

# **IPPC-121**

## **Industrial Panel PC with Intel® Atom® x7000RE Series / N-series Core™ 3 N355 Processors**

### **User's Manual**

Version 1.0  
(August 2025)



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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 European Union (EU). If users modify and/or install other devices in this equipment, the CE conformity declaration may no longer apply.

### FCC

This product 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 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 complies with RoHS 2 restrictions, which prohibit the use of certain hazardous substances in electrical and electronic equipment. The following substances must not exceed the specified concentrations:

- Hexavalent chromium: 1,000 ppm
- Poly-brominated biphenyls (PBBs): 1,000 ppm
- Poly-brominated diphenyl ethers (PBDEs): 1,000 ppm
- Cadmium: 100 ppm
- Mercury: 1,000 ppm
- Lead: 1,000 ppm
- Bis(2-ethylhexyl) phthalate (DEHP): 1,000 ppm
- Butyl benzyl phthalate (BBP): 1,000 ppm
- Dibutyl phthalate (DBP): 1,000 ppm
- Diisobutyl phthalate (DIBP): 1,000 ppm

## Important Safety Information

Carefully read the precautions before using the device.

### Environmental conditions:

- Place the device on a stable, horizontal surface to prevent it from falling and causing damage.
- Ensure there is sufficient space around the device for proper ventilation.
- Operate the product in environments with ambient temperatures as listed in the product specifications.

### Caring for your iBASE products:

- Turn off the device and unplug all cables before cleaning to avoid residual electrical current.
- Clean the chassis with a cloth and neutral cleaning agents or diluted alcohol, then dry it with another clean cloth.
- Use a computer vacuum cleaner to remove dust, especially from air vents and slots, to prevent clogging.



## WARNING

### Attention during use:

- Do not use this product near water.
- Avoid spilling water or other liquids on the device.
- Do not place heavy objects on top of the device.
- Only use the type of power specified on the label. If unsure, consult your distributor or local power company.
- Ensure the correct voltage is applied to the device.
- Do not walk on or place objects on the power cord.
- If using an extension cord, ensure the total ampere rating of the connected devices does not exceed the cord's capacity.

### Avoid Disassembly

Disassembling, repairing, or modifying the device is discouraged, as it may pose hazards, cause damage to the device, or lead to injury or property damage. Additionally, it will void the warranty.



## CAUTION

Replace only with the same or equivalent type recommended by the manufacturer.  
Dispose of used batteries according to local regulations.

## Warranty Policy

- **IBASE standard products:**  
24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, the product serial numbers can be used to determine the approximate shipping date.
  - **3<sup>rd</sup>-party parts:**  
12-month (1-year) warranty from delivery for the 3<sup>rd</sup>-party parts that are not manufactured by IBASE, such as CPU, memory, storage device, power adapter, panel and touchscreen.
- \* PRODUCTS, HOWEVER, THAT FAIL DUE TO MISUSE, ACCIDENT, IMPROPER INSTALLATION OR UNAUTHORIZED REPAIR SHALL BE TREATED AS OUT OF WARRANTY AND CUSTOMERS SHALL BE BILLED FOR REPAIR AND SHIPPING CHARGES.

## Technical Support & Services

1. Visit the IBASE website at [www.ibase.com.tw](http://www.ibase.com.tw) to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.
  - Product model name
  - Product serial number
  - Detailed description of the problem
  - The error messages in text or in screenshots if there is any
  - The arrangement of the peripherals
  - Software in use (such as OS and application software, including the version numbers)

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# Chapter 1

## General Information

The information provided in this chapter includes:

- Introduction
- Features
- Specifications
- Product View
- Dimensions

## 1.1 Introduction

The IPPC-121 is a fanless industrial panel PC engineered for high-reliability deployment across demanding automation and control environments. Powered by a range of Intel® processors including the Core™ 3 N355, Core™ i3 N305, Atom® N97, and Atom® X7835RE, the system provides scalable performance for various workloads, from HMI to edge computing in harsh industrial conditions.



The IPPC-121 features a 12.1-inch projected capacitive touchscreen with 1024x768 resolution and 500 cd/m<sup>2</sup> brightness, enclosed in a rugged chassis with IP65-rated front panel. The design supports both 6mm T-slot and V-slot linear rail, allowing flexible mechanical integration. All configurations are completely fanless and support operating temperature ranges from -20°C to 45°C (N355/N305/N97), and up to 60°C for the X7835RE variant.

In terms of connectivity, the IPPC-121 excels with rich I/O: 2x COM ports (expandable to 6 with power COM), 4x USB 2.0, 2x USB 3.2, USB Type-C with 60W PD, 2x 2.5GbE LAN ports, HDMI, and a 4x DI / 4x DO digital interface. Internally, it offers three M.2 slots (2280 M+B key, 2230 E-key, and 3052 B-key) to support WiFi, Bluetooth, 4G/5G modules, and a Nano SIM slot. These features ensure the system is ready for industrial IoT and wireless edge deployments.

With support for TPM 2.0 hardware security, wide 9V–36V DC input, and OS compatibility across Windows 10/11 and Linux Kernel 4+, the IPPC-121 provides a secure, rugged, and scalable platform.

## 1.2 Features

- Intel® Atom® x7000E Series/ N-series/ Core™ i3-N305 Processors
- Compliance with 6mm T and V-Slot™ Standard Groove
- 12.1" flat LCD panel with projected capacitive touchscreen
- IP65 Front Panel Waterproof Design
- USB Type-C PD 60W (5V/9V/12V/15V/20V\_Max 3A) and DP Alternate mode
- I/O supports 2x COM, 4x Optional Power COM
- 4x DI, 4x DO, USB 6x USB (2x USB 3.2 + 4x USB 2.0)
- Supports M.2 sockets for Wi-Fi / BT and 4G/5G communication with a Nano SIM slot
- Supports hardware TPM2.0 security
- Wide Range Power Input +9V ~ 36V DC-in

## 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.

- IPPC-121 series Panel PC
- Manuals & Driver download instructions
- DC-IN Dinkle bare wire converter
- POWER SW Dinkle bare wire converter
- DIO Dinkle bare wire converter
- M5 T-Nut for T/V slot x 10pcs on bezel

## 1.4 Specifications

| IPPC-121 Specifications  |                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display                  | 12.1 inch 1024x768 panel with Projected Capacitive Touch                                                                                                                                                                                                                                                                                                                                                    |
|                          | 500 nits Brightness, 1000:1 Contrast Ratio                                                                                                                                                                                                                                                                                                                                                                  |
| Processor                | Intel® Atom® N97 Processor (Quad-Core @ 3.6GHz)<br>Intel® Core™ i3 N305 Processor (Eight-Core @ 3.8GHz)<br>Intel® Core™ 3 N355 Processor (Eight-Core @ 3.9GHz)<br>Intel® Atom® X7835RE Processor (Eight-Core @ 3.6GHz)                                                                                                                                                                                      |
| Mainboard                | MBP-210 + IDP-210                                                                                                                                                                                                                                                                                                                                                                                           |
| Memory                   | 1x DDR5-4800 SO-DIMM, Max. 16GB                                                                                                                                                                                                                                                                                                                                                                             |
| Rear Panel External I/O  | <ul style="list-style-type: none"><li>• 1x HDMI</li><li>• 2x RJ45 2.5G Ethernet port</li><li>• 2x USB 3.2 ports, 1x USB 3.2(Type-C), 4x USB 2.0 port</li><li>• 1x RS232/422/485 ports for COM 1</li><li>• 1x RS232 ports for COM2</li><li>• 1x Combo Audio (Line-out/ Mic-in)</li><li>• 1x 2-pin DC-in terminal block for 9V-36V</li><li>• 2x Antenna hole</li><li>• Optional Power COM for #3~#6</li></ul> |
| Front Panel External I/O | <ul style="list-style-type: none"><li>• 1x power button with LED</li><li>• SIM card slots with cover</li><li>• Optional Power COM for #3~#6</li><li>• 2x Antenna hole</li></ul>                                                                                                                                                                                                                             |

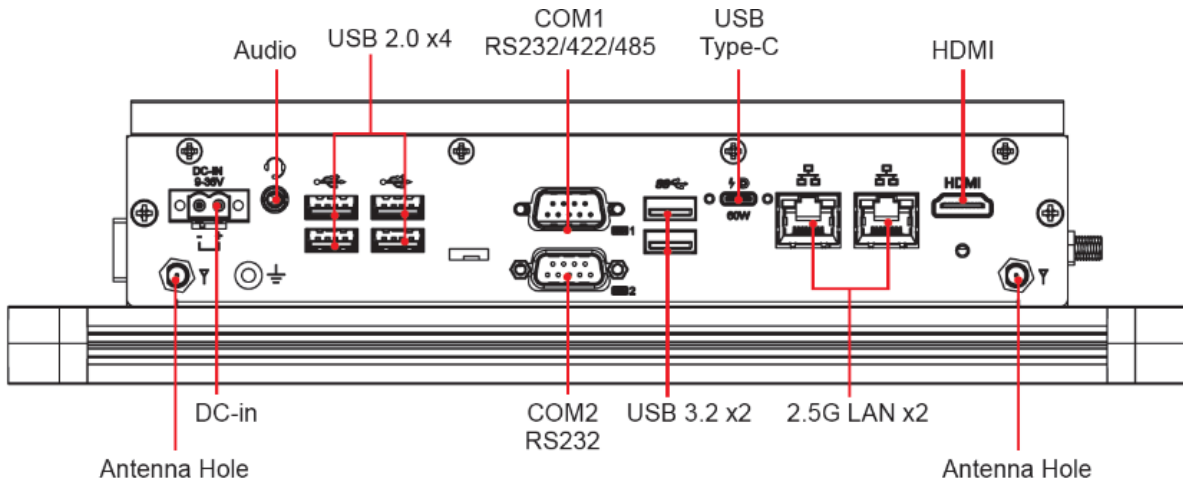
|                                          |                                                                                                                                                                                                                  |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Left and Right Panel External I/O</b> | <ul style="list-style-type: none"> <li>• 1x 4-in &amp; 4-out GPIO</li> <li>• 1x Remote Power Switch</li> <li>• 2x Antenna hole</li> </ul>                                                                        |
| <b>Expansion Slots</b>                   | <ul style="list-style-type: none"> <li>• 1x 2280 M.2 M+B-Key socket (PCI-E + SATA)</li> <li>• 1x 2230 M.2 E-Key socket (USB 2.0 + PCI-E)</li> <li>• 1x 3052 M.2 B-Key socket (USB 3.2 + PCI-E + SATA)</li> </ul> |
| <b>Storage</b>                           | <ul style="list-style-type: none"> <li>• 1x M.2 M+B Key for PCI-E or SATA SSD (Optional)</li> <li>• 1x M.2 B-Key for PCI-E or SATA SSD (Optional)</li> </ul>                                                     |
| <b>Construction</b>                      | Aluminum + SGCC                                                                                                                                                                                                  |
| <b>Chassis Color</b>                     | Gray & Gray                                                                                                                                                                                                      |
| <b>Mounting</b>                          | <ul style="list-style-type: none"> <li>• VESA mounting (75x75mm or 100x100mm)</li> <li>• Side Mount via T-Slot nut</li> <li>• Optional Panel Mounting KIT</li> </ul>                                             |
| <b>Dimensions</b>                        | 303.4mm(W) x 242mm(D) x 72.9mm(H)                                                                                                                                                                                |
| <b>Weight</b>                            | 3.6 kg                                                                                                                                                                                                           |
| <b>Supported O.S.</b>                    | Windows10, 11 and Linux Ubuntu                                                                                                                                                                                   |
| <b>Certification</b>                     | CE/ FCC Class B/ LVD                                                                                                                                                                                             |

| Environment                  |                                                                                                                                                          |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Operating Temperature</b> | <ul style="list-style-type: none"> <li>- 20°C~45°C for N305, N355</li> <li>- 20°C~50°C for N97</li> <li>- 30°C~60°C for X7835RE with air flow</li> </ul> |
| <b>Storage Temperature</b>   | - 30°C~70°C                                                                                                                                              |
| <b>Relative Humidity</b>     | 5~90% @ 45°C, (non-condensing)                                                                                                                           |
| <b>Vibration</b>             | <ul style="list-style-type: none"> <li>• Operating: 0.5Grms / 5~500Hz</li> <li>• Non-operating: 1Grms / 5~500Hz</li> </ul>                               |
| <b>Shock</b>                 | <ul style="list-style-type: none"> <li>• Operating: 30G/11 ms Duration</li> <li>• Non-operating: 40G/11 ms Duration</li> </ul>                           |

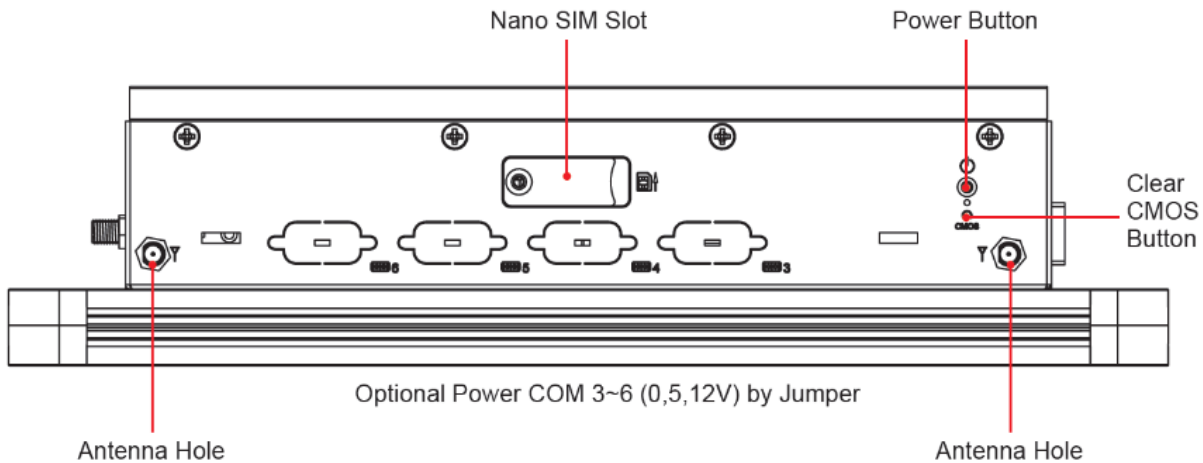
All specifications are subject to change without prior notice.

Note: The product performance relies on the system functioning as a whole. The level of CPU/APU/GPU processor, the interaction among the processor and the memory and storage bandwidth, or the functionality of the digital signage application software may affect the product performance.

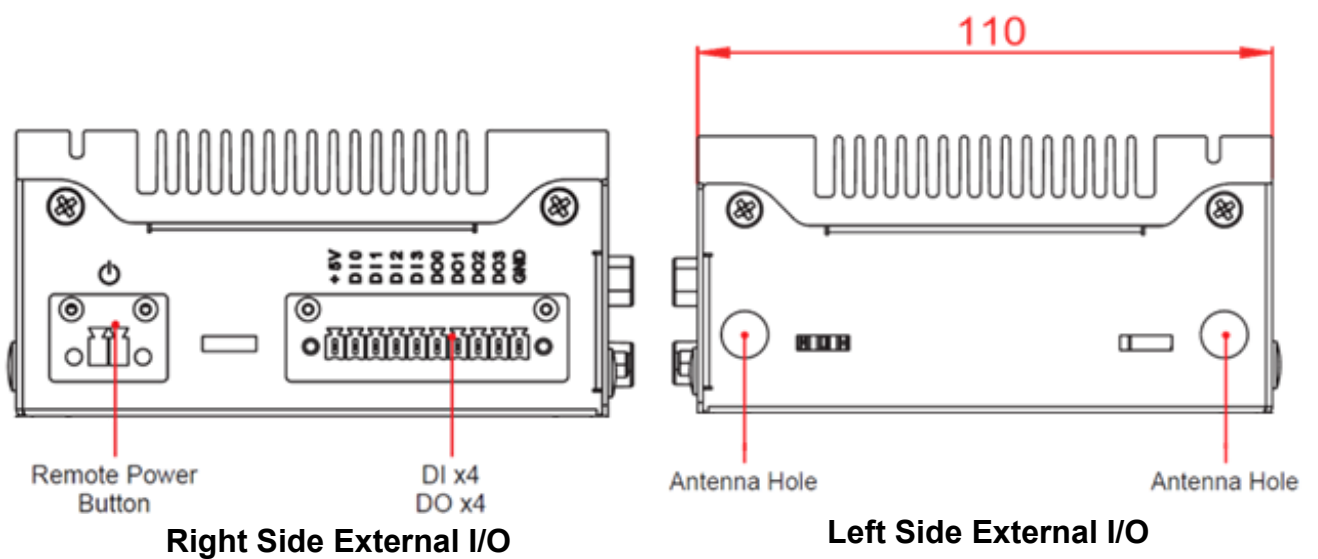




### Rear External I/O



### Front External I/O

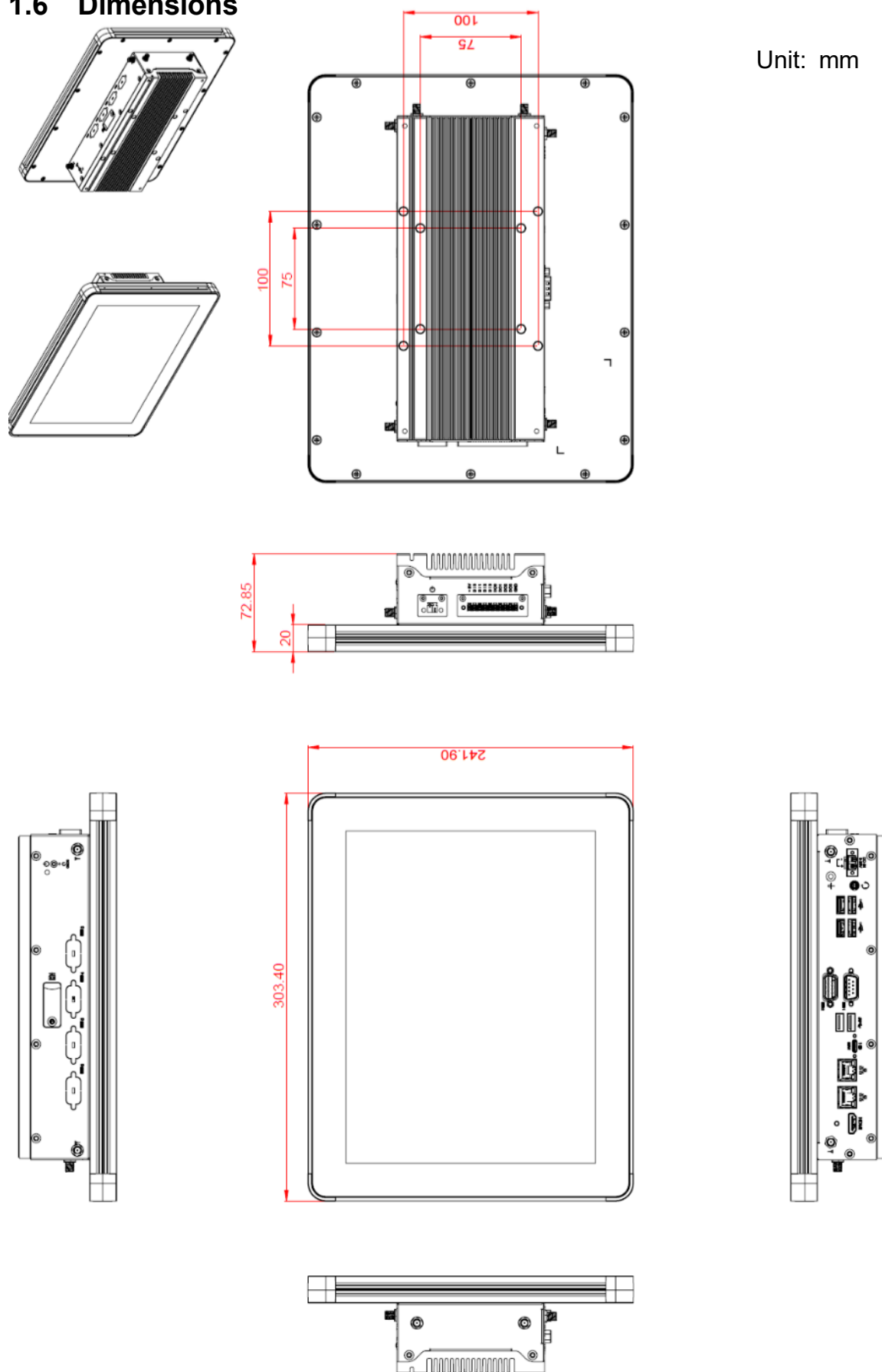


### Right Side External I/O

### Left Side External I/O

## 1.6 Dimensions

Unit: mm



## Chapter 2

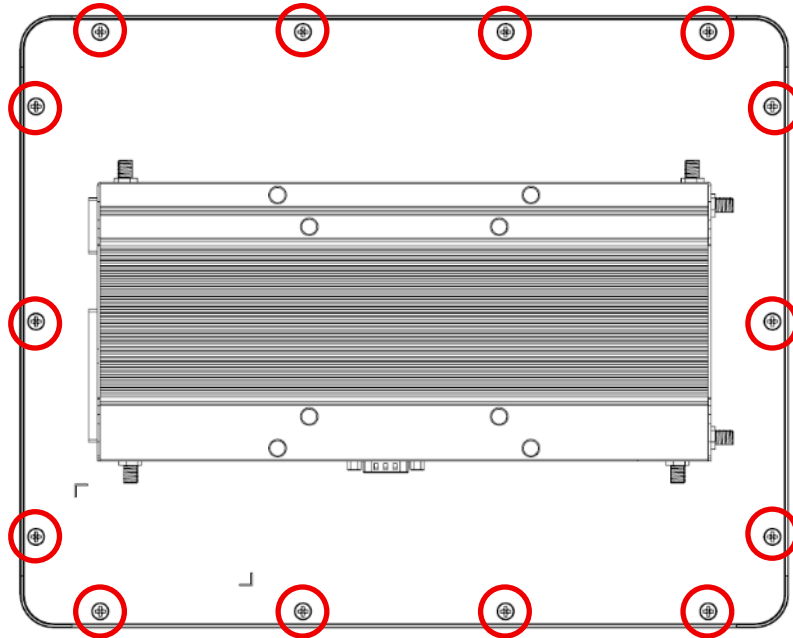
# Hardware Configuration

The information provided in this chapter includes:

- Installations
- Information and locations of connectors

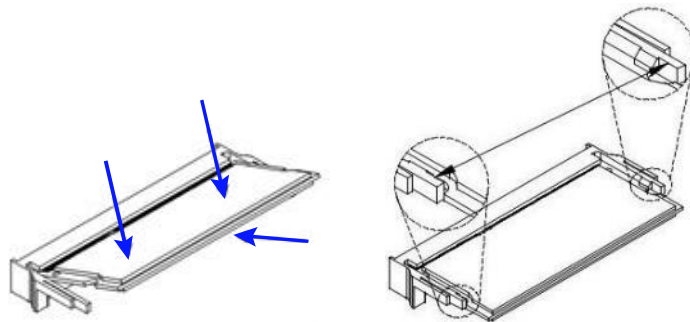
## 2.1 Installations

Turn your product upside down and take away the device bottom cover by removing 14 screws as indicated below for the installation or replacement of the memory module, mSATA SSD or WLAN card. After installations, secure the device bottom cover back.



### 2.1.1 Memory Installation / Replacement

If you need to install or replace a memory module, follow the instructions below for installation after you disassemble the device cover.



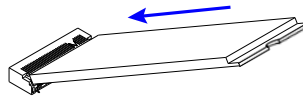
1. Align the key of the memory module with that on the memory slot and insert the module slantwise.
2. Gently push the module in an upright position until the clips of the slot close to hold the module in place when the module touches the bottom of the slot. To remove the module, press the clips outwards with both hands, and the module will pop-up.

### 2.1.2 M.2 Cards Installation / Replacement

After removing the bottom cover, follow the instructions below.

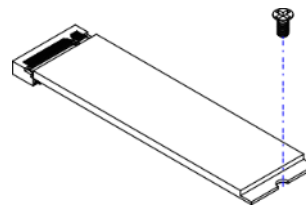
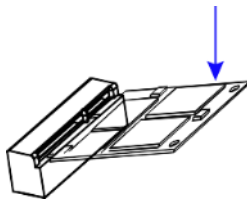
1. Locate the M.2 slot, align the key of the card to the interface, and insert the card slantwise.

