

USER'S MANUAL

BU-2509

**Micro ATX Motherboard
With Intel® 6th Gen. Core™
i7/i5/i3 and Xeon E3 V5
Processor**

BU-2509 M1

BU-2509

With Intel[®] 6th Generation Core[™] Micro ATX Motherboard

COPYRIGHT NOTICE & TRADEMARK

All trademarks and registered trademarks mentioned herein are the property of their respective owners.

This manual is copyrighted in June 2016. You may not reproduce or transmit in any form or by any means, electronic, or mechanical, including photocopying and recording.

DISCLAIMER

This operation manual is meant to assist both Embedded Computer manufacturers and end 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 if 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.

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION

1-1	About This Manual.....	1-2
1-2	System Specification.....	1-3
1-3	Safety Precautions.....	1-7

CHAPTER 2 HARDWARE CONFIGURATION

2-1	Jumper & Connector Quick Reference Table.....	2-2
2-2	Component Locations.....	2-3
2-3	How to Set Jumpers.....	2-6
2-4	COM Port and Connectors (COM1-COM6).....	2-8
2-5	Clear CMOS Data Selection (JCMOS1).....	2-10
2-6	COM3 and COM4 Port RI / Voltage Selection (JPCOM3, JPCOM4).....	2-11
2-7	Digital Input /Output Port Connector (JDIO1).....	2-12
2-8	Keyboard and Mouse Port (KB_MS1).....	2-13
2-9	DVI Port (DVI-D).....	2-14
2-10	VGA Port (VGA).....	2-15
2-11	Front Panel Connector (FP1).....	2-16
2-12	LAN & USB Ports (LAN1_USB1, LAN2_USB1).....	2-17
2-13	Line-In, Line-Out, MIC-In Port (AUDIO1).....	2-19
2-14	RS-232/422/485 (COM2) Selection (JP2).....	2-20
2-15	COM2 Auto Detection Selection (JP4).....	2-21
2-16	Hardware Power Failure Selection (JP1).....	2-22
2-17	Flash Descriptor Override Selection (JP3).....	2-23
2-18	LAN2 Enable/Disable Selection (JP5).....	2-24
2-19	Mini PCIE Voltage Selection (JP13).....	2-25
2-20	VCCIO Voltage Selection (JP10).....	2-26
2-21	Mini PCI Express Slot (MPCIE1).....	2-27
2-22	PCI Express Slots (PCI_E1 (X16), PCI_E2, PCI_E4 (X4), PCI_E3 (X1)).....	2-28

2-23	CPU / System Fan Connectors (CPU_FAN1, SYS_FAN1, SYS_FAN2).....	2-33
2-24	Serial ATA (SATA) Connectors (SATA1, SATA2, SATA3, SATA4, SATA5, SATA6, SATA7, SATA8).....	2-34
2-25	Internal USB 3.0 Connector (USB1).....	2-35
2-26	Internal USB 2.0 Connectors (USB2, USB3).....	2-35
2-27	Display Port Connector (DP1).....	2-36
2-28	Power Input Connectors (ATX_PWR1, ATX_PWR2)	2-37
2-29	Speaker Connector (JSPEAKER).....	2-38
2-30	LPC Connector (JLPC1).....	2-38

CHAPTER 3 SOFTWARE UTILITIES

3-1	Introduction.....	3-2
3-2	Intel [®] Chipset Software Installation Utility.....	3-3
3-3	Intel [®] Trusted Execution Engine Installation Utility.....	3-4
3-4	VGA Driver Utility.....	3-5
3-5	LAN Driver Utility.....	3-6
3-6	Sound Driver Utility.....	3-7

CHAPTER 4 BIOS SETUP

4-1	Introduction.....	4-2
4-2	Entering Setup.....	4-4
4-3	Main.....	4-6
4-4	Advanced.....	4-8
4-5	Chipset.....	4-32
4-6	Security.....	4-52
4-7	Boot.....	4-53
4-8	Save & Exit.....	4-58

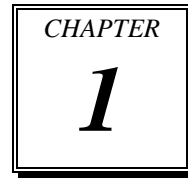
APPENDIX A TECHNICAL SUMMARY

Block Diagram.....	A-2
Interrupt Map.....	A-3
Memory Map.....	A-8
I/O Map.....	A-10
Watchdog Timer Configuration.....	A-13

Flash BIOS Update..... A-16



INTRODUCTION



This chapter gives you the information for BU-2509. It also outlines the system specifications.

The following sections are included:

- About This Manual
- System Specifications
- Safety Precautions

Experienced users can jump to chapter 2 on page 2-1 for a quick start.

1-1. ABOUT THIS MANUAL

Thank you for purchasing our BU-2509 Micro ATX Motherboard with Intel® 6th Generation Core™ i7/i5/i3 Pentium® processor. The BU-2509 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 system. It contains four chapters. The user can apply this manual for configuration according to the following chapters:

Chapter 1 Introduction

This chapter introduces you to the background of this manual, and the specifications for this system. The final page of this chapter will indicate how to avoid damaging this board.

Chapter 2 Hardware Configuration

This chapter outlines the component locations and their functions. In the end of this chapter, you will learn how to set jumper and how to configure this card to meet your own needs.

Chapter 3 Software Utilities

This chapter contains helpful information for proper installations of the VGA utility, LAN utility, Sound utility, and Flash BIOS Update. It also describes the Watchdog-timer configuration.

Chapter 4 BIOS Setup

This chapter indicates you how to set up the BIOS configurations.

Appendix A Expansion Bus

This appendix introduces you the expansion bus for PCIe connectors.

Appendix B Technical Summary

This appendix gives you the information about the Technical maps.

1-2. SYSTEM SPECIFICATIONS

System

CPU	<ul style="list-style-type: none"> ● BU-2509RA-00P/11P/D0P/D1P: Intel® Skylake-S CPU socket (LGA1151), supporting i7-6700(TE), i5-6500(TE), i3-6100(TE), Pentium G4400(TE), Celeron G3900(TE) ● BU-2509RA-06P/D6P: Intel® Skylake-S CPU socket (LGA1151), supporting E3-1275 v5, E3-1225 v5, E3-1268L v5, i3-6100TE, i7-6700(TE), i5-6500(TE), i3-6100, Pentium G4400(TE), Celeron G3900(TE)
OS Support	Windows 7, Windows 8.1, Windows 10, Ubuntu14.4
Chipset	<ul style="list-style-type: none"> ● BU-2509RA-00P/D0P: Intel® Q170 ● BU-2509RA-11P/D1P: Intel® H110 ● BU-2509RA-06P/D6P: Intel® C236
Memory Support	<ul style="list-style-type: none"> ● BU-2509RA-00P/D0P: 4 x DDR4 DIMM 2133, supports dual-channel and non-ECC ● BU-2509RA-11P/D1P: 2 x DDR4 DIMM 2133, supports dual-channel (location: JUDIMM2 / 4) and non-ECC ● BU-2509RA-06P/D6P: 4 x DDR4 DIMM 2133, supports dual-channel, ECC & non-ECC
ECC Compatibility	<ul style="list-style-type: none"> ● BU-2509RA-00P/11P/ D0P/D1P: Non-ECC ● BU-2509RA-06P/D6P: <ul style="list-style-type: none"> - E3-1275 v5, supports ECC - E3-1225 v5, supports ECC - E3-1268L v5, supports ECC - i3-6100TE, supports ECC - i7-6700(TE), non-ECC - i5-6500(TE), non-ECC - i3-6100, non-ECC - Pentium G4400(TE), non-ECC - Celeron G3900(TE), non-ECC
BIOS	AMI BIOS
Watchdog	1~255 seconds

Hardware Monitor	FAN, 12V, 5V, 5Vsb, Vcore
Speaker	Internal buzzer
Power Supply	ATX Power Supply (24 pins + 4 pins)
Dimension	229 mm x 191 mm
Certificate	CE/FCC Class A

I/O Ports

Serial Port	Total 6 COM ports: *COM1-6: RS-232 *COM2: RS-232/422/485 auto flow control (Rear I/O) *COM3, 4 support 5V/12V by jumper selection
USB Port	<ul style="list-style-type: none"> ● BU-2509RA-00P/06P/D0P/D6P: Total 6 x USB 3.0, 4 x USB 2.0 4 x USB 3.0 on Rear I/O, others on board (internal wafer) ● BU-2509RA-11P/D1P: Total 4 x USB 3.0, 4 x USB 2.0 4 x USB 3.0 on Rear I/O, others on board (internal wafer)
SATA Interface	<ul style="list-style-type: none"> ● BU-2509RA-00P/D0P: 6 x SATA III, supports RAID 0/1/5/10 ● BU-2509RA-11P/D1P: 4 x SATA III ● BU-2509RA-06P/D6P: 8 x SATA III, supports RAID 0/1/5/10
LAN	<ul style="list-style-type: none"> ● Dual ports support 10/100/1000Mbps and Wake-on-LAN ● LAN1: Intel® PHY 219 LM (10/100/1000Mbps) ● LAN2: Intel® LAN 210 AT (10/100/1000Mbps)
Audio	Realtek ALC888S High Definition Audio, line-out / line-in / MIC-in (Rear I/O)
DIO	8in/8out (internal connector) API supporting
Keyboard/Mouse	2 x PS/2 (Rear I/O)
Expansion Bus	<ul style="list-style-type: none"> ● BU-2509RA-00P/D0P: 1 x PCIe (x16), 2 x PCIe (x4), 1 x PCIe (x1), 1 x mini-PCIe (PCIe, USB)

	<ul style="list-style-type: none">● BU-2509RA-11P/D1P: 1 x PCIe (x16), 1 x PCIe (x2) with PCIe (x4) connector, 1 x PCIe (x1), 1 x mini-PCIe (PCIe)● BU-2509RA-06P/D6P: 1 x PCIe (x16), 2 x PCIe (x4), 1 x PCIe (x1), 1 x mini-PCIe (PCIe, USB)
LPC	1 x LPC (onboard pin-header)
TPM	Optional function via an additional LPC Daughter Board
FAN	1 x CPU FAN (4 pins), 1 x System FAN (4 pins), 1 x System FAN (3 pins)
I/O and others	<ul style="list-style-type: none">● Fintek 81866AD-I● Fintek 81216

Display

Display Interface	<ul style="list-style-type: none">● BU-2509RA-00P/11P/06P 1 x VGA up to 1920 x 1200 @60Hz, Rear I/O 1 x DVI-D up to 2560 x 1600 @60Hz, Rear I/O 1 Display Port up to 1920 x 1080 @60Hz, internal connector● BU-2509RA-D0P/D1P/D6P 1 x VGA up to 1920 x 1200 @60Hz, Rear I/O 1 x DVI-D up to 2560 x 1600 @60Hz, Rear I/O (no DP function)
Multi-Display	Supports 3 independent displays

Others

Shock	15G peak-to-peak, 11ms duration, non-operation
Vibration	Non-operation: 2G, 5-200Hz, X,Y,Z axis

Environment

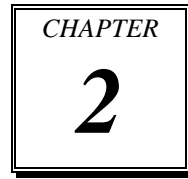
Operating Temp.	0°C ~ 60°C (32°F ~ 140°F)
Storage Temp.	-40°C ~ 85°C (-40°F ~ 185°F)
Humidity	Operating: 5% - 95% (non-condensing)

1-3. SAFETY PRECAUTIONS

Follow the instructions below to avoid your systems 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.

HARDWARE CONFIGURATION



***** QUICK START *****

Helpful information describes the jumper & connector settings, and component locations.

The following sections are included:

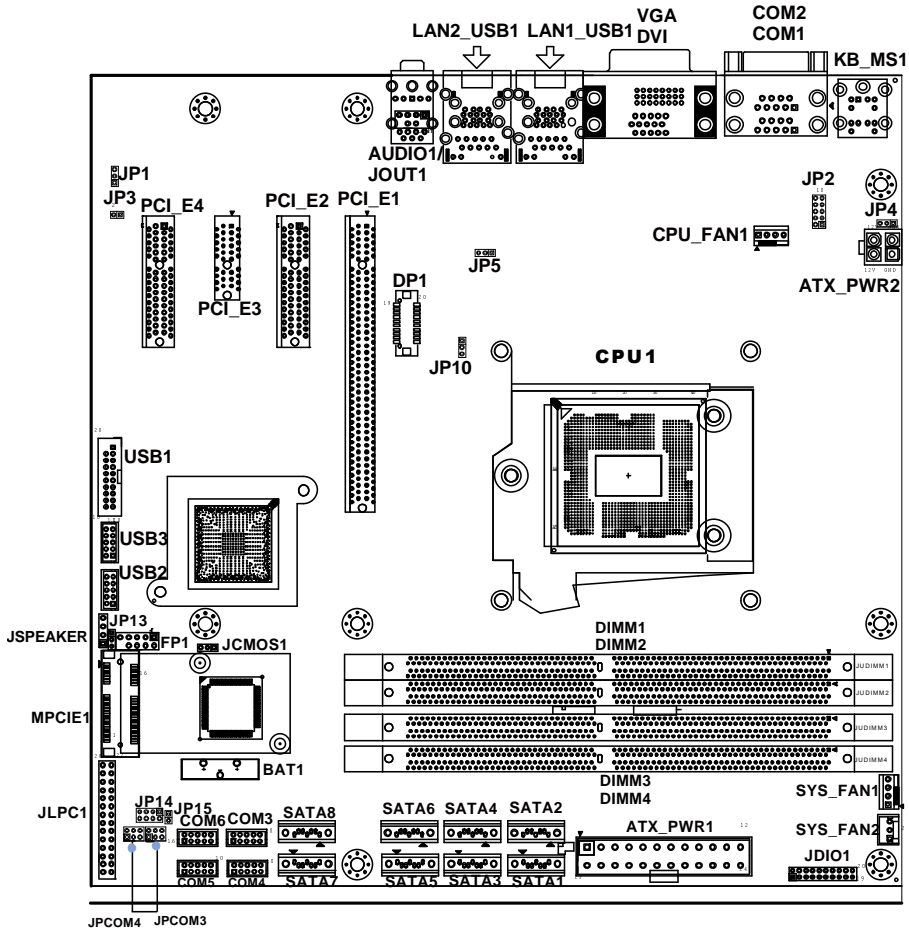
- Jumper & Connector Quick Reference Table
- Component Locations
- Configuration and Jumper Settings
- Connector Pin Assignments

2-1. JUMPER & CONNECTOR QUICK REFERENCE TABLE

The jumpers and connectors are arranged alphabetically below:

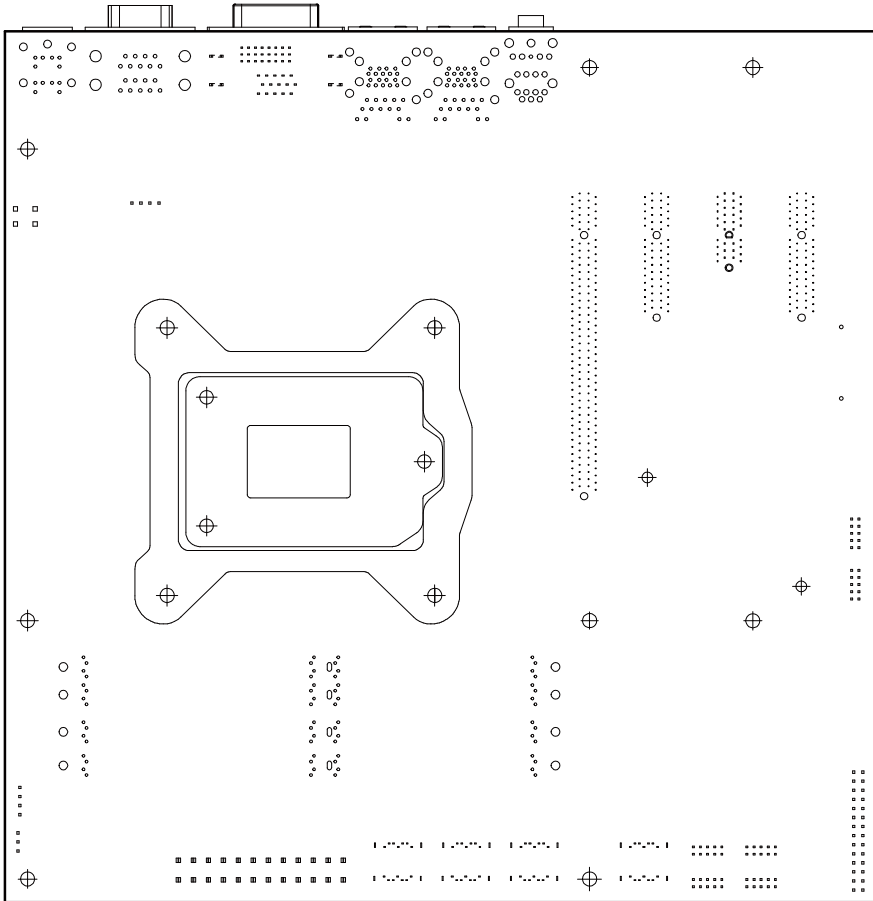
JUMPER/CONNECTOR	NAME
Power Input Connectors	ATX_PWR1, ATX_PWR2
Line-In, Line-Out and MIC-In Port	AUDIO1
COM Port and Connectors	COM1, COM2, COM3, COM4, COM5, COM6
CPU / System FAN Connectors	CPU_FAN1, SYS_FAN1, SYS_FAN2
Display Port Connector	DPI
DVI (Digital Video Interface) Port	DVI-D
Front Panel Connector	FP1
Clear CMOS Data Selection	JCMOS1
Digital Input / Output Connector	JDIO1
LPC Connector	JLPC1
COM Port RI/Voltage Selection	JPCOM3, JPCOM4
Speaker Connector	JSPEAKER
Keyboard / Mouse Connector	KB_MS1
LAN + USB Connectors	LAN1_USB1, LAN2_USB1
Mini PCI Express Slot	MPCIE1
PCI Express Slots	PCI_E1, PCI_E2, PCI_E3, PCI_E4
SATA Connectors	SATA1, SAT2, SATA3, SATA4, SATA5, SATA6, SATA7, SATA8
Universal Serial Bus 3.0 Connector	USB1
Universal Serial Bus 2.0 Connectors	USB2, USB3
VGA Port	VGA
RS-232/422/485 (COM2) Selection	JP2
COM2 Auto Detection Selection	JP4
Hardware Power Failure Selection	JP1
Flash Descriptor Override Selection	JP3
LAN2 Enable / Disable Selection	JP5
Mini PCI Express Voltage Selection	JP13
VCCIO Voltage Selection	JP10

2-2. COMPONENT LOCATIONS



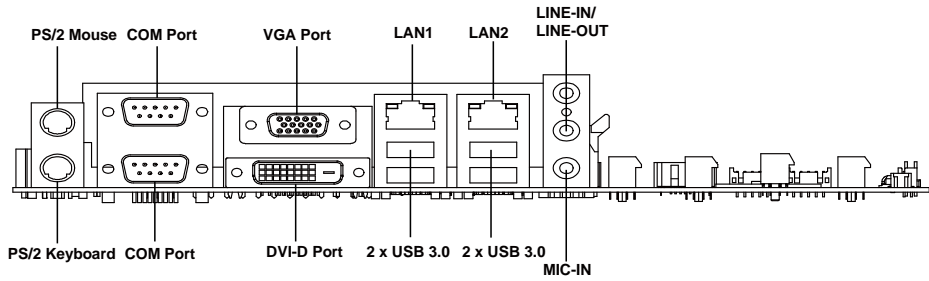
BU-2509 Connector, Jumper and Component Locations (Front Side)

Note: C236 SKU has SATA1~8, JDIMM1~4, PCI_E1~4 available. Q170 SKU only has SATA1~6, JDIMM1~4, PCI_E1~4 available. H110 SKU only has SATA1~4, JDIMM2/4, PCI_E1~3 available. USB1 is not available for H110 SKU. DP1 is not available for BU-2509RA-D0P/D1P/D6P.



BU-2509 Connector, Jumper and Component Locations (Rear Side)

BU-2509 I/O View

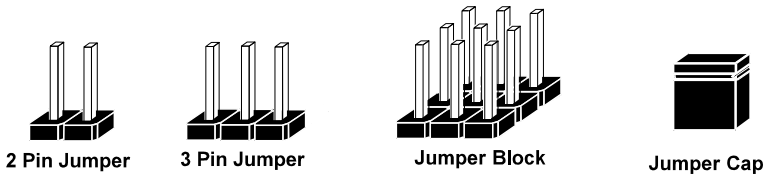


2-3. HOW TO SET JUMPERS

You can configure your board by setting jumpers. Jumper is consists of two or three metal pins with a plastic base mounted on the card, and 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 "open" or "close" pins.

