

USER MANUAL

BM-0982

Thin Mini-ITX Intel®
Pentium® N4200 / Celeron®
J3455 / Celeron® N3350
Embedded SoC

BM-0982 M1

BM-0982

Thin Mini-ITX Intel[®] Pentium[®] N4200 / Celeron[®] J3455 / Celeron[®] N3350 Embedded SoC

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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.

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1 Introduction

This chapter provides the introduction for the BM-0982 system as well as the framework of the user manual.

The following topics are included:

- About This Manual

1.1 About This Manual

Thank you for purchasing our BM-0982 system. The BM-0982 provides faster processing speed, greater expandability and can handle more tasks than before. This manual is designed to assist you how to install and set up the whole system. It contains 5 chapters and 1 appendix. Users can configure the system according to their own needs. This user manual is intended for service personnel with strong hardware background. It is not intended for general users.

The following section outlines the structure of this user manual.

Chapter 1 Introduction

This chapter provides the introduction for the BM-0982 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 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, Intel Trusted Execution Engine Driver Utility, LAN Driver Utility, Sound Driver Utility, Serial IO 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 information about the allocation maps for the system block diagram, system resources, Watchdog Timer Configuration and Flash BIOS Update.

2 Getting Started

This chapter provides the information for the BM-0982 system. It describes the package contents and outlines the system specifications.

The following topics are included:

- Package List
- System Specification
- Safety Precautions

Experienced users can go to [Chapter 3 System Configuration](#) on page 3-1 for a quick start.

2.1 Packing List

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

| Item | Q'ty |
|-----------------------|-------------|
| BM-0982 | 1 |
| Quick Reference Guide | 1 |
| Manual / Driver DVD | 1 |
| Mini Jumper (2.0 mm) | 5 |
| SATA Cable (170mm) | 2 |
| I/O Shield | 1 |

2.2 BM-0982 Specifications

| System | |
|------------------------|---|
| CPU | <ul style="list-style-type: none"> ➤ Intel® Pentium® CPU N4200, 1.1GHz, 4 Cores, 6W ➤ Intel® Celeron® CPU J3455, 1.5GHz, 4 Cores, 10W ➤ Intel® Celeron® CPU N3350, 1.1GHz, 2 Cores, 6W |
| Memory Support | <ul style="list-style-type: none"> ➤ 2 x DDR3L 1600/1866MHz SO-DIMM sockets (up to 8GB) |
| Power Supply | <ul style="list-style-type: none"> ➤ 1 x External DC jack ➤ 1 x Internal 4-pin (2x2) power connector ➤ Wide voltage range 12~24V DC input ➤ Supports AT / ATX mode |
| Expansion Slots | <ul style="list-style-type: none"> ➤ 1x half-sized mini PCIe slot (with USB signal) ➤ 1x M.2 slot for 2242 device (M-Key, for SSD), shared SATA signal with 2nd SATA port, switch SATA signal by jumper. |
| SATA | <ul style="list-style-type: none"> ➤ 2 x SATAIII (6.0Gb/s) ➤ 2nd SATA port is shared SATA signal with M.2 slot, switch SATA signal by jumper |
| O.S. Support | <ul style="list-style-type: none"> ➤ Windows® 10 64bit |
| Dimensions | <ul style="list-style-type: none"> ➤ 170 x 170mm (mini ITX form factor) |
| Certificate | <ul style="list-style-type: none"> ➤ FCC / CE |
| I/O Ports | |
| USB | 6 Ports: <ul style="list-style-type: none"> ➤ 4 x USB 3.0 (Rear I/O) ➤ 2 x USB 2.0 (Internal) |
| Display | <ul style="list-style-type: none"> ➤ 1 x DP / HDMI Combo (rear I/O) ➤ 1 x LVDS (internal I/O) ➤ Optional: 2nd LVDS port (internal I/O), must remove VGA connector and have another I/O shield. ➤ Support triple independent displays. |
| Audio | <ul style="list-style-type: none"> ➤ 1 x Mic In, 1 x Line In, 1 x Line Out (Rear I/O) ➤ 1 x Mic In, 1 x Line Out (internal) |
| LAN | <ul style="list-style-type: none"> ➤ 2 x GbE LANs, Wake-on-LAN (Rear I/O) ➤ LAN1: Intel® I211 AT / LAN2: Intel® I211 AT |
| Serial Ports | 6 ports: <ul style="list-style-type: none"> ➤ COM 1/2: RS-232 / 422 / 485 & support RI / 5V / 12V selected under BIOS (Rear I/O) ➤ COM 3~6: RS-232 (pin header) |
| DIO Port | <ul style="list-style-type: none"> ➤ 8bit GPIO: 4in / 4out (pin header) |

| | |
|------------------------|---|
| Expansion Slots | ➤ 1 x PCIe (x1) ➤ 1 x Half-sized mini PCIe (with USB signal) |
| LPC | ➤ Pin header, support TPM 2.0 module |
| Keyboard/ Mouse | ➤ 2 x PS/2 (rear I/O) |
| Environment | |
| Operating Temp. | ➤ 0°C ~ 60°C (32°F ~ 140°F) |
| Storage Temp. | ➤ -40° C ~ 80° C (-4°F ~ 176°F) |
| Humidity | ➤ 20%~ 90% (68°F ~ 194°F) |

2.3 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 the power supply should be within the range of 100V to 240V AC; otherwise the system may be damaged.
2. Environmental Conditions
 - Place your BM-0982 on a sturdy, level surface. Be sure to allow enough space around the system to have easy access needs.
 - Avoid installing your BM-0982 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 BM-0982 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 BM-0982 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 **Hardware Configuration**

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

The following sections are included:

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

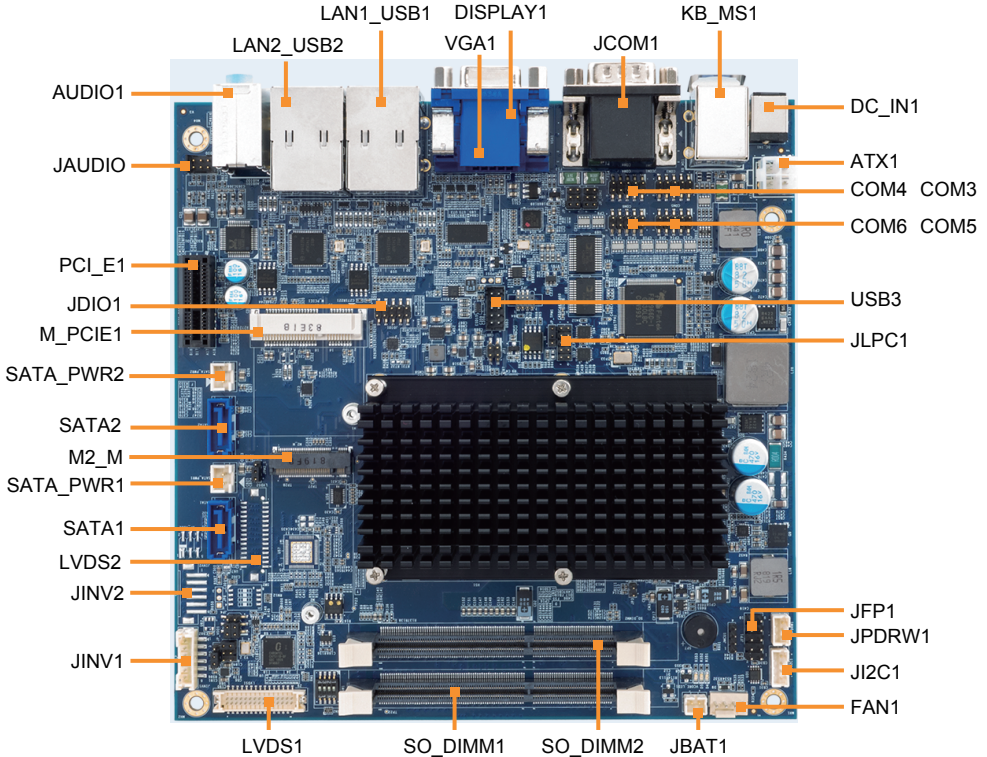
3.1 Jumper & Connector Quick Reference Table



| JUMPER Description | NAME |
|--|------------------|
| COM1 and COM2 Pin9 RI / 5V / 12V Selection | JP_COM1, JP_COM2 |
| TPM Module Selection | JP_TPM1 |
| LVDS VCC Voltage Selection | JP_VDD1, JP_VDD2 |
| Clear CMOS Data Selection | JP3 |
| LVDS Backlight Control Selection | JP5,JP6 |
| LVDS Panel Mode Selection | JP4 |
| SATA Connector / M.2 Selection | JPM2_1 |

| CONNECTOR Description | NAME |
|-------------------------------------|-------------------------------|
| COM Connector | COM3, COM4, COM5, COM6, JCOM1 |
| VGA Connector (Rear) | VGA1 |
| Display Port Connector | DISPLAY1 |
| 2 x USB 3.0 Ports / LAN Ports | LAN1_USB1, LAN2_USB2 |
| USB 2.0 Ports | USB3 |
| Programmable Digital I/O Pin Header | JDIO1 |
| I2C Wafer | JI2C1 |
| System Fan Connector | FAN1 |
| Mini PCI Express Slot | M_PCIE1 |
| PCI Express Slot | PCI_E1 |
| LVDS Panel Connector | LVDS1, LVDS2 |
| Front Panel Connector | JFP1 |
| HD Audio Connector | AUDIO1 |
| Panel Backlight Connector | JINV1, JINV2 |
| SATA 3.0 Connector | SATA1, SATA2 |
| SATA Power Connector | SATA_PWR1, SATA_PWR2 |
| M.2 M-KEY Slot | M2_M |
| TPM MODULE / 80 Port | JLPC1 |
| PS2 Keyboard / Mouse Connector | KB_MS1 |
| CASH DRAWER Connector | JPDRW1 |
| RTC Battery Connector | JBAT1 |

3.2 Component Locations

3.2.1 Top View of BM-0982RA-**N

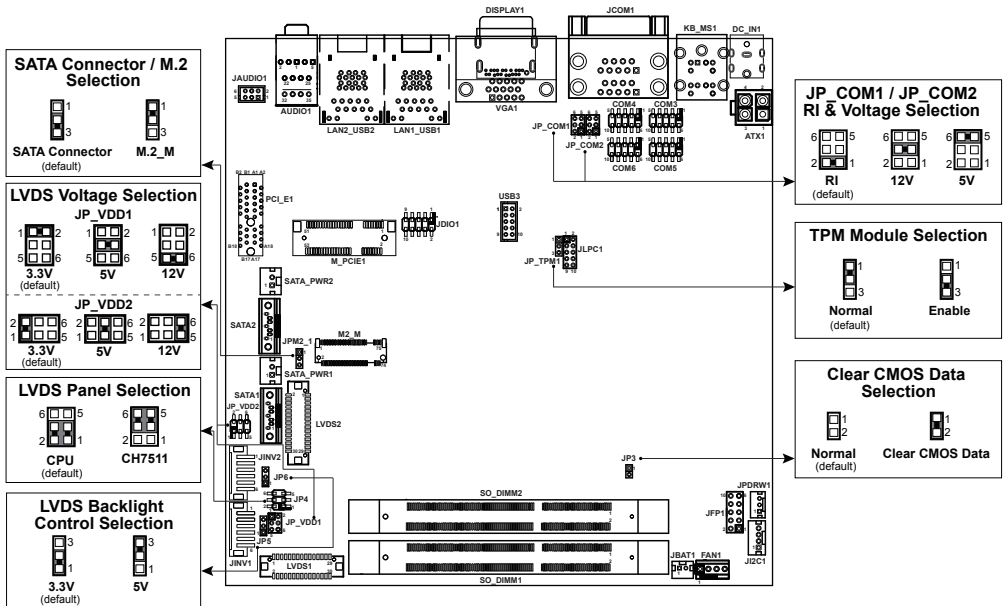


| | |
|---|--|
|  | <p>WARNING: Always disconnect the power cord when you are working with connectors and jumpers on the main board. Make sure both the system and peripheral devices are turned OFF as sudden surge of power could damage sensitive components. Make sure BM-0982 is properly grounded.</p> |
|  | <p>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.</p> |

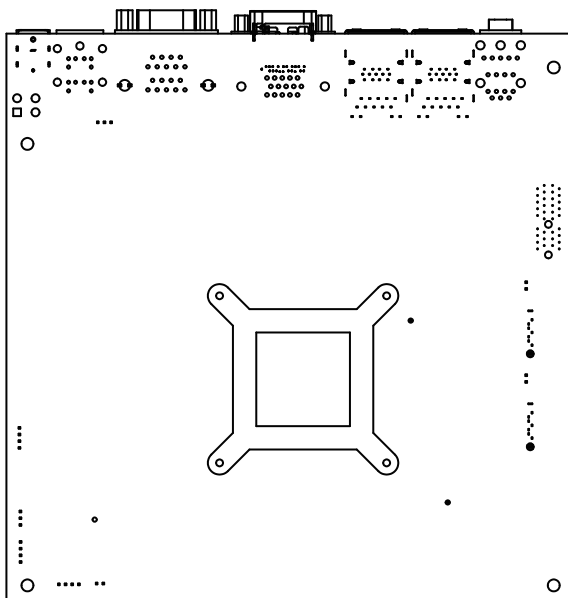


CAUTION: Always touch the motherboard components by the edges. Never touch components such as a processor by its pins. Take special cares while you are holding electronic circuit boards by the edges only. Do not touch the mainboard components.

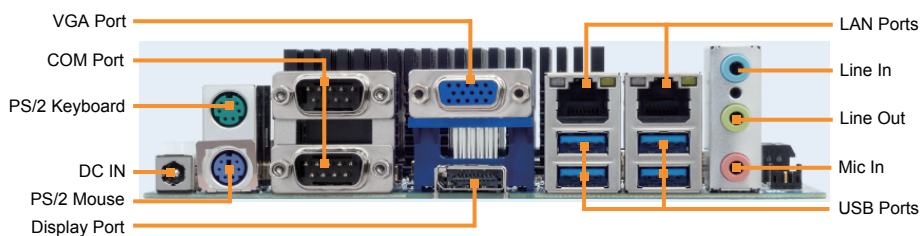
3.2.2 Jumper Setting of BM-0982RA-**N



3.2.3 Bottom View of BM-0982RA-**N



3.2.4 I/O View of BM-0982RA-**N

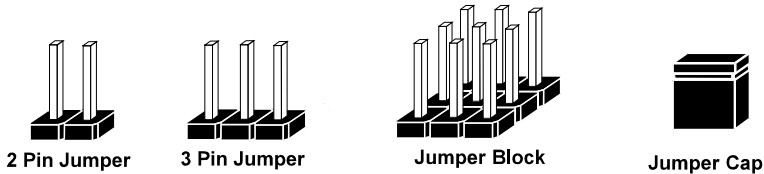


3.3 How To Set Jumpers

You can configure your board by setting jumpers. Jumper is consists of two or three metal pins with a plastic base mounted on the card, and by using a small plastic "cap", Also known as the jumper cap (with a metal contact inside), you are able to connect the pins. So you can set-up your hardware configuration by "open" or "close" pins.

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

JUMPERS AND CAPS



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

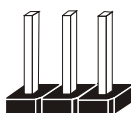
Jumper Diagrams



Jumper Cap
looks like this



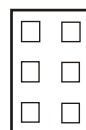
2 pin Jumper
looks like this



3 pin Jumper
looks like this



Jumper Block
looks like this



Jumper Settings



2 pin Jumper close(enabled)
Looks like this



1

1



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

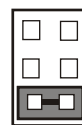


1

1



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



1 2

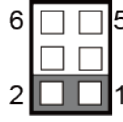
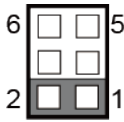
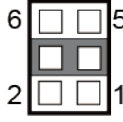
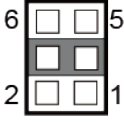
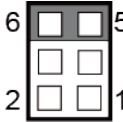
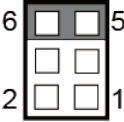
1 2

3.4 Setting Connectors and Jumpers

3.4.1 COM1 and COM2 PIN9 Definition Selection Guide

Jumper Location: JP_COM1, JP_COM2

Description: COM1 and COM2 Port pin9 RI/5V/12V Selection

| SELECTION | JUMPER SETTING | JUMPER ILLUSTRATION | |
|-----------|--------------------------|--|--|
| RI | 1-2 (Default Setting) |  JP_COM1 |  JP_COM2 |
| +12V | 3-4 |  JP_COM1 |  JP_COM2 |
| +5V | 5-6 |  JP_COM1 |  JP_COM2 |

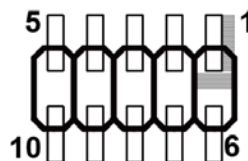
3.4.2 COM Connector

Connector Location: COM3, COM4, COM5, COM6, JCOM1

Description: COM Connector

COM3(RS232) Connector Pin Assignment:

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------|-----|------------|
| 1 | COM3_DCD_R | 6 | COM3_DSR_R |
| 2 | COM3_RX_R | 7 | COM3_RTS_R |
| 3 | COM3_TX_R | 8 | COM3_CTS_R |
| 4 | COM3_DTR_R | 9 | COM3_RI_R |
| 5 | GND | 10 | NC |



COM3/
COM4/
COM5/
COM6

COM4(RS232) Connector Pin Assignment:

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------|-----|------------|
| 1 | COM4_DCD_R | 6 | COM4_DSR_R |
| 2 | COM4_RX_R | 7 | COM4_RTS_R |
| 3 | COM4_TX_R | 8 | COM4_CTS_R |
| 4 | COM4_DTR_R | 9 | COM4_RI_R |
| 5 | GND | 10 | NC |

COM5(RS232) Connector Pin Assignment:

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------|-----|------------|
| 1 | COM5_DCD_R | 6 | COM5_DSR_R |
| 2 | COM5_RX_R | 7 | COM5_RTS_R |
| 3 | COM5_TX_R | 8 | COM5_CTS_R |
| 4 | COM5_DTR_R | 9 | COM5_RI_R |
| 5 | GND | 10 | NC |

COM6(RS232) Connector Pin Assignment:

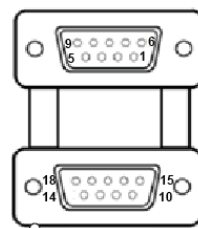
| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------|-----|------------|
| 1 | COM6_DCD_R | 6 | COM6_DSR_R |
| 2 | COM6_RX_R | 7 | COM6_RTS_R |
| 3 | COM6_TX_R | 8 | COM6_CTS_R |
| 4 | COM6_DTR_R | 9 | COM6_RI_R |
| 5 | GND | 10 | NC |

Notes:

Default setting is RS232. Please see Chapter 5 “Advanced – Onboard Device Configuration” for selection details.

