MI1002AF

Intel® 14th Gen Core™ Ultra 7/5/3
Mini-ITX Motherboard

User's Manual

Version 1.0
(October 2024)

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 for environmental specifications and limits and complies with the directives of the European Union (EU). 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 of for waste electrical and electronic equipment (WEEE - 2012/19/EU). Instead, it should be disposed of by returning it to a municipal recycling collection point. Check local regulations for disposal of electronic products.

Green IBASE

This product complies with RoHS 2 restrictions, 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 as between 0˚C and 60˚C.

Care for your IBASE products:

- Before cleaning the PCB, unplug all 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.
- Touch the edges of non-metallic components of the product instead of the surface of the PCB.
- 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 according to 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 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, CPU cooler, memory, storage devices, power adapter, panel and touchscreen.

* PRODUCTS, HOWEVER, THAT FAIL DUE TO MISUSE, ACCIDENT, IMPROPER INSTALLATION OR UNAUTHORIZED REPAIR SHALL BE TREATED AS OUT OF WARRANTY AND CUSTOMERS SHALL BE BILLED FOR REPAIR AND SHIPPING CHARGES.

Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.
   - Product model name
   - Product serial number
   - Detailed description of the problem
   - The error messages in text or in screenshots if there is any
   - The arrangement of the peripherals
   - Software in use (such as OS and application software, including the version numbers)
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 MI1002AF Mini ITX motherboard is based on Intel® Core Ultra 7/5/3 processors. With support for two DDR5 slots accommodating up to 64GB memory, it supports independent displays with HDMI (2.0a) and 1x DisplayPort(1.4a) (DP++) interface. This high-performance platform meets demands in next-generation applications in imaging, AI, and edge computing. Connectivity and expansion are provided by 3x Intel 2.5G LAN, 6x USB 3.x, 4x COM, 2x SATA III, 1x PCI-E (x4) [Gen. 4.0]; 3x M.2 (B-key, E-key and M-Key) .

1.2 Features

- Intel® Core Ultra 7/5/3 Processors
- 2x DDR5 SO-DIMM sockets, Max. 64GB
- Intel® processor integrated graphics supports HDMI (2.0a) and 1x DisplayPort (1.4a) (DP++)
- 3x Intel® 2.5G LAN
- 6x USB 3.x, 4x USB 2.0, 4x COM, 2x SATA III
- 1x PCI-E (x4) [Gen.4.0]; 3x M.2 (B-key, E-key and M-Key)
- Watchdog timer, Digital I/O, iAMT(18.0) , fTPM
- 12V~24V DC input

1.3 Packing List

Your MI1002AFpackage 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.

- MI1002 x 1
- IO Shield x 1
- SATA cable x 1
- COM cable x 1
- USB 2.0 cable x 1

1.4 Optional Accessories

- Audio Cable
- Cooler
- 330W Power Adaptor
  (This is suitable for 45W TDP and 15W TDP CPU skus)
- 150W Power Adaptor (This is recommended to pair with 15W TDP CPU skus only)
- Power Cable

1.5 Specifications

Model	
MI1002AF	LGA1851 Mini-ITX Motherboard w /HDMI, DisplayPort, 3 x 2.5GbE, 2 x SATA, iAMT (18.0), fTPM

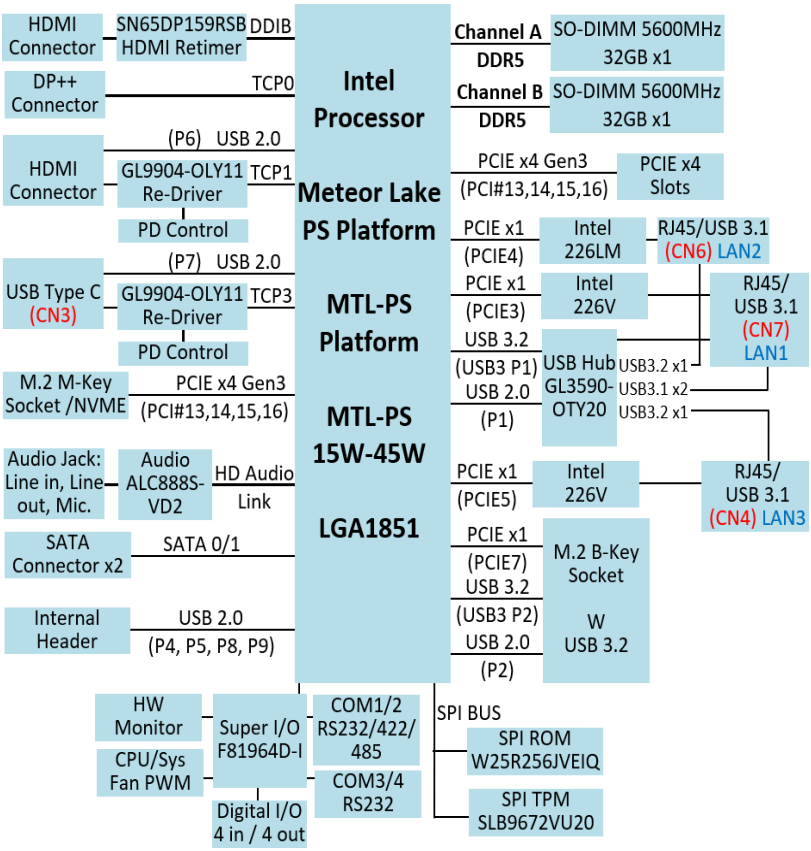
Specifications	
CPU Socket	LGA1851
CPU	Gen Intel® Core™ Ultra 7/5/3 CPU
Memory	2x DDR5 SO-DIMM sockets Supports DDR5-5600 module, Max. 64GB
BIOS	AMI
Watchdog Timer	256 levels
Hardware Monitor	Yes
Storage Interface	SATA III & NVMe
Expansion Slots	1x PCI-E (x4) [Gen.4.0]
Mini Type Slots	• 1x M.2 (M-key, type:2280, PCI-E(4x) Gen.4) • 1x M.2 (E-Key, type:2230, USB 2.0 + PCI-E(1x)) • 1x M.2 (B-Key, type:3052, USB 3.2 + PCI-E(1x))
Graphics	14th Gen Intel Core Ultra 7/5/3 processor integrated
Video Output	1x HDMI (2.0a) + 1x DisplayPort (1.4a) (DP++) + 2x USB Type-C (DP)
Ethernet	• LAN 1: Intel® I226LM, supports 2.5G and iAMT • LAN 2: Intel® I226V, supports 2.5G only • LAN 3: Intel® I226V, supports 2.5G only
I/O Chipset	Fintek F81964D-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 USB 3.2 @ edge connector 2x USB Type-C @ edge connector
Serial ATA	2x SATA III
Audio	Built-in HDA controller+Realtek ALC888S (7.1 ch.)
TPM	Supports fTPM
Others	12V~24V DC-in, Digital I/O (4-in/4-out), SIM socket

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)

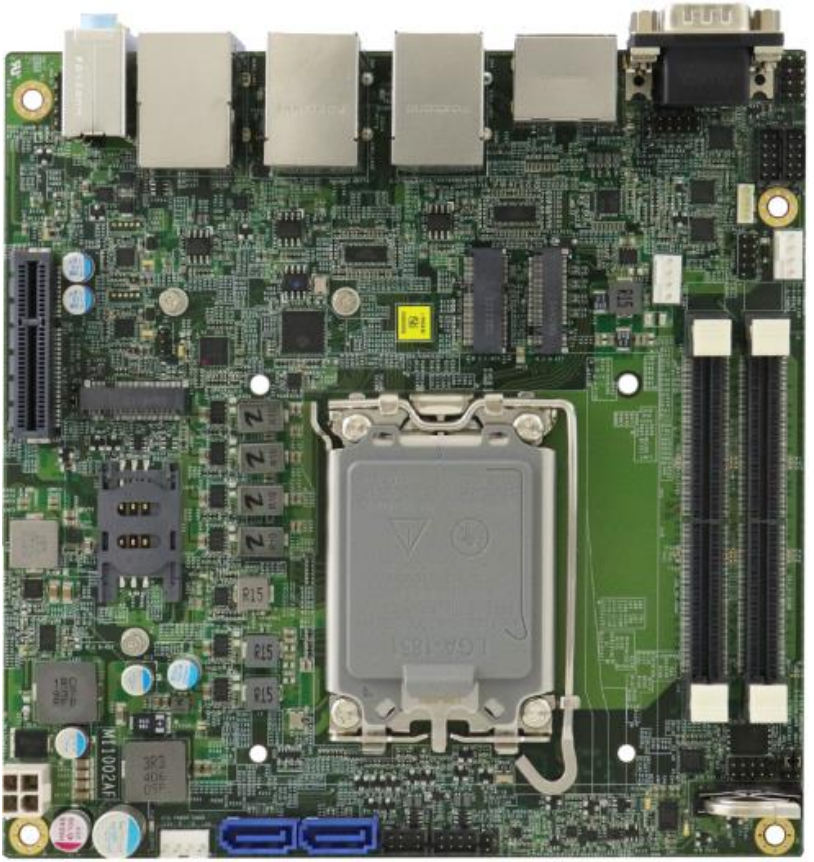
All specifications are subject to change without prior notice.

