USER MANUAL

SP-C121

12.1" Fanless Panel PC Powered By Intel® Celeron® J3455 / N3350 Processor

SP-C121 M1

SP-C121

12.1” Fanless Panel PC Powered By Intel® Celeron® J3455 / N3350 CPU Processor

DISCLAIMER

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

CE NOTICE

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

FCC NOTICE

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

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

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

	**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.

Contents

Revision History

The revision history of SP-C121 User Manual is described below:

Version No.	Revision History	Page No.	Date
M1	Initial Release	-	2022/04/18

1 Introduction

This chapter provides the introduction for the SP-C121 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 SP-C121 system. The SP-C121 is an updated system designed to be comparable with the highest performance of IBM AT personal computers. The SP-C121 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 introduces you to the background of this manual.

Chapter 2 Getting Started

This chapter describes the package contents and outlines the system specifications. It also includes the physical illustrations for the SP-C121 system. Read the safety reminders carefully on how to take care of your system properly.

Chapter 3 System Configuration

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

Chapter 4 Software Utilities

This chapter contains helpful information for proper installations of the Intel Chipset Software Installation Utility, Intel Trusted Execution Engine Installation Utility, Graphics Driver Utility, LAN Driver Utility and Sound Driver Utility.

Chapter 5 BIOS Setup

This chapter indicates you how to change the BIOS configurations.

Appendix A System Diagrams

This appendix provides the system exploded diagrams and part numbers of SP-C121.

Appendix B Technical Summary

This appendix provides the information about the system block diagram, allocation maps for system resources, Watchdog Timer Configuration and Flash BIOS Update.

2 Getting Started

This chapter provides the information for the SP-C121 system. It describes how to set up the system quickly and outlines the system specifications.

The following topics are included:

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

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

2.1 Package List

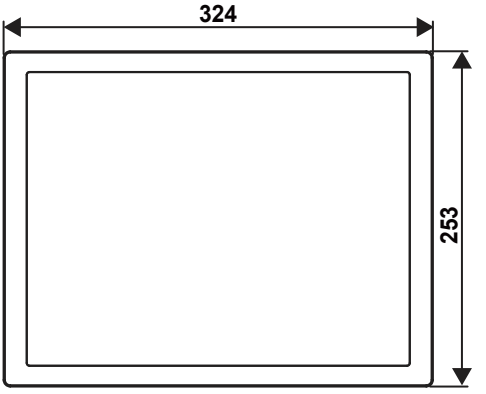
If you discover any of the items listed below are damaged or lost, please contact your local distributor immediately.

Item	Q'ty
SP-C121	1
Manual / Driver DVD	1
Quick Guide	1

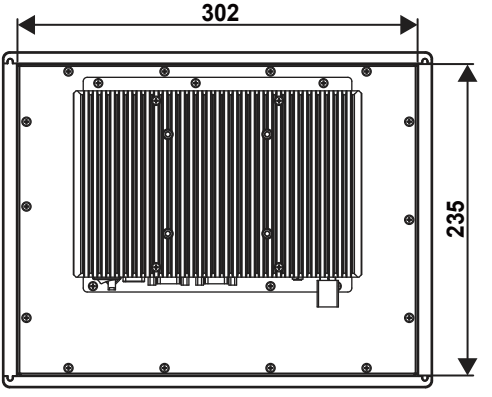
2.2 System Overview

Unit: mm

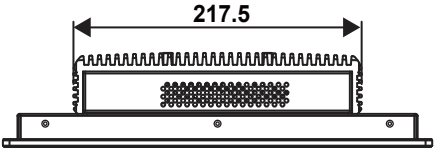
2.2.1 Front View



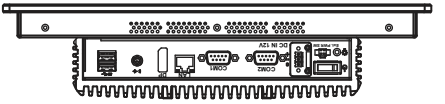
2.2.2 Rear View



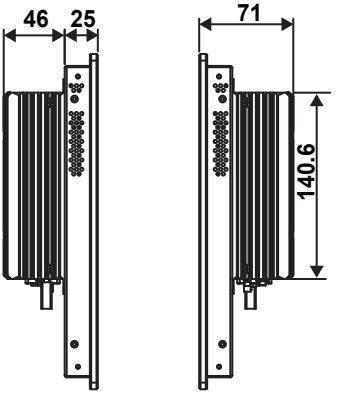
2.2.3 Top View



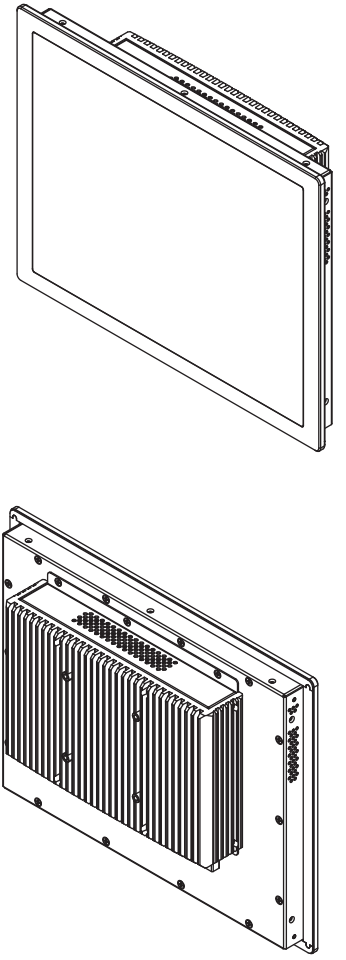
2.2.4 Bottom View



2.2.5 Side View



2.2.6 Quarter View



2.3 System Specifications

System	
CPU Type	➢ Intel® Celeron® J3455: 10w, 4C, 2.3GHz ➢ Intel® Celeron® N3350: 6w, 2C, 2.4GHz
Memory Support	➢ 1 x SO-DIMM socket, supporting 1600/1866 DDR3L DRAM up to 8GB (non-ECC)
API	➢ Hardware monitor / WatchDog
Storage Support	➢ 1 x 2.5" 7mm SATAIII HDD / SSD drive space
Front Bezel	➢ Aluminum
Power	➢ DC 12V power input (3-pin lockable terminal block)
O.S. Support	➢ Windows® 10 64bit ➢ Ubuntu 17.04 64bit (kernel: 4.4)
BIOS	➢ AMI UEFI BIOS
Expansion Slots	➢ N/A
Dimensions (W x H x D) & Weight	➢ 3.55 kg, 324mm x 71mm x 253mm
Mounting Support	➢ VESA 75 ➢ Panel mount
Certificate	➢ FCC/CE
I/O Ports (Bottom Side)	
USB	➢ 2 x USB 3.1
Serial Ports	➢ 2 x COM Ports, COM1 for RS-232 only; COM2 supports RS-232/422/485 (default: RS-232, selectable under BIOS)
Display	➢ 1 x DP
Audio	➢ 1 x Line Out
LAN	➢ 1 x Giga LAN (RJ45) , support Wake-on-LAN/ With PXE (disable in BIOS as default)
Power Button	➢ 1 x Power switch button
LED Indicator	➢ 1 x Power LED Indicator (Green)
Extended Power Switch	➢ 2-Pin extended power switch
Other	
Optional Accessory	➢ 60W/12V Power adapter with lockable 3-pin terminal block (option)

Environment	
Operating Temp.	➢ **SSD:** 0°C ~ 50°C (32°F~122°F) ➢ **HDD:** 0°C ~45°C (32°F~113°F) **Wide Temperature SSD:** ➢ -20°C ~60°C (-4°F~140°F)
Humidity	➢ 20%~ 95%

2.4 Safety Precautions

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

1. Check the Line Voltage
   - The operating voltage for the power supply should be within the range of 100V to 240V AC; otherwise, the system may be damaged.

2. Environmental Conditions
   - Place your SP-C121 on a sturdy, level surface. Be sure to allow enough space around the system to have easy access needs.
   - Avoid installing your SP-C121 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 SP-C121 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 SP-C121 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 you turn 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

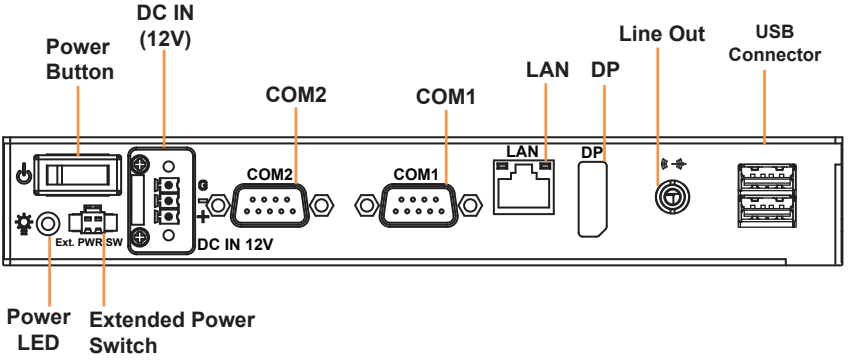
This chapter contains helpful information about the external I/O Ports diagram, and jumper & connector settings, and component locations for the main board.

The following topics are included:

- External I/O Ports Diagram
- Main Board Jumper Settings and Component Locations
- How to Set Jumpers
- Setting Main Board Connectors and Jumpers

3.1 External I/O Ports Diagram

3.1.1 Bottom I/O Ports Diagram



3.2 JUMPER & CONNECTOR QUICK REFERENCE TABLE

JUMPER Description	NAME
LVDS VCC Voltage Selection	JP_VDD1
LVDS PWM/Backlight Enable Sequence Setting	JP1
Clear CMOS Data Selection	JP4
LVDS Backlight Control Voltage Selection	JP7
Slide Switch for LVDS Resolution Selection	SW1

CONNECTOR Description	NAME
COM Connector	COM1, COM2
Display Port Connector	DP1
LAN Port (Bottom)	LAN
2 x Dual USB 3.0 Ports (Bottom)	USB1
2 x USB 2.0 Ports (Internal)	USB3
DC Power Input Connector	PWR2
mSATA Connector	SLOT1
LVDS Connector	LVDS1
Front Panel Connector	JFP1
HD Audio Connector	AUDIO1
Panel Inverter Connector	JINV1
SATA 3.0 Connector	SATA1
SATA Power Connector	SATA_PWR1
BIOS Reset Connector	JP9

3.3 COMPONENT LOCATIONS

3.3.1 Top View and Jumper Settings of BE-0981 Main Board

Top View of BE-0981 Main Board

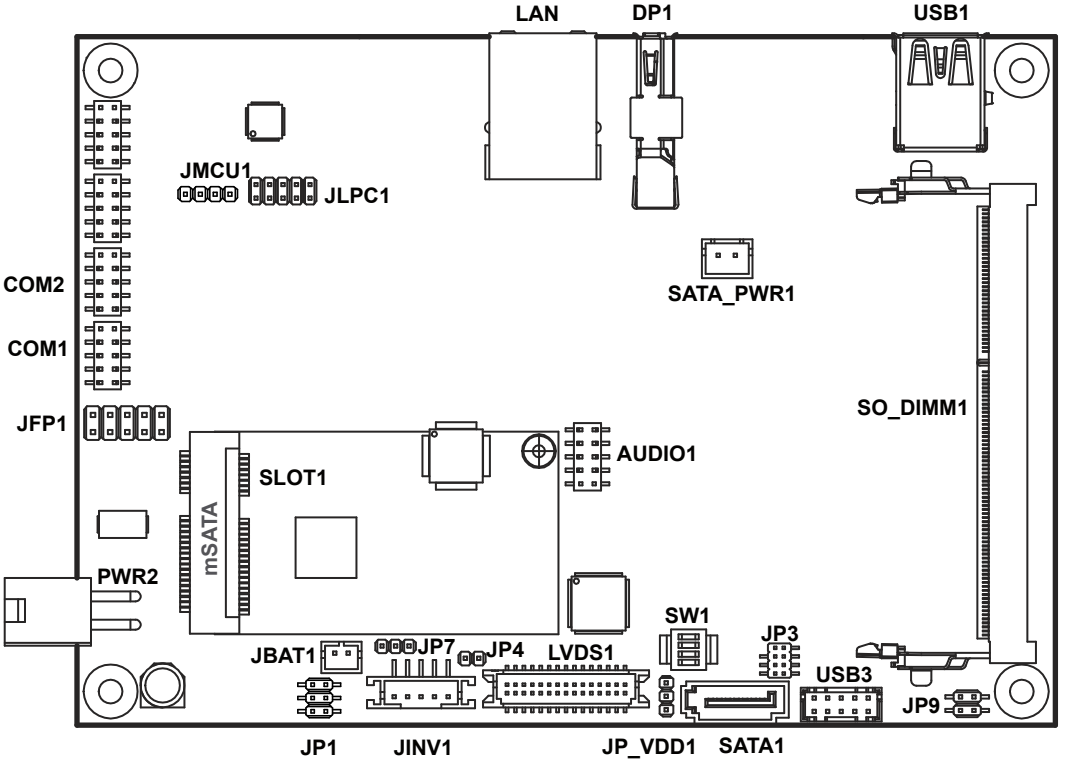


Figure 3-1. BE-0981 Main Board Component Location (Top View)

	**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 the main board is properly grounded.
	**CAUTION:** Observe precautions while handling electrostatic sensitive components. Make sure to ground yourself to prevent static charge while you are working on the connectors and jumpers. Use a grounding wrist strap and place all electronic components in any static-shielded devices.
	**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 main board components.

