

**AMI 220**  
**AMI 221**  
**AMI 222**  
**High Performance Fanless System**

**User's Manual**

Version 1.2  
(September 2020)

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# Compliance



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



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 of for waste electrical and electronic equipment (WEEE - 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

## Green IBASE



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

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

# Important Safety Information

Carefully read the precautions before using the device.

## Environmental conditions:

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

## Care for your products:

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



## WARNING

## Attention during use:

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

## Avoid Disassembly

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



## CAUTION

Replace only with the same or equivalent type recommended by the manufacturer.  
Dispose of used batteries according to the manufacturer's instructions.

## Warranty Policy

- **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:** AMS301 User Manual

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, HDD, power adapter, panel and touchscreen.

\* PRODUCTS, HOWEVER, THAT FAILS 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 IBT website at [www.ibt.ca](http://www.ibt.ca) to find the latest information about the product, or your local dealer.
2. If you encounter any technical problems and require assistance from your distributor or sales representative, please prepare and send the following information:
  - 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)

and send this to [support@ibt.ca](mailto:support@ibt.ca) with your question

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# Chapter 1

## General Information

The information provided in this chapter includes:

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

## 1.1 Introduction

The AMI220 / AMI221 / AMI222 is an embedded computing system series designed for thin clients, smart industrial automation or controller, and retail equipment. It is a compact and fanless design with an Intel®-7<sup>th</sup> / 6<sup>th</sup> Gen. Core™ i7 / i5 / i3 processor. This product series also features iSmart that allows auto-on scheduling for general applications and energy savings. It has an operating temperature ranging from -10°C to 50°C.



Photo of AMI220

## 1.2 Features

- Fanless system supports MB220 customized board
- Onboard Intel® 7<sup>th</sup> / 6<sup>th</sup> Gen. Core™ i7 / i5 / i3 processors
- Three independent display outputs
- Flexible expansion slot system
- Dual SIM sockets with WWAN redundancy
- 12V~24V DC wide-range voltage input
- Over / Under / Reverse voltage protection
- iSmart, iAMT 11.6, TPM 2.0

## 1.3 Packing List

Your product package should include the items listed below.

### **AMI220**

- AMI220 x 1
- Power Cord x 1
- Terminal Block for DC-In Power Adapter (3 pins) x 1
- Terminal Block for Remote Power Button (2 pins) x 1
- Wall Mount Kit x 1
- Flat Head Screw (for Wall Mount Kit) x 6



- Round Head Screw (for 2<sup>nd</sup> memory, if not pre-installed) x 2



- Round Head Screw (for Mini PCIe card) x 2



- Disk (including drivers and this user manual) x 1

### **AMI221**

- AMI221 x 1
- Power Cord x 1
- Terminal Block for DC-In Power Adapter (3 pins) x 1
- Terminal Block for Remote Power Button (2 pins) x 1
- Wall Mount Kit x 1
- Flat Head Screw (for Wall Mount Kit) x 6



- Round Head Screw for 2<sup>nd</sup> memory (if not pre-installed) x 2



- Flat Head Screw for 2<sup>nd</sup> SSD (if not pre-installed) x 4



- Round Head Screw (for Mini PCIe card) x 2



- Disk (including drivers and this user manual) x 1

### **AMI222**

- AMI222 x 1
- Power Cord x 1
- Terminal Block for DC-In Power Adapter (3 pins) x 1
- Terminal Block for Remote Power Button (2 pins) x 1
- Wall Mount Kit x 1
- Flat Head Screw (for Wall Mount Kit) x 6



- Round Head Screw for 2<sup>nd</sup> memory (if not pre-installed) x 2



- Flat Head Screw for 2<sup>nd</sup> SSD (if not pre-installed) x 4



- Round Head Screw (for Mini PCIe card) x 2



- Disk (including drivers and this user manual) x 1

## **1.4 Optional Accessories**

Provide optional accessories as follows. Please contact us or your dealer if you need any.

### **AMI220**

- DC-In Power Adapter
- WiFi Antenna Kit

### **AMI221**

- DC-In Power Adapter
- WiFi Antenna Kit
- Expansion Kit (with 2 cables for COM5 & COM6 ports): IP214, IP215

### **AMI222**

- DC-In Power Adapter
- WiFi Antenna Kit
- Bracket for fieldbus module
- Expansion Kit (with 2 cables for COM5 & COM6 ports): IP211, IP212
- Expansion Card: IP213

## 1.5 Specifications – AMI220

|                        |                                                                                                                               |                                                                                                |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Product Name           | AMI220                                                                                                                        |                                                                                                |
| System                 |                                                                                                                               |                                                                                                |
| Motherboard            | MB220AF                                                                                                                       | MB220EF                                                                                        |
| Operating System       | <ul style="list-style-type: none"><li>Windows10 (64-bit) / 7 (32-bit &amp; 64-bit)</li><li>Linux Ubuntu / Fedora 24</li></ul> |                                                                                                |
| CPU                    | Intel® 7 <sup>th</sup> / 6 <sup>th</sup> Gen. Core™ i7 / i5 / i3 Desktop Processor<br>TDP = 35W                               |                                                                                                |
| CPU Speed              | Up to 3.4 GHz                                                                                                                 |                                                                                                |
| Chipset                | Intel® Q170                                                                                                                   | Intel® H110                                                                                    |
| Memory                 | 2 x DDR4-2133 SO-DIMM 4GB, expandable to 32 GB (Non-ECC)                                                                      |                                                                                                |
| Storage                | <ul style="list-style-type: none"><li>2.5" SSD (1 bay)</li><li>mSATA (2 slots)</li></ul>                                      | <ul style="list-style-type: none"><li>2.5" SSD (1 bay)</li><li>mSATA (1 slot)</li></ul>        |
| Super I/O              | Fintek F81866AD-I                                                                                                             |                                                                                                |
| Audio Codec            | Realtek ALC662                                                                                                                |                                                                                                |
| Network                | <ul style="list-style-type: none"><li>Intel® I219LM GbE PHY</li><li>Intel® I211AT GbE</li></ul>                               | <ul style="list-style-type: none"><li>Intel® I219V GbE PHY</li><li>Intel® I211AT GbE</li></ul> |
| Power Supply           | 150W power adaptor (Optional)                                                                                                 |                                                                                                |
| BIOS                   | AMI BIOS                                                                                                                      |                                                                                                |
| Watchdog               | Watchdog Timer 256 segments, 0, 1, 2...255 sec/min                                                                            |                                                                                                |
| iSmart                 | Yes                                                                                                                           |                                                                                                |
| iAMT                   | 11.6                                                                                                                          | N/A                                                                                            |
| TPM                    | 2.0                                                                                                                           |                                                                                                |
| Chassis                | Aluminum & steel, silver & gray                                                                                               |                                                                                                |
| Mounting               | <ul style="list-style-type: none"><li>Desktop mount</li><li>Wall mount (wall mount kit included)</li></ul>                    |                                                                                                |
| Dimensions (W x H x D) | 210 x 71.6 x 265 mm (8.27" x 2.82" x 10.43")                                                                                  |                                                                                                |
| Weight                 | 3.5 kg (7.72 lb)                                                                                                              |                                                                                                |
| Certificate            | CE / LVD / FCC Class B                                                                                                        |                                                                                                |
| I/O Ports              |                                                                                                                               |                                                                                                |
| Remote Power Button    | 2-pin terminal block for the external, remote power button                                                                    |                                                                                                |
| DC Input               | 12 ~ 24V DC-in through a 3-pin terminal block                                                                                 |                                                                                                |

|                             |                                                                                                                                                                              |                                                            |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <b>Product Name</b>         | <b>AMI220</b>                                                                                                                                                                |                                                            |
| <b>Motherboard</b>          | MB220AF                                                                                                                                                                      | MB220EF                                                    |
| <b>LAN</b>                  | 2 x RJ45 GbE LAN                                                                                                                                                             |                                                            |
| <b>USB</b>                  | <ul style="list-style-type: none"> <li>• 4 x USB 3.0</li> <li>• 4 x USB 2.0</li> </ul>                                                                                       |                                                            |
| <b>Serial</b>               | <b>4 x COM ports:</b> <ul style="list-style-type: none"> <li>• COM1: RS-232/422/485, selectable from BIOS</li> <li>• COM2/3/4: RS-232 only</li> </ul>                        |                                                            |
| <b>Digital I/O</b>          | 4-In & 4-Out (Optional)                                                                                                                                                      |                                                            |
| <b>Display</b>              | 1 x DVI-D<br>1 x VGA<br>2 x DisplayPort                                                                                                                                      |                                                            |
| <b>Audio Jack</b>           | <ul style="list-style-type: none"> <li>• 1 x Microphone Input</li> <li>• 1 x Line-Out</li> </ul>                                                                             |                                                            |
| <b>SIM</b>                  | 2 x SIM card slot                                                                                                                                                            |                                                            |
| <b>SSD</b>                  | 1 x 2.5" SSD bay (on the device bottom)                                                                                                                                      |                                                            |
| <b>SATA</b>                 | 2 x SATA III connector                                                                                                                                                       |                                                            |
| <b>Expansion</b>            | 2 x full-size mini-PCIe (J6 & J7 connectors with mSATA function)                                                                                                             | 2 x full-size mini-PCIe (J6 connector with mSATA function) |
| <b>Environment</b>          |                                                                                                                                                                              |                                                            |
| <b>Temperature</b>          | <ul style="list-style-type: none"> <li>• <b>Operating:</b> -10 ~ 50 °C (14 ~ 122 °F)</li> <li>• <b>Storage:</b> -20~ 80 °C (-4 ~ 176 °F)</li> </ul>                          |                                                            |
| <b>Relative Humidity</b>    | 5 ~ 90% at 45 °C (non-condensing)                                                                                                                                            |                                                            |
| <b>Vibration Protection</b> | <ul style="list-style-type: none"> <li>• <b>Operating:</b> 0.25 Grms / 5 ~ 500 Hz (random test)</li> <li>• <b>Non-operating:</b> 1 Grms / 5 ~ 500Hz (random test)</li> </ul> |                                                            |
| <b>Shock Protection</b>     | <ul style="list-style-type: none"> <li>• <b>Operating:</b> 20 g / 11 ms</li> <li>• <b>Non-operating:</b> 40 g / 11 ms</li> </ul>                                             |                                                            |

All specifications are subject to change without prior notice.

## 1.6 Specifications – AMI221

|                        |                                                                                                                               |                                                                                                |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Product Name           | AMI221                                                                                                                        |                                                                                                |
| System                 |                                                                                                                               |                                                                                                |
| Motherboard            | MB220AF                                                                                                                       | MB220EF                                                                                        |
| Operating System       | <ul style="list-style-type: none"><li>Windows10 (64-bit) / 7 (32-bit &amp; 64-bit)</li><li>Linux Ubuntu / Fedora 24</li></ul> |                                                                                                |
| CPU                    | Intel® 7 <sup>th</sup> / 6 <sup>th</sup> Gen. Core™ i7 / i5 / i3 Desktop Processor<br>TDP = 35W                               |                                                                                                |
| CPU Speed              | Up to 3.4 GHz                                                                                                                 |                                                                                                |
| Chipset                | Intel® Q170                                                                                                                   | Intel® H110                                                                                    |
| Memory                 | 2 x DDR4-2133 SO-DIMM 4GB, expandable to 32 GB (Non-ECC)                                                                      |                                                                                                |
| Storage                | <ul style="list-style-type: none"><li>2.5” SSD (1 bay)</li><li>mSATA (2 slots)</li></ul>                                      | <ul style="list-style-type: none"><li>2.5” SSD (1 bay)</li><li>mSATA (1 slot)</li></ul>        |
| Super I/O              | Fintek F81866AD-I                                                                                                             |                                                                                                |
| Audio Codec            | Realtek ALC662                                                                                                                |                                                                                                |
| Network                | <ul style="list-style-type: none"><li>Intel® I219LM GbE PHY</li><li>Intel® I211AT GbE</li></ul>                               | <ul style="list-style-type: none"><li>Intel® I219V GbE PHY</li><li>Intel® I211AT GbE</li></ul> |
| Power Supply           | 150W power adaptor (Optional)                                                                                                 |                                                                                                |
| BIOS                   | AMI BIOS                                                                                                                      |                                                                                                |
| Watchdog               | Watchdog Timer 256 segments, 0, 1, 2...255 sec/min                                                                            |                                                                                                |
| iSmart                 | Yes                                                                                                                           |                                                                                                |
| iAMT                   | 11.6                                                                                                                          | N/A                                                                                            |
| TPM                    | 2.0                                                                                                                           |                                                                                                |
| Chassis                | Aluminum & steel, silver & gray                                                                                               |                                                                                                |
| Mounting               | <ul style="list-style-type: none"><li>Desktop mount</li><li>Wall mount (wall mount kit included)</li></ul>                    |                                                                                                |
| Dimensions (W x H x D) | 210 x 108.6 x 265 mm (8.27” x 4.28” x 10.43”)                                                                                 |                                                                                                |
| Weight                 | 4.3 kg (9.48 lb)                                                                                                              |                                                                                                |
| Certificate            | CE / LVD / FCC Class B                                                                                                        |                                                                                                |
| I/O Ports              |                                                                                                                               |                                                                                                |
| Remote Power Button    | 2-pin terminal block for the external, remote power button                                                                    |                                                                                                |
| DC Input               | 12 ~ 24V DC-in through a 3-pin terminal block                                                                                 |                                                                                                |

|                             |                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Name</b>         | <b>AMI221</b>                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                       |
| <b>Motherboard</b>          | MB220AF                                                                                                                                                                                                                                                                                                             | MB220EF                                                                                                                                                                                               |
| <b>LAN</b>                  | 2 x RJ45 GbE LAN                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                       |
| <b>USB</b>                  | <ul style="list-style-type: none"> <li>• 4 x USB 3.0</li> <li>• 4 x USB 2.0</li> </ul>                                                                                                                                                                                                                              |                                                                                                                                                                                                       |
| <b>Serial</b>               | <b>6 x COM ports:</b> <ul style="list-style-type: none"> <li>• COM1: RS-232/422/485, selectable from BIOS</li> <li>• COM2/3/4: RS-232 only</li> <li>• COM5 &amp; COM6: Simplified RS-232 with only RX, TX and Ground pins. (Both ports are applicable from either of the expansion card IP214 or IP215.)</li> </ul> |                                                                                                                                                                                                       |
| <b>Digital I/O</b>          | 4-In & 4-Out (Optional)                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                       |
| <b>Display</b>              | 1 x DVI-D<br>1 x VGA<br>2 x DisplayPort                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                       |
| <b>Audio Jack</b>           | <ul style="list-style-type: none"> <li>• 1 x Microphone Input</li> <li>• 1 x Line-Out</li> </ul>                                                                                                                                                                                                                    |                                                                                                                                                                                                       |
| <b>SIM</b>                  | 2 x SIM card slot                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                       |
| <b>SSD</b>                  | 1 x 2.5" SSD drive bay (externally accessible)<br>* An internal SSD bay is optional.                                                                                                                                                                                                                                |                                                                                                                                                                                                       |
| <b>SATA</b>                 | 2 x SATA III connector                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                       |
| <b>Expansion</b>            | <ul style="list-style-type: none"> <li>• 1 x PCI (Derived from IP215)</li> <li>• 1 x PCIe (x16) (Derived from IP214)</li> <li>• 2 x full-size mini-PCIe (J6 &amp; J7 connectors with mSATA function)</li> </ul>                                                                                                     | <ul style="list-style-type: none"> <li>• 1 x PCI (Derived from IP215)</li> <li>• 1 x PCIe (x16) (Derived from IP214)</li> <li>• 2 x full-size mini-PCIe (J6 connector with mSATA function)</li> </ul> |
| <b>Environment</b>          |                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                       |
| <b>Temperature</b>          | <ul style="list-style-type: none"> <li>• <b>Operating:</b> -10 ~ 50 °C (14 ~ 122 °F)</li> <li>• <b>Storage:</b> -20~ 80 °C (-4 ~ 176 °F)</li> </ul>                                                                                                                                                                 |                                                                                                                                                                                                       |
| <b>Relative Humidity</b>    | 5 ~ 90% at 45 °C (non-condensing)                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                       |
| <b>Vibration Protection</b> | <ul style="list-style-type: none"> <li>• <b>Operating:</b> 0.25 Grms / 5 ~ 500 Hz (random test)</li> <li>• <b>Non-operating:</b> 1 Grms / 5 ~ 500Hz (random test)</li> </ul>                                                                                                                                        |                                                                                                                                                                                                       |
| <b>Shock Protection</b>     | <ul style="list-style-type: none"> <li>• <b>Operating:</b> 20 g / 11 ms</li> <li>• <b>Non-operating:</b> 40 g / 11 ms</li> </ul>                                                                                                                                                                                    |                                                                                                                                                                                                       |

All specifications are subject to change without prior notice.

## 1.7 Specifications – AMI222

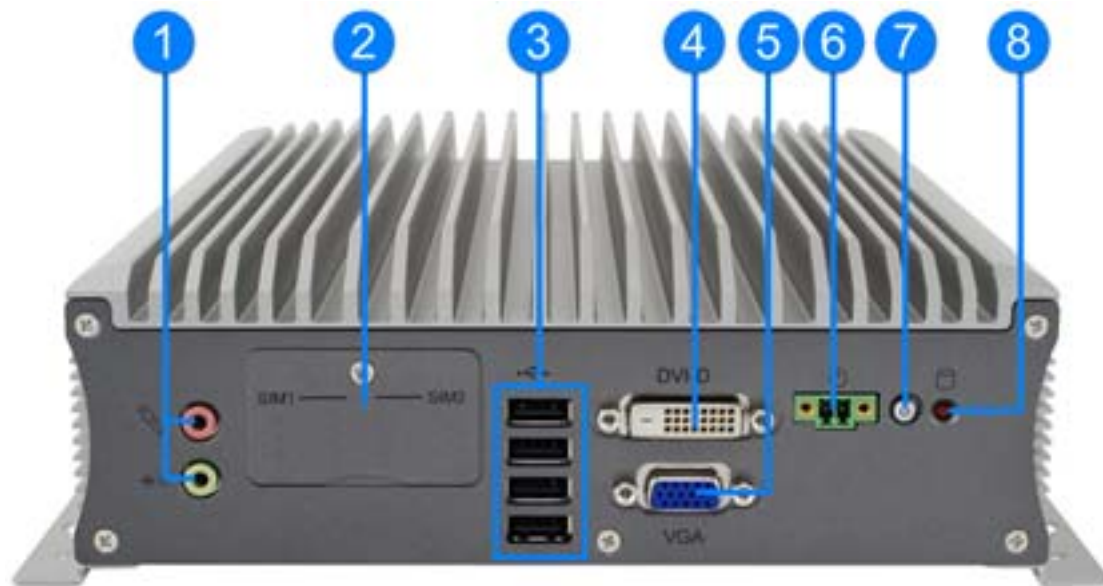
|                        |                                                                                                                               |                                                                                                |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Product Name           | AMI222                                                                                                                        |                                                                                                |
| System                 |                                                                                                                               |                                                                                                |
| Motherboard            | MB220AF                                                                                                                       | MB220EF                                                                                        |
| Operating System       | <ul style="list-style-type: none"><li>Windows10 (64-bit) / 7 (32-bit &amp; 64-bit)</li><li>Linux Ubuntu / Fedora 24</li></ul> |                                                                                                |
| CPU                    | Intel® 7 <sup>th</sup> / 6 <sup>th</sup> Gen. Core™ i7 / i5 / i3 Desktop Processor<br>TDP = 35W                               |                                                                                                |
| CPU Speed              | Up to 3.4 GHz                                                                                                                 |                                                                                                |
| Chipset                | Intel® Q170                                                                                                                   | Intel® H110                                                                                    |
| Memory                 | 2 x DDR4-2133 SO-DIMM 4GB, expandable to 32 GB (Non-ECC)                                                                      |                                                                                                |
| Storage                | <ul style="list-style-type: none"><li>2.5" SSD (1 bay)</li><li>mSATA (2 slots)</li></ul>                                      | <ul style="list-style-type: none"><li>2.5" SSD (1 bay)</li><li>mSATA (1 slot)</li></ul>        |
| Super I/O              | Fintek F81866AD-I                                                                                                             |                                                                                                |
| Audio Codec            | Realtek ALC662                                                                                                                |                                                                                                |
| Network                | <ul style="list-style-type: none"><li>Intel® I219LM GbE PHY</li><li>Intel® I211AT GbE</li></ul>                               | <ul style="list-style-type: none"><li>Intel® I219V GbE PHY</li><li>Intel® I211AT GbE</li></ul> |
| Power Supply           | 150W power adaptor (Optional)                                                                                                 |                                                                                                |
| BIOS                   | AMI BIOS                                                                                                                      |                                                                                                |
| Watchdog               | Watchdog Timer 256 segments, 0, 1, 2...255 sec/min                                                                            |                                                                                                |
| iSmart                 | Yes                                                                                                                           |                                                                                                |
| iAMT                   | 11.6                                                                                                                          | N/A                                                                                            |
| TPM                    | 2.0                                                                                                                           |                                                                                                |
| Chassis                | Aluminum & steel, silver & gray                                                                                               |                                                                                                |
| Mounting               | <ul style="list-style-type: none"><li>Desktop mount</li><li>Wall mount (wall mount kit included)</li></ul>                    |                                                                                                |
| Dimensions (W x H x D) | 210 x 128.6 x 265 mm (8.27" x 5.06" x 10.43")                                                                                 |                                                                                                |
| Weight                 | 4.5 kg (9.92 lb)                                                                                                              |                                                                                                |
| Certificate            | CE / LVD / FCC Class B                                                                                                        |                                                                                                |
| I/O Ports              |                                                                                                                               |                                                                                                |
| Remote Power Button    | 2-pin terminal block for the external, remote power button                                                                    |                                                                                                |
| DC Input               | 12 ~ 24V DC-in through a 3-pin terminal block                                                                                 |                                                                                                |
| LAN                    | 2 x RJ45 GbE LAN                                                                                                              |                                                                                                |

