

# **MI1000AF**

**14th/13th/12th Gen  
Intel® Core™ DT  
Mini-ITX Motherboard**

## **User's Manual**

Version 1.0a  
(February 2025)

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## Compliance



This product has passed CE tests for environmental specifications and limits, complying with the directives of the European Union (EU). In a domestic environment, this product may cause radio interference in which case users may be required to take adequate measures.



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.

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

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

## Important Safety Information

Carefully read the precautions before using the board.

### Environmental conditions:

- Use this product in environments with ambient temperatures between 0°C and 60°C.
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### 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.
- Vacuum the dust with a computer vacuum cleaner to 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.
- Ground yourself by touching a grounded conductor or a grounded bit of metal frequently to discharge any static.



### 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 the manufacturer's instructions or recycle them at a local recycling facility or battery collection point.

## 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.

- **3<sup>rd</sup>-party parts:**

12-month (1-year) warranty from delivery for the 3<sup>rd</sup>-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](http://www.ibase.com.tw) to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.
  - Product model name
  - Product serial number
  - Detailed description of the problem
  - The error messages in text or in screenshots if there is any
  - The arrangement of the peripherals
  - Software in use (such as OS and application software, including the version numbers)
3. If repair service is required, please visit the IBASE website to apply for an RMA number or contact your distributor or sales representative for assistance.

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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

Introducing the MI1000AF Mini ITX motherboard, a compact yet powerful solution designed for high-performance computing. With support for 14th/13th/12th Gen Intel® Core i9/i7/i5/i3 / DT Processors, up to 65W, and 64GB of DDR5 RAM with ECC, it ensures both speed and reliability. The motherboard offers excellent graphics capabilities with integrated Intel® processor graphics supporting eDP, LVDS, and 2 DisplayPort(1.4a) (DP++). Dual LAN, including Intel® I226LM with 2.5G and iAMT support and Intel® I226V with 2.5G, ensures robust networking. Ample connectivity options are available with features like a watchdog timer, Digital I/O, iAMT(16.1), and dTPM (2.0) (default) / fTPM(2.0) (option) enhance security and reliability, making the MI1000AF an ideal choice for versatile computing needs.



## 1.2 Features

- 14th/13th/12th Gen Intel® Core i9/i7/i5/i3 / DT Processors, up to 65W
- 2x DDR5 SO-DIMM sockets, Max. 64GB, support ECC
- Intel® processor integrated graphic supports eDP, LVDS and 2x DisplayPort(1.4a) (DP++)
- LAN 1: Intel® I226LM, supports 2.5G and iAMT LAN 2: Intel® I226V, supports 2.5G only
- 6x USB 3.2, 4x USB 2.0, 2x COM, 4x SATA III
- 1x PCI-E (x16) [Gen.5.0] ; 3x M.2 (E-key and 2x M-Key)
- Watchdog timer, Digital I/O, iAMT(16.1)
- dTPM (2.0) (default) / fTPM (2.0) (option)

## 1.3 Packing List

Your MI1000AF 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.

- MI1000AF 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

## 1.5 Specifications

| Model               |                                                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>MI1000AF-R</b>   | LGA1700 MiniITX Motherboard w/ eDP, LVDS, 2x DisplayPort, 2x Dual 2.5GbE, 4 x SATA, RAID, iAMT (16.1), dTPM (2.0) |
| <b>MI1000AF-R-1</b> | LGA1700 MiniITX Motherboard w/ eDP, LVDS, 2x DisplayPort, 2x Dual 2.5GbE, 4 x SATA, RAID, iAMT (16.1), fTPM (2.0) |

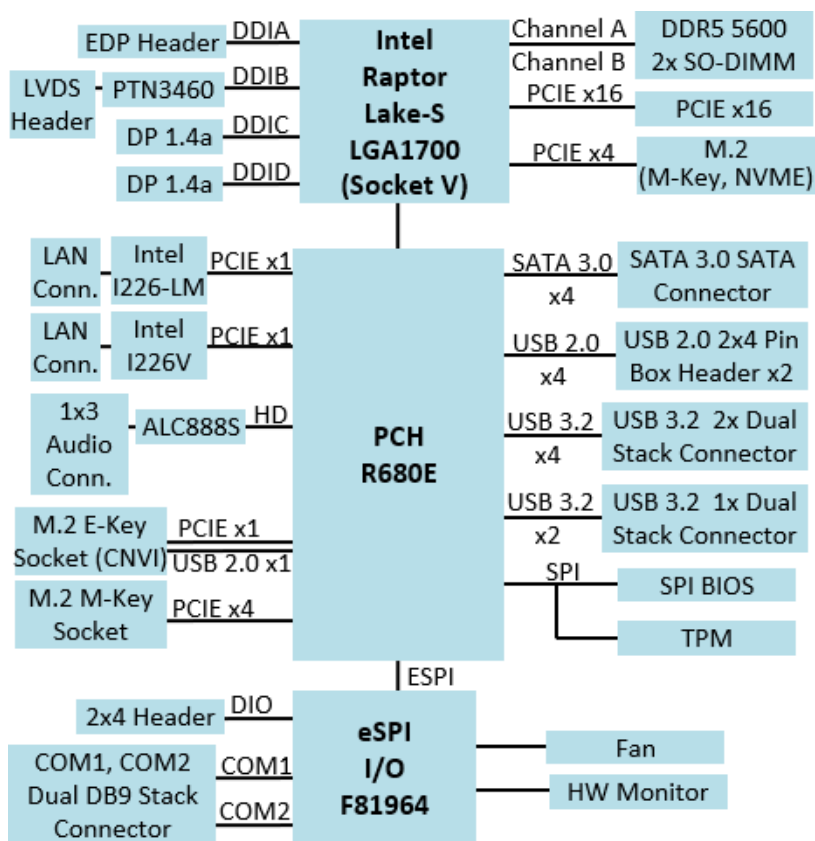
  

| Specifications           |                                                                                                                                                         |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU Socket</b>        | LGA1700                                                                                                                                                 |
| <b>CPU</b>               | 14th/13rh/12th Gen Intel® Core i DT processors                                                                                                          |
| <b>Memory</b>            | 2x DDR5 SO-DIMM sockets, Support DDR5 -5600 memory module, Max. 64GB *DDR5-5600 only by Core i9/i7 Processor & 1R memory module*                        |
| <b>BIOS</b>              | AMI                                                                                                                                                     |
| <b>Watchdog Timer</b>    | 256 levels                                                                                                                                              |
| <b>Hardware Monitor</b>  | Yes                                                                                                                                                     |
| <b>Storage Interface</b> | SATA III & NVMe                                                                                                                                         |
| <b>Expansion Slots</b>   | 1x PCI-E (x16) [Gen 5.0]                                                                                                                                |
| <b>Mini Type Slots</b>   | <ul style="list-style-type: none"> <li>• 2x M.2 (M-key, type:2280, PCI-E(4x) Gen.4)</li> <li>• 1x M.2 (E-Key, type:2230, USB 2.0 + PCIe 3.0)</li> </ul> |
| <b>Graphics</b>          | 14th/13rh/12th Gen Intel® Core i DT processor integrated Xe graphics architecture                                                                       |
| <b>Video Output</b>      | 1x eDP + 2 x DisplayPort (1.4a) (DP++) + LVDS                                                                                                           |
| <b>Ethernet</b>          | <ul style="list-style-type: none"> <li>• LAN 1: Intel® I226LM, supports 2.5G and iAMT</li> <li>• LAN 2: Intel® I226V, supports 2.5G only</li> </ul>     |
| <b>I/O Chipset</b>       | Fintek F81964D-I                                                                                                                                        |
| <b>Serial Port</b>       | 2x COM ports: 1x RS232/422/485 + 1x RS232                                                                                                               |
| <b>USB 2.0</b>           | 4x USB 2.0 via pin header                                                                                                                               |
| <b>USB 3.X</b>           | 2x USB3.2 (10bps)+ 4x USB3.2 (5bps) @edge connector                                                                                                     |
| <b>Serial ATA</b>        | 4x SATA III                                                                                                                                             |
| <b>Audio</b>             | Built-in HDA controller+Realtek ALC888S (7.1 ch.)                                                                                                       |
| <b>TPM</b>               | dTPM (2.0) (default) / fTPM (2.0) (option)                                                                                                              |

| Physical                         |                            |
|----------------------------------|----------------------------|
| <b>Dimensions<br/>(L x W)</b>    | 170mm x 170mm (6.7"x 6.7") |
| Environmental                    |                            |
| <b>Operating<br/>Temperature</b> | 0 ~ 60 °C (32 ~ 140 °F)    |
| <b>Storage<br/>Temperature</b>   | -20 ~ 80 °C (-4 ~ 176 °F)  |

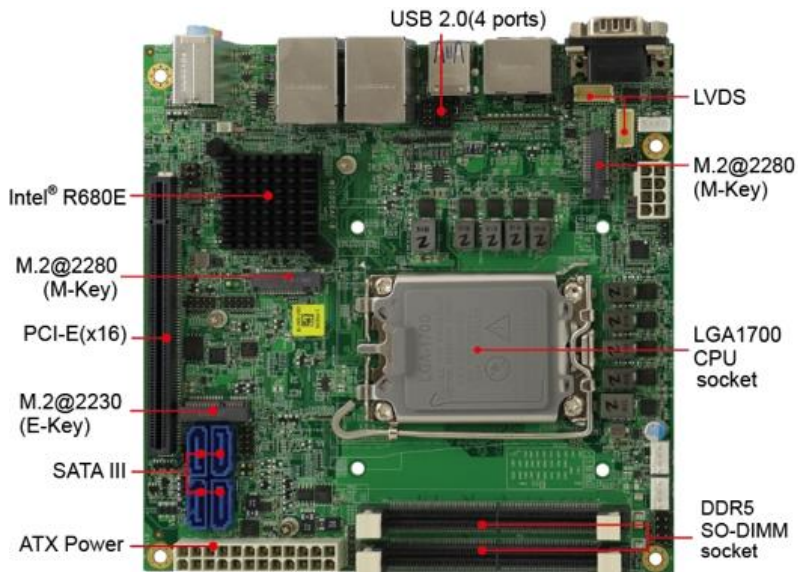
All specifications are subject to change without prior notice.

## 1.6 Block Diagram



## 1.7 Product View

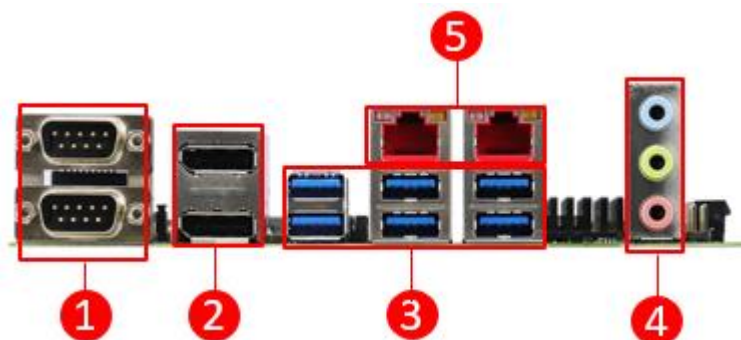
### Top View



### Bottom View

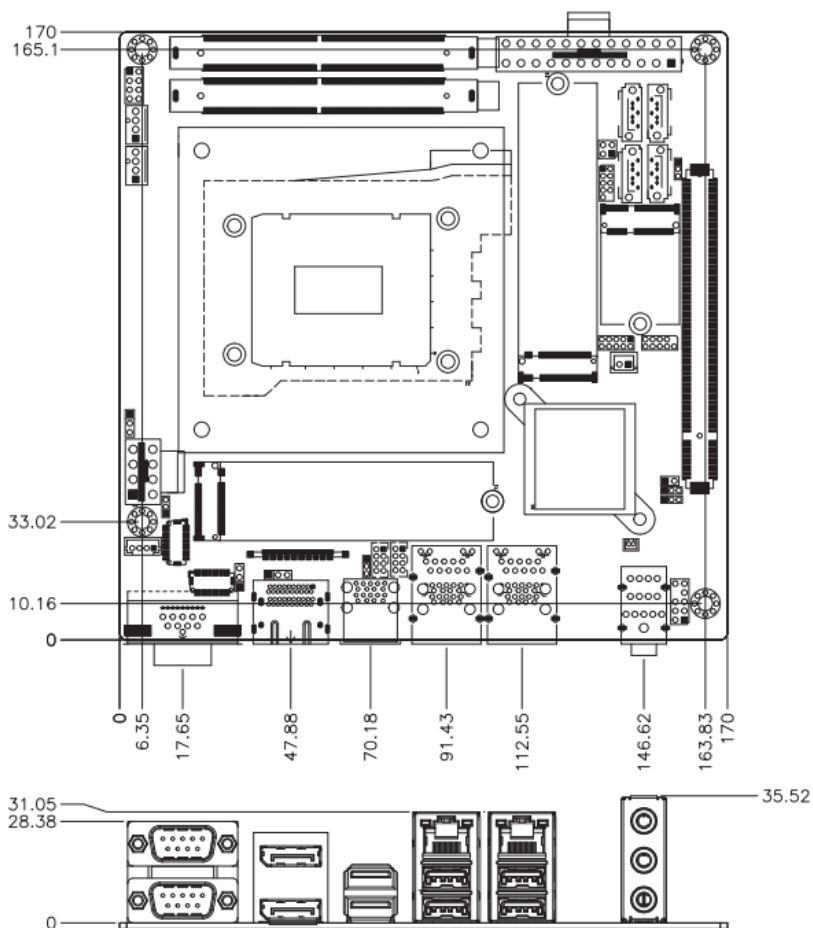


## Rear View



| No. | Description                                        |
|-----|----------------------------------------------------|
| 1   | COM1(top) RS232/422/485<br>COM2(bottom) RS232 only |
| 2   | 2x DisplayPort                                     |
| 3   | 6x USB 3.2 Connector                               |
| 4   | HD Audio Connector                                 |
| 5   | 2x 2.5 Gigabit LAN                                 |

## 1.8 Board Dimensions



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## Chapter 2

# Hardware Configuration

This section provides information on jumper settings and connectors on the MI1000AF 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

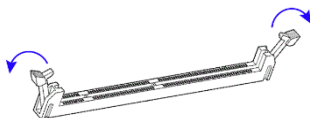
## 2.1 Essential Installations

Follow the instructions below to install the memory modules.

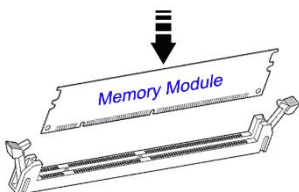
### 2.1.1 Installing the Memory

To install the modules, locate the memory slot on the board and 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.