1.6 Block Diagram

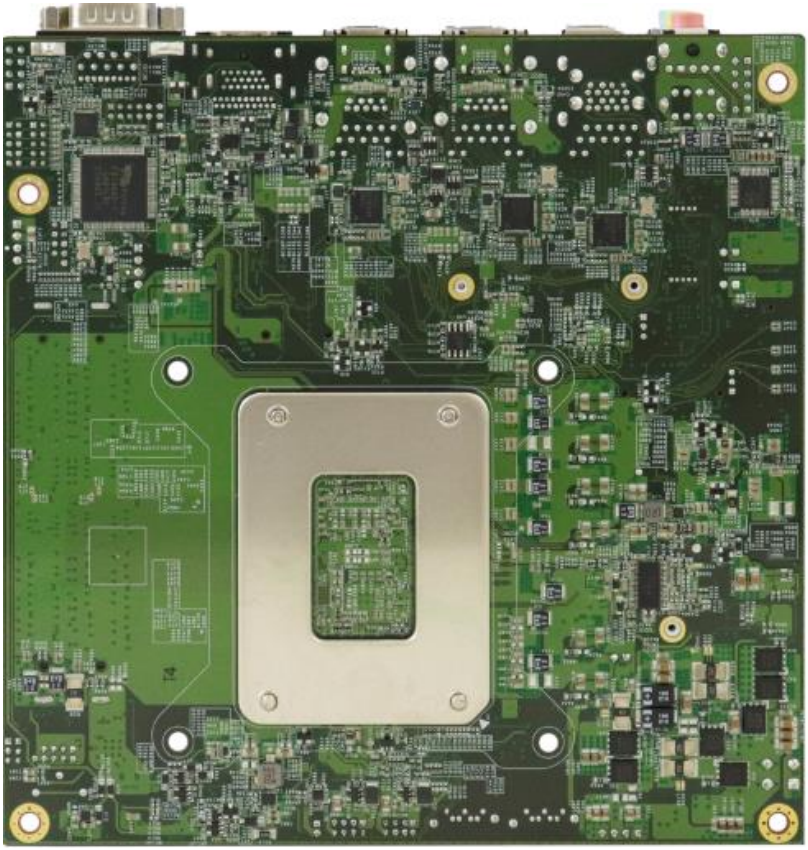


1.7 Product View

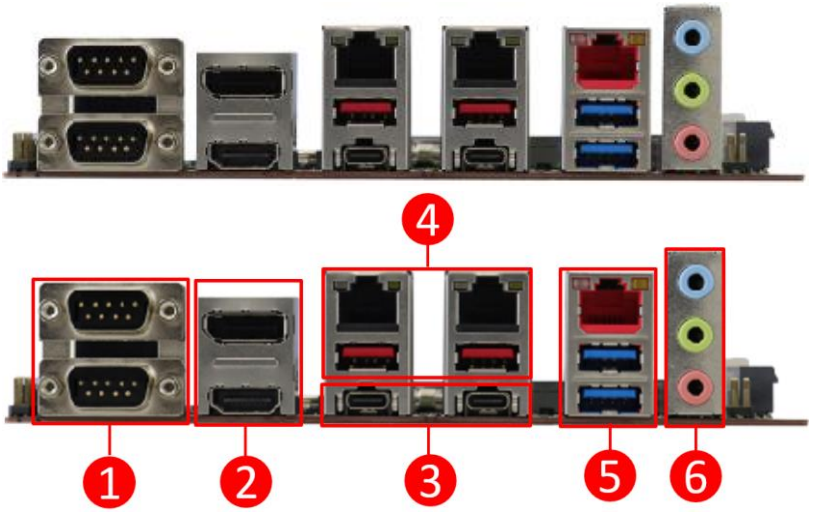
Top View



Bottom View

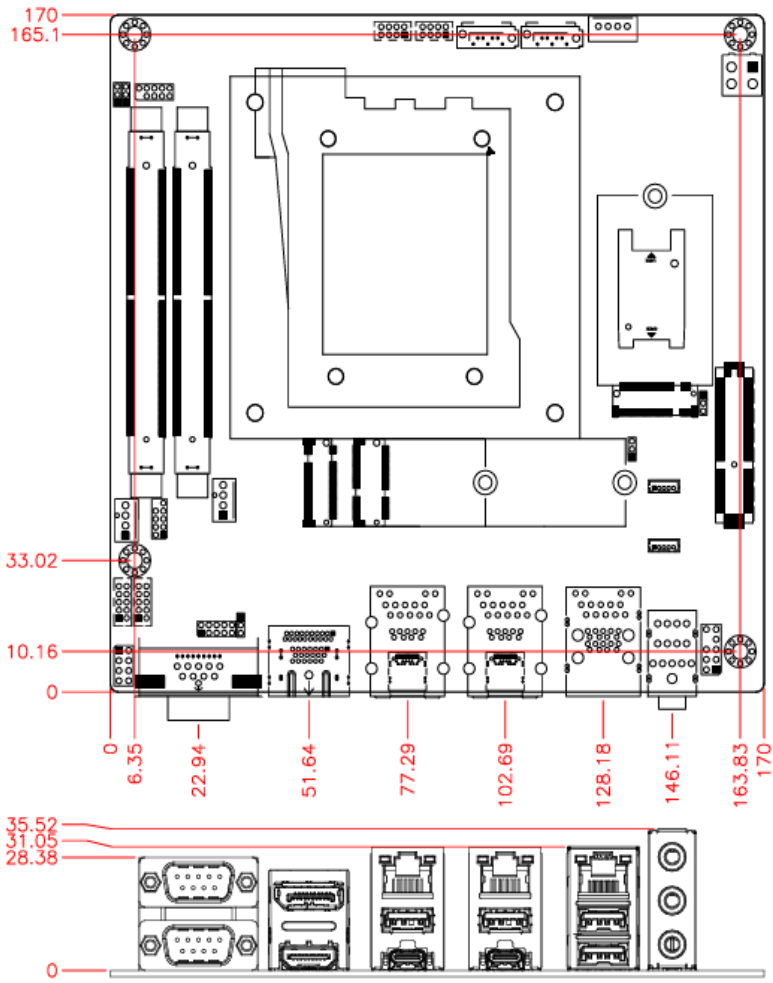


Rear View



No.	Function
1. CN1	COM1 & COM2 RS-232/422/485 Ports
2. CN2	DisplayPort & HDMI Port
3. CN3, CN5	USB Type-C Connector
4. CN4, CN6	2.5 Gigabit LAN (Intel I226-V) + USB 3.2
5. CN7	2.5 Gigabit LAN (Intel I226-LM) + USB 3.2
6. CN8	HD Audio Connector

1.8 Board Dimensions



Chapter 2
Hardware Configuration

This section provides information on jumper settings and connectors on the MI1002AFand 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

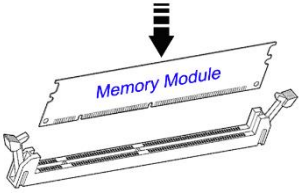
Follow the instructions below to install the memory modules.

2.1.1 Installing the Memory

To install the modules, locate the memory slot on the board and perform the following steps:

1. Align the key of the memory module with that on the memory slot and insert the module slantwise.

2. Gently push the module in an upright position until the clips of the slot close to hold the module in place when the module touches the bottom of the slot.



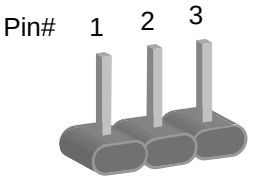
To remove the module, press the ejector tabs at both ends outwards.

2.2 Setting the Jumpers

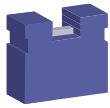
Set up and configure your MI1002AF by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

2.2.1 How to Set Jumpers

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

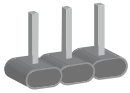
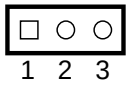
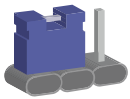
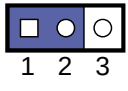
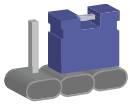
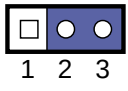


A 3-pin jumper



A jumper cap

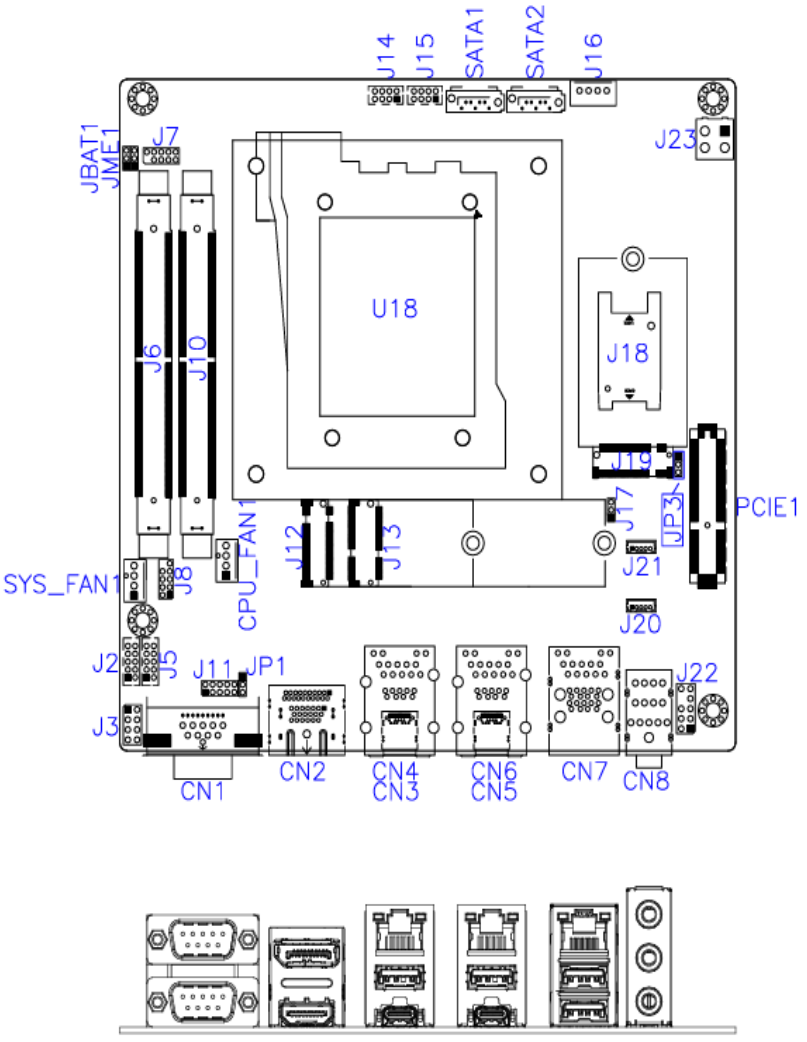
Refer to the illustration below to set jumpers.

Pin closed	Oblique view	Illustration
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**.

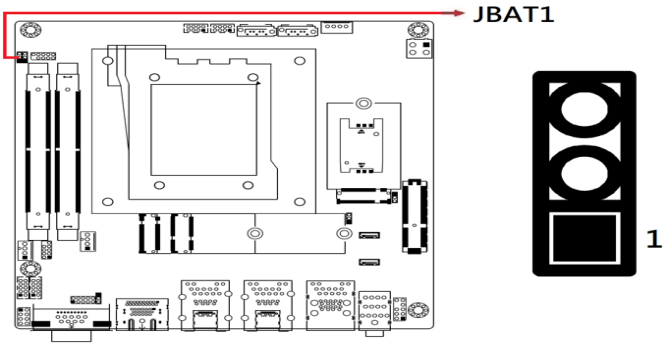
2.3 Jumper & Connector Locations



2.4 Jumpers Quick Reference

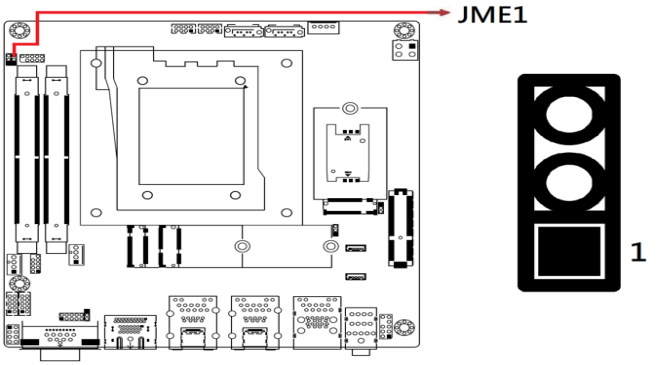
Jumper	Function
JBAT1	Clear CMOS
JME1	Clear ME
JP1	AT/ATX Select
JP3	Sierra EM919x 5G card USB/PCIe Select

