CMI300-997

13th/12th Gen Intel® Core™ desktop SoC processors Mini-ITX System

User Manual

Version 1.0

iBASE

Copyright

Disclaimer

IBASE reserves the right to make changes and improvements to the products described in this document without prior notice. Every effort has been made to ensure the information in the document is correct; however, IBASE does not guarantee this document is error-free. IBASE assumes no liability for incidental or consequential damages arising from misapplication or inability to use the product or the information contained herein, nor for any infringements of rights of third parties, which may result from its use.

Trademarks

All the trademarks, registrations and brands mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective owners.

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

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

Important Safety Information

Carefully read the precautions before using the device.

Environmental conditions:

- Place the device horizontally on a stable and solid surface to prevent it from falling and causing serious damage.
- Ensure there is adequate space around the device to ensure proper ventilation and cooling.

Care for your IBASE products:

- Before cleaning the device, turn it off and unplug all cables, including the power cable, to prevent any residual electrical current.
- Clean the device chassis using neutral cleaning agents or diluted alcohol applied with a cloth, then dry it using a separate, dry cloth.
- Use a computer vacuum cleaner to remove dust and prevent clogging of air vents or slots.

WARNING

Attention during use:

- Avoid using this product near water.
- Do not spill water or any other liquids on your device.
- Do not place heavy objects on top of the device.
- Use the device with the type of power specified on the marking label. If unsure 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 using an extension cord, ensure that the total ampere rating of the devices plugged into it does not exceed the cord's capacity.

Avoid Disassembly

Do not disassemble, repair or or modify the device in any way. Disassembly, modification, or any attempt at repair could generate hazards and cause damage to the device, even bodily injury or property damage, and will void any warranty.

CAUTION

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

Warranty Policy

- **IBASE standard products:**

  24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, 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 CPUs, memory, HDDs, power adapters, panels and touchscreens.

- **Warranty Exclusions:**

  Products that fail due to misuse, accident, improper installation, or unauthorized repair will be considered out of warranty. Customers will be responsible 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, please go to the IBASE website to apply for an RMA number.

iBASE

Table of Contents

Chapter 1
General Information

The information provided in this chapter includes:

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

1.1 Introduction

The CMI300-997 features an LGA1700 socket supporting 13th and 12th Gen Intel® Core™ desktop SoC processors, offering exceptional performance for embedded systems. With dual DDR5 SO-DIMM slots, it accommodates up to 64GB of non-ECC memory at speeds of DDR5-5600/4800. The system supports multiple display outputs, including two DisplayPorts and one HDMI port. Connectivity options include 2x Intel® 2.5G LAN, 6x USB 3.2 ports, 2x COM ports, and 2x NVMe slots. Additional expansion is available through 4x M.2 sockets, with optional VESA mount compatibility for versatile installation.

1.2 Features

- Supports LGA1700 13th/12th Gen Intel® Core™ desktop SoC processor
- 2x DDR5 SO-DIMM for DDR5-5600 /4800, Max. 64GB (Non-ECC)
- Supports 2x DisplayPorts & 1x HDMI
- 2x Intel® 2.5G LAN, 6x USB 3.2, 2x COM, 2x NVMe for storage devices
- 4x M.2 sockets (2x M-Key/B-Key/E-Key)
- Wall mounting kit included, optional VESA mounting kit
- Dimensions: 200(W) x 200(D) x 62(H) mm

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.

- CMI300-997M x 1
- Wall mount kit (2 brackets) x 1
- Screws for wall mount kit x 4

1.4 Optional Accessories

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

- DC power jack
- Power adaptor and power cord (for DC power jack)
- WiFi cable kit (KIT-16)
- VESA mounting kit

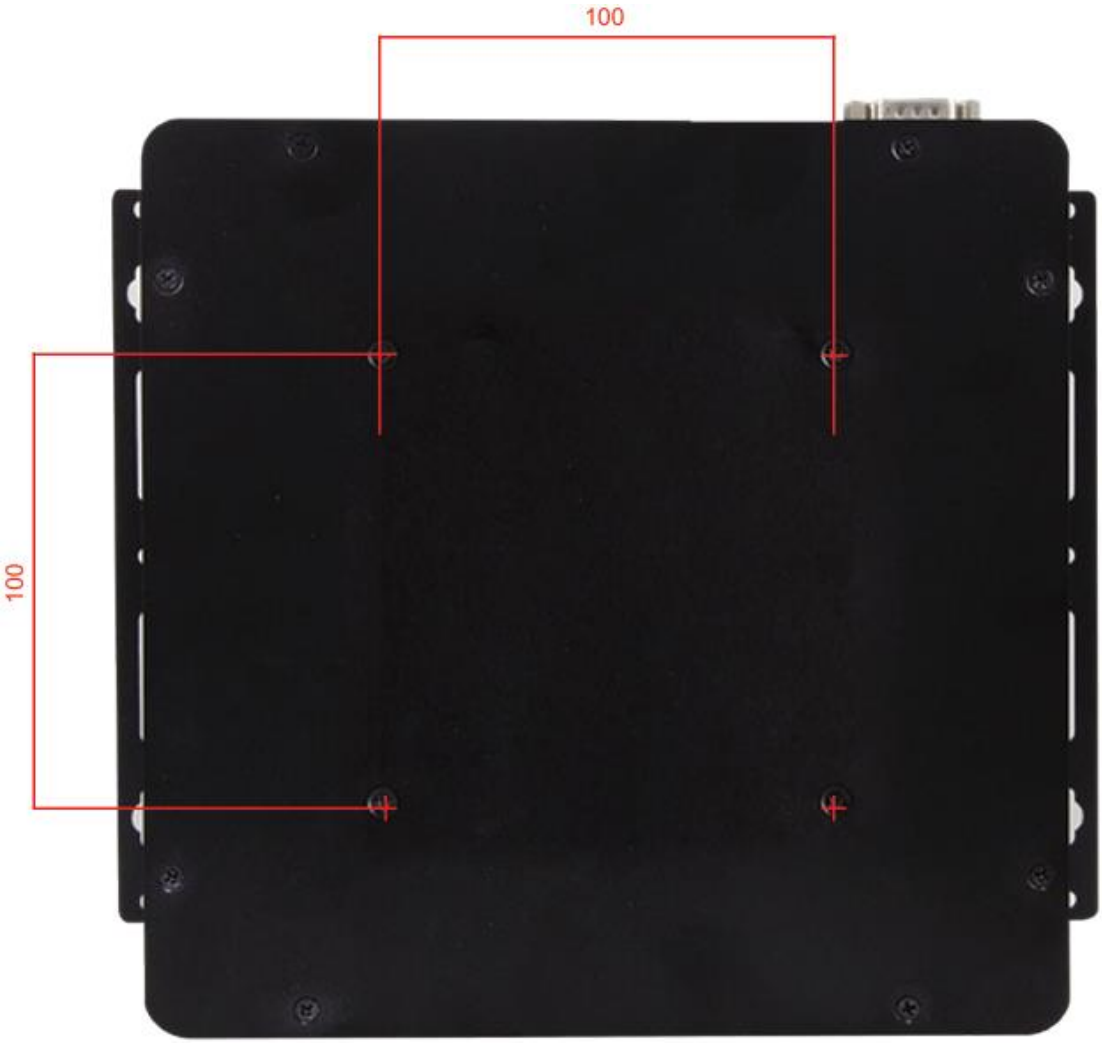
1.5 Specifications

Product Name	CMI300-997M
Product Description	(CMI) Embedded system with Mi997AF & CPU cooler, w/o CPU/memory/SSD/power adaptor, supports iAMT (16.1), mounting brackets (RoH2)
System	
CPU	13th/12th Intel® Core™ Desktop SoC processors (45W or 15W TDP)
System Speed	Up to 4.8GHz
Memory	2x DDR5-5600/4800 SO-DIMM, Max. 64GB
Front Panel External I/O	4x Antenna Hole reserved Power button with LED indicator
Rear Panel External I/O	• 2x RS232/422/485 port for COM#1~COM#2 • 2x DisplayPort + 1x HDMI • 6x USB 3.2 ports • 2x RJ-45 2.5G LAN • 3-port Audio Jack • 1x DC-jack
Expansion Slots	• 1x M.2 B-Key 3052 (LTE/5G/4G) • 1x M.2 E-Key 2230 (WIFI/BT) • 2x M.2 M-Key 2280 (NVMe)
Storage	2x M.2 2280 M-Key for NVMe SSD
Construction	Aluminum & Steel
Chassis Color	Color Black
Mounting	• Desktop & wall mounting bracket • Optional VESA mounting kit
Dimensions	200mm(W)0 x 200mm(D) x 62mm(H)
Others	• With Active CPU Cooler, Optional Power adaptor • Power Requirement: +12~+24V DC-in • Operating System: Windows 10 /11, Ubuntu
Weight	1.9 kg
Certification	CE, FCC Class B & LVD

Environment	
Operating Temperature	• 0 °C ~ +45 °C (32°F~113°F)
Storage Temperature	• -20°C~+80°C (-4°F~176°F)
Relative Humidity	5 ~ 90% at 45 °C (non-condensing)
Vibration	• Operating: 1 Grms / 3~500Hz
Shock	• **Operating:** 20 g / 11 ms • **Non-operating:** 40 g / 11 ms

All specifications are subject to change without prior notice.

1.6 Product View

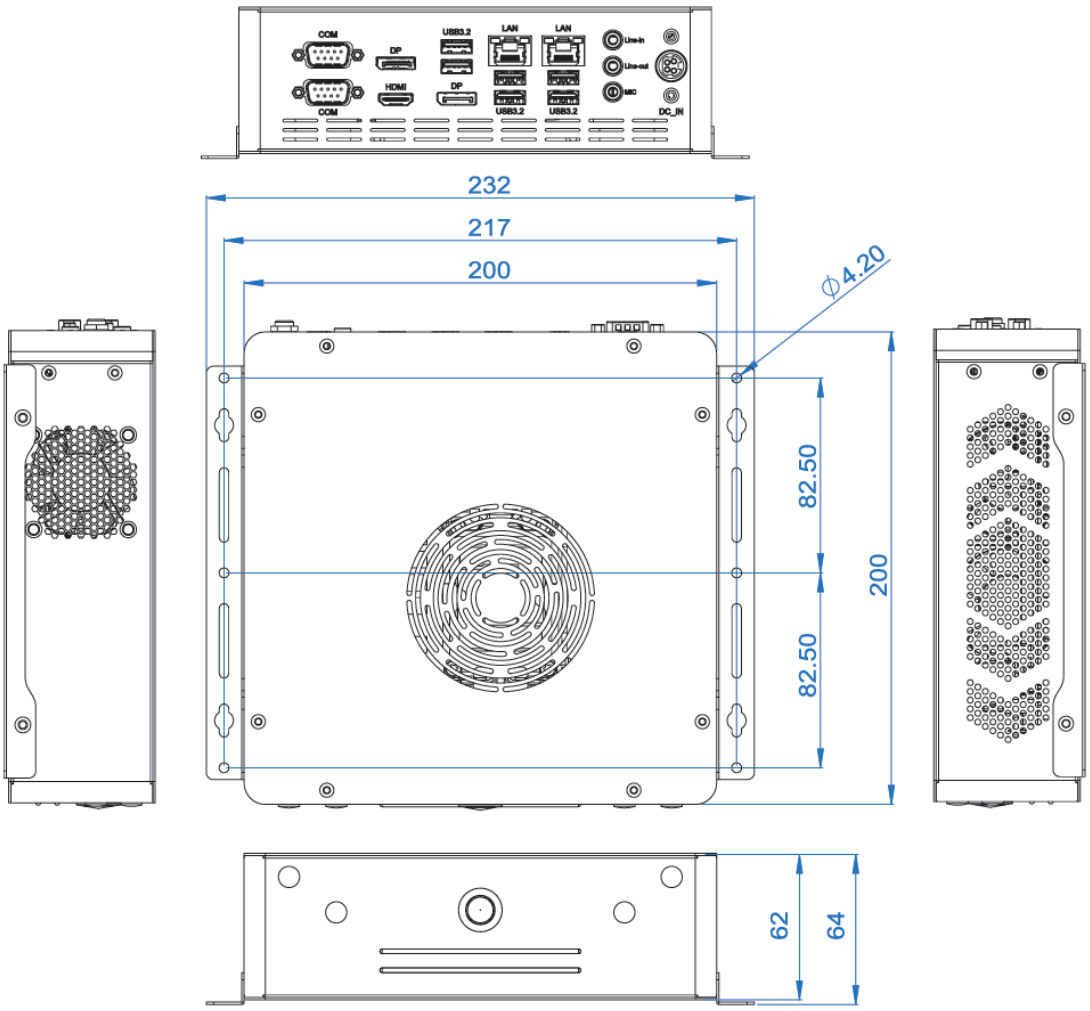


The above picture shows the screw holes for the optional VESA mounting kit.

The above shows the power button at the center and four antenna screw holes.

1.7 Dimensions

Unit: mm



Chapter 2
Hardware Configuration

The information provided in this chapter includes:

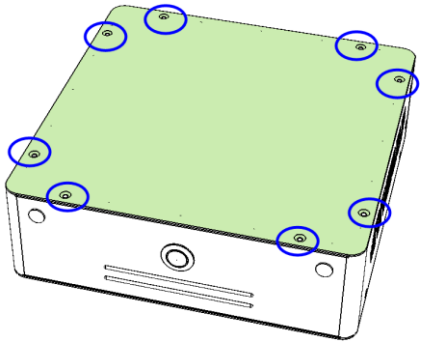
- Installations
- Information and locations of connectors

2.1 Installations

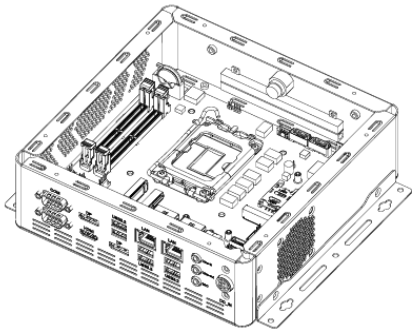
Before installations, remove the two chassis covers based on the installations to be done.

2.1.1 Memory Installation / Replacement

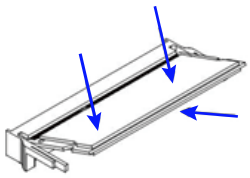
1. Remove the chassis cover by removing 8 screws as indicated below.

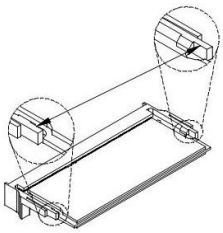


2. Locate the memory slots as shown in the images below.



3. Align the memory module key with that on the memory slot and insert the module slantwise.Gently push the module until the clips of the slot click to hold the module in place when the module touches the bottom of the slot.

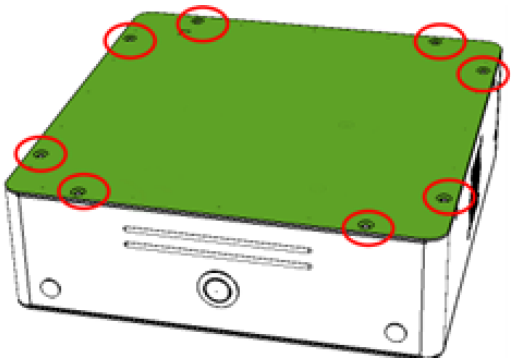




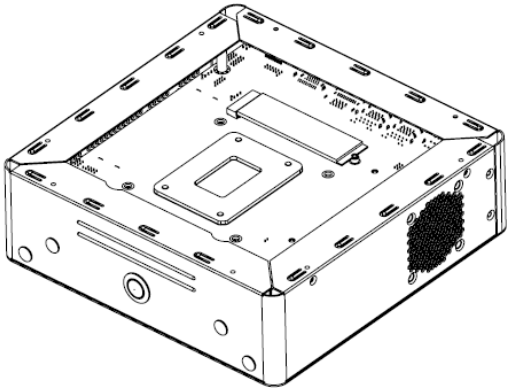
4. To remove the module, press the clips outwards with your thumb and index finger of both hands.

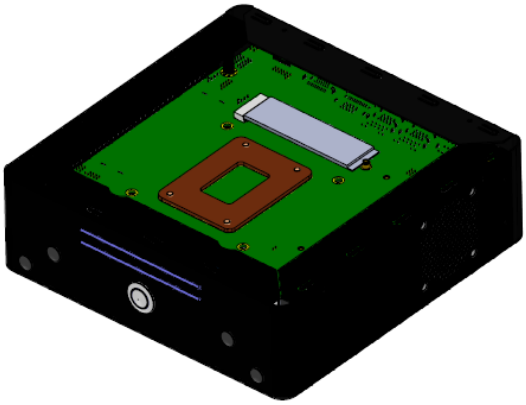
2.1.2 M.2 Card Installation

1. Turn the system upside down. Remove 8 screws as indicated below and remove the bottom plate.

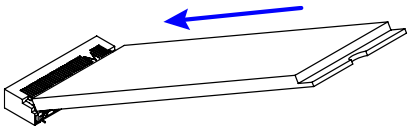


2. Locate M.2 socket as shown in the images below.

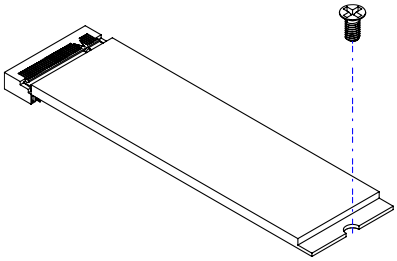




3. Align the key of the M.2 card to the M.2 interface, and insert the card slantwise.



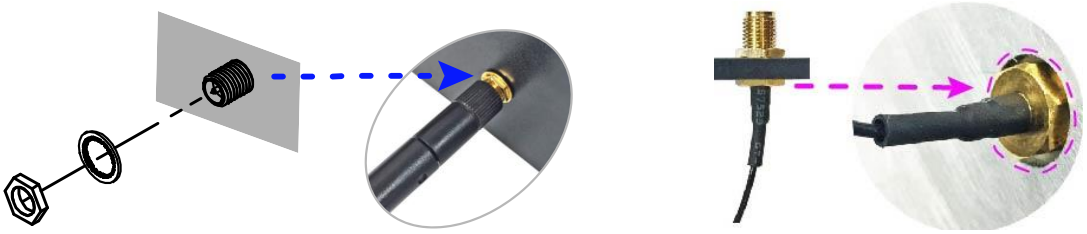
5. Push the M.2 card down, fix it onto the standoff with a screw.



2.1.3 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).

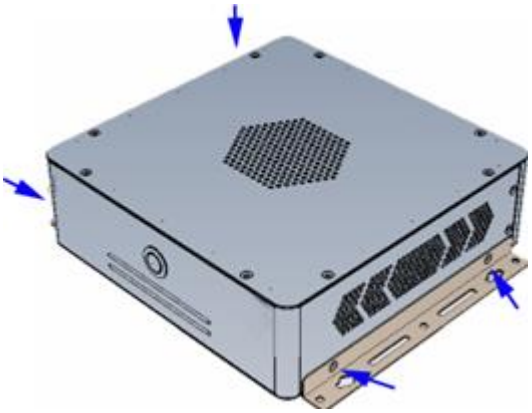
2.1.4 Mounting Installation Requirements

Space and Ventilation / Weight Support

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

Wall Mounting Installation

1. Attach the two mounting brackets and secure them with the supplied four screws as shown below.



2. Then prepare at least four screws (M3, 6 mm) to mount the device on the wall.

2.1.5 COM Ports & DC Power Connectors

- **COM1 & COM2 RS-232/422/485 Ports**

COM1 and COM2 ports are jumper-less and configurable in BIOS.

