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Prefaces

Revision

Revision	Description	Date
1.0	Manual Released	2024/04/19

Disclaimer

All specifications and information in this User's Manual are believed to be accurate and up to date. C&T Solution Inc. does not guarantee that the contents herein are complete, true, accurate or non-misleading. The information in this document is subject to change without notice and does not represent a commitment on the part of C&T Solution Inc.

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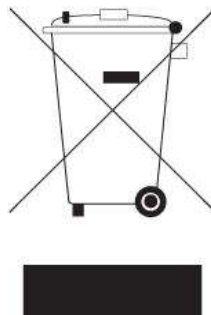
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Environmental Protection Announcement

Do not dispose this electronic device into the trash while discarding. Please recycle to minimize pollution and ensure environment protection.



Safety Precautions

Before installing and using the equipment, please read the following precautions:

- Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.
- The power outlet shall be installed near the equipment and shall be easily accessible.
- Turn off the system power and disconnect the power cord from its source before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the equipment is properly grounded.
- When the power is connected, never open the equipment. The equipment should be opened only by qualified service personnel.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Disconnect this equipment from the power before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- Avoid the dusty, humidity and temperature extremes.
- Do not place heavy objects on the equipment.
- If the equipment is not used for long time, disconnect it from the power to avoid being damaged by transient over-voltage.
- The storage temperature shall be above -40°C and below 85°C.
- The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.
- If one of the following situation arises, get the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well or it cannot work according to the user's manual.
 - The equipment has been dropped and damaged.
 - The equipment has obvious signs of breakage.

Technical Support and Assistance

1. Visit the C&T Solution Inc website at <https://www.candtsolution.com> where you can find the latest information about the product.
2. Contact your distributor, our technical support team or sales representative for technical support if you need additional assistance. Please have following information ready before you call:
 - Model name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Conventions Used in this Manual



WARNING

This indication alerts operators to an operation that, if not strictly observed, may result in severe injury.



CAUTION

This indication alerts operators to an operation that, if not strictly observed, may result in safety hazards to personnel or damage to equipment.



NOTE

This indication provides additional information to complete a task easily.

Package Contents

Before installation, please ensure all the items listed in the following table are included in the package.

Item	Description	Q'ty
1	JCO-6000-ORN-ORN-A Robust AI Edge Computer	1
2	Wall Mount Kit	1
3	Accessory Kit	1

Ordering Information

Model No.	Product Description
JCO-6000-ORN-A (2EBIO)-AGX64	NVIDIA Jetson AGX Orin™ AI Computer with 12-core Arm® Cortex®-A78AE v8.2 64-bit CPU, 2x EDGEBoost I/O Support
JCO-6000-ORN-A (2EBIO)-AGX32	NVIDIA Jetson AGX Orin™ AI Computer with 8-core Arm® Cortex®-A78AE v8.2 64-bit CPU, 2x EDGEBoost I/O Support

Optional Accessories

Model No.	Product Description
1-E09A12002	Adapter AC/DC 24V 5A 120W with 3pin Terminal Block Plug 5.0mm Pitch
1-E09A22102	Adapter AC/DC 24V 9.2A 220W with 3pin Terminal Block Plug 5.0mm Pitch
1-E09A22801	Adapter AC/DC 24V/11.67A 280W with 3pin Terminal Block Plug 5.0mm Pitch
SFICBL022	Power Cord, 3-pin US Type, 180cm
1-TPCD00002	Power Cord, European Type, 180cm
1-TPCD00001	Power Cord, 3-pin UK Type, 180cm

Chapter 1

Product Introductions

1.1 Overview

Powered by NVIDIA Jetson AGX Orin 32GB/64GB system-on-module (SOM), The JCO-6000 Series comprises an Ampere GPU with up to 2048 CUDA cores, 64 Tensor cores that delivers up to 275 TOPS of AI performance with power modes configurable between 40W and 60W. This rugged edge AI computer uses the latest semiconductor acceleration technologies to address the demands for powerful performance acceleration, data intensive storage, and modular I/O configurability in the harshest conditions at the edge. Nvidia's AGX Orin Module provides powerful processing capabilities suitable for applications that require real-time AI inference, sensor fusion, and high-performance computing. The JCO-6000 Series is designed for demanding AI applications in areas such as autonomous vehicles, security and surveillance, robotics, industrial automation, and smart cities.

Model No.	Rear Panel	Front Panel
JCO-6000-ORN-A (2EBIO)		

Key Features

- 8-core/12-core Arm® Cortex®-A78AE v8.2 64-bit CPU
- LPDDR5 3200MHz on SOM. 32 GB/64 GB
- 1x HDMI, 3840 x 2160 @ 60Hz
- 1x GbE, 1x 10 GbE (Wake-on-LAN and PXE)
- 2x External SIM Socket, 1x Micro SD Socket
- 1x eMMC 5.1 Storage, 64 GB
- 1x M.2 (M Key, 2242/2260/2280, PCIe x4, Support NVMe)
- 1x USB 3.2 Gen 2, 1x USB Type C, 1x USB 2.0
- 8x DI + 8x DO with isolation
- 9 to 48VDC Wide Range Power Input Supporting AT/ATX Mode
- Wide Operating Temperature -20°C to 60°C (60W CPU)
- Support GMSL 2 QUAD Port Mini Fakra, 8x Ports | 1280x720 @30FPS (optional)
- Up to 2x EDGEBoost I/O Support

1.2 Hardware Specification

System

Processor

NVIDIA Jetson AGX Orin™ AI Computer with 8-core/12-core Arm® Cortex®-A78AE v8.2 64-bit CPU, 2x EDGEBoost I/O Support

- 64 GB, 12-core Arm® Cortex®-A78AE v8.2 64-bit CPU (60W/275 TOPS)
- 32 GB, 8-core Arm® Cortex®-A78AE v8.2 64-bit CPU (40W/200 TOPS)

LAN Chipset

GbE1: Marvell 88e1512 (right)
10 GbE2: Marvell AQC113(left)

System Memory

AGX Orin 32 GB/64 GB LPDDR5 @ 3200 MHz on SOM

TPM

TPM 2.0

Display

HDMI

1x HDMI, 3840 x 2160 @ 60Hz

Storage

eMMC

1x eMMC 5.1, 64 GB

M2

1x M.2 (M Key, 2242/2260/2280, PCIe x4, Support NVMe)
(Default 128GB)

SD

1x Micro SD Socket

SIM Socket

2x Micro SIM Socket (M.2 B Key attached)

Expansion

M.2

- 1x M.2 (B Key, 3042/3052, USB 3.2 Gen 2, Support 4G/5G Module)
- 1x M.2 (E Key, 2230, PCIe x1, USB 2.0, Support Wi-Fi/Bluetooth)

Expansion Modules

Support EDGEBoost I/O Modules:

- 4x GbE module with Intel® I350 Chipset, RJ45/M12 connector (PoE optional)
- 2x RJ45 10GbE with Intel X710 Chipset
- 4x USB 3.0 Locking Type with 2x screw hole/USB port
- 4x USB 3.0 (share PCIe Gen2 x1 bandwidth)
- 1x M.2 M Key, PCIe x4 Lane, 2242/2260 for NVMe Storage

*The left EBIO Bracket on the front panel don't support PoE Module

I/O	
CAN	2x CAN
COM	2x RS-232/422/485 (Switch by MCU)
DIO	8 in / 8 out (Isolated)
CAN 2.0 A/B	2x CAN
EDGEBoost I/O Bracket	2x EDGEBoost I/O Brackets
GMSL Camera	GMSL 2 Camera Support by 2x Quad Port Mini Fakra, supporting 8x 1280x720 @ 30 FPS (Optional)
LAN	2x RJ45
OOB	1x RJ45 (OOB Management Module, Optional, Occupied 1x EBIO Bracket and 1x COM)
PoE	By Optional 120 Watt PoE Power Module, Support up to 1x 4-port LAN Module
USB	1x USB 3.2 Gen 2 (10 Gbps) 1x USB 2.0 (Flash) 1x USB Type C (Console)
LED	LED 1 : System Status (Blue) LED 2 : Programmable LED (Blue) LED 3 : Programmable LED (Blue) LED 4 : Programmable LED (Blue) LED 5 : Programmable LED (Blue) LED 6 : Programmable LED (Red)
Others	6x Antenna Holes 1x Power Switch, 1x Reset Switch, 1x Force Recovery Switch 1x AT/ATX Switch, 1x Remote Power On/Off 1x PC/CAR Mode Switch

Power	
Power Adapter	Optional AC/DC 24V/5A, 120W Optional AC/DC 24V/9.2A, 220W Optional AC/DC 24V/11.67V, 280W
Power Mode	AT, ATX
Power Ignition Sensing	Adjustable Power Ignition Management
Power Supply Voltage	DC IN 9~48V DC IN 48~110V, Optional (occupied 1x EBIO Bracket)
Power Connector	3-pin Terminal Block
Power Protection	OVP (Over Voltage Protection) OCP (Over Current Protection) Reverse Protection

Operating System

Linux	Linux Ubuntu 20.04 with JetPack
-------	---------------------------------

Environment

Operating Temp.	-20°C to 55°C with 0.6 m/s airflow (MaxN 60W TDP mode, non-throttling) Tested according to: IEC60068-2-1:2007 (Cold test procedure) IEC60068-2-2:2007 (Dry heat test procedure) IEC60068-2-3:2007 (Damp heat, steady state, test procedure) IEC60068-2-14:2009 (Wide temperature range thermal shock)
Storage Temp.	-40°C to 85°C
Relative Humidity	10% to 95% (non-condensing)
Certification	EMI: • CE • FCC Class A (47 CFR part 15.109 and part 15.107) • ICES-003 • UKCA EMC Compliance: • Railway EMC: EN 50155: 2017, EN 50121-1: 2017, EN 50121-3-2: 2016 • Industrial EMC: EN 61000-4-2: 2009, EN IEC 61000-4-3: 2020, EN 61000-4-4: 2012, EN 61000-4-5: 2014 +A1: 2017, EN 61000-4-6: 2014 • E-Mark (E13) Safety: • UL Safety Pending: UL62368-1, 3rd Ed., (cULus) • Test prcedure: CB Scheme • Standard: IEC 62368-1:2018 Green Product: • RoHS 3.0 (Directive 2015/863/EU) • REACH
Vibration	IEC60068-2-64:2008 With SSD: 5 Grms (5 - 500 Hz, 0.5 hr/axis) Designed to comply with MIL-STD-810G Method 514.7 Procedure I
Shock	IEC60068-2-27:2008 With SSD: 50G half-sin 11ms Designed to comply with MIL-STD-810G Method 516.7 Procedure I Package Drop Test: ISTA 2A

Physical

Dimensions	270 (W) x 190 (D) x 95 (H) mm
Weights	5.02 kg
Construction	Extruded Aluminum with Heavy Duty Metal
Mounting Options	Wall Mounting/DIN rail (Optional)

1.3 System I/O

1.3.1 JCO-6000-ORN-A (2EBIO)

Front Panel

Antenna hole

Used to connect an antenna for optional Mini-PCIe WiFi module

USB 3.2 Gen 2 port (10 Gbps)

Used to connect USB 3.2 device

HDMI

Used to connect HDMI-compatible devices

USB Type C (Console)

Used to connect USB Type C

LAN ports

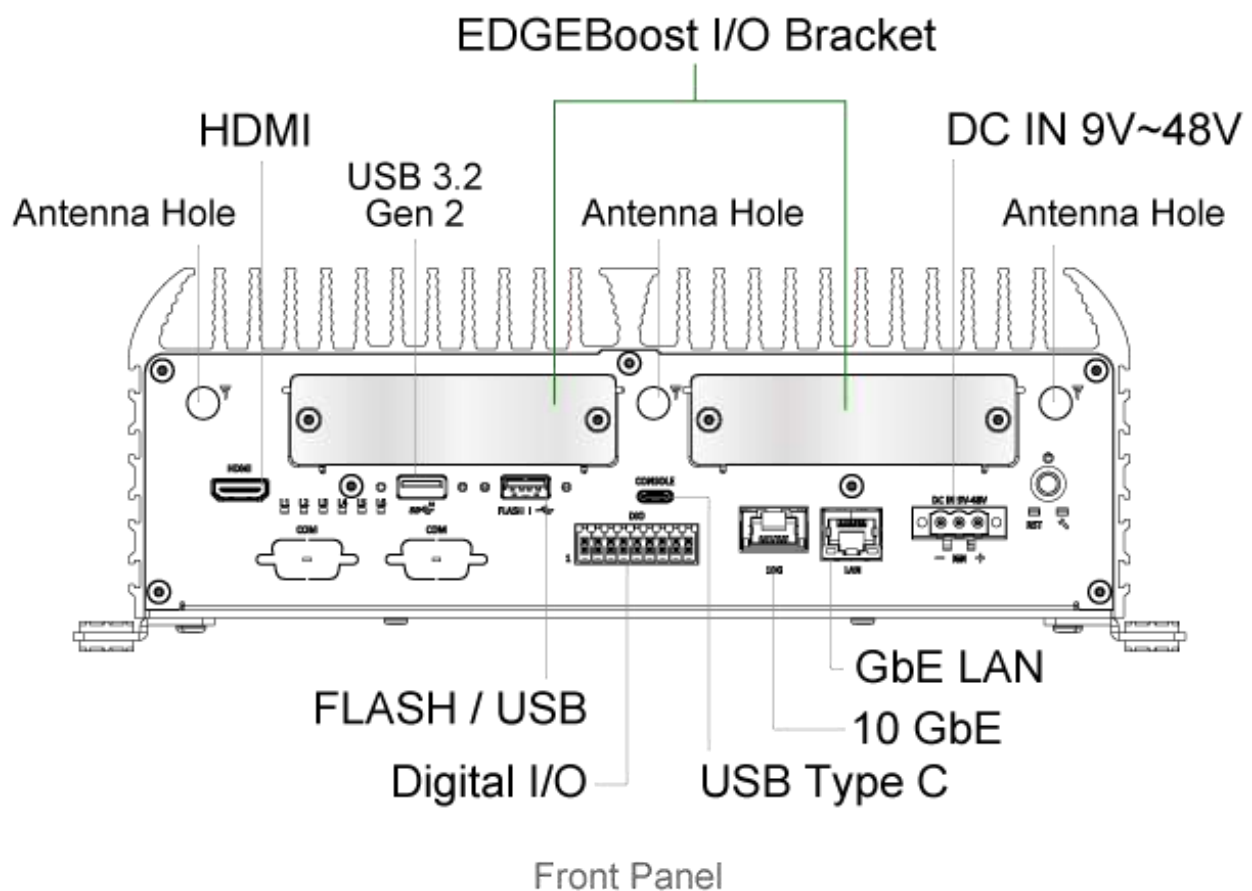
Used to connect the system to a local area network

Digital I/O

The Digital I/O terminal block supports 4 digital input and 4 digital output

DC IN

Used to plug a DC power input with terminal block

EDGEBoost I/O Bracket (Optional)


JCO-6000-ORN-A (2EBIO)

Rear Panel

COM port

COM1 ~ COM2 support RS232/422/485 serial device

Antenna hole

Used to connect an antenna for optional Mini-PCIe WiFi module

CAN

Used to connect an ECU (Electronic control unit) device with D-SUB 9 pin connector

AT/ATX mode select switch

Used to select AT or ATX power mode

SIM Card

Used to insert SIM Card

Micro SD

Used to connect Micro SD devices

GMSL: 2x Quad Port Mini Fakra (Optional)