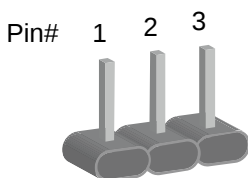
To remove the module, press the ejector tabs at both ends outwards.

## 2.2 Setting the Jumpers

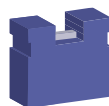
Set up and configure the motherboard by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

### 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.

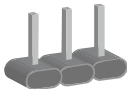
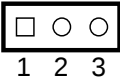
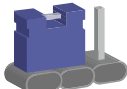
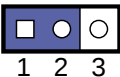
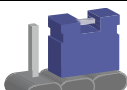
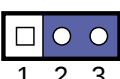


A 3-pin jumper



A jumper cap

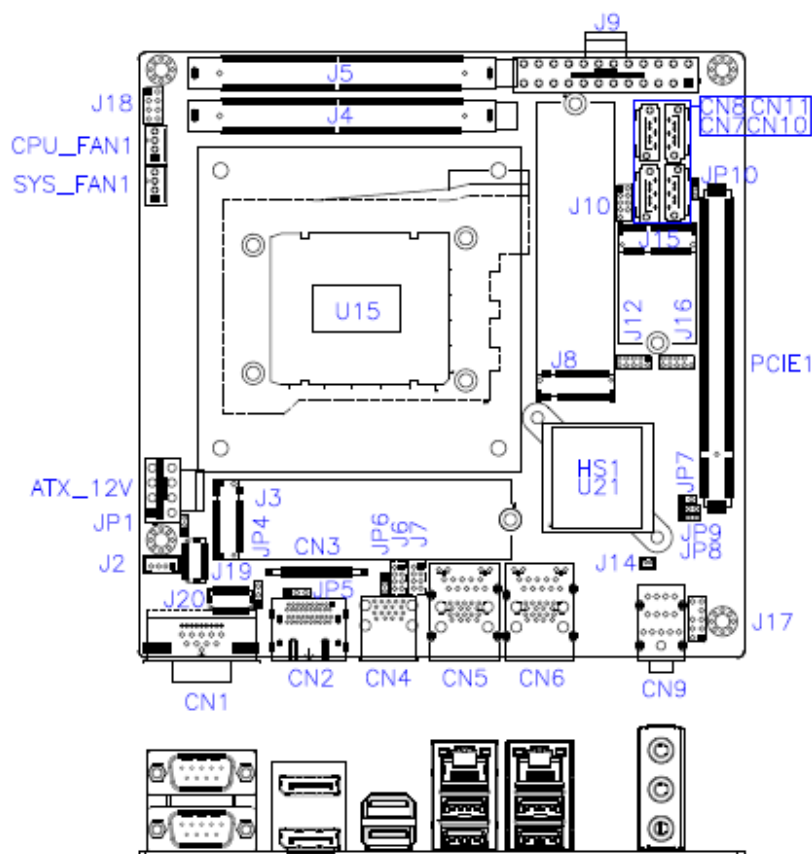
Refer to the illustration below to set jumpers.

| Pin closed | Oblique view                                                                        | Illustration                                                                                 |
|------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Open       |    | <br>1 2 3   |
| 1-2        |   | <br>1 2 3   |
| 2-3        |  | <br>1 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**.

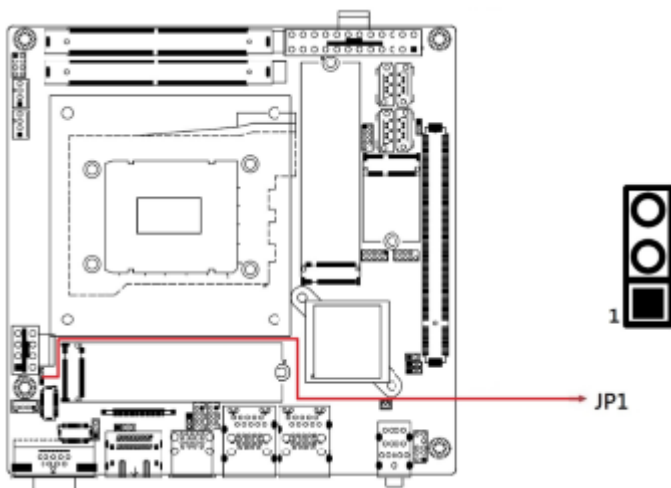
## 2.3 Jumper & Connector Locations



## 2.4 Jumpers Quick Reference

| Jumper | Function                           |
|--------|------------------------------------|
| JP1    | LVDS Panel Brightness Selection    |
| JP4    | LVDS Panel Power Selection         |
| JP5    | eDP Panel Power Selection          |
| JP6    | PCI Express Bifurcation            |
| JP7    | Flash Descriptor Security Override |
| JP8    | Clear CMOS                         |
| JP9    | Clear ME                           |
| JP10   | AT/ATX Select                      |

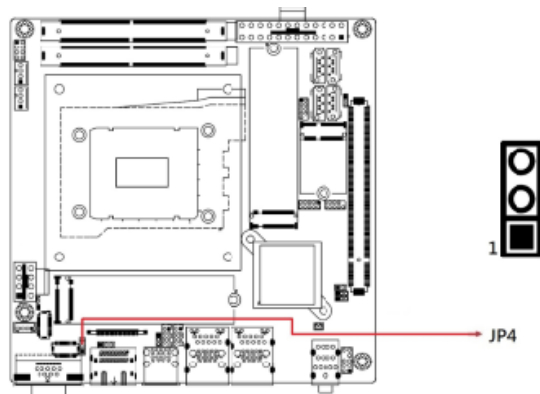
### 2.4.1 LVDS Panel Brightness Selection (JP1)



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

*Note: This is for setting Pin3 voltage of J2.*

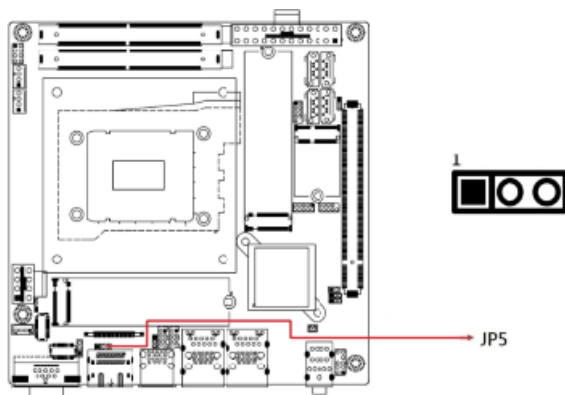
## 2.4.2 LVDS Panel Power Selection (JP4)



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

*Note: This is for setting Pin19~Pin20 voltage of J19, J20.*

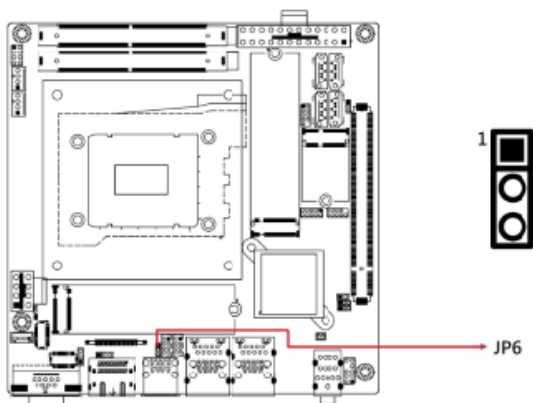
## 2.4.3 eDP Panel Power Selection (JP5)



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

*Note: This is for setting Pin1~Pin5 voltage of CN3.*

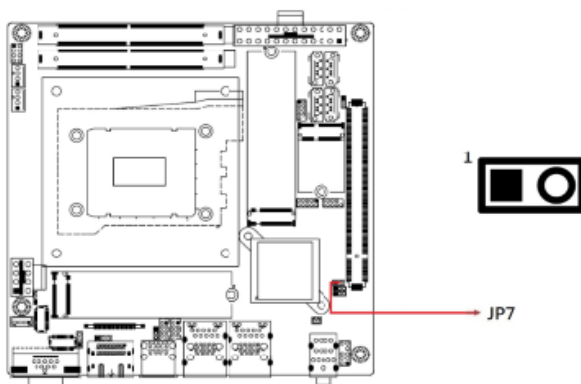
## 2.4.4 PCI Express Bifurcation (JP6)



| Function                    | Pin closed | Illustration |
|-----------------------------|------------|--------------|
| 1 x PCIe (x16)<br>(default) | 1-2        | 1            |
| 2 x PCIe (x8)               | 2-3        | 1            |

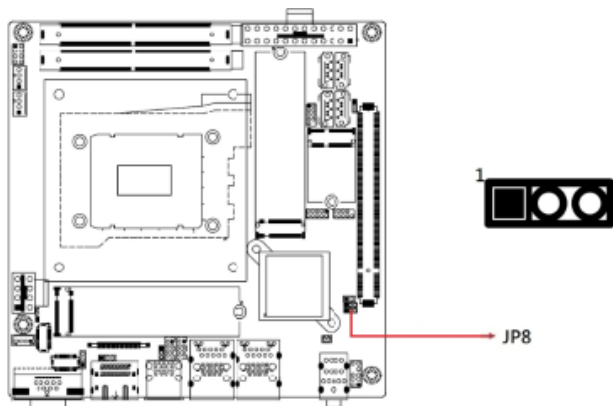
Note :The setting is for PCIE1 slot

## 2.4.5 Flash Descriptor Security Override (JP7)



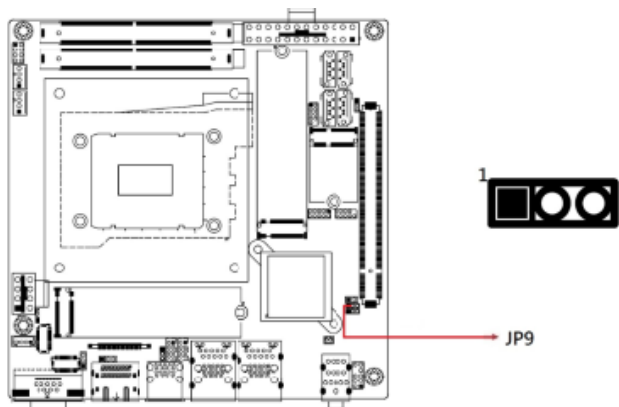
| Flash Descriptor Security Override | Pin   | Illustration |
|------------------------------------|-------|--------------|
| Disabled (default)                 | Open  | 1            |
| Enabled                            | Close | 1            |

## 2.4.6 Clear CMOS (JP8)



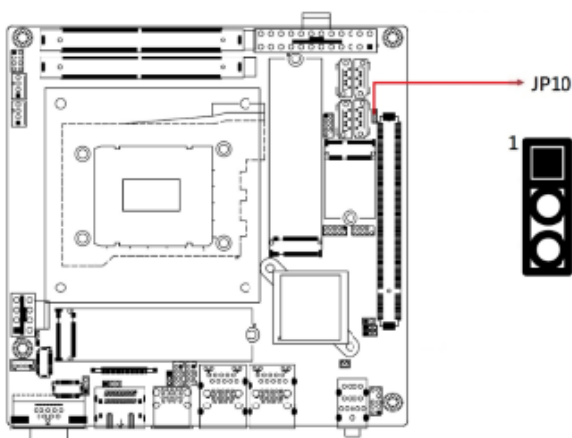
| Function            | Pin closed | Illustration |
|---------------------|------------|--------------|
| Normal<br>(default) | 1-2        | 1            |
| Clear CMOS          | 2-3        | 1            |

## 2.4.7 Clear ME (JP9)



| Function            | Pin closed | Illustration |
|---------------------|------------|--------------|
| Normal<br>(default) | 1-2        | 1            |
| Clear ME            | 2-3        | 1            |

## 2.4.8 AT/ATX Select (JP10)



| Function              | Pin closed | Illustration |
|-----------------------|------------|--------------|
| ATX Mode<br>(default) | 1-2        | 1            |
| AT Mode               | 2-3        | 1            |

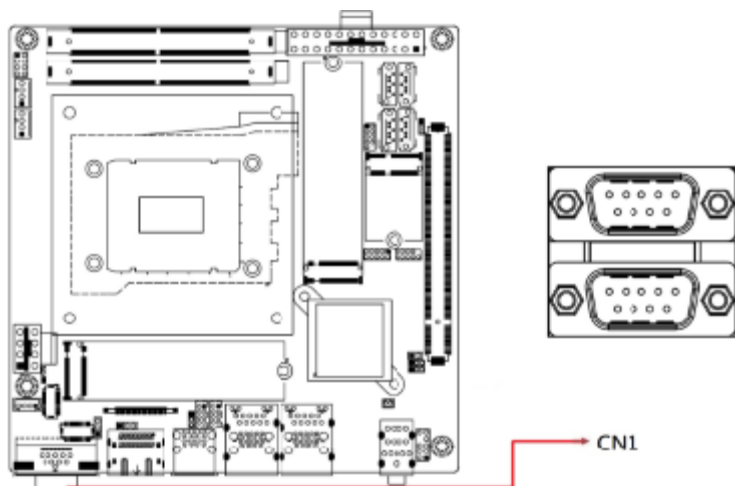
*Note: AT: Auto power on; ATX: Manual power on*

## 2.5 Connectors Quick Reference

### 2.6

| Connector | Function                                                            |
|-----------|---------------------------------------------------------------------|
| CN1       | COM #1 (upper) / COM #2 (bottom) Stack Connector                    |
| CN2       | DP+ #1 / DP+ #2 Stack Connector                                     |
| CN3       | eDP 40-pin Connector                                                |
| CN4       | Dual USB 3.2 Stack Connector                                        |
| CN5       | 2.5G LAN (KT1226V)+ USB 3.2 Gen2 Port (USB Port with power control) |
| CN6       | 2.5G LAN (KT1226LM) + USB3.2 Gen2                                   |
| CN7       | SATA Port                                                           |
| CN8       | SATA Port                                                           |
| CN9       | HD Audio Jacks                                                      |
| CN10      | SATA Port                                                           |
| CN11      | SATA Port                                                           |
| J2        | LVDS Backlight Connector                                            |
| J3        | M.2 M-Key NVME (CPU) Socket                                         |
| J4        | DDR5 SO-DIMM CHA                                                    |
| J5        | DDR5 SO-DIMM CHB                                                    |
| J6        | 2-port USB2.0                                                       |
| J7        | 2-port USB2.0                                                       |
| J8        | M.2 M-Key Socket                                                    |
| J9        | 24-pin ATX power connector                                          |
| J10       | eSPI Debug (Factory use only)                                       |
| J12       | Digital I/O (4in, 4out)                                             |
| J14       | RTC Battery Connector                                               |
| J15       | M.2 E-Key (w/ power control) Socket (supports CNVi)                 |
| J16       | SPI Flash Connector (Factory use only)                              |
| J17       | Audio Pin Header for Chassis Front Panel                            |
| J18       | Front Panel Settings Connector                                      |
| J19       | Dual-Channel LVDS CHA                                               |
| J20       | Dual-Channel LVDS CHB                                               |
| CPU_FAN1  | CPU Fan power connector (PWM Only)                                  |
| SYS_FAN1  | System Fan power connector (PWM Only)                               |
| ATX_12V   | ATX Standard 8-pin Type for 12V Power                               |
| PCIe1     | PCIe (16x)                                                          |

