

# USER'S MANUAL

## **AIE900A-AO Series**

Edge AI Embedded System

User's Manual



[www.axiomtek.com](http://www.axiomtek.com)

## **Disclaimers**

This manual has been carefully checked and believed to contain accurate information. Axiomtek Co., Ltd. assumes no responsibility for any infringements of patents or any third party's rights, or any liability arising from such uses.

Axiomtek does not warrant or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information in this document. Axiomtek does not make any commitment to update any information in this manual.

Axiomtek reserves the right to change or revise this document and/or product at any time without notice.

No part of this document may be reproduced, stored in a retrieval system, or transmitted in any forms or by any means, electronic, mechanical, photocopying, recording, among others, without prior written permissions of Axiomtek Co., Ltd.

**©Copyright 2023 Axiomtek Co., Ltd.**

**All Rights Reserved**

**September 2023, Version A1**

**Printed in Taiwan**

## Safety Precautions

Before getting started, please read the following important safety precautions.

1. The AIE900A-AO does not come with an operating system which must be loaded first before installation of any software into the computer.
2. Be sure to ground yourself to prevent static charge when installing any internal components. Use a wrist grounding strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.
3. Disconnect the power cord from the AIE900A-AO prior to making any installation. Be sure both the system and all external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the AIE900A-AO is properly grounded.
4. Make sure the voltage of the power source is correct before connecting it to any power outlet.
5. Turn OFF system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.
6. Do not leave equipment in an uncontrolled environment where the storage temperature is below -40°C or above 80°C as it may damage the equipment.
7. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:
  - Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help discharge any static electricity on human body.
  - When handling boards and components, wear a wrist grounding strap available from most electronic component stores.

## WARNING

AIE900A-AO can become extremely hot when it is turned on. Do not touch the hot surface of the system unit during operation.

## Classification

1. Degree of protection against electric shock: not classified
2. Degree of protection against ingress of water: IP40
3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.
4. Mode of operation: Continuous



**Note:** All I/O connectors should be connected with corresponding cables when the system is operating with IP40 rated definition. If some of the I/O ports are not to be used or connected during operation, users must use I/O covers to plug the ports in order to meet the IP40 standard.

## General Cleaning Tips

Please keep the following precautions in mind while understanding the details fully before and during any cleaning of the computer and any components within.

A piece of dry cloth is ideal to clean the device.

1. Be cautious of any tiny removable components when using a vacuum cleaner to absorb dirt on the floor.
2. Turn the system off before cleaning up the computer or any components within.
3. Avoid dropping any components inside the computer or getting the circuit board damp or wet.
4. For cleaning, be cautious of all kinds of cleaning solvents or chemicals which may cause allergy to certain individuals.
5. Keep foods, drinks or cigarettes away from the computer.

### Cleaning Tools:

Although many companies have created products to help improve the process of cleaning computer and peripherals, users can also use household items accordingly for cleaning. Listed below are items available for cleaning computers or computer peripherals.

Pay special attention to components requiring designated products for cleaning as mentioned below.

- Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, it is recommended to use a piece of cloth.
- Water or rubbing alcohol: A piece of cloth may be somewhat moistened with water or rubbing alcohol before being rubbed on the computer. Unknown solvents may be harmful to plastic parts.
- Vacuuming dust, dirt, hair, cigarette and other particles outside of a computer can be one of the best methods of cleaning a computer. Over time these items may restrict the airflow in a computer and cause circuitry to corrode.
- Cotton swabs: Cotton swabs moistened with rubbing alcohol or water are applicable to reach areas in a keyboard, mouse and other areas.
- Foam swabs: If possible, it is better to use lint free swabs such as foam swabs.



**Note:** It is strongly recommended that the customer should shut down the system before starting to clean any single components.

### Please follow the steps below:

1. Close all application programs;
2. Close operating software;
3. Turn off power switch;
4. Remove all devices;
5. Pull out the power cable.

## **Scrap Computer Recycling**

Please inform the nearest Axiomtek distributor as soon as possible for suitable solutions in case computers require maintenance or repair; or for recycling in case computers are out of order or no longer in use.

## **Trademarks Acknowledgments**

Axiomtek is a trademark of Axiomtek Co., Ltd.

IBM, PC/AT, PS/2, VGA are trademarks of International Business Machines Corporation.

Intel® and Pentium® are registered trademarks of Intel Corporation.

NVIDIA® and Jetson are registered trademarks of NVIDIA Corporation.

MS-DOS, Microsoft C and QuickBasic are trademarks of Microsoft Corporation.

Windows 10, Linux and other brand names and trademarks are the properties and registered brands of their respective owners.

# Table of Contents

---

Disclaimers.....	ii
Safety Precautions.....	iii
Classification.....	iv
General Cleaning Tips .....	v
Scrap Computer Recycling.....	vi
<b>SECTION 1 INTRODUCTION.....</b>	<b>1</b>
1.1    General Description .....	1
1.2    System Specifications .....	2
1.2.1    Product Specification .....	2
1.2.2    I/O System .....	3
1.2.3    System Specification.....	4
1.3    Dimensions .....	5
1.3.1    System Dimensions.....	5
1.3.2    Wall Mount Bracket Dimension (Screw: M3 *8L 6pcs).....	6
1.3.3    VESA Arm Mount Bracket Dimension (Screw: M3*8L 6pcs) .....	7
1.3.4    DIN-rail Mount Bracket Dimension (Screw: M3*6L 6pcs & M3*8L 8pcs)....	8
1.3.5    External Fan Kit Dimension (Screw: M3*6L 8pcs).....	9
1.4    I/O Outlets.....	10
1.5    Packing List.....	11
1.6    Model List .....	11
<b>SECTION 2 HARDWARE INSTALLATION .....</b>	<b>13</b>
2.1    Installing the PCI Express Mini Card .....	13
2.2    Installing the M.2 Key B 3042/3052 5G or LTE Module .....	15
2.3    Installing the M.2 Key E 2230 Wi-Fi Module .....	19
2.4    Installing LTE or Wi-Fi Antenna Cable.....	21
2.5    Installing the M.2 2280 Key M SSD Drive.....	25
<b>SECTION 3 JUMPER SETTING &amp; CONNECTOR .....</b>	<b>29</b>
3.1    Jumper & Connector Location .....	29
3.2    Connectors .....	31
3.2.1    Nano SIM Card Slot (CN1).....	32
3.2.2    Micro USB 2.0 Connector (Micro USB) (CN2) .....	32
3.2.3    HDMI Connector (CN3) .....	33
3.2.4    USB3.2 Gen2 Connector (CN5, CN6) .....	33
3.2.5    MicroSD Slot (CN8) .....	34
3.2.6    Ethernet / PoE Ports (CN20, CN22) .....	34
3.2.7    Digital I/O Connector (Female) (CN21) .....	35
3.2.8    USB2.0 Connector (CN23).....	35
3.2.9    Serial & CAN Port Connector (COM1/CAN1, COM2/CAN2) .....	36
3.2.10    External Fan Kit Connector (CN25) .....	37
3.2.11    DC Phoenix Power In Connector (CN26).....	37
3.2.12    M.2 2280 Key M PCIe x4 SSD slot (SCN1) .....	38
3.2.13    PCI-Express Mini Card Slot (SCN3) .....	39
3.2.14    M.2 2230 Key E slot (SCN4) .....	40
3.2.15    M.2 3042/3052 Key B 5G module slot (SCN5) .....	41
3.2.16    CMOS Battery Interface (BAT1) .....	42
3.2.17    Debug Port Connector (JP1) .....	42
3.2.18    AT/ATX Switch (SW1).....	42
3.2.19    Recovery Mode Switch (SW2) .....	43

3.2.20	Reset Button (SW3) .....	43
3.2.21	Remote Power Switch Connector (SW4).....	43
3.2.22	Power Button (SW5) .....	43
3.2.23	Power and Storage LED Indicator (LED2).....	44
3.2.24	LAN and PoE LED Indicator (LED1, LED3, LED4) .....	44
<b>SECTION 4 JETPACK SDK Flash Guide .....</b>		<b>45</b>
4.1	JETPACK FLASH METHOD .....	45
4.2	Image Information Inquiry Command .....	49
4.3	JTOP — Third-party Jetson Platform Monitor Tool .....	50
<b>APPENDIX A PROGRAMMABLE DIGITAL I/O.....</b>		<b>51</b>
A.1	Default Setting & Command Format .....	51
A.2	Sample Program .....	52
A.3	Register Table .....	52



# SECTION 1

## INTRODUCTION



This chapter contains general information and detailed specifications of the AIE900A-AO. Chapter 1 includes the following sections:

- General Description
- System Specifications
- Dimensions
- I/O Outlets
- Packing List
- Model List

### 1.1 General Description

The AIE900A-AO is an embedded system that comes with the NVIDIA® Jetson AGX Orin™ Series supercomputer on a module to support Linux Ubuntu 20.04, suitable for the most endurable operation. The system features a fanless design, full feature I/O, as well as one 32GB 256-Bit LPDDR5 memory. It also delivers impressive system dependability enhanced by a built-in Watchdog Timer.

#### ● Features

1. NVIDIA® Jetson AGX Orin™ 32GB (200 TOPS)
2. Seamless speed: 5G, Wi-Fi 6E, and 2.5 GbE combined
3. 24VDC with Ignition (E-Mark compliance)
4. Supports 8 PoE and GMSL for camera and LiDAR connectivity
5. -25°C to +50°C operating temperature range
6. Supports device management and optional OTA deployment powered by Allxon

- **Reliable and Stable Design**

The AIE900A-AO adopts an advanced fanless system and supports PCIe4 NVMe through M.2 connector, which makes it perfectly suitable for operation in AI computing environments, best for deploying advanced edge applications, 3D vision guided robot, autonomous mobile robot (AMR), delivery robot, and computer vision applications.

- **JetPack Supported**

The AIE900A-AO supports JetPack 5.1.1, a NVIDIA SDK providing the most comprehensive solution for building AI applications. All Jetson modules are supported by the JetPack SDK.

JetPack SDK includes est Linux Driver Package (L4T) with Linux operating system and CUDA-X accelerated libraries and APIs for deep learning, computer vision, accelerated computing and multimedia development. It also includes samples, documentation, and developer tools for both host computers and developer kits, and supports higher level SDKs such as DeepStream for streaming video analytics and Isaac for robotics.

- **O.S. Supported**

The AIE900A-AO supports Linux Ubuntu 20.04 or later.

- **Various Storage devices supported**

For maximum storage capacity, the AIE900A-AO supports one M.2 2280 Key M with PCI-Express 4.0 x4 connector, an onboard 64GB eMMC 5.1, and one microSD interface.

## 1.2 System Specifications

### 1.2.1 Product Specification

- **NVIDIA Jetson SoM**

- NVIDIA® Jetson AGX Orin™ 32GB (200 TOPS)
- NVIDIA® Jetson AGX Orin™ 64GB (275 TOPS) (By Project)

- **CPU**

- 8-core NVIDIA Arm® Cortex A78AE v8.2 64-bit CPU 2MB L2 + 4MB L3

- **GPU**

- 1792-core NVIDIA Ampere architecture GPU with 56 Tensor Cores

- **DL Accelerator**

- 2x NVDLA v2.0

- **Vision Accelerator**

- 1 x PVA v2.0

- **Storage**

- 64GB eMMC 5.1 onboard
- One M.2 2280 M Key with PCI-Express 4.0 x4 NVMe SSD slot
- One microSD slot to support optional microSD card expansion (UHS-I compatible)

- **System Memory**
  - One 32GB 256-bit LPDDR5 onboard
- **WLAN & WWAN**
  - One PCI Express Mini Card module slot to support Wi-Fi/Bluetooth/LTE/GPS modules
  - One M.2 2230 Key E slot to support Wi-Fi module
  - One M.2 3042/3052 Key B slot to support LTE/5G module

### 1.2.2 I/O System

- One lockable HDMI 2.1 for display (Resolution: up to 4096x2160 @60Hz)
- Two RJ-45 connectors for 10/100/1000/2500 Base-T Ethernet ports
- Eight RJ-45 connectors for 10/100 Base-T PoE (IEEE 802.3at; PSE), max. up to 60W

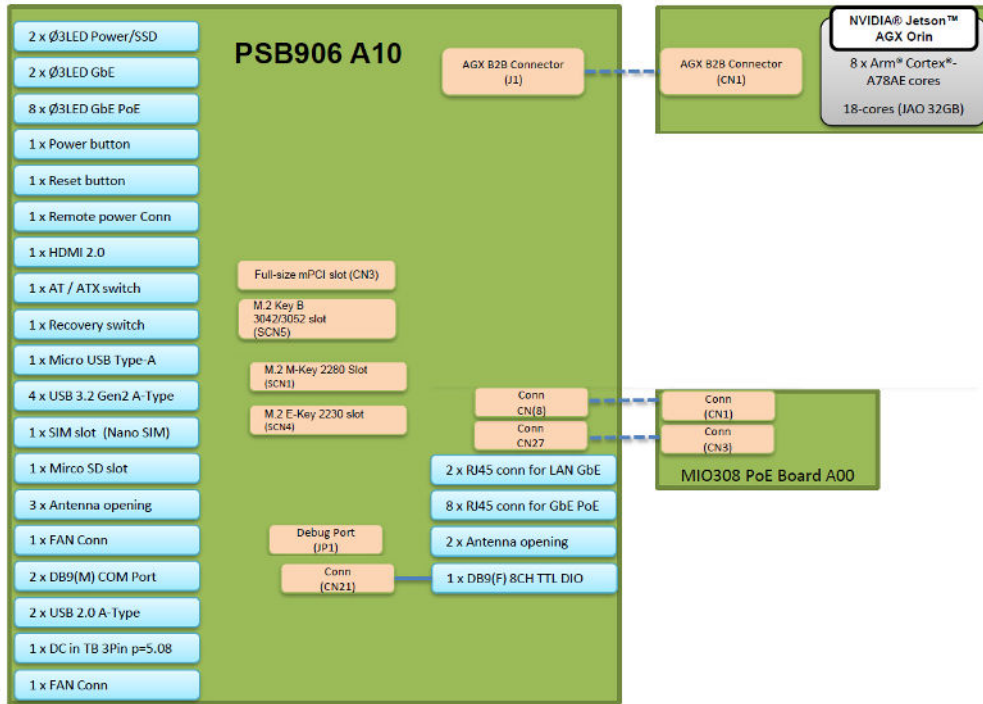


**Note:** AIE900A is a power supply device. Two PSE devices should not be connected together, which may cause the risk of power conflict. Correctly connect PD Device or switch without PoE. If you need PoE switch, please find the switch with uplink port.

