Lanner

Embedded Computing Platform

Hardware Platforms for Intelligent Edge Computing

EAI-I131
User Manual

Version: 2.0

Date of Release: 2024-03-14

About this Document

This manual describes the overview of the various functionalities of this product, and the information you need to get it ready for operation. It is intended for those who are:

- responsible for installing, administering and troubleshooting this system or Information Technology professionals.
- assumed to be qualified in the servicing of computer equipment, such as professional system integrators, or service personnel and technicians.

The latest version of this document can be found on Lanner's official website, available either through the product page or through the Lanner Download Center page with a login account and password.

Conventions & Icons

The icons are used in the manual to serve as an indication of interest topics or important messages.

Icon	Usage
 **Note or Information**	This mark indicates that there is something you should pay special attention to while using the product.
 **Warning or Important**	This mark indicates that there is a caution or warning and it is something that could damage your property or product.

Online Resources

To obtain additional documentation resources and software updates for your system, please visit the Lanner Download Center. As certain categories of documents are only available to users who are logged in, please be registered for a Lanner Account at http://www.lannerinc.com/ to access published documents and downloadable resources.

Technical Support

In addition to contacting your distributor or sales representative, you could submit a request at our Lanner Technical Support and fill in a support ticket to our technical support department.

Documentation Feedback

Your feedback is valuable to us, as it will help us continue to provide you with more accurate and relevant documentation. To provide any feedback, comments or to report an error, please email contact@lannerinc.com. Thank you for your time.

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Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note

1. An unshielded-type power cord is required to meet FCC emission limits and to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.
2. Use only shielded cables to connect I/O devices to this equipment.
3. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Important

1. Operations in the 5.15-5.25GHz band are restricted to indoor usage only.
2. This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

Safety Guidelines

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Do not wear loose clothing or jewelry that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Disconnect all power by turning off the power and unplugging the power cord before installing or removing a chassis or working near power supplies
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit; always check the circuit.

Consignes de sécurité

Suivez ces consignes pour assurer la sécurité générale :

- Laissez la zone du châssis propre et sans poussière pendant et après l'installation.
- Ne portez pas de vêtements amples ou de bijoux qui pourraient être pris dans le châssis. Attachez votre cravate ou écharpe et remontez vos manches.
- Portez des lunettes de sécurité pour protéger vos yeux.
- N'effectuez aucune action qui pourrait créer un danger pour d'autres ou rendre l'équipement dangereux.
- Coupez complètement l'alimentation en éteignant l'alimentation et en débranchant le cordon d'alimentation avant d'installer ou de retirer un châssis ou de travailler à proximité de sources d'alimentation.
- Ne travaillez pas seul si des conditions dangereuses sont présentes.
- Ne considérez jamais que l'alimentation est coupée d'un circuit, vérifiez toujours le circuit. Cet appareil génère, utilise et émet une énergie radiofréquence et, s'il n'est pas installé et utilisé conformément aux instructions des fournisseurs de composants sans fil, il risque de provoquer des interférences dans les communications radio.

Lithium Battery Caution

- There is risk of Explosion if Battery is replaced by an incorrect type.
- Dispose of used batteries according to the instructions.
- Installation only by a skilled person who knows all Installation and Device Specifications which are to be applied.
- Do not carry the handle of power supplies when moving to another place.
- Please conform to your local laws and regulations regarding safe disposal of lithium BATTERY.
- Disposal of a battery into fire or a hot oven, or mechanically crushing or cutting of a battery can result in an explosion.
- Leaving a battery in an extremely high temperature surrounding environment can result in an explosion or the leakage of flammable liquid or gas.
- A battery subjected to extremely low air pressure that may result in an explosion or the leakage of flammable liquid or gas.

Avertissement concernant la pile au lithium

- Risque d'explosion si la pile est remplacée par une autre d'un mauvais type.
- Jetez les piles usagées conformément aux instructions.
- L'installation doit être effectuée par un électricien formé ou une personne formée à l'électricité connaissant toutes les spécifications d'installation et d'appareil du produit.
- Ne transportez pas l'unité en la tenant par le câble d'alimentation lorsque vous déplacez l'appareil.

