MI1005AF

Mini-ITX Motherboard
for
Intel® Core™ Ultra 200H/200U Series
Mobile Processors (Arrow Lake-U/H)

User's Manual

Version 1.0
(September 2025)

iBASE

Compliance

CE

This product complies with CE and FCC Class B requirements. In residential areas, additional measures may be required if radio interference is detected. This product has been tested against environmental specifications and limits, and it complies with applicable European Union (EU) directives. Users should also follow local regulations to prevent any interference or disruptions caused by the product's operation.

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 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 regarding disposal of electronic products.

Green IBASE

This product complies with RoHS 2 restrictions, restricting the use of 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 board.

Environmental conditions:

- Use this product in environments where the ambient temperature ranges between 0˚C and 60˚C.

Care for your IBASE products:

- Turn off the system before unplugging any cables and remove the battery.
- Clean the PCB with a circuit board cleaner or degreaser, or use cotton swabs and alcohol.
- Use a computer vacuum cleaner to remove dust and prevent the fan from being clogged.

WARNING

Attention during use:

- Do not use this product near water.
- Do not spill water or any other liquids on this product.
- Do not place heavy objects on the top of this product.

Anti-static precautions

- Wear an anti-static wrist strap to avoid electrostatic discharge.
- Place the PCB on an anti-static kit or mat.
- Hold the edges of PCB when handling.
- Handle non-metallic parts of the product and avoid touching the PCB surface directly.
- Touch a grounded metal surface, such as an unpainted metal part of your computer case, to discharge static electricity.

CAUTION

Danger of explosion if the internal lithium-ion battery is replaced by an incorrect type. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with local recycling laws and the manufacturer's instructions.

Warranty Policy

- **IBASE standard products:**

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

- **3rd-party parts:**

  12-month (1-year) warranty from the date of delivery for third-party parts that are not manufactured by IBASE, such as CPU, CPU cooler, memory, storage devices, power adapter, panel and touchscreen.

  ⚠ *Products that fail due to misuse, accident, improper installation, or unauthorized repair will be treated as out of warranty, and customers will 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 provide a detailed description of the problem.
   - Product model name
   - Product serial number
   - Detailed description of the problem
   - Any error messages, either as text or screenshots
   - The arrangement of the peripherals
   - Software in use (e.g., operating system and application software, including version numbers)
3. To apply for an RMA number, please visit the IBASE website to complete a request form.

Table of Contents

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Chapter 1
General Information

The information provided in this chapter includes:

- Features
- Packing List
- Optional Accessories
- Specifications
- Block Diagram
- Product View
- Board Dimensions

1.1 Introduction

The MI1005AF Mini-ITX motherboard features onboard Intel® Core™ Ultra 9/7/5 200 U/H processors (up to 65W) and supports up to 96GB DDR5 memory. It offers multiple display outputs including HDMI 2.1/2.0, DP++ 1.4a, eDP 1.4b, and 2x USB Type-C. Connectivity includes 3x Intel 2.5G LAN, 4x USB 3.2, 2x USB Type-C, 4x USB 2.0, 4x COM, and 2x SATA III. Expansion is supported via 1x PCIe x4 (Gen 4) and 3x M.2 slots (E-Key and dual M-Key). Built-in features include watchdog timer, digital I/O, Intel AMT 19.0, and fTPM 2.0, making it ideal for edge AI, imaging, and industrial applications.

1.2 Features

- Intel® Core Ultra 9/7/5 Processors Intel® BGA2049 Core™ Ultra 9/7/5 200 U/H series mobile onboard processors, up to 65W
- 2x DDR5 cSO-DIMM, Max. 96GB, Non-ECC
- supports eDP(1.4b), 2x Type-C, HDMI (2.1/2.0) and DisplayPort(1.4a) (DP++)
- LAN 1: Intel® I226LM, supports 2.5G and iAMT LAN 2 / LAN 3: Intel® I226V, supports 2.5G only
- 4x USB 3.2 (Type A), 2x USB Type-C, 4x USB 2.0, 4x COM, 2x SATA III
- 1x PCI-E (x4) [Gen.4.0]; 3x M.2 (E-Key @2230 and 2x M-Key @2280 & 2242)
- Watchdog timer, Digital I/O, iAMT(19.0), fTPM(2.0)

1.3 Packing List

Your MI1005AF package should include the items listed below. If any of the items below is missing, contact the distributor or dealer from whom you purchased the product.

- MI1005 x 1
- I/O Shield x 1
- SATA cable x 1
- COM cable x 1
- USB 2.0 cable x 1

1.4 Optional Accessories

- Audio Cable
- Cooler
- **600W** Power Supply
  (This is suitable for 45W TDP and 15W TDP CPU SKUs)

1.5 Specifications

Model	
MI1005AF-285H	Intel® Core™ Ultra 9 285H CPU onboard MiniITX board w/ eDP, HDMI, 2x DisplayPort, 2x Type-C (for DP & USB 3.2), 3x 2.5GbE, 2x SATA, iAMT (19.0), fTPM (2.0)
MI1005AF-255H	Intel® Core™ Ultra 7 255H CPU onboard MiniITX board w/ eDP, HDMI, 2x DisplayPort, 2x Type-C (for DP & USB 3.2), 3x 2.5GbE, 2x SATA, iAMT (19.0), fTPM (2.0)
MI1005AF-225H	Intel® Core™ Ultra 5 225H CPU onboard MiniITX board w/ eDP, HDMI, 2x DisplayPort, 2x Type-C (for DP & USB 3.2), 3x 2.5GbE, 2x SATA, iAMT (19.0), fTPM (2.0)
MI1005AF-225U	Intel® Core™ Ultra 5 225U CPU onboard MiniITX board w/ eDP, HDMI, 2x DisplayPort, 2x Type-C (for DP & USB 3.2), 3x 2.5GbE, 2x SATA, iAMT (19.0), fTPM (2.0)

Specifications	
CPU Socket	BGA2049 CPU onboard
CPU	Intel® Core™ Ultra 9/7/5 200 U/H Mobile Processors (Arrow Lake – U/H)
Memory	2x DDR5 SO-DIMM sockets, Up to DDR5-6400 cSO-DIMM memory module, Max. 96GB
BIOS	AMI
Watchdog Timer	256 levels
Hardware Monitor	Yes
Storage Interface	SATA III & NVMe
Expansion Slots	1x PCI-E (x4) [Gen.4.0]
Mini Type Slots	• 2x M.2 (M-Key, type:2280 + 2242, PCI-E(4x) Gen.4) • 1x M.2 (E-Key, type:2230, USB 2.0 + PCI-E(1x) Gen.4)
Graphics	Intel® Core™ Ultra 9/7/5 200 U/H Mobile Processors integrated graphics
Video Output	1x eDP + HDMI + 2x DisplayPort (1.4a) (DP++) + 2x Type-C
Ethernet	• LAN 1 : Intel® I226LM, Support 2.5G and iAMT • LAN 2 / LAN 3: Intel® I226V, support 2.5G
I/O Chipset	Fintek F81966AB-I

Serial Port	4x COM ports : 2x RS232/422/485 + 2x RS232
USB 2.0	4x USB 2.0 via pin header
USB 3.X	• 4x USB3.2 Type A (10Gbps) • 2x USB Type-C @ edge connector
Serial ATA	2x SATA III
Audio	Built-in HD Audio controller + Realtek ALC888S w/ 5.1 channels
TPM	Supports fTPM
Others	Digital I/O (4-in/4-out) , Watchdog timer, PDPC, CPU cooler

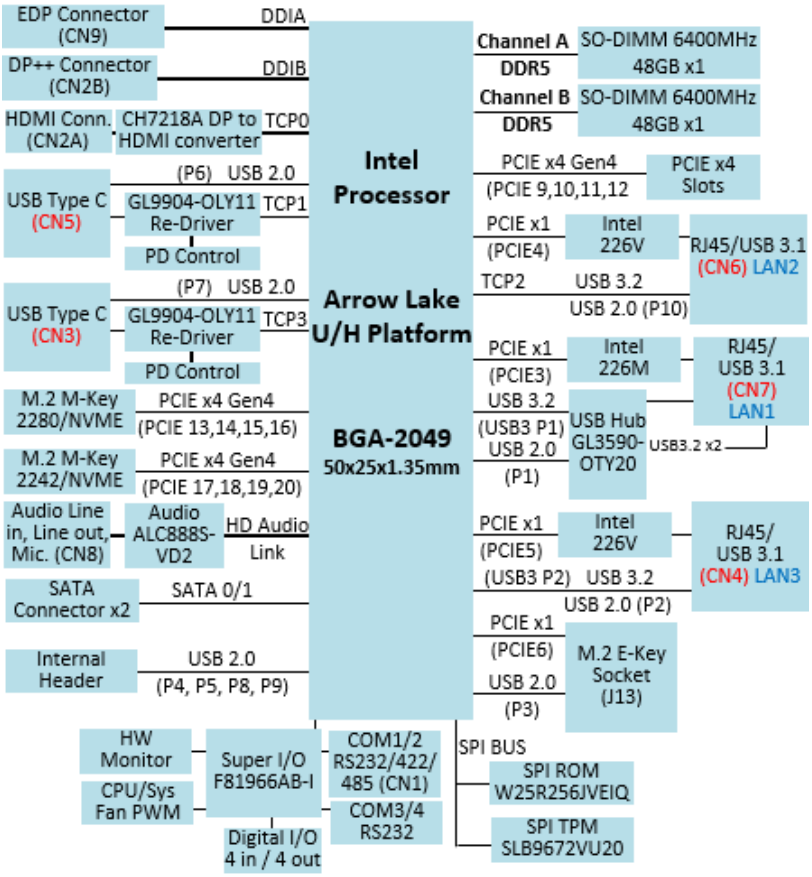
Physical	
Dimensions (L x W)	170mm x 170mm (6.7“x 6.7“)

Environmental	
Operating Temperature	0 ~ 60 °C (32 ~ 140 °F)
Storage Temperature	-20 ~ 80 °C (-4 ~ 176 °F)

All specifications are subject to change without prior notice.

Note: Recommended ATX Power Supply: 600W/ATX5VSB(3A) or above.

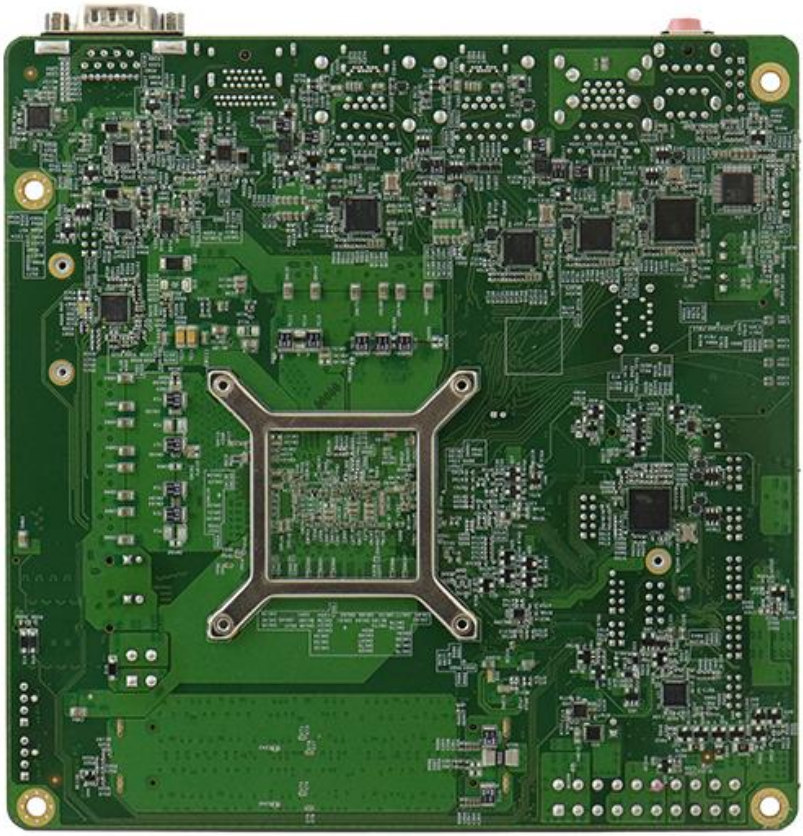
1.6 Block Diagram



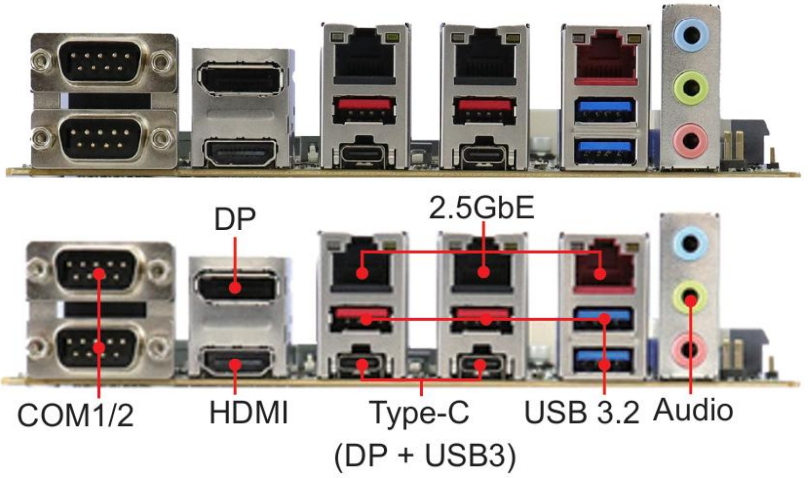
1.7 Product View

Top View

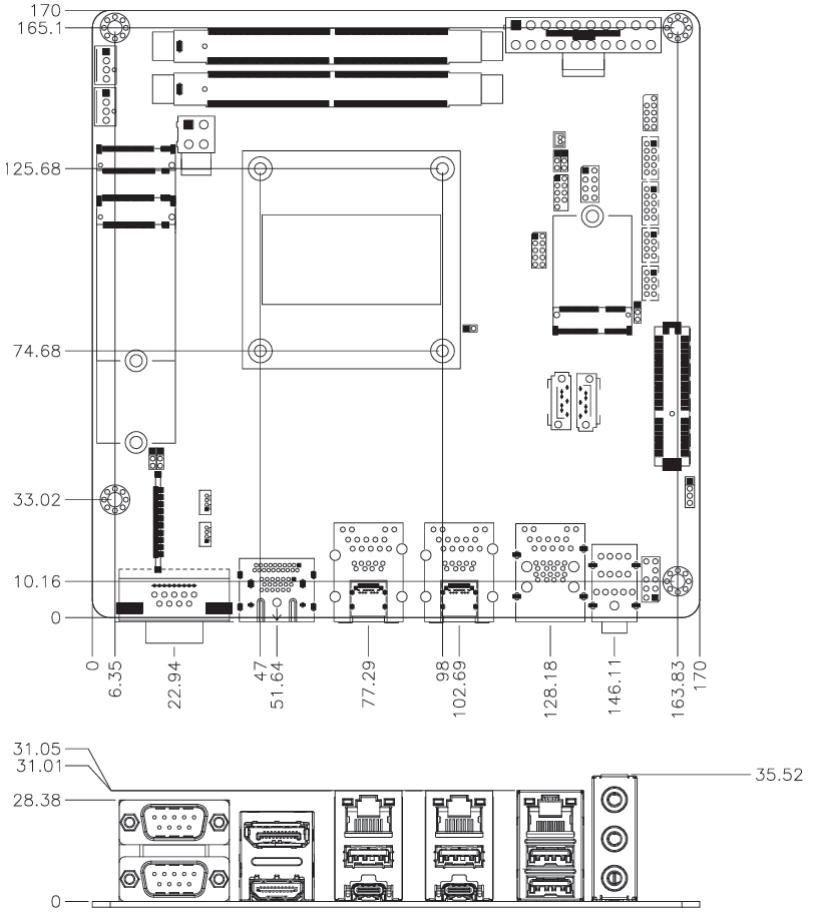
Bottom View



Rear View



1.8 Board Dimensions



Chapter 2
Hardware Configuration

This section provides information on jumper settings and connectors on the MI1005AF and other installation information in order to set up a workable system. The topics covered are:

- Essential installations
- Jumper and connector locations
- Jumper settings and information of connectors

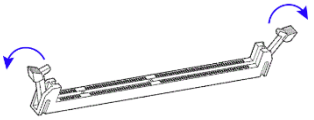
2.1 Essential Installations

Follow the instructions below to install the memory modules.