- Four USB 3.2 Gen2 and two USB 2.0 connectors
- Two DB9 for CAN & RS-232/422/485 (switched by command line)
- One 8 channel DI/DO
- Front-access design for ease of updating NVIDIA JetPack SDK
  - One Micro USB connector for image flash only
  - One recovery switch
- One microSD slot for extra storage (UHS-I compatible)
- One M.2 2280 Key M with PCI-Express 4.0 x4 SSD slot for extra storage
- One full-size PCI Express Mini Card slot (USB + PCI Express signal)
- One M.2 2230 Key E slot (USB + PCI Express signal)
- One M.2 3042/3052 Key B slot (USB + PCI Express signal)
- One Nano SIM slot for 5G/LTE
- One power button, one reset button, and one AT/ATX switch
- Two indicator LEDs (System Power, M.2 Storage)
- Five SMA type connector openings for antenna installation
- One 24VDC Power connector with Ignition Power Control (Phoenix type)

## 1.2.3 System Specification

### ● Block Diagram



### ● Watchdog Timer

- Built-in NVIDIA® Jetson AGX Orin™ Series

### ● Power Supply

- Input : 24 VDC (with ignition power control)
- Inrush Current : 5.28A

### ● Operation Temperature

- -25°C to +50°C (-13°F to +122°F)

### ● Humidity

- 10% ~ 95% (non-condensation)

### ● Vibration Endurance

- 3Grms w/ M.2 SSD & 2.5" SSD storage (5-500Hz, X, Y, Z directions)

### ● Weight

- 3 kg (6.61 lb) without package
- 3.65 kg (8.04 lb) with package

### ● Dimensions

- 239 mm (9.41") (W) x 185.3 mm (7.3") (D) x 79.4 mm (3.13") (H)

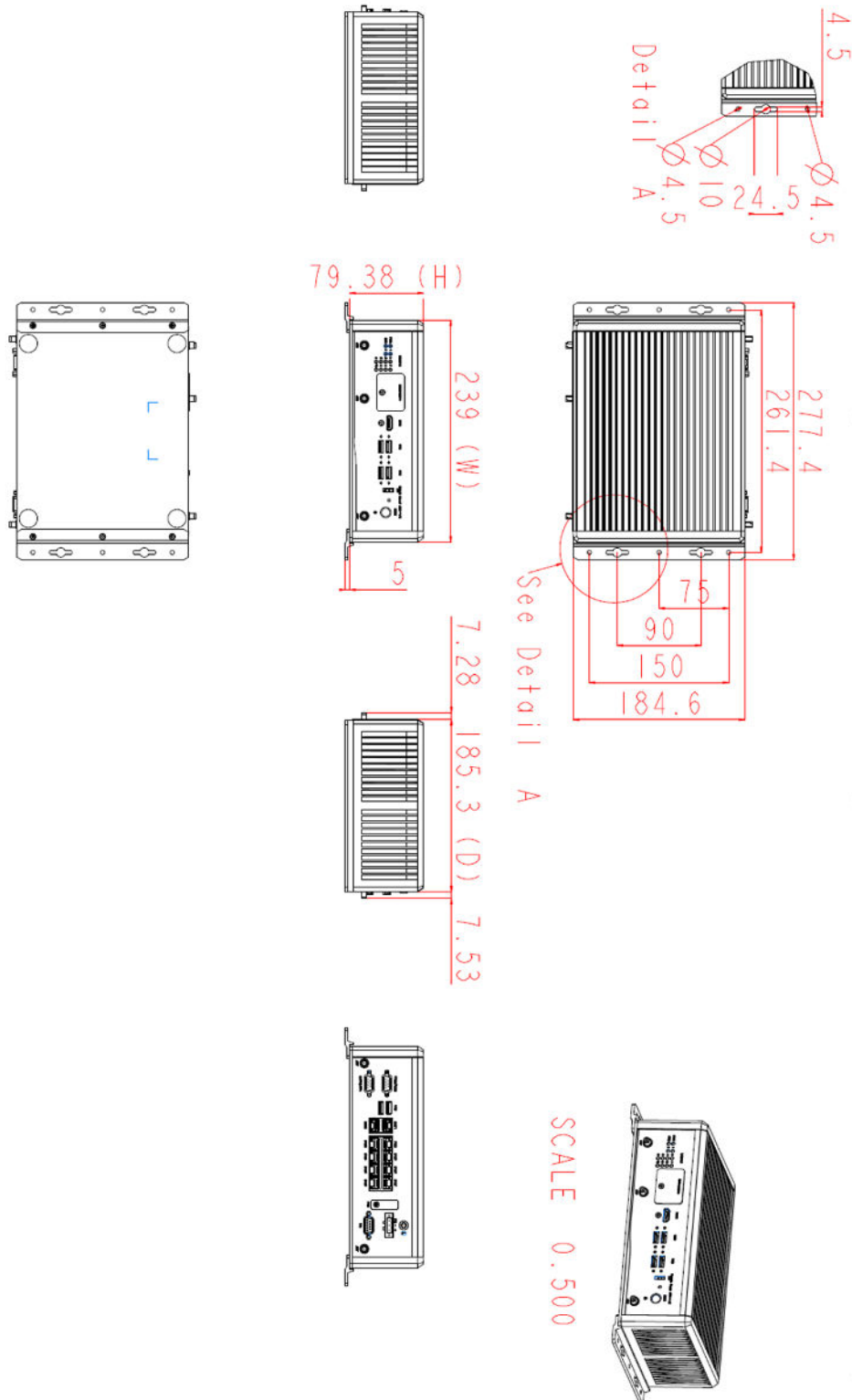


**Note:** All specifications and images are subject to change without notice.

## 1.3 Dimensions

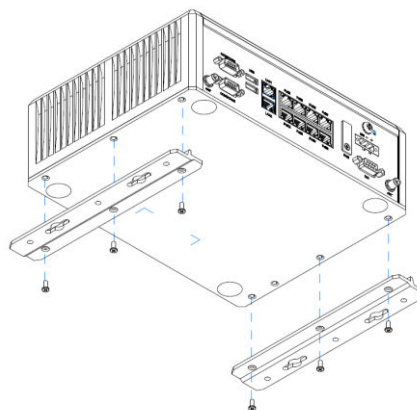
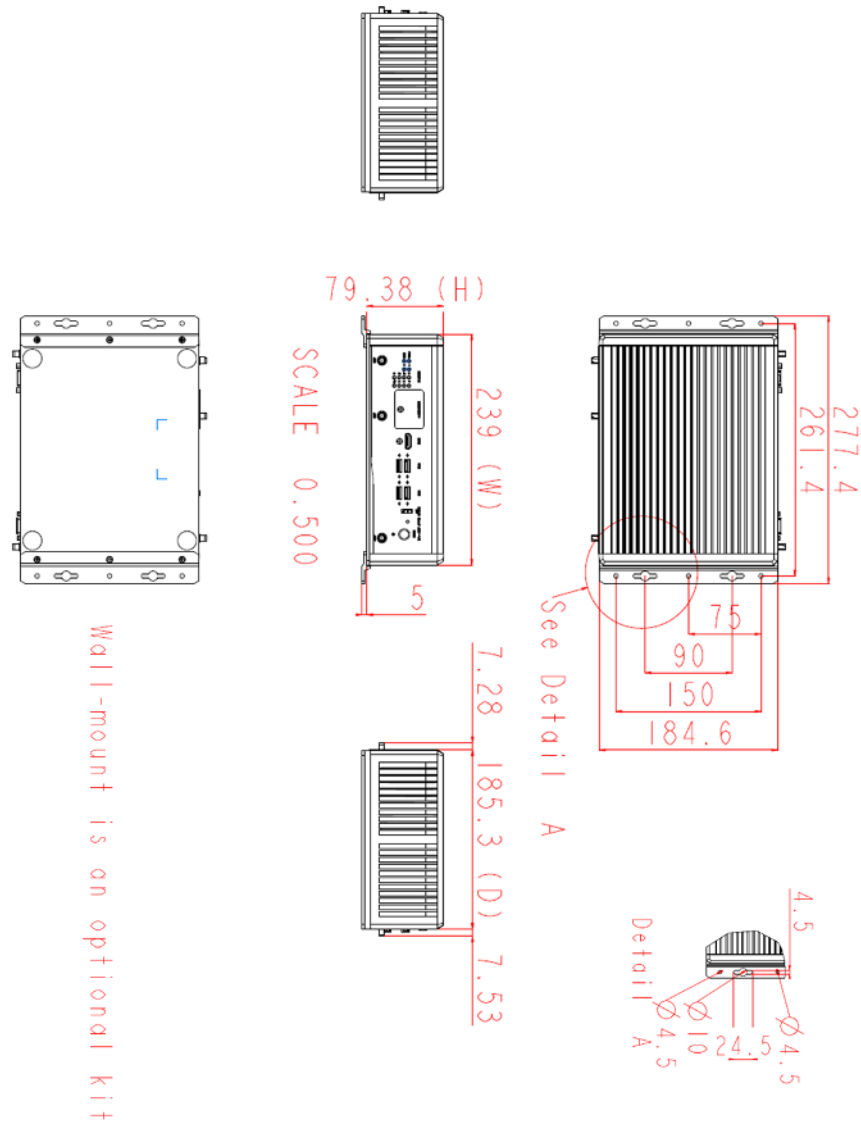
The following diagrams show you the dimensions and outlines of the AIE900A-AO.

