AMI220
AMI221
AMI222
High Performance Fanless System

User's Manual

Version 1.0
(Aug. 2017)

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Compliance

CE

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

FC

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˚C ~ 50˚C.
- DO NOT LEAVE THIS DEVICE IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20˚C OR ABOVE 80˚C. This could damage the device. The device must be used in a controlled environment.

Care for your IBASE products:

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

WARNING

Attention during use:

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

Avoid Disassembly

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

CAUTION

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

Warranty Policy

- **IBASE standard products:**

  24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, the product serial numbers can be used to determine the approximate shipping date.

- **3rd-party parts:**

  12-month (1-year) warranty from delivery for the 3rd-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 the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.

   - Product model name
   - Product serial number
   - Detailed description of the problem
   - The error messages in text or in screenshots if there is any
   - The arrangement of the peripherals
   - Software in use (such as OS and application software, including the version numbers)

3. If repair service is required, you can download the RMA form at http://www.ibase.com.tw/english/Supports/RMAService/. Fill out the form and contact your distributor or sales representative.

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Chapter 1
General Information

The information provided in this chapter includes:

- Features
- Packing List
- Optional Accessories
- Specifications
- Overview
- Dimensions

1.1 Introduction

The AMI220 / AMI221 / AMI222 is a product series of IBASE embedded computing system, applicable to thin clients, smart industrial automation or controller, and retail equipment. It is a compact and fanless design with an Intel®-7th / 6th Gen. Core™ i7 / i5 / i3 processor. This product series also features iSmart that allows the device capable of auto-scheduling for general applications and gives energy savings on power. It is able to be operated at the ambient operating temperat ure ranging from -10 ~ 50 °C, and even from -20 ~ 80 °C for storage.

Photo of AMI220

1.2 Features

- Fanless system supports IBASE MB220 customized board
- Onboard Intel® 7th / 6th 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. If any of the items below is missing, contact the distributor or the dealer from whom you purchased the product.

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 2nd memory, if not pre-installed) 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 2nd memory (if not pre-installed) x 2

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

- 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 2nd memory (if not pre-installed) x 2

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

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

1.4 Optional Accessories

IBASE 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 Card: IP214 / IP215

AMI222

- DC-In Power Adapter
- WiFi Antenna Kit
- Bracket for fieldbus module
- Expansion Card: IP211 / IP212 / IP213

1.5 Specifications – AMI220

Product Name	AMI220	
System		
Motherboard	MB220AF	MB220EF
Operating System	• Windows10 (64-bit) / 7 (32-bit & 64-bit) • Linux Ubuntu / Fedora 24	
CPU	Intel® 7th / 6th Gen. Core™ i7 / i5 / i3 Desktop Processor 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	• 2.5” SSD (1 slot) • mSATA (2 slots)	• 2.5” SSD (1 slot) • mSATA (1 slot)
Super I/O	Fintek F81866AD-I	
Audio Codec	Realtek ALC662	
Network	• Intel® I219LM GbE PHY • Intel® I211AT GbE	• Intel® I219V GbE PHY • Intel® I211AT GbE
Power Supply	120W power adaptor (Optional)	
BIOS	AMI BIOS	
Watchdog	Watchdog Timer 256 segments, 0, 1, 2…255 sec/min	
iSmart	Yes	
iAMT	11.6	
TPM	2.0	
Chassis	Aluminum & steel, silver & gray	
Mounting	• Desktop mount • Wall mount (wall mount kit included)	
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	

Product Name	AMI220	
Motherboard	MB220AF	MB220EF
LAN	2 x RJ45 GbE LAN	
USB	• 4 x USB 3.0 • 4 x USB 2.0	
Serial	**4 x COM ports:** • COM1: RS-232/422/485, selectable from BIOS • COM2/3/4: RS-232 only	
Digital I/O	4-In & 4-Out (Optional)	
Display	1 x DVI-D 1 x VGA 2 x DisplayPort	
Audio Jack	• 1 x Microphone Input • 1 x Line-Out	
CFast	1 x CFast card slot	
SIM	2 x SIM card slot	
SSD	1 x 2.5” SSD bay	
SATA	2 x SATA III connector	
Expansion	2 x full-size mini-PCIe (J6 & J7 connectors with mSATA function)	2 x full-size mini-PCIe (J6 connector with mSATA function)
Environment		
Temperature	• **Operating:** -10 ~ 50 °C (14 ~ 122 °F) • **Storage:** -20~ 80 °C (-4 ~ 176 °F)	
Relative Humidity	5 ~ 90% at 45 °C (non-condensing)	
Vibration Protection	• **Operating:** 0.25 Grms / 5 ~ 500 Hz (random test) • **Non-operating:** 1 Grms / 5 ~ 500Hz (random test)	
Shock Protection	• **Operating:** 20 g / 11 ms • **Non-operating:** 40 g / 11 ms	

All specifications are subject to change without prior notice.

1.6 Specifications – AMI221

Product Name	AMI221	
System		
Motherboard	MB220AF	MB220EF
Operating System	• Windows10 (64-bit) / 7 (32-bit & 64-bit) • Linux Ubuntu / Fedora 24	
CPU	Intel® 7th / 6th Gen. Core™ i7 / i5 / i3 Desktop Processor 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	• 2.5” SSD (1 slot) • mSATA (2 slots)	• 2.5” SSD (1 slot) • mSATA (1 slot)
Super I/O	Fintek F81866AD-I	
Audio Codec	Realtek ALC662	
Network	• Intel® I219LM GbE PHY • Intel® I211AT GbE	• Intel® I219V GbE PHY • Intel® I211AT GbE
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	
TPM	2.0	
Chassis	Aluminum & steel, silver & gray	
Mounting	• Desktop mount • Wall mount (wall mount kit included)	
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	

Product Name	AMI221	
Motherboard	MB220AF	MB220EF
LAN	2 x RJ45 GbE LAN	
USB	• 4 x USB 3.0 • 6 x USB 2.0	
Serial	**6 x COM ports:** • COM1: RS-232/422/485, selectable from BIOS • COM2/3/4/5/6: RS-232 only	
Digital I/O	4-In & 4-Out (Optional)	
Display	1 x DVI-D 1 x VGA 2 x DisplayPort	
Audio Jack	• 1 x Microphone Input • 1 x Line-Out	
CFast	1 x CFast card slot	
SIM	2 x SIM card slot	
SSD	2 x 2.5” SSD bay	
SATA	2 x SATA III connector	
Expansion	• 1 x PCIe (x16) + 1 x PCI * Choose either of the combinations above. • 2 x full-size mini-PCIe (J6 & J7 connectors with mSATA function)	• 1 x PCIe (x16) + 1 x PCI * Choose either of the combinations above. • 2 x full-size mini-PCIe (J6 connector with mSATA function)
Environment		
Temperature	• **Operating:** -10 ~ 50 °C (14 ~ 122 °F) • **Storage:** -20~ 80 °C (-4 ~ 176 °F)	
Relative Humidity	5 ~ 90% at 45 °C (non-condensing)	
Vibration Protection	• **Operating:** 0.25 Grms / 5 ~ 500 Hz (random test) • **Non-operating:** 1 Grms / 5 ~ 500Hz (random test)	
Shock Protection	• **Operating:** 20 g / 11 ms • **Non-operating:** 40 g / 11 ms	

All specifications are subject to change without prior notice.

1.7 Specifications – AMI222

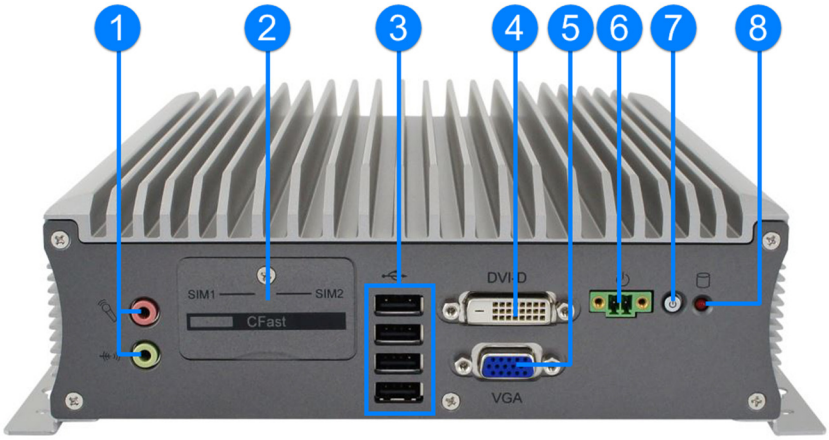
Product Name	AMI222	
System		
Motherboard	MB220AF	MB220EF
Operating System	• Windows10 (64-bit) / 7 (32-bit & 64-bit) • Linux Ubuntu / Fedora 24	
CPU	Intel® 7th / 6th Gen. Core™ i7 / i5 / i3 Desktop Processor TDP = 35W	
CPU Speed	Up to 3.4 GHz	
Chipset	Intel® Q170	Intel® H110
Memory	2 x DDR4-2133 SO-DIMM 4GB, expandable to 32 GB (Non-ECC)	
Storage	• 2.5” SSD (1 slot) • mSATA (2 slots)	• 2.5” SSD (1 slot) • mSATA (1 slot)
Super I/O	Fintek F81866AD-I	
Audio Codec	Realtek ALC662	
Network	• Intel® I219LM GbE PHY • Intel® I211AT GbE	• Intel® I219V GbE PHY • Intel® I211AT GbE
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	
TPM	2.0	
Chassis	Aluminum & steel, silver & gray	
Mounting	• Desktop mount • Wall mount (wall mount kit included)	
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	

Product Name	AMI222	
Motherboard	MB220AF	MB220EF
LAN	2 x RJ45 GbE LAN	
USB	• 4 x USB 3.0 • 6 x USB 2.0	• 4 x USB 3.0 • 4 x USB 2.0
Serial	**6 x COM ports:** • COM1: RS-232/422/485, selectable from BIOS • COM2/3/4/5/6: RS-232 only	
Digital I/O	4-In & 4-Out (Optional)	
Display	1 x DVI-D 1 x VGA 2 x DisplayPort	
Audio Jack	• 1 x Microphone Input • 1 x Line-Out	
CFast	1 x CFast card slot	
SIM	2 x Micro-SIM card slot	
SSD	2 x 2.5” SSD bay	
SATA	2 x SATA III connector	
Expansion	• 1 x PCIe (x8) + 1 x PCIe (x1) • 1 x PCIe (x16) + 1 x PCI • 1 x PCIe (x16) * Choose either of the combinations above. • 2 x full-size mini-PCIe (J6 & J7 connectors with mSATA function)	• 1 x PCIe (x8) + 1 x PCIe (x1) • 1 x PCIe (x16) + 1 x PCI • 1 x PCIe (x16) * Choose either of the combinations above. • 2 x full-size mini-PCIe (J6 connector with mSATA function)
Environment		
Temperature	• **Operating:** -10 ~ 50 °C (14 ~ 122 °F) • **Storage:** -20~ 80 °C (-4 ~ 176 °F)	
Relative Humidity	5 ~ 90% at 45 °C (non-condensing)	
Vibration Protection	• **Operating:** 0.25 Grms / 5 ~ 500 Hz (random test) • **Non-operating:** 1 Grms / 5 ~ 500Hz (random test)	
Shock Protection	• **Operating:** 20 g / 11 ms • **Non-operating:** 40 g / 11 ms	

All specifications are subject to change without prior notice.

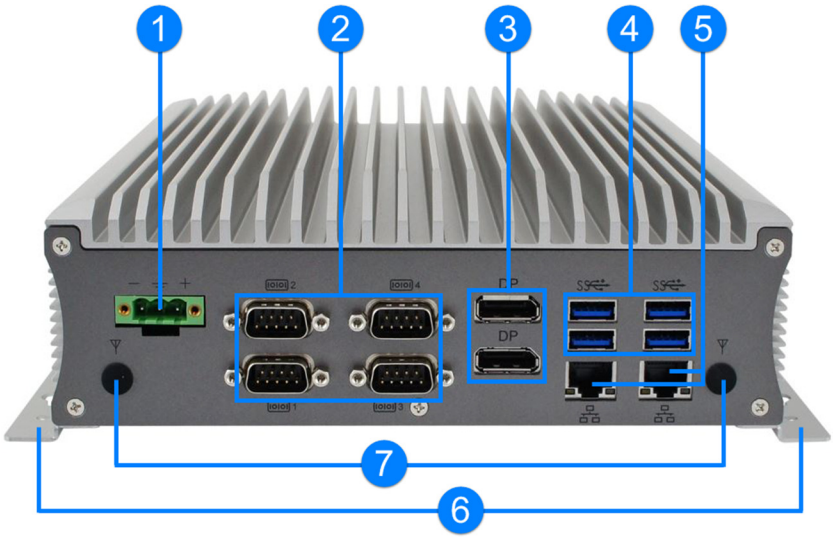
1.8 Overview – AMI220

Front View



No.	Name	No.	Name
1	Audio Jacks (red for Mic-In, green for Line-Out)	5	VGA Port
2	CFast & 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

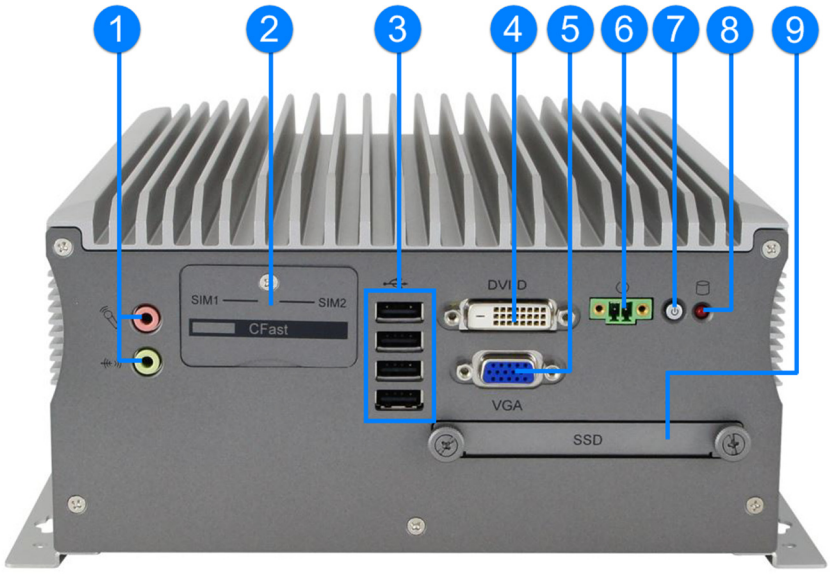


No.	Name	No.	Name
1	DC-In Power Connector (3 pins)	5	LAN Ports
2	COM Ports (COM1 RS-232/422/485, COM2/3/4 RS-232)	6	Wall Mount Brackets
3	DisplayPorts	7	Antenna Holes
4	USB 3.0 Ports		

Oblique View

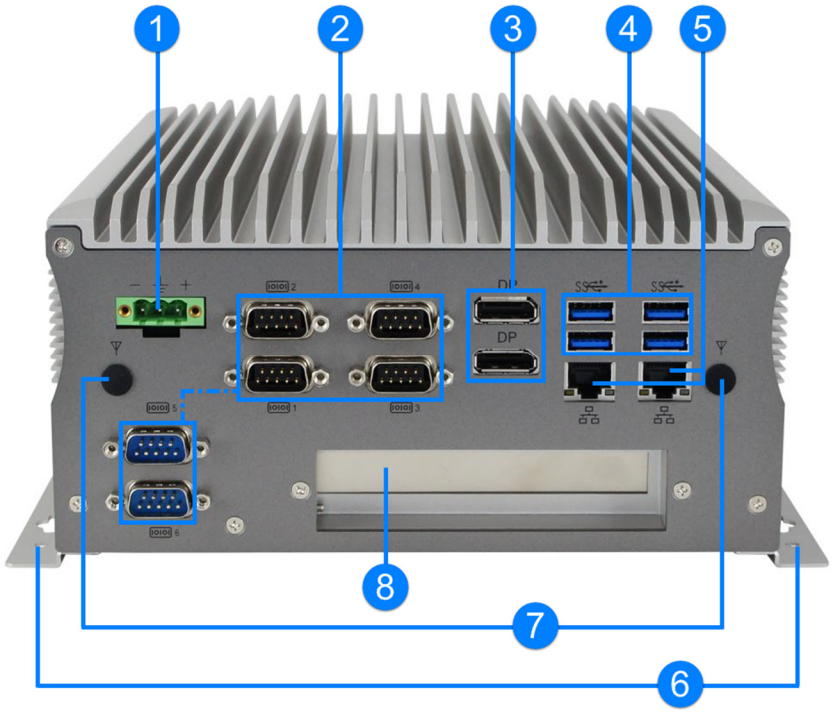
1.9 Overview – AMI221

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	CFast & 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		

