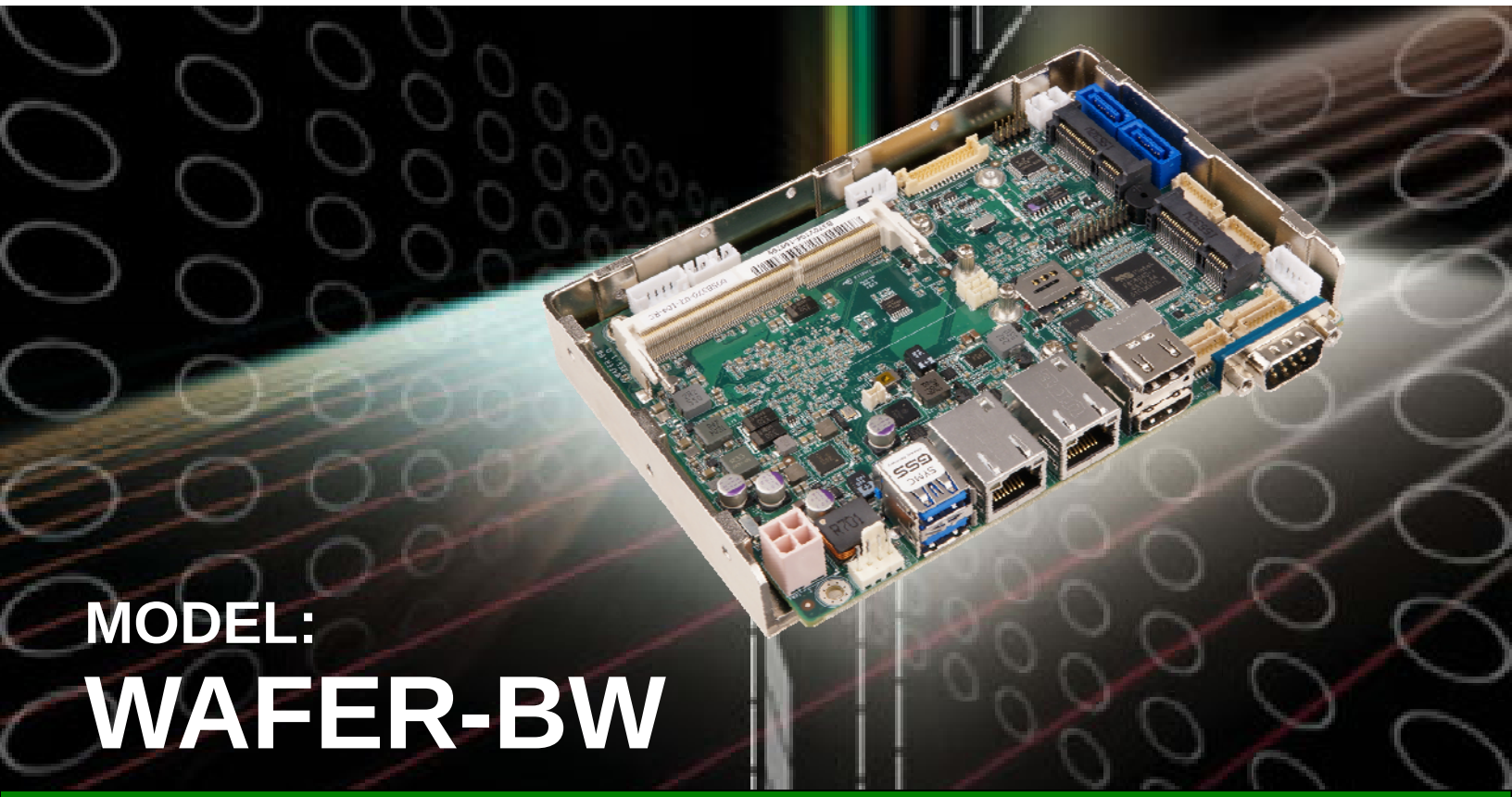
IEI Integration Corp.



MODEL:

WAFER-BW

3.5” SBC with 14nm Intel® Pentium® or Celeron® On-board SoC, Dual HDMI, LVDS, Dual PCIe GbE, USB 3.0, PCIe Mini, mSATA, SATA 6Gb/s, RS-232/422/485, HD Audio, SIM Slot and RoHS

User Manual

Rev. 1.02 - September 20, 2017

RoHS Lead Free

Revision

Date	Version	Changes
September 20, 2017	1.02	Modified Chapter 5: BIOS
November 28, 2016	1.01	Modified Section 2.3: Packing List
August 23, 2016	1.00	Initial release

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Manual Conventions

WARNING

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously.

CAUTION

Cautionary messages should be heeded to help reduce the chance of losing data or damaging the product.

NOTE

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes.

HOT SURFACE

This symbol indicates a hot surface that should not be touched without taking care.

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Chapter

1

Introduction

1.1 Introduction

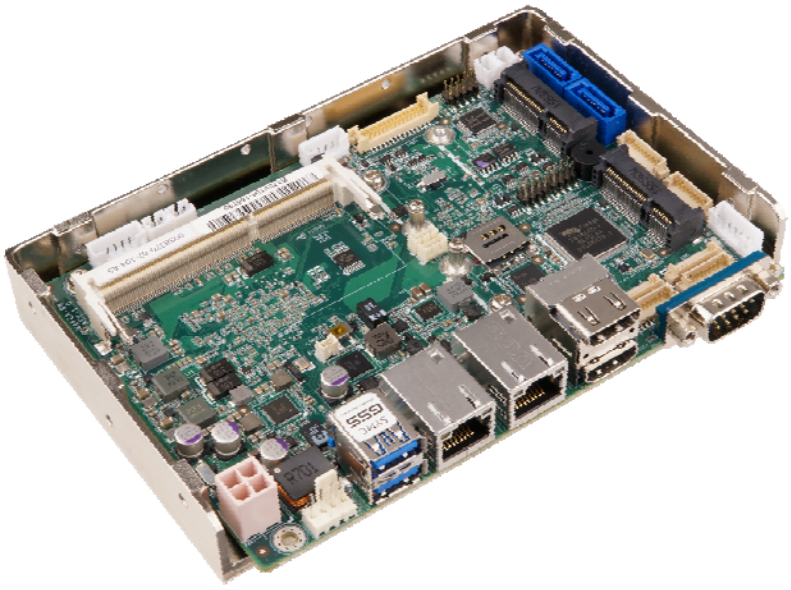


Figure 1-1: WAFER-BW

The WAFER-BW series is a 3.5” single bard computer. It has an on-board 14nm Intel® Pentium® or Celeron® processor, and supports one 204-pin 1600/1333 MHz single-channel unbuffered DDR3 Low Voltage (DDR3L) SDRAM SO-DIMM slot with up to 8.0 GB of memory.

The WAFER-BW series includes two HDMI connectors and an 18-/24-bit LVDS connector for triple independent display. Two RJ-45 GbE connectors provide the system with smooth connections to an external LAN.

Expansion and I/O include one PCIe Mini slot supporting mSATA modules, one PCIe Mini slot with SIM card holder, two USB 3.0 connectors on the rear panel, four USB 2.0 connectors by pin header and two SATA 6Gb/s connectors. Serial device connectivity is provided by four internal RS-232 connectors and two internal RS-232/422/485 connectors.

1.2 Model Variations

The model variations of the WAFER-BW series are listed below.

Model No.	SoC
WAFER-BW-N4-R10	Intel® Pentium® N3710 on-board SoC (2.56 GHz, quad-core, 2 MB cache, TDP=6 W)
WAFER-BW-N3-R10	Intel® Celeron® N3160 on-board SoC (2.24 GHz, quad-core, 2 MB cache, TDP=6 W)
WAFER-BW-N2-R10	Intel® Celeron® N3060 on-board SoC (2.48 GHz, dual-core, 2 MB cache, TDP=6 W)
WAFER-BW-N1-R10*	Intel® Celeron® N3010 on-board SoC (2.24 GHz, dual-core, 2 MB cache, TDP=4 W)
*By order production, MOQ 100	

Table 1-1: WAFER-BW Model Variations

1.3 Features

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

- 3.5” motherboard supports 14nm Intel® Pentium®/Celeron® on-board SoC
- Triple independent display support
- One 1600/1333 MHz DDR3L SO-DIMM slot supports up to 8 GB of memory
- Two SATA 6Gb/s connectors with 5 V power output
- Two USB 3.0 external connectors
- Four RS-232 connectors and two RS-232/422/485 connectors
- One SIM card holder on board
- Two full-size/half-size PCIe Mini card slots for expansion
- Support mSATA modules
- Optional eMMC 4.51
- IEI One Key Recovery solution allows you to create rapid OS backup and recovery

1.4 Connectors

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

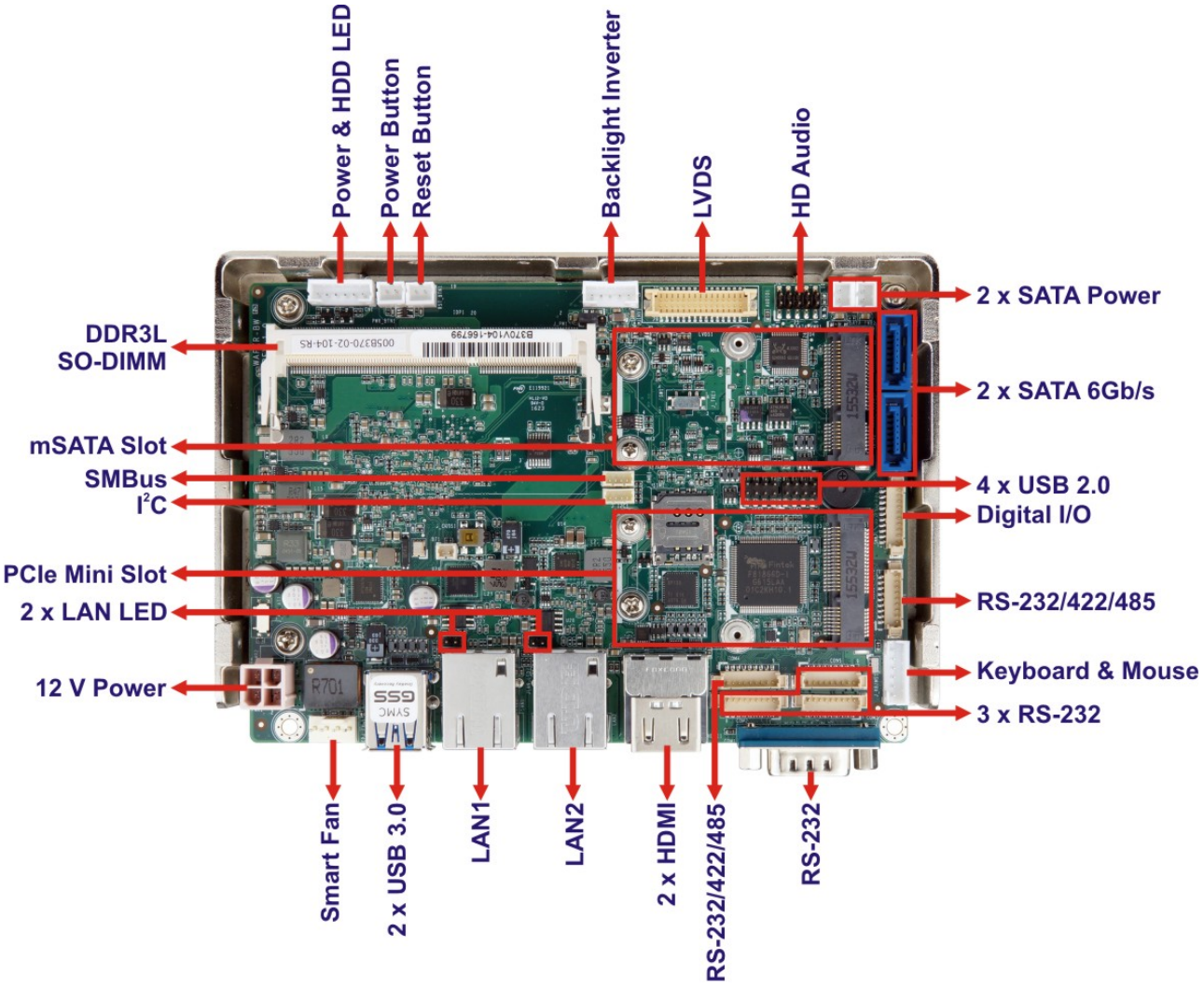
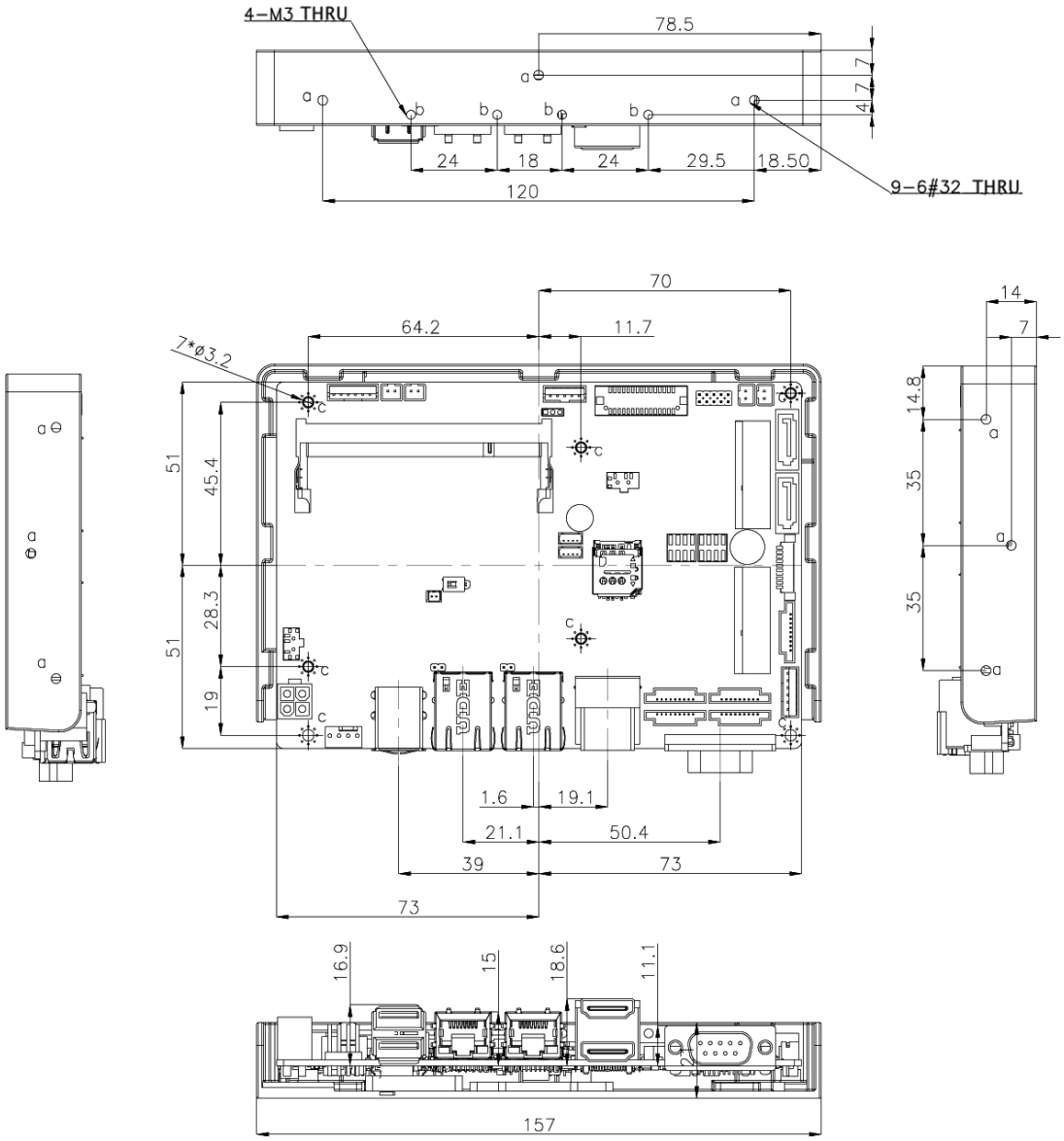


Figure 1-2: Connectors

1.5 Dimensions

The dimensions of the board are listed below:



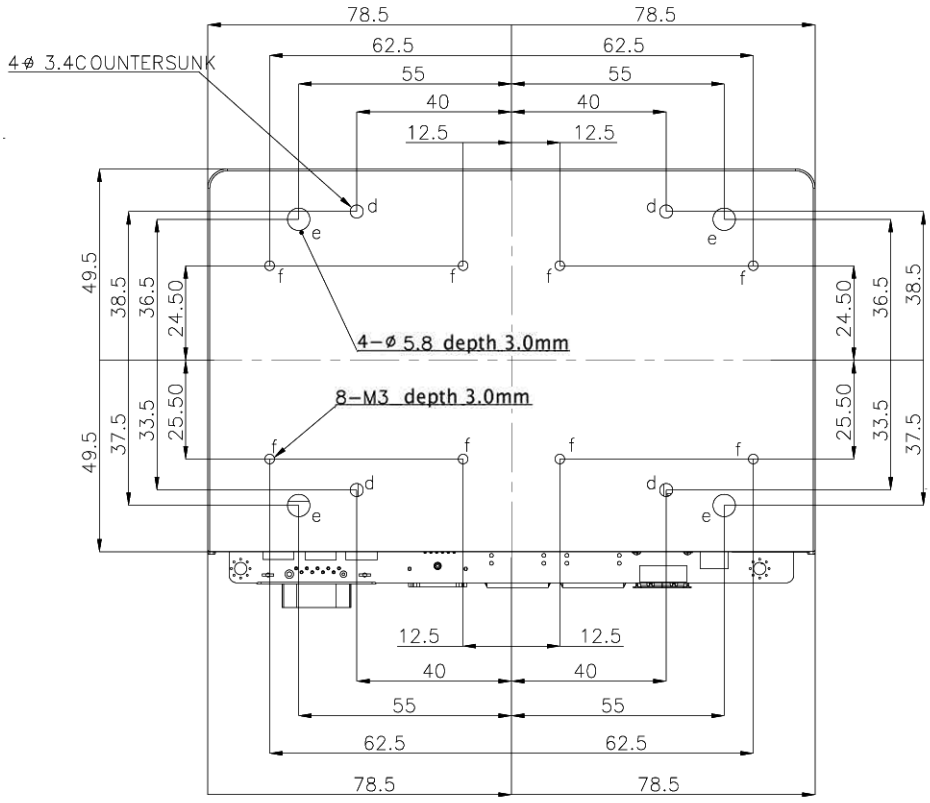


Figure 1-3: Dimensions with Heatsink (mm)

1.6 Data Flow

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

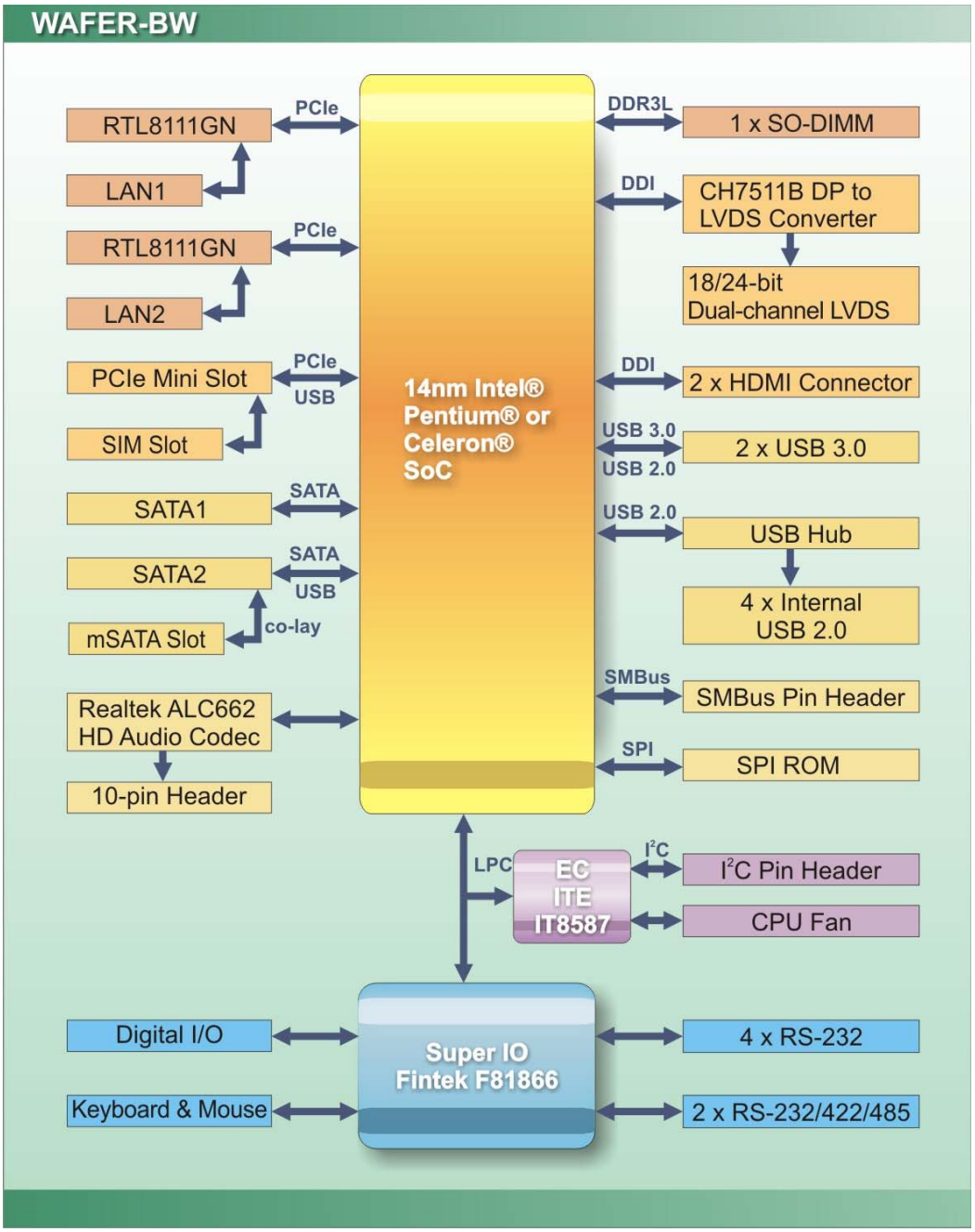


Figure 1-4: Data Flow Diagram

1.7 Technical Specifications

WAFER-BW technical specifications are listed below.