Pin	Signal Name	Pin	Signal Name
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	Signal Name		
	RS-232	RS-422	RS-485
1	DCD	TX-	Data-
2	RXD	TX+	Data+
3	TXD	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

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

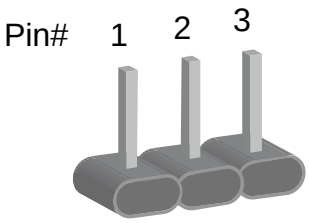
Pin	Assignment	Pin	Assignment
1	Ground	2	Ground
3	+12V	4	+12V

2.2 Setting the Jumpers

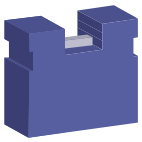
Configure your product by using jumpers for various settings and features based on your specific needs and applications. If you are uncertain about the best configuration for your use, contact your supplier.

2.2.1 How to Set Jumpers

Jumpers consist of short-length conductors with several metal pins mounted on a non-conductive base on the circuit board. Jumper caps are used to enable or disable functions and features. For a jumper with 3 pins, you can short either PIN1 to PIN2 or PIN2 to PIN3 by connecting them with a jumper cap.

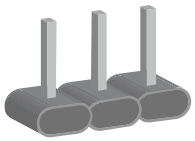
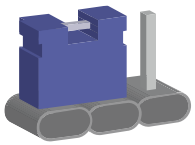
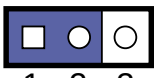
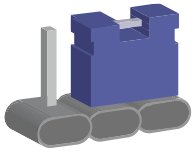
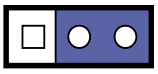


A 3-pin jumper



A jumper cap

Refer to the illustration below to set jumpers.

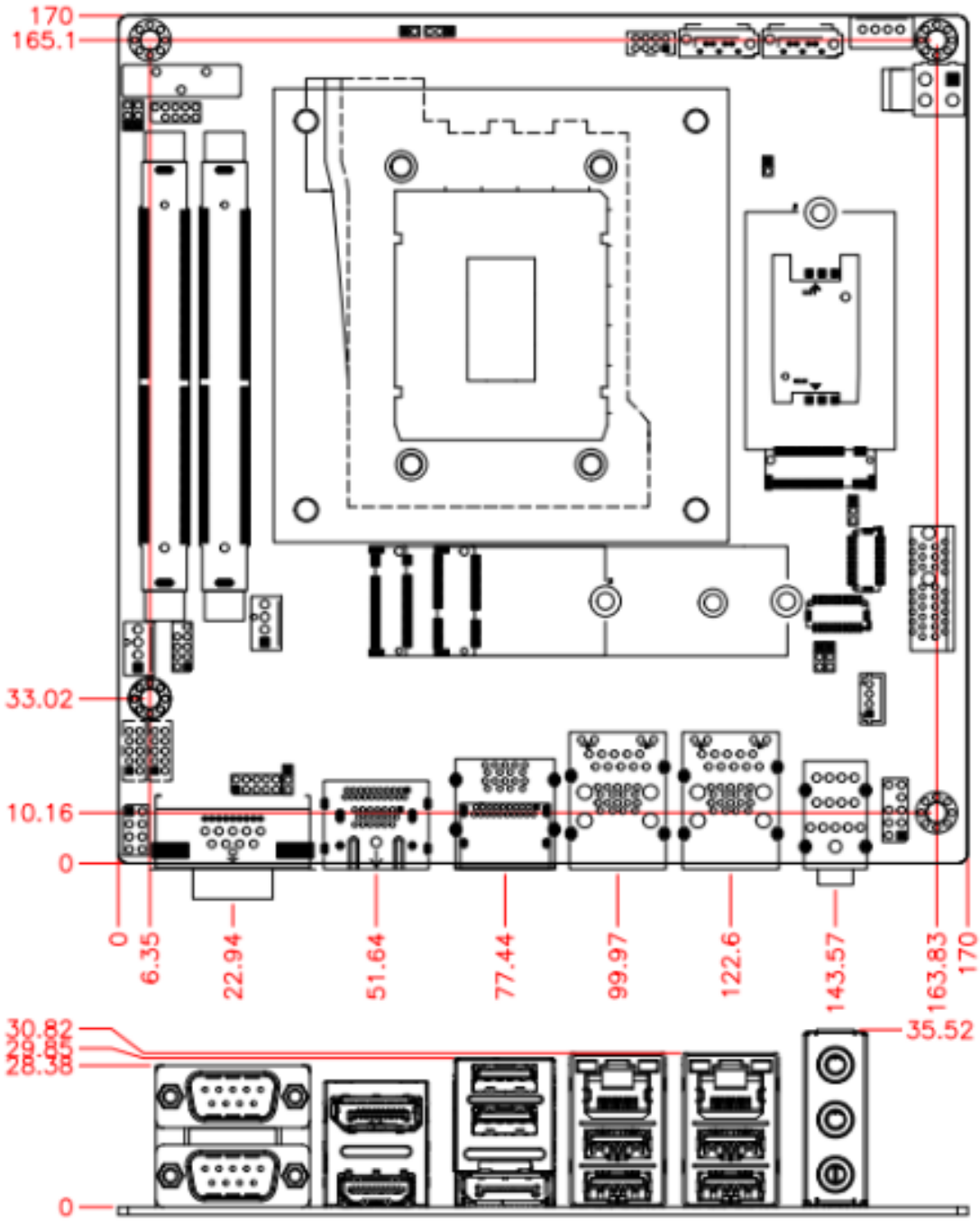
Pin	Jumper	Illustration
Open		
1-2 Closed		
2-3 Closed		

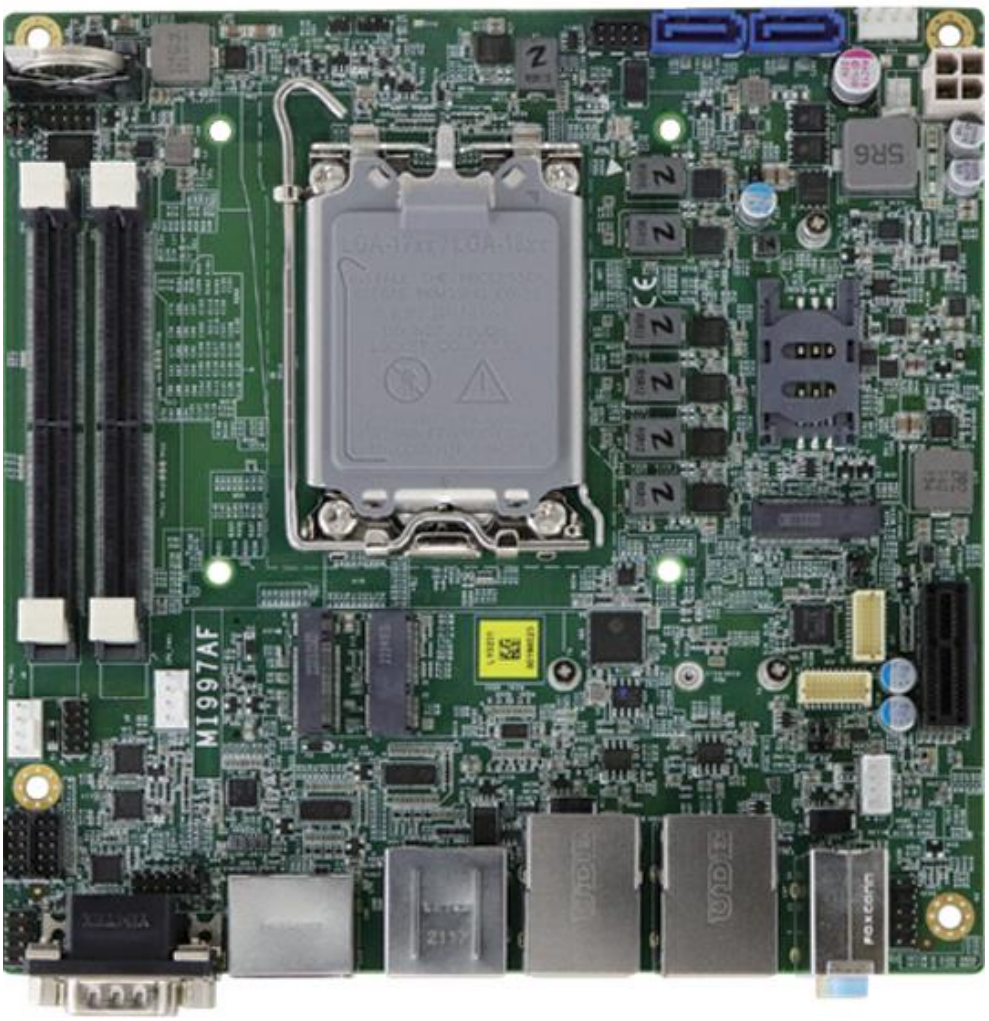
When two pins of a jumper are encased in a jumper cap, this jumper is **closed**, i.e. turned **On**.

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: MI997

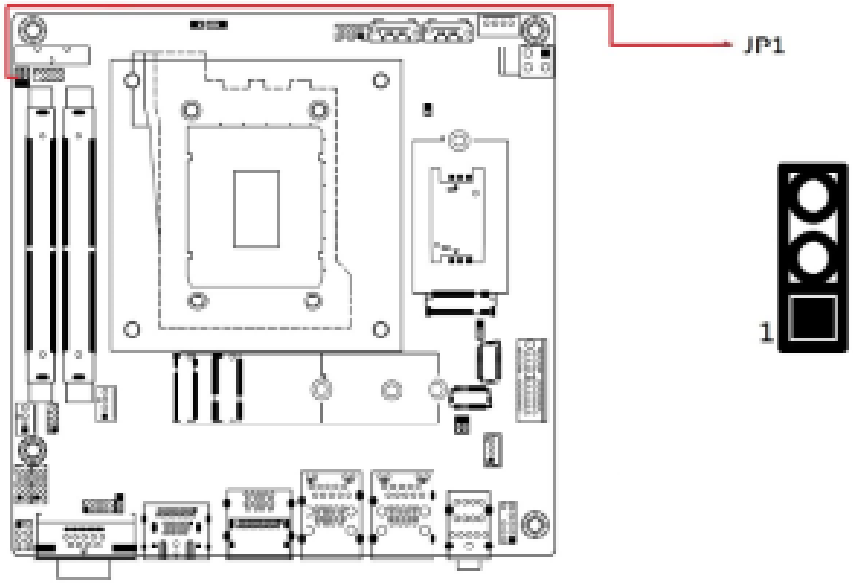



MI997AF

2.4 Jumpers Quick Reference

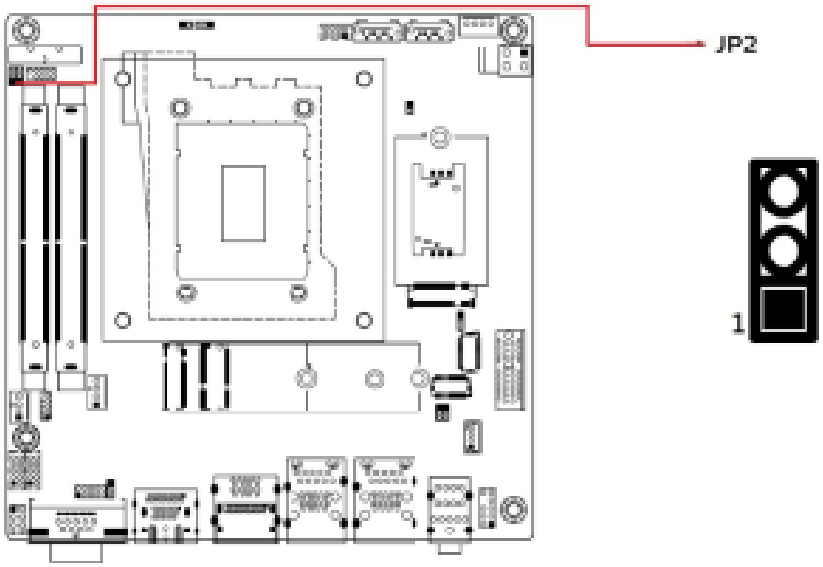
Jumper	Function
JP1	Clear CMOS
JP2	Clear ME
JP3	AT/ATX Select
JP4	LVDS Panel Power Selection
JP5	LVDS Power Brightness Selection
JP6	Sierra EM919x 5G card USB/PCIe Select

2.4.1 Clear CMOS Contents (JP1)



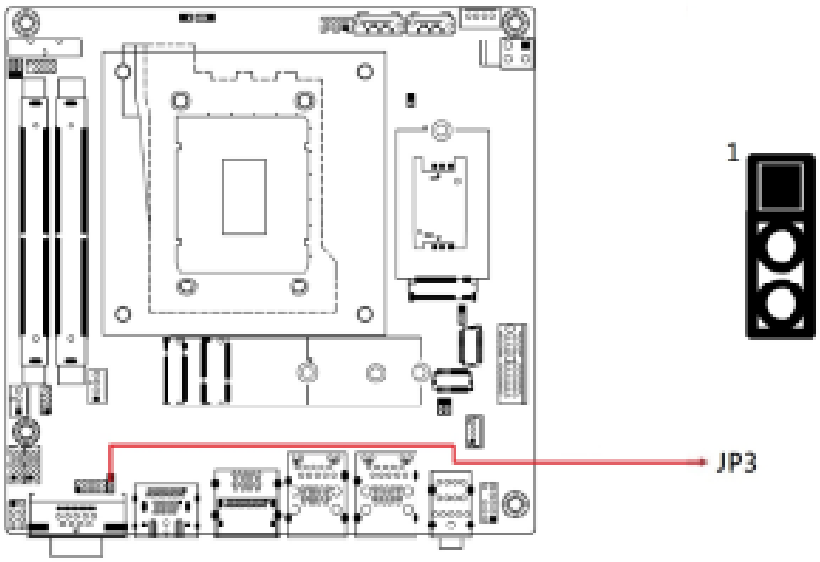
Function	Pin closed	Illustration
Normal	1-2	
Clear CMOS	2-3	

2.4.2 Clear ME Contents (JP2)



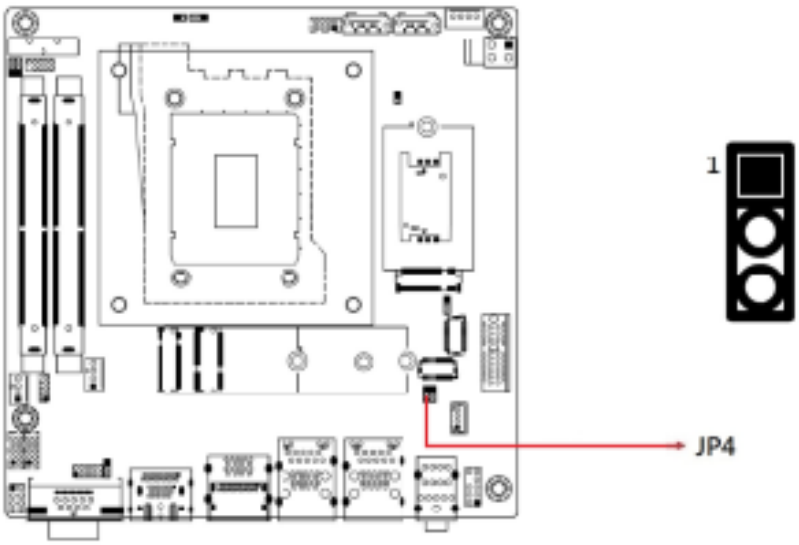
Function	Pin closed	Illustration
Normal	1-2	
Clear ME	2-3	

2.4.3 ATX & AT Power Mode Selection (JP3)



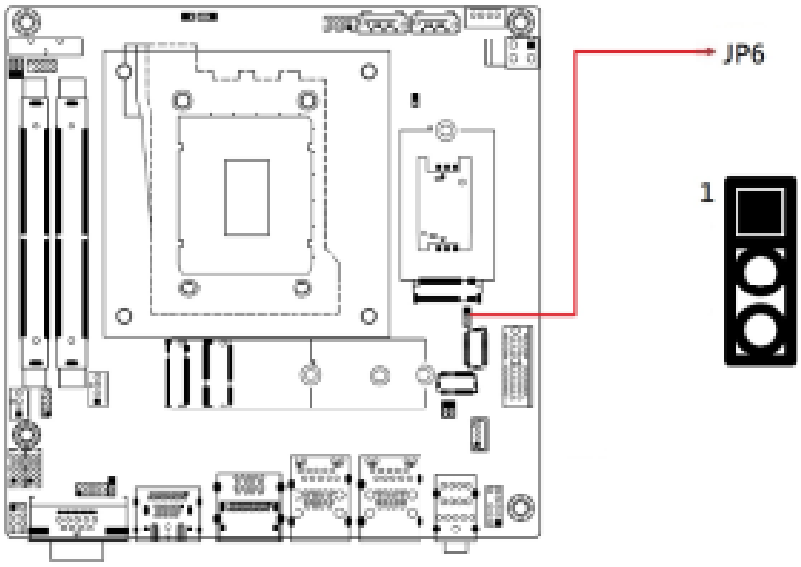
Function	Pin closed	Illustration
ATX (default)	1-2	
AT	2-3	

2.4.4 LVDS Panel Power Selection (JP4)



Function	Pin closed	Illustration
3.3V (default)	1-2	
5V	2-3	

2.4.5 Sierra EM9191 5G Card USB/PCIe Select (JP6)

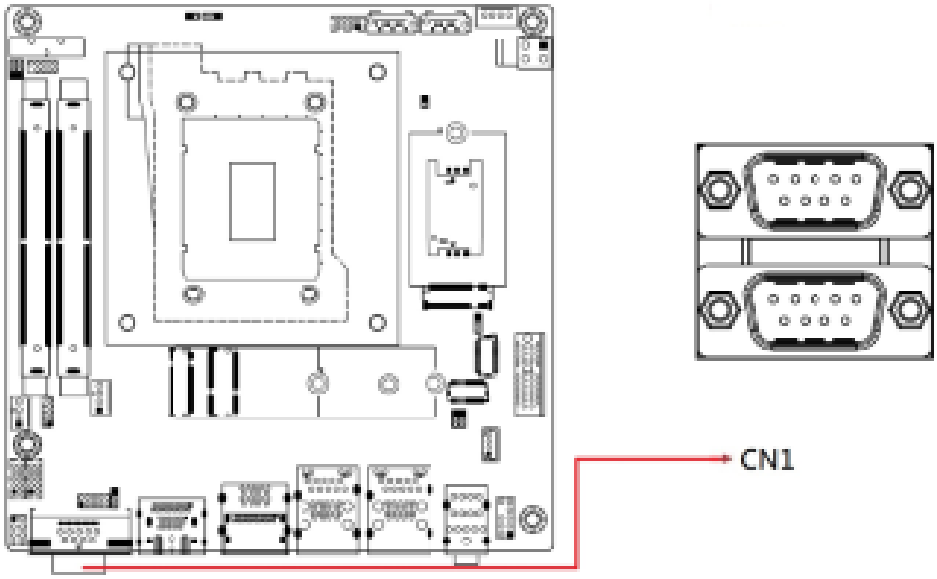


Function	Pin closed	Illustration
USB	1-2	
PCIe (default)	2-3	

2.5 Connectors Quick Reference

Connector	Function
CN1	COM1 & COM2 RS-232/422/485 Ports
CN2	DisplayPort & HDMI Port
CN3	USB 3.2 Connector
CN4	DisplayPort
CN5	2.5 Gigabit LAN (Intel I226-LM) + USB 3.2
CN6	2.5 Gigabit LAN (Intel I226-V) + USB 3.2
CN7	HD Audio Connector
J1, J3	COM3 & COM4 RS-232 Ports
J2	Front Panel Settings Connector
J4, J7	DDR5 SO-DIMM Slots
J8	Digital I/O Connector
J9, J22	M.2 M2280 Slots
J15	M.2 B-key 3052 Slot
J12	M.2 E2230 Slot
J13	USB 2.0 Connector (DF11-8S-PA66H)
J14	SIM Slot
J17, J16	LVDS Connectors (Channel A, Channel B)
J18	LCD Backlight Connector
J19	SATA Power Connector
J20	Audio Pin Header for Chassis Front Panel
J21	DC-In Power Connector
SATA1, SATA2	SATA III Connectors
CPU_FAN1, SYS_FAN1	Fan Power Connectors
PCIE1	PCIe (x1) Slot

