# *NF951T*

# *User's Manual*

***NO.: G03-NF951T-F***

***Revision: 2.0***

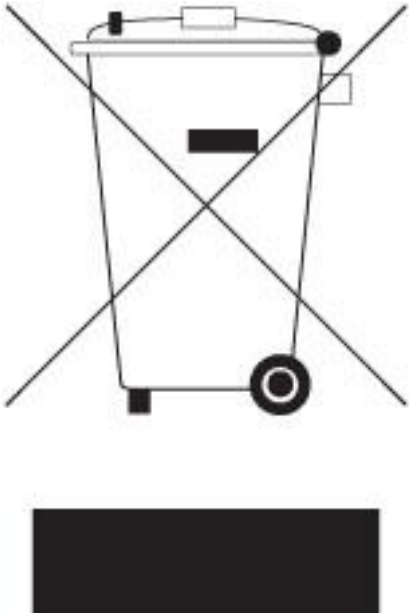
***Release date: December 13, 2022***

**Trademark:**

*** Specifications and Information contained in this documentation are furnished for information use only, and are subject to change at any time without notice, and should not be construed as a commitment by manufacturer.**

## Environmental Protection Announcement

Do not dispose this electronic device into the trash while discarding. To minimize pollution and ensure environment protection of mother earth, please recycle.



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# Environmental Safety Instruction

- Avoid the dusty, humidity and temperature extremes. Do not place the product in any area where it may become wet.

- 0 to 60 centigrade is the suitable temperature. (The figure comes from the request of the main chipset)

- Generally speaking, dramatic changes in temperature may lead to contact malfunction and crackles due to constant thermal expansion and contraction from the welding spots' that connect components and PCB. Computer should go through an adaptive phase before it boots when it is moved from a cold environment to a warmer one to avoid condensation phenomenon. These water drops attached on PCB or the surface of the components can bring about phenomena as minor as computer instability resulted from corrosion and oxidation from components and PCB or as major as short circuit that can burn the components. Suggest starting the computer until the temperature goes up.

- The increasing temperature of the capacitor may decrease the life of computer. Using the close case may decrease the life of other device because the higher temperature in the inner of the case.

- Attention to the heat sink when you over-clocking. The higher temperature may decrease the life of the device and burned the capacitor.

# USER'S NOTICE



## Manual Revision Information

| Reversion | Revision History | Date |
|---|---|---|
| 2.0 | Second Edition | December 13, 2022 |

## Item Checklist

# Chapter 1
# Introduction of the Motherboard

## 1-1 Feature of Motherboard

- Onboard Intel® Apollo Lake - I x5-E3940 processor, TDP 9.5 W,
- Support 1* DDR3L 1866MHz SO-DIMM, maximum capacity up to 8GB
- Onboard 2* 1.0GbE RJ-45 gigabit Ethernet LAN port
- Support 1 * VGA,1* HDMI, 1* eDP
- Support 3 independent displays
- Onboard 1* M.2 M-key slot, type-2242/2260/2280, SATAIII and PCIe x2 interface
- Onboard 1* full size Mini-PCIe, PCIe x1 and USB2.0 interface, support Wi-Fi / Bluetooth / 3G / 4G
- Support 4* USB 3.1 Gen.1 + 2* USB 2.0
- Support 6* COM (**COM3,4** supports RS485 w/ isolated)
- Support 8 in /8 out GPIO w/ isolated
- Support 9~36 V DC-IN
- Support Wide active temperature -40~85°C
- Support Watchdog function
- Solution for Industrial PCs / Factory Automation / IoT Solution

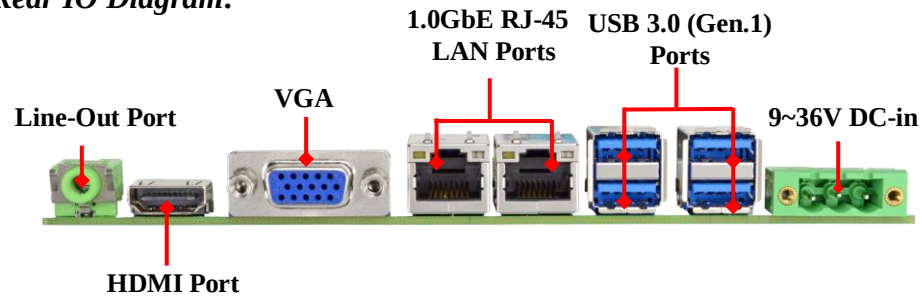
## 1-2 Specification

| Spec | Description |
|---|---|
| **Design** | ● PCB size: 16.7x 13.8 cm |
| **Embedded CPU** | ● Integrated with Intel® Apollo Lake-I x5-E3940 CPU (TDP 9.5W)<br>** **Note:** CPU model varies from different IPC options. Please consult your dealer for more information of onboard CPU.* |
| **Memory Slot** | ● 1*DDR3L SO-DIMM slot support 1* DDR3L 1866MHz non-ECC SO-DIMM up to 8GB<br>** **Note:** Memory clock supporting range is decided by specific CPU of the model. For more memory compatibility information please consults your local dealer.* |
| **Expansion Slot** | ● 1* Mini-PCIe slot, support Wi-Fi / Bluetooth / 3G / 4G (***MPE***) |
| **Storage** | ● 1* M.2 M-key slot, type-2242/2260/2280, SATAIII and PCIe x2 interface (***M2.M***) |
| **LAN Chip** | ● Integrated with 2*Intel i210-IT Gigabit LAN chip<br>● Support Fast Ethernet LAN function of providing 10/100/1000Mbps Ethernet data transfer rate |
| **Audio Chip** | ● Realtek ALC662VD 4-CH HD audio chip |
| **BIOS** | ● AMI Flash ROM |
| **Rear I/O** | ● 1* 9~36V DC-in 3PIN phoenix connector<br>● 1* VGA port<br>● 1* HDMI port<br>● 4* USB 3.0 (Gen.1) port<br>● 2* 1.0GbE RJ-45 LAN port<br>● 1* Audio Line Out port |
| **Front I/O** | ● 1* Power button<br>● 1* AT/ATX mode switch<br>● 1* SIM card slot<br>● 2* RS232/422/485 ( COM1 with 5V/12V power select )<br>● 1* Power ON/OFF 2PIN phoenix connector<br>● 1* 16 bit GPIO phoenix connector w/ isolated (8 in/8 out) |

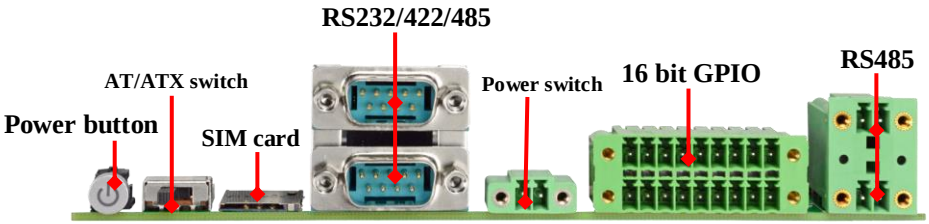
| | |
|---|---|
| | ● 2* RS485 phoenix connector w/ isolated |
| **Internal I/O** | ● 1* 2-pin internal 9~36V DC-in power connector<br>● 1* CPU FAN header<br>● 1* Front panel header<br>● 1* 9-pin USB 2.0 header (Expansible to 2* USB 2.0 ports)<br>● 2* Serial port header (**COM5/COM6**; supports RS232)<br>● 1* Front panel audio header<br>● 1* EDP header<br>● 1* SMBUS header<br>● 1* LAN LED activity LED header |