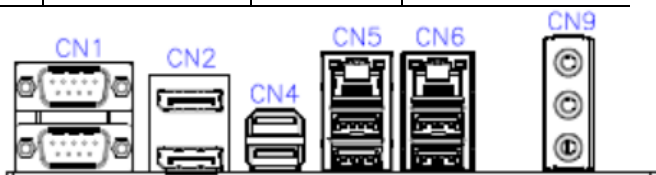
### 2.5.1 COM #1 (upper) / COM #2 (bottom) Stack Connector (CN1)



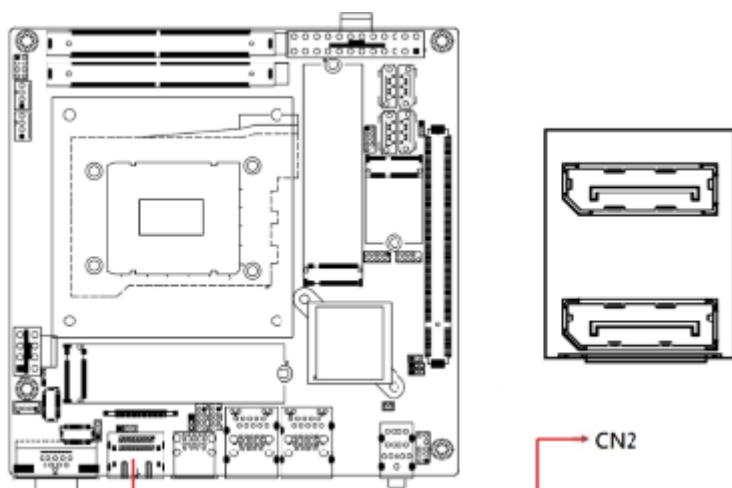
Remarks:

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

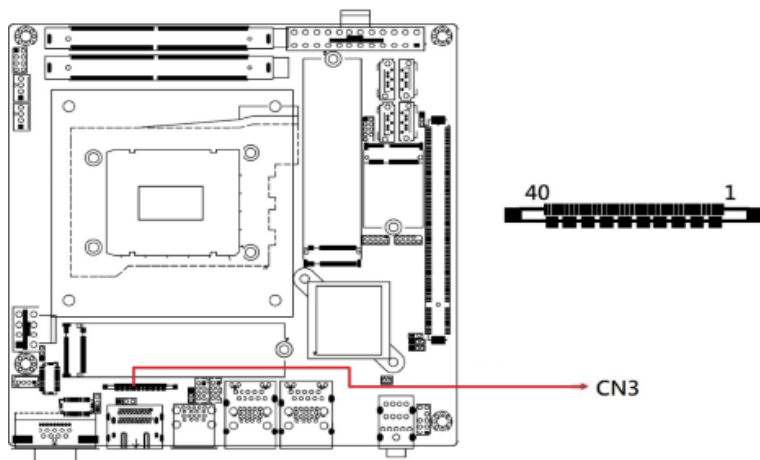
| Pin | Signal Name |        |        |
|-----|-------------|--------|--------|
|     | RS-232      | RS-422 | RS-485 |
| 1   | DCD         | TX-    | DATA-  |
| 2   | RX          | TX+    | DATA+  |
| 3   | TX          | RX+    | NC     |
| 4   | DTR         | RX-    | NC     |
| 5   | Ground      |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



## 2.5.2 DP+ #1 / DP+ #2 (CN2) Stack Connector



## 2.5.3 eDP 40-pin Connector (CN3)



**Remarks:** *KEL\_SSL00-40S*

| Pin | Signal Name | Pin | Signal Name     |
|-----|-------------|-----|-----------------|
| 1   | eDP_VCC     | 2   | eDP_VCC         |
| 3   | eDP_VCC     | 4   | eDP_VCC         |
| 5   | eDP_VCC     | 6   | Ground          |
| 7   | Ground      | 8   | Ground          |
| 9   | Ground      | 10  | Hot Plug detect |
| 11  | Ground      | 12  | TXN3            |
| 13  | TXP3        | 14  | Ground          |
| 15  | TXN2        | 16  | TXP2            |
| 17  | Ground      | 18  | TXN1            |
| 19  | TXP1        | 20  | Ground          |
| 21  | TXN0        | 22  | TXP0            |
| 23  | Ground      | 24  | eDP_AUXP        |
| 25  | eDP_AUXN    | 26  | NC              |
| 27  | +3.3V       | 28  | +12V            |
| 29  | NC          | 30  | Ground          |
| 31  | +5V         | 32  | NC              |
| 33  | BKLT_CTRL   | 34  | BKLT_EN         |
| 35  | +12V        | 36  | +3.3V           |
| 37  | Ground      | 38  | NC              |
| 39  | NC          | 40  | NC              |

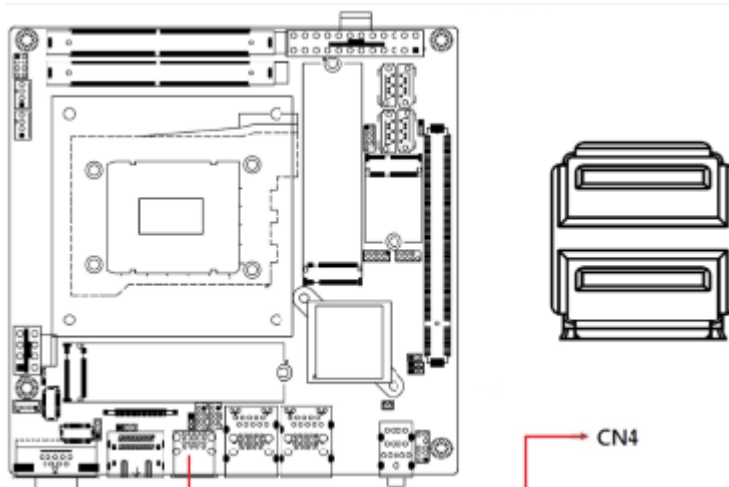
*Note: Use JP1 to set Pin1~ Pin5 voltage; Total current: 1A*

*Pin27, Pin36 Total current: 1A*

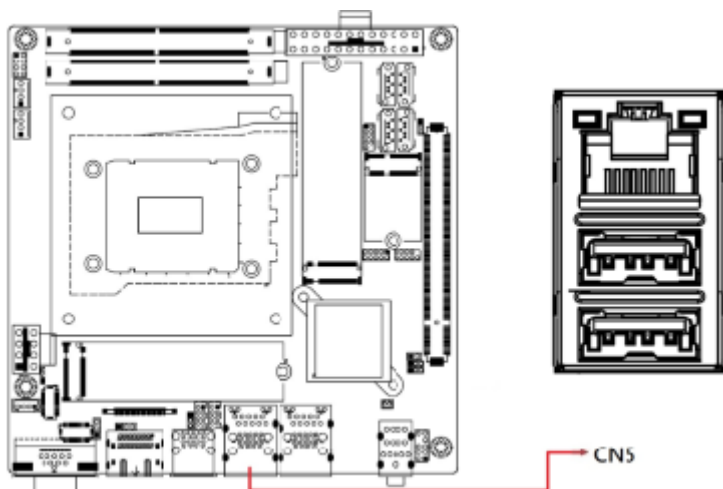
*Pin28, Pin35 Total current: 1A*

*Pin31 Total current: 0.5A*

## 2.5.4 Dual USB 3.2 Stack Connector (CN4)

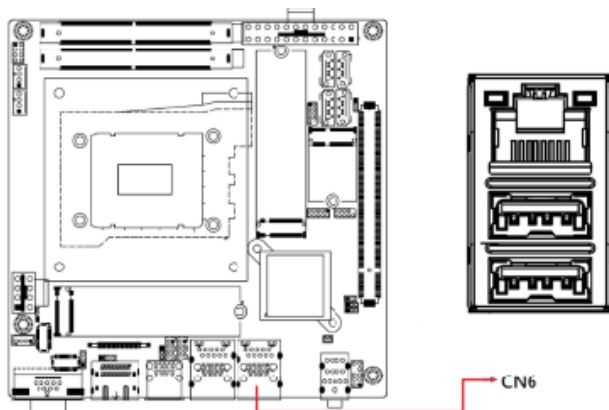


## 2.5.5 2.5G LAN (KT1226V) + USB 3.2 Gen2 (CN5)

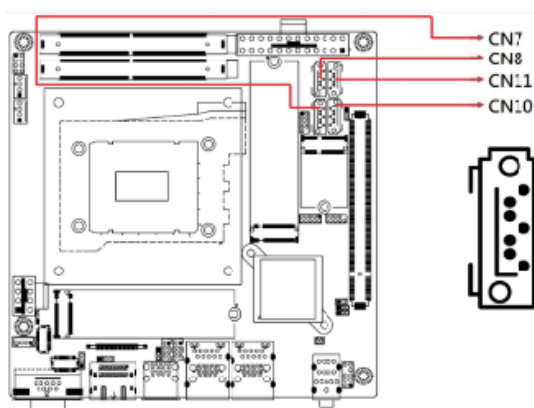


**Remarks: USB Port with Power Control**

## 2.5.6 2.5G LAN (KTI226LM) + USB 3.2 Gen2 (CN6)

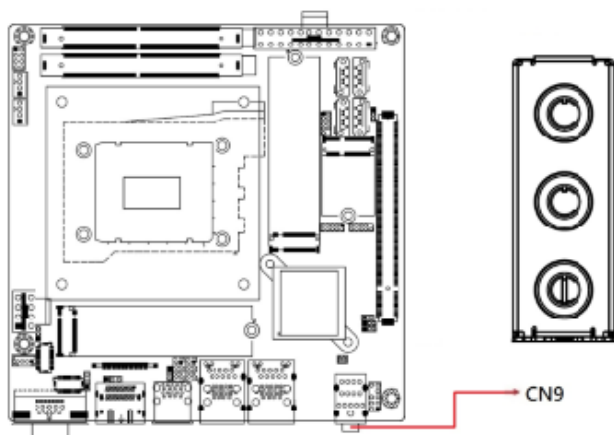


## 2.5.7 SATA Port (CN7, CN8, CN10, CN11)

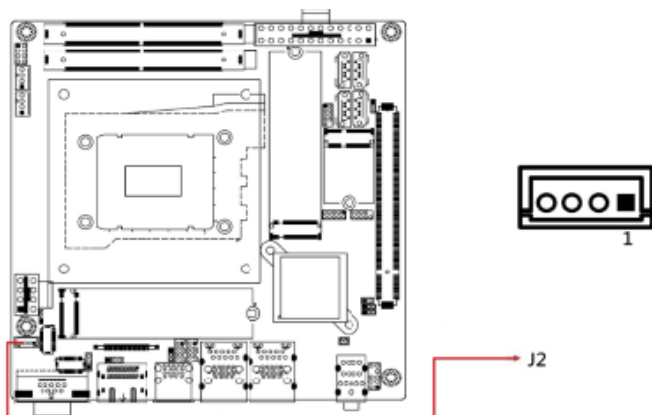


| Pin | Signal Name |
|-----|-------------|
| 1   | Ground      |
| 2   | TX+         |
| 3   | TX-         |
| 4   | Ground      |
| 5   | RX-         |
| 6   | RX+         |
| 7   | Ground      |

## 2.5.8 HD Audio Jacks (CN9)



## 2.5.9 LVDS Backlight Connector (J2)

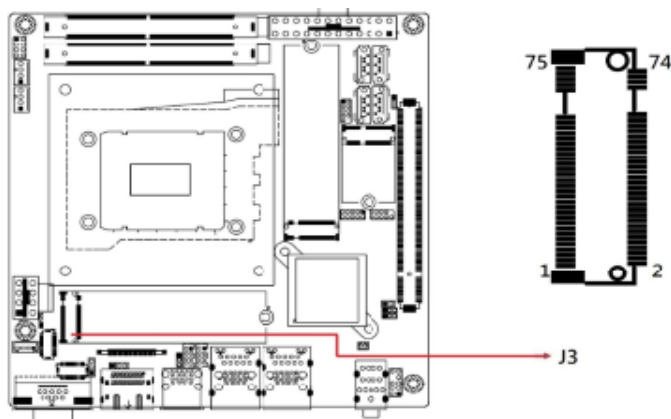


**Remarks:** E-CALL\_0110-161-040

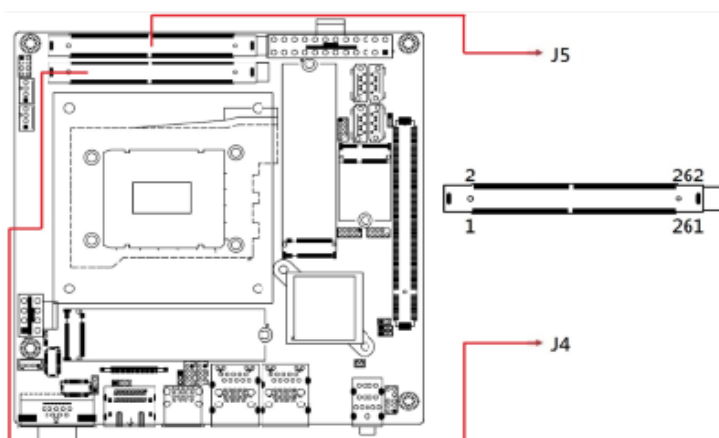
| Pin | Signal Name        |
|-----|--------------------|
| 1   | +12V / 1.5A        |
| 2   | Backlight Enable   |
| 3   | Brightness Control |
| 4   | Ground             |