2.5.1 COM1 & COM2 RS-232/422/485 Ports (CN1)

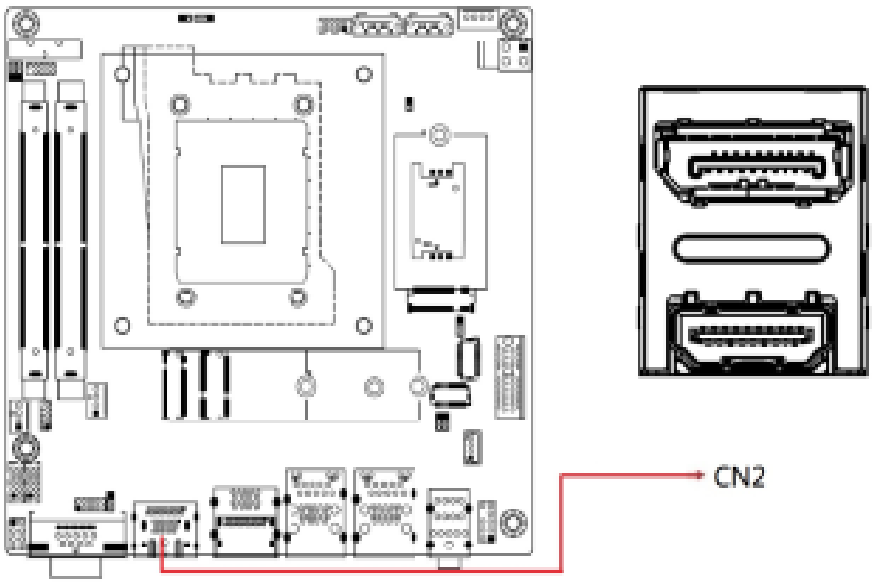


Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	DTR, Data terminal ready	9	RI, Ring indicator
5	Ground		

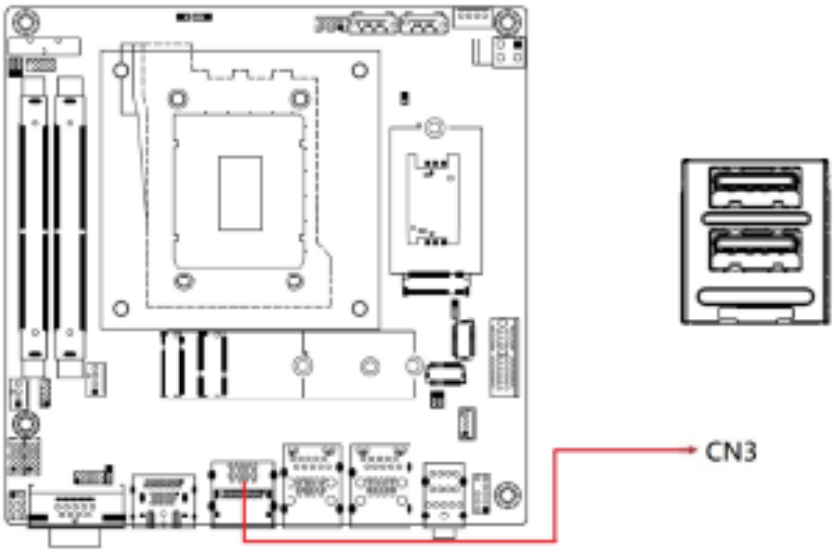
COM1/COM2 RS-232/422/485 are jumperless, configurable in BIOS.

Pin	Signal Name		
	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

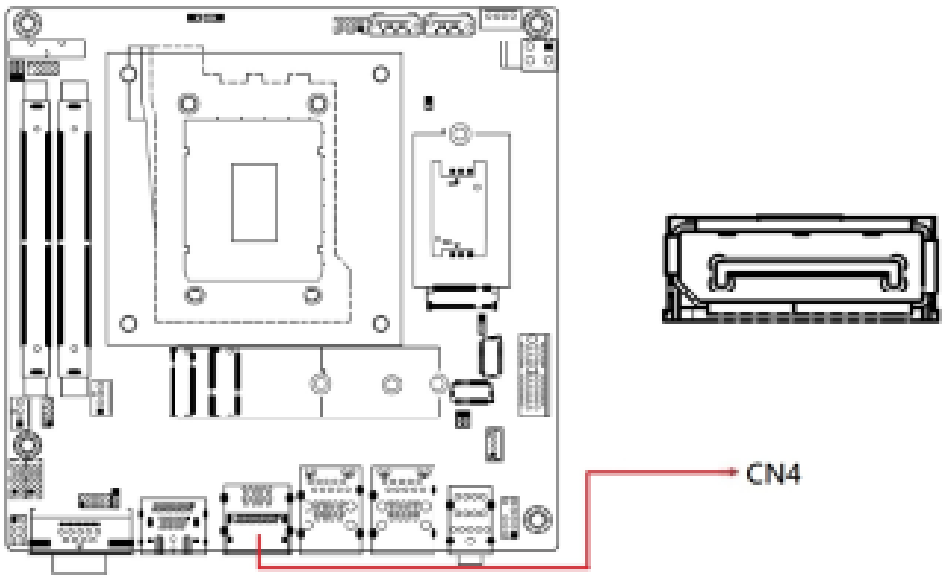
2.5.2 DisplayPort & HDMI Port (CN2)



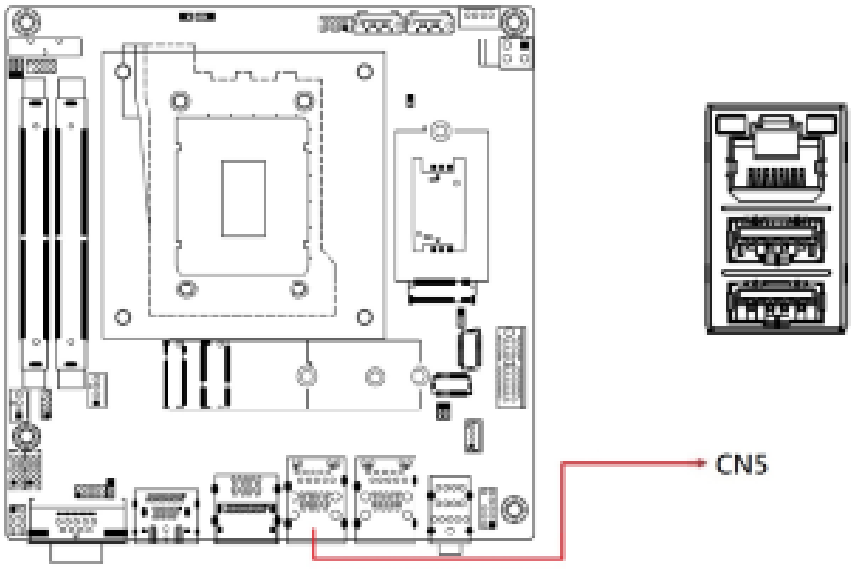
2.5.3 USB 3.2 Connector (CN3)



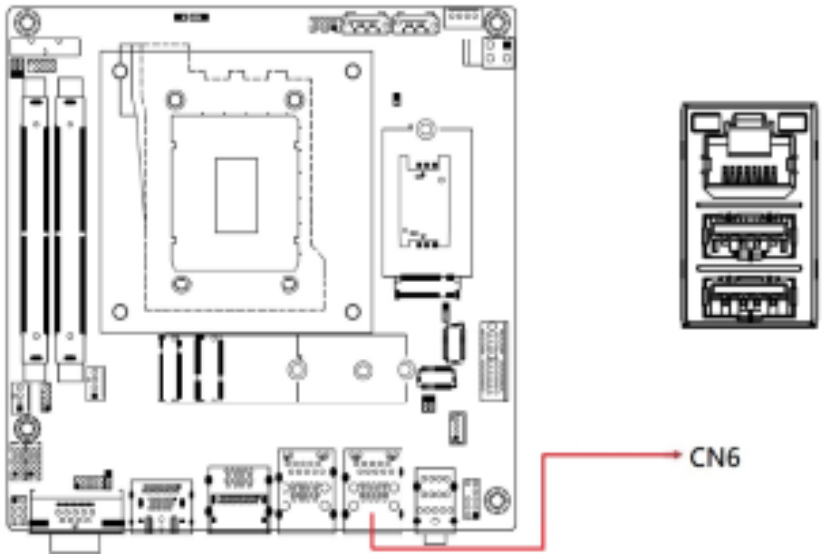
2.5.4 DisplayPort (CN4)



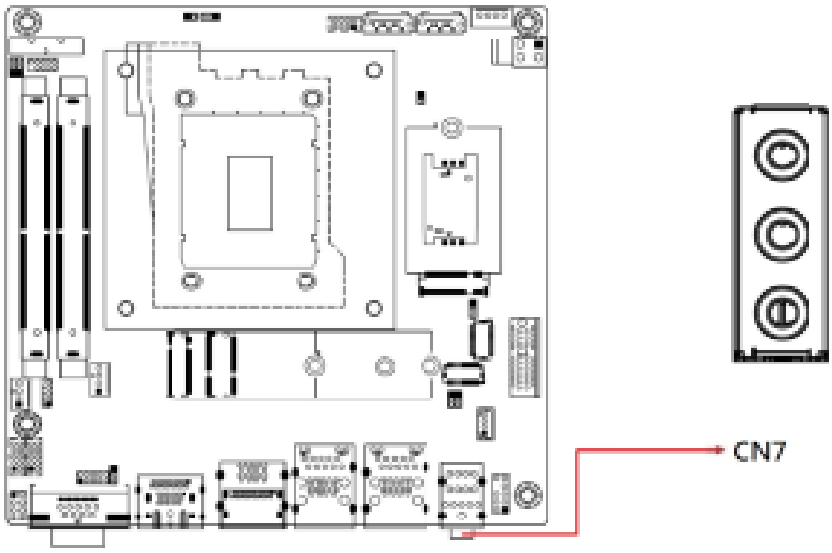
2.5.5 2.5 Gigabit LAN (Intel I226-LM) + USB3.2 (CN5)



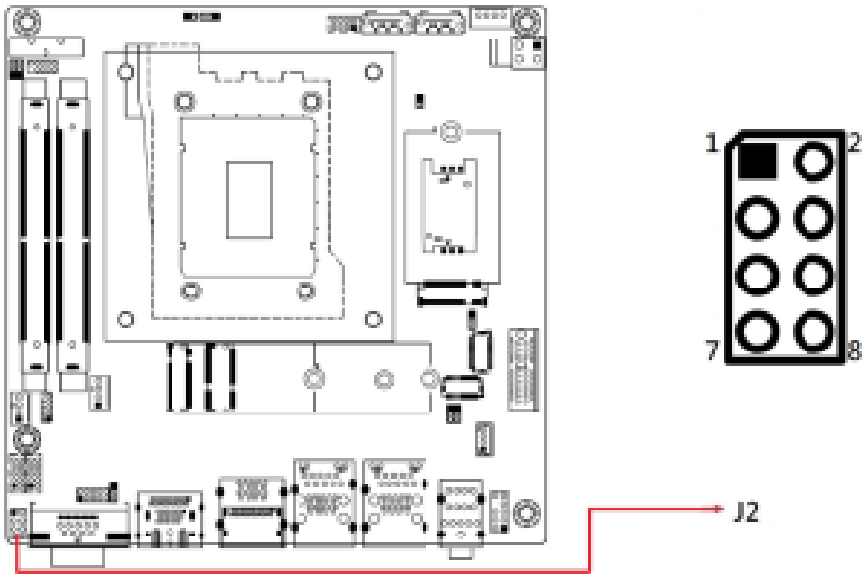
2.5.6 2.5 Gigabit LAN (Intel I226-V) + USB3.2 (CN6)



2.5.7 HD Audio Connector (CN7)



2.5.8 Front Panel Settings Connector (J2)



Pin	Signal	Pin	Signal
1	Power BTN-	2	Power BTN+
3	HDD LED+	4	HDD LED-
5	Reset BTN-	6	Reset BTN+
7	Power LED+	8	Power LED-

J2 is utilized for system indicators to provide light indication of the computer activities and switches to change the computer status. It provides interfaces for the following functions:

ATX Power ON Switch (Pins 1 and 2)

The 2 pins make an “ATX Power Supply On/Off Switch” for the system that connects to the power switch on the case. When pressed, the power switch will force the system to power on. When pressed again, it will power off the system.

Hard Disk Drive LED Connector (Pins 3 and 4)

This connector connects to the hard drive activity LED on control panel. This LED will flash when the HDD is being accessed.

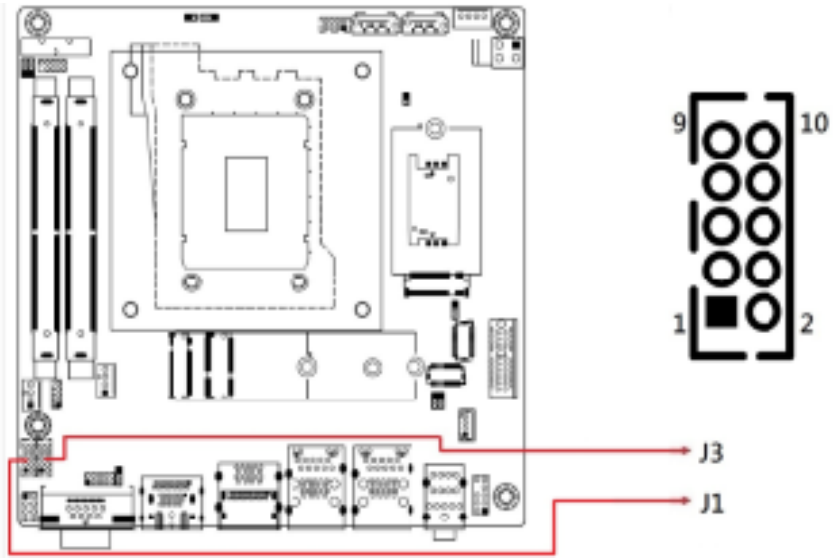
Reset Switch (Pins 5 and 6)

The reset switch allows you to reset the system without turning the main power switch off and then on again. Orientation is not required when making a connection to this header.

Power LED (Pins 7 and 8)

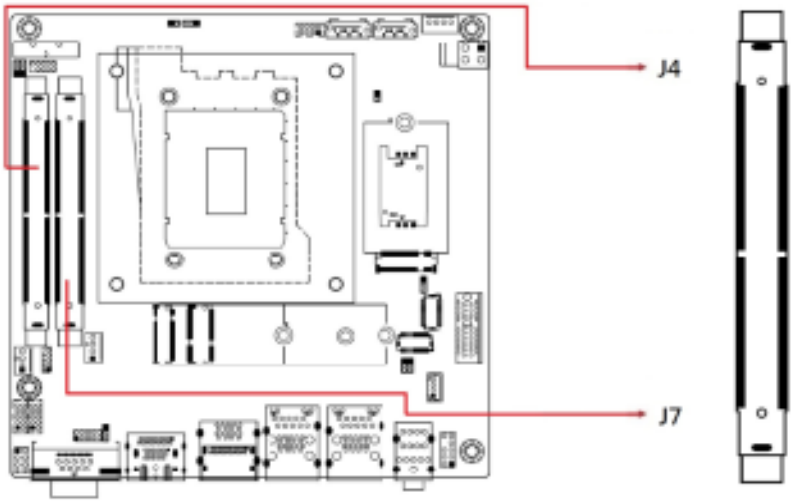
This connector connects to the system power LED on control panel. This LED will light when the system turns on.