## 1-3 Layout Diagram

***Rear IO Diagram:***



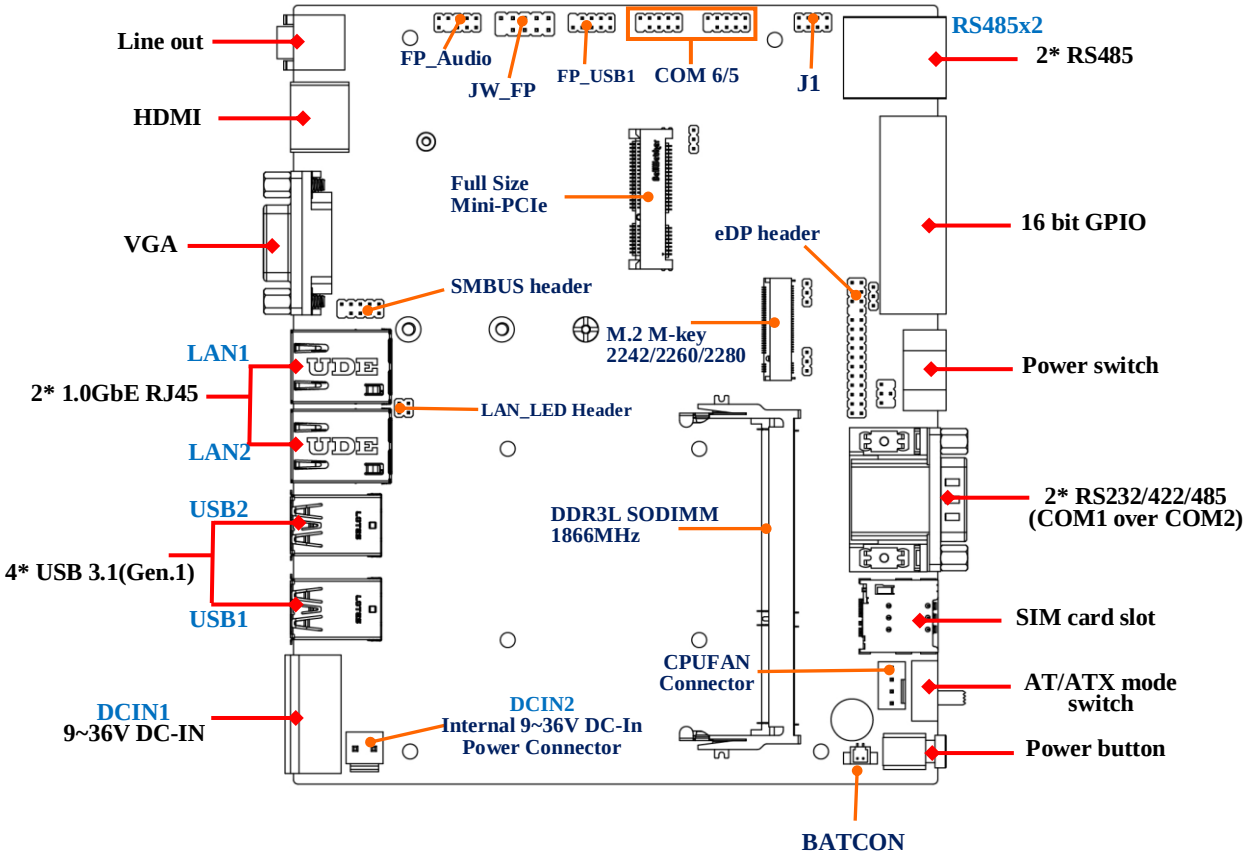

***Front IO Diagram:***



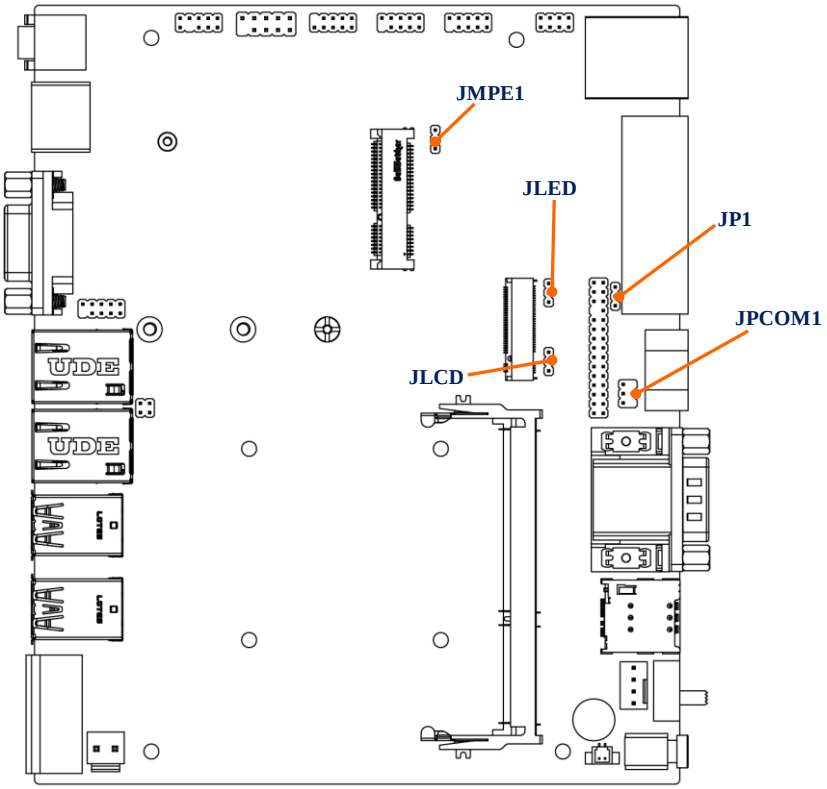
**Warning!!**

The board has a 9~36V DC-in power connector **(DCIN1)** in I/O back panel and an internal 9~36V power connector **(DCIN2).** User can only connect one type of compatible power supply to one of them to power the system.

## *Motherboard Internal Diagram*



## *Motherboard Jumper Position*



## *Jumpers*

| Jumper | Name | Description |
|---|---|---|
| JP1 | GPIO Port Power Select | 3-Pin Block |
| JPCOM1 | COM1 Port Pin-9 Function Select | 4-Pin Block |
| JMPE1 | Mini PCI-E Slot (MPE1) VCC3.3V/3.3VSB Select | 3-Pin Block |
| JLED | Panel Backlight Power Select | 3-Pin Block |
| JLCD | LCD Panel Power Select | 3-Pin Block |
| J1 | Function Header | 8-pin Block |

## *Connectors*

| Connector | Name |
|---|---|
| DCIN1 | 9~36V DC–IN Power Phoenix Connector |
| DCIN2 | Internal 9~36V DC-IN Power Connector |
| USB1/USB2 | USB 3.1 (Gen.1) Port Connector X4 |
| LAN1/LAN2 | RJ-45 LAN Port Connector X2 |
| VGA | VGA Port Connector |
| HDMI | HDMI Port Connector |
| LINE_OUT | Audio Line Out Connector |
| RS485x2 | RS485 With Isolated Function Phoenix Connector X2 |
| 16 Bit GPIO | 8 IN / 8 OUT With Isolated Function Phoenix Connector |
| Power Switch | Power switch 2 PIN Phoenix Connector |
| COM1/COM2 | RS232/422/485 X2 ( COM1 with 5V/12V power select ) |
| SIM Card Slot | SIM card |
| CPU FAN | CPUFAN Connector |
| MPE | Full Size Mini-PCIe |
| M.2M | M.2 M-key 2242/2260/2280 SATAIII and PCIe x2 interface (***M2.M***) |

| | |
|---|---|
| SODIMM1 | DDR3L SODIMM 1866MHz X1 |

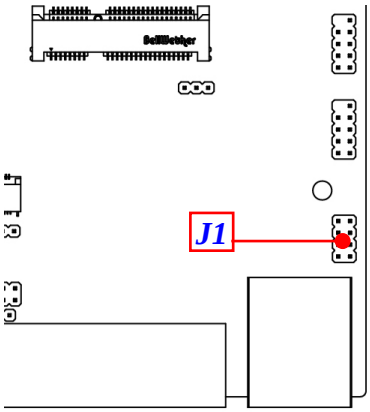
## *Headers*

| Header | Name | Description |
|---|---|---|
| JW_FP | Front Panel Header(PWR LED/ HDD LED/Power Button /Reset) | 9-pin Block |
| FP_USB1 | USB 2.0 Header | 9-pin Block |
| FP_AUDIO | Front Panel Audio Header | 9-pin Block |
| SMBUS_GPIO | SMBUS Port Header | 9-pin Block |
| COM5/COM6 | Serial Port Header | 9-pin Block |
| EDP | EDP Port Header | 29-pin Block |
| LAN_LED | LAN Activity LED Header | 4-pin Block |

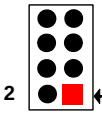
# hapter 2
# Hardware Installation

## 2-1 Jumper Settings

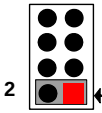
### *Pin (1-2) of J1 (8-pin): ME/RTC Reset*




*Pin (1-2) of J1→ME/RTC Reset*

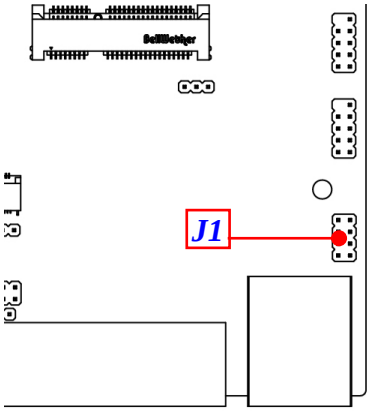



**1-2 Open: Normal(Default);**

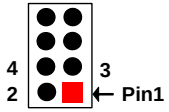



**1-2 Closed: RTC Reset.**

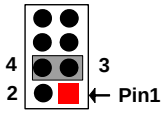
### *Pin (3-4) of J1 (8-pin): Clear CMOS RAM Settings*




*Pin (3-4) of J1→Clear CMOS*

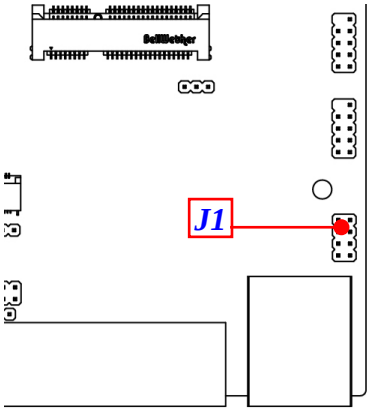



**3-4 Open: Normal(Default);**

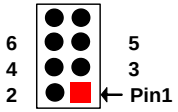



**3-4 Closed: Clear CMOS.**

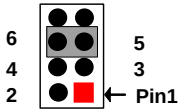
### *Pin (5-6) of J1 (8-pin): TXE Override Select*




*Pin (5-6) of J1→TXE Override*

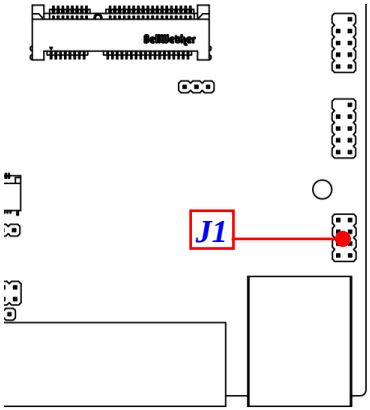



**5-6 Open: Normal(Default);**

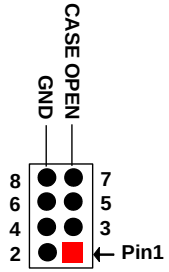



**5-6 Closed: ME Flash Overide.**

### *Pin (7-8) of J1 (8-pin): Case Open Message Display Function Select*



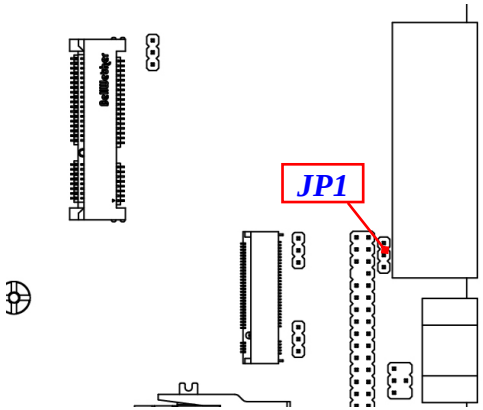

*Pin (7-8) of J1→Case Open*



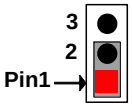

**7-8 Short: Case Open Detect**

***Pin 7-8 Short**: When Case open function pin short to GND, the Case open function was detected. When Used, needs to enter BIOS and enable **'Case Open Detect'** function. In this case if your case is removed, next time when you restart your computer, a message will be displayed on screen to inform you of this.*

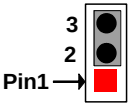
***JP1 (3-pin): GPIO Port Power Select (2.0mm pitch)***




***JP1→GPIO Port Power Select***




**1-2 Closed: Normal(Default)**



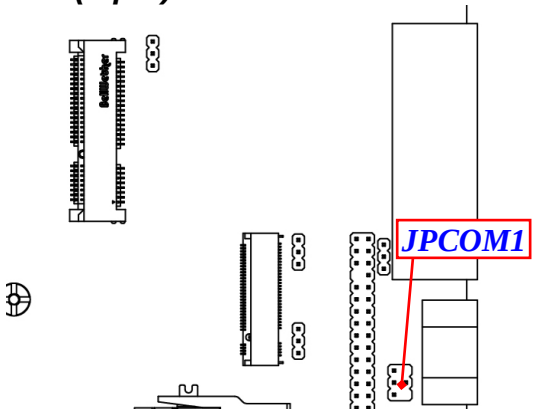

**2-3 Closed: PCOM**

****Note:***

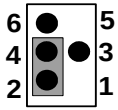
***JP1(1-2): Normal mode,*** *refer to Pin10-17 of GPIO1 Connector as GPIO output pins, the voltage level in this mode is directly provided by the connected remote device.*

***JP1(2-3): PCOM mode****, Pin10-17 (GPIO output pins), after adjusting to PCOM mode, the reference voltage level provided by GPIO1 pin1(COM) will be used to stabilize the voltage of Pin10-17, when Pin10-17 If there is an abnormal surge on the line, you can remove the surge through Pin1(COM) to achieve the protection function.*

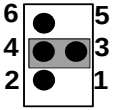
## JPCOM1 (4-pin): COM1 Port Pin-9 Function Select (2.0mm pitch)



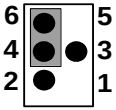

JPCOM1→COM1 Port Pin-9 Function Select




2-4 Closed: RING

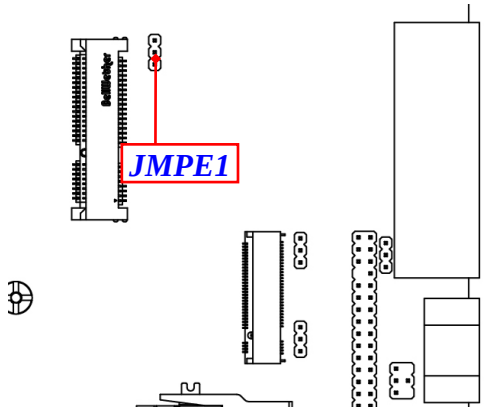



3-4 Closed: +5V

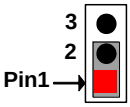



4-6 Closed: +12V

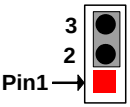
## JMPE1 (3-pin): Mini PCI-E Slot (MPE1) VCC3.3V/3.3VSB Select (2.0mm pitch)