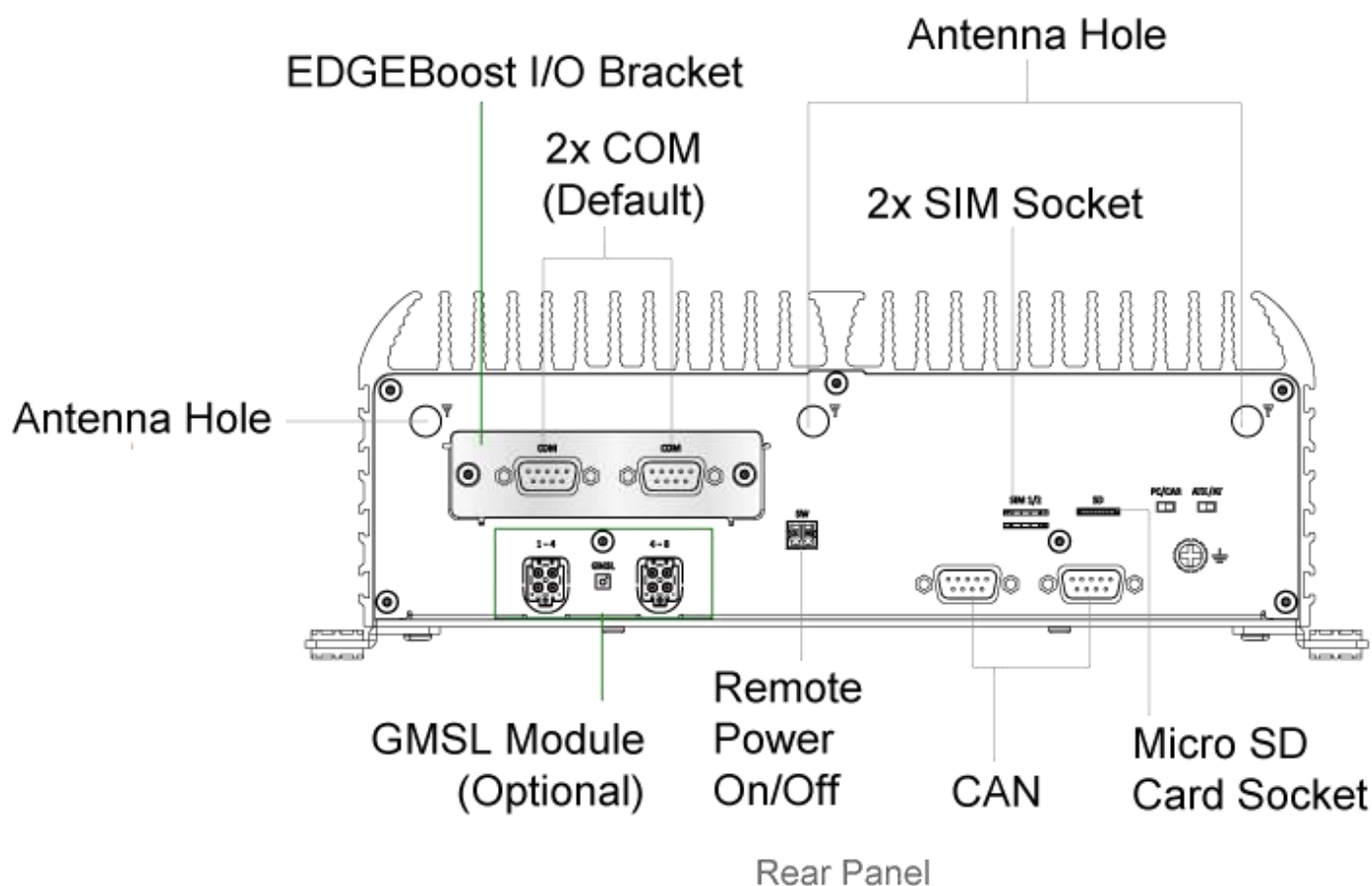
Used to connect GMSL Camera

Remote Power on/off Terminal Block

Used to plug a remote power on/off terminal block

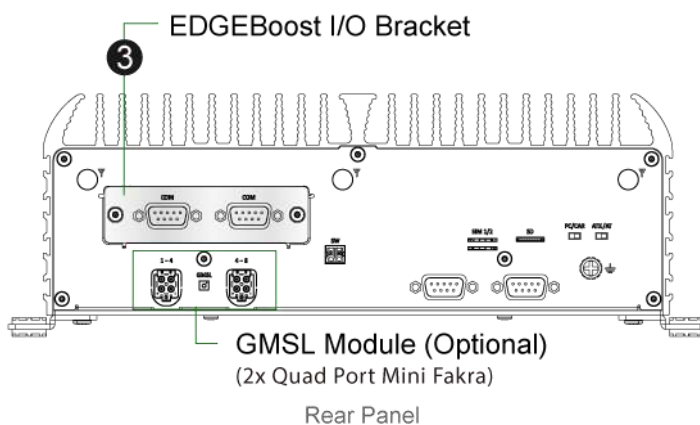
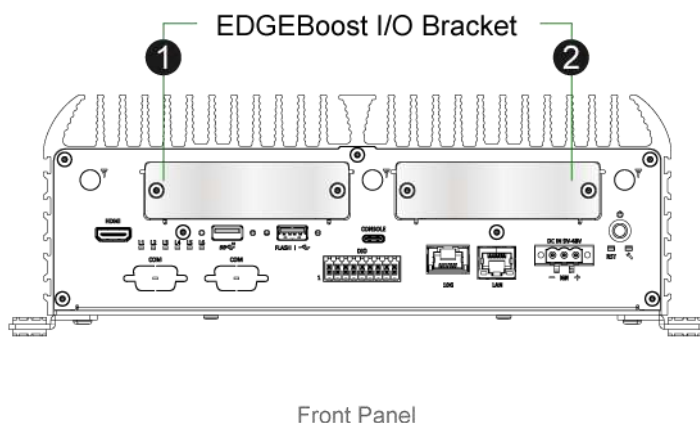
PC/Car mode select switch

Used to select PC or Car mode



1.3.2 EDGEBoost I/O Bracket [EBIO]

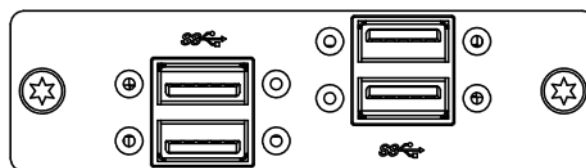
JCO-6000-ORN-A (2EBIO)



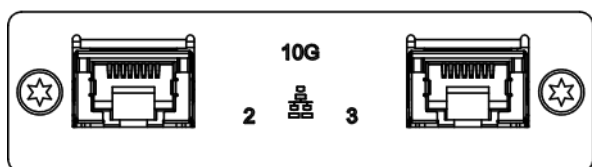
Available EDGEBoost I/O & Expansion



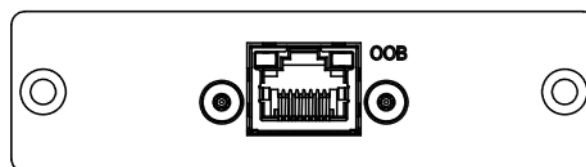
1x M.2 M-Key (4-Lane)



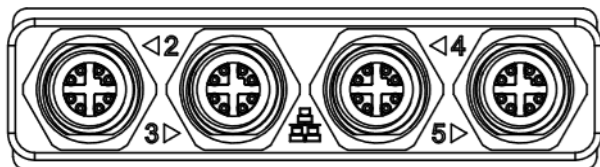
4x USB 3.0 (Locking Ports)



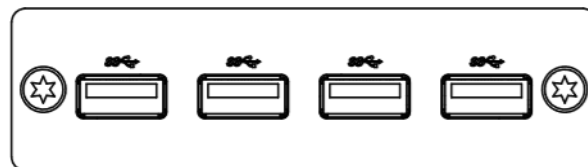
2x 10 GbE Ports



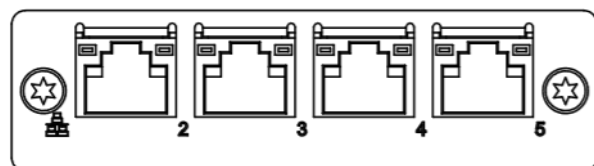
1x RJ45 OOB Port



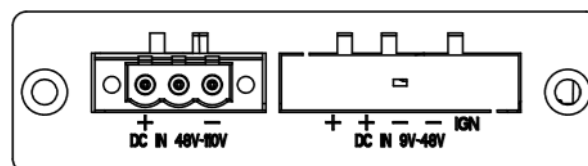
4x M12 LAN/POE Ports



4x USB 3.0 Ports



4x RJ45 LAN/POE Ports



1x 110V Power Module

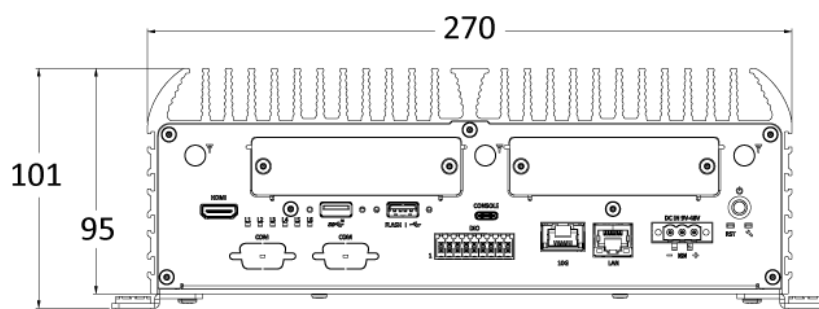
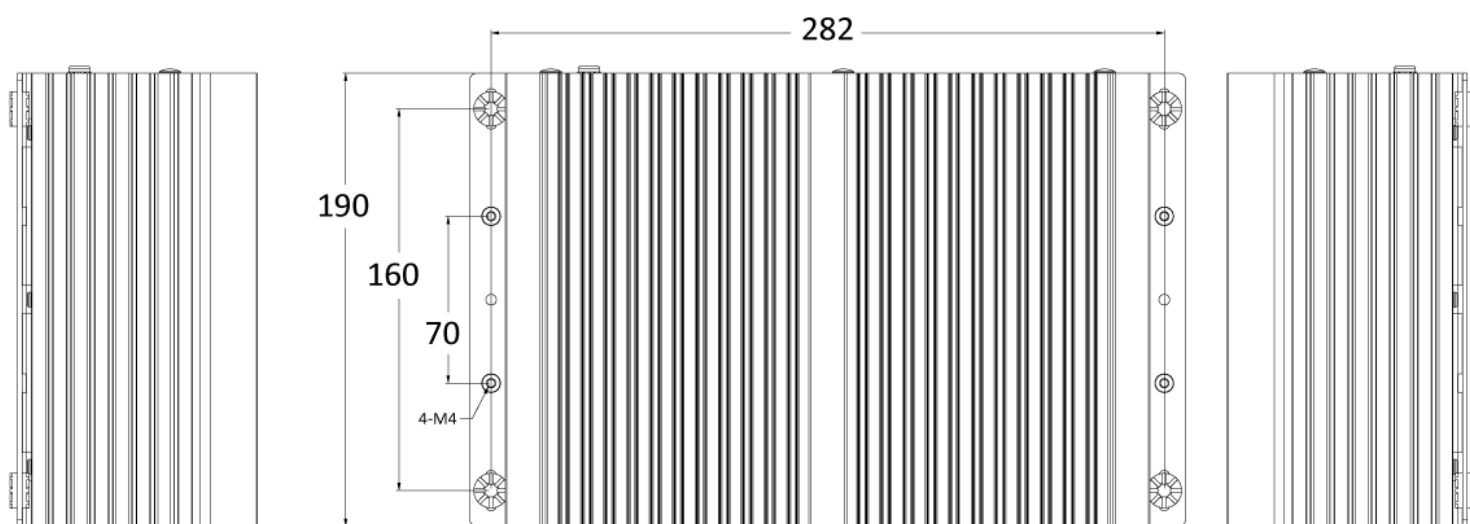
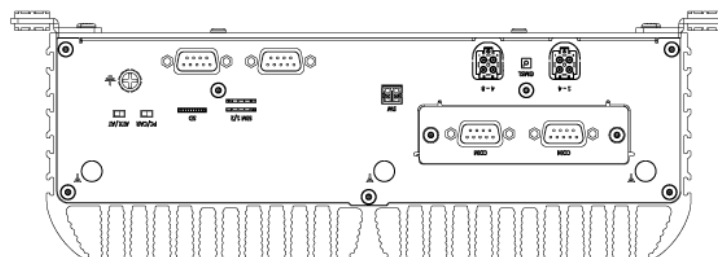
Optional Configurations for Additional Features

Available Model	1	2	3	Optional	Support Q'ty
4x M12/RJ45 LAN Ports	√	√			2
4x M12/RJ45 POE Ports		√			1
2x 10 GbE Ports	√	√			1
4x USB 3.0 Ports	√	√			2
4x USB 3.0 (Locking Ports)	√	√			2
1x M.2 M-Key (4-Lane)	√	√			2
110V Power Module		√			1
1x RJ45 OOB Module OOB Module will be put at the rear panel (3), 2x COM ports from the rear panel (3) will move to the front panel	√	√	√ (Default)		1
1x GMSL Module				√	1

1.4 Mechanical Dimensions

1.4.1 JCO-6000-ORN-A (2EBIO)

Unit: mm

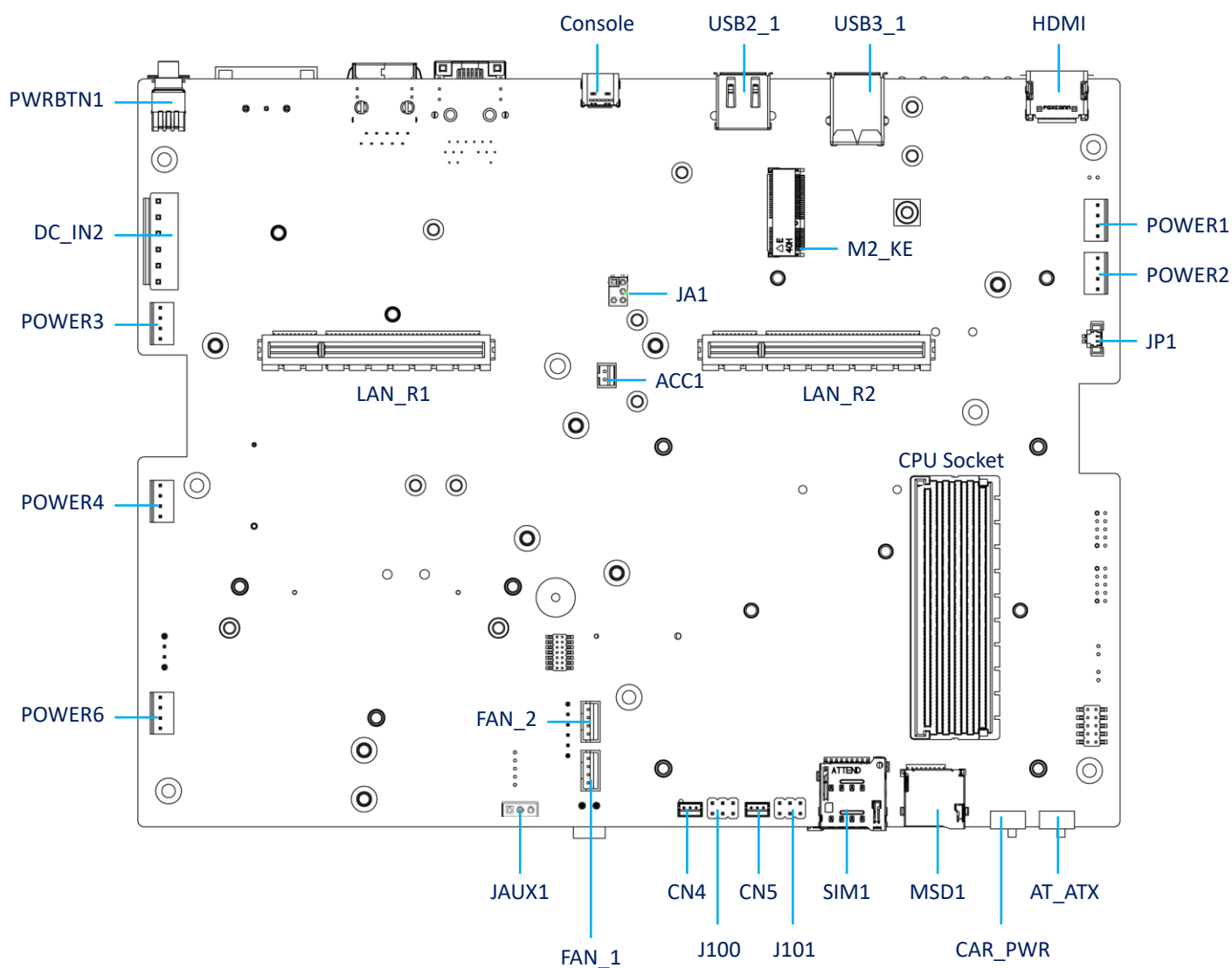


Chapter 2

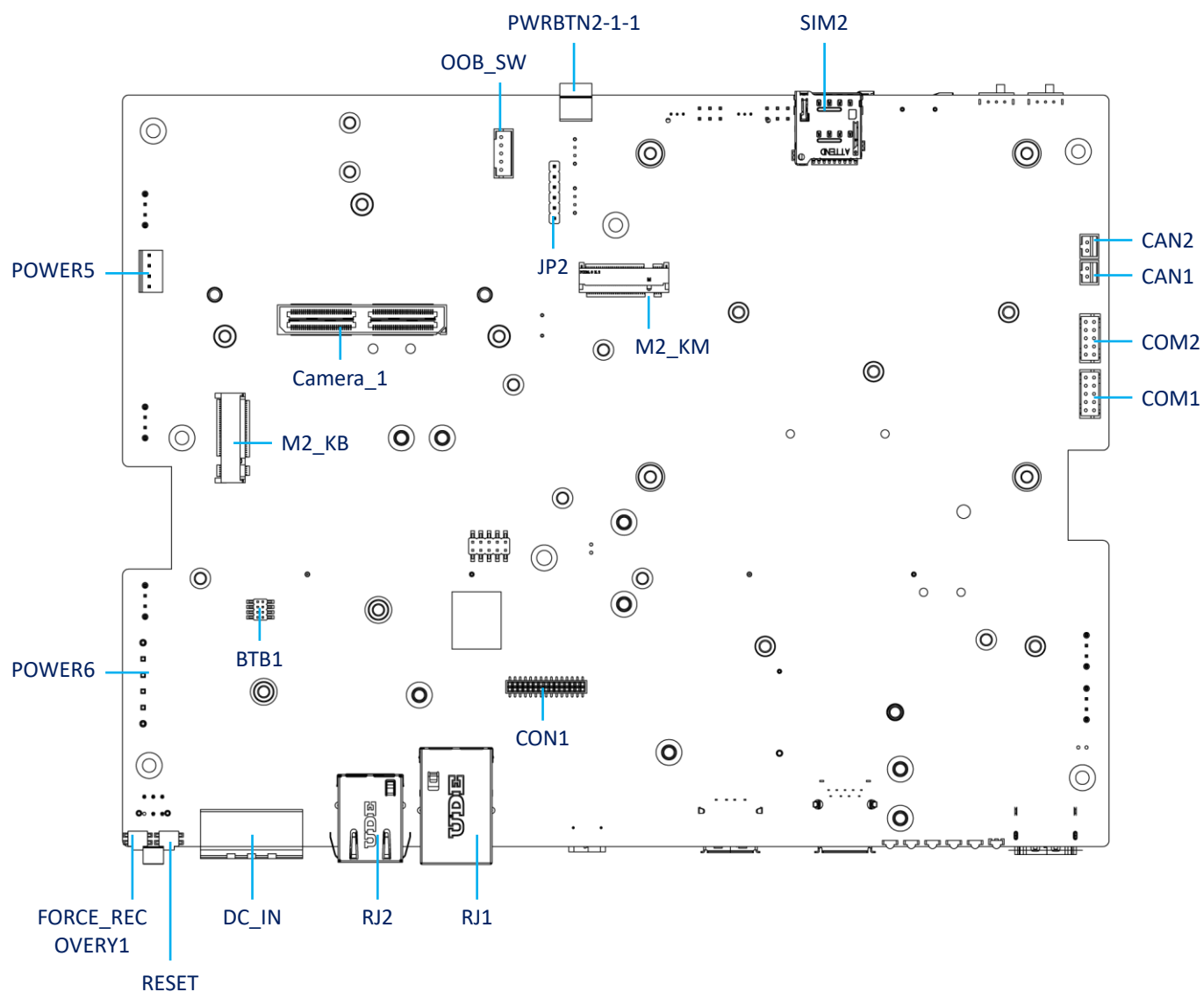
Mechanical Specifications

2.1 Switch and Connector Locations

2.1.1 Top View



2.1.2 Bottom View

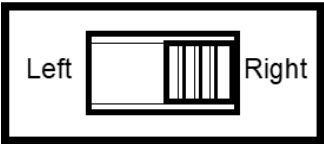
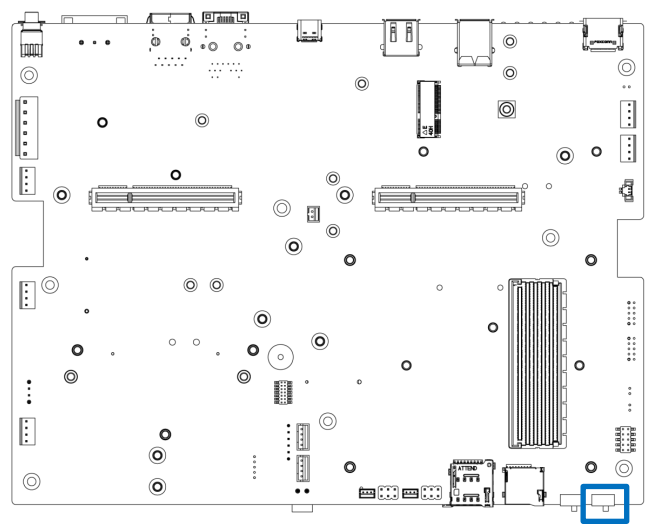