Rear View

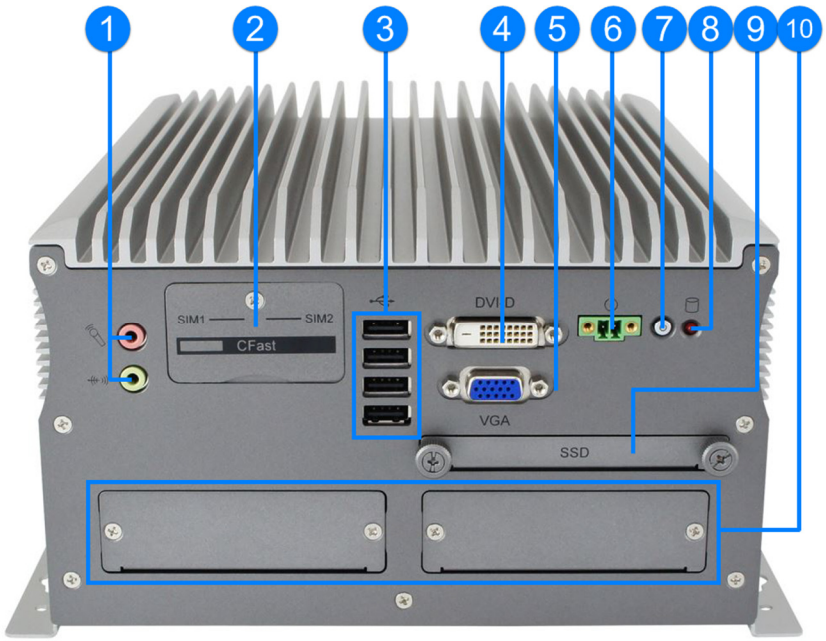


No.	Name	No.	Name
1	DC-In Power Connector (3 pins)	5	LAN Ports
2	COM1 ~ COM6 Ports (COM1 RS-232/422/485, COM2/3/4/5/6 RS-232)	6	Wall Mount Brackets
3	DisplayPorts	7	Antenna Holes
4	USB 3.0 Ports	8	Expansion Slot

Oblique View

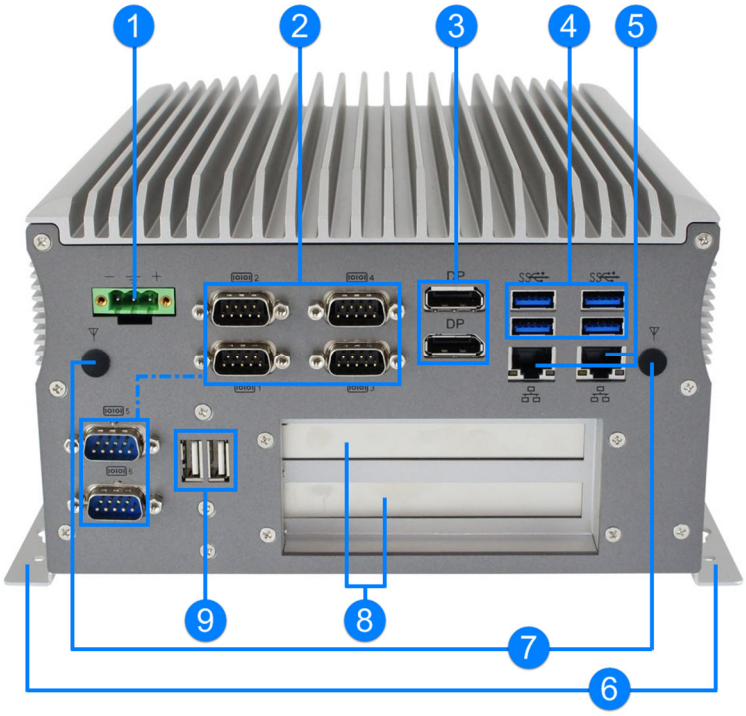
1.10 Overview – AMI222

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	CFast & 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	Fieldbus Module Doors

Rear View

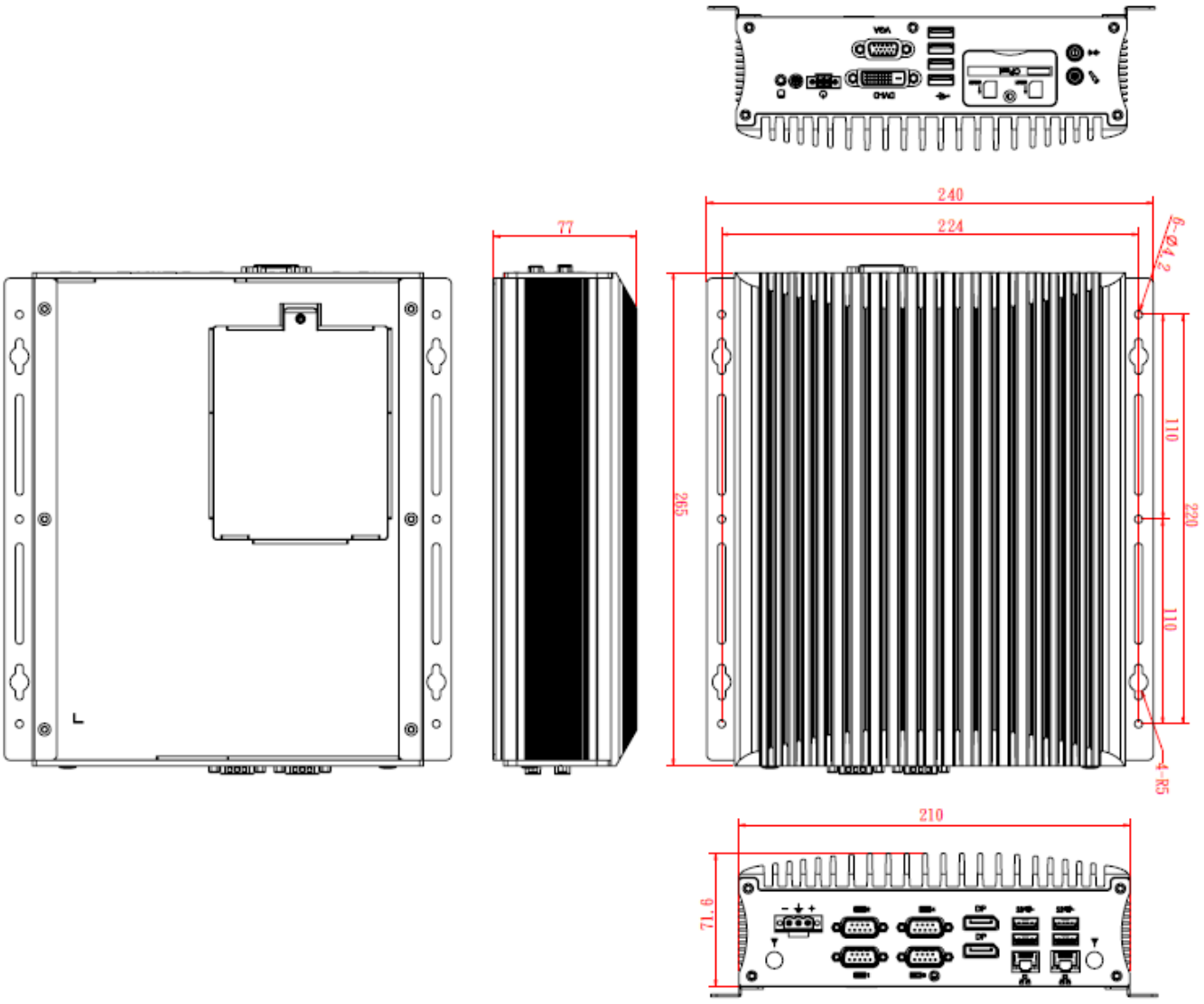


No.	Name	No.	Name
1	DC-In Power Connector (3 pins)	6	Wall Mount Brackets
2	COM Ports (COM1 RS-232/422/485, COM2/3/4/5/6 RS-232)	7	Antenna Holes
3	DisplayPorts	8	Expansion Slots
4	USB 3.0 Ports	9	USB 2.0 Ports (*Available only for AMI222 with MB220AF)
5	LAN Ports		

Oblique View

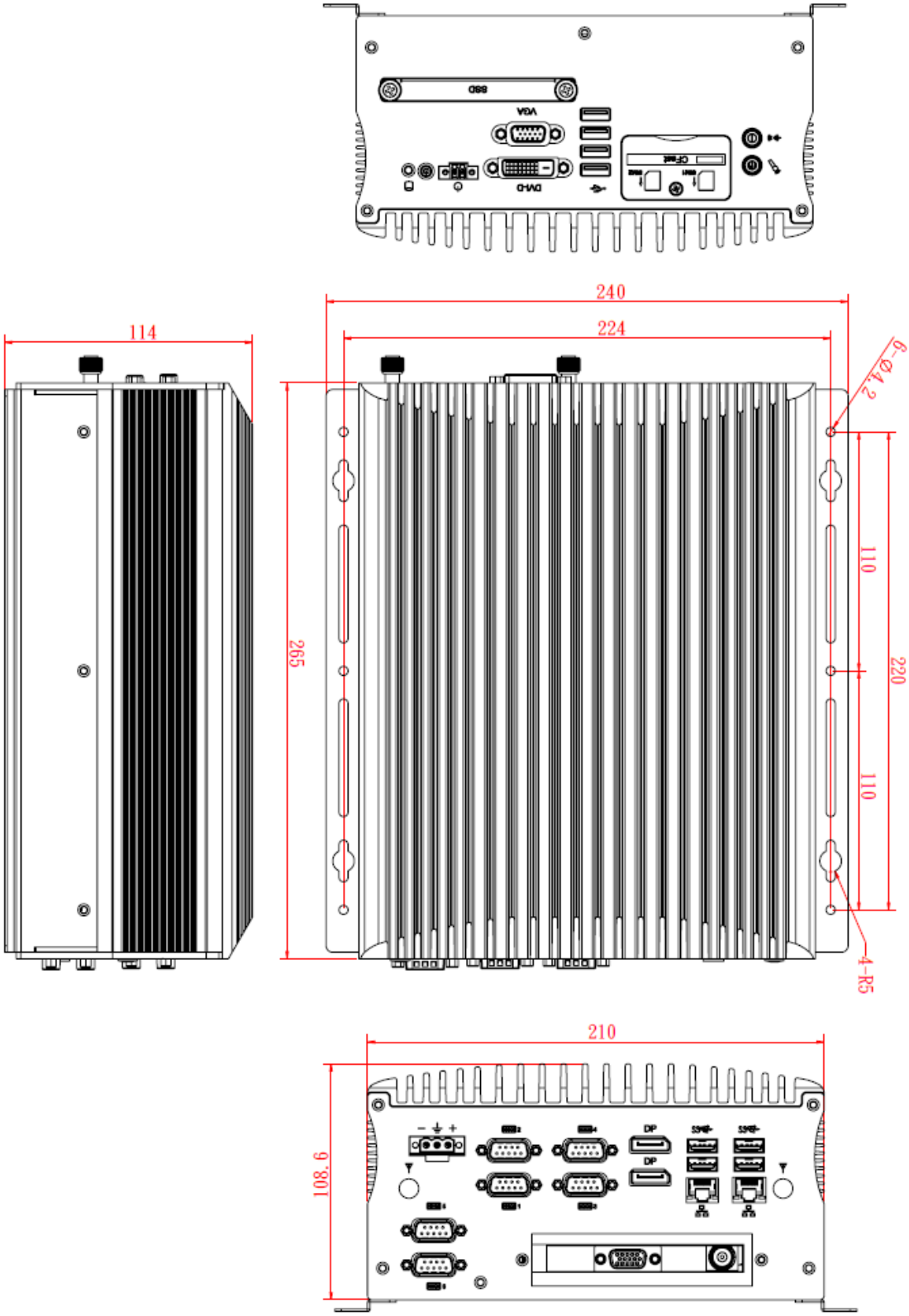
1.11 Dimensions – AMI220

Unit: mm



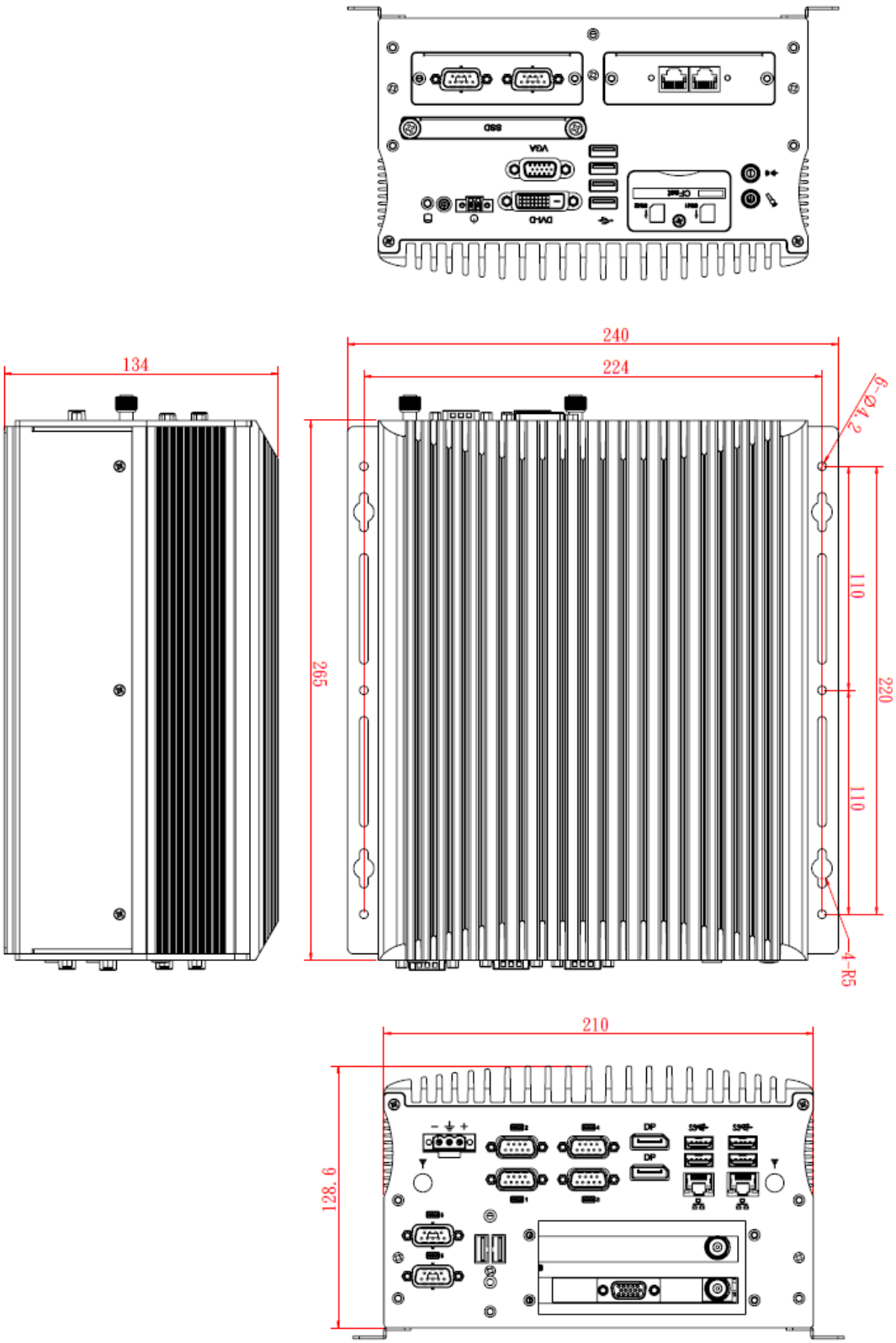
1.12 Dimensions – AMI221

Unit: mm



1.13 Dimensions – AMI222

Unit: mm



Chapter 2
Hardware Configuration

The information provided in this chapter includes:

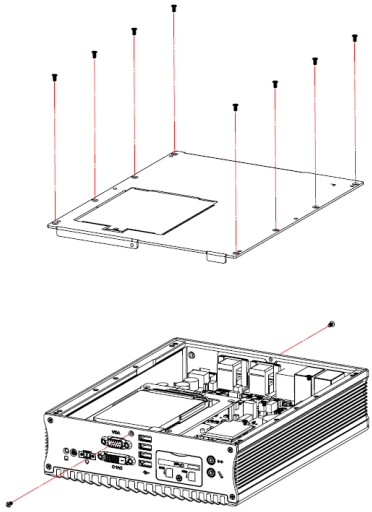
- Essential installations before you begin
- Information and locations of connectors

2.1 Essential Installations Before You Begin

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

AMI220

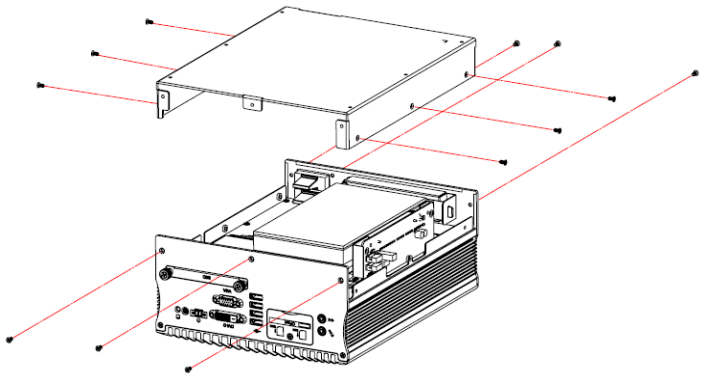
Release the 10 screws to disassemble the device bottom cover.