2.5.9 COM3 (J1) & COM4 (J3) RS-232 Ports

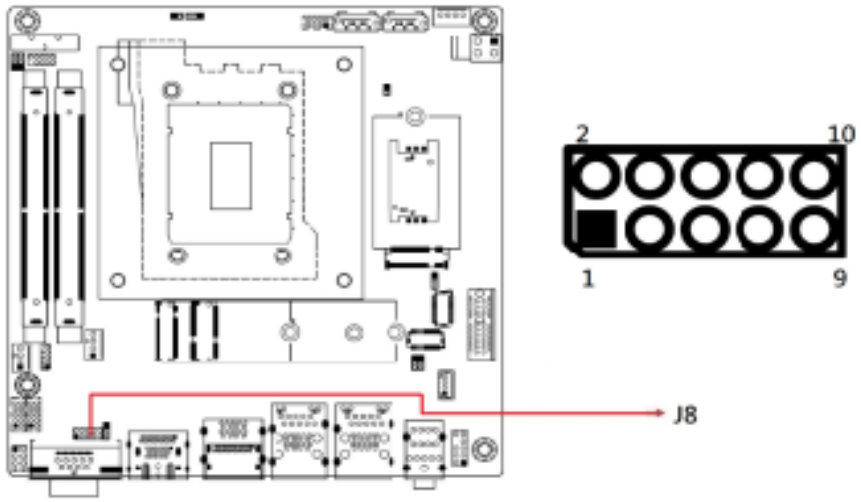


Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	2	RXD, Receive data
3	TXD, Transmit data	4	DTR, Data terminal ready
5	Ground	6	DSR, Data set ready
7	RTS, Request to send	8	CTS, Clear to send
9	RI, Ring indicator	10	Not Used

2.5.10 DDR5 SO-DIMM Slot (J4 / J7)

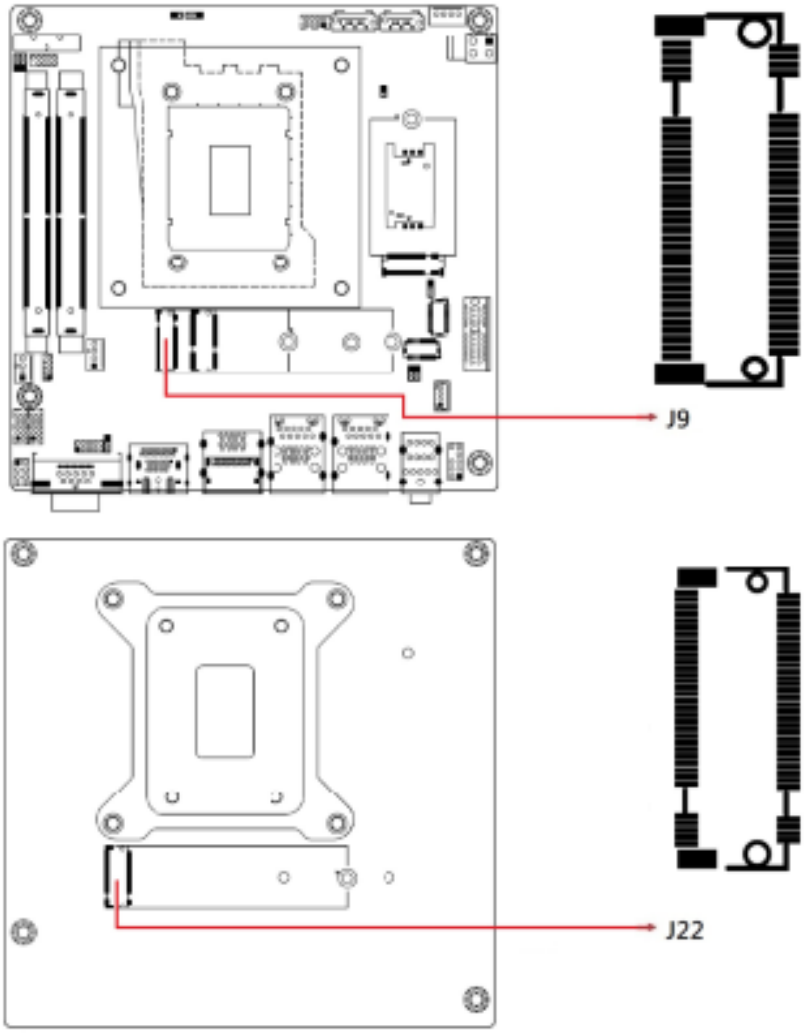


2.5.11 Digital I/O Connector (J8)



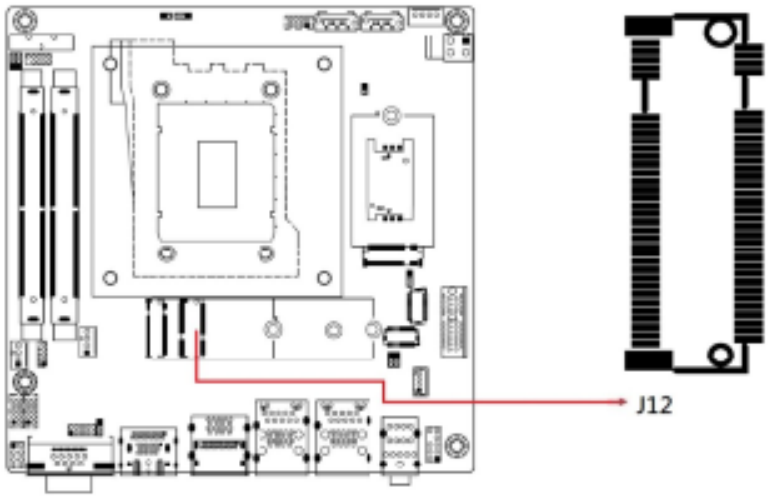
Pin	Signal	Pin	Signal
1	Ground	2	+5V(0.5A)
3	OUT3	4	OUT1
5	OUT2	6	OUT0
7	IN3	8	IN1
9	IN2	10	IN0

2.5.12 M.2 M2280 Slot (J9, J22)



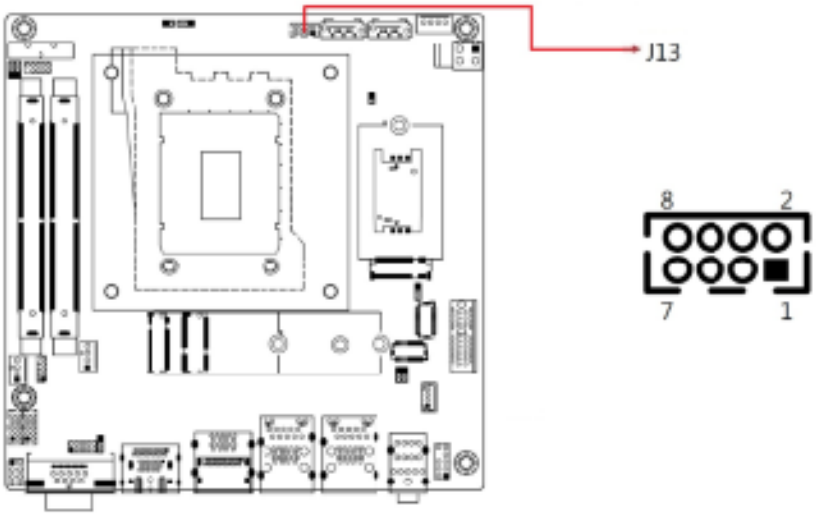
*J9/J22 supports NVME

2.5.13 M.2 E2230 Slot (J12)



*J12 supports USB2.0 & PCIE x1

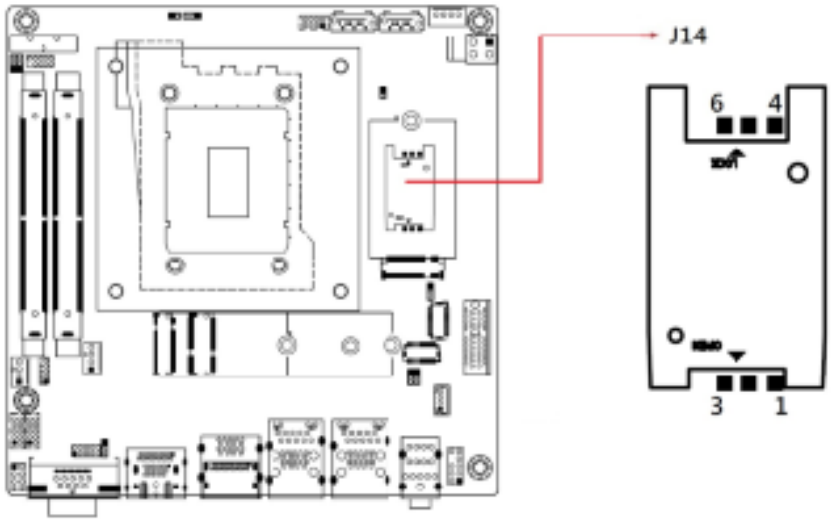
2.5.14 USB 2.0 Connector (J13)



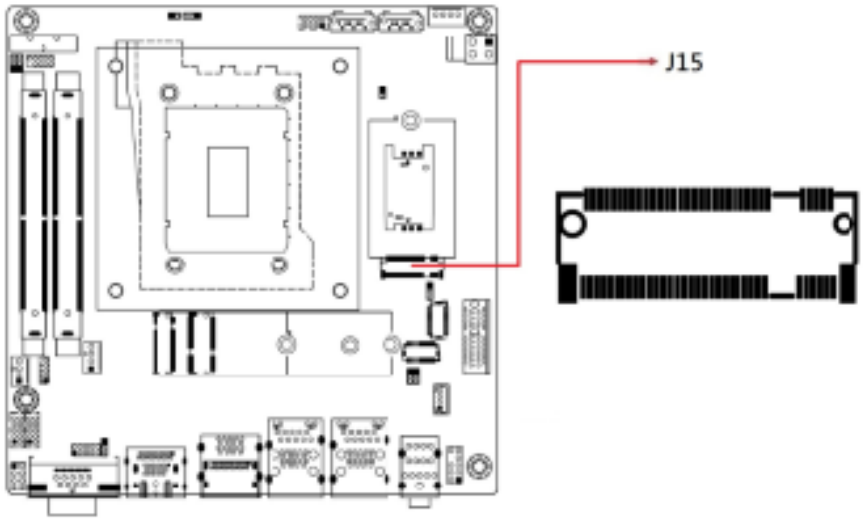
* Connector type: **DF11-8S-PA66H**

Pin	Signal	Pin	Signal
1	VCC(0.5A)	2	Ground
3	D0-	4	D1+
5	D0+	6	D1-
7	Ground	8	VCC(0.5A)

2.5.15 SIM Slot (J14)

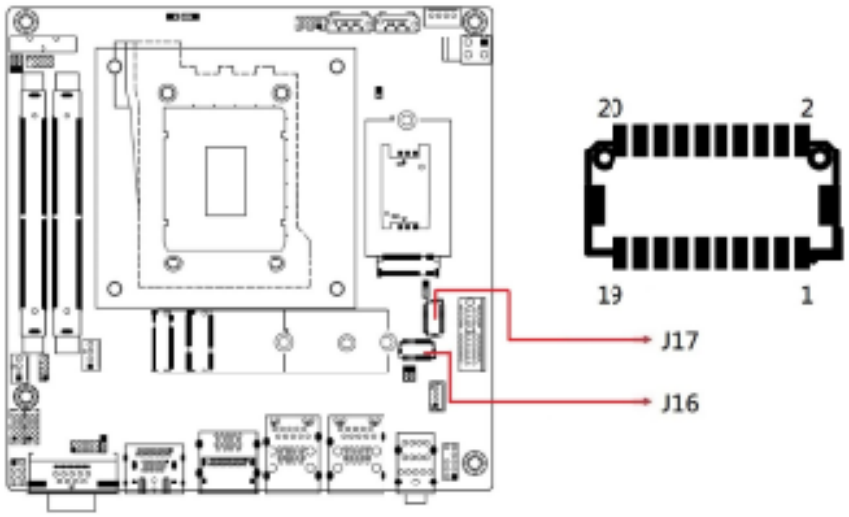


2.5.16 M.2 B-key 3052 Slot (J15)



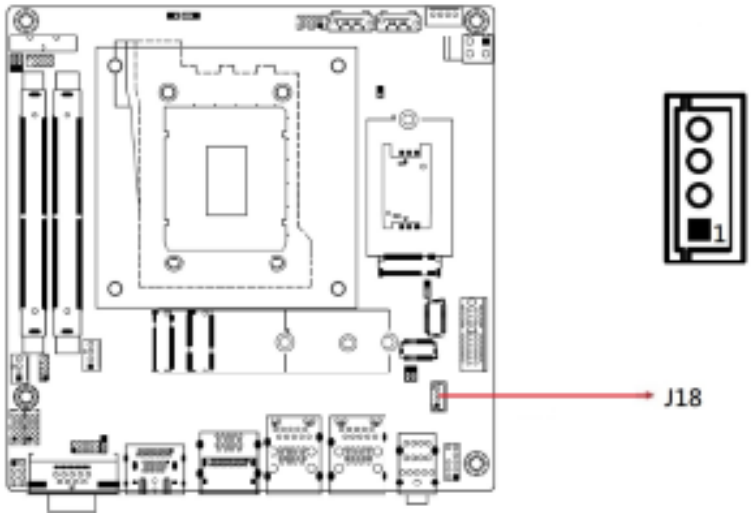
*J15 supports Sierra EM9191 5G modules.

2.5.17 LVDS Connectors (J17, J16) (Channel A, Channel B)



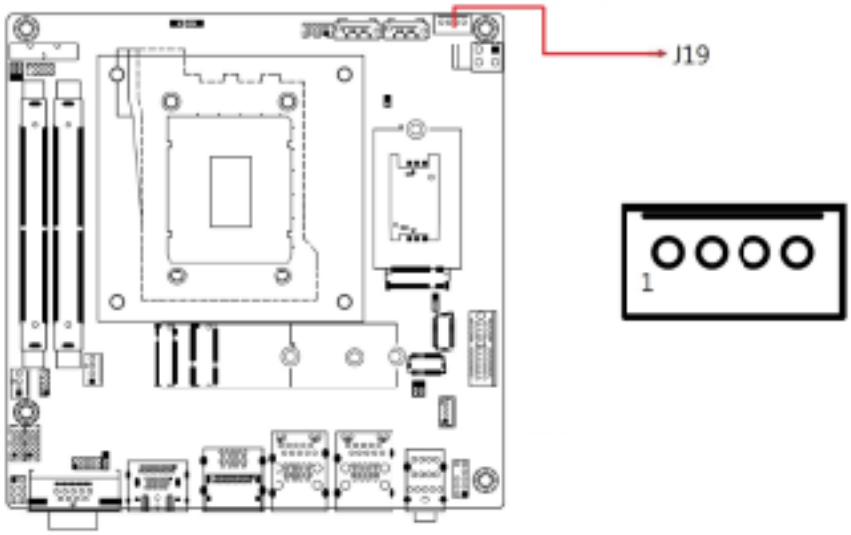
Pin	Signal	Pin	Signal
1	TX0+	2	TX0-
3	Ground	4	Ground
5	TX1+	6	TX1-
7	Ground	8	Ground
9	TX2+	10	TX2-
11	Ground	12	Ground
13	TXC+	14	TXC-
15	Ground	16	Ground
17	TX3+	18	TX3-
19	+3.3 / +5V	20	+3.3 / +5V

2.5.18 LCD Backlight Connector (J18)



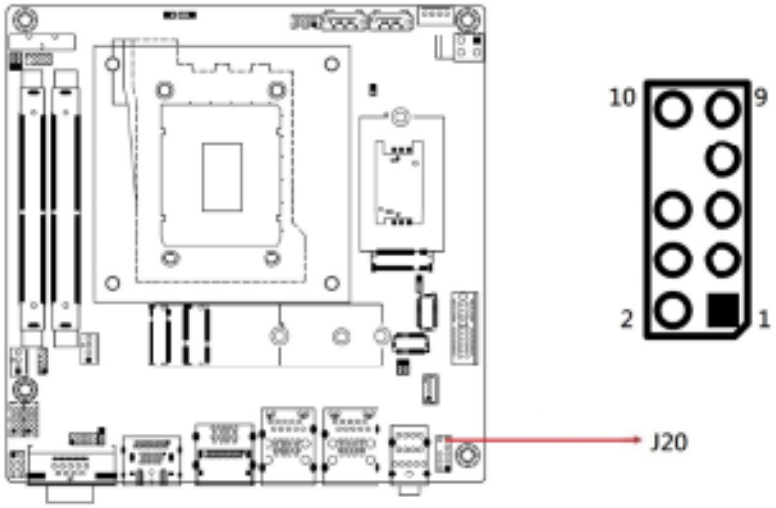
Pin	Signal Name	Pin	Signal Name
1	+12V	3	Brightness Control
2	Backlight Enable	4	Ground

2.5.19 SATA Power Connector (J19)



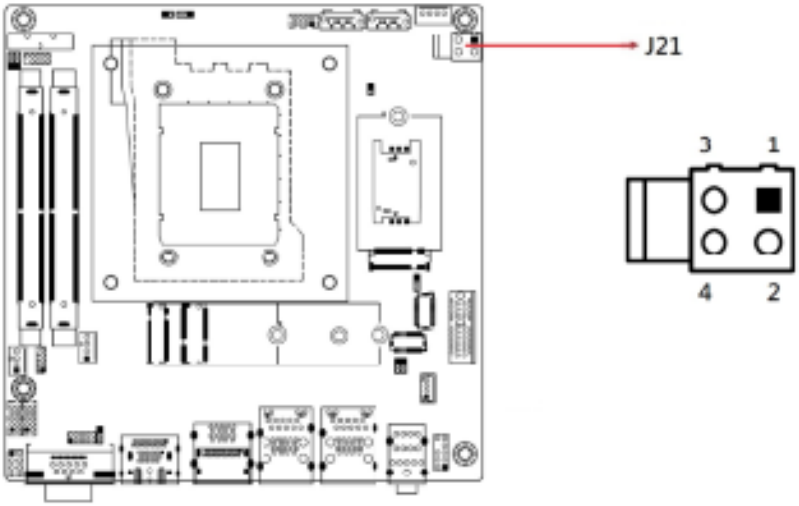
Pin	Signal Name	Pin	Signal Name
1	+5V	3	Ground
2	Ground	4	+12V

2.5.20 Audio Pin Header for Chassis Front Panel (J20)



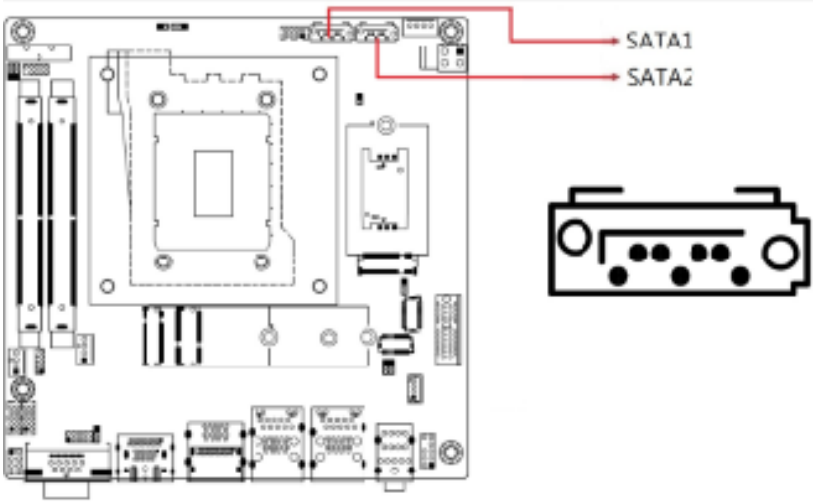
Pin	Signal Name	Pin	Signal Name
1	MIC IN_L	2	Ground
3	MIC IN_R	4	DET
5	LINE_R	6	Sense Ground
7	Sense	8	KEY
9	LINE_L	10	Sense Ground

2.5.21 DC-In Power Connector (J21)

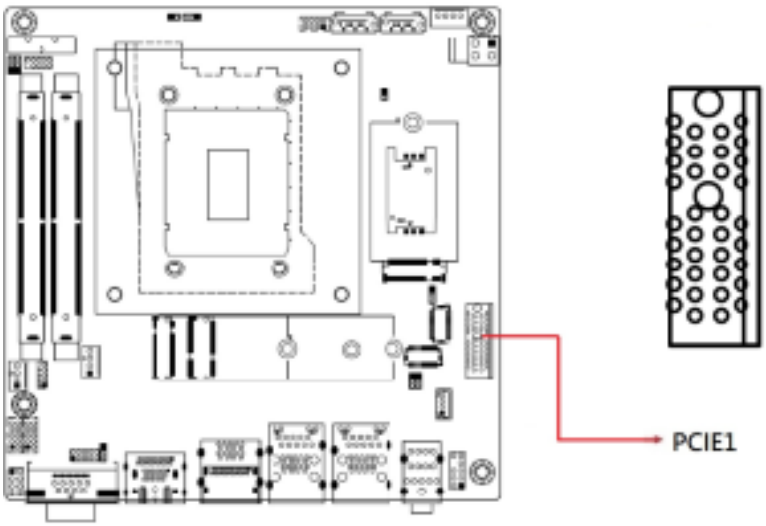


Pin	Signal Name	Pin	Signal Name
1	Ground	2	Ground
3	+12 ~ +24V	4	+12 ~ +24V

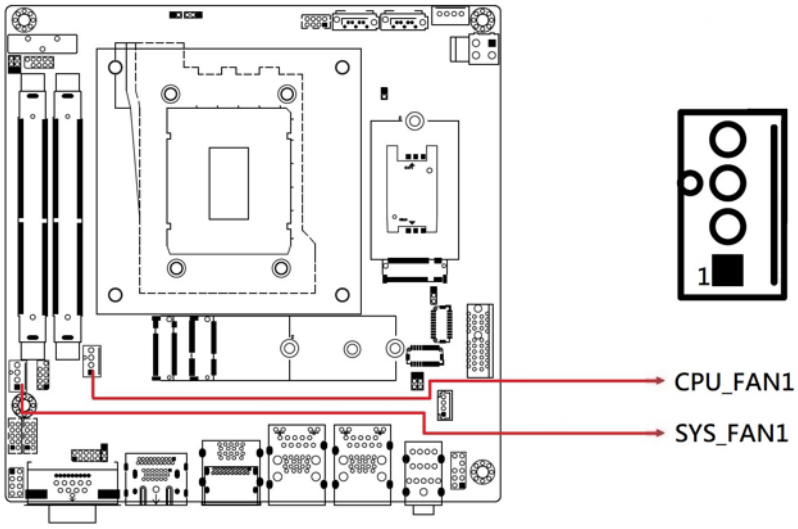
2.5.22 SATA III Connector (SATA1, SATA2)



2.5.23 PCIe (x1) Slot (PCIE1)



2.5.24 Fan Power Connectors (CPU_FAN1, SYS_FAN1)



Pin	Signal Name
1	Ground
2	+12V
3	Rotation detection
4	Control

Chapter 3
Driver Installation

The information provided in this chapter includes:

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

3.1 Introduction

This section describes the installation procedures for software drivers. The software drivers are available on the IBASE website. 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.

