USER MANUAL

BS-0981

Fanless 19" 1U Rockmount PC with Intel® Celeron N3350 SoC

BS-0981 M0

BS-0981

Fanless Fanless 19" 1U Rockmount PC with Celeron N3350 SoC

DISCLAIMER

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

CE NOTICE

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

FCC NOTICE

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

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

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

⚠	**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 BS-0986 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 BS-0981 system. The BS-0981 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 BS-0981 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 BS-0981.

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 BS-0981 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

System Overview

Front View

Storage indicated light

482

Power S/W

USB

45

Rear View

LINE OUT   **LAN**   **USB**

DC-IN   **COM**   **VGA**   **DP**

Top View

Unit: mm

432

250
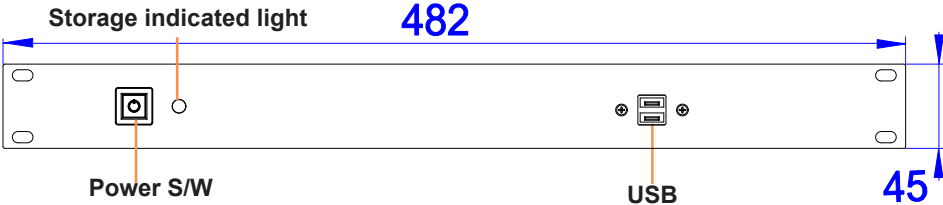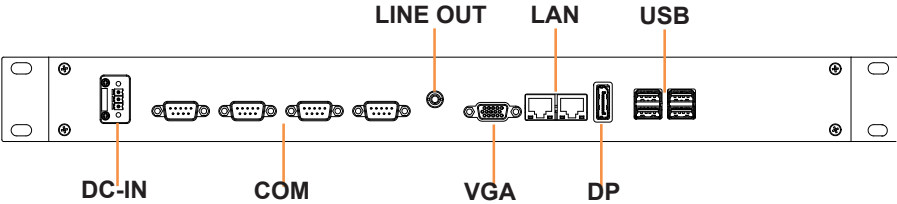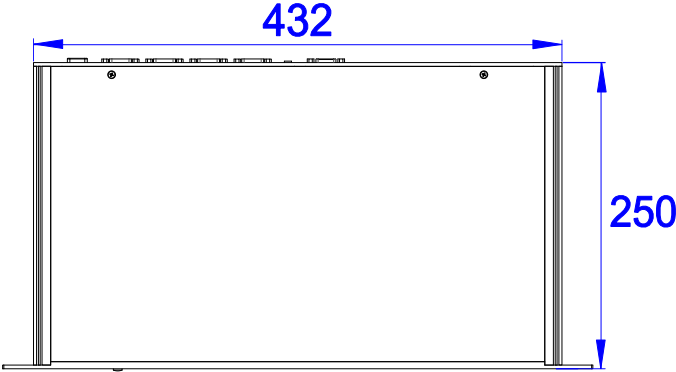
Quarter View

Front I/O Panel
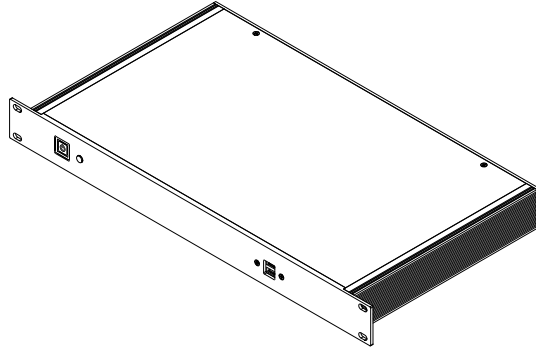
Rear I/O Panel
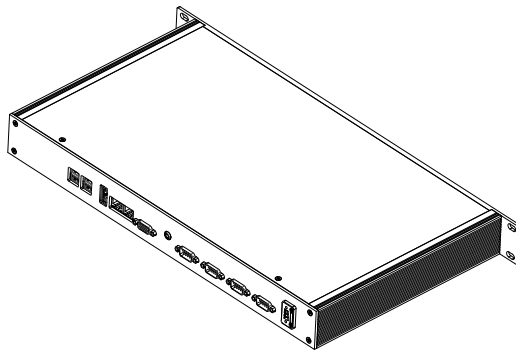
BS-0981 System Specifications

System	
CPU Type	➢ Intel ApolloLake Celeron N3350
Memory Support	➢ 1 x SO-DIMM socket, supporting 1600 DDR3L DRAM up to 8G (non-ECC)
API	➢ Hardware monitor / WatchDog
Storage Support	➢ 1 x 2.5" 7mm SATAIII HDD / SSD drive space
Power Supply	➢ Supports DC 12V power input (3-pin lockable terminal block)
O.S. Support	➢ Windows® 10 64bit
BIOS	➢ AMI UEFI BIOS
Expansion Slots	➢ 1 x full-sized mPCIe slot (with PCIe and USB signals) ➢ 1 x full-sized mSATA slot (with SATA and USB signals)
Dimensions (W x H x D)	➢ 432mm x 45mm x 250mm
Weight	➢ 2kg

I/O Ports (Rear side)	
USB	➢ 4 x USB 3.0
Serial Ports	➢ COM1: RS232 ➢ COM2: RS232/422/485 selectable under BIOS ➢ COM3: RS232 w/ RI/5V/12V selectable under BIOS ➢ COM4: RS232
Sound	➢ 1 x Line Out
Power Input	➢ 3-pin DC In terminal block (lockable)
LAN	➢ 2 x LANs (supports Wake-on-LAN) LAN1: Intel® I210IT (I210AT) LAN2: Intel® I210IT (I210AT)
Display	➢ 1 x DP, resolution: up to 4096x2160 @60Hz ➢ 1 x VGA, resolution: up to 1920x1200 @60Hz

I/O Ports (Front side)	
LED	➢ 1 x Power LED ➢ 1 x HDD LED
USB	➢ 4 x USB 3.0

Power Mode	

Power Mode	➢ (1) BIOS Power Fail "On": Boot-up when AC power returns from "Off" to "On" (default)
	➢ (2) BIOS Power Fail "Off": Non-boot-up when AC power returns from "Off" to "On"
	➢ Way to boot up from S5: (1) Power Button
	                                        (2) Wake-On-LAN
	                                        (3) RTC-wake
	                                            (set under BIOS)
	➢ Way to Shutdown to S5/S4/S3: (1) Power Button
	                                        (2) OS Command
	➢ Supports S0/S3/S4/S5

Other	
Optional Accessory	➢ 60W Power adapter with lockable 3-pin terminal block
Environment	
Operating Temp.	➢ **Celeron N3350** /0°C ~ 40°C
Storage Temp.	➢ -40°C ~85°C (-40°F~185°F)
Humidity	➢ 20%~ 90%

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 (BS-0981) should be 12V; otherwise the system may be damaged.

2. Environmental Conditions
    *   Place your BS-0981 system on a sturdy, level surface. Be sure to allow enough space around the system to have easy access needs.
    *   Avoid installing your 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 system 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 system 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.

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 Front I/O Ports Diagram

Storage indicated light

Power S/W

USB

Rear I/O Ports Diagram

LINE OUT   **LAN**   **USB**

DC-IN   **COM**   **VGA**   **HDMI**
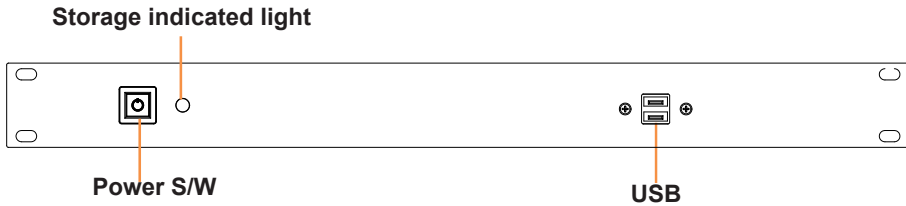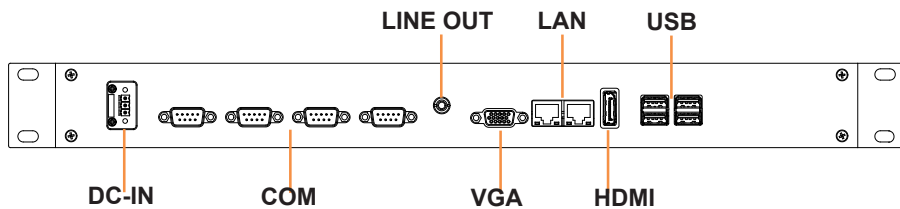
Power Button

To turn on the system, press the power button on the side of the system briefly.

ACTION	ASSIGNMENT
Click	0V
Release	+3.3V

Power Button

Port Name: USB
Description: Dual USB 3.0 ports

PIN	ASSIGNMENT	PIN	ASSIGNMENT
B5	USB3_RXN2	-	-
B6	USB3_RXP2	B4	GND
B7	GND	B3	USB2_P2_DP
B8	USB3_TXN2	B2	USB2_P2_DN
B9	USB3_TXP2	B1	VCC5_USB1
A5	USB3_RXN1	-	-
A6	USB3_RXP1	A4	GND
A7	GND	A3	USB2_P1_DP
A8	USB3_TXN1	A2	USB2_P1_DN
A9	USB3_TXP1	A1	VCC5_USB1
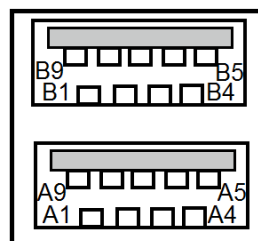
USB3.0

DC IN 3-Pin Terminal Block
Port Name: DC IN (external connector)
Description: Supports DC12V and 16~24V power input (3-pin lockable terminal block)

PIN	ASSIGNMENT
3	NC
2	GND
1	DC Power Input (+12V or 16~24V)
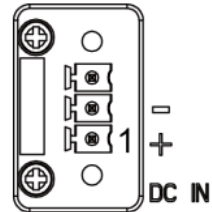
DC IN

VGA Port
Port Name: VGA (external connector)
Description: VGA Port, D-Sub 15-pin (I/O port)
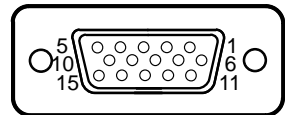
VGA

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

COM Port
Port Name: COM1, COM2, COM3, COM4 (external connector)
Description: COM Port Connector

COM1(RS-232) Connector Pin Assignment:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COM1_DCD	6	COM1_DSR
2	COM1_RX	7	COM1_RTS
3	COM1_TX	8	COM1_CTS
4	COM1_DTR	9	COM1_RI
5	GND	-	-
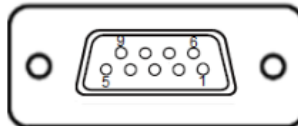
COM1 / COM2

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

PIN	ASSIGNMENT		
	RS-232	RS-422	RS-485
1	COM2_DCD	TX-	D-
2	COM2_RX	TX+	D+
3	COM2_TX	RX-	NC
4	COM2_DTR	RX+	NC
5	GND	GND	GND
6	COM2_DSR	NC	NC
7	COM2_RTS	NC	NC
8	COM2_CTS	NC	NC
9	COM2_RI	NC	NC
-	-	-	-

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

COM3(RS-232) Connector Pin Assignment:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COM3_DCD	6	COM3_DSR
2	COM3_RX	7	COM3_RTS
3	COM3_TX	8	COM3_CTS
4	COM3_DTR	9	COM3_RI_SEL
5	GND	-	-
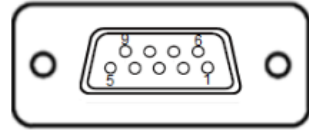
COM3 / COM4

COM4(RS-232) Connector Pin Assignment:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COM4_DCD	6	COM4_DSR
2	COM4_RX	7	COM4_RTS
3	COM4_TX	8	COM4_CTS
4	COM4_DTR	9	COM4_RI_SEL
5	GND	-	-

Note:
COM3, COM4: Pin 9 is selectable as RI, +5V or +12V according to jumper setting. Default setting is RI, please see "**COM3 and COM4 PIN9 Definition Selection Guide"** for selection details.