JMPE1→ Mini PCI-E Slot (MPE1) VCC3.3V/3.3VSB Select

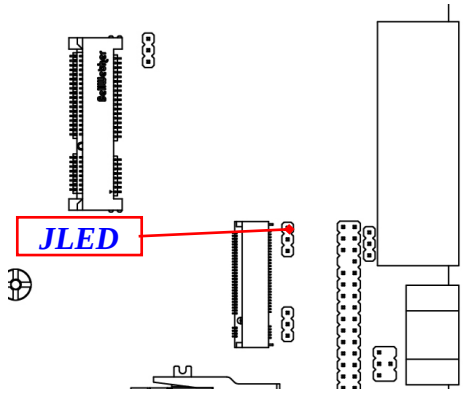



1-2 Closed: VCC 3.3V (Default)

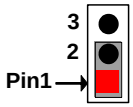



2-3 Closed: 3.3VSB

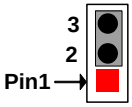
## *JLED (3-pin): Panel Backlight Power Select (2.0mm pitch)*




***JLED →Panel Backlight Power Select***

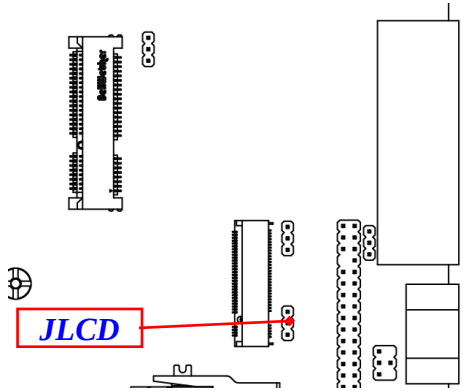



**1-2 Closed: 5V**

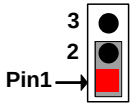



**2-3 Closed: 12V (Default)**

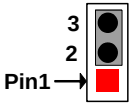
## *JLCD (3-pin): LCD Panel Power Select (2.0mm pitch)*




***JLCD →LCD Panel Power Select***




**1-2 Closed: 3.3V (Default)**




**2-3 Closed: VCC**

# 2-2 Connectors and Headers

## 2-2-1 Connectors

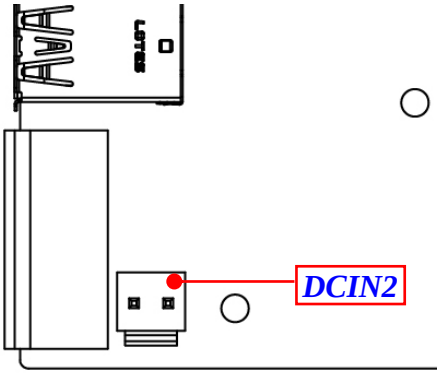
### (1) Rear & Front I/O Connectors

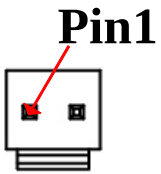
**** Refer to Page-3 Rear & Front IO Diagram.***

| *Icon* | *Name* | *Function* |
|---|---|---|
|  | **9~36V DC-in Power Phoenix Connector** | For user to connect compatible power adapter to provide power supply for the system. |
|  | **USB 3.1 (Gen.1) Port** | To connect USB keyboard, mouse or other devices compatible with USB 3.1 (Gen.1) specification. Ports support up to 10Gbps data transfer rate. |
|  | **1.0GbE RJ-45 LAN Port** | This connector is standard 1.0Gbps RJ-45 LAN jack for Network connection. |
|  | **VGA Port** | To connect display device that support VGA specification. |
|  | **HDMI Port** | To connect display device that support HDMI specification. |
|  | **Line-Out Connector** | For user to connect external speaker, earphones, etc to transfer system audio output. |
|  | **Serial Port Phoenix Connector with Isolator** | To connect device that support RS485 specification with isolator. |
|  | **GPIO Port Phoenix Connector with Isolator** | To connect device that support GPIO 8IN/8OUT specification with isolator. |

| | | |
|---|---|---|
|  | **Power Switch Phoenix Connector** | For user could connect external power control device. |
|  | **Serial Port** | Mainly for user to connect external MODEM or other devices that supports Serial Communications Interface. |
|  | **Micro SIM Card Slot** | Support micro SIM card for 3G/4G Function. |

### *(2) DCIN2(2-pin) : Internal 9~36V DC-in Power Connector*

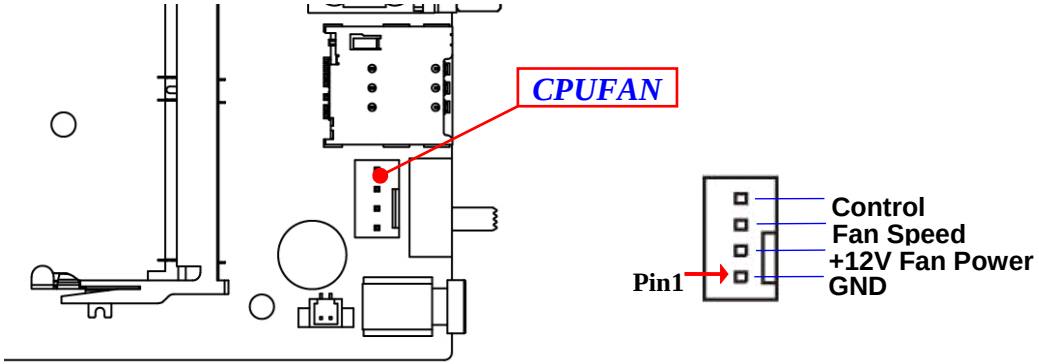



| Pin No. | Definition |
|---|---|
| 1 | +9V~36VC DC-In |
| 2 | GND |

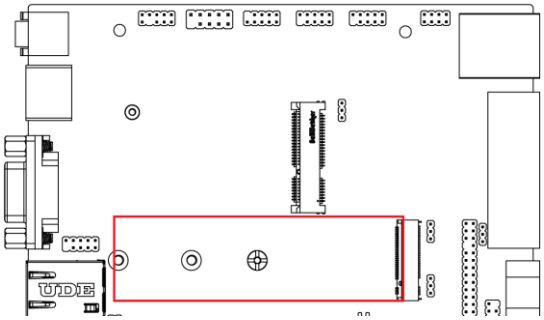
***Warning:*** *Find Pin-1 position before connecting power cable to this 2-pin power connector.* ***WRONG INSTALLATION DIRECTION WILL DAMAGE THE BOARD!!***

### *(3) CPUFAN (4-pin): CPU FAN Connector*




### *(4) M2.M: M.2 M-key Slot*

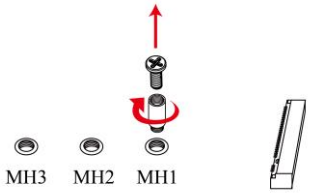
M2.M:M.2 M-Key slot supports compatible type 2242/2260/2280 SATAIII and PCIex2 module.



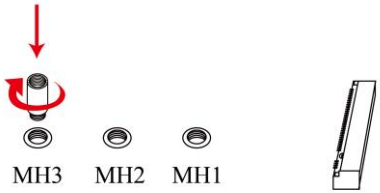
***M2.M Slot:***


***M.2 Module Installation Guide***

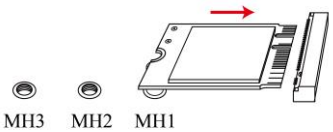
| Nut Location | MH1 | MH2 | MH3 |
|---|---|---|---|
| Card Length | 4.2 cm | 6 cm | 8 cm |
| Module Type | Type- 2242 | Type- 2260 | Type- 2280 |



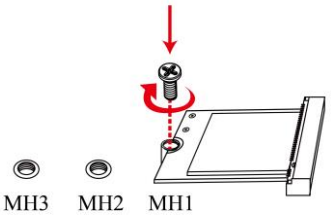

a) Remove the screw post and nut fixed at location **MH1** by default (Skip step b & c and go straight to Step 4 if you are going to use the default nut).




b) Lock the screw post into the location corresponding to the length of the module.

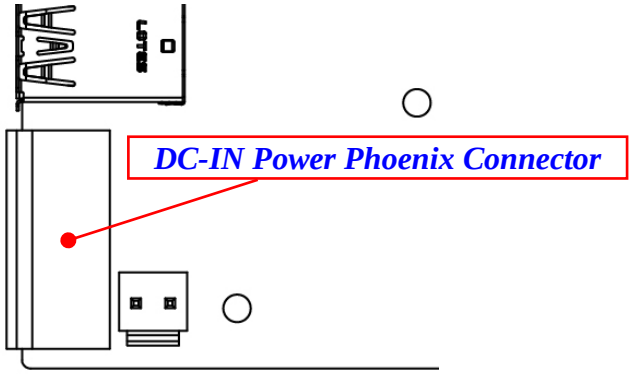


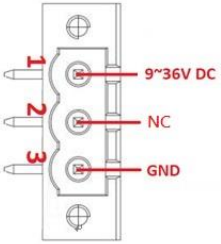

c) Align and insert corresponding M.2 module, as the photo shows.



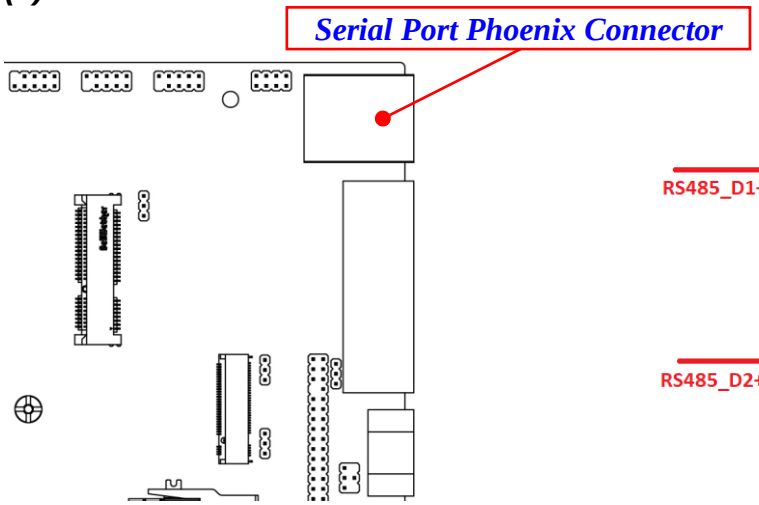

d) Tighten up the screw to secure the module into the M.2 connector. Make sure not overtighten the screw to avoid possible damage to the module.

