USER MANUAL

EL1096

**Fanless Embedded PC
with Intel Kabylake-U
Series SoC
Support 12V /19V /24V**

EL1096 M0

EL1096

Fanless Embedded PC with Intel Kabylake-U Series SoC Support 12V /19V /24V

FCC NOTICE

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

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

	CAUTION: Danger of explosion may occur when the battery is incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

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

1 Introduction

This chapter provides the introduction for EL1096 system as well as the framework of the user manual.

The following topic is included:

- About This Manual

1.1 About This Manual

Thank you for purchasing our EL1096 system. The EL1096 provides faster processing speed, greater expandability and can handle more tasks than before. This manual is designed to assist you how to install and set up the whole system. It contains 5 chapters and 2 appendixes. Users can configure the system according to their own needs. This user manual is intended for service personnel with strong hardware background. It is not intended for general users.

The following section outlines the structure of this user manual.

Chapter 1 Introduction
This chapter provides the introduction for the EL1096 system as well as the framework of the user manual.

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

Chapter 3 System Configuration
This chapter describes the external I/O ports, outlines the locations of the motherboard components and their respective functions. You will learn how to set the jumpers and configure the system to meet your own needs.

Chapter 4 Software Utilities
This chapter contains helpful information for proper installations of the Intel® Chipset Software Installation Utility, Graphics Driver Utility, LAN Driver Utility, Sound Driver Utility, Intel® Serial I/O Driver Utility and Microsoft Hotfix Driver Utility.

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

Appendix A Technical Summary
This appendix provides the exploded diagrams and part numbers of the EL1096

Appendix B Technical Summary
This appendix provides the information about the allocation maps for system resources, Watchdog Timer Configuration and Flash BIOS Update.

2 Getting Started

This chapter provides the information for the EL1096 system. It describes the package contents and outlines the system specifications.

The following topics are included:

- Package List
- System Overview
- System Diagrams
- System Specification
- Safety Precautions

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

2.1　Packing List

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

Item	Q'ty
EL1096	1
Quick Reference Guide	1
Manual / Driver DVD	1
Jumper & Screw for mini-PCIE/mSATA	2+2

2.2 System Overview

2.2.1 Front View

2.2.2 Rear View

2.2.3   Top View

217.5

Ȼ75 (VESA)

Ȼ75 (VESA)

140.6

2.2.4   Side View

45.98   4

6

6
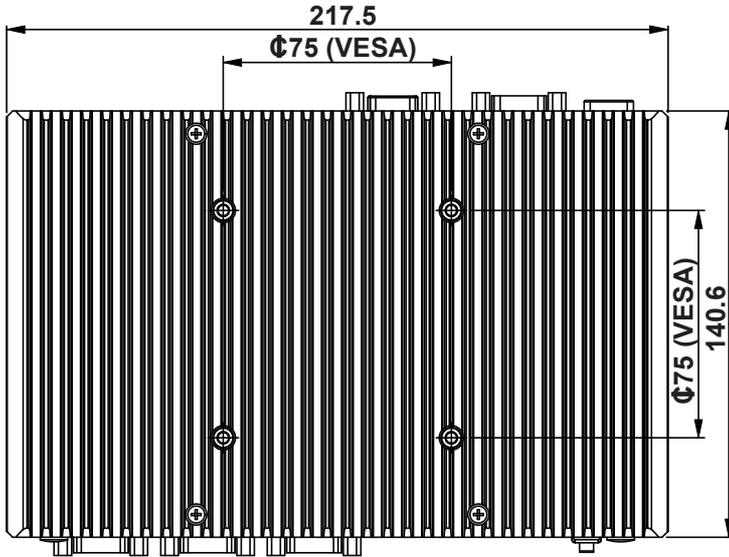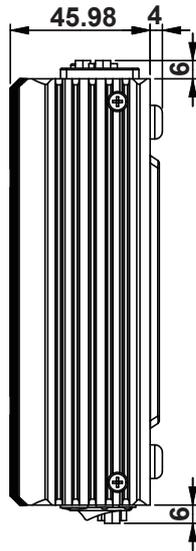
2.2.5   Bottom View

2.3 Speifications

Main Board	
CPU Support	**Intel® Kabylake U Series** ➢ Intel® Core® i5-7300U ➢ Intel® Core® i3-7100U ➢ Intel® Pentium® 4415U
Memory Support	➢ 1 x DDR4 SO-DIMM sockets (up to 16GB)
Power Supply	➢ 4-pin ATX Power Input Connector (12V /19V /24V)
Expansion Slots	➢ 1 x full-sized mSATA slot ➢ 1 x full-sized mPCIe
SATA	➢ 1 x SATAIII (6.0Gb/s)
Operating System	➢ Windows 10 64bit / Ubuntu 16.04 64bit
Dimensions	➢ 218mm x 45mm x 148mm
Certificate	➢ FCC / CE
I/O Ports	
Display	➢ 1 x DP (rear I/O) ➢ 1 x HDMI (rear I/O)
USB	For Core-i5 / i3 SKU: ➢ 2 x USB 2.0 (front I/O, option) ➢ 2 x USB 3.0 (rear I/O), 4 x USB 2.0 (rear I/O) For Pentium SKU: ➢ 2 x USB 3.0 (rear I/O), 4 x USB 2.0 (rear I/O)
Audio	➢ 3.5 phone jack Line Out
LAN	➢ 2 x GbE LANs
Serial Ports	Onboard pin header: ➢ COM1 for RS-232 ➢ COM2 for RS-232/422/485 selectable under BIOS (default: RS-232) ➢ COM3 /COM4 for RS-232, option
DIO Port	➢ 1 x DIO (8 in / 8 out), signal/power: 5V, option
Expansion Slots	For Core-i5 / i3 SKU: ➢ 1 x full-sized mSATA slot (with USB signal) ➢ 1 x full-sized mPCIe slot (with SATA / USB signal) For Pentium SKU: ➢ 1 x full-sized mSATA slot (with SATA signal only) ➢ 1 x full-sized mPCIe slot (with PCIe / USB signal)
I^2C Port	➢ 1 x 4pin I^2C port, option
Environment	
Operating Temperature	➢ 0°C ~ 60°C (32°F~ 140°F)
Storage Temperature	➢ -40°C ~ 80°C (-40°F~ 185°F)
Humidity	➢ 20%~ 95%

2.4   Safety Precautions

Before operating this system, read the following information carefully to protect your systems from damages, and extend the life cycle of the system.

1. Check the Line Voltage
   - The operating voltage for this system (EL1096 should be 12V or 19V /24V DC; otherwise the system may be damaged.

2. Environmental Conditions
   - Place your EL1096 on a sturdy, level surface. Be sure to allow enough space around the system to have easy access needs.
   - Avoid installing your EL1096 system in extremely hot or cold places.
   - Avoid direct sunlight exposure for a long period of time (for example, in a closed car in summer time. Also avoid the system from any heating device.). Or do not use EL1096 when it has been left outdoors in a cold winter day.
   - Avoid moving the system rapidly from a hot place to a cold place, and vice versa, because condensation may occur inside the system.
   - Protect your EL1096 from strong vibrations which may cause hard disk failure.
   - Do not place the system too close to any radio-active device. Radio-active device may cause signal interference.
   - Always shut down the operating system before turning off the power.

3. Handling
   - Avoid placing heavy objects on the top of the system.
   - Do not turn the system upside down. This may cause the hard drive to malfunction.
   - Do not allow any objects to fall into this device.
   - If water or other liquid spills into the device, unplug the power cord immediately.

4. Good Care
   - When the outside case gets stained, remove the stains using neutral washing agent with a dry cloth.
   - Never use strong agents such as benzene and thinner to clean the surface of the case.
   - If heavy stains are present, moisten a cloth with diluted neutral washing agent or alcohol and then wipe thoroughly with a dry cloth.
   - If dust is accumulated on the case surface, remove it by using a special vacuum cleaner for computers.

2.3   Safety Precautions

Follow the instructions below to avoid your system from damages:

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

3   System Configuration

This chapter contains helpful information about the external I/O Ports diagrams, and jumper & connector settings, and component locations for the main board.

The following topics are included:
- External I/O Ports Diagrams
- Jumper & Connector Quick Reference Table
- Main Board Jumper Settings and Component Locations
- How to Set Jumpers
- Setting Main Board Connectors and Jumpers

3.1 External System I/O Ports Diagrams

3.1.1 Front I/O Ports Diagram
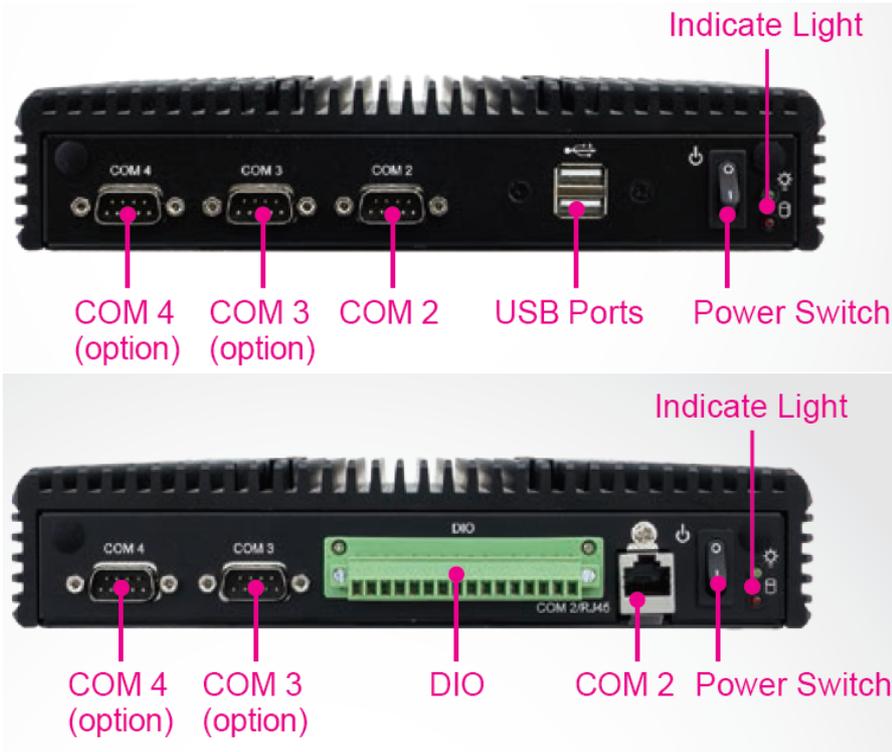
3.1.2 Rear I/O Ports Diagram
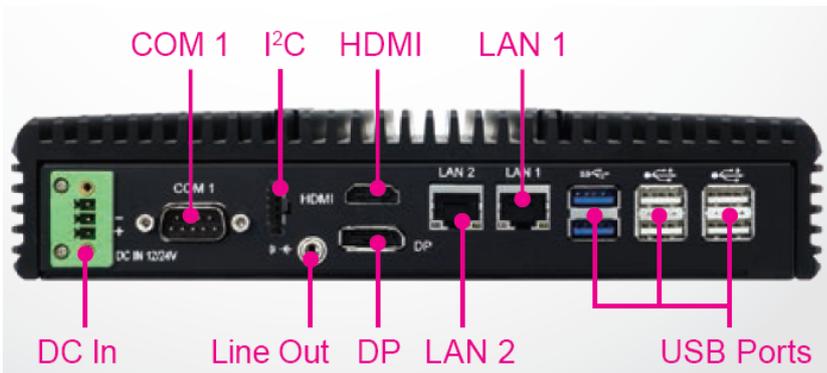
3.2 COMPONENT LOCATIONS
3.2.1 Top View of BE-0996RA-**N

⚠	**WARNING:** Always disconnect the power cord when you are working with connectors and jumpers on M/B. Make sure both the system and peripheral devices are turned OFF as sudden surge of power could damage sensitive components. Make sure M/B is properly grounded.
⚡	**CAUTION:** Observe precautions while handling electrostatic sensitive components. Make sure to ground yourself to prevent static charge while you are working on the connectors and jumpers. Use a grounding wrist strap and place all electronic components in any static-shielded devices.
⚡	**CAUTION:** Always touch M/B components by the edges. Never touch components such as the processor by its pins. Take special cares while you are holding electronic circuit boards by the edges only. Do not touch M/B components.

