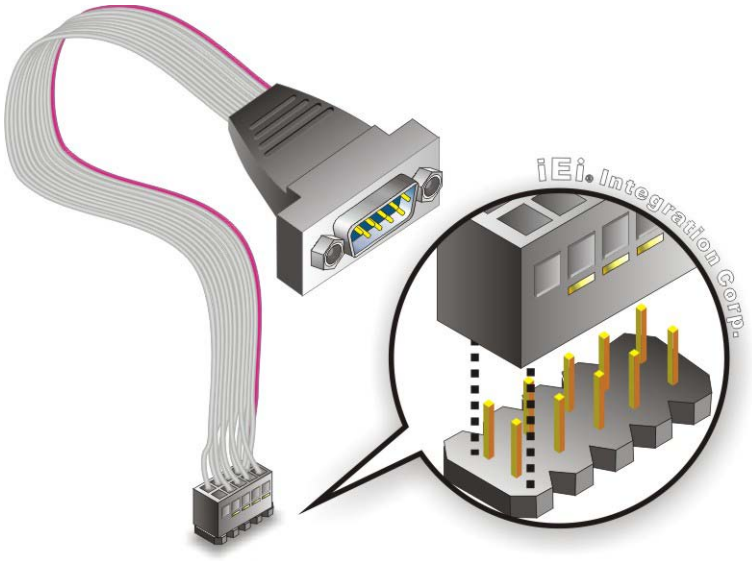


Figure 4-9: Single RS-232 Cable Installation

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

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

4.6 External Peripheral Interface Connection

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

- RJ-45 LAN cable
- Serial port devices
- USB devices
- VGA monitor

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

4.6.1 LAN Connection

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

Step 1: **Locate the RJ-45 connector**. The location of the LAN connector is shown in **Chapter 3**.

Step 2: **Align the connector.** Align the RJ-45 connector on the LAN cable with the RJ-45 connectors on the WAFER-BT. See **Figure 4-10**.

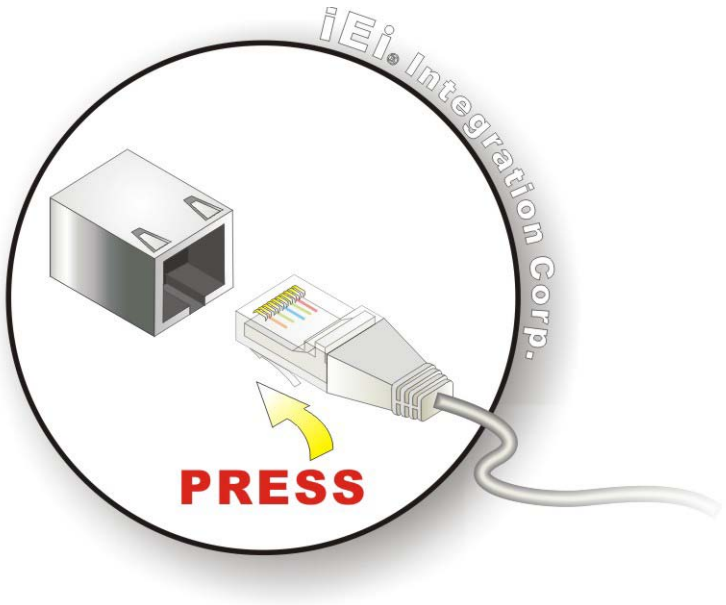


Figure 4-10: LAN Connection

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

4.6.2 Serial Device Connection

The WAFER-BT has two single female DB-9 connectors on the external peripheral interface panel for a serial device. Follow the steps below to connect a serial device to the WAFER-BT.

Step 1: **Locate the DB-9 connector**. The locations of the DB-9 connectors are shown in **Chapter 3**.

Step 2: **Insert the serial connector**. Insert the DB-9 connector of a serial device into the DB-9 connector on the external peripheral interface. See **Figure 4-11**.

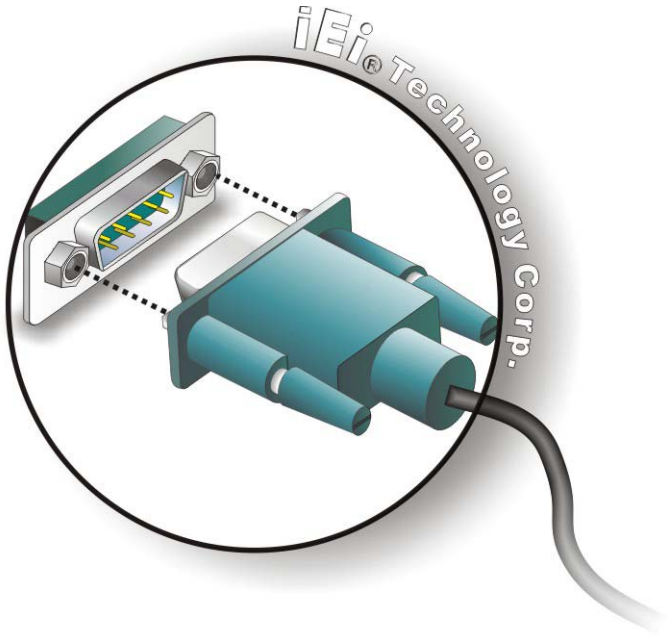


Figure 4-11: Serial Device Connector

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

4.6.3 USB Connection

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

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

Step 2: **Insert a USB Series "A" plug**. Insert the USB Series "A" plug of a device into the USB Series "A" receptacle on the external peripheral interface. See **Figure 4-12.**

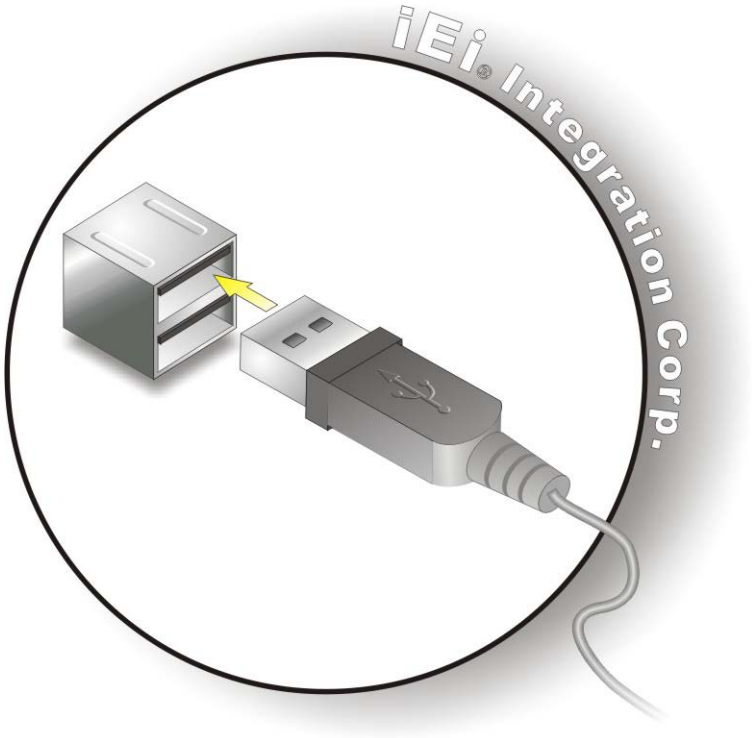


Figure 4-12: USB Connector

4.6.4 VGA Monitor Connection

The WAFER-BT has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the WAFER-BT, please follow the instructions below.

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

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

Step 3: **Insert the VGA connector**. Once the connectors are properly aligned with the insert the male connector from the VGA screen into the female connector on the WAFER-BT. See **Figure 4-13**.

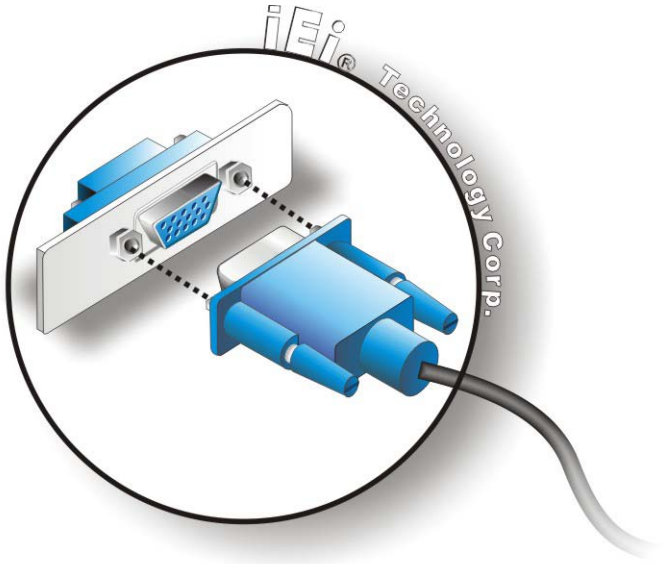


Figure 4-13: VGA Connector

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

Chapter

5

BIOS

5.1 Introduction

The BIOS is programmed onto the BIOS chip. The BIOS setup program allows changes to certain system settings. This chapter outlines the options that can be changed.

NOTE:

Some of the BIOS options may vary throughout the life cycle of the product and are subject to change without prior notice.

