AGS104L

Ultra-Compact IoT Gateway Edge Computing System with Intel® Atom® x7211RE Processors

User's Manual

Version 1.0
(April 2025)

iBASE

Copyright

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Compliance

CE

This product has passed CE tests for environmental specifications and limits. This product is in accordance with the directives of the Union European (EU). If users modify or install additional 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. Please check your local regulations for disposal of electronic products.

Green IBASE

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

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

Important Safety Information

Carefully read the precautions before using the device.

Environmental conditions:

- Place the device on a stable, horizontal surface to prevent it from falling and causing damage.
- Ensure there is sufficient space around the device for proper ventilation.
- Operate the product within the ambient temperature range specified in the product manual.

Caring for your IBASE products:

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

WARNING

Attention during use:

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

Avoid Disassembly

Do not disassemble, repair, or modify the device, as doing so may cause damage, pose safety hazards, or result in injury. Additionally, any unauthorized modifications will void the warranty.

CAUTION

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

Warranty Policy

- **IBASE standard products:**

  IBASE standard products include a 24-month (2-year) warranty from the date of shipment. If the shipment date cannot be determined, the warranty period will begin based on the production 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, HOWEVER, THAT FAIL DUE TO MISUSE, ACCIDENT, IMPROPER INSTALLATION OR UNAUTHORIZED REPAIR SHALL BE TREATED AS OUT OF WARRANTY AND CUSTOMERS SHALL BE BILLED FOR REPAIR AND SHIPPING CHARGES.

Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.

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

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Table of Contents

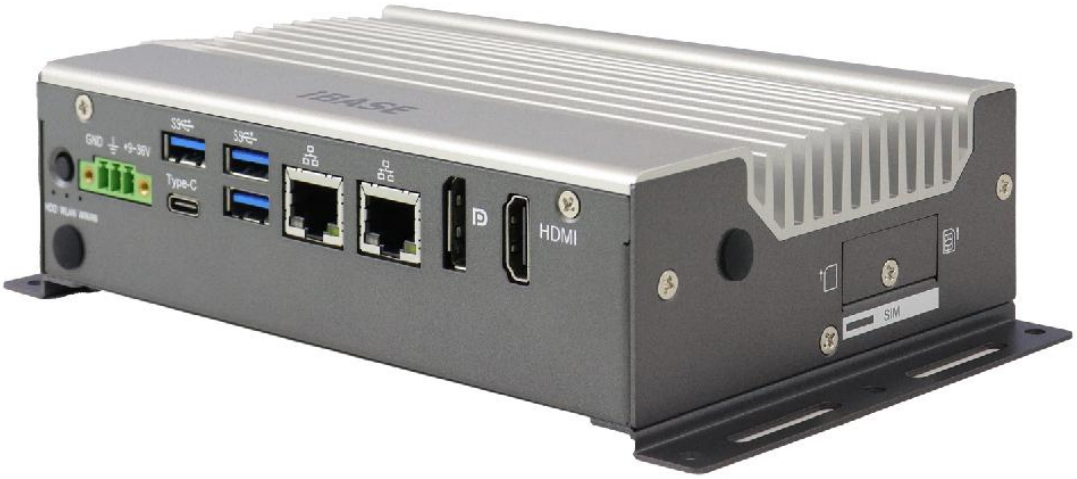
Chapter 1
General Information

The information provided in this chapter includes:

- Introduction
- Features
- Specifications
- Product View
- Dimensions

1.1 Introduction

The AGS104L Ultra-Compact IoT Gateway Edge Computing System is a fanless, rugged solution designed for edge computing applications. It is powered by Intel Atom x7211RE processors and integrates the IBASE MBE104T-1 proprietary board for optimized performance. The system supports multiple display and connectivity options, including HDMI, DisplayPort, and USB Type-C with DP and USB 3.2 support. For expansion and wireless communication, it includes dual M.2 slots, with B-Key 3052 for 5G/4G/LTE modules and E-Key 2230 for WiFi/Bluetooth, along with a full-size Mini PCI-E slot for mSATA storage. The networking interface features two 2.5G LAN ports, three USB 3.2 ports, and two COM ports (RS232/422/485) for industrial control and data transmission. Designed for harsh environments, the AGS104L supports a wide operating temperature range from -40°C to 70°C and includes a 9V to 36V DC wide-range power input with overvoltage, undervoltage, and reverse voltage protection. Additionally, it supports wall mounting and integrates fTPM 2.0 for enhanced security.



1.2 Features

- Fanless system with iBASE MBE104T-1 proprietary board
- Intel® Atom® x7211RE Processors
- HDMI & DisplayPort, USB Type-C (For DP & USB 3.2)
- M.2 B-Key 3052 supports 5G/4G/LTE module, M.2 E-Key 2230 supports WiFi/BT
- Full-size Mini PCI-E for mSATA
- 2x 2.5G LAN port, 3 x USB 3.2, 2x COM (RS232/422/485)
- 9V~36V DC wide-range power input, supports over/under/reverse voltage protection
- Wide-range operating temperature from -40°C to 70°C
- Supports wall mount & fTPM 2.0

1.3 Specifications

Product Description (Ordering Information)	
AGS104L-7211-8G	Fanless System supports fTPM 2.0 w/ Intel® Atom™ Processor x7211RE, 2x 2.5G Ethernet, 2x COM, with industrial-grade 8GB DDR5 memory + 128GB mSATA SSD (RoHS2)
AGS104L-7211M	Fanless System supports fTPM 2.0 w/ Intel® Atom™ Processor x7211RE, 2x 2.5G Ethernet, 2x COM, without memory, storage (RoHS2)
Optional 12V/60W power adaptor	60W (12V@5A) power adaptor, bare wire type Compatible with IEC62368-1/EN62368-1
Optional accessories	WiFi/BT antenna kit, 4G/LTE antenna kit, GPS antenna kit, DIN-rail bracket

Specifications	
Mainboard	MBE104T-7211-1
CPU	Intel® Atom™ x7211RE (2-Core, 1.0/2.9GHz, 2MB cache, TDP=6W)
System Speed	Up to 2.9GHz
Memory	1x DDR5-4800 SO-DIMM, Max. 16GB
Rear Panel External I/O	• 1x DisplayPort + 1x HDMI • 3x USB 3.2 ports, 1x USB 3.2(Type-C) • 2x RJ45 2.5G Ethernet port • 3x LED indicators (HDD, WLAN, WWAN) • 1x Power button with Green LED • 1x 3-pin DC-in terminal block for 9V-36V • 1x Antenna hole
Left Panel External I/O	• 2x RS232/422/485 ports for COM#1/COM#2 • 1x Antenna hole • 1x Line-out/ Mic-in

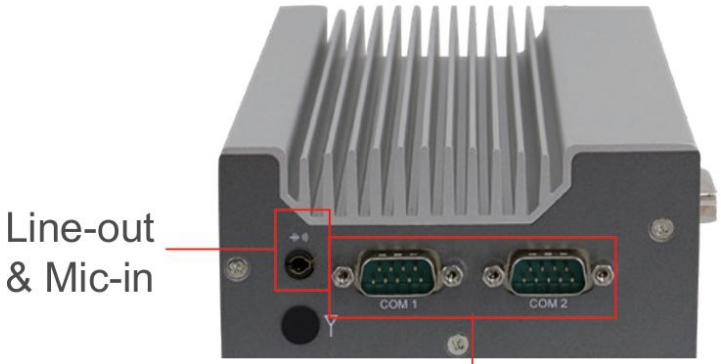
Right Panel External I/O	• Dual SIM card slots with cover • 1x Antenna hole
Expansion Slots	• 1x Full-size Mini PCI-E socket (SATA) • 1x 2230 M.2 E-Key socket (USB 2.0 + PCI-E) • 1x 3052 M.2 B-Key socket (USB 3.2 + PCI-E + SATA)
Storage	• 1x Mini PCI-E socket mSATA SSD (Optional) • 1x M.2 B-Key for SATA SSD
Construction	Aluminum + SGCC
Chassis Color	Silver & Gray
Mounting	• DIN-rail mounting (DIN-rail mount kit included) • Desktop or wall mounting (wall mount kit included)
Dimensions	160mm(W) x 110mm(D) x 44mm(H) 6.3”(W) x 4.33”(D) x 1.73”(H)
Weight	1.0 kg
Supported O.S.	Windows 11 LTSC and Linux Ubuntu
Certification	CE/ FCC Class B/ LVD

Environment	
Operating Temperature	- 40°C~70°C (-40°F~158°F)
Storage Temperature	-40°C~80°C (-40°F~176°F)
Relative Humidity	5~90% @ 45°C, (non-condensing)
Vibration	• Operating: 0.5Grms / 5~500Hz • Non-operating: 1Grms / 5~500Hz
Shock	• Operating: 30G/11 ms Duration • Non-operating: 40G/11 ms Duration

All specifications are subject to change without prior notice.