3.2.2　Jumper Setting of BE-0996RA-**N
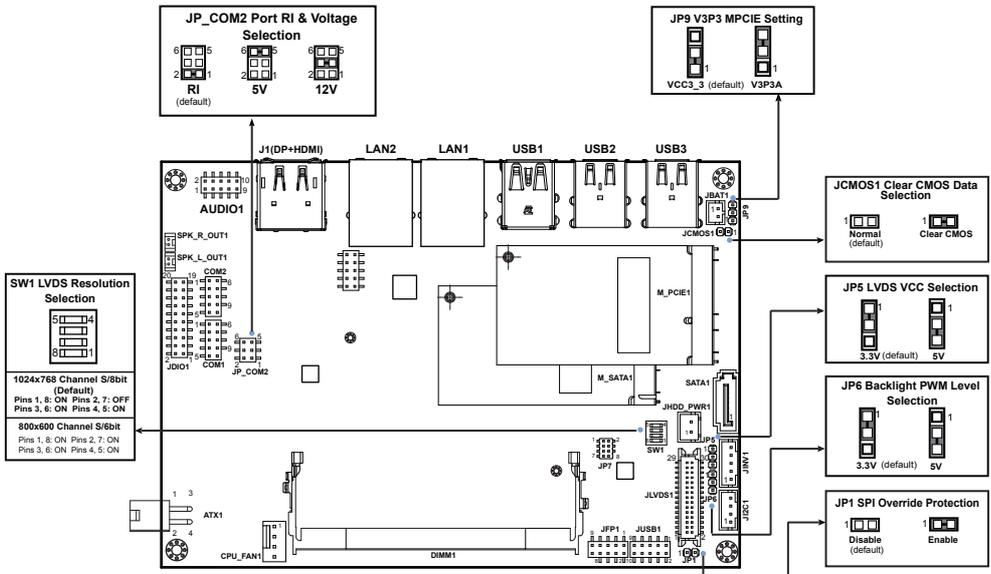
3.2.3　Bottom View of BE-0996RA-**N

3.2.4 I/O View of BE-0996RA

4 x USB 2.0 Ports   2 x USB 3.0 Ports   HDMI

LAN1   LAN2   DP
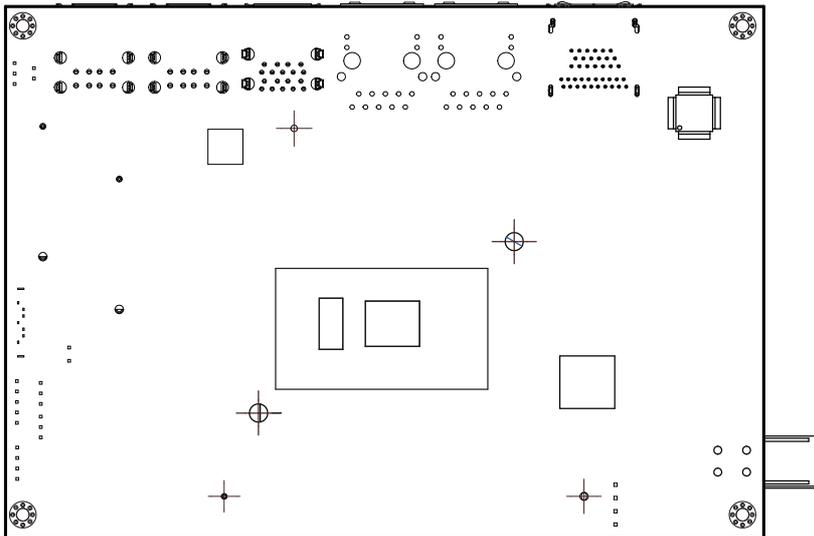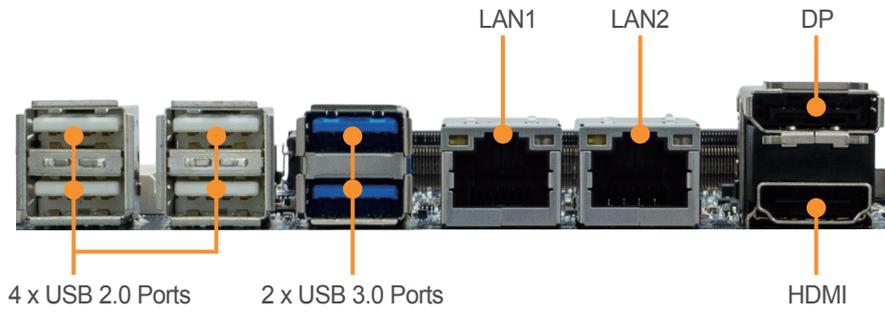
Power Button

Press the Power button located on the left side of Bottom I/O panel.

ACTION	ASSIGNMENT
Press	0V
Release	PWRBTN

DC-IN

Supports DC 12V /19V /24V power input (3 pins lockable terminal block)

PIN	ASSIGNMENT
3	N/C
2	GND
1	+12V
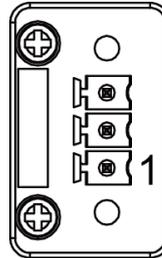
USB 2.0 Port

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+5V	5	+5V
2	USBPN	6	USBPN
3	USBPP	7	USBPP
4	GND	8	GND
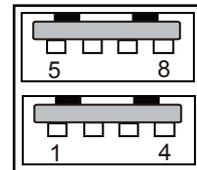
DIO Port

PIN	ASSIGNMENT
1	DIN1
2	DIN2
3	DIN3
4	DIN4
5	DIN5
6	DIN6
7	DIN7
8	DIN8
9	DOUT1
10	DOUT2
11	DOUT3
12	DOUT4
13	DOUT5
14	DOUT6
15	DOUT7
16	DOUT8
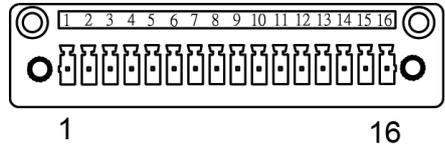
USB 3.%；Yb"%Ports

PIN	ASSIGNMENT	PIN	ASSIGNMENT
A1	5V	A9	TX1_DP
A2	USBP1N	A8	TX1_DN
A3	USBP1P	A7	GND
A4	GND	A6	RX1_DP
-	-	A5	RX1_DN
B1	5V	B9	TX2_DP
B2	USBP2N	B8	TX2_DN
B3	USBP2P	B7	GND
B4	GND	B6	RX2_DP
-	-	B5	RX2_DN
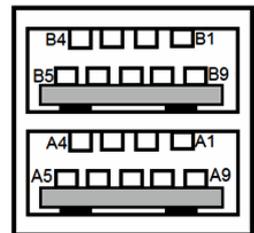
COM PORT

COM1(RS-232) Connector Pin Assignment:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD#	6	DSR#
2	RX	7	RTS#
3	TX	8	CTS#
4	DTR#	9	RI#
5	GND	-	-
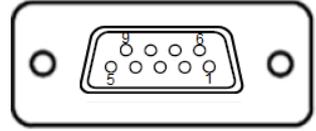
COM1

COM2(RS-232/422/485) Connector Pin Assignment:

PIN	ASSIGNMENT		
	RS-232	RS-422	RS-485
1	DCD#	TX-	RS-485-
2	RX	TX+	RS-485+
3	TX	RX+	X
4	DTR#	RX-	X
5	GND	GND	GND
6	DSR#	X	X
7	RTS#	X	X
8	CTS#	X	X
9	RI#	X	X
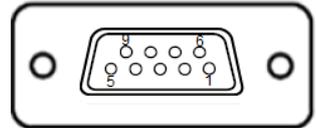
COM2

Notes:
1. COM2 is selectable as RS-232, RS422, RS485 by BIOS setting.
2. Default setting is RS-232. Please see **Chapter 5 "Advanced – Onboard Device Configuration"** for selection details.

COM3, COM4(RS-232) /option

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD#	6	DSR#
2	RX	7	RTS#
3	TX	8	CTS#
4	DTR#	9	RI#
5	GND	-	-
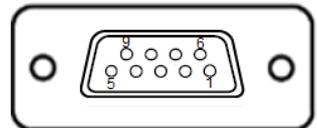
COM3
COM4

LAN1, LAN2

PIN	ASSIGNMENT
1	MDI_0P
2	MDI_0N
3	MDI_1P
4	MDI_2P
5	MDI_2N
6	MDI_1N
7	MDI_3P
8	MDI_3N

Yellow   Green/Orange

8 | | | | | | | 1
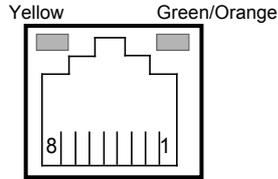
LAN1/

LAN2

LAN LED Indicator:
Right Side LED

Green Color On	10/100Mbps LAN Speed Indicator
Orange Color On	Giga LAN Speed Indicator
Off	No LAN switch/hub connected

Left Side LED

Yellow Color Blinking	LAN Message Active
Off	No LAN Message Active

Internal I^{2}C port

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5	3	I2C0_SCL
2	GND	4	I2C0_SDA

1

7
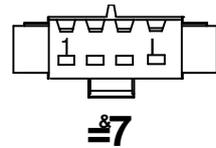
DP and HDMI Port

PIN	ASSIGNMENT	PIN	ASSIGNMENT
P1	DP_C_DATA0+	P2	GND
P3	DP_C_DATA0-	P4	DP_C_DATA1+
P5	GND	P6	DP_C_DATA1-
P7	DP_C_DATA2+	P8	GND
P9	DP_C_DATA2-	P10	DP_C_DATA3+
P11	GND	P12	DP_C_DATA3-
P13	DP_C_AUX_ENJ	P14	GND
P15	DP_C_AUX+	P16	GND
P17	DP_C_AUX-	P18	HPD
P19	GND	P20	DP_VCC3_3

Pin Assignment for HDMI Port Connector:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DP0_HDMI_P2	2	GND
3	DP0_HDMI_N2	4	DP0_HDMI_P1
5	GND	6	DP0_HDMI_N1
7	DP0_HDMI_P0	8	GND
9	DP0_HDMI_N0	10	DP0_HDMI_CLKP
11	GND	12	DP0_HDMI_CLKN
13	NC	14	NC
15	DP0_HDMI_SCL	16	DP0_HDMI_SDA
17	GND	18	VCC5_HDMI
19	DP0_HDMI_HPD_IN	-	-

DP

HDMI
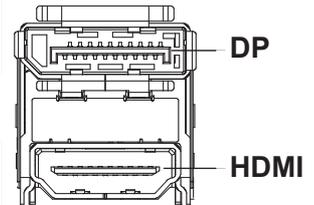
J1

3.3 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

| 2 Pin Jumper | 3 Pin Jumper | Jumper Block | Jumper Cap |
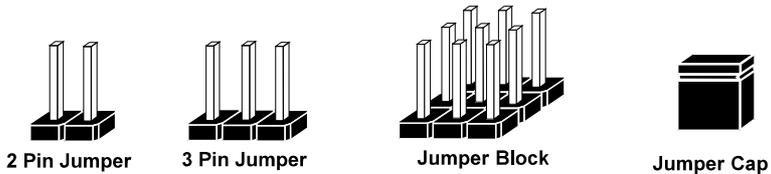
If a jumper has three pins (for examples, labelled PIN1, PIN2, and PIN3), you can connect PIN1 & PIN2 to create one setting by shorting. You can either connect PIN2 & PIN3 to create another setting. The same jumper diagrams are applied all through this manual. The figure below shows what the manual diagrams look and what they represent.

Jumper Diagrams

Jumper Cap
looks like this

2 pin Jumper
looks like this
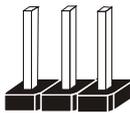
3 pin Jumper
looks like this
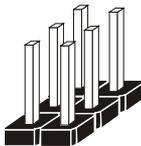
Jumper Block
looks like this
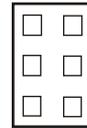
Jumper Settings

2 pin Jumper close(enabled)
Looks like this

1
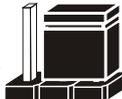
3 pin Jumper
2-3 pin close(enabled)
Looks like this

1

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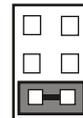
1   2

3.4 Setting Connectors and Jumpers
3.4.1 COM2 Connector Pin9 Definition Selection Guide (JP_COM2)

Jumper Location: JP_COM2
Description: COM2 Port pin9 RI/+5V/+12V Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
RI	*1-2* *(Default Setting)*	
12V	3-4	
5V	5-6	
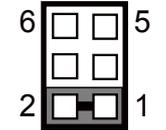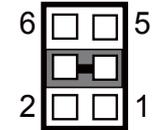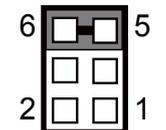
COM1, COM2

COM1 (fixed as RS-232) Connector (onboard pin header)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	DCD#	6	DSR#
2	RX	7	RTS#
3	TX	8	CTS#
4	DTR#	9	RI#
5	GND	-	-
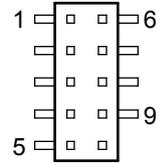
COM2 (selectable as RS-232/422/485) Connector (onboard pin header)

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

Note:

COM2: Pin 9 is selectable for RI, +5V or +12V by **JP_COM2** jumper setting. Default setting is RI. Please see "**COM2 PIN9 Definition Selection Guide"** for selection details.

JUSB1 /Internal USB 2.0 Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+5V	2	+5V
3	USBP7N	4	USBP10N
5	USBP7P	6	USBP10P
7	GND	8	GND
9	GND	10	GND
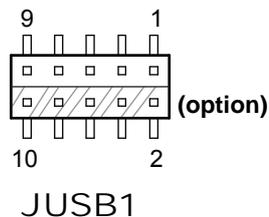
Note: The functions of **JUSB1** option pins are only supported on Core-i5 / i3 SoC boards.

ATX1
Internal Power Input Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	GND	3	+12V / +24V
2	GND	4	+12V / +24V
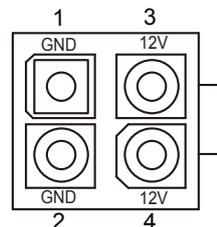
JP7
Internal SPI Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	3.3V	2	GND
3	CSJ	4	CLK
5	MISO	6	MOSI
7	NC	8	NC
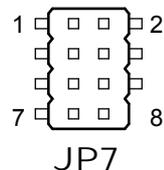
AUDIO1

Internal HD Audio Connector for Line In/Line Out/Mic In.

