

# **AMS310**

## **Compact Expandable Fanless System**

### **User's Manual**

Version 1.0  
(March 2023)

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# Compliance

## CE

This product has passed CE tests for environmental specifications and limits. This product is in accordance with the directives of the Union European (EU). If users modify and/or install other devices in this equipment, the CE conformity declaration may no longer apply.

## FCC

AMS310 has been tested and found to comply with the limits for a Class B device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications.

## WEEE



This product must not be disposed of as normal household waste, in accordance with the EU directive of for waste electrical and electronic equipment (WEEE - 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

## Green IBASE



This product is compliant with the current RoHS restrictions and prohibits use of the following substances in concentrations exceeding 0.1% by weight (1000 ppm) except for cadmium, limited to 0.01% by weight (100 ppm).

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

# Important Safety Information

Carefully read the precautions before using the device.

## Environmental conditions:

- Lay the device horizontally on a stable and solid surface.
- Make sure you leave plenty of space around the device for ventilation.
- Use this product in environments with ambient temperatures  $-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$ .
- DO NOT LEAVE THIS DEVICE IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW  $-20^{\circ}\text{C}$  OR ABOVE  $80^{\circ}\text{C}$ .

## Care for your IBASE products:

- Before cleaning the device, turn it off and unplug all cables such as power in case a small amount of electrical current may still flow.
- Use neutral cleaning agents or diluted alcohol to clean the device chassis with a cloth. Then wipe the chassis with a dry cloth.
- Vacuum the dust with a computer vacuum cleaner to prevent the air vent or slots from being clogged.



## WARNING

## Attention during use:

- Do not use this product near water.
- Do not spill water or any other liquids on your device.
- Do not place heavy objects on the top of the device.
- Operate this device from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your distributor or local power company.
- Ensure that you apply correctly the power supply voltage.
- Do not walk on the power cord or allow anything to rest on it.
- If you use an extension cord, make sure that the total ampere rating of the product plugged into the extension cord does not exceed its limits.

## Avoid Disassembly

You are not suggested to disassemble, repair or make any modification to the device. Disassembly, modification, or any attempt at repair could generate hazards and cause damage to the device, even bodily injury or property damage, and will void any warranty.



## CAUTION

Danger of explosion if internal lithium-ion battery is replaced by an incorrect type.  
Replace only with the same or equivalent type recommended by the manufacturer.  
Dispose of used batteries according to the manufacturer's instructions.

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# Chapter 1

## General Information

The information provided in this chapter includes:

- Features
- Packing List
- Optional Accessories
- Specifications
- Product View
- Dimensions

## 1.1 Introduction

Designed for machine automation, industrial and harsh environment applications, the fanless AMS310 embedded computer features high performance with low power consumption, operating at a temperature range from -10°C to 60°C. It is built with a passive finned heat sink to provide effective transfer of heat away from components. The AMS310 houses the IBASE MB310 board with Intel Q470E PCH and supports 10th Gen Intel® Core™ i7/i5/i3 desktop processors (35W TDP). It has connectors for six antennas and offers industrial-grade connectivity using M.2 2030 E-Key and 3052 B-Key for WLAN/4G/5G connections.



AMS310

## 1.2 Features

- Compact fanless system with for IBASE MB310 customized board
- Supports 10th Gen Intel® Core™ i7/i5/i3 Processors (35W TDP)
- Front removable drive bay for HDD/SSD
- 2x COM, 6x USB, 2x 2.5G LAN, 1x HDMI, 2x DisplayPort
- Over/Under/Reverse voltage protection
- Supports DIN-rail mount & wall mount
- TPM 2.0

### 1.3 Packing List

Your product package should include the items listed below. If any of the items below is missing, contact the distributor or the dealer from whom you purchased the product.

#### AMS310

- AMS310 x 1
- Terminal Block for DC-In Power Adapter (3-pin) x 1
- Terminal Block for Remote Power Button (2-pin) x 1
- Wall Mount Kit x 1
- Round Head Screw (for Wall Mount Kit) x 4



### 1.4 Optional Accessories

- WiFi / Bluetooth antenna kit
- LTE / 5G antenna kit
- GPS antenna kit
- 180W power adaptor

## 1.5 Specifications

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Name</b>            | <b>AMS310</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>             | Fanless System with MB310, w/o CPU/ memory/ storage/ Power adaptor Supporting vPro & iAMT 11.0, desktop or wall mounting brackets (RoHS2), w/o power adaptor                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>System</b>                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Motherboard</b>             | MB310 with Intel® Q470E PCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Operating System</b>        | <ul style="list-style-type: none"><li>• Windows10 (64-bit)</li><li>• Linux Ubuntu</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>CPU</b>                     | 10th Gen Intel® Core™ i7/i5/i3 desktop Processors (35W TDP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>CPU Speed</b>               | Up to 4.5GHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Memory</b>                  | 2x DDR4-2933/2666 SO-DIMM, Max. 64GB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Rear Panel External I/O</b> | <ul style="list-style-type: none"><li>• 1x HDMI connector</li><li>• 2x DisplayPort connector</li><li>• 1x Audio jack for Line-out</li><li>• 4x USB 3.0</li><li>• 2x USB 2.0 ports (1x software programmable)</li><li>• 1x Red HDD LED, 1x green power LED, 2x Error LED by programming</li><li>• 1x 2-pin terminal block connector for remote access</li><li>• 1x Power button</li><li>• 1x RS232/422/485 port for COM#1</li><li>• 1x RS232 port for COM#2</li><li>• 2x RJ45 2.5G Ethernet port</li><li>• 1x 3-pin DC-in terminal block for 24V(±10%)</li></ul> |
| <b>Super I/O</b>               | Fintek F81964I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Expansion Slots</b>         | 1x M.2 2230 E-Key (USB2.0 & PCI-E)<br>1x M.2 3052 B-Key (USB3.0 & PCI-E)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Storage</b>                 | <ul style="list-style-type: none"><li>• 1x 2.5" HDD/SSD (external-accessible)</li><li>• 1x M.2 2280 M-Key (SATA &amp; PCI-E)</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Construction</b>            | Aluminum & steel Chassis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Color</b>                   | Color Silver & Gray                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Mounting</b>                | <ul style="list-style-type: none"><li>• Desktop or wall mounting (wall mount kit included)</li><li>• Side mounting DIN-rail mounting (optional)</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                       |

|                              |                                                                                                           |
|------------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>Dimensions</b>            | 275mm (W) x 150mm (D) x 70mm (H)<br>10.83" (W) x 5.91" (D) x 2.76" (H)                                    |
| <b>Weight</b>                | 2.75kg                                                                                                    |
| <b>Operating Temperature</b> | -10°C to 60°C (14°F~140°F) *with air flow<br>-10°C to 50°C (14°F to 122°F) without air flow               |
| <b>Storage Temperature</b>   | -20°C to 80°C (-4°F to 176°F)                                                                             |
| <b>Relative Humidity</b>     | 5~90% @ 45°C, (non-condensing)                                                                            |
| <b>Vibration</b>             | Non-Operating: 1.0 grms / 5~500Hz / random operation<br>Operating: 0.25 grms / 5~500Hz / random operation |
| <b>Shock</b>                 | Operating: 20 g / 11 ms<br>Non-operating: 40 g / 11 ms                                                    |
| <b>Certification</b>         | CE / LVD / FCC Class-B                                                                                    |

All specifications are subject to change without prior notice.

## 1.6 Product View – AMS310

### Front View

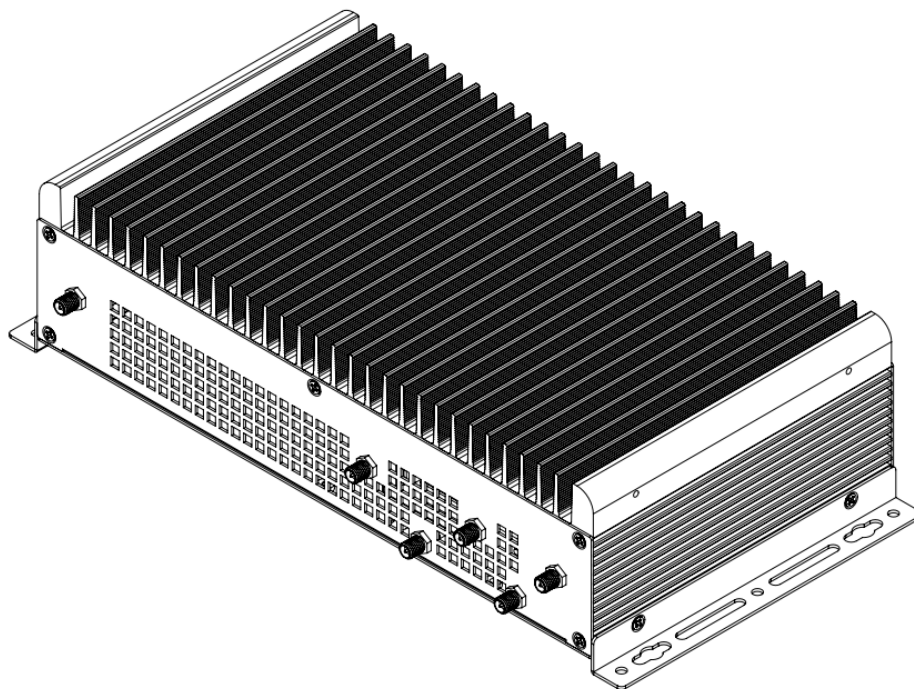


| No. | Name                                                                                | No. | Name                                               |
|-----|-------------------------------------------------------------------------------------|-----|----------------------------------------------------|
| 1   | LED Indicator ( <b>LED1</b> )<br>(from top to bottom: S1*, E1*,<br>SSD, HDD, Power) | 8   | HDMI Port ( <b>CN7</b> )                           |
| 2   | Power Button ( <b>SW1</b> )                                                         | 9   | DP Port ( <b>CN5</b> )                             |
| 3   | Audio Jack for Line-Out ( <b>CN15</b> )                                             | A   | USB 3.0 Ports ( <b>CN6,</b><br><b>CN8</b> )        |
| 4   | 2x GbE LAN ( <b>CN14, CN13</b> )                                                    | B   | USB 2.0 Ports ( <b>CN4</b> )                       |
| 5   | SSD Slot                                                                            | C   | DC-In Power ( <b>J18</b> )                         |
| 6   | 2x COM Ports ( <b>CN10</b> )                                                        | D   | Terminal Block for<br>Remote Access ( <b>CN3</b> ) |
| 7   | DP Port ( <b>CN9</b> )                                                              |     |                                                    |

\* The LED indicators S1 (for status) and E1 (for errors) are configurable by users.

### Rear View





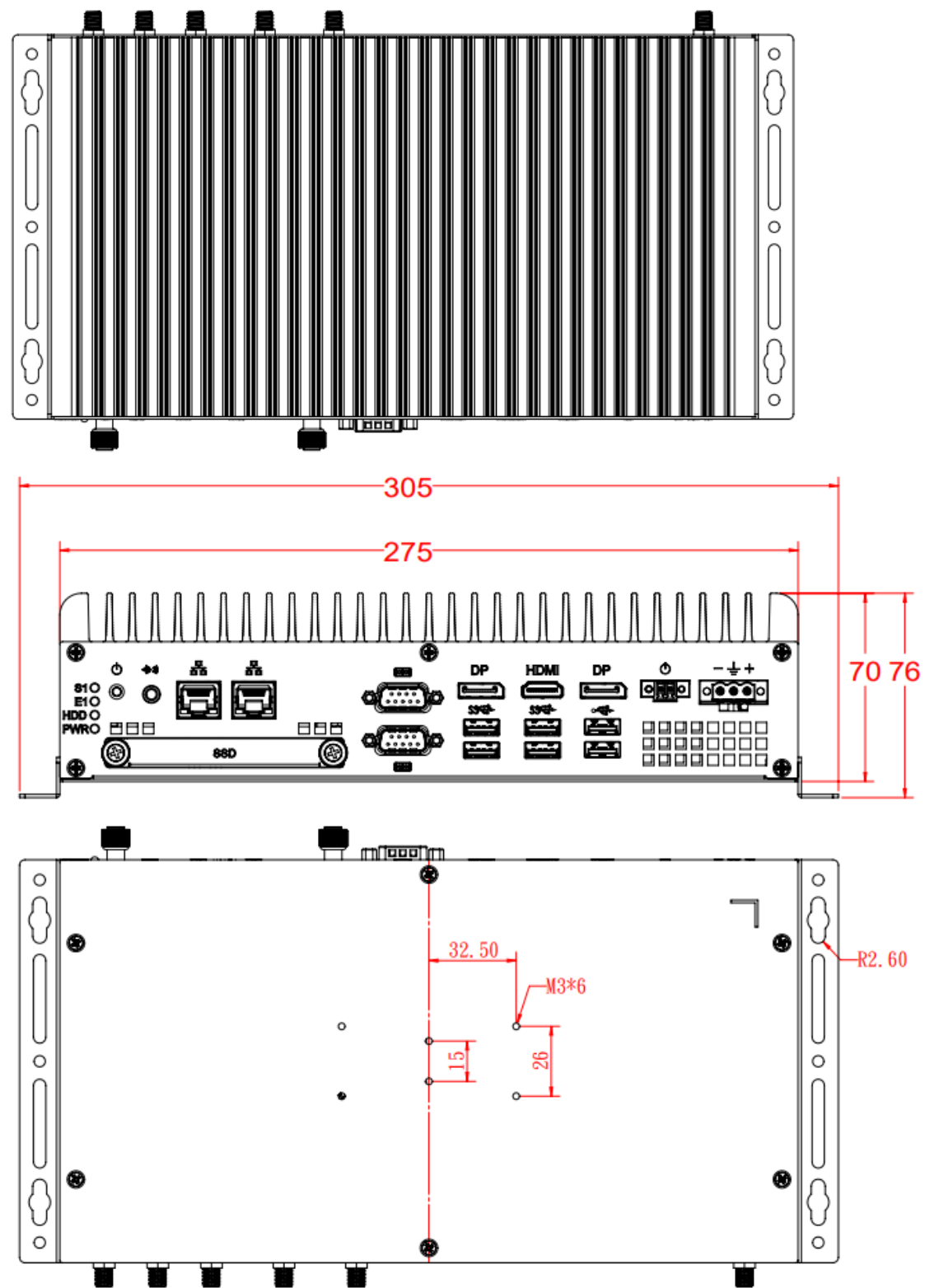
The rear view shows six antenna connectors.

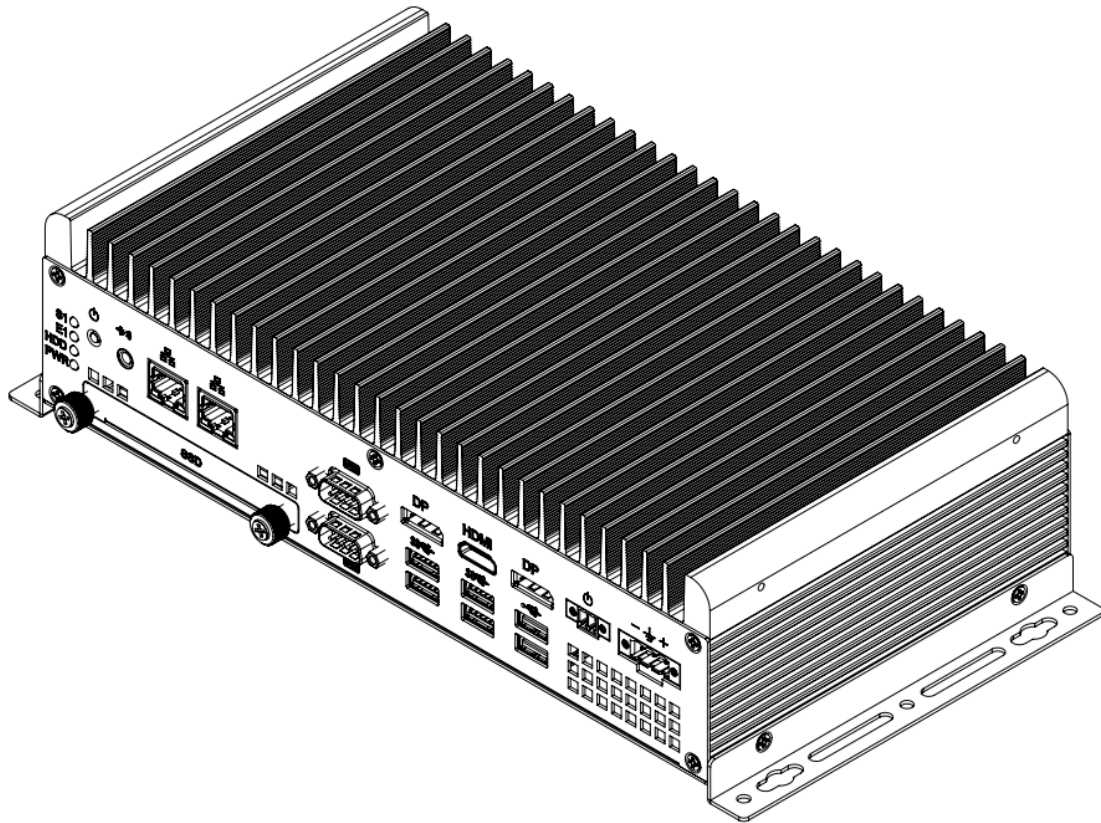


AMS310 with antennas installed at the rear.

