MI1000AF

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

User's Manual

Version 1.0
(February 2024)

iBASE

Copyright

Disclaimer

Trademarks

Compliance

C E

This product has passed CE tests for environmental specifications and limits. This product is in accordance 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.

FC

This product has been tested and found to comply with the limits for a Class B device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications.

WEEE

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

Green IBASE

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

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ether (PBDE)

iBASE

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.
• Do not leave this product in an environment where the storage temperature may be below -20° C or above 80° C. To prevent from damages, the product must be used in a controlled environment.

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.

- **3rd-party parts:**

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

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

Technical Support & Services

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

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

3. If repair service is required, you can download the RMA form at http://www.ibase.com.tw/english/Supports/RMAService/. Fill out the form and contact your distributor or sales representative.

iBASE

Table of Contents

iBASE

Chapter 1
General Information

The information provided in this chapter includes:

- Features

- Packing List

- Optional Accessories

- Specifications

- Block Diagram

- Product View

- Board Dimensions

IBASE

iBASE

1.1   Introduction

Introducing the MI1000AF Mini ITX motherboard, a compact yet powerful solution designed for high-performance computing. With support for 14th/13rh/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/13rh/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
- Disk (containing drivers) x 1
- This User's Manual   x 1

1.4   Optional Accessories

- Audio Cable
- Cooler

iBASE

1.5 Specifications

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

Specifications	
CPU Socket	LGA1700
CPU	14th/13rh/12th Gen Intel® Core i DT processors
Memory	2x DDR5 SO-DIMM sockets, Support DDR5 -5600 memory module, Max. 64GB *DDR5-5600 only by Core i9/i7 Processor & 1R memory module*
BIOS	AMI
Watchdog Timer	256 levels
Hardware Monitor	Yes
Storage Interface	SATA III & NVMe
Expansion Slots	1x PCI-E (x16) [Gen 5.0]
Mini Type Slots	• 2x M.2 (M-key, type:2280, PCI-E(4x) Gen.4) • 1x M.2 (E-Key, type:2230, USB 2.0 + PCIe 3.0)
Graphics	14th/13rh/12th Gen Intel® Core I DT processor integrated Xe graphics architecture
Video Output	1x eDP + 2 x DisplayPort (1.4a) (DP++) + LVDS
Ethernet	• LAN 1: Intel® I226LM, supports 2.5G and iAMT • LAN 2: Intel® I226V, supports 2.5G only
I/O Chipset	Fintek F81964D-I
Serial Port	2x COM ports: 1x RS232/422/485 + 1x RS232
USB 2.0	4x USB 2.0 via pin header
USB 3.X	2x USB3.2 (10bps)+ 4x USB3.2 (5bps) @edge connector
Serial ATA	4x SATA III
Audio	Built-in HDA controller+Realtek ALC888S (7.1 ch.)
TPM	dTPM (2.0) (default) / fTPM (2.0) (option)

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

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

All specifications are subject to change without prior notice.

1.6   Block Diagram

1.7 Product View

Top View

USB 2.0(4 ports)

LVDS

M.2@2280 (M-Key)

Intel® R680E

M.2@2280 (M-Key)

PCI-E(x16)

LGA1700 CPU socket

M.2@2230 (E-Key)

SATA III

ATX Power

DDR5 SO-DIMM socket

Bottom View

iBASE
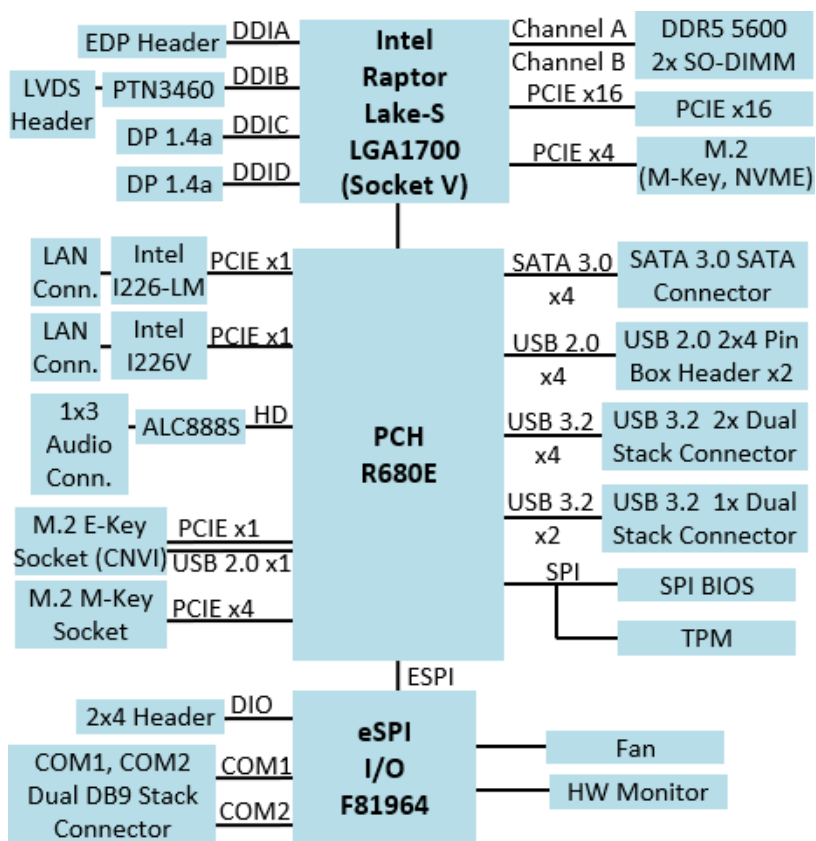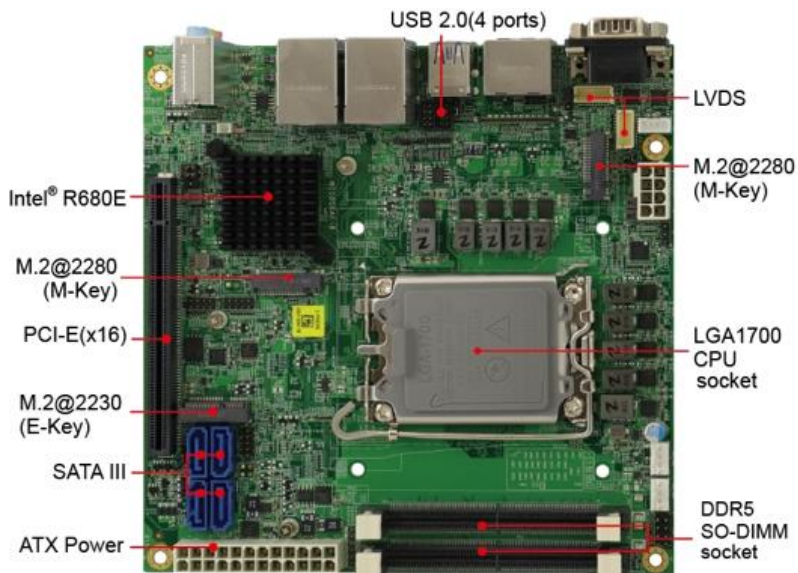
Rear View
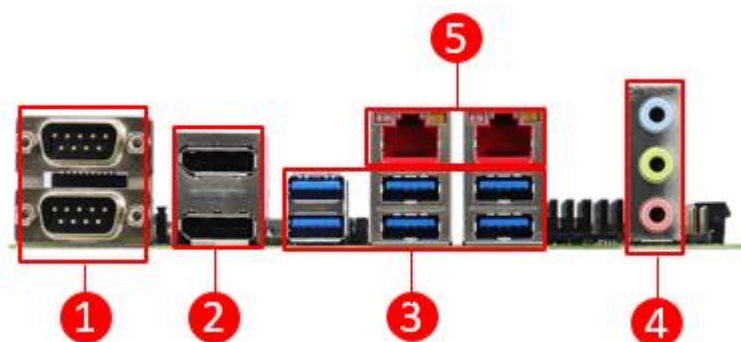
No.	Description
1	COM1(top) RS232/422/485 COM2(bottom) RS232 only
2	2x DisplayPort
3	6x USB 3.2 Connector
4	HD Audio Connector
5	2x 2.5 Gigabit LAN

1.8   Board Dimensions

iBASE
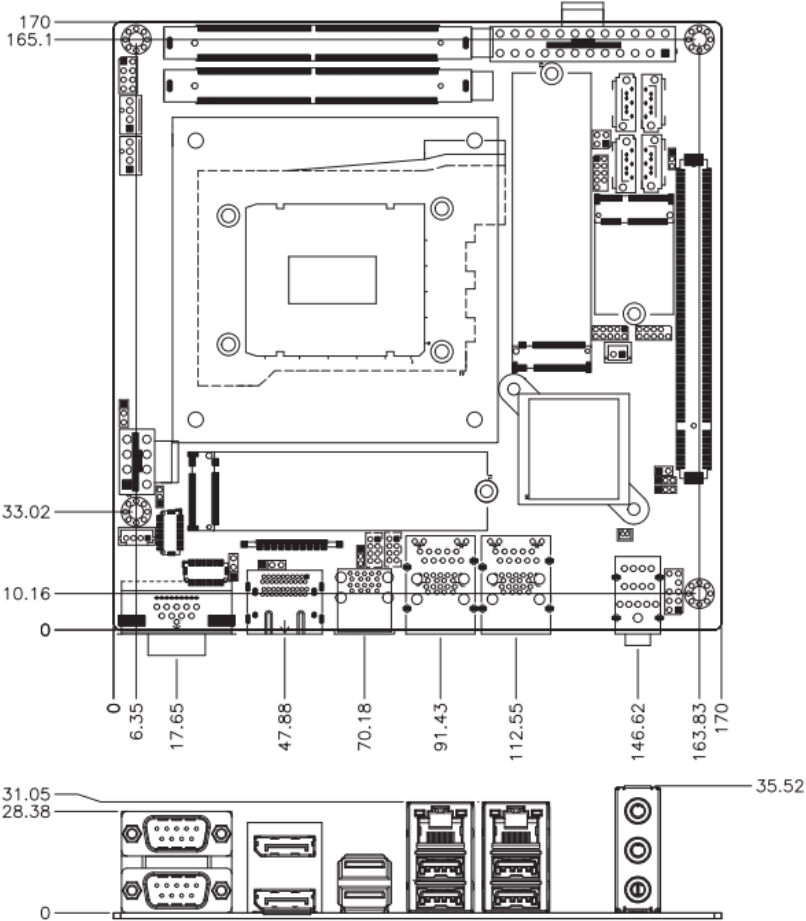
This page is intentionally left blank.

