MPT-3110R

Fanless Railway Computer System with WWAN Redundancy

User Manual

Version 1.0
October 2025

iBASE

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Compliance

CE

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

FC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WEEE

This product must not be disposed of as normal household waste, in accordance with the EU directive for Waste Electrical and Electronic Equipment (WEEE – 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

Green IBASE

This product is compliant with the current RoHS 2 restrictions and prohibits use of the following substances in concentrations exceeding 0.1% by weight (1000 ppm) except for cadmium, limited to 0.01% by weight (100 ppm).

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

Important Safety Information

Carefully read the precautions before using the device.

Environmental conditions:

- Lay the device horizontally on a stable and solid surface in case the device may fall, causing serious damage.
- Leave plenty of space around the device and do not block the openings for ventilation. Never drop or insert any objects of any kind into the ventilation openings.
- Slots and openings on the chassis are for ventilation. Do not block or cover these openings. Make sure you leave plenty of space around the device for ventilation. Never insert objects of any kind into the ventilation openings.

Care for your IBASE products:

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

WARNING

Attention during use:

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

Avoid Disassembly

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

CAUTION

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

Warranty Policy

- **IBASE standard products:**

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

- **3rd-party parts:**

  12-month (1-year) warranty from delivery for the 3rd-party parts that are not manufactured by IBASE, such as CPU, memory, SSD/HDD, power adapter, panel and touchscreen.

* *Products 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)
3. If repair service is required, you can download the RMA form at the website of IBASE. Fill out the form and contact your distributor or sales representative.

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Chapter 1
General Information

The information provided in this chapter includes:

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

1.1 Introduction

The MPT-3110R is a rugged Railway Computer System powered by the Intel® Atom® x7433RE processor (up to 2.7GHz) with DDR5 memory support, certified to EN50155:2021 and EN45545-2 HL1/2/3 standards for reliable railway applications. Designed with robust M12 connectors for dual 2.5GbE LAN, USB, and DC power input, it integrates dual SIM sockets for WWAN redundancy, an onboard isolated CAN 2.0A/2.0B/CAN-FD interface, ignition power control, and a wide-range voltage GPIO interface. Storage and expansion are supported through a removable 2.5" SSD bay, an M.2 2280 M-Key slot (SATA III), additional M.2 sockets for WLAN/BT, WWAN (4G/5G), SSD, GPS modules, and Mini PCIe slots for MVB or add-on cards. External I/O includes USB 3.2 Gen2, USB Type-C with 60W PD (screw lock), COM ports (RS-232/422/485), audio, GPIO, DisplayPort/VGA, and multiple antenna connections. Built with a compact fanless aluminum chassis (250 x 150 x 55 mm), wide DC input range (24V–110V), and industrial-grade endurance (-40°C to +70°C, EN61373 shock/vibration resistance), the MPT-3110R ensures robust and connected performance for railway and transportation systems.

1.2 Features

- EN50155 (2021) / EN45545-2 certified
- Robust M12 connectors for dual 2.5GbE, USB and power input
- Onboard isolated CAN 2.0A / 2.0B / CAN-FD
- Dual SIM sockets support WWAN redundancy
- Removable 2.5”device bay for SSD storage
- Ignition power control
- Wide-range voltage GPIO interface
- 1x USB Type-C alternate mode with PD 60W

1.3 Packing List

Your MPT-3110R package should include the items listed below.

Item	Q’ty	IBASE P/N
MPT-3110R	1	- -
Manual @ Driver download instruction		D2MANUAL--0000100P
Wall Mounting Bracket	2	H06MTMPT3110R000AP
GPIO Matching Connector (7 pins)	2	C1216022107103000P
CAN BUS Matching Connector (Dinkle terminal block, 6 pins)	1	C1216ECH306103100P
Wall Mounting Bracket Screw	4	H0230561B710BN000P
Screw for SSD (if not pre-installed)	4	H032GM15250010000P

1.4 Optional Accessories

Item	IBASE P/N
Power cable: M12 A-Code to bare wired	C501PW39904121000P
LAN cable: M12 X-Code to RJ45 CAT-6 (up to 2.5GbE)	C501LAN8208A32000P
LAN cable: M12 X-Code to RJ45 CAT-5 (up to 1.0GbE)	C501LAN6300A32000P
USB cable: M12 A-code to USB Type-A	C501USB1320A32000P
Audio cable: DB9M to 3.5mm Audio jack for Line-out & MIC-in	N/A

1.5 Specifications

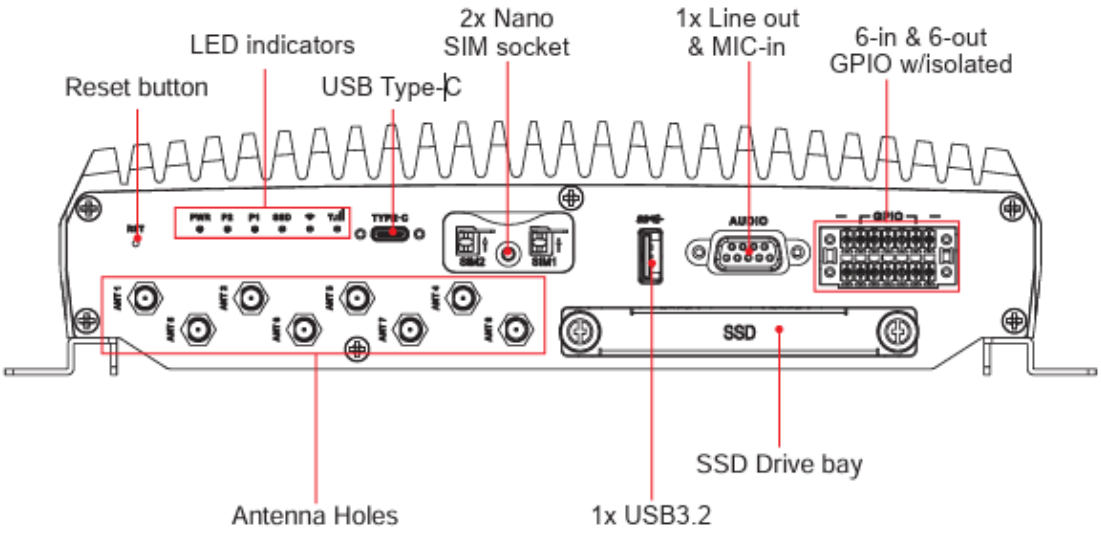
Models	
MPT-3110R	MPT-3110R with Atom® x7433RE Processor, 8GB RAM, 1x DP, 1x USB-C, 1x VGA, 2x LAN (M12 X-Coded), 2x USB (M12 A-Coded), 1x USB 3.2, 2x COM ports, 5x M.2/Mini PCIe, No storage (RoHS) 24V DC-in
MPT-3110RH	MPT-3110RH with Atom® x7433RE Processor, 8GB RAM, 1x DP, 1x USB-C, 1x VGA, 2x LAN (M12 X-Coded), 2x USB (M12 A-Coded), 1x USB 3.2, 2x COM ports, 5x M.2/Mini PCIe, No storage (RoHS) 48V/72V/110V DC-in
System	
Motherboard	MBT-3111
CPU	Intel® Atom® x7433RE Processor
Speed	Up to 2.7GHz
Memory	• 1x DDR5-4800 SO-DIMM socket • Up to 16GB
Front Panel External I/O	• 1x USB 3.2 Gen2 Type-A connector • 2x external accessible SIM socket • 1x USB Type-C connector with screw lock • 1x Removable 2.5" SSD device bay • 1x DB9 female connector for Line-out & Mic-in • 1x 14-pin terminal block 6-in & 6-out digital I/O with 24V input and output • 1x reset button • 6x light pipe for status LED Indicators • 8x Antenna holes
Rear Panel External I/O	• 2x M12 X-code 8P female for GbE LAN1/LAN2 • 1x M12 A-code 4P male for DC-input • 2x M12 A-code 4P female for USB 2.0 • 1x DisplayPort output • 1 x Terminal block DIP 6 pins for 2 x CAN FD master • 2x DB9M for COM#1 (RS232/422/485) / COM#2 (RS232 only) • 1x M3 with washer screw hole for grounding connection • 4x light pipe for LAN status LED Indicators

Storage	• 1x M.2 2280 M-Key socket for SSD (SATA III) • 1x 2.5" removable device bay for SSD
Expansion slots	• 1x M.2 2230 E-Key socket for WLAN & BT connection (PCI-E + USB2.0 + SMBus) • 1x M.2 3042/52 B-Key socket for WWAN (4G/5G) connection (USB 3.2 Gen.1) • 1x M.2 2280 M-Key socket for SSD device (SATA III) • 1x Mini PCI-E full-sized socket for MVB & add-on card (PCI-E + USB2.0 + SMBus) • 1x Mini PCIe half-sized socket for GPS module (USB2.0 only) • 1x Mini PCI-E half-size socket (USB 2.0)
Power Supply	DC-input for 24V~110V
Construction	Aluminum
Chassis Color	Black
Mounting	Wall mount
Dimensions	250 (W) x 150 (D) x 55 (H) mm 9.84” (W) x 5.9” (D) x 2.16” (H)
Environmental	
Operating Temperature	-40°C ~70°C (-40°F~158°F) (with industrial-grade SSD)
Storage Temperature	-40°C ~ 85°C (-40°F~185°F)
Relative Humidity	10 ~ 95% RH @45°C (non-condensing)
Vibration	Function: 1 m/s2, 5Hz~150 Hz (EN 61373) Lifetime: 7.9 m/s2, 5Hz~150 Hz (EN 61373)
Shock	50 m/s2, 30 msec (EN 61373)
Certification	
	EN 50155:2021, EN 45545-2 2020 HL1/2/3 CE (EN 62368-1 / EN55032 / EN55035), FCC Class-A

All specifications are subject to change without prior notice.

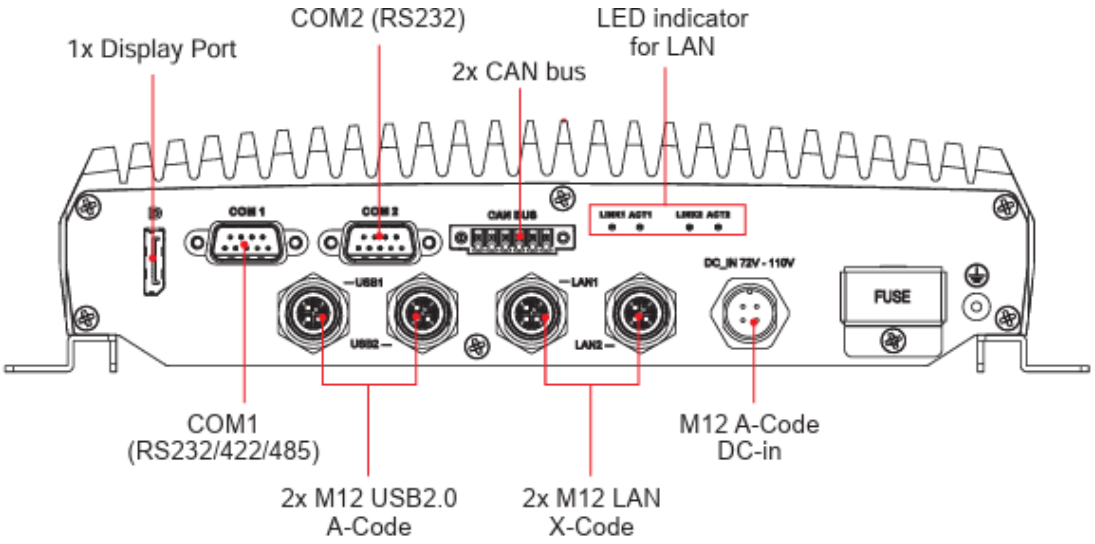
1.6 System View

Front View



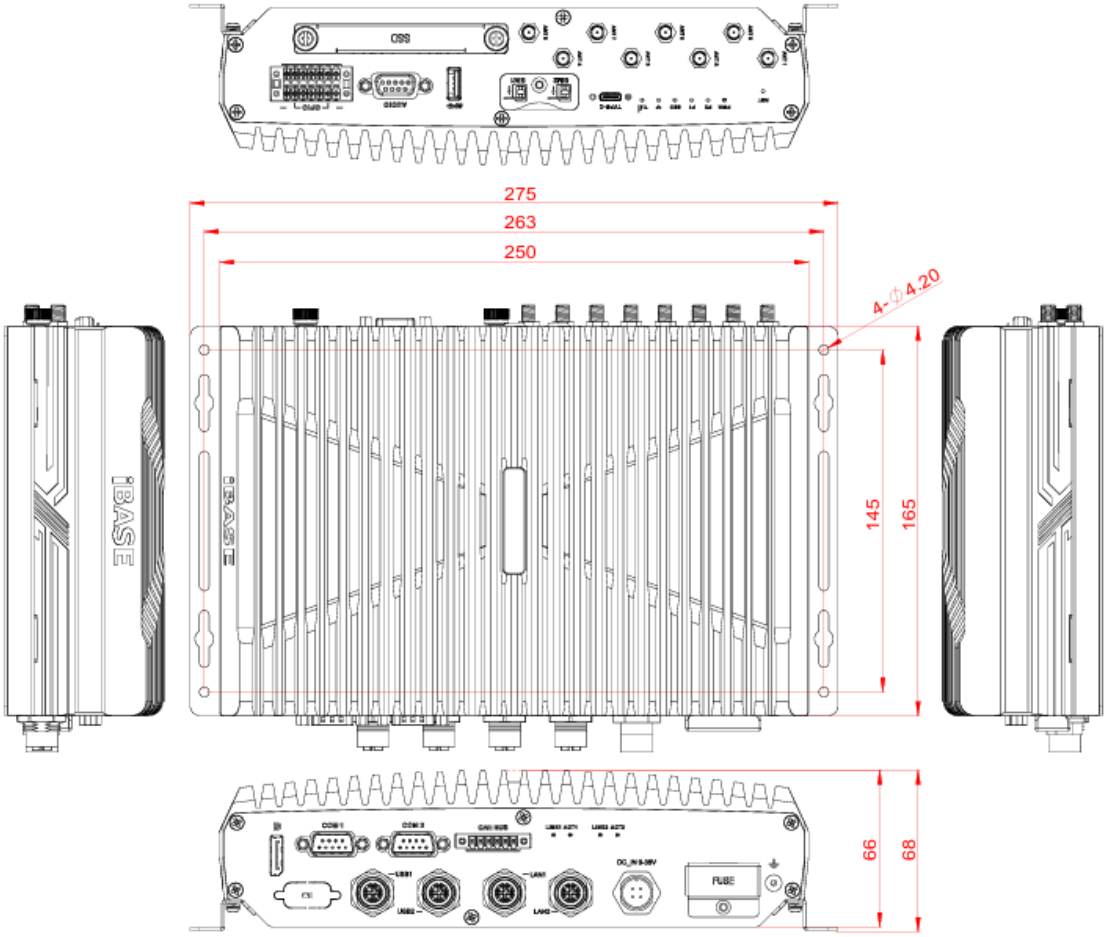
Rear View


COM 1
COM 2
CAN BUS
LINK1 ACT1
LINK2 ACT2
USB1
LAN1
DC_IN 72V - 110V
USB2
LAN2
FUSE

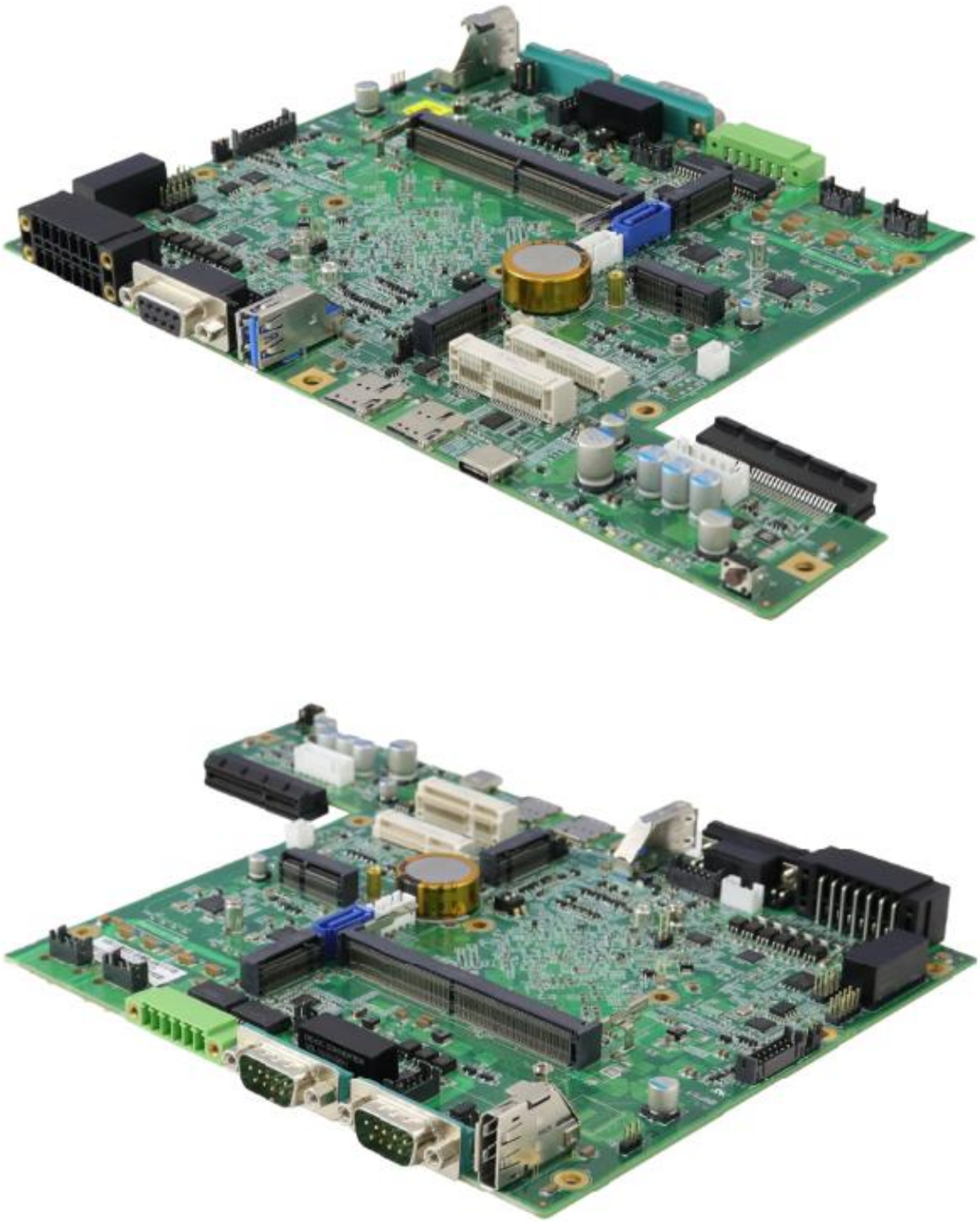

1x Display Port
COM2 (RS232)
2x CAN bus
LED indicator
for LAN
COM1
(RS232/422/485)
2x M12 USB2.0
A-Code
2x M12 LAN
X-Code
M12 A-Code
DC-in
FUSE

1.7 System Dimensions

Unit: mm

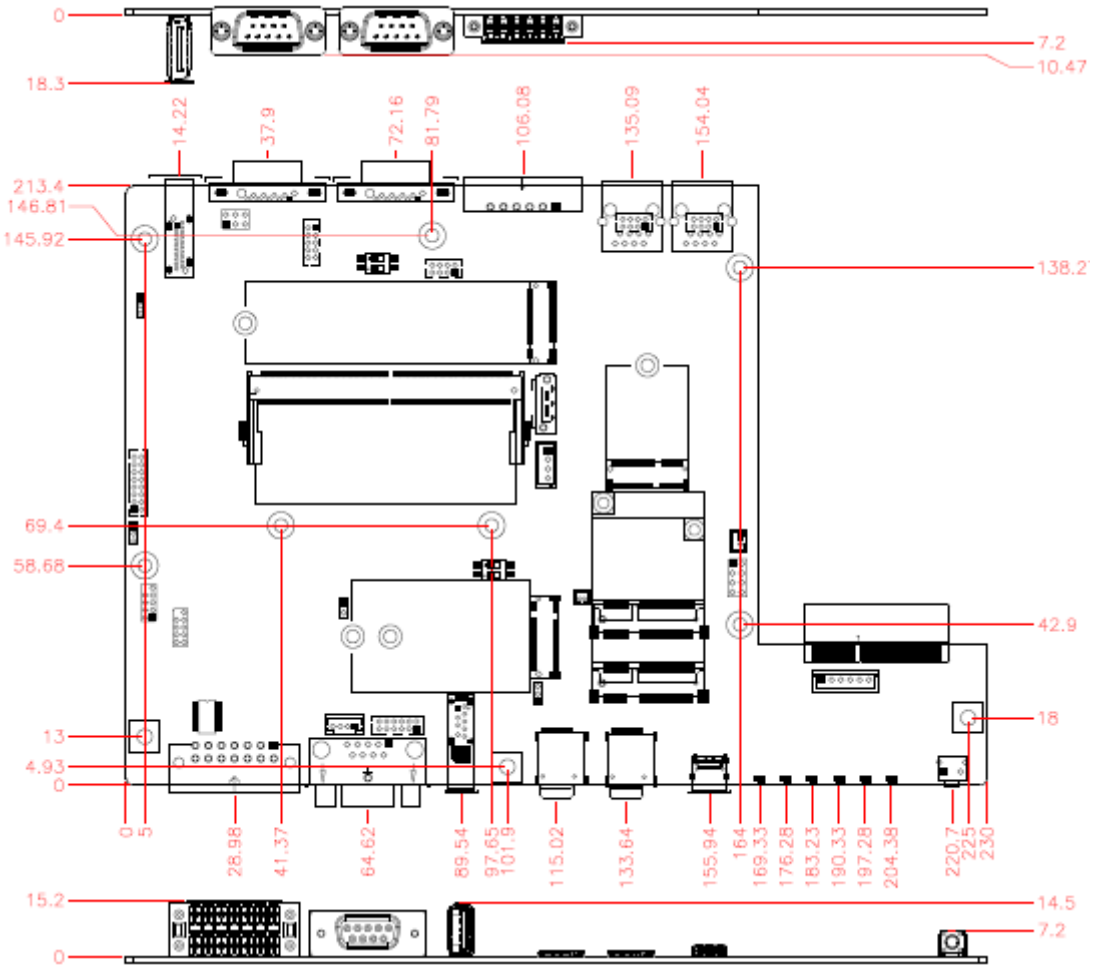


1.8 MBT-3111 Board View



1.9 MBT-3111 Board Dimensions

Unit: mm



Chapter 2
Hardware Configuration

The information provided in this chapter includes:

- installations
- Information and locations of connectors

2.1 Installations

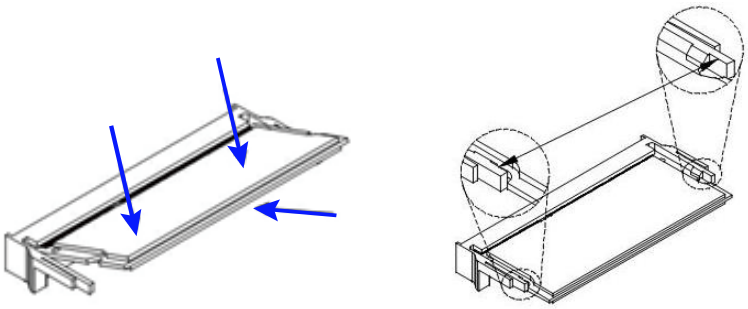
When installing memory modules, M.2 cards, or other components, first remove the corresponding screws to access the designated area. If applicable, carefully detach the existing component before inserting the new one, ensuring proper alignment and secure seating. After installation, reattach the screws in reverse order to firmly secure the component. There are a total of 17 screws that have to be removed including four screws on the bottom side, six screws on both front and back, plus the screw for the micro-SIM card cover as shown below.

When the bottom cover is removed the memory and expansion cards can be installed or uninstalled. Below is the system with its cover removed.

2.1.1 Memory Installation

1. Locate the memory slot and align the notch on the memory module with the key on the slot.
2. Insert the module at an angle, then gently press it down until the side clips snap into place and secure it.

To remove the memory module, push both clips outward to release it.



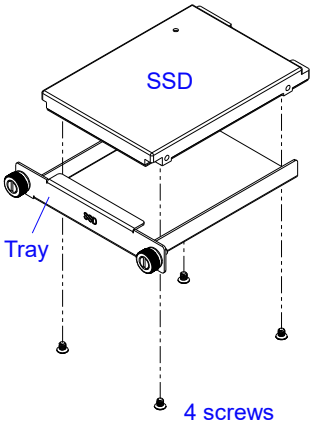
2.1.2 Storage Installation

The system supports both 2.5” SSDs and M.2 SATA cards for storage, and you may install either one or both.