Specification	WAFER-BW
SoC	Intel® Pentium® N3710 on-board SoC (2.56 GHz, quad-core, 2 MB cache, TDP=6 W) Intel® Celeron® N3160 on-board SoC (2.24 GHz, quad-core, 2 MB cache, TDP=6 W) Intel® Celeron® N3060 on-board SoC (2.48 GHz, dual-core, 2 MB cache, TDP=6 W) Intel® Celeron® N3010 on-board SoC (2.24 GHz, dual-core, 2 MB cache, TDP=4 W)
BIOS	AMI UEFI BIOS
Memory	One 204-pin 1600/1333* MHz single-channel DDR3L SDRAM unbuffered SO-DIMM slot (system max. 8 GB) ** DDR3L 1333 MHz operation will be downgraded to 1066 MHz due to Intel® SoC limitation.*
Graphics	8th generation Intel® HD Graphics with 16 low-power execution units, supporting DX11.1, OpenGL 4.2 and OpenCL1.2
Display Output	Triple independent display 2 x HDMI (up to 3840x2160 @ 30 Hz) 1 x 18/24-bit dual-channel LVDS by CH7511B DP to LVDS converter (up to 1920x1200 @ 60 Hz)
Ethernet	Dual Realtek RTL8111GN PCIe GbE controller
Digital I/O	8-bit digital I/O by 10-pin (1x10) wafer
Super IO	Fintek F81866D-I
Embedded Controller	ITE IT8587VG-FX
Audio	Realtek ALC662 HD codec
Watchdog Timer	Software programmable support 1~255 sec. system reset

Specification	WAFER-BW
I/O Interface	
Audio Connector	1 x Analog audio by 10-pin (2x5) header
Ethernet	2 x RJ-45 GbE port
Keyboard/Mouse	1 x KB/MS by 6-pin (1x6) wafer
Serial Ports	1 x RS-232 on rear I/O 3 x RS-232 by 9-pin (1x9) wafer 2 x RS-232/422/485 by 9-pin (1x9) wafer
USB Ports	2 x USB 3.0 on rear I/O 4 x USB 2.0 by 8-pin (2x4) header
Front Panel	1 x Power LED & HDD LED by 6-pin (1x6) wafer 1 x Power button by 2-pin wafer 1 x Reset button by 2-pin wafer
LAN LED	2 x LAN link LED connector by 2-pin header
Fan	1 x Smart fan connector by 4-pin (1x4) wafer
SMBus	1 x SMBus connector by 4-pin (1x4) wafer
I^2C	1 x I^2C connector by 4-pin (1x4) wafer
Storage	2 x SATA 6Gb/s with 5 V SATA power connectors 1 x eMMC 4.51 (optional)
Expansion	Two Full-size/Half-size PCIe Mini card slots: ▪ One supports mSATA module (colay SATA2) ▪ One with a SIM card holder
Environmental and Power Specifications	
Power Supply	12 V DC input only (AT/ATX support)
Power Connector	1 x Internal power connector by 4-pin (2x2) connector
Power Consumption	+12 V @ 1.52 A (Intel® Pentium® processor N3710 with 8 GB 1600 MHz DDR3L memory)
Operating Temperature	-20°C ~ 60°C
Storage Temperature	-30°C ~ 70°C

Specification	WAFER-BW
Humidity	5% ~ 95%, non-condensing
Physical Specifications	
Dimensions	146 mm x 102 mm
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-BW 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-BW was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The WAFER-BW is shipped with the following components:

Quantity	Item and Part Number	Image
1	WAFER-BW single board computer	
1	Audio cable	
1	Power cable	
1	RS-232/422/485 cable	
2	SATA and power cable	

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
KB/MS PS/2 Y-cable, 135 mm, p=2.0 mm (**P/N:** 32000-023800-RS)	
Dual USB port cable, 210mm, p=2.0 mm (**P/N**: 32001-008600-200-RS)	

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

3.1.1 WAFER-BW Layout

The figures below show all the connectors and jumpers.

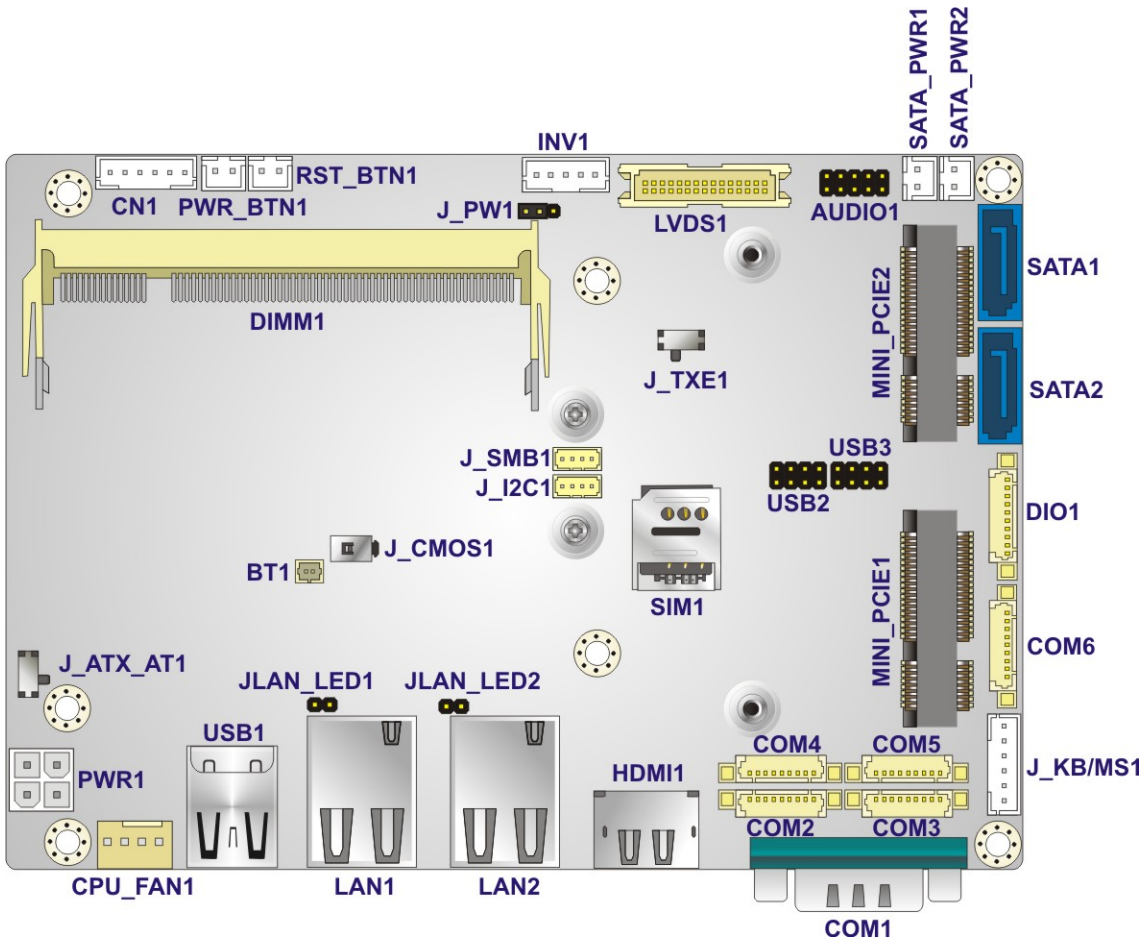


Figure 3-1: Connector and Jumper Locations (Front)

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	PWR1
Audio connector	10-pin header	AUDIO1
Battery connector	2-pin wafer	BT1
Digital I/O connector	10-pin wafer	DIO1
Fan connector, CPU	4-pin wafer	CPU_FAN1
I^2C connector	4-pin wafer	J_I2C1
Keyboard & mouse connector	6-pin wafer	J_KB/MS1
LVDS backlight inverter connector	5-pin wafer	INV1
LVDS LCD connector	30-pin crimp	LVDS1
LAN LED connectors	2-pin header	JLAN_LED1, JLAN_LED2
Memory slot	204-pin DDR3L SO-DIMM	DIMM1
mSATA module slot	PCIe Mini slot	MINI_PCIE2
PCIe Mini card slot	PCIe Mini slot	MINI_PCIE1
Power and HDD LED connector	6-pin wafer	CN1
Power button connector	2-pin wafer	PWR_BTN1
Reset button connector	2-pin wafer	RST_BTN1
RS-232 serial port connectors	9-pin wafer	COM2, COM3, COM5
RS-232/422/485 serial port connectors	9-pin wafer	COM4, COM6

SATA 6Gb/s connectors	7-pin SATA connector	SATA1, SATA2
SATA power connectors	2-pin wafer	SATA_PWR1, SATA_PWR2
SIM card slot	Micro SIM card slot	SIM1
SMBus connector	4-pin wafer	J_SMB1
USB 2.0 connector	8-pin header	USB2, USB3

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 connectors	RJ-45	LAN1, LAN2
HDMI connectors	HDMI	HDMI1
Serial port connector, RS-232	DB-9	COM1
USB 3.0 connectors	USB 3.0	USB1

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

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

3.2.1 +12V DC-IN Power Connector

CN Label: **PWR1**

CN Type: 4-pin Molex, p=4.2 mm

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

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

The connector supports the +12V power supply.

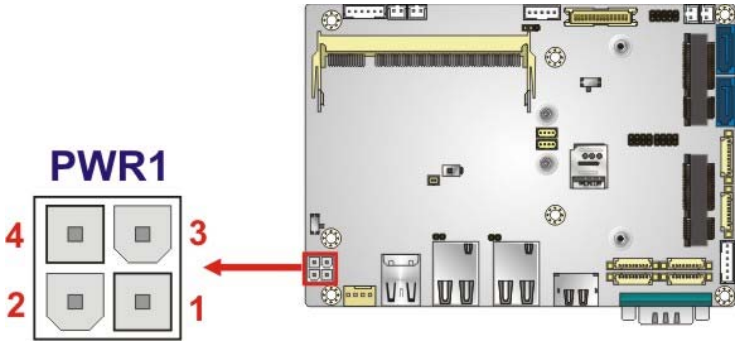


Figure 3-2: +12V DC-IN Power Connector Location

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, p=2.00 mm
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.

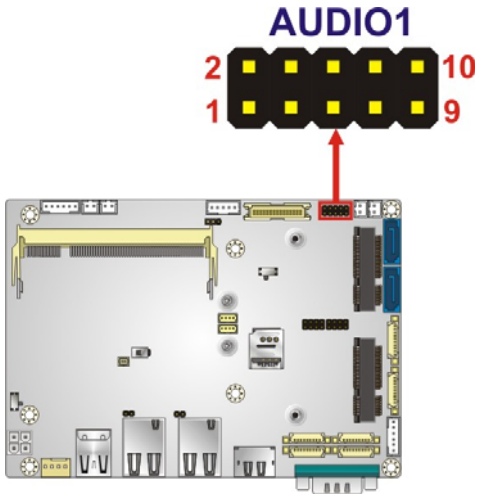


Figure 3-3: Audio Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	LINE-OUT_R	2	LINE-IN_R
3	AUD_GND	4	AUD_GND
5	LINE-OUT_L	6	LINE-IN_L
7	AUD_GND	8	AUD_GND
9	MIC_R	10	MIC_L

Table 3-4: Audio Connector Pinouts

3.2.3 Battery Connector

CAUTION:

Risk of explosion if battery is replaced by an incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

CN Label:	**BT1**
CN Type:	2-pin wafer, p=1.25 mm
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.

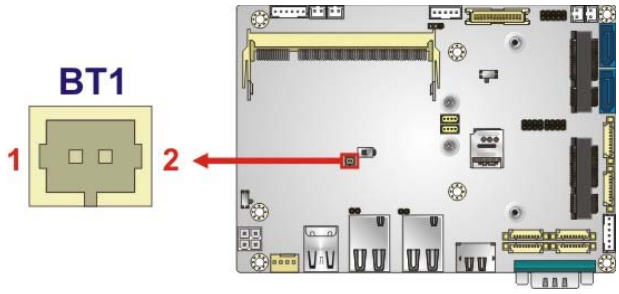


Figure 3-4: Battery Connector Location

Pin	Description
1	VBAT+
2	GND

Table 3-5: Battery Connector Pinouts

3.2.4 Digital I/O Connector

CN Label: **DIO1**

CN Type: 10-pin wafer, p=1.25 mm

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

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

The 8-bit digital I/O connector provides programmable input and output for external devices.

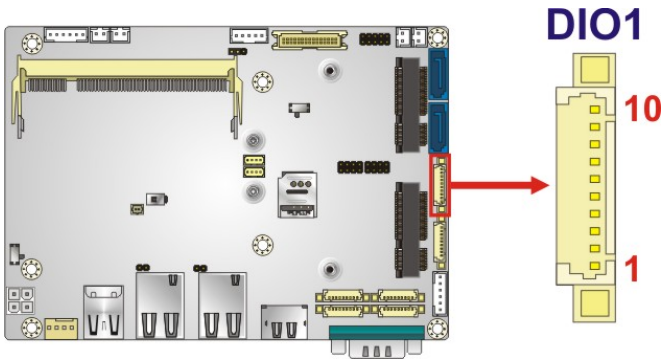


Figure 3-5: Digital I/O Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+5V
3	DOUT3	4	DOUT2
5	DOUT1	6	DOUT0
7	DIN3	8	DIN2
9	DIN1	10	DIN0

Table 3-6: Digital I/O Connector Pinouts

3.2.5 Fan Connector

CN Label: **CPU_FAN1**

CN Type: 4-pin wafer, p=2.54 mm

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

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

The fan connector attaches to a cooling fan.

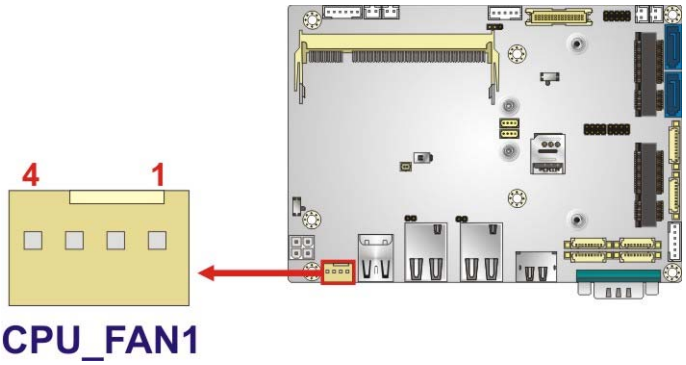


Figure 3-6: Fan Connector Location

Pin	Description
1	GND
2	+V12S
3	Rotation Signal
4	PWM Control Signal

Table 3-7: Fan Connector Pinouts

3.2.6 I²C Connector

CN Label: **J_I2C1**

CN Type: 4-pin wafer, p=1.25 mm

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

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

The I²C connector is used to connect I²C-bus devices to the main board.

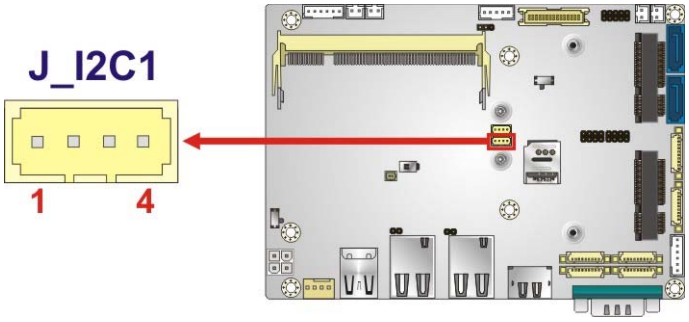


Figure 3-7: I²C Connector Location

Pin	Description
1	GND
2	I²C _DATA
3	I²C _CLK
4	+5V

Table 3-8: I²C Connector Pinouts

3.2.7 Keyboard and Mouse Connector

CN Label: **J_KB/MS1**

CN Type: 6-pin wafer, p=2.00 mm

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

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

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

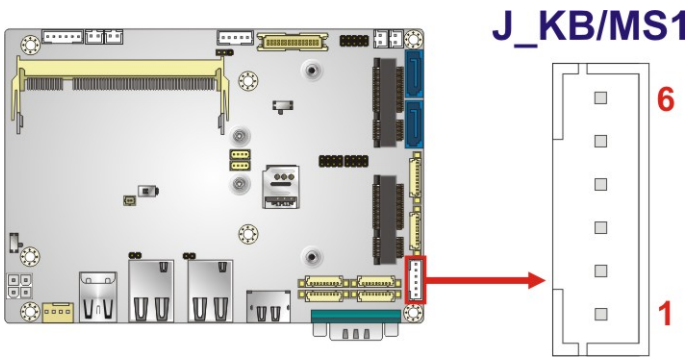


Figure 3-8: Keyboard and Mouse Connector Location

Pin	Description
1	VCC5V
2	Mouse Data
3	Mouse Clock
4	Keyboard Data
5	Keyboard Clock
6	GND

Table 3-9: Keyboard and Mouse Connector Pinouts

3.2.8 LVDS Backlight Inverter Connector

CN Label:	**INV1**
CN Type:	5-pin wafer, p=2.00 mm
CN Location:	See **Figure 3-9**
CN Pinouts:	See **Table 3-10**

The backlight inverter connector provides power to an LCD panel.