DISPLAY PORT

DP1: Display Port Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
20	VCC3_PWR	19	GND
18	HPD_CON	17	DP0_AUX_N_CON
16	GND	15	DP0_AUX_P_CON
14	GND	13	DP0_AUX_ENJ
12	DP0_TX3_DN	11	GND
10	DP0_TX3_DP_C	9	DP0_TX2_DN_C
8	GND	7	DP0_TX2_DP
6	DP0_TX1_DN	5	GND
4	DP0_TX1_DP	3	DP0_TX0_DN
2	GND	1	DP0_TX0_DP
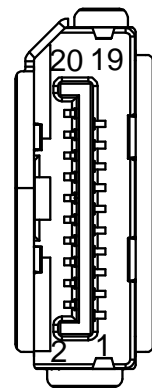
DP1

3.5.6   LAN Port
Port Name: LAN1, LAN2 (external connector)
Description: LAN RJ-45 Ports
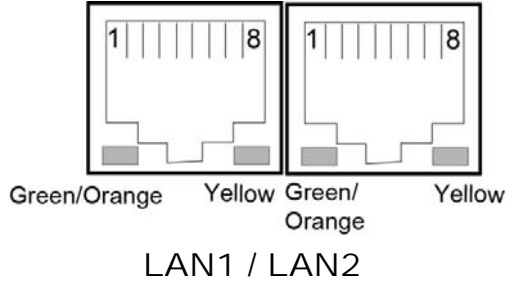
LAN1 / LAN2

LAN1 Pin Assignment

PIN	ASSIGNMENT
1	LAN1_MDIP0
2	LAN1_MDIN0
3	LAN1_MDIP1
4	LAN1_MDIP2
5	LAN1_MDIN2
6	LAN1_MDIN1
7	LAN1_MDIP3
8	LAN1_MDIN3

LAN2 Pin Assignment

PIN	ASSIGNMENT
1	LAN2_MDIP0
2	LAN2_MDIN0
3	LAN2_MDIP1
4	LAN2_MDIP2
5	LAN2_MDIN2
6	LAN2_MDIN1
7	LAN2_MDIP3
8	LAN2_MDIN3

LAN LED Status

There are LAN LED indicators on the rear side of the main board. By observing their status, you can know the status of the Ethernet connection.

LAN LED Indicator	Color	Status	Description
Right Side LED	Yellow	Blink	LAN Message Active
	-	Off	No LAN Message Active
Left Side LED	Green	On	10/100Mbps LAN connection is enabled.
	Orange	On	Giga LAN connection is enabled.
	-	Off	No LAN switch/hub is connected

3.2 Component Locations of System Main Board

Top View of System Main Board
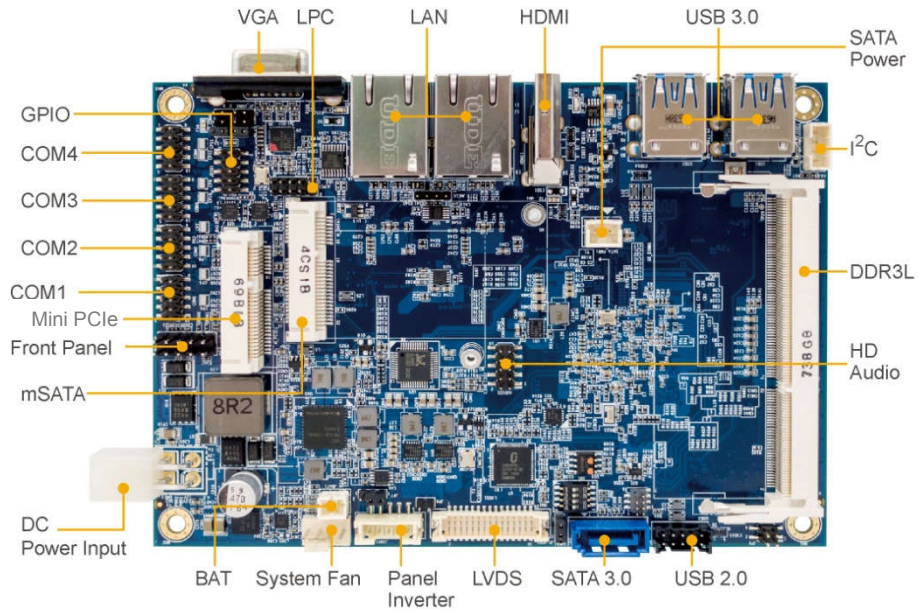
Figure 3-1. Main Board Component Location (Top View)

⚠	**WARNING:** Always disconnect the power cord when you are working with connectors and jumpers on the main board. Make sure both the system and peripheral devices are turned OFF as sudden surge of power could damage sensitive components. Make sure BS-E097 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 the motherboard components by the edges. Never touch components such as a processor by its pins. Take special cares while you are holding electronic circuit boards by the edges only. Do not touch the mainboard components.

Jumper Setting and Connector Location of System Main Board

COM3 Pin9 RI/5V/12V

RI	12V	5V
(default)		

COM4 Pin9 RI/5V/12V

RI	12V	5V
(default)		

Clear CMOS Data

Normal	Clear CMOS
(default)	

Connectors: VGA1, LAN2, LAN1, HDMI1, USB2, USB1, JP_COM4, JP_COM3, JLPC1, JMCU1, JI2C1, COM4, COM3, COM2, COM1, JDIO1, Mini PCI-E, mSATA, M_SATA1, SATA_PWR1, SO_DIMM1, JFP1, M_PCIE1, AUDIO1, PWR2, JBAT1, JP7, JP4, LVDS1, SW1, JP3, FAN1, JINV1, JP_VDD1, SATA1, USB3, JP9
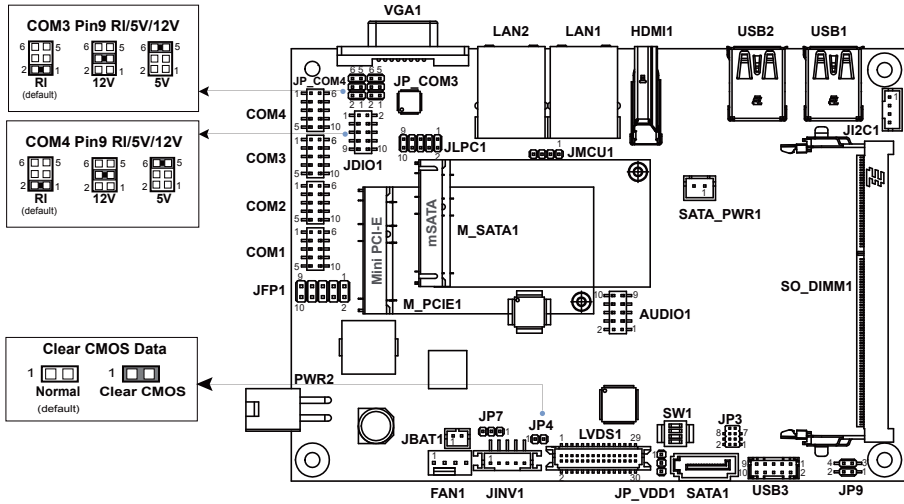
Bottom View of System Main Board
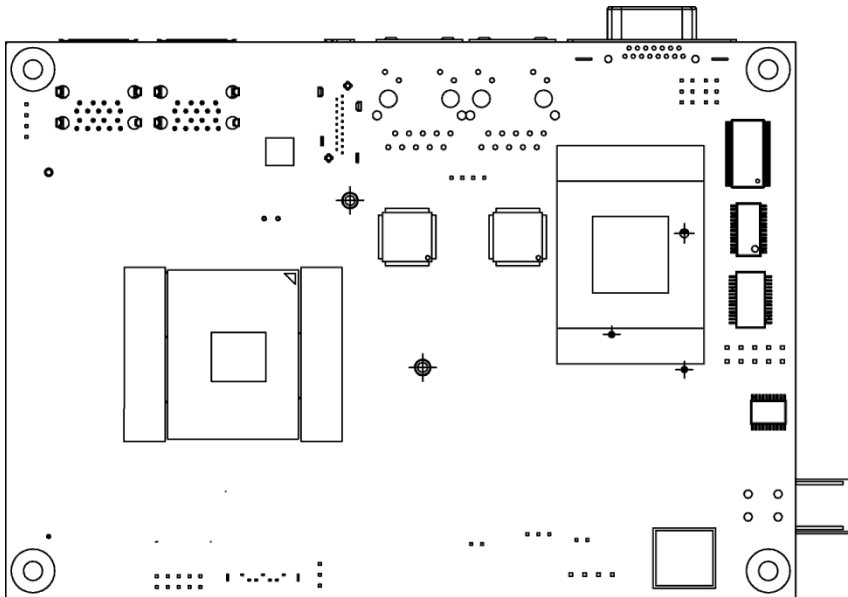
3.3   How To Set Jumpers

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 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. the pins. So you can set-up your hardware configuration by "open" or "close" pins.

Jumpers and Caps

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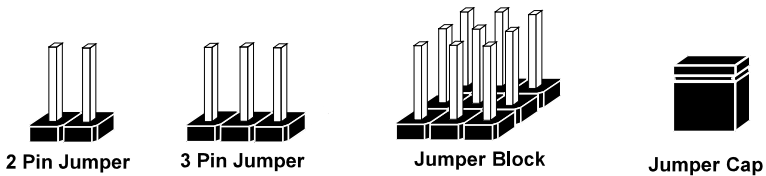
If a jumper has three pins (for examples, labeled PIN1, PIN2, and PIN3), you can connect PIN1 & PIN2 to create one setting by shorting. You can either connect PIN2 & PIN3 to create another setting. The same jumper diagrams are applied all through this manual. The figure below shows what the manual diagrams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

Jumper Diagrams

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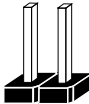
2 pin Jumper looks like this
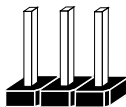
3 pin Jumper looks like this
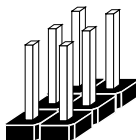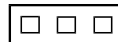
Jumper Block looks like this
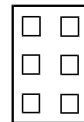
Jumper Settings

2 pin Jumper close(enabled)
Looks like this

1

1

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

1

1

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

1 2
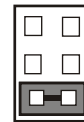
1 2

3.4 Setting Connectors and Jumpers

COM3 and COM4 PIN9 Definition Selection Guide

Jumper Name: JP_COM3, JP_COM4

Description: COM3 and COM4 Port pin9 RI/5V/12V Selection

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION	
RI	*1-2* *(Default Setting)*	6 □ □ 5 □ □ 2 ■-■ 1 **JP_COM3**	6 □ □ 5 □ □ 2 ■-■ 1 **JP_COM4**
+12V	3-4	6 □ □ 5 ■-■ 2 □ □ 1 **JP_COM3**	6 □ □ 5 ■-■ 2 □ □ 1 **JP_COM4**
+5V	5-6	6 ■-■ 5 □ □ 2 □ □ 1 **JP_COM3**	6 ■-■ 5 □ □ 2 □ □ 1 **JP_COM4**

USB 2.0 Port
Port Name: USB3

Description: Internal USB 2.0 Port x 2

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5_USB3	2	VCC5_USB3
3	USB2_P5_DN	4	USB2_P6_DN
5	USB2_P5_DP	6	USB2_P6_DP
7	GND	8	GND
9	GND	10	GND
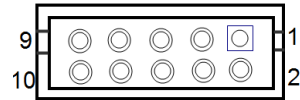
Programmable GPIO Pin Header
Port Name: JDIO1
Description: GPIO pin header and 5V power **(no use for this system.)**

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	VCC5	2	GND
3	GPI/GPO 0	4	GPI/GPO 4
5	GPI/GPO 1	6	GPI/GPO 5
7	GPI/GPO 2	8	GPI/GPO 6
9	GPI/GPO 3	10	GPI/GPO 7
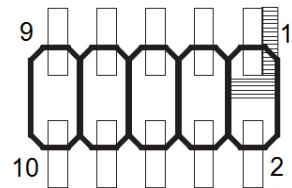
Notes:
1. Users can set the GPI/GPO configuration via Protech's API/Utility.
2. Default setting is GPI every time when system AC power is re-applied from power failure state
3. Configuration can still be kept even in S5 state unless system AC power is lost.

I2C Wafer
Port Name: JI2C1

Description: I2C Wafer **(no use for this system)**

PIN	ASSIGNMENT
1	GND
2	VCC5
3	I2C0_SCL_33
4	I2C0_SDA_33
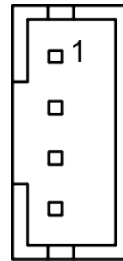
JI2C1

MCU FW Rewrite Connector
Port Name: JMCU1
Description: MCU FW Rewrite Connector for engineering use only

PIN	ASSIGNMENT
1	MCU_5VSB
2	GND
3	MCU_SPD
4	MCU_SPC

JMCU1

System Fan Connector
Port Name: FAN1

Description: System Fan Connector **(no use for this system)**

PIN	ASSIGNMENT
1	GND
2	VCC12
3	SYSFANIN
4	SYSFANOUT
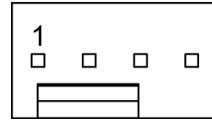
FAN1

DC Power Input Connector Port
Name: PWR2
Description: DC Power Input Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
3	VCC12	4	VCC12
2	GND	1	GND
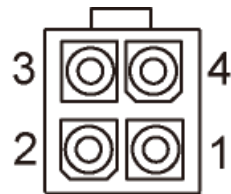
Note: The voltage of input power should be 12V or 16~24V.

