AMS322

Compact Expandable Fanless System

User's Manual

Version 1.0
(December 2024)

iBASE

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Compliance

CE

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

FC

AMS322 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 2 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).

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

Important Safety Information

Carefully read the precautions before using the device.

Environmental conditions:

- Lay the device horizontally on a stable and solid surface.
- Make sure you leave plenty of space around the device for ventilation.
- Use this product in environments with ambient temperatures -10˚C ~ 50˚C.
- Do not leave this device in an environment where the storage temperature may go below -20˚c or above 80˚c.

Care for your IBASE products:

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

WARNING

Attention during use:

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

Avoid Disassembly

It is advised 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, storage device, power adapter, panel and touchscreen.

✳ *Products 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 the website of IBASE. 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
- Product View
- Dimensions

1.1 Introduction

Designed for machine automation, industrial applications, and harsh environments, the fanless AMS322 embedded computer delivers high performance with low power consumption and operates within a temperature range from -10ºC to 60ºC with airflow. Engineered with a passive finned heat sink for efficient heat transfer, the AMS322 incorporates the MBE320 motherboard, powered by 11th Gen Intel® Core™ i7/i5/i3 processors. It supports dual DDR4 SO-DIMM up to 64GB and features front removable drive bay for 2.5” SSD. The system includes six antenna ports and ensures robust connectivity through M.2 2230 E-Key and 3052 B-Key slots, supporting WLAN, 4G, and 5G modules.

AMS322

1.2 Features

- Compact fanless system with for IBASE MBE320 proprietary board
- 11th Gen Intel® Core™ i7/i5/i3 Processors
- Front removable drive bay for 2.5” SSD
- 2x PCI-E (x4) expansion slot
- Over/Under/Reverse voltage protection
- Supports DIN-rail mount & wall mount
- TPM 2.0

1.3 Packing List

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

AMS322

- AMS322 x 1
- Terminal Block for DC-In Power Adapter (3-pin) x 1
- Terminal Block for Remote Power Button (2-pin) x 1
- Wall Mount Kit x 1
- Round Head Screw (for Wall Mount Kit) x 4

1.4 Optional Accessories

- WiFi / Bluetooth antenna kit
- LTE / 5G antenna kit
- GPS antenna kit
- 24V/180W power adaptor

1.5 Specifications

Models
AMS322-i7M Fanless System with MBE320-i7 and Intel® Core™ i7 1185G7E Processor **AMS322-i5M** Fanless System with MBE320-i5 and Intel® Core™ i5 1145G7E Processor **AMS322-i3M** Fanless System with MBE320-i3, w/ Intel® Core™ i3 1115G4E Processor

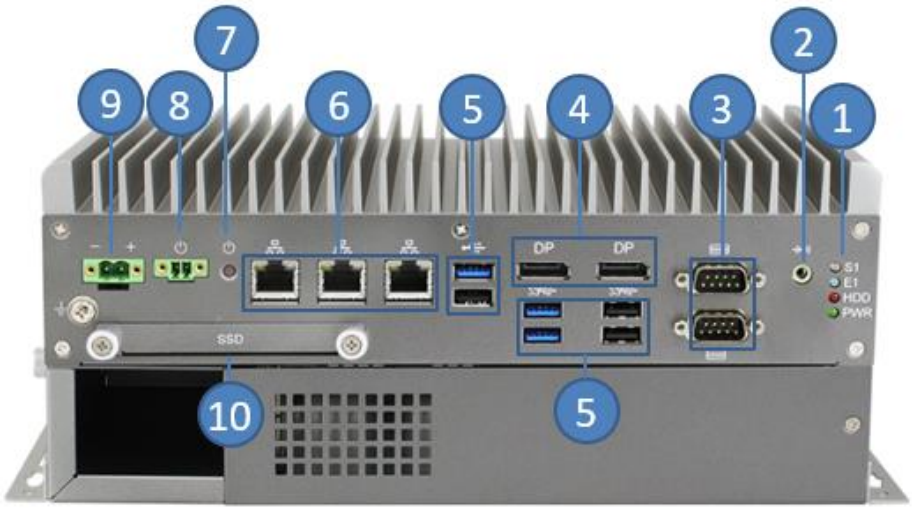
System	
Motherboard	MBE320
Operating System	• Windows10 (64-bit) • Linux Ubuntu
CPU	11th Gen Intel® Core™ i7/i5/i3 Mobile Processors
CPU Speed	Up to 4.4GHz
Memory	2x DDR4 SO-DIMM, Max. 64GB
Rear Panel External I/O	• 1x 2-pin DC-in terminal block for 24V (±10%) • 1x 2-pin terminal block for remote power button • 1x Power Button • 3x RJ45 2.5G Ethernet port • 2x DisplayPort connectors • 3x USB 3.1 ports • 3x USB 2.0 ports • 1x RS232/422/485 port for COM#1 • 1x RS232 port for COM#2 • 1x Audio jack for Line-out • 1x Red LED for HDD/SSD, 1x Green LED for Power • 1x Blue LED & 1x White LED programmable
Expansion Slots	1x M.2 2230 E-Key (USB 2.0 & PCI-E) 1x M.2 3052 B-Key (USB 3.0 & PCI-E) 2x PCI-E (x4) slots
Storage	• 1x 2.5" HDD/SSD (external-accessible)
Construction	Aluminum & steel Chassis
Color	Silver & Gray
Mounting	• Desktop or wall mounting (wall mounting kit included) • Side mounting • DIN-rail mounting (optional)

Dimensions	275mm (W) x 140mm (D) x 70mm (H) 10.83” (W) x 5.51” (D) x 2.76” (H)
Weight	3.5kg
Operating Temperature	-10°C to 60°C (14°F~140°F) *with air flow -10°C to 50°C (14°F to 122°F) without air flow
Storage Temperature	-20°C to 80°C (-4°F to 176°F)
Relative Humidity	5~90% @ 45°C, (non-condensing)
Vibration	Non-Operating: 1.0 grms / 5~500Hz / random operation Operatiing: 0.25 grms / 5~500Hz / random operation
Shock	Operating: 20 g / 11 ms Non-operating: 40 g / 11 ms
Certification	CE / LVD / FCC Class-B

All specifications are subject to change without prior notice.

1.6 Product View – AMS322 and IP302

Front View



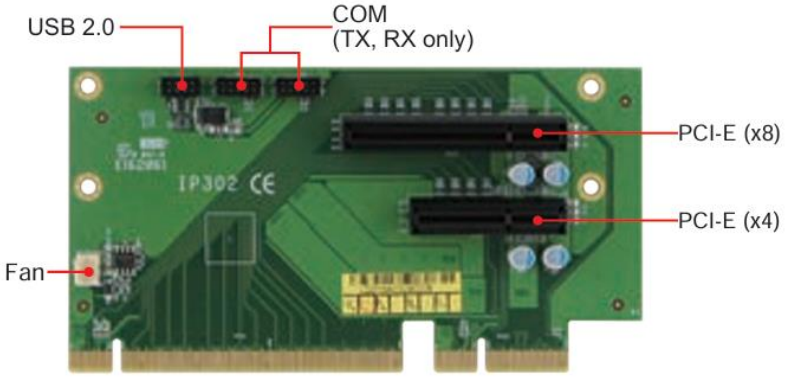
No.	Name	No.	Name
1	LED Indicator (from top to bottom: S1*, E1*, SSD, HDD, Power)	6	3x 2.5GbE Ports
2	Audio Jack for Line-Out	7	Power Button
3	2x COM Ports	8	Terminal block for remote power button
4	DP Ports	9	DC-in terminal block for 24V (±10%)
5	3x USB 3.1 & 3x USB 2.0	10	Removal 2.5” SSD Tray

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

Oblique View

Rear View

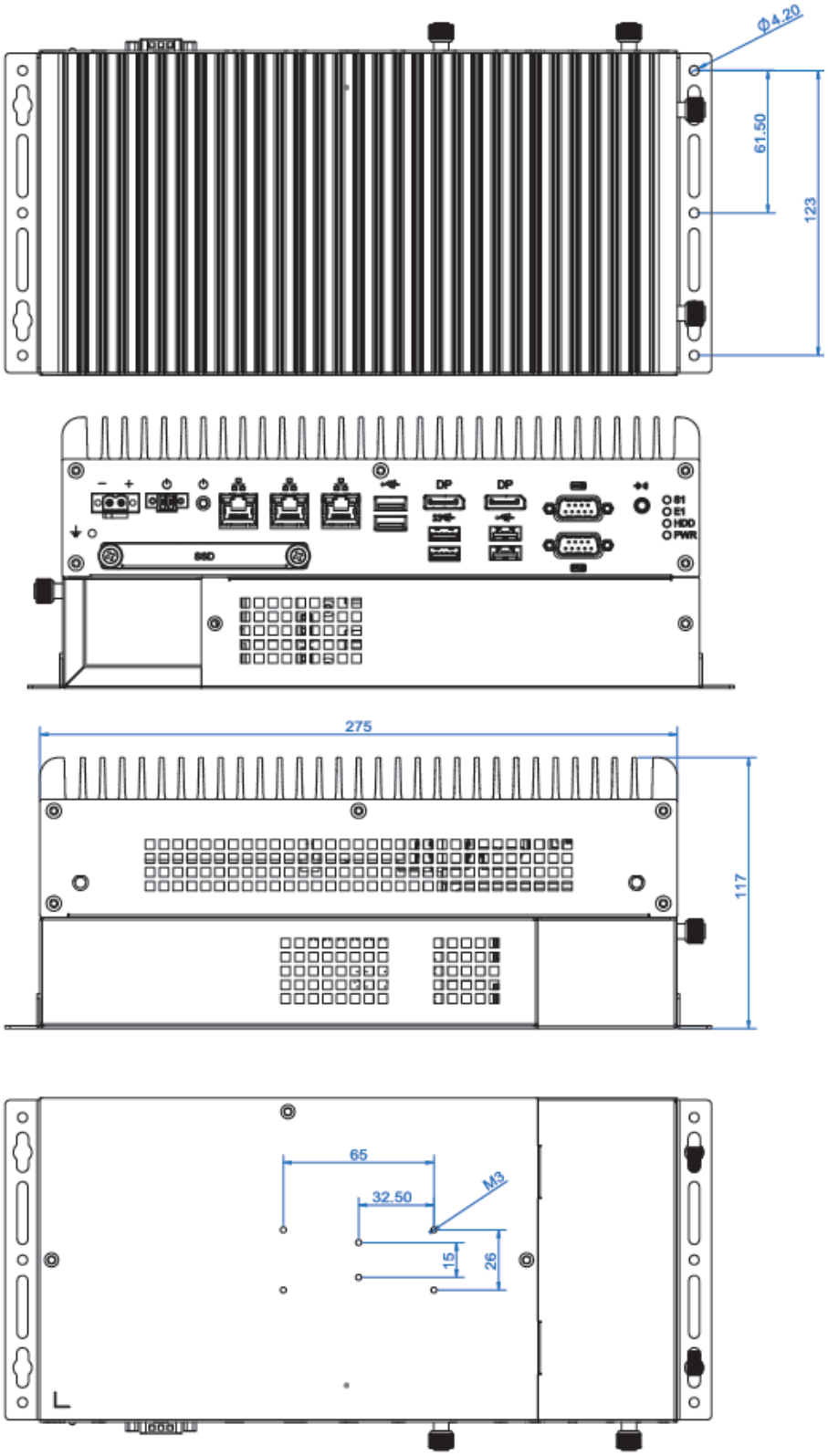
IP302 Expansion Card



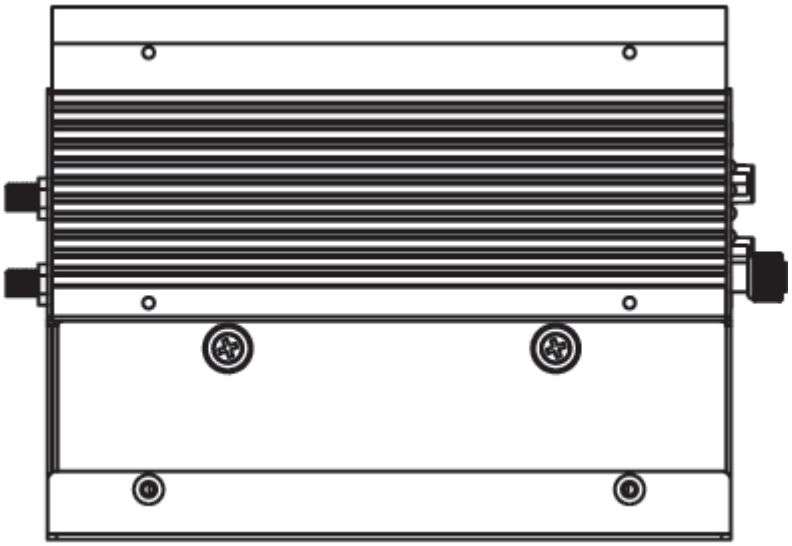
Remarks: The IP302 slots both have PCIe(4x) signals only for AMS322 system.