5.1.1 Starting Setup

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

1. Press the **DELETE** or **F2** key as soon as the system is turned on or
2. Press the **DELETE** or **F2** key when the "**Press Del to enter SETUP**" message appears on the screen.

If the message disappears before the **DELETE** or **F2** key is pressed, restart the computer and try again.

5.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
+	Increase the numeric value or make changes

Key	Function
-	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Load previous values.
F3 key	Load optimized defaults
F4 key	Save changes and Exit BIOS
Esc key	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu

Table 5-1: BIOS Navigation Keys

5.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

5.1.4 Unable to Reboot after Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the jumper described in Chapter **3**.

5.1.5 BIOS Menu Bar

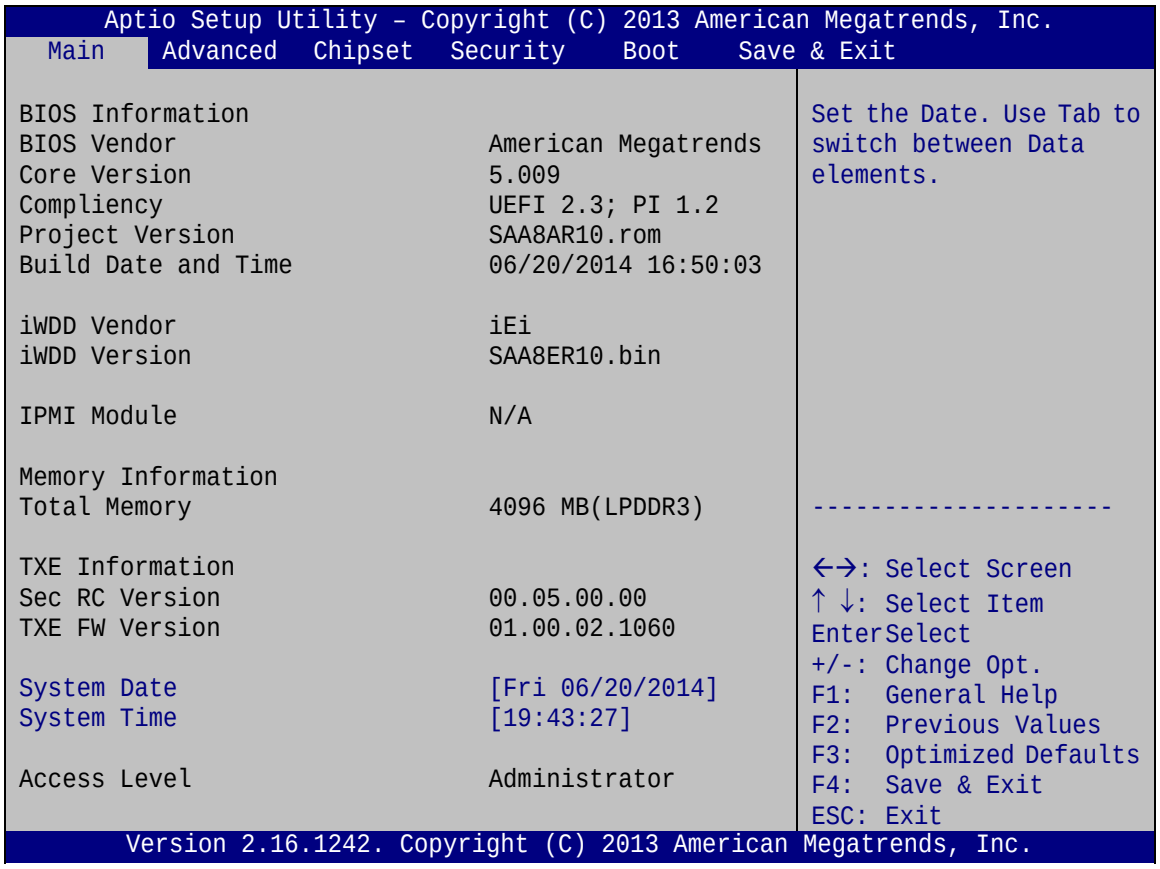
The **menu bar** on top of the BIOS screen has the following main items:

- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Boot – Changes the system boot configuration.
- Security – Sets User and Supervisor Passwords.
- Save & Exit – Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

5.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered. The **Main** menu gives an overview of the basic system information.



BIOS Menu 1: Main

The Main menu lists the following system details:

- BIOS Information
- iWDD Information
- Memory Information
- TXE Information

The System Overview field also has two user configurable fields:

➔ System Date [xx/xx/xx]

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

➔ System Time [xx:xx:xx]

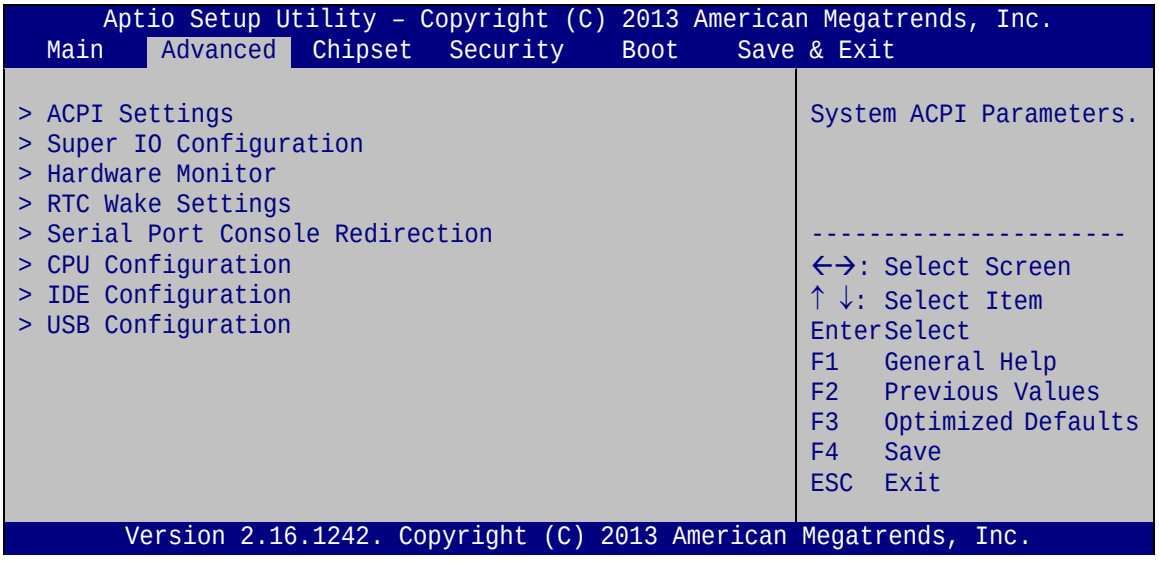
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

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

WARNING!

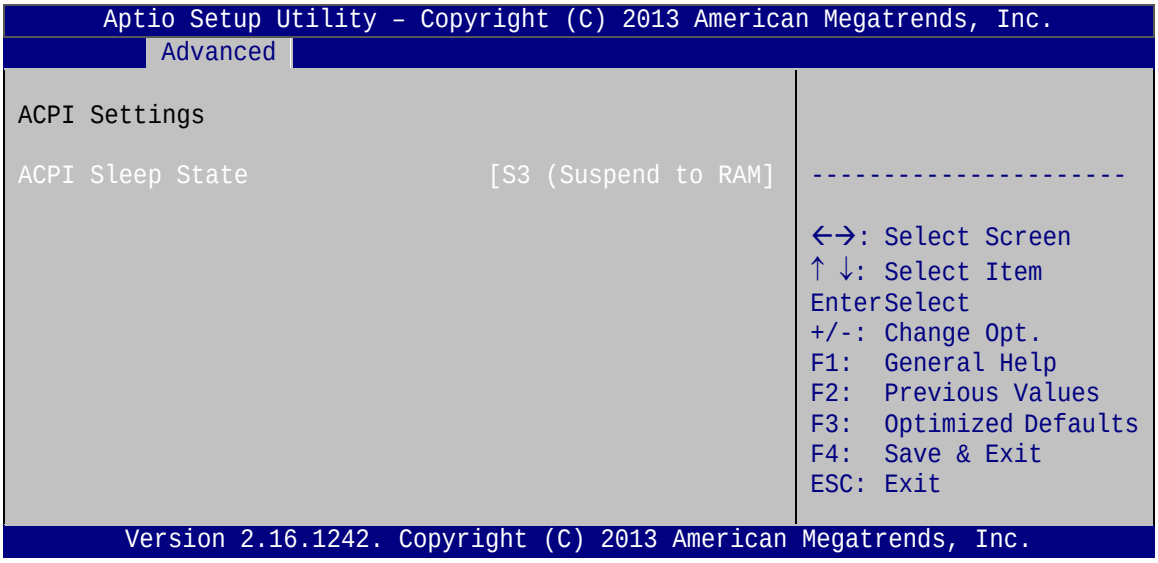
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.