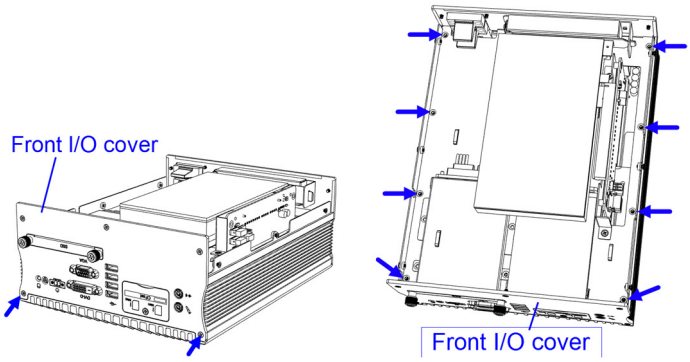
AMI221 / AMI222

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.

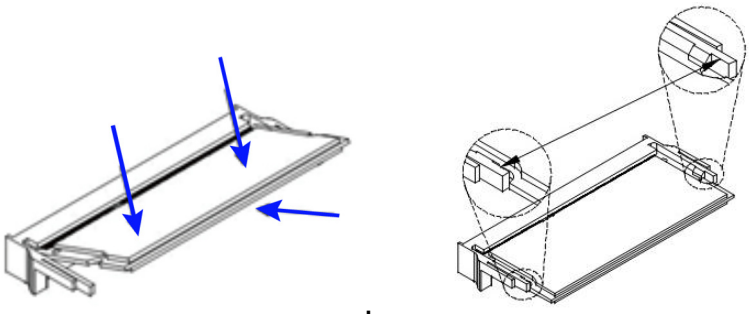


After installation, secure the intermediate plate and the device bottom cover back.

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.



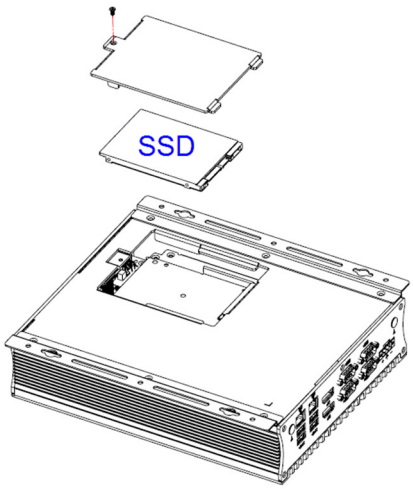
To remove the module, press the clips outwards with both hands.

2.1.2 SSD Installation

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

AMI220

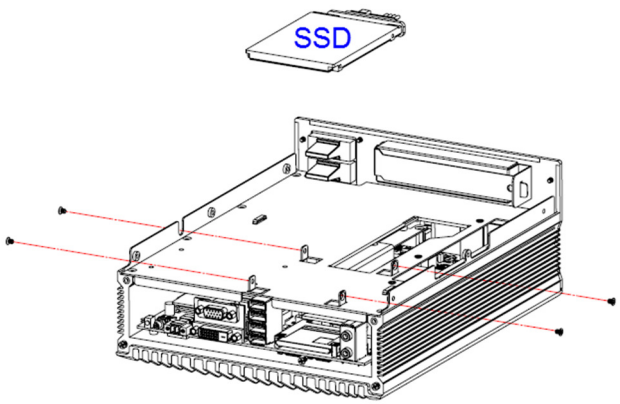
1. Turn your device upside down and loosen a screw as illustrated.
2. Pull up the door, install your SSD onto the bay, and connect related cables.
3. Push down the door and tighten the screw.



AMI221 / AMI222

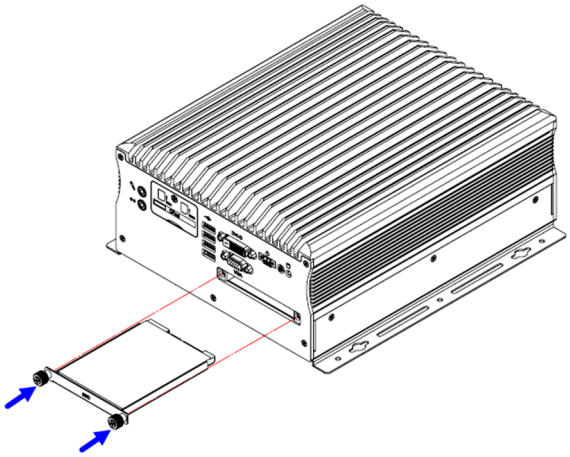
For the 1st (default) SSD:
(This is illustrated by the example of AMI221.)

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.

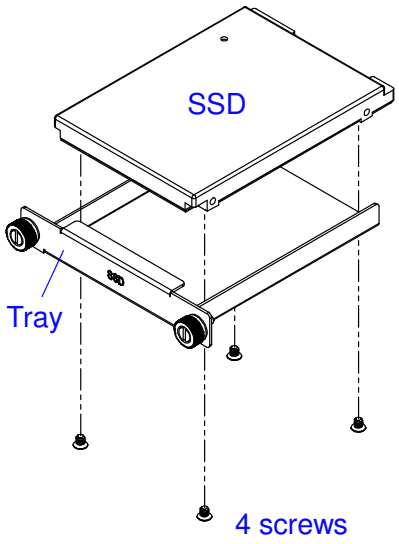


For the 2nd SSD:
(This is illustrated by the example of AMI221.)

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.

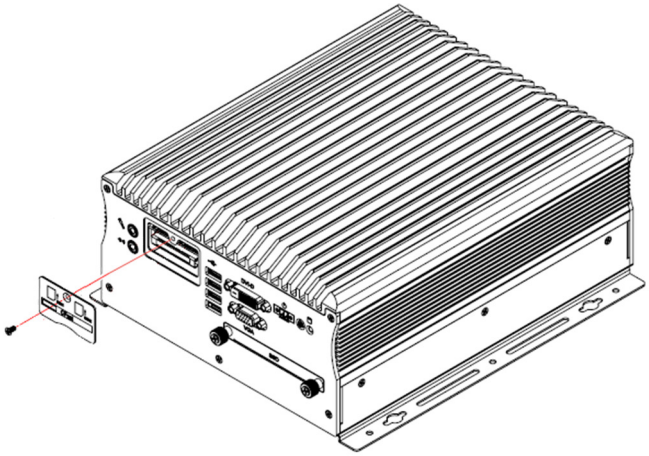


3. Put and secure the tray back to the device.

2.1.3 CFast & Micro-SIM Card Installation

This is illustrated by the example of AMI221.

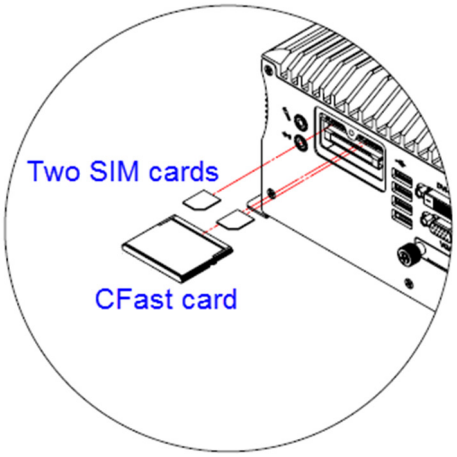
1. Release a screw as shown below to open the CFast & Micro-SIM card slot door.



2. **For CFast card,** insert the card as below.
   To remove the CFast card, push the card again.

   For micro-SIM card, insert the card to one of the micro-SIM card slot and push the card by using your fingernail or a corner of the CFast & micro-SIM card door. Then refer to *2.1.4 Mini-PCIe Network Cards Installation* for further installation.

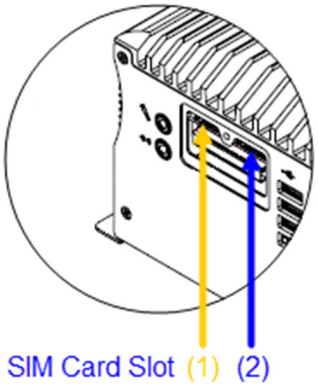
   To remove the micro-SIM card, push the card again.

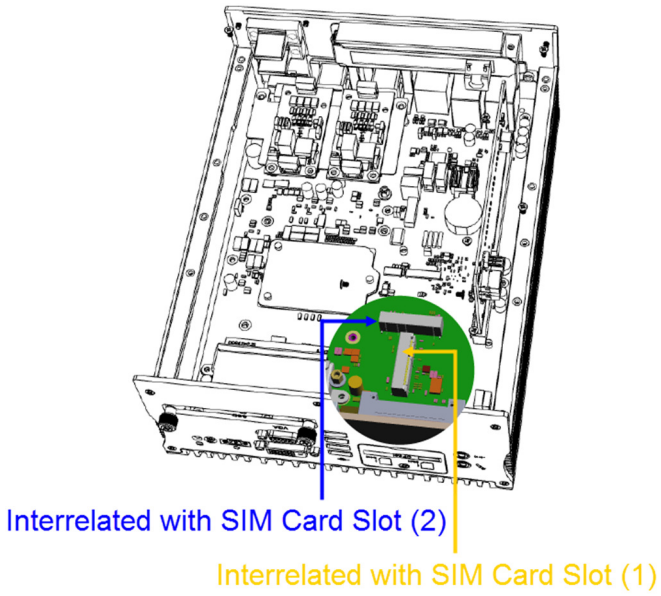


2.1.4 Mini-PCIe Network Cards Installation

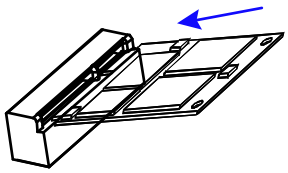
This is illustrated by the example of AMI221.

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

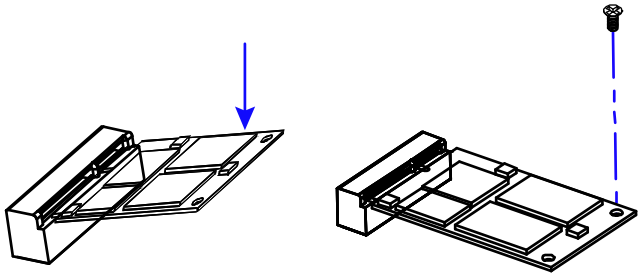




1. Locate the mini-PCIe slot, align the key of the mini-PCIe card to the interface, and insert the card slantwise.



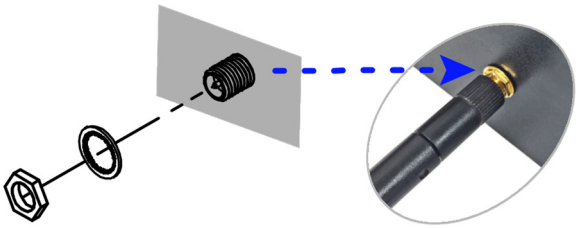
2. Push the mini-PCIe card down, fix it with the supplied 2 flat head screws for full-sized card and with one screw for half-sized card.



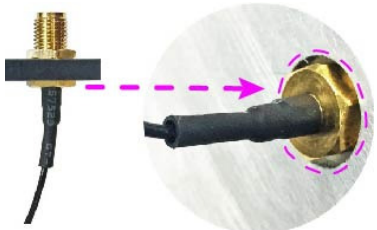
2.1.6 WiFi / 3G / 4G Antenna Installation

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

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



2. Apply adhesive around here.

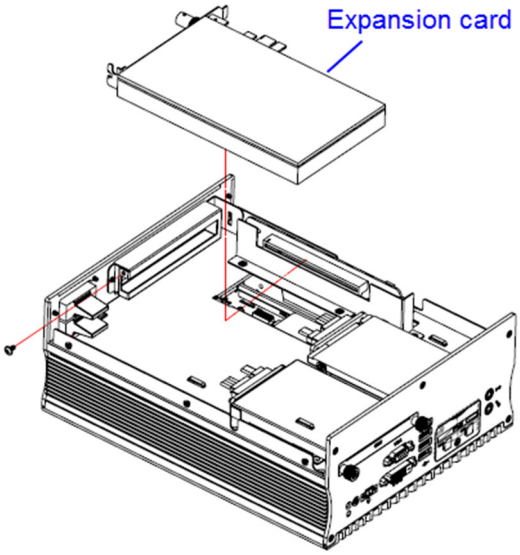


Info: The diameter of the nut is around 6.35 mm (0.25”-36UNC).

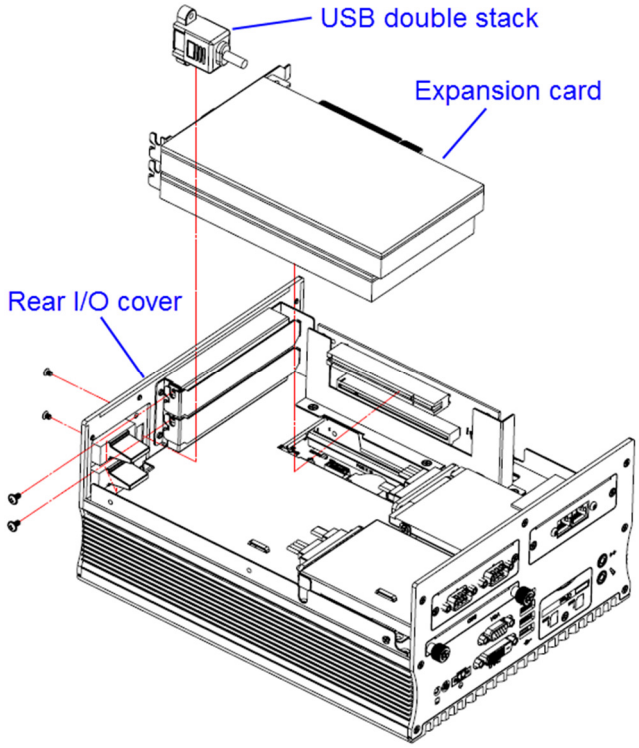
2.1.7 Expansion Card Installation

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.



2.1.8 Wall Mount Installation

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.

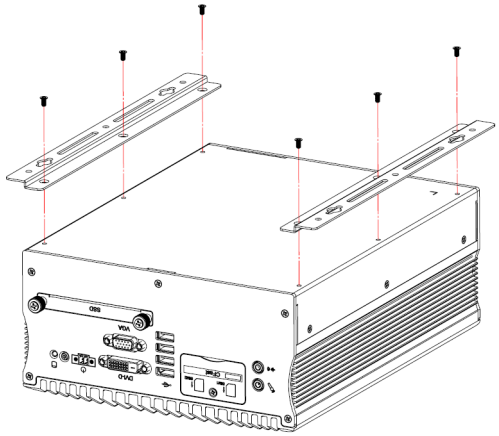
   - **Drywall**
     Drywall over wood studs is acceptable.

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

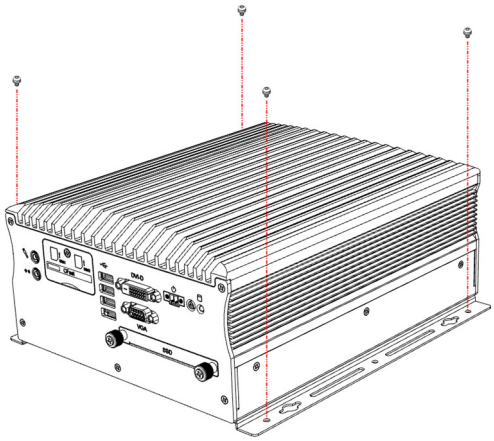
Wall mount installation instructions:

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 .

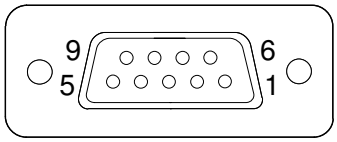


You can install AMI220 on plastic (LCD monitor), wood, drywall surface over studs, or a solid concrete or metal plane directly. The types of fasteners required are dependent on the type of wall construction.