1.7 Dimensions – AMS322

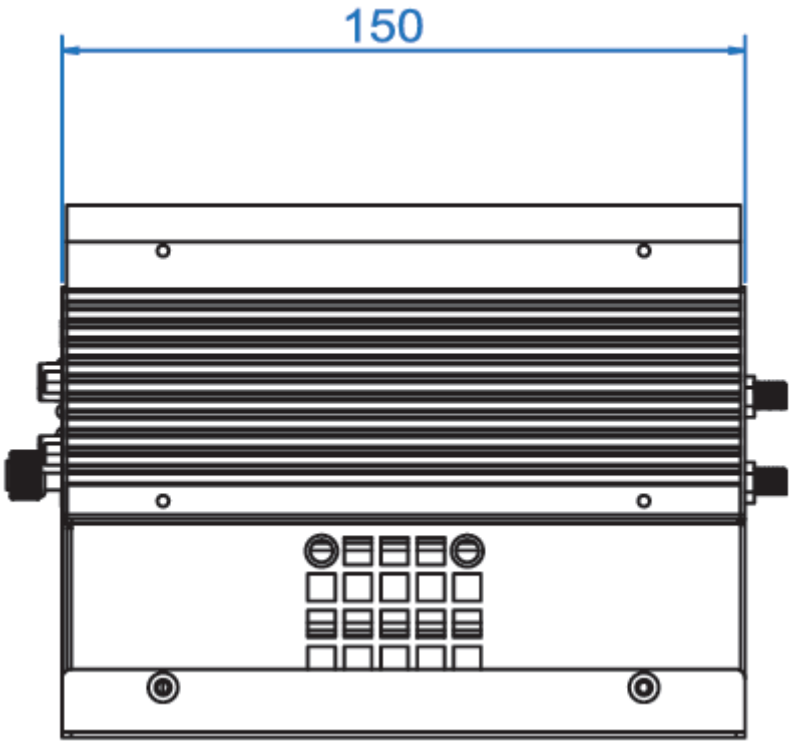
Unit: mm



Unit: mm



(Left Side)



(Right Side)

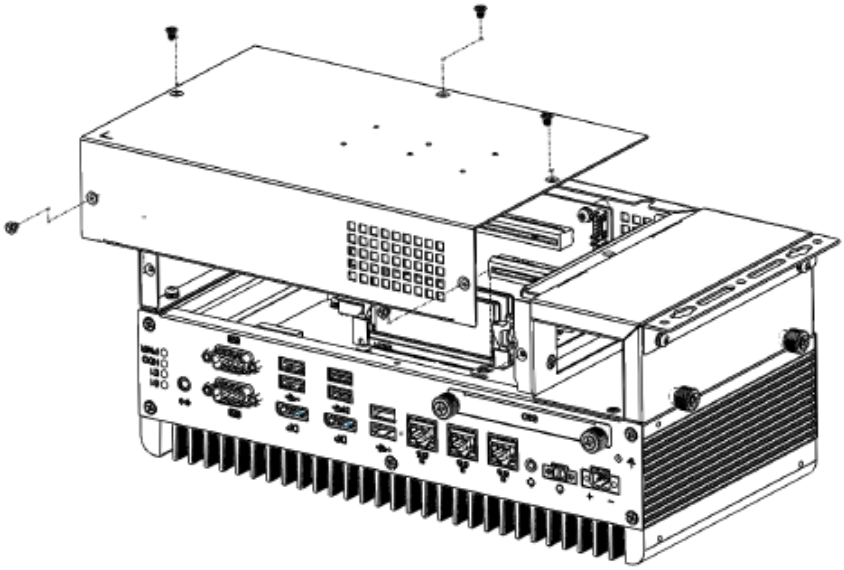
Chapter 2
Hardware Configuration

The information provided in this chapter includes:

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

2.1 Hardware Installations

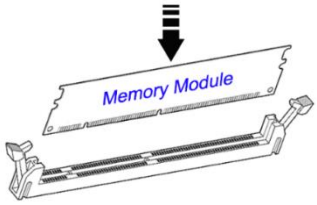
Remove and replace the bottom cover for the installation / replacement of memory module and M.2 socket devices. Release the screws shown below.



2.1.1 Memory Installation / Replacement

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

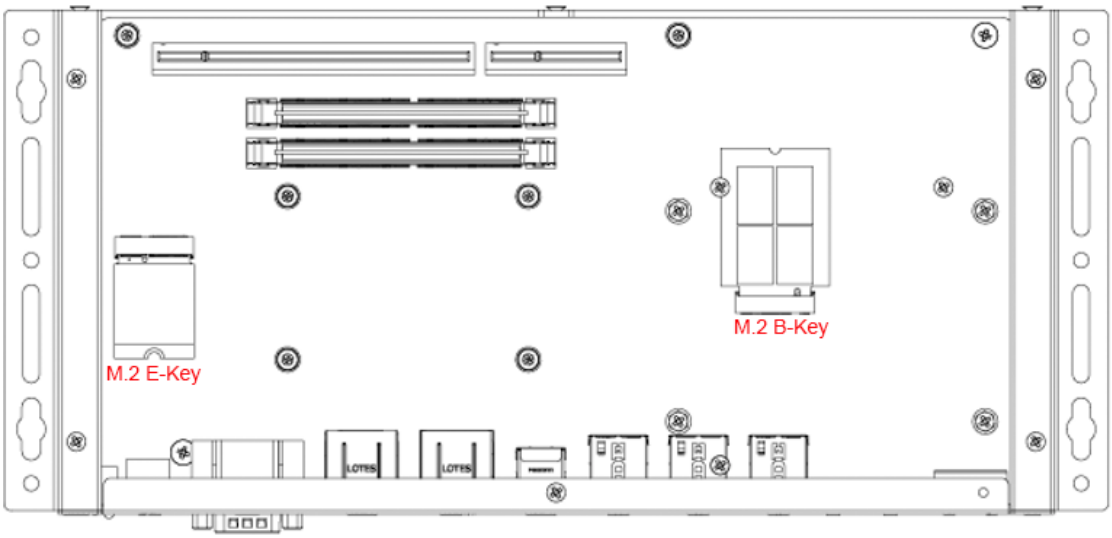
3. Hold the memory module and align the key of the module with that on the memory slot.
4. Gently push the module in an upright position until the ejector tabs of the memory slot close to hold the module in place when the module touches the bottom of the slot.



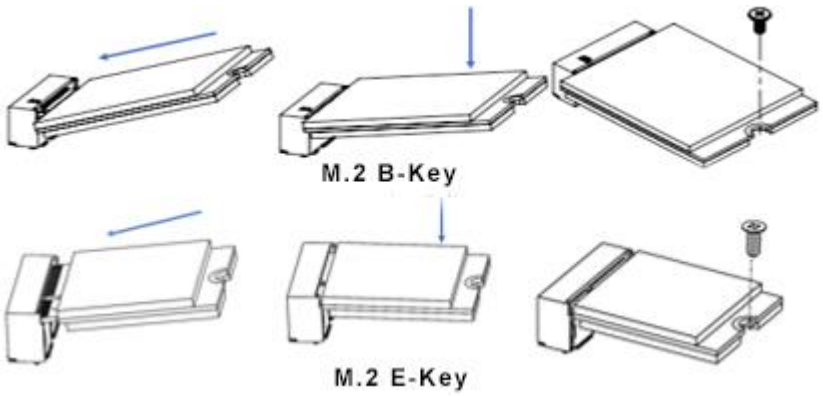
To remove the module, press the ejector tabs outwards with your fingertips to eject the module.

2.1.2 M.2 Installation / Replacement

1. After removing the bottom cover, locate the M.2 sockets.
2. There are two M.2 sockets available on AMS322 (J17: E-Key and J9: B-Key), as shown in the picture below. Locate the desired socket to be used for installation/replacement of M.2 devices to proceed.

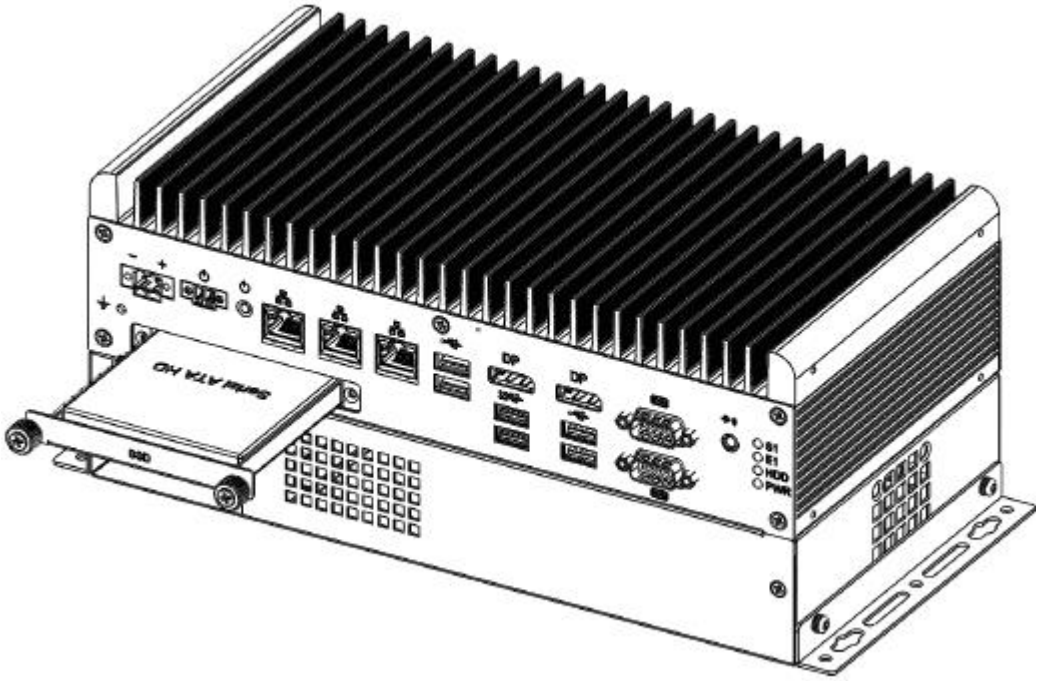


3. To install or replace a card, align the key of the card to the interface, and insert the card slantwise. Push the card down and fix it with a flat head screw.

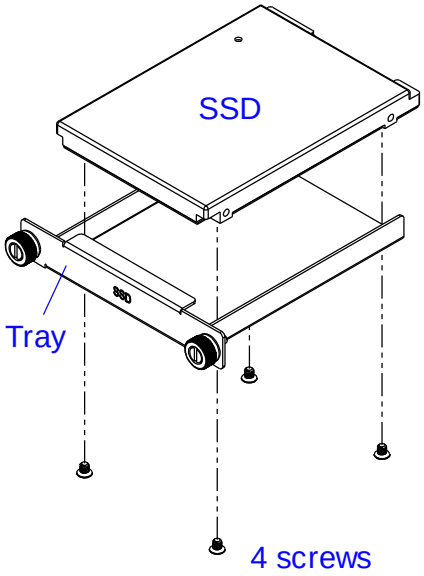


2.1.3 SSD Installation

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



Release 2 screws to pull out the SSD tray.

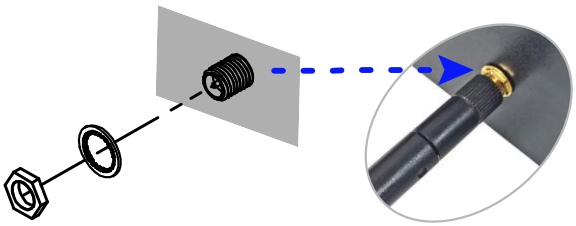


Remove/replace the four screws shown to remove or install the SSD.

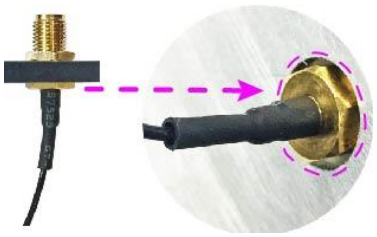
2.1.4 WiFi / 4G / 5G Antenna Installation

Thread the WiFi / 4G / 5G antenna extension cable through an antenna hole of the front I/O cover and fasten the antenna as shown below. Then apply adhesive to the edge of the hex nut behind the front I/O cover to prevent the extension cable from falling if the cable becomes loose.

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



2. Apply adhesive around here.

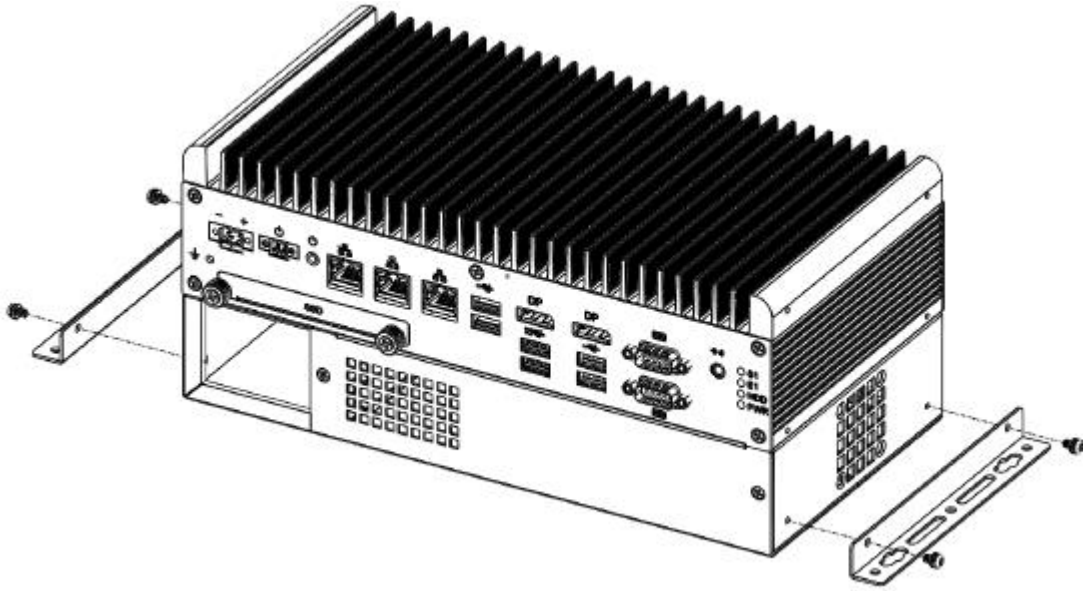


Info: The diameter of the nut is around 6.35 mm (0.25”-36UNC).

2.1.5 Mounting Installation

When mounting the AMS322 to any type of surface, ensure that you have enough room for power and signal cable routing, and have good ventilation. The method of mounting must be able to support weight of the device plus the suspension weight of all the cables to be attached to the system.

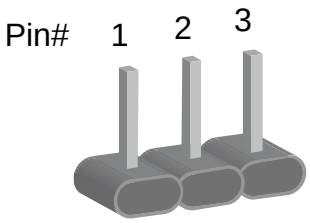
The AMS322 system comes with a set of wall mount kit and four round head screws that are to be used in securing the mounting brackets to the main unit, as shown in the picture below.



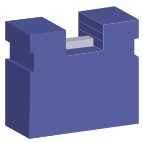
2.2 Jumper Setting

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

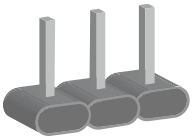
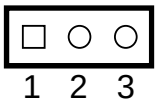
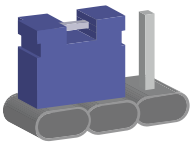
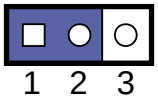
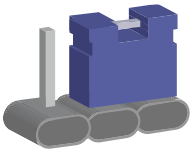
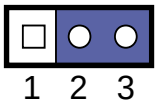
Jumpers are short-length conductors consisting of several metal pins with a non-conductive base mounted on the circuit board. Jumper caps are used to have the functions and features enabled or disabled. If a jumper has 3 pins, you can connect either PIN1 to PIN2 or PIN2 to PIN3 by shorting.