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

iBASE

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.
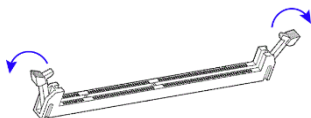
2. Gently push the module in an upright position until the clips of the slot close to hold the module in place when the module touches the bottom of the slot.
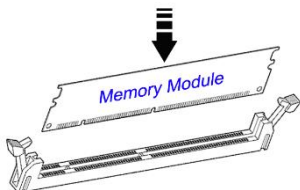
To remove the module, press the ejector tabs at both ends outwards.

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.
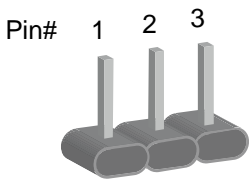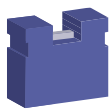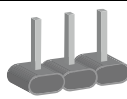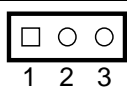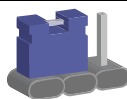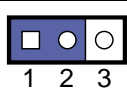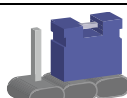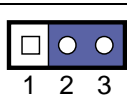
A 3-pin jumper   **A jumper cap**

Refer to the illustration below to set jumpers.

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

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

2.3 Jumper & Connector Locations
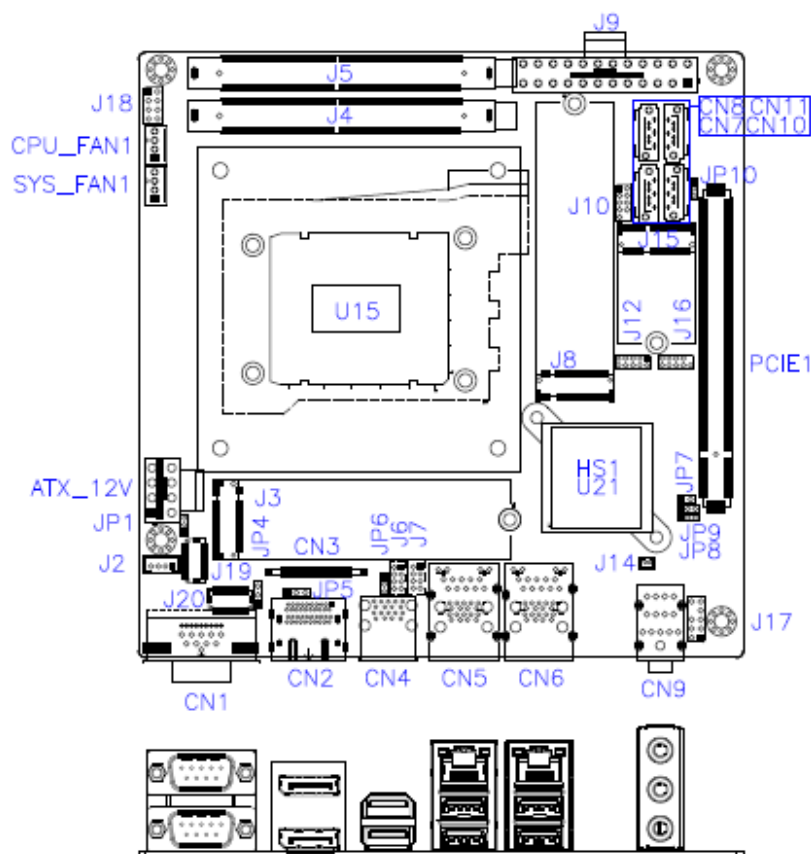
2.4   Jumpers Quick Reference

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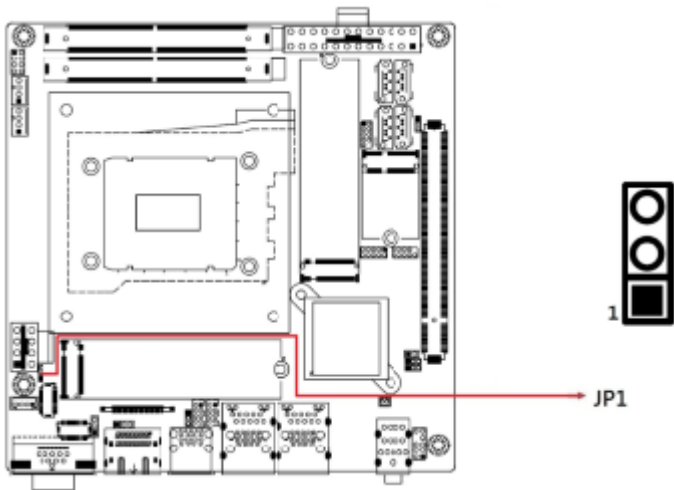
Function	Pin closed	Illustration
3.3V(Default)	1-2	
5V	2-3	

Note: This is for setting Pin3 voltage of J2.

2.4.2 LVDS Panel Power Selection (JP4)
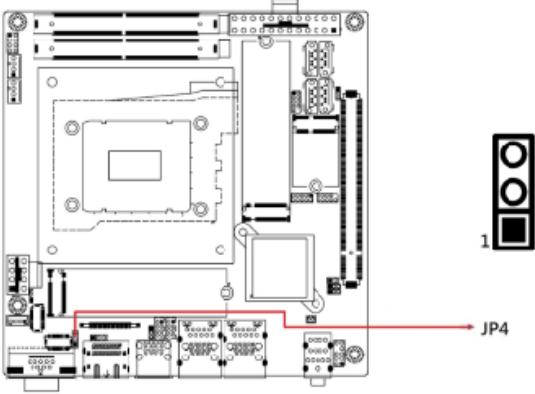
Function	Pin closed	Illustration
3.3V(Default)	1-2	
5V	2-3	

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

2.4.3 eDP Panel Power Selection (JP5)
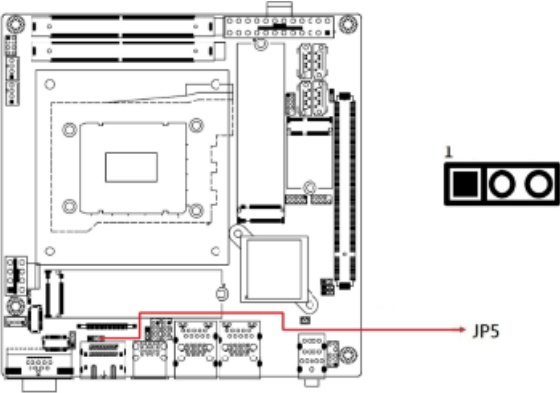
Function	Pin closed	Illustration
3.3V(Default)	1-2	
5V	2-3	

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

2.4.4 PCI Express Bifurcation (JP6)
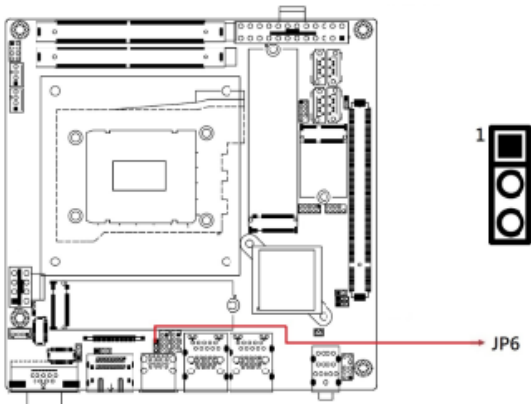
Function	Pin closed	Illustration
1 x PCIe (x16) (default)	1-2	
2 x PCIe (x8)	2-3	

Note :The setting is for PCIE1 slot

2.4.5 Flash Descriptor Security Override (JP7)
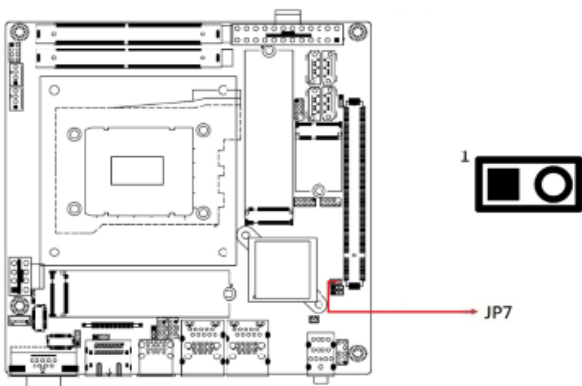
Flash Descriptor Security Override	Pin	Illustration
Disabled (default)	Open	1
Enabled	Close	1

2.4.6 Clear CMOS (JP8)
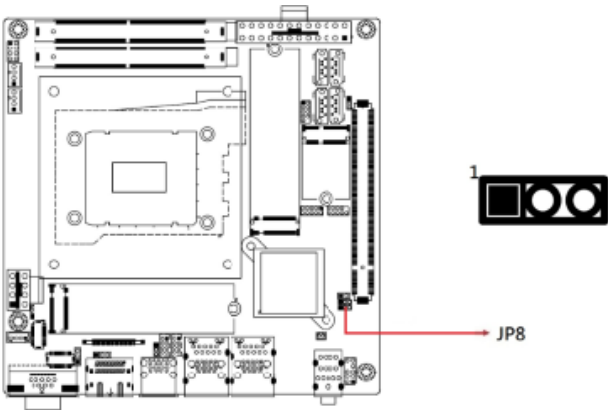
Function	Pin closed	Illustration
Normal (default)	1-2	
Clear CMOS	2-3	