2.4.1 Clear CMOS Contents (JBAT1)



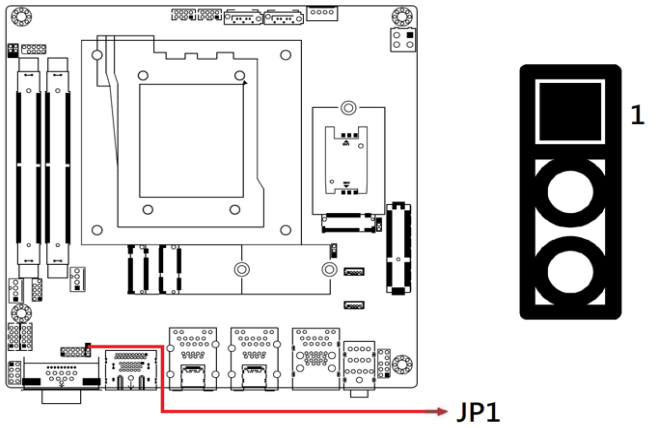
Function	Pin closed	Illustration
Normal	1-2	
Clear CMOS	2-3	

2.4.2 Clear ME Contents (JME1)



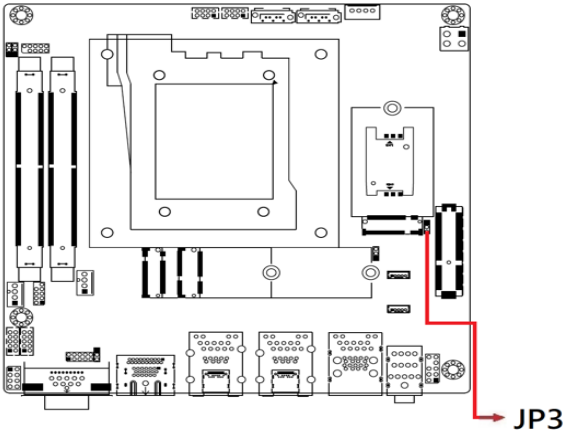
Function	Pin closed	Illustration
Normal	1-2	
Clear ME	2-3	

2.4.3 ATX & AT Power Mode Selection (JP1)



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

2.4.4 Sierra EM9191 5G Card USB/PCIe Select (JP3)

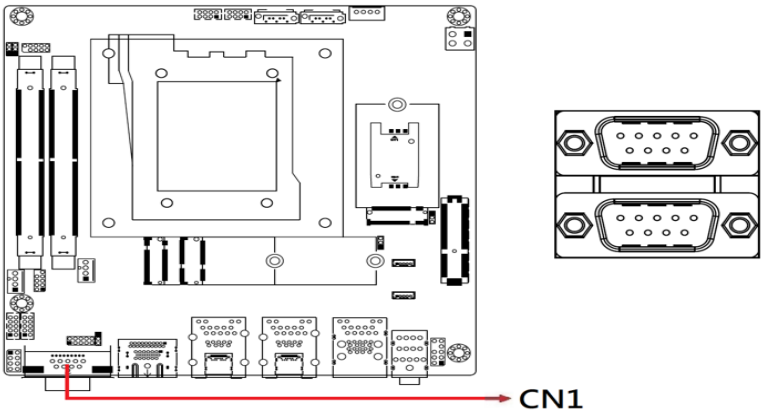


Function	Pin closed	Illustration
USB	1-2	
PCIe (default)	2-3	

2.5 Connectors Quick Reference

Connector	Function
CN1	COM1 & COM2 RS-232/422/485 Ports
CN2	DisplayPort & HDMI Port
CN3, 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
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
J19	M.2 B-key 3052 Slot
J14, J15	USB 2.0 Connector (DF11-8S-PA66H)
J18	SIM Slot
J16	SATA Power Connector
J22	Audio Pin Header for Chassis Front Panel
J23	DC-In Power Connector
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)

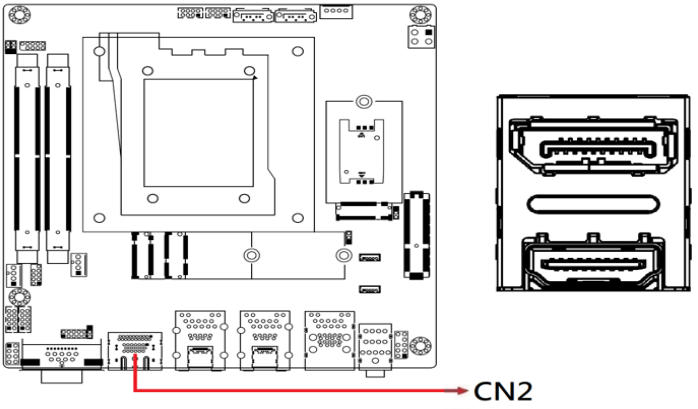


Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	6	DSR, Data set ready
2	RXD, Receive data	7	RTS, Request to send
3	TXD, Transmit data	8	CTS, Clear to send
4	DTR, Data terminal ready	9	RI, Ring indicator
5	Ground		

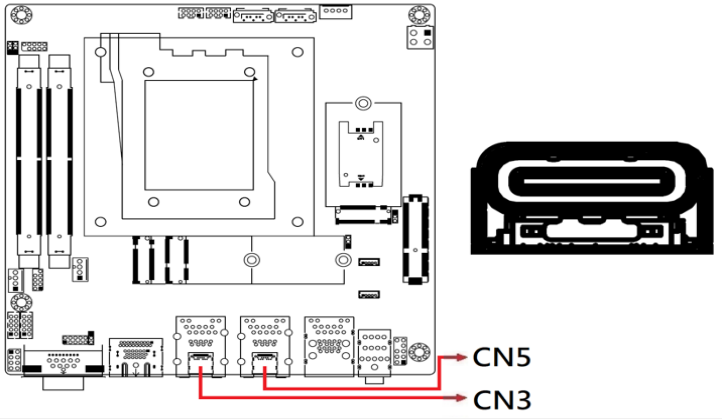
COM1/COM2 RS-232/422/485 are jumperless, configurable in BIOS.

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

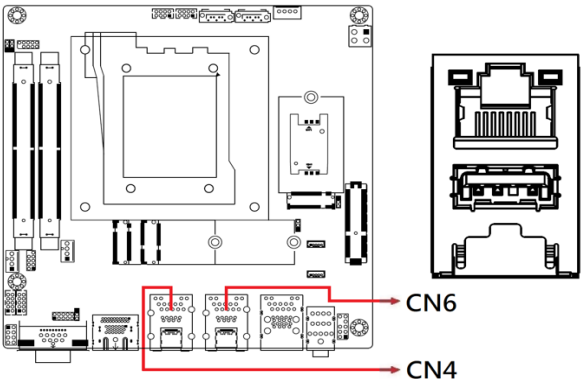
2.5.2 DisplayPort & HDMI Port (CN2)



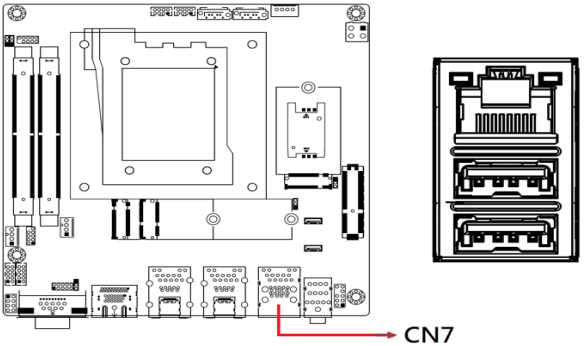
2.5.3 USB Type-C Connector (CN3, CN5)



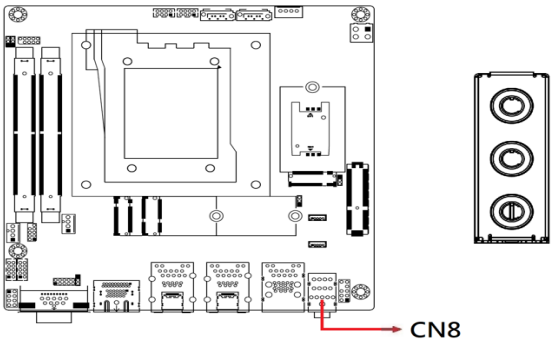
2.5.4 2.5 Gigabit LAN (Intel I226-V) + USB3.2 (CN4, CN6)



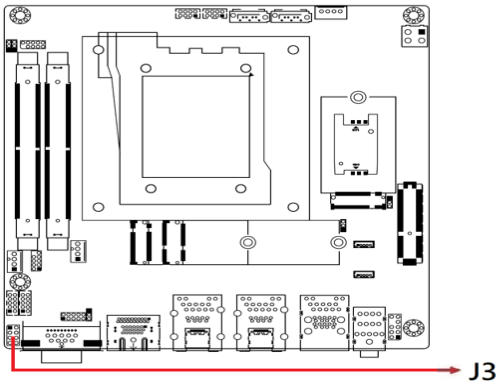
2.5.5 2.5 Gigabit LAN (Intel I226-LM) + USB3.2 (CN7)

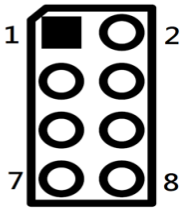


2.5.6 HD Audio Connector (CN8)



2.5.7 Front Panel Settings Connector (J3)



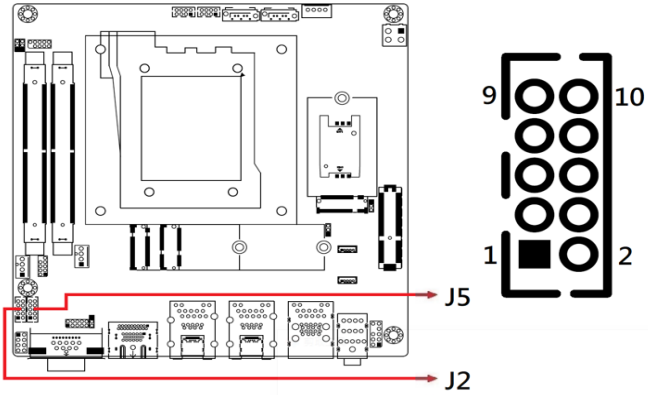


Pin	Signal	Pin	Signal
1	Power BTN-	2	Power BTN+
3	HDD LED+	4	HDD LED-
5	Reset BTN-	6	Reset BTN+
7	Power LED+	8	Power LED-

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:

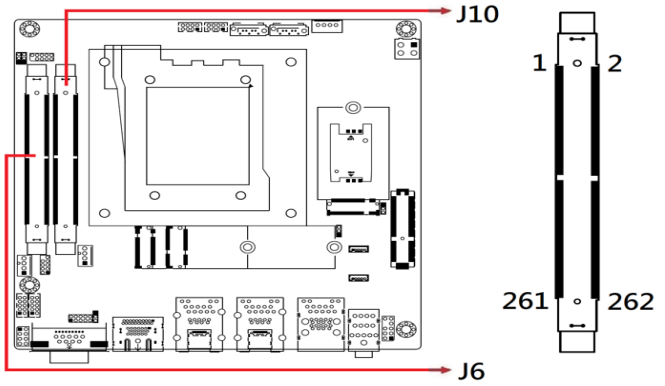
ATX Power ON Switch (Pins 1 and 2)
The 2 pins make an “ATX Power Supply On/Off Switch” for the system that connects to the power switch on the case. When pressed, the power switch will force the system to power on. When pressed again, it will power off the system.
Hard Disk Drive LED Connector (Pins 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 will light when the system turns on.