A 3-pin jumper



A jumper cap

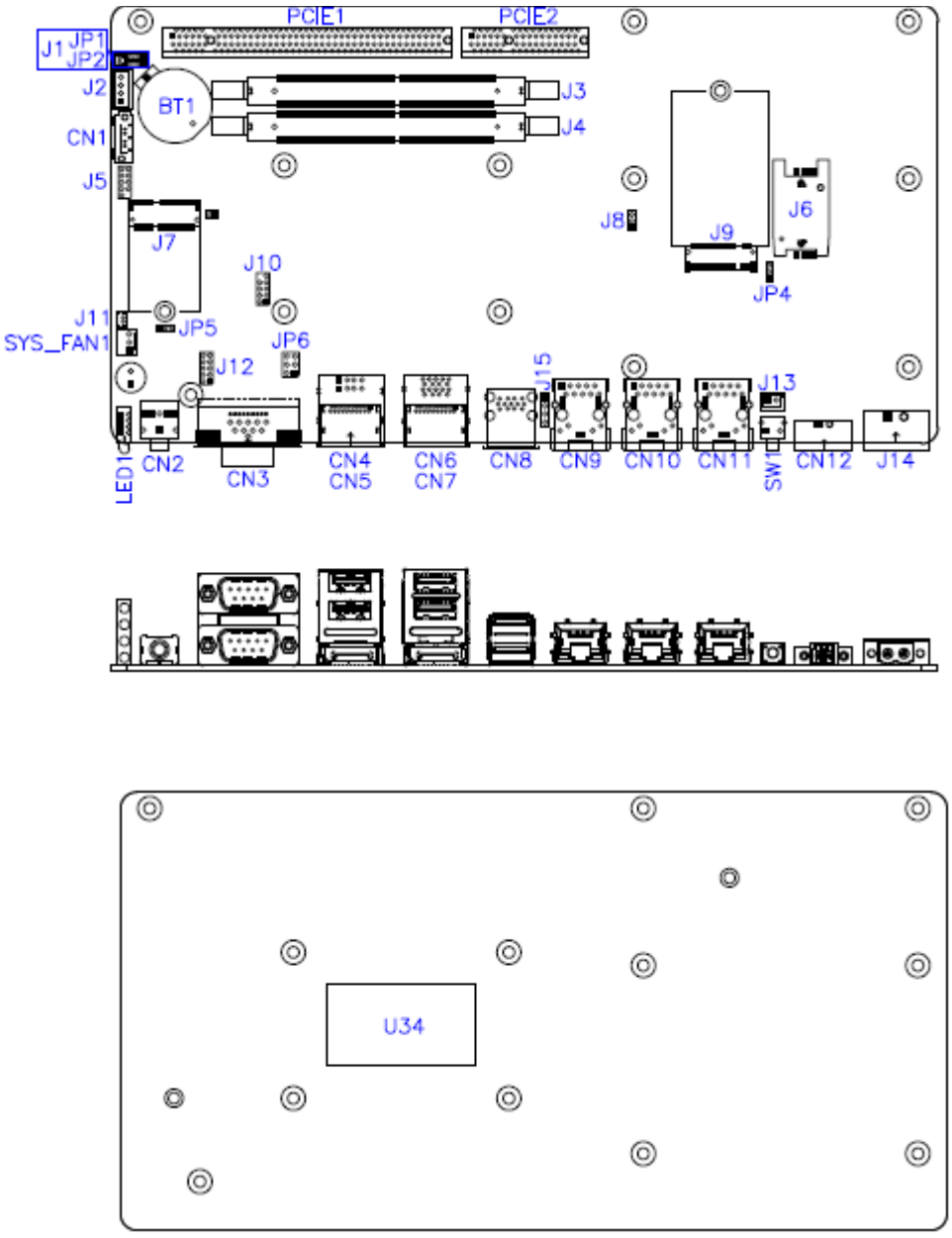
Pin	Oblique view	Illustration
Open		
1-2 closed		
2-3 closed		

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

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

2.3 Jumper & Connector Locations on Motherboard

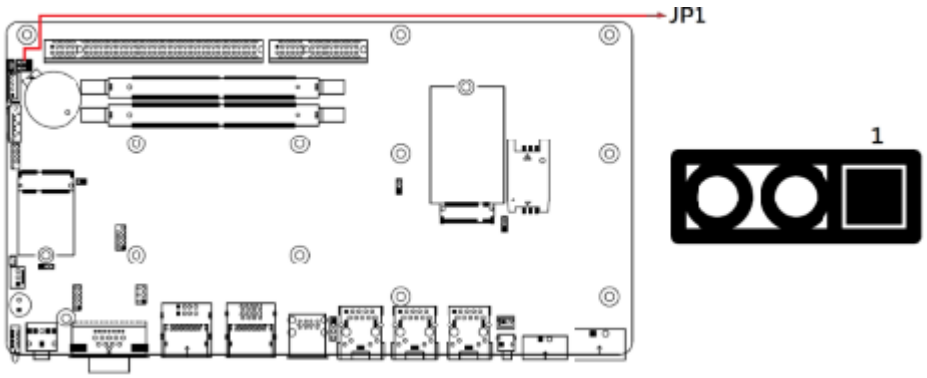
Motherboard: MB320

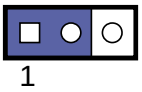
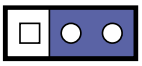


2.4 Jumpers Quick Reference

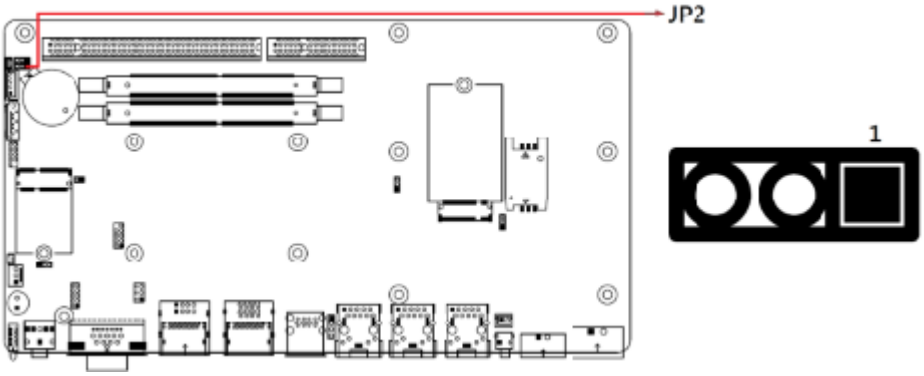
Function	Jumper
Clear RTC	JP1
Clear ME	JP2
M.2 B-Key Support Type	JP4
AT/ATX Mode Setting	JP5

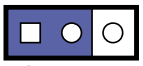
2.4.1 Clear RTC (JP1)



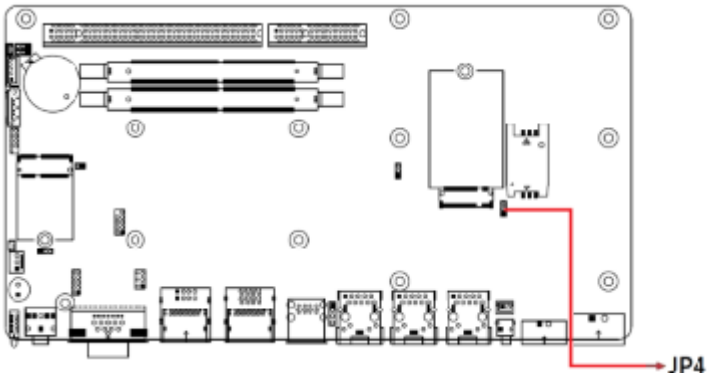
Function	Pin	Illustration
Normal (default)	1-2 Closed	 1
Clear CMOS	2-3 Closed	 1

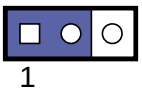
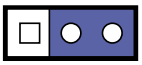
2.4.2 Clear ME (JP2)



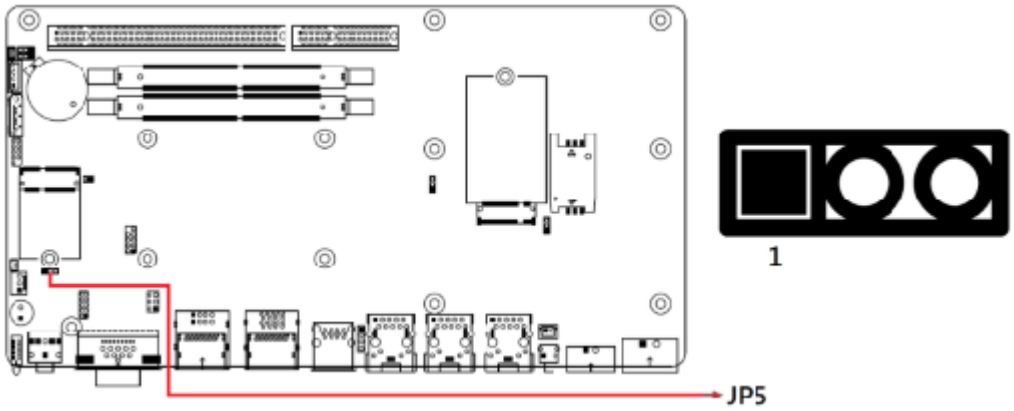
Function	Pin	Illustration
Normal (default)	1-2 Closed	 1
Clear ME	2-3 Closed	 1

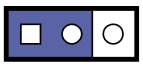
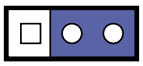
2.4.3 M.2 B-Key Support Type (JP4)



Function	Pin	Illustration
USB	1-2 Closed	 1
PCIe	2-3 Closed	 1

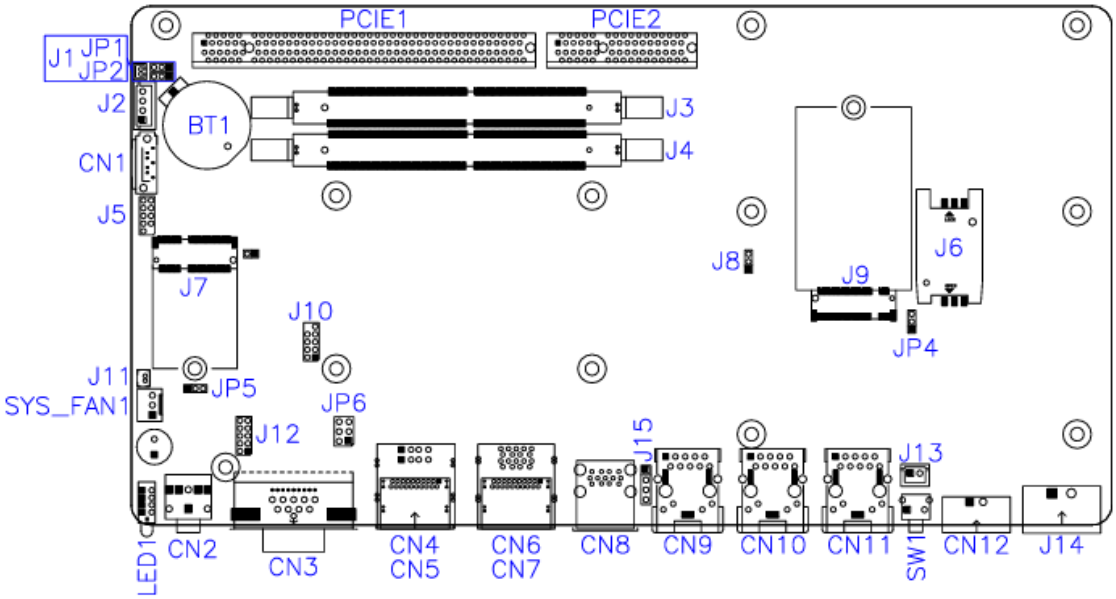
2.4.4 AT/ATX Mode Setting (JP5)

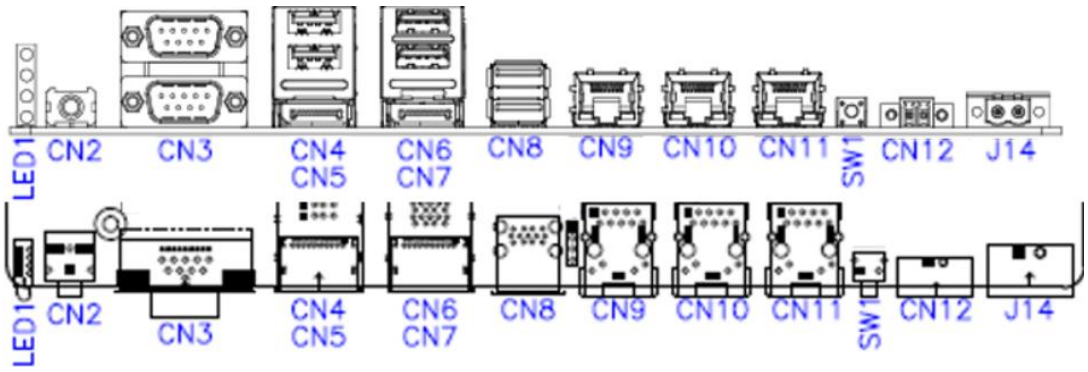


Function	Pin	Illustration
ATX Mode (default)	1-2 Closed	 1
AT Mode	2-3 Closed	 1

2.5 Connectors Quick Reference

Function	Connector
SATA Connector	CN1
Line Out Jack	CN2
COM1 / 2 Ports	CN3
USB 2.0 Ports	CN4
DisplayPort Ports	CN5,CN7
USB 3.1 Ports	CN6,CN8
I226V GbE Ports	CN9, CN10, CN11
Terminal Block for Remote Access	CN12
Power Button	SW1
RTC Battery Connector	J1
SATA Power Connector	J2
SO-DIMM Sockets	J3, J4
SPI Debug Header	J5
SIM Card Slot for 4G/5G	J6
M.2 E-Key Socket	J7
M.2 B-Key Socket	J9
ESPI Debug Header	J10
Reset Header	J11
Digital IO Connector	J12
AT On/Off Switch	J13
DC_IN Connector	J14