Jumper Settings of BE-0981 Main Board

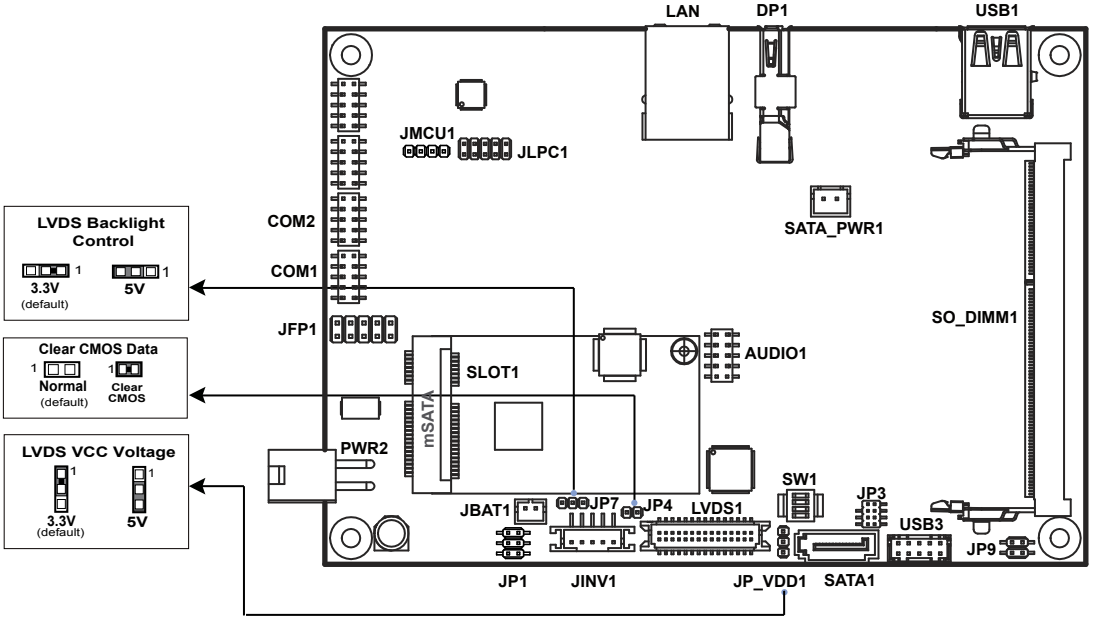


Figure 3-2. BE-0981 Main Board Jumper Settings

3.3.2 Bottom View of BE-0981 Main Board

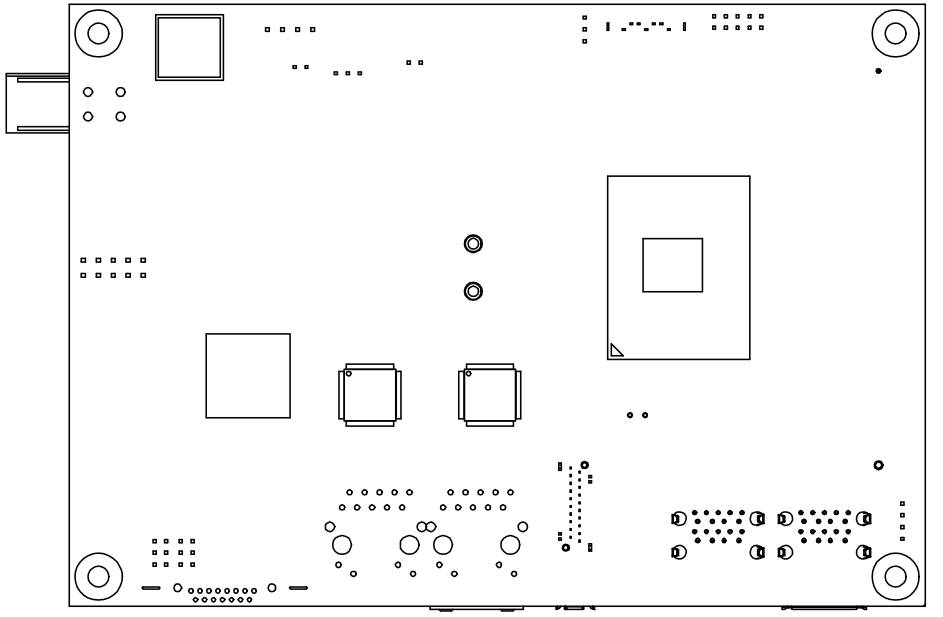


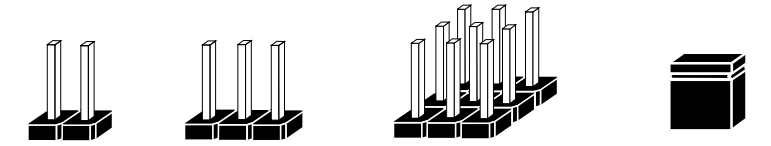
Figure 3-3. BE-0981 Main Board Component Location (Bottom View)

3.4 Setting Jumpers

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

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

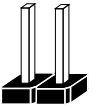
Jumpers & Caps



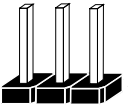
If a jumper has three pins, for example, labeled 1, 2 and 3. You can connect pins 1 and 2 to create one setting and shorting. You can also select to connect pins 2 and 3 to create another setting. The format of the jumper picture will be illustrated throughout this manual. The figure below shows different types of jumpers and jumper settings.

Jumper diagrams

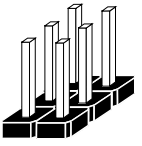
Jumper Cap looks like this



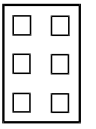
2 pin Jumper looks like this



3 pin Jumper looks like this

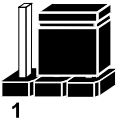


Jumper Block looks like this

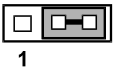


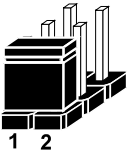
Jumper settings

2 pin Jumper closed(enabled)
looks like this

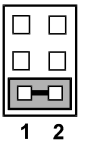


3 pin Jumper
2-3 pin closed(enabled)
looks like this





Jumper Block
1-2 pin closed(enabled)
looks like this



3.5 Setting Main Board Connectors and Jumpers

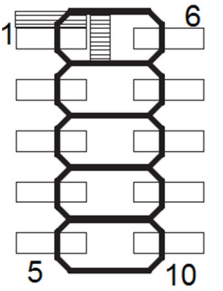
3.5.1 COM PORT (COM1 and COM2)

Port Location: COM1 and COM2

Description: COM Port Connector (bottom I/O)

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	10	NC



COM1/ COM2

COM2(RS-232) Connector Pin Assignment:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	COM2_DCD	6	COM2_DSR
2	COM2_RX	7	COM2_RTS
3	COM2_TX	8	COM2_CTS
4	COM2_DTR	9	COM2_RI
5	GND	10	NC

COM2(RS-422) Connector Pin Assignment:

PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	TX-	6	NC
2	TX+	7	NC
3	RX-	8	NC
4	RX+	9	NC
5	GND	10	NC

COM2(RS-485) Connector Pin Assignment:

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

Notes:

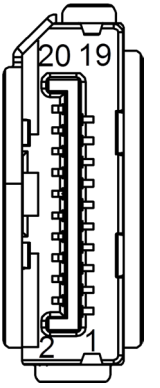
1. COM2 is selectable as RS-232, RS-422, RS-485 under BIOS setting.
2. Default setting is RS-232. Please see **Chapter 5 "Advanced – Onboard Device Configuration"** for selection details.

3.5.2 DISPLAY PORT (DP1)

Port Location: DP1

Description: Display Port Connector (bottom I/O)

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

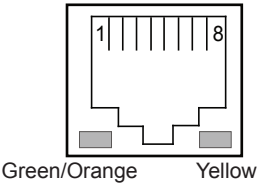


DP1

3.5.3 LAN PORT (LAN)

Port Location: LAN

Description: LAN RJ-45 Port (bottom I/O)



LAN

LAN 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

LAN LED Status

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

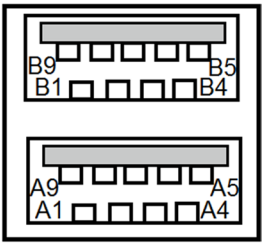
LAN LED Indicator	Color	Status	Description
Right Side LED	Yellow	Blink	LAN Message Active
	-	Off	No LAN Message Active
Left Side LED	Green	On	10/100Mbps LAN connection is enabled.
	Orange	On	Giga LAN connection is enabled.
	-	Off	No LAN switch/hub is connected

3.5.4 Dual USB 3.0 PORT (USB1)

Port Location: USB1
Description: USB 3.0 Port x 2

USB 3.0 signals

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



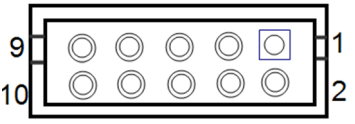
USB1

3.5.5 USB 2.0 PORT (USB3)

Port Location: USB3
Description: Internal USB 2.0 Port x 2

USB 2.0 signals

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

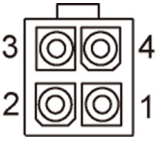


USB3

3.5.6 DC POWER INPUT CONNECTOR (PWR2)

Connector Location: PWR2
Description: DC Power Input Connector

PIN	ASSIGNMENT	PIN	ASSIGNMENT
3	VCC12	4	VCC12
2	GND	1	GND



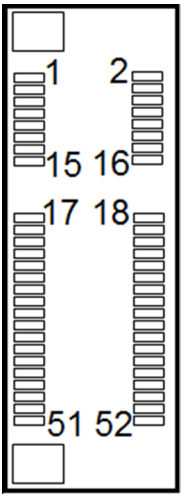
PWR2

3.5.7 mSATA CONNECTOR (SLOT1)

Connector Location: SLOT1

Description: mSATA Slot (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



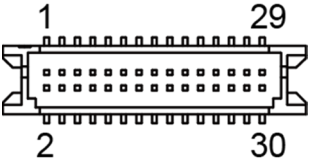
SLOT1

3.5.8 LVDS CONNECTOR (LVDS1)

Connector Location: LVDS1

Description: LVDS Connector

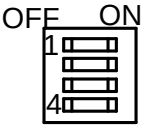
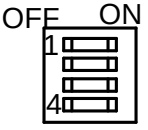
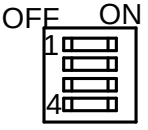
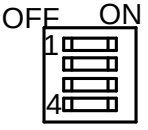
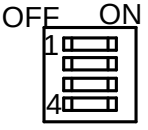
PIN	ASSIGNMENT	PIN	ASSIGNMENT
2	GND	1	LVDS_VCC
4	LVDS_CLKB_DP	3	LVDS_CLKB_DN
6	LVDS_B2_DN	5	GND
8	GND	7	LVDS_B2_DP
10	LVDS_B1_DP	9	LVDS_B1_DN
12	LVDS_B3_DN	11	LVDS_B3_DP
14	LVDS_B0_DN	13	LVDS_B0_DP
16	LVDS_CLKA_DP	15	GND
18	GND	17	LVDS_CLKA_DN
20	LVDS_A2_DN	19	LVDS_A2_DP
22	LVDS_A1_DP	21	GND
24	GND	23	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

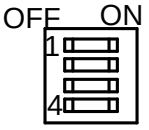
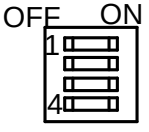
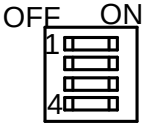
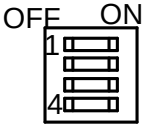
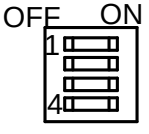


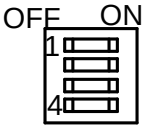
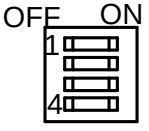
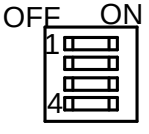
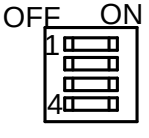
LVDS1

3.5.9 SLIDE SWITCH FOR LVDS RESOLUTION SELECTION (SW1)

Connector Location: SW1
Description: Slide Switch for LVDS Resolution/Channel/Color Bit Selection

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

SELECTION	SW1	PIN	SETTING
1280 x 960 1CH/16bit		1	OFF
		2	ON
		3	OFF
		4	ON
1280 x 1024 2CH/24bit		1	ON
		2	OFF
		3	OFF
		4	ON
1366 x 768 1CH/18bit		1	OFF
		2	OFF
		3	OFF
		4	ON
1366 x 768 1CH/24bit		1	ON
		2	ON
		3	ON
		4	OFF
1440 x 900 2CH/24bit		1	OFF
		2	ON
		3	ON
		4	OFF
1400 x 1050 2CH/24bit		1	ON
		2	OFF
		3	ON

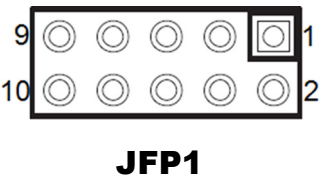
SELECTION	SW1	PIN	SETTING
1280 x 960 1CH/16bit		1	OFF
		2	ON
		3	OFF
		4	ON
1280 x 1024 2CH/24bit		1	ON
		2	OFF
		3	OFF
		4	ON
1366 x 768 1CH/18bit		1	OFF
		2	OFF
		3	OFF
		4	ON
1366 x 768 1CH/24bit		1	ON
		2	ON
		3	ON
		4	OFF
1440 x 900 2CH/24bit		1	OFF
		2	ON
		3	ON
		4	OFF
1400 x 1050 2CH/24bit		1	ON
		2	OFF
		3	ON

3.5.10 FRONT PANEL CONNECTOR (JFP1)

Connector Location: JFP1

Description: Front Panel Connector

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



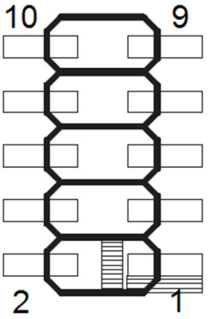
JFP1

3.5.11 HD AUDIO CONNECTOR (AUDIO1)

Connector Location: AUDIO1

Description: HD Audio Connector for Line_in/Line_out/Mic_in.

PIN	ASSIGNMENT	PIN	ASSIGNMENT
10	LINE-OUT-R	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



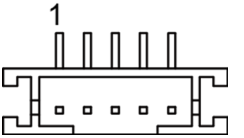
AUDIO1

3.5.12 PANEL INVERTER CONNECTOR (JINV1)

Connector Location: JINV1

Description: Panel Inverter Connector

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

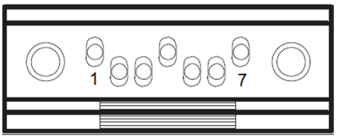


JINV1

3.5.13 SATA 3.0 CONNECTOR (SATA1)

Connector Location: 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

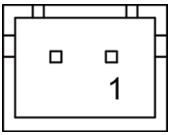


SATA1

3.5.14 SATA Power CONNECTOR (SATA_PWR1)

Connector Location: SATA_PWR1
Description: Serial ATA Power Connector

PIN	ASSIGNMENT
2	GND
1	VCC5



SATA_PWR1

3.5.15 BIOS RESET CONNECTOR (JP9)

JP9: BIOS Reset Usage Connector
This connector is only for Protech's engineers. (Purpose: BIOS reset). Please do not use this connector; otherwise, the system might be crashed.

3.5.16 LVDS BACKLIGHT CONTROL SELECTION (JP7)

Jumper Location: JP7
Description: Jumper for selecting PIN4 (LVDS_BKLTCTL) voltage of JINV1.
Jumper Name: JP7

SELECTION	JUMPER SETTING	JUMPER ILLUSTRATION
3.3V	**1-2** ***(Default Setting)***	 **JP7**
5V	2-3	 **JP7**

Note 1: Users can change the setting according to panel specification
Note 2: Please refer to **PANEL INVERTER CONNECTOR** for more details about pin definition of JINV1.

3.5.17 LVDS VCC VOLTAGE SELECTION (JP_VDD1)

Jumper Location: JP_VDD1

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

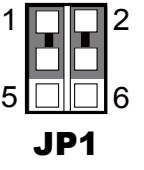
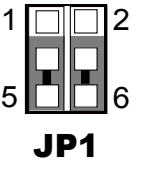
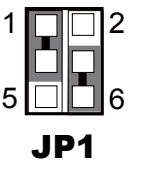
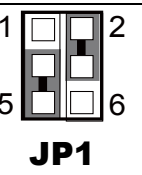
SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
3.3V	**1-2** ***(Default Setting)***	 **JP_VDD1**
5V	2-3	 **JP_VDD1**

Note: Please refer to **PANEL INVERTER CONNECTOR** for more information about pin definition of JINV1.

3.5.18 LVDS PWM/Backlight Enable Sequence Setting (JP1)

Jumper Location: JP1

Description: Jumper for selecting how to control the time sequence of PWM(LVDS_BKLCTL) and Backlight enable(LVDS_BKLEN) of JINV1.