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

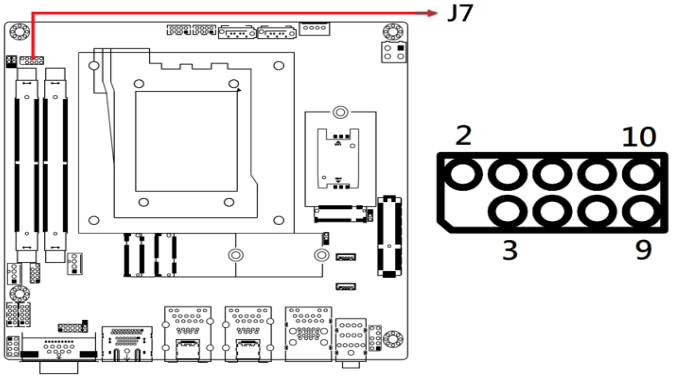


Pin	Signal Name	Pin	Signal Name
1	DCD, Data carrier detect	2	RXD, Receive data
3	TXD, Transmit data	4	DTR, Data terminal ready
5	Ground	6	DSR, Data set ready
7	RTS, Request to send	8	CTS, Clear to send
9	RI, Ring indicator	10	Not Used

2.5.9 DDR5 SO-DIMM Slot (J6 / J10)

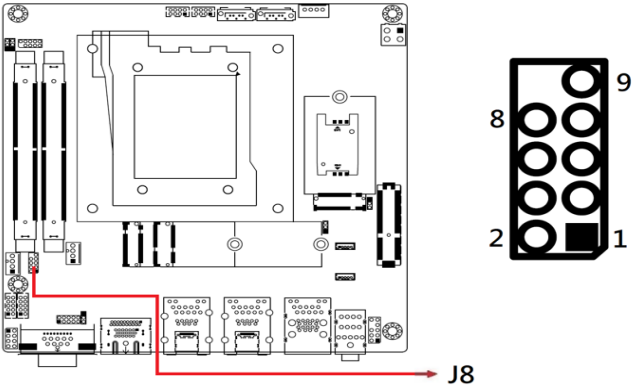


2.5.10 SPI Flash Connector (J7)



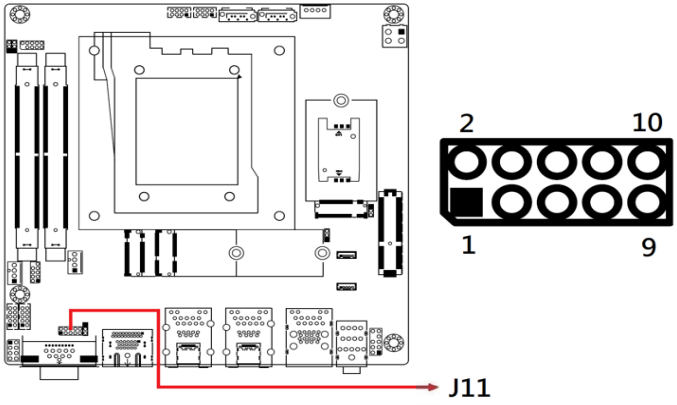
Note: J7 is for factory use only.

2.5.11 80 Port Debug (J8)



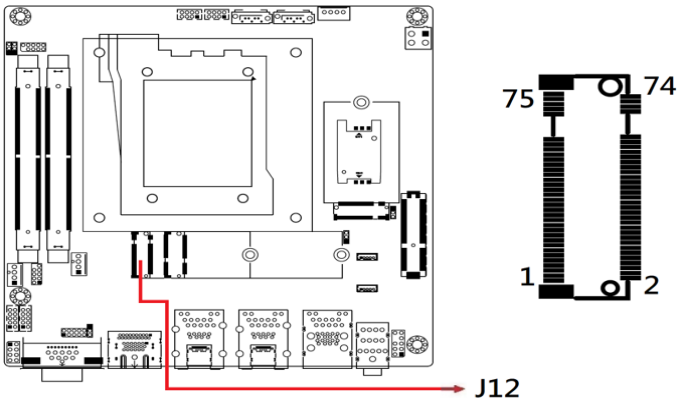
Note: J8 is for factory use only.

2.5.12 Digital I/O Connector (J11)



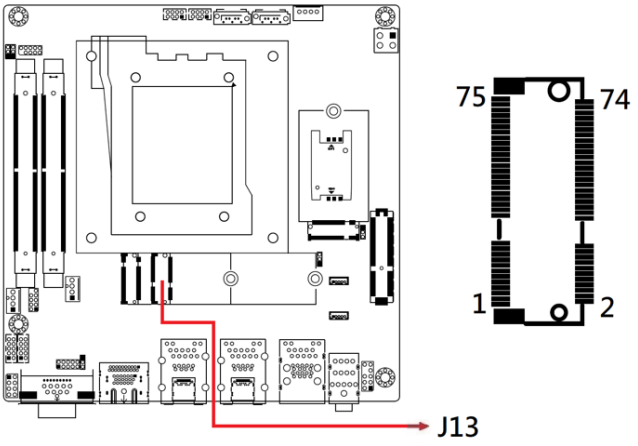
Pin	Signal	Pin	Signal
1	Ground	2	+5V(0.5A)
3	OUT3	4	OUT1
5	OUT2	6	OUT0
7	IN3	8	IN1
9	IN2	10	IN0

2.5.13 **M.2 M2280 Slot (J12)**



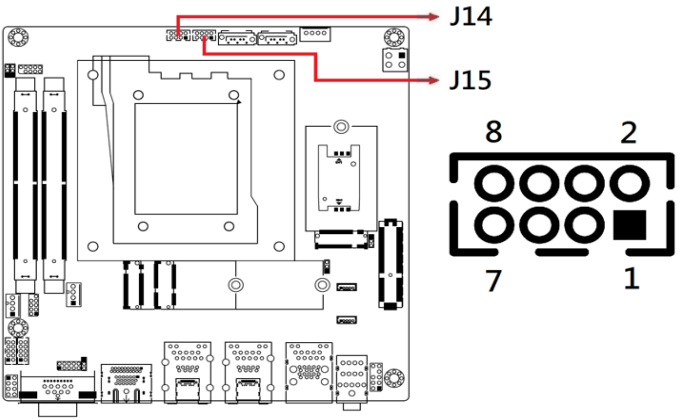
*J12 supports NVME

2.5.14 **M.2 E2230 Slot (J13)**



*J13 supports USB2.0 & PCIE x1

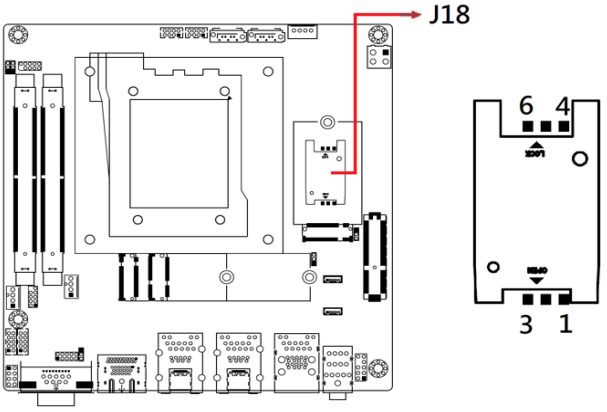
2.5.15 USB 2.0 Connector (J14, J15)



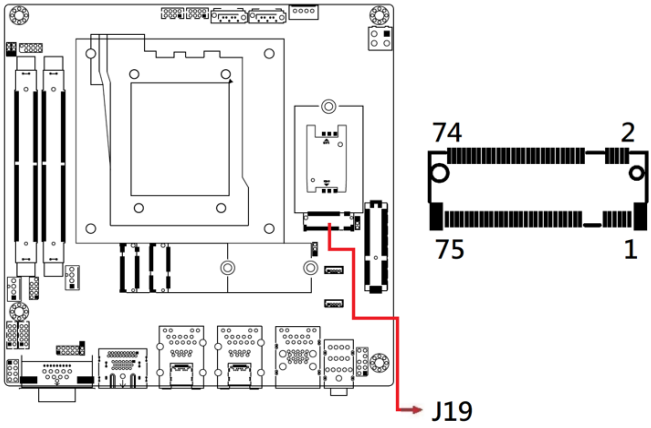
* Connector type: DF11-8S-PA66H

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

2.5.16 SIM Slot (J18)

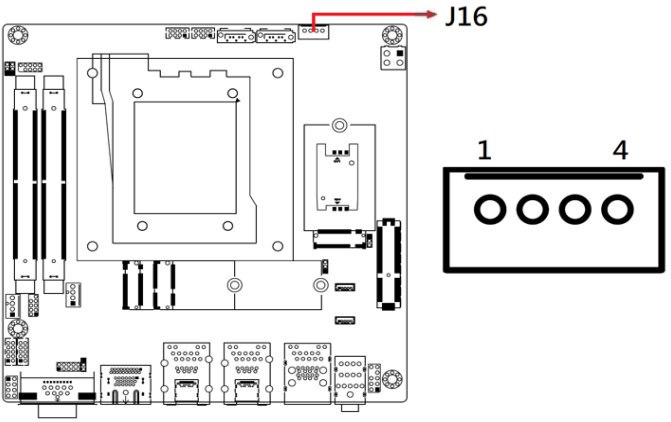


2.5.17 M.2 B-key 3052 Slot (J19)



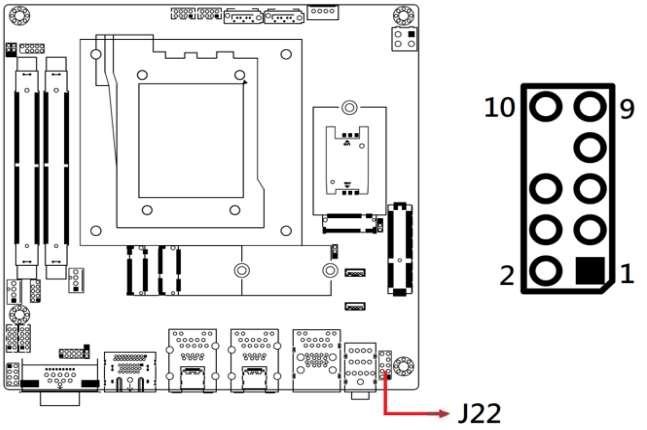
*J19 supports Sierra EM9191 5G modules.