BIOS Menu 2: Advanced

5.3.1 ACPI Settings

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



BIOS Menu 3: ACPI Configuration

➔ ACPI Sleep State [S3 only (Suspend to RAM)]

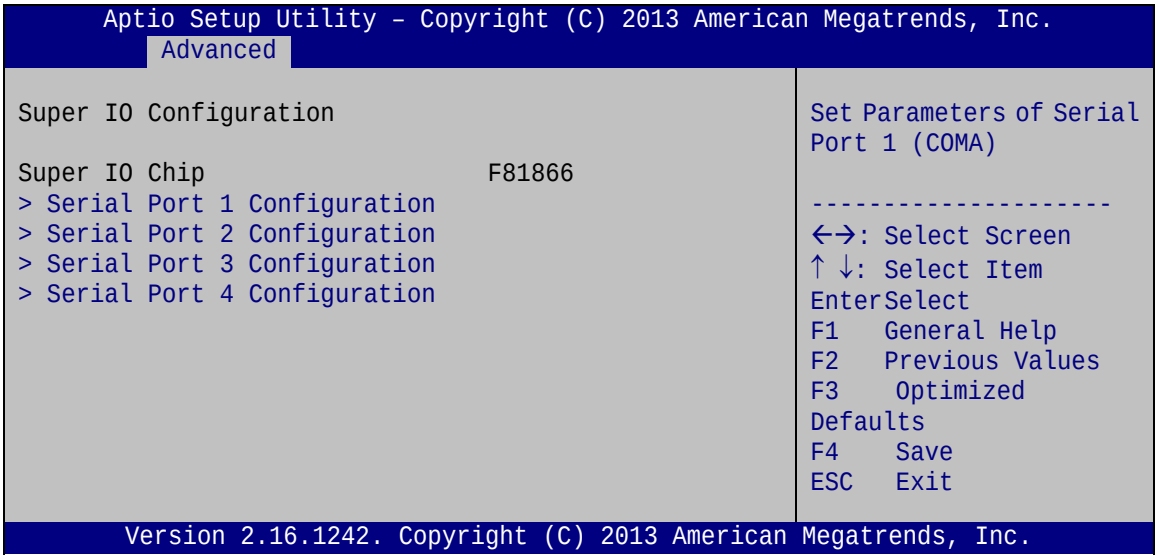
The fields in **ACPI Sleep State** option cannot be changed.

➔ **Suspend Disabled** Disable the suspend function.

➔ **S3 (Suspend to RAM)** **DEFAULT** The caches are flushed and the CPU is powered off. Power to the RAM is maintained. The computer returns slower to a working state, but more power is saved.

5.3.2 Super IO Configuration

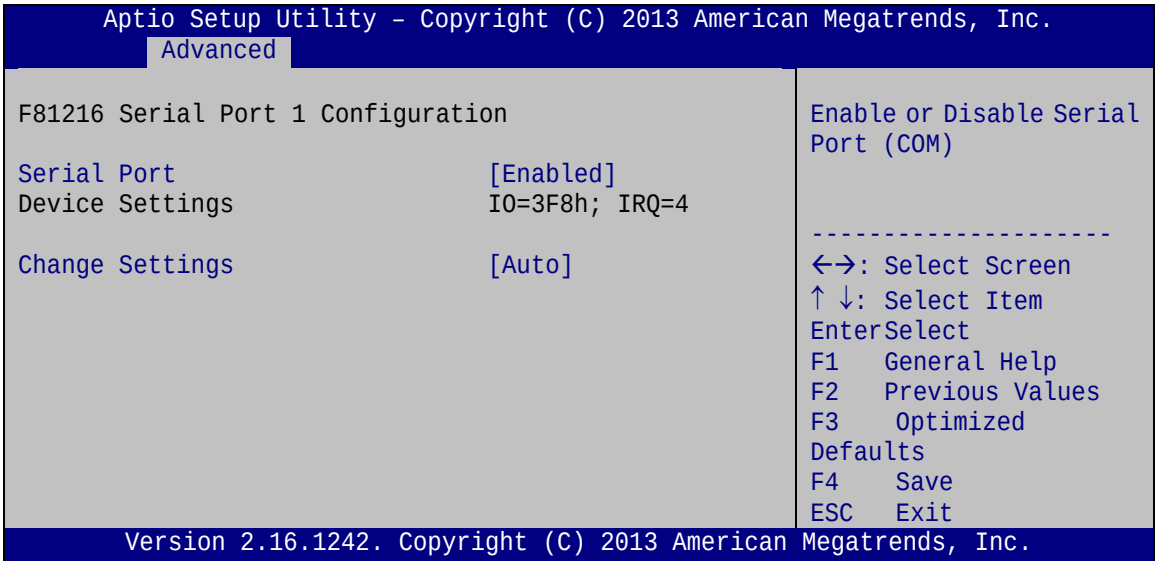
Use the **Super IO Configuration** menu (**BIOS Menu 4**) to set or change the configurations for the serial ports.



BIOS Menu 4: Super IO Configuration

5.3.2.1 Serial Port n Configuration

Use the **Serial Port n Configuration** menu (**BIOS Menu 5**) to configure the serial port n.



BIOS Menu 5: Serial Port n Configuration Menu

5.3.2.1.1 Serial Port 1 Configuration

➔ Serial Port [Enabled]

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

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

➔ Change Settings [Auto]

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

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

5.3.2.1.2 Serial Port 2 Configuration

➔ Serial Port [Enabled]

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

➔ **Disabled**		Disable the serial port

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

➔ Change Settings [Auto]

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

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

5.3.2.1.3 Serial Port 3 Configuration

➔ Serial Port [Enabled]

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

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

➔ Change Settings [Auto]

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

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.
➔ **IO=3E8h; IRQ=7**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ7
➔ **IO=3F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=2F8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F8h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=3E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=2E8h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=2F0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2F0h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=2E0h; IRQ=3, 4,5,6,7,9,10,11,12**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12

5.3.2.1.4 Serial Port 4 Configuration

➔ Serial Port [Enabled]

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

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

➔ Change Settings [Auto]

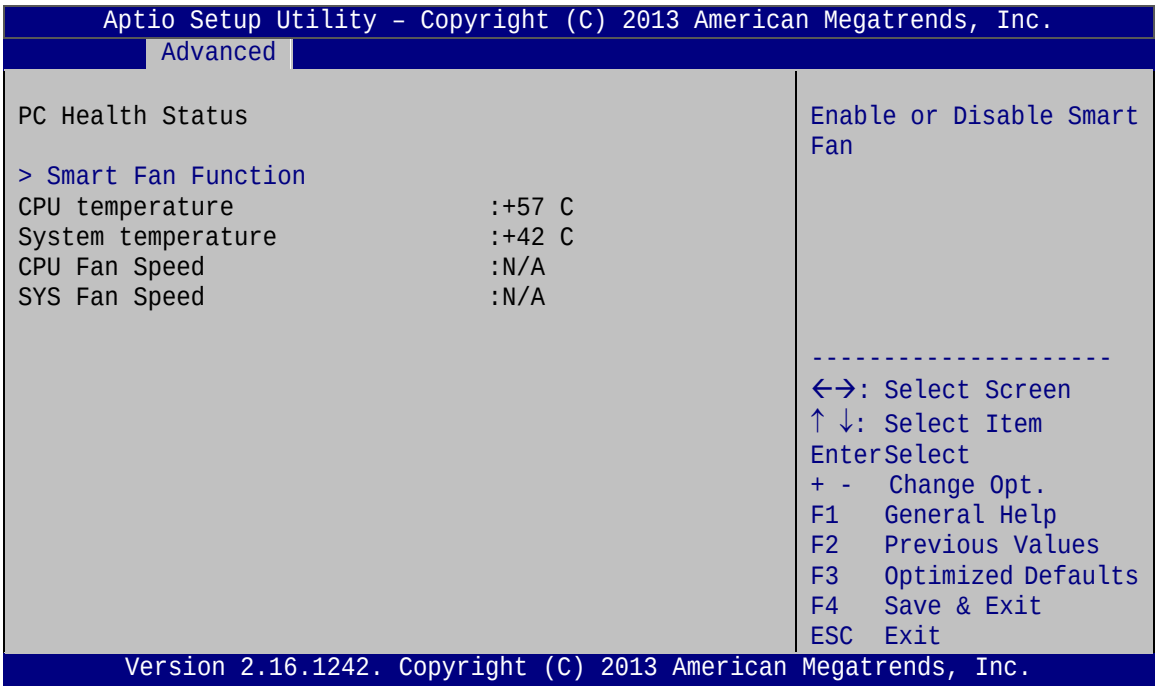
Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**	**DEFAULT**	The serial port IO port address and interrupt address are automatically detected.

➔ **IO=2E8h; IRQ=7**	Serial Port I/O port address is 2E8h and the interrupt address is IRQ7
➔ **IO=3F8h; IRQ=3, 4,5,6,7,9,10,11,12**	Serial Port I/O port address is 3F8h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=2F8h; IRQ=3, 4,5,6,7,9,10,11,12**	Serial Port I/O port address is 2F8h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=3E8h; IRQ=3, 4,5,6,7,9,10,11,12**	Serial Port I/O port address is 3E8h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=2E8h; IRQ=3, 4,5,6,7,9,10,11,12**	Serial Port I/O port address is 2E8h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=2F0h; IRQ=3, 4,5,6,7,9,10,11,12**	Serial Port I/O port address is 2F0h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12
➔ **IO=2E0h; IRQ=3, 4,5,6,7,9,10,11,12**	Serial Port I/O port address is 2E0h and the interrupt address is IRQ3,4,5,6,7,9,10,11,12

5.3.3 Hardware Monitor

The Hardware Monitor menu (**BIOS Menu 6**) contains the fan configuration submenus and displays operating temperature, fan speeds and system voltages.