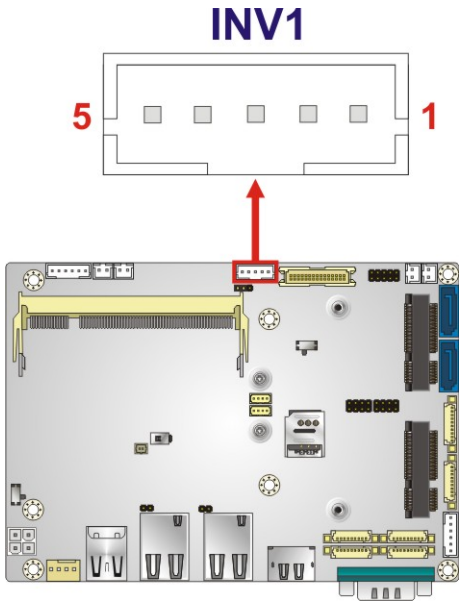


Figure 3-9: Backlight Inverter Connector Location

Pin	Description
1	LCD_BKLTCTL
2	GND
3	+12V
4	GND
5	BACKLIGHT ENABLE

Table 3-10: Backlight Inverter Connector Pinouts

3.2.9 LVDS LCD Connector

CN Label: **LVDS1**

CN Type: 30-pin crimp, p=1.25 mm

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

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

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

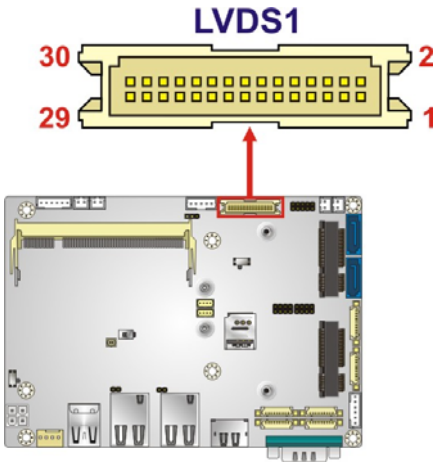


Figure 3-10: LVDS Connector Location

Pin	Description	Pin	Description
1	GROUND	2	GROUND
3	LVDS_A_TX0-P	4	LVDS_A_TX0-N
5	LVDS_A_TX1-P	6	LVDS_A_TX1-N
7	LVDS_A_TX2-P	8	LVDS_A_TX2-N
9	LVDS_A_TXCLK-P	10	LVDS_A_TXCLK-N
11	LVDS_A_TX3-P	12	LVDS_A_TX3-N
13	GROUND	14	GROUND
15	LVDS_B_TX0-P	16	LVDS_B_TX0-N
17	LVDS_B_TX1-P	18	LVDS_B_TX1-N
19	LVDS_B_TX2-P	20	LVDS_B_TX2-N
21	LVDS_B_TXCLK-P	22	LVDS_B_TXCLK-N
23	LVDS_B_TX3-P	24	LVDS_B_TX3-N
25	GROUND	26	GROUND

Pin	Description	Pin	Description
27	+LCD VCC	28	+LCD VCC
29	+LCD VCC	30	+LCD VCC

Table 3-11: LVDS Connector Pinouts

3.2.10 LAN LED Connectors

CN Label: **JLAN_LED1, JLAN_LED2**

CN Type: 2-pin header, p=2.00 mm

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

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

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

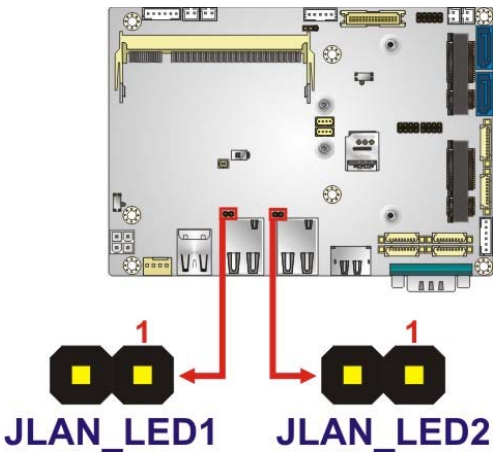


Figure 3-11: LAN LED Connector Locations

Pin	Description
1	+3.3VLAN
2	LAN_LED_LINK#

Table 3-12: LAN LED Connector Pinouts

3.2.11 mSATA Module Slot

CAUTION:

If an mSATA module is installed in the mSATA slot (MINI_PCIE2), the SATA port 2 (SATA2) will be disabled. Choose either the SATA2 connector or the mSATA module for storage.

CN Label:	**MINI_PCIE2**
CN Type:	Half-size/Full-size PCIe Mini card slot
CN Location:	See **Figure 3-12**
CN Pinouts:	See **Table 3-13**

The PCIe Mini card slot supports mSATA modules or PCIe Mini cards with USB interface.

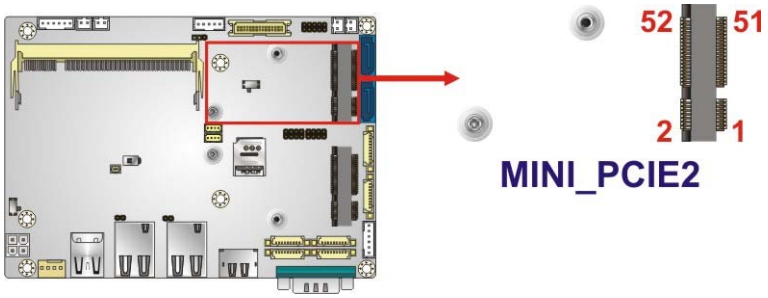


Figure 3-12: mSATA Module Slot Location

Pin	Description	Pin	Description
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5V
7	N/C	8	N/C
9	GND	10	N/C
11	PCIE_CLK#	12	N/C
13	PCIE_CLK	14	N/C
15	GND	16	N/C

Pin	Description	Pin	Description
17	N/C	18	GND
19	N/C	20	N/C
21	GND	22	PCIRST#
23	PCIE_RXN(SATA_RX+)	24	N/C
25	PCIE_RXP(SATA_RX-)	26	GND
27	GND	28	1.5V
29	GND	30	SMBCLK
31	PCIE_TXN(SATA_TX-)	32	SMBDATA
33	PCIE_TXP(SATA_TX+)	34	GND
35	GND	36	USBD-
37	GND	38	USBD+
39	VCC3	40	GND
41	VCC3	42	N/C
43	GND	44	N/C
45	N/C	46	N/C
47	N/C	48	1.5V
49	N/C	50	GND
51	N/C	52	VCC3

Table 3-13: mSATA Module Slot Pinouts

3.2.12 PCIe Mini Card Slot

CN Label: **MINI_PCIE1**

CN Type: Half-size/Full-size PCIe Mini card slot

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

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

The PCIe Mini card slot is for installing a PCIe Mini expansion card with USB interface, such as 3G modules.

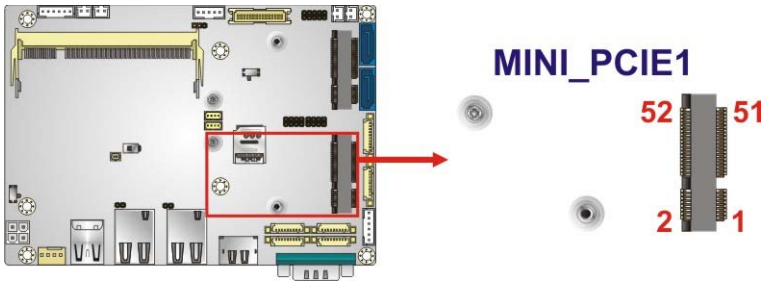


Figure 3-13: PCIe Mini Card Slot Location

Pin	Description	Pin	Description
1	PCIE_WAKE#	2	VCC3
3	N/C	4	GND
5	N/C	6	1.5V
7	N/C	8	UIM_PWR
9	GND	10	UIM_DATA
11	PCIE_CLK#	12	UIM_CLK
13	PCIE_CLK	14	UIM_RST
15	GND	16	UIM_VPP
17	N/C	18	GND
19	N/C	20	N/C
21	GND	22	PCIRST#
23	PCIE_RXN	24	N/C
25	PCIE_RXP	26	GND
27	GND	28	1.5V
29	GND	30	SMBCLK
31	PCIE_TXN	32	SMBDATA
33	PCIE_TXP	34	GND
35	GND	36	USBD-
37	GND	38	USBD+
39	VCC3	40	GND
41	VCC3	42	N/C
43	GND	44	N/C
45	N/C	46	N/C
47	N/C	48	1.5V

Pin	Description	Pin	Description
49	N/C	50	GND
51	N/C	52	VCC3

Table 3-14: PCIe Mini Card Slot Pinouts

3.2.13 Power and HDD LED Connector

CN Label: **CN1**

CN Type: 6-pin wafer, p=2.00 mm

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

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

The CN1 connector connects to power and HDD LED indicators.

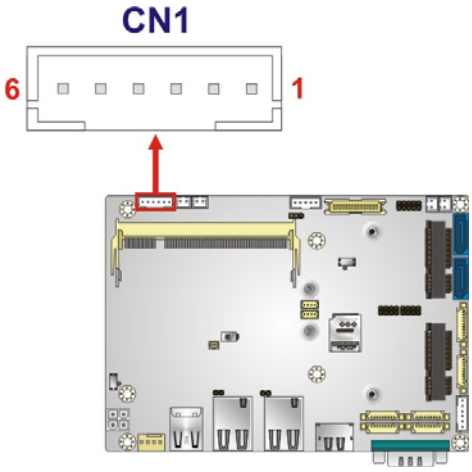


Figure 3-14: Power and HDD LED Connector Location

Pin	Description	
1	VCC	+5V
2	GND	
3	PWR_LED+	Power LED
4	PWR_LED-	
5	HDD_LED+	HDD LED
6	HDD_LED-	

Table 3-15: Power and HDD LED Connector Pinouts

3.2.14 Power Button Connector

CN Label:	**PWR_BTN1**
CN Type:	2-pin wafer, p=2.00 mm
CN Location:	See **Figure 3-15**
CN Pinouts:	See **Table 3-16**

The power button connector connects to a power button.

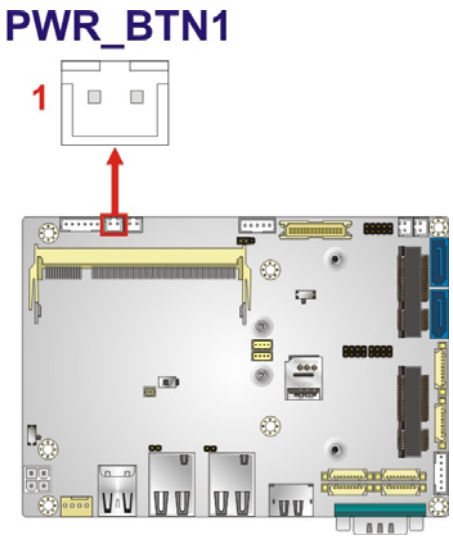


Figure 3-15: Power Button Connector Location

Pin	Description
1	PWR_BTN+
2	PWR_BTN-

Table 3-16: Power Button Connector Pinouts

3.2.15 Reset Button Connector

CN Label:	**RST_BTN1**
CN Type:	2-pin wafer, p=2.00 mm
CN Location:	See **Figure 3-16**
CN Pinouts:	See **Table 3-17**

The reset button connector connects to a reset button.

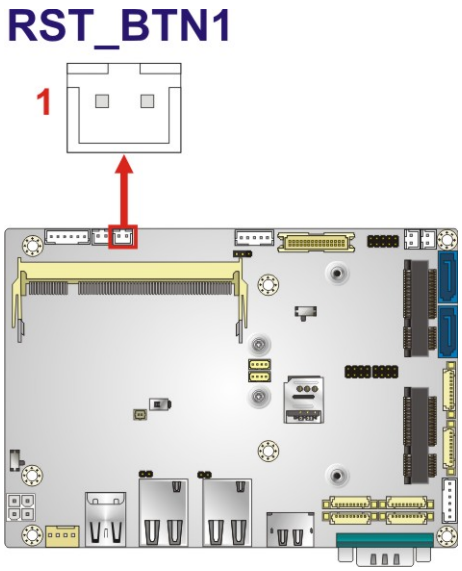


Figure 3-16: Reset Button Connector Location

Pin	Description
1	RESET+
2	RESET-

Table 3-17: Reset Button Connector Pinouts

3.2.16 RS-232 Serial Port Connectors

CN Label:	**COM2, COM3, COM5**
CN Type:	9-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-17**
CN Pinouts:	See **Table 3-18**

The serial connectors provide RS-232 connection.

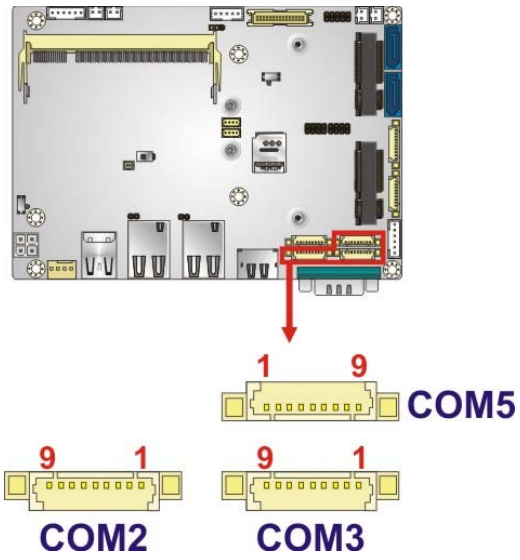


Figure 3-17: RS-232 Serial Port Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI
9	GND		

Table 3-18: RS-232 Serial Port Connector Pinouts

3.2.17 RS-232/422/485 Serial Port Connectors

CN Label:	**COM4, COM6**
CN Type:	9-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-18**
CN Pinouts:	See **Table 3-19**

These two connectors provide RS-232, RS-422 or RS-485 communications. The default mode is set to RS-232 in BIOS. To configure the connectors as RS-422 or RS-485, please refer to **Section 5.3.4.1.4** and **Section 5.3.4.1.6**.

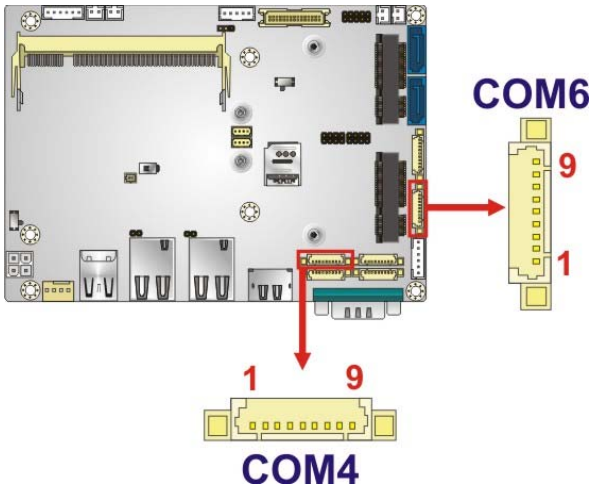


Figure 3-18: RS-232/422/485 Connector Locations

Pin	RS-232	RS-422	RS-485
1	DCD	TXD-	DATA-
2	DSR	--	--
3	RXD	TXD+	DATA+
4	RTS	--	--
5	TXD	RXD+	--
6	CTS	--	--
7	DTR	RXD-	--
8	RI	--	--
9	GND	--	--

Table 3-19: RS-232/422/485 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.

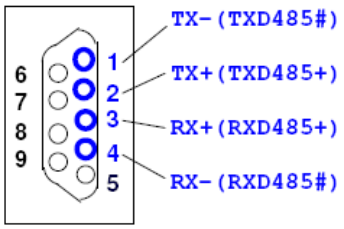
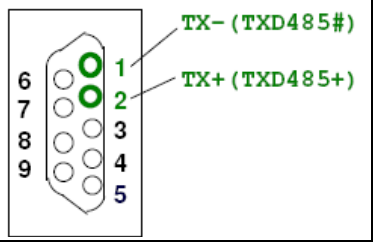
RS-422 Pinouts	RS-485 Pinouts
	

Table 3-20: DB-9 RS-422/485 Pinouts

3.2.18 SATA 6Gb/s Connectors

CN Label: **SATA1, SATA2**

CN Type: 7-pin SATA connector

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

The SATA 6Gb/s connector is connected to a SATA 6Gb/s device. The SATA 6Gb/s device transfers data at speeds as high as 6Gb/s.

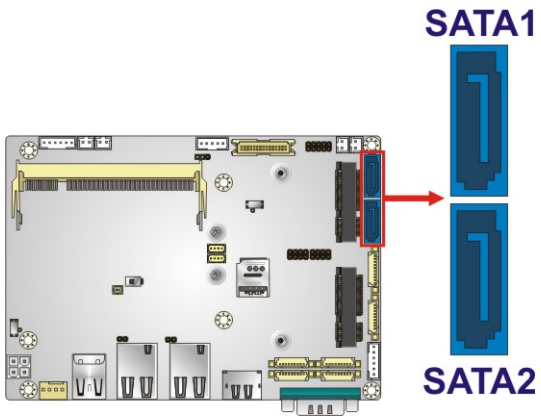


Figure 3-19: SATA 6Gb/s Connector Locations

CAUTION:

If an mSATA module is installed in the mSATA slot (MINI_PCIE2), the SATA port 2 (SATA2) will be disabled. Choose either the SATA2 connector or the mSATA module for storage.

3.2.19 SATA Power Connectors

CN Label:	**SATA_PWR1, SATA_PWR2**
CN Type:	2-pin wafer, p=2.00 mm
CN Location:	See **Figure 3-20**
CN Pinouts:	See **Table 3-21**

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

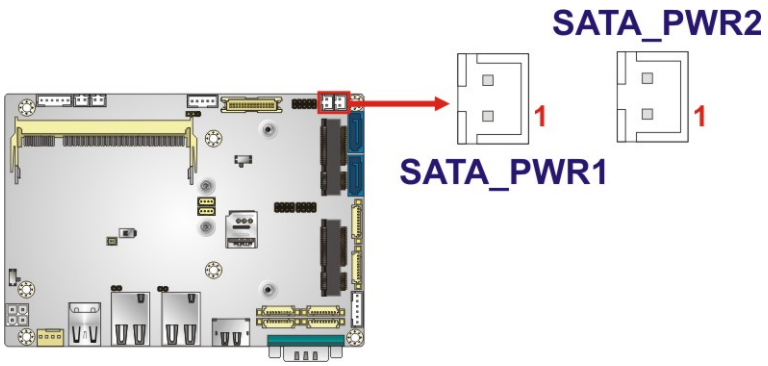


Figure 3-20: SATA Power Connector Locations

Pin	Description
1	+5V
2	GND

Table 3-21: SATA Power Connector Pinouts

3.2.20 SIM Card Slot

CN Label: **SIM1**

CN Type: Micro SIM card slot

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

The SIM card slot accepts a micro SIM card for network communication.

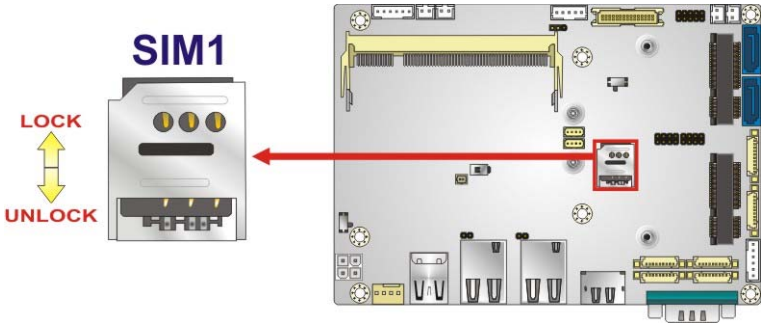


Figure 3-21: SIM Card Slot Location

3.2.21 SMBus Connector

CN Label: **J_SMB1**

CN Type: 4-pin wafer, p=1.25 mm

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

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

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

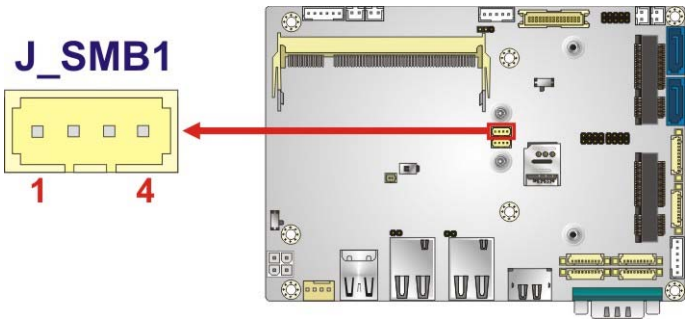


Figure 3-22: SMBus Connector Location

Pin	Description
1	GND
2	SMB_DATA
3	SMB_CLK
4	+5V

Table 3-22: SMBus Connector Pinouts

3.2.22 USB Connectors

CN Label: **USB2, USB3**

CN Type: 8-pin header, p=2.00 mm

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

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

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

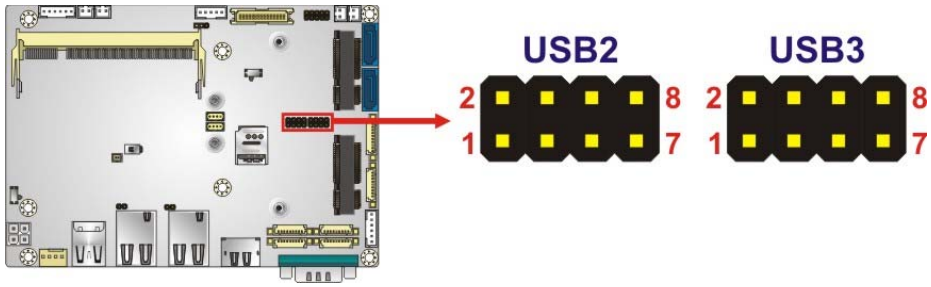


Figure 3-23: USB Connector Locations

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

Table 3-23: USB Connector Pinouts

3.3 External Peripheral Interface Connector Panel

Figure 3-24 shows the WAFER-BW external peripheral interface connector (EPIC) panel. The EPIC panel consists of the following:

- 2 x HDMI connector
- 2 x GbE LAN connector
- 1 x RS-232 serial port connector
- 2 x USB 3.0 connector

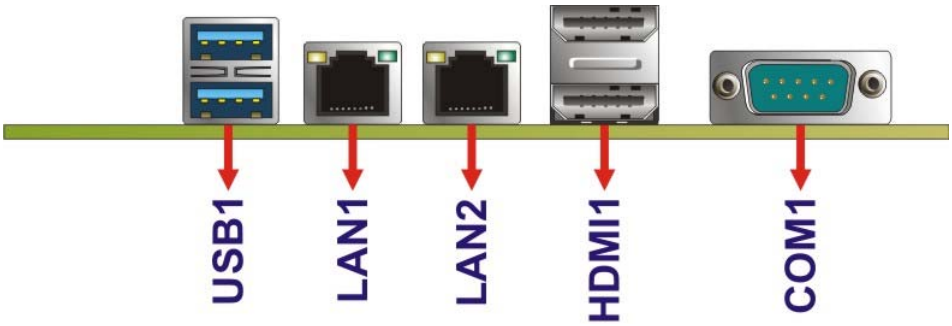


Figure 3-24: External Peripheral Interface Connector

3.3.1 HDMI Connectors

CN Label: **HDMI1**

CN Type: HDMI connector

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

CN Pinouts: See **Table 3-24**

The HDMI connector can connect to an HDMI device. The HDMI connectors support up to 3840x2160 resolution at 30 Hz.