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	MIC1-L	2	MIC1-R
3	GND	4	GND
5	HD_LINE-IN-L_L	6	HD_LINE-IN-R_L
7	GND	8	GND
9	LINE-OUT-L	10	LINE-OUT-R
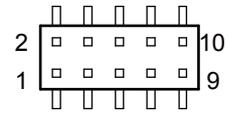
AUDIO1

SPK_L_OUT1

Internal Speaker Out Connector (Left side)

PIN	ASSIGNMENT
1	AMP_OUTL+
2	AMP_OUTL-
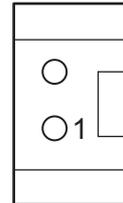
SPK_L_OUT1

SPK_R_OUT1

Internal Speaker Out Connector (Right side)

PIN	ASSIGNMENT
1	AMP_OUTR+
2	AMP_OUTR-
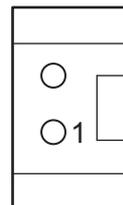
SPK_R_OUT1

JDIO1
Internal Digital Input / Output Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	5V	2	5V
3	GND	4	GND
5	DIN_0	6	DOUT_0
7	DIN_1	8	DOUT_1
9	DIN_2	10	DOUT_2
11	DIN_3	12	DOUT_3
13	DIN_4	14	DOUT_4
15	DIN_5	16	DOUT_5
17	DIN_6	18	DOUT_6
19	DIN_7	20	DOUT_7

JDIO1
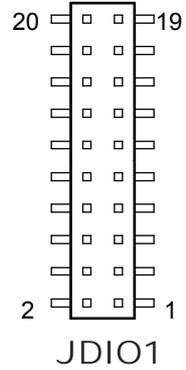
CPU_FAN1
Internal CPU Fan Connector

PIN	ASSIGNMENT
1	GND
2	VCC12
3	TAC
4	CTL

CPU_FAN1
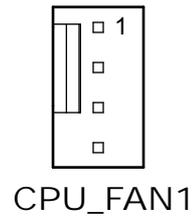
JFP1

Internal Front Panel Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	HDD LED+	2	PWR LED+
3	HDD LED-	4	PWR LED-
5	GND	6	Power Button
7	Reset Button	8	GND
9	5V	-	-
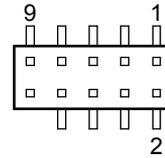
JBAT1

Internal Battery Wafer

PIN	ASSIGNMENT
1	VBAT+
2	GND
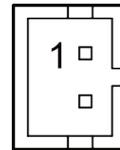
JP1

Internal SPI Override Protection Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
Disable	*Open (Default Setting)*	
Enable	Close	
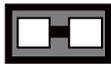
SATA1

Internal Serial ATA (SATA) 6GB/s Connector

PIN	ASSIGNMENT
1	GND
2	TXPC
3	TXNC
4	GND
5	RXNC
6	RXPC
7	GND
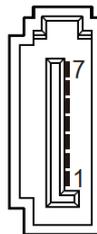
SATA1

JHDD_PWR1

Internal Serial ATA Power Connector

PIN	ASSIGNMENT
1	5V
2	GND
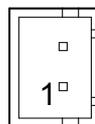
JHDD_PWR1

JI2C1

Internal I2C Wafer

PIN	ASSIGNMENT
1	5V
2	GND
3	I2C0_SCL
4	I2C0_SDA
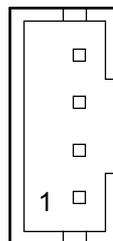
JI2C1

JLVDS1

Inernal LVDS Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	+3.3V/+5V	2	GND
3	LVDS_CLKBM	4	LVDS_CLKBP
5	GND	6	LVDS_YBM2
7	LVDS_YBP2	8	GND
9	LVDS_YBM1	10	LVDS_YBP1
11	LVDS_YBP3	12	LVDS_YBM3
13	LVDS_YBP0	14	LVDS_YBM0
15	GND	16	LVDS_CLKAP
17	LVDS_CLKAM	18	GND
19	LVDS_YAP2	20	LVDS_YAM2
21	GND	22	LVDS_YAP1
23	LVDS_YAM1	24	GND
25	LVDS_YAP0	26	LVDS_YAM0
27	LVDS_YAP3	28	LVDS_YAM3
29	+3.3V/+5V	30	+3.3V/+5V

JLVDS1
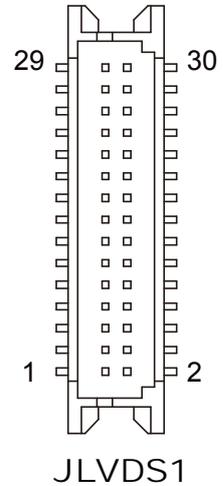
JINV1

Internal Panel Inverter Connector

PIN	ASSIGNMENT
1	+12V
2	GND
3	Backlight PWM
4	GND
5	Backlight Enable
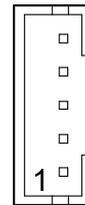
JINV1

M_PCIE1
Internal Mini-PCI Express Slot

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	WAKEJ	2	VCC3_3_SB
3	NC	4	GND
5	NC	6	VCC1_5
7	CLKREQJ	8	NC
9	GND	10	NC
11	CLK_DN	12	NC
13	CLK_DP	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	NC
21	GND	22	PLTRSTJ_BUF
23	PCIE_RXN	24	VCC3_3_SB
25	PCIE_RXP	26	GND
27	GND	28	VCC1_5
29	GND	30	SMB_CLK
31	PCIE_TXN	32	SMB_DATA
33	PCIE_TXP	34	GND
35	GND	36	USBN
37	GND	38	USBP
39	VCC3_3_SB	40	GND
41	VCC3_3_SB	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	VCC1_5
49	NC	50	GND
51	NC	52	VCC3_3_SB
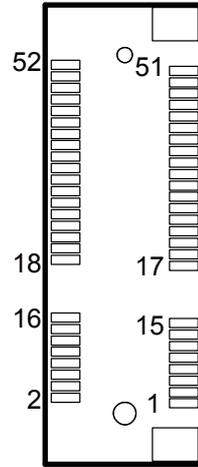
M_PCIE1

Mini PCI Express is the successor of the Mini PCI card and provides an increased data throughput. The cards have a detached network interface and are equipped with one lane. They are used in particular in embedded designs or compact box PCs.

M_SATA1

Internal mSATA Slot

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	NC	2	3.3V
3	NC	4	GND
5	NC	6	NC
7	NC	8	NC
9	GND	10	NC
11	NC	12	NC
13	NC	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	NC
21	GND	22	NC
23	mSATA1_RX_DP	24	3.3V
25	mSATA1_RX_DN	26	GND
27	GND	28	NC
29	GND	30	NC
31	mSATA1_TX_DN	32	NC
33	mSATA1_TX_DP	34	GND
35	GND	36	USB2_P9_DN
37	GND	38	USB2_P9_DP
39	3.3V	40	GND
41	3.3V	42	NC
43	NC	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	GND
51	NC	52	3.3V
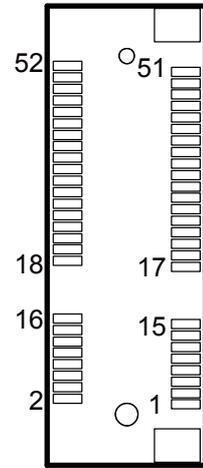
M_SATA1

Note: The USB function is only supported on Core-i5 / i3 SoC boards.

SW1
Internal LVDS Resolution/Channel/Color Bit Selection

SELECTION	SW1	PIN	SETTING
1024 x 768 Channel S/8bit (Default Setting)		**1-8**	**ON**
		2-7	**OFF**
		3-6	**ON**
		4-5	**ON**
800 x 600 Channel S/6bit		1-8	ON
		2-7	ON
		3-6	ON
		4-5	ON
1024 x 768 Channel S/6bit		1-8	OFF
		2-7	ON
		3-6	ON
		4-5	ON
1280 x 768 Channel S/6bit		1-8	OFF
		2-7	OFF
		3-6	ON
		4-5	ON
1280 x 800 Channel S/6bit		1-8	ON
		2-7	ON
		3-6	OFF
		4-5	ON
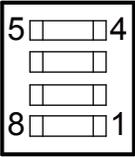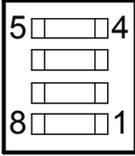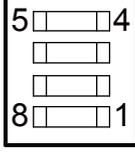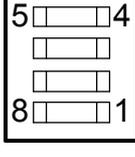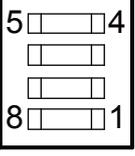
SELECTION	SW1	PIN	SETTING
1280 x 960 Channel S/6bit		1-8	OFF
		2-7	ON
		3-6	OFF
		4-5	ON
1280 x 1024 Channel D/8bit		1-8	ON
		2-7	OFF
		3-6	OFF
		4-5	ON
1366 x 768 Channel S/6bit		1-8	OFF
		2-7	OFF
		3-6	OFF
		4-5	ON
1366 x 768 Channel S/8bit		1-8	ON
		2-7	ON
		3-6	ON
		4-5	OFF
1440 x 900 Channel D/8bit		1-8	OFF
		2-7	ON
		3-6	ON
		4-5	OFF
1400 x 1050 Channel D/8bit		1-8	ON
		2-7	OFF
		3-6	ON

SELECTION	SW1	PIN	SETTING
		4-5	OFF
1600 x 900 Channel D/8bit		1-8	OFF
		2-7	OFF
		3-6	ON
		4-5	OFF
1680 x 1050 Channel D/8bit		1-8	ON
		2-7	ON
		3-6	OFF
		4-5	OFF
1600 x 1200 Channel D/8bit		1-8	OFF
		2-7	ON
		3-6	OFF
		4-5	OFF
1920 x 1080 Channel D/8bit		1-8	ON
		2-7	OFF
		3-6	OFF
		4-5	OFF
1920 x 1200 Channel D/8bit		1-8	OFF
		2-7	OFF
		3-6	OFF
		4-5	OFF
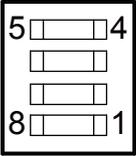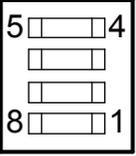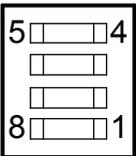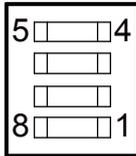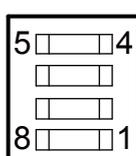
JP5
Internal LVDS VCC Selection
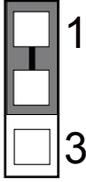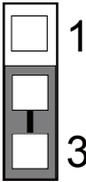
SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
3.3V	*1-2* *(Default Setting)*	1 ▪ 3 JP5
5V	2-3	1 ▪ 3 JP5

JP6
Internal Backlight PWM Level Selection
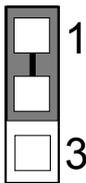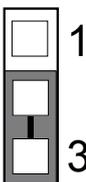
SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
3.3V	*1-2* *(Default Setting)*	1 ▪ 3 JP6
5V	2-3	1 ▪ 3 JP6

JP9
Internal V3P3 MPCIE Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
VCC3_3	*1-2* *(Default Setting)*	3 1 **JP9**
V3P3A	2-3	3 1 **JP9**
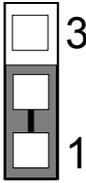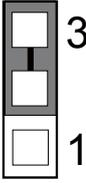
JCMOS1
Internal Clear CMOS Data Selection

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

SELECTION	JUMPER SETTINGS	JUMPER ILLUSTRATION
Normal	***Open*** ***(Default Setting)***	☐ ☐ 1 **JCMOS1**
Clear CMOS Data	Close	☐▬☐ 1 **JCMOS1**
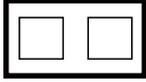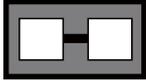
Note: Please make sure the main power is off before you clear CMOS.

4 Software Utilities

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

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

4.1   Introduction

Enclosed with the EL1096 Series package is our driver utilities contained in a DVD-ROM disk. Refer to the following table for driver locations:

Filename (Assume that DVD-ROM drive is D:)	Purpose
D:\EL1096_V1.0\Platform\ 1_Main Chip\Win10(64Bit)	Intel® Chipset Device Software installer
D:\EL1096_V1.0\Platform \ 2_Graphics\Win10(64Bit)	Intel® HD Graphics Family For Graphics driver installation
D:\EL1096_V1.0\Platform\ 3_Sound\Win10(64Bit)	Realtek ALC888S-VD2-GR HD Audio codec System Software
D:\EL1096_V1.0\Platform \ 4_ME\ Win10 (64Bit)\	Intel® Management Engine Components Installer for Intel Kaby Lake chipset
D:\EL1096_V1.0\Platform\ 5_LAN Chip\ Win10 (64Bit)	Intel® I219-V & Intel® I211 For LAN Driver installation
D:\EL1096_V1.0\Platform \ 6_Serial IO\Win10 (64Bit)	Intel® Serial I/O Driver

Note: Install the driver utilities immediately after the OS installation is completed.

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

4.2 Installing Intel® Chipset Software Installation Utility

Introduction

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

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

Intel® Chipset Software Installation Utility

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

1 Connect the USB DVD-ROM device to EL1096 and insert the driver disk.

2 Enter the **Main Chip** folder where the Chipset driver is located (depending on your OS platform).

3 Click **Setup.exe** file for driver installation.

4 Follow the on-screen instructions to install the driver.

5 Once the installation is completed, shut down the system and restart EL1096 for the changes to take effect.

4.3 Installing Graphics Driver Utility

The Graphics interface embedded in EL1096 can support dual displays via DP and HDMI interfaces and make the system work simultaneously.

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

1 Connect the USB DVD-ROM device to EL1096 and insert the driver disk.

2 Enter the **Graphics** folder where the driver is located (depending on your OS platform).

3 Click the **Setup.exe** file for driver installation.

4 Follow the on-screen instructions to complete the installation.

5 Once the installation is completed, shut down the system and restart EL1096 for the changes to take effect.

4.4 Installing LAN Driver Utility

Enhanced with LAN function, EL1096 supports various network adapters. To install the LAN Driver, follow the steps below:

1 Connect the USB DVD-ROM device to EL1096 and insert the driver disk.

2 Enter the **LAN** folder where the driver is located (depending on your OS platform).

3 Click **Autorun.exe** file for driver installation.

4 Follow the on-screen instructions to complete the installation.

5 Once the installation is completed, shut down the system and restart EL1096 for the changes to take effect.

4.5 Installing Sound Driver Utility

To install the Sound Driver, follow the steps below:

1 Connect the USB DVD-ROM device to EL1096 and insert the driver disk.

2 Open the **Sound** folder where the driver is located (depending on your OS platform).

3 Click the **Setup.exe** file for driver installation.

4 Follow the on-screen instructions to complete the installation.

5 Once the installation is completed, shut down the system and restart EL1096 for the changes to take effect.

4.6 Intel® Management Engine Components Installer Installation

Installation Instructions for Intel® Management Engine Components Installer

1 Connect the USB DVD-ROM device to EL1096 and insert the driver disk.

2 Enter the **ME** folder where the driver is located.

3 Select Windows 10 (64-bit) for your OS platform.

4 Click **Setup.exe** file for ME driver installation.

5 Follow the on-screen instructions to complete the installation.

6 Once the installation is completed, shut down the system and restart EL1096 for the changes to take effect.

4.7 Installing Intel® Serial I/O Driver Utility

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

1 Connect the USB DVD-ROM device to EL1096 and insert the driver disk.

2 Open the **Serial I/O** folder where the driver is located.

3 Select Windows 10 (64-bit) for your OS platform.

4 Click the **Setup.exe** file for driver installation.

5 Follow the on-screen instructions to complete the installation.

6 Once the installation is completed, shut down the system and restart EL1096 for the changes to take effect.

5 BIOS SETUP

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

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

5.1   Introduction

The EL1096 uses an AMI (American Megatrends Incorporated) Aptio BIOS that is stored in the Serial Peripheral Interface Flash Memory (SPI Flash) and can be updated. The SPI Flash contains the built-in BIOS setup program, Power-On Self-Test (POST), PCI auto-configuration utility, LAN EEPROM information, and Plug and Play support.