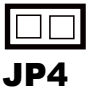
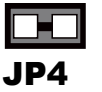
SELECTION	JUMPTER SETTING	JUMPER ILLUSTRATION
PWM: controlled by CPU **Backlight Enable:** controlled by CPU	**1-3, 2-4** ***(Default Setting)***	 **JP1**
PWM: controlled by LVDS IC **Backlight Enable:** controlled by LVDS IC	3-5, 4-6	 **JP1**
PWM: controlled by CPU **Backlight Enable:** controlled by LVDS IC	1-3, 4-6	 **JP1**
PWM: controlled by LVDS IC **Backlight Enable:** controlled by CPU	3-5, 2-4	 **JP1**

Note: Please refer to **PANEL INVERTER CONNECTOR** for more information about pin definition of JINV1.

3.5.19 CLEAR CMOS DATA SELECTION (JP4)

Jumper Location: JP4
Description: Clear CMOS Data Selection

Step 1. Remove the main power of the PC.
Step 2. Close JP4 (pins 1-2) for 6 seconds by a cap.
Step 3. Remove the cap which is just used on JP4 (1-2), so that JP4 returns to "OPEN".
Step 4. Power on the PC and the PC will then auto-reboot for once in order to set SoC's register.
Step 5. Done!

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

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 Intel® Trusted Execution Engine Installation Utility
- Installing Graphics Driver Utility
- Installing LAN Driver Utility
- Installing Sound Driver Utility

4.1 Introduction

Enclosed with the SP-C121 Series package is our driver utilities contained in a DVD-ROM disk. Refer to the following table for driver locations:

Filename (Assume that DVD- ROM drive is D :)	Purpose
D: \Driver\Platform\1_Main Chip\Win10(64Bit)	Intel® Chipset Device Software installer
D: \Driver\Platform\2_Graphics\ Win10(64Bit)	Intel® HD Graphics installer
D:\ Driver\Platform\ 3_Sound\ Win10(64Bit)	Realtek® ALC888S HD Audio Driver installer
D:\ Driver\Platform\4_TXE\ Win10(64Bit)	Intel® Trusted Execution Engine Interface
D: \Driver\Platform\5_LAN Chip\ Win10(64Bit)	Intel® Network Connections Software

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

4.2 Installing Intel® Chipset Software Installation Utility

4.2.1 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

4.2.2 Intel® Chipset Software Installation Utility

The utility pack is to be installed only for Windows® 10 series, 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 SP-C121 and insert the driver disk.
2. Enter the **Main Chip** folder where the Chipset driver is located.
3. Click **SetupChipset.exe** driver installation 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 SP-C121 for the changes to take effect.

4.3 Intel® Trusted Execution Engine Installation Utility

1. Connect the USB DVD-ROM device to SP-C121 and insert the driver disk.
2. Enter the **TXE** folder where the driver is located.
3. Click **SetupTXE.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 SP-C121 for the changes to take effect.

4.4 Installing Graphics Driver Utility

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

1. Connect the USB DVD-ROM device to SP-C121 and insert the driver disk.
2. Enter the **Graphics** folder where the driver is located.
3. Click **igxpin.exe** file for driver installation.
4. Follow the on-screen instructions to complete the installation.
5. Once the installation is completed, shut down the system and restart SP-C121 for the changes to take effect.

4.5 Installing LAN Driver Utility

Enhanced with LAN function, SP-C121 supports various network adapters. To install the LAN Driver, follow the steps below:

1. Connect the USB DVD-ROM device to SP-C121 and insert the driver disk.
2. Enter the **LAN Chip** folder where the driver is located.
3. Click **prowinx64.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 SP-C121 for the changes to take effect.

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

4.6 Installing Sound Driver Utility

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

To install the Sound Driver, follow the steps below:

1. Connect the USB DVD-ROM device to SP-C121 and insert the driver disk.
2. Open the **Sound** 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 SP-C121 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 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:

- Accessing Setup Utilities
- Main Menu
- Advanced Menu
- Chipset Menu
- Security Menu
- Boot Menu
- Save & Exit Menu

5.1 Introduction

The board **BE-0981RB-R7N** uses an AMI (American Megatrends Incorporated) Aptio BIOS that is stored in the Serial Peripheral Interface Flash Memory (SPI Flash) and can be updated. The SPI Flash contains the built-in BIOS setup program, Power-On Self-Test (POST), PCI auto-configuration utility, LAN EEPROM information, and Plug and Play support.

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

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

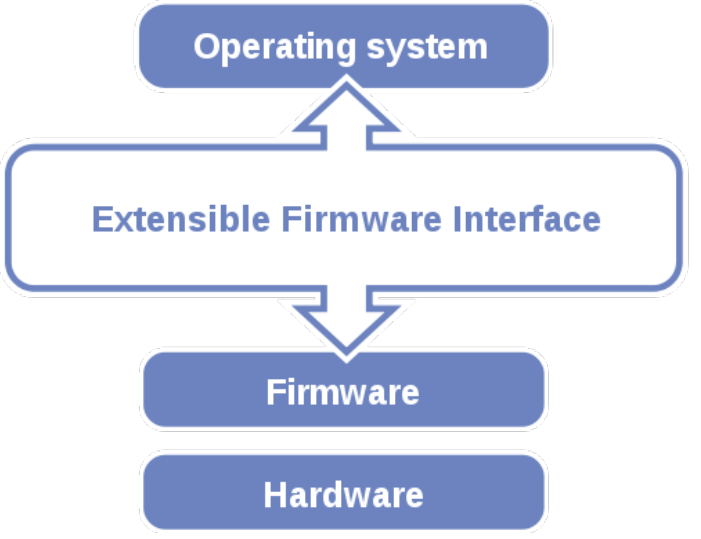


Figure 5-1. Extensible Firmware Interface Diagram

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

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

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

5.2 Accessing Setup Utility

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

Figure 5-2. POST Screen with AMI Logo

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

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.

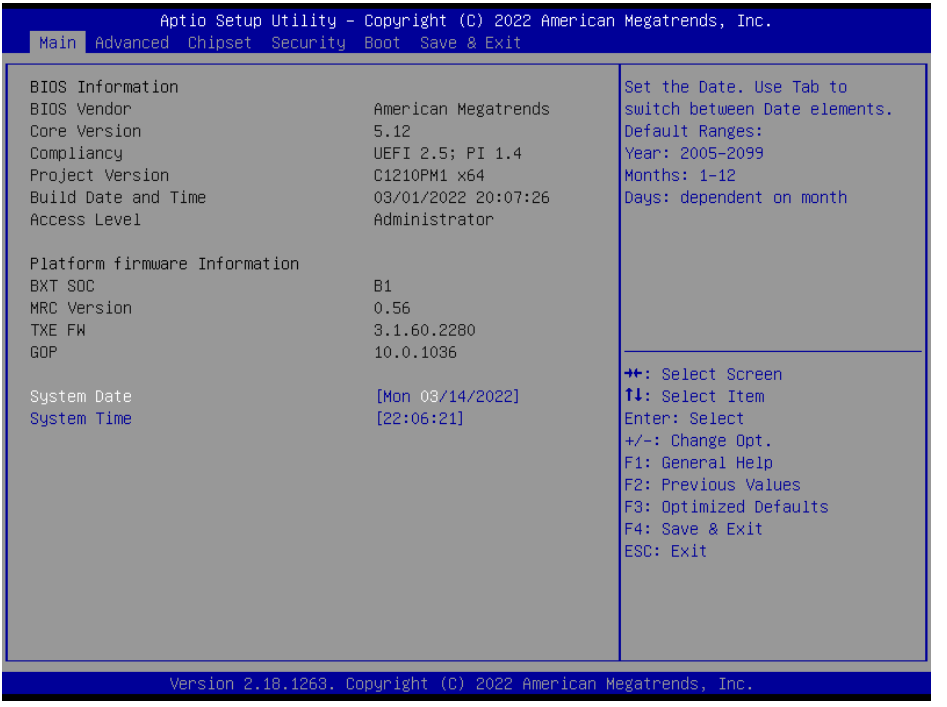
BIOS Setup Navigation Key	Description
<←> and <→>	Select a different menu screen (move the cursor from the selected menu to the left or right).
<↑> and <↓>	Select a different item (move the cursor from the selected item upwards or downwards)

BIOS Setup Navigation Key	Description
<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.



Main Screen

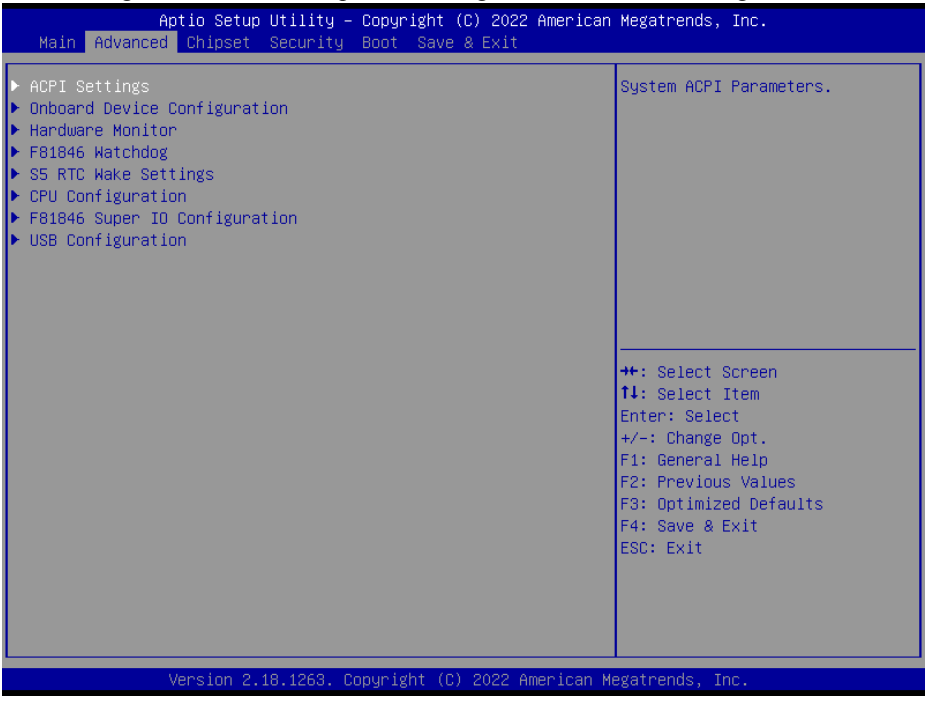
BIOS Setting	Options	Description/Purpose
BIOS Vendor	No changeable options	Displays the BIOS vendor.
Core Version	No changeable options	Displays the current BIOS core version.
Compliancy	No changeable options	Displays the current UEFI version.
Project Version	No changeable options	Displays the version of the BIOS currently installed on the platform.
Build Date and Time	No changeable options	Displays the date of current BIOS version is built.
Access Level	No changeable options	Displays the current access level.
BXT SOC	No changeable options	Displays the SOC stepping.
MRC Version	No changeable options	Displays the MRC version.
TXE FW	No changeable options	Displays the TXE FW version.

BIOS Setting	Options	Description/Purpose
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.
System Time	hour, minute, second	Sets the system time. The format is [Hour: Minute: Second]. Users can directly enter values or use <+> or <-> arrow keys to increase/decrease it.

5.4 Advanced

Menu Path *Advanced*

This menu provides advanced the sub-menu items such as ACPI Settings, Onboard Device Configuration, Hardware Monitor, F81846 Watchdog, S5 RTC Wake Settings, CPU Configuration, F81846 Super IO Configuration and USB Configuration.



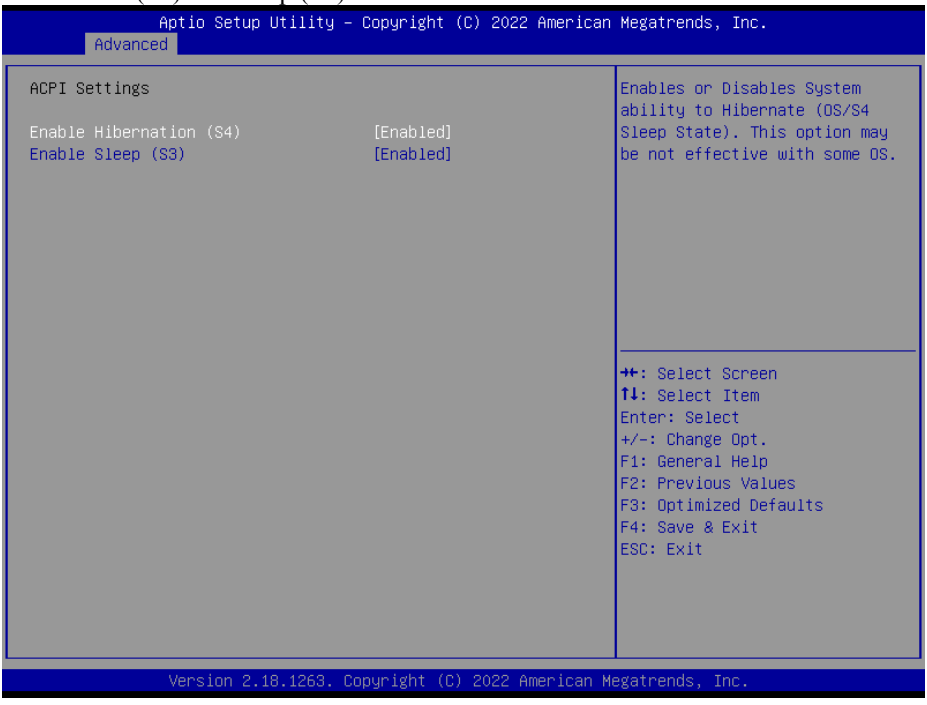
Advanced Menu Screen

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.
F81846 Watchdog	Sub-Menu	Watchdog timer parameters.
S5 RTC Wake Settings	Sub-Menu	RTC wake parameters.
CPU Configuration	Sub-Menu	CPU configuration parameters.
F81846 Super IO Configuration	Sub-Menu	System Super IO chip parameters
USB Configuration	Sub-Menu	USB configuration parameters.

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 enable/disable Hibernation (S4) and Sleep (S3).