JCOM1 Connector Pin Assignment:

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|-------------|-----|-------------|
| 1 | COM1_DCD_R | 10 | COM2_DCD_R |
| 2 | COM1_RX_R | 11 | COM2_RX_R |
| 3 | COM1_TX_R | 12 | COM2_TX_R |
| 4 | COM1_DTR_R | 13 | COM2_DTR_R |
| 5 | GND | 14 | GND |
| 6 | COM1_DSR_R | 15 | COM2_DSR_R |
| 7 | COM1_RTS_R | 16 | COM2_RTS_R |
| 8 | COM1_CTS_R | 17 | COM2_CTS_R |
| 9 | COM1_RI_SEL | 18 | COM2_RI_SEL |



JCOM1

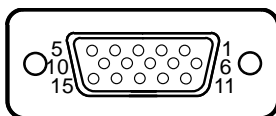
Note:

COM1, COM2: Pin 9 is selectable for RI, +5V or +12V by jumper setting. Default setting is RI, please see “COM1 and COM2 PIN9 Definition Selection Guide” for selection details.

3.4.3 VGA Port

Connector Location: VGA1

Description: VGA Port, D-Sub 15-pin



VGA1

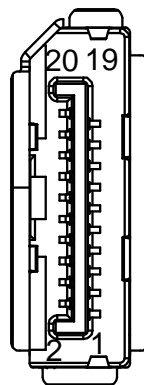
| PIN | ASSIGNMENT | PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------|-----|------------|-----|----------------|
| 1 | CRT_RED | 6 | GND | 11 | SPD_R |
| 2 | CRT_GREEN | 7 | GND | 12 | CRT_DDC_DATA_O |
| 3 | CRT_BLUE | 8 | GND | 13 | CRT_HSYNC_O |
| 4 | SPC_R | 9 | VCC5 | 14 | CRT_VSYNC_O |
| 5 | GND | 10 | GND | 15 | CRT_DDC_CLK_O |

3.4.4 DISPLAY Port

Connector Location: DISPLAY1

Description: Display Port Connector

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|--------------|-----|--------------|
| 1 | DP0_TX0_DP_C | 2 | GND |
| 3 | DP0_TX0_DN_C | 4 | DP0_TX1_DP_C |
| 5 | GND | 6 | DP0_TX1_DN_C |
| 7 | DP0_TX2_DP_C | 8 | GND |
| 9 | DP0_TX2_DN_C | 10 | DP0_TX3_DP_C |
| 11 | GND | 12 | DP0_TX3_DN_C |
| 13 | G_CEC | 14 | G_NC |
| 15 | AUXP_SCL | 16 | G_SDA |
| 17 | AUXN_G | 18 | DHPD_HDMI5V |
| 19 | HDMIHPD | 20 | DP VCC3 |



DISPLAY1

3.4.5 LAN & USB Port

Connector Location: LAN1_USB1, LAN2_USB2

Description: LAN & USB 3.0 Ports

LAN1 signals:

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|--------------|-----|--------------|
| 1 | LAN1_MDI0_DP | 5 | LAN1_MDI2_DP |
| 2 | LAN1_MDI0_DN | 6 | LAN1_MDI2_DN |
| 3 | LAN1_MDI1_DP | 7 | LAN1_MDI3_DP |
| 4 | LAN1_MDI1_DN | 8 | LAN1_MDI3_DN |

LAN LED Indicator:

Left Side LED

| | |
|-----------------|--------------------------------|
| Green Color On | 10/100Mbps LAN Speed Indicator |
| Orange Color On | Giga LAN Speed Indicator |
| Off | No LAN Switch/HUB connected |

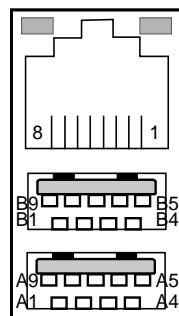
Right Side LED

| | |
|-----------------------|-----------------------|
| Yellow Color Blinking | LAN Message Active |
| Off | No LAN Message Active |

USB 3.0 signals:

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------|-----|------------|
| A1 | VCC5_USB1 | B1 | VCC5_USB1 |
| A2 | USB2_P1_DN | B2 | USB2_P0_DN |
| A3 | USB2_P1_DP | B3 | USB2_P0_DP |
| A4 | GND | B4 | GND |
| A5 | USB3_RXN1 | B5 | USB3_RXN0 |
| A6 | USB3_RXP1 | B6 | USB3_RXP0 |
| A7 | GND | B7 | GND |
| A8 | USB3_TXN1 | B8 | USB3_TXN0 |
| A9 | USB3_TXP1 | B9 | USB3_TXP0 |

Green/Orange Yellow

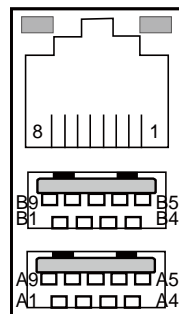


LAN1_USB1

LAN2 signals:

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|--------------|-----|--------------|
| 1 | LAN2_MDI0_DP | 5 | LAN2_MDI2_DP |
| 2 | LAN2_MDI0_DN | 6 | LAN2_MDI2_DN |
| 3 | LAN2_MDI1_DP | 7 | LAN2_MDI3_DP |
| 4 | LAN2_MDI1_DN | 8 | LAN2_MDI3_DN |

Green/Orange Yellow



LAN2_USB2

LAN LED Indicator:

Left Side LED

| | |
|-----------------|--------------------------------|
| Green Color On | 10/100Mbps LAN Speed Indicator |
| Orange Color On | Giga LAN Speed Indicator |
| Off | No LAN Switch/HUB connected |

Right Side LED

| | |
|-----------------------|-----------------------|
| Yellow Color Blinking | LAN Message Active |
| Off | No LAN Message Active |

USB 3.0 signals:

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------|-----|------------|
| A1 | VCC5_USB1 | B1 | VCC5_USB1 |
| A2 | USB2_P3_DN | B2 | USB2_P4_DN |
| A3 | USB2_P3_DP | B3 | USB2_P4_DP |
| A4 | GND | B4 | GND |
| A5 | USB3_RXN3 | B5 | USB3_RXN4 |
| A6 | USB3_RXP3 | B6 | USB3_RXP4 |
| A7 | GND | B7 | GND |
| A8 | USB3_TXN3 | B8 | USB3_TXN4 |
| A9 | USB3_TXP3 | B9 | USB3_TXP4 |

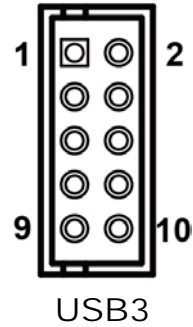
3.4.7 USB 2.0 Port

Connector Location: USB3

Description: USB 2.0 Port

USB 2.0 signals

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|--------------|-----|--------------|
| 1 | VCC5_USB2 | 2 | VCC5_USB2 |
| 3 | USB2_P5_DN_L | 4 | USB2_P6_DN_L |
| 5 | USB2_P5_DP_L | 6 | USB2_P6_DP_L |
| 7 | GND | 8 | GND |
| 9 | GND | 10 | GND |

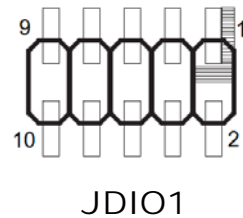


3.4.8 Programmable Digital I/O Pin Header

Connector Location: JDIO1

Description: Digital Input / Output pin header and 5V power.

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------|-----|------------|
| 1 | VCC5 | 2 | GND |
| 3 | DIN0 | 4 | DOUT0 |
| 5 | DIN1 | 6 | DOUT1 |
| 7 | DIN2 | 8 | DOUT2 |
| 9 | DIN3 | 10 | DOUT3 |



Notes:

Users can set the DIN/DOUT configuration via Protech's API/Utility.

3.4.9 I2C Wafer

Connector Location: JI2C1

Description: I2C Wafer

| PIN | ASSIGNMENT |
|-----|-------------|
| 1 | GND |
| 2 | V3P3S |
| 3 | I2C0_SCL_33 |
| 4 | I2C0_SDA_33 |



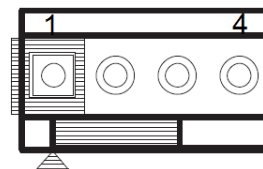
JI2C1

3.4.10 System Fan Connector

Connector Location: FAN1

Description: System Fan Connector

| PIN | ASSIGNMENT |
|-----|------------|
| 1 | GND |
| 2 | VCC12 |
| 3 | SYS_FANOUT |
| 4 | SYS_FANIN |



FAN1

Notes:

Fan speed mode can be set by BIOS or API. (Optional)

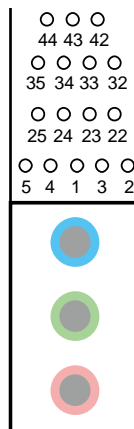
3.4.11 HD Audio Connector

Connector Location: AUDIO1

Description: HD Audio Connector

Line-In:

| PIN | ASSIGNMENT |
|-----|------------|
| 32 | HD_FRONT-L |
| 33 | HD_GND |
| 34 | HD_FRONT-R |
| 35 | HD_GND |



AUDIO1

Line-Out:

| PIN | ASSIGNMENT |
|-----|--------------|
| 22 | HD_LINE-IN-L |
| 23 | HD_GND |
| 24 | HD_LINE-IN-R |
| 25 | HD_GND |

MIC-In:

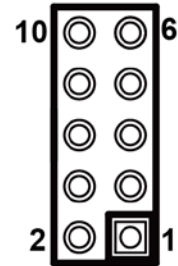
| PIN | ASSIGNMENT |
|-----|------------|
| 1 | HD_GND |
| 2 | HD_MIC1-L |
| 3 | HD_GND |
| 4 | HD_MIC1-R |
| 5 | HD_GND |

3.4.12 Front Panel Connector

Connector Location: JFP1

Description: Front Panel Connector

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|--------------|-----|-------------|
| 1 | WIDE_POWERIN | 2 | VCC-LED |
| 3 | SATA_LED_A_N | 4 | GND |
| 5 | GND | 6 | GND |
| 7 | RST_SW | 8 | GND |
| 9 | NC | 10 | LPC_PWRBTNJ |



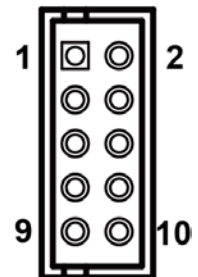
JFP1

3.4.13 TPM Module / 80 Port

Connector Location: JLPC1

Description: TPM Module / 80 Port

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|----------------|-----|--------------------|
| 1 | LPC_CLKOUT1_33 | 2 | GND |
| 3 | LPC_LFRAMEJ_33 | 4 | GND/LPC_SER_IRQ_33 |
| 5 | PMU_PLTRST_N | 6 | LPC_AD0_33 |
| 7 | LPC_AD3_33 | 8 | LPC_AD2_33 |
| 9 | V3P3A/V3P3S | 10 | LPC_AD1_33 |



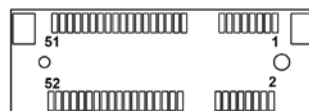
JLPC1

3.4.14 Mini PCI Express Slot

Connector Location: M_PCIE1

Description: Mini-PCI Express Slot

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|---------------|-----|--------------|
| 1 | WAKE_MPCIE1_N | 2 | V3P3S |
| 3 | NC | 4 | GND |
| 5 | NC | 6 | V1P5S_MINI |
| 7 | PCIE_CLKREQ2 | 8 | NC |
| 9 | GND | 10 | NC |
| 11 | M_PCIE_CLKN | 12 | NC |
| 13 | M_PCIE_CLKP | 14 | NC |
| 15 | GND | 16 | NC |
| 17 | NC | 18 | GND |
| 19 | NC | 20 | NC |
| 21 | GND | 22 | PMU_PLTRST_N |
| 23 | PCIE_P2_RXN | 24 | V3P3A |
| 25 | PCIE_P2_RXP | 26 | GND |
| 27 | GND | 28 | V1P5S_MINI |
| 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

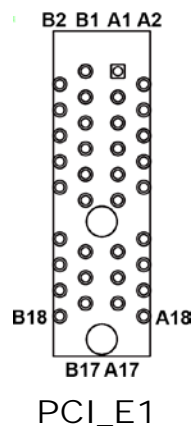
Mini PCI Express is the successor of the Mini PCI card and provides an increased data throughput. The cards have a detached network interface and are equipped with one lane. They are used in particular in embedded designs or compact box PCs.

3.4.15 PCI Express Slot

Connector Location: PCI_E1

Description: PCI Express Slot

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|---------------|-----|--------------|
| B1 | VCC12 | A1 | NC |
| B2 | VCC12 | A2 | VCC12 |
| B3 | VCC12 | A3 | VCC12 |
| B4 | GND | A4 | GND |
| B5 | SMB_3P3_SCL | A5 | NC |
| B6 | SMB_3P3_SDA | A6 | NC |
| B7 | GND | A7 | NC |
| B8 | V3P3S | A8 | NC |
| B9 | NC | A9 | V3P3S |
| B10 | V3P3A | A10 | V3P3S |
| B11 | WAKE_PCIEx1_N | A11 | PMU_PLTRST_N |
| B12 | PCIE_CLKREQ3 | A12 | GND |
| B13 | GND | A13 | PCIEx1_CLKP |
| B14 | PCIE_P5_TXP | A14 | PCIEx1_CLKN |
| B15 | PCIE_P5_TXN | A15 | GND |
| B16 | GND | A16 | PCIE_P5_RXP |
| B17 | V3P3S | A17 | PCIE_P5_RXN |
| B18 | GND | A18 | GND |



3.4.16 SATA 3.0 Connector**Connector Location: SATA1, SATA2****Description: SATA 3.0 Connector****SATA1 signals:**

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



SATA1 / SATA2

SATA2 signals:

| PIN | ASSIGNMENT |
|-----|-------------|
| 1 | GND |
| 2 | SATA_TXP1_B |
| 3 | SATA_TXN1_B |
| 4 | GND |
| 5 | SATA_RXN1_B |
| 6 | SATA_RXP1_B |
| 7 | GND |

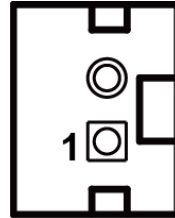
3.4.17 SATA Power Connector

Connector Location: SATA_PWR1, SATA_PWR2

Description: SATA Power Connector

SATA_PWR1 signals:

| PIN | ASSIGNMENT |
|-----|------------|
| 1 | VDD5 |
| 2 | GND |



SATA_PWR2 signals:

| PIN | ASSIGNMENT |
|-----|------------|
| 1 | VDD5 |
| 2 | GND |

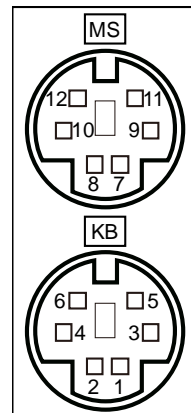
SATA_PWR1 /
SATA_PWR2

3.4.18 Keyboard & Mouse Port

Connector Location: KB_MS1

Description: PS/2 Keyboard & Mouse Port

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------|-----|------------|
| 1 | KB_DATA_L | 7 | MS_DATA_L |
| 2 | NC | 8 | NC |
| 3 | GND | 9 | GND |
| 4 | KBMS_VCC_L | 10 | KBMS_VCC_L |
| 5 | KB_CLK_L | 11 | MS_CLK_L |
| 6 | NC | 12 | NC |



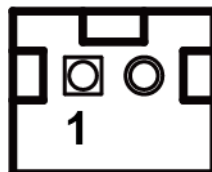
KB_MS1

3.4.19 RTC Battery Connector

Connector Location:JBAT1

Description: RTC (Real-Time Clock) Battery Connector

| PIN | ASSIGNMENT |
|-----|------------|
| 1 | VBAT |
| 2 | GND |



JBAT1

3.4.20 Cash Drawer Connector

Connector Location:JPDRW1

Description: Cash Drawer Connector

| PIN | ASSIGNMENT |
|-----|----------------|
| 1 | Drawer1_Open |
| 2 | GND |
| 3 | Drawer1_Sensor |



JPDRW1

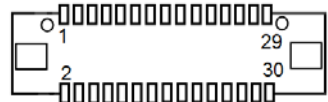
3.4.21 LVDS Panel Connector

Connector Location: LVDS1, LVDS2

Description: LVDS Panel Connector

LVDS1 Pin Assignment:

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



LVDS1

LVDS2 Pin Assignment:

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|------------------|-----|------------------|
| 1 | LVDS_VCC_2nd | 2 | GND |
| 3 | LVDS_CLKB_DN_2nd | 4 | LVDS_CLKB_DP_2nd |
| 5 | GND | 6 | LVDS_B2_DN_2nd |
| 7 | LVDS_B2_DP_2nd | 8 | GND |
| 9 | LVDS_B1_DN_2nd | 10 | LVDS_B1_DP_2nd |
| 11 | LVDS_B3_DP_2nd | 12 | LVDS_B3_DN_2nd |
| 13 | LVDS_B0_DP_2nd | 14 | LVDS_B0_DN_2nd |
| 15 | GND | 16 | LVDS_CLKA_DP_2nd |
| 17 | LVDS_CLKA_DN_2nd | 18 | GND |
| 19 | LVDS_A2_DP_2nd | 20 | LVDS_A2_DN_2nd |
| 21 | GND | 22 | LVDS_A1_DP_2nd |
| 23 | LVDS_A1_DN_2nd | 24 | GND |
| 25 | LVDS_A0_DP_2nd | 26 | LVDS_A0_DN_2nd |
| 27 | LVDS_A3_DP_2nd | 28 | LVDS_A3_DN_2nd |
| 29 | LVDS_VCC_2nd | 30 | LVDS_VCC |



LVDS2

3.4.22 LVDS Backlight Connector

Connector Location: JINV1, LINV2

Description: LVDS Backlight Connector

JINV1 Pin Assifnment:

| PIN | ASSIGNMENT |
|-----|-------------|
| 1 | V12P0_INV |
| 2 | V12P0_INV |
| 3 | GND |
| 4 | LVDS_BKLCTL |
| 5 | GND |
| 6 | LVDS_BKLTEN |



JINV1 / JINV2

JINV2 Pin Assifnment:

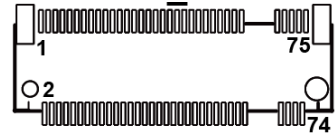
| PIN | ASSIGNMENT |
|-----|-----------------|
| 1 | V12P0_INV_2nd |
| 2 | V12P0_INV_2nd |
| 3 | GND |
| 4 | LVDS_BKLCTL_2nd |
| 5 | GND |
| 6 | LVDS_BKLTEN_2nd |

3.4.23 M.2 M-KEY Solt

Connector Location: M2_M

Description: M.2 M-KEY Solt

| PIN | ASSIGNMENT | PIN | ASSIGNMENT |
|-----|-------------|-----|------------|
| 1 | GND | 2 | V3P3S |
| 3 | GND | 4 | V3P3S |
| 5 | NC | 6 | NC |
| 7 | NC | 8 | NC |
| 9 | NC | 10 | TP28 |
| 11 | NC | 12 | NC |
| 13 | NC | 14 | NC |
| 15 | NC | 16 | NC |
| 17 | NC | 18 | NC |
| 19 | NC | 20 | NC |
| 21 | GND | 22 | NC |
| 23 | NC | 24 | NC |
| 25 | NC | 26 | NC |
| 27 | GND | 28 | NC |
| 29 | NC | 30 | NC |
| 31 | NC | 32 | NC |
| 33 | GND | 34 | NC |
| 35 | NC | 36 | NC |
| 37 | NC | 38 | TP27 |
| 39 | GND | 40 | NC |
| 41 | SATA_RXP1_C | 42 | NC |
| 43 | SATA_RXN1_C | 44 | NC |
| 45 | GND | 46 | NC |
| 47 | SATA_TXN1_C | 48 | NC |
| 49 | SATA_TXP1_C | 50 | NC |
| 51 | GND | 52 | NC |
| 53 | NC | 54 | NC |
| 55 | NC | 56 | NC |
| 57 | GND | 58 | NC |
| 59 | KEY | 60 | NC |
| 61 | KEY | 62 | NC |
| 63 | KEY | 64 | NC |
| 65 | KEY | 66 | NC |
| 67 | NC | 68 | TP26 |
| 69 | GND | 70 | V3P3S |
| 71 | GND | 72 | V3P3S |



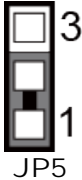

M2_M

| | | | |
|----|-----|----|-------|
| 73 | GND | 74 | V3P3S |
| 75 | GND | | |

3.4.24 LVDS Backlight Control Selection

Jumper Name: JP5, JP6

Description: Jumper for selecting PIN18 (LVDS_BKLCTL) voltage of JINV1.

