EFCO
EverFine Industrial Co. Ltd.

Eagle Eyes Series
Fanless Embedded System

This manual covers the following SKU's

AIM ❖ AIML ❖ AIMV

Hardware User's Manual

Revision 1.2

EFCOGROUP

Preface

Revision History

Revision	Date	Author	Changes
1.0	2019/03/15	J Yen	Preliminary release
1.1	2019/08/13	J Yen	Change Ignition control pin define
1.2	2020/04/07	J Marengo	Update

Copyright

Acknowledgments

For more information about this and other EFCO products, please visit our website at www.efcotec.com

Declaration of Conformity

FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, according to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE

The product(s) described in this manual complies with all applicable European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

Warnings, Cautions, and Notes

Warning!

Warnings indicate conditions, which if not observed, can cause personal injury!

Caution!

Cautions are included to help you avoid damaging hardware or losing data

Note:

Notes provide additional information

Safety Instructions

Please read the following safety instructions carefully.
It is advised that you keep this manual for future references.

1. All cautions and warnings on the device should be noted.
2. Make sure the power source matches the power rating of the device.
3. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
4. Always completely disconnect the power before working on the system's hardware.
5. No connections should be made when the system is powered on, as a sudden rush of energy may damage sensitive electronic components.
6. If the device is not used for an extended period, disconnect the device from the power supply to avoid being damaged by transient over-voltage.
7. Always unplug this device from any electrical outlet before cleaning.
8. While cleaning, use a damp cloth instead of liquid or spray detergents.
9. Make sure the device is installed near a power outlet and is easily accessible.
10. Keep this device away from any humidity.
11. Place the device on a solid surface during installation to prevent falls.
12. Do not cover the openings on the device to ensure optimal heat dissipation.
13. System enclosure may get hot during operation, use caution when handling.
14. Do not touch the heat sink or heat spreader when the system is running.
15. Never pour any liquid into the openings. This could cause fire or electric shock.
16. As most electronic components are sensitive to a static electrical charge, be sure to ground yourself to prevent static charge(s) when installing the internal components. Use a grounding wrist strap and contain all electronic components in static shielded containers.
17. If any of the following situations arises, please contact our service personnel:
    I. Damaged power cord or plug.
    II. Liquid intrusion to the device.
    III. Exposure to moisture.
    IV. The device is not working as expected or in a manner as described in this manual.
    V. The device is dropped or damaged.
    VI. Any visible signs of damage displayed on the device.

18. **<u>Do Not</u> store this device in an uncontrolled environment where the ambient temperatures are <u>BELOW -40°C (-40°F) or ABOVE 85°C (185°F)</u> to prevent damage.**

Table of Contents

Chapter 1

General Introduction

This chapter includes:

- Overview
- System Features
- System Specification
- Power Specification
- Supported CPU List
- Packing List
- Ordering Information

1.1 Overview

The Eagle Eyes AIM series embedded PC is a high-performance, Fanless Embedded System that delivers outstanding performance, power efficiency, and flexible manageability for performance-driven embedded computing applications. The all-in-one design provides exceptional performance, versatile I/O functions, flexible expansion features, and rugged reliability for embedded applications such as Machine Vision, Rolling Stock, Intelligent Surveillance, Smart Manufacturing, ITS, Intelligent Automation, Vehicle Computing, and many other Industry 4.0 performance-driven real-time embedded computing applications.

AIM

AIML

AIMV

1.2 System Specifications

AIM Series Specifications

Model Name		AIM	AIML	AIMV
System Core	Intel® Platform	Skylake U (default) / Kaby lake U (by request)		
	CPU	Core™ i7-6600U/ i7-7600U Core™ i5-6300U/ i5-7300U Core™ i3-6100U/ i3-7100U Celeron® 3955U/ 3965U		
	Graphics	Intel® HD Graphics 510/520; Intel® HD Graphics 610/620		
	Max. Memory	32GB		
	BIOS	AMI 128Mbit SPI BIOS		
	Operating System	Windows / Linux		
	TPM	SLB9665 (TPM 2.0) for data security		
EFCO eKits	AI Controller	Non-volatile user data storage, manufacturing and board information, board statistics, hardware monitoring, fan control, I2C bus, Power loss control, Multi-stage watchdog		
	DDM	0.96-inch LCM display module for warning & status display		
	API Library	DDMI & DMCI		
Power	DC input	9-36V, max. 10A		
	Surge Protection	80V/1ms		
	Power-in Protection	Reverse-Voltage, Over-Voltage, Under-Voltage, and Over-Current		
	Remote Control	Yes		
	Ignition Control	Yes		
	Power Mode	AT/ATX (BIOS setting)		
External I/O	Triple Display Mode	2x DP (4K) + 1x VGA		
	Giga Ethernet	4x Giga LAN (RJ45)	2x Giga LAN (RJ45)	4x Giga LAN (M12)
	Giga Ethernet with PoE	Optional (IEEE 802.3at, 30W)		
	USB 3.0	4x		
	USB 2.0	N/A		
	UART (serial port)	2x RS-232/422/485 2x RS-232	1x RS-232/422/485 3x RS-232	2x RS-232/422/485 2x RS-232 CAN bus (optional)
	DIO	16-bit (programmable)		
	Isolated DIO	Optional (8-bit DI & 8-bit DIO)		
	Audio	Mic-in / Line-out		
	SIM Push-Push/USIM Sockets	2x SIM Push-Push Sockets – SIM supports 2G / USIM supports 3 & 4G		
Storage	Internal 2.5" Drive Bay	1x		
	mSATA	1x (muxed with Mini PCIe)		
	M.2 (SATA)	1x M.2 M Key 2242 (1 – PCIe x1 or 1 – SATA (M.2))		
	Removable Drive Bay	N/A		
	RAID Mode	N/A		
Expansion	Mini PCIe	2x		
	PCI Express	N/A		
	PCI	N/A		
	IOM	N/A		
	Internal USB 2.0 Dongle	1x		
Mechanical	Antenna Opening	4x		

Model Name		AIM	AIML	AIMV
	Dimensions	161(W) mm x 130(D) mm x 68.1(H) mm (6.34" x 5.12" x 2.68")		
	Mounting	Anti-slide pads Optional: Wall mount bracket		
Environment	Operating Temperature	-20°C - 50°C (-4°F - 122°F)		
	Extended Operating Temperature*	-25°C - 70°C (-13°F - 158°F)		
	Storage Temperature	-40°C - 85°C		
	Relative Humidity	95% @ 40°C (non-condensing)		
Certification	EMC	CE / FCC		

1.3 Power Specifications

- DC Voltage Input: 9V-36V
- DC Power Connector: 3-Pin Terminal Block, 5.08mm pitch
- Power Input Protection: Reverse-Voltage, Over-Voltage, Under-Voltage, and Over-Current
- Surge Protection: 80V/1ms

1.4 Supported CPUs

AIM embedded PCs support the 7th/6th Generation Intel® Core™ i7/i5/i3 processor (Platform: Kaby Lake-U/Skylake-U). You may select from the processors listed below according to your cost and performance requirements.

Intel® 6th Gen Skylake:
Core™ i7-6600U Processor (2 cores/4 threads, 2.6 GHz/3.4 GHz, 4MB cache, 15W TDP)
Core™ i5-6300U Processor (2 cores/4 threads, 2.4 GHz/3.0 GHz, 3MB cache, 15W TDP)
Core™ i3-6100U Processor (2 cores/4 threads, 2.3 GHz, 3MB cache, 15W TDP)
Celeron® G3955U Processor (2 cores/2 threads, 2.0 GHz, 2MB cache, 15W TDP)

Intel® 7th Gen Kaby Lake:
Core™ i7-7600U Processor (2 cores/4 threads, 2.8GHz/3.9 GHz, 4MB cache, 15W TDP)
Core™ i5-7300U Processor (2 cores/4 threads, 2.6 GHz/3.5 GHz, 3MB cache, 15W TDP)
Core™ i3-7100UProcessor (2 cores/2 threads, 2.2 GHz, 3MB cache, 15W TDP)

1.5 Packing List

When you open the AIM package, check immediately to see if the package contains all the items listed in the following table. If any items are missing or damaged, please contact your local dealer or EFCO for further assistance.

Item	Description	Qty
1	Eagle Eyes AIM Series Embedded Box PC	1
2	Anti-slide pads x4 with M2.5x6 screws x4	1

1.6 Ordering information

Optional Accessories

Model Name	Description
CBL-S01	SATA (Data + Power) cable x1
TBP5-S03	3-pin, 5.08mm pitch Female Terminal Block Plug for DC input x1
TBP3-S05	5-pin, 3.81mm pitch Female Terminal Block Plug for Remote Connector x1
TBP3-D20	2x10-pin, 3.5mm pitch Female Terminal Block Plug for DIO Connector x1
WBK-AIM	Wall Mount Bracket x2 with M2.5x6 screws x4

Memory

Model Name	Description – Memory Options
DDR4-2400-4G-SO	SO-DIMM DDR4-2400 4GB memory module
DDR4-2400-8G-SO	SO-DIMM DDR4-2400 8GB memory module
DDR4-2400-16G-SO	SO-DIMM DDR4-2400 16GB memory module
DDR4-2400-4G-SO-i	SO-DIMM DDR4-2400 4GB memory module (Wide Temp.)
DDR4-2400-8G-SO-i	SO-DIMM DDR4-2400 8GB memory module (Wide Temp.)
DDR4-2400-16G-SO-i	SO-DIMM DDR4-2400 16GB memory module (Wide Temp.)

Storage

Model Name	Description – Storage Options
M2-2242-SATA-32G	M.2 M-key 2242 32GB SATA disk
M2-2242-SATA-64G	M.2 M-key 2242 64GB SATA disk
M2-2242-SATA-128G	M.2 M-key 2242 128GB SATA disk
M2-2242-SATA-256G	M.2 M-key 2242 256GB SATA disk
M2-2242-SATA-32G-i	M.2 M-key 2242 32GB SATA disk (Wide Temp.)
M2-2242-SATA-64G-i	M.2 M-key 2242 64GB SATA disk (Wide Temp.)
M2-2242-SATA-128G-i	M.2 M-key 2242 128GB SATA disk (Wide Temp.)
M2-2242-SATA-256G-i	M.2 M-key 2242 256GB SATA disk (Wide Temp.)
mSATA-32G	mSATA 32GB SATA disk
mSATA-64G	mSATA 64GB SATA disk
mSATA-128G	mSATA 128GB SATA disk
mSATA-256G	mSATA 256GB SATA disk
mSATA-32G-i	mSATA 32GB SATA disk (Wide Temp.)
mSATA-64G-i	mSATA 64GB SATA disk (Wide Temp.)
mSATA-128G-i	mSATA 128GB SATA disk (Wide Temp.)
mSATA-256G-i	mSATA 256GB SATA disk (Wide Temp.)
SSD2.5-250G	2.5" SSD 250GB Disk

Model Name	Description – Storage Options
SSD2.5-500G	2.5" SSD 500GB Disk
SSD2.5-1T	2.5" SSD 1TB Disk
SSD2.5-250G-i	2.5" SSD 250GB Disk (Wide Temp.)
SSD2.5-500G-i	2.5" SSD 500GB Disk (Wide Temp.)
SSD2.5-1T-i	2.5" SSD 1TB Disk (Wide Temp.)
HDD2.5-500G	2.5" HDD 500GB Disk
HDD2.5-1T	2.5" HDD 1TB Disk
HDD2.5-2T	2.5" HDD 2TB Disk
HDD2.5-3T	2.5" HDD 3TB Disk
HDD2.5-4T	2.5" HDD 4TB Disk
HDD2.5-5T	2.5" HDD 5TB Disk

AC-DC Power Adapter

Model Name	Description
ADT-24V90-T3A	24V/60W AC-DC power adapter with pitch 5.08mm 3-pin terminal block plug
ADT-24V120-T3A	24V/120W AC-DC power adapter with pitch 5.08mm 3-pin terminal block plug
ADT-24V160-T3A	24V/160W AC-DC power adapter with pitch 5.08mm 3-pin terminal block plug
ADT-24V280-T3A	24V/280W AC-DC power adapter with pitch 5.08mm 3-pin terminal block plug

Chapter 2

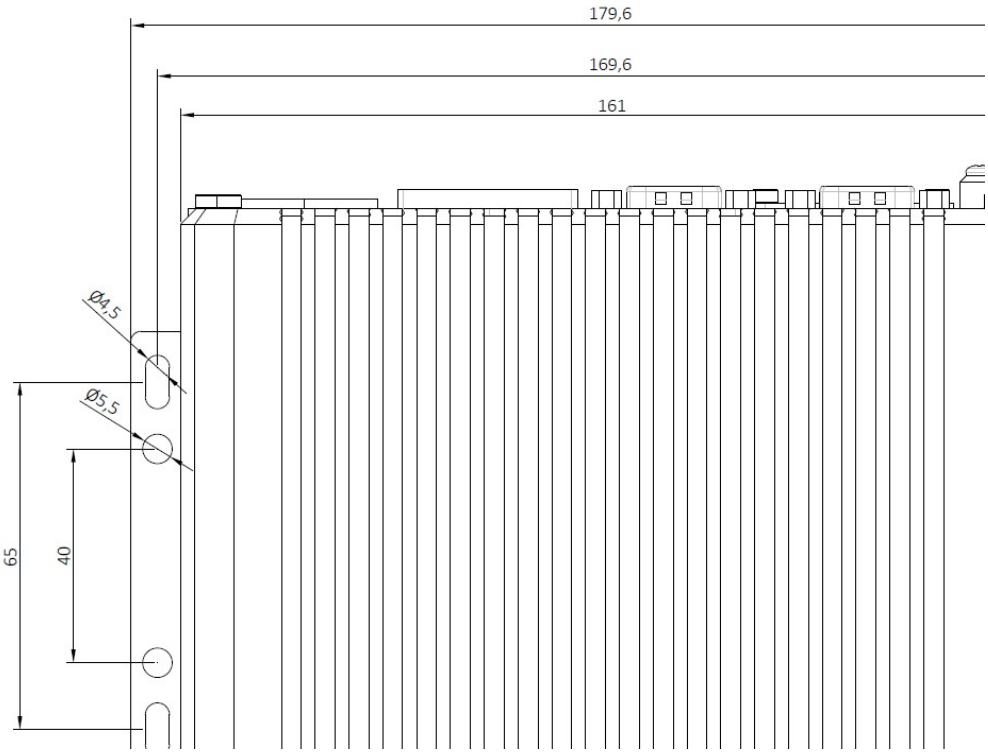
Mechanical Dimensions

This chapter includes the dimensions:

- Top View
- Front View
- Rear View
- Left-Side View
- Right-Side View
- Bottom View