The jumper can be combined into sets that 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

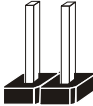


If a jumper has three pins (for examples, labelled PIN1, PIN2, and PIN3), you can connect PIN1 & PIN2 to create one setting by shorting. You can either connect PIN2 & PIN3 to create another setting. The same jumper diagrams are applied all through this manual. The figure below shows what the manual diagrams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

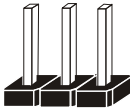
Jumper Diagrams



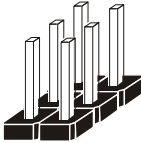
Jumper Cap
looks like this



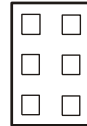
2 pin Jumper
looks like this



3 pin Jumper
looks like this



Jumper Block
looks like this



Jumper Settings



2 pin Jumper close(enabled)
Looks like this



1

1



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

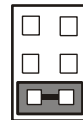


1

1



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



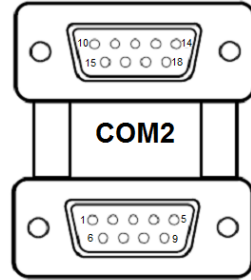
1 2

1 2

2-4. COM PORT and CONNECTORS

COM1: COM1 Connector, fixed as RS-232.

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



COM1

**COM2/
COM1**

COM2: COM2 Connector selectable as RS-232/422/485.

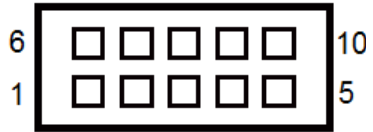
The pin assignments are as follows:

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

COM3/COM4/COM5/COM6 CONNECTOR

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

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







**COM3/
COM4/
COM5/
COM6**

Note: Pin 9 is selectable for RI, +5V or +12V for COM3 and COM4 only.

2-5. CLEAR CMOS DATA SELECTION

JCMOS1: Clear CMOS Data Selection

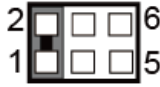
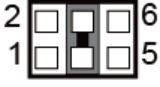

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
Normal	1-2	 3  1 JCMOS1
Clear CMOS	2-3	 3  1 JCMOS1

Note 1: Manufacturing Default is **Normal**.

Note 2: To clear CMOS data, users must power off the computer and set the jumper to “Clear CMOS” as shown above. After five to six seconds, set the jumper back to “NC” and power on the computer.

2-6. COM PORT RI / VOLTAGE SELECTION

COM3 and COM4 RI & Voltage Selection

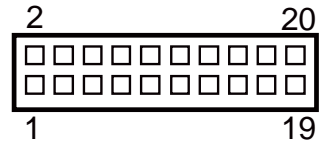
SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
RI	1-2	 <p>JPCOM3/JPCOM4</p>
12V	3-4	 <p>JPCOM3/JPCOM4</p>
5V	5-6	 <p>JPCOM3/JPCOM4</p>

Note: Manufacturing default is **RI**.

2-7. DIGITAL I/O PORT CONNECTOR

JDIO1: Digital Input / Output Port Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5	11	DIN5
2	VCC12	12	DOUT5-
3	DIN1	13	DIN6
4	DOUT1	14	DOUT6
5	DIN2	15	DIN7
6	DOUT2	16	DOUT7
7	DIN3	17	DIN8
8	DOUT3	18	DOUT8
9	DIN4	19	GND
10	DOUT4	20	GND



JDIO1

2-8. KEYBOARD & MOUSE PORT

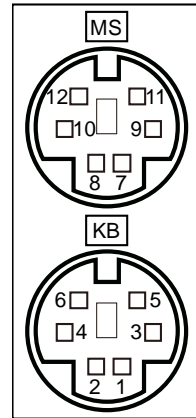
KB_MS1: PS/2 Keyboard & Mouse Port

Mouse:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
7	MSDATA	10	VCC5
8	NC	11	MSCLK
9	GND	12	NC

Keyboard:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	KBDATA	4	VCC5
2	NC	5	KBCLK
3	GND	6	NC



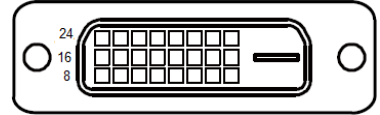
KB_MS1

2-9. DVI (Digital Video Interface) PORT

DVI-D: DVI-D (Digital Video Interface – Digital) function is supported.

The pin assignments are as follows:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	TMDS_D2-	13	NC
2	TMDS_D2+	14	VCC5
3	GND	15	GND
4	NC	16	TMDS_HPD
5	NC	17	TMDS_D0-
6	TMDS_CLK	18	TMDS_D0+
7	TMDS_DATA	19	GND
8	NC	20	NC
9	TMDS_D1-	21	NC
10	TMDS_D1+	22	GND
11	GND	23	TMDS_D3+
12	NC	24	TMDS_D3-



DVI-D

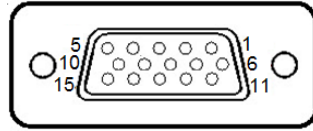
A DVI-D connector transfer only digital signals, providing faster transfer rates and better quality than their predecessor, the VGA cable. It is most commonly used to connect computer video cards to LCD monitors.

2-10. VGA PORT

VGA: VGA (Video Graphics Array) Connector

The pin assignments are as follows:

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

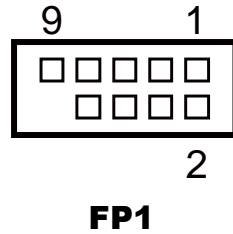


VGA

2-11. FRONT PANEL CONNECTOR

FP1: Front Panel Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	HDD_LED+	6	PWR_BTN
2	PWR_LED+	7	RST_BTN
3	HDD_LED-	8	GND
4	PWR_LED-	9	VCC5
5	GND	-	-



2-12. LAN & USB PORT

LAN1_USB1: LAN1 & Two USB 3.0 Ports

LAN1 signals:

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

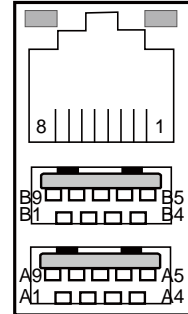
Right Side LED

Yellow Color Blinking	LAN Message Active
Off	No LAN Message Active

USB 3.0 signals:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	VCC	B1	VCC
A2	USB_N1	B2	USB_N2
A3	USB_P1	B3	USB_P2
A4	GND	B4	GND
A5	USB3_RX_N1	B5	USB3_RX_N2
A6	USB3_RX_P1	B6	USB3_RX_P2
A7	GND	B7	GND
A8	USB3_TX_N1	B8	USB3_TX_N2
A9	USB3_TX_P1	B9	USB3_TX_P2

Green/Orange Yellow



LAN1_USB1

LAN2_USB1: LAN2 & Two USB 3.0 Ports

LAN2 signals:

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

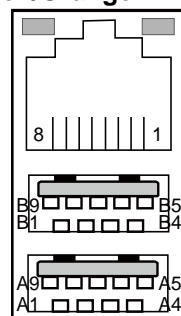
Right Side LED

Yellow Color Blinking	LAN Message Active
Off	No LAN Message Active

USB 3.0 signals:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	VCC	B1	VCC
A2	USB_N3	B2	USB_N4
A3	USB_P3	B3	USB_P4
A4	GND	B4	GND
A5	USB3_RX_N3	B5	USB3_RX_N4
A6	USB3_RX_P3	B6	USB3_RX_P4
A7	GND	B7	GND
A8	USB3_TX_N3	B8	USB3_TX_N4
A9	USB3_TX_P3	B9	USB3_TX_P4

Green/Orange Yellow



LAN2_USB1

2-13. LINE-IN, LINE-OUT, MIC-IN PORT

AUDIO1: Line-In, Line-Out & Microphone

The connector can also support only Microphone.

Line-In:

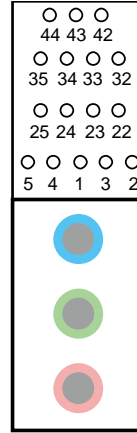
PIN	ASSIGNMENT
32	HD_LINE-IN-L
33	GND
34	GND
35	HD_LINE-IN-R

Line-Out:

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

MIC-In:

PIN	ASSIGNMENT
1	GND
2	HD_MIC1-L_L
3	GND
4	GND
5	HD_MIC1-R_L

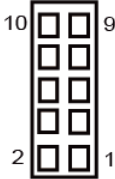
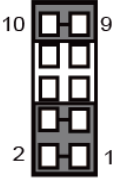
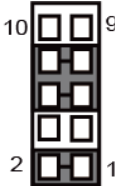


AUDIO1

2-14. RS-232/422/485 (COM2) SELECTION

JP2: RS-232/422/485 (COM2) Selection

The selections are as follows:


Selection	Jumper Setting (Pin Closed)	Jumper Illustration
RS-232	Close	 <p style="text-align: center;">JP2</p>
RS-422	1-2, 3-4, 9-10	 <p style="text-align: center;">JP2</p>
RS-485	1-2, 5-6, 7-8	 <p style="text-align: center;">JP2</p>

***Manufacturing Default – RS-232.

2-15. COM2 Auto Detection Selection

JP4: COM2 Auto Detection Selection

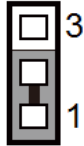
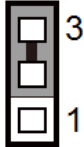
The selections are as follows:

Selection	Jumper Setting (Pin Closed)	Jumper Illustration
Normal	1-2	 JP4
Auto	2-3	 JP4

***Manufacturing Default – Auto.

2-16. HARDWARE POWER FAILURE SELECTION

JP1: Hardware Power Failure Selection



SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
Enable	1-2	 <p>JP1</p>
Disable	2-3	 <p>JP1</p>

Note: Manufacturing default is **Disable**.

2-17. FLASH DESCRIPTOR OVERRIDE SELECTION

JP3: Flash Descriptor Override Selection

The selections are as follows:



Selection	Jumper Setting (Pin Closed)	Jumper Illustration
Disable	Close	 JP3
Enable	1-2	 JP3

***Manufacturing Default – **Disable**.

2-18. LAN2 ENABLE / DISABLE Selection

JP5: LAN2 Enable / Disable Selection

The selections are as follows:



Selection	Jumper Setting (Pin Closed)	Jumper Illustration
Enable	1-2	 JP5
Disable	2-3	 JP5

***Manufacturing Default – **Enable**.

2-19. Mini PCIE VOLTAGE SELECTION

JP13: Mini PCIE Voltage Selection

The selections are as follows:



Selection	Jumper Setting (Pin Closed)	Jumper Illustration
3.3V	1-2	 <p>JP13</p>
3.3V_AUX	2-3	 <p>JP13</p>

***Manufacturing Default –3.3V_AUX.

2-20. VCCIO VOLTAGE SELECTION

JP10: VCCIO Voltage Selection

The selections are as follows:

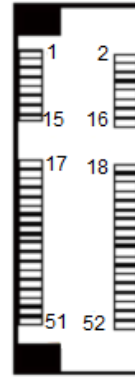
Selection	Jumper Setting (Pin Closed)	Jumper Illustration
1.0V	1-2	 <p>JP10</p>
0.95V	2-3	 <p>JP10</p>

***Manufacturing Default – **0.95V**.

2-21. MINI PCI EXPRESS SLOT

MPCIE1: Mini-PCI Express Slot

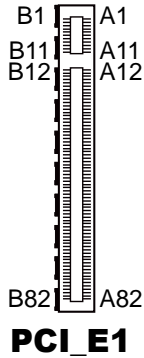
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	WAKE_N	27	GND
2	3.3V_SB	28	1.5V
3	NC	29	GND
4	GND	30	SMB_CLK
5	NC	31	PE_TX_N
6	1.5V	32	SMB_DATA
7	CLKREQ#	33	PE_TX_P
8	NC	34	GND
9	GND	35	GND
10	NC	36	USB_N
11	REFCLK-	37	GND
12	NC	38	USB_P
13	REFCLK+	39	3.3V_SB
14	NC	40	GND
15	GND	41	3.3V_SB
16	NC	42	NC
17	NC	43	GND
18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



MPCIE1

2-22. PCI EXPRESS SLOTS

PCI_E1 (X16): PCI_E1 (PCIE X16)



PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	PRSNT#1	A21	HSIP1	A41	GND
A2	+ 12V	A22	HSIN1	A42	GND
A3	+ 12V	A23	GND	A43	HSIP6
A4	GND	A24	GND	A44	HSIN6
A5	NC	A25	HSIP2	A45	GND
A6	NC	A26	HSIN2	A46	GND
A7	NC	A27	GND	A47	HSIP7
A8	NC	A28	GND	A48	HSIN7
A9	+ 3.3V	A29	HSIP3	A49	GND
A10	+ 3.3V	A30	HSIN3	A50	RSVD
A11	PERST#	A31	GND	A51	GND
A12	GND	A32	RSVD	A52	HSIP8
A13	REFCLK+	A33	RSVD	A53	HSIN8
A14	REFCLK-	A34	GND	A54	GND
A15	GND	A35	HSIP4	A55	GND
A16	HSIP0	A36	HSIN4	A56	HSIP9
A17	HSIN0	A37	GND	A57	HSIN9
A18	GND	A38	GND	A58	GND
A19	RSVD	A39	HSIP5	A59	GND
A20	GND	A40	HSIN5	A60	HSIP10

PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
A61	HSIN10	A69	HSIN12	A77	HSIN14
A62	GND	A70	GND	A78	GND
A63	GND	A71	GND	A79	GND
A64	HSIP11	A72	HSIP13	A80	HSIP15
A65	HSIN11	A73	HSIN13	A81	HSIN15
A66	GND	A74	GND	A82	GND
A67	GND	A75	GND	-	-
A68	HSIP12	A76	HSIP14	-	-

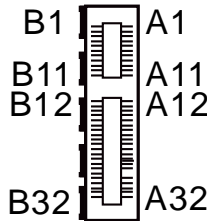
PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
B1	+ 12V	B22	GND	B43	GND
B2	+ 12V	B23	HSOP2	B44	GND
B3	+ 12V	B24	HSOP2	B45	HSOP7
B4	GND	B25	GND	B46	HSOP7
B5	SMB_CLK	B26	GND	B47	GND
B6	SMB_DATA	B27	HSOP3	B48	PRSNT#2
B7	GND	B28	HSOP3	B49	GND
B8	+ 3.3V	B29	GND	B50	HSOP8
B9	NC	B30	RSVD	B51	HSOP8
B10	+ 3.3V_AXU	B31	PRSNT#2	B52	GND
B11	WAKE#	B32	GND	B53	GND
B12	RSVD	B33	HSOP4	B54	HSOP9
B13	GND	B34	HSOP4	B55	HSOP9
B14	HSOP0	B35	GND	B56	GND
B15	HSOP0	B36	GND	B57	GND
B16	GND	B37	HSOP5	B58	HSOP10
B17	PRSNT#2	B38	HSOP5	B59	HSOP10
B18	GND	B39	GND	B60	GND
B19	HSOP1	B40	GND	B61	GND
B20	HSOP1	B41	HSOP6	B62	HSOP11
B21	GND	B42	HSOP6	B63	HSOP11

PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
B64	GND	B71	HSO13	B78	HSIP15
B65	GND	B72	GND	B79	HSIN15
B66	HSOP12	B73	GND	B80	GND
B67	HSO12	B74	HSOP14	B81	PRSNT#2
B68	GND	B75	HSIN14	B82	RSVD
B69	GND	B76	GND	-	-
B70	HSOP13	B77	GND	-	-

PCI_E2, PCI_E4 (X4): PCI_E2, PCI_E4 (PCIE X4)

PCI_E2, PCI_E4 are only supported in C236 and Q170 SKU.

Note1: H110 SKU PCI_E2 only supports PCIE X 1.

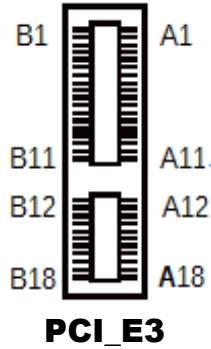


PCI_E2/PCI_E4

PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	PRSNT#1	A12	GND	A23	GND
A2	+ 12V	A13	REFCLK+	A24	GND
A3	+ 12V	A14	REFCLK-	A25	HSIP2
A4	GND	A15	GND	A26	HSIN2
A5	NC	A16	HSIP0	A27	GND
A6	NC	A17	HSIN0	A28	GND
A7	NC	A18	GND	A29	HSIP3
A8	NC	A19	RSVD	A30	HSIN3
A9	+ 3.3V	A20	GND	A31	GND
A10	+ 3.3V	A21	HSIP1	A32	RSVD
A11	PERST#	A22	HSIN1	-	-

PIN	ASSIGNMENT	PIN	ASSIGNMENT	PIN	ASSIGNMENT
B1	+ 12V	B12	RSVD	B23	HSOP2
B2	+ 12V	B13	GND	B24	HSOP2
B3	+ 12V	B14	HSOP0	B25	GND
B4	GND	B15	HSOP0	B26	GND
B5	SMB_CLK	B16	GND	B27	HSOP3
B6	SMB_DATA	B17	PRSNT#2	B28	HSOP3
B7	GND	B18	GND	B29	GND
B8	+ 3.3V	B19	HSOP1	B30	RSVD
B9	NC	B20	HSOP1	B31	PRSNT#2
B10	+ 3.3V_AXU	B21	GND	B32	GND
B11	WAKE#	B22	GND	-	-

PCI_E3 (X1): PCI_E3 (PCIE X1)



PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	PRSNT#1	A10	+ 3.3V
A2	+ 12V	A11	PERST#
A3	+ 12V	A12	GND
A4	GND	A13	REFCLK+
A5	NC	A14	REFCLK-
A6	NC	A15	GND
A7	NC	A16	HSIP0
A8	NC	A17	HSIN0
A9	+ 3.3V	A18	GND

PIN	ASSIGNMENT	PIN	ASSIGNMENT
B1	+ 12V	B10	+ 3.3V_AXU
B2	+ 12V	B11	WAKE#
B3	+ 12V	B12	RSVD
B4	GND	B13	GND
B5	SMB_CLK	B14	HSOP0
B6	SMB_DATA	B15	HSO0
B7	GND	B16	GND
B8	+ 3.3V	B17	PRSNT#2
B9	NC	B18	GND

2-23. CPU / SYSTEM FAN CONNECTORS

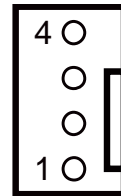
CPU_FAN1: CPU Fan Connector

SYS_FAN1: System Fan Connector 1

PIN	ASSIGNMENT
1	GND
2	VCC12
3	CPU_FANTAC
4	CPU_FANCTRL



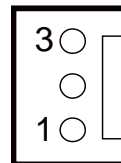
CPU_FAN1



SYS_FAN1

SYS_FAN2: System Fan Connector 2

PIN	ASSIGNMENT
1	GND
2	VCC12
3	NC



SYS_FAN2

2-24. Serial ATA (SATA) CONNECTORS

SATA1, SATA2, SATA3, SATA4, SATA5,
SATA6, SATA7, SATA8: SATA Connectors

SATA1-8 Pin Assignment:

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

Notes:

1. C236 SKU supports SATA1~SATA8.
2. Q170 SKU supports SATA1~SATA6.
3. H110 SKU supports SATA1~SATA4.



**SATA1/
SATA3/
SATA5/
SATA7/**

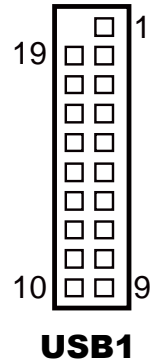


**SATA2/
SATA4/
SATA6/
SATA8/**

2-25. INTERNAL USB 3.0 CONNECTOR

USB1: Internal USB 3.0 Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5	11	USB2_P
2	USB3_RX_N	12	USB2_N
3	USB3_RX_P	13	GND
4	GND	14	USB3_TX_P
5	USB3_TX_N	15	USB3_TX_N
6	USB3_TX_P	16	GND
7	GND	17	USB3_RX_P
8	USB2_N	18	USB3_RX_N
9	USB2_P	19	VCC5
10	GND	-	

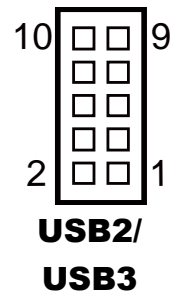


Note: USB1 is only available for C236/Q170 SKU, not available for H110 SKU.

