SI-664 / SI-664-N

Intel® Core™ Ultra Series 1 Digital Signage Player with Four HDMI Outputs

User's Manual

Version 1.0
(November 2026)

iBASE

Copyright

© 2026 IBASE Technology, Inc. All rights reserved.
No part of this publication may be reproduced, copied, stored in a retrieval system, translated into any language, or transmitted in any form or by any means, whether electronic, mechanical, photocopying, or otherwise, without the prior written consent of IBASE Technology, Inc. (hereinafter referred to as “IBASE”).

Disclaimer

IBASE reserves the right to make changes and improvements to the products described in this document without prior notice. Every effort has been made to ensure that the information in this document is accurate; however, IBASE does not guarantee that it is error-free. IBASE assumes no liability for incidental or consequential damages arising from the misuse of or inability to use the product or the information contained herein, or for any infringement of third-party rights resulting from such use.

Trademarks

All trademarks, trade names, and brand names mentioned herein are used for identification purposes only and are the property of their respective owners.

Compliance

CE

In a domestic environment, this product may cause radio interference, in which case users may be required to take appropriate measures.

FC

This equipment has been tested and found to comply with the limits for a Class B digital 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 the 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 Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU. Instead, it should be taken to a designated collection point for recycling. Check local regulations for disposal of electronic products.

Green IBASE



This product complies with the EU Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU, as amended by Directive (EU) 2015/863. The following substances are restricted to concentrations not exceeding 0.1% by weight (1,000 ppm), except for cadmium, which is limited to 0.01% by weight (100 ppm), unless an applicable exemption applies.

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr6+)
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)
- Bis(2-ethylhexyl) phthalate (DEHP)
- Butyl benzyl phthalate (BBP)
- Dibutyl phthalate (DBP)
- Diisobutyl phthalate (DIBP)

iBASE

Important Safety Information

Carefully read the following precautions before using the device.

Environmental conditions:

- Place the device horizontally on a stable, solid surface to prevent it from falling and causing damage.
- Leave sufficient space around the device and do not block the ventilation openings. Do not drop or insert any objects into the ventilation openings.
- Operate this product at ambient temperatures between 0˚C and 45˚C.
- Do not store this device at temperatures below -20° C or above 80°C. This could damage the device. The device must be used in a controlled environment.

Care for your IBASE products:

- Before cleaning the device, turn it off and disconnect all cables, including the power cable, to prevent electrical hazards.
- Use a soft cloth dampened with a neutral cleaning agent or diluted alcohol to clean the device chassis. Then wipe it with a dry cloth.
- Remove dust using a computer vacuum cleaner to prevent the ventilation openings from becoming clogged.



WARNING

Attention during use:

- Do not place heavy objects on top of the device.
- Operate this device only with the power source specified on the product label. If you are not sure of the type of power available, consult your distributor or local power company.
- Do not walk on the power cord or allow anything to rest on it.
- If using an extension cord, ensure that the total current rating of all connected devices does not exceed the cord's rated capacity.

Avoid Disassembly

Do not disassemble, repair, or modify the device. Doing so may create safety hazards, damage the device, cause personal injury or property damage, and void the warranty.

⚠ WARNING	
• **INGESTION HAZARD:** This product contains a coin/button cell battery (BR-2450A). • **DEATH or serious injury can occur if ingested.** • A swallowed button cell or coin battery can cause **internal chemical burns in as little as 2 hours.** • **KEEP new and used batteries OUT OF REACH OF CHILDREN.** • **Seek immediate medical attention** if a battery is swallowed or suspected to be swallowed or inserted into any part of the body.	

BATTERY SAFETY INSTRUCTIONS

- Remove and immediately recycle or dispose of used batteries in accordance with local regulations and keep them away from children. Do NOT dispose of batteries in household trash or incinerate.
- Even used batteries may cause severe injury or death.
- Call a local poison control center for treatment information if battery ingestion is suspected.
- Compatible Battery Models/Types: BR-2450A or equivalent lithium coin cell.
  Nominal Voltage: 3V.
- Non-rechargeable batteries are not to be recharged.
- Do not force discharge, recharge, disassemble, or expose to temperatures outside the specified range, or incinerate. Doing so may result in injury due to venting, leakage, or explosion resulting in chemical burns.
- Ensure the battery is installed correctly according to polarity (+ and −).
- Do not mix old and new batteries, or different brands or types of batteries.
- Remove and immediately recycle or dispose of batteries from equipment not used for an extended period of time in accordance with local regulations.
- Always securely close the battery compartment. If the battery compartment does not close securely, stop using the product, remove the batteries, and keep them away from children. Battery replacement shall only be performed by qualified service personnel.

CAUTION:

- Lithium Battery Caution: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type. Dispose of batteries according to the manufacturer's instructions.
- Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery, may result in an explosion.
- Leaving a battery in an extremely high temperature environment may result in an explosion or leakage of flammable liquid or gas.
- A battery subjected to extremely low air pressure may result in an explosion or leakage of flammable liquid or gas.

ATTENTION:

Risque d'explosion si la batterie est remplacée par un type incorrect. Mettre au rebut les batteries usagées selon les instructions.

BATTERY REPLACEMENT INSTRUCTIONS (For Qualified Service Personnel Only)

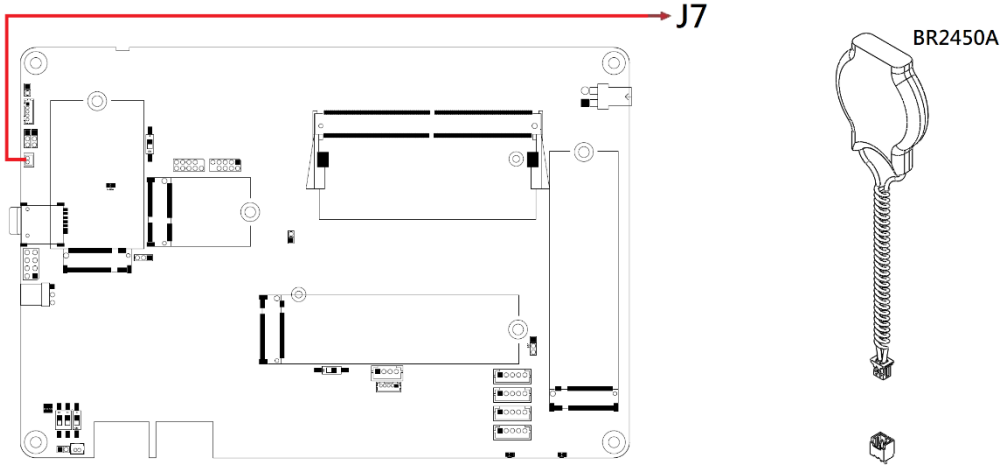
- To change the battery, proceed as follows:

1. Gently pull the battery cable connector straight up to disconnect it from the motherboard socket.

2. Remove the existing BR-2450A battery assembly.

3. Align and plug the new BR-2450A wired lithium battery connector into the socket, ensuring the correct orientation.

4. Ensure the battery connector is securely connected before turning on/operating the system.



Warranty Policy

- **IBASE standard products:**

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

- **3rd-party parts:**

  A 12-month (1-year) warranty applies from the date of delivery to third-party components not manufactured by IBASE.

* Products that fail due to misuse, accidents, improper installation, or unauthorized repairs are not covered by the warranty. Customers will be responsible 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 require further assistance from your distributor or sales representative, prepare the following product information and a detailed description of the problem.

   - Product model name
   - Product serial number
   - Detailed description of the problem
   - Error messages, if any, in text or screenshots
   - Peripheral device configuration
   - Software in use, including the operating system, applications, and version numbers

3. If repair service is required, visit the eRMA page on the IBASE website and follow the instructions to obtain RMA authorization, or contact your distributor or sales representative for assistance.

iBASE

Table of Contents

Compliance iii

Important Safety Information iv

WARNING iv

Warranty Policy vii

Technical Support & Services vii

Chapter 1 General Information 1

1.1 Introduction 2
1.2 Features 2
1.3 Packing List 3
1.4 Specifications 3
1.5 Product View 6
1.6 Dimensions 11

Chapter 2 Hardware Installation & Motherboard Information 12

2.1 Installation / Replacement 13
2.1.1 Memory Installation 16
2.1.2 M.2 Card Installation 17
2.1.3 WiFi / 4G / 5G Antenna Installation 18
2.2 Setting the Jumpers 19
2.3 Jumper & Connector Locations 20
2.3.1 Jumper and Switch Quick Reference 21
2.3.2 JP2: Clear RTC Setting 21
2.3.3 JP3: Clear CMOS Setting 22
2.3.4 JP4: M.2 B-key Select (Sierra interface) 22
2.3.5 SW3: AT/ATX Mode Select 23
2.3.6 SW4: Bypass EDID Setting 23
2.4 Connector Quick Reference 24
2.4.1 CN5: COM1 Port 25
2.4.2 CN13: DC-IN (+12V) 25
2.4.3 J7: Battery Header 26
2.4.4 J8: SPI Flash Header 26
2.4.5 J9: ESPI Debug Header 27
2.4.6 J10: M.2 E-key 27
2.4.7 J11: Flash Descriptor Security Override 28

2.4.8 J12: M.2 B-key 29
2.4.9 J13: Front Panel Signal Connector 29
2.4.10 J15, J21: M.2 M-key Slots 30
2.4.11 FAN1: Fan Connector (reserved) 30

Chapter 3 Driver Installation 31

3.1 Introduction 32
3.2 Intel® Chipset Software Installation Utility 32
3.3 HD Graphics Driver Installation 34
3.4 Realtek HD Audio Driver Installation 35
3.5 Realtek Audio DCH Driver Installation 36
3.6 LAN Drivers Installation 37
3.7 Intel® ME Drivers Installation 38
3.8 Intel® Serial I/O Drivers Installation 39
3.9 Intel® PMT Installation 40
3.10 Intel® NPU IO Installation 41

Chapter 4 BIOS Setup 42

4.1 Introduction 43
4.2 BIOS Setup 43
4.3 Main Settings 44
4.4 Advanced Settings 45
4.4.1 CPU Configuration 46
4.4.2 Power & Performance 47
4.4.3 PCH-IO Configuration 48
4.4.4 PCH-FW Configuration 49
4.4.5 Trusted Computing 50
4.4.6 ACPI Settings 51
4.4.7 iSmart Controller 52
4.4.8 F8196x Super IO Configuration 53
4.4.9 F8196x Hardware Monitor 54
4.4.10 USB Configuration 55
4.4.11 Network Stack Configuration 56
4.4.12 NVMe Configuration 57
4.4.13 EDID Bypass Control 58
4.4.14 HDMI CEC Configuration 59
4.5 Security Settings 60
4.6 Boot Settings 62
4.7 Save & Exit Settings 63

Appendix 64

A. I/O Port Address Map.....65
B. Interrupt Request Lines (IRQ) 67
C. Watchdog Timer.....68
D. USB Power Control Mapping 72

Chapter 1
General Information

The information provided in this chapter includes:

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

1.1 Introduction

The SI-664 and SI-664-N are digital signage players powered by Intel® Core™ Ultra Series 1 processors (Meteor Lake). The SI-664 features H-series processors with active cooling, while the SI-664-N features U-series processors in a fanless design. Both models feature three HDMI 2.0b outputs and one HDMI 2.1 output with independent audio, supporting versatile multi-display applications. Both models support dual-channel DDR5-5600 memory up to 96 GB, hardware EDID emulation, and HDMI-CEC. Equipped with iSMART intelligent energy-saving technology, TPM 2.0, and a watchdog timer, it provides efficient and reliable operation. Optional Intel® vPro® and out-of-band management support further enhance its suitability for commercial and industrial digital signage applications.



1.2 Features

- Intel® Core™ Ultra Processors Series 1 (Meteor Lake)
- 2x DDR5-5600 SO-DIMM, dual channel, Max. 96GB
- 3x HDMI 2.0b, 1x HDMI 2.1 with independent audio output
- iSMART intelligent energy-saving technology - enables power on/off scheduling and power resume functions
- Built-in hardware EDID emulation function
- HDMI-CEC and Observer remote monitoring technologies
- 1x M.2 B-key (3052) for 5G
- 1x M.2 E-key (2230) for WiFi, Bluetooth
- TPM 2.0 and watchdog timer
- Optional Intel® vPro® platform support
- Supports OOB function via I210IT LAN port (optional)
- Supports PDPC (Peripheral Device Power Control) function

1.3 Packing List

Your product package should include the items listed below.

- SI-664 / SI-664-N Digital Signage Player
- Power Adapter
- Power Cord

1.4 Specifications

Product	SI-664
Model	**Configuration**
SI-664-65HTB	Intel® Core™ Ultra 7 165H Processor, 2 × 8GB DDR5 SO-DIMM, M.2 2280 256GB storage, 120W power adaptor, TPM and OOB functions
SI-664-65HT	Intel® Core™ Ultra 7 165H Processor, 2 × 8GB DDR5 SO-DIMM, M.2 2280 256GB storage, 120W power adaptor and TPM function
SI-664-65H	Intel® Core™ Ultra 7 165H Processor, 2 × 8GB DDR5 SO-DIMM, M.2 2280 256GB storage and 120W power adaptor
SI-664-25HTB	Intel® Core™ Ultra 5 125H Processor, 2 × 8GB DDR5 SO-DIMM, M.2 2280 256GB storage, 120W power adaptor, TPM and OOB functions
SI-664-25HT	Intel® Core™ Ultra 5 125H Processor, 2 × 8GB DDR5 SO-DIMM, M.2 2280 256GB storage, 120W power adaptor and TPM function
SI-664-25H	Intel® Core™ Ultra 5 125H Processor, 2 × 8GB DDR5 SO-DIMM, M.2 2280 256GB storage and 120W power adaptor

Product	SI-664-N
Model	**Configuration**
SI-664-N65UTB	Intel® Core™ Ultra 7 165U Processor, 2x 8GB DDR5 SO-DIMM, M.2 2280 256GB storage and 120W power adaptor with TPM and OOB function
SI-664-N65UT	Intel® Core™ Ultra 7 165U Processor, 2x 8GB DDR5 SO-DIMM, M.2 2280 256GB storage and 120W power adaptor with TPM function
SI-664-N65U	Intel® Core™ Ultra 7 165U Processor, 2x 8GB DDR5 SO-DIMM, M.2 2280 256GB storage and 120W power adaptor
SI-664-N25UTB	Intel® Core™ Ultra 5 125U Processor, 2x 8GB DDR5 SO-DIMM, M.2 2280 256GB storage and 120W power adaptor with TPM and OOB function
SI-664-N25UT	Intel® Core™ Ultra 5 125U Processor, 2x 8GB DDR5 SO-DIMM, M.2 2280 256GB storage and 120W power adaptor with TPM function
SI-664-N25U	Intel® Core™ Ultra 5 125U Processor, 2x 8GB DDR5 SO-DIMM, M.2 2280 256GB storage and 120W power adaptor