2.1 Top View

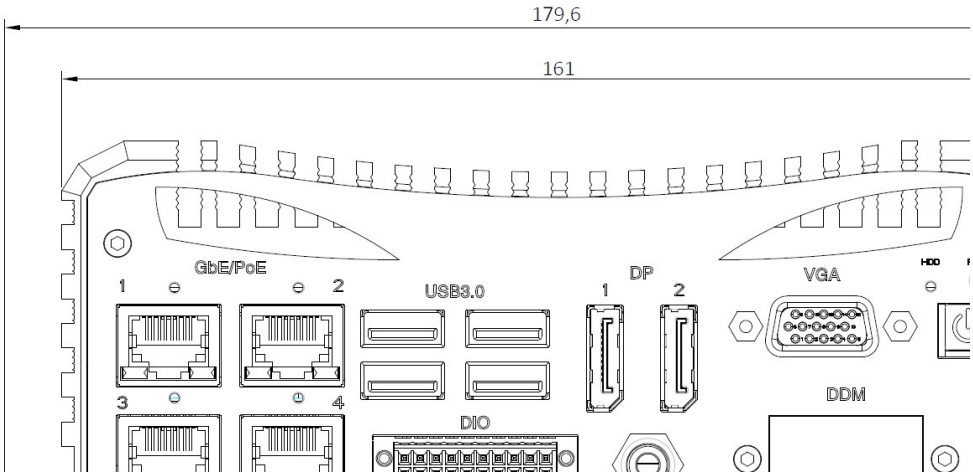
Unit: mm



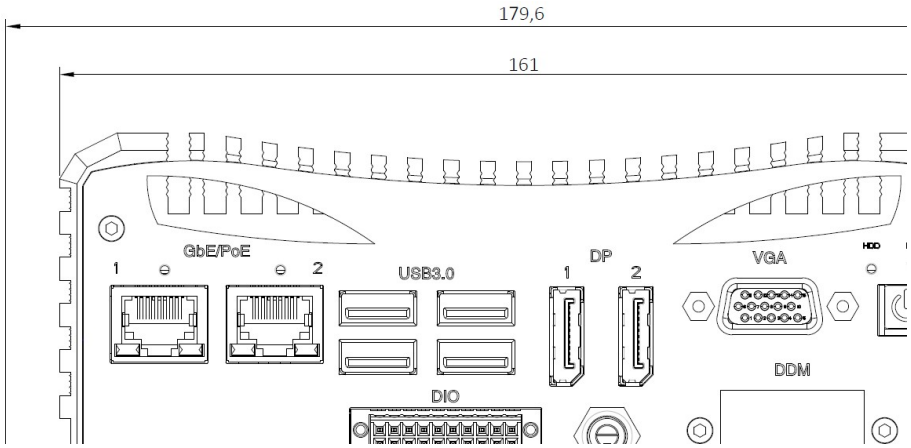
AIM / AIML / AIMV

2.2 Front View

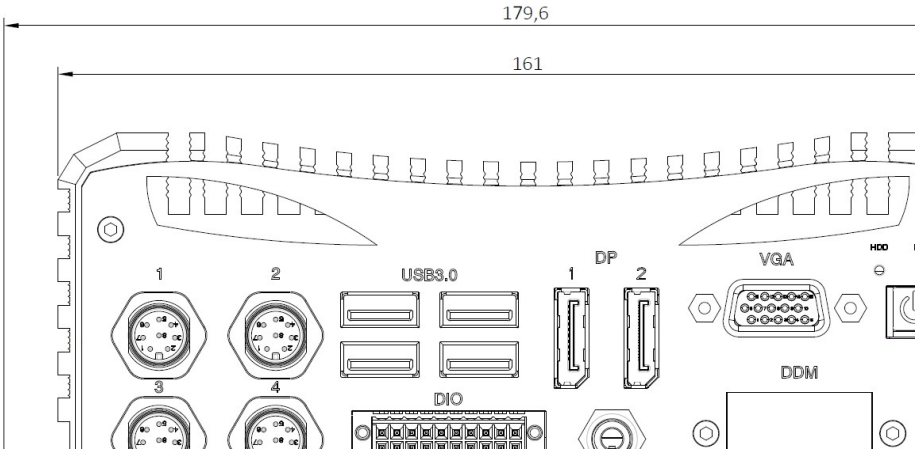
Unit: mm



AIM


179,6
161
GbE/PoE
1
2
USB3.0
DP
1
2
VGA
HDD
DDM
DIO

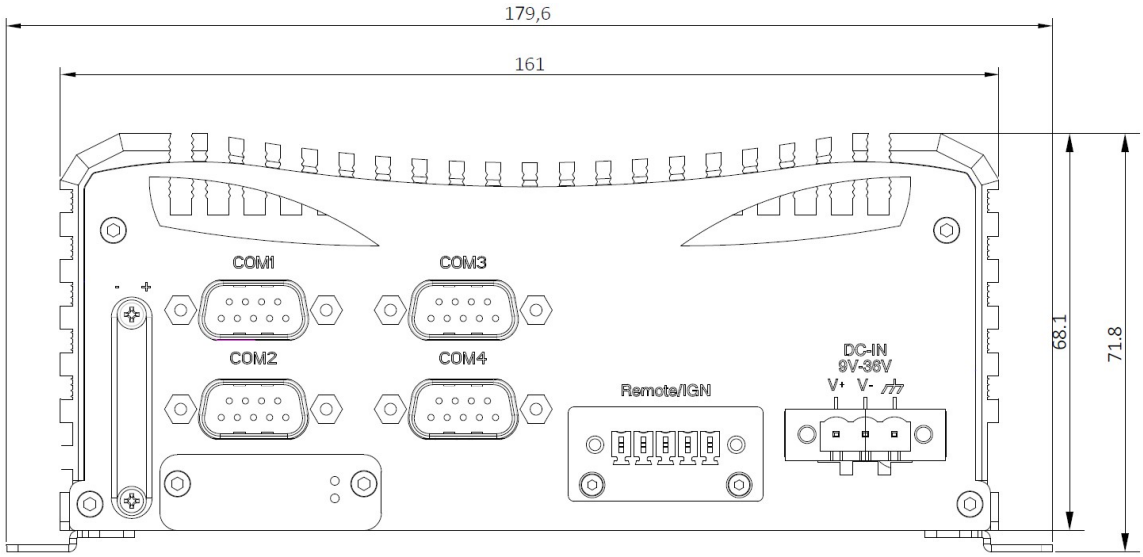
AIML


179,6
161
1
2
USB3.0
DP
1
2
VGA
HDD
3
4
DIO
DDM

AIMV

2.3 Rear View

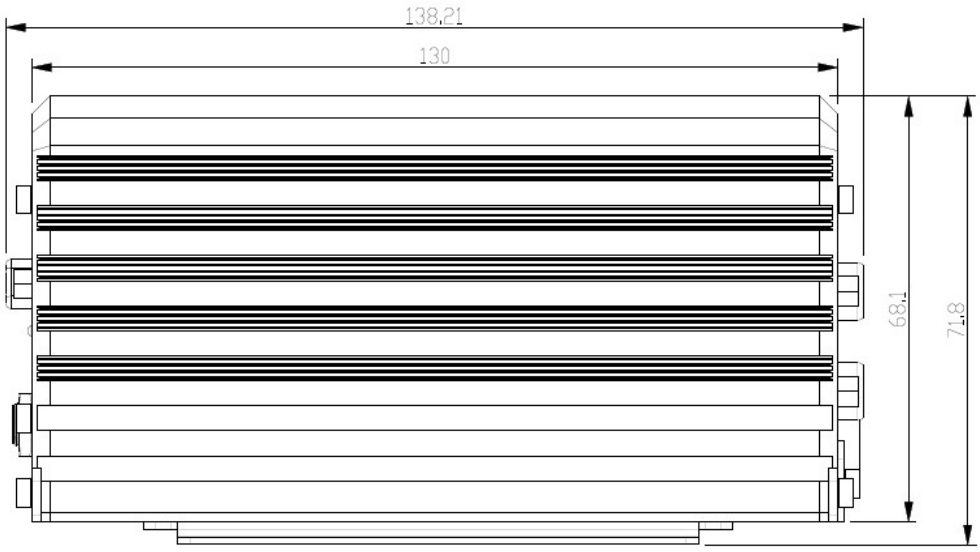
Unit: mm



AIM / AIML / AIMV

2.4 Right-Side View

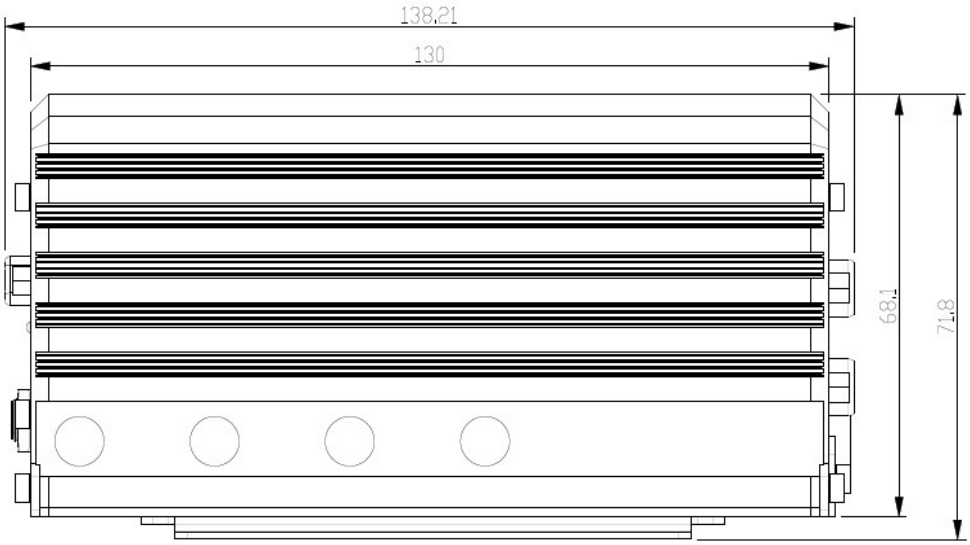
Unit: mm



AIM / AIML / AIMV

2.5 Left-Side View

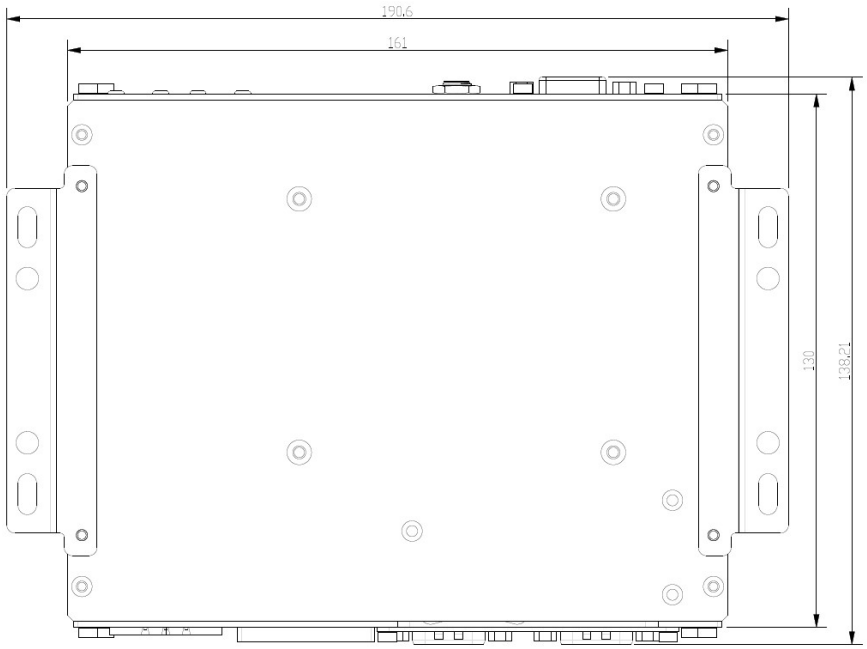
Unit: mm



AIM / AIML / AIMV

2.6 Bottom View

Unit: mm



AIM / AIML / AIMV

Chapter 3

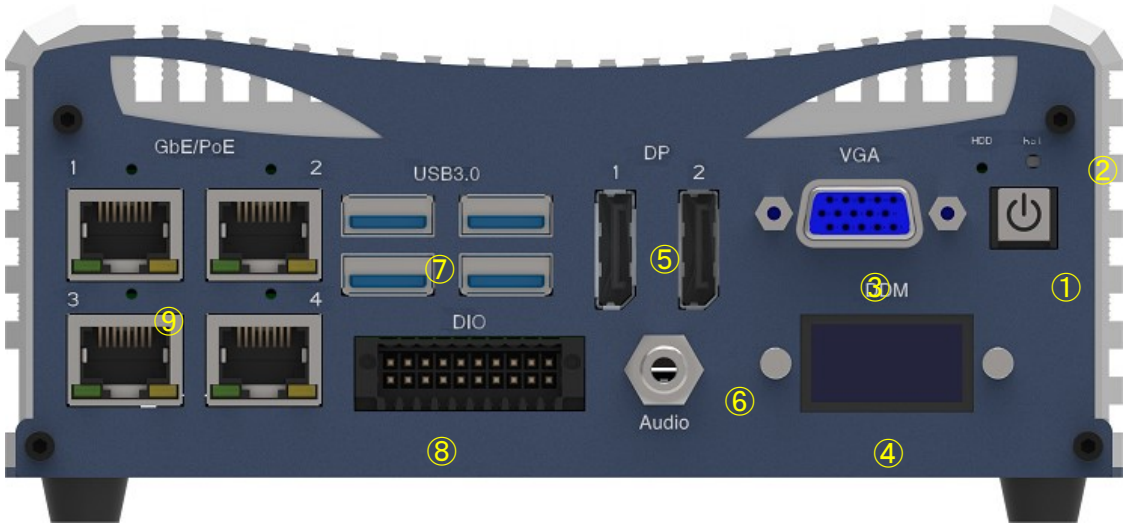
Hardware Function Description

This chapter includes:

- I/O Layout
- Front Panel I/O Functions
- Rear Panel I/O Functions
- Right-Side Panel I/O Functions
- Internal I/O Functions

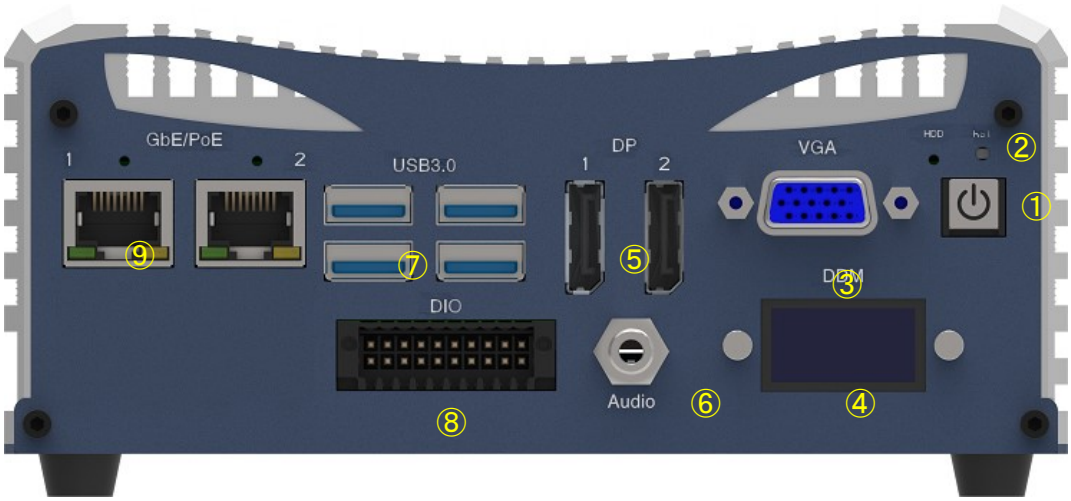
3.1 I/O Layout

Front I/O – AIM



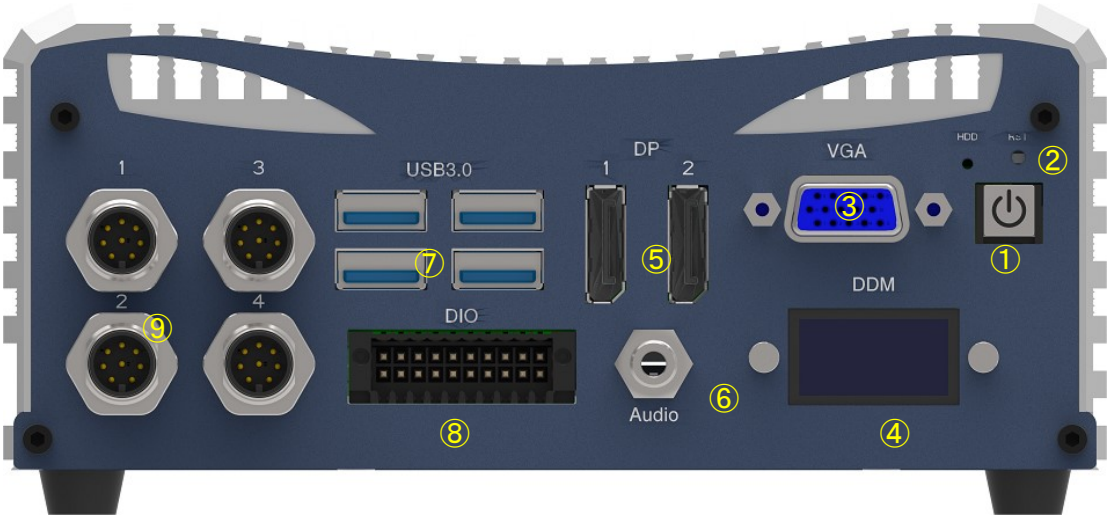
① Power Button with Power LED ② Reset Button ③ VGA port
④ Dynamic Display Module (DDM) ⑤ DisplayPort (2 ports)
⑥ Line-out/Mic-In ⑦ Dual Stack USB 3.0 (2 connectors, four ports)
⑧ GPIO or Isolated DI & DO ⑨ RJ45 GbE/PoE (4 ports)

Front I/O – AIML



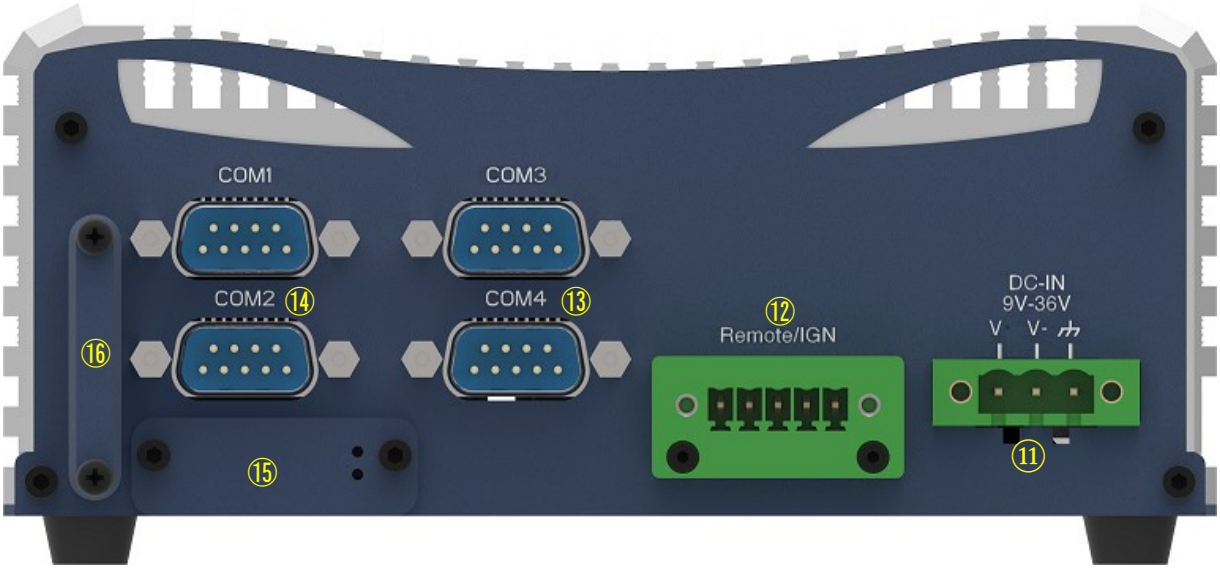
① Power Button with Power LED ② Reset Button ③ VGA port
④ Dynamic Display Module (DDM) ⑤ DisplayPort (2 ports)
⑥ Line-out/Mic-in ⑦ Dual Stack USB 3.0 connector (2 connectors, four ports)
⑧ GPIO or Isolated DI & DO ⑨ RJ45 GbE/PoE (2 ports)

Front I/O – AIMV



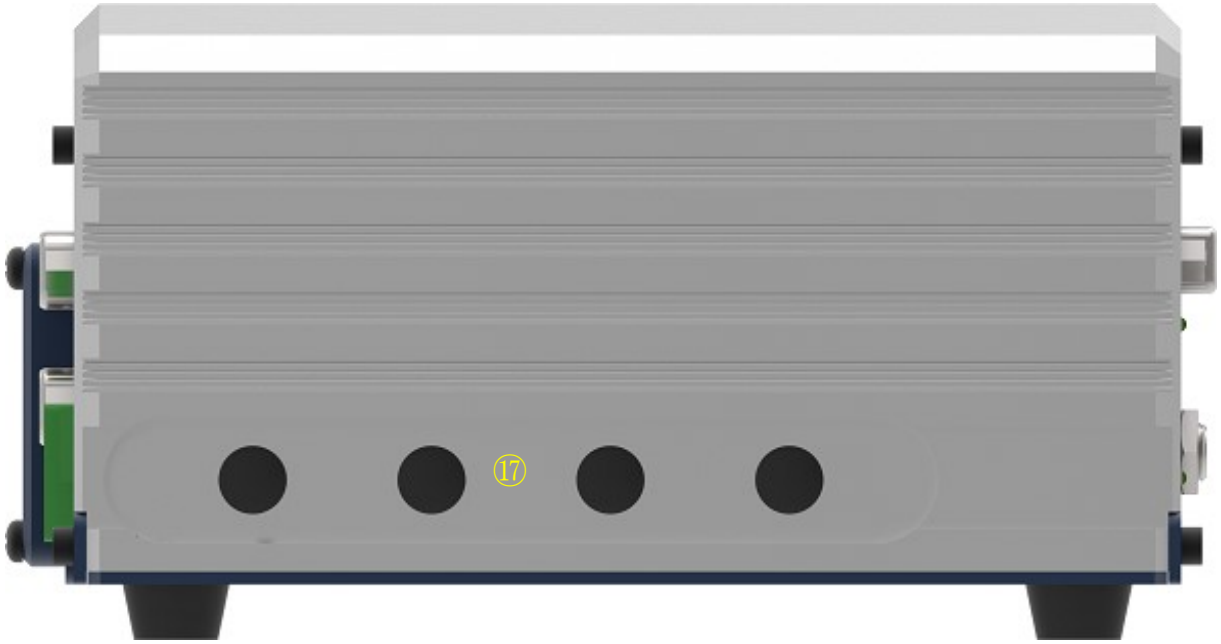
① Power Button with Power LED ② Reset Button ③ VGA port
④ Dynamic Display Module (DDM) ⑤ DisplayPort (2 ports)
⑥ Line-out/Mic-in ⑦ Dual Stack USB 3.0 connector (2 connectors, four ports)
⑧ GPIO or Isolated DI & DO ⑨ M12 GbE/PoE (4 ports)

Rear I/O – AIM / AIML / AIMV



⑪ DC-in terminal block ⑫ Remote & Ignition control terminal block
⑬ RS-232: COM3-COM4 (2 ports) ⑭ RS-232/422/485: COM1, COM2 (2 ports)
⑮ SIM slots (2 slots) ⑯ RTC Battery

Right-Side I/O – AIM / AIML / AIMV



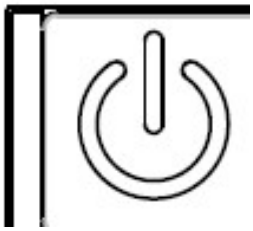
⑰ Antenna Hole: 4 holes

3.2 Front Panel I/O Functions

The most standard computer I/O functions are placed on the front panel. This section describes each I/O function on the front panel.

3.2.1 Power Button with Power LED

The Power Button is a non-latched switch with a dual-color LED indicator. It indicates power status: S0, S3, and S5.



LED Color	Power Status	System Status
Solid Blue	S0	System working
Solid Orange	S3, S5	Suspend to RAM, System off with standby power

More detailed LED indications are listed as follows:

Power Mode	Power On	Power Off	Suspend to RAM, HiberN/Ate
ATX Mode	Solid Blue	Solid Orange	Solid Orange
AT Mode	Solid Blue	-	-
Ignition Mode	Solid Blue	-	-

Note:

ATX Mode:
Press the power button to power on the system. The blue LED will turn on. When the system is powered off, the orange LED will turn on. In case of a system error, press the power button for 4 seconds to shut down the system directly.