2.2 Connector / Switch Definition

Connector Location	Definition
AT_ATX	AT/ ATX Power Mode Switch
PWRBTN1 & PWRBTN2	Power Switch
Reset	Reset Switch
FORCE_RECOVERY1	FORCE_RECOVERY
DC_IN1	3-pin DC +9~48V Power Input Connector
DC_IN2	6-pin DC +9~48V Power Input Connector
DIO(Digital Input / Output Connector)	CON1(PIN Header 2*15)
COM1/2	RS232 / RS422 / RS485 Connector
CON1,2	CAN BUS
Display Port	HDMI Connector
USB Port	USB3_1 , USB2_1
SIM1, SIM2	SIM Card Socket
FAN 1/2	Smart FAN Connector 1*4Pin
CAR_PWR	PC mode / CAR mode select
PCIE1,2, LAN_L, LAN_R	PClex4 w/o POE , PClex4 w POE
M.2 Key	M2_KE , M2_KB , M2_KM
Console Type-C	Debug Port
PWR1-6	+12V / +5V Power Connector
Camear_1	GMSL (Gigabit Multimedia Serial Link)
OOB_SW	OOB Power Input
CN4/5(J100/J101)	UART OOB (Select Function)

2.3 I/O Interface Descriptions

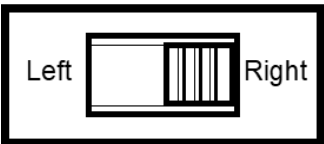
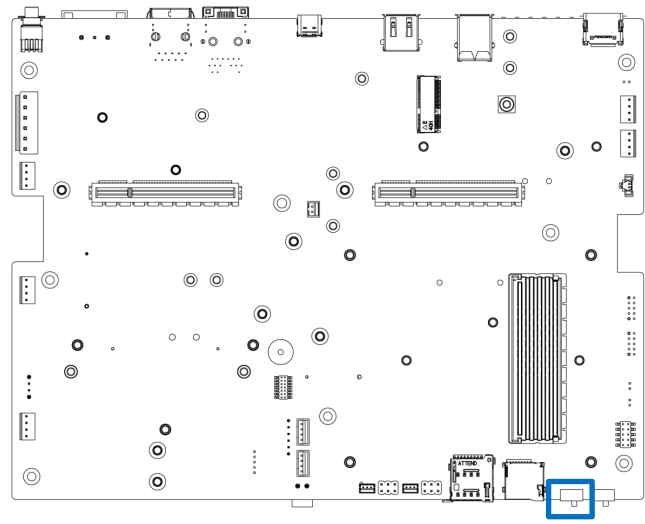
AT/ ATX Power Mode Switch



AT_ATX

Switch	Definition
1-2	ATX Power Mode (Default)
2-3	AT Power Mode

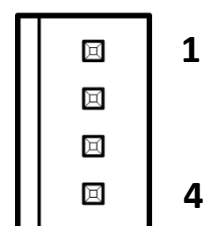
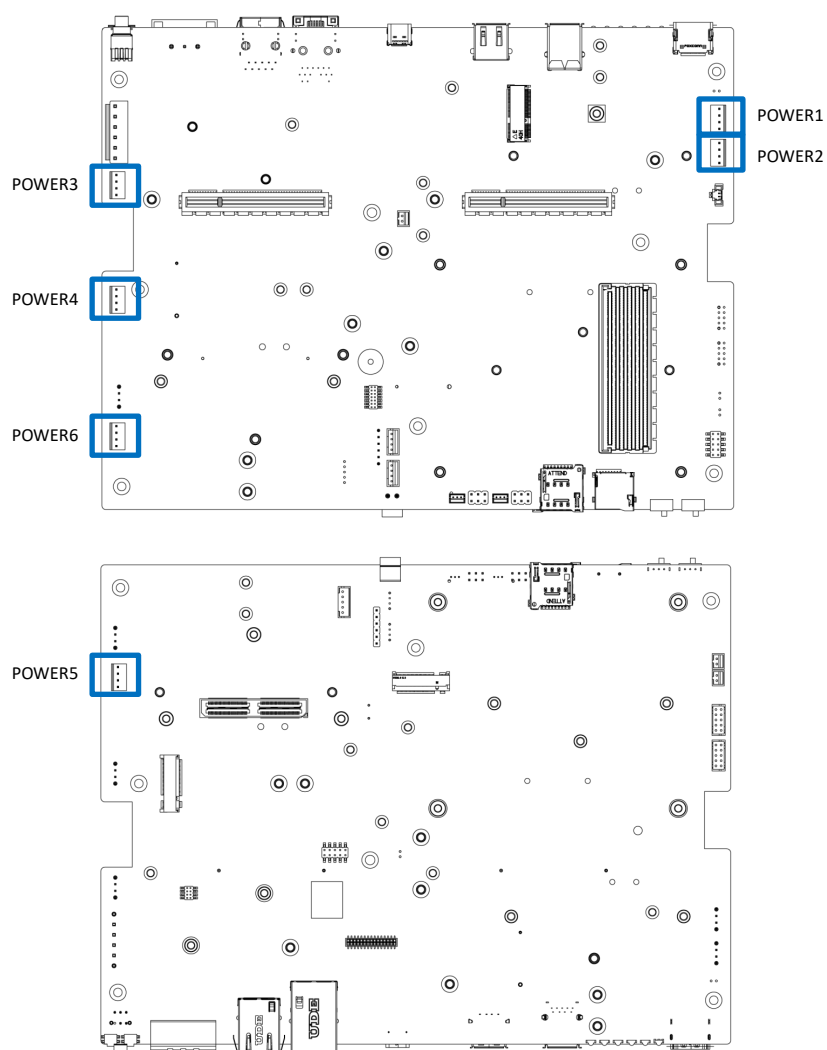
CAR_PWR Mode Switch



CAR_PWR

Switch	Definition
1-2	PC mode Mode (Default)
2-3	CAR mode Mode

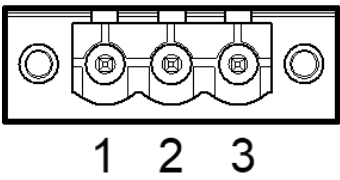
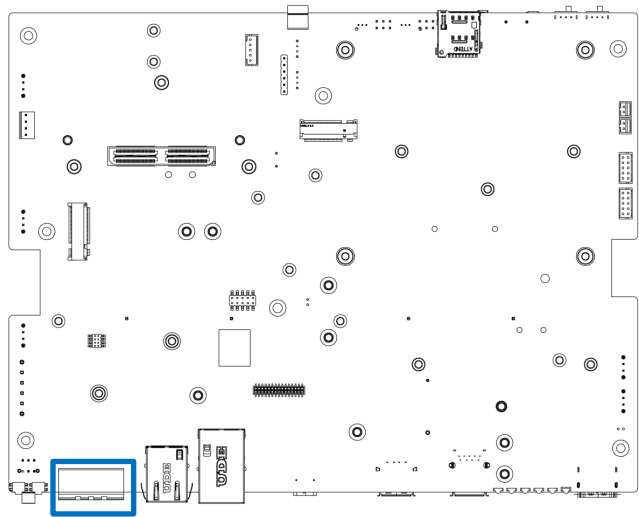
Power Conn



Power 1 ~ 6

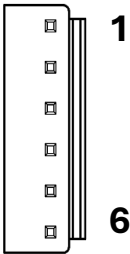
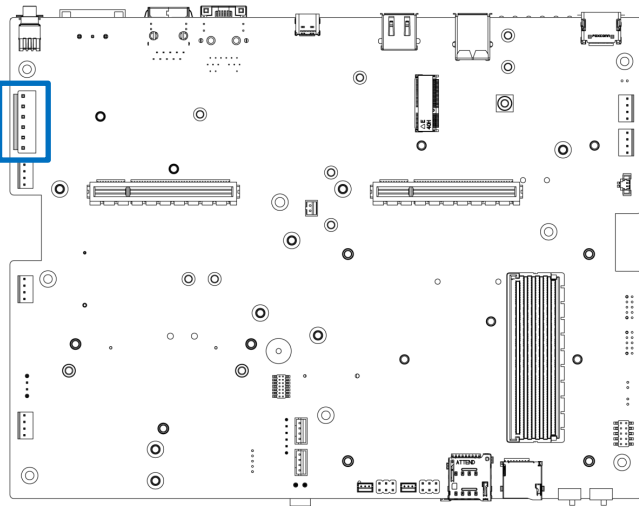
Pin	Signal
1	+5V
2	GND
3	GND
4	+12V

DC_IN1



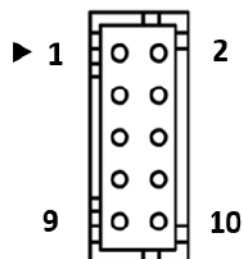
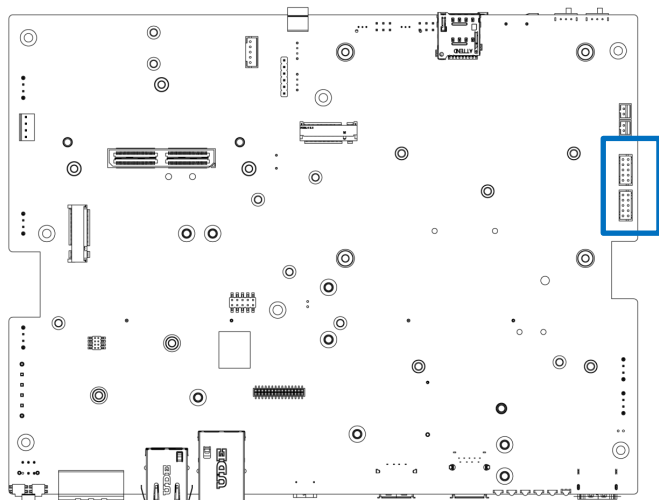
Pin	Signal
1	+9 ~ 48V
2	IGN
3	GND

DC_IN2



Pin	Signal
1	+9 ~ 48V
2	+9 ~ 48V
3	+9 ~ 48V
4	GND
5	GND
6	GND

COM Port



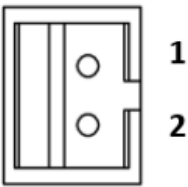
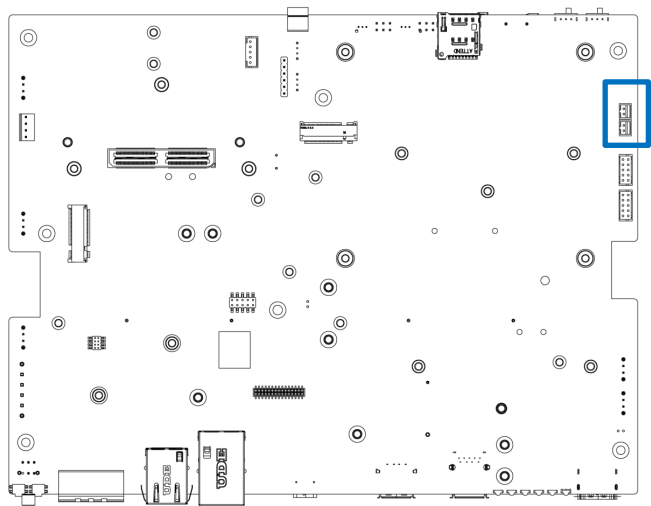
COM 1 /2

Pin	Signal	Pin	Signal
1	DCD1/2	2	X
3	RXD1/2	4	RTS1/2
5	TXD1/2	6	CTS1/2
7	DTR1/2	8	X
9	GND	10	GND

RS232 / RS422 / RS485 Connector 2x5 10-pin box header, 2.0mm pitch

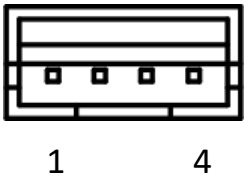
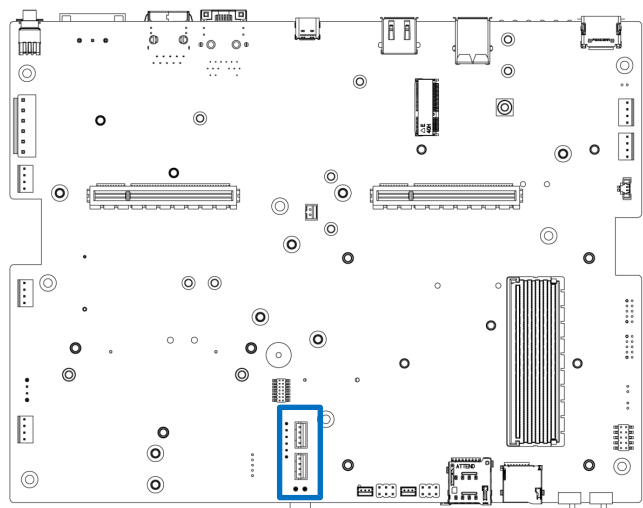
Pin	Signal	RS422/RS485 Half Duplex Definition	RS485 Half Duplex Definition
1	DCD1/2	TX-	DATA-
2	X		
3	RXD1/2	TX+	DATA+
4	RTS1/2		
5	TXD1/2	RX+	
6	CTS1/2		
7	DTR1/2	RX_	
8	X		
9	GND	GND	GND
10	GND	GND	GND

CAN Bus



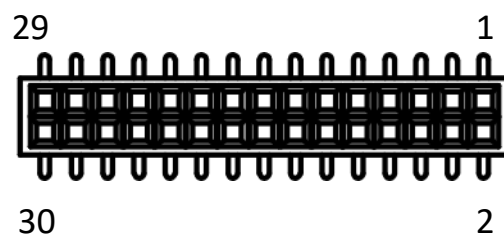
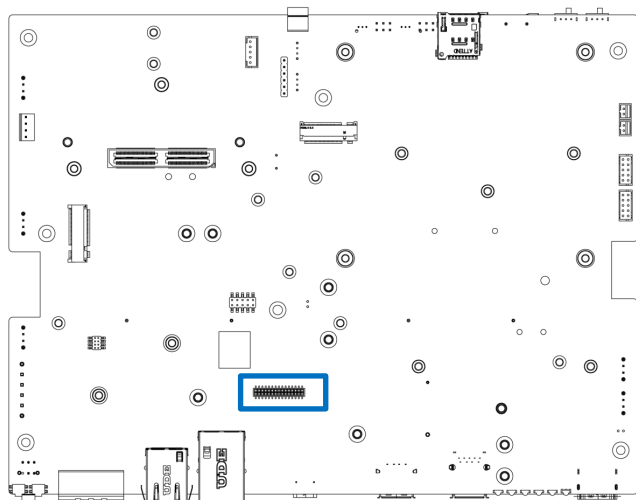
Pin	Signal
1	CAN_L
2	CAN_H

FAN Conn” 1/2



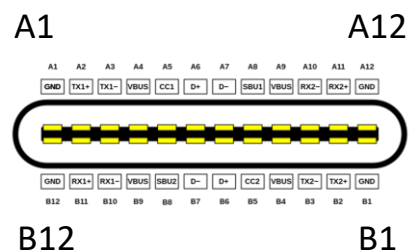
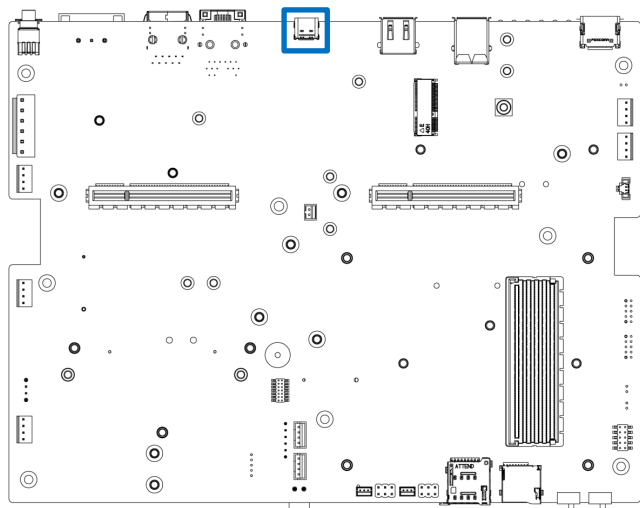
Pin	Signal
1	GND
2	PWR
3	TACH
4	PWM

DIO (Digital Input / Output Connector)