2.4.7 Clear ME (JP9)
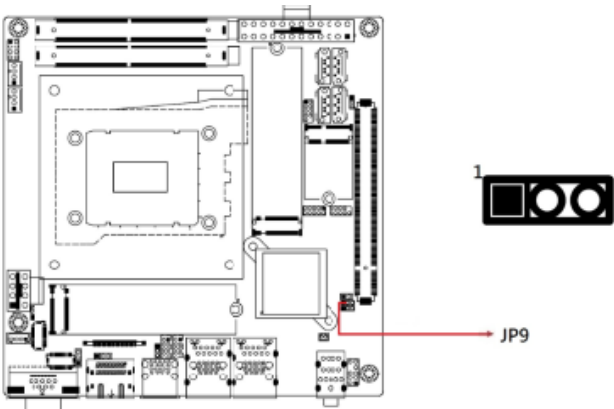
Function	Pin closed	Illustration
Normal (default)	1-2	
Clear ME	2-3	

2.4.8   AT/ATX Select (JP10)
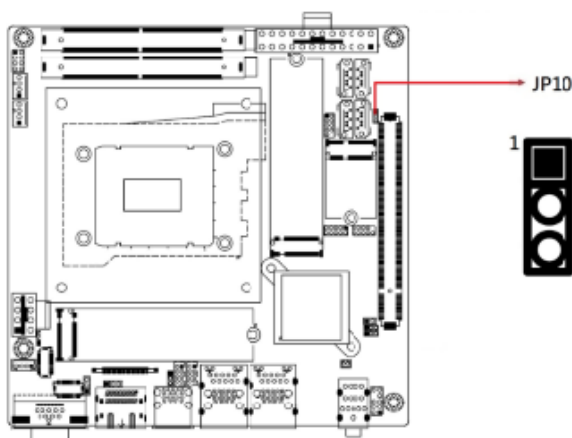
Function	Pin closed	Illustration
ATX Mode (default)	1-2	
AT Mode	2-3	

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

iBASE

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 (KTI226V)+ USB 3.2 Gen2 Port (USB Port with power control)
CN6	2.5G LAN (KTI226LM) + 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)
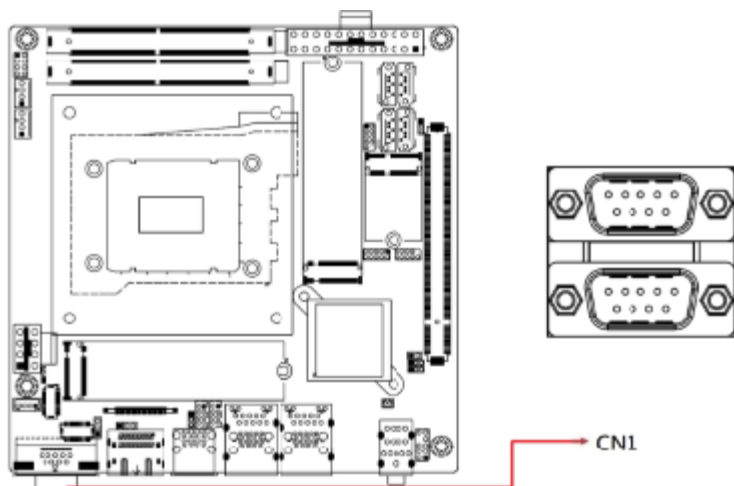
Remarks:
COM1 RS-232/422/485 is jumperless, configurable in BIOS.

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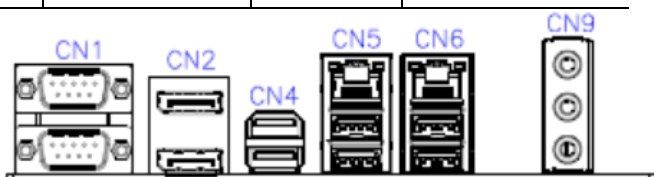
2.5.2   DP+ #1 / DP+ #2 (CN2) Stack Connector

CN2
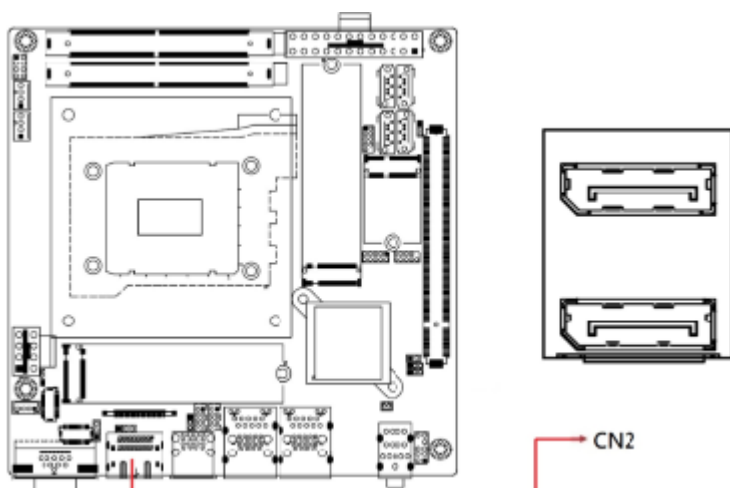
2.5.3   eDP 40-pin Connector (CN3)

40   1

CN3
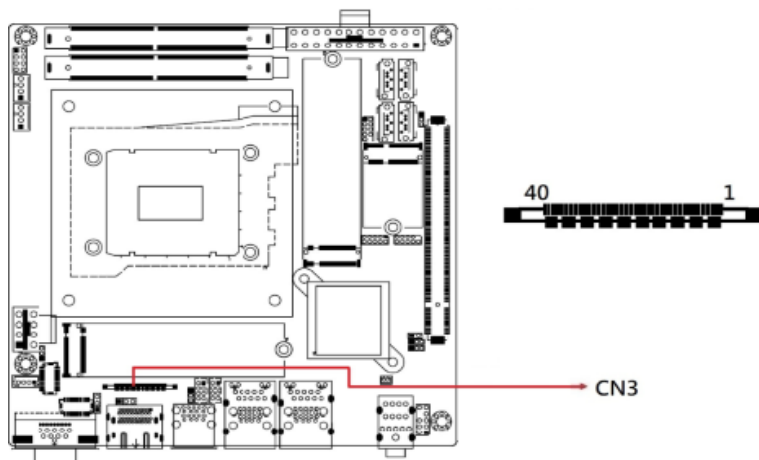
Remarks: KEL_SSL00-40S

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)
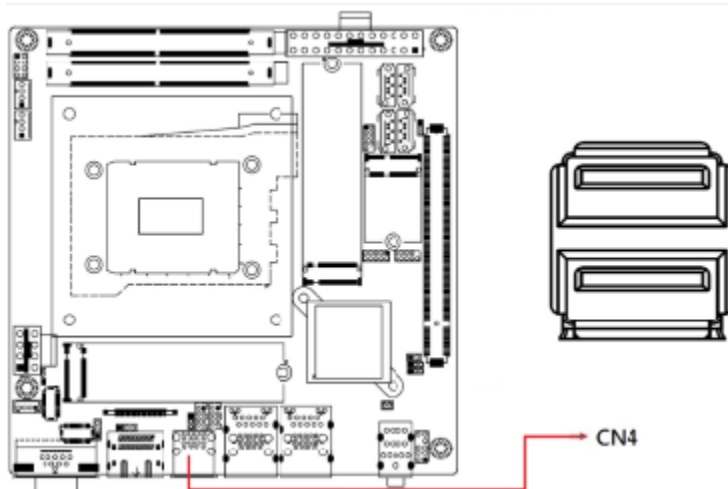
2.5.5   2.5G LAN (KTI226V) + USB 3.2 Gen2 (CN5)
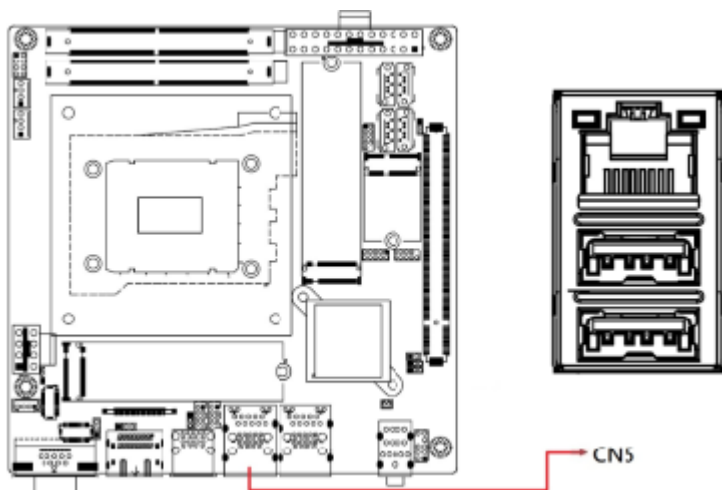
Remarks: USB Port with Power Control

2.5.6 2.5G LAN (KTI226LM) + USB 3.2 Gen2 (CN6)
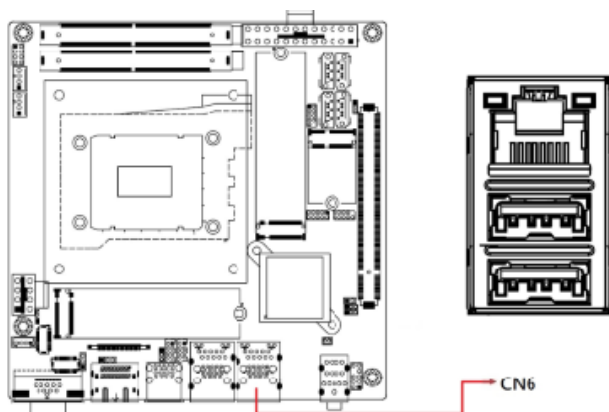
2.5.7 SATA Port (CN7, CN8, CN10, CN11)
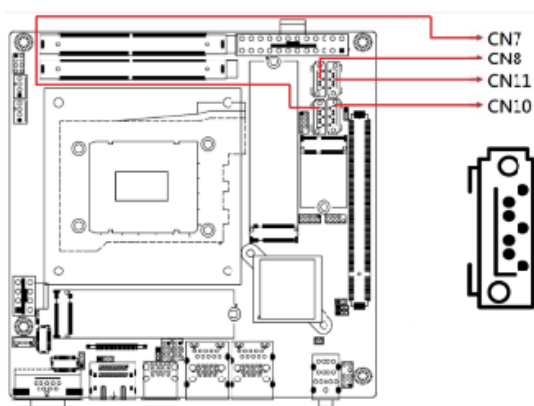
Pin	Signal Name
1	Ground
2	TX+
3	TX-
4	Ground
5	RX-
6	RX+
7	Ground