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 Intel chipset components. Follow the instructions below to complete the installation.

1. Click Intel on the left pane and then Intel(R) AlderLake-P Chipset Drivers, and Intel(R) Chipset Software Installation Utility on the right pane.

3. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next**.
4. Accept the *License Agreement* and click **Accept**.
5. On the *Readme File Information* screen, click **Install**.

6. When installation has been completed, press Finish to complete the setup process.

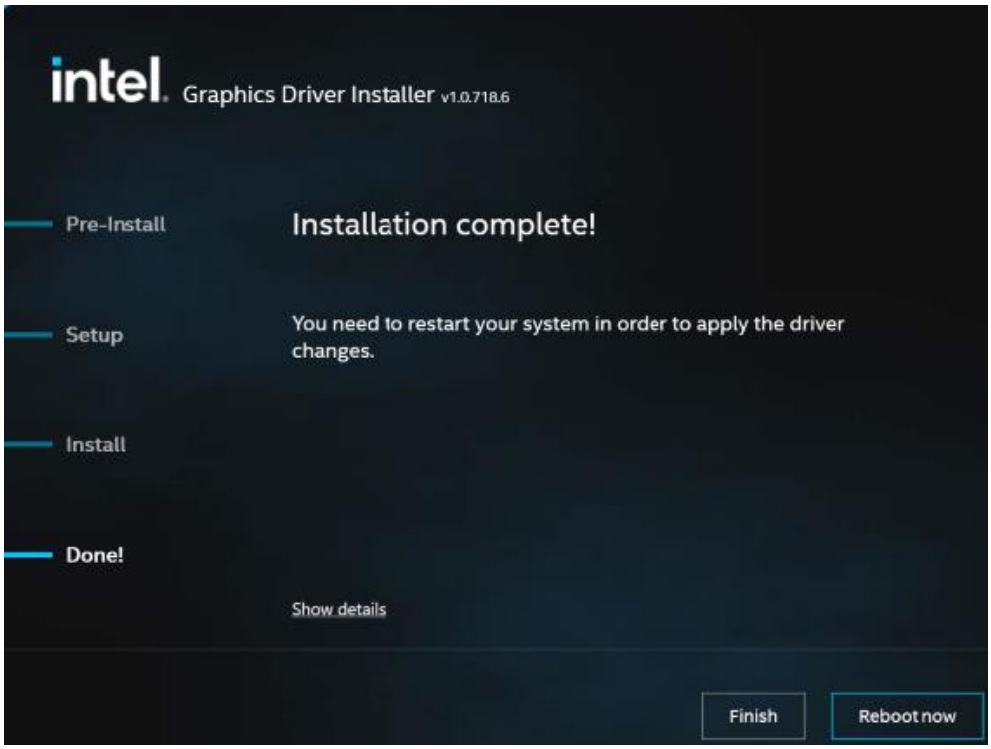
3.3 VGA Driver Installation

1. Click **Intel** on the left pane and then **Intel(R) AlderLake-P Chipset Drivers**, and **Intel(R) HD Graphics Driver** on the right pane.

2. When the ***Intel Graphics Driver Installer*** screen appears, click **Begin installation**.

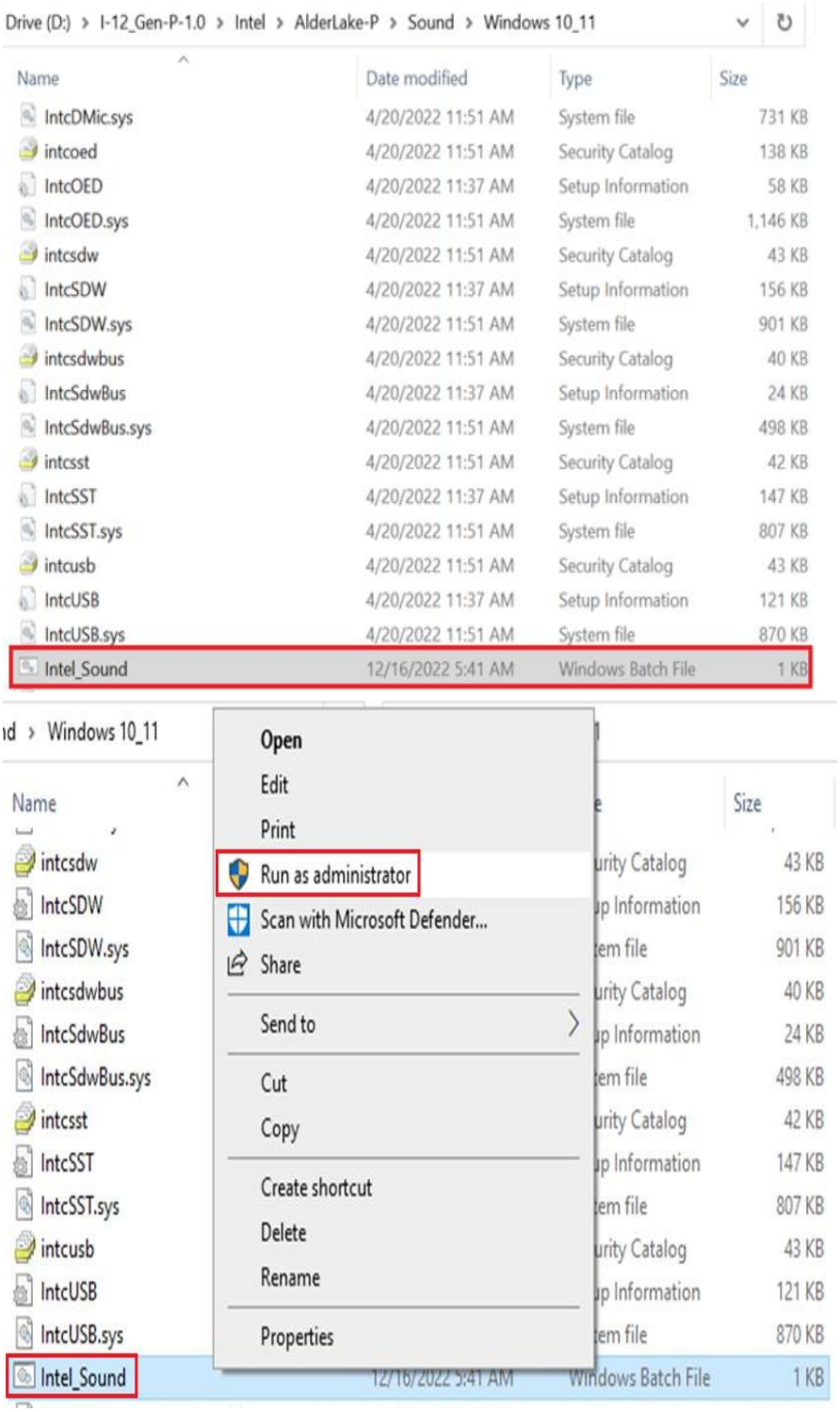
3. Click **I agree** to accept the INTEL SOFTWARE LICENSE AGREEEMENT.

4. In the Pre-Install stage, “The installer will install the following components:
   - Intel® Graphics Driver
   - Intel® Graphics Command Center
   Click **Start** to start installing the new graphics driver.
5. The next screen will indicate that the new graphics driver is being installed. When the message “**Installation complete!**” appears, restart your system in order to apply the driver changes.



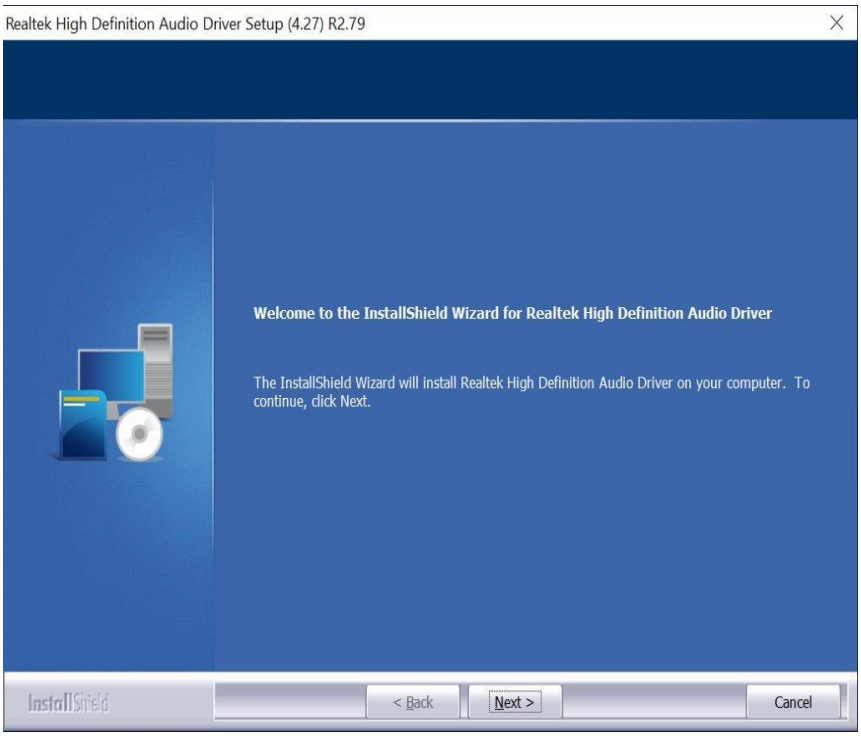
3.4 Realtek HD Audio Driver Installation

1. Before installing the audio drivers, run the batch file - **Intel_Sound.bat** in the directory shown in the picture below:
   I-12_Gen-P-1.0\Intel\AlderLake-P\Sound\Windows 10_11
   Right-click Intel_Sound.bat and **run the batch file as administrator**.



2. After running the batch file, install the audio drivers. Click **Intel** on the left pane and then **Intel(R) AlderLake-P Chipset Drivers** on the right.Click **Intel** on the left pane and then **Intel(R) AlderLake-P Chipset Drivers**, and **Realtek High Definition Audio Driver** on the right pane.

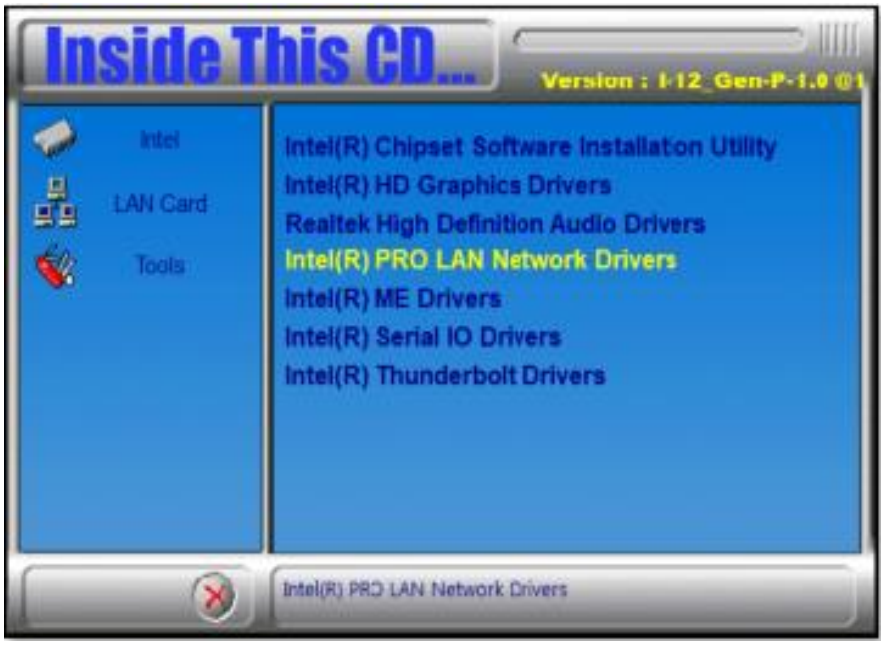
3. On the *Welcome* screen of the InstallShield Wizard, click **Next** to install the drivers.



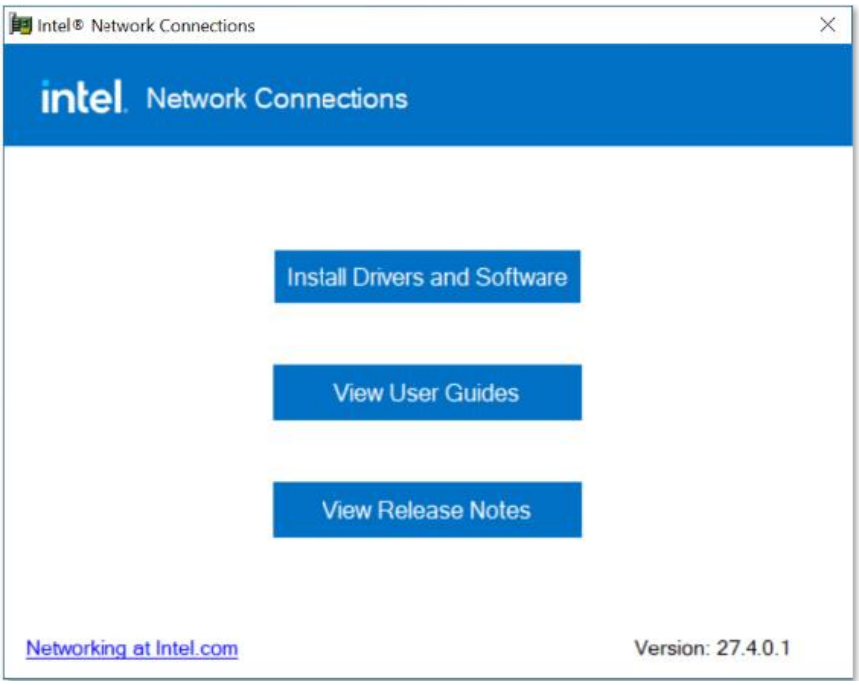
4. When the audio driver has been installed, click **Finish** to restart the computer.

3.5 LAN Drivers Installation

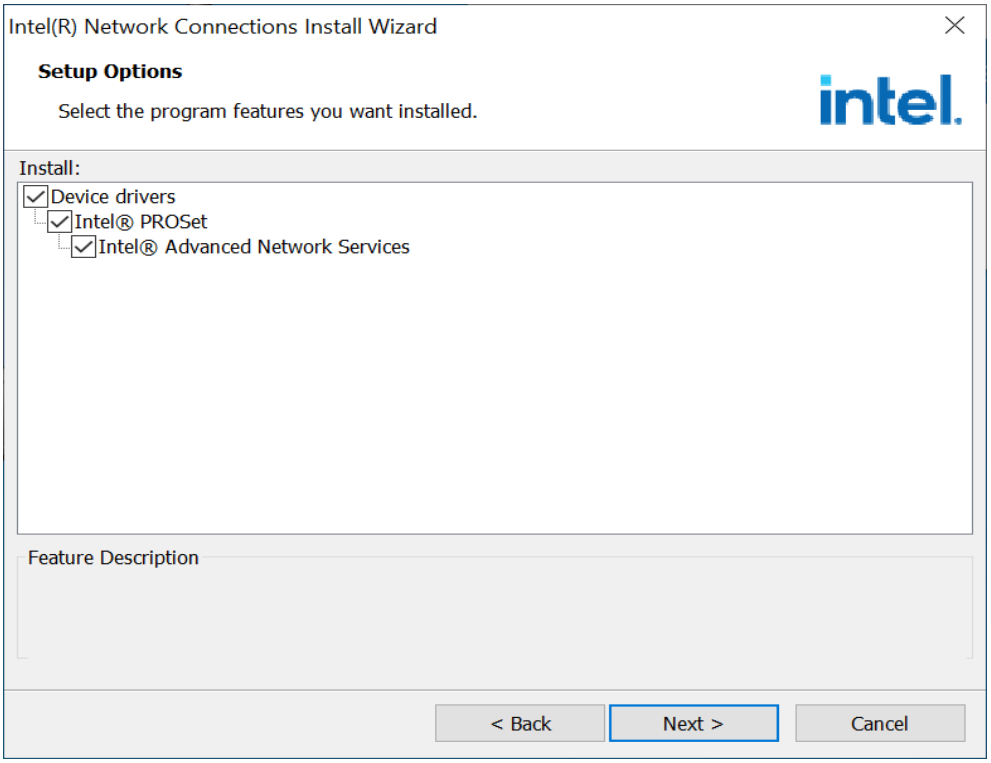
1. Click **Intel** on the left pane and then **Intel(R) AlderLake-P Chipset Drivers**, and **Intel PRO LAN Network Drivers** on the right pane.



2. Click **Intel Drivers and Software**.



3. When the *Welcome to the install wizard for Intel(R) Nework Connection* screen appears, click **Next**. On the next screen, accept the terms in the License Agreement and click **Next**.
4. On the *Setup Options* screen, select the program features you want to be installed. Then click **Next** to continue.

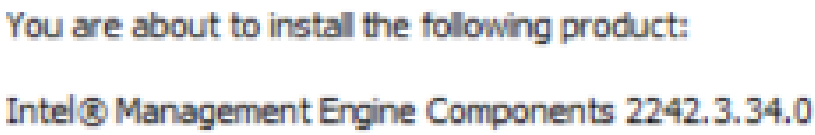


5. On the *Ready to Install the Program* screen, click **Install** to begin the installation.
7. When the *Install wizard Completed* screen appears, click **Finish**.

3.6 Intel® ME Drivers Installation

1. Click **Intel** on the left pane and then **Intel(R) AlderLake-P Chipset Drivers,** and **Intel(R) ME Drivers** on the right pane.

2. When the *Welcome* screen to the **Intel® Management Engine Components** appears, click **Next**.

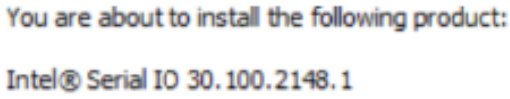


3. Accept the terms in the License Agreement and click **Next**.
4. On the next screen, click **Next** to install to the default folder.
5. Click **Finish** when the necessary components have been successfully installed.