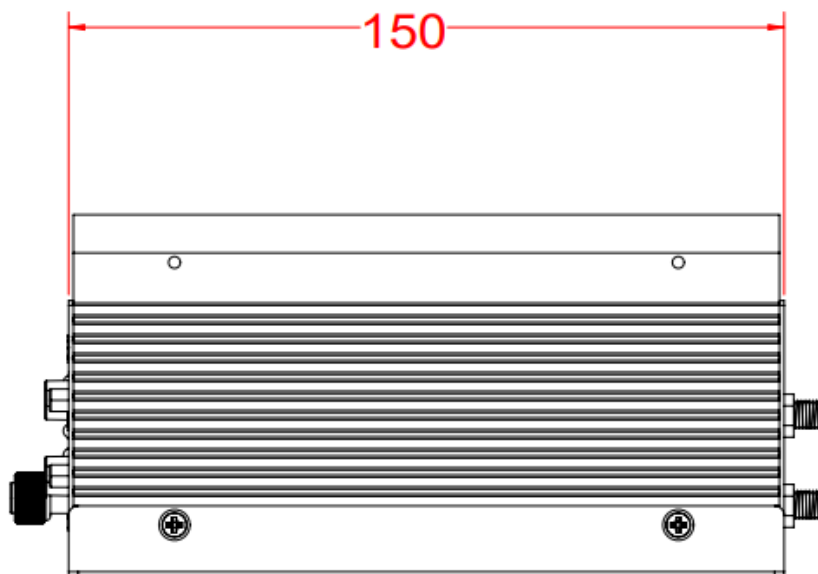
## 1.7 Dimensions – AMS310

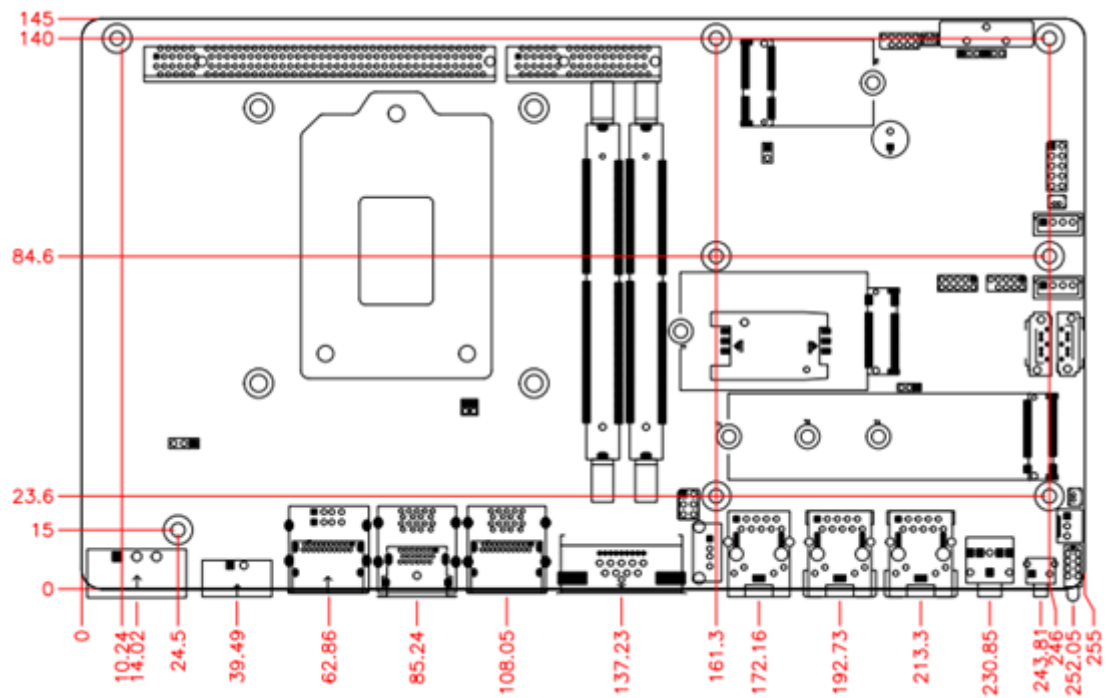
Unit: mm





Unit: mm





**MB310 Motherboard Dimensions**

## Chapter 2

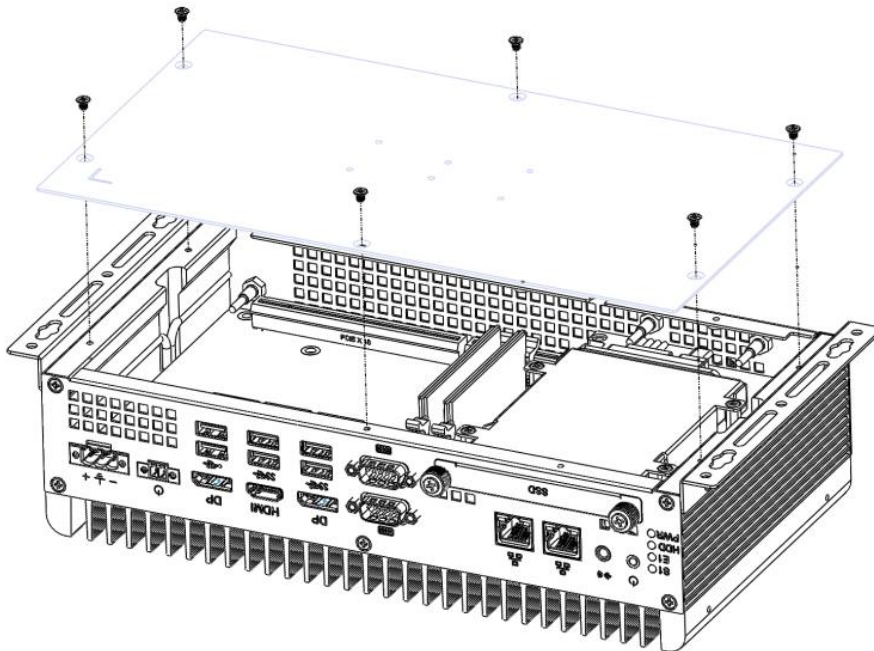
# Hardware Configuration

The information provided in this chapter includes:

- Essential installations before you begin
- Information and locations of connectors

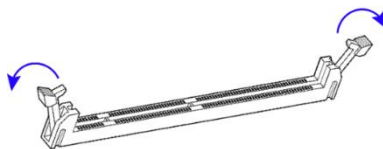
## 2.1 Hardware Installations

Remove and replace the bottom cover for the installation / replacement of memory module and M.2 socket devices. Release the 6 screws shown below.

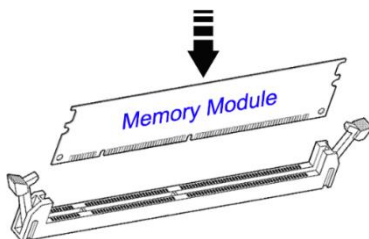


### 2.1.1 Memory Installation / Replacement

1. After removing the bottom cover, locate the memory slots.
2. Press the ejector tab of the memory slot outwards with your fingertips.



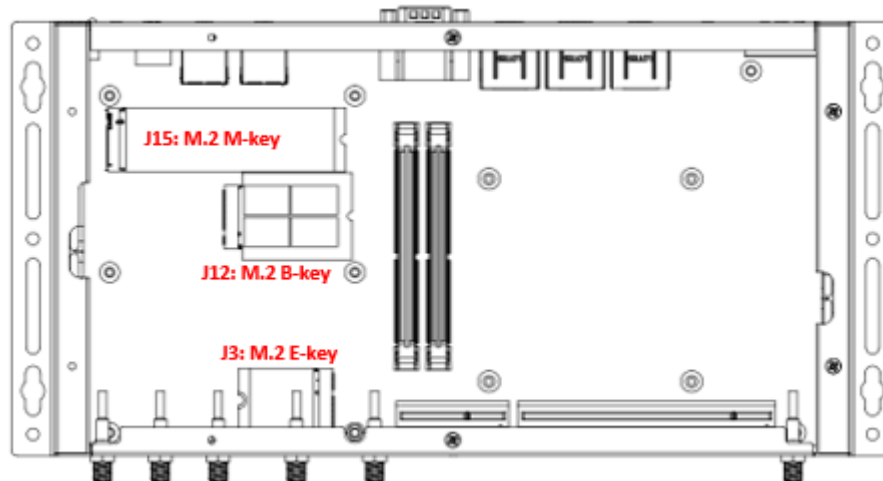
3. Hold the memory module and align the key of the module with that on the memory slot.
4. Gently push the module in an upright position until the ejector tabs of the memory slot close to hold the module in place when the module touches the bottom of the slot.



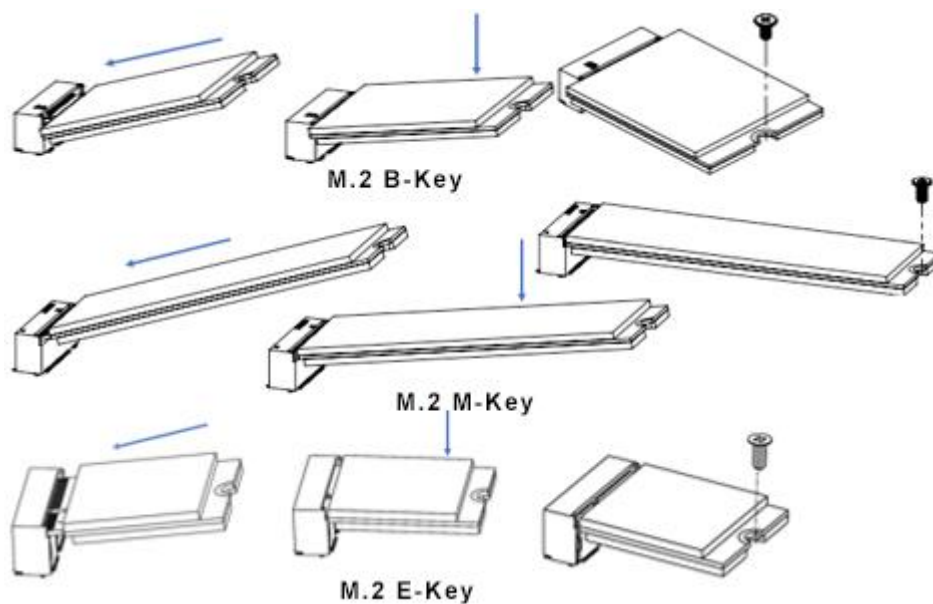
To remove the module, press the ejector tabs outwards with your fingertips to eject the module.

### 2.1.2 M.2 Installation / Replacement

1. After removing the bottom cover, locate the M.2 sockets.
2. There are three M.2 sockets available on AMS310 (J15: M-Key, J12: B-Key, and J3: E-Key), as shown in the picture below. Locate the desired socket to be used for installation/replacement of M.2 devices to proceed.

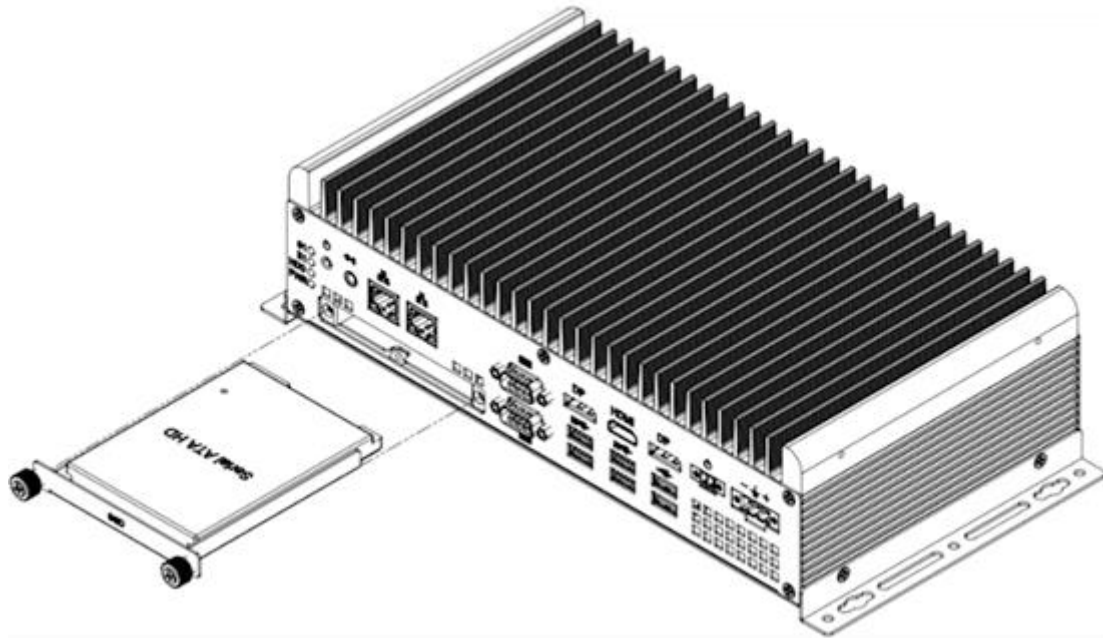


3. To install or replace a card, align the key of the card to the interface, and insert the card slantwise. Push the card down and fix it with a flat head screw.

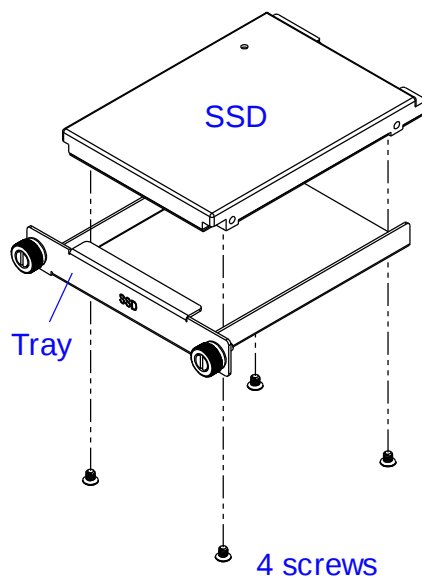


### 2.1.3 SSD Installation

1. To install or replace the SSD, follow the instructions below.



Release 2 screws to pull out the SSD tray.



Remove/replace the four screws shown to remove or install the SSD.

### 2.1.4 WiFi / 3G / 4G Antenna Installation

Thread the WiFi / 3G / 4G antenna extension cable through an antenna hole of the front I/O cover and fasten the antenna as shown below. Then apply adhesive to the edge of the hex nut behind the front I/O cover to prevent the extension cable from falling if the cable becomes loose.

1. Thread and fasten the hex nut and the washer. Then install the antenna.
2. Apply adhesive around here.



---

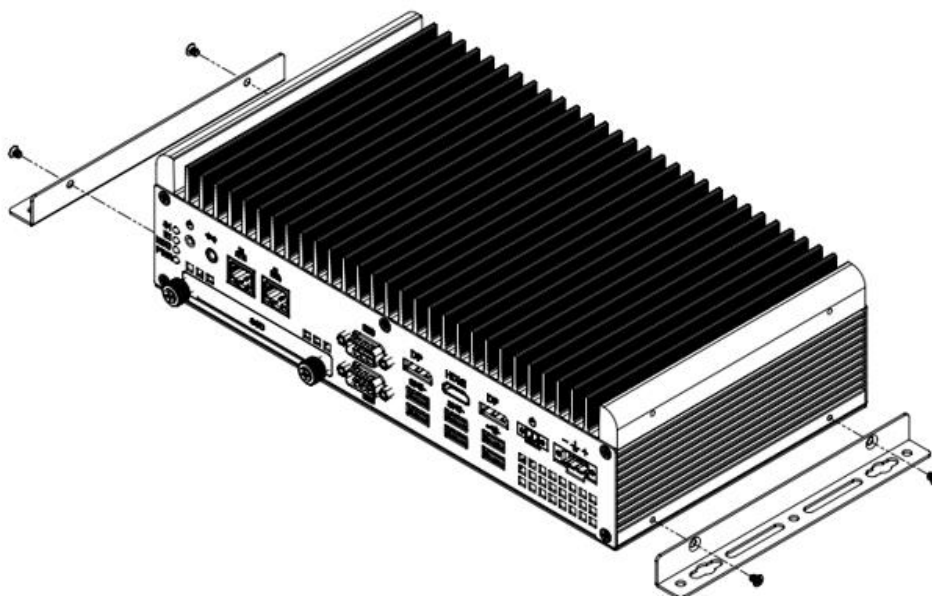
**Info:** The diameter of the nut is around 6.35 mm (0.25"-36UNC).

---

### 2.1.5 Mounting Installation

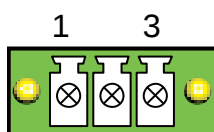
When mounting the AMS310 to any type of surface, ensure that you have enough room for power and signal cable routing, and have good ventilation. The method of mounting must be able to support weight of the device plus the suspension weight of all the cables to be attached to the system.

The AMS310 system comes with a set of wall mount kit and four round head screws that are to be used in securing the mounting brackets to the main unit, as shown in the picture below.



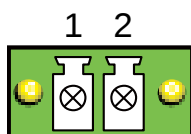
## 2.1.6 DC-In & Power Button Connectors

- DC-In Power Connector (3-pin terminal block)



| Pin | Assignment   |
|-----|--------------|
| 1   | 24V          |
| 2   | Case Ground  |
| 3   | Power Ground |

- Remote Control Connector (2-pin terminal block)

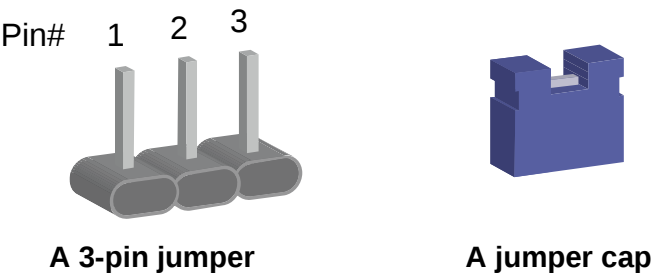


| Pin | Assignment |
|-----|------------|
| 1   | Power BTN  |
| 2   | Ground     |

2.2 Jumper Setting

Set up and configure your device by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

Jumpers are short-length conductors consisting of several metal pins with a non-conductive base mounted on the circuit board. Jumper caps are used to have the functions and features enabled or disabled. If a jumper has 3 pins, you can connect either PIN1 to PIN2 or PIN2 to PIN3 by shorting.



Refer to the illustration below to set jumpers.

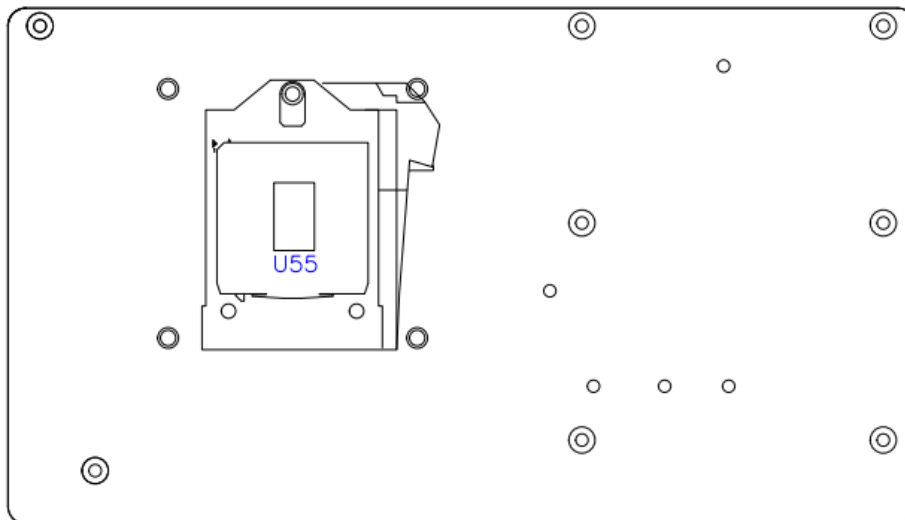
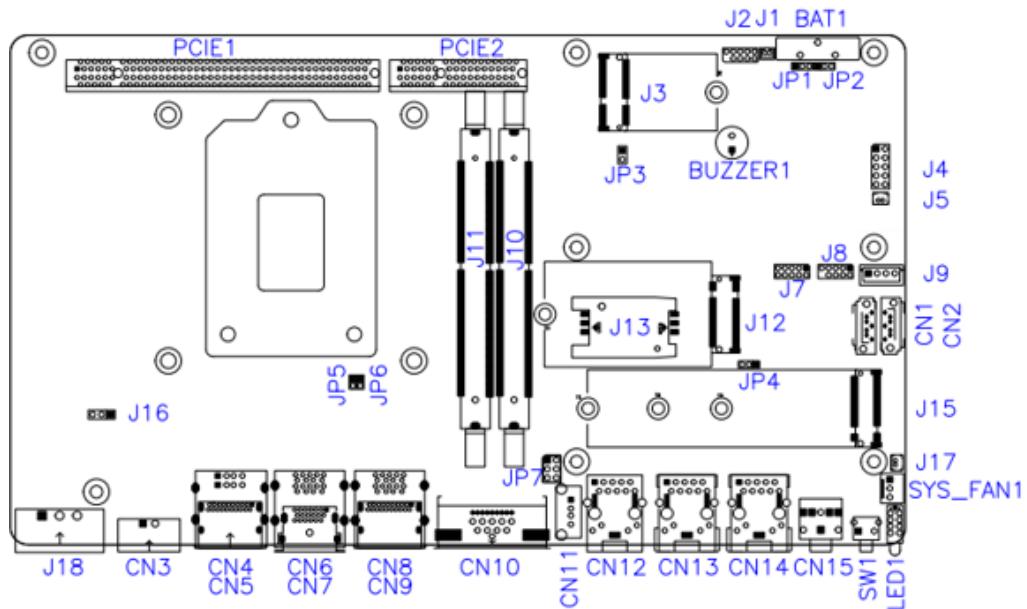
| Pin        | Oblique view | Illustration |
|------------|--------------|--------------|
| Open       |              |              |
| 1-2 closed |              |              |
| 2-3 closed |              |              |

When two pins of a jumper are encased in a jumper cap, this jumper is **closed**, i.e. turned **On**.