Installation for 2.5” SSD

1. Loosen the 2 screws securing the SSD tray, then pull the tray out.

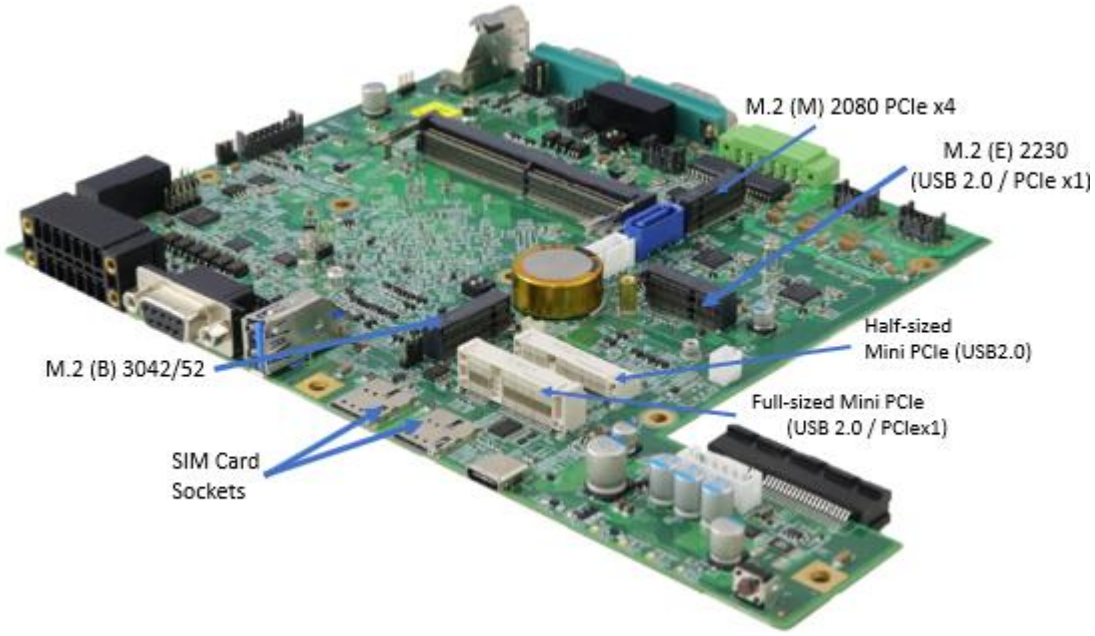
2. Place a 2.5” SSD onto the tray and secure it using the supplied 4 screws as shown.



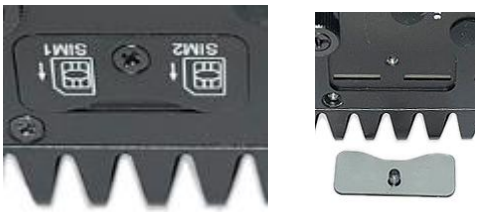
3. Reinsert the tray into the device and fasten securely.

Installation for M.2 and Mini Cards, and Micro-SIM Cards

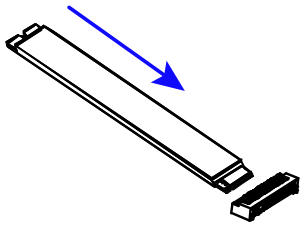
1. After removing the necessary screws as outlined in the *Installation* section, locate the relevant component slots.



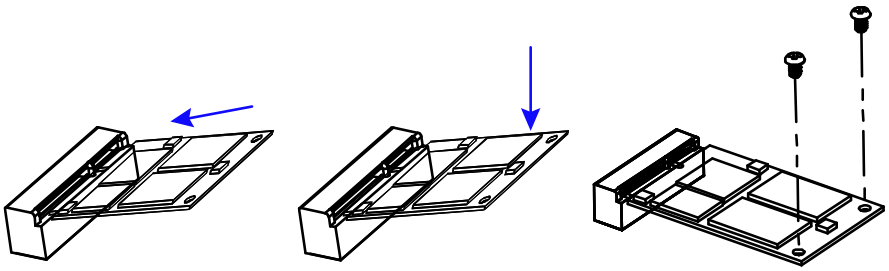
1. To access the micro-SIM card sockets, remove the single screw securing the socket cover (as shown below). Insert the micro-SIM card with the chip facing up and push it in using your fingernail. To remove the card, push it again to release.



2. To install an M.2 card, align its notch with the connector on the interface, insert the card at a slight angle, then press it down and secure it with the brass standoff and screw (if applicable).



3. To install a Mini PCIe card, align the notch with the connector, insert it slantwise, press it down, and fasten it.



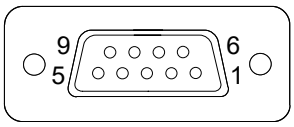
4. Push the mini-PCIe card down, fix it with the supplied 2 flat head screws for full-sized card and with one screw for half-sized card.

2.1.3 Mounting Brackets Installation

1. Turn the MPT-3110R upside down. Attach the mounting brackets to the bottom of the unit and secure them using the four supplied screws, as shown below.

2.1.4 Pinout for COM, Power Input, LAN, CANBUS & DIO

COM1 / COM2 RS-232 Ports



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

- **DC_IN (M12, 4-pin, male)**

*Remarks: DC_IN is available in 24V for the **MPT-3110R** model and 72V~110V for the **MPT-3110RH** model.*

Pin	Assignment	Pin	Assignment
1	Ignition	3	Ground
2	Ground	4	DC-Input

- **LAN Connector (M12, 8-pin, Female, X-code)**

Pin	Assignment	Pin	Assignment
1	MX1+	5	MX4+
2	MX1	6	MX4
3	MX2+	7	MX3+
4	MX2	8	MX3

- **CANBUS**

Pin	Assignment	Pin	Assignment
1	CAN_DH1	4	GND_ISO_CAN2
2	CAN_DL1	5	CAN_DL2
3	GND_ISO_CAN1	6	CAN_DH2

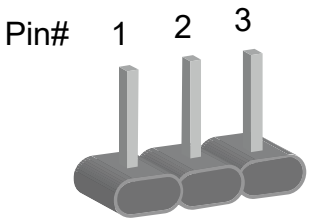
- **Digital I/O**

Pin	Assignment	Pin	Assignment
1	DI0	2	DO0
3	DI1	4	DO1
5	DI2	6	DO2
7	DI3	8	DO3
9	DI4	10	DO4
11	DI5	12	DO5
13	GND	14	VDO_ISO_COM

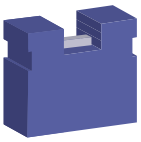
2.2 Setting the Jumpers

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.

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.

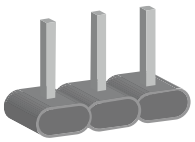
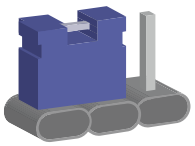
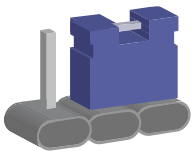
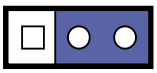


A 3-pin jumper



A jumper cap

Refer to the illustration below to set jumpers.

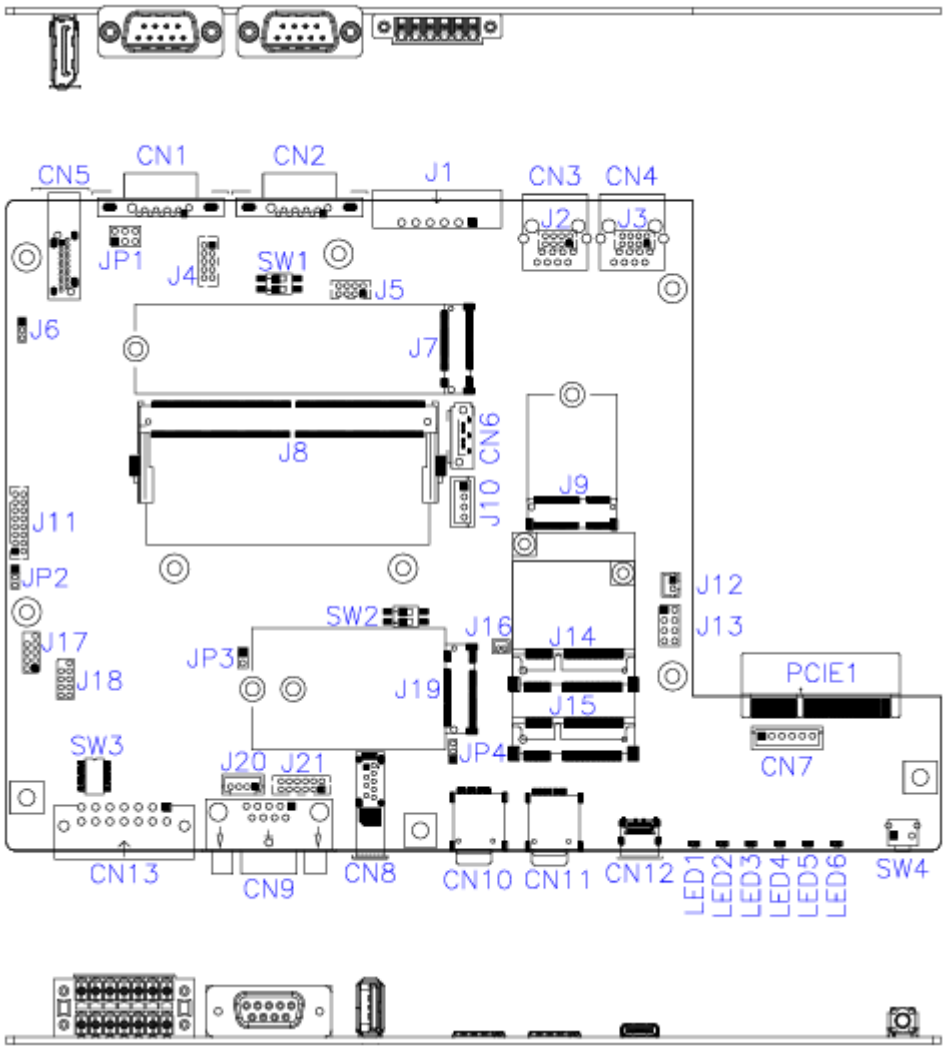
Pin closed	Oblique view	illustration
Open		
1-2		
2-3		

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

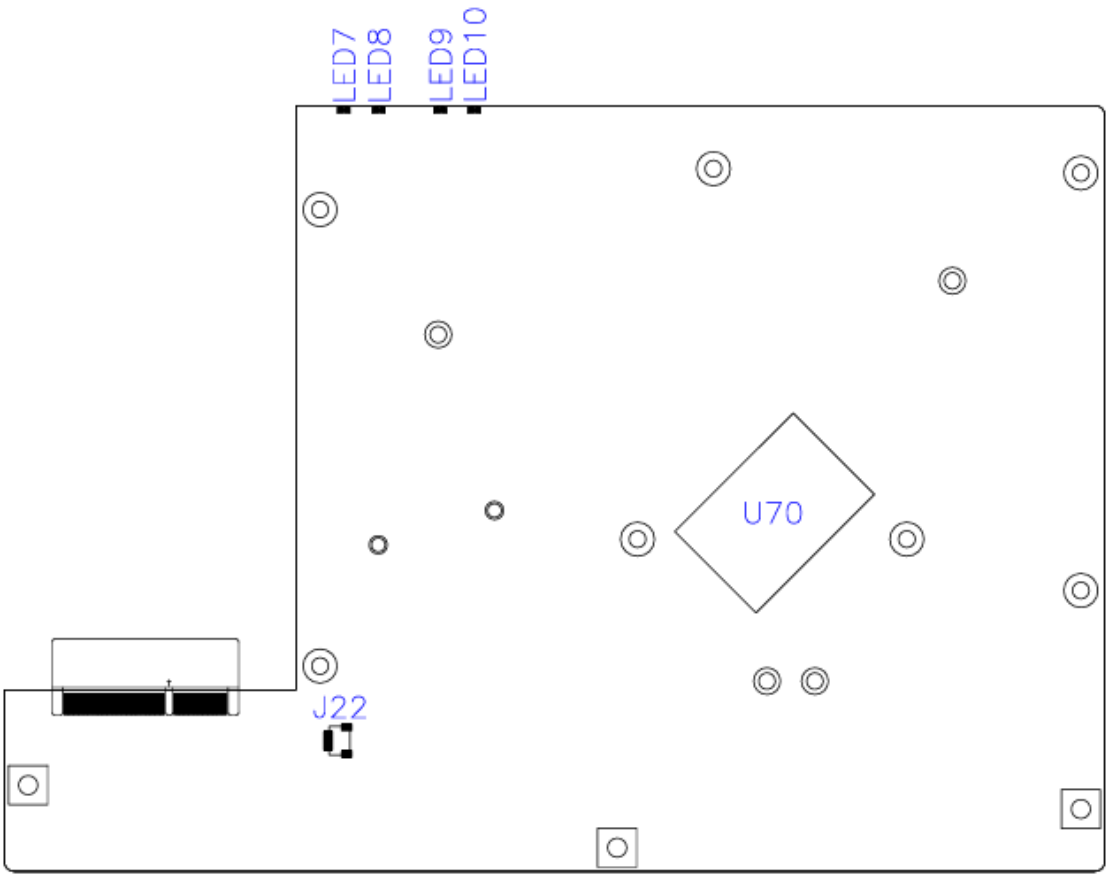
When a jumper cap is removed from two jumper pins, this jumper is **open**, i.e. turned **Off**.

2.3 Jumper & Connector Locations on Motherboard

Motherboard: MBT-3111



MBT-3111 - top

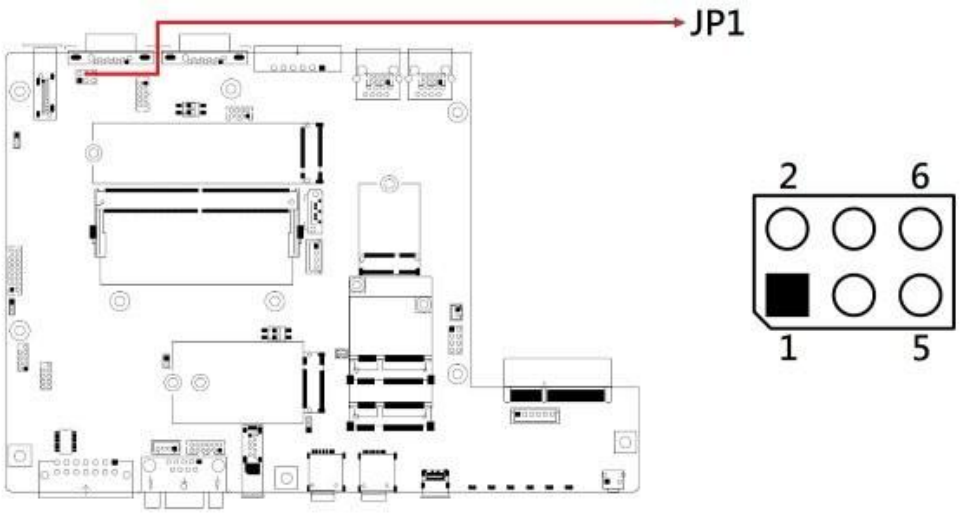


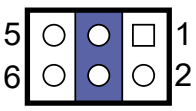
MBT-3111 - bottom

2.4 Jumpers Quick Reference

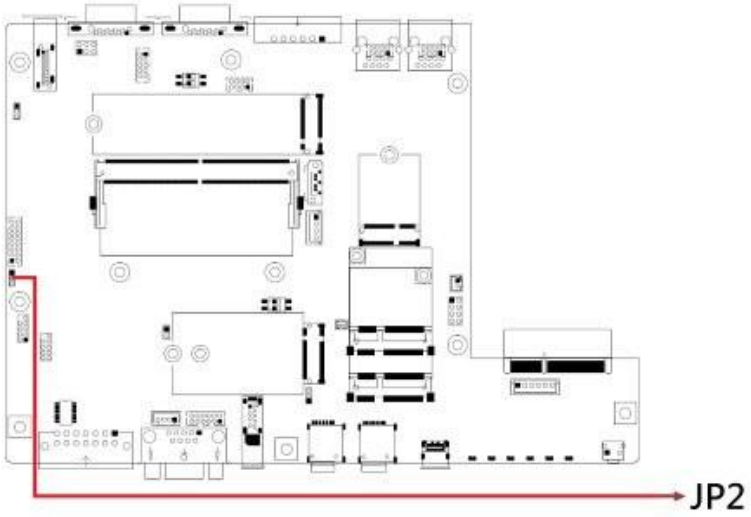
Jumper	Function
JP1	COM1 RS232 RI/+5V/+12V Power Setting
JP2	ATX/AT Mode Setting
JP3	Flash Descriptor Security Override
JP4	SIM Card Select
SW1-1	COM3 RS485 120 OHM
SW1-2	COM4 RS485 120 OHM
SW2-1	Clear CMOS Contents
SW2-2	Clear ME Contents
SW3	Digital IO Pull High to +5V Switch
SW4	Reset Button

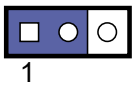
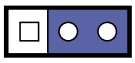
2.4.1 JP1: COM1 RS232 RI/+5V/+12V Power Setting



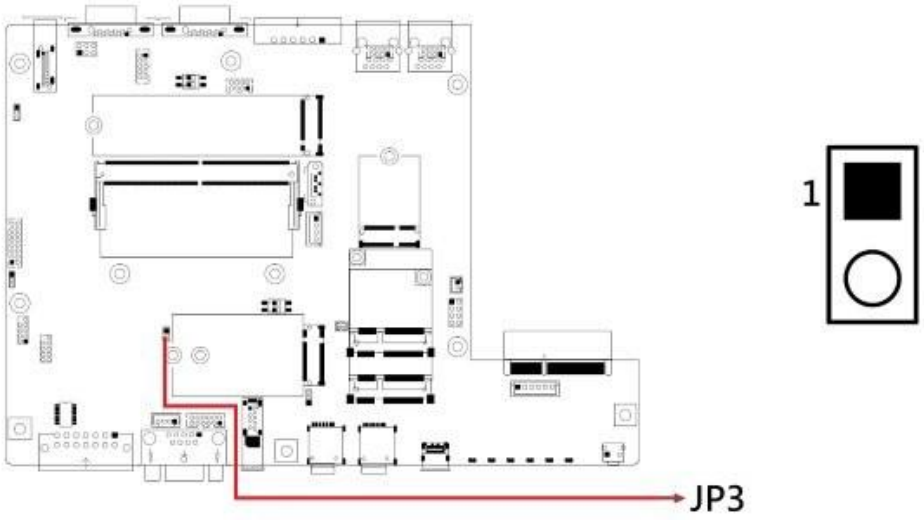
JP1	Setting	Function
	Pin 1-3 Short/Closed	+12V
	Pin 3-4 Short/Closed	RI
	Pin 5-3 Short/Closed	+5V

2.4.2 JP2: ATX / AT Mode Setting



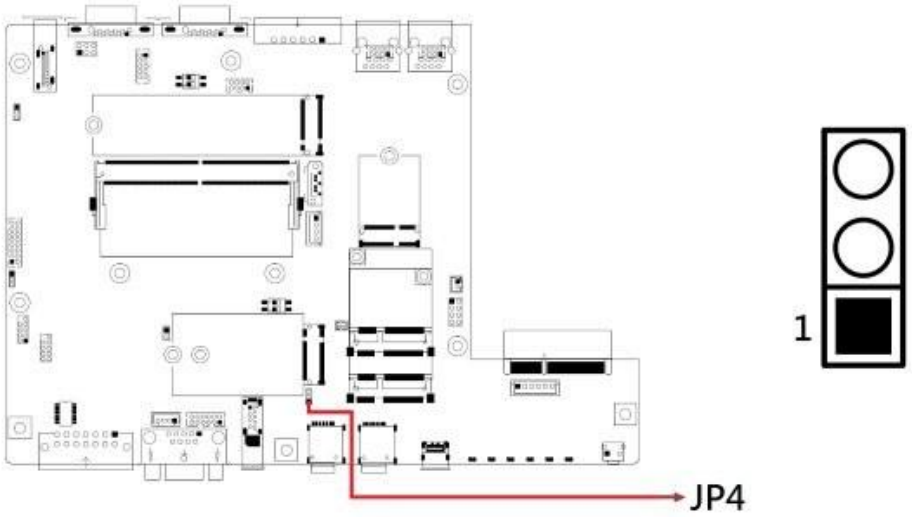
JP2	Setting	Function
 1	Pin 1-2 Short/Closed	ATX Mode (Default)
 1	Pin 2-3 Short/Closed	AT Mode

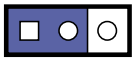
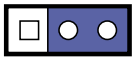
2.4.3 JP3: Flash Descriptor Security Override



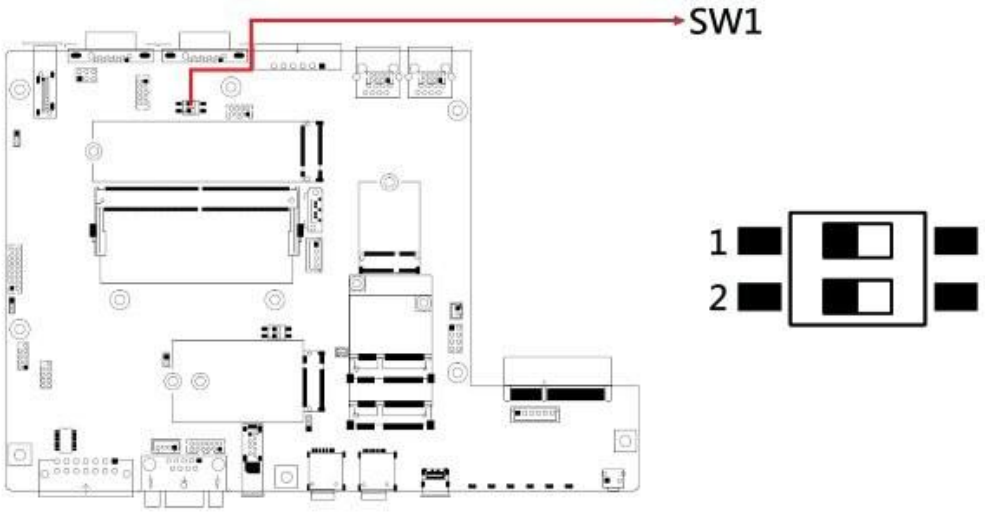
JP3	Flash Descriptor Security Override
Open	Disabled (Default)
Close	Enabled

2.4.4 JP4: SIM Card Select



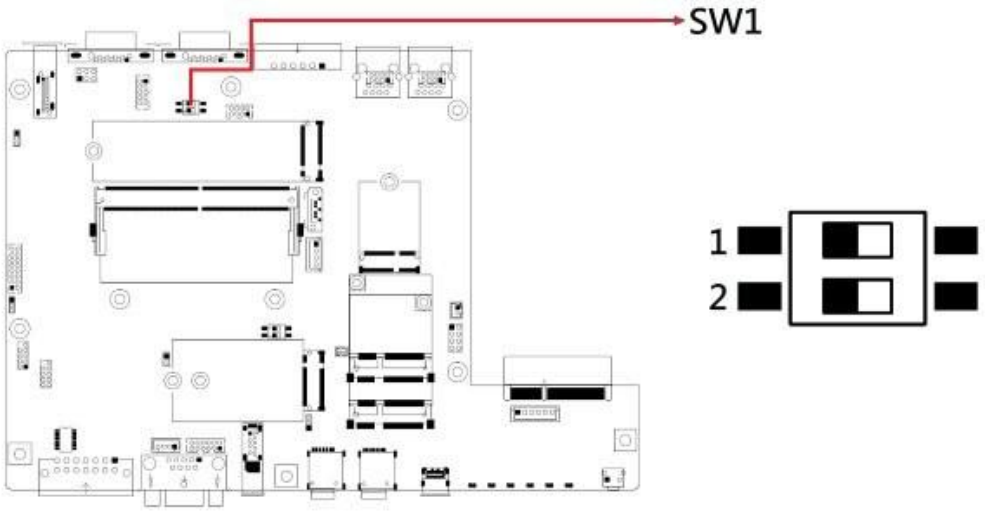
JP4	Function	Setting
 1	For M.2-2	1-2 closed
 1	For Mini-PCIe	2-3 closed

2.4.5 SW1-1: COM3 RS485 120 OHM



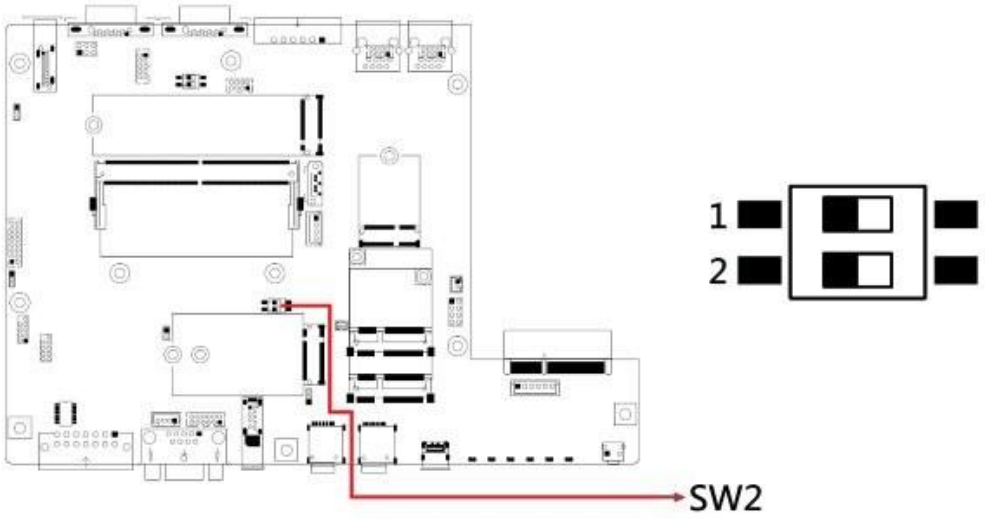
Function	Setting
COM3 Terminal Disable (default)	Pin_1 Off
COM3 Terminal Enable	Pin_1 On