Operating Safety

- Electrical equipment generates heat. Ambient air temperature may not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Be sure that the room in which you choose to operate your system has adequate air circulation.
- Ensure that the chassis cover is secure. The chassis design allows cooling air to circulate effectively. An open chassis permits air leaks, which may interrupt and redirect the flow of cooling air from internal components.
- Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures. Be sure to follow ESD-prevention procedures when removing and replacing components to avoid these problems.

- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. If no wrist strap is available, ground yourself by touching the metal part of the chassis.
- Periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohms).

Sécurité de fonctionnement

- L'équipement électrique génère de la chaleur. La température ambiante peut ne pas être adéquate pour refroidir l'équipement à une température de fonctionnement acceptable sans circulation adaptée. Vérifiez que votre site propose une circulation d'air adéquate.
- Vérifiez que le couvercle du châssis est bien fixé. La conception du châssis permet à l'air de refroidissement de bien circuler. Un châssis ouvert laisse l'air s'échapper, ce qui peut interrompre et rediriger le flux d'air frais destiné aux composants internes.
- Les décharges électrostatiques (ESD) peuvent endommager l'équipement et gêner les circuits électriques. Des dégâts d'ESD surviennent lorsque des composants électroniques sont mal manipulés et peuvent causer des pannes totales ou intermittentes. Suivez les procédures de prévention d'ESD lors du retrait et du remplacement de composants.
- Portez un bracelet anti-ESD et veillez à ce qu'il soit bien au contact de la peau. Si aucun bracelet n'est disponible, reliez votre corps à la terre en touchant la partie métallique du châssis.
- Vérifiez régulièrement la valeur de résistance du bracelet antistatique, qui doit être comprise entre 1 et 10 mégohms (Mohms).

Mounting Installation Precaution

- Do not install and/or operate this unit in any place that flammable objects are stored or used in.
- If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- Installation of the equipment (especially in a rack) should consider the ventilation of the system's intake (for taking chilled air) and exhaust (for emitting hot air) openings so that the amount of airflow required for safe operation of the equipment is not compromised.
- To avoid a hazardous load condition, be sure the mechanical loading is even when mounting.
- Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable earthing should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

Installation & Operation:

- This equipment must be grounded. The power cord for product should be connected to a socket-outlet with earthing connection.
  Cet équipement doit être mis à la terre. La fiche d'alimentation doit être connectée à une prise de terre correctement câblée
- Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.
  Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.
- The machine can only be used in a restricted access location and must be installed by a skilled person.
  Les matériels sont destinés à être installés dans des EMPLACEMENTS À ACCÈS RESTREINT.

Warning

- Class I Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts.
- Product shall be used with Class 1 laser device modules.

Avertissement

- Équipement de classe I. Ce matériel doit être relié à la terre. La fiche d'alimentation doit être raccordée à une prise de terre correctement câblée. Une prise de courant mal câblée pourrait induire des tensions dangereuses sur des parties métalliques accessibles.
- Le produit doit être utilisé avec des modules de dispositifs laser de classe 1.

Electrical Safety Instructions

Before turning on the device, ground the grounding cable of the equipment. Proper grounding (grounding) is very important to protect the equipment against the harmful effects of external noise and to reduce the risk of electrocution in the event of a lightning strike. To uninstall the equipment, disconnect the ground wire after turning off the power. A ground wire is required and the part connecting the conductor must be greater than 4 mm2 or 10 AWG.

Consignes de sécurité électrique

- Avant d'allumer l'appareil, reliez le câble de mise à la terre de l'équipement à la terre.
- Une bonne mise à la terre (connexion à la terre) est très importante pour protéger l'équipement contre les effets néfastes du bruit externe et réduire les risques d'électrocution en cas de foudre.
- Pour désinstaller l'équipement, débranchez le câble de mise à la terre après avoir éteint l'appareil.
- Un câble de mise à la terre est requis et la zone reliant les sections du conducteur doit faire plus de 4 mm2 ou 10 AWG.

