USER MANUAL

BU-B015

ATX Intel® 10th Gen. Core™
i9/ i7/i5/i3/ Pentium® / Celeron®
/ Xeon® W-1200 CPU Processor

BU-B015 M1

BU-B015

ATX Intel® 10th Gen. Core™ i9/i7/i5/i3/ Pentium® / Celeron® / Xeon® W-1200 CPU Processor

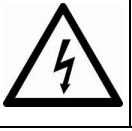
DISCLAIMER
This user's manual is meant to assist users in installing and setting up the system. The information contained in this document is subject to change without any notice.

CE NOTICE
This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC NOTICE

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.

You are cautioned that any change or modifications to the equipment not expressly approve by the party responsible for compliance could void your authority to operate such equipment.

	**CAUTION:** Danger of explosion may occur when the battery is incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
	**CAUTION:** Always touch the board components by the edges. Never touch components such as a processor by its pins. Take special cares while you are holding electronic circuit boards by the edges only. Do not touch BU-B015 components.

	**WARNING:** Some internal parts of BU-B015 may have high electrical voltage. We strongly recommend that only qualified engineers are allowed to service and disassemble the system. If any damages should occur on BU-B015 and are caused by unauthorized servicing, it will not be covered by the product warranty.

Contents

Revision History

The revision history of BU-B015 User Manual is described below:

Version No.	Revision History	Date
M1	Initial Release	2021/01/27

1 Introduction

This chapter provides the introduction for the BU-B015 system as well as the framework of the user manual.

The following topic is included:

- About This Manual

1.1 About This Manual

Thank you for purchasing our BU-B015 system. The BU-B015 provides faster processing speed, greater expandability and can handle more tasks than before. This manual is designed to assist you how to install and set up the whole system. It contains 5 chapters and 1 appendix. Users can configure the system according to their own needs. This user manual is intended for service personnel with strong hardware background. It is not intended for general users.

The following section outlines the structure of this user manual.

Chapter 1 Introduction
This chapter provides the introduction for the BU-B015 system as well as the framework of the user manual.

Chapter 2 Getting Started
This chapter describes the package contents and outlines BU-B015 specifications. Read the safety reminders carefully on how to take care of your system properly.

Chapter 3 Hardware Configuration
This chapter outlines the locations of the motherboard components and their respective functions. You will learn how to set the jumpers and configure the system to meet your own needs.

Chapter 4 Software Utilities
This chapter contains helpful information for proper installations of the Intel Chipset Software Installation Utility, Graphics Driver Utility, LAN Driver Utility, Sound Driver Utility, Intel® Management Engine Components Driver Installer, Intel® Rapid Storage Utility and Intel® Serial I/O Driver Utility.

Chapter 5 BIOS Setup
This chapter indicates you how to change the BIOS configurations.

Appendix A Technical Summary
This appendix provides the information about the allocation maps for BU-B015 block diagram, system resources, Watchdog Timer Configuration and Flash BIOS Update.

2 Getting Started

This chapter provides the information for the BU-B015 system. It describes the package contents and outlines the BU-B015 specifications.

The following topics are included:

- Package List
- BU-B015 Specification
- Safety Precautions

Experienced users can go to Chapter 3 Hardware Configuration on page 3-1 for a quick start.

2.1 Package List

If you discover any of the items listed below are damaged or lost, please contact your local distributor immediately.

Item	Q'ty
BU-B015	1
Quick Reference Guide	1
Manual / Driver DVD	1
Mini Jumper (2mm)	6
SATA Cable (500 mm)	1
I/O Shield	1

2.2 BU-B015 Specifications

System	
CPU Support	➢ LGA1200 socket for Intel® 10th Gen. Core™ i9 / i7 / i5 / i3 / Pentium® / Celeron® desktop CPU ➢ Xeon® W-1200 server CPU
CPU List	➢ **Xeon®:** W-1290E(TE), W-1270E(TE), W-1250E(TE) ➢ **10th Core™:** i9-10900E(TE), i7-10700E(TE), i5-10500E(TE), i3-10100E(TE) ➢ **Pentium®:** G6400E, G6400TE ➢ **Celeron®:** G5900E, G5900TE
Chipset	➢ Intel® W480E (supports Xeon® / Core™ / Pentium® / Celeron® CPU) ➢ Intel® Q470E / H420E (supports Core™ / Pentium® / Celeron® CPU)
Memory Support	➢ 4 x DIMM sockets, support 2933MHz DDR4 up to 64GB; support 2666MHz DDR4 up to 128GB (W480E/Q470E) ➢ 2 x DIMM sockets, supporting 2666MHz DDR4 (up to 64GB) (H420E) ➢ Supports ECC (W480E)/non-ECC (all sku)
BIOS	➢ AMI UEFI BIOS
Hardware Monitor	➢ CPU, System FAN (smart FAN connector*2), 12V, 5V, 5Vsb, Vcore
Watchdog Timer	➢ 1~255 seconds watchdog timer selectable
Power Supply	➢ Supports ATX power (24+4 pins)
Power Consumption	➢ +12V: 1.7A; -12V: 0.1A; +3.3V: 0.33A; +5V: 1.12A; 5Vsb: 0.1A
Speaker	➢ 1 x internal buzzer
Dimensions	➢ 244 x 244mm (9.6” x 9.6”)
O.S. Support	➢ Windows 10 IoT Enterprise LTSC 2019 ➢ Linux Ubuntu 20.04 LTS
Certifications	➢ CE / FCC
I/O Ports	
SATA Interface	➢ **W480E and Q470E SKU:** 6 x SATA III (6.0Gb/s) with RAID 0,1,5,10 ➢ **H420E SKU:** 4 x SATA III (6.0Gb/s) without RAID

USB

		W480E/Q470E	H420E
Total		**12**	**8**
Rear I/O	LAN_USB1	2 x USB 3.0	2 x USB 2.0
	LAN_USB2	2 x USB 3.1	2 x USB 3.0
	KB_MS_USB1	2 x USB 2.0	2 x USB 2.0
Internal	USB_1	2 x USB 3.0	2 x USB 3.0
	USB_2	2 x USB 2.0	N/A
	USB_3	2 x USB 2.0	N/A

Serial Ports

		W480E/Q470E/H420E
Total		**6**
Rear I/O, D-sub	COM1	RS-232/422/485 selectable under BIOS
	COM2	
Internal, Pitch 2.0mm header	COM3	5V and 12V selectable by jumper
	COM4	
	COM5	RS-232
	COM6	RS-232

LAN

- Dual LAN (2 x RJ45 on rear I/O), Supports Wake-On-LAN & PXE
- **LAN1:** Intel® PHY 219LM (GbE)
- **LAN2:** Intel® LAN 211AT (GbE) (via PCIeX1, colay with M_PCIE1, selectable by jumper)

GPIO / DIO

- 8 in , 8 out (internal connector)

FAN (Internal)

- 1 x CPU fan (4-pin), 1 x System Fan (4-pin) compatible to 3-pin Fan, 1 x system fan (3 pin)

Keyboard / Mouse

- 1 x PS/2 Combo connector for keyboard & mouse (rear I/O)
  Note: PS/2 Keyboard can work alone. If customer intends to insert PS/2 Keyboard and Mouse simultaneously, the PS/2 extension cable enclosed in the package must be used.

Audio

- Mic In / Line In / Line Out (rear I/O)
- Internal 2 x 5 wafer, Pitch 2.0 (connected to front panel of chassis)

<table>
<tr><td>Expansion Bus</td><td>
<table>
<tr><th></th><th>W480E/Q470E</th><th>H420E</th></tr>
<tr><td>1st slot</td><td>PCIeX16</td><td>PCIeX16</td></tr>
<tr><td>2nd slot</td><td>PCIeX4</td><td>PCIeX4</td></tr>
<tr><td>3rd slot</td><td>PCIeX1</td><td>PCIeX1</td></tr>
<tr><td>4th slot</td><td>PCIeX4</td><td>N/A</td></tr>
<tr><td>M_PCIE1</td><td>Mini PCIe</td><td>Mini PCIe</td></tr>
</table>
M_PCIE1: with PCIe and USB signal, half size, left one keep alone. (Colay with LAN2, selectable by jumper)
</td></tr>
<tr><td>M.2 Slot</td><td>➢ 1 x M.2 slot, M-Key, supports NVMe PCIex4, for storage only without USB signals
➢ Supports 2242/ 2260/ 2280 (W480E/Q470E SKU)</td></tr>
<tr><td>LPC</td><td>➢ 2 x 10-pin header, Pitch 2.54, support 80 port for debug & support BR-4010RB-01N for TPM</td></tr>
<tr><td>SPI</td><td>➢ 2 x 10 Pin Header, Pitch 2.0</td></tr>
<tr><td colspan="2">Display</td></tr>
<tr><td>Flexible Display</td><td>➢ Standard SKU: 1 x VGA, 2 x DP, 1 x eDP (internal)
➢ W480E/Q470E support triple independent display
➢ H420E supports dual independent display</td></tr>
<tr><td>VGA (Rear I/O)</td><td>➢ 1 x VGA, FHD, up to 1920 x 1200 @60Hz</td></tr>
<tr><td>DP (Rear I/O)</td><td>➢ 2 x DP, up to 4096 x 2304 @60Hz</td></tr>
<tr><td>eDP (Internal)</td><td>➢ 1 x eDP (internal) up to 4096 x 2304 @60Hz (W480E/Q470E)</td></tr>
<tr><td colspan="2">Others</td></tr>
<tr><td>I^{2}C</td><td>➢ 2 x I^{2}C 4-pin wafer</td></tr>
<tr><td>Front Panel LED Indicator</td><td>➢ HDD LED, Power LED, Power Switch, Reset Switch
➢ On-board Power LED (Green)</td></tr>
<tr><td>Front Panel Audio</td><td>➢ 2 x 5 wafer, pitch 2.0mm</td></tr>
<tr><td>Case Open Detection</td><td>➢ 1 x 2-pin jumper for case intrusion detection</td></tr>
<tr><td>Shock</td><td>➢ 15G peak-to-peak, 11ms duration, non-operation</td></tr>
<tr><td>Vibration</td><td>➢ Non-operation: 2G, 5-200Hz, X, Y, Z axis</td></tr>
<tr><td colspan="2">Environment</td></tr>
<tr><td>Operating Temp.</td><td>➢ 0°C ~ 60°C (32°F ~ 140°F)</td></tr>
<tr><td>Storage Temp.</td><td>➢ -40°C ~ 85°C (-40°F ~ 185°F)</td></tr>
<tr><td>Operating Humidity</td><td>➢ 20%~ 90% (non-condensing)</td></tr>
</table>

2.3 Safety Precautions

Follow the instructions below to avoid your system from damages:

1. Keep your system away from static electricity on all occasions.
2. Prevent electric shock. Don't touch any components of this board when it is powered on. Always disconnect power when the system is not in use.
3. Disconnect power source when you change any hardware devices.
   For instance, when you connect a jumper or install any cards, a surge of power may damage the electronic components or the whole system.

3 Hardware Configuration

This chapter contains helpful information about the jumper & connector settings, and component locations.

The following sections are included:

- Jumper & Connector Quick Reference Table
- Component Locations
- Configuration and Jumper Settings
- Connector Pin Assignments

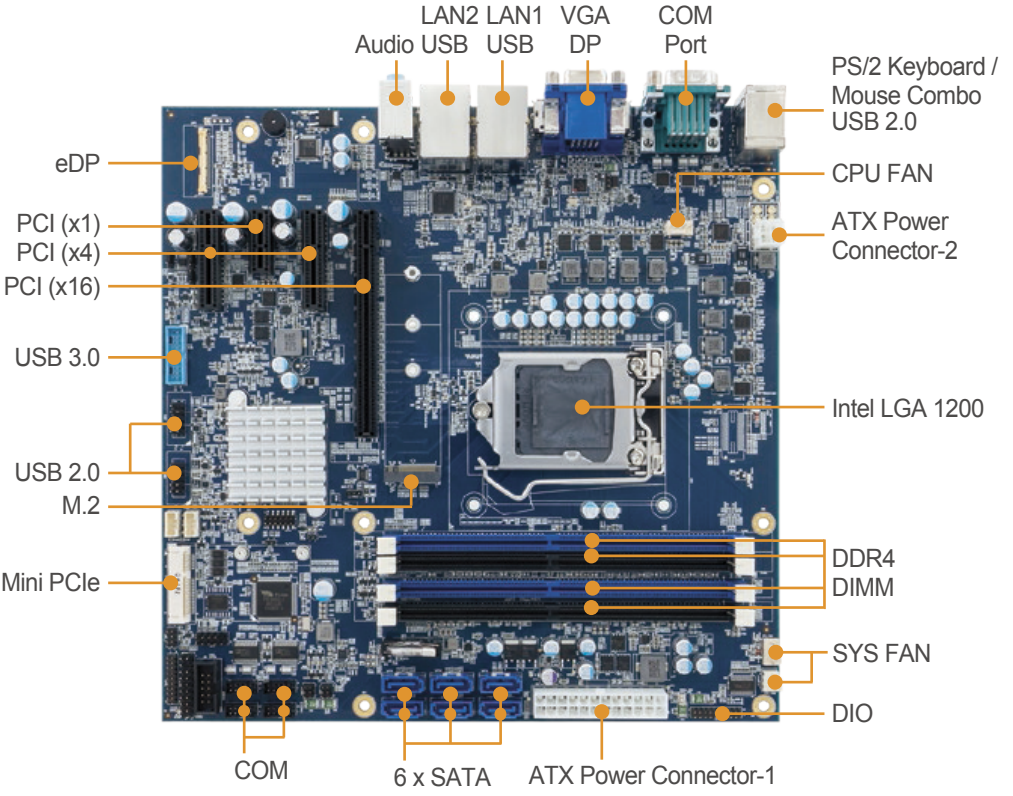
3.1 JUMPER & CONNECTOR QUICK REFERENCE TABLE

JUMPER Description	NAME
Clear CMOS Data Selection	JCMOS1
Hardware Power Failed Selection	JP_AT1
PCH Configuration / Recovery Selection	JP1
Flash Descriptor Override Selection	JP2
USB Power Selection	JP3
COM Port RI/Voltage Selection	JPCOM3, JPCOM4
Mini PCI Express / LAN2 Selection	JPMUX1

CONNECTOR Description	NAME
COM Port Connectors	COM1, COM3, COM4, COM5, COM6
VGA Port	VGA1
LAN Connector	LAN_USB1, LAN_USB2
Universal Serial Bus Connector	USB1, USB2, USB3
Digital Input / Output Connector	JDIO1
DisplayPort Connector	DP1, DP2
Embedded DisplayPort Connector	EDP1
Keyboard / Mouse Connector	KB_MS_USB1
Audio Port Connector	AUDIO1, JAUDIO1
FAN Connector	CPU_FAN1, SYS_FAN1, SYS_FAN2
Front Panel Connector	JFP1
I2C Connector	JI2C1, JI2C2
Case Open Connector	JP5
LPC Connector	JLPC1
M.2 Slot	M2_SSD1
Mini PCI Express Slot	M_PCIE1
PCIe Slots	PCI_E1, PCI_E2, PCI_E3, PCI_E4
Power Input Connector	ATX_PWR3, ATX_PWR2
SATA Connector	SATA1, SAT2, SATA3, SATA4, SATA5, SATA6
Speaker Connector	JSPK1
SPI TPM Connector	JSPI1

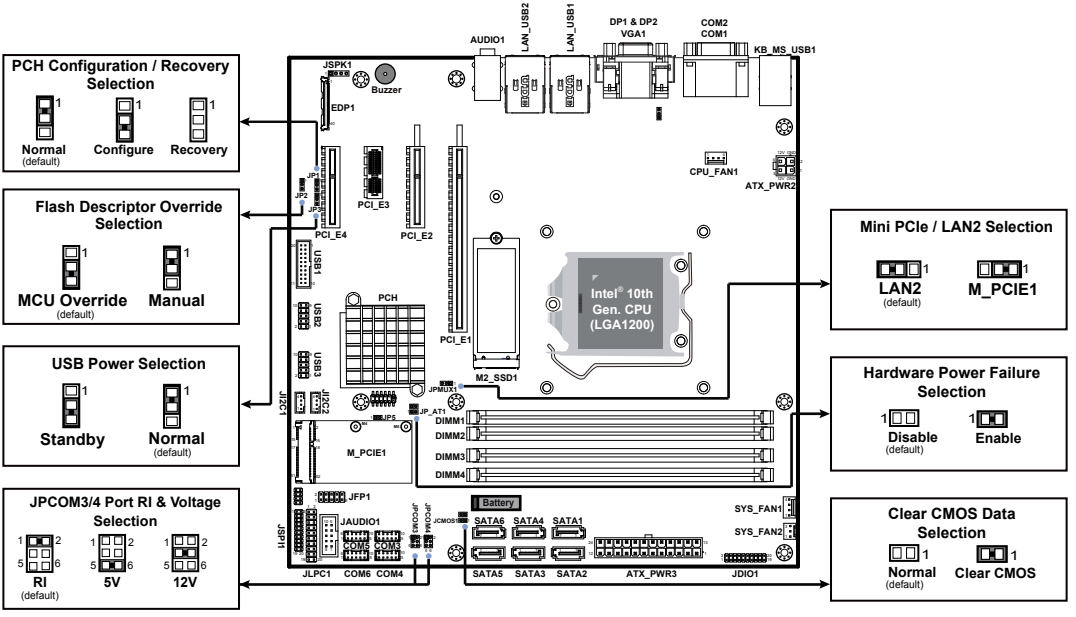
3.2 COMPONENT LOCATIONS

3.2.1 BU-B015 Top View

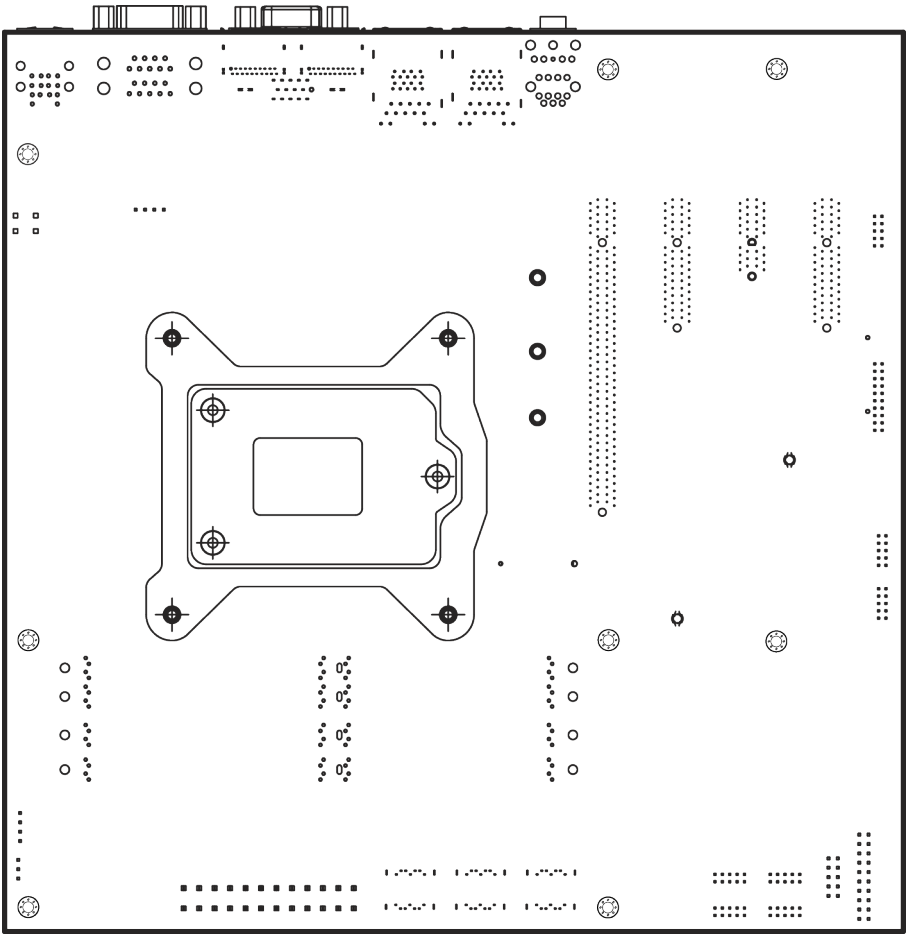


	**WARNING:** Always disconnect the power cord when you are working with connectors and jumpers on BU-B015. Make sure both the system and peripheral devices are turned OFF as sudden surge of power could damage sensitive components. Make sure the board is properly grounded.
	**CAUTION:** Observe precautions while handling electrostatic sensitive components. Make sure to ground yourself to prevent static charge while you are working on the connectors and jumpers. Use a grounding wrist strap and place all electronic components in any static-shielded devices.

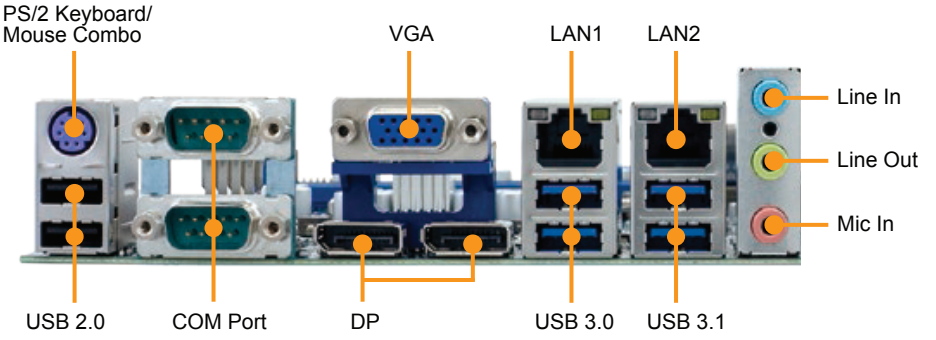
3.2.2 BU-B015 Jumper Setting



3.2.3 BU-B015 Bottom View



3.2.4 BU-B015 I/O View

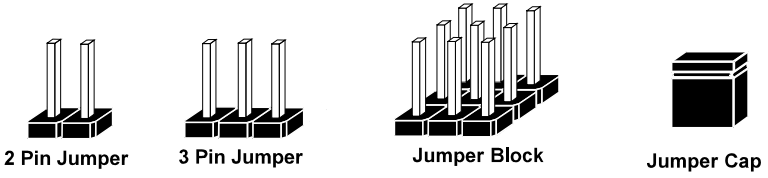


3.3 HOW TO SET JUMPERS

You can configure your board by setting jumpers. A jumper is consists of two or three metal pins with a plastic base mounted on the board. By using a small plastic "cap", (also known as the jumper cap (with a metal contact inside)), you are able to connect the pins. So you can set up your hardware configuration by "opening" or "closing" pins.

The jumper can be combined into sets that are called jumper blocks. When the jumpers are all in the block, you have to put them together to set up the hardware configuration. The figure below shows how this looks like.

JUMPERS AND CAPS

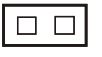


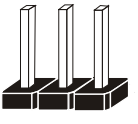
If a jumper has three pins (for examples, labeled PIN1, PIN2, and PIN3), you can connect PIN1 & PIN2 to create one setting by shorting. You can either connect PIN2 & PIN3 to create another setting. The same jumper diagrams are applied all through this manual. The figure below illustrates what the jumper diagrams look and what they represent.

Jumper Diagrams

Jumper Cap looks like this

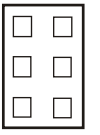
2 pin Jumper looks like this





3 pin Jumper looks like this

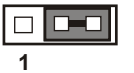
Jumper Block looks like this



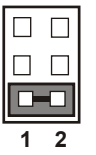
Jumper Settings

2 pin Jumper close(enabled) Looks like this

3 pin Jumper 2-3 pin close(enabled) Looks like this



Jumper Block 1-2 pin close(enabled) Looks like this



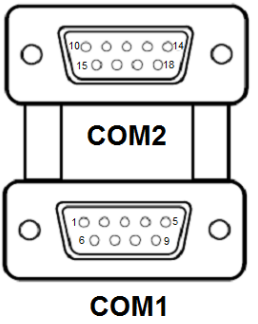
3.4 SETTING CONNECTORS AND JUMPERS

3.4.1 COM1 and COM2 PORT (COM1, COM2)

Port Location: COM1, COM2

Description: COM1 and COM2 Connectors (Default: RS-232)

PIN	Signal		
	RS-232	**RS-422**	**RS-485**
1	DCD#	TX-	RS-485-
2	RX	TX+	RS-485+
3	TX	RX+	NC
4	DTR#	RX-	NC
5	GND	GND	GND
6	DSR#	NC	NC
7	RTS#	NC	NC
8	CTS#	NC	NC
9	RI#	NC	NC



COM1/ COM2

COM2: COM2 Connector, selectable as RS-232/422/485.
The pin assignments are as follows:

PIN	Signal		
	RS-232	**RS-422**	**RS-485**
10	DCD#	TX-	RS-485-
11	RX	TX+	RS-485+
12	TX	RX+	NC
13	DTR#	RX-	NC
14	GND	GND	GND
15	DSR#	NC	NC
16	RTS#	NC	NC
17	CTS#	NC	NC
18	RI#	NC	NC

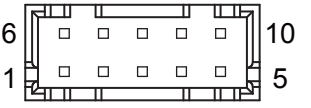
Notes:

1. COM1 and COM2 are selectable as RS-232, RS-422, RS-485 under BIOS setting.
2. Default setting is RS-232. Please see **Chapter 5 "Advanced – Super IO Configuration"** for details.