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.

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

- **COM1 RS232/422/485 Port**

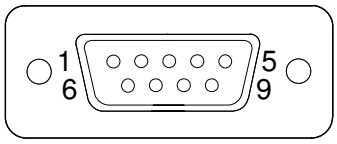


COM1 port is jumper-less and configurable in BIOS.

Pin	Assigment	Pin	Assigment
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

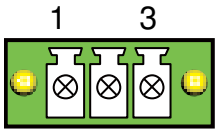
- **COM2 / COM3 / COM4 / COM5 / COM6 RS-232 Ports**



COM5 and COM6 are both available for AMI221 and AMI222 only.
For AMI220, you can externally use COM5 and COM6 by connecting them from the motherboard.

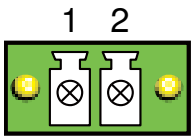
Pin	Assigment	Pin	Assigment
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	DTR, Data terminal ready	9	RI, Ring indicator
5	Ground		

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



Pin	Assigment	Pin	Assigment
1	12V ~ 24V	3	Power Ground
2	Case Ground		

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



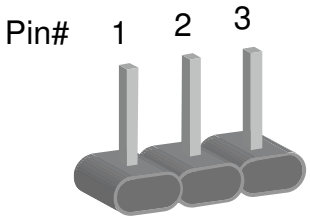
Pin	Assigment	Pin	Assigment
1	Power BTN	2	Ground

2.2 Setting the Jumpers

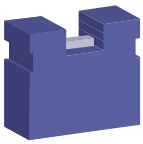
Set up and configure your device by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

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.

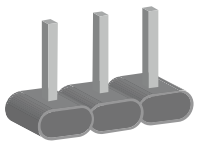
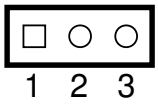
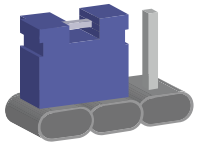
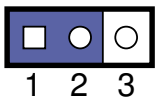
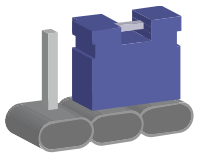
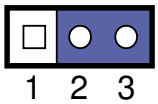


A 3-pin jumper



A jumper cap

Refer to the illustration below to set jumpers.

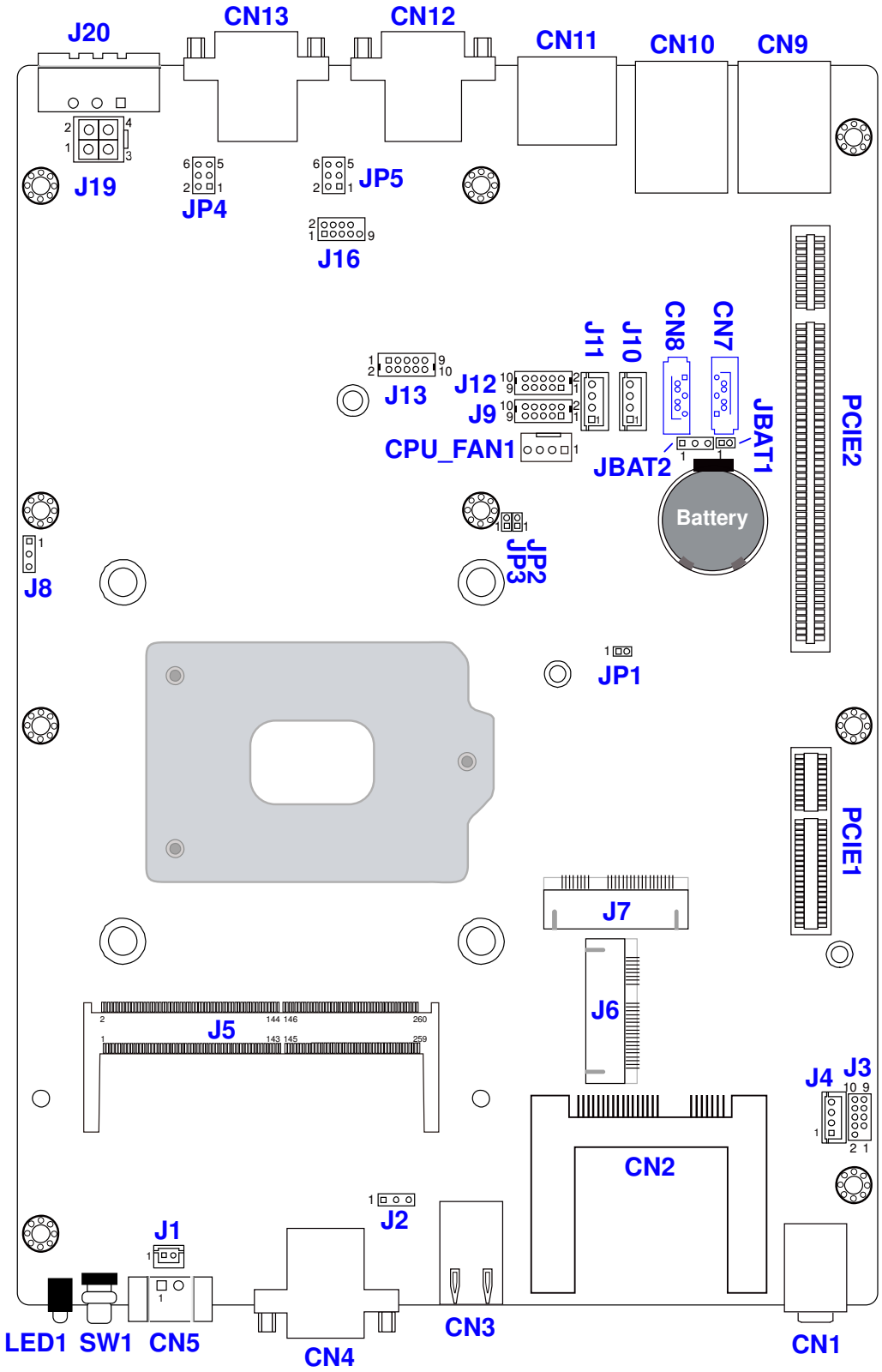
Pin closed	Oblique view	Schematic illustration in the manual
Open		
1-2		
2-3		

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

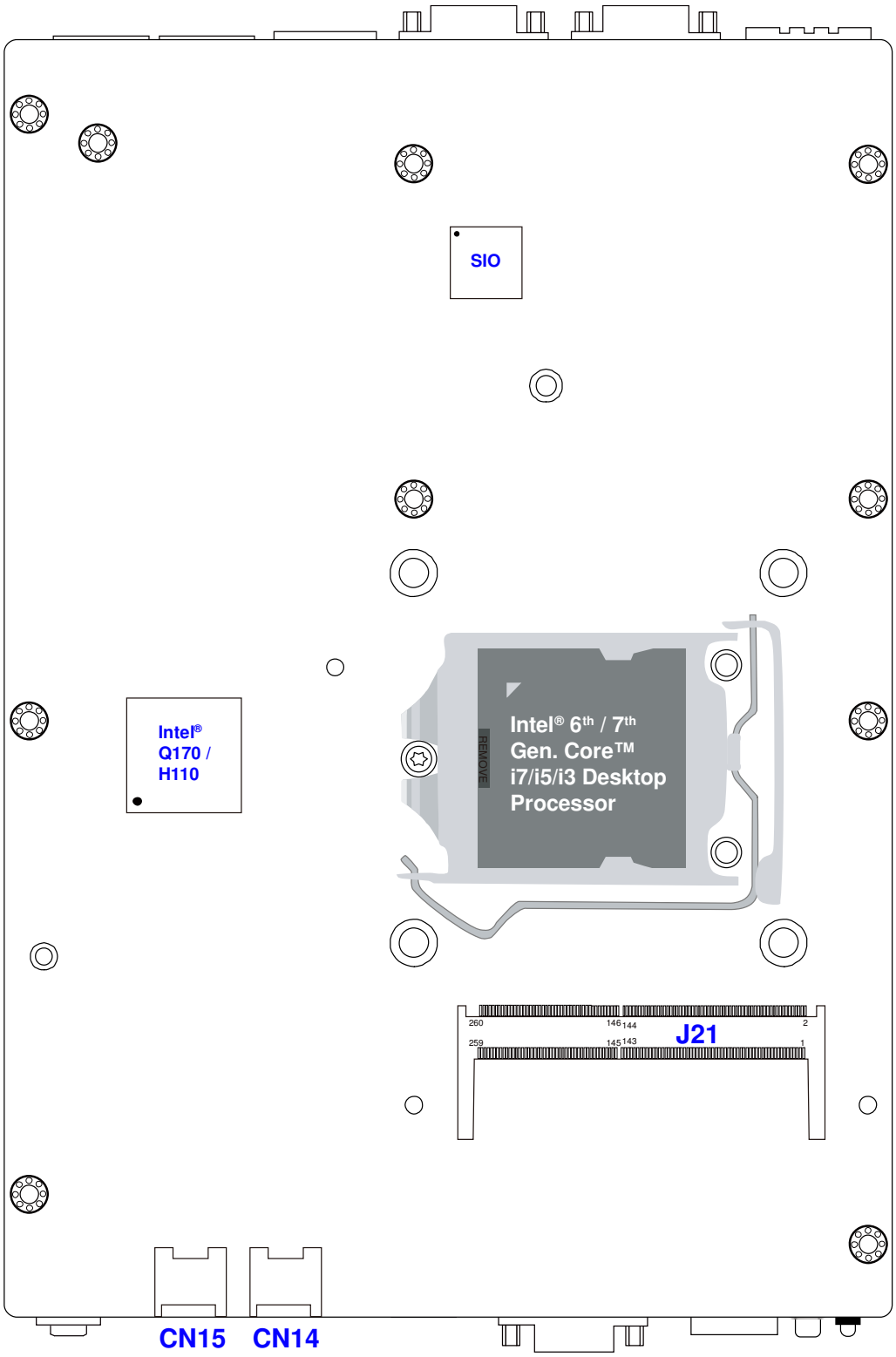
When a jumper cap is removed from two jumper pins, this jumper is **open**, i.e. turned **Off**.

2.3 Jumper & Connector Locations on Motherboard

Motherboard: MB220



MB220 – top

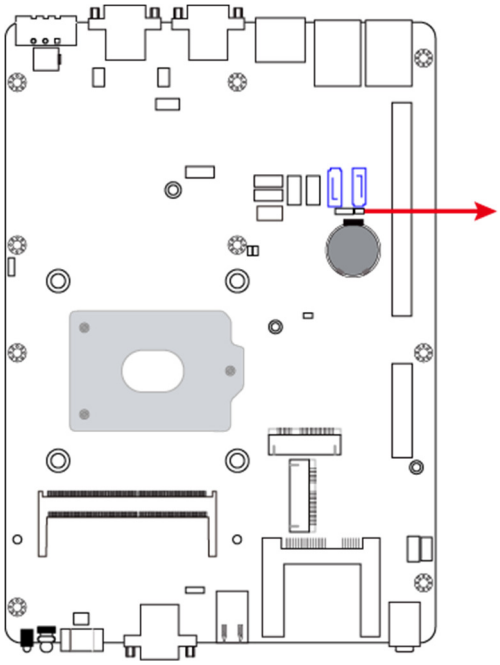


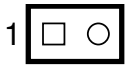
MB220 - bottom

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	--

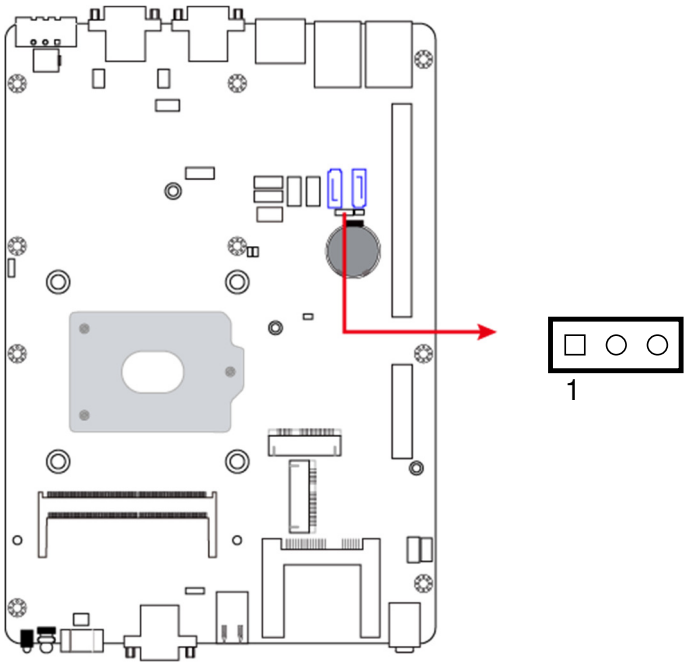
2.4.1 RTC Content Clearance (JBAT1)

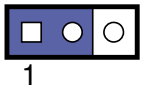
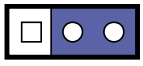




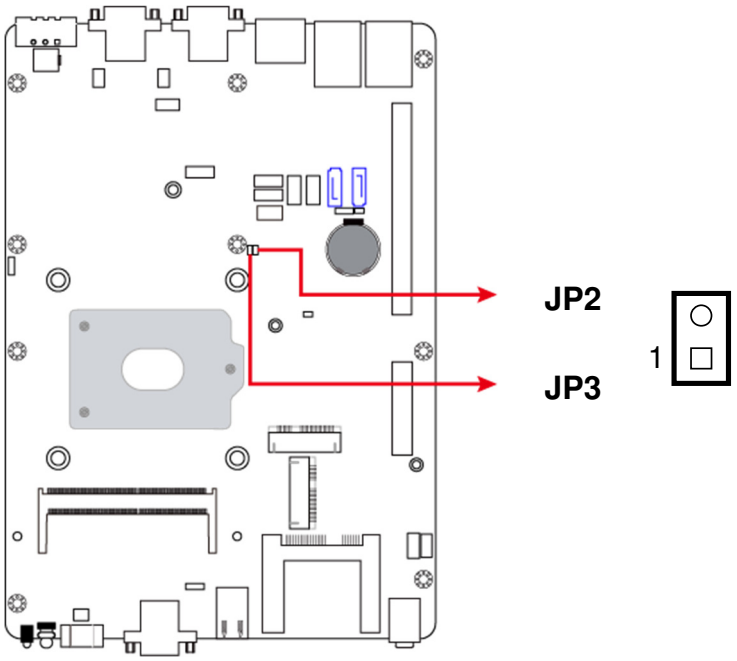
Function	Pin closed	Illustration
Normal (default)	Open	
Clear RTC	Close	

2.4.2 CMOS Data Clearance (JBAT2)



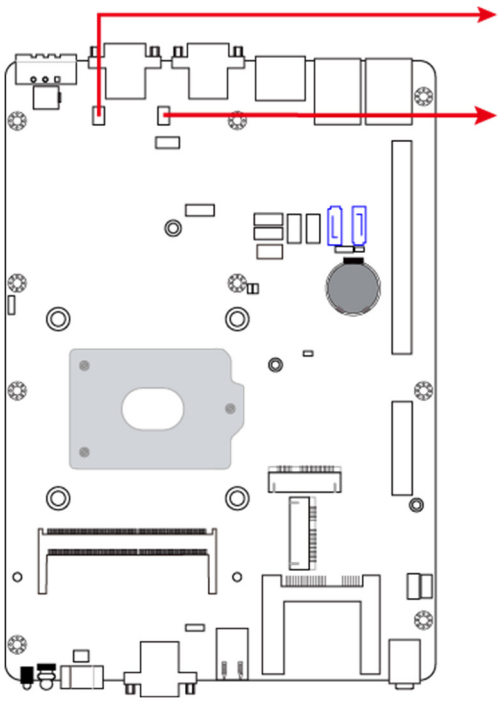
Function	Pin closed	Illustration
Normal (default)	1-2	 1
Clear CMOS	2-3	 1

2.4.3 CPU dGfx Bifurcation Selection (JP2, JP3)



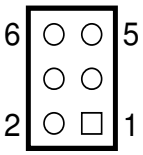
Function	Pin closed	Illustration
1 x 16 (default)	**JP2:** Open	
	JP3: Open	
2 x 8	**JP2:** Close	
	JP3: Open	
RSVD	**JP2:** Open	
	JP3: Close	
x 8, x 4, x 4	**JP2:** Close	
	JP3: Close	

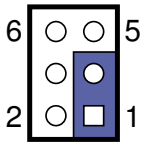
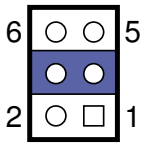
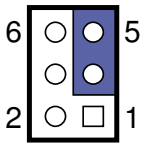
2.4.4 COM1 & COM2 RS-232 Power Selection (JP4, JP5)