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*

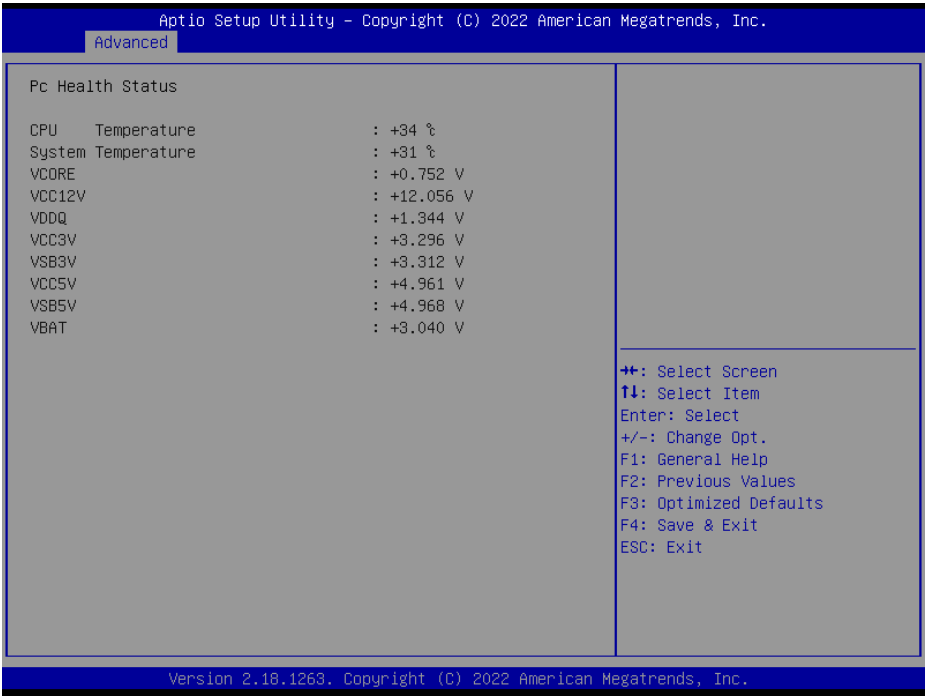
Onboard Device Configuration Screen

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 and voltage levels in supply.



Hardware Monitor Screen

BIOS Setting	Options	Description/Purpose
CPU Temperature	No changeable options	Displays processor's temperature.
System Temperature	No changeable options	Displays system's temperature.
VCORE	No changeable options	Displays the voltage level of the VCORE in supply.
VCC12V	No changeable options	Displays the voltage level of VCC12V in supply.
VDDQ	No changeable options	Displays the voltage level of VDDQ in supply.
VCC3V	No changeable options	Displays the voltage level of VCC3V in supply.
VSB3V	No changeable options	Displays the voltage level of VSB3V in supply.

BIOS Setting	Options	Description/Purpose
VCC5V	No changeable options	Displays the voltage level of VCC5V in supply.
VSB5V	No changeable options	Displays the voltage level of VSB5V in supply.
VBAT	No changeable options	Displays the voltage level of VBAT in supply.

5.4.4 Advanced – F81846 Watchdog

Menu Path *Advanced > F81846 Watchdog*

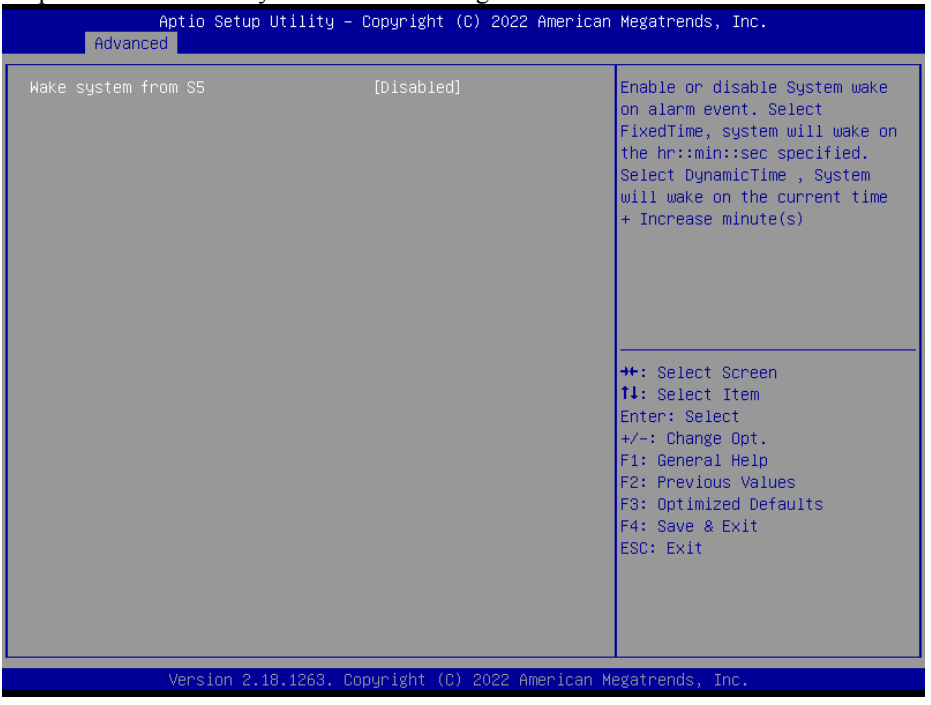
F81846 Watchdog Screen

BIOS Setting	Options	Description/Purpose
Enable Watchdog	- Disabled (default) - Enabled	F81846 Watchdog timer settings Enable/Disable
Watchdog Timer Count	Multiple options ranging from 10 to 255	Select count of 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 or unspecified time of a day from S5 State using RTC alarm.



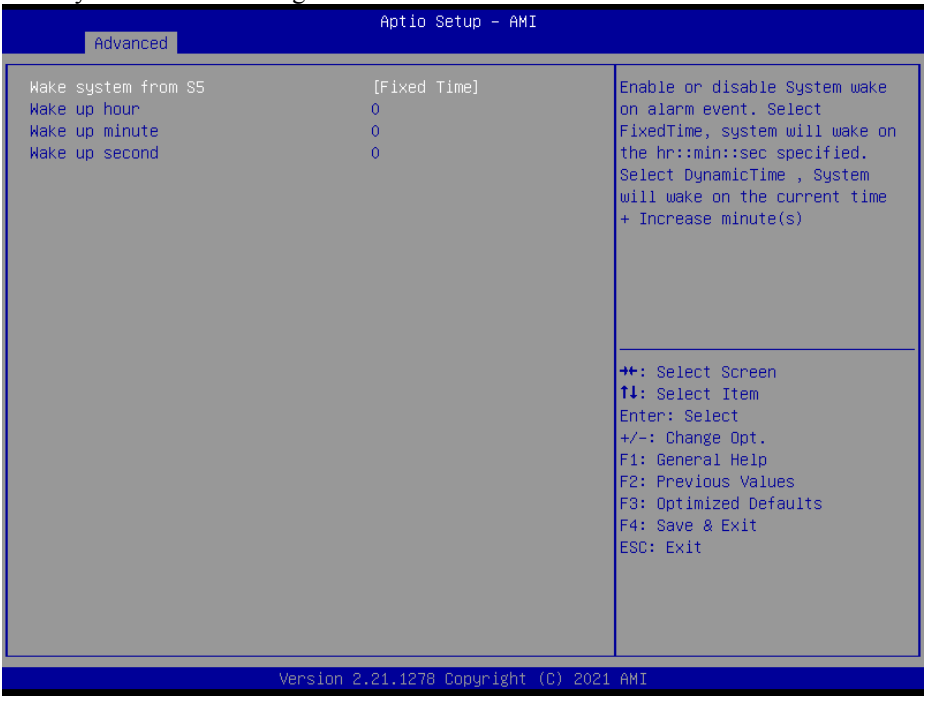
S5 RTC Wake Settings Screen

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled (default) - Fixed Time - Dynamic Time	Enable or disable System wake on alarm event. Select **Fixed Time**, system will wake on the hr::min::sec specified. Select **Dynamic Time** , System will wake on the current time + Increased minute(s)

5.4.5.1 Advanced – S5 RTC Wake Settings [Fixed Time]

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

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

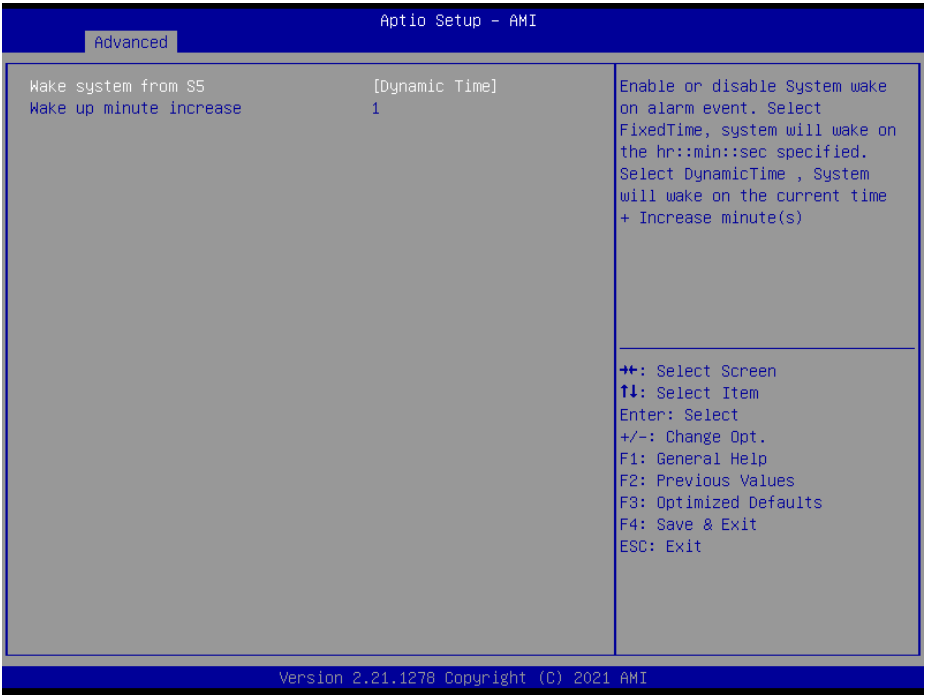


S5 RTC Wake Settings Screen[Fixed Time]

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

5.4.5.2 Advanced – S5 RTC Wake Settings [Dynamic Time]

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



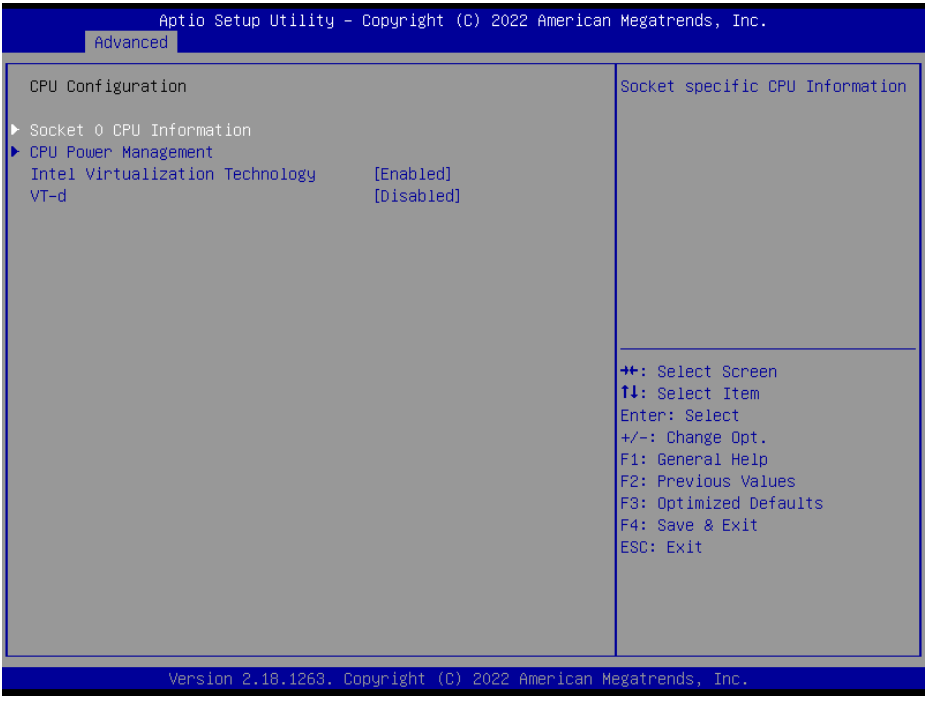
S5 RTC Wake Settings Screen[Dynamic Time]

BIOS Setting	Options	Description/Purpose
Wake system from S5	- Disabled (Default) - Fixed Time - Dynamic Time	Enables or disables System to wake on alarm events. • **Fixed Time:** The system will wake on the time (hr::min::sec) specified. • **Dynamic Time:** The system will wake on the current time + Increase minute(s).
Wake up minute increase	Numeric (from 1 to 5)	Enters **1-5** to set the increased minute(s) for dynamic wake-up time.

5.4.6 Advanced – CPU Configuration

Menu Path *Advanced > CPU Configuration*

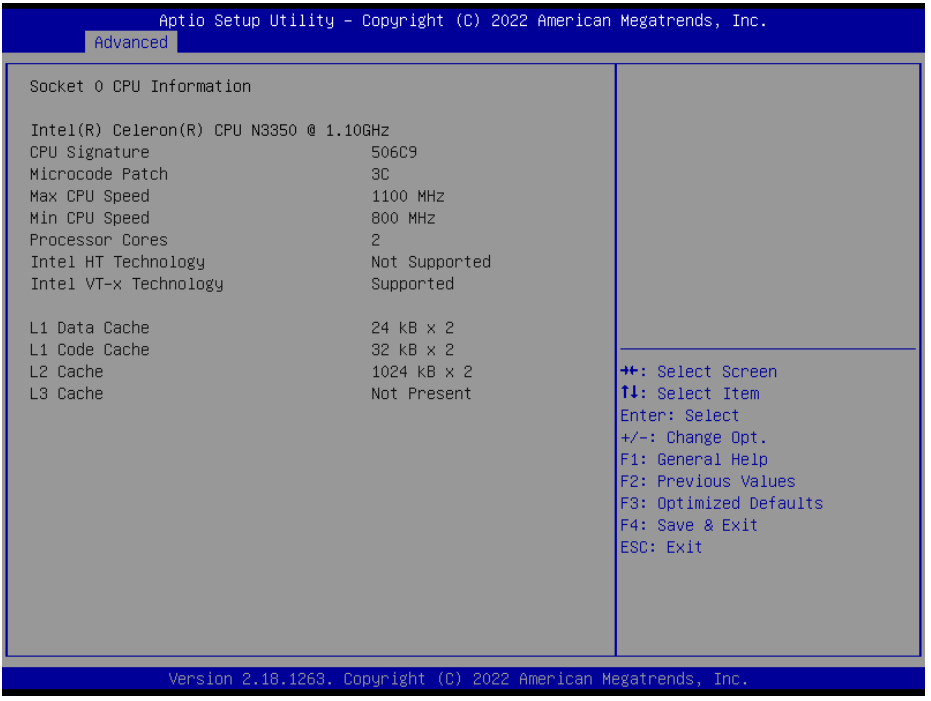
The **CPU Configuration** provides advanced CPU settings such as CPU power management and some information about CPU.



CPU Configuration Screen

BIOS Setting	Options	Description/Purpose
Socket 0 CPU Information	Sub-Menu	Socket 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.