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

The diagram below shows the Extensible Firmware Interface's location in the software stack.
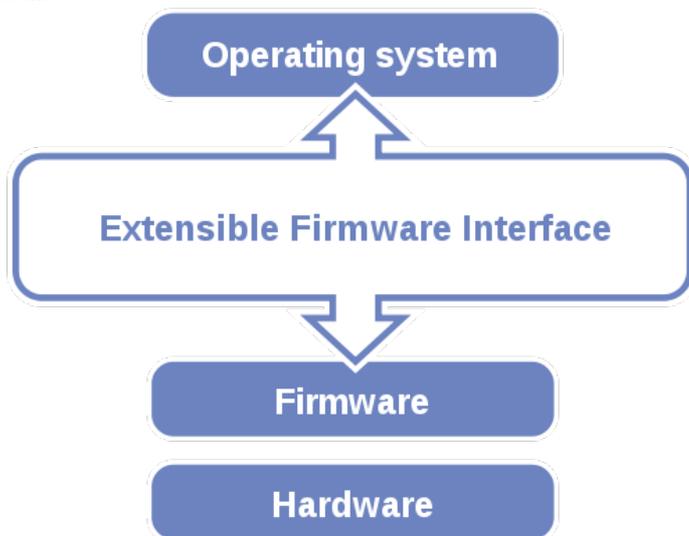
Figure 5-1. Extensible Firmware Interface Diagram

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

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

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

5.2 Accessing Setup Utility

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

Figure 5-2. POST Screen with AMI Logo

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

```
              Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
   Main  Advanced  Chipset  Security  Boot  Save & Exit

   BIOS Information                                              Set the Date. Use Tab to
   BIOS Vendor                    American Megatrends           switch between Date elements.
   Core Version                   5.12
   Compliancy                     UEFI 2.7; PI 1.6
   Project Version                E9960TU5 x64
   Build Date and Time            10/26/2018 16:07:45

   System Date                    [Sun 10/21/2018]
   System Time                    [19:46:12]

                                                                →←: Select Screen
                                                                ↑↓: Select Item
                                                                Enter: Select
                                                                +/-: Change Opt.
                                                                F1: General Help
                                                                F2: Previous Values
                                                                F3: Optimized Defaults
                                                                F4: Save & Exit
                                                                ESC: Exit

              Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc.
```

BIOS Setup Menu Initialization Screen

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

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

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

5.3   Main

Menu Path	*Main*

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

```
            Aptio Setup Utility - Copyright (C) 2019 American Megatrends, Inc.
  Main  Advanced  Chipset  Security  Boot  Save & Exit

   BIOS Information                                        Enable/Disable Built-in
   BIOS Vendor                  American Megatrends        Display (LVDS).
   Core Version                 5.12                       It is recommended to disable
   Compliancy                   UEFI 2.7; PI 1.6           Built-in Display function for
   Project Version              E9960PU2 x64               the system without LVDS.
   Build Date and Time          03/19/2019 16:05:43

   Built-in Display             [Enabled]


   System Date                  [Tue 03/19/2019]
   System Time                  [16:44:48]
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit




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```

Main Screen

BIOS Setting	Options	Description/Purpose
BIOS Vendor	No changeable options	Displays the name of the BIOS vendor.
Core Version	No changeable options	Displays the current BIOS core version.
Compliancy	No changeable options	Displays the current UEFI version.
Project Version	No changeable options	Displays the version of the BIOS currently installed on the platform.
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

BIOS Setting	Options	Description/Purpose
		automatically changed.
System Time	Hour, minute, second	Sets the system time. The format is [Hour: Minute: Second]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it.
Built-in Display	Enable, Disable	Sets the LVDS function on or off

5.4   Advanced

Menu Path	*Advanced*

This menu provides advanced configurations such as such as CPU Configuration, SATA Configuration, PCH-FW Configuration, Trusted Computing, ACPI Settings, F81866 Super IO Configuration, Hardware Monitor, F81866 Watchdog, S5 RTC Wake Settings, Graphic Output Protocol Policy, USB Configuration and Network Stack Configuration.

```
Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
  Main   Advanced   Chipset   Security   Boot   Save & Exit

▶ CPU Configuration                                    CPU Configuration Parameters
▶ SATA Configuration
▶ PCH-FW Configuration
▶ Trusted Computing
▶ ACPI Settings
▶ F81866 Super IO Configuration
▶ Hardware Monitor
▶ F81866 Watchdog
▶ S5 RTC Wake Settings
▶ Graphic Output Protocol Policy
▶ USB Configuration
▶ Network Stack Configuration

                                                       ↔: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit

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```

Advanced Menu Screen

BIOS Setting	Options	Description/Purpose
CPU Configuration	Sub-Menu	CPU Configuration Parameters.
SATA Configuration	Sub-Menu	SATA Device Options Settings.
PCH-FW Configuration	Sub-Menu	Management Engine Technology Parameters.
Trusted Computing	Sub-Menu	Trusted Computing Settings.
ACPI Settings	Sub-Menu	System ACPI Parameters.
F81866 Super IO Configuration	Sub-Menu	System Super IO Chip Parameters
Hardware Monitor	Sub-Menu	Monitor hardware status
F81866 Watchdog	Sub-Menu	F81866 Watchdog Parameters.
S5 RTC Wake Settings	Sub-Menu	Enables the system to wake from S5 using RTC alarm.

BIOS Setting	Options	Description/Purpose
Graphic Output Protocol Policy	Sub-Menu	User selects Monitor Output by Graphic Output Protocol.
USB Configuration	Sub-Menu	USB Configuration Parameters.
Network Stack Configuration	Sub-Menu	Network Stack Settings.

5.4.1   Advanced – CPU Configuration

Menu Path   *Advanced > CPU Configuration*

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


```
               Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
   Advanced

   CPU Configuration                                            Enabled for Windows XP and
                                                                Linux (OS optimized for
   Type                          Intel(R) Core(TM)              Hyper-Threading Technology)
                                 i5-7300U CPU @ 2.60GHz         and Disabled for other OS (OS
   ID                            0x806E9                        not optimized for
   Microcode Revision            8E                             Hyper-Threading Technology).
   Speed                         2700 MHz
   Number of Processors          2Core(s) / 4Thread(s)
   VMX                           Supported
   SMX/TXT                       Supported

   L1 Data Cache                 32 KB x 2
   L1 Instruction Cache          32 KB x 2
   L2 Cache                      256 KB x 2                     →←: Select Screen
   L3 Cache                      3 MB                           ↑↓: Select Item
   L4 Cache                      N/A                            Enter: Select
                                                                +/-: Change Opt.
   Hyper-Threading               [Enabled]                      F1: General Help
   Intel (VMX) Virtualization    [Enabled]                      F2: Previous Values
   Technology                                                   F3: Optimized Defaults
                                                                F4: Save & Exit
                                                                ESC: Exit




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```

CPU Configuration Screen

BIOS Setting	Options	Description/Purpose
Type	No changeable options	Displays CPU type.
ID	No changeable options	Displays CPU ID number.
Microcode Revision	No changeable options	Displays the CPU Microcode Revision.
Speed	No changeable options	Displays the CPU speed.
Number of Processors	No changeable options	Displays the CPU number of the

BIOS Setting	Options	Description/Purpose
		processor.
VMX	No changeable options	CPU VMX hardware support for virtual machines.
SMX/TXT	No changeable options	Reports if Intel Secure Mode Extensions Technology (SMX) /Trusted Execution Technology (TXT) is supported by the processor.
L1 Data Cache	No changeable options	Displays L1 Data Cache size.
L1 Instruction Cache	No changeable options	Displays L1 Instruction 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.
Hyper-Threading	- Disabled - Enabled	When disabled, only one thread per enabled core is enabled. Hyper Threading is Intel's term for its simultaneous multithreading implementation in their CPUs. Enabling 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 (VMX) Virtualization Technology	- Disabled - Enabled	When enabled, VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

5.4.2 Advanced – SATA Configuration

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 hard drive is set to work in AHCI mode.

```
Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
  Advanced

 SATA And RST Configuration                                    Enable/Disable SATA Device.

 SATA Controller(s)              [Enabled]
 SATA Mode Selection             [AHCI]

 Serial ATA Port 0               Empty
   Software Preserve             Unknown
   Port 0                        [Enabled]
   Hot Plug                      [Disabled]
 Serial ATA Port 1               Empty
   Software Preserve             Unknown
   Port 1                        [Enabled]
   Hot Plug                      [Disabled]

                                                              →←: Select Screen
                                                              ↑↓: Select Item
                                                              Enter: Select
                                                              +/-: Change Opt.
                                                              F1: General Help
                                                              F2: Previous Values
                                                              F3: Optimized Defaults
                                                              F4: Save & Exit
                                                              ESC: Exit


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```

SATA Configuration Screen

BIOS Setting	Options	Description/Purpose
SATA Controller(s)	- Disabled - Enabled	Enables or Disables the on-chip SATA Device. Default: Enabled.
SATA Mode Selection	- AHCI	Determines how SATA controller(s) operate.
Serial ATA Port 0 – 1	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 - 1	- Disabled - Enabled	Enables or Disables SATA Port Device.
Hot Plug	- Disabled - Enabled	Enables or Disables Hot Plug function to designate a SATA port device as hot-pluggable.

5.4.3 Advanced – PCH-FW Configuration

Menu Path	*Advanced > PCH-FW Configuration*

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

```
              Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
        Advanced

    ME Firmware Version              11.8.55.3510
    ME Firmware Mode                 Normal Mode
    ME Firmware SKU                  Consumer SKU




                                                         ⇄: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



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```
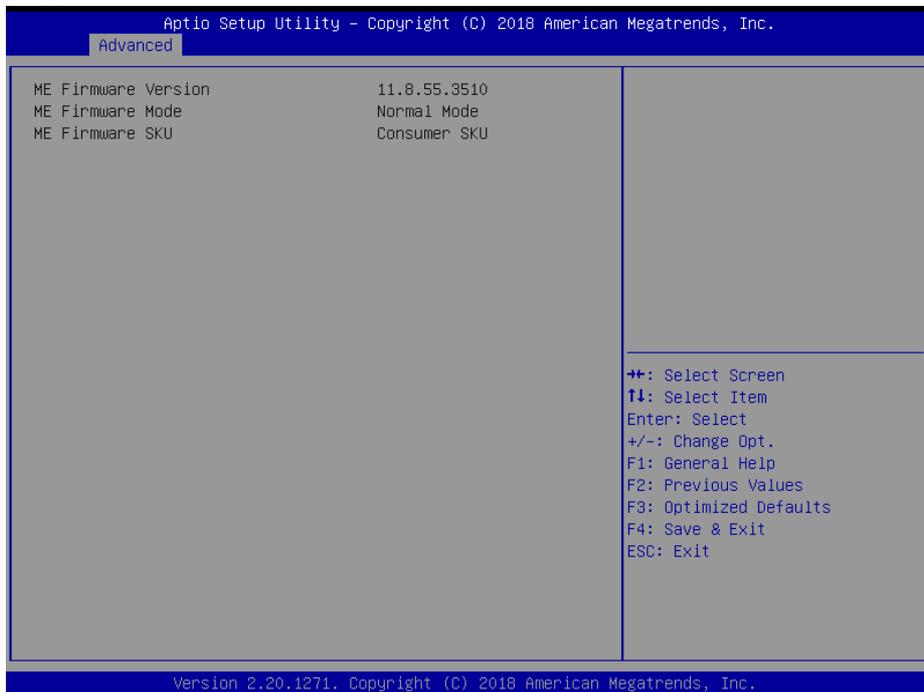
PCH-FW Configuration Screen

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

5.4.4 Advanced – Trusted Computing

Menu Path	*Advanced > Trusted Computing*

```
              Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
      Advanced

     TPM20 Device Found                               Enables or Disables BIOS
     Firmware Version:               302.12           support for security device.
     Vendor:                         INTC             O.S. will not show Security
                                                      Device. TCG EFI protocol and
     Security Device Support         [Enable]         INT1A interface will not be
     Active PCR banks                SHA-1,SHA256     available.
     Available PCR banks             SHA-1,SHA256

     SHA-1 PCR Bank                  [Enabled]
     SHA256 PCR Bank                 [Enabled]

     Pending operation               [None]
     Platform Hierarchy              [Enabled]
     Storage Hierarchy               [Enabled]        ➙➙: Select Screen
     Endorsement Hierarchy           [Enabled]        ↑↓: Select Item
     TPM2.0 UEFI Spec Version        [TCG_2]          Enter: Select
     Physical Presence Spec Version  [1.3]            +/-: Change Opt.
     TPM 20 InterfaceType            [CRB]            F1: General Help
     Device Select                   [Auto]           F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit

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```

Trusted Computing Screen

BIOS Setting	Options	Description/Purpose
Firmware Version	No changeable options	Displays the Firmware Version.
Vendor	No changeable options	Displays the Vendor.
Security Device Support	- Disabled - Enabled	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Active PCR banks	No changeable options	Displays the Active PCR banks.
Available PCR banks	No changeable options	Displays the Available PCR banks.
SHA-1 PCR Bank	- Disabled - Enabled	Enables or Disables SHA-1 PCR Bank.
SHA256 PCR Bank	- Disabled - Enabled	Enables or Disables SHA256 PCR Bank.
Pending operation	- None - TPM Clear	Schedules an operation for the Security Device. **Note:** Your computer will reboot during restart in

BIOS Setting	Options	Description/Purpose
		order to change the State of Security Device.
Platform Hierarchy	- Disabled - Enabled	Enables or Disables the Platform Hierarchy.
Storage Hierarchy	- Disabled - Enabled	Enables or Disables the Storage Hierarchy.
Endorsement Hierarchy	- Disabled - Enabled	Enables or Disables the Endorsement Hierarchy.
TPM2.0 UEFI Spec Version	- TCG_1_2 - TCG_2	Selects the TCG2 Spec Version Support. • **TCG_1_2:** The Compatible mode for Win8/Win10. • **TCG_2:** Supports new TCG2 protocol and event format for Win10 or later.
Physical Presence Spec Version	- 1.2 - 1.3	Selects to tell O.S. to support PPI Spec. version 1.2 or 1.3. Note some HCK tests might not support version 1.3.
TPM 20 InterfaceType	No changeable options	Displays the TPM 20 Interface Type.
Device Select	- TPM 1.2 - TPM 2.0 - Auto	• **TPM 1.2:** Restricts support to TPM 1.2 devices. • **TPM 2.0:** Restricts support to TPM 2.0 devices. • **Auto:** Supports both TPM 1.2 and TPM 2.0 with the default set to TPM 2.0 devices if not found. TPM 1.2 devices will be enumerated.