BIOS Menu 6: Hardware Monitor

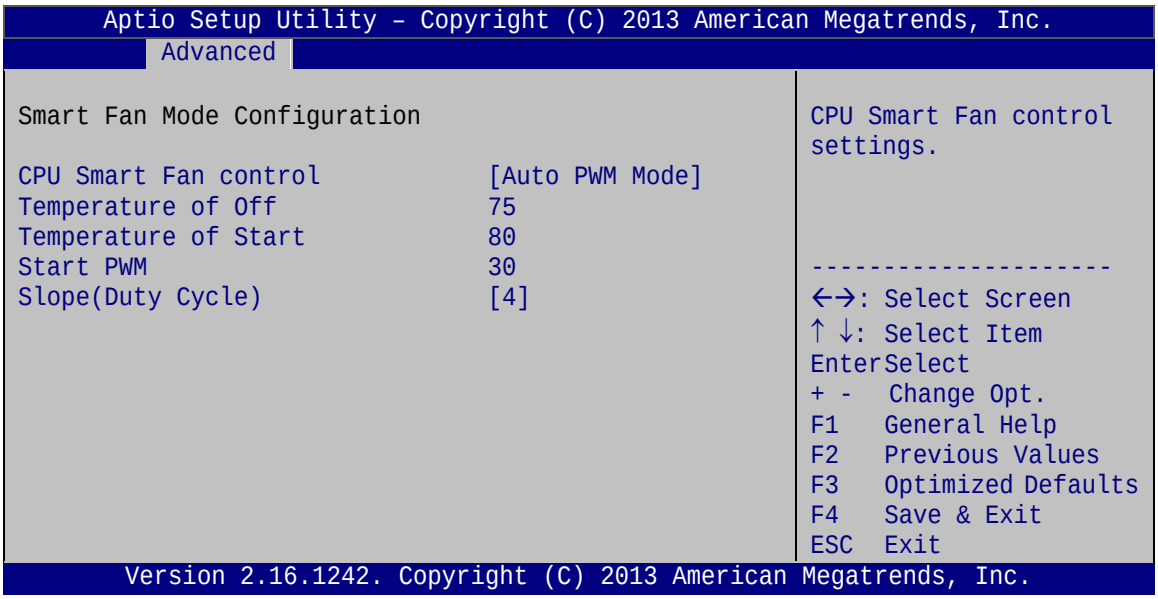
➔ PC Health Status

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

- System Temperatures:
  - CPU Temperature
  - System temperature
- Fan Speed:
  - CPU Fan Speed
  - SYS Fan Speed

5.3.3.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration submenu** (**BIOS Menu 7**) to configure fan temperature and speed settings.



BIOS Menu 7: Smart Fan Mode Configuration

➔ CPU Smart Fan control [Auto PWM Mode]

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

➔ **Full Mode**		Fan is on all the time
➔ **Manual PWM Mode**		The fan spins at the speed set in the manual PWM setting
➔ **Auto PWM Mode**	**DEFAULT**	The fan adjusts its speed using these settings: Temperature of Off Temperature of Start Start PWM Slope (Duty Cycle)

➔ Temperature of Off [75]

WARNING:

Setting this value too high may cause the fan to speed up only when

the CPU is at a very high temperature and therefore cause the system to be damaged.

The **Temperature of Off** option can only be set if the **CPU Smart Fan control** option is set to **Auto Mode**. If the CPU temperature is lower than **Temperature of Off**, the fan speed change to be lowest. To set a value, select the **Temperature of Off** option and enter a decimal number between 0 and 127. The temperature range is specified below.

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

➔ Temperature of Start [80

WARNING:

Setting this value too high may cause the fan to rotate at full speed only when the CPU is at a very high temperature and therefore cause the system to be damaged.

The **Temperature of Start** option can only be set if the **CPU Smart Fan control** option is set to **Auto Mode**. If the CPU temperature is between **Temperature of Off** and **Temperature of Start**, the fan speed change to be **Start PWM**. To set a value, select the **Temperature of Start** option and enter a decimal number between 0 and 127. The temperature range is specified below.

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

➔ Start PWM [30]

The **Start PWM** option can only be set if the **CPU Smart Fan control** option is set to **Auto Mode**. Use the **Start PWM** option to set the PWM start value. To set a value, select the **Start PWM** option and enter a decimal number between 0 and 100. The temperature range is specified below.

- Minimum Value: 0
- Maximum Value: 100

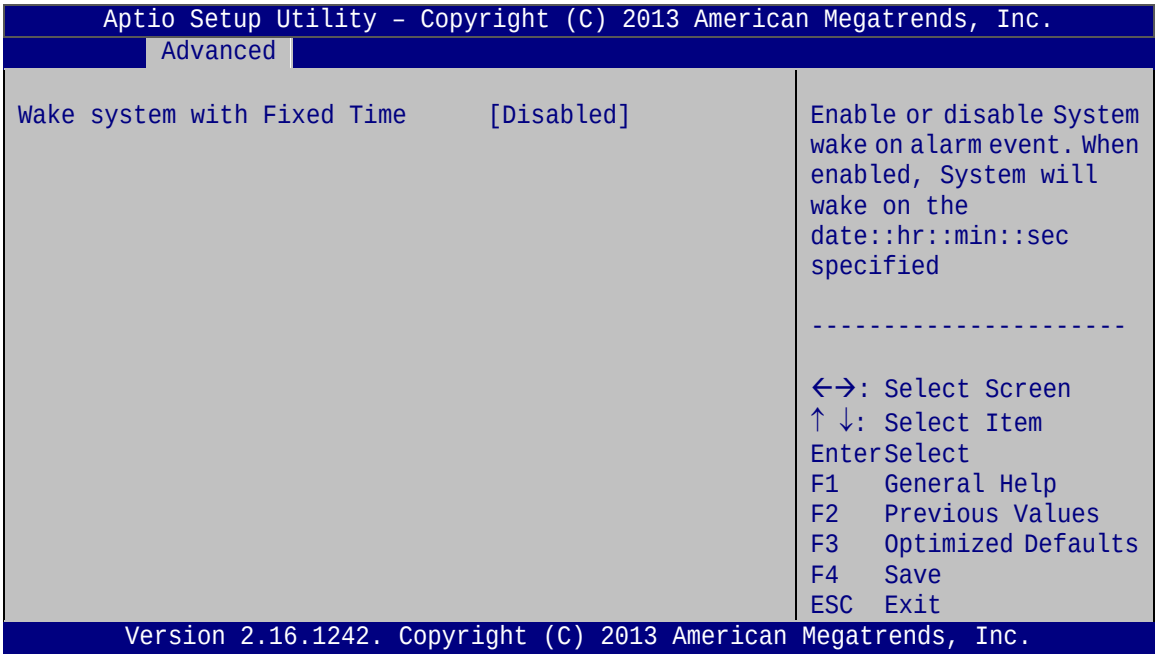
➔ Slope (Duty Cycle) [4]

The **Slope (Duty Cycle)** option can only be set if the **CPU Smart Fan control** option is set to **Auto Mode**. Use the **Slope (Duty Cycle)** option to select the linear rate at which the PWM mode increases with respect to an increase in temperature. A list of available options is shown below:

- 0
- 1
- 2
- 4
- 8
- 16

5.3.4 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 8**) configures RTC wake event.



BIOS Menu 8: RTC Wake Settings

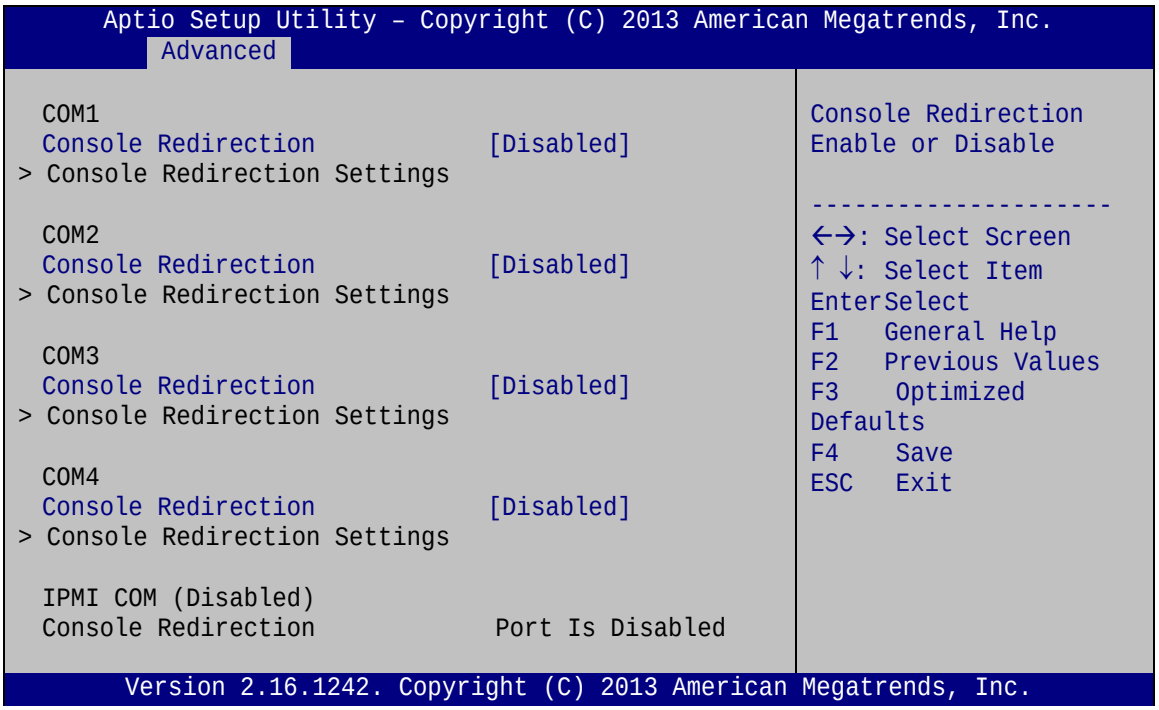
➔ Wake system with Fixed Time [Disabled]

Use the **Wake system with Fixed Time** option to enable or disable the system wake on alarm event.