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

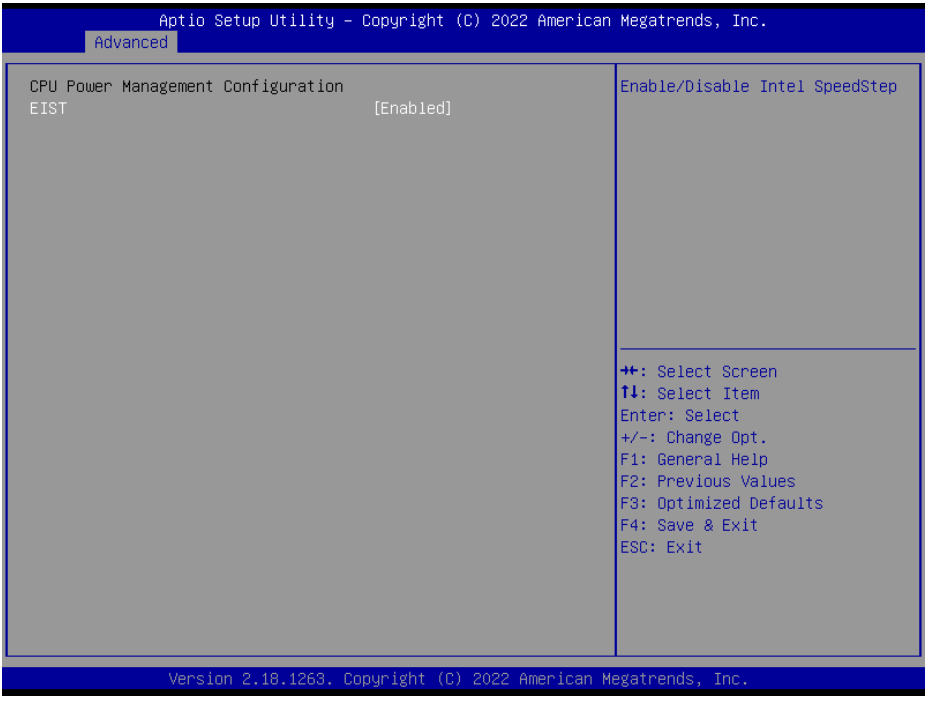


Socket 0 CPU Information Screen

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

BIOS Setting	Options	Description/Purpose
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.

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

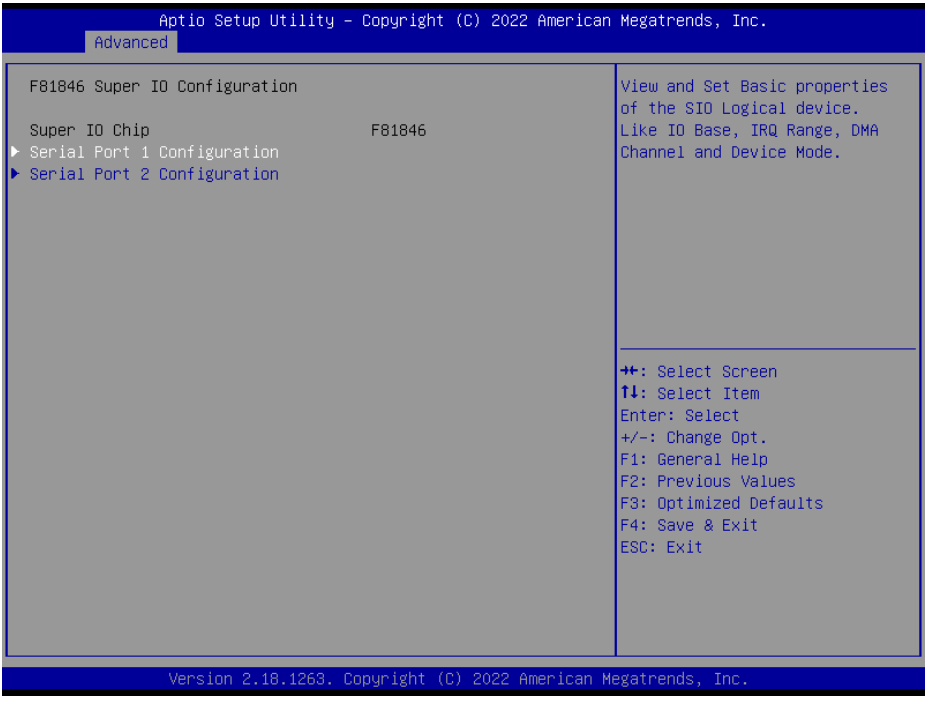


CPU Power Management Configuration Screen

BIOS Setting	Options	Description/Purpose
EIST	- Disabled - Enabled (default)	Enable/Disable Intel Speed Step feature for dynamic scaling processor frequency.

5.4.7 Advanced – F81846 Super IO Configuration

Menu Path *Advanced > F81846 Super IO Configuration*

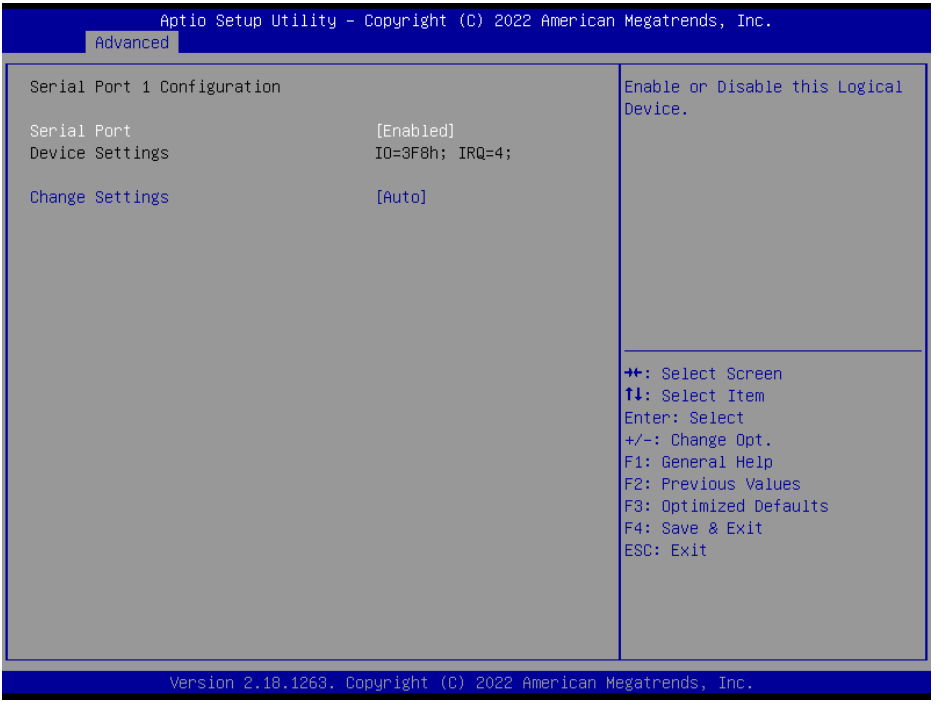


F81846 Super IO Configuration Screen

BIOS Setting	Options	Description/Purpose
Super IO Chip (F81846)	No changeable options	Displays the Super IO chip model.
Serial Port 1 Configuration	Sub-Menu	COM1 parameters.
Serial Port 2 Configuration	Sub-Menu	COM2 parameters.

5.4.7.1 F81846 Super IO Configuration – Serial Port 1 Configuration

Menu Path *Advanced > F81846 Super IO Configuration > Serial Port 1 Configuration*

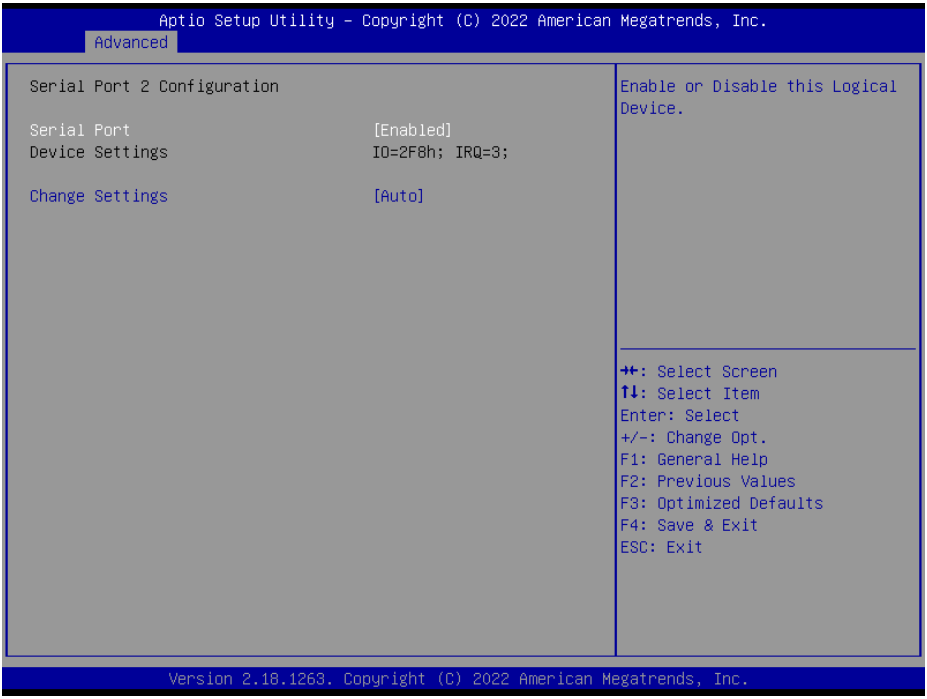


Serial Port 1 Configuration Screen

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 user to change Device's Resource settings. New settings will be reflected on this Setup Page after System restarts.

5.4.7.2 F81846 Super IO Configuration – Serial Port 2 Configuration

Menu Path *Advanced > F81846 Super IO Configuration > Serial Port 2 Configuration*



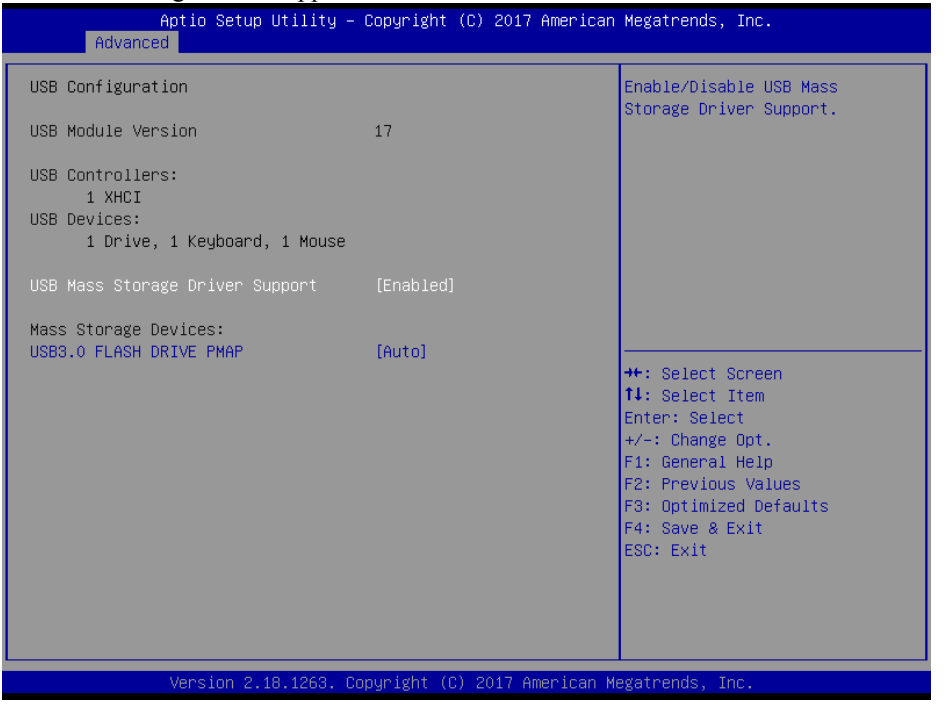
Serial Port 2 Configuration Screen

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 user 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.



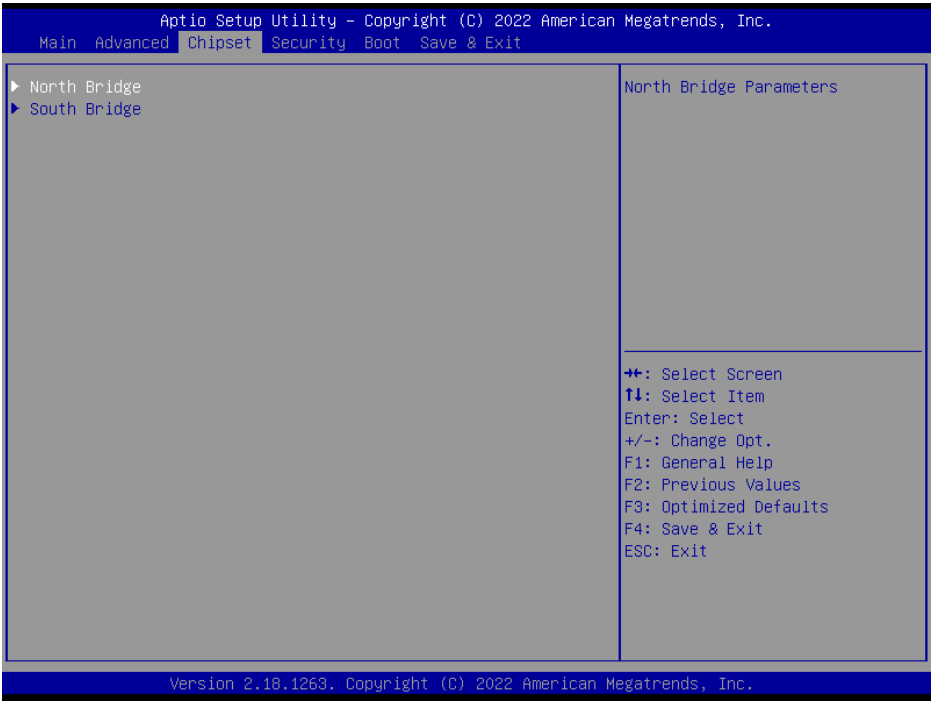
USB Configuration Screen

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)	Enable/ Disable 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.