|                             |                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product Name</b>         | <b>AMI222</b>                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                |
| <b>Motherboard</b>          | MB220AF                                                                                                                                                                                                                                                                                                                                             | MB220EF                                                                                                                                                                                                                                                                                                                        |
| <b>USB</b>                  | <ul style="list-style-type: none"> <li>• 4 x USB 3.0</li> <li>• 4 x USB 2.0 (2 extra ports are applicable from the optional expansion cards IP211 / IP212 / IP213.)</li> </ul>                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                |
| <b>Serial</b>               | <b>4 ~ 6 x COM ports:</b> <ul style="list-style-type: none"> <li>• COM1: RS-232/422/485, selectable from BIOS</li> <li>• COM2/3/4: RS-232 only</li> <li>• COM5 &amp; COM6: Simplified RS-232 with only RX, TX, and Ground pins. Both ports are applicable from either of the expansion card IP211 / IP212, but inapplicable from IP213.)</li> </ul> |                                                                                                                                                                                                                                                                                                                                |
| <b>Digital I/O</b>          | 4-In & 4-Out (Optional)                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                |
| <b>Display</b>              | <ul style="list-style-type: none"> <li>• 1 x DVI-D</li> <li>• 1 x VGA</li> <li>• 2 x DisplayPort</li> </ul>                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                |
| <b>Audio Jack</b>           | Microphone Input & Line-Out                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                |
| <b>SIM</b>                  | 2 x Micro-SIM card slot                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                |
| <b>SSD</b>                  | 1 x 2.5" SSD drive bay (externally accessible)<br>* An internal SSD bay is optional.                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                |
| <b>SATA</b>                 | 2 x SATA III connector                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                |
| <b>Expansion</b>            | <ul style="list-style-type: none"> <li>• 1 x PCIe (x8) + 1 x PCIe (x1) + 1 x SATA II (Derived from IP211)</li> <li>• 1 x PCIe (x16) + 1 x SATA II (Derived from IP212)</li> <li>• 1 x PCIe (x16) + 1 x PCI + 1 x SATA III (Derived from IP213)</li> <li>• 2 x full-size mini-PCIe (J6 &amp; J7 connectors with mSATA function)</li> </ul>           | <ul style="list-style-type: none"> <li>• 1 x PCIe (x8) + 1 x PCIe (x1) + 1 x SATAII (Derived from IP211)</li> <li>• 1 x PCIe (x16) + 1 x SATA II (Derived from IP212)</li> <li>• 1 x PCIe (x16) + 1 x PCI + 1 x SATA III (Derived from IP213)</li> <li>• 2 x full-size mini-PCIe (J6 connector with mSATA function)</li> </ul> |
| <b>Environment</b>          |                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                |
| <b>Temperature</b>          | <ul style="list-style-type: none"> <li>• <b>Operating:</b> -10 ~ 50 °C (14 ~ 122 °F)</li> <li>• <b>Storage:</b> -20~ 80 °C (-4 ~ 176 °F)</li> </ul>                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                |
| <b>Relative Humidity</b>    | 5 ~ 90% at 45 °C (non-condensing)                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                |
| <b>Vibration Protection</b> | <ul style="list-style-type: none"> <li>• <b>Operating:</b> 0.25 Grms / 5 ~ 500 Hz (random test)</li> <li>• <b>Non-operating:</b> 1 Grms / 5 ~ 500Hz (random test)</li> </ul>                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                |
| <b>Shock Protection</b>     | <ul style="list-style-type: none"> <li>• <b>Operating:</b> 20 g / 11 ms</li> <li>• <b>Non-operating:</b> 40 g / 11 ms</li> </ul>                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                |

All specifications are subject to change without prior notice.

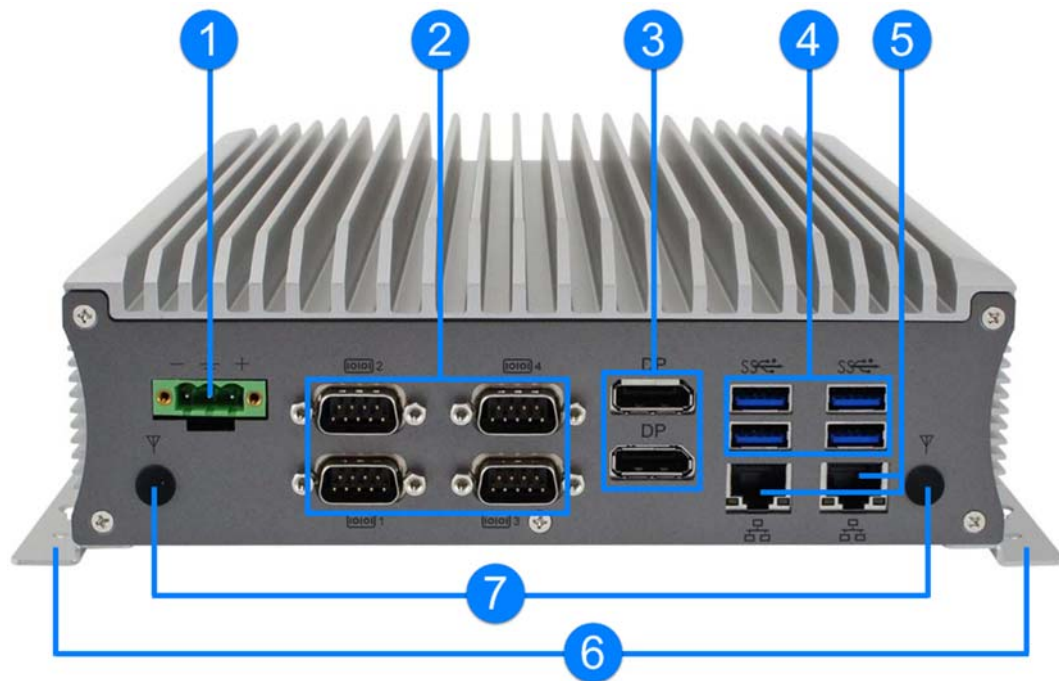
## 1.8 Product View – AMI220

### Front View



| No. | Name                                                | No. | Name                                            |
|-----|-----------------------------------------------------|-----|-------------------------------------------------|
| 1   | Audio Jacks<br>(red for Mic-In, green for Line-Out) | 5   | VGA Port                                        |
| 2   | SIM Card Slots                                      | 6   | Terminal Block for Remote Power Button (2 pins) |
| 3   | USB 2.0 Ports                                       | 7   | Power Button                                    |
| 4   | DVI-D Port                                          | 8   | LED Indicator for HDD                           |

## Rear View



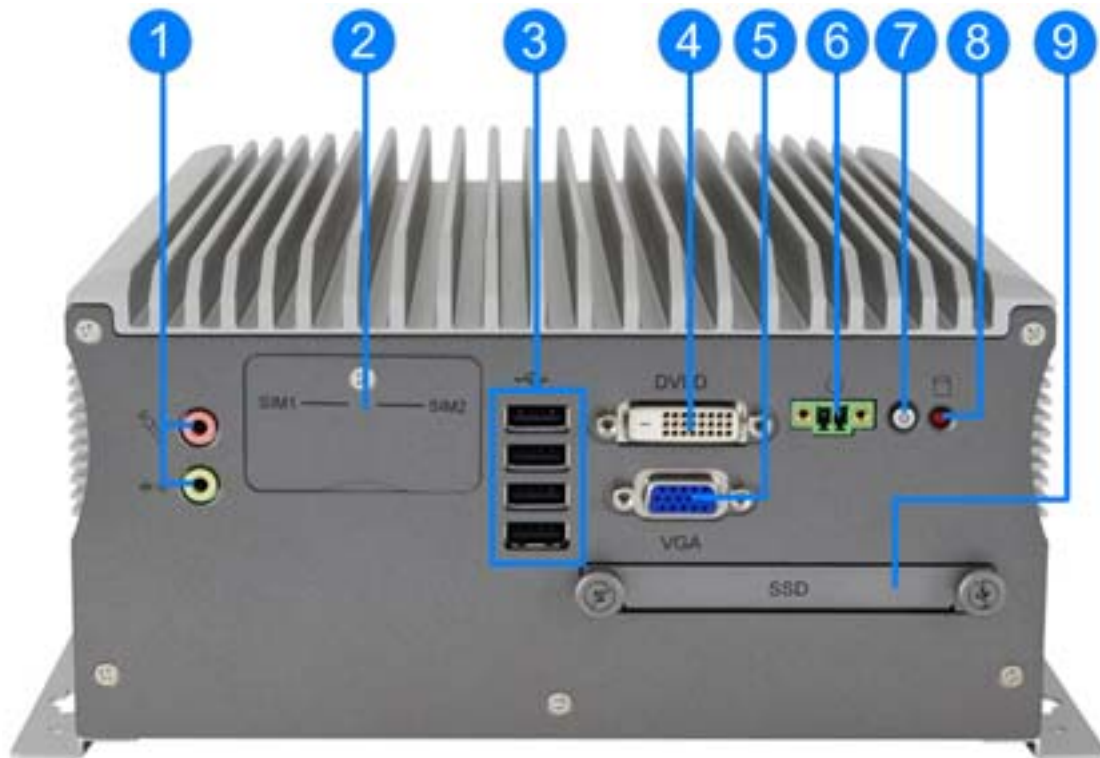
| No. | Name                                             | No. | Name                |
|-----|--------------------------------------------------|-----|---------------------|
| 1   | DC-In Power Connector (3 pins)                   | 5   | LAN Ports           |
| 2   | COM Ports (COM1 RS-232/422/485, COM2/3/4 RS-232) | 6   | Wall Mount Brackets |
| 3   | DisplayPorts                                     | 7   | Antenna Holes       |
| 4   | USB 3.0 Ports                                    |     |                     |

## Oblique View



## 1.9 Product View – AMI221

### Front View

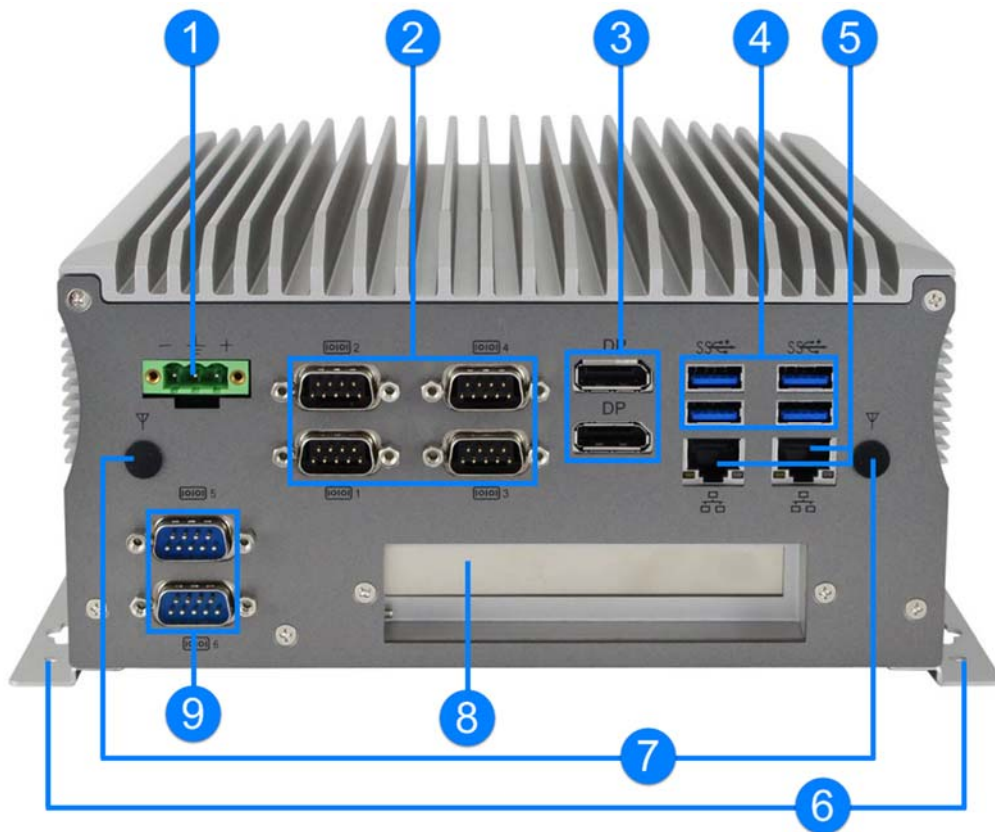


| No. | Name                                             | No. | Name                                            |
|-----|--------------------------------------------------|-----|-------------------------------------------------|
| 1   | Audio Jacks (red for Mic-In, green for Line-Out) | 6   | Terminal Block for Remote Power Button (2 pins) |
| 2   | SIM Card Slots                                   | 7   | Power Button                                    |
| 3   | USB 2.0 Ports                                    | 8   | LED Indicator for HDD                           |
| 4   | DVI-D Port                                       | 9   | SSD Drive Bay                                   |
| 5   | VGA Port                                         |     |                                                 |

### Oblique View



## Rear View



| No. | Name                                                           | No. | Name                                                  |
|-----|----------------------------------------------------------------|-----|-------------------------------------------------------|
| 1   | DC-In Power Connector (3 pins)                                 | 6   | Wall Mount Brackets                                   |
| 2   | COM1 ~ COM4 Ports<br>(COM1 RS-232/422/485,<br>COM2/3/4 RS-232) | 7   | Antenna Holes                                         |
| 3   | DisplayPorts                                                   | 8   | Expansion Slot <sup>[1]</sup>                         |
| 4   | USB 3.0 Ports                                                  | 9   | COM5 & COM6 Simplified<br>RS-232 Ports <sup>[1]</sup> |
| 5   | LAN Ports                                                      |     |                                                       |

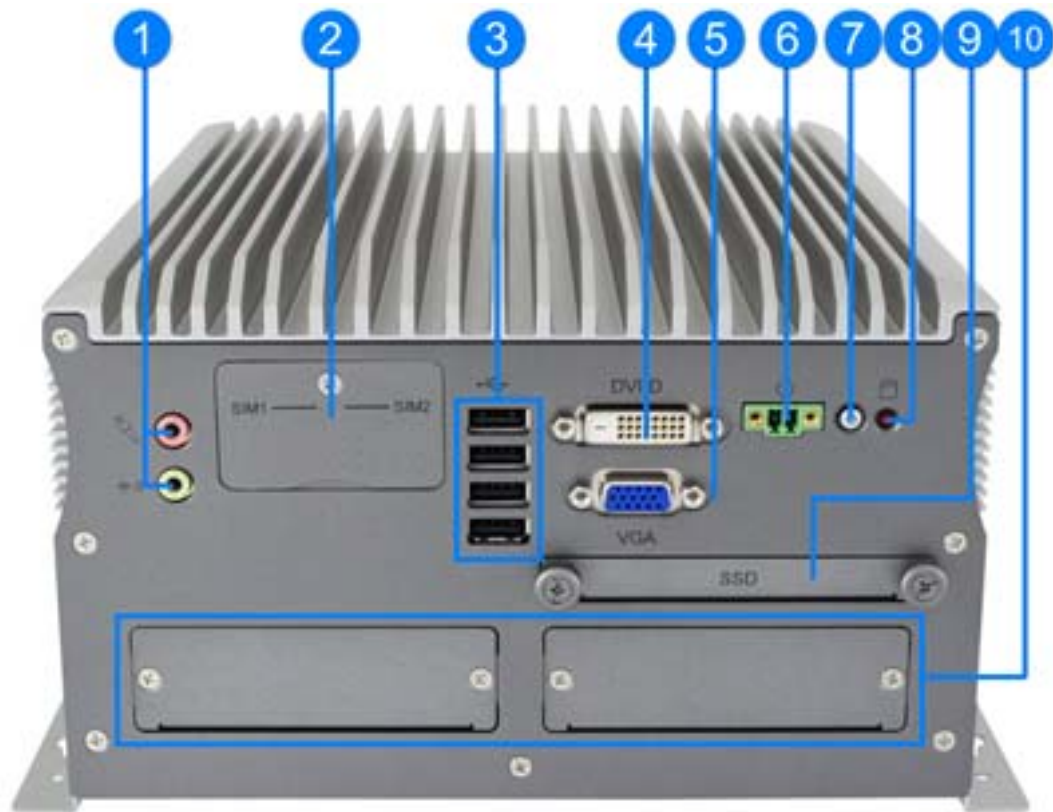
[1]: Derived from the optional expansion card IP214 / IP215.

## Compatible Expansion Cards:

| Name  | Features                                           |
|-------|----------------------------------------------------|
| IP214 | 1 x PCIe (x16), 2 x COM (COM5 & COM6), 2 x USB 2.0 |
| IP215 | 1 x PCI, 2 x COM (COM5 & COM6), 2 x USB 2.0        |

## 1.10 Product View – AMI222

### Front View

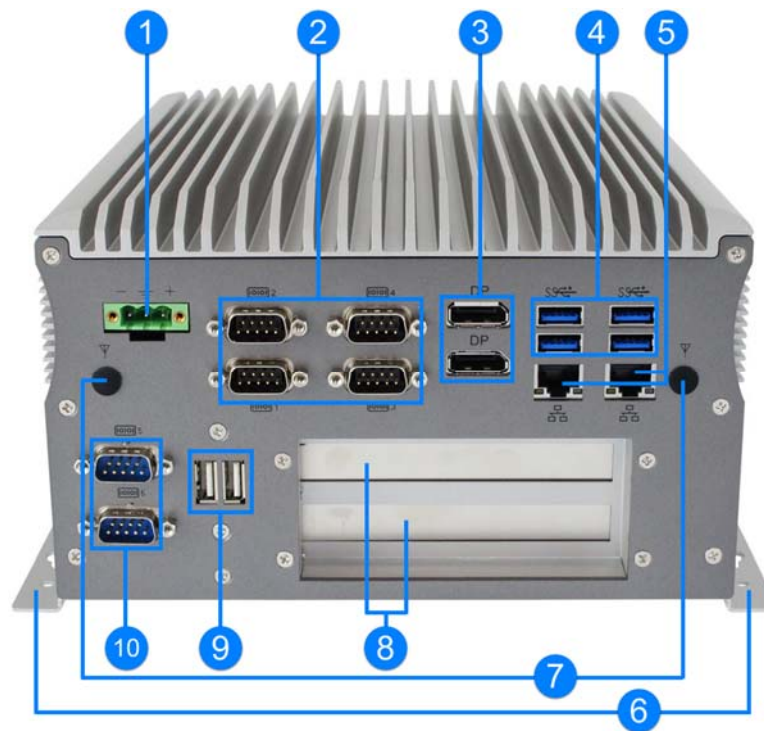


| No. | Name                                            | No. | Name                                            |
|-----|-------------------------------------------------|-----|-------------------------------------------------|
| 1   | Audio Jack (red for Mic-In, green for Line-Out) | 6   | Terminal Block for Remote Power Button (2 pins) |
| 2   | SIM Card Slots                                  | 7   | Power Button                                    |
| 3   | USB 2.0 Ports                                   | 8   | LED Indicator for HDD                           |
| 4   | DVI-D Port                                      | 9   | SSD Drive Bay                                   |
| 5   | VGA Port                                        | 10  | Doors for Fieldbus Module (Optional)            |

### Oblique View



## Rear View



| No. | Name                                                           | No. | Name                                                                         |
|-----|----------------------------------------------------------------|-----|------------------------------------------------------------------------------|
| 1   | DC-In Power Connector (3 pins)                                 | 6   | Wall Mount Brackets                                                          |
| 2   | COM1 ~ COM4 Ports<br>(COM1 RS-232/422/485,<br>COM2/3/4 RS-232) | 7   | Antenna Holes                                                                |
| 3   | DisplayPorts                                                   | 8   | Expansion Slots <sup>[1]</sup>                                               |
| 4   | USB 3.0 Ports                                                  | 9   | USB 2.0 Ports <sup>[1]</sup><br>(*Available only for AMI222<br>with MB220AF) |
| 5   | LAN Ports                                                      | 10  | COM5 & COM6 Simplified<br>RS-232 Ports <sup>[2]</sup>                        |

<sup>[1]</sup>: Derived from the optional expansion card IP211 / IP212 / IP213.

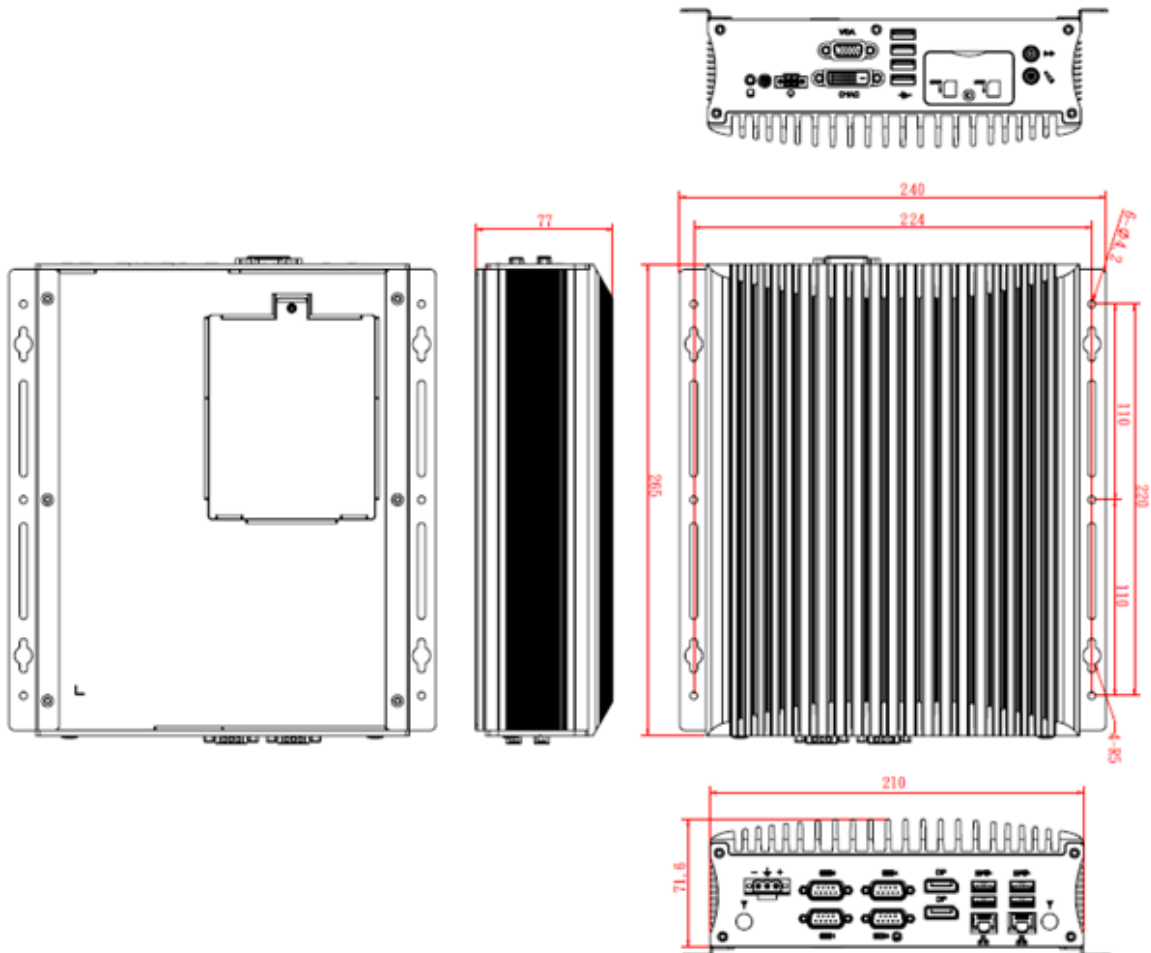
<sup>[2]</sup>: Derived from the optional expansion card IP211 / IP212.