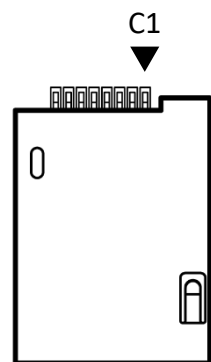
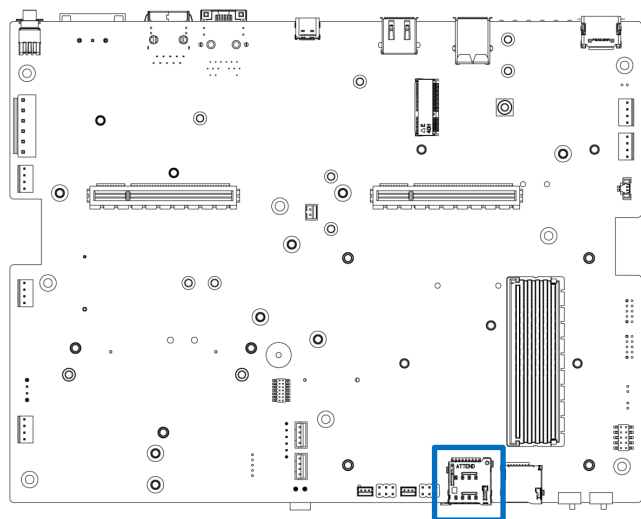
Pin	Signal	Pin	Signal
1	3V3	2	3V3
3	X	4	X
5	X	6	X
7	X	8	X
9	IO_DI1	10	IO_DO1
11	IO_DI2	12	IO_DO2
13	IO_DI3	14	IO_DO3
15	IO_DI4	16	IO_DO4
17	IO_DI5	18	IO_DO5
19	IO_DI6	20	IO_DO6
21	IO_DI7	22	IO_DO7
23	IO_DI8	24	IO_DO8
25	X	26	X
27	GND	28	GND
29	GND	30	GND

Type-C (Console / Debug Port)



Pin	Signal	Pin	Signal
A1	GND	B1	GND
A6	DEBUG_USB_DP	B6	DEBUG_USB_DP
A7	DEBUG_USB_DM	B7	DEBUG_USB_DM
A12	GND	B12	GND

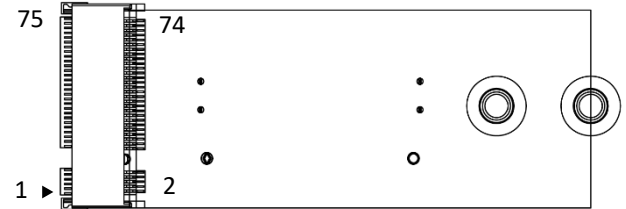
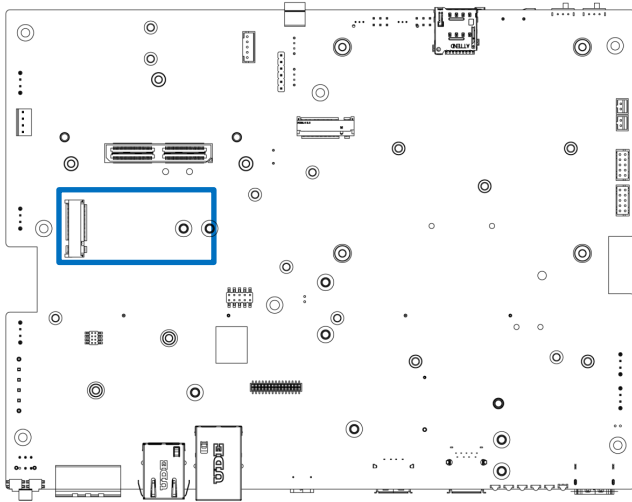
SIM 1, SIM 2



Top : SIM 1
Bottom : SIM 2

Pin	Signal
P1	PWR
P5	GND
P2	RST
P6	VPP
P3	CLK
P7	DATA
P4	X
P8	X
CD	DET

M.2 B Key Socket

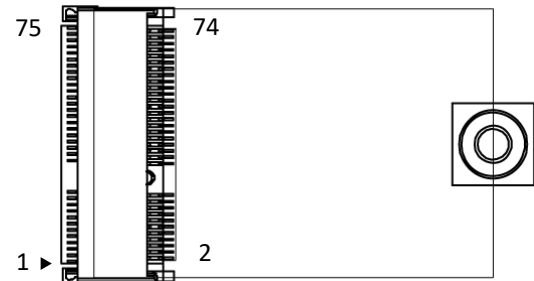
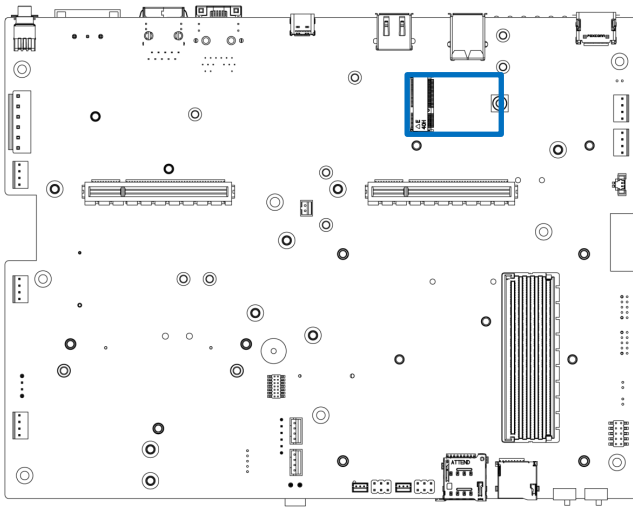


M2_KB

Pin	Definition	Pin	Definition
1	CONFIG_3	2	+3.3V
3	GND	4	+3.3V
5	GND	6	FULL_CARD_POWER_OFF#
7	USB_D+	8	W_DISABLE1#
9	USB_D-	10	WWAN_LED#
11	GND	20	NC
21	CONFIG_0	22	NC
23	GPIO_11(0/1.8V)	24	NC
25	DPR	26	NC
27	GND	28	P_UIM_VPP
29	PERn1/USB3.0-Rx-	30	USIM1_RST
31	PERp1/USB3.0-Rx+	32	USIM1_CLK
33	GND	34	USIM1_DATA
35	PETn1/USB3.0-Tx-	36	USIM1_VDD
37	PETp1/USB3.0-Tx+	38	NC
39	GND	40	NC
41	PERn0/SATA-B+	42	NC

43	PERp0/SATA-B-	44	NC
45	GND	46	NC
47	PETn0/SATA-A-	48	NC
49	PETp0/SATA-A+	50	PCIE_RST_N
51	GND	52	PCIE_CLKREQ_N
53	PCIE_REFCLK_M	54	PCIE_WAKE_N
55	PCIE_REFCLK_P	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	USIM1_DET
67	NC	68	SUSCLK(32kHz)
69	CONFIG_1	70	+3.3VAUX
71	GND	72	+3.3VAUX
73	GND	74	+3.3VAUX
75	CONFIG_2		

M.2 E Key Socket

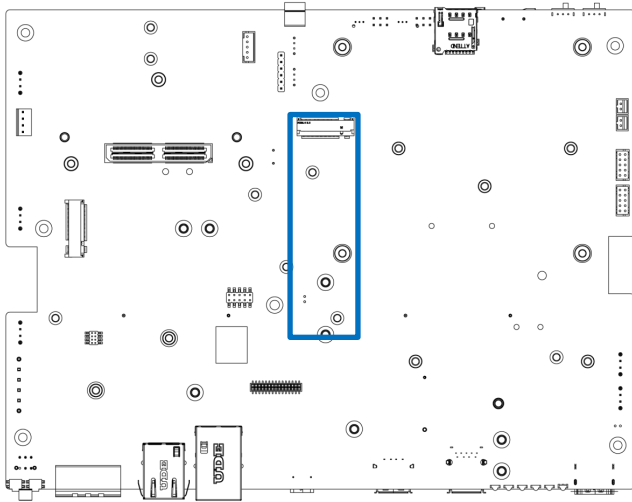


M2_KE

Pin	Definition	Pin	Definition
1	GND	2	+3.3VAUX
3	USB2_D+	4	+3.3VAUX
5	USB2_D-	6	NC
7	GND	8	I2S2_SCLK
9	CNV_WR_1_DN	10	CNV_RF_RESET#
11	CNV_WR_1_DP	12	I2S2_RXD
13	GND	14	MODEM_CLKREQ
15	CNV_WR_0_DN	16	NC
17	CNV_WR_0_DP	18	GND
19	GND	20	UART_WAKE_L
21	CNV_WR_CLK_DN	22	CNV_BRI_RSP
23	CNV_WR_CLK_DP	32	CNV_RGI_DT
33	GND	34	CNV_RGI_RSP
35	TxP0	36	CNV_BRI_DT
37	TxN0	38	CL_RST#
39	GND	40	CL_DATA
41	RxP0	42	CL_CLK

43	RxNO	44	CNV_PA_BLANKING
45	GND	46	CNV_MFUART2_TXD
47	REFCLK0+	48	CNV_MFUART2_RXD
49	REFCLK0-	50	SUSCLK
51	GND	52	PERST0#
53	NC	54	M2_KEY-E_BT_DIS2#
55	WAKE0#	56	M2_KEY-E_WIFI_DIS1#
57	GND	58	SMBDATAS_DUAL
59	CNV_WT_1_DN	60	SMBCLKS_DUAL
61	CNV_WT_1_DP	62	SMBALERT#
63	GND	64	Pull Low
65	CNV_WT_0_DN	66	PERST1#
67	CNV_WT_0_DP	68	NC
69	GND	70	WAKE1#
71	CNV_WT_CLK_DN	72	+3.3VAUX
73	CNV_WT_CLK_DP	74	+3.3VAUX
75	GND		

M.2 M Key Socket

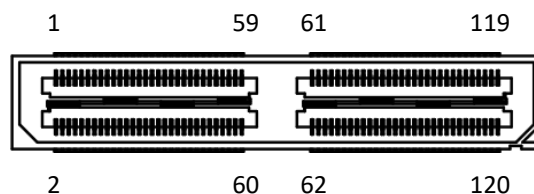
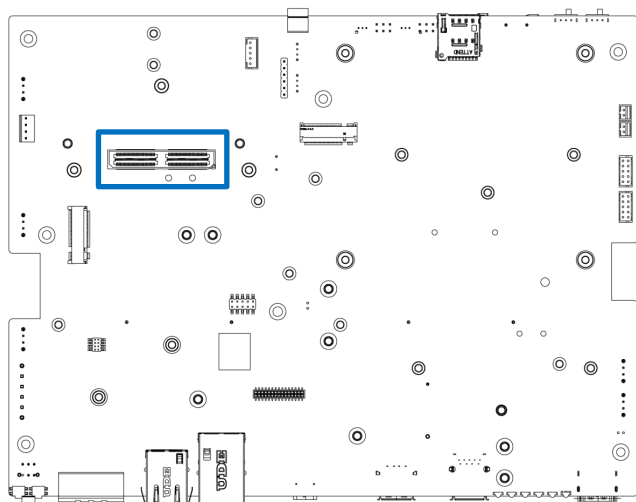


M2_KM

Pin	Definition	Pin	Definition
1	GND	2	3.3VAUX
3	GND	4	3.3VAUX
5	PER3-	6	NC
7	PER3+	8	NC
9	GND	10	DAS/DSS-
11	PET3-	12	3.3VAUX
13	PET3+	14	3.3VAUX
15	GND	16	3.3VAUX
17	PER2-	18	3.3VAUX
19	PER2+	20	NC
21	GND	22	NC
23	PET2-	32	NC
33	PET2+	34	NC
35	PET1-	36	NC
37	PET1+	38	DEVSLP
39	GND	40	SMB_CLK
41	PET0-/SATA_B+	42	SMB_DATA

43	PER0+/SATA_B+	44	ALERT-
45	GND	46	NC
47	PET0-/SATA_A+	48	NC
49	PET0-/SATA_A-	50	PERST-
51	GND	52	CLKREQ-
53	REFCLKN	54	PEWAKE-
55	REFCLKP	56	NC
57	GND	58	NC
59	---	60	---
61	---	62	---
63	---	64	---
65	---	66	---
67	NC	68	SUSCLK(32KHz)
69	PEDET	70	3.3VAUX
71	GND	72	3.3VAUX
73	GND	74	3.3VAUX
75	GND		

GMSL (Gigabit Multimedia Serial Link)

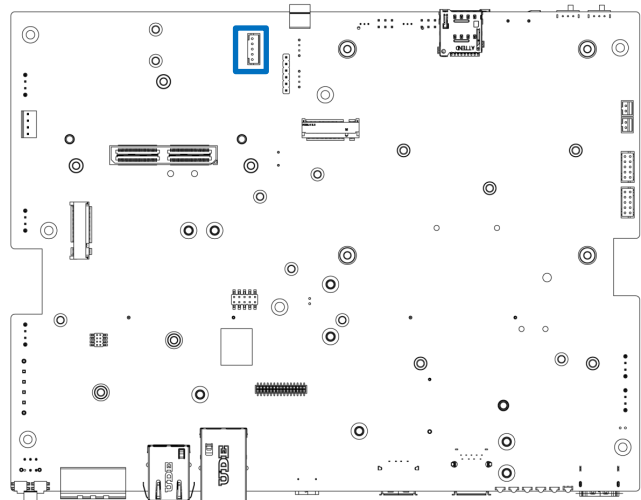


Can_1

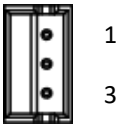
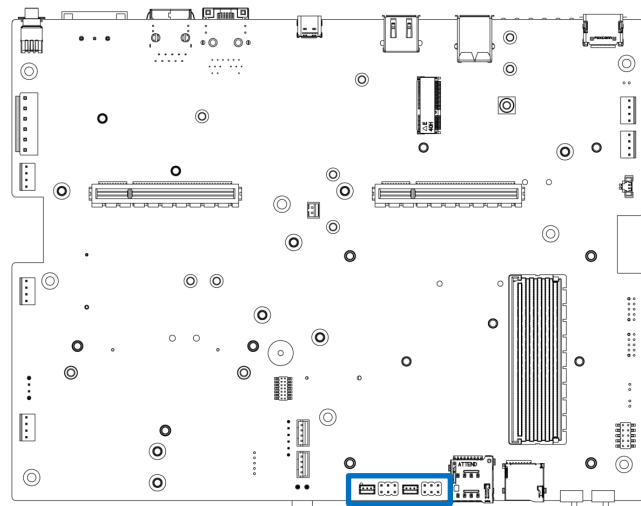
Pin	Definition	Pin	Definition
1	CSI_0_DO_P	2	CSI_1_DO_P
3	CSI_0_DO_N	4	CSI_1_DO_N
5	GND	6	GND
7	CSI_0_CLK_P	8	CSI_1_CLK_P
9	CSI_0_CLK_N	10	CSI_1_CLK_N
11	GND	12	GND
13	CSI_0_D1_P	14	CSI_1_D1_P
15	CSK_0_D1_N	16	CSK_1_D1_N
17	GND	18	GND
19	CSI_2_DO_P	20	CSI_3_DO_P
21	CSI_2_DO_N	22	CSI_3_DO_N
23	GND	24	GND
25	CSI_2_CLK_P	26	CSI_3_CLK_P
27	CSI_2_CLK_N	28	CSI_3_CLK_N
29	GND	30	GND
31	CSI_2_D1_P	32	CSI_3_D1_P
33	CSI_2_D1_N	34	CSI_3_D1_N
35	GND	36	GND
37	CSI_4_DO_P	38	CSI_6_DO_P
39	CSI_4_DO_N	40	CSI_6_DO_N
41	GND	42	GND
43	CSI_4_CLK_P	44	CSI_6_CLK_P
45	CSI_4_CLK_N	46	CSI_6_CLK_N

47	GND	48	GND
49	CSI_4_D1_P	50	CSI_6_D1_P
51	CSI_4_D1_N	52	CSI_6_D1_N
53	GND	54	GND
55	NC	56	NC
57	NC	58	NC
59	CSI_5_D0_P	60	CSI_7_D0_P
61	CSI_5_D0_N	62	CSI_7_D0_N
63	GND	64	GND
65	CSI_5_CLK_P	66	CSI_7_CLK_P
67	CSI_5_CLK_N	68	CSI_7_CLK_N
69	GND	70	GND
71	CSI_5_D1_P	72	CSI_7_D1_P
73	CSI_5_D1_N	74	CSI_7_D1_N
75	I2C_GP3_CLK	76	CAM_ERROR1
77	I2C_GP3_DAT	78	CAM_ERROR2
79	GND	80	GND
81	CAM_Power_2V8	82	CAM_Power_2V8
83	CAM_Power_2V8	84	CAM_ERROR3
85	CAM_FRSYNC	86	CAM_ERROR4
87	I2C_GP2_CLK	88	MCLK03_CAM1_MCLK
89	I2C_GP2_DAT	90	CAM1_PWDN
91	MCLK02_CAM0_MCLK	92	CAM1_RST
93	CAM0_PWDN	94	MCLK04_CAM2_MCLK
95	CAM0_RST	96	CAM_FRSYNC4
97	CAM_FRSYNC3	98	CAM_FRSYNC2
99	GND	100	GND
101	CAM_TE_RSV	102	+V1.8S
103	CAM_INT3	104	CAM_INT4
105	I2C_GP9_CLK	106	CAM_INT2
107	I2C_GP9_DAT	108	+V3.3S
109	CAM_BACKLIGHT_RWM	110	+V3.3S
111	CAM_SPI_SCK	112	CAM_SPI_MOSI
113	CAM_SPI_CS0	114	CAM_SPI_MISO
115	GND	116	GND
117	CAM_INT1	118	+V3.3S
119	CAM_VDD_SYS_EN	120	+V3.3S