2.5.1 LED1: 4x LED Indicators (Power, HDD, RTC battery low, Programmable)

Green (Power LED)
Red (HDD LED)
Blue(RTC battery low LED)
Green/yellow (GPIO LED)

2.5.2 CN2: Line Out Jack

2.5.3 CN3: COM1 / COM2 Ports

2.5.4 CN4: USB 2.0 Ports

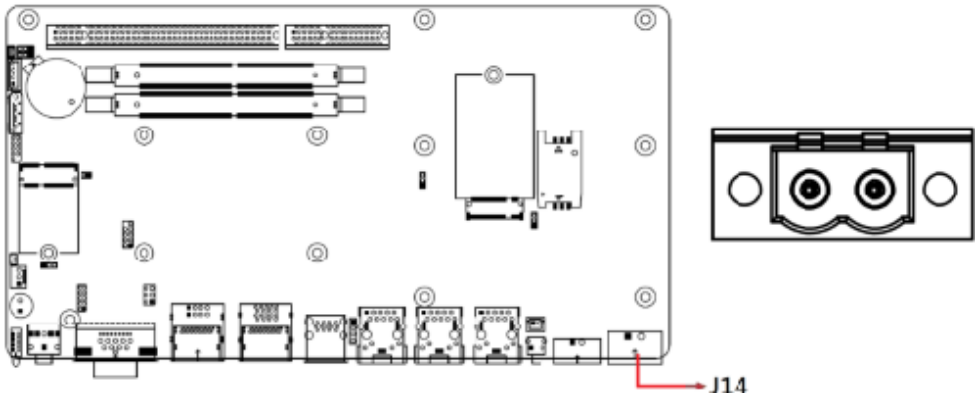
2.5.5 CN5, CN7: DisplayPort Ports

2.5.6 CN6, CN8: USB 3.1 Ports

2.5.7 CN9, CN10, CN11: I226V GbE Ports

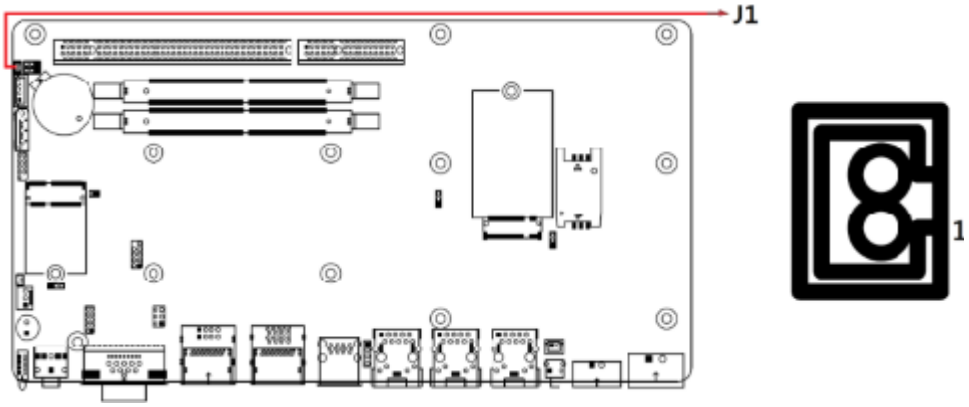
2.5.8 CN12 : Terminal Block Connector for Remote Access

2.5.9 J14: DC_IN Connector (2-pin terminal block)

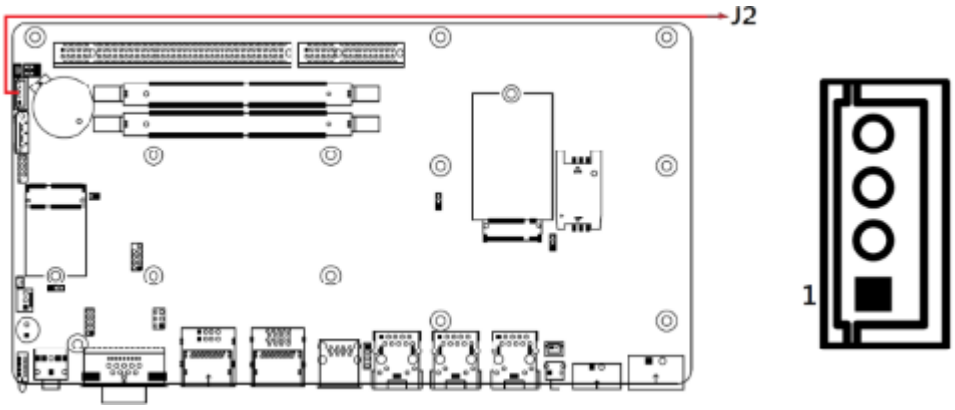


Pin	Signal Name	Pin	Signal Name
1	24V	2	Ground

2.5.10 J1: RTC Battery Connector

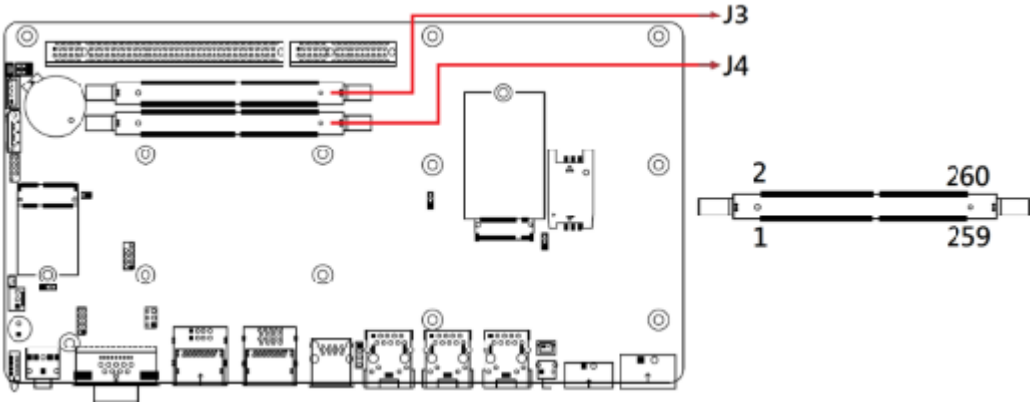


2.5.11 J2: SATA Power Connector

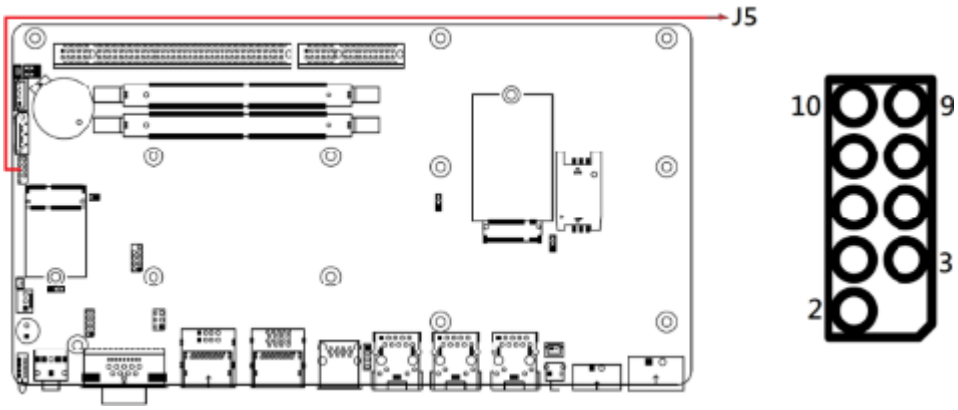


Pin	Signal Name	Pin	Signal Name
1	+5V	3	Ground
2	Ground	4	+12V

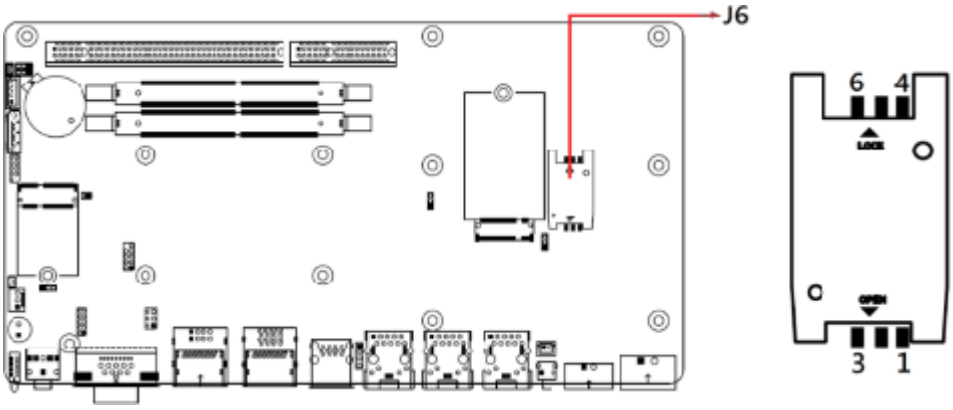
2.5.12 J3, J4: SO-DIMM Sockets



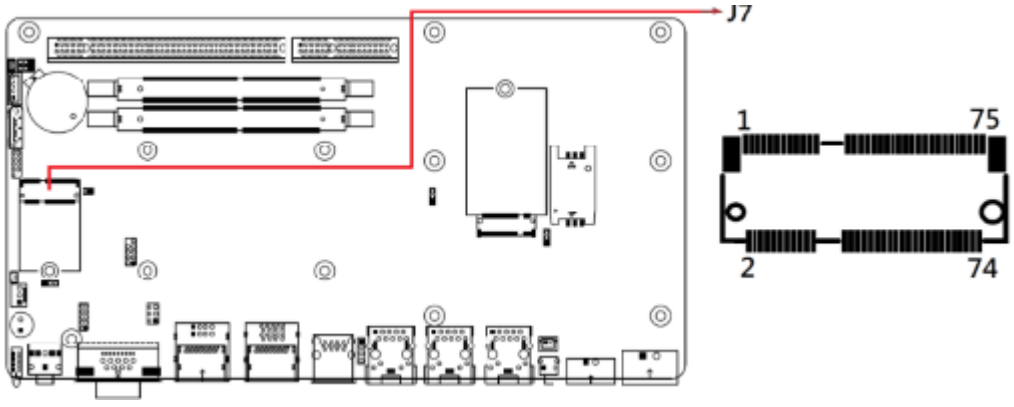
2.5.13 J5: SPI Debug Header



2.5.14 J6: SIM Card Slot for 4G/5G

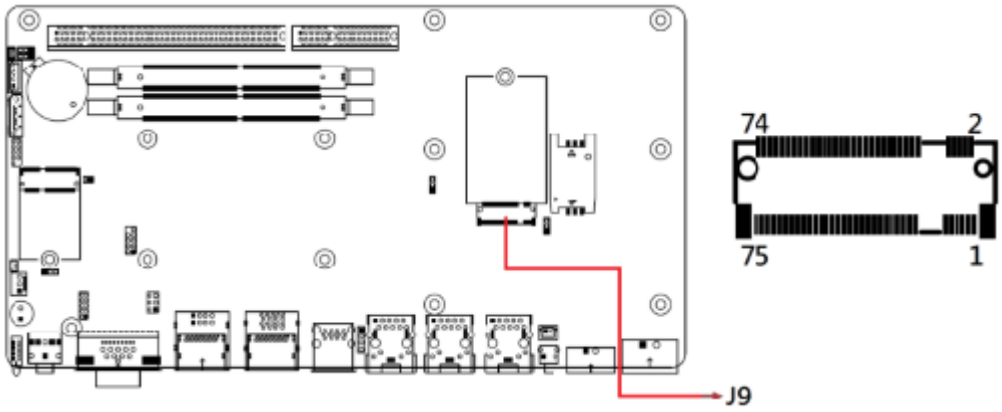


2.5.15 J7: M.2 E-Key Socket



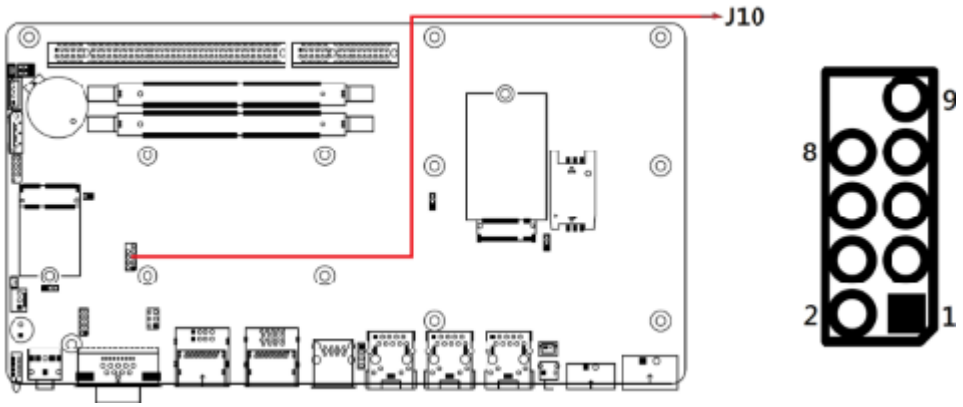
Note: J7 supports USB 2.0 & PCIe (for wifi module)

2.5.16 J9: M.2 B-Key Socket

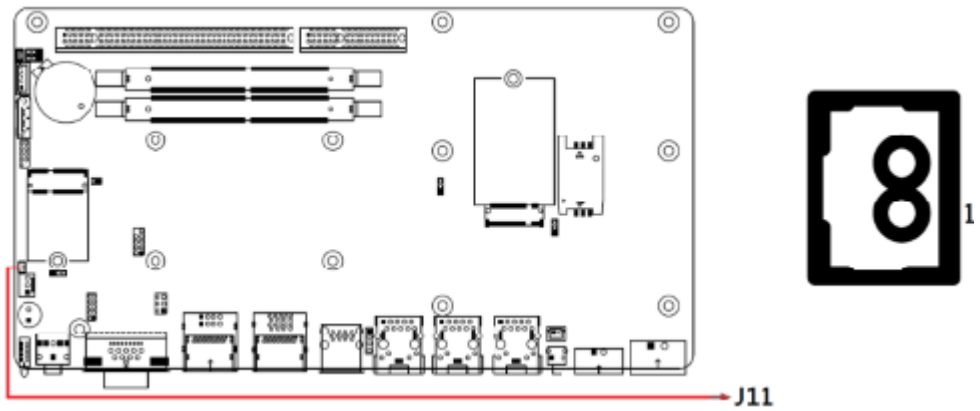


Note: J9 supports USB 2.0 & 3.0 & PCIe (for 4G / 5G module)