Pin	Description	Pin	Description
1	HDMI_DATA2	2	GND
3	HDMI_DATA2#	4	HDMI_DATA1
5	GND	6	HDMI_DATA1#
7	HDMI_DATA0	8	GND
9	HDMI_DATA0#	10	HDMI_CLK
11	GND	12	HDMI_CLK#

Pin	Description	Pin	Description
13	N/A	14	N/A
15	HDPMI_SCL	16	HDPMI_SDA
17	GND	18	+5V
19	HDPMI_HPD	20	HDMI_GND

Table 3-24: HDMI Connector Pinouts

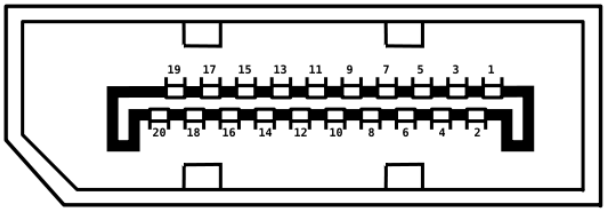


Figure 3-25: HDMI Connector Pinout Locations

3.3.2 LAN Connectors

CN Label: **LAN1, LAN2**

CN Type: RJ-45

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

CN Pinouts: See **Figure 3-26** and **Table 3-25**

The LAN connector connects to a local network.

Pin	Description	Pin	Description
1	LAN_MDI0+	7	LAN_MDI2+
2	LAN_MDI0-	8	LAN_MDI2-
3	LAN_MDI1+	9	LAN_MDI3+
4	LAN_MDI1-	10	LAN_MDI3-

Table 3-25: LAN Pinouts

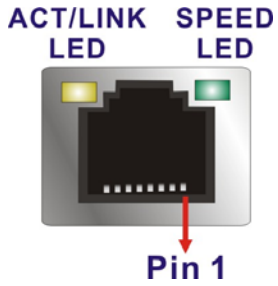


Figure 3-26: LAN Connector

3.3.3 Serial Port Connector (COM1)

CN Label:	**COM1**
CN Type:	9-pin male D-sub
CN Location:	See **Figure 3-24**
CN Pinouts:	See **Table 3-26**

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

Pin	Description	Pin	Description
1	DCD	6	DSR
2	RX	7	RTS
3	TX	8	CTS
4	DTR	9	RI
5	GND		

Table 3-26: Serial Port Pinouts

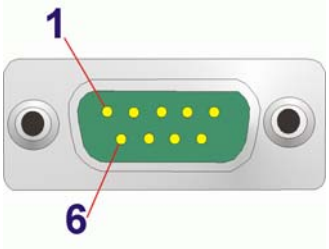


Figure 3-27: Serial Port Pinout Locations

3.3.4 USB Connectors

CN Label: **USB1**

CN Type: USB 3.0 ports

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

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

The WAFER-BW has two external USB 3.0 ports. The USB connector can be connected to a USB 2.0 or USB 3.0 device. The pinouts of USB 3.0 connectors are shown below.

Pin	Description	Pin	Description
1	USB_VCC	10	USB_VCC
2	USB2_D0-	11	USB2_D0-
3	USB2_D0+	12	USB2P0_D0+
4	GND	13	GND
5	USB3P0_RXDN1	14	USB3P0_RXDN2
6	USB3P0_RXDP1	15	USB3P0_RXDP2
7	GND	16	GND
8	USB3P0_TXDN1	17	USB3P0_TXDN2
9	USB3P0_TXDP1	18	USB3P0_TXDP2

Table 3-27: USB 3.0 Port Pinouts

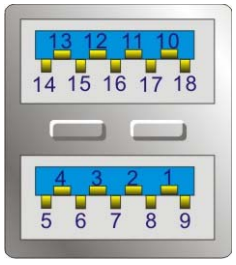


Figure 3-28: USB 3.0 Port Pinout Locations

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

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

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the WAFER-BW. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the WAFER-BW 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-BW, place it on an anti-static pad. This reduces the possibility of ESD damaging the WAFER-BW.
- ***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-BW, WAFER-BW 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-BW 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-BW 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-BW off:
  - When working with the WAFER-BW, 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-BW **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

CAUTION:

1. DDR3L 1333 MHz operation will be downgraded to 1066 MHz due to Intel® SoC limitation.

2. In some cases, the WAFER-BW with DDR3L 1333 MHz memory module installed may take a longer time to boot up.

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

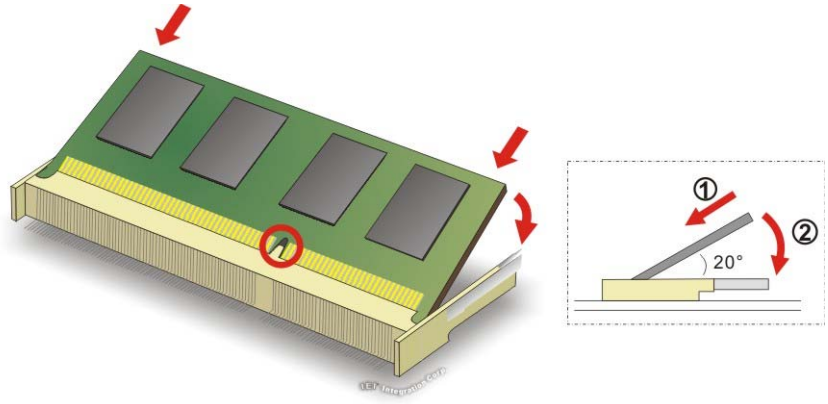


Figure 4-1: SO-DIMM Installation

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 mSATA Module Installation

CAUTION:

If an mSATA module is installed in the mSATA slot (MINI_PCIE2), the SATA port 2 (SATA2) will be disabled. Choose either the SATA2 connector or the mSATA module for storage.

The full-size/half-size PCIe Mini card slot (MINI_PCIE2) allows installation of an mSATA module. To install an mSATA module, please follow the steps below.

4.4.1 Full-size mSATA Module Installation

To install a full-size mSATA module, please follow the steps below.

Step 1: Locate the PCIe Mini slot (MINI_PCIE2). See **Chapter 3**.

Step 2: Remove the retention screw as shown in **Figure 4-2**.

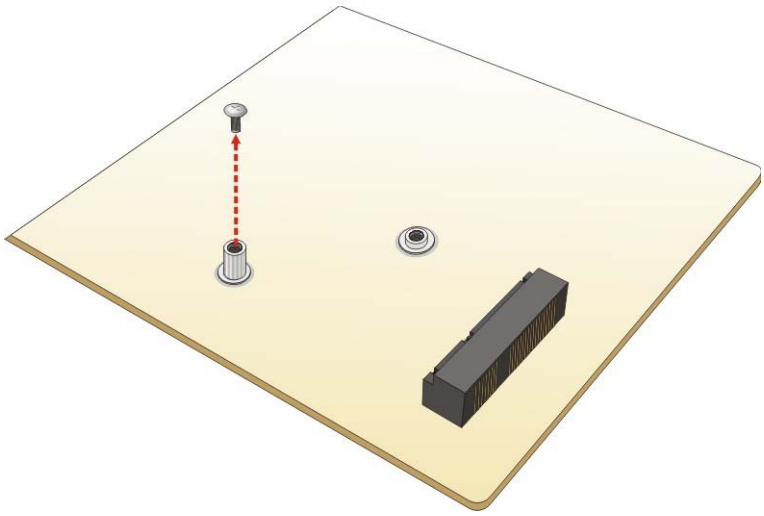


Figure 4-2: Removing the Retention Screw

Step 3: Line up the notch on the mSATA module with the notch on the slot. Slide the mSATA module into the socket at an angle of about 20º (**Figure 4-3**).

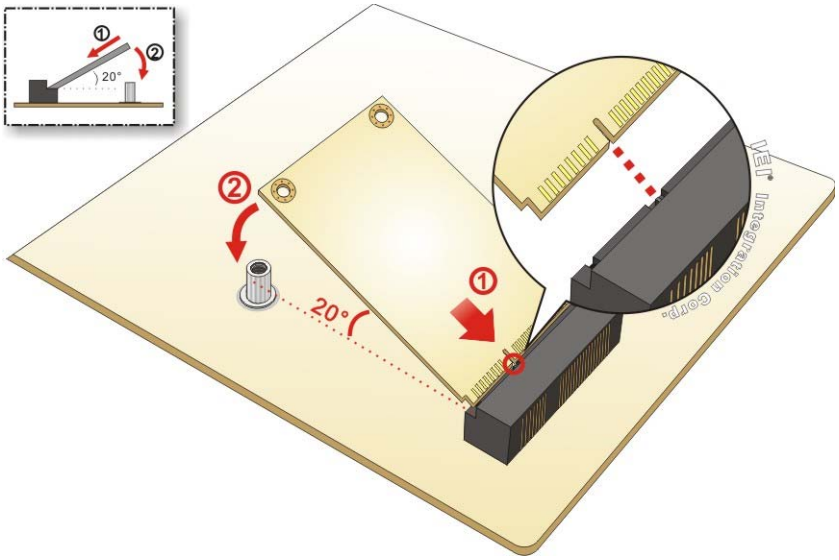


Figure 4-3: Inserting the Full-size mSATA Module into the Slot at an Angle

Step 4: Secure the mSATA module with the retention screw previously removed (**Figure 4-4**).

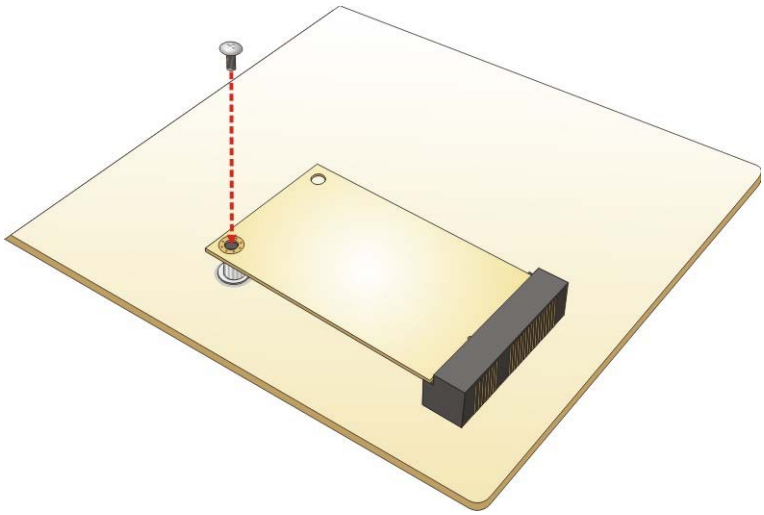


Figure 4-4: Securing the mSATA Module

4.4.2 Half-size mSATA Module Installation

To install a half-size mSATA module, please follow the steps below.

Step 1: Locate the PCIe Mini card slot (MINI_PCIE2). See **Chapter 3**.

Step 2: Remove the retention screw. Unscrew and remove the standoff secured on the motherboard. See **Figure 4-5**.

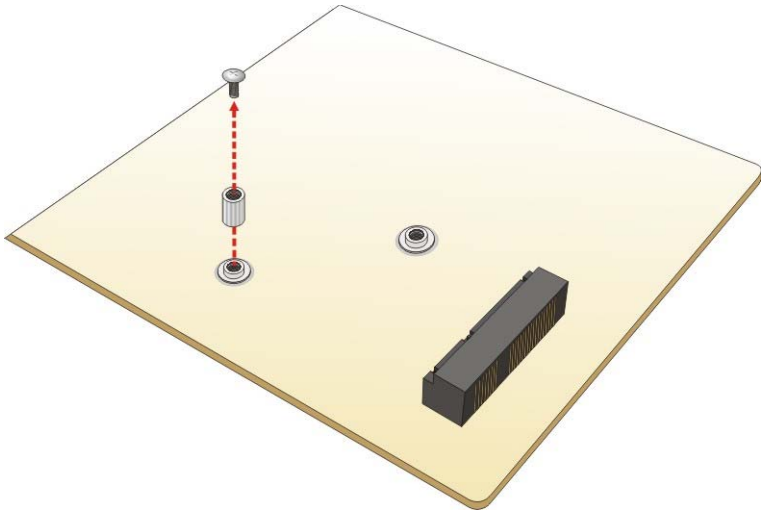


Figure 4-5: Removing the Retention Screw and the Standoff

Step 3: Install the previously removed standoff to the screw hole for the half-size mSATA module (**Figure 4-6**).

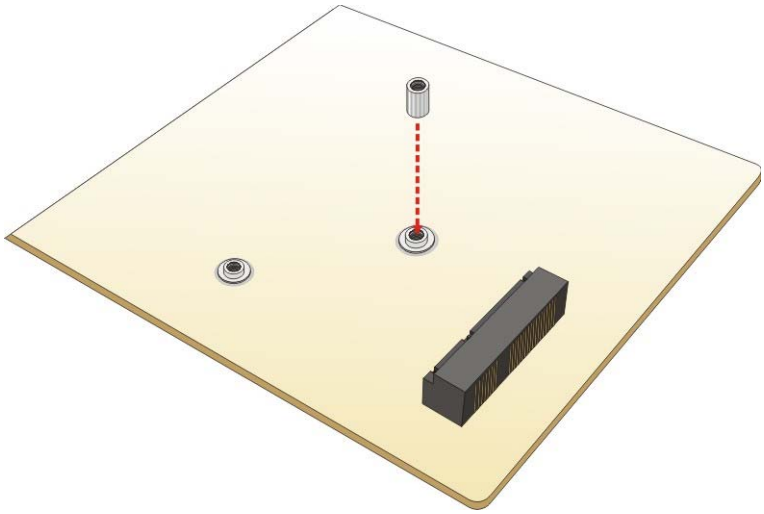


Figure 4-6: Installing the Standoff

Step 4: Line up the notch on the card with the notch on the slot. Slide the mSATA module into the slot at an angle of about 20º (**Figure 4-7**).

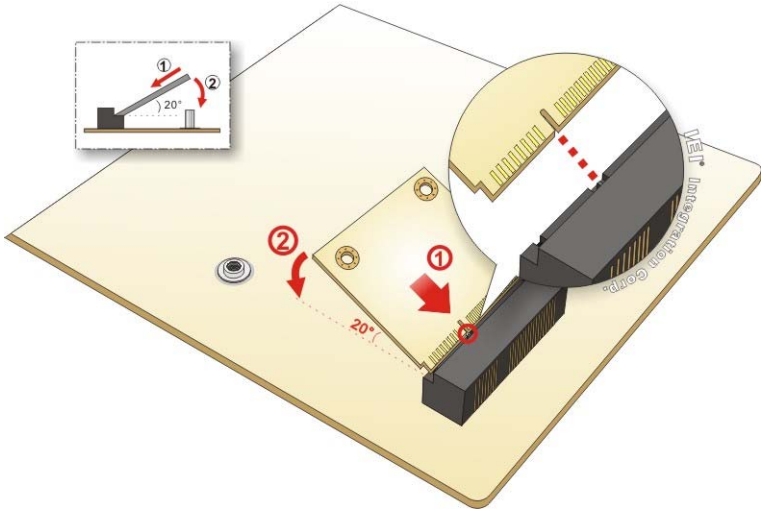


Figure 4-7: Inserting the Half-size mSATA Module into the Slot at an Angle

Step 5: Secure the half-size mSATA module with the retention screw previously removed (**Figure 4-8**).

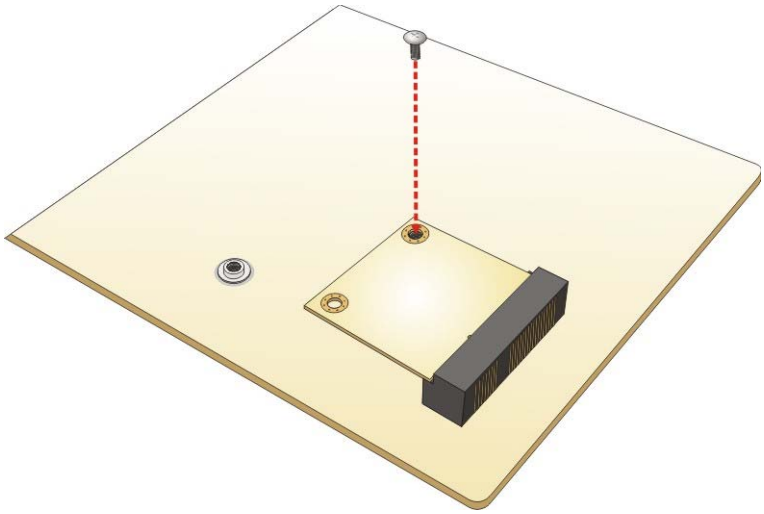


Figure 4-8: Securing the Half-size mSATA Module

4.5 PCIe Mini Card Installation

The PCIe Mini card slot (MINI_PCIE1) allows installation of either a full-size or half-size PCIe Mini card. To install a full-size PCIe Mini card, please refer to the steps described in **Section 4.4** above.

4.6 System Configuration

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

4.6.1 AT/ATX Mode Select Switch

CN Label:	**J_ATX_AT1**
CN Type:	Switch
CN Location:	See **Figure 4-9**
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 1-2	ATX Mode (Default)
Short 2-3	AT Mode

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

The location of the AT/ATX mode select switch is shown in **Figure 4-9** below.

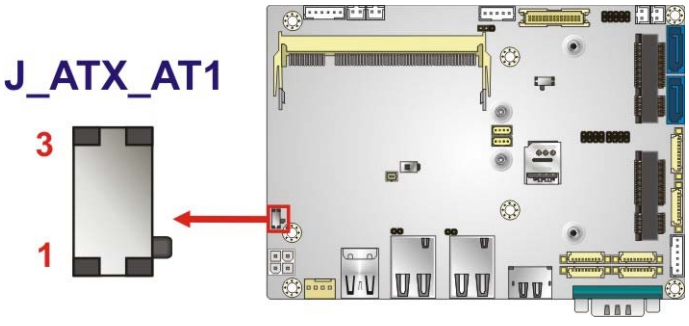


Figure 4-9: AT/ATX Mode Select Switch Location

4.6.2 Clear CMOS Button

CN Label:	**J_CMOS1**
CN Type:	Button
CN Location:	See **Figure 4-10**

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

The location of the clear CMOS button is shown in **Figure 4-10**

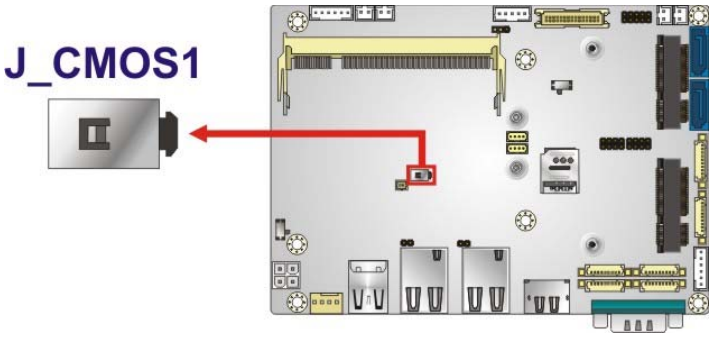


Figure 4-10: Clear CMOS Button Location

4.6.3 Flash Descriptor Security Override Switch

CN Label:	**J_TXE1**
CN Type:	Switch
CN Location:	See **Figure 4-9**
CN Settings:	See **Table 4-1**

The Flash Descriptor Security Override jumper allows users to enable or disable the TXE update. The settings are shown in **Table 4-1**.

Setting	Description
Short 1-2	Disabled (Default)
Short 2-3	Enabled

Table 4-2: Flash Descriptor Security Override Switch Settings

The location of the switch is shown in **Figure 4-9** below.