➔ **Disabled**	**DEFAULT**	The real time clock (RTC) cannot generate a wake event
➔ **Enabled**		If selected, the **Wake up every day** option appears allowing you to enable to disable the system to wake every day at the specified time. Besides, the following options appear with values that can be selected: Wake up date Wake up hour Wake up minute Wake up second After setting the alarm, the computer turns itself on from a suspend state when the alarm goes off.

5.3.5 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 9**) allows the console redirection options to be configured. Console redirection allows users to maintain a system remotely by re-directing keyboard input and text output through the serial port.



BIOS Menu 9: Serial Port Console Redirection

➔ Console Redirection [Disabled]

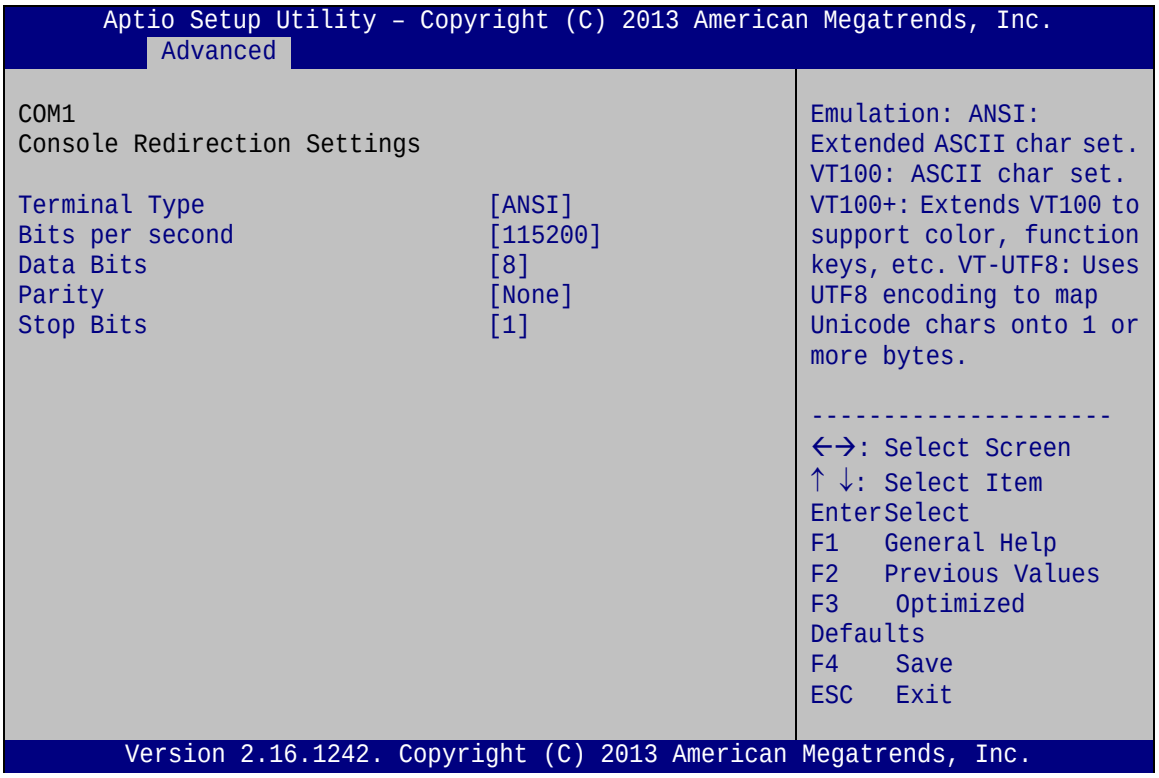
Use **Console Redirection** option to enable or disable the console redirection function.

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

➔ **Enabled** Enabled the console redirection function

5.3.5.1 Console Redirection Settings

The **Console Redirection Settings** menu (**BIOS Menu 10**) allows the console redirection options to be configured. The option is active when Console Redirection option is enabled.



BIOS Menu 10: Console Redirection Settings

➔ Terminal Type [ANSI]

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

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

➔ Bits per second [115200]

Use the **Bits per second** option to specify the serial port transmission speed. The speed must match the other side. Long or noisy lines may require lower speeds.

➔	**9600**	Sets the serial port transmission speed at 9600.
➔	**19200**	Sets the serial port transmission speed at 19200.

- ➔ **38400** Sets the serial port transmission speed at 38400.
- ➔ **57600** Sets the serial port transmission speed at 57600.
- ➔ **115200** **DEFAULT** Sets the serial port transmission speed at 115200.

➔ Data Bits [8]

Use the **Data Bits** option to specify the number of data bits.

- ➔ **7** Sets the data bits at 7.
- ➔ **8** **DEFAULT** Sets the data bits at 8.

➔ Parity [None]

Use the **Parity** option to specify the parity bit that can be sent with the data bits for detecting the transmission errors.

- ➔ **None** **DEFAULT** No parity bit is sent with the data bits.
- ➔ **Even** The parity bit is 0 if the number of ones in the data bits is even.
- ➔ **Odd** The parity bit is 0 if the number of ones in the data bits is odd.
- ➔ **Mark** The parity bit is always 1. This option does not provide error detection.
- ➔ **Space** The parity bit is always 0. This option does not provide error detection.

➔ Stop Bits [1]

Use the **Stop Bits** option to specify the number of stop bits used to indicate the end of a serial data packet. Communication with slow devices may require more than 1 stop bit.

- ➔ **1** **DEFAULT** Sets the number of stop bits at 1.
- ➔ **2** Sets the number of stop bits at 2.