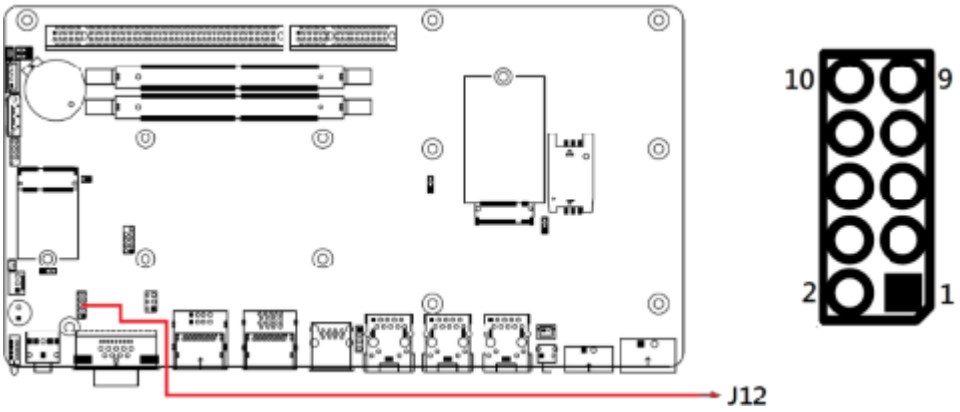
2.5.17 J10: ESPI Debug Header



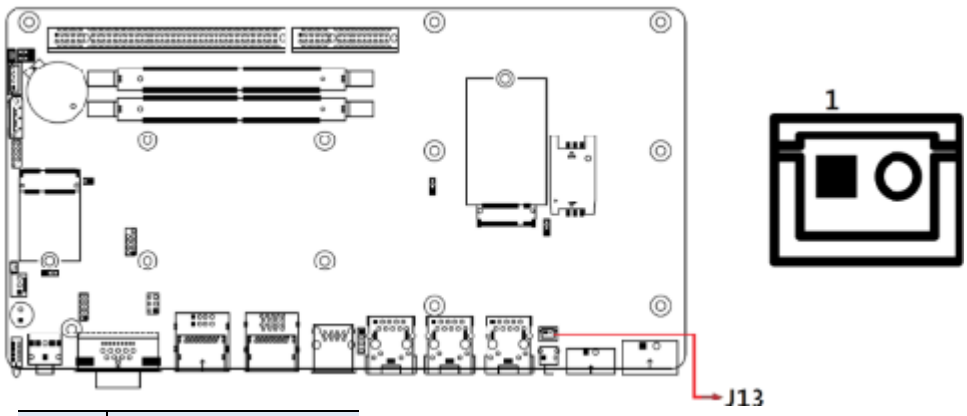
2.5.18 J11: Reset Header



2.5.19 J12: Digital IO Connector



2.5.20 J13 : AT On/Off Switch



Pin	Assigment
1	SHDN#
2	Ground

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® ME Drivers Installation

3.1 Introduction

This section describes the installation procedures for software drivers.

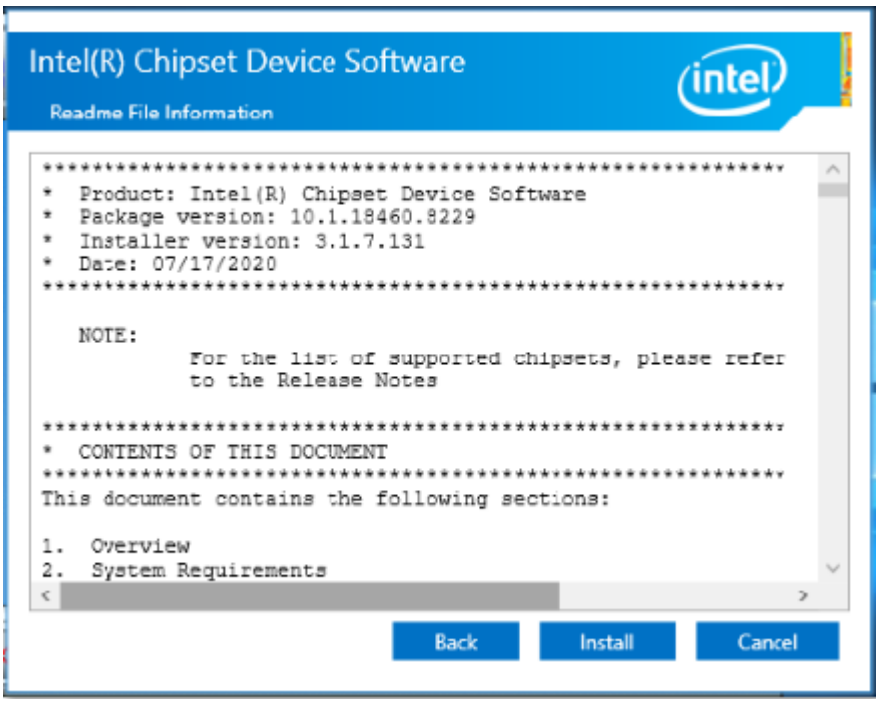
3.2 Intel® Chipset Software Installation Utility

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. Go to the download page of the product. Copy the compressed drivers file to your computer. Double click the file to decompress it. Run “CDGuide” to go to the main drivers page as shown. Click **Intel** and then **Intel(R) TigerLake-U 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 terms in the software license agreement.
5. On the *Readme File Information* screen, click **Install**.

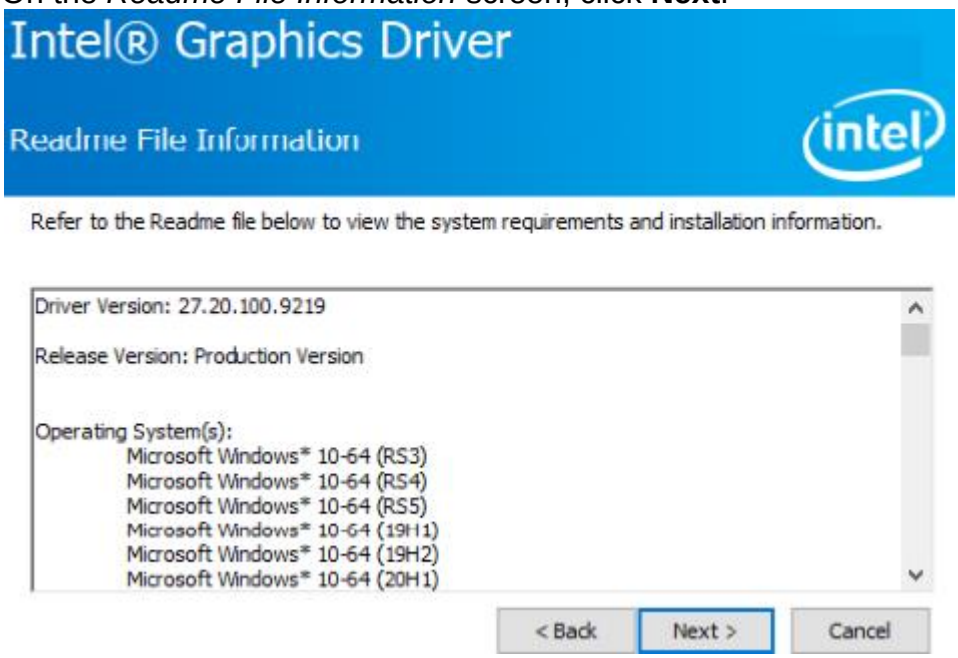


6. When Intel® Chipset Device Software has been completely installed, click **Finish** to complete the setup process.

3.3 Graphics Driver Installation

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

3. When the *Welcome* screen appears, click **Next**.
4. Accept the terms in the license agreement and click **Yes**.
5. On the *Readme File Information* screen, click **Next**.



6. In the Setup Progress screen, click **Next**.
7. When Setup is Complete, click **Finish** to restart the computer.

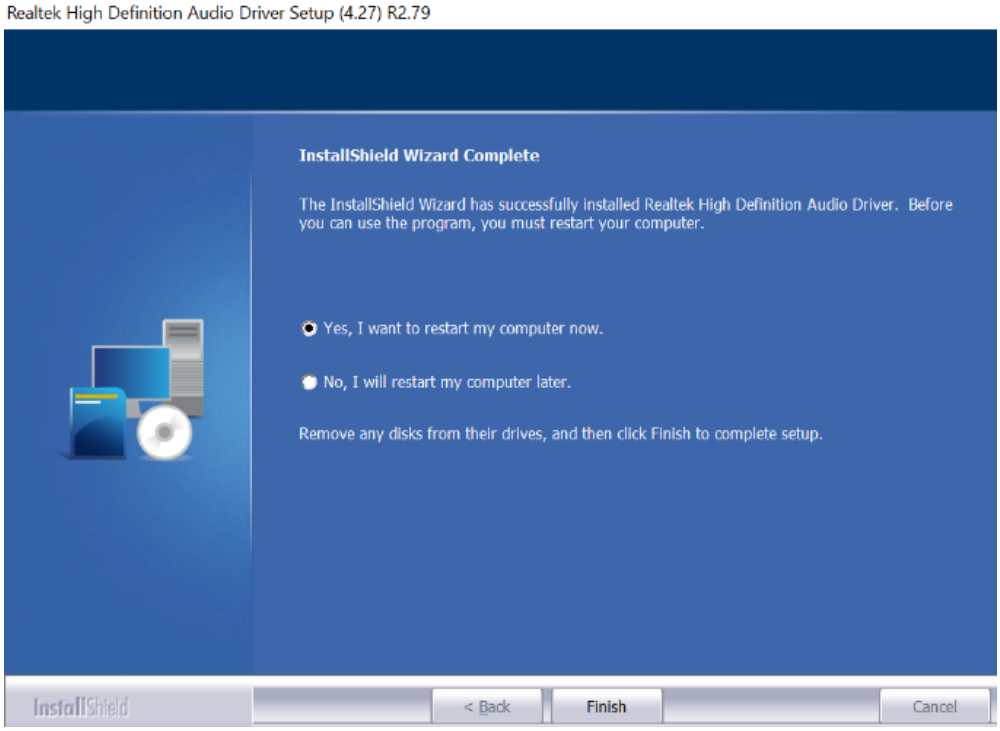
3.4 HD Audio Driver Installation

1. Click **Intel** and then **Intel(R) TigerLake-U Chipset Drivers**.

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

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

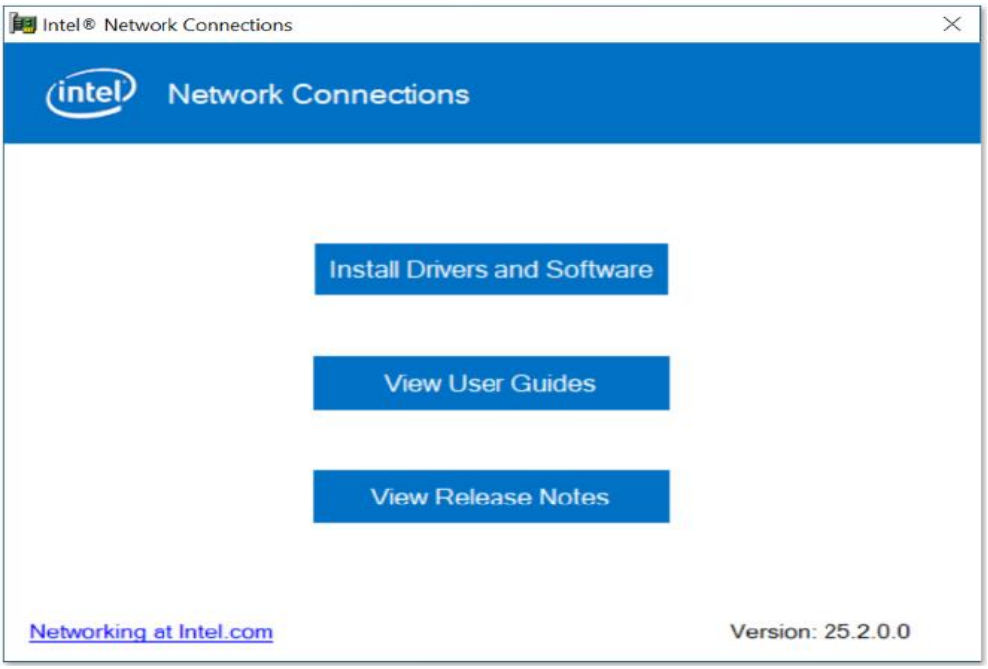
4. When InstallShield Wizard has completed the installation, restart the computer.



3.5 LAN Driver Installation

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

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



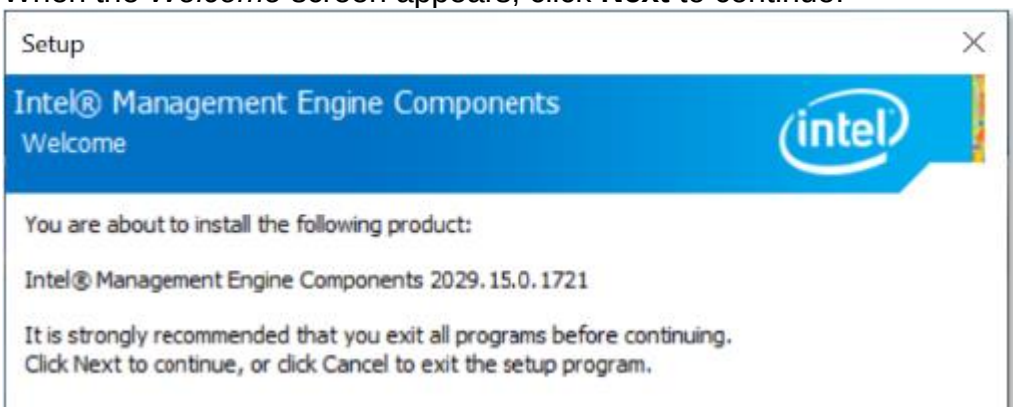
4. On the Welcome screen to the Install Wizard, click **Next**.
5. Accept the terms in the License Agreement and click **Next**.
6. Click **Next** in the Setup Options screen.
7. Install Wizard is now ready to install the program, click **Install**.
8. When Install Wizard has completed the installation,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

3.6 Intel® Management Engine Driver Installation

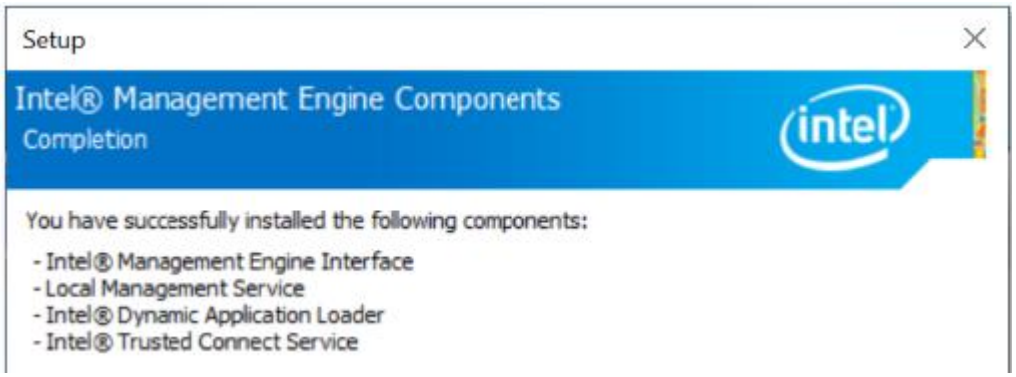
1. Click **Intel** and then **Intel(R) TigerLake-U Chipset Drivers**.