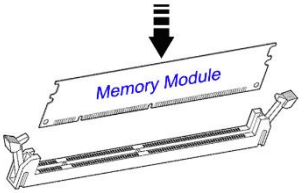
2.1.1 Installing the Memory

To install the modules, locate the memory slot on the board and follow these steps:

1. Align the notch (key) on the memory module with the corresponding key in the slot. Insert the module at a slight angle.



2. **Press** the module down into a vertical position until it is fully seated and the locking clips on both sides snap into place.



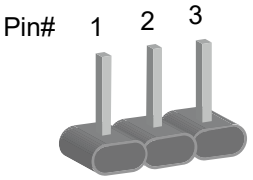
To remove the module, gently press the ejector tabs outward on both sides of the slot to release the module.

2.2 Setting the Jumpers

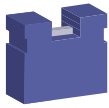
Configure your MI1005AF by setting jumpers according to your specific needs and applications. If you are unsure about the optimal configuration, please contact your supplier for assistance.

2.2.1 How to Set Jumpers

Jumpers are short-length conductors consisting of metal pins mounted on a non-conductive base on the circuit board. Jumper caps are used to enable or disable certain functions and features. For 3-pin jumpers, you can short either **Pin 1–2** or **Pin 2–3** depending on the required setting.

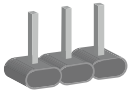
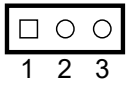
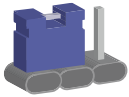
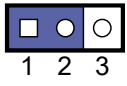
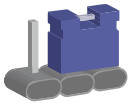
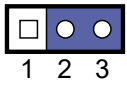


A 3-pin jumper



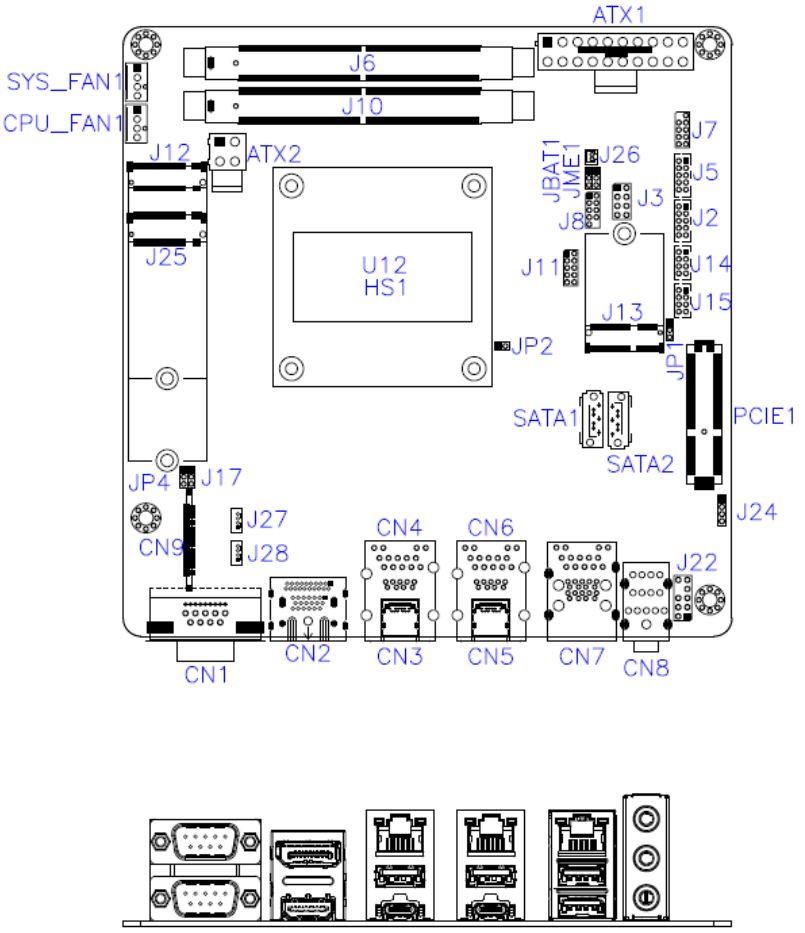
A jumper cap

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 covered by a jumper cap, the jumper is **closed** (i.e., turned **On**).
When the jumper cap is removed, the jumper is **open** (i.e., turned **Off**).

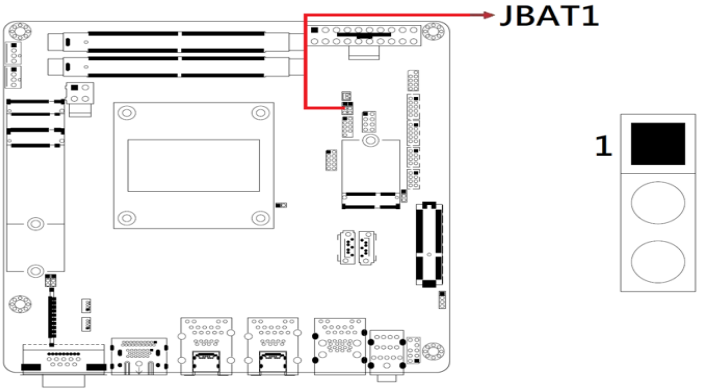
2.3 Jumper & Connector Locations



2.4 Jumpers Quick Reference

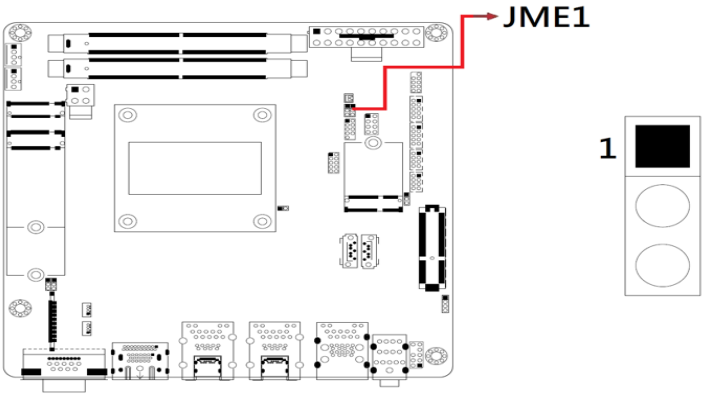
Jumper	Function
JBAT1	Clear CMOS
JME1	Clear ME
JP1	AT/ATX Select
JP4	EDP Panel Power Select

2.4.1 Clear CMOS Contents (JBAT1)



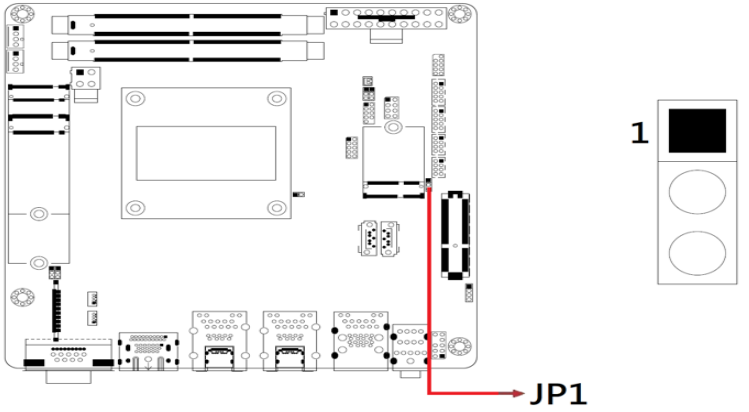
Function	Pin closed	Illustration
Normal	1-2	
Clear CMOS	2-3	

2.4.2 Clear ME Contents (JME1)



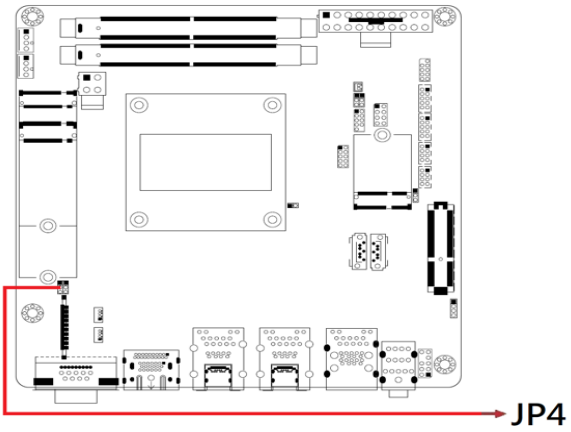
Function	Pin closed	Illustration
Normal	1-2	
Clear ME	2-3	

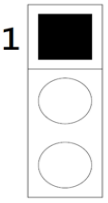
2.4.3 ATX & AT Power Mode Selection (JP1)



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

2.4.4 EDP Panel Power Select (JP4)





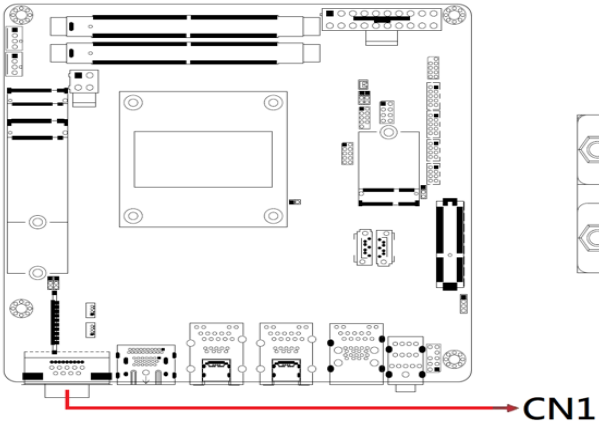
Function	Pin closed	Illustration
+3.3V(default)	1-2	
+5V	2-3	

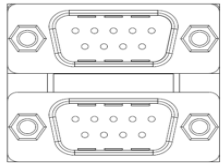
2.5 Connectors Quick Reference

2.6

Connector	Function
CN1	COM1 & COM2 RS-232/422/485 Ports
CN2	DisplayPort & HDMI Port
CN3, CN5	USB Type-C Connector
CN4	2.5 Gigabit LAN (Intel I226-V) + USB 3.2
CN6	2.5 Gigabit LAN (Intel I226-LM) + USB 3.2
CN7	2.5 Gigabit LAN (Intel I226-V) + USB 3.2
CN8	HD Audio Connector
CN9	EDP Panel Connector
J2, J5	COM3 & COM4 RS-232 Ports
J3	Front Panel Settings Connector
J6, J10	DDR5 SO-DIMM Slots
J7	SPI Flash Connector (Factory use only)
J8	80 Port Debug (Factory use only)
J11	Digital I/O Connector
J12	M.2 M2280 Slot
J13	M.2 E2230 Slot
J25	M.2 M2242 Slot
J14, J15	USB 2.0 Connector (DF11-8S-PA66H)
J26	Battery Connector
ATX1	ATX Power Connector
J22	Audio Pin Header for Chassis Front Panel
ATX2	CPU Power Connector
J24, J27, J28	Factory use only
SATA1, SATA2	SATA III Connectors
CPU_FAN1, SYS_FAN1	Fan Power Connectors
PCIE1	PCIe (x4) Slot

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



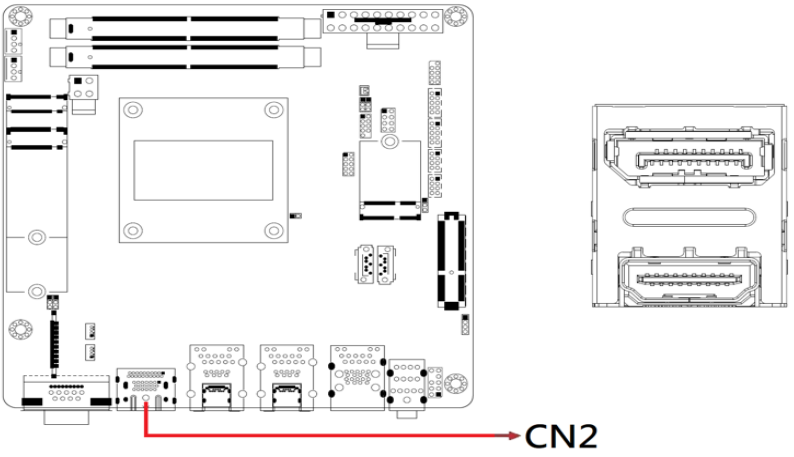


Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	DTR, Data terminal ready	9	RI, Ring indicator
5	Ground		

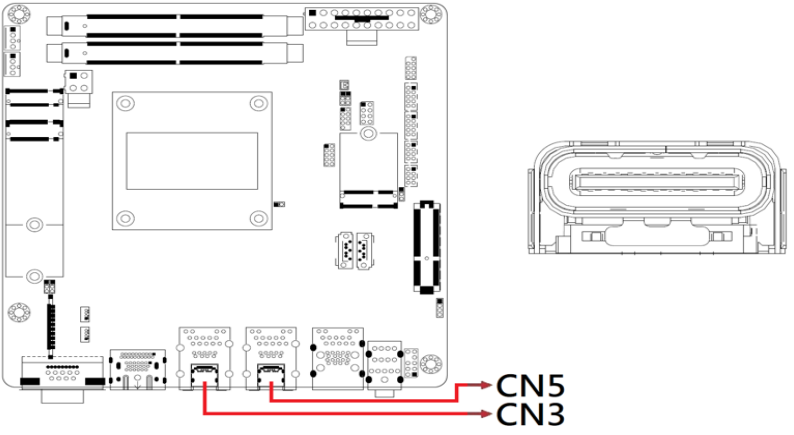
COM1/COM2 RS-232/422/485 are jumperless, configurable in BIOS.