2.5.8 HD Audio Jacks (CN9)

CN9
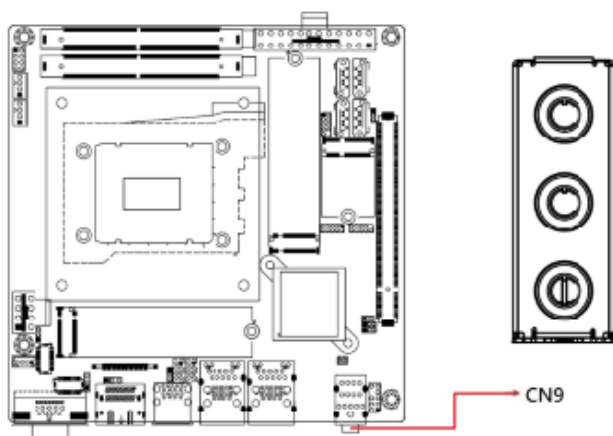
2.5.9 LVDS Backlight Connector (J2)

J2
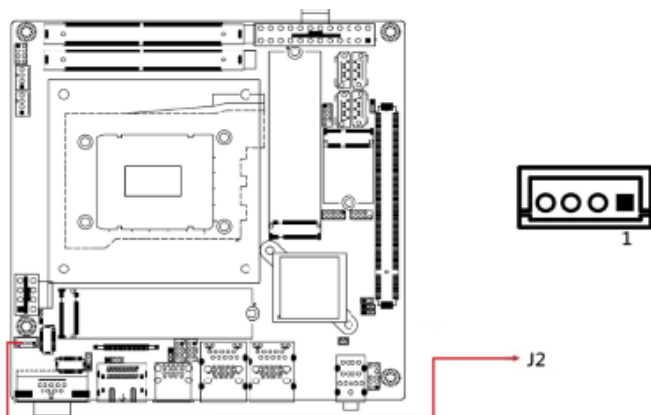
Remarks: E-CALL_0110-161-040

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)
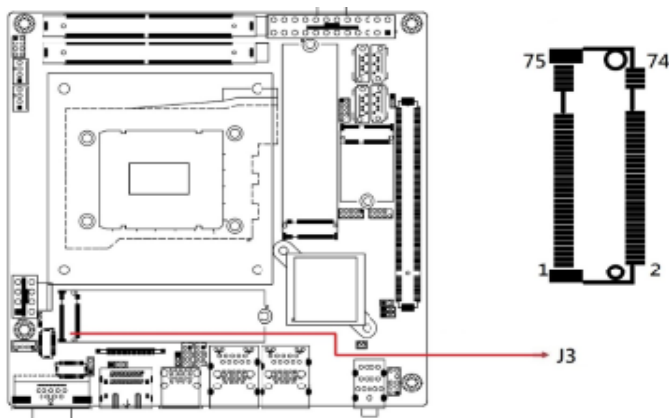
2.5.11 DDR5 SO-DIMM CHA/CHAB (J4 / J5)
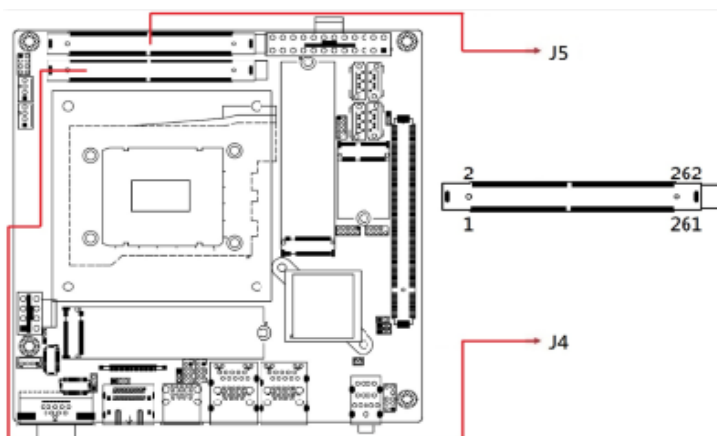
2.5.12   2-Port USB 2.0 Ports (J6, J7)
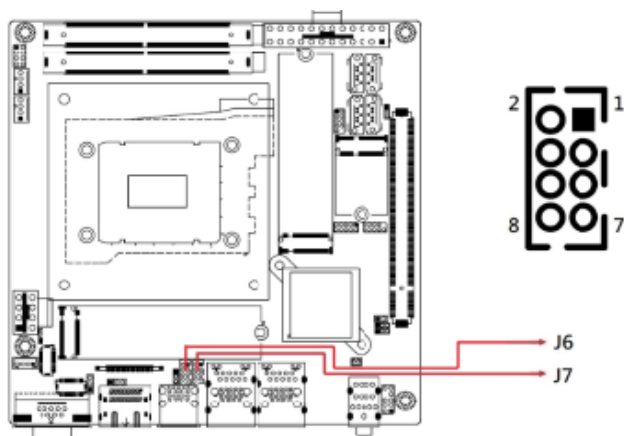
Pin	Signal Name	Pin	Signal Name
1	5VDUAL / 0.5A	2	GND
3	USB_PN	4	USB_PP
5	USB_PP	6	USB_PN
7	GND	8	5VDUAL / 0.5A

2.5.13   M.2 M-Key Socket (J8)
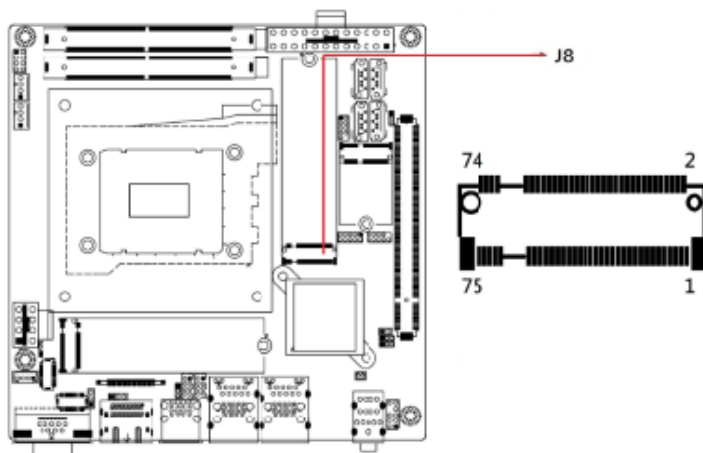
2.5.14   24-pin ATX Power Connector (J9)
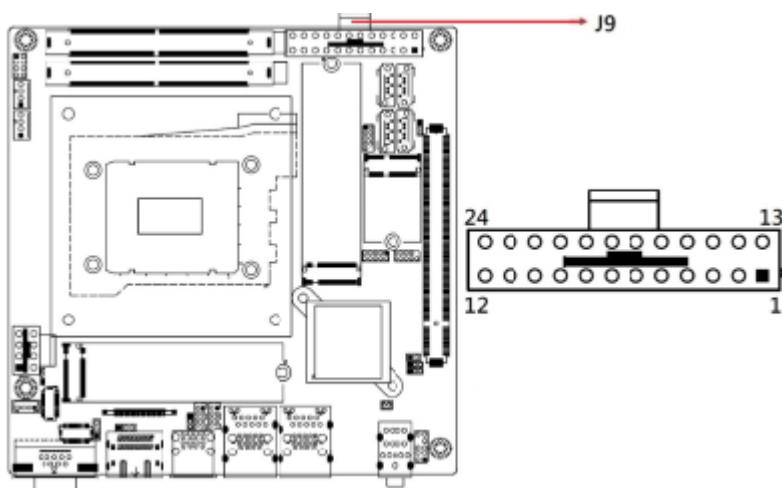
Pin	Signal	Pin	Signal
13	3.3V	1	3.3V
14	-12V	2	3.3V
15	Ground	3	Ground
16	PS-ON	4	+5V
17	Ground	5	Ground
18	Ground	6	+5V
19	Ground	7	Ground
20	-5V	8	Power good
21	+5V	9	5VSB
22	+5V	10	+12V
23	+5V	11	+12V
24	Ground	12	3.3V

2.5.15 eSPI Debug (Factory use only) (J10)
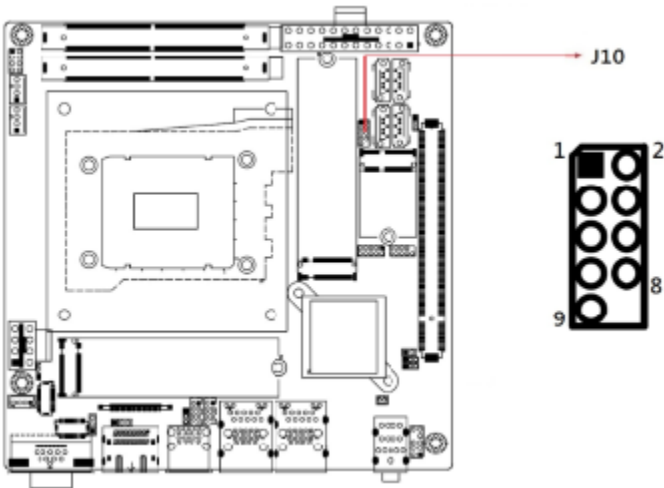
2.5.16 Digital I/O (4-in, 4-out) (J12)
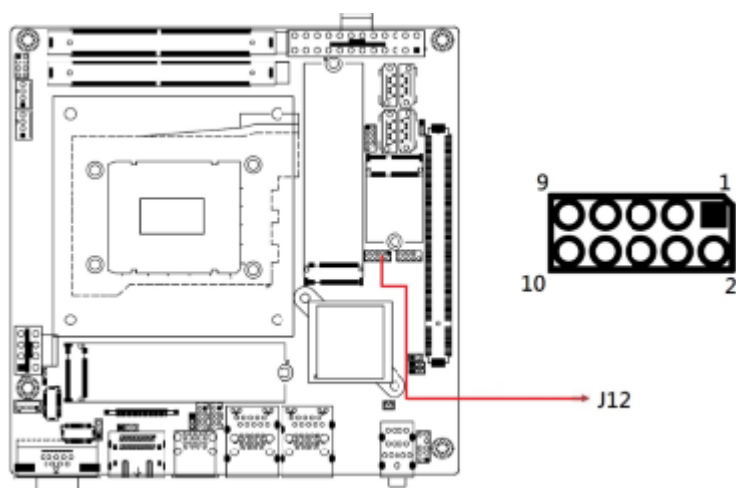
Remarks: E-CALL_0196-01-200-100