When a jumper cap is removed from two jumper pins, this jumper is **open**, i.e. turned **Off**.

## 2.3 Jumper & Connector Locations on Motherboard

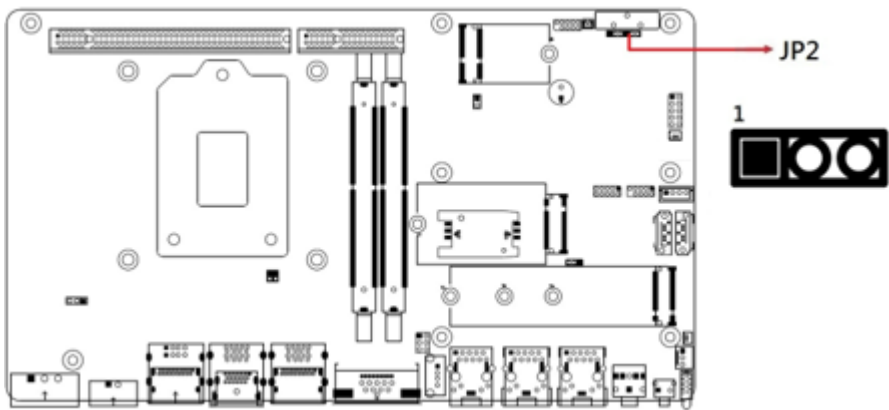
Motherboard: MB310

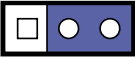


2.4 Jumpers Quick Reference

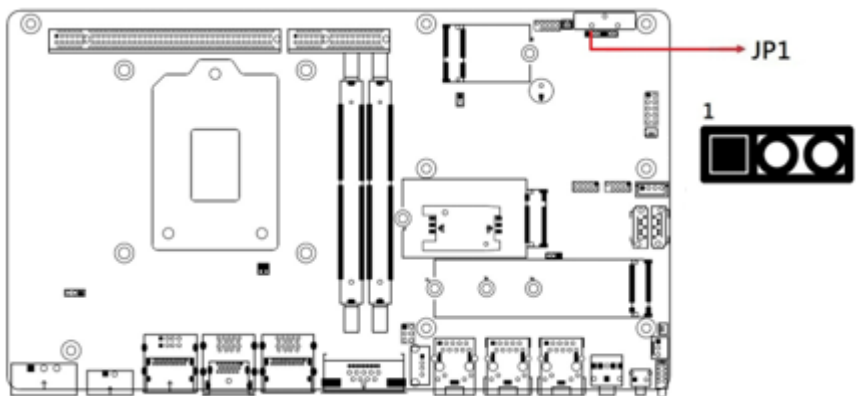
| Function                         | Jumper   |
|----------------------------------|----------|
| Clear CMOS Data                  | JP2      |
| Clear ME                         | JP1      |
| COM2 RS-232 Power Selection      | JP7      |
| AT/ATX Mode Setting              | JP4      |
| PCIe (x16) Bifurcation Selection | JP5, JP6 |

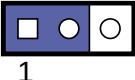
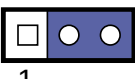
2.4.1 Clear CMOS Data (JP2)



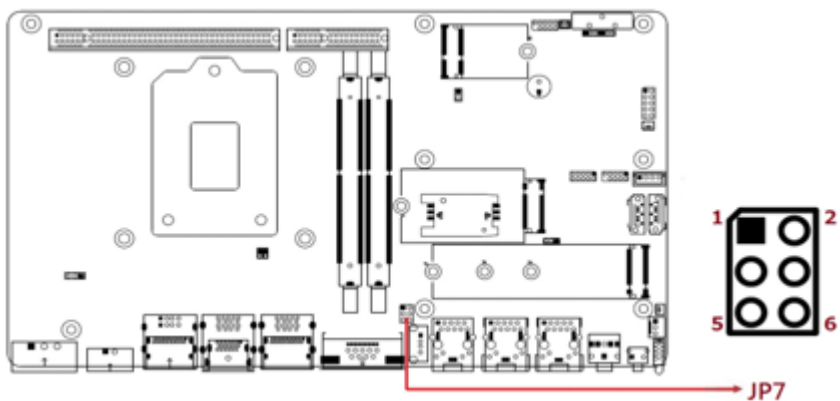
| Function            | Pin           | Illustration                                                                             |
|---------------------|---------------|------------------------------------------------------------------------------------------|
| Normal<br>(default) | 1-2<br>Closed | <br>1 |
| Clear CMOS          | 2-3<br>Closed | <br>1 |

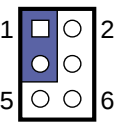
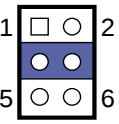
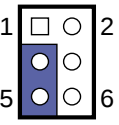
### 2.4.2 Clear ME Data (JP1)



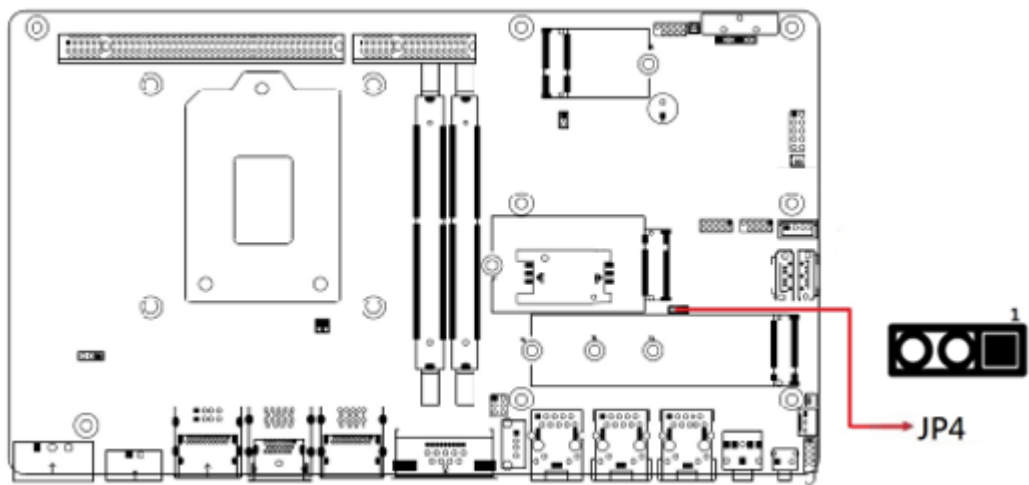
| Function         | Pin        | Illustration                                                                           |
|------------------|------------|----------------------------------------------------------------------------------------|
| Normal (default) | 1-2 Closed | <br>1 |
| Clear ME         | 2-3 Closed | <br>1 |

### 2.4.3 COM2 RS-232 Power Selection (JP7)



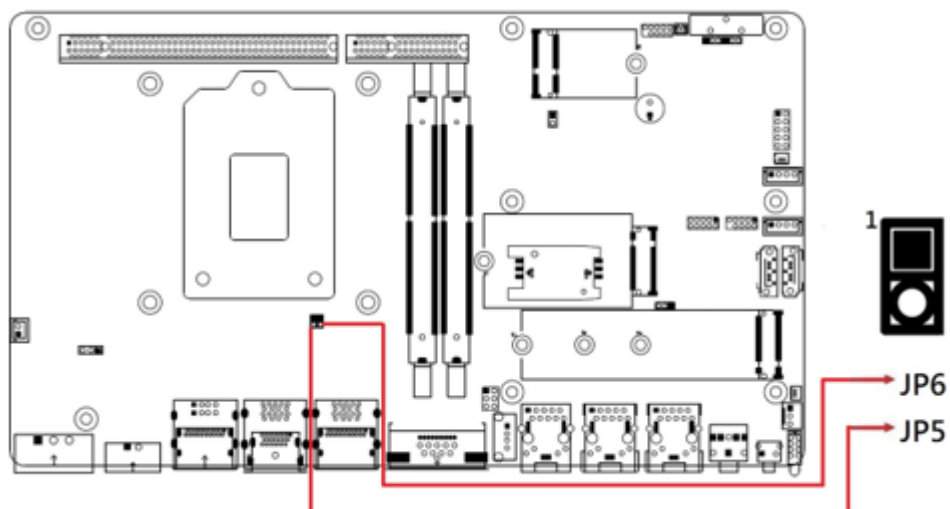
| Function         | Pin closed | Illustration                                                                                      |
|------------------|------------|---------------------------------------------------------------------------------------------------|
| 12V              | 1-3        | <br>1 2<br>5 6 |
| Normal (default) | 3-4        | <br>1 2<br>5 6 |
| 5V               | 3-5        | <br>1 2<br>5 6 |

### 2.4.4 AT/ATX Mode Setting (JP4)



| Function              | Pin        | Illustration                                                                            |
|-----------------------|------------|-----------------------------------------------------------------------------------------|
| ATX Mode<br>(default) | 1-2 Closed | <br>1  |
| AT Mode               | 2-3 Closed | <br>1 |

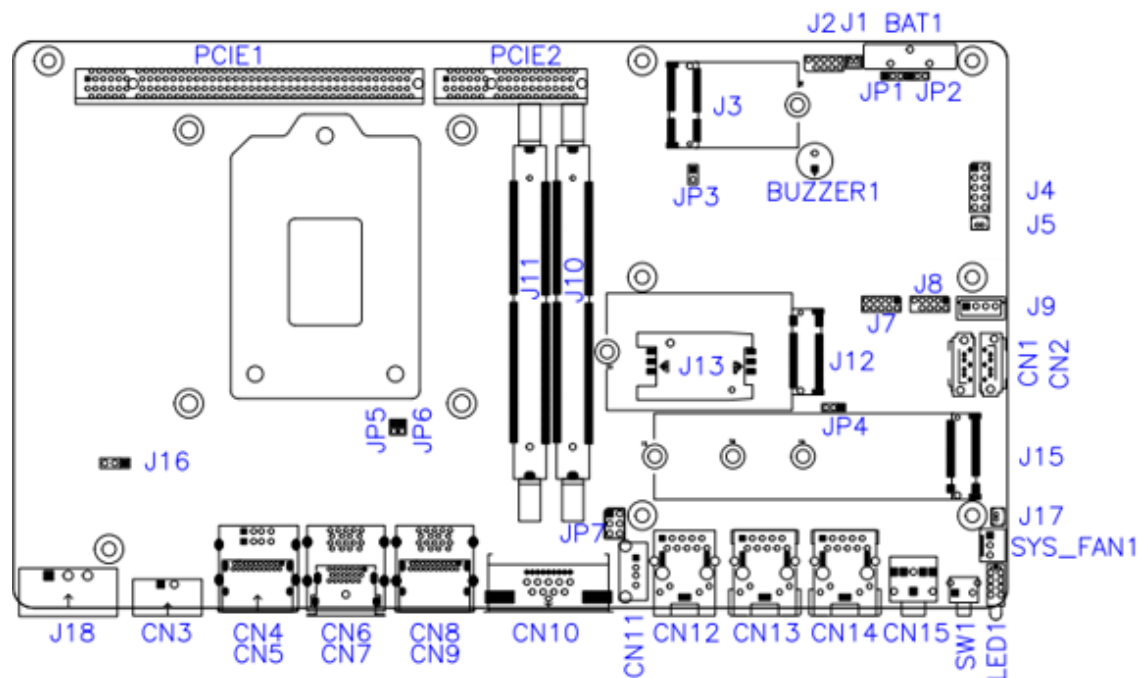
## 2.4.5 PCIe (x16) Bifurcation Selection (JP5 & JP6)



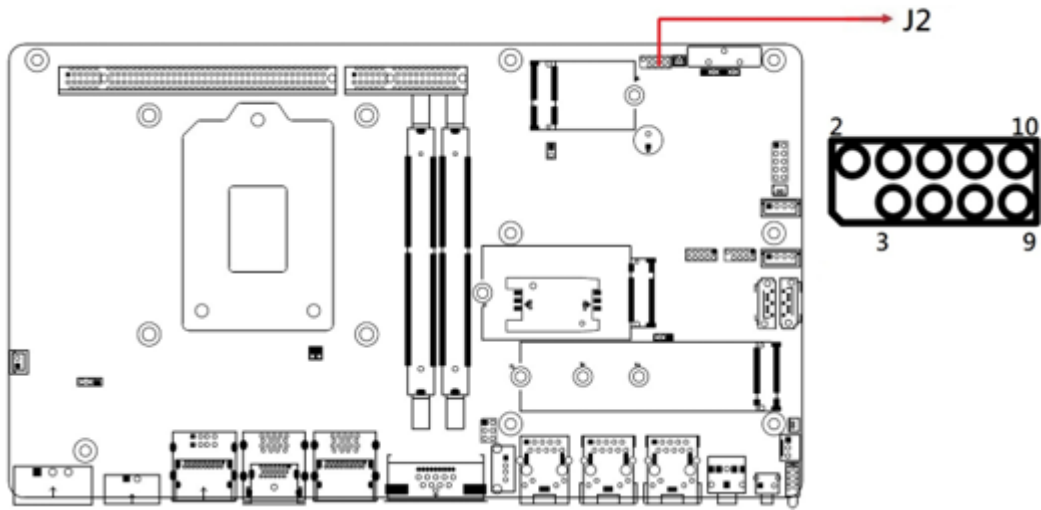
| Function                       | Pin        | Illustration                                                                          |
|--------------------------------|------------|---------------------------------------------------------------------------------------|
| 1 x PCIe (x16)<br>(default)    | JP5: Open  |  1   |
|                                | JP6: Open  |  1 |
| 2 x PCIe (x8)                  | JP5: Open  |  1 |
|                                | JP6: Close |  1 |
| RSVD                           | JP5: Close |  1 |
|                                | JP6: Open  |  1 |
| 1 x PCIe (x8)<br>2 x PCIe (x4) | JP5: Close |  1 |
|                                | JP6: Close |  1 |

## 2.5 Connectors Quick Reference

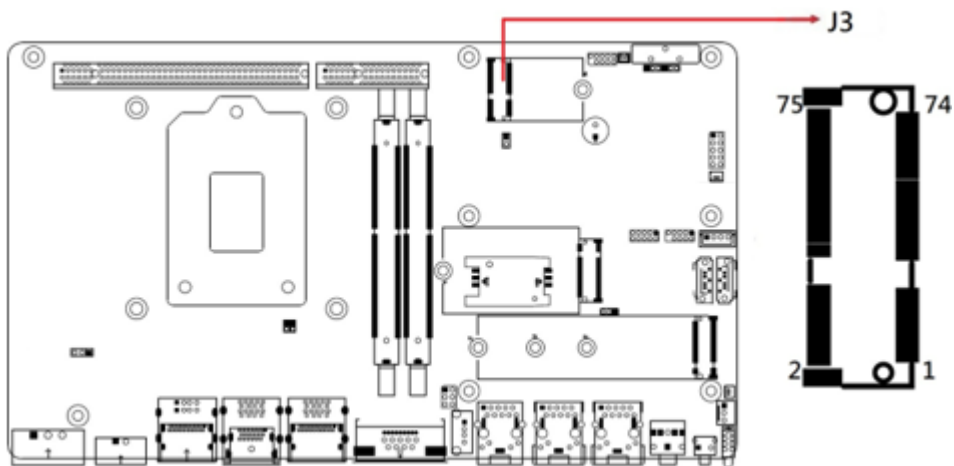
| Function                         | Connector |
|----------------------------------|-----------|
| SPI Debug tools Pin Header       | J2        |
| M.2 E-Key Socket                 | J3        |
| SATA HDD Power Connector         | J9        |
| Digital I/O                      | J7        |
| SPI Firmware Header              | J8        |
| M.2 B-Key Socket                 | J12       |
| M.2 M-Key Socket                 | J15       |
| Reset Switch                     | J17       |
| DC-In Power Connector            | J18       |
| LED indicators                   | LED1      |
| PCI-Express (x16)                | PCIE1     |
| PCI-Express (x4)                 | PCIE2     |
| Terminal Block for Remote Access | CN3       |
| COM1/COM2 Ports                  | CN10      |
| LAN2 (I225V 2.5G)                | CN13      |
| LAN3 (I225V 2.5G)                | CN14      |
| System Fan Power Connector       | SYS_FAN1  |
| Audio Jack for Line Out          | CN15      |
| DisplayPort                      | CN8, CN4  |
| HDMI Port                        | CN6       |
| USB 3.0 Ports                    | CN9, CN7  |
| USB 2.0 Ports                    | CN5       |



### 2.5.1 J2: SPI Debug tools Pin Header

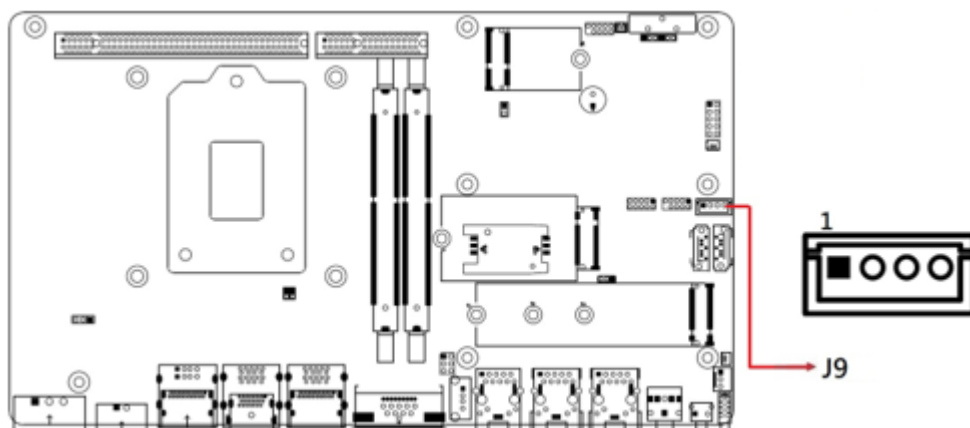


### 2.5.2 J3: M.2 E-Key Socket



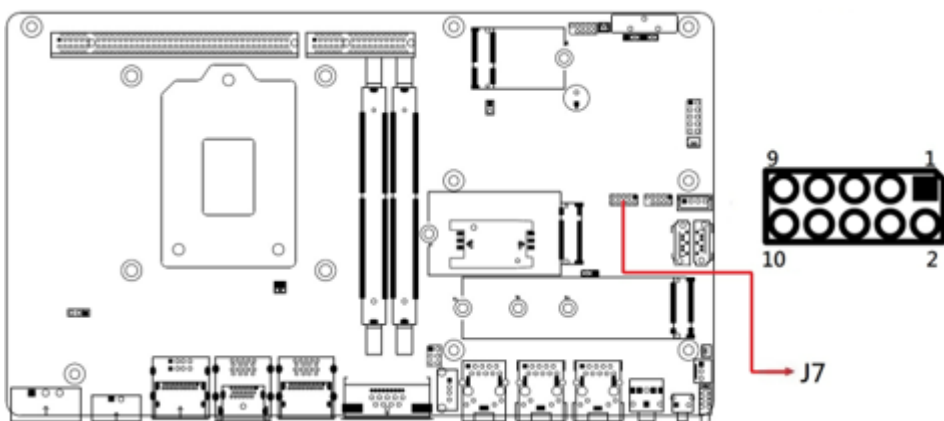
Note: J3 supports USB2.0 & PCIe (for wifi module)