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

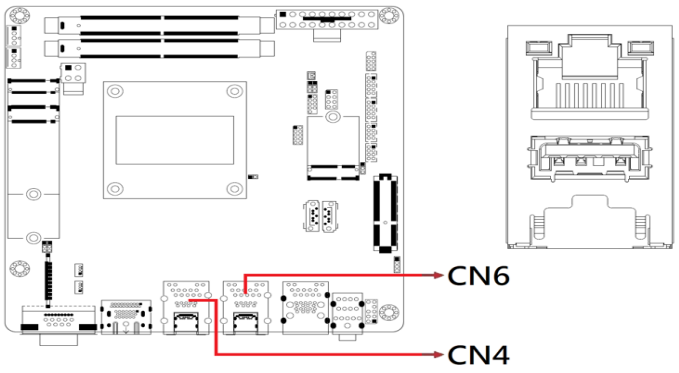
2.5.2 DisplayPort & HDMI Port (CN2)



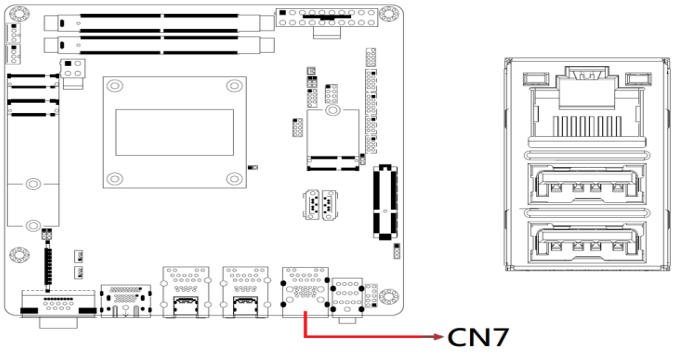
2.5.3 USB Type-C Connector (CN3, CN5)



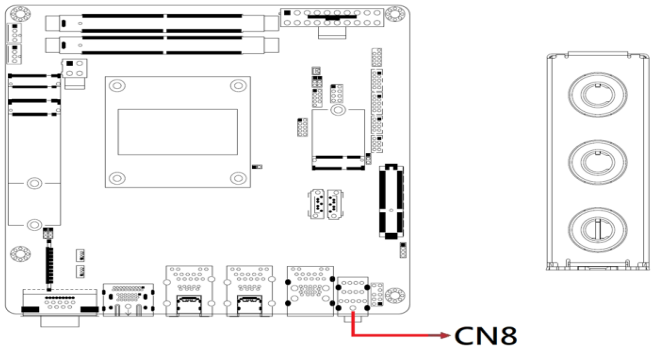
2.5.4 2.5 Gigabit LAN (Intel I226-V) + USB3.2 (CN4, CN6)



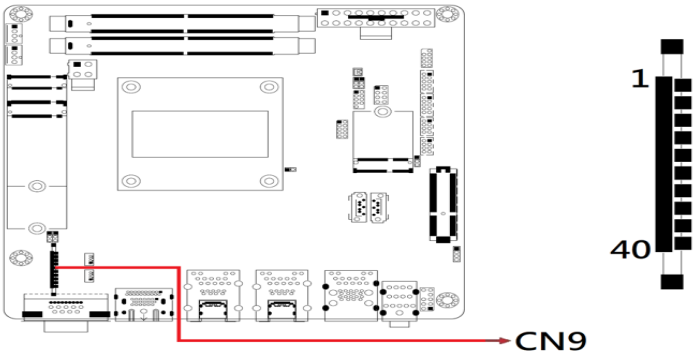
2.5.5 2.5 Gigabit LAN (Intel I226-LM) + USB3.2 (CN7)



2.5.6 HD Audio Connector (CN8)



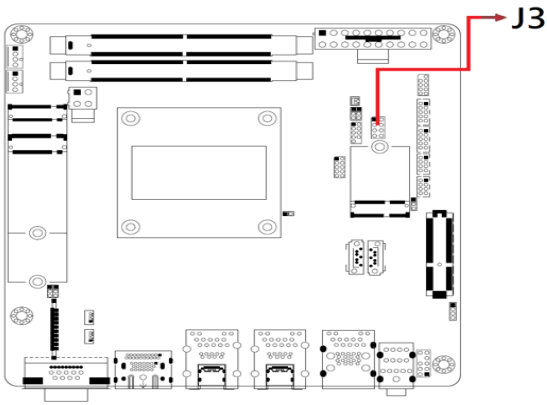
2.5.7 EDP Panel Connector (CN9)

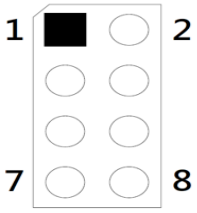


Remarks: KEL_SSL00-40S

Pin	Signal Name	Pin	Signal Name
1	eDP Vcc	21	TXN0
2	eDP Vcc	22	TXP1
3	eDP Vcc	23	Ground
4	eDP Vcc	24	AUXP
5	eDP Vcc	25	AUXN
6	Ground	26	NC
7	Ground	27	+3.3V
8	Ground	28	EDP BKLT (+12V)
9	Ground	29	NC
10	Hot Plug detect	30	Ground
11	Ground	31	+5V
12	TXN3	32	NC
13	TXP3	33	Back Light Control
14	Ground	34	Back Light Enable
15	TXN2	35	EDP BKLT (+12V)
16	TXP2	36	+3.3V
17	Ground	37	Ground
18	TXN1	38	NC
19	TXP1	39	NC
20	Ground	40	NC

2.5.8 Front Panel Settings Connector (J3)





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

J3 is utilized for system indicators to provide light indication of the computer activities and switches to change the computer status. It provides interfaces for the following functions:

ATX Power ON Switch (Pins 1 and 2)

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

Hard Disk Drive LED Connector (Pins 3 and 4)

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

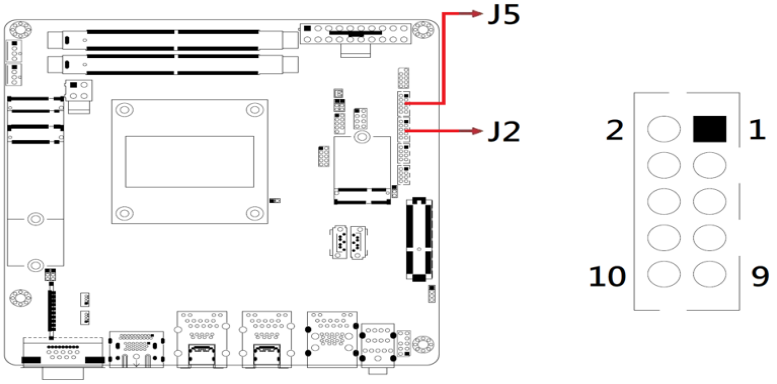
Reset Switch (Pins 5 and 6)

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

Power LED (Pins 7 and 8)

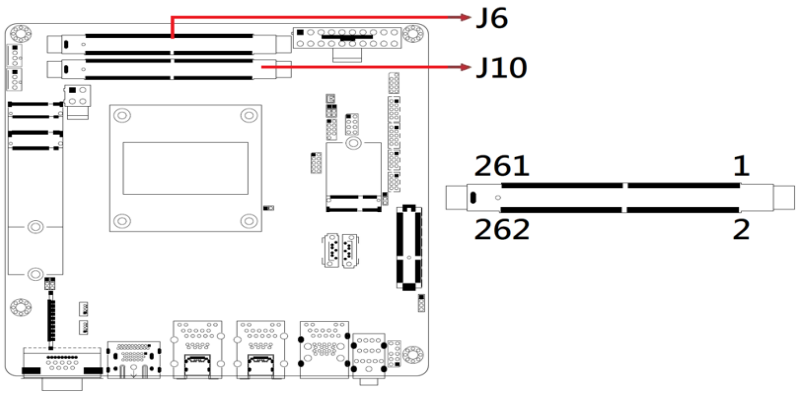
This connector connects to the system power LED on control panel. This LED lights up when the system turns on.

2.5.9 COM3 (J2) & COM4 (J5) RS-232 Ports

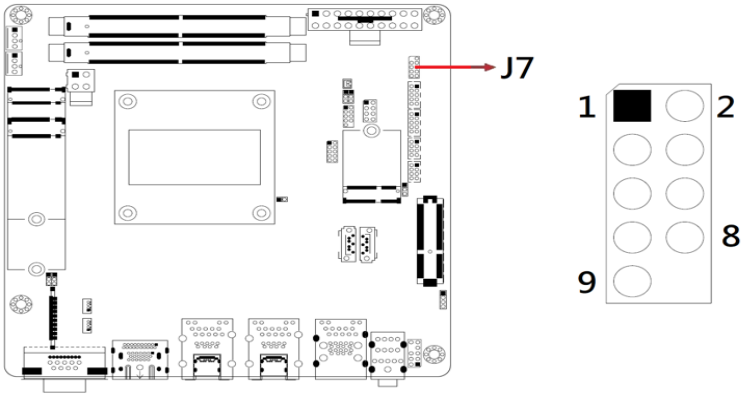


Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	2	RXD, Receive data
3	TXD, Transmit data	4	DTR, Data terminal ready
5	Ground	6	DSR, Data set ready
7	RTS, Request to send	8	CTS, Clear to send
9	RI, Ring indicator	10	Not Used

2.5.10 DDR5 SO-DIMM Slot (J6 / J10)

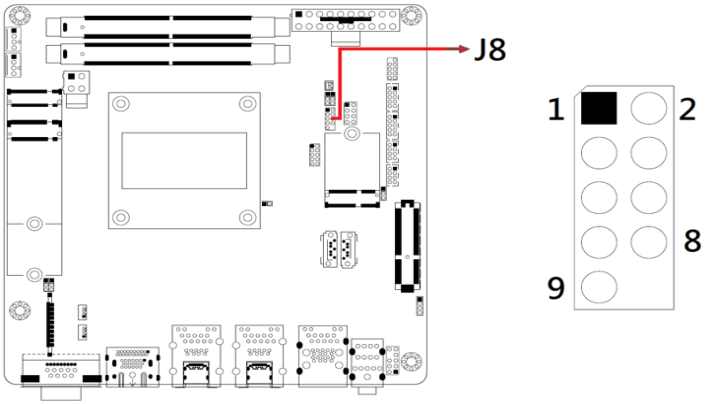


2.5.11 SPI Flash Connector (J7)



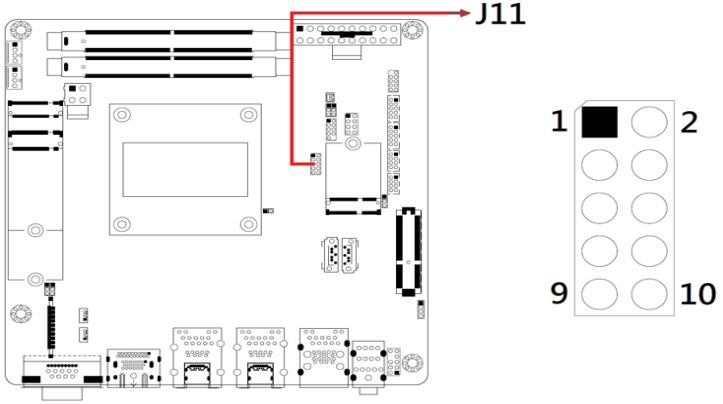
Note: J7 is for Factory use only.

2.5.12 80 Port Debug (J8)



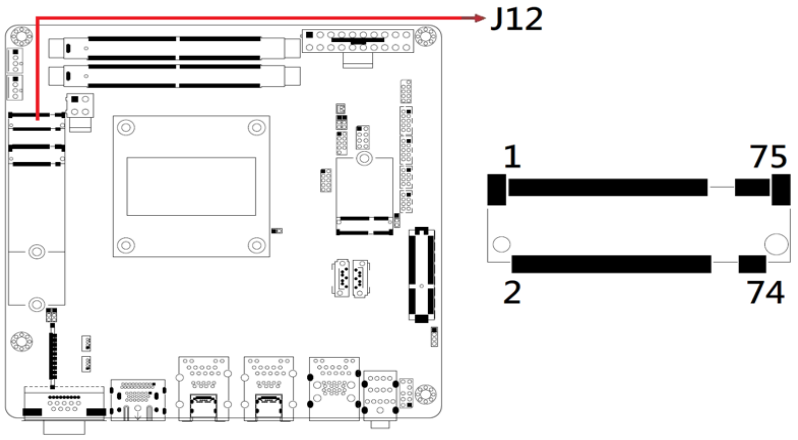
Note: J8 is for factory use only.