PWR2

Mini PCI Express Slot
Name: M_PCIE1 Description: Mini PCI Express Slot

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	PCIE_WAKEJ	2	V3P3S
3	Reserved	4	GND
5	Reserved	6	VCC1_5
7	M_CLKREQJ	8	Reserved
9	GND	10	Reserved
11	M_PCIE_CLKN	12	Reserved
13	M_PCIE_CLKP	14	Reserved
15	GND	16	Reserved
17	Reserved	18	GND
19	Reserved	20	Reserved
21	GND	22	PMU_PLTRST_N
23	PCIE_P2_RXN	24	V3_3SB
25	PCIE_P2_RXP	26	GND
27	GND	28	VCC1_5
29	GND	30	SMB_3P3_SCL
31	PCIE_P2_TXN	32	SMB_3P3_SDA
33	PCIE_P2_TXP	34	GND
35	GND	36	USB2_P7_DN
37	GND	38	USB2_P7_DP
39	V3P3S	40	GND
41	V3P3S	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	VCC1_5
49	NC	50	GND
51	NC	52	V3P3S
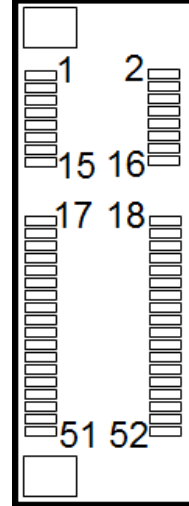
M_PCIE1

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.

mSATA Connector
Port Name: M_SATA1
Description: mSATA Slot (An USB type mPCIe card is supported.)

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	NC	2	V3P3S_MSATA
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	SATA_RXP1	24	V3P3S_MSATA
25	SATA_RXN1	26	GND
27	GND	28	NC
29	GND	30	NC
31	SATA_TXN1	32	NC
33	SATA_TXP1	34	GND
35	GND	36	USB2_P0_DN
37	GND	38	USB2_P0_DP
39	V3P3S_MSATA	40	GND
41	V3P3S_MSATA	42	NC
43	NC	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	GND
51	NC	52	V3P3S_MSATA
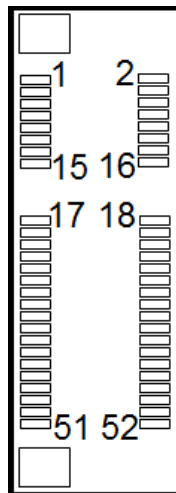
M_SATA1

LVDS Connector
Port Name: LVDS1

Description: LVDS Connector **(no use for this system)**

PIN	ASSIGNMENT	PIN	ASSIGNMENT
2	GND	1	LVDS_VCC
4	LVDS_CLKB_DP	3	LVDS_CLKB_DN
6	LVDS_B2_DN	5	GND
8	GND	7	LVDS_B2_DP
10	LVDS_B1_DP	9	LVDS_B1_DN
12	LVDS_B3_DN	11	LVDS_B3_DP
14	LVDS_B0_DN	13	LVDS_B0_DP
16	LVDS_CLKA_DP	15	GND
18	GND	17	LVDS_CLKA_DN
20	LVDS_A2_DN	19	LVDS_A2_DP
22	LVDS_A1_DP	21	GND
24	GND	23	LVDS_A1_DN
26	LVDS_A0_DN	25	LVDS_A0_DP
28	LVDS_A3_DN	27	LVDS_A3_DP
30	LVDS_VCC	29	LVDS_VCC
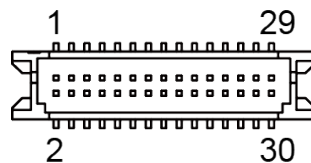
LVDS1

Slide Switch For LVDS Resolution Selection (no use for this system)
Jumper Name: SW1

Description: Slide Switch for LVDS Resolution/Channel/Color Bit Selection

SELECTION	SW1	PIN	SETTING
800 x 600 1CH/18bit *(Default Setting)*	OFF ON	1	ON
		2	ON
		3	ON
		4	ON
1024 x 768 1CH/18bit	OFF ON	1	OFF
		2	ON
		3	ON
		4	ON
1024 x 768 1CH/24bit	OFF ON	1	ON
		2	OFF
		3	ON
		4	ON
1280 x 768 1CH/18bit	OFF ON	1	OFF
		2	OFF
		3	ON
		4	ON
1280 x 800 1CH/18bit	OFF ON	1	ON
		2	ON
		3	OFF
		4	ON

SELECTION	SW1	PIN	SETTING
1280 x 960 1CH/18bit	OFF ON	1	OFF
		2	ON
		3	OFF
		4	ON
1280 x 1024 2CH/24bit	OFF ON	1	ON
		2	OFF
		3	OFF
		4	ON
1366 x 768 1CH/18bit	OFF ON	1	OFF
		2	OFF
		3	OFF
		4	ON
1366 x 768 1CH/24bit	OFF ON	1	ON
		2	ON
		3	ON
		4	OFF
1440 x 900 2CH/24bit	OFF ON	1	OFF
		2	ON
		3	ON
		4	OFF
1400 x 1050 2CH/24bit	OFF ON	1	ON
		2	OFF
		3	ON

SELECTION	SW1	PIN	SETTING
		4	OFF
1600 x 900 2CH/24bit	OFF ON	1	OFF
		2	OFF
		3	ON
		4	OFF
1680 x 1050 2CH/24bit	OFF ON	1	ON
		2	ON
		3	OFF
		4	OFF
1600 x 1200 2CH/24bit	OFF ON	1	OFF
		2	ON
		3	OFF
		4	OFF
1920 x 1080 2CH/24bit	OFF ON	1	ON
		2	OFF
		3	OFF
		4	OFF
1920 x 1200 2CH/24bit	OFF ON	1	OFF
		2	OFF
		3	OFF
		4	OFF

Front Panel Connector Port
Name: JFP1
Description: Front Panel Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	HDD LED+	2	POWER LED+
3	HDD LED-	4	GND
5	GND	6	GND
7	RESET BTN	8	GND
9	NC	10	POWER BTN
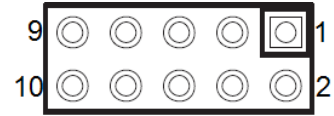
JFP1

HD Audio Connector
Port Name: AUDIO1
Description: HD Audio Connector for Line In / Line Out / Mic In.

PIN	ASSIGNMENT	PIN	ASSIGNMENT
10	LINE-OUT-L	9	LINE-OUT-L
8	HD_GND	7	HD_GND
6	HD_LINE-IN-R	5	HD_LINE-IN-L
4	HD_GND	3	HD_GND
2	HD_MIC1-R	1	HD_MIC1-L
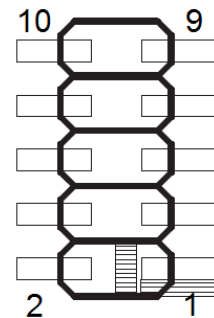
AUDIO1

Panel Inverter Connector
Port Name: JINV1
Description: Panel Inverter Connector **(no use for this system)**

PIN	ASSIGNMENT
1	VCC12
2	VCC12
3	GND
4	LVDS_BKLCTL
5	LVDS_BKLTEN

JINV1
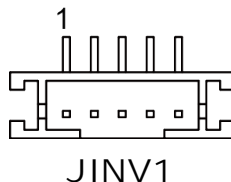
SATA 3.0 Connector
Port Name: SATA1
Description: Serial ATA 3.0 Connector

PIN	ASSIGNMENT
1	GND
2	SATA_TXP0
3	SATA_TXN0
4	GND
5	SATA_RXN0
6	SATA_RXP0
7	GND

SATA1

SATA Power Connector Port Name: SATA1_PWR1 Description: Serial ATA Power Connector

PIN	ASSIGNMENT
2	GND
1	VCC5
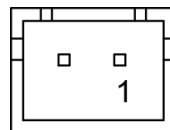
SATA_PWR1

LVDS Backlight Control Selection (no use for this system)
Jumper Name: JP7
Description: Jumper for selecting PIN4 (LVDS_BKLCTL) voltage of JINV1.
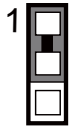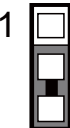
SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
3.3V	**1-2** *(Default Setting)*	JP7
5V	2-3	JP7

LVDS VCC Voltage Selection

Jumper Name: JP_VDD1

Description: Voltage selection jumper for selecting PIN1, PIN29, PIN30 (LVDS_VCC) voltage of LVDS1.

SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
3.3V	**1-2** *(Default Setting)*	JP_VDD1
5V	2-3	JP_VDD1

Clear CMOS Data Selection
Jumper Name: JP4

Description: Clear CMOS Data Selection

Step1. Remove the main power of the PC.

Step2. Close JP4 (pins 1-2) for 6 seconds by a cap.

Step3. Remove the cap which is just used on JP4 (1-2), so that JP4 returns to "OPEN".

Step4. Power on the PC and the PC will then auto-reboot for once in order to set SoC's register.

Step5. Done!

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
Normal	**Open** *(Default Setting)*	1 □□ JP4
Clear CMOS*	1-2	1 ■■ JP4

RTC Battery Power Input Connector
Port Name: JBAT1
Description: It must be connected to a RTC battery for a normal RTC function.

PIN	ASSIGNMENT
1	VBAT (+3.0 ~ +3.3V)
2	GND
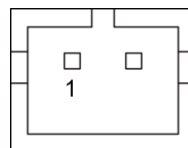
JBAT1

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® Serial I/O Driver Utility
- Microsoft Hotfix KB3211320 and KB3213986 Driver Installation

4.1   Introduction

Enclosed with the BS-E097 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	Shell	Win10 64-bit OS
D:\Driver\Flash BIOS	For Aptio(EFI) BIOS update utility	✔	X
D:\Driver\Platform\Chipset	Intel(R) Chipset Device Software Installation Utility	X	✔
D:\Driver\Platform\TXE	For Intel Trusted Execution Engine Interface	X	✔
D:\Driver\Platform\VGA	Intel HD Graphics	X	✔
D:\Driver\Platform\LAN	Intel I210 For LAN Driver installation	X	✔
D:\Driver\Platform\Sound	Realtek ALC888S For Sound driver installation	X	✔
D:\Driver\Platform\Serial IO	Intel(R) Serial IO driver for Windows 10	X	✔
D:\Driver\Hotfix	Microsoft Hotfix KB3211320 and KB3213986 for Windows 10	X	✔

X : Not support

✔: Support

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

⚠	**WARNING:** It is **strongly recommended** that you follow the installation sequence below: (1) Chipset Driver (2) Hotfix (3) Graphics Driver (4) TXE Driver (5) Other Drivers

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
- PCIe 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 64bit, 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 BS-E097 and insert the driver disk.

2 Enter the **Main Chip** folder where the Chipset driver is located

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 BS-E097 for the changes to take effects.

4.3   Installing Graphics Driver Utility

The GRAPHICS interface embedded in BS-E097 can support a wide range of display types.

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

1 Connect the USB DVD-ROM device to BS-E097 and insert the driver disk.

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

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

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

5 Once the installation is completed, shut down the system and restart BS-E097 for the changes to take effects.

4.4   Installing LAN Driver Utility

Enhanced with LAN function, BS-E097 supports various network adapters. To install the LAN Driver, follow the steps below:

1   Connect the USB DVD-ROM device to BS-E097 and insert the driver disk.

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

3   Click **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 BS-E097 for the changes to take effects.

For more details on the installation procedure, refer to the Readme.txt file that you can find on LAN Driver Utility.

4.5 Installing Sound Driver Utility

The sound function enhanced in this system is fully compatible with Windows® 10 64bit.

To install the Sound Driver, follow the steps below:

1 Connect the USB DVD-ROM device to BS-E097 and insert the driver disk.

2 Open the **Sound** folder where the driver is located.

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

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

5 Once the installation is completed, shut down the system and restart BS-E097 for the changes to take effects.

4.6 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 BS-E097 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 **SetupSerialIO.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 BS-E097 for the changes to take effects.

4.7 Microsoft Hotfix KB3211320 and KB3213986 Driver Installation

Introduction

The Microsoft Hotfix kb3211320 and kb3213986 Driver that needs to be installed depends on the system's specific hardware and firmware features. The installer, compatible with Windows 10, detects the system's capabilities and installs the relevant drivers and applications.

Installation Instructions for Windows 10

To install the utility, simply follow the following steps:
1. Insert the driver disk into a DVD ROM device.
2. Under Windows system, go to the directory where the driver is located.
3. Run **windows10.0-kb3211320-x64** and **windows10.0-kb3213986-x64** with administrative privileges.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart BS-E097 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 battery-backed CMOS RAM and 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 BS-E097 System 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.
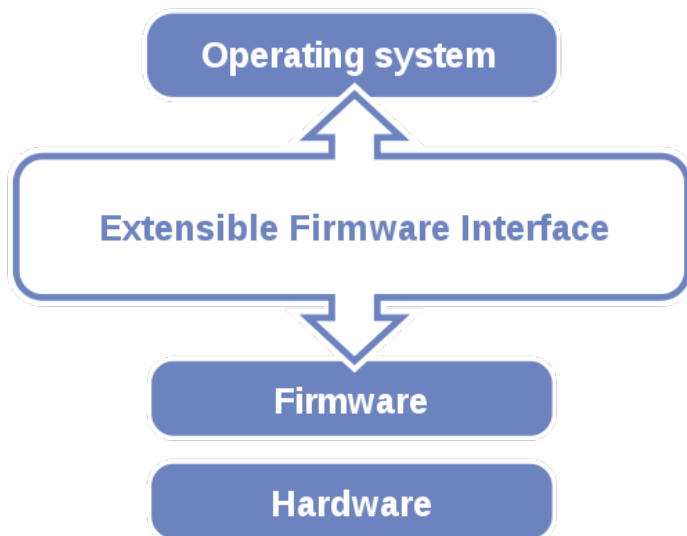
Figure 5-1. Extensible Firmware Interface Diagram

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.