SI-664 / SI-664-N System	
Mainboard	MBD664
CPU	Intel® Core™ Ultra 7/5 Processors
CPU Socket	FCBGA2049
Chipset	Integrated
Memory	2x SO-DIMM DDR5 5600 MHz, Max. 96GB
Graphics	SI-664: Intel® Arc™ Graphics SI-664-N: Intel® Graphics
LAN Controller	1x 2.5 Gb LAN 1x 1.0 Gb LAN with optional OOB/In-band support
Expansion Slots	2x M.2 M-key (2280) for storage 1x M.2 E-key (2230) for WiFi, Bluetooth 1x M.2 B-key (3052) for 5G/LTE 1x SIM card slot
I/O Interface	1x HDMI 2.1 + 3x HDMI 2.0b 4x USB 3.1 (including 1x PDPC function) 2x RJ45 LAN ports 1x DB9 for RS-232 serial port 1x 2-pin header for SYS on/off control cable 1x Audio connector for Line-out 1x Power button 1x Power jack (+12V DC) 2x LEDs for Power & Storage
Watchdog Timer	256 segments, 0, 1, 2…255 (sec/min)
Power Requirement	+12V DC
Construction	Aluminum + SGCC
Weight	2 kg (4.4 lbs)
Chassis Color	Black & White
Power Supply	120W power adaptor
Mounting	Standard system bracket
Dimensions	220mm(W) x 137mm(D) x 46.5mm(H)
Certificate	CE, FCC Class B, cULus
Operating System	Windows 11 IoT Enterprise LTSC, Linux Ubuntu 64-bit

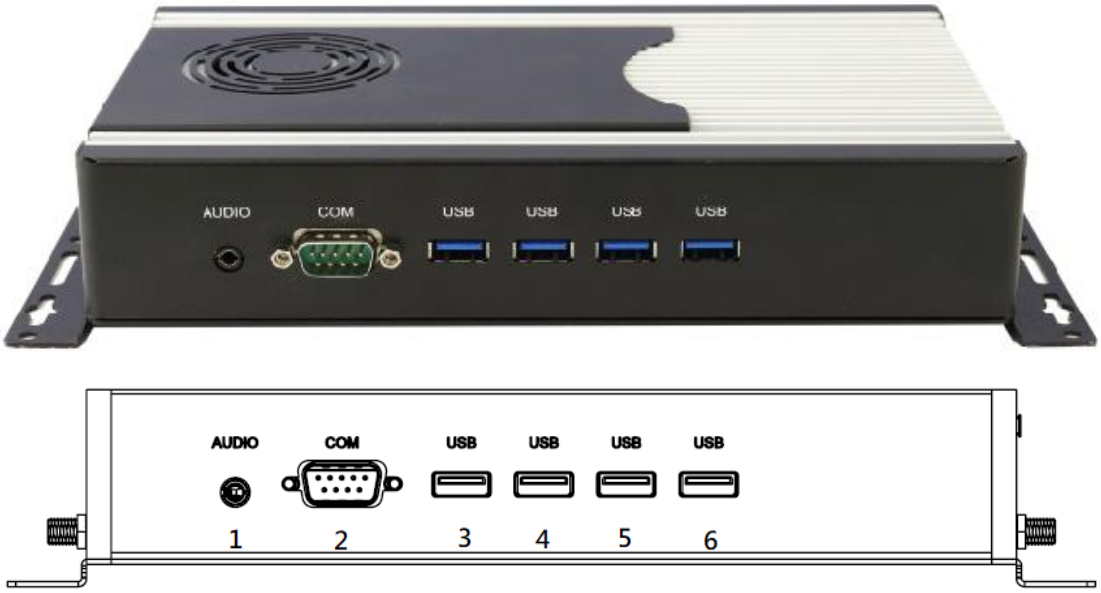
Environment	
Temperature	• Operating: 0°C ~ 45°C (32°F ~ 113°F) • Storage: -20°C ~ 80°C (-4°F ~ 176°F)
Relative Humidity	10% ~ 90% (non-condensing)
Vibration Protection	1Grms / 3 ~ 500Hz / Random operation

All specifications are subject to change without prior notice.

Note: Product performance depends on the overall system configuration, including the processor, graphics, memory and storage bandwidth, and digital signage application software.

1.5 Product View

Front View

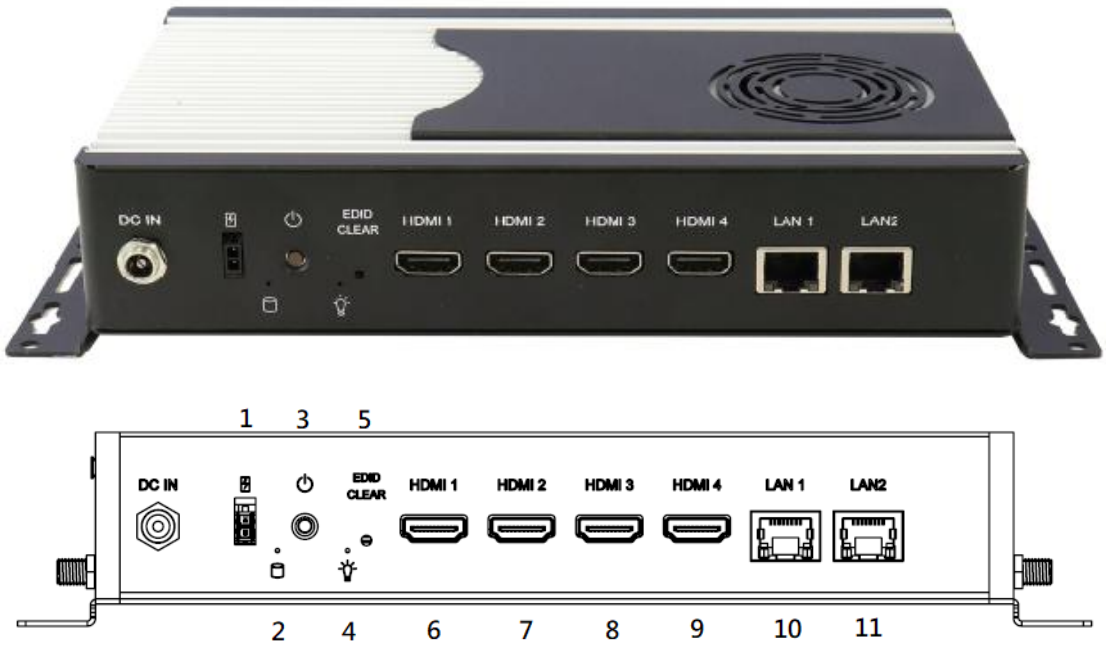


No.	Function	No.	Function
1	Line-Out Jack (J1)	4	USB 3.1 Connector (CN3)
2	COM1 Connector (CN5)	5	USB 3.1 Connector (CN2)
3	USB 3.1 Connector (CN4)	6*	USB 3.1 Connector (CN1)

Note1: The front and rear views shown are for reference only and illustrate the SI-664 model with a cooling fan.

Note2: CN1 supports PDPC.

Rear View



No.	Function	No.	Function
1	Power Button CONN(J4)	7	HDMI 2.0 (HDMI 2_CN8)
2	HDD Activity LED (LED5)	8	HDMI 2.0 (HDMI 3_CN9)
3	Power Button(SW2)	9	HDMI 2.0 (HDMI 4_CN10)
4	Power LED (LED4)	10	2.5G LAN (LAN1_CN11)
5	EDID Clear Button(SW1)	11	1G LAN (LAN2_CN12)
6	HDMI 2.1 (HDMI 1_CN7)		

Note: The front and rear views shown are for reference only and illustrate the SI-664 model with a cooling fan.

Oblique View



Note: The images show the SI-664 model with a cooling fan for reference only.





Note: The images show the SI-664-N fanless model for reference only

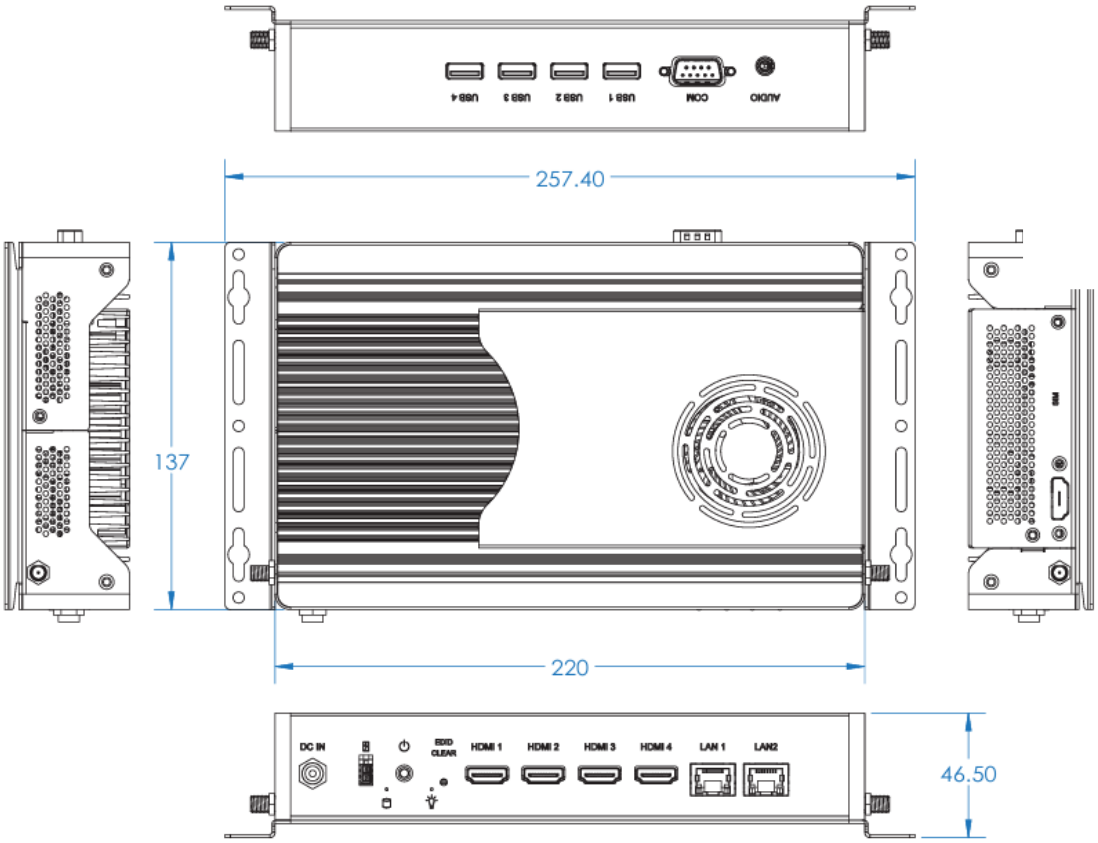
Side and Bottom View



Note: The images show the SI-664 model with a cooling fan for reference only.

1.6 Dimensions

Unit: mm



Chapter 2
Hardware Installation & Motherboard Information

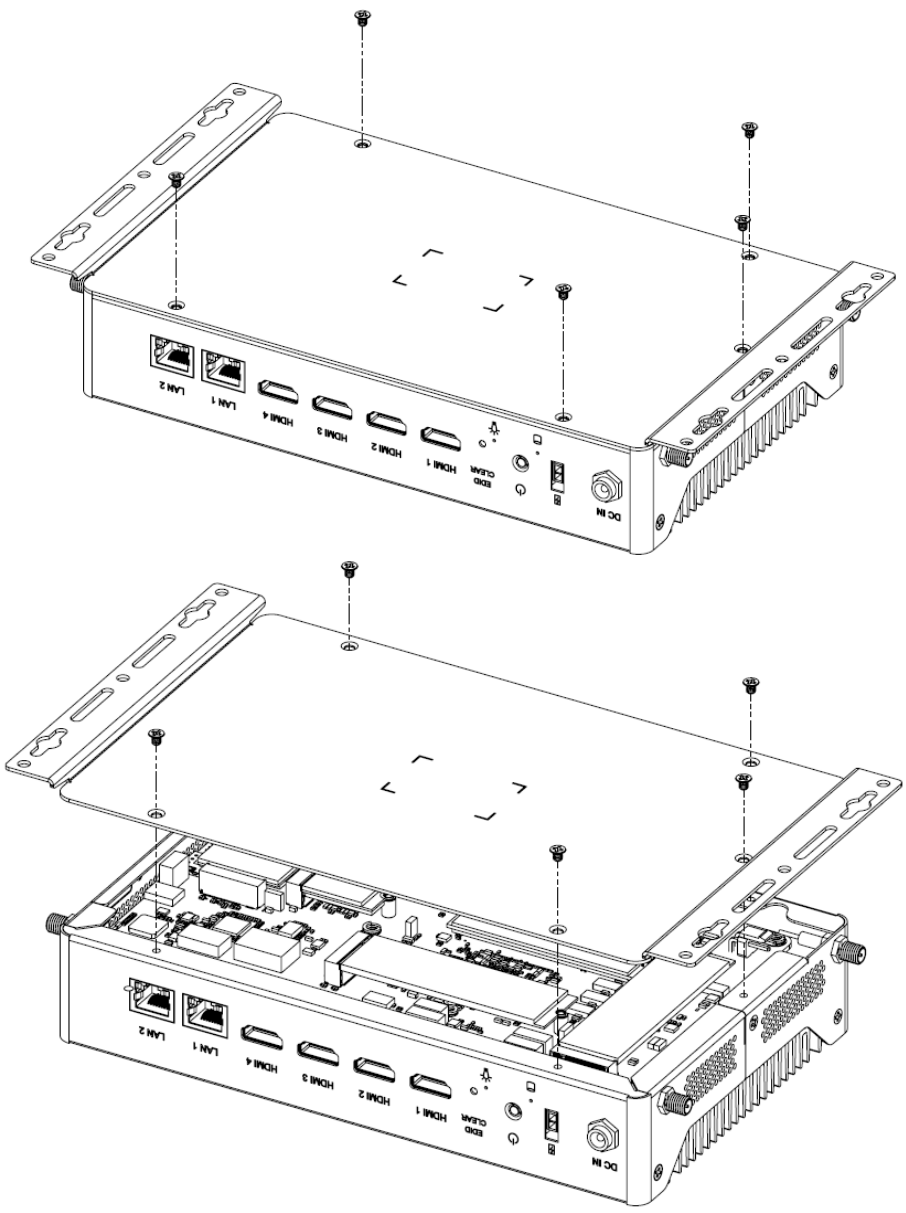
The information provided in this chapter includes:

- Installation /Replacement
- Jumpers and Connectors

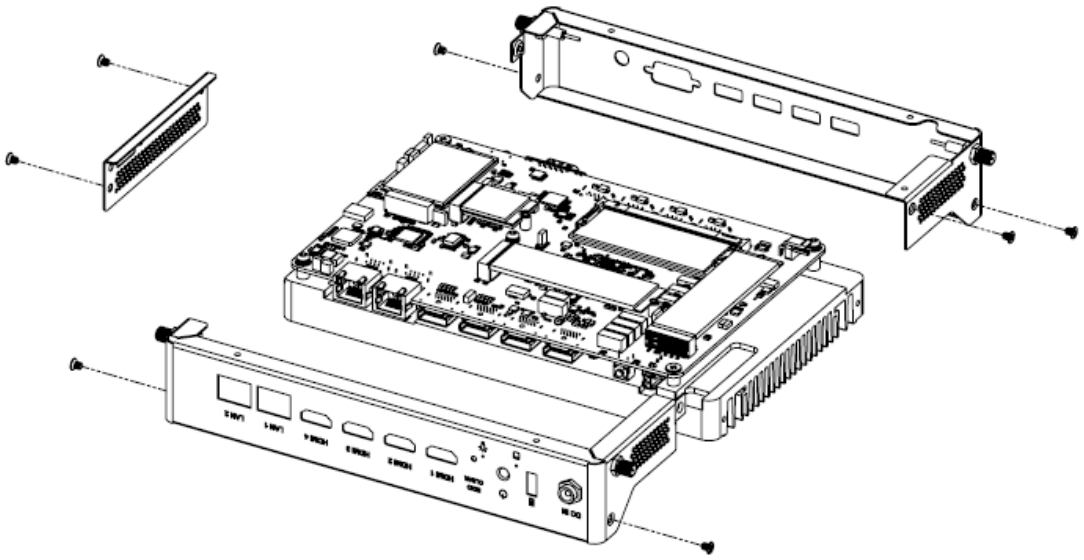
2.1 Installation / Replacement

Before disassembling the system, turn off the device and disconnect the power adapter and all peripheral cables. The following pictures show how to disassemble the SI-664.