AT Mode:
Plug in the DC input power, and the system will auto power on, and the blue LED will turn on. When the system is powered off, the system will turn off the LED. In case of a system error, you can just press the power button for 4 seconds to shut down the system directly

Ignition Mode:
External ignition switch turn-on, the system will power on, and the blue LED will turn on. Plug in DC input power. External ignition switch turn-off, the system will turn off, and the LED will turn off. The power button will not function at ignition.

3.2.2 Reset Button

The hardware Reset Button is used to reset the system without powering off the system. Press the Reset Button for a few seconds to reboot the system.

3.2.3 SSD / HDD LED

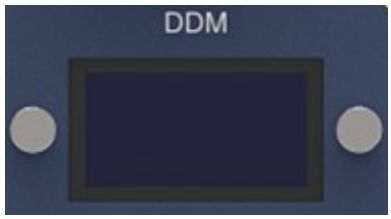
If the LED is on, it indicates that the system's storage is functional. If it is off, it indicates that the system's storage is not functional. If it is flashing, it indicates data access activity.

HDD LED	LED Status
Storage Active	Flash Green

3.2.4 Dynamic Display Module (DDM)

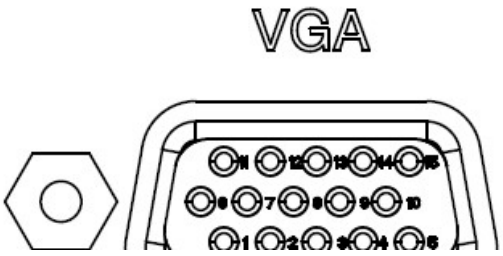
The Dynamic Display Module (DDM) is a 0.96" LCM module. It can display the following information:

- Customer's information
- Logo
- Part Number
- CPU temperature
- Power consumption
- RTC battery voltage
- DC in voltage
- Warning message
- PoE status
- POST code
- Hardware healthy status
- Customized information



3.2.5 VGA Connector

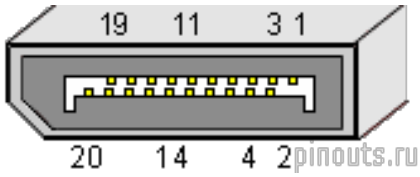
There is a high-resolution VGA display output on the front panel. It supports display resolutions up to 1920x1080.



Pin	N/Ame	Description
1	RED	Red Video (75-ohm, 0.7 V p-p)
2	GREEN	Green Video (75-ohm, 0.7 V p-p)
3	BLUE	Blue Video (75-ohm, 0.7 V p-p)
4	RES/NC	Reserved
5	GND	Ground
6	RGND	Red Ground
7	GGND	Green Ground
8	BGND	Blue Ground
9	DDC +5V	+5 VDC
10	SGND	Sync Ground
11	ID0	Monitor ID Bit 0 (optional)
12	SDA	DDC Serial Data Line
13	HSYNC or CSYNC	Horizontal Sync (or Composite Sync)
14	VSYNC	Vertical Sync
15	SCL	DDC Data Clock Line

3.2.6 DisplayPort Connectors

The system provides two high-resolution DisplayPort (DP) outputs on the front panel. It supports display resolutions up to 4096x2304@60Hz.



Pin	Name	Description
1	ML Lane 0 (p)	Lane 0 (positive)
2	GND	Ground
3	ML Lane 0 (n)	Lane 0 (negative)
4	ML Lane 1 (p)	Lane 1 (positive)
5	GND	Ground
6	ML Lane 1 (n)	Lane 1 (negative)
7	ML Lane 2 (p)	Lane 2 (positive)
8	GND	Ground
9	ML Lane 2 (n)	Lane 2 (negative)
10	ML Lane 3 (p)	Lane 3 (positive)
11	GND	Ground
12	ML Lane 3 (n)	Lane 3 (negative)
13	CONFIG1	Connected to Ground. Pins 13 and 14 may either be directly connected to ground or connected to ground through a pulldown device.
14	CONFIG2	connected to Ground
15	AUX CH (p)	Auxiliary Channel (positive)
16	GND	Ground
17	AUX CH (n)	Auxiliary Channel (negative)
18	Hot Plug	Hot Plug Detect
19	Return	Return for Power
20	DP PWR	Power for the connector (3.3 V 500 mA)

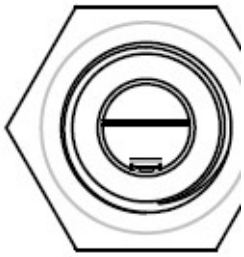
AIM also supports Multi-Stream Transport (MST) as shown in the following MST Display Resolutions Table:

Multi-Stream Transport Display	Max. Resolution
One panel Display	4096x2304@60Hz
Two panel Displays concurrently	2880x1800@60Hz
Three panel Displays concurrently	2304x1440@60Hz

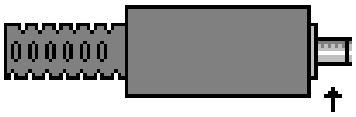
To achieve optimal DP output resolution in Windows, you need to install the corresponding graphics driver.

3.2.7Audio Line-out and Mic-in Audio Jacks

Audio functions provided using Intel® High Definition Audio and Realtek ALC892 codecs. There is one 3.5mm audio jack on the front panel with Line-out (Left/Right stereo) and Mic-in (Mono) signals.



Line-out and Mic-in Connector

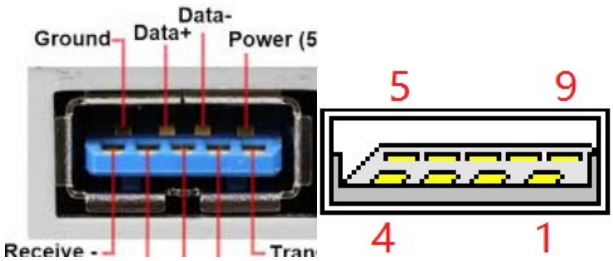


Pin	N/Ame	Description
1	Mic-In	Microphone input signal
2	Audio R	Right Audio out signal
3	Audio L	Left Audio out signal
4	GND	Audio Ground

3.2.8 USB 3.0 Connectors

There are four USB 3.0 Type A connectors with signals directly connected to the Intel® XHCI controller, each port supporting up to 5GBs and 5V/0.9A power. They are compliant with Super Speed, High Speed, Full Speed, and Low-Speed USB signaling rates. Each port can be powered on/off by the BIOS or an EFCO Application Program.

USB 3.0 Connector



Pin	N/Ame	Description
1	VBus	+5V Power
2	USB D-	USB 2.0 data
3	USB D+	
4	GND	Ground for power return
5	StdA SSRX-	SuperSpeed receiver
6	StdA SSRX+	SuperSpeed receiver
7	GND DRAIN	Ground for signal return
8	StdA SSTX-	SuperSpeed transmitter
9	StdA SSTX+	SuperSpeed transmitter

3.2.9 GPIO/Isolated DIO

16-bit digital programmable general-purpose input and output (GPIO) is standard. Isolated 8-bit DI & 8-bit DO is optional. The GPIO 3.3V or 5V signals are configured by the BIOS or an Application Program.

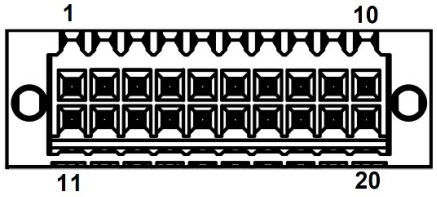
DI/DO Safety-Related Certifications:

DI	DO
2500-V **PART NUMBER PACKAGE BODY SIZE (NOM)** RMS Isolation for 1 minute per UL 1577	2500-V **PART NUMBER PACKAGE BODY SIZE (NOM)** RMS Isolation for 1 minute per UL 1577
Approved by VDE, DIN EN60747-5-2(_) (as an option), file No. 40009162 (as model No. **PC3H4**)	4242-V ISO7131CC PK Isolation per DIN V VDE V 0884-10 (VDE V 0884-10):2006-12, 566 V ISO7140CC PK Working Voltage
UL flammability grade (94V-0)	CSA Component Acceptance Notice 5A, IEC ISO7141CC 60950-1 and IEC 61010-1 End Equipment ISO7141FCC Standards
CQC Certification per GB 4943.1-2011 (Vendor Certificate)	

DI/DO Operation Characteristics:

Parameter	DI	DO
Operation Voltage	5 - 48V DC	Source Mode:5 - 48V DC Sink Mode: 5-40V DC
Input/Output Current Limit	25 uS	100mA
Turn On Delay Time (Max.)	25 uS	Source Mode: 15 uS Sink Mode: 60uS
Turn Off Delay Time (Max.)	25 uS	Source Mode: 15 uS Sink Mode: 60uS

GPIO/Isolated DIO Terminal Block



Programmable DIO

Pin	Description	Pin No.	Description
1	GPIO10 (Default GPI bit0)	11	GPIO0 (Default GPO bit0)
2	GPIO11 (Default GPI bit1)	12	GPIO1 (Default GPO bit1)
3	GPIO12 (Default GPI bit2)	13	GPIO2 (Default GPO bit2)
4	GPIO13 (Default GPI bit3)	14	GPIO3 (Default GPO bit3)
5	GPIO14 (Default GPI bit4)	15	GPIO4 (Default GPO bit4)
6	GPIO15 (Default GPI bit5)	16	GPIO5 (Default GPO bit5)
7	GPIO16 (Default GPI bit6)	17	GPIO6 (Default GPO bit6)
8	GPIO17 (Default GPI bit7)	18	GPIO7 (Default GPO bit7)
9	Digital Input COM	19	GND
10	GND	20	VCC

Isolated DIO

Pin	Description	Pin No.	Description
1	Isolated DI bit0	11	Isolated DO bit0
2	Isolated DI bit1	12	Isolated DO bit1
3	Isolated DI bit2	13	Isolated DO bit2
4	Isolated DI bit3	14	Isolated DO bit3
5	Isolated DI bit4	15	Isolated DO bit4
6	Isolated DI bit5	16	Isolated DO bit5
7	Isolated DI bit6	17	Isolated DO bit6
8	Isolated DI bit7	18	Isolated DO bit7
9	Digital Input COM	19	Isolated GND
10	Isolated GND	20	Isolated VCC

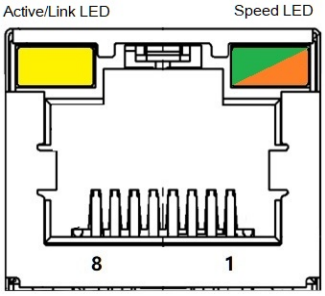
3.2.10 PoE/Gigabit Ethernet Port

The GbE ports are located on the front panel. Each port supports IEEE 802.3at (PoE+) Power over Ethernet connection delivering up to 30W/54V per port and 1000BASE-T GigE data signals over a standard Ethernet Cat 5/Cat 6 cable

Ethernet Port 1 is powered by the Intel® i219 Ethernet controller, supporting 10/100/1000 Mbps, PXE, Wake on LAN, and iAMT11. The Connector is RJ45 with LED indicators or M12 A code connector, depends on the model.

Ethernet Ports 2-4 are powered by the Intel® i210 Ethernet controller, supporting 10/100/1000 Mbps, PXE, Wake on LAN, and IEEE-1588 header. The connector is RJ45 with LED indicators or M12 A-code connector depending upon the model.

RJ45 Connector



Pin No	10 / 100 Mbps	1000 Mbps	Description	PoE (optioN/AI)
1	TX+	BI_DA+	Bi-directional pair A +	PoE+
2	TX-	BI_DA-	Bi-directional pair A -	PoE+
3	RX+	BI_DB+	Bi-directional pair B +	PoE-
4	N/A	BI_DC+	Bi-directional pair C +	N/A
5	N/A	BI_DC-	Bi-directional pair C -	N/A
6	RX-	BI_DB-	Bi-directional pair B -	PoE-
7	N/A	BI_DD+	Bi-directional pair D +	N/A
8	N/A	BI_DD-	Bi-directional pair D -	N/A

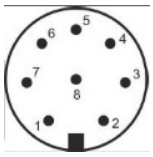
Ethernet Active/Link LEDs

Active/Link LED (left)	Status
Off	Disconnected
Solid Yellow	Connected, no data transmission
Flashing Yellow	Connected, data transmitting/receiving

Ethernet Speed LED

Right Top Link LED	Status
Off	10 Mbps Link
Solid Green	100 Mbps Link
Solid Orange	1000 Mbps Like

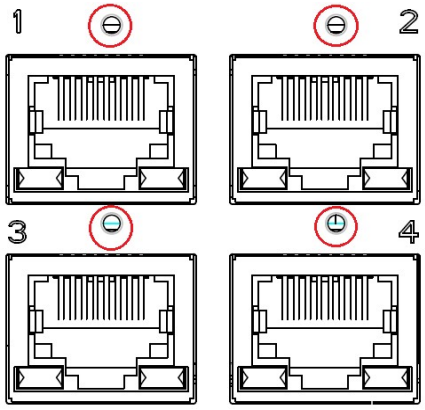
M12 A-code Connector



Pin No	10 / 100 Mbps	1000 Mbps	Description	PoE (optional)
1	N/A	BI DC+	Bi-directional pair C +	N/A
2	N/A	BI DD+	Bi-directional pair D +	N/A
3	N/A	BI DD-	Bi-directional pair D -	N/A
4	TX-	BI DA-	Bi-directional pair A -	PoE+
5	RX+	BI DB+	Bi-directional pair B +	PoE-
6	TX+	BI DA+	Bi-directional pair A +	PoE+
7	N/A	BI DC-	Bi-directional pair C -	N/A
8	RX-	BI DB-	Bi-directional pair B -	PoE-

3.2.11 PoE LEDs

4 LEDs indicate the PoE status. The LED will light when the PoE port links to PoE PD of each device.



Note:

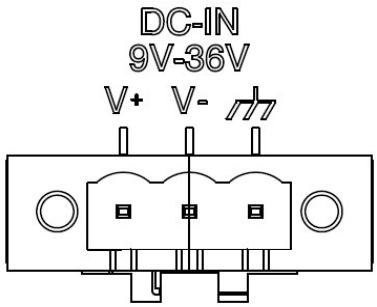
The photo is for the AIM model

3.3 Rear Panel I/O Functions

To fit more general application requirements, AIM offers more I/O functions on its rear panel. In this section, we'll illustrate each I/O feature on the back panel.

3.3.1 3-Pin Euro-type Terminal Block for System DC Input

Eagle Eyes AI allows a wide range of DC power input from 9V to 36Vdc. It offers a 3-pin, pitch 5.08mm Euro Type pluggable terminal block. The 3-pin power connector is used to connect the power plug of an AC/DC adapter. It's convenient for indoor usage where AC power is usually available. Since there is no specific rule of pin definition for this type of connector, please always confirm the polarity of the power connector before plugging it into the AIM if you're not using the power adapter provided by EFCO.



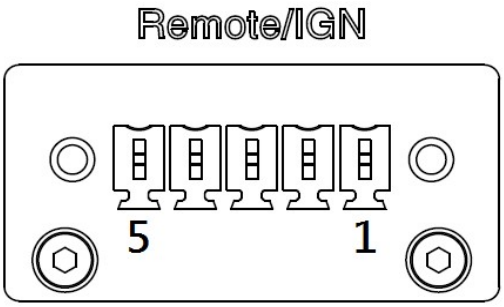
Pin	N/Ame	Description
1	DC V+	DC INPUT +
2	DC V-	DC INPUT -
3	Ground	Earth Ground or Chassis Ground

Caution!

Make sure the polarity of the power plug is correct before plugging it into the system.

Please make sure the voltage of the DC power supply is correct before you connect it to the AIM system. Supplying a voltage over 36V will damage the system.

3.3.2 5-Pin Euro-type Terminal Block for Power Remote & Ignition Control



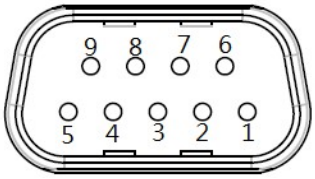
Pin	Name
1	Ignition control+
2	Ignition control-
3	Remote control +
4	Remote GND
5	Power LED+

3.3.3 UART Ports

Two RS-232/422/485 ports and two RS-232 ports are on the rear panel for communicating with external devices. COM1-COM4 are located on the back panel via 9-pin D-Sub male connectors. COM1 and COM2 can be configured for full RS232, RS422, or RS485 with auto flow control communication. Mode selection is by BIOS. The default definition is RS232.

Each of the serial ports individually contains a programmable baud rate generator, which is capable of dividing the input clock by a number ranging from 1 to 65535. The data rate of each serial port can be programmed from 115.2K baud (COM1 baud rate up to 912.6Kbit/s) and down to 50 baud. The character options are programmable for 1 start bit; 1, 1.5 or 2 stop bits; even, odd, stick or no parity; and privileged interrupts. Each port supports 128 bytes RX FIFO depths and 16 bytes TX FIFO depths.

All transmitter outputs and receiver inputs feature robust electrostatic discharge (ESD) protection to ±15kV Human Body Model (HBM) and ±8kV IEC- 61000-4-2 Contact. Each receiver output has full fail-safe protection to avoid system lockup, oscillation, or indeterminate states by defaulting to logic-high output levels when the inputs are open, shorted, or terminated, but not driven.



The following table describes the pin definition of UART ports.

COM1, COM2:

UART mode		RS-232	RS-422 (5-wire)	RS-422 (9-wire)	RS-485 (3-wire)
D-Sub 9 Male **COM1, COM2**	Pin 1	DCD#	TxD-	TxD-	Data-
	Pin 2	RxD	TxD+	TxD+	Data+
	Pin 3	TxD	RxD+	RxD+	N/A
	Pin 4	DTR#	RxD-	RxD-	N/A
	Pin 5	GND	GND	GND	GND
	Pin 6	DSR	N/A	RTS-	N/A
	Pin 7	RTS#	N/A	RTS+	N/A
	Pin 8	CTS#	N/A	CTS+	N/A
	Pin 9	RI#	N/A	CTS-	N/A

COM3, COM4:

UART mode		RS-232	Description
D-Sub 9 Male **COM3, COM4**	Pin 1	DCD#	Data Carrier Detect
	Pin 2	RxD	Receive Data
	Pin 3	TxD	Transmit Data
	Pin 4	DTR#	Data Terminal Ready
	Pin 5	GND	System Ground
	Pin 6	DSR	Data Set Ready
	Pin 7	RTS#	Request to Send
	Pin 8	CTS#	Clear to Send
	Pin 9	RI#	Ring Indicator

3.3.4 Wireless module LED for Mini PCIe

Two Mini PCIe slots with USIM sockets, which can support any WWAN / WLAN / WPAN Mini PCIe wireless module, such as Wi-Fi, Bluetooth, 3G/4G/LTE, etc. When a Mini PCIe wireless module is installed and activated, the corresponding LED will light up as described below.

Mini Card LED	LED Status
WWAN Linked	Solid Green
WWAN Active	Flash Green
WLAN Linked	Solid Green
WLAN Active	Flash Green
WPAN Linked	Solid Green
WPAN Active	Flash Green

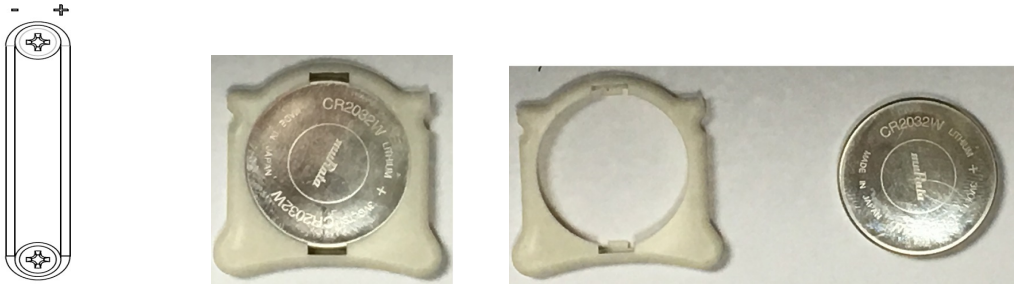
3.3.5 USIM slot

There are two USIM sockets for wireless applications for when 3G/4G wireless modules are installed in the full-length Mini PCIe slots.