2. Click **Intel(R) ME 15.x Drivers**.

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



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



Chapter 4
BIOS Setup

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

- Introduction
- BIOS Setup
- Main Settings
- Advanced Settings
- Chipset Settings
- Security Settings
- Boot Settings
- Save & Exit Settings

4.1 Introduction

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

4.2 BIOS Setup

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

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

The following message will appear on the screen:

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

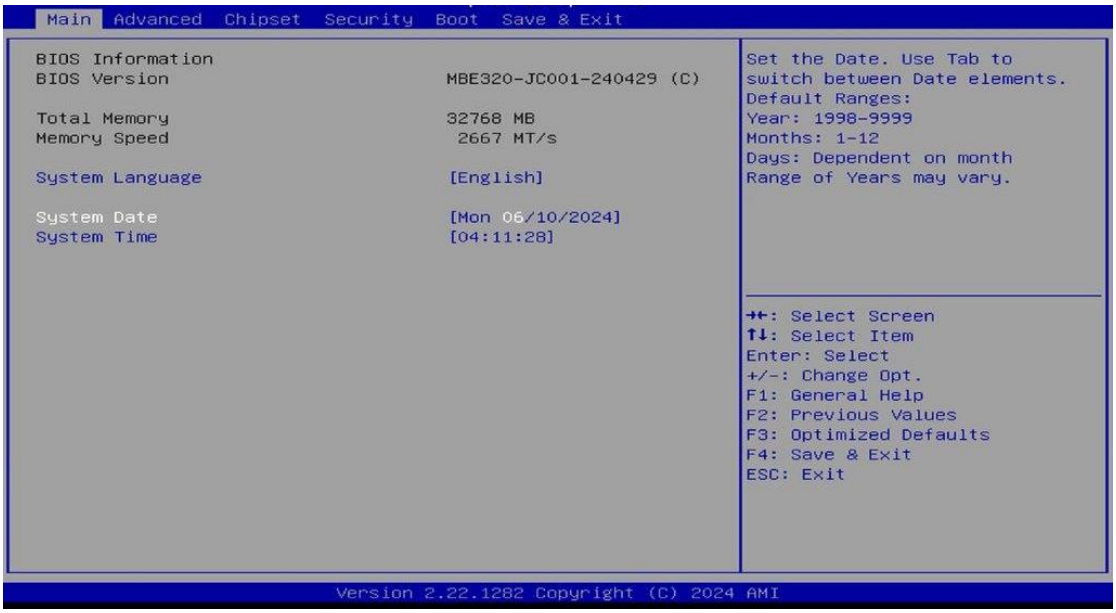
In general, press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help, and <Esc> to quit.

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

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

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

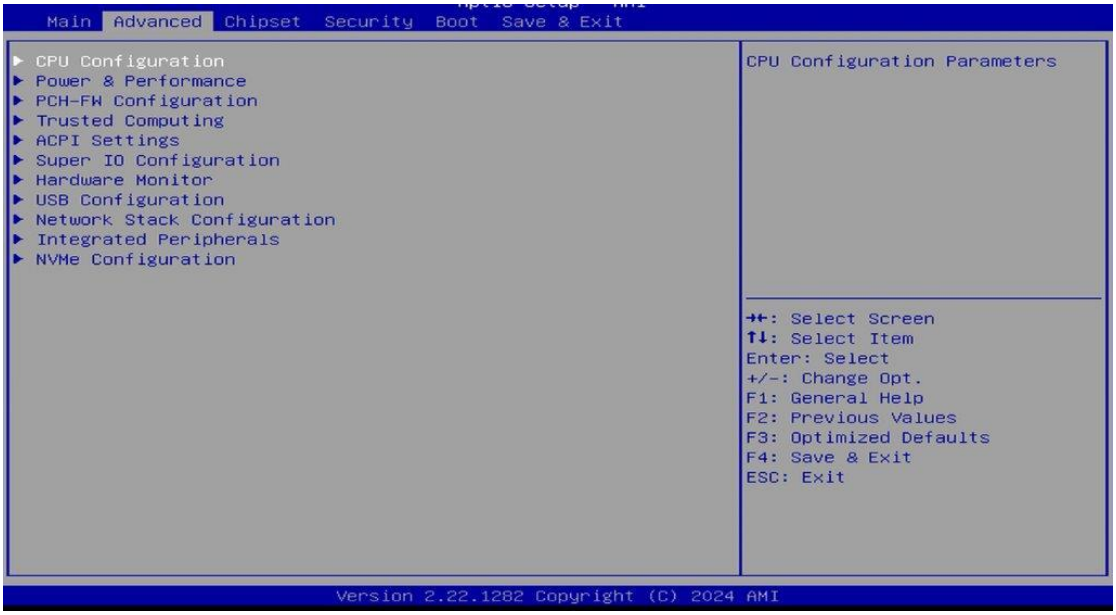
4.3 Main Settings



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

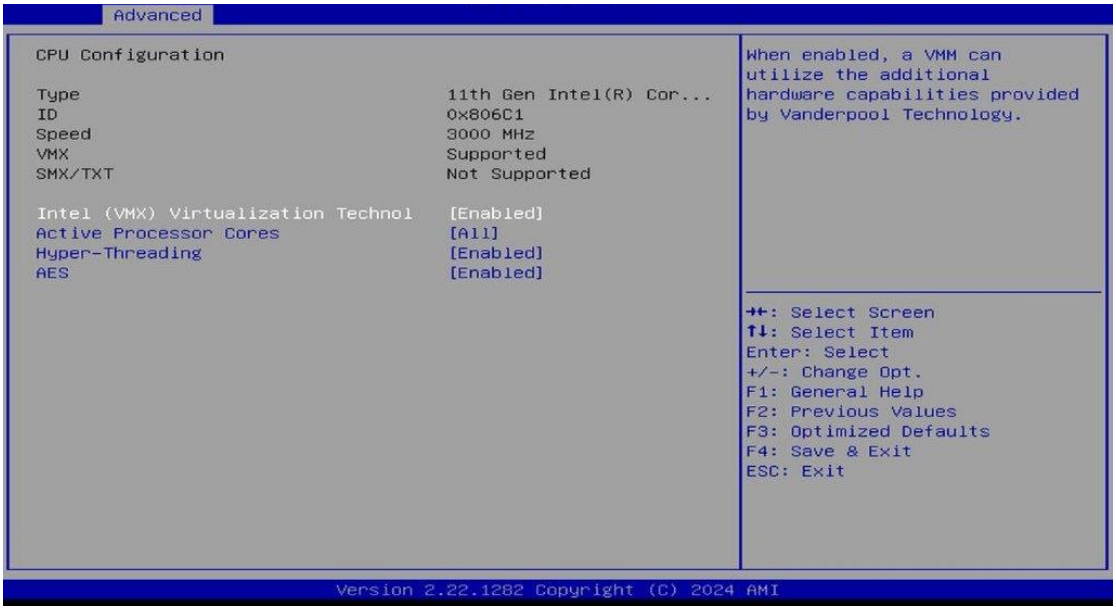
4.4 Advanced Settings

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



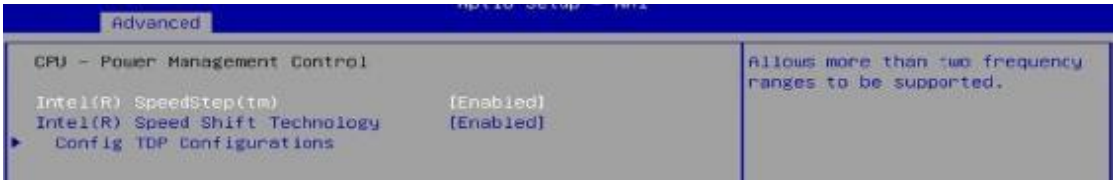
BIOS Setting	Description
CPU Configuration	Displays CPU configuration parameters.
Power & Performance	Shows power and performance options.
PCH-FW Configuration	Configures management engine technology parameters.
Trusted Computing	Configures management engine technology parameters.
ACPI Settings	Displays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

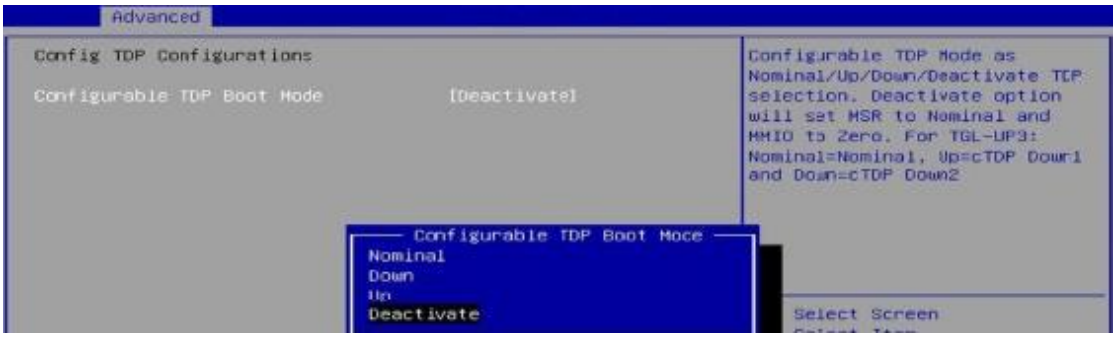
4.4.1 CPU Configuration



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

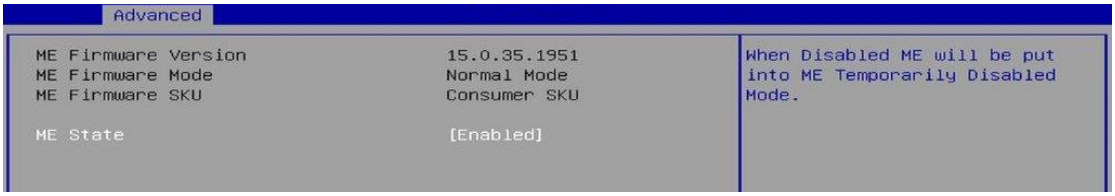
4.4.2 Power & Performance





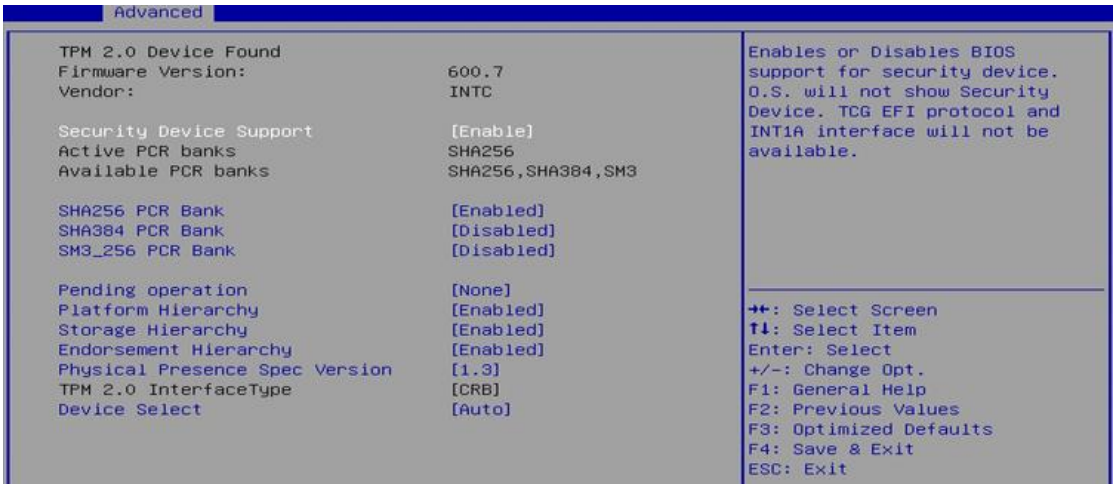
BIOS Setting	Description
CPU - Power Management Control	CPU - Power Management Control Options
Intel Speedstep	Allows more than two frequency ranges to be supported
Intel Speed Shift Technology	Enable/Disable Intel Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Config TDP Configurations	cTDP (Assured Power) Configurations
Configurable TDP Boot Mode	Configurable TDP Mode as Nominal/Up/Down/ Deactiivate TDP selection. Deactivate option will set MSR to Nominal and MMIO to zero. For TCL UP3: Nominal=Nominal, Up=cTDP Down1 and Down=cTDP Down2

4.4.3 PCH-FW Configuration



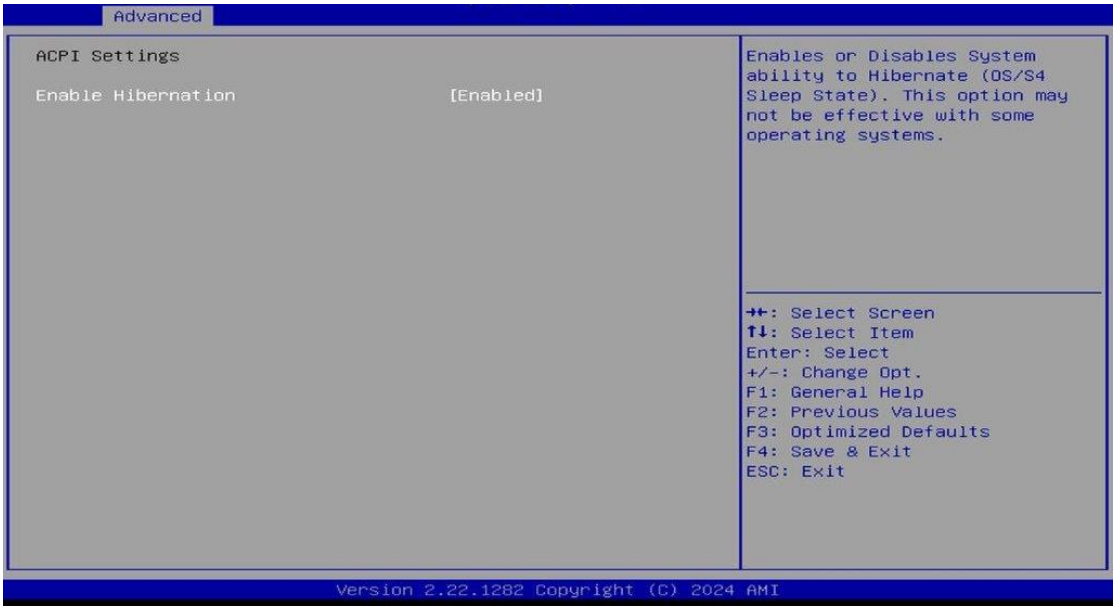
BIOS Setting	Description
ME State	When disabled, ME will be put into ME Temporarily Disabled Mode.