2.4.6 SW1-2: COM4 RS485 120 OHM



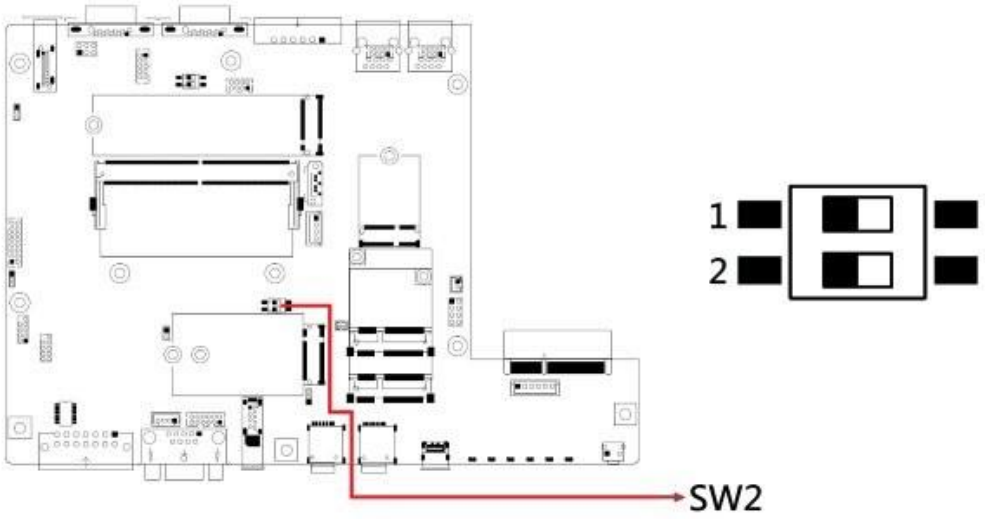
Function	Setting
COM4 Terminal Disable (default)	Pin_2 Off
COM4 Terminal Enable	Pin_2 On

2.4.7 SW2-1: Clear CMOS Contents



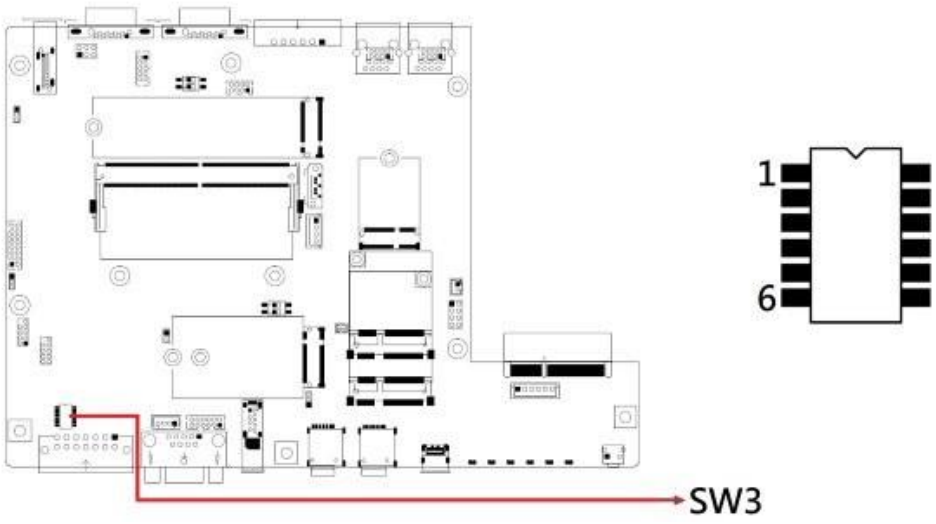
Setting	Function
Pin_1 Off	Normal (default)
Pin_1 On	Clear CMOS

2.4.8 SW2-2: Clear ME Contents



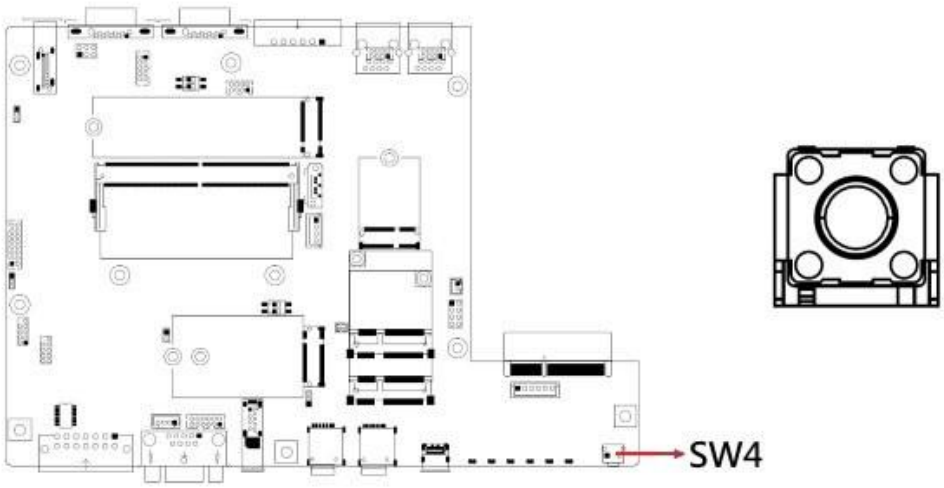
Setting	Function
Pin_2 Off	Normal (default)
Pin_2 On	Clear ME

2.4.9 SW3: Digital IO Pull High to +5V Switch



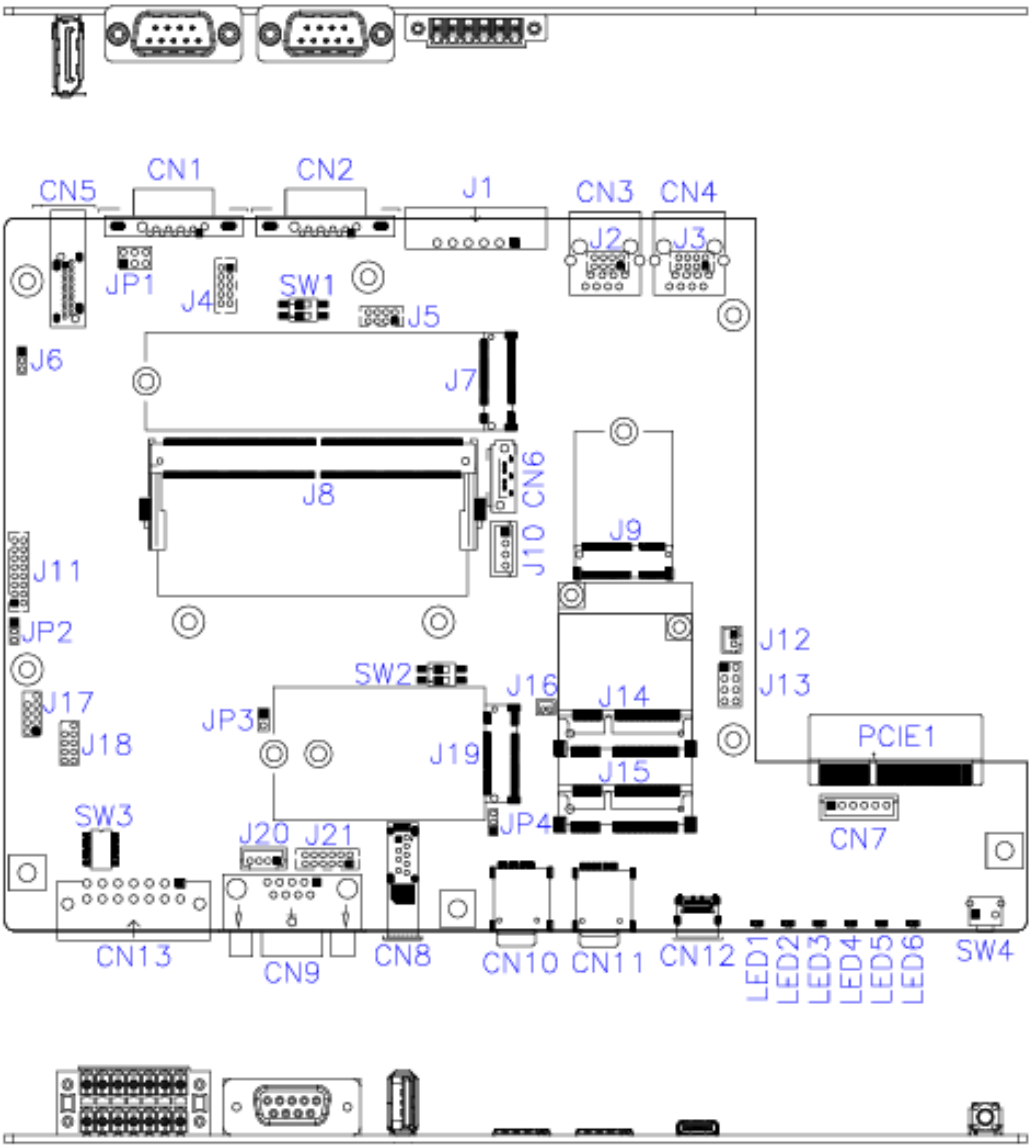
Pin	Assignment	Pin	Assignment
1	5V	7	DO5
2	5V	8	DO4
3	5V	9	DO3
4	5V	10	DO2
5	5V	11	DO1
6	5V	12	DO0

2.4.10 SW4: Reset Button



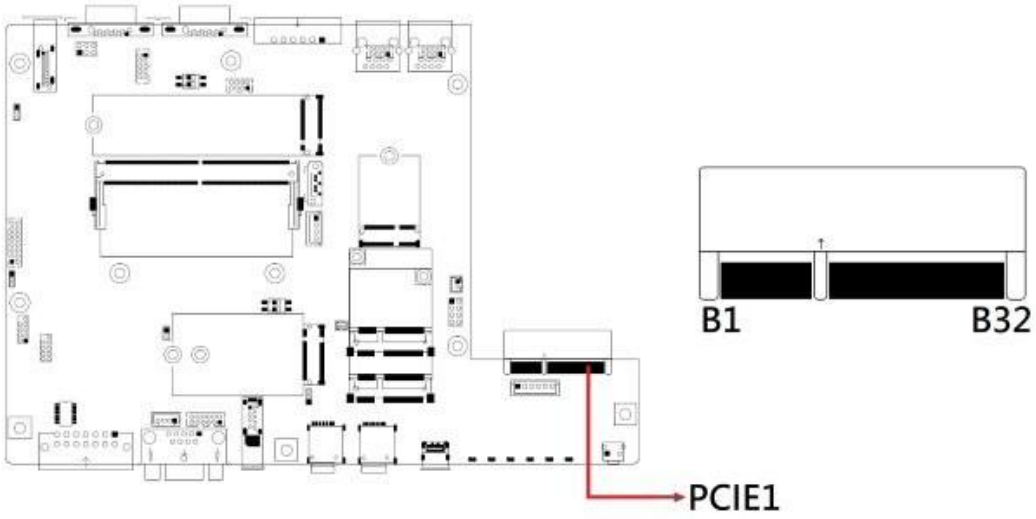
2.5 Connectors on MBT-3111

Connector	Function
PCIE1	DC_IN Connector (+12V)
J1	CAN bus Connector
J2	2.5GbE LAN Connector (CN3)
J3	2.5GbE LAN Connector (CN4)
J4	COM3~COM4 RS485 Pin Header
J5	USB 2.0 Pin Header
J7	M.2 M-KEY SATA-Only Connector
J8	DDR5 SO-DIMM (CH-A) Sockets
J9	M.2(E) 2230 (USB2.0/ PCIe x1) Connector
J10	HDD Power Connector
J11	CRT PIN Header
J12	Power Button Pin header
J13	Front panel
J14	Half Mini PCIE (USB2.0) Connector
J15	Full Mini PCIE (USB2.0/ PCIe x1) Connector
J16	RTC Battery Connector
J17	eSPI Debug (Factory use only)
J18	SPI Flash Connector (Factory use only)
J19	M.2(B) 3042/52 (USB 2.0/ USB 3.0) Connector
J20	Audio Amplifier Connector
J21	Audio Pin Header
CN1	COM1 COM Port Connector
CN2	COM2 COM Port Connector
CN3	2.5GbE LAN Connector (J2)
CN4	2.5GbE LAN Connector (J3)
CN5	DisplayPort connector
CN6	SATA Connector
CN7	+12V Connector
CN8	USB 3.0 Connector
CN9	Audio (Front) Connector
CN10	SIM1 Card Slot (J19-1)
CN11	SIM2 Card Slot (J15, J19-2)
CN12	Type-C Connector for 5,9.15.20V Power Out/ USB3.0-DP
CN13	Digital I/O Connector

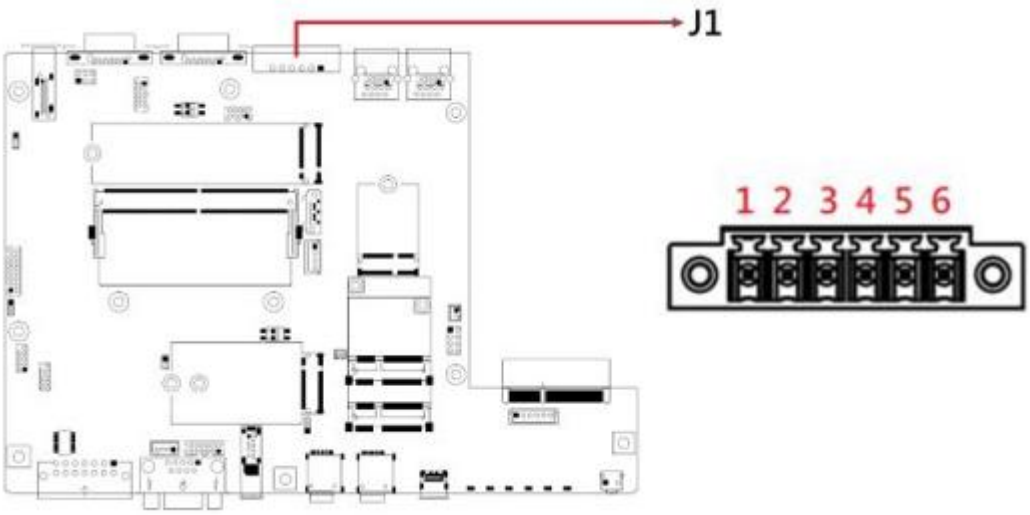


Jumper/Switch/Connector Locations

2.5.1 PCIE1: DC_IN Connector (+12V)

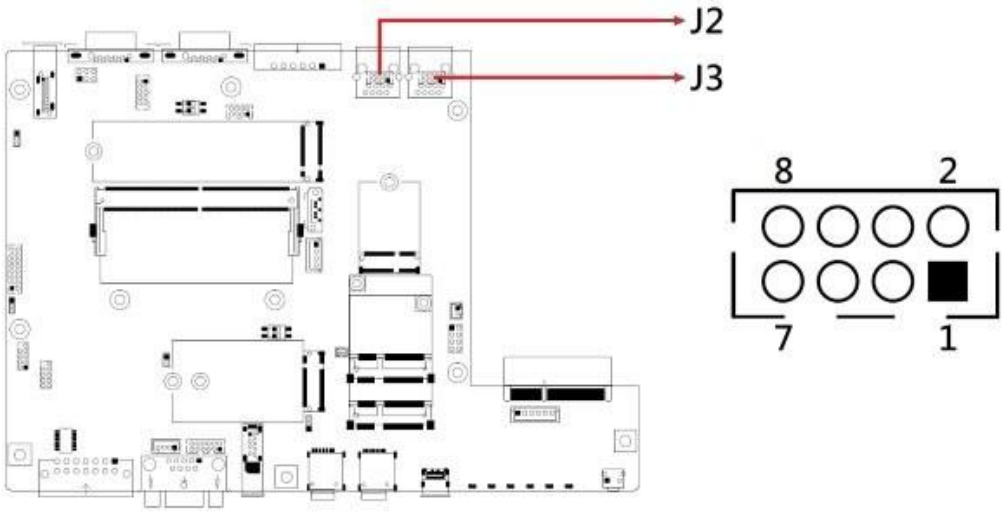


2.5.2 J1: CAN Bus Connector



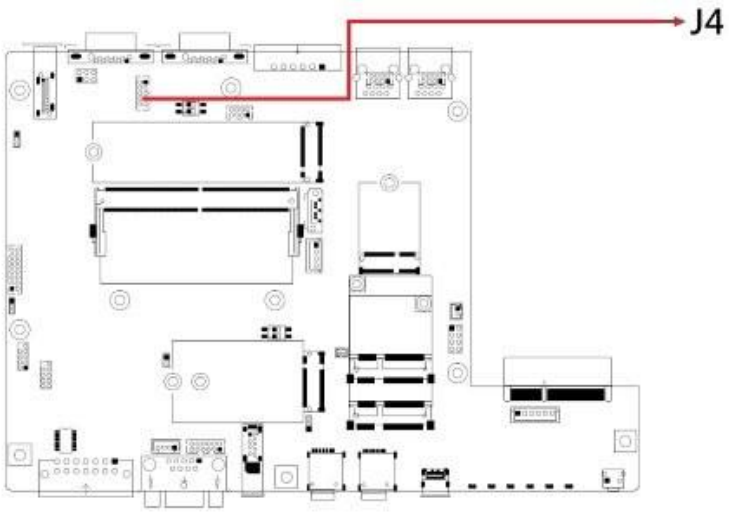
Pin	Assignment	Pin	Assignment
1	CAN_DH1	4	GND_ISO_CAN2
2	CAN_DL1	5	CAN_DL2
3	GND_ISO_CAN1	6	CAN_DH2

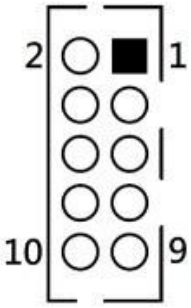
2.5.3 J2, J3: 2.5GbE LAN Connector



Pin	Assignment	Pin	Assignment
1	MXP0	**2**	MXN0
3	MXP1	**4**	MXN1
5	MXN2	**6**	MXP2
7	MXP3	**8**	MXN3

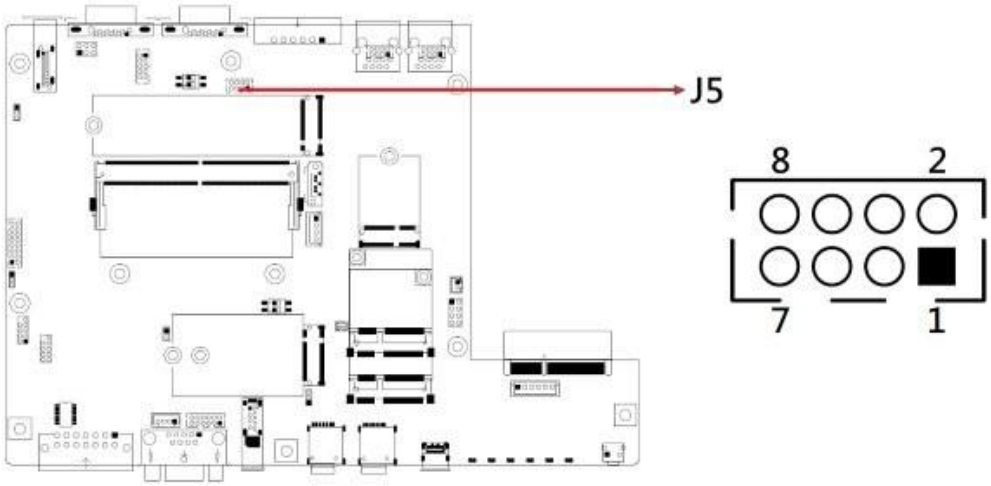
2.5.4 J4: COM3~COM4 RS485 Pin header





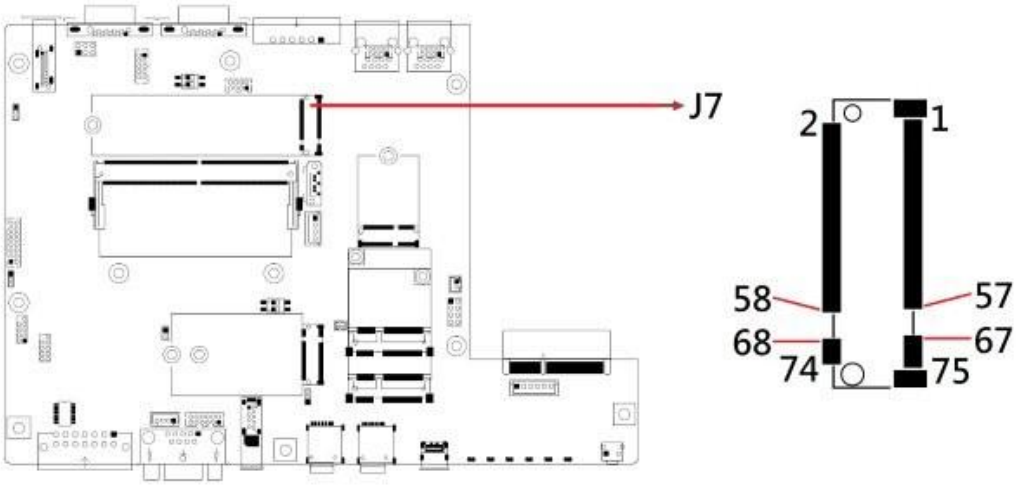
Pin	Assignment	Pin	Assignment
1	NC	2	NC
3	GND	4	GND
5	RS485-DATA3-	6	RS485-DATA4-
7	RS485-DATA3+	8	RS485-DATA4+
9	GND	10	GND

2.5.5 J5: USB 2.0 Pin Header

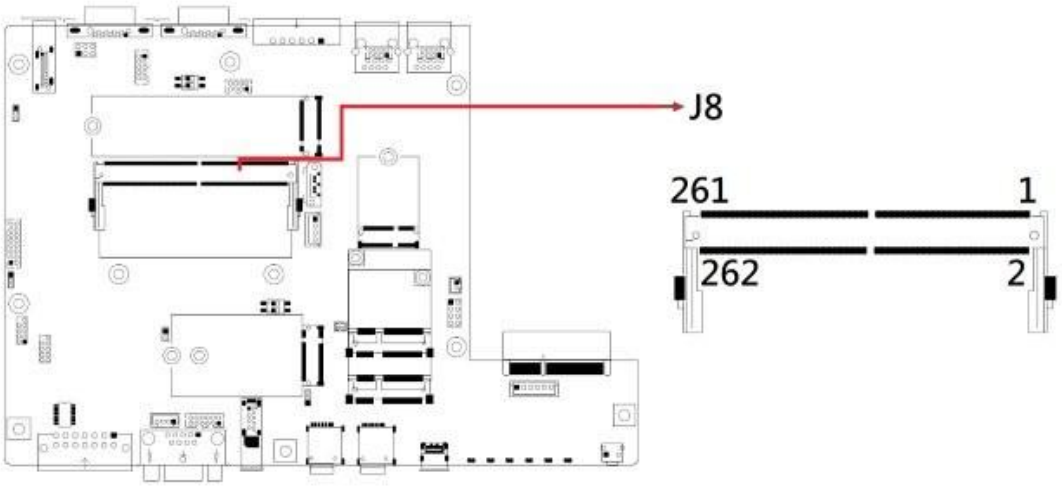


Pin	Assignment	Pin	Assignment
1	5VDUAL	2	GND
3	USB_PN	4	USB_PP
5	USB_PP	6	USB_PN
7	GND	8	5VDUAL