3.4.2 COM3, COM4, COM5, COM6 CONNECTOR (COM3 ~ COM6)

Connector Location: COM3, COM4, COM5, COM6
Description: COM Connector, fixed as RS-232

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD#	6	DSR#
2	RX	7	RTS#
3	TX	8	CTS#
4	DTR#	9	RI#
5	GND	-	-

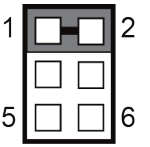
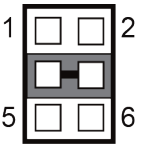
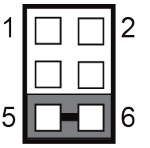


COM3/ COM4/ COM5/ COM6

Note:
1. COM3, COM4: Pin 9 is selectable for RI, +5V or +12V by jumper setting. Default setting is RI. Please see "**COM3 and COM4 PIN9 Definition Selection Guide"** for details.

3.4.3 COM3 and COM4 PIN9 DEFINITION SELECTION GUIDE (JPCOM3, JPCOM4)

Jumper Location: JPCOM3, JPCOM4
Description: COM3 and COM4 RI & Voltage Selection

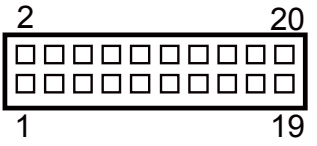
Selection	Jumper Setting (Pin Closed)	Jumper Illustration
RI	**1-2** *(Default Setting)*	 **JPCOM3/JPCOM4**
+12V	3-4	 **JPCOM3/JPCOM4**
+5V	5-6	 **JPCOM3/JPCOM4**

3.4.4 DIGITAL INPUT / OUTPUT CONNECTOR (JDIO1)

Connector Location: JDIO1

Description: Digital Input / Output Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+V5	2	+V12
3	DIN0	4	DOUT0
5	DIN1	6	DOUT1
7	DIN2	8	DOUT2
9	DIN3	10	DOUT3
11	DIN4	12	DOUT4
13	DIN5	14	DOUT5
15	DIN6	16	DOUT6
17	DIN7	18	DOUT7
19	GND	20	GND



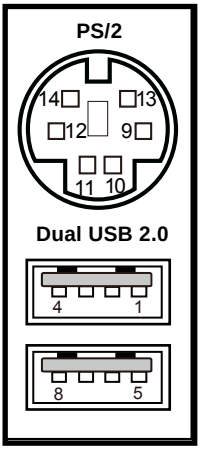
JDIO1

3.4.5 PS/2 KEYBOARD & DUAL USB 2.0 PORT (KB_MS_USB1)

Port Location: KB_MS_USB1

Description: PS/2 Keyboard Port & Dual USB 2.0 Ports

Supports mouse function on PS/2 by Y-cable.



KB_MS_USB1

PS/2:

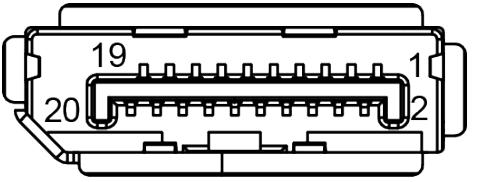
PIN	ASSIGNMENT	PIN	ASSIGNMENT
9	GND	12	+5V
10	KB_DATA	13	KB_CLK
11	MS_DATA	14	MS_CLK

Dual USB 2.0:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	5	GND
2	USB D+	6	USB D+
3	USB D-	7	USB D-
4	+5V	8	+5V

3.4.6 DISPLAYPORT (DP1, DP2)

Port Location: DP1, DP2
Description: DisplayPort



DP1 / DP2

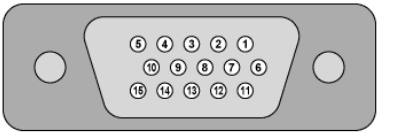
DP1 / DP2 signals:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	LANE 0_P	2	GND
3	LANE 0_N	4	LANE 1_P
5	GND	6	LANE 1_N
7	LANE 2_P	8	GND
9	LANE 2_N	10	LANE 3_P
11	GND	12	LANE 3_N
13	AUX_EN	14	GND
15	AUX CH_P	16	GND
17	AUX CH_N	18	HPD
19	GND	20	+3.3V

3.4.7 VGA (Video Graphics Array) PORT (VGA1)

Port Location: VGA1
Description: VGA (Video Graphics Array) Port

PIN	ASSIGNMENT
1	CRT_RED
2	CRT_GREEN
3	CRT_BLUE
4	NC
5	GND
6	NC
7	GND
8	GND
9	CRT_VCC
10	GND
11	NC
12	CRT_SDA
13	CRT_HSYNC
14	CRT_VSYNC
15	CRT_SCL

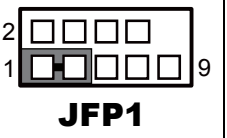
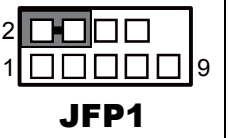
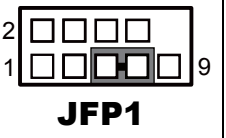
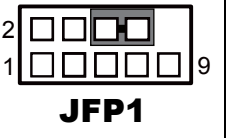
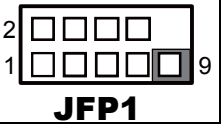


VGA1

3.4.8 FRONT PANEL CONNECTOR (JFP1)

Connector Location: JFP1

Description: Front Panel Connector

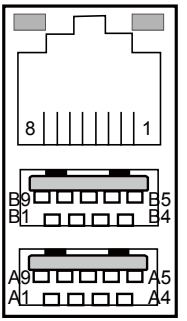
SELECTION	PIN & ASSIGNMENT	JUMPER SETTINGS	JUMPER ILLUSTRATION
HDD LED	1. HDD_LED+ 3. HDD_LED-	1-3	
Power LED	2. PWR_LED+ 4. PWR_LED-	2-4	
Reset Button	5. GND 7. RST_BTN	5-7	
Power Button	6. PWR_BTN 8. GND	6-8	
+5V	9. VCC5	9	

3.4.9 LAN & USB PORT (LAN_USB1, LAN_USB2)

Dual LAN ports are provided to support 10/100/1000Mbps, RJ45, rear I/O, and supports Wake-On-LAN & PXE.

Port Location: LAN_USB1
Description: LAN & Two USB 3.0 Ports
LAN1: Intel® PHY 219-LM (10/100/1000 Mbps)
Note: W480E/Q470E SKU supports USB 3.0 on LAN_USB1.
H420E SKU supports USB 2.0 on LAN_USB1.

Green/Orange Yellow



LAN_USB1

LAN pin assignment:

PIN	ASSIGNMENT
1	MDI_P0
2	MDI_N0
3	MDI_P1
4	MDI_N1
5	MDI_P2
6	MDI_N2
7	MDI_P3
8	MDI_N3

LAN LED Indicator:
Left Side LED

Green Color On7	10/100 LAN Speed Indicator
Orange Color On8	Giga LAN Speed Indicator
Off	No LAN Switch/HUB connected

Right Side LED

Yellow Color Blinking	LAN Message Active
Off	No LAN Message Active

USB 3.0 signals:

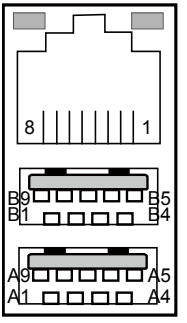
PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	+5V	A9	USB_TX_P
A2	USB D-	A8	USB_TX_N
A3	USB D+	A7	GND
A4	GND	A6	USB_RX_P
-	-	A5	USB_RX_N

PIN	ASSIGNMENT	PIN	ASSIGNMENT
B1	+5V	B9	USB_TX_P
B2	USB D-	B8	USB_TX_N
B3	USB D+	B7	GND
B4	GND	B6	USB_RX_P
-	-	B5	USB_RX_N

Port Location: LAN_USB2
Description: LAN & Two USB 3.1 Ports
LAN2: Intel® PHY 211AT (10/100/1000 Mbps)

Note: W480E/Q470E SKU supports USB 3.1 on LAN_USB2.
H420E SKU supports USB 3.0 on LAN_USB2.

Green/Orange Yellow



LAN_USB2

LAN Pin Assignment:

PIN	ASSIGNMENT
1	MDI_P0
2	MDI_N0
3	MDI_P1
4	MDI_N1
5	MDI_P2
6	MDI_N2
7	MDI_P3
8	MDI_N3

LAN LED Indicator:
Left Side LED

Green Color On7	10/100 LAN Speed Indicator
Orange Color On8	Giga LAN Speed Indicator
Off	No LAN Switch/HUB connected

Right Side LED

Yellow Color Blinking	LAN Message Active
Off	No LAN Message Active

USB 3.1 signals:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	+5V	A9	USB_TX_P
A2	USB D-	A8	USB_TX_N
A3	USB D+	A7	GND
A4	GND	A6	USB_RX_P
-	-	A5	USB_RX_N

PIN	ASSIGNMENT	PIN	ASSIGNMENT
B1	+5V	B9	USB_TX_P
B2	USB D-	B8	USB_TX_N
B3	USB D+	B7	GND
B4	GND	B6	USB_RX_P
-	-	B5	USB_RX_N

3.4.10 LINE IN, LINE OUT, MIC IN PORT (AUDIO1)

Port Location: AUDIO1

Description: Line In, Line Out & Microphone

Line In:

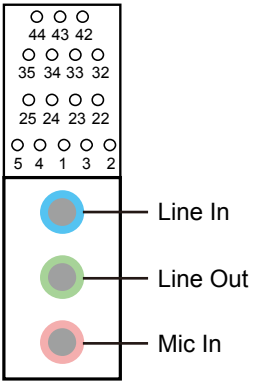
PIN	ASSIGNMENT
32	HD_LINE-IN-L
33	GND
34	GND
35	HD_LINE-IN-R

Line Out:

PIN	ASSIGNMENT
22	HD_LINE-OUT-L
23	GND
24	GND
25	HD_LINE-OUT-R

Mic In:

PIN	ASSIGNMENT
2	HD_MIC-L
3	GND
1	GND
4	GND
5	HD_MIC-R



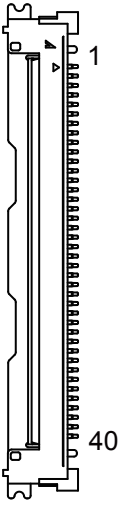
AUDIO1

3.4.11 EMBEDDED DISPLAY PORT (EDP) CONNECTOR (EDP1)

Connector Location: EDP1

Description: Embedded DisplayPort (EDP) Connector

PIN	ASSIGNMENT
1	NC
2	GND
3	LANE 3_N
4	LANE 3_P
5	GND
6	LANE 2_N
7	LANE 2_P
8	GND
9	LANE 1_N
10	LANE 1_P
11	GND
12	LANE 0_N
13	LANE 0_P
14	GND
15	AUX_CH_P
16	AUX_CH_N
17	GND
18	LCD_VCC
19	LCD_VCC
20	LCD_VCC
21	LCD_VCC
22	NC
23	LCD_GND
24	LCD_GND
25	LCD_GND
26	LCD_GND
27	HPD
28	BKLT_GND
29	BKLT_GND
30	BKLT_GND
31	BKLT_GND
32	BKLT_EN
33	BKLT_CTL
34	NC
35	NC
36	+12V



EDP1

PIN	ASSIGNMENT
37	+12V
38	+12V
39	+12V
40	NC

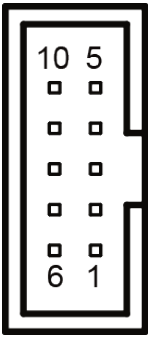
eDP (Embedded DisplayPort) was developed to be used specifically in embedded display applications, such as Notebook and Notepad PCs. eDP is based on the VESA DisplayPort Standard. It aims to define a standardized display panel interface for internal connections; e.g., graphics cards to notebook display panels. It has advanced power-saving features including seamless refresh rate switching. It has become the new mainstream display panel interface for LCD panels with the realized higher resolution.

3.4.12 FRONT PANEL AUDIO CONNECTOR (JAUDIO1)

Connector Location: JAUDIO1

Description: Front Panel Audio Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	MIC1-L	6	MIC1-R
2	GND	7	GND
3	LINE-IN-L	8	LINE-IN-R
4	GND	9	GND
5	LINE-OUT-L	10	LINE-OUT-R



JAUDIO1

3.4.13 HARDWARE POWER FAILURE SELECTION (JP_AT1)

Jumper Location: JP_AT1

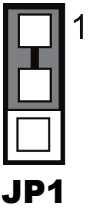
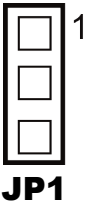
Description: Hardware Power Failure Selection

Selection	Jumper Setting (Pin Closed)	Jumper Illustration
Enable	1-2	 **JP_AT1**
Disable	**Open** ***(Default Setting)***	 **JP_AT1**

3.4.14 PCH CONFIGURATION / RECOVERY SELECTION (JP1)

Jumper Location: JP1

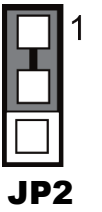
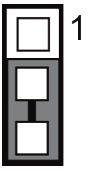
Description: PCH Configuration / Recovery Selection

Selection	Jumper Setting (Pin Closed)	Jumper Illustration
Normal	**1-2** ***(Default Setting)***	
Configure	2-3	
Recovery	Open	

3.4.15 FLASH DESCRIPTOR OVERRIDE SELECTION (JP2)

Jumper Location: JP2

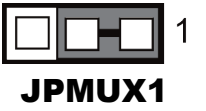
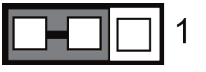
Description: Flash Descriptor Override Selection

Selection	Jumper Setting (Pin Closed)	Jumper Illustration
Normal	1-2	 **JP2**
MCU Override	**2-3** ***(Default Setting)***	 **JP2**

3.4.16 MINI PCI EXPRESS / LAN2 SELECTION (JPMUX1)

Jumper Location: JPMUX1

Description: Mini PCI Express / LAN2 Selection

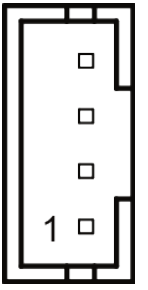
Selection	Jumper Setting (Pin Closed)	Jumper Illustration
MPCIE	1-2	 **JPMUX1**
LAN2	**2-3** ***(Default Setting)***	 **JPMUX1**

3.4.17 I2C WAFER (JI2C1, JI2C2)

Connector Location: JI2C1, JI2C2

Description: I2C Wafer

PIN	ASSIGNMENT
1	GND
2	+3.3V
3	I2C_SCL
4	I2C_SDA



JI2C1/ JI2C2

3.4.18 CASE OPEN CONNECTOR (JP5)

Connector Location: JP5

Description: Case Open Connector

PIN	ASSIGNMENT
1	COPEN#
2	GND

JP5

3.4.19 MINI PCI EXPRESS SLOT (M_PCIE1)

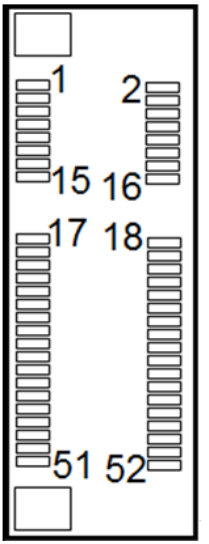
Connector Location: M_PCIE1

Description: Mini-PCI Express Slot

Note 1: M_PCIE1 is multiplexed with LAN2 selectable by JPMUX1 jumper setting.

Note 2: Only W480E and Q470E SKU support Mini-PCI Express Slot.

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	WAKE_N	2	+3.3V_AUX
3	NC	4	GND
5	NC	6	+1.5V
7	CLKREQ#	8	NC
9	GND	10	NC
11	REFCLK-	12	NC
13	REFCLK+	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	NC
21	GND	22	PERST#
23	PE_RX_N	24	+3.3V_AUX
25	PE_RX_P	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TX_N	32	SMB_DATA
33	PE_TX_P	34	GND
35	GND	36	USB_N
37	GND	38	USB_P
39	+3.3V_AUX	40	GND
41	+3.3V_AUX	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3V_AUX

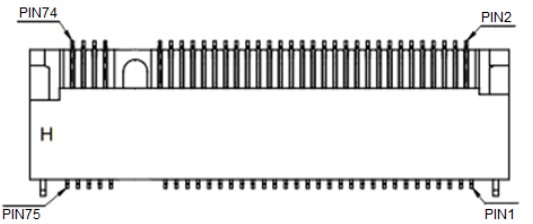


M_PCIE1

3.4.20 M.2 SLOT (M2_SSD1)

Connector Location: M2_SSD1

Description: M.2 M-key slot supports PCIeX4/X2 and 2242/2260/2280 size.



M2_SSD1

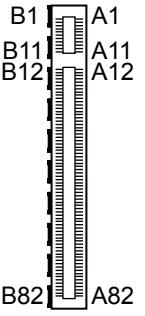
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	2	+3.3V
3	GND	4	+3.3V
5	PE_RX_N3	6	NC
7	PE_RX_P3	8	NC
9	GND	10	NC
11	PE_TX_N3	12	+3.3V
13	PE_TX_P3	14	+3.3V
15	GND	16	+3.3V
17	PE_RX_N2	18	+3.3V
19	PE_RX_P2	20	NC
21	GND	22	NC
23	PE_TX_N2	24	NC
25	PE_TX_P2	26	NC
27	GND	28	NC
29	PE_RX_N1	30	NC
31	PE_RX_P1	32	NC
33	GND	34	NC
35	PE_TX_N1	36	NC
37	PE_TX_P1	38	NC
39	GND	40	NC
41	PE_RX_N0	42	NC
43	PE_RX_P0	44	NC
45	GND	46	NC
47	PE_TX_N0	48	NC
49	PE_TX_P0	50	PERST#
51	GND	52	CLKREQ#

PIN	ASSIGNMENT	PIN	ASSIGNMENT
53	REFCLK_N	54	PEWAKE#
55	REFCLK_P	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	NC
67	NC	68	NC
69	NC	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	GND	-	-

3.4.21 PCIE Bus (PCI_E1 (x16), PCI_E2 (x4), PCI_E3 (x1), PCI_E4 (x4))

Connector Location: PCI_E1

Description: 164-pin PCIE Bus (x16)



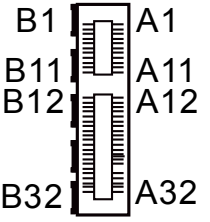
PCI_E1

PIN	ASSIGNMENT	PIN	ASSIGNMENT
B1	+12V	A1	PRSNT#1
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	NC
B6	SMB_DATA	A6	NC
B7	GND	A7	NC
B8	+3.3V	A8	NC
B9	NC	A9	+3.3V
B10	+3.3V_AUX	A10	+3.3V
B11	WAKE#	A11	PERST#
B12	RSVD	A12	GND
B13	GND	A13	REFCLK+
B14	HSOP0	A14	REFCLK-
B15	HSON0	A15	GND
B16	GND	A16	HSIP0
B17	PRSNT#2	A17	HSIN0
B18	GND	A18	GND
B19	HSOP1	A19	RSVD
B20	HSON1	A20	GND
B21	GND	A21	HSIP1
B22	GND	A22	HSIN1
B23	HSOP2	A23	GND

PIN	ASSIGNMENT	PIN	ASSIGNMENT
B24	HSON2	A24	GND
B25	GND	A25	HSIP2
B26	GND	A26	HSIN2
B27	HSOP3	A27	GND
B28	HSON3	A28	GND
B29	GND	A29	HSIP3
B30	RSVD	A30	HSIN3
B31	PRSNT#2	A31	GND
B32	GND	A32	RSVD
B33	HSOP4	A33	RSVD
B34	HSON4	A34	GND
B35	GND	A35	HSIP4
B36	GND	A36	HSIN4
B37	HSOP5	A37	GND
B38	HSON5	A38	GND
B39	GND	A39	HSIP5
B40	GND	A40	HSIN5
B41	HSOP6	A41	GND
B42	HSON6	A42	GND
B43	GND	A43	HSIP6
B44	GND	A44	HSIN6
B45	HSOP7	A45	GND
B46	HSON7	A46	GND
B47	GND	A47	HSIP7
B48	PRSNT#2	A48	HSIN7
B49	GND	A49	GND
B50	HSOP8	A50	RSVD
B51	HSON8	A51	GND
B52	GND	A52	HSIP8
B53	GND	A53	HSIN8
B54	HSOP9	A54	GND
B55	HSON9	A55	GND
B56	GND	A56	HSIP9
B57	GND	A57	HSIN9
B58	HSOP10	A58	GND
B59	HSON10	A59	GND
B60	GND	A60	HSIP10
B61	GND	A61	HSIN10
B62	HSOP11	A62	GND
B63	HSON11	A63	GND

PIN	ASSIGNMENT	PIN	ASSIGNMENT
B64	GND	A64	HSIP11
B65	GND	A65	HSIN11
B66	HSOP12	A66	GND
B67	HSON12	A67	GND
B68	GND	A68	HSIP12
B69	GND	A69	HSIN12
B70	HSOP13	A70	GND
B71	HSON13	A71	GND
B72	GND	A72	HSIP13
B73	GND	A73	HSIN13
B74	HSOP14	A74	GND
B75	HSIN14	A75	GND
B76	GND	A76	HSIP14
B77	GND	A77	HSIN14
B78	HSIP15	A78	GND
B79	HSIN15	A79	GND
B80	GND	A80	HSIP15
B81	PRSNT#2	A81	HSIN15
B82	RSVD	A82	GND

Connector Location: PCI_E2 (x4), PCI_E4 (x4)
Description: PCIE Bus (x4)
You will find the **PCI_E2, PCI_E4** connector with 64 pins on BU-B015.



PCI_E2 / PCI_E4

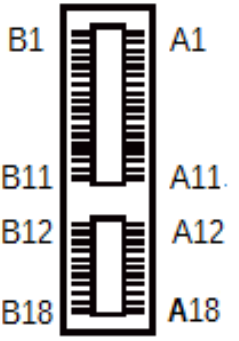
PIN	ASSIGNMENT	PIN	ASSIGNMENT
B1	+12V	A1	PRSNT#1
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	NC
B6	SMB_DATA	A6	NC
B7	GND	A7	NC
B8	+3.3V	A8	NC
B9	NC	A9	+3.3V
B10	+3.3V_AUX	A10	+3.3V
B11	WAKE#	A11	PERST#
B12	RSVD	A12	GND
B13	GND	A13	REFCLK+
B14	HSOP0	A14	REFCLK-
B15	HSON0	A15	GND
B16	GND	A16	HSIP0
B17	PRSNT#2	A17	HSIN0
B18	GND	A18	GND
B19	HSOP1	A19	RSVD
B20	HSON1	A20	GND
B21	GND	A21	HSIP1
B22	GND	A22	HSIN1
B23	HSOP2	A23	GND
B24	HSON2	A24	GND

PIN	ASSIGNMENT	PIN	ASSIGNMENT
B25	GND	A25	HSIP2
B26	GND	A26	HSIN2
B27	HSOP3	A27	GND
B28	HSON3	A28	GND
B29	GND	A29	HSIP3
B30	RSVD	A30	HSIN3
B31	PRSNT#2	A31	GND
B32	GND	A32	RSVD

Note: PCI_E4 is not supported in PCH H420E

Connector Location: PCI_E3 (x1)

Description: PCIE Bus (x1)
You will find the **PCI_E3** connector with 36 pins on BU-B015.



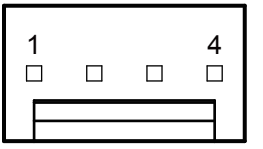
PCI_E3

PIN	ASSIGNMENT	PIN	ASSIGNMENT
B1	+12V	A1	PRSNT#1
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	SMB_CLK	A5	NC
B6	SMB_DATA	A6	NC
B7	GND	A7	NC
B8	+3.3V	A8	NC
B9	NC	A9	+3.3V
B10	+3.3V_AUX	A10	+3.3V
B11	WAKE#	A11	PERST#
B12	RSVD	A12	GND
B13	GND	A13	REFCLK+
B14	HSOP0	A14	REFCLK-
B15	HSON0	A15	GND
B16	GND	A16	HSIP0
B17	PRSNT#2	A17	HSIN0
B18	GND	A18	GND

3.4.22 CPU / SYSTEM FAN CONNECTOR (CPU_FAN1, SYS_FAN1, SYS_FAN2)

Connector Location: CPU_FAN1
Description: CPU Fan Connector (CPU_FAN1)

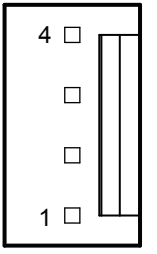
PIN	ASSIGNMENT
1	GND
2	+12V
3	CPU_FANTAC
4	CPU_FANCTRL



CPU_FAN1

Connector Location: SYS_FAN1
Description: System Fan Connector (SYS_FAN1)

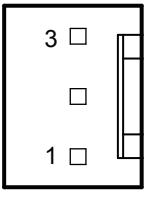
PIN	ASSIGNMENT
1	GND
2	+12V
3	SYS_FANTAC
4	SYS _FANCTRL



SYS_FAN1

Connector Location: SYS_FAN2
Description: System Fan Connector 2

PIN	ASSIGNMENT
1	GND
2	+12V
3	NC



SYS_FAN2

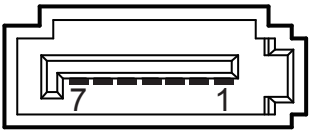
3.4.23 SERIAL ATA (SATA) CONNECTOR (SATA1 ~ SATA6)

Connector Location: SATA1, SATA2, SATA3, SATA4, SATA5, SATA6

Description: SATA Connectors

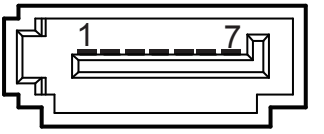
Pin Assignments for SATA1 ~ SATA6:

PIN	ASSIGNMENT
1	GND
2	SATA_TX_P
3	SATA_TX_N
4	GND
5	SATA_RX_N
6	SATA_RX_P
7	GND



SATA1/
SATA4/
SATA6

Note: SATA5, SATA6 is not supported in PCH H420E.