## Compatible Expansion Cards:

| Name  | Features                                                                      |
|-------|-------------------------------------------------------------------------------|
| IP211 | 1 x PCIe (x1), 1 x PCIe (x8), 2 x COM (COM5 & COM6), 1 x SATA II, 2 x USB 2.0 |
| IP212 | 1 x PCIe (x16), 2 x COM (COM5 & COM6), 1 x SATA II, 2 x USB 2.0               |
| IP213 | 1 x PCI, 1 x PCIe (x16), 1 x SATA III, 2 x USB 2.0                            |

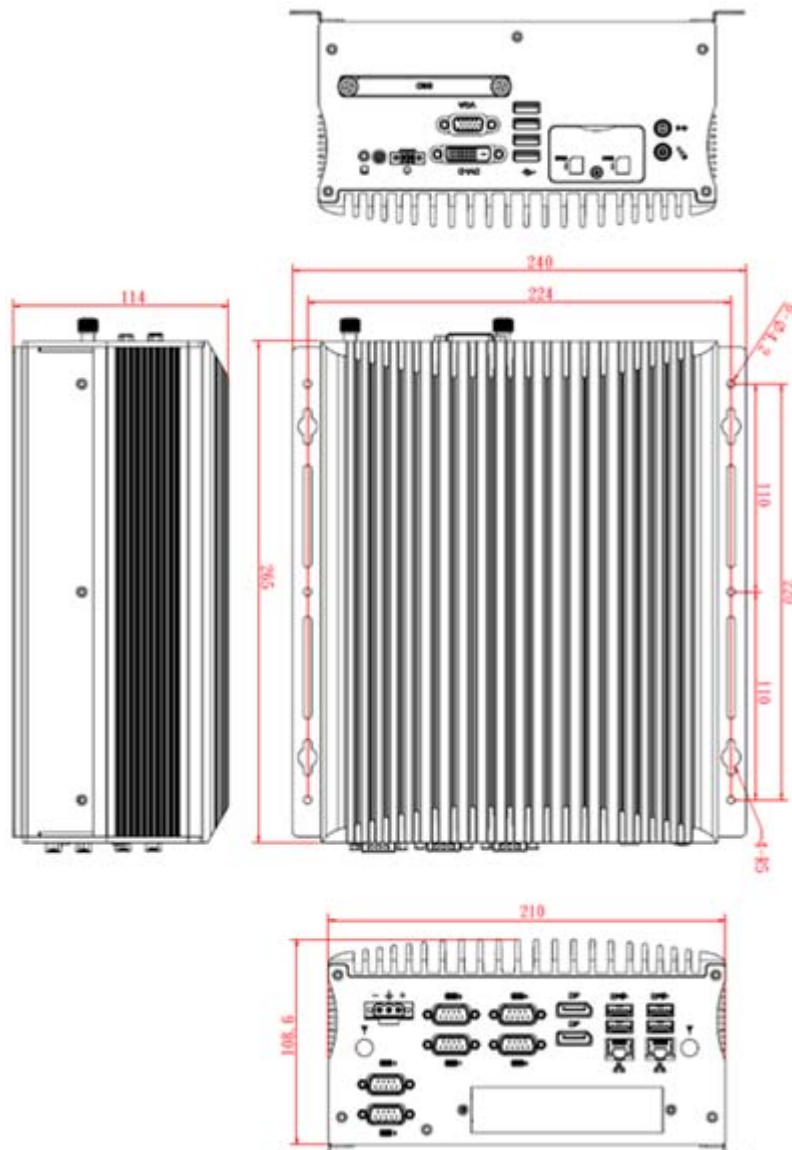
## 1.11 Dimensions – AMI220

Unit: mm



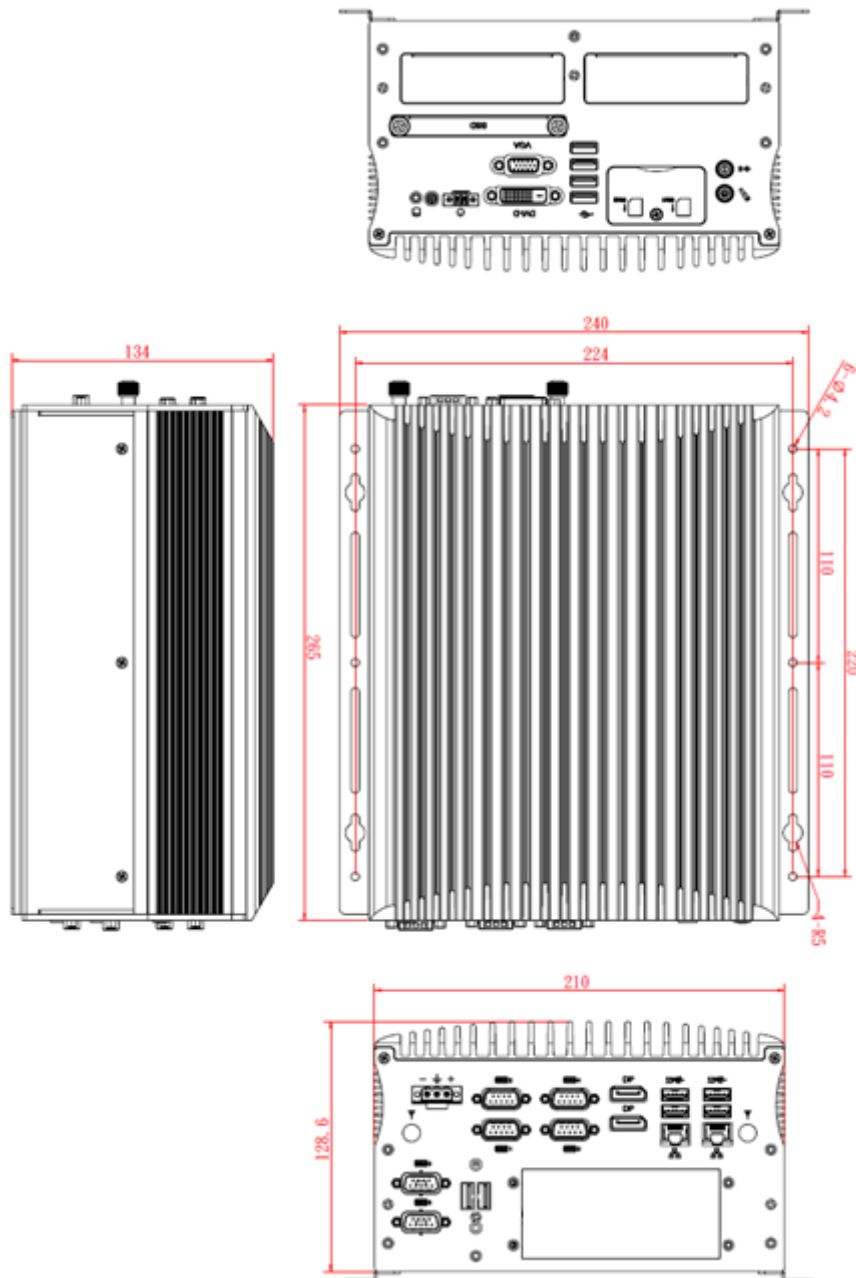
## 1.12 Dimensions – AMI221

Unit: mm



### 1.13 Dimensions – AMI222

Unit: mm



## Chapter 2

# Hardware Configuration

The information provided in this chapter includes:

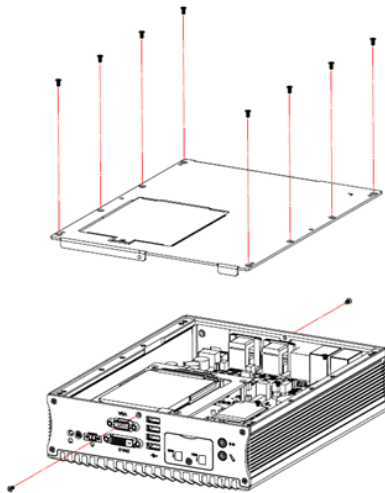
- Essential installations before you begin
- Information and locations of connectors

## 2.1 Essential Installations Before You Begin

You need to disassemble the device bottom cover for all the installations except the installations of SIM card, and the outer SSD. After installation, secure the device bottom cover back.

### **AMI220**

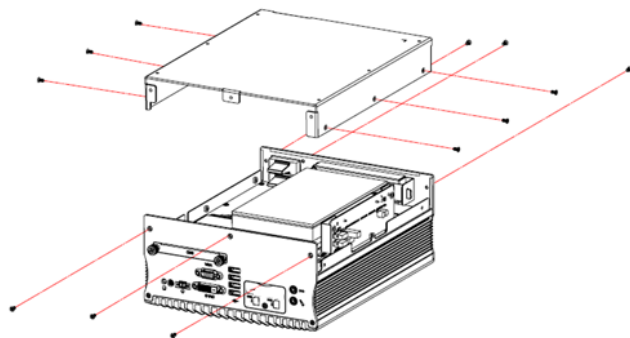
Release the 10 screws to disassemble the device bottom cover.



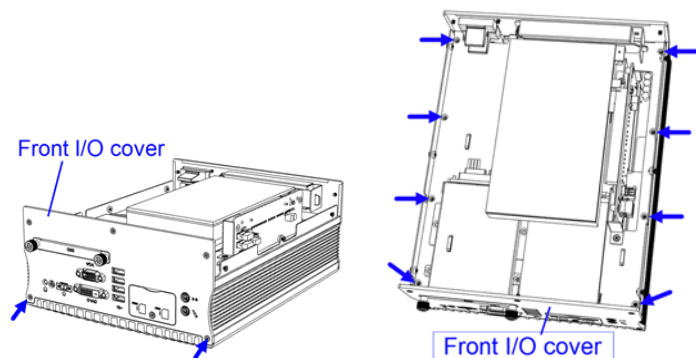
### **AMI221 / AMI222**

This is illustrated by the example of AMI221.

Release 12 screws to disassemble the device bottom cover.



For slots inside the AMI221 & AMI222, you also need to disassemble the intermediate plate by removing the front I/O cover first and then removing 8 screws as shown below.

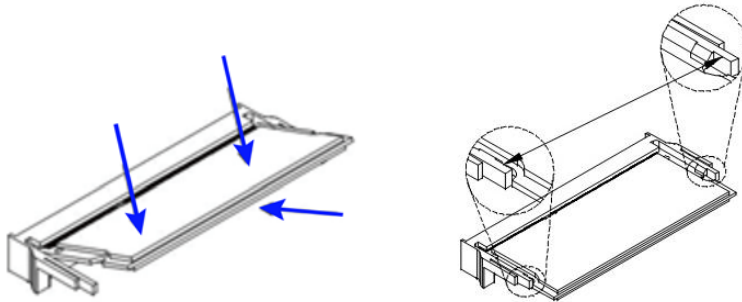


After installation, secure the intermediate plate and the device bottom cover back.

### 2.1.1 Memory Installation

If you need to replace or install the memory modules, perform the following steps.

1. Locate the memory slot and align the key of the memory module with that on the memory slot.
2. Insert the module slantwise and gently push the module straight down until the clips of the slot close to hold the module in place when the module touches the bottom of the slot.



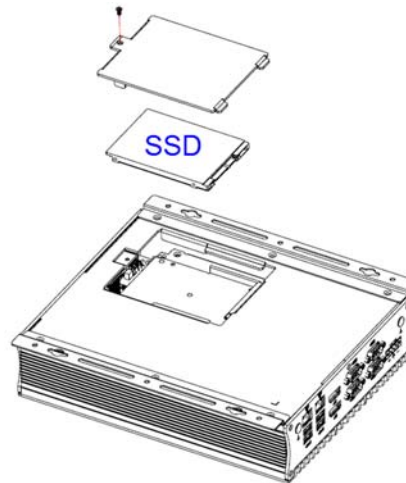
To remove the module, press the clips outwards with both hands.

## 2.1.2 SSD Installation

To replace the SSD, follow the instructions below for installation.

### **AMI220**

1. Turn your device upside down and loosen a screw as illustrated.
2. Pull up the door, install your SSD onto the bay, and connect related cables.
3. Push down the door and tighten the screw.

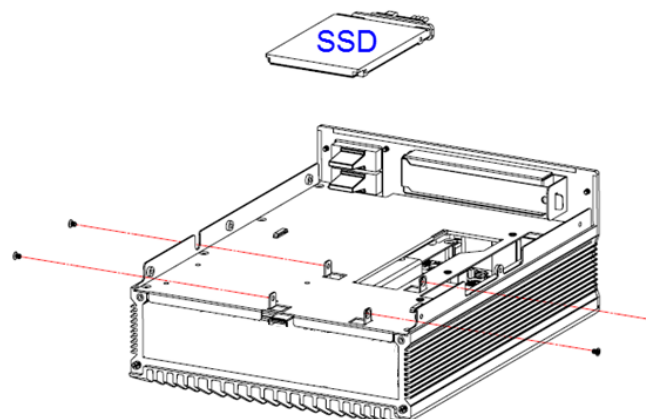


### **AMI221 / AMI222**

#### **For the 1<sup>st</sup> (default) SSD:**

(This is illustrated by the example of AMI221.)

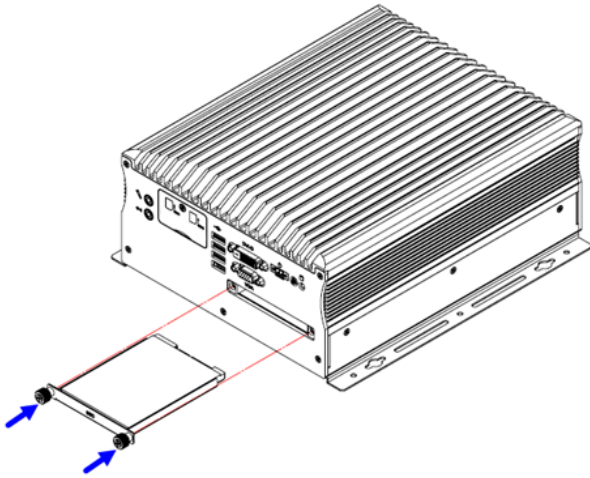
1. Loosen 4 screws, take out the original 2.5" SSD and attach a new one after you disassemble the device bottom cover.
2. Secure the SSD with the 4 screws mentioned above.



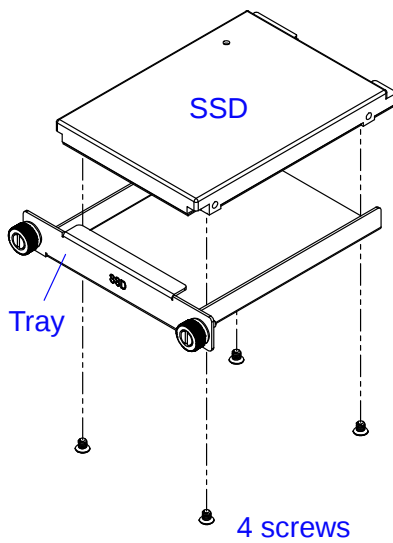
**For the 2<sup>nd</sup> SSD:**

(This is illustrated by the example of AMI221.)

1. Release 2 screws to pull out the SSD tray.



2. Install your 2.5" SSD onto the tray, and secure the SSD with the supplied 4 screws for the tray.

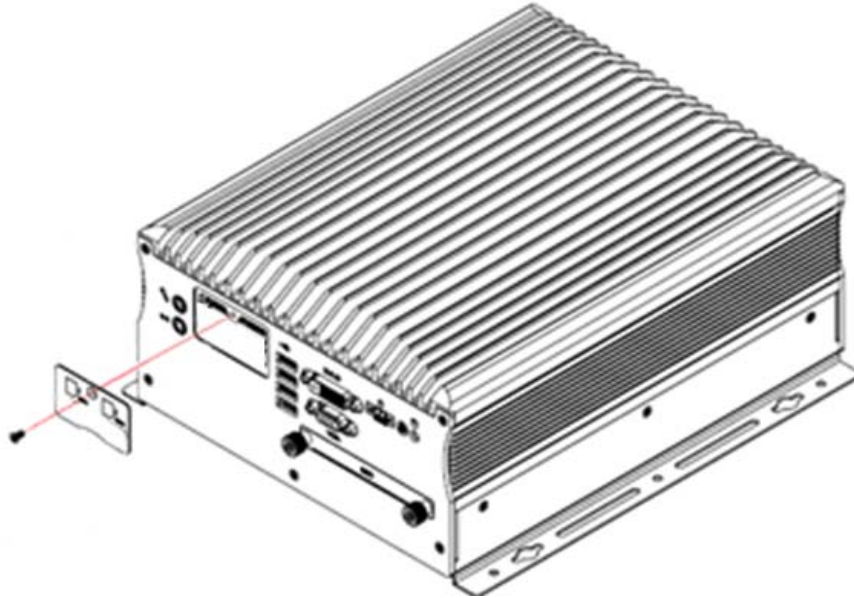


3. Put and secure the tray back to the device.

### 2.1.3 Micro-SIM Card Installation

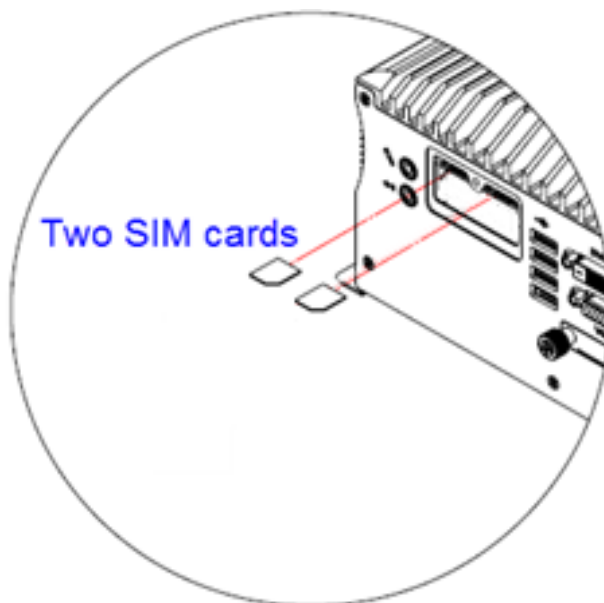
This is illustrated by the example of AMI221.

1. Release a screw as shown below to open the Micro-SIM card slot door.



Insert the card to one of the micro-SIM card slot and push the card by using your fingernail or a corner of the micro-SIM card door. Then refer to 2.1.4 *Mini-PCle Network Cards Installation* for further installation.

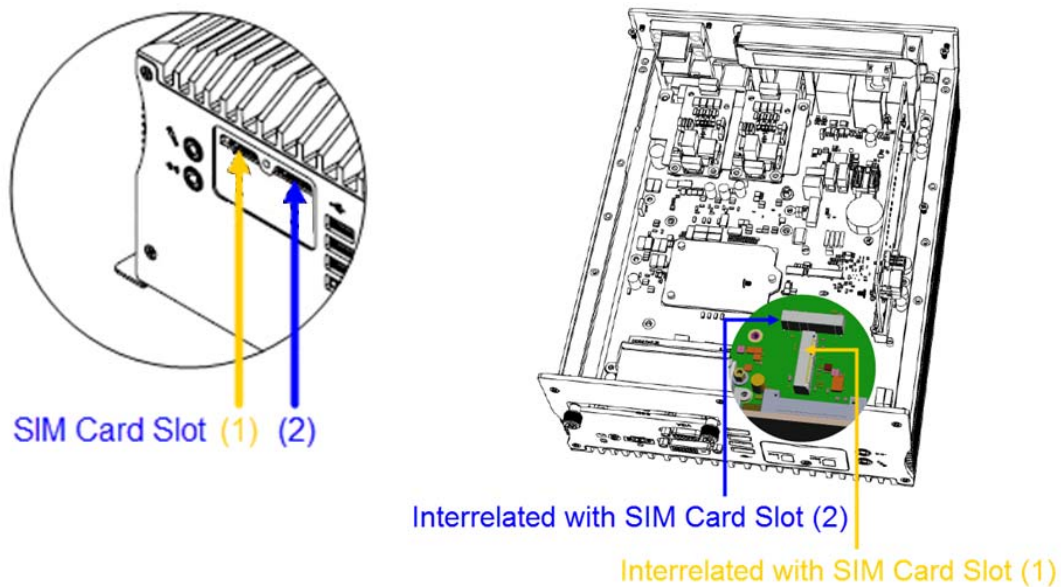
To remove the micro-SIM card, push the card again.



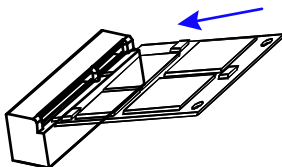
## 2.1.4 Mini-PCle Network Cards Installation

This is illustrated by the example of AMI221.