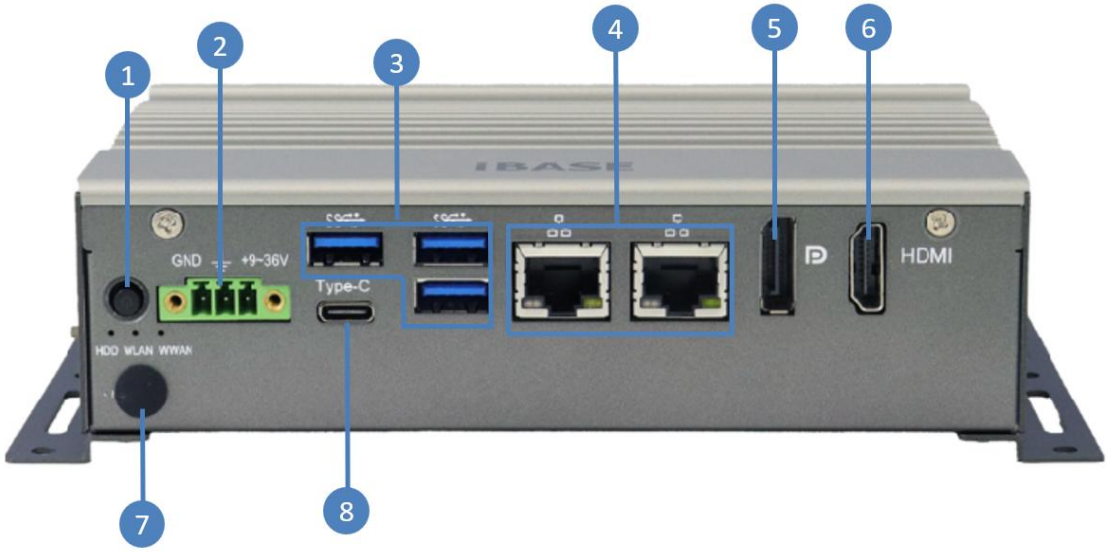
1.4 Product View

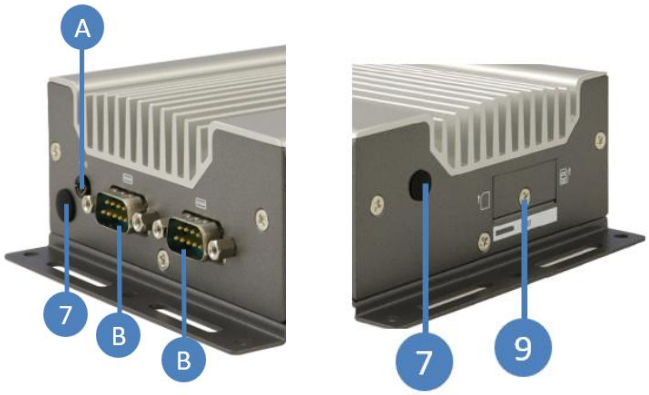
Rear I/O



Line-out
& Mic-in

COM1 & COM2





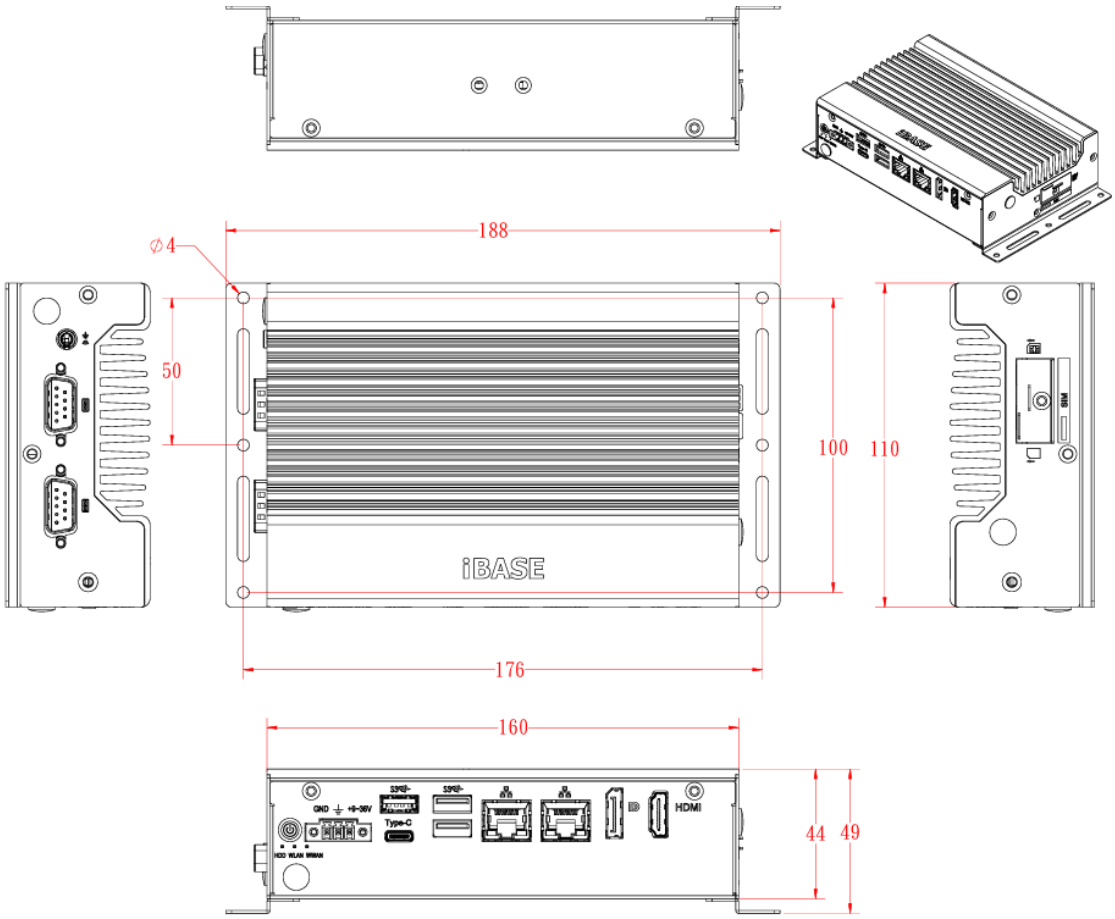
No.	Name	No.	Name
1	Power button	7	Antenna holes*
2	DC-In (9V ~ 36V)	8	Type C connector
3	USB 3.2 Ports	9	SIM card slot
4	GbE LAN Ports	A	Line Out / Mic In
5	DisplayPort	B	COM1/COM2 ports
6	HDMI		

Wall Mounting

DIN Rail Mounting (optional)

1.5 Dimensions

Unit: mm



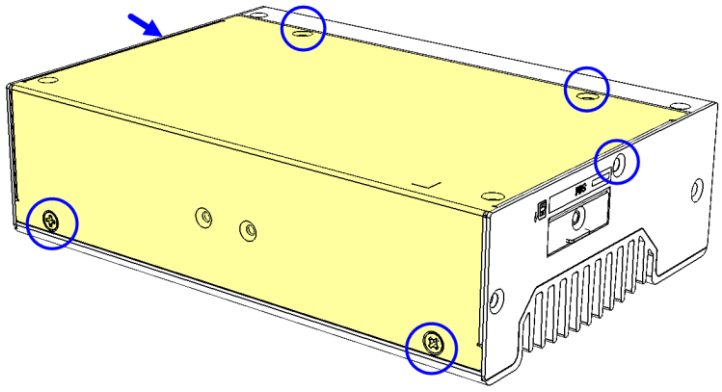
Chapter 2
Hardware Configuration

The information provided in this chapter includes:

- Installations
- Information and locations of connectors

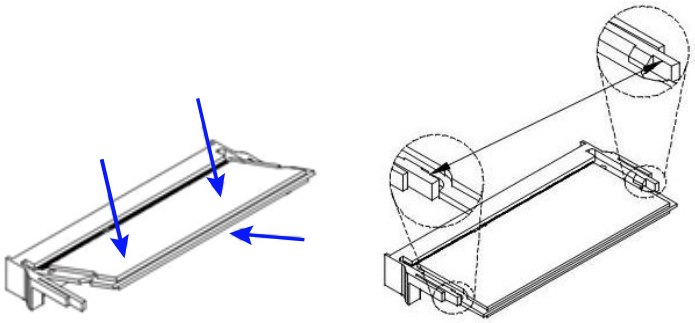
2.1 Installations

Turn your product upside down and take away the device bottom cover by removing 6 screws as indicated below for the installation or replacement of the memory module, mSATA SSD or WLAN card. After installations, secure the device bottom cover back.



2.1.1 Memory Installation / Replacement

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



1. Align the key of the memory module with that on the memory slot and insert the module slantwise.
2. Gently push the module in an upright position until the clips of the slot close to hold the module in place when the module touches the bottom of the slot.

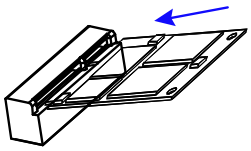
To remove the module, press the clips outwards with both hands, and the module will pop-up.

2.1.2 Mini-PCIe & M.2 Cards Installation / Replacement

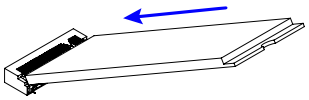
After removing the bottom cover, follow the instructions below.

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

Mini-PCIe card:

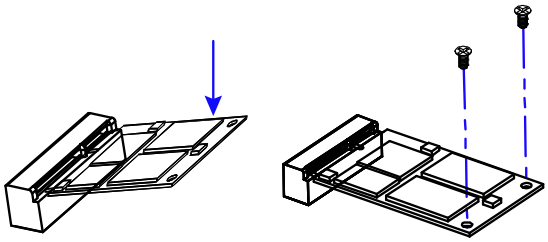


M.2 card:

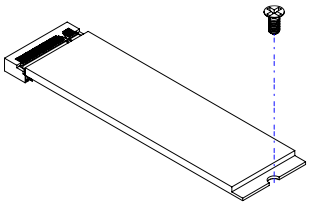


2. Push the card down and fix it with the supplied 2 flat head screws for the mini-PCIe card and with one screw for M.2 card.

Mini-PCIe card:



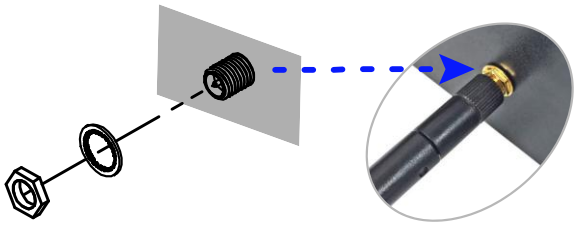
M.2 card:



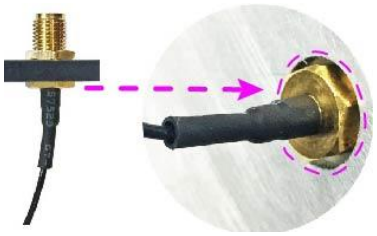
2.1.3 WiFi / 5G / 4G Antenna Installation

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

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



2. Apply adhesive around here.



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

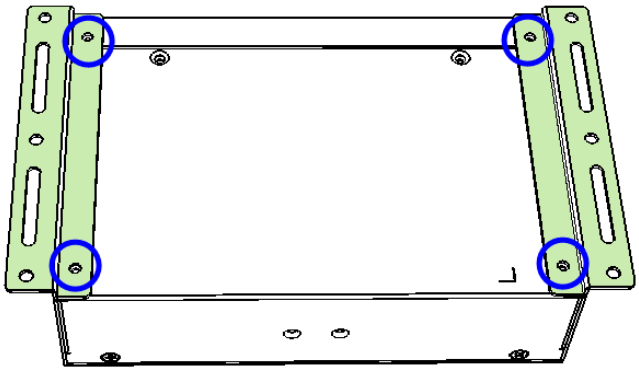
2.1.4 Mounting Installation

Requirements

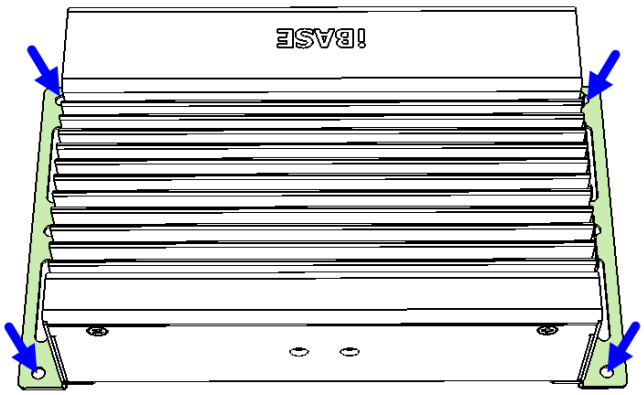
Before mounting the system, ensure that you have enough room for power and signal cable routing, and have good ventilation for the power adaptor. The method of mounting must be able to support the weight of the device plus the weight of the suspending cables to be attached to the system. Use the following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

2.1.4.1. Wall-Mounting Installation

1. Turn your product upside down to attach the mounting brackets to your product and secure with the supplied 4 screws.

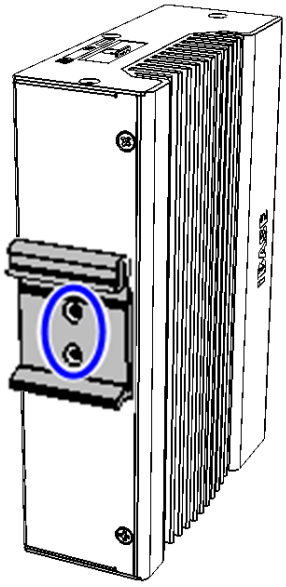


2. Prepare at least 4 screws (M3) to install the device on wall.



2.1.4.2. DIN Rail Mounting Installation

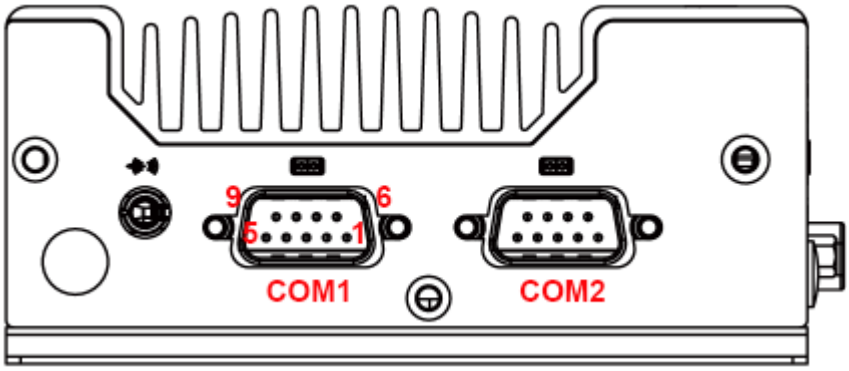
1. Attach the DIN rail mounting bracket to your product, and secure with the supplied 2 screws.



2. Hook the DIN rail mounting bracket over the top of the DIN rail, and then press the lower section of the bracket towards the DIN rail to clip the bracket onto it.

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

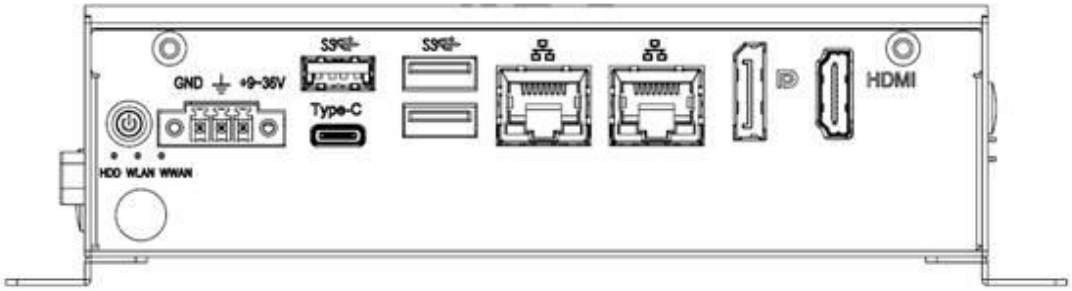
2.1.5.1. COM1 & COM2 RS232/422/485 Ports

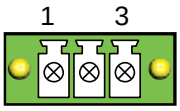


COM1 and COM2 ports are jumper-less and configurable in BIOS.