### 2.5.3 SATA HDD Power Connector (J9)

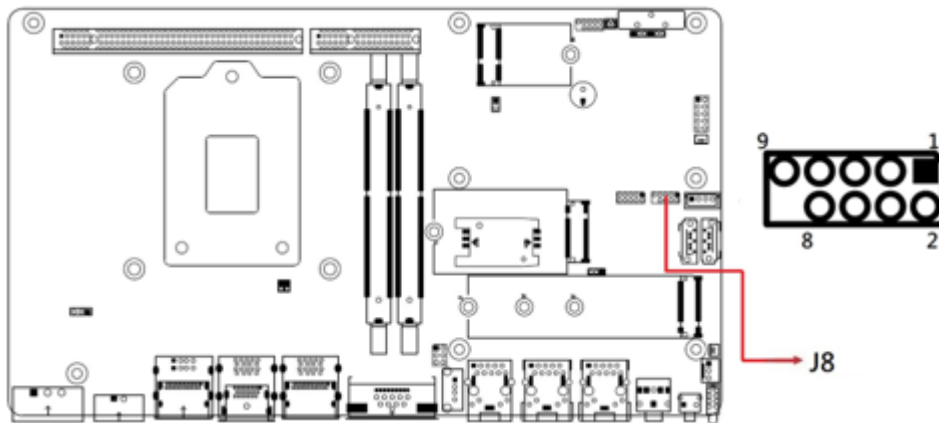


| Pin | Signal Name | Pin | Signal Name |
|-----|-------------|-----|-------------|
| 1   | +5V         | 3   | Ground      |
| 2   | Ground      | 4   | +12V        |

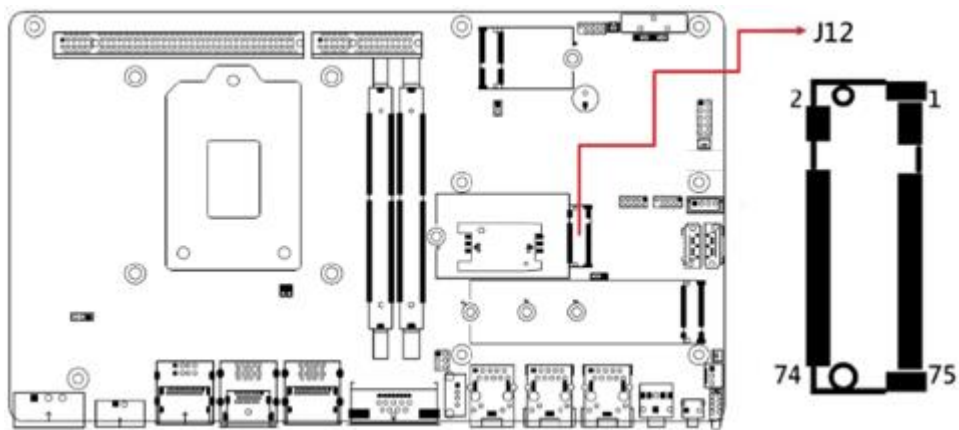
### 2.5.4 Digital I/O (J7)



### 2.5.5 SPI Firmware Header (J8)

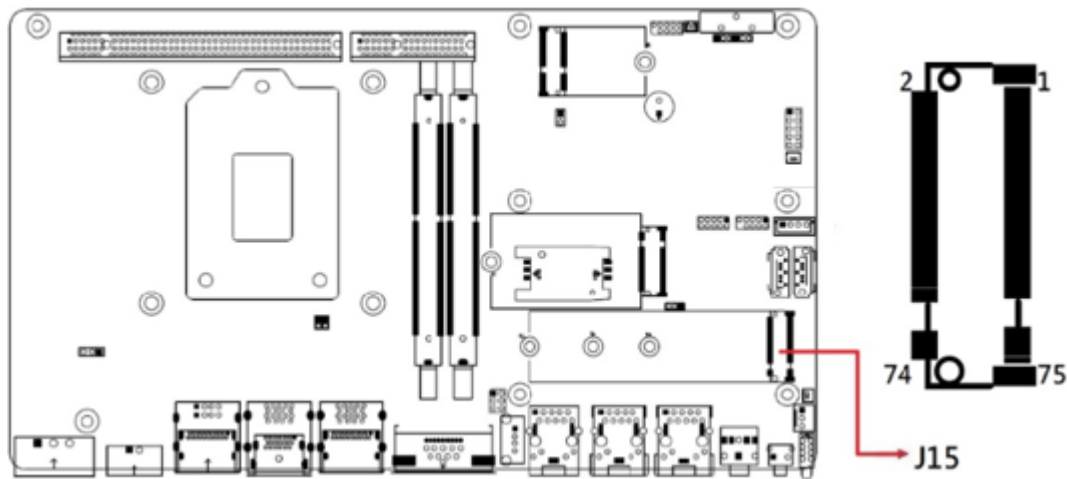


### 2.5.6 M.2 B-Key Socket (J12)



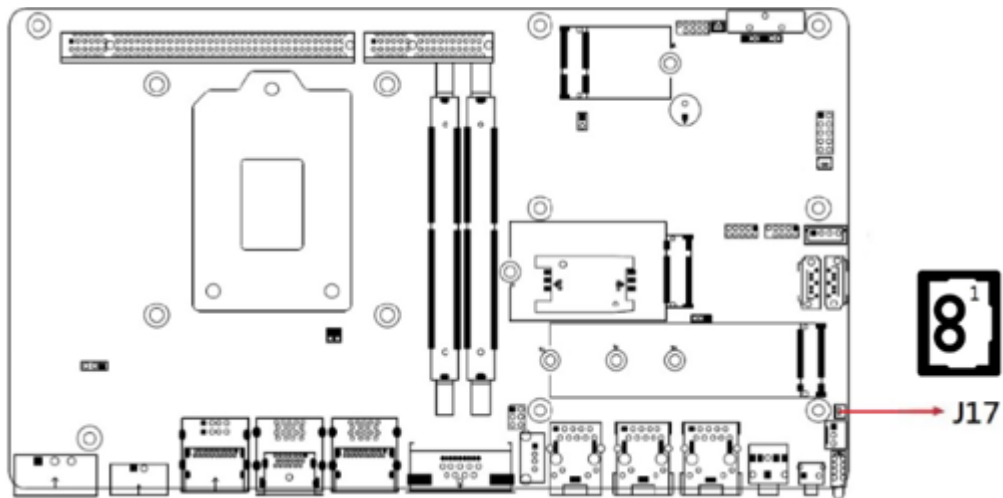
Note: J12 supports USB2.0 & 3.0, and 4G/5G module; (Non-Sierra 5G module)

### 2.5.7 M.2 M-Key Socket (J15)



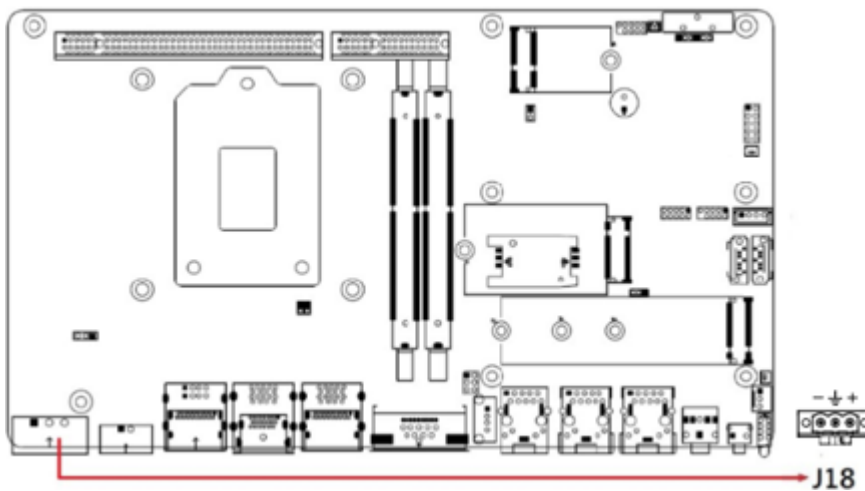
Note: J15 supports SATA & PCIe x4 (for storage)

### 2.5.8 Reset Switch (J17)



| Pin | Signal Name |
|-----|-------------|
| 1   | Reset#      |
| 2   | Ground      |

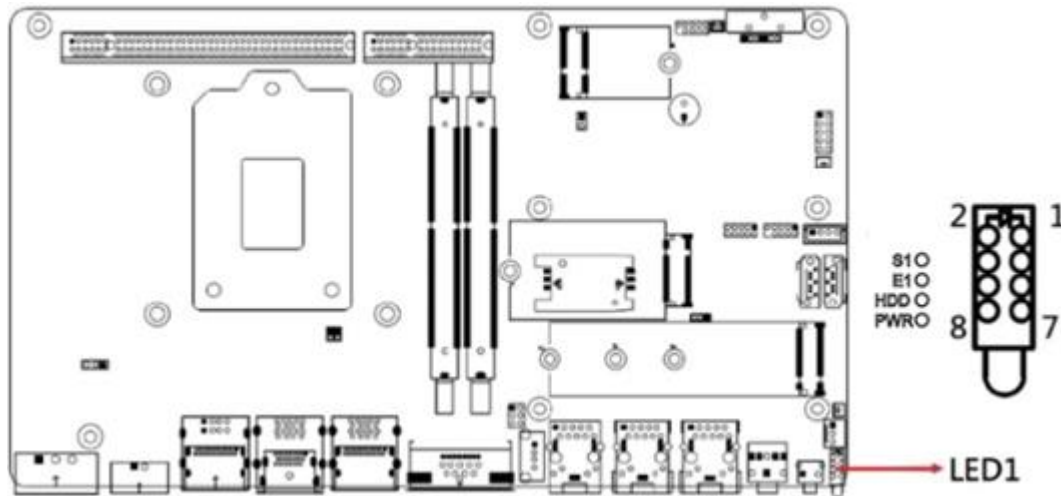
### 2.5.9 DC-In Power Connector (J18)



Note: J18 is a 3-pin terminal block.

| Pin | Signal Name |
|-----|-------------|
| 1   | 24V         |
| 2   | Case Ground |
| 3   | Ground      |

### 2.5.10 LED indicators (LED1)



Note: LED1 consists of Power, HDD, and 2x error warning.

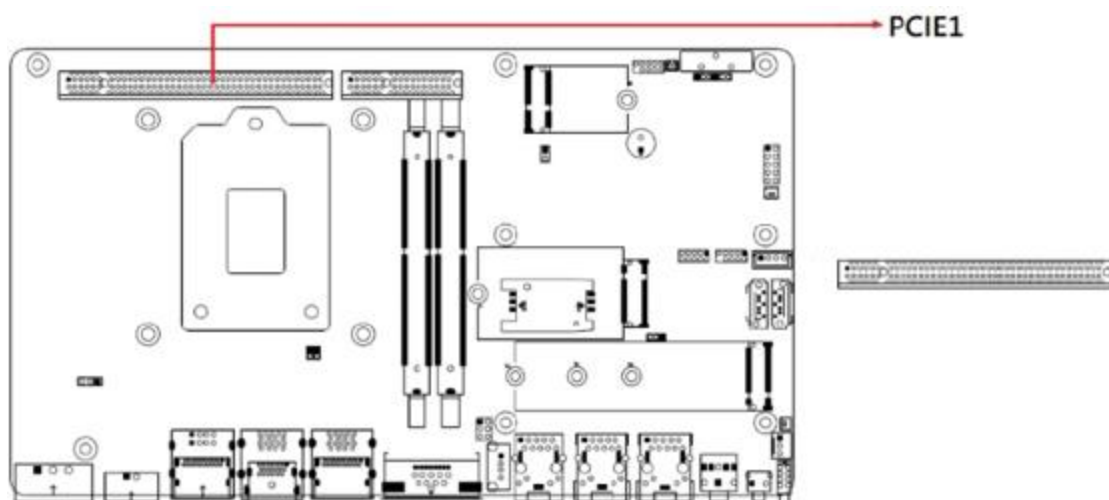
Green (Power LED)

Red (HDD)

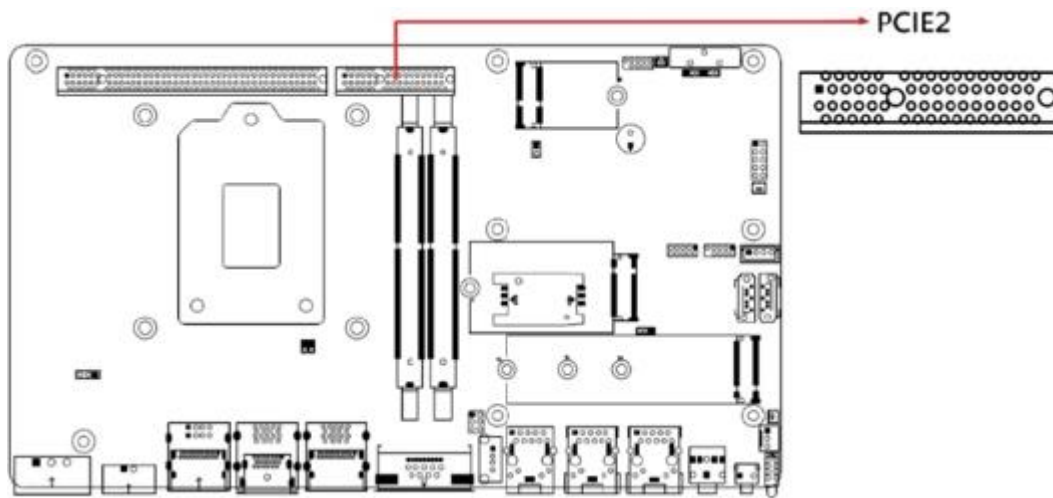
Blue (GPIO)

Green/Yellow (GPIO)

### 2.5.11 PCI-Express (x16) (PCIE1)



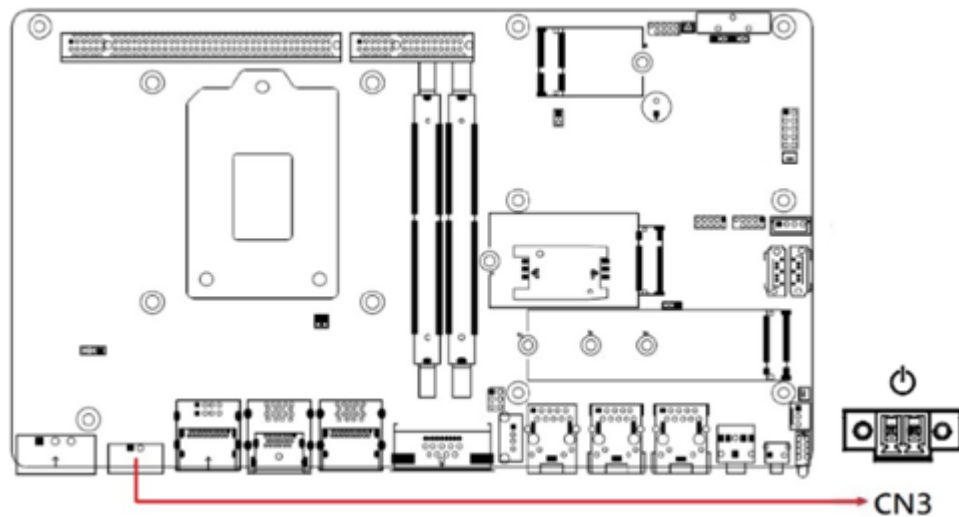
### 2.5.12 PCI-Express (x4) (PCIE2)



Note: PCIE2 is used with IP301 and IP302.