**Note:** Use JP1 to set Pin3 voltage.

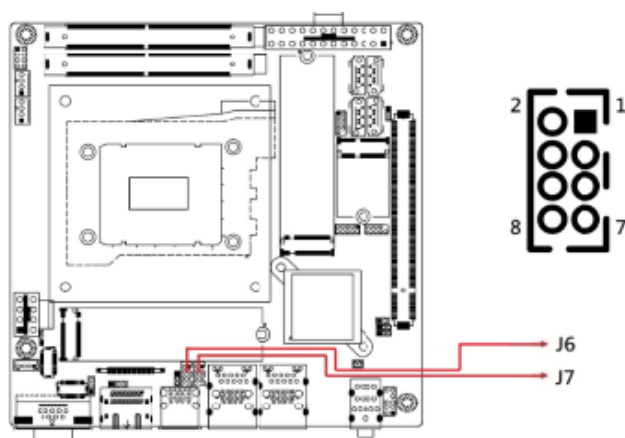
### 2.5.10 M.2 M-Key NVME (CPU) Socket (J3)



### 2.5.11 DDR5 SO-DIMM CHA/CHAB (J4 / J5)

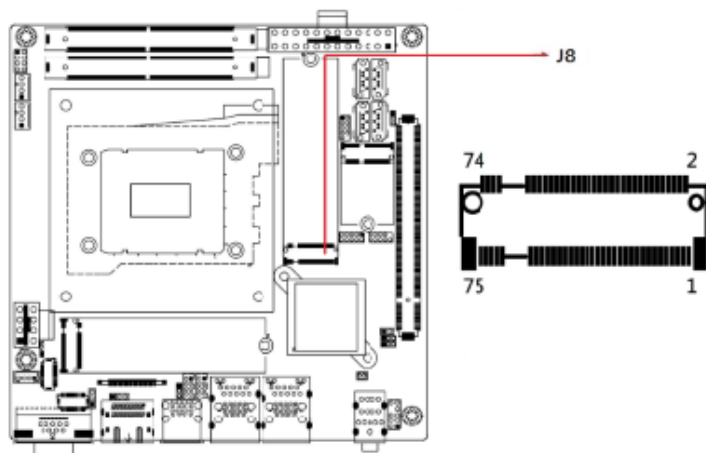


## 2.5.12 2-Port USB 2.0 Ports (J6, J7)

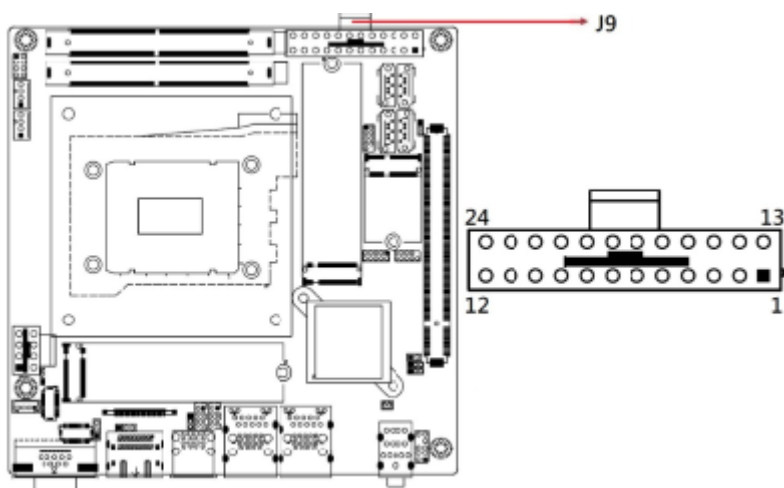


| Pin | Signal Name   | Pin | Signal Name   |
|-----|---------------|-----|---------------|
| 1   | 5VDUAL / 0.5A | 2   | GND           |
| 3   | USB_PN        | 4   | USB_PP        |
| 5   | USB_PP        | 6   | USB_PN        |
| 7   | GND           | 8   | 5VDUAL / 0.5A |

## 2.5.13 M.2 M-Key Socket (J8)

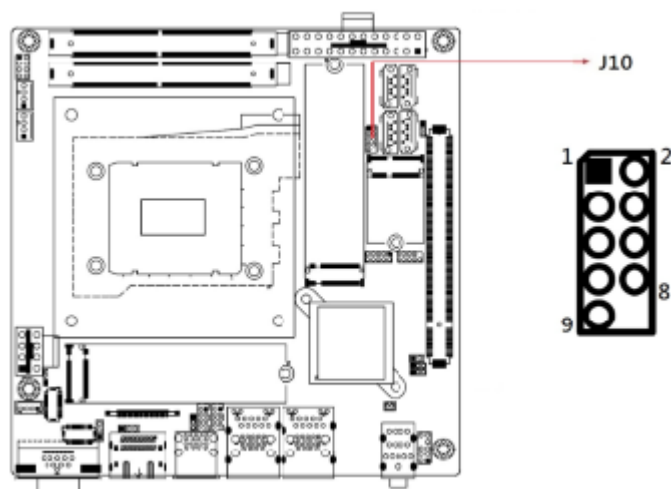


## 2.5.14 24-pin ATX Power Connector (J9)

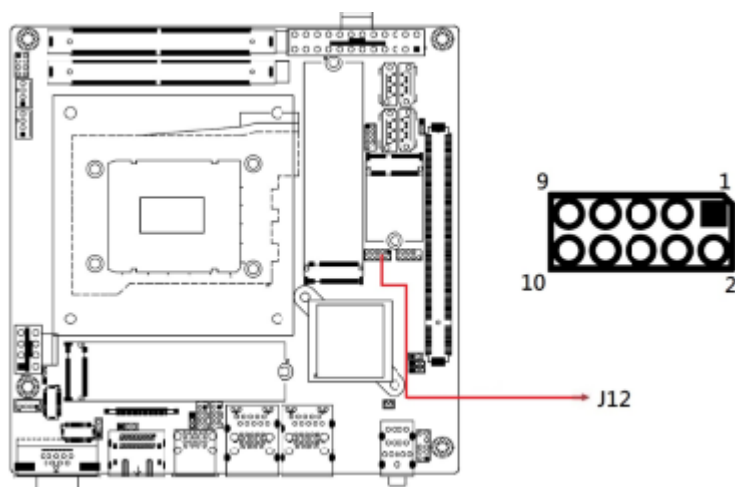


| Pin | Signal | Pin | Signal     |
|-----|--------|-----|------------|
| 13  | 3.3V   | 1   | 3.3V       |
| 14  | -12V   | 2   | 3.3V       |
| 15  | Ground | 3   | Ground     |
| 16  | PS-ON  | 4   | +5V        |
| 17  | Ground | 5   | Ground     |
| 18  | Ground | 6   | +5V        |
| 19  | Ground | 7   | Ground     |
| 20  | -5V    | 8   | Power good |
| 21  | +5V    | 9   | 5VSB       |
| 22  | +5V    | 10  | +12V       |
| 23  | +5V    | 11  | +12V       |
| 24  | Ground | 12  | 3.3V       |

## 2.5.15 eSPI Debug (Factory use only) (J10)



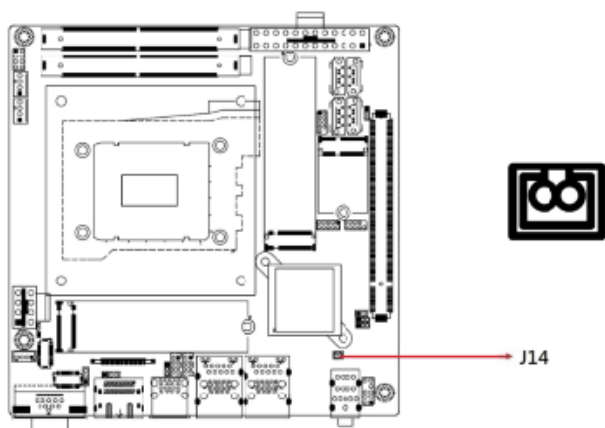
## 2.5.16 Digital I/O (4-in, 4-out) (J12)



**Remarks:** E-CALL\_0196-01-200-100

| 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       |

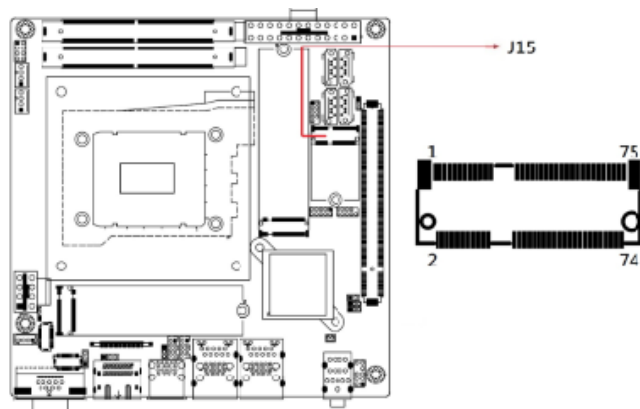
## 2.5.17 RTC Battery Connector (J14)



*Note: Coin battery with cable.*

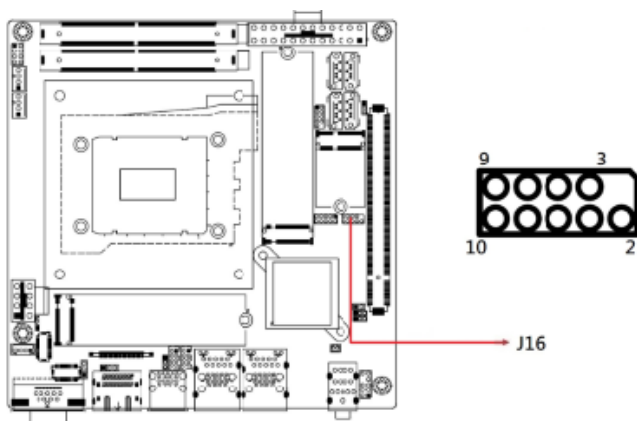
| Pin | Signal Name |
|-----|-------------|
| 1   | +3V         |
| 2   | Ground      |

## 2.5.18 M.2 E-Key (w/ Power Control) Socket (J15)

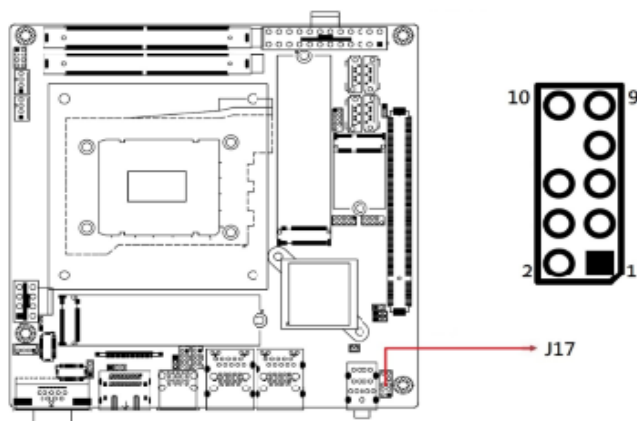


**Remarks: J15 supports CNVi**

## 2.5.19 SPI Flash Connector (Factory use only) (J16)



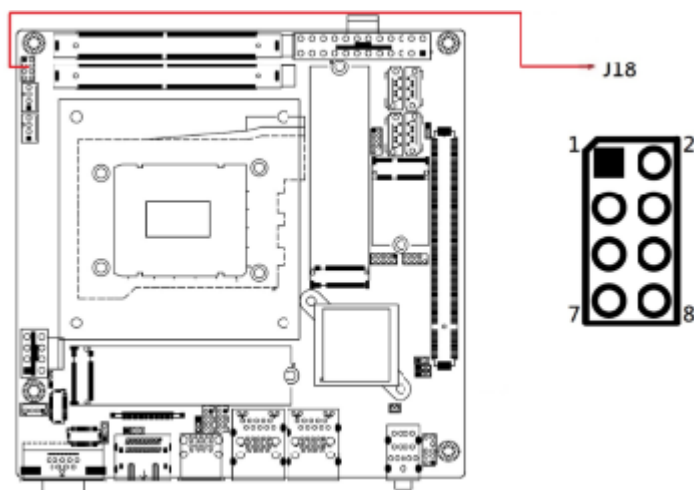
## 2.5.20 Audio Pin Header for Chassis Front Panel (J17)



**Remarks:** E-CALL\_0126-01-2821009

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

## 2.5.21 Front Panel Settings Connector (J18)



| 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- |

J18 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.

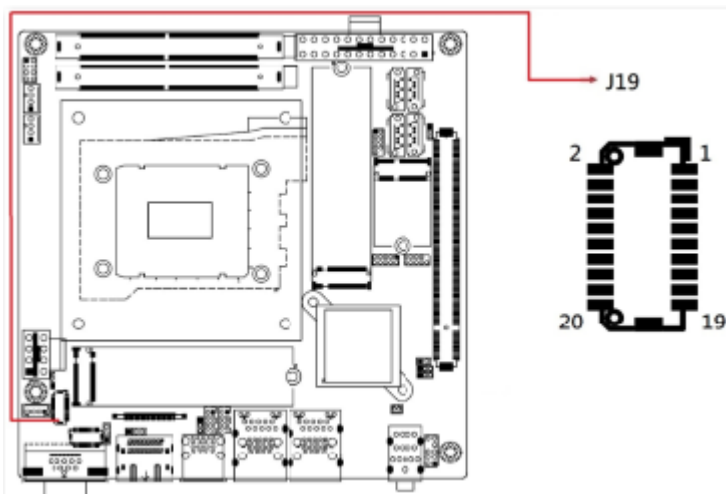
- **Reset Switch (Pins 5 and 6)**

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.