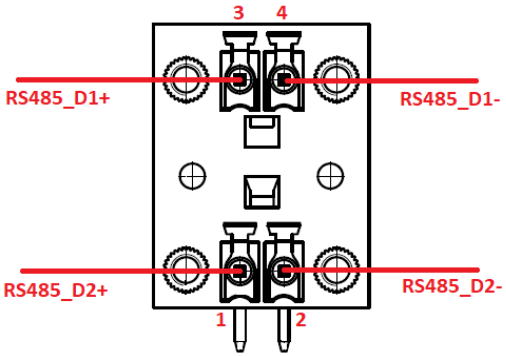
## (5) 9~36V DC-IN Power Phoenix Connector



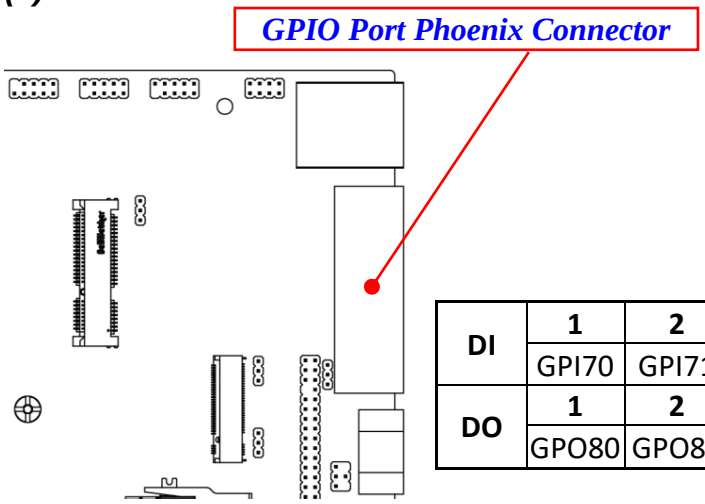



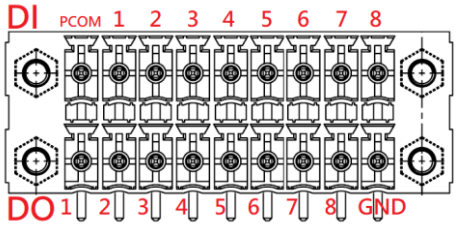

## (6) Serial Port Phoenix Connector



## (7) GPIO Port Phoenix Connector

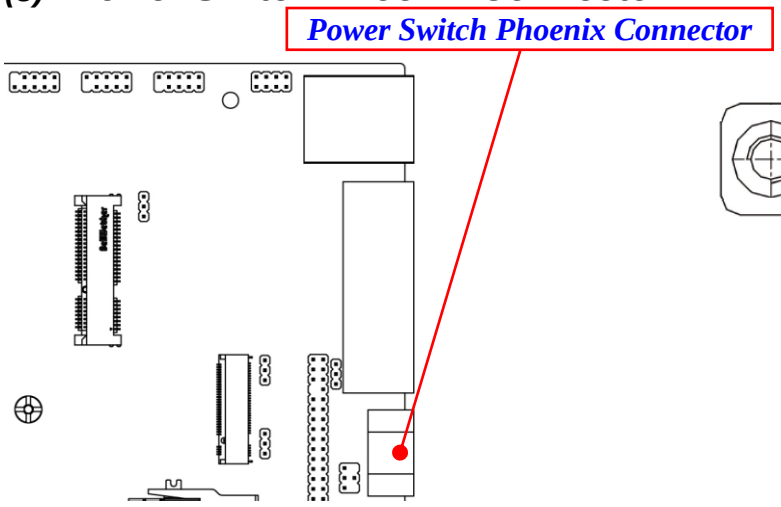


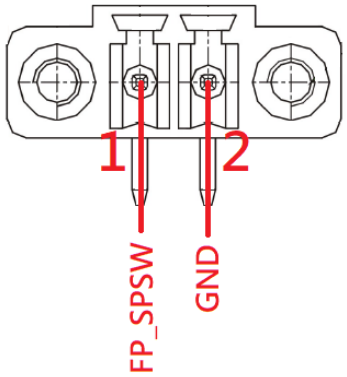




| DI | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| | GPI70 | GPI71 | GPI72 | GPI73 | GPI74 | GPI75 | GPI76 | GPI77 |
| **DO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| | GPO80 | GPO81 | GPO82 | GPO83 | GPO84 | GPO85 | GPO86 | GPO87 |

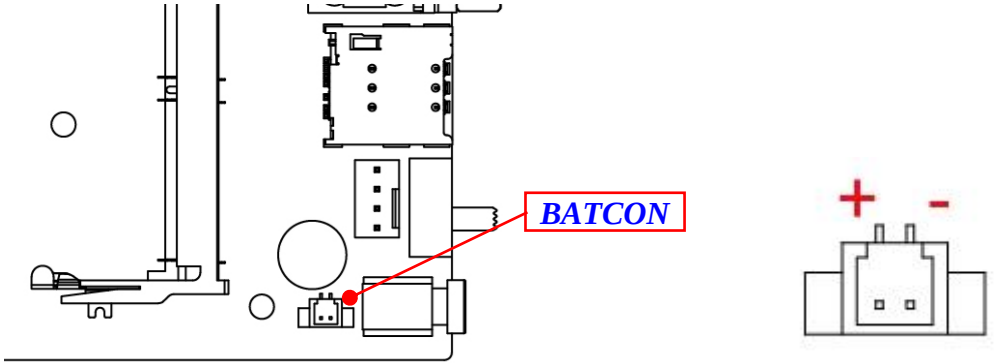
***Note:** 5-36VDC for GPIO1 DO 1-7, this voltage is provided by the connected remote device without adjustment*

## (8) Power Switch Phoenix Connector



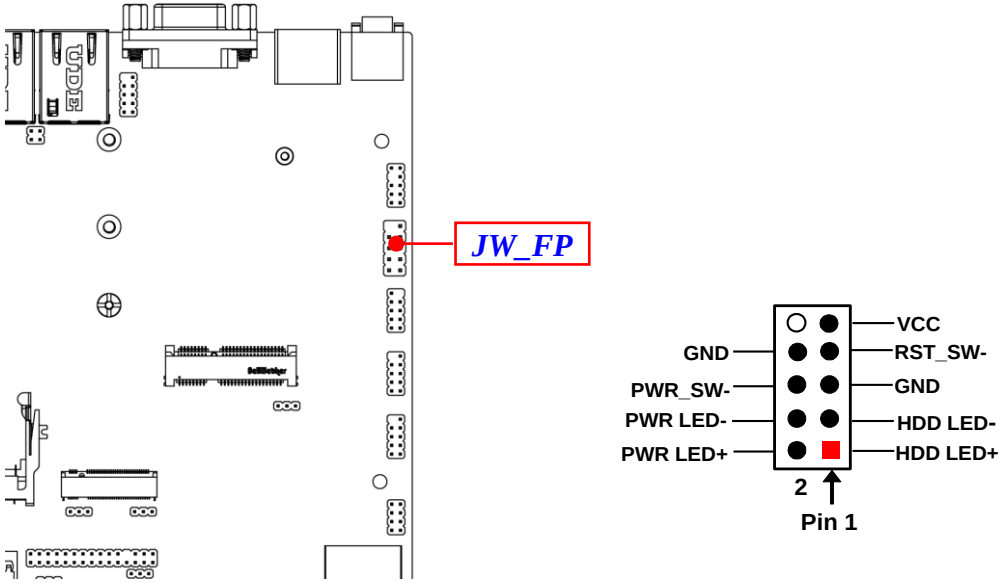



### *(9) BATCON (2-pin): Battery Connector*

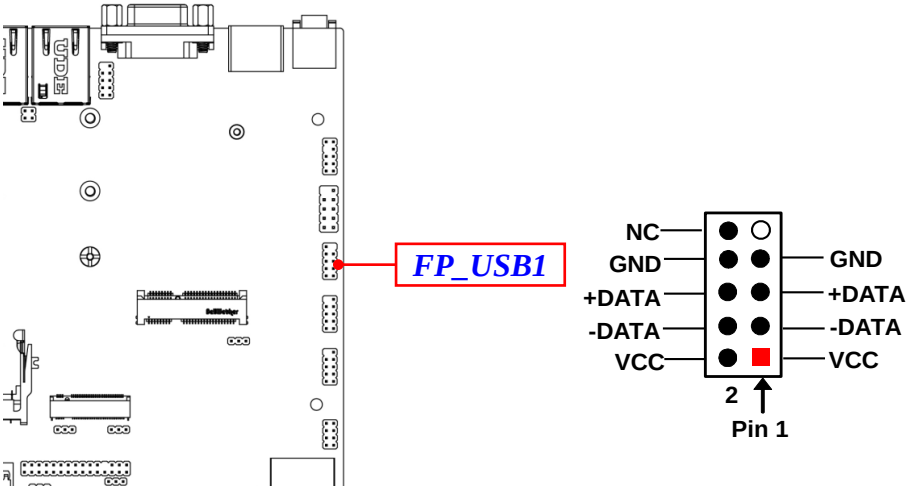



## 2-2-2 Headers

### (1) JW_FP (9-pin): Front Panel Header (2.54mm pitch)

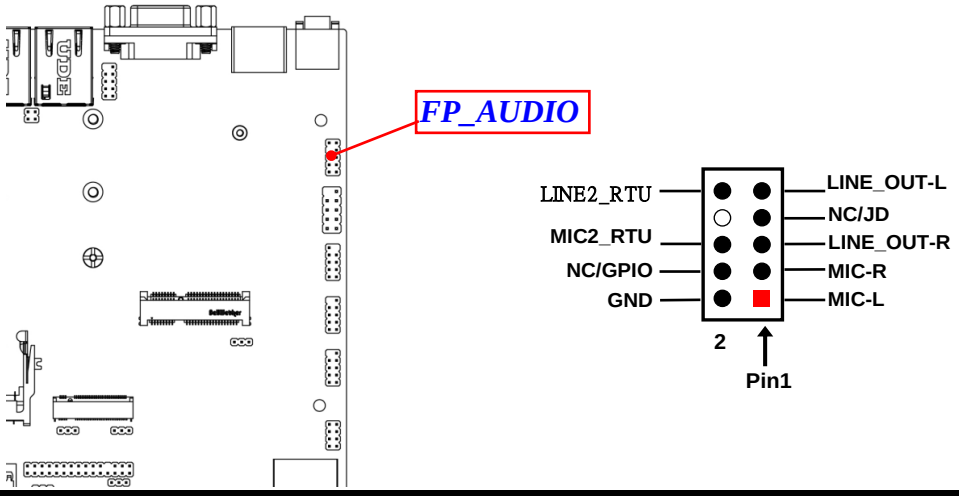


## (2) FP_USB1 (9-pin): USB 2.0 Port Header (2.0mm pitch)



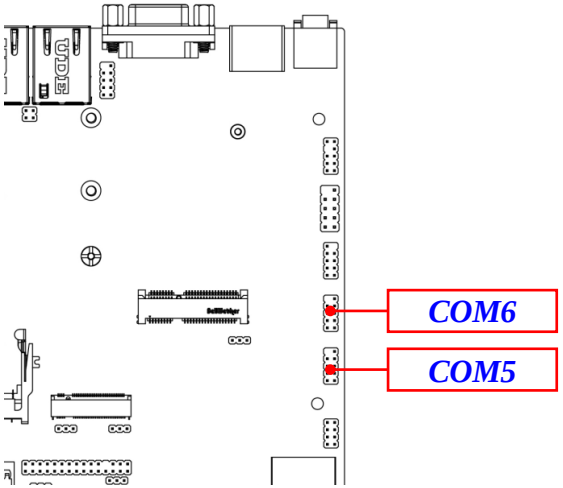

## (3) FP_AUDIO (9-pin): Line-Out, MIC-In Header (2.0mm pitch)

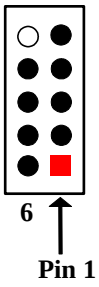
This header connects to Front Panel Line-out, MIC-In connector with cable.