OOB_SW & UART OOB

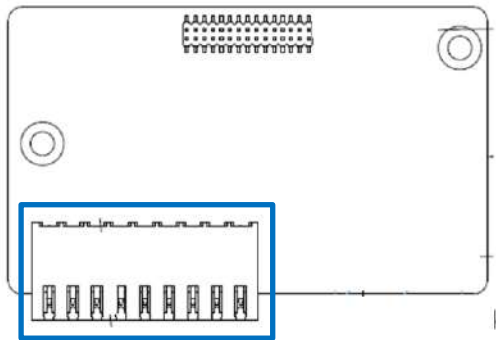


Pin	Signal
1	Power 5Vcc
2	GND
3	Power Button
4	System Reset
5	Power On Off



Pin	Signal
P1	RX
P5	TX
P2	GND

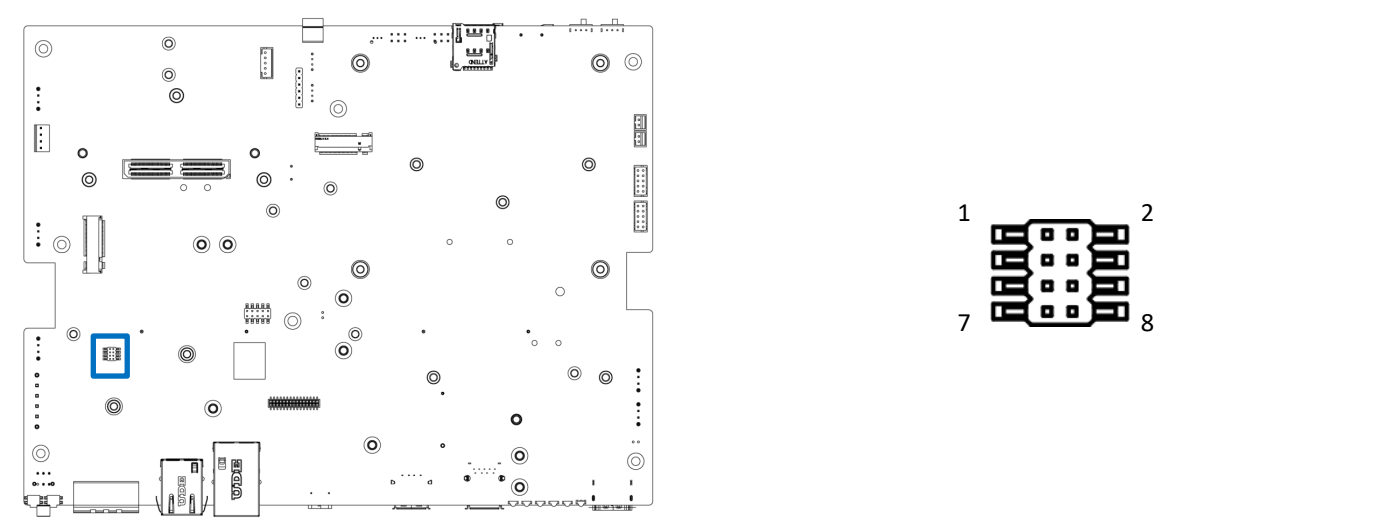
DIO (8IN 8OUT) Daughter Board



DIO PINOUT

PIN	Definition	PIN	Definition
1	IN1	2	OUT1
3	IN2	4	OUT2
5	IN3	6	OUT3
7	IN4	8	OUT4
9	IN5	10	OUT5
11	IN6	12	OUT6
13	IN7	14	OUT7
15	IN8	16	OUT8
17	XCOM+	18	XCOM-

BTB1



PIN	Signal	PIN	Signal
1	3Vcc	2	5Vcc
3	I2C_CLK	4	X
5	I2C_DAT	6	INT
7	GND	8	GND

Chapter 3

System Setup

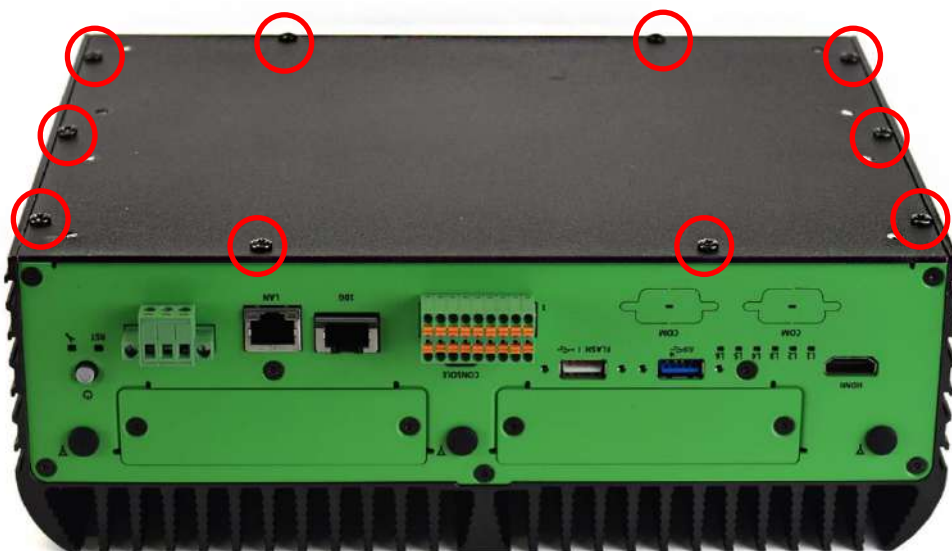
3.1 Set torque force to 3.5 kgf-cm to screw or unscrew system parts.

**WARNING**

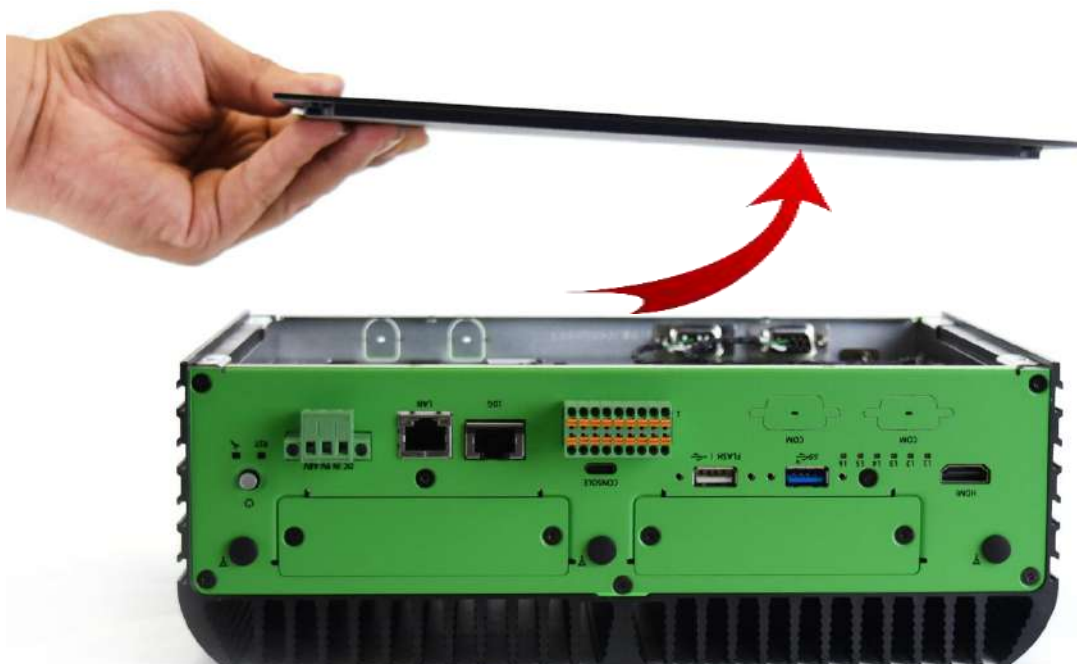
To ensure safety and prevent system damage, before disassembly, please switch off the system and disconnect the unit from its power source.

3.2 Removing chassis bottom cover

1. Turn the computer upside down. Loosen the screws on the bottom cover as highlighted in the picture below.

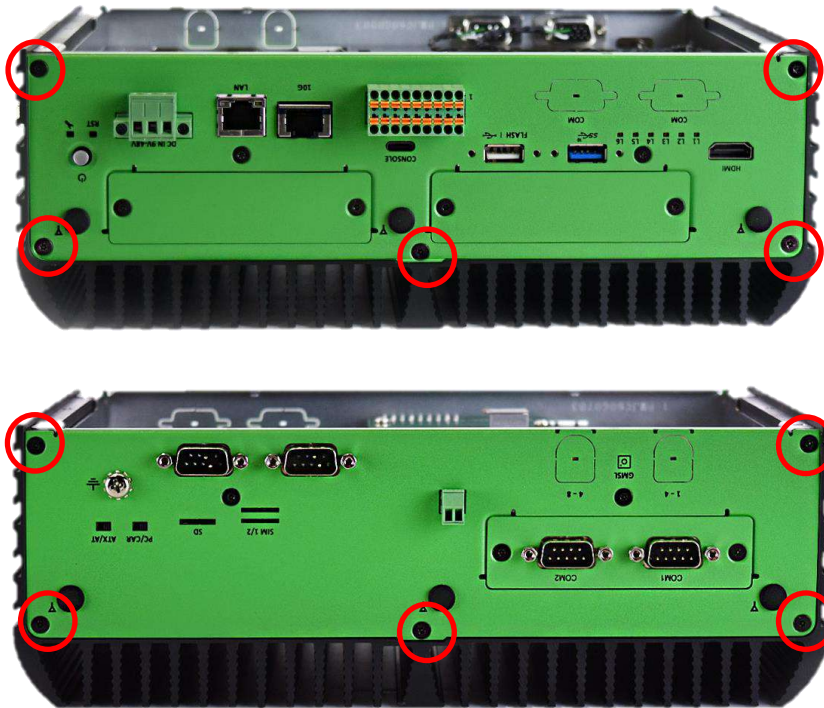


2. Now you can remove the bottom cover.

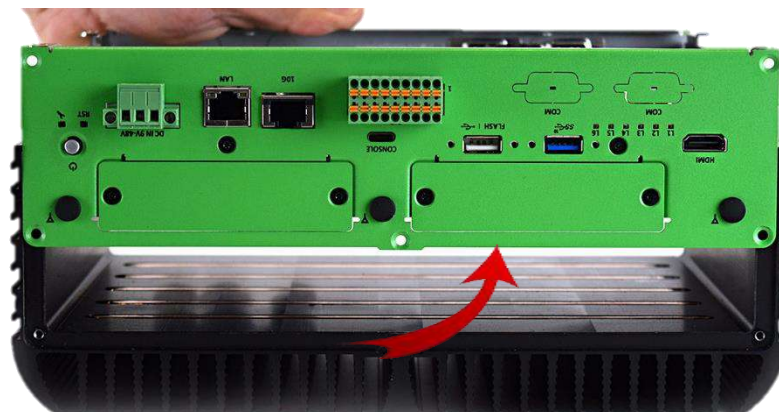


3.3 Installing NVIDIA GPU

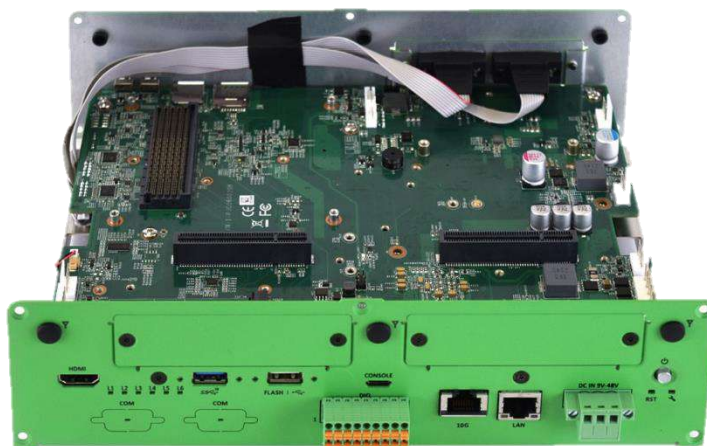
1. Loosen the 10 screws (M3*5L) on the front/rear panel.



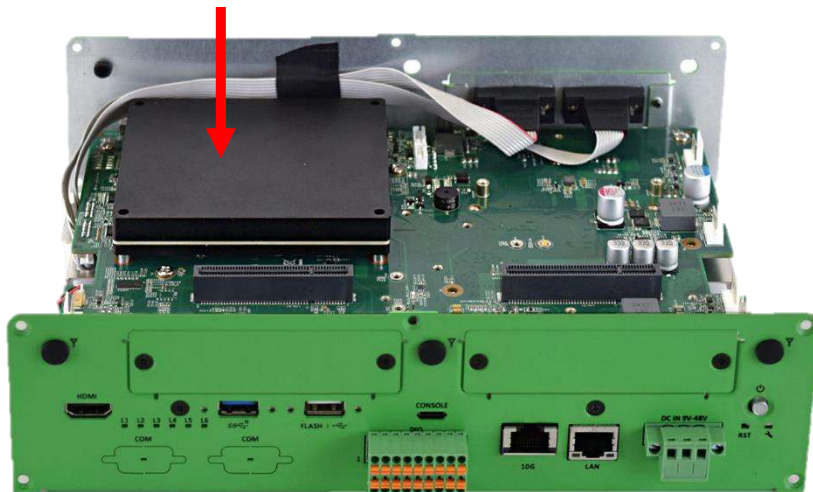
2. Separate the system body computer from the upper cover.



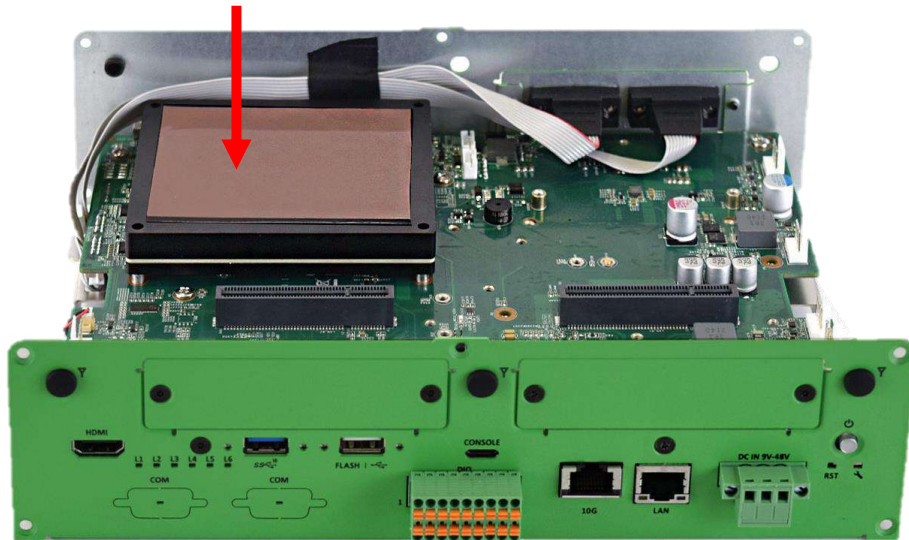
3. Turn the system body over.



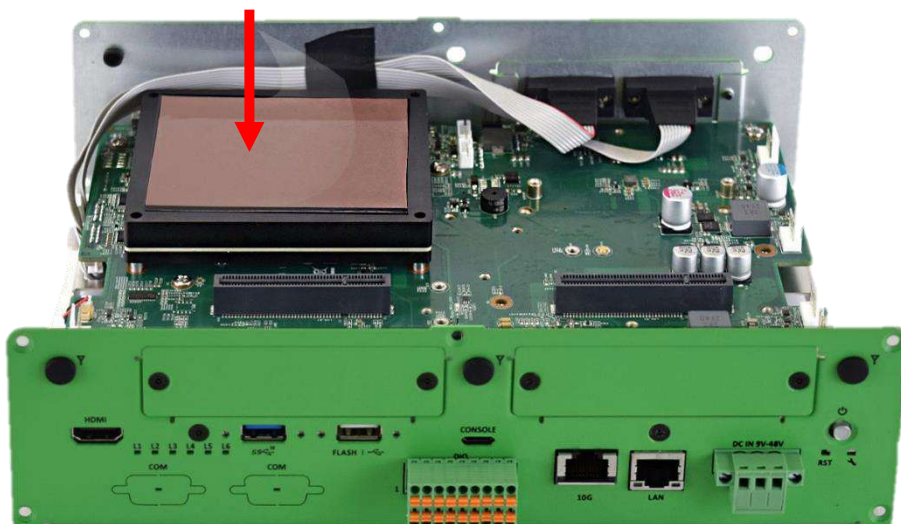
4. Install NVIDIA GPU on motherboard



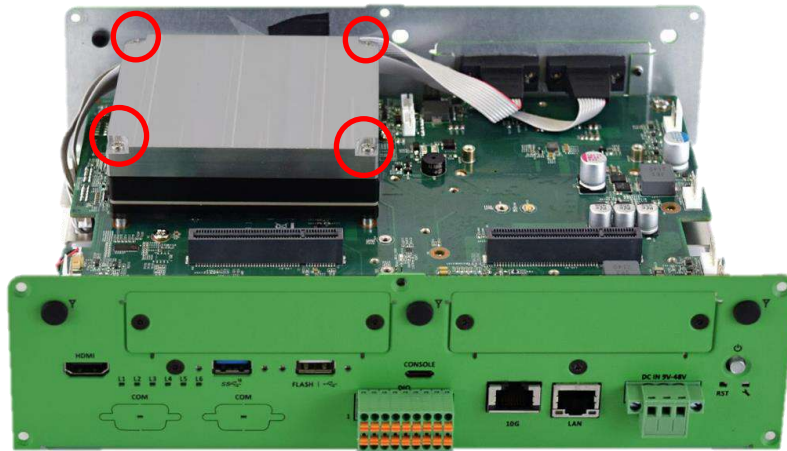
5. Paste the thermal pad on the NVIDIA Module chip.
(Tear off the plastic film on the bottom side of the thermal pad before pasting)



6. Tear off the thermal pad on the NVIDIA GPU chip
(Tear off the plastic film on the front side of all the pasted thermal pads)



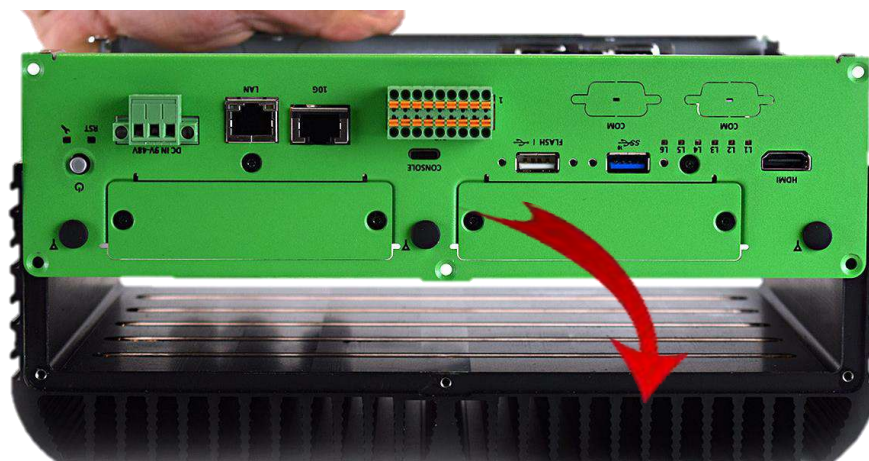
7. Install the NVIDIA GPU heat block on the NVIDIA GPU and lock the 4 screws (M3x30L)