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)
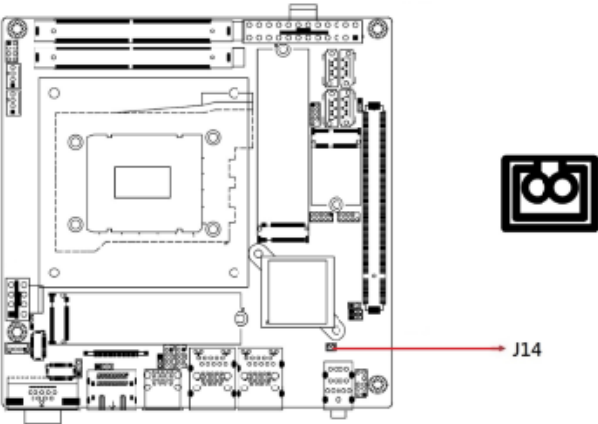
Note: Coin battery with cable.

Pin	Signal Name
1	+3V
2	Ground

2.5.18 M.2 E-Key (w/ Power Control) Socket (J15)
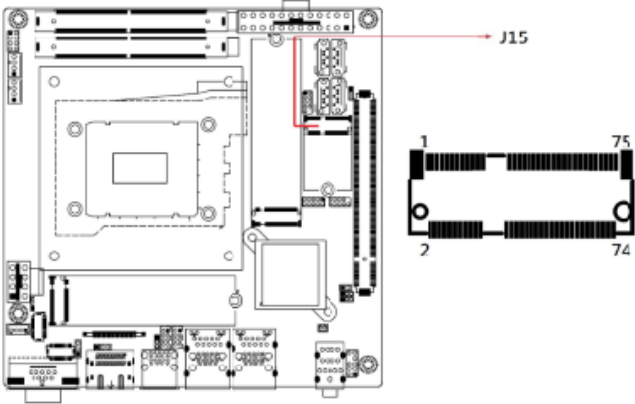
Remarks: J15 supports CNVi

2.5.19 SPI Flash Connector (Factory use only) (J16)
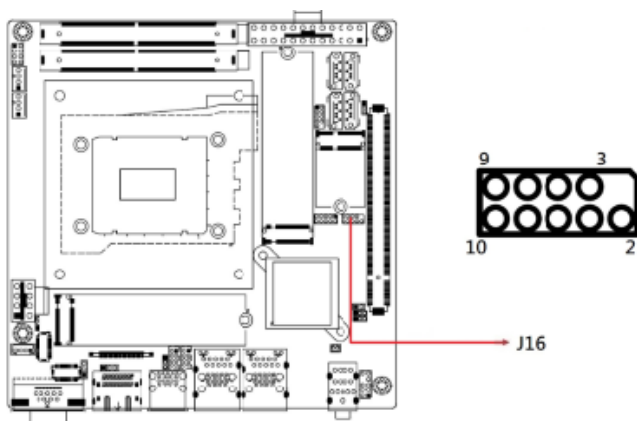
2.5.20 Audio Pin Header for Chassis Front Panel (J17)
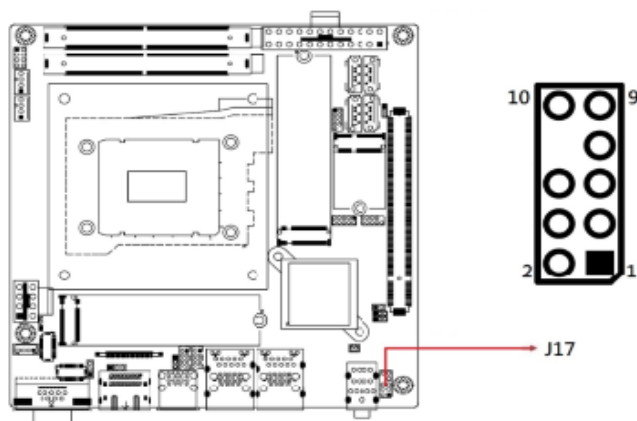
Remarks: E-CALL_0126-01-2821009

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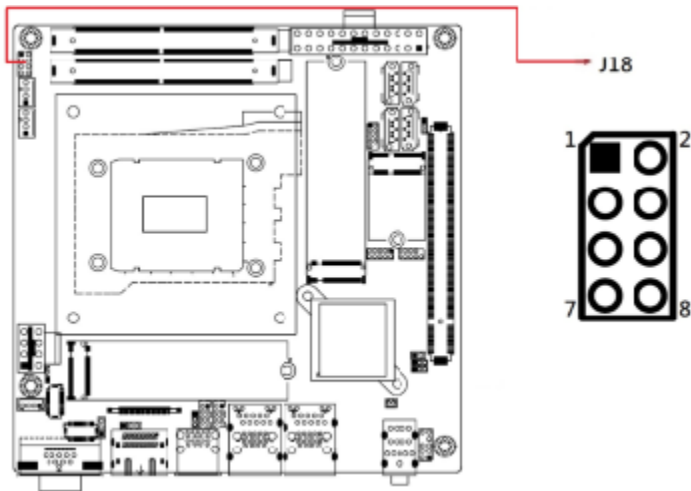
Pin	Signal	Pin	Signal
1	Power BTN-	2	Power BTN+
3	HDD LED+	4	HDD LED-
5	Reset BTN-	6	Reset BTN+
7	Power LED+	8	Power LED-

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)
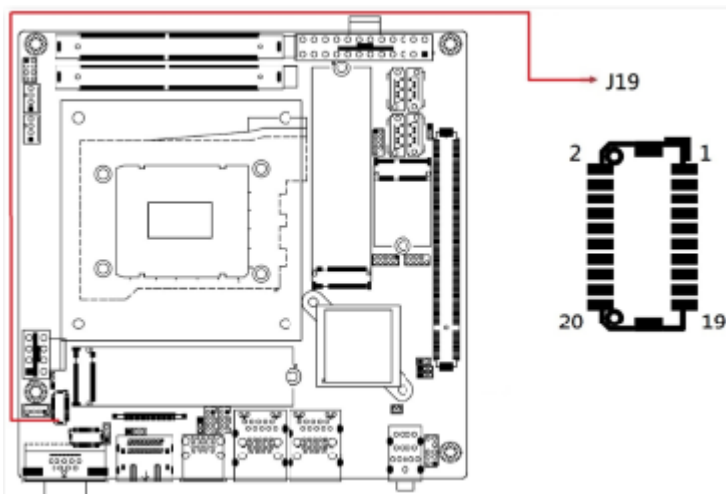
Remarks: HRS_DF20EG-20DP-1V(52)

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	LVSCKO_P	14	LVSCKO_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)
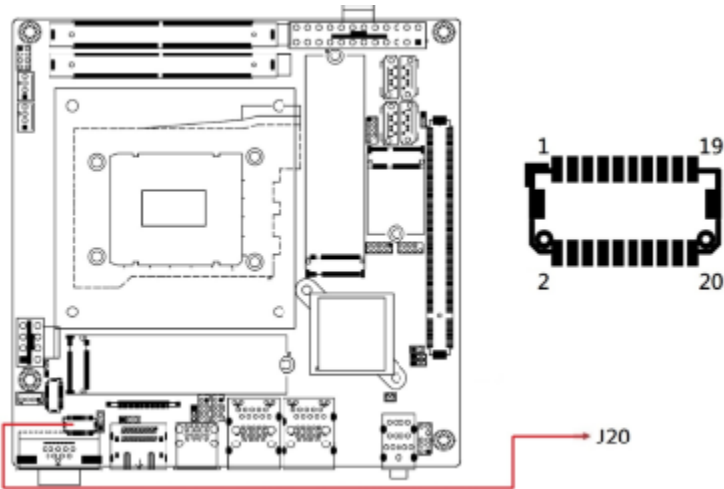
Remarks: HRS_DF20EG-20DP-1V(52)

Pin	Signal	Pin	Signal
1	LVSAE_P	2	LVSAE_N
3	Ground	4	Ground
5	LVSBE_P	6	LVSBE_N
7	Ground	8	Ground
9	LVSCE_P	10	LVSCE_N
11	Ground	12	Ground
13	LVSCKE_P	14	LVSCKE_N
15	Ground	16	Ground
17	LVSDE_P	18	LVSDE_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)
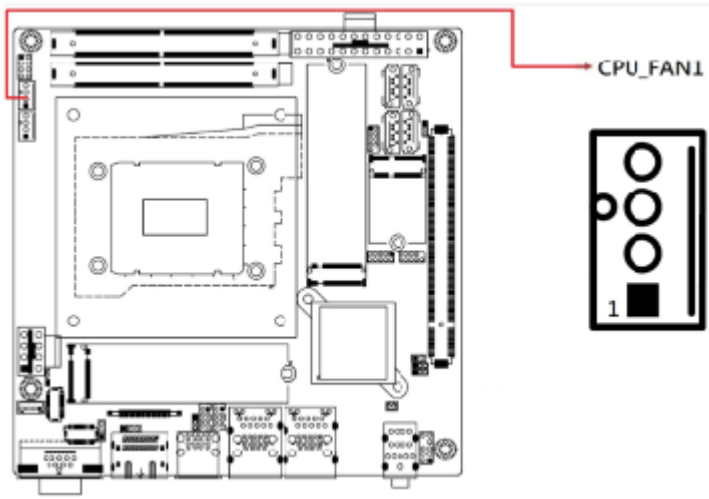
Remarks: PWM only.