## (4) COM5/6(9-pin): Serial Port Headers

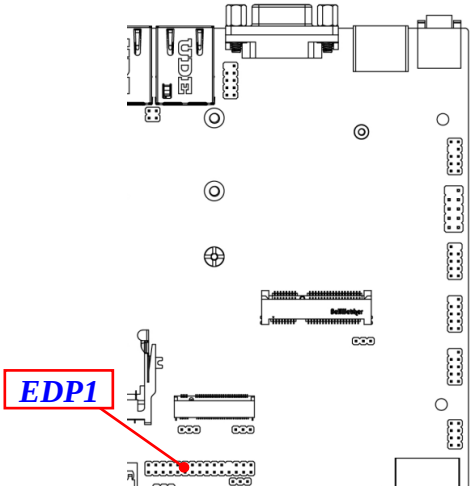
***COM5/6: RS232 Serial Port Header.***

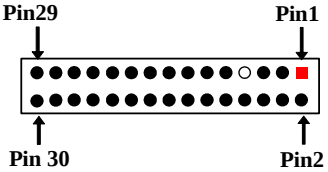



| Pin NO. | RS232 |
|---|---|
| Pin 1 | DCD |
| Pin 2 | SIN |
| Pin 3 | SO |
| Pin 4 | DTR |
| Pin 5 | GND |
| Pin 6 | DSR |
| Pin 7 | RTS |
| Pin 8 | CTS |
| Pin 9 | RI |

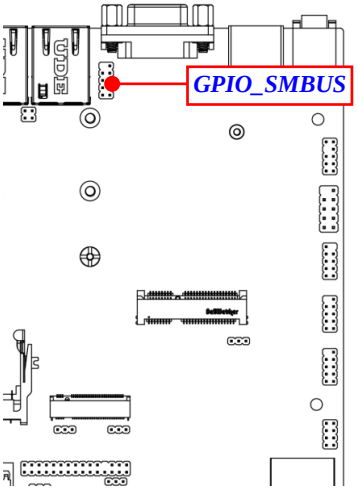
## (5) EDP1 (29-pin): eDP Port Header (2.0mm pitch)

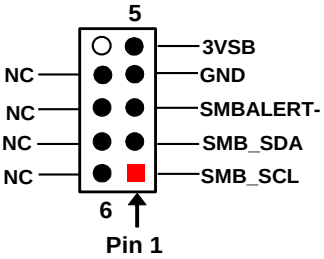


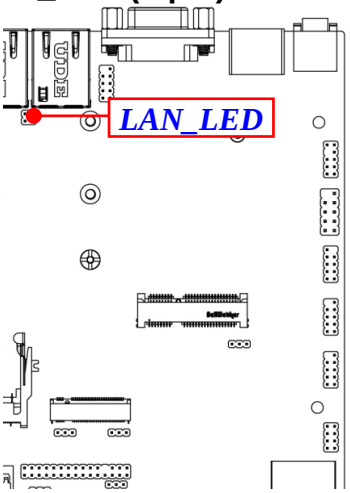

| Pin NO. | Pin Define | Pin NO. | Pin Define |
|---|---|---|---|
| Pin 30 | EDP_LANE-0 | Pin 29 | EDP_LANE+0 |
| Pin 28 | EDP_LANE-1 | Pin 27 | EDP_LANE+1 |
| Pin 26 | GND | Pin 25 | GND |
| Pin 24 | EDP_LANE-2 | Pin 23 | EDP_LANE+2 |
| Pin 22 | EDP_LANE-3 | Pin 21 | EDP_LANE+3 |
| Pin 20 | GND | Pin 19 | GND |
| Pin 18 | EDP_AUXN_C | Pin 17 | EDP_HPD |
| Pin 16 | EDP_AUXP_C | Pin 15 | L_BKLT_EN |
| Pin 14 | GND | Pin 13 | GND |
| Pin 12 | L_BKLT_PWM | Pin 11 | EDP_VDD |
| Pin 10 | NC | Pin 9 | EDP_VDD |
| Pin 8 | NC | Pin 7 | N/A |
| Pin 6 | NC | Pin 5 | GND |
| Pin 4 | GND | Pin 3 | BKLT_PW |
| Pin 2 | BKLT_PW | Pin 1 | BKLT_PW |

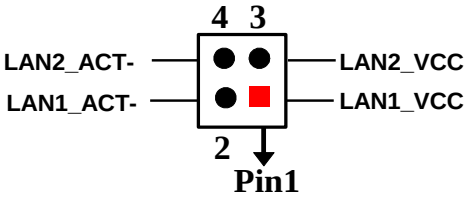
## (6) SMBUS_GPIO (9-pin): SMBUS Header (2.0mm pitch)




## (7) LAN_LED (4-pin): LAN Activity LED Header



# Chapter 3
# Introducing BIOS

| | |
|---|---|
| **Notice!** | The BIOS options in this manual are for reference only. Different configurations may lead to difference in BIOS screen and BIOS screens in manuals are usually the first BIOS version when the board is released and may be different from your purchased motherboard. Users are welcome to download the latest BIOS version form our official website. |

The BIOS is a program located on a Flash Memory on the motherboard. This program is a bridge between motherboard and operating system. When you start the computer, the BIOS program will gain control. The BIOS first operates an auto-diagnostic test called POST (power on self test) for all the necessary hardware, it detects the entire hardware device and configures the parameters of the hardware synchronization. Only when these tasks are completed done it gives up control of the computer to operating system (OS). Since the BIOS is the only channel for hardware and software to communicate, it is the key factor for system stability, and in ensuring that your system performance as its best.

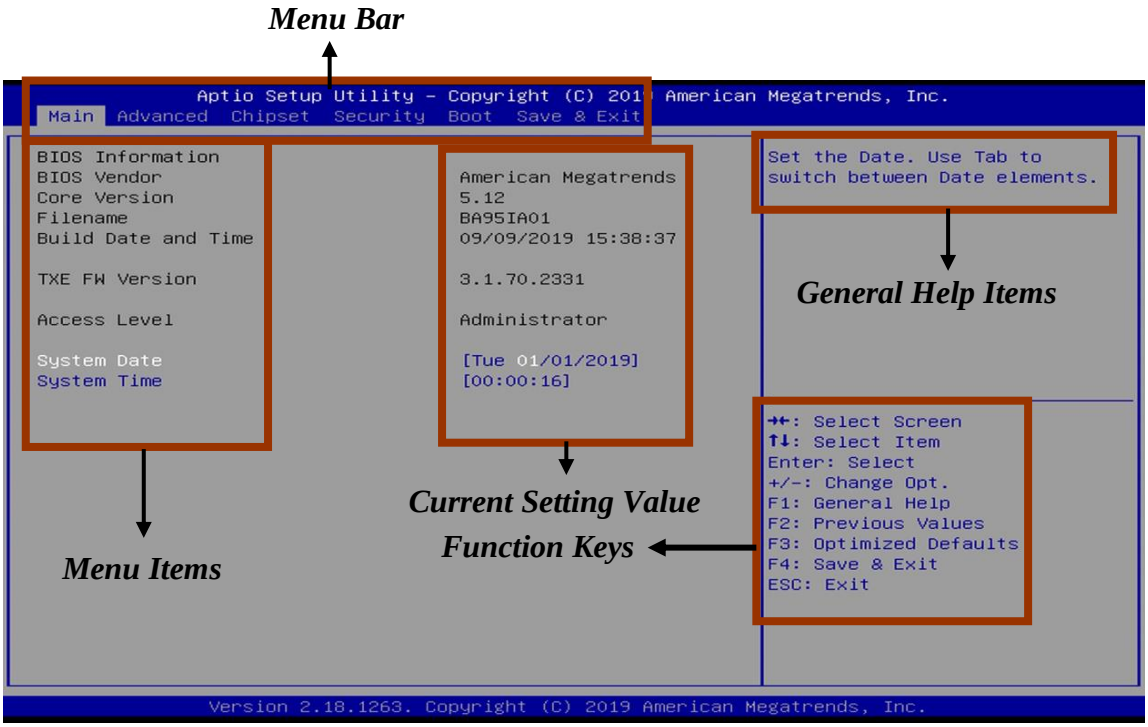
## 3-1 Entering Setup

Power on the computer and by pressing <Del> immediately allows you to enter Setup. If the message disappears before your respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the “RESET” button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt> and <Delete> keys. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to

Press **<Del>** to enter Setup; press < **F7**> for Pop Menu.

## 3-2 BIOS Menu Screen

The following diagram show a general BIOS menu screen:




## 3-3 Function Keys

In the above BIOS Setup main menu of, you can see several options. We will explain these options step by step in the following pages of this chapter, but let us first see a short description of the function keys you may use here:

- Press←→ (left, right) to select screen;

- Press ↑↓ (up, down) to choose, in the main menu, the option you want to confirm or to modify.
- Press <Enter> to select.
- Press <+>/<–> keys when you want to modify the BIOS parameters for the active option.
- [F1]: General help.
- [F2]: Previous value.
- [F3]: Optimized defaults.
- [F4]: Save & Exit.
- Press <Esc> to quit the BIOS Setup.

## 3-4 Getting Help

### Main Menu

The on-line description of the highlighted setup function is displayed at the top right corner the screen.

### Status Page Setup Menu/Option Page Setup Menu

Press **[F1]** to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window, press <**Esc**>.

## 3-5 Menu Bars

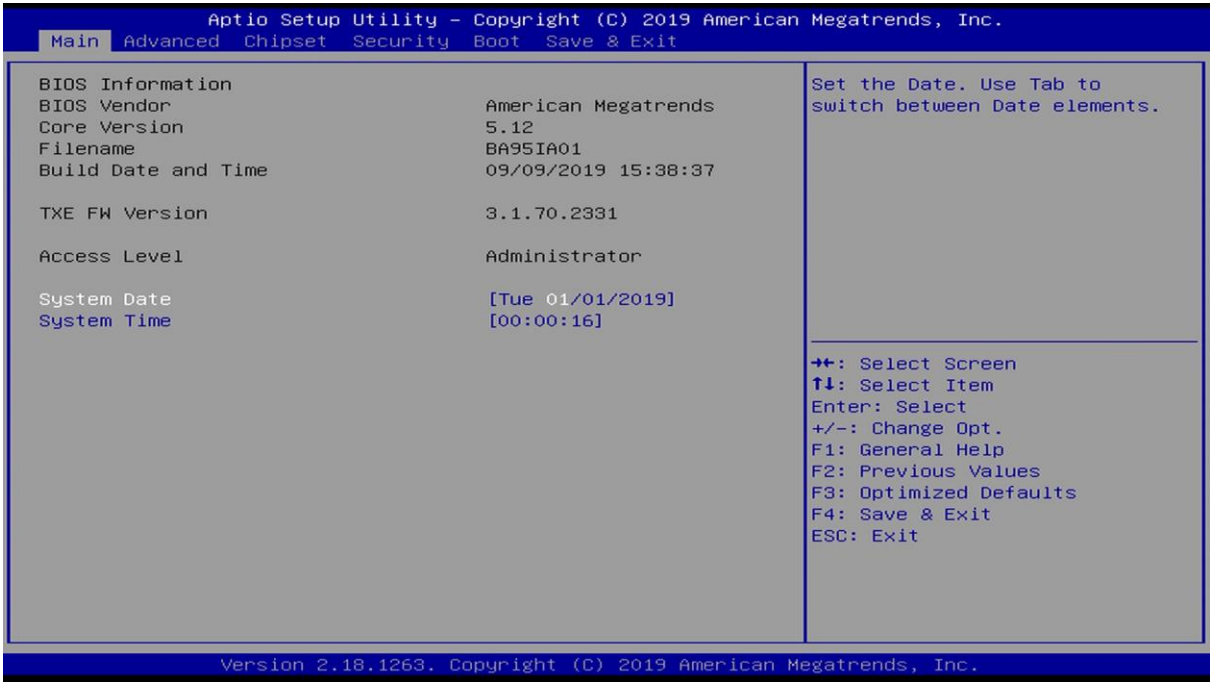
### There are six menu bars on top of BIOS screen:

| | |
|---|---|
| **Main** | To change system basic configuration |
| **Advanced** | To change system advanced configuration |
| **Chipset** | To change chipset configuration |
| **Security** | Password settings |
| **Boot** | To change boot settings |
| **Save & Exit** | Save setting, loading and exit options. |

User can press the right or left arrow key on the keyboard to switch from menu bar. The selected one is highlighted.