### 1.3.1 System Dimensions

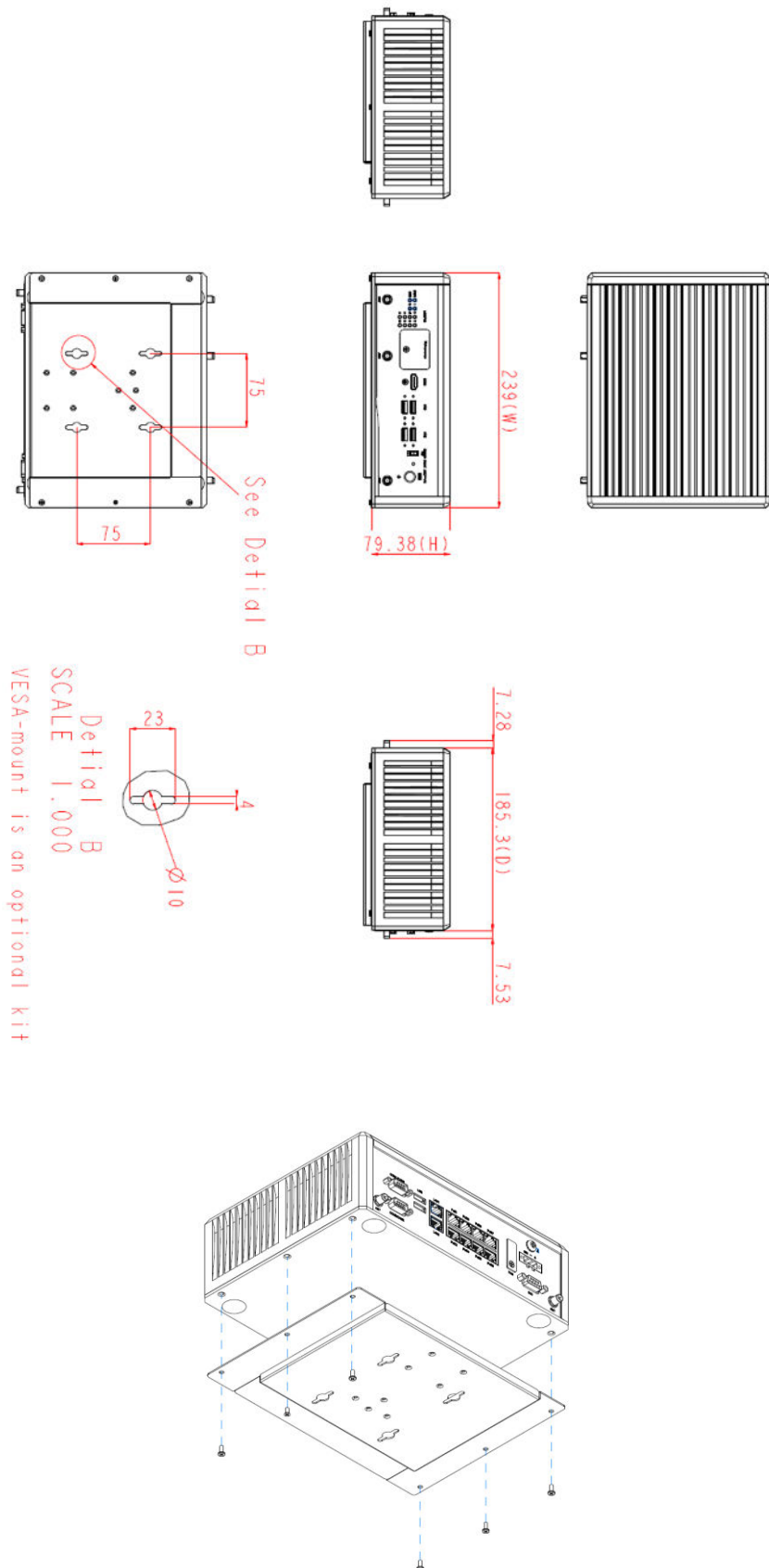


### 1.3.2 Wall Mount Bracket Dimension (Screw: M3 \*8L 6pcs)

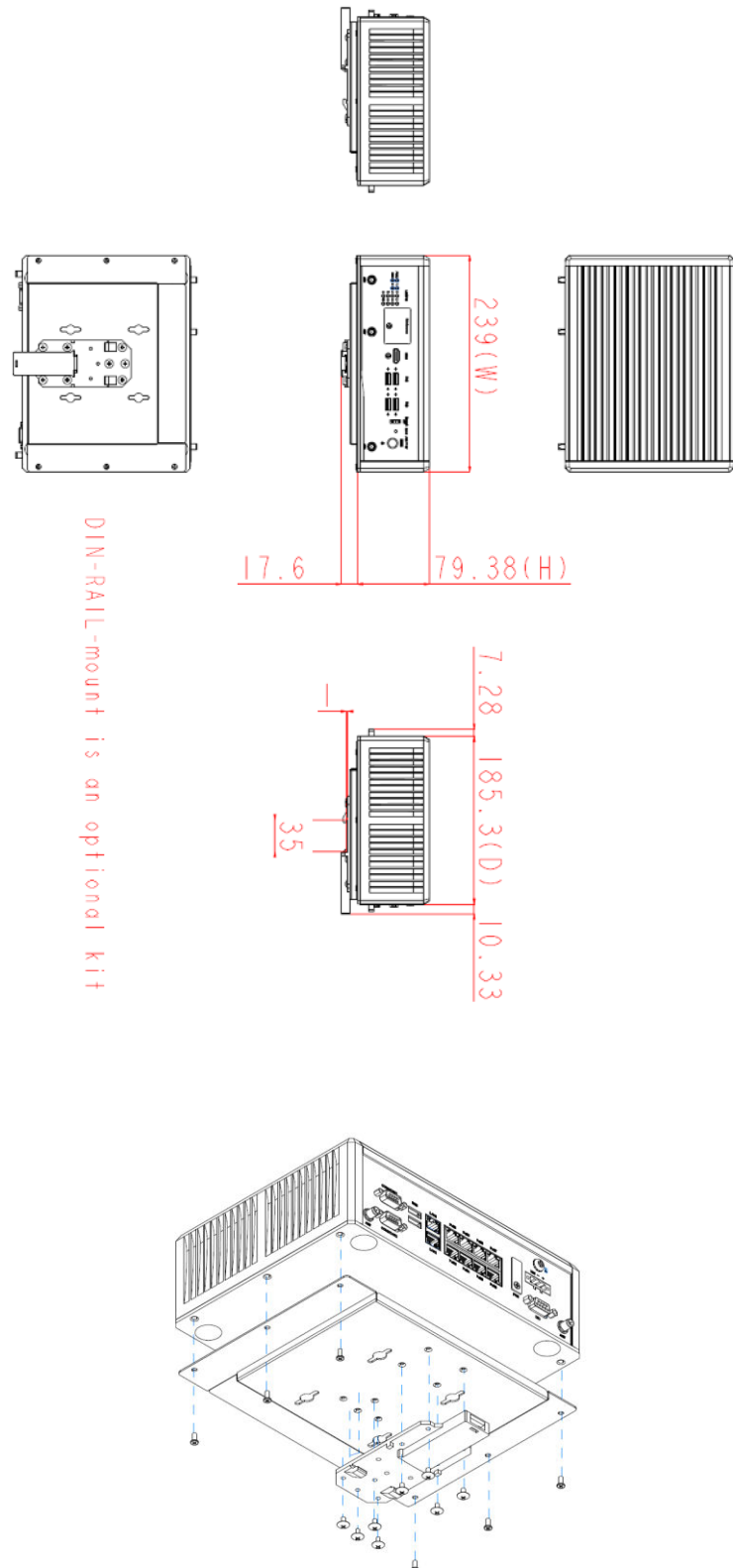
 **Mount AIE on Drywall:** Minimum screw size: M5 x 6L (Depends on the thickness of drywall)



### 1.3.3 VESA Arm Mount Bracket Dimension (Screw: M3\*8L 6pcs)

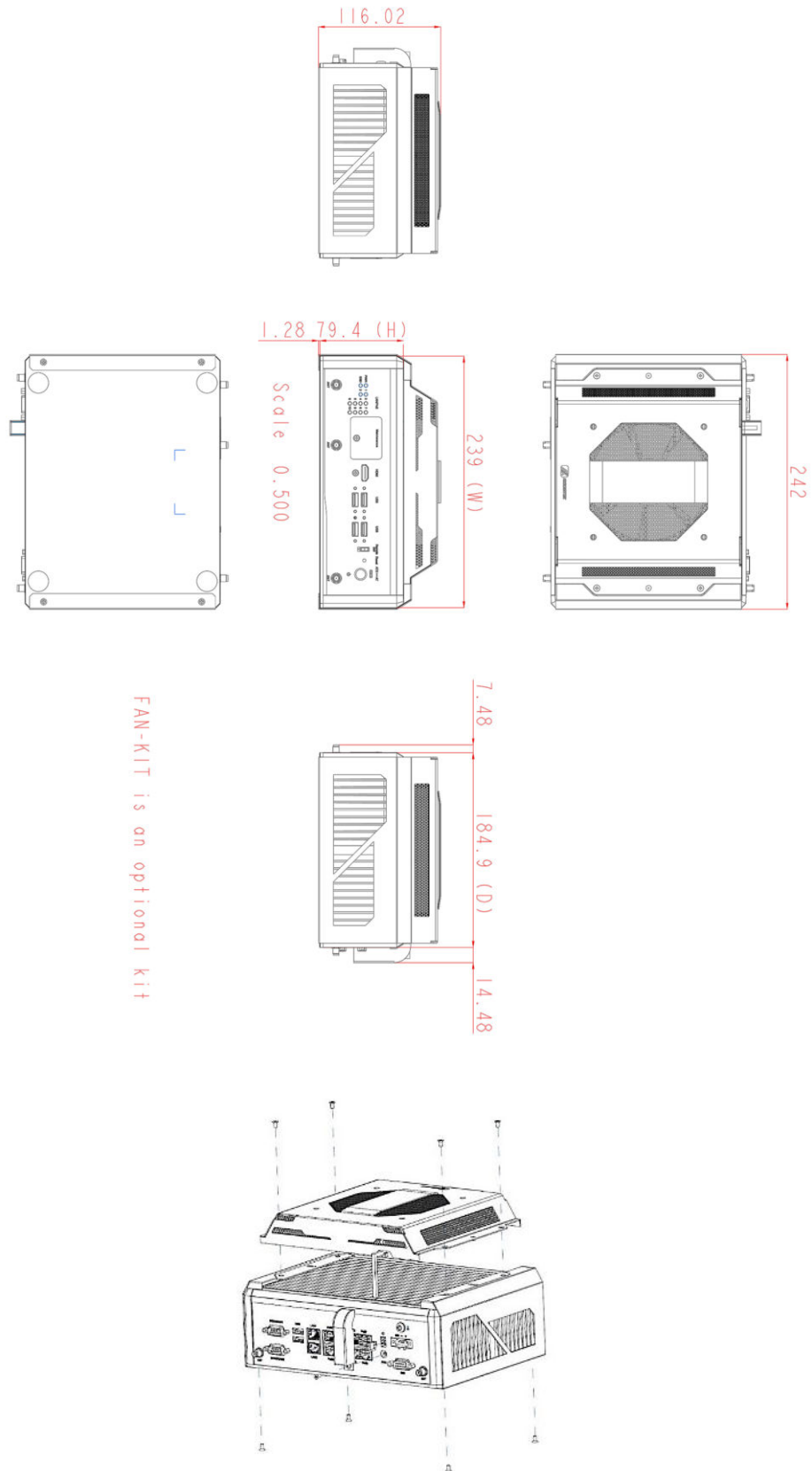


### 1.3.4 DIN-rail Mount Bracket Dimension (Screw: M3\*6L 6pcs & M3\*8L 8pcs)





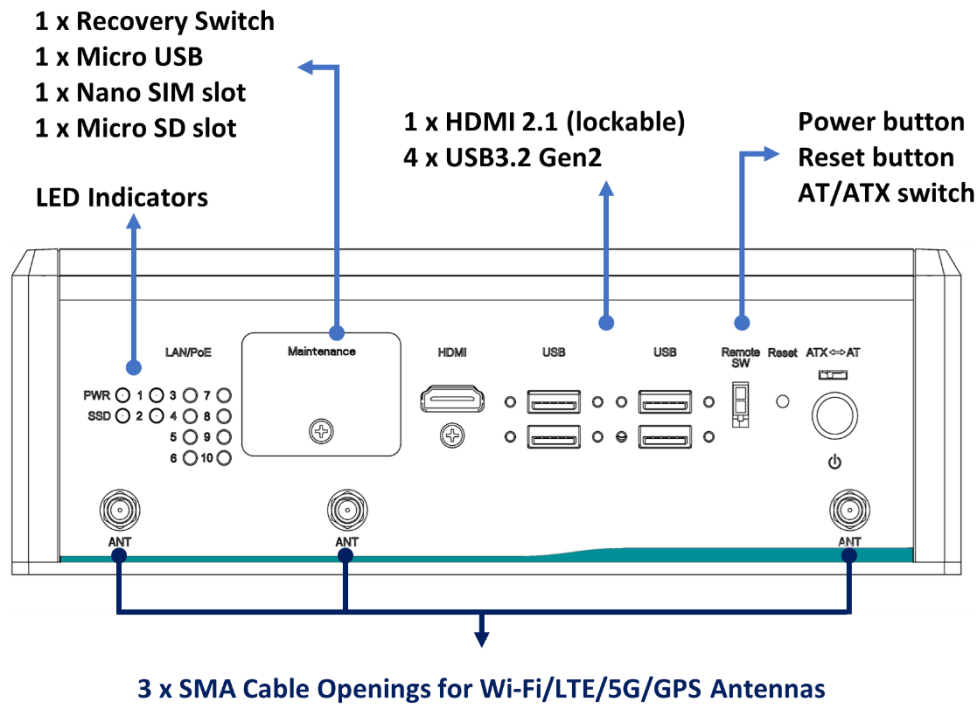
### 1.3.5 External Fan Kit Dimension (Screw: M3\*6L 8pcs)



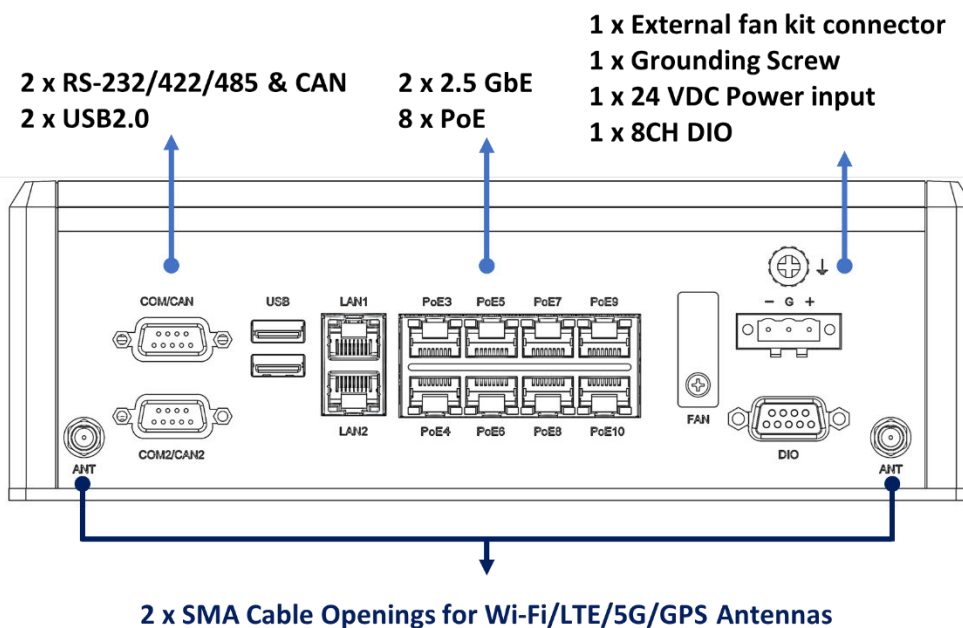
## 1.4 I/O Outlets

The following figures show you the I/O outlets on the front view of the AIE900A-AO.

### • Front View Drawing



### • Rear View Drawing



## 1.5 Packing List

The package bundled with your AIE900A-AO should contain the following items:

- **AIE900A-AO system unit x 1**
- **Foot pad x 4**
- **Screws pack x 1**
- **Terminal block x 1**
- **Remote Power Switch Cable x1**
- **M.2 SSD thermal kit x 1 (for M.2 SSD drive)**
- **M.2 5G thermal kit x 1 (for 5G module)**

※ Please visit Axiomtek's official website to download the latest product manual.

## 1.6 Model List

<b>AIE900A-AO-2L8P</b>	Fanless Edge AI System with NVIDIA® Jetson AGX Orin™ 32GB, 1 HDMI, 2 2.5GbE, 8 PoE, 6 USB, 8-CH DI/DO, and 2 COM/CAN
------------------------	--

Please contact Axiomtek's distributors immediately in case any of the abovementioned items is missing.

**This page is intentionally left blank.**

## SECTION 2 HARDWARE INSTALLATION

The AIE900A-AO is convenient for your various hardware configurations, such as SSD (Solid State Drive), M.2 Key E module, M.2 Key B module, and PCI Express Mini Card modules. Chapter 2 will show you how to install the hardware.

### 2.1 Installing the PCI Express Mini Card

**Step 1** Turn off the system, and unplug the power adaptor.

**Step 2** Flip the system upside down and loosen seven screws at the bottom side, as marked with red circles in the figure below.



**Step 3** Take off the bottom cover, and locate the PCI Express mini card slot on the board.



- Step 4** While holding the PCI Express mini card at a 45-degree angle up from the horizontal, slowly insert the golden fingers into the mini PCI Express slot, until it is fully inserted in place.



- Step 5** Press the PCI Express mini card down gently, but firmly, and then secure the mini card to the carrier by tightening up one M2 screw to the marked position.






## 2.2 Installing the M.2 Key B 3042/3052 5G or LTE Module

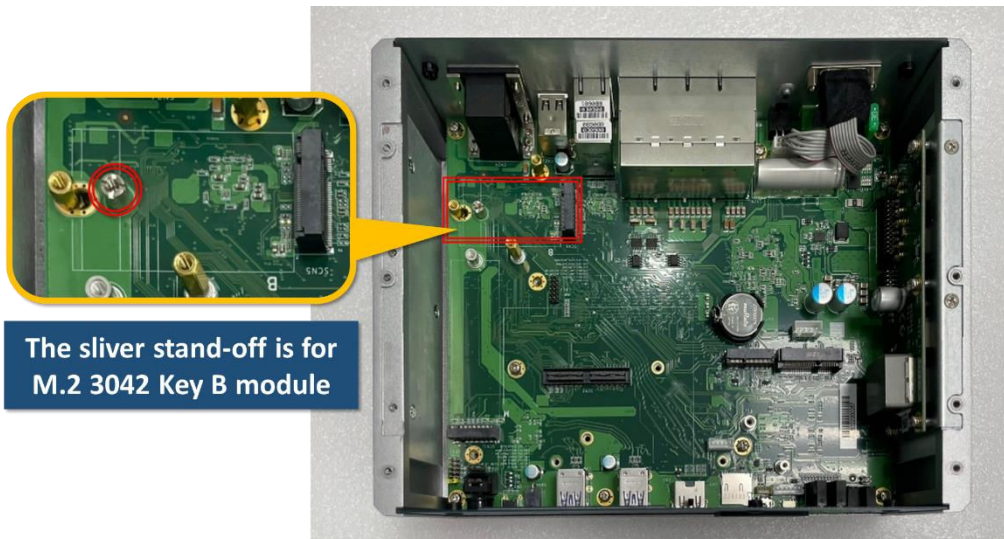
**Step 1** Turn off the system, and unplug the power adaptor.

**Step 2** Flip the system upside down and loosen seven screws at the bottom side, as marked with red circles in the figure below.