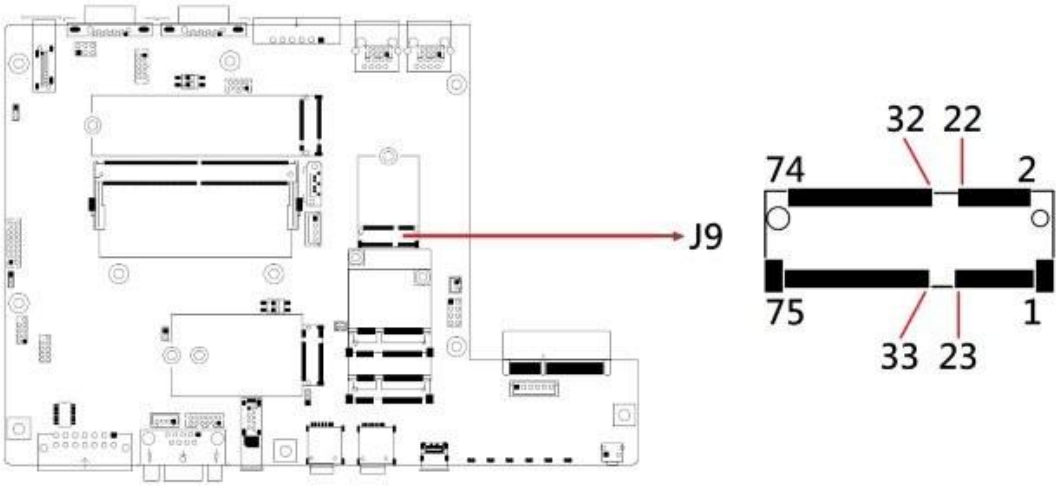
2.5.6 J7: M.2 M-Key SATA-Only Connector



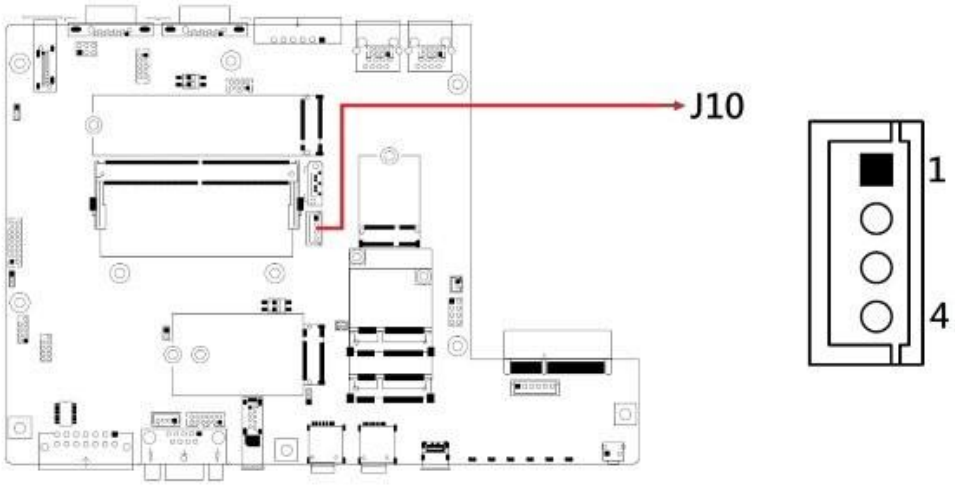
2.5.7 J8: DDR5 SO-DIMM (CH-A) Sockets



2.5.8 J9: M.2(E) 2230 (USB2.0/ PCIe x1) Connector

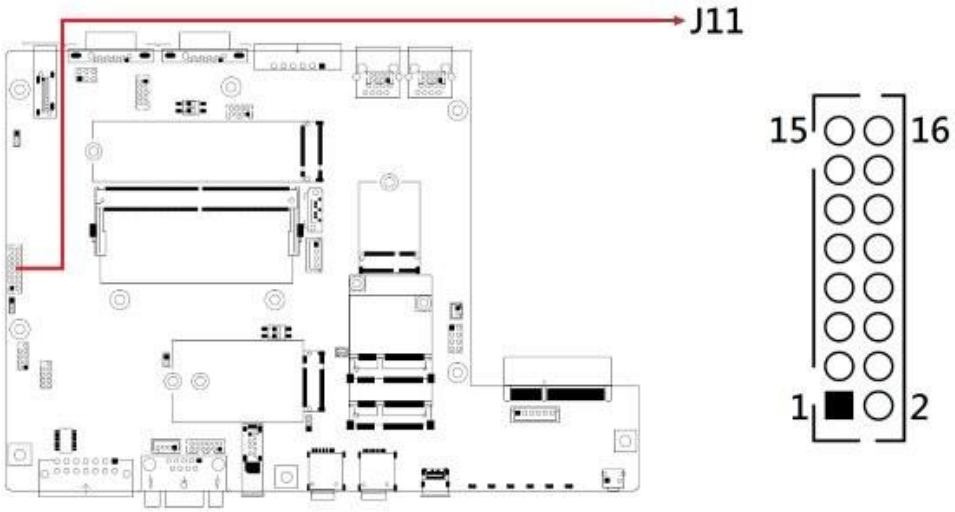


2.5.9 J10: HDD Power Connector



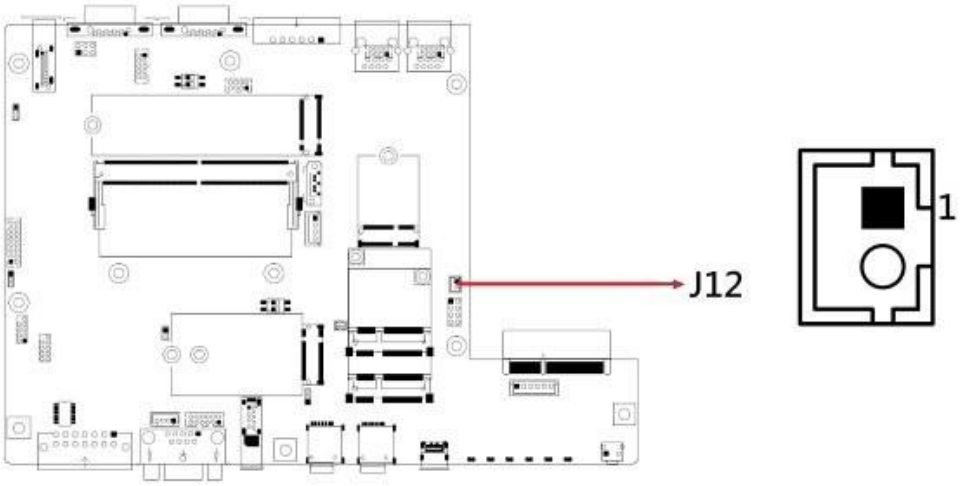
Pin	Assignment
1	+5V
2	Ground
3	Ground
4	+12V

2.5.10 J11: CRT Pin Header

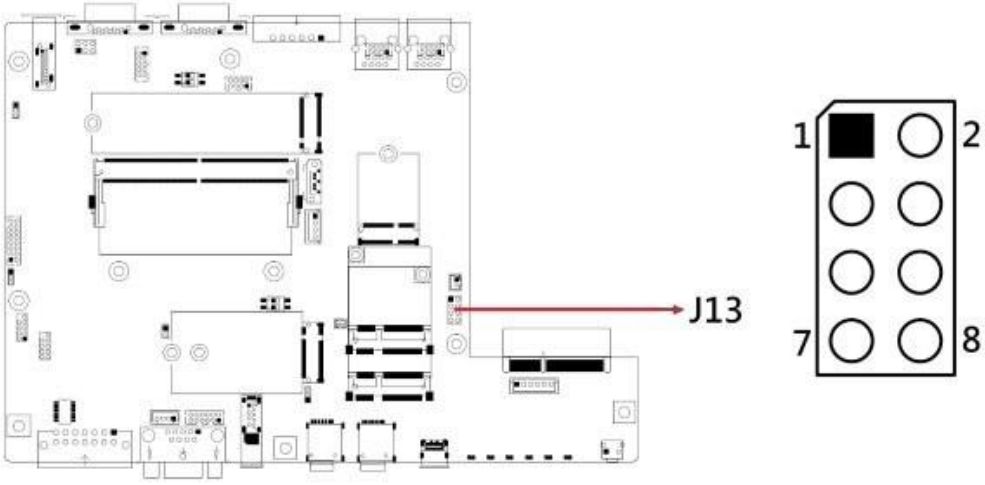


Pin	Assignment	Pin	Assignment
1	Red	2	VCC
3	Green	4	GND
5	Blue	6	N.C.
7	N.C.	8	DDCDATA
9	GND	10	HSYNC
11	GND	12	VSYNC
13	GND	14	DDCCLK
15	GND	16	N.C.

2.5.11 J12: Power Button Pin header

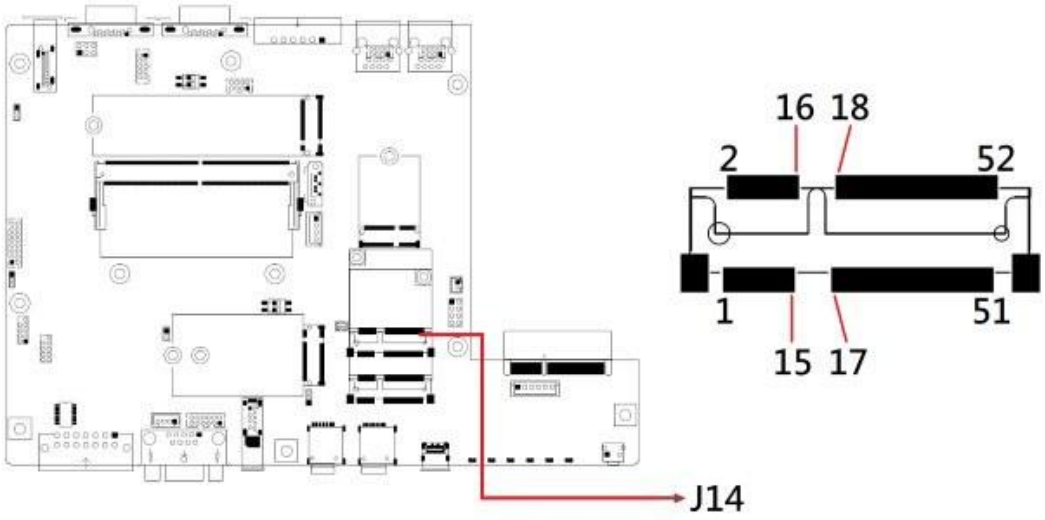


2.5.12 J13: For Front Panel

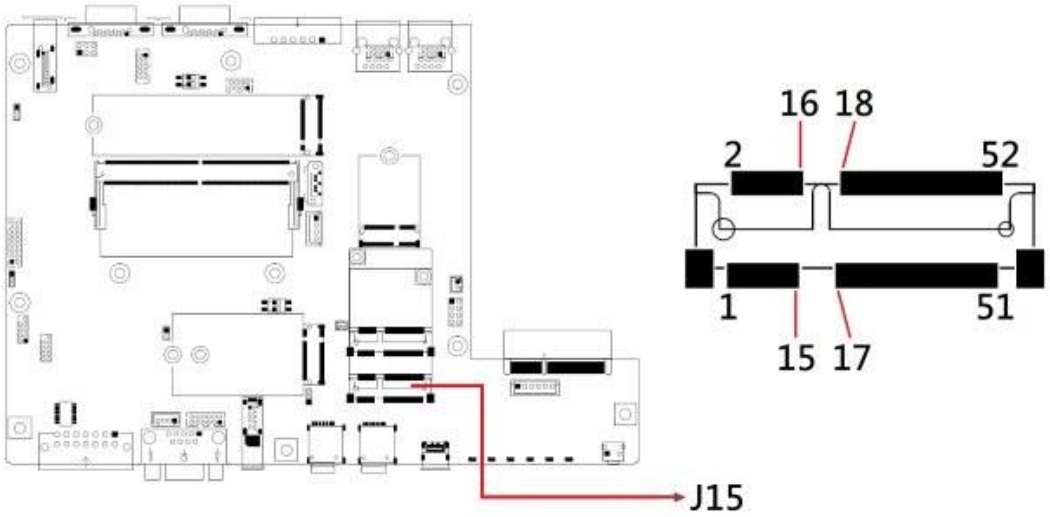


Pin	Assignment	Pin	Assignment
1	Power BTN-	2	Power BTN+
3	HDD LED+	4	HDD LED-
5	Reset BTN-	6	Reset BTN+
7	Power LED+	8	Power LED-

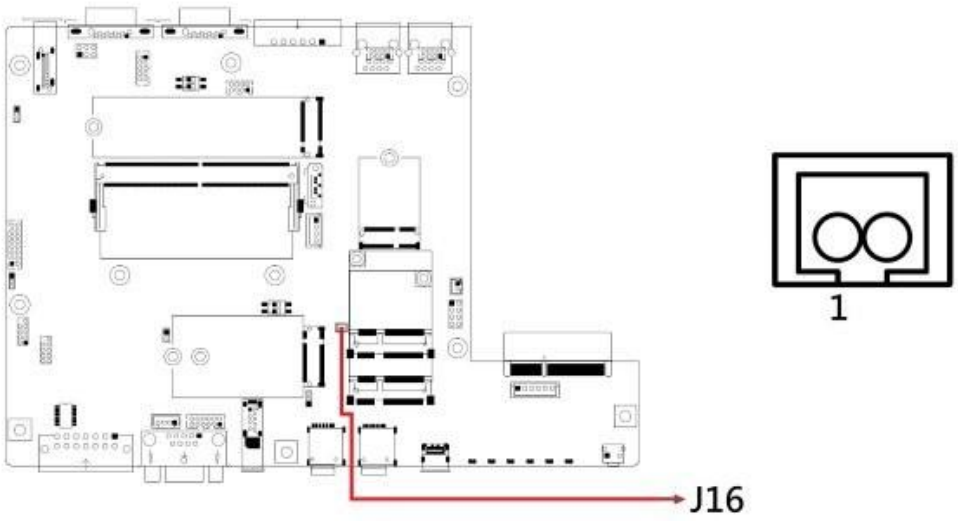
2.5.13 J14: Half Mini PCIE (USB2.0) Connector



2.5.14 J15: Full Mini PCIE (USB2.0/ PCIe x1) Connector



2.5.15 J16: RTC Battery Connector

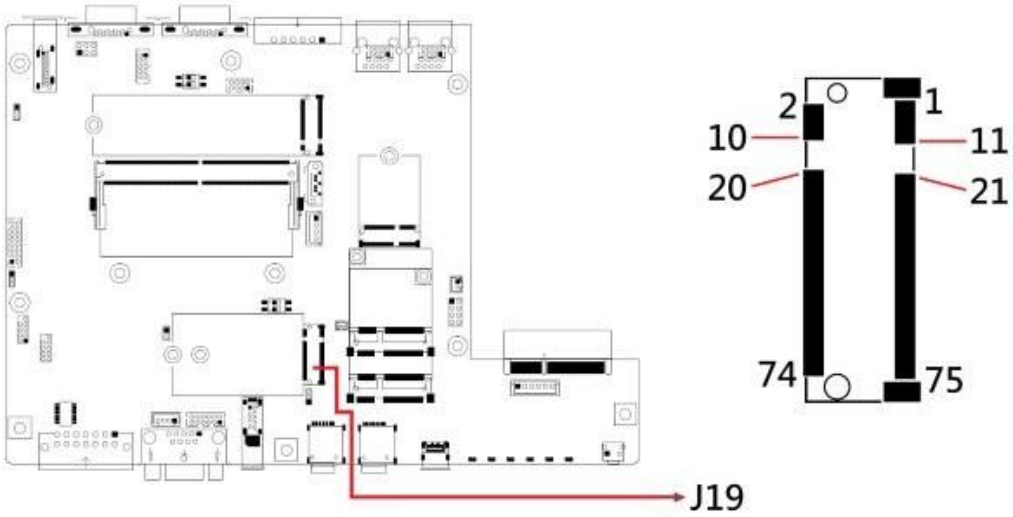


Pin	Assignment
1	+3V
2	Ground

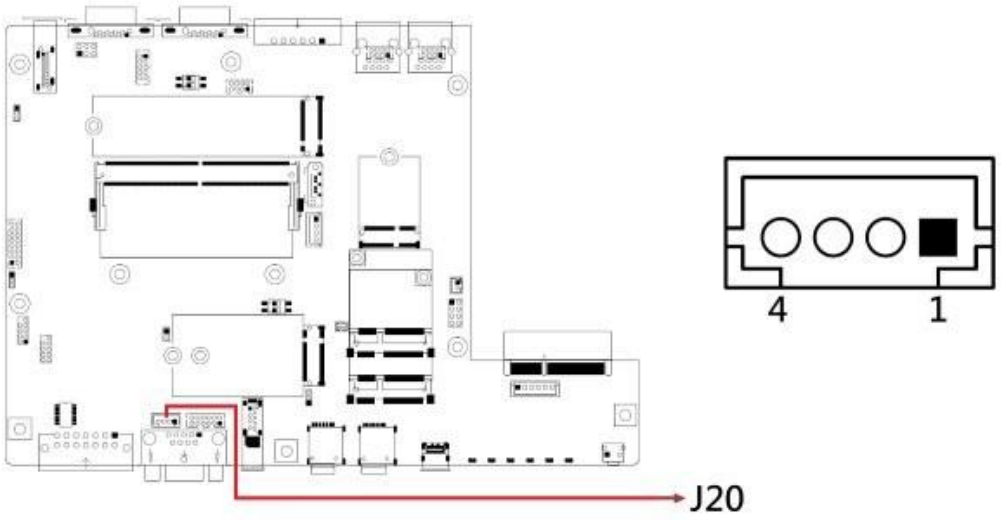
2.5.16 J17: eSPI Debug (Factory use only)

2.5.17 J18: SPI Flash Connector (Factory use only)

2.5.18 J19: M.2(B) 3042/52 (USB 2.0/ USB 3.0) Connector

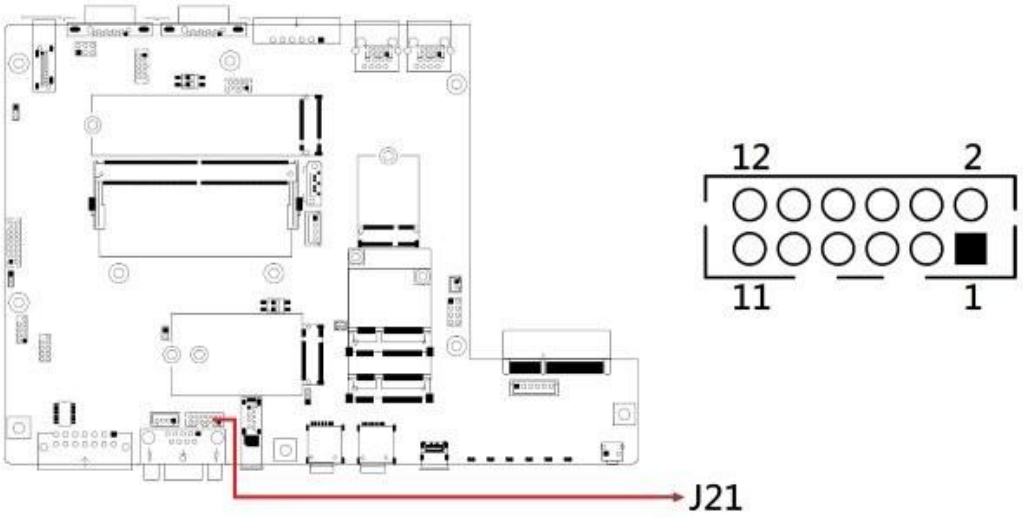


2.5.19 J20: Audio Amplifier Connector



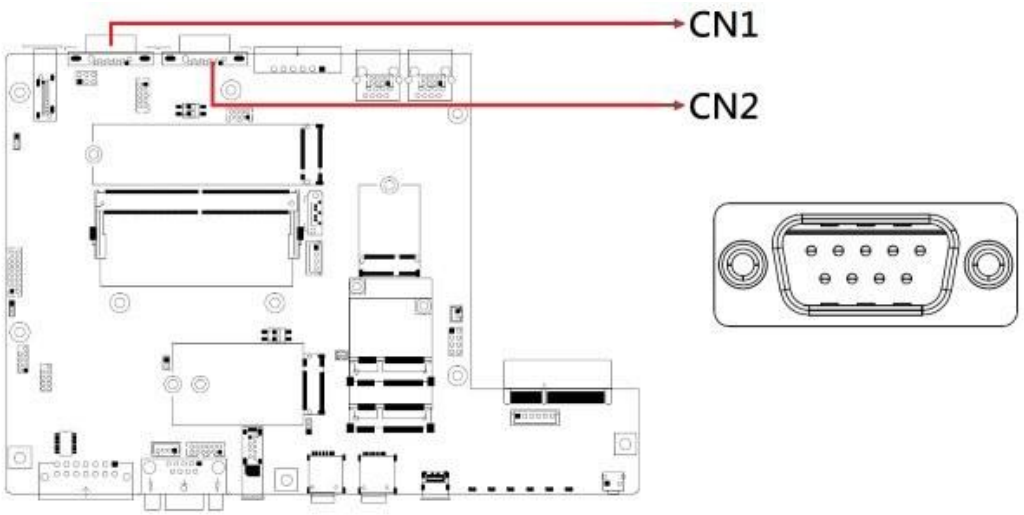
Pin	Assignment
1	SPK_L+
2	SPK_L-
3	SPK_R-
4	SPK_R+

2.5.20 J21: Audio Pin Header



Pin	Assignment	Pin	Assignment
1	LINE OUT_L	2	LINE OUT_R
3	FRONT_JD	4	GND
5	NC	6	NC
7	NC	8	GND
9	MIC_L	10	MIC_R
11	MIC_JD	12	GND

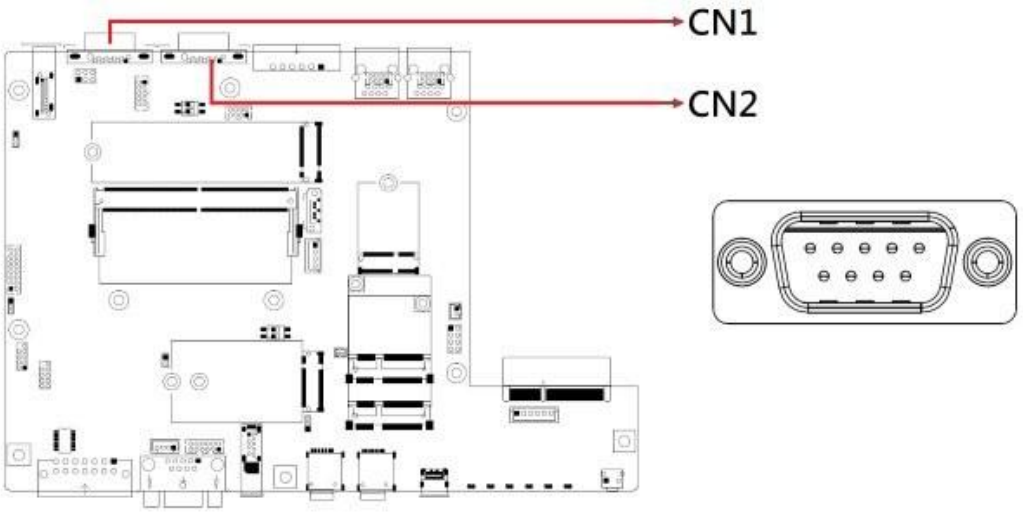
2.5.21 CN1: COM1 COM Port Connector (RS-232/422/485)



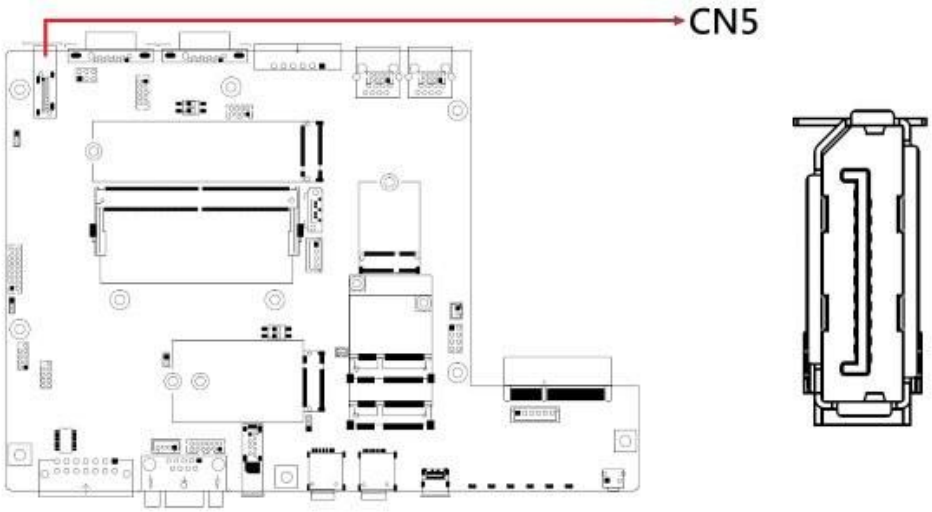
*COM1 setting is selectable in BIOS.