M.2 card:



2. Push the card down and fix it with the supplied flat head screws for the M.2 card.

M.2 card:

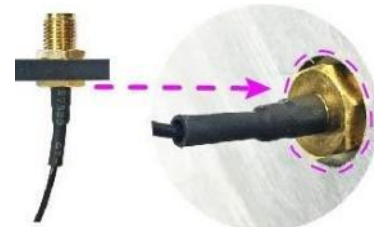
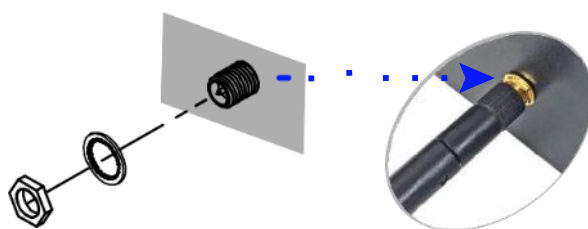


### 2.1.3 WiFi / 5G / 4G Antenna Installation

Thread the WiFi / 5G / 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).

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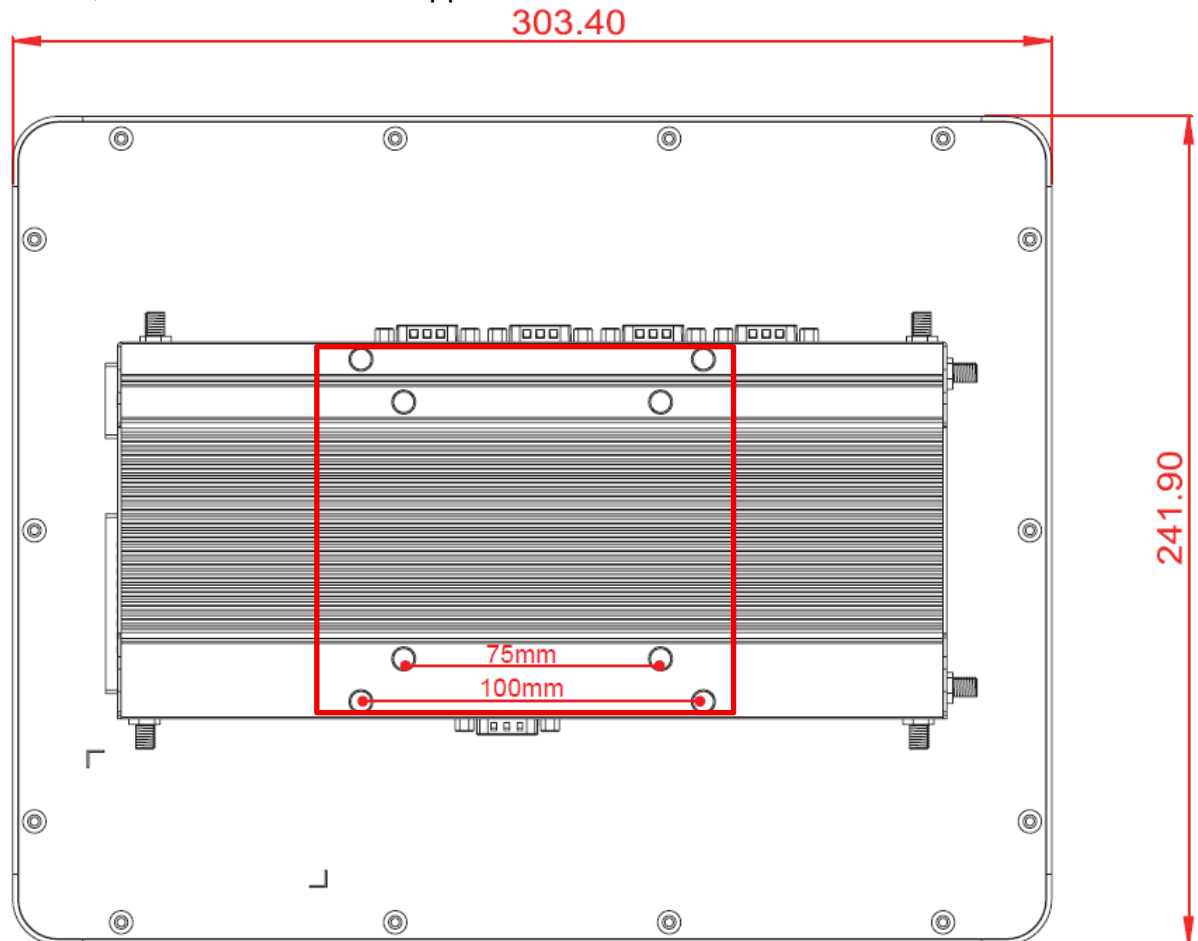
## 2.1.4 Mounting Installation

### Requirements

Before mounting the system, ensure that you have enough room for power and signal cable routing, and have good ventilation for the power adaptor. The method of mounting must be able to support the weight of the device plus the weight of the suspending cables to be attached to the system. Use the following methods for mounting your system:

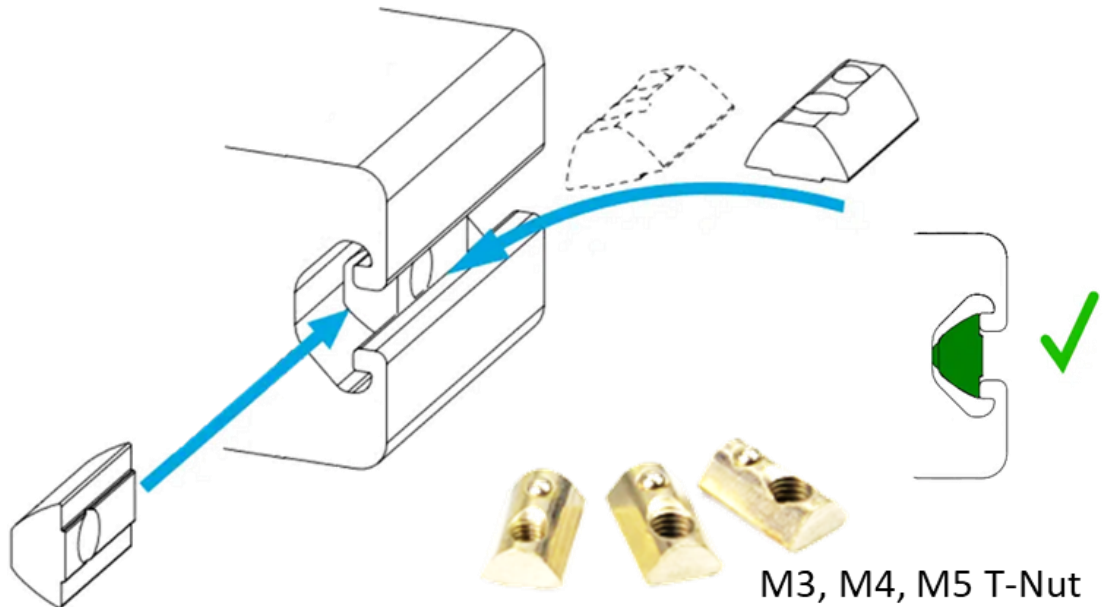
#### 2.1.4.1. VESA Mounting Installation

1. Attach the 75x75mm or 100x100mm VESA mounting KIT bracket to your product, and secure with the supplied M4x4 screws.

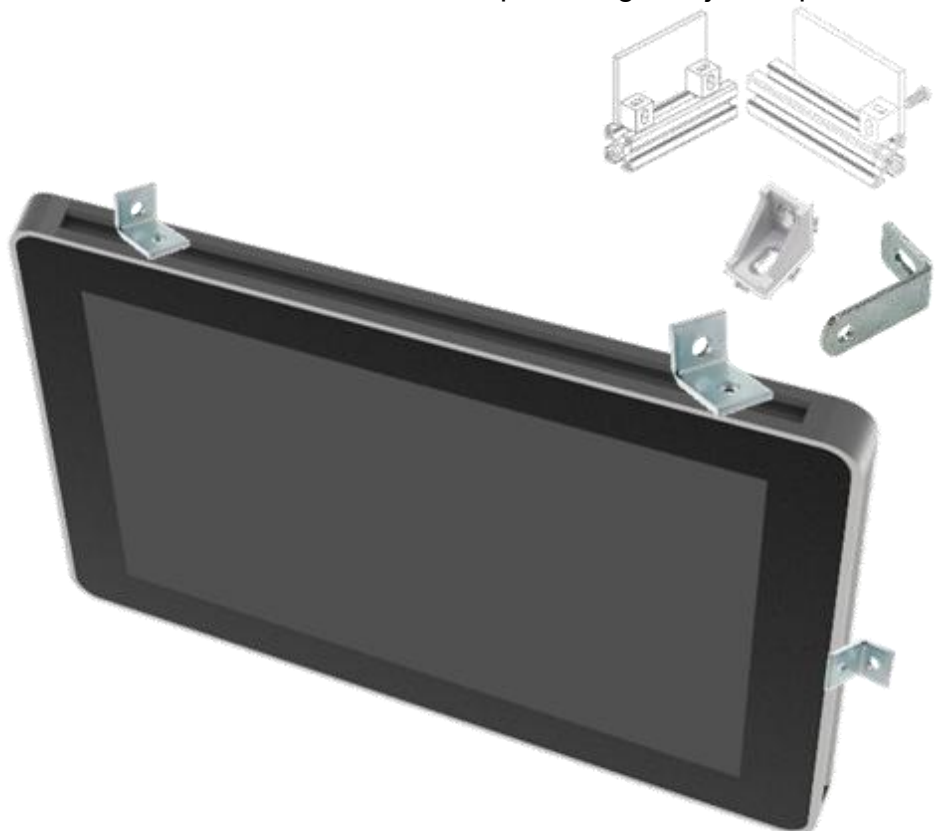


### 2.1.4.2. Side Mounting Installation

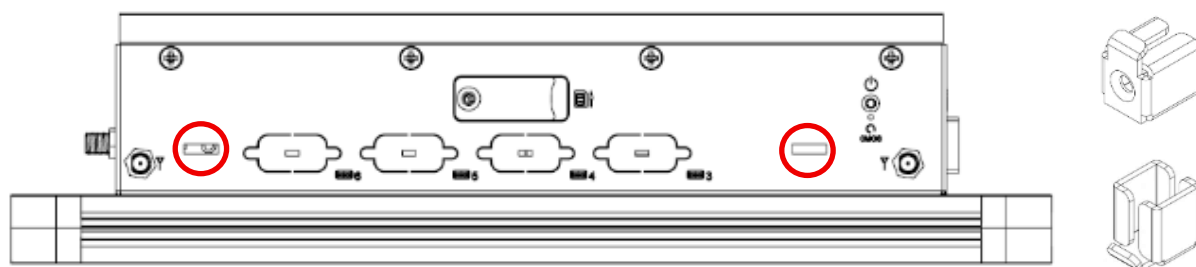
1. Attach the T-Nut around the product's bottom side, and secure with the supplied 4 screws.



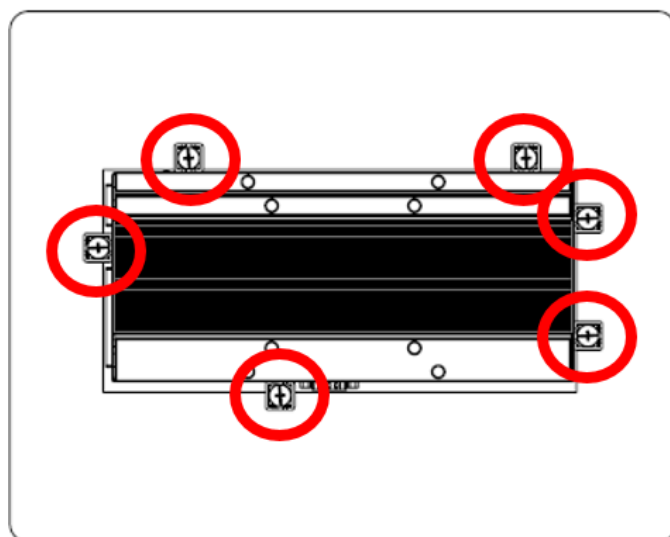
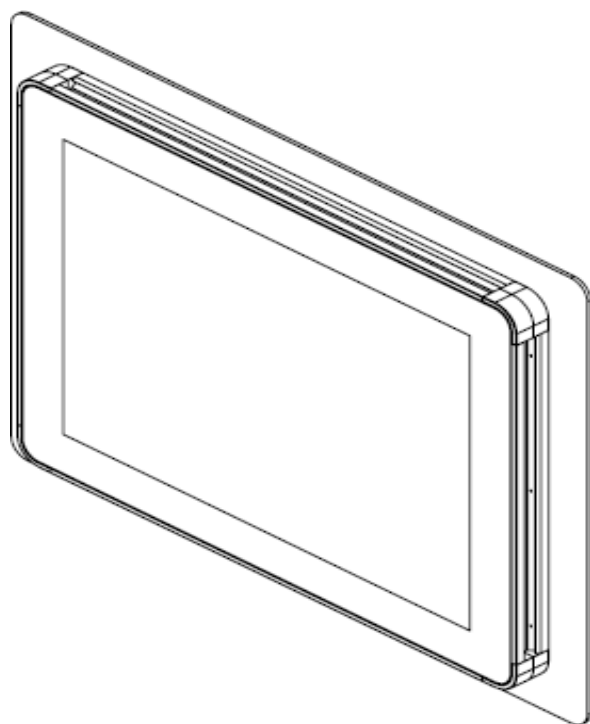
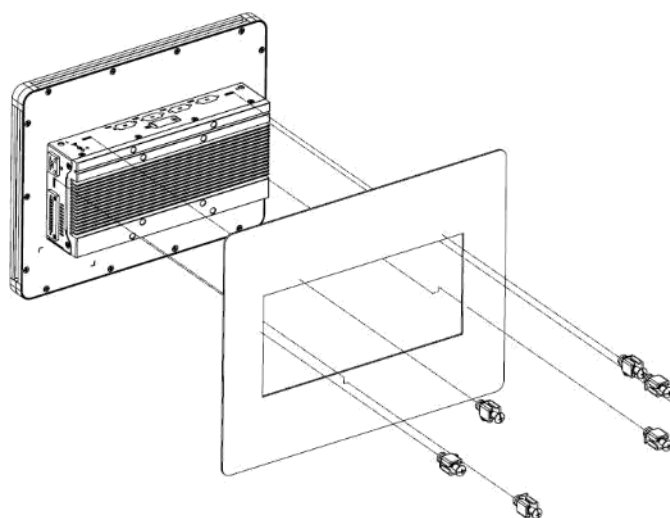
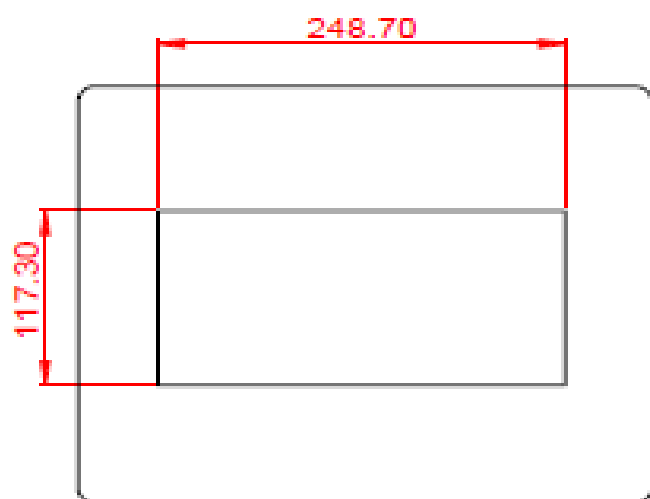
2. Use the T-slot bracket to screw up the target object in place.



### 2.1.4.3. Panel Mounting Installation (Nut Type) for V-B1



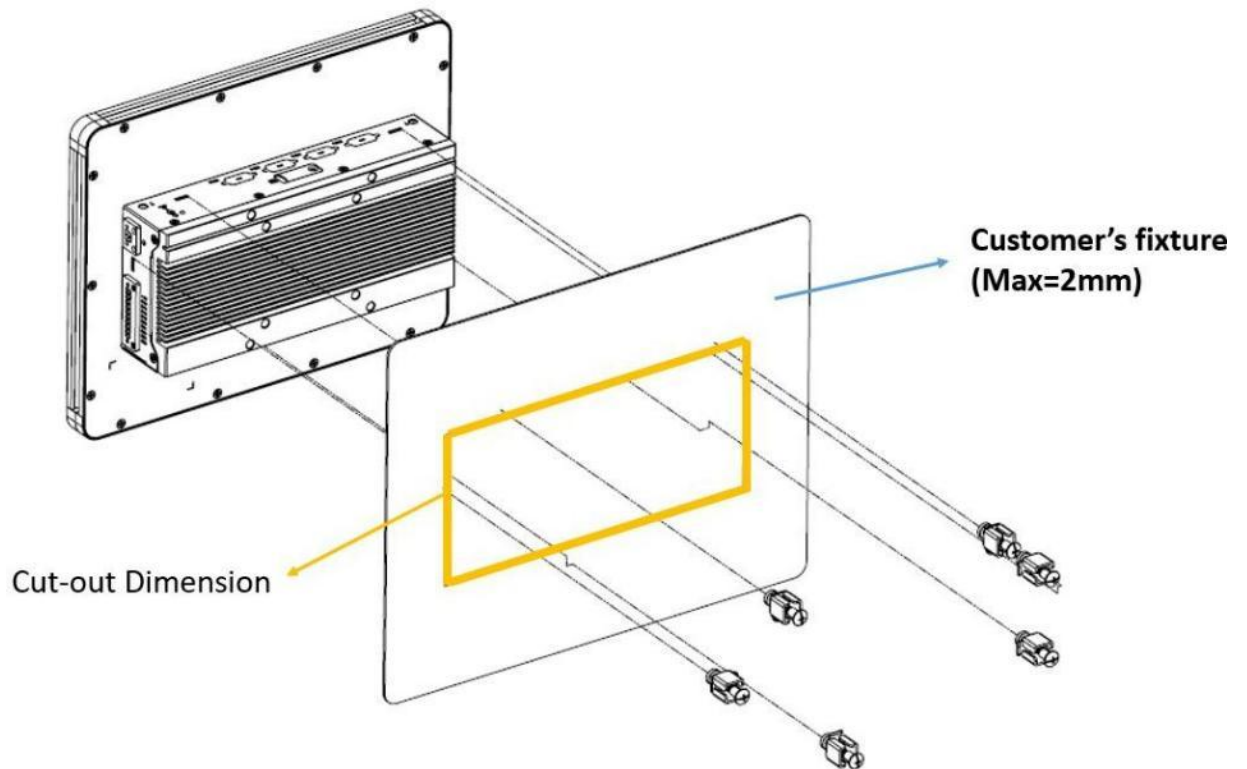
**Cut-Out Dimensions → 248.7mm \* 117.3mm**



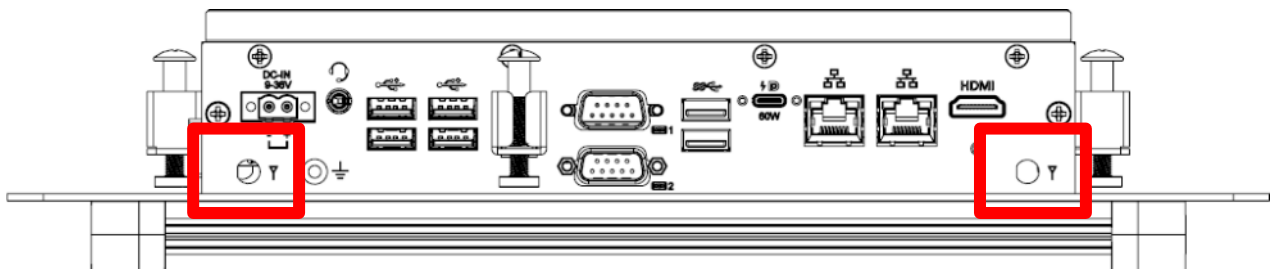
**Back view**

**NOTE:**

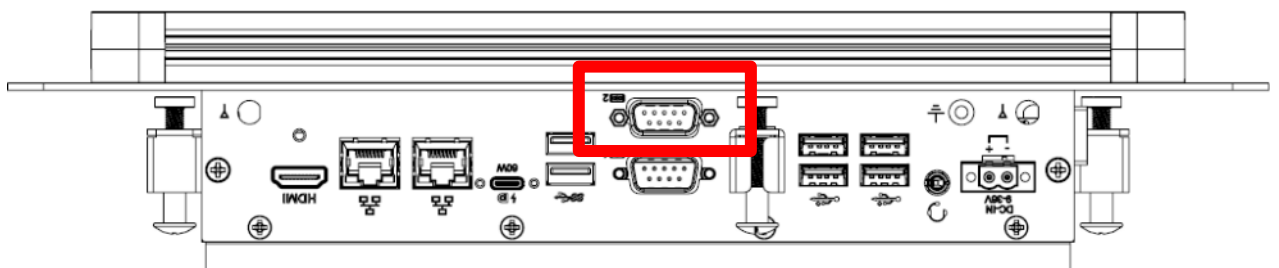
1. Mounting panel thickness maximum 2mm



2. Antenna cannot be installed



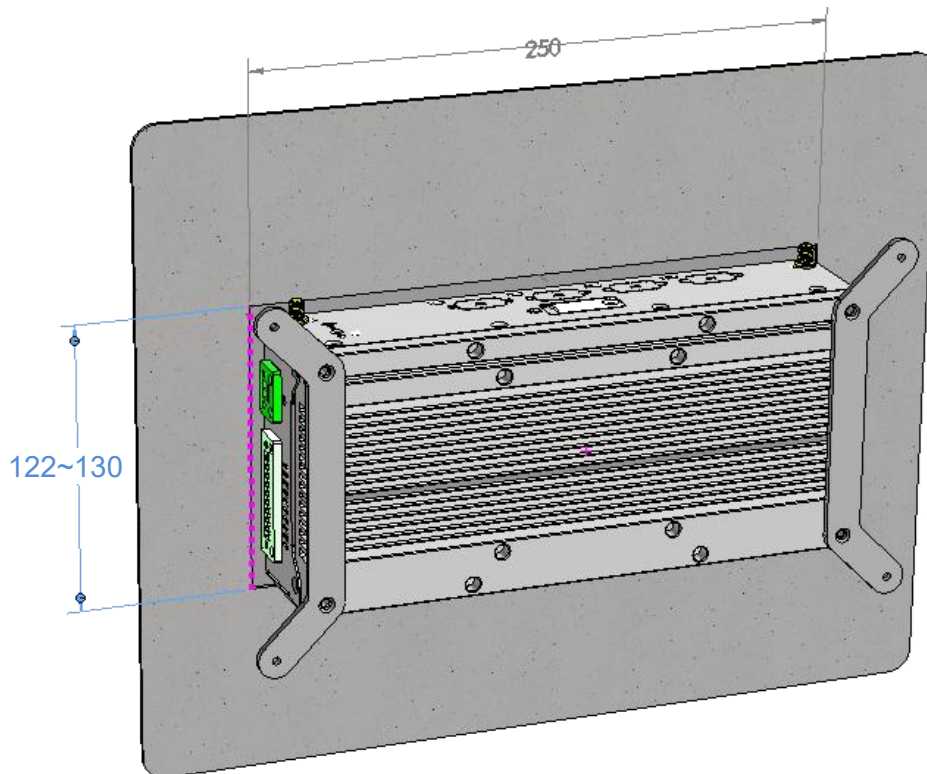
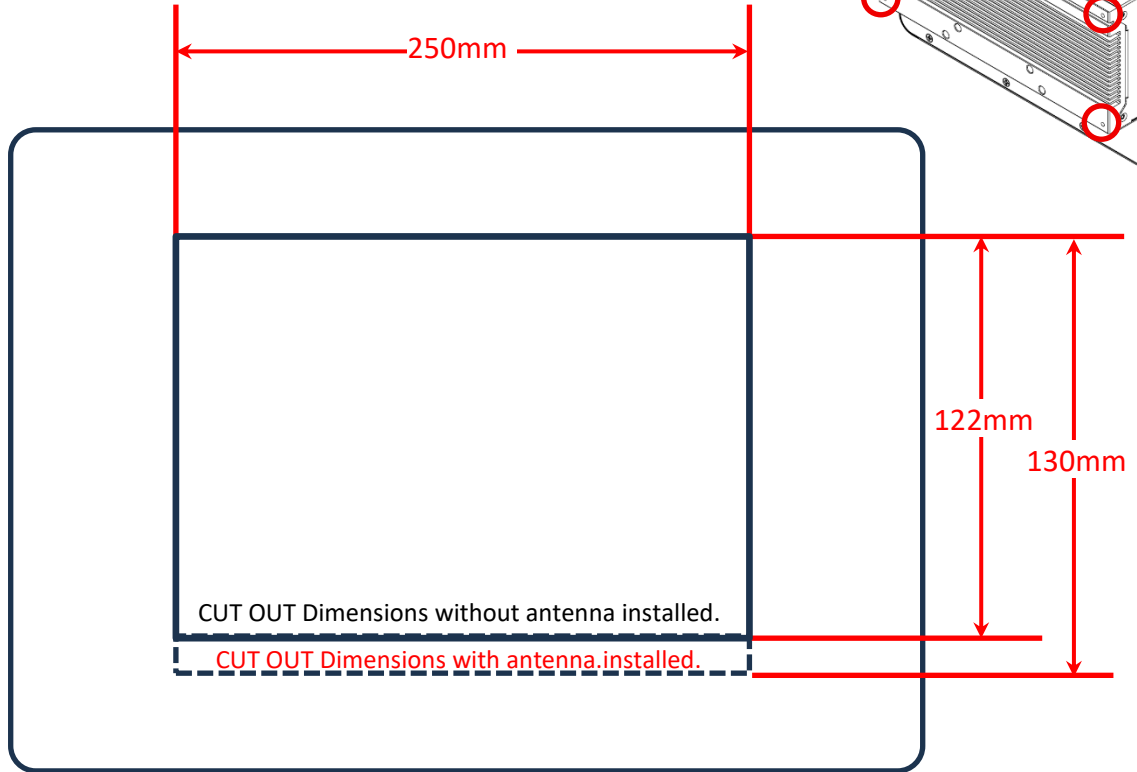
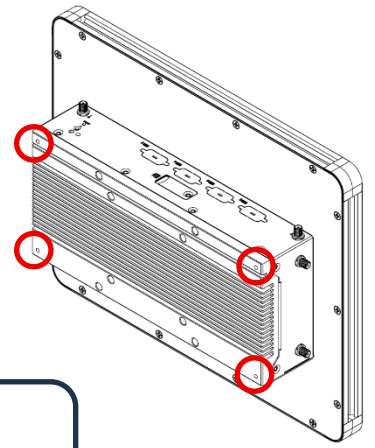
3. COM2 cannot be installed