Table of Contents

CHAPTER 1: PRODUCT OVERVIEW

EAI-I131, an industrial-grade AI inference system for 5G edge computing, is built with NVIDIA® Jetson Orin NX/Nano and offers up to 100 TOPS AI performance. The system also supports LTE, 5G Sub6, and Wi-Fi wireless connectivity and provides rich connectivity options, including 2x GbE PoE, 2x COM, 2x USB, and 4x DI/DO ports.

Package Content

Your package contains the following items:

- 1x EAI-I131 IoT Edge AI Box PC
- 1x Terminal Block (5-pin*2 / 6-pin*2)
- Thermal Pad Kit (for NVMe/Wi-Fi Module)
- 1x Power Adapter
- Rackmount Set

Note: If you should find any components missing or damaged, please contact your dealer immediately for assistance.

Ordering Information

SKU No.	Description
EAI-I131A	IPC with NVIDIA® Jetson Orin NX (100 TOPs) With 16GB LPDDR5 Memory, 1x M.2 2280 M-Key (PCIex4), 2x GigE PoE LANs, 1x M.2 304(5)2 B-Key for 5G Sub6, 1x M.2 2230 E-Key for Wi-Fi, 2x COM for RS232/422/485, 1x CAN 2.0 (Optional)
EAI-I131B	IPC with NVIDIA® Jetson Orin NX (70 TOPs) With 8GB LPDDR5 Memory, 1x M.2 2280 M Key (PCIex4), 2x GigE PoE LANs, 1x M.2 304(5)2 B-Key for 5G Sub6, 1x M.2 2230 E-Key for Wi-Fi, 2x COM for RS232/422/485, 1x CAN 2.0 (Optional)
EAI-I131C	IPC with NVIDIA® Jetson Orin Nano (40 TOPs) With 8GB LPDDR5 Memory, 1x M.2 2280 M-Key (PCIex4), 2x GigE PoE LANs,1x M.2 304(5)2 B-Key for 5G sub6, 1x M.2 2230 E-Key for Wi-Fi, 2x COM for RS232/422/485, 1x CAN 2.0 (Optional)
EAI-I131D	IPC with NVIDIA Jetson Orin Nano (20 TOPs) With 4GB LPDDR5 Memory, 1x M.2 2280 M-Key (PCIex4), 2x GigE PoE LANs, 1x M.2 304(5)2 B-Key for 5G sub6, 1x M.2 2230 E-Key for Wi-Fi, 2x COM For RS232/422/485, 1x CAN 2.0 (Optional)

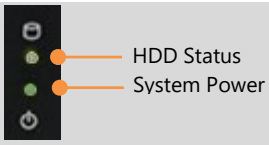
Optional Accessories

Model	Description
LTE Kit	EM9191 LTE Module with Antenna Kit
LTE Kit	EAI-I131 LTE Antenna Kit without LTE Module
WI-FI Kit	EAI-I131 WI-FI Antenna Kit without WI-FI Module