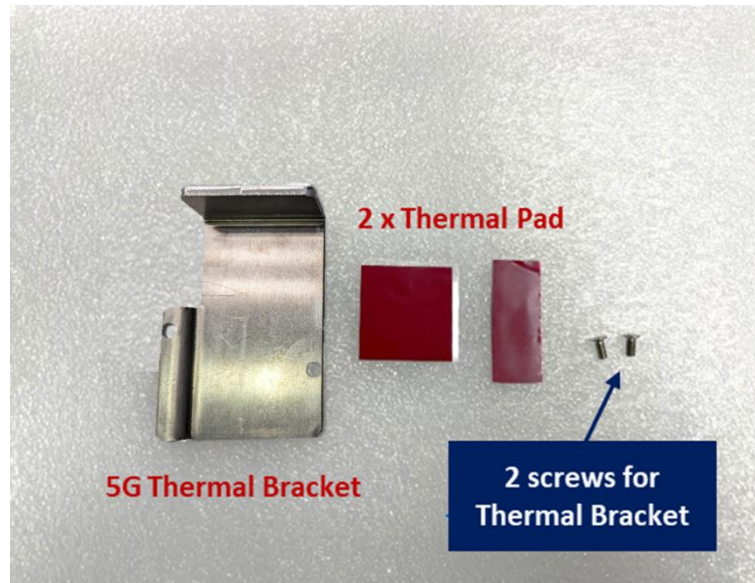


**Step 3** Take off the bottom cover, and locate the M.2 3042/3052 Key B slot on the carrier board.


 **Note:** To prevent mechanical interference, please remove the stand-off for the M.2 3042 Key B module before installing the M.2 3052 Key B module.

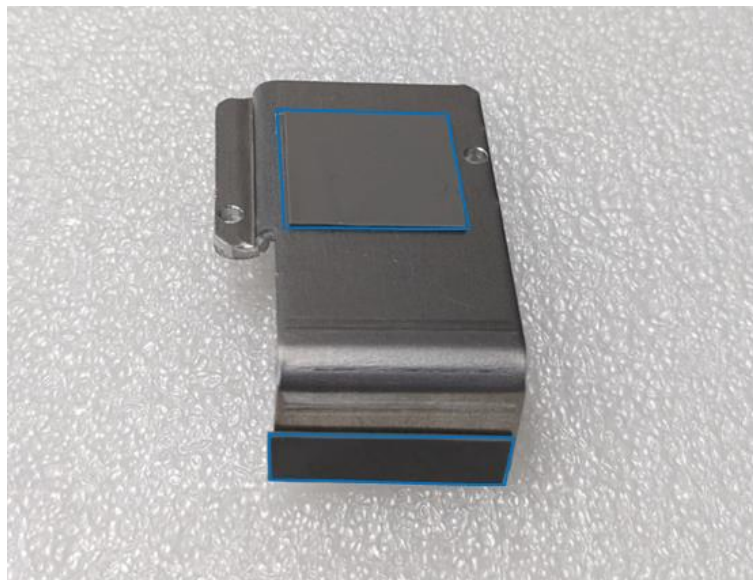


**Step 4** Take the 5G thermal bracket, two thermal pads, and two M3 screws out of the package box.



**Step 5** Attach the two thermal pads onto the 5G thermal bracket.

-  **Note:** Thermal Pad dimensions:
- 27mm (L) x 27mm (W) x 2mm (H)
  - 35mm (L) x 10mm (W) x 1mm (H)





- Step 6** While holding the M.2 Key B 3052 module at a 30 degree angle up from the horizontal, slowly insert the golden fingers into the M.2 Key B 3042/3052 slot, until it is fully inserted in place.



- Step 7** Press the M.2 Key B 3052 module down gently, but firmly, and then secure the module to the carrier by tightening up one M3 screw to the marked position.

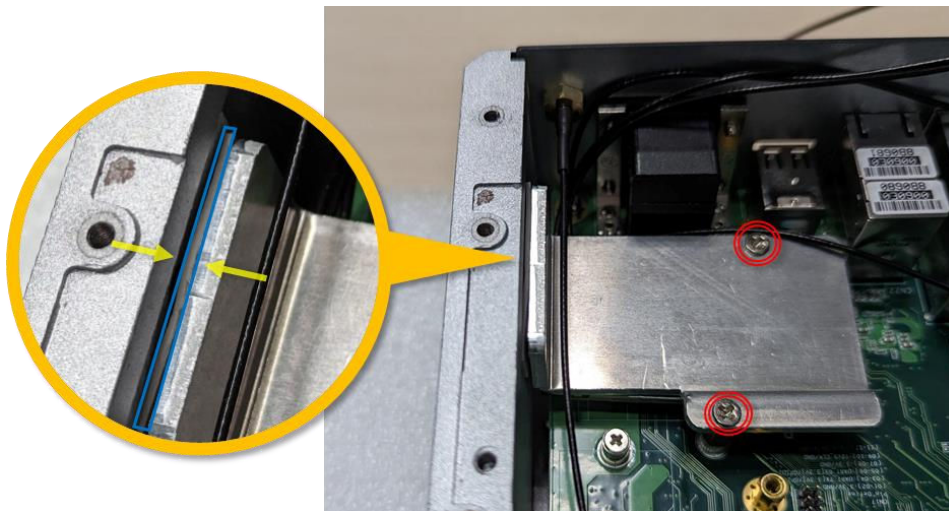
 **Note:** M3 screw requires the tightening torque: 4.5~5.5Kgf-cm



- Step 8** Refer to the section 2.4: Installing 5G or LTE or Wi-Fi Antenna Cable for the antennas cable installation and management.



- Step 9** Place the 5G thermal bracket on the M.2 Key B 3052 module, then secure the bracket to the carrier by firmly tightening the two M3 screws to the marked positions. Ensure that the thermal pad on the side is securely attached to the chassis.



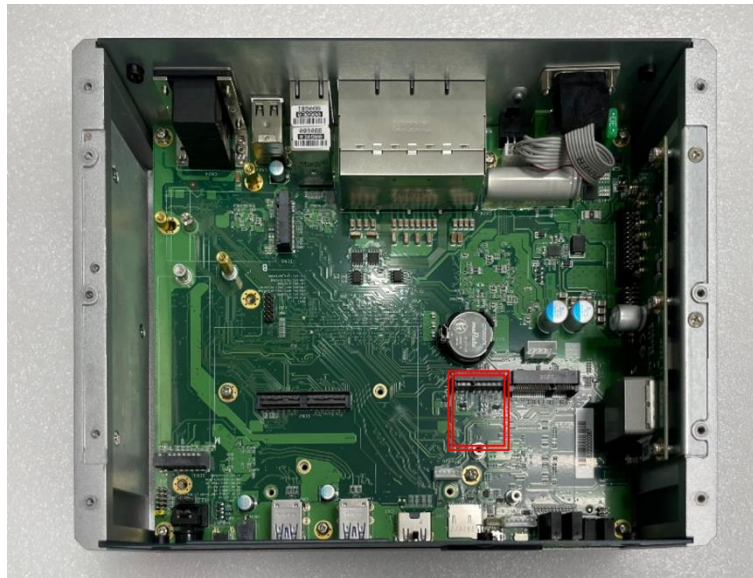
## 2.3 Installing the M.2 Key E 2230 Wi-Fi Module

**Step 1** Turn off the system, and unplug the power adaptor.

**Step 2** Flip the system upside down and loosen seven screws at the bottom side, as marked with red circles in the figure below.

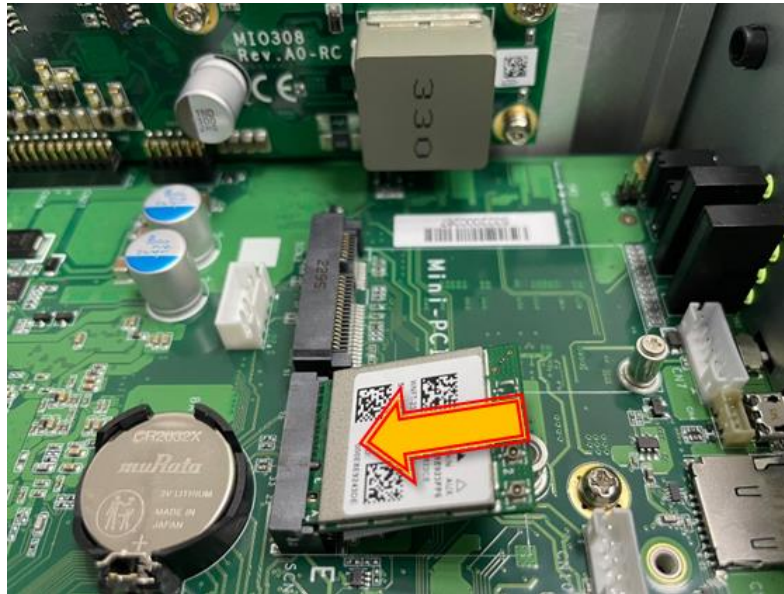


**Step 3** Take off the bottom cover, and locate the M.2 2230 Key E slot on the carrier board.





- Step 4** While holding the M.2 Key E 2230 module at a 30 degree angle up from the horizontal, slowly insert the golden fingers into the M.2 Key E 2230 slot, until it is fully inserted in place.



- Step 5** Press the M.2 Key E 2230 module down gently, but firmly, and then secure the module to the carrier by tightening up one M3 screw to the marked position.



## 2.4 Installing LTE or Wi-Fi Antenna Cable

**Step 1** Install the Mini PCIe card or M.2 Key E card or M.2 Key B module, and affix it with a screw. For more details, please refer to section 2.1 to 2.3.

### ▼ PCI Express mini card



### ▼ M.2 2230 Key E module

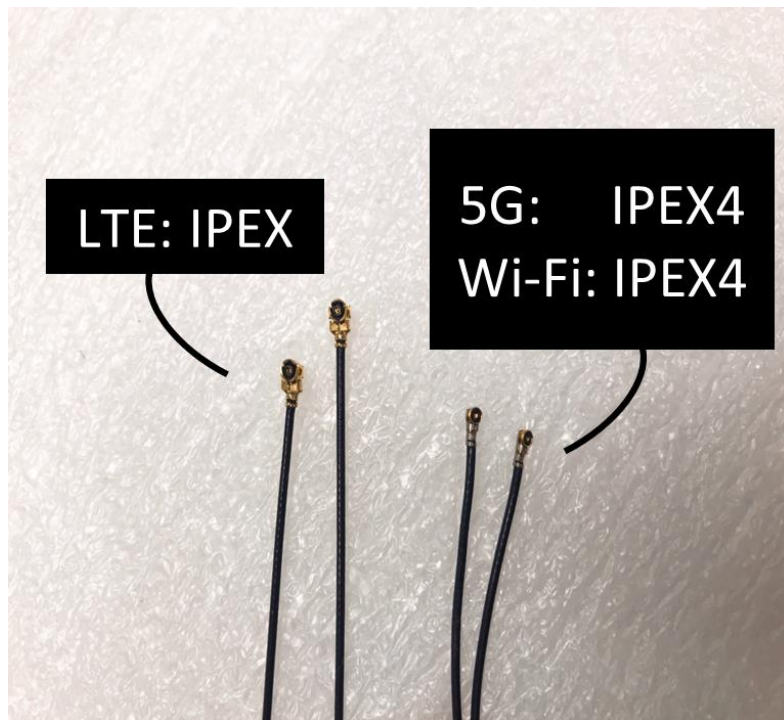
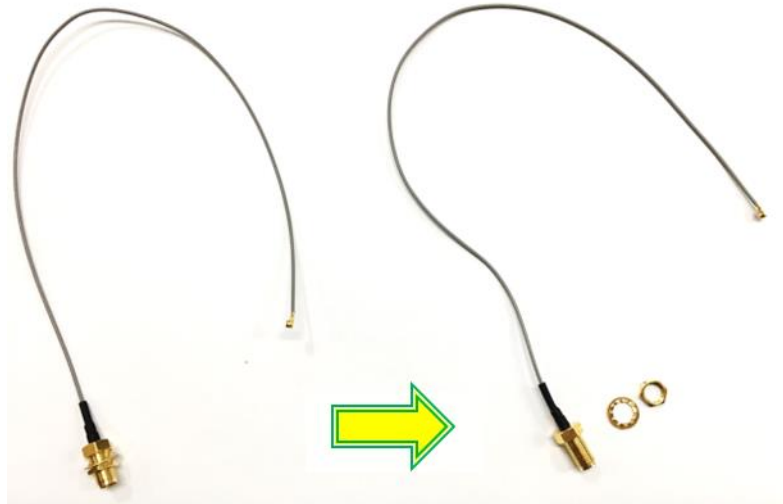


### ▼ M.2 3042/3052 Key B module



**Step 2** Take the antenna kit out of its box, and remove the hex nut and washer from the antenna cable.

 **Note:** The 5G, LTE and Wi-Fi modules come with a different type of SMA cable, one is IPEX, and another one is IPEX4. Please do not mix them up to avoid mismatch.



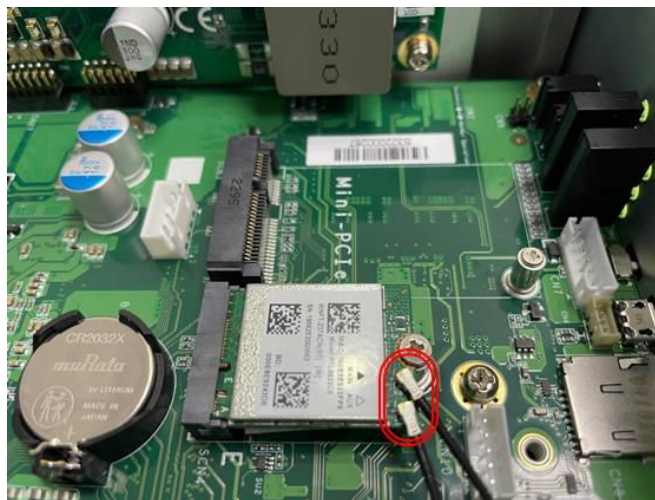


**Step 3 Connect the SMA cables to the PCI Express mini card or the M.2 Key E module or M.2 Key B module.**

▼ **PCI Express mini card**




▼ **M.2 2230 Key E module**



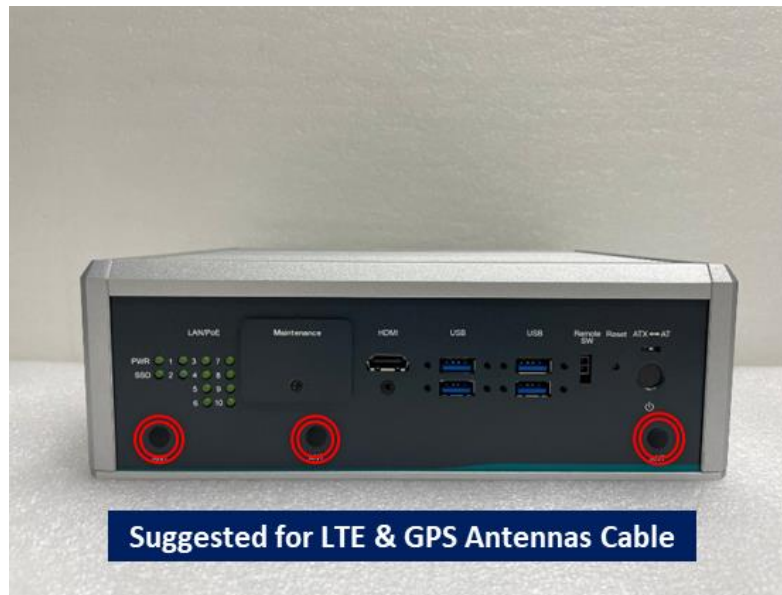
▼ **M.2 3042/3052 Key B module**



**Step 4** Install the antenna cable connectors through the openings on the chassis, put the washer and Hex nut into the antenna cable connector, and then tighten them up.