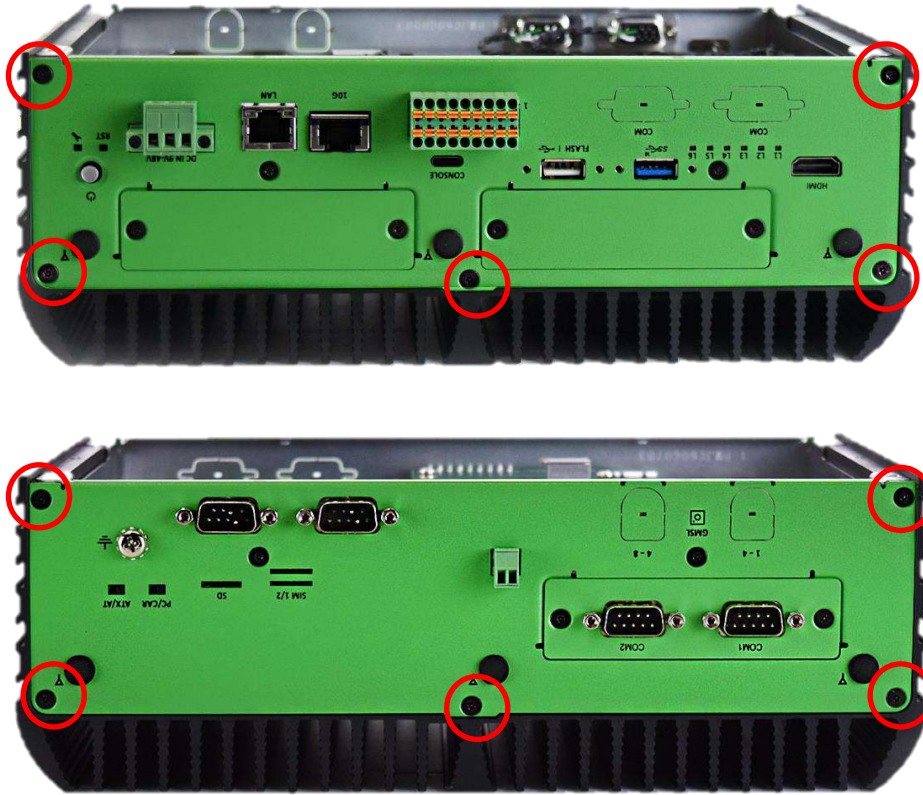
8. Tear off the thermal pad and paste it on the NVIDIA GPU chip.
(Tear off the plastic film on the bottom side of the thermal pad before pasting)



9. Install the upper cover on the system body.

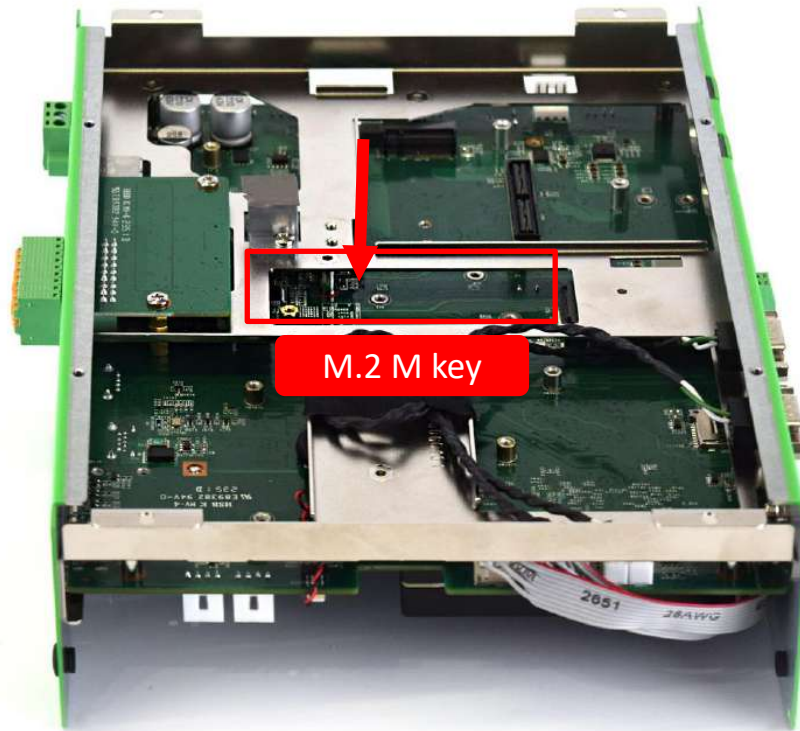


11. Fasten the 10 screws (M3*5L) on the front/rear panel.

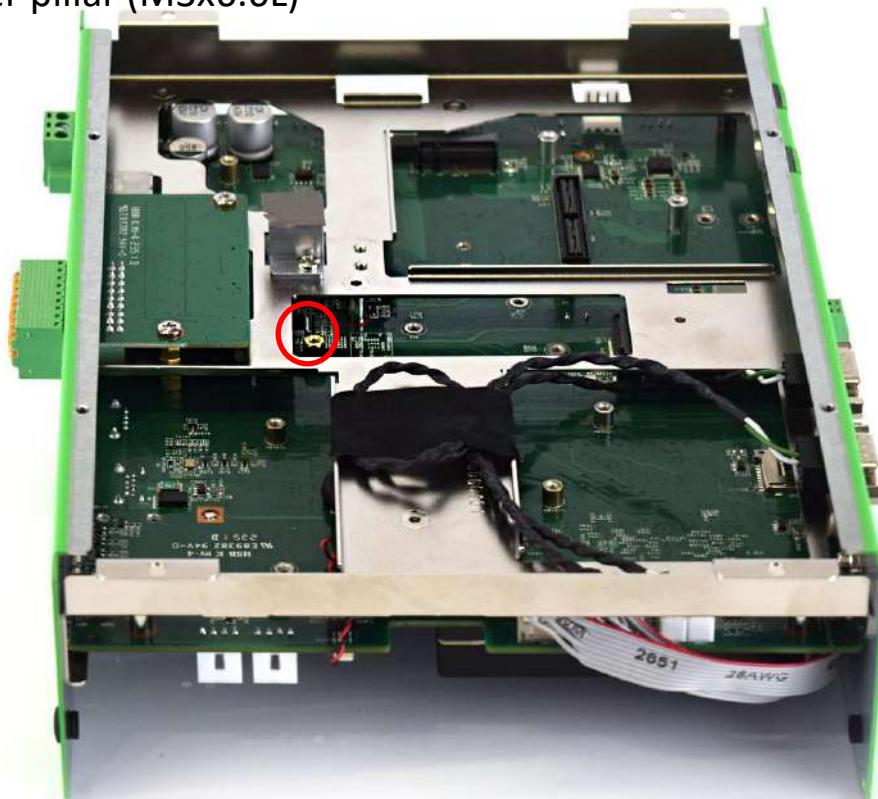


3.4 Install M.2 M Key card

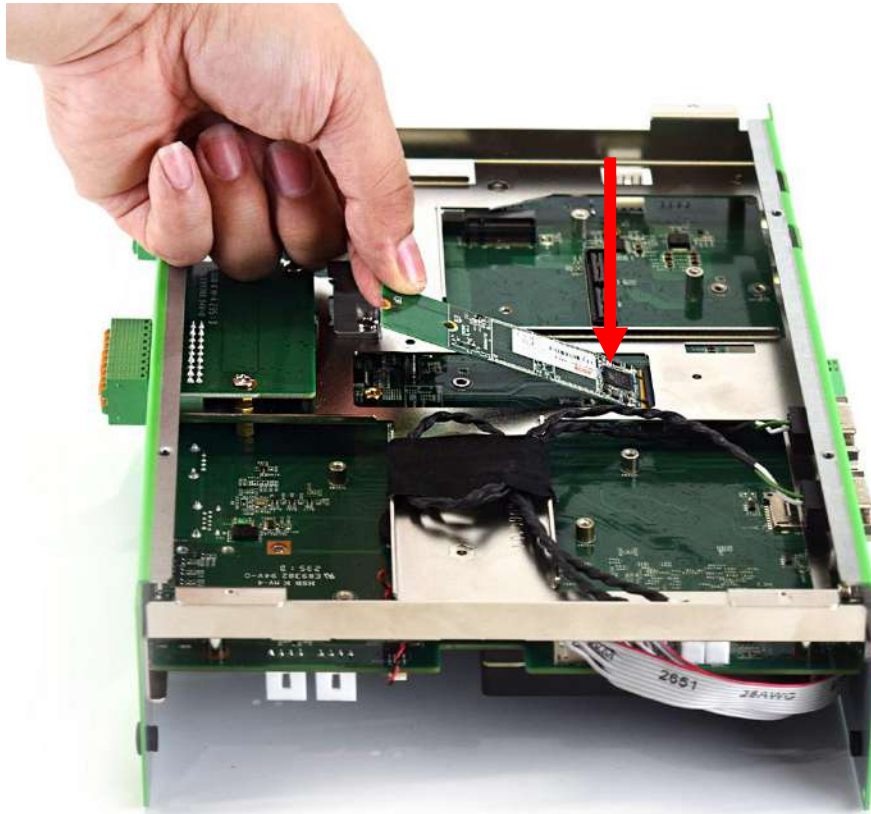
1. JCO-6000-ORN-A (2EBIO) series PCBA support M.2 M-Key slot for NVMe storage



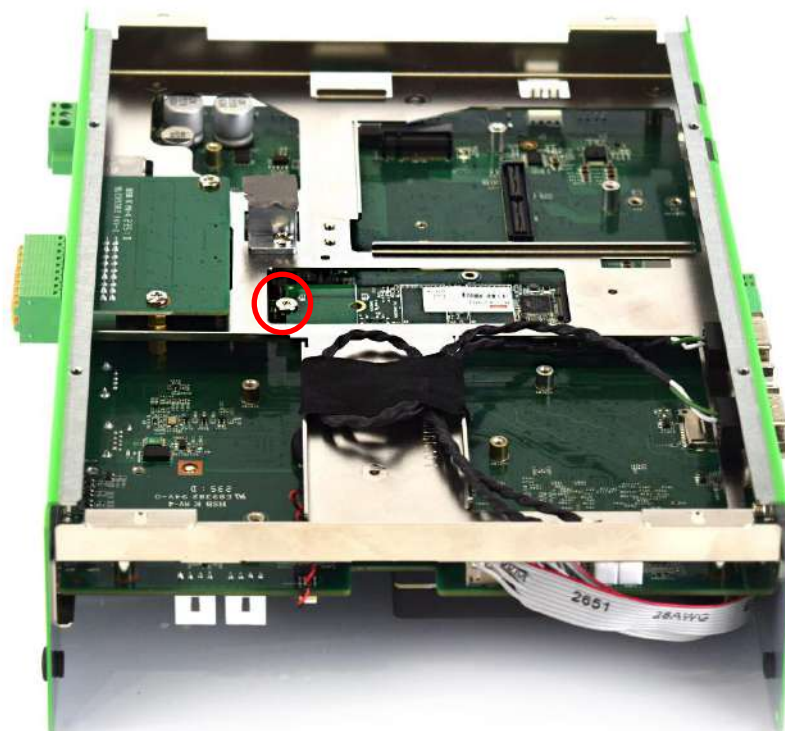
2. Insert copper pillar (M3x6.6L)



3. Insert M.2 M-Key card at a 45 degree angle.



4. Press the M.2 M-Key card down and secure it with one screw (M3x5L).

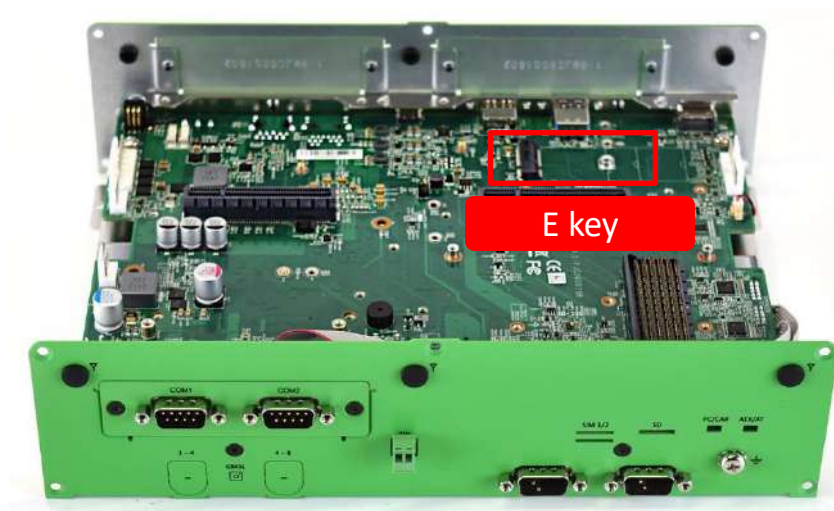


3.5 Installing WiFi Module and antenna

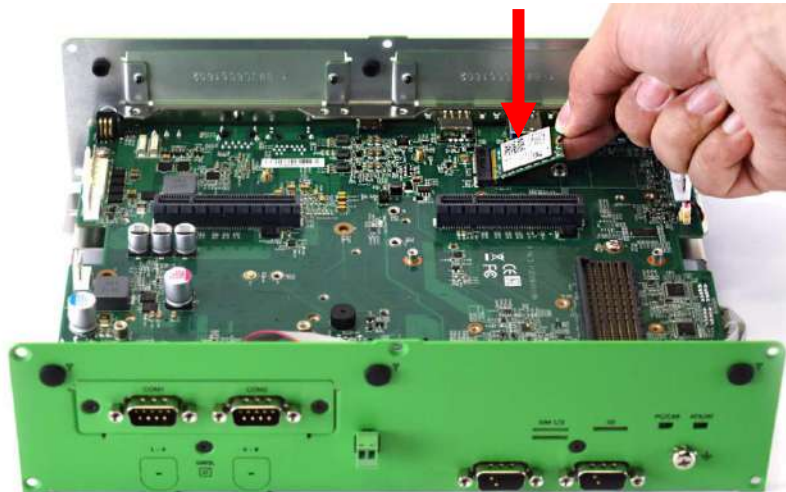
1. The JCO-6000-ORN-A (2EBIO) system has 6 antenna holes on the front panel and rear panel as pictured below.



2. JCO-6000-ORN-A (2EBIO) series PCBA has an M.2 E-Key slot, supports WiFi Module.



3. Insert WiFi module at a 45 degree angle.



4. Press the WiFi module down and secure it with one screw (M3x5L).



5. Remove antenna hole cover on the system panel.



6. Install the SMA female jack through the antenna holes and then secure it with the SMA male plug.



7. Attach the end of the cable from the Wireless RF connector to the communication module as shown in the picture below.

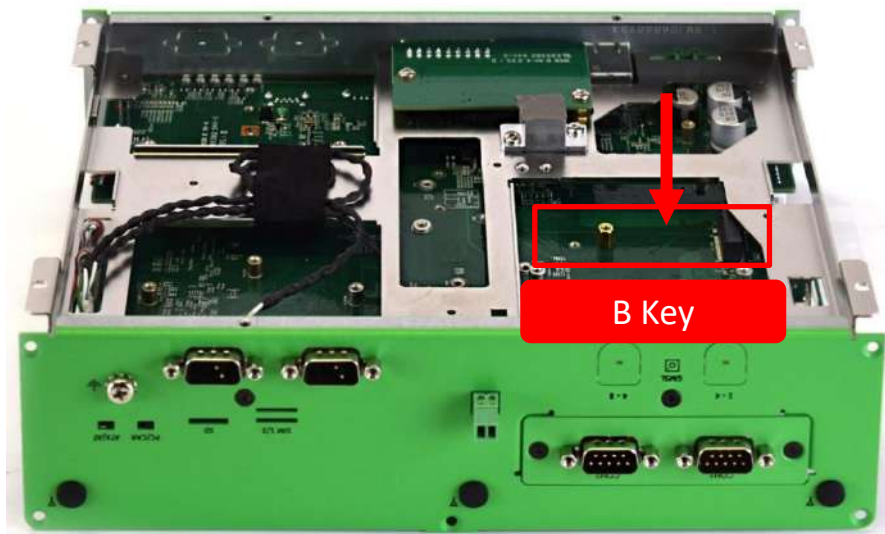


8. Assemble the antenna and SMA jack together; the outcome should resemble the picture below.

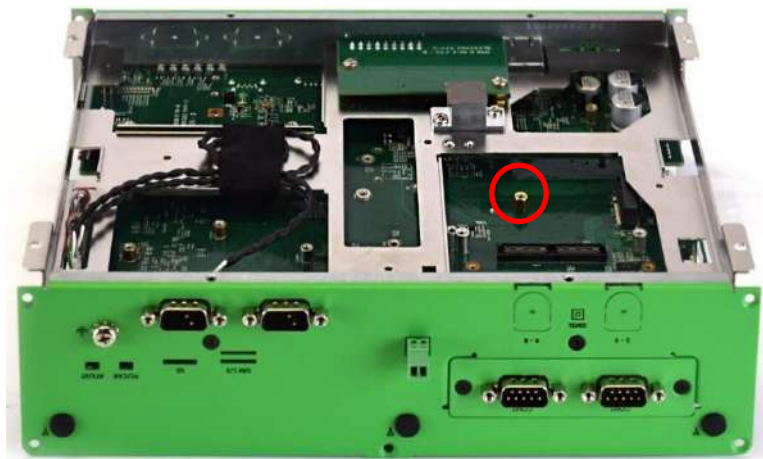


3.6 Installing 4G/5G Module and antenna

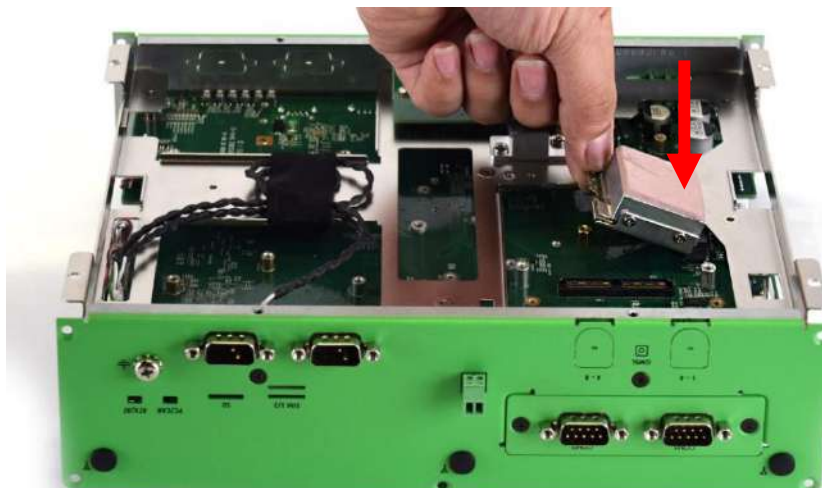
1. JCO-6000-ORN-A (2EBIO) series PCBA has an M.2 B key slot on the Down which supports 4G/5G application.