2-26. INTERNAL USB 2.0 CONNECTORS

USB2, USB3: Internal USB 2.0 Connector

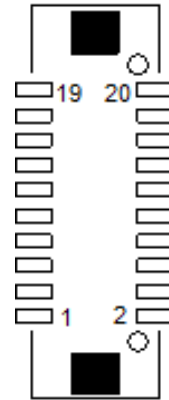
PIN	ASSIGNMENT
1	VCC5
2	VCC5
3	USB2_N
4	USB2_N
5	USB2_P
6	USB2_P
7	GND
8	GND
9	NC
10	GND



2-27. DISPLAY PORT CONNECTOR

DP1: Display Port Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DATA0+	11	GND
2	GND	12	DATA3-
3	DATA0-	13	AUX_EN#
4	DATA1+	14	GND
5	GND	15	AUX+
6	DATA1-	16	HPD
7	DATA2+	17	AUX
8	GND	18	VCC3
9	DATA2-	19	VCC5
10	DATA3+	20	VCC3



DP1

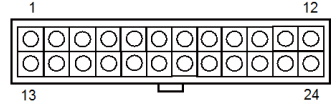
NOTE: BU-2509RA-D0P / D1P / D6P don't support DP.

2-28. POWER INPUT CONNECTORS

ATX_PWR1: ATX Connector

The pin assignments are as follows:

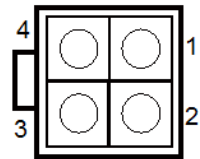
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+ 3.3V	13	+ 3.3V
2	+ 3.3V	14	-12V
3	GND	15	GND
4	+ 5V	16	PSON
5	GND	17	GND
6	+ 5V	18	GND
7	GND	19	GND
8	POK	20	-5V
9	+ 5V_SB	21	+ 5V
10	+ 12V	22	+ 5V
11	+ 12V	23	+ 5V
12	+ 3.3V	24	GND



ATX_PWR1

ATX_PWR2: Power Connector

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

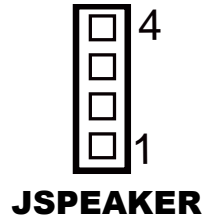


ATX_PWR2

2-29. SPEAKER CONNECTOR

JSPEAKER: Speaker Connector

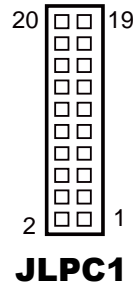
PIN	ASSIGNMENT
1	SPKR_VCC
2	SPKR_SIGNAL
3	SPKR_SIGNAL
4	SPKR_SIGNAL



2-30. LPC CONNECTOR

JLPC1: LPC Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	CLK	11	LAD0
2	GND	12	GND
3	FRAME	13	SMBCLK
4	NC	14	SMBDATA
5	RESET	15	3VSB
6	VCC5	16	SERIRQ
7	LAD3	17	GND
8	LAD2	18	CLK RUN
9	VCC3	19	SUS_TAT
10	LAD1	20	DREQ0



SOFTWARE UTILITIES

CHAPTER **3**

This chapter comprises the detailed information of VGA driver, LAN driver, and Sound driver.

The following sections are included:

- Introduction.
- Intel® Chipset Software Installation Utility
- Intel® Trusted Execution Engine Installation Utility
- VGA Driver Utility
- LAN Driver Utility
- Sound Driver Utility

3-1. INTRODUCTION

Enclosed with our BU-2509 package are our driver utilities, which come in a DVD-ROM disk. Refer to the following table for driver locations.

Filename (Assume that DVD ROM drive is D :)	Purpose	OS			
		DOS	Win7	Win8.1	Win10
D:\H110\Driver\FIash BIOS	For BIOS update utility	✓			
D:\H110\Driver\Plaform\Win7(32-bit)\Main Chip	Intel® Chipset Device Software installer		✓	✓	✓
D:\H110\Driver\Plaform\Win7(32-bit)\VGA	Intel® HD Graphics installer		✓	✓	✓
D:\H110\Driver\Plaform\Win7(32-bit)\LAN	Intel® Network Connections Software		✓	✓	✓
D:\H110\Driver\Plaform\Win7(32-bit)\Sound	Realtek High Definition Audio System Software		✓	✓	✓
D:\H110\Driver\Plaform\Win7(32-bit)\USB3.0	Intel® USB 3.0 eXtensible Host Controller		✓	✓	✓
D:\H110\Driver\Plaform\Win7(32-bit)\ME	Intel® Management Engine Components installer		✓	✓	✓
D:\H110\Driver\Plaform\Win7(64-bit)\Main Chip	Intel® Chipset Device Software installer		✓	✓	✓
D:\H110\Driver\Plaform\Win7(64-bit)\VGA	Intel® HD Graphics installer		✓	✓	✓
D:\H110\Driver\Plaform\Win7(64-bit)\LAN	Intel® Network Connections Software		✓	✓	✓
D:\H110\Driver\Plaform\Win7(64-bit)\Sound	Realtek High Definition Audio System Software		✓	✓	✓
D:\H110\Driver\Plaform\Win7(64-bit)\USB3.0	Intel® USB 3.0 eXtensible Host Controller		✓	✓	✓
D:\H110\Driver\Plaform\Win7(64-bit)\ME	Intel® Management Engine Components installer		✓	✓	✓
D:\H110\Driver\Plaform\Win8.1(64-bit)\Main Chip	Intel® Chipset Device Software installer		✓	✓	✓
D:\H110\Driver\Plaform\Win8.1(64-bit)\VGA	Intel® HD Graphics installer		✓	✓	✓
D:\H110\Driver\Plaform\Win8.1(64-bit)\LAN	Intel® Network Connections Software		✓	✓	✓
D:\H110\Driver\Plaform\Win8.1(64-bit)\Sound	Realtek High Definition Audio System Software		✓	✓	✓

Filename (Assume that DVD ROM drive is D :)	Purpose	OS			
		DOS	Win7	Win8.1	Win10
D:\H110\Driver\Plaform\Win8.1(64-bit)\USB3.0	Intel® USB 3.0 eXtensible Host Controller		✓	✓	✓
D:\H110\Driver\Plaform\Win8.1(64-bit)\ME	Intel® Management Engine Components installer		✓	✓	✓
D:\H110\Driver\Plaform\Win10(64-bit)\Main Chip	Intel® Chipset Device Software installer		✓	✓	✓
D:\H110\Driver\Plaform\Win10(64-bit)\VGA	Intel® HD Graphics installer		✓	✓	✓
D:\H110\Driver\Plaform\Win10(64-bit)\LAN	Intel® Network Connections Software		✓	✓	✓
D:\H110\Driver\Plaform\Win10(64-bit)\Sound	Realtek High Definition Audio System Software		✓	✓	✓
D:\H110\Driver\Plaform\Win10(64-bit)\USB3.0	Intel® USB 3.0 eXtensible Host Controller		✓	✓	✓
D:\H110\Driver\Plaform\Win10(64-bit)\ME	Intel® Management Engine Components installer		✓	✓	✓
D:\Q170\Driver\Flash BIOS	For BIOS update utility	✓			
D:\Q170\Driver\Plaform\Win7(32-bit)\Main Chip	Intel® Chipset Device Software installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(32-bit)\VGA	Intel® HD Graphics installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(32-bit)\LAN	Intel® Network Connections Software		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(32-bit)\Sound	Realtek High Definition Audio System Software		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(32-bit)\USB3.0	Intel® USB 3.0 eXtensible Host Controller		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(32-bit)\RAID	Intel® Rapid Storage Technology (Intel® RST).		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(32-bit)\ME	Intel® Management Engine Components installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(64-bit)\Main Chip	Intel® Chipset Device Software installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(64-bit)\VGA	Intel® HD Graphics installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(64-bit)\LAN	Intel® Network Connections Software		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(64-bit)\Sound	Realtek High Definition Audio System Software		✓	✓	✓

Filename (Assume that DVD ROM drive is D :)	Purpose	OS			
		DOS	Win7	Win8.1	Win10
D:\Q170\Driver\Plaform\Win7(64-bit)\USB3.0	Intel® USB 3.0 eXtensible Host Controller		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(64-bit)\ME	Intel® Management Engine Components installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win7(64-bit)\RAID	Intel® Rapid Storage Technology (Intel® RST).		✓	✓	✓
D:\Q170\Driver\Plaform\Win8.1(64-bit)\Main Chip	Intel® Chipset Device Software installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win8.1(64-bit)\VGA	Intel® HD Graphics installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win8.1(64-bit)\LAN	Intel® Network Connections Software		✓	✓	✓
D:\Q170\Driver\Plaform\Win8.1(64-bit)\Sound	Realtek High Definition Audio System Software		✓	✓	✓
D:\Q170\Driver\Plaform\Win8.1(64-bit)\USB3.0	Intel® USB 3.0 eXtensible Host Controller		✓	✓	✓
D:\Q170\Driver\Plaform\Win8.1(64-bit)\ME	Intel® Management Engine Components installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win8.1(64-bit)\RAID	Intel® Rapid Storage Technology (Intel® RST).		✓	✓	✓
D:\Q170\Driver\Plaform\Win10(64-bit)\Main Chip	Intel® Chipset Device Software installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win10(64-bit)\VGA	Intel® HD Graphics installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win10(64-bit)\LAN	Intel® Network Connections Software		✓	✓	✓
D:\Q170\Driver\Plaform\Win10(64-bit)\Sound	Realtek High Definition Audio System Software		✓	✓	✓
D:\Q170\Driver\Plaform\Win10(64-bit)\USB3.0	Intel® USB 3.0 eXtensible Host Controller		✓	✓	✓
D:\Q170\Driver\Plaform\Win10(64-bit)\ME	Intel® Management Engine Components installer		✓	✓	✓
D:\Q170\Driver\Plaform\Win10(64-bit)\RAID	Intel® Rapid Storage Technology (Intel® RST).		✓	✓	✓

3-2. Intel® Chipset Device Software installer

3-2-1. Introduction

The Intel® Chipset Device Software installs 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 features function properly:

- Core PCI and ISAPNP Services
- PCIe Support
- IDE/ATA33/ATA66/ATA100 Storage Support
- SATA Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

3-2-2. Installation of Utility for Windows 7/8.1/10

The Utility Pack is to be installed only for Windows 7/8.1/10 series, and it should be installed right after the OS installation. Please follow the steps below:

1. Insert the driver disk into a DVD-ROM device.
2. Under Windows system, go to the directory where the Utility driver is located.
3. Run the application with administrative privileges.

3-3. INTEL[®] TRUSTED EXECUTION ENGINE INSTALLATION UTILITY

3-3-1. Introduction

Pre-install Microsoft's Kernel-Mode Driver Framework (KMDF) version 1.11 for Windows 7/8.1/10 before you install the Intel[®] Trusted Execution Engine (TXE) driver in order to avoid errors in Device Manager.

3-3-2. Installation Instructions for Windows 7/8.1/10

1. Insert the driver disk into a DVD-ROM device.
2. Under Windows system, go to the directory where the driver is located.
3. Run the application with administrative privileges.

3-4. VGA DRIVER UTILITY

3-4-1. Introduction

The VGA interface embedded with our BU-2509 can support a wide range of display.

3-4-2. Installation of VGA Driver

To install the VGA Driver, simply follow the following steps:

1. Insert the driver disk into a DVD-ROM device.
2. Under Windows system, go to the directory where the VGA driver is located.
3. Run the application with administrative privileges.

3-5. LAN DRIVER UTILITY

3-5-1. Introduction

BU-2509 is enhanced with LAN function that can support various network adapters. Installation programs for LAN drivers are listed as follows:

For more details on Installation procedure, please refer to Readme.txt file found on LAN Driver Utility.

3-6. SOUND DRIVER UTILITY

3-6-1. Introduction

The Realtek sound function enhanced in this system is fully compatible with Windows 7/8.1. Below, you will find the content of the Sound driver:

3-6-2. Installation of Sound Driver

1. Insert the driver disk into a DVD-ROM device.
2. Under Windows system, go to the directory where the Sound driver is located.
3. Run the application with administrative privileges.
4. Follow the instructions on the screen to complete the installation.
5. Once the installation is completed, shut down the system and restart it in order for the changes to take effect.

AMI BIOS SETUP

CHAPTER

4

This chapter shows how to set up the AMI BIOS.

The following sections are included:

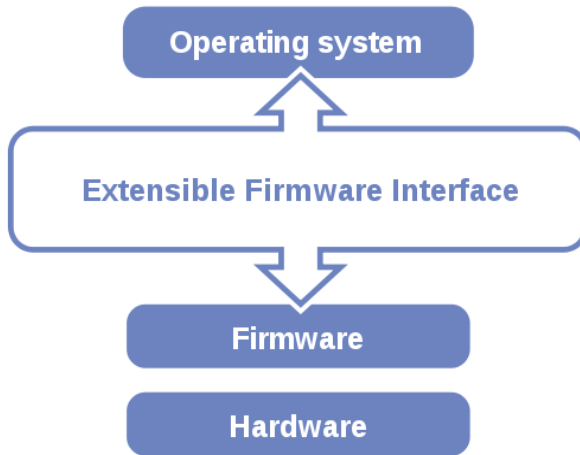
- Introduction
- Entering Setup
- Main
- Advanced
- Chipset
- Boot
- Security
- Save & Exit

4-1. INTRODUCTION

The system **BU-2509** uses an AMI Aptio BIOS that is stored in the Serial Peripheral Interface Flash Memory (SPI Flash) and can be updated. The SPI Flash contains the BIOS Setup program, Power-on Self-Test (POST), the 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.

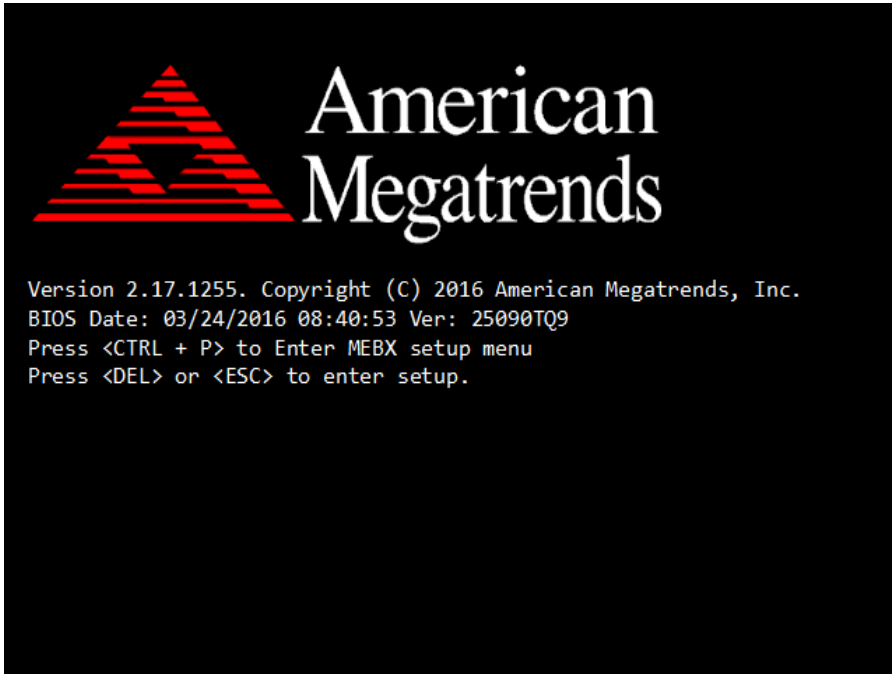


EFI BIOS provides an user interface that allows you to modify hardware configuration, e.g. change the system date and time, enable/disable a system component, determine bootable device priority, set up personal password, etc., which is convenient for engineers to perform modifications and customize the 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 or <Esc> immediately while the POST message is running before the operating system is loading.

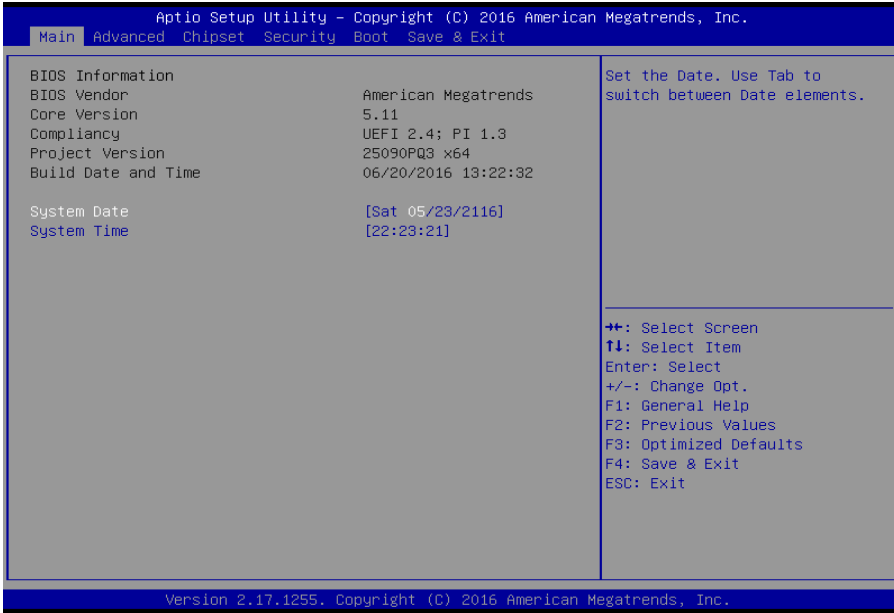
4-2. ENTERING SETUP UTILITY

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



POST Screen

Press the or <Esc> key 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 up/down keys to highlight the individual menu items. As you highlight each item, a brief description of the highlighted selection will appear at the bottom of the screen.

4-3. MAIN

Menu Path *Main*



Main Screen

Use <↑> or <↓> arrow keys to highlight the item and key in the value you want in each item. This menu provides basic system configurations, such as system date and time.

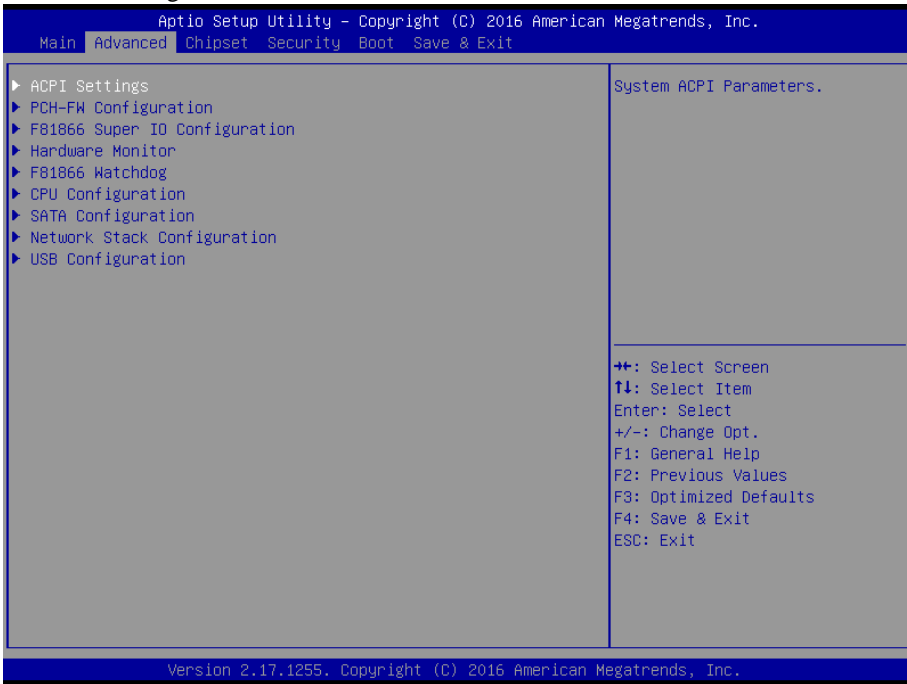
BIOS Setting	Options	Description/Purpose
BIOS Vendor	No changeable options	Displays the name of the BIOS vendor.
Core Version	No changeable options	Displays the current BIOS core version.
Compliance	No changeable options	Displays the current UEFI version.
Project Version	No changeable options	Displays 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.
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.

BIOS Setting	Options	Description/Purpose
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.

4-4. ADVANCED

Menu Path *Advanced*

This menu provides advanced configurations such as ACPI Settings, PCH-FW Configuration, F81866 Super IO Configuration, Hardware Monitor, F81866 Watchdog, CPU Configuration, SATA Configuration, Network Stack Configuration and USB Configuration.



Advanced Screen

BIOS Setting	Options	Description/Purpose
ACPI Settings	Sub-Menu	System ACPI Parameters.
PCH-FW Configuration	Sub-Menu	Management Engine Technology Parameters.
F81866 Super IO Configuration	Sub-Menu	System Super IO Chip Parameters.
Hardware Monitor	Sub-Menu	Monitor hardware status.