JP4: COM1

JP5: COM2



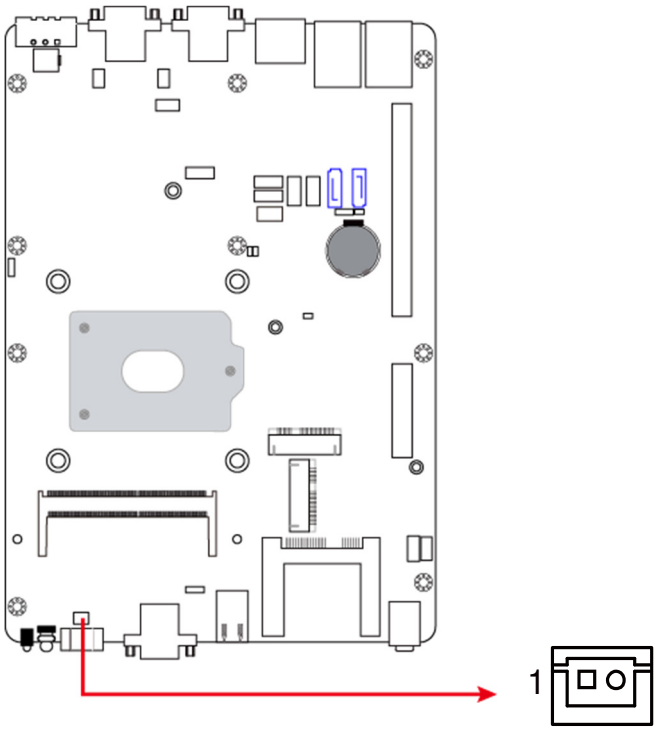
Function	Pin closed	Illustration
12V	1-3	
RI (default)	3-4	
5V	3-5	

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 [1]	J20	--
Audio Jacks	CN1	--
CFast Slot	CN2	--
USB 2.0 Quad Port	CN3	--
VGA & DVI-D Ports	CN4	--
Remote Control Connector [2]	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 [3]	CN12, CN13	--
Micro-SIM Card Slot	CN14, CN15	--
DDR4 SO-DIMM Slot	J5, J21	--
Ful-Size Mini-PCIe Slot	J6, J7	--
PCIE (x1) & PCIE (x16) Slots	PCIE1, PCIE2	--
Factory Use Only	J2, J3, J4, J8, J16, J19	--

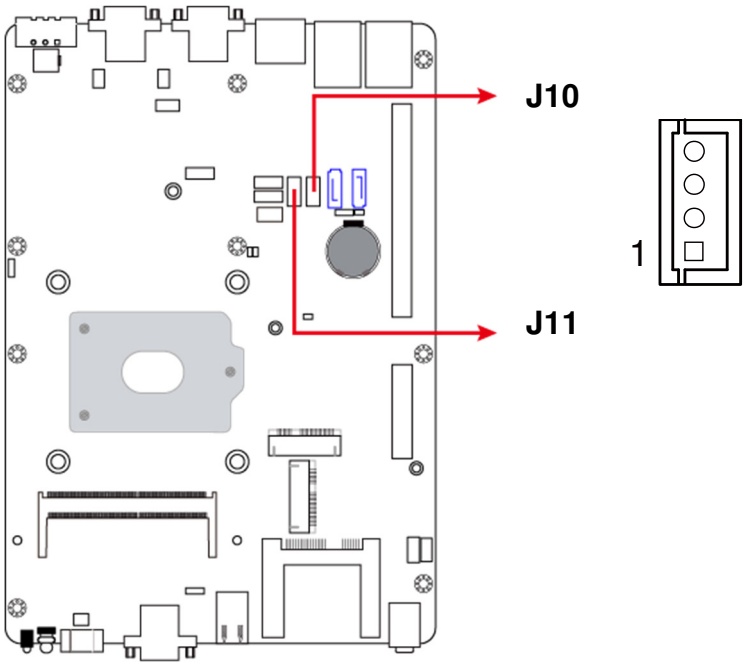
[1], [2], [3] : Refer to *2.1.9 Pinout for COM Ports, DC-In & Power Button Connectors*.

2.5.1 Reset Button Connector (J1)



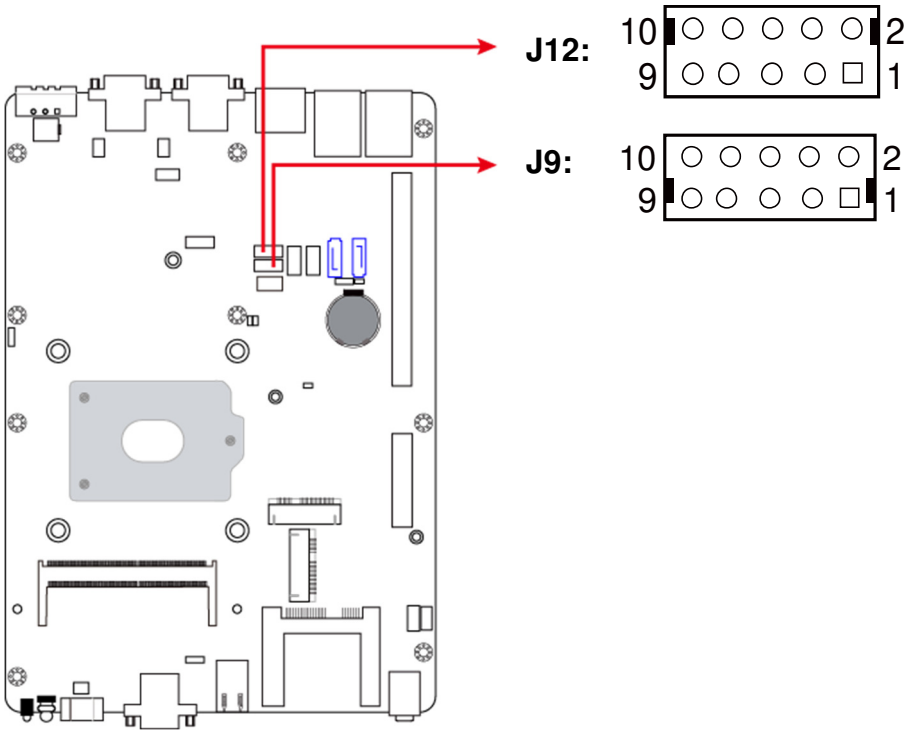
Pin	Assignment	Pin	Assignment
1	Reset BTN	2	Ground

2.5.2 SATA Power Connector (J10, J11)



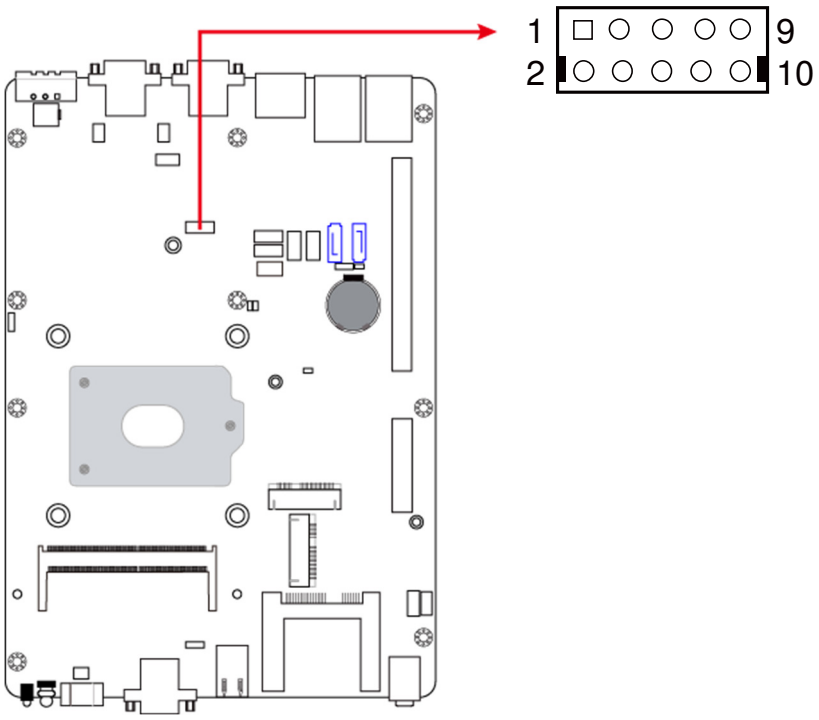
Pin	Assignment	Pin	Assignment
1	5V	3	Ground
2	Ground	4	12V

2.5.3 COM3 & COM4 Ports (J12, J9)



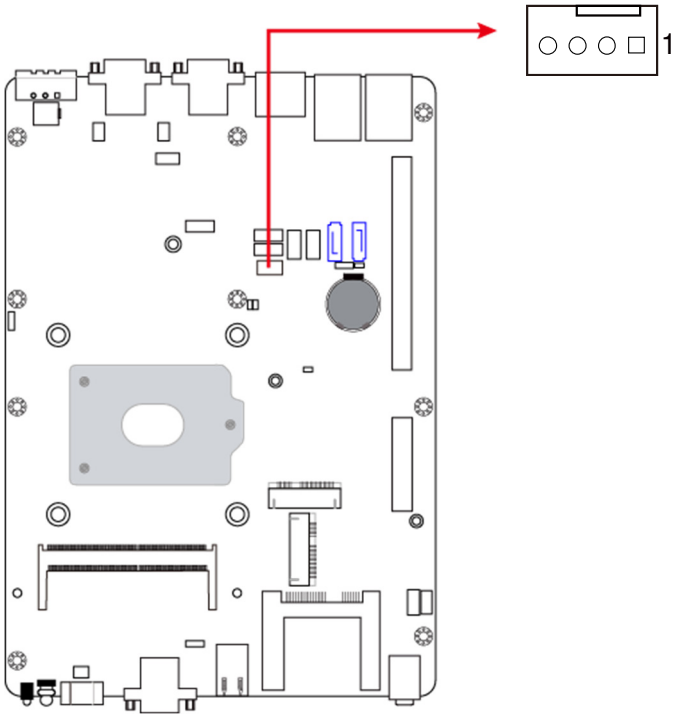
Pin	Assignment	Pin	Assignment
1	DCD, Data carrier detect	2	RXD, Receive data
3	TXD, Transmit data	4	Data terminal ready
5	Ground	6	DSR, Data set ready
7	RTS, Request to send	8	CTS, Clear to send
9	RI, Ring indicator	10	5V

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. The driver has been completely installed. You are suggested to 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.

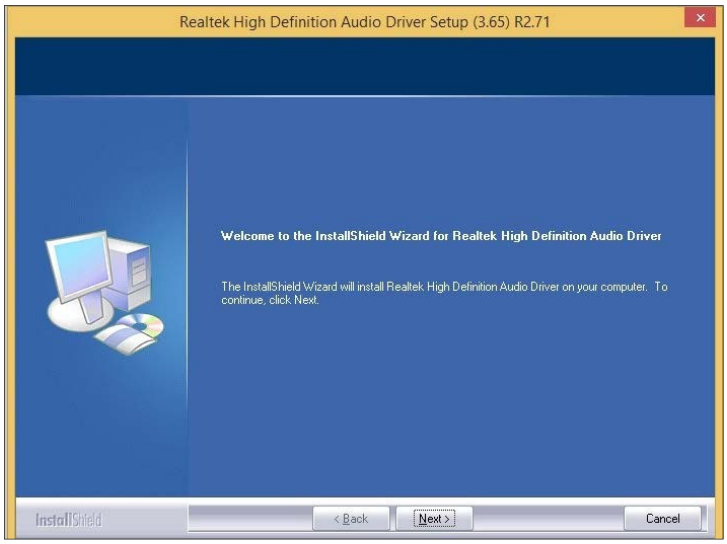
5. The driver has been completely installed. You are suggested to restart the computer for changes to take effect.

3.4 HD Audio Driver Installation

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

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

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



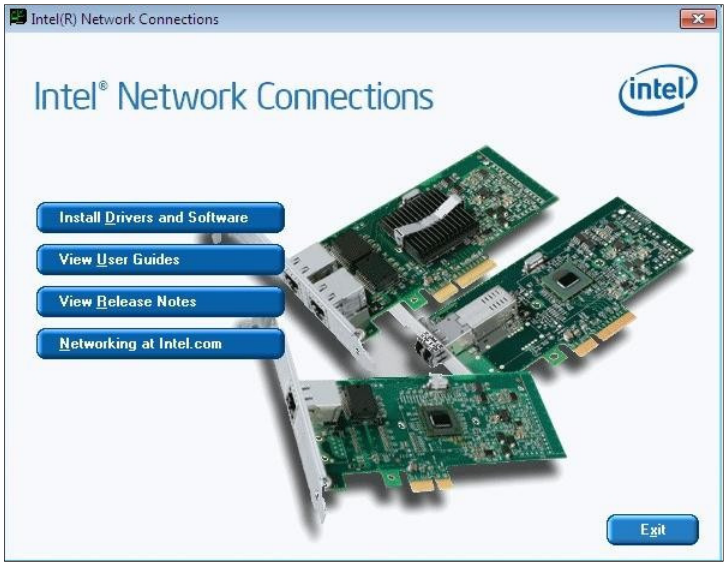
4. The driver has been completely installed. You are suggested to restart the computer for changes to take effect.

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.**.

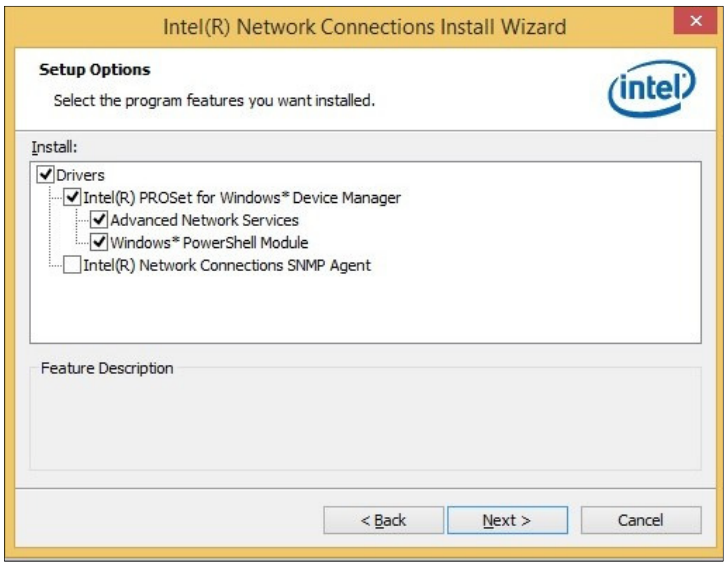
3. Click **Install Drivers and Software.**.



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. The driver has been completely installed. You are suggested to 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. The driver has been completely installed. You are suggested to 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. The driver has been completely installed. You are suggested to 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
- Book Settings
- Save & Exit

4.1 Introduction

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

4.2 BIOS Setup

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

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

The following message will appear on the screen:

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

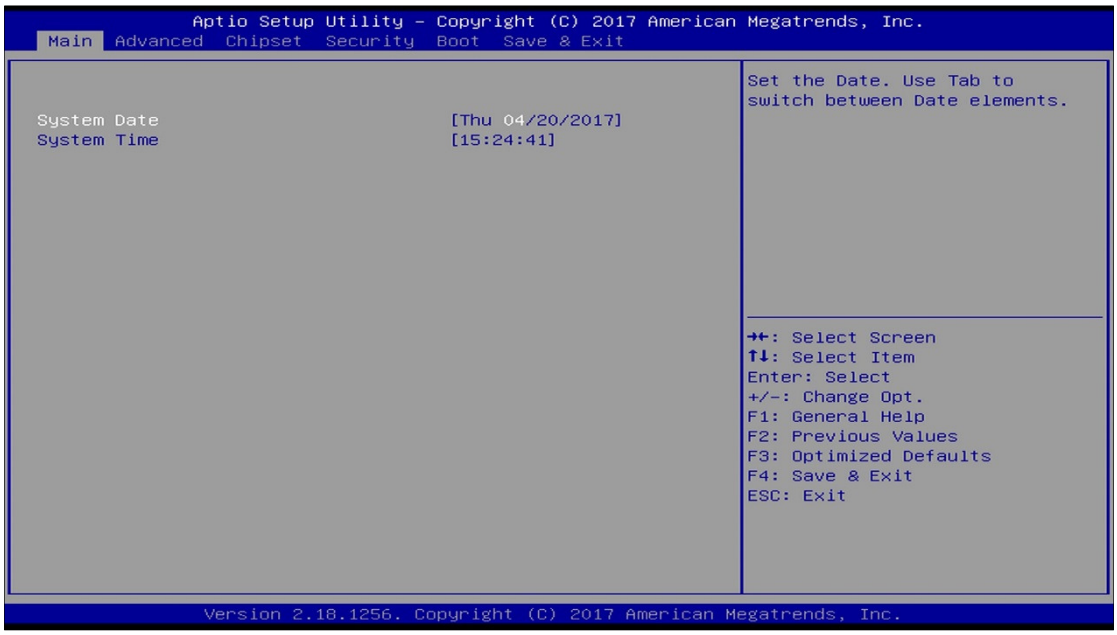
In general, press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help, and <Esc> to quit.