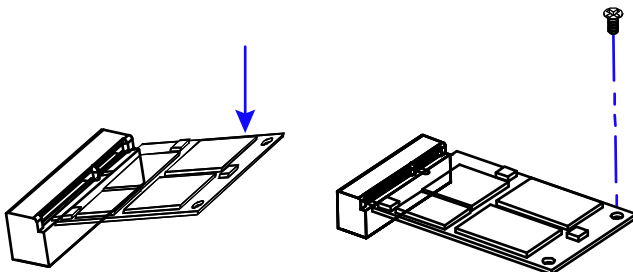
Before you start, firstly pay attention to the interrelation among the SIM card slots and mini-PCle slots.



1. Locate the mini-PCle slot, align the key of the mini-PCle card to the interface, and insert the card slantwise.



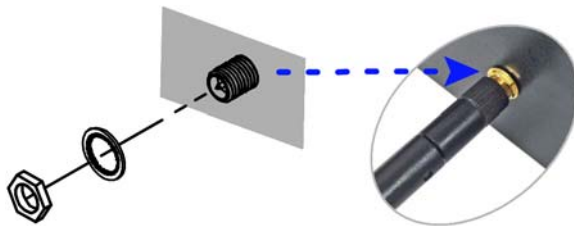
2. Push the mini-PCle card down, fix it with the supplied 2 flat head screws for full-sized card and with one screw for half-sized card.



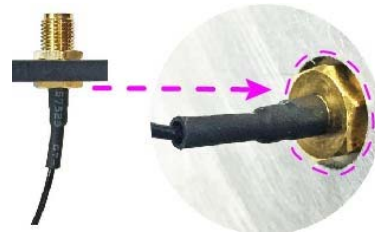
### 2.1.5 WiFi / 3G / 4G Antenna Installation

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

1. Thread and fasten the hex nut and the washer. Then install the antenna.



2. Apply adhesive around here.




---

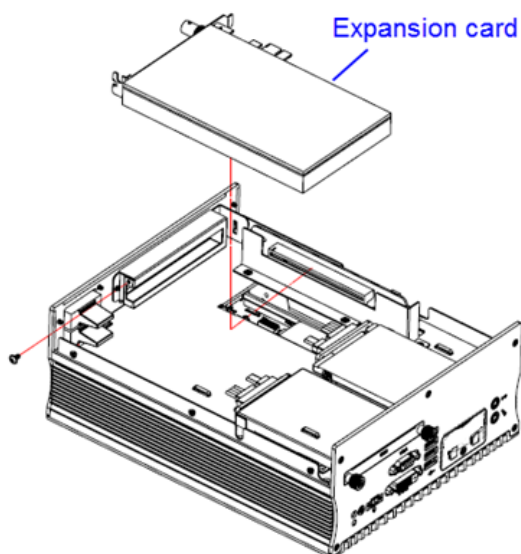
**Info:** The diameter of the nut is around 6.35 mm (0.25"-36UNC).

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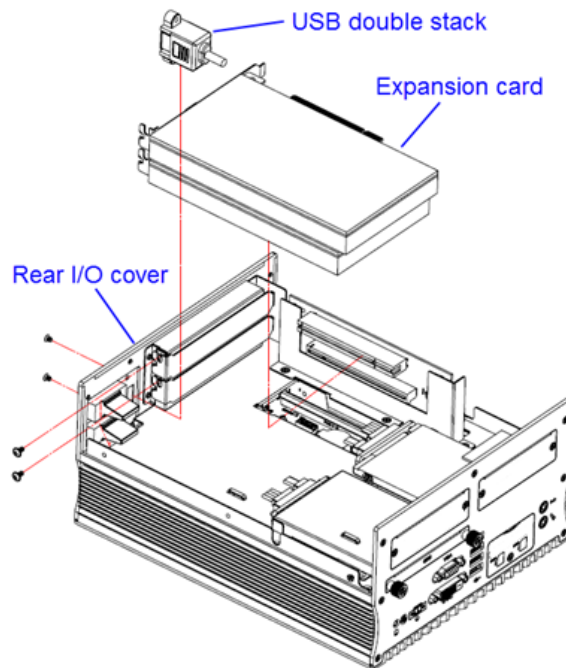
### 2.1.6 Expansion Card Installation

AMI221 and AMI222 support an expansion card slot while AMI220 does not feature any expansion slot.

**For AMI221,** loosen a screw to remove the expansion filler. Then install the expansion card and fix the card with the screw.



**For AMI222**, loosen 2 screws from the rear I/O cover to disassemble the USB double stack. Then release two screws to remove the expansion fillers and then install the expansion cards. Secure the cards with the 2 screws.



## 2.1.7 Wall Mount Installation

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**Note:** Before mounting the system on wall, ensure that you are following all applicable building and electric codes.

---

### Requirements

When mounting, ensure that you have enough room for power and signal cable routing, and have good ventilation for power adapter. The method of mounting must be able to support weight of the AMI220 plus the suspension weight of all the cables to be attached to the system. Use the following methods for mounting your system:

### Selecting the Location

Plan the mounting location thoroughly. Locations such as walkway areas, hallways, and crowded areas are not recommended. Mount the product to a flat, sturdy, structurally sound column or wall surface.

The best mounting surface is a standard countertop, cabinet, table, or other structure that is minimally the width and length of the product. This will reduce the risk that someone may accidentally wall into and damage the product. Local laws governing the safety of individuals might require this type of consideration.

### Selecting the type of wall construction

#### 1. Mounting on a hollow wall

- **Wood surface**

Use construction-grade wood and the recommended minimum thickness is 38 x 25.4 mm (1.5" x 10").

---

**Note:** This method provides the most reliable attachment for the product with little risk that the product may come loose or require ongoing maintenance.

---

- **Drywall**

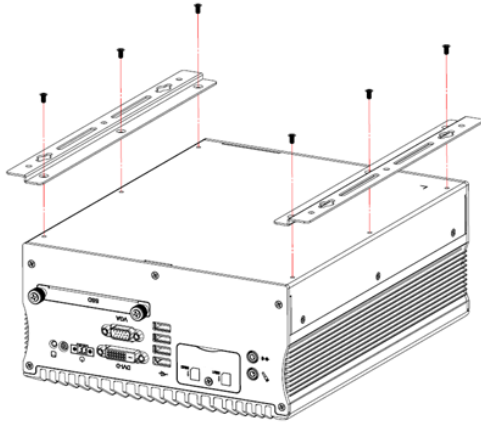
Drywall over wood studs is acceptable.

#### 2. Mounting on a solid concrete or brick wall with flat and smooth surface

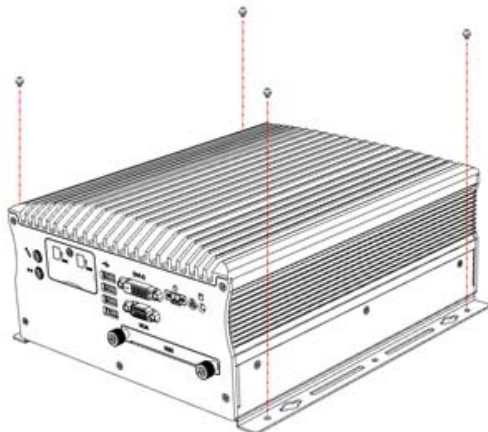
## Wall mount installation instructions:

This is illustrated by the example of AMI221.

1. Attach the mounting brackets to your product, and secure with the supplied 6 screws.



2. Prepare at least 4 screws (M3) to install the device on wall .

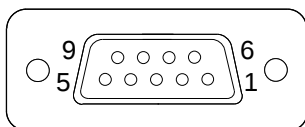


You can install AMI220 on plastic (LCD monitor), wood, drywall surface over studs, or a solid concrete or metal plane directly. The types of fasteners required are dependent on the type of wall construction.

Fasteners are not supplied in the product package. You will need to prepare the fasteners. Choose fasteners that are rated either **Medium Duty** or **Heavy Duty**. To assure proper fastener selection and installation, follow the fastener manufacturer's recommendations.

### 2.1.8 Pinout for COM Ports, DC-In & Power Button Connectors

- COM1 RS232/422/485 Port**

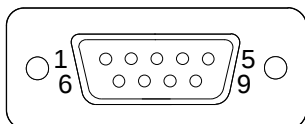


COM1 port is jumper-less and configurable in BIOS.

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

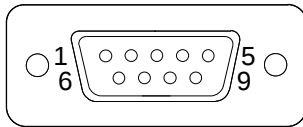
| Pin | Assignment |        |        |
|-----|------------|--------|--------|
|     | RS-232     | RS-422 | RS-485 |
| 1   | DCD        | TX-    | DATA-  |
| 2   | RX         | TX+    | DATA+  |
| 3   | TX         | RX+    | NC     |
| 4   | DTR        | RX-    | NC     |
| 5   | Ground     | Ground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

- COM2 / COM3 / COM4 RS-232 Ports**



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

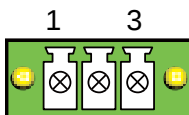
- **COM5 / COM6 Simplified RS-232 Ports (with RX & TX only)**



COM5 and COM6 are both available for AMI221 via the expansion card IP214 / IP215 and available for AMI222 via IP211 / IP212.

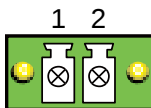
| Pin | Assignment         | Pin | Assignment        |
|-----|--------------------|-----|-------------------|
| 1   | NC, No Connection  | 6   | NC, No Connection |
| 2   | RXD, Receive data  | 7   | NC, No Connection |
| 3   | TXD, Transmit data | 8   | NC, No Connection |
| 4   | NC, No Connection  | 9   | NC, No Connection |
| 5   | Ground             |     |                   |

- **DC-In Power Connector (terminal block)**



| Pin | Assignment  | Pin | Assignment   |
|-----|-------------|-----|--------------|
| 1   | 12V ~ 24V   | 3   | Power Ground |
| 2   | Case Ground |     |              |

- **Remote Control Connector (terminal block)**



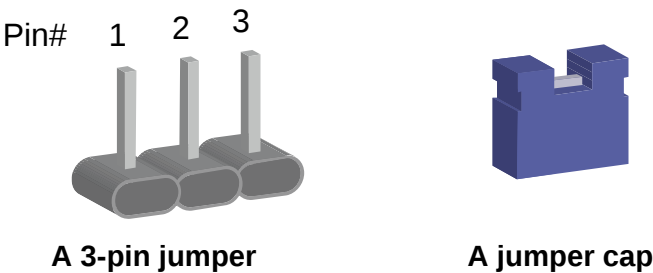
| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1   | Power BTN  | 2   | Ground     |

## 2.2 Setting the Jumpers

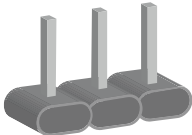
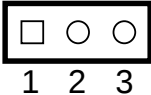
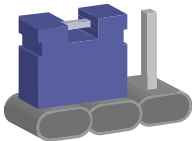
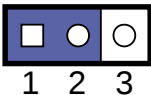
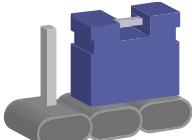
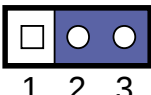
Set up and configure your device by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

### 2.2.1 How to Set Jumpers

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



Refer to the illustration below to set jumpers.

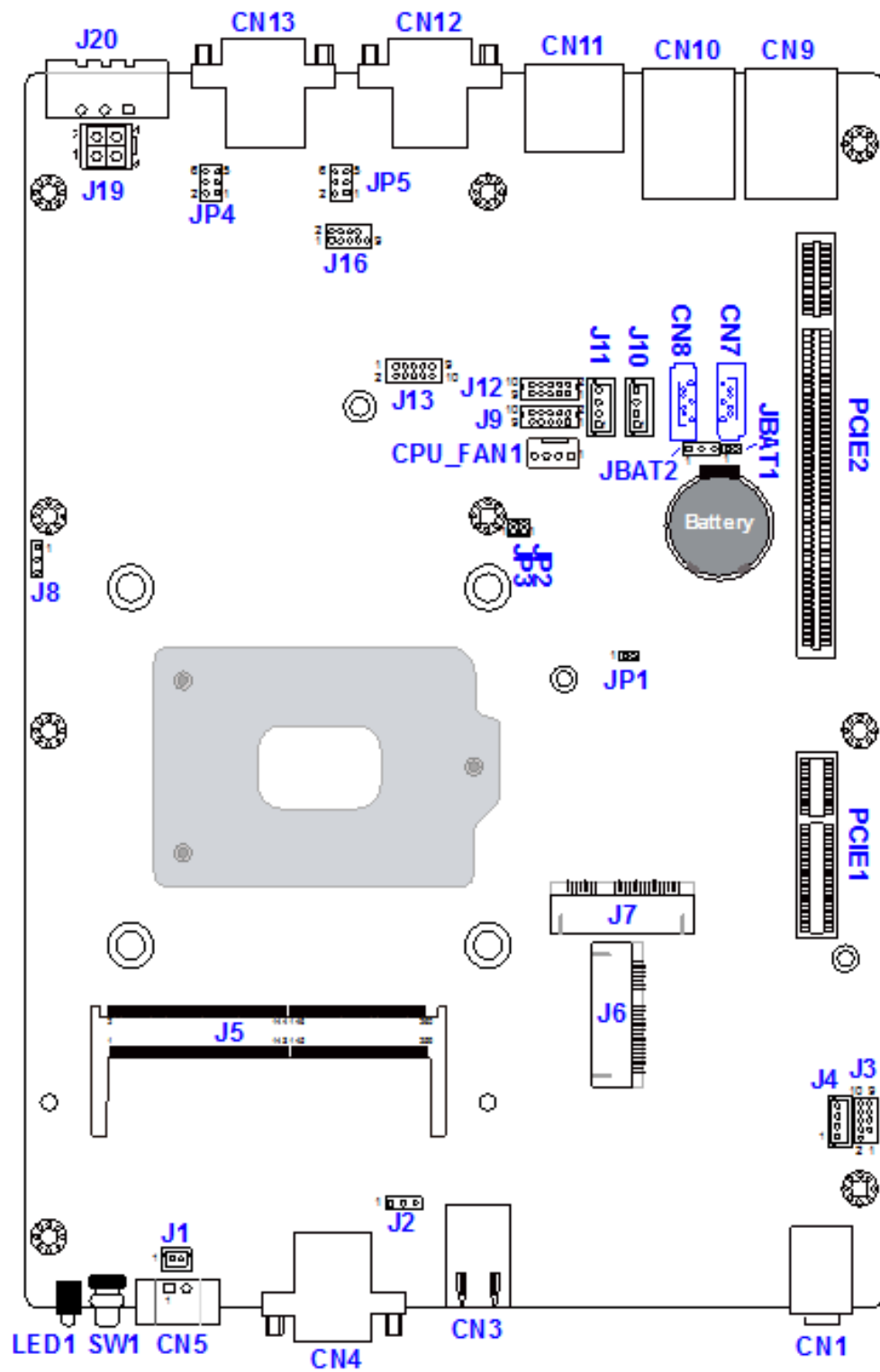
| Pin closed | Oblique view                                                                        | Schematic illustration in the manual                                                          |
|------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 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**, i.e. turned **On**.

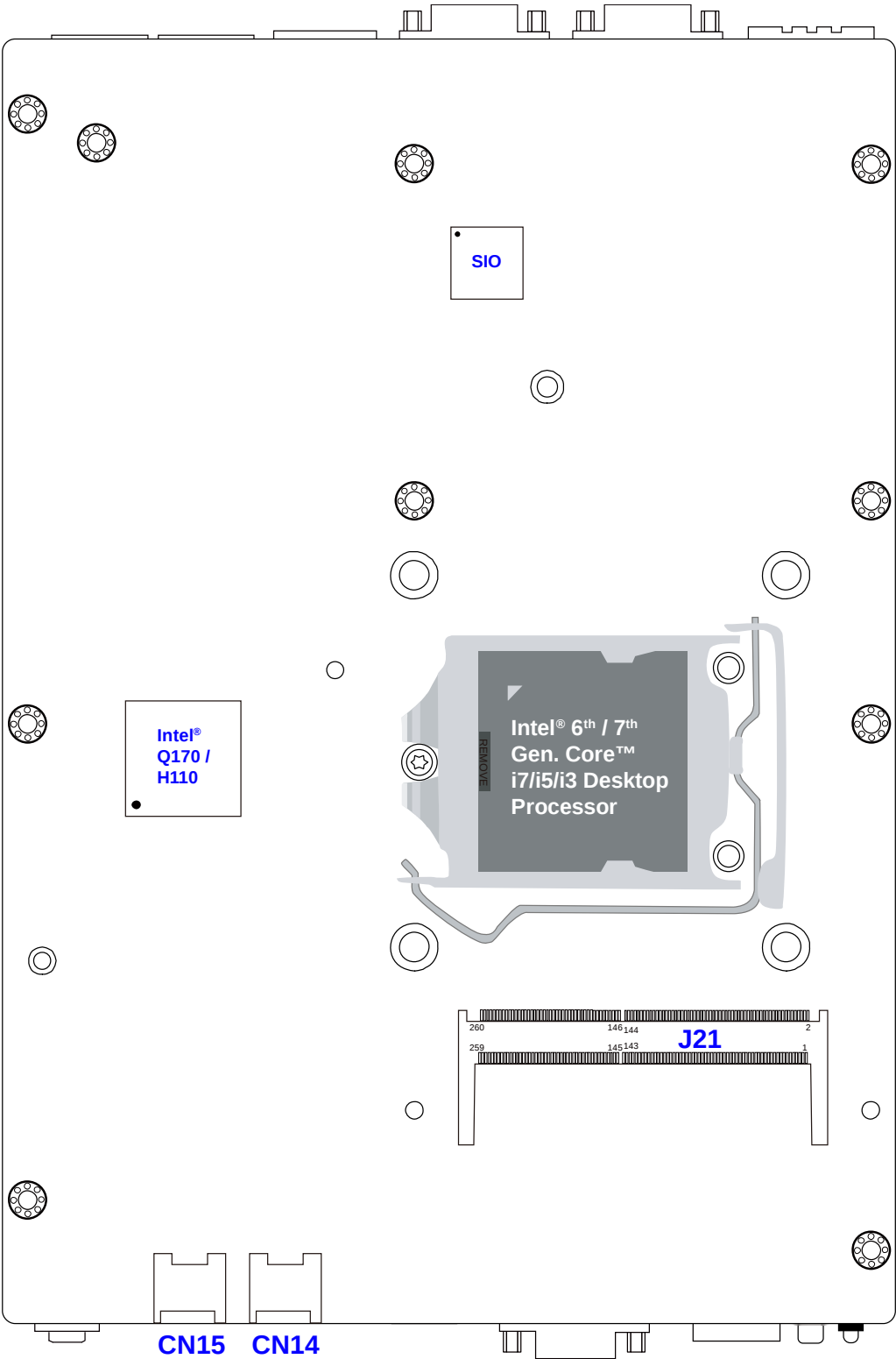
When a jumper cap is removed from two jumper pins, this jumper is **open**, i.e. turned **Off**.