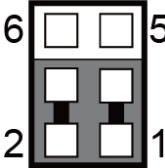
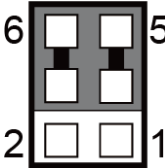
| SELECTION | JUMPER SETTING | JUMPER ILLUSTRATION |
|-----------|--------------------------|---|
| 3.3V | 1-2 (Default Setting) |  <p>JP5</p> |
| 5V | 2-3 |  <p>JP5</p> |

Note 1: Users can change the setting according to panel specification

3.4.25 LVDS Panel Selection

Jumper Name: JP4

Description: LVDS Panel Mode Selection

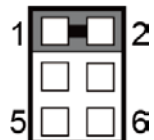
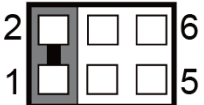
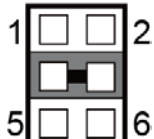
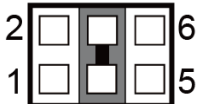
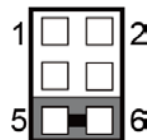
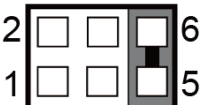
| SELECTION | JUMPTER SETTING | JUMPER ILLUSTRATION |
|-----------|--|---|
| CPU | 1-3 2-4 <i>(Default Setting)</i> |  <p>JPM2_1</p> |
| CH7511 | 3-5 4-6 |  <p>JPM2_1</p> |

| JP4 | LVDS Sequence |
|---------------|---------------|
| | BKLTCTL FROM |
| 1-3 (Default) | CPU |
| 3-5 | CH7511 |
| | BKLEN FROM |
| 2-4 (Default) | CPU |
| 4-6 | CH7511 |

3.4.26 LVDS VCC Voltage Selection

Jumper Name: JP_VDD1, JP_VDD2

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 |  JP_VDD2 |
| 5V | 3-4 |  JP_VDD1 |  JP_VDD2 |
| 12V | 5-6 |  JP_VDD1 |  JP_VDD2 |

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

3.4.27 SATA Con/M.2 Selection

Jumper Name: JPM2_1



Description: SATA Con/M.2 Selection

| SELECTION | JUMPTER SETTING | JUMPER ILLUSTRATION |
|-----------|---------------------------------|---|
| SATA | 2-3 <i>(Default Setting)</i> |  <p>JPM2_1</p> |
| M.2_M | 1-2 |  <p>JPM2_1</p> |

3.4.28 TPM Module Selection

Jumper Name: JP_TPM1

Description: TPM Module Selection

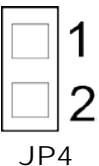
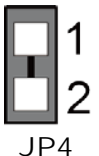
| SELECTION | JUMPTER SETTING | JUMPER ILLUSTRATION |
|-----------|---------------------------------|---|
| Normal | 1-2 <i>(Default Setting)</i> |  <p>JPM2_1</p> |
| Enable | 2-3 |  <p>JPM2_1</p> |

3.4.29 Clear CMOS Data Selection

Jumper Name: JP3

Description: Clear CMOS Data Selection

- Step1.** Remove the main power of the PC.
- Step2.** Close JP3 (pins 1-2) for 6 seconds by a cap.
- Step3.** Remove the cap which is just used on JP3 (1-2), so that JP3 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 <i>(Default Setting)</i> |  |
| Clear CMOS* | 1-2 |  |

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 Intel[®] Trusted Execution Engine Driver installation
- 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 BM-0982 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 | OS | |
|--|---|------|-------------------|
| | | UEFI | Win10 (64-bit) |
| D:\Driver\Flash BIOS | For Aptio(EFI) BIOS update utility | ✓ | X |
| D:\Driver\Platform\1_Main Chip | Intel(R) Chipset Device Software Installation Utility | X | ✓ |
| D:\Driver\Platform\2_Graphics | Intel HD Graphics Driver installation | X | ✓ |
| D:\Driver\Platform\3_TXE | For Intel Trusted Execution Technology Interface | X | ✓ |
| D:\Driver\Platform\4_Sound | Realtek ALC888 For Sound driver installation | X | ✓ |
| D:\Driver\Platform\5_LAN Chip | Intel I210 For LAN Driver installation | X | ✓ |
| D:\Driver\Platform\6_Serial IO | Intel Serial IO Host Controller driver installation | X | ✓ |
| D:\Driver\Platform\7_HotFix | Windows 10 update Package installation | X | ✓ |

X : Not support

✓: Support

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

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 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 BM-0982 and insert the driver disk.
- 2** Enter the **1_Main Chip** folder where the Chipset driver is located (depending on your OS platform).
- 3** Click **Setup.exe** file for driver installation.
- 4** Follow the on-screen instructions to install the driver.
- 5** Once the installation is completed, shut down the system and restart BM-0982 for the changes to take effects.

4.3 Installing Graphics Driver Utility

The GRAPHICS interface embedded in BM-0982 can support a wide range of display types. You can have dual displays via LVDS interfaces and make the system work simultaneously.

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

- 1** Connect the USB DVD-ROM device to BM-0982 and insert the driver disk.
- 2** Enter the **2_GRAPHICS** folder where the driver is located (depending on your OS platform).
- 3** Click the **Setup.exe** file for driver installation.
- 4** Follow the on-screen instructions to complete the installation.
- 5** Once the installation is completed, shut down the system and restart BM-0982 for the changes to take effects.

4.4 Intel® Trusted Execution Engine Driver Installation

Introduction

The Intel® ME software components that need to be installed depend 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

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

4.5 Installing LAN Driver Utility

Enhanced with LAN function, BM-0982 supports various network adapters. To install the LAN Driver, follow the steps below:

- 1** Connect the USB DVD-ROM device to BM-0982 and insert the driver disk.
- 2** Enter the **5_LAN Chip** folder where the driver is located (depending on your OS platform).
- 3** Click **Autorun.exe** file for driver installation.
- 4** Follow the on-screen instructions to complete the installation.
- 5** Once the installation is completed, shut down the system and restart BM-0982 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.

4.6 Installing Sound Driver Utility

The sound function enhanced in this system is fully compatible with POSReady 7 & Windows® 7 series.

To install the Sound Driver, follow the steps below:

- 1** Connect the USB DVD-ROM device to BM-0982 and insert the driver disk.
- 2** Open the **4_Sound** folder where the driver is located (depending on your OS platform).
- 3** Click the **Setup.exe** file for driver installation.
- 4** Follow the on-screen instructions to complete the installation.
- 5** Once the installation is completed, shut down the system and restart BM-0982 for the changes to take effects.

4.7 Installing Intel® Serial I/O Driver Utility

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

1. Connect the USB DVD-ROM device to BM-0982 and insert the driver disk.
2. Open the **6_Serial I/O** folder where the driver is located.
3. Select Windows 10 (64-bit) for your OS platform.
4. Click the **Setup.exe** file for driver installation.
5. Follow the on-screen instructions to complete the installation.
6. Once the installation is completed, shut down the system and restart BM-0982 for the changes to take effects.

4.8 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 the application with administrative privileges.

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:

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

5.1 Introduction

The BM-0982 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.

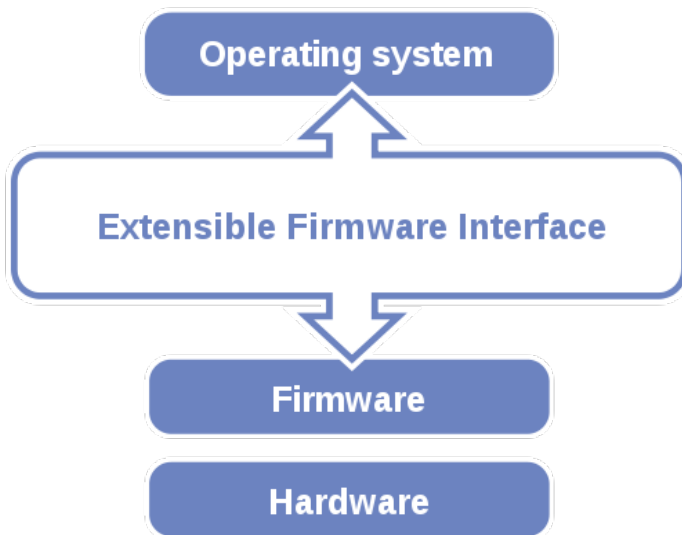


Figure 5-1. Extensible Firmware Interface Diagram

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



BIOS Setup Menu Initialization Screen

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

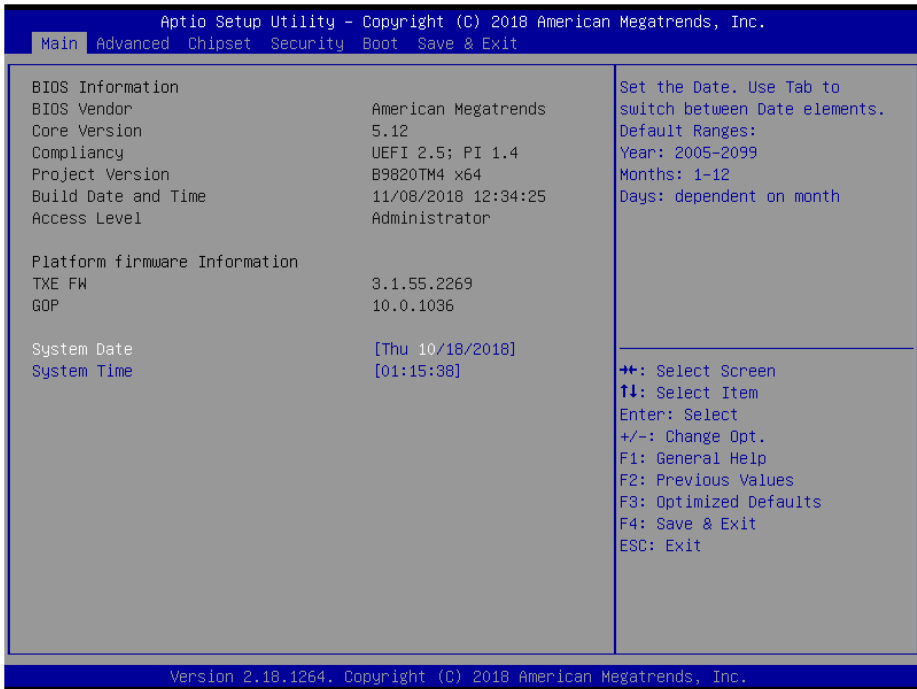
The language of the BIOS setup menu interface and help messages are shown in US English. You may use <↑> or <↓> key to select among the items and press <Enter> to confirm and enter the sub-menu. The following table provides the list of the navigation keys that you can use while operating the BIOS setup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

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

5.3 Main

Menu Path *Main*

The **Main** menu allows you to view the BIOS Information, 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

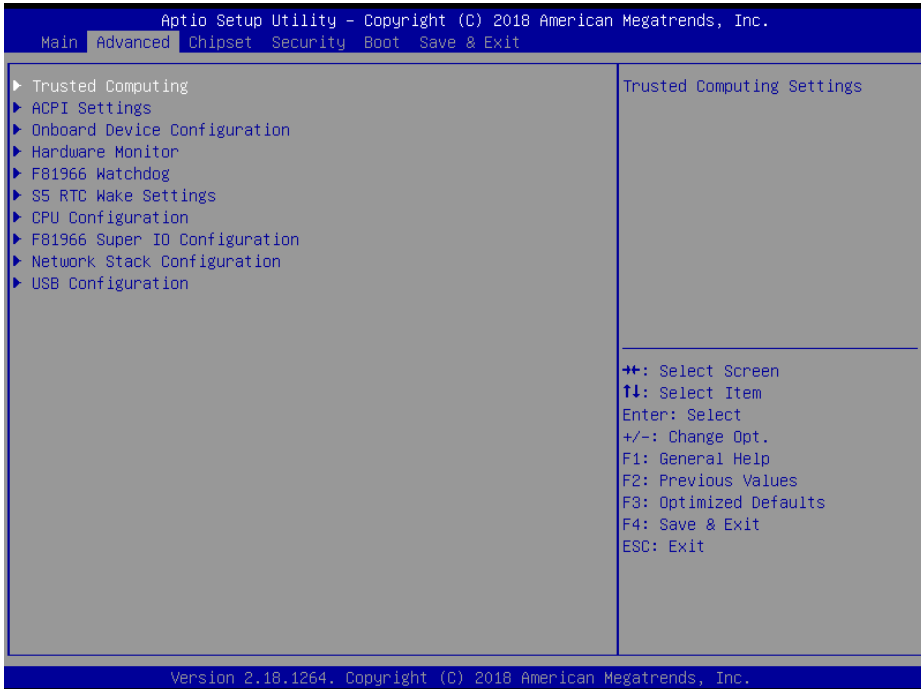
| BIOS Setting | Options | Description/Purpose |
|---------------------|-----------------------|---|
| BIOS Vendor | No changeable options | Displays the name of the BIOS vendor. |
| Core Version | No changeable options | Displays the current BIOS core version. |
| Compliancy | No changeable options | 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. |
| TXE FW | No changeable options | Displays the TXE FW version. |
| GOP | No changeable options | Displays the GOP version. |

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

5.4 Advanced

Menu Path *Advanced*

This menu provides advanced configurations such as Trusted Computing, ACPI Settings, Onboard Device Configuration, Hardware Monitor, F81966 Watchdog, S5 RTC Wake Settings, CPU Configuration, F81966 Super IO Configuration, Network Stack Configuration and USB Configuration.



Advanced Menu Screen

| BIOS Setting | Options | Description/Purpose |
|-------------------------------|----------|---------------------------------|
| Trusted Computing | Sub-Menu | Trusted Computing parameters. |
| ACPI Settings | Sub-Menu | System ACPI parameters. |
| Onboard Device Configuration | Sub-Menu | Project specific parameters. |
| Hardware Monitor | Sub-Menu | Monitor hardware status. |
| F81966 Watchdog | Sub-Menu | Watchdog timer parameters. |
| S5 RTC Wake Settings | Sub-Menu | RTC wake parameters. |
| CPU Configuration | Sub-Menu | CPU configuration parameters. |
| F81966 Super IO Configuration | Sub-Menu | System Super IO chip parameters |
| Network Stack Configuration | Sub-Menu | Network Stack parameters. |
| USB Configuration | Sub-Menu | USB configuration parameters. |

5.4.1 Advanced – Trusted Computing

Menu Path *Advanced > Trusted Computing*

The **Trusted Computing** provides security device settings such as Security Device Support and No Security Device Found.



Trusted Computing Screen

| BIOS Setting | Options | Description/Purpose |
|--------------------------|-------------------------|---|
| Security Device Support | - Disabled - Enabled | Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available. |
| No Security Device Found | - No changeable options | Display the Security Device |

5.4.2 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).