4.4.4 Trusted Computing



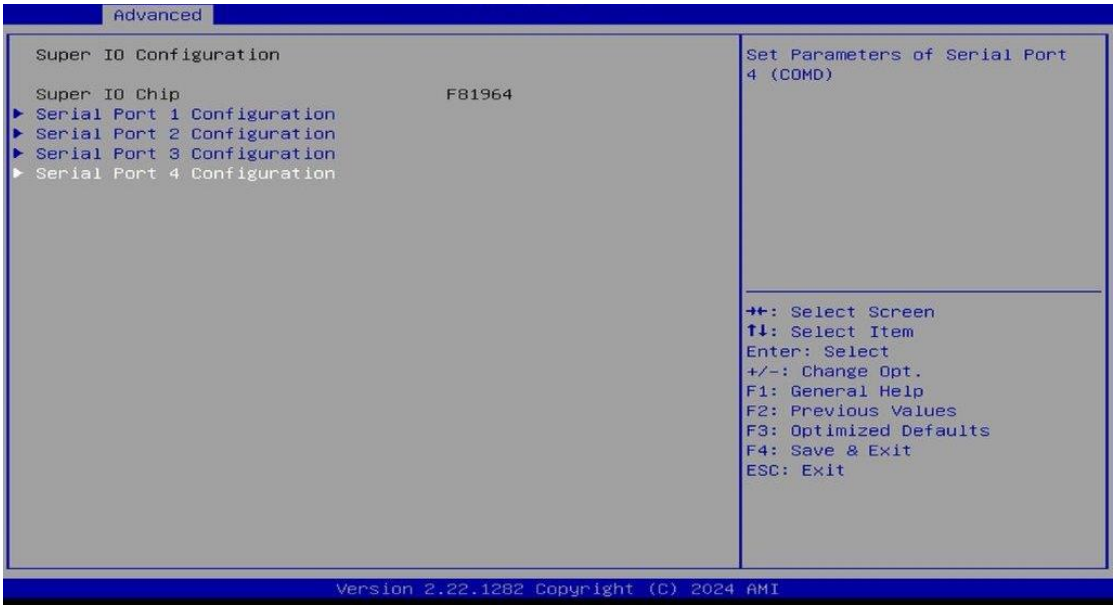
BIOS Setting	Description
Security Device Support	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
SHA256 / SHA384 / SH3_256 PCR Bank	Option: Enabled / Disabled
Pending operation	Schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device.
Platform / Storage / Endorsement Hierarchy	Enables / Disables the Platform / Storage / Endorsement Hierarchy
Physical Presence Spec Version	Select to tell O.S to support PPI Spec Version (1.2 or 1.3). **Note:** Some HCK tests might not support 1.3.
Device Select	Auto will support TPM 1.2 / 2.0 devices with the default set to TPM 2.0. If not found, TPM 1.2 devices will be enumerated

4.4.5 ACPI Settings

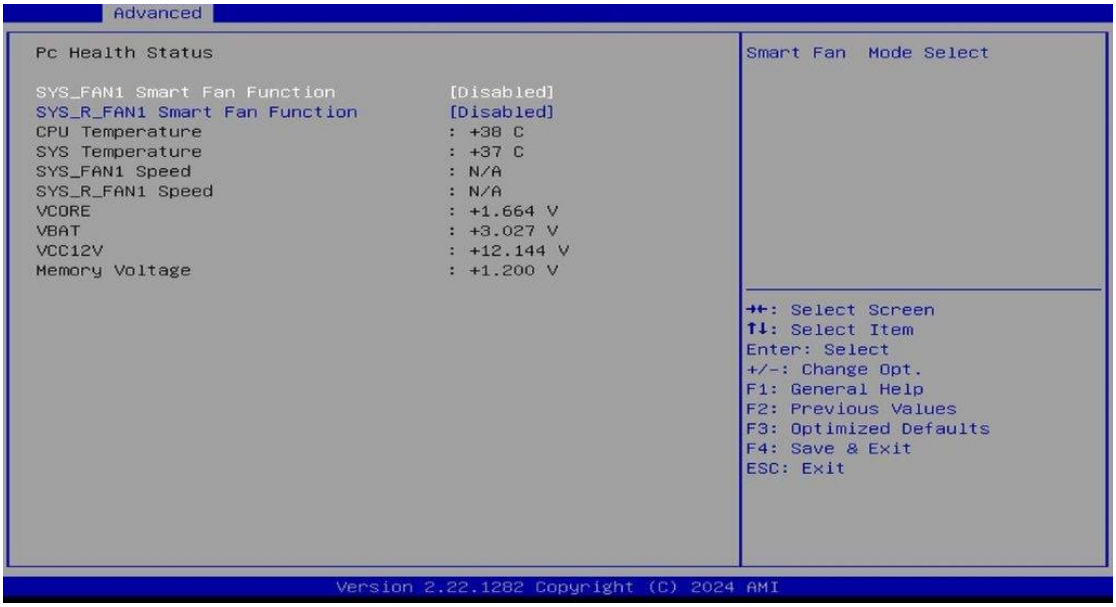


BIOS Setting	Description
Enable Hibernation	Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may not be effective with some OS.

4.4.6 Super IO Configuration

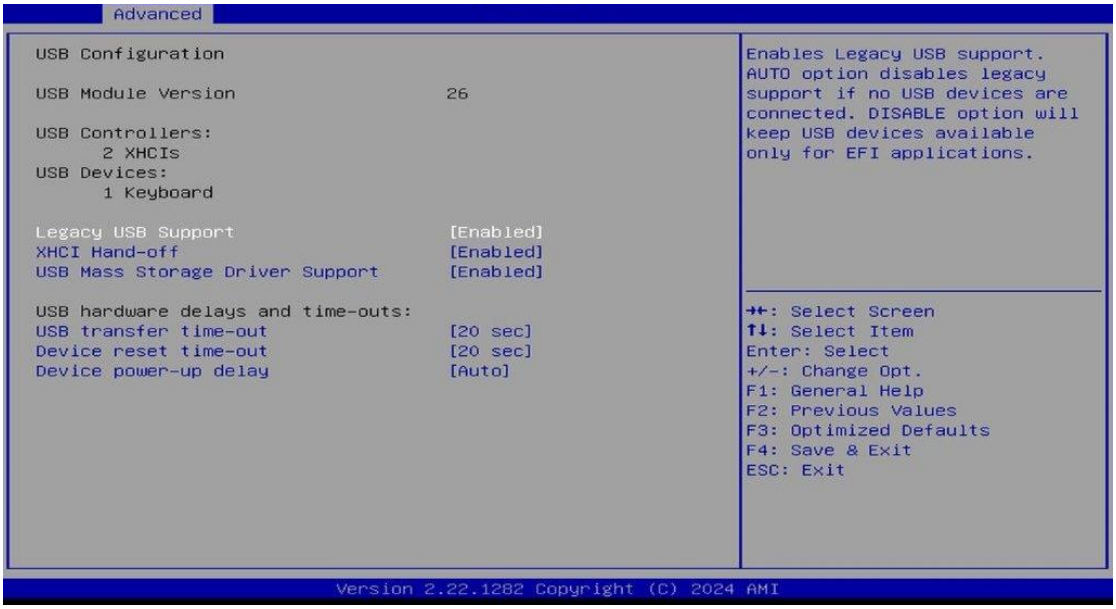


4.4.7 Hardware Monitor



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

4.4.8 USB Configuration

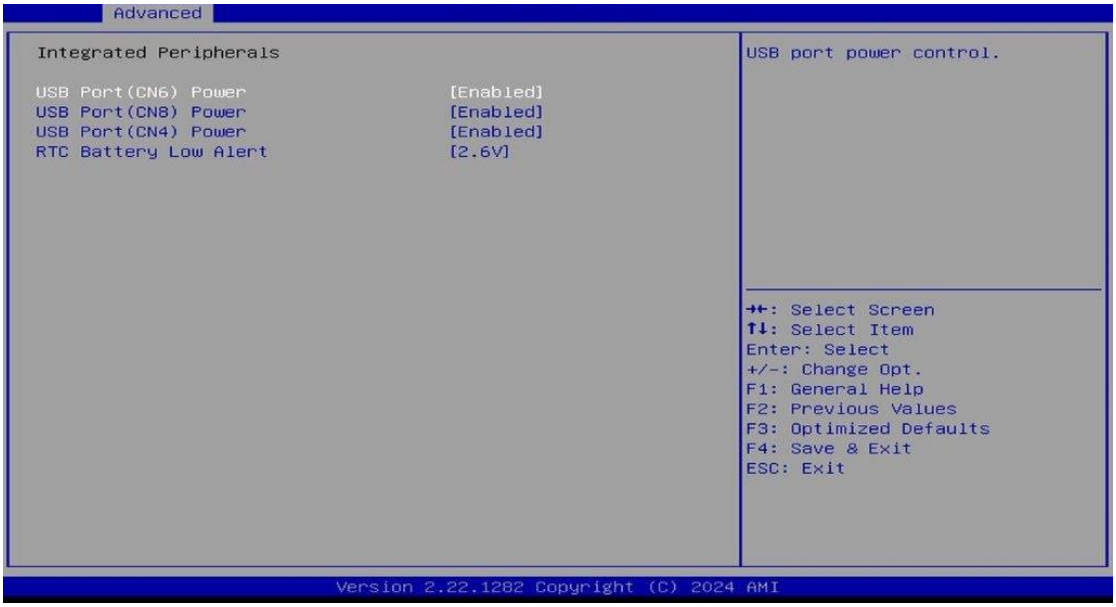


BIOS Setting	Description
Legacy USB Support	Enables / Disables Legacy USB support. • **Auto** disables legacy support if there is no USB device connected. • **Disable** keeps USB devices available only for EFI applications.
XHCI Hand-pff	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enables / Disables USB mass storage driver support.
USB Transfer time-out	Sets the time-out value 1, 5, 10 or 20 sec(s) for Control, Bulk, and Interrupt transfers.
Device reset time-out	Sets the seconds (10, 20, 30, 40 secs) of delaying execution of start unit command to USB mass storage device.
Device power-up delay	Maximum time the device will take before it properly reports itself to the Host Controller. ‘Auto’ uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor. Options: Auto, Manual