#### 2.1.4.4. Panel Mounting Installation (Bar Type) for V-1.0

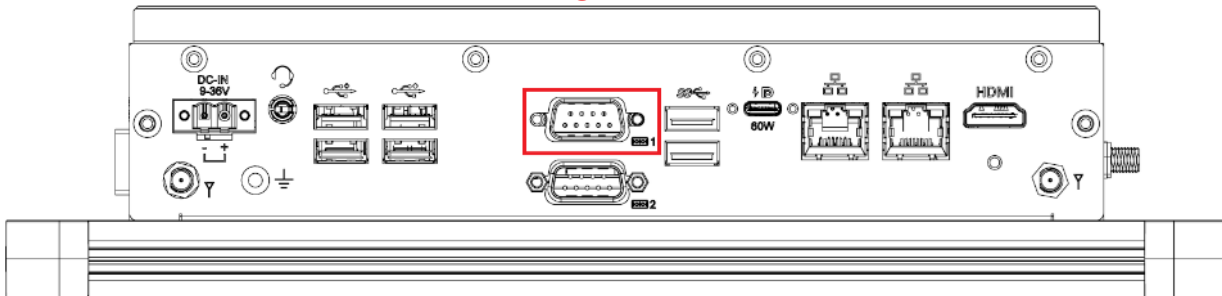
Cut-Out Dimensions → 202mm x 122~130mm



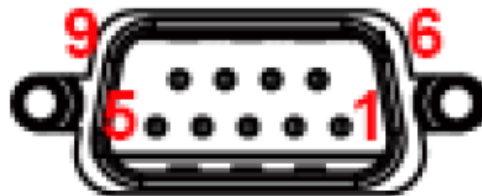
## 2.1.1 Pinout for COM Ports, DC-In Power Connector & Line-Out Jack

### 2.1.1.1. COM1 RS232/422/485 Ports

#### COM 1

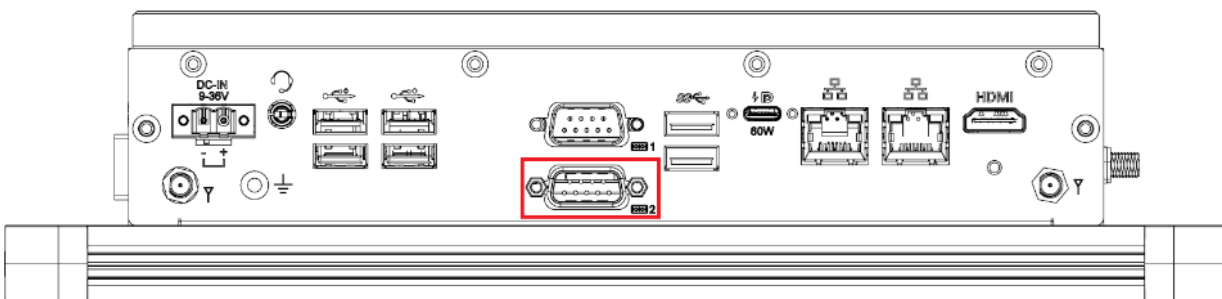


COM1 ports are jumper-less and configurable in BIOS.



| Pin | Assignment               |        |        |
|-----|--------------------------|--------|--------|
|     | RS-232                   | RS-422 | RS-485 |
| 1   | DCD, Data carrier detect | TX-    | DATA-  |
| 2   | RXD, Receive data        | TX+    | DATA+  |
| 3   | TXD, Transmit data       | RX+    | NC     |
| 4   | DTR, Data terminal ready | RX-    | NC     |
| 5   | Ground                   | Ground | Ground |
| 6   | DSR, Data set ready      | NC     | NC     |
| 7   | RTS, Request to send     | NC     | NC     |
| 8   | CTS, Clear to send       | NC     | NC     |
| 9   | RI, Ring indicator       | NC     | NC     |

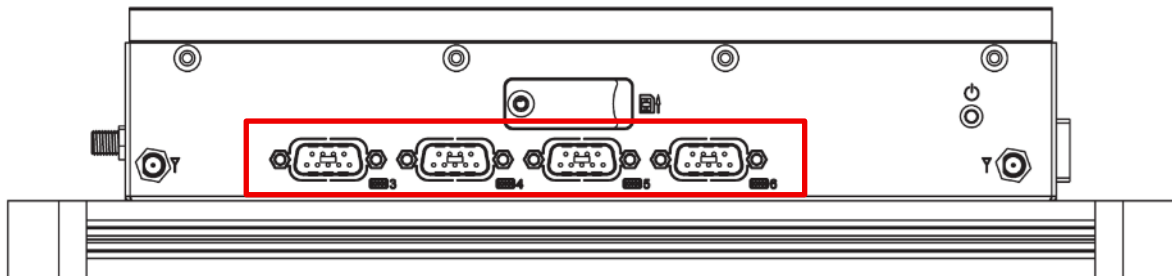
#### COM 2 (RS232 only)



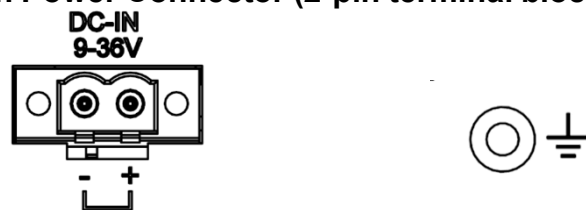
### 2.1.1.2. Optional COM 3~6 Port with Power (0, 5V , 12V)

#### RS-232

| Pin | Assignment               |             |           |           |
|-----|--------------------------|-------------|-----------|-----------|
|     | RS-232                   | Jumper Open | 1,2 Short | 2,3 Short |
| 1   | DCD, Data carrier detect | DSR         | DSR       | DSR       |
| 2   | RXD, Receive data        | Ground      | Ground    | Ground    |
| 3   | TXD, Transmit data       | Ground      | Ground    | Ground    |
| 4   | DTR, Data terminal ready | TX          | TX        | TX        |
| 5   | Ground                   | RX          | RX        | RX        |
| 6   | DSR, Data set ready      | DCD         | DCD       | DCD       |
| 7   | RTS, Request to send     | DTR         | DTR       | DTR       |
| 8   | CTS, Clear to send       | CTS         | CTS       | CTS       |
| 9   | RI, Ring indicator       | 0V          | 12V       | 5V        |

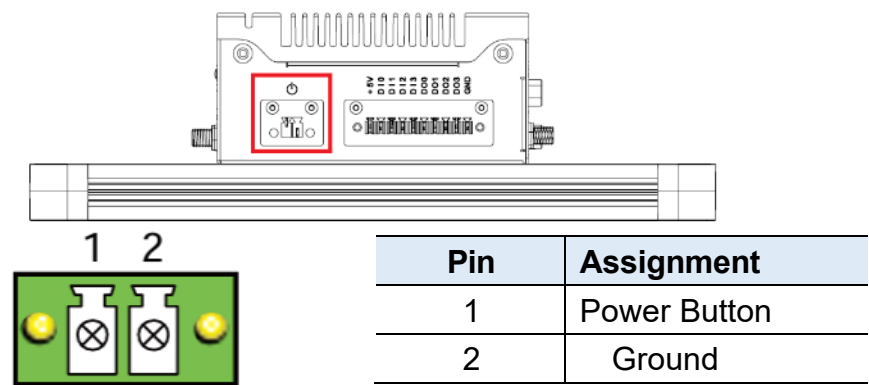


### 2.1.1.3. DC-In Power Connector (2-pin terminal block)

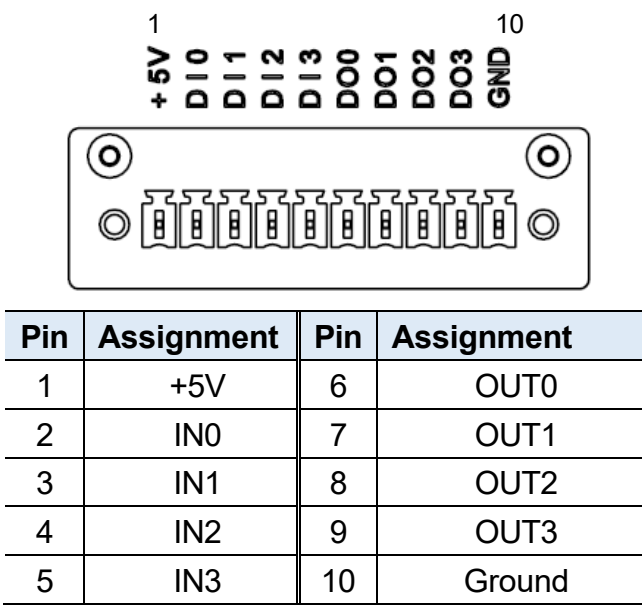


| Pin | Assignment   | Pin | Assignment             |
|-----|--------------|-----|------------------------|
| -   | Power Ground | GND | Screw Type Case Ground |
| +   | 9V ~ 36V     |     |                        |

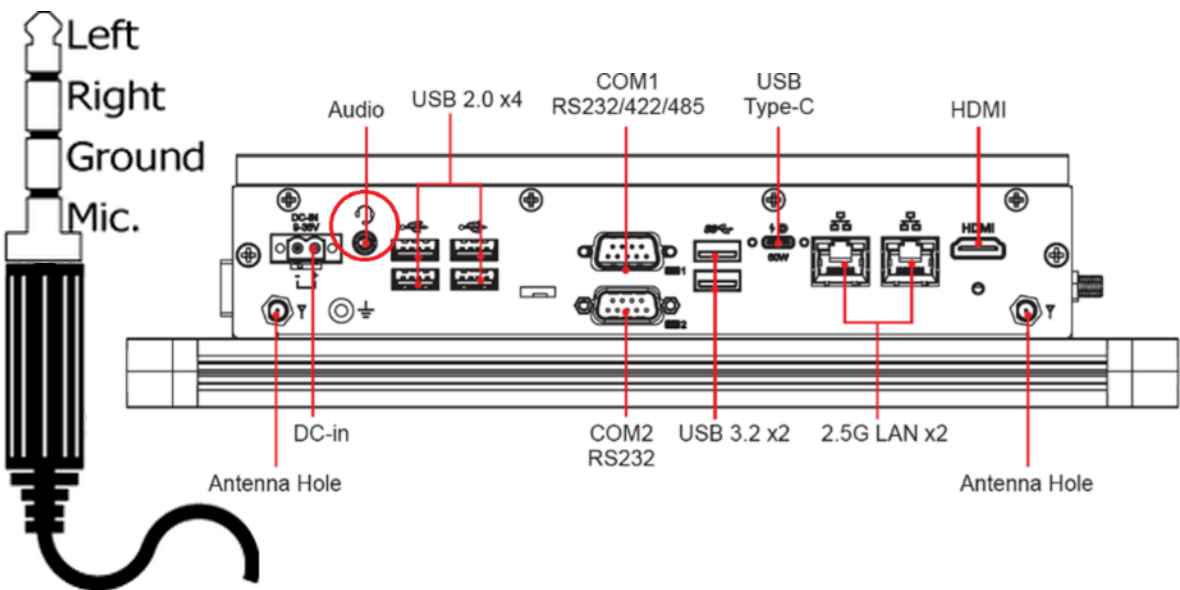
2.1.1.4. Remote Control Connector (2-pin terminal block)



2.1.1.5. 4-In & 4-Out GPIO Connector (10-pin terminal block)



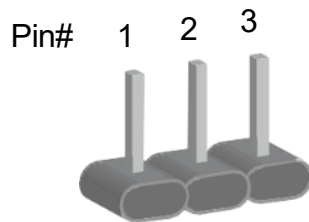
2.1.1.6. Audio Line-Out Jack



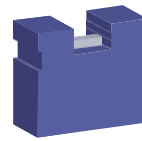
## 2.2 Setting the Jumpers

Use jumpers to configure your device's settings and features for specific applications. If you are unsure about the correct configuration, consult your supplier.

A jumper is a set of metal pins mounted on the circuit board, with a plastic cap used to connect two pins. Placing the jumper cap on specific pins enables or disables certain features. On a 3-pin jumper, you can short either pins 1–2 or pins 2–3 to select different settings.

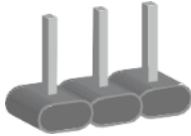
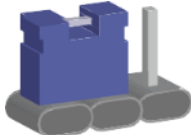
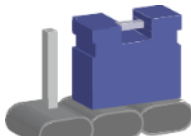
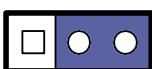


**A 3-pin jumper**



**A jumper cap**

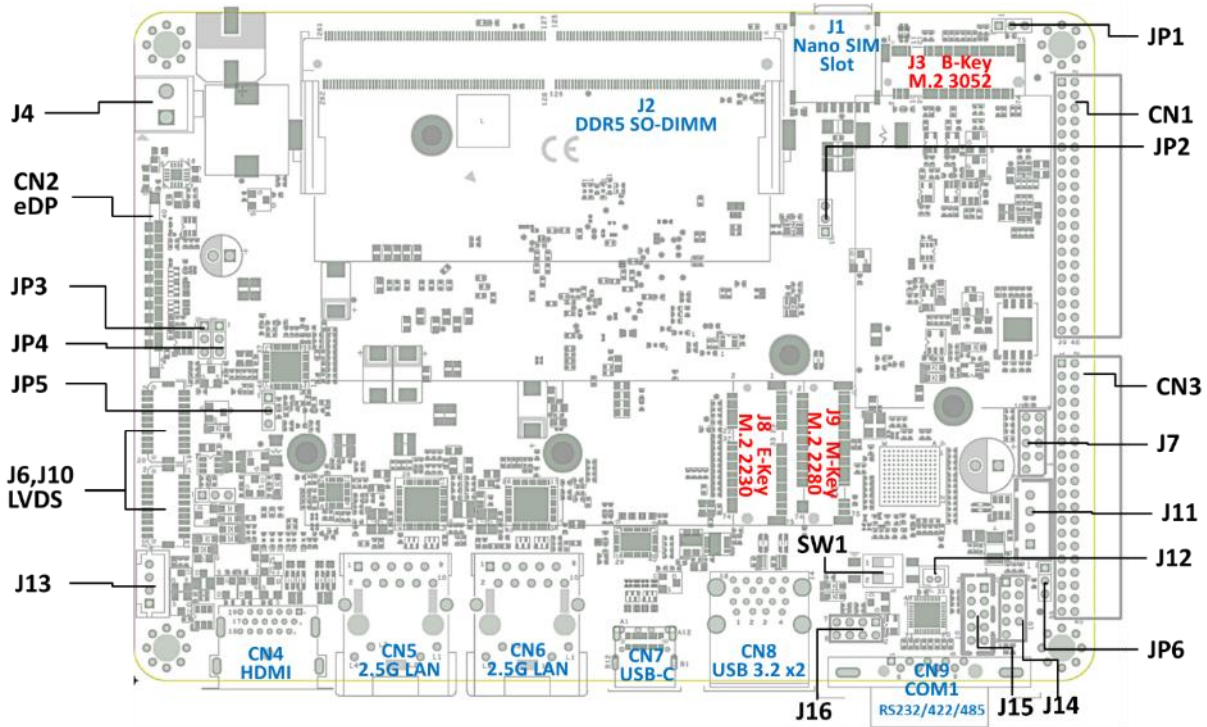
Refer to the illustration below to set jumpers.

| Pin closed | Oblique view                                                                        | Illustration                                                                                  |
|------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Open       |  | <br>1 2 3 |
| 1-2        |  | <br>1 2 3 |
| 2-3        |  | <br>1 2 3 |

When two pins of a jumper are encased in a jumper cap, this jumper is **closed** (on). When a jumper cap is removed from two jumper pins, this jumper is **open** (off).

## 2.3 Motherboard Jumper & Connector Locations

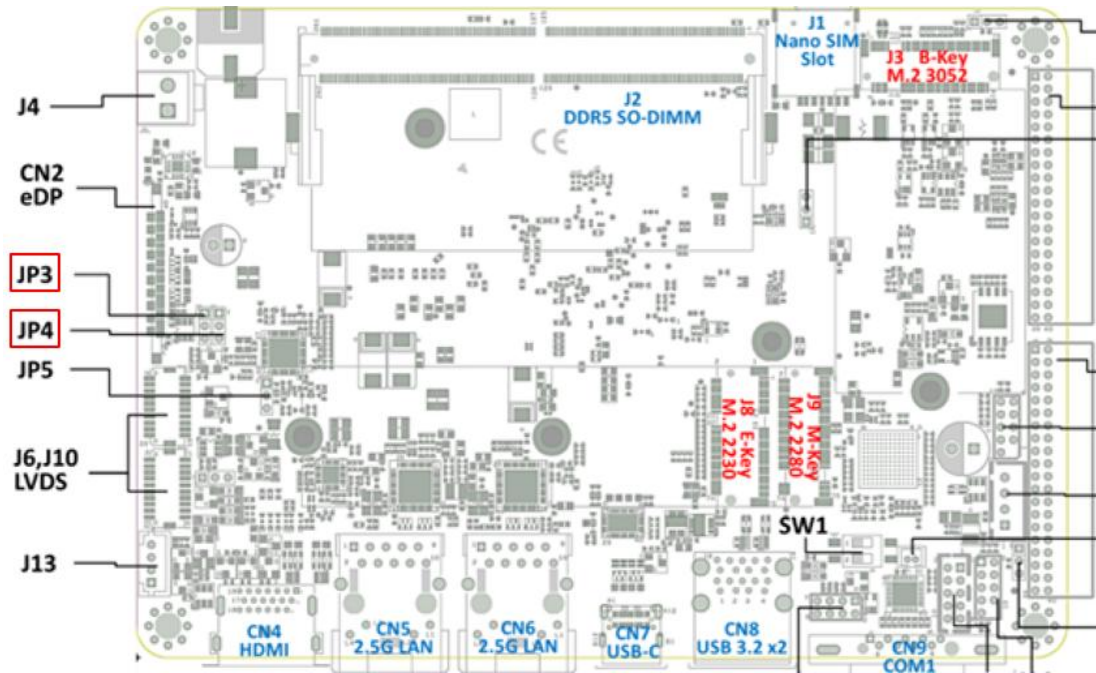
### MBP-210 Motherboard



## 2.4 Jumpers Quick Reference

| Function                            | Jumper |
|-------------------------------------|--------|
| eDP Panel Power Selection           | JP3    |
| LVDS Panel Brightness Selection     | JP4    |
| LVDS Panel Power Selection          | JP5    |
| AT / ATX Selection                  | JP6    |
| M.2 B-key / Sierra Module Selection | JP1    |
| Sierra Module Interface Selection   | JP2    |
| Clear CMOS Data                     | SW1    |
| Clear ME Register                   | SW1    |

#### 2.4.1 JP3: eDP Panel Power Selection



| Function       | Pin closed | Setting                                                                                            |
|----------------|------------|----------------------------------------------------------------------------------------------------|
| 3.3V (default) | 1-2        | 1 <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>            |
| 5V             | 2-3        | 1 <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |

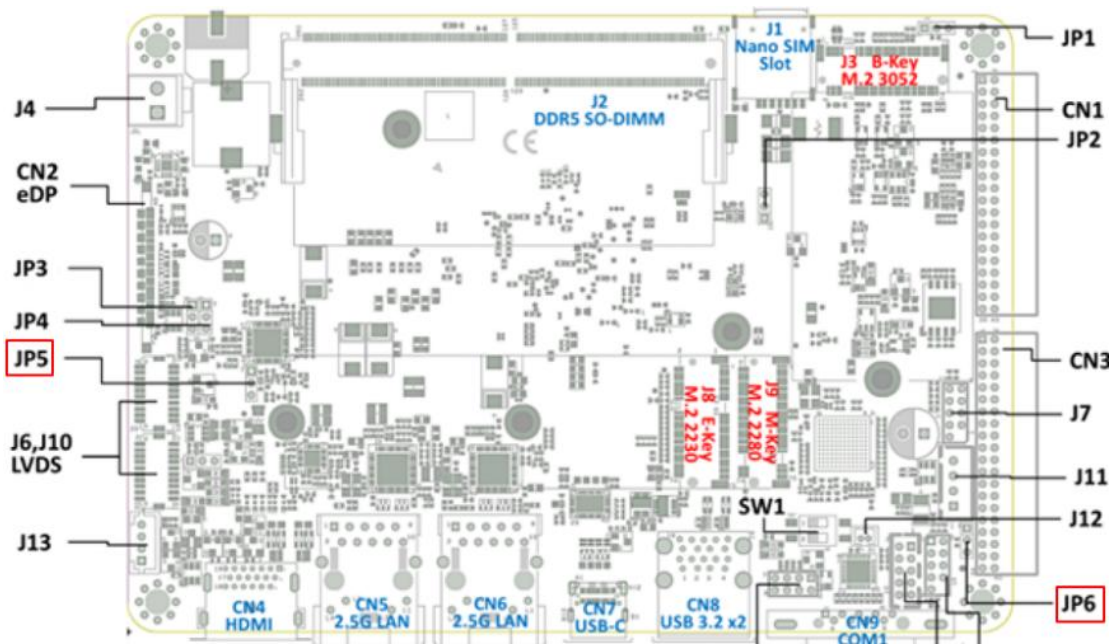
*Note: This is for setting Pin1~Pin5 voltage of CN2.*

#### 2.4.2 JP4: LVDS Panel Brightness Selection

| Function       | Pin closed | Setting                                                                                            |
|----------------|------------|----------------------------------------------------------------------------------------------------|
| 3.3V (default) | 1-2        | 1 <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>            |
| 5V             | 2-3        | 1 <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> |

*Note: This is for setting Pin3 voltage of J13.*

### 2.4.3 JP5: LVDS Panel Power Selection



| Function       | Pin closed | Setting                                                                           |
|----------------|------------|-----------------------------------------------------------------------------------|
| 3.3V (default) | 1-2        | 1 <input type="checkbox"/> <input checked="" type="radio"/> <input type="radio"/> |
| 5V             | 2-3        | 1 <input type="checkbox"/> <input type="radio"/> <input checked="" type="radio"/> |

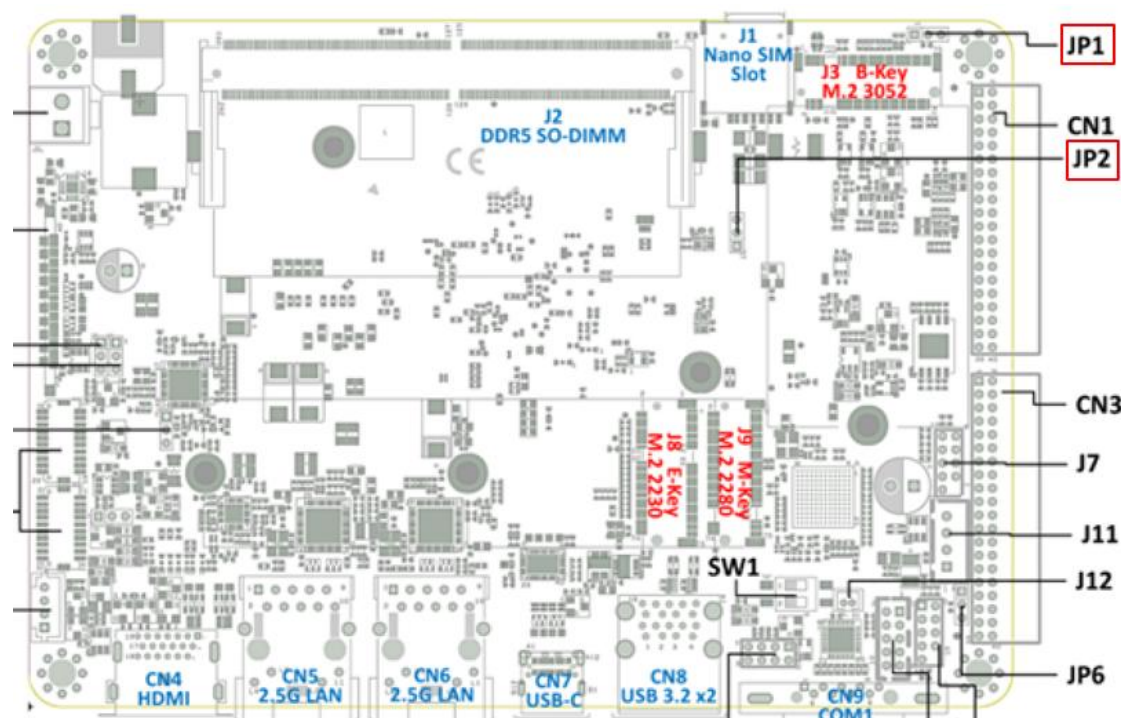
Note: This is for setting Pin19~Pin20 voltage of J6, J10