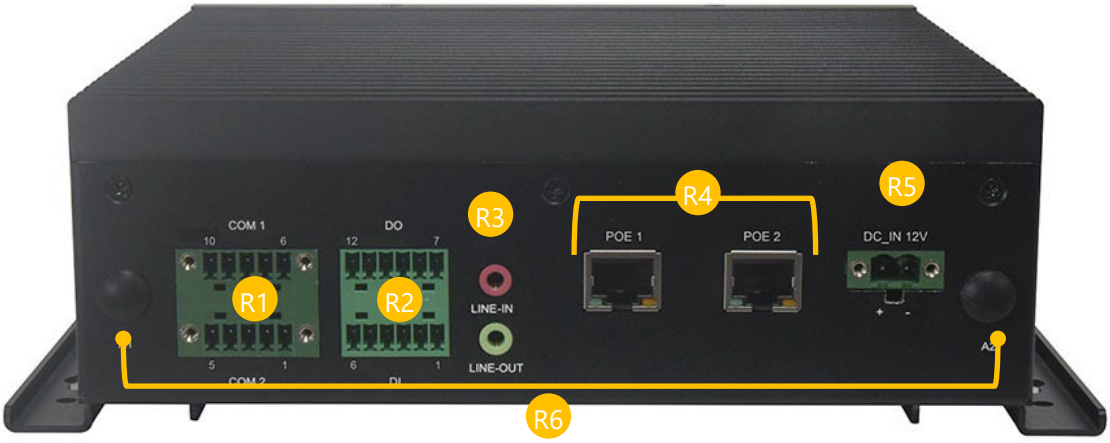
System Specifications

Processor System	CPU	SKU A: 8-core Nvidia Arm® Cortex A78AE v8.2, 64-bit SKU B/C/D: 6-coreNvidia ARM® Cortex A78AE v8.2, 64-bit
	GPU	SKU A: Nvidia Ampere, 1024 CUDA Cores, 32 Tensor Cores, 918MHz SKU B: Nvidia Ampere, 1024 CUDA Cores, 32 Tensor Cores, 765MHz SKU C: Nvidia Ampere, 1024 CUDA Cores, 48 Tensor Cores, 625MHz SKU D: Nvidia Ampere, 512 CUDA Cores, 16 Tensor Cores, 625MHz
Fanless		Yes
Memory	Technology	SKU A: 16GB LPDDR5 SKU B/C: 8GB LPDDR5 SKU D: 4GB LPDDR5
Ethernet	LAN Ports	2x LAN Ports
	Speed	10/100/1000 Mbps
	Interface	RJ45
	PoE	GigE PoE LANs with Support for IEEE 802.3af/at, PoE (+) Under Max. 30W (Surge Protection Up to 2KV)
Storage	Interface	1x M.2 2280 M-Key NvME (PCIe x4)
I/O	COM Port	2x RS232/422/485 Ports
	CAN Port	1x CAN 2.0 from COM2 (Optional)
	Audio	1x Line-in; 1x Line-Out
	USB Port	2x USB 2.0 Ports
	Display	1x HDMI 2.0A/B @ 4Kp60 with Screw Lock;
	Digital I/O	4x DI (Support PNP / NPN / Dry Contact); 4x DO (Support Dry / Sink), IEC61121-2; 24V with Max. 200mA
	Button	1x Reset Button; 1x Power Button
	Antenna	4x Antenna Hole for 5G; 2x Antenna Hole for Wi-Fi
Expansion Interface	M.2	1x M.2 3042/50/52 B-Key for 5G Sub6; 1x M.2 2230 E-Key for Wi-Fi
Miscellaneous	TPM	Onboard TPM 2.0
Cooling	Processor	Passive CPU
Power	Input	System Power Input Rated DC12V
	Connector	1x 2-pin Terminal Block, ATX +12VDC Typically
Environment	Operating Temperature	0°C to 40°C (Support -40°C~70°C with LTE; -40°C~75°C without LTE; -40°C~70/75°C without AC-DC power adapter)
	Storage Temperature	-40°C to 70°C
	Relative Humidity	5%~90% Operating; 5%~95% Non-Operating
Mechanical	Dimension (WxHxD)	201mm x 65mm x 196mm
	Weight	2.6KG
	Mounting	Wallmount, VESA mount (Optional), Chassis w/ Intrusion Design
Driver Support	OS	Linux (Nvidia Jetpack 5.1); Linux (Lanner SDK); Ubuntu
Security	TrustZone & Security Boot	U-bootloader & OS Protected
Certification	EMC	CE/FCC Class A, UL

Front Panel

No.	Description	
F1	USB Port	2x USB 2.0 Type A Ports
F2	Display	1x HDMI Port with Screw Lock
F3	SIM Cover	SIM Cover w/ Intrusion Design for 2x Nano SIM
F4	Reset Button	1x Reset Button
F5	Power Switch	1x Power On/Off Switch
F6	LED Indicator	 HDD Status System Power
F7	Antenna	4x Antenna Holes for LTE/5G/Wi-Fi