The signal shall be 1x PCI-E(x1) [36 pins] and 3x USB2.0 / 2x RS232

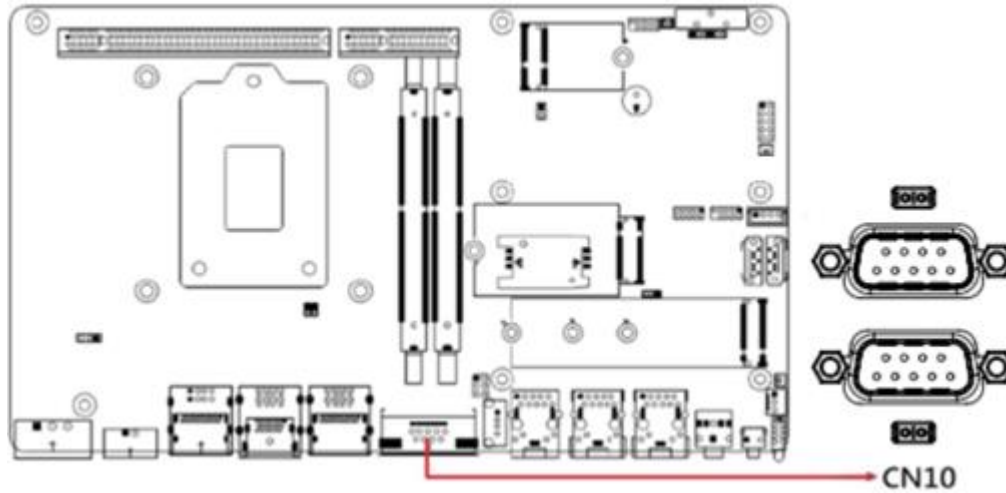
### 2.5.13 Terminal Block Connector for Remote Access (CN3)



### 2.5.14 COM1/COM2 Ports (CN10)

\* COM1: RS232/422/485 (top)

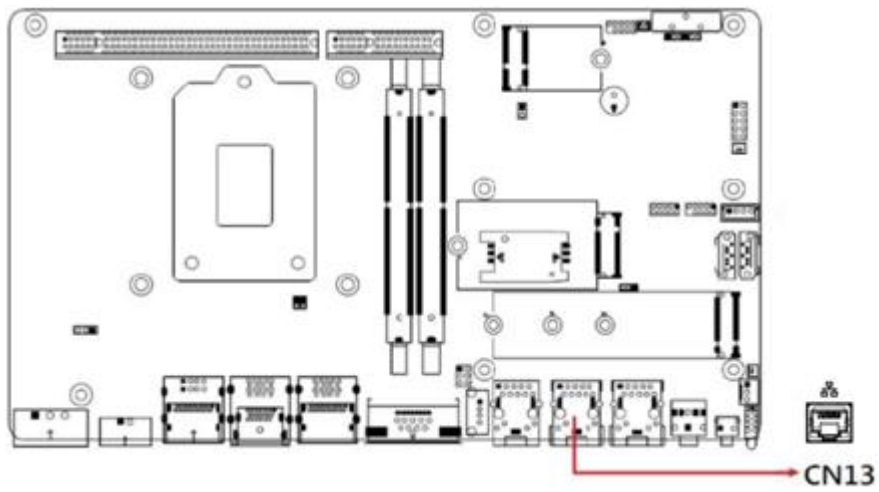
\* COM2: RS232 (bottom)



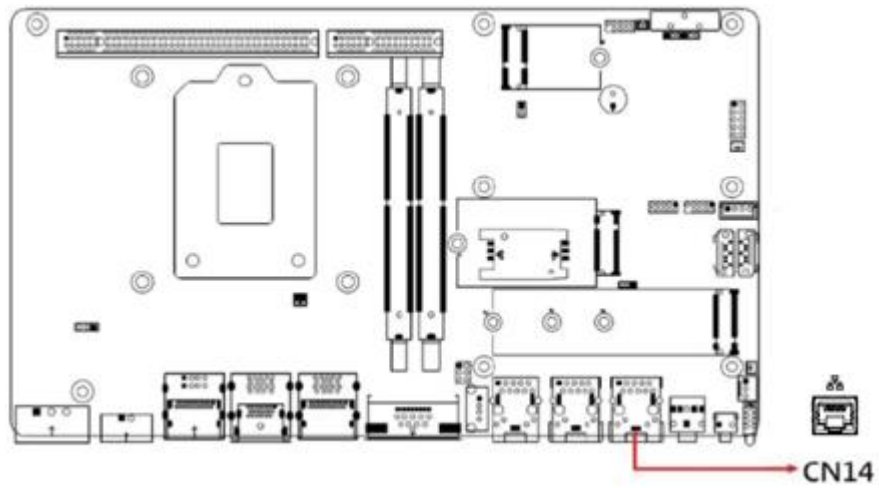
COM1~2 port is jumper-less and configurable in the BIOS.

| Pin | Assignment               | Pin | Assignment           |
|-----|--------------------------|-----|----------------------|
| 1   | DCD, Data carrier detect | 6   | DSR, Data set ready  |
| 2   | RXD, Receive data        | 7   | RTS, Request to send |
| 3   | TXD, Transmit data       | 8   | CTS, Clear to send   |
| 4   | DTR, Data terminal ready | 9   | RI, Ring indicator   |
| 5   | Ground                   |     |                      |

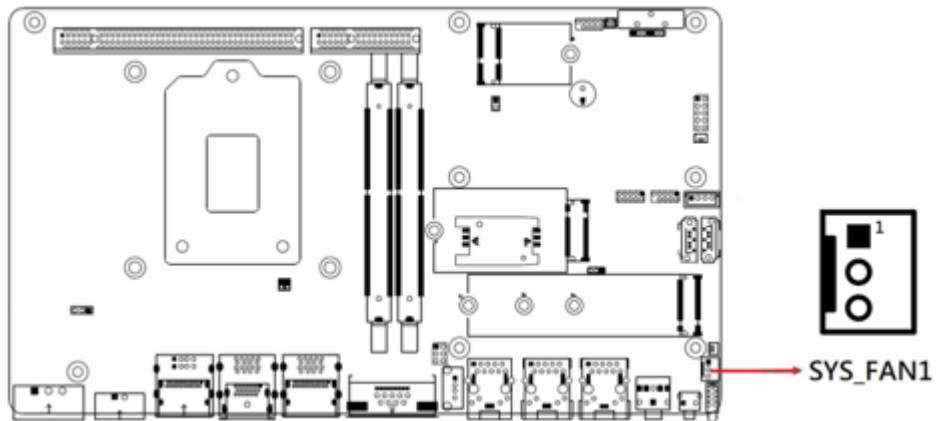
### 2.5.15 LAN2 (I225V 2.5G) (CN13)



### 2.5.16 LAN3 (I225V 2.5G) (CN14)



### 2.5.17 System Fan Power Connector (SYS\_FAN1)



| Pin | Assignment         |
|-----|--------------------|
| 1   | Ground             |
| 2   | 12V                |
| 3   | Rotation detection |

## Chapter 3

# Driver Installation

The information provided in this chapter includes:

- Intel® Chipset Software Installation Utility
- Graphics Driver Installation
- HD Audio Driver Installation
- LAN Driver Installation
- Intel® Management Engine Driver Installation

### 3.1 Introduction

This section describes the installation procedures for software drivers.

---

**Note:** After installing your Windows OS, install the Intel® Chipset Software Installation Utility first before proceeding with the drivers installation.

---

### 3.2 Intel® Chipset Software Installation Utility

The Intel® Chipset drivers should be installed first before the software drivers to install INF files for Plug & Play function for the chipset components.

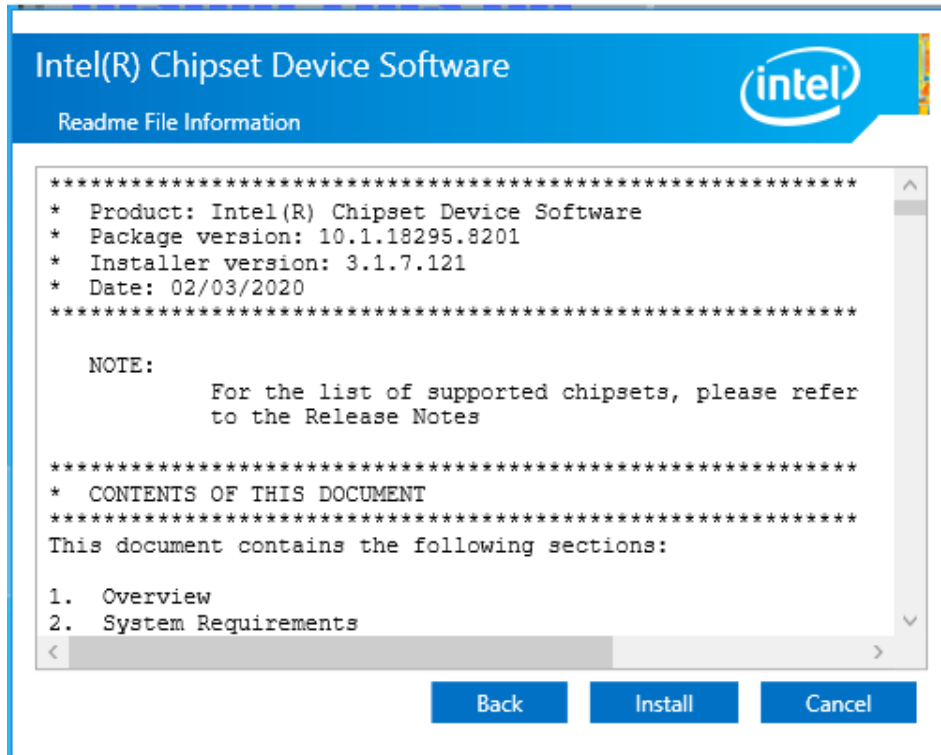
1. Go to the download page of the product. Copy the compressed drivers file to your computer. Double click the file to decompress it. Run “CDGuide” to go to the main drivers page as shown. Click **Intel** and then **Intel(R) CometLake Chipset Drivers**.



2. Click **Intel(R) Chipset Software Installation Utility**.



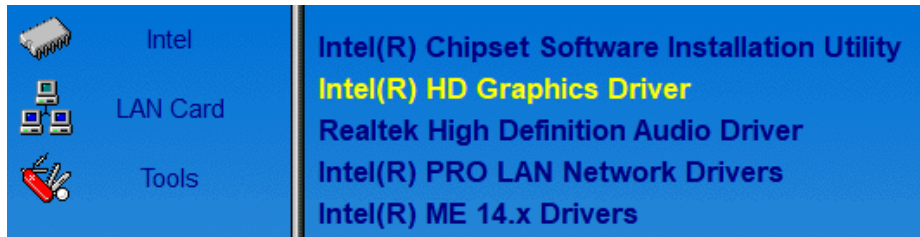
3. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next** to continue.
4. Accept the software license agreement.
5. On the *Readme File Information* screen, click **Install**.



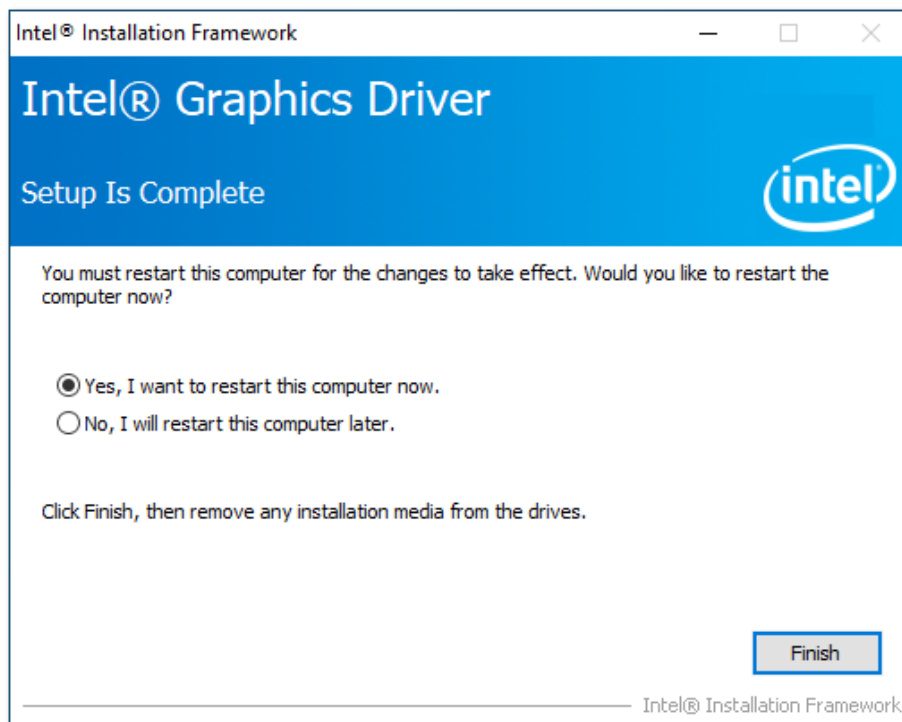
6. When Intel® Chipset Device Software has been completely installed, click **Finish** to complete the setup process.

### 3.3 Graphics Driver Installation

1. Click **Intel** and then **Intel(R) CometLake Chipset Drivers**.
2. Click **Intel(R) HD Graphics Driver**.



3. When the *Welcome* screen appears, click **Next**.
4. Accept the license agreement and click **Yes**.
5. On the *Readme File Information* screen, click **Next**.
6. In the Setup Progress screen, click **Next**.
7. When Setup is Complete, click **Finish** to restart the computer.



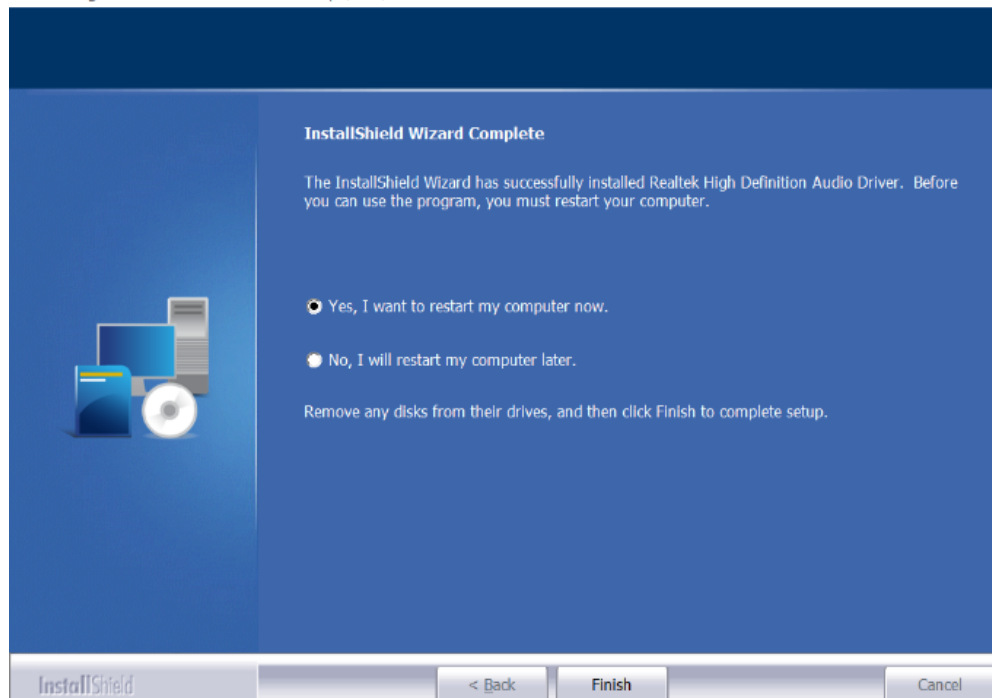
### 3.4 HD Audio Driver Installation

1. Click **Intel** and then **Intel(R) CometLake Chipset Drivers**.
2. Click **Realtek High Definition Audio Driver**.



3. On the *Welcome* screen of the InstallShield Wizard, click **Next**.
4. When InstallShield Wizard has completed the installation, restart the computer.

Realtek High Definition Audio Driver Setup (4.27) R2.79

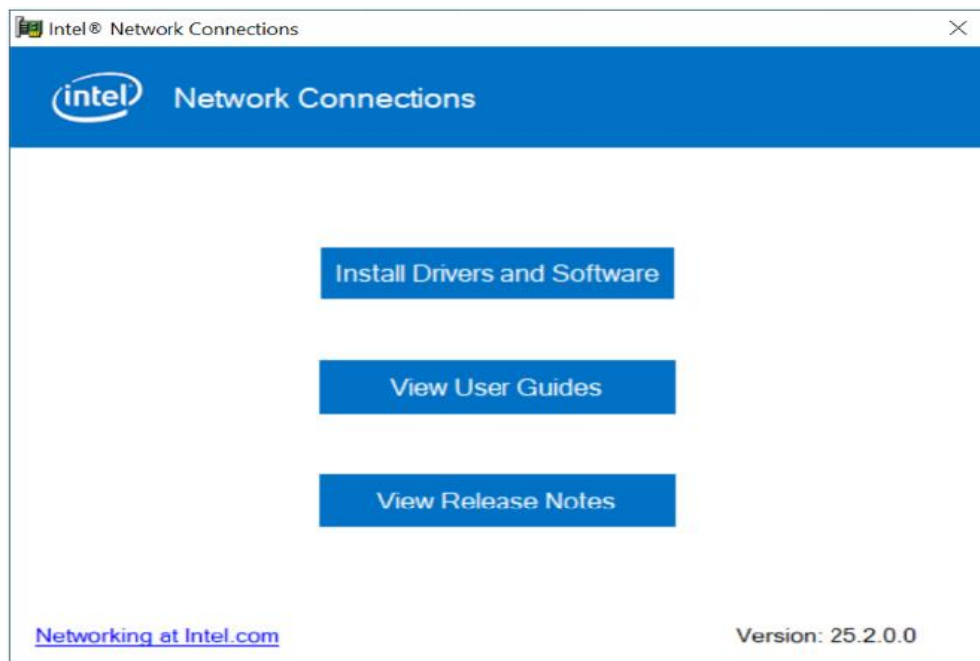


### 3.5 LAN Driver Installation

1. Click **Intel** and then **Intel(R) CometLake Chipset Drivers**
2. Click **Intel(R) PRO LAN Network Drivers..**



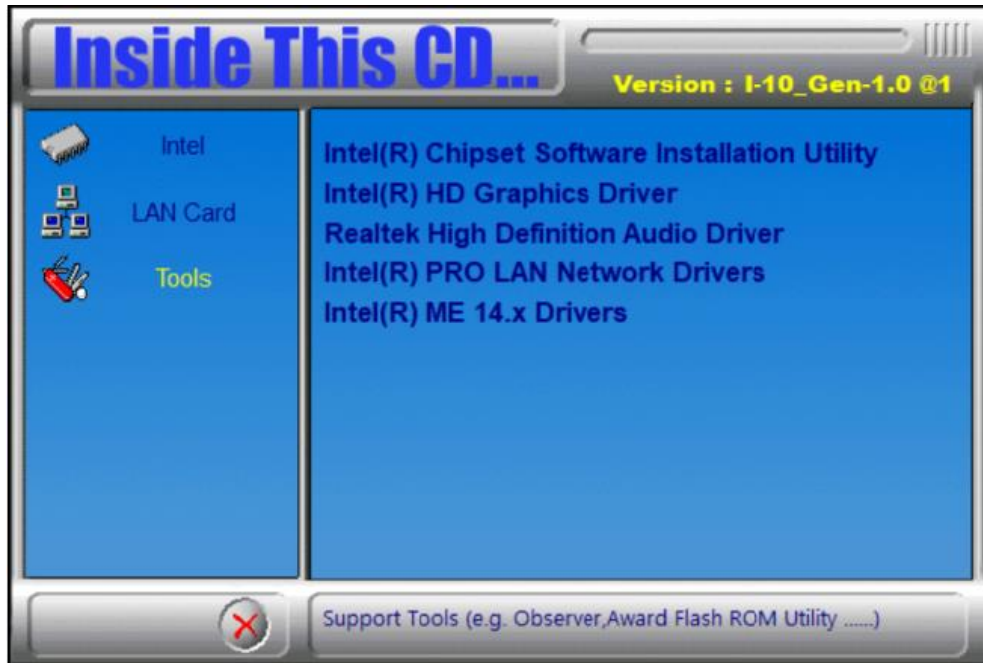
3. Click **Install Drivers and Software.**



4. On the Welcome screen to the Install Wizard, click **Next**.
5. Accept the License Agreement and click **Next**.
6. Click **Next** in the Setup Options screen as shown below.
7. Install Wizard is now ready to install the program, click **Install**.
8. When Install Wizard has completed the installation, click **Finish**.

### 3.6 Intel® Management Engine Driver Installation

1. Click **Intel** and then **Intel(R) CometLake Chipset Drivers**.
2. Click **Intel(R) ME 14.x Drivers**.



3. When the *Welcome* screen appears, click **Next** to continue.
4. Accept the licence agreement and click **Next** to continue.
5. Click **Next** to install to the default folder, or click **Change** to choose another destination folder.
6. When the Intel Management Engine Components has been successfully installed, click **Finish**.

## Chapter 4

# BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

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

## 4.1 Introduction

The BIOS (Basic Input/Output System) installed in the ROM of your computer system supports Intel® processors. The BIOS provides critical low-level support for standard devices such as disk drives, serial ports and parallel ports. It also provides password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

## 4.2 BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Press the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup.

If you still need to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again.

The following message will appear on the screen:

```
Press <DEL> to Enter Setup
```

In general, press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help, and <Esc> to quit.