## 2.5.22 Dual-Channel LVDS CHA (J19)

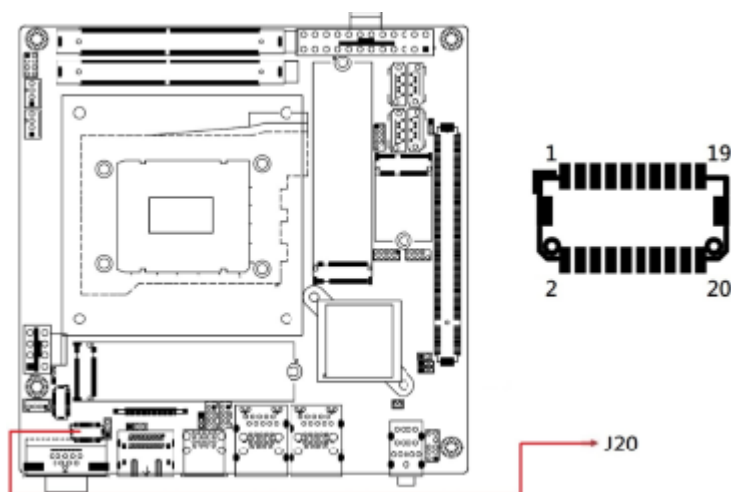


**Remarks:** *HRS\_DF20EG-20DP-1V(52)*

| Pin | Signal     | Pin | Signal     |
|-----|------------|-----|------------|
| 1   | LVSAO_P    | 2   | LVSAO_N    |
| 3   | Ground     | 4   | Ground     |
| 5   | LVSBO_P    | 6   | LVSBO_N    |
| 7   | Ground     | 8   | Ground     |
| 9   | LVSCO_P    | 10  | LVSCO_N    |
| 11  | Ground     | 12  | Ground     |
| 13  | LVCKO_P    | 14  | LVCKO_N    |
| 15  | Ground     | 16  | Ground     |
| 17  | LVSDO_P    | 18  | LVSDO_N    |
| 19  | +3.3V /+5V | 20  | +3.3V /+5V |

*Note: Use JP4 to set Pin19~Pin20 voltage. Total current: 1A*

## 2.5.23 Dual-Channel LVDS CHB (J20)

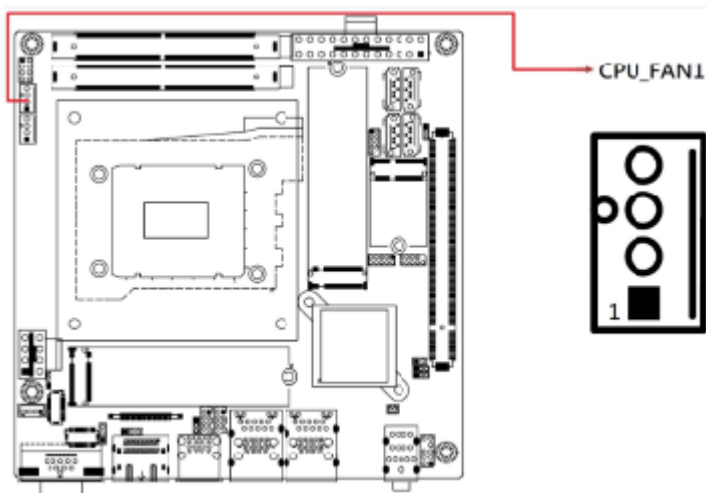


Remarks: HRS\_DF20EG-20DP-1V(52)

| Pin | Signal                | Pin | Signal                |
|-----|-----------------------|-----|-----------------------|
| 1   | LVS <sub>AE</sub> _P  | 2   | LVS <sub>AE</sub> _N  |
| 3   | Ground                | 4   | Ground                |
| 5   | LVS <sub>BE</sub> _P  | 6   | LVS <sub>BE</sub> _N  |
| 7   | Ground                | 8   | Ground                |
| 9   | LVS <sub>CE</sub> _P  | 10  | LVS <sub>CE</sub> _N  |
| 11  | Ground                | 12  | Ground                |
| 13  | LVS <sub>CKE</sub> _P | 14  | LVS <sub>CKE</sub> _N |
| 15  | Ground                | 16  | Ground                |
| 17  | LVS <sub>DE</sub> _P  | 18  | LVS <sub>DE</sub> _N  |
| 19  | +3.3V /+5V            | 20  | +3.3V /+5V            |

Note: Use JP4 to set Pin19~Pin20 voltage. Total current: 1A

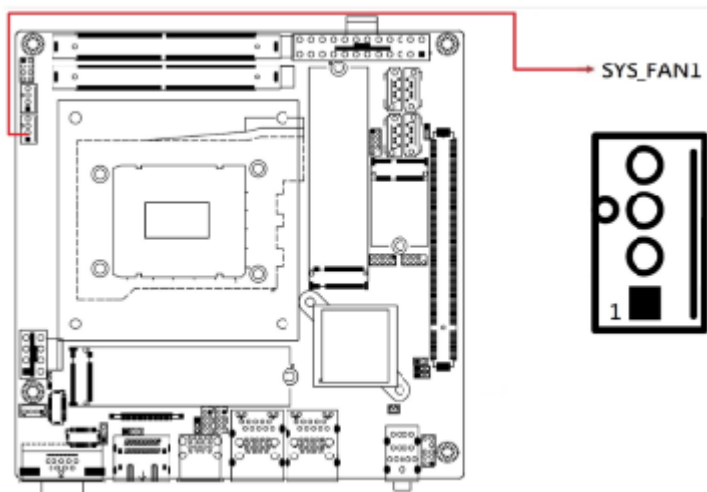
## 2.5.24 CPU Fan Power Connector (CPU\_FAN1)



**Remarks:** *PWM only.*

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

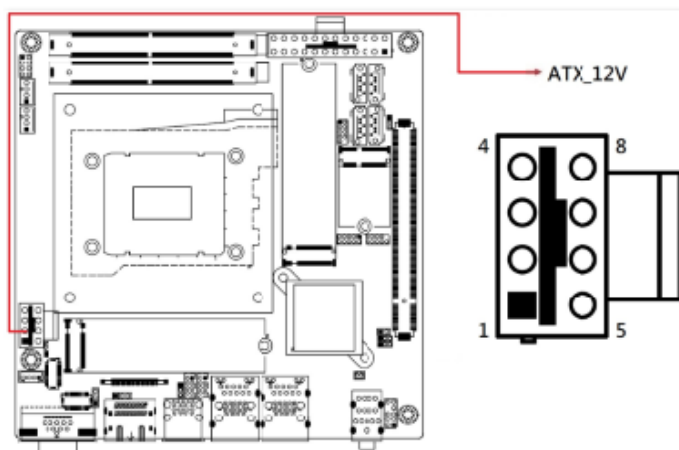
## 2.5.25 System Fan Power Connector (SYS\_FAN1)



**Remarks:** PWM only.

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

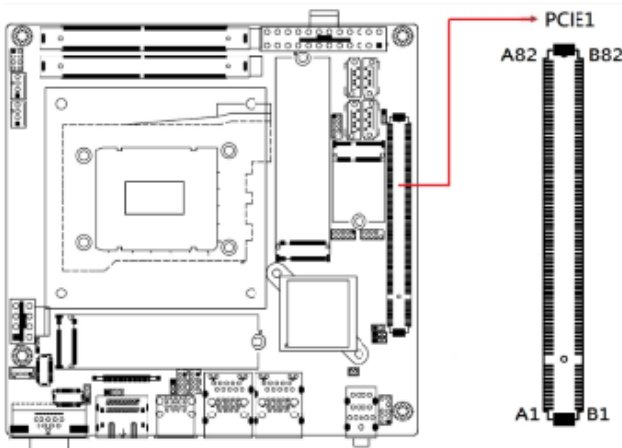
## 2.5.26 ATX Power Connector for 12V Power (ATX\_12V)



**Remarks:** This connector supplies the CPU operating voltage.

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1   | Ground | 5   | +12V   |
| 2   | Ground | 6   | +12V   |
| 3   | Ground | 7   | +12V   |
| 4   | Ground | 8   | +12V   |

## 2.5.27 PCIe (x16) Slot (PCIE1)



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## Chapter 3

# Drivers Installation

This chapter introduces installation of the following drivers:

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

### 3.1 Introduction

This section describes the installation procedures for software drivers. The software drivers are available on the IBASE website. Go to the product's download page. Copy the compressed drivers file to your computer. Double-click the file to extract it. Run "CDGuide" to access the main drivers page.

---

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

---

### 3.2 Intel® Chipset Software Installation Utility

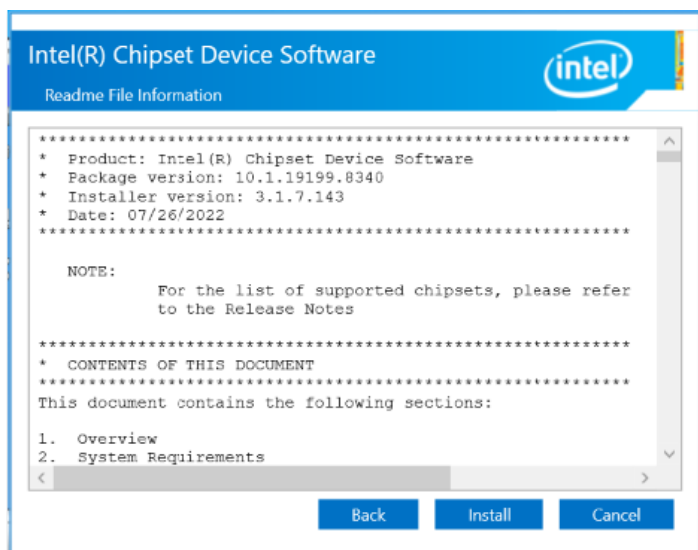
The Intel® Chipset drivers should be installed first before the software drivers to install INF files for Plug & Play function for Intel chipset components. Follow the instructions below to complete the installation.

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





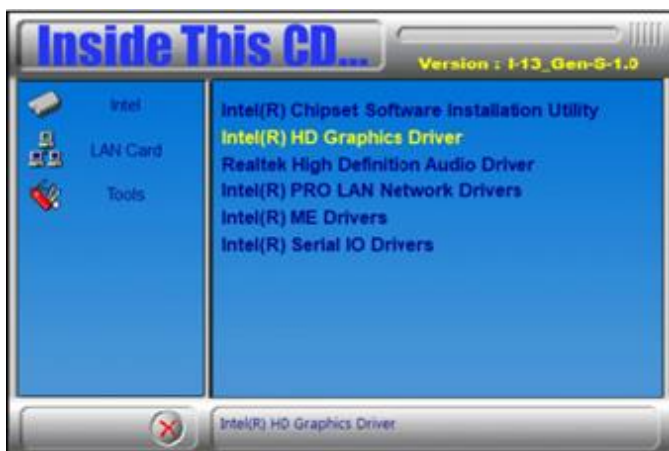
2. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next**.
3. Accept the *License Agreement* and click **Accept**.
4. On the *Readme File Information* screen, click **Install**.



5. Press **Finish** to complete the setup process.

### 3.3 VGA Driver Installation

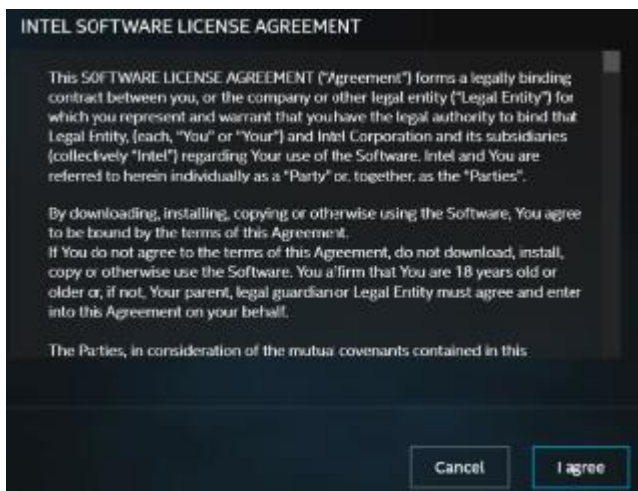
1. Click **Intel** on the left pane and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers**, and **Intel(R) HD Graphics Driver** on the right pane.



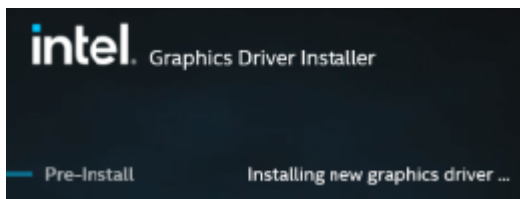
2. When the **Intel Graphics Driver Installer** screen appears, click **Begin installation**.



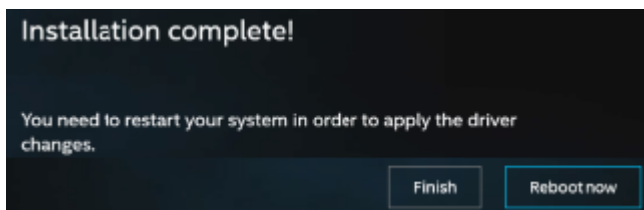
- Click **I agree** to accept the INTEL SOFTWARE LICENSE AGREEMENT.



- Continue for the installer to start installing the new graphics driver...



- When the message "**Installation complete!**" appears, restart your system in order to apply the driver changes.

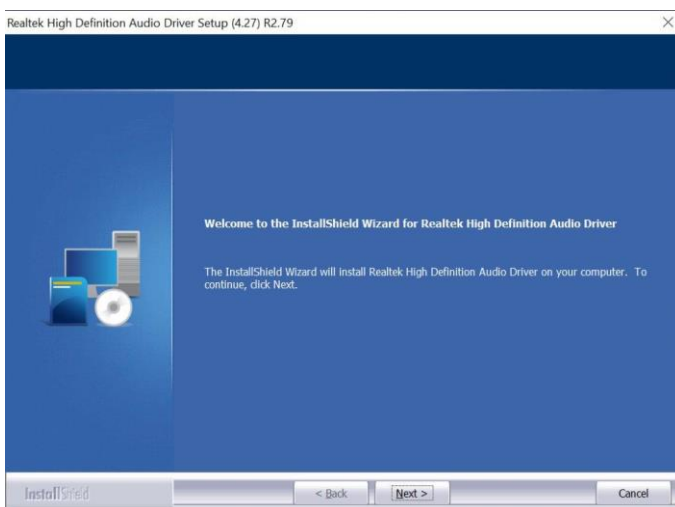


### 3.4 Realtek HD Audio Driver Installation

1. Click **Intel** on the left pane and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers** on the right. Click **Intel** on the left pane and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers**, and **Realtek High Definition Audio Driver** on the right pane.



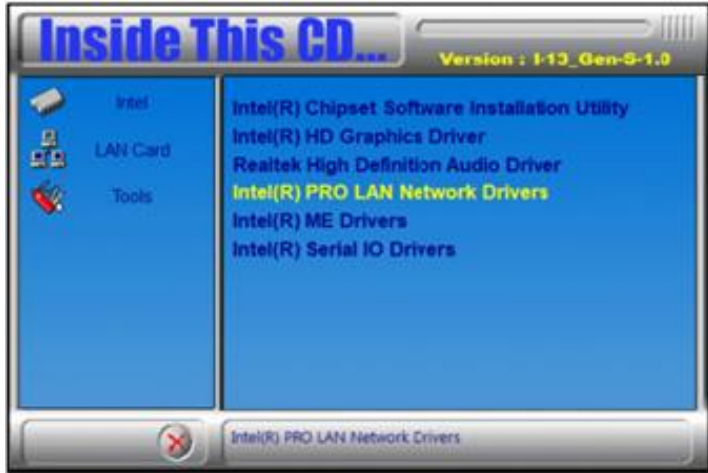
2. On the *Welcome* screen of the InstallShield Wizard, click **Next** to install the drivers.