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

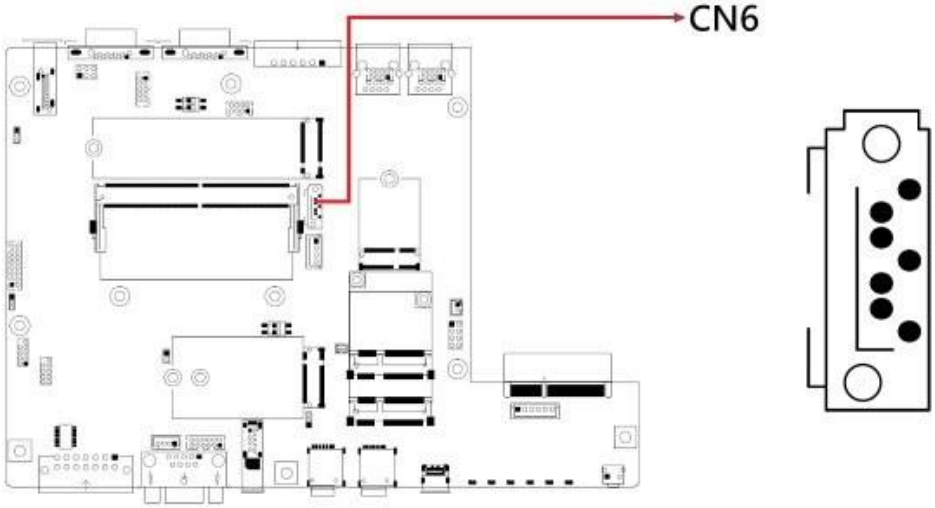
2.5.22 CN2: COM2 RS232 Connector



2.5.23 CN5: DisplayPort Connector

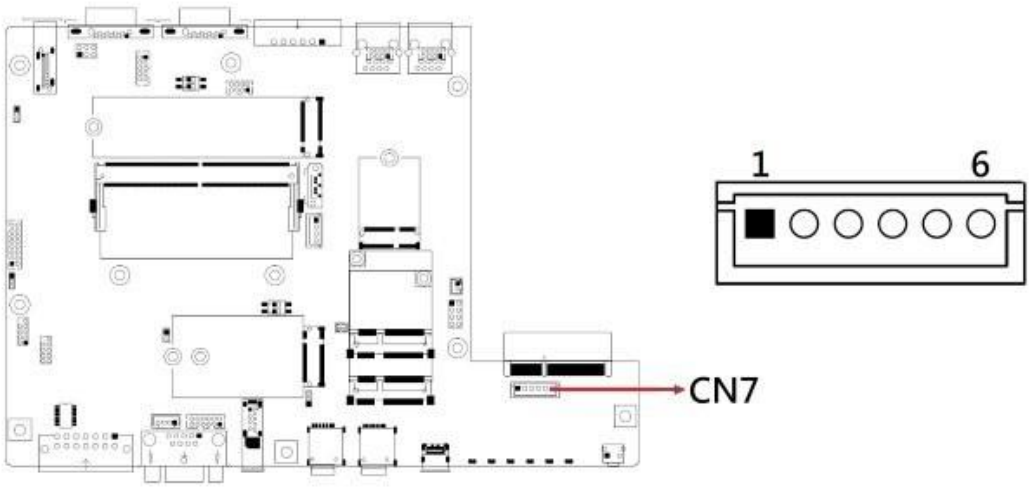


2.5.24 CN6: SATA Connector



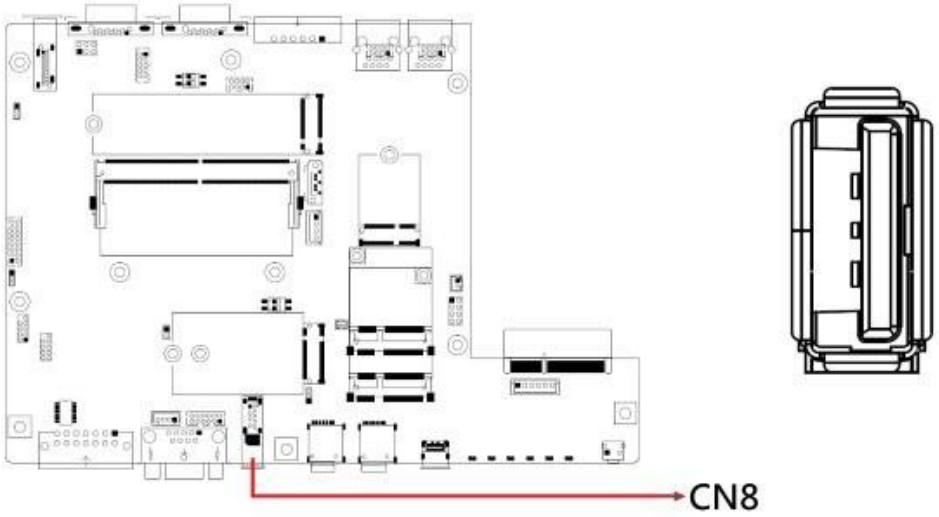
Pin	Assignment
1	Ground
2	TX+
3	TX-
4	Ground
5	RX-
6	RX+
7	Ground

2.5.25 CN7: +12V Connector

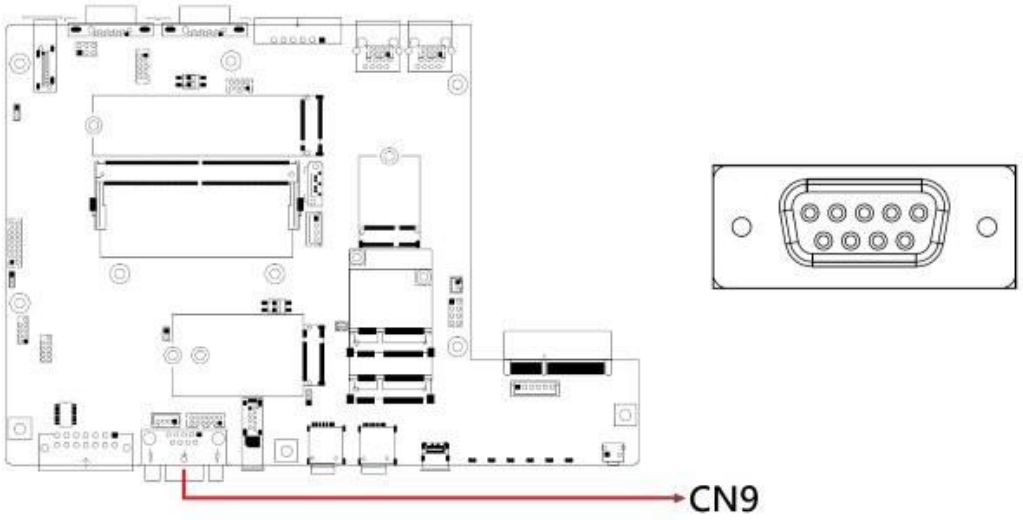


Pin	Assignment
1	+12V
2	+12V
3	+12V
4	GND
5	GND
6	GND

2.5.26 CN8: USB 3.0 Connector

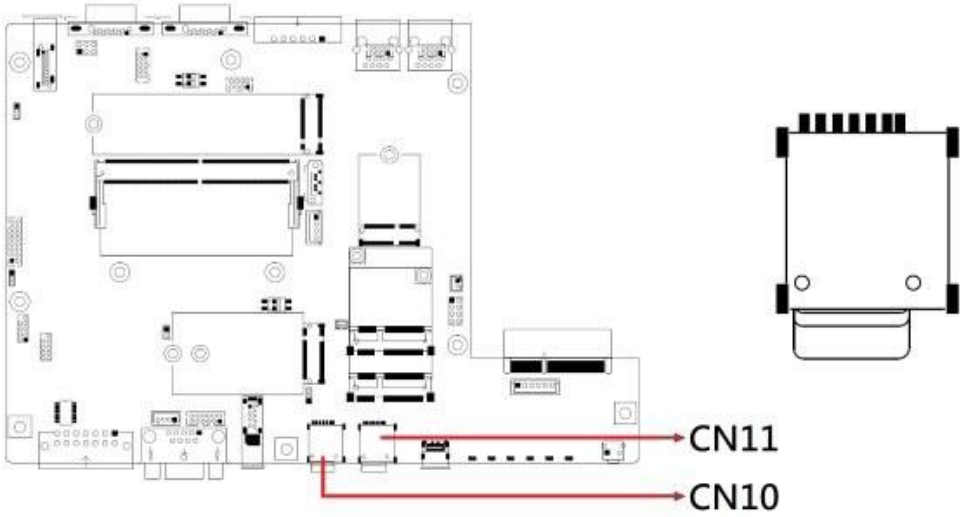


2.5.27 CN9: Audio (Front) Connector

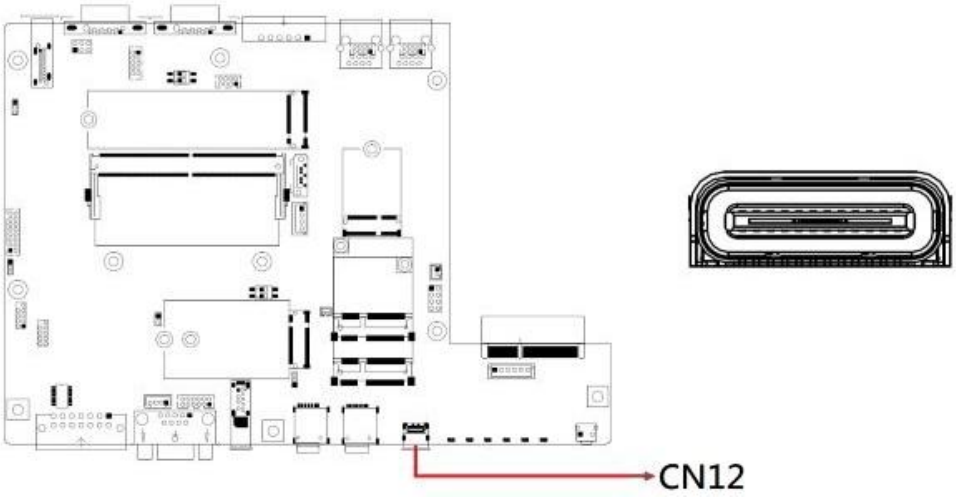


Pin	Assignment	Pin	Assignment
1	MIC_JD	6	FRONT_JD
2	MIC_R	7	LINE OUT_L
3	MIC_L	8	LINE OUT_R
4	Ground	9	Ground
5	Ground	10	NC

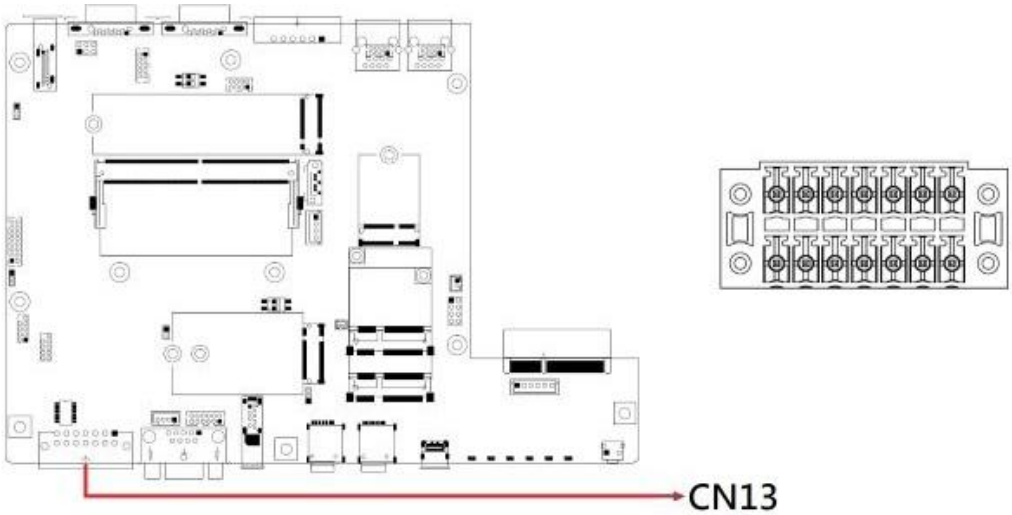
2.5.28 CN10, CN11: SIM1/SIM2 Card Slots



2.5.29 CN12: Type-C Connector for 5,9.15.20V Power Out / USB3.0-DP



2.5.30 CN13: Digital I/O Connector



Pin	Assignment	Pin	Assignment
1	DI0	2	DO0
3	DI1	4	DO1
5	DI2	6	DO2
7	DI3	8	DO3
9	DI4	10	DO4
11	DI5	12	DO5
13	GND	14	VDO_ISO_COM

Chapter 3
Driver Installation

The information provided in this chapter includes:

- Intel® Chipset Software Installation Utility
- Graphics Drivers
- Audio Drivers
- LAN Drivers
- Intel® Management Engine Drivers
- Integrated Sensor Drivers
- Intel® Serial IO Drivers
- Intel® CANBus Drivers

3.1 Introduction

This section describes the installation procedures for software drivers. The drivers can be downloaded from the IBASE website.

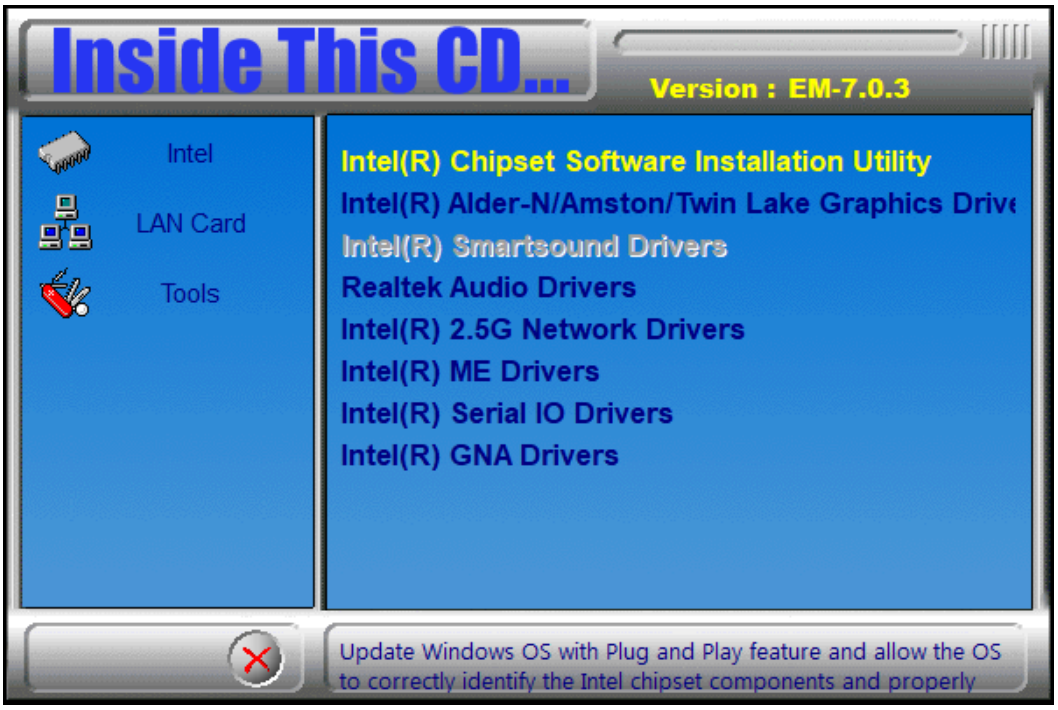
Note: After installing your Windows operating system, you must install the Intel® Chipset Software Installation Utility first before proceeding with other drivers.

3.2 Intel® Chipset Software Installation Utility

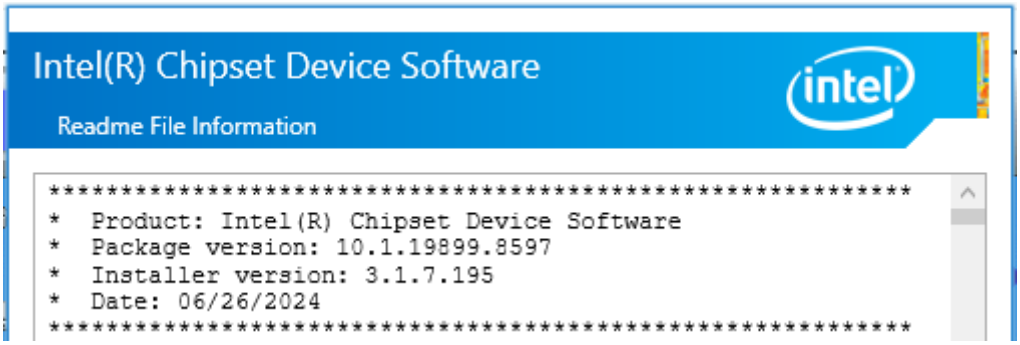
The Intel® Chipset drivers should be installed first before the software drivers to install INF files for Plug & Play function for the chipset components. Follow the steps below.

1. Visit the IBASE download page and navigate to your product's support section. Download the compressed driver package and copy it to your system. Double-click the file to extract its contents. Run the CDGuide to open the main driver interface. In the left navigation pane, click Intel, then select Intel® Alder-N/Amston/Twin Lake Chipset Drivers from the options on the right.

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



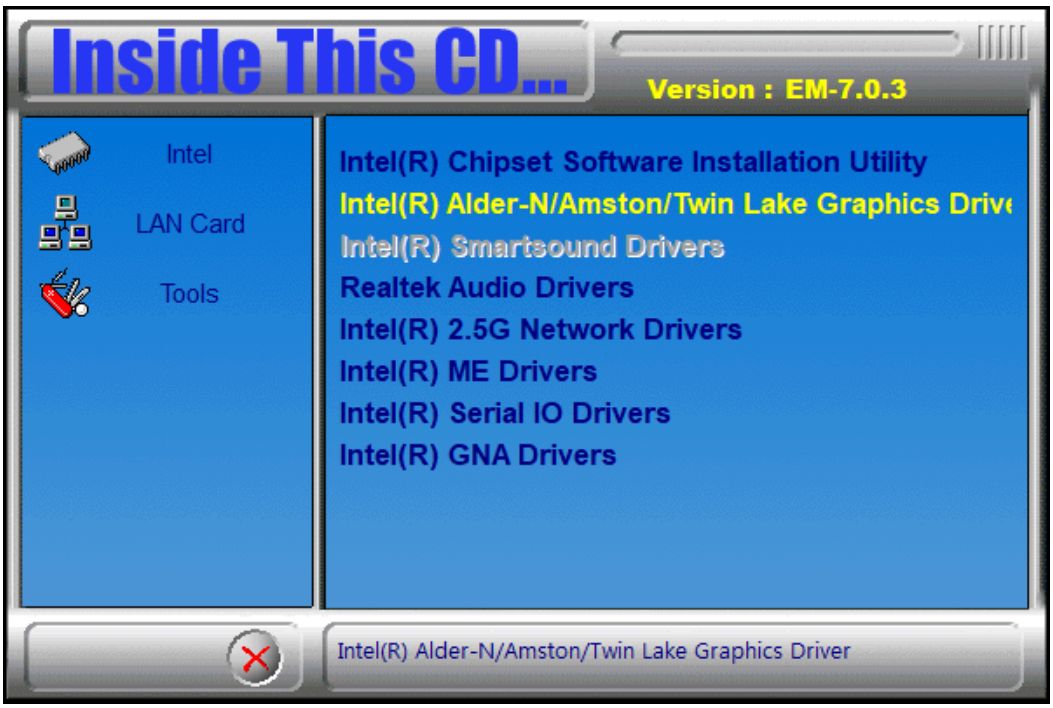
3. When the *Welcome* screen appears, click **Next** to continue.
4. Read and accept the license agreement, then click **Next**.
5. On the *Readme File Information* screen, click **Install**.



6. When installation is complete, click **Finish** to exit setup.

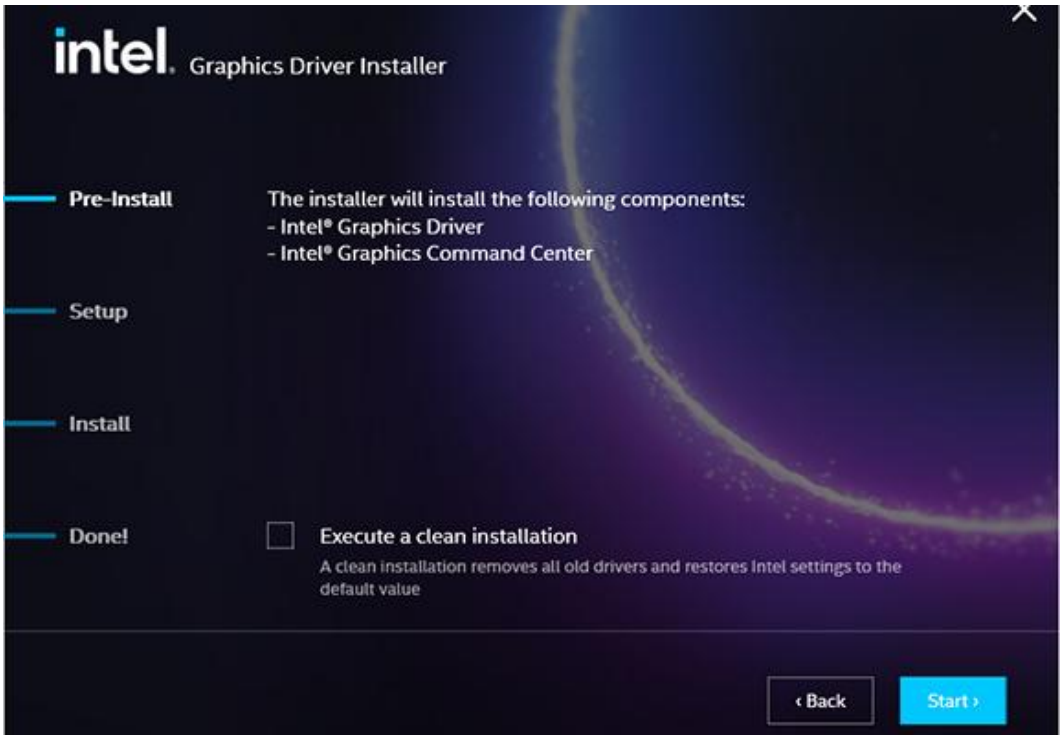
3.3 VGA Driver Installation

1. Click **Intel** on the left pane and then **Intel(R) Alder-N/Amston/Twin Lake Chipset Drivers** on the right pane.
2. Click **Intel(R) Alder-N/Amston/Twin Lake Graphics Driver**.

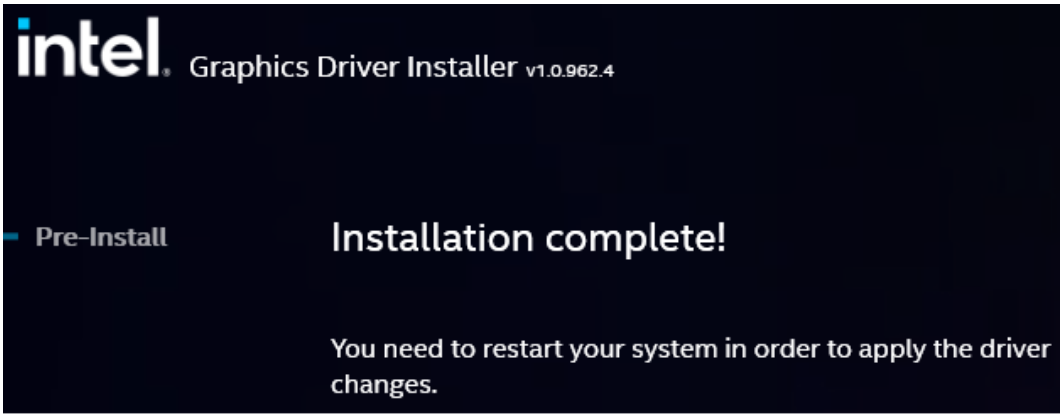


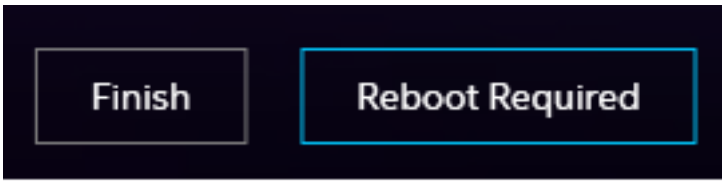
3. Click **Begin installation**.

4. Click **I agree** in the LICENSE AGREEMENT screen.
5. Click **Start** to begin installation.



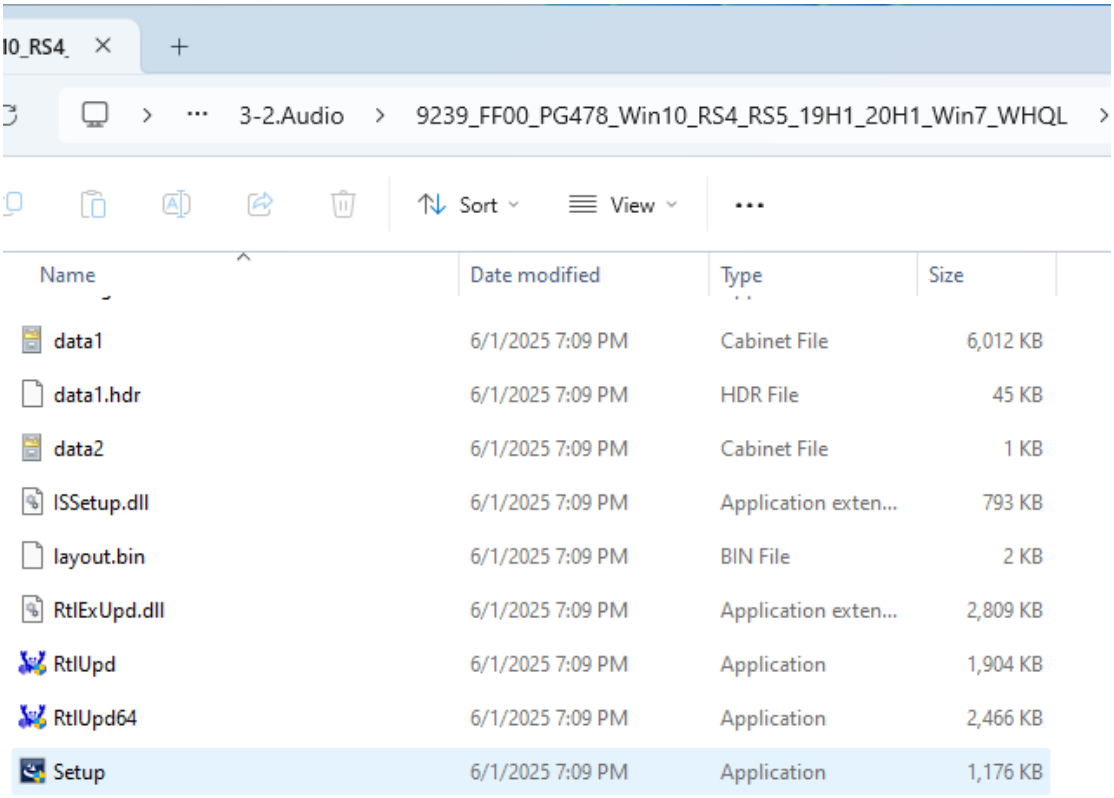
6. When installation completes, click **Finish**.