## 3-6 Main Menu

Main menu screen includes some basic system information. Highlight the item and then use the <+> or <-> and numerical keyboard keys to select the value you want in each item.



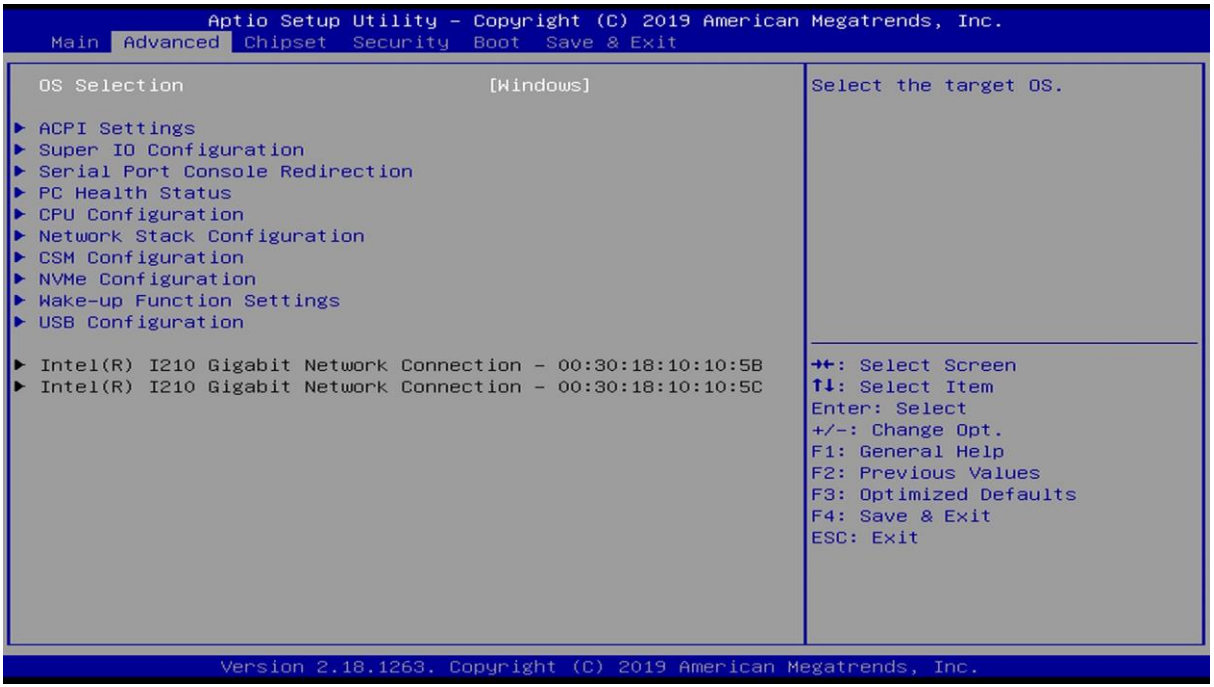

**System Date**

Set the date. Please use [Tab] to switch between data elements.

**System Time**

Set the time. Please use [Tab] to switch between time elements.

# 3-7 Advanced Menu




**OS Selection**

The optional settings: [Windows]; [Intel Linux]; [MSDOS].

***Note**: User needs to go to this item to select OS before installing OS.*

- **ACPI Settings**

  Press [Enter] to make settings for the following sub-item:

  ***ACPI Settings***

  **ACPI Sleep State**

  Use this item to select the highest ACPI sleep state the system will enter when the suspend button is pressed.

  The optional settings are: [Suspend Disabled]; [S3 (Suspend to RAM)].

- **Super I/O Configuration**

Press [Enter] to make settings for the following sub-items:

***Super IO Configuration***

- **Serial Port 1/2 Configuration**

Press [Enter] to make settings for the following items:

**Serial Port**

Use this item to enable or disable serial port (COM).

The optional settings: [Disabled]; [Enabled].

When set as [Enabled], the following items shall appear:

**Change Settings**

Use this item to select an optimal setting for super IO device.

The optional settings are: [Auto]; [IO=3F8h; IRQ=4;]; [IO=2F8h; IRQ=3;]; [IO=3E8h; IRQ=4;]; [IO=2E3F8h; IRQ=3;].

**Transmission Mode Select**

The optional settings are: [RS422]; [RS232]; [RS485].

- **Serial Port 3/4 Configuration**

Press [Enter] to make settings for the following items:

**Serial Port**

Use this item to enable or disable serial port (COM).

The optional settings: [Disabled]; [Enabled].

When set as [Enabled], the following items shall appear:

**Change Settings**

Use this item to select an optimal setting for super IO device.

The optional settings are: [Auto]; [IO=3F8h; IRQ=10;]; [IO=2F8h; IRQ=10; [IO=3E8h; IRQ=10;]; [IO=2E8h; IRQ=10;]; [IO=2F0h; IRQ=10;]; [IO=2E0h; IRQ=10;].

- **Serial Port 5/6 Configuration**

Press [Enter] to make settings for the following items:

**Serial Port**

Use this item to enable or disable serial port (COM).

The optional settings: [Disabled]; [Enabled].
When set as [Enabled], the following items shall appear:

**Change Settings**

Use this item to select an optimal setting for super IO device.
The optional settings are: [Auto]; [IO=3F8h; IRQ=11;]; [IO=2F8h; IRQ=11 [IO=3E8h; IRQ=11;]; [IO=2E8h; IRQ=11;]; [IO=2F0h; IRQ=11;]; [IO=2E0h; IRQ=11;].

**ERP Support**

The optional settings: [Disabled]; [Enabled].
This item should be set as [Disabled] if you wish to have all active wake-up functions.

**Case Open Detect**

This item controls detect case open function.
The optional settings: [Disabled]; [Enabled].

**WatchDog Reset Timer**

Use this item to enable or disable WatchDog Timer Control. When set as [Enabled], the following sub-items shall appear:

**WatchDog Reset Timer Value**

User can set a value in the range of [10] ~ [255] seconds, or [1] ~ [255] minutes.

**WatchDog Reset Timer Unit**

The optional settings are: [Sec.]; [Min.].

**WatchDog Wake-up Timer**

This item support WDT wake-up while ERP function is set as [Enabled].
The optional settings: [Disabled]; [Enabled].
When set as [Enabled], the following sub-items shall appear:

**WatchDog Wake-up Timer Value**

The setting range is [10] ~ [4095] seconds, or [1] ~ [4095] minutes.

**WatchDog Wake-up Timer Unit**

The optional settings are: [Sec.]; [Min.].

**ATX Power Emulate AT Power**

This item displays current Emulate AT Power Status, motherboard power On/Off control by power supply. User needs to select 'AT or ATX Mode' on MB at first.

- **Serial Port Console Redirection**

Press [Enter] to make settings for the following sub-items:

***COM1***

**Console Redirection**

Use this item to enable or disable COM1 Console Redirection.

The optional settings are: [Disabled]; [Enabled].

*When set as [Enabled], user can make further settings in the '**Console Redirection Settings**' screen:*

- **Console Redirection Settings**

The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.

Press [Enter] to make settings for the following sub-items.

**Terminal Type**

The optional settings are: [VT100]; [VT100+]; [VT-UTF8]; [ANSI].

**Bits per second**

The optional settings are: [9600]; [19200]; [38400]; [57600]; [115200].

**Data Bits**

The optional settings are: [7]; [8].

**Parity**

A parity bit can be sent with the data bits to detect some transmission errors.

Even: Parity bit is 0 if the num of 1's in the data bits is even.

Odd: Parity bit is 0 if the num of 1's in the data bits is odd.

Mark: Parity bit is always 1.

Space: Parity bit is always 0.

Mark and Space Parity do not allow for error detection.

The optional settings are: [None]; [Even]; [Odd]; [Mark]; [Space].

**Stop Bits**

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.

The optional settings are: [1]; [2].

**Flow Control**

Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.

The optional settings are: [None]; [Hardware RTS/CTS].

**VT-UTF8 Combo Key Support**

Use this item to enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals.

The optional settings are: [Disabled]; [Enabled].

**Recorder Mode**

With this mode enabled only text will be sent. This is to capture Terminal data.

The optional settings are: [Disabled]; [Enabled].

**Resolution 100x31**

Use this item to enable or disable extended terminal resolution.

The optional settings are: [Disabled]; [Enabled].

**Legacy OS Redirection Resolution**

On Legacy OS, the Number of Rows and Columns supported redirection.

The optional settings are: [80x24]; [80x25].

**Putty Keypad**

Use this item to select FunctionKey and KeyPad on Putty.

The optional settings are: [VT100]; [Intel Linux]; [XTERMR6]; [SCO]; [ESCN]; [VT400].

**Redirection After BIOS POST**

When Bootloader is selected, then Legacy Console Redirection is disabled before booting to legacy OS. When Always Enable is selected, then Legacy

Console Redirections is enabled for legacy OS. Default setting for this option is set to Always Enable.
The optional settings are: [Always Enable]; [BootLoader].

***Serial Port for Out-of-Band Management/ Windows Emergency Management Services (EMS)***

**Console Redirection**
The optional settings: [Disabled]; [Enabled].
When set as [Enabled], user can make further settings in 'Console Redirection Settings':

- **Console Redirection Settings**

The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.
Press [Enter] to make settings for the following sub-items.

**Out-of-Band Mgmt Port**
The default setting is: [COM1].

**Terminal Type**
VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then BT100. See **Console Redirection Settings** page for more Help with Terminal Type/Emulation.
The optional settings are: [VT100]; [VT100+]; [VT-UTF8]; [ANSI].

**Bits per second**
Use this item to select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
The optional settings are: [9600]; [19200]; [57600]; [115200].

**Flow Control**
Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.

The optional settings are: [None]; [Hardware RTS/CTS]; [Software Xon/Xoff].

**Data Bits**

The default setting is: [8].

**This item may or may not show up, depending on different configuration.*

**Parity**

The default setting is: [None].

**This item may or may not show up, depending on different configuration.*

**Stop Bits**

The default setting is: [1].

**This item may or may not show up, depending on different configuration.*

- **PC Health Status**

Press [Enter] to view current hardware health status, set shutdown temperature, or make further settings in '**Smart Fan Configuration**'.

- **SmartFAN Configuration**

Press [Enter] to make settings for SmartFAN Configuration:

**CPUFAN Smart Mode**

The optional settings are: [Disabled]; [Enabled].