When you enter the BIOS Setup utility, the *Main Menu* screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

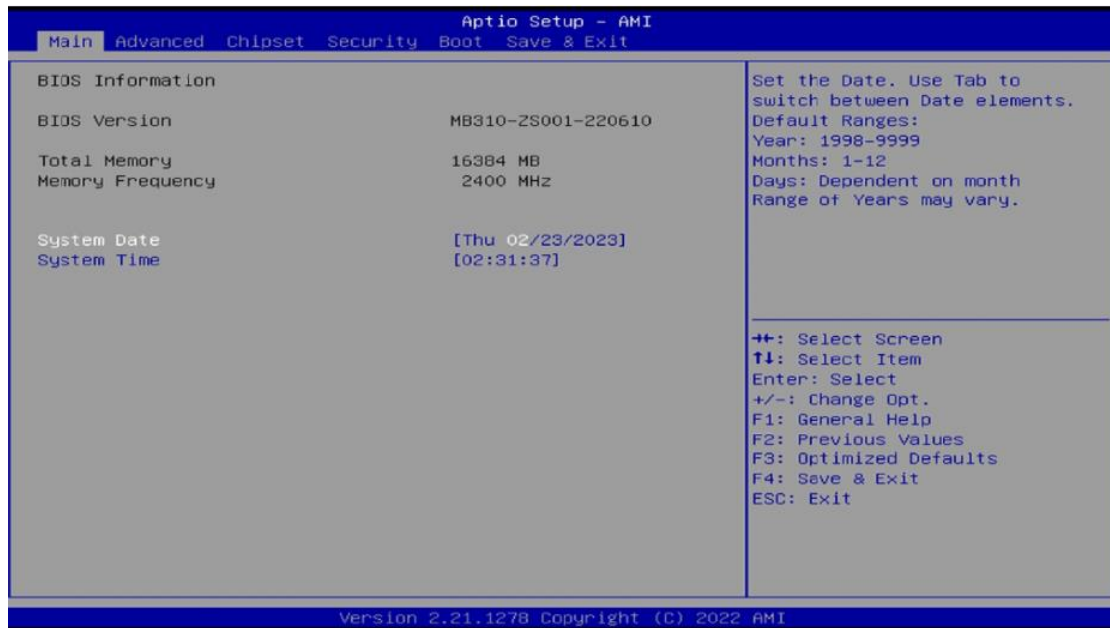
---

**Warning:** It is strongly recommended that you avoid making any changes to the chipset defaults.

These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could make the system unstable and crash in some cases.

---

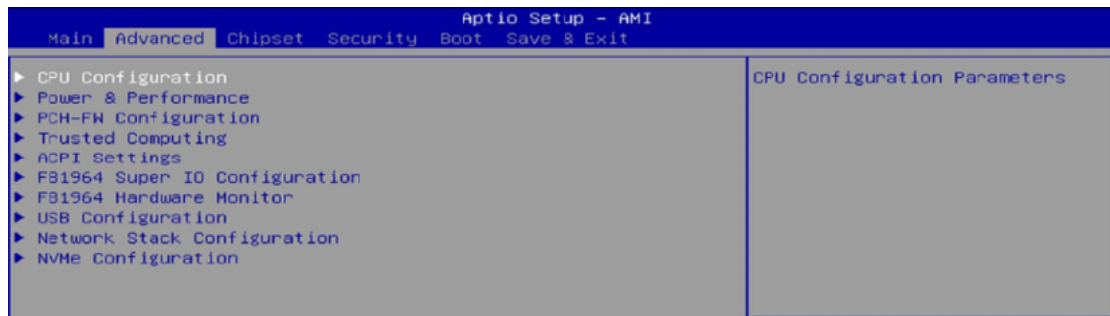
## 4.3 Main Settings



| BIOS Setting | Description                                                          |
|--------------|----------------------------------------------------------------------|
| System Date  | Sets the date.<br>Use the <Tab> key to switch between date elements. |
| System Time  | Set the time.<br>Use the <Tab> key to switch between time elements.  |

## 4.4 Advanced Settings

This section allows you to configure, improve your system and allows you to set up some system features according to your preference.



| BIOS Setting                  | Description                                         |
|-------------------------------|-----------------------------------------------------|
| CPU Configuration             | Displays CPU configuration parameters.              |
| Power & Performance           | Shows power and performance options.                |
| Trusted Computing             | Configures management engine technology parameters. |
| ACPI Settings                 | Displays system ACPI parameters.                    |
| F81964 Super IO Configuration | Displays super IO chip parameters.                  |
| F81964 Hardware Monitor       | Shows super IO monitor hardware status.             |
| PCH-FW Configuration          | Configures management engine technology parameters. |
| USB Configuration             | Displays USB configuration parameters.              |
| Network Stack Configuration   | Enable/Disable UEFI Network Stack.                  |
| NVMe Configuration            | Configures NVME Device                              |

4.4.1 CPU Configuration

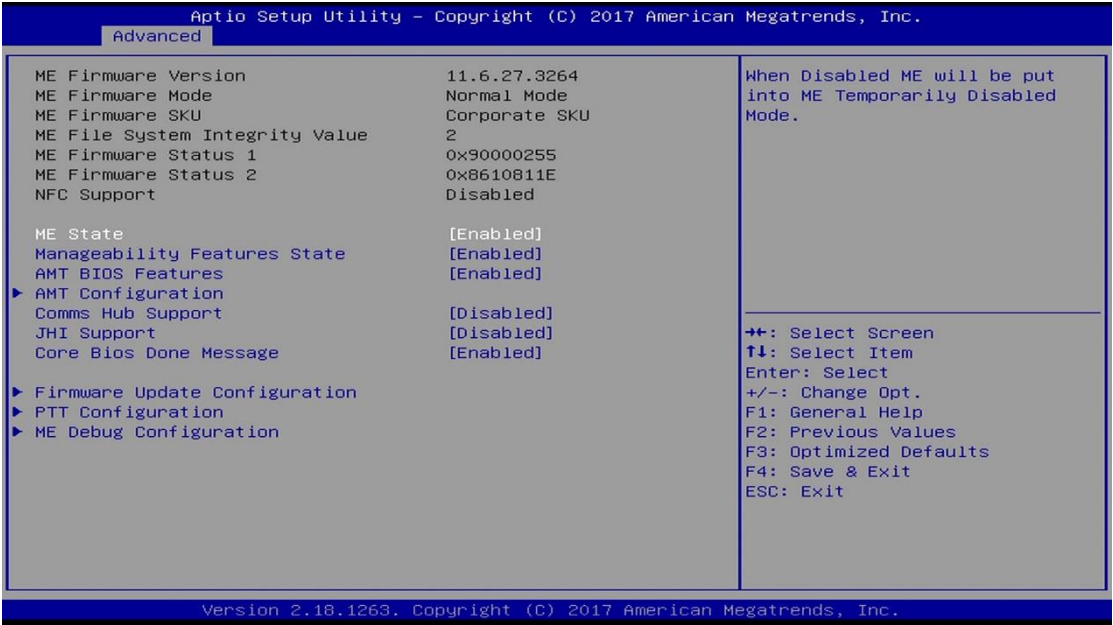


| BIOS Setting                          | Description                                                                                             |
|---------------------------------------|---------------------------------------------------------------------------------------------------------|
| Intel (VMX) Virtualization Technology | When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology. |
| Active Processor Cores                | Number of cores to enable in each processor package.                                                    |
| Hyper-Threading                       | Enable or Disable Hyper-Threading Technology.                                                           |
| AES                                   | Enables / Disables AES (Advanced Encryption Standard).                                                  |

## 4.4.2 Power & Performance

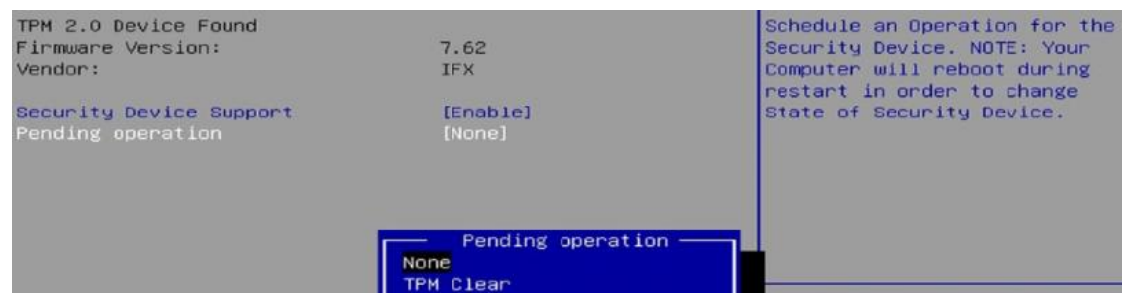


4.4.3 PCH-FW Configuration



| BIOS Setting      | Description                                                                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AMT BIOS Features | <p>When disabled AMT BIOS features are no longer supported and user is no longer able to access MEBx Setup.</p> <p>Note: This option does not disable manageability features in FW.</p> |

## 4.4.4 Trusted Computing

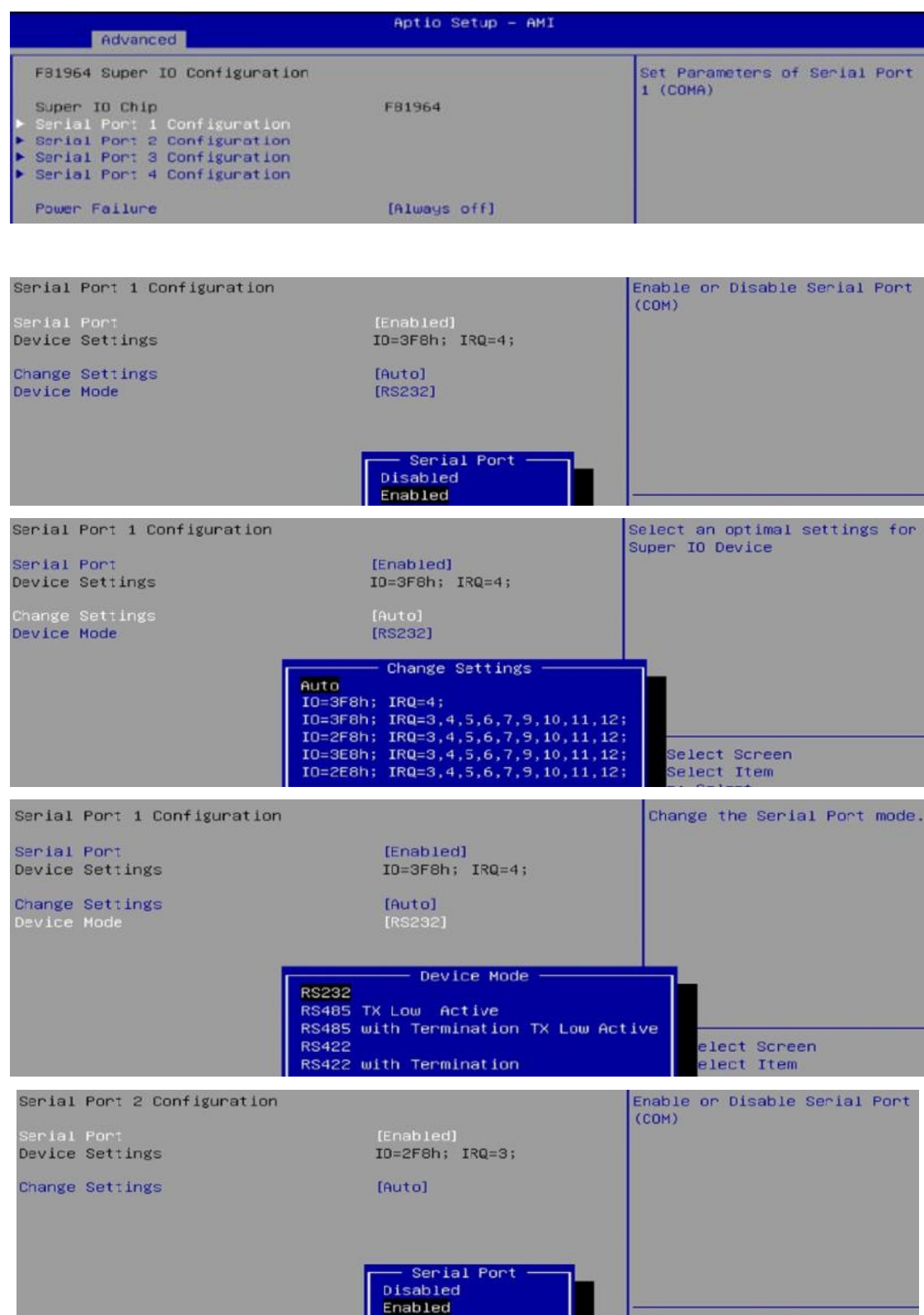


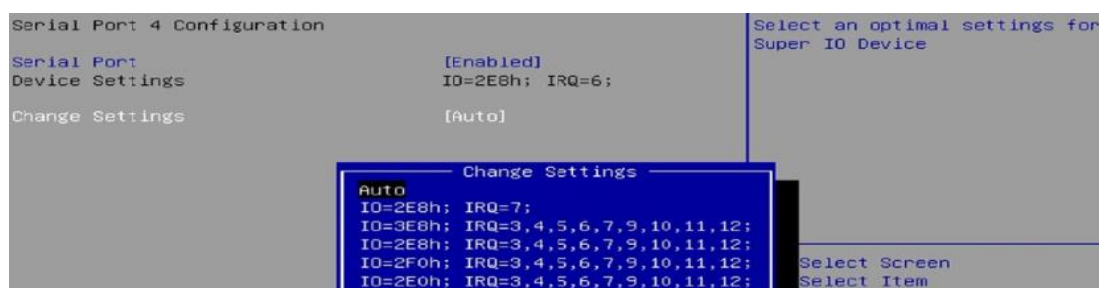
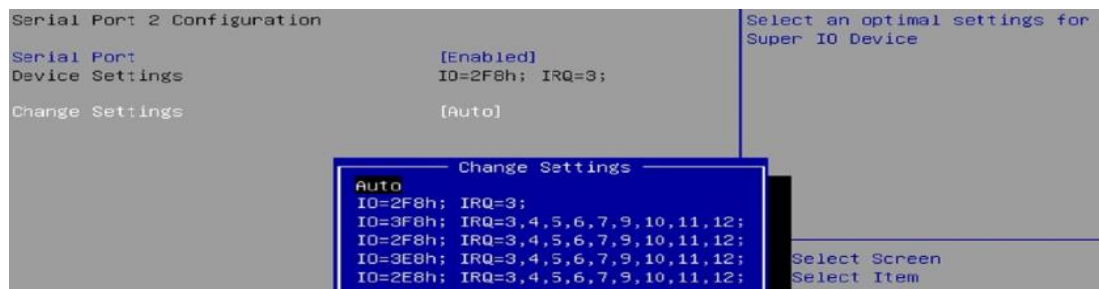
### 4.4.5 ACPI Settings



| BIOS Setting       | Description                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| Enable Hibernation | Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may not be effective with some OS. |
| ACPI Sleep State   | Selects a ACPI sleep state for the system to enter. Options: Suspend Disabled, S3 (Suspend to RAM)                     |

## 4.4.6 F81964 Super IO Configuration



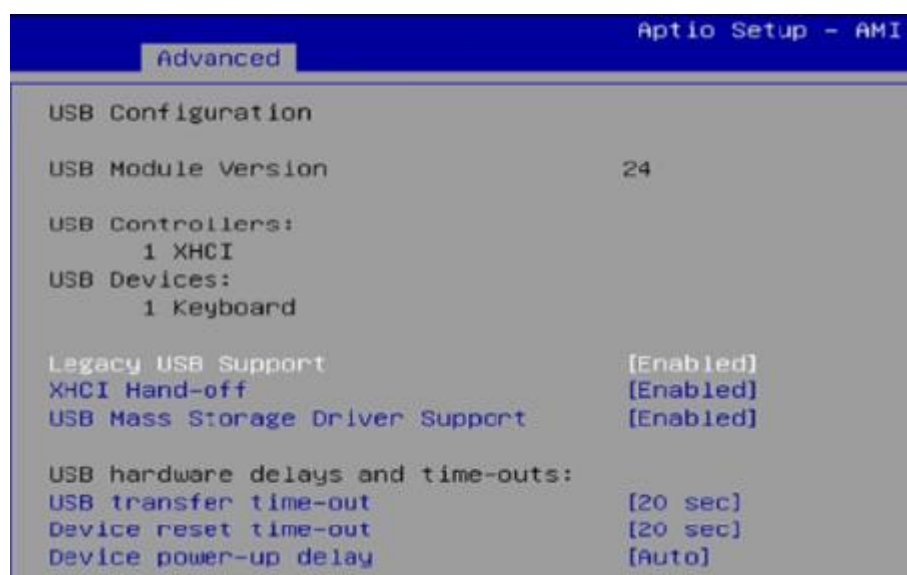


#### 4.4.7 F81964 Hardware Monitor



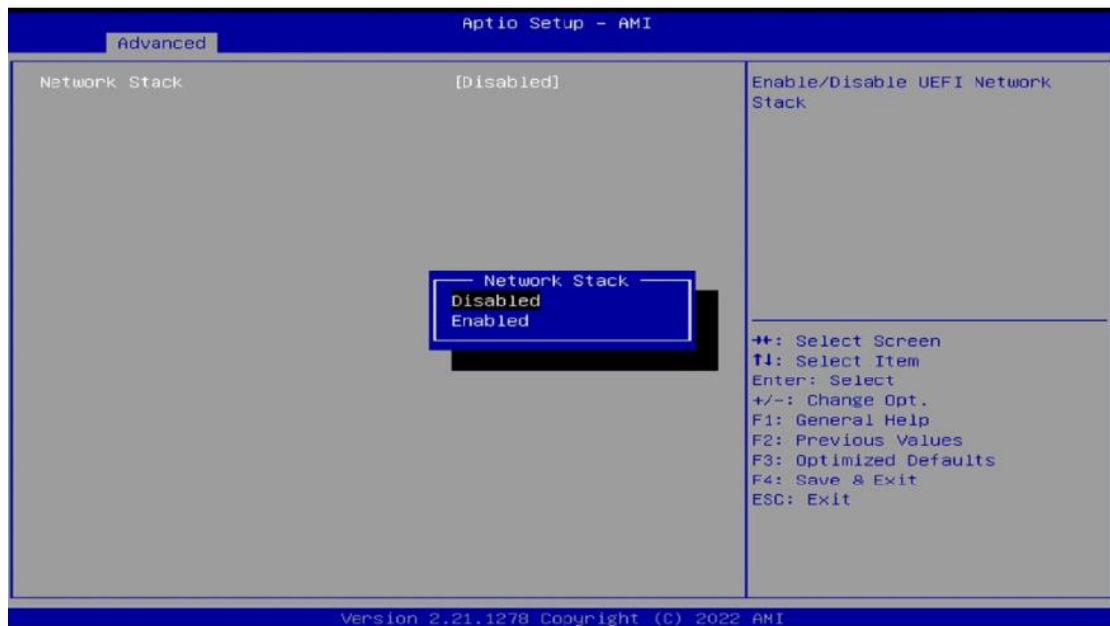
| BIOS Setting            | Description                                                                                                                                                                          |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Smart Fan Control   | Controls the CPU fan temperature by setting up a threshold temperature.<br>Options: Disabled (default),. 50 °C, 60 °C, 70 °C, 80 °C                                                  |
| SYS Smart Fan Control   | Controls the system fan temperature by setting up a threshold temperature.<br>Options: Disabled (default),. 50 °C, 60 °C, 70 °C, 80 °C                                               |
| Temperatures / Voltages | These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only as monitored by the system and showing the PC health status |