2.5.13 Digital I/O Connector (J11)



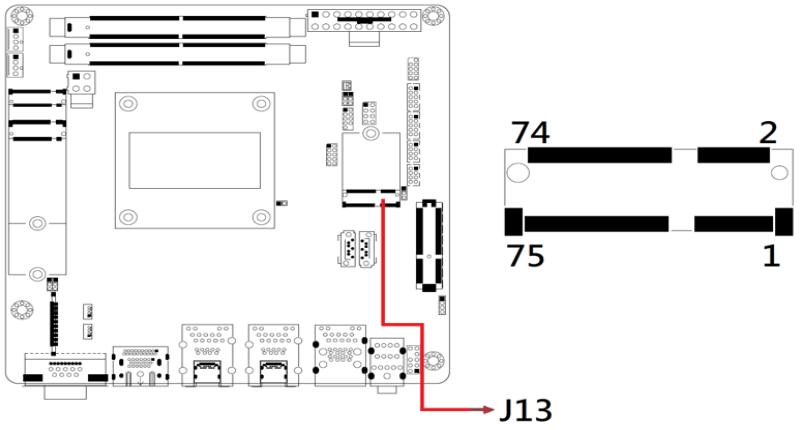
Pin	Signal	Pin	Signal
1	Ground	2	+5V(0.5A)
3	OUT3	4	OUT1
5	OUT2	6	OUT0
7	IN3	8	IN1
9	IN2	10	IN0

2.5.14 M.2 M2280 Slot (J12)



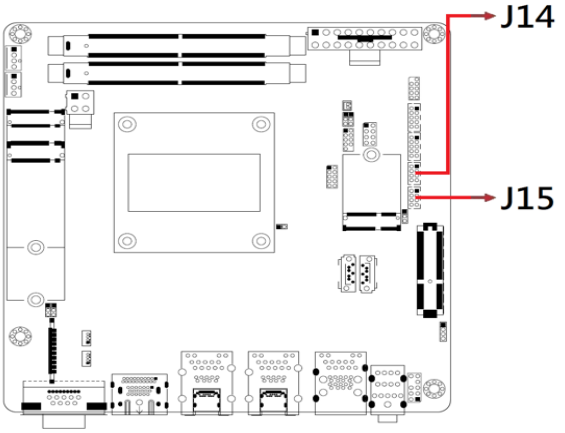
*J12 supports NVME

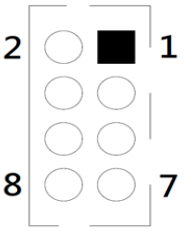
2.5.15 M.2 E2230 Slot (J13)



*J13 supports USB2.0 & PCIE x1

2.5.16 USB 2.0 Connector (J14, J15)

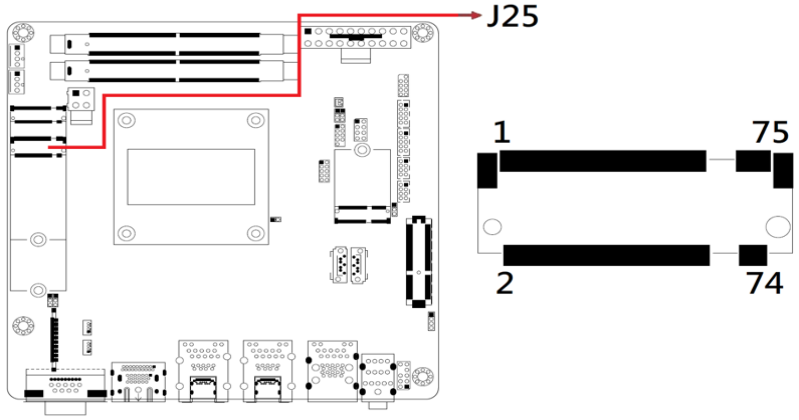




* Connector type: DF11-8S-PA66H

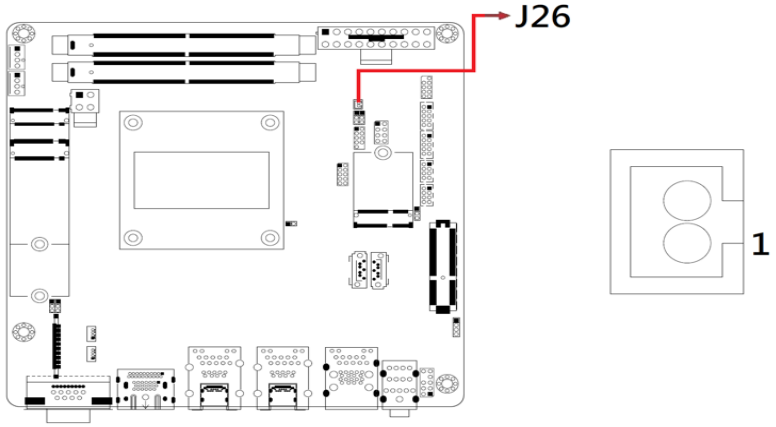
Pin	Signal	Pin	Signal
1	VCC(0.5A)	2	Ground
3	D0-	4	D1+
5	D0+	6	D1-
7	Ground	8	VCC(0.5A)

2.5.17 M.2 M-key 2242 Slot (J25)



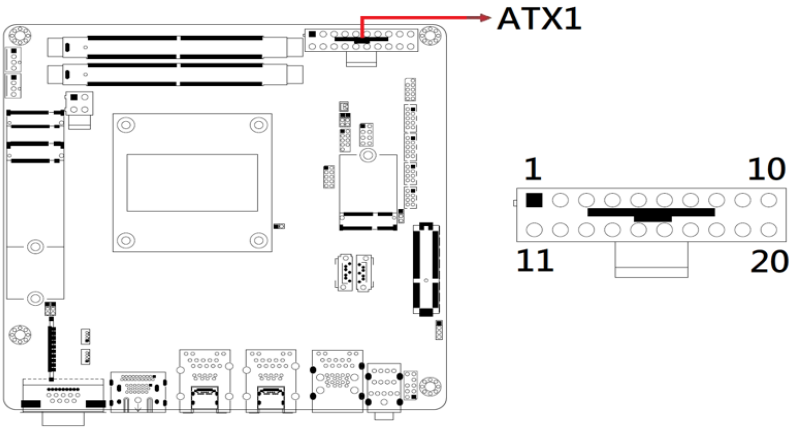
*J25 supports NVME

2.5.18 Battery Connector (J26)



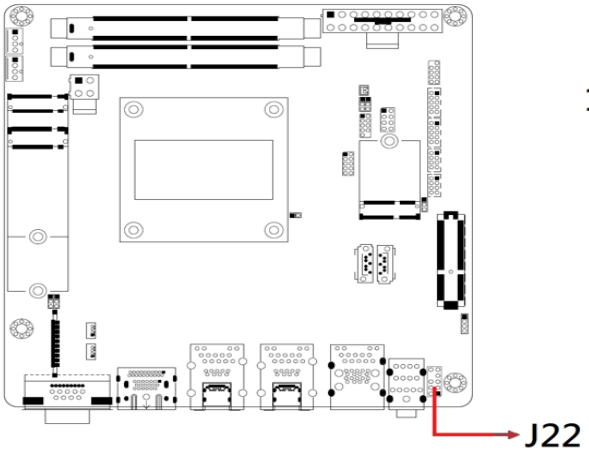
Pin	Signal Name	Pin	Signal Name
1	Battery (3V)	2	Ground

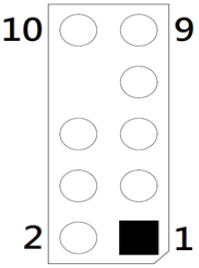
2.5.19 ATX Power Connector (ATX1)



Pin	Signal Name	Pin	Signal Name
1	3.3V	11	3.3V
2	3.3V	12	-12V
3	Ground	13	Ground
4	+5V	14	PS-ON
5	Ground	15	Ground
6	+5V	16	Ground
7	Ground	17	Ground
8	Power good	18	-5V
9	5VSB	19	+5V
10	+12V	20	+5V

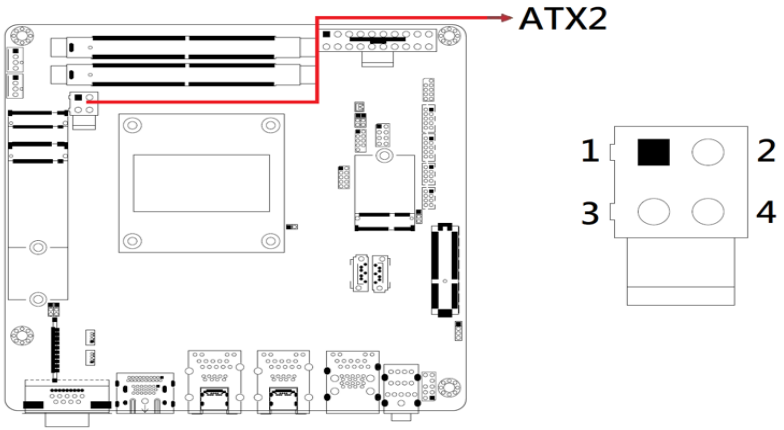
2.5.20 Audio Pin Header for Chassis Front Panel (J22)





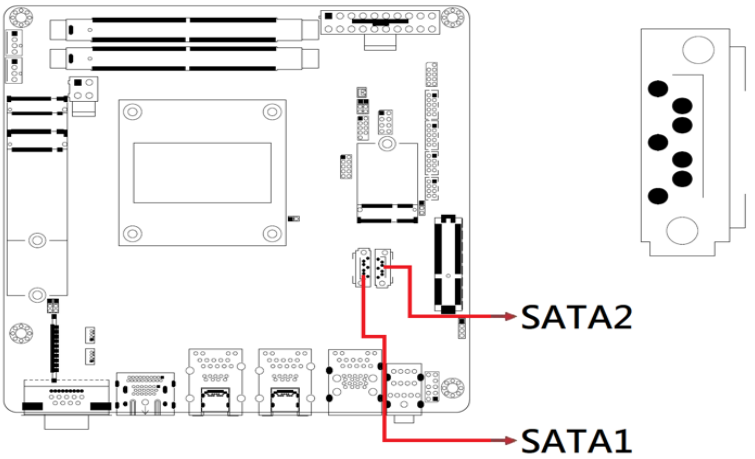
Pin	Signal Name	Pin	Signal Name
1	MIC IN_L	2	Ground
3	MIC IN_R	4	DET
5	LINE_R	6	Sense Ground
7	Sense	8	KEY
9	LINE_L	10	Sense Ground

2.5.21 CPU Power Connector (ATX2)

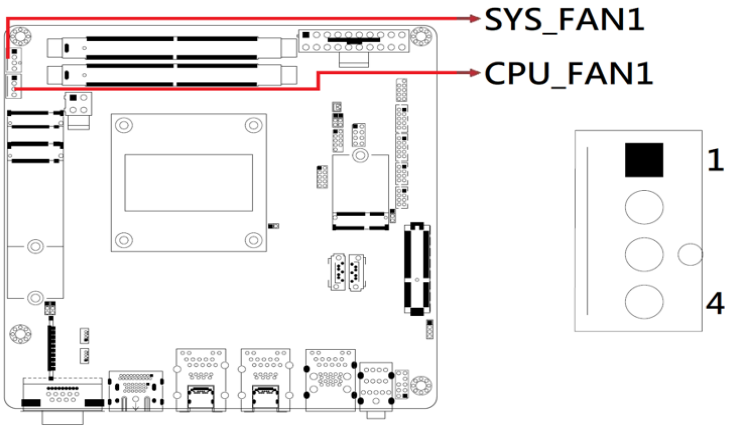


Pin	Signal Name	Pin	Signal Name
1	Ground	2	Ground
3	+12 V	4	+12V

2.5.22 SATA III Connector (SATA1, SATA2)

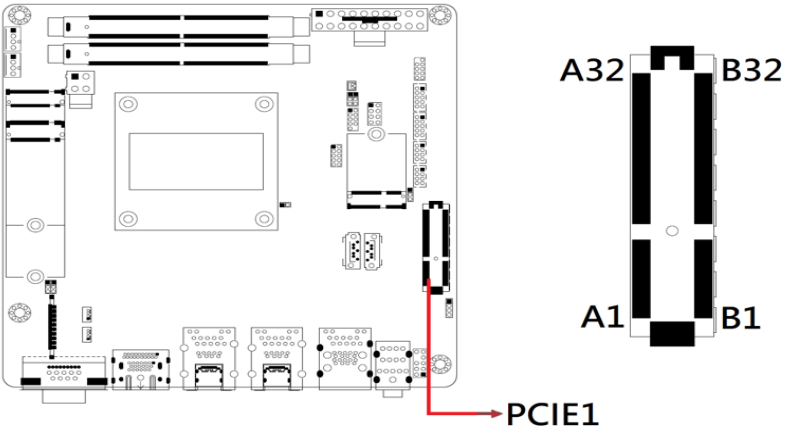


2.5.23 Fan Power Connectors (CPU_FAN1, SYS_FAN1)



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

2.5.24 PCIe (x4) Slot (PCIE1)



Chapter 3
Drivers Installation

This chapter introduces installation of the following drivers:

- Intel Chipset Software Installation Utility
- VGA Driver Installation
- Intel Smartsound Drivers Installation
- Realtek Audio DCH Drivers Installation
- LAN Driver Installation
- Intel ME Drivers Installation
- Intel PMT Drivers Installation
- Intel NPU IO Drivers Installation
- Intel GNA IO Drivers Installation

3.1 Introduction

This section describes the installation procedures for software and drivers under Windows 11.

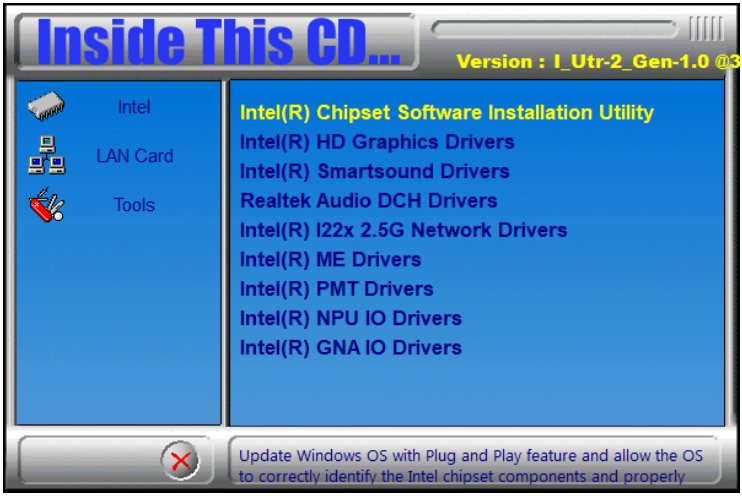
Note: After installing the Windows operating system, you must install Intel® Chipset Software Installation Utility first before proceeding with the installation of other drivers.

3.2 Intel® Chipset Software Installation Utility

Intel® Chipset Software Installation Utility must be installed first to properly configure INF files for Plug & Play functionality of Intel chipset components. Follow the steps below:

1. Visit the IBASE website and navigate to the product's Download page. Download the compressed driver file to your computer. Double-click the file to extract it. Run CDGuide.exe to open the main driver interface. In the interface, click Intel on the left pane, then select Intel® Arrow Lake-P/U/H Chipset Drivers on the right.

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

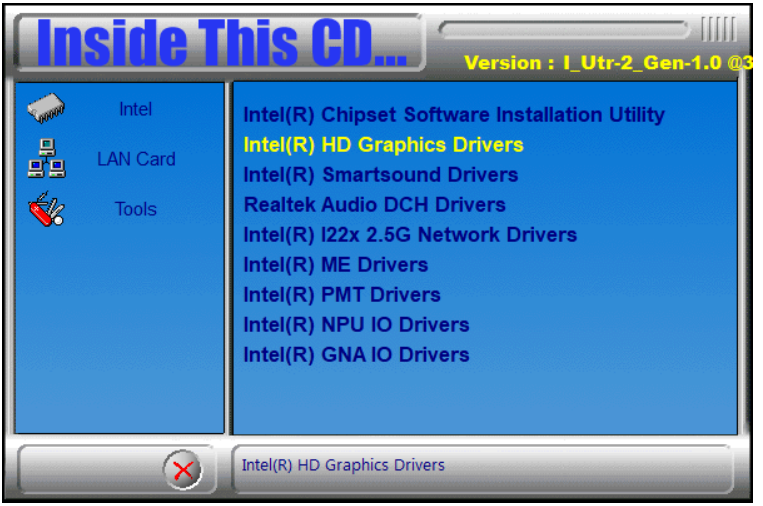


3. When the *Welcome* screen appears, click **Next**.
4. Accept the terms in the software license agreement.
5. On the *Readme File Information* screen, click **Install**.