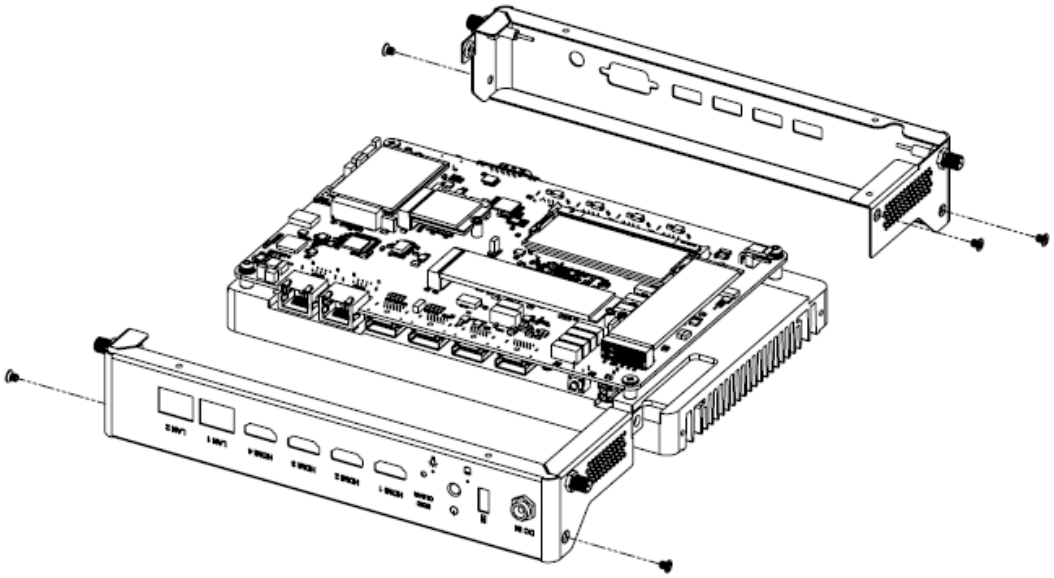
1. Remove the bracket screws and then the cover plate screws as shown below.



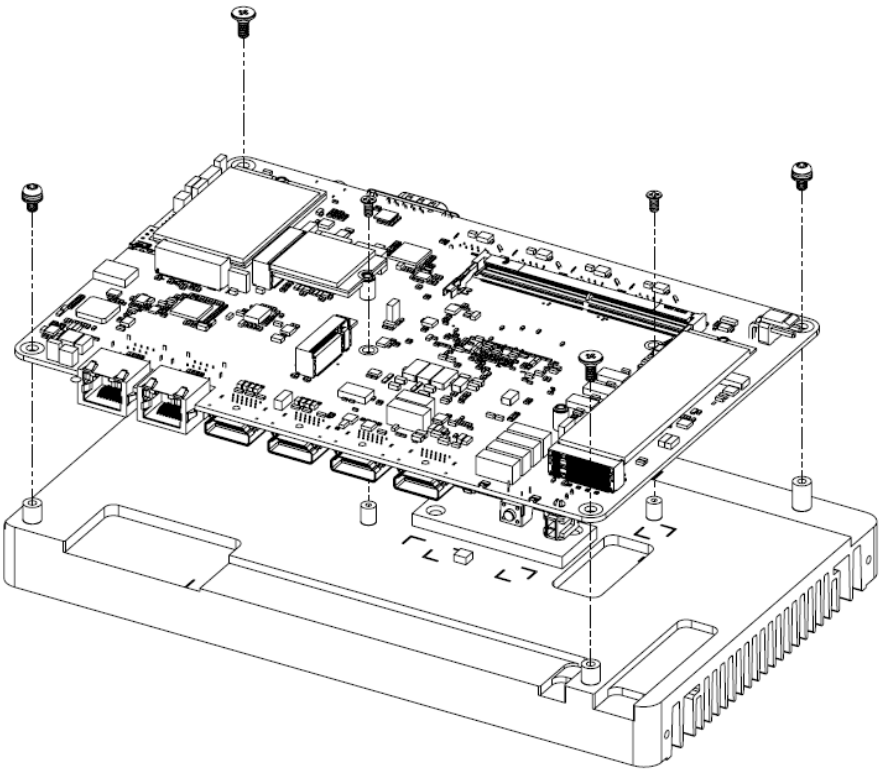
2. Remove the side plate by releasing the screws and chassis-side brackets shown below.



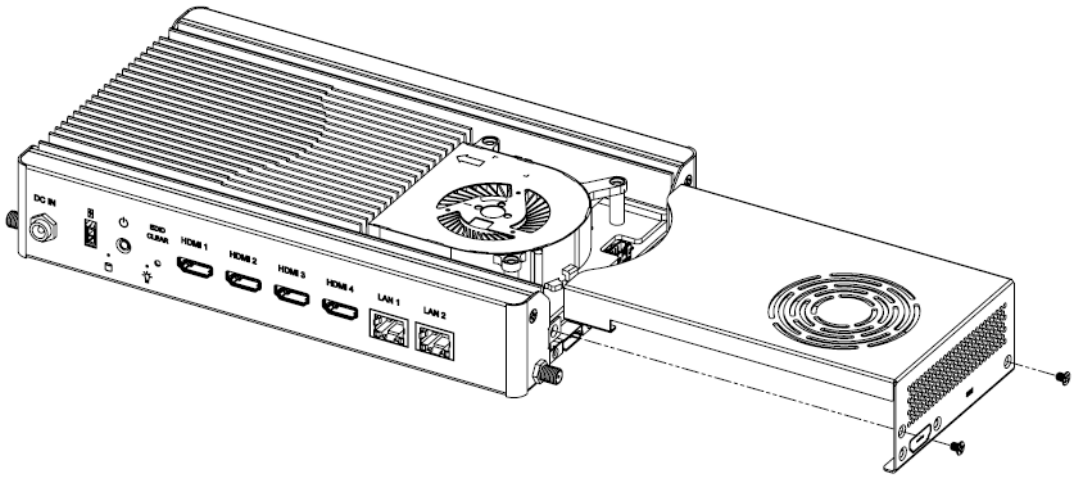
3. Remove the I/O connector cover plates by releasing the five (5) screws shown below.



4. Separate the system board from the base heat sink by releasing the screws shown below.

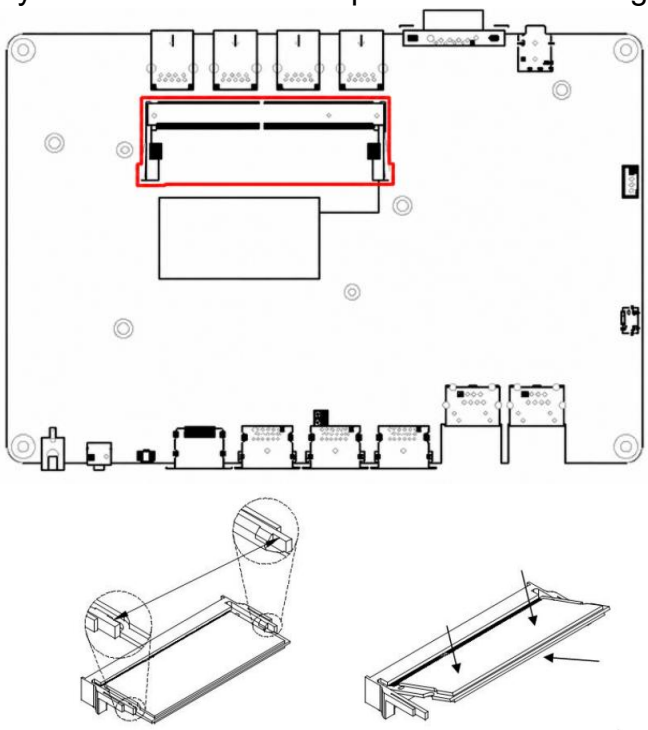


5. For SI-664 models equipped with a cooling fan, remove the two screws securing the fan cover. Remove the cover to access the system fan for installation or replacement.



2.1.1 Memory Installation

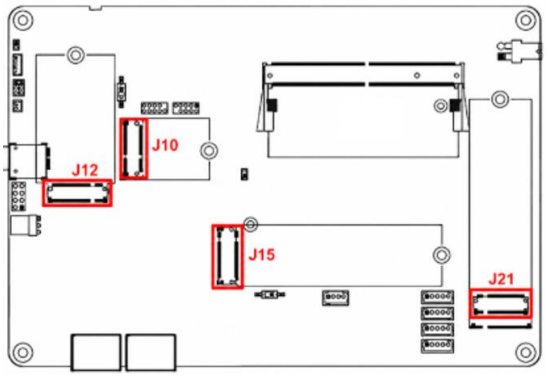
The MBD664 supports two DDR5 memory sockets. To install the modules, locate the memory slot on the board and perform the following steps:



1. Align the key of the memory module with that on the memory slot and insert the module slantwise.
2. Gently press the memory module downward toward the motherboard until the retaining clips lock it securely in place.
3. To remove the module, press the ejector tabs outwards with your fingertips to eject the module.

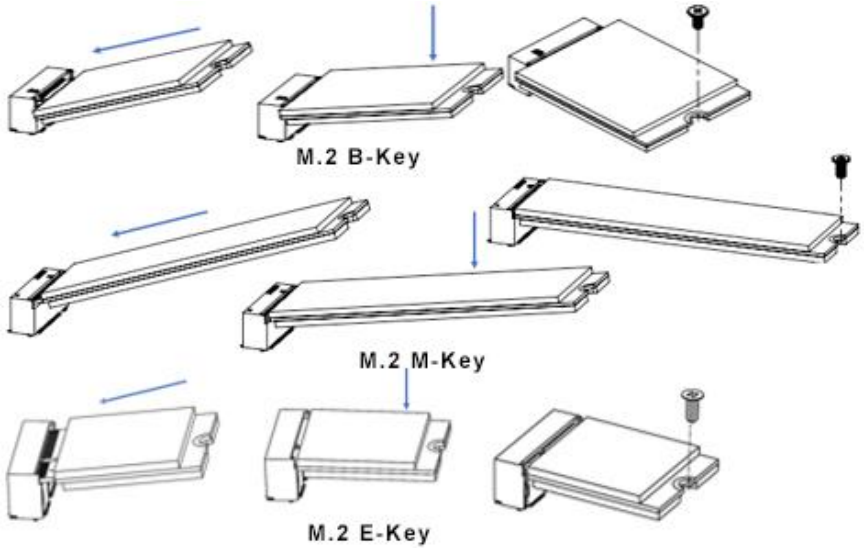
2.1.2 M.2 Card Installation

1. Locate the M.2 slot inside the device.



J10	M.2 E-key Slot
J12	M.2 B-key
J15, J21	M.2 M-key Slots

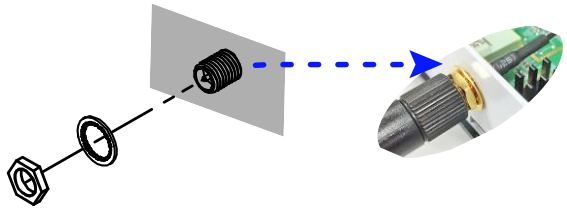
2. Align the key of the M.2 card to the interface, and insert the card slantwise.
3. Fix the M.2 card with an M3 screw.



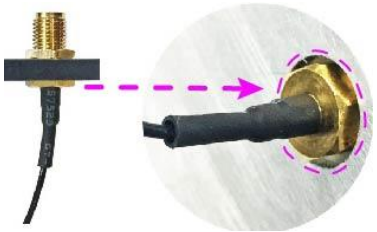
2.1.3 WiFi / 4G / 5G Antenna Installation

Thread the WiFi / 4G / 5G Antenna extension cable through an antenna hole of the front I/O cover and fasten the antenna as shown below. Then apply adhesive to the edge of the hex nut behind the front I/O cover to prevent the extension cable from falling if the cable becomes loose.

1. Thread and fasten the hex nut and the washer. Then install the antenna.



2. Apply adhesive around here.

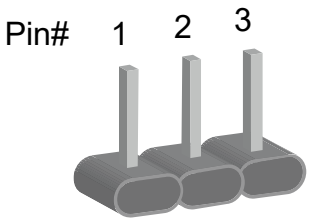


Info: The diameter of the nut is around 6.35 mm (0.25”-36UNC).

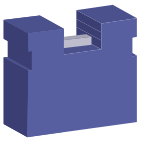
2.2 Setting the Jumpers

Set up and configure your SI-664 by using jumpers for various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your use.

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

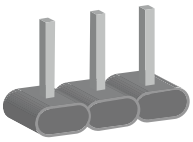
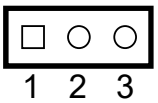
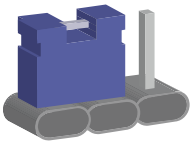
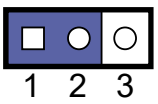
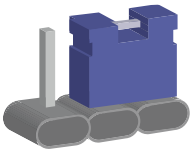
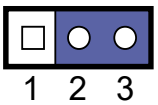


A 3-pin jumper



A jumper cap

Refer to the illustration below to set jumpers.