2.5.18 SATA Power Connector (J16)



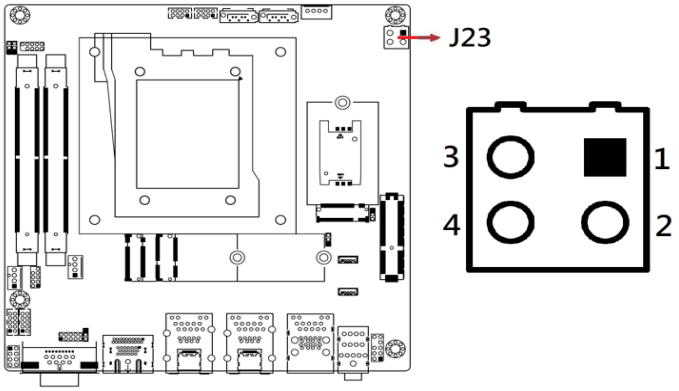
Pin	Signal Name	Pin	Signal Name
1	+5V	3	Ground
2	Ground	4	+12V

2.5.19 Audio Pin Header for Chassis Front Panel (J22)



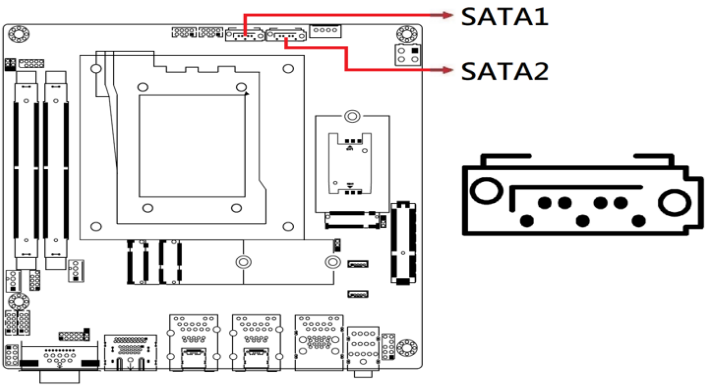
Pin	Signal Name	Pin	Signal Name
1	MIC IN_L	2	Ground
3	MIC IN_R	4	DET
5	LINE_R	6	Sense Ground
7	Sense	8	KEY
9	LINE_L	10	Sense Ground

2.5.20 DC-In Power Connector (J23)

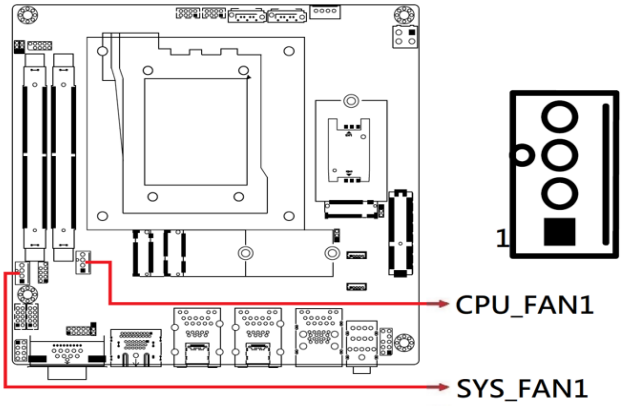


Pin	Signal Name	Pin	Signal Name
1	Ground	2	Ground
3	+12 ~ +24V	4	+12 ~ +24V

2.5.21 SATA III Connector (SATA1, SATA2)

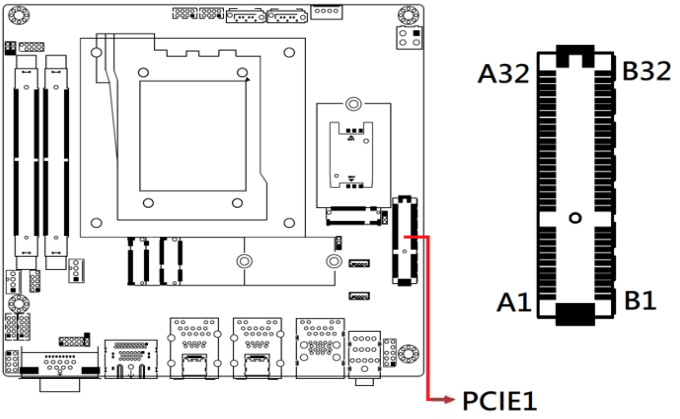


2.5.22 Fan Power Connectors (CPU_FAN1, SYS_FAN1)



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

2.5.23 PCIe (x4) Slot (PCIE1)



Chapter 3
Drivers Installation

This chapter introduces installation of the following drivers:

- Intel® Chipset Software Installation Utility
- HD Graphics Drivers
- Smartsound Drivers
- HD Audio Drivers
- LAN Drivers
- Intel® ME Drivers
- Intel® Serial I/O Drivers
- Intel® PMT Drivers
- Intel® NPU IO Drivers

3.1 Introduction

This section describes the installation procedures for software and drivers.

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

3.2 Intel® Chipset Software Installation Utility

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

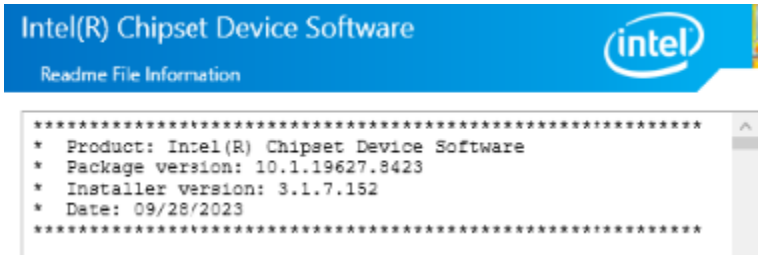
1. The software drivers are available on the IBASE website. Go to the download page of the product. Copy the compressed drivers file to your computer. Double click the file to decompress it. Run “CDGuide” to go to the main drivers page. Click **Intel** on the left pane and then **Intel(R) Meteor Lake-P/PS/U Chipset Drivers** on the right pane.

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

3. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next** to continue.

4. Accept the terms in the software license agreement.

5. On the *Readme File Information* screen, click **Install**.



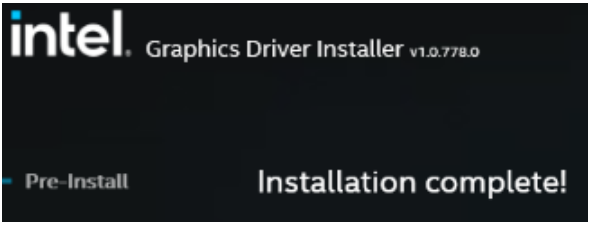
6. After completing the installation, click **Finish** to complete the setup process.

3.3 VGA Driver Installation

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

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 has been completed, click **Finish**.



3.4 Intel(R) Smartsound Drivers Installation

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

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 HD Audio Driver Installation

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

2. Click **Realtek Audio DCH Drivers**.

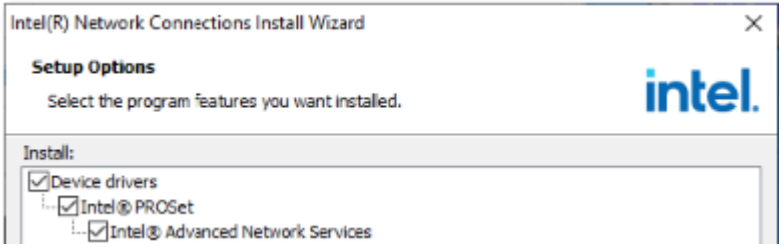
3. Click **Next** when the Welcome to the InstallShield Wizard for Realtek Audio Driver screen appears. After the Installshield Wizard has completed the installation, restart the computer.

3.6 LAN Driver Installation

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

2. Click **Intel(R) PRO LAN Network Drivers**..

3. On the *Intel® Network Connections* screen, click **Install Drivers and Software**.
4. When the Welcome to the install wizard for Intel(R) Network Connections screen appears, click **Next**.
5. Accept the terms in the software license agreement and click **Next**.
6. On the *Setup Options* screen, click the checkbox to select the desired driver(s) for installation. Then click **Next** to continue.



7. On the *Ready to Install the Program* screen, click **Install** to begin the installation. When the Install wizard has completed the installation, click **Finish**.

3.7 Intel® ME Drivers Installation

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

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

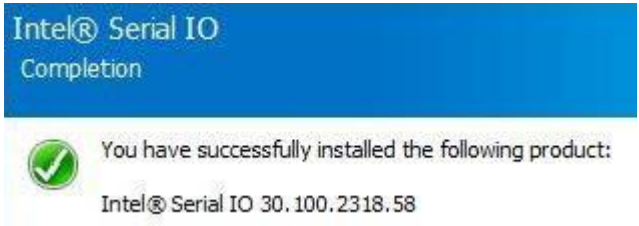
3. When the Welcome screen appears, click **Next**.
4. Accept the terms in the license agreement and click **Next**.
5. In the Destination Folder screen, click **Next** to install to the default folder, or click Change to choose another destination folder.
6. After Intel Management Engine Components have been successfully installed, click **Finish**.

3.8 Intel® Serial IO Drivers Installation

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

2. Click **Intel(R) Serial IO Drivers**.

3. When the Welcome screen appears, click **Next**.
4. Accept the terms in the license agreement and click **Next**.
5. In both the Readme File Information and Confirmation screens, click **Next**. When you successfully finished the installation, click **Finish**.



3.9 Intel® PMT Drivers Installation

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

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

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

3.10 Intel® NPU IO Drivers Installation

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

2. Click **Intel(R) NPU IO Drivers**.

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

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

4.2 BIOS Setup

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

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

The following message will appear on the screen:

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

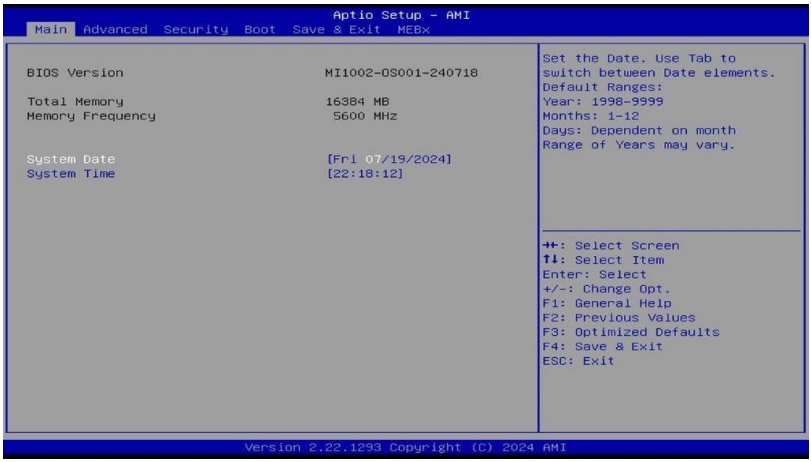
In general, press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help, and <Esc> to quit.