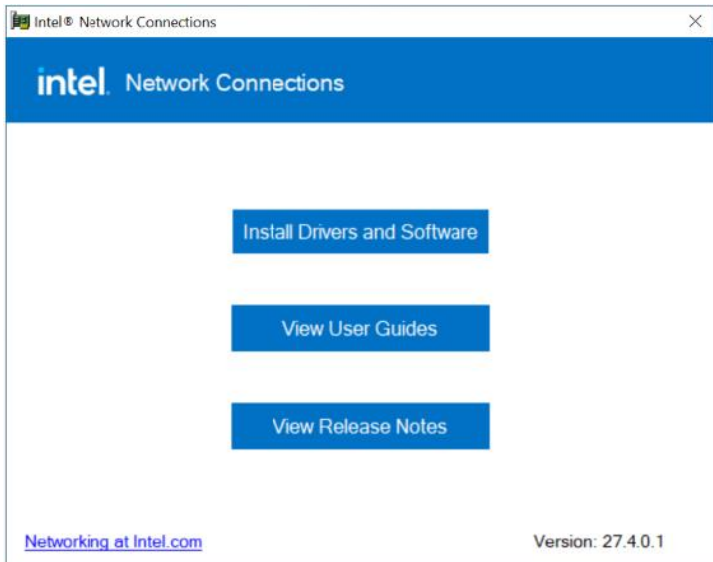
3. When the audio driver has been installed, click **Finish** to restart the computer.

### 3.5 LAN Drivers Installation

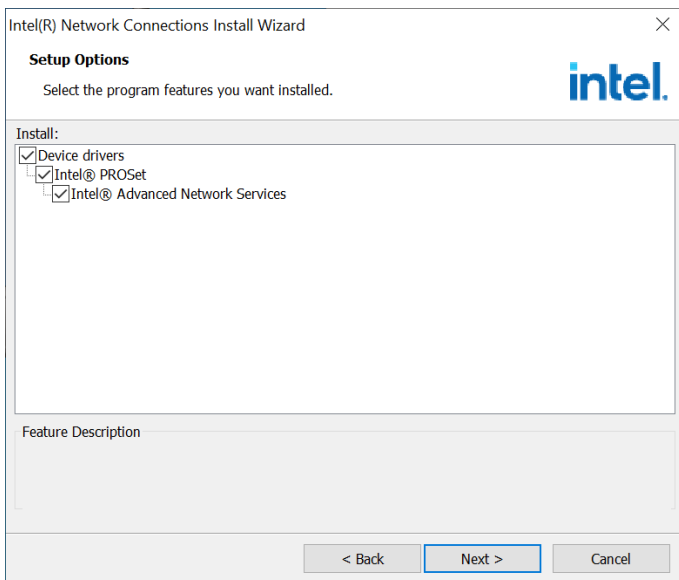
1. Click **Intel** on the left pane and then **Intel(R) AlderLake-S/RaptorLake-S Chipset Drivers**, and **Intel PRO LAN Network Drivers** on the right pane.



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



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



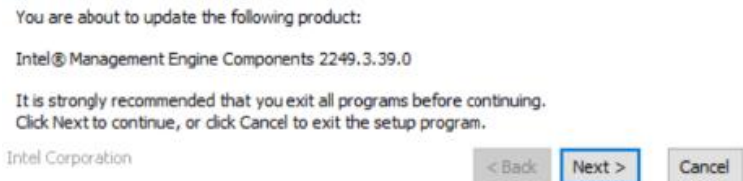
- On the *Ready to Install the Program* screen, click **Install** to begin the installation.
- When the *Install wizard Completed* screen appears, click **Finish**.

### 3.6 Intel® ME Drivers Installation

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



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



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



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

## 4.1 Introduction

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

## 4.2 BIOS Setup

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

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

The following message will appear on the screen:

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

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

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

---

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

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

---

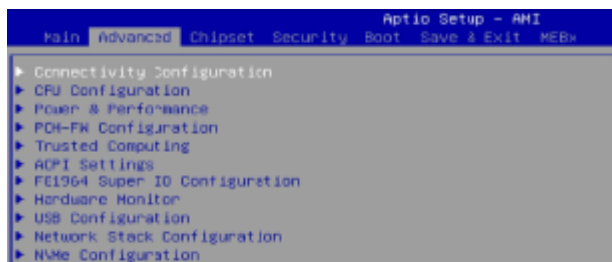
## 4.3 Main Settings



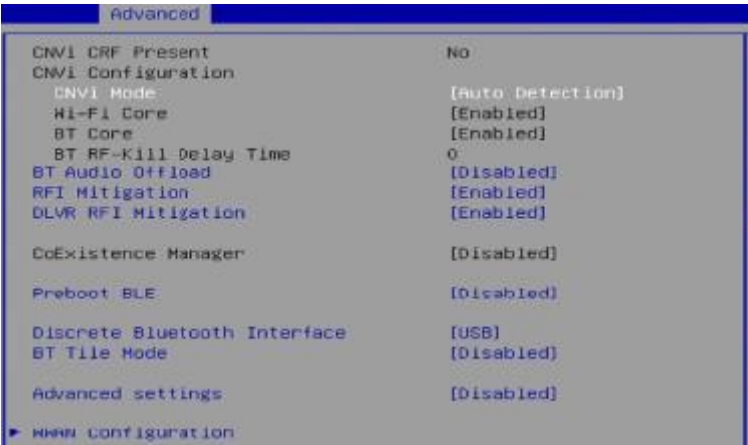
| BIOS Setting    | Description                                                           |
|-----------------|-----------------------------------------------------------------------|
| System Language | Choose the system default language.                                   |
| System Date     | Sets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

## 4.4 Advanced Settings

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

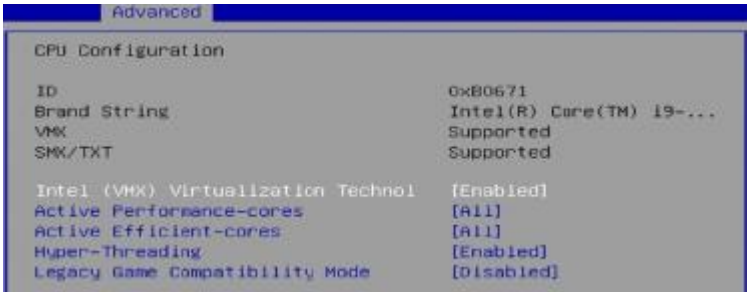


4.4.1 Connectivity Configuration



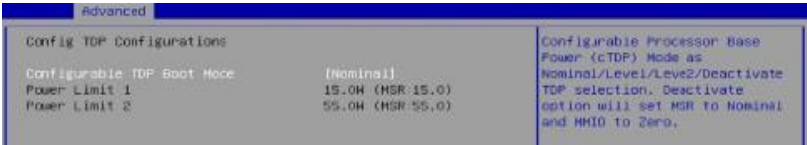
| BIOS Setting                 | Description                                                                                                                                                                                                                                      |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CNVi Mode                    | This option configures Connectivity<br>[Auto Detection] means that if Discrete solution is discovered it will be enabled by default. Otherwise Integrated solution (CNVi) will be enabled;<br>[Disable Integrated] disables integrated solution. |
| BT Audio Offload             | This is an option to Enable/Disable BT Audio Offload which enables audio input from BT device to the audio DSP and enables power efficient audio output to BT device.                                                                            |
| RFI Mitigation               | This is an option intended to Enable/Disable DDR-RFIM feature for Connectivity. This RFI mitigation feature may result in temporary slowdown of the DDR speed.                                                                                   |
| DLVR RFI Mitigation          | This is an option intended to Enable/Disable DLVR RFIM feature for connectivity. This option is only valid when global DLVR is enabled.                                                                                                          |
| Preboot BLE                  | This will be used to enable Preboot BT function.                                                                                                                                                                                                 |
| Discrete Bluetooth Interface | SerialIO UART0 needs to be enabled to select BT interface.                                                                                                                                                                                       |
| BT Tile Mode                 | Enable/Disable Tile.                                                                                                                                                                                                                             |
| Advanced Seetings            | Configure ACPI objects for wireless devices                                                                                                                                                                                                      |
| WWAN Configuration           | Configure WWAN related options.                                                                                                                                                                                                                  |

### 4.4.2 CPU Configuration



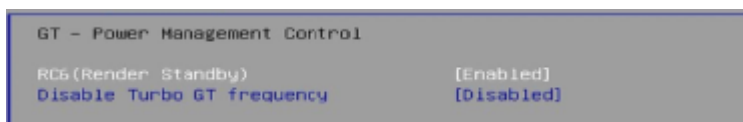
| BIOS Setting                                       | Description                                                                                                                                                       |
|----------------------------------------------------|-------------------------------------------------------------------------------------------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

4.4.3 Power & Performance



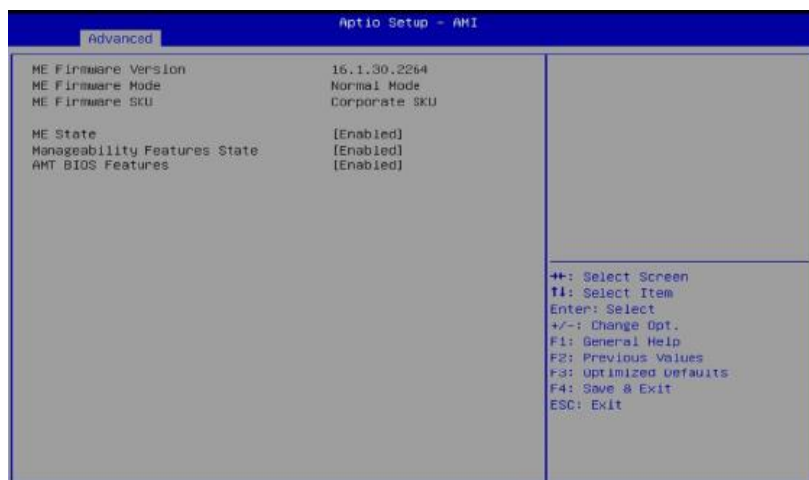
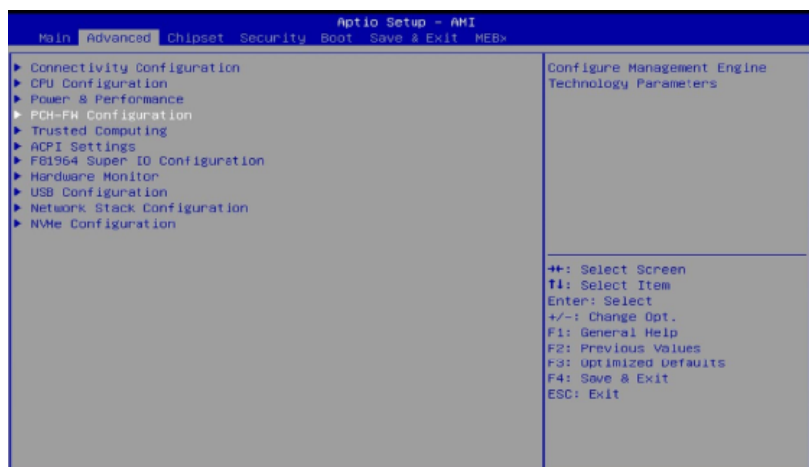
| BIOS Setting                        | Description                                                                                                                                   |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| CPU-Power Management Control        | CPU – Power Management Control Options                                                                                                        |
| Intel(R) SpeedStep                  | Allows more than two frequency ranges to be supported                                                                                         |
| Intel(R) Speed Shift Technology     | Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states. |
| Intel(R) Turbo Boost Max Technology | Enable/Disable Intel(R) Turbo Boost Max Technology 3.0 support. Disabling will report the maximum ratio of the slowest core in _cpc object.   |
| Turbo Mode                          | Enable/Disable processor Turbo Mode (requires EMTIM enabled too). AUTO means enabled.                                                         |

|                        |                                                                                                                                                    |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| C states               | Enable/Disable CPU Power Management. Allows CPU to go to C states when it is not 100% utilized.                                                    |
| Enhanced C states      | When enabled, CPU will switch to minimum speed when all cores enter C-State.                                                                       |
| Package C State Limite | Maximum Package C State Limit Setting. CPU Default: Leaves to Factory default value. Auto: Initializes to deepest available Package C State Limit. |



| BIOS Setting                | Description                                                                     |
|-----------------------------|---------------------------------------------------------------------------------|
| GT-Power Management Control | GT – Power Management Control Options                                           |
| RC6(Render Stanby)          | Check to enable render standby support.                                         |
| Disable Turbo GT frequency  | Enabled: Disables Turbo GT frequency.<br>Disabled: GT frequency is not limited. |

## 4.4.4 PCH-FW Configuration

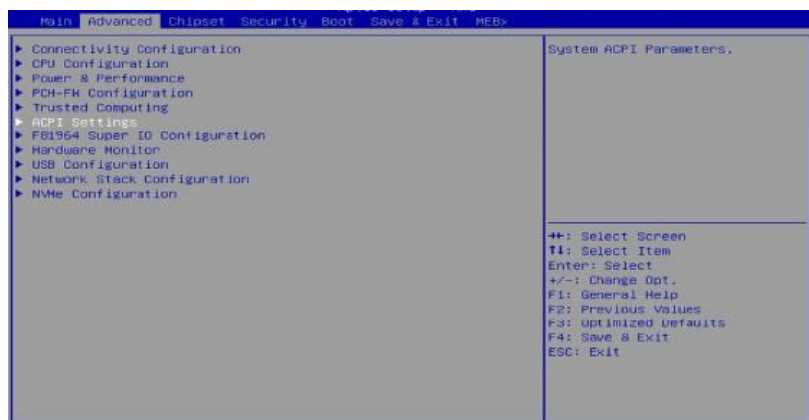


## 4.4.5 Trusted Computing



| BIOS Setting                       | Description                                                                                                                                                                                                                                                                                                                            |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Security Device Support            | Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INTIA interface will not be available.                                                                                                                                                                                     |
| SHA256 / SHA384 / SM3_256 PCR Bank | Option:<br>Enabled / Disabled                                                                                                                                                                                                                                                                                                          |
| Pending operation                  | Schedule an operation for the security device.<br>Note: Your computer will reboot during restart in order to change state of security device.                                                                                                                                                                                          |
| Platform Hierarchy                 | Enables / Disables platform hierarchy.                                                                                                                                                                                                                                                                                                 |
| Storage Hierarchy                  | Enables / Disables storage hierarchy.                                                                                                                                                                                                                                                                                                  |
| Endorsement Hierarchy              | Enables / Disables endorsement hierarchy.                                                                                                                                                                                                                                                                                              |
| Physical Presence Spec Version     | Selects to show the PPI Spec Version (1.2 or 1.3) that the OS supports.<br><b>Note:</b> Some HCK tests might not support 1.3.                                                                                                                                                                                                          |
| Device Select                      | <ul style="list-style-type: none"> <li>• <b>TPM 1.2</b> will restrict support to TPM 1.2 devices only.</li> <li>• <b>TPM 2.0</b> will restrict support to TPM 2.0 devices only.</li> <li>• <b>Auto</b> will support both with the default being set to TPM 2.0 devices if not found, and TPM 1.2 device will be enumerated.</li> </ul> |