### 4.4.8 USB Configuration



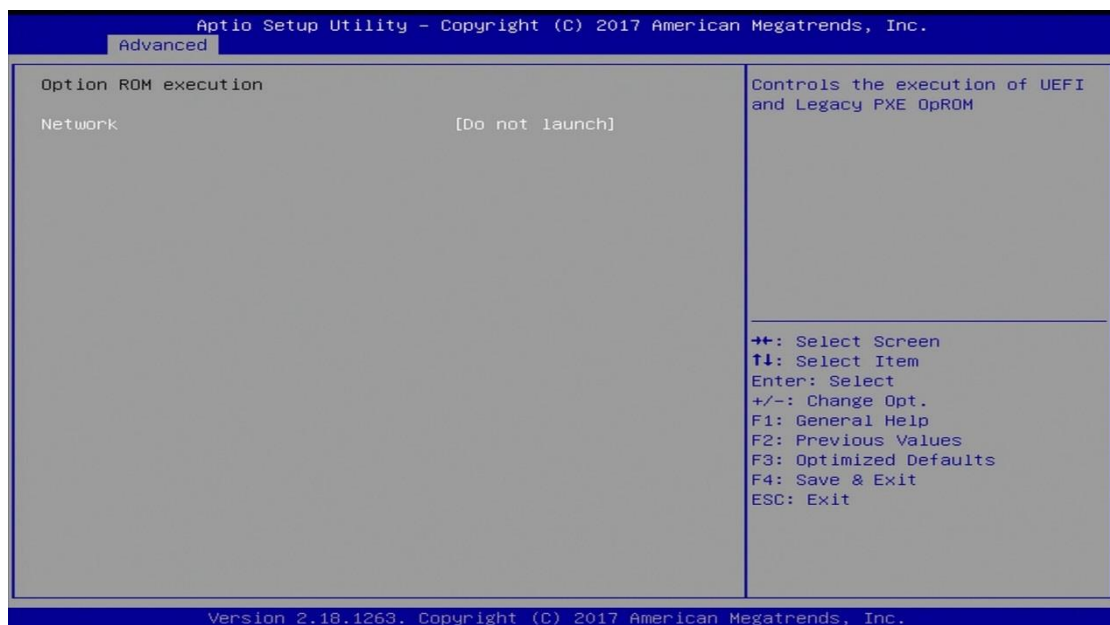
| BIOS Setting                    | Description                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Legacy USB Support              | Enables / Disables Legacy USB support. <ul style="list-style-type: none"> <li>• <b>Auto</b> disables legacy support if there is no USB device connected.</li> <li>• <b>Disable</b> keeps USB devices available only for EFI applications.</li> </ul> |
| XHCI Hand-off                   | This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.                                                                                                                             |
| USB Mass Storage Driver Support | Enables / Disables USB mass storage driver support.                                                                                                                                                                                                  |
| USB Transfer time-out           | Sets the time-out value 1, 5, 10 or 20 sec(s) for Control, Bulk, and Interrupt transfers.                                                                                                                                                            |
| Device reset time-out           | Sets the seconds (10, 20, 30, 40 secs) of delaying execution of start unit command to USB mass storage device.                                                                                                                                       |
| Device power-up delay           | Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor. Options: Auto, Manual                    |

#### 4.4.9 Network Stack Configuration

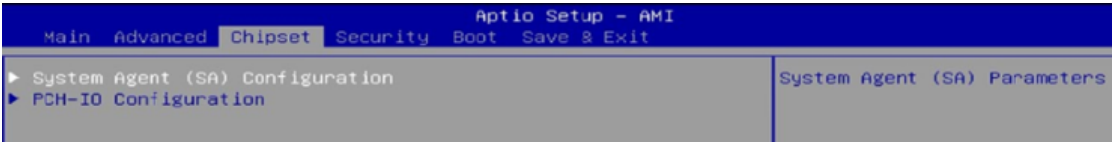


| BIOS Setting  | Description                       |
|---------------|-----------------------------------|
| Network Stack | Enable/Disable UEFI Network Stack |

#### 4.4.10 NVME Configuration

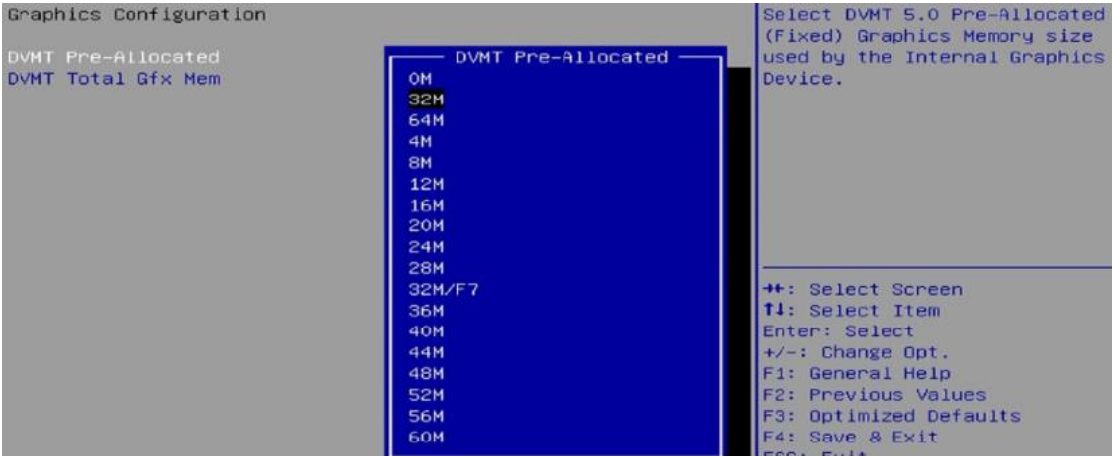
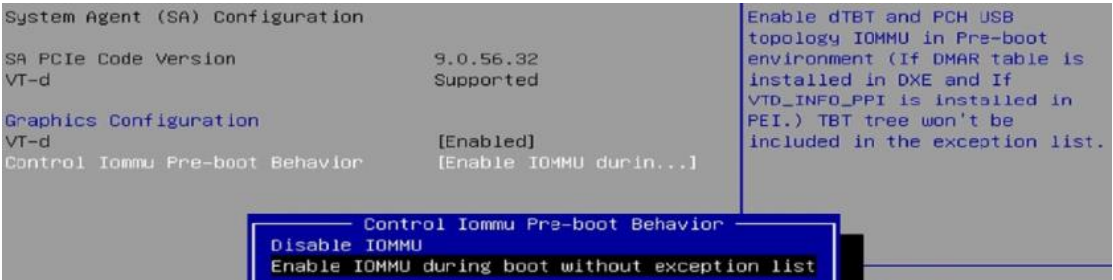


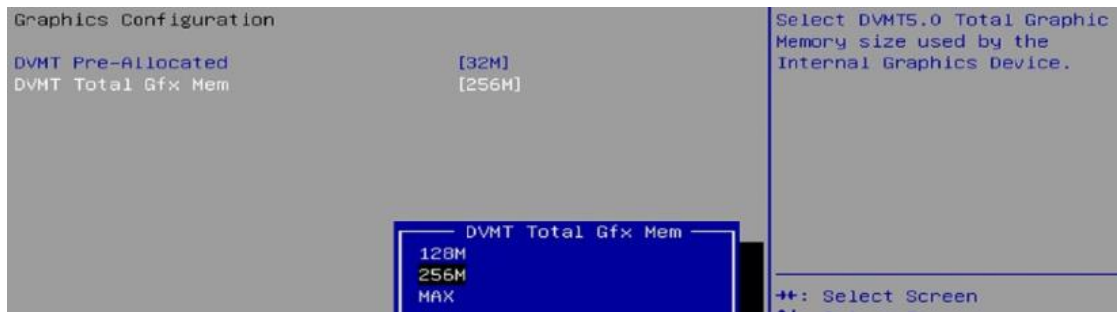
## 4.5 Chipset Settings



| BIOS Setting                    | Description                         |
|---------------------------------|-------------------------------------|
| System Agent (SA) Configuration | System Agent (SA) parameters        |
| VT-d                            | Enables / Disables VT-d capability. |

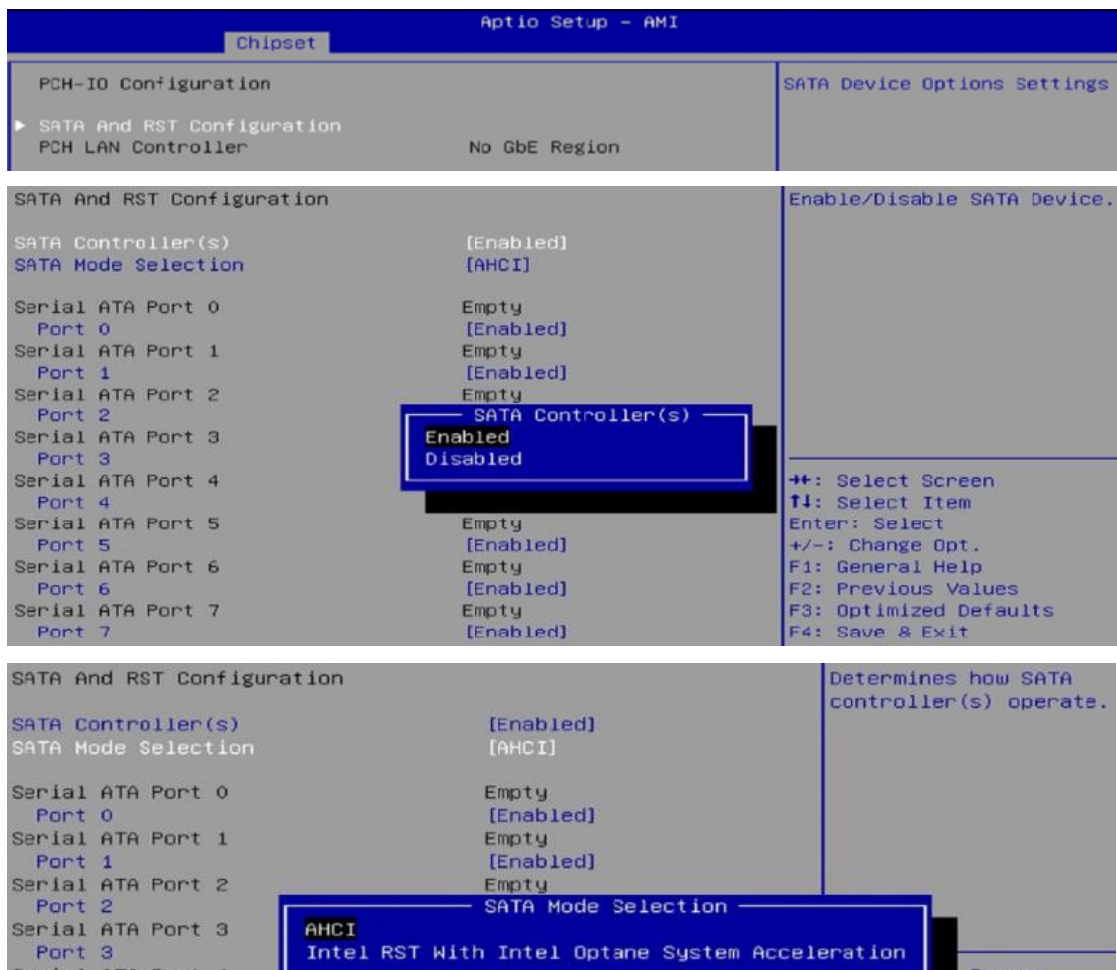
### 4.5.1 System Agent Configuration



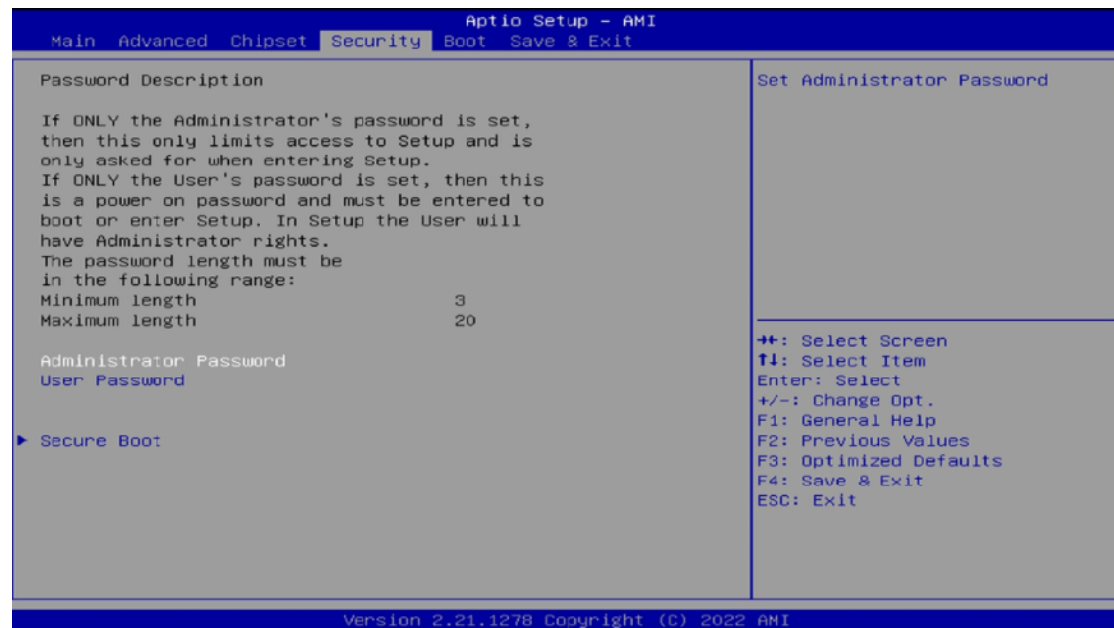


| BIOS Setting               | Description                                           |
|----------------------------|-------------------------------------------------------|
| SATA and RST Configuration | SATA device options and settings                      |
| PCH LAN Controller         | Enables / Disables onboard NIC.                       |
| Wake on LAN Enable         | Enables / Disables integrated LAN to wake the system. |

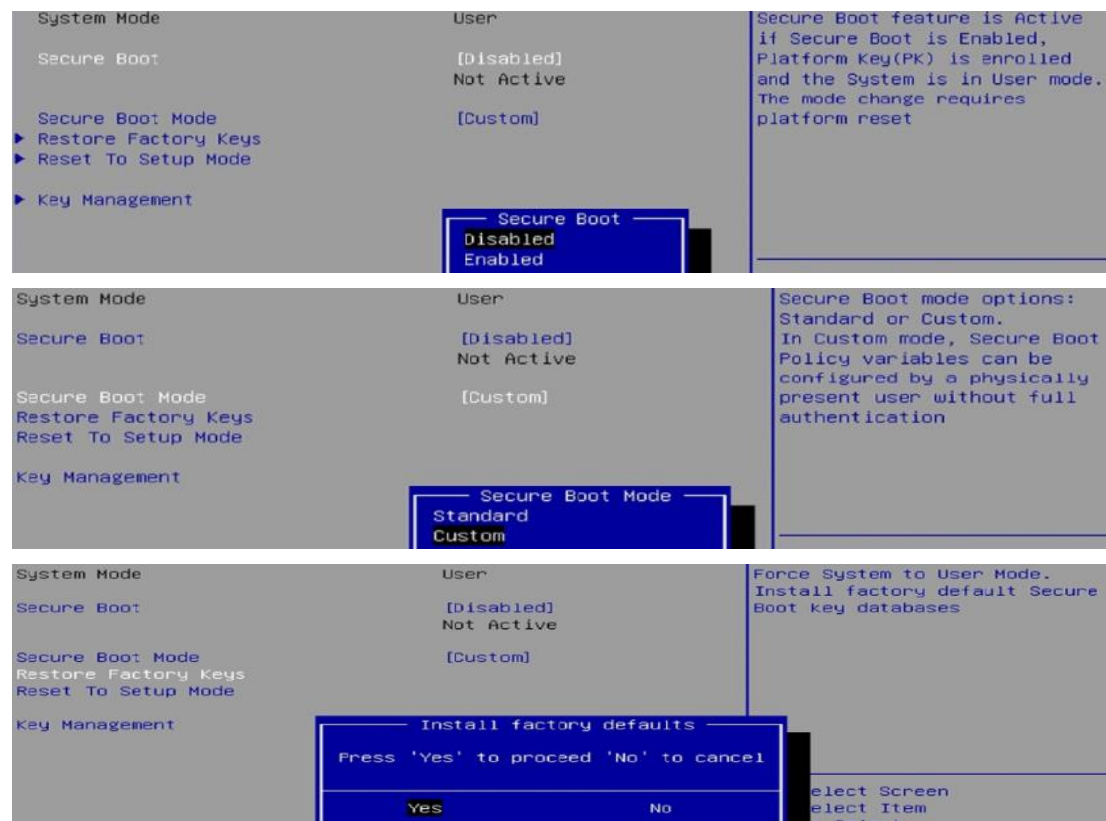
## 4.5.2 PCH-IO Configuration

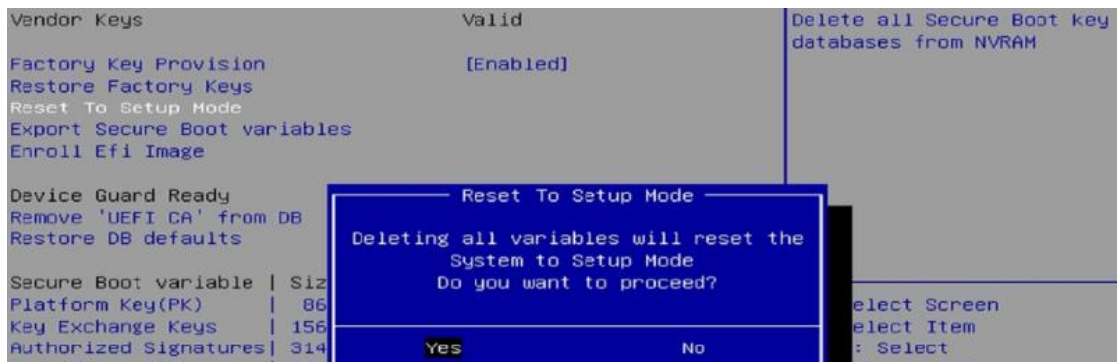
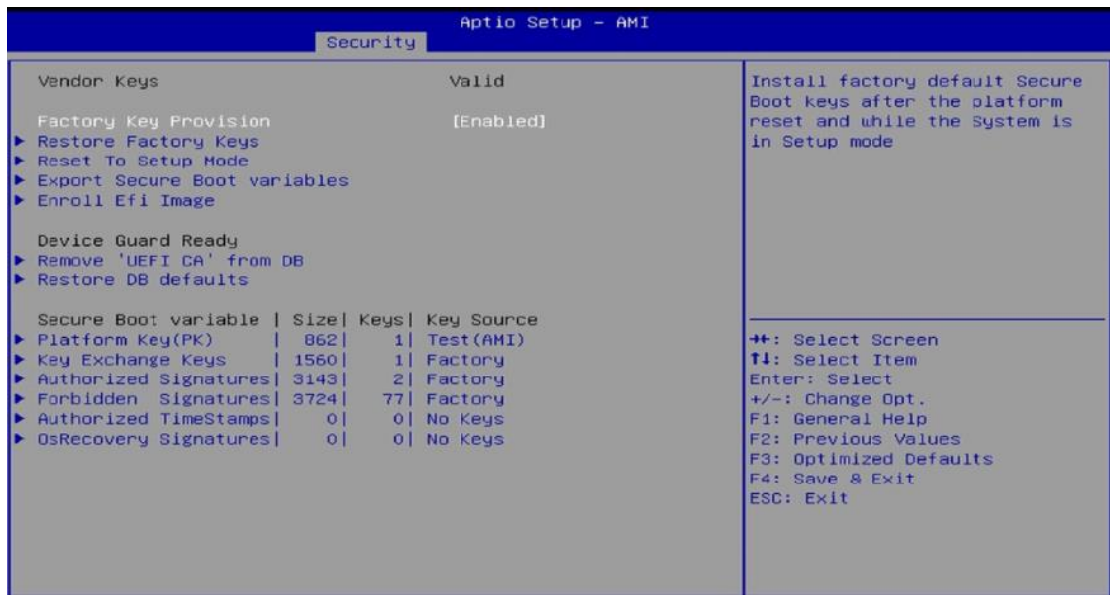