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

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

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

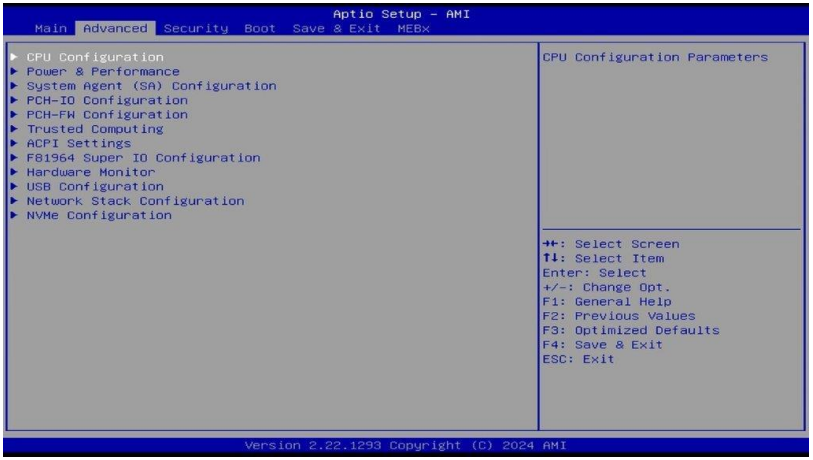
4.3 Main Settings



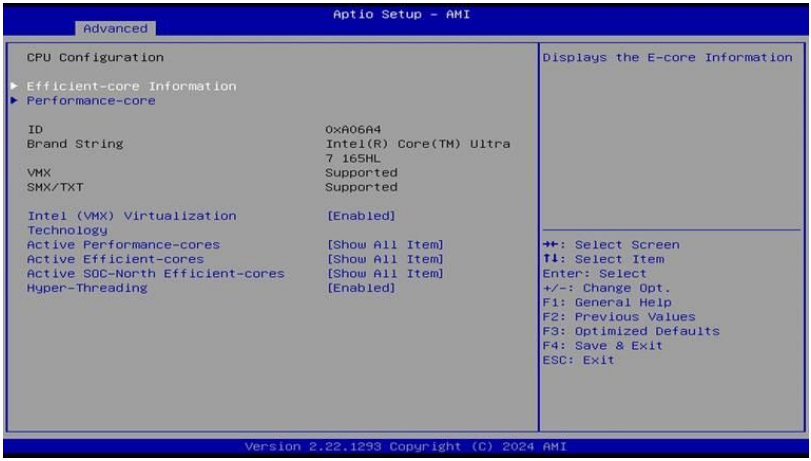
BIOS Setting	Description
System Date	Sets the date. Use the <Tab> key to switch between the Date elements.
System Time	Set the time. Use the <Tab> key to switch between the Time elements.

4.4 Advanced Settings

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

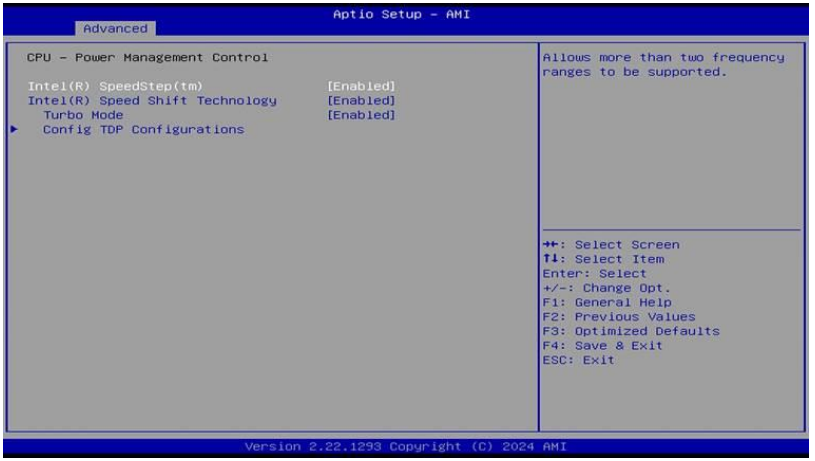


4.4.1 CPU Configuration



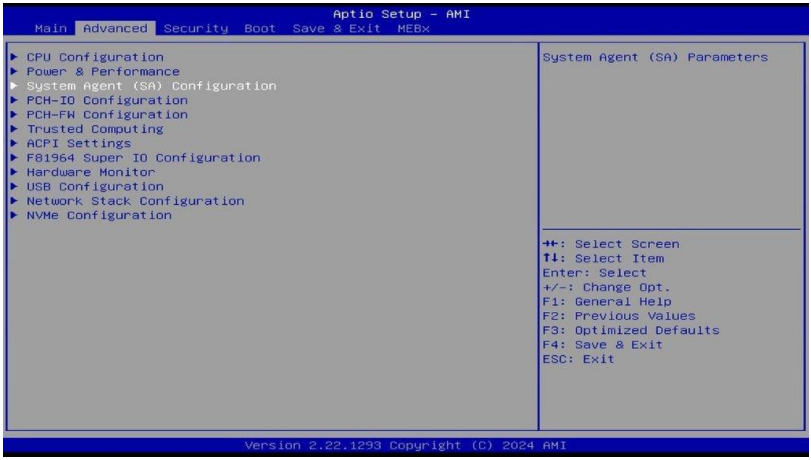
BIOS Setting	Description
Efficient/Performance-core Information	Displays the E-core / P-core Information
Intel (VMX) Virtualization Technology	When enabled, a VMX can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Performance Cores	Number of P-cores to enable in 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

4.4.2 Power & Performance

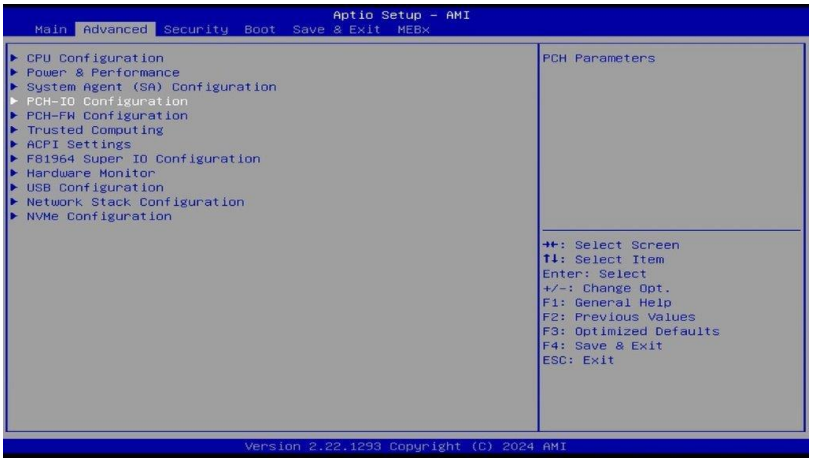


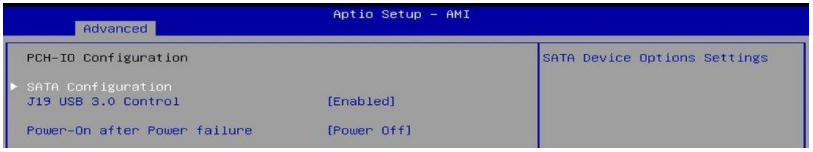
BIOS Setting	Description
CPU - Power Management Control	CPU - Power Management Control Options
Intel Speedstep	Allows more than two frequency ranges to be supported
Intel Speed Shift Technology	Enable/Disable Intel Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Turbo Mode	Options: Enabled, Disabled
Config TDP Configurations	cTDP (Assured Power) Configurations
Configurable TDP Boot Mode	cTDP (Assured Power) Mode as Nominal/Level1/Level12/Deactiivate TDP (Base Power) selection. Deactivate option will set MSR to Nominal and MMIO to zero.