## 4.4.6 ACPI Settings



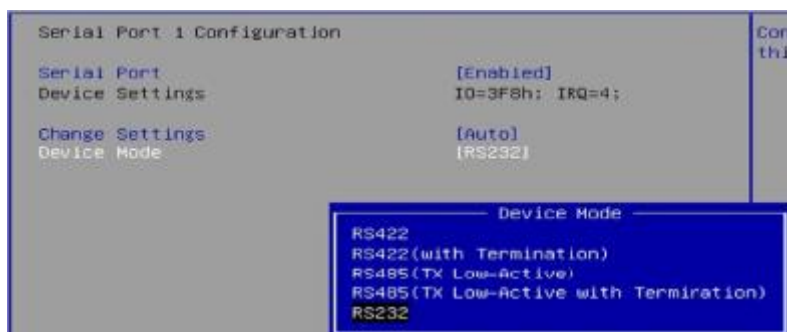
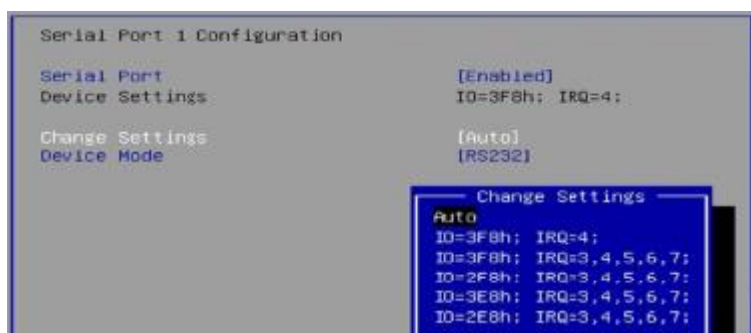
| BIOS Setting                   | Description                                                                                                            |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------|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

## 4.4.7 F81964 Super IO Configuration

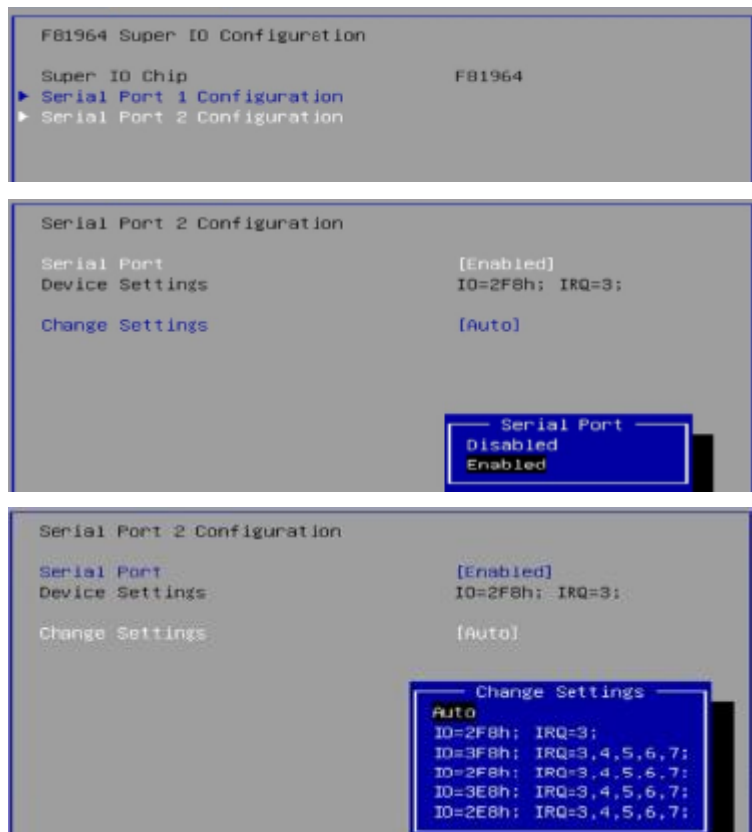
| Advanced                      |                                        |
|-------------------------------|----------------------------------------|
| F81964 Super IO Configuration | Set Parameters of Serial Port 1 (COMA) |
| Super IO Chip F81964          |                                        |
| ► Serial Port 1 Configuration |                                        |
| ► Serial Port 2 Configuration |                                        |

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

## 4.4.7.1. Serial Port 1 Configuration



## 4.4.7.2. Serial Port 2 Configuration



## 4.4.8 Hardware Monitor

| Advanced             |             |
|----------------------|-------------|
| PC Health Status     |             |
| ▶ Smart Fan Function |             |
| CPU temperature      | : +38 °C    |
| System temperature   | : +34 °C    |
| CPU Fan Speed        | : 1604 RPM  |
| System Fan Speed     | : N/A       |
| Vcore                | : +1.328 V  |
| +5V                  | : +5.170 V  |
| +12V                 | : +12.232 V |
| VDDQ                 | : +1.096 V  |
| VBAT                 | : +3.056 V  |

|                      |  |
|----------------------|--|
| ▶ CPU Fan Setting    |  |
| ▶ System Fan Setting |  |

|                             |                  |
|-----------------------------|------------------|
| CPU Fan Setting             |                  |
| CPU Smart Fan Configuration | [Automatic Mode] |
| Boundary 1                  | 65               |
| Boundary 2                  | 55               |
| Boundary 3                  | 45               |
| Boundary 4                  | 35               |
| Segment 1 Speed             | 100              |
| Segment 2 Speed             | 85               |
| Segment 3 Speed             | 70               |
| Segment 4 Speed             | 55               |
| Segment 5 Speed             | 40               |

|                                |                  |
|--------------------------------|------------------|
| System Fan Setting             |                  |
| System Smart Fan Configuration | [Automatic Mode] |
| Boundary 1                     | 65               |
| Boundary 2                     | 55               |
| Boundary 3                     | 45               |
| Boundary 4                     | 35               |
| Segment 1 Speed                | 100              |
| Segment 2 Speed                | 85               |
| Segment 3 Speed                | 70               |
| Segment 4 Speed                | 55               |
| Segment 5 Speed                | 40               |

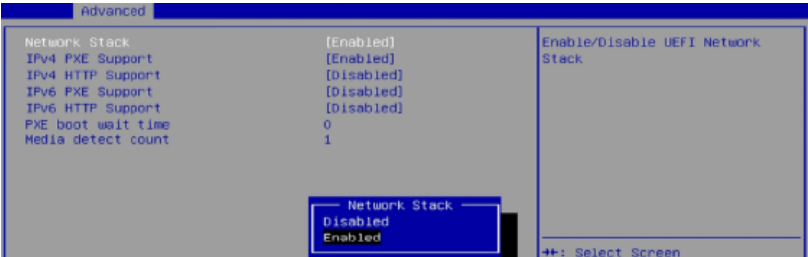
| BIOS Setting                    | Description                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Smart Fan Control Configuration | Smart Fan Mode Select                                                                                                                                                                     |
| 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

| Advanced                           |           |                                                                                                                                                                            |
|------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| USB Configuration                  |           | Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications. |
| USB Module Version                 | 31        |                                                                                                                                                                            |
| USB Controllers:                   |           |                                                                                                                                                                            |
| 1 XHCI                             |           |                                                                                                                                                                            |
| USB Devices:                       |           |                                                                                                                                                                            |
| 1 Keyboard                         |           |                                                                                                                                                                            |
| Legacy USB Support                 | [Enabled] |                                                                                                                                                                            |
| XHCI Hand-off                      | [Enabled] |                                                                                                                                                                            |
| USB Mass Storage Driver Support    | [Enabled] |                                                                                                                                                                            |
| USB hardware delays and time-outs: |           | ++: Select Screen                                                                                                                                                          |
| USB transfer time-out              | [20 sec]  | TI: Select Item                                                                                                                                                            |
| Device reset time-out              | [20 sec]  | Enter: Select                                                                                                                                                              |
| Device power-up delay              | [Auto]    | +/-: Change Opt.                                                                                                                                                           |

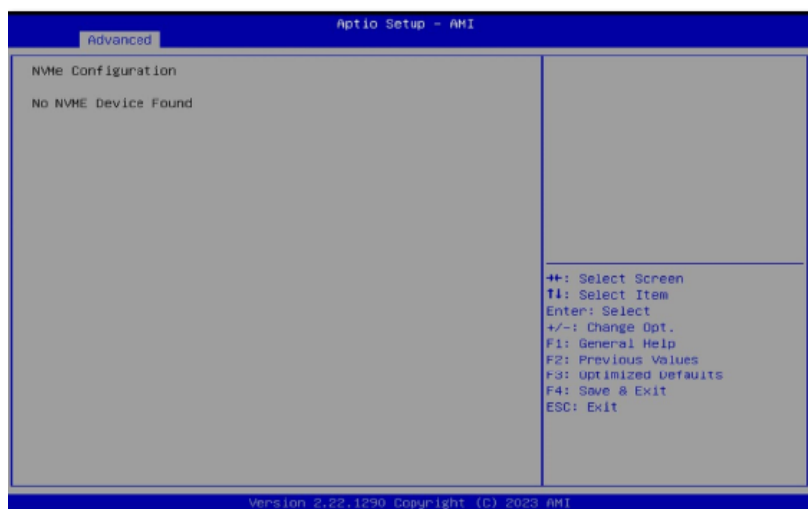
| BIOS Setting                    | Description                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Legacy USB Support              | <ul style="list-style-type: none"> <li><b>Enabled</b> enables Legacy USB support.</li> <li><b>Auto</b> disables legacy support if there is no USB device connected.</li> <li><b>Disabled</b> keeps USB devices available only for EFI applications.</li> </ul> |
| 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           | <p>The maximum time the device will take before it properly reports itself to the Host Controller.</p> <p><b>Auto</b> uses default value for a Root port it is 100ms. But for a Hub port, the delay is taken from Hub descriptor.</p>                          |

4.4.10 Network Stack Configuration

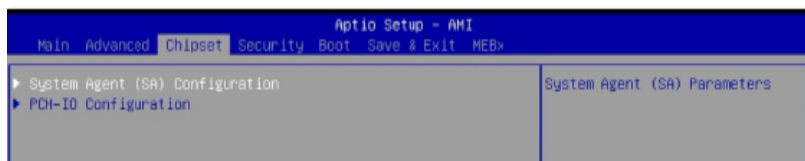


| BIOS Setting       | Description                                                                                           |
|--------------------|-------------------------------------------------------------------------------------------------------|
| Network Stack      | Enables / Disables UEFI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

## 4.4.11 NVMe Configuration



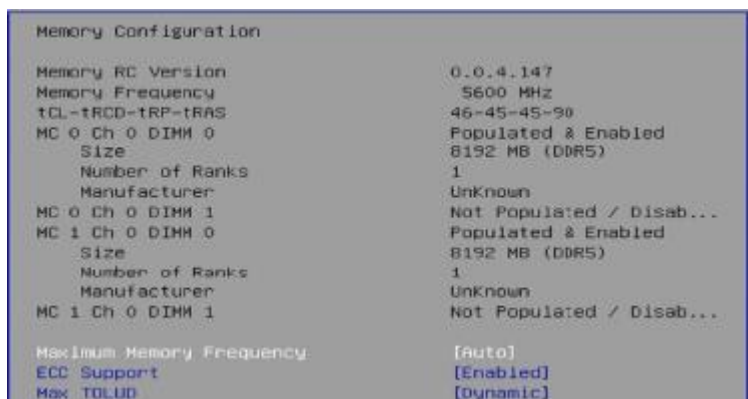
## 4.5 Chipset Settings



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

### 4.5.1 System Agent (SA) Configuration

#### 4.5.1.1. Memory Configuration



| BIOS Setting             | Description                                                                                                                               |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Memory Configuration     | Memory Configuration Parameters                                                                                                           |
| Maximum Memory Frequency | Maximum Memory Frequency Selection in Mhz                                                                                                 |
| ECC Support              | Enable/disable DDR ECC Support                                                                                                            |
| Max TOLUD                | Maximum value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller. |