Users will need to set up the system configuration from the BIOS Setup Utility when any of the following conditions occurs:
1. You are starting your system for the first time.
2. You have changed the hardware in your system or the hardware becomes faulty.
3. The system configuration is reset after the user configures to clear CMOS data via the JP4 jumper.
4. The power of the CMOS RAM became lost and the system configuration has been erased.

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

5.2 Accessing Setup Utility

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

Figure 5-2. POST Screen with AMI Logo

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

```
              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                      Default Ranges:
   Compliancy                     UEFI 2.5; PI 1.4          Year: 2005-2099
   Project Version                E0970PM1 x64              Months: 1-12
   Build Date and Time            03/07/2018 13:25:24       Days: dependent on month
   Access Level                   Administrator

   Platform firmware Information
   BXT SOC                        B1
   MRC Version                    0.56
   TXE FW                         3.0.13.1144
   GOP                            10.0.1036
                                                            ↔: Select Screen
   System Date                    [Wed 03/07/2018]          ↑↓: Select Item
   System Time                    [02:18:33]                Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit



              Version 2.18.1263. 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) 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                     Default Ranges:
      Compliancy                     UEFI 2.5; PI 1.4         Year: 2005-2099
      Project Version                E0970PM1 x64             Months: 1-12
      Build Date and Time            03/07/2018 13:25:24      Days: dependent on month
      Access Level                   Administrator

      Platform firmware Information
      BXT SOC                        B1
      MRC Version                    0.56
      TXE FW                         3.0.13.1144
      GOP                            10.0.1036
                                                              ↔: Select Screen
      System Date                    [Wed 03/07/2018]         ↑↓: Select Item
      System Time                    [02:18:33]               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.
Build Date and Time	No changeable options	Displays the date that the current BIOS version is built.
Access Level	No changeable options	Displays the current user access level.
BXT SOC	No changeable options	Displays the SOC stepping.
MRC Version	No changeable options	Displays the MRC version.

BIOS Setting	Options	Description/Purpose
TXE FW	No changeable options	Displays the TXE FW version.
GOP	No changeable options	Displays the GOP version.
System Date	Month, day, year	Sets the system date. The format is [Day Month/ Date/ Year]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it. The "Day" is automatically changed.
System Time	Hour, minute, second	Sets the system time. The format is [Hour: Minute: Second]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it.

5.4 Advanced

Menu Path	*Advanced*

This menu provides advanced configurations such as ACPI Settings, Onboard Device Configuration, Hardware Monitor, F81964 Watchdog, S5 RTC Wake Settings, CPU Configuration, F81964 Super IO Configuration, USB Configuration and Platform Trust Technology.

```
Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
  Main   Advanced   Chipset   Security   Boot   Save & Exit
────────────────────────────────────────────────────────────────────────────
▶ ACPI Settings                                    System ACPI Parameters.
▶ Onboard Device Configuration
▶ Hardware Monitor
▶ F81964 Watchdog
▶ S5 RTC Wake Settings
▶ CPU Configuration
▶ F81964 Super IO Configuration
▶ USB Configuration
▶ Platform Trust Technology

                                                   ↔: 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
ACPI Settings	Sub-Menu	System ACPI parameters.
Onboard Device Configuration	Sub-Menu	Project specific parameters.
Hardware Monitor	Sub-Menu	Monitor hardware status.
F81964 Watchdog	Sub-Menu	Watchdog timer parameters.
S5 RTC Wake Settings	Sub-Menu	RTC wake parameters.
CPU Configuration	Sub-Menu	CPU configuration parameters.
F81964 Super IO Configuration	Sub-Menu	System Super IO chip parameters
USB Configuration	Sub-Menu	USB configuration parameters.
Platform Trust Technology	Sub-Menu	Platform Trust Technology.

5.4.1   Advanced - ACPI Settings

Menu Path	*Advanced > ACPI Settings*

The **ACPI Settings** allows users to configure relevant ACPI (Advanced Configuration and Power Management Interface) settings, such as Hibernation (S4) and Enable Sleep (S3).

```
                 Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    Advanced

    ACPI Settings                                             Enables or Disables System
                                                              ability to Hibernate (OS/S4
    Enable Hibernation (S4)           [Enabled]               Sleep State). This option may
    Enable Sleep (S3)                 [Enabled]               be not effective with some OS.




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


                 Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

ACPI Settings Screen

BIOS Setting	Options	Description/Purpose
Enable Hibernation (S4)	- Disabled - Enabled (default)	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
Enable Sleep (S3)	- Disabled - Enabled (default)	Enables or Disables System ability to Sleep (OS/S3 Sleep State).

5.4.2   Advanced – Onboard Device Configuration

Menu Path   *Advanced > Onboard Device Configuration*

```
          Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
    Advanced

 Onboard Device Configuration                              Select COM2 mode.

 COM2 Mode Selection                   [RS-232]




                                                          ++: Select Screen
                                                          ↑↓: Select Item
                                                          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.
```

Onboard Device Configuration Screen

BIOS Setting	Options	Description/Purpose
COM2 Mode Selection	- RS-422 - RS-232 (default) - RS-485	Selects COM2 mode.

5.4.3   Advanced – Hardware Monitor

Menu Path	*Advanced > Hardware Monitor*

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

```
               Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
       Advanced

  Pc Health Status

  CPU    Temperature              : +57 %
  System Temperature             : +57 %
  Sys Fan Speed                  : N/A
  VCORE                          : +0.752 V
  VCC12V                         : +11.880 V
  VCC3V                          : +3.280 V
  VSB3V                          : +3.312 V
  VCC5V                          : +5.171 V
  VSB5V                          : +5.184 V
  VBAT                           : +3.024 V

                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          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.
```

Hardware Monitor Screen

BIOS Setting	Options	Description/Purpose
CPU Temperature	No changeable options	Displays the processor's temperature.
System Temperature	No changeable options	Displays the system's temperature.
Sys Fan Speed	No changeable options	Displays system fan speed.
VCORE	No changeable options	Detects and displays the VCORE CPU voltage.
VCC12V	No changeable options	Detects and displays 12V voltage.
VCC3V	No changeable options	Detects and displays the voltage level of VCC3V in supply.
VSB3V	No changeable options	Detects and displays VSB3V voltage.
VCC5V	No changeable options	Detects and displays the voltage level of VCC5V in supply.
VSB5V	No changeable options	Detects and displays the voltage level of VSB5V in supply.
VBAT	No changeable options	Detects and displays the battery voltage.

5.4.4 Advanced - F81964 Watchdog

Menu Path   *Advanced > F81964 Watchdog*

If the system hangs or fails to respond, enable the F81964 watchdog function to trigger a system reset via the 255-level watchdog timer.

```
              Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
   Advanced

     F81964 Watchdog                                        F81964 Watchdog timer settings
                                                            Enable/Disable
     Enable Watchdog                    [Enabled]

     Watchdog Timer Count               10




                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            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.
```

F81964 Watchdog Screen

BIOS Setting	Options	Description/Purpose
Enable Watchdog	- Disabled (default) - Enabled	Enables/Disables 81964 Watchdog timer settings.
Watchdog Timer Count	(Numeric) 10 to 255	Sets the timeout for Watchdog timer. Watchdog Timer = 1sec * Count

5.4.5   Advanced - S5 RTC Wake Settings

Menu Path   *Advanced > S5 RTC Wake Settings*

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

```
                 Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
        Advanced

     Wake system from S5                  [Disabled]              Enable or disable System wake
                                                                  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

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled (default) - Fixed Time - Dynamic Time	Enables or disables System wake on alarm event. • **Fixed Time:** The system will wake on the time (hr::min::sec) specified. • **Dynamic Time:** The system will wake on the current time + increased minute(s).

5.4.5.1 S5 RTC Wake Settings [Fixed Time]

Menu Path   *Advanced > S5 RTC Wake Settings [Fixed Time]*

```
                Aptio Setup Utility - Copyright (C) 2016 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 up hour	(Numeric) from 0 to 23	Sets an hour for a scheduled power-on event.
Wake up minute	(Numeric)from 0 to 59	Sets a minute for a scheduled power-on event.
Wake up second	(Numeric)from 0 to 59	Sets a second for a scheduled power-on event.

5.4.5.2 S5 RTC Wake Settings [Dynamic Time]

Menu Path   *Advanced > S5 RTC Wake Settings [Dynamic Time]*

```
              Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    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 up minute increase	(Numeric) from 1 to 5	Sets a period of time (in minutes) after which the board wakes up from S5 state.

5.4.6   Advanced - CPU Configuration

Menu Path	*Advanced > CPU Configuration*

The **CPU Configuration** provides advanced CPU settings such as CPU power management and some information about CPU.

```
              Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
       Advanced

     CPU Configuration                                            Socket specific CPU Information

   ▶ Socket 0 CPU Information
   ▶ CPU Power Management
     Intel Virtualization Technology      [Enabled]
     VT-d                                 [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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```

CPU Configuration Screen

BIOS Setting	Options	Description/Purpose
Socket 0 CPU Information	Sub-Menu	Soket specific CPU Information.
CPU Power Management	Sub-Menu	CPU power management options.
Intel Virtualization Technology	- Disabled - Enabled (default)	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
VT-d	- Disabled (default) - Enabled	Enables/Disables CPU VT-d.

5.4.6.1 CPU Configuration - Socket 0 CPU Information

Menu Path   *Advanced > CPU Configuration > Socket 0 CPU Information*

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

       Socket 0 CPU Information

       Intel(R) Pentium(R) CPU N4200 @ 1.10GHz
       CPU Signature                    506C9
       Microcode Patch                  28
       Max CPU Speed                    1100 MHz
       Min CPU Speed                    800 MHz
       Processor Cores                  4
       Intel HT Technology              Not Supported
       Intel VT-x Technology            Supported

       L1 Data Cache                    24 kB x 4
       L1 Code Cache                    32 kB x 4
       L2 Cache                         1024 kB x 2         ++: Select Screen
       L3 Cache                         Not Present         ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit


               Version 2.18.1263. Copyright (C) 2018 American Megatrends, Inc.
```

Socket 0 CPU Information Screen

BIOS Setting	Options	Description/Purpose
CPU Branding String	No changeable options	Displays CPU Branding String.
CPU Signature	No changeable options	Displays CPU Signature.
Microcode Patch	No changeable options	CPU Microcode Patch Revision.
Max CPU Speed	No changeable options	Displays the Max CPU Speed.
Min CPU Speed	No changeable options	Displays the Min CPU Speed.
Processor Cores	No changeable options	Displays number of cores.
Intel HT Technology	No changeable options	Displays Hyper Threading support.
Intel VT-x Technology	No changeable options	Displays VT-x support.
L1 Data Cache	No changeable options	L1 Data Cache Size.
L1 Code Cache	No changeable options	L1 Code Cache Size.
L2 Cache	No changeable options	L2 Cache Size.
L3 Cache	No changeable options	L3 Cache Size.

5.4.6.2 CPU Configuration - CPU Power Management Configuration

Menu Path   *Advanced > CPU Configuration > CPU Power Management Configuration*

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced

    CPU Power Management Configuration                    Enable/Disable Intel SpeedStep
    EIST                              [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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```

CPU Power Management Configuration Screen

BIOS Setting	Options	Description/Purpose
EIST	- Disabled - Enabled (default)	Enables/Disables Intel SpeedStep feature for dynamic scaling processor frequency.

5.4.7   Advanced - F81964 Super IO Configuration

Menu Path   *Advanced > F81964 Super IO Configuration*

The **F81964 Super IO Configuration** allows users to configure the serial ports 1-4.

```
                 Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
          Advanced

      F81964 Super IO Configuration                              View and Set Basic properties
                                                                 of the SIO Logical device.
      Super IO Chip                      F81964                  Like IO Base, IRQ Range, DMA
    ▶ Serial Port 1 Configuration                                Channel and Device Mode.
    ▶ Serial Port 2 Configuration
    ▶ Serial Port 3 Configuration
    ▶ Serial Port 4 Configuration



                                                                 ▸◂: Select Screen
                                                                 ↑↓: Select Item
                                                                 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.
```

F81964 Super IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Super IO Chip (F81964)	No changeable options	Displays the super I/O chip model.
Serial Port 1 Configuration	Sub-Menu	COM1 parameters.
Serial Port 2 Configuration	Sub-Menu	COM2 parameters.
Serial Port 3 Configuration	Sub-Menu	COM3 parameters.
Serial Port 4 Configuration	Sub-Menu	COM4 parameters.