## 2.3 Jumper & Connector Locations on Motherboard

Motherboard: MB220



MB220 – top

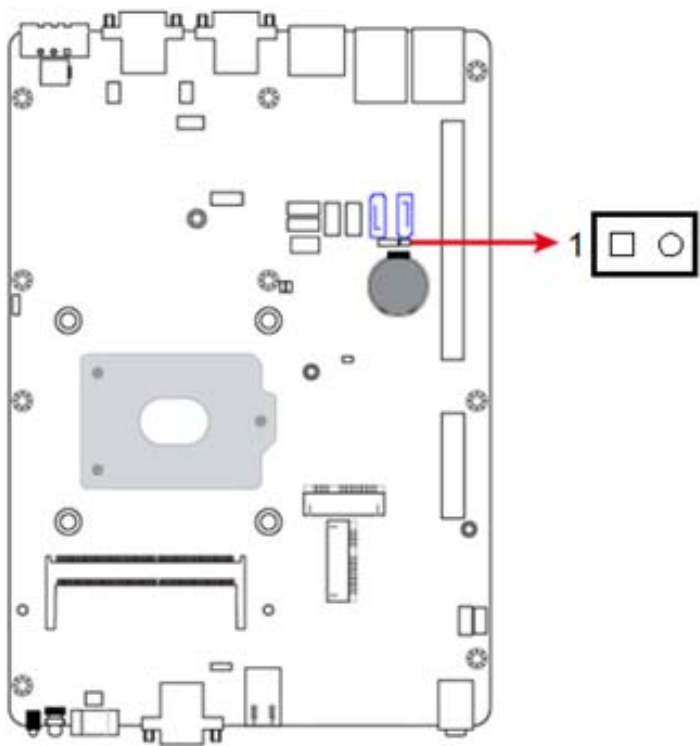


MB220 - bottom

## 2.4 Jumpers Quick Reference

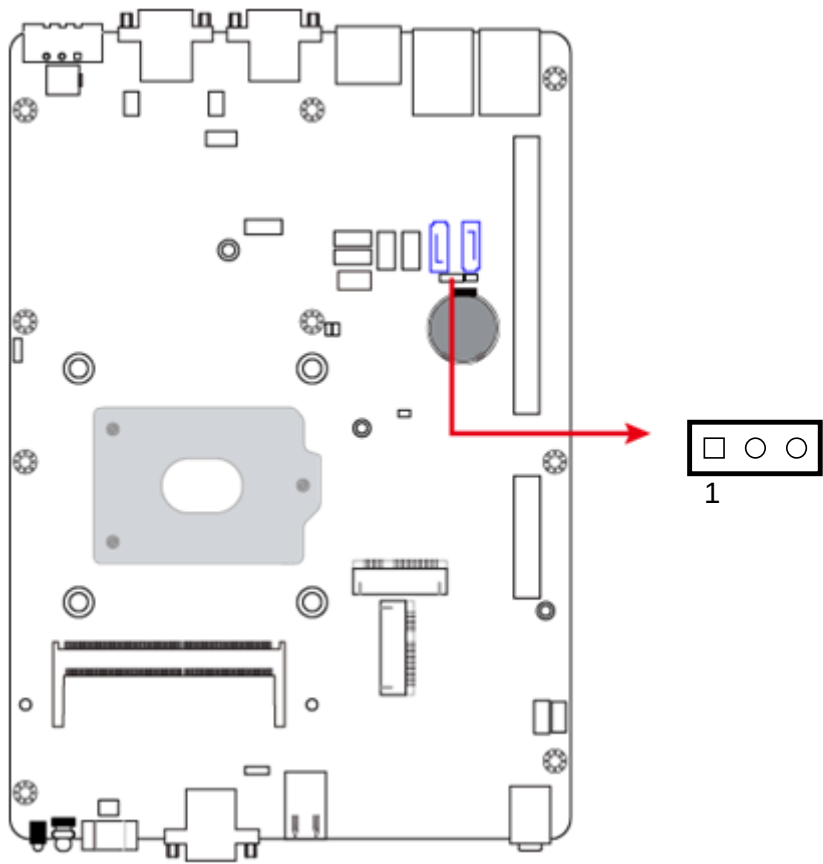
| Function                           | Connector Name | Page |
|------------------------------------|----------------|------|
| RTC Content Clearance              | JBAT1          | 36   |
| CMOS Data Clearance                | JBAT2          | 37   |
| CPU dGfx Bifurcation Selection     | JP2, JP3       | 38   |
| COM1 & COM2 RS-232 Power Selection | JP4, JP5       | 39   |
| Factory Use Only                   | JP1            | --   |

### 2.4.1 RTC Content Clearance (JBAT1)



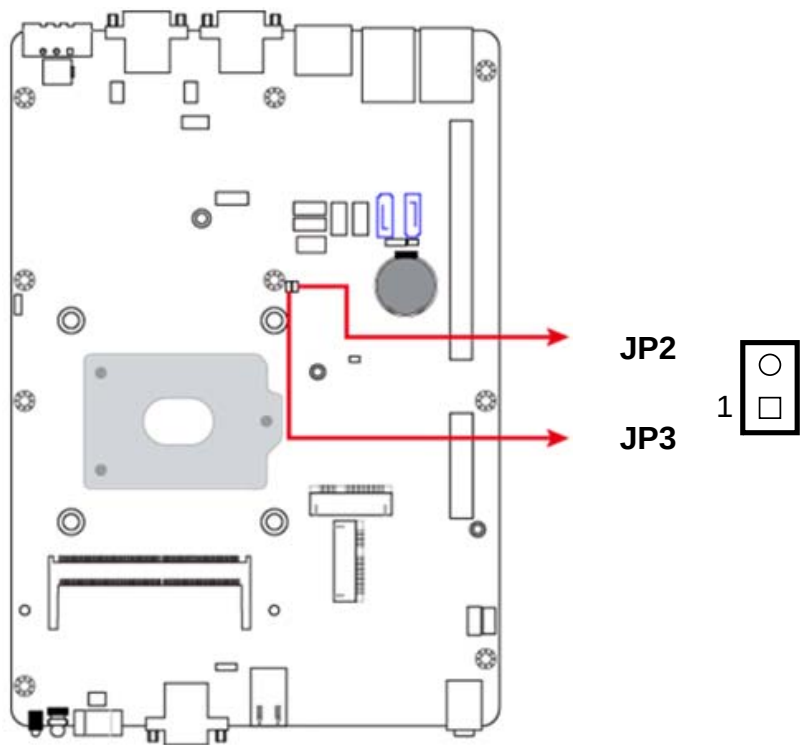
| Function            | Pin closed | Illustration |
|---------------------|------------|--------------|
| Normal<br>(default) | Open       | 1            |
| Clear RTC           | Close      | 1            |

2.4.2 CMOS Data Clearance (JBAT2)



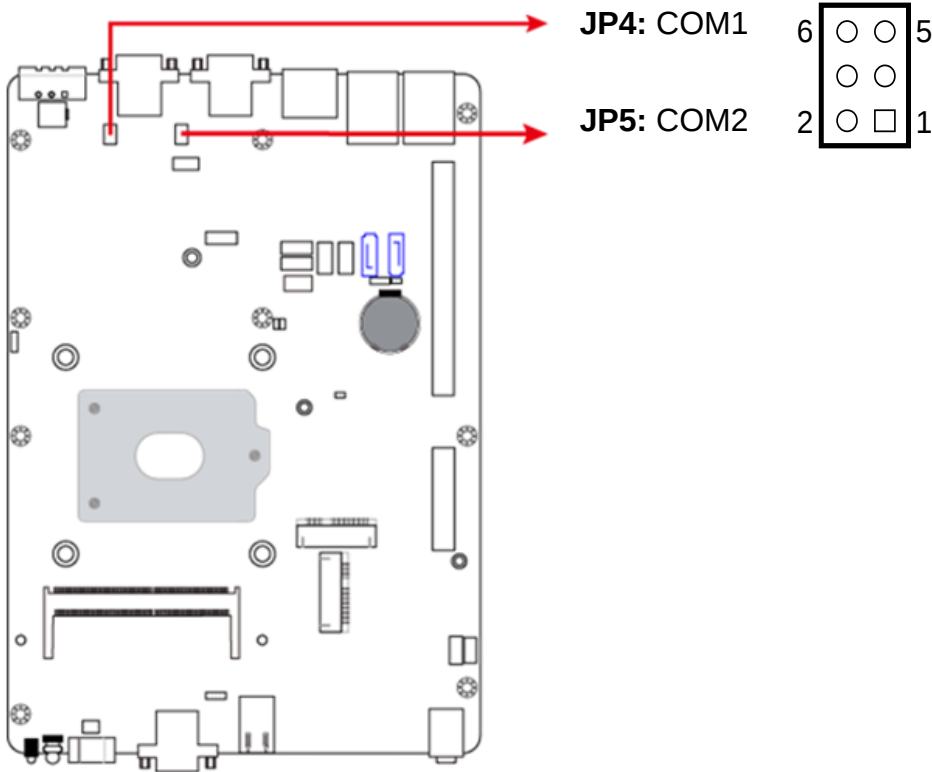
| Function            | Pin closed | Illustration                                                                             |
|---------------------|------------|------------------------------------------------------------------------------------------|
| Normal<br>(default) | 1-2        | <br>1 |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

2.4.3 CPU dGfx Bifurcation Selection (JP2, JP3)



| Function            | Pin closed | Illustration |
|---------------------|------------|--------------|
| 1 x 16<br>(default) | JP2: Open  | 1            |
|                     | JP3: Open  | 1            |
| 2 x 8               | JP2: Close | 1            |
|                     | JP3: Open  | 1            |
| RSVD                | JP2: Open  | 1            |
|                     | JP3: Close | 1            |
| x 8, x 4, x 4       | JP2: Close | 1            |
|                     | JP3: Close | 1            |

2.4.4 COM1 & COM2 RS-232 Power Selection (JP4, JP5)



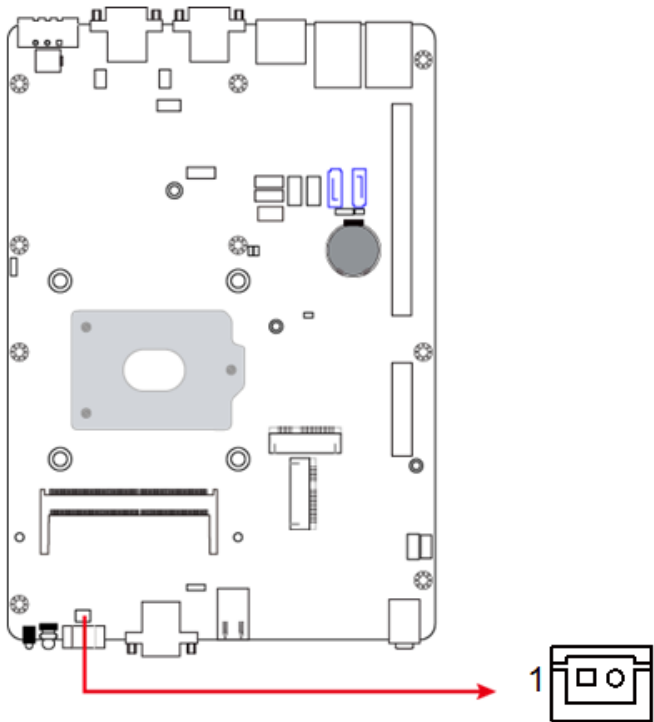
| Function        | Pin closed | Illustration |
|-----------------|------------|--------------|
| 12V             | 1-3        |              |
| RI<br>(default) | 3-4        |              |
| 5V              | 3-5        |              |

## 2.5 Connectors Quick Reference

| Function                                | Connector Name           | Page |
|-----------------------------------------|--------------------------|------|
| Reset Button Connector                  | J1                       | 41   |
| SATA Power Connector                    | J10, J11                 | 42   |
| COM3 & COM4 Ports                       | J12, J9                  | 43   |
| Digital I/O Connector                   | J13                      | 44   |
| CPU Fan Power Connector                 | CPU_FAN1                 | 45   |
| DC-In Power Connector <sup>[1]</sup>    | J20                      | --   |
| Audio Jacks                             | CN1                      | --   |
| USB 2.0 Quad Port                       | CN3                      | --   |
| VGA & DVI-D Ports                       | CN4                      | --   |
| Remote Control Connector <sup>[2]</sup> | CN5                      | --   |
| SATA3 Port                              | CN7, CN8                 | --   |
| Power Button                            | SW1                      | --   |
| LED Indicator for Power                 | LED1                     | --   |
| LAN (GbE) & USB 3.0 Ports               | CN9, CN10                | --   |
| Dual DisplayPort                        | CN11                     | --   |
| COM1 ~ COM4 Ports <sup>[3]</sup>        | CN12, CN13               | --   |
| Micro-SIM Card Slot                     | CN14, CN15               | --   |
| DDR4 SO-DIMM Slot                       | J5, J21                  | --   |
| Ful-Size Mini-PCle Slot                 | J6, J7                   | --   |
| PCIE (x1) & PCIE (x16) Slots            | PCIE1, PCIE2             | --   |
| Factory Use Only                        | J2, J3, J4, J8, J16, J19 | --   |

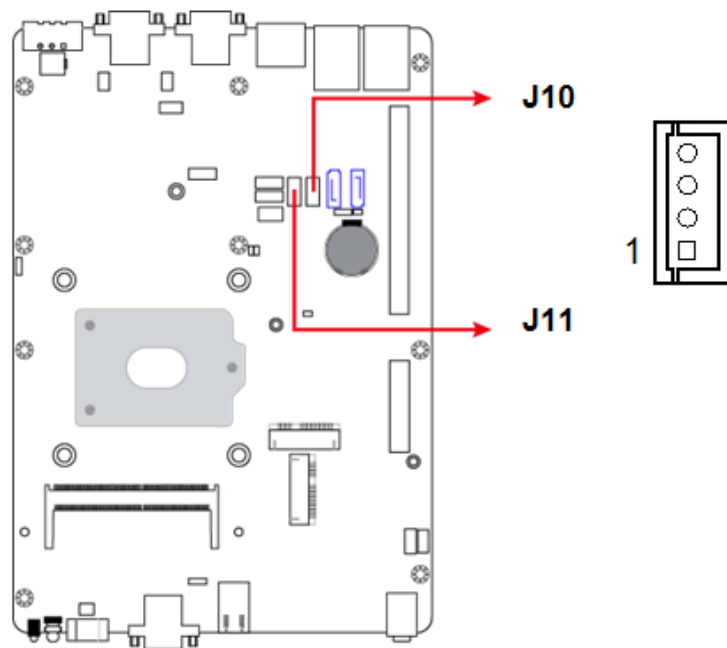
[1], [2], [3] : Refer to 2.1.8 Pinout for COM Ports, DC-In & Power Button Connectors.

2.5.1 Reset Button Connector (J1)



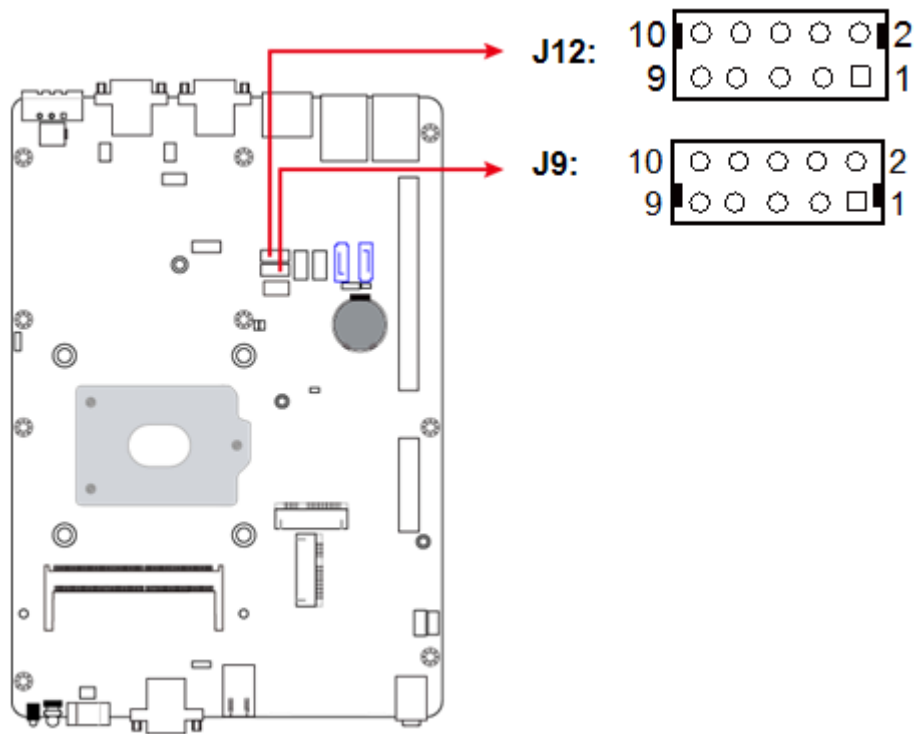
| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1   | Reset BTN  | 2   | Ground     |

## 2.5.2 SATA Power Connector (J10, J11)



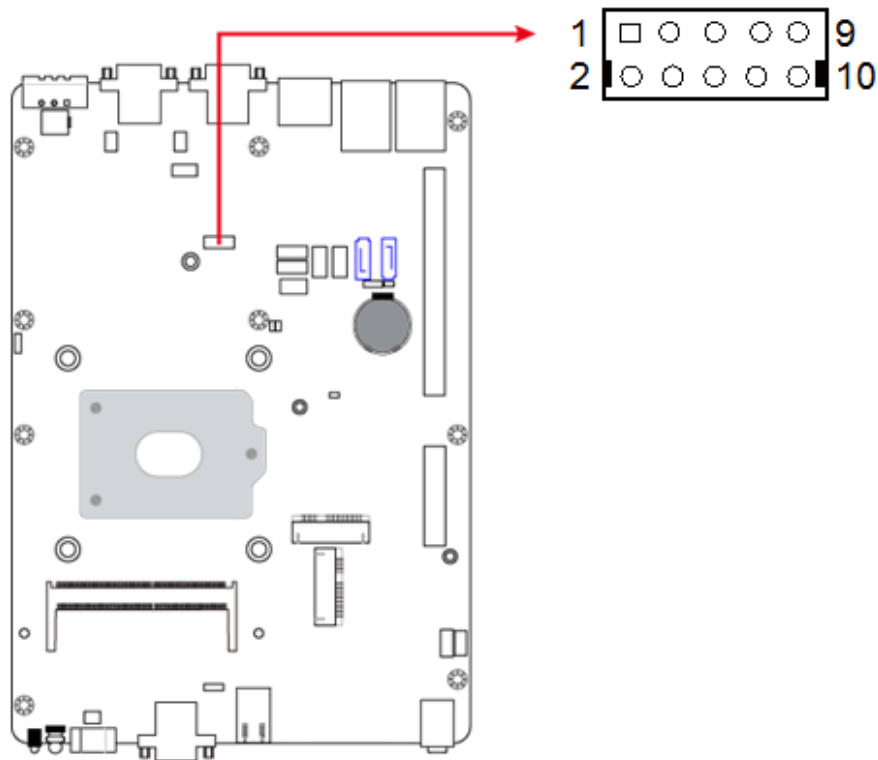
| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1   | 5V         | 3   | Ground     |
| 2   | Ground     | 4   | 12V        |

### 2.5.3 COM3 & COM4 Ports (J12, J9)



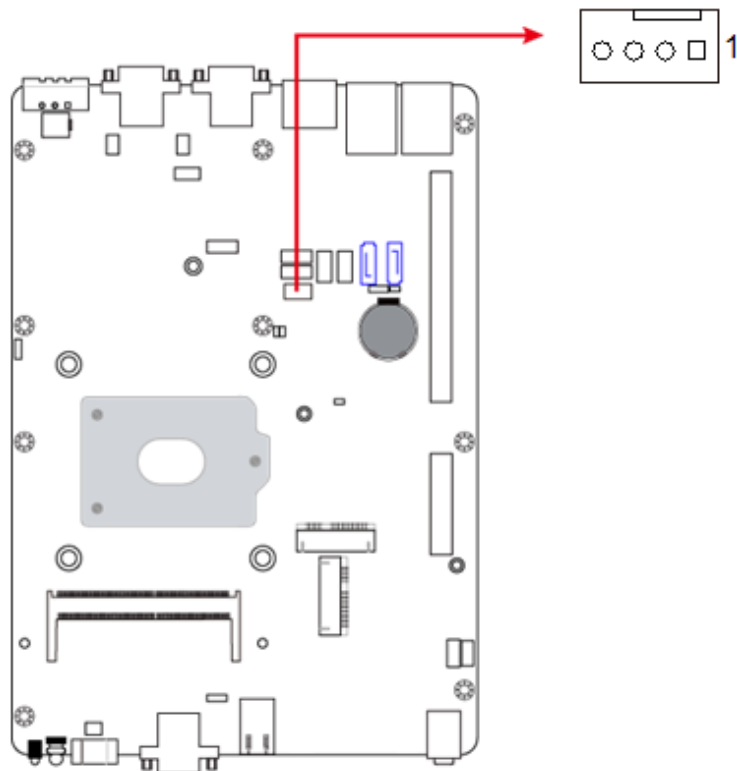
| Pin | Assignment               | Pin | Assignment          |
|-----|--------------------------|-----|---------------------|
| 1   | DCD, Data carrier detect | 2   | RXD, Receive data   |
| 3   | TXD, Transmit data       | 4   | Data terminal ready |
| 5   | Ground                   | 6   | DSR, Data set ready |
| 7   | RTS, Request to send     | 8   | CTS, Clear to send  |
| 9   | RI, Ring indicator       | 10  | 5V                  |

## 2.5.4 Digital I/O Connector (J13)



| Pin | Assignment | Pin | Assignment |
|-----|------------|-----|------------|
| 1   | Ground     | 2   | VCC5       |
| 3   | OUT3       | 4   | OUT1       |
| 5   | OUT2       | 6   | OUT0       |
| 7   | IN3        | 8   | IN1        |
| 9   | IN2        | 10  | IN0        |

### 2.5.5 CPU Fan Power Connector (CPU\_FAN1)



| Pin | Assignment | Pin | Assignment         |
|-----|------------|-----|--------------------|
| 1   | Ground     | 3   | Rotation detection |
| 2   | 12V        | 4   | Control            |

## Chapter 3

# Driver Installation

The information provided in this chapter includes:

- Intel® Chipset Software Installation Utility
- Graphics Driver Installation
- HD Audio Driver Installation
- LAN Driver Installation
- Intel® Management Engine Driver Installation
- USB 3.1 Driver Installation

### 3.1 Introduction

This section describes the installation procedures for software drivers. The software drivers are in a disk enclosed with the product package. If you find anything missing, please contact the distributor where you made the purchase.

---

**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. Insert the disk enclosed in the package. Click **Intel** and then **Intel(R) Skylake Chipset Drivers**.



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



3. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next** to continue.
4. Accept the software license agreement and proceed with the installation process.
5. On the *Readme File Information* screen, click **Next** for installation.
6. When the driver has been completely installed, restart the computer for changes to take effect.

### 3.3 Graphics Driver Installation

1. Insert the disk enclosed in the package. Click **Intel** and then **Intel(R) Skylake Chipset Drivers**.



2. Click **Intel(R) HD Graphics Driver**.



3. When the *Welcome* screen appears, click **Next** to continue.
4. Agree with the license agreement and click **Install** for installation.
5. When the driver has been completely installed, restart the computer for changes to take effect.

### 3.4 HD Audio Driver Installation

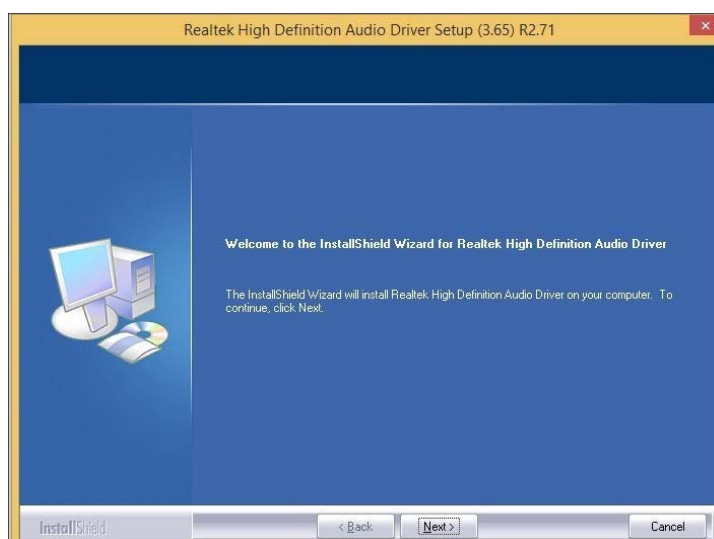
1. Insert the disk enclosed in the package. Click **Intel** and then **Intel(R) Skylake Chipset Drivers**.