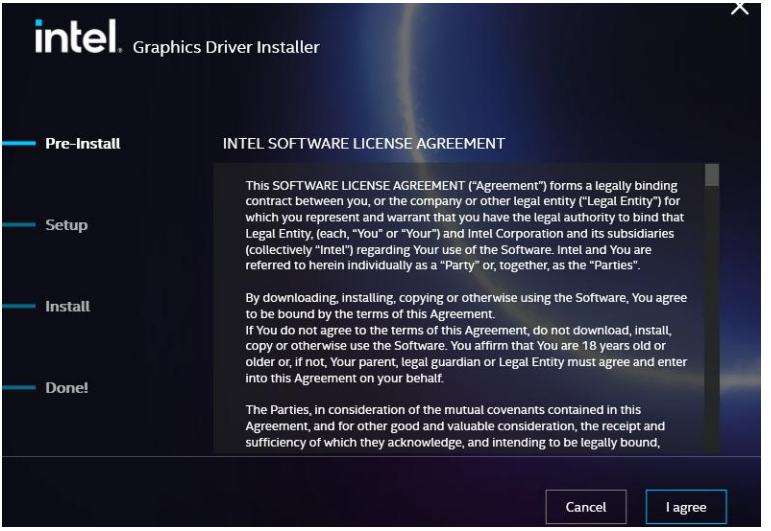
6. When installation is complete, click **Finish**.

3.3 VGA Driver Installation

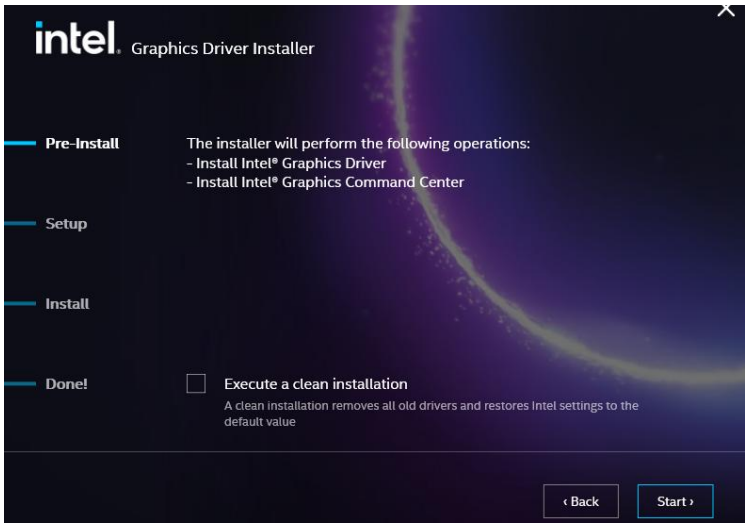
1. Click **Intel** on the left pane and then **Intel(R) Arrow Lake-P/U/H Chipset Drivers** on the right.
2. Click **Intel(R) HD Graphics Driver**.



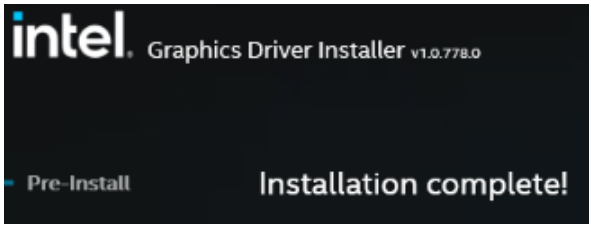
3. Click **Begin installation**.
4. Click **I agree** in the INTEL SOFTWARE LICENSE AGREEMENT screen.



5. Click **Start** for the installer to install the following components:
   - Intel Graphics Driver
   - Intel Graphics Command Center

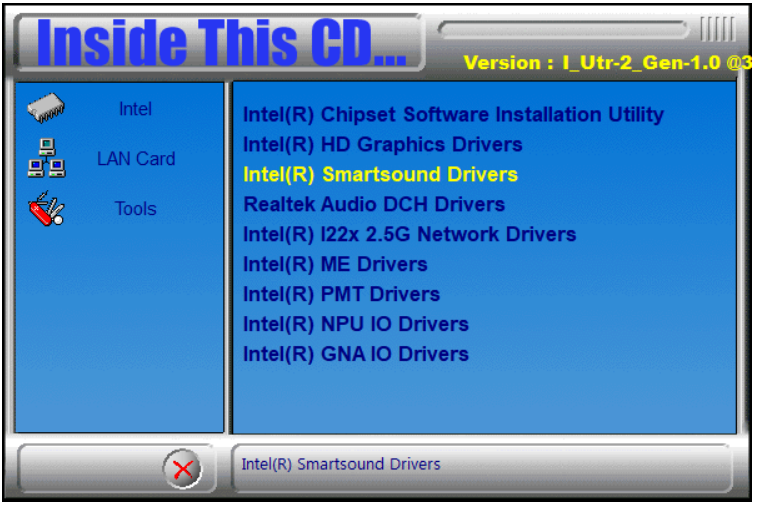


6. When installation is complete, click **Finish**.



3.4 Intel(R) Smartsound Drivers Installation

1. Click **Intel** on the left pane and then **Intel(R) Arrow Lake-P/U/H Chipset Drivers** on the right pane. Click **Intel(R) Smartsound Drivers** on the right.



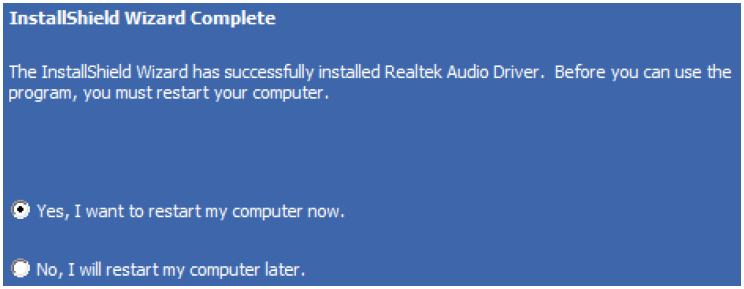
2. Run the file in the path shown below for the InstallShield Wizard to start and complete the installation of the Intel Smartsound drivers. When installation has been completed, press any key to continue.

3.5 Realtek Audio DCH Drivers Installation

1. Click **Intel** on the left pane and then **Intel(R) Arrow Lake-P/U/H Chipset Drivers** on the right. Click **Realtek Audio DCH Drivers**.

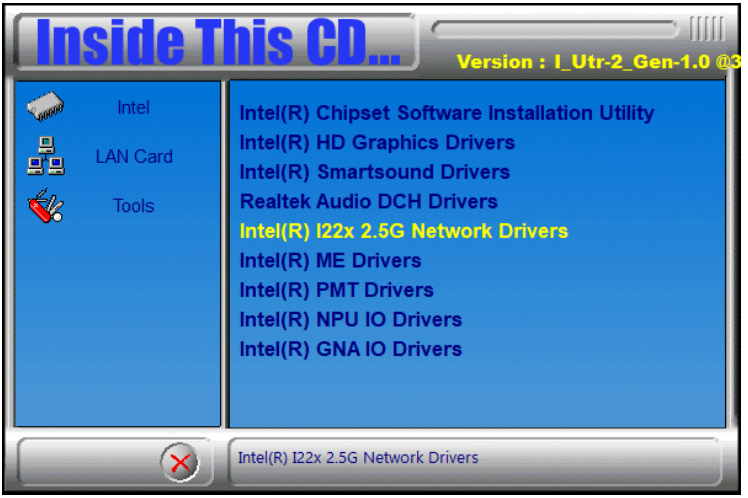
2. Click **Next** when the Welcome to the InstallShield Wizard for Realtek Audio Driver screen appears.

3. After the InstallShield Wizard has completed the installation, restart the computer.

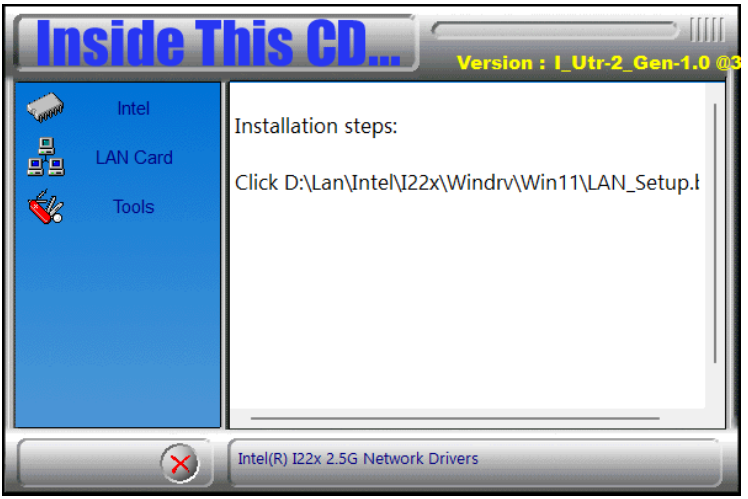


3.6 LAN Driver Installation

1. Click **Intel** on the left pane and then **Intel(R) Arrow Lake-P/U/H Chipset Drivers** on the right.
2. Click **Intel(R) I22x 2.5G Network Drivers**.

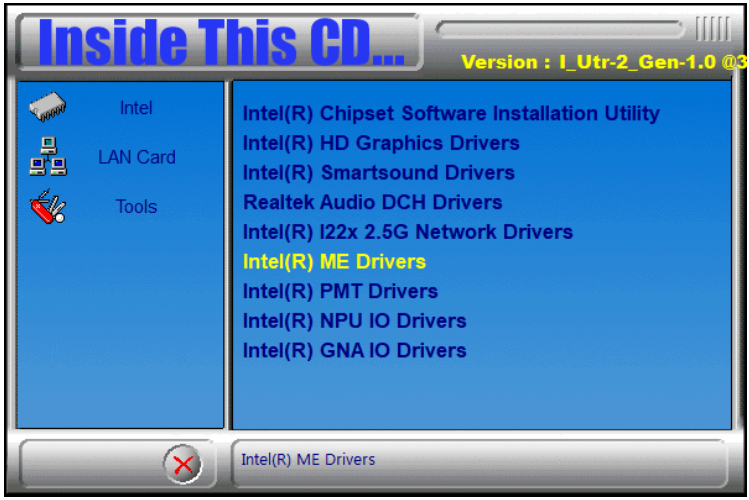


3. Follow the steps until InstallShield Wizard completes the installation.

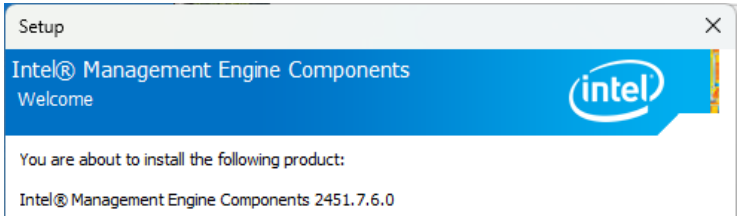


3.7 Intel® ME Drivers Installation

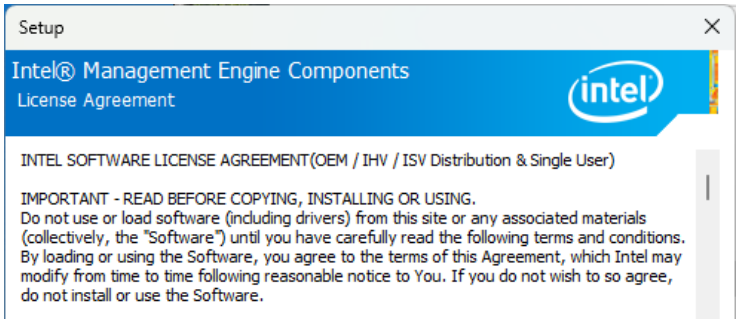
1. Click **Intel** on the left pane and then **Intel(R) Arrow Lake-P/U/H Chipset Drivers** on the right.
2. Click **Intel(R) ME Drivers**.



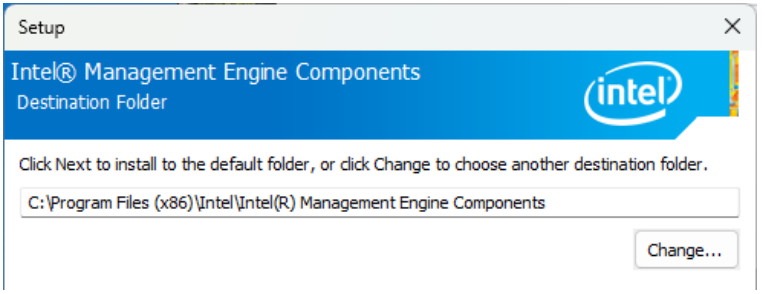
3. When the Welcome screen appears, click **Next**.



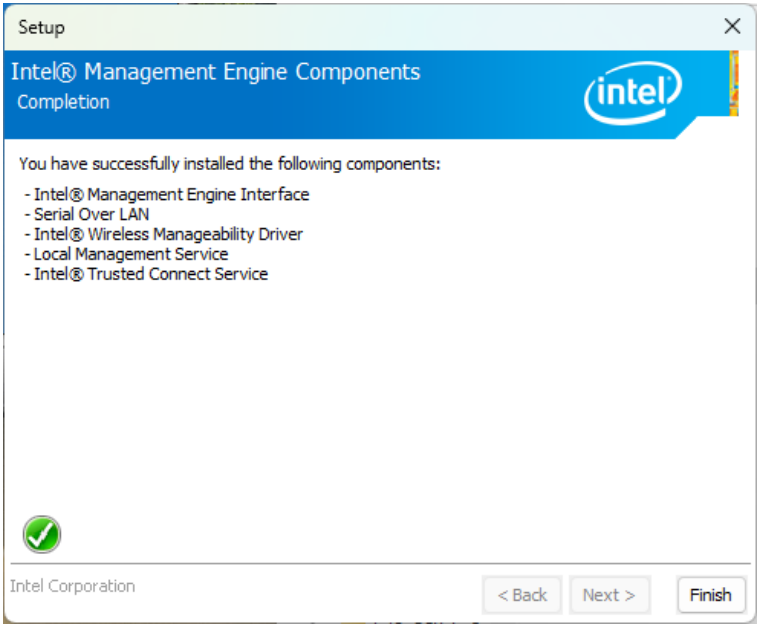
4. Accept the terms in the license agreement and click **Next**.