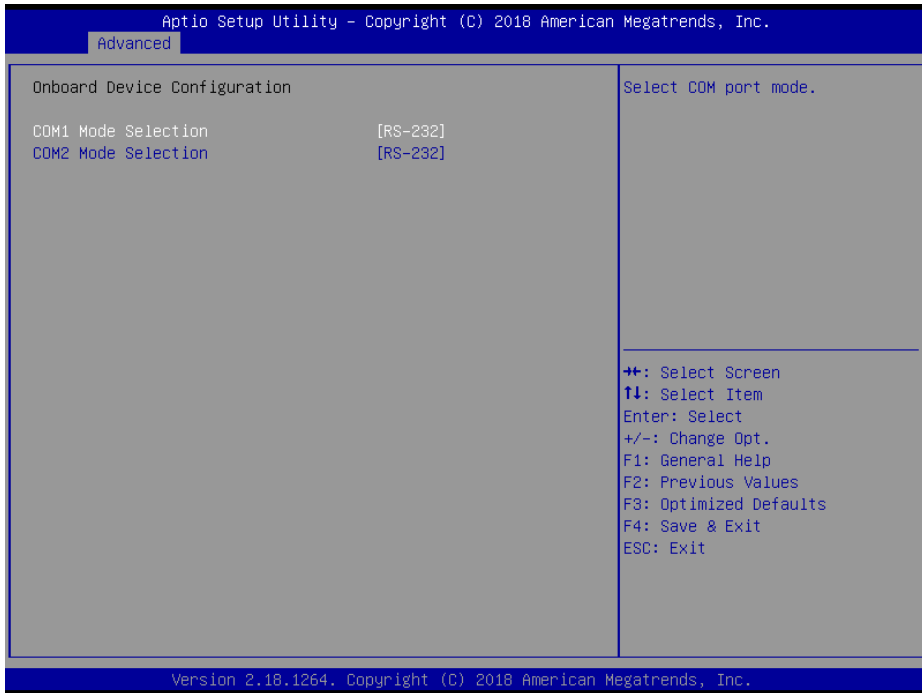


ACPI Settings Screen

| 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). |

5.4.3 Advanced – Onboard Device Configuration

Menu Path *Advanced > Onboard Device Configuration*



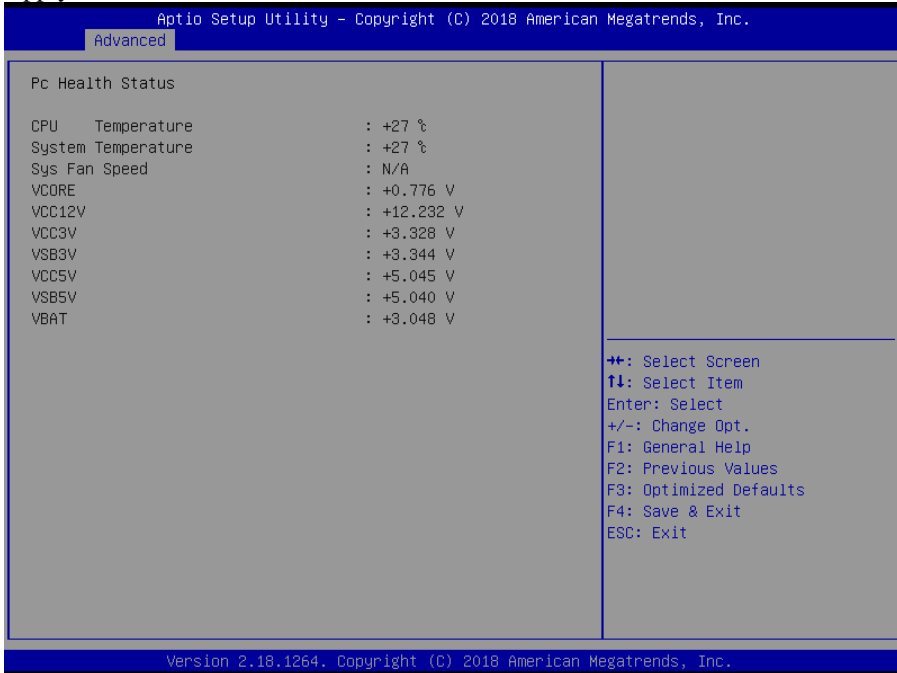
Onboard Device Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|---------------------|--|---------------------|
| COM1 Mode Selection | - RS-422 - RS-232 (default) - RS-485 | Selects COM1 mode. |
| COM2 Mode Selection | - RS-422 - RS-232 (default) - RS-485 | Selects COM2 mode. |

5.4.4 Advanced – Hardware Monitor

Menu Path *Advanced > Hardware Monitor*

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



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. |
| VCC12 | No changeable options | Detects and displays 12V voltage. |
| VCC3V | No changeable options | Detects and displays the voltage level of VCC3V in supply. |
| VS3V | No changeable options | Detects and displays VS3V voltage. |
| VCC5V | No changeable options | Detects and displays the voltage level of VCC5V in supply. |
| VS5V | No changeable options | Detects and displays the voltage level of VS5V in supply. |
| VBAT | No changeable options | Detects and displays the battery voltage. |

5.4.5 Advanced - F81966 Watchdog

Menu Path *Advanced > F81966 Watchdog*

If the system hangs or fails to respond, enable the F81966 watchdog function to trigger a system reset via the 255-level watchdog timer.



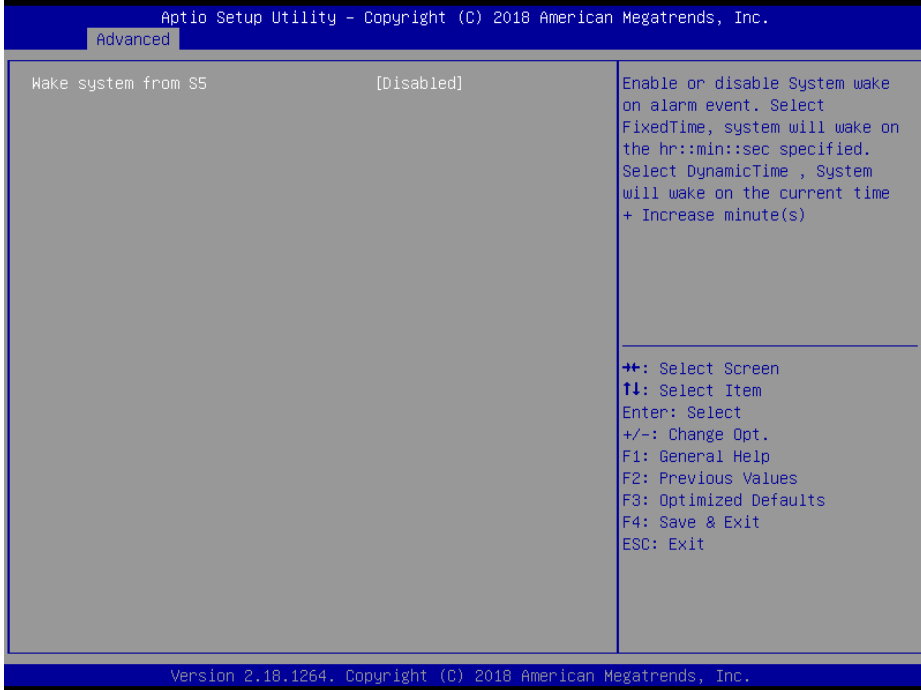
F81966 Watchdog Screen

| BIOS Setting | Options | Description/Purpose |
|----------------------|-----------------------------------|---|
| Enable Watchdog | - Disabled - Enabled (default) | Enables/Disables 81966 Watchdog timer settings. |
| Watchdog Timer Count | (Numeric) 10 to 255 | Sets the timeout for Watchdog timer. Watchdog Timer = 1sec * Count |

5.4.6 Advanced - S5 RTC Wake Settings

Menu Path *Advanced > S5 RTC wake Settings*

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

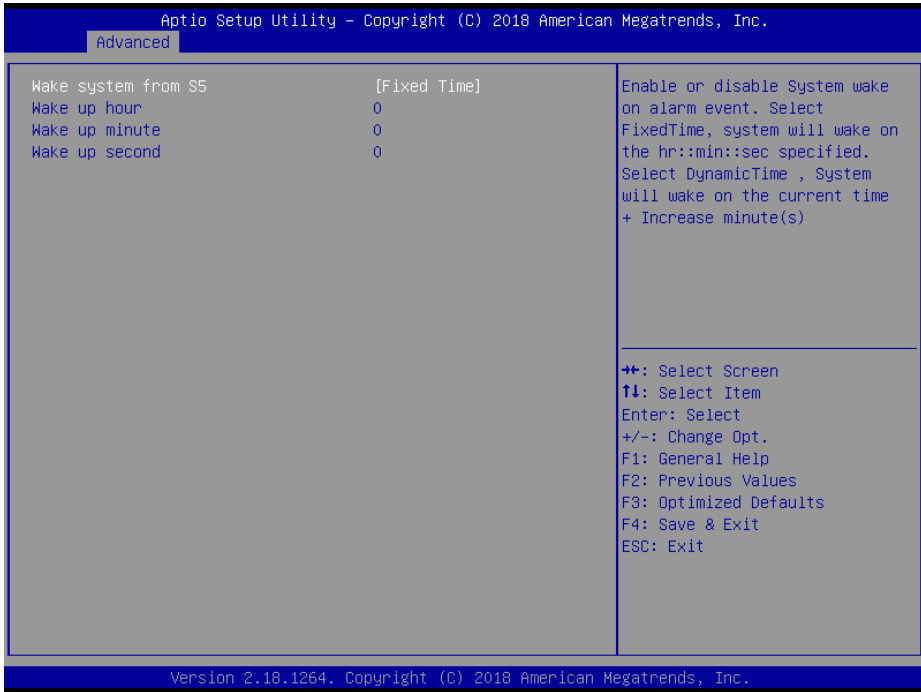


S5 RTC Wake Settings Screen

| BIOS Setting | Options | Description/Purpose |
|---------------------|--|---|
| Wake system from S5 | <ul style="list-style-type: none"> - Disabled (default) - Fixed Time - Dynamic Time | Enables or disables System wake on alarm event. <ul style="list-style-type: none"> • 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). |

5.4.6.1 S5 RTC Wake Settings [Fixed Time]

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

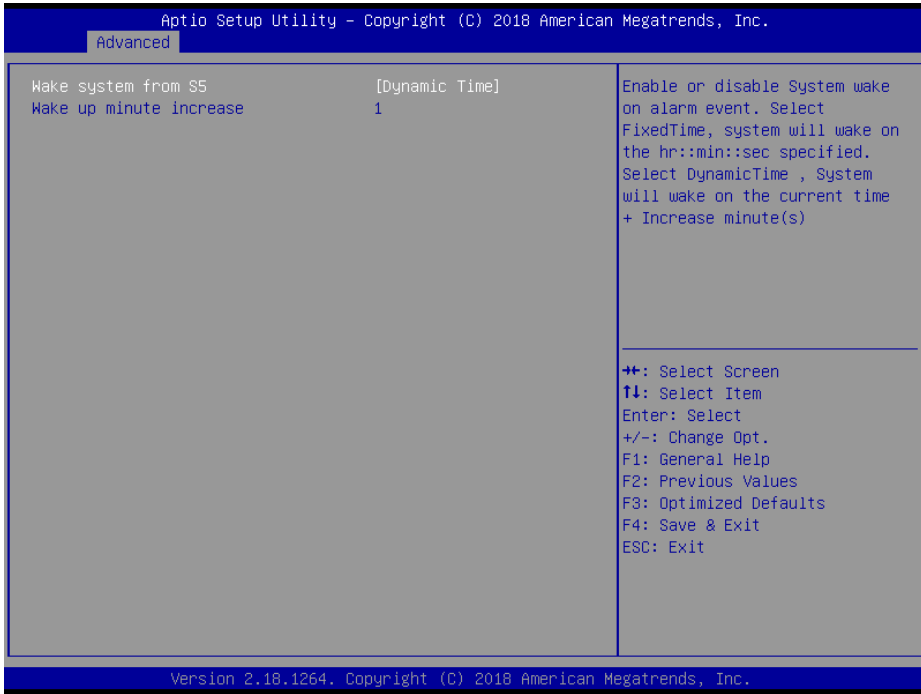


S5 RTC Wake Settings Screen (Fixed Time)

| 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. |

5.4.6.2 S5 RTC Wake Settings [Dynamic Time]

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



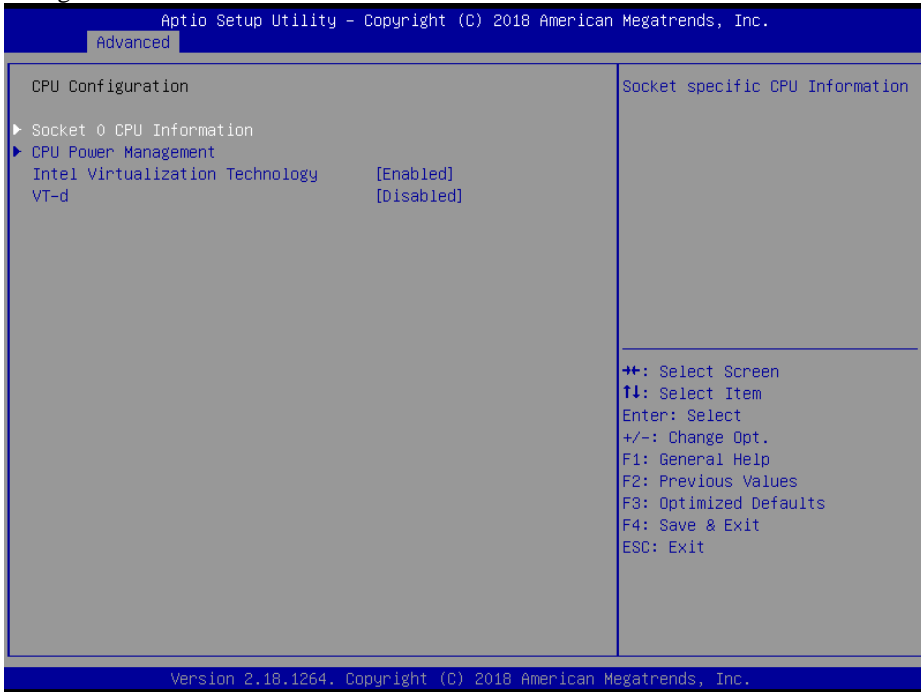
S5 RTC Wake Setting Screen (Dynamic Time)

| 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. |

5.4.7 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). |
| VT-d | - Disabled (default) - Enabled | Enables/Disables CPU VT-d. |

5.4.7.1 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 32

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

L3 Cache Not Present

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

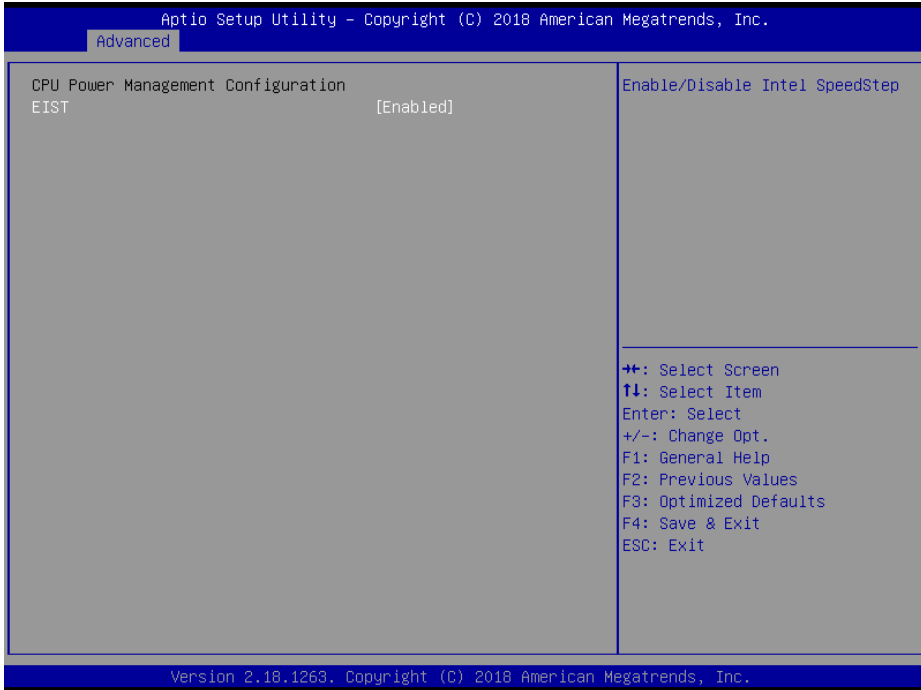
Version 2.18.1264. Copyright (C) 2018 American Megatrends, Inc.

Socket 0 CPU Information Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------------|-----------------------|-----------------------------------|
| CPU Signature | No changeable options | Displays CPU Signature. |
| Microcode Patch | No changeable options | CPU Microcode Patch Revision. |
| Max CPU Speed | No changeable options | Displays the 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. |

5.4.7.2 CPU Configuration - CPU Power Management Configuration

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



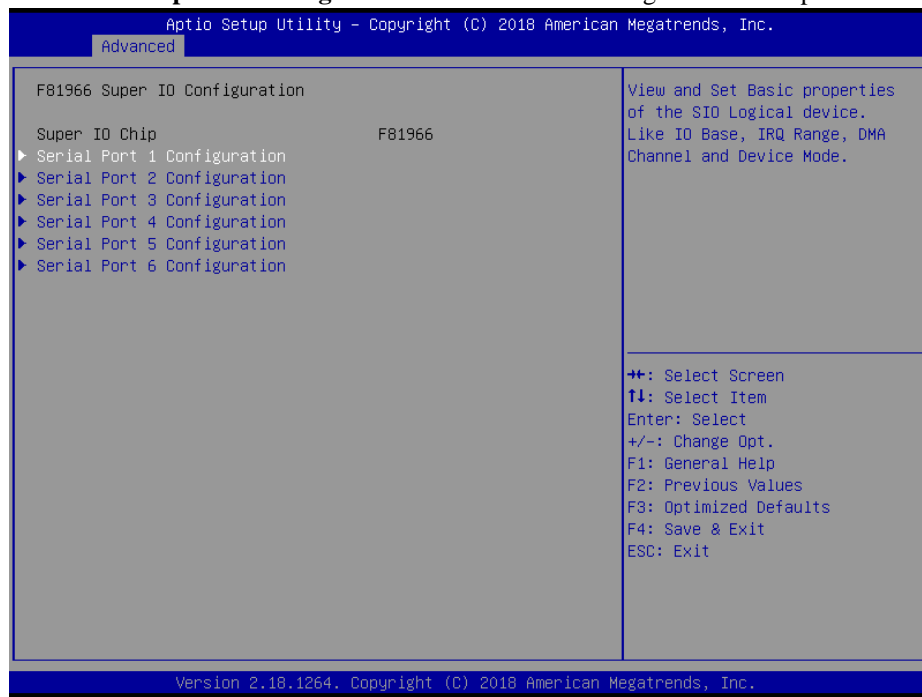
CPU Power Management Configuration Screen

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

5.4.8 Advanced - F81966 Super IO Configuration

Menu Path *Advanced > F81966 Super IO Configuration*

The **F81966 Super IO Configuration** allows users to configure the serial ports 1-6.