### 2.4.4 JP6: AT / ATX Selection

| Function | Pin closed | Setting                                                                           |
|----------|------------|-----------------------------------------------------------------------------------|
| ATX      | 1-2        | 1 <input type="checkbox"/> <input checked="" type="radio"/> <input type="radio"/> |
| AT       | 2-3        | 1 <input type="checkbox"/> <input type="radio"/> <input checked="" type="radio"/> |

Note: AT: Auto power on; ATX: Manual power on

## 2.4.5 JP1: M.2 B-key / Sierra Module Selection



| Function            | Pin closed | Setting                                                                           |
|---------------------|------------|-----------------------------------------------------------------------------------|
| M.2 B-key (default) | 1-2        | 1 <input type="checkbox"/> <input checked="" type="radio"/> <input type="radio"/> |
| Sierra Module       | 2-3        | 1 <input type="checkbox"/> <input type="radio"/> <input checked="" type="radio"/> |

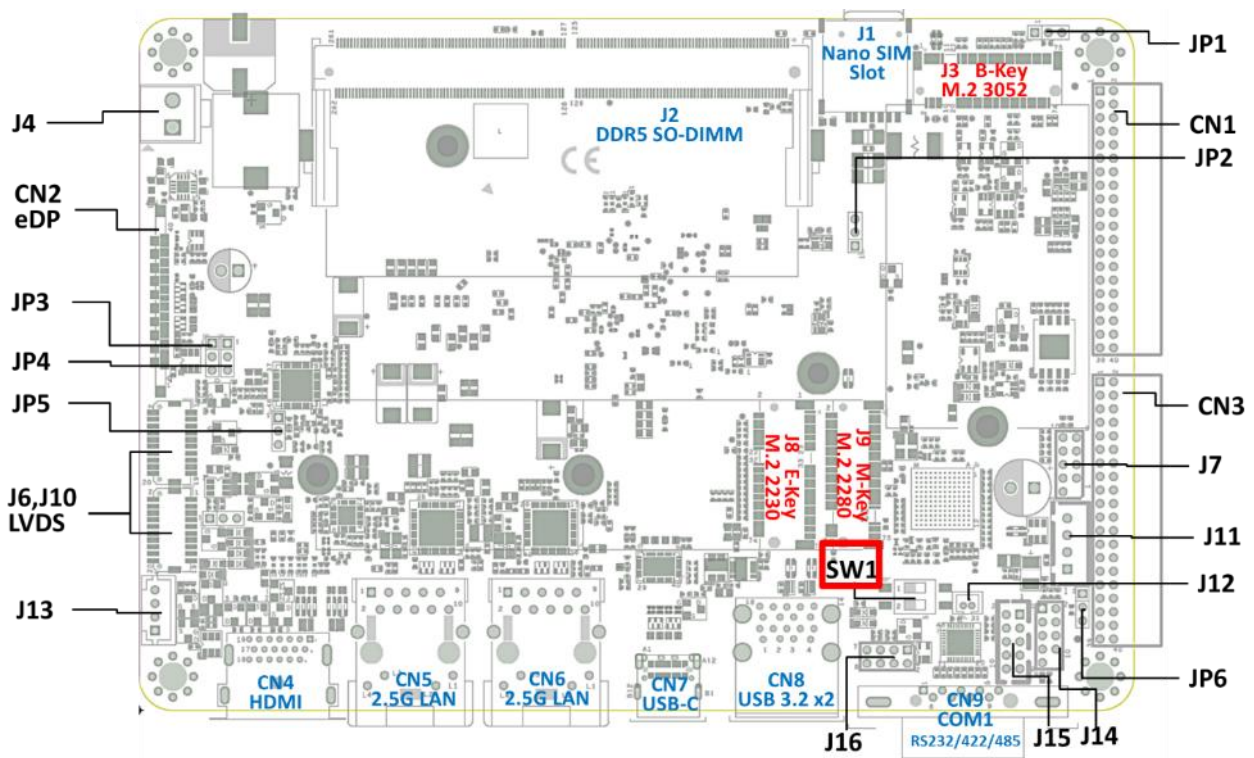
Note: The setting is via J3.

## 2.4.6 JP2: Sierra Module Interface Selection

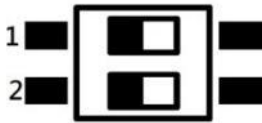
| Function       | Pin closed | Setting                                                                           |
|----------------|------------|-----------------------------------------------------------------------------------|
| USB            | 1-2        | 1 <input type="checkbox"/> <input checked="" type="radio"/> <input type="radio"/> |
| PCIe (default) | 2-3        | 1 <input type="checkbox"/> <input type="radio"/> <input checked="" type="radio"/> |

Note: The setting is via J3.

2.4.7 SW1: Clear CMOS Data



| Function         | Setting |
|------------------|---------|
| Normal (default) | P1-OFF  |
| Clear CMOS       | P1-ON   |



2.4.8 SW1: Clear ME Register

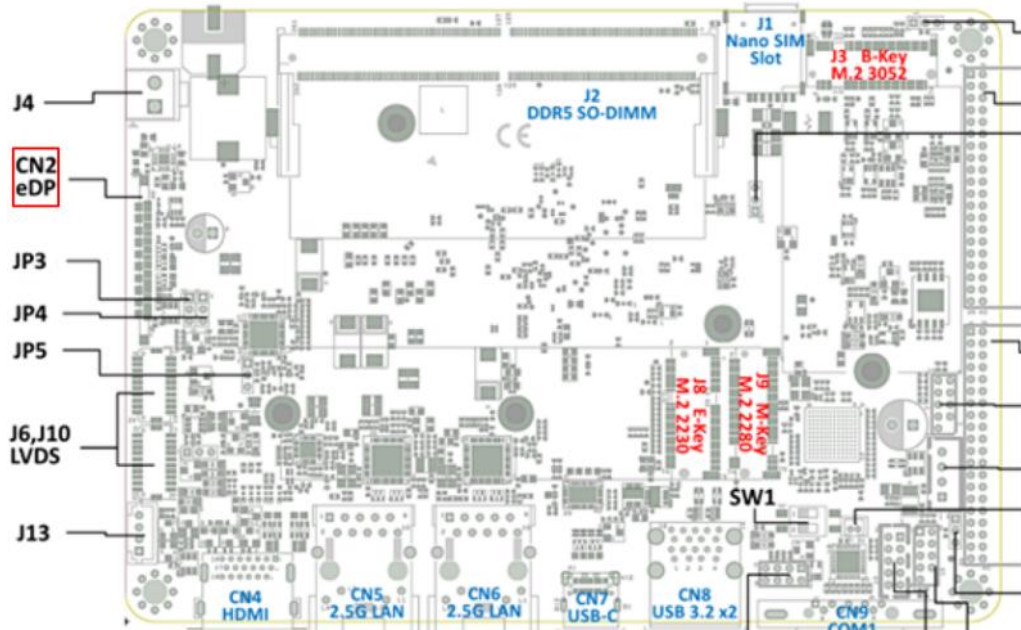
| Function          | Setting |
|-------------------|---------|
| Normal (default)  | P2-OFF  |
| Clear ME Register | P2-ON   |



## 2.5 Connectors Quick Reference

| Function                        | Connector |
|---------------------------------|-----------|
| 40 PIN IO-1                     | CN1       |
| eDP Connector                   | CN2       |
| 40 PIN IO-2                     | CN3       |
| HDMI Connectors                 | CN4       |
| LAN1, LAN2 Connector            | CN5, CN6  |
| Type-C Connector                | CN7       |
| USB 3.2 Stack Connector         | CN8       |
| COM1 RS-232/422/485 Serial Port | CN9       |
| Nano SIM Card Slot              | J1        |
| DDR5 SO-DIMM Connector          | J2        |
| M.2 B-Key 3052 Connector        | J3        |
| DC Power Input Connector        | J4        |
| LVDS Connectors                 | J6, J10   |
| SPI Flash Tool Connector        | J7        |
| M.2 E-Key 2230 Connector        | J8        |
| M.2 M-Key 2280 Connector        | J9        |
| USB 2.0 Connector               | J11       |
| RTC Battery Connector           | J12       |
| LVDS Backlight Connector        | J13       |
| COM2 RS-232 Ports               | J15       |
| 80 Port Debug Tool Connector    | J14       |
| Front Panel Connector           | J16       |

### 2.5.1 CN2: eDP Connector



Remarks: KEL\_SSL00-40S

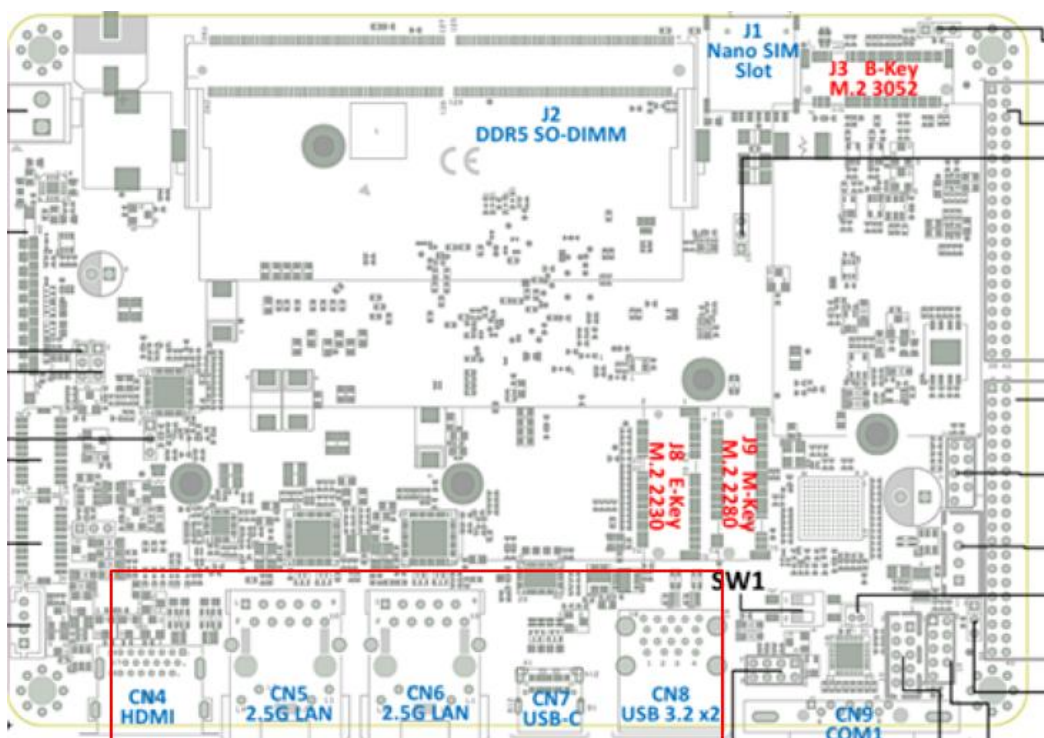
Note: Use JP3 to set Pin1~ Pin5 voltage; Total current: 1A

Pin27, Pin36 Total current: 1A

Pin28, Pin35 Total current: 1A

Pin31 Total current: 0.5A

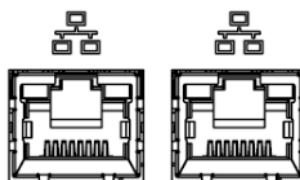
| Pin | Assignment      | Pin | Assignment         |
|-----|-----------------|-----|--------------------|
| 1   | eDP Vcc         | 21  | TXN0               |
| 2   | eDP Vcc         | 22  | TXP1               |
| 3   | eDP Vcc         | 23  | Ground             |
| 4   | eDP Vcc         | 24  | AUXP               |
| 5   | eDP Vcc         | 25  | AUXN               |
| 6   | Ground          | 26  | NC                 |
| 7   | Ground          | 27  | +3.3V              |
| 8   | Ground          | 28  | EDP BKLT (+12V)    |
| 9   | Ground          | 29  | NC                 |
| 10  | Hot Plug detect | 30  | Ground             |
| 11  | Ground          | 31  | +5V                |
| 12  | TXN3            | 32  | NC                 |
| 13  | TXP3            | 33  | Back Light Control |
| 14  | Ground          | 34  | Back Light Enable  |
| 15  | TXN2            | 35  | EDP BKLT (+12V)    |
| 16  | TXP2            | 36  | +3.3V              |
| 17  | Ground          | 37  | Ground             |
| 18  | TXN1            | 38  | NC                 |
| 19  | TXP1            | 39  | NC                 |
| 20  | Ground          | 40  | NC                 |



### 2.5.3 CN4: HDMI Connector



### 2.5.4 CN5, CN6: LAN Connectors



### 2.5.5 CN7: Type-C Connector



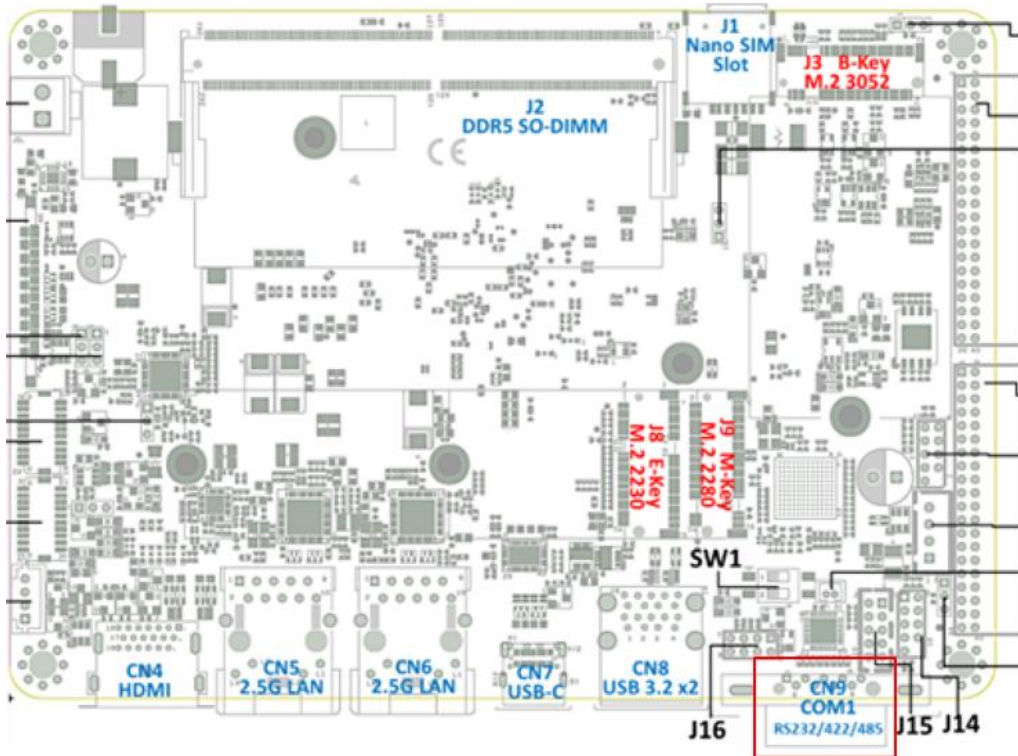
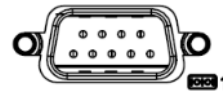
USB Type-C Support PD 60W (5V/9V/12V/15V/20V\_Max 3A) and Alternate mode.

Note : IPPC-121 have IDP-210 installed. To support PD 60W, IDP-210 is required.

### 2.5.6 CN8: USB 3.2 Connectors



## 2.5.7 CN9: COM1 RS-232/422/485 Serial Port

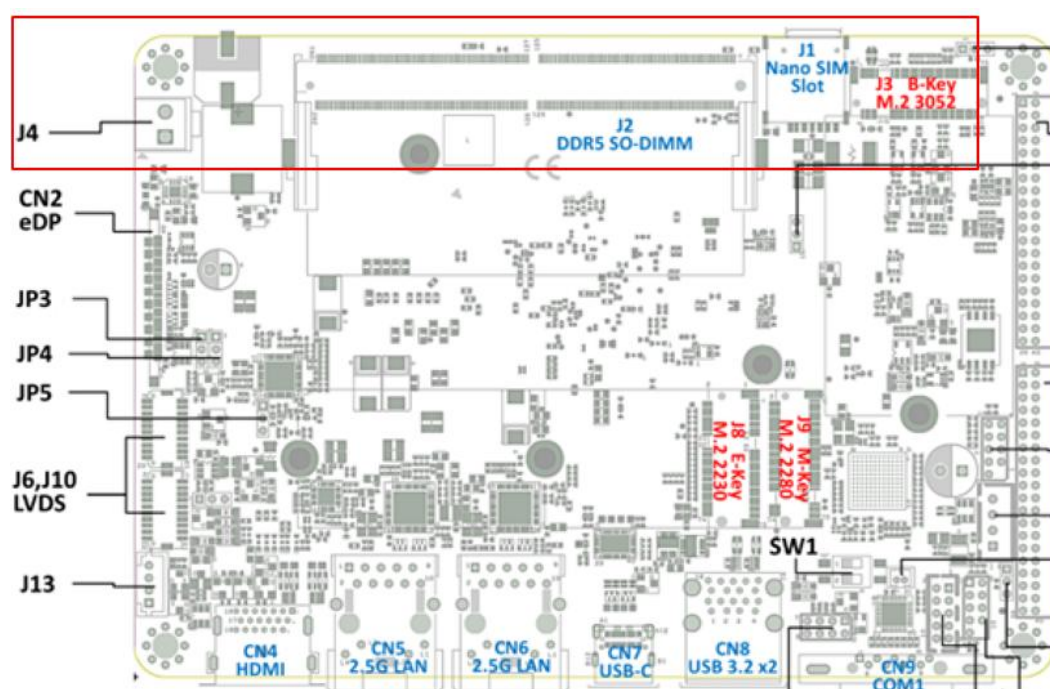


\*COM1 port is jumper-less and configurable in BIOS.

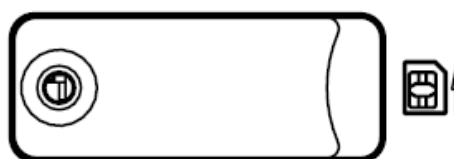
| Pin | Assignment          | Pin | Assignment               |
|-----|---------------------|-----|--------------------------|
| 1   | DSR, Data set ready | 6   | DCD, Data carrier detect |
| 2   | Ground              | 7   | DTR, Data terminal ready |
| 3   | Ground              | 8   | CTS, Clear to send       |
| 4   | TX, Transmit        | 9   | RTS, Request to send     |
| 5   | RX, Receive         | 10  | RI, Ring Indicator       |

| Pin | Assignment       |        |        |
|-----|------------------|--------|--------|
|     | RS-232 (default) | RS-422 | RS-485 |
| 1   | DSR              | NC     | NC     |
| 2   | Ground           | Ground | Ground |
| 3   | Ground           | Ground | Ground |
| 4   | TX               | RX+    | NC     |
| 5   | RX               | TX+    | Data+  |
| 6   | DCD              | TX-    | Data-  |
| 7   | DTR              | RX-    | NC     |
| 8   | CTS              | NC     | NC     |
| 9   | RTS              | NC     | NC     |
| 10  | RI               | NC     | NC     |

Note : COM3~COM6 see page 18



#### 2.5.8 J1: Nano SIM Card Slot



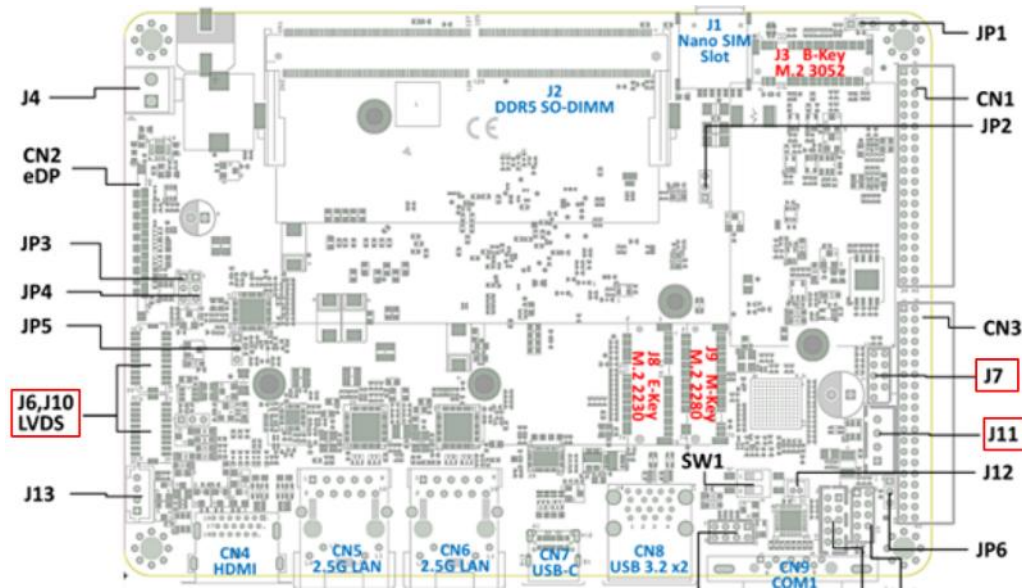
#### 2.5.9 J2: DDR5 SO-DIMM Connector

#### 2.5.10 J3: M.2 B-Key 3052 Connector

*\*With Sierra LTE card, USB/PCIE I/F is configurable by JP1, JP2.*

#### 2.5.11 J4: DC Power Input Connector

| Pin | Assignment |
|-----|------------|
| 1   | +9V ~ +36V |
| 2   | Ground     |



### 2.5.12 J7: SPI Flash Tool Connector

Remarks: Factory use only.