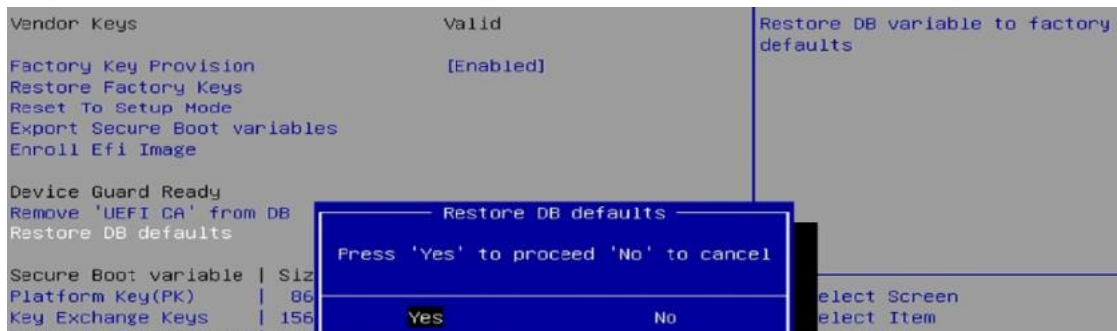
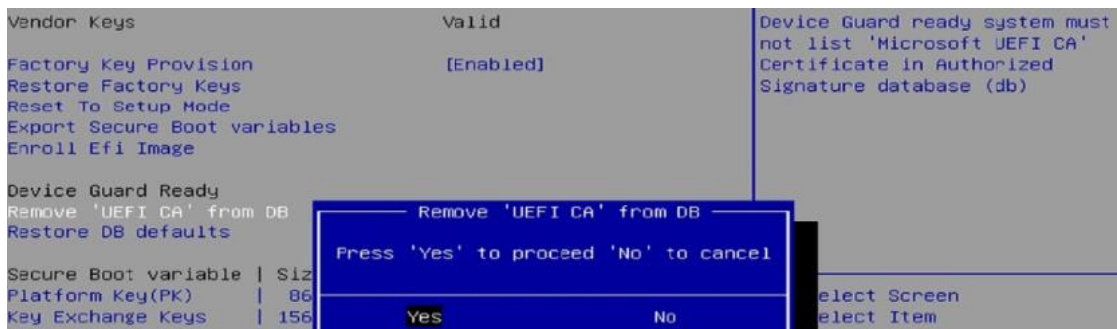
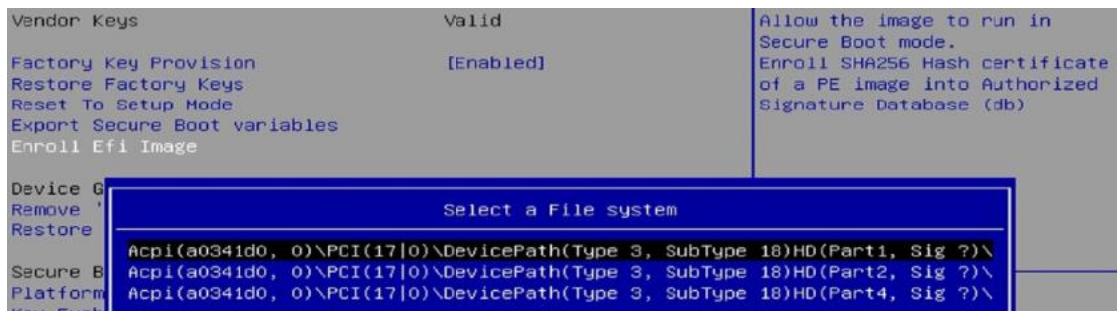
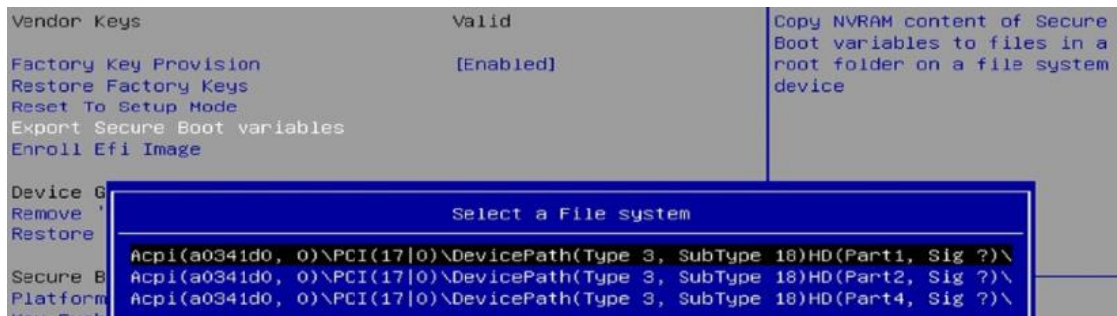
## 4.6 Security Settings



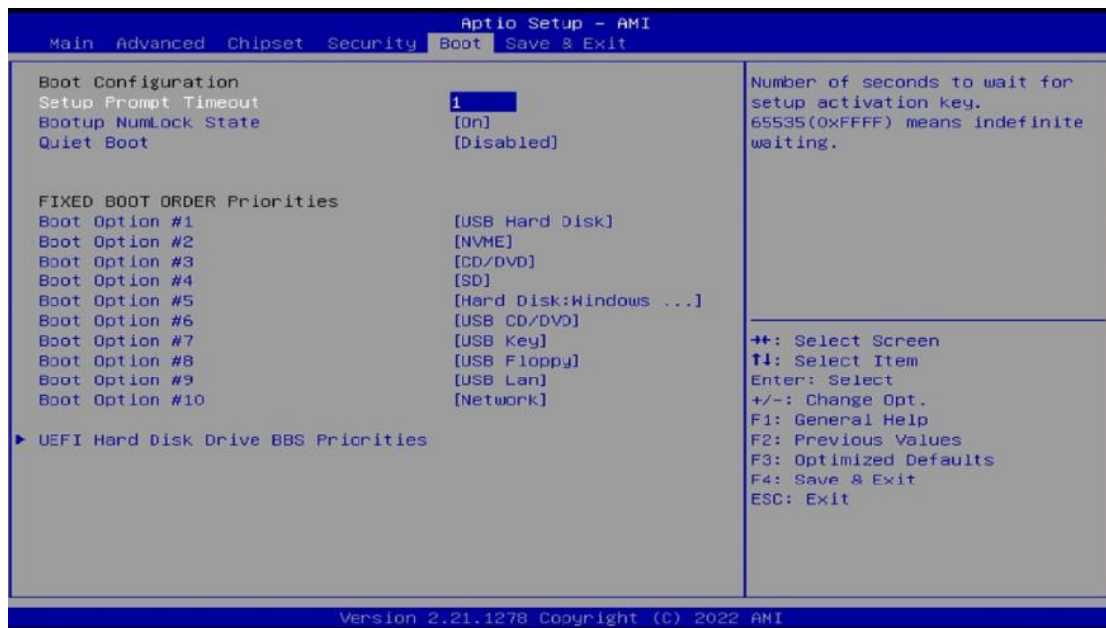
| BIOS Setting           | Description                     |
|------------------------|---------------------------------|
| Administrator Password | Sets an administrator password. |
| User Password          | Sets a user password.           |
| Secure Boot            | Secure Boot configuration       |







## 4.7 Boot Settings



| BIOS Setting                        | Description                                                                                  |
|-------------------------------------|----------------------------------------------------------------------------------------------|
| Setup Prompt Timeout                | Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting. |
| Bootup NumLock State                | Selects the keyboard NumLock state.                                                          |
| Quiet Boot                          | Enables / Disables Quiet Boot option.                                                        |
| Fixed Boot Order Priorities         | Sets the system boot order.                                                                  |
| UEFI Hark Disk Drive BBS Priorities | Specifies the Boot Device Priority sequence from available Uefl Hark Disk Drives.            |

## 4.8 Save & Exit Settings



| BIOS Setting                            | Description                                                                                       |
|-----------------------------------------|---------------------------------------------------------------------------------------------------|
| Save Changes and Exit                   | Exits system setup after saving the changes.                                                      |
| Discard Changes and Exit                | Exits system setup without saving any changes.                                                    |
| Save Changes and Reset                  | Resets the system after saving the changes.                                                       |
| Discard Changes and Reset               | Resets system setup without saving any changes.                                                   |
| Save Changes                            | Saves changes done so far to any of the setup options.                                            |
| Discard Changes                         | Discards changes done so far to any of the setup options.                                         |
| Restore Defaults                        | Restores / Loads defaults values for all the setup options.                                       |
| Save as User Defaults                   | Saves the changes done so far as user defaults.                                                   |
| Restore User Defaults                   | Restores the user defaults to all the setup options.                                              |
| Launch EFI Shell from filesystem device | Attempts to launch EFI Shell application (Shell.efi) from one of the available filesystem devices |

# Appendix

This section provides the mapping addresses of peripheral devices and the sample code of watchdog timer configuration.

- I/O Port Address Map
- Interrupt Request Lines (IRQ)
- Watchdog Timer Configuration

## A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

| Address               | Device Description                |
|-----------------------|-----------------------------------|
| 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             |
| 0x00000080-0x00000080 | Motherboard resources             |
| 0x00000092-0x00000092 | Motherboard resources             |
| 0x000000B2-0x000000B3 | Motherboard resources             |
| 0x00000680-0x0000069F | Motherboard resources             |
| 0x0000164E-0x0000164F | Motherboard resources             |
| 0x0000EFA0-0x0000EFBF | Intel(R) SMBus - 06A3             |
| 0x000003F8-0x000003FF | Communications Port (COM1)        |
| 0x000002F8-0x000002FF | Communications Port (COM2)        |
| 0x000003E8-0x000003EF | Communications Port (COM3)        |
| 0x000002E8-0x000002EF | Communications Port (COM4)        |
| 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 |

| Address               | Device Description                |
|-----------------------|-----------------------------------|
| 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 |
| 0x000000D0-0x000000D1 | Programmable interrupt controller |
| 0x00001800-0x000018FE | Motherboard resources             |
| 0x000000F0-0x000000F0 | Numeric data processor            |
| 0x00000000-0x00000CF7 | PCI Express Root Complex          |
| 0x00000D00-0x0000FFFF | PCI Express Root Complex          |
| 0x00000040-0x00000043 | System timer                      |
| 0x00000050-0x00000053 | System timer                      |
| 0x00001854-0x00001857 | Motherboard resources             |
| 0x00002000-0x000020FE | Motherboard resources             |
| 0x00003000-0x0000303F | Intel(R) UHD Graphics 630         |
| 0x00003090-0x00003097 | Standard SATA AHCI Controller     |
| 0x00003080-0x00003083 | Standard SATA AHCI Controller     |
| 0x00003060-0x0000307F | Standard SATA AHCI Controller     |

## B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

| Level             | Function                                                       |
|-------------------|----------------------------------------------------------------|
| IRQ 4294967294    | Intel(R) PCI Express Root Port #12 - 06B3                      |
| IRQ 16            | High Definition Audio Controller                               |
| IRQ 4             | Communications Port (COM1)                                     |
| IRQ 3             | Communications Port (COM2)                                     |
| IRQ 7             | Communications Port (COM3)                                     |
| IRQ 6             | Communications Port (COM4)                                     |
| IRQ 13            | Numeric data processor                                         |
| IRQ 55~IRQ 204    | Microsoft ACPI-Compliant System                                |
| IRQ 256 ~ IRQ 511 | Microsoft ACPI-Compliant System                                |
| IRQ 4294967293    | Intel(R) PCI Express Root Port #11 - 06B2                      |
| IRQ 4294967289    | Intel(R) USB 3.1 eXtensible Host Controller - 1.10 (Microsoft) |
| IRQ 0             | System timer                                                   |
| IRQ 45            | Trusted Platform Module 2.0                                    |
| IRQ 4294967290    | Intel(R) UHD Graphics 630                                      |
| IRQ 4294967292    | Intel(R) PCIe Controller (x16) - 1901                          |
| IRQ 14            | Intel(R) Serial IO GPIO Host Controller - INT3450              |
| IRQ 4294967291    | Standard SATA AHCI Controller                                  |
| IRQ 4294967279~83 | Intel(R) Ethernet Controller (3) I225-V                        |
| IRQ 4294967284~88 | Intel(R) Ethernet Controller (3) I225-V #2                     |
| IRQ 4294967278    | Intel(R) Management Engine Interface                           |
| IRQ 4294967294    | Intel(R) PCI Express Root Port #12 - 06B3                      |

## C. Watchdog Timer Configuration

The Watchdog Timer (WDT) is used to generate a variety of output signals after a user programmable count. The WDT is suitable for the use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven.

Under normal circumstance, you will need to restart the WDT at regular intervals before the timer counts to zero.

### Sample Code

```
//-----  
//  
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY  
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE  
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A  
// PARTICULAR  
// PURPOSE.  
//  
//-----  
#include <dos.h>  
#include <conio.h>  
#include <stdio.h>  
#include <stdlib.h>  
#include "F81964.H"  
//-----  
int main (int argc, char *argv[]);  
void EnableWDT(int);  
void DisableWDT(void);  
//-----  
int main (int argc, char *argv[])  
{  
    unsigned char bBuf;  
    unsigned char bTime;  
    char **endptr;  
  
    char SIO;  
  
    printf("Fintek 81964 watch dog program\n");  
    SIO = Init_F81964();  
    if (SIO == 0)  
    {  
        printf("Can not detect Fintek 81964, program abort.\n");  
        return(1);  
    }  
    if (argc != 2)
```

```

    {
        printf(" Parameter incorrect!!\n");
        return (1);
    }

    bTime = strtol (argv[1], endptr, 10);
    printf("System will reset after %d seconds\n", bTime);

    if (bTime)
    { EnableWDT(bTime); }
    else
    { DisableWDT();      }
    return 0;
}
//-----
void EnableWDT(int interval)
{
    unsigned char bBuf;

    bBuf = Get_F81964_Reg(0x2B);
    bBuf &= (~0x20);
    Set_F81964_Reg(0x2B,  bBuf);  //Enable WDTO

    Set_F81964_LD(0x07);          //switch to logic device 7
    Set_F81964_Reg(0x30,  0x01);  //enable timer

    bBuf = Get_F81964_Reg(0xF5);
    bBuf &= (~0x0F);
    bBuf |= 0x52;
    Set_F81964_Reg(0xF5,  bBuf);  //count mode is second

    Set_F81964_Reg(0xF6,  interval); //set timer

    bBuf = Get_F81964_Reg(0xFA);
    bBuf |= 0x01;
    Set_F81964_Reg(0xFA,  bBuf);  //enable WDTO output

    bBuf = Get_F81964_Reg(0xF5);
    bBuf |= 0x20;
    Set_F81964_Reg(0xF5,  bBuf);  //start counting
}
//-----
void DisableWDT(void)
{
    unsigned char bBuf;

    Set_F81964_LD(0x07);          //switch to logic device 7

    bBuf = Get_F81964_Reg(0xFA);
    bBuf &= ~0x01;

```

```

        Set_F81964_Reg(0xFA, bBuf); //disable WDTO output

        bBuf = Get_F81964_Reg(0xF5);
        bBuf &= ~0x20;
        bBuf |= 0x40;
        Set_F81964_Reg(0xF5, bBuf); //disable WDT
    }
//-----

//-----
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY
// OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO
// THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
// PARTICULAR
// PURPOSE.
//
//-----
#include "F81964.H"
#include <dos.h>
//-----
unsigned int F81964_BASE;
void Unlock_F81964 (void);
void Lock_F81964 (void);
//-----
unsigned int Init_F81964(void)
{
    unsigned int result;
    unsigned char ucDid;

    F81964_BASE = 0x4E;
    result = F81964_BASE;

    ucDid = Get_F81964_Reg(0x20);
    if (ucDid == 0x07) //Fintek 81964
    { goto Init_Finish; }

    F81964_BASE = 0x2E;
    result = F81964_BASE;

    ucDid = Get_F81964_Reg(0x20);
    if (ucDid == 0x07) //Fintek 81964
    { goto Init_Finish; }

    F81964_BASE = 0x00;
    result = F81964_BASE;
}

```

```

Init_Finish:
    return (result);
}
//-----
void Unlock_F81964 (void)
{
    outportb(F81964_INDEX_PORT, F81964_UNLOCK);
    outportb(F81964_INDEX_PORT, F81964_UNLOCK);
}
//-----
void Lock_F81964 (void)
{
    outportb(F81964_INDEX_PORT, F81964_LOCK);
}
//-----
void Set_F81964_LD( unsigned char LD)
{
    Unlock_F81964();
    outportb(F81964_INDEX_PORT, F81964_REG_LD);
    outportb(F81964_DATA_PORT, LD);
    Lock_F81964();
}
//-----
void Set_F81964_Reg( unsigned char REG, unsigned char DATA)
{
    Unlock_F81964();
    outportb(F81964_INDEX_PORT, REG);
    outportb(F81964_DATA_PORT, DATA);
    Lock_F81964();
}
//-----
unsigned char Get_F81964_Reg(unsigned char REG)
{
    unsigned char Result;
    Unlock_F81964();
    outportb(F81964_INDEX_PORT, REG);
    Result = inportb(F81964_DATA_PORT);
    Lock_F81964();
    return Result;
}
//-----

```

```

//-----
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY
// OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO
// THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
// PARTICULAR
// PURPOSE.
//
//-----
#ifndef    F81964_H
#define    F81964_H        1
//-----
#define    F81964_INDEX_PORT (F81964_BASE)
#define    F81964_DATA_PORT  (F81964_BASE+1)
//-----
#define    F81964_REG_LD  0x07
//-----
#define    F81964_UNLOCK  0x87
#define    F81964_LOCK    0xAA
//-----
unsigned int Init_F81964(void);
void Set_F81964_LD( unsigned char);
void Set_F81964_Reg( unsigned char,
unsigned char); unsigned char
Get_F81964_Reg( unsigned char);
//-----
#endif    //    F81964_H

```