F81966 Super IO Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------------------|-----------------------|--|
| Super IO Chip (F81966) | No changeable options | Displays the super I/O chip model. |
| Serial Port 1 Configuration | Sub-Menu | Set Parameters of Serial Port 1 (COMA) |
| Serial Port 2 Configuration | Sub-Menu | Set Parameters of Serial Port 2 (COMB) |
| Serial Port 3 Configuration | Sub-Menu | Set Parameters of Serial Port 3 (COMA) |
| Serial Port 4 Configuration | Sub-Menu | Set Parameters of Serial Port 4 (COMB) |
| Serial Port 5 Configuration | Sub-Menu | Set Parameters of Serial Port 5 (COMA) |
| Serial Port 6 Configuration | Sub-Menu | Set Parameters of Serial Port 6 (COMB) |

5.4.8.1 F81966 Super IO Configuration - Serial Port 1 Configuration

Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 1 Configuration*



Serial Port 1 Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------|---|---|
| Serial Port | - Disabled - Enabled (default) | Enables/Disables COMA. |
| 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. |

5.4.8.2 F81966 Super IO Configuration - Serial Port 2 Configuration

Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 2 Configuration*

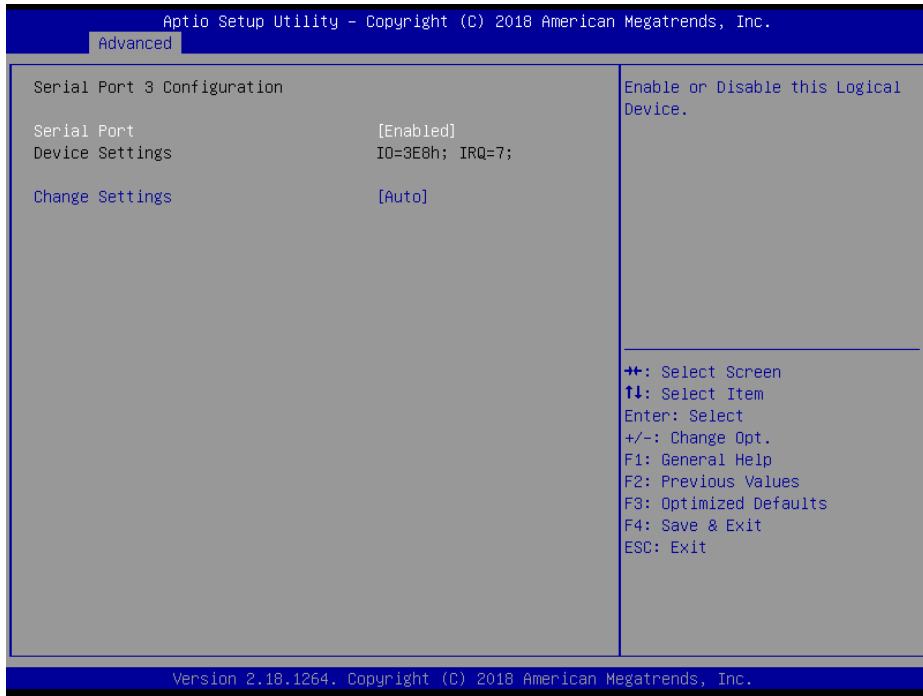


Serial Port 2 Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------|---|---|
| Serial Port | - Disabled - Enabled (default) | Enables/Disables COMB |
| 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. |

5.4.8.3 F81966 Super IO Configuration - Serial Port 3 Configuration

Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 3 Configuration*



Serial Port 3 Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------|---|---|
| Serial Port | - Disabled - Enabled (default) | Enables/Disables COMA. |
| 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. |

5.4.8.4 F81966 Super IO Configuration - Serial Port 4 Configuration

Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 4 Configuration*

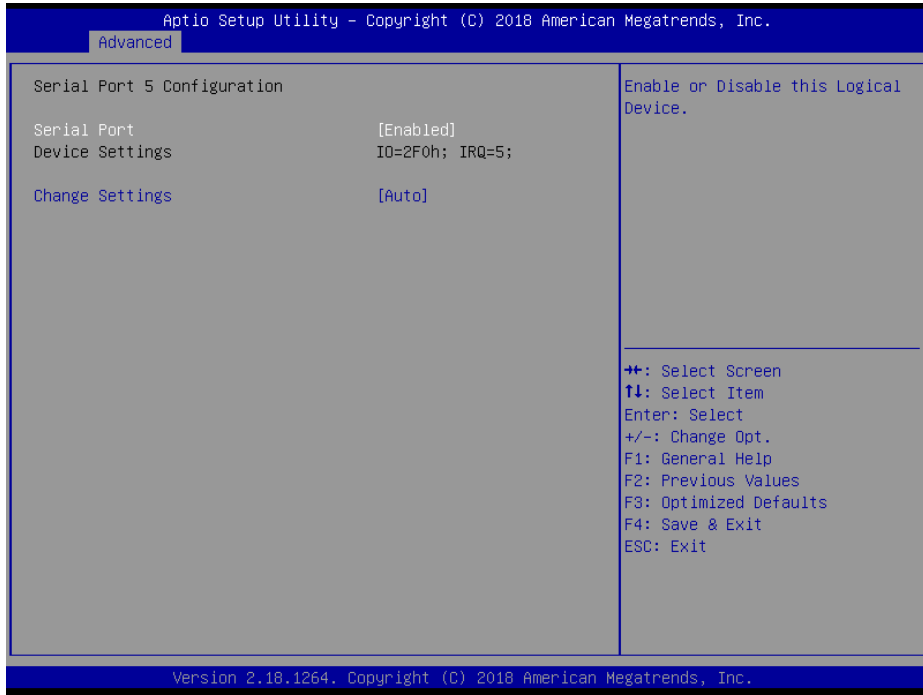


Serial Port 4 Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------|---|---|
| Serial Port | - Disabled - Enabled (default) | Enables/Disables COMB |
| 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. |

5.4.8.5 F81966 Super IO Configuration - Serial Port 5 Configuration

Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 5 Configuration*

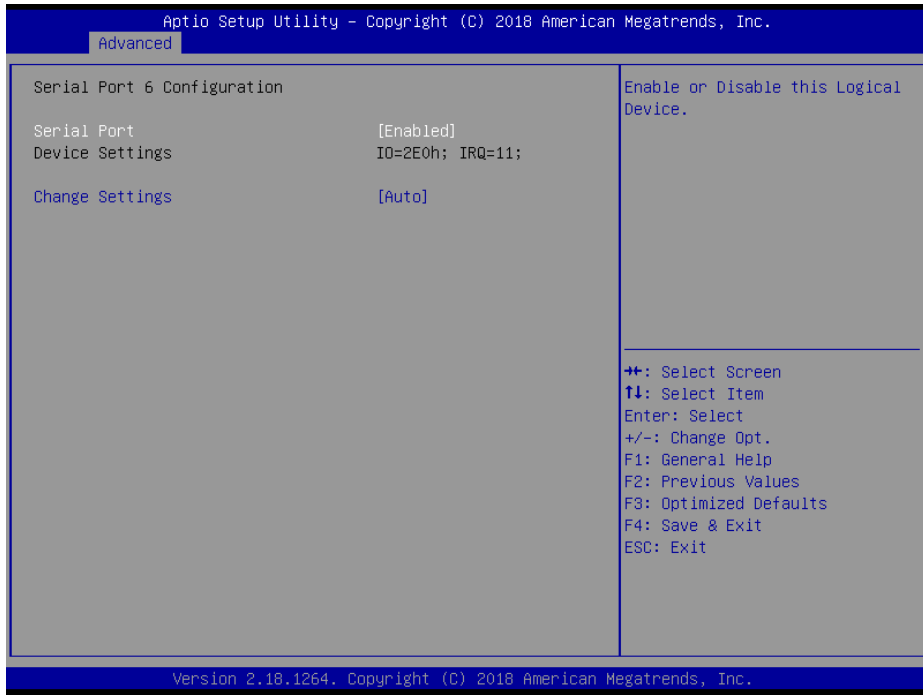


Serial Port 5 Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------|---|---|
| Serial Port | - Disabled - Enabled (default) | Enables/Disables COMA |
| 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. |

5.4.8.6 F81966 Super IO Configuration - Serial Port 6 Configuration

Menu Path *Advanced > F81966 Super IO Configuration > Serial Port 6 Configuration*



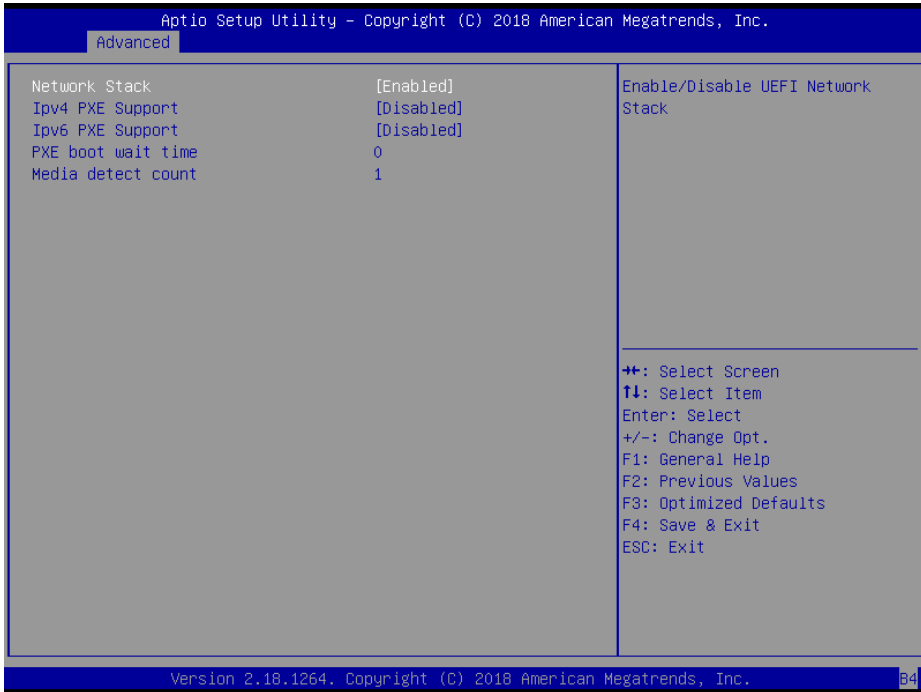
Serial Port 6 Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------|---|---|
| Serial Port | - Disabled - Enabled (default) | Enables/Disables COMB |
| 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. |

5.4.9 Advanced - Network Stack Configuration

Menu Path *Advanced > USB Configuration*

The **Network Stack Configuration** allows users to configure Network Stack settings such as Ipv4 PXE Support, Ipv6 PXE Support, PXE boot wait time and Media detect count.



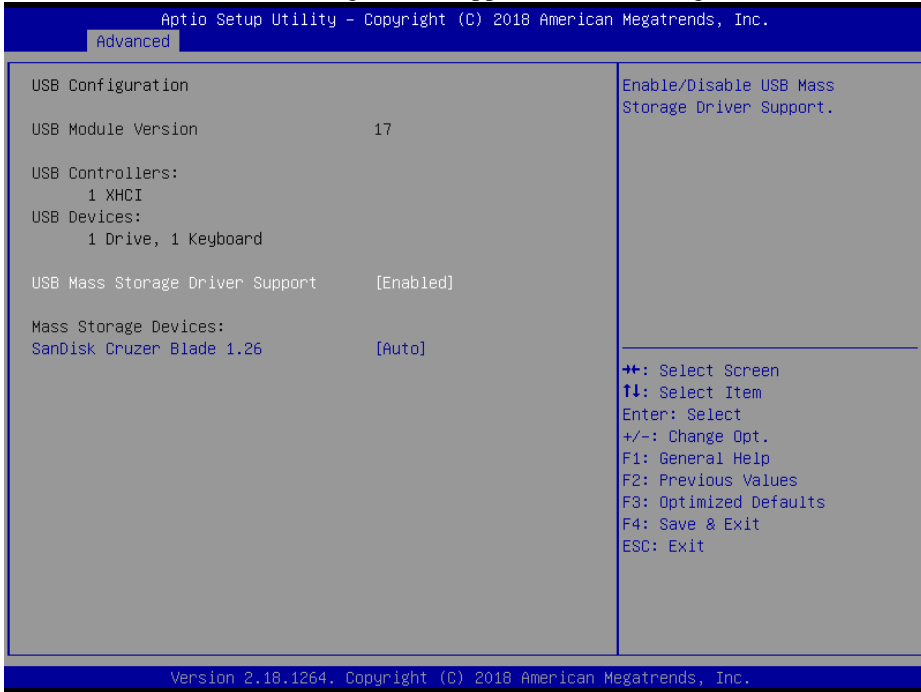
Network Stack Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|--------------------|-------------------------|--|
| Network Stack | - Disabled - Enabled | Enable or Disable UEFI Network Stack. |
| Ipv4 PXE Support | - Disabled - Enabled | Enable Ipv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created. |
| Ipv6 PXE Support | - Disabled - Enabled | Enable Ipv6 PXE Boot Support. If disabled, Ipv6 PXE boot option will not be created. |
| PXE boot wait time | Numeric (from 0 to 5) | Wait time to press ESC key to abort the PXE boot. |
| Media detect count | Numeric (from 1 to 50) | Numbers of times presence of media will be checked. |

5.4.10 Advanced - USB Configuration

Menu Path *Advanced > USB Configuration*

The **USB Configuration** allows users to configure advanced USB settings such as XHCI hand-off, USB mass storage driver support and mass storage devices.



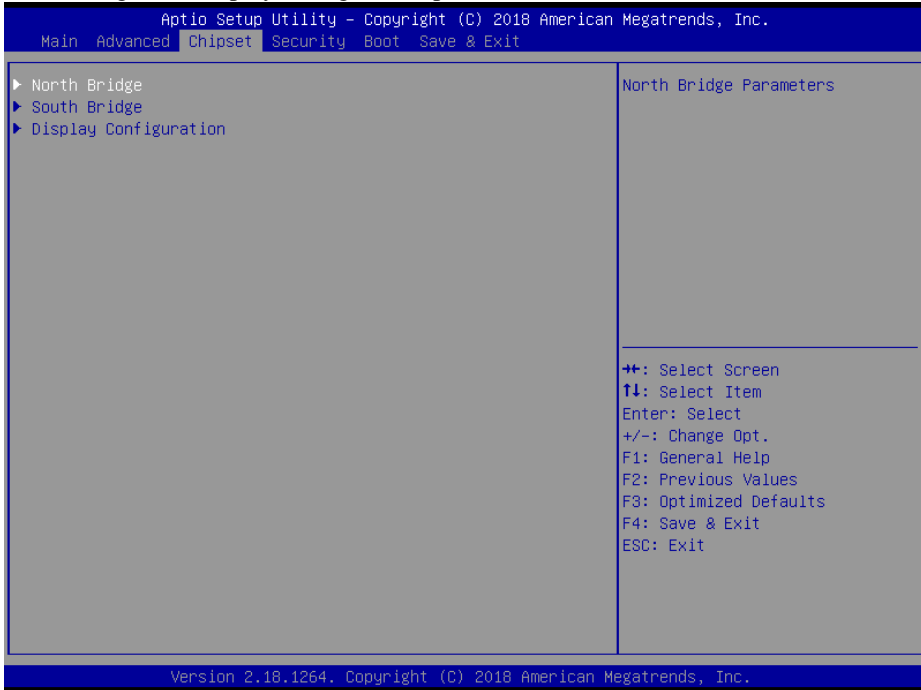
USB Configuration Screen

| 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. |

5.5 Chipset

Menu Path *Chipset*

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

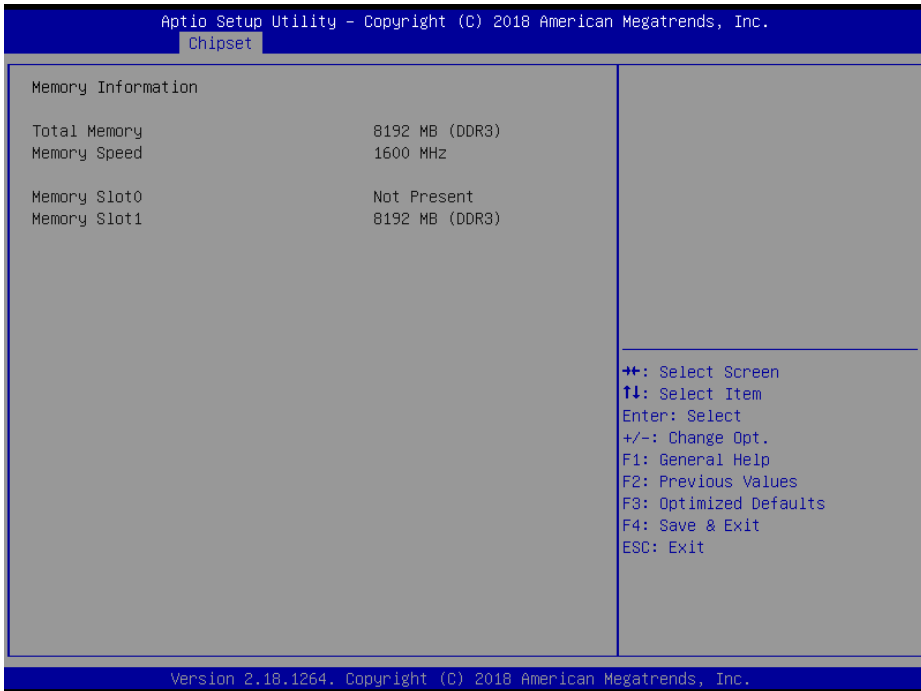


Chipset Screen

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

5.5.1 Chipset - North Bridge

Menu Path *Chipset > North Bridge*

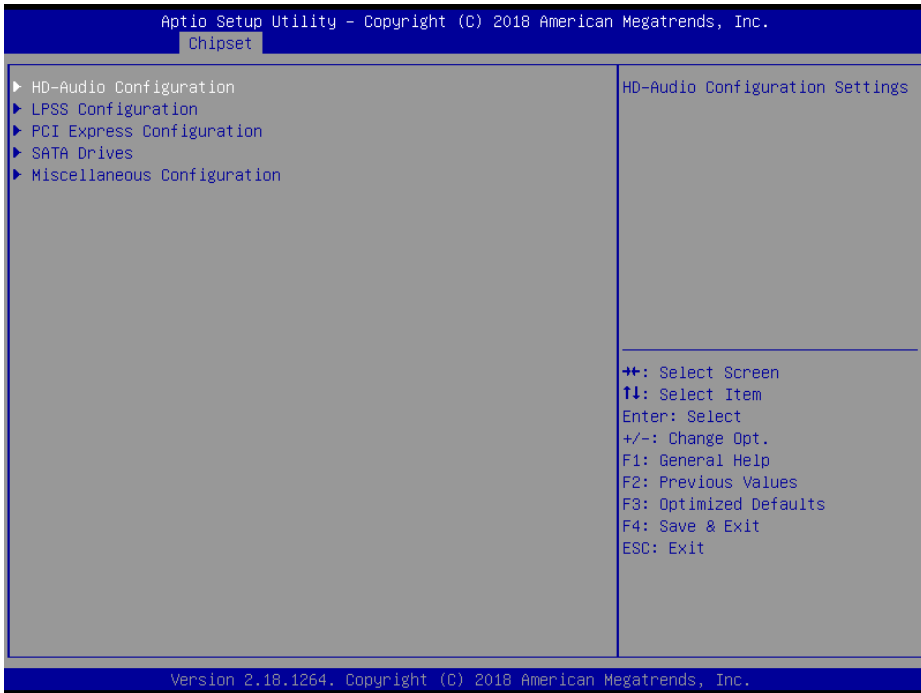


North Bridge Screen

| 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 (DDR3)". |
| 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 |
| Memory Slot1 | No changeable options | Displays the current amount and type of memory on each memory slot, e.g. "8192 MB (DDR3)". |