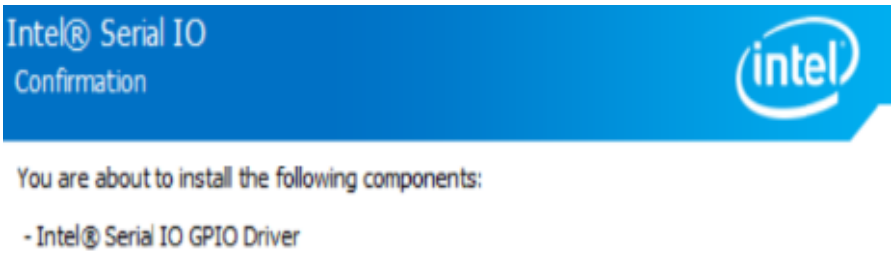
3.7 Intel® Serial IO Drivers Installation

1. Click **Intel** on the left pane and then **Intel(R) AlderLake-P Chipset Drivers,** and **Intel(R) Serial IO Drivers** on the right pane.

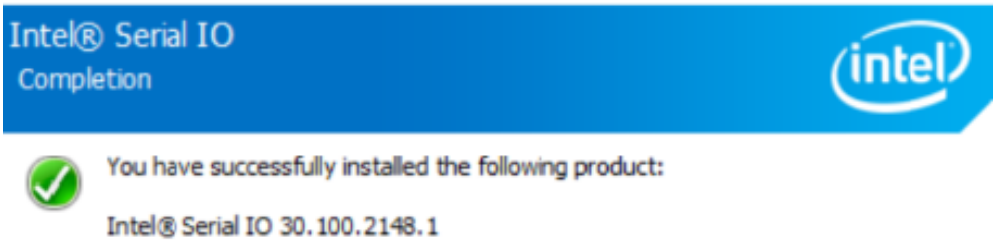
2. When the *Welcome* screen to the Intel® Serial IO appears, click **Next**.



3. Accept the terms in the license agreement and click **Next**.
4. On the **Readme File Information** and **Confirmation** screens, click **Next**.



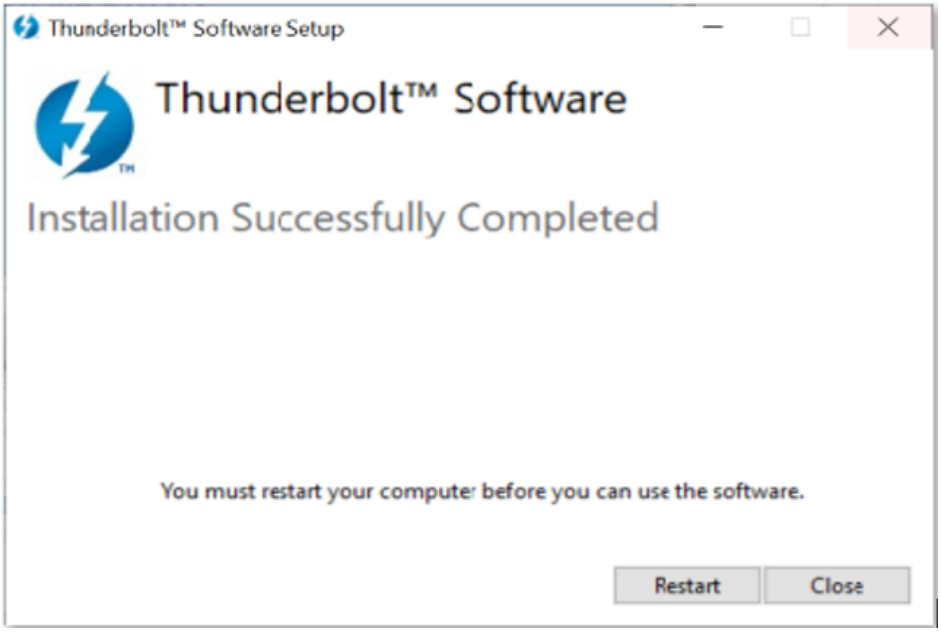
8. Click **Finish** when the **Completion** screen appears.



3.8 Intel® Thunderbolt Drivers Installation

1. Click **Intel** on the left pane and then **Intel(R) AlderLake-P Chipset Drivers,** and **Intel(R) Thunderbolt Drivers** on the right pane.

2. Accept the terms in the license agreement and click **Install**.
3. When installation has been completed, click **Restart**.



Chapter 4
BIOS Setup

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

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

4.1 Introduction

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

4.2 BIOS Setup

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

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

The following message will appear on the screen:

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

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

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

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

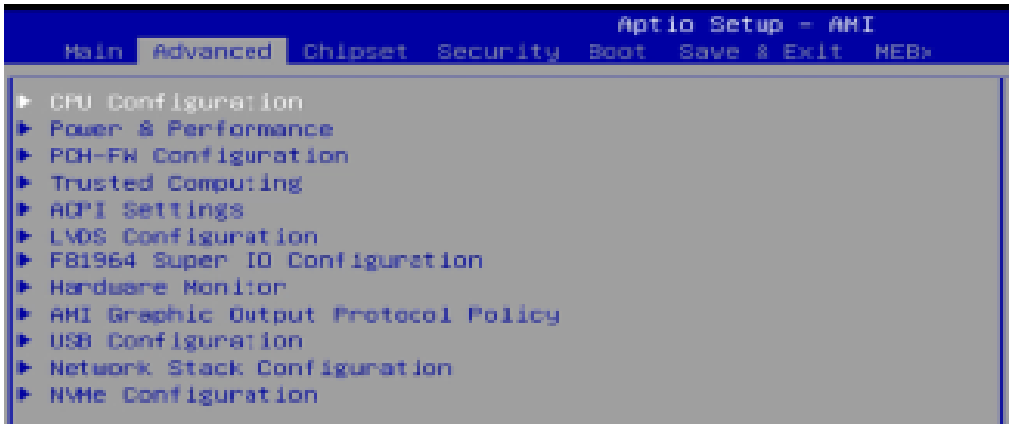
These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could make the system unstable and crash in some cases.

4.3 Main Settings

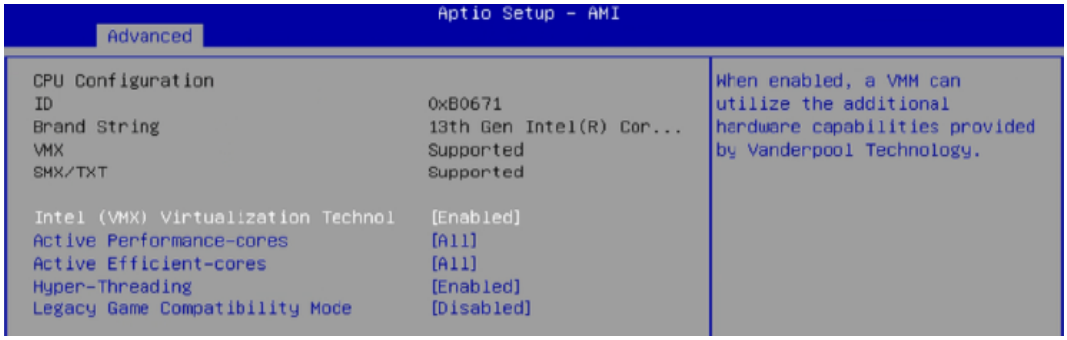
BIOS Setting	Description
System Language	Choose the system default language.
System Date	Sets the date. Use the <Tab> key to switch between the data elements.
System Time	Set the time. Use the <Tab> key to switch between the data elements.

4.4 Advanced Settings

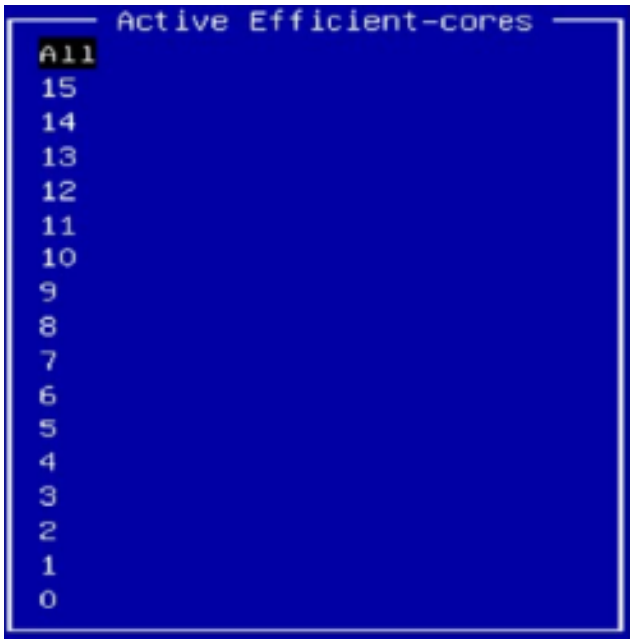
This section allows you to configure, improve your system and allows you to set up some system features according to your preference.



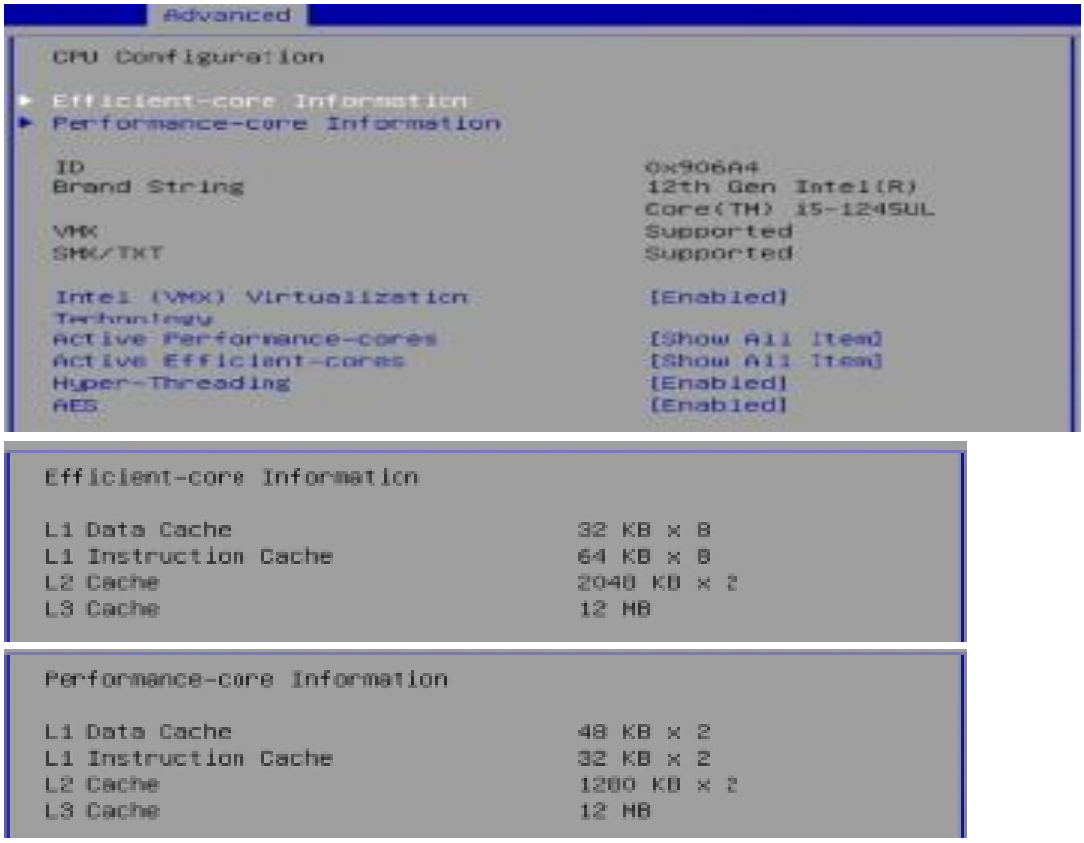
CPU Configuration



BIOS Setting	Description
Intel (VMX) Virtualization Technology	When enable, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Performance-cores Active Efficient-cores	Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are (0,0), Pcode will enable all cores
Hyper-Threading	Enable or disable Hyper-Threading Technology.
Legacy Game Compatibility Mode	When enable, pressing the scroll lock key will toggle the Efficient-cores between being parked when Scroll Lock LED is on and un-parked when LED is off.

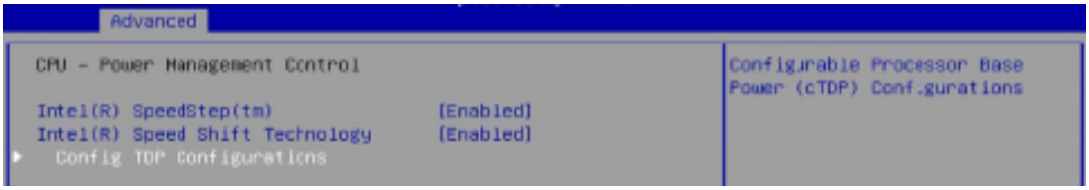


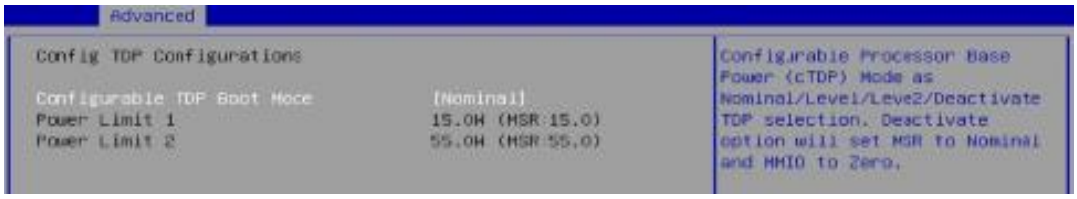
CPU Configuration



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

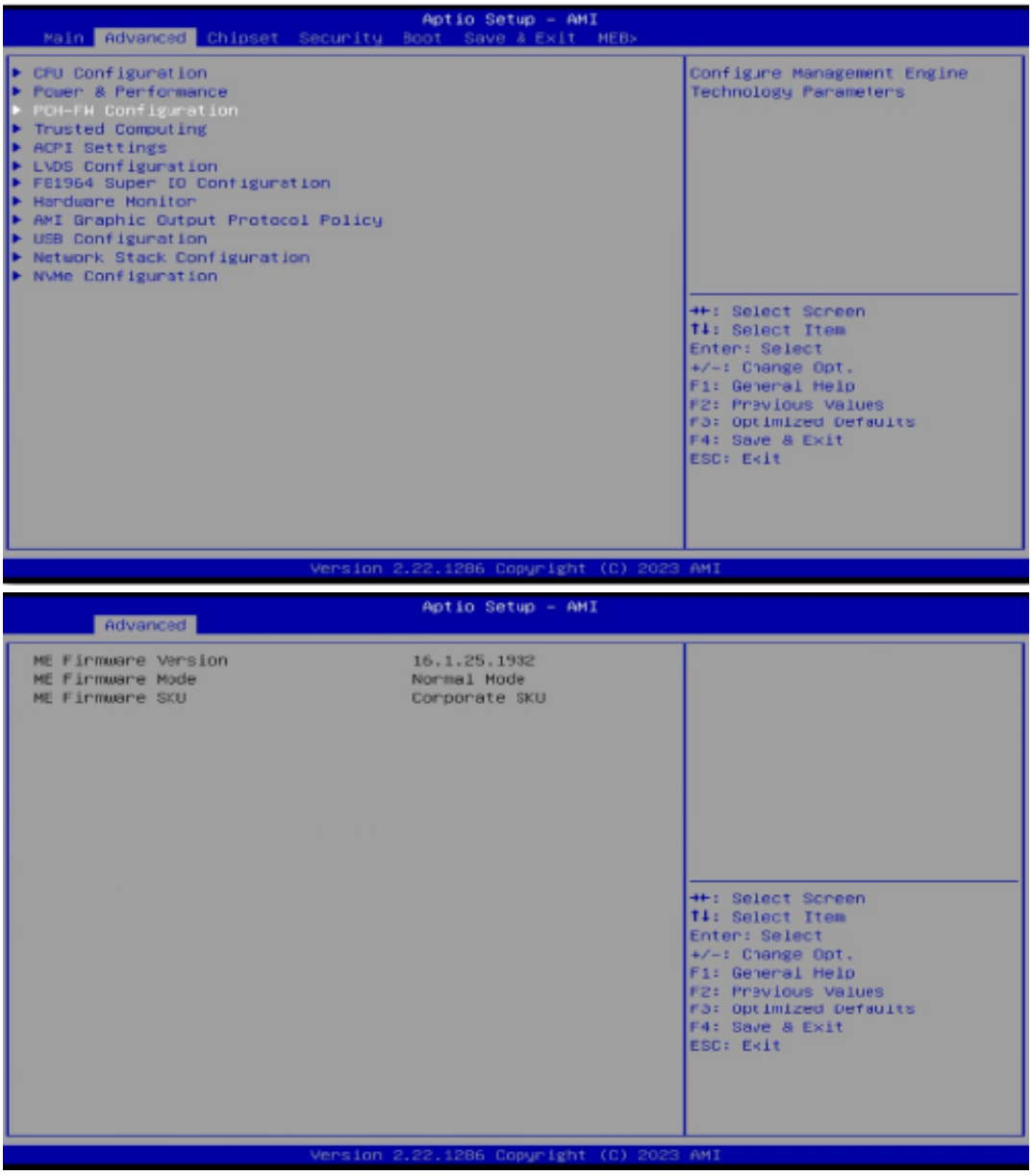
Power & Performance



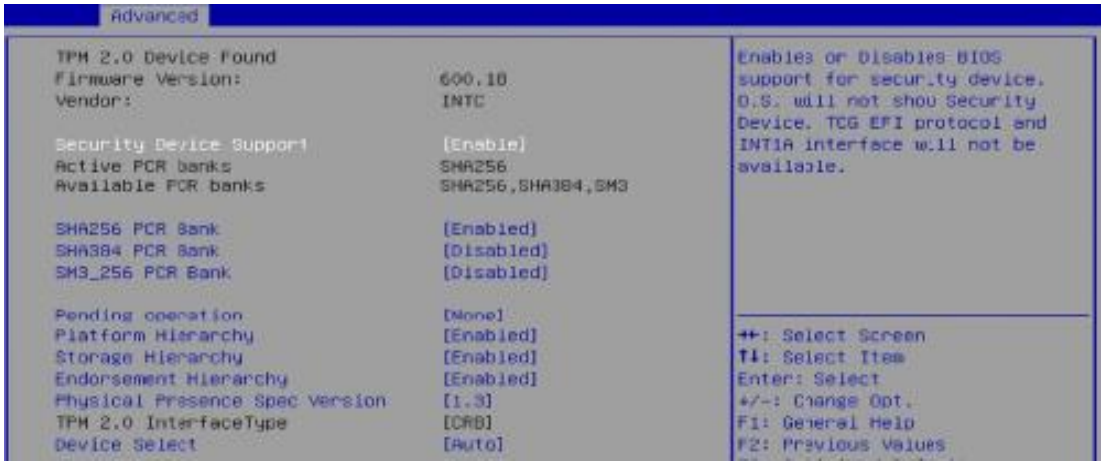


BIOS Setting	Description
Intel(R) SpeedStep(tm)	Allows more than two frequency ranges to be supported.
Intel(R) Speed Shift Technology	Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Config TDP Configuration	Configurable Processor Base Power (cTDP) Configurations
Configurable TDP Boot Mode	Configurable Processor Base Power (cTDP) Mode as Nominal/ Level/ Leve2 / Deactivate TDP selection. Deactivate option will set MSR to Nominal and MMIO to Zero.