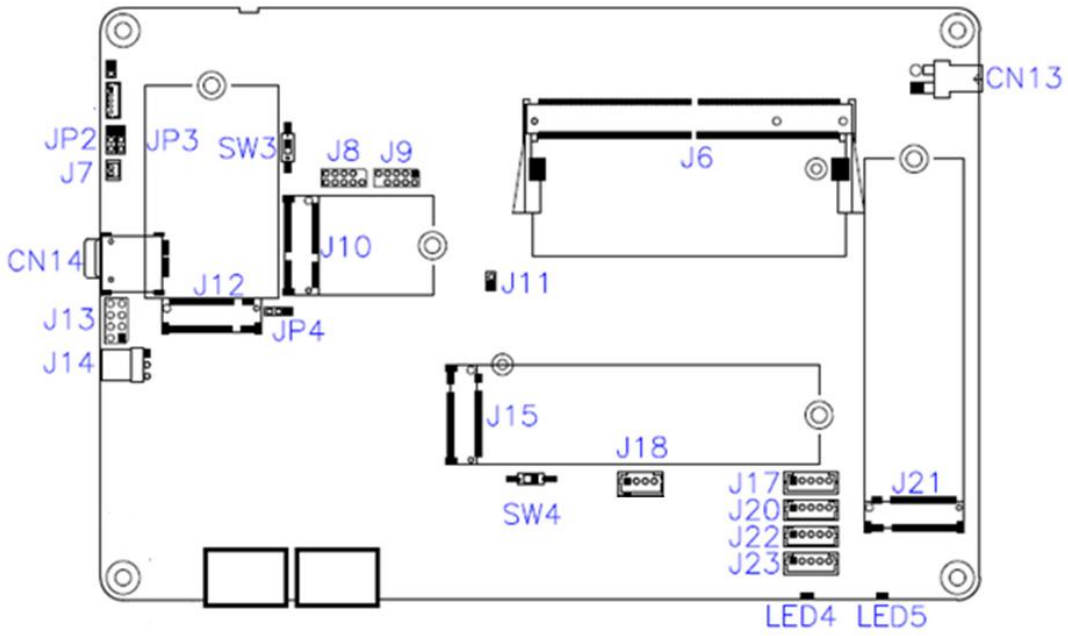
Pin closed	Oblique view	Illustration
Open		
1-2		
2-3		

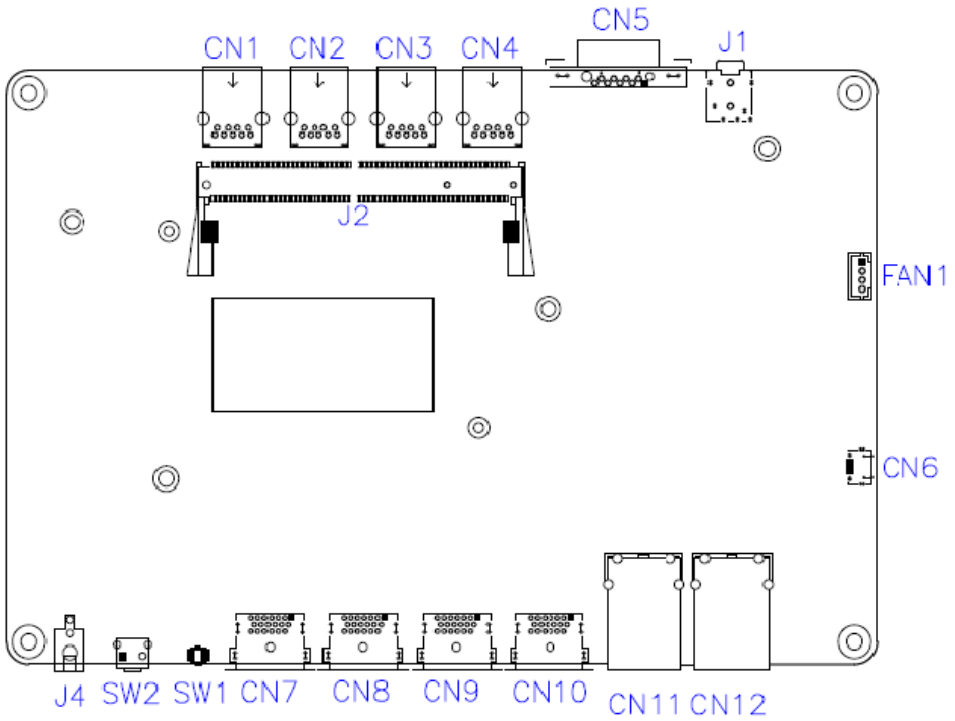
When two pins of a jumper are encased in a jumper cap, this jumper is **closed**, i.e. turned **On**.

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

2.3 Jumper & Connector Locations

Motherboard: MBD664

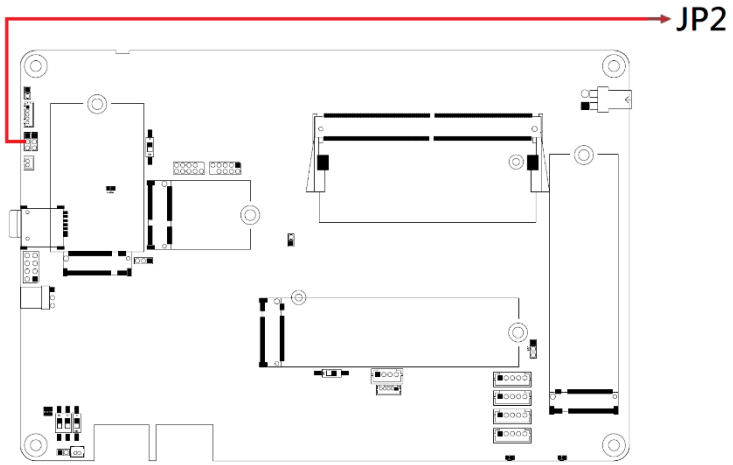




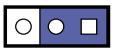
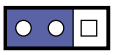
2.3.1 Jumper and Switch Quick Reference

Jumper	Function
JP2	Clear RTC Setting
JP3	Clear CMOS Setting
JP4	M.2 B-key Select (Sierra interface)
SW3	AT/ATX Mode Select
SW4	Bypass EDID Setting

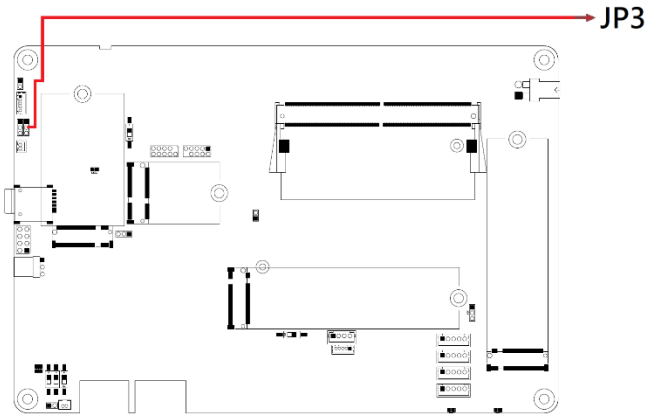
2.3.2 JP2: Clear RTC Setting



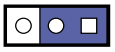
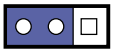


JP2	Function	Pin closed
 1	Normal (Default)	1-2
 1	Clear RTC	2-3

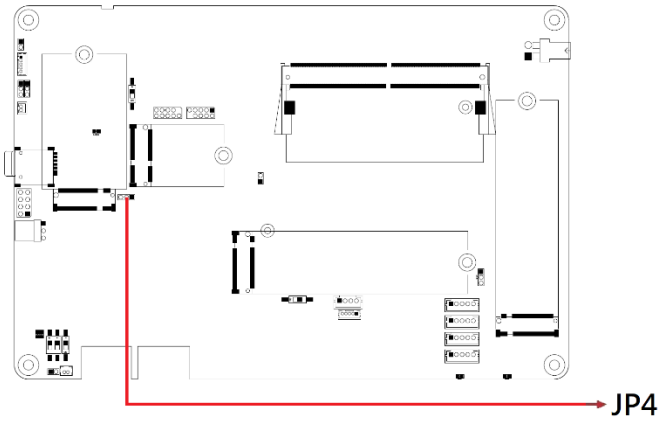
2.3.3 JP3: Clear CMOS Setting



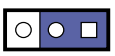
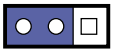


JP3	Function	Pin closed
 1	Normal (Default)	1-2
 1	Clear CMOS	2-3

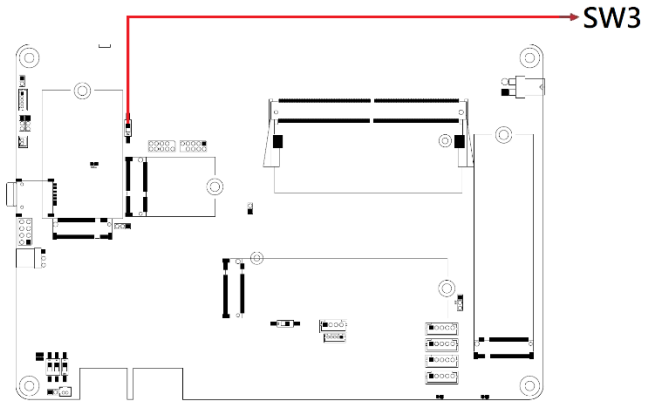
2.3.4 JP4: M.2 B-key Select (Sierra interface)





JP4	Function	Pin closed
 1	USB	1-2
 1	PCIe (Default)	2-3

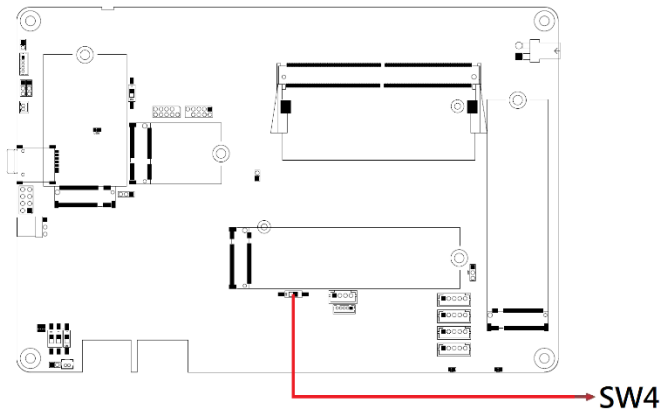
2.3.5 SW3: AT/ATX Mode Select





SW3	Function	Pin closed
	ATX (Default)	OFF
	AT	ON

2.3.6 SW4: Bypass EDID Setting



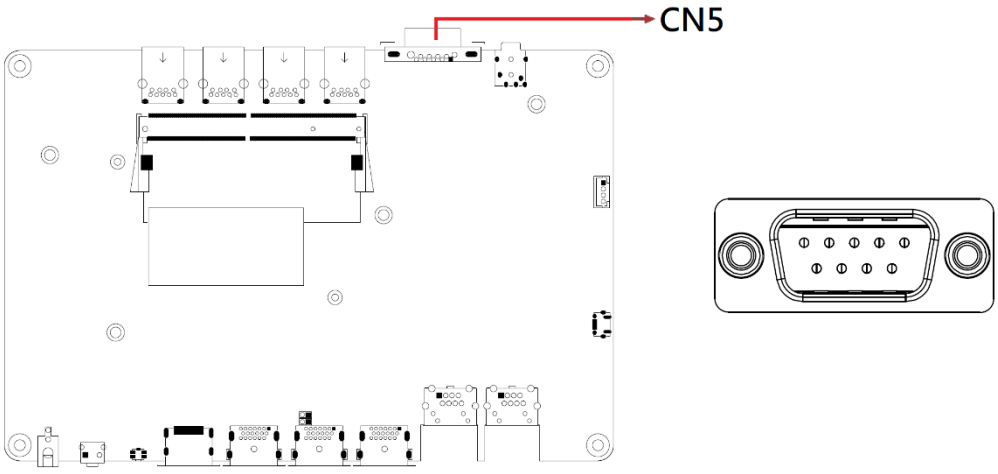


SW4	Function	Pin closed
	Enable (Default)	OFF
	Bypass	ON

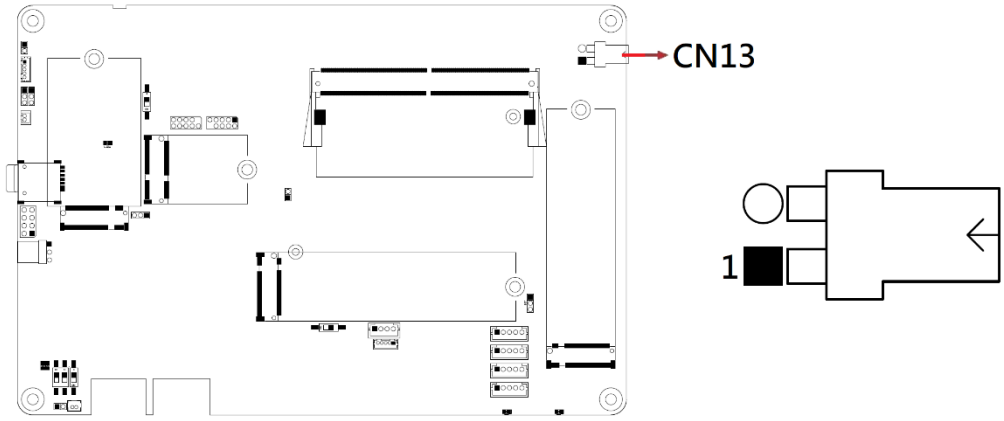
2.4 Connector Quick Reference

Connector	Function
CN5	COM1 Port
CN13	DC-IN (+12V)
J7	Battery Header
J8	SPI Flash Header
J9	ESPI Debug Header
J10	M.2 E-key Slot
J11	Flash Descriptor Security Override (Factory use only)
J12	M.2 B-key
J13	Front Panel Signal Connector
J15, J21	M.2 M-key Slots
FAN1	FAN Connector(reserved)