5.4.7.1 F81964 Super IO Configuration - Serial Port 1 Configuration

Menu Path   *Advanced > F81964 Super IO Configuration > Serial Port 1 Configuration*

```
             Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
     Advanced

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

     Change Settings                       [Auto]




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




             Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

Serial Port 1 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled (default)	Enables/Disables COM1.
Device Settings	No changeable options	Reports the current COM setting.
Change Settings	- Auto (default) - IO=3F8h; IRQ=4 - IO=3F8h; IRQ=3,4,5,7,9,10,11,12; - IO=2F8h; IRQ=3,4,5,7,9,10,11,12; - IO=3E8h; IRQ=3,4,5,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,7,9,10,11,12;	Allows users to change Device's Resource settings. New settings will be reflected on this Setup Page after System restarts.

5.4.7.2　F81964 Super IO Configuration - Serial Port 2 Configuration

Menu Path　　　　*Advanced > F81964 Super IO Configuration > Serial Port 2 Configuration*

```
              Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
        Advanced

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

        Change Settings                    [Auto]




                                                                ++: 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
Serial Port	- Disabled - Enabled (default)	Enables/Disables COM2.
Device Settings	No changeable options	Reports the current COM setting.
Change Settings	- Auto (default) - IO=2F8h; IRQ=3 - IO=3F8h; IRQ=3,4,5,7,9,10,11,12; - IO=2F8h; IRQ=3,4,5,7,9,10,11,12; - IO=3E8h; IRQ=3,4,5,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,7,9,10,11,12;	Allows users to change Device's Resource settings. New settings will be reflected on this Setup Page after System restarts.

5.4.7.3 F81964 Super IO Configuration - Serial Port 3 Configuration

Menu Path   *Advanced > F81964 Super IO Configuration > Serial Port 3 Configuration*

```
            Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
     Advanced

   Serial Port 3 Configuration                            Enable or Disable this Logical
                                                          Device.
   Serial Port                         [Enabled]
   Device Settings                     IO=3E8h; IRQ=7;

   Change Settings                     [Auto]




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



            Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

Serial Port 3 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled (default)	Enables/Disables COM3.
Device Settings	No changeable options	Reports the current COM setting.
Change Settings	- Auto (default) - IO=3E8h; IRQ=7 - IO=3E8h; IRQ=3,4,5,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,7,9,10,11,12; - IO=2F0h; IRQ=3,4,5,7,9,10,11,12; - IO=2E0h; IRQ=3,4,5,7,9,10,11,12;	Allows users to change Device's Resource settings. New settings will be reflected on this Setup Page after System restarts.

5.4.7.4 F81964 Super IO Configuration - Serial Port 4 Configuration

Menu Path   *Advanced > F81964 Super IO Configuration > Serial Port 4*
                   Configuration

```
          Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
    Advanced

    Serial Port 4 Configuration                              Enable or Disable this Logical
                                                             Device.
    Serial Port                       [Enabled]
    Device Settings                   IO=2E8h; IRQ=10;

    Change Settings                   [Auto]




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




          Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```
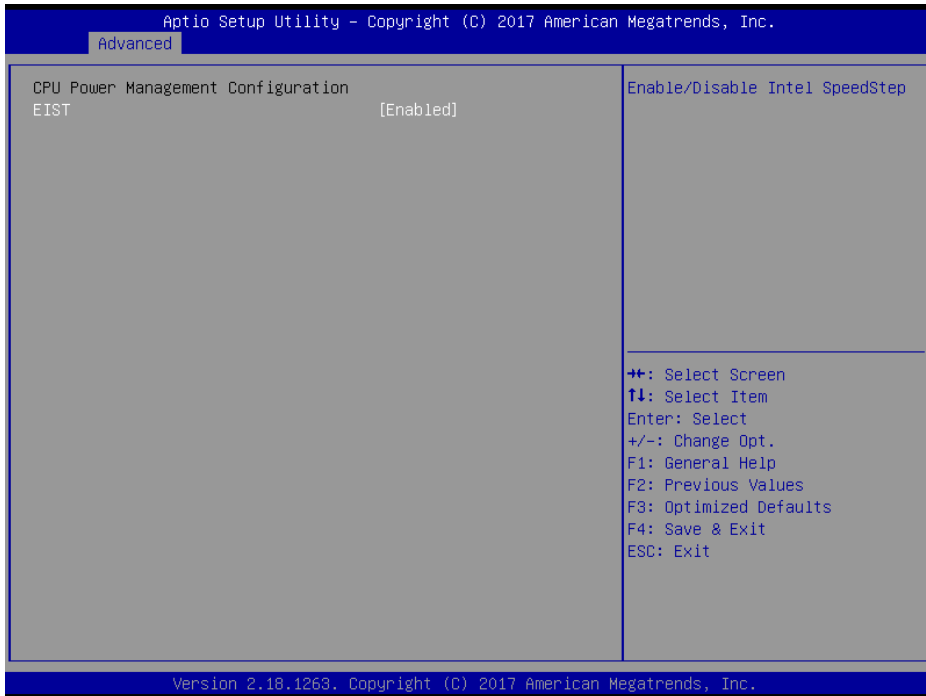
Serial Port 4 Configuration Screen

BIOS Setting	Options	Description/Purpose
Serial Port	- Disabled - Enabled (default)	Enable/Disable COM4.
Device Settings	No changeable options	Reports the current COM setting.
Change Settings	- Auto (default) - IO=2E8h; IRQ=10 - IO=3E8h; IRQ=3,4,5,7,9,10,11,12; - IO=2E8h; IRQ=3,4,5,7,9,10,11,12; - IO=2F0h; IRQ=3,4,5,7,9,10,11,12; - IO=2E0h; IRQ=3,4,5,7,9,10,11,12	Allows users to change Device's Resource settings. New settings will be reflected on this Setup Page after System restarts.

5.4.8 Advanced - USB Configuration

Menu Path   *Advanced > USB Configuration*

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

```
                Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
       Advanced

    USB Configuration                                    Enable/Disable USB Mass
                                                         Storage Driver Support.
    USB Module Version              17

    USB Controllers:
         1 XHCI
    USB Devices:
         1 Drive, 1 Keyboard, 1 Mouse

    USB Mass Storage Driver Support     [Enabled]

    Mass Storage Devices:
    USB3.0 FLASH DRIVE PMAP             [Auto]
                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        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.
```
USB Configuration Screen

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

5.4.9   Advanced - Platform Trust Technology

Menu Path   *Advanced > Platform Trust Technology*

The **Platform Trust Technology** allows users to configure advanced TPM settings such as fTPM.

```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Advanced

   TPM Configuration                                      Enable/Disable fTPM
   fTPM                           [Disabled]




                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         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.
```
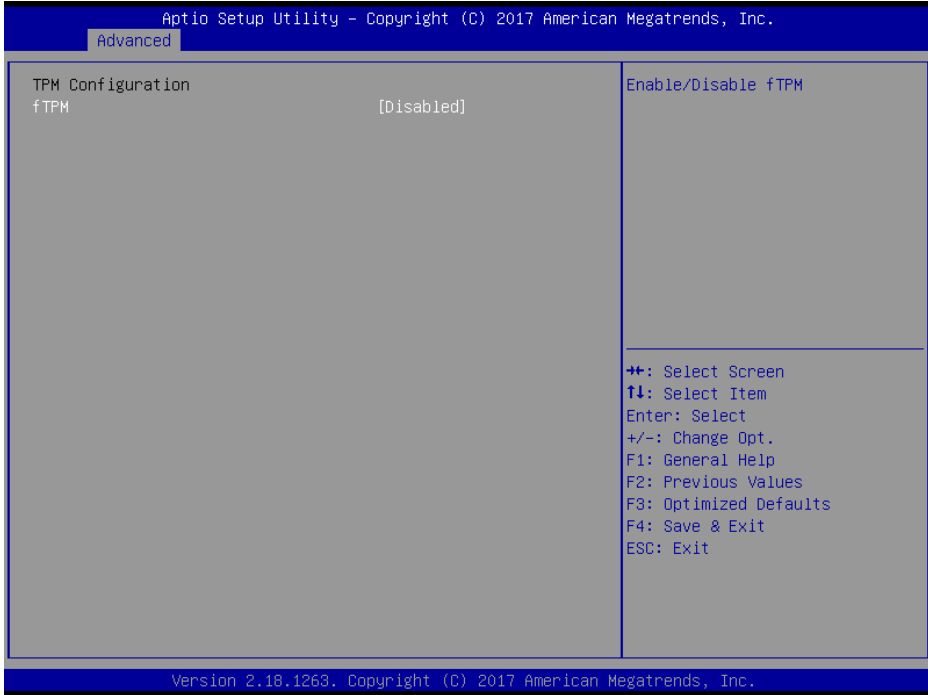
Platform Trust Technology Screen

BIOS Setting	Options	Description/Purpose
fTPM	- Disabled - Enabled	Enables or Disables fTPM. It must be disabled when discrete TPM is used.

5.5   Chipset

Menu Path	*Chipset*

This menu allows users to configure advanced Chipset settings such as North Bridge and South Bridge configuration parameters.
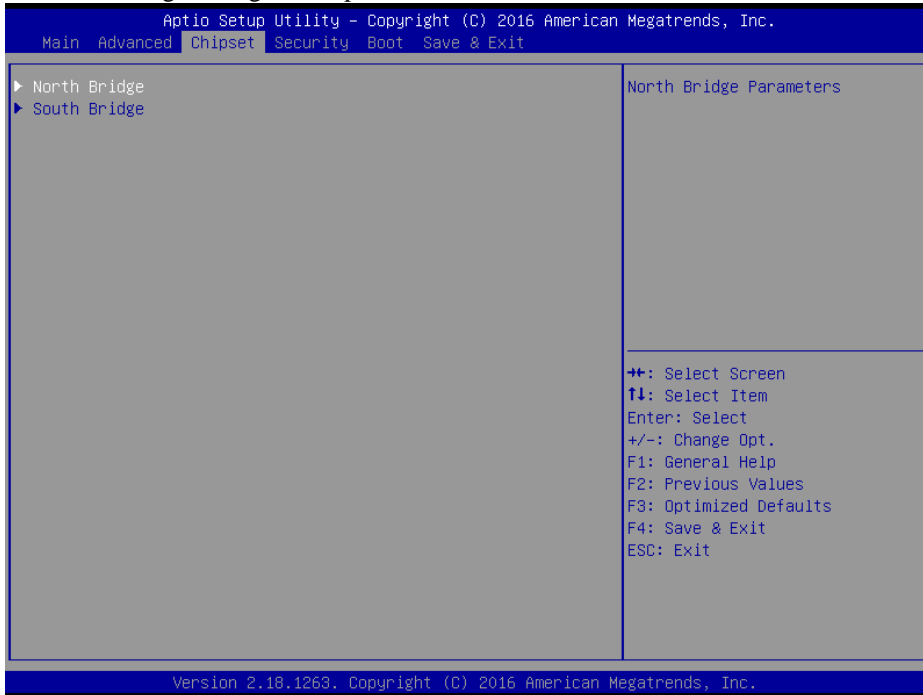
Chipset Screen

BIOS Setting	Options	Description/Purpose
North Bridge	Sub-menu	North Bridge Parameters.
South Bridge	Sub-menu	South Bridge Parameters.

5.5.1　Chipset - North Bridge

Menu Path	*Chipset > North Bridge*

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                Chipset

  Memory Information

  Total Memory                         8192 MB (LPDDR3)
  Memory Speed                         1600 MHz

  Memory Slot0                         8192 MB (LPDDR3)



                                                          ↔: Select Screen
                                                          ↑↓: Select Item
                                                          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.
```
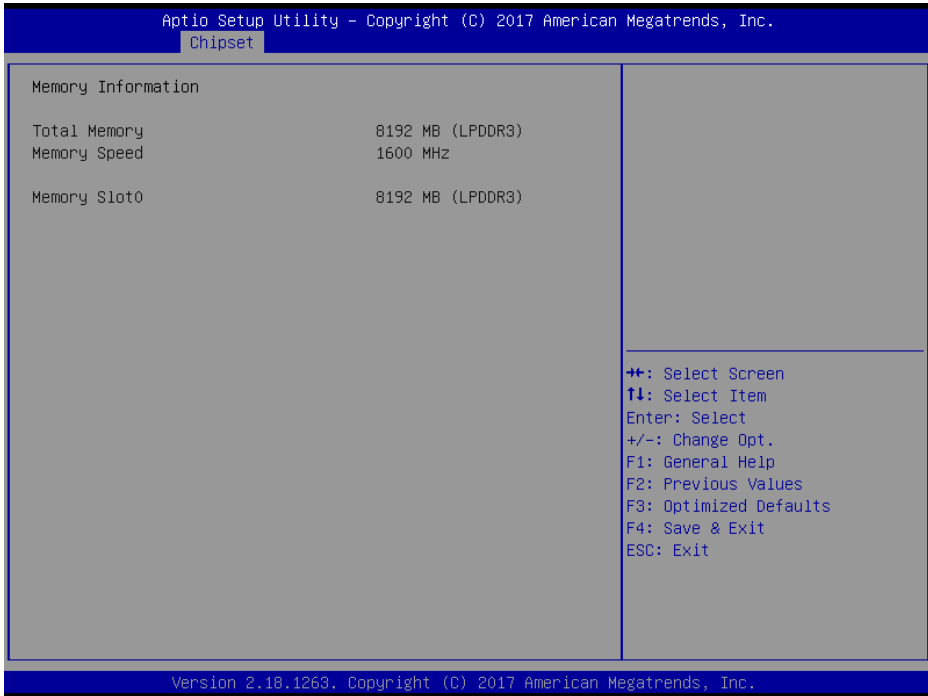
North Bridge Screen

BIOS Setting	Options	Description/Purpose
Total Memory	No changeable options	Displays the current amount and type of memory on the system, e.g. "8192 MB (LPDDR3)".
Memory Speed	No changeable options	Displays memory speed.
Memory Slot0	No changeable options	Displays the current amount and type of memory on each memory slot, e.g. "8192 MB (LPDDR3)".

5.5.2   Chipset - South Bridge

Menu Path	*Chipset > South Bridge*