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

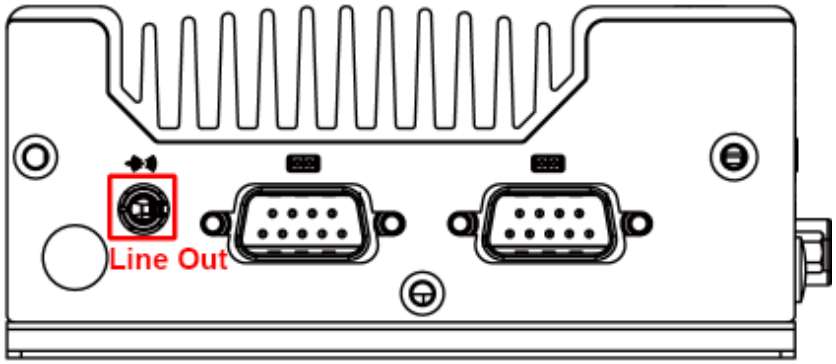
2.1.5.2. DC-In Power Connector (3-pin terminal block)

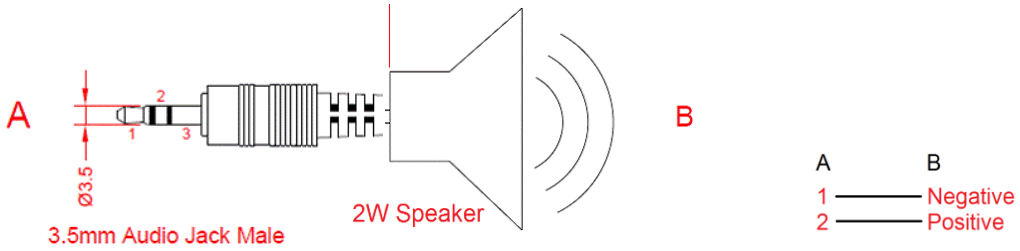




Pin	Assignment	Pin	Assignment
1	Power Ground	3	9V ~ 36V
2	Case Ground		

2.1.5.3. Audio Line-Out Jack



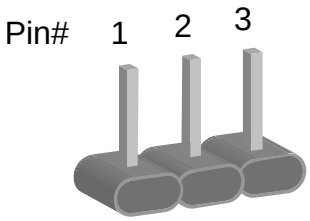


2.2 Setting the Jumpers

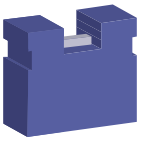
Set up and configure your device by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

2.2.1 How to Set Jumpers

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

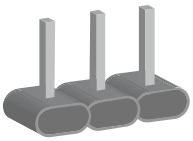
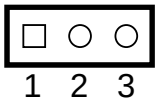
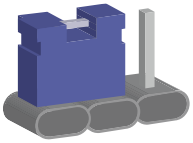
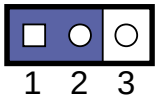
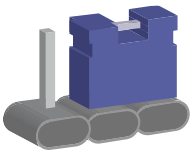
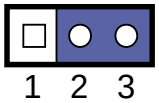


A 3-pin jumper



A jumper cap

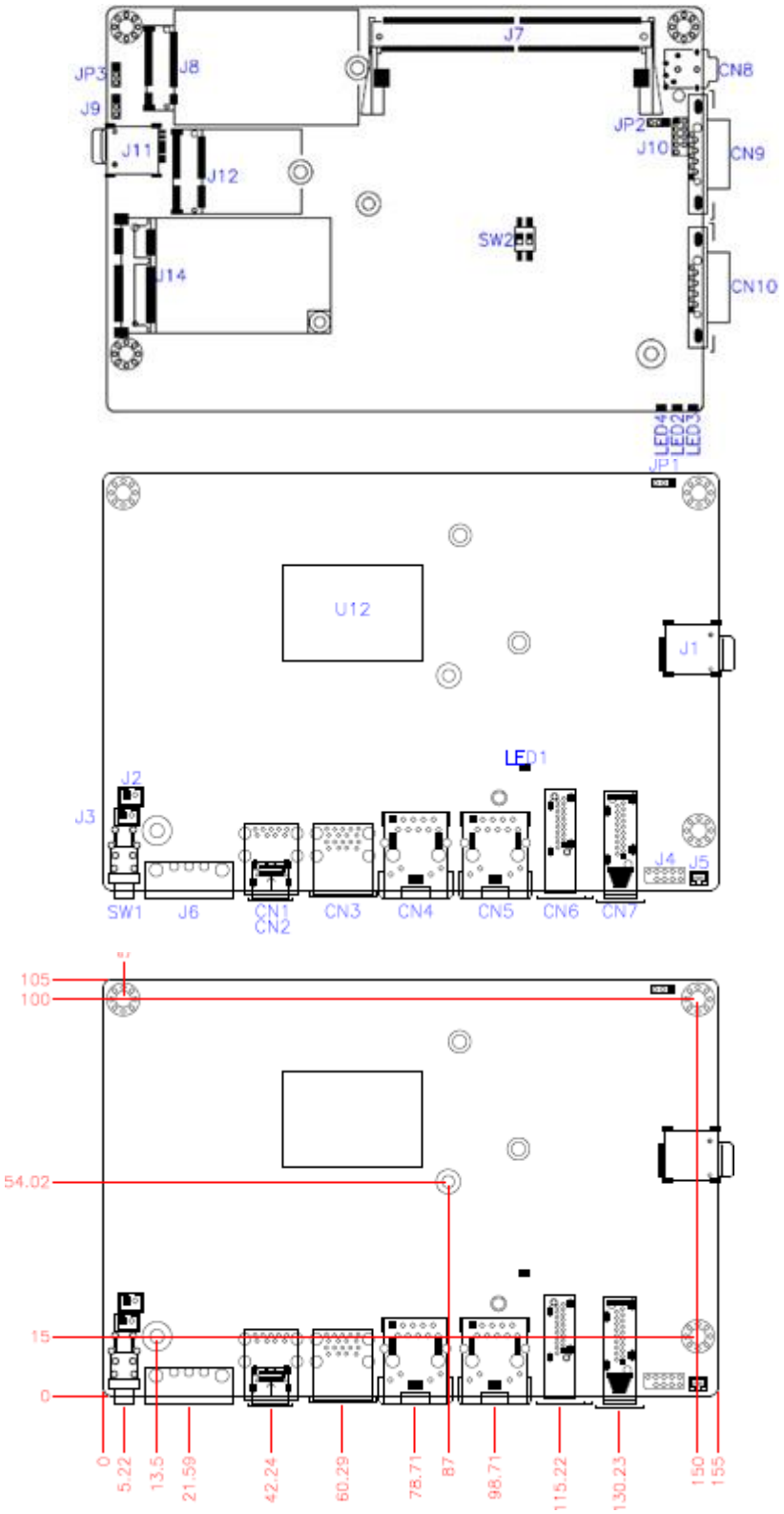
Refer to the illustration below to set jumpers.

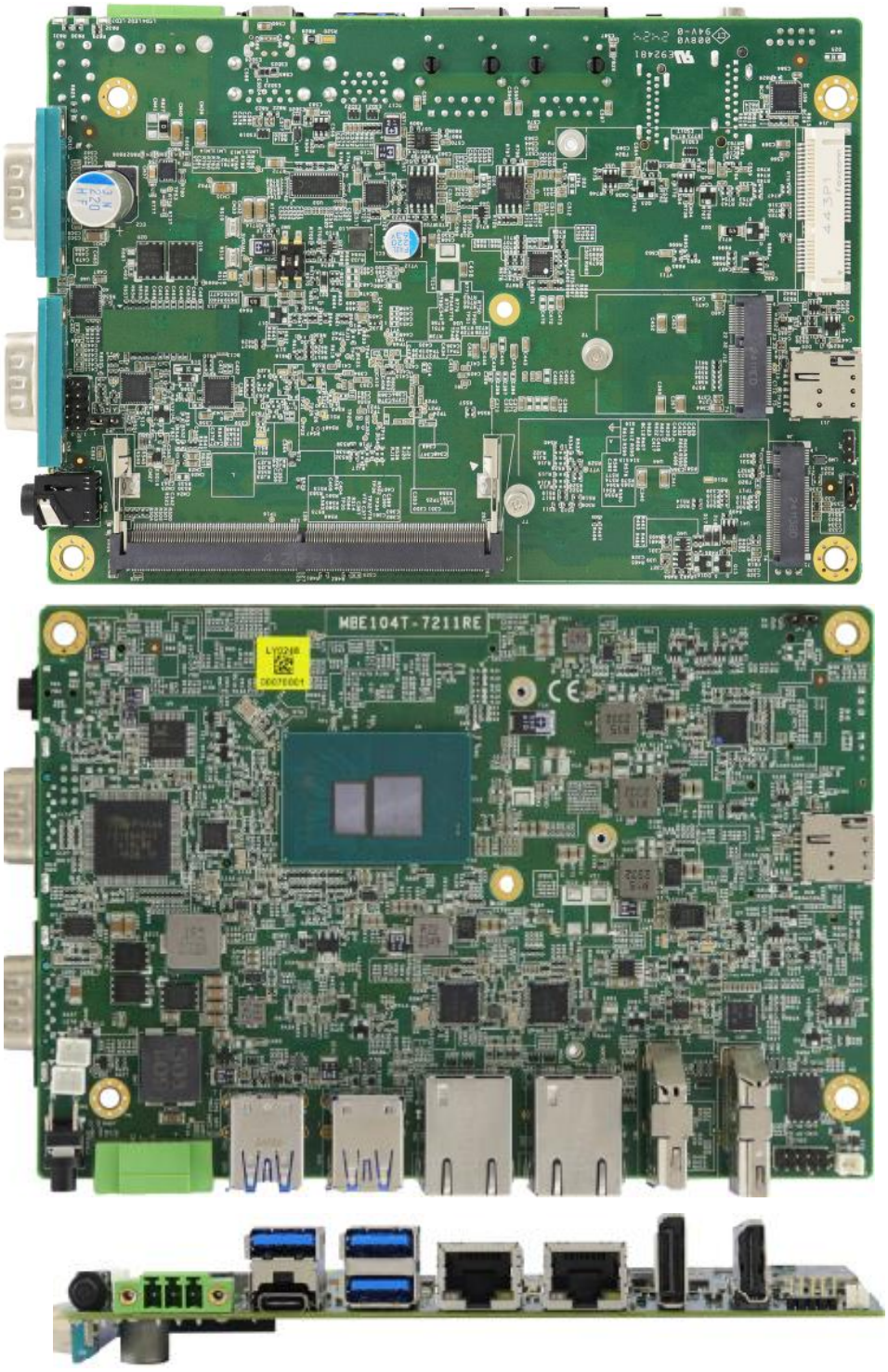
Pin closed	Oblique view	Illustration in the manual
Open		
1-2		
2-3		

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

2.3 Motherboard Jumper & Connector Locations

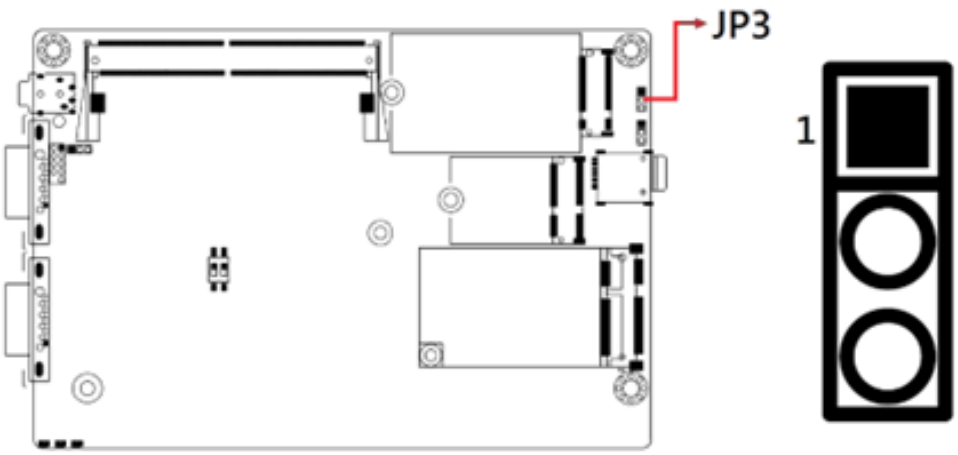
MBE104T-1 Motherboard

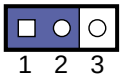
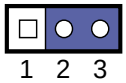



MBE104T-7211RE

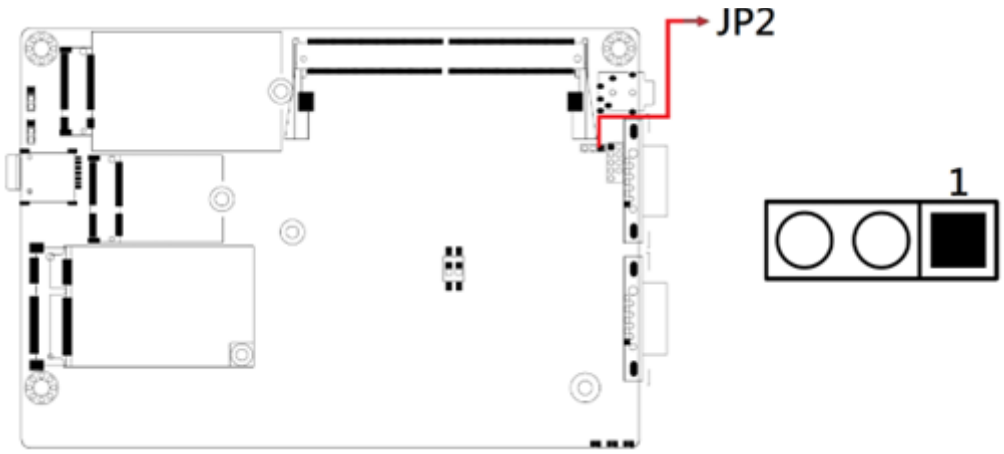
2.4 Motherboard Jumpers and Connectors

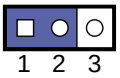
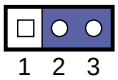
2.4.1 JP3: Mini PCIe Select for PCIe or mSATA