 **Note:** We suggest installing the antenna cables through the openings marked in the figure below for better cable management.

- **LTE:** Through the openings at the front of the chassis
- **Wi-Fi:** Through the openings at the rear of the chassis
- **5G:** Through the openings at both the front and rear of the chassis





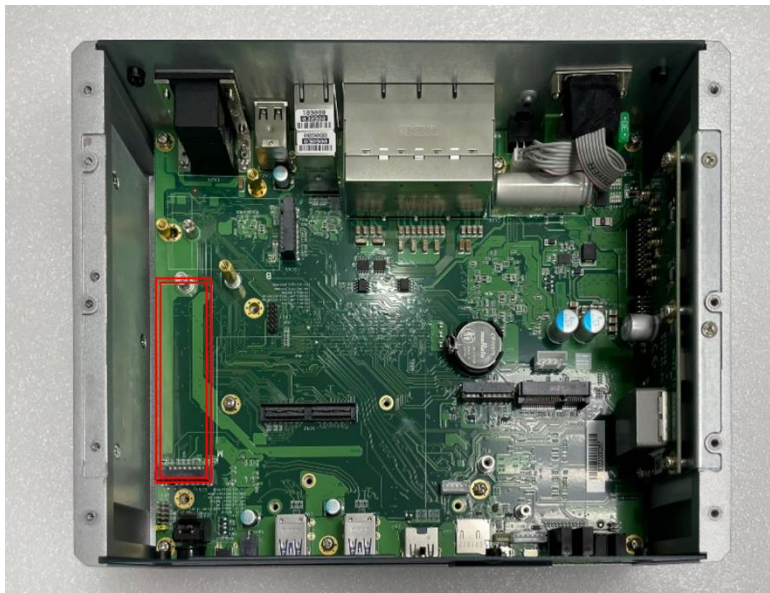
## 2.5 Installing the M.2 2280 Key M SSD Drive

**Step 1** Turn off the system, and unplug the power adaptor.

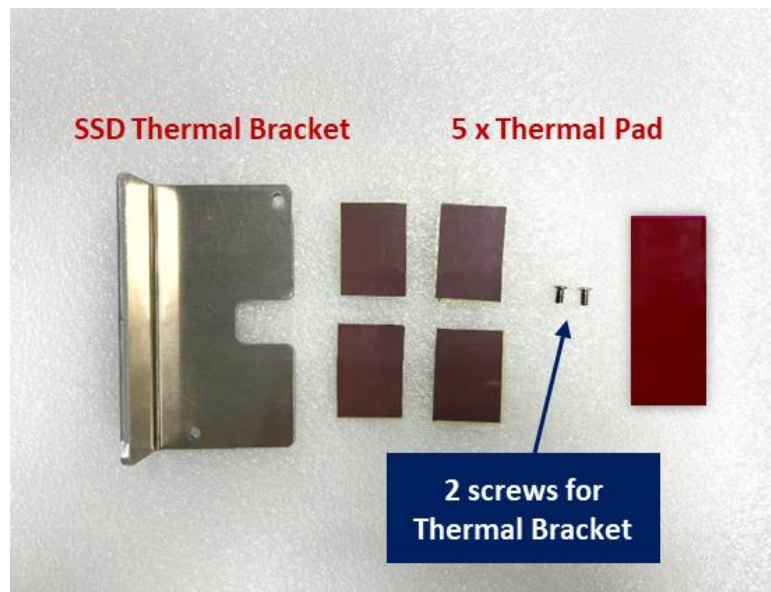
**Step 2** Flip the system upside down and loosen seven screws at the bottom side, as marked with red circles in the figure below.




**Step 3** Take off the bottom cover, and locate the M.2 2280 Key M slot on the board.

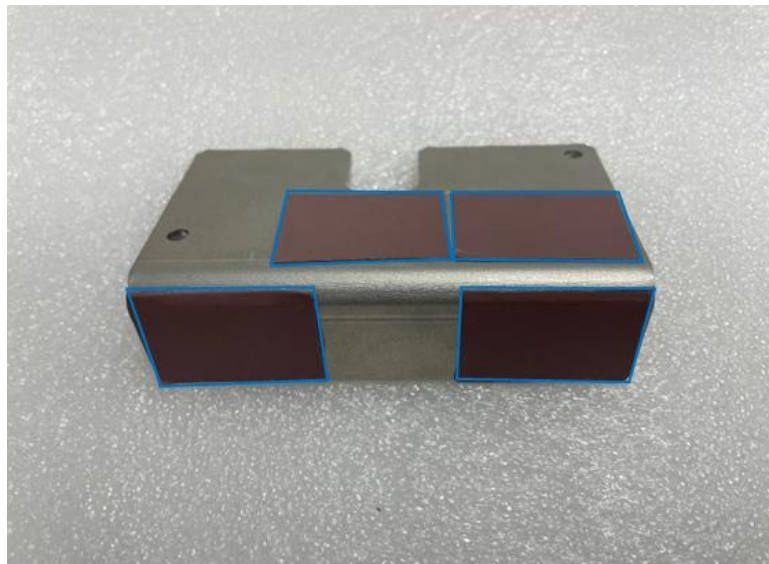


**Step 4** Take the SSD thermal bracket, five thermal pads, and two M3 screws out of the package box.




**Step 5** Attach the four smaller thermal pads onto the SSD thermal bracket.

 **Note:** Thermal Pad dimension: 32mm (L) x 23mm (W) x 0.5mm (H)



**Step 6** Apply the larger thermal pad onto the M.2 2280 Key M slot.

 **Note:** Thermal Pad dimension: 60mm (L) x 25mm (W) x 5.5mm (H)



**Step 7** While holding the M.2 2280 Key M SSD drive at a 30-degree angle up from the horizontal, slowly insert the golden fingers into the M.2 2280 Key M slot, until it is fully inserted in place.

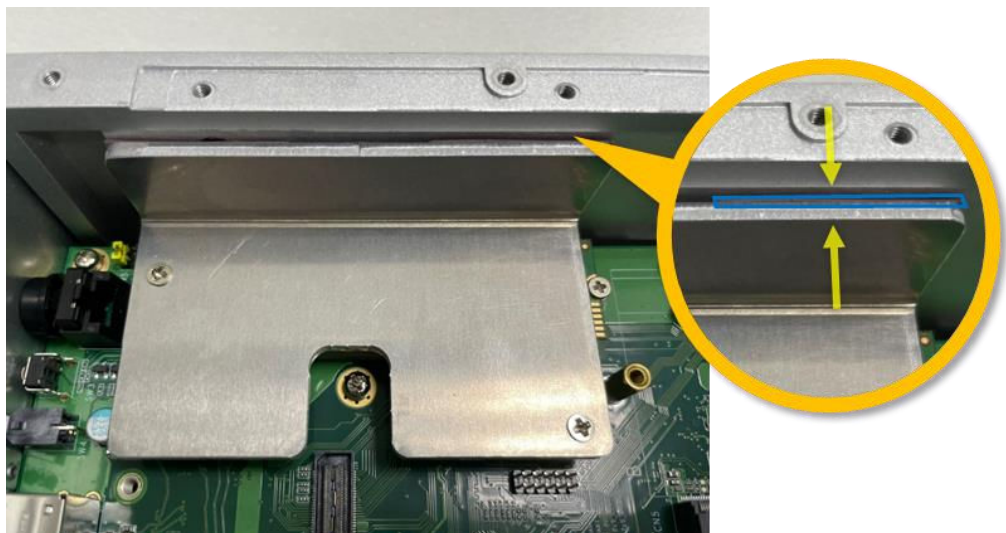




- Step 8** Press the M.2 2280 Key M SSD drive down gently, but firmly, and then secure the M.2 2280 Key M SSD drive to the carrier by tightening up one M3 screw to the marked position.



- Step 9** Place the SSD thermal bracket on the M.2 2280 Key M SSD drive, then secure the bracket to the carrier by firmly tightening the two M3 screws to the marked positions. Ensure that the thermal pad on the side is securely attached to the chassis.



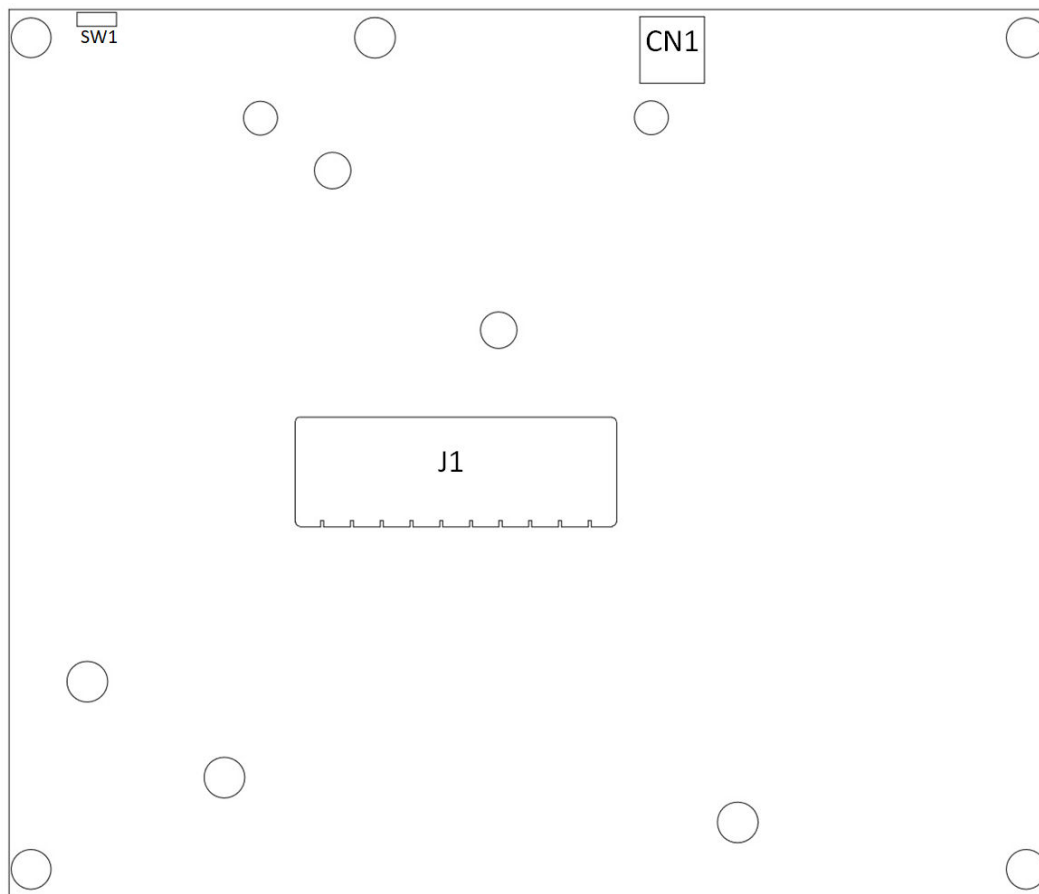
## SECTION 3

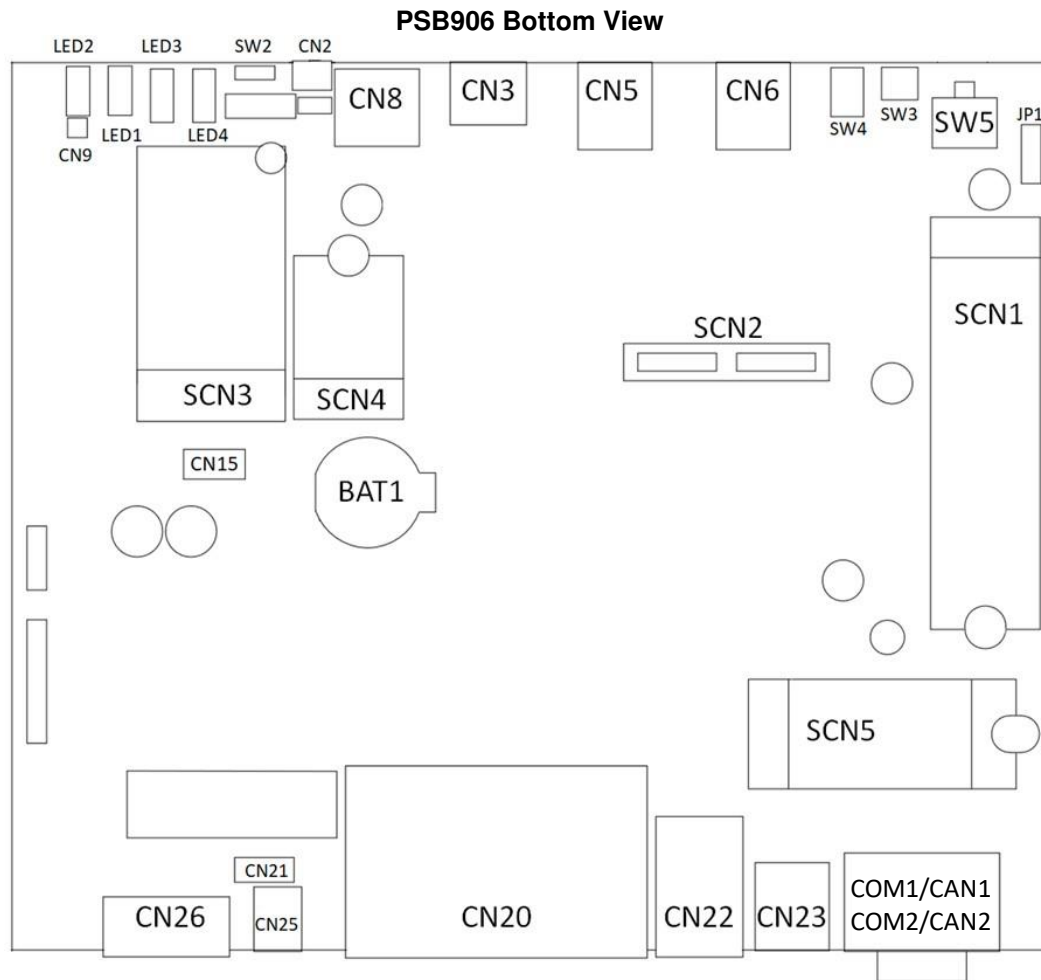
# JUMPER SETTING & CONNECTOR

Proper jumper settings configure the **AIE900A-AO** to meet your application purpose. This section explains all jumpers and connectors as well as their default settings for onboard devices, respectively.