BIOS Setting	Options	Description/Purpose
F81866 Watchdog	Sub-Menu	F81866 Watchdog Parameters.
CPU Configuration	Sub-Menu	CPU Configuration Parameters.
SATA Configuration	Sub-Menu	SATA Device Options Settings.
Network Stack Configuration	Sub-Menu	Network Stack Settings.
USB Configuration	Sub-Menu	USB Configuration Parameters.

4-4-1. 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 Hibernation, ACPI Sleep State, lock legacy resources, etc.



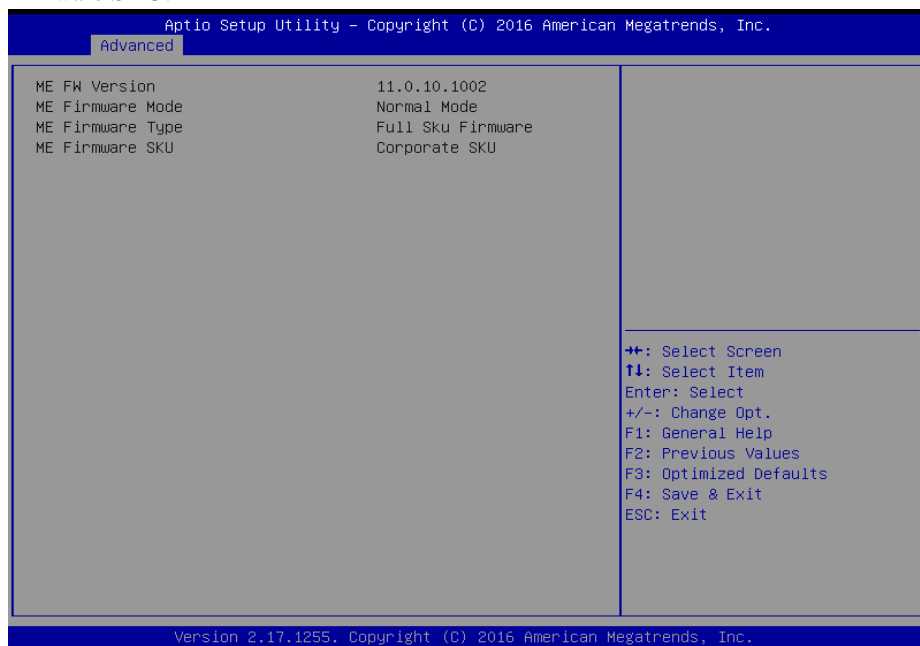
ACPI Settings Screen

BIOS Setting	Options	Description/Purpose
Enable Hibernation	- Disabled - Enabled	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)	Selects the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
Lock Legacy Resources	- Disabled - Enabled	Enables or Disables Lock of Legacy Resources.
S3 Video Repost	- Disabled - Enabled	Enables or Disables S3 Video Repost.

4-4-2. 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 ME firmware version, firmware mode, firmware type and firmware SKU.

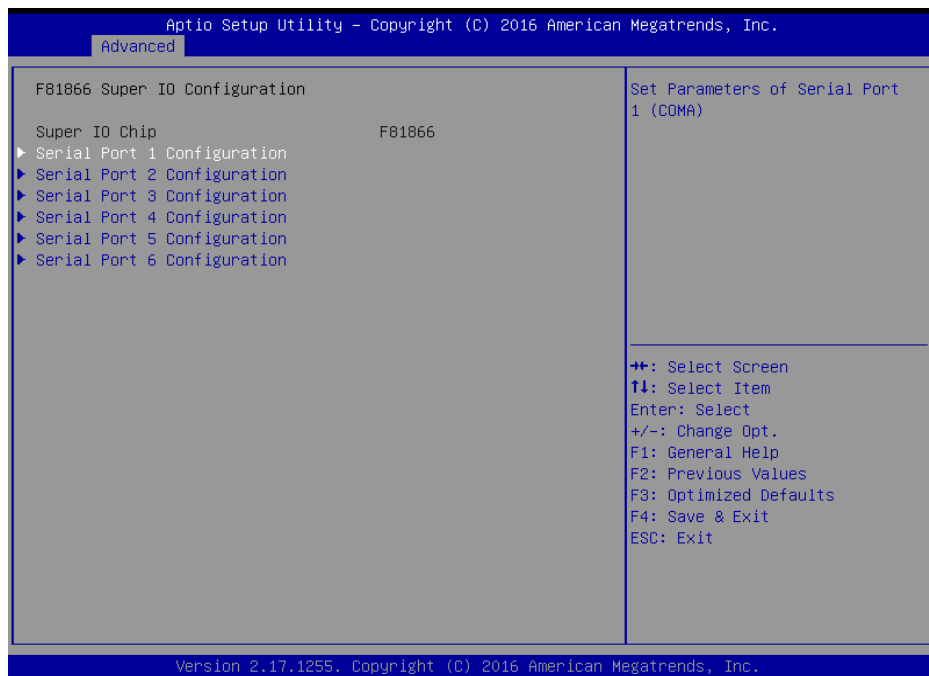


PCH-FW Configuration Screen

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

4-4-3. Advanced - F81866 Super IO Configuration

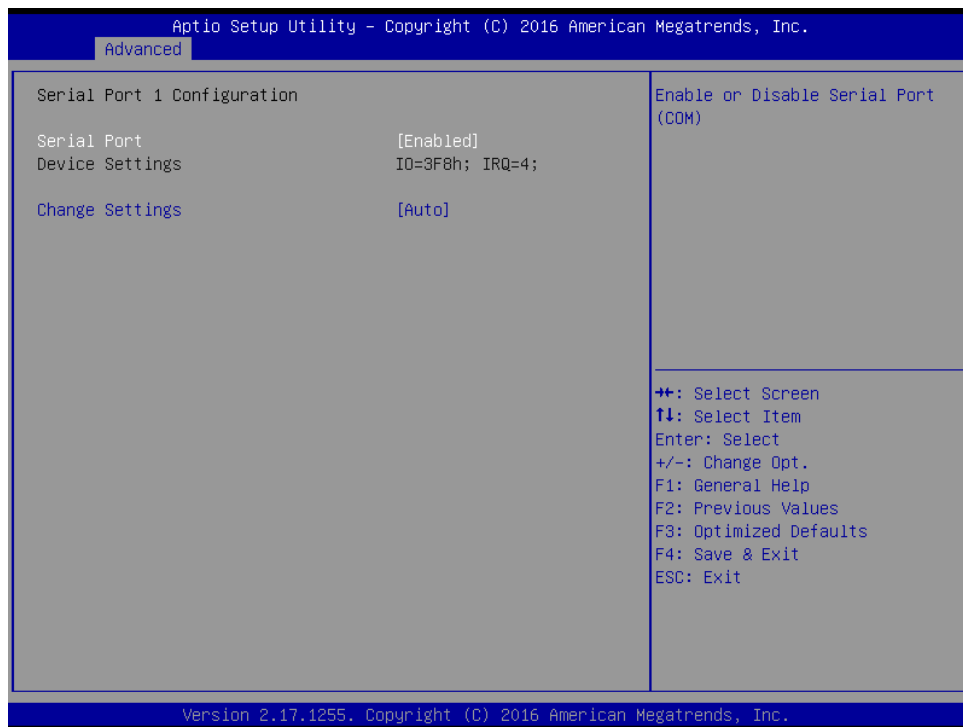
Menu Path *Advanced > F81866 Super IO Configuration*



F81866 Super IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port 1 Configuration	Sub-menu	Sets parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Sub-menu	Sets parameters of Serial Port 2 (COMB).
Serial Port 3 Configuration	Sub-menu	Sets parameters of Serial Port 3 (COMC).
Serial Port 4 Configuration	Sub-menu	Sets parameters of Serial Port 4 (COMD).
Serial Port 5 Configuration	Sub-menu	Sets parameters of Serial Port 5 (COME).
Serial Port 6 Configuration	Sub-menu	Sets parameters of Serial Port 6 (COMF).

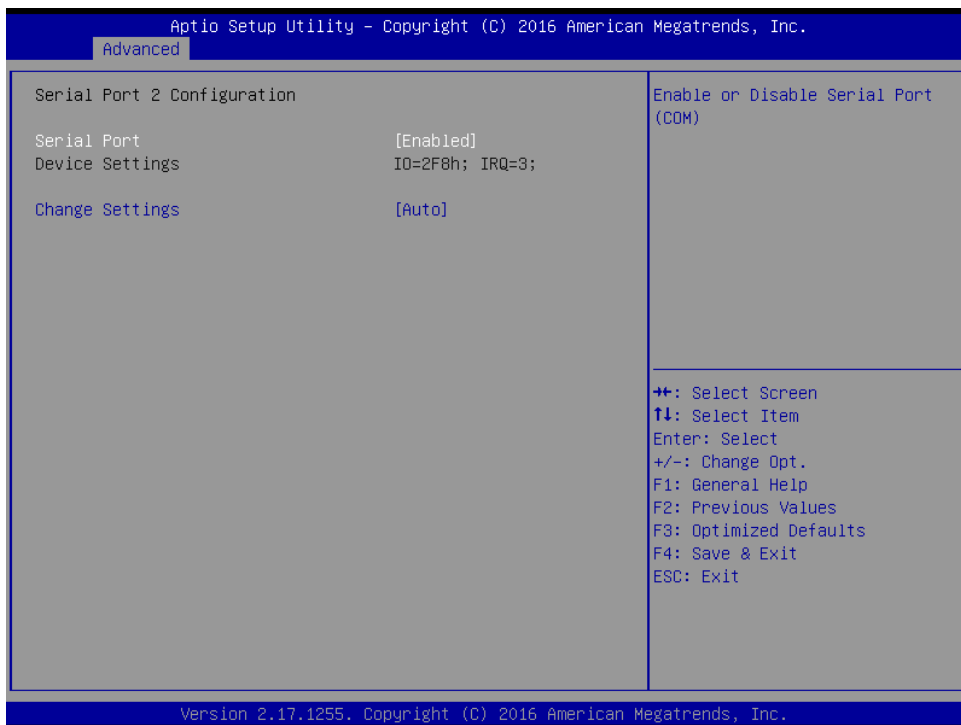
Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 1 Configuration*



Serial Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 1.
Device settings	No changeable options	Displays the current settings of Serial Port 1.
Change Settings	- Auto - 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 settings for Serial Port 1.

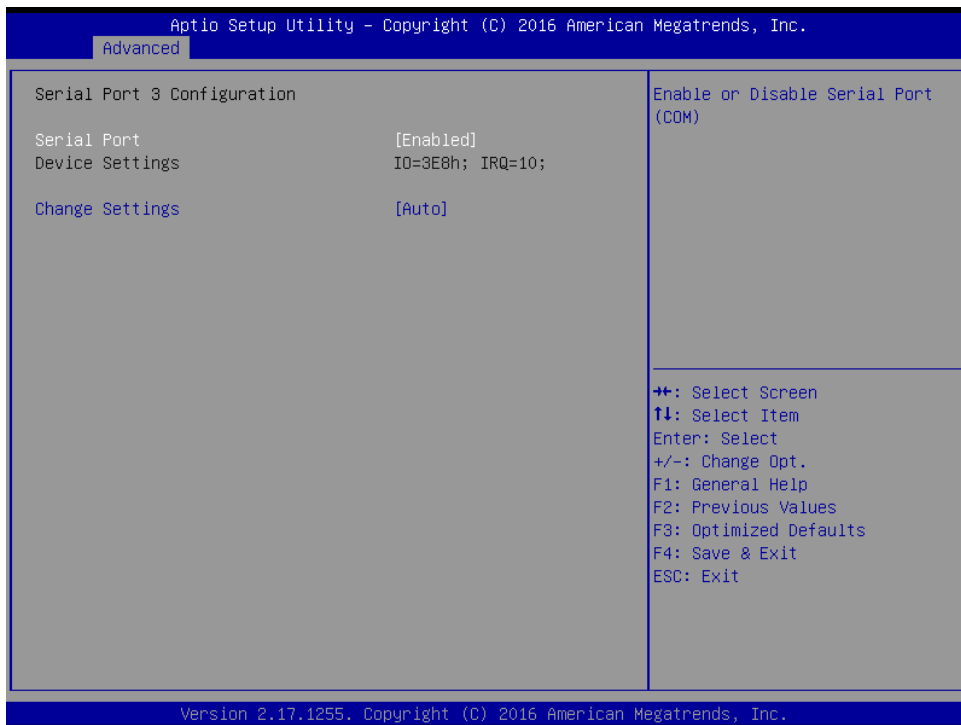
Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 2 Configuration*



Serial Port 2 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 2.
Device Settings	No changeable options	Displays the current settings of Serial Port 2.
Change Settings	- Auto - 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 settings for Serial Port 2.

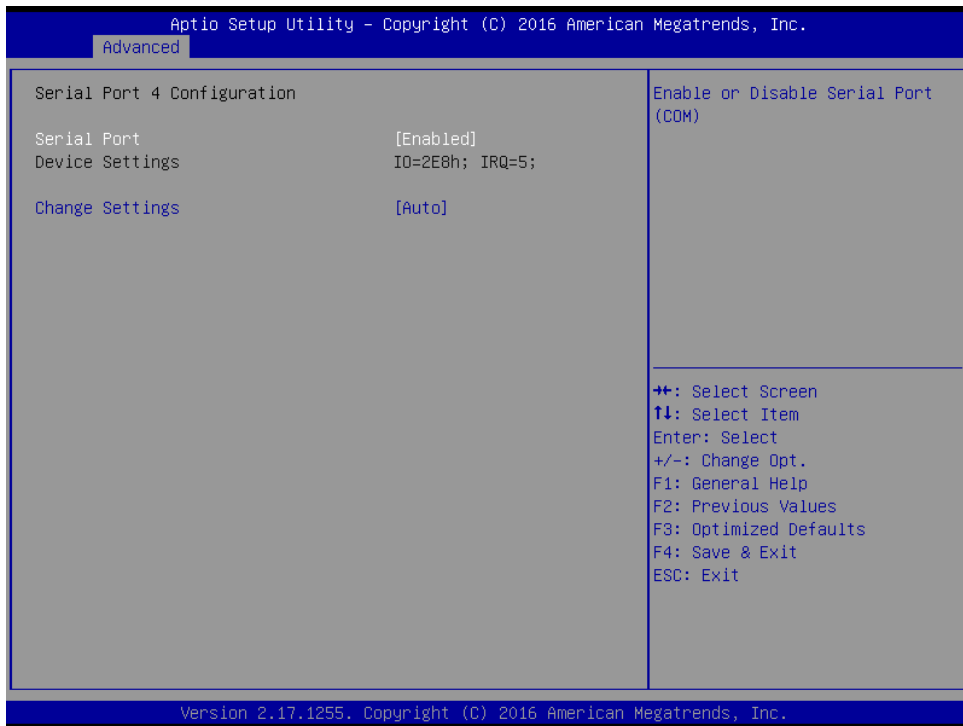
Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 3 Configuration*



Serial Port 3 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 3.
Device Settings	No changeable options	Displays the current settings of Serial Port 3.
Change Settings	- Auto - 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 settings for Serial Port 3.

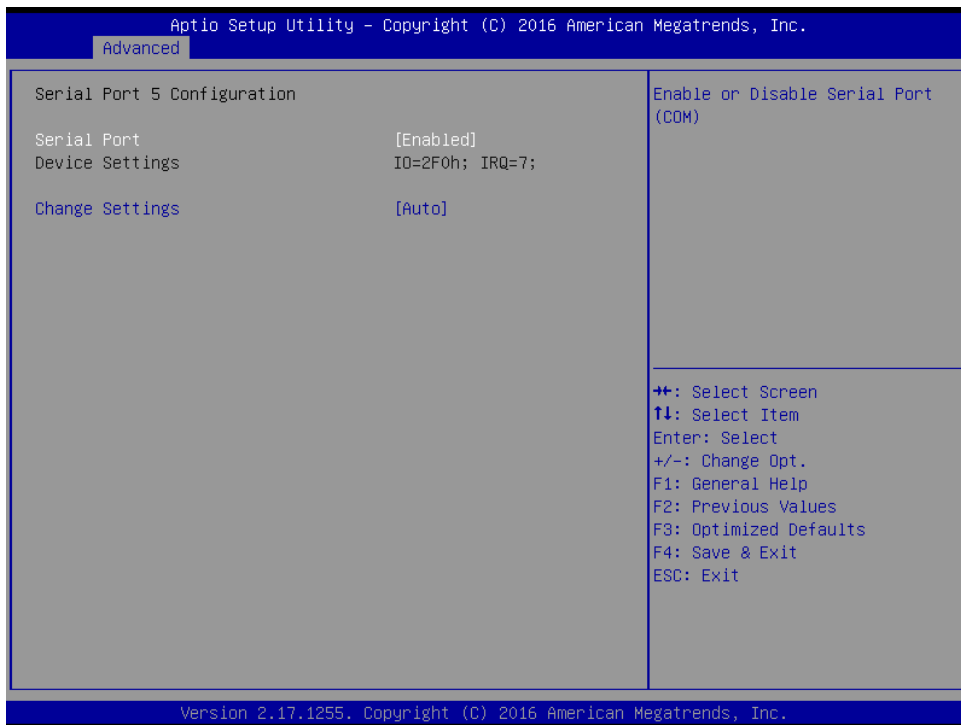
Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 4 Configuration*



Serial Port 4 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 4.
Device Settings	No changeable options	Displays the current settings of Serial Port 4.
Change Settings	- Auto - IO=2E8h; IRQ=10; - 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 settings for Serial Port 4.

Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 5 Configuration*



Serial Port 5 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 5.
Device Settings	No changeable options	Displays the current settings of Serial Port 5.
Change Settings	- Auto - IO=2F0h; IRQ=6; - 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 settings for Serial Port 5.

Menu Path *Advanced > F81866 Super IO Configuration > Serial Port 6 Configuration*



Serial Port 6 Configuration Screen

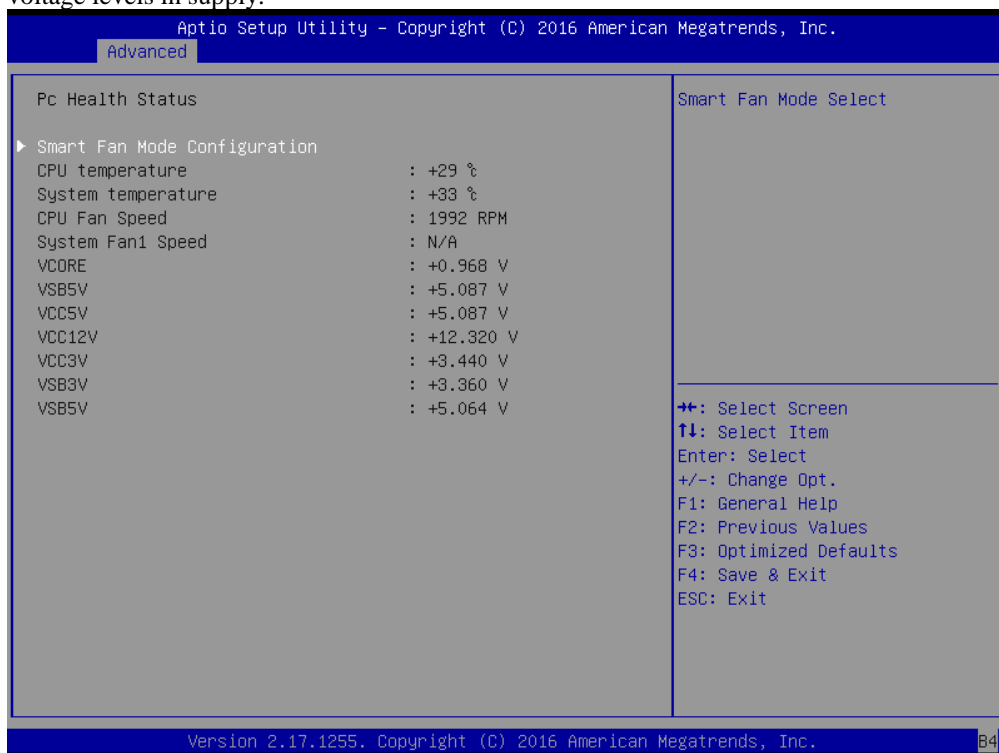
BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled	Enables or Disables Serial Port 6.
Device Settings	No changeable options	Displays the current settings of Serial Port 6.
Change Settings	- Auto - IO=2F0h; IRQ=7; - IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12; - 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 settings for Serial Port 6.
Device Mode	- Disables IR1 function	Enables or Disables IR Mode

BIOS Setting	Options	Description/Purpose
	<ul style="list-style-type: none"> - Enables IR1 function, active pulse 1.6uS - Enables IR1 function, active pulse 3/16 bit time. 	function.