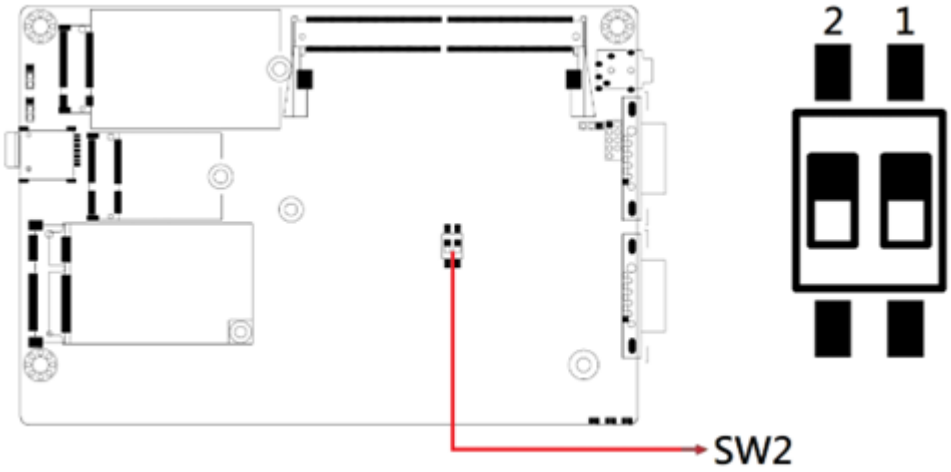
Function	Pin closed	Illustration
mSATA	1-2	
PCIe (default)	2-3	

2.4.2 JP2: Power Failure Mode Setting



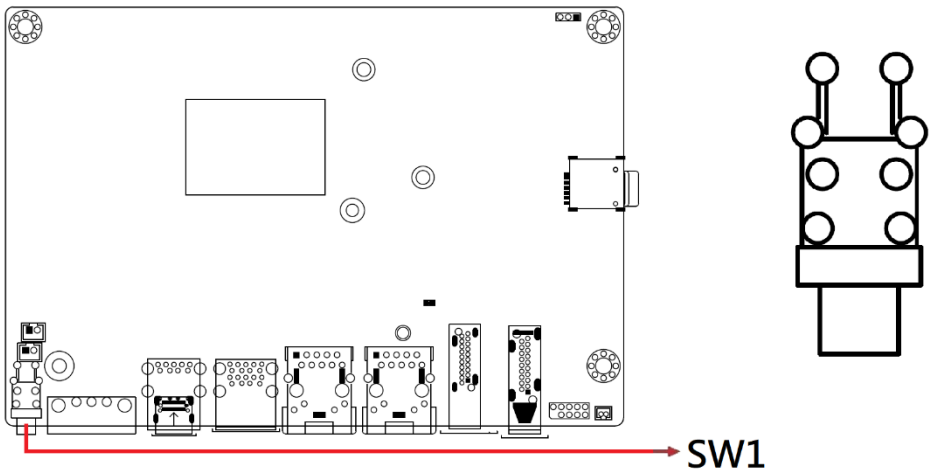
Function	Pin closed	Illustration
ATX Mode (default)	1-2	
AT Mode	2-3	

2.4.3 SW2: Clear CMOS Setting



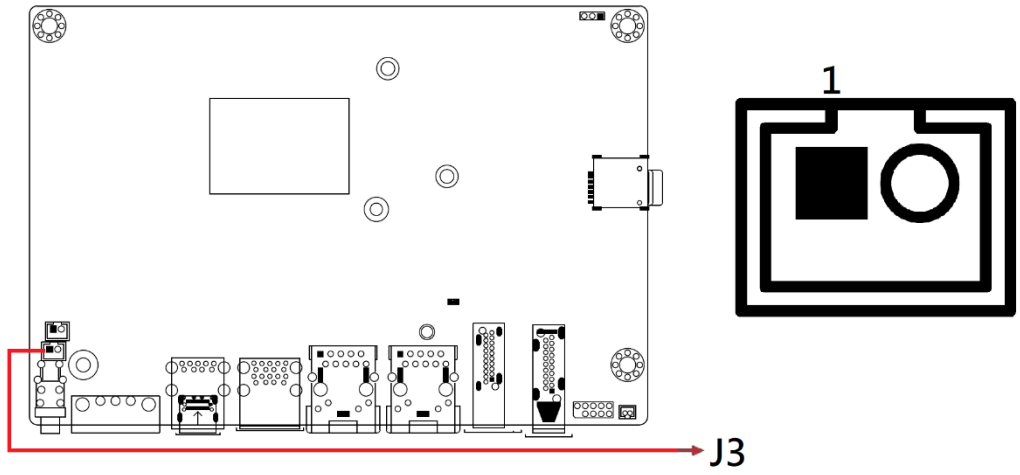
Function	Setting
Normal (default)	P1-OFF
Clear CMOS	P1-ON

2.4.4 J3/SW1: Power Button and Power On LED Connector

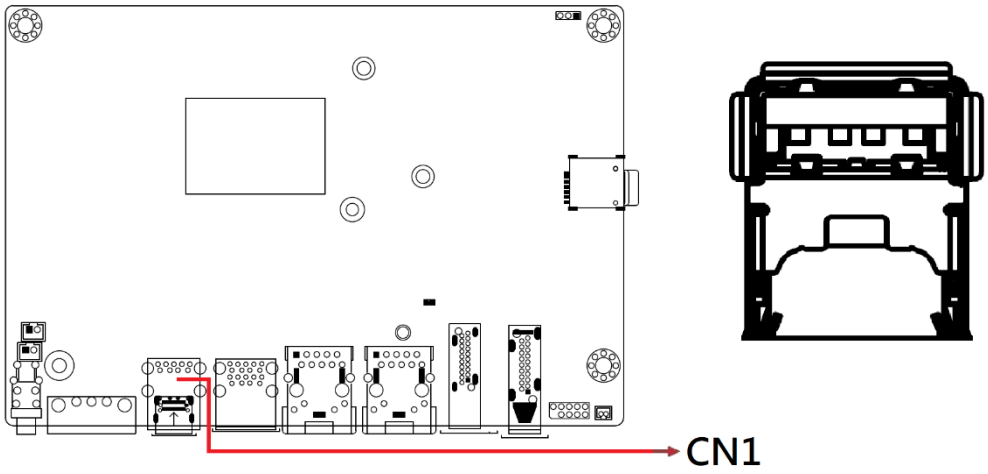


J3: TECHBEST_01017021001-L

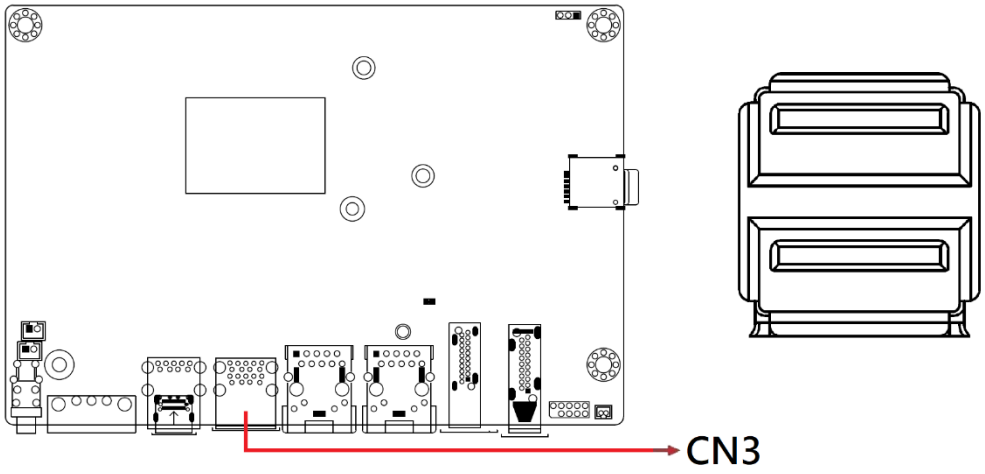
Pin	Signal Name
1	Ground
2	Power Button



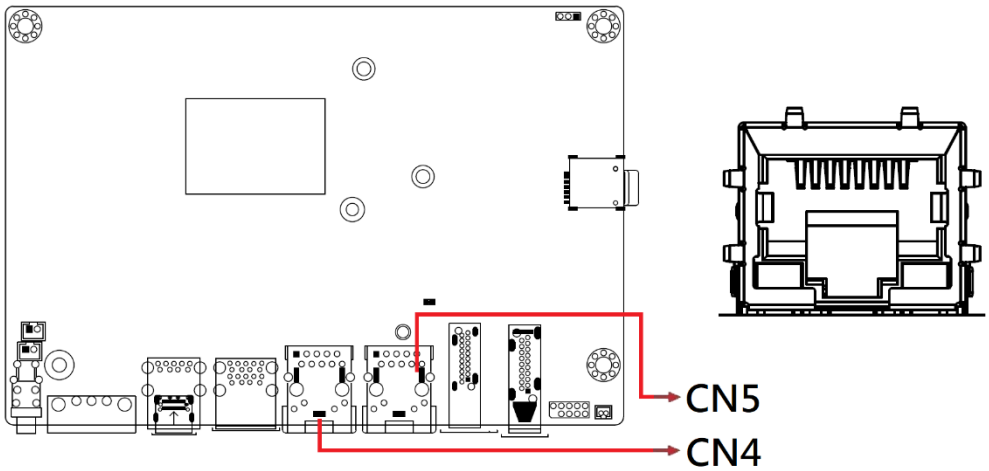
2.4.5 CN1: USB 3.2 Connector



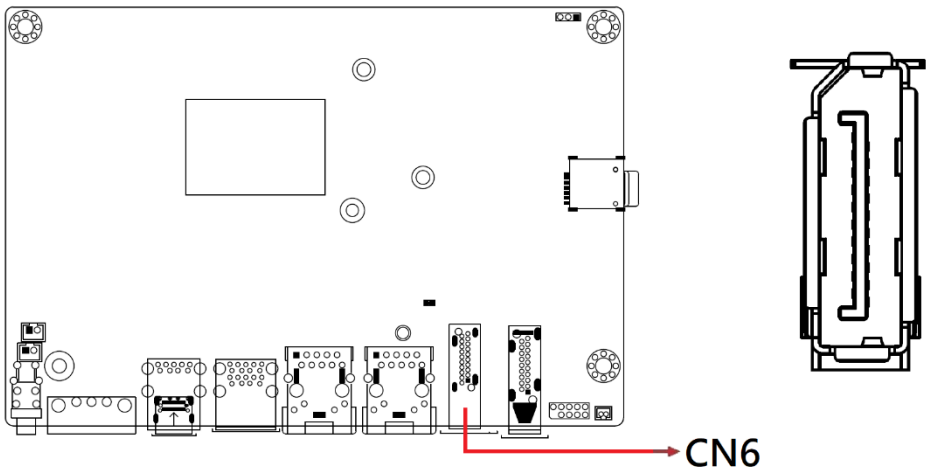
2.4.6 CN3: USB 3.2 Dual Connector



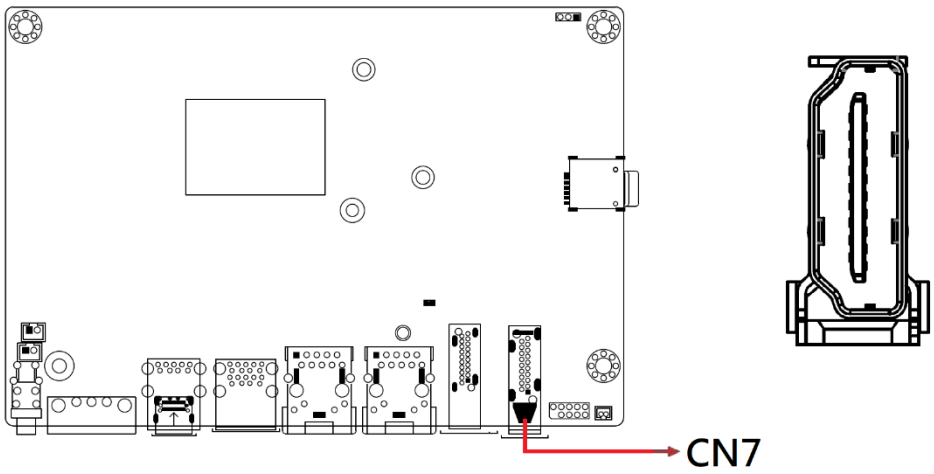
2.4.7 CN4, CN5: RJ-45 Connector (I226IT)