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



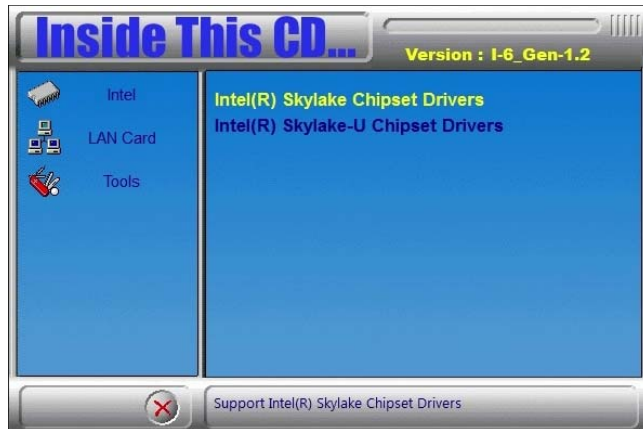
3. On the *Welcome* screen of the InstallShield Wizard, click **Next** for installation.



4. When the driver has been completely installed, restart the computer for changes to take effect.

### 3.5 LAN Driver Installation

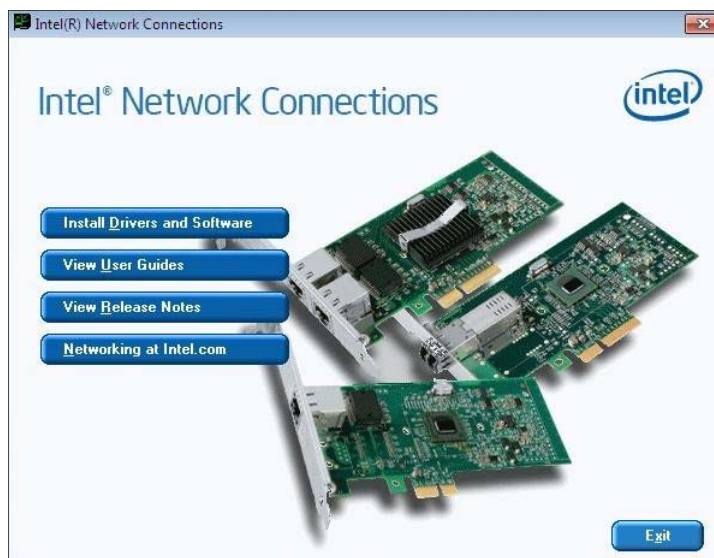
1. Insert the disk enclosed in the package with the product. Click **LAN Card** and then **Intel(R) Skylake Chipset Drivers**



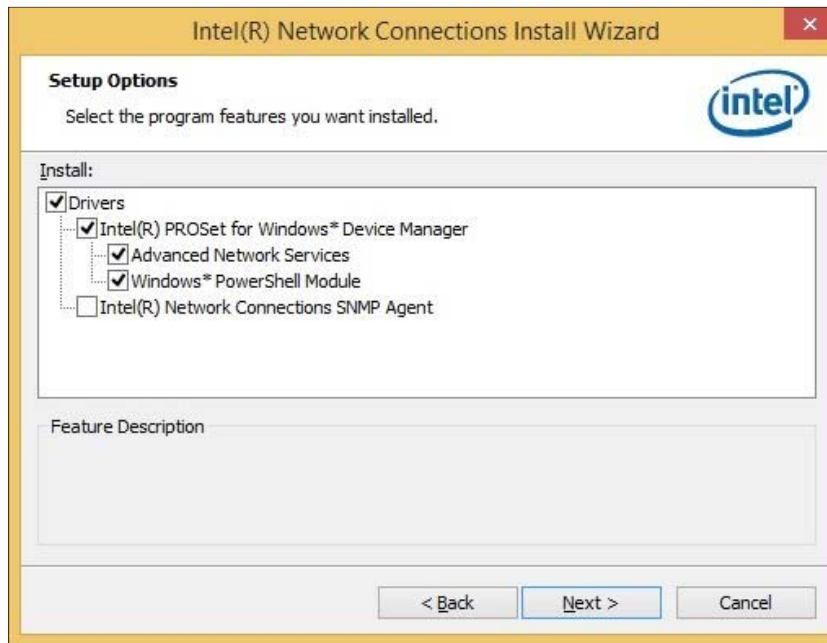
2. Click **Intel(R) PRO LAN Network Drivers..**



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



4. When the *Welcome* screen appears, click **Next** to continue.
5. Accept the license agreement and click **Next** to continue.
6. Tick the checkbox for **Drivers** to select the related drivers and click **Next**.



7. When the wizard is ready for installation, click **Install**.
8. As the driver has been completely installed, restart the computer for changes to take effect.

### 3.6 Intel® Management Engine Driver Installation

1. Insert the disk enclosed in the package. Click **Intel** and then **Intel(R) Skylake Chipset Drivers**.



2. Click **Intel(R) ME 11.x Drivers**.



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



4. Accept the licence agreement and click **Next** to continue.
5. As the driver has been completely installed, restart the computer for changes to take effect.

### 3.7 USB 3.1 Driver Installation

1. Insert the disk enclosed in the package. Click **Intel** and then **Intel(R) Skylake Chipset Drivers**.



2. Click **ASMedia USB 3.1 Drivers**.



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



4. When the driver has been completely installed, restart the computer for changes to take effect.

## Chapter 4

# BIOS Setup

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

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

## 4.1 Introduction

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

## 4.2 BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Press the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. You can also press <F7> to call the pop-up Boot menu immediately.

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.

---

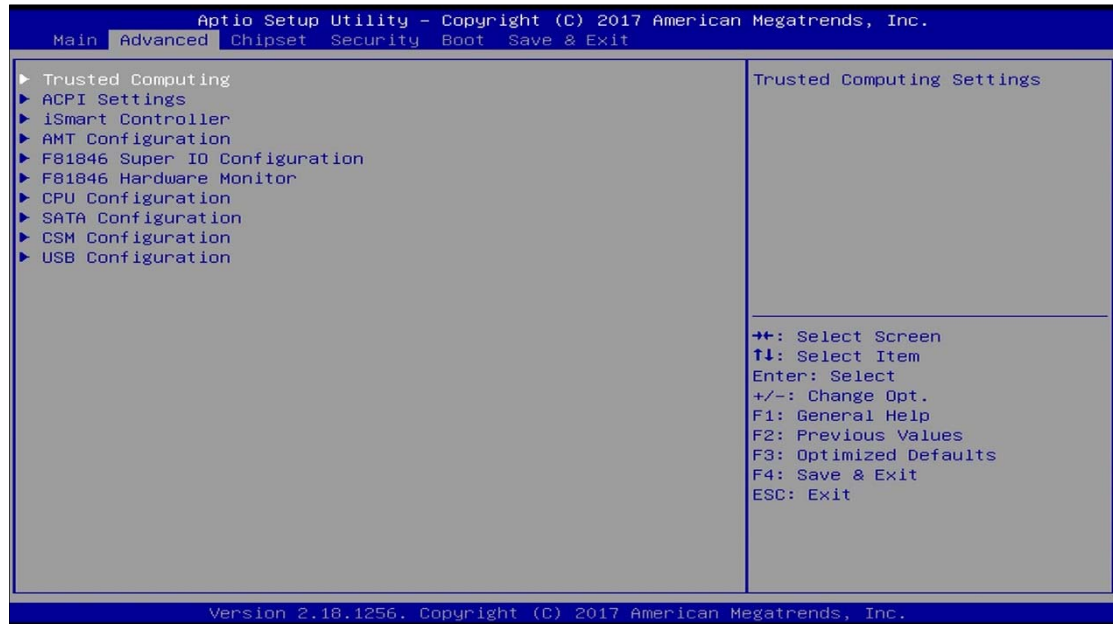
## 4.3 Main Settings



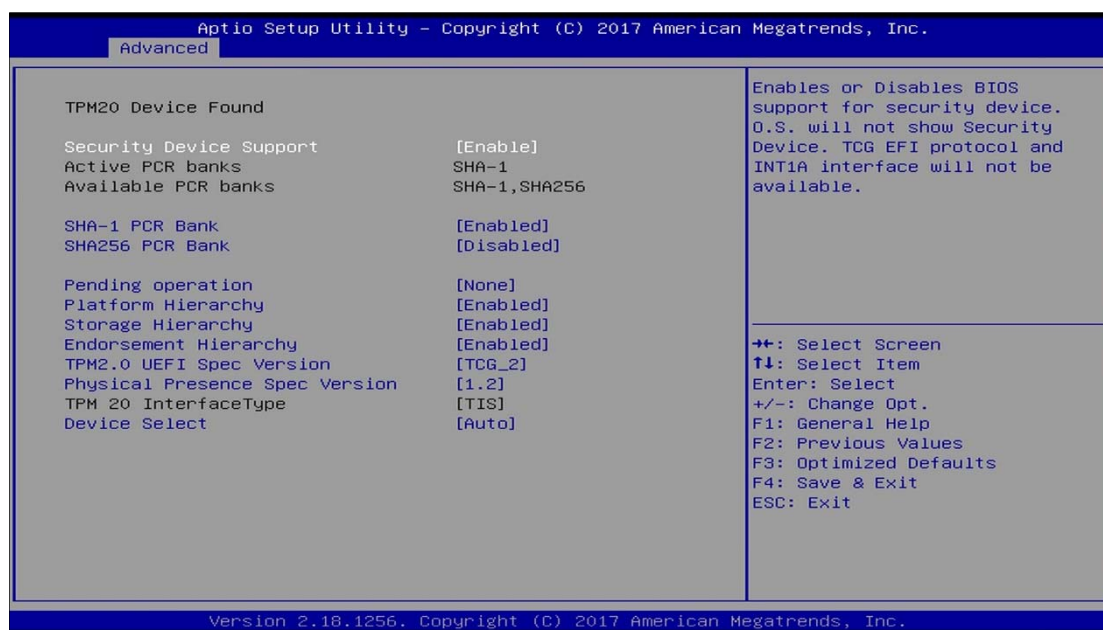
| BIOS Setting    | Description                                                              |
|-----------------|--------------------------------------------------------------------------|
| System Language | Choose the system default language.                                      |
| System Date  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

## 4.4 Advanced Settings

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

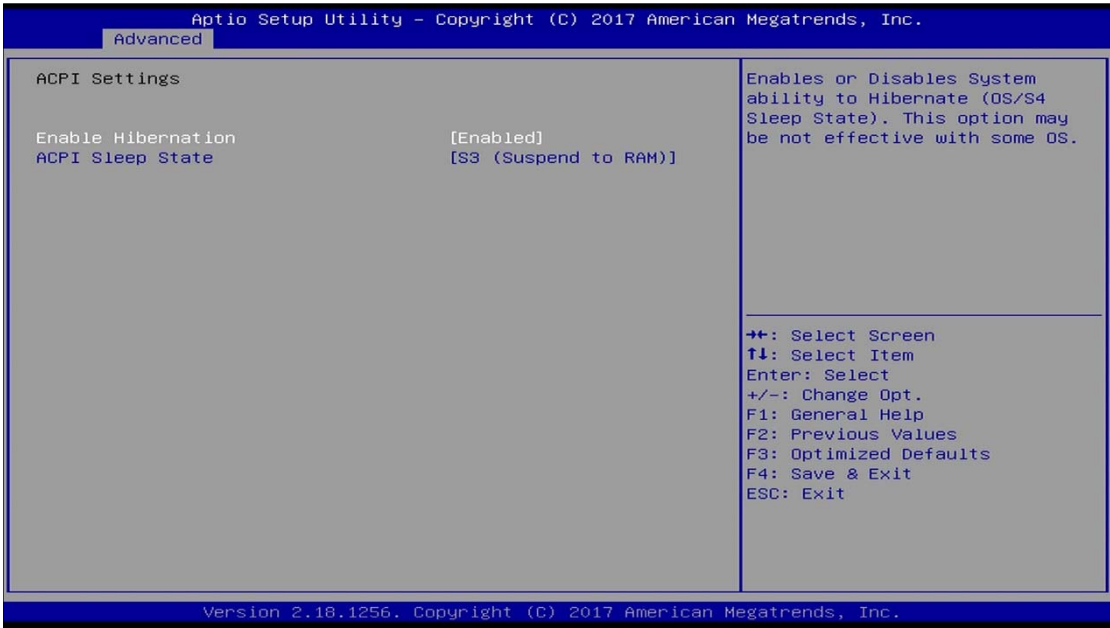


## 4.4.1 Trusted Computing



| BIOS Setting            | Description                                                                                                                                                                        |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Security Device Support | <p>Enables / Disables BIOS support for security device. The operating system will not show security device.</p> <p>TCG EFI protocol and INT1A interface will not be available.</p> |

### 4.4.2 ACPI Settings



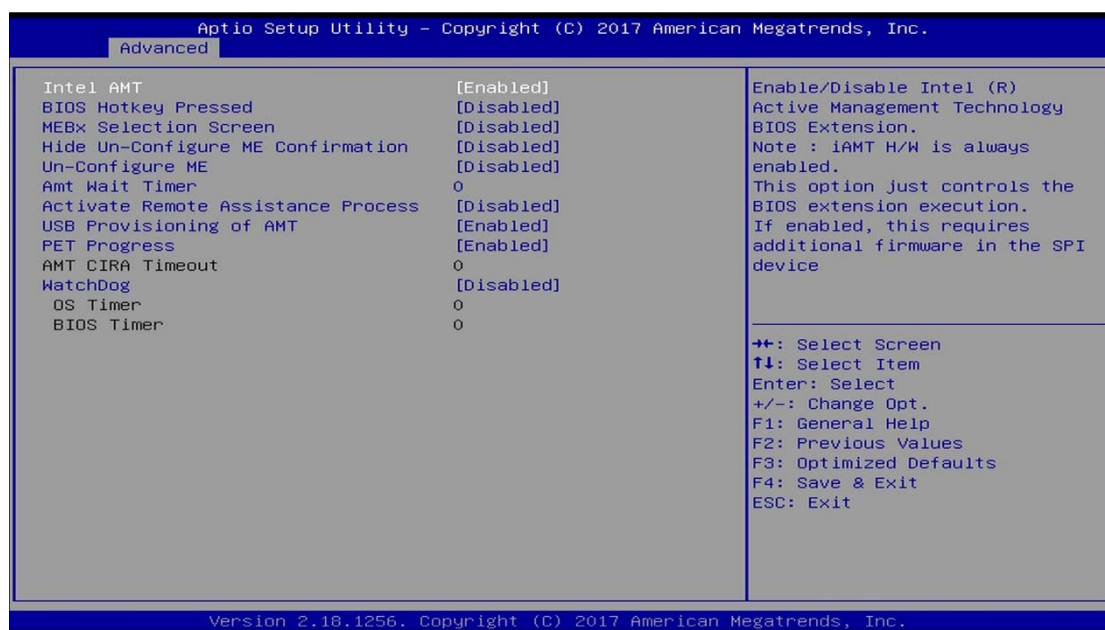
| BIOS Setting       | Description                                                                                                            |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| Enable Hibernation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

### 4.4.3 iSmart Controller



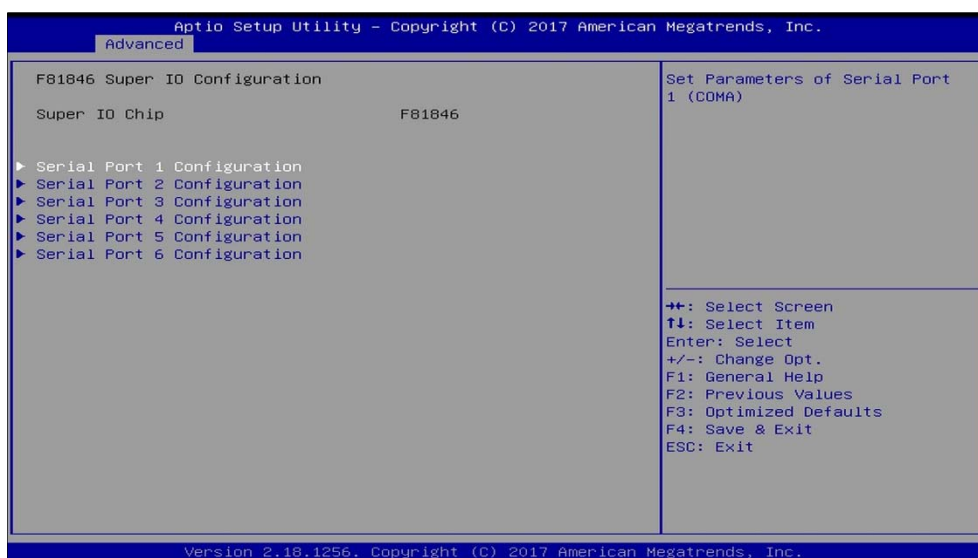
| BIOS Setting                 | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power-On after Power failure | Enables / Disables the system to be turned on automatically after a power failure.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Power Resume Delay           | Enables / Disables to delay the time for system to turn on.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Temperature Guardian         | Generate the reset signal when system hands up on POST.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Schedule Slot 1 / 2          | <p>Sets up the hour / minute / day for the power-on schedule for the system.</p> <p>Options:</p> <ul style="list-style-type: none"> <li>• None</li> <li>• Power On</li> <li>• Power On / Off</li> </ul> <p><b>Important:</b> If you would like to set up a schedule between adjacent days, configure two schedule slots.</p> <p>For example, if setting up a schedule from Wednesday 5 p.m. to Thursday 2 a.m., configure two schedule slots. But if setting up a schedule from 3 p.m to 5 p.m. on Wednesday, configure only a schedule slot.</p> |

#### 4.4.4 AMT Configuration



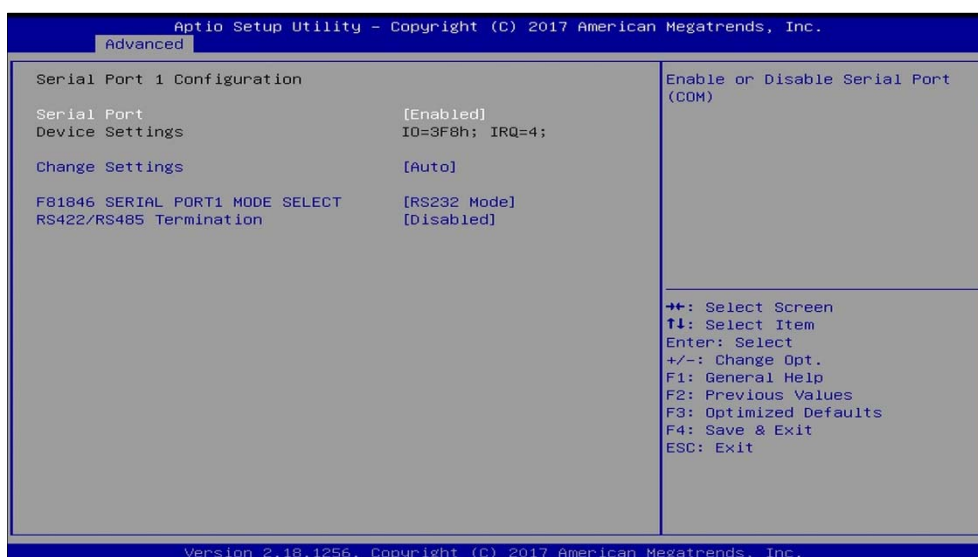
| BIOS Setting                      | Description                                                                                                                                                                                                                             |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Intel AMT                         | Enables / Disables Intel(R) Active Management Tecnology BIOS Extension.<br>Note: iAMT H/W is alwas enabled.<br>This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device. |
| BIOS Hotkey Pressed               | OEMFlag Bit 1: enables or disables BIOS hotkey press.                                                                                                                                                                                   |
| MEBx Selection Screen             | OEMFlag Bit 2: enables or disables MEBx selection screen.                                                                                                                                                                               |
| Hide Un-Configure ME Confirmation | OEMFlag Bit 6: hides unconfigure ME without passowrd confirmation prompt.                                                                                                                                                               |
| Unconfigure Me                    | OEMFlag Bit 15: unconfigure ME without passowrd.                                                                                                                                                                                        |
| Amt Wait Timer                    | Sets timer to wait before sending ASF_GET_BOOT_OPTIONS.                                                                                                                                                                                 |
| Active Remote Assistance Process  | Triggers CIRA boot.                                                                                                                                                                                                                     |
| USB Configure                     | Enables / Disables USB configure function.                                                                                                                                                                                              |
| PET Progress                      | Enables / Disables PET events progress to receive PET events or not.                                                                                                                                                                    |
| WatchDog                          | Enables / Disables watchdog timer.                                                                                                                                                                                                      |

## 4.4.5 F81846 Super IO Configuration



| BIOS Setting              | Description                                                                                                                          |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Serial Port Configuration | Sets Parameters of Serial Ports.<br>You can enable / disable the serial port and select an optimal settings for the Super IO device. |

### 4.4.5.1. Serial Port 1 Configuration



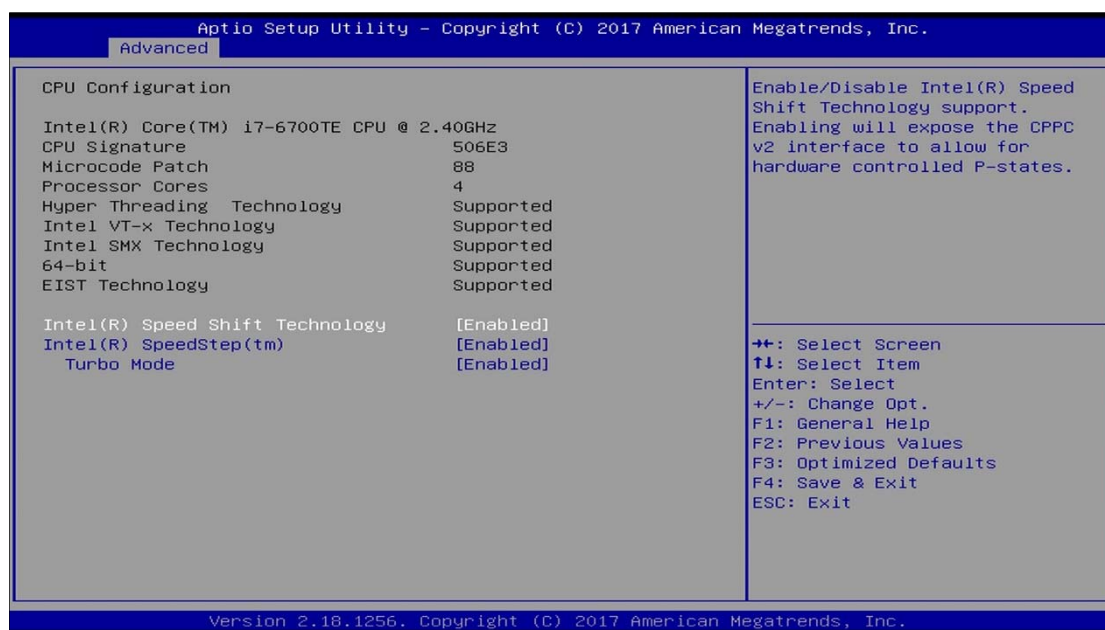
| BIOS Setting    | Description                                           |
|-----------------|-------------------------------------------------------|
| Change Settings | Selects an optimal settings for the Super I/O device. |
| Device Mode     | Changes the mode of serial port.                      |