Pin	Name	Description
C1	VCC	+5 VDC power supply input (optional use by the card)
C2	RESET	Reset signal, used to reset the card's communications. Either used itself (reset signal supplied from the interface device) or in combination with an internal reset control circuit (optional use by the card). If internal reset is implemented, the voltage supply on VCC is mandatory
C3	CLOCK	Provides the card with a clock signal, from which data communications timing is derived
C4	RESERVED	AUX1, optionally used for USB interfaces and other uses.
C5	GND	Ground (reference voltage)
C6	VPP	Programming voltage input (optional). This contact may be used to supply the voltage required to program or to erase the internal non-volatile memory. ISO/IEC 7816-3:1997 designated this as a programming voltage: an input for a higher voltage to program persistent memory (e.g., EEPROM). ISO/IEC 7816-3:2006 designates it SPU, for either standard or proprietary use, as input and/or output.
C7	I/O	Input or Output for serial data (half-duplex) to the integrated circuit inside the card.
C8	RESERVED	AUX2, optionally used for USB interfaces and other uses.

3.3.6 RTC CMOS Battery Tray

Swappable RTC CMOS battery tray.

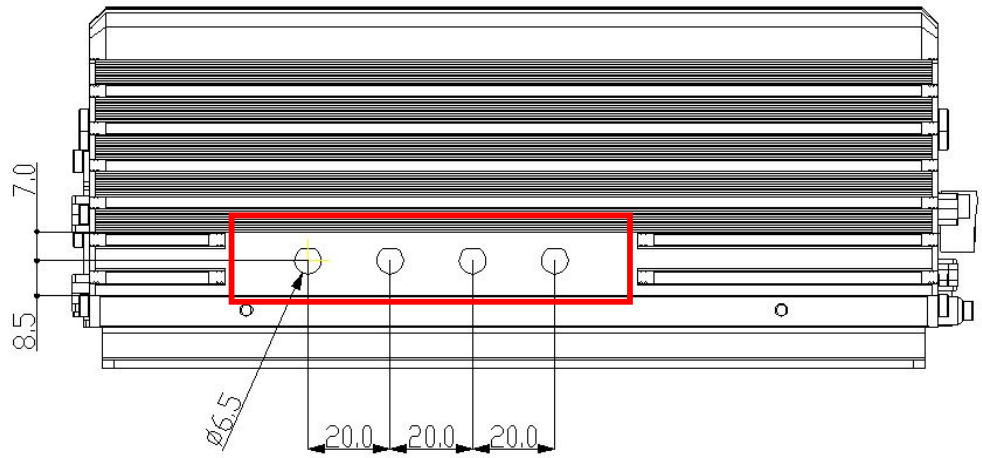


Caution!

Risk of explosion if the battery is replaced with an incorrect type. Dispose of used batteries according to your local guidelines.

3.4 Antenna Holes

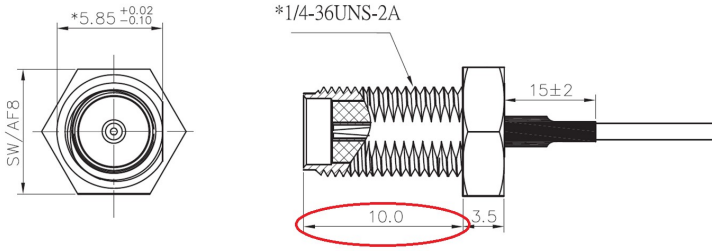
Four Antenna holes on its right-side panel



1. Proposed SMA connector SPEC:

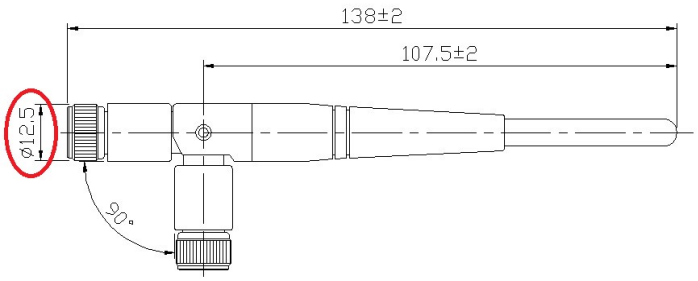
   SMA screw length "***minimum 10mm.***"

Caution!



2. Proposed Antenna connector SPEC:

   Antenna screw size "***maximum 15mm.***"



3.5 Internal I/O Functions

In addition to I/O connectors on the front/rear panel, the AIM system provides other useful features via its on-board connectors, such as mSATA sockets, Mini PCIe slots. This section describes these internal I/O functions.

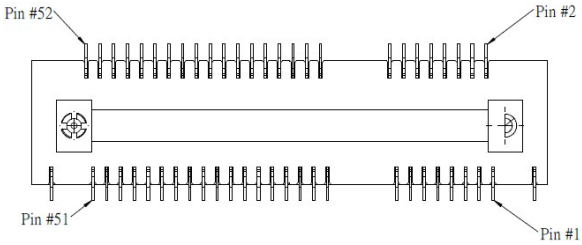
There are two on-board full-length Mini PCIe slots with USIM sockets. By installing a Mini PCIe module, your system can have expanded features such as Wi-Fi, 3G, 4G, GPS, Bluetooth, etc.

3.5.1 DDR4 SO-DIMM Socket

One Channel DDR4 SO-DIMM slot supports DDR4 2133 (Skylake) or DDR4 2400 (Kaby Lake), up to 32GB (ECC/Non-ECC) memory.

3.5.2 Mini PCIe / mSATA Socket 1 (with USIM Socket)

The full-length Mini PCIe Slots supports a Mini PCIe or mSATA modes (selectable by the BIOS setup) and supports USB 2.0 and USIM card socket. USIM card socket supports +3.3V Power On/Off (controlled by the EFCO Application Program) and one Card Detection LED (WWAN, WLAN, and WPAN) on the front panel. This slot allows your system to connect to the Internet through any available telecom operator's GPRS/3G/4G network. For Wi-Fi/3G/4G communications, the AIM system provides multiple SMA antenna apertures on the left panel for multi-antenna configuration.

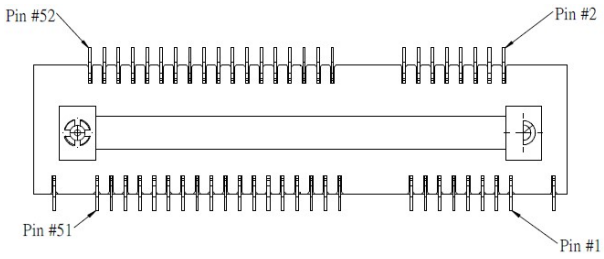


Top Side		Bottom Side	
1	PCIe Wake#	2	3.3V
3	Reserved	4	GND
5	Reserved	6	1.5V
7	PCIe CLKREQ#	8	UIM PWR
9	GND	10	UIM DATA
11	PCIe REFCLK-	12	UIM CLK
13	PCIe REFCLK+	14	UIM RESET
15	GND	16	UIM VPP

Top Side		Bottom Side	
Mechanical key			
17	Reserved (UIM C8)	18	GND
19	Reserved (UIM C4)	20	Reserved
21	GND	22	PCIe RST#
23	PCIe PERn0/SATA-Tx+	24	+3.3V SB
25	PCIe PERp0/SATA-TX-	26	GND
27	GND	28	+1.5V
29	GND	30	SMB CLK
31	PCIe PETn0/SATA-RX-	32	SMB DATA
33	PCIe PETp0/SATA-RX+	34	GND
35	GND	36	USB D-
37	GND	38	USB D+
39	+3.3V	40	GND
41	+3.3V	42	LED WWAN#
43	GND	44	LED WLAN#
45	Reserved	46	LED WPAN#
47	Reserved	48	+1.5V
49	Reserved	50	GND
51	Reserved	52	+3.3V

3.5.3 Mini PCIe Slot 2 (with USIM Socket)

The full-length Mini PCIe Slots supports a Mini PCIe or mSATA modes (selectable by the BIOS setup) and supports USB 2.0 and USIM card socket. USIM card socket supports +3.3V Power On/Off (controlled by the EFCO Application Program) and one Card Detection LED (WWAN, WLAN, and WPAN) on the front panel. This slot allows your system to connect to the Internet through an available telecom operator's GPRS/3G/4G network. For Wi-Fi/3G/4G communications, the AIM system provides multiple SMA antenna apertures on the left panel for multi-antenna configuration.



Top Side		Bottom Side	
1	PCIe Wake#	2	3.3V
3	Reserved	4	GND
5	Reserved	6	1.5V
7	PCIe CLKREQ#	8	UIM PWR
9	GND	10	UIM DATA

Top Side		Bottom Side	
11	PCIe REFCLK-	12	UIM CLK
13	PCIe REFCLK+	14	UIM RESET
15	GND	16	UIM VPP
Mechanical key			
17	Reserved (UIM C8)	18	GND
19	Reserved (UI C4)	20	Reserved
21	GND	22	PCIe RST#
23	PCIe PERn0	24	+3.3V SB
25	PCIe PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB CLK
31	PCIe PETn0	32	SMB DATA
33	PCIe PETp0	34	GND
35	GND	36	USB D-
37	GND	38	USB D+
39	+3.3V	40	GND
41	+3.3V	42	LED WWAN#
43	GND	44	LED WLAN#
45	Reserved	46	LED WPAN#
47	Reserved	48	+1.5V
49	Reserved	50	GND
51	Reserved	52	+3.3V

3.5.4 M.2 Socket

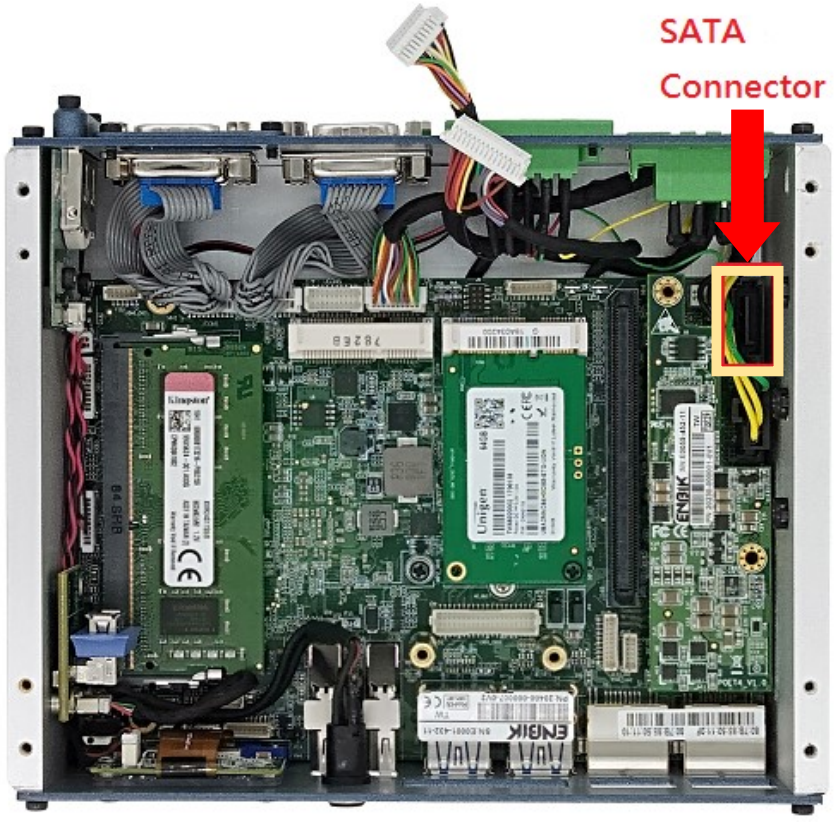
One M.2 M Key Slot supports 2242 PCIe x1 or mSATA mode selection by BIOS setup.

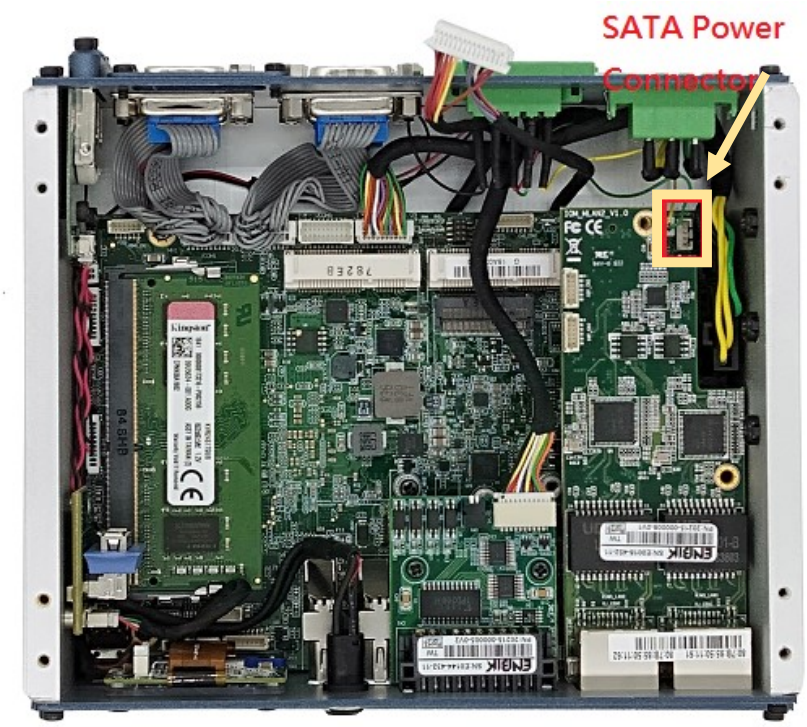
Pin	Description	Pin	Description
1	Ground	2	VCC 3.3V
3	Ground	4	VCC 3.3V
5	N/A	6	N/A
7	N/A	8	N/A
9	Ground	10	LED#
11	N/A	12	VCC 3.3V
13	N/A	14	VCC 3.3V
15	Ground	16	VCC 3.3V
17	N/A	18	VCC 3.3V
19	N/A	20	N/A
21	Ground	22	N/A
23	N/A	24	N/A
25	N/A	26	N/A
27	Ground	28	N/A
29	N/A	30	N/A
31	N/A	32	N/A
33	Ground	34	N/A
35	N/A	36	N/A
37	N/A	38	DEVSLP
39	Ground	40	N/A
41	PCIe RX N0 / SATA B+	42	N/A
43	PCIe RX P0 / SATA B-	44	N/A
45	Ground	46	N/A
47	PCIe TX N0 / SATA A-	48	N/A
49	PCIe TX P0 / SATA A+	50	Reset#
51	Ground	52	Clock Request#
53	PCIe Clock N	54	Wake#
55	PCIe Clock P	56	N/A
57	Ground	58	N/A

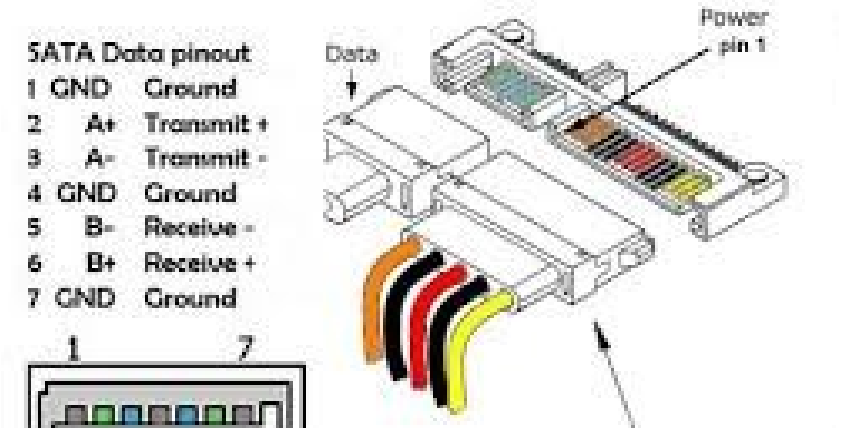
Pin	Description	Pin	Description
Mechanical Key			
67	Ground	68	N/A
69	N/A	70	Ground
71	Ground	72	Ground
73	Ground	74	Ground

3.5.5 Internal SATA and SATA Power Connector

One internal SATA and SATA power connector. The SATA Power Header supports +5V power at 2A for SSD devices.







SATA Data Pinout

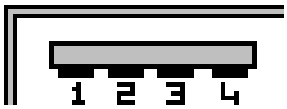
Pin	N/Ame	Function
1	GND	Ground
2	A+	Transmit+
3	A-	Transmit-
4	GND	Ground
5	B-	Receive-
6	B+	Receive+
7	GND	Ground

SATA Power Pinout

Pin	Name	Function
1	NC	N/A
2	NC	3.3V Power
3	NC	3.3V Power, Pre-charge, 2nd mate
4	Ground	1st Mate
5	Ground	2nd Mate
6	Ground	3rd Mate
7	V5	5V Power, pre-charge, 2nd mate
8	V5	5V Power
9	V5	5V Power
10	Ground	2nd Mate
11	Reserved	N/A
12	Ground	1st Mate
13	NC	12V Power, Pre-charge, 2nd mate
14	NC	12V Power
15	NC	12V Power

3.5.6 Internal USB 2.0 Ports

One internal USB 2.0 Type A connector. The internal USB port is designed to allow users to attach a protection dongle inside the chassis.