```
            Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
             Chipset

▶ HD-Audio Configuration                          HD-Audio Configuration Settings
▶ LPSS Configuration
▶ PCI Express Configuration
▶ SATA Drives
▶ Miscellaneous Configuration






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




            Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```

South Bridge Screen

BIOS Setting	Options	Description/Purpose
HD-Audio Configuration	Sub-Menu	HD-Audio configuration settings.
LPSS Configuration	Sub-Menu	LPSS configuration settings.
PCI Express Configuration	Sub-Menu	PCI Express configuration settings.
SATA Drives	Sub-Menu	SATA Drives configuration settings.
Miscellaneous Configuration	Sub-Menu	Miscellaneous configuration settings

5.5.2.1   South Bridge - HD-Audio Configuration

Menu Path	*Chipset > South Bridge > HD-Audio Configuration*

```
                Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
                   Chipset

       HD-Audio Configuration                              Enable/Disable HD-Audio Support
       HD-Audio Support                   [Enable]




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



                Version 2.18.1263. Copyright (C) 2016 American Megatrends, Inc.
```
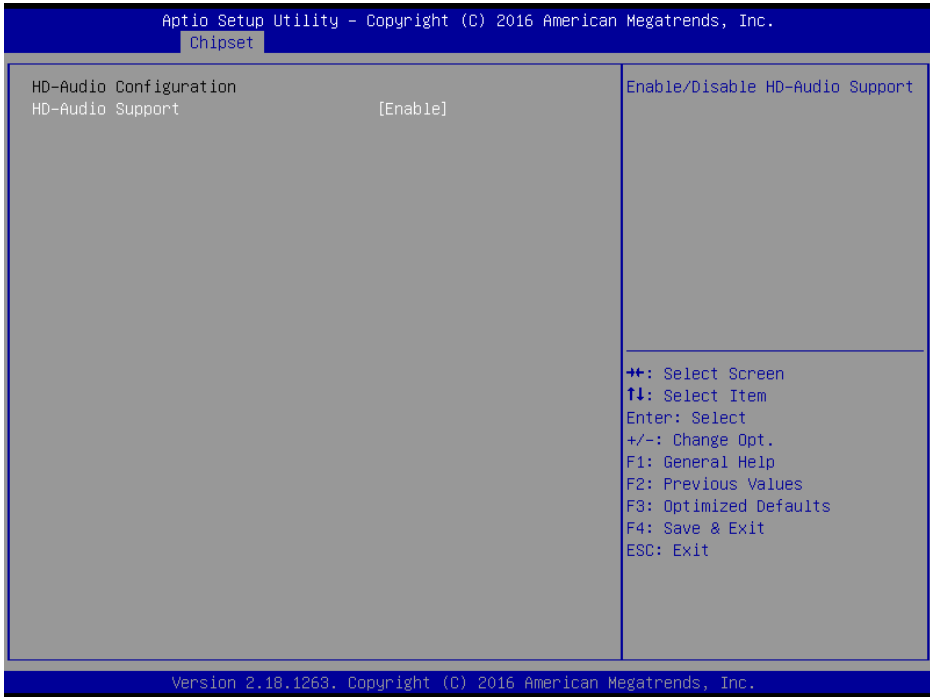
HD-Audio Configuration Screen

BIOS Setting	Options	Description/Purpose
HD-Audio Support	- Disabled - Enabled (default)	Enables/Disables HD-Audio support.

5.5.2.2　　　　South Bridge - LPSS Configuration

Menu Path	*Chipset > South Bridge > LPSS Configuration*

```
         Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
           Chipset

 Low Power Sub System                                  Enable/Disable LPSS I2C #1
 LPSS I2C #1 Support (D22:F0)        [Enable]          Support
 Set LPSS I2C #1 Speed               [Fast Mode]




                                                       ↔: Select Screen
                                                       ↑↓: Select Item
                                                       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.
```
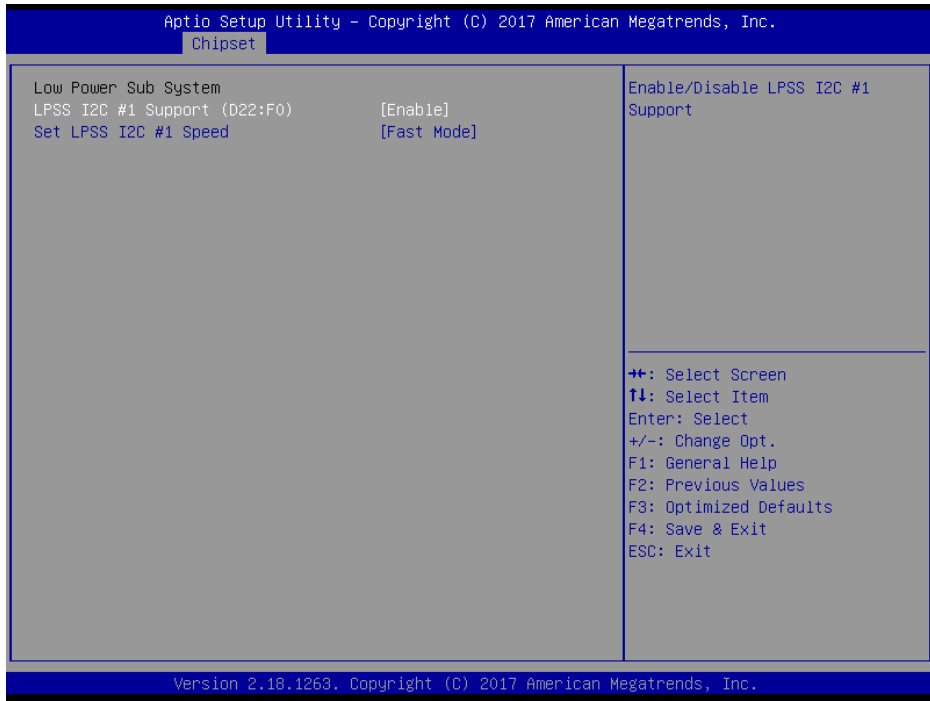
LPSS Configuration Screen

BIOS Setting	Options	Description/Purpose
LPSS I2C #1 Support (D22:F0)	- Disable - PCI Mode (default)	Enables/Disables LPSS I2C #1 support.
Set LPSS I2C #1 Speed	- Standard Mode - Fast Mode (default) - Fast Plus Mode - High Speed Mode	Selects LPSS I2C #1 speed.

5.5.2.3 South Bridge - PCI Express Configuration

Menu Path   *Chipset > South Bridge > PCI Express Configuration*

```
                 Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                     Chipset

      PCI Express Configuration                           Control the PCI Express Root
    ▶ PCI Express Root Port 1 (I210 LAN)                  Port.
    ▶ PCI Express Root Port 2 (I210 LAN)                  AUTO: To disable unused root
    ▶ PCI Express Root Port 3 (Mini-PCIe)                 port automatically for the
                                                          most optimum power savings.
                                                          Enable: Enable PCIe root port
                                                          Disable: Disable PCIe root port


                                                          ⭾: 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

BIOS Setting	Options	Description/Purpose
PCI E Express Root Port 1 (I210 LAN)	Sub-Menu	PCIE RP1 parameters (I210 LAN).
PCI E Express Root Port 2 (I210 LAN)	Sub-Menu	PCIE RP2 parameters (I210 LAN).
PCI E Express Root Port 3 (Mini-PCIe)	Sub-Menu	PCIE RP3 parameters (Mini-PCIe).

South Bridge - PCI Express Configuration - PCI Express Root Port 1 (I210 LAN)

Menu Path	*Chipset > South Bridge > PCI Express Configuration > PCI Express Root Port 1(I210 LAN)*

```
                Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
                   Chipset

    PCI Express Root Port 1 (I210 LAN)     [Auto]              Control the PCI Express Root
    PCIe Speed                             [Auto]              Port.
                                                               AUTO: To disable unused root
                                                               port automatically for the
                                                               most optimum power savings.
                                                               Enable: Enable PCIe root port
                                                               Disable: Disable PCIe root port


                                                               →←: 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 Root Port 1 (I210 LAN) Screen

BIOS Setting	Options	Description/Purpose
PCI Express Root Port 1 (I210 LAN)	- Disable - Enable - Auto (default)	Enable/Disable PCIE root port 1 (I210 LAN).
PCIe Speed	- Auto (default) - Gen1 - Gen2	Configures PCIe speed.

South Bridge - PCI Express Configuration - PCI Express Root Port 2 (I210 LAN)