5.5 Chipset

Menu Path *Chipset*

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

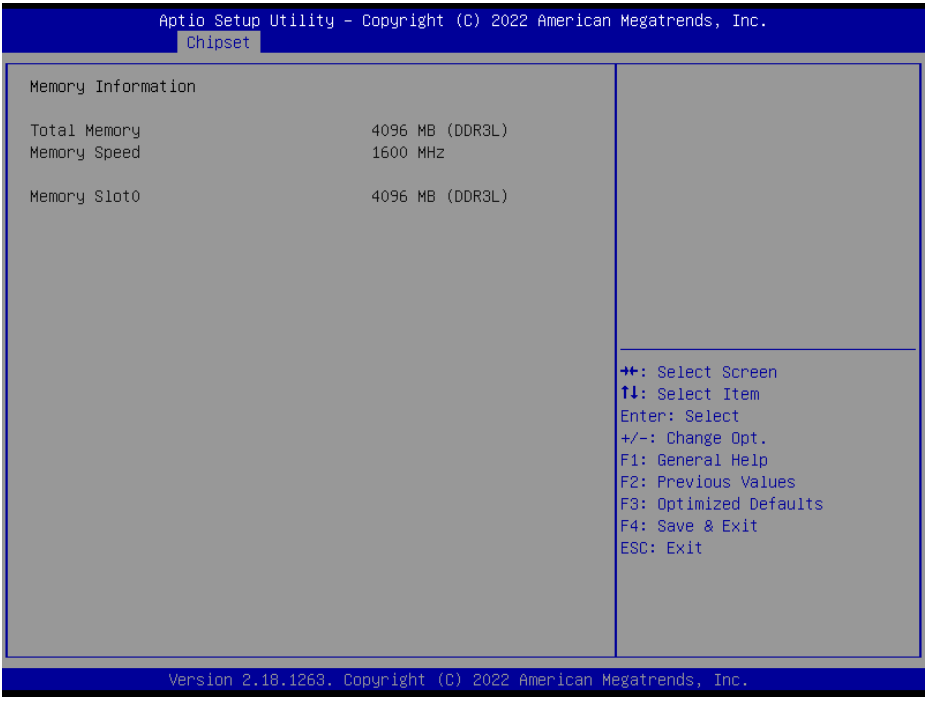


Chipset Screen

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*

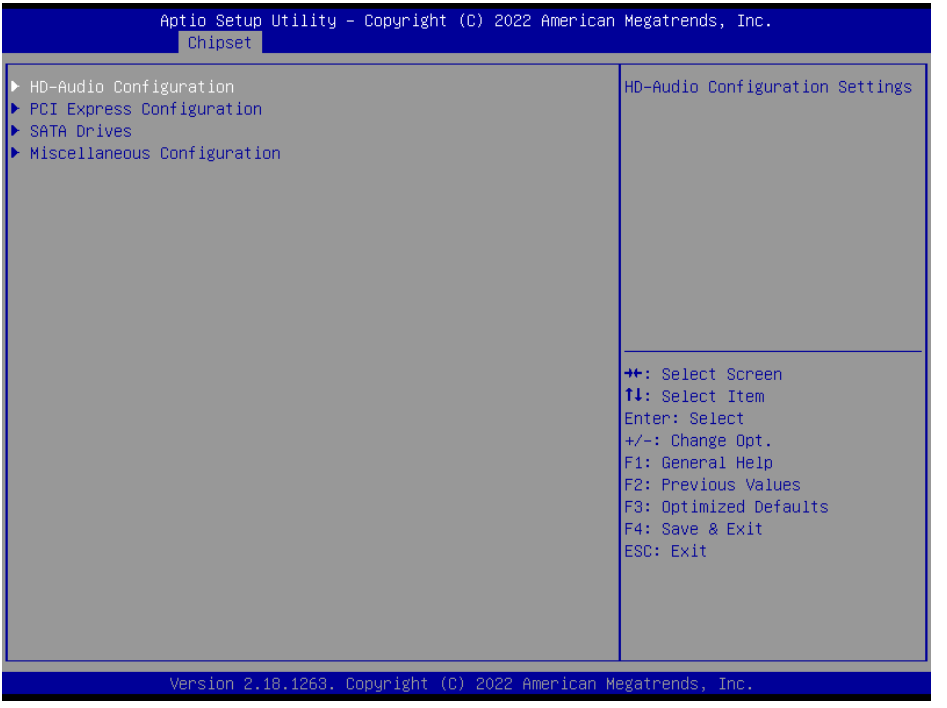


North Bridge Screen

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*

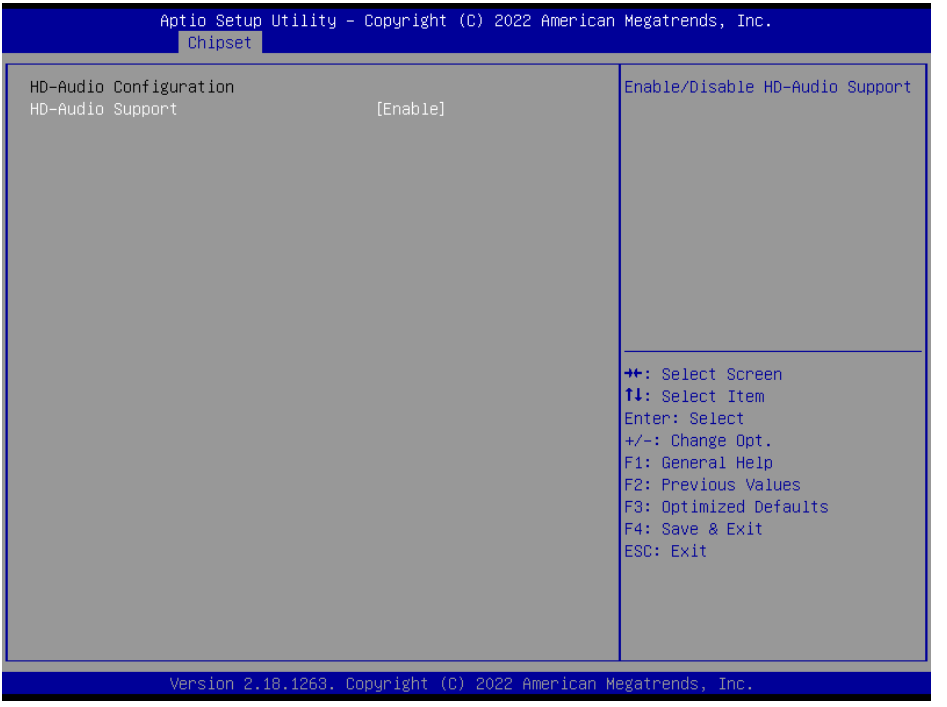


South Bridge Screen

BIOS Setting	Options	Description/Purpose
HD-Audio Configuration	Sub-Menu	HD-Audio 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*



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 – PCI Express Configuration

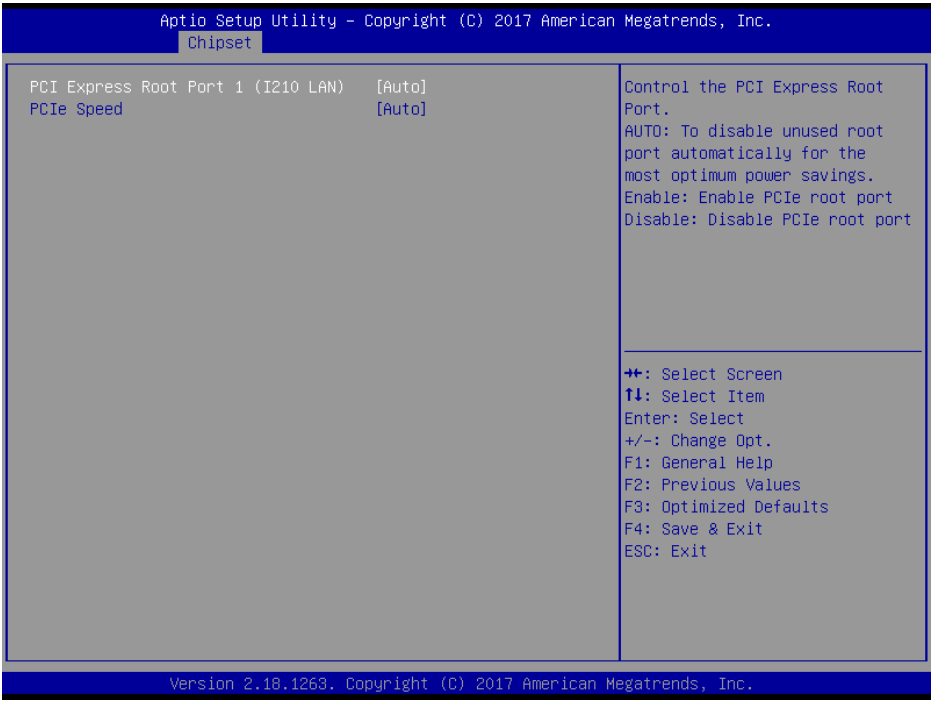
Menu Path *Chipset > South Bridge > PCI Express Configuration*

PCI Express Configuration Screen

BIOS Setting	Options	Description/Purpose
PCI E Express Root Port 1 (I210 LAN)	Sub-Menu	PCIE RP1 parameters (I210 LAN).

Chipset – 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)*

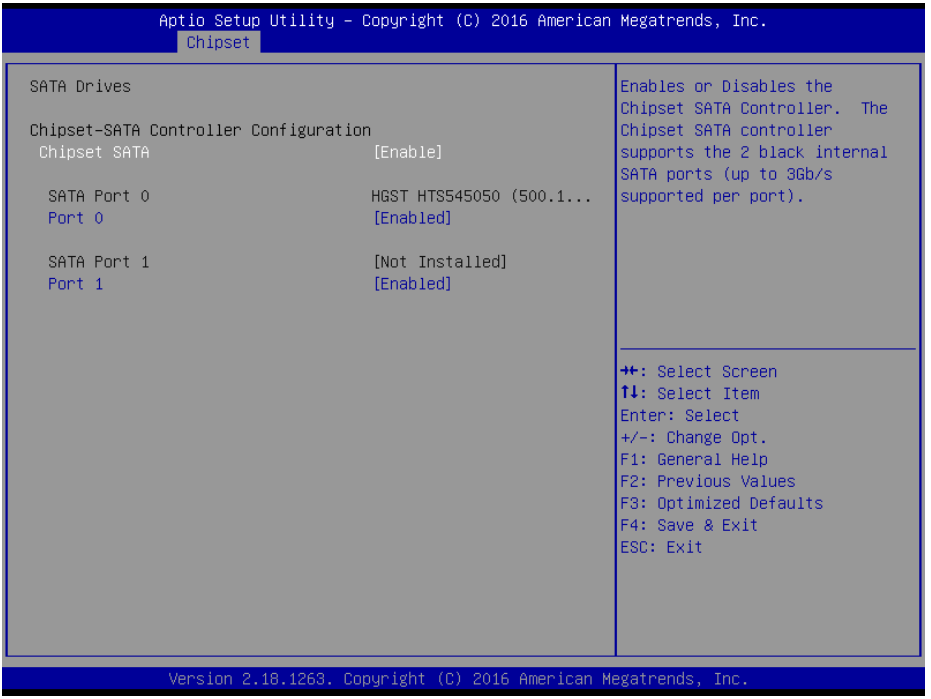


PCI Express Root Port 1 (I210 LAN) Screen

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

5.5.2.3 South Bridge – SATA Drives

Menu Path *Chipset > South Bridge > SATA Drives*

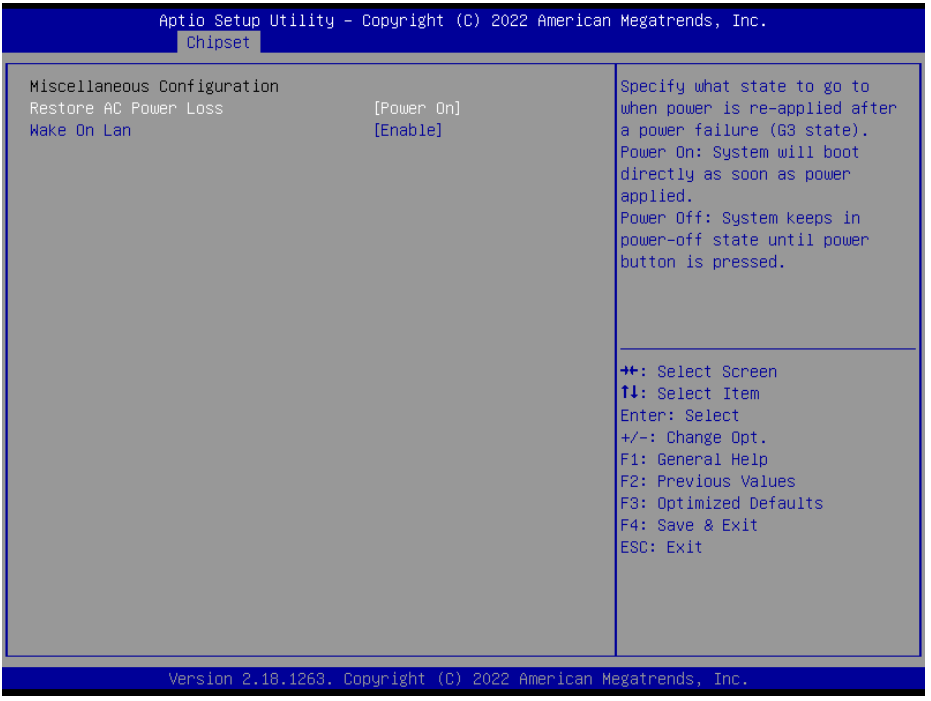


SATA Drives Screen

BIOS Setting	Options	Description/Purpose
Chipset SATA	- Enable (default) - Disable	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.

5.5.2.4 South Bridge – Miscellaneous Configuration

Menu Path *Chipset > South Bridge > Miscellaneous Configuration*



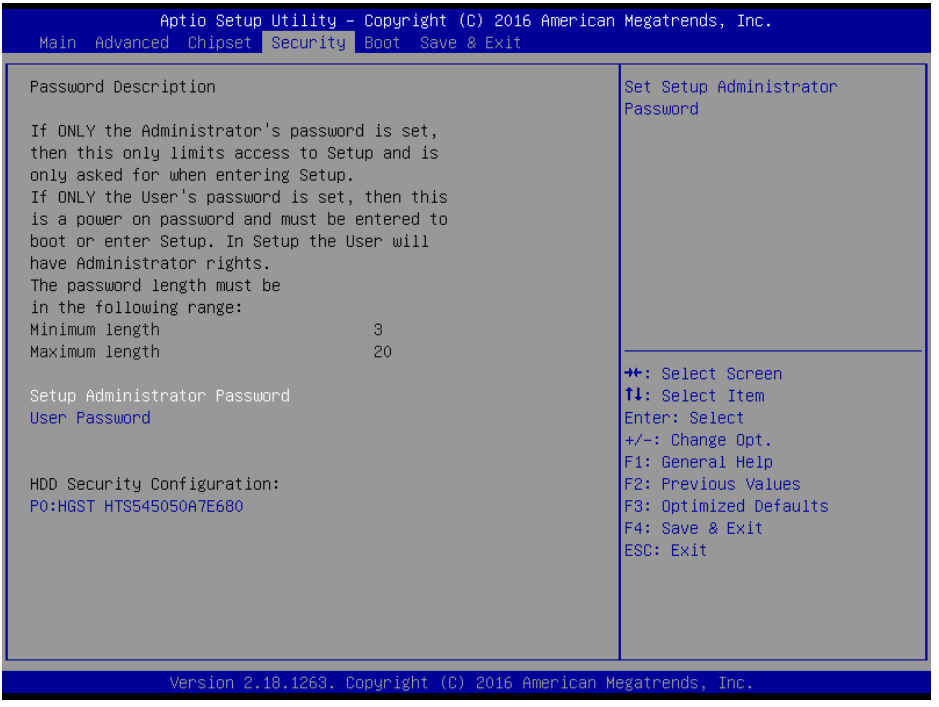
Miscellaneous Configuration Screen

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. Win 8/8.1/10 don't support WOL from hybrid shutdown state (S4). If user needs 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.