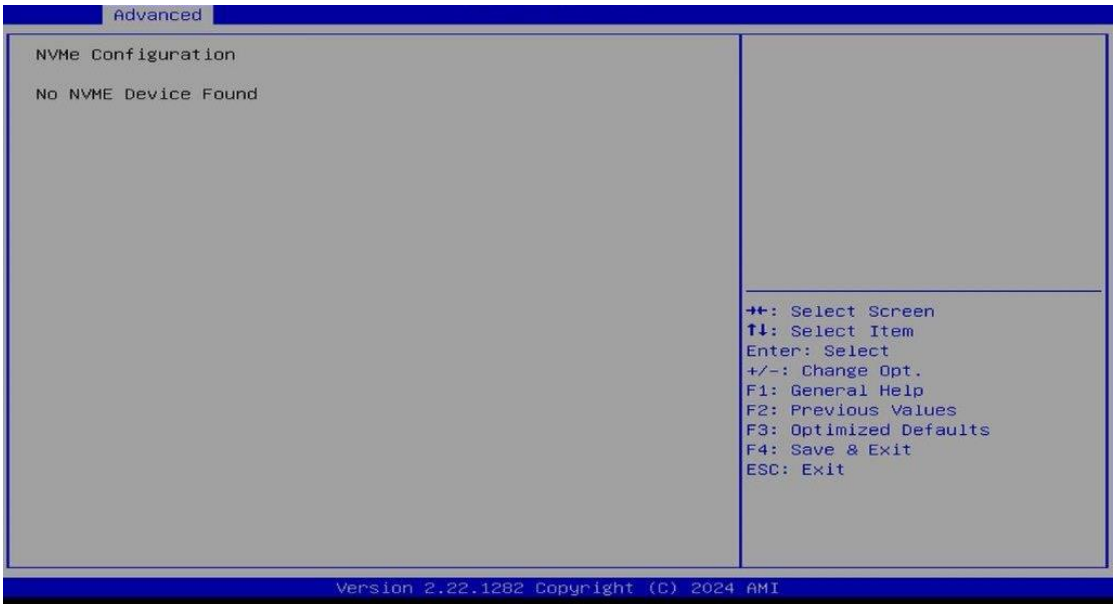
4.4.9 Network Stack Configuration

BIOS Setting	Description
Network Stack	Enable/Disable UEFI Network Stack

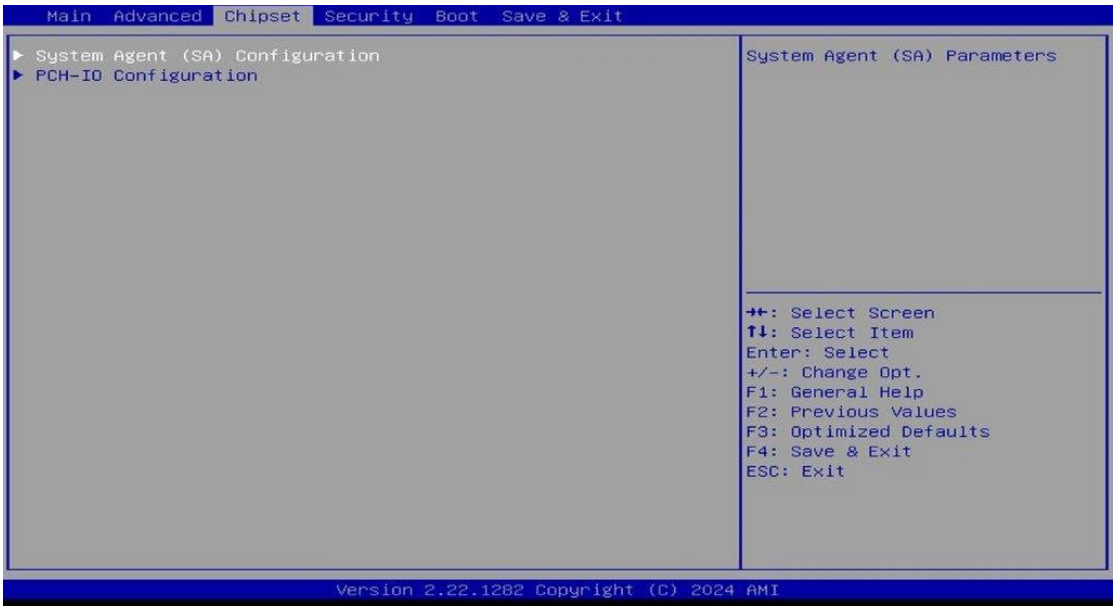
4.4.10 USB Configuration



4.4.11 NVME Configuration

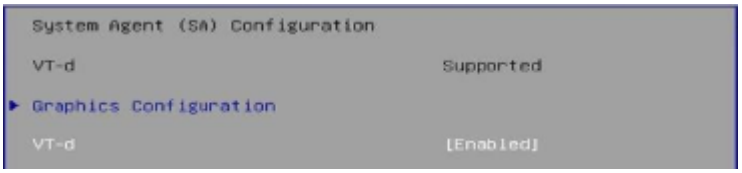


4.5 Chipset Settings



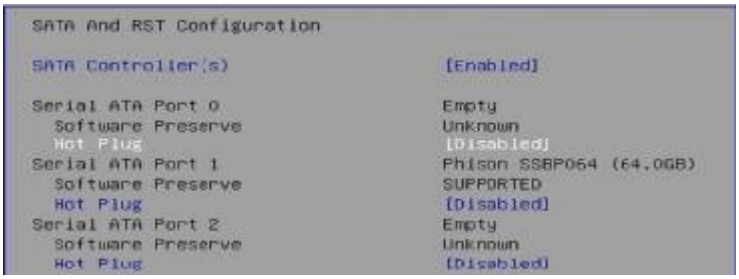
BIOS Setting	Description
System Agent (SA) Configuration	System Agent (SA) parameters
PCH-IO Configuration	PCH parameters
VT-d	Enables / Disables VT-d capability.
USB Port Disable Override	Selectively enable/disable the corresponding USB port from reporting a device connection to the controller.

4.5.1 System Agent Configuration

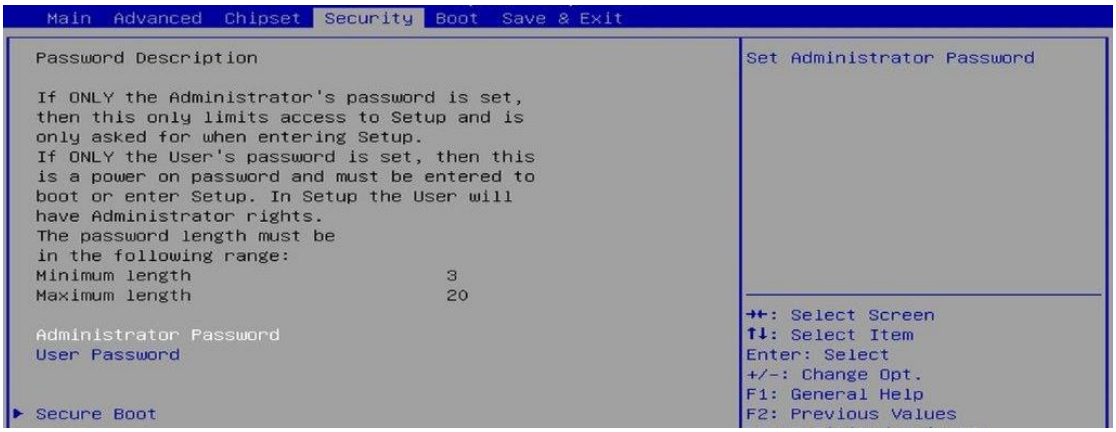


4.5.2 PCH-IO Configuration

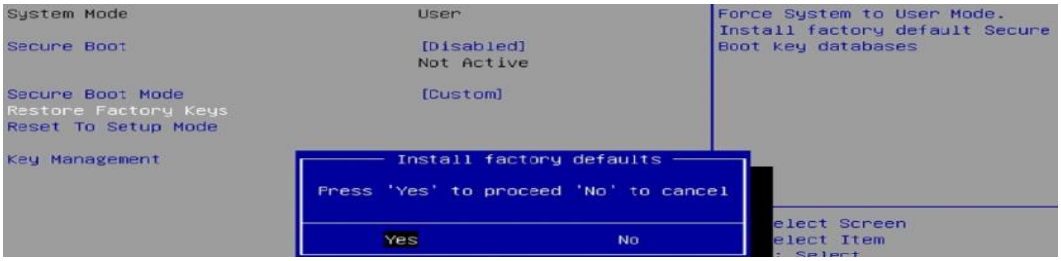
BIOS Setting	Description
SATA and RST Configuration	SATA device options settings
USB Configuration	USB configuration settings
Power-on after Power failure	Specify what state to go to when power is re-applied after a power failure (G3 state).

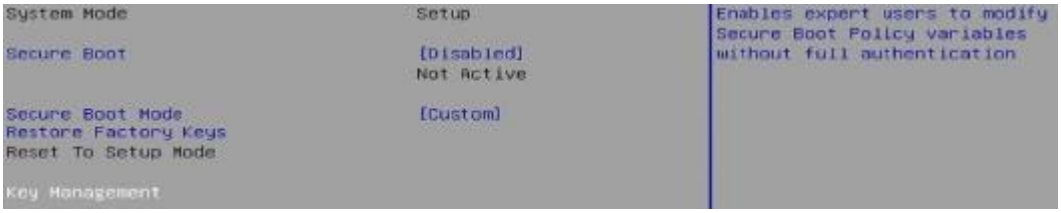


4.6 Security Settings

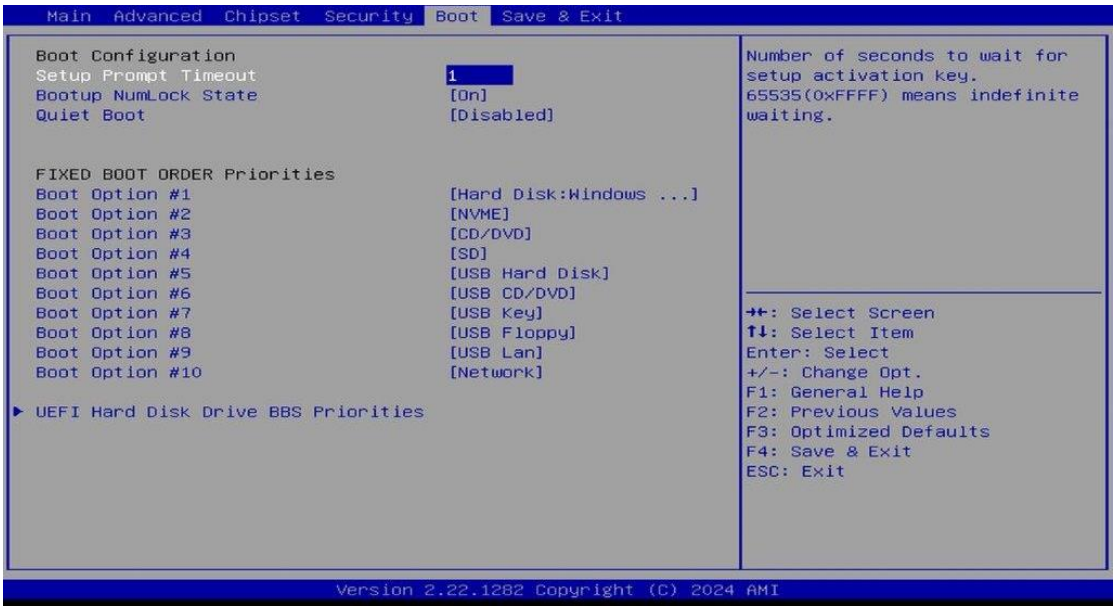


BIOS Setting	Description
Administrator Password	Sets an administrator password.
User Password	Sets a user password.
Secure Boot	Secure Boot configuration



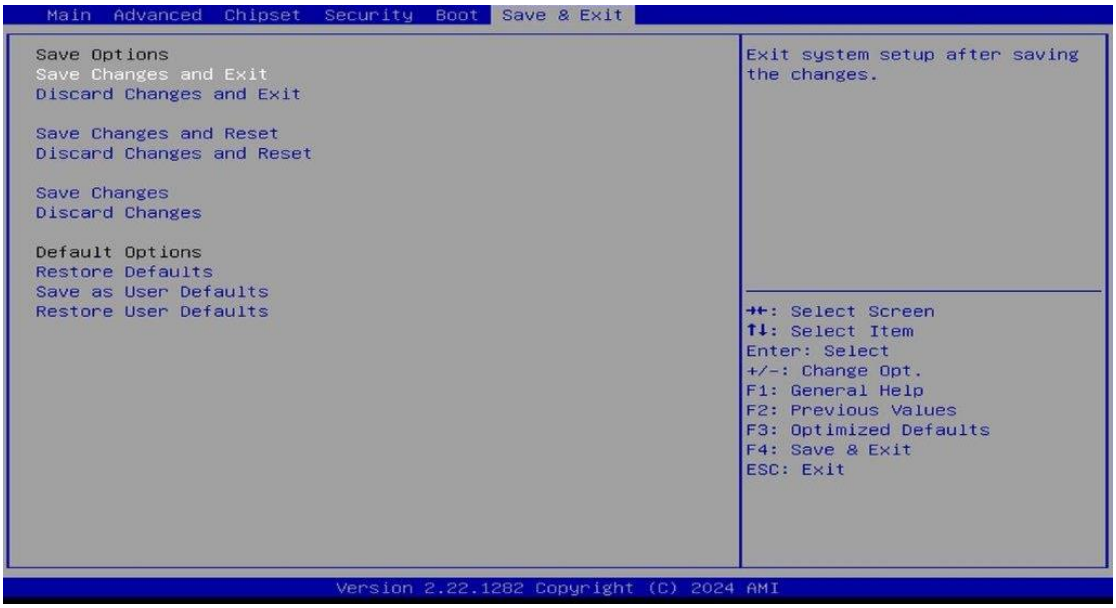


4.7 Boot Settings



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

4.8 Save & Exit Settings



BIOS Setting	Description
Save Changes and Exit	Exits system setup after saving the changes.
Discard Changes and Exit	Exits system setup without saving any changes.
Save Changes and Reset	Resets the system after saving the changes.
Discard Changes and Reset	Resets system setup without saving any changes.
Save Changes	Saves changes done so far to any of the setup options.
Discard Changes	Discards changes done so far to any of the setup options.
Restore Defaults	Restores / Loads defaults values for all the setup options.
Save as User Defaults	Saves the changes done so far as user defaults.
Restore User Defaults	Restores the user defaults to all the setup options.

Appendix

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

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

A. I/O Port Address Map

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

Address	Device Description
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x0000EFA0-0x0000EFBF	Intel(R) SMBus - 06A3
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller

Address	Device Description
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller
0x00001800-0x000018FE	Motherboard resources
0x000000F0-0x000000F0	Numeric data processor
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x00001854-0x00001857	Motherboard resources
0x00002000-0x000020FE	Motherboard resources
0x00003000-0x0000303F	Intel(R) UHD Graphics 630
0x00003090-0x00003097	Standard SATA AHCI Controller
0x00003080-0x00003083	Standard SATA AHCI Controller
0x00003060-0x0000307F	Standard SATA AHCI Controller

B. Interrupt Request Lines (IRQ)

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

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

C. Watchdog Timer Configuration

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

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

Sample Code

```
//---------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "F81964.H"
//---------------------------------------------------------------------------
int main (int argc, char *argv[]);
void EnableWDT(int);
void DisableWDT(void);
//---------------------------------------------------------------------------
int main (int argc, char *argv[])
{
        unsigned char bBuf;
        unsigned char bTime;
        char **endptr;

        char SIO;

        printf("Fintek 81964 watch dog program\n");
        SIO = Init_F81964();
        if (SIO == 0)
        {
                printf("Can not detect Fintek 81964, program abort.\n");
                return(1);
        }//if (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_F81964_Reg(0x2B);
        bBuf &= (~0x20);
        Set_F81964_Reg(0x2B,    bBuf);    //Enable WDTO

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

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

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

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

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

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

        bBuf = Get_F81964_Reg(0xFA);
        bBuf &= ~0x01;
        Set_F81964_Reg(0xFA,    bBuf);    //disable WDTO output
```

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


//-----------------------------------------------------------------------------
//
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// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----------------------------------------------------------------------------
#include "F81964.H"
#include <dos.h>
//-----------------------------------------------------------------------------
unsigned int F81964_BASE;
void Unlock_F81964 (void);
void Lock_F81964 (void);
//-----------------------------------------------------------------------------
unsigned int Init_F81964(void)
{
        unsigned int result;
        unsigned char ucDid;

        F81964_BASE = 0x4E;
        result = F81964_BASE;

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

        F81964_BASE = 0x2E;
        result = F81964_BASE;

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

        F81964_BASE = 0x00;
        result = F81964_BASE;

Init_Finish:
        return (result);
}
```

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

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