Rear Panel

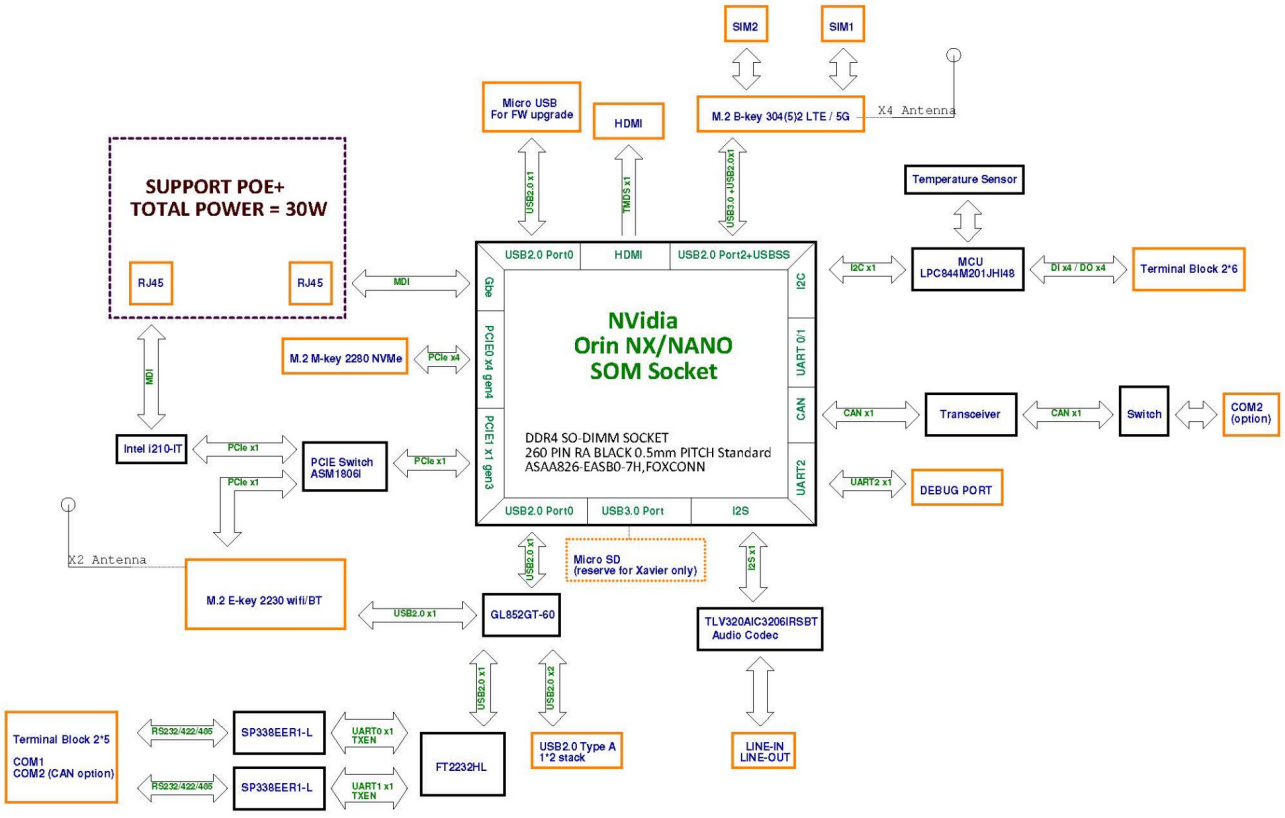


No.	Description	
R1	COM Port	1x 2x5-pin Terminal Block for isolated; 2x RS232/422/485 (COM1 & COM2; COM2 is optional for 1x CAN 2.0A)
R2	DIO	1x 2x6-pin Terminal Block: 4x DI (support PNP/NPN/dry contact), 4x DO (support dry/sink contact);
R3	Audio	1x Line-in; 1x Line-out
R4	Ethernet/PoE	2x 10/100/1000Mbps LAN RJ45 w/ IEEE802.3af/at PoE (+) w/ surge 2KV protection under maximum 30W power budget w/o isolation
R5	Power Input	1x 2-pin Terminal Block, ATX +12VDC Typically
R6	Antenna Holes	2x Antenna Holes for LTE/5G