Security Screen

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

Create an Administrator or User Password

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

Change an Administrator or User Password

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

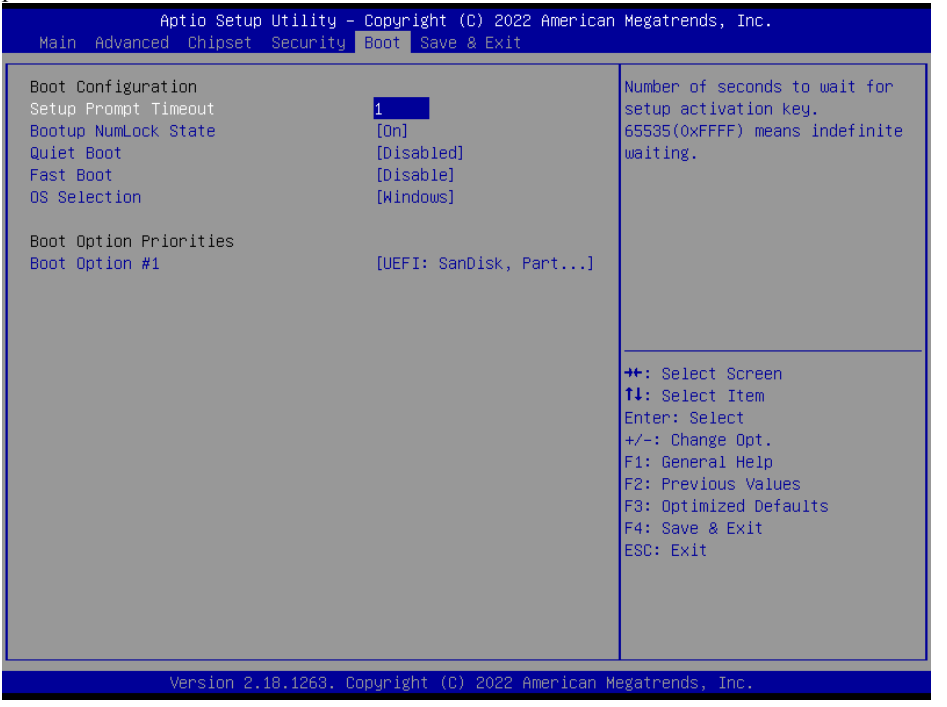
Remove an Administrator or User Password

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

5.7 Boot

Menu Path *Boot*

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



Boot Screen

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

5.8 Save & Exit

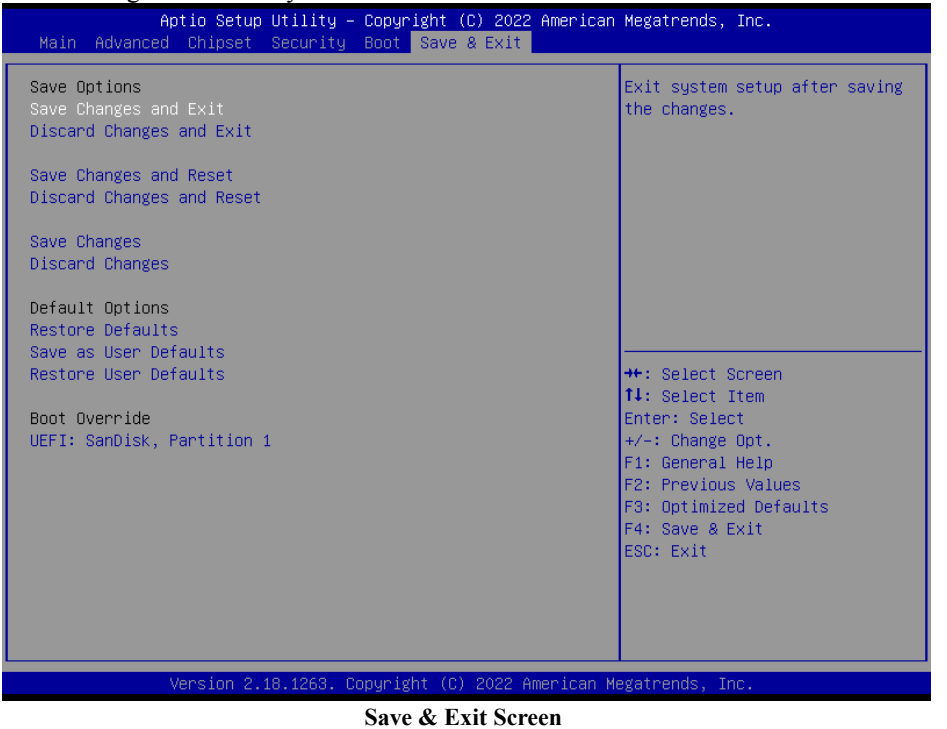
Menu Path	*Save & Exit*

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.



Save & Exit Screen

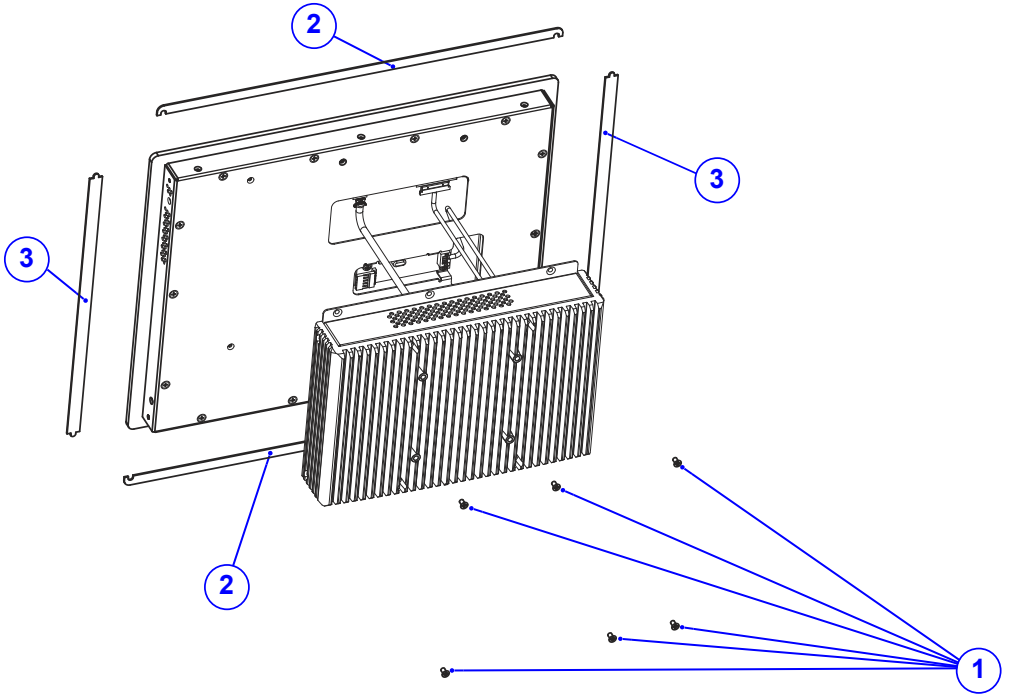
BIOS Setting	Options	Description/Purpose
Save Changes and Exit	No changeable options	Exits and saves the changes in NVRAM.
Discard Changes and Exit	No changeable options	Exits without saving any changes made in BIOS settings.
Save Changes and Reset	No changeable options	Saves the changes in NVRAM and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

Appendix A System Diagrams

This appendix includes the exploded diagrams of the system and the parts list as well as the part numbers of the SP-C121 system.

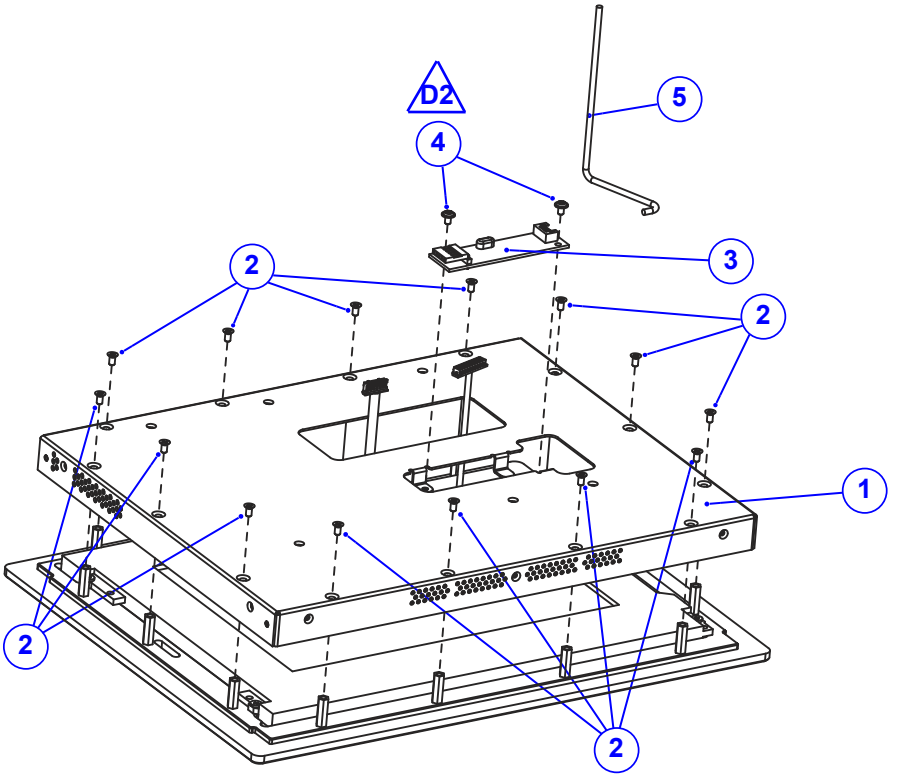
- SP-C121 System Assembly Exploded Diagrams
- SP-C121 Box PC Assembly Exploded Diagrams

SP-C121 System Assembly Exploded Diagram (1)



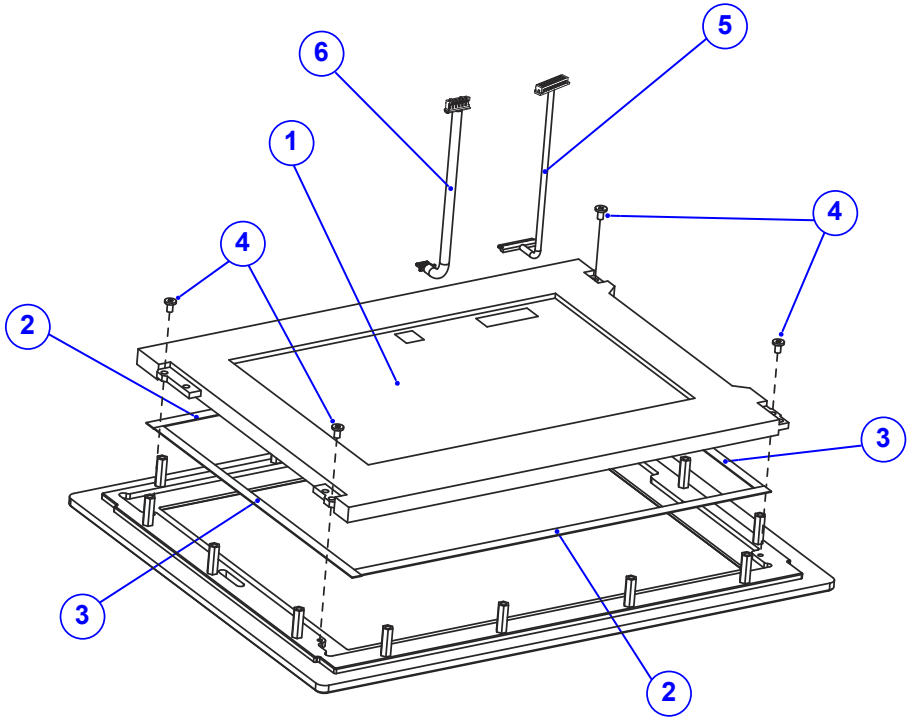
No.	Component Name	Part No.	Q'ty
1	Flat Head Screw M3x0.5Px6mm (Black)	22-215-30060011	6
2	SP-6132 TB CR (323x8x1mm)	30-013-24200309	2
3	SP-6132 LR CR (235.9x10x1mm)	30-013-24100309	2

SP-C121 System Assembly Exploded Diagram (2)



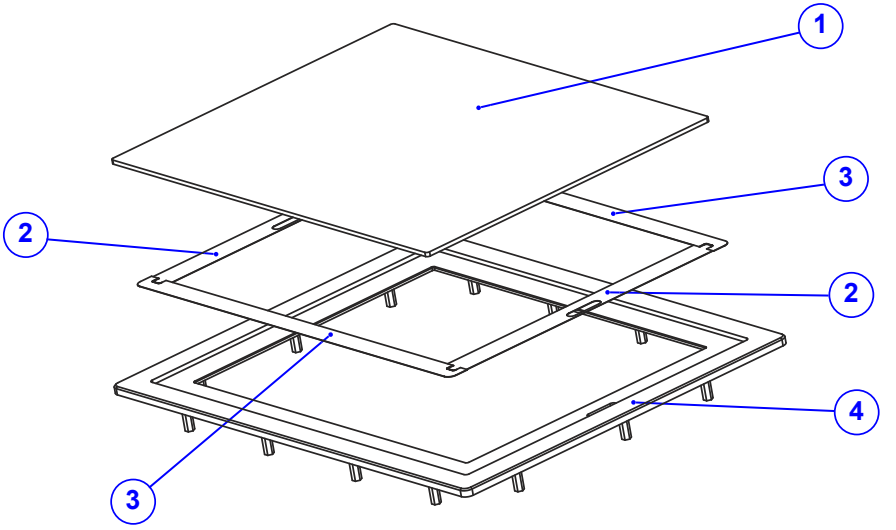
No.	Component Name	Part No.	Q'ty
1	SP-C121 LCD Cover (w/Paint)(Black)	20-104-03061518	1
2	Flat Head Screw M3x0.5Px6mm(Black)	22-215-30060011	14
3	Touch control board for 5-wire,USB interface	52-370-01040504	1
4	Round Washer Head Screw M3x0.5Px5mm	22-242-30005311	2
5	USB Touch Board Cable (5F/P2.0/TIN to 10F/P2.0/TIN) L=300mm	27-016-51806111	1

SP-C121 System Assembly Exploded Diagram (3)