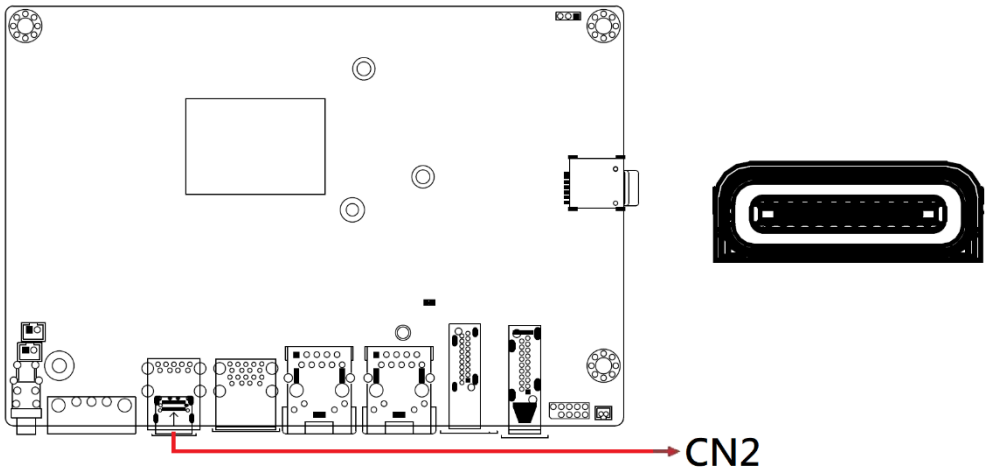
2.4.8 CN6: DP Connector



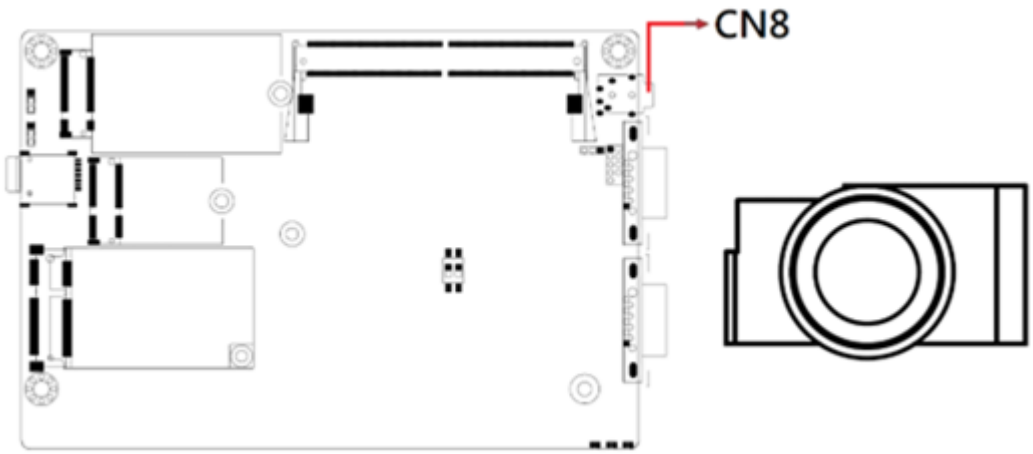
2.4.9 CN7: HDMI Connector



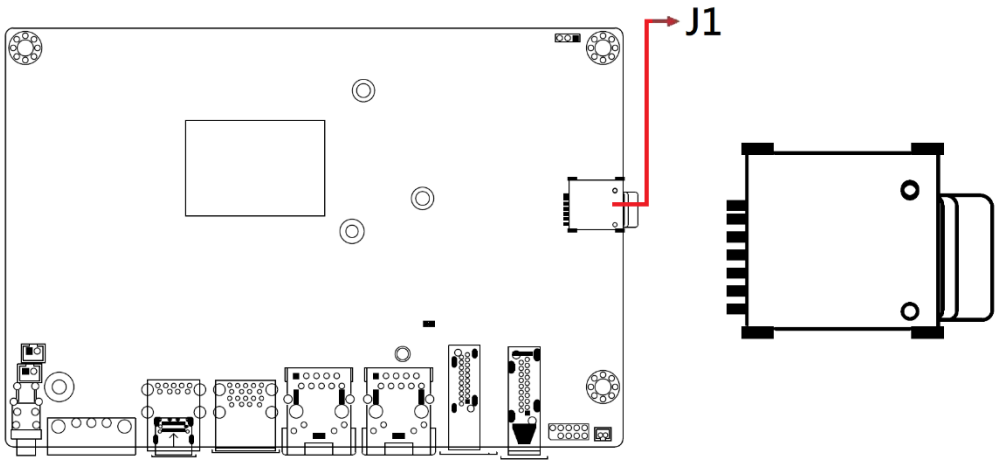
2.4.10 CN2: Type-C Connector



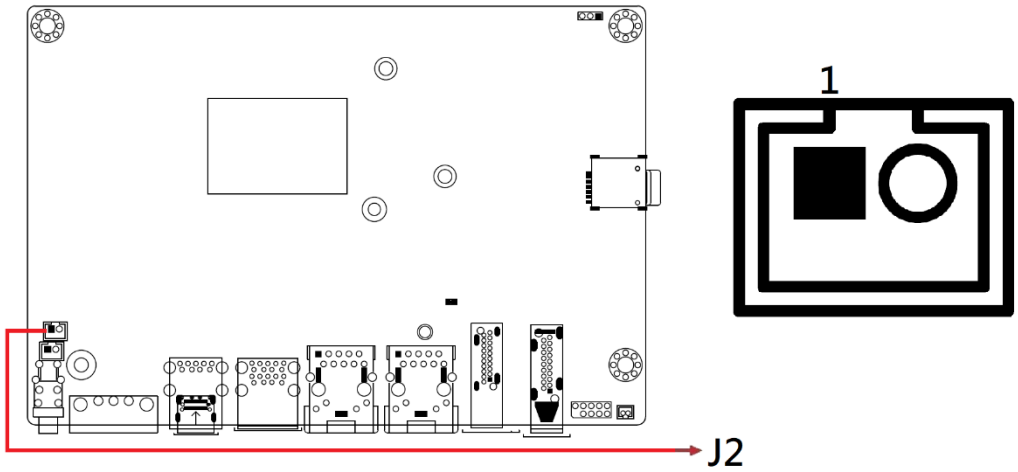
2.4.11 CN8: Audio Connector



2.4.12 J1: Nano SIM Card Slot (for Mini PCIe socket)



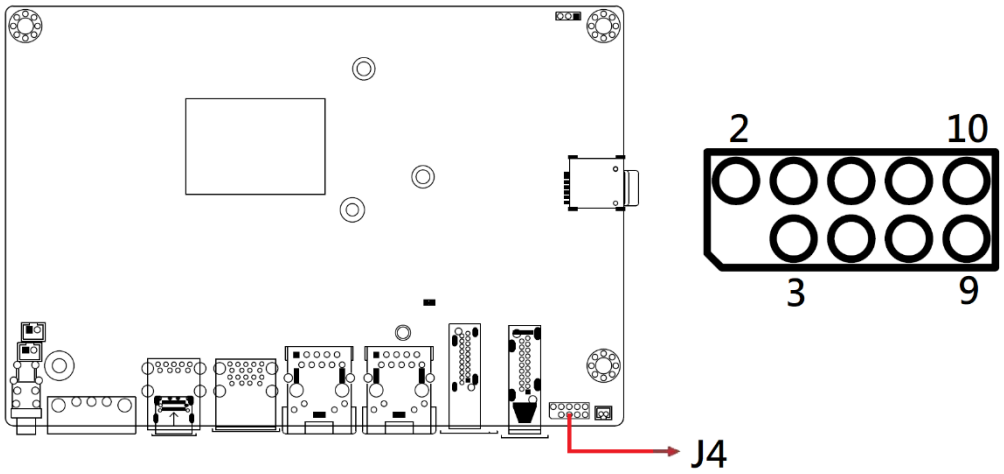
2.4.13 J2: Reset Button Connector



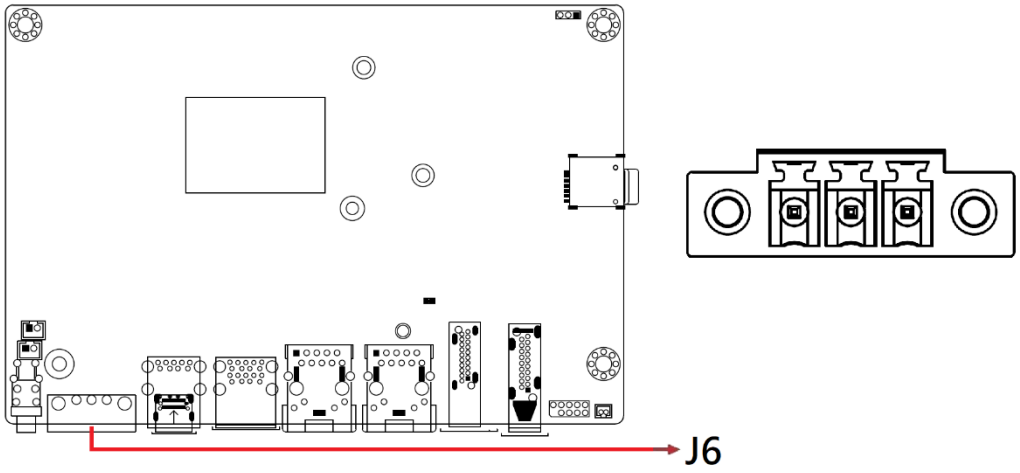
J2: TECHBEST_01017021001-L

Pin	Signal Name
1	Ground
2	Reset Button

2.4.14 J4: SPI Flash Connector

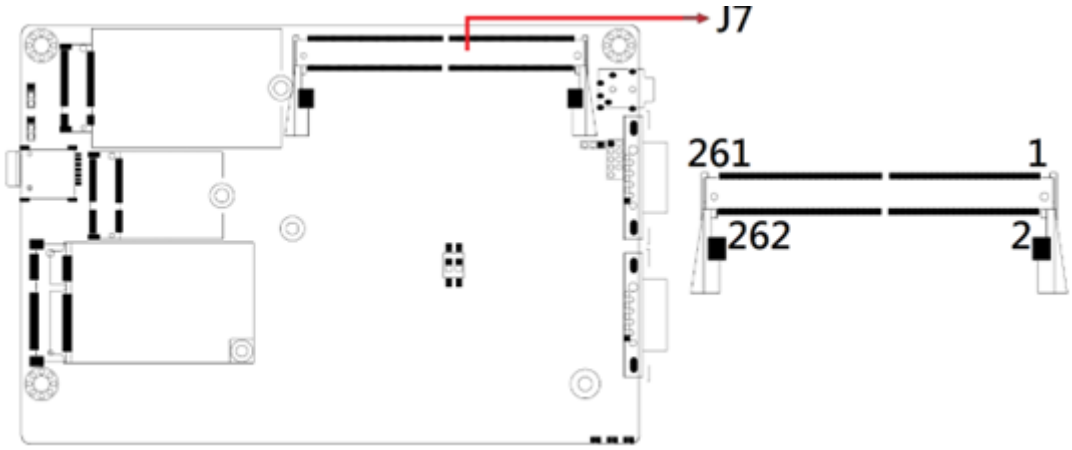


2.4.15 J6: DC-in Connector (DINKLE_ECH381RM-03P)

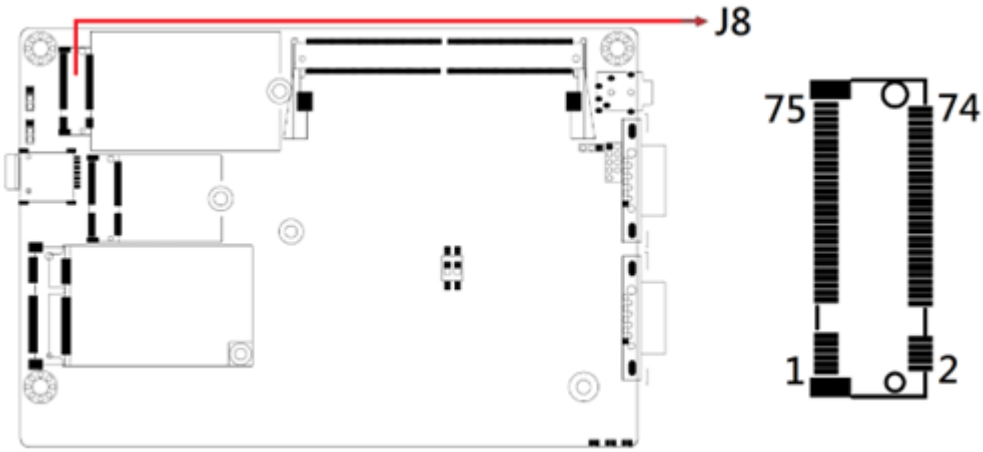


Pin	Signal Name
1	Power Ground
2	Case Ground
3	+9V to +36V

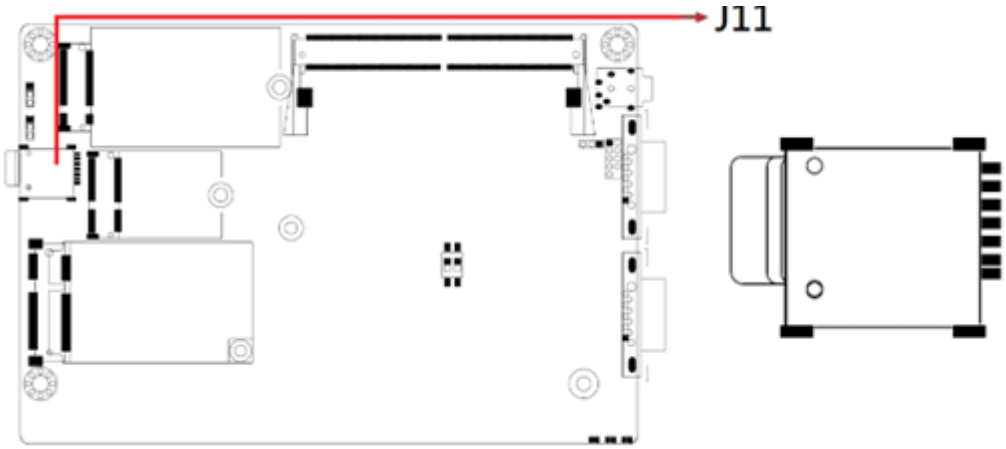
2.4.16 J7: Memory Socket



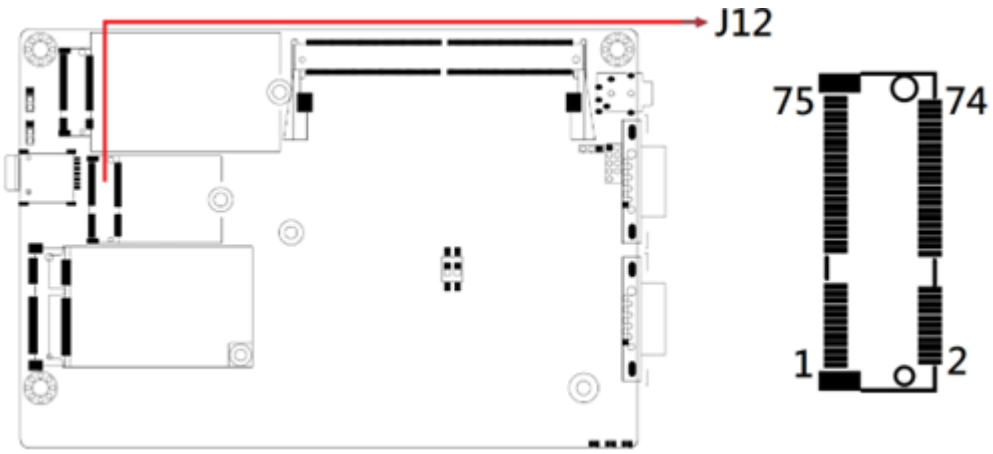
2.4.17 J8: M.2 (B-Key) Socket



2.4.18 J11: Nano SIM Card Slot (for M.2 B-Key socket)

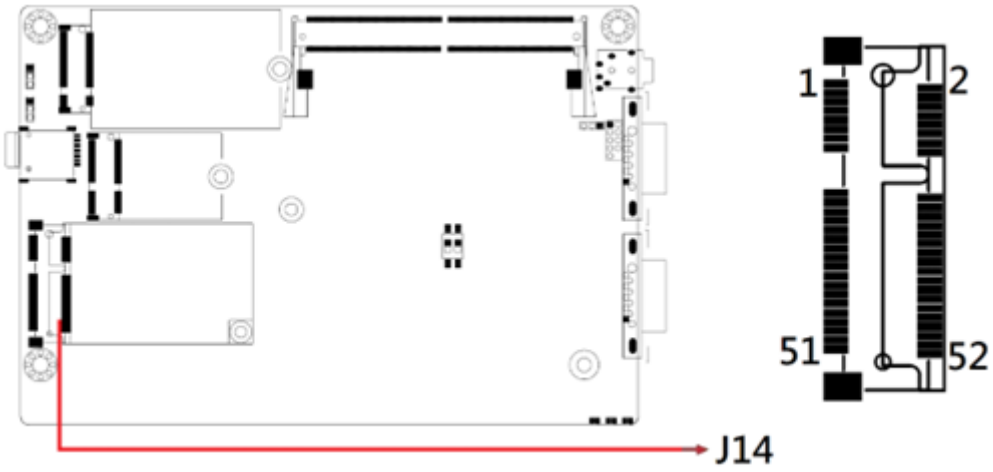


2.4.19 J12: M.2 (E-Key) Socket



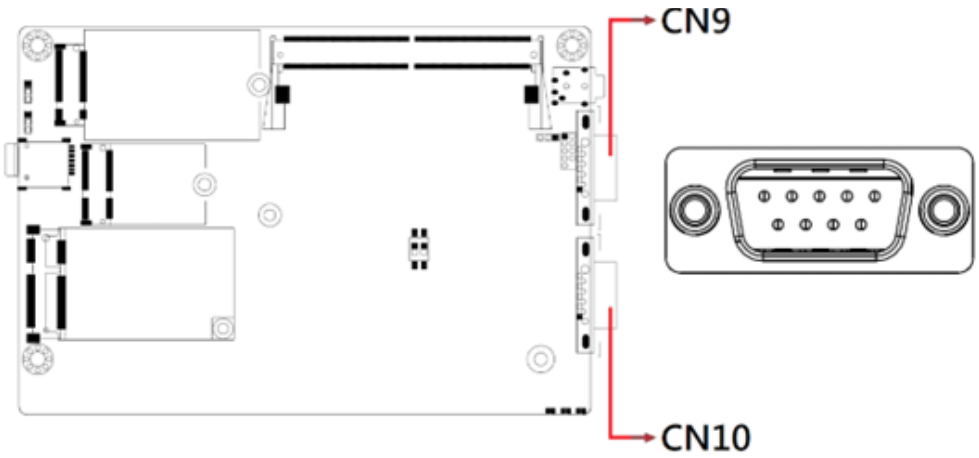
- J12: For WLAN & BT connection (PCIe + USB2.0)