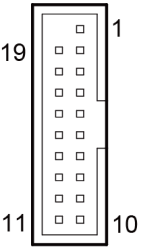
SATA2/
SATA3/
SATA5

3.4.24 INTERNAL USB 3.1 CONNECTOR (USB1)

Connector Location: USB1

Description: Internal USB 3.1 Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+5V	11	USB_D+
2	USB_RX_N	12	USB_D-
3	USB_RX_P	13	GND
4	GND	14	USB_TX_P
5	USB_TX_N	15	USB_TX_N
6	USB_TX_P	16	GND
7	GND	17	USB_RX_P
8	USB D-	18	USB_RX_N
9	USB D+	19	+5V
10	GND	-	-



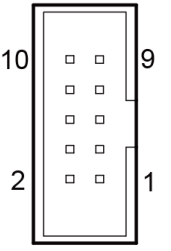
USB1

3.4.25 INTERNAL USB 2.0 CONNECTOR (USB2, USB3)

Connector Location: USB2, USB3

Description: Internal USB 2.0 Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+5V	2	+5V
3	USB D-	4	USB D-
5	USB D+	6	USB D+
7	GND	8	GND
9	NC	10	GND

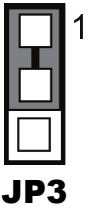


USB2/ USB3

3.4.26 USB POWER SELECTION (JP3)

Jumper Location: JP3

Description: USB Standby / Normal Power Selection

Selection	Jumper Setting (Pin Closed)	Jumper Illustration
Normal	**1-2** ***(Default Setting)***	 **JP3**
Standby	2-3	 **JP3**

3.4.27 SPEAKER CONNECTOR (JSPK1)

Connector Location: JSPK1
Description: Speaker Connector

PIN	ASSIGNMENT
1	SPKR_VCC
2	SPKR_SIGNAL
3	SPKR_SIGNAL
4	SPKR_SIGNAL

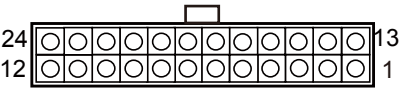
JSPK1

3.4.28 POWER INPUT CONNECTOR (ATX_PWR3, ATX_PWR2)

Connector Location: ATX_PWR3

Description: ATX Power Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PSON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	POK	20	-5V
9	+5V_SB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

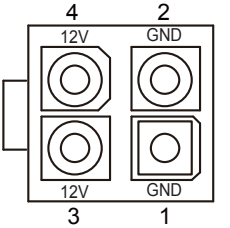


ATX_PWR3

Connector Location: ATX_PWR2

Description: Power Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
4	+12V	2	GND
3	+12V	1	GND

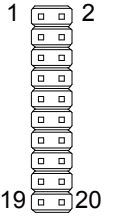


ATX_PWR2

3.4.29 LOW PIN COUNT (LPC) CONNECTOR (JLPC1)

Connector Location: JLPC1
Description: LPC Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	CLK	2	GND
3	FRAME	4	NC
5	RESET	6	+5V
7	LAD3	8	LAD2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	SMBCLK	14	SMBDATA
15	+3.3V_AUX	16	SERIRQ
17	GND	18	CLK RUN
19	SUS_TAT	20	DREQ0



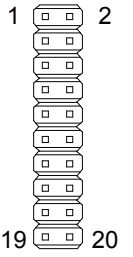
JLPC1

3.4.30 SPI TPM CONNECTOR (JSPI1)

Connector Location: JSPI1

Description: SPI TPM Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	NC	2	NC
3	NC	4	NC
5	GND	6	+3.3V_AUX
7	SPI_CLK	8	NC
9	NC	10	SPI_MISO
11	NC	12	SPI_MOSI
13	SPI_CS	14	GND
15	NC	16	NC
17	SPI_PIRQ	18	NC
19	RESET	20	NC

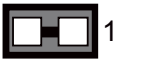


JSPI1

3.4.31 CLEAR CMOS DATA SELECTION (JCMOS1)

Jumper Location: JCMOS1
Description: Clear CMOS Data Selection

Step 1. Remove the main power of the PC.
Step 2. Close JCMOS1 (pins 1-2) for 6 seconds by a cap.
Step 3. Remove the cap which is just used on JCMOS1 (1-2), so that JCMOS1 returns to "OPEN".
Step 4. Power on the PC and the PC will then auto-reboot for once in order to set SoC's register.
Step 5. Done!

Selection	Jumper Setting (Pin Closed)	Jumper Illustration
Normal	**Open** ***(Default Setting)***	 **JCMOS1**
Clear CMOS	1-2	 **JCMOS1**

4 Software Utilities

This chapter provides the detailed information that guides users to install driver utilities for the system. The following topics are included:

- Installing Intel® Chipset Software Installation Utility
- Installing Graphics Driver Utility
- Installing LAN Driver Utility
- Installing Sound Driver Utility
- Installing Intel® Management Engine Components Driver Installer
- Installing Intel® Rapid Storage Utility
- Installing Intel® Serial I/O Driver Utility

4.1 Introduction

Enclosed with the BU-B015 Series package is our driver utilities contained in a DVD-ROM disk. Refer to the following table for driver locations:

Filename (Assume that DVD- ROM drive is D :)	Purpose
D:\Driver\Platform\1_Main Chip\Win10(64-bit)	Intel(R) Chipset Device Software installer
D:\Driver\Platform\2_Graphics\Win10 (64-bit)	Intel(R) HD Graphics Driver installer
D:\Driver\Platform\3_Sound\Win10 (64-bit)	Realtek(R) ALC888S HD Audio Driver installer
D:\Driver\Platform\4_ME\Win10 (64-bit)	Intel(R) *Management Engine* Driver installer for W480E/Q470E/H420E
D:\Driver\Platform\5_LAN Chip\Win10 (64-bit)	Intel(R) LAN Driver installer
D:\Driver\Platform\6_Serial IO\Win10 (64-bit)	Intel(R)Serial IO Driver installer
D:\Driver\Platform\7_RAID\Win10 (64-bit)	Intel(R)RST Driver installer for RAID

Notes:

1. Install the driver utilities immediately after the OS installation is completed.
2. After the Intel RST Utility is installed, you must execute Windows 10 LTSC 2019 update procedure. The Intel RST Utility can be activated successfully only after the Windows Update procedure is finished.

For more details on the installation sequence, refer to the Readme.txt file.

4.2 Installing Intel® Chipset Software Installation Utility

Introduction

The Intel® Chipset Software Installation Utility installs the Windows *.INF files to the target system. These files outline to the operating system how to configure the Intel chipset components in order to ensure that the following functions work properly:

- Core PCI and ISAPNP Services
- PCI-e Support
- SATA Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

Intel® Chipset Software Installation Utility

The utility pack is to be installed only for Windows 10 (64-bit), and it should be installed immediately after the OS installation is finished. Please follow the steps below:

1. Connect the USB DVD-ROM device to BU-B015 and insert the driver disk.
2. Enter the **Main Chip** folder where the Chipset driver is located.
3. Click **SetupChipset.exe** file for driver installation.
4. Follow the on-screen instructions to install the driver.
5. Once the installation is completed, shut down the system and restart BU-B015 for the changes to take effect.

4.3 Installing Graphics Driver Utility

To install the Graphics driver utility, follow the steps below:

1. Connect the USB DVD-ROM device to BU-B015 and insert the driver disk.
2. Enter the **Graphics** folder where the driver is located.
3. Click the **igxpin.exe** file for driver installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart BU-B015 for the changes to take effect.

4.4 Installing LAN Driver Utility

Enhanced with LAN function, BU-B015 supports various network adapters. To install the LAN Driver, follow the steps below:

1. Connect the USB DVD-ROM device to BU-B015 and insert the driver disk.
2. Enter the **LAN Chip** folder where the driver is located.
3. Click **Autorun.exe** file for driver installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart BU-B015 for the changes to take effect.

4.5 Installing Sound Driver Utility

To install the Sound Driver, follow the steps below:

1. Connect the USB DVD-ROM device to BU-B015 and insert the driver disk.
2. Open the **Sound** folder where the driver is located.
3. Click the **Setup.exe** file for driver installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart BU-B015 for the changes to take effect.

4.6 Installing Intel® Management Engine Components Driver Installer

Installation Instructions for Intel® Management Engine Components Driver Installer

1. Connect the USB DVD-ROM device to BU-B015 and insert the driver disk.
2. Enter the **ME** folder where the driver is located.
3. Click **SetupME.exe** file for ME driver installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart BU-B015 for the changes to take effect.

4.7 Installing Intel® Rapid Storage Utility

The Intel® Rapid Storage Technology option ROM provides the following functions:

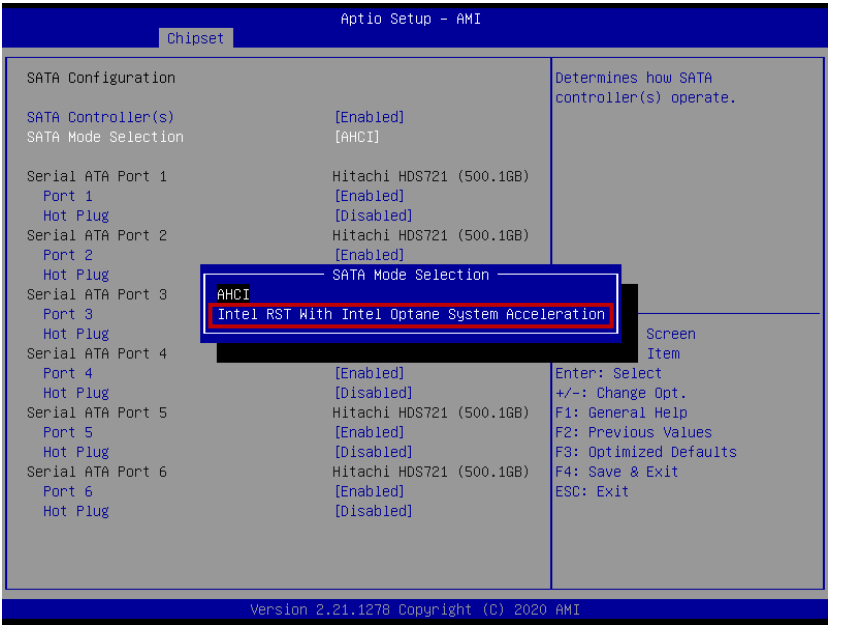
- Pre-operating system user interface for RAID volume management
- Ability to create, delete and reset RAID volumes
- RAID recovery

Entering option ROM User Interface from BIOS Setup Utility

Follow the instructions below to enter the Intel® Rapid Storage Technology option ROM user interface:

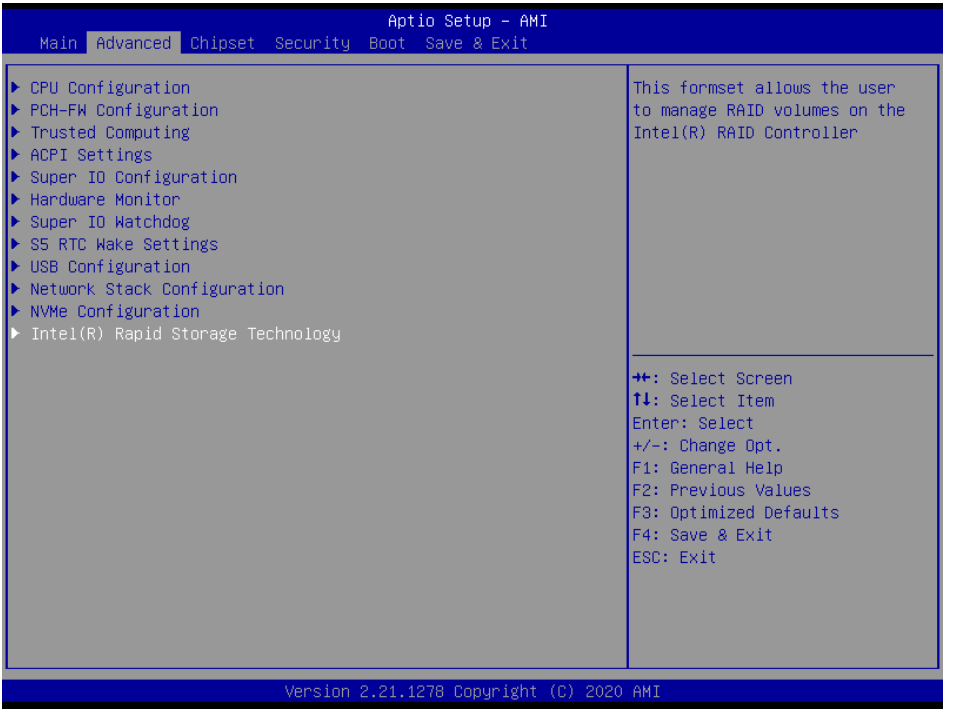
1 Press **<Del>** to access the BIOS SetupUtility program when prompted during the Power-On Self-Test (POST).

2 Enter **Chipset > PCH-IO Configuration > SATA Configuration** menu screen and select "**Intel RST With Intel Optane System Acceleration**" option for **SATA Controller(s)** option item. See the picture below:

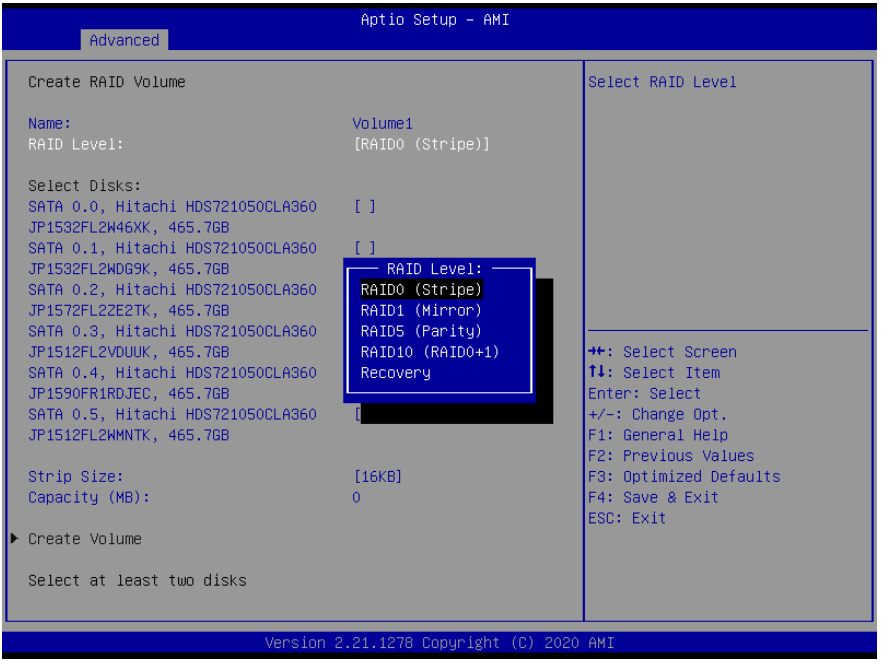


3 Press **F4** to save and validate the changed BIOS configuration and reset the system.

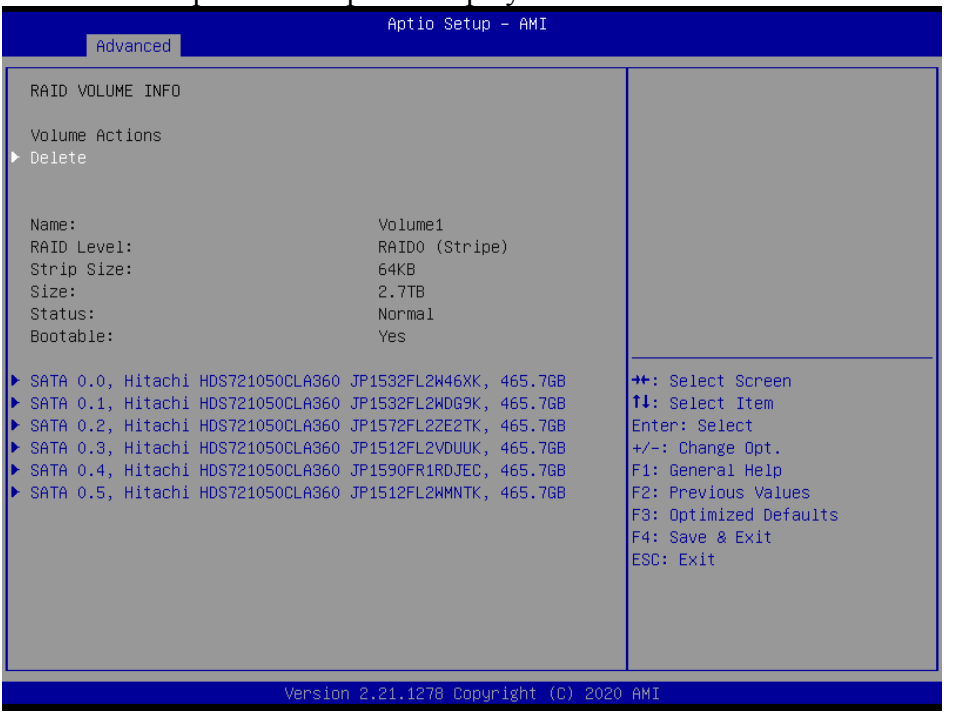
4 Press **<Del>** to enter the BIOS Setup Utility program again and the **Intel(R) Rapid Storage Technology** option item will display under the **Advanced** menu screen as below:



5 Select the **Intel(R) Rapid Storage Technology** option item and press**<Enter>**, and the following screen will display. Select a RAID level that you want to enter and press **<Enter>**.



The hard drive(s) and hard drive information of the RAID level you selected in the previous step will display:



Heed that in the user interface, the hard drive(s) and hard drive information listed for your system will differ from the example above.

Installing Intel® RST Utility (Only for W480E and Q470E, Optional)

The Intel® Rapid Storage Technology (Intel® RST) utility supports RAID 0, 1, 5, 10 in W480E/Q470E SKU.

To install the RAID utility, follow the steps below:

1. Connect the USB DVD-ROM device to BU-B015 and insert the driver disk.
2. Enter the **RAID** folder where the utility is located.
3. Click **SetupRST.exe**file for utility installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart BU-B015for the changes to take effect.
6. Execute Windows 10 LTSC 2019 update procedure.
   The Intel RST Utility can be activated successfully only after the Windows Update procedure is finished.

Note: The Intel RST Utility is not supported for H420E SKU.

4.8 Installing Intel® Serial I/O Driver Utility

To install the Serial I/O Driver, follow the steps below:

1. Connect the USB DVD-ROM device to BU-B015 and insert the driver disk.
2. Open the **Serial IO** folder where the driver is located.
3. Click the **SetupSerialIO.exe** file for driver installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart BU-B015 for the changes to take effect.

5 BIOS SETUP

This chapter guides users how to configure the basic system configurations via the BIOS Setup Utilities. The information of the system configuration is saved in BIOS NVRAM so that the Setup information is retained when the system is powered off. The BIOS Setup Utilities consist of the following menu items:

- Main Menu
- Advanced Menu
- Chipset Menu
- Security Menu
- Boot Menu
- Save & Exit Menu

5.1 Introduction

The BU-B015 board uses an AMI (American Megatrends Incorporated) Aptio BIOS that is stored in the Serial Peripheral Interface Flash Memory (SPI Flash) and can be updated. The SPI Flash contains the built-in BIOS setup program, Power-On Self-Test (POST), PCI auto-configuration utility, LAN EEPROM information, and Plug and Play support.

Aptio is AMI's BIOS firmware based on the UEFI (Unified Extensible Firmware Interface) specifications and the Intel Platform Innovation Framework for EFI. The UEFI specification defines an interface between the operating system and platform firmware. The interface consists of data tables that contain platform-related information, boot service calls, and runtime service calls that are available to the operating system and its loader. These elements have combined to provide a standard environment for booting the operating system and running pre-boot applications.

The diagram below shows the Extensible Firmware Interface's location in the software stack.

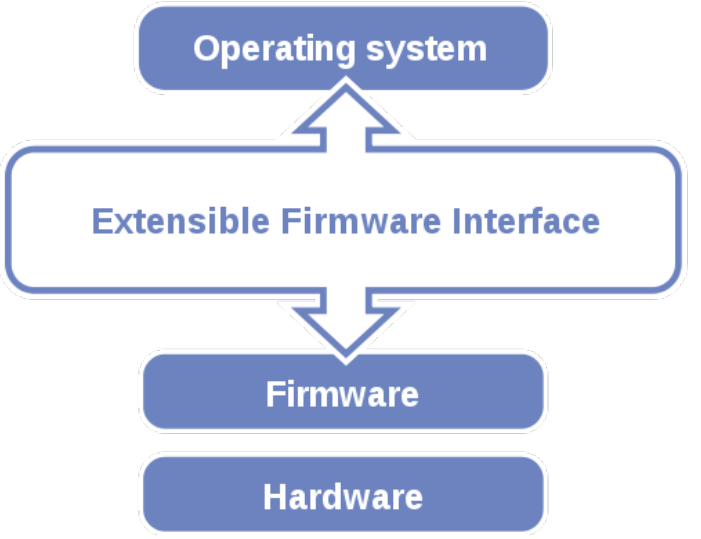


Figure 5-1. Extensible Firmware Interface Diagram

EFI BIOS provides an user interface that allows you to modify hardware configuration, e.g. change the system date and time, enable/disable a system component, determine bootable device priority, set up personal password, etc., which is convenient for engineers to perform modifications and customize the computer

system and allows technicians to troubleshoot the occurred errors when the hardware is faulty.

The BIOS setup menu allows users to view and modify the BIOS settings for the computer. After the system is powered on, users can access the BIOS setup menu by pressing <Del> or <Esc> immediately while the POST message is running before the operating system is loading.

All the menu settings are described in details in this chapter.

5.2 Accessing Setup Utility

After the system is powered on, BIOS will enter the Power-On Self-Test (POST) routines and the POST message will be displayed:

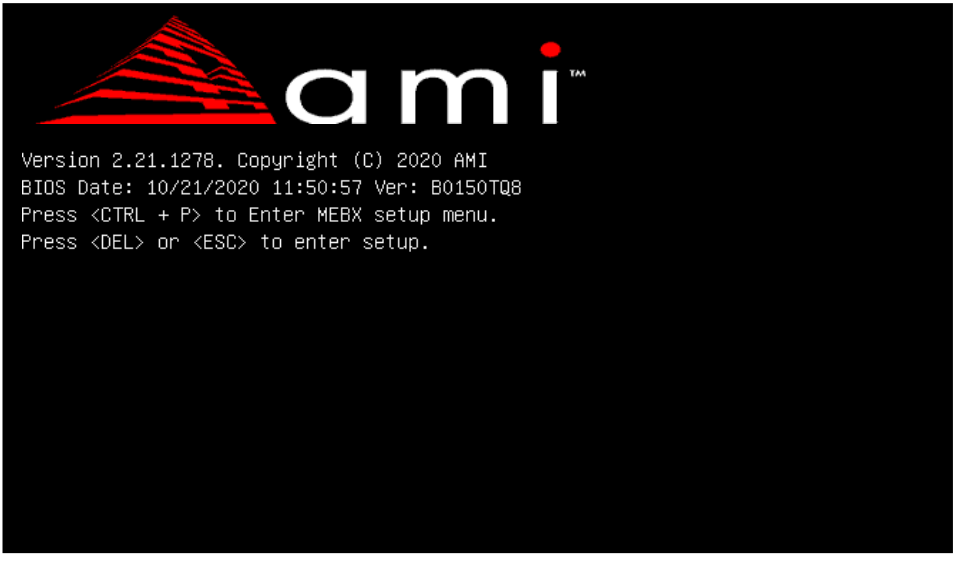
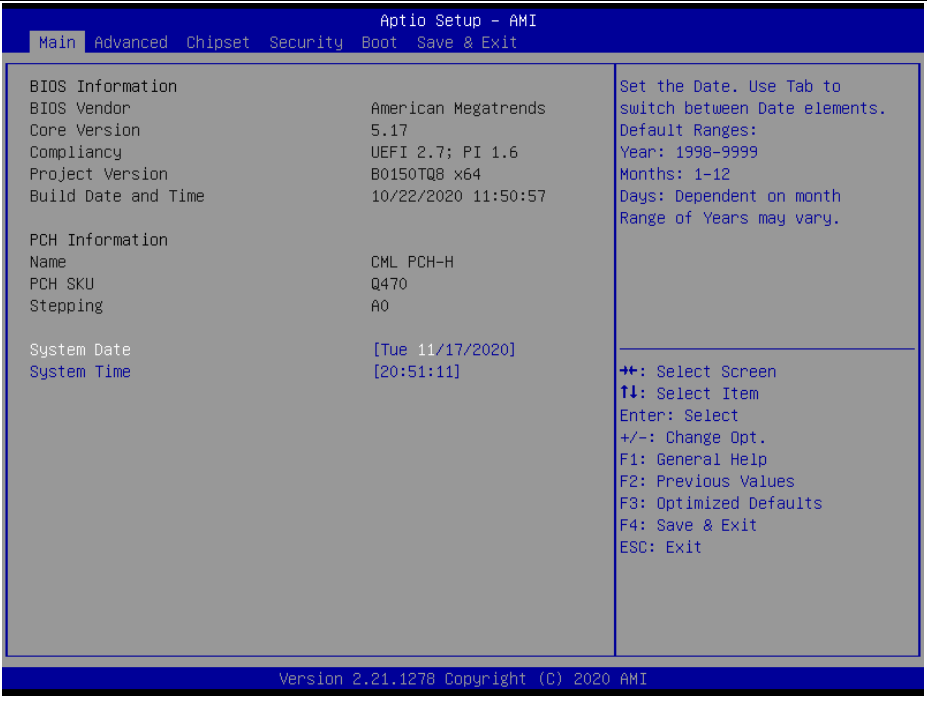


Figure 5-2. POST Screen with AMI Logo

Press **<Del>** or **<Esc>** to access the Setup Utility program and the **Main** menu of the Aptio Setup Utility will appear on the screen as below:



BIOS Setup Menu Initialization Screen

You may move the cursor by <↑> and <↓> keys to highlight the individual menu items. As you highlight each item, a brief description of the highlighted selection will appear on the right side of the screen.