4-4-4. Advanced – Hardware Monitor

Menu Path *Advanced > Hardware Monitor*

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

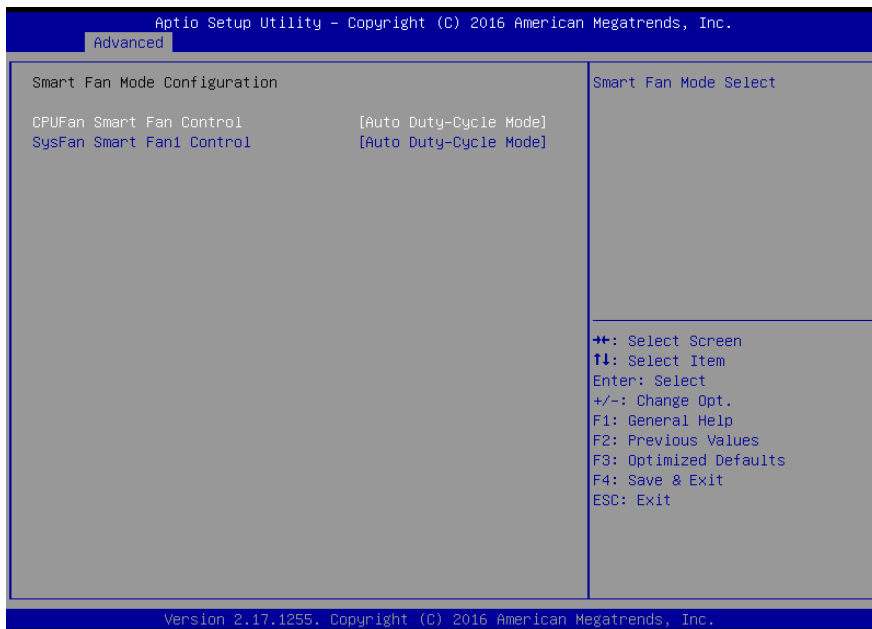


Hardware Monitor Screen

BIOS Setting	Options	Description/Purpose
Smart Fan Mode Configuration	Sub-Menu	Smart Fan Mode Select
CPU Temperature	No changeable options	Displays the processor's temperature.
System Temperature	No changeable options	Displays the system's temperature.
CPU Fan Speed	No changeable options	Displays CPU Fan speed.
System Fan Speed	No changeable options	Displays System Fan speed
VCORE	No changeable options	Displays the voltage level of VCORE in supply.
VS5V	No changeable options	Displays the voltage level of VS5V in supply.
VCC5V	No changeable options	Displays the voltage level of VCC5V in supply.
VCC12V	No changeable options	Displays the voltage level of VCC12V in supply.
VCC3V	No changeable options	Displays the voltage level of VCC3V in supply.
VS3V	No changeable options	Displays the voltage level of VS3V in supply.
VS5V	No changeable options	Displays the voltage level of VS5V in supply.

4-4-5. Advanced – Smart Fan Mode Configuration

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



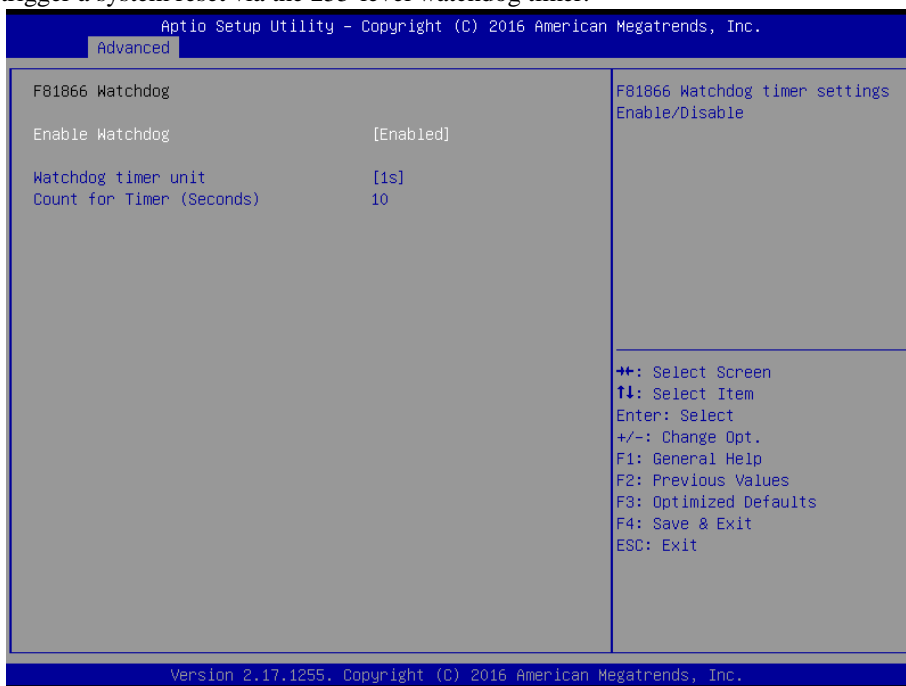
Smart Fan Mode Configuration Screen

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

4-4-5. Advanced – F81866 Watchdog Configuration

Menu Path *Advanced > F81866 Watchdog*

If the system hangs or fails to respond, enable the F81866 watchdog function to trigger a system reset via the 255-level watchdog timer.



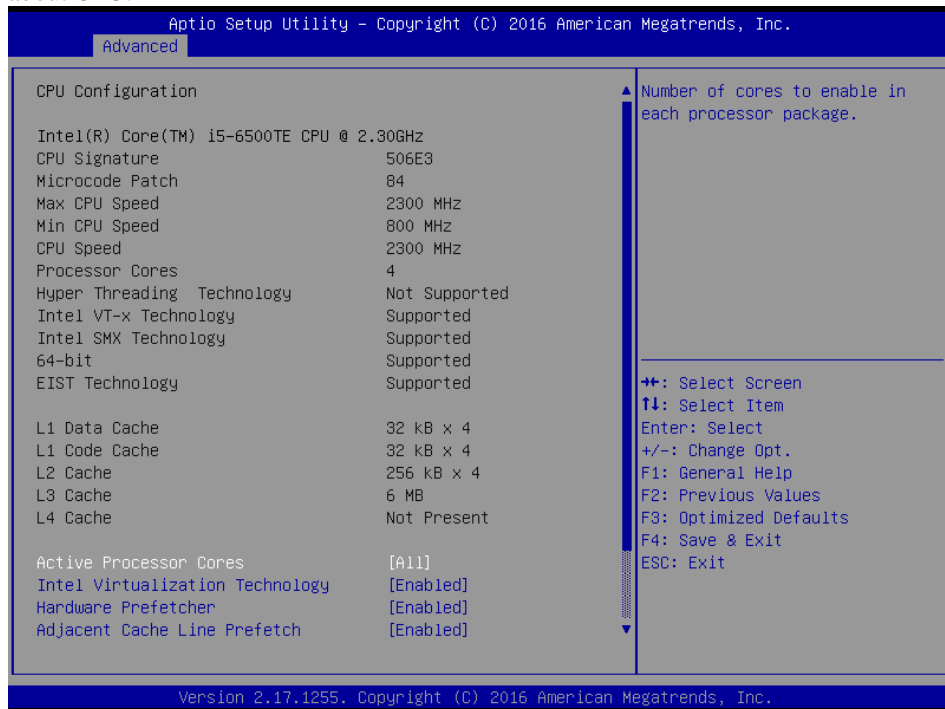
F81866 Watchdog Configuration Screen

BIOS Setting	Options	Description/Purpose
Enable Watchdog	- Enabled - Disabled	Enables/Disables F81866 Watchdog timer settings.
Watchdog timer unit	- 1s - 60s	Selects 1s (second) or 60s (minute) as the time unit of Watchdog timer.
Count for Timer	Numeric (from 1 to 255)	Sets the timeout for Watchdog timer. (Max. value: 255 seconds or minutes)

4-4-6. Advanced – CPU Configuration

Menu Path *Advanced > CPU Configuration*

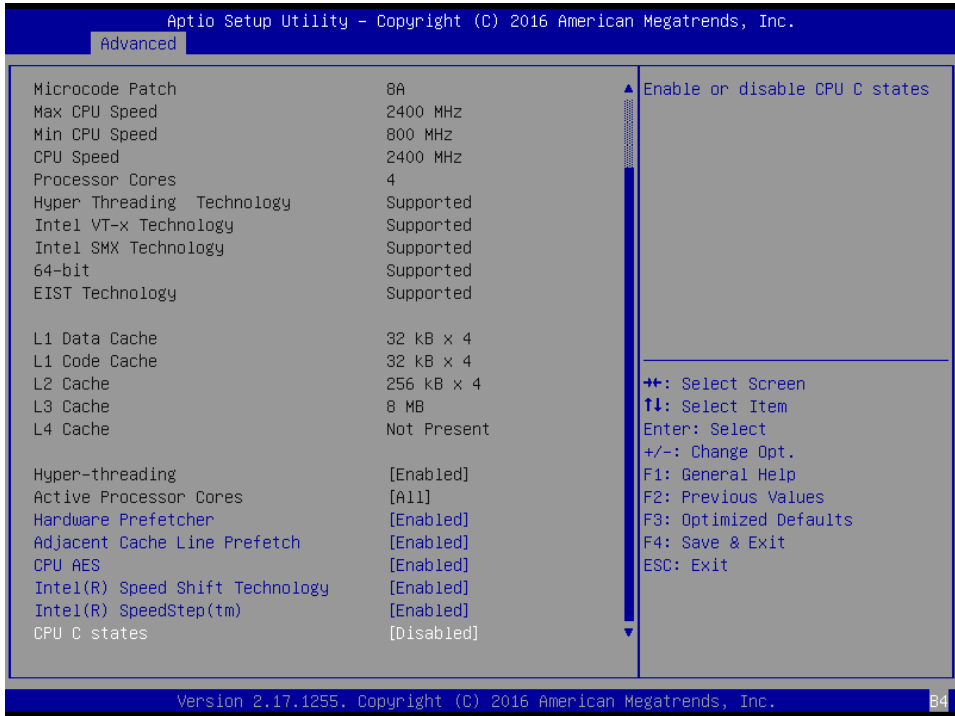
The **CPU Configuration** provides advanced CPU settings and some information about CPU.



CPU Configuration Screen 1

BIOS Setting	Options	Description/Purpose
CPU Signature	No changeable options	Displays CPU Signature.
Microcode Patch	No changeable options	CPU Microcode Patch Revision.
Max CPU Speed	No changeable options	Displays the maximum CPU speed.
Min CPU Speed	No changeable options	Displays the minimum CPU speed.
CPU Speed	No changeable options	Displays the CPU speed.
Processor Cores	No changeable options	Displays the number of cores of the processor.
Hyper Threading Technology	No changeable options	Reports if Intel Hyper-Threading Technology is supported by the

BIOS Setting	Options	Description/Purpose
		processor. Hyper Threading is Intel's term for its simultaneous multithreading implementation in their CPUs. Enable this function will improve parallelization of computation performed on PC microprocessor. For each processor core that is physically present, the operating system addresses two virtual processors, and shares the workload between them when possible.
Intel VT-x Technology	No changeable options	Reports if Intel VT-x Technology is supported by the processor. Previously codenamed "Vanderpool", VT-x represents Intel's technology for virtualization on the x86 platform. Utilizing Vanderpool Technology (VT), a VMM (Virtual Machine Monitor) can utilize the additional hardware capabilities.
Intel SMX (Secure Mode Extensions) Technology	No changeable options	Reports if Intel Secure Mode Extensions Technology is supported by the processor.
64-bit	No changeable options	Reports if the processor supports Intel x86-64 (amd64) implementation.
EIST Technology	No changeable options	Report if the processor supports Intel Enhanced SpeedStep Technology.
L1 Data Cache	No changeable options	Displays L1 Data Cache size.
L1 Code Cache	No changeable options	Displays L1 Code Cache size.
L2 Cache	No changeable options	Displays L2 Cache size.
L3 Cache	No changeable options	Displays L3 Cache size.
L4 Cache	No changeable options	Displays L4 Cache size
Active Processor Cores	- All - 1 to n (depends on CPU)	Number of cores to enable in each processor package.



CPU Configuration Screen 2

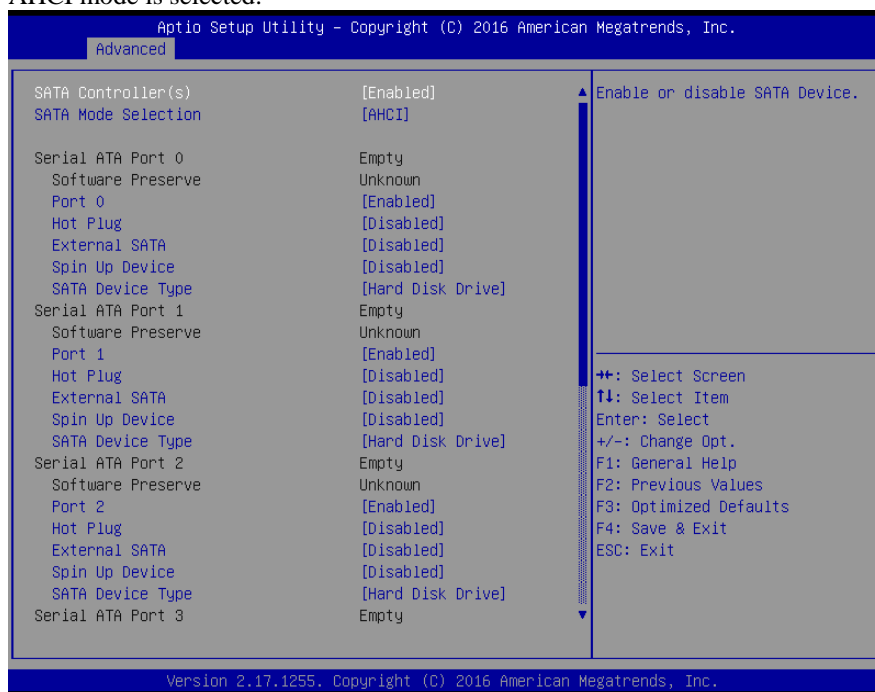
BIOS Setting	Options	Description/Purpose
Intel Virtualization Technology	- Disabled - Enabled	When enabled, a VMM (Virtual Machine Monitor) can utilize the additional hardware capabilities provided by Vanderpool Technology (VT).
Hardware Prefetcher	- Disabled - Enabled	To turn on/off the MLC streamer prefetcher.
Adjacent Cache Line Prefetch	- Disabled - Enabled	Turns on/off prefetching of adjacent cache lines.
CPU AES	- Disabled - Enabled	Enables/Disables CPU Advanced Encryption Standard instructions.
Intel(R) Speed Shift Technology	- Disabled - Enabled	Enabling Intel(R) Speed Shift Technology will expose the CPPC v2 interface to allow for hardware controlled P-states.
Intel(R) SpeedStep(tm)	- Disabled - Enabled	Allows more than two frequency ranges to be supported.

BIOS Setting	Options	Description/Purpose
CPU C states	- Disabled - Enabled	Enables or Disables CPU C states.
Enhanced C-states	- Disabled - Enabled	When enabled, CPU will switch to minimum speed when all cores enter C-State.

4-4-7. Advanced - SATA Configuration (AHCI Mode)

Menu Path *Advanced > SATA Configuration*

The **SATA Configuration** allows users to enable / disable the SATA controller as well as the operational mode after the SATA controller is enabled. The following screen indicates the functions available when the SATA controller is enabled and the AHCI mode is selected.



SATA Configuration Screen

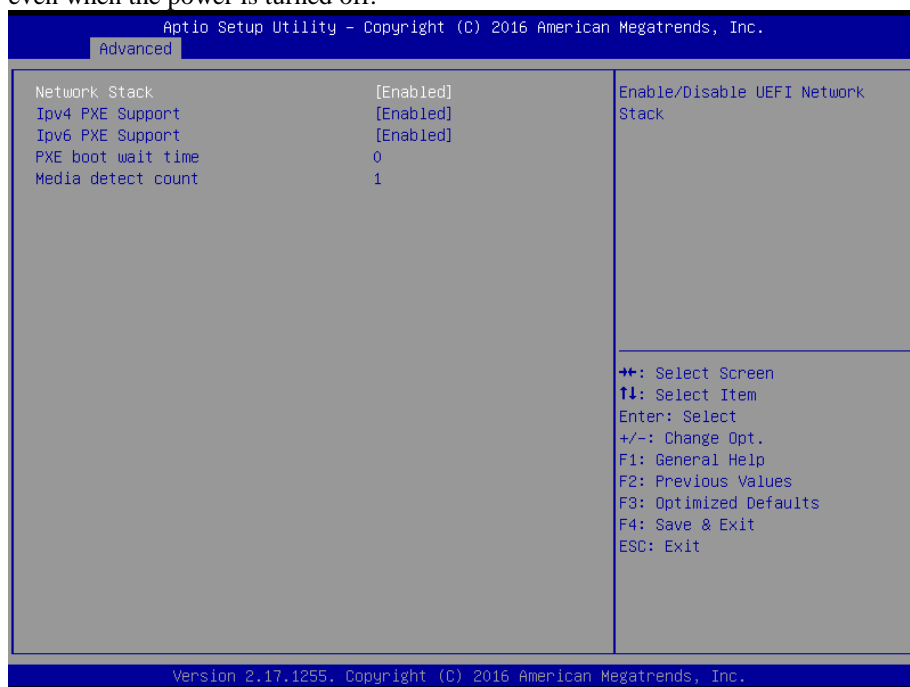
BIOS Setting	Options	Description/Purpose
SATA Controller(s)	- Disabled - Enabled	Enables or Disables SATA Device.
SATA Mode	- AHCI - RAID	Determines how SATA controller(s) operate.
Alternate ID	- Disabled - Enabled	Reports the alternate device ID.
Serial ATA Port 0 – 3 for H110 sku. Serial ATA Port 0 – 5 for Q170 sku. Serial ATA Port 0 – 7 for C236 sku.	No changeable options	Displays the SATA device's name.
Software Preserve	No changeable options	Indicates whether the connected SATA device supports Software Setting Preservation (SSP).
Port 0-3 for H110 sku. Port 0-5 for Q170 sku. Port 0-7 for C236 sku.	- Disabled - Enabled	Enable or Disable SATA Port Device.
Hot Plug	- Disabled - Enabled	Enables or Disables Hot Plug function to designate a SATA port device as hot-pluggable.
Spin Up Device	- Disabled - Enabled	On an edge detection from 0 to 1, the PCH starts a COMRESET initialization sequence to the device.
SATA Device Type	- Hard Disk Drive - Solid State Drive	Identifies the SATA port is connected to Solid State Drive or Hard Disk Drive.

4-4-8. 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

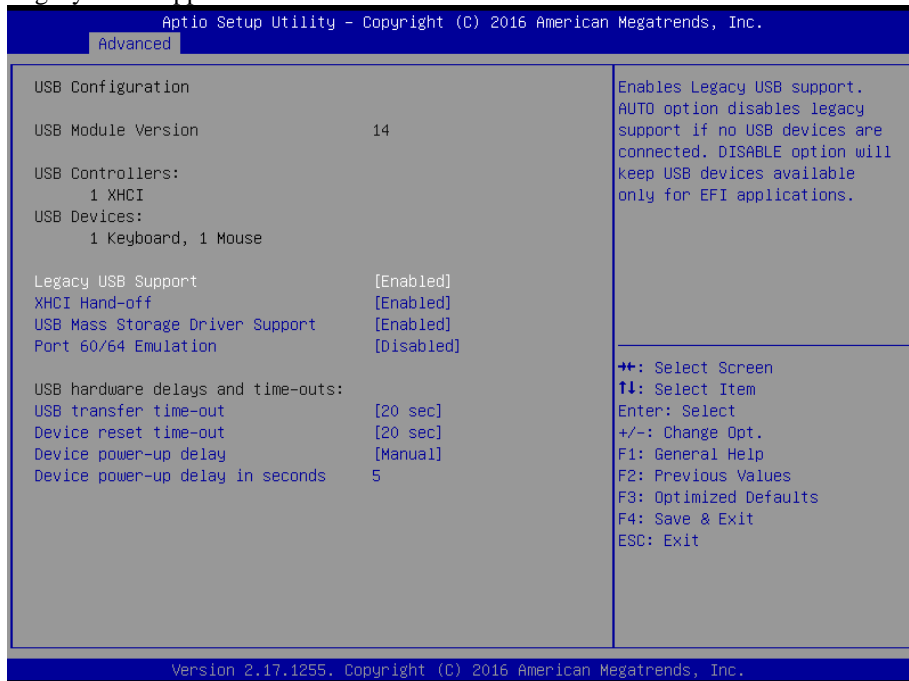
BIOS Setting	Options	Description/Purpose
Network Stack	- Disabled - Enabled	Enables or Disables UEFI Network Stack.