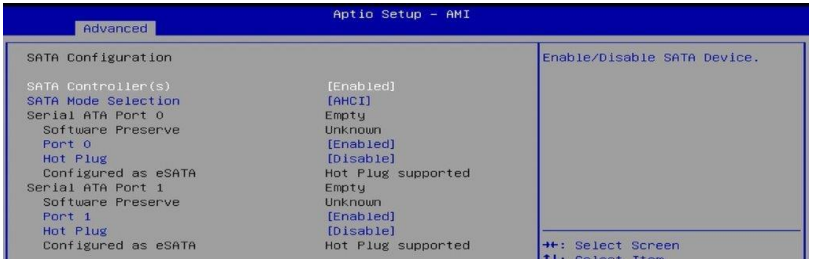
4.4.3 System Agent (SA) Configuration

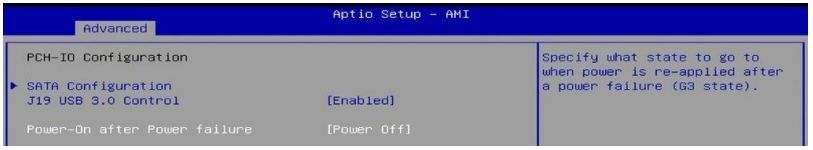


4.4.4 PCH-IO Configuration

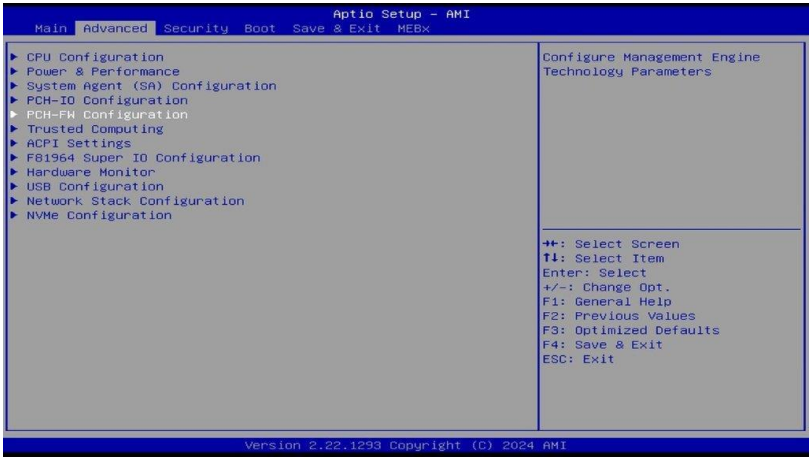




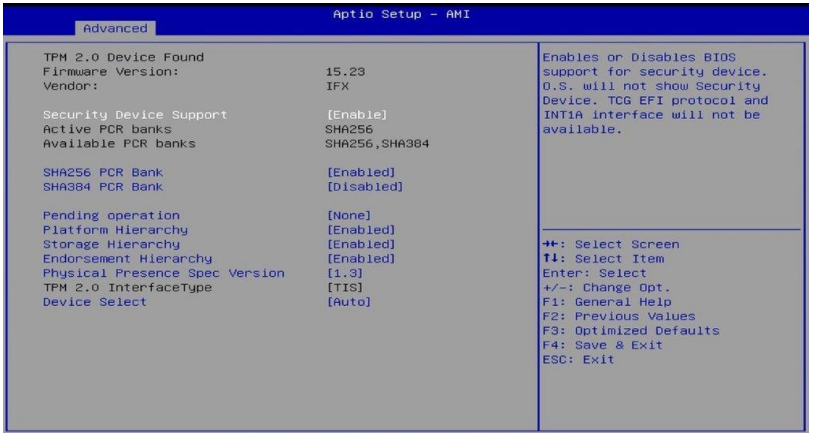




4.4.5 PCH-FW Configuration

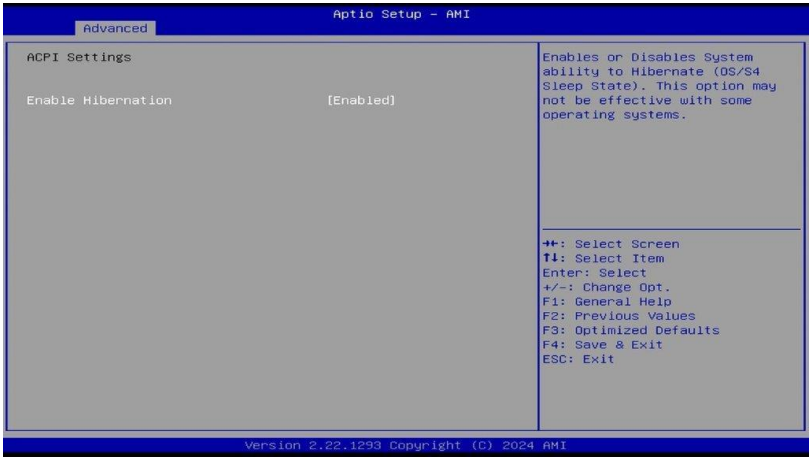


4.4.6 Trusted Computing



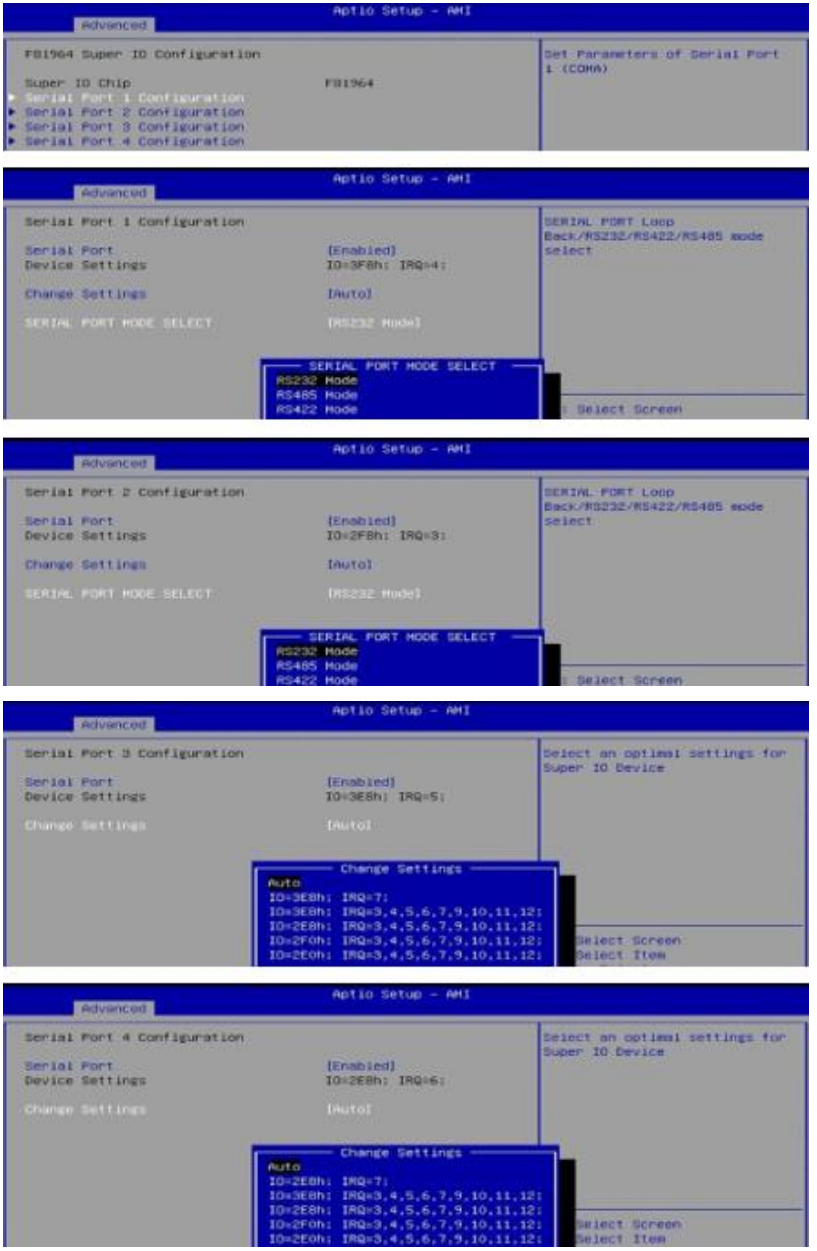
BIOS Setting	Description
Security Device Support	Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INT1A interface will not be available.
SHA256/384, SM3_256 PCR Bank	Enables / Disables PCR Bank.
Pending operation	Schedule an operation for the 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.

4.4.7 ACPI Settings

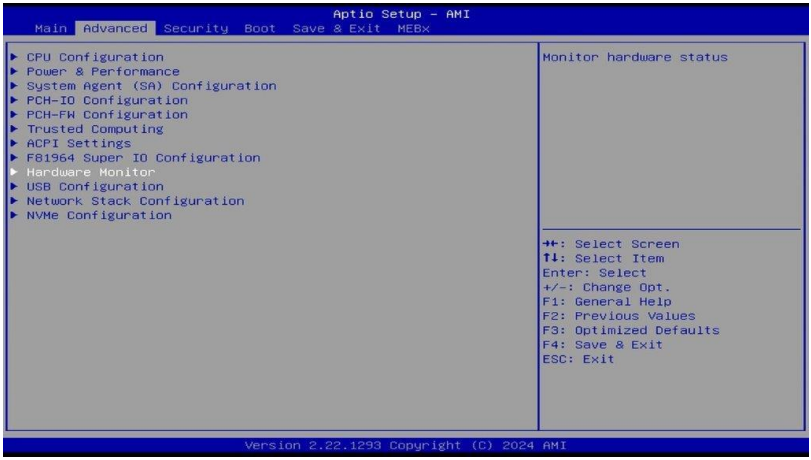


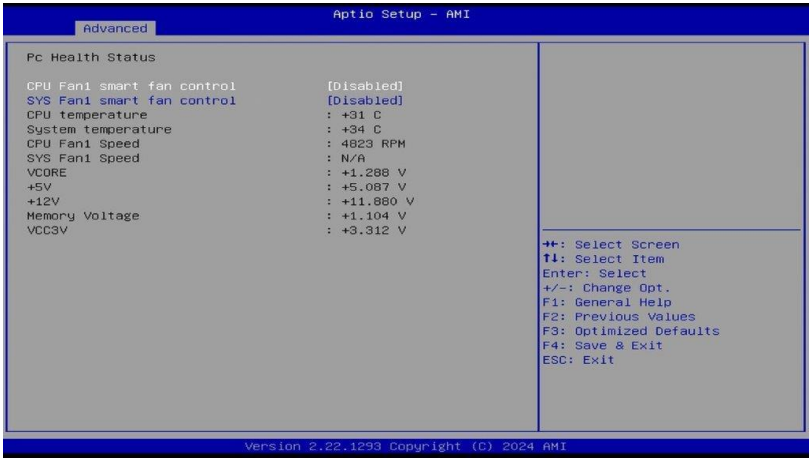
BIOS Setting	Description
Enable Hibernation	Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

4.4.8 F81964 Super IO Configuration



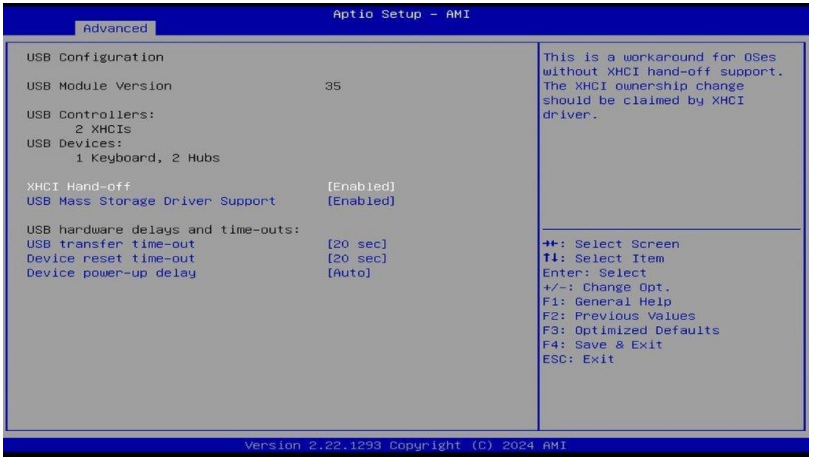
4.4.9 Hardware Monitor





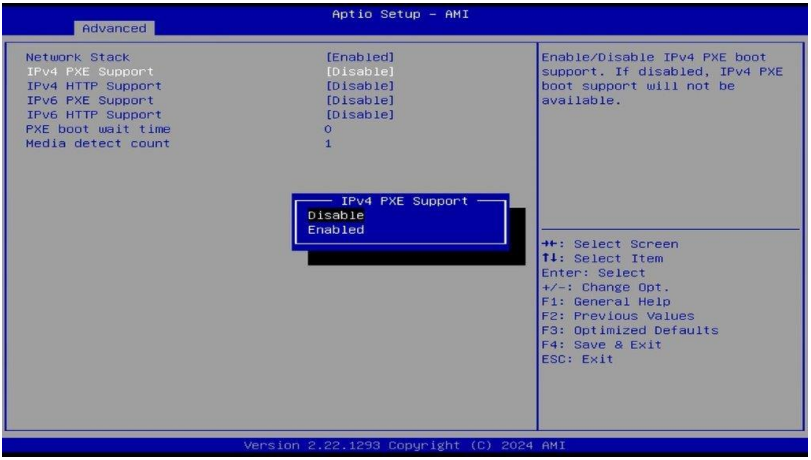
BIOS Setting	Description
CPU Smart Fan Control	Enables / Disables smart fan control.
Temperatures / Voltages	These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

4.4.10 USB Configuration



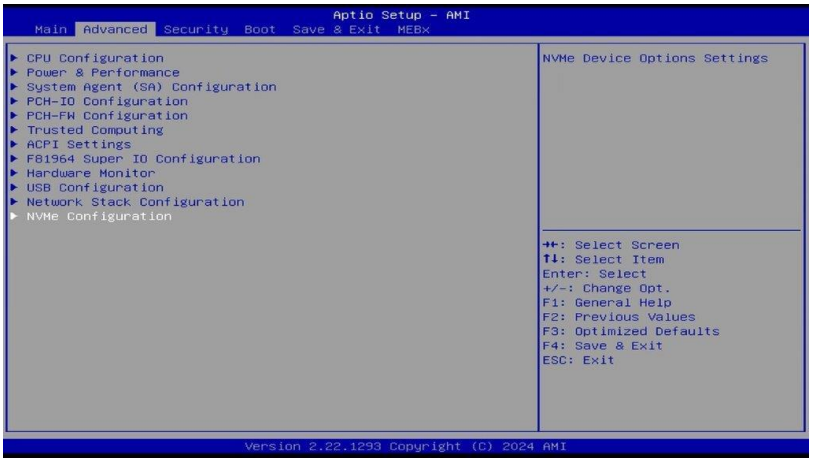
BIOS Setting	Description
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enables / Disables the support for USB mass storage driver.
USB Transfer time-out	The time-out value (1 / 5 10 / 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.