Pin	Name	Description
1	VCC	+5 VDC
2	D-	Data -
3	D+	Data +
4	GND	Ground

Chapter 4

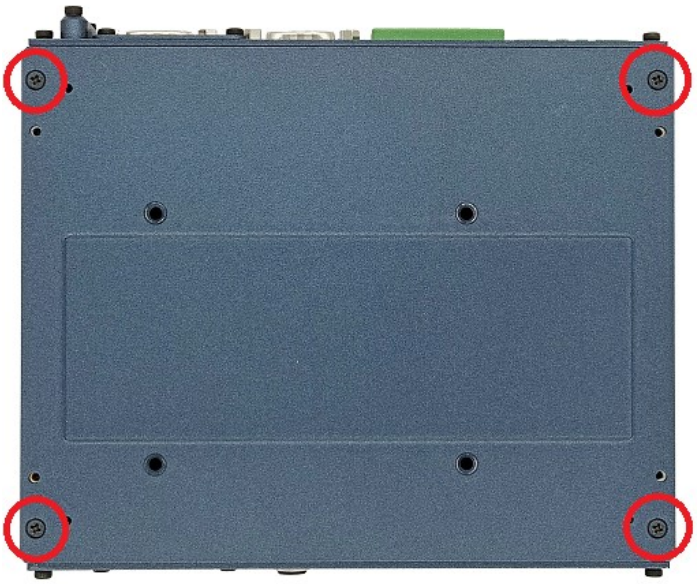
Hardware Installation

This chapter describes how to install parts, including:

- SO-DIMM Memory Installation
- M.2 SSD Installation
- MSATA SSD Installation
- Mini PCIe 1 Module Installation
- Mini PCIe 2 Module Installation
- 2.5" SATA SSD/ HDD Installation
- Replace CMOS RTC Battery
- Mounting Bracket Installation

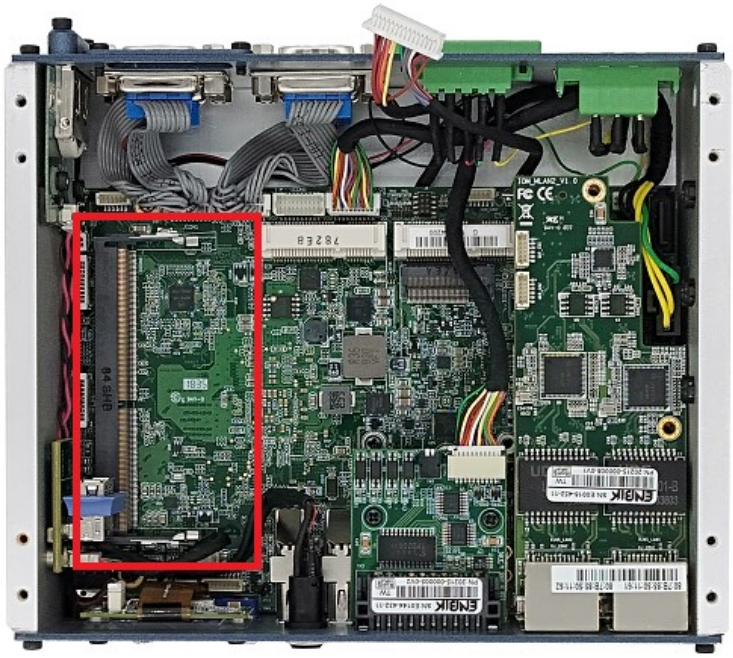
4.1 SO-DIMM Memory Installation

1. Remove the bottom four M2.5*5mm screws to remove the bottom cover.

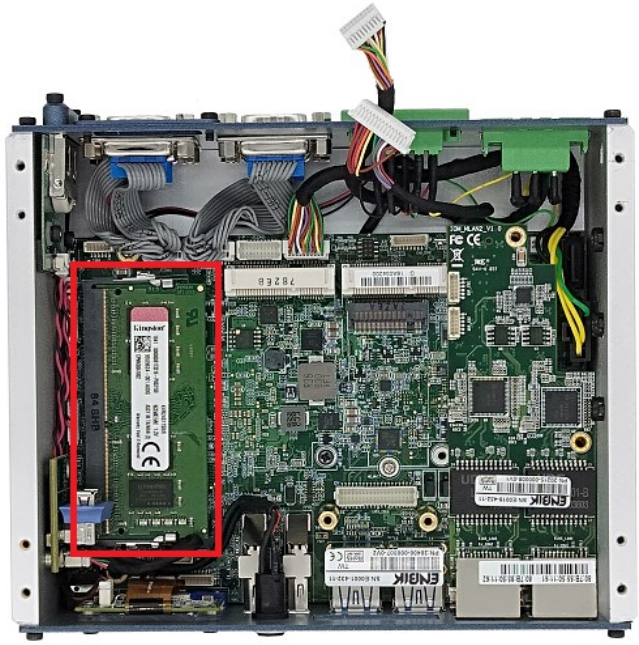


2. Open the bottom cover and unplug the cable connected to the SIM slot board on the inside of the bottom cover.

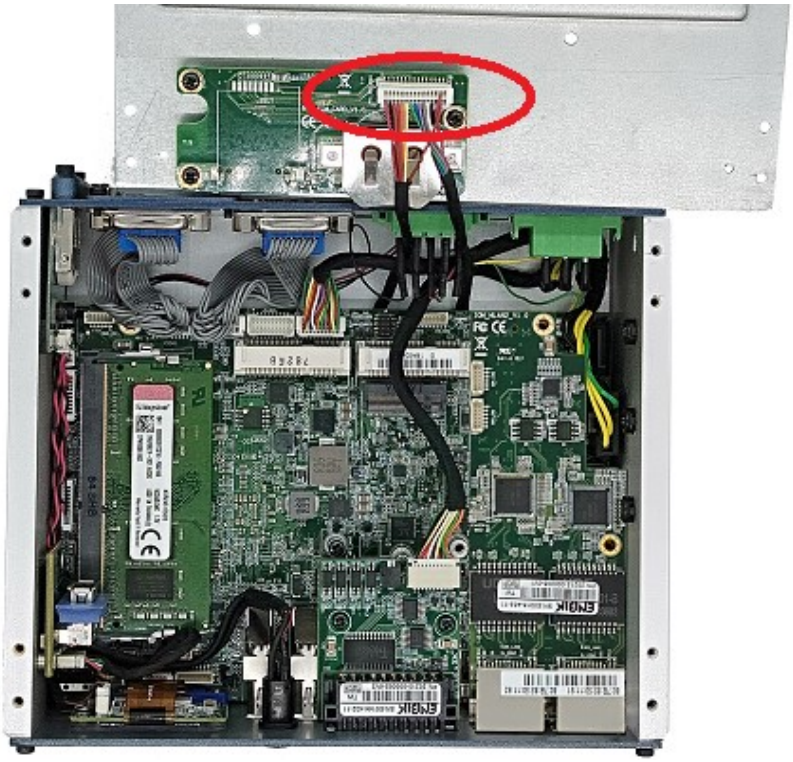
3. Insert the SO-DIMM memory module into the SO-DIMM socket.



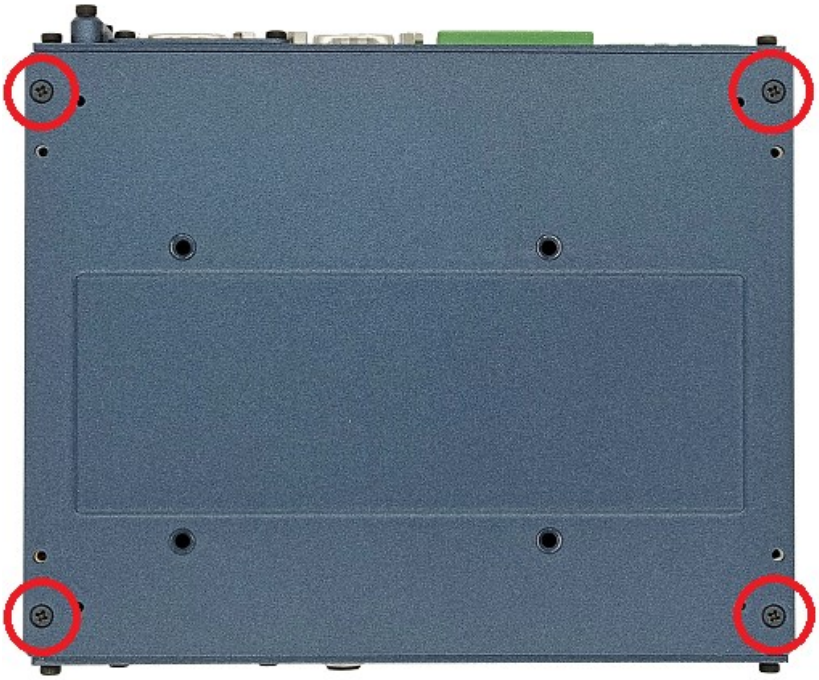
4. Confirm that the SO-DIMM is securely inserted into the socket.



5. Reconnect the cable to the SIM slot board on the inside of the bottom cover.

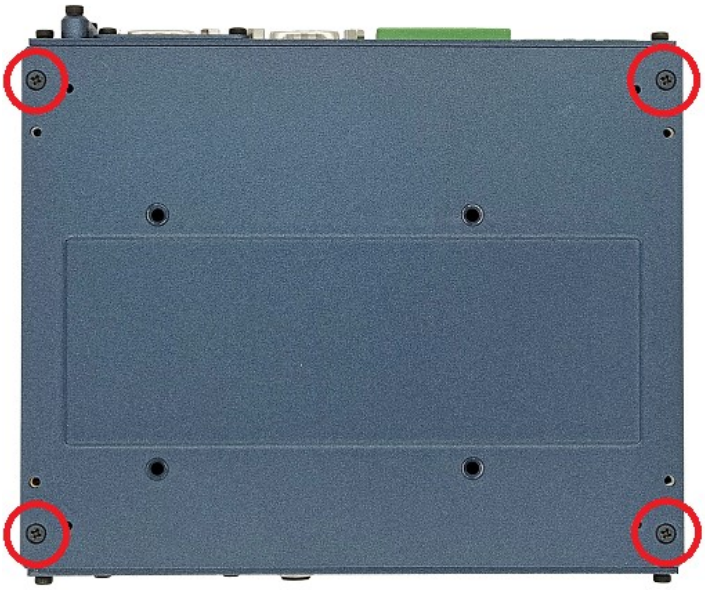


6. Replace the bottom cover and secure with four M2.5*5mm screws.

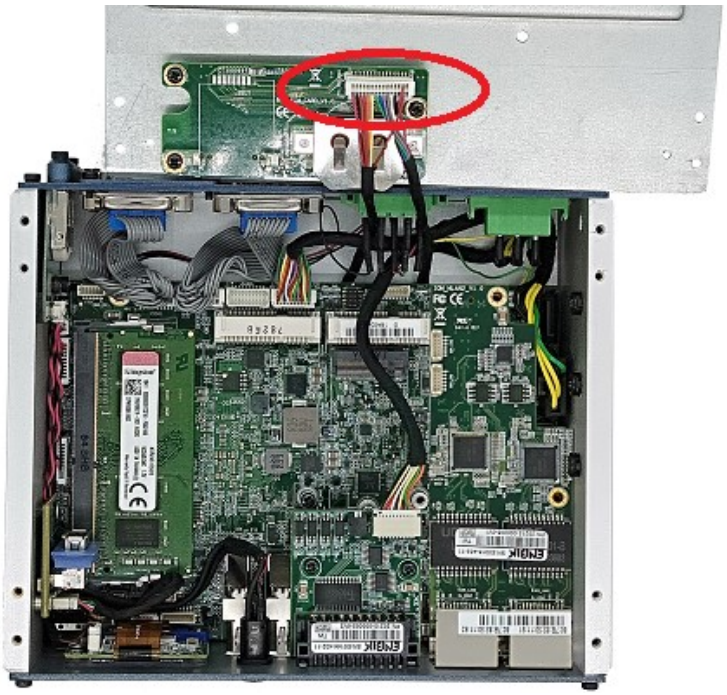


4.2 M.2 SSD Installation

1. Remove the bottom four M2.5*5mm screws to remove the bottom cover.

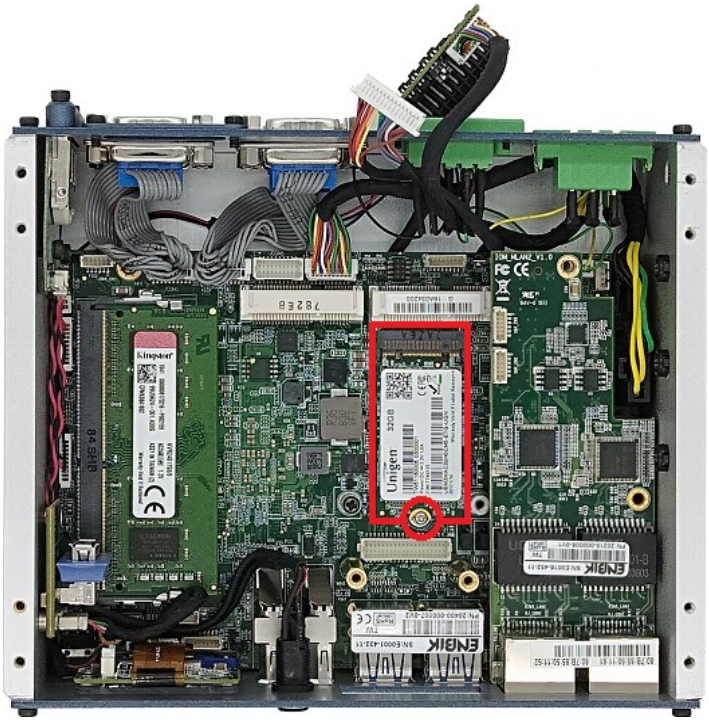


2. Open the bottom cover and unplug the cable connected to the SIM socket board on the inside of the bottom cover.

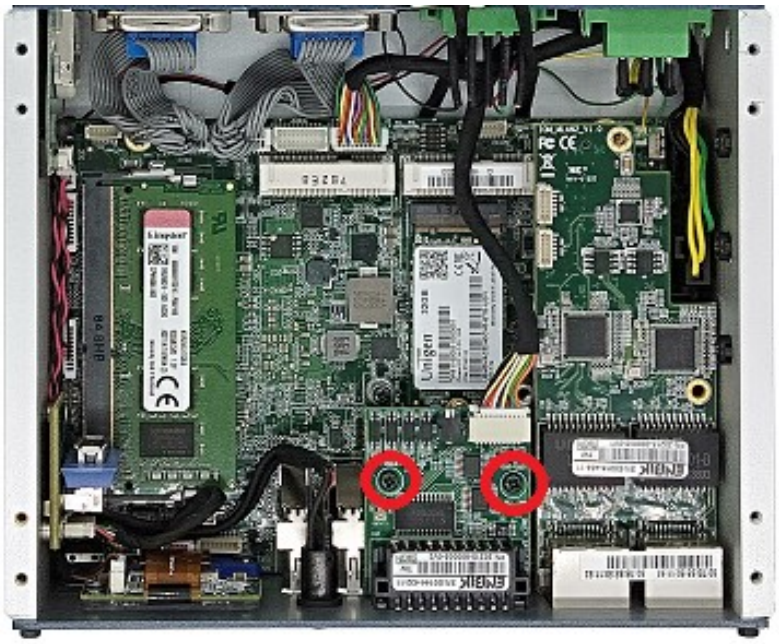


3. Remove the two M2.5*6mm screws securing the DIO module and remove the DIO module.

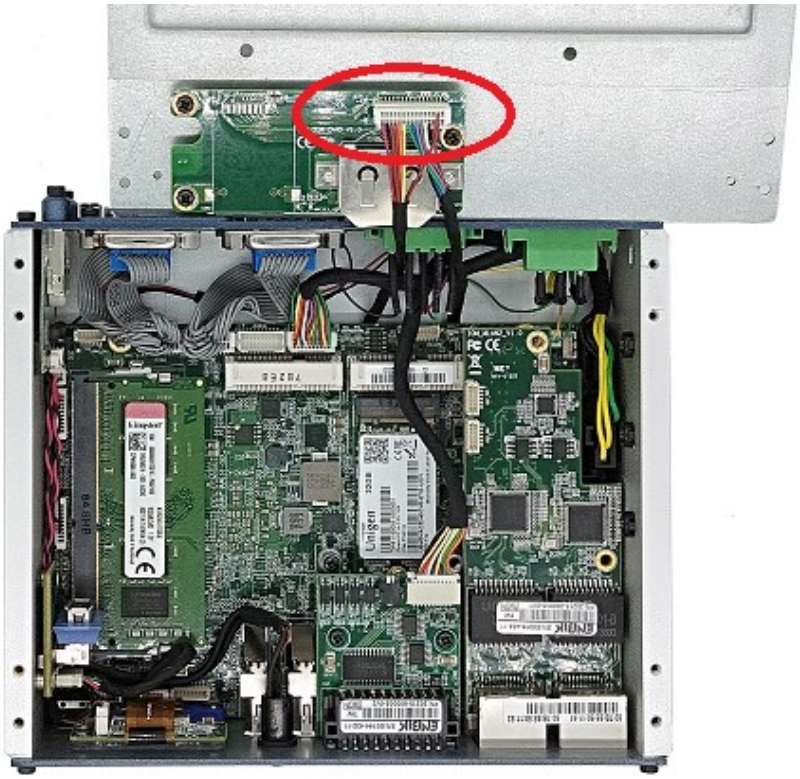
4. Insert the M.2 SSD module into the M.2 socket and secure it with the M2*4mm screws.



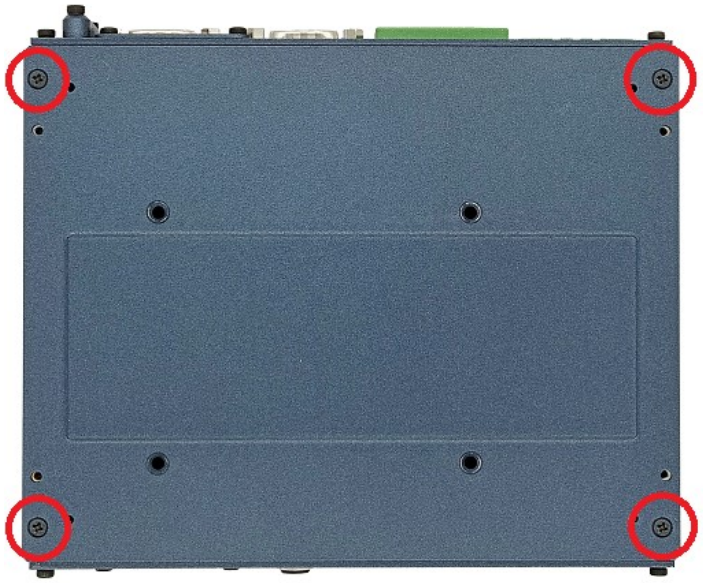
5. Insert the DIO module and secure it with two M2.5*6mm screws.



6. Reconnect the cable to the SIM socket on the inside of the bottom cover.

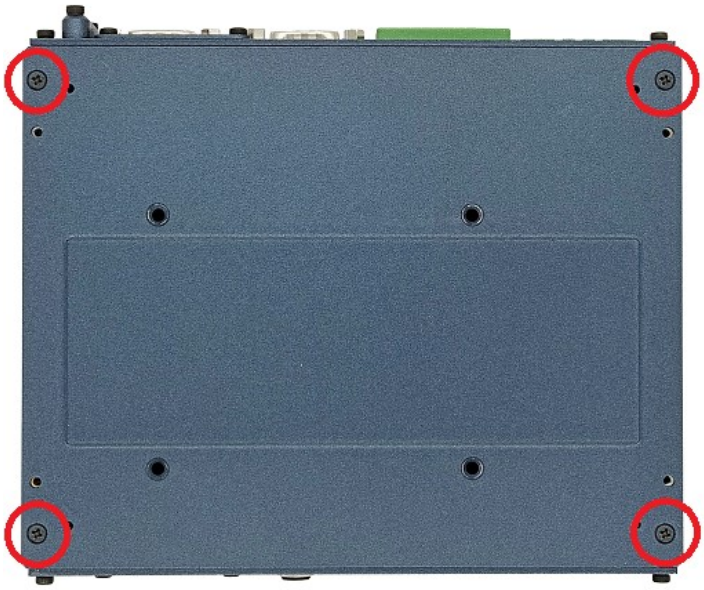


7. Replace the bottom cover and secure with four M2.5*5mm screws.

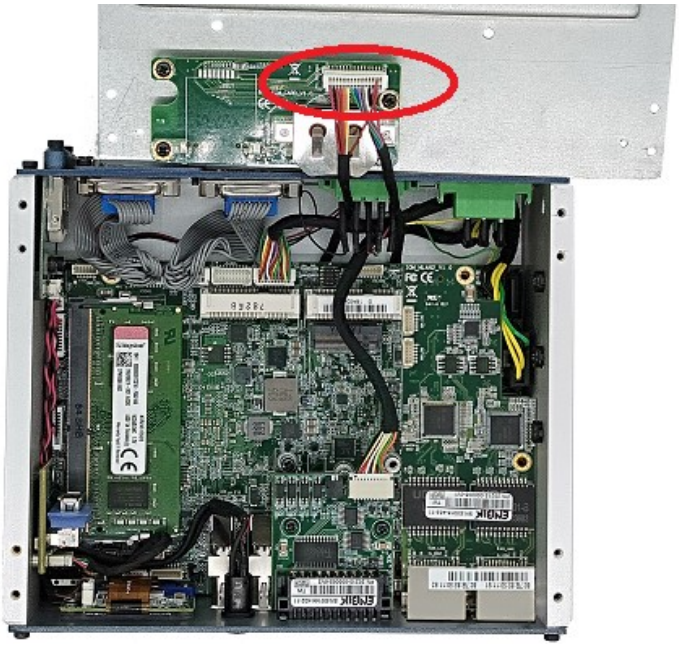


4.3 mSATA SSD Installation (Mini PCIe 1)

1. Remove the bottom four M2.5*5mm screws to remove the bottom cover.

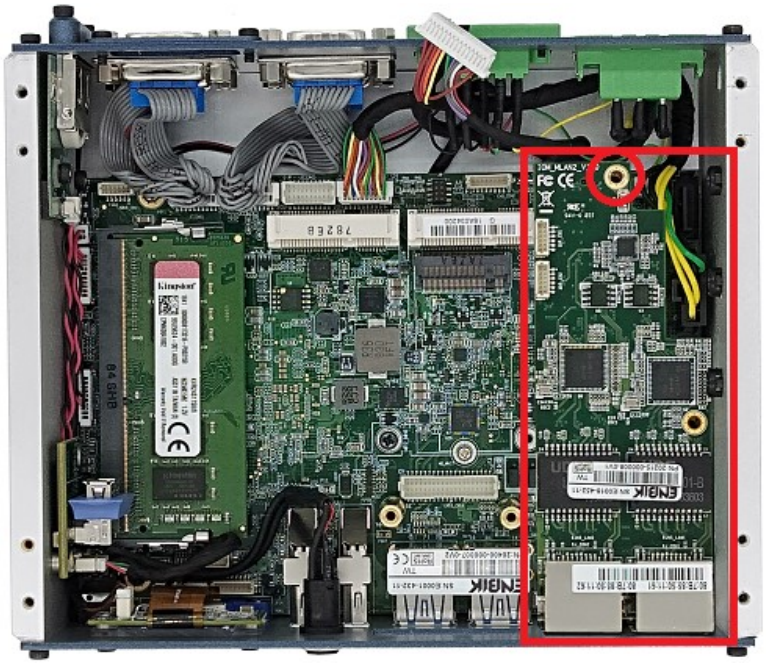


2. Open the bottom cover and unplug the cable connected to the SIM socket on the inside of the bottom cover.



3. Remove the two M2.5*6mm screws securing the DIO module and remove the DIO module.

4. Remove the M2.5*8mm screw securing the IOM-2RG module and remove the IOM-2RG module.

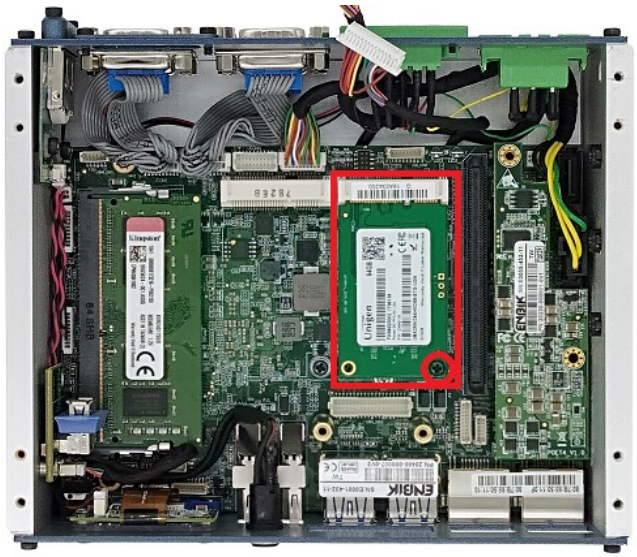


Note:

Please note, that there will be a plastic pillar underneath. Don't lose it.