5. In the Destination Folder screen, click **Next** to install to the default folder, or click Change to choose another destination folder.

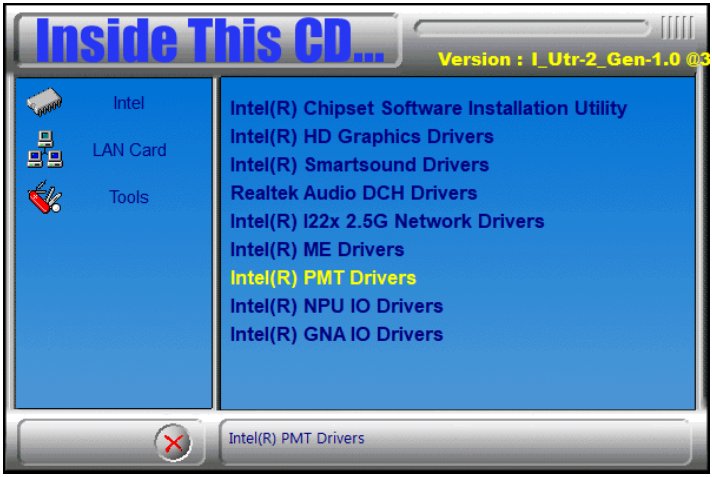


6. When installation is complete, click **Finish**.



3.8 Intel® PMT Drivers Installation

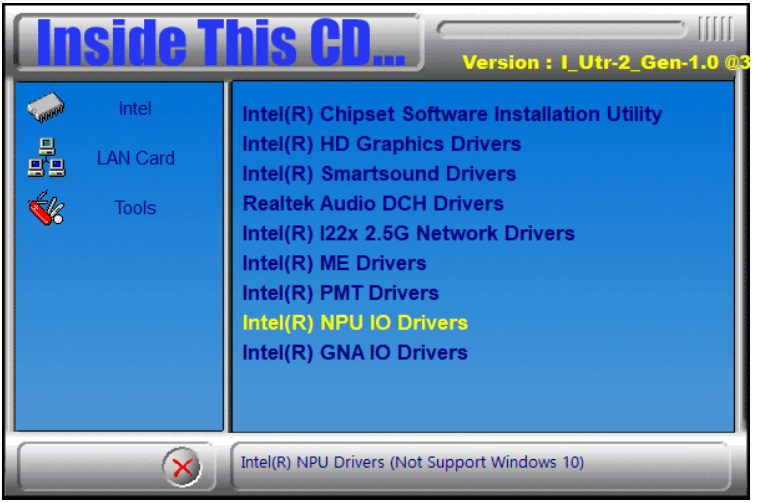
1. Click **Intel** on the left pane and then **Intel(R) Arrow Lake-P/U/H Chipset Drivers** on the right.
2. Click **Intel(R) PMT Drivers**.



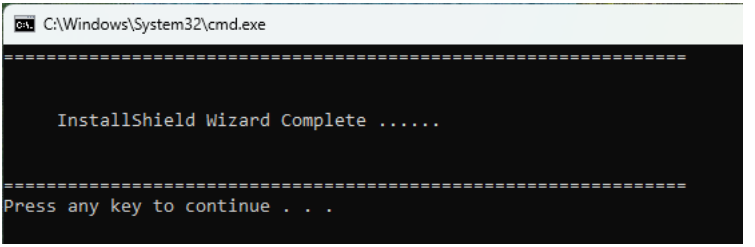
3. Follow the steps until InstallShield Wizard completes the installation.

3.9 Intel® NPU IO Drivers Installation

1. Click **Intel** on the left pane and then **Intel(R) Arrow Lake-P/U/H Chipset Drivers** on the right.
2. Click **Intel(R) NPU IO Drivers**.

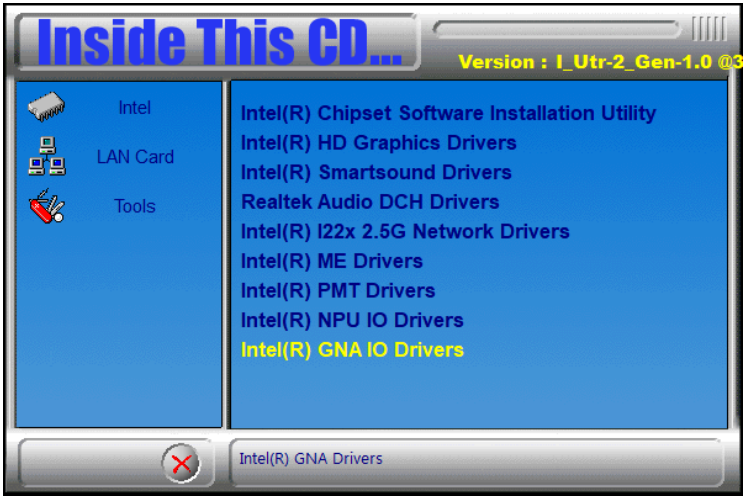


3. Follow the steps until InstallShield Wizard completes the installation.

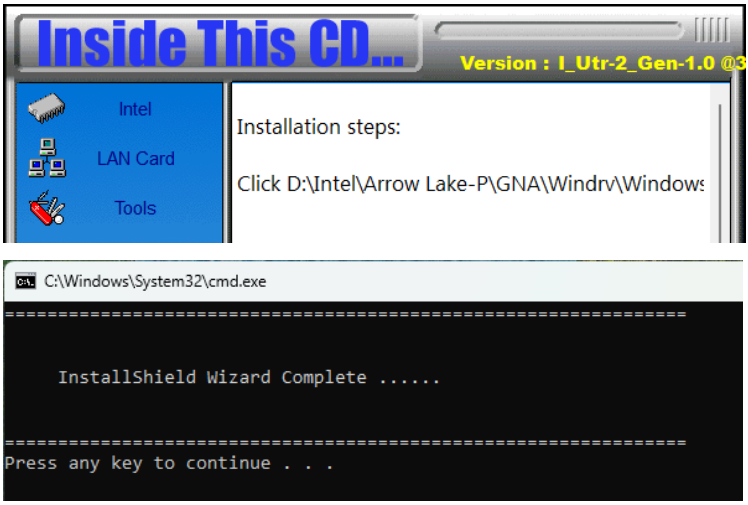


3.10 Intel® GNA IO Drivers Installation

1. Click **Intel** on the left pane and then **Intel(R) Arrow Lake-P/U/H Chipset Drivers** on the right.
2. Click **Intel(R) GNA IO Drivers**.



3. Follow the steps until InstallShield Wizard completes the installation.



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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
- MEBx

4.1 Introduction

The BIOS (Basic Input/Output System) is stored in the ROM of your computer and supports Intel® processors. It provides essential low-level support for standard hardware components such as disk drives, serial ports, and parallel ports. It also includes security features like password protection and enables detailed fine-tuning of the chipset that controls the entire system.

4.2 BIOS Setup

The BIOS includes a Setup Utility for configuring system settings. This utility is stored in the BIOS ROM and is activated immediately when the system powers on. To enter Setup, press the **<Del>** key as soon as the system begins booting. If pressed too late, the POST (Power-On Self-Test) process will proceed, and Setup access will be bypassed. To re-enter Setup, restart the system by pressing the **Reset** button or pressing **<Ctrl> + <Alt> + <Delete>**. Alternatively, turn the system off and on again.