When set as [Enabled], the following sub-items shall appear:

**CPUFAN Full-Speed Temperature**

Use this item to set CPUFAN full speed temperature. Fan will run at full speed when above the preset temperature.

**CPUFAN Full-Speed Duty**

Use this item to set CPUFAN full speed duty. Fan will run at full speed when above the pre-set duty.

**CPUFAN Idle-Speed Temperature**

Use this item to set CPUFAN idle speed temperature. Fan will run at idle speed when below the pre-set temperature.

**CPUFAN Idle-Speed Duty**

Use this item to set CPUFAN idle speed duty. Fan will run at idle speed when below the pre-set duty.

- **CPU Configuration**

  Press [Enter] to view current CPU configuration and make settings for the following sub-items:

  **VT-d**

  Use this item to enable or disable CPU VT-d.

  The optional settings are: [Disabled]; [Enabled].

  **EIST**

  Use this item to enable or disable Intel SpeedStep.

  The optional settings are: [Disabled]; [Enabled].

  **Turbo Mode**

  Use this item to enable or disable Turbo Mode.

  The optional settings are: [Disabled]; [Enabled].

  **C-States**

  Use this item to enable or disable C state to OS.

  The optional settings are: [Disabled]; [Enabled].

  *When set as [Enabled], the following item shall appear for setting:*

  **Enhanced C-states**

  Use this item to enable or disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.

  The optional settings are: [Disabled]; [Enabled].

  **Max Package C State**

  This item controls the Max Package C state that the processor will support.

  The optional settings are: [PC2]; [PC1]; [C0].

  **Max Core C State**

  This item controls the Max Core C state that cores will support.

  The optional settings are: [Fused Value]; [Core C10]; [Core C9]; [Core C8]; [Core C7]; [Core C6]; [Core C1]; [Unlimited].

- **Network Stack Configuration**

  Press [Enter] to go to '**Network Stack**' screen to make further settings.

  **Network Stack**

  The optional settings are: [Disabled]; [Enabled].

When set as [Enabled], the following sub-items shall appear:

**Ipv4 PXE Support**

The optional settings are: [Disabled]; [Enabled].

Use this item to enable Ipv4 PXE Boot Support. When set as [Disabled], IPV4 PXE boot optional will not be created.

**Ipv6 PXE Support**

The optional settings are: [Disabled]; [Enabled].

Use this item to enable Ipv6 PXE Boot Support. When set as [Disabled], IPV6 PXE boot optional will not be created.

**PXE Boot Wait Time**

Use this item to set wait time to press [ESC] key to abort the PXE boot.

**Media Detect Count**

Use this item to set media detect count.

- **CSM Configuration**

Press [Enter] to make settings for the following sub-items:

***Compatibility Support Module Configuration***

**Boot Option Filter**

This item controls Legacy/UEFI ROMs priority.

The optional settings are: [UEFI and Legacy]; [Legacy only]; [UEFI only].

**Network**

This item controls the execution of UEFI and legacy PXE OpROM.

The optional settings are: [Do not launch]; [UEFI]; [Legacy].

**Storage**

This item controls the execution of UEFI and Legacy Storage OpROM.

The optional settings are: [Do not launch]; [UEFI]; [Legacy].

**Video**

This item controls the execution of UEFI and Legacy Video OpROM.

The optional settings are: [UEFI]; [Legacy].

**Other PCI devices**

This item determines OpROM execution policy for devices other than Network, storage or video.

The optional settings are: [Do not launch]; [UEFI]; [Legacy].

- **NVMe Configuration**
  When NVMe SSD is plugged in M.2 PCIe/SATA slot, the NVMe controller and Drive information will appear.

- **Wake-up Function Settings**
  Press [Enter] to make settings for the following sub-items:
  **Wake-up System with Fixed Time**
  Use this item to enable or disable system wake-up by RTC alarm.
  The optional settings are: [Disabled]; [Enabled].
  When set as [Enabled], system will wake on the Hour/Minute/Second specified.
  **Wake-up System with Dynamic Time**
  Use this item to enable or disable system wake-up by RTC alarm.
  The optional settings: [Disabled]; [Enabled].
  When set as [Enabled], system will wake on the current time + increased minute(s).The settings range is from [1] ~ [60] minute(s).
  **USB Wake-up from S4**
  Use this item to enable or disable USB Wake-up from S4.
  The optional settings: [Disabled]; [Enabled].
  **This item is only supported when **'ERP Support'** is set as [Disabled]. Please disable ERP before activating this function in S4.*

- **USB Configuration**
  Press [Enter] to make settings for the following sub-items:
  ***USB Configuration***
  **Legacy USB Support**
  The optional settings are: [Enabled]; [Disabled]; [Auto].
  **[Enabled]:** To enable legacy USB support.
  **[Disabled]**: To keep USB devices available only for EFI specification,
  **[Auto]:** To disable legacy support if no USB devices are connected.
  **XHCI Hand-off**
  This is a workaround for OSes without XHCI hand-off support. The XHCI

ownership change should be claimed by XHCI driver.
The optional settings are: [Enabled]; [Disabled].

**USB Mass Storage Driver Support**

The optional settings are: [Disabled]; [Enabled].

***USB Hardware Delays and Time-outs:***

**USB Transfer Time-out**

Use this item to set the time-out value for control, bulk, and interrupt transfers.
The optional settings are: [1 sec]; [5 sec]; [10 sec]; [20 sec].

**Device Reset Time-out**

Use this item to set USB mass storage device start unit command time-out.
The optional settings are: [10 sec]; [20 sec]; [30 sec]; [40 sec].

**Device Power-up Delay**

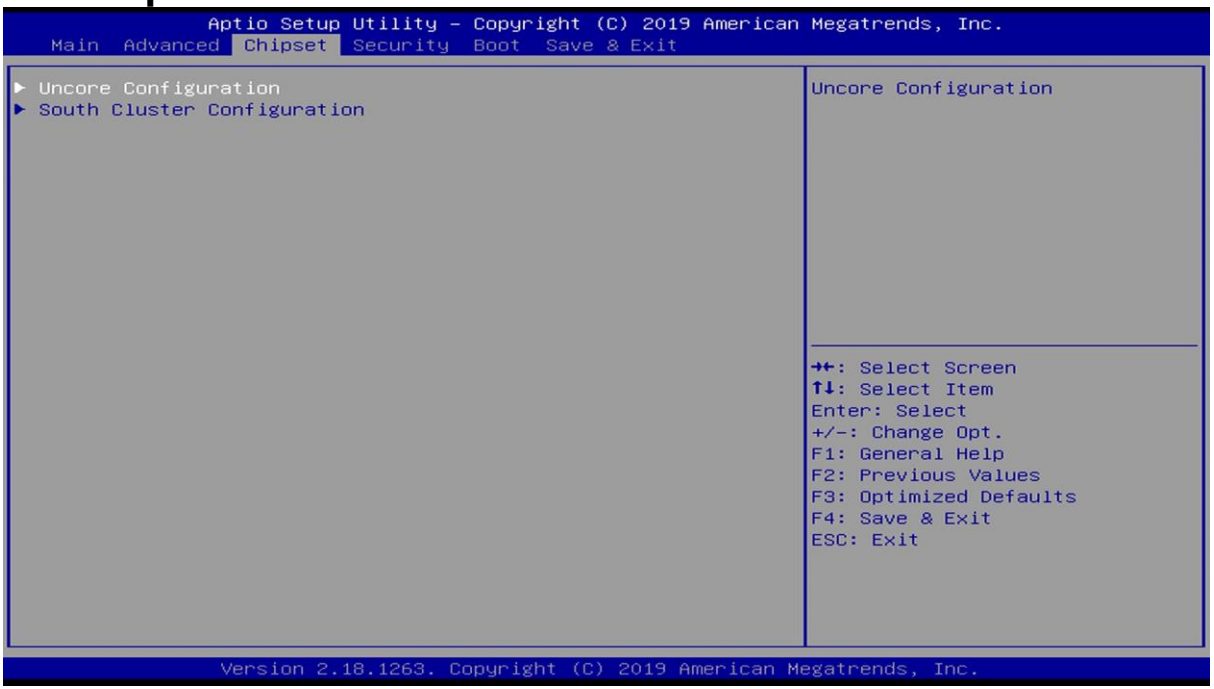
Use this item to set maximum time the device will take before it properly reports itself to the host controller.
The optional settings: [Auto]; [Manual].
'Auto' uses default value: for a root port it is 100 ms, for a hub port the delay is taken from hub descriptor.
Select [Manual] you can set value for the following sub-item: '**Device Power-up Delay in Seconds'.**

**Device Power-up Delay in Seconds**

The delay range is from [1] to [40] seconds, in one second increments.

- **Intel(R) I210 Gigabit Network Connection- XX:XX:XX:XX:XX:XX**
- **Intel(R) I210 Gigabit Network Connection- XX:XX:XX:XX:XX:XX**

## 3-8 Chipset Menu




- **Uncore Configuration**

  Press [Enter] to make settings for the following sub-items:

  **GTT Size**

  Use this item to select the GTT Size.

  The optional settings are: [2MB]; [4MB]; [8MB].

  **DVMT Pre-Allocated**

  Use this item to select DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics device.

  The optional settings are: [64M]; [96M]; [128M]; [160M]; [192M]; [224M]; [256M]; [288M]; [320M]; [352M]; [384M]; [416M]; [448M]; [480M]; [512M].

  **DVMT Total Gfx Mem**

Use this item to select DVMT 5.0 total graphics memory size used by the internal graphics device.
The optional settings are: [128M]; [256M]; [MAX].

**Active LFP**
The optional settings are: [Disabled]; [eDP].
When set as [eDP], the following items shall appear:

**GMCH BLC Control**
Use this item to control Back Light Control Setting.
The optional settings are: [PWM-Inverted]; [PWM-Normal].

**Primary IGFX Boot Display**
Use this item to select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on selection. BGA modes will be supported only on primary display.
The optional settings are: [Auto]; [LFP]; [HDMI]; [CRT].
*Please note that [LFP] option will appear when **Active LFP** is set as [eDP].*

**Secondary IGFX Boot Display**
Use this item to select Secondary Display Device
The optional settings are: [Disabled]; [HDMI]; [CRT].

- **South Cluster Configuration**
  Press [Enter] to further setting South Cluster Configuration.

- **PCI Express Configuration**
  Press [Enter] to further setting.

**Peer Memory Write Enable**
The optional settings are: [Disabled]; [Enabled].

**Compliance Mode**
The optional settings are: [Disabled]; [Enabled].

**Onboard PCIE LAN1**
The optional settings are: [Disabled]; [Enabled].

**Onboard PCIE LAN2**
The optional settings are: [Disabled]; [Enabled].

- **SATA Configuration**

  Press [Enter] to make settings for the following sub-items:

**SATA Controller**

The optional settings are: [Enabled]; [Disabled].

When set as [Enabled], the following items shall appear:

**SATA Mode Selection**

Use this item to determine how SATA controller operate.

The default setting is: [AHCI].

***M.2***

**M.2**

Use this item to enable or disable M.2 SATA port.

The optional settings: [Disabled]; [Enabled].