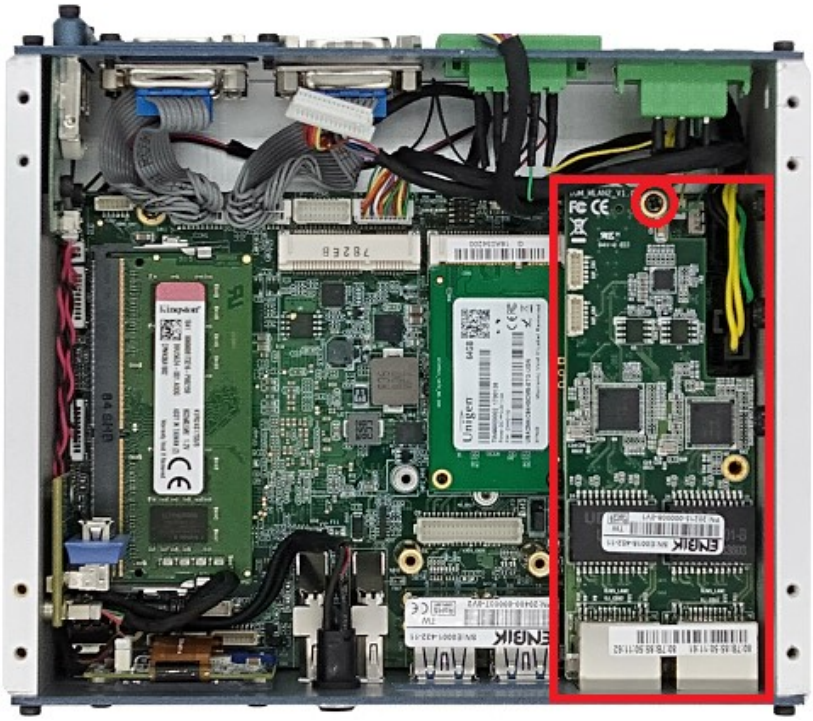
5. Remove the Plastic Pillars.

6. Insert the mSATA module into the Mini PCIe x1 slot and secure it with M2.5*6mm screws.

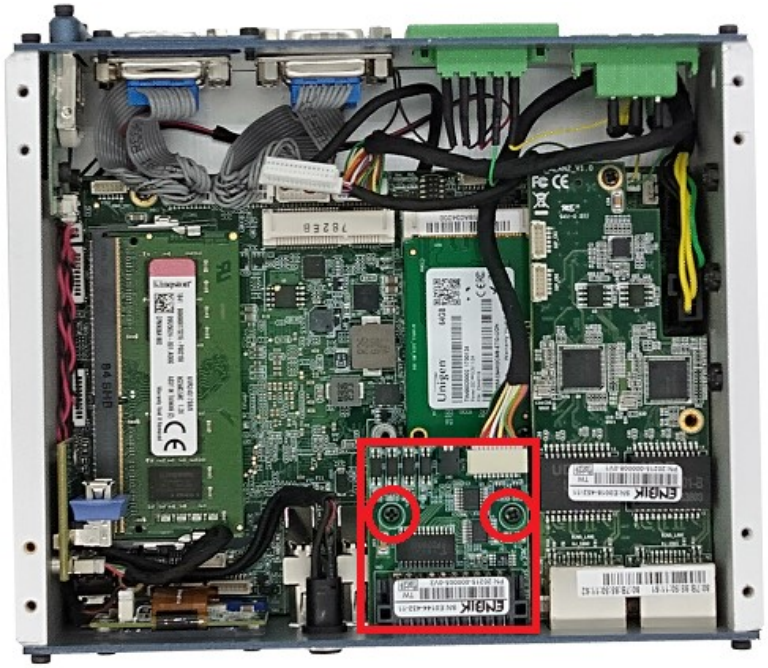


7. Install the Plastic Pillars.

8. Insert the IOM-2RG module and secure it with an M2.5*8mm screw.

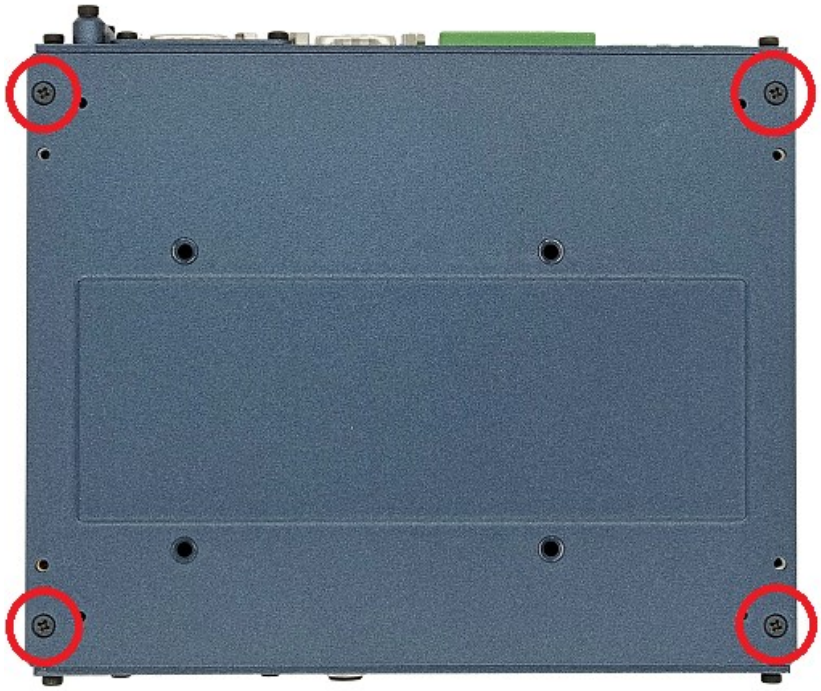


9. Insert the DIO module and secure it with two M2.5*6mm screws.



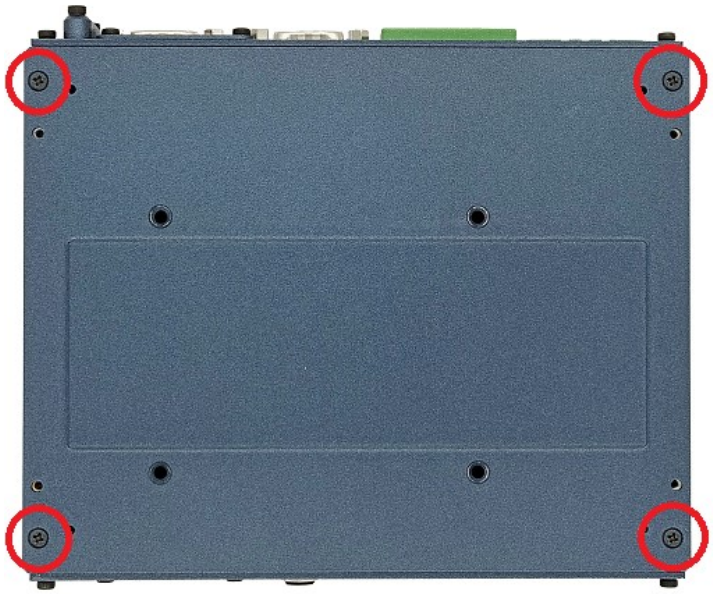
10. Reconnect the cable to the SIM socket onto the inside of the bottom cover.

11. Replace the bottom cover and secure with four M2.5*5mm screws.

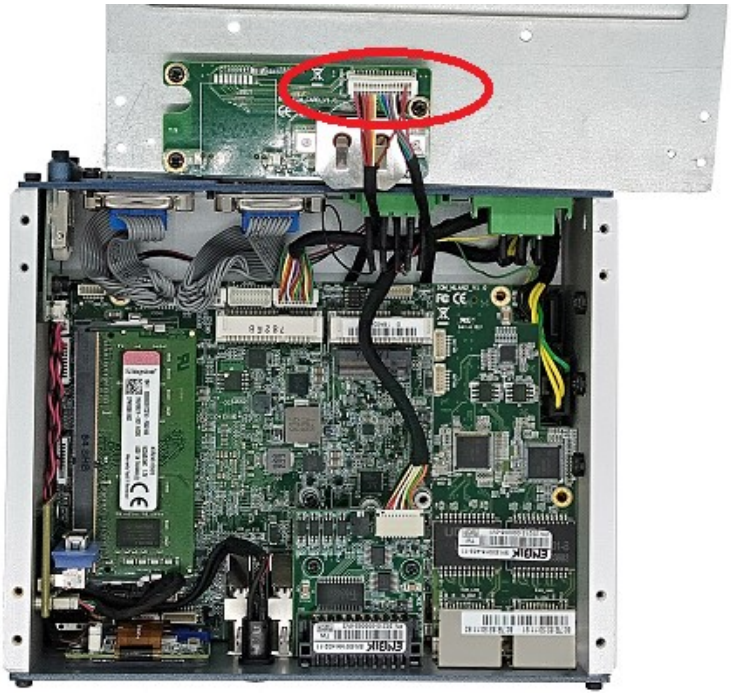


4.4 Mini PCIe slot #1 Module Installation

1. Remove the bottom four M2.5*5mm screws to remove the bottom cover.

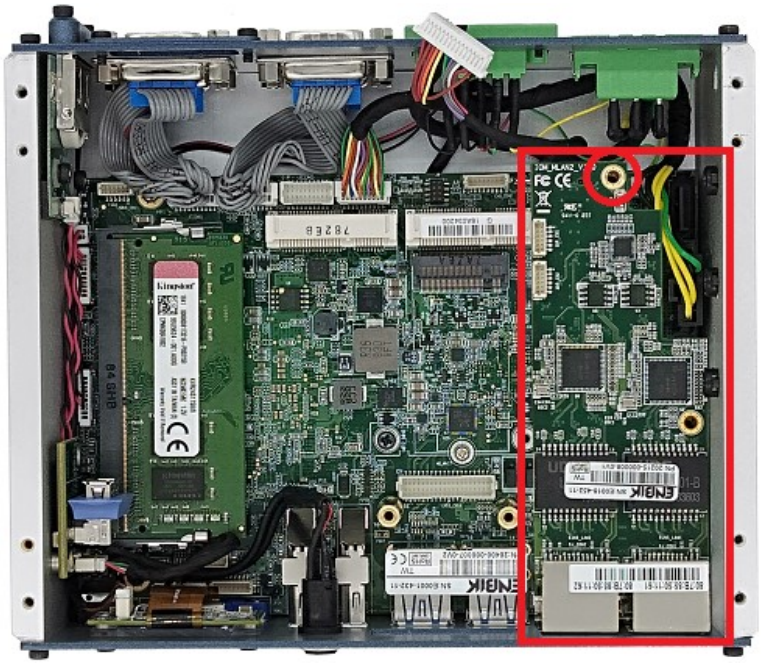


2. Open the bottom cover and unplug the cable connected to the SIM socket on the inside of the bottom cover.



3. Remove the two M2.5*6mm screws securing the DIO module and remove the DIO module.

4. Remove the M2.5*8mm screw to securing the IOM-2RG module and remove the IOM-2RG module.

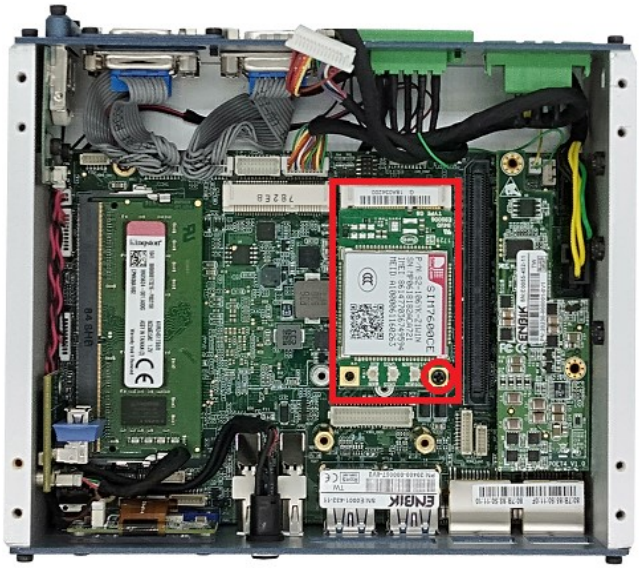


Note:

Please note, that there will be a plastic pillar underneath. Don't lose it.

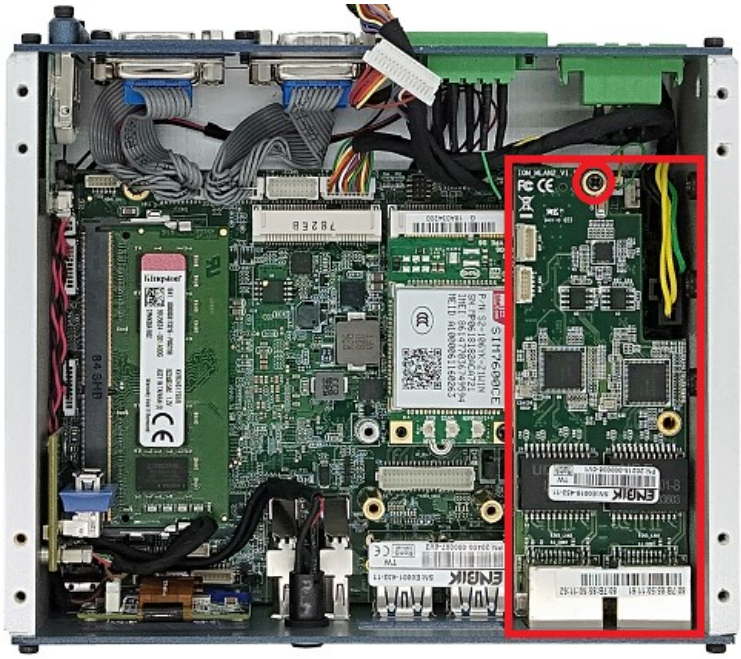
5. Remove the Plastic Pillars.

6. Insert the Mini PCIe module into the Mini PCIe slot #1 and secure it with an M2.5*6mm screw.

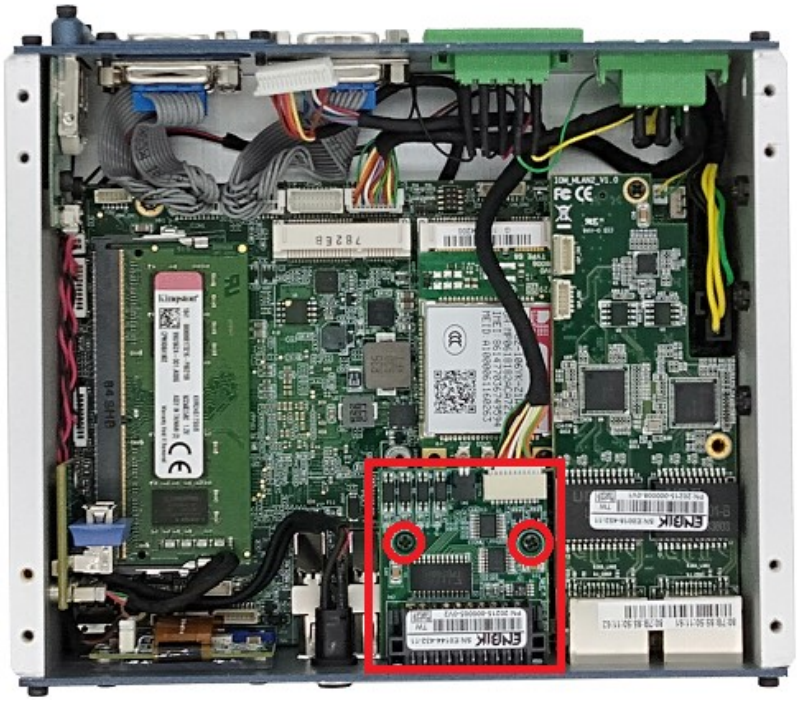


7. Install the Plastic Pillars.

8. Insert the IOM-2RG module and secure it with an M2.5*8mm screw.

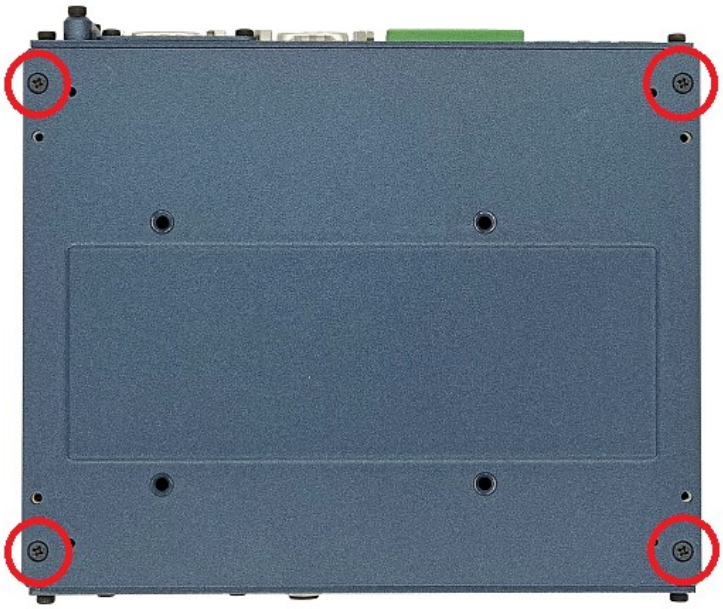


9. Insert the DIO module and secure it with two M2.5*6mm screws.



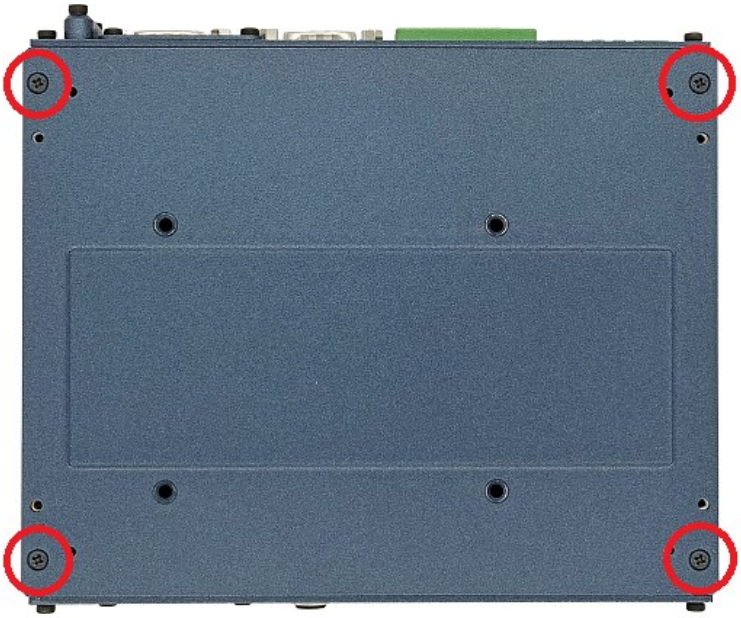
10. Reconnect the cable to the SIM socket on the inside of the bottom cover.