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

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

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

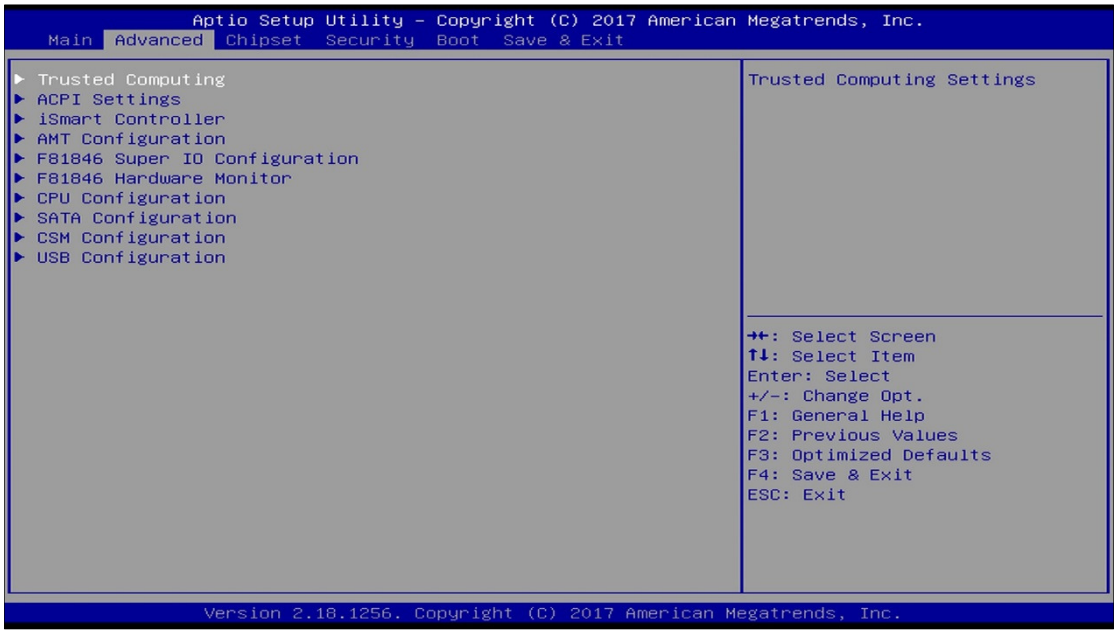
4.3 Main Settings



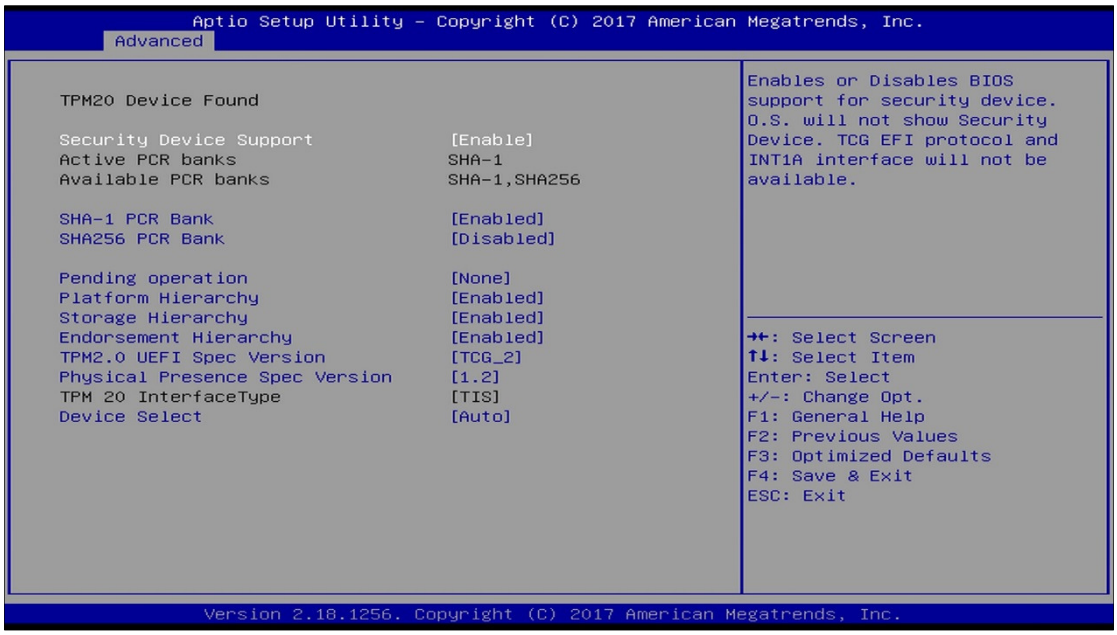
BIOS Setting	Description
System Language	Choose the system default language.
System Date	Sets the date. Use the <Tab> key to switch between the data elements.
System Time	Set the time. Use the <Tab> key to switch between the data elements.

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.

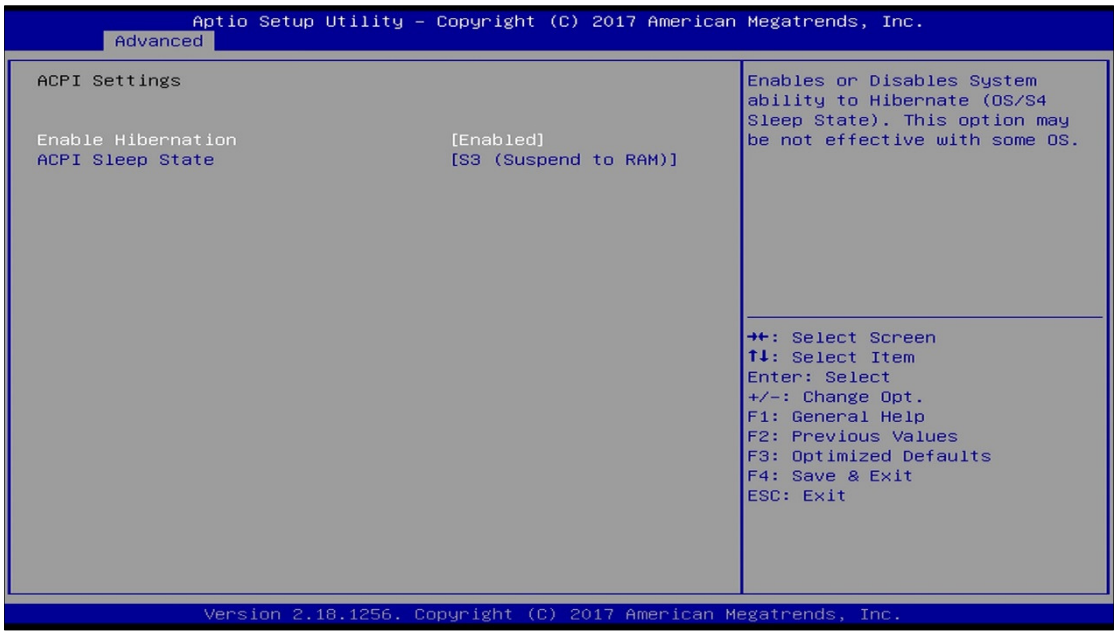


4.4.1 Trusted Computing



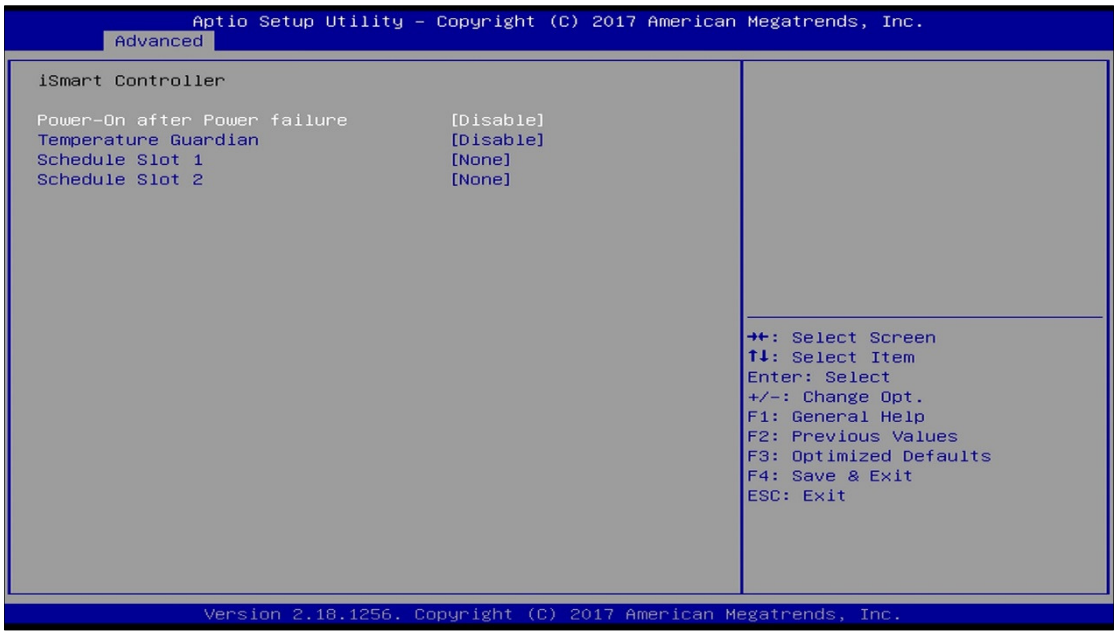
BIOS Setting	Description
Security Device Support	Enables / Disables BIOS support for security device. The operating system will not show security device. TCG EFI protocol and INT1A interface will not be available.

4.4.2 ACPI Settings



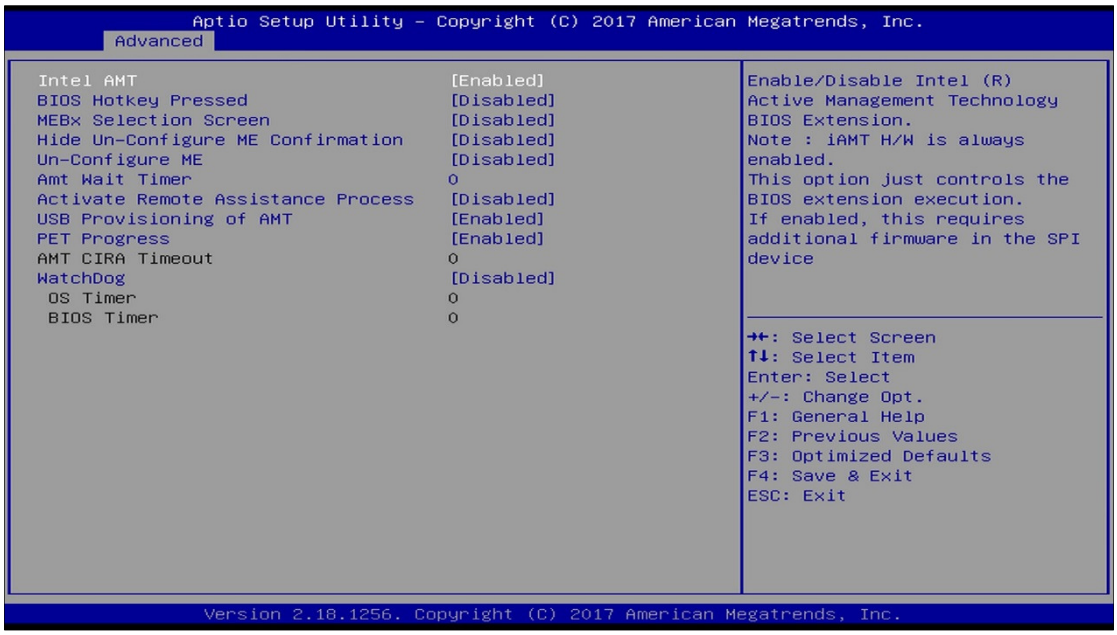
BIOS Setting	Description
Enable Hibernation	Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may not be effective with some OS.
ACPI Sleep State	Selects a ACPI sleep state for the system to enter. Options: Suspend Disabled S3 (Suspend to RAM)

4.4.3 iSmart Controller



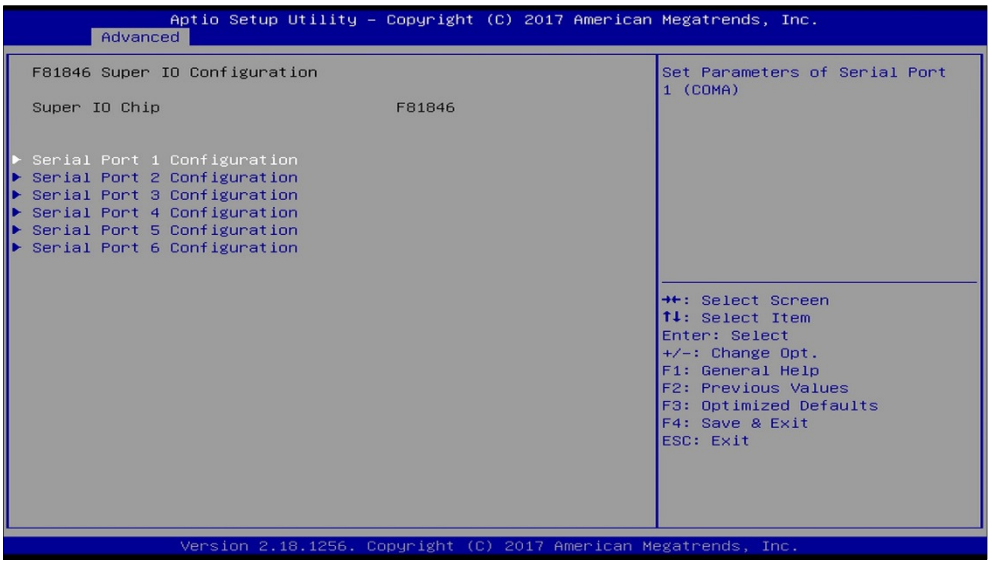
BIOS Setting	Description
Power-On after Power failure	Enables / Disables the system to be turned on automatically after a power failure.
Power Resume Delay	Enables / Disables to delay the time for system to turn on.
Temperature Guardian	Generate the reset signal when system hands up on POST.
Schedule Slot 1 / 2	Sets up the hour / minute / day for the power-on schedule for the system. Options: • None • Power On • Power On / Off **Important:** If you would like to set up a schedule between adjacent days, configure two schedule slots. 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.