PCH-FW Configuration

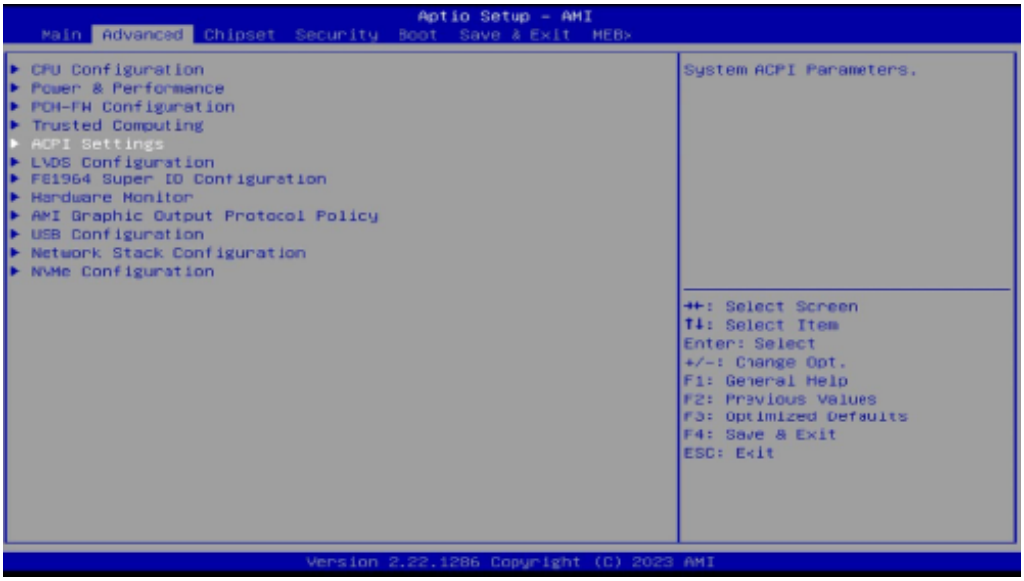


Trusted Computing



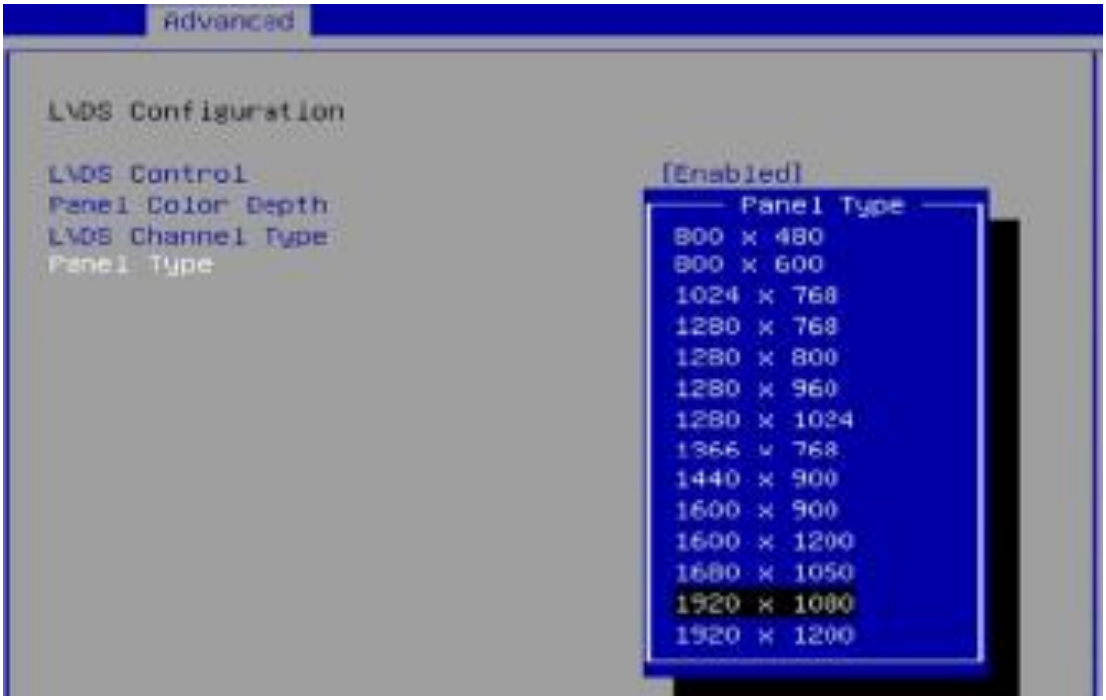
BIOS Setting	Description
Security Device Support	Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INTIA interface will not be available.
SHA256 / SHA384 / SH3_256 PCR Bank	Options: Enabled / Disabled
Pending operation	Schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device.
Platform Hierarchy	Enables / Disables platform hierarchy.
Storage Hierarchy	Enables / Disables storage hierarchy.
Endorsement Hierarchy	Enables / Disables endorsement hierarchy.
Physical Presence Spec Version	Selects to show the PPI Spec Version (1.2 or 1.3) that the OS supports. **Note:** Some HCK tests might not support 1.3.
Device Select	• **TPM 1.2** will restrict support to TPM 1.2 devices only. • **TPM 2.0** will restrict support to TPM 2.0 devices only. • **Auto** will support both with the default being set to TPM 2.0 deices if not found, and TPM 1.2 device will be enumerated.

ACPI Settings



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

LVDS Configuration



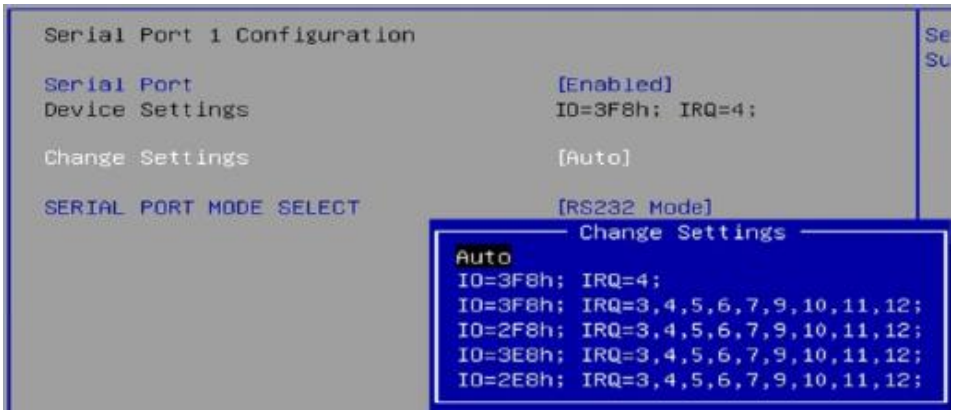
BIOS Setting	Description
LVDS Control	Enables / Disables LVDS.
Panel Color Depth	Options: 18 BIT, 24 BIT
LVDS Channel Type	Options: Single, Dual
Panel Type	Options: 800 x 480 / 800 x 600 / 1024 x 768 / 1280 x 768 / 1280 x 960 / 1280 x 1024 / 1366 x 768 / 1440 x 900 / 1600 x 900 / 1600 x 1200 / 1680 x 1050 / 1920 x 1080 / 1920 x 1200

Note: LVDS brightness control can only be controlled in Windows.

F81964 Super IO Configuration

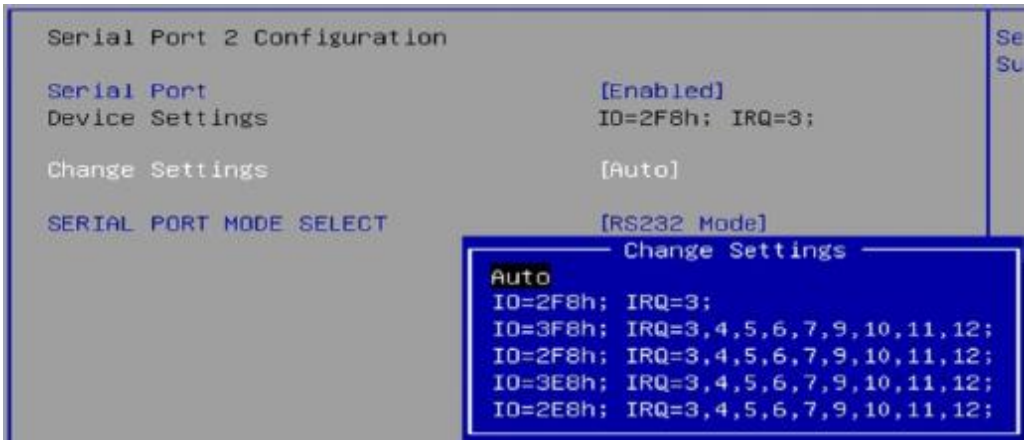
BIOS Setting	Description
Serial Port Configuration	Sets parameters of Serial Ports. Enables / Disables the serial port and select an optimal setting for the Super IO device.

Serial Port 1 Configuration



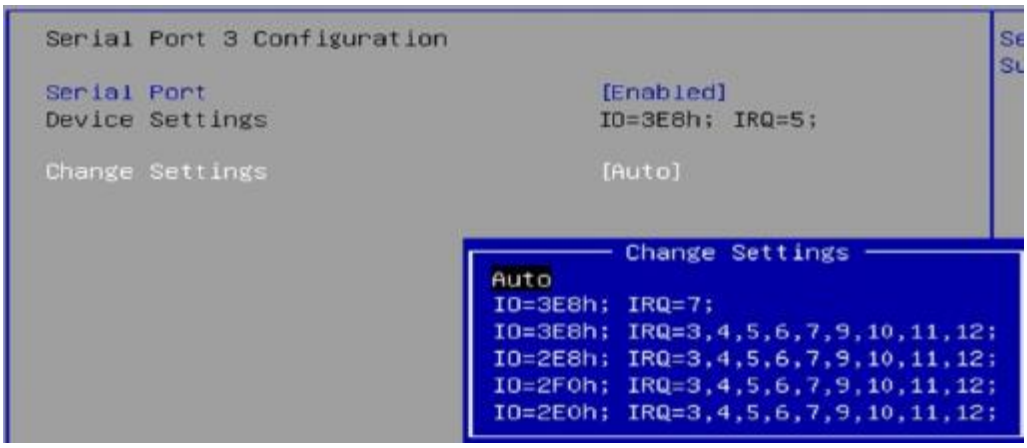
BIOS Setting	Description
Serial Port Mode Select	Serial Port Loop Back/RS232/RS422/ RS485 mode select

Serial Port 2 Configuration

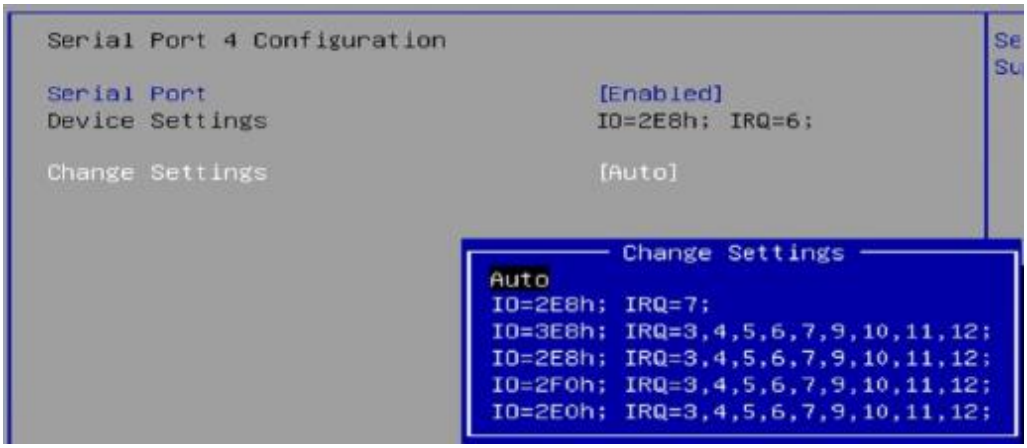


BIOS Setting	Description
Serial Port Mode Select	Serial Port Loop Back/RS232/RS422/ RS485 mode select

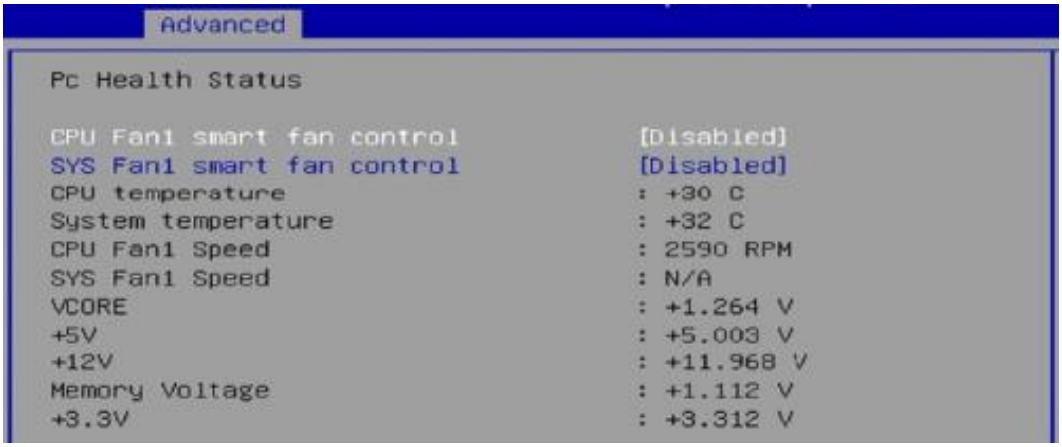
Serial Port 3 Configuration



Serial Port 4 Configuration

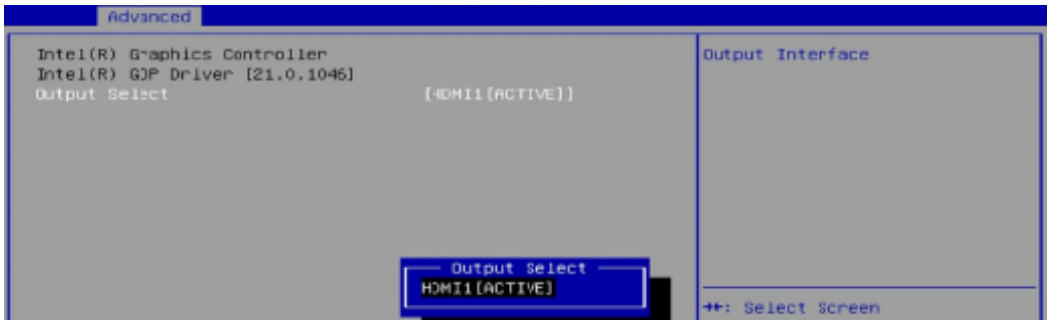


Hardware Monitor

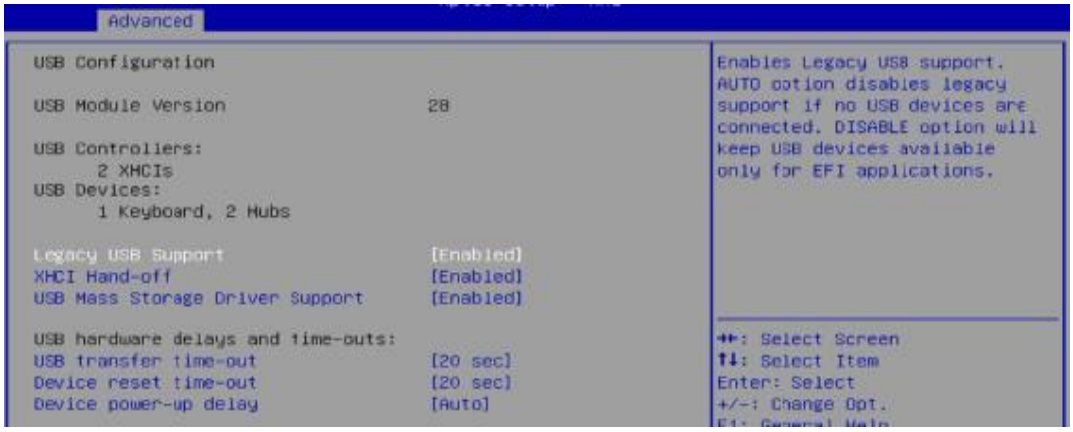


BIOS Setting	Description
CPU Fan Smart Fan Control	Enables / Disables CPU smart fan control. Options: Disabled / 50 °C / 60 °C / 70 °C / 80 °C
System Smart Fan Control	Enables / Disables system smart fan control. Options: Disabled / 50 °C / 60 °C / 70 °C / 80 °C
Temperatures / Voltages	These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

AMI Graphic Output Protocol Policy

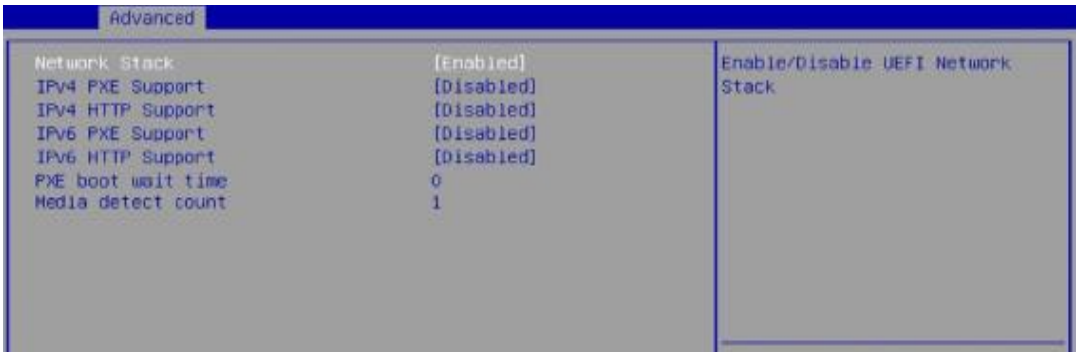


USB Configuration



BIOS Setting	Description
Legacy USB Support	• **Enabled** enables Legacy USB support. • **Auto** disables legacy support if there is no USB device connected. • **Disabled** keeps USB devices available only for EFI applications.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enables / Disables the support for USB mass storage driver.
USB Transfer time-out	The time-out value (1 / 5 10 / 20 secs) for Control, Bulk, and Interrupt transfers.
Device reset time-out	Gives seconds (10 / 20 / 30 / 40 secs) to delay execution of Start Unit command to USB mass storage device.
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 100ms. But for a Hub port, the delay is taken from Hub descriptor.