11. Replace the bottom cover and secure with four M2.5*5mm screws.

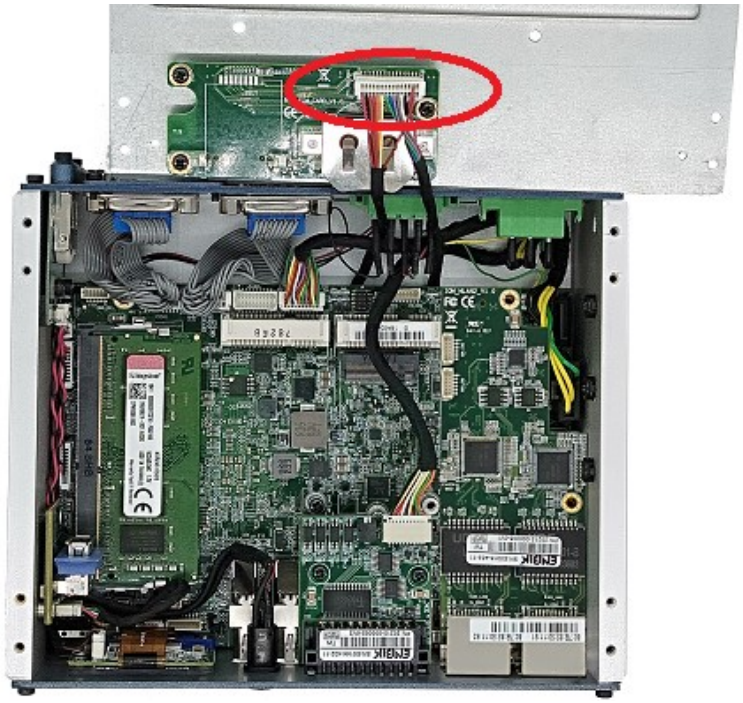


4.5 Mini PCIe slot #2 module installation

1. Remove the four M2.5*5mm screws to remove the bottom cover.

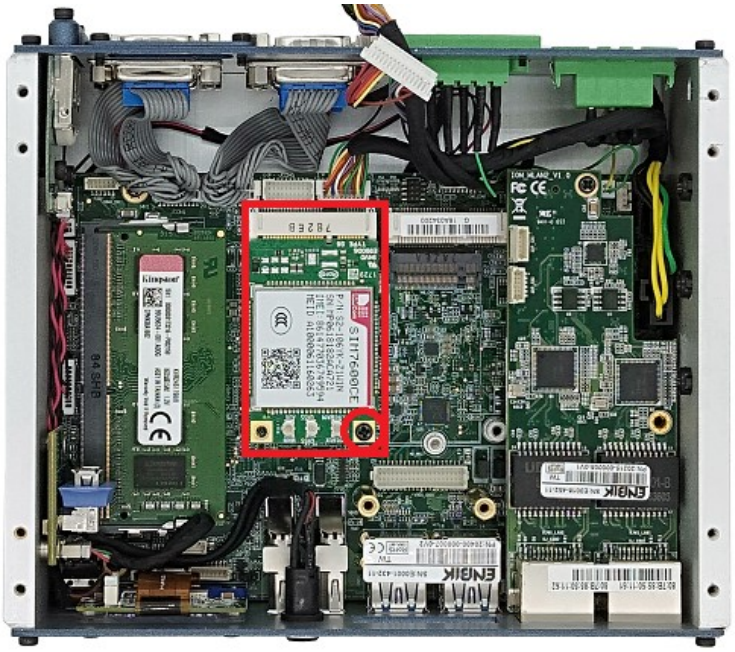


2. Open the bottom cover and unplug the cable connected to the SIM socket on the inside of the bottom cover.

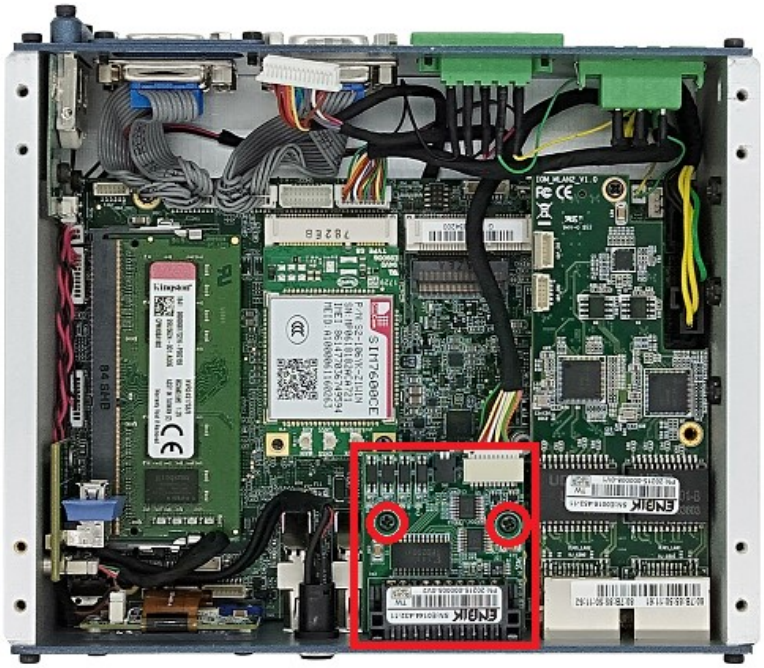


3. Remove the two M2.5*6mm screws securing the DIO module and remove the DIO module.

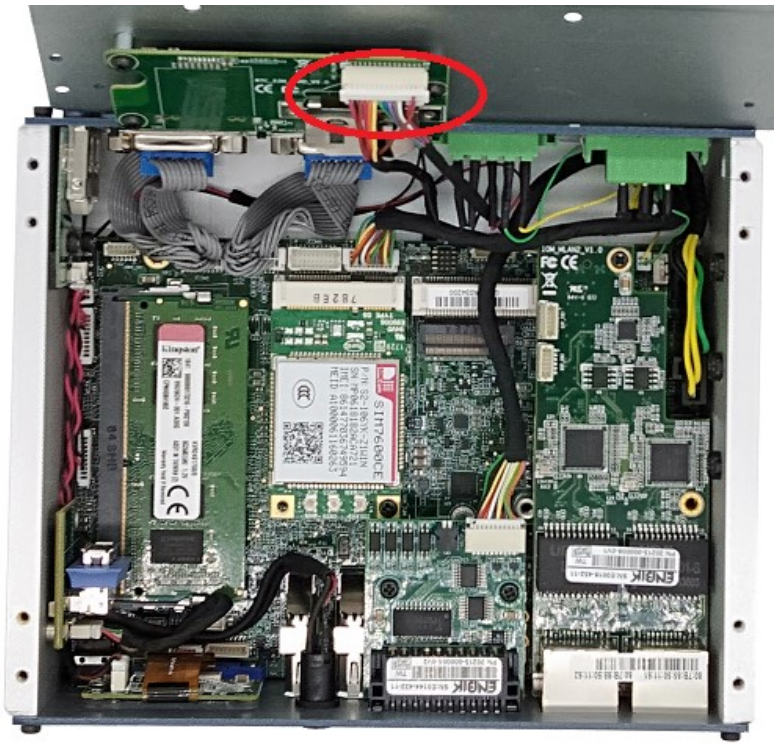
4. Insert the Mini PCIe module into the Mini PCIe slot # 2 and secure it with M2.5*6mm screws.



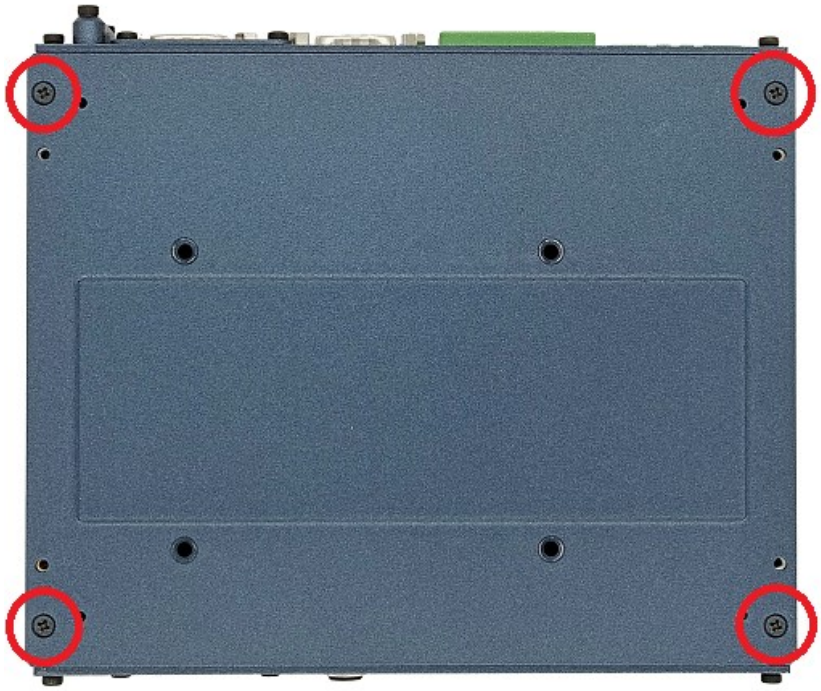
5. Insert the DIO module and secure it with two M2.5*6mm screws.



6. Reconnect the cable to the SIM socket on the inside of the bottom cover.

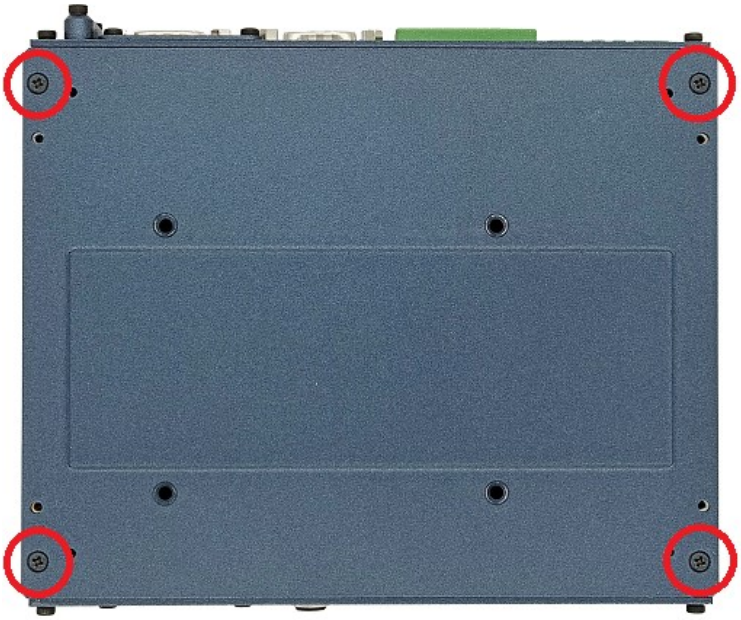


7. Replace the bottom cover and secure with four M2.5*5mm screws.

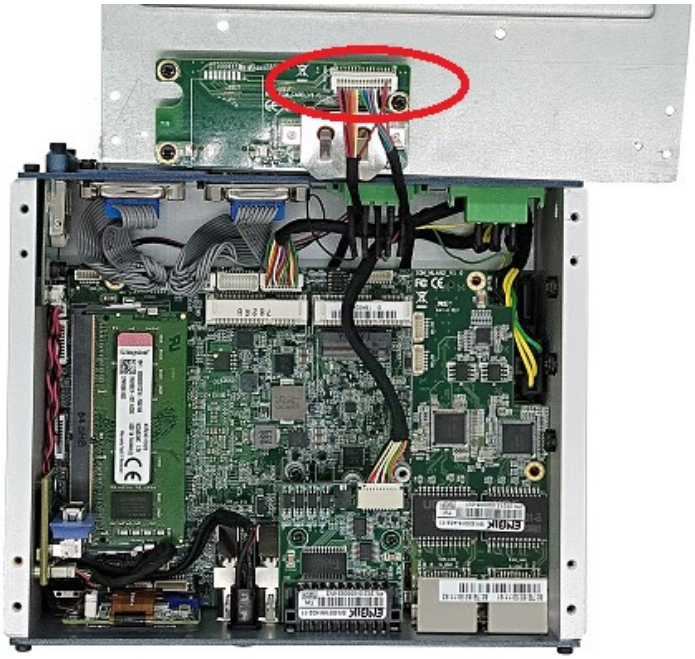


4.6 2.5" SATA SSD / HDD Installation

1. Remove the bottom four M2.5*5mm screws to remove the bottom cover.

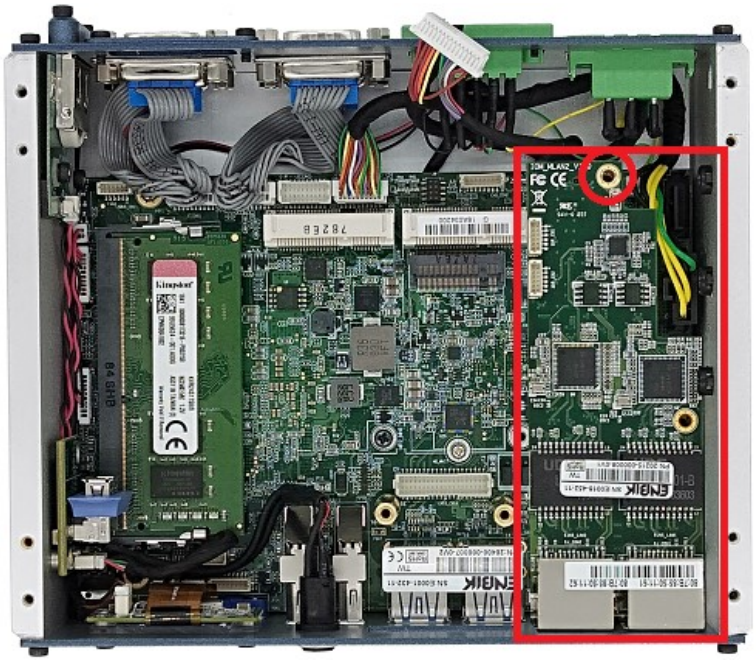


2. Open the bottom cover and unplug the cable connected to the SIM socket board on the inside of the bottom cover.



3. Remove the two M2.5*6mm screws securing the DIO module and remove the DIO module.

4. Remove the M2.5*8mm screw to securing the IOM-2RG module and remove the IOM-2RG module.

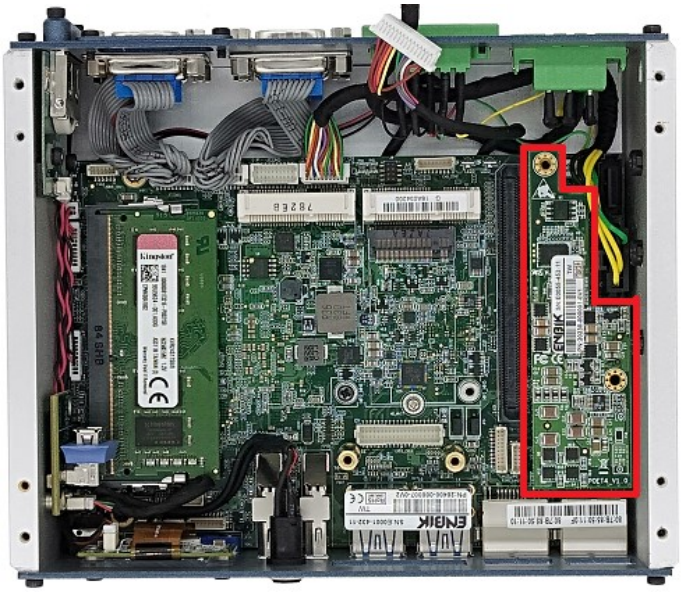


Note:

Please note, that there will be a plastic pillar underneath. Don't lose it.

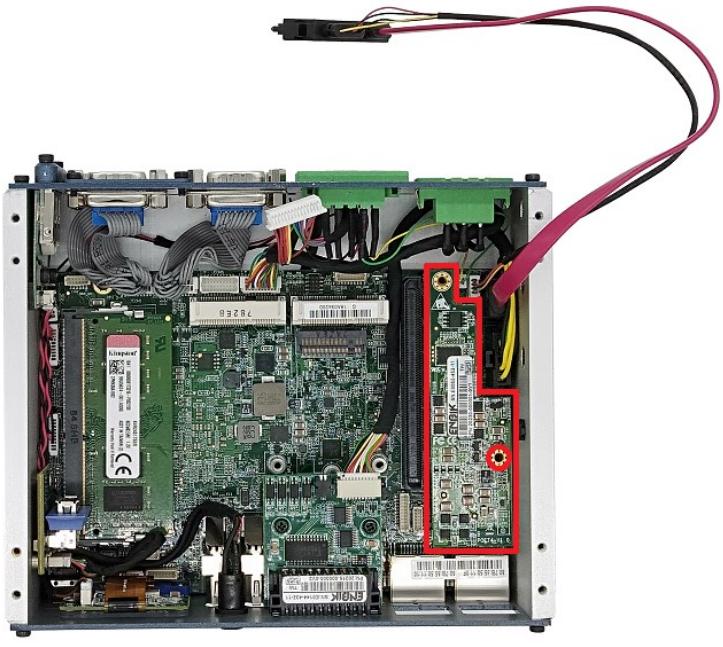
5. Remove the Plastic Pillars.