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

2.5.25 System Fan Power Connector (SYS_FAN1)
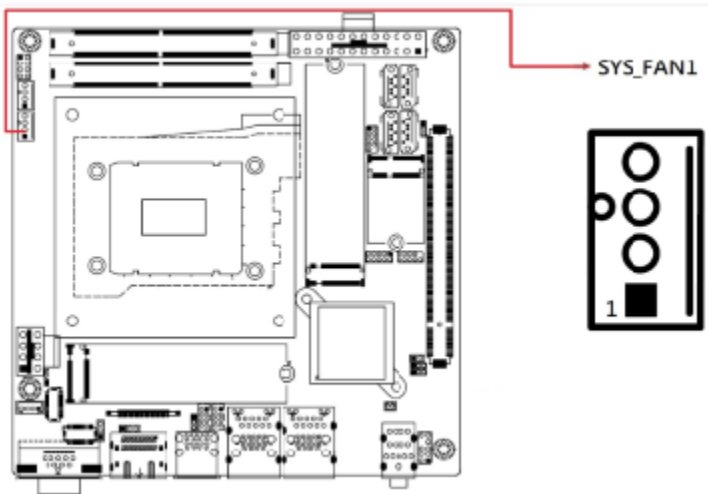
Remarks: PWM only.

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

2.5.26 ATX Power Connector for 12V Power (ATX_12V)
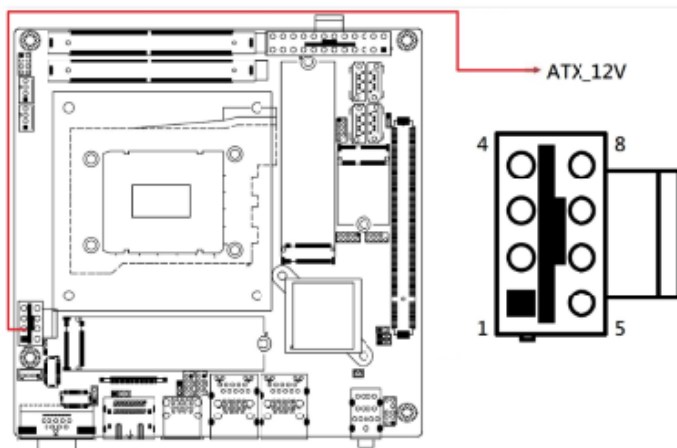
Remarks: This connector supplies the CPU operating voltage.

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)

iBASE
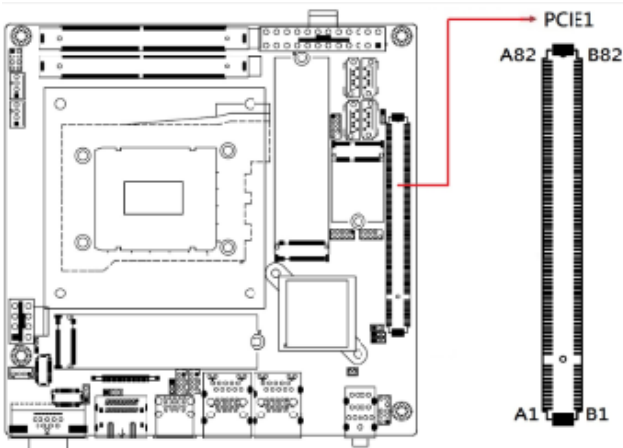
This page is intentionally left blank.

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 and drivers. The software and drivers are included with the motherboard. If you find anything missing, please contact the distributor where you made the purchase. The contents of this section include the following:

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.   Run the drivers disk. 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**.
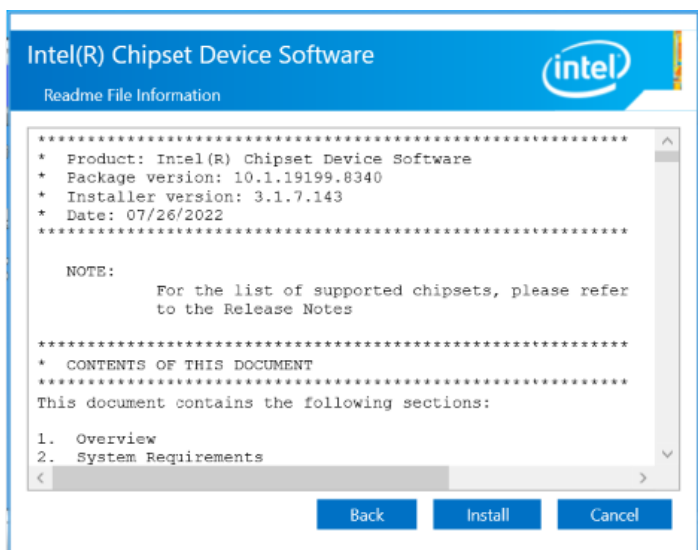
5. Press **Finish** to complete the setup process.

3.3 VGA Driver Installation

1. Run the drivers disk. 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**.

3. Click **I agree** to accept the INTEL SOFTWARE LICENSE AGREEEEMENT.

INTEL SOFTWARE LICENSE AGREEMENT

This SOFTWARE LICENSE AGREEMENT ("Agreement") forms a legally binding contract between you, or the company or other legal entity ("Legal Entity") for which you represent and warrant that you have the legal authority to bind that Legal Entity, (each, "You" or "Your") and Intel Corporation and its subsidiaries (collectively "Intel") regarding Your use of the Software. Intel and You are referred to herein individually as a "Party" or, together, as the "Parties".

By downloading, installing, copying or otherwise using the Software, You agree to be bound by the terms of this Agreement.
If You do not agree to the terms of this Agreement, do not download, install, copy or otherwise use the Software. You affirm that You are 18 years old or older or, if not, Your parent, legal guardian or Legal Entity must agree and enter into this Agreement on your behalf.

The Parties, in consideration of the mutual covenants contained in this

Cancel   I agree

4. Continue for the installer to start installing the new graphics driver…

intel. Graphics Driver Installer

— Pre-Install   Installing new graphics driver ...

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

Installation complete!

You need to restart your system in order to apply the driver changes.

Finish   Reboot now
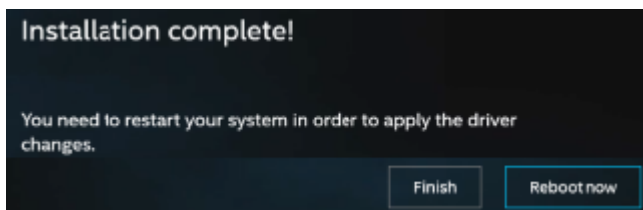
3.4　Realtek HD Audio Driver Installation

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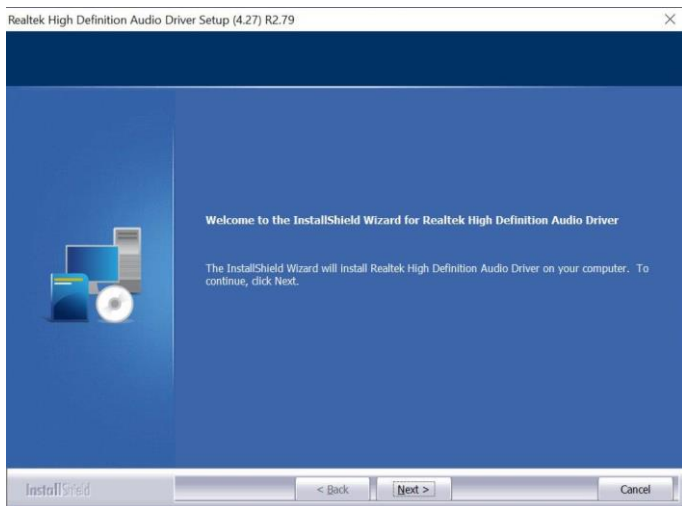
3. When the audio driver has been installed, click **Finish** to restart the computer.

3.5 LAN Drivers Installation

1. Run the drivers disk. 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.
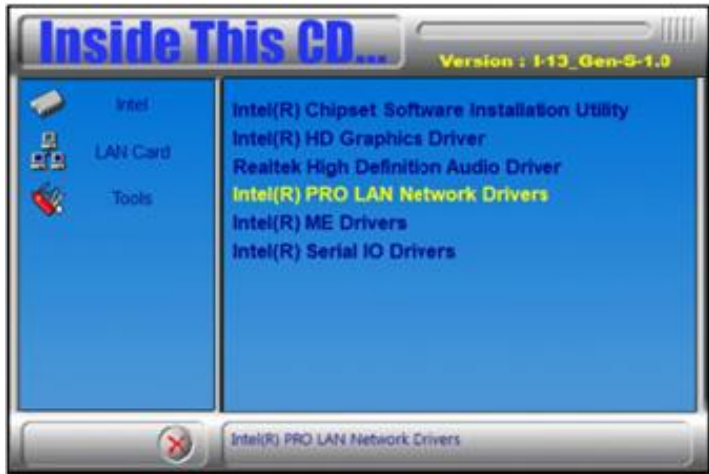
2. Click **Intel Drivers and Software**.

iBASE
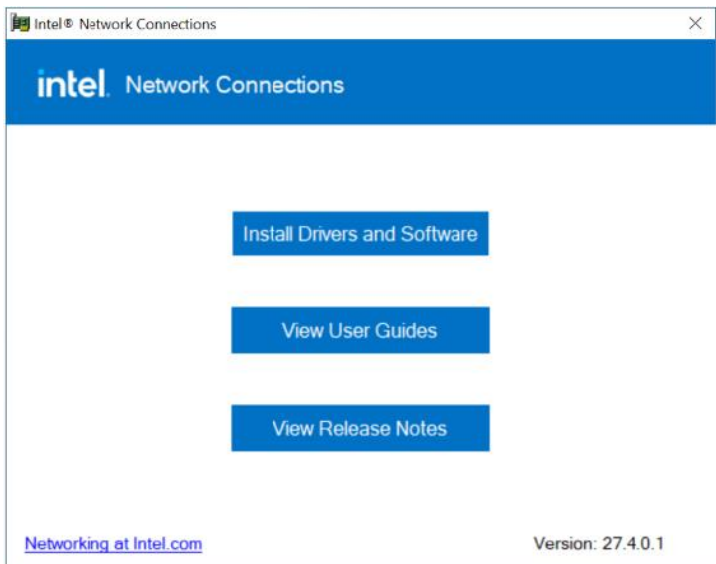
3. When the *Welcome to the install wizard for Intel(R) Nework Connection* screen appears, click **Next**. On the next screen, accept the terms in the License Agreement and click **Next**.