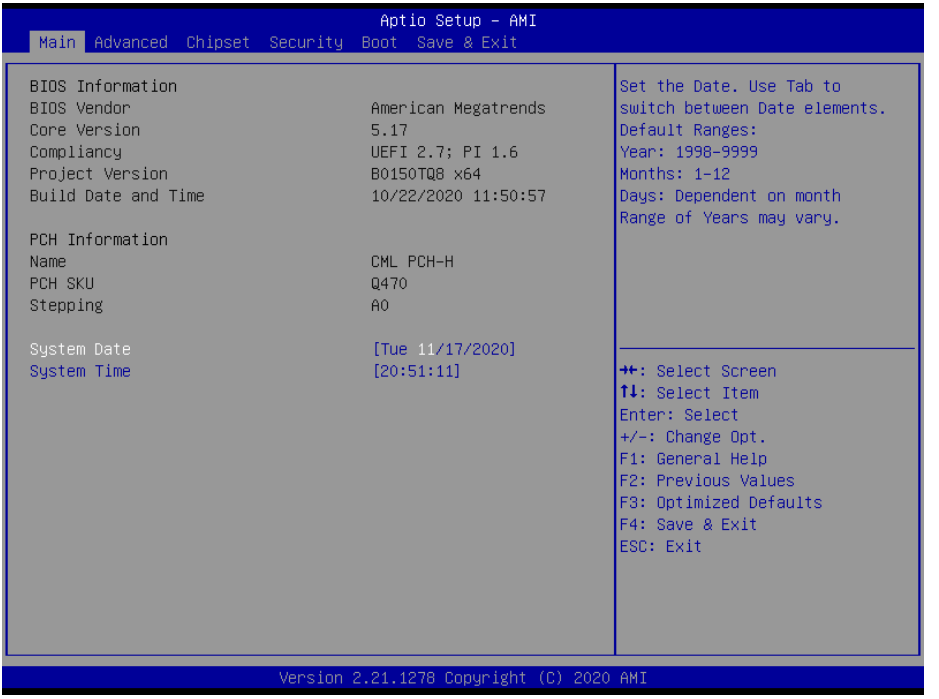
The language of the BIOS setup menu interface and help messages are shown in US English. You may use <↑> or <↓> key to select among the items and press <Enter> to confirm and enter the sub-menu. The following table provides the list of the navigation keys that you can use while operating the BIOS setup menu.

BIOS Setup Navigation Key	Description
<←> and <→>	Select a different menu screen (move the cursor from the selected menu to the left or right).
<↑> and <↓>	Select a different item (move the cursor from the selected item upwards or downwards)
<Enter>	Execute the command or select the sub-menu.
<F2>	Load the previous configuration values.
<F3>	Load the default configuration values.
<F4>	Save the current values and exit the BIOS setup menu.
<Esc>	Close the sub-menu. Trigger the confirmation to exit BIOS setup menu.

5.3 Main

Menu Path *Main*

The **Main** menu allows you to view the BIOS Information and change the system date and time. Use tab to switch between date elements. Use <↑> or <↓> arrow keys to highlight the item and enter the value you want in each item. This screen also displays the BIOS version (project) and BIOS Build Date and Time.



Main Screen

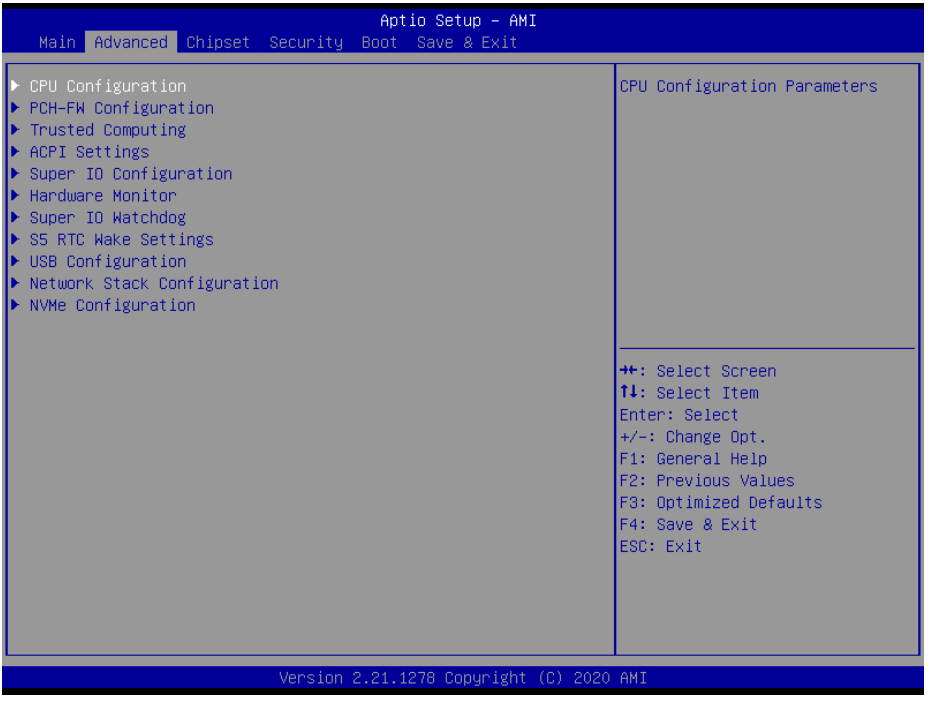
BIOS Setting	Options	Description/Purpose
BIOS Vendor	No changeable options	Displays the name of the BIOS vendor.
Core Version	No changeable options	Displays the current BIOS core version.
Compliancy	No changeable options	Displays the current UEFI version.
Project Version	No changeable options	Displays the version of the BIOS currently installed on the platform.
Build Date and Time	No changeable options	Displays the date that the current BIOS version is built.
Name	No changeable options	Displays the name of the PCH.
PCH SKU	No changeable options	Displays the SKU for the PCH.
Stepping	No changeable options	Displays the stepping of the PCH.

BIOS Setting	Options	Description/Purpose
System Date	Month, day, year	Sets the system date. The format is [Day Month/ Date/ Year]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it. The "Day" is automatically changed.
System Time	Hour, minute, second	Sets the system time. The format is [Hour: Minute: Second]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it.

5.4 Advanced

Menu Path *Advanced*

This menu provides advanced the sub-menu items such as CPU Configuration, PCH-FW Configuration, Trusted Computing, ACPI Settings, Super IO Configuration, Hardware Monitor, Super IO Watchdog, S5 RTC Wake Settings, USB Configuration, Network Stack Configuration and NVMe Configuration.



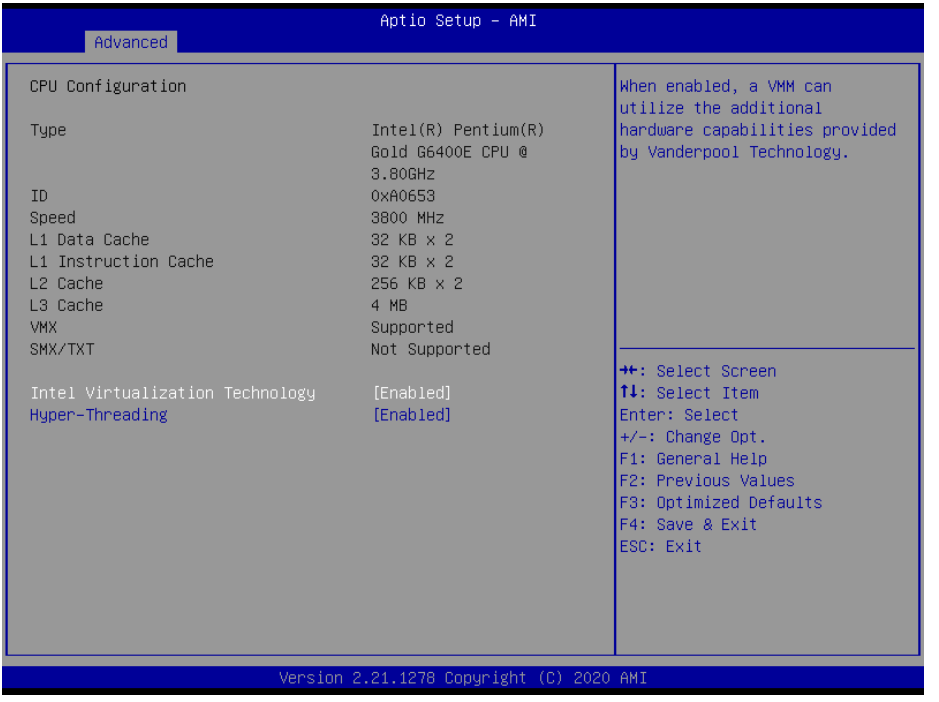
Advanced Menu Screen

BIOS Setting	Options	Description/Purpose
CPU Configuration	Sub-Menu	CPU Configuration Parameters.
PCH-FW Configuration	Sub-Menu	Management Engine Technology Parameters.
Trusted Computing	Sub-Menu	Trusted Computing Settings.
ACPI Settings	Sub-Menu	System ACPI Parameters.
Super IO Configuration	Sub-Menu	System Super I/O Chip Parameters.
Hardware Monitor	Sub-Menu	Monitors hardware status.
Super IO Watchdog	Sub-Menu	Super I/O Watchdog Parameters.
S5 RTC Wake Settings	Sub-Menu	S5 RTC Wake Parameters.
USB Configuration	Sub-Menu	USB Configuration Parameters.
Network Stack Configuration	Sub-Menu	Network Stack Settings.
NVMe Configuration	Sub-Menu	NVMe Device Options Settings.

5.4.1 Advanced – CPU Configuration

Menu Path *Advanced > CPU Configuration*

The **CPU Configuration** provides advanced CPU settings and some information about CPU.



CPU Configuration Screen

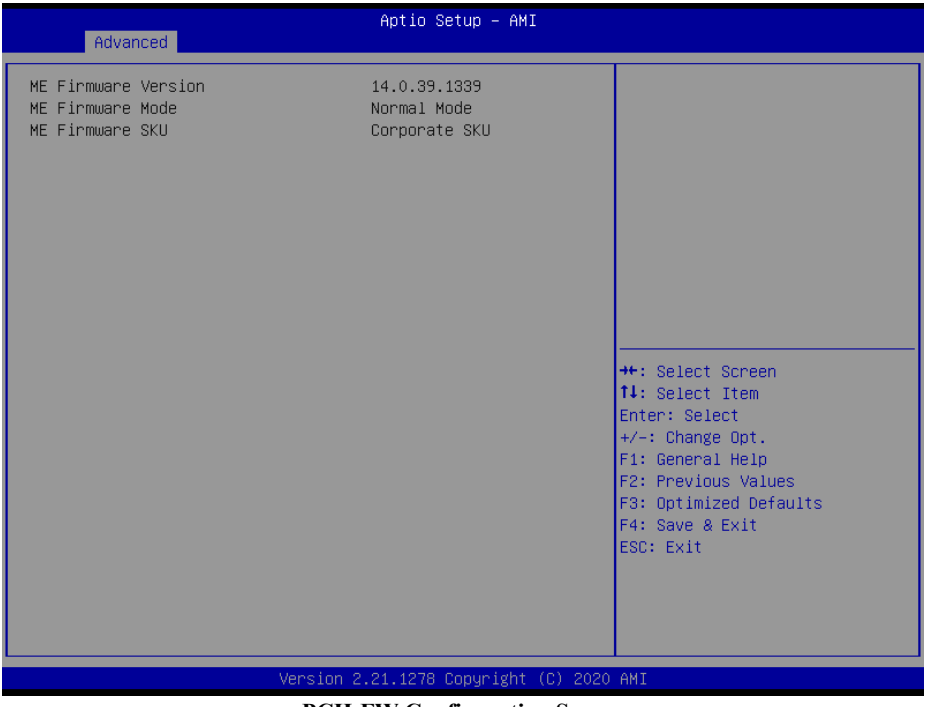
BIOS Setting	Options	Description/Purpose
Type	No changeable options	Displays the CPU Type.
ID	No changeable options	Displays the CPU ID.
Speed	No changeable options	Displays the CPU Speed.
L1 Data Cache	No changeable options	L1 Data Cache Size.
L1 Instruction Cache	No changeable options	L1 Instruction Cache Size.
L2 Cache	No changeable options	L2 Cache Size.
L3 Cache	No changeable options	L3 Cache Size.
VMX	No changeable options	CPU VMX hardware support for virtual machines.
SMX (Secure Mode Extensions) / TXT	No changeable options	Secure Mode extensions support.
Intel Virtualization Technology	- Disabled - Enabled (default)	When enabled, VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

BIOS Setting	Options	Description/Purpose
Hyper-Threading	- Disabled - Enabled (default)	When Disabled, only one thread per enabled core is enabled.

5.4.2 Advanced – PCH-FW Configuration

Menu Path *Advanced > PCH-FW Configuration*

The **PCH-FW** allows users to view the information about ME (Management Engine) firmware information, such as ME firmware version, firmware mode and firmware SKU.

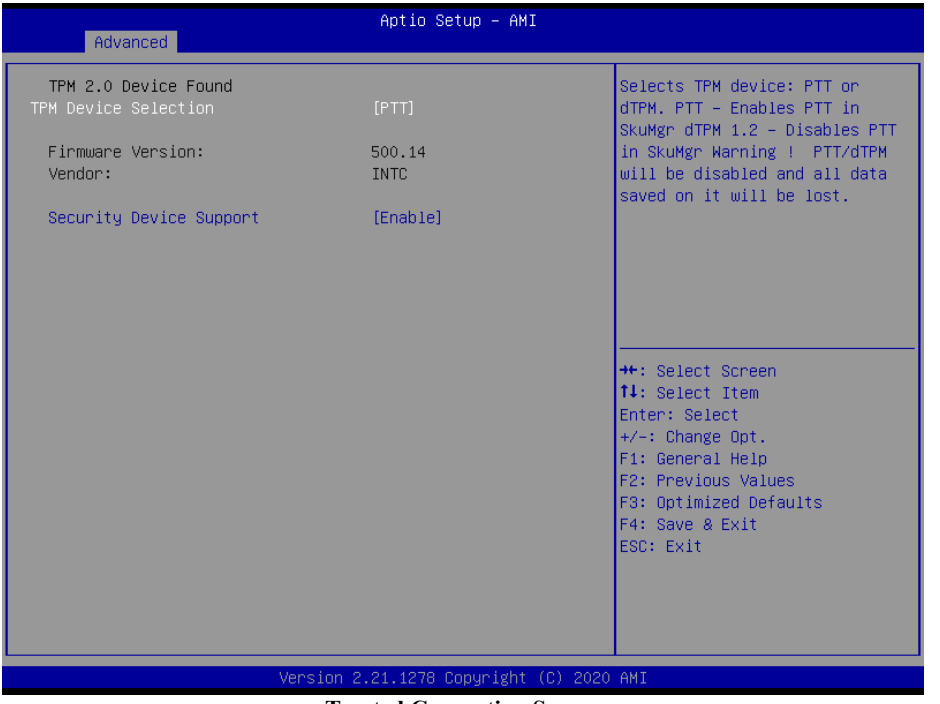


PCH-FW Configuration Screen

BIOS Setting	Options	Description/Purpose
ME Firmware Version	No changeable options	Displays the ME Firmware Version.
ME Firmware Mode	No changeable options	Displays the ME Firmware Mode.
ME Firmware SKU	No changeable options	Displays the ME Firmware SKU.

5.4.3 Advanced – Trusted Computing

Menu Path *Advanced > Trusted Computing*



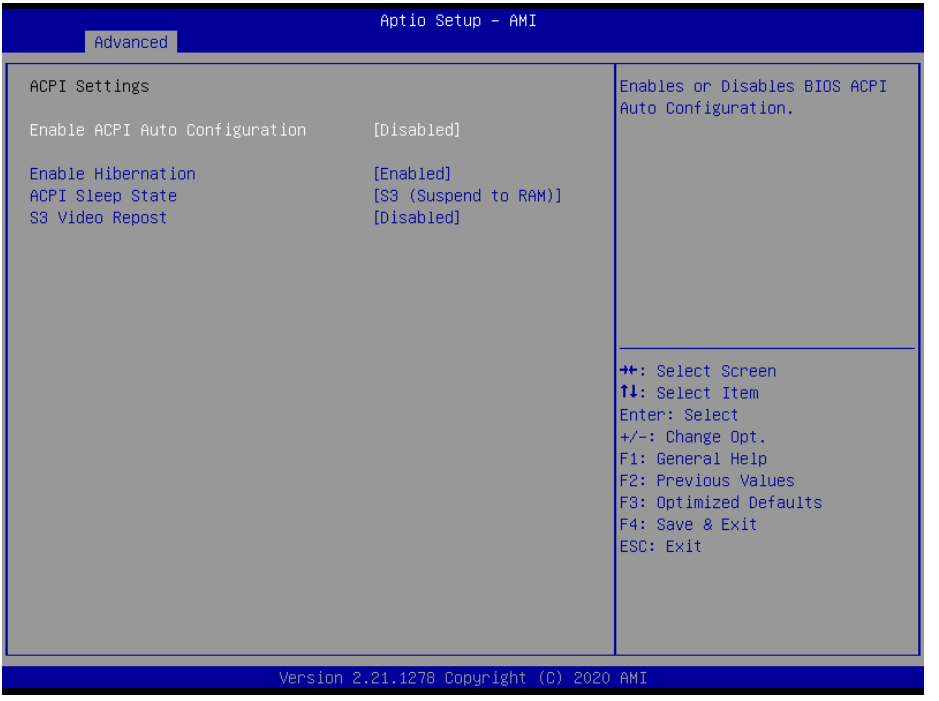
Trusted Computing Screen

BIOS Setting	Options	Description/Purpose
TPM Device Selection	- dTPM - PTT (Default)	Selects TPM device: PTT or dTPM. PTT - Enables PTT in SkuMgr dTPM 1.2 - Disables PTT in SkuMgr Warning ! PTT/dTPM will be disabled and all data saved on it will be lost.
Firmware Version:	No changeable options	TPM firmware version.
Vendor:	No changeable options	TPM module vendor.
Security Device Support	- Enable (Default) - Disable	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

5.4.4 Advanced – ACPI Settings

Menu Path *Advanced > ACPI Settings*

The **ACPI Settings** allows users to configure relevant ACPI (Advanced Configuration and Power Management Interface) settings, such as enable/disable ACPI Auto Configuration, Hibernation, ACPI Sleep State and S3 Video Repost.

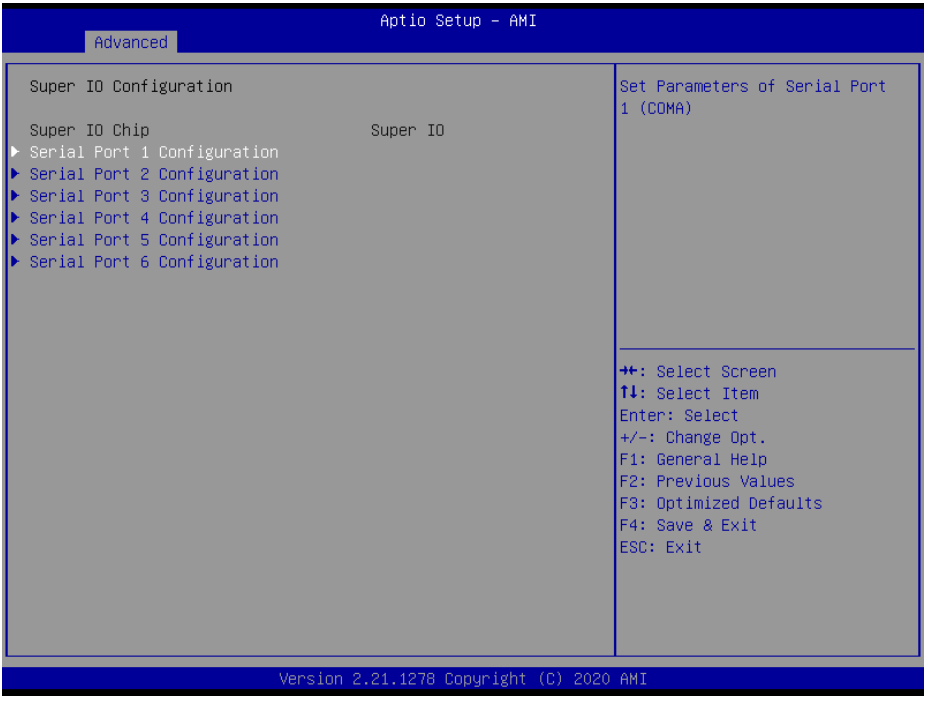


ACPI Settings Screen

BIOS Setting	Options	Description/Purpose
Enable ACPI Auto Configuration	- Disabled (Default) - Enabled	Enables or Disables BIOS ACPI Auto Configuration.
Enable Hibernation	- Disabled - Enabled (Default)	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	- Suspend Disabled - S3 (Suspend to RAM) (Default)	Selects the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
S3 Video Repost	- Disabled (Default) - Enabled	Enables or Disables S3 Video Repost.

5.4.5 Advanced – Super IO Configuration

Menu Path *Advanced > Super IO Configuration*

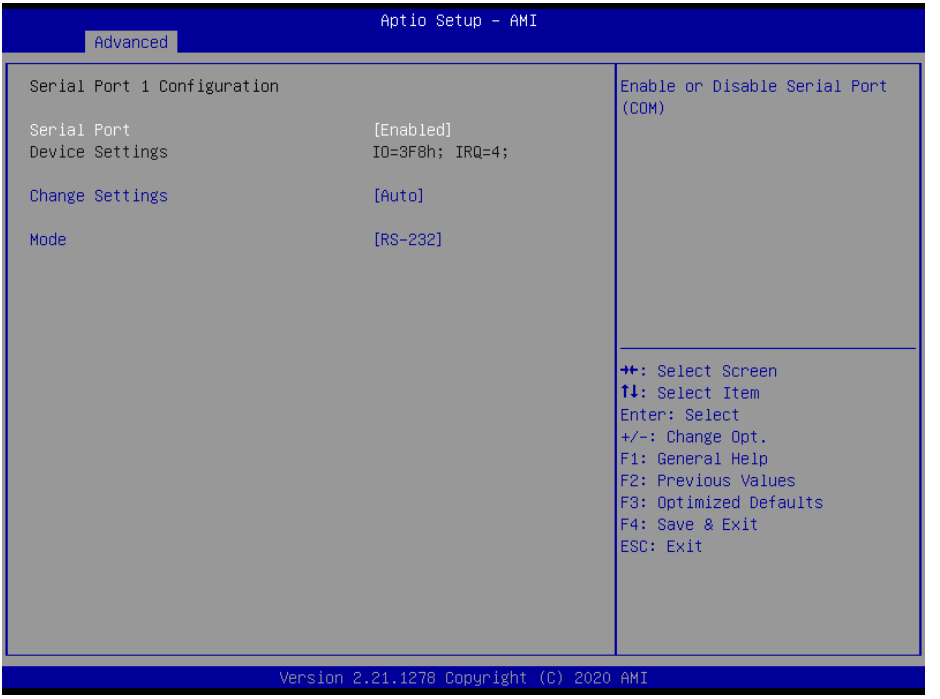


Super IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port 1 Configuration	Sub-Menu	Sets Parameters of Serial Port 1 (COM1).
Serial Port 2 Configuration	Sub-Menu	Sets Parameters of Serial Port 2 (COM2).
Serial Port 3 Configuration	Sub-Menu	Sets Parameters of Serial Port 3 (COM3).
Serial Port 4 Configuration	Sub-Menu	Sets Parameters of Serial Port 4 (COM4).
Serial Port 5 Configuration	Sub-Menu	Sets Parameters of Serial Port 5 (COM5).
Serial Port 6 Configuration	Sub-Menu	Sets Parameters of Serial Port 6 (COM6).