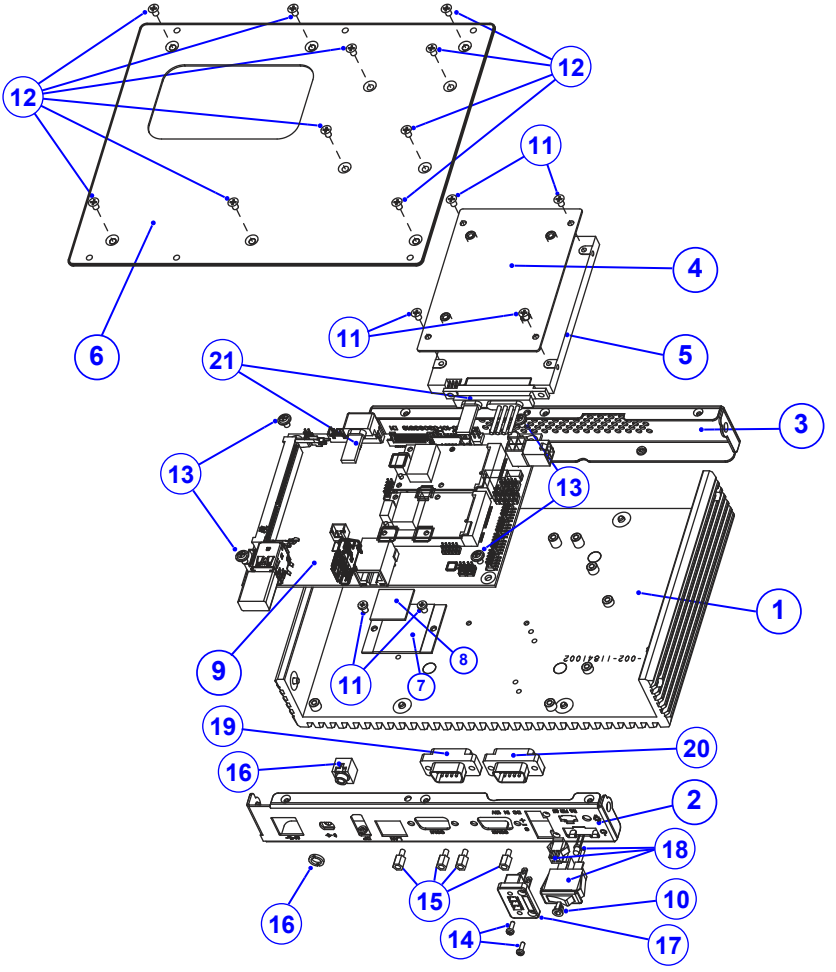
No.	Component Name	Part No.	Q'ty
1	12.1" TFT LCD Panel (LED Backlight), 500nits, XGA (1024x768)	52-351-02121402	1
2	SP-6118 Poron Sponge (257x7x0.5mm)	90-013-24400264	2
3	SP-6118 Poron Sponge (197x6x0.5mm)	90-013-24300264	2
4	Fillister Head Screw #1/M3x0.5Px6mm	22-272-30006011	4
5	LVDS Cable for G121XN01_V0 (30F /P1.25/TIN to 20F/P1.25/TIN) L=300mm	27-020-51806111	1
6	BS-E098 Inverter Cable for AUO 12.1" (5p to 5p) L=310mm	27-015-39505111	1

A-SP-C121 System Assembly Exploded Diagram (4)



No.	Component Name	Part No.	Q'ty
1	12.1" AccuTouch 5-wire Resistive Touch Panel	52-380-02010701	1
2	SP-6132 LR Double Faced Adhesive Tape (193mmx17.4mm)	94-026-04901309	2
3	SP-6132 TB Double Faced Adhesive Tape (288.2mmx13.7mm)	94-026-04902309	2
4	SP-6132 Front Panel	20-003-01091309	1

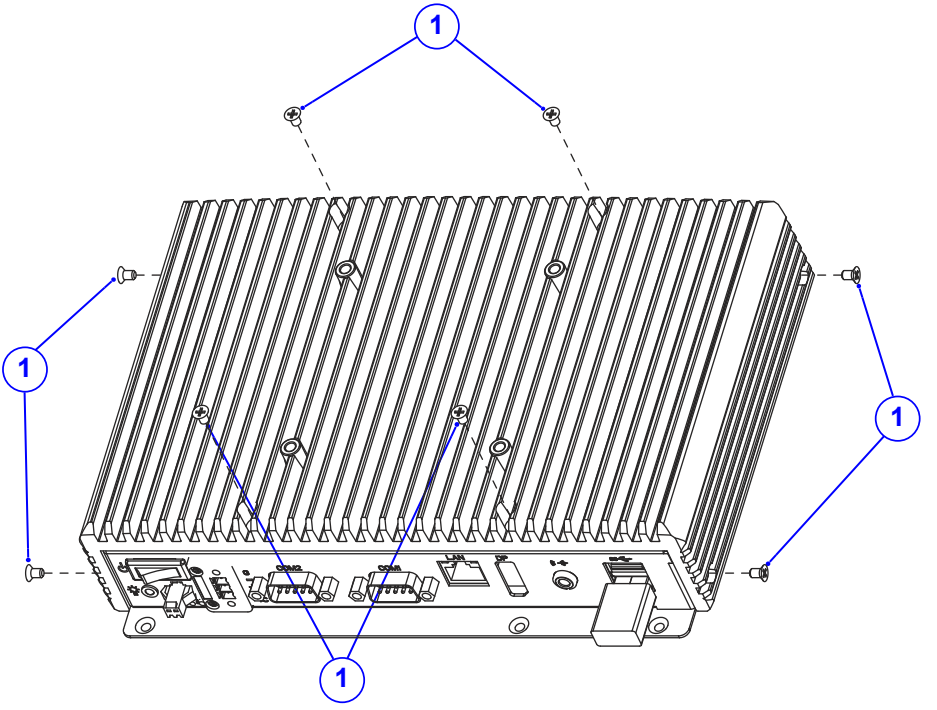
SP-C121 Box PC Assembly Exploded Diagram (1)



(The information of the part no. shown above are provided on the next page.)

No.	Component Name	Part No.	Q'ty
1	BS-E097 Heatsink Case (Black) (217.5x140.6x46mm)	81-002-11841007	1
2	SP-C121 Back Case-BE-0981 (w/Paint) (Black)	20-101-03061518	1
3	SP-C121 Front Case-BE-0981 (w/Paint) (Black)	20-101-03063518	1
4	BS-E097 HDD Plate Holder Kit	20-229-03001416	1
5	2.5 SATA HDD	N/A	1
6	SP-C121 BOT Case Type (w/Paint)(Black)	20-101-03062518	1
7	BS-E098 U32 Block (40x27x2.4mm)	21-002-14027002	1
8	Thermal Interface Pads, K=8,15x15x1mm (Purple)	81-006-81515501	1
9	PCBA: BE-0981	BE-0981RB-R7N	1
10	PS-3100 LED Housing (Black)	30-014-04100165	1
11	Fillister Head Screw #1/M3x0.5Px4mm	22-272-30004011	6
12	Flat Head Screw M3x0.5Px6mm (Black)	22-215-30060011	10
13	Round Washer Head Screw M3x0.5Px5mm	22-242-30005311	4
14	Pan Head Screw M2.0x0.4Px6mm	22-222-20060011	2
15	HEX CU BOSS UNC No.4-40,L=4.8,H=7mm	22-692-40048051	4
16	BS-E098 Audio Jack Cable (2.6mm(F) to 10P(F)) L=130mm	27-028-39503111	1
17	BS-E098 Power Cable (DC-IN) L=150mm	27-012-39503071	1
18	Power Button And Led Cable (5F/P2.5/TIN to 2F/P2.5/TIN+SW+LED/G φ 3) L=150mm	27-019-41603072	1
19	BS-E098 COM Port Cable (9M to 10F) (Black) L=220mm	27-024-39505031	1
20	BS-E098 RS422/485 Cable (9M to 10F) (blue) L=220mm	27-024-39505032	1
21	BS-E098 SATA HDD & Power Cable L=150mm	27-008-39503081	1

SP-C121 Box PC Assembly Exploded Diagram (2)



No.	Component Name	Part No.	Q'ty
1	Flat Head Screw M3x0.5Px6mm (Black)	22-215-30060011	8

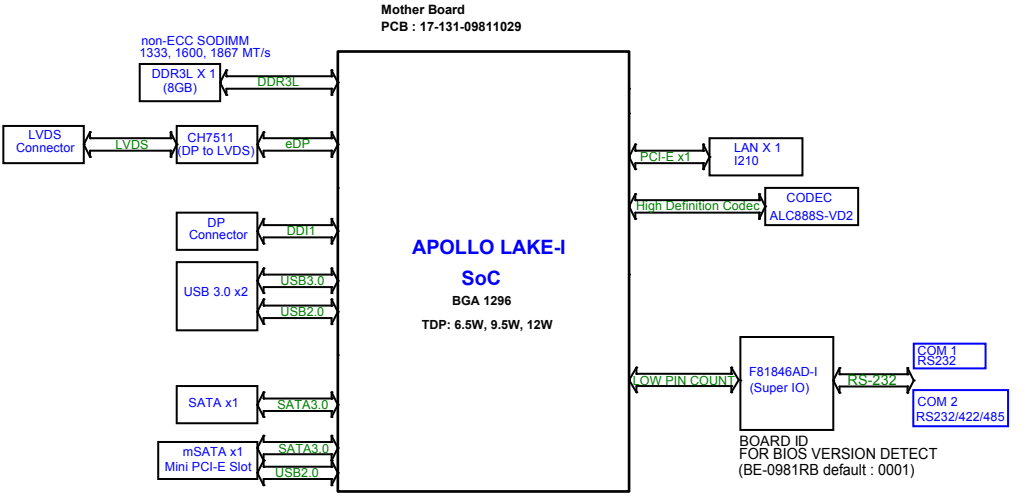
Appendix B Technical Summary

This appendix will give you a brief introduction of the allocation maps for the system resources.

The following topics are included:

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

Block Diagram



Interrupt Map

IRQ	Assignment
IRQ 0	System timer
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 8	System CMOS/real time clock
IRQ 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
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IRQ	Assignment
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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 4294967289	Intel(R) I210 Gigabit Network Connection
IRQ 4294967290	Intel(R) HD Graphics
IRQ 4294967291	Intel(R) Trusted Execution Engine Interface
IRQ 4294967292	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
IRQ 4294967293	Standard SATA AHCI Controller
IRQ 4294967294	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8

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

I/O MAP

I/O Map	Assignment
0x00000000-0x0000006F	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
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003F8-0x000003FF	Communications Port (COM1)
0x00000400-0x0000047F	Motherboard resources
0x000004D0-0x000004D1	Programmable interrupt controller
0x00000500-0x000005FE	Motherboard resources
0x00000600-0x0000061F	Motherboard resources
0x00000680-0x0000069F	Motherboard resources

I/O Map	Assignment
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x0000164E-0x0000164F	Motherboard resources
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
0x91210000-0x91213FFF	High Definition Audio Controller
0x91000000-0x910FFFFF	High Definition Audio Controller
0x91316000-0x913160FF	Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4
0xFED00000-0xFED003FF	High precision event timer
0x91200000-0x9120FFFF	Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
0x90000000-0x90FFFFFF	Intel(R) HD Graphics
0x80000000-0x8FFFFFFF	Intel(R) HD Graphics
0x80000000-0x8FFFFFFF	PCI Express Root Complex
0x91100000-0x911FFFFF	Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8

Memory Map	Assignment
0x9121B000-0x9121BFFF	Intel(R) Trusted Execution Engine Interface
0x91180000-0x911FFFFF	Intel(R) I210 Gigabit Network Connection
0x9117C000-0x9117FFFF	Intel(R) I210 Gigabit Network Connection
0x91214000-0x91215FFF	Standard SATA AHCI Controller
0x91218000-0x912180FF	Standard SATA AHCI Controller
0x91217000-0x912177FF	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 F81846 configuration registers, the following configuration sequence must be followed:

(1) Enter the extended function mode

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

(2) Configure the configuration registers

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

(3) Exit the extended function mode

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

Code example for watch dog timer

Enable watchdog timer and set timeout interval to 30 seconds.

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

Flash BIOS Update

I. Prerequisites

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

2 Download and save the BIOS file (e.g. C1210PM1.bin) to the storage device.

3 Copy AMI flash utility – AfuEfix64.efi (v5.12.02.2028) into bootable device.

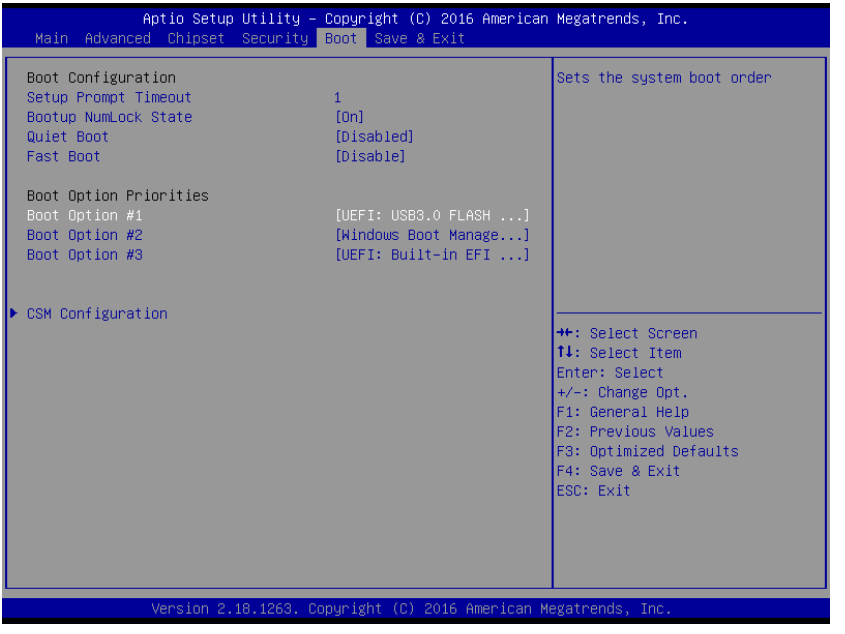
4 Make sure the targeted system can first boot to the EFI shell environment.

(1) Connect the bootable USB device.

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

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

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



II. AFUDOS Command for System BIOS Update

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

AFUEFIx64 <ROM File Name> [option1] [option2]….

Users can type "AFUEFIx64 /?" to view the definition of each control option. The recommended options for BIOS ROM update include the following parameters:

/P: Program main BIOS image.

/B: Program Boot Block.

/N: Program NVRAM.

/X: Don't check ROM ID.

III. BIOS Update Procedure

1. Use the bootable USB storage to boot up system into the EFI Shell.
2. Type "**AfuEfix64 C121xxxx.bin /p /n /x"** and press enter to start the flash procedure. (xxxx means the BIOS revision part, e.g. 0PM1…)
3. During the update procedure, you will see the BIOS update process status and the percentage it has been updated. **Beware!** Do not turn off system power or reset your computer if the whole update procedure is not completed yet, or it may crash the BIOS ROM and the system will be unable to boot up next time.

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

```
fs0:\> AfuEfix64 C1210PM1.bin /p /n /x

+-------------------------------------------------------------------+
|             AMI Firmware Update Utility v5.12.02.2028             |
|                       APL FaultTolerance Mode                     |
|   Copyright (C) 1985-2019, American Megatrends International LLC. |
|      All rights reserved. Subject to AMI licensing agreement.     |
+-------------------------------------------------------------------+
Reading flash ..... done
- FFS checksums ..... ok
- Check RomLayout ..... ok.
- Fault Tolerance Flash Support Enable.
Fault Tolerance Backup ..... done
Erasing AplFt Block ..... done
Updating AplFt Block ..... done
Verifying AplFt 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 configuration.

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.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BIOS Date: 10/26/2021 10:18:12 Ver: C1210PM1
Press <DEL> or <ESC> to enter setup.