#### 4.4.6 F81846 Hardware Monitor



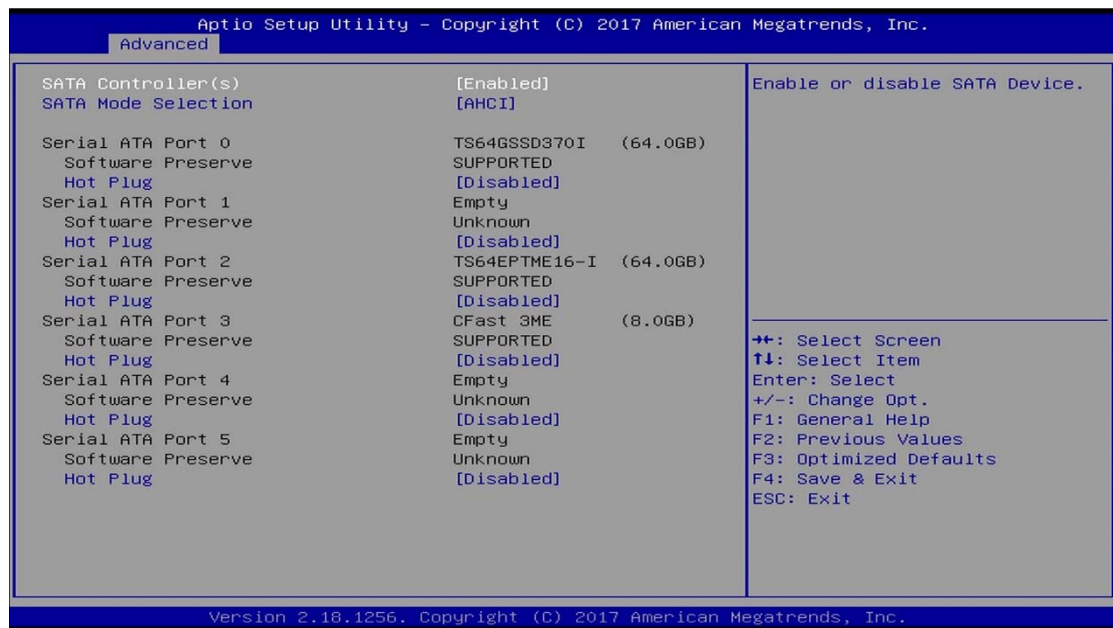
| BIOS Setting             | Description                                                                                                                                                                          |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Smart Fan Control    | Controls the CPU fan temperature by setting up a threshold temperature.<br><br>Options: Disabled (default), 50 °C, 60 °C, 70 °C, 80 °C                                               |
| CPU Shutdown Temperature | This field enables or disables the Shutdown Temperature<br><br>Options: Disabled (default), 70 °C, 75 °C, 80 °C, 85 °C, 90 °C, 95 °C                                                 |
| Temperatures / Voltages  | These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only as monitored by the system and showing the PC health status |

## 4.4.7 CPU Configuration



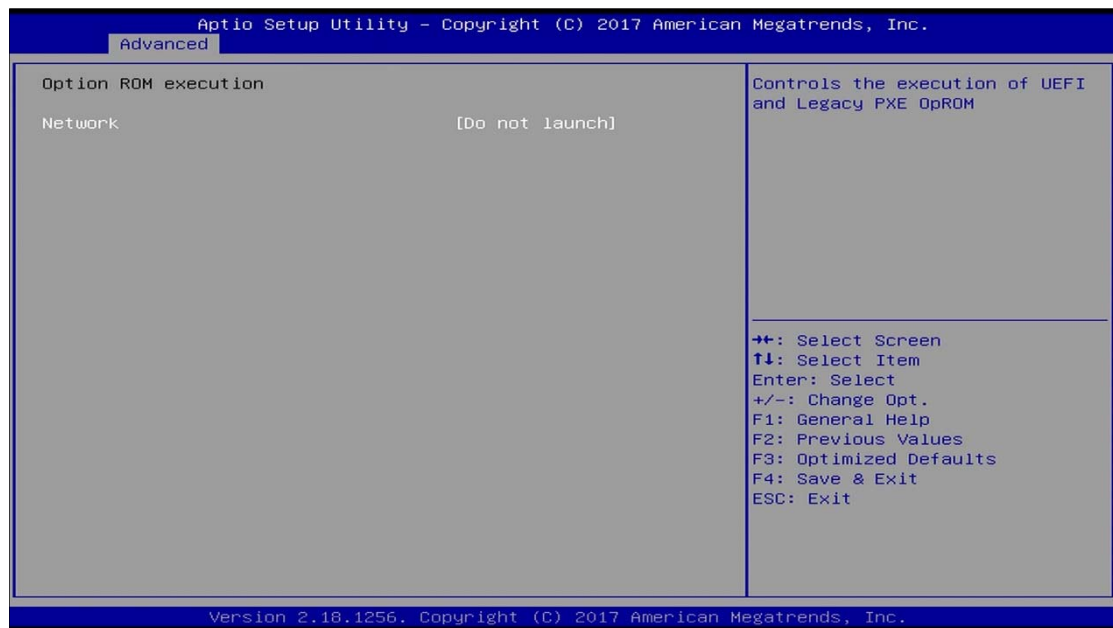
| BIOS Setting                    | Description                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Intel(R) Speed Shift Technology | Enables / Disables Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states. |
| Intel(R) SpeedStep (tm)         | Enables / Disables the function to allow more than two frequency ranges to be supported.                                                          |
| Turbo Mode                      | Enables / Disables Turbo Mode.                                                                                                                    |

### 4.4.8 SATA Configuration



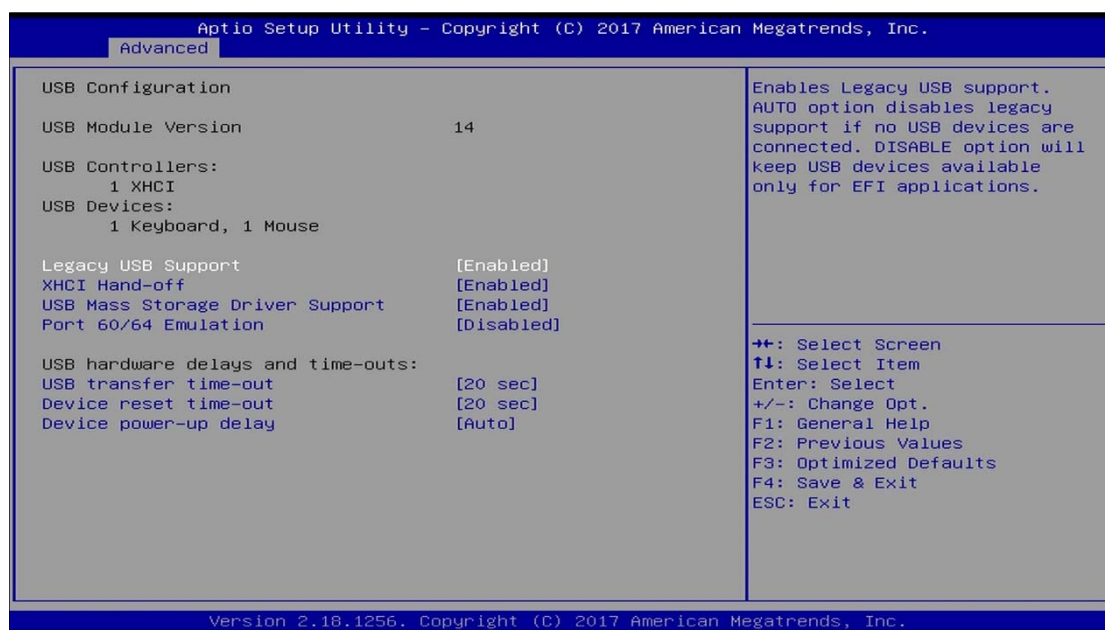
| BIOS Setting            | Description                                 |
|-------------------------|---------------------------------------------|
| SATA Controller(s)      | Enables / Disables SATA device.             |
| SATA Mode Selection     | Selects IDE / AHCI Mode.                    |
| Serial ATA Port 0~5     | Enables / Disables Serial Port 0 ~ 5.       |
| SATA Port 0 ~ 5 HotPlug | Enables / Disables SATA Port 0 ~ 5 HotPlug. |

## 4.4.9 CSM Configuration



| BIOS Setting | Description                                          |
|--------------|------------------------------------------------------|
| Network      | Controls the execution of UEFI and Legacy PXE OpROM. |

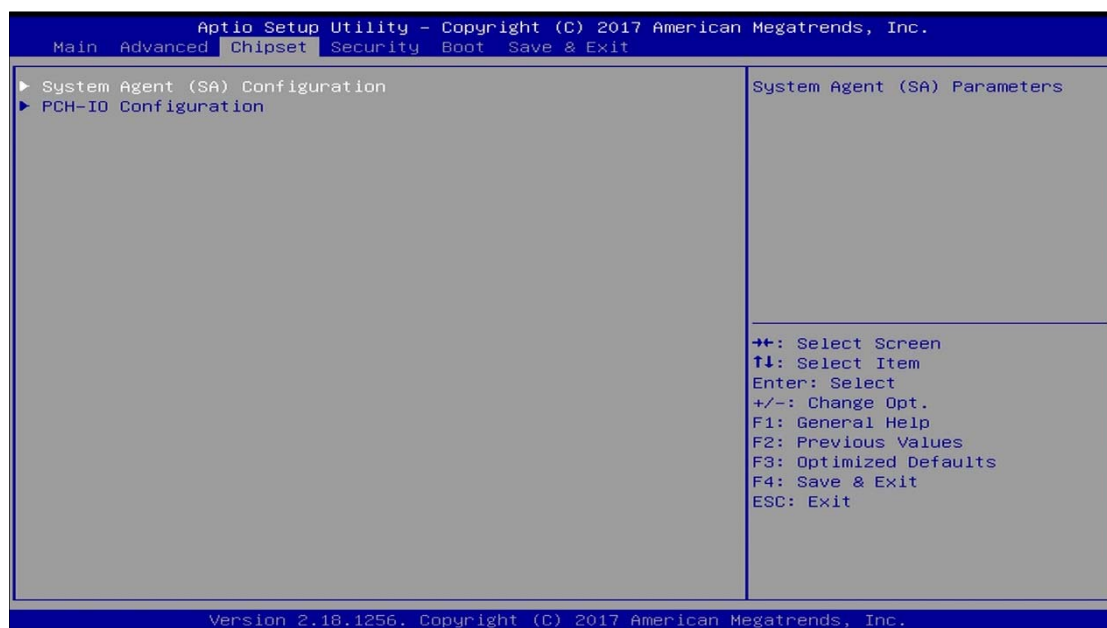
### 4.4.10 USB Configuration



| BIOS Setting                    | Description                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Legacy USB Support              | Enables / Disables Legacy USB support. <ul style="list-style-type: none"> <li><b>Auto</b> disables legacy support if there is no USB device connected.</li> <li><b>Disable</b> keeps USB devices available only for EFI applications.</li> </ul> |
| XHCI Hand-pff                   | This is a workaround for OSeS without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.                                                                                                                         |
| USB Mass Storage Driver Support | Enables / Disables USB mass storage driver support.                                                                                                                                                                                              |
| Port 60/64 Emulation            | Enables / Disables I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSeS.                                                                                               |
| USB Transfer time-out           | Sets the time-out value 1, 5, 10 or 20 sec(s) for Control, Bulk, and Interrupt transfers.                                                                                                                                                        |
| Device reset time-out           | Sets the seconds (10, 20, 30, 40 secs) of delaying execution of start unit command to USB mass storage device.                                                                                                                                   |

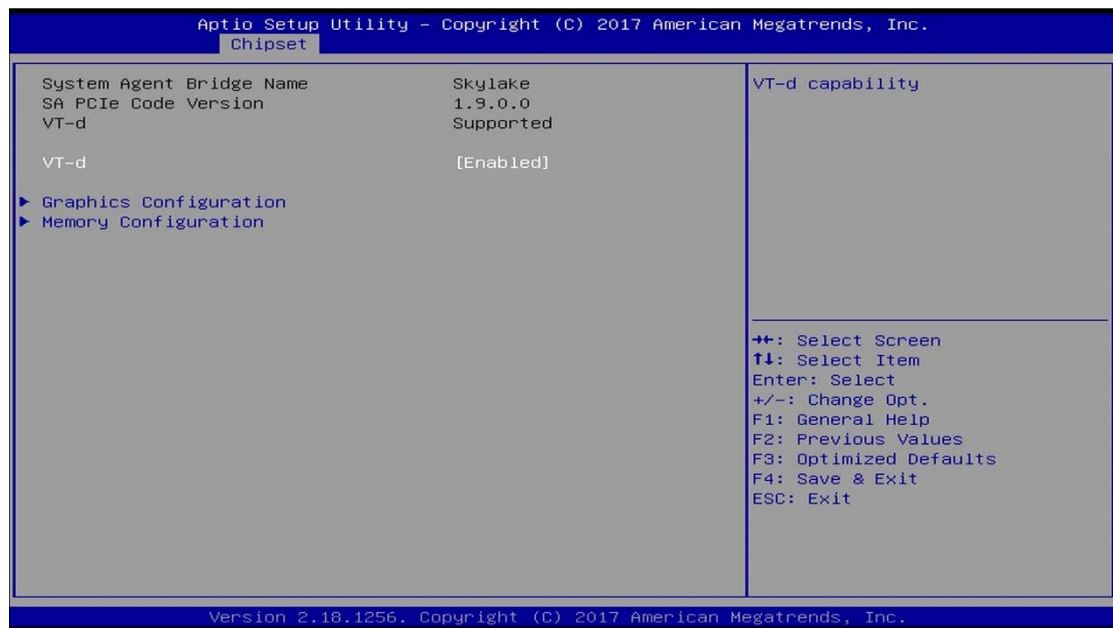
| BIOS Setting          | Description                                                                                                                                                                                                                          |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Device power-up delay | <p>The maximum time the device will take before it properly reports itself to the Host Controller.</p> <p><b>Auto</b> uses default value. For a Root port, it is 100 ms. For a Hub port, the delay is taken from Hub descriptor.</p> |

## 4.5 Chipset Settings



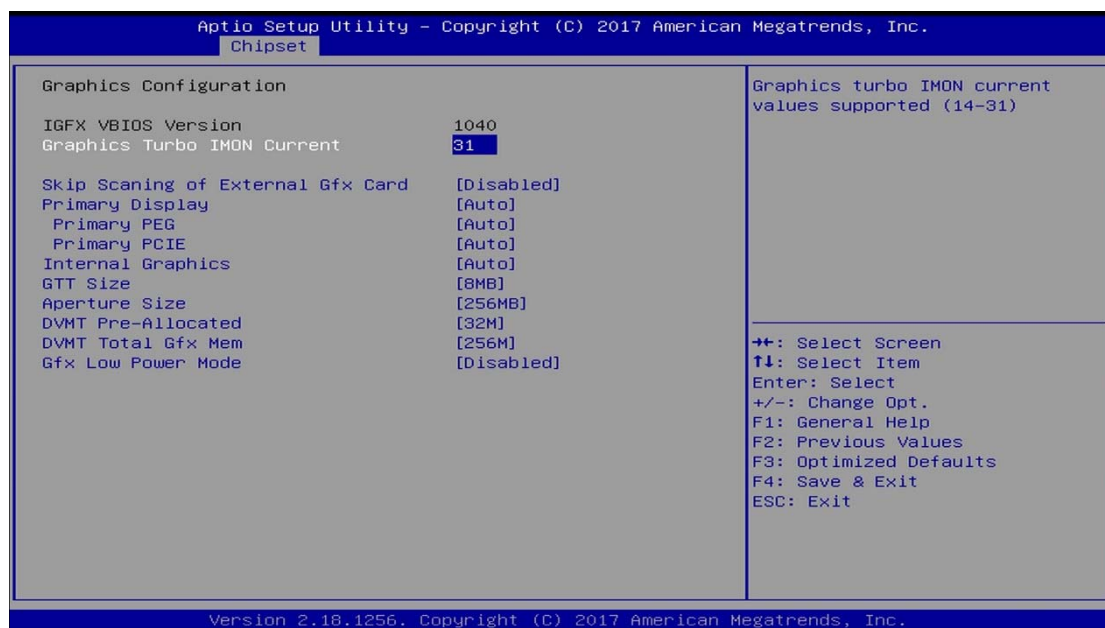
| BIOS Setting                    | Description                  |
|---------------------------------|------------------------------|
| System Agent (SA) Configuration | System Agent (SA) parameters |
| PCH-IO Configuration            | PCH parameters               |

## 4.5.1 System Agent (SA) Configuration



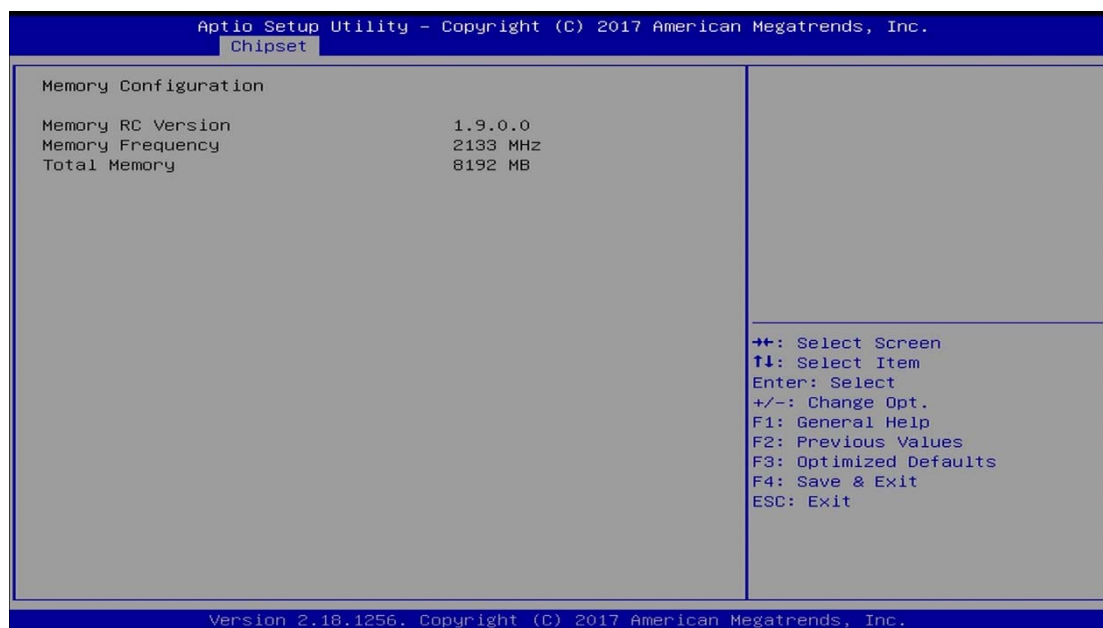
| BIOS Setting           | Description                                   |
|------------------------|-----------------------------------------------|
| VT-d                   | Checks if VT-d function on MCH is supported.  |
| Graphics Configuration | Configures the graphics settings.             |
| Memory Configuration   | Displays the memory configuration parameters. |

## 4.5.1.1. Graphics Configuration

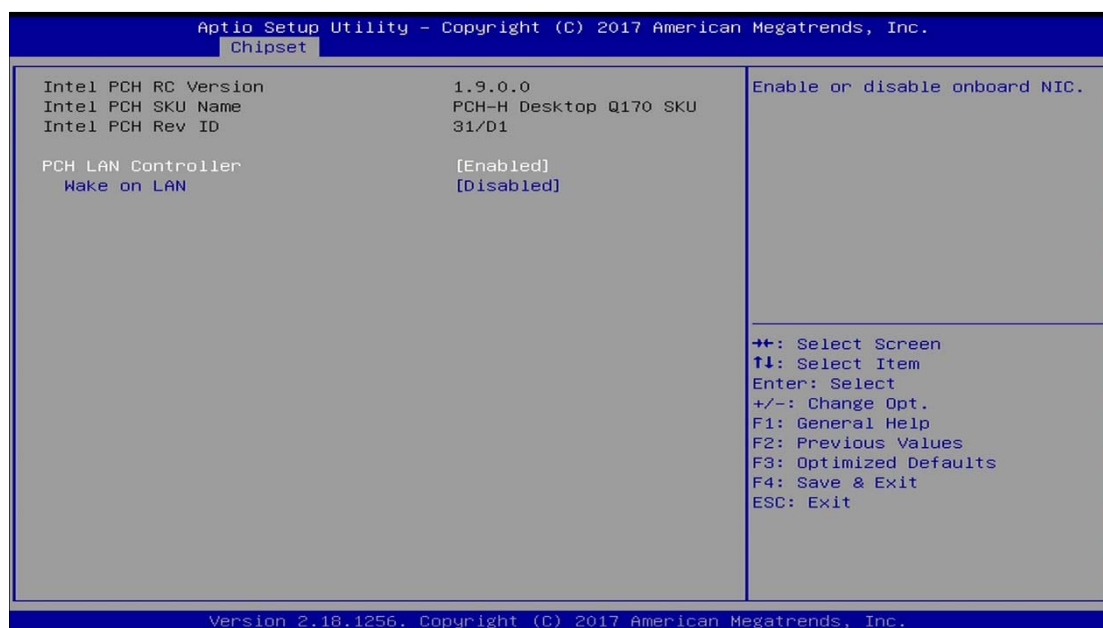


| BIOS Setting                       | Description                                                                                                                                                                                                          |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Graphics Turbo IMON Current        | Graphics turbo IMON current values supported (14-31).                                                                                                                                                                |
| Skip Scanning of External Gfx Card | If enabled, it will not scan for external Gfx Card on PEG and PCH PCIE ports.                                                                                                                                        |
| Primary Display                    | Selects which of IGFX/PEG/PCI graphics device should be primary display, or selects SG for switchable Gfx.                                                                                                           |
| Internal Graphics                  | Keep IGFX enabled based on the setup options.                                                                                                                                                                        |
| GTT Size                           | Sets the GTT size as 2 MB, 4 MB, or 8 MB.                                                                                                                                                                            |
| Aperture Size                      | Sets the aperture size as 128 MB / 256 MB / 512 MB / 1024 MB / 2048 MB.<br>Note: Above 4 GB MMIO BIOS assignment is automatically enabled when selecting 2048 MB aperture. To use this feature, disable CSM support. |
| DVMT Pre-Allocated                 | Sets DVMT 5.0 pre-allocated (fixed) graphics memory size used by the internal graphics device.                                                                                                                       |
| DVMT Total Gfx Mem                 | Selects DVMT 5.0 total graphic memory size used by the internal graphics device.                                                                                                                                     |