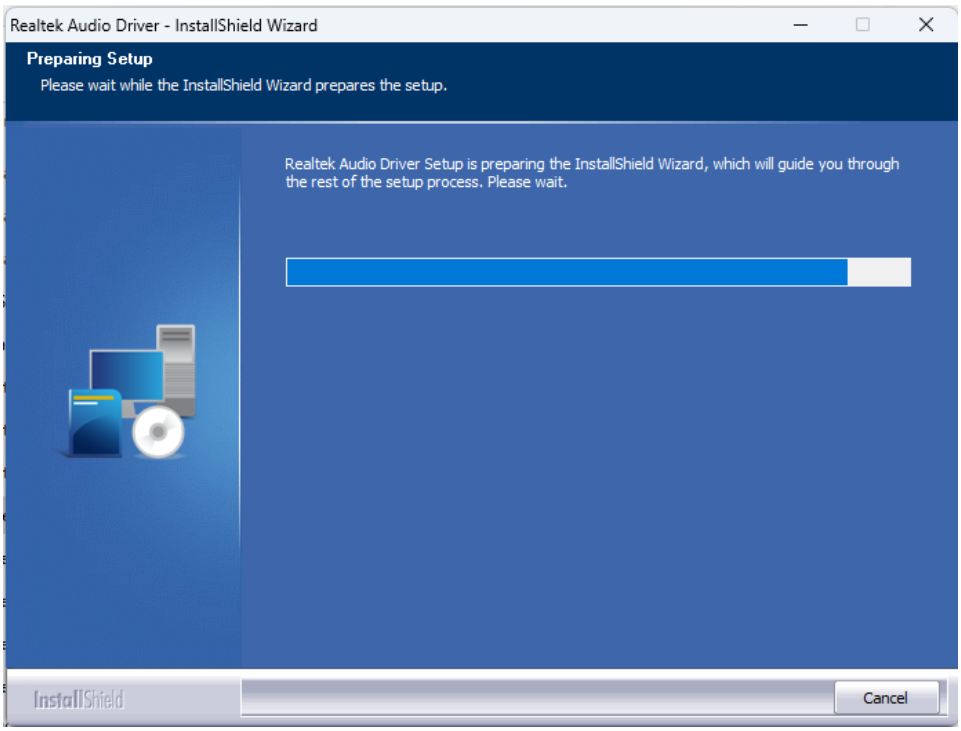




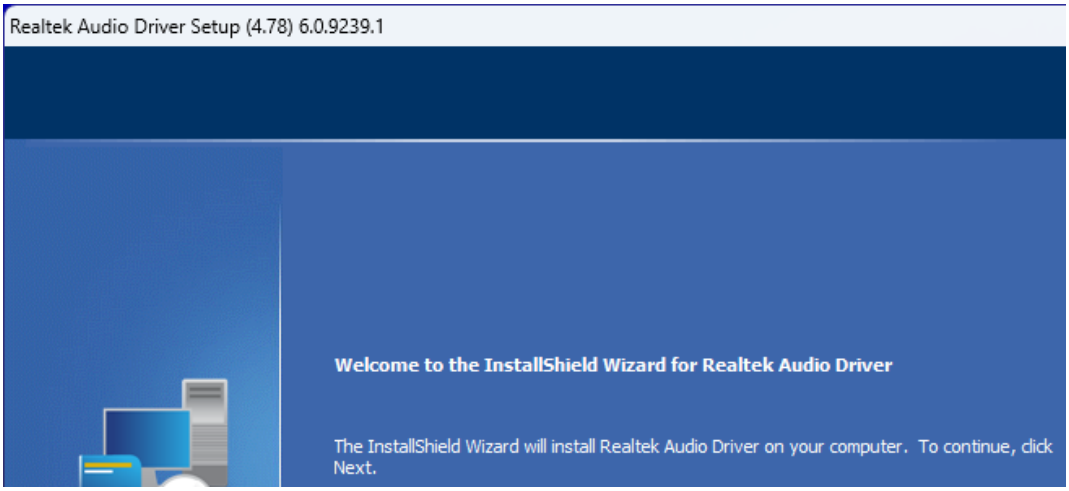
3.4 HD Audio Driver Installation

1. To install the audio drivers, you must run the Setup application file as shown below.





2. Click **Next** in the Welcome screen.



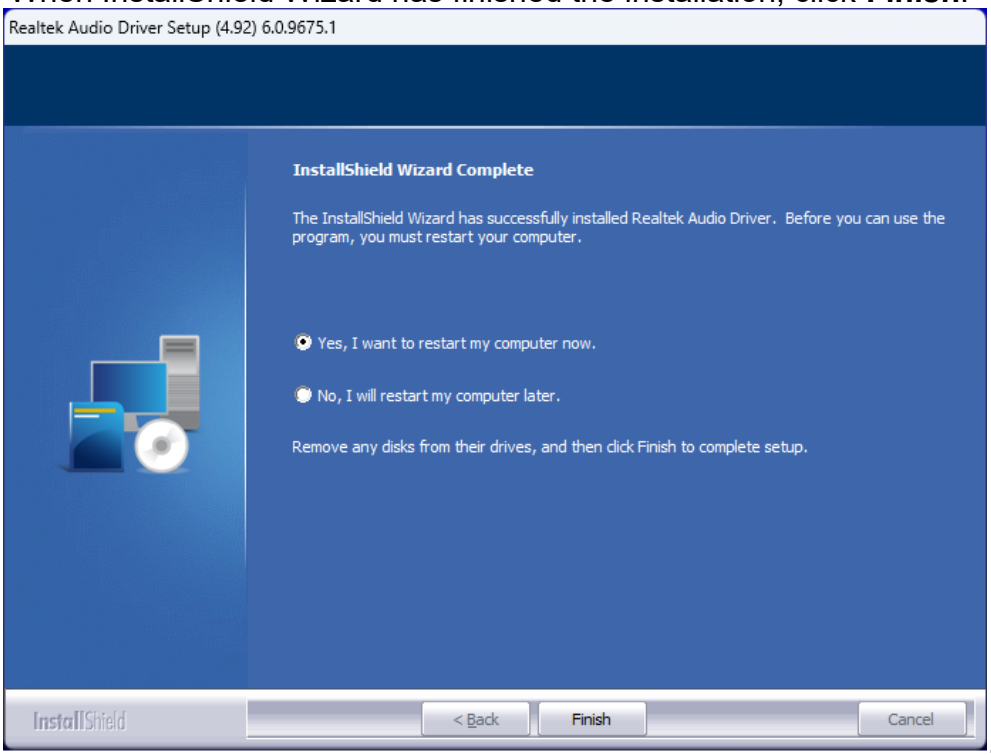
3. Click **Next** in the setup options screen to start the setup process.

4. When InstallShield Wizard has finished installation of the Realtek Audio Driver, click **Finish**.

3.5 Realtek Audio DCH Drivers Installation

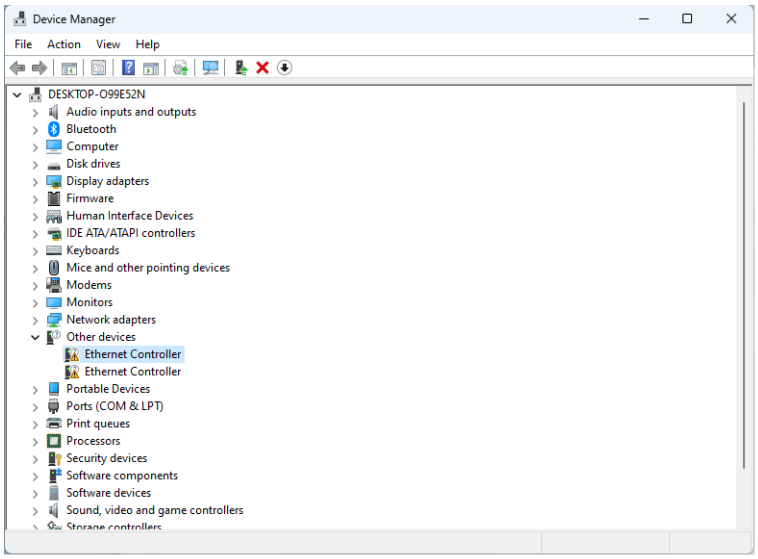
1. Click **Intel** on the left pane and then **Intel(R) Alder-N/Amston/Twin Lake Chipset Drivers** on the right pane.
2. Click **Realtek Audio Drivers**.

3. When the **Welcome** screen appears, click **Next** to install the drivers.
4. When InstallShield Wizard has finished the installation, click **Finish**.

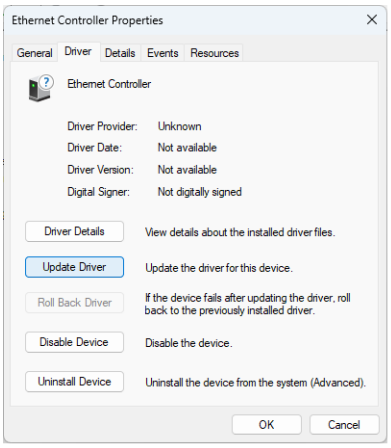


3.6 LAN Drivers Installation

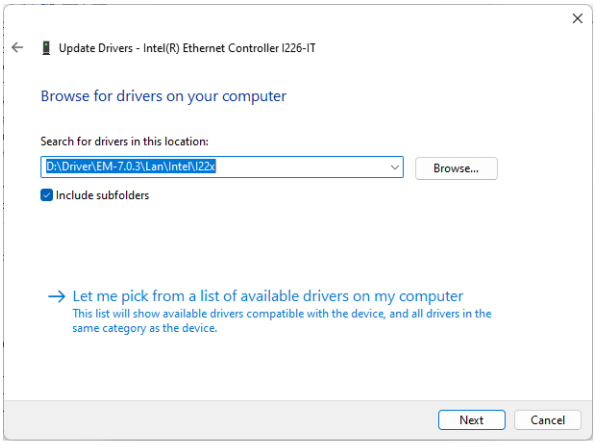
1. Got to the **Device Manager** and notice the Ethernet Controller.



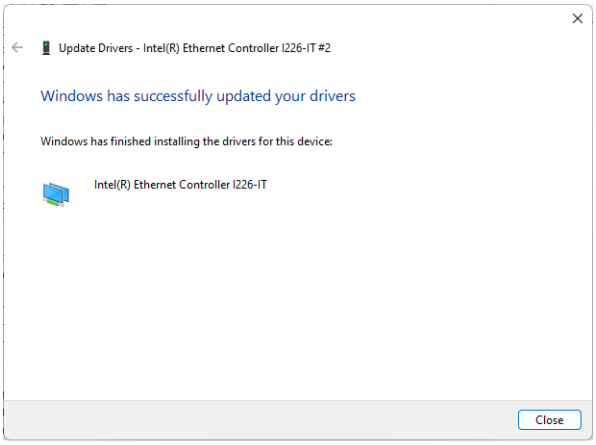
2. After clicking **Ethernet Controller**, the image will below will appear. Click **Update Driver**.



3. Browse for drivers on your computer, as shown below and click **Next**.



4. After the drives have bee installed, click **Close**.

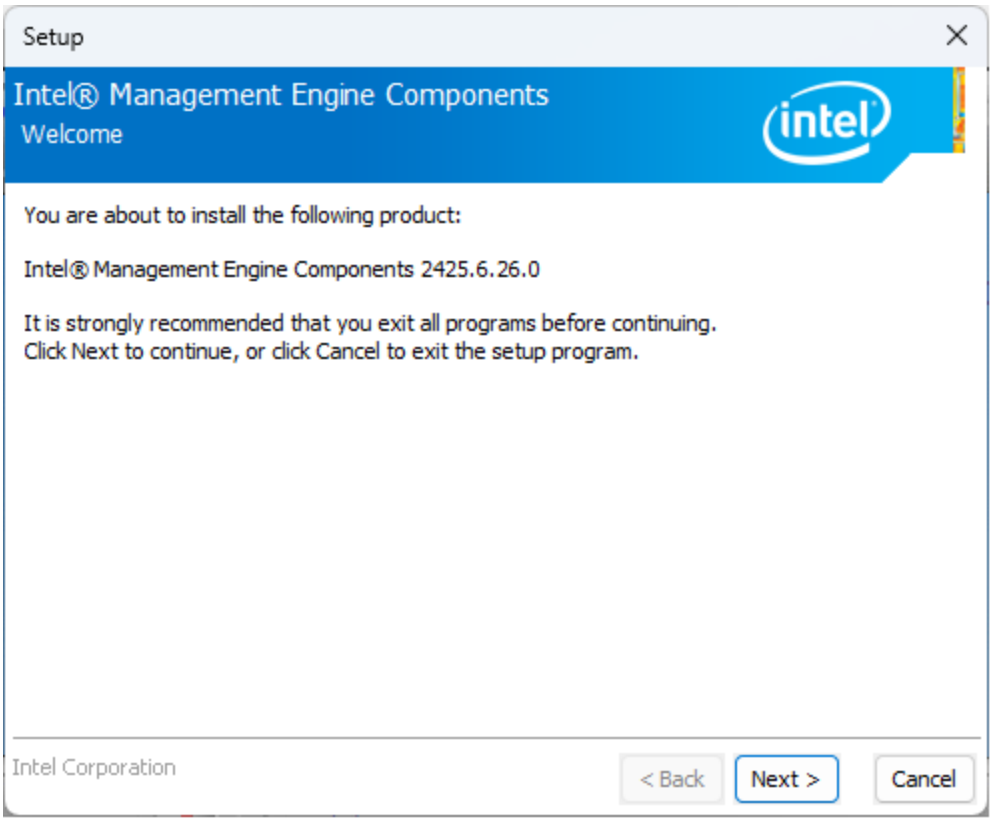


3.7 Intel® ME Drivers Installation

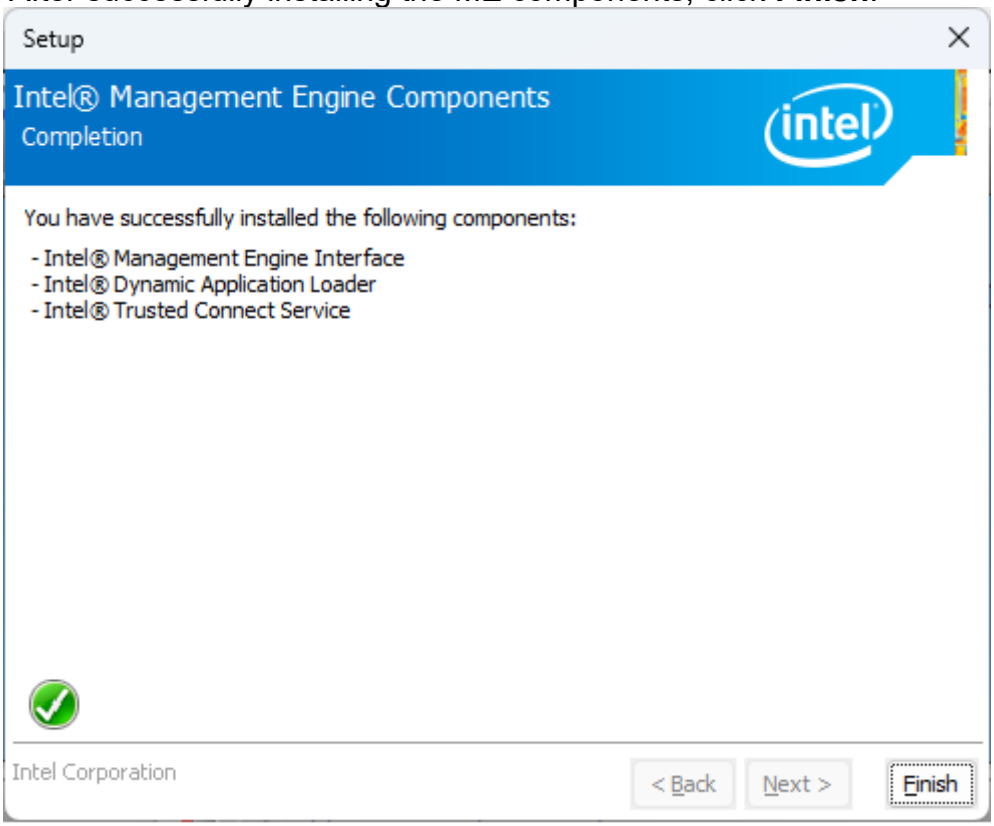
1. Click **Intel** on the left pane and then select **Intel(R) Alder-N/Amston/Twin Lake Chipset Drivers** on the right pane.

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

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

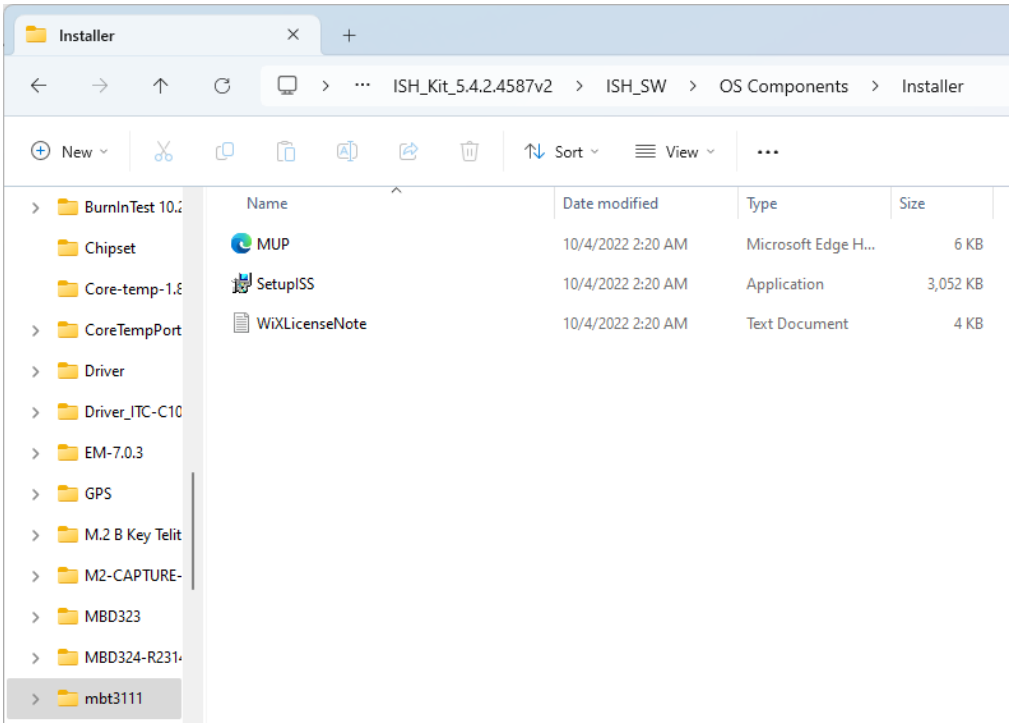


4. Accept the license agreement, then click **Next**.
5. In the Destination Folder, click **Next** to install to the default folder, or click Change to choose another destination folder.
6. After successfully installing the ME components, click **Finish**.

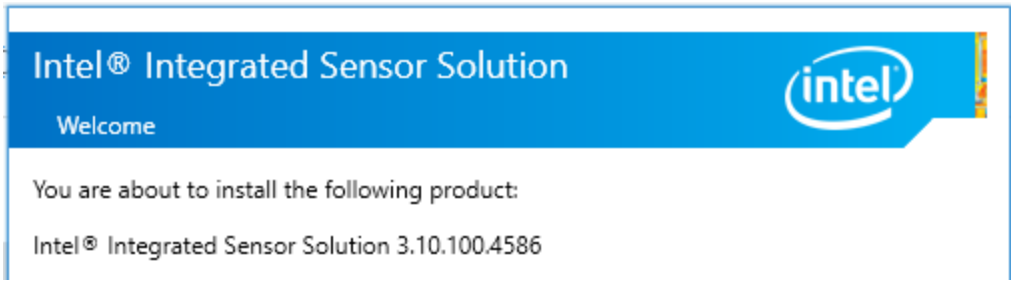


3.8 Integrated Sensor Solution Installation

1. Locate the installation files of the Integrated Sensor Solution in the corresponding directory and run the application as shown below.



2. Click **Next** in the Welcome screen.

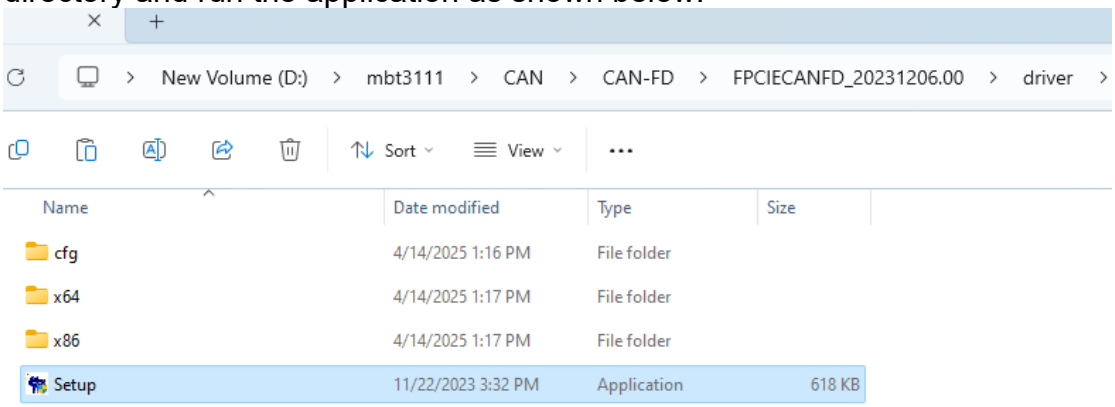


3. Click **Next** in the setup options screen to start the setup process.

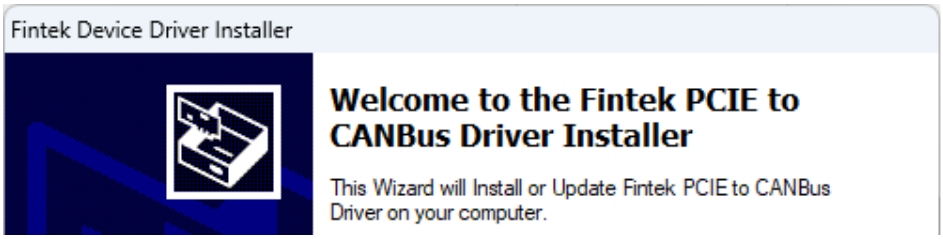
4. Accept the license agreement and click **Install**. After the components have been installed, click **Finish** to complete the setup process.

3.9 CANBus Driver Installation

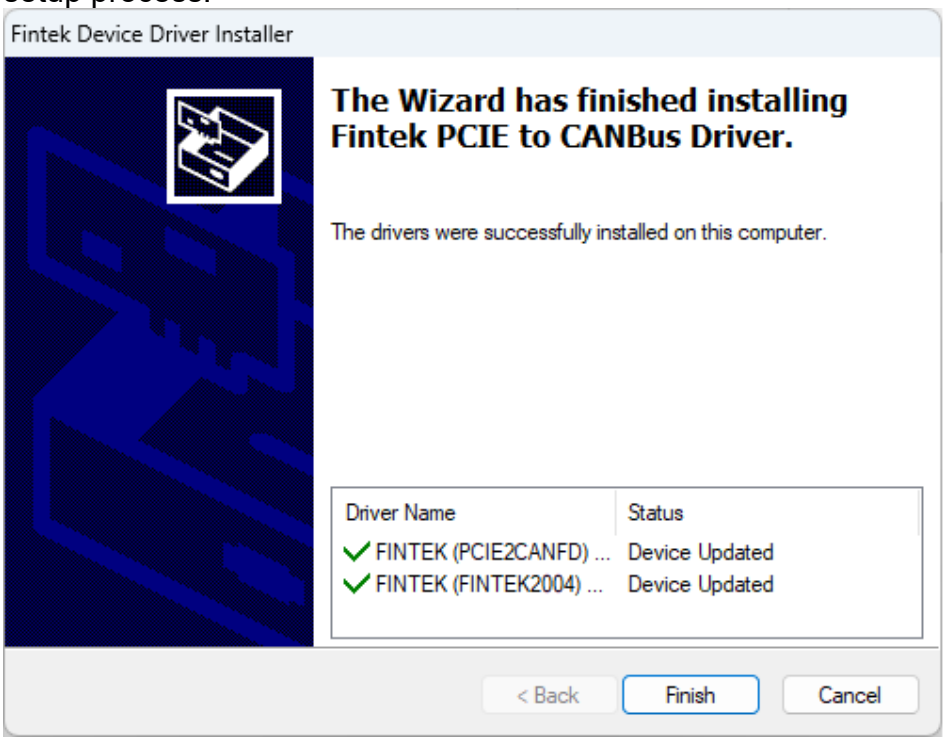
1. Locate the installation files of the CANBus driver in the corresponding directory and run the application as shown below.



2. Click **Next** in the Welcome screen to start installing the driver.



3. After the components have been installed, click **Finish** to complete the setup process.



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
- Security Settings
- Boot Settings
- Save & Exit

4.1 Introduction

The BIOS (Basic Input/Output System) stored in the ROM of your computer system provides low-level control and initialization for Intel® processors. It supports standard devices such as disk drives, and serial ports. The BIOS also includes password protection and advanced options for fine-tuning the system chipset for maximum performance and stability.

4.2 BIOS Setup

The BIOS includes a Setup utility for configuring system settings. This utility is stored in the system's ROM and is activated as soon as the system is powered on.

To enter the BIOS Setup utility, press the <Del> key immediately after turning on the computer. If you wait too long, the system will proceed with POST (Power-On Self-Test), and you will need to restart in order to access Setup.

If you miss the timing:

- Press the **Reset** button, or
- Simultaneously press <Ctrl> + <Alt> + <Delete>, or
- Power the system off and back on again.

When starting up, you will see the message:
Press <DEL> to Enter Setup
Within the BIOS Setup utility:

- Use the **arrow keys** to navigate,
- Press **<Enter>** to select,
- Use **<PgUp>** and **<PgDn>** to change values,
- Press **<F1>** for help,
- And **<Esc>** to exit.

The first screen you will see is the **Main Menu**, where you can access various configuration settings and exit options.

⚠ **Warning:**
It is strongly recommended that you do **not** modify the chipset default settings. These defaults have been carefully selected by AMI and your system manufacturer to ensure optimal performance and stability. Changing them may cause the system to become unstable or crash.