2. Insert copper pillar (M3x6.6L).



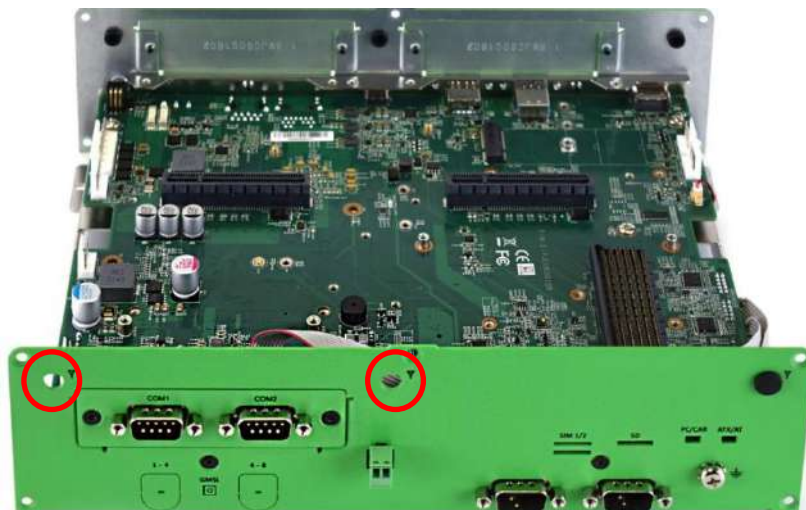
3. Insert 4G/5G module at a 45 degree angle.



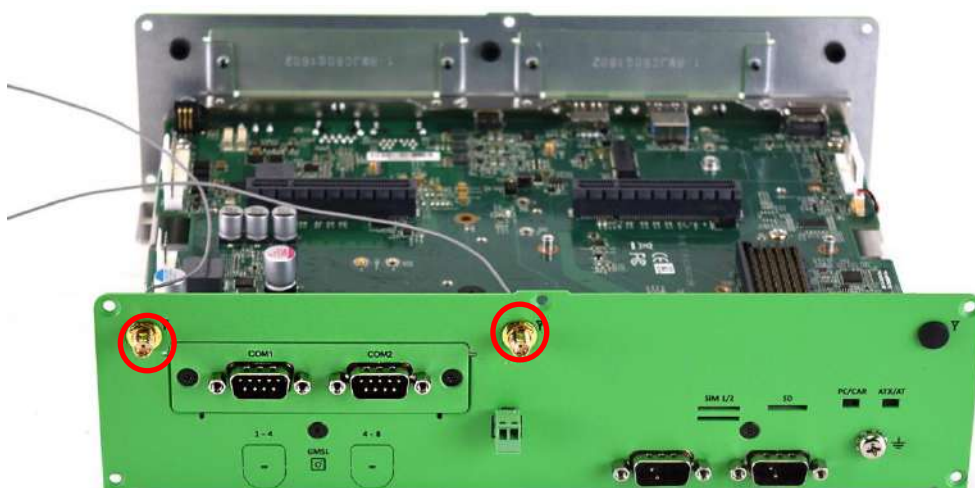
4. Press the 4G/5G module down and secure it with one screw (M3x5L).



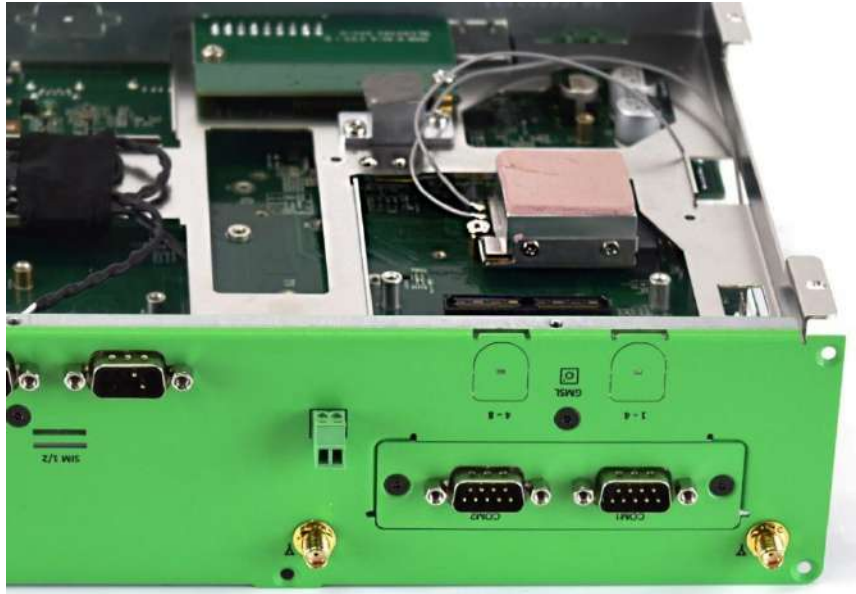
5. Remove antenna hole cover on the system panel.



6. Install the SMA female jack through the antenna holes and then secure it with the SMA male plug.



7. Attach the end of the cable from the Wireless RF connector to the communication module as shown in the picture below.



8. Assemble the antenna and SMA jack together; the outcome should resemble the picture below.

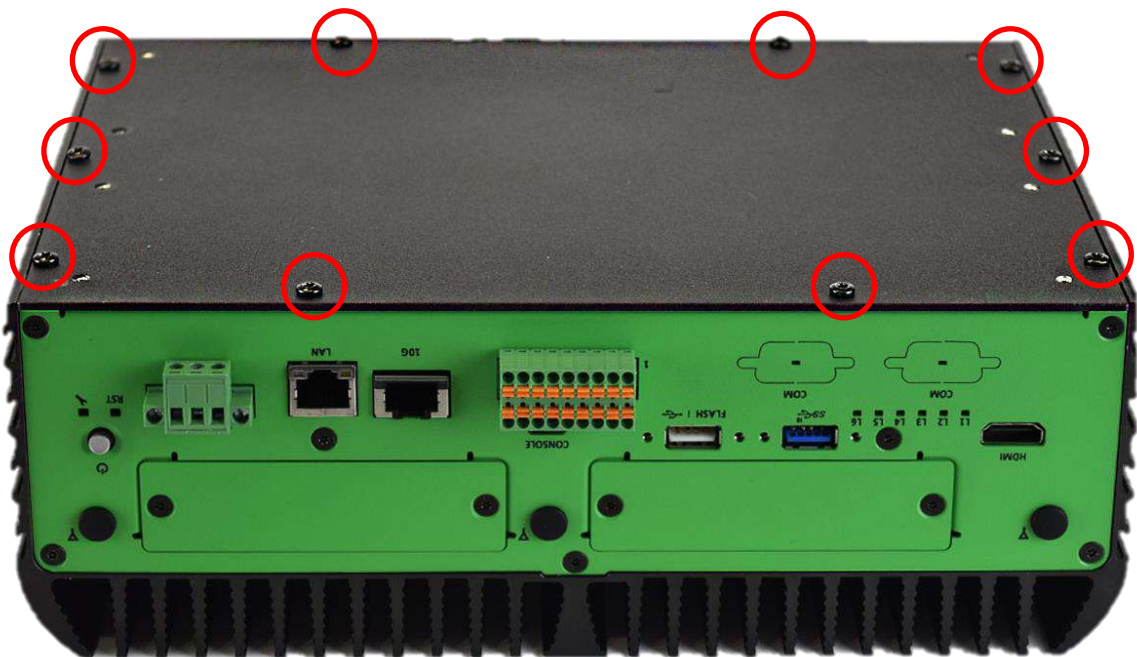


3.7 Assemble chassis bottom cover

1. Place the bottom cover according to the direction shown in the picture below..



2. Lock the bottom cover with the screws



3.8 Installing SIM card

1. The SIM card has 2 slots located on the front panel of the system, SIM 1 (upper) and SIM 2 (lower).



2. Insert SIM 1 into the socket



3. To remove SIM card, simply press the inserted SIM card and then the card will be ejected out.



4. Insert SIM 2 into the socket.



5. To remove SIM card, simply press the inserted SIM card and then the card will be ejected out.



3.9 Installing SD card

1. The SD card slot is located on the front panel of the system.



2. Insert SD card into the socket.



3. To remove SD card, simply press the inserted SD card and then the card will be ejected out.



3.10 Installing Wall Mount

1. Wall Mount holder is available for JCO-6000-ORN-A (2EBIO) series as optional accessories.



2. In the rail holder on top of the bottom cover and lock it with SIX Anti-Vibrate Grommet

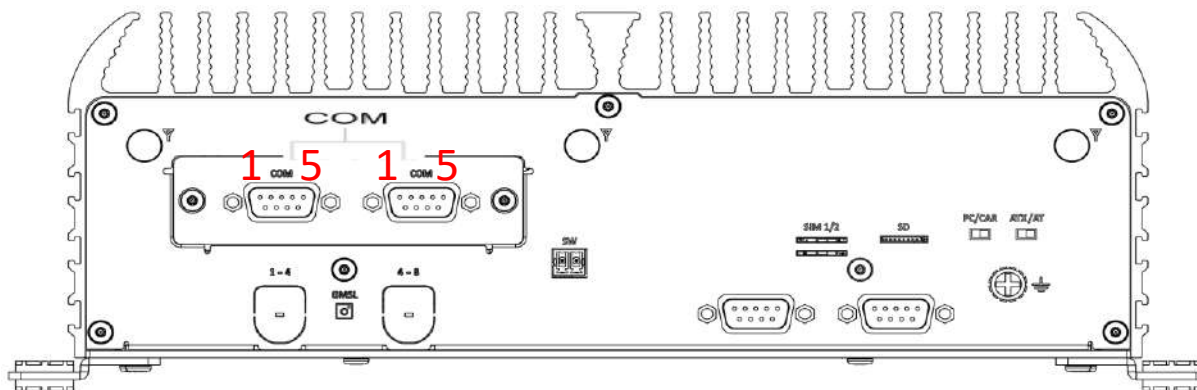


3. In rail holder on top of the bottom cover and lock it with eight screws (M4x5L, Nylok).



3.11 Appendix A Optional COM Cable

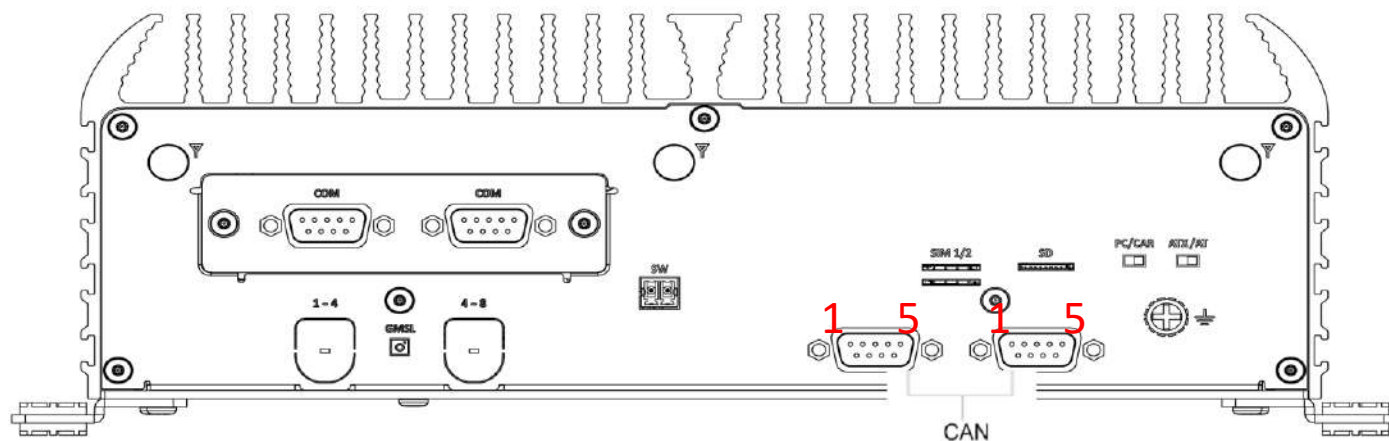
1. 1-TCOM00014 > Single Channel



CONN1	1	6	2	7	3	8	4	9	5
FUNCTION	DCD	DSR	RXD	RTX	TXD	CST	DTR	RI	GND
CONN2	1	2	3	4	5	6	7	8	9

3.12 Appendix B Optional CAN Cable

1. 1-TCAN00008 > Single Channel



CONN1		FUNCTION	COLOR	CONN2	
PIN NO.				PIN NO.	
7	TWIST	CAN1 H	Green	2	
2		CAN1 L	White	1	

Chapter 4

Software Setup Guide

4.1 OS Flash Image Guide

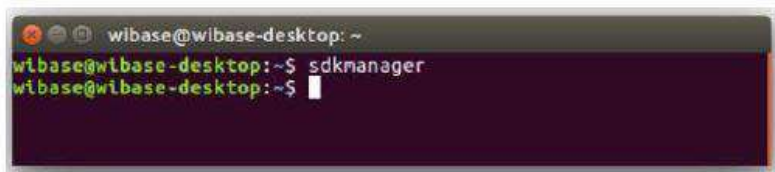
4.1.1 Preparation

Host PC:

- You need a host PC running Ubuntu Desktop 16.04, 18.04, or 20.04.

1. Need install Nvidia SDK Manager. Please refer to the web site:
<https://developer.nvidia.com/sdk-manager>
2. Run “sdkmanager” to download flashing environment.

Command : `sudo sdkmanager`



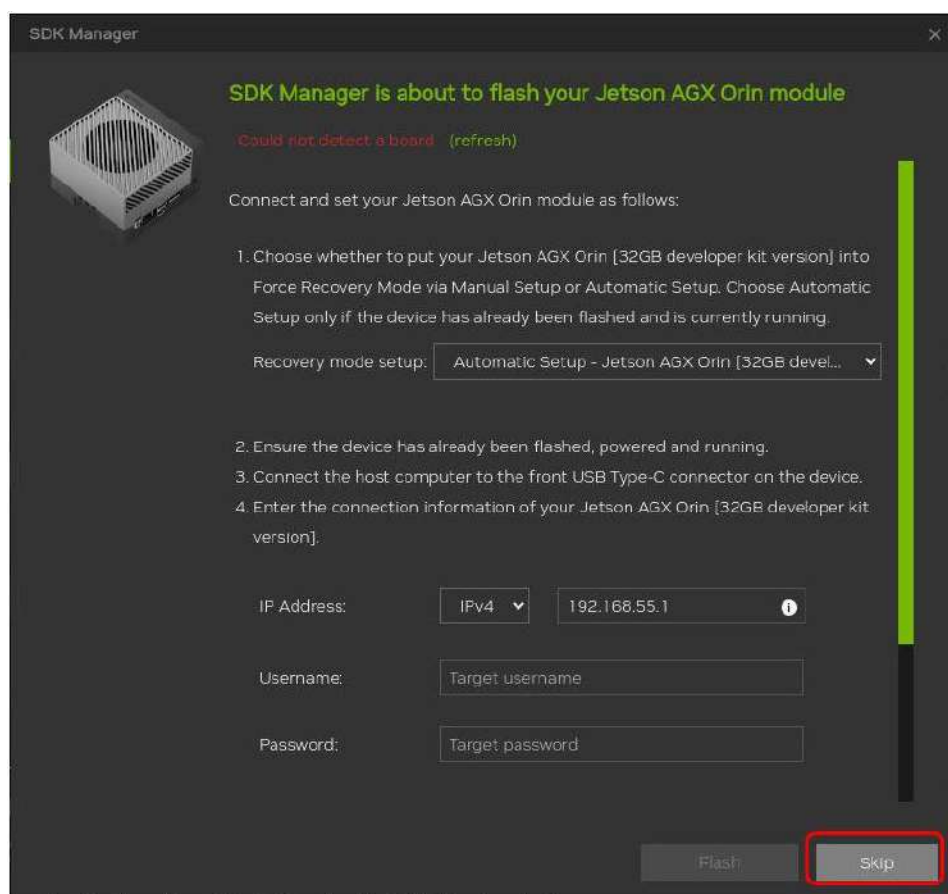
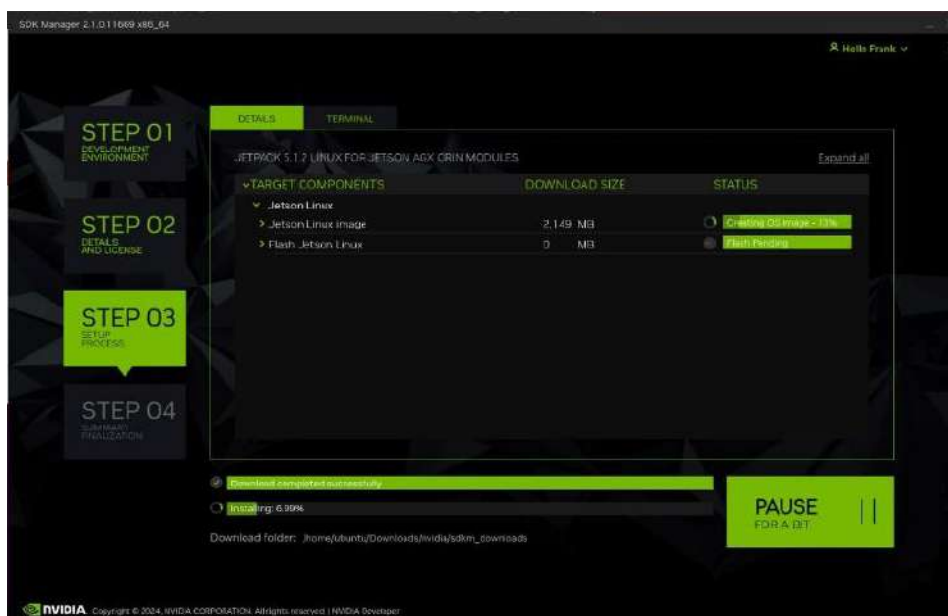
Select correct module and JetPack SDK Version (JetPack 5.1.2) and target hardware (Jetson AGX Orin modules) , then click “CONTINUE”



Select correct check box as below , then click “CONTINUE”



Wait for download finished, then click “Skip” and Exit SDK Manager



- **BSP Image:**

Download the BSP image from C&T web site. The file name will follow the format of :

[{Model}_{JetPack_Ver}_{BSP_Ver}.tar.gz](#)

For Example:

[JCO-6000-ORN-A_JP512_V0.0.2.tar.gz](#)

4.1.2 Flash BSP Image

On Host Computer, open Linux terminal and enter the following command to extract compressed OS image files (file name may vary):

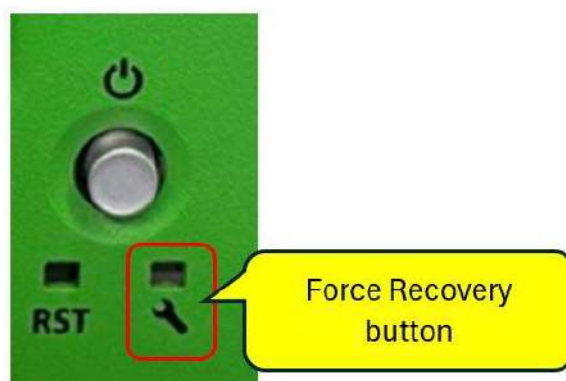
```
$ sudo tar zxvf JCO-6000-ORN-A_JP512_V0.0.1.tar.gz
```

Next, following steps to setup the system to start in USB Recovery Mode:

1. Connect the Micro-USB plug on the USB cable to the OTG Port on the JCO-6000 and the USB port on the host PC.



2. Press and hold force recovery button, then press power button on the system. Wait for two seconds then release the buttons.