BIOS Setting	Options	Description/Purpose
Ipv4 PXE Support	- Disabled - Enabled	Enables IPv4 PXE Boot Support. If disabled, IPv4 PXE boot option will not be created.
Ipv6 PXE Support	- Disabled - Enabled	Enables IPv6 PXE Boot Support. If disabled, IPv6 PXE boot option will not be created.
PXE boot wait time	Numeric (from 0 to 5)	Number of seconds to wait for PXE boot to abort after the Esc key is pressed.
Media detect count	Numeric (from 1 to 50)	Number of times that the media presence will be checked.

4-4-9. Advanced - USB Configuration

Menu Path *Advanced > USB Configuration*

The **USB Configuration** allows users to configure advanced USB settings such as Legacy USB support.



USB Configuration Screen

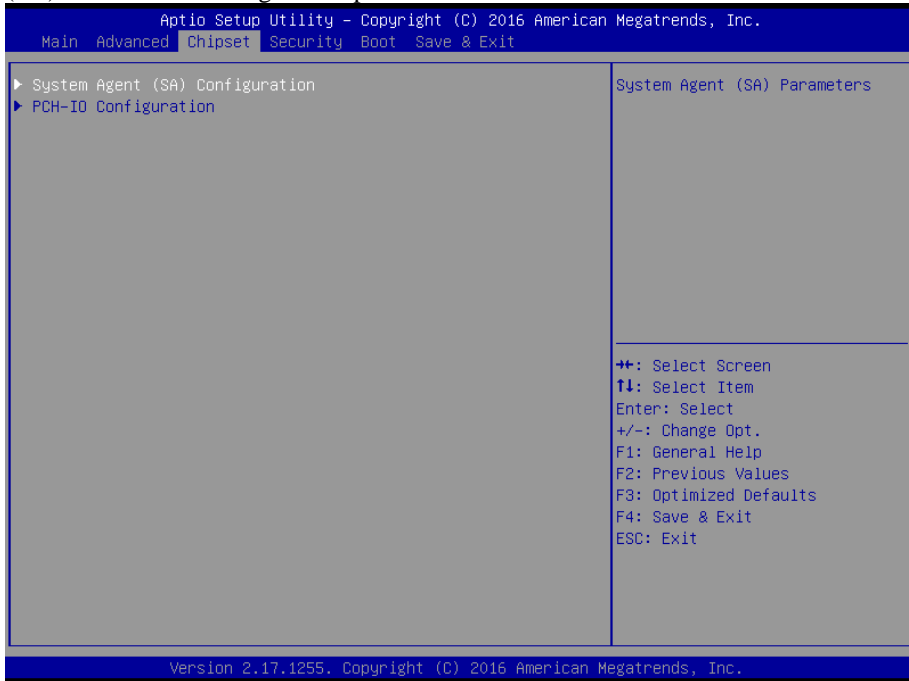
BIOS Setting	Options	Description/Purpose
Legacy USB Support	- Disabled - Enabled - Auto	Sets to "Enabled" if you want to use USB device in the legacy operating system.
XHCI Hand-off	- Disabled - Enabled	This is a workaround for OSes w/o XHCI hand-off support.
USB Mass Storage Driver Support	- Disabled - Enabled	Enables/Disables USB mass storage driver support.
Port 60/64 Emulation	- Disabled - Enabled	This should be enabled for the complete USB keyboard legacy support for non-USB-aware OSes.

BIOS Setting	Options	Description/Purpose
USB transfer time-out	1 / 5 / 10 /20 sec	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 / 20 / 30 / 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	- Auto - Manual	The maximum time it would take for the USB device to report itself to the controller. If set to auto, it would use default values (100ms for root port) and value read from hub descriptor in case of hub port.
Device power-up delay in seconds	Numeric (from 1 to 40)	The time range for power-up delay is from 1 to 40 seconds in one-second increment.

4-5. CHIPSET

Menu Path *Chipset*

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



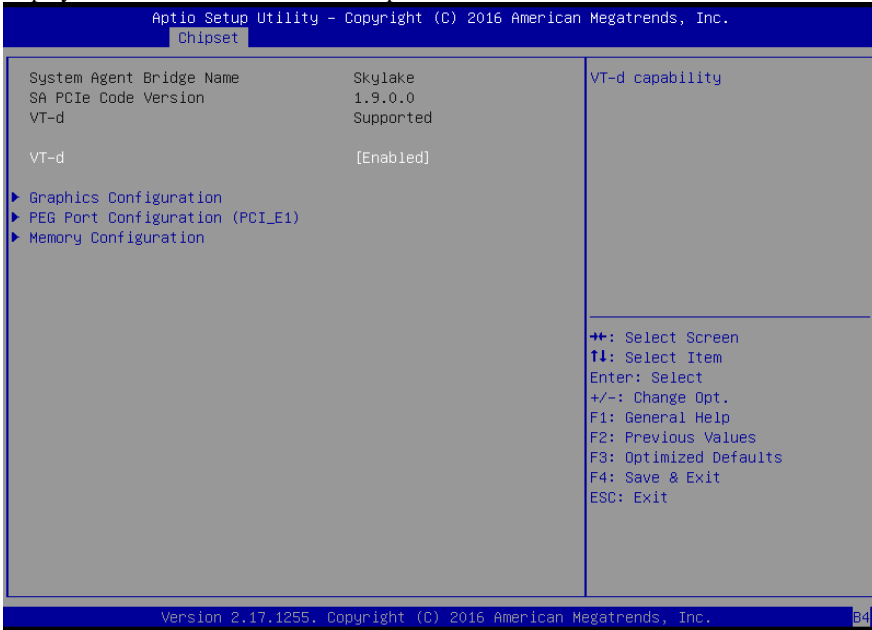
Chipset Screen

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

4-5-1. Chipset – System Agent (SA) Configuration

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

The **System Agent Configuration** allows users to configure graphics settings and displays the DRAM information on the platform.



System Agent (SA) Configuration Screen

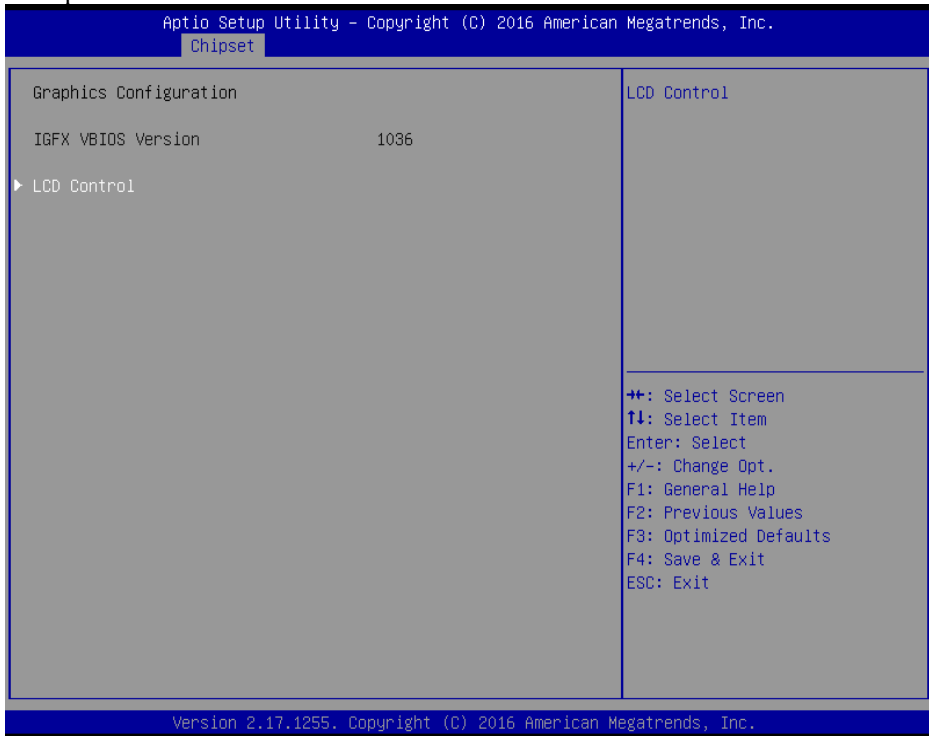
BIOS Setting	Options	Description/Purpose
System Agent Bridge Name	No changeable options	Displays the System Agent Bridge Name.
SA PCIe Code Version	No changeable options	Displays the SA PCIe Code Version.
VT-d	No changeable options	Indicates whether Intel's VT-d (Virtualization Technology for Directed I/O) capability is supported. VT-d extends Intel's Virtualization Technology (VT) roadmap by providing hardware assists for virtualization solution, and helps end users improve security and reliability of the systems and also improves performance of I/O devices in virtualized environment.

BIOS Setting	Options	Description/Purpose
VT-d	- Disabled - Enabled	Enables or Disables VT-d function.
Graphics Configuration	Sub-menu	Configures Graphic Settings.
PEG Port Configuration (PCI_E1)	Sub-menu	PEG Port Configuration
Memory Configuration	Sub-menu	Displays the DRAM information on the platform.

4-5-1-1. Chipset - 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.

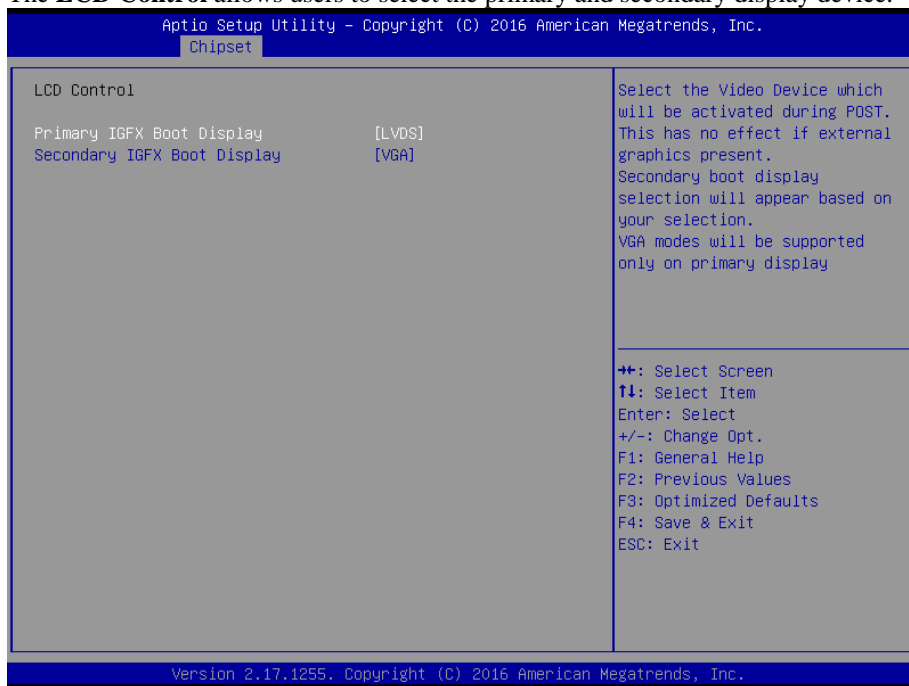


Graphics Configuration Screen

BIOS Setting	Options	Description/Purpose
IGFX VBIOS Version	No changeable options	Displays the IGFX VBIOS Version.
LCD Control	Sub-menu	LCD Control menu.

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

The **LCD Control** allows users to select the primary and secondary display device.



LCD Control Screen

BIOS Setting	Options	Description/Purpose
Primary IGFX Boot Display	- VGA - EDP - LVDS	Selects Primary Display device.
Secondary IGFX Boot Display	- Disabled - VGA - EDP - LVDS	Selects Secondary Display device.

4-5-1-2. Chipset – SA Configuration > PEG Port Configuration

Menu Path *Chipset > System Agent (SA) Configuration > PEG Port Configuration (PCI_E1)*

The **PEG Port Configuration** allows users to display the PEG status, enable Root Port and configure the maximum link speed and width, control ASPM support, etc.



PEG Port Configuration Screen

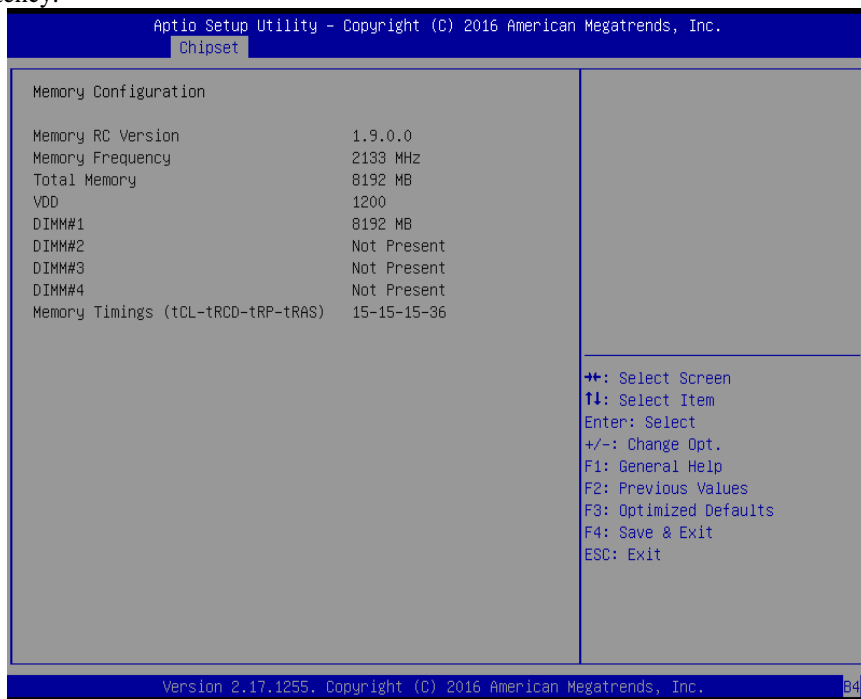
BIOS Setting	Options	Description/Purpose
PEG 0:1:0	No changeable options	Displays the PEG Status.
Enable Root Port	-Disable -Enable -Auto	Enables or Disables to the Root Port.

BIOS Setting	Options	Description/Purpose
Max Link Speed	<ul style="list-style-type: none">- Auto- Gen 1- Gen 2- Gen 3	Configures PEG 0:1:0 Max Speed.
Max Link Width	<ul style="list-style-type: none">- Auto- Force X1- Force X2- Force X4- Force X8	Forces PEG link to retrain to X1/2/4/8.
ASPM	<ul style="list-style-type: none">- Disabled- Auto- ASPM L0s- ASPM L1- ASPM L0sL1	Controls ASPM support for the PEG 0. This has no effect if PEG is not the currently active device.
Detect Non-Compliance Device	<ul style="list-style-type: none">- Disable- Enable	Detects Non-Compliance PCI Express Device in PEG.

4-5-1-3. Chipset – SA Configuration > Memory Configuration

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

The **Memory Configuration** allows users to check for the information about the memory frequency, total DRAM size, DIMM size, and memory (RAM) timings and latency.



Memory Configuration Screen

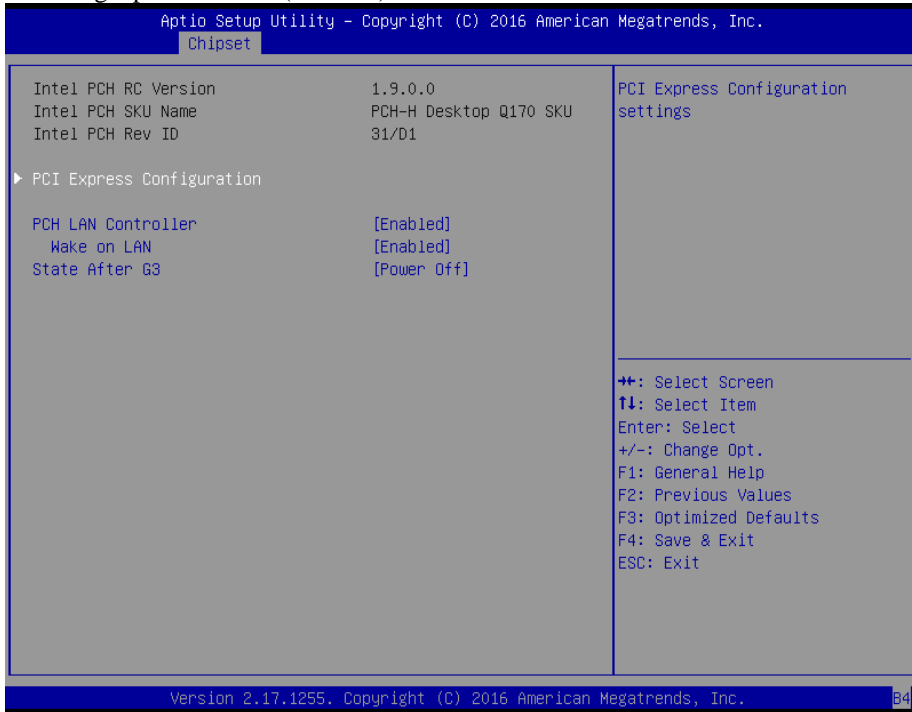
BIOS Setting	Options	Description/Purpose
Memory RC Version	No changeable options	Displays the Memory RC Version.
Memory Frequency	No changeable options	Displays the Frequency of Memory.
Total Memory	No changeable options	Displays the total system memory.
VDD	No changeable options	Displays the Memory Voltage (mV).
DIMM#1	No changeable options	Displays the size of DIMM#1.

BIOS Setting	Options	Description/Purpose
DIMM#2	No changeable options	Displays the size of DIMM#2.
DIMM#3 for Q170 and C236 sku.	No changeable options	Displays the size of DIMM#3.
DIMM#4 for Q170 and C236 sku.	No changeable options	Displays the size of DIMM#4.
Memory Timings (tCL-tRCD-tRP-tRAS)	No changeable options	<p>Displays the Memory (RAM) timings and latency.</p> <ul style="list-style-type: none"> • CAS Latency (tCL) - This is the most important memory timing. CAS stands for Column Address Strobe. If a row has already been selected, it tells us how many clock cycles we'll have to wait for a result (after sending a column address to the RAM controller). • Row Address (RAS) to Column Address (CAS) Delay (tRCD) - Once we send the memory controller a row address, we'll have to wait this many cycles before accessing one of the row's columns. So, if a row hasn't been selected, this means we'll have to wait tRCD + tCL cycles to get our result from the RAM. • Row Precharge Time (tRP) - If we already have a row selected, we'll have to wait this number of cycles before selecting a different row. This means it will take tRP + tRCD + tCL cycles to access the data in a different row. • Row Active Time (tRAS) - This is the minimum number of cycles that a row has to be active for to ensure we'll have enough time to access the information that's in it. This usually needs to be greater than or equal to the sum of the previous three latencies (tRAS = tCL + tRCD + tRP).

4-5-2. Chipset – PCH-IO Configuration

Menu Path *Chipset > PCH-IO Configuration*

The **PCH-IO Configuration** allows users to configure North Bridge chipset, set PCI Express 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).