5.3.6 CPU Configuration

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

```
Aptio Setup Utility – Copyright (C) 2013 American Megatrends, Inc.
   Advanced

CPU Configuration                                  When enabled, a VMM can
                                                   utilize the additional
Intel(R) Celeron(R) CPU J1900 @ 1.99GHz            hardware capabilities
CPU Signature                    30678             provided by Vanderpool
Microcode Patch                  809               Technology.
Max CPU Speed                    1990 MHz
Min CPU Speed                    1334 MHz
Processor Cores                  4
Intel HT Technology              Not Supported
Intel VT-x Technology            Supported

L1 Data Cache                    24 KB x 2         ----------------------
L1 Code Cache                    32 KB x 2
L2 Cache                         1024 KB x 1       ←→: Select Screen
L3 Cache                         Not Present       ↑ ↓: Select Item
CPU Speed                        2001 MHz          EnterSelect
64-bit                           Supported         F1   General Help
                                                   F2   Previous Values
Intel Virtualization Technology  [Enabled]         F3    Optimized
EIST                             [Enabled]         Defaults
                                                   F4    Save
                                                   ESC   Exit
Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

BIOS Menu 11: CPU Configuration

➔ Intel® Virtualization Technology [Disabled]

Use the **Intel® Virtualization Technology** option to enable or disable virtualization on the system. When combined with third party software, Intel Virtualization technology allows several OSs to run on the same system at the same time.

➔	**Disabled**	**DEFAULT**	Disables Intel Virtualization Technology.
➔	**Enabled**		Enables Intel Virtualization Technology.

➔ EIST [Enabled]

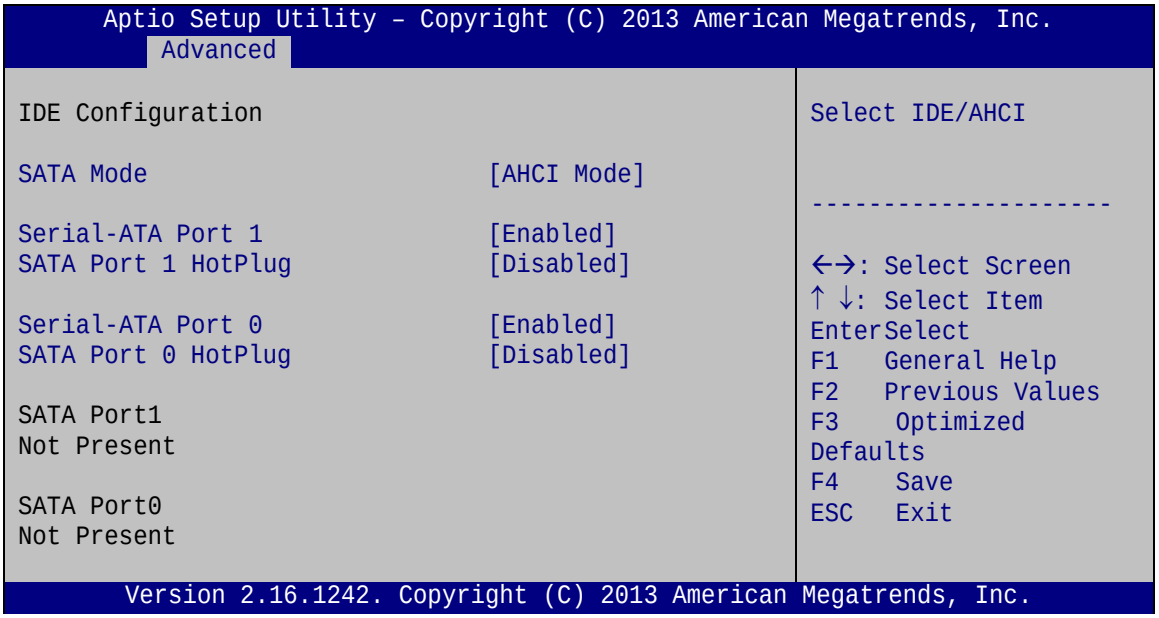
Use the **EIST** option to enable or disable the Intel Speed Step Technology.

➔ **Disabled** Disables the Intel Speed Step Technology.

➔ **Enabled** **DEFAULT** Enables the Intel Speed Step Technology.

5.3.7 IDE Configuration

Use the **IDE Configuration** menu (**BIOS Menu 12**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 12: IDE Configuration

➔ SATA Mode [ACHI Mode]

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

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

➔ **ACHI Mode** **DEFAULT** Configures SATA devices as AHCI device.

➔ Serial-ATA Port 1/0 [Enabled]

Use the **Serial-ATA Port 1/0** option to enable or disable the SATA device.

➔ **Disabled** Disables the SATA device.

➔ **Enabled** **DEFAULT** Enables the SATA device.