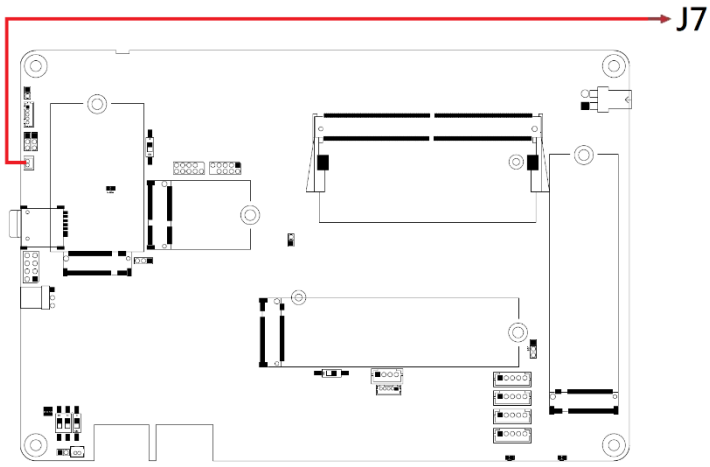
2.4.1 CN5: COM1 Port

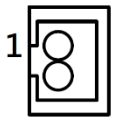


2.4.2 CN13: DC-IN (+12V)

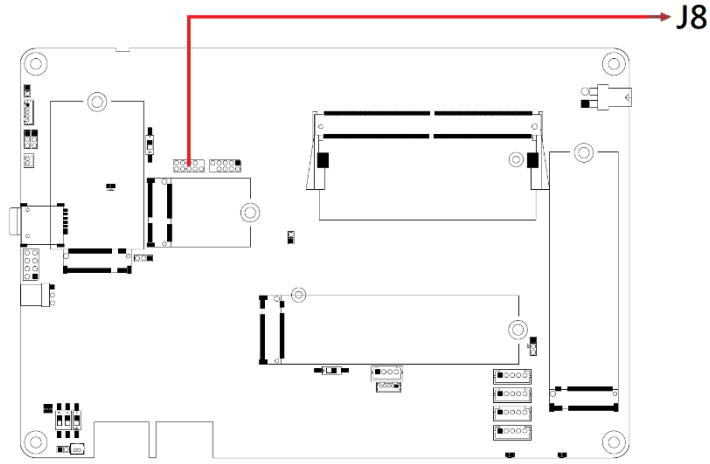


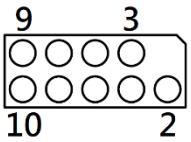
2.4.3 J7: Battery Header



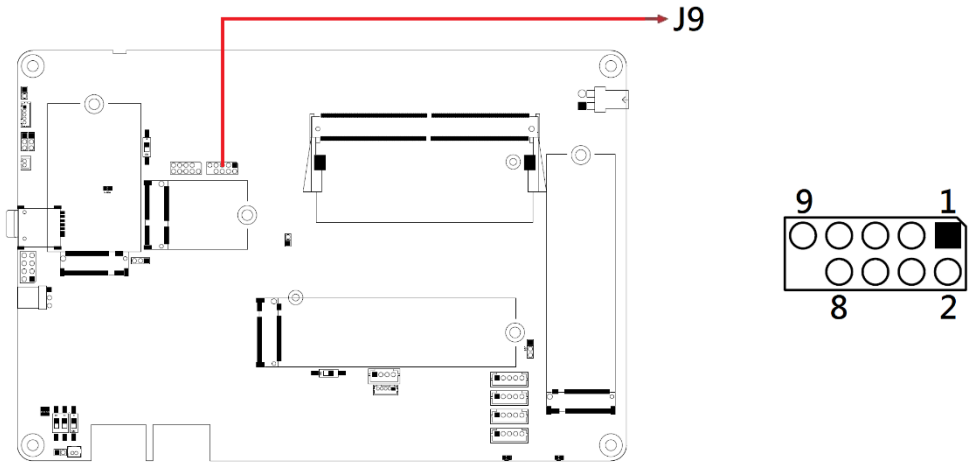


2.4.4 J8: SPI Flash Header

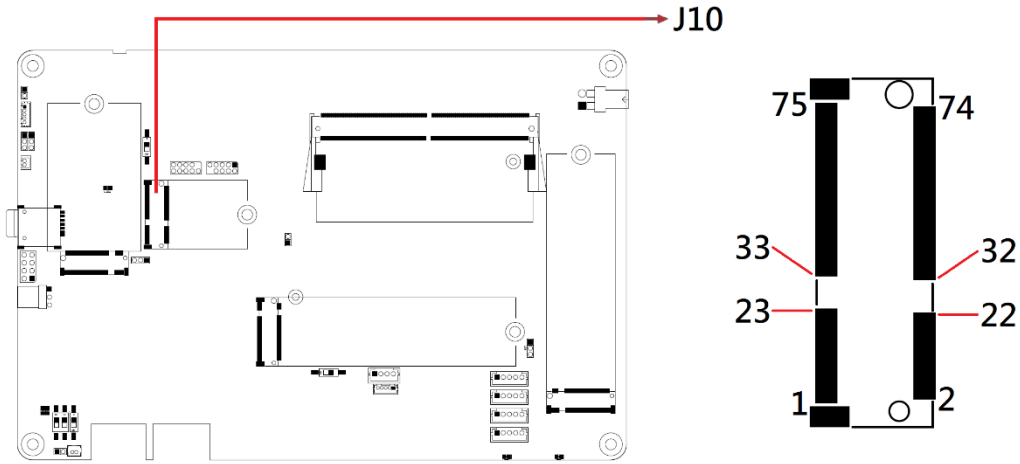




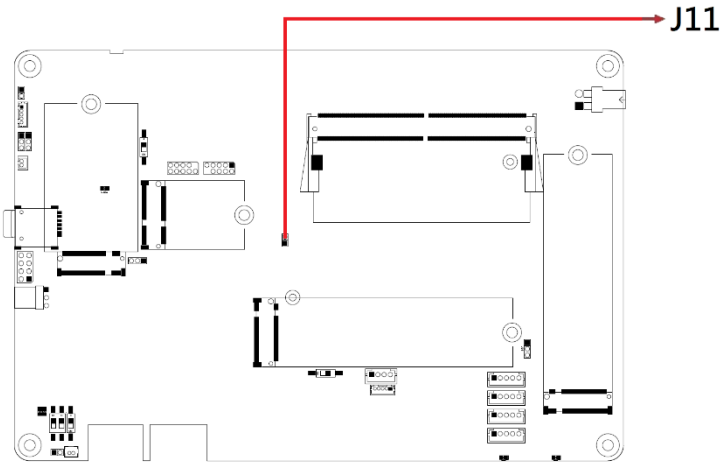
2.4.5 J9: ESPI Debug Header

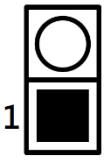


2.4.6 J10: M.2 E-key



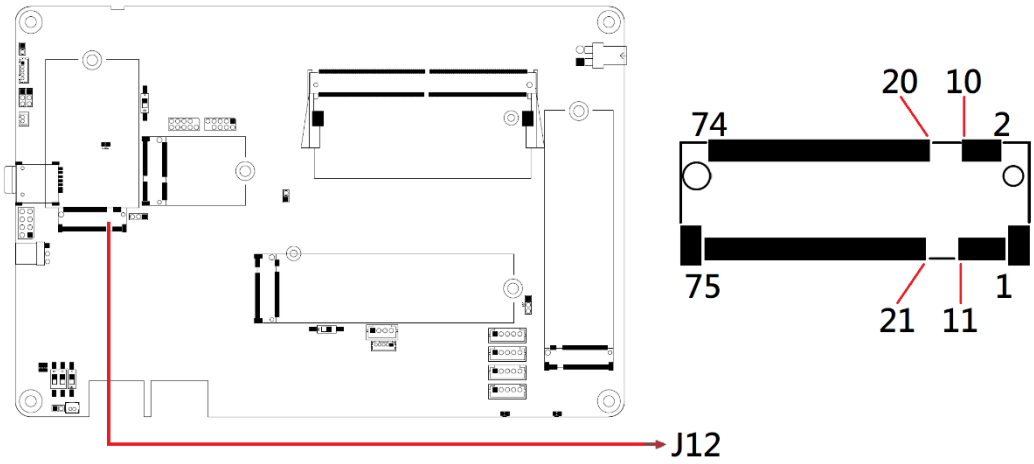
2.4.7 J11: Flash Descriptor Security Override (Factory use only)



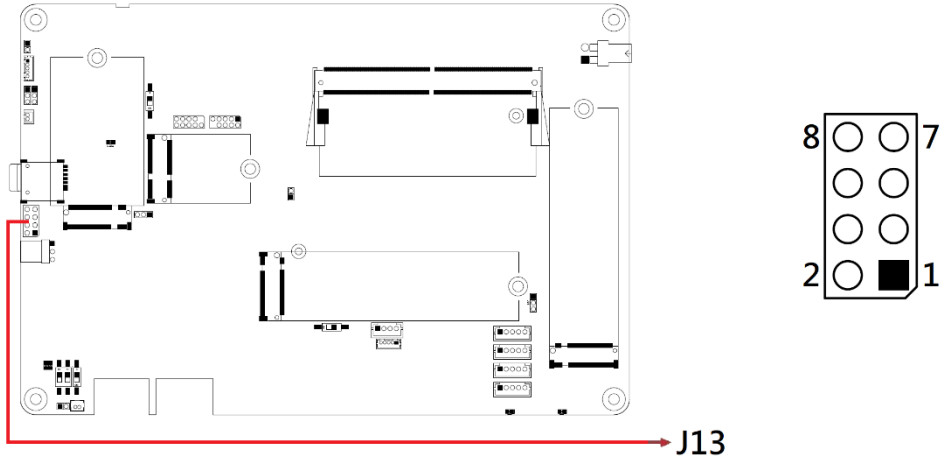


J11	Function	Pin Setting
 1	Disabled (Default)	Open
 1	Enabled	Pin 1-2 Closed

2.4.8 J12: M.2 B-key

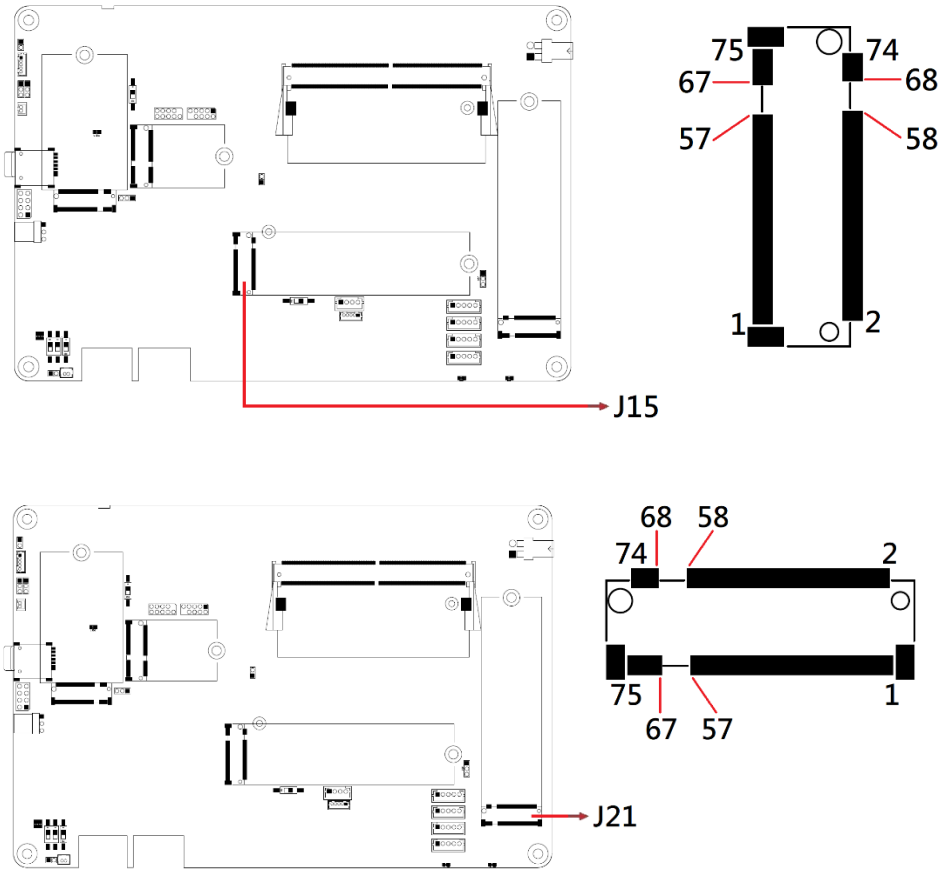


2.4.9 J13: Front Panel Signal Connector

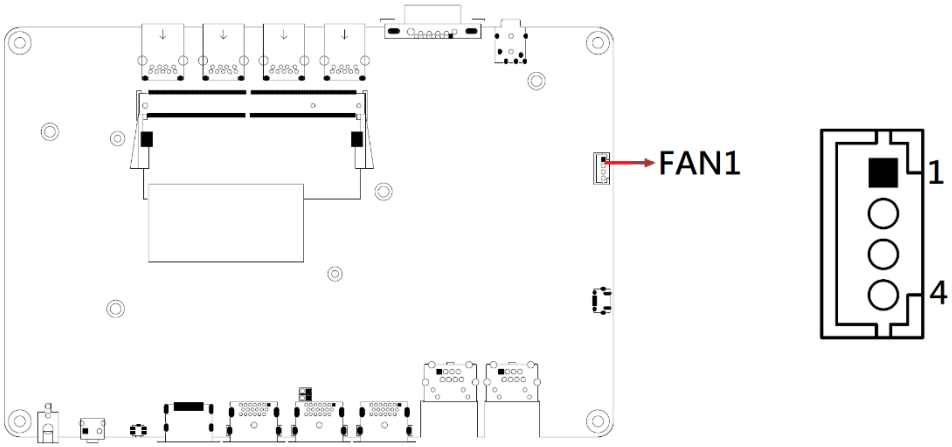


Pin	Signal Name	Pin	Signal Name
1	Power BTN	2	Power BTN
3	HDD LED+	4	HDD LED-
5	Reset BTN	6	Reset BTN
7	Power LED+	8	Power LED-

2.4.10 J15, J21: M.2 M-key Slots



2.4.11 FAN1: Fan Connector (reserved)



Chapter 3
Driver Installation

The information provided in this chapter includes:

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

3.1 Introduction

This section describes the installation procedures for software drivers. The software drivers are available on IBASE website www.ibase.com.tw.

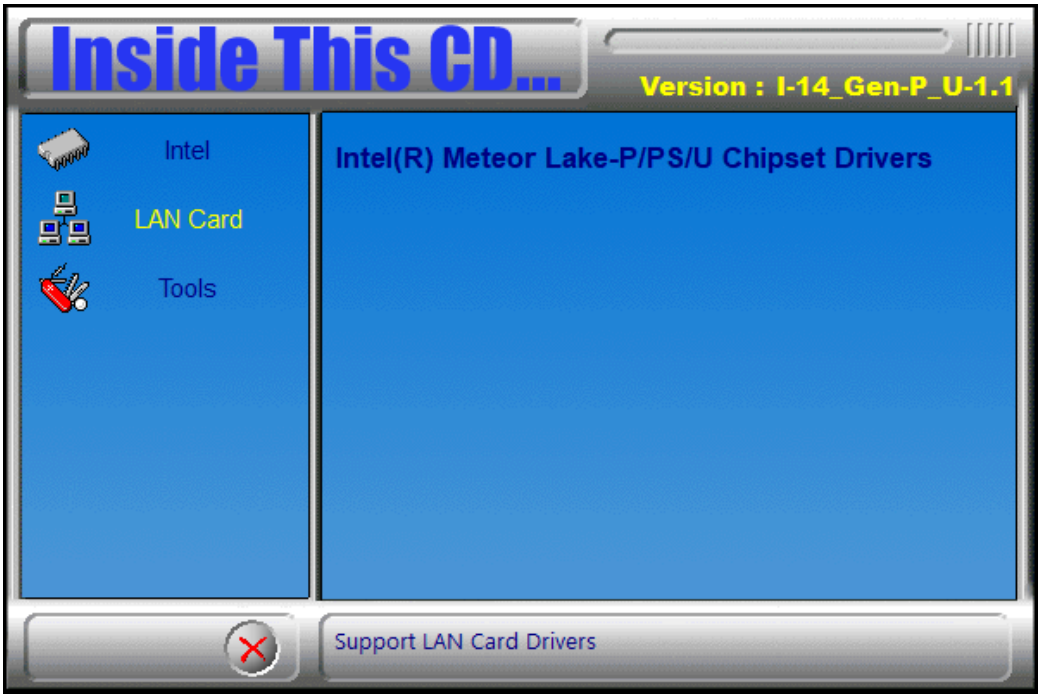
Note: After installing the Windows operating system, install the Intel® Chipset Software Installation Utility before proceeding with driver installation.