**HD-Audio Support**

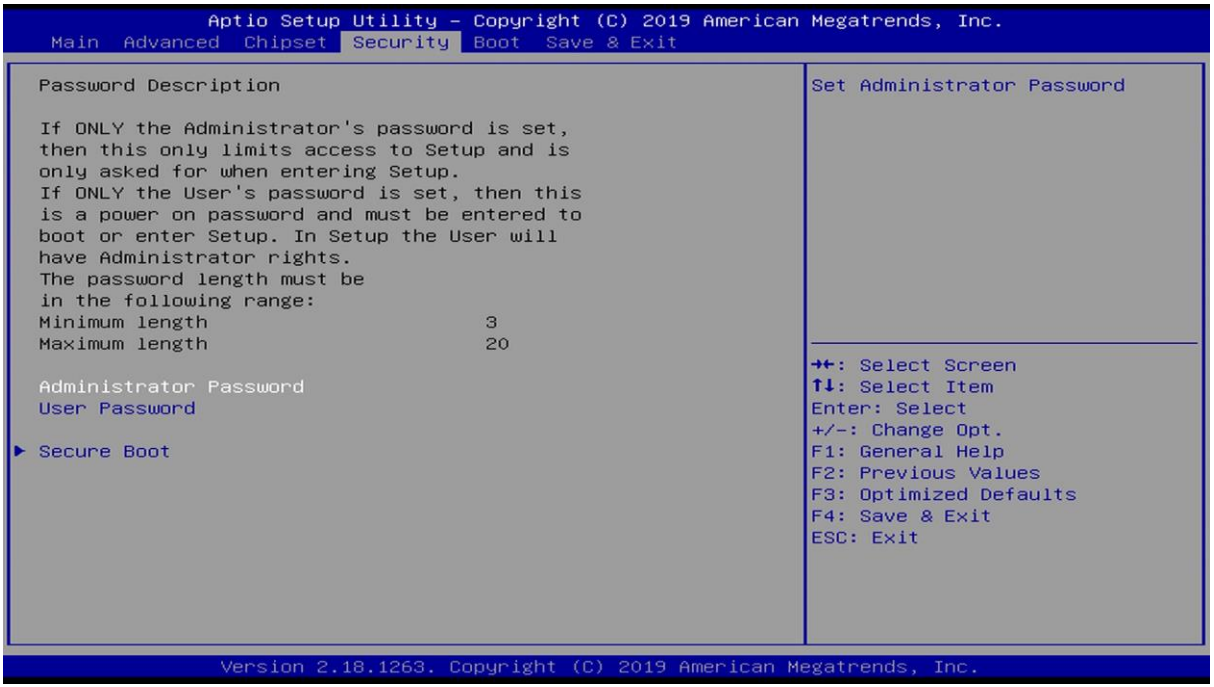
The optional settings are: [Disabled]; [Enabled].

**System State after power Failure**

Use this item to specify what state to go to when power re-applied after a power failure.

The optional settings are: [Always On]; [Always Off]; [Former State].

## 3-9 Security Menu




Security menu allow users to change administrator password and user password settings.

**Administrator Password**

If there is no password present on system, please press [Enter] to create new administrator password. If password is present on system, please press [Enter] to verify old password then to clear/change password. Press again to confirm the new administrator password.

**User Password**

If there is no password present on system, please press [Enter] to create new administrator password. If password is present on system, please press [Enter] to verify old password then to clear/change password. Press again to confirm the new

administrator password.

- **Secure Boot**
  Press [Enter] to further setting Customizable Secure Boot.
  **Secure Boot Control**
  Secure Boot can be enabled if System running in User Mode with enrolled Platform Key(PK) or CSM function is disabled.
  The optional settings are: [Disabled]; [Enabled].
  **Secure Boot Mode**
  Use this item to select Standard or Custom Mode. Set UEFI Secure Boot Mode to STANDARD mode or CUSTOM mode, this change is effect after save. After reset, the mode will return to STANDARD mode.
  The optional settings are: [Standard]; [Custom].
  When set as [Custom], the following items shall appear:
- ***Key Management***
  This item enables experienced users to modify Secure Boot variables, which includes the following items:
  **Provision Factory Default Key**
  This item is for user to install factory default secure boot keys when system is in Setup Mode.
  The optional settings are: [Disabled]; [Enabled].
- **Enroll All Factory Default Keys**
  This item is for Force System to User Mode – install all Factory Default Keys.
- **Save All Secure Boot Variables**
  Use this item to Save NVRAM content of all Secure Boot variables to the files (EFI_SIGNATURE_LIST data format) in root folder on a target file system device.

**Secure Boot Variable**

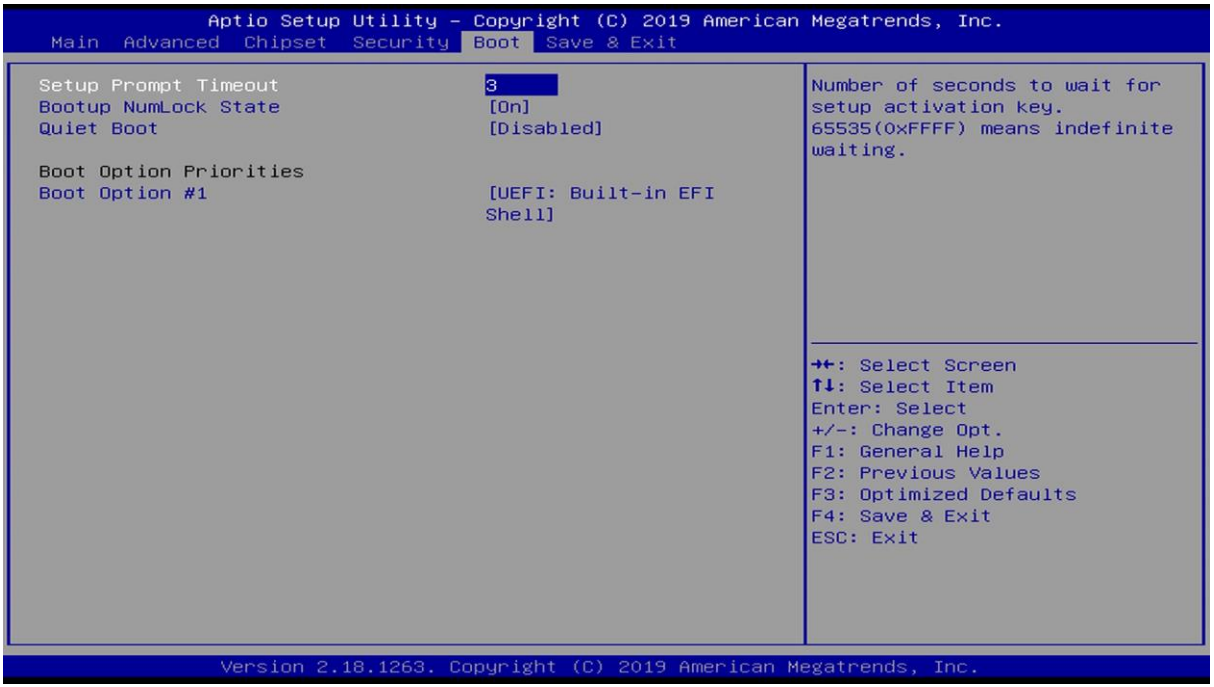
- **Platform Key(PK)**
  The Enroll Factory Defaults or load the keys from a file with:
  1. Public Key Certificate in:

a) EFI_SIGNATURE_LIST
b) EFI_ CERT_X509 (DER encoded)
c) EFI_ CERT_RSA2048 (bin)
d) EFI_ CERT_SHA256 (bin)
2. Authenticated UEFI Variable

Key: Vendor, Custom, Mixed, Test (*) modified from Setup menu.
The optional settings are: [Set New Key]; [Delete key].

- **Key Exchange Keys/Authorized Signatures/Forbidden Signatures**
  The optional settings are: [Set New Key]; [Append Key]; [Delete Key].
- **Authorized TimeStamps/OsRecovery Signatures**
  The optional settings are: [Set New Key]; [Append Key].

## 3-10 Boot Menu




**Setup Prompt Timeout**

Use this item to set number of seconds to wait for setup activation key.

**Bootup Numlock State**

Use this item to select keyboard numlock state.

The optional settings are: [On]; [Off].

**Quiet Boot**

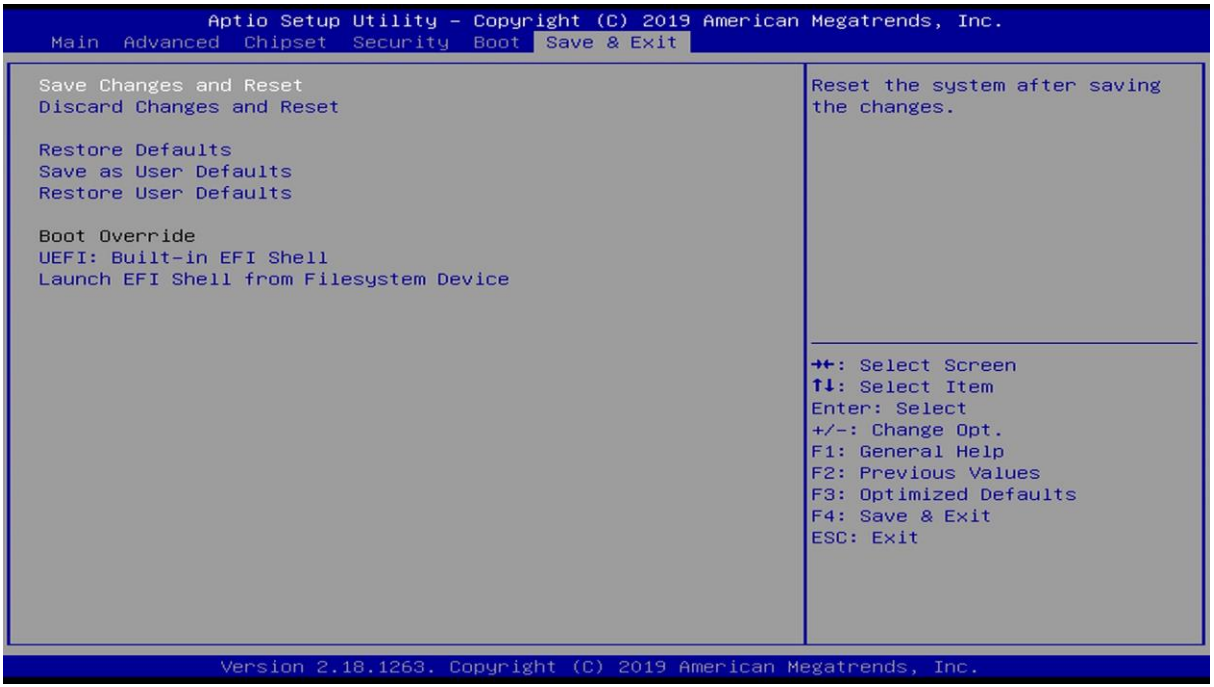
The optional settings are: [Disabled]; [Enabled].

***Boot Option Priorities***

**Boot Option #1**

Use this item to decide system boot order from available options.

## 3-11 Save & Exit Menu




**Save Changes and Reset**

This item allows user to reset the system after saving the changes.

**Discard Changes and Reset**

This item allows user to reset the system without saving any changes.

**Restore Defaults**

Use this item to restore /load default values for all the setup options.

**Save as User Defaults**

Use this item to save the changes done so far as user defaults.

**Restore User Defaults**

Use this item to restore the user defaults to all the setup options.

***Boot Override***

**Boot Override**

**UEFI: Built-in EFI Shell**

Press this item to select the device as boot disk after save configuration and reset.

**Launch EFI shell from Filesystem Device**

Press this item to attempt to Launch EFI Shell application (Shell.efi) from one of the available filesystem devices.