### 2.5.13 J6, J10: LVDS Connectors

\*\* J6: Channel-A, J10:Channel-B

Remarks: HIROSE\_DF20G-20DP-1V(56)

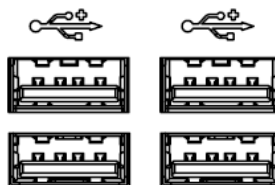
Note: Use JP5 to set Pin19~Pin20 voltage.Total current: 1A

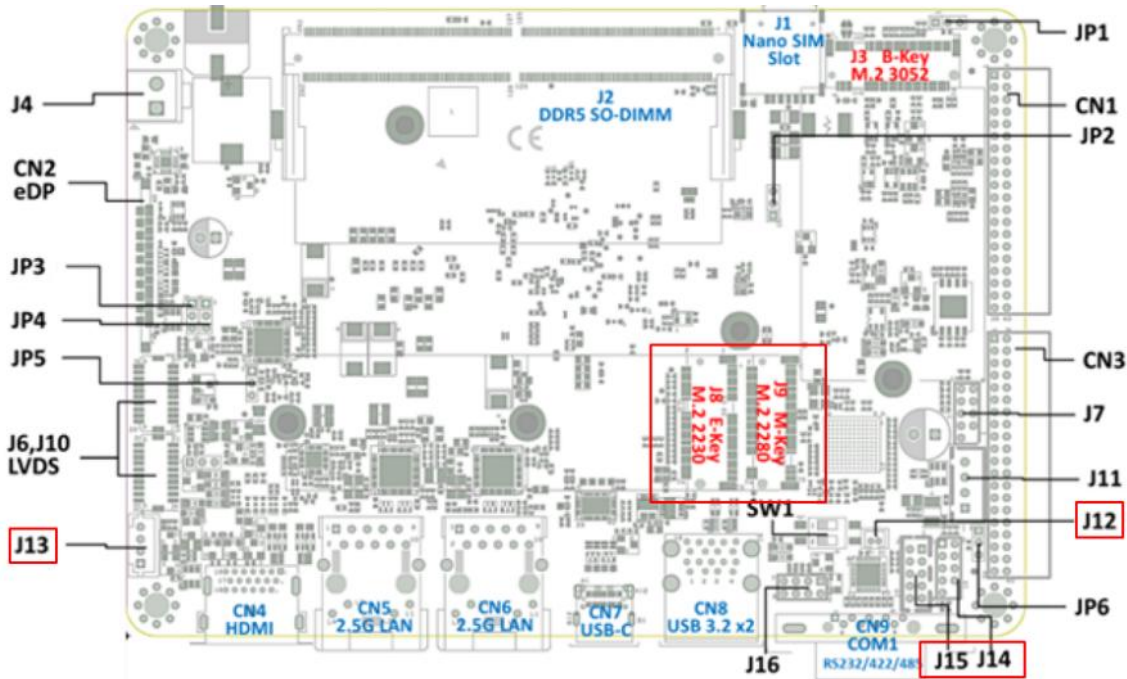
| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1   | TX0P       | 2   | TX0N       |
| 3   | Ground     | 4   | Ground     |
| 5   | TX1P       | 6   | TX1N       |
| 7   | Ground     | 8   | Ground     |
| 9   | TX2P       | 10  | TX2N       |
| 11  | Ground     | 12  | Ground     |
| 13  | CLKP       | 14  | CLKN       |
| 15  | Ground     | 16  | Ground     |
| 17  | TX3P       | 18  | TX3N       |
| 19  | Power      | 20  | Power      |

### 2.5.14 J11: USB 2.0 Connector

Remarks: TECHBEST\_01026041001-L

| Pin | Assignment |
|-----|------------|
| 1   | +5V/0.5A   |
| 2   | Data-      |
| 3   | Data+      |
| 4   | Ground     |





#### 2.5.15 J8: M.2 E-Key 2230 Connector

*\*Supports CNVI Card*

#### 2.5.16 J9: M.2 M-Key 2280 Connector

#### 2.5.17 RTC Battery Connector (J12)

*Note: Coin battery with cable.*

| Pin | Assignment |
|-----|------------|
| 1   | +3V        |
| 2   | Ground     |

#### 2.5.18 J13: LVDS Backlight Connector

*Remarks: E-CALL\_0110-161-040*

*Note: Use JP4 to set Pin3 voltage.*

| Pin | Assignment       | Pin | Assignment         |
|-----|------------------|-----|--------------------|
| 1   | +12V/1.5A        | 3   | Brightness Control |
| 2   | Backlight Enable | 4   | Ground             |

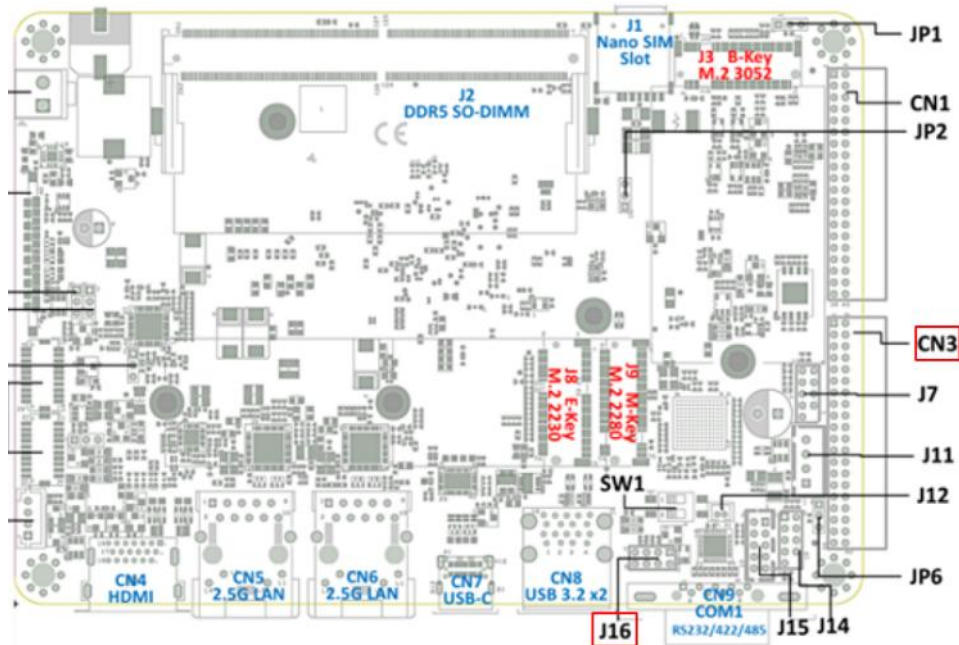
#### 2.5.19 J14: 80 Port Debug Tool Connector

*Remarks: Factory use only.*

#### 2.5.20 J15: COM2 Serial Port

*Remarks: HK\_DF11-10S-PA66H*

| Pin | Assignment               | Pin | Assignment               |
|-----|--------------------------|-----|--------------------------|
| 1   | DCD, Data carrier detect | 2   | RXD, Receive data        |
| 3   | TXD, Transmit data       | 4   | DTR, Data terminal ready |
| 5   | Ground                   | 6   | DSR, Data set ready      |
| 7   | RTS, Request to send     | 8   | CTS, Clear to send       |
| 9   | RI, Ring indicator       | 10  | Not Used                 |



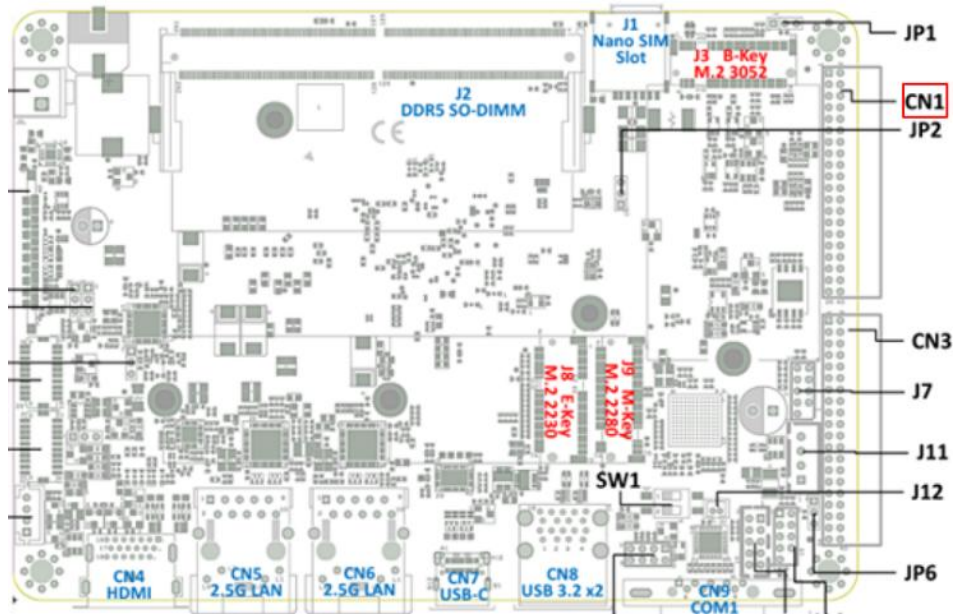
### 2.5.21 J16:Front Panel Setting Connector

Remarks: E-CALL\_0126-01-203-080

| Pin | Assignment     | Pin | Assignment |
|-----|----------------|-----|------------|
| 1   | PWR_BTN-       | 2   | PWR_BTN+   |
| 3   | HDD_LED+, 3.3V | 4   | HDD Active |
| 5   | Ground         | 6   | Reset      |
| 7   | POWER_LED+, 5V | 8   | Ground     |

### 2.5.22 CN3: 40 Pin IO Signal TO IDP-210

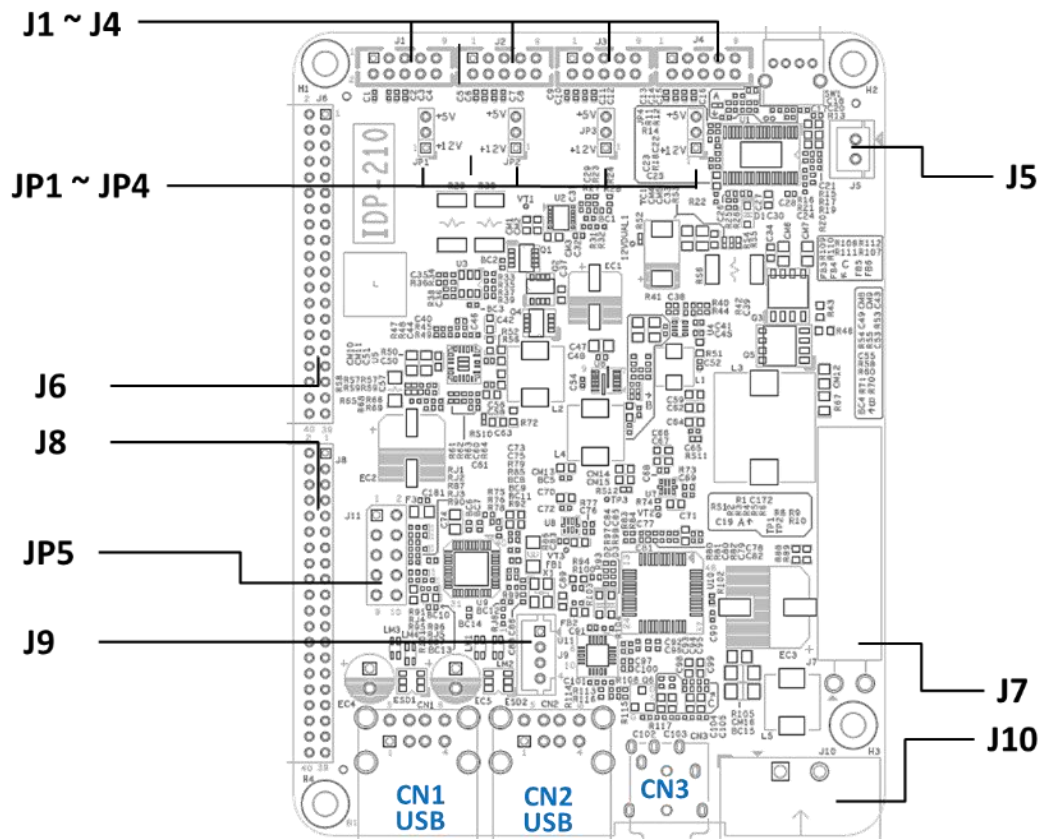
| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1   | CTS3       | 2   | DSR3       |
| 3   | DTR5       | 4   | CTS4       |
| 5   | DSR6       | 6   | DCD5       |
| 7   | DTR6       | 8   | SOUT6      |
| 9   | RTS6       | 10  | CTS6       |
| 11  | CTS5       | 12  | SIN6       |
| 13  | GND        | 14  | DOUT2      |
| 15  | DOUT1      | 16  | DOUT3      |
| 17  | DOUT0      | 18  | DIN3       |
| 19  | RTC_RST#   | 20  | DIN1       |
| 21  | DIN2       | 22  | DIN0       |
| 23  | DCD6       | 24  | DSR5       |
| 25  | SIN4       | 26  | SOUT4      |
| 27  | DCD4       | 28  | RTS5       |
| 29  | SOUT5      | 30  | DSR4       |
| 31  | RTS4       | 32  | SIN3       |
| 33  | RTS3       | 34  | DCD3       |
| 35  | DTR3       | 36  | SOUT3      |
| 37  | DTR4       | 38  | SIN5       |
| 39  | GND        | 40  | GND        |



### 2.5.23 CN1: 40 Pin IO Signal to IDP-210

| Pin | Assignment  | Pin | Assignment  |
|-----|-------------|-----|-------------|
| 1   | DC_IN       | 2   | DC_IN       |
| 3   | DC_IN       | 4   | DC_IN       |
| 5   | DC_IN       | 6   | DC_IN       |
| 7   | DC_IN       | 8   | DC_IN       |
| 9   | DC_IN       | 10  | DC_IN       |
| 11  | 12VDUAL_EN  | 12  | DC_IN       |
| 13  | PD_SDA      | 14  | GND         |
| 15  | PD_SCL      | 16  | GND         |
| 17  | PS_ON#      | 18  | TYPE_C_OUT  |
| 19  | GND         | 20  | TYPE_C_OUT  |
| 21  | GND         | 22  | TYPE_C_OUT  |
| 23  | TYPE_C_VBUS | 24  | PWR_BTN#    |
| 25  | TYPE_C_VBUS | 26  | GND         |
| 27  | TYPE_C_VBUS | 28  | GND         |
| 29  | TYPE_C_VBUS | 30  | GND         |
| 31  | HDA_SDOUT   | 32  | HDA_RST#    |
| 33  | HDA_SYNC    | 34  | HDA_BIT_CLK |
| 35  | HDA_SDIN0   | 36  | DPS_EN      |
| 37  | GND         | 38  | GND         |
| 39  | USB+        | 40  | USB-        |

## 2.6 IDP-210 Daughter Board



### 2.6.1 IDP-210 : J1, J2, J3, J4: COM3, COM4, COM5, COM6 RS-232 Serial Ports

| Pin | Assignment          | Pin | Assignment               |
|-----|---------------------|-----|--------------------------|
| 1   | DSR, Data set ready | 6   | DCD, Data carrier detect |
| 2   | Ground              | 7   | DTR, Data terminal ready |
| 3   | Ground              | 8   | CTS, Clear to send       |
| 4   | TX, Transmit        | 9   | RTS, Request to send     |
| 5   | RX, Receive         | 10  | RI, Ring Indicator       |

### 2.6.2 IDP-210 : JP4, JP3, JP2, JP1: COM3, COM4, COM5, COM6 RI Power Selection

| Function | Pin closed | Setting                                                                                 |
|----------|------------|-----------------------------------------------------------------------------------------|
| 12V      | 1-2        | 1 <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> |
| 5V       | 2-3        | 1 <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> |

**2.6.3 IDP-210 : (J5),SW1: Power Button**

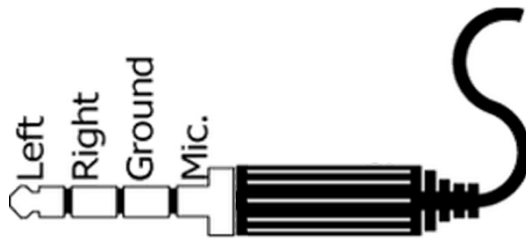
| Pin | Assignment |
|-----|------------|
| 1   | SHDN#      |
| 2   | Ground     |

**2.6.4 IDP-210 : JP5: Digital I/O Connector**

| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1   | Ground     | 2   | +5V/0.5A   |
| 3   | OUT3       | 4   | OUT1       |
| 5   | OUT2       | 6   | OUT0       |
| 7   | OUT4       | 8   | IN4        |
| 9   | IN3        | 10  | IN1        |
| 11  | IN2        | 12  | IN0        |

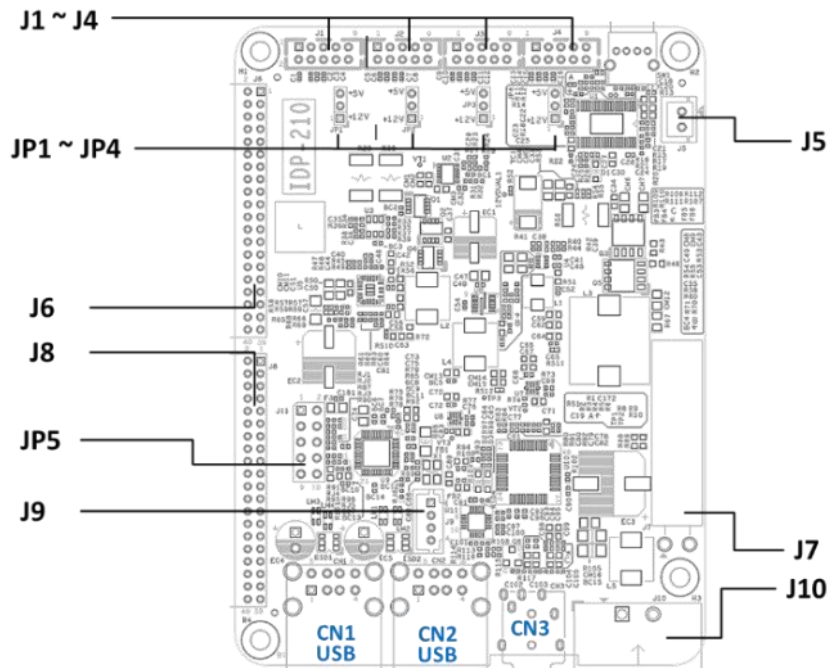
**2.6.5 IDP-210 : J10, J7: DC\_IN Connector (2-pin terminal block)**

| Pin | Signal Name | Pin | Signal Name |
|-----|-------------|-----|-------------|
| 1   | 9V~36V      | 2   | Ground      |

**2.6.6 IDP-210 : CN3: Audio Combo (Line-Out / Mic)****2.6.7 IDP-210 : J9: Speaker Out Connector**

| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1   | SPK_L+     | 3   | SPK_R-     |
| 2   | SPK_L-     | 4   | SPK_R+     |

### 2.6.8 IDP-210 : CN1, CN2: USB 2.0 Stack Connector



### 2.6.9 IDP-210 : J6 : 40 Pin IO Signal From MBP-210

| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1   | CTS3       | 2   | DSR3       |
| 3   | DTR5       | 4   | CTS4       |
| 5   | DSR6       | 6   | DCD5       |
| 7   | DTR6       | 8   | SOUT6      |
| 9   | RTS6       | 10  | CTS6       |
| 11  | CTS5       | 12  | SIN6       |
| 13  | GND        | 14  | DOUT2      |
| 15  | DOUT1      | 16  | DOUT3      |
| 17  | DOUT0      | 18  | DIN3       |
| 19  | RTC_RST#   | 20  | DIN1       |
| 21  | DIN2       | 22  | DIN0       |
| 23  | DCD6       | 24  | DSR5       |
| 25  | SIN4       | 26  | SOUT4      |
| 27  | DCD4       | 28  | RTS5       |
| 29  | SOUT5      | 30  | DSR4       |
| 31  | RTS4       | 32  | SIN3       |
| 33  | RTS3       | 34  | DCD3       |
| 35  | DTR3       | 36  | SOUT3      |
| 37  | DTR4       | 38  | SIN5       |
| 39  | GND        | 40  | GND        |

**2.6.10 IDP-210 : J8: 40 Pin IO Signal From MBP-210**

| Pin | Assignment  | Pin | Assignment  |
|-----|-------------|-----|-------------|
| 1   | DC_IN       | 2   | DC_IN       |
| 3   | DC_IN       | 4   | DC_IN       |
| 5   | DC_IN       | 6   | DC_IN       |
| 7   | DC_IN       | 8   | DC_IN       |
| 9   | DC_IN       | 10  | DC_IN       |
| 11  | 12VDUAL_EN  | 12  | DC_IN       |
| 13  | PD_SDA      | 14  | GND         |
| 15  | PD_SCL      | 16  | GND         |
| 17  | PS_ON#      | 18  | TYPE_C_OUT  |
| 19  | GND         | 20  | TYPE_C_OUT  |
| 21  | GND         | 22  | TYPE_C_OUT  |
| 23  | TYPE_C_VBUS | 24  | PWR_BTN#    |
| 25  | TYPE_C_VBUS | 26  | GND         |
| 27  | TYPE_C_VBUS | 28  | GND         |
| 29  | TYPE_C_VBUS | 30  | GND         |
| 31  | HDA_SDOUT   | 32  | HDA_RST#    |
| 33  | HDA_SYNC    | 34  | HDA_BIT_CLK |
| 35  | HDA_SDIN0   | 36  | DPS_EN      |
| 37  | GND         | 38  | GND         |
| 39  | USB+        | 40  | USB-        |

## Chapter 3

# Driver Installation

The information provided in this chapter includes:

- Intel® Chipset Software Installation Utility
- Graphics Driver Installation
- HD Audio Drivers Installation
- Intel® ME Drivers Installation
- Intel® Serial I/O Drivers Installation
- LAN Driver Installation

Download Link:

<https://drive.google.com/drive/folders/1PN30Iq0dLtG9jffwqcpj-Z6p61F01p62>



### 3.1 Introduction

This section describes the installation procedures for software drivers. Visit the product support page on the IBASE website to download the drivers. Copy the compressed drivers file to your computer. Double click the file to decompress it. Run “CDGuide” to go to the main drivers page.

---

**Note:** After installing your Windows operating system, you must 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. Follow the instructions below to complete the installation.

1. Click Intel and then Intel(R) Alder-N/Amston/Twin Lake Chipset Drivers.



## iBASE

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

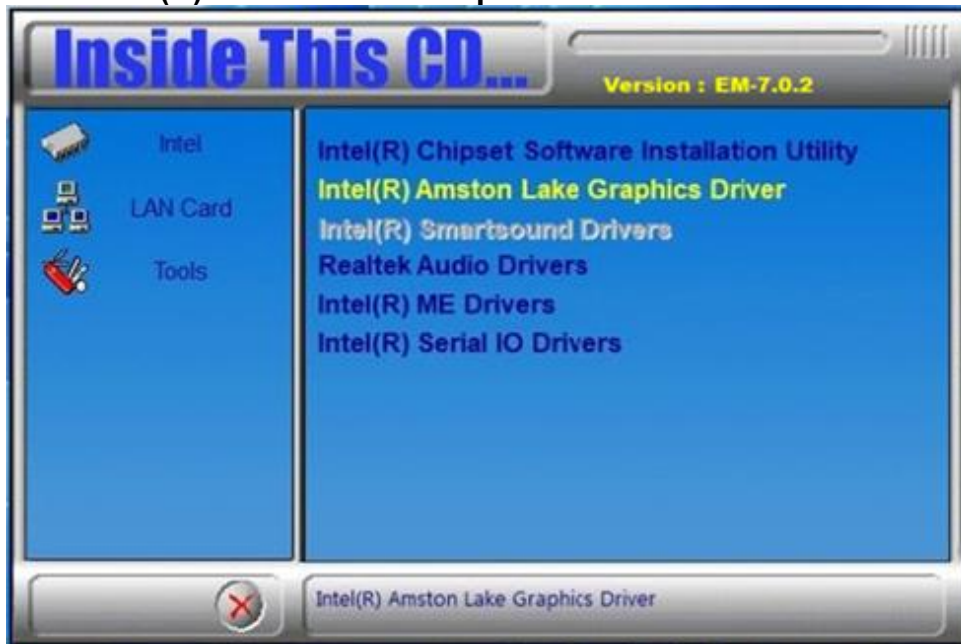


3. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next**.
4. Accept the terms of the software license agreement. Click **Next**.
5. On the *Readme File Information* screen, click **Install** and then **Next**.
6. When the driver is completely installed, click **Finish**.

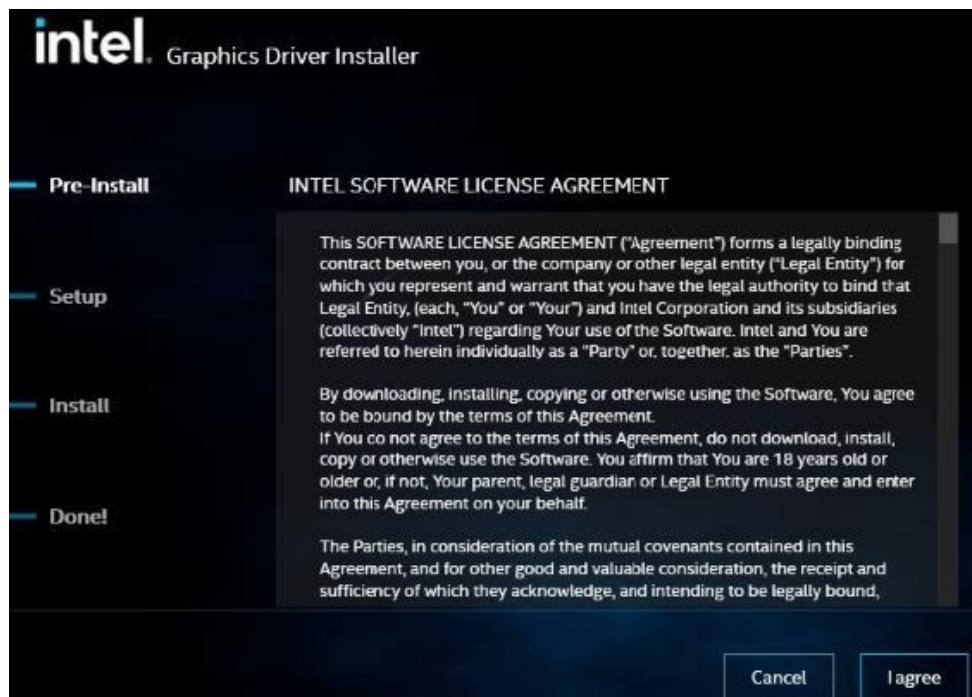


### 3.3 Graphics Driver Installation

1. Click **Intel** and then **Intel(R) Alder-N/Amston/Twin Lake Chipset Drivers**.
2. Click **Intel(R) Amston Lake Graphics Driver**.