5.4.5   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 and S3 Video Repost.

```
          Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
     Advanced

   ACPI Settings                                              Enables or Disables System
                                                             ability to Hibernate (OS/S4
                                                             Sleep State). This option may
   Enable Hibernation            [Enabled]                   not be effective with some
   ACPI Sleep State              [S3 (Suspend to RAM)]       operating systems.
   Lock Legacy Resources         [Disabled]
   S3 Video Repost               [Disabled]




                                                             →←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit




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```

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.

5.4.6   Advanced – F81866 Super IO Configuration

Menu Path	*Advanced > F81866 Super IO Configuration*

The **F81866 Super IO Configuration** allows users to configure the serial ports 1-2.

```
         Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
     Advanced

   F81866 Super IO Configuration                        View and Set Basic properties
                                                        of the SIO Logical device.
   Super IO Chip                    F81866              Like IO Base, IRQ Range, DMA
 ▶ Serial Port 1 Configuration                          Channel and Device Mode.
 ▶ Serial Port 2 Configuration



                                                        ┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈┈
                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit



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```

F81866 Super IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port 1 Configuration	Sub-Menu	Sets the parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Sub-Menu	Sets the parameters of Serial Port 2 (COMB).

```
         Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
   Advanced

   Serial Port 1 Configuration                            Enable or Disable this Logical
                                                          Device.
   Use This Device                  [Enabled]
   Device Settings                  IO=3F8h; IRQ=4;

   Change Settings                  [Auto]
   Mode                             [RS-232]



                                                          ↔: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit



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```

Serial Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
Use This Device	- 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=3,4,5,7,10,11,12; - IO=2F8h; IRQ=3,4,5,7,10,11,12; - IO=3E8h; IRQ=3,4,5,7,10,11,12; - IO=2E8h; IRQ=3,4,5,7,10,11,12;	Selects IRQ and I/O resource settings for Serial Port 1.
Mode	- RS-232 - RS-422 - RS-485	Selects COM mode.

```
            Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
        Advanced

    Serial Port 2 Configuration                            Enable or Disable this Logical
                                                           Device.
    Use This Device                    [Enabled]
    Device Settings                    IO=2F8h; IRQ=3;

    Change Settings                    [Auto]
    Mode                               [RS-232]



                                                           ↔: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit



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```

Serial Port 2 Configuration Screen

BIOS Setting	Options	Description/Purpose
Use This Device	- 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=3,4,5,7,10,11,12; - IO=2F8h; IRQ=3,4,5,7,10,11,12; - IO=3E8h; IRQ=3,4,5,7,10,11,12; - IO=2E8h; IRQ=3,4,5,7,10,11,12;	Selects IRQ and I/O resource settings for Serial Port 2.
Mode	- RS-232 - RS-422 - RS-485	Selects COM mode.

5.4.7 Advanced – Hardware Monitor

Menu Path	*Advanced > Hardware Monitor*

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

```
          Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
      Advanced

   Pc Health Status                                         Smart Fan Mode Select

 ▶ Smart Fan Mode Configuration
   CPU temperature                    : +51 %
   System temperature                 : +51 %
   CPU Fan Speed                      : N/A
   VCORE                              : +0.816 V
   VSB5V                              : +5.213 V
   VCC5V                              : +5.675 V
   VCC12                              : +11.352 V
   VCC3V                              : +3.328 V
   VSB3V                              : +3.328 V
   VBAT                               : +3.184 V
                                                        ──────────────────────────
                                                         ➜←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit




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```

Hardware Monitor Screen

BIOS Setting	Options	Description/Purpose
Smart Fan Mode Configuration	Sub-Menu	Smart Fan Mode Selection.
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
VCORE	No changeable options	Displays the voltage level of VCORE in supply.
VSB5V	No changeable options	Displays the voltage level of VSB5V in supply.
VCC5V	No changeable options	Displays the voltage level of VCC5V in supply.

BIOS Setting	Options	Description/Purpose
VCC12	No changeable options	Displays the voltage level of VCC12 in supply.
VCC3V	No changeable options	Displays the voltage level of VCC3V in supply.
VSB3V	No changeable options	Displays the voltage level of VSB3V in supply.
VBAT	No changeable options	Displays the voltage level of VBAT in supply.

Smart Fan Mode Configuration

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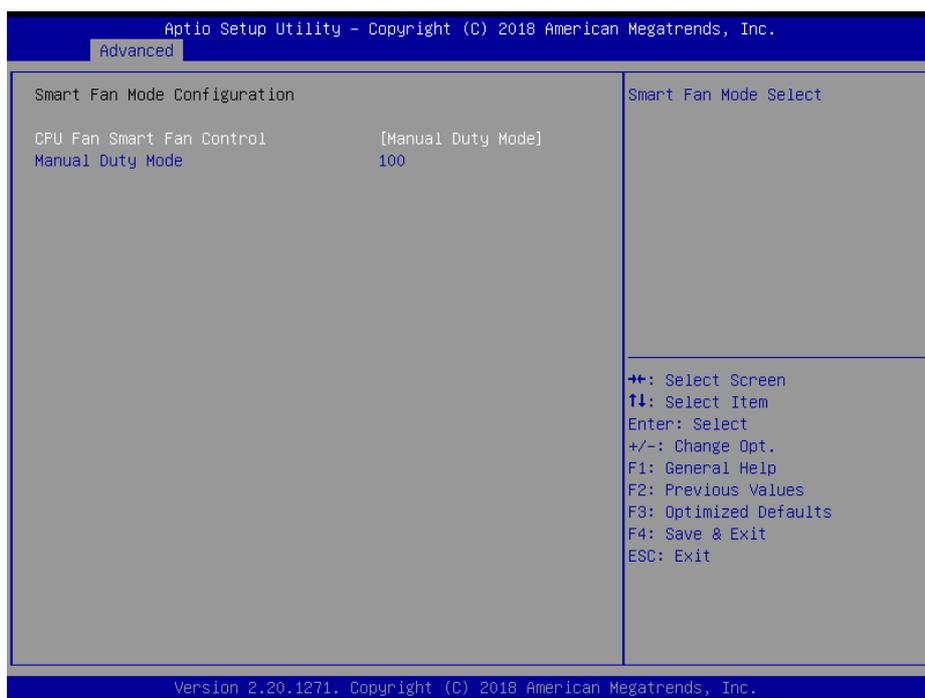
Smart Fan Mode Configuration Screen

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

5.4.8   Advanced – F81866 Watchdog

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.

```
         Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
      Advanced

   F81866 Watchdog                                     F81866 Watchdog timer settings
                                                       Enable/Disable
   Enable Watchdog                  [Enabled]

   Watchdog timer unit              [1s]
   Count for Timer (Seconds)        10




                                                       →←: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit



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```

F81866 Watchdog Screen

BIOS Setting	Options	Description/Purpose
Enable Watchdog	- Disabled (default) - Enabled	Enables/Disables F81866 Watchdog timer settings.
Watchdog timer unit	- 1s - 60s	Watchdog timer unit.
Count for Timer (Seconds)	Numeric (from 10 to 255)	The number of count for Timer.

5.4.9 Advanced – S5 RTC Wake Settings

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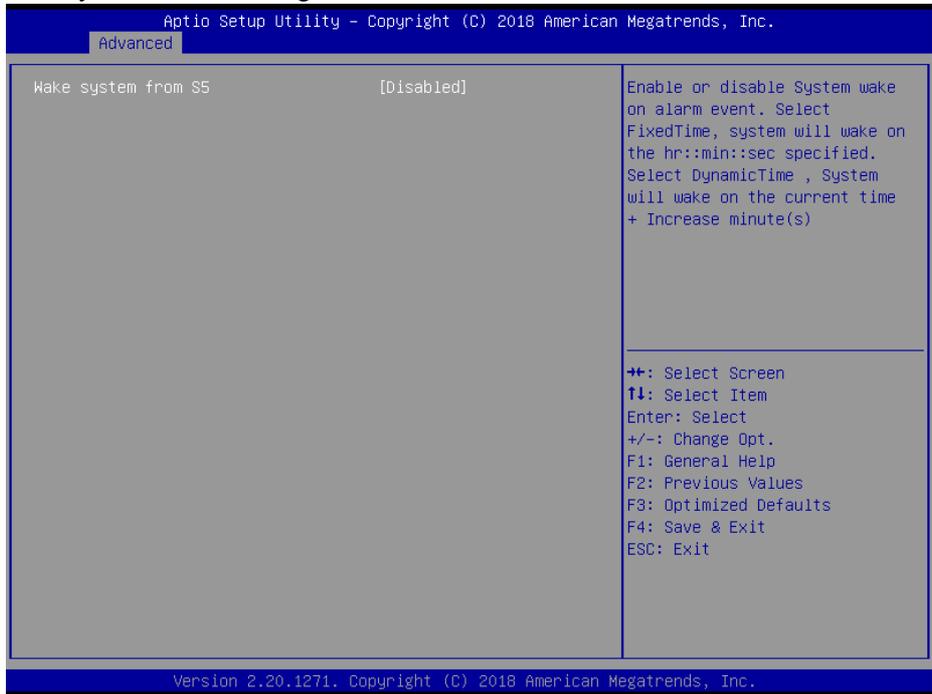
S5 RTC Wake Settings Screen (Disabled)

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled - Fixed Time - Dynamic Time	Allows enabling scheduled S5 to S0 (option **enabled**). ● **Fixed Time:** System will wake on the hr::min::sec specified. ● **Dynamic Time:** System will wake on the current time + Increase minute(s).

```
            Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
     Advanced

  Wake system from S5              [Fixed Time]           Enable or disable System wake
  Wake up hour                     0                      on alarm event. Select
  Wake up minute                   0                      FixedTime, system will wake on
  Wake up second                   0                      the hr::min::sec specified.
                                                          Select DynamicTime , System
                                                          will wake on the current time
                                                          + Increase minute(s)



                                                          ↔: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit



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```

S5 RTC Wake Settings Screen (Fixed Time)

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled - Fixed Time - Dynamic Time	Allows enabling scheduled S5 to S0 (option: **enabled**). • **Fixed Time:** System will wake on the hr::min::sec specified. • **Dynamic Time:** System will wake on the current time + Increase minute(s).
Wake up hour	Multiple options ranging from 0 to 23	Sets an hour for scheduled power-on event.
Wake up minute	Multiple options ranging from 0 to 59	Sets a minute for scheduled power-on event.
Wake up second	Multiple options ranging from 0 to 59	Sets a second for scheduled power-on event.

```
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     Advanced

 Wake system from S5                   [Dynamic Time]          Enable or disable System wake
 Wake up minute increase               1                       on alarm event. Select
                                                               FixedTime, system will wake on
                                                               the hr::min::sec specified.
                                                               Select DynamicTime , System
                                                               will wake on the current time
                                                               + Increase minute(s)


                                                               ➔←: Select Screen
                                                               ↑↓: Select Item
                                                               Enter: Select
                                                               +/-: Change Opt.
                                                               F1: General Help
                                                               F2: Previous Values
                                                               F3: Optimized Defaults
                                                               F4: Save & Exit
                                                               ESC: Exit


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```

S5 RTC Wake Settings Screen (Dynamic Time)

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled - Fixed Time - Dynamic Time	Allows enabling scheduled S5 to S0 (option: **enabled**). • **Fixed Time:** System will wake on the hr::min::sec specified. • **Dynamic Time:** System will wake on the current time + Increase minute(s).
Wake up minute increase	Multiple options ranging from 1 to 5	Sets a period of time (in minutes) after which the board wakes up from S5 state.

5.4.10 Advanced – Graphic Output Protocol Policy

Menu Path	*Advanced > Graphic Output Protocol Policy*

The **Graphic Output Protocol Policy** allows users to configure the monitor output policy.
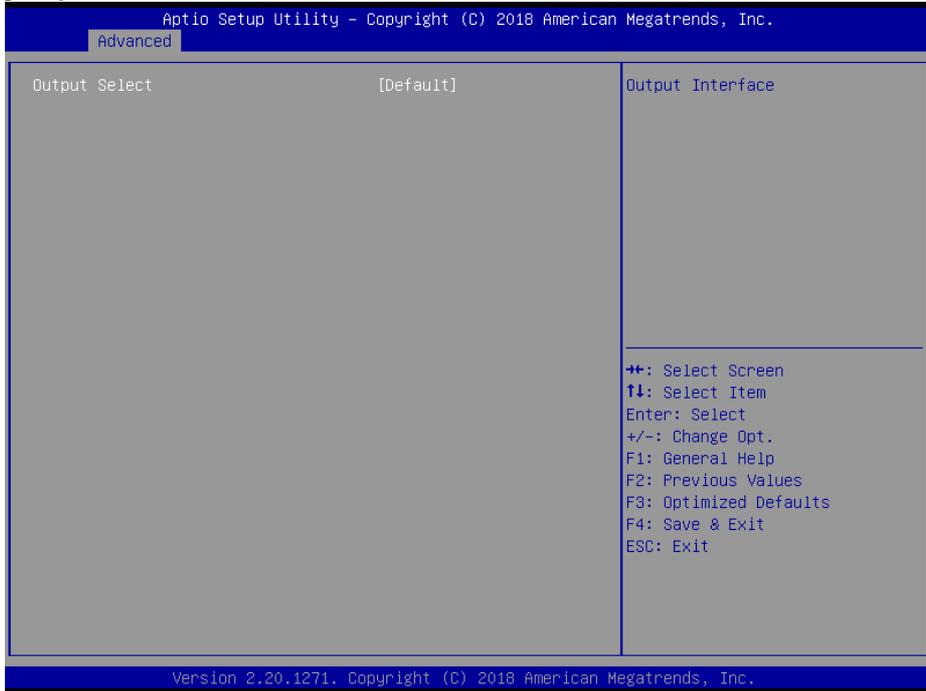
Graphic Output Protocol Policy Screen

BIOS Setting	Options	Description/Purpose
Output Select	- Default - DP + HDMI	Output Interface.