### 3.1 Jumper & Connector Location

PSB906 Top View





**Note:** We strongly recommended that you should not modify any unmentioned jumper setting without Axiomtek FAE's instruction. Any modification without instruction might cause damage to the system.

## 3.2 Connectors

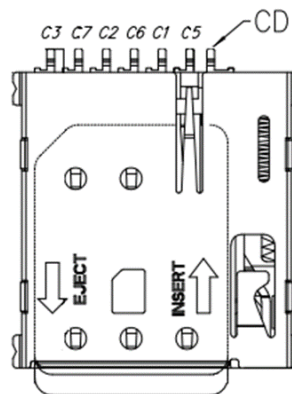
Connectors connect the board with other parts of the system. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected. Here is a summary table showing you all connectors and buttons on the **AIE900A-AO** Series.

External Connectors / Buttons	PCB Location	Section
Nano SIM Card Slot	CN1	3.2.1
Micro USB2.0 Connector (For Jetpack flash only)	CN2	3.2.2
HDMI Connector	CN3	3.2.3
USB3.2 Gen2 Connector	CN5 CN6	3.2.4
MicroSD Slot	CN8	3.2.5
Ethernet / PoE Ports	CN22 CN20	3.2.6
Digital I/O Connector	CN21	3.2.7
USB2.0 Connector	CN23	3.2.8
Serial & CAN Port Connector	COM1/CAN1 COM2/CAN2	3.2.9
External Fan Kit Connector	CN25	3.2.10
DC Phoenix Power In Connector	CN26	3.2.11
M.2 2280 Key M PCIe x4 SSD Slot	SCN1	3.2.12
PCI-Express Mini Card Slot	SCN3	3.2.13
M.2 2230 Key E Slot	SCN4	3.2.14
M.2 3042/3052 Key B Slot	SCN5	3.2.15
CMOS Battery Interface	BAT1	3.2.16
Debug Port	JP1	3.2.17
AT / ATX Switch	SW1	3.2.18
Recovery Mode Switch	SW2	3.2.19
Reset Button	SW3	3.2.20
Remote Power Switch Connector	SW4	3.2.21
Power Button	SW5	3.2.22
Power and Storage LED Indicator	LED1 LED3 LED4	3.2.23
LAN and PoE LED Indicator	LED2	3.2.24

### 3.2.1 Nano SIM Card Slot (CN1)

AIE900A-AO has a Nano SIM card slot (CN1). To make sure the system functions correctly, you need to use the Nano SIM card along with a 5G/LTE module. Please insert the LTE module into the PCI-Express Mini Card slot (SCN3) for LTE/3G networks. Additionally, for 5G/LTE(CAT6 or above) wireless networks, you can insert 5G/LTE module into the M.2 3042/3052 Key B slot (SCN5).

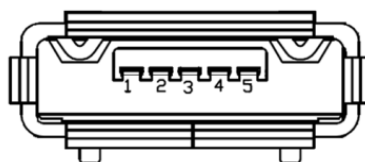
Pin	Signal
C1	UIM PWR
C2	UIM RST
C3	UIM CLK
C5	GND
C6	UIM VPP
C7	UIM DATA
CD	NC



### 3.2.2 Micro USB 2.0 Connector (Micro USB) (CN2)

The CN2 is specifically designed for image flashing only. To flash Jetpack, please switch SW2 to ON before booting up the system, which would force the system to recovery mode.

Pin	Signal
1	+5V
2	USB0 DN
3	USB0 DP
4	NC
5	GND

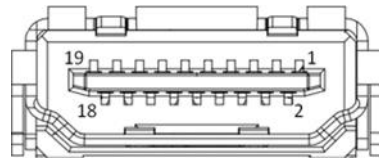




### 3.2.3 HDMI Connector (CN3)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

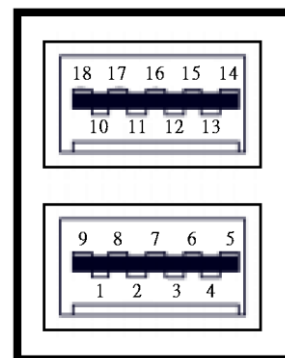
Pin	Signal	Pin	Signal
1	HDMI1_DATA2+	2	GND
3	HDMI1_DATA2-	4	HDMI1_DATA1+
5	GND	6	HDMI1_DATA1-
7	HDMI1_DATA0+	8	GND
9	HDMI1_DATA0-	10	HDMI1_CLK+
11	GND	12	HDMI1_CLK-
13	NC	14	NC
15	HDMI1_SCL	16	HDMI1_SDA
17	GND	18	+5V
19	HDMI_HTPLG		



### 3.2.4 USB3.2 Gen2 Connector (CN5, CN6)

The Universal Serial Bus connectors (CN5, CN6) are compliant with the USB 3.2 Gen2 (10Gbps) standard. These connectors are perfect for connecting USB peripherals like keyboards, mice, scanners, and more.

Pin	Signal	Pin	Signal
1	5V_USB1	10	5V_USB2
2	USB1_D-	11	USB2_D-
3	USB1_D+	12	USB2_D+
4	GND	13	GND
5	USB_SS1_RX-	14	USB_SS2_RX-
6	USB_SS1_RX+	15	USB_SS2_RX+
7	GND	16	GND
8	USB_SS1_TX-	17	USB_SS2_TX-
9	USB_SS1_TX+	18	USB_SS2_TX+



### 3.2.5 MicroSD Slot (CN8)

The Micro Secure Digital (SD) is a type of flash memory card format utilized in portable devices such as notebooks and digital cameras.

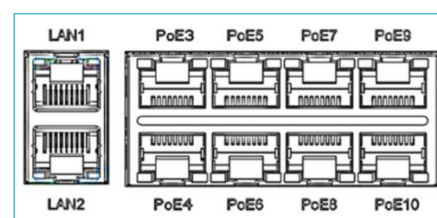
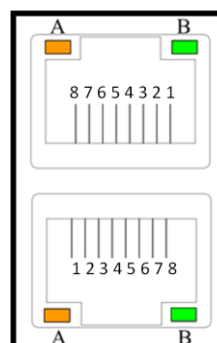
Pin	Signal	Pin	Signal
1	DATA1	5	+3.3VS
2	DATA0	6	CMD
3	GND	7	DATA3
4	CLK	8	DATA2



### 3.2.6 Ethernet / PoE Ports (CN20, CN22)

The AIE900A-AO is equipped with 10 RJ-45 connectors: CN20 and CN22 (Intel® I226-IT). Among these, CN22 offers two 2.5GbE ports, while CN20 provides eight 10/100Mbps PoE ports (non-isolated). The PoE ports are compliant with IEEE 802.3at class 4 standards, and the total power budget reaches 60 Watts for 8 channels of PoE (The PoE numbering begins at PoE3).

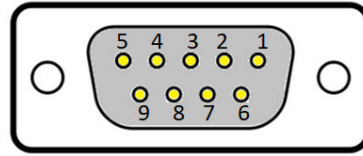
CN20 (10/100Mbps PoE, PSE)		CN22 (2.5 GbE)
Pin	Signal	
1	Tx+(Data transmission positive)	
2	Tx-(Data transmission negative)	
3	Rx+(Data reception positive)	
4	RJ-1(For 1000 base T-Only)	
5	RJ-1(For 1000 base T-Only)	
6	Rx- (Data reception negative)	
7	RJ-1(For 1000 base T-Only)	
8	RJ-1(For 1000 base T-Only)	
A	Status LED No Link: OFF Link: Yellow Data activity: Yellow Blank	
	PoE Link Speed LED 10Mb/s: OFF 100Mb/s: Green 1Gb/s: Yellow LAN Link Speed LED 10Mb/s or 100Mb/s: OFF 1Gb/s: Orange 2.5Gb/s: Green	



### 3.2.7 Digital I/O Connector (Female) (CN21)

The AIE900A-AO features a single 8-Channel digital I/O connector, which can be managed through software programming.

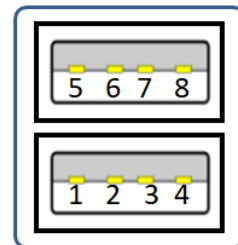
Pin	Signal	Pin	Signal
1	DIO1	2	DIO2
3	DIO3	4	DIO4
5	DIO5	6	DIO6
7	DIO7	8	DIO8
9	GND		



### 3.2.8 USB2.0 Connector (CN23)

The Universal Serial Bus connectors are designed to be compliant with the USB 2.0 (480Mbps) standard, making them suitable for connecting USB peripherals like keyboards, mice, scanners, and more.

Pin	Signal	Pin	Signal
1	5V_USB1	5	5V_USB2
2	USB1_D-	6	USB2_D-
3	USB1_D+	7	USB2_D+
4	GND	8	GND



### 3.2.9 Serial & CAN Port Connector (COM1/CAN1, COM2/CAN2)

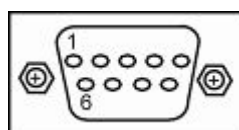
AIE900A-AO features two DB9 connectors for two serial ports (RS-232 / RS-422 / RS-485) as well as two CAN-bus ports, with the default setting being RS-232 and CAN-bus. Users have the flexibility to choose between RS-232, RS-422, or RS-485 through command line.



#### Note:

- The COM signals originate from UART signals on NVIDIA® Jetson AGX Orin™. NVIDIA's official mapping designates: COM1 corresponds to “ttyTHS0”, and COM2 corresponds to “ttyTHS1”.
- Baud Rate: 50~115200

Pin	RS-232	RS-422	RS-485
1		TX-	DATA-
2	RXD	TX+	DATA+
3	TXD	RX+	
4		RX-	
5	GND		
6	CAN_H		
7	RTS		
8	CTS		
9	CAN_L		



#### [Command Line]:

```
$ sudo su
$ cd /sys/devices/platform/f81435_mode_ctrl/f81435/
```

[Switch to RS232]: (Default Mode)

```
$ echo rs232 > uartMode
$ cat uartMode
```

[Switch to RS422]:

```
$ echo rs422 > uartMode
$ cat uartMode
```


[Switch to RS485]:

```
$ echo rs485 > uartMode
$ cat uartMode
```

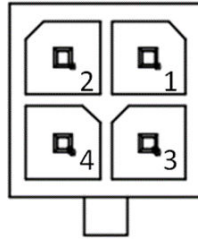
```
nvidia@nvidia-desktop:~$ sudo su
[sudo] password for nvidia:
root@nvidia-desktop:/home/nvidia# cd /sys/devices/platform/f81435_mode_ctrl/f81435/
root@nvidia-desktop:/sys/devices/platform/f81435_mode_ctrl/f81435# cat uartMode
rs232
root@nvidia-desktop:/sys/devices/platform/f81435_mode_ctrl/f81435# echo rs422 > uartMode
root@nvidia-desktop:/sys/devices/platform/f81435_mode_ctrl/f81435# cat uartMode
rs422
root@nvidia-desktop:/sys/devices/platform/f81435_mode_ctrl/f81435# echo rs485 > uartMode
root@nvidia-desktop:/sys/devices/platform/f81435_mode_ctrl/f81435# cat uartMode
rs485
```

### 3.2.10 External Fan Kit Connector (CN25)

The AIE900A-AO is designed with an optional external fan kit to enhance AI computing performance and extend the operating temperature range. CN25 serves as the fan connector, making it easy and effortless for users to install and maintain the external fan kit.

 **Note:** For more details on external fan kit installation and maintenance, please refer to the section 1.3.5: External Fan Kit Dimension

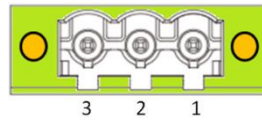
Pin	Signal
1	TACH
2	GND
3	12V
4	PWM



### 3.2.11 DC Phoenix Power In Connector (CN26)

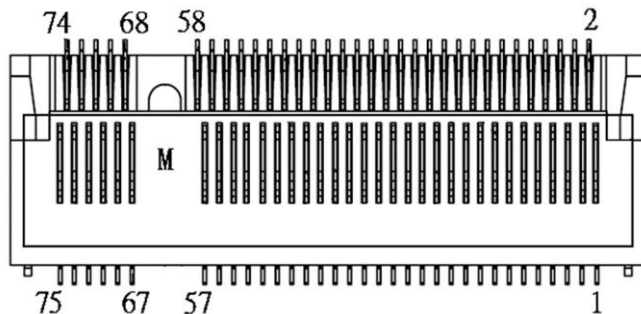
The AIE900A-AO supports a 24V Phoenix DC-in connector for system power input.

Pin	Signal
1	DC IN
2	GND
3	Ignition



### 3.2.12 M.2 2280 Key M PCIe x4 SSD slot (SCN1)

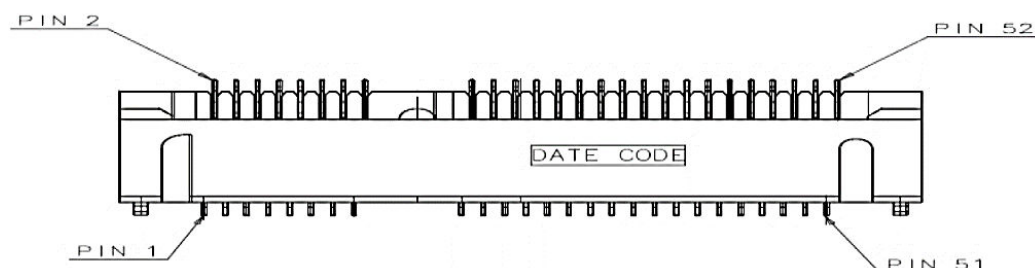
The AIE900A-AO is equipped with one M.2 2280 Key M slot that supports PCI-Express 4.0 x4 NVMe SSD for additional storage capacity.