When prompted, the following message appears:

```
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.

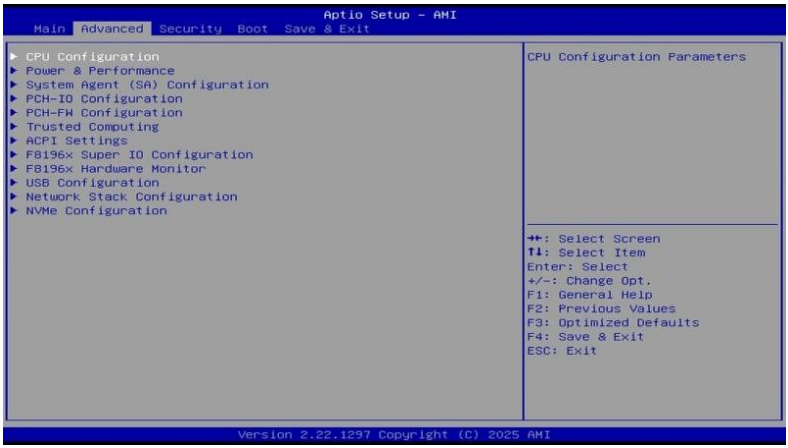
These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could make the system unstable and crash in some cases.

4.3 Main Settings

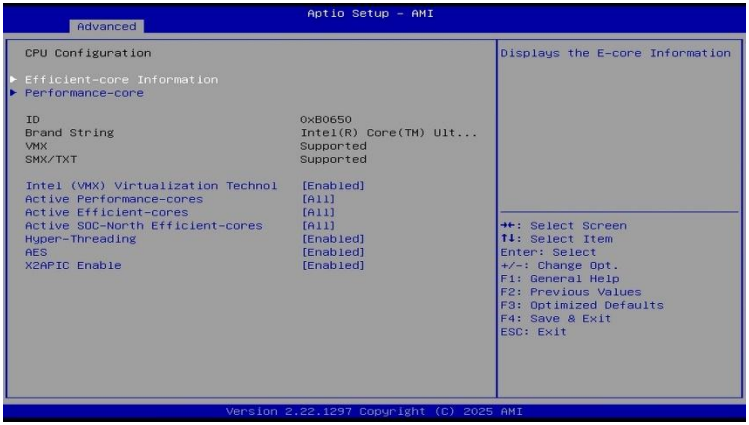
BIOS Setting	Description
System Date	Sets the system date. Use **<Tab>** to navigate fields.
System Time	Sets the system time. Use **<Tab>** to navigate fields.

4.4 Advanced Settings

This section covers system configurations.

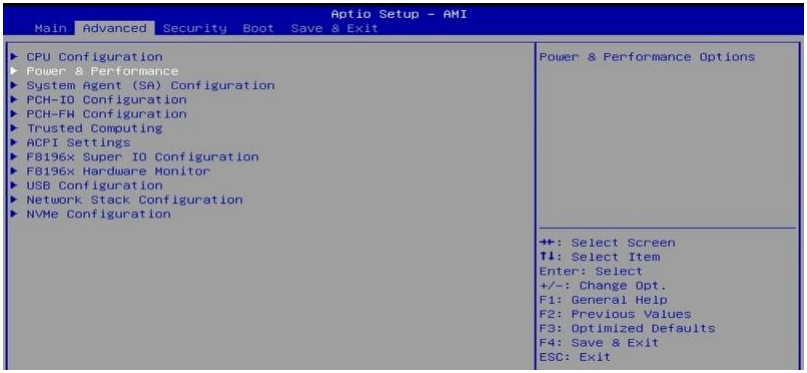


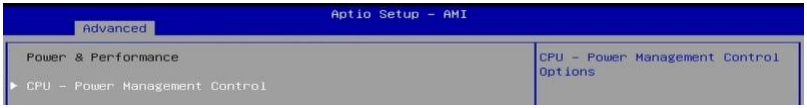
4.4.1 CPU Configuration

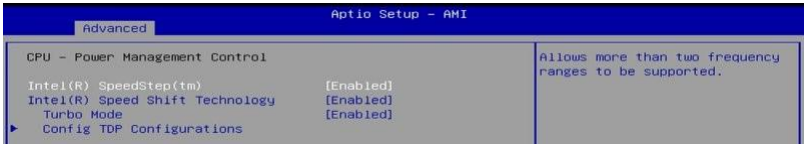


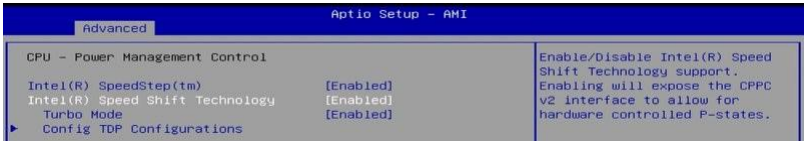
BIOS Setting	Description
Efficient/Performance-core Information	Displays the E-core / P-core Information
Intel (VMX) Virtualization Technology	When enabled, a VMX can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Performance Cores	Number of P-cores to enable in each processor package. Note: Number of cores and E-cores are looked at together. When both are (0,0), Pcode will enable all cores.
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.
Active SOC-North Efficient-cores	Number of SOC-North Efficient-cores to enable in SOC North.
Hyper-Threading	Enable/Disable Hyper-Threading Technology.
AES	Enable/Disable AES (Advanced Encryption Standard).
X2APIC Enable	Enable/Disable X2APIC Operating Mode. When this option is configured as 'Enabled', 'VT-d' option must be 'Enabled' and 'X2APIC Opt Out' option must be 'Disabled' as well. This option will be grayed out when 'VT-d' option is configured as 'Disabled'.

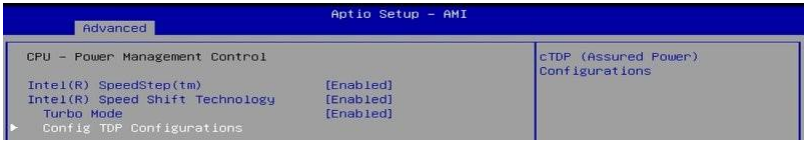
Power & Performance

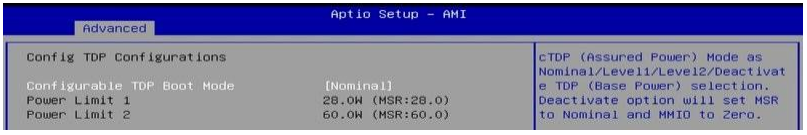




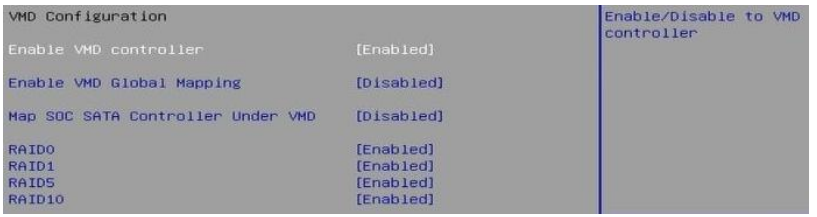


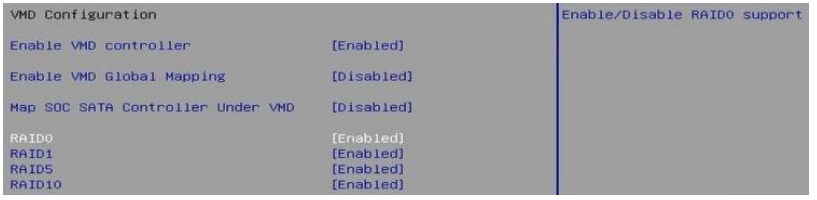






4.4.2 System Agent (SA) Configuration



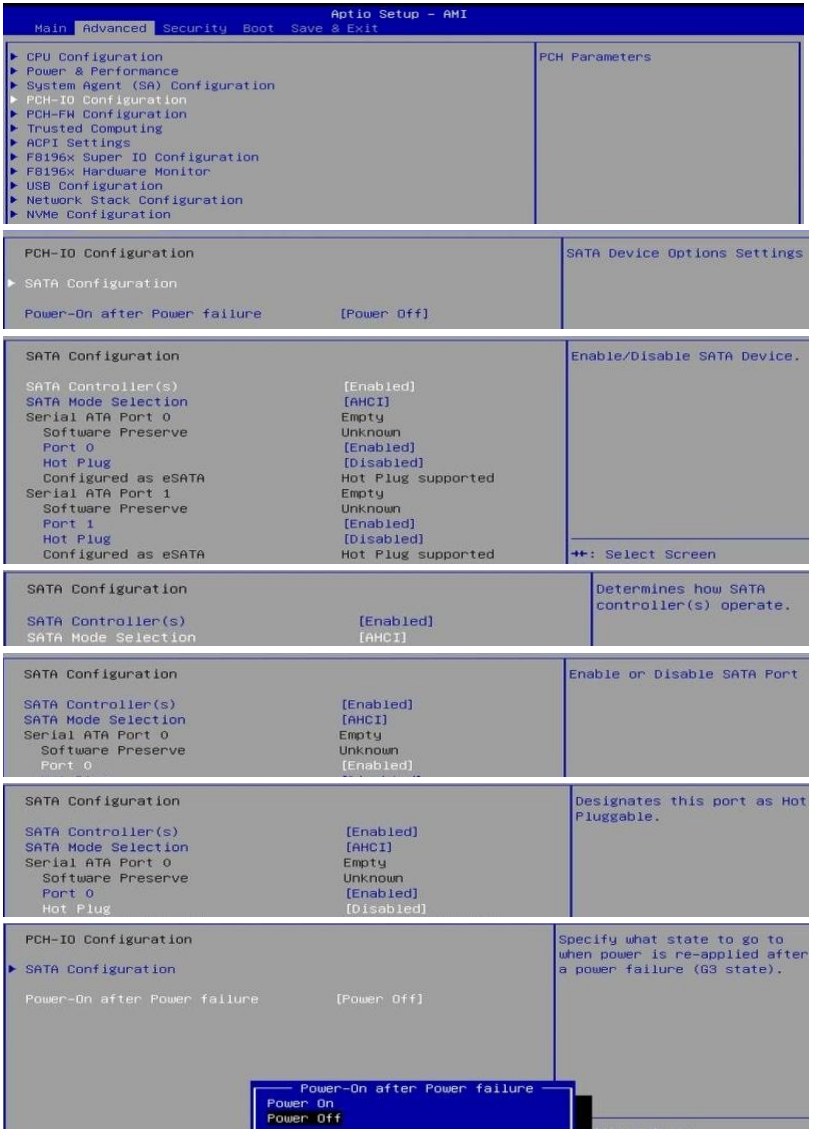



System Agent (SA) Configuration
VMD setup menu
VT-d setup menu
NPU Device (B0:D11:F0) [Enabled]
VT-d Configuration settings

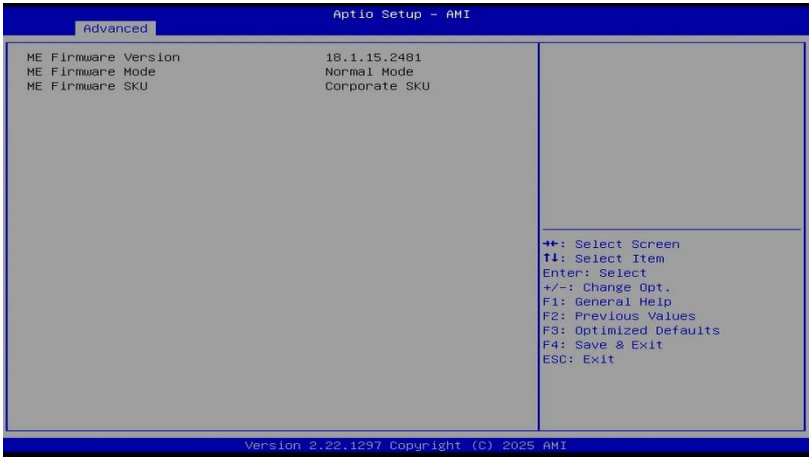

VT-d Configuration
VT-d Supported
VT-d [Enabled]


System Agent (SA) Configuration
VMD setup menu
VT-d setup menu
NPU Device (B0:D11:F0) [Enabled]
Enable/Disable NPU (Neural Processing Unit) Device.
NPU Device (B0:D11:F0)
Enabled
Disabled

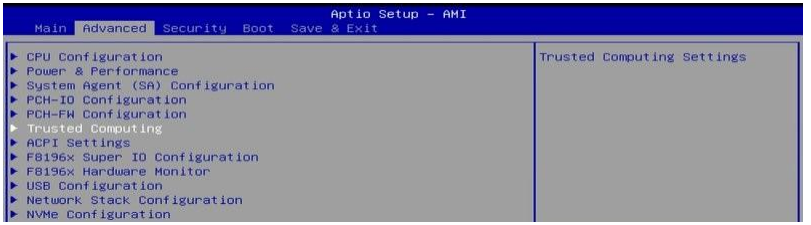
4.4.3 PCH-IO Configuration



4.4.4 PCH-FW Configuration

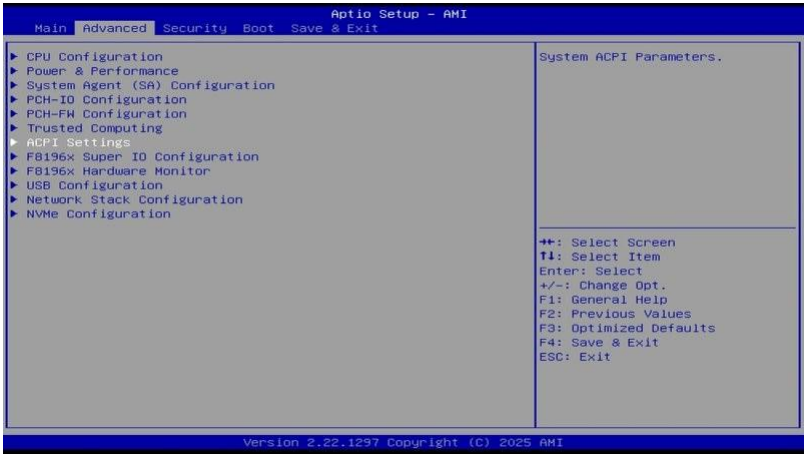


4.4.5 Trusted Computing



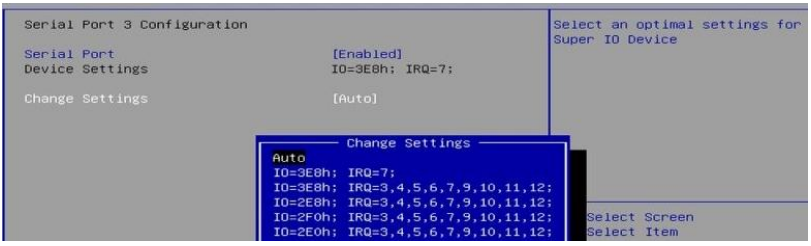
BIOS Setting	Description
Security Device Support	Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INT1A interface will not be available.
SHA256/384 PCR Bank	Enables / Disables PCR Bank.
Pending operation	Schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device.
Platform Hierarchy	Enables / Disables platform hierarchy.
Storage Hierarchy	Enables / Disables storage hierarchy.
Endorsement Hierarchy	Enables / Disables endorsement hierarchy.
Physical Presence Spec Version	Select to tell O.S. to support PPI Spec Version 1.2 or 1.3. Note some HCK tests might not support 1.3.
Device Select	TPM 1.2 will restrict support to TPM 1.2 devices. TPM 2.0 will restrict support to TPM 2.0 devices. Auto will support both with the default set to TPM 2.0 devices if not found, TPM 1.2 devices will be enumerated.

4.4.6 ACPI Settings

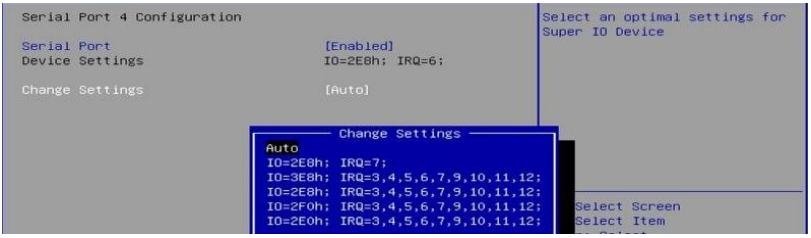


4.4.7 F8196x Super IO Configuration


F8196x Super IO Configuration
Super IO Chip F8196x
Serial Port 1 Configuration
Serial Port 2 Configuration
Serial Port 3 Configuration
Serial Port 4 Configuration
Set Parameters of Serial Port 3 (COMC)


Serial Port 3 Configuration
Serial Port [Enabled]
Device Settings IO=3E8h; IRQ=7;
Change Settings [Auto]
Select an optimal settings for Super IO Device
Change Settings
Auto
IO=3E8h; IRQ=7;
IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;
IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;
IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12;
IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12;
Select Screen
Select Item

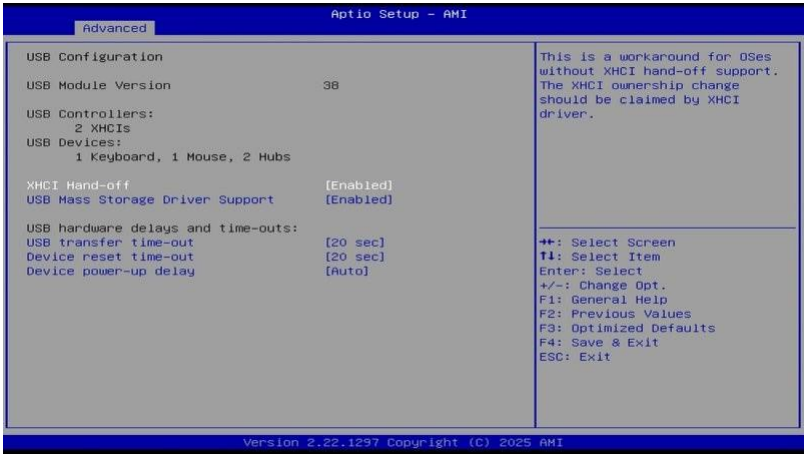

F8196x Super IO Configuration
Super IO Chip F8196x
Serial Port 1 Configuration
Serial Port 2 Configuration
Serial Port 3 Configuration
Serial Port 4 Configuration
Set Parameters of Serial Port 4 (COMD)


Serial Port 4 Configuration
Serial Port [Enabled]
Device Settings IO=2E8h; IRQ=6;
Change Settings [Auto]
Select an optimal settings for Super IO Device
Change Settings
Auto
IO=2E8h; IRQ=7;
IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12;
IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12;
IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12;
IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12;
Select Screen
Select Item

4.4.8 F8196x Hardware Monitor

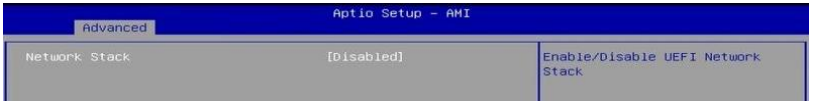
BIOS Setting	Description
CPU Smart Fan Control	Enables / Disables smart fan control.
Temperatures / Voltages	These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

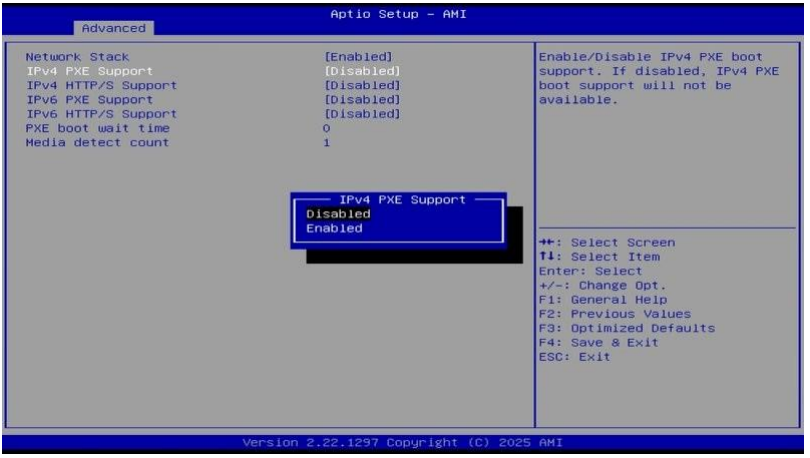
4.4.9 USB Configuration



BIOS Setting	Description
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enables / Disables the support for USB mass storage driver support.
USB Transfer time-out	The time-out value (1 / 5 10 / 20 secs) for Control, Bulk, and Interrupt transfers.
Device reset time-out	Gives seconds (10 / 20 / 30 / 40 secs) to delay execution of Start Unit command to USB mass storage device.
Device power-up delay	Max.time the device will take before it properly reports itself to the Host Controller. '**Auto**' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.

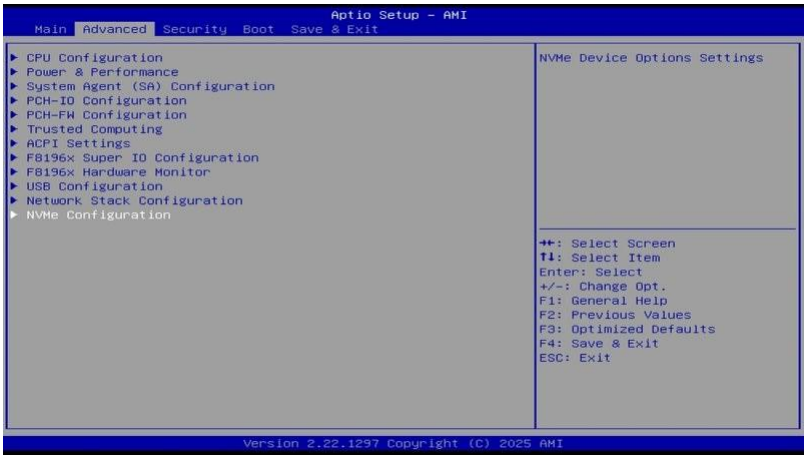
4.4.10 Network Stack Configuration

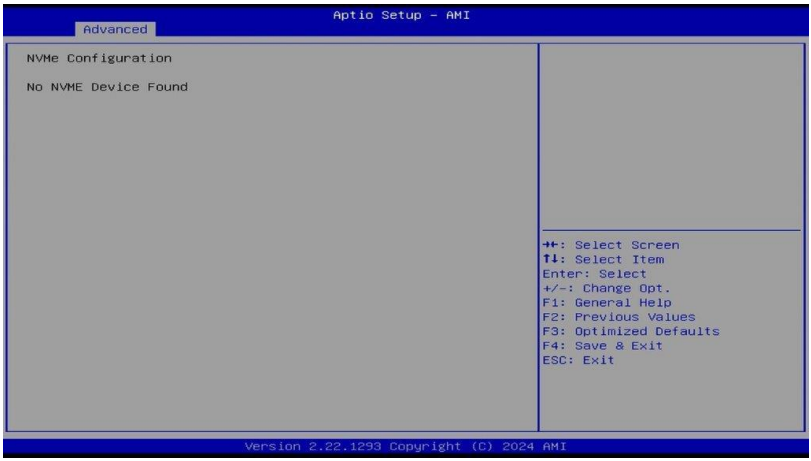




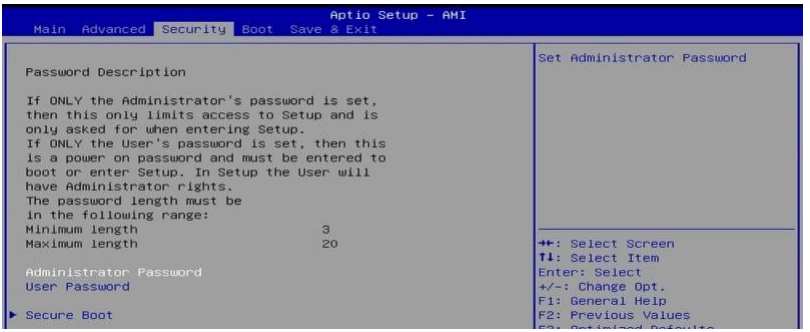
BIOS Setting	Description
Network Stack	Enable/Disable UEFI Network Stack
IPv4 PXE Support	If disabled, IPv4 PXE boot support will not be available.
IPv4 HTTP Support	If disabled, IPv4 HTTP boot support will not be available.
IPv6 PXE Support	If disabled, IPv6 PXE boot support will not be available.
IPv6 HTTP Support	If disabled, IPv6 HTTP boot support will not be available.
PXE boot wait time	Wait time in seconds to press ESC key to abort the PXE boot. Use either +/- or numeric keys to set the value
Media detect count	Number of times the presence of media will be checked. Use either +/- numeric keys to set the value.

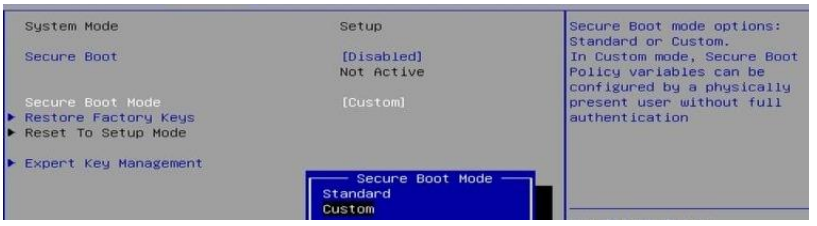
4.4.11 NVMe Configuration

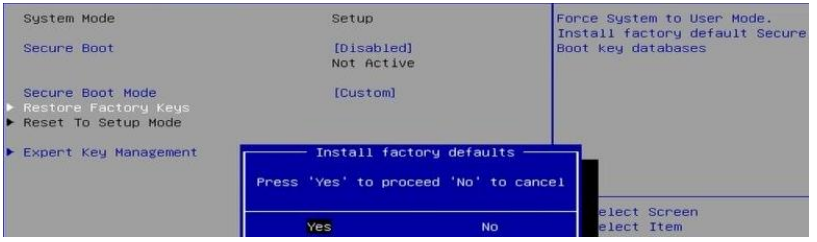


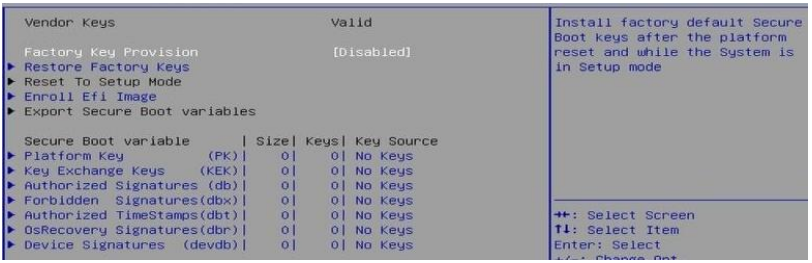


4.5 Security Settings



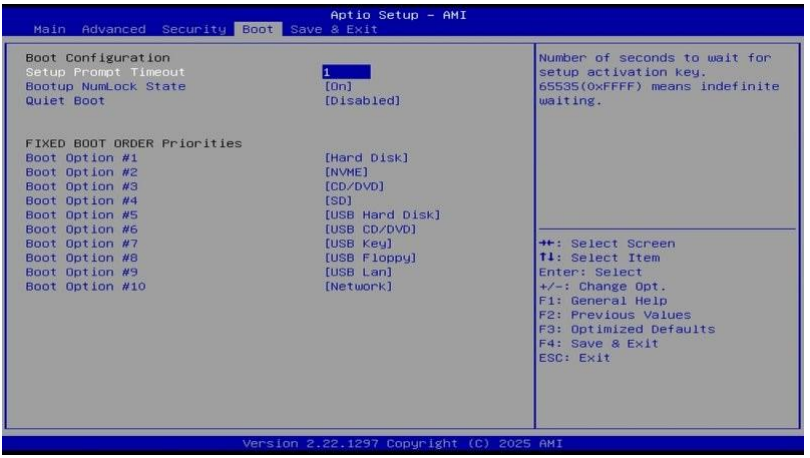






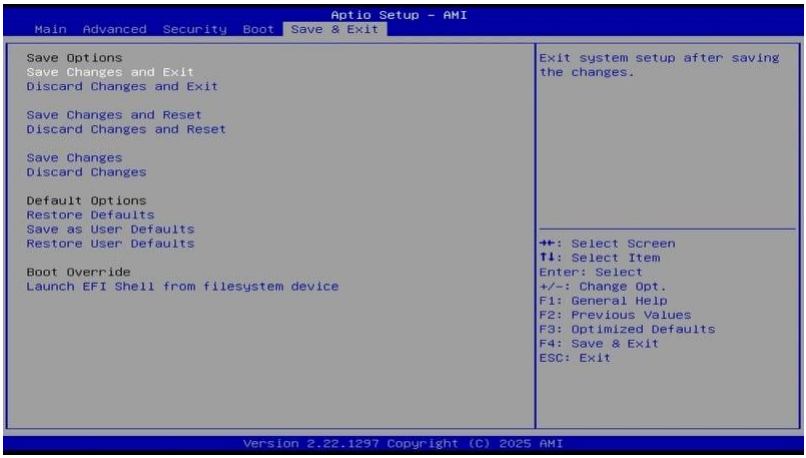
BIOS Setting	Description
Setup Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.
Secure Boot	Secure Boot feature is Active if Secure Boot is enabled. Platform Key(PK) is enrolled and the system is in user mode. The mode change requires platform reset.
Secure Boot Mode	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.
Restore Factory Keys	Forces system to user mode. Install factory default Secure Boot key databases.
Reset to Setup Mode	Delete all Secure Boot key databases from NVRAM
Expert Key Management	Enables expert users to modify Secure Boot Policy variables without full authentication.

4.6 Boot Settings



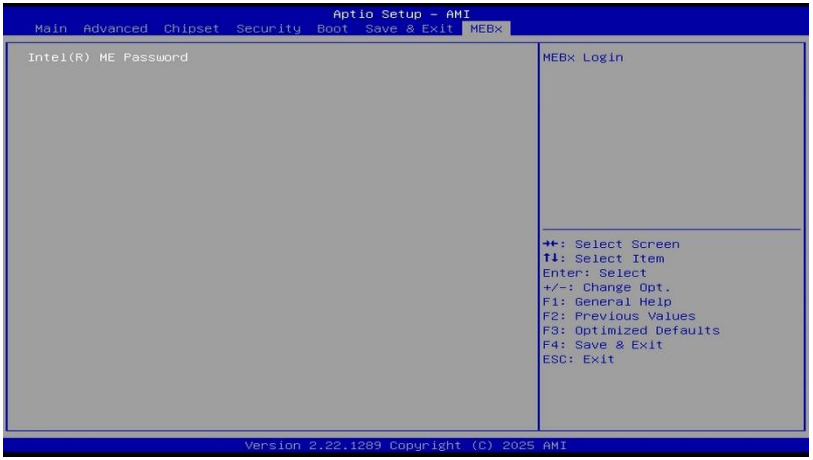
BIOS Setting	Description
Setup Prompt Timeout	Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.
Bootup NumLock State	Selects the keyboard NumLock state.
Quiet Boot	Enables / Disables Quiet Boot option.
FIXED BOOT ORDER Priorities	Sets the system boot order.

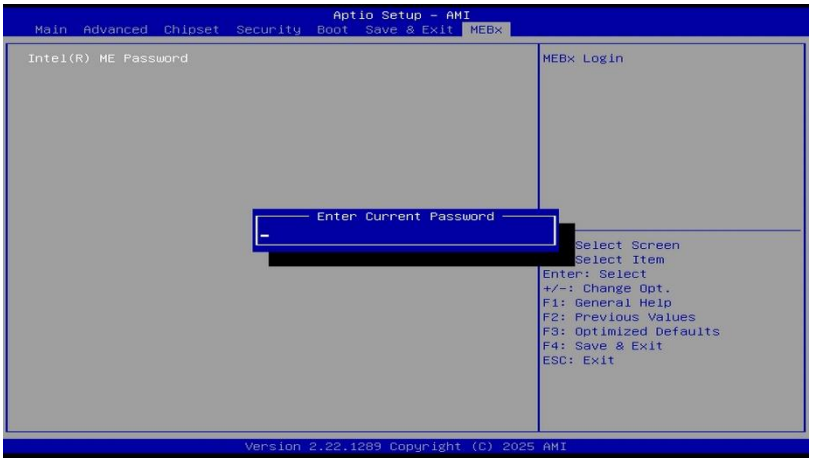
4.7 Save & Exit Settings



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

4.8 MEBx Settings





Appendix

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

A. I/O Port Address Map

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

Address	Device Description
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x0000EFA0-0x0000EFBF	Intel (R) SMBus - 7722
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x00003050-0x00003057	Standard SATA AHCI Controller
0x00003040-0x00003043	Standard SATA AHCI Controller
0x00003020-0x0000303F	Standard SATA AHCI Controller
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x00001854-0x00001857	Motherboard resources

Address	Device Description
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00002000-0x000020FE	Motherboard resources
0x0000FFF8-0x0000FFFF	Intel(R) Active Management Technology - SOL (COM5)
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller
0x000000BC-0x000000BD	Programmable interrupt controller
0x000004D0-0x000004D1	Programmable interrupt controller

B. Interrupt Request Lines (IRQ)

The following table shows the IRQ used by the devices on board.

Level	Function
IRQ 4294967269-85	Intel(R) Ethernet Controller I226-V
IRQ 4294967252-68	Intel(R) Ethernet Controller I226-V #2
IRQ 4294967292	PCI Express Root Port
IRQ 4294967235-51	Intel(R) Ethernet Controller I226-LM
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 7	Communications Port (COM3)
IRQ 6	Communications Port (COM4)
IRQ 4294967290	Standard SATA AHCI Controller
IRQ 0	System timer
IRQ 4294967289	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 55-204	Microsoft ACPI-Compliant System
IRQ 256-511	Microsoft ACPI-Compliant System
IRQ 4294967293	PCI Express Root Port
IRQ 4294967232	Intel(R) GNA Scoring Accelerator module
IRQ 4294967287	Intel(R) Graphics
IRQ 19	Intel(R) Active Management Technology - SOL (COM5)
IRQ 4294967288	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4294967233	Intel(R) AI Boost
IRQ 4294967291	PCI Express Root Port
IRQ 4294967234	Intel(R) Management Engine Interface #1
IRQ 4294967286	Intel® Smart Sound Technology BUS
IRQ 4294967294	PCI Express Root Port

C. Watchdog Timer Configuration

The Watchdog Timer (WDT) is used to generate specific output signals after a user-programmable countdown. It is typically used to prevent system lock-up, such as when software becomes unresponsive or trapped in a deadlock. In such cases, the timer will count down to zero and trigger the designated output action.

Under normal circumstances, the WDT must be regularly reset or refreshed before the countdown reaches zero, ensuring that the system is functioning correctly.

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(0x2B);
        bBuf &= (~0x20);
        Set_F81966_Reg(0x2B,   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 == 0x07)                      //Fintek 81966
        {       goto Init_Finish;               }

        F81966_BASE = 0x2E;
        result = F81966_BASE;

        ucDid = Get_F81966_Reg(0x20);
        if (ucDid == 0x07)                      //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
```