3.2 Intel® Chipset Software Installation Utility

The software drivers are available on the IBASE website. Go to the download page of the product. Copy the compressed drivers file to your computer. Double click the file to decompress it. Download the applicable drivers from the SI-664 product page on the IBASE website, extract the downloaded files if necessary, and run the installation programs.

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

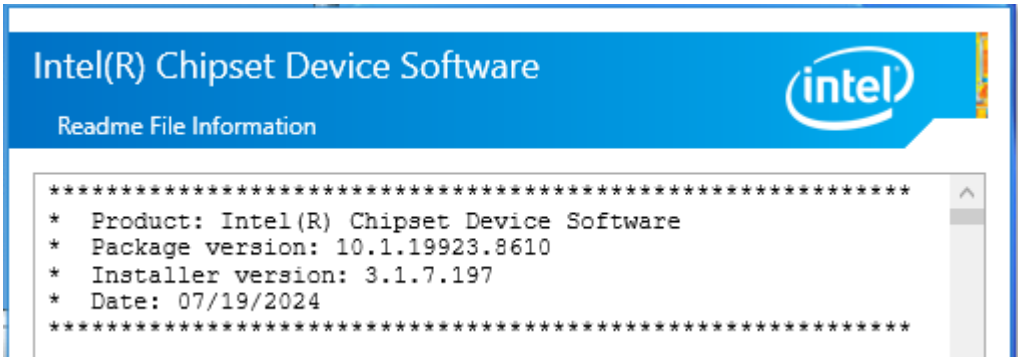
1. Click **Intel** on the left pane and then **Intel(R) Meteor Lake-P/PS/U Chipset Drivers** on the right pane.



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



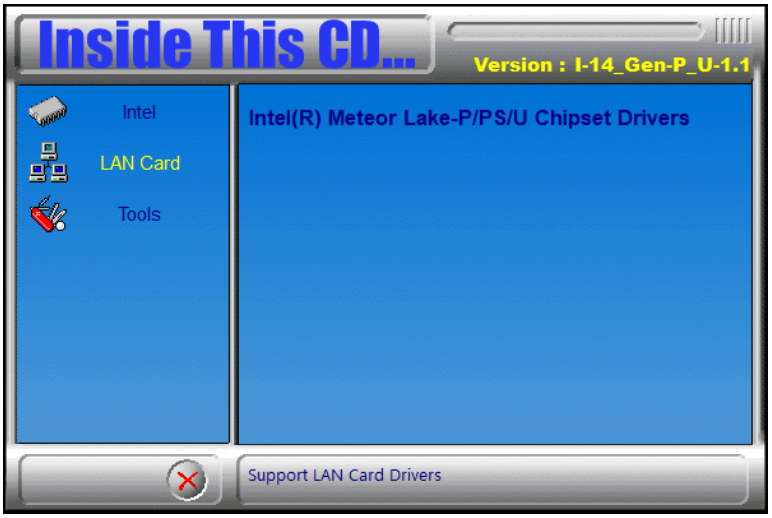
3. When the *Welcome* screen to the Intel® Chipset Device Software appears, click **Next** to continue.
4. Accept the terms in the software license agreement.
5. On the *Readme File Information* screen, click **Install**.



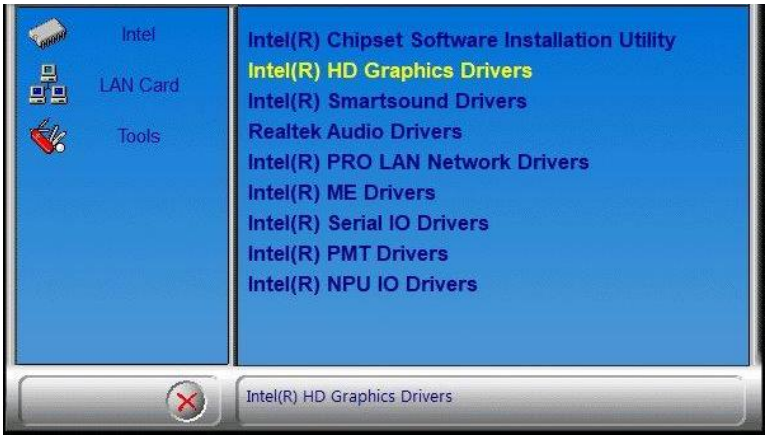
6. After completing the installation, click **Finish** to complete the setup process.

3.3 HD Graphics Driver Installation

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



2. Click **Intel(R) HD Graphics Driver**.



3. Click **Begin installation**.
4. Click **I agree** in the INTEL SOFTWARE LICENSE AGREEMENT screen.
5. Click **Start** for the installer to install the following components:
   - Intel Graphics Driver



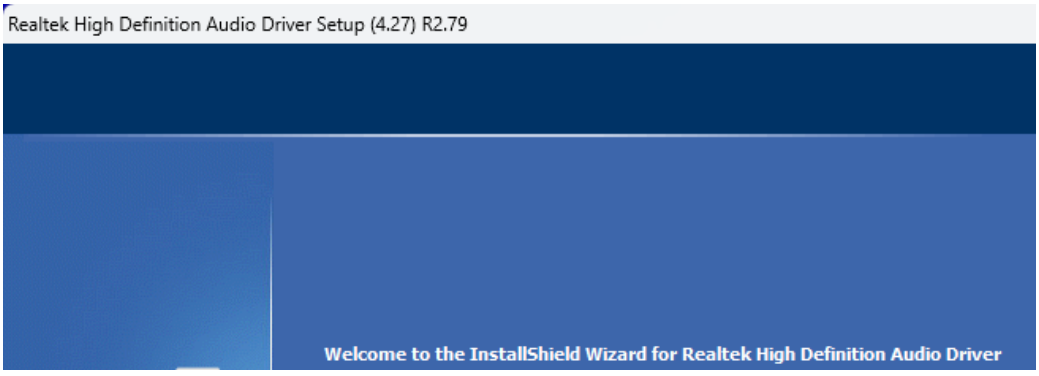
6. When installation has been completed, click **Finish**.

3.4 Realtek HD Audio Driver Installation

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



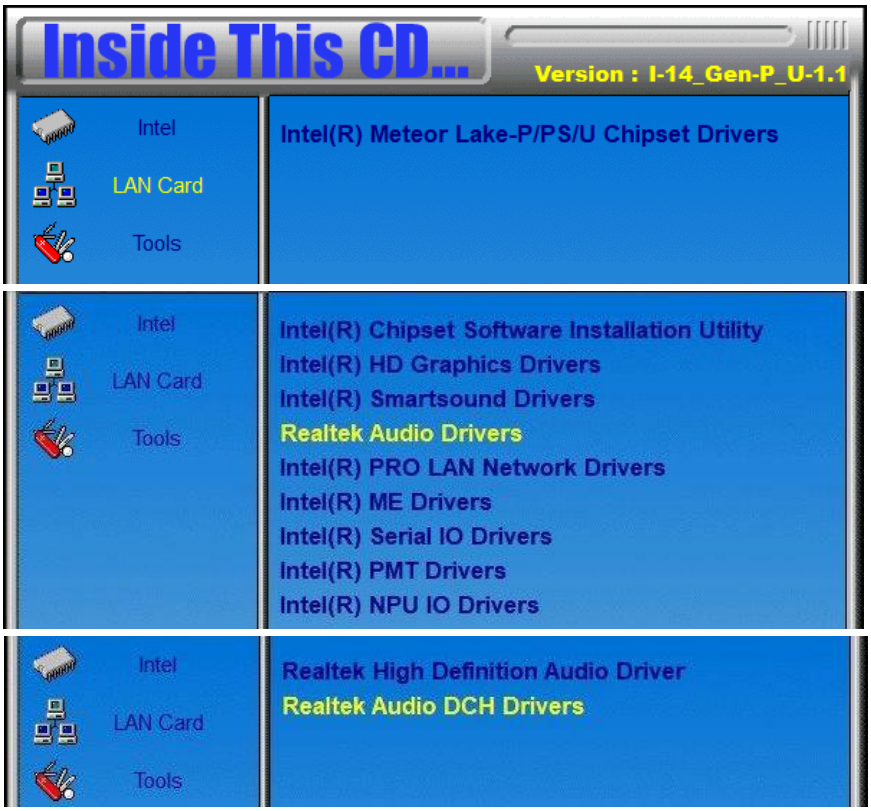
2. Click **Next** when the Welcome to the InstallShield Wizard for Realtek Audio Driver screen appears.



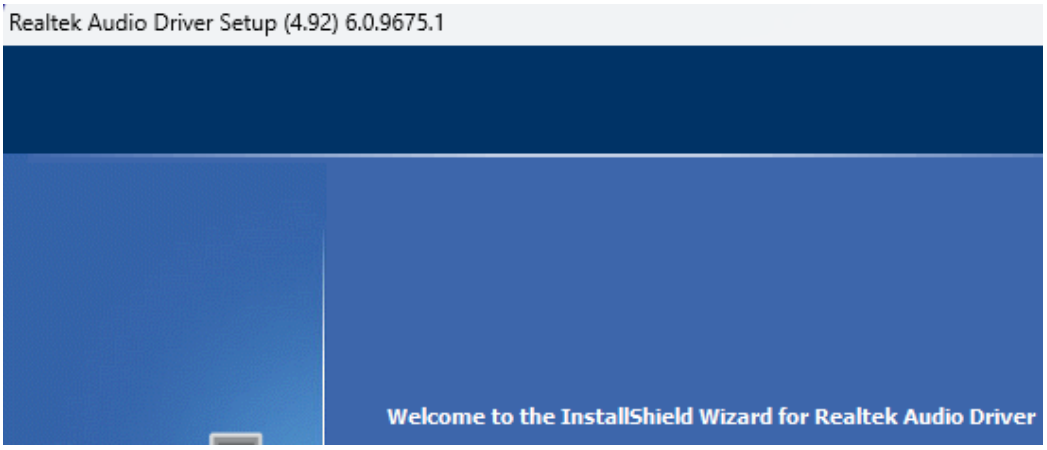
3. After the Installshield Wizard has completed the installation, restart the computer.

3.5 Realtek Audio DCH Driver Installation

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



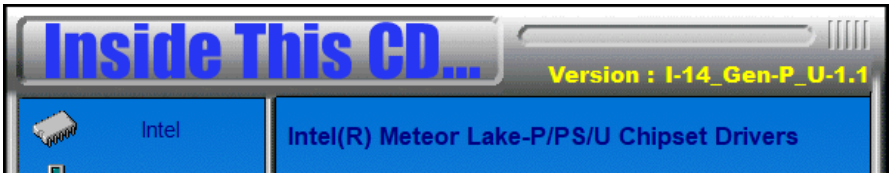
2. Click **Next** when the Welcome to the InstallShield Wizard for Realtek Audio Driver screen appears.



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

3.6 LAN Drivers Installation

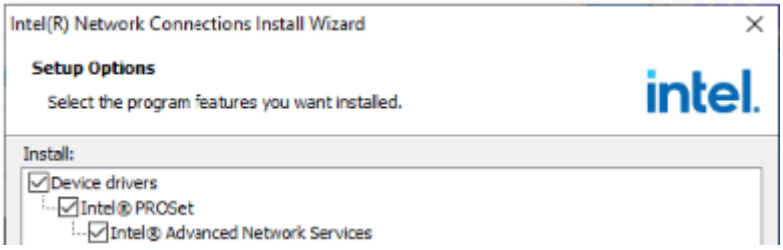
1. Click **Intel** on the left pane and then **Intel(R) Meteor Lake-P/PS/U Chipset Drivers** on the right pane.



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



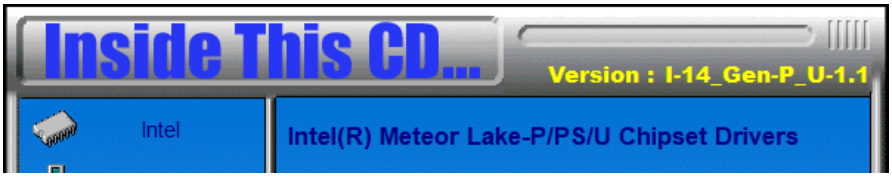
3. On the *Intel® Network Connections* screen, click **Install Drivers and Software**.
4. When the Welcome to the install wizard for Intel(R) Network Connections screen appears, click **Next**.
5. Accept the terms in the software license agreement and click **Next**.
6. On the *Setup Options* screen,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



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

3.7 Intel® ME Drivers Installation

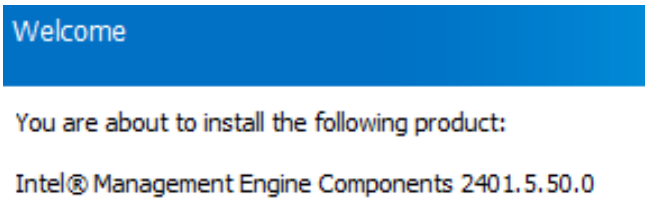
1. Click **Intel** on the left pane and then **Intel(R) Meteor Lake-P/PS/U Chipset Drivers** on the right pane.



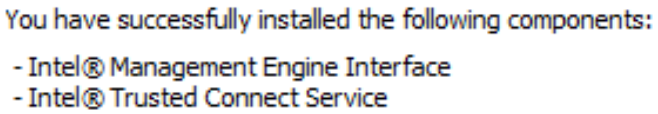
2. Click **Intel(R) ME Drivers**.



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

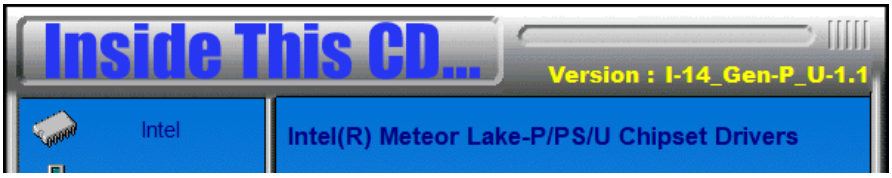


4. Accept the terms in the license agreement and click **Next**.
5. In the Destination Folder screen, click **Next** to install to the default folder, or click Change to choose another destination folder.
6. After Intel Management Engine Components have been successfully installed, click **Finish**.



3.8 Intel® Serial I/O Drivers Installation

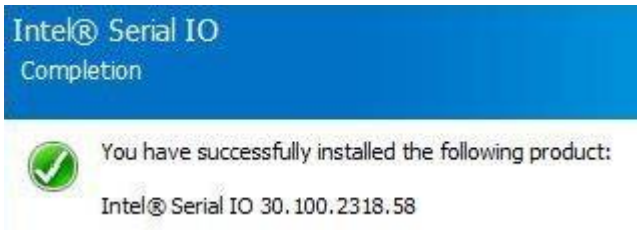
1. Click **Intel** on the left pane and then **Intel(R) Meteor Lake-P/PS/U Chipset Drivers** on the right pane.