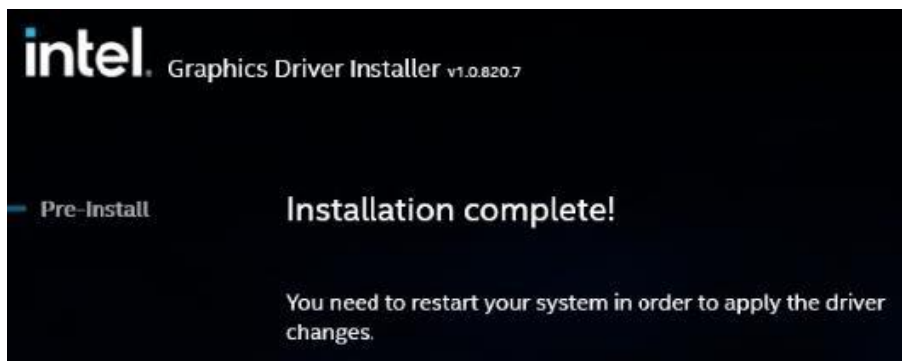
3. In the *Intel Software License Agreement* screen, click **I agree**.



4. Click **Start** for the Installer to install the components shown below.



5. You need to restart your system in order to apply the driver changes. Click **Finish**.





### 3.4 Realtek HD Audio Driver Installation

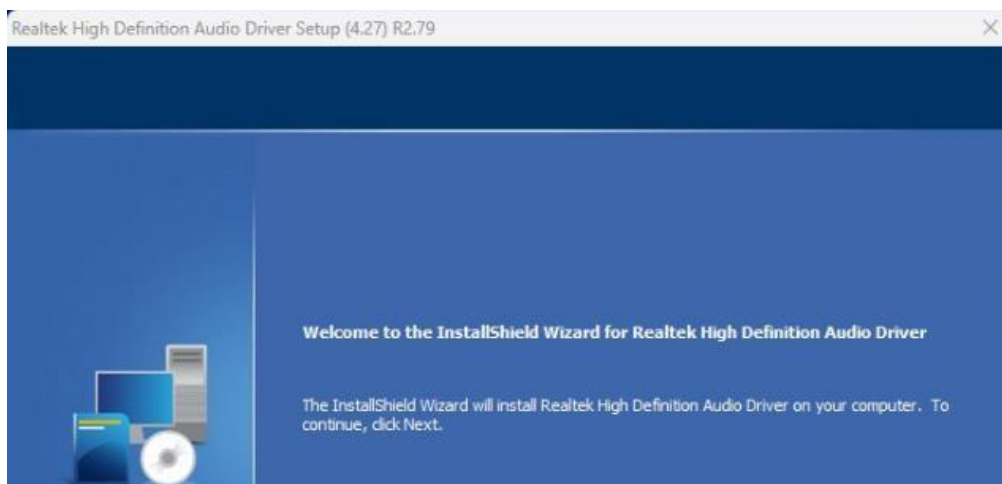
1. Click **Intel** and then **Intel(R) Alder-N/Amston/Twin Lake Chipset Drivers**.
2. Click **Realtek Audio Drivers**.



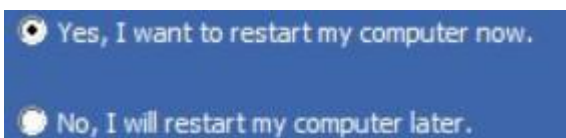
3. Click **Realtek High Definition Audio Driver**.



4. On the *Welcome* screen of the InstallShield Wizard, click **Next**.



5. After installation has been completed, restart the computer for changes to take effect..

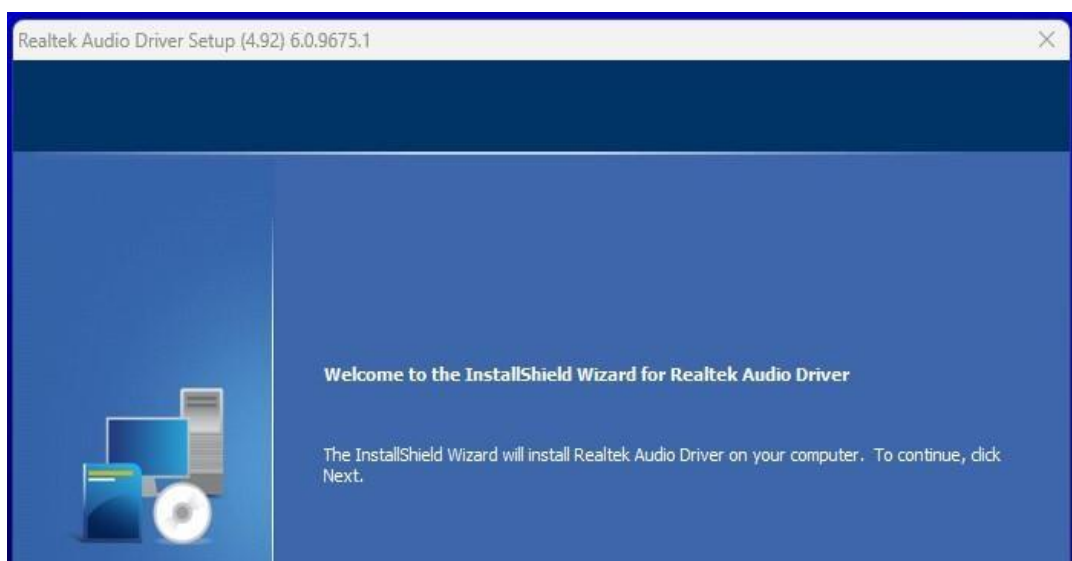


### 3.5 Realtek Audio DCH Drivers Installation

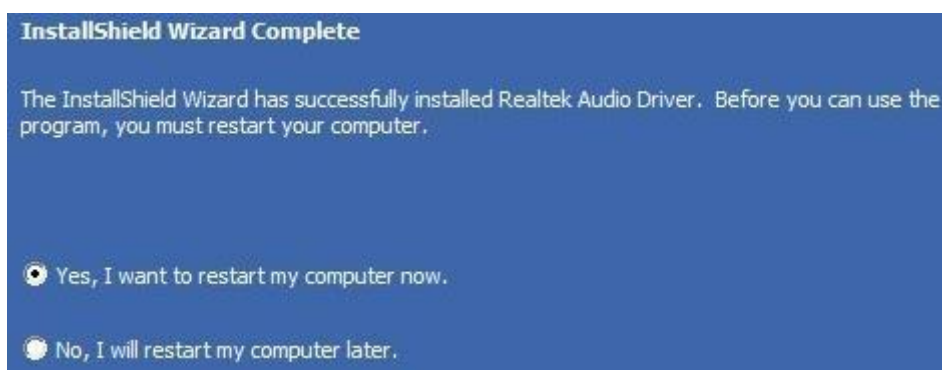
1. Click **Intel** and then **Intel(R) Alder-N/Amston/Twin Lake Chipset Drivers**.
2. Click **Realtek Audio DCH Drivers**.



3. On the *Welcome* screen of the InstallShield Wizard, click **Next**.



4. After installation has been completed, restart the computer.



### 3.6 Intel (R) ME Drivers Installation

1. Click **Intel** and then **Intel(R) Alder-N/Amston/Twin Lake Chipset Drivers**.
2. Click **Intel(R) ME Drivers**.



3. On the *Welcome* screen, click **Next**.



4. Click **Next** to accept the destination folder or click **Change** to choose another destination folder.
5. Click **Finish** when you have installed the ME components.



### 3.7 Intel® Serial IO Drivers Installation

1. Click **Intel** and then **Intel(R) Alder-N/Amston/Twin Lake Chipset Drivers**.
2. Click **Intel(R) Serial IO Drivers**.



3. When the *Welcome* screen appears, click **Next** to continue.



4. Accept the terms of the license agreement and click **Next**.
5. On the *Readme File Information* screen, click **Next**.
6. On the *Confirmation* screen, click **Next**.



7. On the *Completion* screen, click **Finish**.



### 3.8 LAN Drivers Installation

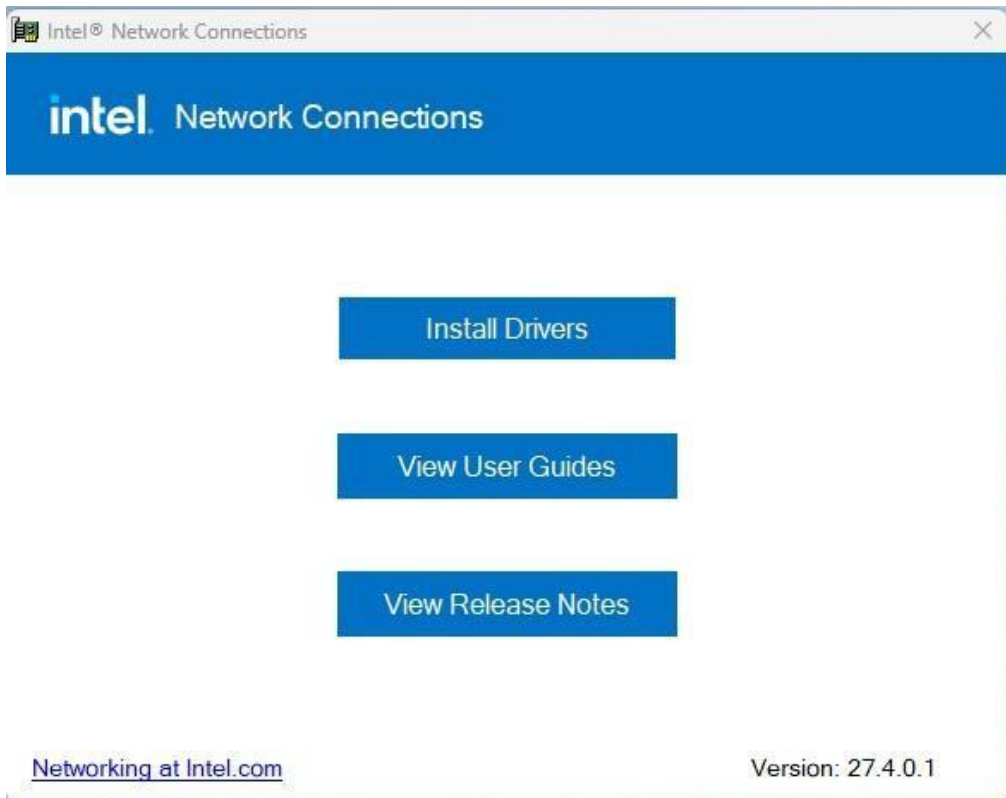
1. Click **LAN Card** on the left and then **Intel LAN Controller Drivers**.



2. Click **Intel(R) I21x Gigabit Network Drivers**.



3. Click **Install Drivers**.



4. After the drivers have been successfully installed, click **Close**.

## 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 and serial 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.

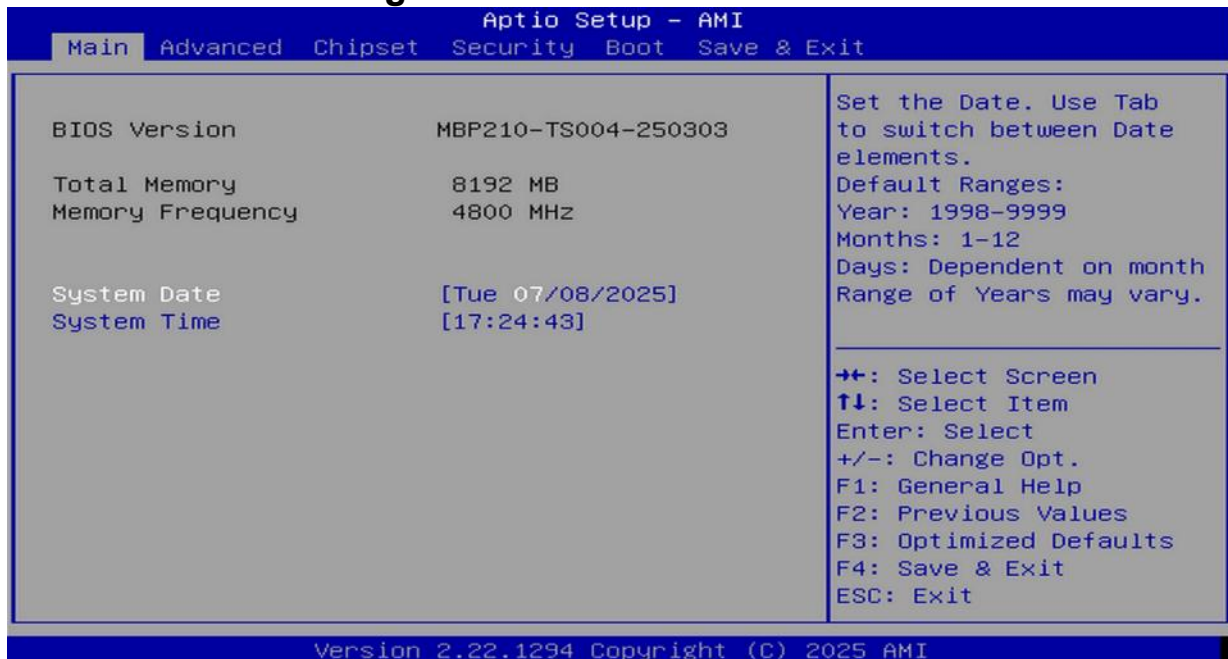
---

**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.

---

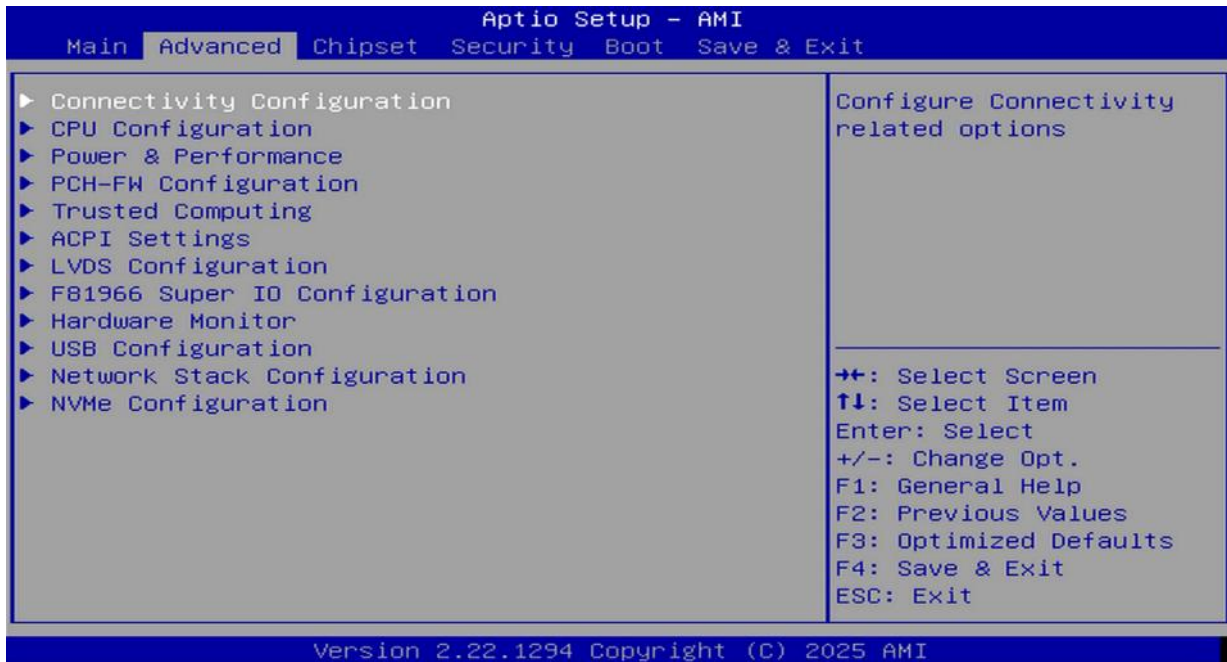
### 4.3 Main Settings



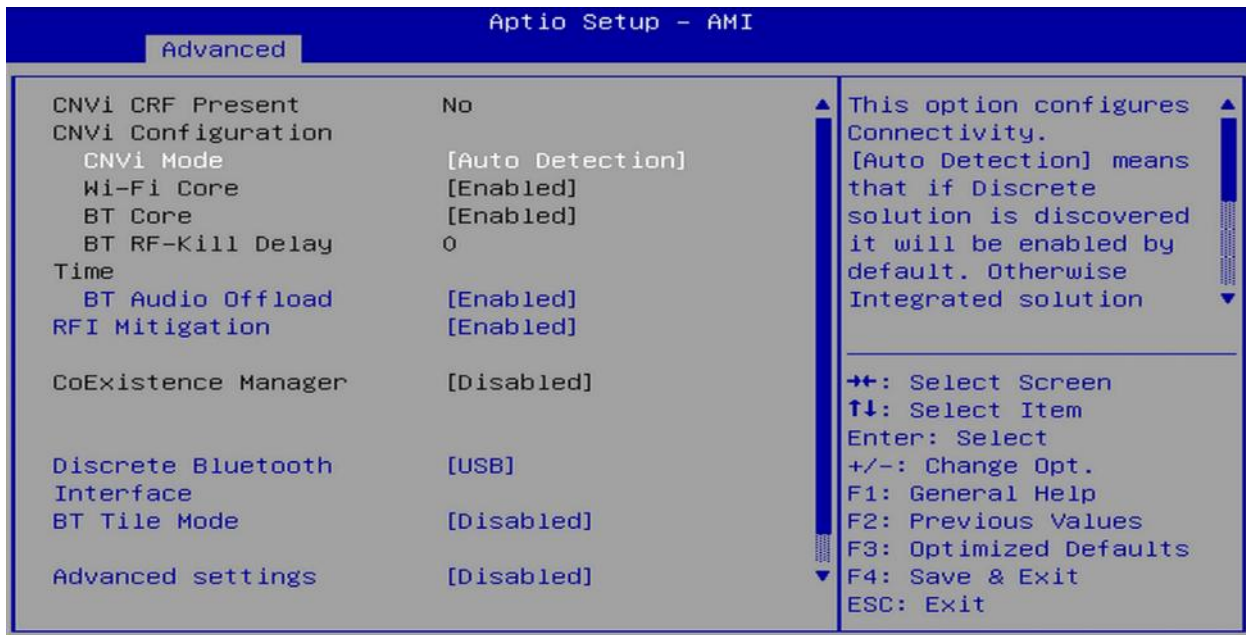
| BIOS Setting | Description                                                              |
|--------------|--------------------------------------------------------------------------|
| System Date  | Sets the date.<br>Use the <Tab> key to switch between the date elements. |
| System Time  | Set the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

## 4.4 Advanced Settings

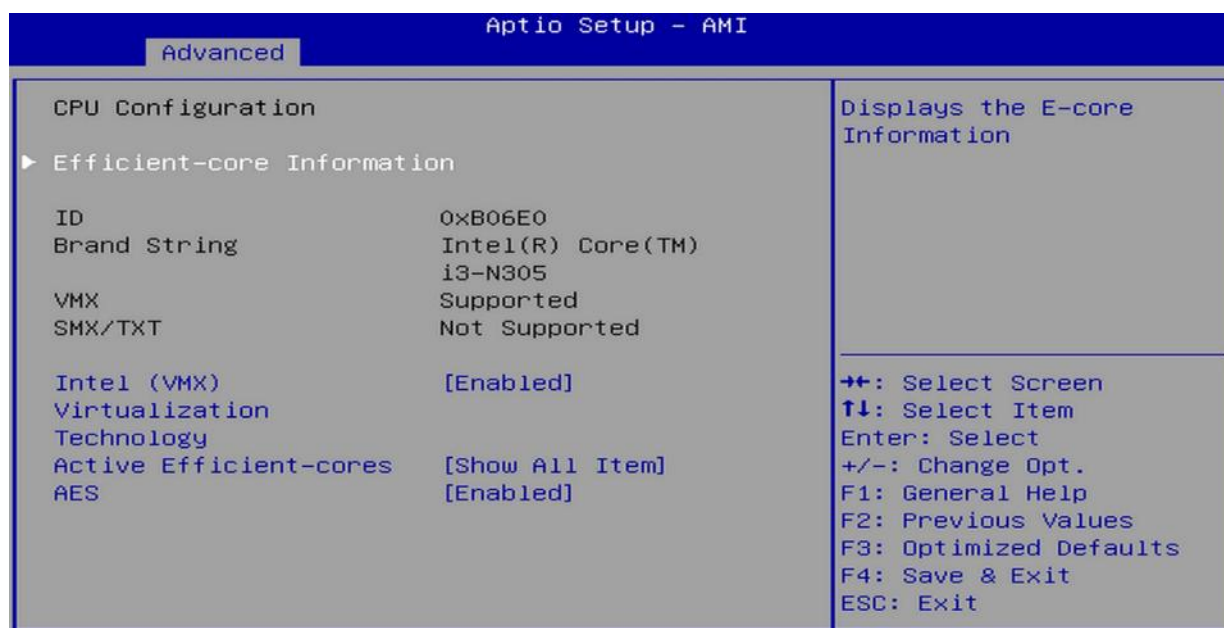
This section allows you to configure, improve your system and to set up some system features according to your preference.



### 4.4.1 Connectivity Configuration

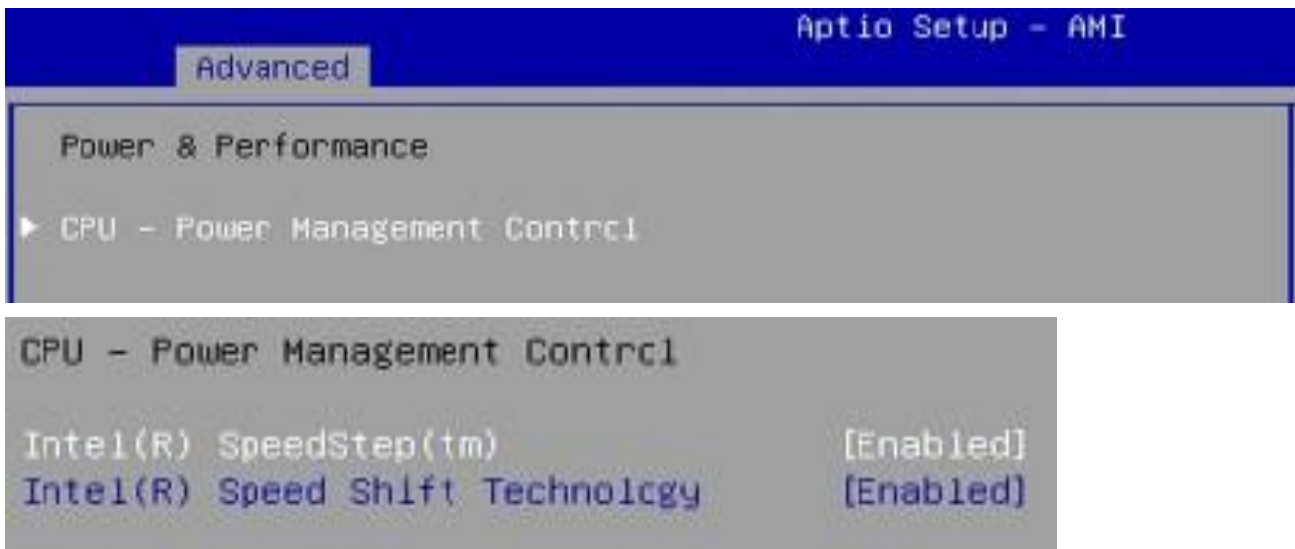


| BIOS Setting                 | Description                                                                                                                                                                                                                                                     |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CNVi Mode                    | This option configures Connectivity.<br><b>Auto Detection</b> – means that if Discrete solution is discovered it will be enabled by default. Otherwise Integrated solution (CNVi) will be enabled;<br><b>Disable Integrated</b> – disables Integrated Solution. |
| RFI Mitigation               | This is an option intended to enable/disable DDR- RFIM feature for Connectivity. This feature may result in temporary slowdown of the DDR speed.                                                                                                                |
| Discrete Bluetooth Interface | Serial IO UART0 needs to be enabled to select BT interface.                                                                                                                                                                                                     |
| BT Tile Mode                 | Options: Enabled/Disabled                                                                                                                                                                                                                                       |
| Advanced Settings            | Configure ACPI objects for wireless devices Default: Disabled                                                                                                                                                                                                   |
| WWAN Configuration           | Configure WWAN related options.<br>WWAN Device: enable or disable M.2 WWAN device                                                                                                                                                                               |