4. On the *Setup Options* screen, select the program features you want to be installed. Then click **Next** to continue.
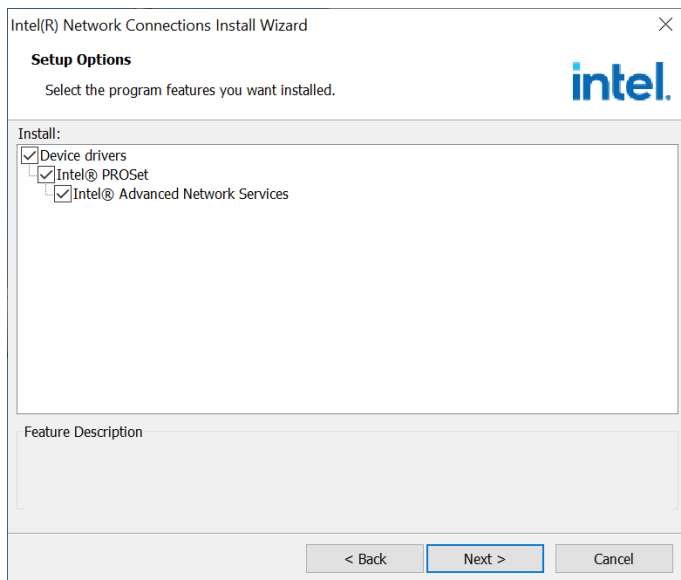
5. On the *Ready to Install the Program* screen, click **Install** to begin the installation.

6. When the *Install wizard Completed* screen appears, click **Finish**.

3.6 Intel® ME Drivers Installation

1. Run the drivers disk. 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**.

You are about to update the following product:

Intel® Management Engine Components 2249.3.39.0

It is strongly recommended that you exit all programs before continuing.
Click Next to continue, or click Cancel to exit the setup program.

Intel Corporation

< Back   Next >   Cancel
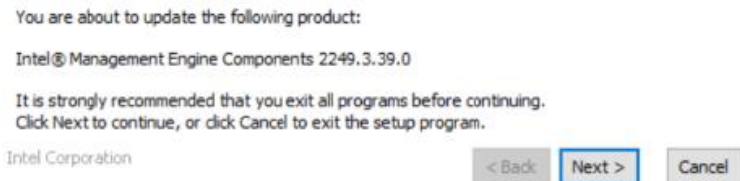
3. Accept the terms in the License Agreement and click **Next**.

4. On the next screen, click **Next** to install to the default folder.

5. Click **Finish** when the necessary components have been successfully installed.

You have successfully updated the following components:

- Intel® Management Engine Interface
- Serial Over LAN
- Intel® Wireless Manageability Driver
- Local Management Service
- Intel® Dynamic Application Loader
- Intel® Trusted Connect Service

This page is intentionally left blank.

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

iBASE

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.
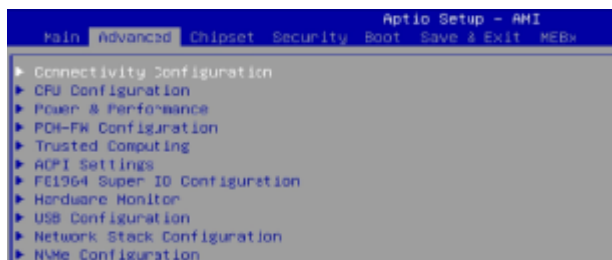
4.4.1 Connectivity Configuration

BIOS Setting	Description
CNVi Mode	This option configures Connectivity [Auto Detection] means that if Discrete solution is discovered it will be enabled by default. Otherwise Integrated solution (CNVi) will be enabled; [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 UARTO 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
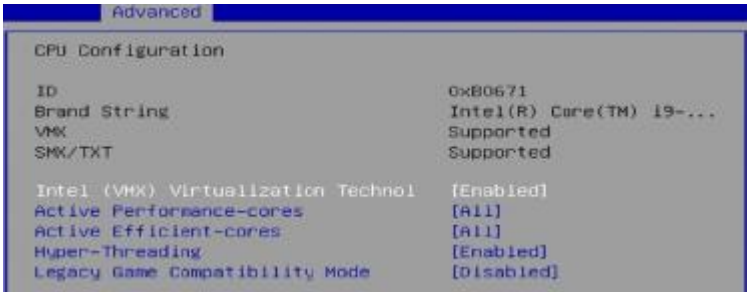
BIOS Setting	Description
Intel (VMX) Virtualization Technology	When enable, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Performance-cores Active Efficient-cores	Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores 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
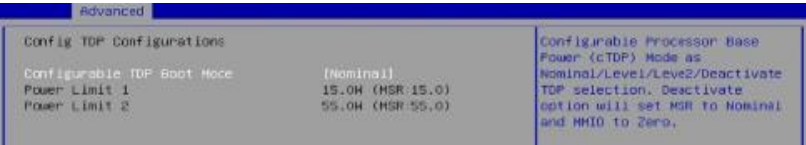
BIOS Setting	Description
CPU-Power Management Control	CPU – Power Management Control Options
Intel(R) SpeedStep	Allows more than two frequency ranges to be supported
Intel(R) Speed Shift Technology	Enable/Disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow 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.

```
Power & Performance

▶ CPU - Power Management Control
▶ GT - Power Management Control
```

```
GT - Power Management Control

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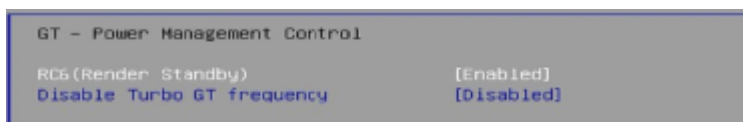
BIOS Setting	Description
GT-Power Management Control	GT – Power Management Control Options
RC6(Render Stanby)	Check to enable render standby support.
Disable Turbo GT frequency	Enabled: Disables Turbo GT frequency. Disabled: GT frequency is not limited.

iBASE

4.4.4   PCH-FW Configuration
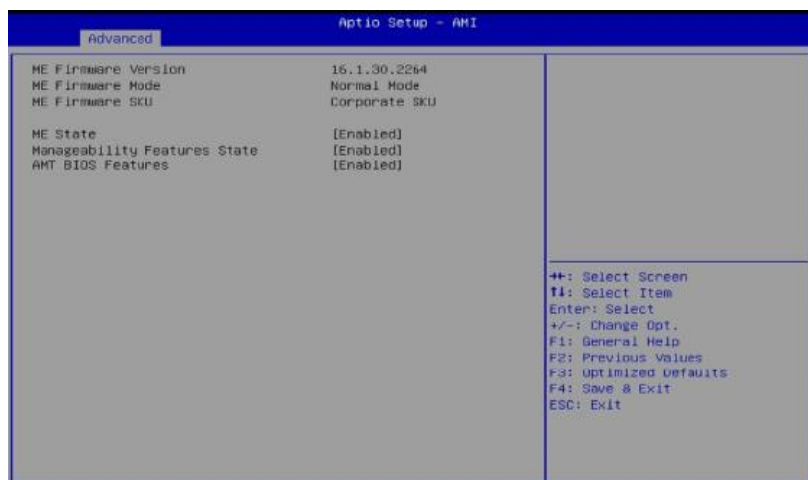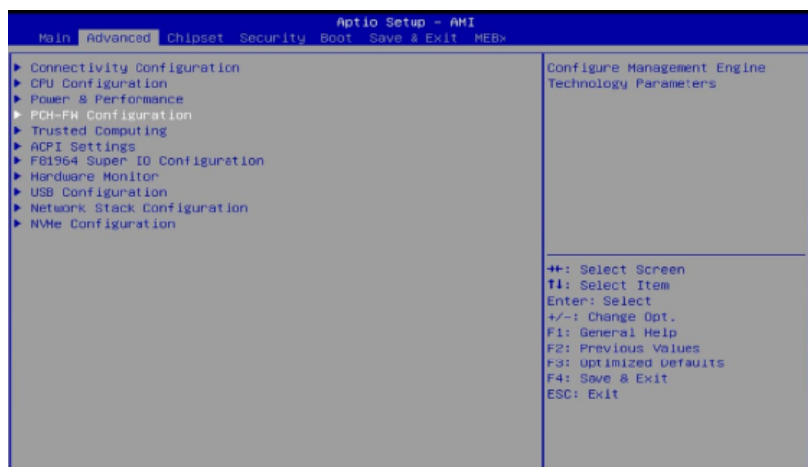
4.4.5 Trusted Computing

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 / SH3_256 PCR Bank	Option: Enabled / Disabled
Pending operation	Schedule an operation for the security device. Note: Your computer will reboot during restart in order to change state of security device.
Platform Hierarchy	Enables / Disables platform hierarchy.
Storage Hierarchy	Enables / Disables storage hierarchy.
Endorsement Hierarchy	Enables / Disables endorsement hierarchy.
Physical Presence Spec Version	Selects to show the PPI Spec Version (1.2 or 1.3) that the OS supports. **Note:** Some HCK tests might not support 1.3.
Device Select	• **TPM 1.2** will restrict support to TPM 1.2 devices only. • **TPM 2.0** will restrict support to TPM 2.0 devices only. • **Auto** will support both with the default being set to TPM 2.0 deices if not found, and TPM 1.2 device will be enumerated.

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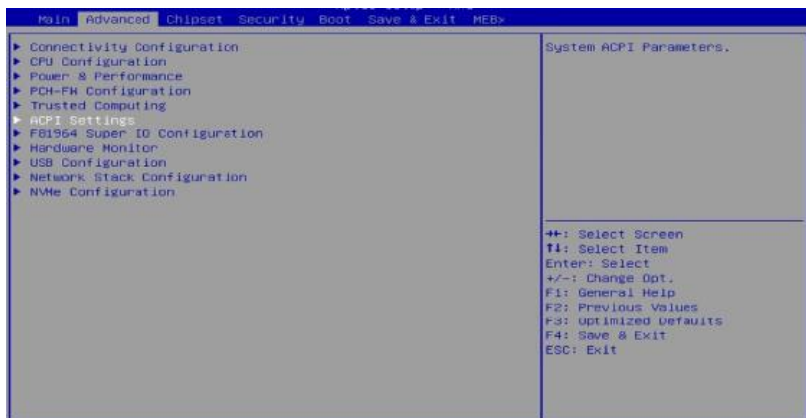
BIOS Setting	Description
Enable ACPI Auto Configuration	Enables / Disables BIOS ACPI Auto Configuration.
Enable Hibernation	Enables / Disables the system ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
ACPI Sleep State	Select the highest ACPI sleep state the system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

4.4.7   F81964 Super IO Configuration

BIOS Setting	Description
Serial Port Configuration	Sets parameters of Serial Ports. 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