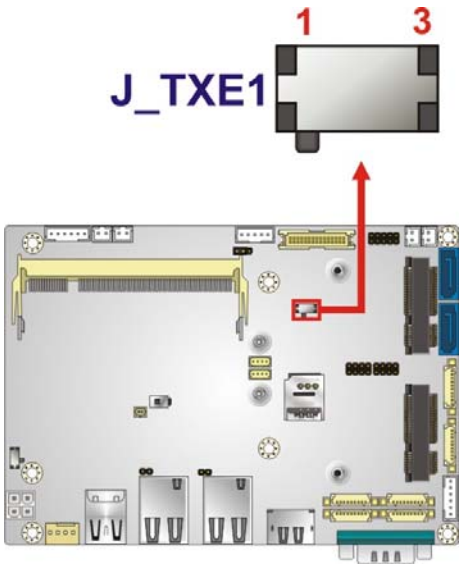


Figure 4-11: Flash Descriptor Security Override Switch Location

4.6.4 LVDS Voltage Select Jumper

WARNING:

Permanent damage to the screen and WAFER-BW 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_PW1**
Jumper Type:	3-pin header, p=2.00 mm
Jumper Settings:	See **Table 4-3**
Jumper Location:	See **Figure 4-12**

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

Setting	Description
Short 1-2	+3.3 V (Default)
Short 2-3	+5 V

Table 4-3: LVDS Voltage Select Jumper Settings

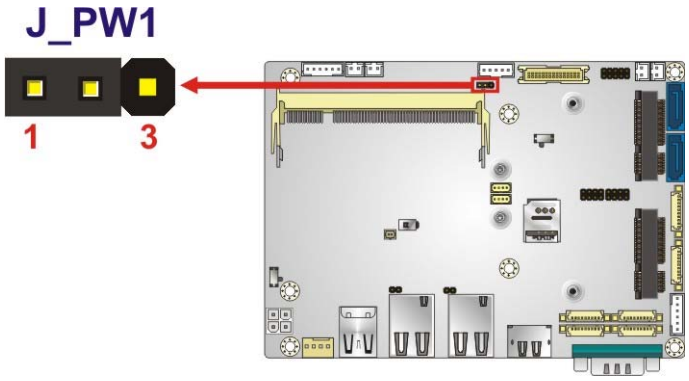


Figure 4-12: LVDS Voltage Select Jumper Location

4.7 Chassis Installation

4.7.1 Heat Sink Enclosure

WARNING:

Never run the WAFER-BW without the heat sink secured to the board. The heat sink ensures the system remains cool and does not need addition heat sinks to cool the system.

WARNING:

When running the WAFER-BW, do not put the WAFER-BW directly on a surface that can not dissipate system heat, especially the wooden or plastic surface. It is highly recommended to run the WAFER-BW

→ on a heat dissipation surface or

→ using copper pillars to hold the board up from the chassis

When the WAFER-BW is shipped, it is secured to a heat sink with five retention screws. If the WAFER-BW must be removed from the heat sink, the five retention screws must be removed.

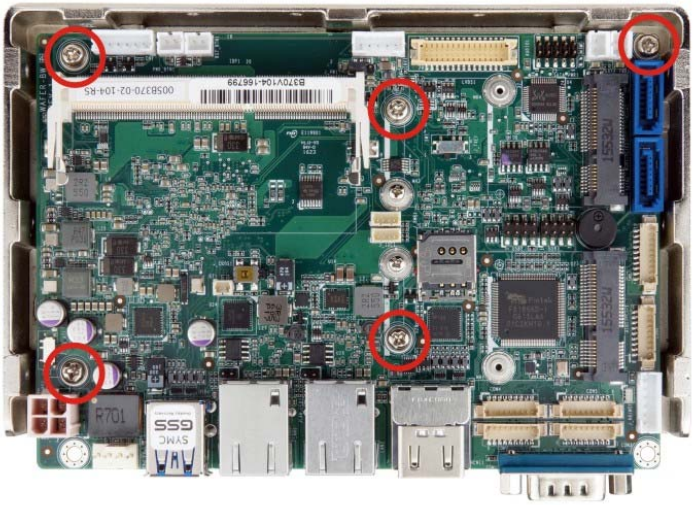


Figure 4-13: Heat Sink Enclosure Screws

4.7.2 Motherboard Installation

Each side of the heat sink enclosure has several screw holes allowing the WAFER-BW to be mounted into a chassis (please refer to Figure 1-3 for the detailed dimensions). The user can design or select a chassis that has screw holes matching up with the holes on the heat sink enclosure for installing the WAFER-BW. The following diagram shows an example of motherboard installation.

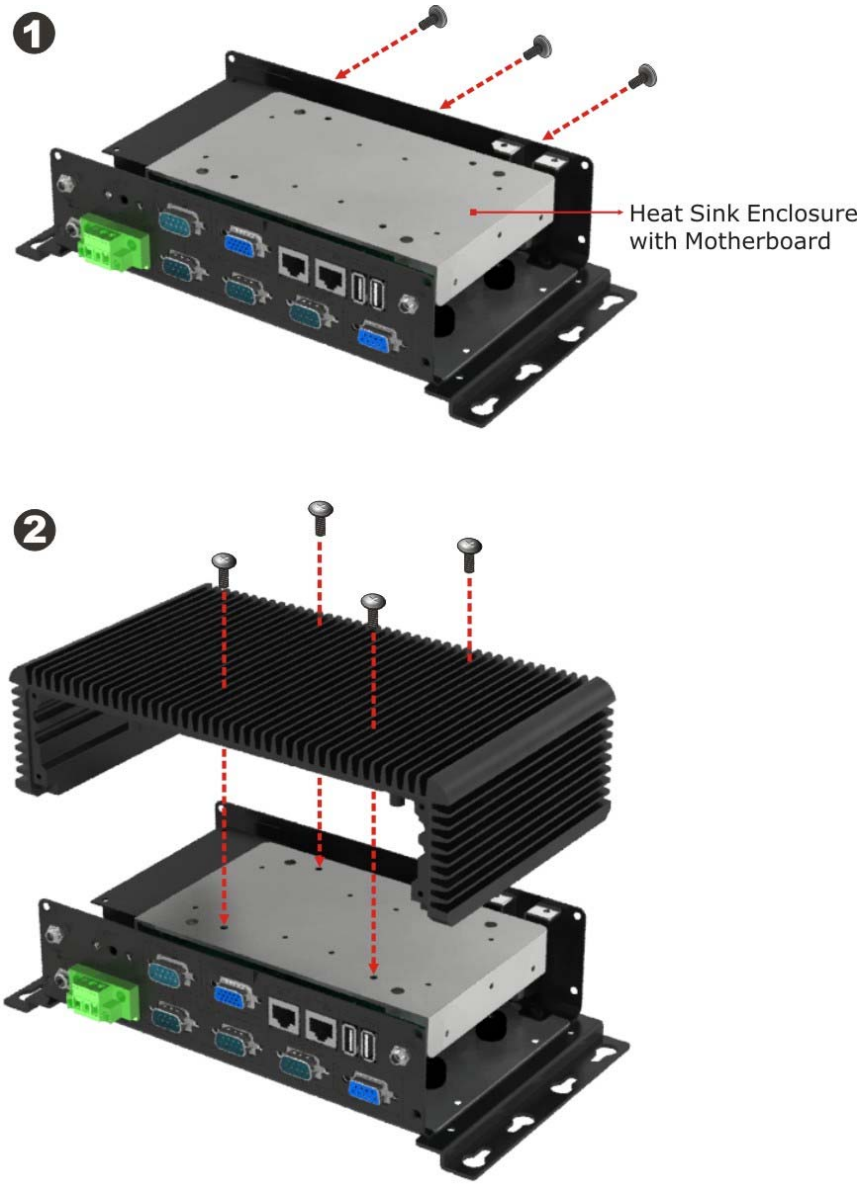


Figure 4-14: Motherboard Installation Example

4.8 Internal Peripheral Device Connections

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

4.8.1 Audio Kit Installation

The Audio Kit that came with the WAFER-BW connects to the audio connector on the WAFER-BW. 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 4-15.

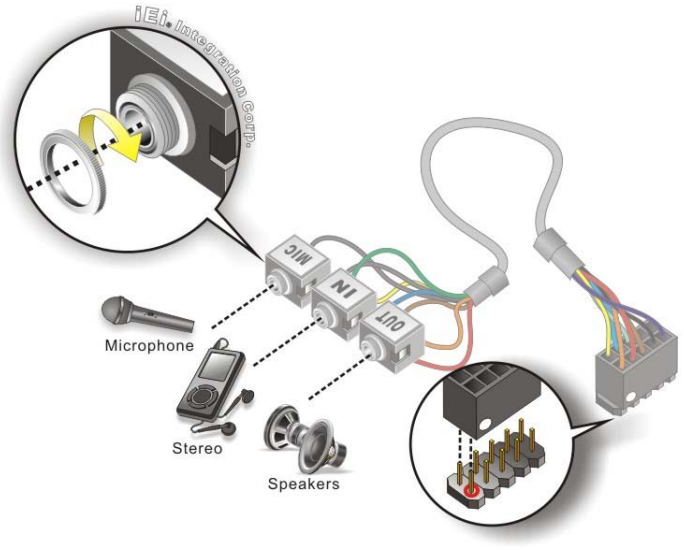


Figure 4-15: Audio Kit Cable Connection

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.

4.8.2 AT Power Connection

Follow the instructions below to connect the WAFER-BW to an AT power supply.

WARNING:

Disconnect the power supply power cord from its AC power source to prevent a sudden power surge to the WAFER-BW.

Step 1: **Locate the power cable**. The power cable is shown in the packing list in **Chapter 2**.

Step 2: **Connect the Power Cable to the Motherboard**. Connect the 4-pin (2x2) Molex type power cable connector to the AT power connector on the motherboard. See Figure 4-16.

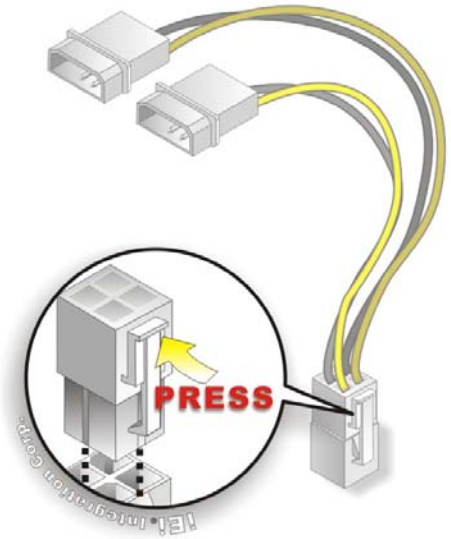


Figure 4-16: Power Cable to Motherboard Connection

Step 3: **Connect Power Cable to Power Supply**. Connect one of the 4-pin (1x4) Molex type power cable connectors to an AT power supply. See Figure 4-17.

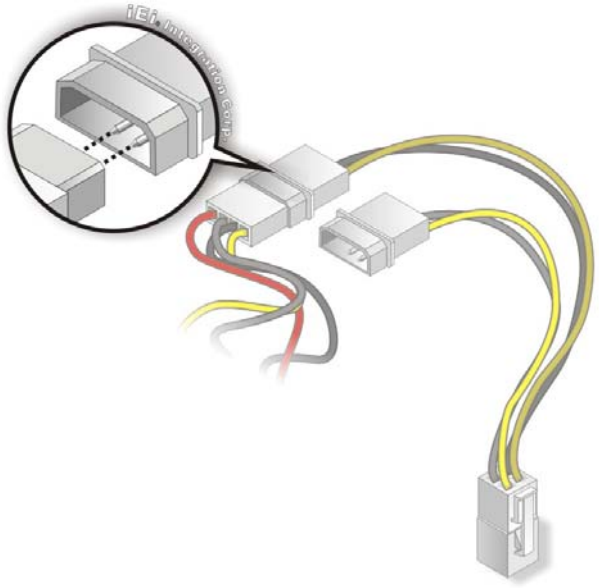


Figure 4-17: Connect Power Cable to Power Supply

4.8.3 SATA Drive Connection

The WAFER-BW is shipped with two SATA cables. 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 4-18**.

NOTE:

The connector locations in the following diagram are just for reference. For the exact locations, please see **Section 3.2.18** and **Section 3.2.19**.

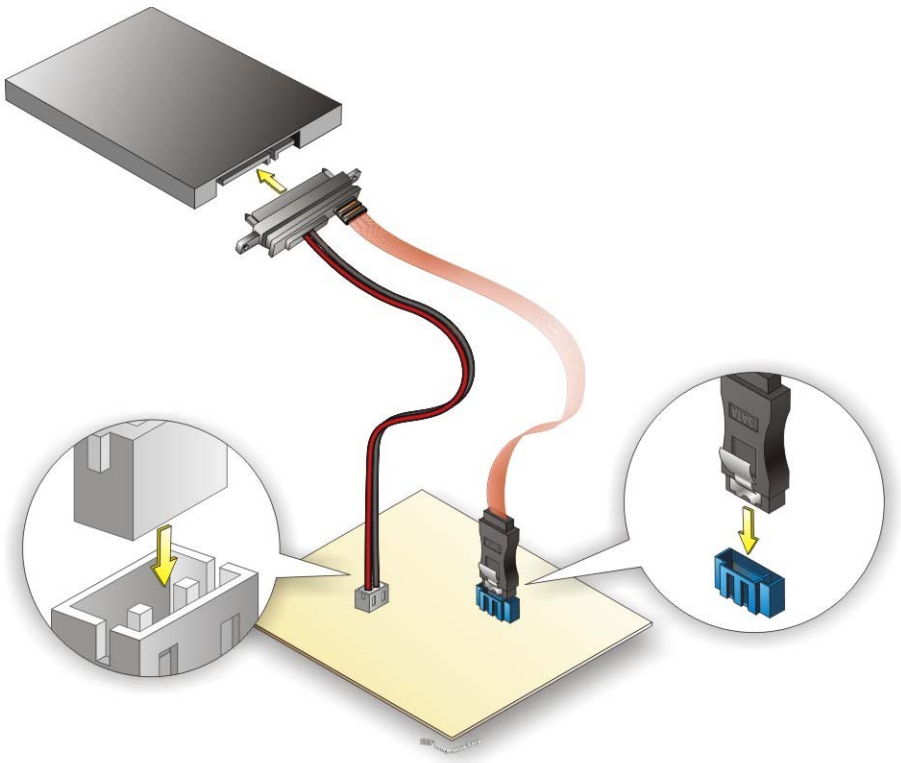


Figure 4-18: SATA Drive Cable Connection

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 4-18**.

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

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 **Section 4.6.2**.

5.1.5 BIOS Menu Bar

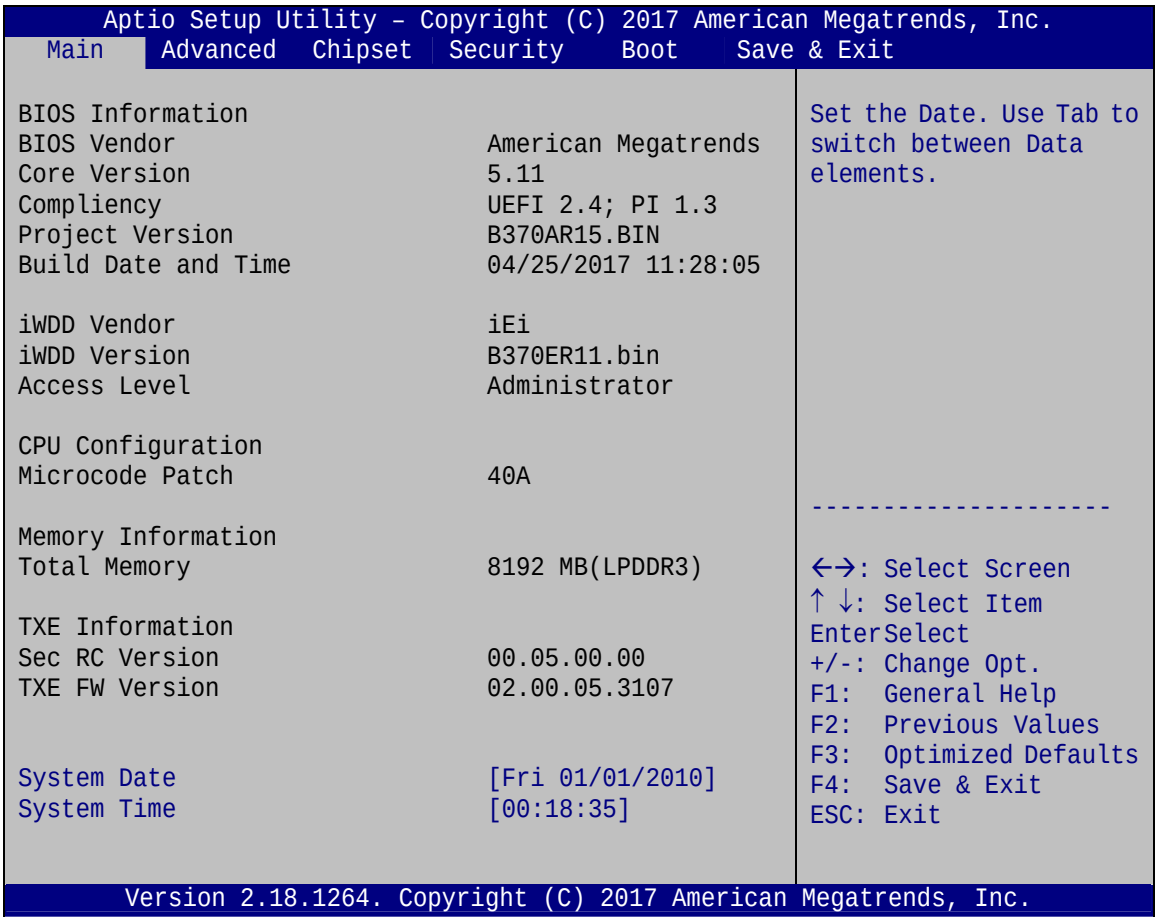
The **menu bar** on top of the BIOS screen has the following main items:

- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Security – Sets User and Supervisor Passwords.
- Boot – Changes the system boot configuration.
- 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
- CPU Configuration

The System Overview field also has two user configurable fields:

➔ **System Date [xx/xx/xx]**

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

➔ **System Time [xx:xx:xx]**

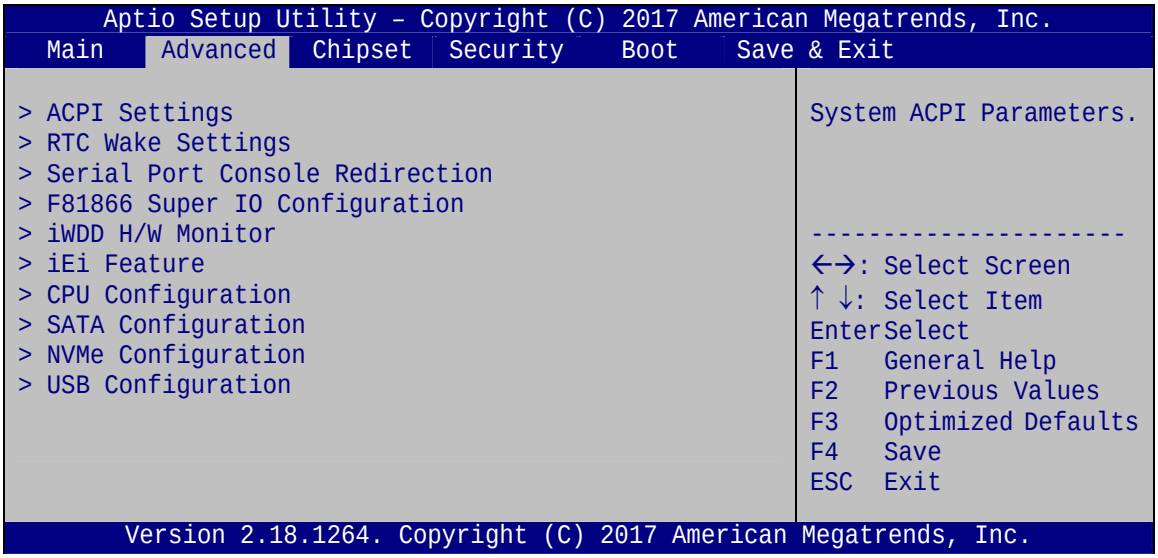
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

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

WARNING!

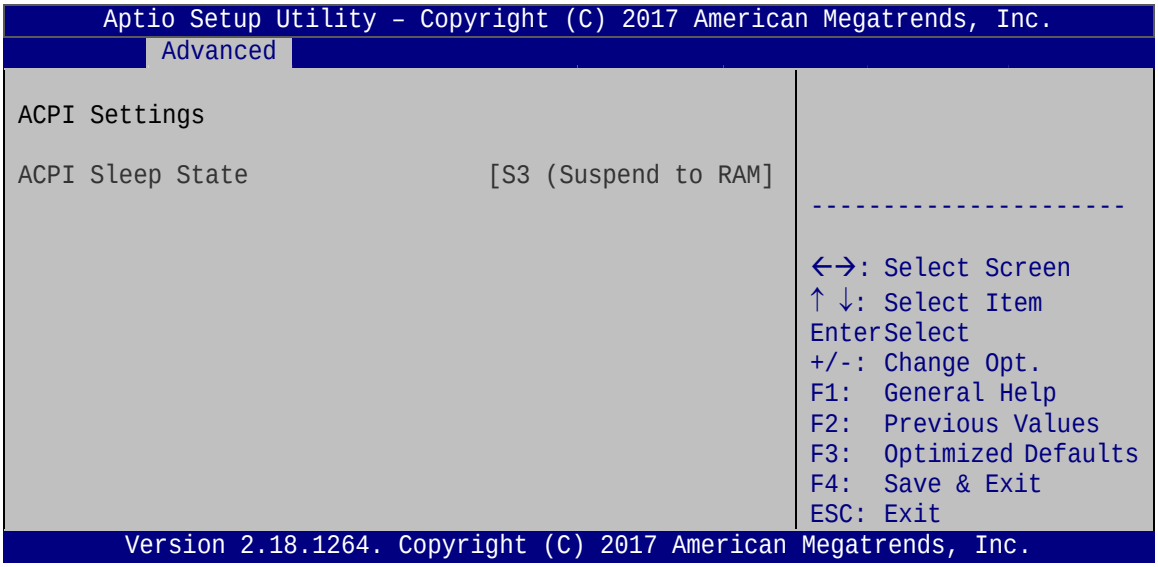
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.