2.4.20 J14: Mini PCIe Socket



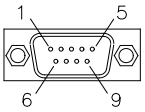
- J14 supports mSATA [USB 2.0 + PCIe + SATA]

2.4.21 CN9/CN10: COM1/COM2 Connector



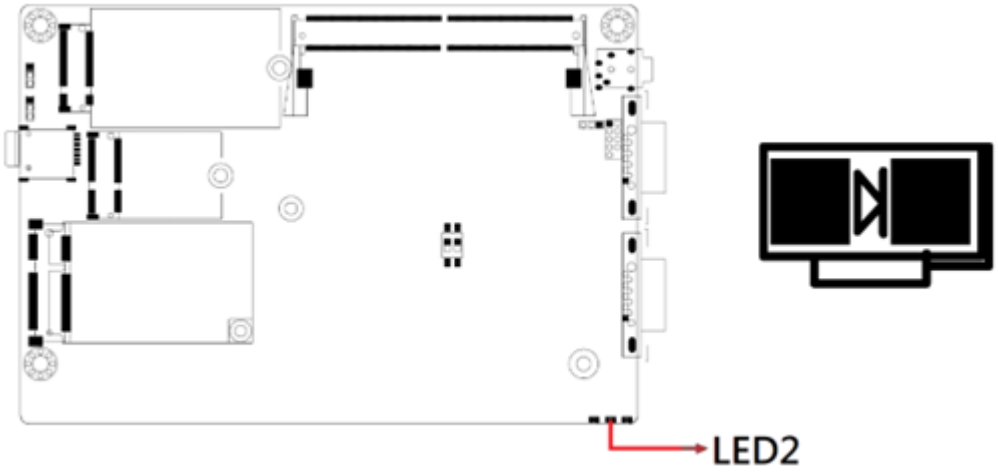
COM1/COM2 is jumper-less for RS-232, RS-422 and RS-485 and is to be configured with BIOS Selection.

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

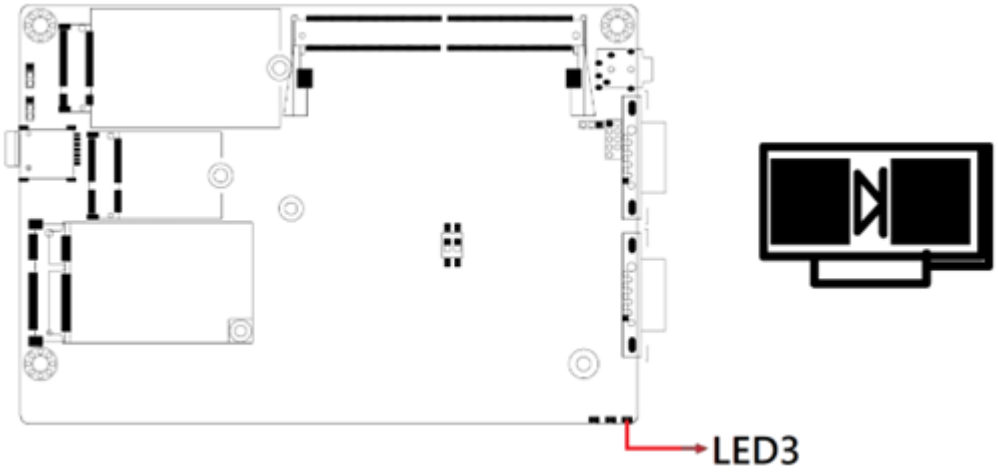


Pin #	Signal Name		
	RS-232	R2-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC
10	NC	NC	NC

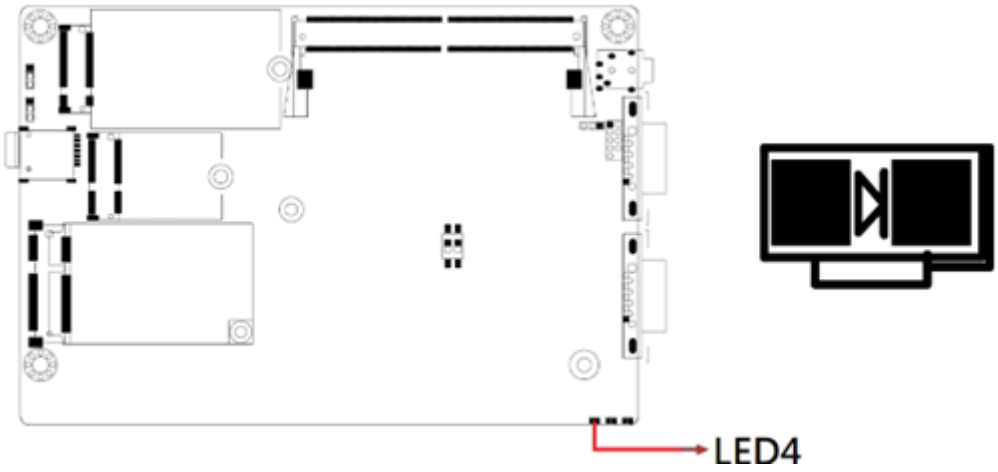
2.4.22 LED2: Blue LED Indicator for WLAN Status



2.4.23 LED3: Red LED Indicator for SSD Status



2.4.24 LED4: Yellow LED Indicator for B-Key WWAN Status



Chapter 3
Driver Installation

The information provided in this chapter includes:

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

3.1 Introduction

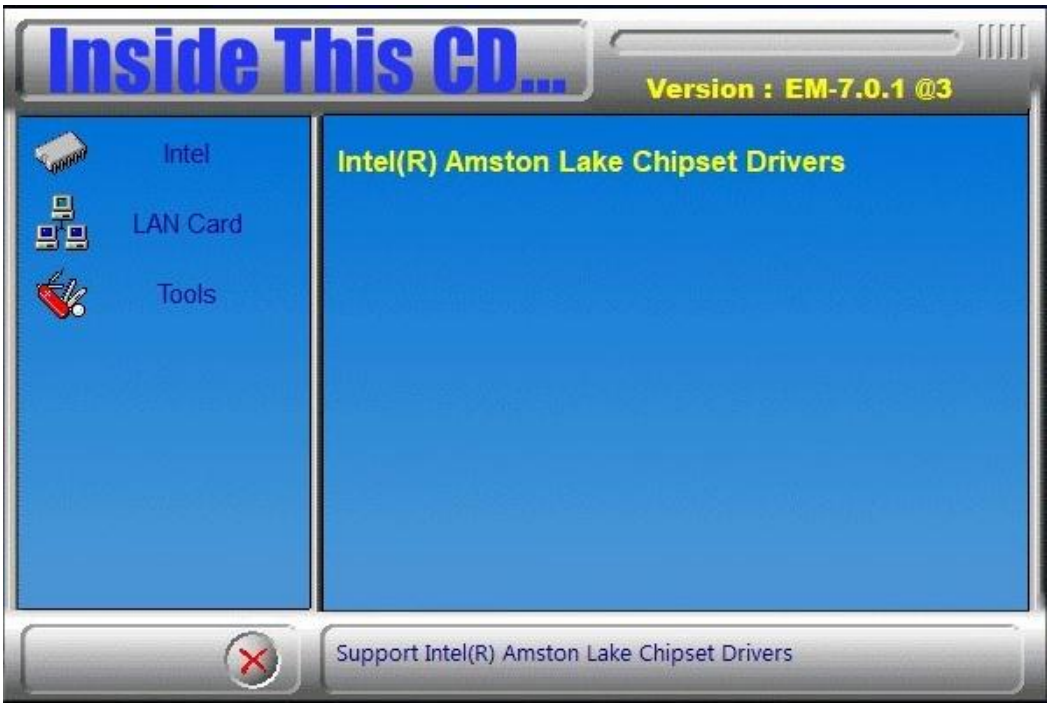
This section describes the installation procedures for software drivers. Go to the download page of the product. Copy the compressed drivers file to your computer. Double click the file to decompress it. Run “CDGuide” to go to the main drivers page.