Super IO Configuration – Serial Port 1 Configuration

Menu Path *Advanced > Super IO Configuration > Serial Port 1 Configuration*

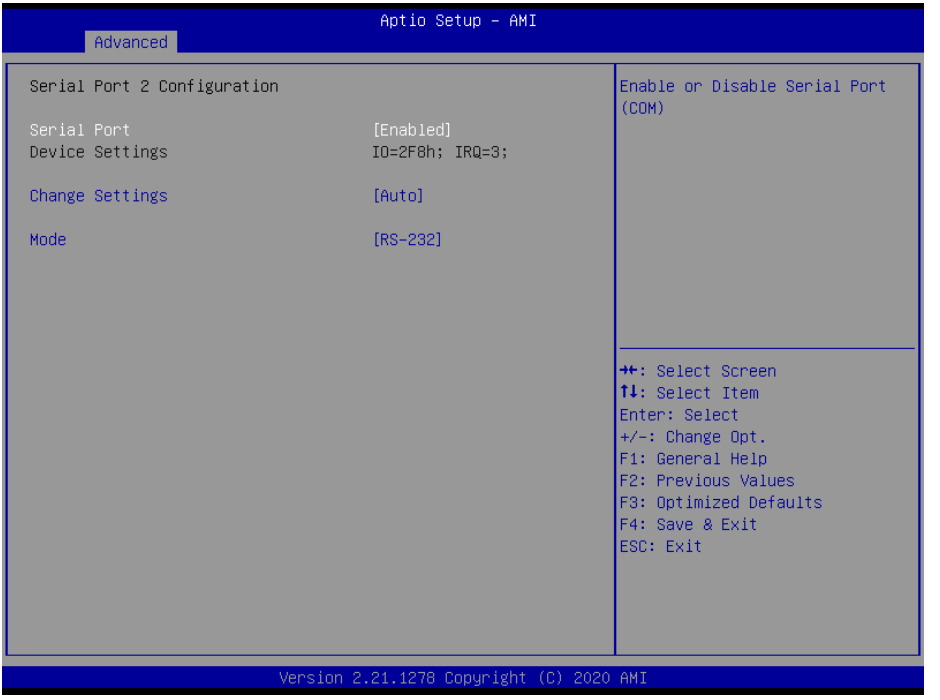


Serial Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled (Default)	Enables or Disables Serial Port 1.
Device Settings	No changeable options	Displays current settings of Serial Port 1.
Change Settings	- Auto (Default) - IO=3F8h; IRQ=4; - IO=3F8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2F8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=3E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9, 10,11,12;	Selects IRQ and I/O resource for Serial Port 1.
Mode	- RS-232 (Default) - RS-422 - RS-485	Selects COM mode.

Super IO Configuration – Serial Port 2 Configuration

Menu Path *Advanced > Super IO Configuration > Serial Port 2 Configuration*

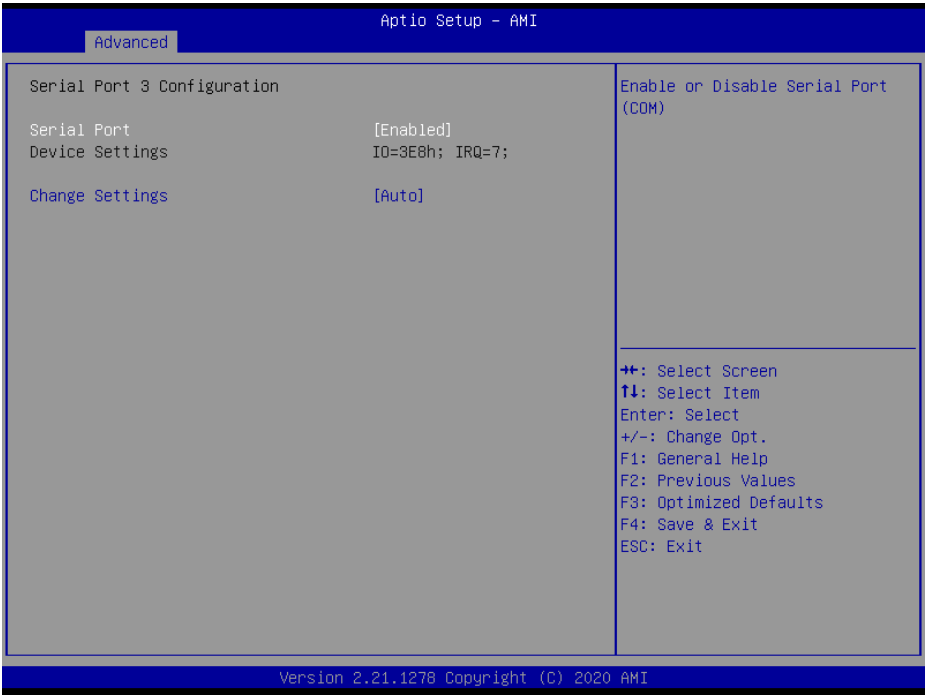


Serial Port 2 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled (Default)	Enables or Disables Serial Port 2.
Device Settings	No changeable options	Displays current settings of Serial Port 2.
Change Settings	- Auto (Default) - IO=2F8h; IRQ=3; - IO=3F8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2F8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=3E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9, 10,11,12;	Selects IRQ and I/O resource for the Serial Port 2.
Mode	- RS-232 (Default) - RS-422 - RS-485	Selects COM mode.

Super IO Configuration – Serial Port 3 Configuration

Menu Path	*Advanced > Super IO Configuration > Serial Port 3 Configuration*

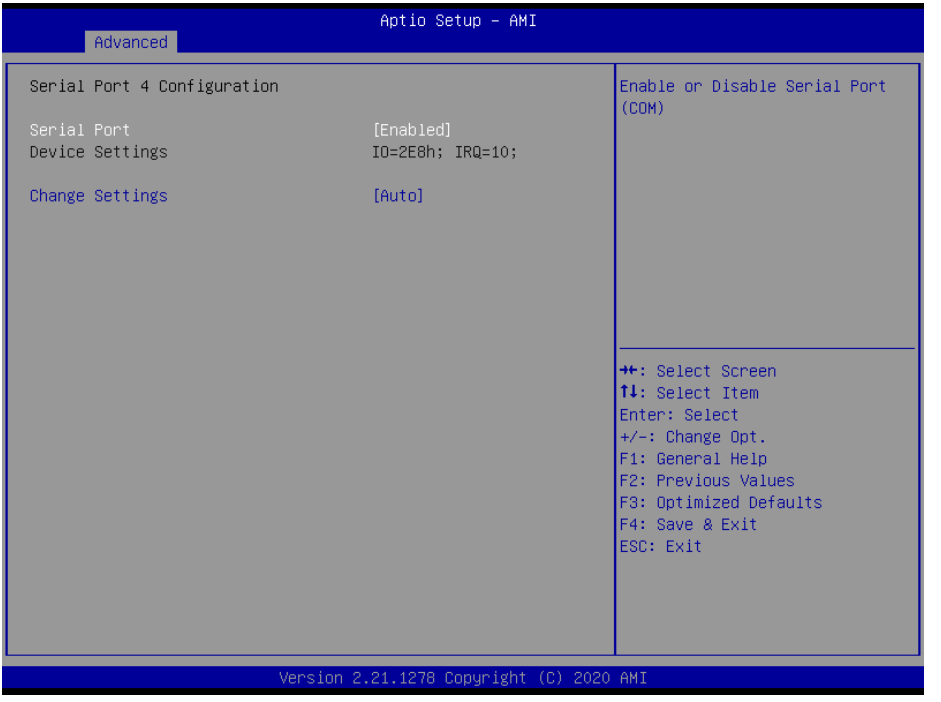


Serial Port 3 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled (Default)	Enables or Disables Serial Port 3.
Device Settings	No changeable options	Displays current settings of Serial Port 3.
Change Settings	- Auto (Default) - IO=3E8h; IRQ=7; - IO=3E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2F0h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E0h; IRQ=3,4,5,6,7,9, 10,11,12;	Selects IRQ and I/O resource for Serial Port 3.

Super IO Configuration – Serial Port 4 Configuration

Menu Path	*Advanced > Super IO Configuration > Serial Port 4 Configuration*

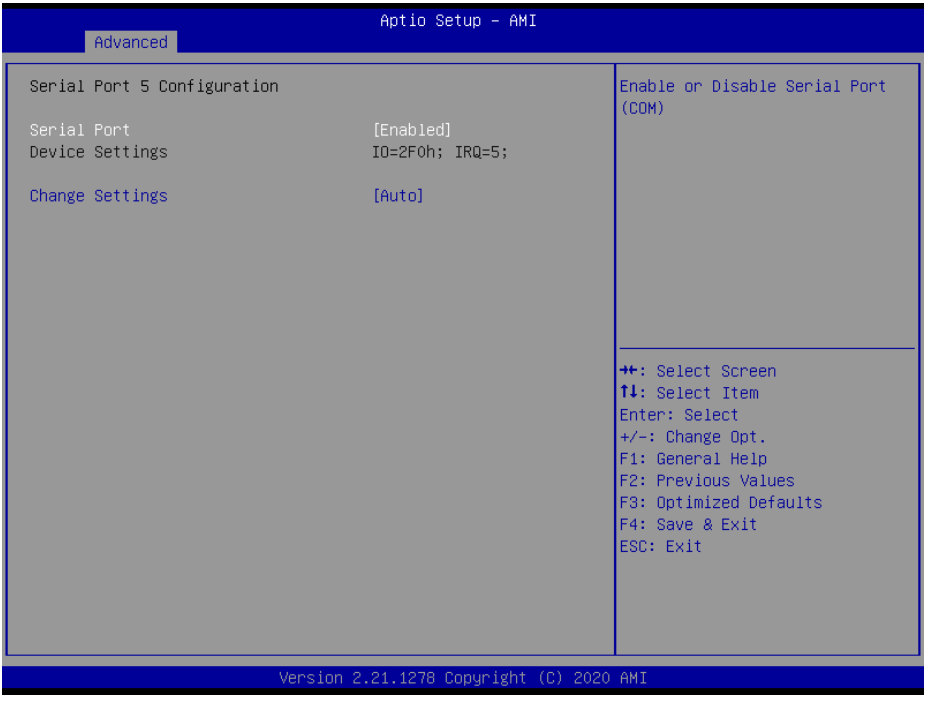


Serial Port 4 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled (Default)	Enables or Disables Serial Port 4.
Device Settings	No changeable options	Displays current settings of Serial Port 4.
Change Settings	- Auto (Default) - IO=2E8h; IRQ=7; - IO=3E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2F0h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E0h; IRQ=3,4,5,6,7,9, 10,11,12;	Selects IRQ and I/O resource for the Serial Port 4.

Super IO Configuration – Serial Port 5 Configuration

Menu Path *Advanced > Super IO Configuration > Serial Port 5 Configuration*

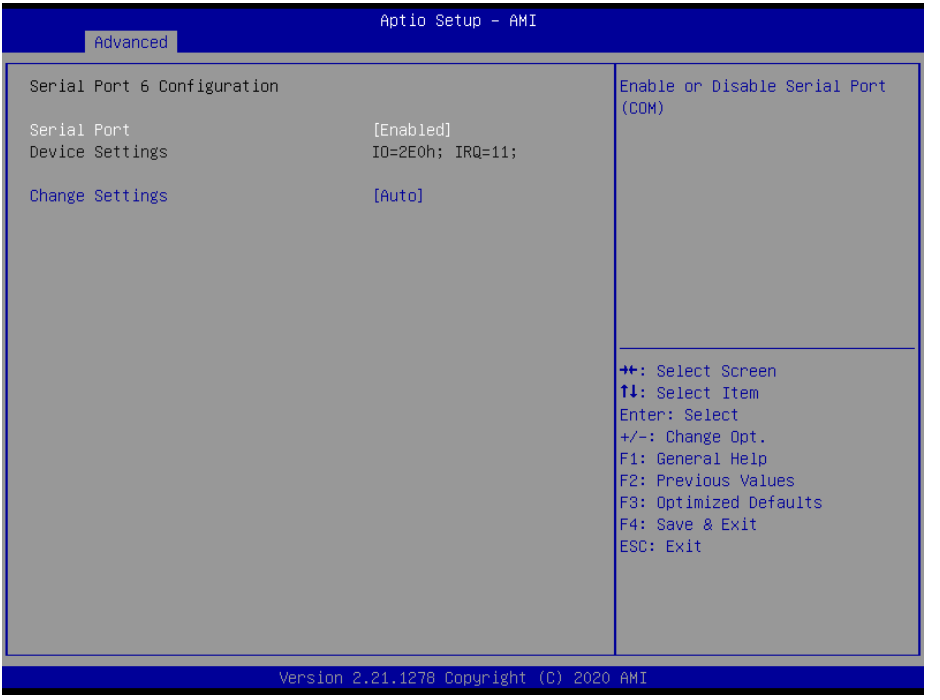


Serial Port 5 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled (Default)	Enables or Disables Serial Port 5.
Device Settings	No changeable options	Displays current settings of Serial Port 5.
Change Settings	- Auto (Default) - IO=2F0h; IRQ=7; - IO=3E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2F0h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E0h; IRQ=3,4,5,6,7,9, 10,11,12;	Selects IRQ and I/O resource for the Serial Port 5.

Super IO Configuration – Serial Port 6 Configuration

Menu Path *Advanced > Super IO Configuration > Serial Port 6 Configuration*



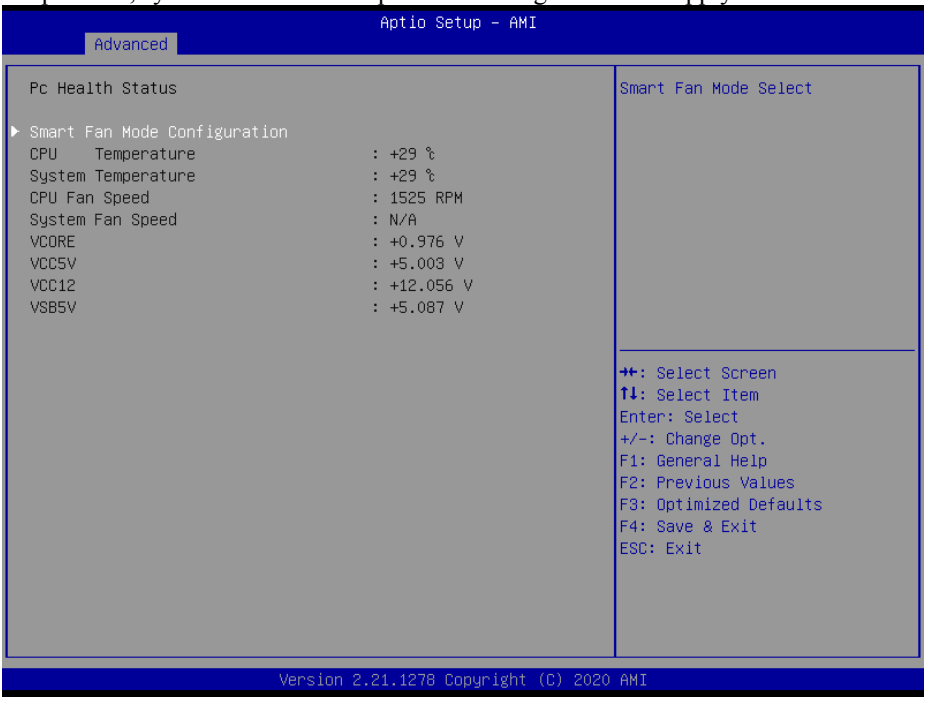
Serial Port 6 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled (Default)	Enables or Disables Serial Port 6.
Device Settings	No changeable options	Displays current settings of Serial Port 6.
Change Settings	- Auto (Default) - IO=2E0h; IRQ=7; - IO=3E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2F0h; IRQ=3,4,5,6,7,9, 10,11,12; - IO=2E0h; IRQ=3,4,5,6,7,9, 10,11,12;	Selects IRQ and I/O resource for the Serial Port 6.

5.4.6 Advanced – Hardware Monitor

Menu Path *Advanced > Hardware Monitor*

The **Hardware Monitor** allows users to configure Smart Fan Mode for CPU fan, monitor the health and status of the system such as CPU temperature, system temperature, system and CPU fan speed and voltage levels in supply.



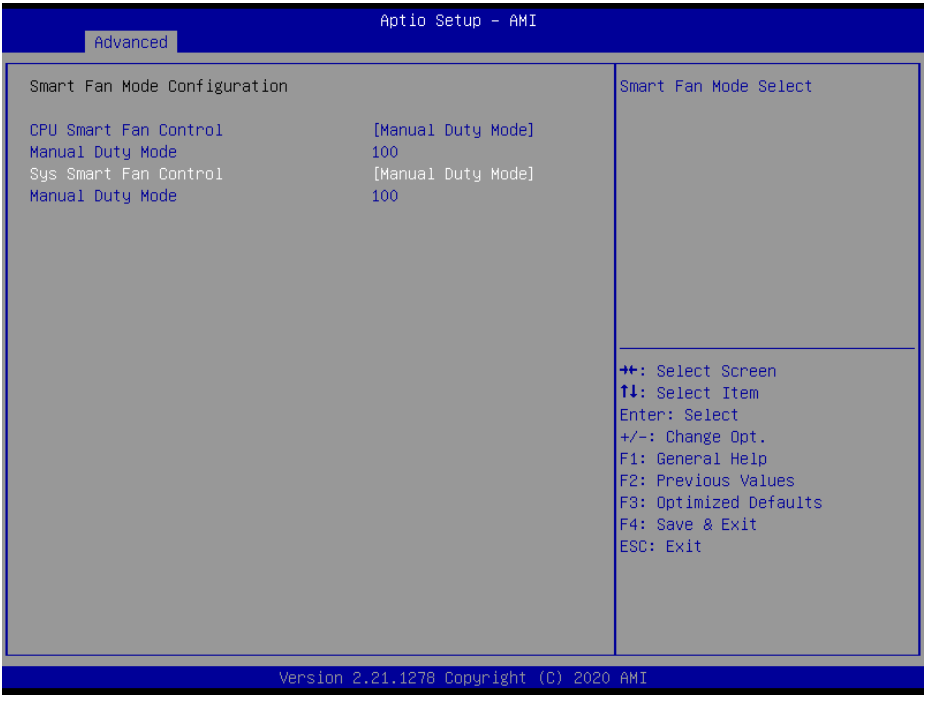
Hardware Monitor Screen

BIOS Setting	Options	Description/Purpose
Smart Fan Mode Configuration	Sub-Menu	Smart Fan Mode Selection.
CPU Temperature	No changeable options	Displays processor's temperature.
System Temperature	No changeable options	Displays system's temperature.
CPU Fan Speed	No changeable options	Display CPU Fan speed
System Fan Speed	No changeable options	Display System Fan speed
VCORE	No changeable options	Displays the voltage level of VCORE in supply.
VCC5V	No changeable options	Displays the voltage level of VCC5V in supply.

BIOS Setting	Options	Description/Purpose
VCC12	No changeable options	Displays the voltage level of VCC12 in supply.
VSB5V	No changeable options	Displays the voltage level of VSB5V in supply.

Smart Fan Mode Configuration

Menu Path *Advanced > Hardware Monitor > Smart Fan Mode Configuration*



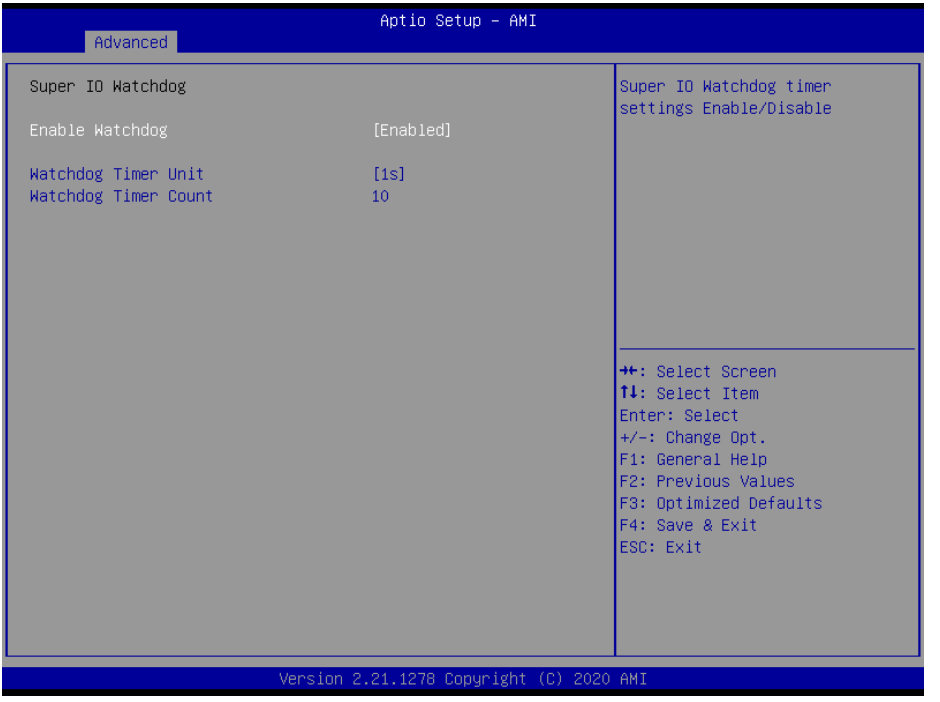
Smart Fan Mode Configuration Screen

BIOS Setting	Options	Description/Purpose
CPU Smart Fan Control	- Manual Duty Mode - Auto Duty-Cycle Mode (Default)	Smart Fan Mode selection for CPU Fan.
Manual Duty Mode	Numeric (from 1 to 100)	Manual mode fan control. Users can write expected duty cycle (PWM fan type) 1-100.
Sys Smart Fan Control	- Manual Duty Mode - Auto Duty-Cycle Mode (Default)	Smart Fan Mode selection for System Fan.

BIOS Setting	Options	Description/Purpose
Manual Duty Mode	Numeric (from 1 to 100)	Manual mode fan control. Users can write expected duty cycle (PWM fan type) 1-100.

5.4.7 Advanced – Super IO Watchdog

Menu Path *Advanced > Super IO Watchdog*



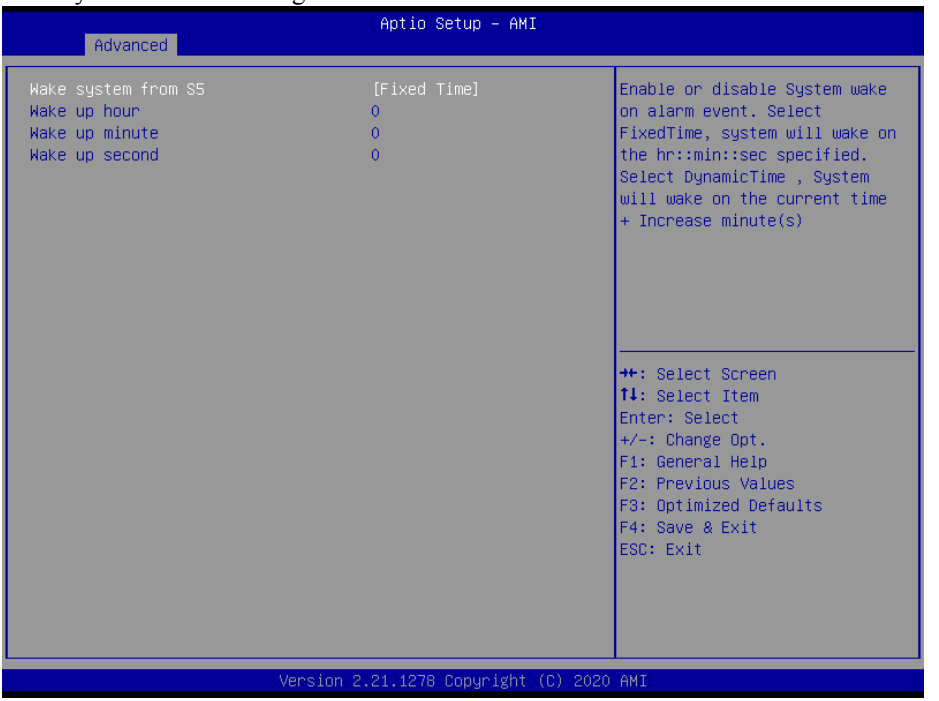
Super IO Watchdog Screen

BIOS Setting	Options	Description/Purpose
Enable Watchdog	- Enabled - Disabled (Default)	Super I/O Watchdog timer settings enabled/disabled.
Watchdog Timer unit	- 1s (Default) - 60s	Select time unit (1sec/ 60sec) of watchdog timer.
Watchdog Timer Count	Numeric	The number of second count for Timer (10-59 seconds).