BIOS Menu 2: Advanced

5.3.1 ACPI Settings

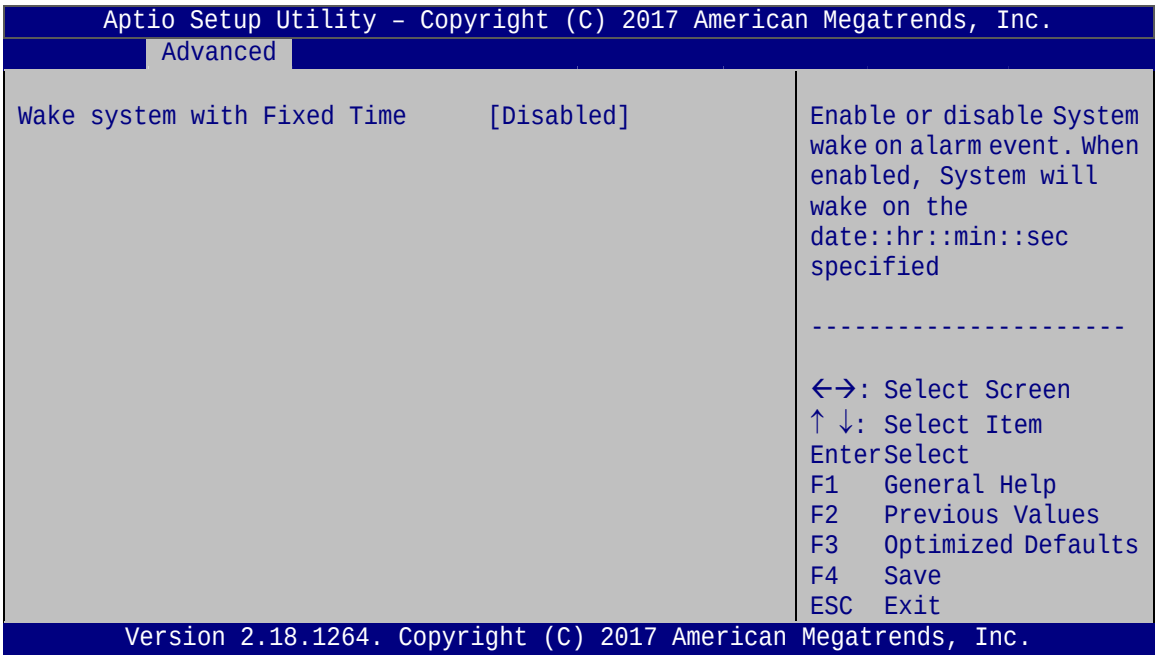
The **ACPI Settings** menu (**BIOS Menu 3**) configures the Advanced Configuration and Power Interface (ACPI) options.



BIOS Menu 3: ACPI Settings

5.3.2 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 4**) configures RTC wake event.



BIOS Menu 4: 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

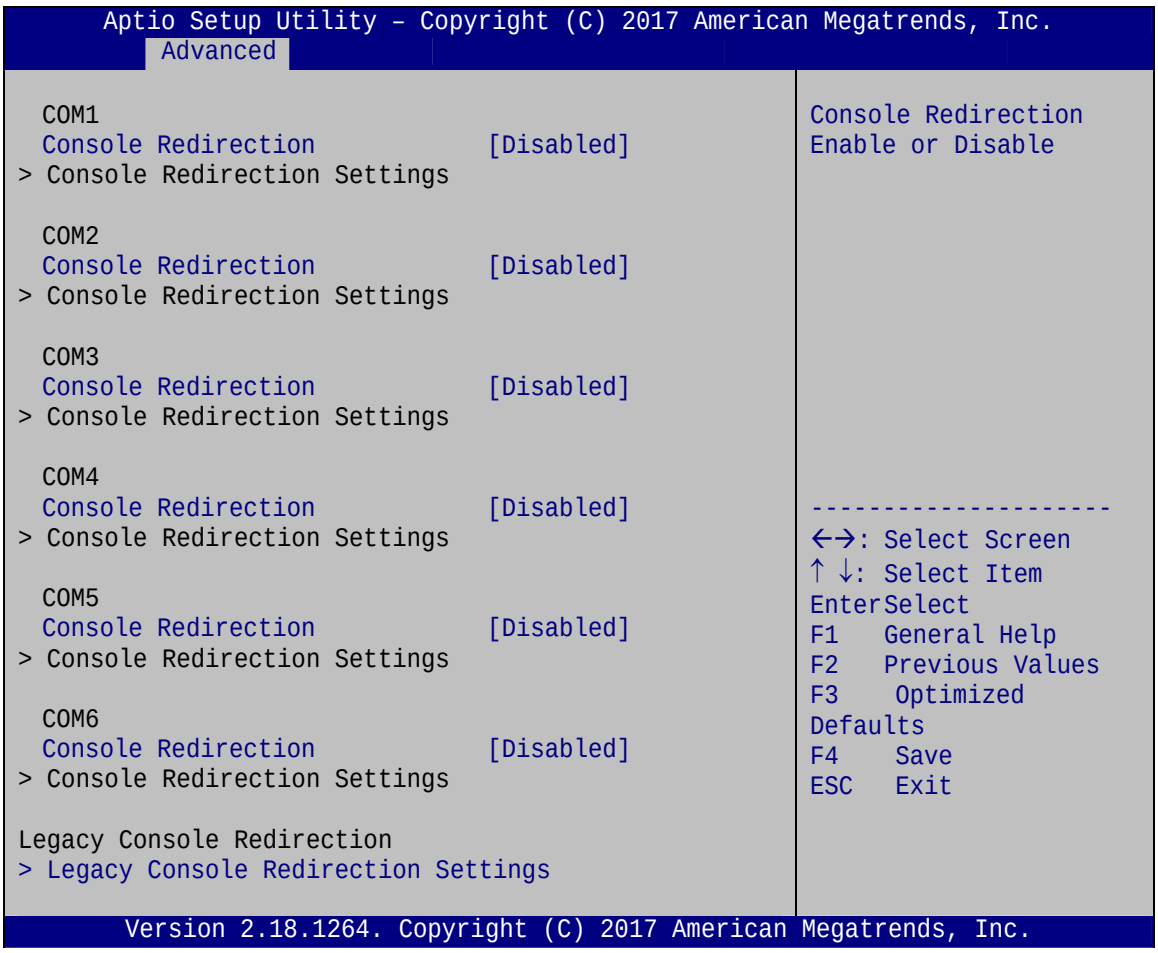
Wake up minute

Wake up second

After setting the alarm, the computer turns itself on from a suspend state when the alarm goes off.

5.3.3 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 5**) 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 5: Serial Port Console Redirection

➔ **Console Redirection [Disabled]**

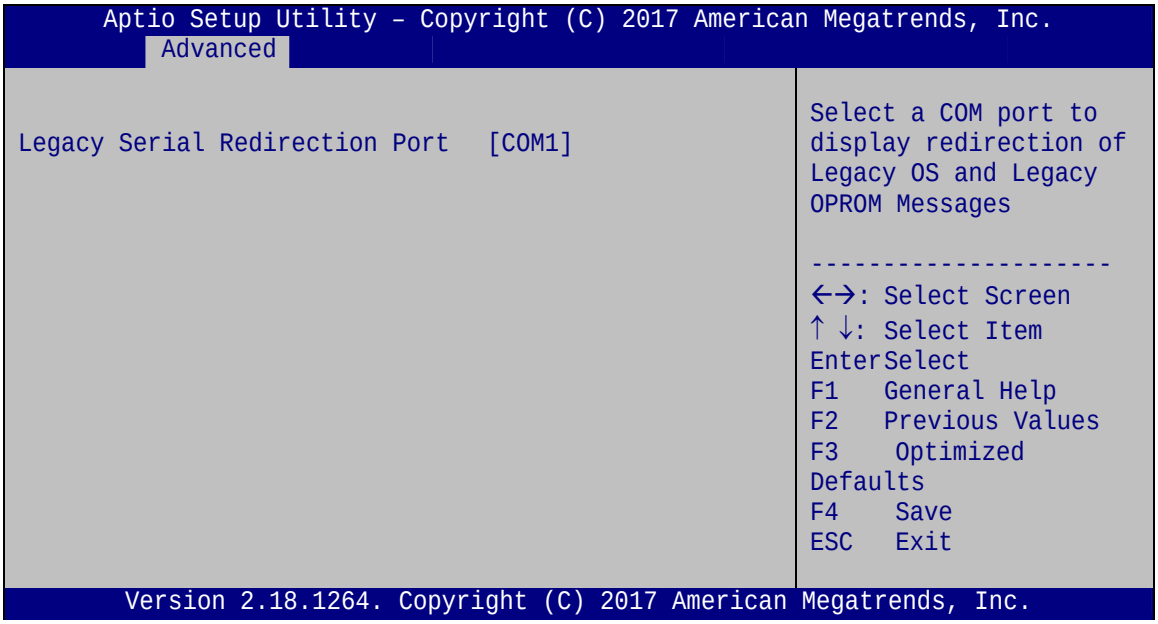
Use **Console Redirection** option to enable or disable the console redirection function.

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

➔ **Enabled** Enabled the console redirection function

5.3.3.1 Legacy Console Redirection Settings

The **Legacy Console Redirection Settings** menu (**BIOS Menu 6**) allows the legacy console redirection options to be configured.



BIOS Menu 6: Legacy Console Redirection Settings

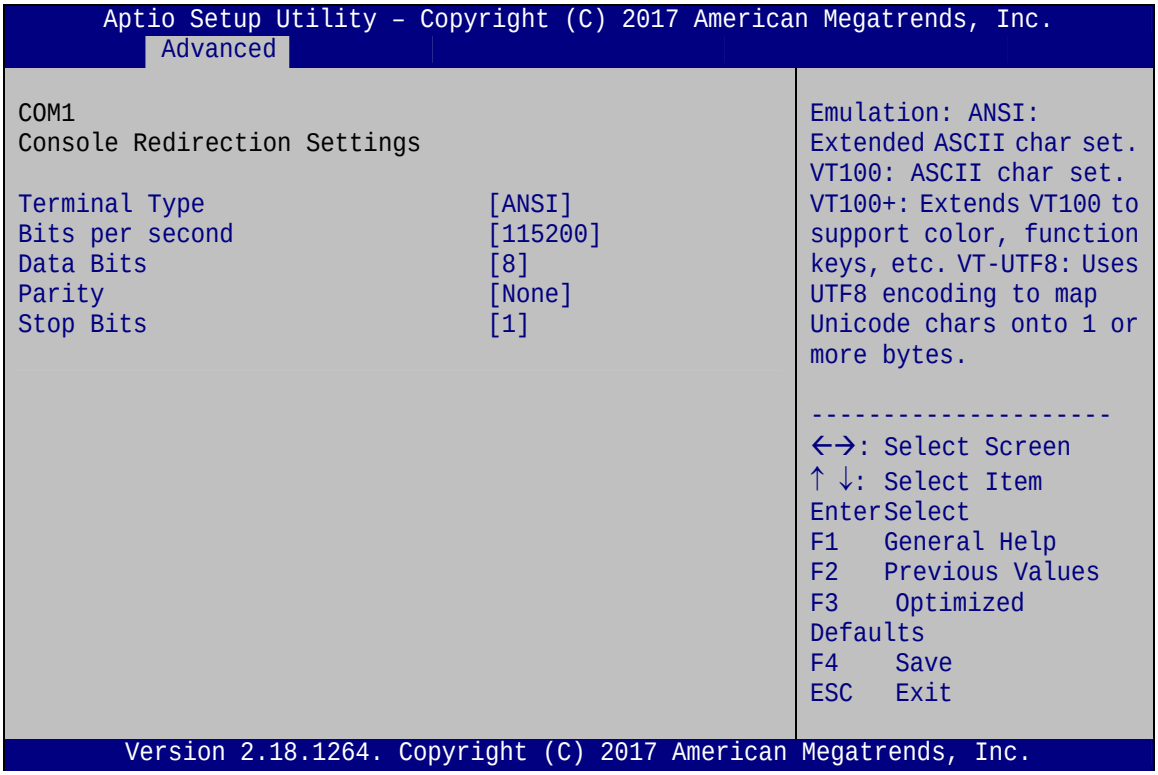
➔ **Legacy Serial Redirection Port [COM1]**

Use the **Legacy Serial Redirection Port** option to specify a COM port to display redirection of legacy OS and legacy OPROM messages. The options include:

- COM1 **DEFAULT**
- COM2
- COM3
- COM4
- COM5
- COM6

5.3.3.2 Console Redirection Settings

The **Console Redirection Settings** menu (**BIOS Menu 7**) allows the console redirection options to be configured. The option is active when Console Redirection option is enabled.



BIOS Menu 7: 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.