```
F81964 Super IO Configuration

Super IO Chip                      F81964
► Serial Port 1 Configuration
► Serial Port 2 Configuration
```

```
Serial Port 2 Configuration

Serial Port                        [Enabled]
Device Settings                    IO=2F8h; IRQ=3;

Change Settings                    [Auto]



                          ─── Serial Port ───
                           Disabled
                           Enabled
```

```
Serial Port 2 Configuration

Serial Port                        [Enabled]
Device Settings                    IO=2F8h; IRQ=3;

Change Settings                    [Auto]

                      ─── Change Settings ───
                       Auto
                       IO=2F8h; IRQ=3;
                       IO=3F8h; IRQ=3,4,5,6,7;
                       IO=2F8h; IRQ=3,4,5,6,7;
                       IO=3E8h; IRQ=3,4,5,6,7;
                       IO=2E8h; IRQ=3,4,5,6,7;
```

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

BIOS Setting	Description
Legacy USB Support	• **Enabled** enables Legacy USB support. • **Auto** disables legacy support if there is no USB device connected. • **Disabled** keeps USB devices available only for EFI applications.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enables / Disables 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	The maximum time the device will take before it properly reports itself to the Host Controller. **Auto** uses default value for a Root port it is 100ms. But for a Hub port, the delay is taken from Hub descriptor.

4.4.10 Network Stack Configuration
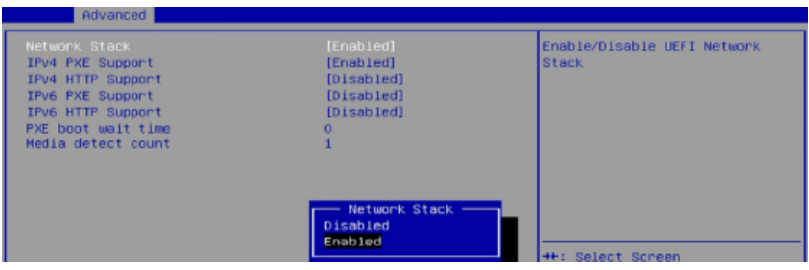
BIOS Setting	Description
Network Stack	Enables / Disables UEFI Network Stack.
IPv4 PXE Support	Enables / Disables IPv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created.
IPv4 HTTP Support	Enables / Disables IPv4 HTTP Boot Support. If disabled, Ipv4 HTTP boot option will not be created.
IPv6 PXE Support	Enables / Disables IPv6 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created.
IPv6 HTTP Support	Enables / Disables IPv6 HTTP Boot Support. 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

```
                          Aptio Setup - AMI
      Advanced

  NVMe Configuration

  No NVME Device Found




                                                        ++: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit


                 Version 2.22.1290 Copyright (C) 2023 AMI
```

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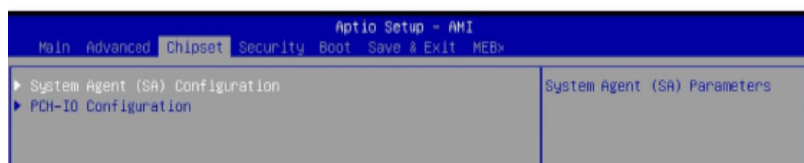
BIOS Setting	Description
System Agent (SA) Configuration	System Agent (SA) parameters
PCH-IO Configuration	PCH parameters

4.5.1   System Agent (SA) Configuration

4.5.1.1.   Memory Configuration

BIOS Setting	Description
Memory Configuration	Memory Configuration Parameters
Maximum Memory Frequency	Maximum Memory Frequency Selction in Mhz
ECC Support	Enable/disable DDR ECC Support
Max TOLUD	Maximum valude 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 Dispplay 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. **Note:** Above 4 GB MMIO BIOS assignment is automatically enabled when selecting 2048 MB aperture. To use this feature, disable CSM support.

```
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]
```
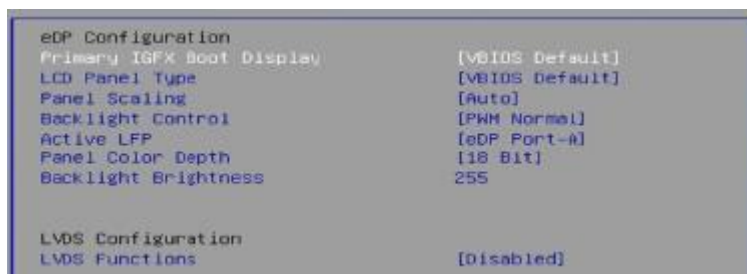
BIOS Setting	Description
LCD Control	LCD Control
Primary IGFX Boot Display	Select the video device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection VGA modes will be supported nly on primary display.
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 graphcs device.
Backlight Control	Back Light Control Setting

Active LFP	Select the Active LFP Configuration. No LVDS: VBIOS does not enable LVDS. Int-LVDS VBIOS enables LVDS driver by integrated encoder. SVDO LVDS: VBIOS enables LVDS driver by SDVO encoder. eDP Port-A: LFP drive ㄅby 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

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 ZP0DD 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 intstalled in PEI.)
X2APIC Opt Out	Options: Enabled/Disabled
DMA control Guarantee	Options: Enabled/Disabled
Above 4GB MMIO BIOS Assignment	Options: Enabled/Disabled This is enable automatically when Aperture Size is set to 2040MB.

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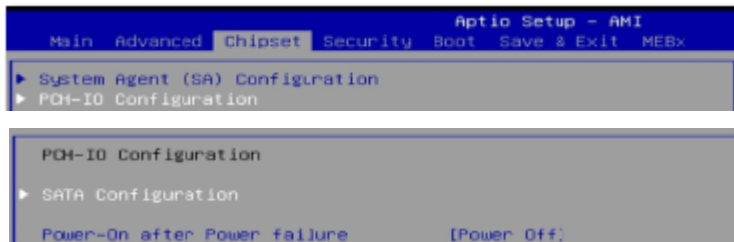
BIOS Setting	Description
PCH-IO Configuration	PCH Parameters
SATA Configuration	SATA Devices Options Settings
Power-On After Power Failure	Specify what state to go to when power is re-applied after a power failure (G3 state)

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
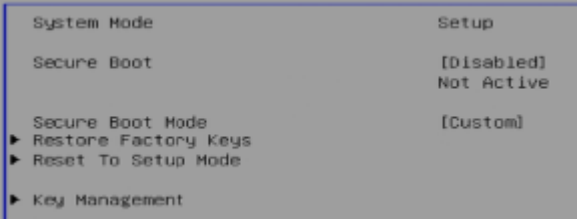
BIOS Setting	Description
Secure Boot	Secure Boot feature is Active if Secure Boot is enabled. Platform Key (PK) Is enrolled and the system is in User mode. The mode change requires platform reset.
Secure Boot Mode	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot policy variables 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. 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
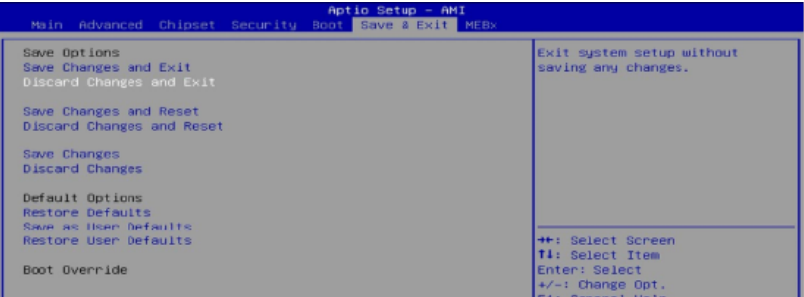
BIOS Setting	Description
Save Changes and Exit	Exits system setup after saving the changes.
Discard Changes and Exit	Exits system setup without saving any changes.
Save Changes and Reset	Resets the system after saving the changes.
Discard Changes and Reset	Resets system setup without saving any changes.
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
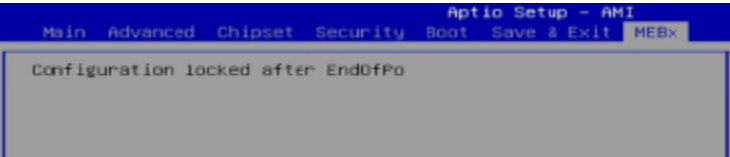
Appendix

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();
}
```

iBASE

```
//-------------------------------------------------------------------------
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	J13	Hao Guo Xing Ye DF11-8S-PA66H	Hirose DF11-8DS-2C
SATA Power Connector	J19	Hao Guo Xing Ye WAFER25-104S-2442-ST	AMP 171822-4
Digital I/O Connector	J8	E-CALL E-CALL_0196-01-200-100	Dupont 10P 2.0 mm-pitch (female)
Front Panel Connector	J18	E-CALL 0126-01-203-080	Dupont 8P 2.54 mm-pitch (female)
Audio Connector	J20	E-CALL 0126-01-2821009	Dupont 10P 2.54 mm-pitch (female)
Fan Power Connectors	CPU_FAN1 SYS_FAN1	TechBest W2-03I104132S1WT(A)-L	Molex 47054-1000
LCD Backlight Connector	J18	E-CALL 0110-161-040	JST PHR-4
LVDS Connectors	J19, J20	Hirose DF20EG-20DP-1V	Hirose 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