5.5.2 Chipset - South Bridge

Menu Path *Chipset > South Bridge*

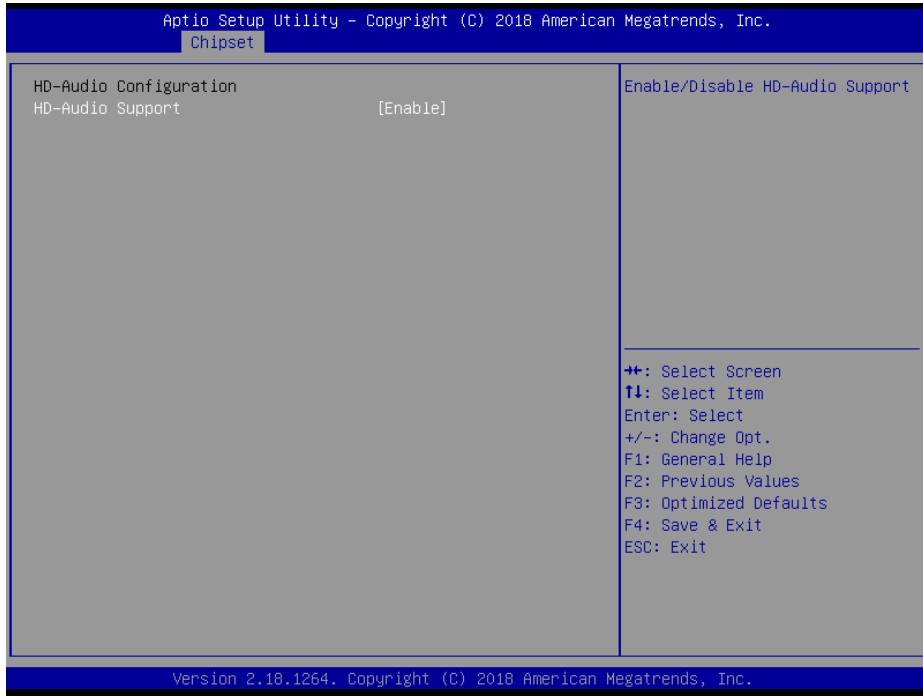


South Bridge Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------------------|----------|--------------------------------------|
| HD-Audio Configuration | Sub-Menu | HD-Audio configuration settings. |
| 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*

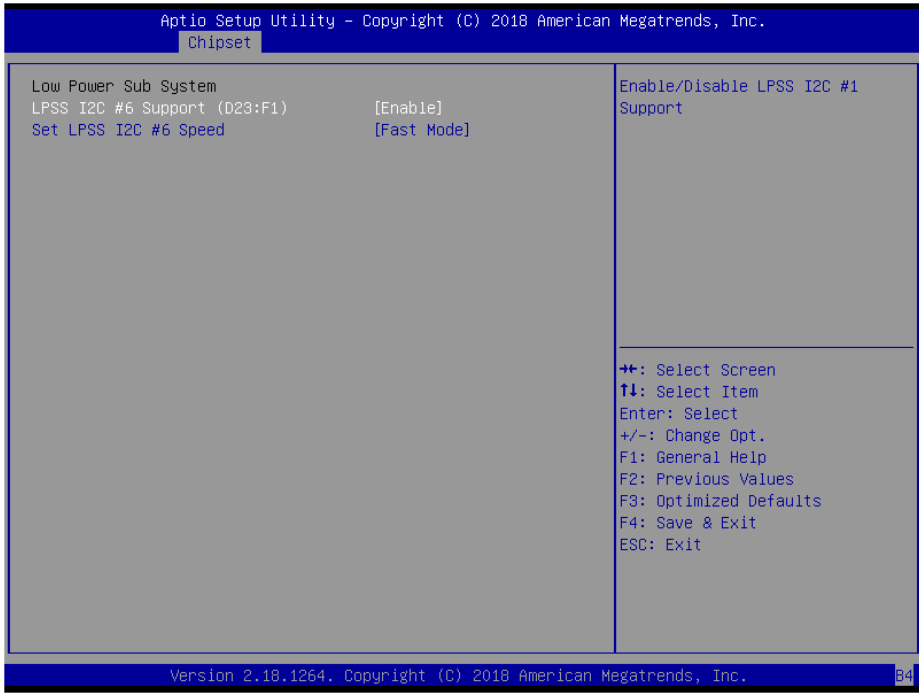


HD-Audio Configuration Screen

| 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*

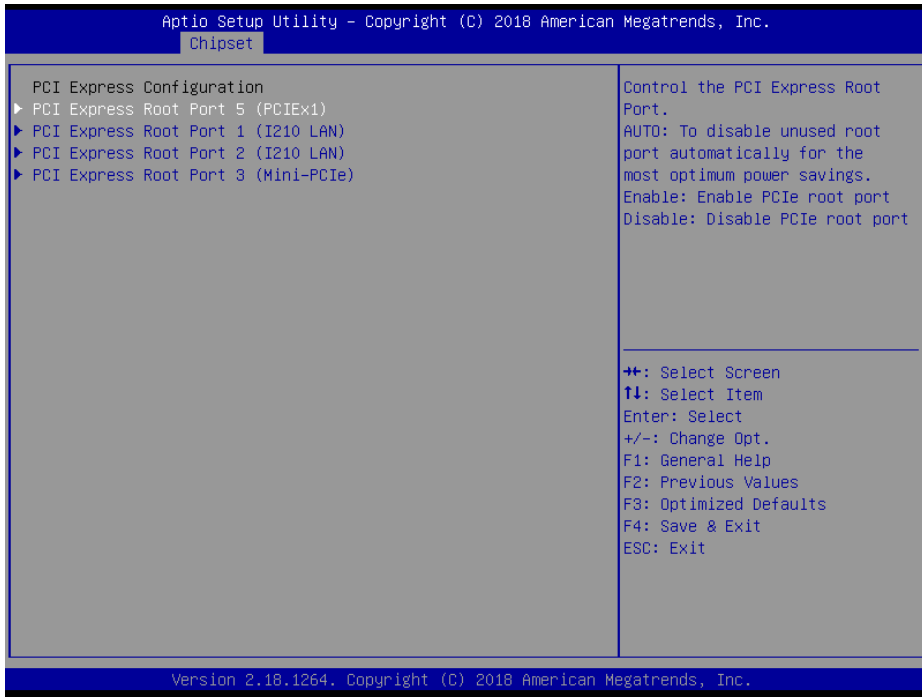


LPSS Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|------------------------------|---|---------------------------------------|
| LPSS I2C #1 Support (D22:F0) | - Disable - Enable (default) | Enables/Disables LPSS I2C #1 support. |
| Set LPSS I2C #1 Speed | - Fast Mode (default) - Standard Mode - 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*

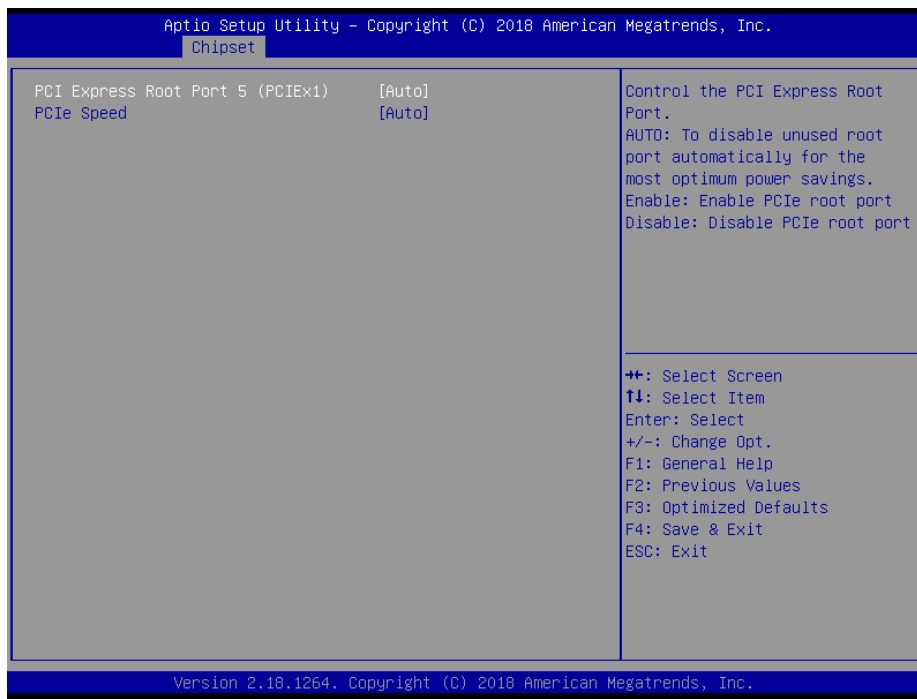


PCI Express Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|-------------------------------------|----------|----------------------------------|
| PCI Express Root Port 5 (PCIEx 1) | Sub-Menu | PCIe RP5 parameters (PCIEx 1). |
| PCI Express Root Port 1 (I210 LAN) | Sub-Menu | PCIe RP1 parameters (I210 LAN). |
| PCI Express Root Port 2 (I210 LAN) | Sub-Menu | PCIe RP2 parameters (I210 LAN). |
| PCI Express Root Port 3 (Mini-PCIe) | Sub-Menu | PCIe RP3 parameters (Mini PCIe). |

PCI Express Configuration - PCI Express Root Port 5 (PCIEx1)

Menu Path *Chipset > South Bridge > PCI Express Configuration > PCI Express Root Port 5 (PCIEx1)*

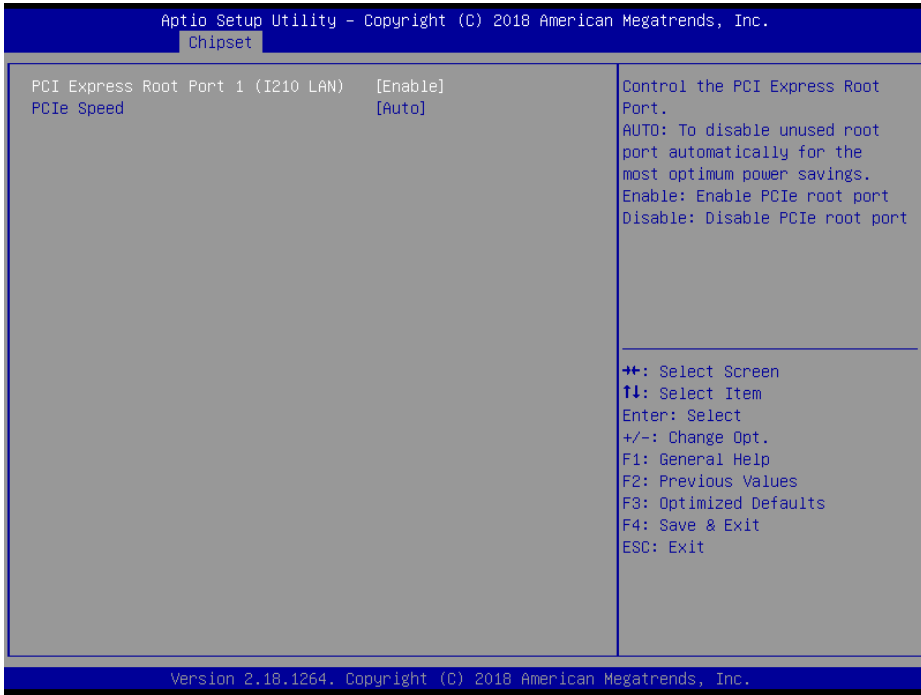


PCI Express Root Port 5 (PCIEx1) Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|-----------------------------------|-----------------------------------|--|
| PCI Express Root Port 5 (PCIEx 1) | - Disabled - Enabled - Auto | Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port. Disable: Disable PCIe root port. |
| PCIe Speed | - Auto - Gen1 - Gen2 | Configure PCIe Speed. |

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)*

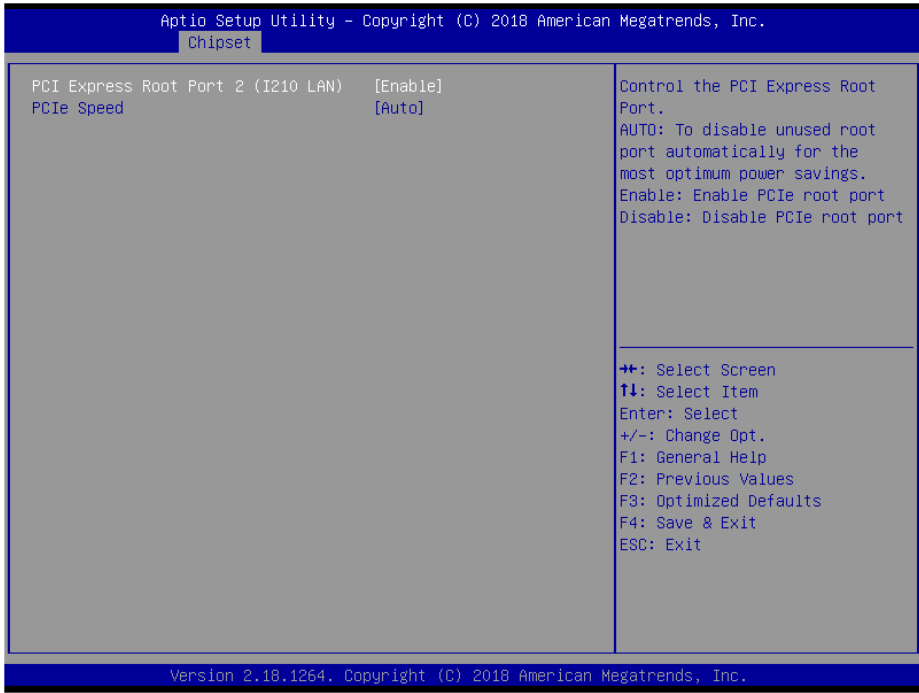


PCI Express Root Port 1 (I210 LAN) Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|--------------------------------------|---|--|
| PCI E Express Root Port 1 (I210 LAN) | - Disable - Enable (default) - Auto | Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port. Disable: Disable PCIe root port. |
| PCIe Speed | - Auto (default) - Gen1 - Gen2 | Configure PCIe Speed. |

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)*

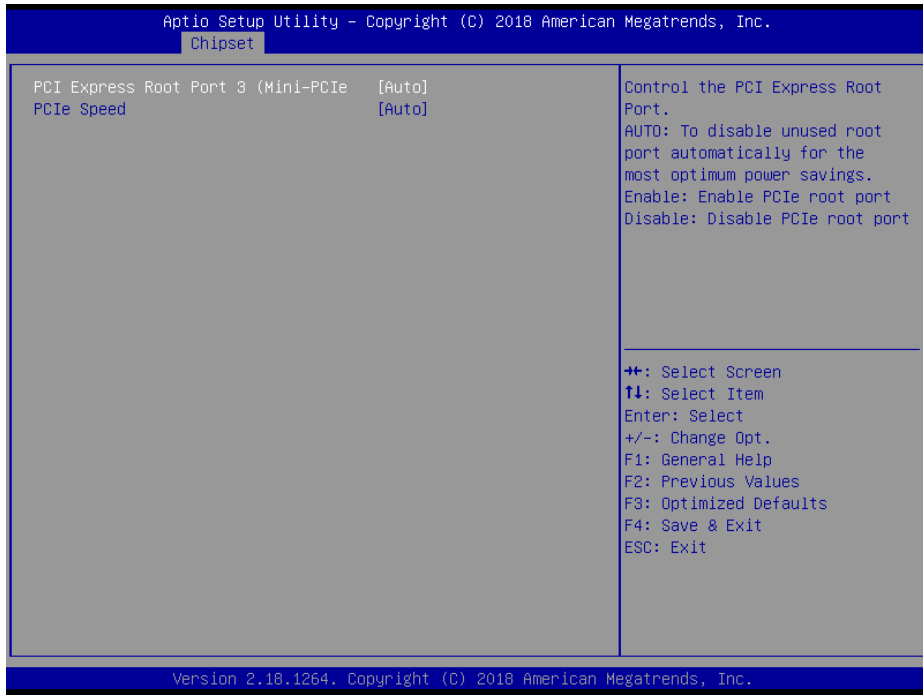


PCI Express Root Port 2 (I210 LAN) Configuration Screen

| BIOS Setting | Options | Description/Purpose |
|--------------------------------------|---|--|
| PCI E Express Root Port 2 (I210 LAN) | - Disable - Enable - Auto (default) | Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port. Disable: Disable PCIe root port. |
| PCIe Speed | - Auto (default) - Gen1 - Gen2 | Configure PCIe Speed. |

South Bridge - PCI Express Configuration - PCI Express Root Port 3

Menu Path *Chipset > South Bridge > PCI Express Configuration > PCI Express Root Port3 (Mini-PCIe)*