➔ SATA Port 1/0 HotPlug [Disabled]

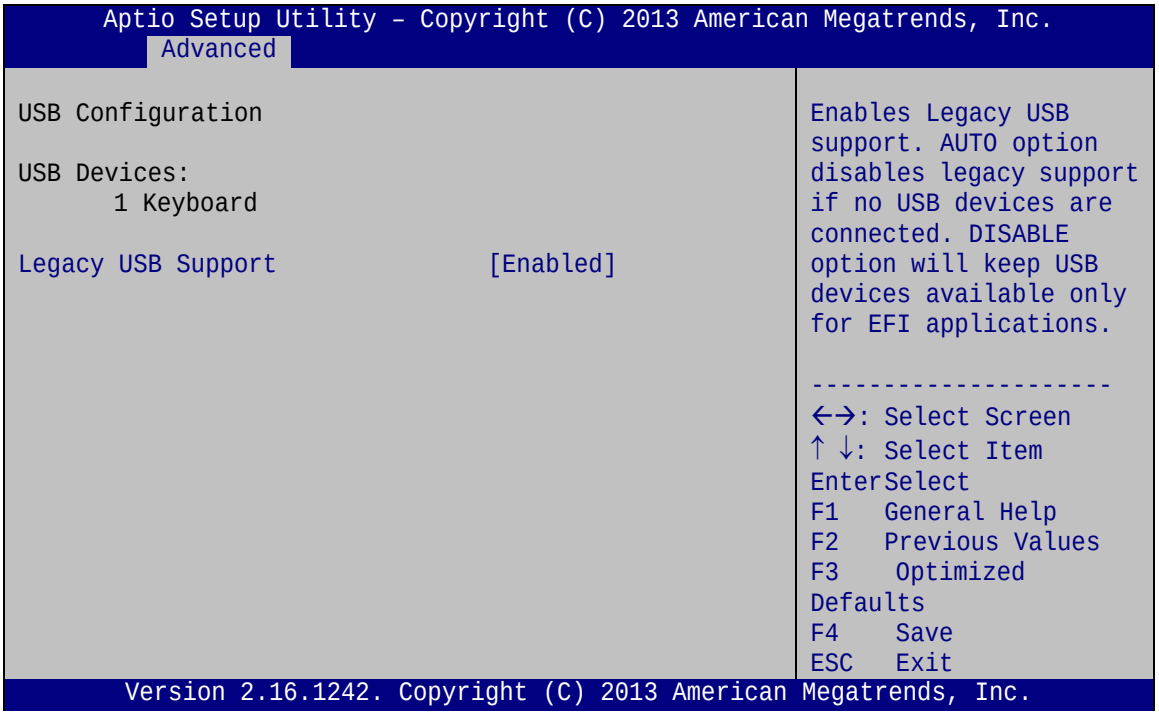
Use the **Serial-ATA Port 1/0 HotPlug** option to enable or disable the SATA device hot plug.

➔ **Disabled** Disables the SATA device hot plug.

➔ **Enabled** **DEFAULT** Enables the SATA device hot plug

5.3.8 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 13**) to read USB configuration information and configure the USB settings.



BIOS Menu 13: USB Configuration

➔ USB Devices

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

➔ Legacy USB Support [Enabled]

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

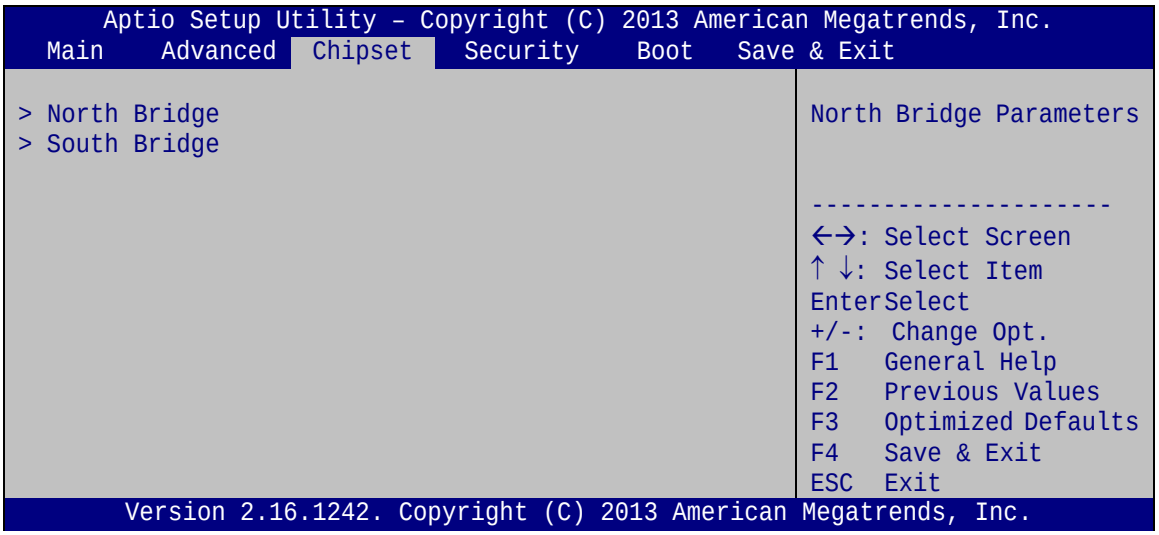
➔	**Enabled**	**DEFAULT**	Legacy USB support enabled
➔	**Disabled**		Legacy USB support disabled
➔	**Auto**		Legacy USB support disabled if no USB devices are connected

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 14**) to access the Northbridge and Southbridge configuration menus

WARNING!

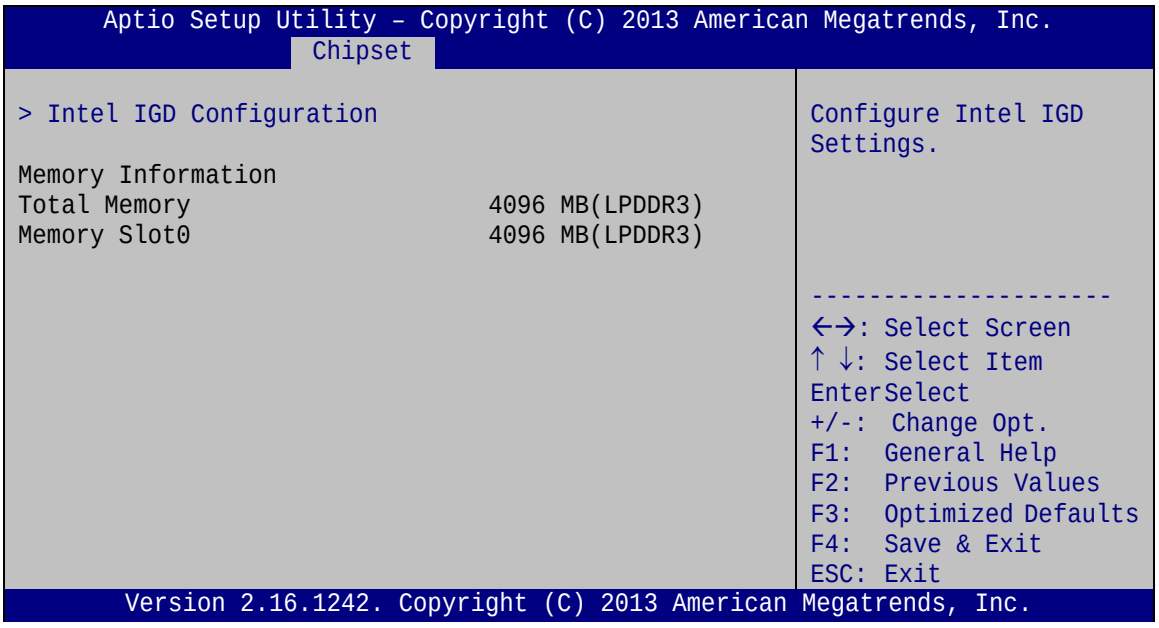
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.



BIOS Menu 14: Chipset

5.4.1 North Bridge Configuration

Use the **North Bridge Configuration** menu (**BIOS Menu 15**) to configure the Intel IGD settings.



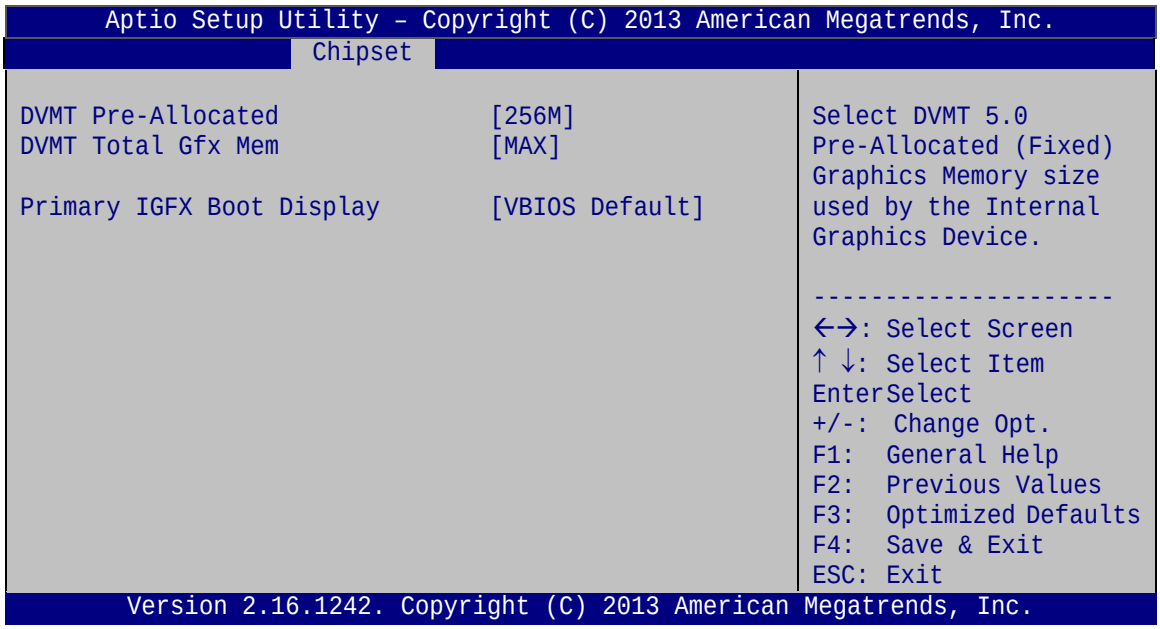
BIOS Menu 15: Northbridge Chipset Configuration

➔ Memory Information

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

5.4.1.1 Intel IGD Configuration

Use the **Intel IGD Configuration** menu (**BIOS Menu 16**) to configure the video device connected to the system.



BIOS Menu 16: Integrated Graphics

➔ DVMT Pre-Allocated [256MB]

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

- 64M
- 128M
- 256M **Default**
- 512M

➔ DVMT Total Gfx Mem [MAX]

Use the **DVMT Total Gfx Mem** option to select DVMT5.0 total graphic memory size used by the internal graphic device. The following options are available:

- 128M
- 256M
- MAX **Default**

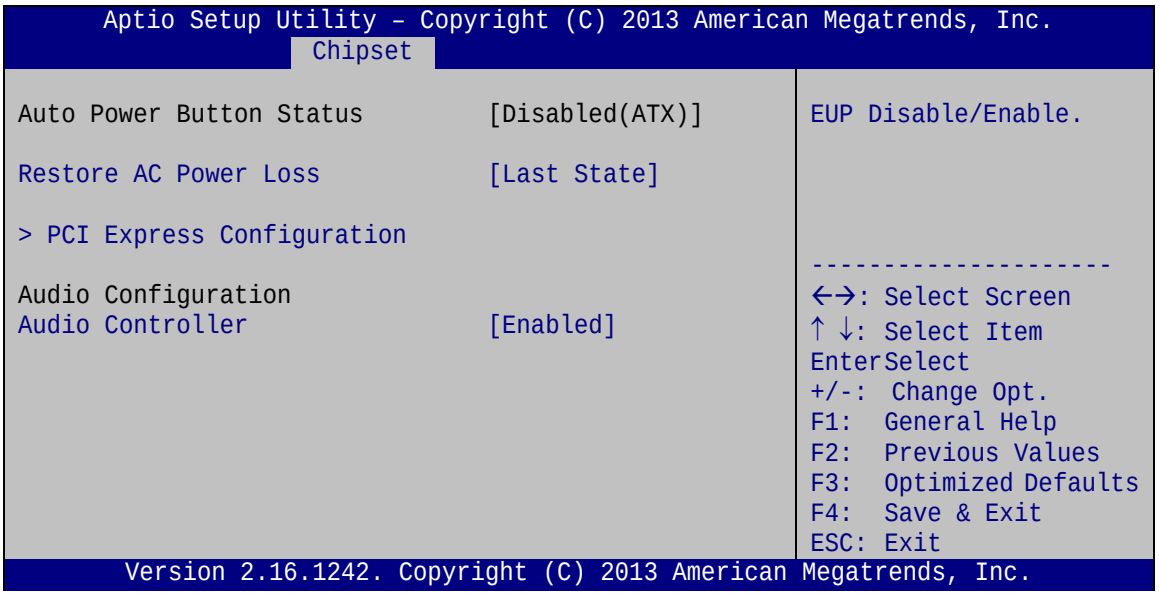
➔ Primary IGFX Boot Display [VBIOS Default]

Use the **Primary IGFX Boot Display** option to select the display device used by the system when it boots. For dual display support, select "VBIOS Deafult." Configuration options are listed below.

- VBIOS Default **DEFAULT**
- CRT
- LVDS
- DP Port

5.4.2 Southbridge Configuration

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



BIOS Menu 17: Southbridge Chipset Configuration

➔ Restore on AC Power Loss [Last State]

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

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

➔ Audio Controller [Enabled]

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

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

5.4.2.1 PCI Express Configuration

Use the **PCI Express Configuration** menu (**BIOS Menu 17**) to configure the PCI Express.