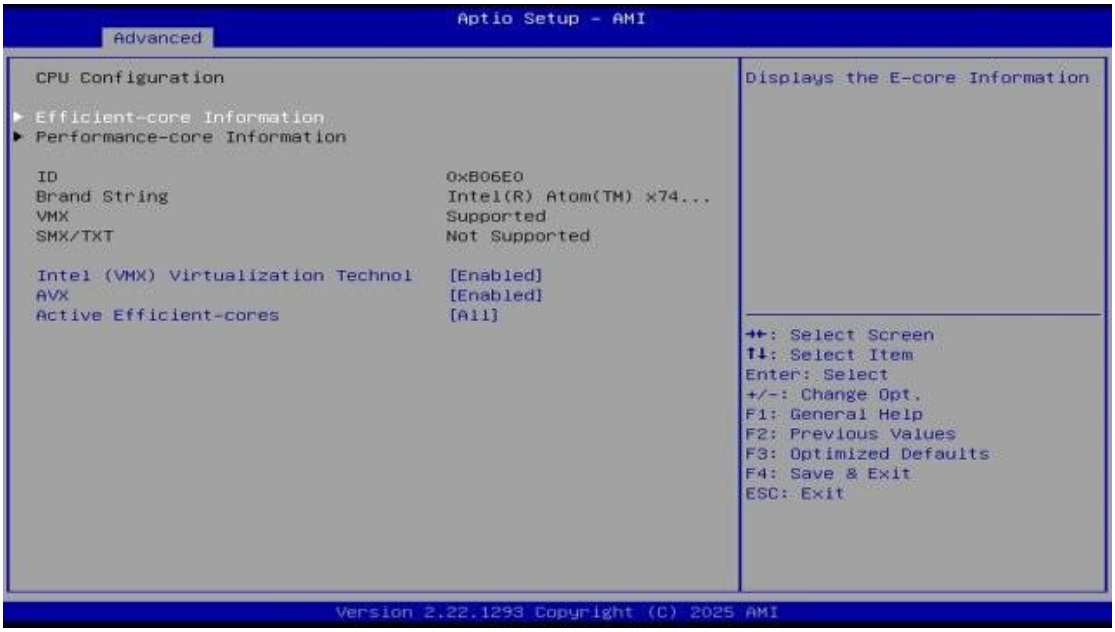
4.3 Main Settings

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

4.4 Advanced Settings

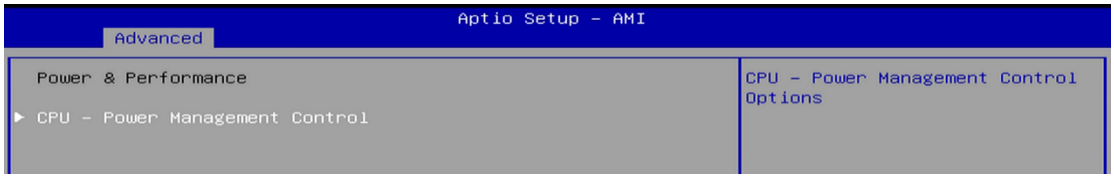
This section allows you to configure system features according to your preference.

4.4.1 CPU Configuration

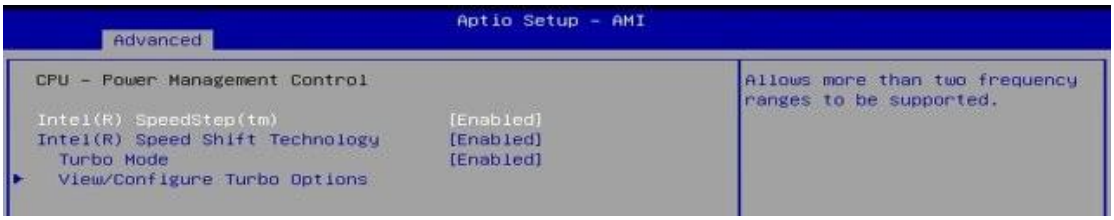


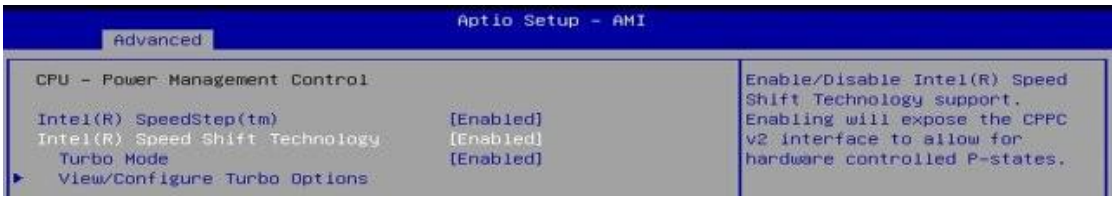
BIOS Setting	Description
Efficient-core Information	Displays the E-core Information
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
AVX	Enable/Disable the AVX 2 instructions. This is applicable for Performance-core only.
Active Efficient-cores	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

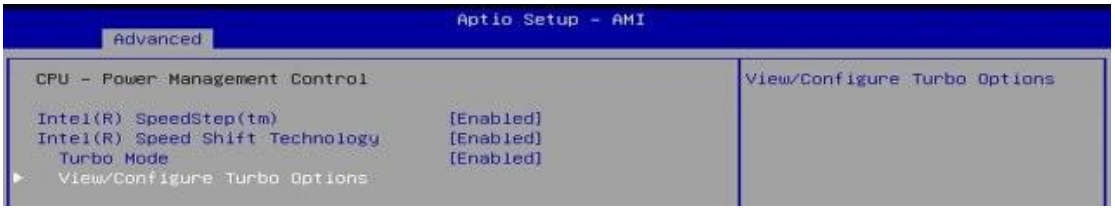
4.4.2 Power & Performance

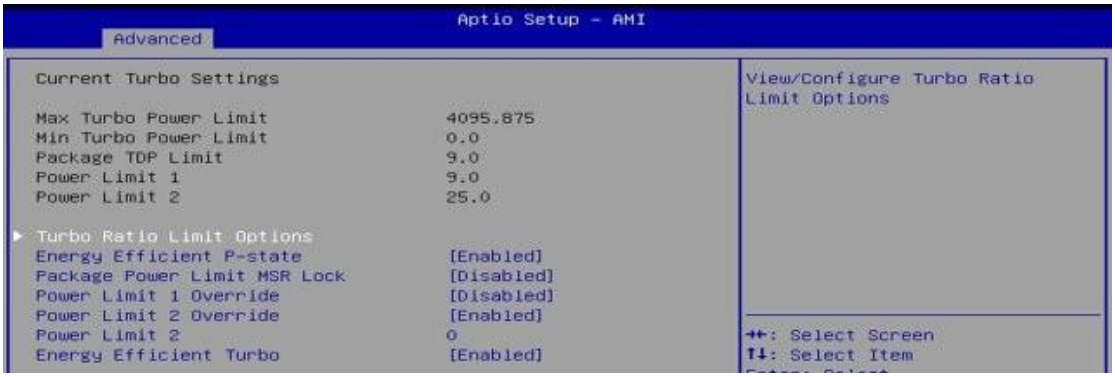


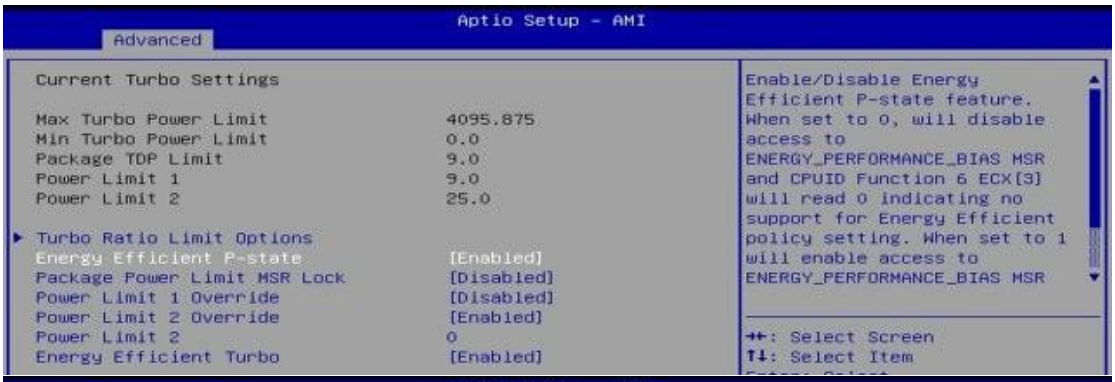
BIOS Setting	Description
CPU – Power Management Control	CPU – Power Management Control Options
Intel(R) SpeedStep(tm)	Allows more than two frequency ranges to be supported
Intel(R) Speed Shift Technology	Enable/Disable. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states
View/Configure Turbo Options	View/Configure Turbo Options

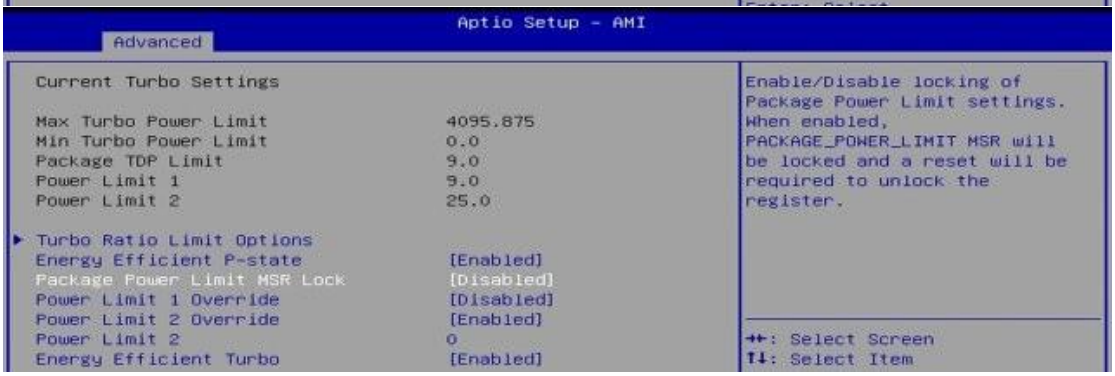


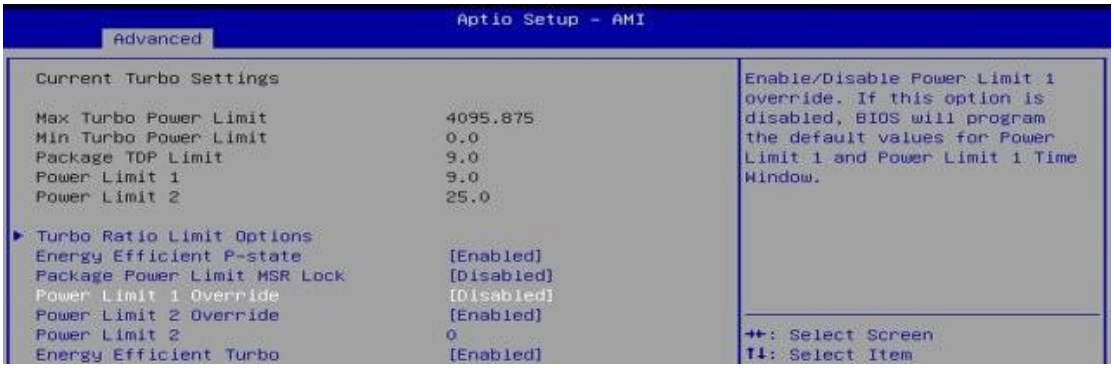




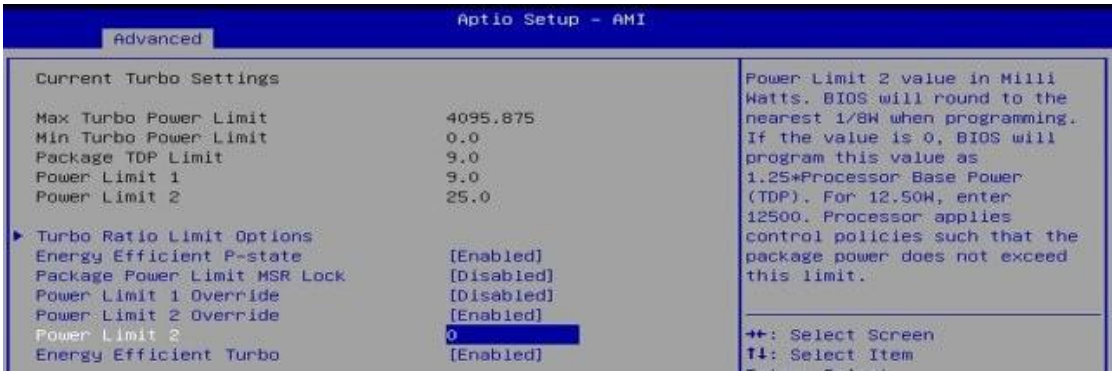

Aptio Setup – AMI
Advanced
Current Turbo Settings
Max Turbo Power Limit 4095.875
Min Turbo Power Limit 0.0
Package TDP Limit 9.0
Power Limit 1 9.0
Power Limit 2 25.0
Turbo Ratio Limit Options
Energy Efficient P-state [Enabled]
Package Power Limit MSR Lock [Disabled]
Power Limit 1 Override [Disabled]
Power Limit 2 Override [Enabled]
Power Limit 2 0
Energy Efficient Turbo [Enabled]
View/Configure Turbo Ratio Limit Options
→←: Select Screen
↑↓: Select Item


Aptio Setup – AMI
Advanced
Current Turbo Settings
Max Turbo Power Limit 4095.875
Min Turbo Power Limit 0.0
Package TDP Limit 9.0
Power Limit 1 9.0
Power Limit 2 25.0
Turbo Ratio Limit Options
Energy Efficient P-state [Enabled]
Package Power Limit MSR Lock [Disabled]
Power Limit 1 Override [Disabled]
Power Limit 2 Override [Enabled]
Power Limit 2 0
Energy Efficient Turbo [Enabled]
Enable/Disable Energy Efficient P-state feature. When set to 0, will disable access to ENERGY_PERFORMANCE_BIAS MSR and CPUID Function 6 ECX[3] will read 0 indicating no support for Energy Efficient policy setting. When set to 1 will enable access to ENERGY_PERFORMANCE_BIAS MSR
→←: Select Screen
↑↓: Select Item


Aptio Setup – AMI
Advanced
Current Turbo Settings
Max Turbo Power Limit 4095.875
Min Turbo Power Limit 0.0
Package TDP Limit 9.0
Power Limit 1 9.0
Power Limit 2 25.0
Turbo Ratio Limit Options
Energy Efficient P-state [Enabled]
Package Power Limit MSR Lock [Disabled]
Power Limit 1 Override [Disabled]
Power Limit 2 Override [Enabled]
Power Limit 2 0
Energy Efficient Turbo [Enabled]
Enable/Disable locking of Package Power Limit settings. When enabled, PACKAGE_POWER_LIMIT MSR will be locked and a reset will be required to unlock the register.
→←: Select Screen
↑↓: Select Item


Aptio Setup – AMI
Advanced
Current Turbo Settings
Max Turbo Power Limit 4095.875
Min Turbo Power Limit 0.0
Package TDP Limit 9.0
Power Limit 1 9.0
Power Limit 2 25.0
Turbo Ratio Limit Options
Energy Efficient P-state [Enabled]
Package Power Limit MSR Lock [Disabled]
Power Limit 1 Override [Disabled]
Power Limit 2 Override [Enabled]
Power Limit 2 0
Energy Efficient Turbo [Enabled]
Enable/Disable Power Limit 1 override. If this option is disabled, BIOS will program the default values for Power Limit 1 and Power Limit 1 Time Window.
→←: Select Screen
↑↓: Select Item


Aptio Setup - AMI
Advanced
Current Turbo Settings
Max Turbo Power Limit 4095.875
Min Turbo Power Limit 0.0
Package TDP Limit 9.0
Power Limit 1 9.0
Power Limit 2 25.0
Turbo Ratio Limit Options
Energy Efficient P-state [Enabled]
Package Power Limit MSR Lock
Power Limit 1 Override
Power Limit 2 Override
Power Limit 2
Energy Efficient Turbo
Power Limit 2 Override
Disabled
Enabled
Enable/Disable Power Limit 2 override. If this option is disabled, BIOS will program the default values for Power Limit 2.
+: Select Screen
↓: Select Item


Aptio Setup - AMI
Advanced
Current Turbo Settings
Max Turbo Power Limit 4095.875
Min Turbo Power Limit 0.0
Package TDP Limit 9.0
Power Limit 1 9.0
Power Limit 2 25.0
Turbo Ratio Limit Options
Energy Efficient P-state [Enabled]
Package Power Limit MSR Lock [Disabled]
Power Limit 1 Override [Disabled]
Power Limit 2 Override [Enabled]
Power Limit 2 0
Energy Efficient Turbo [Enabled]
Power Limit 2 value in Milli Watts. BIOS will round to the nearest 1/8W when programming. If the value is 0, BIOS will program this value as 1.25*Processor Base Power (TDP). For 12.50W, enter 12500. Processor applies control policies such that the package power does not exceed this limit.
→←: Select Screen
↑↓: Select Item


Aptio Setup - AMI
Advanced
Current Turbo Settings
Max Turbo Power Limit 4095.875
Min Turbo Power Limit 0.0
Package TDP Limit 9.0
Power Limit 1 9.0
Power Limit 2 25.0
Turbo Ratio Limit Options
Energy Efficient P-state [Enabled]
Package Power Limit MSR Lock [Disabled]
Power Limit 1 Override [Disabled]
Power Limit 2 Override [Enabled]
Power Limit 2 0
Energy Efficient Turbo [Enabled]
Enable/Disable Energy Efficient Turbo Feature. This feature will opportunistically lower the turbo frequency to increase efficiency. Recommended only to disable in overclocking situations where turbo frequency must remain constant. Otherwise, leave enabled.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1293 Copyright (C) 2025 AMI

4.4.3 Trusted Computing

BIOS Setting	Description
Security Device Support	Enables / Disables BIOS support for security device. The OS will not show security device. TCG EFI protocol and INTIA interface will not be available.
SHA256 / SHA384 Bank	Option: Enabled / Disabled
Pending operation	Schedule an operation for the security device. Note: Your computer will reboot 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 devices if not found, and TPM 1.2 device will be enumerated.

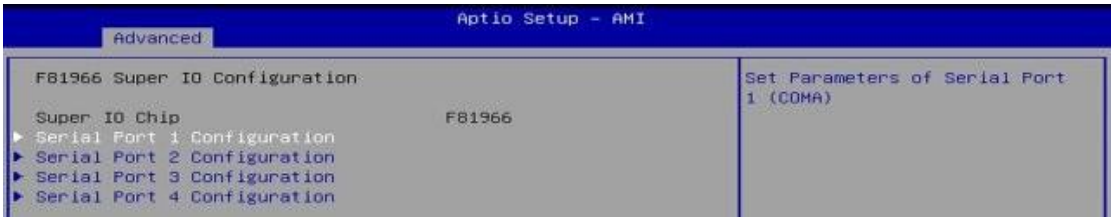
4.4.4 ACPI Setting

BIOS Setting	Description
Enable Hibernation	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some OS.
ACPI Sleep State	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

4.4.5 Power Board Configuration

BIOS Setting	Description
Power Board Control	Allows to set the power board configuration.
Power Board Delay Control	Allows to set the delay timer for turning on or off the power board.
Power On Delay (minutes) / (seconds)	Sets the power-on-delay timer for minutes / seconds.
Power Off Delay (minutes) / (seconds)	Sets the power-off-delay timer for minutes / seconds.

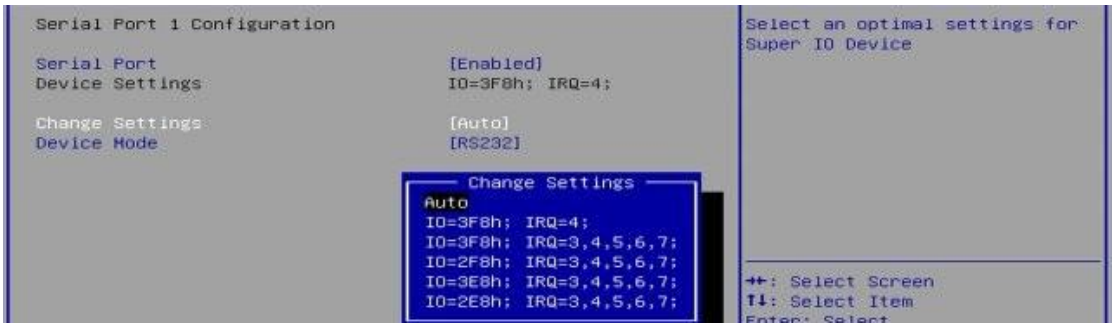
4.4.6 F81966 Super IO Configuration

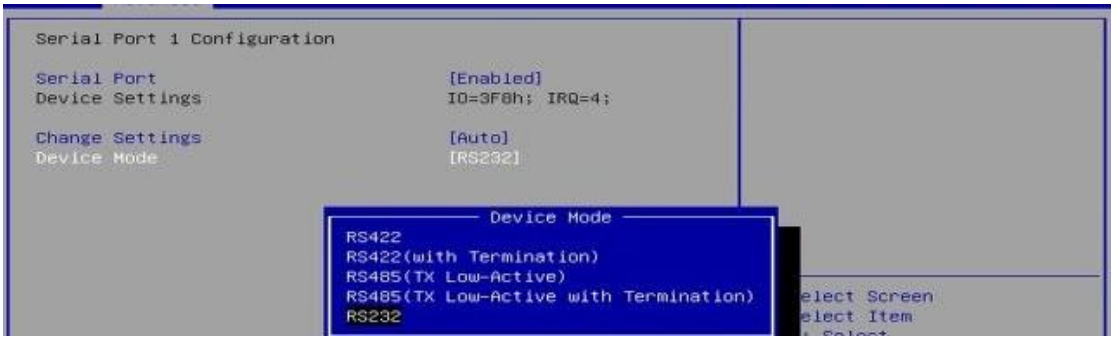


BIOS Setting	Description
Serial IO Configuration	System Super IO Chip Parameters.
Serial Port Configuration	Configures serial ports. You can enable / disable the serial port and select an optimal setting for the Super IO device.

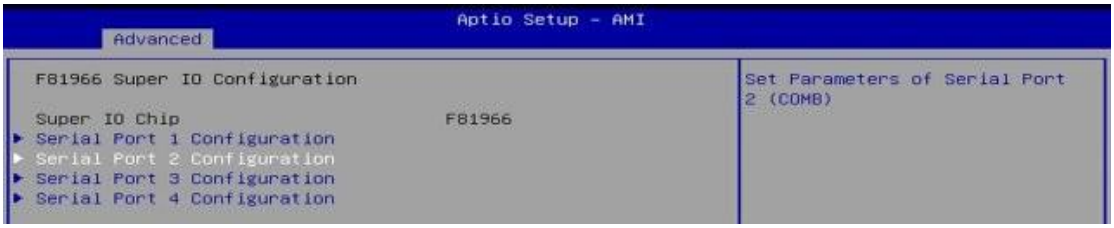
4.4.6.1. Serial Port 1 Configuration

BIOS Setting	Description
Serial Port	Enables / Disables the serial port (COM).

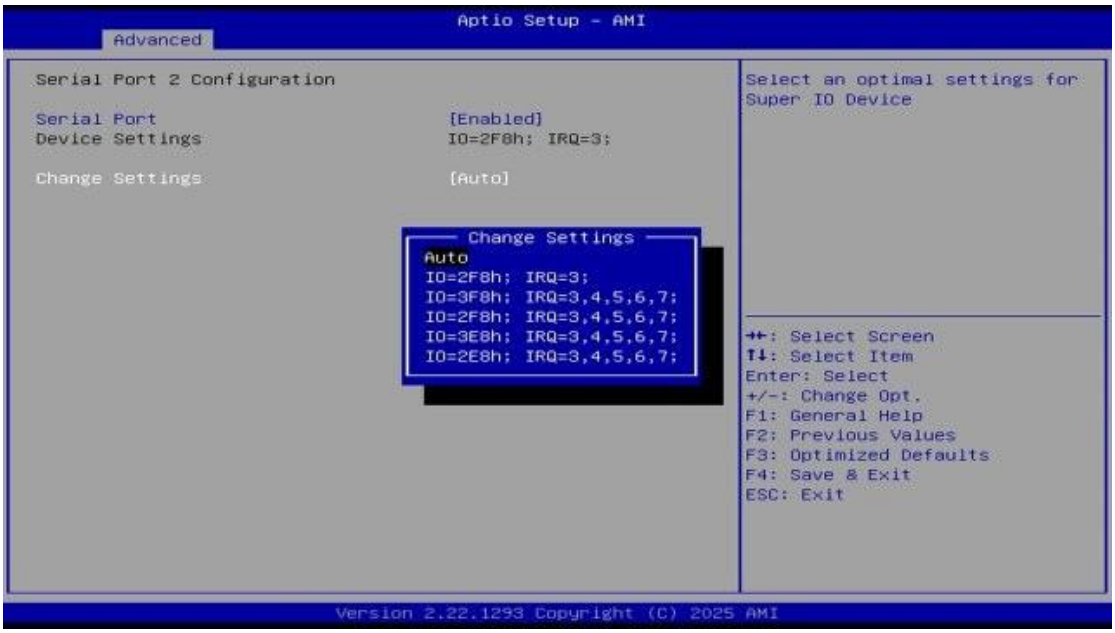




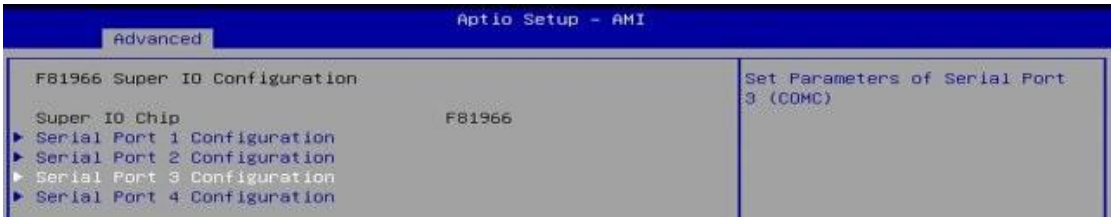
4.4.6.2. Serial Port 2 Configuration



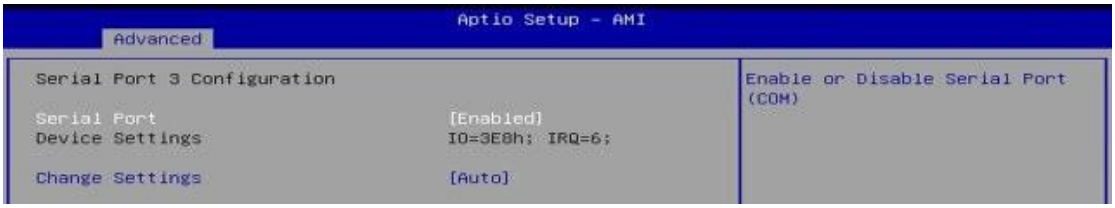
BIOS Setting	Description
Serial Port	Enables / Disables the serial port (COM).
Change Settings	Selects an optimal setting for the Super I/O device.