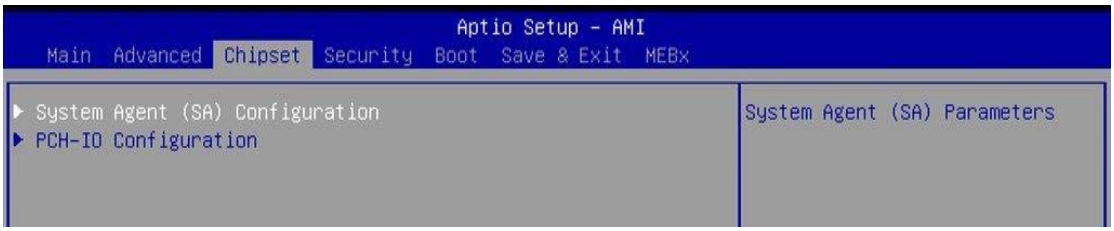
Network Stack Configuration



BIOS Setting	Description
Network Stack	Enables / Disables UEFI Network Stack.
IPv4 PXE Support	Enables / Disables IPv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created.
IPv4 HTTP Support	Enables / Disables IPv4 HTTP Boot Support. If disabled, Ipv4 HTTP boot option will not be created.
IPv6 PXE Support	Enables / Disables IPv6 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created.
IPv6 HTTP Support	Enables / Disables IPv6 HTTP Boot Support. If disabled, Ipv4 HTTP boot option will not be created.
PXE boot wait time	Assigns a period of time to press ESC key to abort the PXE boot.
Media detect count	Assigns a number of times to check the presence of media.

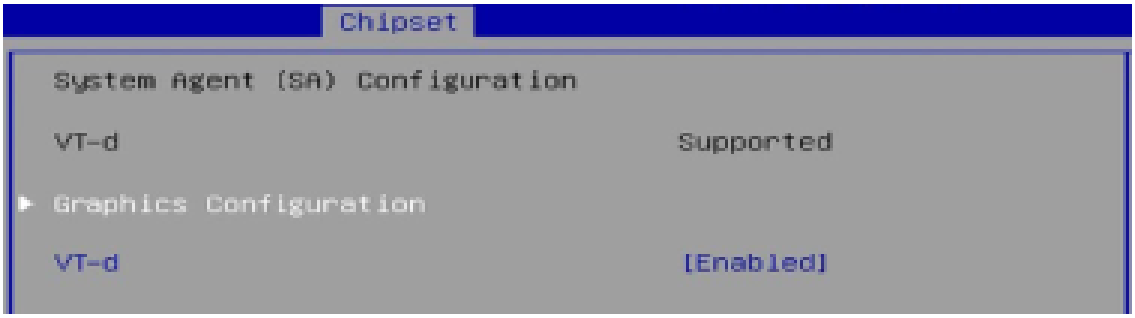
NVMe Configuration

4.5 Chipset Settings



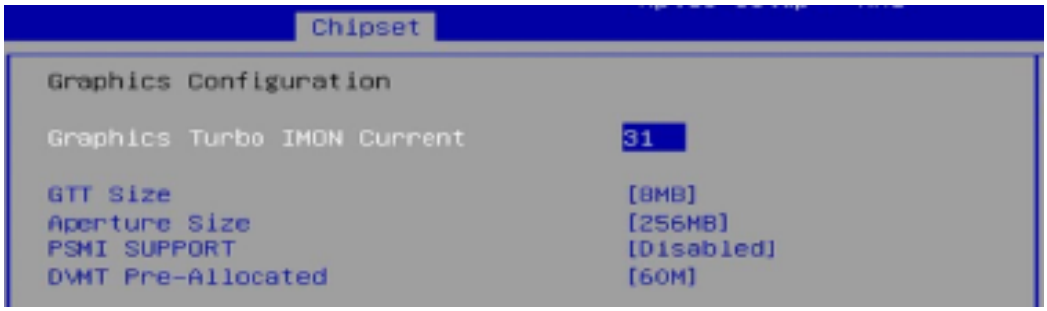
BIOS Setting	Description
System Agent (SA) Configuration	System Agent (SA) parameters
PCH-IO Configuration	PCH parameters

4.5.1 System Agent (SA) Configuration

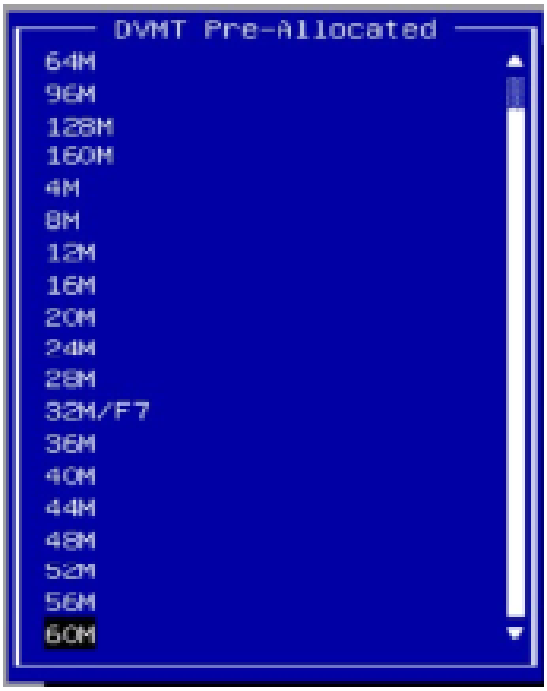


BIOS Setting	Description
Graphics Configuration	Configures the graphics settings.
VT-d	VT-d capability, Enabled/Disabled

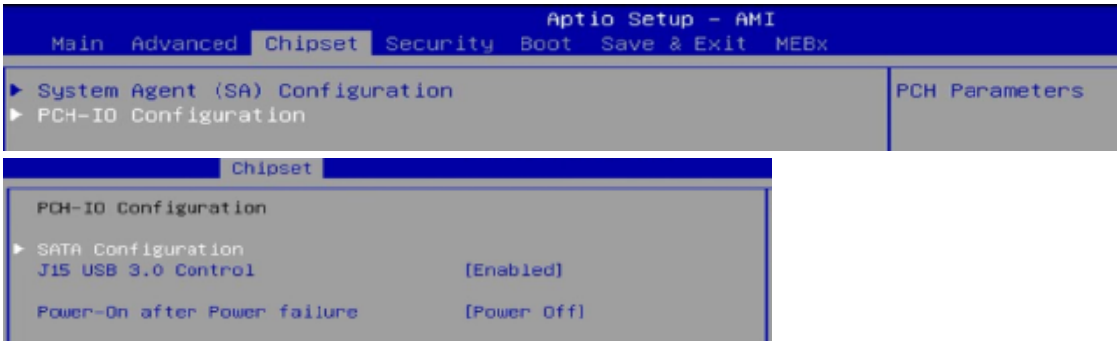
4.5.1.1. Graphics Configuration



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

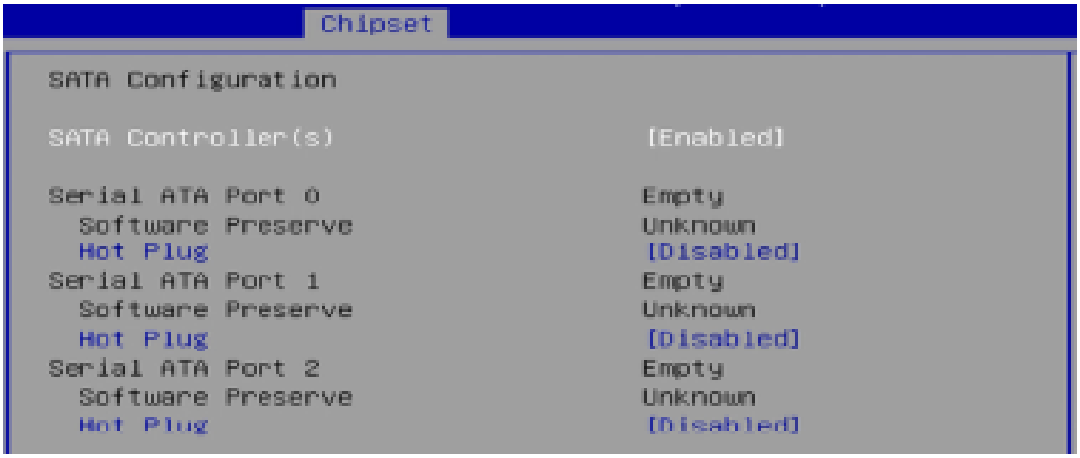


4.5.2 PCH-IO Configuration



BIOS Setting	Description
PCH-IO Configuration	PCH Parameters
SATA Configuration	SATA Devices Options Settings
USB Configuration	USB Configuration Settings

4.5.2.1. SATA Configuration:

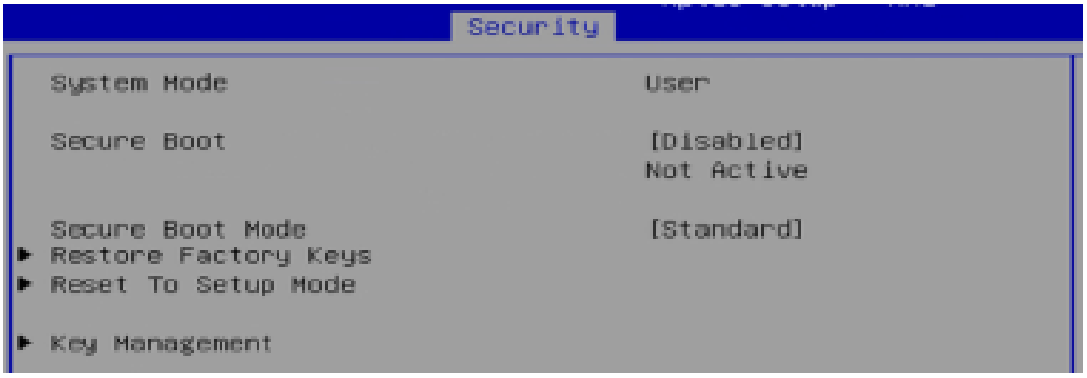


BIOS Setting	Description
SATA Controller(s)	Enables / Disables the SATA device.
SATA Mode Selection	Determines how SATA controller(s) operate.
Serial ATA Ports	Enables / Disables SATA ports.
Hot Plug	Designates the port as Hot Pluggable.
J15 USB 3.0 Control	Enable/Disable this USB Physical Connector (physical port). Once disabled, any USB devices plugged into the connector will not be detected by BIOS or OS.
Power-On after Power failure	Specify what state to go to when power is re-applied after a power failure (S3 state)

4.6 Security Settings

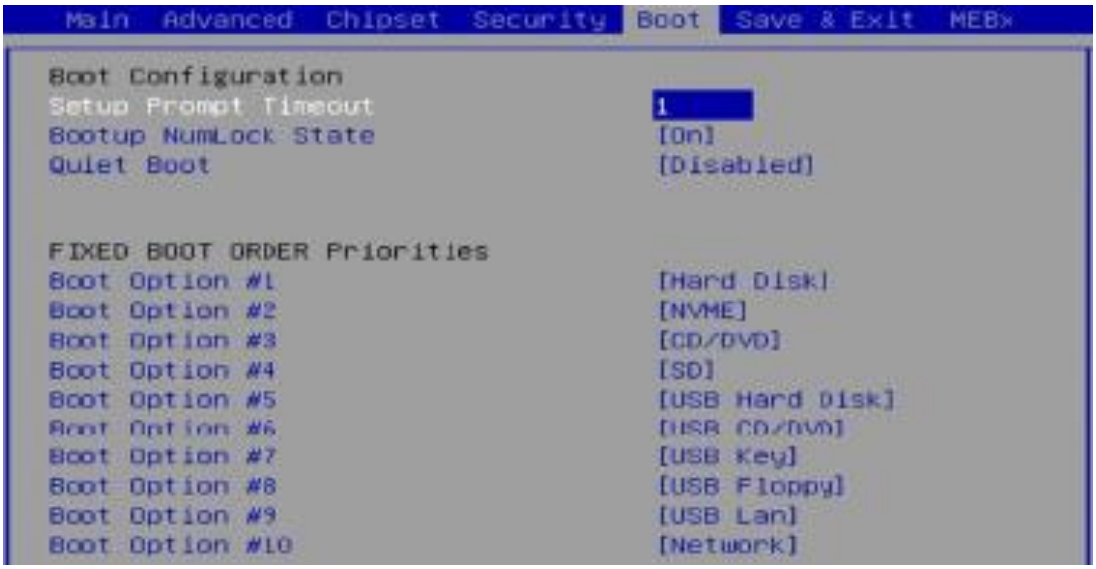
BIOS Setting	Description
Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.
Secure Boot	Configures Secure Boot.

4.6.1 Secure Boot



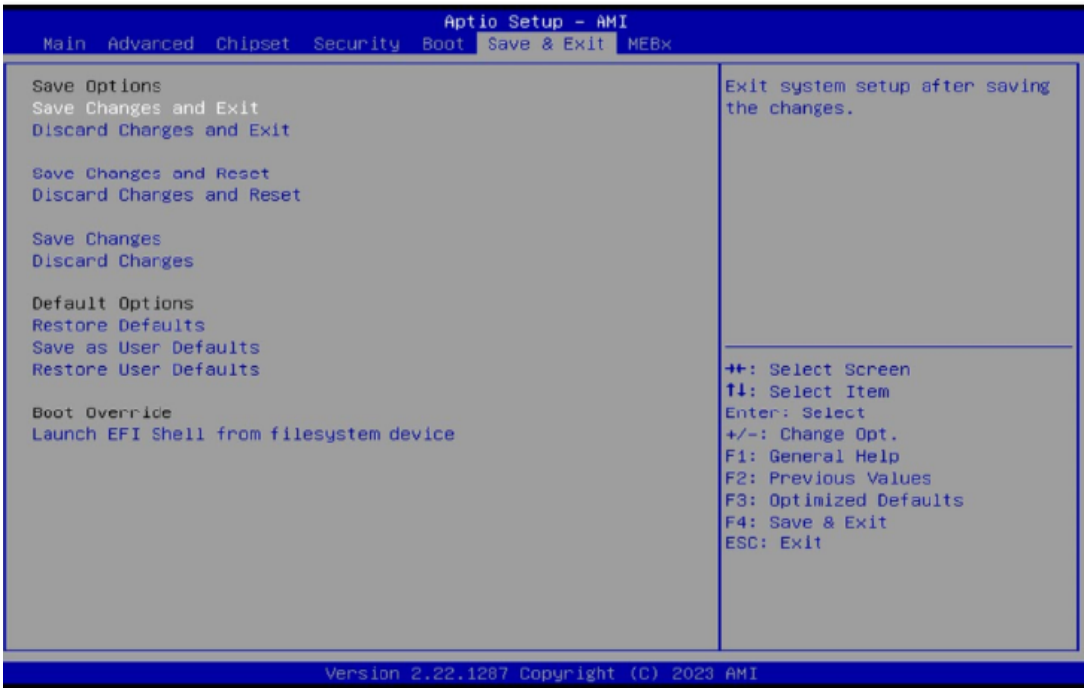
BIOS Setting	Description
Secure Boot	Secure Boot feature is Active if Secure Boot is enabled. Platform Key (PK) Is enrolled and the system is in User mode. The mode change requires platform reset.
Secure Boot Mode	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot policy variables can be configured by a physically present user without full authentication.
Restore Factory Keys	Forces system to user mode. Install factory default Secure Boot key databases.
Key Management	Enables expert users to modify Secure Boot Policy variables without full authentication.

4.7 Boot Settings



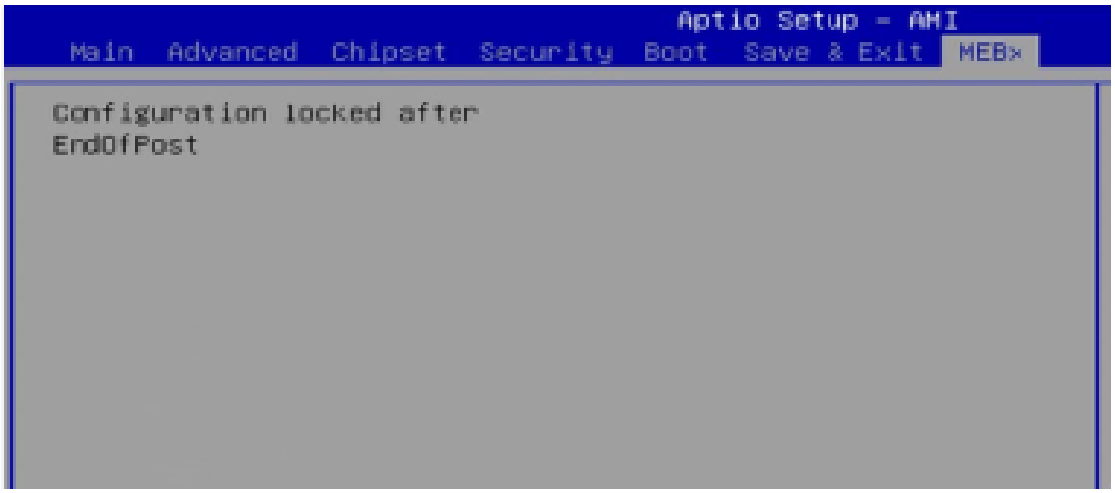
BIOS Setting	Description
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	Selects the keyboard NumLock state.
Quiet Boot	Enables / Disables Quiet Boot option.
Boot Option Priorities	Sets the system boot order.

4.8 Save & Exit Settings



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

4.9 MEBx


Aptio Setup – AMI
Main Advanced Chipset Security Boot Save & Exit MEBx
Configuration locked after
EndOfPost

Appendix

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

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

A. I/O Port Address Map

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

Address	Device Description
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x0000FFF8-0x0000FFFF	Intel(R) Active Management Technology - SOL (COM14)
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex

Address	Device Description
0x00001854-0x00001857	Motherboard resources
0x00002000-0x000020FE	Motherboard resources
0x00003000-0x0000303F	Intel(R) Iris(R) Xe Graphics
0x00003090-0x00003097	Standard SATA AHCI Controller
0x00003080-0x00003083	Standard SATA AHCI Controller
0x00003060-0x0000307F	Standard SATA AHCI Controller
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000064-0x00000064	Standard PS/2 Keyboard
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller

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 6	Communications Port (COM4)
IRQ 12	Microsoft PS/2 Mouse
IRQ 14	Intel(R) Serial IO GPIO Host Controller - INTC1055
IRQ 16	High Definition Audio Controller
IRQ 19	Intel(R) Active Management Technology - SOL (COM14)
IRQ 256~IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967266	Intel(R) Management Engine Interface #1
IRQ 4294967267	Intel(R) Iris(R) Xe Graphics
IRQ 4294967268~78	Intel(R) Ethernet Controller I226-V #4
IRQ 4294967279~89	Intel(R) Ethernet Controller I226-LM #2
IRQ 4294967290	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4294967291	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4294967292	Standard SATA AHCI Controller
IRQ 4294967293	PCI Express Root Port
IRQ 4294967294	PCI Express Root Port

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.

1. 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
}
//-----------------------------------------------------------------------
```

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

        F81964_BASE = 0x4E;
        result = F81964_BASE;

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

        F81964_BASE = 0x2E;
        result = F81964_BASE;

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

        F81964_BASE = 0x00;
        result = F81964_BASE;

Init_Finish:
        return (result);
}
//---------------------------------------------------------------------------
void Unlock_F81964 (void)
{
        outportb(F81964_INDEX_PORT, F81964_UNLOCK);
        outportb(F81964_INDEX_PORT, F81964_UNLOCK);
}
//---------------------------------------------------------------------------
void Lock_F81964 (void)
{
        outportb(F81964_INDEX_PORT, F81964_LOCK);
}
//---------------------------------------------------------------------------
void Set_F81964_LD( unsigned char LD)
```

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

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