#### 4.5.1.2. Graphics Configuration

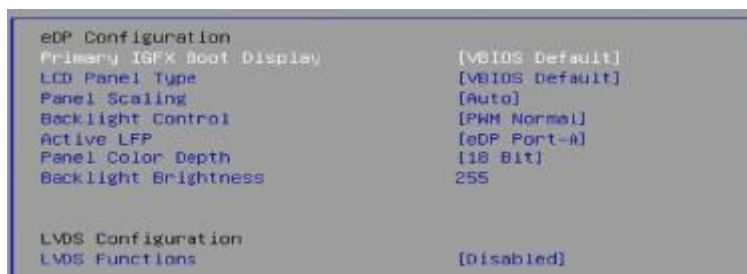
|                                 |                 |
|---------------------------------|-----------------|
| ► Graphics Configuration        |                 |
| ► VMD setup menu                |                 |
| VT-d                            | [Enabled]       |
| Control Iommu Pre-boot Behavior | [Disable IOMMU] |
| X2APIC Opt Out                  | [Enabled]       |
| DMA Control Guarantee           | [Enabled]       |
| Above 4GB MMIO BIOS assignment  | [Enabled]       |

|                                                   |         |
|---------------------------------------------------|---------|
| Graphics Configuration                            |         |
| Primary Display                                   | [Auto]  |
| ► External Gfx Card Primary Display Configuration |         |
| Internal Graphics                                 | [Auto]  |
| GTT Size                                          | [8MB]   |
| Aperture Size                                     | [256MB] |
| ► LCD Control                                     |         |

|                                                   |         |
|---------------------------------------------------|---------|
| Graphics Configuration                            |         |
| Primary Display                                   | [Auto]  |
| ► External Gfx Card Primary Display Configuration |         |
| Internal Graphics                                 | [Auto]  |
| GTT Size                                          | [8MB]   |
| Aperture Size                                     | [256MB] |
| ► LCD Control                                     |         |

|                           |                 |
|---------------------------|-----------------|
| eDP Configuration         |                 |
| Primary IGFX Boot Display | [VBIOS Default] |
| LCD Panel Type            | [VBIOS Default] |
| Panel Scaling             | [Auto]          |
| Backlight Control         | [PWM Normal]    |
| Active LFP                | [eDP Port-A]    |
| Panel Color Depth         | [18 Bit]        |
| Backlight Brightness      | 255             |
| LVDS Configuration        |                 |
| LVDS Functions            | [Disabled]      |

| BIOS Setting                                    | Description                                                                                                                                                                     |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Primary Display                                 | Select which of IGFX/PEG/PCI graphics device should be primary display or select HG for hybrid graphics.                                                                        |
| External Gfx Card Primary Display Configuration | External Gfx Card Primary Display Configuration                                                                                                                                 |
| Internal Graphics                               | Keep IGFX enabled based on the setup options. Internal Graphics options: Auto, Disabled, Enabled                                                                                |
| GTT Size                                        | Sets the GTT size as 2 MB, 4 MB, or 8 MB.                                                                                                                                       |
| Aperture Size                                   | Sets the aperture size.<br><br><b>Note:</b> Above 4 GB MMIO BIOS assignment is automatically enabled when selecting 2048 MB aperture. To use this feature, disable CSM support. |



| BIOS Setting              | Description                                                                                                                                                                                                                              |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LCD Control               | LCD Control                                                                                                                                                                                                                              |
| Primary IGFX Boot Display | Select the video device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display. |
| LCD Panel Type            | Select LCD panel used by internal graphics device by selecting the appropriate setup item.                                                                                                                                               |
| Panel Scaling             | Select the LCD panel scaling option used by the internal graphics device.                                                                                                                                                                |
| Backlight Control         | Back Light Control Setting                                                                                                                                                                                                               |

|                      |                                                                                                                                                                                                                                                                     |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Active LFP           | Select the Active LFP Configuration.<br>No LVDS: VBIOS does not enable LVDS.<br>Int-LVDS VBIOS enables LVDS driver by integrated encoder.<br>SVDO LVDS: VBIOS enables LVDS driver by SDVO encoder.<br>eDP Port-A: LFP drive by Int-DisplayPort encoder from Port-A. |
| Panel Color Depth    | Select the LFP Panel Color Depth                                                                                                                                                                                                                                    |
| Backlight Brightness | Set VBIOS brightness. Range: 0~255                                                                                                                                                                                                                                  |
| LVDS Function        | Options: Disables, Enabled                                                                                                                                                                                                                                          |

#### 4.5.1.3. VMD Setup Menu

|                                 |                 |
|---------------------------------|-----------------|
| VMD Setup menu                  |                 |
| VT-d                            | [Enabled]       |
| Control Iommu Pre-boot Behavior | [Disable IOMMU] |
| X2APIC Opt Out                  | [Enabled]       |
| DMA Control Guarantee           | [Enabled]       |
| Above 4GB MMIO BIOS assignment  | [Enabled]       |

|                       |            |
|-----------------------|------------|
| VMD Configuration     |            |
| Enable VMD controller | [Disabled] |

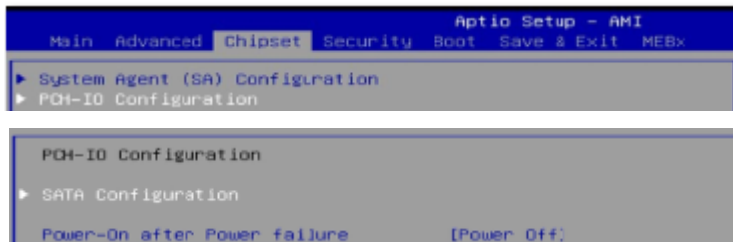
|                                   |                 |
|-----------------------------------|-----------------|
| VMD Configuration                 |                 |
| Enable VMD controller             | [Enabled]       |
| Enable VMD Global Mapping         | [Enabled]       |
| Map this Root Port under VMD      | [Disabled]      |
| Root Port BDF details             | SATA Controller |
| RAID0                             | [Enabled]       |
| RAID1                             | [Enabled]       |
| RAID5                             | [Enabled]       |
| RAID10                            | [Enabled]       |
| Intel Rapid Recovery Technology   | [Enabled]       |
| RRT volumes can span internal and | [Enabled]       |
| Intel(R) Optane(TM) Memory        | [Enabled]       |
| ZPODD                             | [Disabled]      |

| BIOS Setting        | Description                                                                   |
|---------------------|-------------------------------------------------------------------------------|
| Intel Optane Memory | Enable/Disable system acceleration with Intel® Optane™ memory features.       |
| ZPODD               | This option is only needed to be enabled when ZPODD is connected in VMD node. |



| BIOS Setting                    | Description                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------|
| VT-d                            | VT-d capability                                                                                                   |
| Control Iommu Pre-boot Behavior | Enable IOMMU in pre-boot environment (If DMAR table is installed in DXE and if VTD_INFO_PPI is installed in PEI.) |
| X2APIC Opt Out                  | Options: Enabled/Disabled                                                                                         |
| DMA control Guarantee           | Options: Enabled/Disabled                                                                                         |
| Above 4GB MMIO BIOS Assignment  | Options: Enabled/Disabled<br>This is enable automatically when Aperture Size is set to 2040MB.                    |

## 4.5.2 PCH-IO Configuration



| BIOS Setting                 | Description                                                                           |
|------------------------------|---------------------------------------------------------------------------------------|
| PCH-IO Configuration         | PCH Parameters                                                                        |
| SATA Configuration           | SATA Devices Options Settings                                                         |
| Power-On After Power Failure | Specify what state to go to when power is re-applied after a power failure (G3 state) |

4.5.2.1. SATA Configuration:



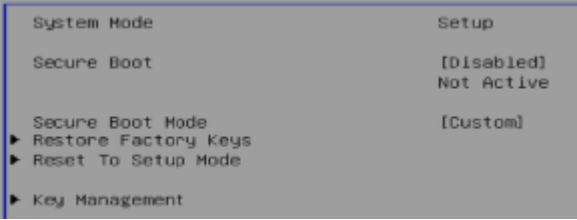
| BIOS Setting       | Description                                                                                                                                                                                                       |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SATA Controller(s) | Enables / Disables the SATA device.                                                                                                                                                                               |
| SATA Port #        | Enables / Disables SATA ports.                                                                                                                                                                                    |
| SATA Device Type   | Identify the SATA port is connected to Solid State Drive or Hard Disk Drive                                                                                                                                       |
| SATA Port # DevSlp | Enable/Disable STA Port # DevSlp. For DevSlp to work, both hard drive and SATA port need to support DEVSlp function, otherwise an unexpected behavior might happen. Please check board design before enabling it. |

## 4.6 Security Settings



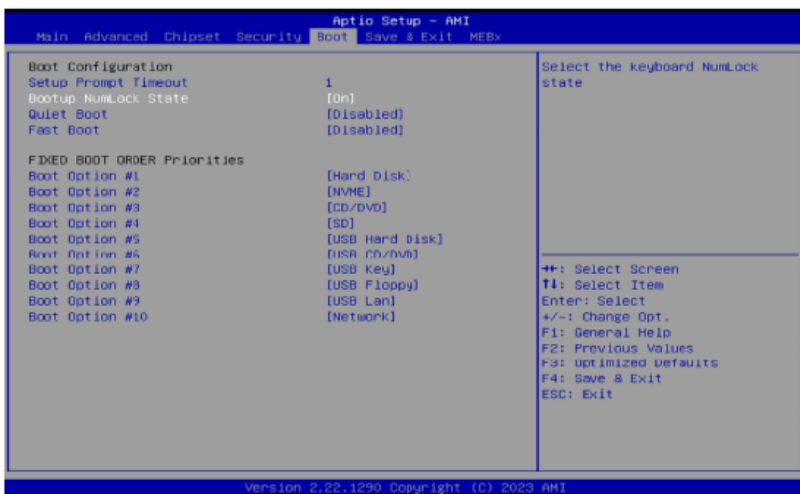
| BIOS Setting           | Description                  |
|------------------------|------------------------------|
| Administrator Password | Sets administrator password. |
| User Password          | Set user password.           |
| Secure Boot            | Configures Secure Boot.      |

4.6.1 Secure Boot



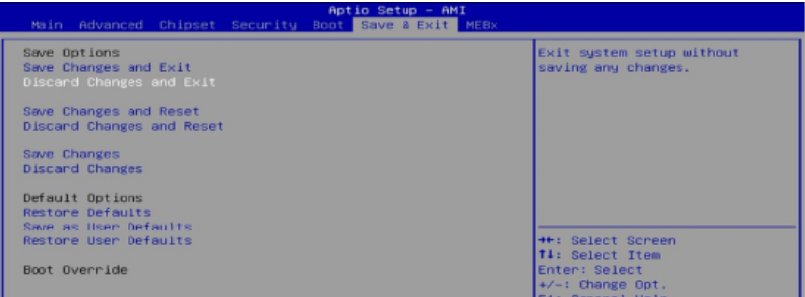
| BIOS Setting         | Description                                                                                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------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

## 4.7 Boot Settings



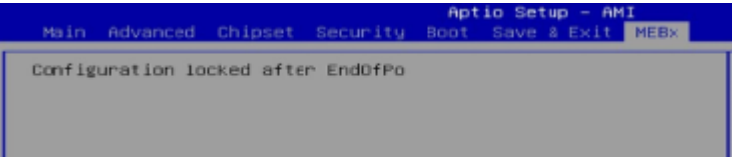
| BIOS Setting           | Description                                                                                                                                         |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Setup Prompt Timeout   | Number of seconds to wait for setup activation key.<br>65535(0xFFFF) means indefinite waiting.                                                      |
| Bootup NumLock State   | Selects the keyboard NumLock state.                                                                                                                 |
| Quiet Boot             | Enables / Disables Quiet Boot option.                                                                                                               |
| Fast Boot              | Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options. |
| Boot Option Priorities | Sets the system boot order.                                                                                                                         |

## 4.8 Save & Exit Settings



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

## 4.9 MEBx



# 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             |
| 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 |

| Address               | Device Description                                 |
|-----------------------|----------------------------------------------------|
| 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                  |
| 0x00004000-0x0000403F | Intel(R) UHD Graphics 770                          |
| 0x000003F8-0x000003FF | Communications Port (COM1)                         |
| 0x000002F8-0x000002FF | Communications Port (COM2)                         |
| 0x0000EFA0-0x0000EFBF | Intel(R) SMBus - 7AA3                              |
| 0x00004090-0x00004097 | Standard SATA AHCI Controller                      |
| 0x00004080-0x00004083 | Standard SATA AHCI Controller                      |
| 0x00004060-0x0000407F | Standard SATA AHCI Controller                      |
| 0x0000FFF8-0x0000FFFF | Intel(R) Active Management Technology - SOL (COM7) |
| 0x00000000-0x00000CF7 | PCI Express Root Complex                           |
| 0x00001854-0x00001857 | Motherboard resources                              |
| 0x00000040-0x00000043 | System timer                                       |
| 0x00000050-0x00000053 | System timer                                       |
| 0x00003000-0x00003FFF | Intel(R) PCI Express Root Port #8 - 7ABF           |
| 0x00002000-0x000020FE | Motherboard resources                              |

## B. Interrupt Request Lines (IRQ)

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

| Level             | Function                                                        |
|-------------------|-----------------------------------------------------------------|
| IRQ 4294967290    | Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft) |
| IRQ 4294967289    | Intel(R) Management Engine Interface #1                         |
| IRQ 4294967293    | Intel(R) PCI Express Root Port #4 - 7ABB                        |
| IRQ 27            | Intel(R) Serial IO I2C Host Controller - 7ACC                   |
| IRQ 4294967264~88 | Intel(R) Ethernet Controller I226-LM #2                         |
| IRQ 4294967238    | Intel(R) UHD Graphics 770                                       |
| IRQ 4             | Communications Port (COM1)                                      |
| IRQ 3             | Communications Port (COM2)                                      |
| IRQ 4294967291    | Standard SATA AHCI Controller                                   |
| IRQ 19            | Intel(R) Active Management Technology - SOL (COM7)              |
| IRQ 4294967294    | Intel(R) PCI Express Root Port #3 - 7ABA                        |
| IRQ 55~204        | Microsoft ACPI-Compliant System                                 |
| IRQ 0             | System timer                                                    |
| IRQ 17            | High Definition Audio Controller                                |
| IRQ 4294967292    | Intel(R) PCI Express Root Port #8 - 7ABF                        |
| IRQ 40            | Intel(R) Serial IO I2C Host Controller - 7ACD                   |
| IRQ 4294967239~63 | Intel(R) Ethernet Controller I226-V #2                          |

## 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    |
|-------------------------|----------------------|-----------------------------------|-----------------------------------------|
| USB 2.0 Connector       | J6,J7                | Hao Guo Xing Ye<br>DF11-8S-PA66H  | Hirose<br>DF11-8DS-2C                   |
| Digital I/O Connector   | J12                  | E-CALL<br>E-CALL_0196-01-200-100  | Dupont<br>10P 2.0 mm-pitch<br>(female)  |
| Front Panel Connector   | J18                  | E-CALL<br>0126-01-203-080         | Dupont<br>8P 2.54 mm-pitch<br>(female)  |
| Audio Connector         | J17                  | E-CALL<br>0126-01-2821009         | Dupont<br>10P 2.54 mm-pitch<br>(female) |
| Fan Power Connectors    | CPU_FAN1<br>SYS_FAN1 | TechBest<br>W2-03I104132S1WT(A)-L | Molex<br>47054-1000                     |
| LCD Backlight Connector | J2                   | E-CALL<br>0110-161-040            | JST PHR-4                               |
| LVDS Connectors         | J19, J20             | Hirose<br>DF20EG-20DP-1V          | Hirose<br>DF20A-20DS-1C                 |

**E. MI1000AF USB Power Control Bit Mapping.**

| Function    | Connector | Software Mapping |
|-------------|-----------|------------------|
| M.2 – E-Key | J15       | bit_3            |
| USB 3.2     | CN5       | bit_4            |