6. Remove the IOM-POEAT4 module.

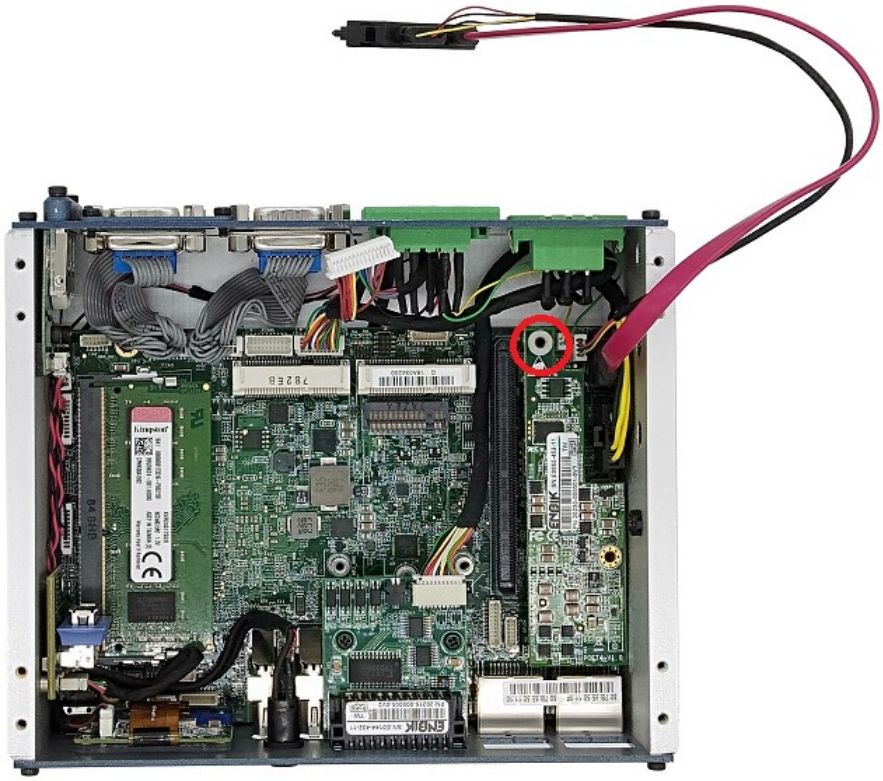


7. Plug the SATA power cable into the SATA power connector on the board. Then plug the SATA cable (without lock) into the SATA connector on the board.

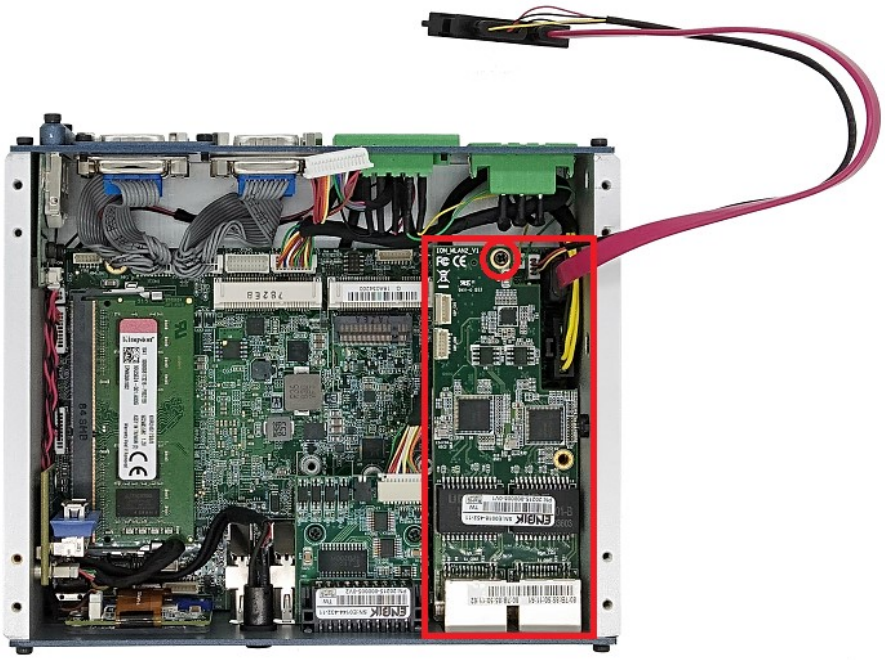
8. Install the IOM-POEAT4 module and secure it with M2.5*6mm screws.



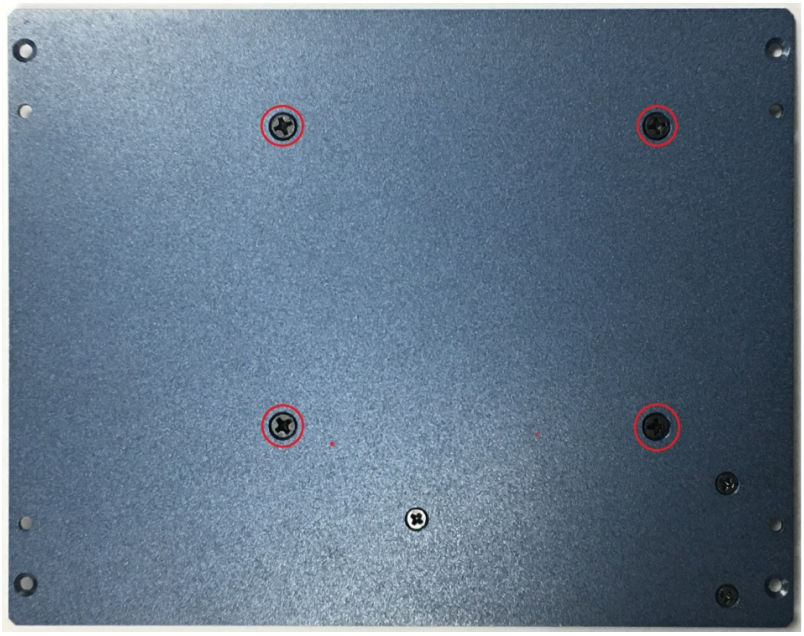
9. Install the Plastic Pillars.



10. Insert the IOM-2RG module and secure it with M2.5*8mm screws.

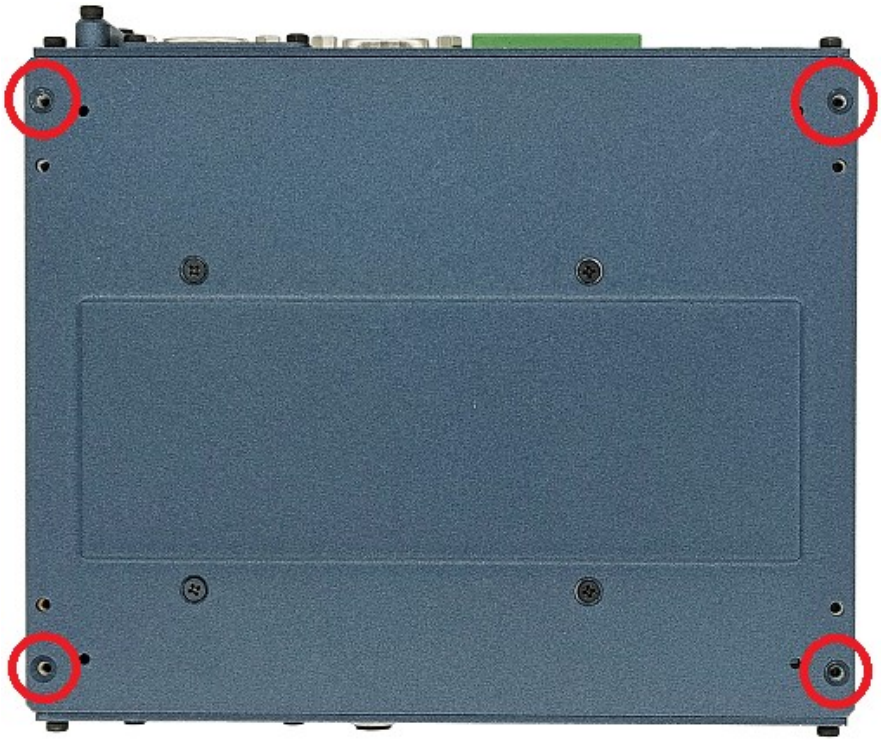


11. Install the 2.5" SATA drive to the bottom cover with 4 M3x4mm screws and insert the SATA cable (with lock) and SATA power cable into the 2.5" SATA drive.



12. Reconnect the cable to the SIM socket board on the inside of the bottom cover.

13. Replace the bottom cover and secure with four M2.5*5mm screws.

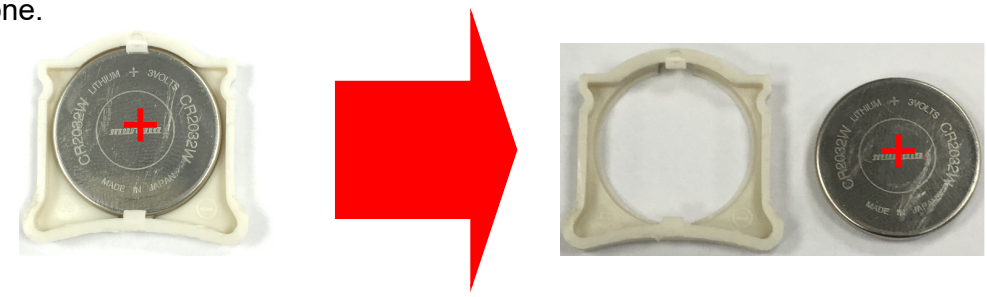


4.7 Replace CMOS RTC Battery

1. Remove the two M2.5*8mm screws securing the rear panel battery cover.

2. Open the battery cover and pull out the white battery tray holder.

3. Remove the CR2032 button battery from the white battery tray holder and replace it with a new one.



Caution!

When changing the battery, make a note of the polarity of the battery.
When the battery tray holder is inserted back into the battery slot, make sure that positive (+) is facing up.

4. Insert the battery tray holder into the battery holder and secure the rear panel battery cover with 2 M2.5 screws.


COM1
COM3
COM2
COM4
Remote/IGN
DC-IN
9V-36V
V+ V-

4.8 Mounting Bracket Installation

1. Secure both brackets to the bottom cover with 2 M2.5x5 screws.

Chapter 5

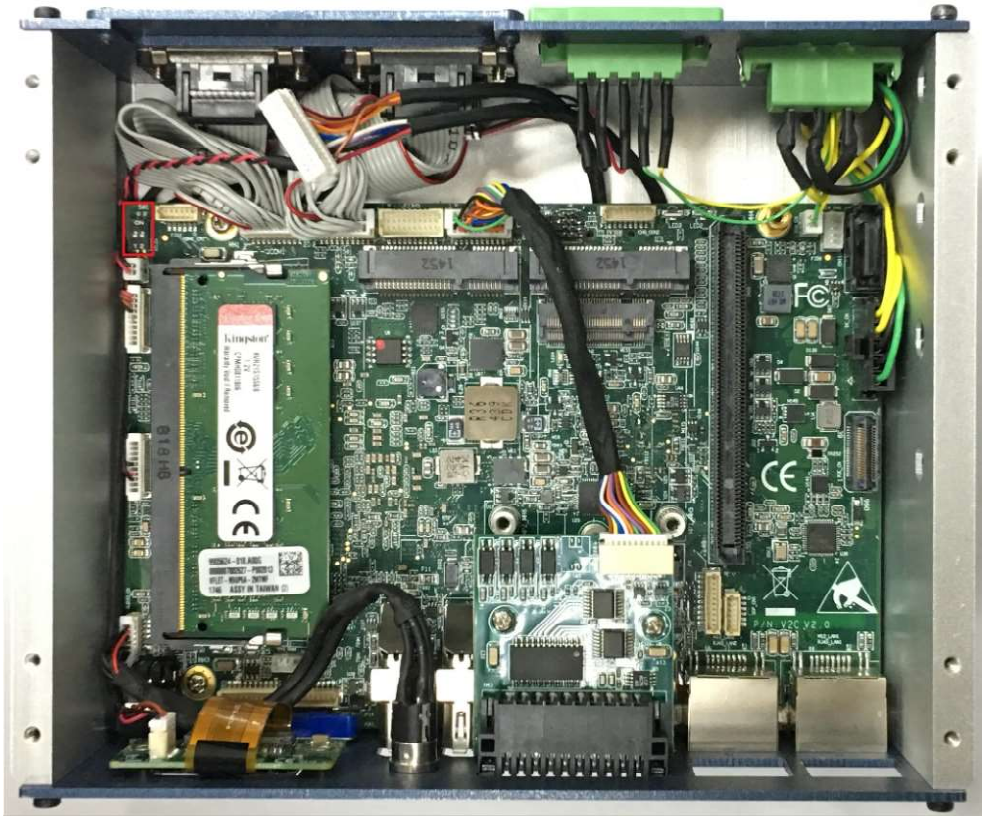
Function Settings

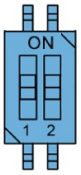
This chapter includes:

- Clear CMOS/ME Switch (SW1)

5.1 Clear CMOS/ME Switch (SW1)

You can use Switch SW1 to clear CMOS and Intel® Management Engine settings.





Switch 1	Description (Clear CMOS)
On	Clear
Off	(Default)
Switch 2	Description (Clear ME)
On	Clear
Off	(Default)

Appendices

This section includes:

- Appendix A: DisplayPort Multi-Stream Transport (MST) Capabilities
- Appendix B: How To Use GPIO

Appendix A: DisplayPort Multi-Stream Transport (MST) Capabilities

The AIM system DisplayPorts support Multi-Stream Transport (MST).

MST	Max. Resolution	Pixel Clock	One Display Bandwidth [Gbps]	Total Bandwidth for all display [Gbps]
1 display	3840x2160 @60Hz	533.25	16	16
	4096x2304 @60Hz	605.0	18.5	18.15
2 concurrent	2880x1800 @60Hz	337.75	10.13	20.26

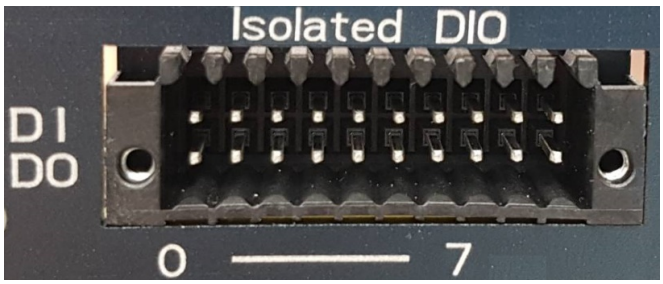
Note:

1. Multi-Stream Transport (MST) eN/Ables multiple monitors via a single DisplayPort* connector.
2. Total bandwidth for all displays must be lower than the Max theoretical bandwidth of 3.4x4 = 21.6 [Gbps].
3. Additional cooling is required.

Appendix B: How to use GPIO

Functional Description

GPIO signals are accessed via a 2.54mm 2x10-pin terminal block, including isolated DI 8 bit, DO 8-bit, DI Com, Power, and GND.
DI/DO supports NPN (Sink) and PNPO (Source) mode.



DI mode is selected by an external H/W connection. DO mode is chosen by a BIOS setting or an Application Program.

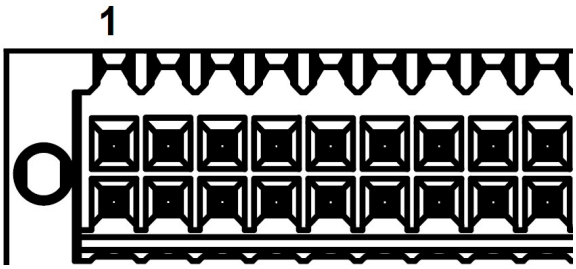
DI/DO Safety-Related Certifications:

DI	DO
2500-V PART NUMBER PACKAGE BODY SIZE (NOM) RMS Isolation for 1 minute per UL 1577	2500-V PART NUMBER PACKAGE BODY SIZE (NOM) RMS Isolation for 1 minute per UL 1577
Approved by VDE, DIN EN60747-5-2(_) (as an option), file No. 40009162 (as model No. PC3H4)	4242-V ISO7131CC PK Isolation per DIN V VDE V 0884-10 (VDE V 0884-10):2006-12, 566 V ISO7140CC PK Working Voltage
UL flammability grade (94V-0)	CSA Component Acceptance Notice 5A, IEC ISO7141CC 60950-1 and IEC 61010-1 End Equipment ISO7141FCC Standards
CQC Certification per GB 4943.1-2011	

DI/DO Operation Characteristics:

Parameter	DI	DO
Operation Voltage	5 - 48V DC	Source Mode:5 - 48V DC Sink Mode: 5-40V DC
Input/Output Current Limit	25 uS	100mA
Turn On Delay Time (Max.)	25 uS	Source Mode: 15 uS Sink Mode: 60uS
Turn Off Delay Time (Max.)	25 uS	Source Mode: 15 uS Sink Mode: 60uS

Pin Definition

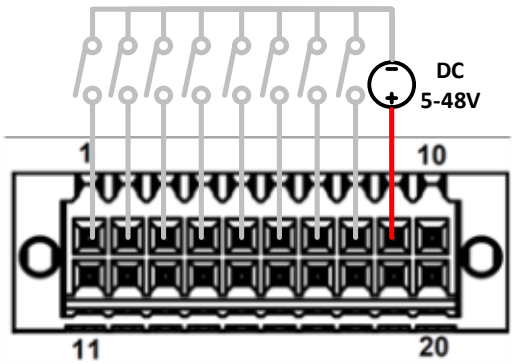


Pin	Description	Pin	Description
1	Isolated DI bit0	11	Isolated DO bit0
2	Isolated DI bit1	12	Isolated DO bit1
3	Isolated DI bit2	13	Isolated DO bit2
4	Isolated DI bit3	14	Isolated DO bit3
5	Isolated DI bit4	15	Isolated DO bit4
6	Isolated DI bit5	16	Isolated DO bit5
7	Isolated DI bit6	17	Isolated DO bit6
8	Isolated DI bit7	18	Isolated DO bit7
9	Digital Input COM	19	Isolated GND
10	Isolated GND	20	Isolated VCC

Isolation Digital Input Connection Method

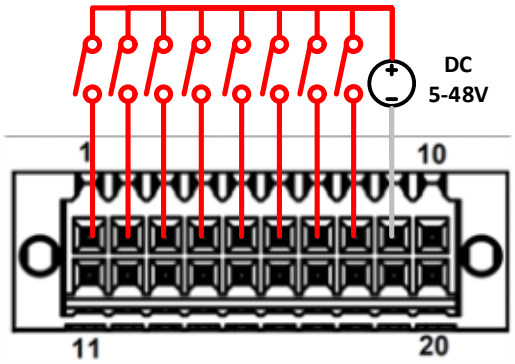
Digital Input Sink Mode Connection Method

Pin 9 digital input COM pin connection to V+. Input pin (Pins 1-8) control by V-.



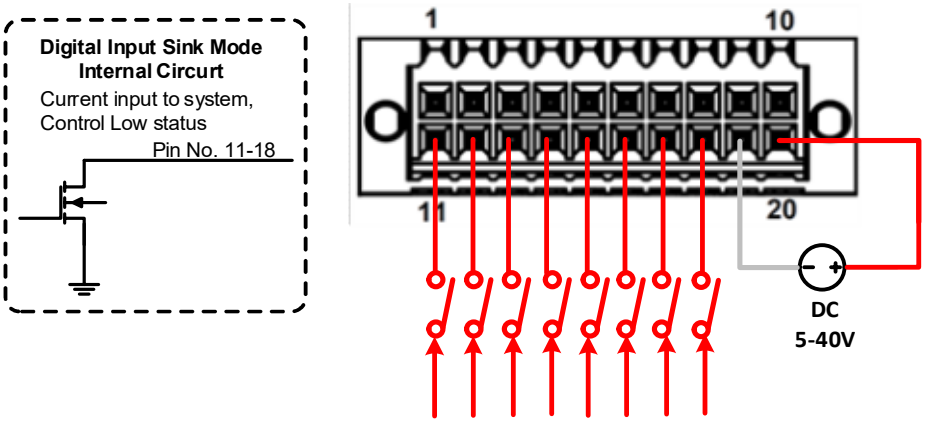
Digital Input Source Mode Connection Method

Pin 9 digital input COM pin connection to V-. Input pin (Pins 1-8) control by V+.



Isolation Digital Output Connection Method

Digital Output Sink Mode Connection Method



Digital Output Source Mode Connection Method