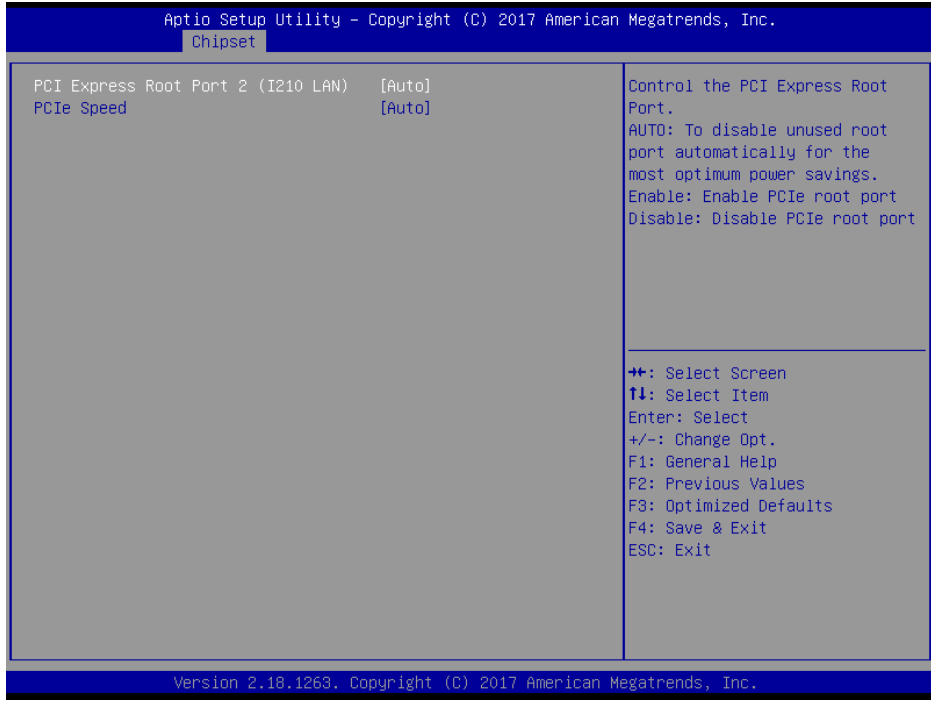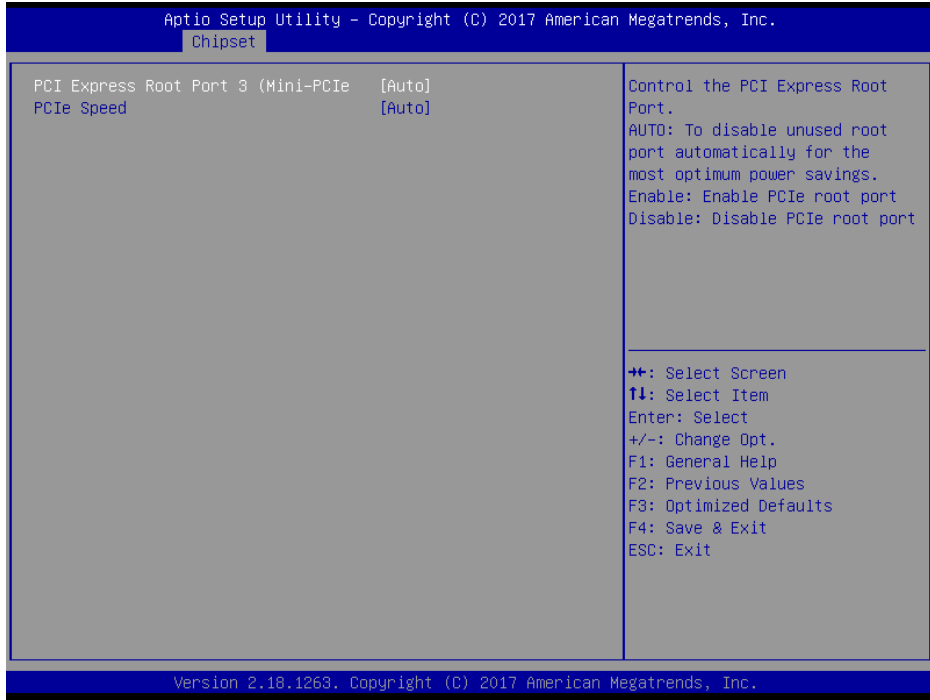| Menu Path	*Chipset > South Bridge > PCI Express Configuration > PCI Express Root Port 2(I210 LAN)*

```
              Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
               Chipset
   PCI Express Root Port 2 (I210 LAN)    [Auto]         Control the PCI Express Root
   PCIe Speed                            [Auto]         Port.
                                                        AUTO: To disable unused root
                                                        port automatically for the
                                                        most optimum power savings.
                                                        Enable: Enable PCIe root port
                                                        Disable: Disable PCIe root port



                                                        ++: 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 Root Port 2(I210 LAN) Screen

BIOS Setting	Options	Description/Purpose
PCI Express Root Port 2 (I210 LAN)	- Disable - Enable - Auto (default)	Enables/Disables PCIE root port 2 (I210 LAN).
PCIe Speed	- Auto (default) - Gen1 - Gen2	Configures PCIe speed.

South Bridge - PCI Express Configuration - PCI Express Root Port 3 (Mini-PCIe)

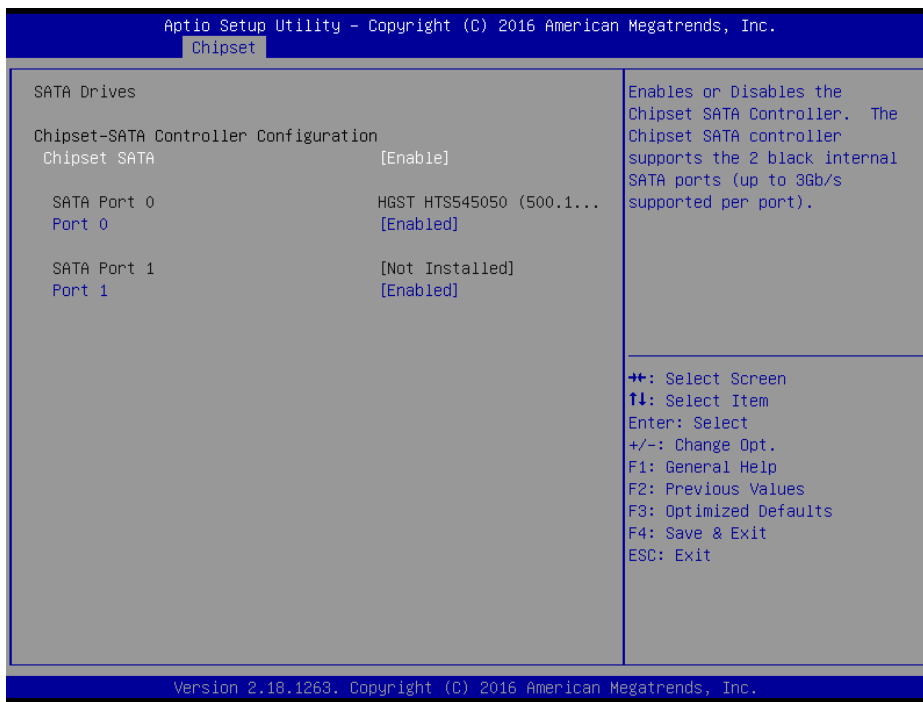| Menu Path	*Chipset > South Bridge > PCI Express Configuration > PCI Express Root Port 3 (Mini-PCIe)*

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                 Chipset

   PCI Express Root Port 3 (Mini-PCIe    [Auto]           Control the PCI Express Root
   PCIe Speed                            [Auto]           Port.
                                                          AUTO: To disable unused root
                                                          port automatically for the
                                                          most optimum power savings.
                                                          Enable: Enable PCIe root port
                                                          Disable: Disable PCIe root port


                                                          →←: 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 Root Port 3 (Mini-PCIe) Screen

BIOS Setting	Options	Description/Purpose
PCI Express Root Port 3 (Mini-PCIe)	- Disable - Enable - Auto (default)	Enables/Disables PCIE root port 3 (Mini-PCIe).
PCIe Speed	- Auto (default) - Gen1 - Gen2	Configures PCIe speed.

5.5.2.4   South Bridge - SATA Drives

```
              Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
                    Chipset

 SATA Drives                                             Enables or Disables the
                                                         Chipset SATA Controller.  The
 Chipset-SATA Controller Configuration                   Chipset SATA controller
  Chipset SATA                     [Enable]              supports the 2 black internal
                                                         SATA ports (up to 3Gb/s
   SATA Port 0                     HGST HTS545050 (500.1...supported per port).
   Port 0                          [Enabled]

   SATA Port 1                     [Not Installed]
   Port 1                          [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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```

SATA Drives Screen

BIOS Setting	Options	Description/Purpose
Chipset SATA	- Enabled (default) - Disabled	Enables/Disables the chipset SATA controller.
SATA Port 0	No changeable options	Displays SATA drive branding information if device exists on port 0.
Port 0	- Disabled - Enabled (default)	Enables/Disables SATA port 0.
SATA Port 1	No changeable options	Displays SATA drive branding information if device exists on port 1.
Port 1	- Disabled - Enabled (default)	Enables/Disables SATA port 1.

5.5.2.5   South Bridge - Miscellaneous Configuration

Menu Path   *Chipset > South Bridge > Miscellaneous Configuration*

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                  Chipset

    Miscellaneous Configuration               Specify what state to go to
    Restore AC Power Loss          [Power On]   when power is re-applied after
    Wake On Lan                    [Enable]     a power failure (G3 state).
                                                Power On: System will boot
                                                directly as soon as power
                                                applied.
                                                Power Off: System keeps in
                                                power-off state until power
                                                button is pressed.


                                                →←: 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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```

Miscellaneous Configuration Screen

BIOS Setting	Options	Description/Purpose
Restore AC Power Loss	-Power On (default) -Power Off	Specifies what state to go to when power is re-applied after a power failure (G3 state). • **Power On:** System will boot directly as soon as power applied. • **Power Off:** System keeps in power-off state until power button is pressed.
Wake On Lan	- Disable - Enable (default)	Enables or Disables the Wake On LAN (WOL). Win 8/8.1/10 don't support WOL from hybrid shutdown state (S4). If you want to support WOL from classic shutdown state (S5), please turn off 'fast startup' feature in OS.

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) 2016 American Megatrends, Inc.
      Main  Advanced  Chipset  Security  Boot  Save & Exit

    Password Description                                  Set Setup 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
                                                       ↑↓: Select Item
    Setup Administrator Password                       Enter: Select
    User Password                                      +/-: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
    HDD Security Configuration:                        F3: Optimized Defaults
    P0:HGST HTS545050A7E680                            F4: Save & Exit
                                                       ESC: Exit



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```

Security Screen

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

BIOS Setting	Options	Description/Purpose
User Password	Password can be 3-20 alphanumeric characters.	Specifies the user password.
HDD Security Configuration	Sub-Menu	Enter sub-menu with option to enabled password protected HDD/SSD (if supported by SATA device).

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

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

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

5.7 Boot

Menu Path	*Boot*

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

```
              Aptio Setup Utility - Copyright (C) 2017 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                       [Disable]
        OS Selection                    [Windows]

        Boot Option Priorities
        Boot Option #1                  [UEFI: USB3.0 FLASH ...]
        Boot Option #2                  [UEFI: Built-in EFI ...]


                                                          →←: 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 (default) - 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 (default) - Enabled	When quite boot is enabled, it displays AMI or OEM logo (if implemented) instead of POST messages during the boot.
Fast Boot	- Disabled (default) - Enabled	Enables or Disables Fast Boot Options.
OS Selection	-Windows (default) -Android -Intel Linux	Select the target OS.
Boot Option #1~#n	- [Drive(s)] - Disabled	Sets the system boot order.

5.8   Save & Exit

Menu Path	*Save & Exit*

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

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

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

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

```
Aptio Setup Utility - Copyright (C) 2017 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
 UEFI: Built-in EFI Shell                    +/-: Change Opt.
 UEFI: USB3.0 FLASH DRIVE PMAP, Partition 1  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 and saves the changes in NVRAM.
Discard Changes and Exit	No changeable options	Exits without saving any changes made in BIOS settings.
Save Changes and Reset	No changeable options	Saves the changes in NVRAM and resets.
Discard Changes and Reset	No changeable options	Resets without saving any changes made in BIOS settings.
Save Changes	No changeable options	Save Changes done so far to any of the setup options.
Discard Changes	No changeable options	Discard 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	Save the changes done so far as User Defaults.
Restore User Defaults	No changeable options	Restore the User Defaults to all the setup options.
Boot Override	- [Drive(s)]	Forces to boot from selected [drive(s)].

Appendix A   System Diagrams

This appendix provides exploded diagrams and part numbers of BS-E097 system.

The following topics are included:

· BS-E097 System Exploded Diagram
· BS-E097 SATA HDD Exploded Diagram
· BS-E097 Stand Exploded Diagram

BS-0981 System Exploded Diagram
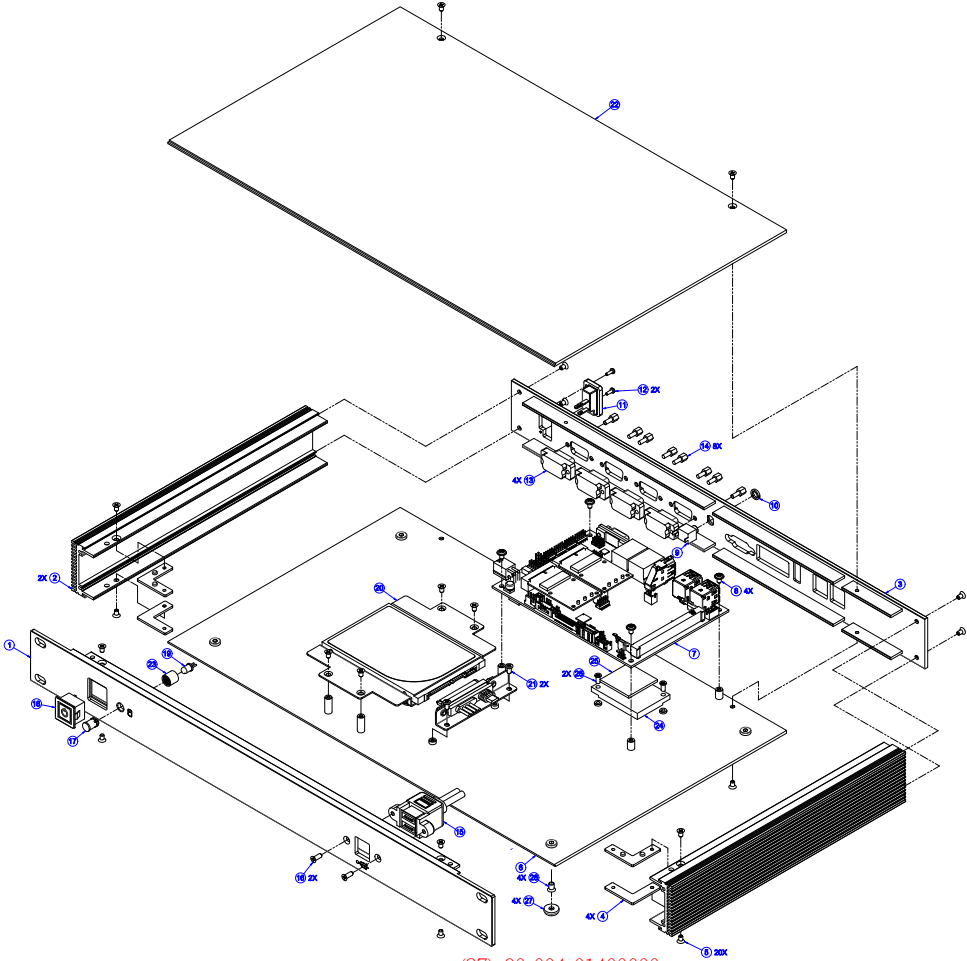
(27) 90-004-01400000
(28) 22-215-40006011

NO.	COMPONENT NAME	PART NO.	Q'TY
1	FRONT_PLATE	80-005-01002452	1
2	SIDE_PLATE	80-005-01004406	2
3	BACK_PLATE	80-005-01001406	1
4	CORNER_FIXED_POSITION_SLICE	80-130-02011406	4
5	FLAT HEAD SCREW #2/ Ø 5/M3x0.5Px5mm	22-212-30005311	20
6	BOTTOM_PLATE	80-005-01006406	1
7	BE-0981R2_PCB_APOLLO_LAKE_ASM	BE-0981RA-M0N	1
8	ROUND WASHER HEAD SCREW M3x0.5Px5mm	22-242-30005311	4
9 10	BT-0981 LINE OUT CABLE((3.5mm(F) to 10P(F))L=180mm(SLPRO875003-A)	27-028-40604111	1
11	BT-0981 POWER EXTENDING CABLE(DC-IN) L=280mm(SLPRO875004-A)	27-012-40606071	1
12	PAN HEAD SCREW M2.0x0.4Px6mm	22-222-20060011	2
13	BS-E098 COM PORT CABLE(9M to 10F)(Black)L=220mm(附螺絲)(SL812875151-A)	27-024-39505031	4
14	HEX CU BOSS UNC No.4-40,L=4.8,H=7mm	22-692-40048051	8
15	BS-E098 2-PORT USB CABLE(10F to USBx2)L=160mm(SL812875153-A)	27-006-39504111	1
16	FLAT HEAD SCREW #2/ Ø 5/M3x0.5Px8mm	22-212-30008011	2
17	LED HOUSING(Clear)(康揚 LC5-1 Rev.D)	90-014-02200000	1
18 19	BT-0981 POWER & INDICATION LIGHT CABLE L=400mm(CJS-108-0233-V4.0)	27-019-40608111	1
20	BS-E098_2INCH_HDD_EXP	SEE PAGE 2	1
21	FILLISTR HEAD SCREW #2/M3x0.5Px5mm	22-272-30049015	2
22	TOP_PLATE	80-005-01004452	1
23	LAMP HOLDER(Φ7x8.2mm)(Black)(LC5-1T Rev.A)	90-012-04100221	1
24	EPC-9611 SB HEATSINK(48x34x5.5mm)	21-002-15034001	1
25	Thermal Interface Pads,K=4,30x30x2.0mm(Blue)(TG4040-300300200-0-1)	81-006-83030004	1
26	FILLISTR HEAD SCREW #2/M3x0.5Px6mm	22-272-30006018	2

page 89

Appendix B   Technical Summary

This appendix will give you a brief introduction of the allocation maps for BS-E097 resources.