5.4.11 Advanced – USB Configuration

Menu Path	*Advanced > USB Configuration*

The **USB Configuration** allows users to enable/disable legacy USB support.
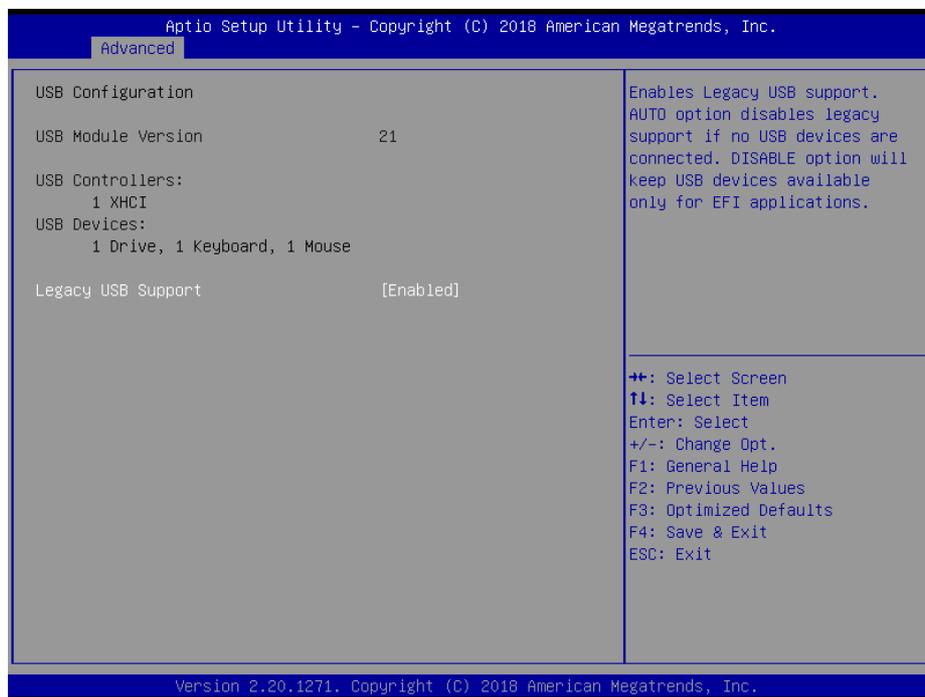
USB Configuration Screen

BIOS Setting	Options	Description/Purpose
Legacy USB Support	- Disabled - Enabled	Enables/Disables Legacy USB support.

5.4.12　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 Environment) 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.

```
            Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
    Advanced

 Network Stack                    [Enabled]                 Enable/Disable UEFI Network
 Ipv4 PXE Support                 [Disabled]                Stack
 Ipv6 PXE Support                 [Disabled]
 IPSEC Certificate                [Enabled]
 PXE boot wait time               0
 Media detect count               1




                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit



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```

Network Stack Configuration Screen

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

BIOS Setting	Options	Description/Purpose
IPSEC Certificate	- Disabled - Enabled	Support to Enable/Disable IPSEC certificate for Ikev.
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.

5.5 Chipset

Menu Path	*Chipset*

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

```
                Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

 ▶ System Agent (SA) Configuration                        System Agent (SA) Parameters
 ▶ PCH-IO Configuration




                                                          ──────────────────────────
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit




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```

Chipset Screen

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

5.5.1 Chipset – System Agent (SA) Configuration

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

The **System Agent Configuration** allows users to display DRAM information on the platform as well as configure graphics and PEG Port settings, and enable/disable VT-d function.

```
          Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
            Chipset

     System Agent (SA) Configuration                        Memory Configuration Parameters

     SA PCIe Code Version              3.6.2.0
     VT-d                              Supported

  ▶  Memory Configuration

     VT-d                              [Enabled]

                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit

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```

System Agent (SA) Configuration Screen

BIOS Setting	Options	Description/Purpose
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.
Memory Configuration	Sub-Menu	Displays the DRAM information on the platform.

BIOS Setting	Options	Description/Purpose
VT-d	- Disabled - Enabled	Enables or Disables VT-d function.

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 and memory (RAM) timings, etc.

```
            Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
              Chipset

   Memory Configuration

   Memory RC Version                   3.6.2.0
   Memory Frequency                    2133 MHz
   Total Memory                        4096 MB
   Memory Timings (tCL-tRCD-tRP-tRAS)  15-15-15-36

   Channel 0 Slot 0                    Populated & Enabled
      Size                             4096 MB (DDR4)


                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit



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```

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 memory.
Memory Timings (tCL-tRCD-tRP-tRAS)	No changeable options	Displays the Memory (RAM) timings and latency. • **CAS Latency (tCL)** - This is the most important memory timing. CAS stands

BIOS Setting	Options	Description/Purpose
		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).
Channel 0 Slot 0	No changeable options	Displays if Channel 0 Slot 0 socket is populated/enabled or not.
Size	No changeable options	Displays the total memory size.

5.5.2 Chipset – PCH-IO Configuration

Menu Path	*Chipset > PCH-IO Configuration*

The **PCH-IO Configuration** allows users to enable/disable PCH LAN Controller and Wake-On-LAN function and determine the power on/off state that the system will go into following a power failure (G3 state).
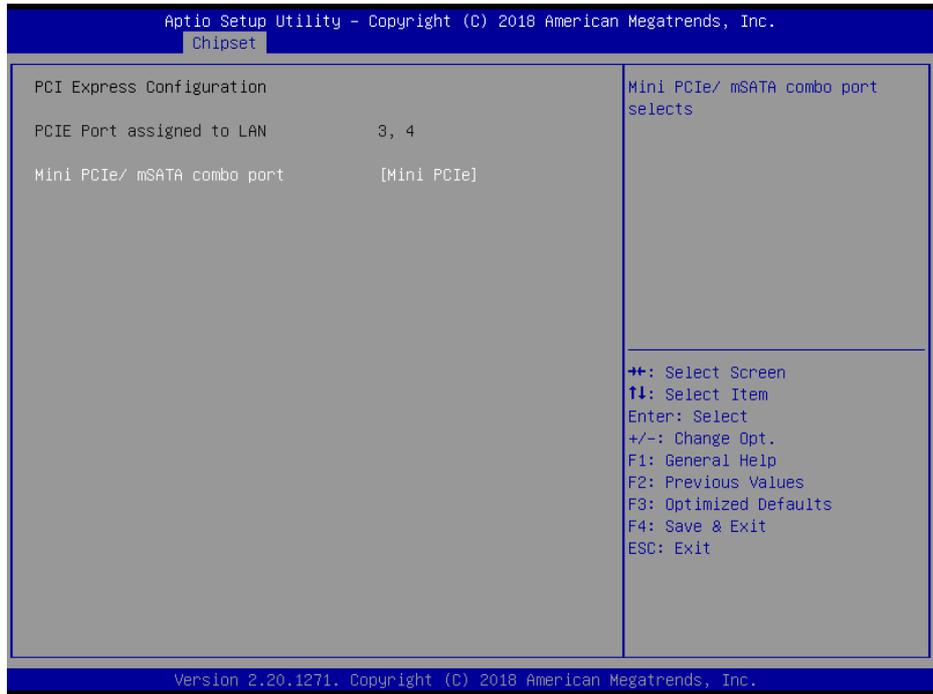
```
          Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
              Chipset

  PCH-IO Configuration                                    PCI Express Configuration
  Name                          SKL PCH-LP                settings
  PCH SKU                       (U) iHDCP 2.2 Base
  Stepping                      C1

▶ PCI Express Configuration

  PCH LAN Controller            [Enabled]
    Wake on LAN Enable          [Enabled]
  State After G3                [Power On]



                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit



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```

PCH-IO Configuration Screen

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

Chipset – PCH-IO Configuration – PCI Express Configuration

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

```
              Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
                Chipset

   PCI Express Configuration                                  Mini PCIe/ mSATA combo port
                                                              selects
   PCIE Port assigned to LAN          3, 4

   Mini PCIe/ mSATA combo port        [Mini PCIe]







                                                              →←: Select Screen
                                                              ↑↓: Select Item
                                                              Enter: Select
                                                              +/-: Change Opt.
                                                              F1: General Help
                                                              F2: Previous Values
                                                              F3: Optimized Defaults
                                                              F4: Save & Exit
                                                              ESC: Exit




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```

PCI Express Configuration Screen

* Mini PCIe/ mSATA combo port function is for "CPU i5-7300U" SKU only.

BIOS Setting	Options	Description/Purpose
PCIE Port assigned to LAN	No changeable options	Displays the LAN assigned PCIE Port.
Mini PCIe/ mSATA combo port	- Mini PCIe - mSATA	Mini PCIe/ mSATA combo port selection.

5.6   Security

Menu Path	*Security*

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

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

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

  Password Description                                Set Administrator Password

  If ONLY the Administrator's password is set,
  then this only limits access to Setup and is
  only asked for when entering Setup.
  If ONLY the User's password is set, then this
  is a power on password and must be entered to
  boot or enter Setup. In Setup the User will
  have Administrator rights.
  The password length must be
  in the following range:
  Minimum length              3
  Maximum length              20

                                                     →←: Select Screen
  Administrator Password                             ↑↓: Select Item
  User Password                                      Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



       Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Security Screen

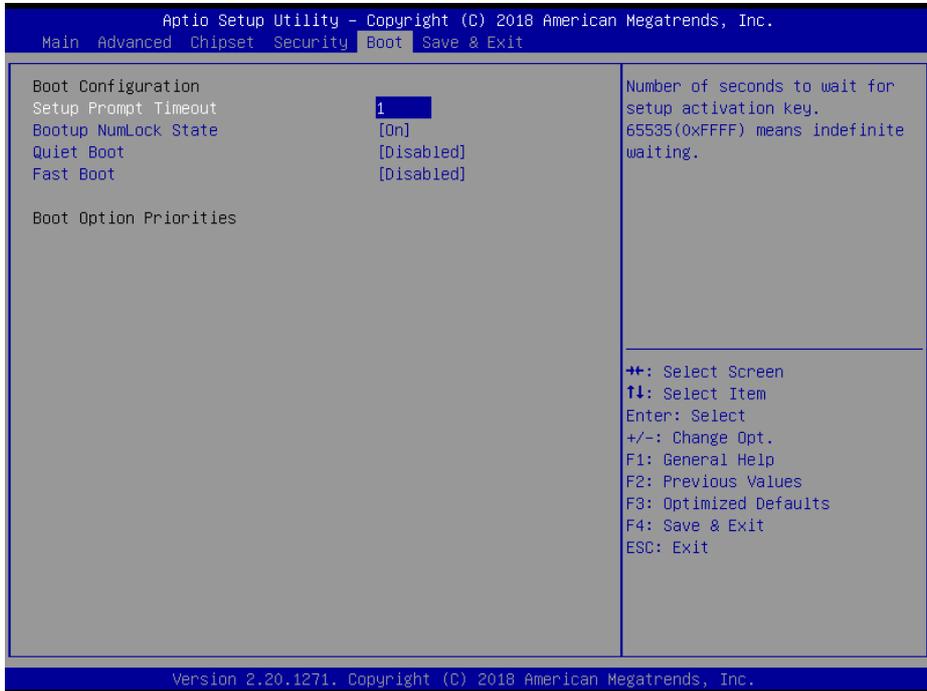| BIOS Setting	Options	Description/Purpose
Administrator Password	Password can be 3-20 alphanumeric characters.	Specifies the administrator password.
User Password	Password can be 3-20 alphanumeric characters.	Specifies the user password.

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

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

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

5.7 Boot

Menu Path	*Boot*

This menu provides control items for system boot configuration such as setting setup prompt timeout, specifying the NumLock state after the system is powered on, enabling/disabling quiet boot and fast boot and changing the boot order from the available bootable device(s).

```
            Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
       Main  Advanced  Chipset  Security  Boot  Save & Exit

      Boot Configuration                                    Number of seconds to wait for
      Setup Prompt Timeout                 1                setup activation key.
      Bootup NumLock State                 [On]             65535(0xFFFF) means indefinite
      Quiet Boot                           [Disabled]       waiting.
      Fast Boot                            [Disabled]

      Boot Option Priorities




                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit



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```

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. • **On:** Enables the NumLock function automatically after the system is powered on. • **Off:** Disables the NumLock function after the system is powered on.

BIOS Setting	Options	Description/Purpose
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 options.
Boot Option #1~#n	- [Drive(s)] - Disabled	Allows users to set the system boot order. Note that in the menu displayed, you will only see the device with the highest priority for a specific boot device type.

5.8 Save & Exit

Menu Path	*Save & Exit*

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

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

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

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

```
          Aptio Setup Utility - Copyright (C) 2018 American Megatrends, Inc.
     Main  Advanced  Chipset  Security  Boot  Save & Exit

    Save Options                                      Exit system setup after saving
    Save Changes and Exit                             the changes.
    Discard Changes and Exit

    Save Changes and Reset
    Discard Changes and Reset

    Save Changes
    Discard Changes

    Default Options
    Restore Defaults
    Save as User Defaults
    Restore User Defaults                             →←: Select Screen
                                                      ↑↓: Select Item
    Boot Override                                     Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit




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```

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.
Discard Changes	No changeable options	Discards the changes done so far to any of the setup options.
Restore Defaults	No changeable options	Loads the optimized defaults for BIOS settings.
Save as User Defaults	No changeable options	Saves the changes done so far as User Defaults.
Restore User Defaults	No changeable options	Restores the User Defaults to all the BIOS settings.
Boot Override	- [Drive(s)]	Forces to boot from selected [drive(s)].

Appendix A   Technical Summary

This appendix will give you a brief introduction of

the allocation maps for EL1096 resources.