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

1. Click **Intel** and then **Intel(R) Amston Lake Chipset Drivers**.



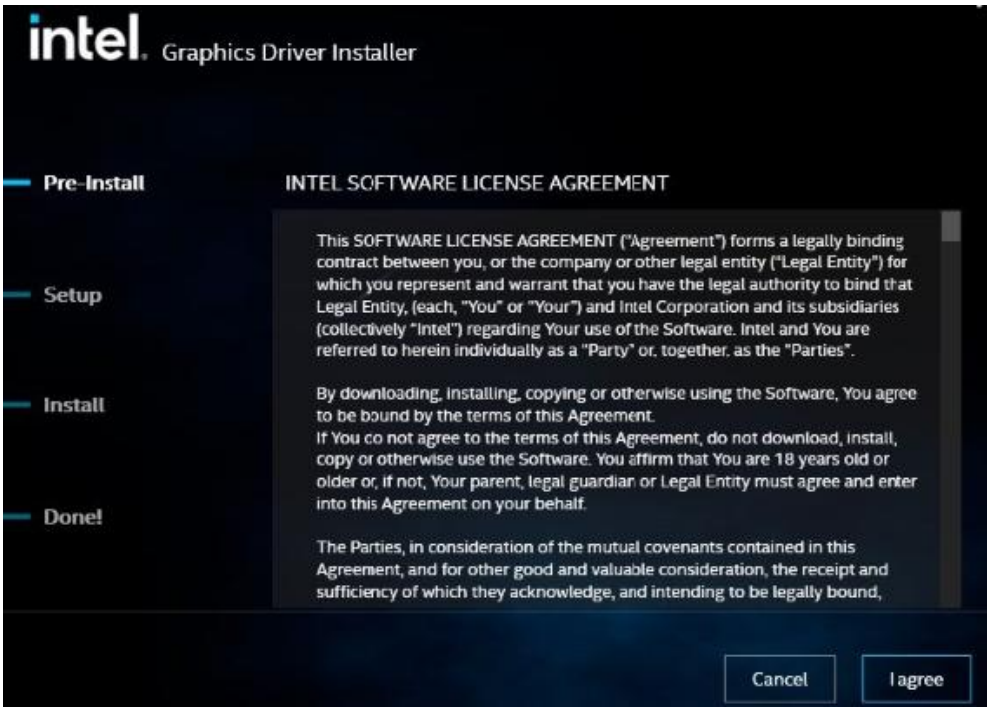
2. Click **Intel(R) Chipset Software Installation Utility**.

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

3.3 Graphics Driver Installation

1. Click **Intel** and then **Intel(R) Amston Lake Chipset Drivers**.
2. Click **Intel(R) Amston Lake Graphics Driver**.

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



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

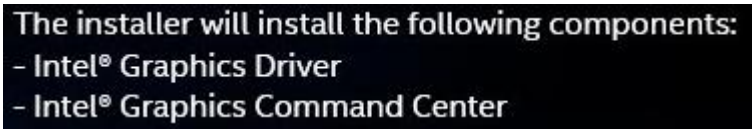
5. You need to restart your system in order to apply the driver changes. Click **Finish**.

3.4 Intel® Amston Lake Graphics Driver Installation

1. Click **Intel** and then **Intel(R) Amston Lake Chipset Drivers**.
2. Click **Intel(R) Amston Lake Graphics Driver**.

3. Agree to the terms of the license agreement, and click **Next**.

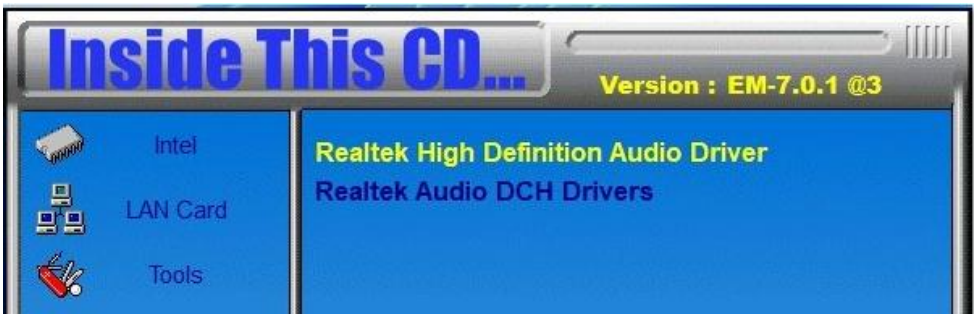
4. Click **Next** to install the components shown below.



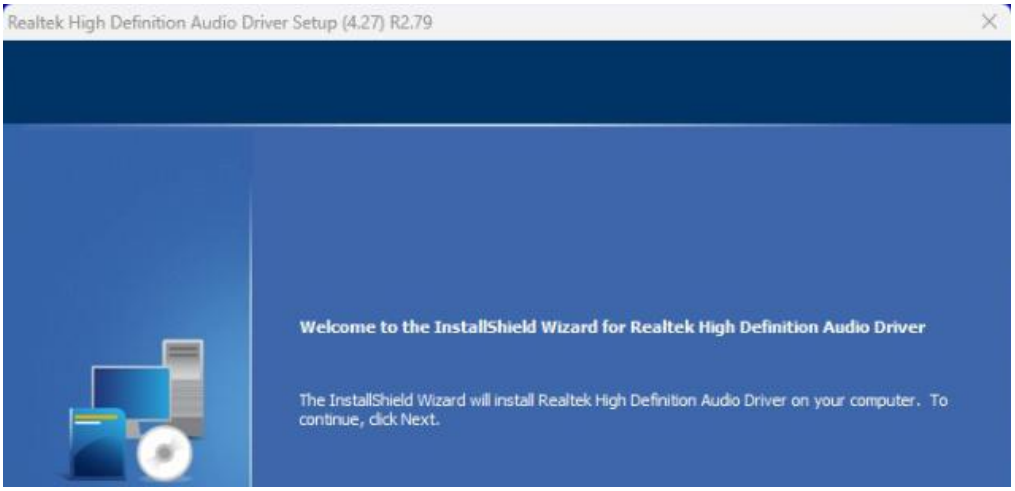
5. After installation has been completed, restart your system. Click **Finish**.

3.5 Realtek HD Audio Driver Installation

1. Click **Intel** and then **Intel(R) Amston Lake Chipset Drivers**.
2. Click **Realtek High Definition Audio Driver**.



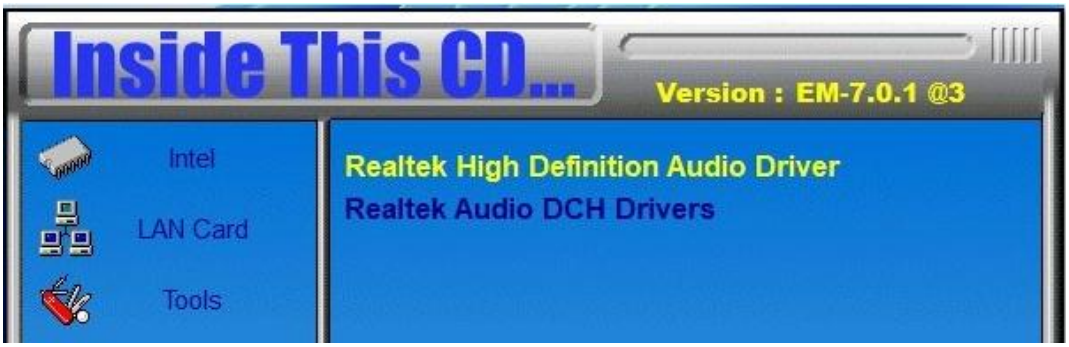
3. On the *Welcome* screen of the InstallShield Wizard, click **Next**.



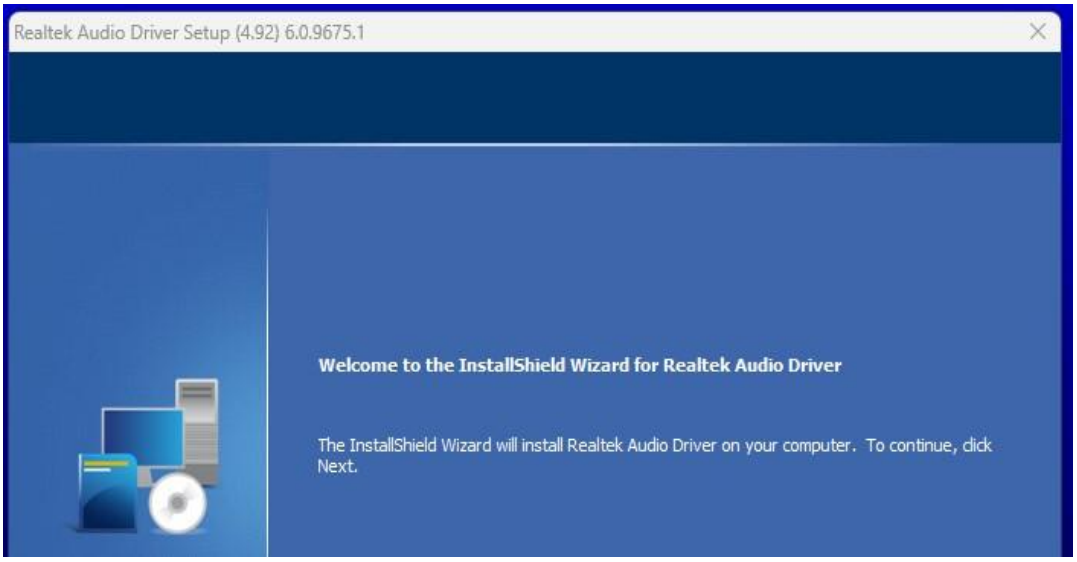
4. After installation has been completed, restart the computer for changes to take effect.

3.6 Realtek Audio DCH Drivers Installation

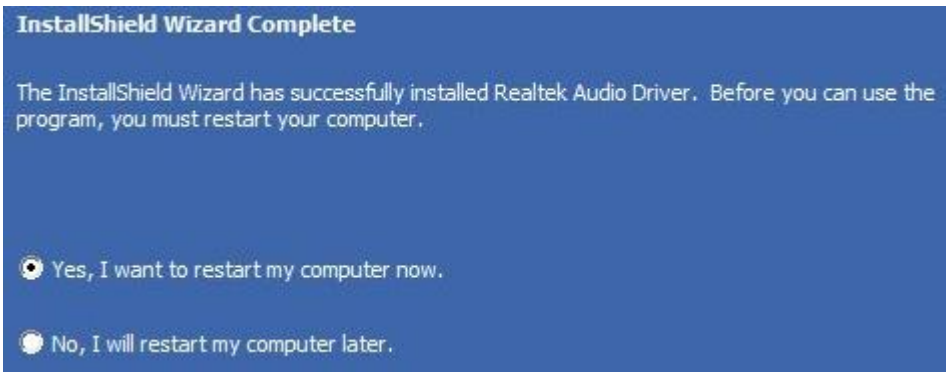
1. Click **Intel** and then **Intel(R) Amston Lake Chipset Drivers**.
2. Click **Realtek Audio DCH Drivers**.



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



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



3.7 Intel® ME Drivers Installation

1. Click **Intel** and then **Intel(R) Amston Lake Chipset Drivers**.

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

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

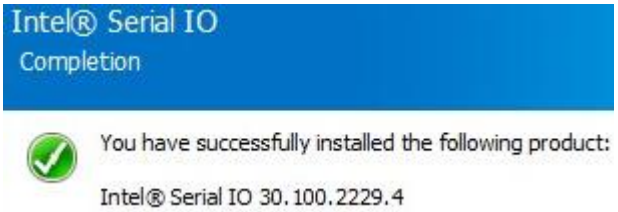
3.8 Intel® Serial IO Drivers Installation

1. Click **Intel** and then **Intel(R) Amston Lake Chipset Drivers**.
2. Click **Intel(R) Serial IO Drivers.**

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

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

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

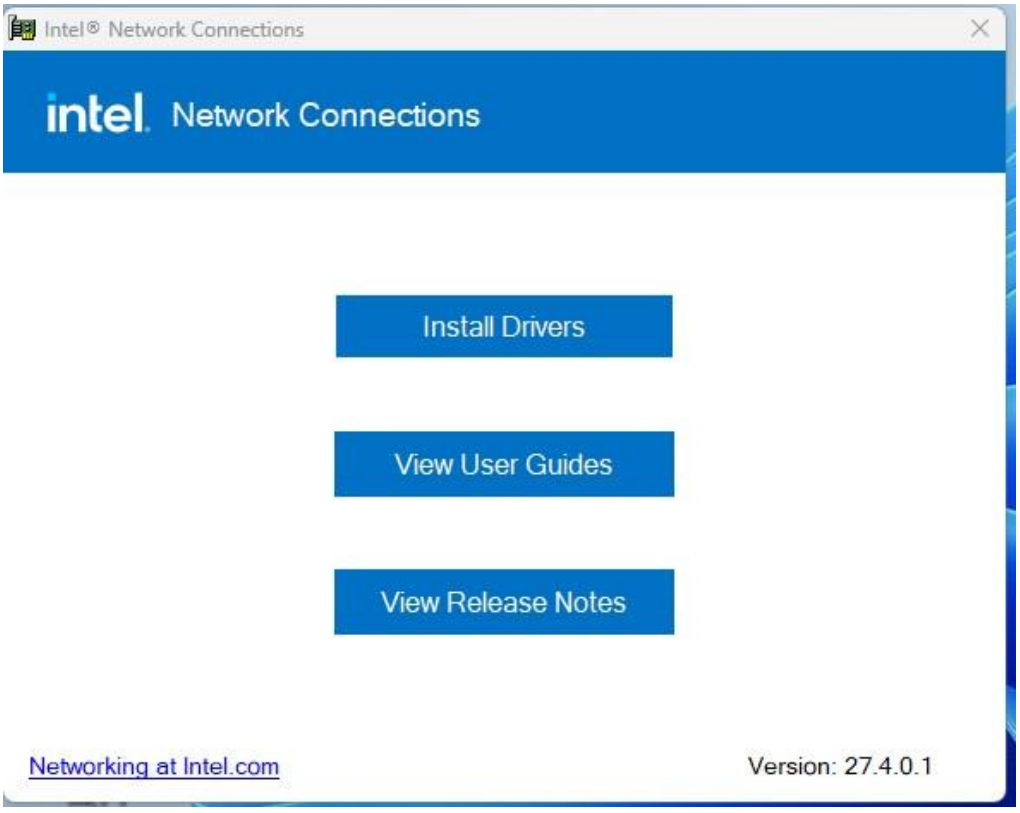


3.9 LAN Driver Installation

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

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

3. Click **Install Drivers**.



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

Chapter 4
BIOS Setup

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

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

4.1 Introduction

The BIOS (Basic Input/Output System) installed in the ROM of your computer system supports Intel® processors. The BIOS provides critical low-level support for standard devices such as disk drives, 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.