```
Aptio Setup Utility – Copyright (C) 2013 American Megatrends, Inc.
Advanced

PCI Express Configuration                          Enable or Disable the PCI
PCI Express Port 0              [Enabled]          Express Port 0 in the
  Speed                         [Auto]             Chipset.

PCI Express Port 1              [Enabled]          ---------------------
  Speed                         [Auto]             ←→: Select Screen
                                                   ↑ ↓: Select Item
PCI Express Port 2              [Enabled]          Enter Select
  Speed                         [Auto]             F1   General Help
                                                   F2   Previous Values
PCI Express Port 3              [Enabled]          F3    Optimized
  Speed                         [Auto]             Defaults
                                                   F4    Save
                                                   ESC   Exit

Version 2.16.1242. Copyright (C) 2013 American Megatrends, Inc.
```

BIOS Menu 18: Console Redirection Settings

➔ PCI Express Port [Enabled]

Use the **PCI Express Port** option to enable or disable the PCI Express port.

➔ **Disabled**		Disables the PCI Express port.
➔ **Enabled**	**DEFAULT**	Enables the PCI Express port.

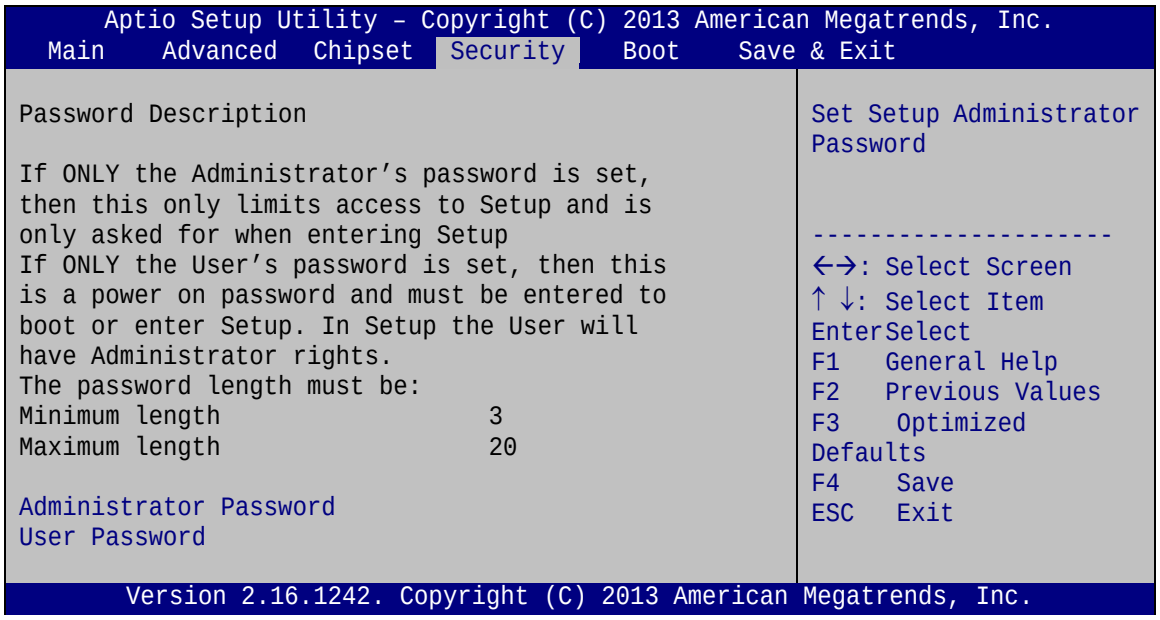
➔ Speed [Auto]

Use the **Speed** option to configure PCIe port speed.

➔ **Auto**	Configure PCIe port speed to auto
➔ **Gen 2**	Configure PCIe port speed to Gen2
➔ **Gen 1**	Configure PCIe port speed to Gen1

5.5 Security

Use the **Security** menu (**BIOS Menu 19**) to set system and user passwords.



BIOS Menu 19: Security

➔ Administrator Password

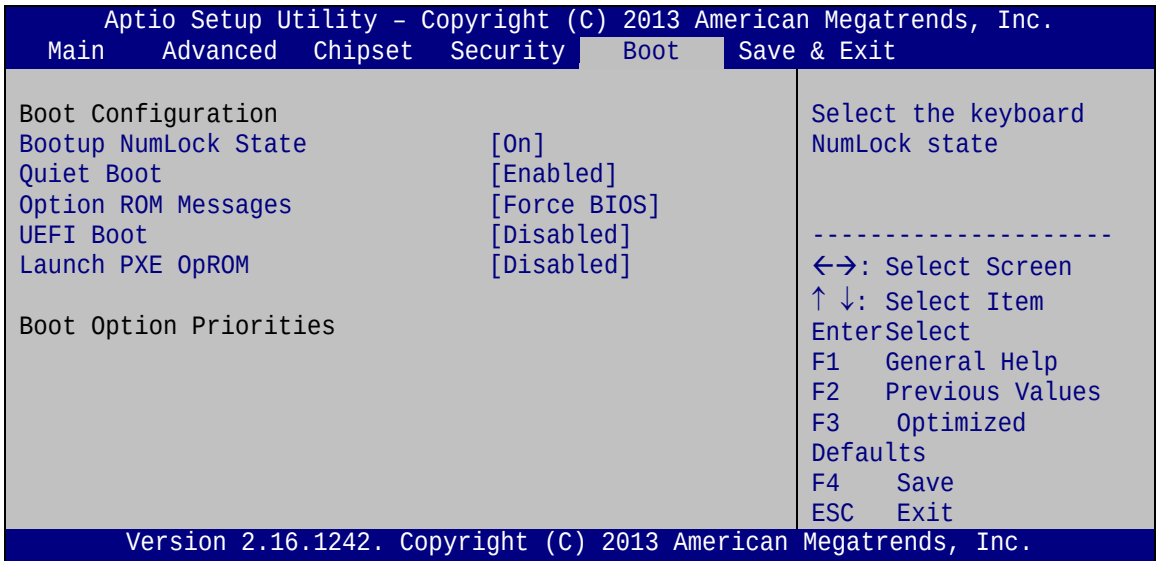
Use the **Administrator Password** to set or change a administrator password.

➔ User Password

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

5.6 Boot

Use the **Boot** menu (**BIOS Menu 17**) to configure system boot options.



BIOS Menu 20: Boot

➔ Bootup NumLock State [On]

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

➔ **On** **DEFAULT** Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

➔ **Off** Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.

➔ Quiet Boot [Enabled]

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

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

➔ Option ROM Messages [Force BIOS]

Use the **Option ROM Messages** option to set the Option ROM display mode.

➔	**Force BIOS**	**DEFAULT**	Sets display mode to force BIOS.
➔	**Keep Current**		Sets display mode to current.

➔ UEFI Boot [Disabled]

Use the **UEFI Boot** option to enable or disable to boot from the UEFI devices.

➔	**Auto**		If the first boot HDD is GPT then enable UEFI boot options, otherwise disable,
➔	**Enabled**		Boot from UEFI devices is enabled.
➔	**Disabled**	**DEFAULT**	Boot from UEFI devices is disabled.

➔ Launch PXE OpROM [Disabled]

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

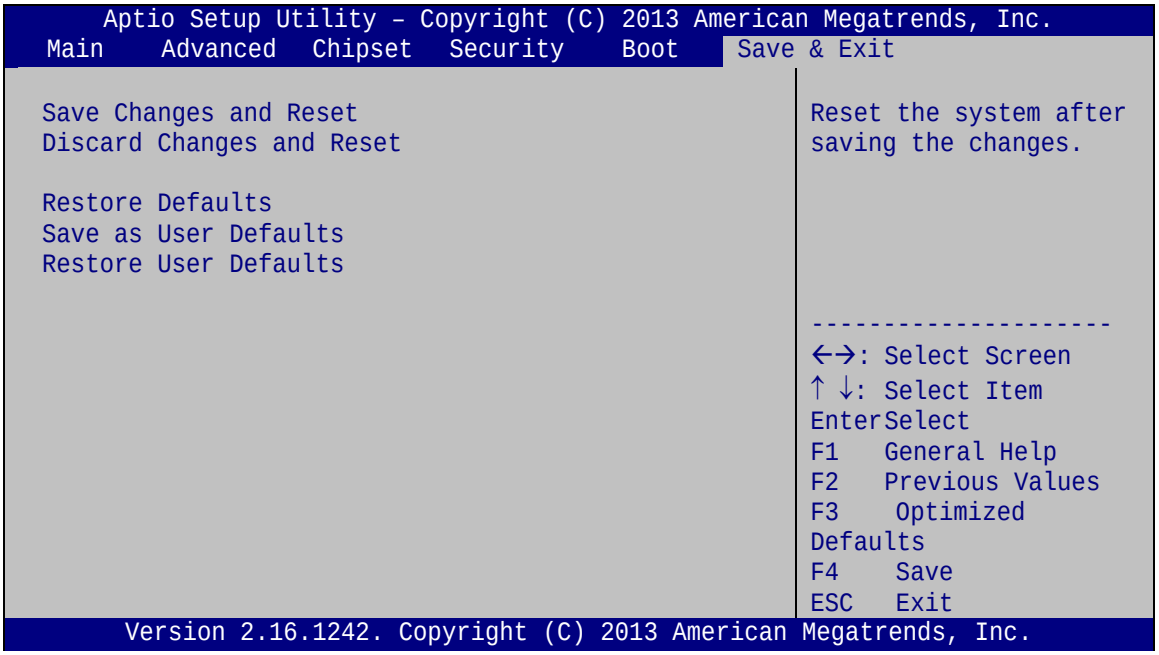
➔	**Disabled**	**DEFAULT**	Ignore all PXE Option ROMs
➔	**Enabled**		Load PXE Option ROMs.

➔ Boot Option Priority

Use the **Boot Option Priority** function to set the system boot sequence from the available devices. The drive sequence also depends on the boot sequence in the individual device section.

5.7 Exit

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



BIOS Menu 21:Exit

➔ Save Changes and Reset

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

➔ Discard Changes and Reset

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

➔ Restore Defaults

Use the **Restore Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F3 key can be used for this operation.**

➔ Save as User Defaults

Use the **Save as User Defaults** option to save the changes done so far as user defaults.

➔ Restore User Defaults

Use the **Restore User Defaults** option to restore the user defaults to all the setup options.

Appendix

A

BIOS Menu Options

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Appendix

B

Terminology

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

	computer is usually a male DE-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.
DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.
DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
GbE	Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gbps and complies with the IEEE 802.3-2005 standard.
GPIO	General purpose input
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.
LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
MAC	The Media Access Control (MAC) protocol enables several terminals or network nodes to communicate in a LAN, or other multipoint networks.

PCIe	PCI Express (PCIe) is a communications bus that uses dual data lines for full-duplex (two-way) serial (point-to-point) communications between the SBC components and/or expansion cards and the SBC chipsets. Each line has a 2.5 Gbps data transmission rate and a 250 MBps sustained data transfer rate.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
QVGA	Quarter Video Graphics Array (QVGA) refers to a display with a resolution of 320 x 240 pixels.
RAM	Random Access Memory (RAM) is a form of storage used in computer. RAM is volatile memory, so it loses its data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA 3Gb/s bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.
USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates, while

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

Appendix

C

Hazardous Materials Disclosure

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

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

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

Please refer to the table on the next page.

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

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

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

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

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

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

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

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