The following topics are included:

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

M/B Block Diagram

DP Port	
HDMI Port HDMI1.4a	
LVDS Connector	CH7511

Dual Channel, 18/24-bit

Digital Display Interface

KABY LAKE-U

i3-7100U
i5-7300U
4415U

BGA 1356

USB 3.0 Rear *2 — USB3.0

USB 2.0 Rear *4 Wafer*2 — USB2.0

mSATA *1 w/ USB2.0*1 — SATA

SATA 3.0 (GEN3) Connector *1 — SATA

L&R Out/2CH Connector — Audio Amp ALC105

Line In, Line Out, Mic — Pin HEADER

ALC 888S-VD2 — High Definition Codec

DDR4 1866/2133MHz — SO-DIMM DRAM Modules SLOT *1 (non-ECC)

PCI-E 1X BUS — LAN1 INTEL PHY-I219V LAN2 INTEL I211

PCI-E 1X BUS — mPCIE Connector *1 /w USB2.0 *1

SPI — **SPI** SPI Flash ROM

I2C Wafer(4 pins)

DIO 8IN/8OUT F75111RG

IMVP8 ISL95855 1+1+1 Phase PWM

TPS51716 For DDR4

LOW PIN COUNT

80 PORT for Debug

COM1 — F8143 A [RS232]

PIN HEADER

COM2 — F8143 A [RS232/422/485]

PIN HEADER

COM2 support 5V/12V

FINTEK

LPC SIO

F81866AD-I

FAN Connector — CPU FAN*1

HW monitor — 12V, 5V, 5VSB, VCORE

Interrupt Map

IRQ	ASSIGNMENT
IRQ 0	System timer
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 8	System CMOS/real time clock
IRQ 11	Intel(R) 100 Series/C230 Series Chipset Family SMBus - A123
IRQ 11	Intel(R) 100 Series/C230 Series Chipset Family Thermal subsystem - A131
IRQ 13	Numeric data processor
IRQ 14	Motherboard resources
IRQ 16	High Definition Audio Controller
IRQ 19	Intel(R) Active Management Technology - SOL (COM3)
IRQ 54	Microsoft ACPI-Compliant System
IRQ 55	Microsoft ACPI-Compliant System
IRQ 56	Microsoft ACPI-Compliant System
IRQ 57	Microsoft ACPI-Compliant System
IRQ 58	Microsoft ACPI-Compliant System
IRQ 59	Microsoft ACPI-Compliant System
IRQ 60	Microsoft ACPI-Compliant System
IRQ 61	Microsoft ACPI-Compliant System
IRQ 62	Microsoft ACPI-Compliant System
IRQ 63	Microsoft ACPI-Compliant System
IRQ 64	Microsoft ACPI-Compliant System
IRQ 65	Microsoft ACPI-Compliant System
IRQ 66	Microsoft ACPI-Compliant System
IRQ 67	Microsoft ACPI-Compliant System
IRQ 68	Microsoft ACPI-Compliant System
IRQ 69	Microsoft ACPI-Compliant System
IRQ 70	Microsoft ACPI-Compliant System
IRQ 71	Microsoft ACPI-Compliant System
IRQ 72	Microsoft ACPI-Compliant System
IRQ 73	Microsoft ACPI-Compliant System
IRQ 74	Microsoft ACPI-Compliant System
IRQ 75	Microsoft ACPI-Compliant System
IRQ 76	Microsoft ACPI-Compliant System
IRQ 77	Microsoft ACPI-Compliant System
IRQ 78	Microsoft ACPI-Compliant System
IRQ 79	Microsoft ACPI-Compliant System
IRQ 80	Microsoft ACPI-Compliant System
IRQ 81	Microsoft ACPI-Compliant System
IRQ 82	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
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 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 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	ASSIGNMENT
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 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	ASSIGNMENT
IRQ 169	Microsoft ACPI-Compliant System
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
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IRQ 197	Microsoft ACPI-Compliant System
IRQ 198	Microsoft ACPI-Compliant System
IRQ 199	Microsoft ACPI-Compliant System
IRQ 200	Microsoft ACPI-Compliant System
IRQ 201	Microsoft ACPI-Compliant System
IRQ 202	Microsoft ACPI-Compliant System
IRQ 203	Microsoft ACPI-Compliant System
IRQ 204	Microsoft ACPI-Compliant System
IRQ 256	Microsoft ACPI-Compliant System
IRQ 257	Microsoft ACPI-Compliant System
IRQ 258	Microsoft ACPI-Compliant System
IRQ 259	Microsoft ACPI-Compliant System
IRQ 260	Microsoft ACPI-Compliant System
IRQ 261	Microsoft ACPI-Compliant System
IRQ 262	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 263	Microsoft ACPI-Compliant System
IRQ 264	Microsoft ACPI-Compliant System
IRQ 265	Microsoft ACPI-Compliant System
IRQ 266	Microsoft ACPI-Compliant System
IRQ 267	Microsoft ACPI-Compliant System
IRQ 268	Microsoft ACPI-Compliant System
IRQ 269	Microsoft ACPI-Compliant System
IRQ 270	Microsoft ACPI-Compliant System
IRQ 271	Microsoft ACPI-Compliant System
IRQ 272	Microsoft ACPI-Compliant System
IRQ 273	Microsoft ACPI-Compliant System
IRQ 274	Microsoft ACPI-Compliant System
IRQ 275	Microsoft ACPI-Compliant System
IRQ 276	Microsoft ACPI-Compliant System
IRQ 277	Microsoft ACPI-Compliant System
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IRQ 280	Microsoft ACPI-Compliant System
IRQ 281	Microsoft ACPI-Compliant System
IRQ 282	Microsoft ACPI-Compliant System
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IRQ 295	Microsoft ACPI-Compliant System
IRQ 296	Microsoft ACPI-Compliant System
IRQ 297	Microsoft ACPI-Compliant System
IRQ 298	Microsoft ACPI-Compliant System
IRQ 299	Microsoft ACPI-Compliant System
IRQ 300	Microsoft ACPI-Compliant System
IRQ 301	Microsoft ACPI-Compliant System
IRQ 302	Microsoft ACPI-Compliant System
IRQ 303	Microsoft ACPI-Compliant System
IRQ 304	Microsoft ACPI-Compliant System
IRQ 305	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 306	Microsoft ACPI-Compliant System
IRQ 307	Microsoft ACPI-Compliant System
IRQ 308	Microsoft ACPI-Compliant System
IRQ 309	Microsoft ACPI-Compliant System
IRQ 310	Microsoft ACPI-Compliant System
IRQ 311	Microsoft ACPI-Compliant System
IRQ 312	Microsoft ACPI-Compliant System
IRQ 313	Microsoft ACPI-Compliant System
IRQ 314	Microsoft ACPI-Compliant System
IRQ 315	Microsoft ACPI-Compliant System
IRQ 316	Microsoft ACPI-Compliant System
IRQ 317	Microsoft ACPI-Compliant System
IRQ 318	Microsoft ACPI-Compliant System
IRQ 319	Microsoft ACPI-Compliant System
IRQ 320	Microsoft ACPI-Compliant System
IRQ 321	Microsoft ACPI-Compliant System
IRQ 322	Microsoft ACPI-Compliant System
IRQ 323	Microsoft ACPI-Compliant System
IRQ 324	Microsoft ACPI-Compliant System
IRQ 325	Microsoft ACPI-Compliant System
IRQ 326	Microsoft ACPI-Compliant System
IRQ 327	Microsoft ACPI-Compliant System
IRQ 328	Microsoft ACPI-Compliant System
IRQ 329	Microsoft ACPI-Compliant System
IRQ 330	Microsoft ACPI-Compliant System
IRQ 331	Microsoft ACPI-Compliant System
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IRQ 343	Microsoft ACPI-Compliant System
IRQ 344	Microsoft ACPI-Compliant System
IRQ 345	Microsoft ACPI-Compliant System
IRQ 346	Microsoft ACPI-Compliant System
IRQ 347	Microsoft ACPI-Compliant System
IRQ 348	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 349	Microsoft ACPI-Compliant System
IRQ 350	Microsoft ACPI-Compliant System
IRQ 351	Microsoft ACPI-Compliant System
IRQ 352	Microsoft ACPI-Compliant System
IRQ 353	Microsoft ACPI-Compliant System
IRQ 354	Microsoft ACPI-Compliant System
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IRQ 356	Microsoft ACPI-Compliant System
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IRQ 391	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 392	Microsoft ACPI-Compliant System
IRQ 393	Microsoft ACPI-Compliant System
IRQ 394	Microsoft ACPI-Compliant System
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IRQ 433	Microsoft ACPI-Compliant System
IRQ 434	Microsoft ACPI-Compliant System

IRQ	ASSIGNMENT
IRQ 435	Microsoft ACPI-Compliant System
IRQ 436	Microsoft ACPI-Compliant System
IRQ 437	Microsoft ACPI-Compliant System
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IRQ	ASSIGNMENT
IRQ 478	Microsoft ACPI-Compliant System
IRQ 479	Microsoft ACPI-Compliant System
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IRQ 504	Microsoft ACPI-Compliant System
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IRQ 506	Microsoft ACPI-Compliant System
IRQ 507	Microsoft ACPI-Compliant System
IRQ 508	Microsoft ACPI-Compliant System
IRQ 509	Microsoft ACPI-Compliant System
IRQ 510	Microsoft ACPI-Compliant System
IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967283	Intel(R) Management Engine Interface
IRQ 4294967290	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
IRQ 4294967291	Intel(R) HD Graphics 630
IRQ 4294967289	Intel(R) I211 Gigabit Network Connection
IRQ 4294967288	Intel(R) I211 Gigabit Network Connection
IRQ 4294967287	Intel(R) I211 Gigabit Network Connection
IRQ 4294967286	Intel(R) I211 Gigabit Network Connection
IRQ 4294967285	Intel(R) I211 Gigabit Network Connection

IRQ	ASSIGNMENT
IRQ 4294967284	Intel(R) I211 Gigabit Network Connection
IRQ 4294967292	Intel(R) Ethernet Connection (2) I219-LM
IRQ 4294967293	Standard SATA AHCI Controller
IRQ 4294967294	Intel(R) 100 Series/C230 Series Chipset Family PCI Express Root Port #6 - A115

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

I/O Map

I/O Map	Assignment
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x0000002E-0x0000002F	Motherboard resources
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x00000040-0x00000043	System timer
0x0000004E-0x0000004F	Motherboard resources
0x00000050-0x00000053	System timer
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000070-0x00000070	System CMOS/real time clock
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B2-0x000000B3	Motherboard resources
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003F8-0x000003FF	Communications Port (COM1)
0x000004D0-0x000004D1	Programmable interrupt controller
0x00000680-0x0000069F	Motherboard resources
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x0000164E-0x0000164F	Motherboard resources
0x00001800-0x000018FE	Motherboard resources

I/O Map	Assignment
0x00001854-0x00001857	Motherboard resources
0x0000E000-0x0000EFFF	Mobile Intel(R) Processor Family I/O PCI Express Root Port #4 - 9D13
0x0000F000-0x0000F03F	Intel(R) HD Graphics 620
0x0000F040-0x0000F05F	Mobile Intel(R) Processor Family I/O SMBUS - 9D23
0x0000F060-0x0000F07F	Standard SATA AHCI Controller
0x0000F080-0x0000F083	Standard SATA AHCI Controller
0x0000F090-0x0000F097	Standard SATA AHCI Controller
0x0000FF00-0x0000FFFE	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources
0x0000FFFF-0x0000FFFF	Motherboard resources

Memory Map

Memory Map	Assignment
0xDE000000-0xDEFFFFFF	Intel(R) HD Graphics 620
0xC0000000-0xCFFFFFFF	Intel(R) HD Graphics 620
0xFF000000-0xFFFFFFFF	Legacy device
0xFF000000-0xFFFFFFFF	Motherboard resources
0xFED10000-0xFED17FFF	Motherboard resources
0xFED18000-0xFED18FFF	Motherboard resources
0xFED19000-0xFED19FFF	Motherboard resources
0xE0000000-0xEFFFFFFF	Motherboard resources
0xFED20000-0xFED3FFFF	Motherboard resources
0xFED90000-0xFED93FFF	Motherboard resources
0xFED45000-0xFED8FFFF	Motherboard resources
0xFEE00000-0xFEEFFFFF	Motherboard resources
0xDFFE0000-0xDFFFFFFF	Motherboard resources
0xFE029000-0xFE029FFF	Motherboard resources
0xFE028000-0xFE028FFF	Motherboard resources
0xFDAF0000-0xFDAFFFFF	Motherboard resources
0xFDAE0000-0xFDAEFFFF	Motherboard resources
0xFDAC0000-0xFDACFFFF	Motherboard resources
0xFE034000-0xFE034FFF	Intel(R) Serial IO UART Host Controller - 9D27
0xDFFC0000-0xDFFDFFFF	Intel(R) Ethernet Connection I219-V
0xFED00000-0xFED003FF	High precision event timer
0xFD000000-0xFDABFFFF	Motherboard resources
0xFD000000-0xFDABFFFF	PCI Express Root Complex
0xFDAD0000-0xFDADFFFF	Motherboard resources
0xFDB00000-0xFDFFFFFF	Motherboard resources
0xFE000000-0xFE01FFFF	Motherboard resources
0xFE036000-0xFE03BFFF	Motherboard resources
0xFE03D000-0xFE3FFFFF	Motherboard resources
0xFE410000-0xFE7FFFFF	Motherboard resources
0xFE03C000-0xFE03CFFF	Intel(R) Serial IO I2C Host Controller - 9D60
0xFE030000-0xFE033FFF	High Definition Audio Controller
0xFE400000-0xFE40FFFF	High Definition Audio Controller
0x90000000-0xDFFFFFFF	PCI Express Root Complex
0xFE035000-0xFE035FFF	Intel(R) Management Engine Interface
0xFED40000-0xFED44FFF	Trusted Platform Module 2.0
0xDF130000-0xDF13FFFF	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
0xDF14A000-0xDF14A0FF	Mobile Intel(R) Processor Family I/O SMBUS - 9D23