The following topics are included:
- Interrupt Map
- I/O Map
- Memory Map
- Configuring WatchDog Timer
- Flash BIOS Update

Interrupt Map

IRQ	Assignment
IRQ 0	System timer
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 7	Communications Port (COM3)
IRQ 8	System CMOS/real time clock
IRQ 10	Communications Port (COM4)
IRQ 25	High Definition Audio Controller
IRQ 27	Intel(R) Serial IO I2C Host Controller - 5AAC
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	Assignment
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 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	Assignment
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 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	Assignment
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 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	Assignment
IRQ 176	Microsoft ACPI-Compliant System
IRQ 177	Microsoft ACPI-Compliant System
IRQ 178	Microsoft ACPI-Compliant System
IRQ 179	Microsoft ACPI-Compliant System
IRQ 180	Microsoft ACPI-Compliant System
IRQ 181	Microsoft ACPI-Compliant System
IRQ 182	Microsoft ACPI-Compliant System
IRQ 183	Microsoft ACPI-Compliant System
IRQ 184	Microsoft ACPI-Compliant System
IRQ 185	Microsoft ACPI-Compliant System
IRQ 186	Microsoft ACPI-Compliant System
IRQ 187	Microsoft ACPI-Compliant System
IRQ 188	Microsoft ACPI-Compliant System
IRQ 189	Microsoft ACPI-Compliant System
IRQ 190	Microsoft ACPI-Compliant System
IRQ 191	Microsoft ACPI-Compliant System
IRQ 192	Microsoft ACPI-Compliant System
IRQ 193	Microsoft ACPI-Compliant System
IRQ 194	Microsoft ACPI-Compliant System
IRQ 195	Microsoft ACPI-Compliant System
IRQ 196	Microsoft ACPI-Compliant System
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	Assignment
IRQ 260	Microsoft ACPI-Compliant System
IRQ 261	Microsoft ACPI-Compliant System
IRQ 262	Microsoft ACPI-Compliant System
IRQ 263	Microsoft ACPI-Compliant System
IRQ 264	Microsoft ACPI-Compliant System
IRQ 265	Microsoft ACPI-Compliant System
IRQ 266	Microsoft ACPI-Compliant System
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IRQ 290	Microsoft ACPI-Compliant System
IRQ 291	Microsoft ACPI-Compliant System
IRQ 292	Microsoft ACPI-Compliant System

IRQ	Assignment
IRQ 293	Microsoft ACPI-Compliant System
IRQ 294	Microsoft ACPI-Compliant System
IRQ 295	Microsoft ACPI-Compliant System
IRQ 296	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 326	Microsoft ACPI-Compliant System
IRQ 327	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 359	Microsoft ACPI-Compliant System
IRQ 360	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 392	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 425	Microsoft ACPI-Compliant System
IRQ 426	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 458	Microsoft ACPI-Compliant System
IRQ 459	Microsoft ACPI-Compliant System
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IRQ	Assignment
IRQ 491	Microsoft ACPI-Compliant System
IRQ 492	Microsoft ACPI-Compliant System
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IRQ 509	Microsoft ACPI-Compliant System
IRQ 510	Microsoft ACPI-Compliant System
IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967277	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967278	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967279	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967280	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967281	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967282	Intel(R) I210 Gigabit Network Connection #2
IRQ 4294967283	Intel(R) I210 Gigabit Network Connection
IRQ 4294967284	Intel(R) I210 Gigabit Network Connection
IRQ 4294967285	Intel(R) I210 Gigabit Network Connection
IRQ 4294967286	Intel(R) I210 Gigabit Network Connection
IRQ 4294967287	Intel(R) I210 Gigabit Network Connection
IRQ 4294967288	Intel(R) I210 Gigabit Network Connection

IRQ	Assignment
IRQ 4294967289	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
IRQ 4294967290	Intel(R) Trusted Execution Engine Interface
IRQ 4294967291	Intel(R) HD Graphics
IRQ 4294967292	Standard SATA AHCI Controller
IRQ 4294967293	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
IRQ 4294967294	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8

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

I/O MAP

I/O Map	Assignment
0x00000000-0x0000006F	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
0x00000078-0x00000CF7	PCI Express Root Complex
0x00000080-0x0000008F	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
0x000002E8-0x000002EF	Communications Port (COM4)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000003F8-0x000003FF	Communications Port (COM1)
0x00000400-0x0000047F	Motherboard resources
0x000004D0-0x000004D1	Programmable interrupt controller

I/O Map	Assignment
0x00000500-0x000005FE	Motherboard resources
0x00000600-0x0000061F	Motherboard resources
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
0x0000D000-0x0000DFFF	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
0x0000E000-0x0000EFFF	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8
0x0000F000-0x0000F03F	Intel(R) HD Graphics
0x0000F040-0x0000F05F	Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4
0x0000F060-0x0000F07F	Standard SATA AHCI Controller
0x0000F080-0x0000F083	Standard SATA AHCI Controller
0x0000F090-0x0000F097	Standard SATA AHCI Controller

Memory Map

Memory Map	Assignment
0xE0000000-0xEFFFFFFF	Motherboard resources
0xE0000000-0xEFFFFFFF	PCI Express Root Complex
0xFEA00000-0xFEAFFFFF	Motherboard resources
0xFED01000-0xFED01FFF	Motherboard resources
0xFED03000-0xFED03FFF	Motherboard resources
0xFED06000-0xFED06FFF	Motherboard resources
0xFED08000-0xFED09FFF	Motherboard resources
0xFED80000-0xFEDBFFFF	Motherboard resources
0xFED1C000-0xFED1CFFF	Motherboard resources
0xFEE00000-0xFEEFFFFF	Motherboard resources
0x91310000-0x91313FFF	High Definition Audio Controller
0x91000000-0x910FFFFF	High Definition Audio Controller
0x91316000-0x913160FF	Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4
0x91100000-0x911FFFFF	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9
0x91280000-0x912FFFFF	Intel(R) I210 Gigabit Network Connection #2
0x9127C000-0x9127FFFF	Intel(R) I210 Gigabit Network Connection #2
0x91180000-0x911FFFFF	Intel(R) I210 Gigabit Network Connection
0x9117C000-0x9117FFFF	Intel(R) I210 Gigabit Network Connection
0xFED00000-0xFED003FF	High precision event timer
0x91318000-0x91318FFF	Intel(R) Serial IO I2C Host Controller - 5AAC
0x91317000-0x91317FFF	Intel(R) Serial IO I2C Host Controller - 5AAC
0x91300000-0x9130FFFF	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
0x91200000-0x912FFFFF	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8
0x80000000-0x8FFFFFFF	PCI Express Root Complex
0x90000000-0x90FFFFFF	Intel(R) HD Graphics
0x9131D000-0x9131DFFF	Intel(R) Trusted Execution Engine Interface

Memory Map	Assignment
0x80000000-0x8FFFFFFF	Intel(R) HD Graphics
0x91314000-0x91315FFF	Standard SATA AHCI Controller
0x9131A000-0x9131A0FF	Standard SATA AHCI Controller
0x91319000-0x913197FF	Standard SATA AHCI Controller
0x7B800001-0x7BFFFFFF	PCI Express Root Complex
0x7C000001-0x7FFFFFFF	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 F81964 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 the watchdog timer and set the timeout interval to **30** seconds.

```
; ---------------------- Enter to extended function mode ----------------------
mov     dx,        2Eh
mov     al,        87h
out     dx,        al
out     dx,        al
; ------------------ Select Logical Device 7 of watchdog timer ------------
mov     al,        07h
out     dx,        al
inc     dx
mov     al,        07h
out     dx,        al
;------------------------ Enable Watch dog feature -------------------------
dec     dx
mov     al,        30h
out     dx,        al
inc     dx
mov     al,        01h
out     dx,        al
; ---------- Set timeout interval as 30seconds and start counting ----------
dec     dx
mov     al,        F6h
out     dx,        al
inc     dx
mov     al,        1Eh
out     dx,        al
;---------------------------- Enable Watch PME----------------------------
dec     dx
mov     al,        FAh
out     dx,        al
inc     dx
```

```
in      al,     dx
or      al,     51h
out     dx,     al
```
;---------------------- Set second as counting unit ------------------------
```
dec     dx
mov     al,     F5h
out     dx,     al
inc     dx
in      al,     dx
and     al,     DEh
out     dx,     al
```
;------------------------- Start the watchdog timer --------------------------
```
or      al,     20h
out     dx,     al
```
;--------------------Exit the extended function mode ----------------------
```
dec     dx
mov     al,     AAh
out     dx,     al
```

Flash BIOS Update

I. Prerequisites

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

2 Download and save the BIOS file (e.g. E0970PM1.bin) to the bootable device.

3 Copy AMI flash utility –AfuEfix64.efi (v5.08.02.1189) into bootable device.

4 Make sure the target system can first boot to the bootable device.
   (1) Connect the bootable USB device.
   (2) Turn on the computer and press **<ESC>** or **<DEL>** during boot to enter BIOS Setup.
   (3) The system will go into the BIOS setup menu.
   (4) Select **[Boot]** menu and set the USB bootable device as the 1st boot device.
   (5) Press **F4** to save the configuration and exit the BIOS setup menu.

```
          Aptio Setup Utility – Copyright (C) 2017 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                         [Disable]
   OS Selection                      [Windows]

   Boot Option Priorities
   Boot Option #1                    [UEFI: USB3.0 FLASH ...]
   Boot Option #2                    [UEFI: Built-in EFI ...]


                                                            →←: Select Screen
                                                            ↑↓: Select Item
                                                            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.
```

II. AFUEFI Command for System BIOS Update

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

AfuEfix64 <ROM File Name> [option1] [option2]….
User can type "AfuEfix64/ ?" to see all the definition of each control options. The recommended options for BIOS ROM update include following parameters:

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

III. BIOS Update Procedure

1   Use the bootable USB storage to boot up the system into the EFI Shell command prompt.

2   Type **" AfuEfix64 E097xxxx.bin /p /b /n /x"** and press **Enter** to start the flash procedure.
    (Note that xxxx means the BIOS revision part, e.g. 0PM1…)

3   During the update procedure, you will see the BIOS update process status and its percentage. Beware! Do not turn off the system power or reset your computer when the entire update procedure are not complete; otherwise, the BIOS ROM may be crashed and the system will be unable to boot up next time.

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

```
fs0:\> AfuEfix64 E0970PM1.bin /p /b /n /x

+-----------------------------------------------------------------+
|                  AMI Firmware Update Utility v5.08.02.1189       |
|    Copyright (C)2016 American Megatrends Inc. All Rights Reserve.|
+-----------------------------------------------------------------+
Reading flash .............. done
- FFS checksums ........ ok
Erasing Boot Block ......... done
Updating Boot Block ........ done
Verifying Boot Block ....... done
Erasing Main Block ......... done
Updating Main Block ........ done
Verifying Main Block ....... done
Erasing NVRAM Block ........ done
Updating NVRAM Block ....... done
Verifying NVRAM Block ...... done

fs0:\>
```

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

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

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


```
Version 2.18.1263. Copyright (C) 2018 American Megatrends, Inc.
BIOS Date: 03/07/2018 13:25:24 Ver: E0970PM1
Press <DEL> or <ESC> to enter setup.
```