5.4.8 Advanced – S5 RTC Wake Settings

Menu Path *Advanced > S5 RTC Wake Settings*

The **S5 RTC Wake Settings** enables/disables the system to wake up at a preset time of a day from S5 State using RTC alarm.



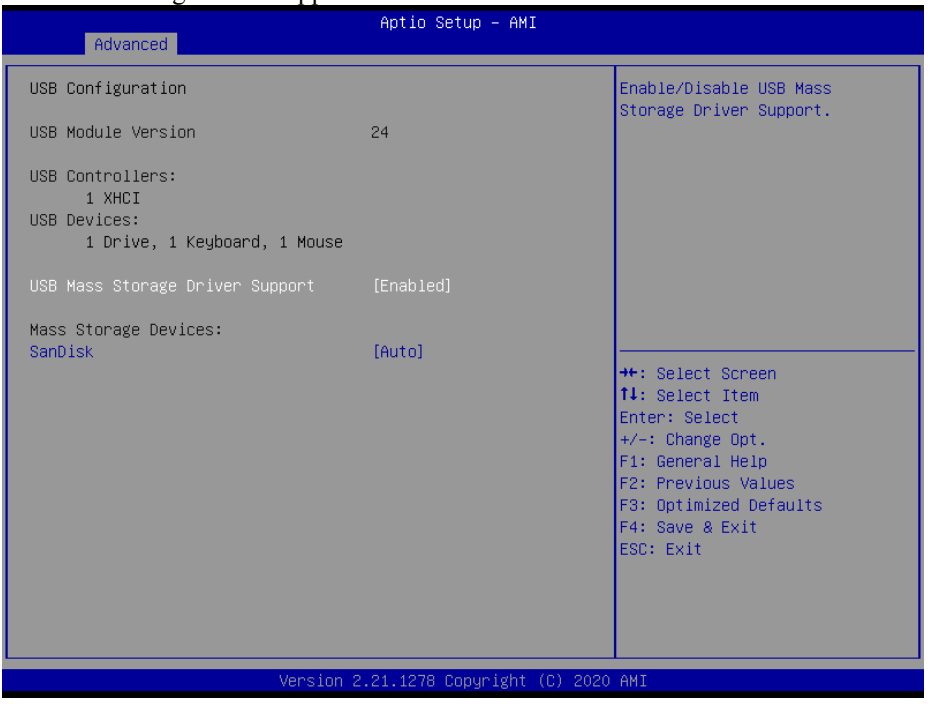
S5 RTC Wake Settings Screen

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled (Default) - Fixed Time - Dynamic Time	Enables or disables System to wake on alarm events. • **Fixed Time:** The system will wake on the time (hr::min::sec) specified. • **Dynamic Time:** The system will wake on the current time + Increase minute(s).
Wake up hour	Numeric (from 0 to 23)	Enters **0-23** to set the wake-up hour, e.g.: enters 3 for 3 a.m. and 15 for 3 pm
Wake up minute	Numeric (from 0 to 59)	Enters **0-59** to set the wake-up minute.
Wake up second	Numeric (from 0 to 59)	Enters **0-59** to set the wake-up second.
Wake up minute increase	Numeric (from 1 to 5)	Enters **1-5** to set the increased minute(s) for dynamic wake-up time.

5.4.9 Advanced – USB Configuration

Menu Path *Advanced > USB Configuration*

The **USB Configuration** allows users to configure advanced USB settings such as USB mass storage driver support.



USB Configuration Screen

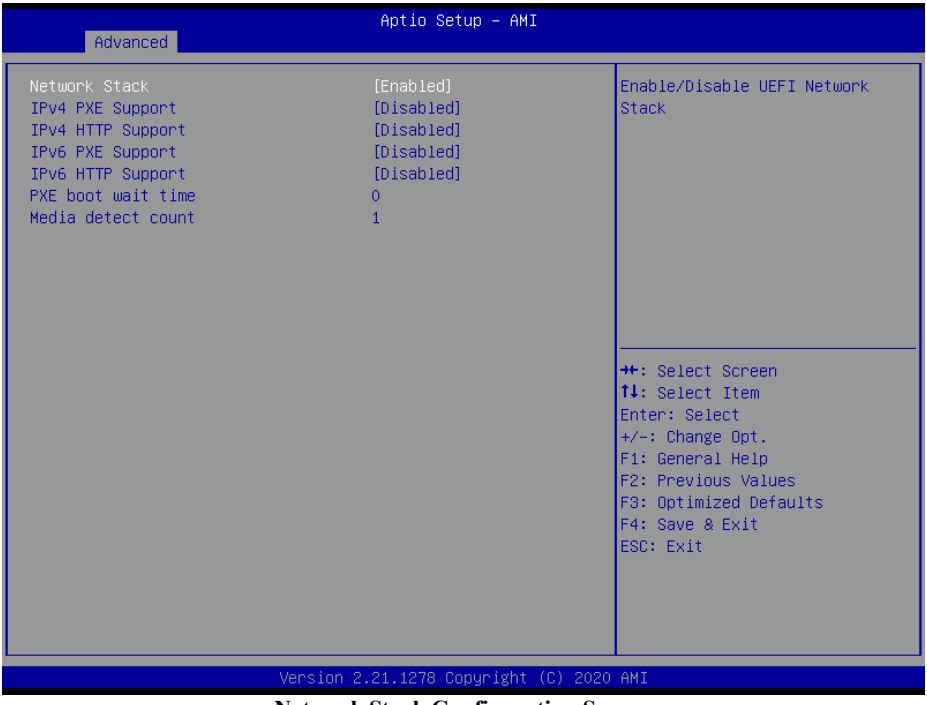
BIOS Setting	Options	Description/Purpose
USB Module Version	No changeable options	Displays USB module version.
USB Controllers	No changeable options	Displays number and type of USB controllers (if any).
USB Devices	No changeable options	Displays number and type of connected USB devices (if any).
USB Mass Storage Driver Support	- Disabled - Enabled (default)	Enables/Disables USB Mass Storage Driver Support.
MASS STORAGE DEVICES: [drive(s)]	- Auto (default) - Floppy - Forced FDD - Hard Disk - CD-ROM	**Auto** enumerates devices according to their media format. Optical drives are emulated as 'CD-ROM'. Drives with no media will be emulated according to a drive type.

5.4.10 Advanced – Network Stack Configuration

Menu Path *Advanced > Network Stack Configuration*

The **Network Stack Configuration** allows users to enable/disable UEFI Network Stack, IPv4/IPv6 PXE (Pre-Boot Execution) support and configure PXE boot wait time and detects the media presence.

PXE allows a workstation to boot from a server on a network prior to booting the operating system on the local hard drive. A PXE-enabled workstation connects its NIC to the LAN via a jumper, which keeps the workstation connected to the network even when the power is turned off.



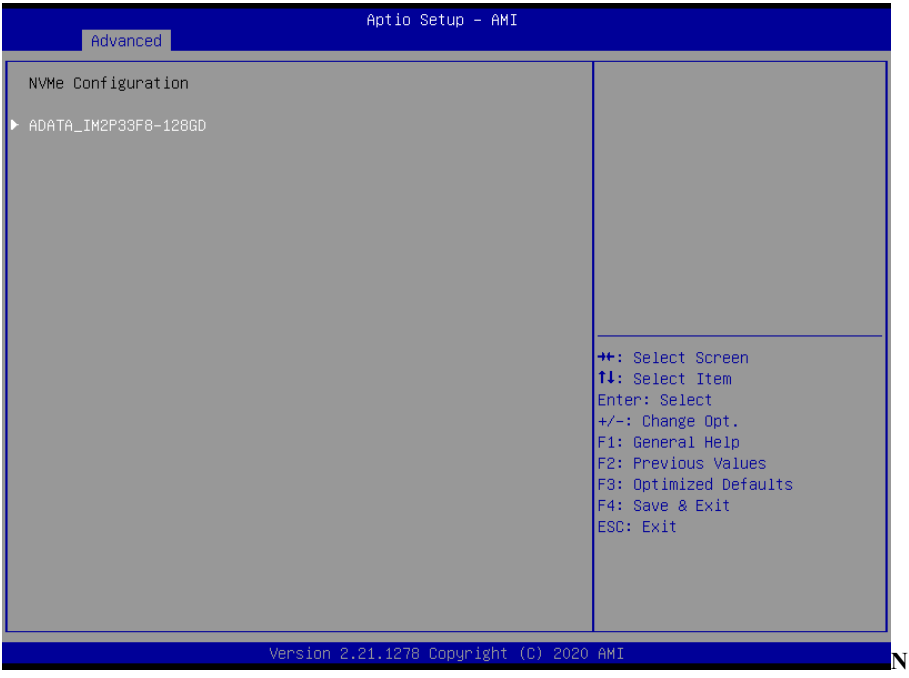
Network Stack Configuration Screen

BIOS Setting	Options	Description/Purpose
Network Stack	- Disabled (Default) - Enabled	Enables / Disables UEFI Network Stack.
Ipv4 PXE Support	- Disabled (Default) - Enabled	Enables / Disables Ipv4 PXE boot support. If disabled, Ipv4 PXE boot support will not be available.

BIOS Setting	Options	Description/Purpose
Ipv4 HTTP Support	- Disabled (Default) - Enabled	Enables / Disables Ipv4 HTTP boot support. If disabled, Ipv4 HTTP boot support will not be available.
Ipv6 PXE Support	- Disabled (Default) - Enabled	Enable s/ Disables Ipv6 PXE boot support. If disabled, Ipv6 PXE boot support will not be available.
Ipv6 HTTP Support	- Disabled (Default) - Enabled	Enables / Disables Ipv6 HTTP boot support. If disabled, Ipv4 HTTP boot support will not be available.
PXE boot wait time	Numeric (from 0 to 5)	Wait time to press ESC key to abort the PXE boot.
Media detect count	Numeric (from 1 to 50)	Numbers of times presence of media will be checked.

5.4.11 Advanced – NVMe Configuration

Menu Path *Advanced > NVMe Configuration*



NVMe Configuration Screen

BIOS Setting	Options	Description/Purpose
NVMe Configuration	No changeable options	Displays NVMe device

5.5 Chipset

Menu Path *Chipset*

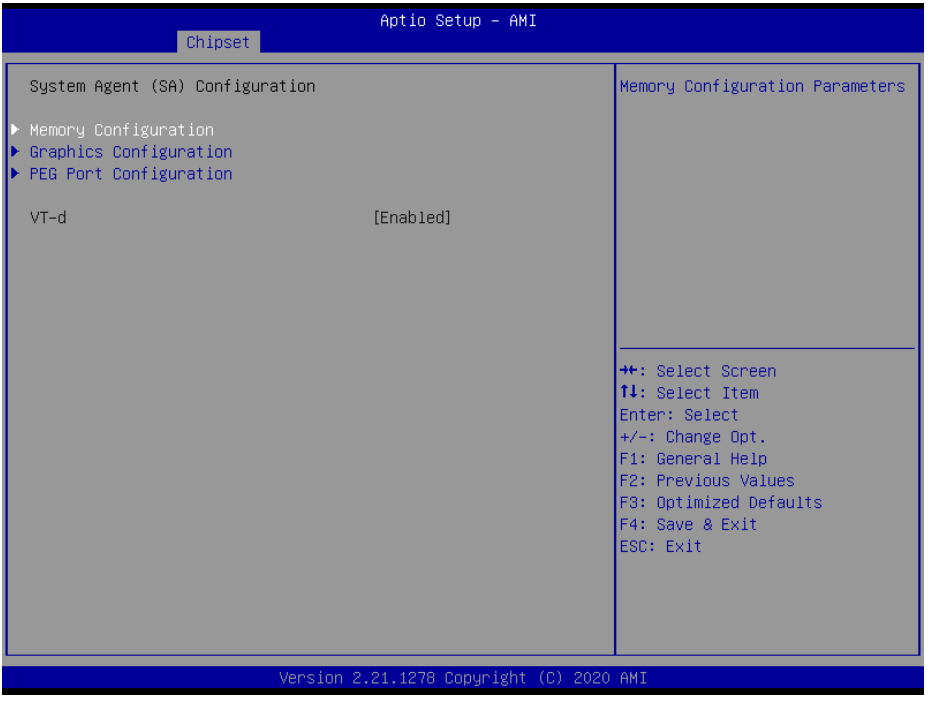
This menu allows users to configure advanced Chipset settings such as System Agent (SA) and PCH-IO configuration parameters.

Chipset Screen

BIOS Setting	Options	Description/Purpose
System Agent (SA) Parameters	Sub-Menu	System Agent (SA) Parameters.
PCH-IO Configuration	Sub-Menu	PCH Parameters.

5.5.1 Chipset – System Agent (SA) Configuration

Menu Path *Chipset > System Agent (SA) Configuration*

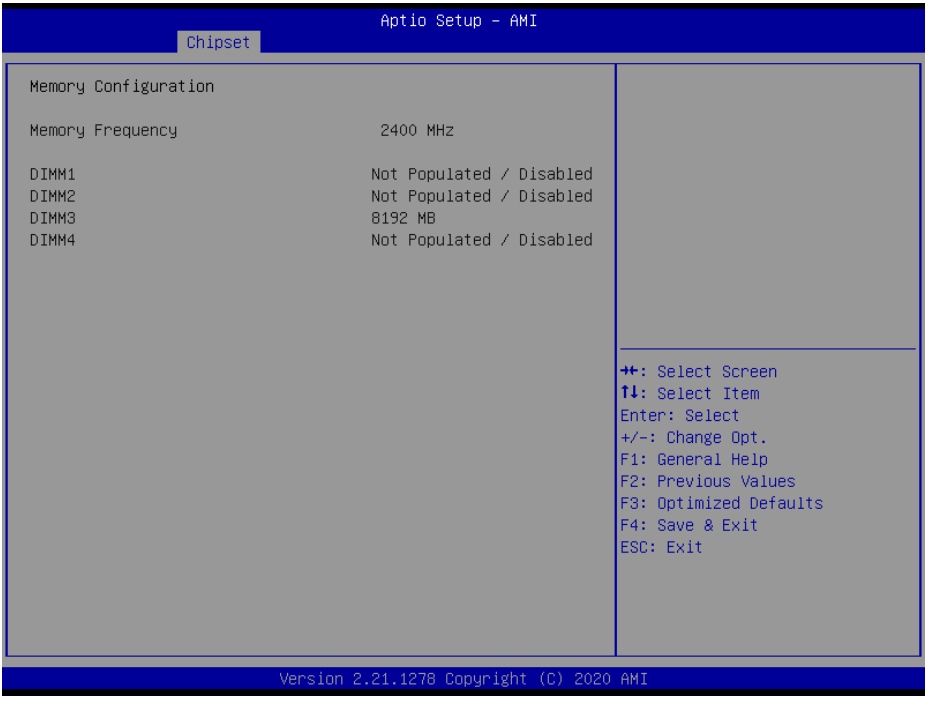


System Agent (SA) Configuration Screen

BIOS Setting	Options	Description/Purpose
Memory Configuration	Sub-Menu	Memory Configuration.
Graphics Configuration	Sub-Menu	Graphics Configuration.
PEG Port Configuration	Sub-Menu	PEG Port Configuration.
VT-d	- Disabled - Enabled (Default)	Enables or Disables VT-d function.

System Agent (SA) Configuration – Memory Configuration

Menu Path	*Chipset > System Agent (SA) Configuration > Memory Configuration*



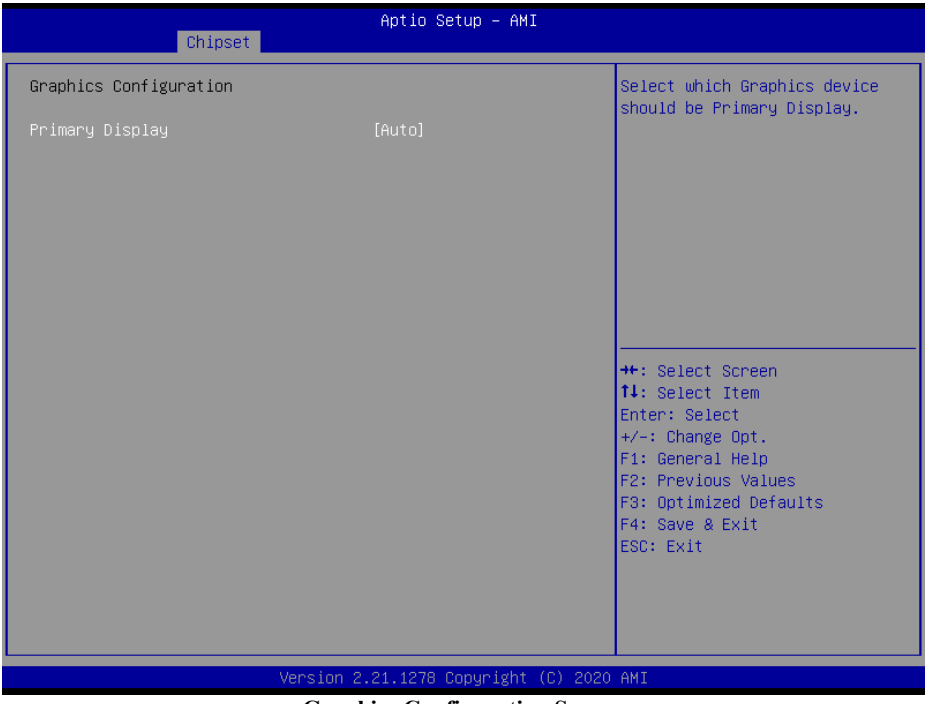
Memory Configuration Screen

BIOS Setting	Options	Description/Purpose
Memory Frequency	No changeable options	Displays the Frequency of Memory.
DIMM1	No changeable options	Displays the size of DIMM1.
DIMM2 *(for Q470E/W480E only)*	No changeable options	Displays the size of DIMM2.
DIMM3	No changeable options	Displays the size of DIMM3.
DIMM4 *(for Q470E/W480E only)*	No changeable options	Displays the size of DIMM4.

System Agent (SA) Configuration – Graphics Configuration

Menu Path *Chipset > System Agent (SA) Configuration > Graphics Configuration*

The **Graphics Configuration** allows users to configure the display settings for the LCD panel.



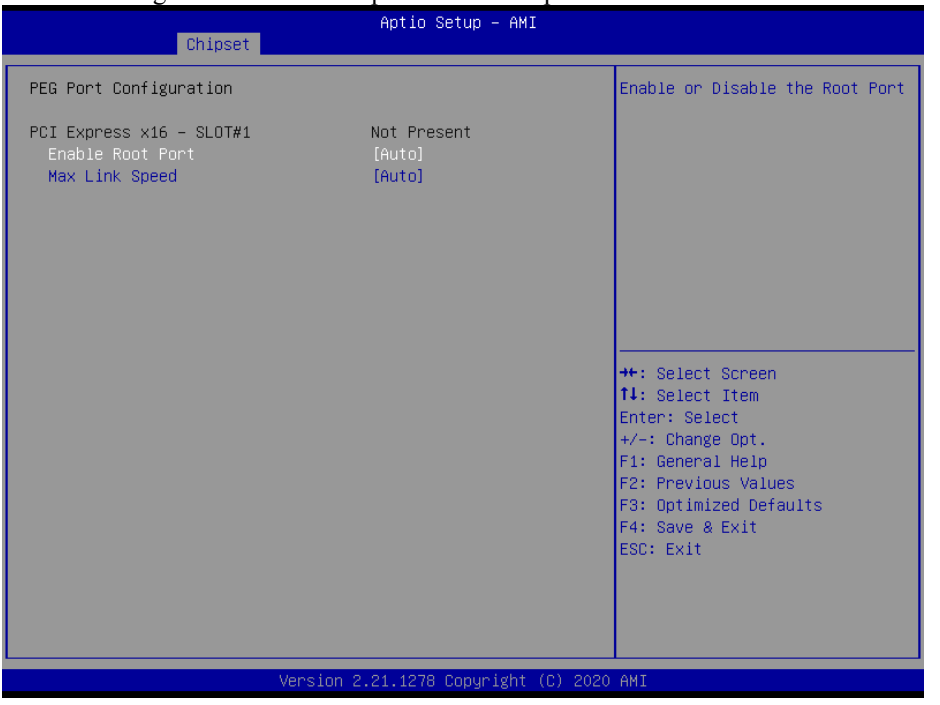
Graphics Configuration Screen

BIOS Setting	Options	Description/Purpose
Primary Display	- Auto (Default) - IGFX	Select the Graphics device that should be Primary Display.

System Agent (SA) Configuration – PEG Port Configuration

Menu Path	*Chipset > System Agent (SA) Configuration > PEG Port Configuration*

The **PEG Port Configuration** allows users to display the PEG status, enable Root Port and configure the maximum speed for PCI Express x16 slot.



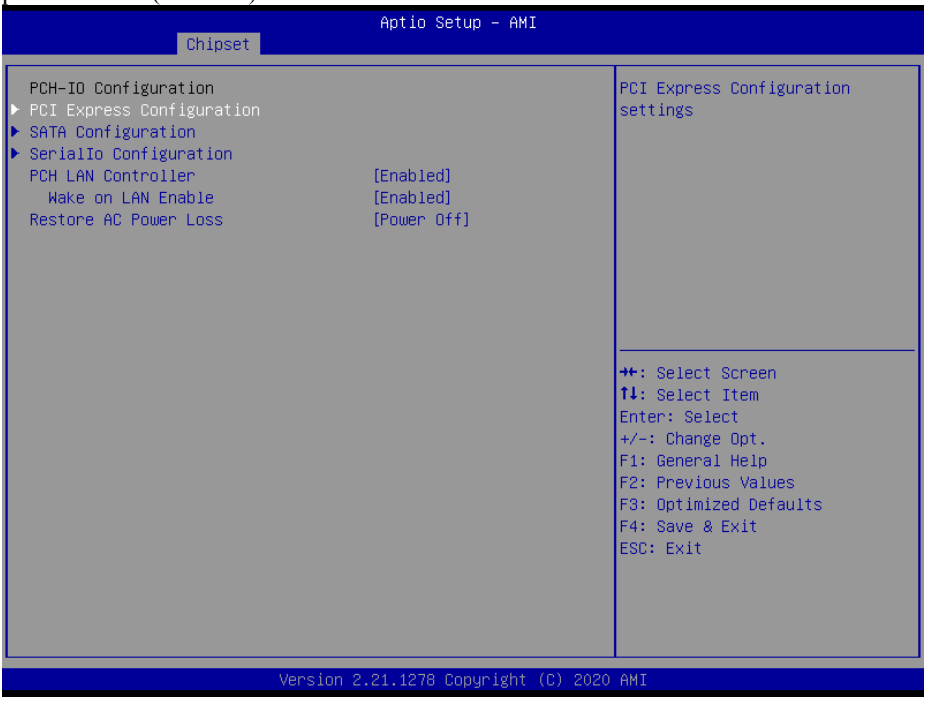
PEG Port Configuration Screen

BIOS Setting	Options	Description/Purpose
PCI Express x16 – SLOT#1	No changeable options	PCI Express x16 Slot Link and Speed information.
Enable Root Port	- Disabled - Enabled - Auto (Default)	Enables or Disables the Root Port.
Max Link Speed	- Auto (Default) - Gen1 - Gen2 - Gen3	Configures PCI-E1 Max Speed.

5.5.2 Chipset – PCH IO Configuratioin

Menu Path *Chipset > PCH-IO Configuration*

The **PCH-IO Configuration** allows users to configure PCI Express and SATA configuration parameters, enable/disable PCH LAN Controller and Wake-On-LAN function and determine the power on/off state that the system will go to following a power failure (G3 state).