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

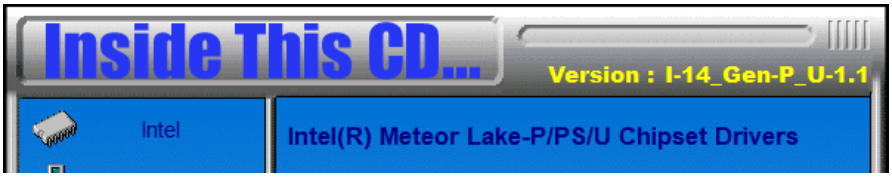


3. When the Welcome screen appears, click **Next**.
4. Accept the terms in the license agreement and click **Next**.
5. In both the Readme File Information and Confirmation screens, click **Next**. When you successfully finished the installation, click **Finish**.



3.9 Intel® PMT Installation

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



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



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



3.10 Intel® NPU IO Installation

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



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



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



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 and also provides password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

4.2 BIOS Setup

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

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

The following message will appear on the screen:

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

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

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

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

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

4.3 Main Settings



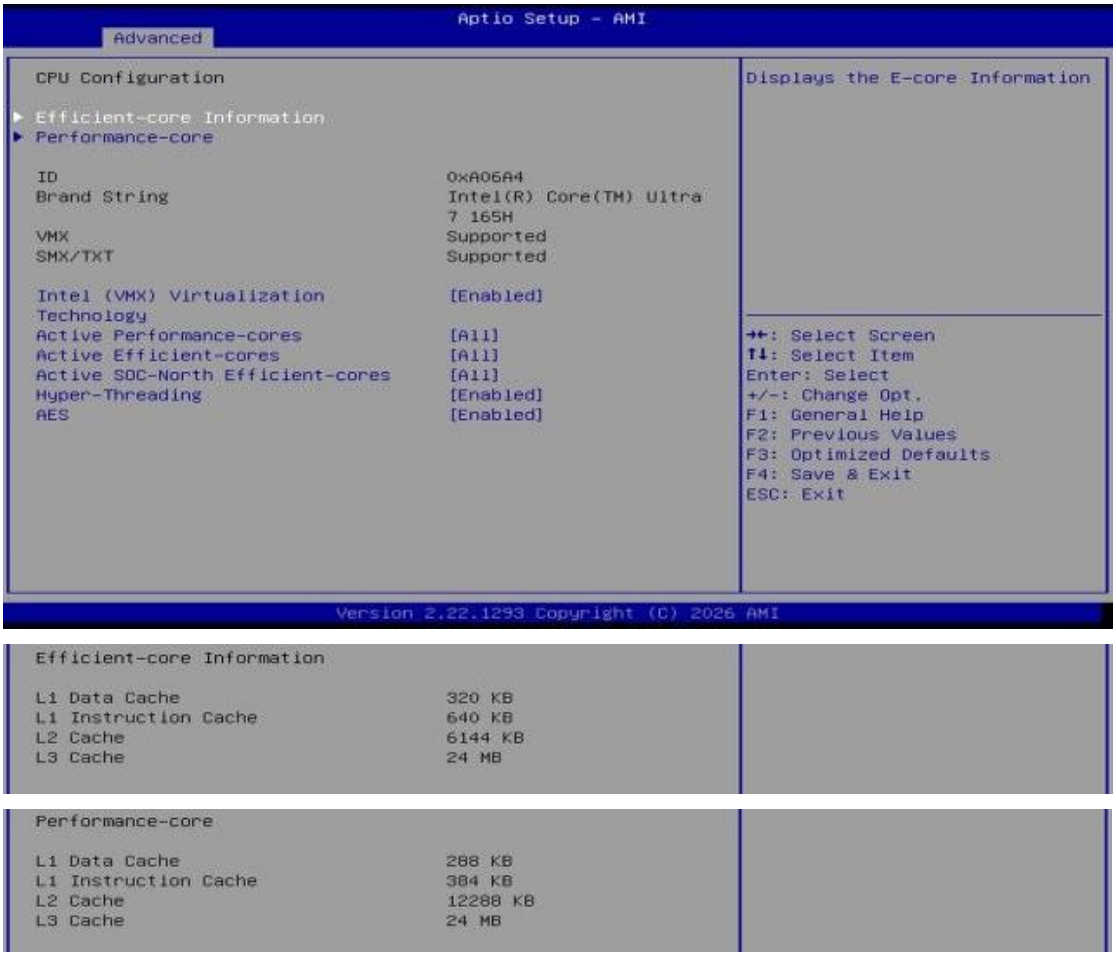
BIOS Setting	Description
System Date	Sets the date. Use the <Tab> key to switch between the date elements.
System Time	Set the time. Use the <Tab> key to switch between the time elements.

4.4 Advanced Settings

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

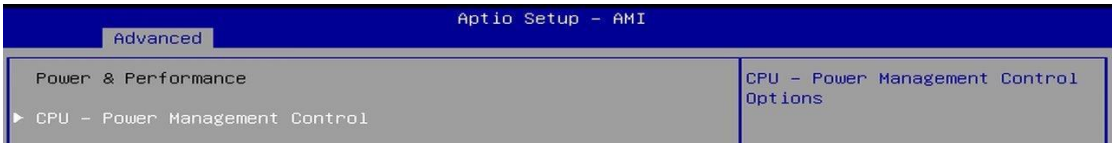


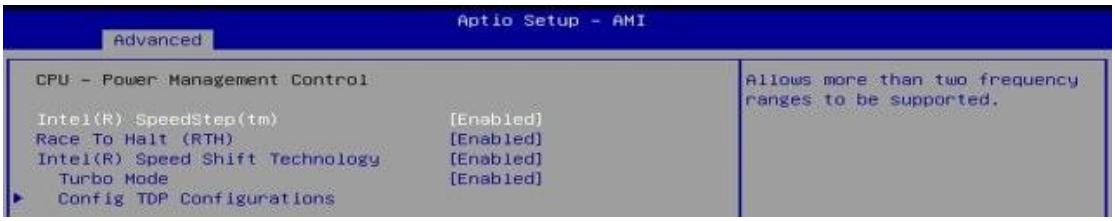
4.4.1 CPU Configuration

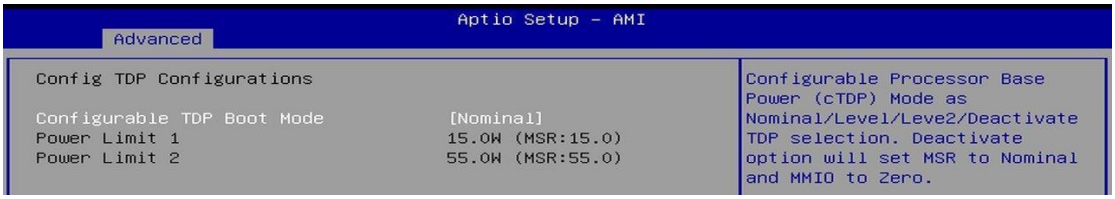


BIOS Setting	Description
Intel (VMX) Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Procesor-cores Active Efficient-cores	Number of cores to enable in each processor package. Number of Core and E-cores are looked 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)

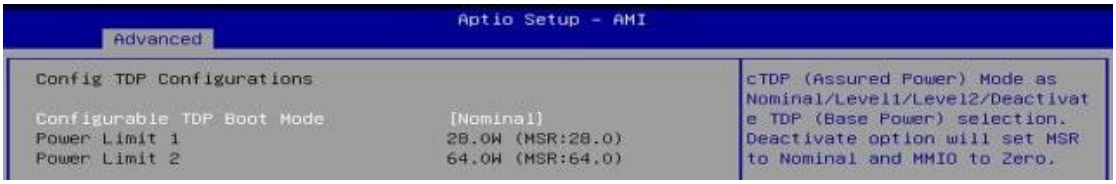
4.4.2 Power & Performance





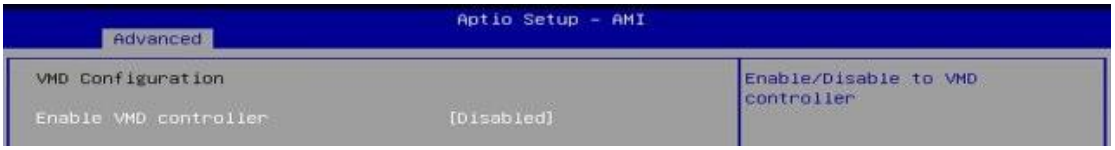


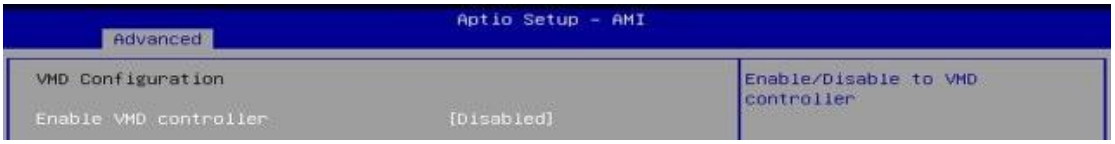
BIOS Setting	Description
CPU – Power Management Control	CPU power management control options.
Intel(R) SpeedStep(tm)	Allows more than two frequency ranges to be supported
Race To Halt (RTH)	Enable/Disable Race To Halt feature. RTH will dynamically increase CPU frequency in order to enter pkg C-State faster to reduce overall power.
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.
Turbo Mode	Enable/Disable processor Turbo mode.
Config TDP Configuration	Configurable processor base power (cTDP) configuration

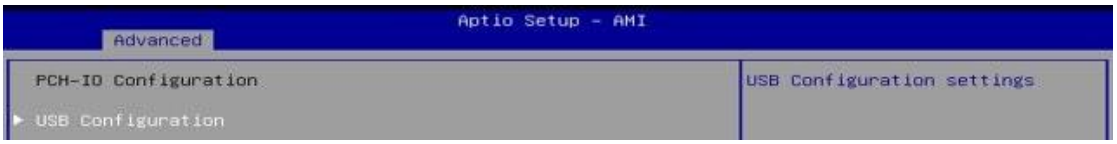


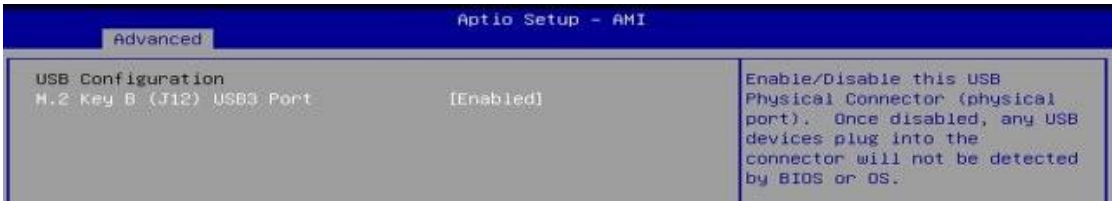
4.4.3 PCH-IO Configuration











4.4.4 PCH-FW Configuration



4.4.5 Trusted Computing



BIOS Setting	Description
Security Device Support	Enables / Disables BIOS support for security device. OS will not show security device. TCG EFI protocol and INTIA interface will not be available.
SHA256 PCR Bank SHA384 PCR Bank	Options: Enable / Disable
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 / Storage / Endorsement Hierarchy	Options: Enable / Disable
Physical Presence Spec Version	Select to tell OS to support PPI Spect Version 1.2 or 1.3. Some HCK tests might not support 1.3.
TPM 2.0 InterfaceType	Default: CRB
Device Select	TPM 1.2 will restrict support to TPM 1.2 devices. TPM 2.0 will restrict support to TPM 2.0 devices. Auto will support both with the default set to TPM 2.0 devices. If not found, TPM 1.2 devices will be enumerated.

4.4.6 ACPI Settings



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

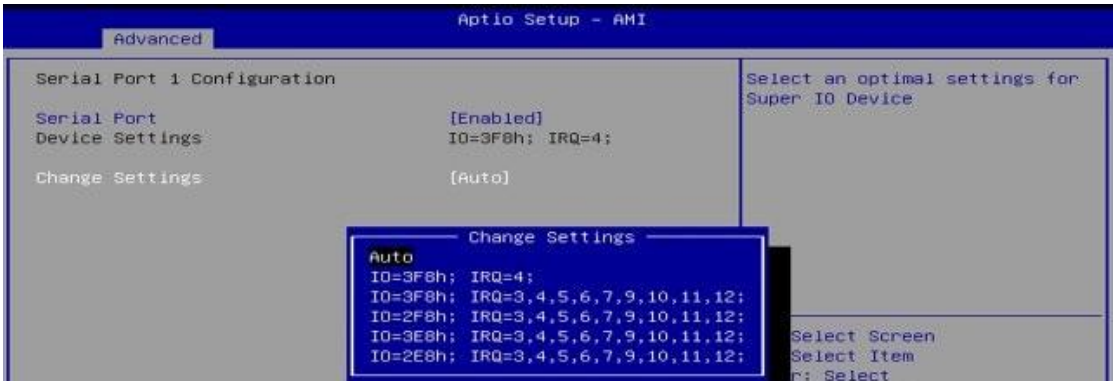
4.4.7 iSmart Controller



BIOS Setting	Description
Power-On after Power failure	Enables / Disables the system to be turned on automatically after a power failure.
PWR Resume Delay	Enables / Disables Power on resume delay.
Temperature Guardian	Options: Disable / Enable
Schedule Slot 1 / 2	Sets up the hour / minute for system powe-on. **Important:** If you would like to set up a schedule between adjacent days, configure two schedule slots. For example, if setting up a schedule from Wednesday 5 p.m. to Thursday 2 a.m., configure two schedule slots. But if setting up a schedule from 3 p.m to 5 p.m. on Wednesday, configure only a schedule slot.
Power Unlocker	iSmart will monitor the system power status, if it is unable to boot within 6 seconds when the system is shut down and the power button is pressed, it will activate the recovery process. iSmart controller will perform the RTC clear sequence and then trigger the power button to turn on the system.