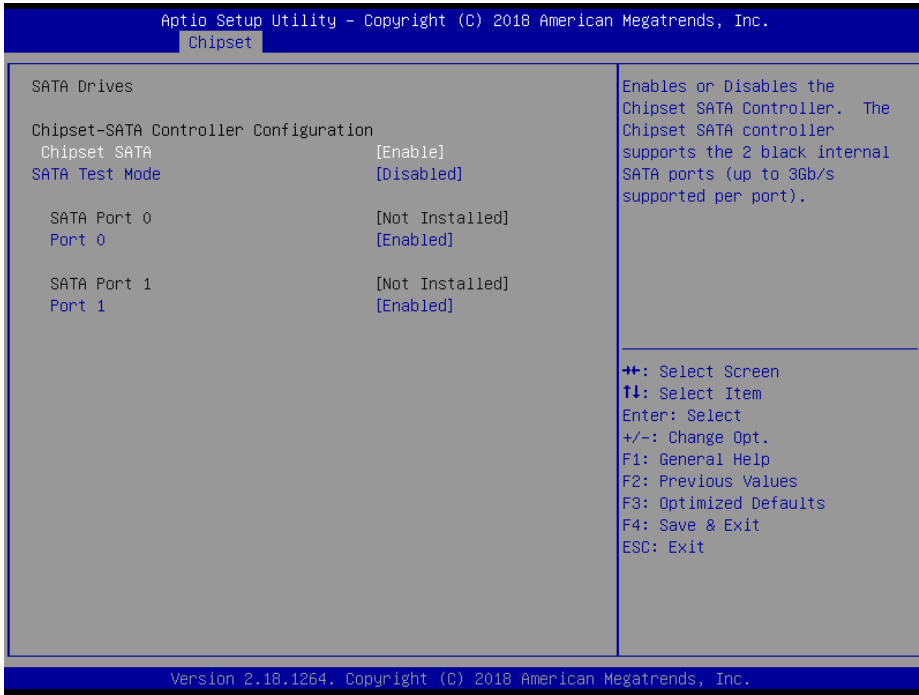


PCI Express Root Port 3 (Mini-PCIe) Screen

| BIOS Setting | Options | Description/Purpose |
|---------------------------------------|---|--|
| PCI E Express Root Port 3 (Mini-PCIe) | - Disable - Enable - Auto (default) | Control the PCI Express Root Port. AUTO: To disable unused root port automatically for the most optimum power savings. Enable: Enable PCIe root port. Disable: Disable PCIe root port. |
| PCIe Speed | - Auto (default) - Gen1 - Gen2 | Configures PCIe speed. |

5.5.2.4 South Bridge - SATA Drives

Menu Path *Chipset > South Bridge > SATA Drives*

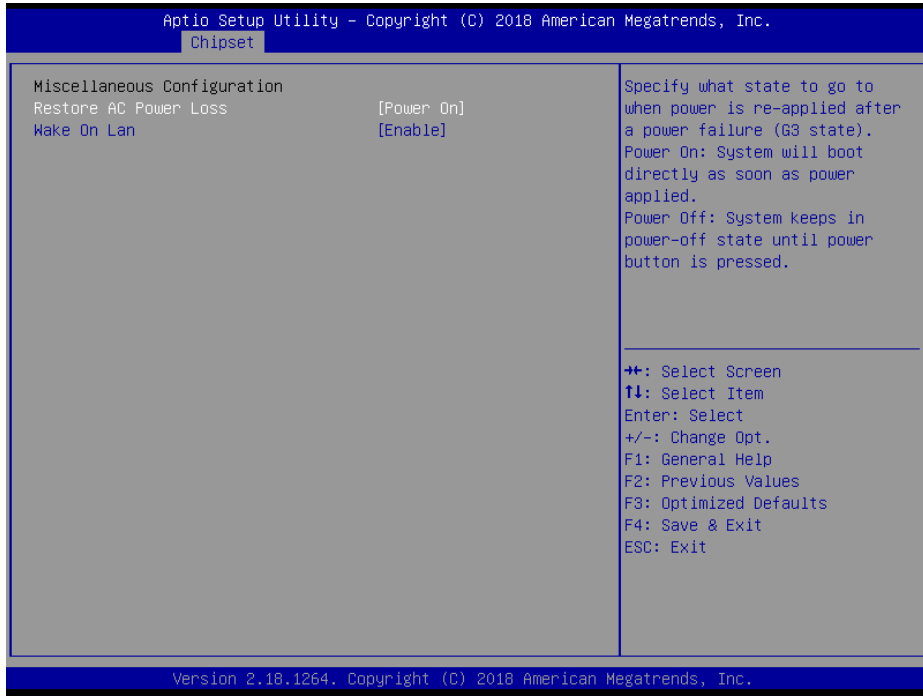


SATA Drives Screen

| BIOS Setting | Options | Description/Purpose |
|----------------|-----------------------------------|--|
| Chipset SATA | - Enabled (default) - Disabled | Enables/Disables the chipset SATA controller. |
| SATA Test Mode | - Disabled (default) - Enabled | Test Mode Enable/Disable |
| 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*

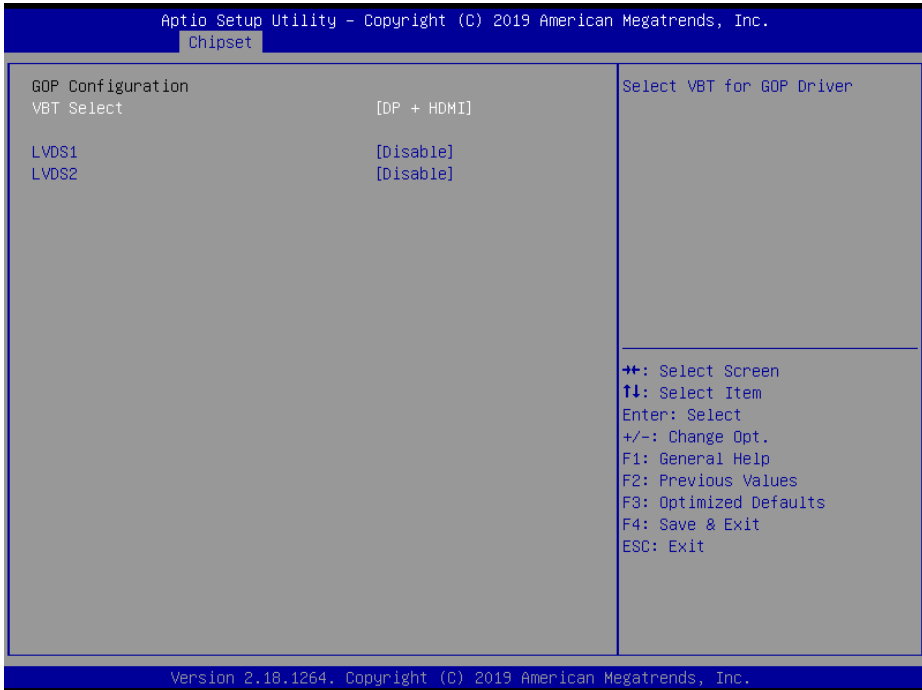


Miscellaneous Configuration Screen

| 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). <ul style="list-style-type: none"> • S0 State: System will boot directly as soon as power applied. • S5 State: 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. |

5.5.3 Chipset - Display Configuration

Menu Path *Chipset > Display Configuration*



Display Configuration Screen

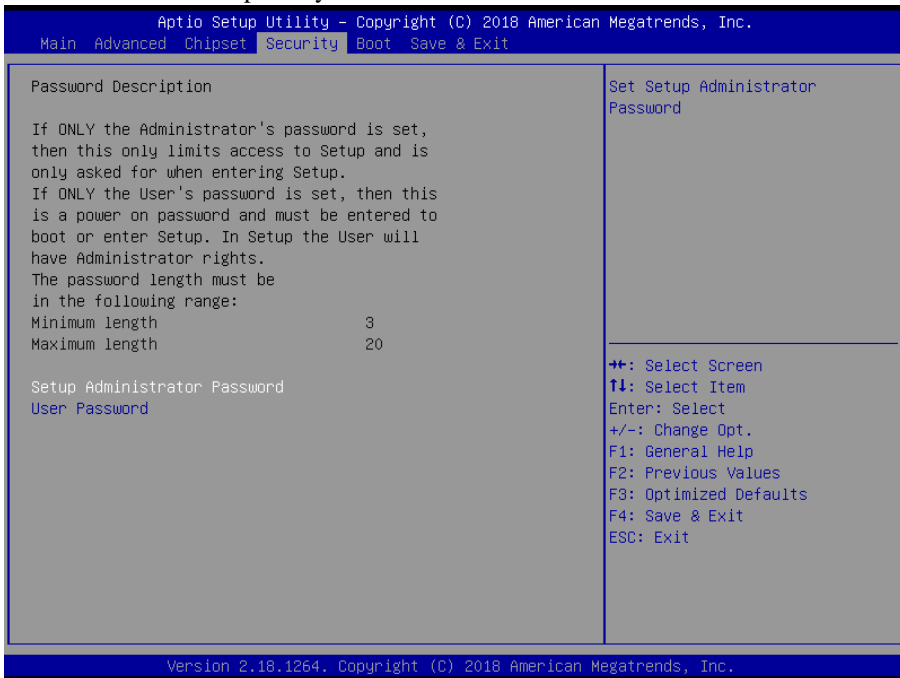
| BIOS Setting | Options | Description/Purpose |
|--------------|---------------------------------------|------------------------------|
| VBT Select | - DP+HDMI (default) - Only HDMI 4K | Select VBT for GOP Driver. |
| LVDS1 | - Disable(default) - Enable | Enable/Disable LVDS1 Display |
| LVDS2 | - Disable(default) - Enable | Enable/Disable LVDS2 Display |

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 |
|------------------------------|---|---------------------------------------|
| Setup Administrator Password | Password can be 3-20 alphanumeric characters. | Specifies the administrator password. |
| User Password | Password can be 3-20 alphanumeric characters. | Specifies the user password. |

Create an Administrator or User Password

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

Change an Administrator or User Password

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

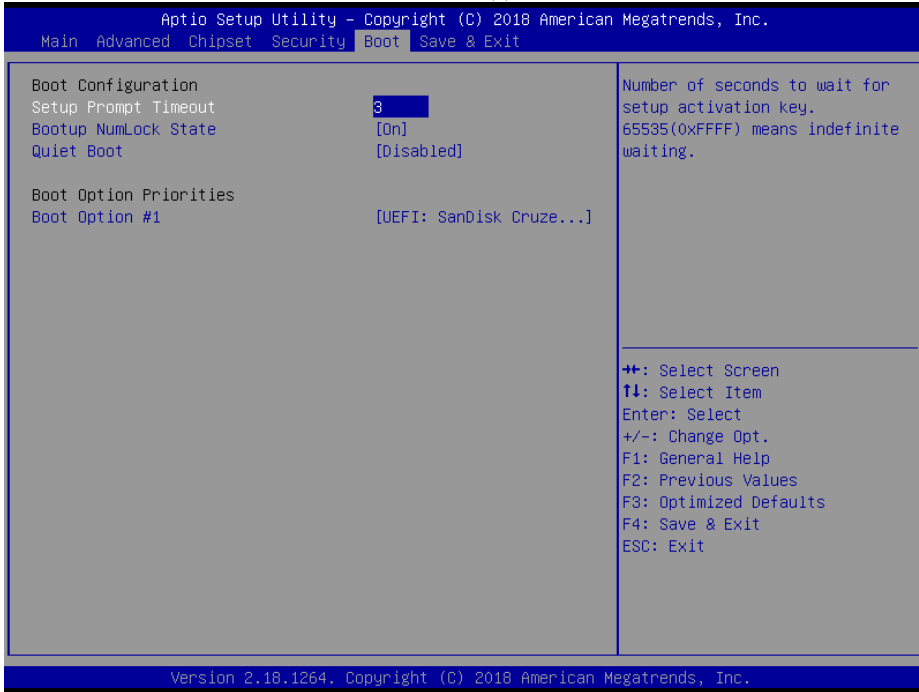
Remove an Administrator or User Password

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

5.7 Boot

Menu Path *Boot*

This menu provides control items for system boot configuration such as setting setup prompt timeout, Bootup NumLock State, enabling/disabling quiet boot, changing the boot order from the available bootable device(s).



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. <ul style="list-style-type: none"> • On: Enables the NumLock function automatically after the system is powered on. • Off: Disables the NumLock function after the system is powered on. |
| Quiet Boot | - Disabled (default) - Enabled | When quiet boot is enabled, it displays AMI or OEM logo (if |

| BIOS Setting | Options | Description/Purpose |
|---------------------|----------------------------|--|
| | | implemented) instead of POST messages during the boot. |
| 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

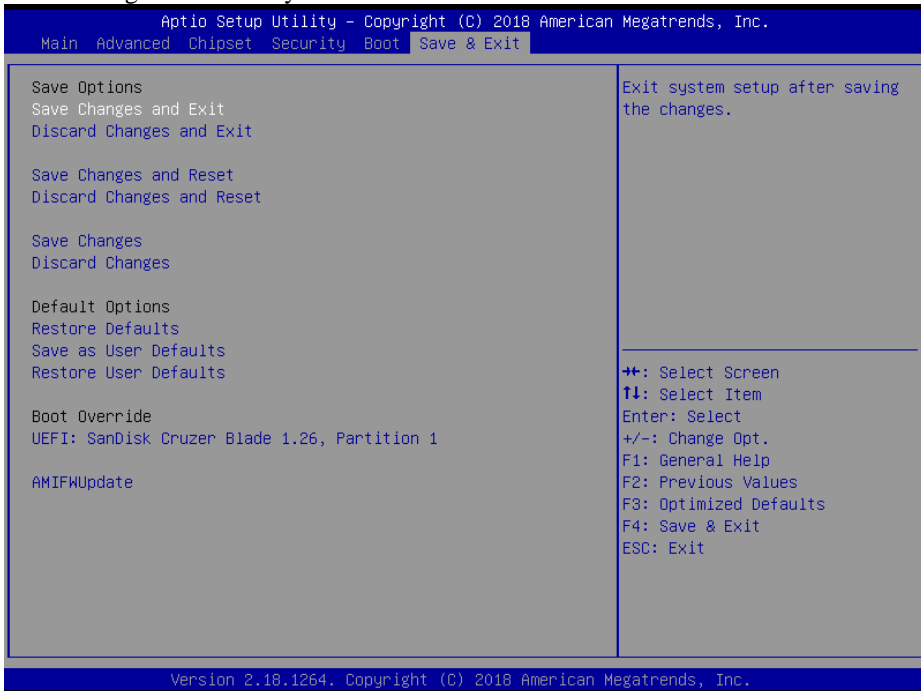
To save and validate the changed BIOS settings, select **Save Changes** from the **Save & Exit** menu, or you can select **Save Changes and Exit** (or press **F4**) to validate the changes and then exit the system. Select **Save Changes and Reset** to validate the changed BIOS settings and then restart 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 | 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)]. |
| AMIFWUpdate | No changeable options | Launches AMIFWUpdate |

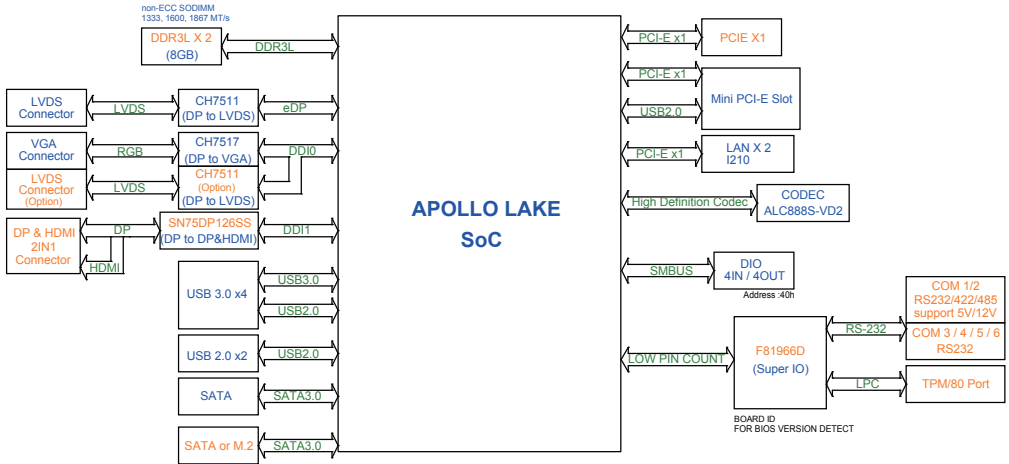
Appendix A Technical Summary

This appendix will give you a brief introduction of the allocation maps for BM-0982 resources.