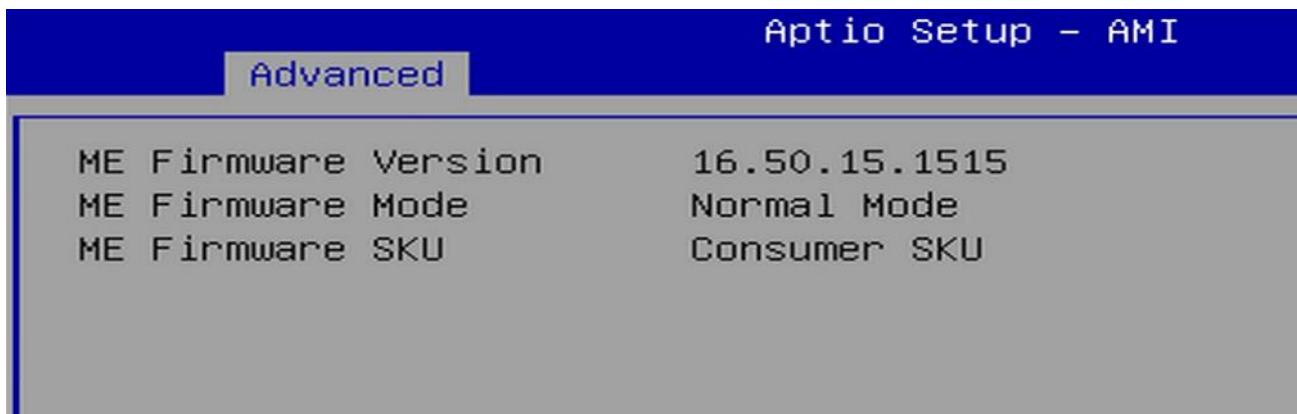
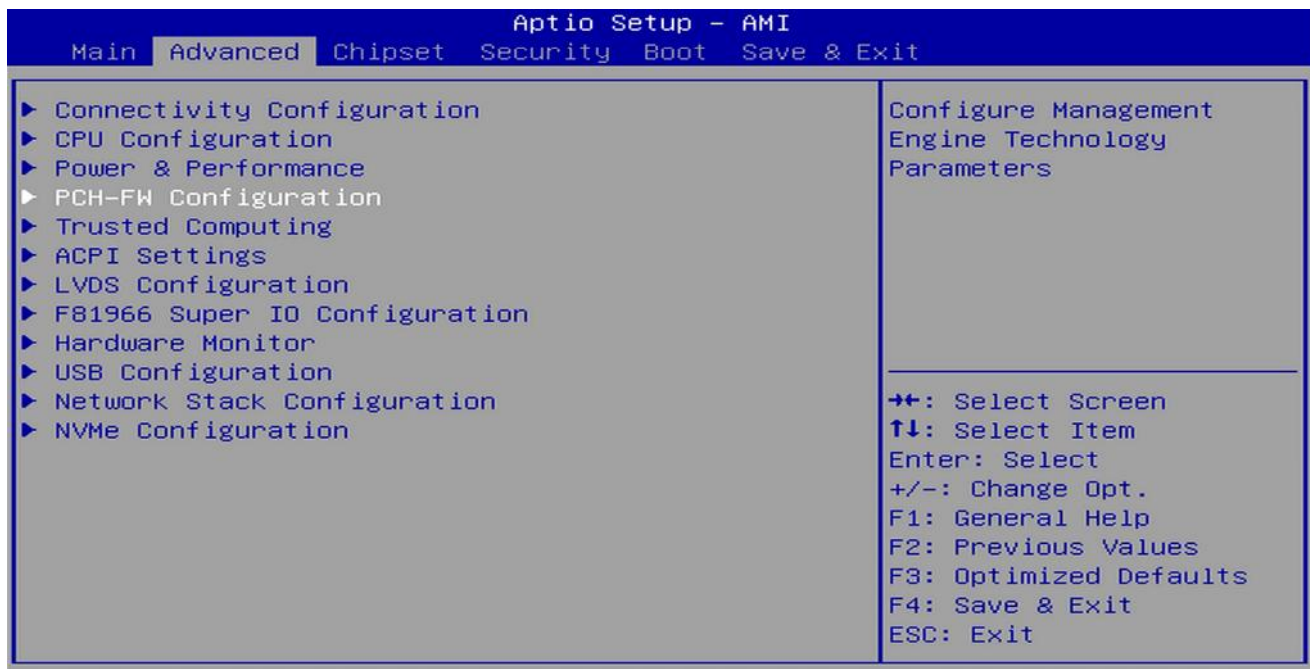
| BIOS Setting                          | Description                                                                                                                                                        |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Efficient-core Information            | Displays the E-core Information.                                                                                                                                   |
| Intel (VMX) Virtualization Technology | When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.                                                            |
| Active Efficient-cores                | Number of E-cores to enable in each processor package. Note: Number of cores and E-cores are looked at together. When both are (0,0), Pcode will enable all cores. |
| AES                                   | Enable/Disable AES (Advanced Encryption Standard)                                                                                                                  |

### 4.4.3 Power & Performance

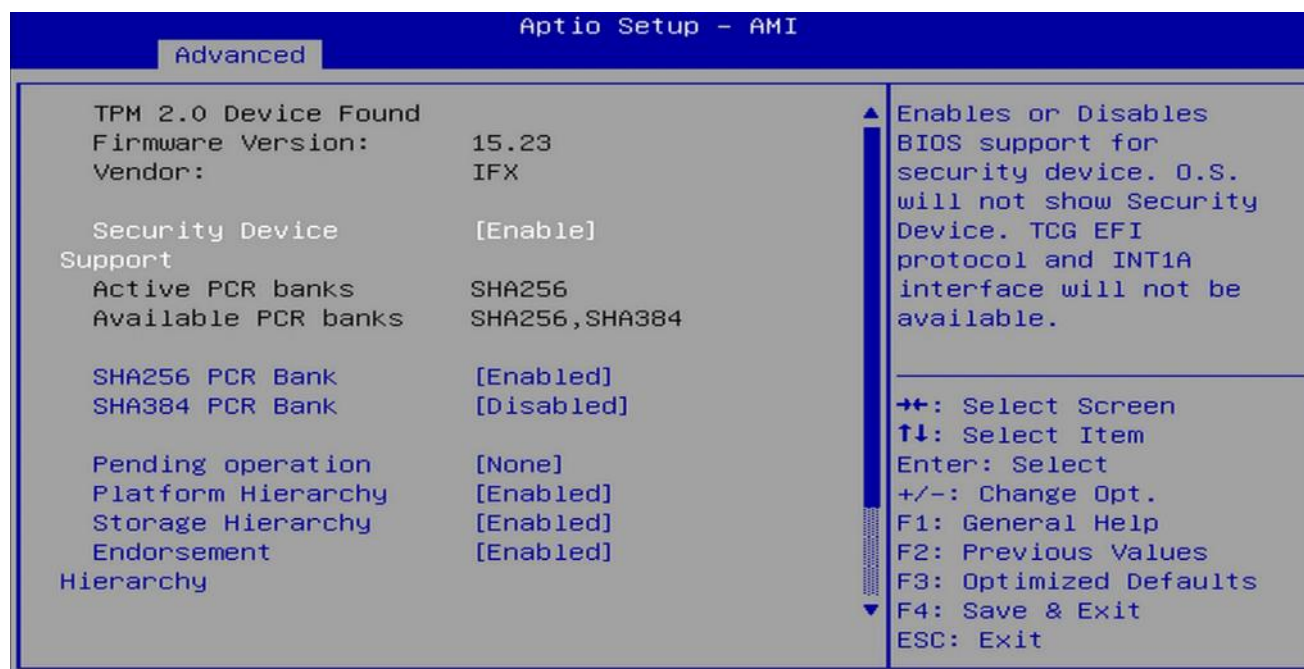


| BIOS Setting                   | Description                                                                                                                                 |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| CPU – Power Management Control | CPU – Power Management Control Options                                                                                                      |
| Intel Speedstep                | Allows more than two frequency ranges to be supported                                                                                       |
| Intel Speed Shift Technology   | Enable/Disable Intel Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P- states. |

## 4.4.4 PCH-FW Configuration

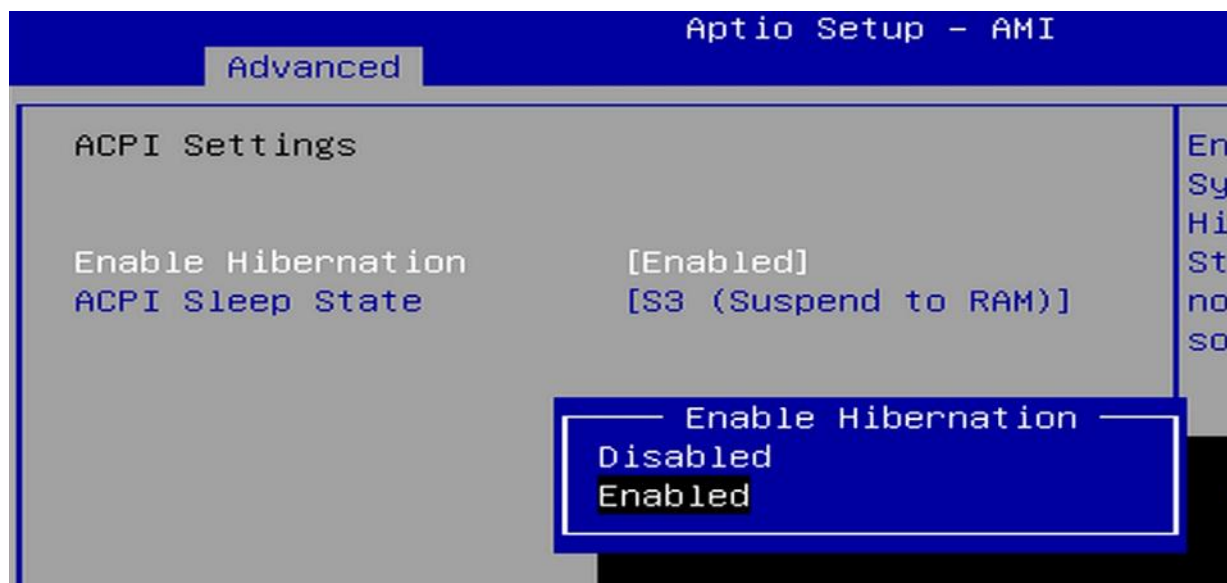


### 4.4.5 Trusted Computing



| BIOS Setting                   | Description                                                                                                                                                                                                          |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Security Device Support        | Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INT1A interface will not be available.                                                                   |
| SHA256 PCR Bank                | Options: Enabled / Disabled                                                                                                                                                                                          |
| SHA384 PCR Bank                | Options: Enabled / Disabled                                                                                                                                                                                          |
| Pending operation              | Schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device.                                                                           |
| Platform Hierarchy             | Enables / Disables platform hierarchy.                                                                                                                                                                               |
| Storage Hierarchy              | Enables / Disables storage hierarchy.                                                                                                                                                                                |
| Endorsement Hierarchy          | Enables / Disables endorsement hierarchy.                                                                                                                                                                            |
| Physical Presence Spec Version | Select to tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.                                                                                                               |
| Device Select                  | TPM 1.2 will restrict support to TPM 1.2 devices. TPM 2.0 will restrict support to TPM 2.0 devices. Auto will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated. |

#### 4.4.6 ACPI Settings



| BIOS Setting       | Description                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| Enable Hibernation | Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS. |
| ACPI Sleep State   | Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.                          |

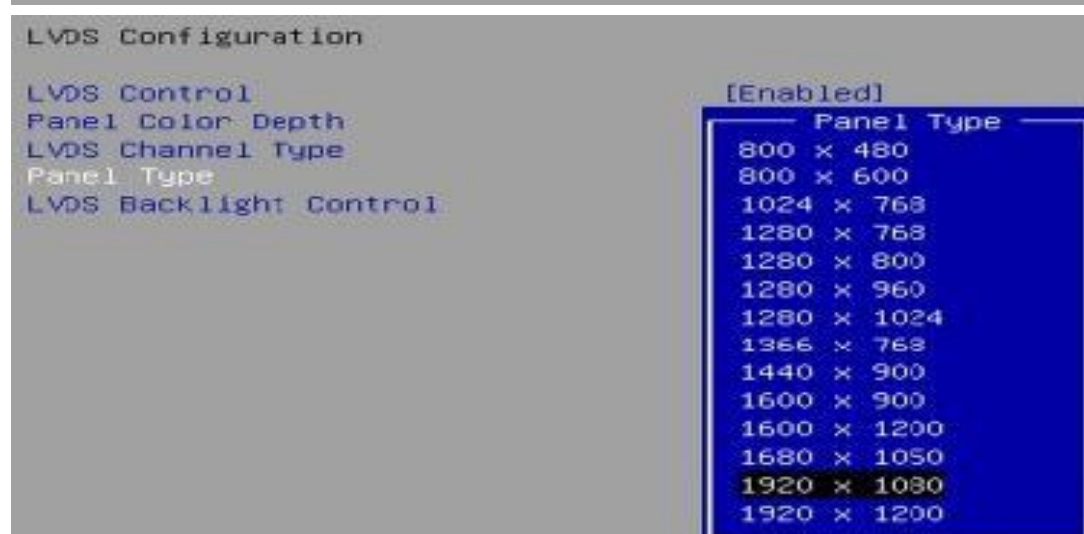
### 4.4.7 LVDS Configuration

The IPPC-121 Default is Enable and select Panel Type 1024x768.

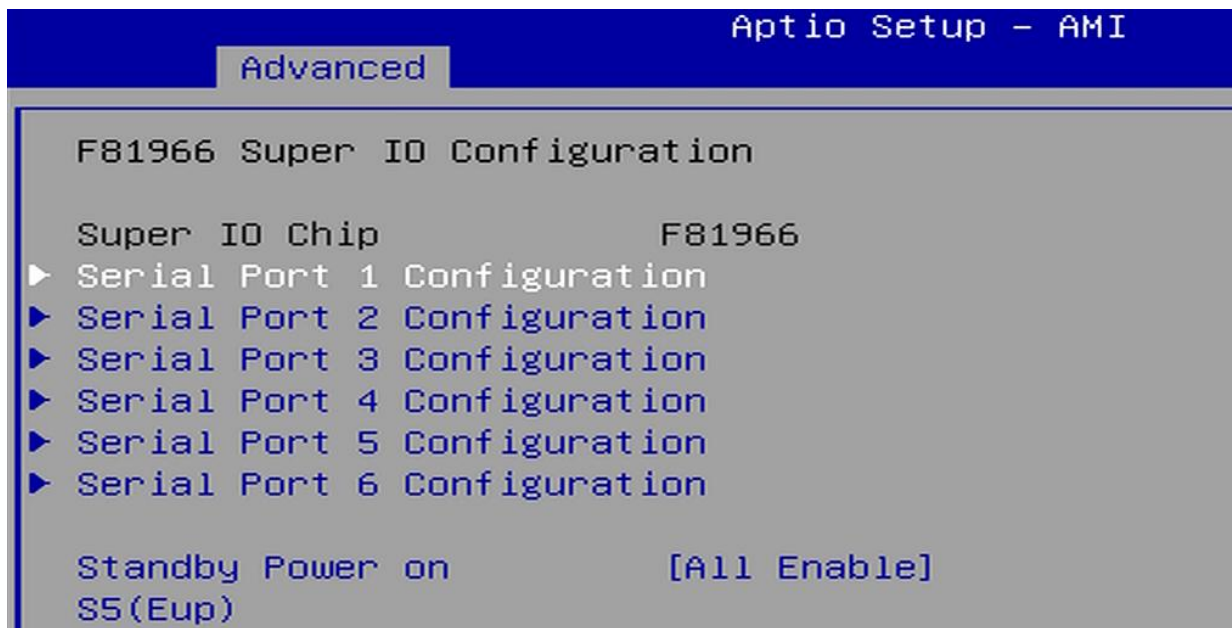


#### LVDS Configuration

|                        |              |
|------------------------|--------------|
| LVDS Control           | [Enabled]    |
| Panel Color Depth      | [18 BIT]     |
| LVDS Channel Type      | [Single]     |
| Panel Type             | [1024 × 768] |
| LVDS Backlight Control | [7(Max)]     |



## 4.4.8 F81966 Super IO Configuration



## Serial Port 1 Configuration

Serial Port [Enabled]  
 Device Settings IO=3F8h; IRQ=4;  
 Change Settings [Auto]  
 SERIAL PORT MODE [RS232 Mode]  
 SELECT

## Serial Port 2 Configuration

Serial Port [Enabled]  
 Device Settings IO=2F8h; IRQ=3;  
 Change Settings [Auto]

## Serial Port 3 Configuration

Serial Port [Enabled]  
 Device Settings IO=3E8h; IRQ=5;  
 Change Settings [Auto]

## Serial Port 4 Configuration

Serial Port [Enabled]  
 Device Settings IO=2E8h; IRQ=6;  
 Change Settings [Auto]

## Serial Port 5 Configuration

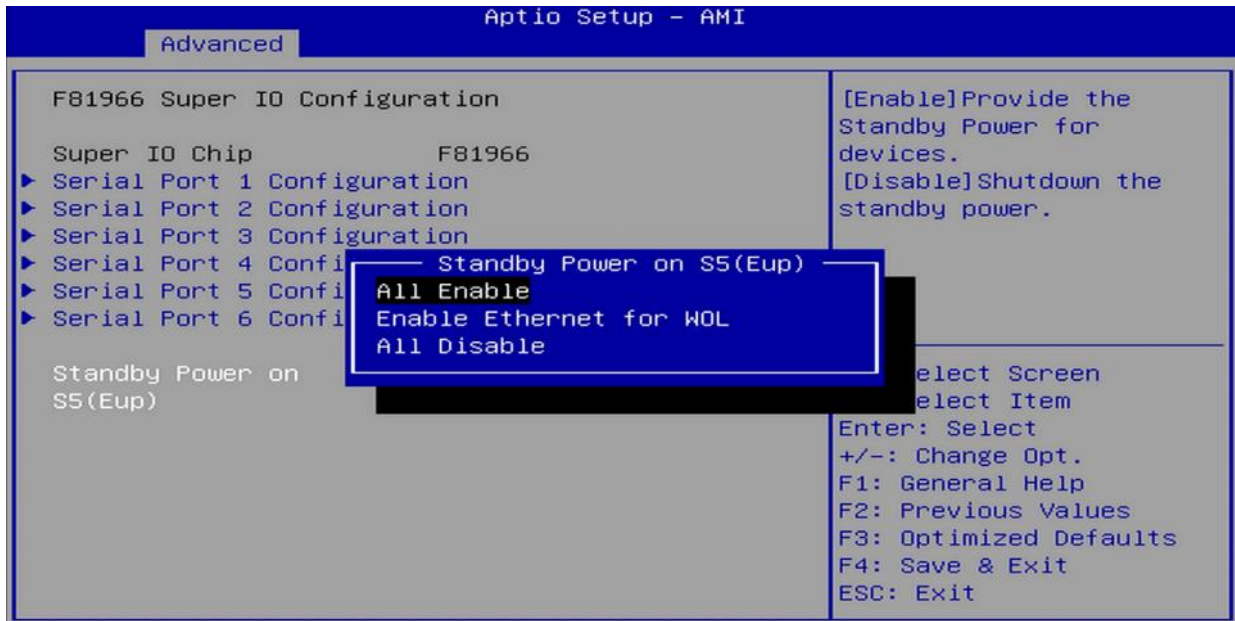
Serial Port [Enabled]  
 Device Settings IO=2F0h; IRQ=7;  
 Change Settings [Auto]

## Serial Port 6 Configuration

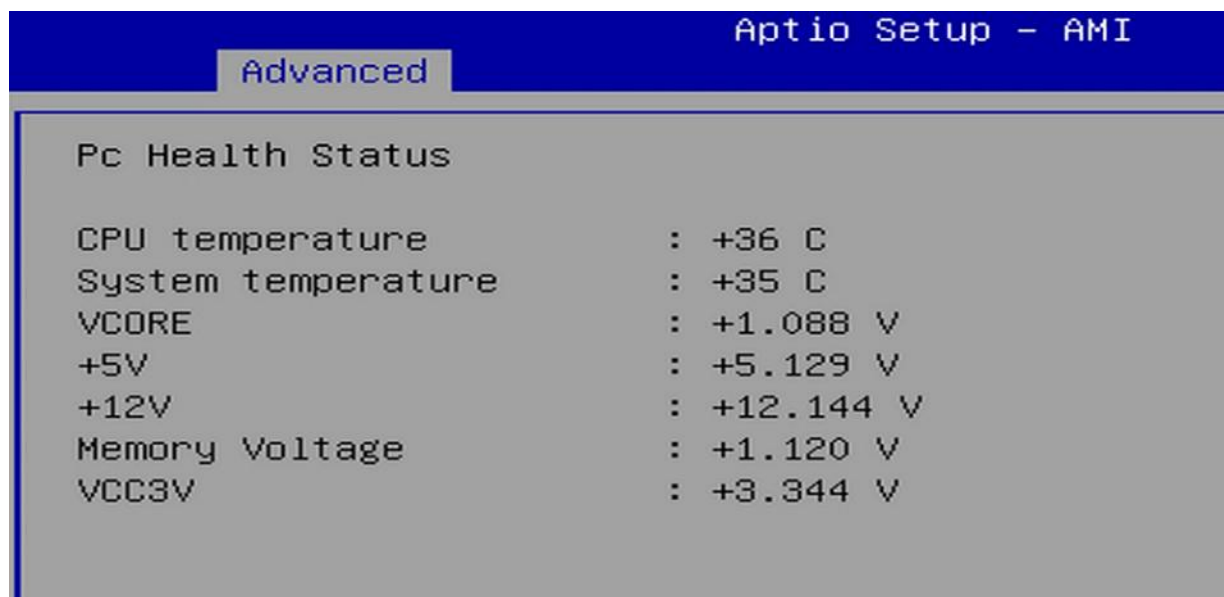
Serial Port [Enabled]  
 Device Settings IO=2E0h; IRQ=10;  
 Change Settings [Auto]

| BIOS Setting              | Description                                                                           |
|---------------------------|---------------------------------------------------------------------------------------|
| Serial Port Configuration | Sets parameters of Serial Port 1/2/3/4                                                |
| Standby Power on S5 (Eup) | Enable – provide the standby power for devices. Disable – shutdown the standby power. |

#### 4.4.9 Standby Power on S5(Eup)

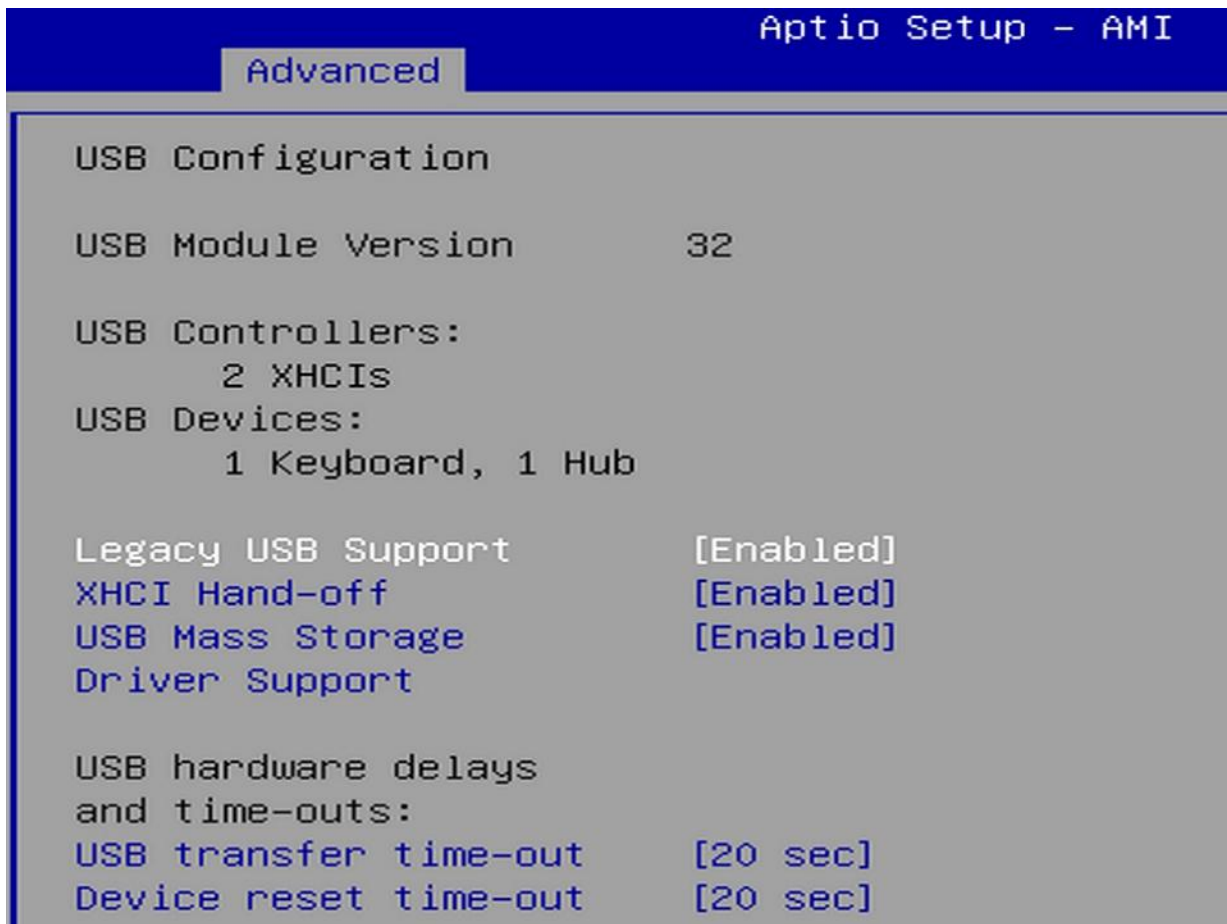


## 4.4.10 Hardware Monitor



| BIOS Setting            | Description                                                                                                                                                                               |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperatures / Voltages | These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status. |