4.4.4 AMT Configuration



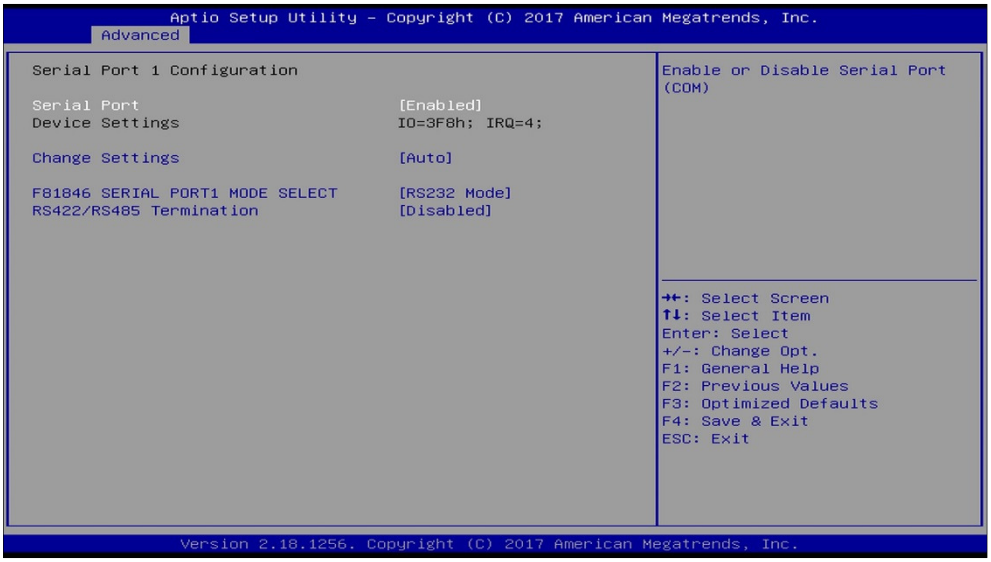
BIOS Setting	Description
Intel AMT	Enables / Disables Intel(R) Active Management Tecnology BIOS Extension. Note: iAMT H/W is alwas enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.
BIOS Hotkey Pressed	OEMFlag Bit 1: enables 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



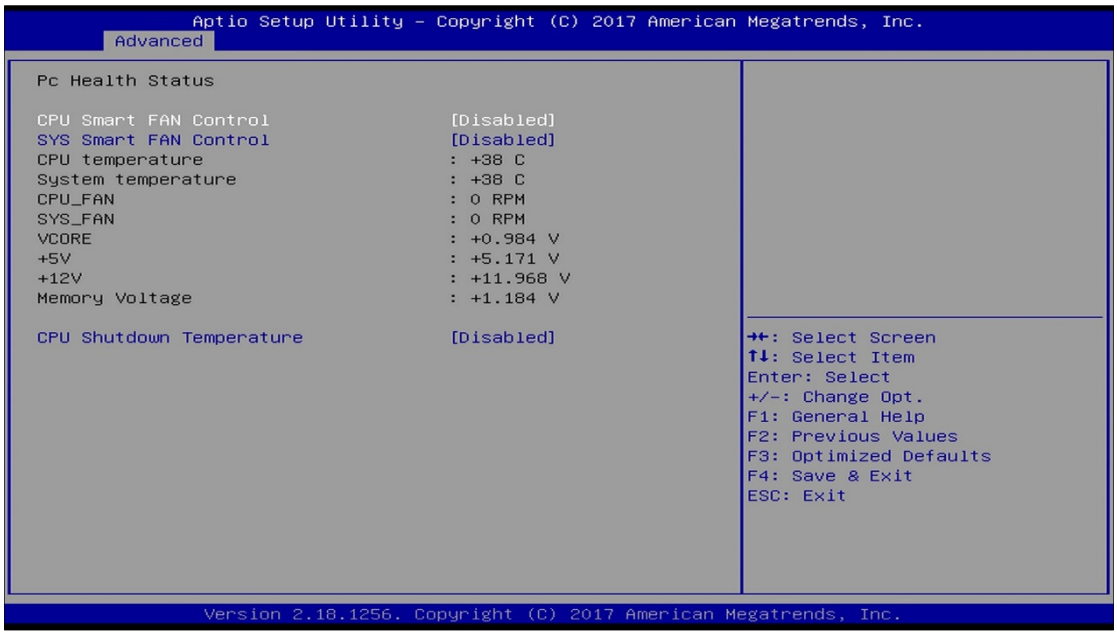
BIOS Setting	Description
Serial Port Configuration	Sets Parameters of Serial Ports. You can enable / disable the serial port and select an optimal settings for the Super IO device.

4.4.5.1. Serial Port 1 Configuration



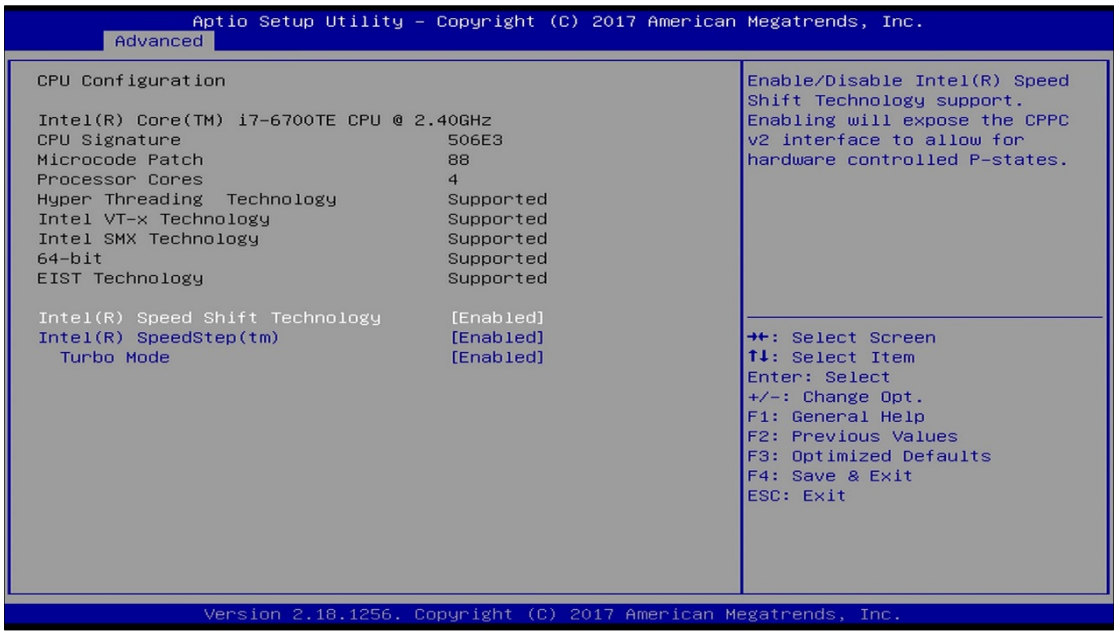
BIOS Setting	Description
Change Settings	Selects an optimal settings for the Super I/O device.
Device Mode	Changes the mode of serial port.

4.4.6 F81846 Hardware Monitor



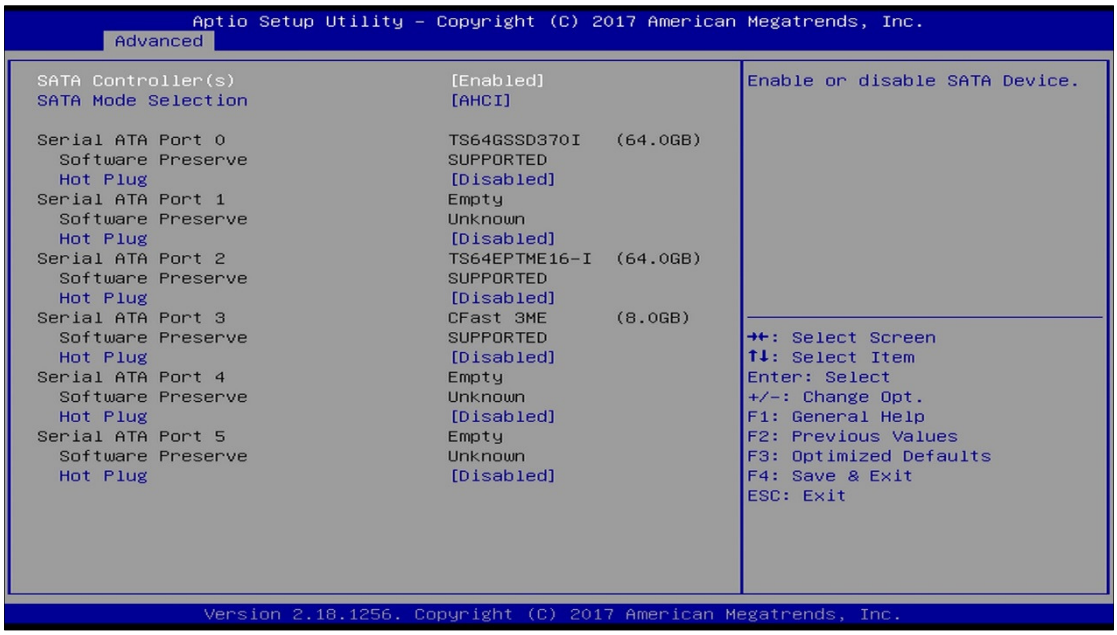
BIOS Setting	Description
CPU Smart Fan Control	Controls the CPU fan temperature by setting up a threashold temperature. Options: Disabled (default),. 50 °C, 60 °C, 70 °C, 80 °C
CPU Shutdown Temperature	This field enables or disables the Shutdown Temperature Options: Disabled (default),. 70 °C, 75 °C, 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



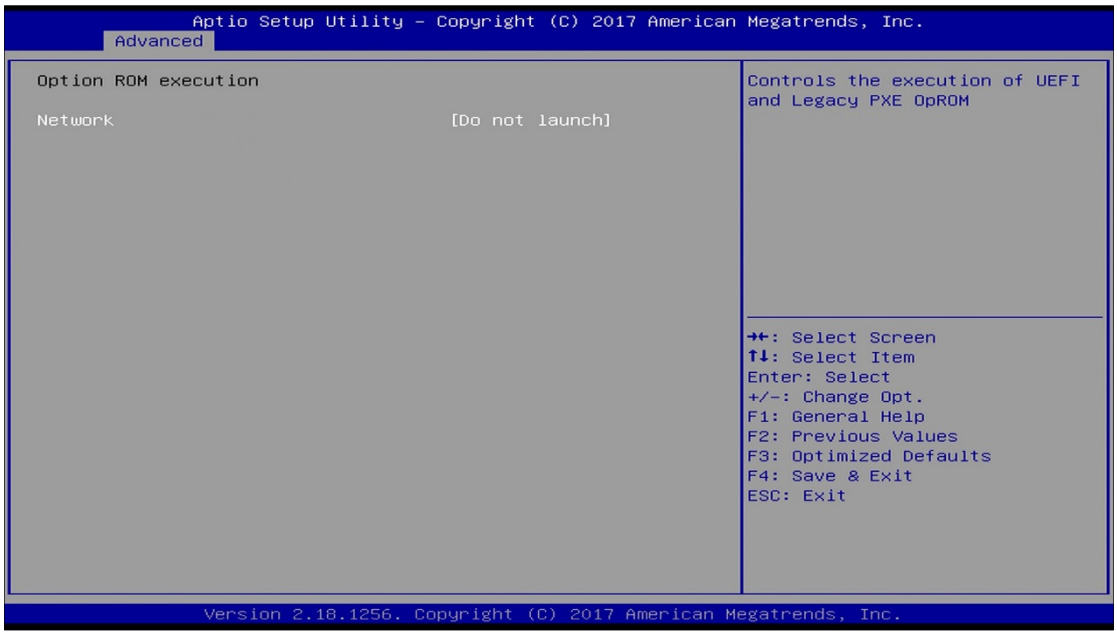
BIOS Setting	Description
Intel(R) Speed Shift Technology	Enables / Disabvbles Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware contorlled P-states.
Intel(R) SpeedStep (tm)	Enables / Disables the function to allow more than two frequency ranges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

4.4.8 SATA Configuration



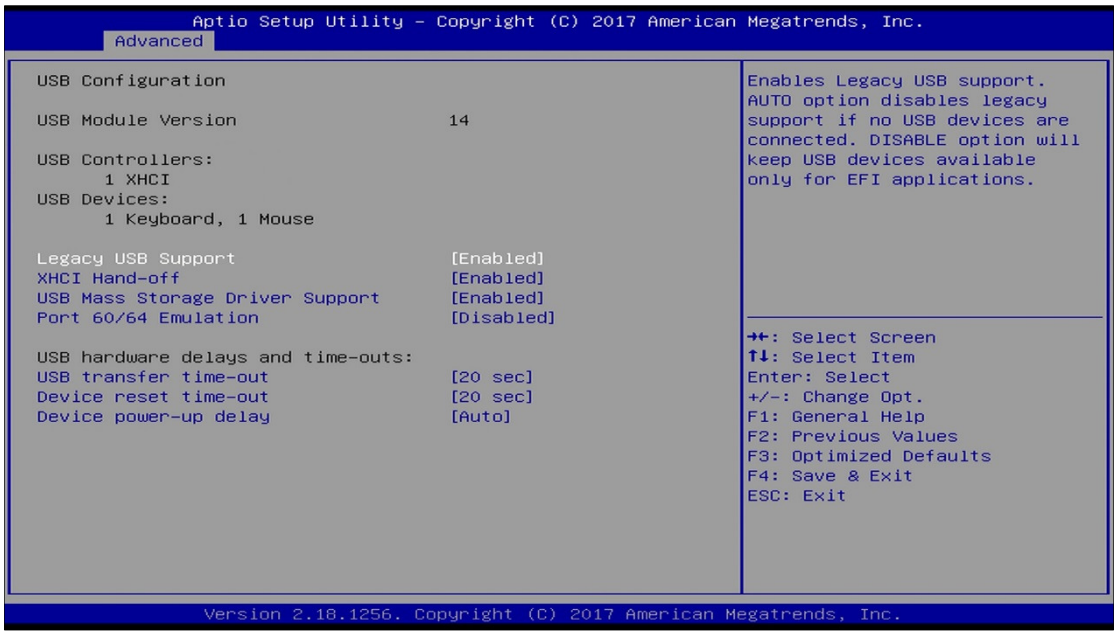
BIOS Setting	Description
SATA Controller(s)	Enables / Disables SATA device.
SATA Mode Selection	Selects IDE / AHCI Mode.
Serial ATA Port 0~5	Enables / Disables Serial Port 0 ~ 5.
SATA Port 0 ~ 5 HotPlug	Enables / Disables SATA Port 0 ~ 5 HotPlug.

4.4.9 CSM Configuration



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

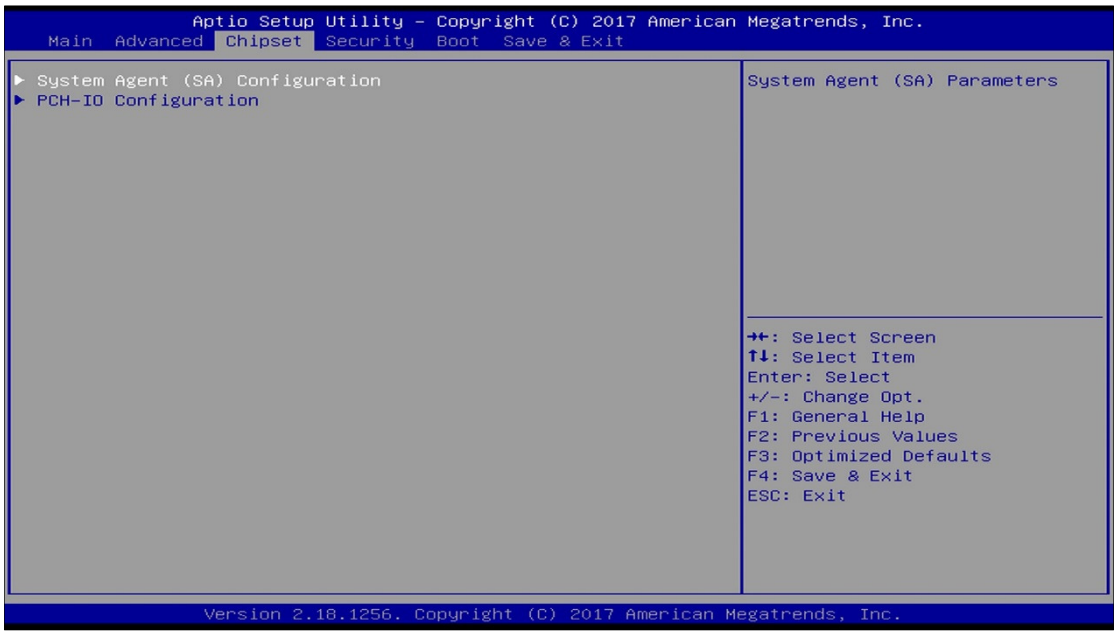
4.4.10 USB Configuration



BIOS Setting	Description
Legacy USB Support	Enables / Disables Legacy USB support. • **Auto** disables legacy support if there is no USB device connected. • **Disable** keeps USB devices available only for EFI applications.
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.