5.3.4 F81866 Super IO Configuration

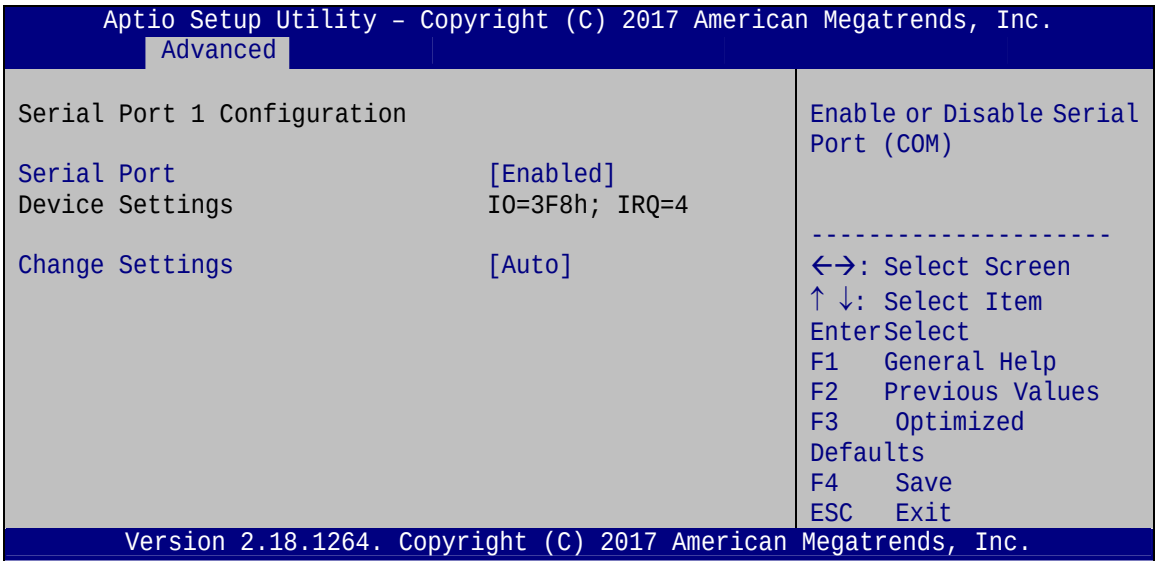
Use the **F81866 Super IO Configuration** menu (**BIOS Menu 8**) to set or change the configurations for the serial ports.

```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
        Advanced
F81866 Super IO Configuration                  Set Parameters of Serial
                                               Port 1 (COMA)
Super IO Chip                    F81866
> Serial Port 1 Configuration                  ----------------------
> Serial Port 2 Configuration                  ←→: Select Screen
> Serial Port 3 Configuration                  ↑ ↓: Select Item
> Serial Port 4 Configuration                  EnterSelect
> Serial Port 5 Configuration                  F1   General Help
> Serial Port 6 Configuration                  F2   Previous Values
                                               F3    Optimized
                                               Defaults
                                               F4    Save
                                               ESC   Exit
        Version 2.18.1264. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 8: F81866 Super IO Configuration

5.3.4.1 Serial Port n Configuration

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



BIOS Menu 9: Serial Port n Configuration

5.3.4.1.1 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

5.3.4.1.2 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

5.3.4.1.3 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=10**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ10
➔ **IO=3E8h; IRQ=10,11**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ10,11
➔ **IO=2E8h; IRQ=10,11**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10,11
➔ **IO=2D0h; IRQ=10,11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ10,11
➔ **IO=2E0h; IRQ=10,11**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ10,11

5.3.4.1.4 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=10**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10
➔ **IO=3E8h; IRQ=10,11**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ10,11
➔ **IO=2E8h; IRQ=10,11**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10,11
➔ **IO=2D0h; IRQ=10,11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ10,11
➔ **IO=2E0h; IRQ=10,11**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ10,11

➔ **Serial Port Mode [RS232]**

Use the **Serial Port Mode** option to select the Serial Port 4 signaling mode.

➔ **RS232**	**DEFAULT**	Serial Port 5 signaling mode is RS-232
➔ **RS422**		Serial Port 5 signaling mode is RS-422
➔ **RS485**		Serial Port 5 signaling mode is RS-485

5.3.4.1.5 Serial Port 5 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=2D0h; IRQ=11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ11
➔ **IO=3E8h; IRQ=10,11**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ10,11
➔ **IO=2E8h; IRQ=10,11**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10,11
➔ **IO=2D0h; IRQ=10,11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ10,11
➔ **IO=2E0h; IRQ=10,11**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ10,11

5.3.4.1.6 Serial Port 6 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=2E0h; IRQ=11**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ11
➔ **IO=3E8h; IRQ=10,11**		Serial Port I/O port address is 3E8h and the interrupt address is IRQ10,11
➔ **IO=2E8h; IRQ=10,11**		Serial Port I/O port address is 2E8h and the interrupt address is IRQ10,11
➔ **IO=2D0h; IRQ=10,11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ10,11
➔ **IO=2E0h; IRQ=10,11**		Serial Port I/O port address is 2E0h and the interrupt address is IRQ10,11

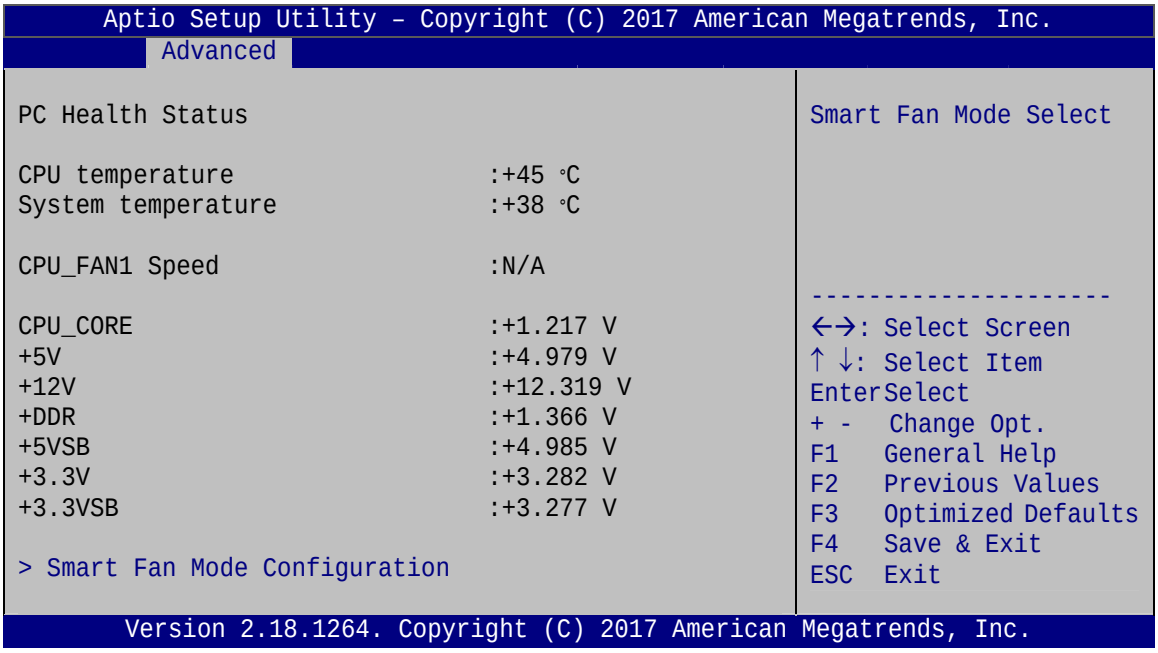
➔ **Serial Port Mode [RS232]**

Use the **Serial Port Mode** option to select the Serial Port 6 signaling mode.

➔ **RS232**	**DEFAULT**	Serial Port 6 signaling mode is RS-232
➔ **RS422**		Serial Port 6 signaling mode is RS-422
➔ **RS485**		Serial Port 6 signaling mode is RS-485

5.3.5 iWDD H/W Monitor

The **iWDD H/W Monitor** menu (**BIOS Menu 10**) contains the fan configuration submenus and displays operating temperature, fan speeds and system voltages.



BIOS Menu 10: iWDD H/W Monitor

➔ **PC Health Status**

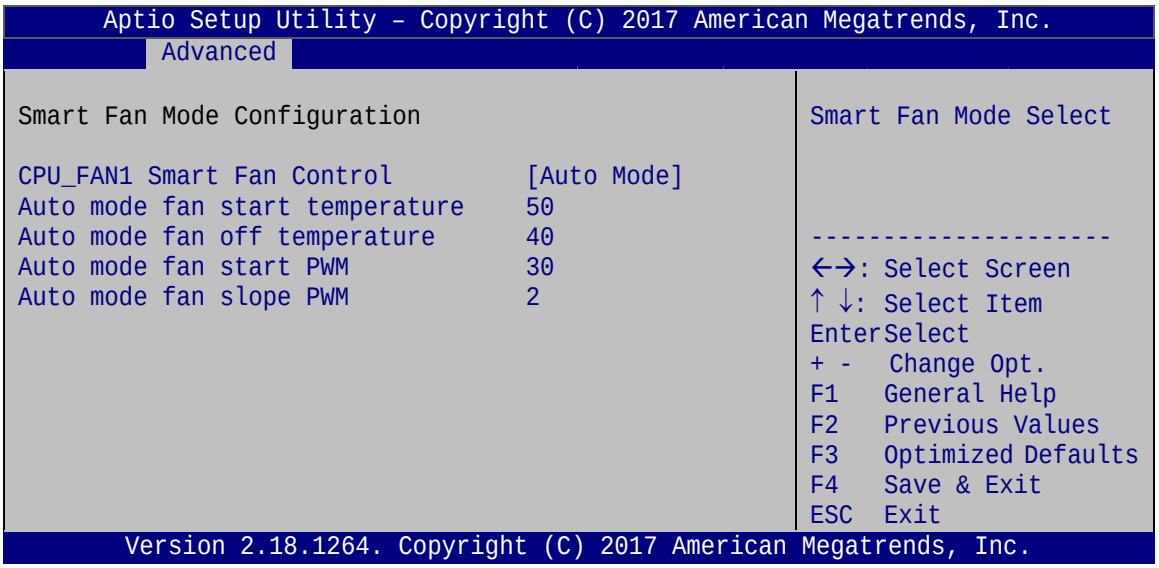
The following system parameters and values are shown. The system parameters that are monitored are:

- System Temperatures:
  - CPU Temperature
  - System temperature
- Fan Speed:
  - CPU Fan Speed
- Voltages
  - CPU_CORE
  - +5V
  - +12V
  - +DDR
  - +5VSB

- +3.3V
- +3.3VSB

5.3.5.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration** submenu (**BIOS Menu 11**) to configure fan temperature and speed settings.



BIOS Menu 11: Smart Fan Mode Configuration

➔ **CPU_FAN1 Smart Fan Control [Auto Mode]**

Use the **CPU_FAN1 Smart Fan Control** BIOS option to configure the CPU Smart Fan.

➔ **Manual Mode** The fan spins at the speed set in the Manual Mode option

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

Auto mode fan start temperature

Auto mode fan off temperature

Auto mode fan start PWM

Auto mode fan slope PWM

➔ **Auto mode fan start temperature [50]**

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 **Auto mode fan start temperature** option can only be set if the **CPU_FAN1 Smart Fan Control** option is set to **Auto Mode**. If the system temperature is between **Start Temperature** and **Off Temperature**, the fan speed change to be **Start PWM**. To set a value, select the **Auto mode fan start temperature** option and enter a decimal number between 1 and 100. The temperature range is specified below.

- Minimum Value: 1°C
- Maximum Value: 100°C

➔ **Auto mode fan off temperature [40]**

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 **Auto mode fan off temperature** option can only be set if the **CPU_FAN1 Smart Fan control** option is set to **Auto Mode**. If the system temperature is lower than **Auto mode fan off temperature**, the fan speed change to be lowest. To set a value, select the **Auto mode fan off temperature** option and enter a decimal number between 1 and 100. The temperature range is specified below.

- Minimum Value: 1°C
- Maximum Value: 100°C

➔ **Auto mode fan start PWM [30]**

The **Auto mode fan start PWM** option can only be set if the **CPU_FAN1 Smart Fan control** option is set to **Auto Mode**. Use the **Auto mode fan start PWM** option to set the PWM start value. To set a value, select the **Auto mode fan start PWM** option and enter a decimal number between 1 and 100. The temperature range is specified below.

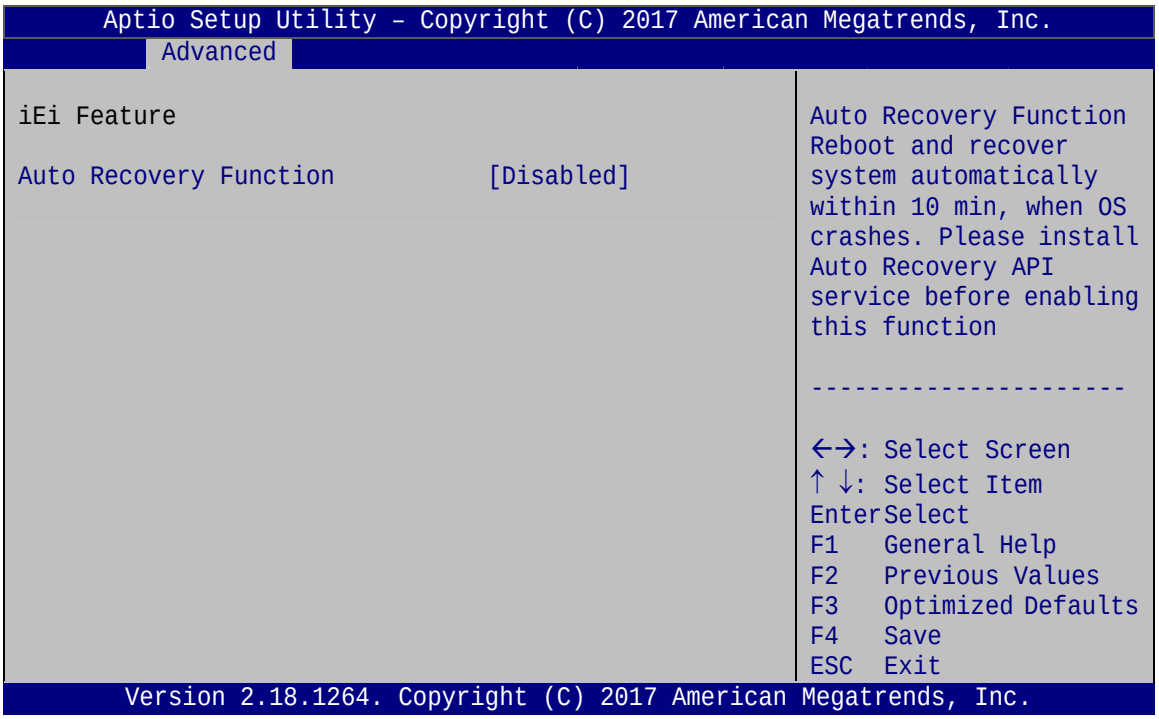
- Minimum Value: 1
- Maximum Value: 100

➔ **Auto mode fan slope PWM [2]**

The **Auto mode fan slope PWM** option can only be set if the **CPU_FAN1 Smart Fan control** option is set to **Auto Mode**. Use the **Auto mode fan slope PWM** option to select the linear rate at which the PWM mode increases with respect to an increase in temperature. To set a value, select the **Auto mode fan slope PWM** option and enter a decimal number between 1 and 8.

5.3.6 IEI Feature

Use the **IEI Feature** menu (**BIOS Menu 12**) to configure One Key Recovery function.



BIOS Menu 12: IEI Feature

➔ **Auto Recovery Function [Disabled]**

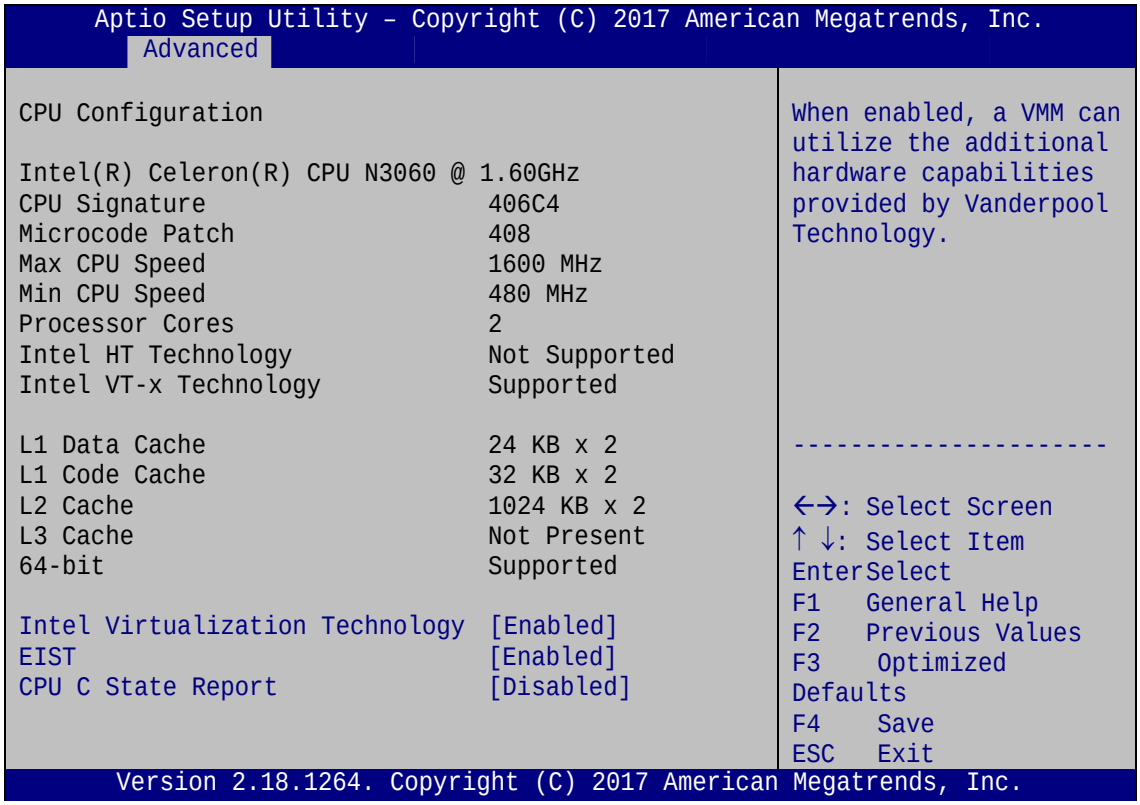
Use the **Auto Recovery Function** BIOS option to enable or disable the auto recovery function of the IEI One Key Recovery.

➔ **Disabled** **DEFAULT** Auto recovery function disabled

➔ **Enabled** Auto recovery function enabled

5.3.7 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 13**) to view detailed CPU specifications and configure the CPU.



BIOS Menu 13: CPU Configuration

➔ **Intel® Virtualization Technology [Enabled]**

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**		Disables Intel® Virtualization Technology.
➔	**Enabled**	**DEFAULT**	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.

➔ **CPU C State Report [Disabled]**

Use the **CPU C State Report** option to enable or disable CPU C state report to OS.

➔ **Disabled** **DEFAULT** Disables CPU C state report to OS.

➔ **Enabled** Enables CPU C state report to OS.

5.3.8 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 14**) to change and/or set the configuration of the SATA devices installed in the system.

```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
        Advanced
SATA Configuration                          Enable/Disable SATA
                                            Device
STAT Controller                 [Enabled]
SATA Mode Selection             [AHCI]      ---------------------

SATA1 Port                                  ←→: Select Screen
Not Present                                 ↑ ↓: Select Item
Hot Plug                        [Disabled]  EnterSelect
                                            F1   General Help
SATA2 Port (MSATA)                          F2   Previous Values
Not Present                                 F3    Optimized
Hot Plug                        [Disabled]  Defaults
                                            F4    Save
                                            ESC   Exit
        Version 2.18.1264. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 14: SATA Configuration

➔ **STAT Configuration [Enabled]**

Use the **STAT Configuration** option to enable or disable the SATA device.

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

➔ **SATA Mode Selection [AHCI]**

Use the **SATA Mode Selection** option to configure SATA devices as AHCI devices.

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

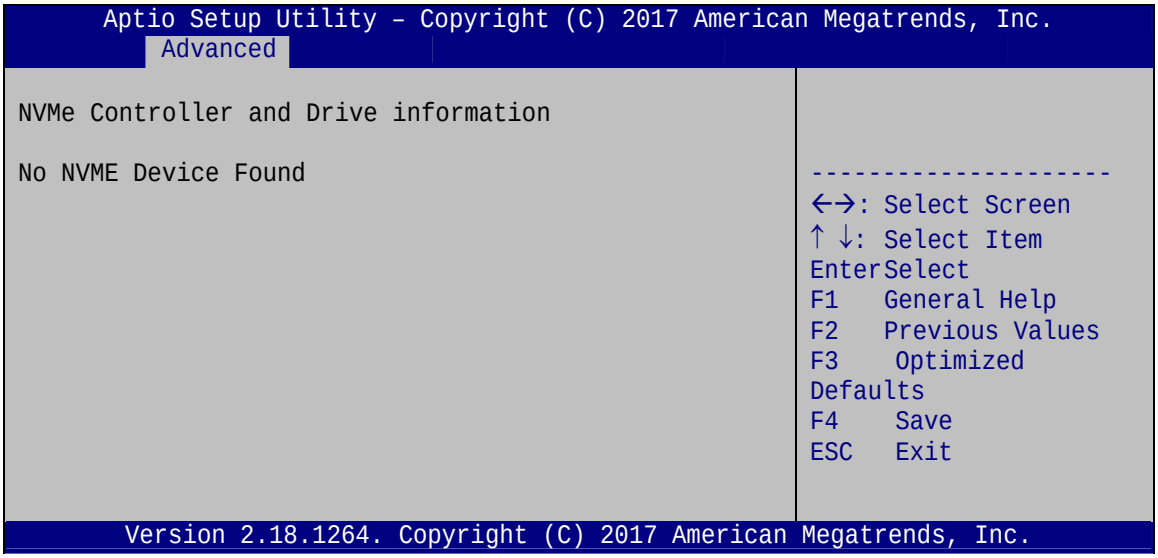
➔ **Hot Plug [Disabled]**

Use the **Hot Plug** option to enable or disable the SATA device hot plug.

➔ **Enabled**		Enables the SATA device hot plug
➔ **Disabled**	**DEFAULT**	Disables the SATA device hot plug.

5.3.9 NVMe Configuration

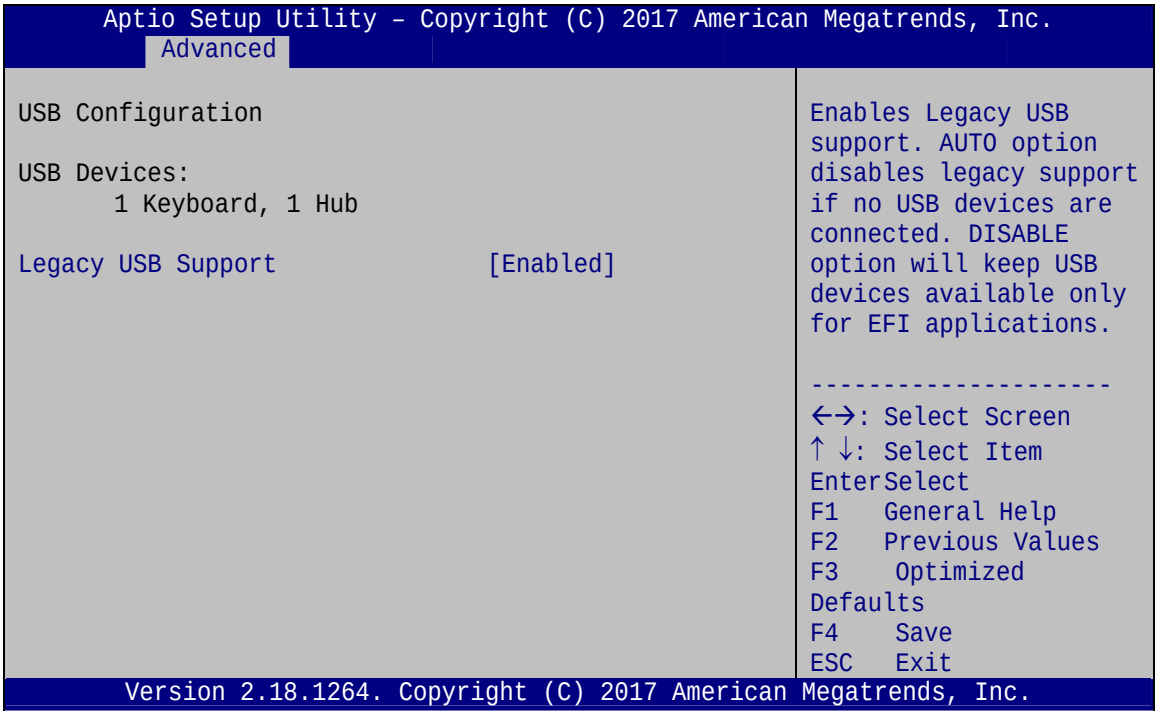
Use the **NVMe Configuration** menu (**BIOS Menu 15**) to change and/or set the configuration of the NVMe devices installed in the system.



BIOS Menu 15: NVMe Configuration

5.3.10 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 16**) to read USB configuration information and configure the USB settings.



BIOS Menu 16: 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 17**) to access the north bridge and south bridge configuration menus

WARNING!