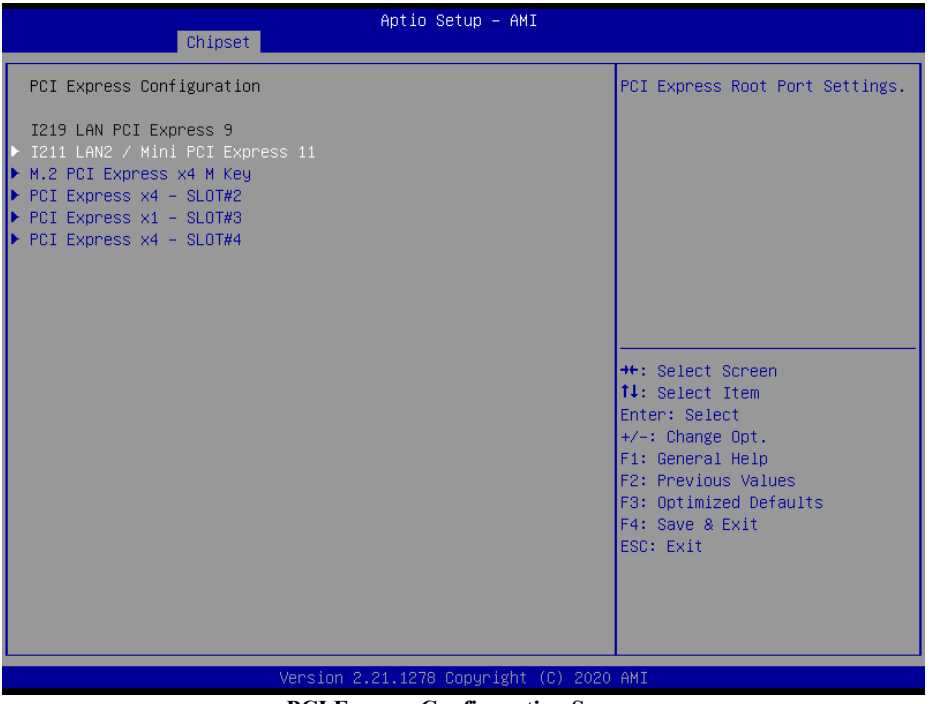
PCH-IO Configuration Screen

BIOS Setting	Options	Description/Purpose
PCI Express Configuration	Sub-Menu	PCI Express Configuration settings.
SATA Configuration	Sub-Menu	SATA Configuration settings.
Serial IO Configuration	Sub-Menu	Serial I/O Configuration Settings
PCH LAN Controller	- Disabled - Enabled (Default)	Enables or Disables onboard NIC.
Wake On LAN	- Disabled - Enabled (Default)	Enables or Disables integrated LAN to wake up the system.

BIOS Setting	Options	Description/Purpose
Restore AC Power Loss	- Power On - Power Off (Default)	Specifies what state to go to when power is re-applied following a power failure (G3 state).

PCH-IO Configuration – PCI Express Configuration

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration*



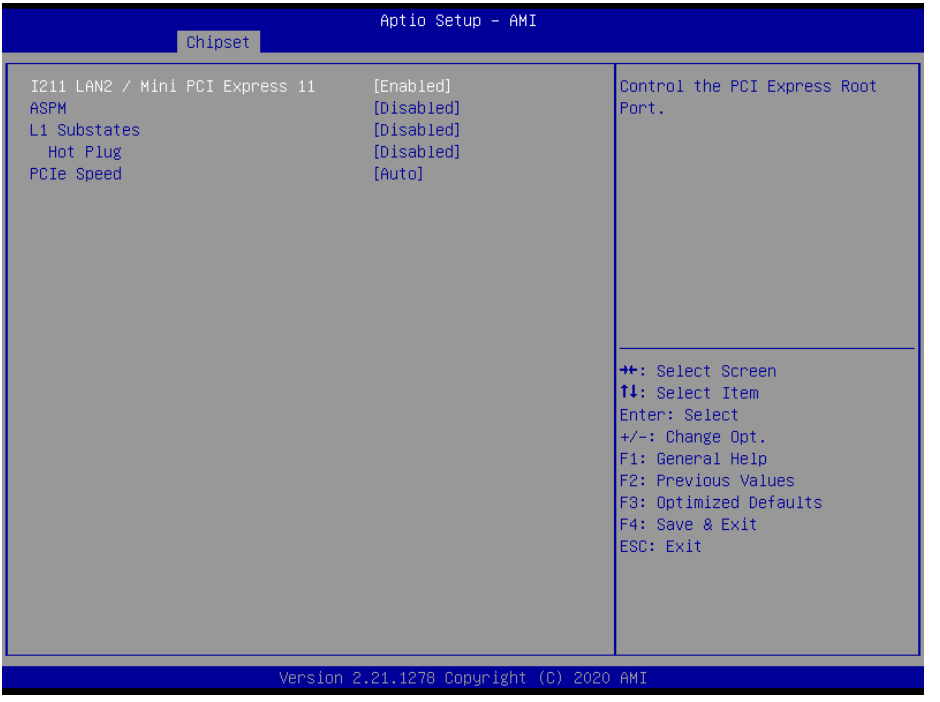
PCI Express Configuration Screen

BIOS Setting	Options	Description/Purpose
I219 LAN PCI Express 9	No changeable options	PCI Express 9 settings.
I211 LAN2 / Mini PCI Express 11	Sub-Menu	PCI Express Root Port settings.
M.2 PCI Express x4 M Key *(for Q470E/W480E only)*	Sub-Menu	PCI Express Root Port settings.
PCI Express x4 – SLOT#2	Sub-Menu	PCI Express Root Port settings.
PCI Express x1 – SLOT#3	Sub-Menu	PCI Express Root Port settings.

BIOS Setting	Options	Description/Purpose
PCI Express x4 – SLOT#4 *(for Q470E/W480E only)*	Sub-Menu	PCI Express Root Port settings.

PCH-IO Configuration – PCI Express Configuration – I211 LAN2 / Mini PCI Express 11

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > I211 LAN2 / Mini PCI Express 11*



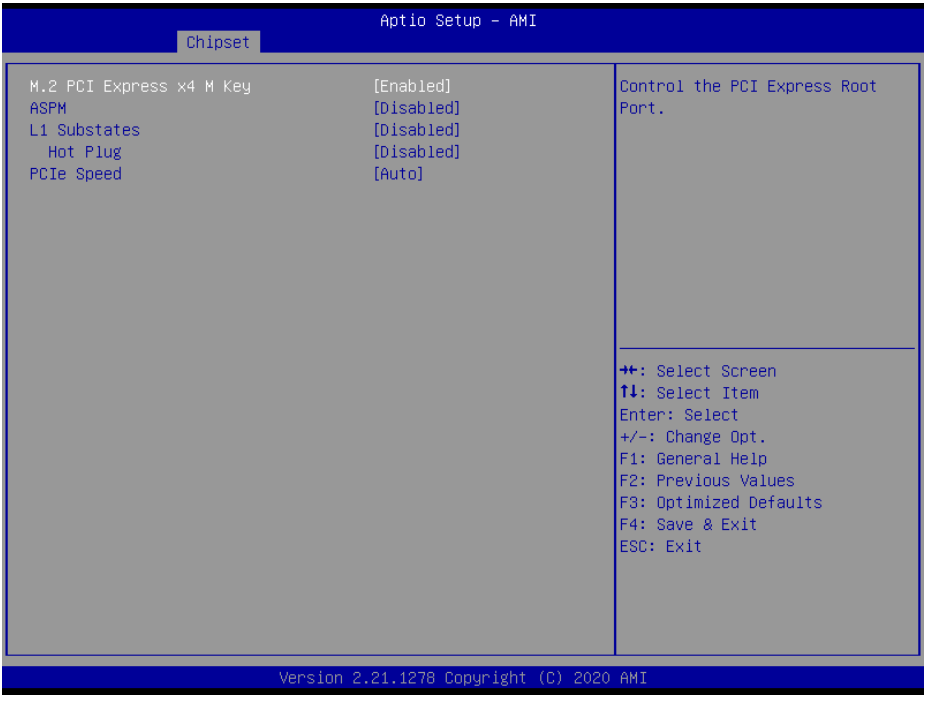
I211 LAN2 / Mini PCI Express 11 Screen

BIOS Setting	Options	Description/Purpose
I211 LAN2 / MIni PCI Express 11	- Disabled - Enabled (Default)	Control the PCI Express Root Port
ASPM	- Disabled (Default) - L0s - L1 - L0sL1 - Auto	Sets the ASPM Level: • **Force L0s** - Force all links to L0s State. • **Auto** - BIOS auto configure. • **Disabled** - Disables ASPM.

BIOS Setting	Options	Description/Purpose
L1 Substates	- Disabled (Default) - L1.1 - L1.1 & L1.2	PCI Express L1 Substates settings.
Hot Plug	- Disabled (Default) - Enabled	Hot Plug support enabled / disabled.
PCIe Speed	- Auto (Default) - Gen1 - Gen2 - Gen3	Configures PCIe Speed.

PCH-IO Configuration – PCI Express Configuration – M.2 PCI Express x4 M Key (for Q470E/W480E only)

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > M.2 PCI Express x4 M Key (for Q470E/W480E only)*

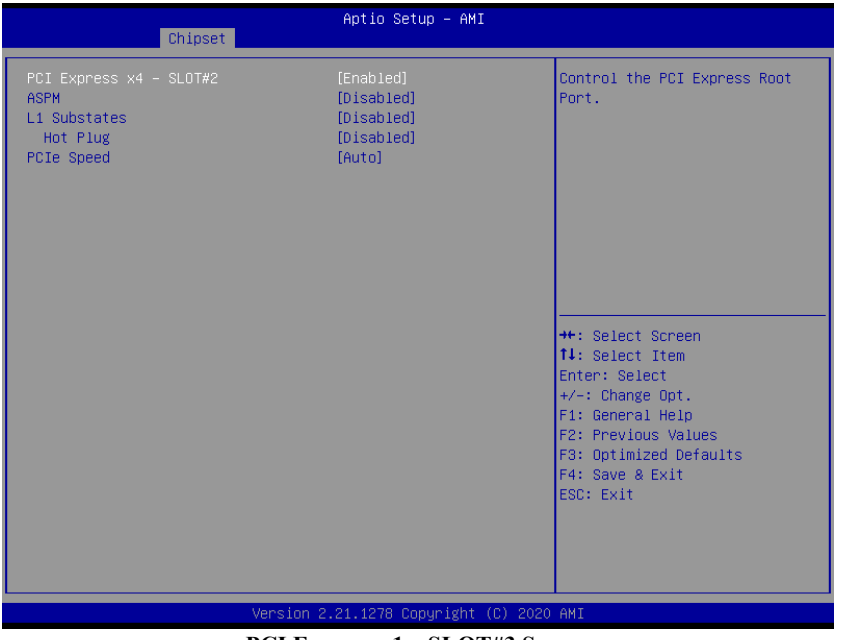


M.2 PCI Express x4 M Key Screen

BIOS Setting	Options	Description/Purpose
M.2 PCI Express x4 M Key	- Disabled - Enabled (Default)	Controls the PCI Express Root Port.
ASPM	- Disabled (Default) - L0s - L1 - L0sL1 - Auto	Sets the ASPM Level: • **L0s** - Force all links to L0s State • **Auto** - BIOS auto configure. • **Disabled** - Disables ASPM.
L1 Substates	- Disabled (Default) - L1.1 - L1.1 & L1.2	PCI Express L1 Substates settings.
Hot Plug	- Disabled (Default) - Enabled	Hot Plug support enabled / disabled.
PCIe Speed	- Auto (Default) - Gen1 - Gen2 - Gen3	Configures PCIe speed.

PCH-IO Configuration – PCI Express Configuration – PCI Express x1 – SLOT#3

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > PCI Express x1 – SLOT#3*

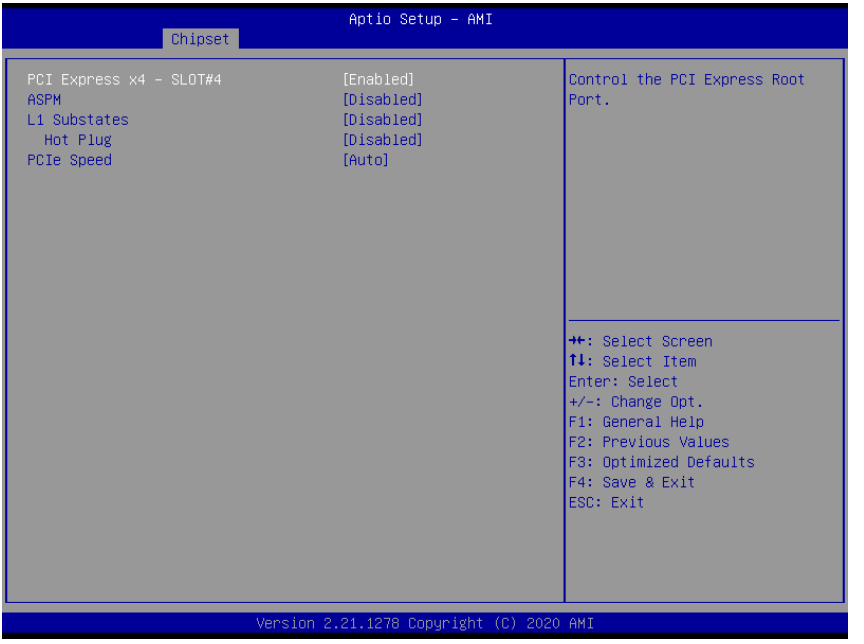


PCI Express x1 – SLOT#3 Screen

BIOS Setting	Options	Description/Purpose
PCI Express x1 – SLOT#3	- Disabled - Enabled (Default)	Controls the PCI Express Root Port
ASPM	- Disabled (Default) - L0s - L1 - L0sL1 - Auto	Sets the ASPM Level: • **L0s** - Force all links to L0s State. • **Auto** - BIOS auto configure. • **Disabled** - Disables ASPM.
L1 Substates	- Disabled (Default) - L1.1 - L1.1 & L1.2	PCI Express L1 Substates settings
Hot Plug	- Disabled (Default) - Enabled	Hot Plug support enabled / disabled.
PCIe Speed	- Auto (Default) - Gen1 - Gen2 - Gen3	Configures PCIe speed.

PCH-IO Configuration – PCI Express Configuration – PCI Express x4 – SLOT#4 (for Q470E/W480E only)

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > PCI Express x4 – SLOT#4 (for Q470E/W480E only)*

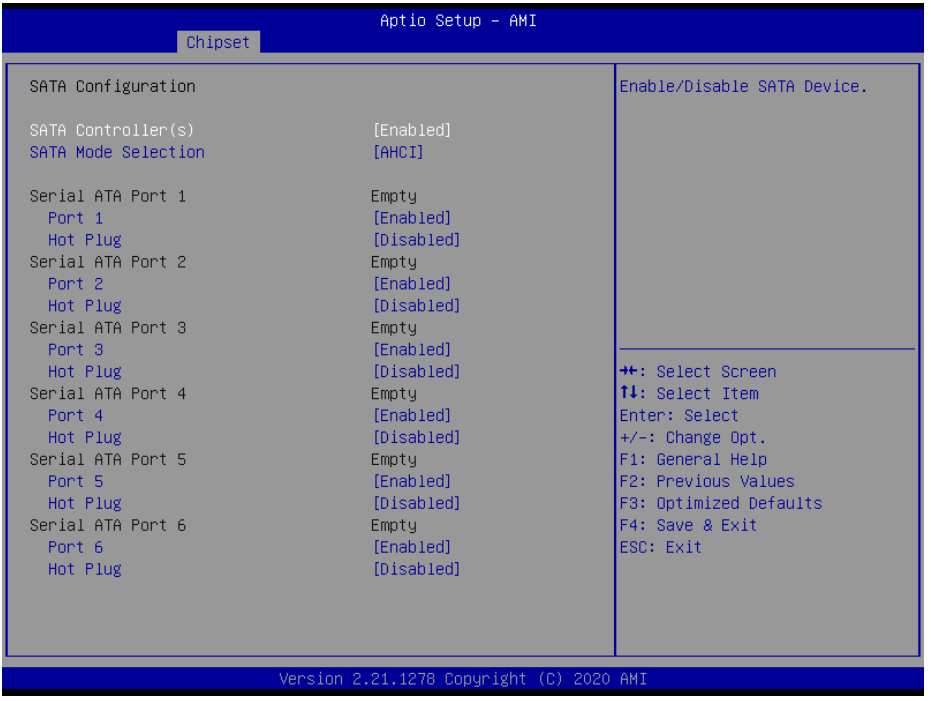


PCI Express x4 – SLOT#4 Screen

BIOS Setting	Options	Description/Purpose
PCI Express x4 – SLOT#4	- Disabled - Enabled (Default)	Controls the PCI Express Root Port
ASPM	- Disabled (Default) - L0s - L1 - L0sL1 - Auto	Sets the ASPM Level: • **L0s** - Force all links to L0s State. • **Auto** - BIOS auto configure. • **Disabled** - Disables ASPM.
L1 Substates	- Disabled (Default) - L1.1 - L1.1 & L1.2	PCI Express L1 Substates settings.
Hot Plug	- Disabled (Default) - Enabled	Hot Plug support enabled / disabled.
PCIe Speed	- Auto (Default) - Gen1 - Gen2 - Gen3	Configures PCIe speed.

PCH-IO Configuration – SATA Configuration

Menu Path *Chipset > PCH-IO Configuration > SATA Configuration*



SATA Configuration Screen

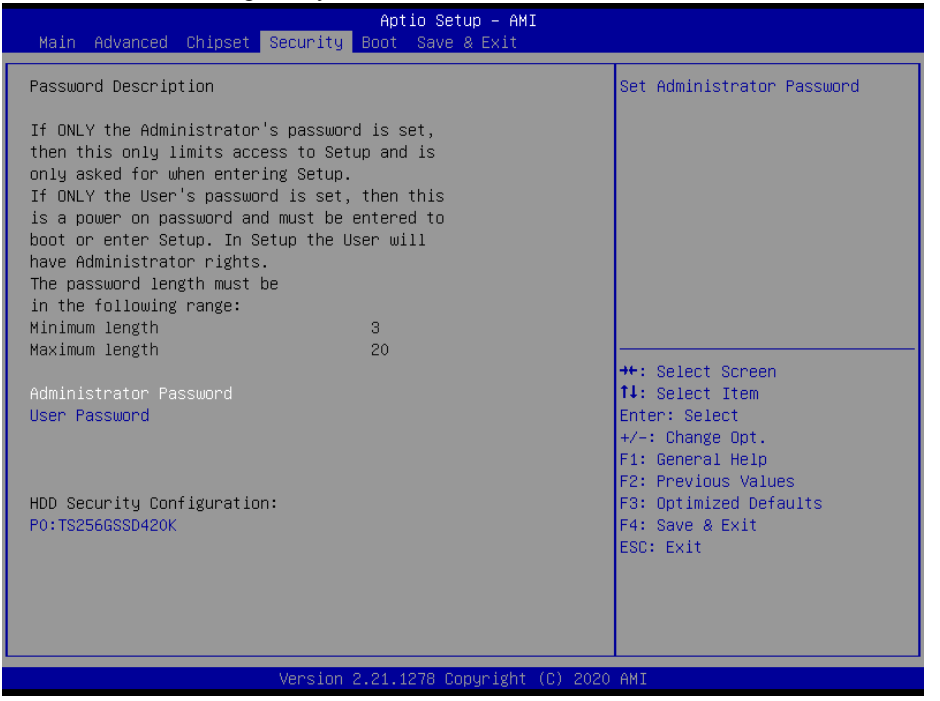
BIOS Setting	Options	Description/Purpose
SATA Controller(s)	- Disabled (Default) - Enabled	Enables or Disables SATA Device.
SATA Mode	- AHCI (Default) - Intel RST (RAID)	Determines how SATA controller(s) operate.
Serial ATA Port 1 – 4	No changeable options	Displays the SATA device's name.
Port 1 - 4	- Disabled - Enabled (Default)	Enables or Disables SATA Port Device.
Hot Plug	- Disabled (Default) - Enabled	Enables or Disables SATA Port Device Hot Plug function.
Serial ATA Port 5 – 6 *(for Q470E/W480E only)*	No changeable options	Displays the SATA device's name.
Port 5 - 6 *(for Q470E/W480E only)*	- Disabled - Enabled (Default)	Enables or Disables SATA Port Device.
Hot Plug *(for Q470E/W480E only)*	- Disabled (Default) - Enabled	Enables or Disables SATA Port Device Hot Plug function.

5.6 Security

Menu Path *Security*

From the **Security** menu, you are allowed to create, change or clear the administrator password. You will be asked to enter the configured administrator password before you can access the Setup Utility.

By setting an administrator password, you will prevent other users from changing your BIOS settings. You can configure an Administrator password and then configure a user password. An administrator has much more privileges over the settings in the Setup utility than a user. Heed that a user password does not provide access to most of the features in the Setup utility.



Security Screen

BIOS Setting	Options	Description/Purpose
Administrator Password	Password can be 3-20 alphanumeric characters.	Specifies the administrator password.
User Password	Password can be 3-20 alphanumeric characters.	Specifies the user password.

BIOS Setting	Options	Description/Purpose
HDD Security Configuration	Sub-Menu	Enters sub-menu with option to enabled password protected HDD/SSD (if supported by SATA device).

Create an Administrator or User Password

1. Select the **Administrator Password** / **User Password** option from the Security menu and press <Enter>, and the password dialog entry box appears.
2. Enter the password you want to create. A password can be 3-20 alphanumeric characters. After you have configured the password, press <Enter> to confirm.
3. Type the new password again and press <Enter>.

Change an Administrator or User Password

1. Select the **Administrator Password** / **User Password** option from the Security menu and press <Enter>, and the password dialog entry box appears.
2. Select the Administrator Password or User Password that you want to change. A password can be 3-20 alphanumeric characters. After you have changed the password, press <Enter> to confirm.
3. Type the changed password again and press <Enter>.

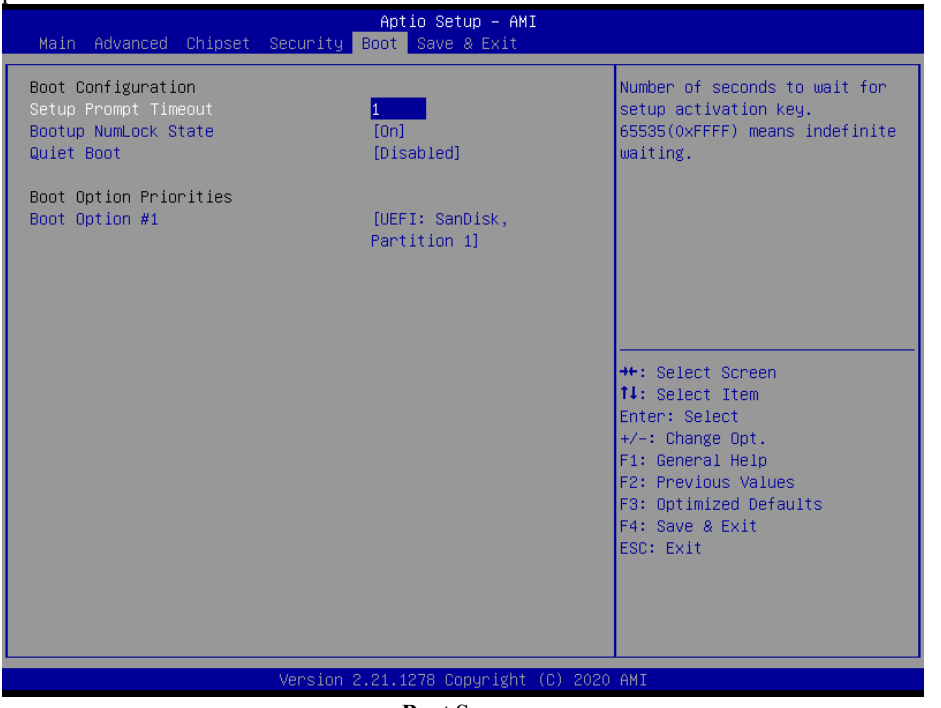
Remove an Administrator or User Password

1. Select the **Administrator Password** / **User Password** option from the Security menu and press <Enter>, and the password dialog entry box appears.
2. Select the configured Administrator Password or User Password that you want to delete. Leave the dialog box blank and press <Enter>.
3. Press <Enter> again when the password confirmation box appears.

5.7 Boot

Menu Path *Boot*

This menu provides control items for setting system boot configuration and boot priorities.



Boot Screen

BIOS Setting	Options	Description/Purpose
Setup Prompt Timeout	Numeric (from 1 to 65535)	Number of seconds to wait for setup activation key.
Bootup NumLock State	- On (Default) - Off	Specifies the power-on state of the NumLock Key.
Quiet Boot	- Disabled (Default) - Enabled	Enables or Disables Quiet Boot options.
Boot Option #1~#n	- [Drive(s)] - Disabled	Sets the system boot order.

5.8 Save & Exit

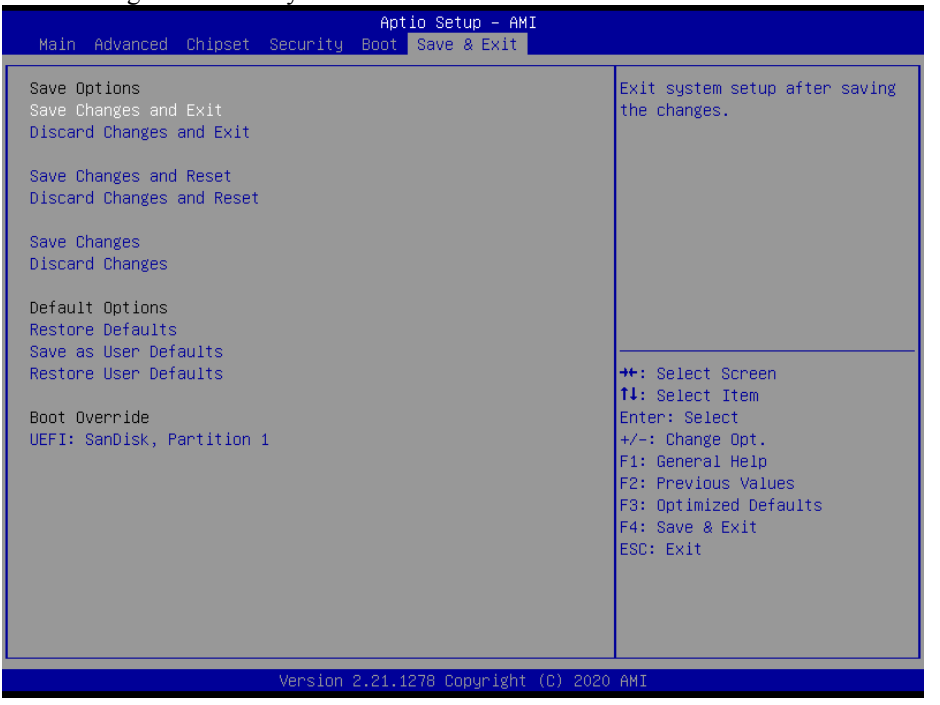
Menu Path *Save & Exit*

The **Save & Exit** allows users to save or discard changed BIOS settings as well as load factory default settings.