4.4.11 Network Stack Configuration

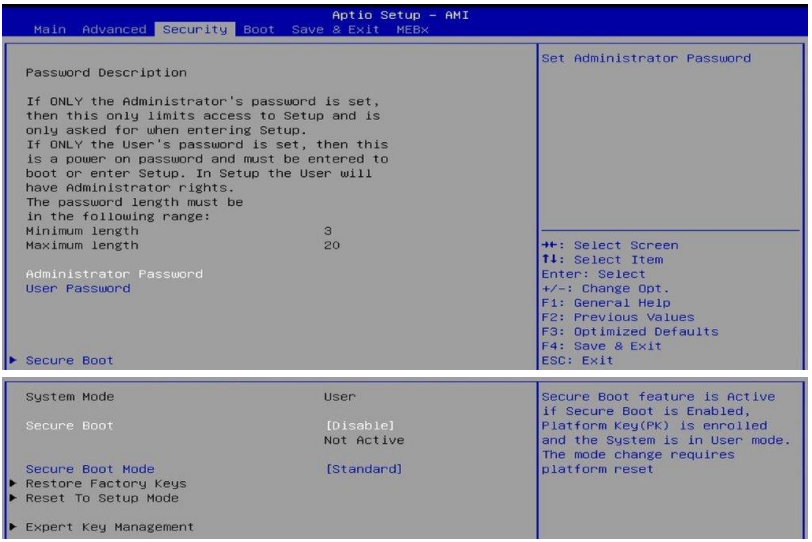


BIOS Setting	Description
Network Stack	Enable/Disable UEFI Network Stack
IPv4 PXE Support	If disabled, IPv4 PXE boot support will not be available.
IPv4 HTTP Support	If disabled, IPv4 HTTP boot support will not be available.
Ipv6 PXE Support	If disabled, IPv6 PXE boot support will not be available.
Ipv6 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 +/- nurmeric keys to set the value.

4.4.12 NVMe Configuration

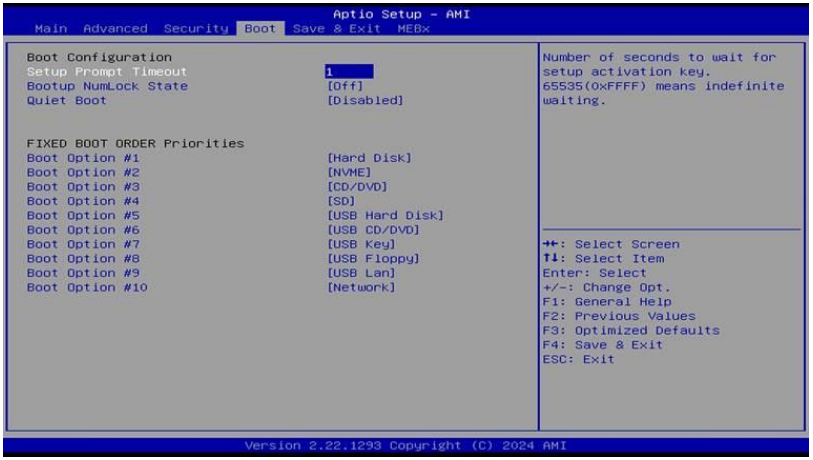


4.5 Security Settings



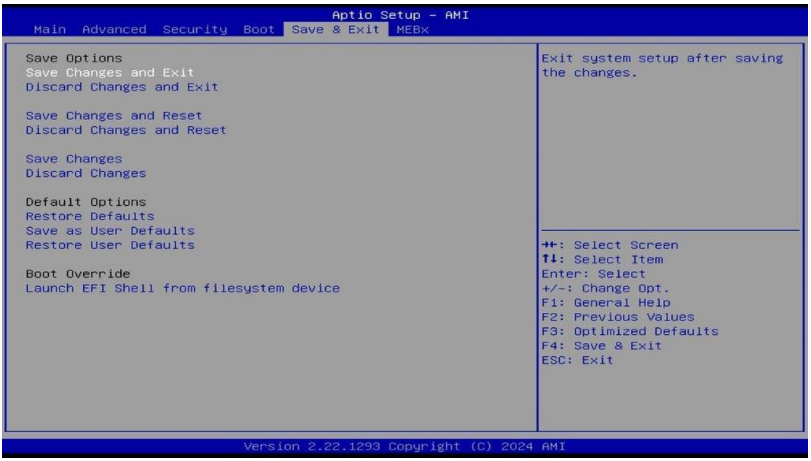
BIOS Setting	Description
Setup Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.
Secure Boot	Secure Boot feature is Active if Secure Boot is enabled. Platform Key(PK) is enrolled and the system is in user mode. The mode change requires platform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

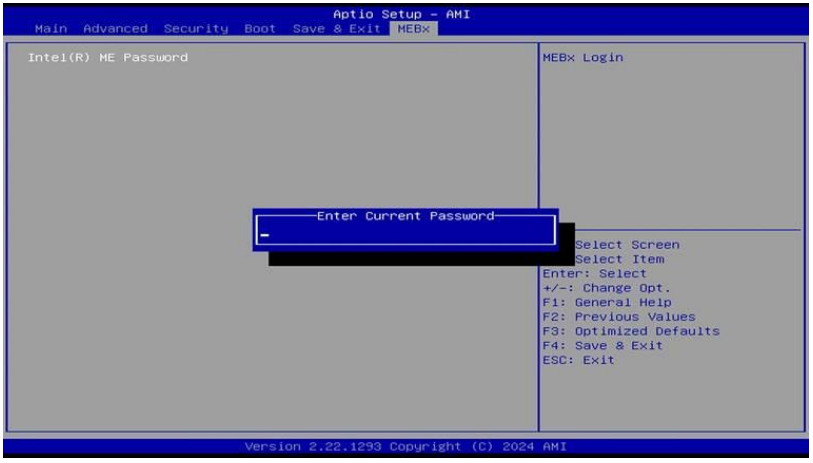
4.7 Save & Exit Settings



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


Aptio Setup – AMI
Main Advanced Security Boot Save & Exit MEBx
Intel(R) ME Password
MEBx Login
→←: 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) 2024 AMI


Aptio Setup – AMI
Main Advanced Security Boot Save & Exit MEBx
Intel(R) ME Password
MEBx Login
Enter Current Password
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) 2024 AMI

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
0x0000EFA0-0x0000EFBF	Intel(R) SMBus - 7E22
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x0000002E-0x0000002F	Motherboard resources
0x0000004E-0x0000004F	Motherboard resources
0x00000061-0x00000061	Motherboard resources
0x00000063-0x00000063	Motherboard resources
0x00000065-0x00000065	Motherboard resources
0x00000067-0x00000067	Motherboard resources
0x00000070-0x00000070	Motherboard resources
0x00000080-0x00000080	Motherboard resources
0x00000092-0x00000092	Motherboard resources
0x000000B2-0x000000B3	Motherboard resources
0x00000680-0x0000069F	Motherboard resources
0x0000164E-0x0000164F	Motherboard resources
0x00003050-0x00003057	Standard SATA AHCI Controller
0x00003040-0x00003043	Standard SATA AHCI Controller
0x00003020-0x0000303F	Standard SATA AHCI Controller
0x000003F8-0x000003FF	Communications Port (COM1)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000002E8-0x000002EF	Communications Port (COM4)
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller

Address	Device Description
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
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x00000040-0x00000043	System timer
0x00000050-0x00000053	System timer
0x0000FFF8-0x0000FFFF	Intel(R) Active Management Technology - SOL (COM5)
0x00002000-0x000020FE	Motherboard resources
0x00000060-0x00000060	Standard PS/2 Keyboard
0x00000064-0x00000064	Standard PS/2 Keyboard
0x00001854-0x00001857	Motherboard resources

B. Interrupt Request Lines (IRQ)

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

Level	Function
IRQ 4294967286~84	Intel(R) Ethernet Controller I226-LM
IRQ 4294967292	PCI Express Root Port
IRQ 4294967289	Standard SATA AHCI Controller
IRQ 4	Communications Port (COM1)
IRQ 3	Communications Port (COM2)
IRQ 5	Communications Port (COM3)
IRQ 6	Communications Port (COM4)
IRQ 4294967290	PCI Express Root Port
IRQ 4294967286	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4294967293	PCI Express Root Port
IRQ 4294967232	Intel(R) Reserved Device
IRQ 55~204	Microsoft ACPI-Compliant System
IRQ 256~511	Microsoft ACPI-Compliant System
IRQ 4294967288	Intel(R) Arc(TM) Graphics
IRQ 0	System timer
IRQ 19	Intel(R) Active Management Technology - SOL (COM5)
IRQ 4294967291	PCI Express Root Port
IRQ 1	Microsoft PS/2 Keyboard
IRQ 4294967287	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4294967251~67	Intel(R) Ethernet Controller I226-V
IRQ 4294967234~50	Intel(R) Ethernet Controller I226-V #2
IRQ 12	Microsoft PS/2 Mouse
IRQ 4294967233	Intel(R) Management Engine Interface #1
IRQ 4294967285	Intel® Smart Sound Technology BUS
IRQ 14	Intel(R) Serial IO GPIO Host Controller - INTC1083
IRQ 4294967294	PCI Express Root Port

C. Watchdog Timer Configuration

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

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

Sample Code:

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

        char SIO;

        printf("Fintek 81964 watch dog program\n");
        SIO = Init_F81964();
        if (SIO == 0)
        {
                printf("Can not detect Fintek 81964, program abort.\n");
                return(1);
        }//if (SIO == 0)

        if (argc != 2)
        {
                printf(" Parameter incorrect!!\n");
                return (1);
        }
```

```
        bTime = strtol (argv[1], endptr, 10);
        printf("System will reset after %d seconds\n", bTime);

        if (bTime)
        {       EnableWDT(bTime); }
        else
        {       DisableWDT(); }
        return 0;
}
//-------------------------------------------------------------------------
void EnableWDT(int interval)
{
        unsigned char bBuf;

        bBuf = Get_F81964_Reg(0x2B);
        bBuf &= (~0x20);
        Set_F81964_Reg(0x2B,   bBuf);          //Enable WDTO

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

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

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

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

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

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

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

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


//-------------------------------------------------------------------------
//
```

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

        F81964_BASE = 0x4E;
        result = F81964_BASE;

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

        F81964_BASE = 0x2E;
        result = F81964_BASE;

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

        F81964_BASE = 0x00;
        result = F81964_BASE;

Init_Finish:
        return (result);
}
//---------------------------------------------------------------------------
void Unlock_F81964 (void)
{
        outportb(F81964_INDEX_PORT, F81964_UNLOCK);
        outportb(F81964_INDEX_PORT, F81964_UNLOCK);
}
//---------------------------------------------------------------------------
void Lock_F81964 (void)
{
        outportb(F81964_INDEX_PORT, F81964_LOCK);
}
//---------------------------------------------------------------------------
void Set_F81964_LD( unsigned char LD)
{
        Unlock_F81964();
        outportb(F81964_INDEX_PORT, F81964_REG_LD);
        outportb(F81964_DATA_PORT, LD);
        Lock_F81964();
}
```

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




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

D. Onboard Connector Types

Function	Connector	Onboard Type	Compatible Mating Type for Reference
DC-In Power Connector	J23	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. MI1002AF USB Power Control Bit Mapping.

Function	Connector	Software Mapping
M.2 –E Key	J13	bit_3
USB3	CN7 (A, B)	bit_4