D. Onboard Connector Types

Function	Connector	Onboard Type	Compatible Mating Type for Reference
CPU Power Connector	ATX2	Hao Guo Xing Ye ATX4PT-NY46	Molex 39-01-2040
USB 2.0 Connector	J14, J15	Hao Guo Xing Ye DF11-8S-PA66H	Hirose DF11-8DS-2C
SATA Power Connector	J16	Hao Guo Xing Ye WAFER25-104S-2442-ST	AMP 171822-4
Digital I/O Connector	J11	E-Call E-CALL_0196-01-200-100	Dupont 10P 2.0 mm-pitch (female)
Front Panel Settings Connector	J3	E-Call 0126-01-203-080	Dupont 8P 2.54 mm-pitch (female)
COM3 & COM4 RS-232 Port	J2, J5	Hao Guo Xing Ye DF11-10S-PA66H	HRS DF11-10DS-2C
Audio Connector	J22	E-Call 0126-01-2821009	Dupont 10P 2.54 mm-pitch (female)
Fan Power Connectors	CPU_FAN1 SYS_FAN1	TechBest W2-03I104132S1WT(A)-L	Molex 47054-1000

E. USB Power Control Bit Mapping.

PDPC (Peripheral Device Power Control) allows users to turn off the external power and restart it via software, enabling the external device to recover and ensuring the system remains operational. Here are the bit-mapping for software SDK.

Function	Connector	Software Mapping
M.2 –E Key	J13	bit_0
USB3	CN7 (A, B)	bit_1
USB3	CN6	bit_2
USB3	CN4	bit_3