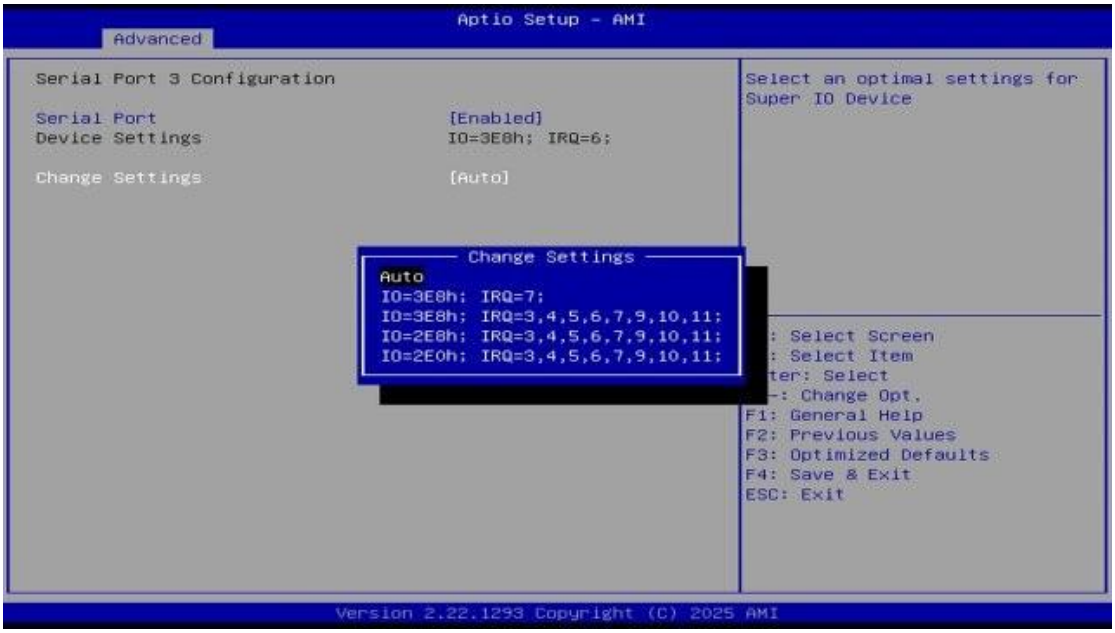


4.4.6.3. Serial Port 3 Configuration

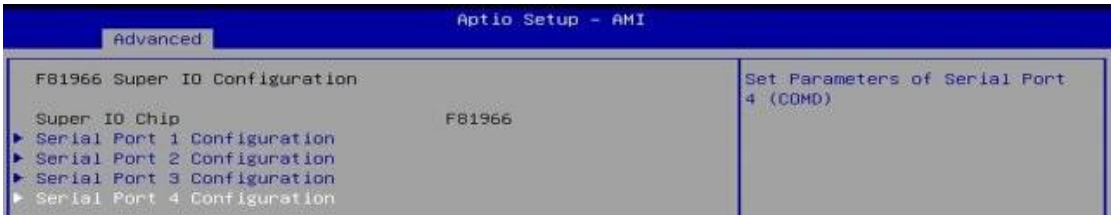


BIOS Setting	Description
Serial Port	Enables / Disables the serial port (COM).
Change Settings	Selects an optimal setting for the Super I/O device.



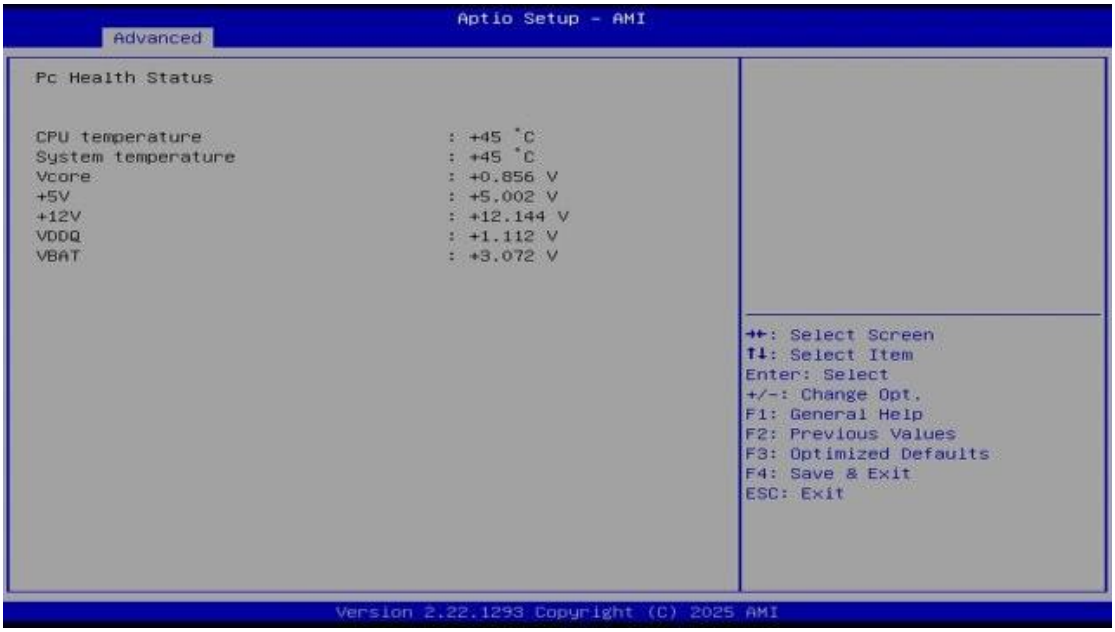


4.4.6.4. Serial Port 4 Configuration



BIOS Setting	Description
Serial Port	Enables / Disables the serial port (COM).
Change Settings	Selects an optimal setting for the Super I/O device.

4.4.7 Hardware Monitor



BIOS Setting	Description
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

4.4.8 PCI Subsystem Settings

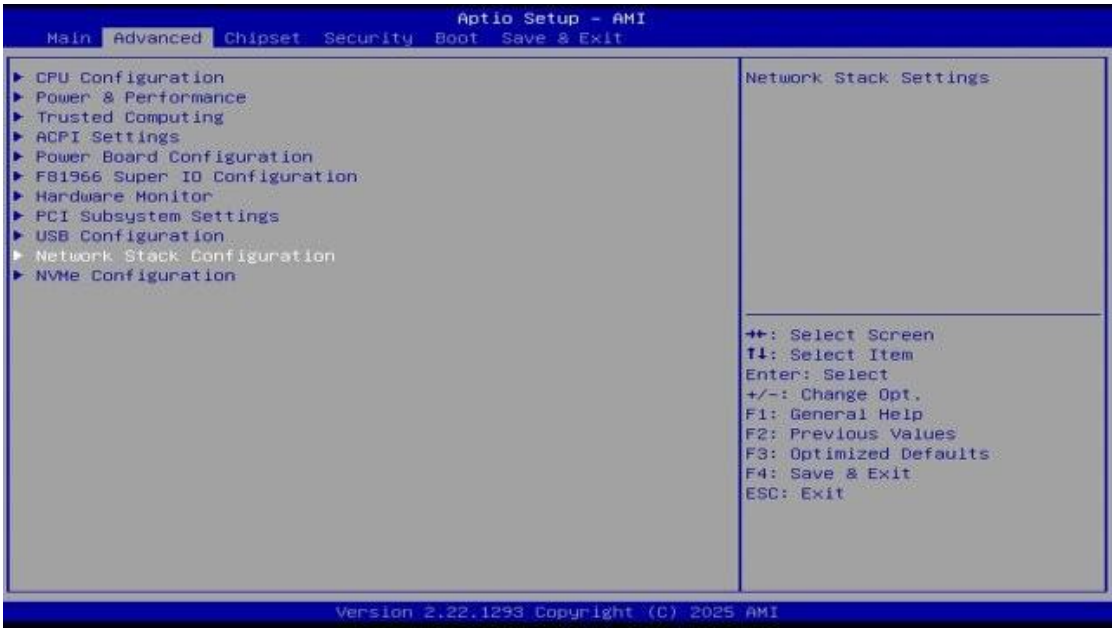

Aptio Setup – AMI
Advanced
AMI PCI Driver Version : A5.01.28
PCI Settings Common for all Devices:
Re-Size BAR Support [Disabled]
BME DMA Mitigation [Disabled]
Change Settings of the Following PCI Devices:
WARNING: Changing PCI Device(s) settings may have unwanted side effects! System may HANG! PROCEED WITH CAUTION.
If system has Resizable BAR capable PCIe Devices, this option Enables or Disables Resizable BAR Support.
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1293 Copyright (C) 2025 AMI


Aptio Setup – AMI
Advanced
AMI PCI Driver Version : A5.01.28
PCI Settings Common for all Devices:
Re-Size BAR Support [Disabled]
BME DMA Mitigation [Disabled]
Change Settings of the Following PCI Devices:
WARNING: Changing PCI Device(s) settings may have unwanted side effects! System may HANG! PROCEED WITH CAUTION.
Re-enable Bus Master Attribute disabled during Pci enumeration for PCI Bridges after SMM Locked
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1293 Copyright (C) 2025 AMI

4.4.9 USB Configuration

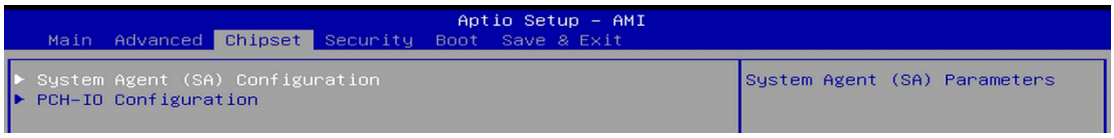
BIOS Setting	Description
Legacy USB Support	Enables / Disables Legacy USB support. • **Auto** disables legacy support if there is no USB device connected. • **Disable** keeps USB devices available only for EFI applications.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enables / Disables 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.

4.4.10 Network Stack Configuration



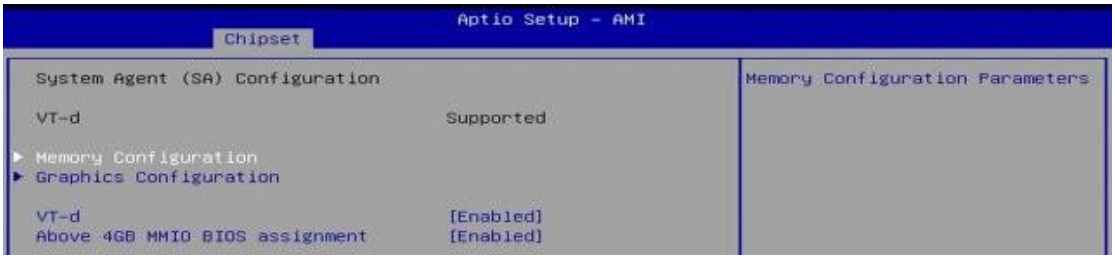
4.4.11 NVMe Configuration

4.5 Chipset Settings



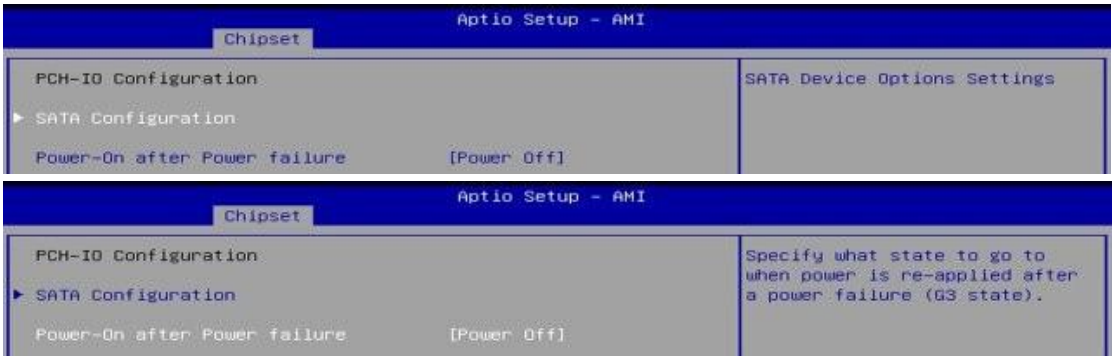
BIOS Setting	Description
System Agent (SA) Configuration	System Agent (SA) parameters
PCH-IO Configuration	PCH parameters

4.5.1 System Agent (SA) Configuration



BIOS Setting	Description
Memory Configuration	Memory Configuration Parameters.
Graphics Configuration	Configures the graphics settings.
VT-d	VT-d capability, Enabled/Disabled
Above 4GB MMIO BIOS assignment	Enable/Disable above 4GB MemoryMappedIO BIOS assignment. This is enabled automatically when Aperture Size is set to 2048MB

4.5.2 PCH-IO Configuration

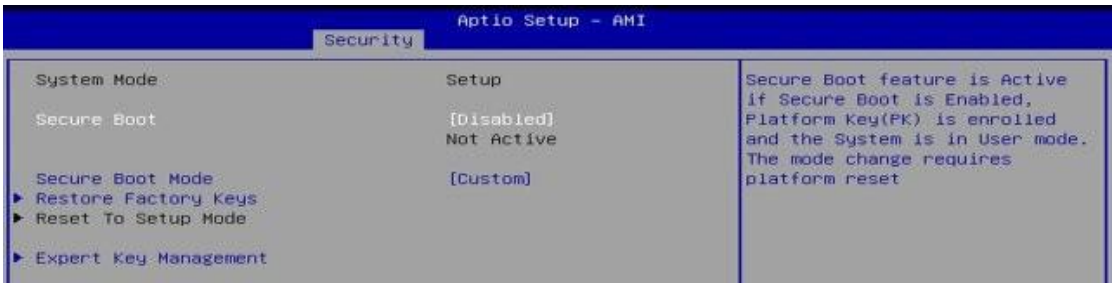


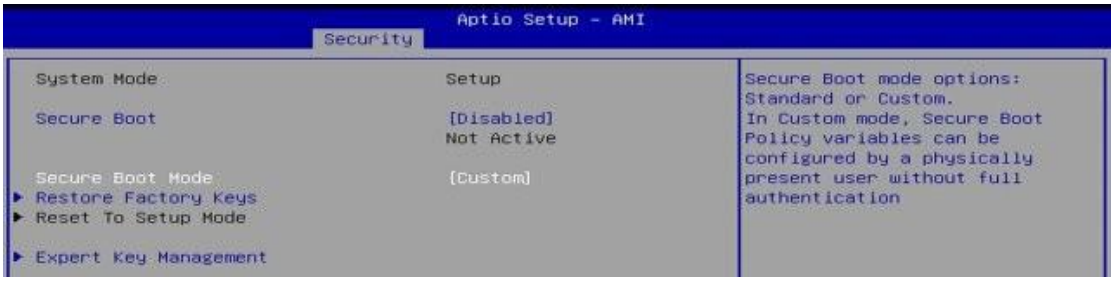
BIOS Setting	Description
SATA Configuration	SATA Device Options Settings
Power-On after Power failure	Specify what state to when power is re-applied after a power failure (G3 state).

4.6 Security Settings

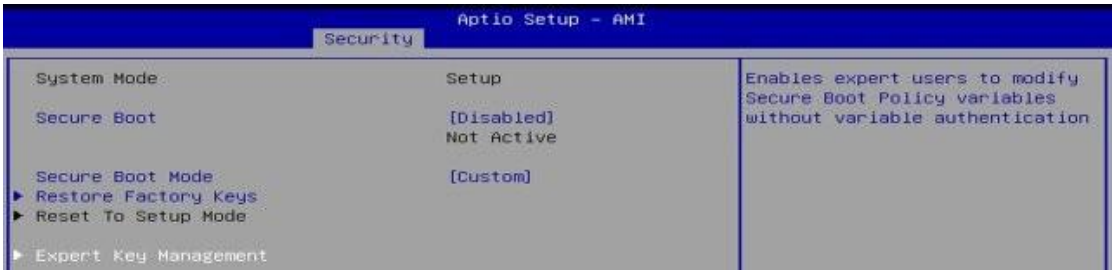
BIOS Setting	Description
Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.
HDD Security Configuration	HDD Security Configuration for selected drive
Secure Boot	Allows override for SID authentication of TCG storage device. Modified value will be applicable only for next boot.

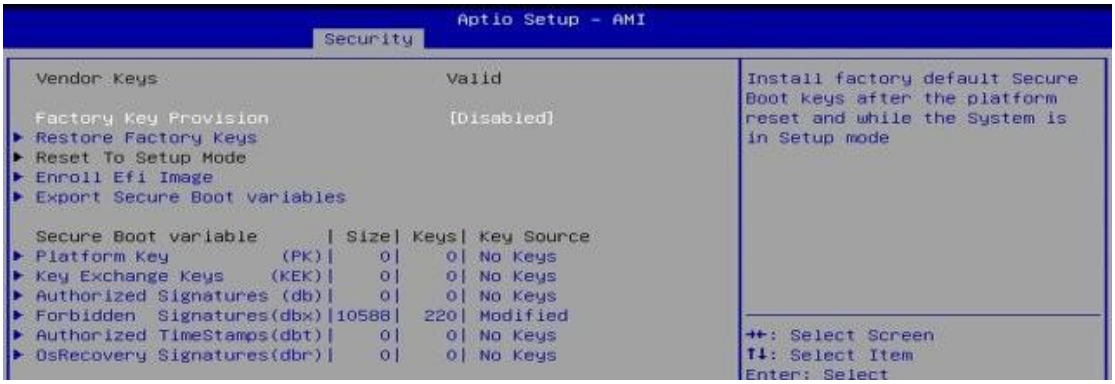
4.6.1 Secure Boot






Aptio Setup - AMI
Security
System Mode
Setup
Secure Boot
[Disabled]
Not Active
Secure Boot Mode
[Custom]
Restore Factory Keys
Reset To Setup Mode
Expert Key Management
Force System to User Mode.
Install factory default Secure
Boot key databases
Install factory defaults
Press 'Yes' to proceed 'No' to cancel
Yes
No
elect Screen
elect Item


Aptio Setup - AMI
Security
System Mode
Setup
Secure Boot
[Disabled]
Not Active
Secure Boot Mode
[Custom]
Restore Factory Keys
Reset To Setup Mode
Expert Key Management
Enables expert users to modify
Secure Boot Policy variables
without variable authentication


Aptio Setup - AMI
Security
Vendor Keys
Valid
Factory Key Provision
[Disabled]
Restore Factory Keys
Reset To Setup Mode
Enroll Efi Image
Export Secure Boot variables
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Key Exchange Keys (KEK)| 0| 0| No Keys
Authorized Signatures (db)| 0| 0| No Keys
Forbidden Signatures(dbx)|10588| 220| Modified
Authorized TimeStamps(dbt)| 0| 0| No Keys
OsRecovery Signatures(dbr)| 0| 0| No Keys
Install factory default Secure
Boot keys after the platform
reset and while the System is
in Setup mode
→←: Select Screen
↑↓: Select Item
Enter: Select

4.7 Boot Settings

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

* UEFI (Unified Extensible Firmware Interface)

4.8 Save & Exit Settings

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

Appendix

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

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

A. I/O Port Address Map

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

Address	Device Description
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x000002F0-0x000002F7	Communications Port (COM5)
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

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 4294967288	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4294967274	CANBusFD Port (COM7)
IRQ 0	System timer
IRQ 4294967273	CANBusFD Port (COM6)
IRQ 4294967293	PCI Express Root Port #7 - 54BE
IRQ 4294967275	Intel(R) Management Engine Interface #1
IRQ 4294967294	PCI Express Root Port #4 - 54BB
IRQ 4294967277	Intel(R) GNA Scoring Accelerator module
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 6	Communications Port (COM3)
IRQ 5	Communications Port (COM4)
IRQ 10	Communications Port (COM5)
IRQ 19	High Definition Audio Controller
IRQ 4294967290	Intel(R) UHD Graphics
IRQ 26	Intel(R) Integrated Sensor Solution
IRQ 4294967292	PCI Express Root Port #10 - 54B1
IRQ 4294967278-82	Intel(R) Ethernet Controller I226-IT
IRQ 4294967283-87	Intel(R) Ethernet Controller I226-IT #2
IRQ 55-204	Microsoft ACPI-Compliant System
IRQ 256-511	Microsoft ACPI-Compliant System
IRQ 4294967291	Standard SATA AHCI Controller
IRQ 4294967289	Intel(R) USB 3.10 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4294967276	FINTEK Pcie To CanBus FD

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 "F81966.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 81966 watch dog program\n");
        SIO = Init_F81966();
        if (SIO == 0)
        {
                printf("Can not detect Fintek 81966, 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_F81966_Reg(0x27);
    bBuf &= (~0x0C);
    bBuf |= (0x08);
    Set_F81966_Reg(0x2B, bBuf);       //Switch to bank 2

    bBuf = Get_F81966_Reg(0x2A);
    bBuf &= (~0x70);
    bBuf |= (0x60);
    Set_F81966_Reg(0x2A, bBuf);       //Enable WDTO

    Set_F81966_LD(0x07);               //Switch to logic device 7
    Set_F81966_Reg(0x30, 0x01);       //Enable timer

    bBuf = Get_F81966_Reg(0xF5);
    bBuf &= (~0x0F);
    bBuf |= 0x52;
    Set_F81966_Reg(0xF5, bBuf);       //Count mode is second

    Set_F81966_Reg(0xF6, interval); //Set timer

    bBuf = Get_F81966_Reg(0xFA);
    bBuf |= 0x01;
    Set_F81966_Reg(0xFA, bBuf);       //Enable WDTO output

    bBuf = Get_F81966_Reg(0xF5);
    bBuf |= 0x20;
    Set_F81966_Reg(0xF5, bBuf);       //Start counting
}
//---------------------------------------------------------------------------
void DisableWDT(void)
{
        unsigned char bBuf;

        Set_F81966_LD(0x07);        //switch to logic device 7

        bBuf = Get_F81966_Reg(0xFA);
        bBuf &= ~0x01;
        Set_F81966_Reg(0xFA,    bBuf);  //disable WDTO output

        bBuf = Get_F81966_Reg(0xF5);
        bBuf &= ~0x20;
        bBuf |= 0x40;
        Set_F81966_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 "F81966.H"
#include <dos.h>
//---------------------------------------------------------------------------
unsigned int F81966_BASE;
void Unlock_F81966 (void);
void Lock_F81966 (void);
//---------------------------------------------------------------------------
unsigned int Init_F81966(void)
{
	unsigned int result;
	unsigned char ucDid;

	F81966_BASE = 0x4E;
	result = F81966_BASE;

	ucDid = Get_F81966_Reg(0x20);
	if (ucDid == 0x15)	//Fintek 81966
	{ goto Init_Finish; }

	F81966_BASE = 0x2E;
	result = F81966_BASE;

	ucDid = Get_F81966_Reg(0x20);
	if (ucDid == 0x15)	//Fintek 81966
	{ goto Init_Finish; }

	F81966_BASE = 0x00;
	result = F81966_BASE;

Init_Finish:
	return (result);
}
//---------------------------------------------------------------------------
void Unlock_F81966 (void)
{
		outportb(F81966_INDEX_PORT, F81966_UNLOCK);
		outportb(F81966_INDEX_PORT, F81966_UNLOCK);
}
//---------------------------------------------------------------------------
void Lock_F81966 (void)
{
		outportb(F81966_INDEX_PORT, F81966_LOCK);
}
//---------------------------------------------------------------------------
void Set_F81966_LD( unsigned char LD)
{
		Unlock_F81966();
		outportb(F81966_INDEX_PORT, F81966_REG_LD);
		outportb(F81966_DATA_PORT, LD);
		Lock_F81966();
```

```
}
//---------------------------------------------------------------------------
void Set_F81966_Reg( unsigned char REG, unsigned char DATA)
{
        Unlock_F81966();
        outportb(F81966_INDEX_PORT, REG);
        outportb(F81966_DATA_PORT, DATA);
        Lock_F81966();
}
//---------------------------------------------------------------------------
unsigned char Get_F81966_Reg(unsigned char REG)
{
        unsigned char Result;
        Unlock_F81966();
        outportb(F81966_INDEX_PORT, REG);
        Result = inportb(F81966_DATA_PORT);
        Lock_F81966();
        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      F81966_H
#define      F81966_H            1
//---------------------------------------------------------------------------
#define     F81966_INDEX_PORT     (F81966_BASE)
#define     F81966_DATA_PORT      (F81966_BASE+1)
//---------------------------------------------------------------------------
#define     F81966_REG_LD     0x07
//---------------------------------------------------------------------------
#define     F81966_UNLOCK     0x87
#define     F81966_LOCK  0xAA
//---------------------------------------------------------------------------
unsigned int Init_F81966(void);
void Set_F81966_LD( unsigned char);
void Set_F81966_Reg( unsigned char,
unsigned char); unsigned char
Get_F81966_Reg( unsigned char);
//---------------------------------------------------------------------------
#endif   //     F81966_H
```