Save Changed BIOS Settings
To save and validate the changed BIOS settings, select **Save Changes** from the **Save & Exit** menu, or you can select **Save Changes and Exit** (or press **F4**) to validate the changes and then exit the system. Select **Save Changes and Reset** to validate the changed BIOS settings and then restart the system.

Discard Changed BIOS Settings
To cancel the BIOS settings you have previously configured, select **Discard Changes and Exit** from this menu, or simply press **Esc** to exit the BIOS setup. You can also select **Discard Changes and Reset** to discard any changes you have made and restore the factory BIOS defaults.

Load User Defaults
You may simply press **F3** at any time to load the **Optimized Values** which resets all BIOS settings to the factory defaults.



Save & Exit Screen

BIOS Setting	Options	Description/Purpose
Save Changes and Exit	No changeable options	Exits and saves the changes in NVRAM.
Discard Changes and Exit	No changeable options	Exits without saving any changes made in BIOS settings.
Save Changes and Reset	No changeable options	Saves the changes in NVRAM and resets.
Discard Changes and Reset	No changeable options	Resets without saving any changes made in BIOS settings.
Save Changes	No changeable options	Saves Changes done so far to any of the setup options.
Discard Changes	No changeable options	Discards Changes done so far to any of the setup options.
Restore Defaults	No changeable options	Loads the optimized defaults for BIOS settings.
Save as User Defaults	No changeable options	Saves the changes done so far as User Defaults.
Restore User Defaults	No changeable options	Restores the User Defaults to all the setup options.
Boot Override	- [Drive(s)]	Forces to boot from selected [drive(s)].

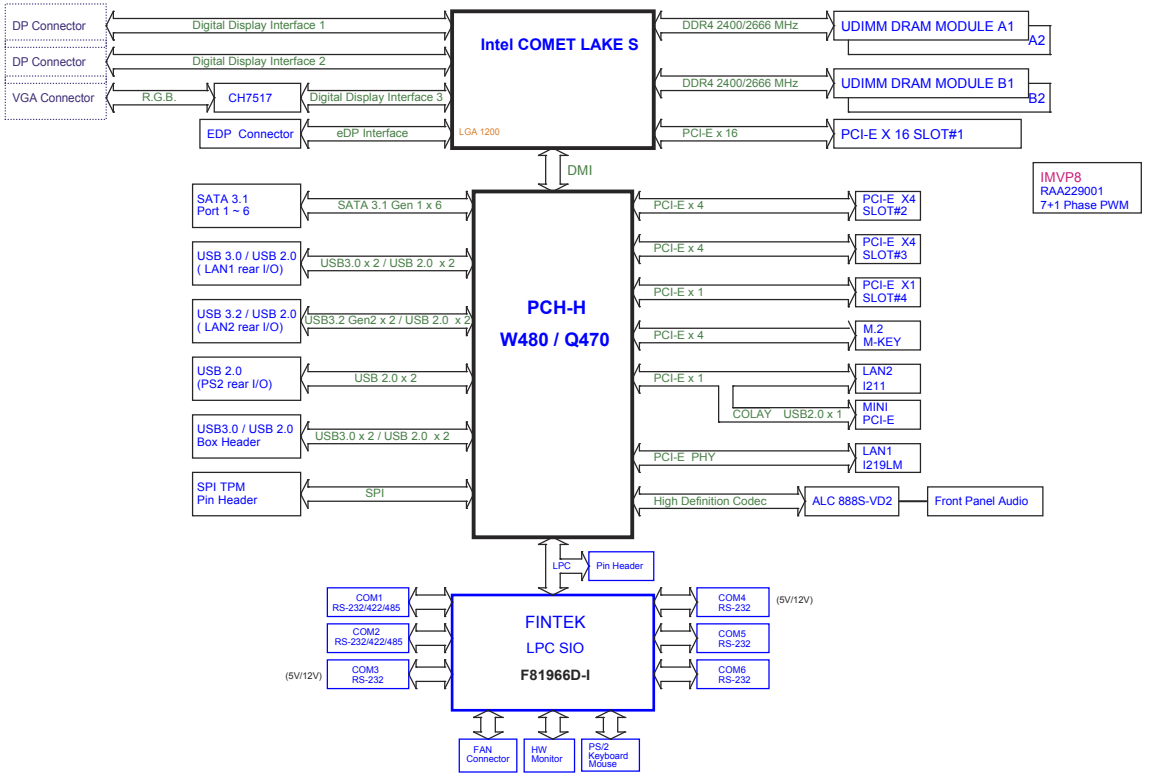
Appendix A Technical Summary

This appendix will give you a brief introduction of the allocation maps for BU-B015 resources.

The following topics are included:

- BU-B015 Block Diagram
- Interrupt Map
- I/O Map
- Memory Map
- DMA Map
- Configuring WatchDog Timer
- Flash BIOS Update

BU-B015 Block Diagram



Interrupt Map

IRQ	ASSIGNMENT
IRQ 0	System timer
IRQ 1	Standard PS/2 Keyboard
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 6	Communications Port (COM4)
IRQ 7	Communications Port (COM3)
IRQ 10	Communications Port (COM5)
IRQ 11	Communications Port (COM6)
IRQ 12	PS/2 Compatible Mouse
IRQ 13	Numeric data processor
IRQ 14	Intel(R) Serial IO GPIO Host Controller - INT3450
IRQ 16	Intel(R) Serial IO I2C Host Controller - A368
IRQ 16	High Definition Audio Controller
IRQ 17	Intel(R) Serial IO I2C Host Controller - A369
IRQ 19	Intel(R) Active Management Technology - SOL (COM8)
IRQ 45	Trusted Platform Module 2.0
RQ 54	Microsoft ACPI-Compliant System
IRQ 55	Microsoft ACPI-Compliant System
IRQ 56	Microsoft ACPI-Compliant System
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IRQ 395	Microsoft ACPI-Compliant System
IRQ 396	Microsoft ACPI-Compliant System
IRQ 397	Microsoft ACPI-Compliant System
IRQ 398	Microsoft ACPI-Compliant System
IRQ 399	Microsoft ACPI-Compliant System
IRQ 400	Microsoft ACPI-Compliant System
IRQ 401	Microsoft ACPI-Compliant System
IRQ 402	Microsoft ACPI-Compliant System
IRQ 403	Microsoft ACPI-Compliant System
IRQ 404	Microsoft ACPI-Compliant System
IRQ 405	Microsoft ACPI-Compliant System
IRQ 406	Microsoft ACPI-Compliant System
IRQ 407	Microsoft ACPI-Compliant System
IRQ 408	Microsoft ACPI-Compliant System
IRQ 409	Microsoft ACPI-Compliant System
IRQ 410	Microsoft ACPI-Compliant System
IRQ 411	Microsoft ACPI-Compliant System
IRQ 412	Microsoft ACPI-Compliant System
IRQ 413	Microsoft ACPI-Compliant System
IRQ 414	Microsoft ACPI-Compliant System
IRQ 415	Microsoft ACPI-Compliant System
IRQ 416	Microsoft ACPI-Compliant System
IRQ 417	Microsoft ACPI-Compliant System
IRQ 418	Microsoft ACPI-Compliant System
IRQ 419	Microsoft ACPI-Compliant System
IRQ 420	Microsoft ACPI-Compliant System
IRQ 421	Microsoft ACPI-Compliant System
IRQ 422	Microsoft ACPI-Compliant System
IRQ 423	Microsoft ACPI-Compliant System
IRQ 424	Microsoft ACPI-Compliant System
IRQ 425	Microsoft ACPI-Compliant System
IRQ 426	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 427	Microsoft ACPI-Compliant System
IRQ 428	Microsoft ACPI-Compliant System
IRQ 429	Microsoft ACPI-Compliant System
IRQ 430	Microsoft ACPI-Compliant System
IRQ 431	Microsoft ACPI-Compliant System
IRQ 432	Microsoft ACPI-Compliant System
IRQ 433	Microsoft ACPI-Compliant System
IRQ 434	Microsoft ACPI-Compliant System
IRQ 435	Microsoft ACPI-Compliant System
IRQ 436	Microsoft ACPI-Compliant System
IRQ 437	Microsoft ACPI-Compliant System
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IRQ 441	Microsoft ACPI-Compliant System
IRQ 442	Microsoft ACPI-Compliant System
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IRQ 450	Microsoft ACPI-Compliant System
IRQ 451	Microsoft ACPI-Compliant System
IRQ 452	Microsoft ACPI-Compliant System
IRQ 453	Microsoft ACPI-Compliant System
IRQ 454	Microsoft ACPI-Compliant System
IRQ 455	Microsoft ACPI-Compliant System
IRQ 456	Microsoft ACPI-Compliant System
IRQ 457	Microsoft ACPI-Compliant System
IRQ 458	Microsoft ACPI-Compliant System
IRQ 459	Microsoft ACPI-Compliant System
IRQ 460	Microsoft ACPI-Compliant System
IRQ 461	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 462	Microsoft ACPI-Compliant System
IRQ 463	Microsoft ACPI-Compliant System
IRQ 464	Microsoft ACPI-Compliant System
IRQ 465	Microsoft ACPI-Compliant System
IRQ 466	Microsoft ACPI-Compliant System
IRQ 467	Microsoft ACPI-Compliant System
IRQ 468	Microsoft ACPI-Compliant System
IRQ 469	Microsoft ACPI-Compliant System
IRQ 470	Microsoft ACPI-Compliant System
IRQ 471	Microsoft ACPI-Compliant System
IRQ 472	Microsoft ACPI-Compliant System
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IRQ 480	Microsoft ACPI-Compliant System
IRQ 481	Microsoft ACPI-Compliant System
IRQ 482	Microsoft ACPI-Compliant System
IRQ 483	Microsoft ACPI-Compliant System
IRQ 484	Microsoft ACPI-Compliant System
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IRQ 489	Microsoft ACPI-Compliant System
IRQ 490	Microsoft ACPI-Compliant System
IRQ 491	Microsoft ACPI-Compliant System
IRQ 492	Microsoft ACPI-Compliant System
IRQ 493	Microsoft ACPI-Compliant System
IRQ 494	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 495	Microsoft ACPI-Compliant System
IRQ 496	Microsoft ACPI-Compliant System
IRQ 497	Microsoft ACPI-Compliant System
IRQ 498	Microsoft ACPI-Compliant System
IRQ 499	Microsoft ACPI-Compliant System
IRQ 500	Microsoft ACPI-Compliant System
IRQ 501	Microsoft ACPI-Compliant System
IRQ 502	Microsoft ACPI-Compliant System
IRQ 503	Microsoft ACPI-Compliant System
IRQ 504	Microsoft ACPI-Compliant System
IRQ 505	Microsoft ACPI-Compliant System
IRQ 506	Microsoft ACPI-Compliant System
IRQ 507	Microsoft ACPI-Compliant System
IRQ 508	Microsoft ACPI-Compliant System
IRQ 509	Microsoft ACPI-Compliant System
IRQ 510	Microsoft ACPI-Compliant System
IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967280	Intel(R) Management Engine Interface
IRQ 4294967281	Intel(R) Ethernet Connection (7) I219-LM
IRQ 4294967282	Intel(R) I211 Gigabit Network Connection
IRQ 4294967283	Intel(R) I211 Gigabit Network Connection
IRQ 4294967284	Intel(R) I211 Gigabit Network Connection
IRQ 4294967285	Intel(R) I211 Gigabit Network Connection
IRQ 4294967286	Intel(R) I211 Gigabit Network Connection
IRQ 4294967287	Intel(R) I211 Gigabit Network Connection
IRQ 4294967288	Intel(R) I211 Gigabit Network Connection
IRQ 4294967289	Intel(R) I211 Gigabit Network Connection
IRQ 4294967290	Intel(R) I211 Gigabit Network Connection
IRQ 4294967291	Intel(R) I211 Gigabit Network Connection
IRQ 4294967292	Intel(R) USB 3.1 eXtensible Host Controller - 1.10 (Microsoft)
IRQ 4294967293	Intel(R) UHD Graphics P630
IRQ 4294967294	Standard SATA AHCI Controller

Note: These resource information were gathered using Windows 10 (the IRQ could be assigned differently depending on OS).

I/O MAP

I/O	ASSIGNMENT
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x0000002E-0x0000002F	Motherboard resources
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x00000040-0x00000043	System timer
0x0000004E-0x0000004F	Motherboard resources
0x00000050-0x00000053	System timer
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000064-0x00000064	Standard PS/2 Keyboard
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B2-0x000000B3	Motherboard resources
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000000F0-0x000000F0	Numeric data processor

I/O	ASSIGNMENT
0x000002E0-0x000002E7	Communications Port (COM6)
0x000002E8-0x000002EF	Communications Port (COM4)
0x000002F0-0x000002F7	Communications Port (COM5)
0x000002F8-0x000002FF	Communications Port (COM2)
0x00000378-0x0000037F	Printer Port (LPT1)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000003F8-0x000003FF	Communications Port (COM1)
0x000004D0-0x000004D1	Programmable interrupt controller
0x00000680-0x0000069F	Motherboard resources
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x0000164E-0x0000164F	Motherboard resources
0x00001800-0x000018FE	Motherboard resources
0x00001854-0x00001857	Motherboard resources
0x00002000-0x000020FE	Motherboard resources
0x00003000-0x00003FFF	Intel(R) PCI Express Root Port #11 - A332
0x00004000-0x0000403F	Intel(R) UHD Graphics P630
0x00004060-0x0000407F	Standard SATA AHCI Controller
0x00004080-0x00004083	Standard SATA AHCI Controller
0x00004090-0x00004097	Standard SATA AHCI Controller
0x0000EFA0-0x0000EFBF	Intel(R) SMBus - A323
0x0000FFF8-0x0000FFFF	Intel(R) Active Management Technology - SOL (COM8)

Memory Map

MEMORY MAP	ASSIGNMENT
0xFED10000-0xFED17FFF	Motherboard resources
0xFED18000-0xFED18FFF	Motherboard resources
0xFED19000-0xFED19FFF	Motherboard resources
0xE0000000-0xEFFFFFFF	Motherboard resources
0xFED20000-0xFED3FFFF	Motherboard resources
0xFED90000-0xFED93FFF	Motherboard resources
0xFED45000-0xFED8FFFF	Motherboard resources
0xFEE00000-0xFEEFFFFF	Motherboard resources
0xA1100000-0xA111FFFF	Intel(R) I211 Gigabit Network Connection
0xA1100000-0xA111FFFF	Intel(R) PCI Express Root Port #11 - A332
0xA1120000-0xA1123FFF	Intel(R) I211 Gigabit Network Connection
0xFED00000-0xFED003FF	High precision event timer
0xA1220000-0xA122FFFF	Intel(R) USB 3.1 eXtensible Host Controller - 1.10 (Microsoft)
0xFE1DD000-0xFE1DDFFF	Intel(R) Serial IO I2C Host Controller - A369
0xFD000000-0xFD69FFFF	Motherboard resources
0xFD6C0000-0xFD6CFFFF	Motherboard resources
0xFD6F0000-0xFDFFFFFF	Motherboard resources
0xFE000000-0xFE01FFFF	Motherboard resources
0xFE200000-0xFE7FFFFF	Motherboard resources
0xFF000000-0xFFFFFFFF	Motherboard resources
0x90000000-0xDFFFFFFF	PCI Express Root Complex
0x90000000-0xDFFFFFFF	Intel(R) UHD Graphics P630
0xFC800000-0xFE7FFFFF	PCI Express Root Complex
0xA1234000-0xA1235FFF	Standard SATA AHCI Controller
0xA123A000-0xA123A0FF	Standard SATA AHCI Controller
0xA1239000-0xA12397FF	Standard SATA AHCI Controller
0xFE010000-0xFE010FFF	Intel(R) SPI (flash) Controller - A324
0xFE1DF000-0xFE1DFFFF	Intel(R) Active Management Technology - SOL (COM8)
0xFED40000-0xFED44FFF	Trusted Platform Module 2.0

MEMORY MAP	ASSIGNMENT
0xFE1DC000-0xFE1DCFFF	Intel(R) Management Engine Interface
0xFE1DE000-0xFE1DEFFF	Intel(R) Serial IO I2C Host Controller - A368
0xA0000000-0xA0FFFFFF	Intel(R) UHD Graphics P630
0xFE1E0000-0xFE1FFFFF	Intel(R) Ethernet Connection (7) I219-LM
0xFD6E0000-0xFD6EFFFF	Intel(R) Serial IO GPIO Host Controller - INT3450
0xFD6D0000-0xFD6DFFFF	Intel(R) Serial IO GPIO Host Controller - INT3450
0xFD6B0000-0xFD6BFFFF	Intel(R) Serial IO GPIO Host Controller - INT3450
0xFD6A0000-0xFD6AFFFF	Intel(R) Serial IO GPIO Host Controller - INT3450
0xFE1D8000-0xFE1DBFFF	High Definition Audio Controller
0xFCF00000-0xFCFFFFFF	High Definition Audio Controller
0xA1238000-0xA12380FF	Intel(R) SMBus - A323
0xA0000-0xBFFFF	PCI Express Root Complex
0xE0000-0xE3FFF	PCI Express Root Complex
0xE4000-0xE7FFF	PCI Express Root Complex
0xE8000-0xEBFFF	PCI Express Root Complex
0xEC000-0xEFFFF	PCI Express Root Complex
0xF0000-0xFFFFF	PCI Express Root Complex
0x40000000-0x403FFFFF	Motherboard resources

DMA Map

DMA MAP	ASSIGNMENT
Channel 3	Printer Port (LPT1)

Configuring WatchDog Timer

The I/O port address of the watchdog timer is 2E (hex) and 2F (hex). 2E (hex) is the address port. 2F (hex) is the data port. Users must first assign the address of register by writing address value into address port 2E (hex), then write/read data to/from the assigned register through data port 2F (hex).

Configuration Sequence

To program F81966 configuration registers, the following configuration sequence must be followed:

(1) Enter the extended function mode

To place the chip into the Extended Function Mode, two successive writes of 0x87 must be applied to Extended Function Enable Registers (EFERs, i.e. 2Eh or 4Eh).

(2) Configure the configuration registers

The chip selects the Logical Device and activates the desired Logical Devices through Extended Function Index Register (EFIR) and Extended Function Data Register (EFDR). The EFIR is located at the same address as the EFER, and the EFDR is located at address (EFIR+1). First, write the Logical Device Number (i.e. 0x07) to the EFIR and then write the number of the desired Logical Device to the EFDR. If accessing the Chip (Global) Control Registers, this step is not required. Secondly, write the address of the desired configuration register within the Logical Device to the EFIR and then write (or read) the desired configuration register through the EFDR.

(3) Exit the extended function mode

To exit the Extended Function Mode, writing 0xAA to the EFER is required. Once the chip exits the Extended Function Mode, it is in the normal running mode and is ready to enter the configuration mode.

Code example for watch dog timer

Enable watchdog timer and set timeout interval to 30 seconds.

```
; ---------------------- Enter to extended function mode -----------------------------
mov     dx,     2Eh
mov     al,     87h
out     dx,     al
out     dx,     al
; ---------------------- Select Logical Device 7 of watchdog timer ---------------------
mov     al,     07h
out     dx,     al
inc     dx
mov     al,     07h
out     dx,     al
;---------------------------------Enable Watch dog feature ----------------------------
dec     dx
mov     al,     30h
out     dx,     al
inc     dx
mov     al,     01h
out     dx,     al
; ---------------- Set timeout interval as 30seconds and start counting --------------
dec     dx
mov     al,     F6h
out     dx,     al
inc     dx
mov     al,     1Eh
out     dx,     al
;------------------------------ Enable Watch PME----------------------------------------
dec     dx
mov     al,     FAh
out     dx,     al
inc     dx
in      al,     dx
or      al,     51h
out     dx,     al
;------------------------- Set second as counting unit ------------------------------------
dec     dx
mov     al,     F5h
out     dx,     al
inc     dx
in      al,     dx
and     al,     DEh
out     dx,     al
;-------------------------- Start the watchdog timer ---------------------------------
or      al,     20h
out     dx,     al
;--------------------------------Exit the extended function mode ------------------------
dec     dx
mov     al,     AAh
out     dx,     al
```

Flash BIOS Update

I. Prerequisites

1 Prepare a bootable media (e.g. USB storage device) which can boot system to EFI Shell.

Note: Copy UEFI Shell into the storage device under specific directory path. (/efi/boot/bootx64.efi)

2 Download and save the BIOS file (e.g. B0150PW1.bin) to the bootable device.

3 Copy AMI flash utility – AfuEfix64.efi (v5.13.00.05) into bootable device.

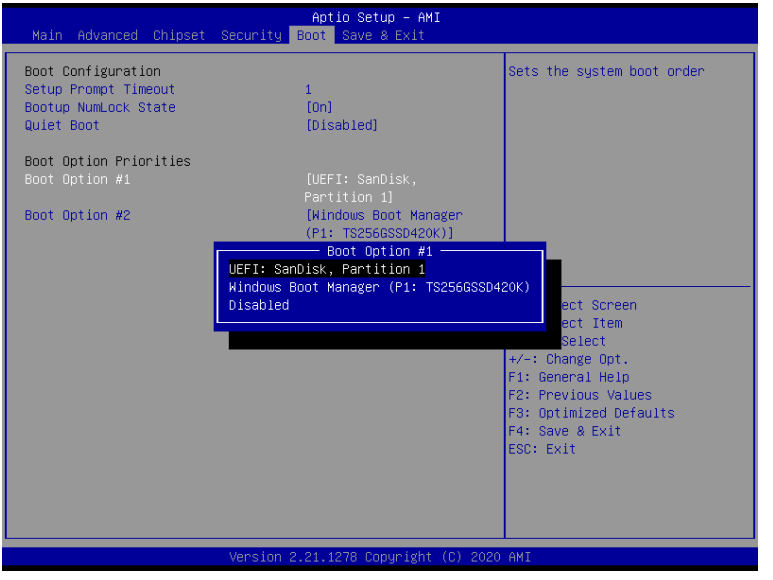
4 Make sure the target system can first boot to the bootable device.

(1) Connect the bootable USB device.

(2) Turn on the computer and press **<ESC>** or **<DEL>** during boot to enter BIOS Setup.

(3) Select [**Boot**] menu and set the USB bootable device as the 1st boot device.

(4) Press **<F4>** to save the configuration and exit the BIOS setup menu.



II. AFUEFI Command For System BIOS Update

AfuEfix64.efi is the AMI firmware update utility. The command line is shown as below:

AfuEfix64 <ROM File Name> [option1] [option2]….

Users can type "AfuEfix64/ ?" to view the definition of each control option. The recommended options for BIOS ROM update include the following parameters:

/P: Program main BIOS image.
/B: Program Boot Block.
/N: Program NVRAM.
/X: Don't check ROM ID.

III. BIOS Update Procedure

1. Use the bootable USB storage to boot up the system into the EFI Shell.
2. Type "**AfuEfix64 B015xxxx.bin /p /b /n /x"** and press "Enter" to start the flash procedure. (xxxx means the BIOS revision part, e.g. 0PW1…)
3. During the update procedure, you will see the BIOS update process status and its percentage. Beware! **DO NOT** turn off the system power or reset your computer if the whole procedure is not completed yet, or it may crash the BIOS ROM and make the system unable to boot up next time.
4. After BIOS update procedure is completed, the messages below will display:

```
fs0:\> afuefix64 B0150PW1.bin /p /b /n /x
 +-------------------------------------------------------------------------------+
 |                    AMI Firmware Update Utility v5.13.00.05                    |
 |      Copyright (C) 1985-2020, American Megatrends International LLC.      |
 |         All rights reserved. Subject to AMI licensing agreement.          |
 +-------------------------------------------------------------------------------+
 Reading flash ..... done
 - FFS checksums ..... ok
 Erasing Boot Block ..... done
 Updating Boot Block ..... done
 Verifying Boot Block ..... done
 Erasing Main Block ..... done
 Updating Main Block ..... done
 Verifying Main Block ..... done
 Erasing NVRAM Block ..... done
 Updating NVRAM Block ..... done
 Verifying NVRAM Block ..... done

 fs0:\>
```

5 Restart the system and boot up with the new BIOS configurations.

6 The BIOS Update is completed after the system is restarted.

7 Reboot the system and verify if the BIOS version shown on the initialization screen has been updated.