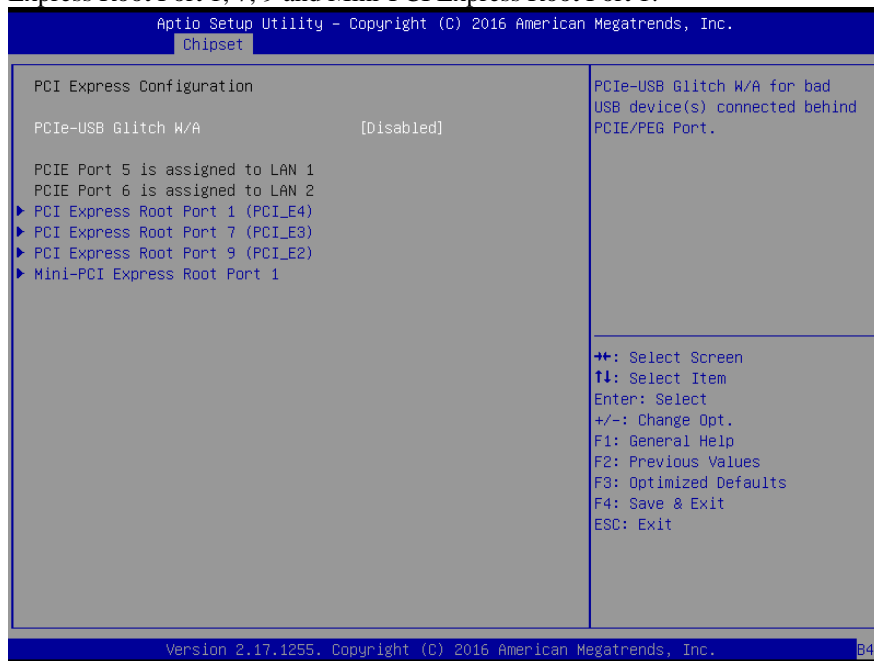
PCH-IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Intel PCH RC Version	No changeable options	Displays the Intel PCH RC Version.
Intel PCH SKU Name	No changeable options	Displays the Intel PCH SKU Name.
Intel PCH Rev ID	No changeable options	Displays the Intel PCH Revision ID.
PCI Express Configuration	Sub-menu	PCI Express Configuration settings.
PCH LAN Controller	- Disabled - Enabled	Enables or Disables onboard NIC.
Wake On LAN	- Disabled - Enabled	Enables or Disables integrated LAN to wake up the system.
State After G3	- Power On - Power Off	Specifies the Power On/Off state that the system will go to when the power is re-applied following a power failure (G3 state).

4-5-2-1. Chipset – PCI Express Configuration

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

The **PCI Express Configuration** allows users to configure the settings for PCI Express Root Port 1, 7, 9 and Mini-PCI Express Root Port 1.



PCI Express Configuration Screen

BIOS Setting	Options	Description/Purpose
PCIe-USB Glitch W/A	- Disabled - Enabled	PCIe-USB Glitch W/A for bad USB devices(s) connected behind PCIE/PEG Port.
PCIE Port 5	No changeable options	PCIE Port 5 is assigned to LAN.
PCIE Port 6	No changeable options	PCIE Port 6 is assigned to LAN.
PCI Express Root Port 1 (PCI_E4)	Sub-menu	Configures PCI Express Root Port 1 settings.
PCI Express Root Port 7 (PCI_E3)	Sub-menu	Configures PCI Express Root Port 7 settings.

BIOS Setting	Options	Description/Purpose
PCI Express Root Port 9 (PCI_E2)	Sub-menu	Configures PCI Express Root Port 9 settings.
Mini-PCI Express Root Port 1	Sub-menu	Configures Mini-PCI Express Root Port 1 settings.

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > PCI Express Root Port 1 (PCI_E4)*

The **PCI Express Root Port 1 (PCI_E4)** function allows users to enable/disable PCI Express Root Port 1, select the PCIe port's speed, configure ASPM support and detect the non-compliance device.

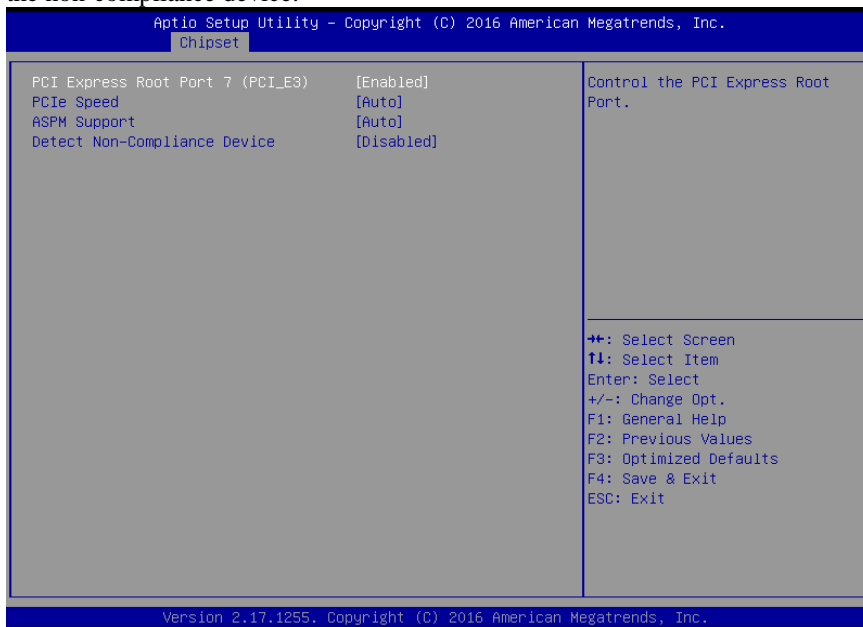


PCI Express Root Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
PCI Express Root Port 1 (PCI_E4)	- Disabled - Enabled	Controls the PCI Express Root Port 1.
PCIe Speed	- Auto - Gen1 - Gen2 - Gen3	Selects PCI Express port speed.
ASPM Support	- Disabled - L0s - L1 - L0sL1 - Auto	Sets the ASPM (Active-State Power Management) Level. The option allows users to set lower power mode that activates when the bus is not being used. Force L0s – Force all links to L0s State Auto – BIOS Auto configure Disable – Disables ASPM
Detect Non-Compliance Device	- Disabled - Enabled	Detects a Non-Compliance PCI Express device that is connected to the PCI Express port. If enabled, it will take more time during POST.

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > PCI Express Root Port 7 (PCI_E3)*

The **PCI Express Root Port 7 (PCI_E3)** function allows users to enable/disable PCI Express Root Port 7, select the PCIe port's speed, configure ASPM support and detect the non-compliance device.



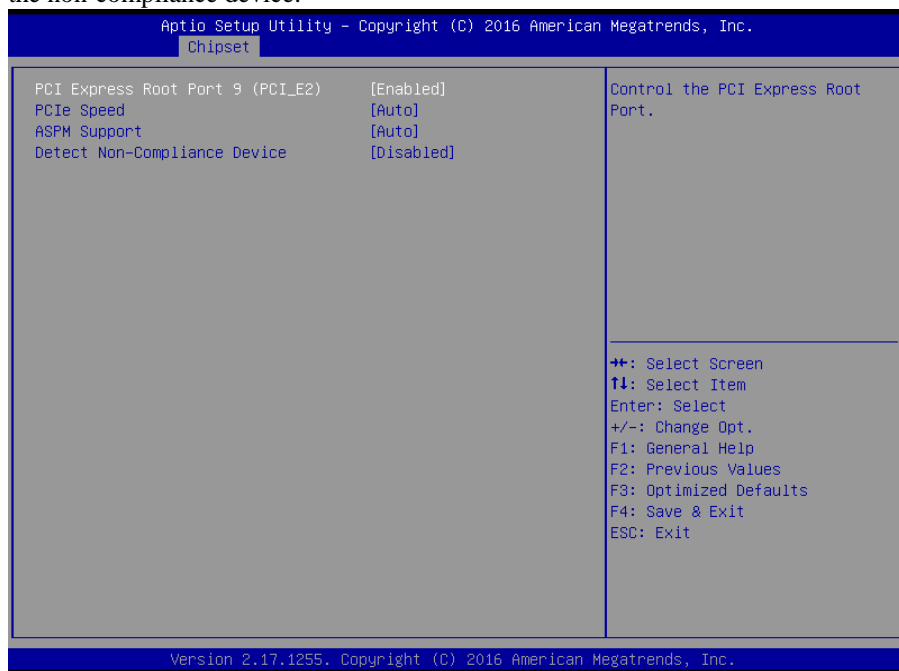
PCI Express Root Port 7 Configuration Screen

BIOS Setting	Options	Description/Purpose
PCI Express Root Port 7 (PCI_E3)	- Disabled - Enabled	Controls the PCI Express Root Port 7.
PCIe Speed	- Auto - Gen1 - Gen2 - Gen3	Selects PCI Express port speed.
ASPM Support	- Disabled - L0s - L1 - L0sL1	Sets the ASPM (Active-State Power Management) Level. The option allows users to set lower power mode that activates when the bus is not being used.

BIOS Setting	Options	Description/Purpose
	- Auto	Force L0s – Force all links to L0s State Auto – BIOS Auto configure Disable – Disables ASPM
Detect Non-Compliance Device	- Disabled - Enabled	Detects a Non-Compliance PCI Express device that is connected to the PCI Express port. If enabled, it will take more time during POST.

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > PCI Express Root Port 9 (PCI_E2)*

The **PCI Express Root Port 9 (PCI_E2)** function allows users to enable/disable PCI Express Root Port 9, select the PCIe port’s speed, configure ASPM support and detect the non-compliance device.

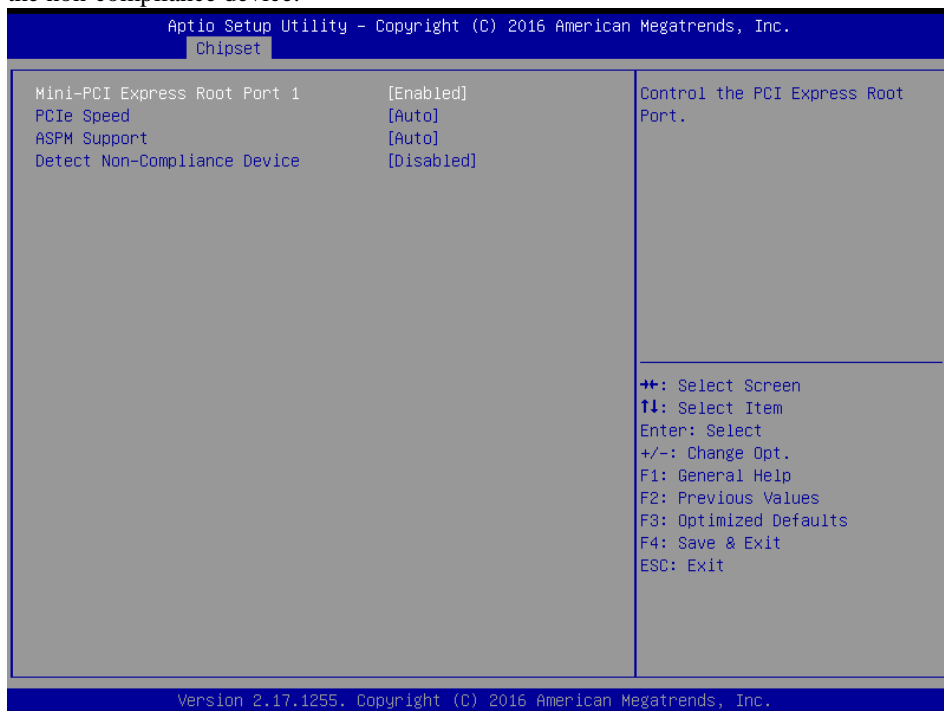


PCI Express Root Port 9 Configuration Screen

BIOS Setting	Options	Description/Purpose
PCI Express Root Port 9 (PCI_E2)	- Disabled - Enabled	Controls the PCI Express Root Port 9.
PCIe Speed	- Auto - Gen1 - Gen2 - Gen3	Selects PCI Express port speed.
ASPM Support	- Disabled - L0s - L1 - L0sL1 - Auto	Sets the ASPM (Active-State Power Management) Level. The option allows users to set lower power mode that activates when the bus is not being used. Force L0s – Force all links to L0s State Auto – BIOS Auto configure Disable – Disables ASPM
Detect Non-Compliance Device	- Disabled - Enabled	Detects a Non-Compliance PCI Express device that is connected to the PCI Express port. If enabled, it will take more time during POST.

Menu Path *Chipset > PCH-IO Configuration > PCI Express Configuration > Mini-PCI Express Root Port 1*

The **Mini-PCI Express Root Port 1** function allows users to enable/disable Mini-PCI Express Root Port 1, select the PCIe port's speed, configure ASPM support and detect the non-compliance device.



Mini-PCI Express Root Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
Mini-PCI Express Root Port 1	- Disabled - Enabled	Controls the PCI Express Root Port 1.
PCIe Speed	- Auto - Gen1 - Gen2 - Gen3	Selects PCI Express port speed.
ASPM Support	- Disabled - L0s	Sets the ASPM (Active-State Power Management) Level. The option allows

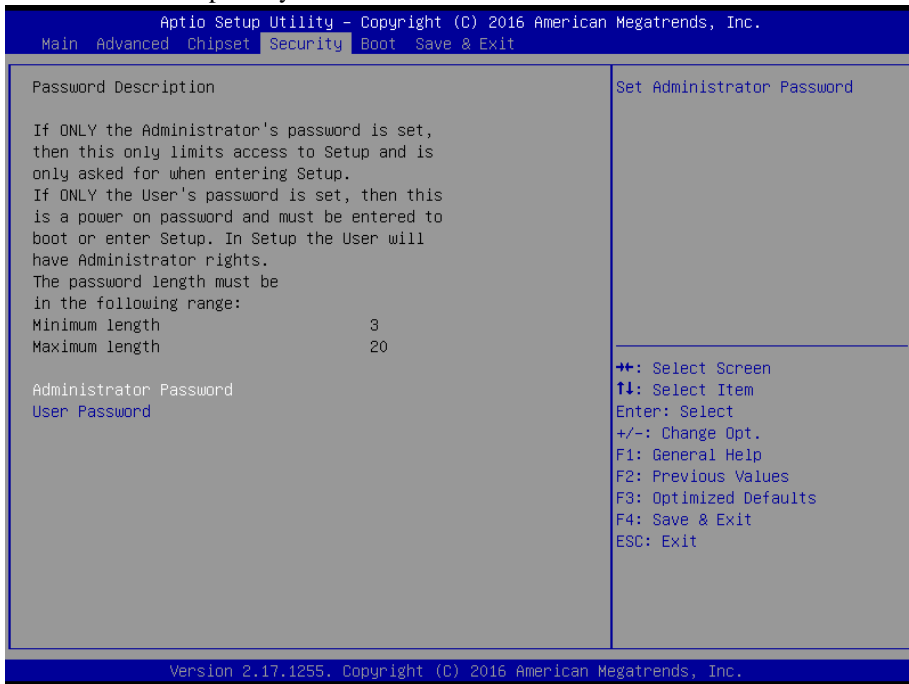
BIOS Setting	Options	Description/Purpose
	<ul style="list-style-type: none">- L1- L0sL1- Auto	users to set lower power mode that activates when the bus is not being used. Force L0s – Force all links to L0s State Auto – BIOS Auto configure Disable – Disables ASPM
Detect Non-Compliance Device	<ul style="list-style-type: none">- Disabled- Enabled	Detects a Non-Compliance PCI Express device that is connected to the Mini PCI Express root port. If enabled, it will take more time during POST.

4-6. SECURITY

Menu Path *Security*

From the **Security** menu, you are allowed to configure or change 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. Heed that a user password does not provide access to most of the features in the Setup utility.



Security Screen

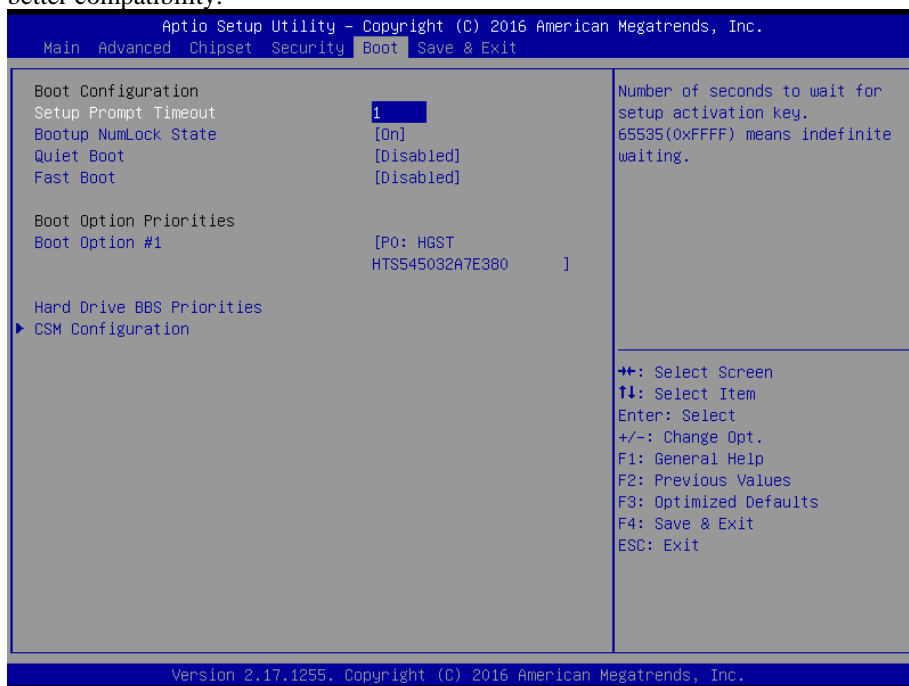
BIOS Setting	Options	Description/Purpose
Administrator Password	Password can be 3-20 alphanumeric characters.	Specifies the administrator password.

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

4-7. BOOT

Menu Path *Boot*

This menu provides control items for system boot configuration such as setting setup prompt timeout, enabling/disabling quiet boot and fast boot, selecting the boot sequence from the available device(s) and BBS option priorities, and setting CSM (Compatibility Support Module) configuration parameters to support legacy BIOS operation systems, various VGA, bootable devices and add-on devices for achieving better compatibility.



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 - Off	Selects the NumLock state after the system is powered on. <ul style="list-style-type: none"> • On: Enables the NumLock function automatically after the system is powered on. • Off: Disables the NumLock function after the system is powered on.
Quiet Boot	- Disabled - Enabled	Enables or Disables Quiet Boot options. When this option is set to "Disabled", BIOS will display normal POST messages.
Fast Boot	- Disabled - Enabled	Enables or Disables Fast Boot option. It allows users to reduce the system startup time and start up the system in a fast manner.
Boot Option #1~#n	- [Drive(s)] - Disabled	Allows users to choose the boot sequence from the available device(s). Note that in the menu displayed, you will only see the device with the highest priority for a specific boot device type.
Hard Drive BBS Priorities	Sub-Menu	Defines the boot order for all the hard drives connected to the system, e.g. SATA, USB drive.
CSM Configuration	Sub-Menu	CSM configuration: Enable/Disable, Option ROM execution settings, etc.

4-7-1. BOOT > Hard Drive BBS Priorities

Menu Path *Boot > Hard Drive BBS Priorities*

Select **Hard Drive BBS Priorities** from the **Boot** menu to configure the boot sequence and priority of the available drives.



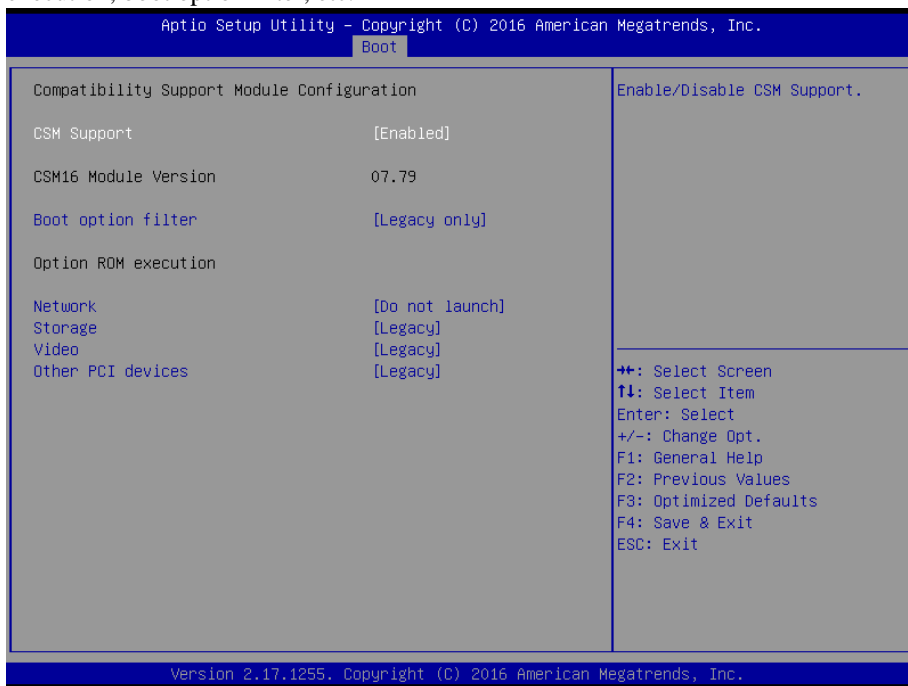
Hard Drive BBS Priorities Screen

BIOS Setting	Options	Description/Purpose
Boot Option #1~#n	- [Drive(s)] - Enabled	Allows users to set the priority of all the drives connected to the system or another bootable USB storage. Press Enter to enter the sub-menu and press <↑> or <↓> arrow keys to select the device. Another way is to press <+> or <-> to move the selected device up/down in the priority list.