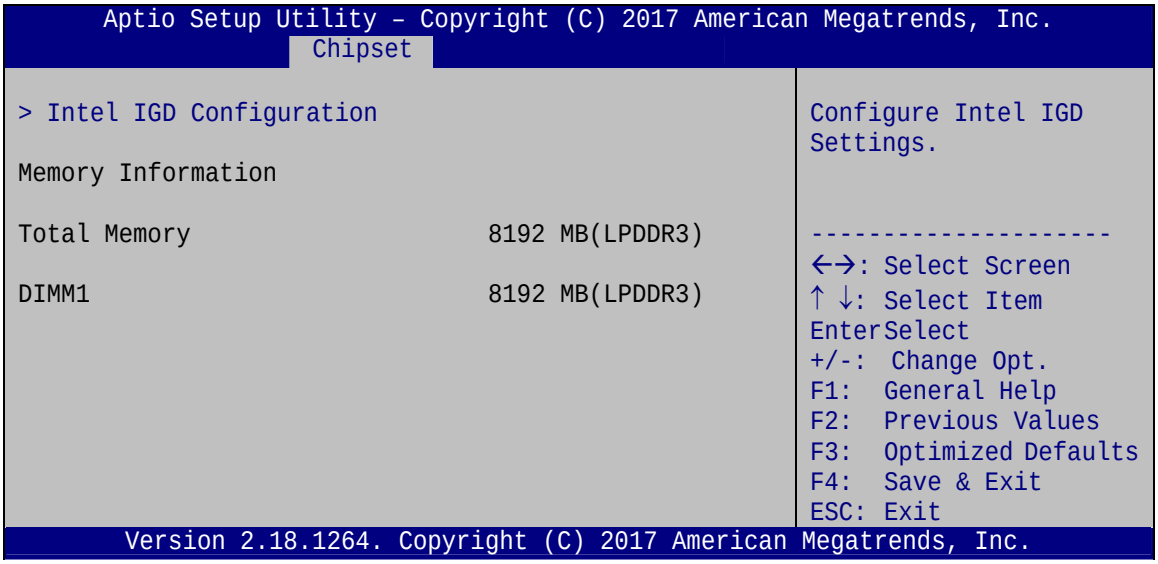
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

```
      Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
  Main    Advanced  Chipset   Security    Boot   Save & Exit

> North Bridge                                  North Bridge Parameters
> South Bridge


                                                ---------------------
                                                ←→: Select Screen
                                                ↑ ↓: Select Item
                                                EnterSelect
                                                +/-:  Change Opt.
                                                F1    General Help
                                                F2    Previous Values
                                                F3    Optimized Defaults
                                                F4    Save & Exit
                                                ESC   Exit
       Version 2.18.1264. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 17: Chipset

5.4.1 North Bridge Configuration

Use the **North Bridge Configuration** menu (**BIOS Menu 18**) to configure the Intel IGD settings.



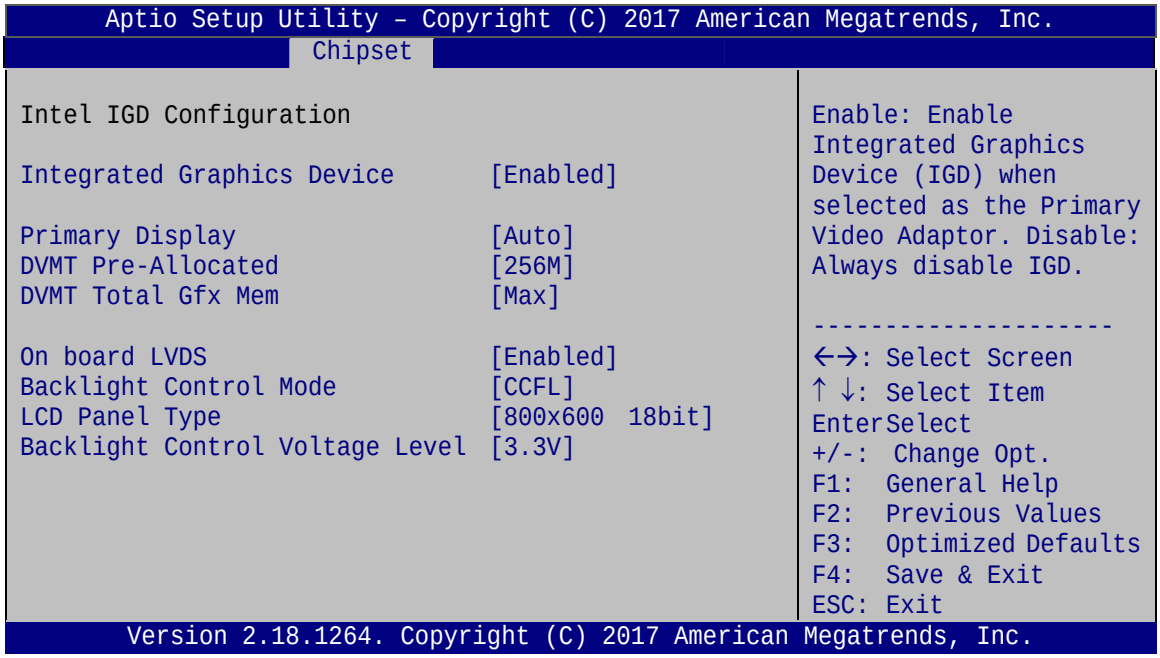
BIOS Menu 18: North Bridge Configuration

➔ **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 19**) to configure the video device connected to the system.



BIOS Menu 19: Intel IGD Configuration

➔ **Integrated Graphics Device [Enabled]**

Use the **Integrated Graphics Device** option enables or disables Integrated Graphics Device (IGD).

➔ **Enabled** **DEFAULT** Enabled Integrated Graphics Device (IGD) when selected as the Primary Video Adaptor.

➔ **Disabled** Always disable IGD.

➔ **Primary Display [Auto]**

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

- Auto **DEFAULT**
- IGD
- PCIe

➔ **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**

➔ **On board LVDS [Enabled]**

Use the **On board LVDS** option enables or disables the on-board LVDS connector.

➔ **Disabled** The on-board LVDS connector is disabled.

➔ **Enabled** **DEFAULT** The on-board LVDS connector is enabled.

➔ **Backlight Control Mode [CCFL]**

Use the **Backlight Control Mode** option to specify the backlight control mode. Configuration options are listed below.

- LED
- CCFL **DEFAULT**

➔ **LCD Panel Type [800x600 18bit]**

Use the **LCD Panel Type** option to select the type of flat panel connected to the system. Configuration options are listed below.

- 800x600 18bit **DEFAULT**
- 1024x768 18bit
- 1024x768 24bit
- 1280x768 18bit
- 1280x800 18bit
- 1280x960 18bit
- 1280x1024 48bit
- 1366x768 18bit
- 1366x768 24bit
- 1440x900 48bit
- 1400x1050 48bit
- 1600x900 48bit
- 1680x1050 48bit
- 1600x1200 48bit
- 1920x1080 48bit
- 1920x1200 48bit

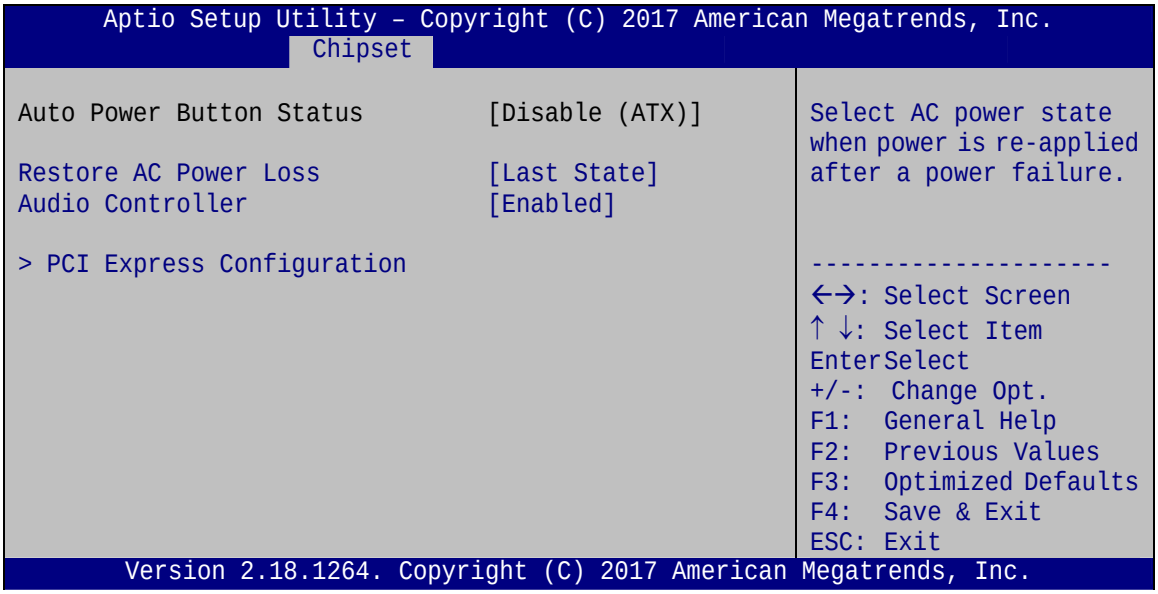
➔ **Backlight Control Voltage Level [3.3V]**

Use the **Backlight Control Voltage Level** option to specify the voltage of the power supplied to the LCD panel. Configuration options are listed below.

- 3.3V **DEFAULT**
- 5.0V

5.4.2 South Bridge Configuration

Use the **South Bridge Configuration** menu (**BIOS Menu 20**) to configure the south bridge chipset.



BIOS Menu 20: South Bridge 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 21**) to configure the PCI Express.

```
Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
  Advanced
PCI Express Configuration                    Configure PCIe Speed.
                                             CHV A1 always with Gen1
MINI-PCIE1                                   Speed.
PCIe Speed                    [Auto]
Detect Non-Compliance Device  [Disabled]     ----------------------
                                             ←→: Select Screen
MINI-PCIE2(MSATA)                            ↑ ↓: Select Item
PCIe Speed                    [Auto]         EnterSelect
Detect Non-Compliance Device  [Disabled]     F1   General Help
                                             F2   Previous Values
                                             F3    Optimized
                                             Defaults
                                             F4    Save
                                             ESC   Exit
Version 2.18.1264. Copyright (C) 2017 American Megatrends, Inc.
```

BIOS Menu 21: PCI Express Configuration

➔ **PCIe Speed [Auto]**

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

➔ **Auto** **DEFAULT** Configure PCIe port speed to auto

➔ **Gen 2** Configure PCIe port speed to Gen2

➔ **Gen 1** Configure PCIe port speed to Gen1

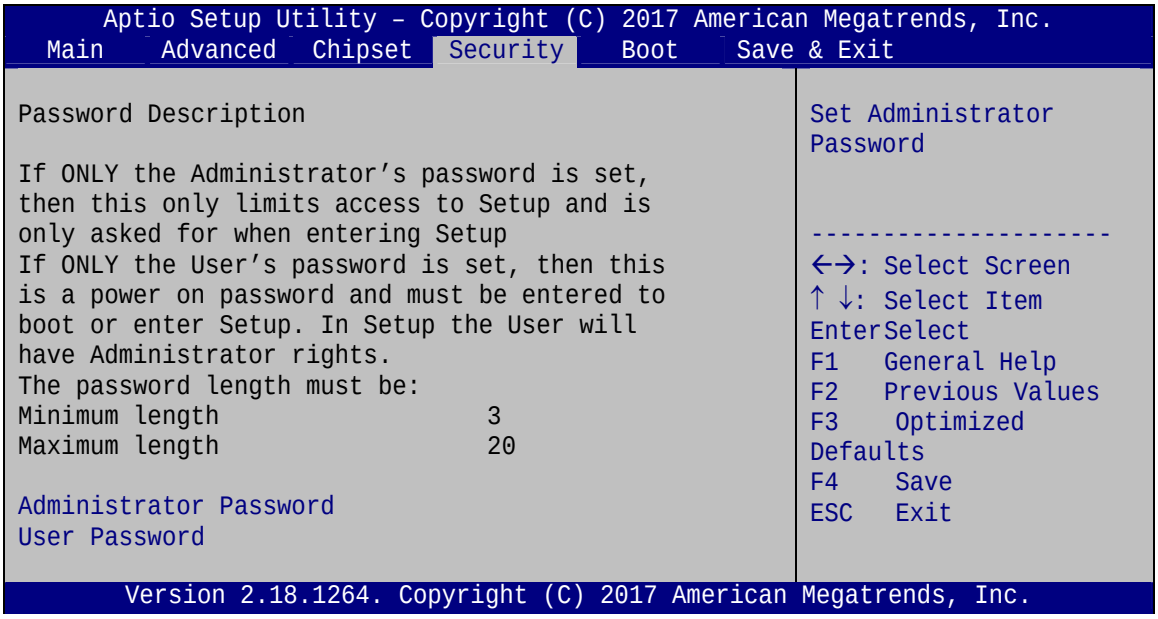
➔ **Detect Non-Compliance Device [Disabled]**

Use the **Detect Non-Compliance Device** option to enable or disable the Non-compliant PCIe device detection function.

➔ **Disabled**	**DEFAULT**	Disables non-compliant PCIe device detection.
➔ **Enabled**		Enables non-compliant PCIe device detection.

5.5 Security

Use the **Security** menu (**BIOS Menu 22**) to set system and user passwords.



BIOS Menu 22: Security

➔ **Administrator Password**

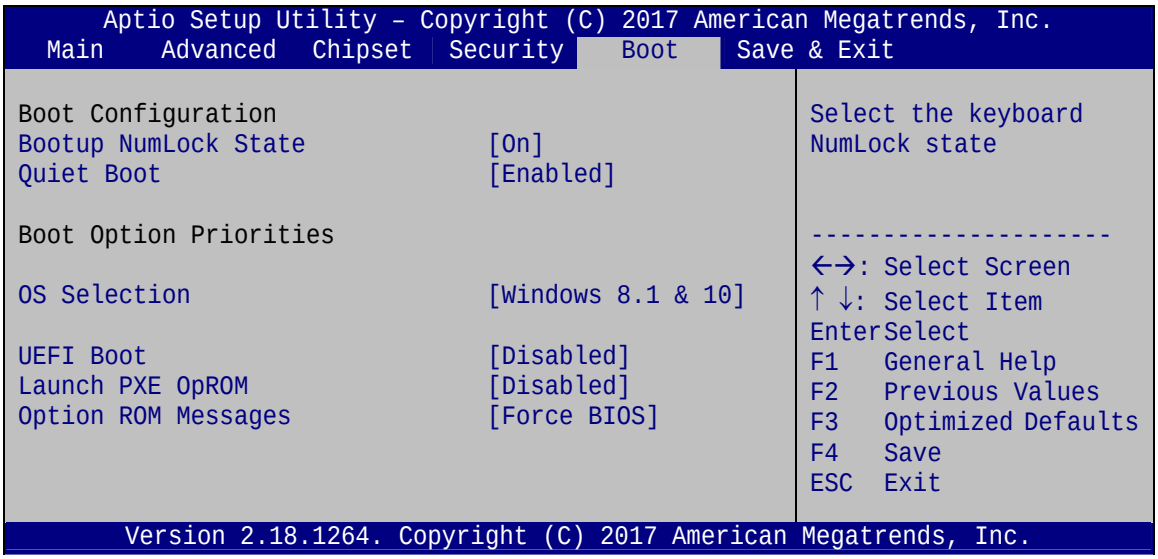
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

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

5.6 Boot

Use the **Boot** menu (**BIOS Menu 23**) to configure system boot options.



BIOS Menu 23: 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

➔ **OS Selection [Windows 8.1 & 10]**

Use the **OS Selection** BIOS option to select an operating system (OS) before installing OS.

➔ **Windows 8.1 & 10**	**DEFAULT**	The system will be installed with Windows 8.1 or Windows 10 operating system.
➔ **Windows 7**		The system will be installed with Windows 7 operating system.
➔ **Linux**		The system will be installed with Linux operating system.

➔ **UEFI Boot [Disabled]**

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

➔ **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.

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

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

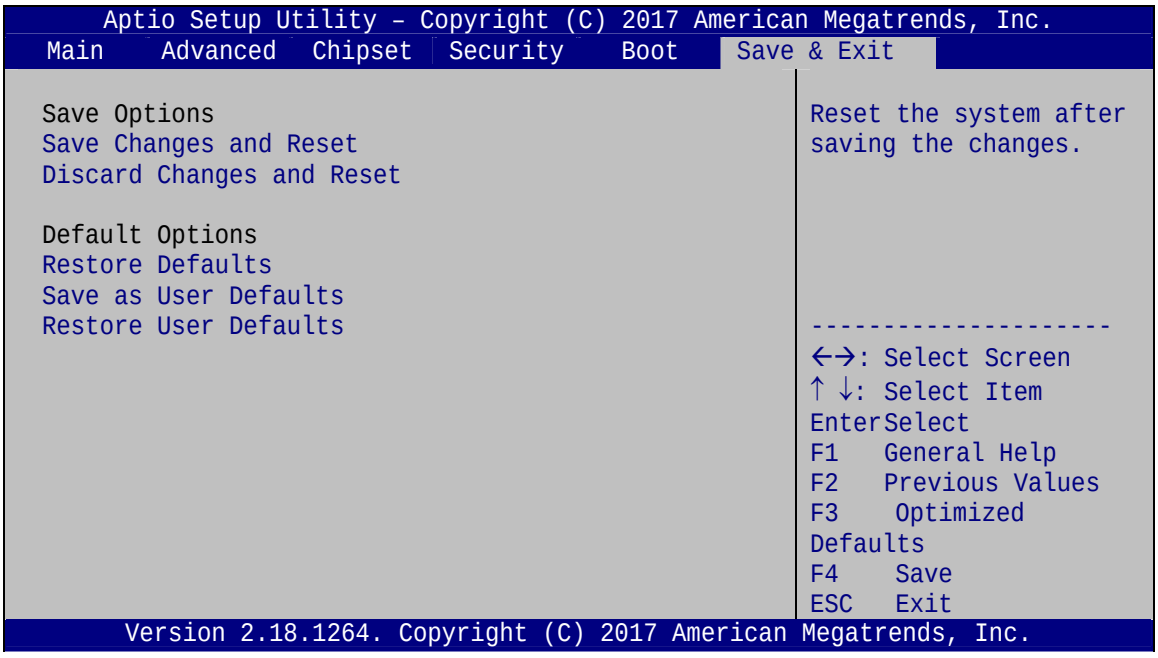
➔ **Force BIOS**	**DEFAULT**	Sets display mode to force BIOS.
➔ **Keep Current**		Sets display mode to current.

➔ **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 24**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 24: 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.

Chapter

6

Software Drivers

NOTE:

The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. Visit the IEI website or contact technical support for the latest updates.

6.1 Software Installation

All the drivers for the WAFER-BW are on the CD that came with the system. To install the drivers, please follow the steps below.

Step 1: Insert the CD into a CD drive connected to the system.

NOTE:

If the installation program doesn't start automatically:
Click "Start->My Computer->CD Drive->autorun.exe"

Step 2: The driver main menu appears (**Figure 6-1**).

Step 3: Click **WAFER-BW**.

Figure 6-1: Driver CD Main Menu

Step 4: A new screen with a list of available drivers appears (**Figure 6-2**).

Figure 6-2: Available Drivers

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

6.2 Available Software Drivers

All the drivers for the WAFER-BW are on the utility CD that came with the system. The utility CD contains drivers for Windows 7, Windows 8 and Windows 10 operating systems. If the drivers are not installed automatically, please install the following drivers manually.

The following drivers can be installed on the **WAFER-BW**:

- Chipset
- Graphics
- Audio
- LAN
- USB 3.0 (for Windows 7 and Windows 8)
- Serial I/O
- TXE

NOTE:

The Intel TXE requires that Microsoft's "Kernel-Mode Driver Framework (KMDF) version 1.11 update for Windows 7" must be installed first on Windows 7 OS. If the KMDF is not installed, either error 37 or error 28 may appear on the Intel TXE device in Device Manager.

Please find the KMDF version 1.11 update for Windows 7 in the TXE driver folder in the driver CD or click the following link to download it.

http://www.microsoft.com/en-us/download/details.aspx?id=38423

Appendix

A

Regulatory Compliance

DECLARATION OF CONFORMITY

This equipment has been tested and found to comply with specifications for CE marking. If the user modifies and/or installs other devices in the equipment, the CE conformity declaration may no longer apply.

FCC WARNING

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Appendix

B

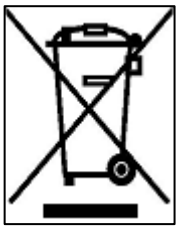
Product Disposal

CAUTION:

Risk of explosion if battery is replaced by an incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

- Outside the European Union – If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority so as to comply with the correct disposal method.
- Within the European Union – The device that produces less waste and is easier to recycle is classified as electronic device in terms of the European Directive 2012/19/EU (WEEE), and must not be disposed of as domestic garbage.



EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need to dispose of your device, please follow the guidance of your local authority, or ask the shop where you purchased the product. The mark on electrical and electronic products only applies to the current European Union Member States.

Please follow the national guidelines for electrical and electronic product disposal.

Appendix

C

BIOS Menu Options

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Appendix

D

Digital I/O Interface

The DIO connector on the WAFER-BW is interfaced to GPIO ports on the Super I/O chipset. The DIO has both 8-bit digital inputs and 8-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

NOTE:

For further information, please refer to the datasheet for the Super I/O chipset.

The BIOS interrupt call **INT 15H** controls the digital I/O.

INT 15H:

AH – 6FH	
Sub-function:	
AL – 8	:Set the digital port as INPUT
AL	:Digital I/O input value

Assembly Language Sample 1

```
MOV     AX, 6F08H       ;setting the digital port as input
INT     15H             ;
```

AL low byte = value

AH – 6FH	
Sub-function:	
AL – 9	:Set the digital port as OUTPUT
BL	:Digital I/O output value

Assembly Language Sample 2

```
MOV     AX, 6F09H       ;setting the digital port as output
MOV     BL, 09H                 ;digital value is 09H
INT     15H             ;
```

Digital Output is 1001b

Appendix

E

Watchdog Timer

NOTE:

The following discussion applies to DOS. Contact IEI support or visit the IEI website for drivers for other operating systems.

The Watchdog Timer is a hardware-based timer that attempts to restart the system when it stops working. The system may stop working because of external EMI or software bugs. The Watchdog Timer ensures that standalone systems like ATMs will automatically attempt to restart in the case of system problems.

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

INT 15H:

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

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

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

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

NOTE:

The Watchdog Timer is activated through software. The software application that activates the Watchdog Timer must also deactivate it when closed. If the Watchdog Timer is not deactivated, the system will automatically restart after the Timer has finished its countdown.

EXAMPLE PROGRAM:

```
; INITIAL TIMER PERIOD COUNTER

;
W_LOOP:
;

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30          ;time-out value is 48 seconds
        INT     15H

;
; ADD THE APPLICATION PROGRAM HERE
;

        CMP     EXIT_AP, 1      ;is the application over?
        JNE     W_LOOP          ;No, restart the application

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

;
; EXIT ;
```

Appendix

F

Hazardous Materials Disclosure

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 following table.

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 (now replaced by GB/T 26572-2011).

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 (now replaced by GB/T 26572-2011).

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/T 11363-2006 (现由 GB/T 26572-2011 取代) 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/T 11363-2006 (现由 GB/T 26572-2011 取代) 标准规定的限量要求。