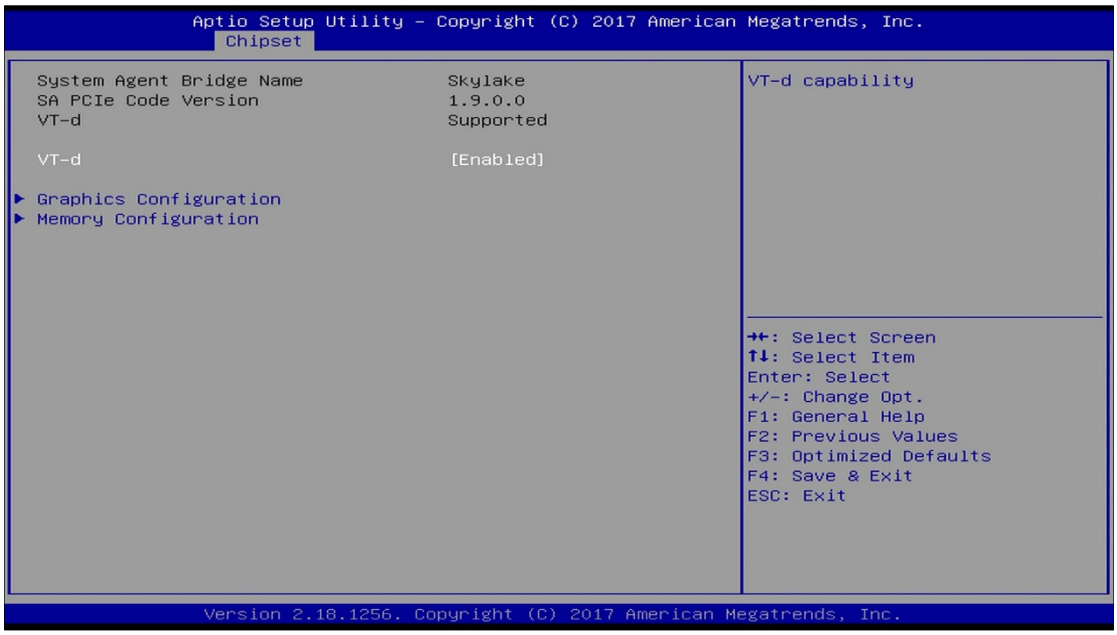
BIOS Setting	Description
Device power-up delay	The maximum time the device will take before it properly reports itself to the Host Controller. **Auto** uses default value. For a Root port, it is 100 ms. For a Hub port, the delay is taken from Hub descriptor.

4.5 Chipset Settings



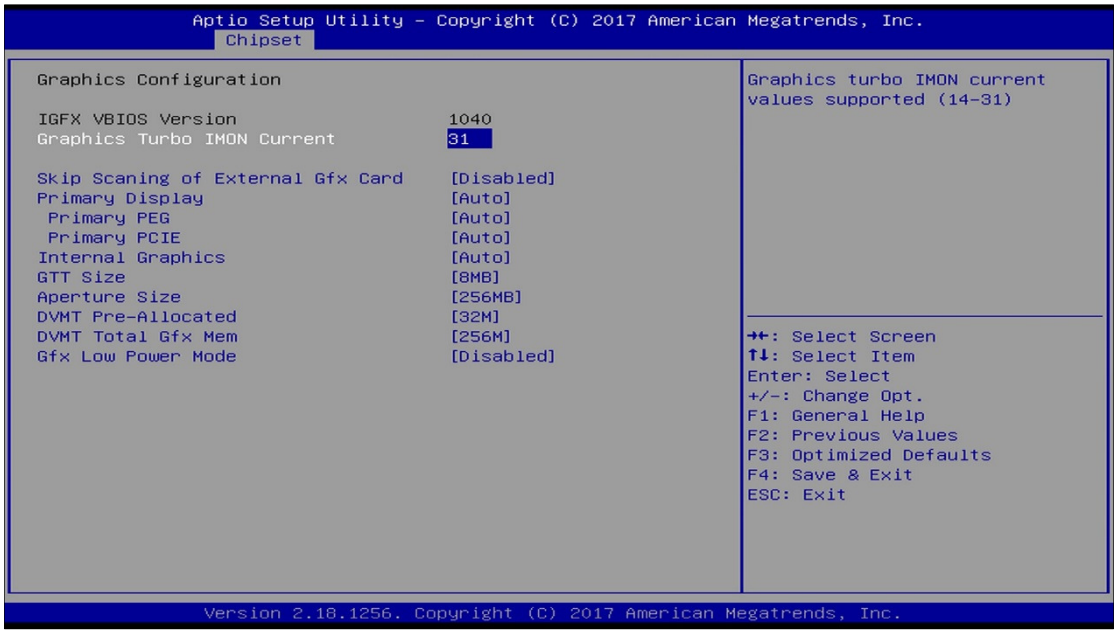
BIOS Setting	Description
System Agent (SA) Configuration	System Agent (SA) parameters
PCH-IO Configuration	PCH parameters

4.5.1 System Agent (SA) Configuration



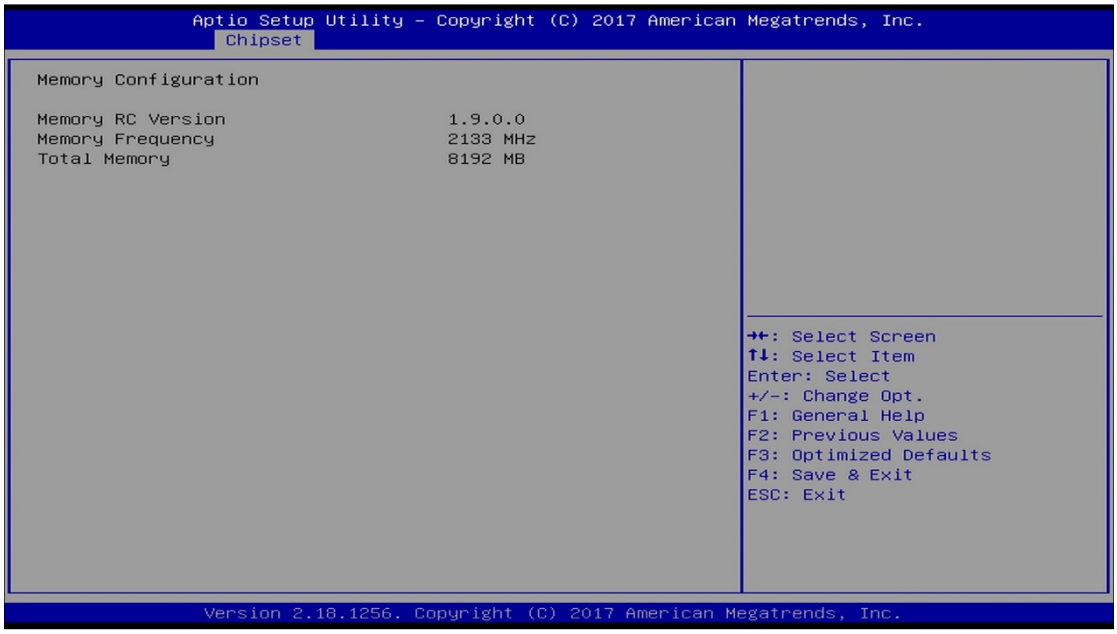
BIOS Setting	Description
VT-d	Checks if VT-d function on MCH is supported.
Graphics Configuration	Configures the graphics settings.
Memory Configuration	Displays the memory configuration parameters.

4.5.1.1. Graphics Configuration

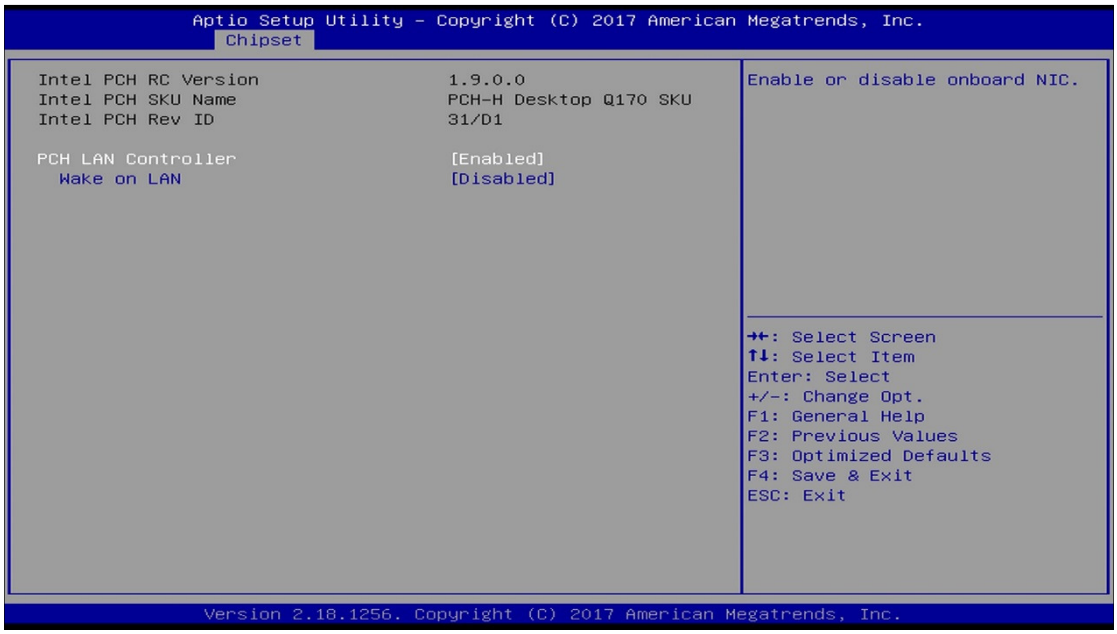


BIOS Setting	Description
Graphics Turbo IMON Current	Graphics turbo IMON current values supported (14-31).
Skip Scanning of External Gfx Card	If enabled, it will not scan for external Gfx Card on PEG and PCH PCIE ports.
Primary Display	Selects which of IGFX/PEG/PCI graphics device should be primary display, 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. 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 devce.
DVMT Total Gfx Mem	Selects DVMT 5.0 total graphic memory size used by the internal graphcis device.

4.5.1.2. Memory Configuration

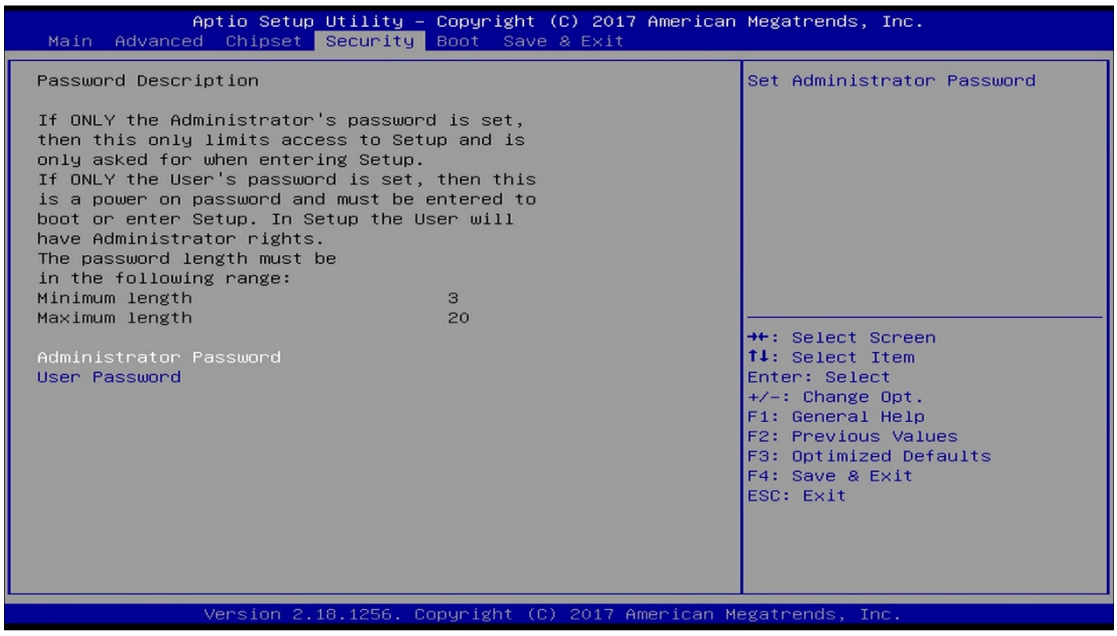


4.5.2 PCH-IO Configuration



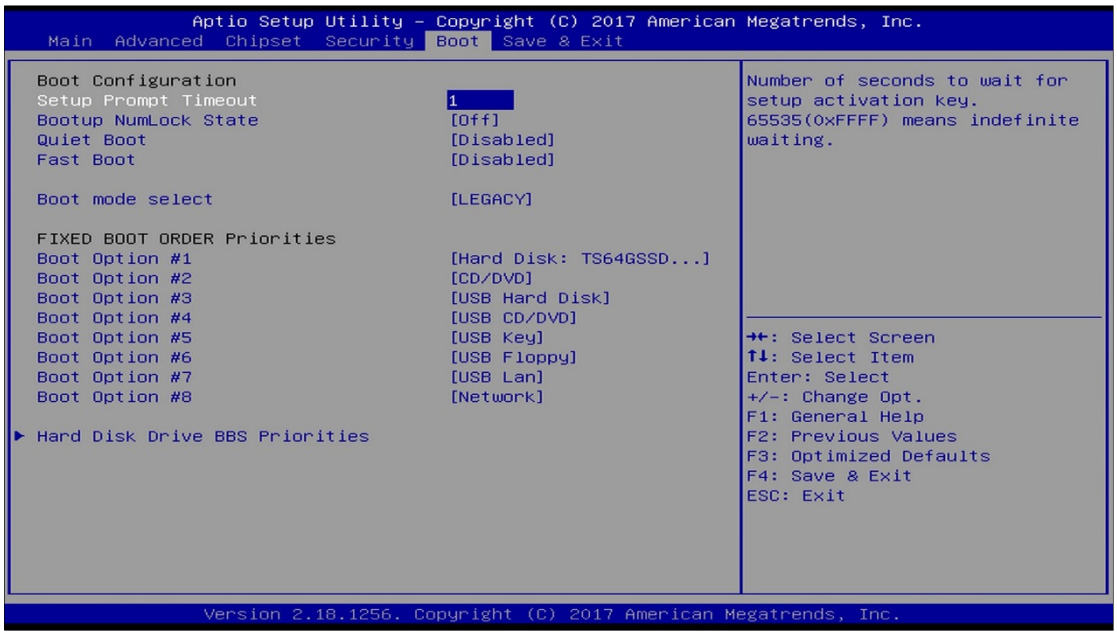
BIOS Setting	Description
PCH LAN Controller	Enables / Disables onboard NIC.
Wake on LAN	Enables / Disables integrated LAN to wake the system. (The Wake on LAN cannot be disabled if ME is at Sx state.)

4.6 Security Settings



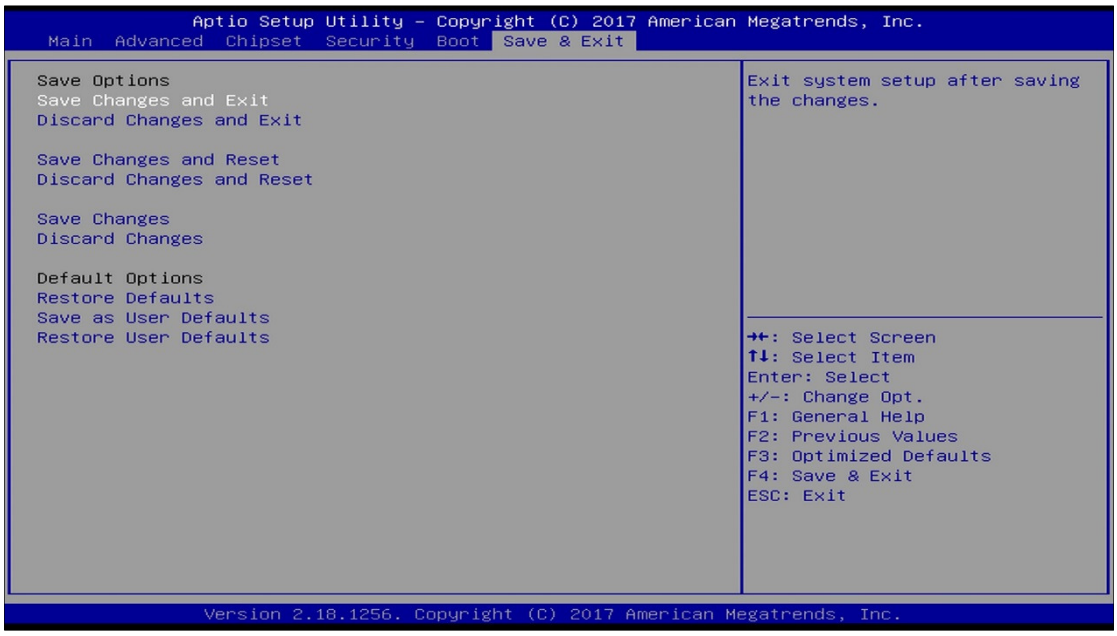
BIOS Setting	Description
Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.

4.7 Boot Settings



BIOS Setting	Description
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 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.

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

A. I/O Port Address Map

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

Address	Device Description
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
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

B. Interrupt Request Lines (IRQ)

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

Level	Function
IRQ 0	System timer
IRQ 1	Standard PS/2 Keyboard
IRQ 3	Communications Port (COM2)
IRQ 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)

Level	Function
IRQ 4294967292	Intel(R) HD Graphics 630
IRQ 4294967293	Intel(R) Ethernet Connection (2) I219-LM
IRQ 4294967294	Standard SATA AHCI Controller

C. Watchdog Timer Configuration

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

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

Sample Code

```
//---------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A
PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "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
```