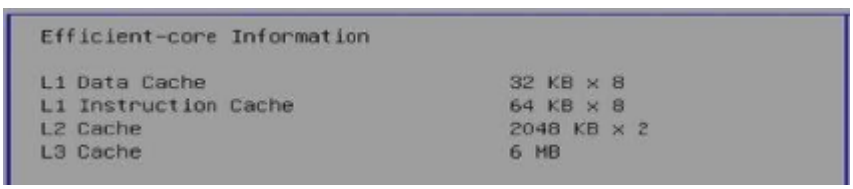
4.3 Main Settings

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

4.4 Advanced Settings

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

4.4.1 CPU Configuration



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

4.4.2 Power & Performance

BIOS Setting	Description
CPU – Power Management Control	CPU – Power Management Control Options

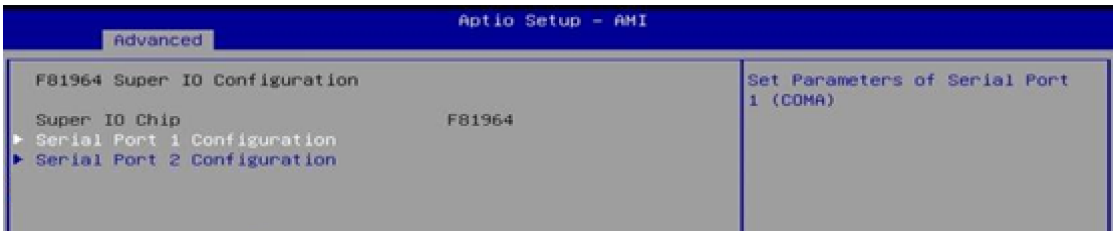
4.4.3 Trusted Computing

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.
SHA256384 PCR Bank	Enable or Disable PCR Bank
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	Enable or Disable Platform Hierarchy
Storage Hierarchy	Enable or Disable Storege Hierarchy
Endorsement Hierarchy	Enable or Disable Endorsement Hierarchy
Physical Presence Spec Version	Select to tell OS to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.
Device Select	TPM 2.0 will restrict to support TPM 2.0 devices.

4.4.4 ACPI Settings

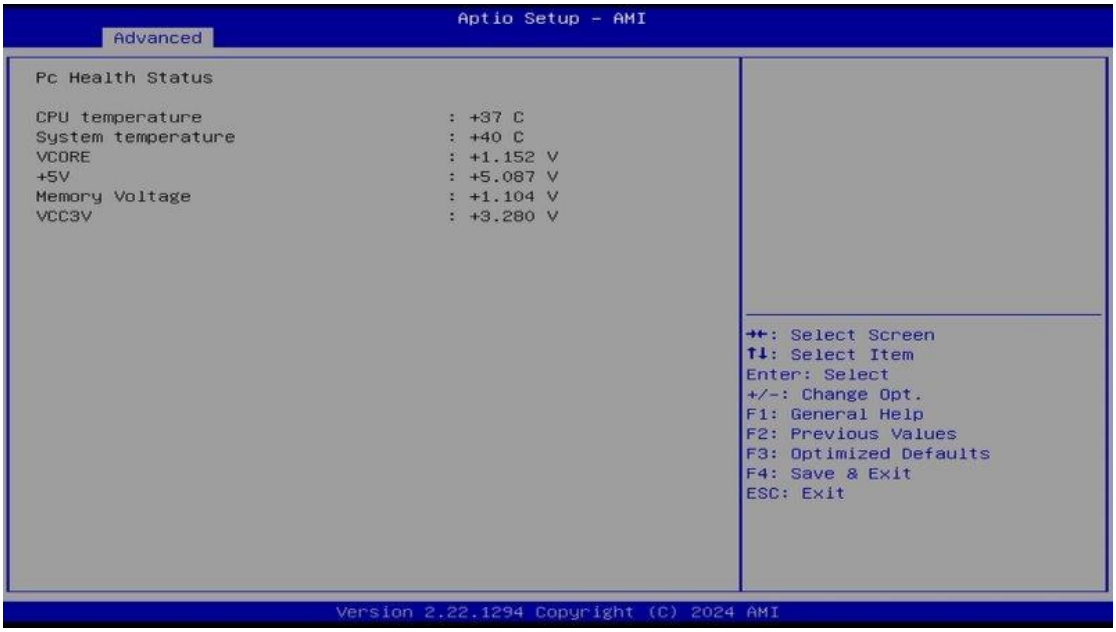
BIOS Setting	Description
Enable Hibernation	Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may not be effective with some OS.
ACPI Sleep State	Selects a ACPI sleep state for the system to enter. Options: Suspend Disabled, S3 (Suspend to RAM)

4.4.5 F81964 Super IO Configuration



BIOS Setting	Description
Serial Port Configuration	Sets Parameters of Serial Ports. Select an optimal settings for the Super IO device.

4.4.6 Hardware Monitor



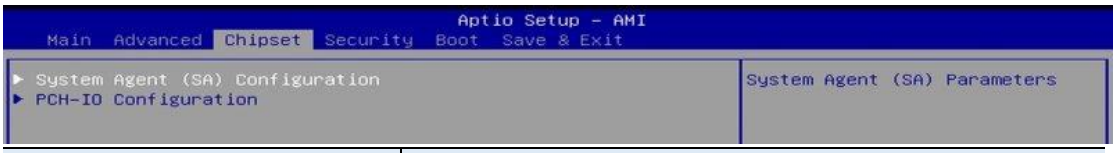
4.4.7 USB Configuration

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

4.4.8 Network Stack Configuration

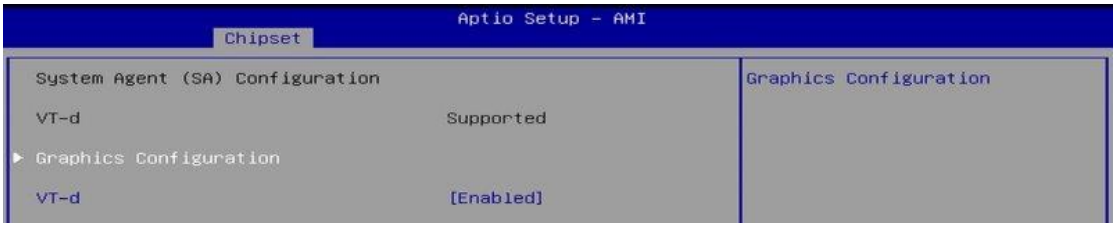
BIOS Setting	Description
Network Stack	Enables / Disables UEFI Network Stack.

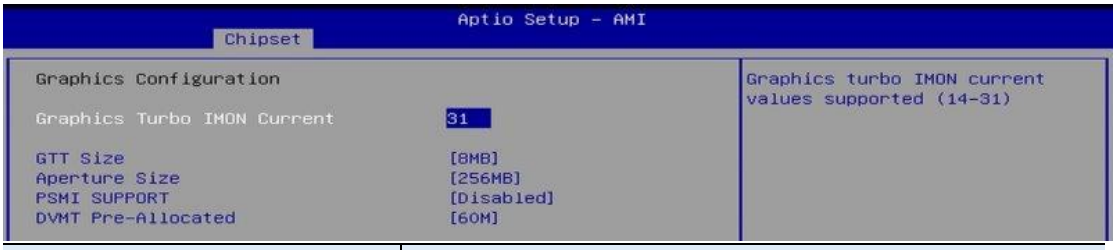
4.5 Chipset Settings



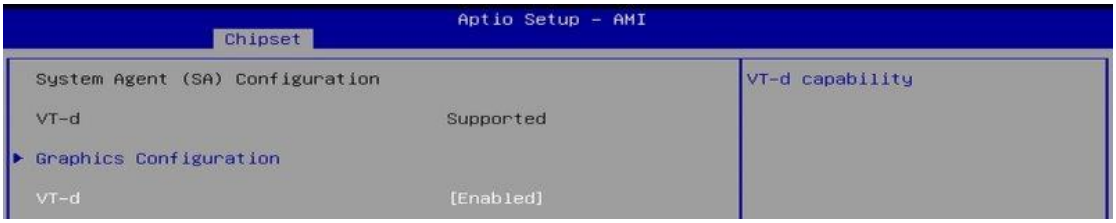
BIOS Setting	Description
System Agent (SA) Configuration	System Agent (SA) parameters
PCH-IO Configuration	PCH parameters

4.5.1 System Agent (SA) Configuration





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

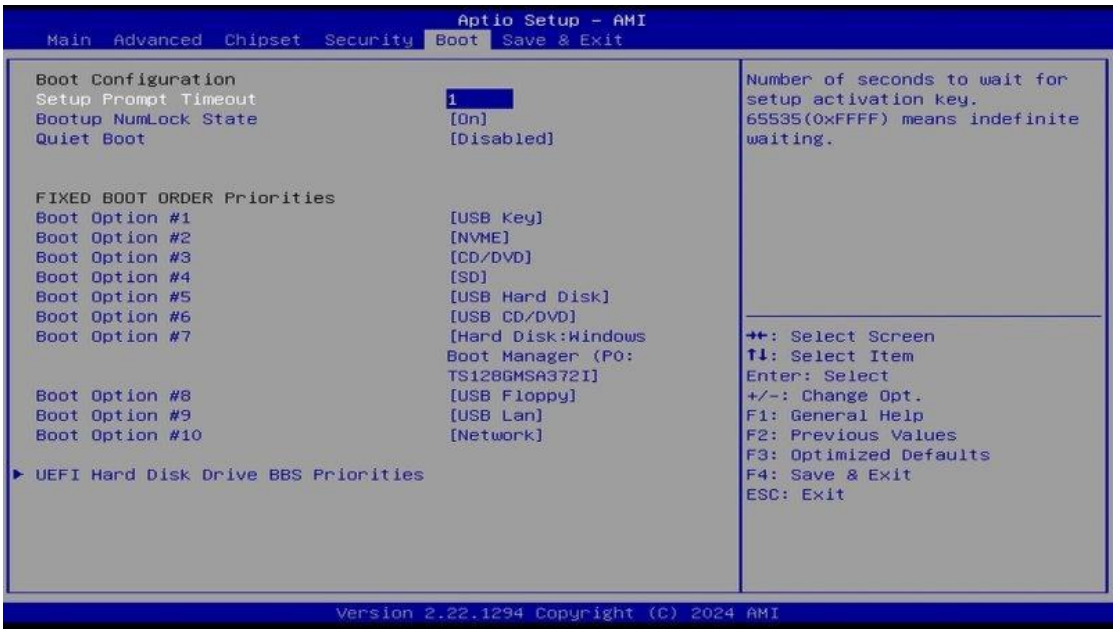


4.5.2 PCH-IO Configuration

4.6 Security Settings

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

4.7 Boot Settings



BIOS Setting	Description
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Bootup NumLock State	Turns on/off the keyboard NumLock state.
Quiet Boot	Enables / Disables Quiet Boot option.
FIXED BOOT ORDER PRIORITY	Sets the system boot order
UEFI Hard Disk Drive BBS Priorities	Specifies the boot device priority sequence from available UEFI hard disk drives.

4.8 Save & Exit Settings

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

Appendix

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

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

A. I/O Port Address Map

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

Address	Device Description
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x0000EFA0-0x0000EFBF	SMBus - 54A3
0x00003000-0x0000303F	Intel(R) UHD Graphics
0x00001854-0x00001857	Motherboard resources
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00003090-0x00003097	Standard SATA AHCI Controller
0x00003080-0x00003083	Standard SATA AHCI Controller
0x00003060-0x0000307F	Standard SATA AHCI Controller
0x00002000-0x000020FE	Motherboard resources

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

B. Interrupt Request Lines (IRQ)

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

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

C. Watchdog Timer Configuration

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

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

Sample Code

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

        char SIO;
        printf("Fintek 81866 watch dog program\n");
        SIO = Init_F81964();
        if (SIO == 0)
        {
                printf("Can not detect Fintek 81866, program abort.\n");
                return(1);
        }//if (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 81866
	{	goto Init_Finish;}

	F81964_BASE = 0x2E;
	result = F81964_BASE;

	ucDid = Get_F81964_Reg(0x20);
	if (ucDid == 0x07)			//Fintek 81866
	{	goto Init_Finish;}

	F81964_BASE = 0x00;
	result = F81964_BASE;

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

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

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