The following topics are included:

- BM-0982 Block Diagram
- Interrupt Map
- I/O Map
- Memory Map
- Configuring WatchDog Timer
- Flash BIOS Update

BM-0982 Block Diagram



Interrupt Map

| IRQ | Assignment |
|--------|---|
| IRQ 0 | System timer |
| IRQ 3 | Intel SD Host Controller |
| IRQ 4 | Communications Port (COM1) |
| IRQ 6 | Communications Port (COM2) |
| IRQ 7 | Communications Port (COM3) |
| IRQ 8 | System CMOS/real time clock |
| IRQ 10 | Communications Port (COM4) |
| IRQ 14 | Intel(R) Serial IO GPIO Host Controller - INT3452 |
| IRQ 25 | High Definition Audio Controller |
| IRQ 31 | Intel(R) Serial IO I2C Host Controller - 5AB4 |
| IRQ 32 | Intel(R) Serial IO I2C Host Controller - 5AB6 |
| 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 | Assignment |
|------------|---------------------------------|
| IRQ 74 | Microsoft ACPI-Compliant System |
| IRQ 75 | Microsoft ACPI-Compliant System |
| IRQ 76 | Microsoft ACPI-Compliant System |
| IRQ 77 | Microsoft ACPI-Compliant System |
| IRQ 78 | Microsoft ACPI-Compliant System |
| IRQ 79 | Microsoft ACPI-Compliant System |
| IRQ 80 | Microsoft ACPI-Compliant System |
| IRQ 81 | Microsoft ACPI-Compliant System |
| IRQ 82 | Microsoft ACPI-Compliant System |
| IRQ 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 | Assignment |
|------------|---------------------------------|
| IRQ 107 | Microsoft ACPI-Compliant System |
| IRQ 108 | Microsoft ACPI-Compliant System |
| IRQ 109 | Microsoft ACPI-Compliant System |
| IRQ 110 | Microsoft ACPI-Compliant System |
| IRQ 111 | Microsoft ACPI-Compliant System |
| IRQ 112 | Microsoft ACPI-Compliant System |
| IRQ 113 | Microsoft ACPI-Compliant System |
| IRQ 114 | Microsoft ACPI-Compliant System |
| IRQ 115 | Microsoft ACPI-Compliant System |
| IRQ 116 | Microsoft ACPI-Compliant System |
| IRQ 117 | Microsoft ACPI-Compliant System |
| IRQ 118 | Microsoft ACPI-Compliant System |
| IRQ 119 | Microsoft ACPI-Compliant System |
| IRQ 120 | Microsoft ACPI-Compliant System |
| IRQ 121 | Microsoft ACPI-Compliant System |
| IRQ 122 | Microsoft ACPI-Compliant System |
| IRQ 123 | Microsoft ACPI-Compliant System |
| IRQ 124 | Microsoft ACPI-Compliant System |
| IRQ 125 | Microsoft ACPI-Compliant System |
| IRQ 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 | Assignment |
|------------|---------------------------------|
| IRQ 140 | Microsoft ACPI-Compliant System |
| IRQ 141 | Microsoft ACPI-Compliant System |
| IRQ 142 | Microsoft ACPI-Compliant System |
| IRQ 143 | Microsoft ACPI-Compliant System |
| IRQ 144 | Microsoft ACPI-Compliant System |
| IRQ 145 | Microsoft ACPI-Compliant System |
| IRQ 146 | Microsoft ACPI-Compliant System |
| IRQ 147 | Microsoft ACPI-Compliant System |
| IRQ 148 | Microsoft ACPI-Compliant System |
| IRQ 149 | Microsoft ACPI-Compliant System |
| IRQ 150 | Microsoft ACPI-Compliant System |
| IRQ 151 | Microsoft ACPI-Compliant System |
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| IRQ 153 | Microsoft ACPI-Compliant System |
| IRQ 154 | Microsoft ACPI-Compliant System |
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| IRQ 162 | Microsoft ACPI-Compliant System |
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| 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 | Assignment |
|------------|---------------------------------|
| IRQ 173 | Microsoft ACPI-Compliant System |
| IRQ 174 | Microsoft ACPI-Compliant System |
| IRQ 175 | Microsoft ACPI-Compliant System |
| IRQ 176 | Microsoft ACPI-Compliant System |
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| IRQ 197 | Microsoft ACPI-Compliant System |
| IRQ 198 | Microsoft ACPI-Compliant System |
| IRQ 199 | Microsoft ACPI-Compliant System |
| IRQ 200 | Microsoft ACPI-Compliant System |
| IRQ 201 | Microsoft ACPI-Compliant System |
| IRQ 202 | Microsoft ACPI-Compliant System |
| IRQ 203 | Microsoft ACPI-Compliant System |
| IRQ 204 | Microsoft ACPI-Compliant System |
| IRQ 256 | Microsoft ACPI-Compliant System |

| IRQ | Assignment |
|------------|---------------------------------|
| IRQ 257 | Microsoft ACPI-Compliant System |
| IRQ 258 | Microsoft ACPI-Compliant System |
| IRQ 259 | Microsoft ACPI-Compliant System |
| IRQ 260 | Microsoft ACPI-Compliant System |
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| IRQ 262 | Microsoft ACPI-Compliant System |
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| IRQ | Assignment |
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| IRQ 290 | Microsoft ACPI-Compliant System |
| IRQ 291 | Microsoft ACPI-Compliant System |
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| IRQ 321 | Microsoft ACPI-Compliant System |
| IRQ 322 | Microsoft ACPI-Compliant System |

| IRQ | Assignment |
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| IRQ 323 | Microsoft ACPI-Compliant System |
| IRQ 324 | Microsoft ACPI-Compliant System |
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| IRQ 326 | Microsoft ACPI-Compliant System |
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| IRQ | Assignment |
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| IRQ 356 | Microsoft ACPI-Compliant System |
| IRQ 357 | Microsoft ACPI-Compliant System |
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| IRQ 359 | Microsoft ACPI-Compliant System |
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| IRQ 388 | Microsoft ACPI-Compliant System |

| IRQ | Assignment |
|------------|---------------------------------|
| IRQ 389 | Microsoft ACPI-Compliant System |
| IRQ 390 | Microsoft ACPI-Compliant System |
| IRQ 391 | Microsoft ACPI-Compliant System |
| IRQ 392 | Microsoft ACPI-Compliant System |
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| IRQ 408 | Microsoft ACPI-Compliant System |
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| IRQ 411 | Microsoft ACPI-Compliant System |
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| IRQ 413 | Microsoft ACPI-Compliant System |
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| IRQ 419 | Microsoft ACPI-Compliant System |
| IRQ 420 | Microsoft ACPI-Compliant System |
| IRQ 421 | Microsoft ACPI-Compliant System |

| IRQ | Assignment |
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| IRQ 422 | Microsoft ACPI-Compliant System |
| IRQ 423 | Microsoft ACPI-Compliant System |
| IRQ 424 | Microsoft ACPI-Compliant System |
| IRQ 425 | Microsoft ACPI-Compliant System |
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| IRQ 447 | Microsoft ACPI-Compliant System |
| IRQ 448 | Microsoft ACPI-Compliant System |
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| IRQ 450 | Microsoft ACPI-Compliant System |
| IRQ 451 | Microsoft ACPI-Compliant System |
| IRQ 452 | Microsoft ACPI-Compliant System |
| IRQ 453 | Microsoft ACPI-Compliant System |
| IRQ 454 | Microsoft ACPI-Compliant System |

| IRQ | Assignment |
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| IRQ 455 | Microsoft ACPI-Compliant System |
| IRQ 456 | Microsoft ACPI-Compliant System |
| IRQ 457 | Microsoft ACPI-Compliant System |
| IRQ 458 | Microsoft ACPI-Compliant System |
| IRQ 459 | Microsoft ACPI-Compliant System |
| IRQ 460 | Microsoft ACPI-Compliant System |
| IRQ 461 | Microsoft ACPI-Compliant System |
| IRQ 462 | Microsoft ACPI-Compliant System |
| IRQ 463 | Microsoft ACPI-Compliant System |
| IRQ 464 | Microsoft ACPI-Compliant System |
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| IRQ 472 | Microsoft ACPI-Compliant System |
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| IRQ 475 | Microsoft ACPI-Compliant System |
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| IRQ 480 | Microsoft ACPI-Compliant System |
| IRQ 481 | Microsoft ACPI-Compliant System |
| IRQ 482 | Microsoft ACPI-Compliant System |
| IRQ 483 | Microsoft ACPI-Compliant System |
| IRQ 484 | Microsoft ACPI-Compliant System |
| IRQ 485 | Microsoft ACPI-Compliant System |
| IRQ 486 | Microsoft ACPI-Compliant System |
| IRQ 487 | Microsoft ACPI-Compliant System |

| IRQ | Assignment |
|----------------|---|
| IRQ 488 | Microsoft ACPI-Compliant System |
| IRQ 489 | Microsoft ACPI-Compliant System |
| IRQ 490 | Microsoft ACPI-Compliant System |
| IRQ 491 | Microsoft ACPI-Compliant System |
| IRQ 492 | Microsoft ACPI-Compliant System |
| IRQ 493 | Microsoft ACPI-Compliant System |
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| IRQ 501 | Microsoft ACPI-Compliant System |
| IRQ 502 | Microsoft ACPI-Compliant System |
| IRQ 503 | Microsoft ACPI-Compliant System |
| IRQ 504 | Microsoft ACPI-Compliant System |
| IRQ 505 | Microsoft ACPI-Compliant System |
| IRQ 506 | Microsoft ACPI-Compliant System |
| IRQ 507 | Microsoft ACPI-Compliant System |
| IRQ 508 | Microsoft ACPI-Compliant System |
| IRQ 509 | Microsoft ACPI-Compliant System |
| IRQ 510 | Microsoft ACPI-Compliant System |
| IRQ 511 | Microsoft ACPI-Compliant System |
| IRQ 1024 | Intel SD Host Controller |
| IRQ 4294967277 | Intel(R) HD Graphics |
| 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 #2 |
| IRQ 4294967284 | Intel(R) I210 Gigabit Network Connection |

| IRQ | Assignment |
|----------------|---|
| 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) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft) |
| IRQ 4294967291 | Intel(R) Trusted Execution Engine Interface |
| 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: These resource information were gathered using Windows 10 (the IRQ could be assigned differently depending on OS).

I/O MAP

| I/O Map | Assignment |
|-----------------------|---|
| 0x00000A00-0x00000A0F | Motherboard resources |
| 0x00000A10-0x00000A1F | Motherboard resources |
| 0x00000A20-0x00000A2F | Motherboard resources |
| 0x0000002E-0x0000002F | Motherboard resources |
| 0x0000004E-0x0000004F | Motherboard resources |
| 0x00000061-0x00000061 | Motherboard resources |
| 0x00000063-0x00000063 | Motherboard resources |
| 0x00000065-0x00000065 | Motherboard resources |
| 0x00000067-0x00000067 | Motherboard resources |
| 0x00000070-0x00000070 | Motherboard resources |
| 0x00000070-0x00000070 | System CMOS/real time clock |
| 0x00000080-0x0000008F | Motherboard resources |
| 0x00000092-0x00000092 | Motherboard resources |
| 0x000000B2-0x000000B3 | Motherboard resources |
| 0x00000680-0x0000069F | Motherboard resources |
| 0x00000400-0x0000047F | Motherboard resources |
| 0x00000500-0x000005FE | Motherboard resources |
| 0x00000600-0x0000061F | Motherboard resources |
| 0x0000164E-0x0000164F | Motherboard resources |
| 0x0000F040-0x0000F05F | Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4 |
| 0x0000D000-0x0000DFFF | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9 |
| 0x000003F8-0x000003FF | Communications Port (COM1) |
| 0x000002F8-0x000002FF | Communications Port (COM2) |
| 0x000003E8-0x000003EF | Communications Port (COM3) |
| 0x000002E8-0x000002EF | Communications Port (COM4) |
| 0x0000F000-0x0000F03F | Intel(R) HD Graphics |
| 0x0000E000-0x0000EFFF | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8 |
| 0x00000000-0x0000006F | PCI Express Root Complex |
| 0x00000078-0x00000CF7 | PCI Express Root Complex |
| 0x00000D00-0x0000FFFF | PCI Express Root Complex |

| I/O Map | Assignment |
|-----------------------|-----------------------------------|
| 0x00000020-0x00000021 | Programmable interrupt controller |
| 0x00000024-0x00000025 | Programmable interrupt controller |
| 0x00000028-0x00000029 | Programmable interrupt controller |
| 0x0000002C-0x0000002D | Programmable interrupt controller |
| 0x00000030-0x00000031 | Programmable interrupt controller |
| 0x00000034-0x00000035 | Programmable interrupt controller |
| 0x00000038-0x00000039 | Programmable interrupt controller |
| 0x0000003C-0x0000003D | Programmable interrupt controller |
| 0x000000A0-0x000000A1 | Programmable interrupt controller |
| 0x000000A4-0x000000A5 | Programmable interrupt controller |
| 0x000000A8-0x000000A9 | Programmable interrupt controller |
| 0x000000AC-0x000000AD | Programmable interrupt controller |
| 0x000000B0-0x000000B1 | Programmable interrupt controller |
| 0x000000B4-0x000000B5 | Programmable interrupt controller |
| 0x000000B8-0x000000B9 | Programmable interrupt controller |
| 0x000000BC-0x000000BD | Programmable interrupt controller |
| 0x000004D0-0x000004D1 | Programmable interrupt controller |
| 0x0000F090-0x0000F097 | Standard SATA AHCI Controller |
| 0x0000F080-0x0000F083 | Standard SATA AHCI Controller |
| 0x0000F060-0x0000F07F | Standard SATA AHCI Controller |
| 0x00000040-0x00000043 | System timer |
| 0x00000050-0x00000053 | System timer |

Memory Map

| Memory Map | Assignment |
|-------------------------|---|
| 0xE0000000-0xEFFFFFFF | Motherboard resources |
| 0xE0000000-0xEFFFFFFF | PCI Express Root Complex |
| 0xFEAA00000-0xFEAF00000 | 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 |
| 0xFEE00000-0xFEEFFFFFFF | Motherboard resources |
| 0x91310000-0x91313FFF | High Definition Audio Controller |
| 0x91000000-0x910FFFFFFF | High Definition Audio Controller |
| 0x91316000-0x913160FF | Intel(R) Celeron(R)/Pentium(R) Processor SMBUS - 5AD4 |
| 0x91180000-0x911FFFFFFF | Intel(R) I210 Gigabit Network Connection |
| 0x9117C000-0x9117FFFF | Intel(R) I210 Gigabit Network Connection |
| 0x91100000-0x911FFFFFFF | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD9 |
| 0x9131C000-0x9131CFFF | Intel(R) Serial IO I2C Host Controller - 5AB4 |
| 0x9131B000-0x9131BFFF | Intel(R) Serial IO I2C Host Controller - 5AB4 |
| 0xFED00000-0xFED003FF | High precision event timer |
| 0x91300000-0x9130FFFF | Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft) |
| 0x90000000-0x90FFFFFFF | Intel(R) HD Graphics |
| 0x80000000-0x8FFFFFFF | Intel(R) HD Graphics |
| 0x80000000-0x8FFFFFFF | PCI Express Root Complex |
| 0x91200000-0x912FFFFFFF | Intel(R) Celeron(R)/Pentium(R) Processor PCI Express Root Port - 5AD8 |

| Memory Map | Assignment |
|-------------------------|---|
| 0x9131A000-0x9131AFFF | Intel(R) Serial IO I2C Host Controller - 5AB6 |
| 0x91319000-0x91319FFF | Intel(R) Serial IO I2C Host Controller - 5AB6 |
| 0x7C000001-0x7FFFFFFF | PCI Express Root Complex |
| 0x7B800001-0x7BFFFFFF | PCI Express Root Complex |
| 0x91321000-0x91321FFF | Intel(R) Trusted Execution Engine Interface |
| 0xD0C00000-0xD0C00653 | Intel(R) Serial IO GPIO Host Controller - INT3452 |
| 0xCF000000-0xFFFFFFFF | Intel SD Host Controller |
| 0xCFFFE000-0xCFFFEFFF | Intel SD Host Controller |
| 0x91314000-0x91315FFF | Standard SATA AHCI Controller |
| 0x9131E000-0x9131E0FF | Standard SATA AHCI Controller |
| 0x9131D000-0x9131D7FF | Standard SATA AHCI Controller |
| 0x91280000-0x912FFFFFFF | Intel(R) I210 Gigabit Network Connection #2 |
| 0x9127C000-0x9127FFFF | Intel(R) I210 Gigabit Network Connection #2 |

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

(1) Enter the extended function mode

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

(2) Configure the configuration registers

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

(3) Exit the extended function mode

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

Code example for watch dog timer

Enable 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 -----

```
mov    al, 030h
out    dx, al
inc    dx
mov    al, 01h
out    dx, al
```

;----- Enable Watch PME-----

```
dec    dx
mov    al, 0FAh
out    dx, al
inc    dx
in     al, dx
and    al, 51h
out    dx, al
```

;----- Set timeout interval to 30 -----

```
dec    dx
mov    al, 0F6h
out    dx, al
inc    dx
```

mov al, 1Eh

out dx, al

;-----Set second as counting unit and start counting -----

dec dx

mov al, 0F5h

out dx, al

inc dx

in al, dx

and al, 30h

out dx, al

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

dec dx

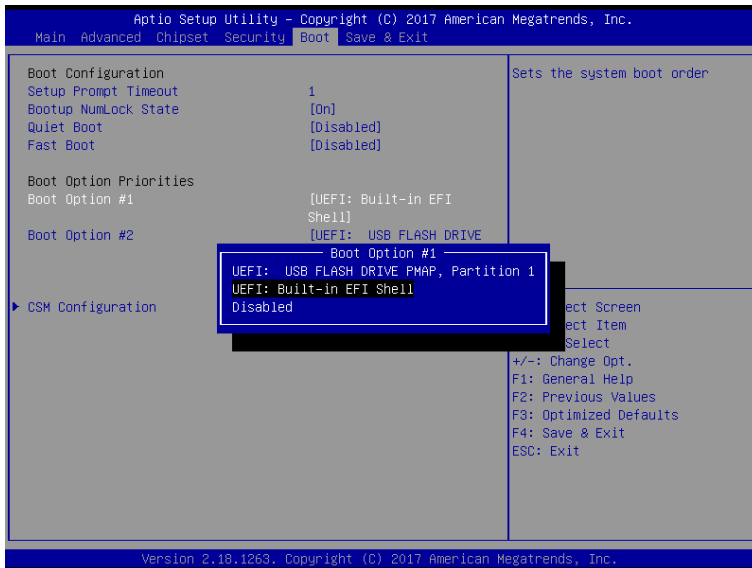
mov al, 0AAh

out dx, al

Flash BIOS Update

I. Prerequisites

- 1 Prepare a bootable media (e.g. USB storage device) which can boot the system to BIOS update.
- 2 Download and save the BIOS file (e.g. B9820TM4.bin) to the bootable device.
- 3 Copy AMI flash utility – AFUEFIx64.exe (v5.09.01) 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 during boot to enter BIOS Setup.
 - (3) Select [**Boot**] menu and set [**UEFI: Built-in EFI Shell**] and set the USB bootable device as the 1st boot device.
 - (4) Press **F4** to save the configuration and exit the BIOS setup menu.



II. AFUEFIx64 Command for System BIOS Update

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

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

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

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

2 Type " **AFUEFIx64 655Xxxxx.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 BIOS 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> afuefix64 655X0TM0.bin /p /b /n /x
+-----+
|                                     AMI Firmware Update Utility  v5.09.01.1317   |
|                                     |                                         |
|   Copyright (C) 2016 American Megatrends Inc. All Rights Reserved.           |
+-----+
Reading flash ..... done
- ME Data Size Checking . ok
- FFS checksums ..... ok
- Check RomLayout ..... Ok.
Erasing Boot Block ..... done
Updating Boot Block ..... done
Verifying Boot Block ..... done
Erasing Main Block ..... done
Updating Main Block ..... done
Verifying Main Block ..... done
Erasing NVRAM Block ..... done
Updating NVRAM Block ..... done
Verifying NVRAM Block ..... done

fs0:\afuefix64> _
```

- 5 Restart the system and boot up with the new BIOS configurations.
- 6 The BIO Update is completed after the system is restarted.
- 7 Reboot the system and verify if the BIOS version shown on the initialization screen has been updated.