Memory Map	Assignment
0xDF000000-0xDF01FFFF	Intel(R) I211 Gigabit Network Connection
0xDF000000-0xDF01FFFF	Mobile Intel(R) Processor Family I/O PCI Express Root Port #4 - 9D13
0xDF020000-0xDF023FFF	Intel(R) I211 Gigabit Network Connection
0xDF150000-0xDF150FFF	Mobile Intel(R) Processor Family I/O Thermal subsystem - 9D31
0xDF148000-0xDF149FFF	Standard SATA AHCI Controller
0xDF14D000-0xDF14D0FF	Standard SATA AHCI Controller
0xDF14C000-0xDF14C7FF	Standard SATA AHCI Controller
0xA0000-0xBFFFF	PCI Express Root Complex
0xC0000-0xC3FFF	PCI Express Root Complex
0xC4000-0xC7FFF	PCI Express Root Complex
0xC8000-0xCBFFF	PCI Express Root Complex
0xCC000-0xCFFFF	PCI Express Root Complex
0xD0000-0xD3FFF	PCI Express Root Complex
0xD4000-0xD7FFF	PCI Express Root Complex
0xD8000-0xDBFFF	PCI Express Root Complex
0xDC000-0xDFFFF	PCI Express Root Complex
0xE0000-0xE3FFF	PCI Express Root Complex
0xE4000-0xE7FFF	PCI Express Root Complex
0xE8000-0xEBFFF	PCI Express Root Complex
0xEC000-0xEFFFF	PCI Express Root Complex
0xF0000-0xFFFFF	PCI Express Root Complex

Configuring WatchDog Timer

The I/O port address of the watchdog timer is 2E (hex) and 2F (hex). 2E (hex) is the address port. 2F (hex) is the data port. 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.
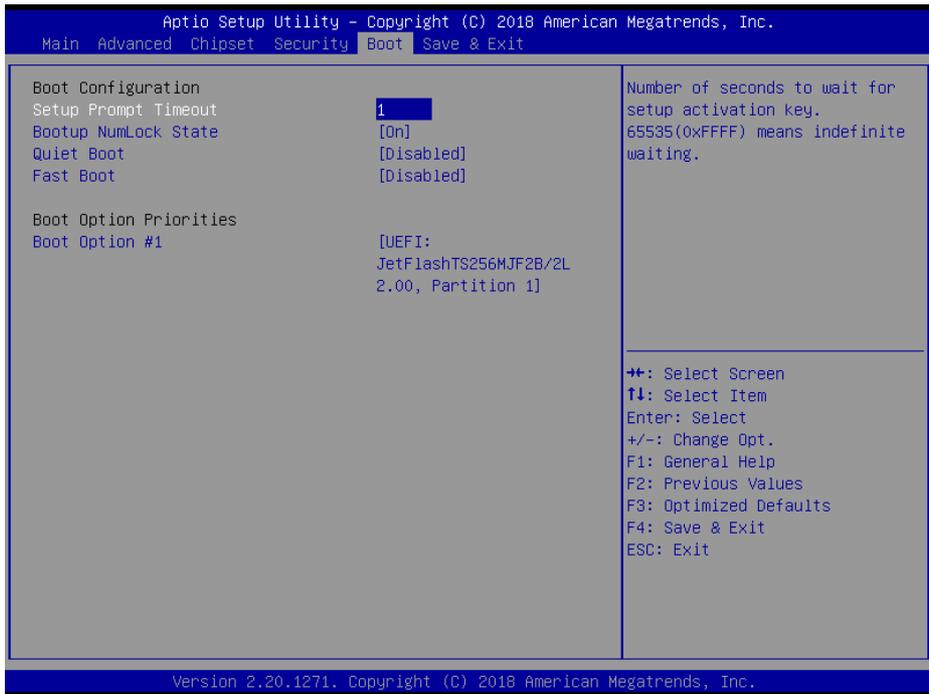
Code example for watch dog timer

Enable watchdog timer and set timeout interval to 30 seconds.

```
; ---------------------- Enter to extended function mode ---------------------
mov     dx,   2eh
mov     al,   87h
out     dx,   al
out     dx,   al
; --------------------- Select Logical Device 7 of watchdog timer --------------------
mov     al,   07h
out     dx,   al
inc     dx
mov     al,   07h
out     dx,   al
;-------------------------- Enable Watch dog feature -----------------------------------
mov     al,   030h
out     dx,   al
inc     dx
mov     al,   01h
out     dx,   al
; ------------------------ Set timeout interval as 30 seconds --------------------------
dec     dx
mov     al,   0F6h
out     dx,   al
inc     dx
mov     al,   1Eh
out     dx,   al
;--------------------------- Enable Watch PME----------------------------------------
dec     dx
mov     al,   0FAh
out     dx,   al
inc     dx
in      al,   dx
or      al,   51h
out     dx,   al
;------------------ Set second as counting unit and start counting -------------------
dec     dx
mov     al,   0F5h
out     dx,   al
inc     dx
in      al,   dx
and     al,   0F7h
or      al,   20h
out     dx,   al
;-------------------------- Exit the extended function mode ----------------------------
dec     dx
mov     al,   0AAh
out     dx,   al
```

Flash BIOS Update

I. Prerequisites

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

2 Download and save the BIOS file (e.g. E9960PU1.bin) to the storage device.

3 Copy AMI flash utility – AFUEFIx64.exe (v5.09.01) into the storage device. The utility and BIOS file should be saved to the same path.

4 Make sure the target system can first boot to the EFI shell environment.

   (1) Connect the USB storage device.

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

   (3) The system will go into the BIOS setup menu.

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

   (5) Press **<F4>** key to save the configuration and restart the system to boot into EFI Shell environment.

```
                Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

   Boot Configuration                                     Number of seconds to wait for
   Setup Prompt Timeout              1                    setup activation key.
   Bootup NumLock State              [On]                 65535(0xFFFF) means indefinite
   Quiet Boot                        [Disabled]           waiting.
   Fast Boot                         [Disabled]

   Boot Option Priorities
   Boot Option #1                    [UEFI:
                                     JetFlashTS256MJF2B/2L
                                     2.00, Partition 1]


                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit




                Version 2.20.1271. Copyright (C) 2018 American Megatrends, Inc.
```

II. AFUEFIx64 Command for System BIOS Update

AFUEFIx64.efi is the AMI firmware update utility; the command line is shown as below:

AFUEFIx64 <ROM File Name> [option1] [option2]….
Users can type "AFUEFIx64 /?" to view the definition of each control option. The recommended options for BIOS ROM update include the following parameters:
   /P: Program main BIOS image.
   /B: Program Boot Block.
   /N: Program NVRAM.
   /X: Don't check ROM ID.

III. BIOS Update Procedure

1 Boot into EFI Shell, change to the path where you put BIOS image and AFUEFIx64.

```
Shell> fs0:
fs0:\> cd afuefix64
```

2 Type "**AFUEFIx64 E9960Pxx.bin /p /b /n /x**" and press Enter to start the flash procedure. (xx means the BIOS revision part, e.g. U1…)

3 During the update procedure, you will see the BIOS update process status and its execution percentage. Beware! Do not turn off the system power or reset your computer if the whole procedure are not complete yet, or it may crash the BIOS ROM and the system will be unable to boot up next time.

4 After the BIOS update procedure is completed, the following messages will display:

```
fs0:\afuefix64> AFUEFIx64 E9960PU1.bin /p /b /n /x

+----------------------------------------------------------------+
|               AMI Firmware Update Utility  v5.09.01.1317       |
|   Copyright (C) 2016 American Megatrends Inc. All Rights Reserved. |
+----------------------------------------------------------------+
  Reading flash .............. done
  - ME Data Size Checking. ok
  - FFS checksums ........ ok
  - Check RomLayout ...... ok
  Erasing Boot Block ......... done
  Updating Boot Block ........ done
  Verifying Boot Block ....... done
  Erasing Main Block ......... done
  Updating Main Block ........ done
  Verifying Main Block ....... done
  Erasing NVRAM Block ........ done
  Updating NVRAM Block ....... done
  Verifying NVRAM Block ...... done

fs0:\afuefix64>_
```

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

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

7 Reboot the system and verify if the BIOS version shown on the initialization screen has been updated.
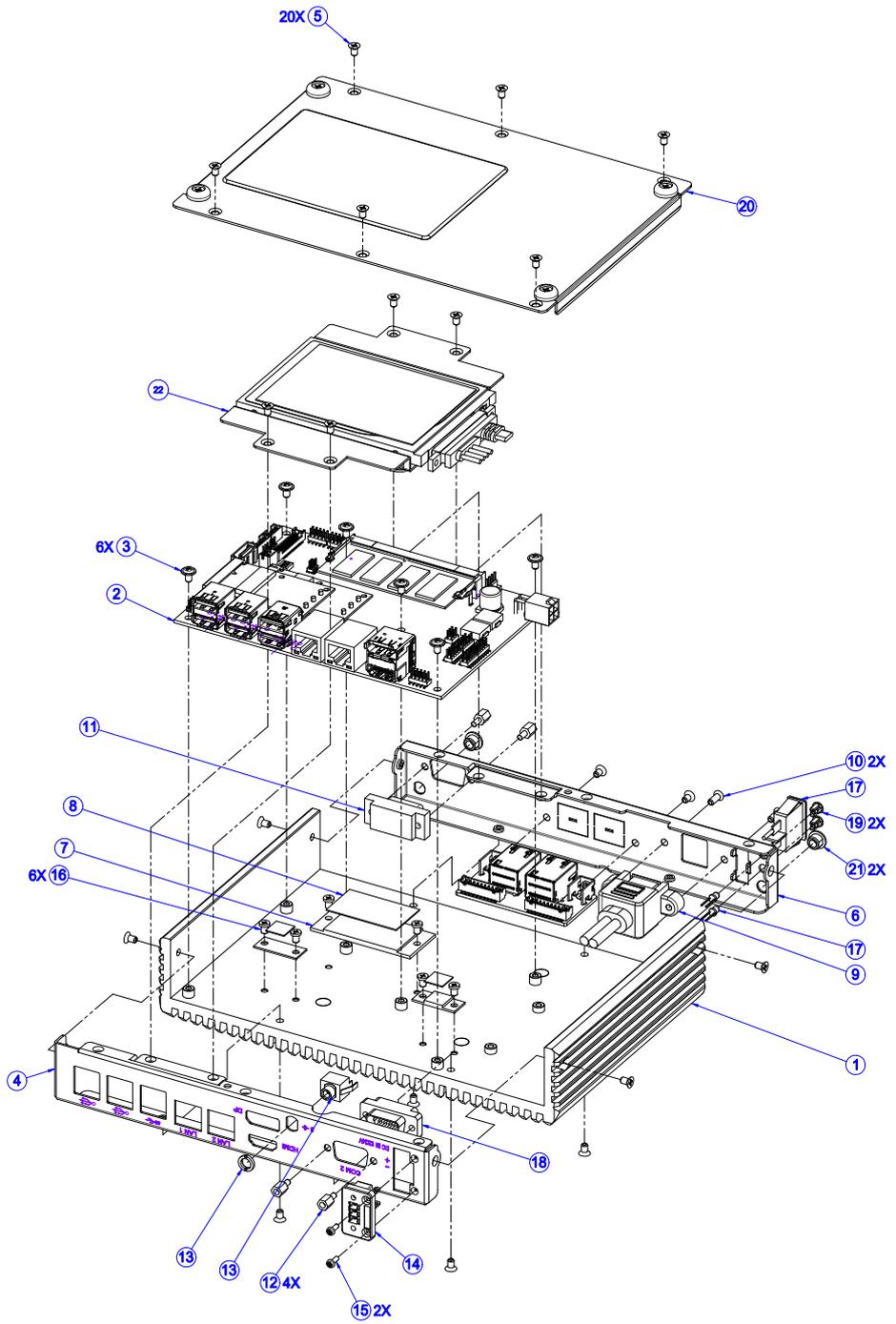
Version 2.18.1271. Copyright (C) 2018 American Megatrends, Inc.
BIOS Date: 12/05/2018 16:07:45 Ver: E9960PU1
Press <DEL> or <ESC> to enter setup.

Appendix B

This appendix will give you a brief introduction of

the allocation maps for EL1096 resources.

The following topics are included:

- Exploded diagrams

NO.	COMPONENT NAME	PART NO.	Q'TY	REMARK
1	BS-E099 HEAT HINK CASE ASM(217.5x140.6x46mm)	81-002-11841005	1	
2	BE-0996 MAIN PCB	BE-0996	1	
3	ROUND WASHER HEAD SCREW M3x0.5Px5mm	22-242-30005311	6	5.0±0.5kgf-cm
4	BACK_CASE	20-101-03001452	1	
5	FLAT HEAD SCREW #2/M3x0.5Px5mm(BLACK)	22-215-30005011	20	5.0±0.5kgf-cm
6	FRONT_CASE	20-101-03002452	1	
7	CPU_BLOCK	81-002-15424001	1	
8	THERMAL_PAD_38X22X0_5	xx-xxx-xxxxxxxx	1	
9	BS-E098 2-PORT USB CABLE(10F to USBx2)L=160mm	27-006-39504111	1	
10	FLAT HEAD SCREW #2/ Ø 5/M3x0.5Px8mm(Black)	22-215-30008011	2	5.0±0.5kgf-cm
11	BS-E098 RS422/485 CABLE(9M to 10F)(blue)L=220mm	27-024-39505032	1	
12	HEX CU BOSS UNC No.4-40,L=4.8,H=7mm	22-692-40048051	4	3.5±0.5kgf-cm
13	BS-E098 AUDIO JACK CABLE(2.6mm(F) to 10P(F))L=130mm	27-028-39503111	1	
14	BS-E098 POWER CABLE (DC-IN) L=150mm	27-012-39503071	1	
15	PAN HEAD SCREW M2.0x0.4Px6mm	22-222-20060011	2	2.5±0.5kgf-cm
16	FILLISTR HEAD SCREW #1/M3x0.5Px4mm	22-272-30004011	6	4.0±0.5kgf-cm
17	BS-E098 POWER BUTTON AND LED CABLE L=140mm+110mm	27-019-39503071	1	
18	BS-E098 COM PORT CABLE(9M to 10F)(Black)L=220mm	27-024-39505031	1	
19	PS-3100 LED HOUSING (Black)	30-014-04100165	2	
20	BS-E098 BOT CASE(w/Paint)(Black)(NCT)	80-001-03062395	1	
21	HOLE PLUG(Φ6.6mm)(Black)	90-067-01100000	2	
22	BS-E098_2INCH_HDD_SATA_KIT_ASM	SEE PAGE 2	1	