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	+3.3V	3	GND	4	+3.3V
5	PEX3_RX-	6	NC	7	PEX3_RX+	8	NC
9	GND	10	LED_1#	11	PEX3_TX-	12	+3.3V
13	PEX3_TX+	14	+3.3V	15	GND	16	+3.3V
17	PEX2_RX-	18	+3.3V	19	PEX2_RX+	20	NC
21	GND	22	NC	23	PEX2_TX-	24	NC
25	PEX2_TX+	26	NC	27	GND	28	NC
29	PEX1_RX-	30	NC	31	PEX1_RX+	32	NC
33	GND	34	NC	35	PEX1_TX-	36	NC
37	PEX1_TX+	38	NC	39	GND	40	NC
41	PEX0_RX-	42	NC	43	PEX0_RX+	44	NC
45	GND	46	NC	47	PEX0_TX-	48	NC
49	PEX0_TX+	50	PERST#	51	GND	52	CLKREQ#
53	PEX0_REFCLK <sub>n</sub>	54	PEWAKE#	55	PEX0_REFCLK <sub>p</sub>	56	NC
57	GND	58	NC	59	CONNECTOR Key M	60	CONNECTOR Key M
61	CONNECTOR Key M	62	CONNECTOR Key M	63	CONNECTOR Key M	64	CONNECTOR Key M
65	CONNECTOR Key M	66	CONNECTOR Key M	67	NC	68	NC
69	NC	70	+3.3V	71	GND	72	+3.3V
73	GND	74	+3.3V	75	GND		

### 3.2.13 PCI-Express Mini Card Slot (SCN3)

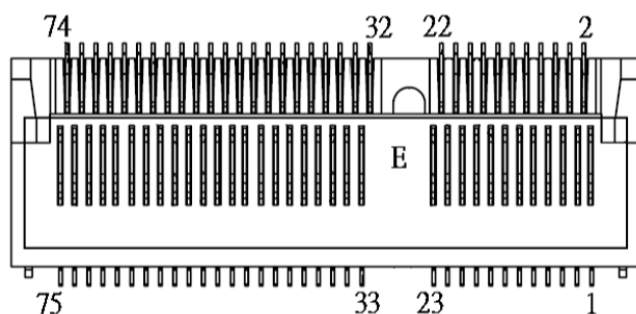
The AIE900A-AO features a full-size PCI-Express Mini Card slot known as SCN3. It can handle both PCI-Express and USB 2.0 signals, following the PCI-Express Mini Card Specification Version 1.2.



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	WAKE#	2	+3.3V	3	NC	4	GND
5	NC	6	+1.5V	7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA	11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_RESET	15	GND	16	UIM_VPP
17	NC	18	GND	19	NC	20	Pull up to +3.3V
21	GND	22	PERST#	23	PEX2_RX-	24	+3.3V
25	PEX2_RX+	26	GND	27	GND	28	+1.5V
29	GND	30	NC	31	PEX2_TX-	32	NC
33	PEX2_TX+	34	GND	35	GND	36	USB2.0_D-
37	GND	38	USB2.0_D+	39	+3.3V	40	GND
41	+3.3V	42	LED_WWAN#	43	GND	44	NC
45	NC	46	NC	47	NC	48	+1.5V
49	NC	50	GND	51	NC	52	+3.3V

### 3.2.14 M.2 2230 Key E slot (SCN4)

The AIE900A-AO features one M.2 2230 Key E slot designed for Wi-Fi module usage.



Pi n	Signal	Pi n	Signal	Pi n	Signal	Pi n	Signal
1	GND	2	+3.3V	3	USB_D+	4	+3.3V
5	USB_D-	6	NC	7	GND	8	NC
9	NC	10	NC	11	NC	12	NC
13	NC	14	NC	15	NC	16	NC
17	NC	18	GND	19	NC	20	NC
21	NC	22	NC	23	NC	24	CONNECTOR KEY E
25	CONNECTOR KEY E	26	CONNECTOR KEY E	27	CONNECTOR KEY E	28	CONNECTOR KEY E
29	CONNECTOR KEY E	30	CONNECTOR KEY E	31	CONNECTOR KEY E	32	NC
33	GND	34	NC	35	PETp0	36	NC
37	PETn0	38	NC	39	GND	40	NC
41	PERp0	42	NC	43	PERn0	44	NC
45	GND	46	NC	47	REFCLKp0	48	NC
49	REFCLKn0	50	NC	51	GND	52	PERST0#
53	CLKREQ0#	54	W_DISABLE2#	55	PEWAKE0#	56	W_DISABLE1#
57	GND	58	I2C_DATA	59	NC	60	I2C_CLK
61	NC	62	ALERT#	63	GND	64	NC
65	NC	66	NC	67	NC	68	NC
69	GND	70	NC	71	NC	72	+3.3V
73	NC	74	+3.3V	75	GND		

\* W\_DISABLE2 is controlled from GPIO26 (Pin.H51) of AGX Orin.

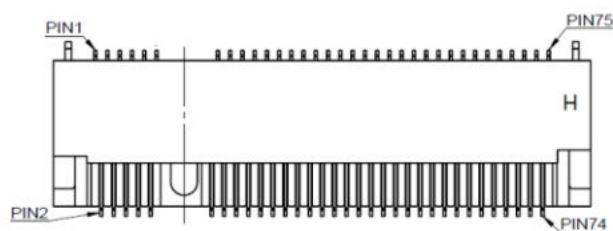
\* W\_DISABLE1# is controlled from GPIO01 (Pin.J4) of AGX Orin.

\* ALERT# is controlled from GPIO30 (Pin.B55) of AGX Orin.



### 3.2.15 M.2 3042/3052 Key B 5G module slot (SCN5)

The AIE900A-AO comes with one M.2 3042/3052 Key B USB3.2 Gen2 (10Gbps) slot for 5G or LTE (CAT6 or above) module.

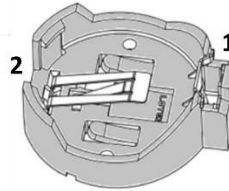


Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	Config_3	2	+3.3V	3	GND	4	+3.3V
5	GND	6	Pull up 10K ohm to 3.3V	7	USB_D+	8	Pull up 100K ohm to 3.3V
9	USB_D-	10	NC	11	GND	12	CONNECTOR KEY B
13	CONNECTOR KEY B	14	CONNECTOR KEY B	15	CONNECTOR KEY B	16	CONNECTOR KEY B
17	CONNECTOR KEY B	18	CONNECTOR KEY B	19	CONNECTOR KEY B	20	NC
21	GND	22	NC	23	Pull up 10K ohm to 1.8V	24	NC
25	NC	26	NC	27	GND	28	NC
29	USB3_RX-	30	UIM_RESET	31	USB3_RX+	32	UIM_CLK
33	GND	34	UIM_DATA	35	USB3_TX-	36	UIM_PWR
37	USB3_TX+	38	NC	39	GND	40	NC
41	NC	42	NC	43	NC	44	NC
45	GND	46	NC	47	NC	48	NC
49	NC	50	NC	51	GND	52	NC
53	NC	54	NC	55	NC	56	NC
57	GND	58	NC	59	NC	60	NC
61	NC	62	NC	63	NC	64	NC
65	NC	66	NC	67	Pull up 10K ohm to 1.8V	68	NC
69	GND	70	+3.3V	71	GND	72	+3.3V
73	NC	74	+3.3V	75	GND		

### 3.2.16 CMOS Battery Interface (BAT1)

This connector is used for CMOS battery interface.

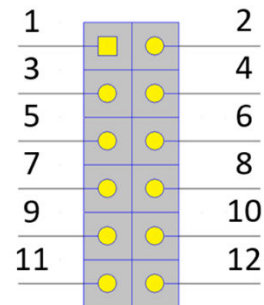
Pin	Signal
1	+VBAT
2	GND



### 3.2.17 Debug Port Connector (JP1)

CN13 serves as the UART interface (UART Port3) for debugging purposes during software development.

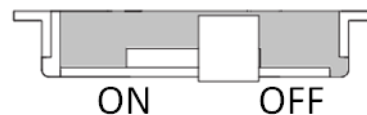
Pin	Signal	Pin	Signal
1	UART3_Debug_TX	2	UART3_Debug_RX
3	GND	4	3.3V
5	PWR Button	6	GND
7	AT Power ON Switch	8	Pull up 10k ohm to 3V3
9	Recovery Button	10	GND
11	Sleep Button	12	GND



### 3.2.18 AT/ATX Switch (SW1)

If you switch OFF SW1, the system will automatically power on upon receiving power input, without requiring you to press the soft power button. This switch enables the system to be powered on automatically.

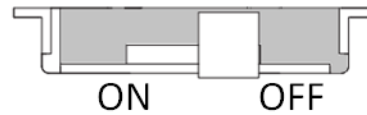
Function	Description
ON	ATX Mode
OFF	AT mode



### 3.2.19 Recovery Mode Switch (SW2)

To flash the image, please switch SW2 to ON before booting up the AIE900A-AO; this action will activate the force recovery mode.

Function	Description
ON	Recovery Mode
OFF	Normal



### 3.2.20 Reset Button (SW3)

The reset button enables users to restart the AIE900A-AO if the system encounters an issue and is not functioning correctly.

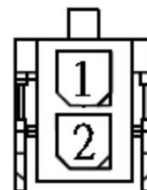
Function	Description
ON	Reset System
OFF	Keep system status



### 3.2.21 Remote Power Switch Connector (SW4)

One 2-pin connector output for remote power on/off switch.

Function	Description
Short(1-2)	Turn on/off system
Open	Keep system status



### 3.2.22 Power Button (SW5)

The power button can allow users to either turn on the AIE900A-AO or forcibly shut down the system.

Function	Description
ON	Turn on system
OFF	Forcibly shut down the system



### 3.2.23 Power and Storage LED Indicator (LED2)

The upper green LED is linked to M.2 2280 Key M solid state drive (SSD) to receive its activity signal. LED flashes every time SSD is accessed. The lower green LED (Power) is linked to power signal which lights up and will remain lsteady while the system is powered on.

LED Color	Description
Green	Power on / off
Green	M.2 Key M SSD

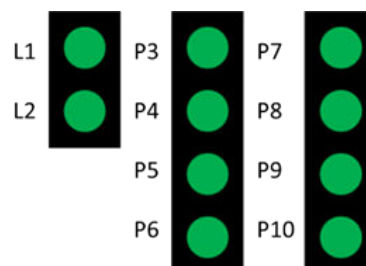


### 3.2.24 LAN and PoE LED Indicator (LED1, LED3, LED4)

LED1, LED3, and LED4 are connected to both LAN and PoE ports, receiving activity signals from them. These LEDs blink to indicate ongoing activity.

**Note:** The PoE numbering begins at PoE3, which means that the numbers for 8 PoE will range from PoE 3 to PoE 10.

LED	Description	LED	Description
L1	LAN1 Link Active LED	P6	PoE6 Link Active LED
L2	LAN2 Link Active LED	P7	PoE7 Link Active LED
P3	PoE3 Link Active LED	P8	PoE8 Link Active LED
P4	PoE4 Link Active LED	P9	PoE9 Link Active LED
P5	PoE5 Link Active LED	P10	PoE10 Link Active LED



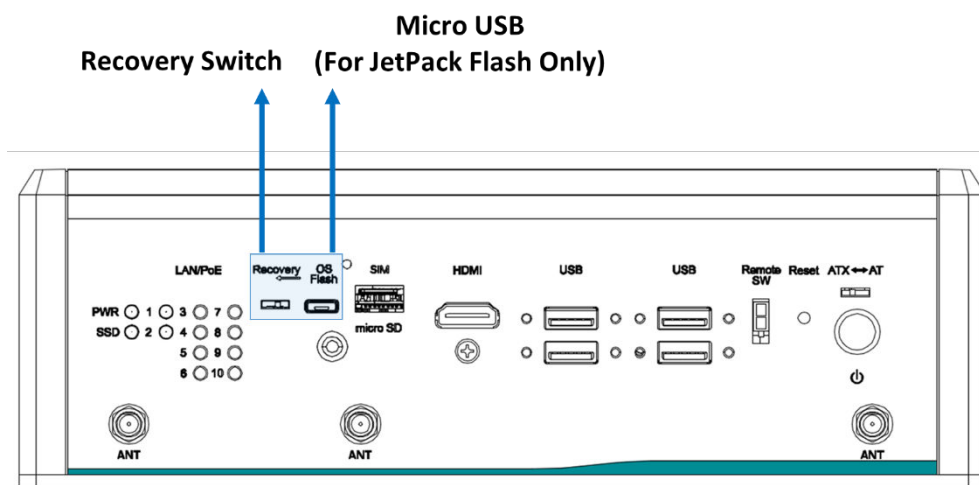
## SECTION 4

# JETPACK SDK Flash Guide

This section provides users with a detailed description of how to flash NVIDIA JetPack SDK for AIE900A-AO. Users can follow the instructions below to install or reinstall JetPack SDK by themselves.

### 4.1 JETPACK FLASH METHOD

Please use the following instructions to flash the JetPack to the AIE900A-AO.



Please contact our sales or FAE for the latest Jetpack SDK, and prepare a Linux host system running x86\_64 Ubuntu v18.04 or later.



**Note:** If the Linux host system is running x86\_64 Ubuntu v18.04, please follow the instructions below to install Python first.

Step 1. Connect the Linux host system to internet

Step 2. Install Python with the command below:

```
sudo apt-get update
sudo apt-get install python
```

Step1. Set up the AIE900A-AO connection as follows:

- Take off the Maintenance cover.
- Connect a USB cable from the Linux host system to the Micro USB port on AIE900A-AO, and switch the recovery switch to ON. For more details, please refer to **3.2.19 Recovery Mode Switch (SW2)**.
- Connect an HDMI monitor to AIE900A-AO.

Step2. Open the terminal at host system, and change the path to the image file directory for example “~/Downloads” with following commands to check image tarball data integrity first.

```
$ cd ~/Downloads
```

```
$ md5sum -c <image_tarball_file_name>.tbz2.md5sum
```



**Command Example:**

```
$ md5sum -c mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0.tbz2.md5sum
```

```
axio@axio-B460MD3H: ~/Downloads
```

```
axio@axio-B460MD3H:~/Downloads$ md5sum -c mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0.tbz2.md5sum
mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0.tbz2: OK
axio@axio-B460MD3H:~/Downloads$
```

Step3. If above command returns OK, Untar the image file with the command below:

```
$ tar -zxvf imagefilename
```

```
$ sudo tar jxvf <image_tarball_file_name>.tbz2
```



**Command Example:**

```
$ sudo tar jxvf mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0.tbz2
```

```
axio@axio-B460MD3H: ~/Downloads
```

```
axio@axio-B460MD3H:~/Downloads$ sudo tar jxvf mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0.tbz2
```

Step4. Change the directory to the image package folder with the command below:

```
$ cd <image_file_name>
```



**Command Example:**

```
$ cd mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0
```

```
axio@axio-B460MD3H: ~/Downloads/mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0
```

```
axio@axio-B460MD3H:~/Downloads$ cd mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0/
axio@axio-B460MD3H:~/Downloads/mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0$
```

Step5. Make sure the recovery switch(SSW2) has been switched to ON, and run the command `lsusb`, then the command line "0955:7223 Nvidia Corp." should be listed.

```
$ lsusb
```



**Note:**

- "0955:7223 NVidia Corp." for AGX Orin 32GB
- "0955:7023 NVidia Corp." for AGX Orin 64GB

```
axio@axio-B460MD3H: ~/Downloads/mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0
axio@axio-B460MD3H:~/Downloads/mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0$ lsusb
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 002: ID 1c4f:0002 SiGma Micro Keyboard TRACER Gamma Ivory
Bus 001 Device 005: ID 0955:7223 NVidia Corp.
Bus 001 Device 004: ID 05e3:0608 Genesys Logic, Inc. Hub
Bus 001 Device 003: ID 1c4f:0034 SiGma Micro
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
axio@axio-B460MD3H:~/Downloads/mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0$
```

Step6. Running the following command to flash the image.