3. When device is in recovery mode, lsusb command on host PC will list a line of “0955:7223 Nvidia Corp”

```

ubuntu@ubuntu-desktop: ~
ubuntu@ubuntu-desktop:~$ lsusb
Bus 002 Device 005: ID 046b:ff10 American Megatrends, Inc. Virtual Keyboard and Mouse
Bus 002 Device 004: ID 046b:ff01 American Megatrends, Inc.
Bus 001 Device 009: ID 0955:7223 NVIDIA Corp.
Bus 001 Device 002: ID 8087:0024 Intel Corp. Integrated Rate Matching Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
ubuntu@ubuntu-desktop:~$

```

Next, following steps to flash BSP image in JCO-6000 :

1. Open terminal on Ubuntu host PC, then access the bootloader folder you extracted in the previous section.
2. Enter the following command in terminal to flash the image:

```
$ sudo ./flash-jco-6000.sh
```

3. Wait as the image is installed. Once finished you should see the following:

```

330.1043 [.....] 100%
330.1145 Writing partition B_bpmp-fw with bpmp_t234-TE990M-A1_prod_sigheader.bin.encrypt [ 1051136 bytes ]
332.1415 [.....] 100%
345.0480 Writing partition B_bpmp-fw-dtb with tegra234-bpmp-3701-0004-3737-0000_with_odm_sigheader.dtb.encrypt [ 200160 bytes ]
345.0835 [.....] 100%
345.0970 Writing partition B_psc-fw with pscfw_t234_prod_sigheader.bin.encrypt [ 375168 bytes ]
348.3002 [.....] 100%
348.3182 Writing partition B_mts-mce with mce_flash_o10_cr_prod_sigheader.bin.encrypt [ 190592 bytes ]
352.9279 [.....] 100%
352.9392 Writing partition B_sc7 with sc7_t234_prod_sigheader.bin.encrypt [ 184544 bytes ]
355.2881 [.....] 100%
355.2989 Writing partition B_pscrf with psc_rf_t234_prod_sigheader.bin.encrypt [ 122320 bytes ]
357.5729 [.....] 100%
357.5805 Writing partition B_mb2rf with mb2rf_t234_sigheader.bin.encrypt [ 122752 bytes ]
359.0880 [.....] 100%
359.0972 Writing partition B_cpu-bootloader with uefi_jetson_with_dtb_sigheader.bin.encrypt [ 3031104 bytes ]
360.0112 [.....] 100%
366.4523 Writing partition B_secure-os with tos-optee_t234_sigheader.img.encrypt [ 1127568 bytes ]
397.9181 [.....] 100%
410.0291 Writing partition B_eks with eks_t234_sigheader.img.encrypt [ 9232 bytes ]
411.0079 [.....] 100%
411.0127 Writing partition B_dce-fw with display-t234-dce_with_kernel_tegra234-p3701-0004-p3737-0000_aligned_blob_w_bin_sigheader.bl
n.encrypt [ 747936 bytes ]
411.9398 [.....] 100%
411.9721 Writing partition B_spe-fw with spe_t234_sigheader.bin.encrypt [ 270336 bytes ]
421.1525 [.....] 100%
421.1668 Writing partition B_rce-fw with camera-rtcpu-t234-rce_sigheader.img.encrypt [ 537952 bytes ]
424.4859 [.....] 100%
424.5101 Writing partition B_adsp-fw with adsp-fw_sigheader.bin.encrypt [ 400864 bytes ]
431.1105 [.....] 100%
431.1334 Writing partition B_VER with qspl_bootblob_ver.txt [ 109 bytes ]
436.0570 [.....] 100%
436.0616 Writing partition A_VER with qspl_bootblob_ver.txt [ 109 bytes ]
436.0717 [.....] 100%
436.0765 Writing partition master_boot_record with mbr_1_3.bin [ 512 bytes ]
436.0870 [.....] 100%
436.0913 Writing partition A_kernel with boot.img [ 43489280 bytes ]
436.0972 [.....] 100%
437.0265 Writing partition A_kernel-dtb with kernel_tegra234-p3701-0004-p3737-0000.dtb [ 378167 bytes ]
437.0319 [.....] 100%
437.0493 Writing partition B_kernel with boot.img [ 43489280 bytes ]
437.0543 [.....] 100%
439.0495 Writing partition B_kernel-dtb with kernel_tegra234-p3701-0004-p3737-0000.dtb [ 378167 bytes ]
439.0548 [.....] 100%
439.0738 Writing partition recovery with recovery.img [ 47073280 bytes ]
439.0788 [.....] 100%
441.0198 Writing partition recovery-dtb with tegra234-p3701-0004-p3737-0000.dtb.rec [ 378167 bytes ]
441.0264 [.....] 100%
441.0435 Writing partition esp with esp.img [ 87108864 bytes ]
441.0484 [.....] 100%
444.6108 Writing partition APP with system.img [ 59055800320 bytes ]
444.6163 [.....] 100%

```

4. The system will reboot after flashing all images.

```
ubuntu@ubuntu-DWL01: ~/JCO-6000-ORN-A_JP512_V0.0.2
[ 832.1313 ] Bootloader version 01.00.0000
[ 832.1589 ] Writing partition B_MB1_BCT with mbi_cold_boot_bct_MB1_sigheader.bct.encrypt [ 18112 bytes ]
[ 832.1604 ] [.....] 100%
[ 832.4021 ] tegradevflash_v2 --write A_MEM_BCT mem_coldboot_sigheader.bct.encrypt
[ 832.4044 ] Bootloader version 01.00.0000
[ 832.4362 ] Writing partition A_MEM_BCT with mem_coldboot_sigheader.bct.encrypt [ 243712 bytes ]
[ 832.4370 ] [.....] 100%
[ 835.4473 ] tegradevflash_v2 --write B_MEM_BCT mem_coldboot_sigheader.bct.encrypt
[ 835.4523 ] Bootloader version 01.00.0000
[ 835.4829 ] Writing partition B_MEM_BCT with mem_coldboot_sigheader.bct.encrypt [ 243712 bytes ]
[ 835.4862 ] [.....] 100%
[ 838.4861 ] Flashing completed

[ 838.4863 ] Coldbooting the device
[ 838.4915 ] tegrarcv_v2 --chip 0x23 0 --ismb2
[ 838.4964 ] MB2 version 01.00.0000
[ 838.5262 ] Coldbooting the device
[ 838.5311 ] tegrarcv_v2 --chip 0x23 0 --reboot coldboot
[ 838.5353 ] MB2 version 01.00.0000
*** The target t186ref has been flashed successfully. ***
Reset the board to boot from internal eMMC.

Restore backup image successfully.
ubuntu@ubuntu-DWL01:~/JCO-6000-ORN-A_JP512_V0.0.2$
```

4.2 MCU Control Functions

4.2.1 Control Functions

MCU driver can control or get status of the below functions.

- LED Control
- GPIO Control
- Device Mode Status
- Buzzer Control
- Com Port Control
- IGN Power On/Off Delay Time Control
- Setting Save Control

4.2.2 LED Control

Control L2 ~ L6 leds's behavior.

- The sysfs path : /sys/bus/i2c/devices/8-0040/
- Sysfs files : led_2 ~ led_6 (Read/Write)
- Control method :

```
$ echo value > /sys/bus/i2c/devices/8-0040/led_2
```

- Value format :

BIT number	Function	Default value
2 ~ 0	<Hz> 0: OFF, 7: ON, 1 ~ 6: Hz	0
5 ~ 3	<Light Count> 0: continuous, 1 ~ 7: count	0
6 ~ 7	<Gap Time> 0:continuous, 1 ~ 3 : 0.5~ 1.5S gap	0

4.2.3 GPIO Control

Read or setup GPIO status

- The sysfs path : /sys/bus/i2c/devices/8-0040/
- Sysfs files :
 - gpio_in (Read-only) : default value 0
 - gpio_out (Read/Write) : default value 0
- Control method :

```
$ cat /sys/bus/i2c/devices/8-0040/gpio_in
$ echo value > /sys/bus/i2c/devices/8-0040/gpio_out
```

- GPIO bit mapping :

■ GPIO Input

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
IN8	IN7	IN6	IN5	IN4	IN3	IN2	IN1

■ GPIO Output

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
OUT8	OUT7	OUT6	OUT5	OUT4	OUT3	OUT2	OUT1

4.2.4 Device Mode Status

Read device mode as PC MODE or IGN MODE

- The sysfs path : /sys/bus/i2c/devices/8-0040/
- Sysfs files : device_mode (Read-only)
- Control method :

```
$ cat /sys/bus/i2c/devices/8-0040/device_mode
```

- Value format :
 - PC MODE : PC mode
 - IGN MODE : Ignition Mode

4.2.5 Buzzer Control

Control buzzer function

- The sysfs path : /sys/bus/i2c/devices/8-0040/
- Sysfs files : buzzer_time (Read/Write) : default value 0
- Control method :

```
$ echo value > /sys/bus/i2c/devices/8-0040/buzzer_time
```

- Value format :

Buzzer turn on time : value * 0.1 seconds , then Buzzer turn off.

The value will auto clear to 0

4.2.6 Power on Buzzer Control

Enable or disable the buzzer when power on

- The sysfs path : /sys/bus/i2c/devices/8-0040/
- Sysfs files : power_on_buzzer (Read/Write) : default value 1 (EEPROM Save)
- Control method :

```
$ echo value > /sys/bus/i2c/devices/8-0040/power_on_buzzer
```

- Value format :

1 : Enable the Buzzer when power on.

0 : Disable the Buzzer when power on.

4.2.7 Com Port Control

Set the COM port mode as RS-232, RS-485 or RS-422

- The sysfs path : /sys/bus/i2c/devices/8-0040/
- Sysfs files : mgpio_out (Read/Write) : default value 5 (RS-232, EEPROM Save)
- Control method :

```
$ echo mode > /sys/bus/i2c/devices/8-0040/mgpio_out
```

- Value format :

Writing a valid value (5, 10, 15) to change COM port settings

- 5: RS-232 MODE
- 10: RS-485 MODE
- 15: RS-422 MODE

4.2.8 IGN Power On/Off Delay Time Control

Set IGN ON/OFF to SB-PW ON/OFF delay time at ignition mode

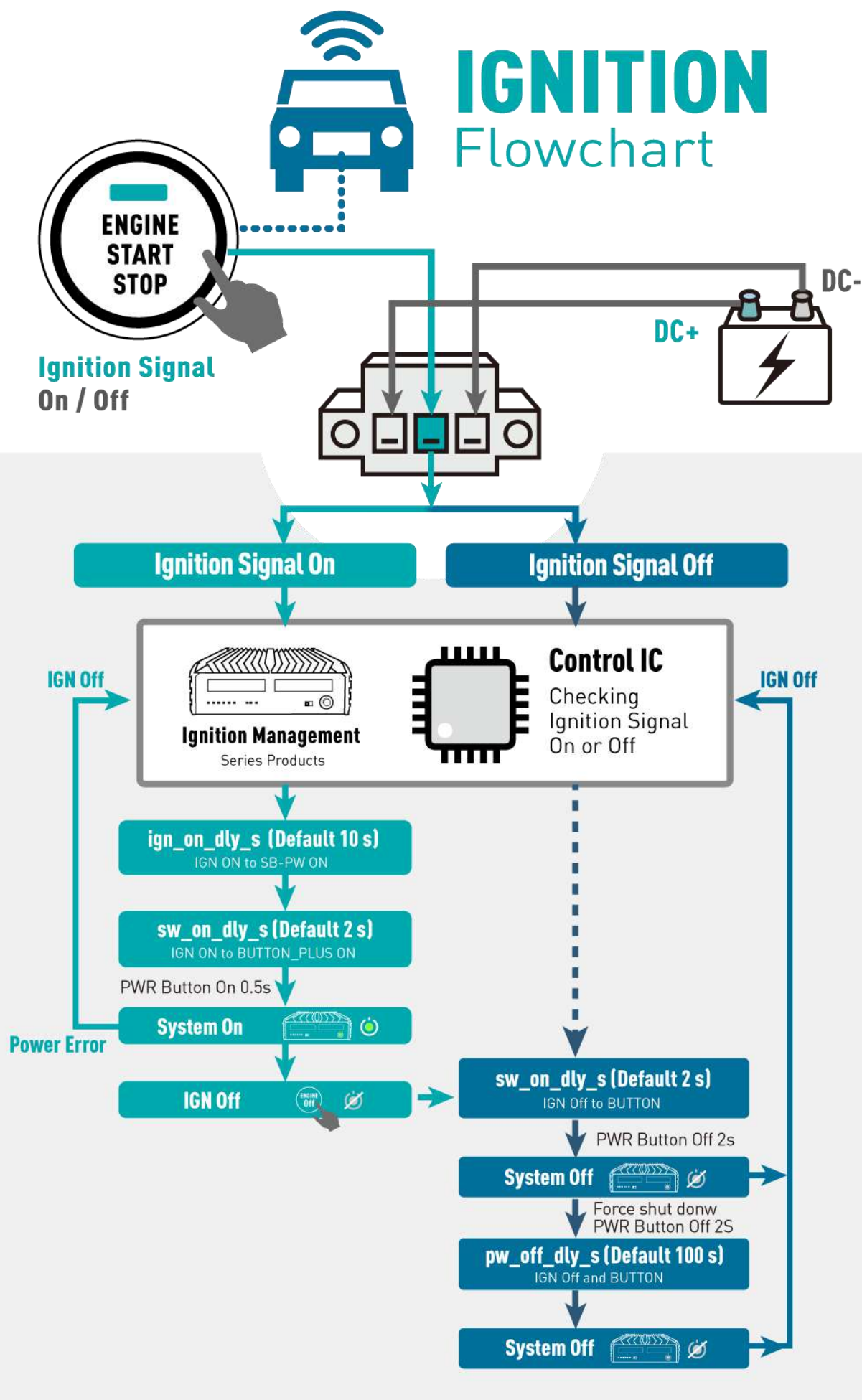
- The sysfs path : `/sys/bus/i2c/devices/8-0040/`
- Sysfs files :
 - `ign_on_dly_s` (Read/Write) : default value 10 (EEPROM Save)
 - IGN ON to SB-PW ON delay second
 - `sw_on_dly_s` (Read/Write) : default value 2 (EEPROM Save)
 - IGN ON to BUTTON_PLUS ON MB delay second
 - `sw_off_dly_s` (Read/Write) : default value 2 (EEPROM Save)
 - IGN OFF to BUTTON_PLUS OFF MB delay second
 - `pw_off_dly_s` (Read/Write) : default value 100 (EEPROM Save)
 - IGN OFF and BUTTON_PLUS send ,delay second forced Power OFF
- Control method examples:

```
$ echo value > /sys/bus/i2c/devices/8-0040/ign_on_dly_s  
$ cat /sys/bus/i2c/devices/8-0040/ign_on_dly_s
```

- Value format :

Value * 1 seconds

Range: 0 ~ 65535 seconds



4.2.9 Setting Save Control

Save the settings into the EEPROM

- The sysfs path : /sys/bus/i2c/devices/8-0040/
- Sysfs files : rom_update (Read/Write) : default value 0
- Control method :

```
$ echo 1 > /sys/bus/i2c/devices/8-0040/rom_update
```

- Value format :

Value > 0 , update (EEPROM SAVE) REG to EEPROM , update ok
MCU auto clear to 0

4.3 GMSL Camera Control (Optional)

Open GMSL camera function when connect GMSL camera.

Check Camera In System

- Type command to check how many camera are attached in the /dev directory.

```
$ ls /dev/video*
```

- Open Camera by gstreamer app in a example:

```
gst-launch-1.0 -vvv nvv4l2camerasrc device="/dev/video1" !  
    "video/x-raw(memory:NVMM),  
    width=(int)1920,height=(int)1280,format=(string)UYVY,  
    framerate=(fraction)60/1,interlace-mode=progressive" !  
    nvvidconv ! "video/x-raw(memory:NVMM),  
    format=(string)NV12" ! nv3dsink -e
```