#### 4.4.11 USB Configuration



| BIOS Setting                    | Description                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Legacy USB Support              | <ul style="list-style-type: none"> <li><b>Enabled</b> enables Legacy USB support.</li> <li><b>Auto</b> disables legacy support if there is no USB device connected.</li> <li><b>Disabled</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 the support for USB mass storage driver.                                                                                                                                                                                                    |
| USB Transfer time-out           | The time-out value (1 / 5 10 / 20 secs) for Control, Bulk, and Interrupt transfers.                                                                                                                                                                            |
| Device reset time-out           | USB mass storage device Start Unit command time-out                                                                                                                                                                                                            |
| Device power-up delay           | Max.time the device will take before it properly reports itself to the Host Controller. ' <b>Auto</b> ' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.                                                |

## 4.4.12 Network Stack Configuration

| Aptio Setup - AMI |            |  |
|-------------------|------------|--|
| Advanced          |            |  |
| Network Stack     | [Disabled] |  |

| Aptio Setup - AMI  |            |                                                                                                 |
|--------------------|------------|-------------------------------------------------------------------------------------------------|
| Advanced           |            |                                                                                                 |
| Network Stack      | [Enabled]  | Enable/Disable IPv4 PXE boot support. If disabled, IPv4 PXE boot support will not be available. |
| IPv4 PXE Support   | [Disabled] |                                                                                                 |
| IPv4 HTTP Support  | [Disabled] |                                                                                                 |
| IPv6 PXE Support   | [Disabled] |                                                                                                 |
| IPv6 HTTP Support  | [Disabled] |                                                                                                 |
| PXE boot wait time | 0          |                                                                                                 |

| Aptio Setup - AMI  |            |                                                                                                   |
|--------------------|------------|---------------------------------------------------------------------------------------------------|
| Advanced           |            |                                                                                                   |
| Network Stack      | [Enabled]  | Enable/Disable IPv4 HTTP boot support. If disabled, IPv4 HTTP boot support will not be available. |
| IPv4 PXE Support   | [Disabled] |                                                                                                   |
| IPv4 HTTP Support  | [Disabled] |                                                                                                   |
| IPv6 PXE Support   | [Disabled] |                                                                                                   |
| IPv6 HTTP Support  | [Disabled] |                                                                                                   |
| PXE boot wait time | 0          |                                                                                                   |
| Media detect count | 1          |                                                                                                   |

| Aptio Setup - AMI  |            |                                                                                                         |
|--------------------|------------|---------------------------------------------------------------------------------------------------------|
| Advanced           |            |                                                                                                         |
| Network Stack      | [Enabled]  | Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value. |
| IPv4 PXE Support   | [Disabled] |                                                                                                         |
| IPv4 HTTP Support  | [Disabled] |                                                                                                         |
| IPv6 PXE Support   | [Disabled] |                                                                                                         |
| IPv6 HTTP Support  | [Disabled] |                                                                                                         |
| PXE boot wait time | 0          |                                                                                                         |
| Media detect count | 1          |                                                                                                         |

| Aptio Setup - AMI  |            |                                                                                                 |
|--------------------|------------|-------------------------------------------------------------------------------------------------|
| Advanced           |            |                                                                                                 |
| Network Stack      | [Enabled]  | Enable/Disable IPv6 PXE boot support. If disabled, IPv6 PXE boot support will not be available. |
| IPv4 PXE Support   | [Disabled] |                                                                                                 |
| IPv4 HTTP Support  | [Disabled] |                                                                                                 |
| IPv6 PXE Support   | [Disabled] |                                                                                                 |
| IPv6 HTTP Support  | [Disabled] |                                                                                                 |
| PXE boot wait time | 0          |                                                                                                 |
| Media detect count | 1          |                                                                                                 |

| Aptio Setup - AMI  |            |                                                                                                   |
|--------------------|------------|---------------------------------------------------------------------------------------------------|
| Advanced           |            |                                                                                                   |
| Network Stack      | [Enabled]  | Enable/Disable IPv6 HTTP boot support. If disabled, IPv6 HTTP boot support will not be available. |
| IPv4 PXE Support   | [Disabled] |                                                                                                   |
| IPv4 HTTP Support  | [Disabled] |                                                                                                   |
| IPv6 PXE Support   | [Disabled] |                                                                                                   |
| IPv6 HTTP Support  | [Disabled] |                                                                                                   |
| PXE boot wait time | 0          |                                                                                                   |
| Media detect count | 1          |                                                                                                   |

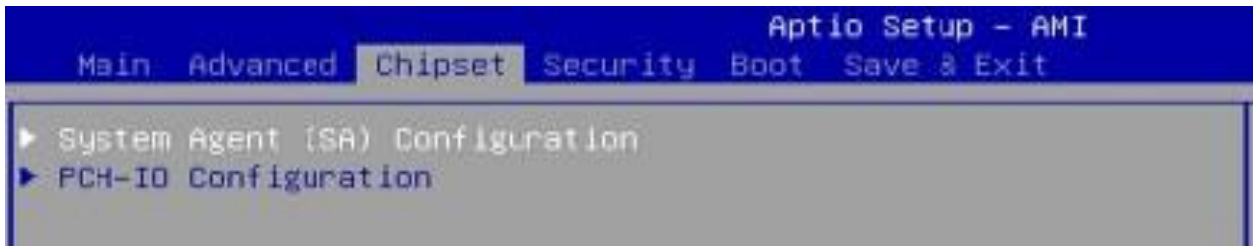
  

| Aptio Setup - AMI  |            |                                                                                                               |
|--------------------|------------|---------------------------------------------------------------------------------------------------------------|
| Advanced           |            |                                                                                                               |
| Network Stack      | [Enabled]  | Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value. |
| IPv4 PXE Support   | [Disabled] |                                                                                                               |
| IPv4 HTTP Support  | [Disabled] |                                                                                                               |
| IPv6 PXE Support   | [Disabled] |                                                                                                               |
| IPv6 HTTP Support  | [Disabled] |                                                                                                               |
| PXE boot wait time | 0          |                                                                                                               |
| Media detect count | 1          |                                                                                                               |

#### 4.4.13 NVME Configuration

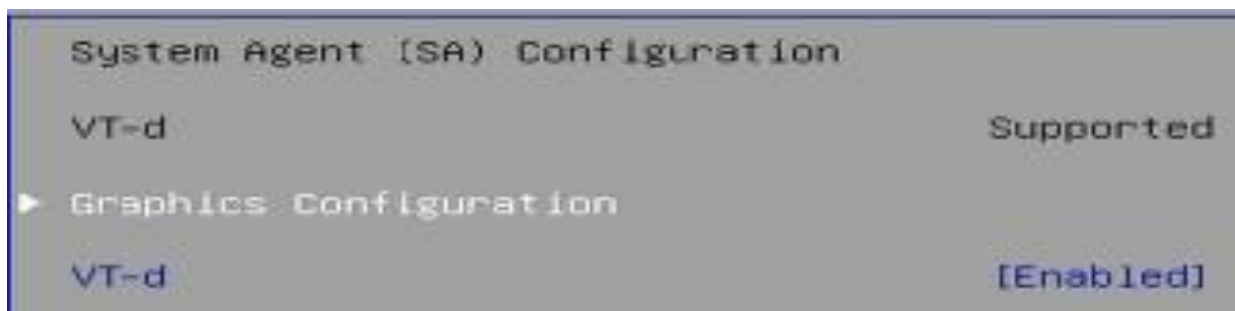


## 4.5 Chipset Settings



| BIOS Setting                    | Description                  |
|---------------------------------|------------------------------|
| System Agent (SA) Configuration | System Agent (SA) parameters |
| PCH-IO Configuration            | PCH parameters               |

### 4.5.1 Graphics Configuration :

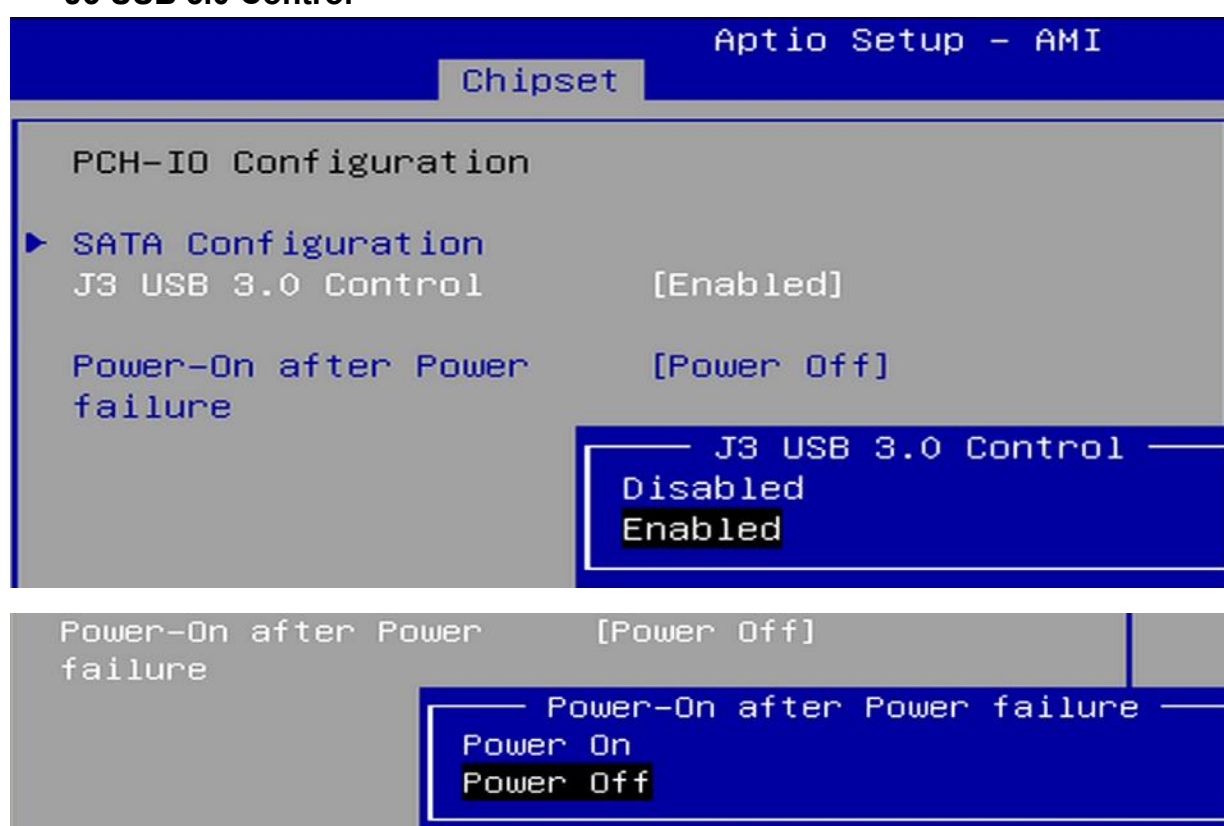


| IOS Setting                 | Description                                                                                                                                                            |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Graphics Turbo IMON Current | Graphics turbo IMON current values supported (14-31)                                                                                                                   |
| GTT Size                    | Sets the GTT size as 2 MB, 4 MB, or 8 MB.                                                                                                                              |
| Aperture Size               | Select the aperture size.<br>Note: Above 4 GB MMIO BIOS assignment is automatically enabled when selecting 2048 MB aperture. To use this feature, disable CSM support. |
| PSMI Support                | PSMI Enable/Disable                                                                                                                                                    |
| DVMT Pre-Allocated          | Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device                                                                        |
| Graphics Configuration      | VT-d capability                                                                                                                                                        |

### 4.5.2 PCH-IO Configuration

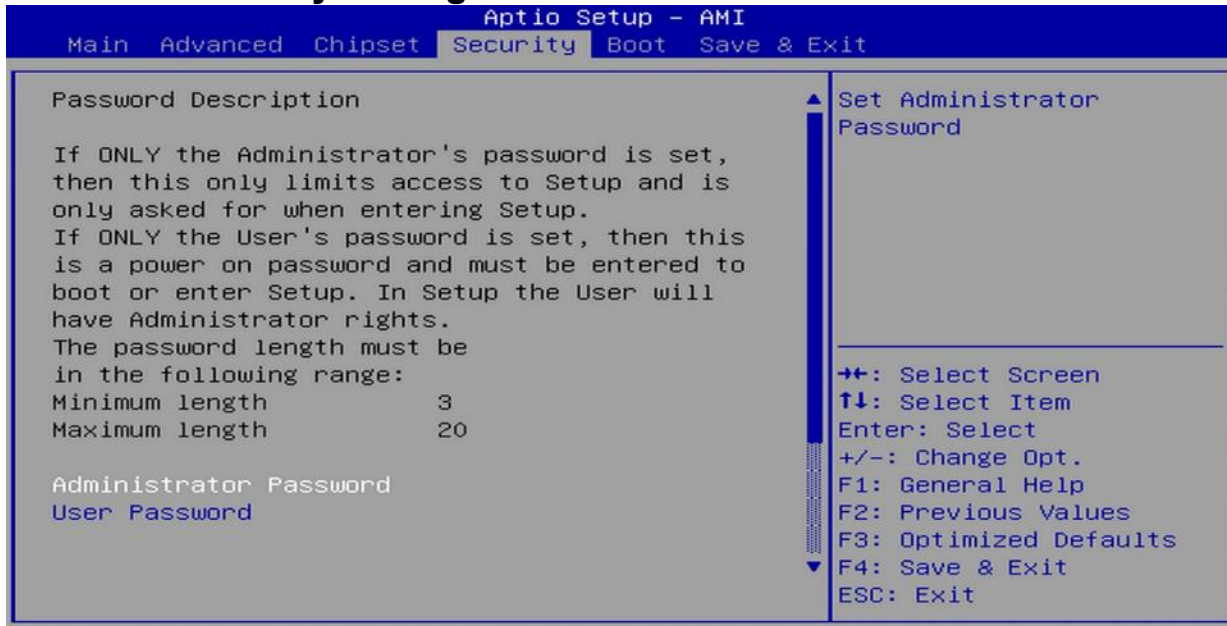


#### J3 USB 3.0 Control



| BIOS Setting                 | Description                                                                            |
|------------------------------|----------------------------------------------------------------------------------------|
| SATA and RST Configuration   | SATA device options and settings                                                       |
| SATA Controller(s)           | Enables / Disables the Serial ATA.                                                     |
| SATA Mode Selection          | Selects IDE or AHCI Mode.                                                              |
| Serial ATA Port 0~2          | Enables / Disables Serial Port 0 ~ 2.                                                  |
| SATA Ports Hot Plug          | Enables / Disables SATA Ports HotPlug.                                                 |
| Power-On After Power failure | Specify what state to go to when power is re- applied after a power failure (G3 state) |

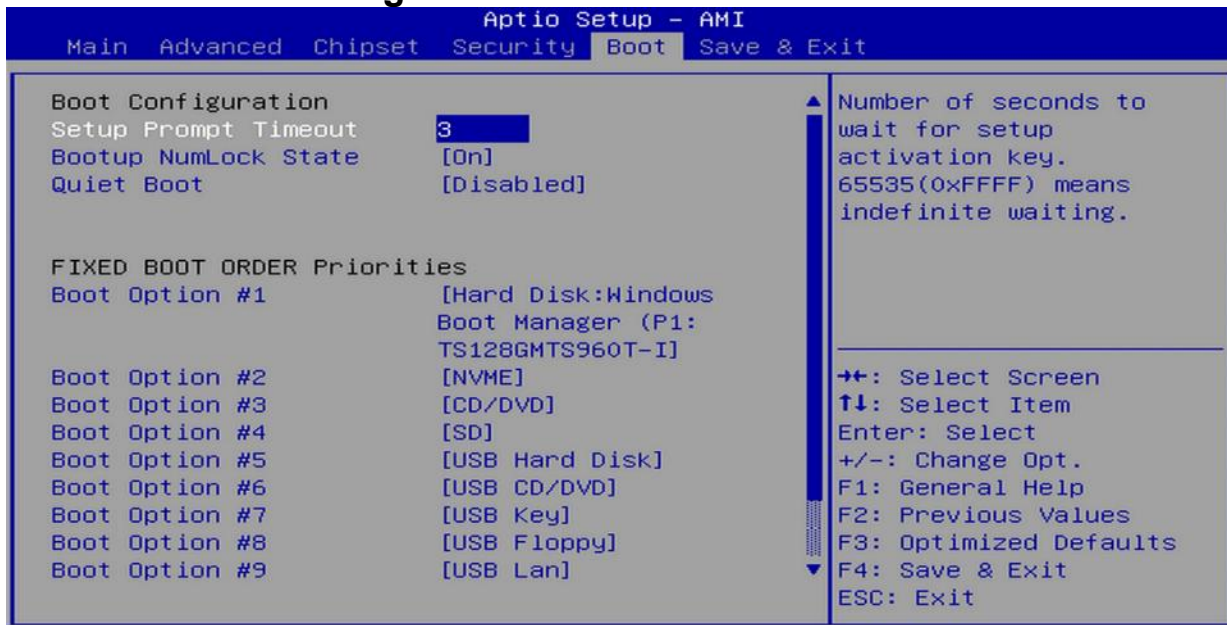
## 4.6 Security Settings



| BIOS Setting                 | Description                                                                                                                                                    |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Setup Administrator Password | Sets an administrator password for the setup utility.                                                                                                          |
| User Password                | Sets a user password.                                                                                                                                          |
| Secure Boot                  | Secure Boot feature is Active if Secure Boot is Enabled. Platform Key(PK) is enrolled and the System is in user mode. The mode change requires platform reset. |

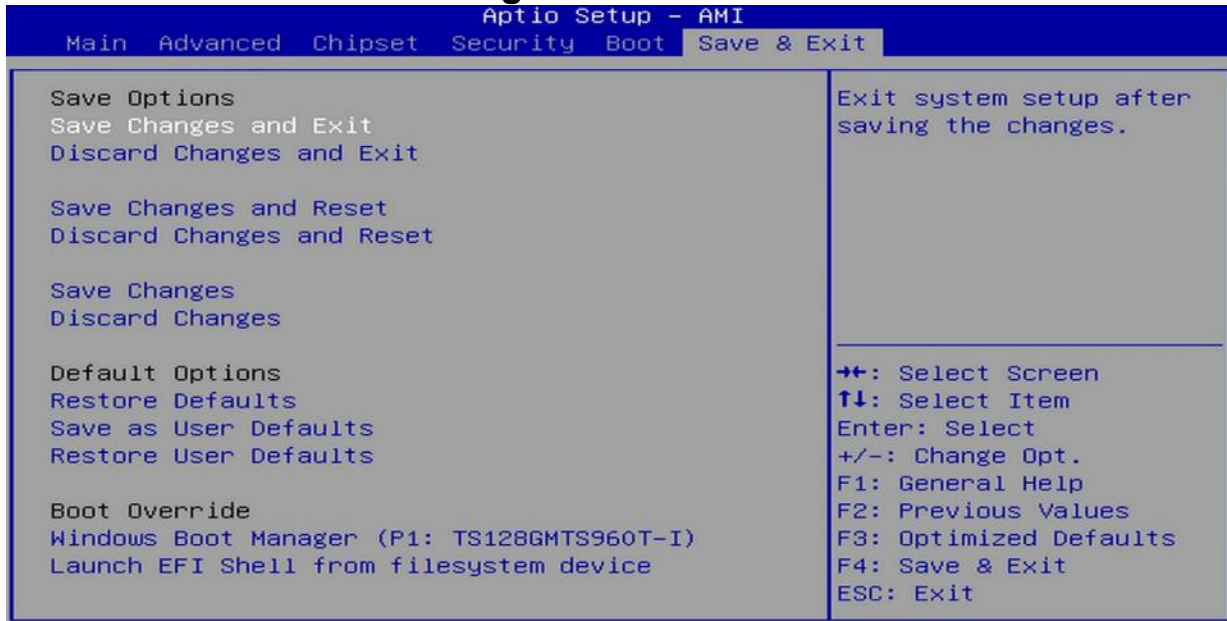


## 4.7 Boot Settings



| BIOS Setting                        | Description                                                                                     |
|-------------------------------------|-------------------------------------------------------------------------------------------------|
| Setup Prompt Timeout                | Number of seconds to wait for setup activation key.<br>65535 (0xFFFF) means indefinite waiting. |
| Bootup Num Lock State               | Turns on/off the keyboard Num Lock state.                                                       |
| Quiet Boot                          | Enables / Disables Quiet Boot option.                                                           |
| FIXED BOOT ORDER PRIORITY           | Sets the system boot order                                                                      |
| UEFI Hard Disk Drive BBS Priorities | Specifies the boot device priority sequence from available UEFI hard 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         |
| 0x00000A10-0x00000A1F | 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         |
| 0x00000040-0x00000043 | System timer                  |
| 0x00000050-0x00000053 | System timer                  |
| 0x000003F8-0x000003FF | Communications Port (COM1)    |
| 0x000002F8-0x000002FF | Communications Port (COM2)    |
| 0x000003E8-0x000003EF | Communications Port (COM3)    |
| 0x000002E8-0x000002EF | Communications Port (COM4)    |
| 0x0000EFA0-0x0000EFBF | SMBus - 54A3                  |
| 0x00003000-0x0000303F | Intel(R) UHD Graphics         |
| 0x00001854-0x00001857 | Motherboard resources         |
| 0x00000000-0x00000CF7 | PCI Express Root Complex      |
| 0x00000D00-0x0000FFFF | PCI Express Root Complex      |
| 0x00003090-0x00003097 | Standard SATA AHCI Controller |
| 0x00003080-0x00003083 | Standard SATA AHCI Controller |

|                       |                                   |
|-----------------------|-----------------------------------|
| 0x00003060-0x0000307F | Standard SATA AHCI Controller     |
| 0x00002000-0x000020FE | Motherboard resources             |
| 0x00000020-0x00000021 | Programmable interrupt controller |
| 0x00000024-0x00000025 | Programmable interrupt controller |
| 0x00000028-0x00000029 | Programmable interrupt controller |
| 0x0000002C-0x0000002D | Programmable interrupt controller |
| 0x00000030-0x00000031 | Programmable interrupt controller |
| 0x00000034-0x00000035 | Programmable interrupt controller |
| 0x00000038-0x00000039 | Programmable interrupt controller |
| 0x0000003C-0x0000003D | Programmable interrupt controller |
| 0x000000A0-0x000000A1 | Programmable interrupt controller |
| 0x000000A4-0x000000A5 | Programmable interrupt controller |
| 0x000000A8-0x000000A9 | Programmable interrupt controller |
| 0x000000AC-0x000000AD | Programmable interrupt controller |
| 0x000000B0-0x000000B1 | Programmable interrupt controller |
| 0x000000B4-0x000000B5 | Programmable interrupt controller |
| 0x000000B8-0x000000B9 | Programmable interrupt controller |
| 0x000000BC-0x000000BD | Programmable interrupt controller |
| 0x000004D0-0x000004D1 | Programmable interrupt controller |
| 0x00000060-0x00000060 | Standard PS/2 Keyboard            |
| 0x00000064-0x00000064 | Standard PS/2 Keyboard            |

## 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 0             | System timer                                                    |
| IRQ 1             | Standard PS/2 Keyboard                                          |
| IRQ 3             | Communications Port (COM2)                                      |
| IRQ 5             | Communications Port (COM3)                                      |
| IRQ 10            | Communications Port (COM4)                                      |
| IRQ 12            | Microsoft PS/2 Mouse                                            |
| IRQ 14            | Intel(R) Serial IO GPIO Host Controller - INTC1057              |
| IRQ 16            | Intel(R) Serial IO UART Host Controller - 54A8                  |
| IRQ 19            | High Definition Audio Controller                                |
| IRQ 55 ~ IRQ 204  | Microsoft ACPI-Compliant System                                 |
| IRQ 256 ~ IRQ 511 | Microsoft ACPI-Compliant System                                 |
| IRQ 4294967280    | Intel(R) Management Engine Interface #1                         |
| IRQ 4294967281~85 | Intel(R) Ethernet Controller I226-IT                            |
| IRQ 4294967293    | Intel(R) UHD Graphics                                           |
| IRQ 4294967286~90 | Intel(R) Ethernet Controller I226-IT #2                         |
| IRQ 4294967291    | Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft) |
| IRQ 4294967292    | Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft) |
| IRQ 4294967294    | Standard SATA AHCI Controller                                   |

## 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 81866 watch dog program\n");
    SIO = Init_F81964();
    if (SIO == 0)
    {
        printf("Can not detect Fintek 81866, 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 81866  
    {        goto Init_Finish; }  
  
    F81964_BASE = 0x2E;  
    result = F81964_BASE;  
  
    ucDid = Get_F81964_Reg(0x20);  
    if (ucDid == 0x07)                                //Fintek 81866  
    {        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

```