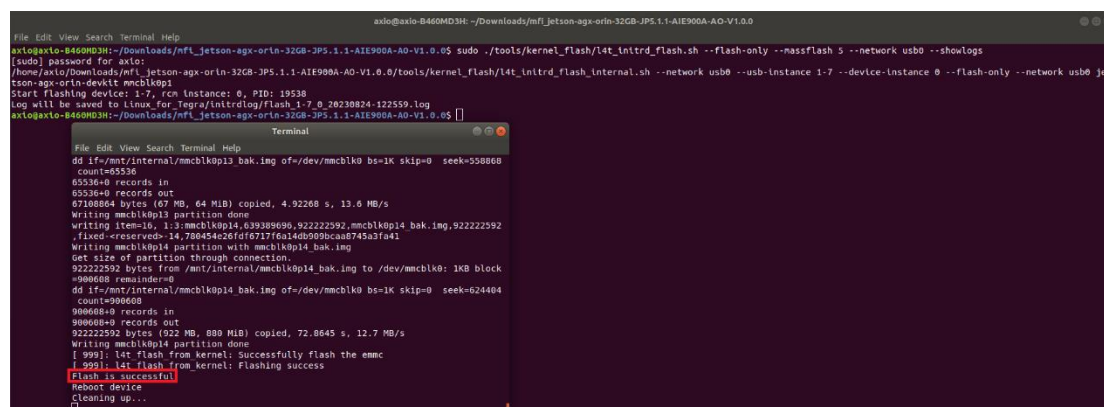
```
$ sudo ./tools/kernel_flash/l4t_initrd_flash.sh --flash-only --massflash 5 --network usb0 --showlogs
```

```
axio@axio-B460MD3H: ~/Downloads/mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0
File Edit View Search Terminal Help
axio@axio-B460MD3H:~/Downloads/mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0$ sudo ./tools/kernel_flash/l4t_initrd_flash.sh --flash-only --massflash 5 --network usb0 --showlogs
[sudo] password for axio:
/home/axio/Downloads/mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0/tools/kernel_flash/l4t_initrd_flash_internal.sh --network usb0 --usb-instance 1-7 --device-instance 0 --flash-only --network usb0 je
tson-agx-orin-devkit mmcblk0p1
Start flashing device: 1-7, rcn instance: 0, PID: 19538
Log will be saved to Linux_for_Uitrdlog/flash_1-7_0_20230824-122559.log

Terminal
File Edit View Search Terminal Help
[ 0.0863 ] Added binary blob_eks_t234_sigheader.img.encrypt of size 9232
[ 0.0865 ] Added binary blob_boot0.img of size 63586394
[ 0.1114 ] Added binary blob_tegra234-p3781-0004-p3737-0000.dtb of size 365967
[ 0.1542 ] tegrarcn.v2 --instance 1-7 --chip 0x23 0 --pollbl --download bct_me
n mem_rcn_sigheader.bct.encrypt --download blob blob_bin
[ 0.1546 ] Rc version 0.32.0.1-1234-54845784-1c03cfd last_boot_error: 0
[ 0.2890 ] Sending bct_mem
[ 0.2976 ] Sending blob
[ 3.1670 ] RCN boot started

~/Downloads/mfi_jetson-agx-orin-32GB-JP5.1.1-AIE900A-AO-V1.0.0
*****
* Step 3: Start the flashing process *
*****
Waiting for target to boot-up...
Waiting for target to boot-up...
Waiting for target to boot-up...
Waiting for target to boot-up...
Waiting for target to boot-up...
```

Step7. The flashing procedure takes approximately 20 minutes or more. Once finished, you should see “Flash is successful ” as shown below, and AIE900A-AO will automatically reboot, and please switch the recovery switch(SW2) to OFF to return to standard mode.



```
axio@axio-B460MD3H: ~/Downloads/nfi_jetson-agx-orn-32GB-JP5.1.1-AIE900A-AO-V1.0.0$ sudo ./tools/kernel_flash/l4t_initrd_flash.sh --flash-only --massflash 5 --network usb0 --showlogs
[sudo] password for axio:
/home/axio/Downloads/nfi_jetson-agx-orn-32GB-JP5.1.1-AIE900A-AO-V1.0.0/tools/kernel_flash/l4t_initrd_flash_internal.sh --network usb0 --usb-instance 1-7 --device-instance 0 --flash-only --network usb0 je
tson-agx-orn-devkit mmcblkp1
Start flashing device: 1-7, rcm instance: 0, PID: 19538
Log will be saved to /tmp/for_tegra/initrdlog/flash-1-7_0_20230824_122559.log
axio@axio-B460MD3H: ~/Downloads/nfi_jetson-agx-orn-32GB-JP5.1.1-AIE900A-AO-V1.0.0$

Terminal
dd if=/mnt/internal/mmcblkp13_bak.img of=/dev/mmcblk0 bs=1K skip=0 seek=558868
count=65536
65536+0 records in
65536+0 records out
67108864 bytes (67 MB, 64 MiB) copied, 4.92268 s, 13.6 MB/s
Writing mmcblkp13 partition done
Writing item=16, 1:3:mmcblkp14,639389696,922222592,mmcblkp14_bak.img,922222592
./fixed-reserved=14,780454e26df6717f6a140b909bcaa8745a3fa41
Writing mmcblkp14 partition with mmcblkp14_bak.img
Get size of partition through connection.
922222592 bytes from /mnt/internal/mmcblkp14_bak.img to /dev/mmcblk0: 1KB block
=900608+0 remainder=0
dd if=/mnt/internal/mmcblkp14_bak.img of=/dev/mmcblk0 bs=1K skip=0 seek=624404
count=900608
900608+0 records in
900608+0 records out
922222592 bytes (922 MB, 889 MiB) copied, 72.8645 s, 12.7 MB/s
Writing mmcblkp14 partition done
[ 999] l4t flash from kernel: Successfully flash the emmc
[ 999] l4t flash from kernel: Flashing success
Flash is successful
Reboot device
Cleaning up...
```

## THE DEFAULT LOGIN CREDENTIALS:

Username: nvidia Password: nvidia

## ✖CAUTION:



Running `$ sudo apt upgrade` command for NVIDIA JetPack OTA may overwrite the BSP of the AIE series platform, which can cause unexpected results including losing I/O ports. For regular JetPack updates or reflashing, please contact our sales or FAE to get the latest AIE Series JetPack image.



## 4.2 Image Information Inquiry Command

Running `axiomtek.sh` command to inquiry the current image information, image version, L4T version, Linux kernel version, and Ubuntu version.

```
nvidia@nvidia-desktop:~$ axiomtek.sh
BUILD_MODEL=PSB906 + Jetson-AGX_ORIN
BUILD_VERSION=JetPack-5.1.1_Linux
BSP_BUILD_VERSION=V1.0.0
BSP_BUILD_COMMIT_ID=master_a07a821c4
BUILD_DATE=2023/08/13 17:17:17
BUILD_ID=axio
L4T_VERSION=R35-3.1
LINUX_KERNEL_VERSION=5.10.104
UBUNTU_VERSION=Ubuntu 20.04.5 LTS
nvidia@nvidia-desktop:~$
```

### 4.3 JTOP — Third-party Jetson Platform Monitor Tool

JTOP is a third-party system monitoring utility that runs on the terminal and see and control realtime the status of the AIE Series Platform. CPU, RAM, GPU status, power mode management, toolkits version and more.

#### Installation Guide:

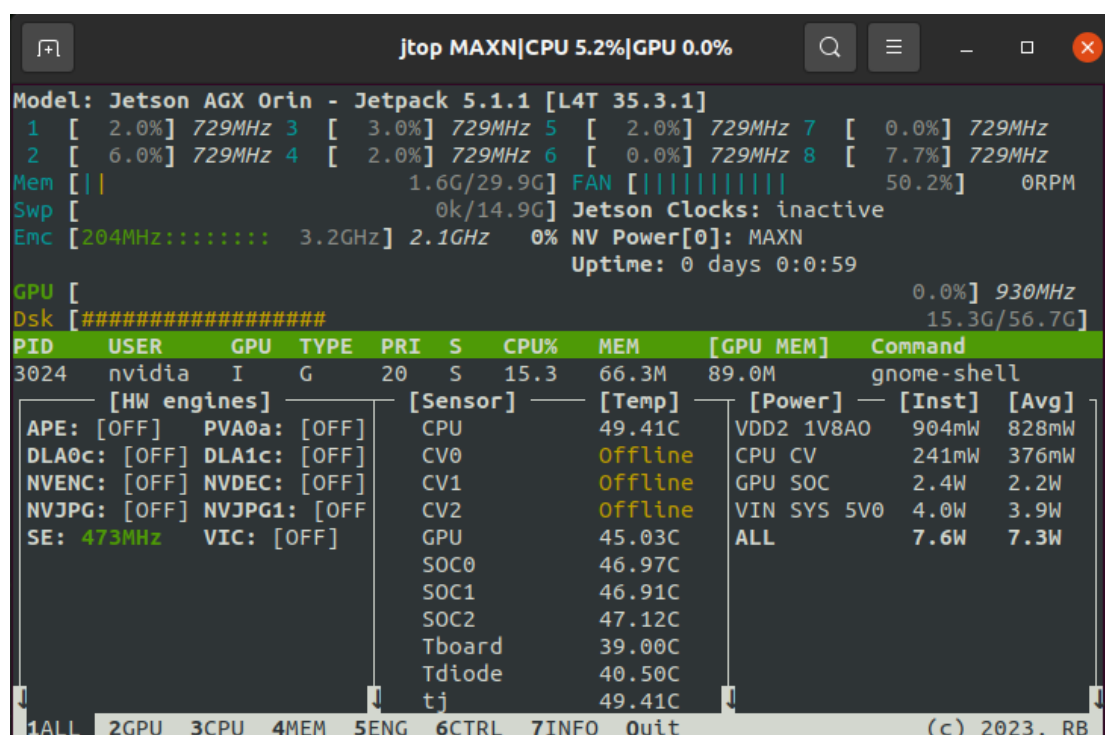
Please enter the following commands in terminal to install JTOP.

```
$ sudo apt install python3-pip
$ sudo pip3 install -U jetson-stats
```

Then, reboot device. After that, it can be accessed in terminal with the command:

```
$ jtop
```

 **Note:** JTOP may require approximately 200 to 300 MB of storage space.



## APPENDIX A

# PROGRAMMABLE DIGITAL I/O

### About Programmable Digital I/O

The AIE900A-AO supports 8 channels programmable digital I/O which allows user to program the DI or DO. For more details, please refer to the below sample code.

### A.1 Default Setting & Command Format

#### THE DEFAULT SETTING:

DIO1 ~ 8 are all **INPUT**



**Note:** The DIO protocol will reset to the default setting after a cold boot.

#### COMMAND FORMAT:

```
# i2cset -f -y <i2c_num> <device_addr> <reg_addr> <value>
# i2cget -f -y <i2c_num> <device_addr> <reg_addr>
```

#### [For Example]

<i2c\_num>: 1

<device\_adrr>: 0x22

<reg\_addr>: 0x00~0x03 (as below Register Table)

<value>:

- Bit0 -> DIO1, Low: 0 High: 1
- Bit1 -> DIO2, Low: 0 High: 1
- ...
- Bit7 -> DIO8, Low: 0 High: 1

## A.2 Sample Program

### 1. DIO Output Sample Code

```
# i2cset -f -y 1 0x22 0x01 0xFF //Set DIO1 ~ 8 as High
# i2cset -f -y 1 0x22 0x03 0x00 //Set DIO1 ~ 8 as Output
# i2cset -f -y 1 0x22 0x01 0xF0 //Set DIO1 ~ 4 as Low and DIO5~8 as High
# i2cset -f -y 1 0x22 0x01 0x01 //Set DIO1 as High and DIO2~8 as Low
# i2cset -f -y 1 0x22 0x03 0x0F //Set DIO1 ~ 4 as Input and DIO5~8 as Output
...

```

### 2. DIO Input Sample Code

```
# i2cset -f -y 1 0x22 0x03 0xFF //Set DIO1 ~ 8 as Input
# i2cget -f -y 1 0x22 0x00 //Read all inputs
...

```

## A.3 Register Table

Register 0 - Input Port Register Bit Description

Bit	Symbol	Access	Value	Description
7	I7	read only	X	Determined by externally applied logic level
6	I6	read only	X	
5	I5	read only	X	
4	I4	read only	X	
3	I3	read only	X	
2	I2	read only	X	
1	I1	read only	X	
0	I0	read only	X	

**Register 1 - Output Port Register Bit Description**

This register reflects the outgoing logic levels of the pins defined as outputs by Register 3. Bit values in this register have no effect on pins defined as inputs. Reads from this register return the value that is in the flip-flop controlling the output selection, **not** the actual pin value.

Legend: \* default value

Bit	Symbol	Access	Value	Description
7	O7	R	1*	Reflects outgoing logic levels of pins defined as outputs by Register 3
6	O6	R	1*	
5	O5	R	1*	
4	O4	R	1*	
3	O3	R	1*	
2	O2	R	1*	
1	O1	R	1*	
0	O0	R	1*	

**Register 3 - Configuration Register Bit Description**

This register configures the directions of the I/O pins. If a bit in this register is set, the corresponding port pin is enabled as an input with high-impedance output driver. If a bit in this register is cleared, the corresponding port pin is enabled as an output. At reset, the I/Os are configured as inputs with a weak pull-up to  $V_{DD}$ .

Legend: \* default value

Bit	Symbol	Access	Value	Description
7	C7	R / W	1*	Configures the directions of the I/O pins 0 = corresponding port pin enabled as an output 1 = corresponding port pin configured as input (default value)
6	C6	R / W	1*	
5	C5	R / W	1*	
4	C4	R / W	1*	
3	C3	R / W	1*	
2	C2	R / W	1*	
1	C1	R / W	1*	
0	C0	R / W	1*	