4-7-2. BOOT > CSM Configuration

Menu Path *Chipset > CSM Configuration*

The **CSM Configuration** provides advanced CSM (Compatibility Support Module) configurations such as Enable/Disable CSM Support, configure Option ROM execution, boot option filter, etc.



CSM Configuration Screen

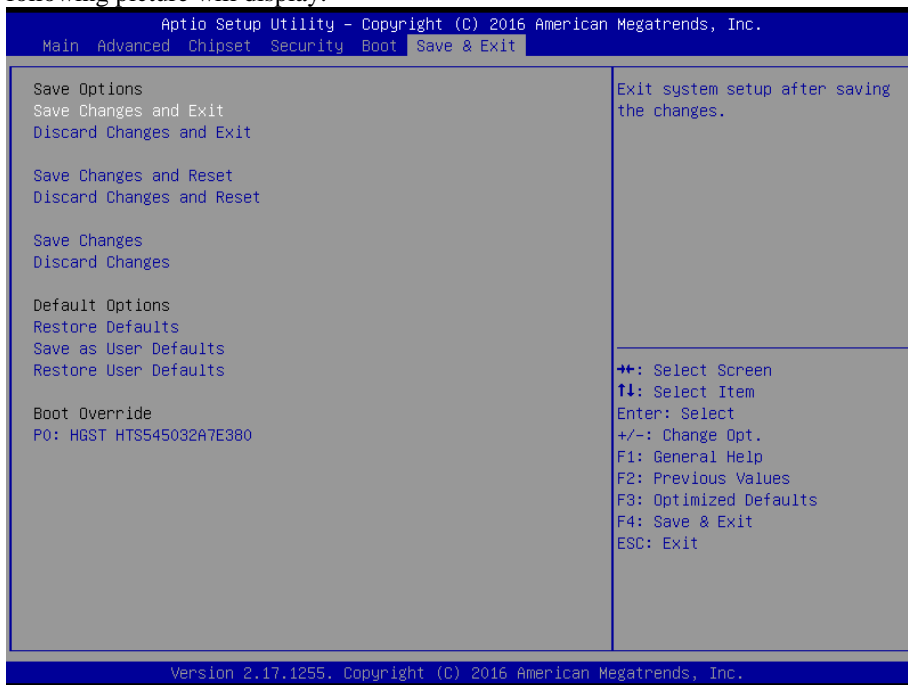
BIOS Setting	Options	Description/Purpose
CSM Support	- Disabled - Enabled	Enables or Disables CSM Support.
CSM16 Module	No changeable options	Displays the CSM 16 Module version.

BIOS Setting	Options	Description/Purpose
Boot option filter	<ul style="list-style-type: none">- UEFI and Legacy- Legacy only- UEFI only	This option controls Legacy/UEFI ROMs priority.
Network	<ul style="list-style-type: none">- Do not launch- UEFI- Legacy	Controls the execution of UEFI and Legacy PXE Option ROM.
Storage	<ul style="list-style-type: none">- Do not launch- UEFI- Legacy	Controls the execution of UEFI and Legacy Storage Option ROM.
Video	<ul style="list-style-type: none">- Do not launch- UEFI- Legacy	Controls the execution of UEFI and Legacy Video Option ROM.
Other PCI devices	<ul style="list-style-type: none">- Do not launch- UEFI- Legacy	Determines Option ROM execution policy for devices other than Network, Storage or Video.

4-8. SAVE & EXIT

Menu Path *Save & Exit*

To save and validate the changed BIOS settings, select the **Save & Exit** menu and the following picture will display:

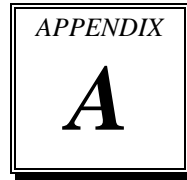


Save & Exit Screen

BIOS Setting	Options	Description/Purpose
Save Changes and Exit	No changeable options	Exits the system and saves the changes in NVRAM.
Discard Changes and Exit	No changeable options	Exits the system without saving any changes configured in BIOS settings.
Save Changes and Reset	No changeable options	Saves the changes in NVRAM and resets the system.
Discard Changes and Reset	No changeable options	Resets the system without saving any changes configured in BIOS settings.
Save Changes	No changeable options	Saves the changes done so far to any of the setup options.

BIOS Setting	Options	Description/Purpose
Discard Changes	No changeable options	Discards the changes done so far to any of the BIOS settings.
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 BIOS settings.
Boot Override	- [Drive(s)]	Forces to boot the system from selected [drive(s)].

TECHNICAL SUMMARY



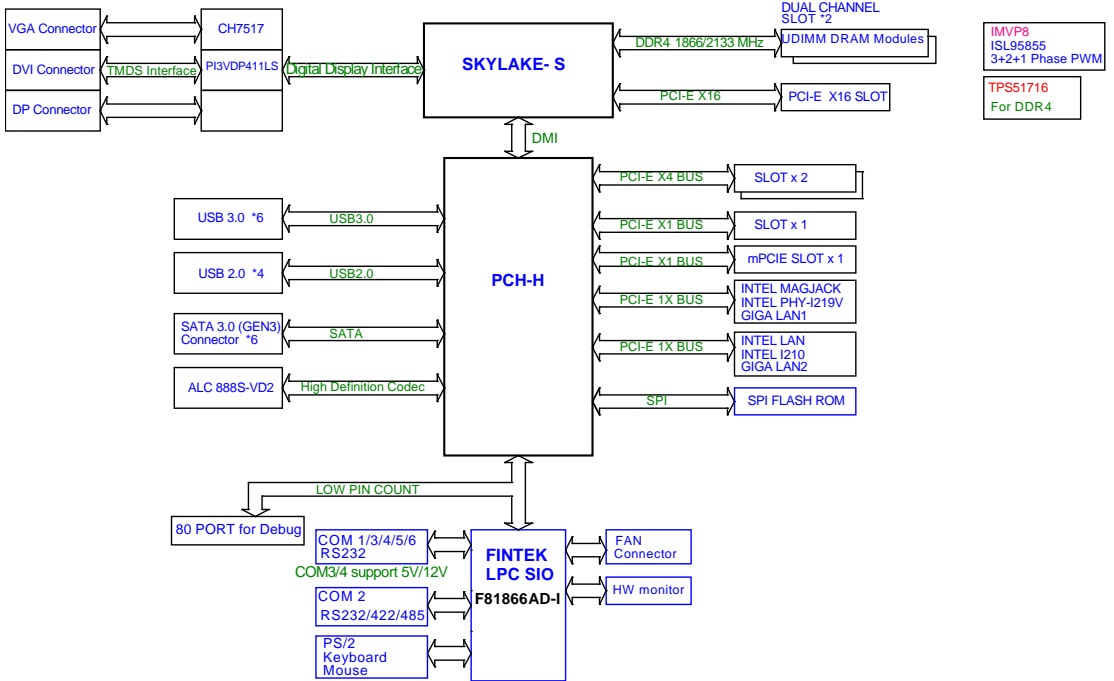
This section introduce you the maps concisely.

The following sections are included:

- Block Diagram
- Interrupt Map
- DMA Channel Map
- I/O Map
- Memory Map
- Watchdog Timer Configuration
- Flash BIOS Update

BLOCK DIAGRAM

BU-2509R
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 (COM5)
IRQ 7	Communications Port (COM3)
IRQ 8	System CMOS/real time clock
IRQ 10	Communications Port (COM4)
IRQ 11	Intel® 100 Series/C230 Series Chipset Family SMBus- A123
IRQ 11	Intel® 100 Series/C230 Series Chipset Family Thermal subsystem - A131
IRQ 13	Numeric data processor
IRQ 14	Motherboard resources
IRQ 16	Standard AHCI 1.0 Serial ATA Controller
IRQ 16	High Definition Audio Controller
IRQ 81	Microsoft ACPI-Compliant System
IRQ 82	Microsoft ACPI-Compliant System
IRQ 83	Microsoft ACPI-Compliant System
IRQ 84	Microsoft ACPI-Compliant System
IRQ 85	Microsoft ACPI-Compliant System
IRQ 86	Microsoft ACPI-Compliant System
IRQ 87	Microsoft ACPI-Compliant System
IRQ 88	Microsoft ACPI-Compliant System
IRQ 89	Microsoft ACPI-Compliant System
IRQ 90	Microsoft ACPI-Compliant System
IRQ 91	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 92	Microsoft ACPI-Compliant System
IRQ 93	Microsoft ACPI-Compliant System
IRQ 94	Microsoft ACPI-Compliant System
IRQ 95	Microsoft ACPI-Compliant System
IRQ 96	Microsoft ACPI-Compliant System
IRQ 97	Microsoft ACPI-Compliant System
IRQ 98	Microsoft ACPI-Compliant System
IRQ 99	Microsoft ACPI-Compliant System
IRQ 100	Microsoft ACPI-Compliant System
IRQ 101	Microsoft ACPI-Compliant System
IRQ 102	Microsoft ACPI-Compliant System
IRQ 103	Microsoft ACPI-Compliant System
IRQ 104	Microsoft ACPI-Compliant System
IRQ 105	Microsoft ACPI-Compliant System
IRQ 106	Microsoft ACPI-Compliant System
IRQ 107	Microsoft ACPI-Compliant System
IRQ 108	Microsoft ACPI-Compliant System
IRQ 109	Microsoft ACPI-Compliant System
IRQ 110	Microsoft ACPI-Compliant System
IRQ 111	Microsoft ACPI-Compliant System
IRQ 112	Microsoft ACPI-Compliant System
IRQ 113	Microsoft ACPI-Compliant System
IRQ 114	Microsoft ACPI-Compliant System
IRQ 115	Microsoft ACPI-Compliant System
IRQ 116	Microsoft ACPI-Compliant System
IRQ 117	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 118	Microsoft ACPI-Compliant System
IRQ 119	Microsoft ACPI-Compliant System
IRQ 120	Microsoft ACPI-Compliant System
IRQ 121	Microsoft ACPI-Compliant System
IRQ 122	Microsoft ACPI-Compliant System
IRQ 123	Microsoft ACPI-Compliant System
IRQ 124	Microsoft ACPI-Compliant System
IRQ 125	Microsoft ACPI-Compliant System
IRQ 126	Microsoft ACPI-Compliant System
IRQ 127	Microsoft ACPI-Compliant System
IRQ 128	Microsoft ACPI-Compliant System
IRQ 129	Microsoft ACPI-Compliant System
IRQ 130	Microsoft ACPI-Compliant System
IRQ 131	Microsoft ACPI-Compliant System
IRQ 132	Microsoft ACPI-Compliant System
IRQ 133	Microsoft ACPI-Compliant System
IRQ 134	Microsoft ACPI-Compliant System
IRQ 135	Microsoft ACPI-Compliant System
IRQ 136	Microsoft ACPI-Compliant System
IRQ 137	Microsoft ACPI-Compliant System
IRQ 138	Microsoft ACPI-Compliant System
IRQ 139	Microsoft ACPI-Compliant System
IRQ 140	Microsoft ACPI-Compliant System
IRQ 141	Microsoft ACPI-Compliant System
IRQ 142	Microsoft ACPI-Compliant System
IRQ 143	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 144	Microsoft ACPI-Compliant System
IRQ 145	Microsoft ACPI-Compliant System
IRQ 146	Microsoft ACPI-Compliant System
IRQ 147	Microsoft ACPI-Compliant System
IRQ 148	Microsoft ACPI-Compliant System
IRQ 149	Microsoft ACPI-Compliant System
IRQ 150	Microsoft ACPI-Compliant System
IRQ 151	Microsoft ACPI-Compliant System
IRQ 152	Microsoft ACPI-Compliant System
IRQ 153	Microsoft ACPI-Compliant System
IRQ 154	Microsoft ACPI-Compliant System
IRQ 155	Microsoft ACPI-Compliant System
IRQ 156	Microsoft ACPI-Compliant System
IRQ 157	Microsoft ACPI-Compliant System
IRQ 158	Microsoft ACPI-Compliant System
IRQ 159	Microsoft ACPI-Compliant System
IRQ 160	Microsoft ACPI-Compliant System
IRQ 161	Microsoft ACPI-Compliant System
IRQ 162	Microsoft ACPI-Compliant System
IRQ 163	Microsoft ACPI-Compliant System
IRQ 164	Microsoft ACPI-Compliant System
IRQ 165	Microsoft ACPI-Compliant System
IRQ 166	Microsoft ACPI-Compliant System
IRQ 167	Microsoft ACPI-Compliant System
IRQ 168	Microsoft ACPI-Compliant System
IRQ 169	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 170	Microsoft ACPI-Compliant System
IRQ 171	Microsoft ACPI-Compliant System
IRQ 172	Microsoft ACPI-Compliant System
IRQ 173	Microsoft ACPI-Compliant System
IRQ 174	Microsoft ACPI-Compliant System
IRQ 175	Microsoft ACPI-Compliant System
IRQ 176	Microsoft ACPI-Compliant System
IRQ 177	Microsoft ACPI-Compliant System
IRQ 178	Microsoft ACPI-Compliant System
IRQ 179	Microsoft ACPI-Compliant System
IRQ 180	Microsoft ACPI-Compliant System
IRQ 181	Microsoft ACPI-Compliant System
IRQ 182	Microsoft ACPI-Compliant System
IRQ 183	Microsoft ACPI-Compliant System
IRQ 184	Microsoft ACPI-Compliant System
IRQ 185	Microsoft ACPI-Compliant System
IRQ 186	Microsoft ACPI-Compliant System
IRQ 187	Microsoft ACPI-Compliant System
IRQ 188	Microsoft ACPI-Compliant System
IRQ 189	Microsoft ACPI-Compliant System
IRQ 190	Microsoft ACPI-Compliant System
IRQ 4294967294	Intel® Ethernet Connection (2) I219-V
IRQ 4294967292	Intel® USB 3.0 eXtensible Host Controller
IRQ 4294967293	Intel® HD Graphics 510

IRQ	ASSIGNMENT
IRQ 4294967291	Intel® Management Engine Interface

Note: These resource information were gathered using Windows 7 (the IRQ could be assigned differently depending on OS).

MEMORY MAP

MEMORY MAP	ASSIGNMENT
0xFED00000-0xFED003FF	High precision event timer
0xDF048000-0xDF049FFF	Standard AHCI 1.0 Serial ATA Controller OK 0xDF04C000-0xDF04C0FF
0xDF020000-0xDF02FFFF	High Definition Audio Controller
0xA0000-0xBFFFF	PCI bus
0xA0000-0xBFFFF	Intel® HD Graphics 510
0x90000000-0xDFFFFFFF	PCI bus
0xFD000000-0xFE7FFFFFFF	PCI bus
0xFD000000-0xFE7FFFFFFF	Motherboard resources
0xDF044000-0xDF047FFF	Intel® 100 Series/C230 Series Chipset Family PMC - A121
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
0xFF000000-0xFFFFFFFF	Motherboard resources
0xFF000000-0xFFFFFFFF	Intel® 82802 Firmware Hub Device
0xFEE00000-0xFEEFFFFFFF	Motherboard resources

MEMORY MAP	ASSIGNMENT
0xDFFE0000-0xDFFFFFFF	Motherboard resources
0xDF04A000-0xDF04A0FF	Intel® 100 Series/C230 Series Chipset Family SMBus - A123
0xFDFAF0000-0xFDFAFFFFF	Motherboard resources
0xFDAE0000-0xFDAEFFFFF	Motherboard resources
0xFDAC0000-0xFDACFFFFF	Motherboard resources
0xDF000000-0xDF01FFFFF	Intel® Ethernet Connection I219-V
0xDF030000-0xDF03FFFFF	Intel® USB 3.0 eXtensible Host Controller
0xFDAD0000-0xFDADFFFFF	Motherboard resources
0xFDB00000-0xFDBFFFFF	Motherboard resources
0xFE000000-0xFE01FFFFF	Motherboard resources
0xFE036000-0xFE03BFFF	Motherboard resources
0xFE03D000-0xFE3FFFFF	Motherboard resources
0xFE410000-0xFE7FFFFF	Motherboard resources
0xDE000000-0xDEFFFFFFF	Intel® HD Graphics 510
0xC0000000-0xCFFFFFFF	Intel® HD Graphics 510
0xDF04E000-0xDF04EFFF	Intel® 100 Series/C230 Series Chipset Family Thermal subsystem - A131
0xFE40F000-0xFE40FFFFF	Intel® Management Engine Interface

I/O MAP

I/O MAP	ASSIGNMENT
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x000002F0-0x000002F7	Communications Port (COM5)
0x000002E0-0x000002E7	Communications Port (COM6)
0x0000F090-0x0000F097	Standard AHCI 1.0 Serial ATA Controller
0x0000F080-0x0000F083	Standard AHCI 1.0 Serial ATA Controller
0x0000F060-0x0000F07F	Standard AHCI 1.0 Serial ATA Controller
0x00000000-0x00000CF7	PCI bus
0x0000B000-0x0000BFFF	PCI bus
0x0000C000-0x0000CFFF	PCI bus
0x0000D000-0x0000DFFF	PCI bus
0x0000E000-0x0000EFFF	PCI bus
0x00000070-0x00000077	System CMOS/real time clock
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources

I/O MAP	ASSIGNMENT
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x00001800-0x000018FE	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x0000FF00-0x0000FFFE	Motherboard resources
0x00000800-0x0000087F	Motherboard resources
0x00001854-0x00001857	Motherboard resources
0x000000F0-0x000000F0	Numeric data processor
0x0000F000-0x0000F03F	Intel® HD Graphics 510
0x000003B0-0x000003BB	Intel® HD Graphics 510
0x000003C0-0x000003DF	Intel® HD Graphics 510
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000064-0x00000064	Standard PS/2 Keyboard
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller

I/O MAP	ASSIGNMENT
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer

WATCHDOG TIMER CONFIGURATION

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. User 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 F81866 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.

Example Program

Enable watchdog timer and set the time-out 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 -----  
mov       al, 030h  
out       dx, al  
inc       dx  
mov       al, 01h  
out       dx, al  
;----- Enable Watch PME-----  
dec       dx  
mov       al, 0FAh  
out       dx, al  
inc       dx  
in        al, dx  
and       al, 51h  
out       dx, al  
;----- Set second as counting unit -----  
dec       dx  
mov       al, 0f5h  
out       dx, al  
inc       dx  
in        al, dx  
and       al, 30h  
out       dx, al  
;----- Set timeout interval as 30seconds and start counting -----  
--- dec    dx  
mov       al, 0f6h  
out       dx, al  
inc       dx
```

```
mov    al, 1Eh
out    dx, al
```

```
;-----Exit the extended function mode -----
```

```
--- dec    dx
mov     al, 0aah
out     dx, al
```

Flash BIOS Update

I. Before System BIOS Update

1. Prepare a bootable media (e.g. USB storage device) which can boot system to DOS prompt.
2. Download and save the BIOS file (e.g. 25090TQ9.bin) to the bootable device.
3. Copy AMI flash utility – AFUDOS.exe (v5.07) into a 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 key during boot to enter BIOS Setup.
 - (3) The system will go into the BIOS setup menu.
 - (4) Select [Boot] menu.
 - (5) Select [Hard Drive BBS Priorities], set the USB bootable device to be the 1st boot device.
 - (6) Press <F4> key to save the configuration and exit the BIOS setup menu.



II. AFUDOS Command for System BIOS Update

AFUDOS.exe is the AMI firmware update utility; the command line is shown as below:

`AFUDOS <ROM File Name> [option1] [option2]...`

You can type `AFUDOS /?` to see all the definition of each control options. The recommended options for BIOS ROM update consist of following parameters:

`/P`: program main BIOS image

`/B`: program Boot Block

`/N`: program NVRAM

`/X`: don't check ROM ID

`/REBOOT`: Reboot after programming

III. BIOS update procedure

1. Use the bootable USB device to boot up system into the MS-DOS command prompt.
2. Type "**AFUDOS 2509xxxx.bin /p /b /n /x /reboot**" and press enter to start the flash procedure.
Note: **xxxx** means the BIOS revision part, ex. 0PH1.
3. During the update procedure, you will see the BIOS update process status and its percentage. Beware! Do not turn off system power or reset your computer if the whole procedure are not complete yet, or it may crash the BIOS ROM and make system unable to boot up next time.
4. After BIOS update procedures is completed, the following messages will be shown:

```
C:\> AFUDOS 25090TQ9.bin /p /b /n /x
-----+-----
                AMI Firmware Update Utility v5.07.01
                Copyright (C) 2014 American Megatrends Inc. All Rights Reserved.
-----+-----
Reading flash ..... done
- ME Data Size Checking . ok
- 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
C:>_
```

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