### 4.5.1.2. Memory Configuration



### 4.5.2 PCH-IO Configuration



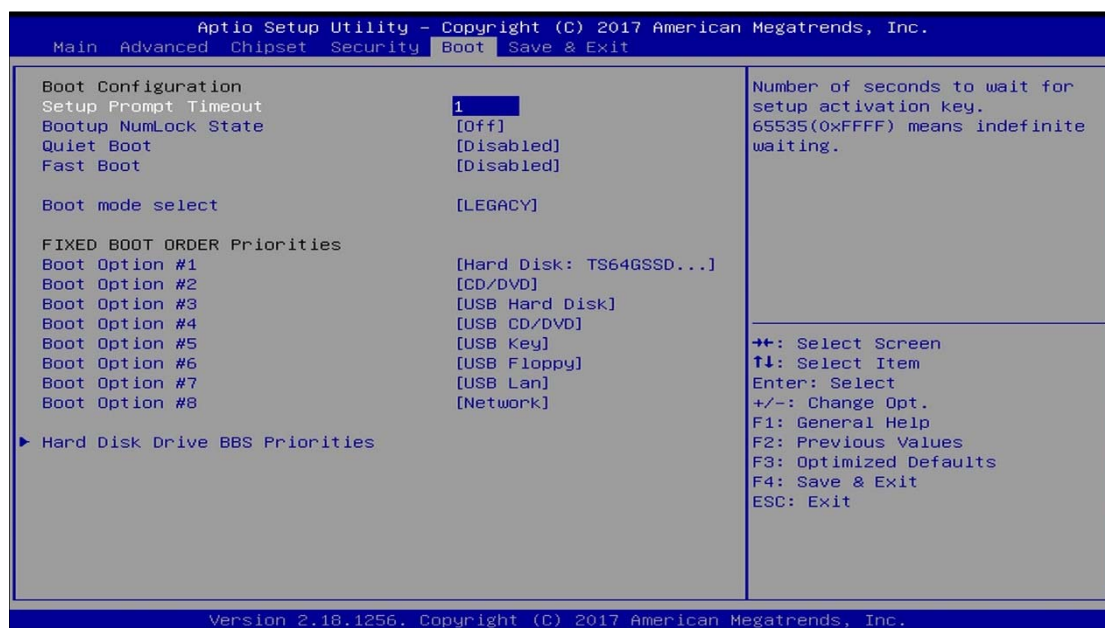
| BIOS Setting       | Description                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------------------|
| PCH LAN Controller | Enables / Disables onboard NIC.                                                                                  |
| Wake on LAN        | Enables / Disables integrated LAN to wake the system. (The Wake on LAN cannot be disabled if ME is at Sx state.) |

## 4.6 Security Settings



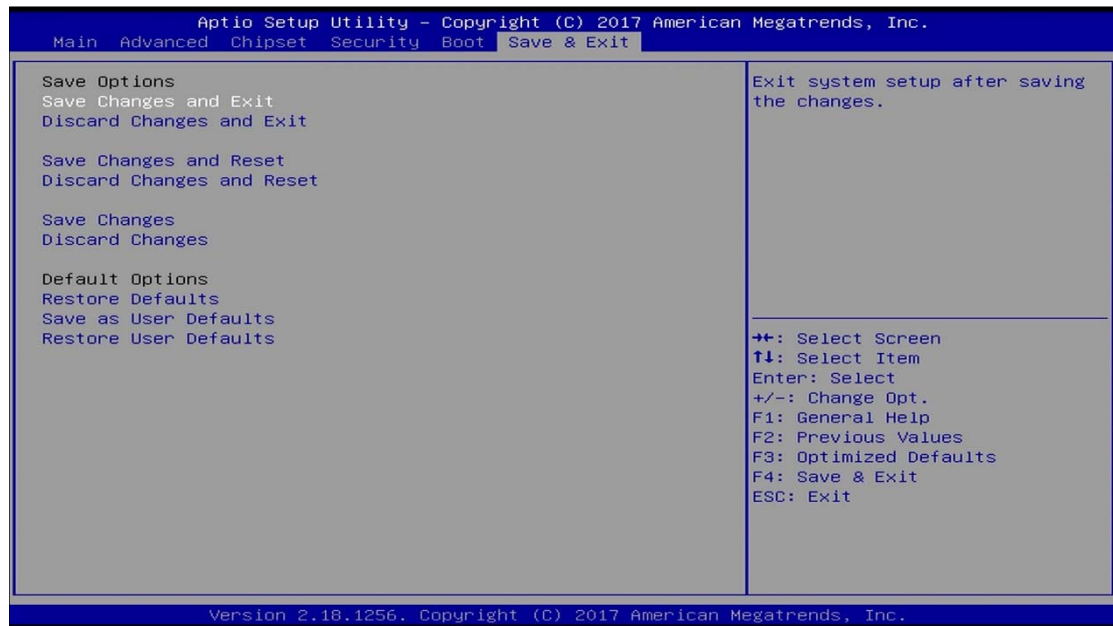
| BIOS Setting           | Description                                           |
|------------------------|-------------------------------------------------------|
| Administrator Password | Sets an administrator password for the setup utility. |
| User Password          | Sets a user password.                                 |

## 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 NumLock State   | Selects the keyboard NumLock state.                                                                                                                    |
| Quiet Boot             | Enables / Disables Quiet Boot option.                                                                                                                  |
| Fast Boot              | Enables / Disables boot with initialization of a minimal set of devices required to launch the active boot option. Has no effect for BBS boot options. |
| Boot mode select       | Selects a Boot mode, Legacy / UEFI.                                                                                                                    |
| Boot Option Priorities | Sets the system boot order priorities for hard disk, CD/DVD, USB, Network.                                                                             |

## 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.        |

## Appendix

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

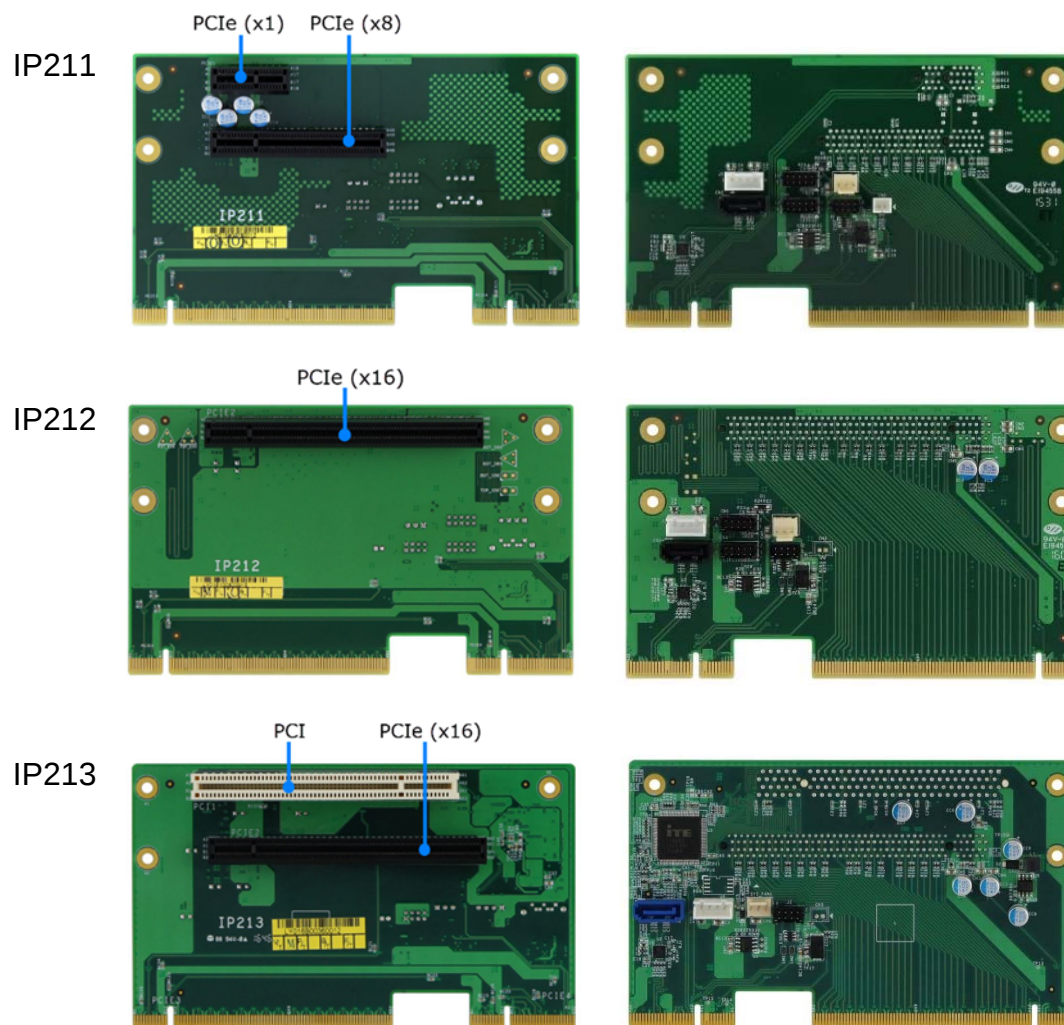
- Compatible Expansion Cards for AMI221 & AMI222
- I/O Port Address Map
- Interrupt Request Lines (IRQ)
- Watchdog Timer Configuration

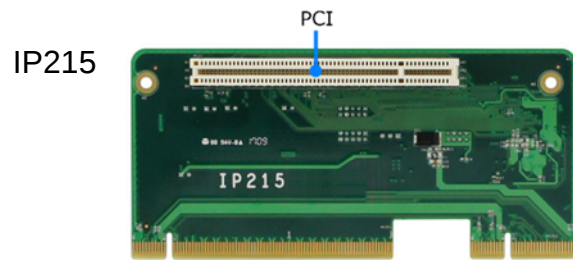
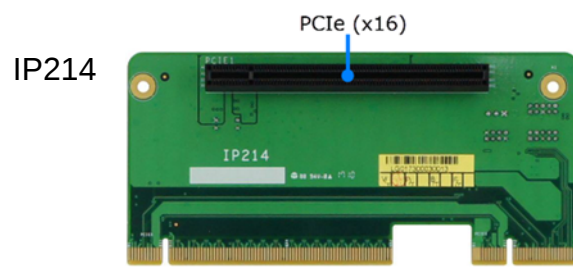
## A. Compatible Expansion Cards for AMI221 & AMI222

Compatible expansion cards: (with AMI221 & AMI222 are as follows)

| Name  | Features                                                                      | Compatible System |
|-------|-------------------------------------------------------------------------------|-------------------|
| IP211 | 1 x PCIe (x1), 1 x PCIe (x8), 2 x COM (COM5 & COM6), 1 x SATA II, 2 x USB 2.0 | AMI222            |
| IP212 | 1 x PCIe (x16), 2 x COM (COM5 & COM6), 1 x SATA II, 2 x USB 2.0               | AMI222            |
| IP213 | 1 x PCI, 1 x PCIe (x16), 1 x SATA III, 2 x USB 2.0                            | AMI222            |
| IP214 | 1 x PCIe (x16), 2 x COM (COM5 & COM6), 2 x USB 2.0                            | AMI221            |
| IP215 | 1 x PCI, 2 x COM (COM5 & COM6), 2 x USB 2.0                                   | AMI221            |

### Expansion Cards Product View





## B. I/O Port Address Map

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

| Address               | Device Description                |
|-----------------------|-----------------------------------|
| 0x00000A00-0x00000A0F | Motherboard resources             |
| 0x00000A10-0x00000A1F | Motherboard resources             |
| 0x00000A20-0x00000A2F | Motherboard resources             |
| 0x0000002E-0x0000002F | Motherboard resources             |
| 0x0000004E-0x0000004F | Motherboard resources             |
| 0x00000061-0x00000061 | Motherboard resources             |
| 0x00000063-0x00000063 | Motherboard resources             |
| 0x00000065-0x00000065 | Motherboard resources             |
| 0x00000067-0x00000067 | Motherboard resources             |
| 0x00000070-0x00000070 | Motherboard resources             |
| 0x00000070-0x00000070 | System CMOS/real time clock       |
| 0x00000080-0x00000080 | Motherboard resources             |
| 0x00000092-0x00000092 | Motherboard resources             |
| 0x000000B2-0x000000B3 | Motherboard resources             |
| 0x00000680-0x0000069F | Motherboard resources             |
| 0x0000FFFF-0x0000FFFF | Motherboard resources             |
| 0x0000FFFF-0x0000FFFF | Motherboard resources             |
| 0x0000FFFF-0x0000FFFF | Motherboard resources             |
| 0x00001800-0x000018FE | Motherboard resources             |
| 0x0000164E-0x0000164F | 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 |

| Address               | Device Description                                                             |
|-----------------------|--------------------------------------------------------------------------------|
| 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                                              |
| 0x00000800-0x0000087F | Motherboard resources                                                          |
| 0x0000E000-0x0000EFFF | Intel(R) 100 Series/C230 Series Chipset Family PCI Express Root Port #6 - A115 |
| 0x000000F0-0x000000F0 | Numeric data processor                                                         |
| 0x0000F090-0x0000F097 | Standard SATA AHCI Controller                                                  |
| 0x0000F080-0x0000F083 | Standard SATA AHCI Controller                                                  |
| 0x0000F060-0x0000F07F | Standard SATA AHCI Controller                                                  |
| 0x000003F8-0x000003FF | Communications Port (COM1)                                                     |
| 0x000002F8-0x000002FF | Communications Port (COM2)                                                     |
| 0x000003E8-0x000003EF | Communications Port (COM3)                                                     |
| 0x000002E8-0x000002EF | Communications Port (COM4)                                                     |
| 0x000002F0-0x000002F7 | Communications Port (COM5)                                                     |
| 0x000002E0-0x000002E7 | Communications Port (COM6)                                                     |
| 0x00000040-0x00000043 | System timer                                                                   |
| 0x00000050-0x00000053 | System timer                                                                   |
| 0x00001854-0x00001857 | Motherboard resources                                                          |
| 0x00000000-0x00000CF7 | PCI Express Root Complex                                                       |
| 0x00000D00-0x0000FFFF | PCI Express Root Complex                                                       |
| 0x0000F0A0-0x0000F0A7 | Intel(R) Active Management Technology - SOL (COM7)                             |
| 0x0000F000-0x0000F03F | Intel(R) HD Graphics 630                                                       |
| 0x000003B0-0x000003BB | Intel(R) HD Graphics 630                                                       |

| Address               | Device Description                                                             |
|-----------------------|--------------------------------------------------------------------------------|
| 0x000003C0-0x000003DF | Intel(R) HD Graphics 630                                                       |
| 0x0000FF00-0x0000FFFE | Motherboard resources                                                          |
| 0x0000F040-0x0000F05F | Intel(R) 100 Series/C230 Series Chipset Family SMBus - A123                    |
| 0x00000060-0x00000060 | Standard PS/2 Keyboard                                                         |
| 0x00000064-0x00000064 | Standard PS/2 Keyboard                                                         |
| 0x0000D000-0x0000DFFF | Intel(R) 100 Series/C230 Series Chipset Family PCI Express Root Port #7 - A116 |

## C. 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 4                           | Communications Port (COM1)                                                                 |
| IRQ 5                           | Communications Port (COM3)                                                                 |
| IRQ 7                           | Communications Port (COM4)                                                                 |
| IRQ 8                           | System CMOS/real time clock                                                                |
| IRQ 10                          | Communications Port (COM5)                                                                 |
| IRQ 11                          | Communications Port (COM6)                                                                 |
| IRQ 11                          | Intel(R) Xeon(R) E3 - 1200/1500 v5/6th Gen Intel(R) Core(TM) Gaussian Mixture Model - 1911 |
| IRQ 11                          | Intel(R) 100 Series/C230 Series Chipset Family SMBus - A123                                |
| IRQ 11                          | Intel(R) 100 Series/C230 Series Chipset Family Thermal subsystem - A131                    |
| IRQ 12                          | Microsoft PS/2 Mouse                                                                       |
| IRQ 13                          | Numeric data processor                                                                     |
| IRQ 14                          | Motherboard resources                                                                      |
| IRQ 16                          | High Definition Audio Controller                                                           |
| IRQ 19                          | Intel(R) Active Management Technology - SOL (COM7)                                         |
| IRQ 54 ~ IRQ 204                | Microsoft ACPI-Compliant System                                                            |
| IRQ 256 ~ IRQ 511               | Microsoft ACPI-Compliant System                                                            |
| IRQ 4294967278                  | Intel(R) Management Engine Interface                                                       |
| IRQ 4294967279 ~ IRQ 4294967284 | Intel(R) I211 Gigabit Network Connection                                                   |
| IRQ 4294967285 ~ IRQ 4294967290 | Intel(R) I211 Gigabit Network Connection #2                                                |
| IRQ 4294967291                  | Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)                              |
| IRQ 4294967292                  | Intel(R) HD Graphics 630                                                                   |
| IRQ 4294967293                  | Intel(R) Ethernet Connection (2) I219-LM                                                   |
| IRQ 4294967294                  | Standard SATA AHCI Controller                                                              |

## D. 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 "F81866.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_F81866();
    if (SIO == 0)
    {
        printf("Can not detect Fintek 81866, program abort.\n");
        return(1);
    }/if (SIO == 0)

    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_F81866_Reg(0x2B);
    bBuf &= (~0x20);
    Set_F81866_Reg(0x2B, bBuf);           //Enable WDTO

    Set_F81866_LD(0x07);                  //switch to logic device 7
    Set_F81866_Reg(0x30, 0x01);           //enable timer

    bBuf = Get_F81866_Reg(0xF5);
    bBuf &= (~0x0F);
    bBuf |= 0x52;
    Set_F81866_Reg(0xF5, bBuf);           //count mode is second
    Set_F81866_Reg(0xF6, interval);       //set timer
    bBuf = Get_F81866_Reg(0xFA);
    bBuf |= 0x01;
    Set_F81866_Reg(0xFA, bBuf);           //enable WDTO output

    bBuf = Get_F81866_Reg(0xF5);
    bBuf |= 0x20;
    Set_F81866_Reg(0xF5, bBuf);           //start counting
}
//-----
void DisableWDT(void)
{
    unsigned char bBuf;
    Set_F81866_LD(0x07);                  //switch to logic device 7
    bBuf = Get_F81866_Reg(0xFA);
    bBuf &= ~0x01;
    Set_F81866_Reg(0xFA, bBuf);           //disable WDTO output

    bBuf = Get_F81866_Reg(0xF5);
    bBuf &= ~0x20;
    bBuf |= 0x40;
    Set_F81866_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 "F81866.H"
#include <dos.h>
//-----
unsigned int F81866_BASE; void Unlock_F81866 (void); void Lock_F81866 (void);
//-----
unsigned int Init_F81866(void)
{
    unsigned int result;
    unsigned char ucDid;

    F81866_BASE = 0x4E;
    result = F81866_BASE;

    ucDid = Get_F81866_Reg(0x20);
    if (ucDid == 0x07)                                //Fintek 81866
    {
        goto Init_Finish;
    }

    F81866_BASE = 0x2E;
    result = F81866_BASE;

    ucDid = Get_F81866_Reg(0x20);
    if (ucDid == 0x07)                                //Fintek 81866
    {
        goto Init_Finish;
    }

    F81866_BASE = 0x00;
    result = F81866_BASE;

Init_Finish:
    return (result);
}
//-----
void Unlock_F81866 (void)
{
    outportb(F81866_INDEX_PORT, F81866_UNLOCK);
    outportb(F81866_INDEX_PORT, F81866_UNLOCK);
}
//-----
void Lock_F81866 (void)
{
    outportb(F81866_INDEX_PORT, F81866_LOCK);
}
//-----
void Set_F81866_LD( unsigned char LD)
{
    Unlock_F81866();
    outportb(F81866_INDEX_PORT, F81866_REG_LD);
}

```

```

        outportb(F81866_DATA_PORT, LD); Lock_F81866();
    }
//-----
void Set_F81866_Reg( unsigned char REG, unsigned char DATA)
{
    Unlock_F81866();
    outportb(F81866_INDEX_PORT, REG);
    outportb(F81866_DATA_PORT, DATA);
    Lock_F81866();
}
//-----
unsigned char Get_F81866_Reg(unsigned char REG)
{
    unsigned char Result;
    Unlock_F81866();
    outportb(F81866_INDEX_PORT, REG);
    Result = inportb(F81866_DATA_PORT);
    Lock_F81866();
    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    F81866_H
#define    F81866_H    1
//-----
#define    F81866_INDEX_PORT    (F81866_BASE)
#define    F81866_DATA_PORT    (F81866_BASE+1)
//-----
#define    F81866_REG_LD    0x07
//-----
#define F81866_UNLOCK 0x87
#define    F81866_LOCK 0xAA
//-----
unsigned int Init_F81866(void);
void Set_F81866_LD( unsigned char);
void Set_F81866_Reg( unsigned char, unsigned char); unsigned char
Get_F81866_Reg( unsigned char);
//-----
#endif //    F81866_H

```