4.4.8 F8196x Super IO Configuration



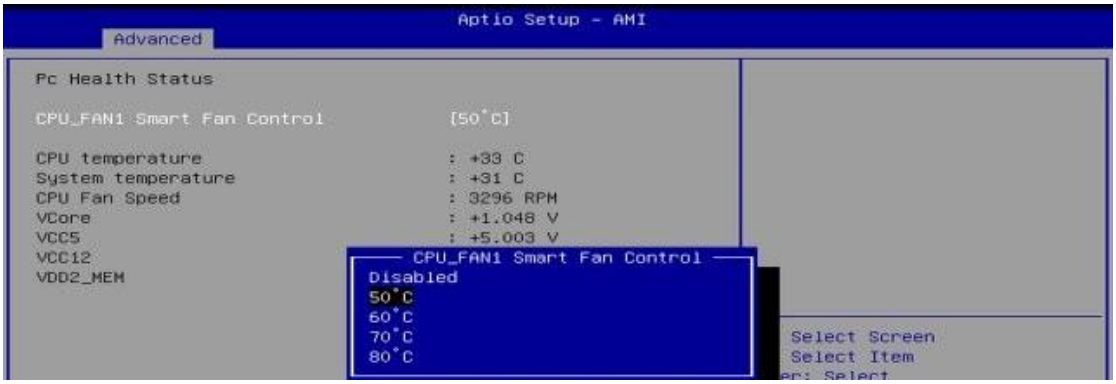


BIOS Setting	Description
Serial Port 1 Configuration	Sets parameters of Serial Port 1 (COMA).
Serial Port	Enable / Disable the serial port.
Change Settings	Select an optimal setting for the Super IO device.

Note: Serial Ports 1–4 share the same BIOS configuration options. The settings for Serial Port 1 are shown as an example and also apply to the remaining serial ports.

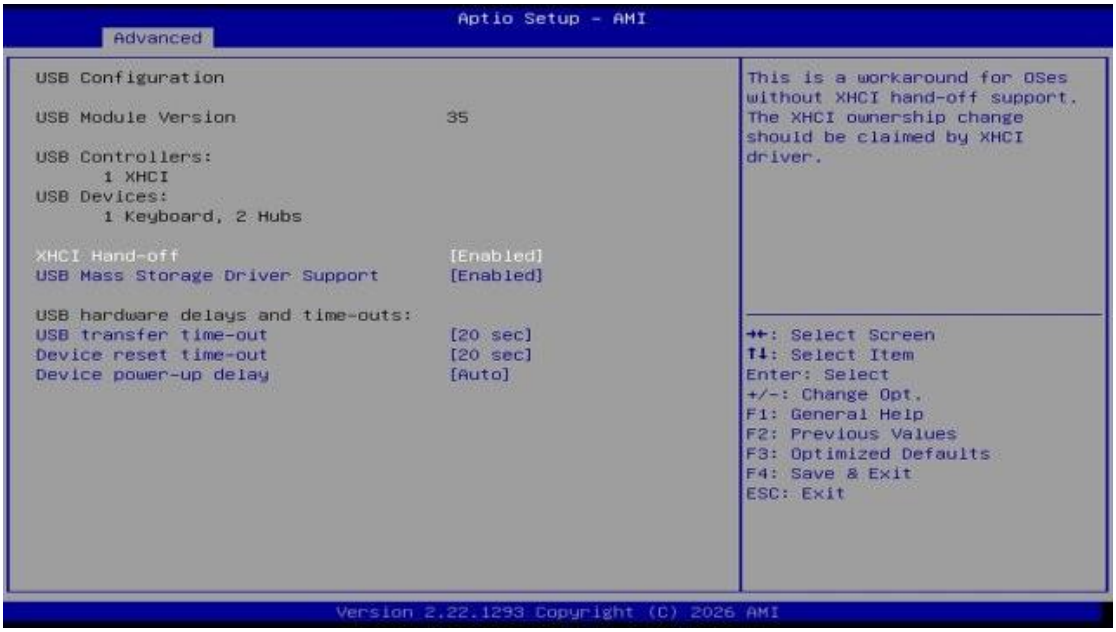
4.4.9 F8196x Hardware Monitor





BIOS Setting	Description
Temperatures / Voltages	These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.
CPU Smart Fan Function	Smart Fan Mode Select

4.4.10 USB Configuration



BIOS Setting	Description
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Enables / Disables the support for USB mass storage driver.
USB Transfer time-out	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	Seconds of delaying execution of start unit command to USB mass storage device.
Device power-up delay	The maximum time the device will take before it properly reports itself to the Host Controller. “Auto” uses default value for a Root port it is 100ms. But for a Hub port, the delay is taken from Hub descriptor.

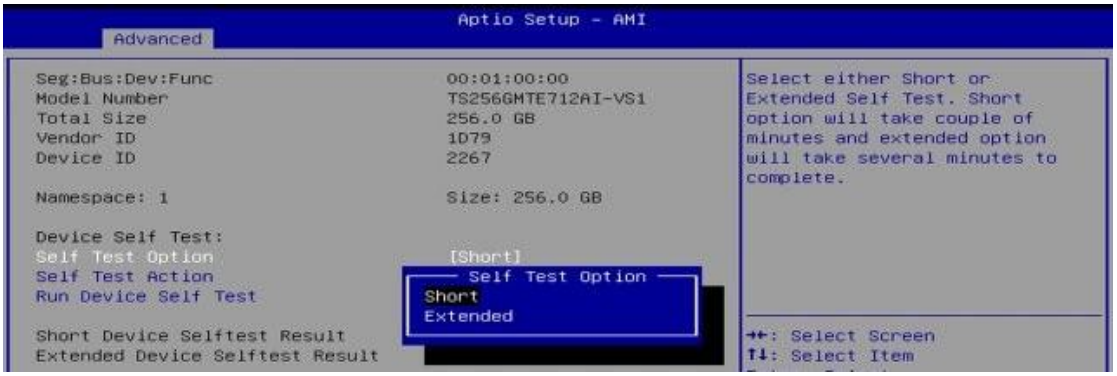
4.4.11 Network Stack Configuration





4.4.12 NVMe Configuration







4.4.13 EDID Bypass Control





4.4.14 HDMI CEC Configuration







4.5 Security Settings



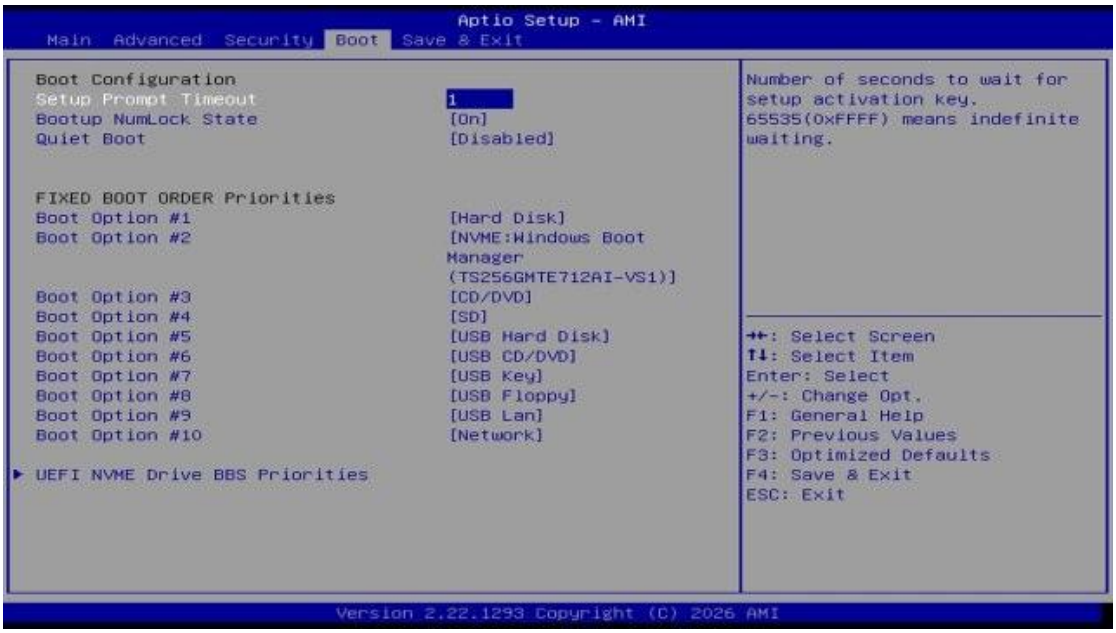
BIOS Setting	Description
Administrator Password	Sets an administrator password for the setup utility.
User Password	Sets a user password.
Secure Boot	Configures Secure Boot.

4.5.1 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.

4.6 Boot Settings



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

4.7 Save & Exit Settings



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

Appendix

This appendix provides I/O port address mappings, interrupt request lines (IRQ), and USB power control mapping information.

- I/O Port Address Map
- Interrupt Request Lines (IRQ)
- Watchdog Timer
- USB Power Control Mapping

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
0x00000000-0x00000CF7	PCI Express Root Complex
0x00000020-0x00000021	Programmable interrupt controller
0x00000024-0x00000025	Programmable interrupt controller
0x00000028-0x00000029	Programmable interrupt controller
0x0000002C-0x0000002D	Programmable interrupt controller
0x0000002E-0x0000002F	Motherboard resources
0x00000030-0x00000031	Programmable interrupt controller
0x00000034-0x00000035	Programmable interrupt controller
0x00000038-0x00000039	Programmable interrupt controller
0x0000003C-0x0000003D	Programmable interrupt controller
0x00000040-0x00000043	System timer
0x0000004E-0x0000004F	Motherboard resources
0x00000050-0x00000053	System timer
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
0x000000A0-0x000000A1	Programmable interrupt controller
0x000000A4-0x000000A5	Programmable interrupt controller
0x000000A8-0x000000A9	Programmable interrupt controller
0x000000AC-0x000000AD	Programmable interrupt controller
0x000000B0-0x000000B1	Programmable interrupt controller
0x000000B2-0x000000B3	Motherboard resources
0x000000B4-0x000000B5	Programmable interrupt controller
0x000000B8-0x000000B9	Programmable interrupt controller

Address	Device Description
0x000000BC-0x000000BD	Programmable interrupt controller
0x000002E8-0x000002EF	Communications Port (COM4)
0x000002F8-0x000002FF	Communications Port (COM2)
0x000003E8-0x000003EF	Communications Port (COM3)
0x000003F8-0x000003FF	Communications Port (COM1)
0x000004D0-0x000004D1	Programmable interrupt controller
0x00000680-0x0000069F	Motherboard resources
0x00000A00-0x00000A0F	Motherboard resources
0x00000A10-0x00000A1F	Motherboard resources
0x00000A20-0x00000A2F	Motherboard resources
0x00000D00-0x0000FFFF	PCI Express Root Complex
0x0000164E-0x0000164F	Motherboard resources
0x00001854-0x00001857	Motherboard resources
0x00002000-0x000020FE	Motherboard resources
0x00003000-0x00003FFF	PCI Express Root Port
0x00004020-0x0000403F	Standard SATA AHCI Controller
0x00004040-0x00004043	Standard SATA AHCI Controller
0x00004050-0x00004057	Standard SATA AHCI Controller
0x0000EFA0-0x0000EFBF	Intel(R) SMBus - 7E22

B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ 0	System timer
IRQ 3	Communications Port (COM2)
IRQ 4	Communications Port (COM1)
IRQ 6	Communications Port (COM4)
IRQ 7	Communications Port (COM3)
IRQ 16	High Definition Audio Controller
IRQ 55 ~ IRQ 204	Microsoft ACPI-Compliant System
IRQ 256 ~ IRQ 511	Microsoft ACPI-Compliant System
IRQ 4294967247-64	Intel(R) I210 Gigabit Network Connection
IRQ 4294967265-69	Intel(R) Ethernet Controller I226-V
IRQ 4294967270	Intel(R) AI Boost
IRQ 4294967271	Intel(R) Arc(TM) Graphics
IRQ 4294967272	Intel(R) USB 3.20 eXtensible Host Controller - 1.20 (Microsoft)
IRQ 4294967273	Intel(R) Management Engine Interface #1
IRQ 4294967274-89	Standard NVM Express Controller
IRQ 4294967290	Standard SATA AHCI Controller
IRQ 4294967291-94	PCI Express Root Port

C. Watchdog Timer

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 "F81966.H"
//---------------------------------------------------------------------------
int main (int argc, char *argv[]);
void EnableWDT(int);
void DisableWDT(void);
//---------------------------------------------------------------------------
int main (int argc, char *argv[])
{
        unsigned char bBuf;
        unsigned char bTime;
        char **endptr;

        char SIO;

        printf("Fintek 81966 watch dog program\n");
        SIO = Init_F81966();
        if (SIO == 0)
        {
                printf("Can not detect Fintek 81966, program abort.\n");
                return(1);
        }//if (SIO == 0)

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

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

        if (bTime)
        {  EnableWDT(bTime); }
```

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

		bBuf = Get_F81966_Reg(0x2B);
		bBuf &= (~0x20);
		Set_F81966_Reg(0x2B,	bBuf);	//Enable WDTO

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

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

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

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

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

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

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

		bBuf = Get_F81966_Reg(0xF5);
		bBuf &= ~0x20;
		bBuf |= 0x40;
		Set_F81966_Reg(0xF5,	bBuf);	//disable WDT
}
//-----------------------------------------------------------------------------
```

```
//---------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include "F81966.H"
#include <dos.h>
//---------------------------------------------------------------------------
unsigned int F81966_BASE;
void Unlock_F81966 (void);
void Lock_F81966 (void);
//---------------------------------------------------------------------------
unsigned int Init_F81966(void)
{
        unsigned int result;
        unsigned char ucDid;

        F81966_BASE = 0x4E;
        result = F81966_BASE;

        ucDid = Get_F81966_Reg(0x20);
        if   (ucDid  ==  0x07)          //Fintek 81966
        {  goto     Init_Finish;  }

        F81966_BASE = 0x2E;
        result = F81966_BASE;

        ucDid = Get_F81966_Reg(0x20);
        if   (ucDid  ==  0x07)          //Fintek 81966
        {  goto     Init_Finish;  }

        F81966_BASE = 0x00;
        result = F81966_BASE;

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

```
		Lock_F81966();
}
//----------------------------------------------------------------------------
void Set_F81966_Reg( unsigned char REG, unsigned char DATA)
{
		Unlock_F81966();
		outportb(F81966_INDEX_PORT, REG);
		outportb(F81966_DATA_PORT, DATA);
		Lock_F81966();
}
//----------------------------------------------------------------------------
unsigned char Get_F81966_Reg(unsigned char REG)
{
		unsigned char Result;
		Unlock_F81966();
		outportb(F81966_INDEX_PORT, REG);
		Result = inportb(F81966_DATA_PORT);
		Lock_F81966();
		return Result;
}
//----------------------------------------------------------------------------
```

```
//----------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//----------------------------------------------------------------------------
#ifndef	F81966_H
#define	 F81966_H		1
//----------------------------------------------------------------------------
#define		F81966_INDEX_PORT	(F81966_BASE)
#define		F81966_DATA_PORT	(F81966_BASE+1)
//----------------------------------------------------------------------------
#define		F81966_REG_LD	0x07
//----------------------------------------------------------------------------
#define		F81966_UNLOCK	0x87
#define		F81966_LOCK		0xAA
//----------------------------------------------------------------------------
unsigned int Init_F81966(void);
void Set_F81966_LD( unsigned char);
void Set_F81966_Reg( unsigned char,
unsigned char); unsigned char
Get_F81966_Reg( unsigned char);
//----------------------------------------------------------------------------
#endif	//	F81966_H
```

D. USB Power Control Mapping

Connector	Software Mapping
CN1	Bit_0
J10	Bit_1