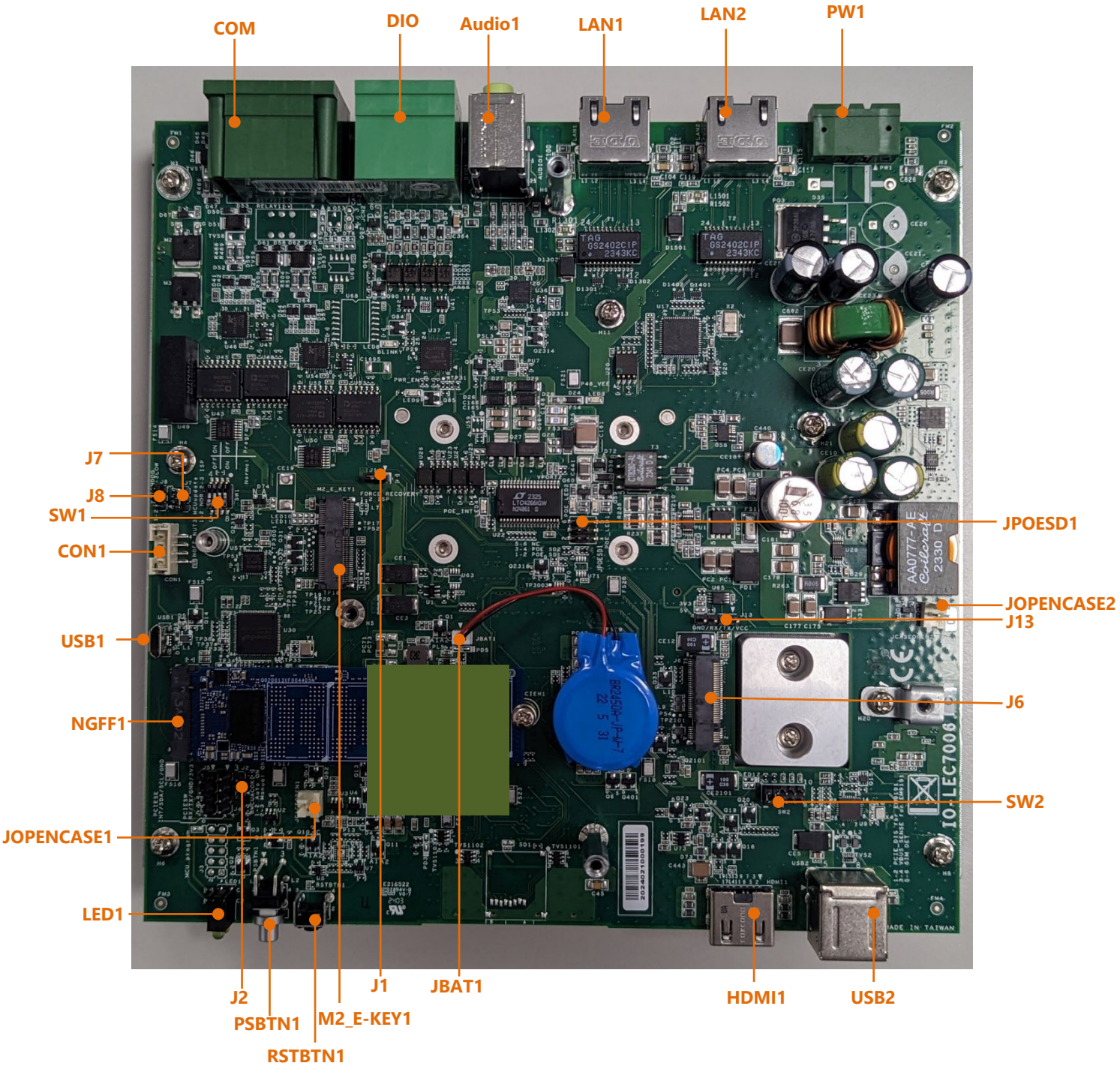
CHAPTER 2: MOTHERBOARD INFORMATION

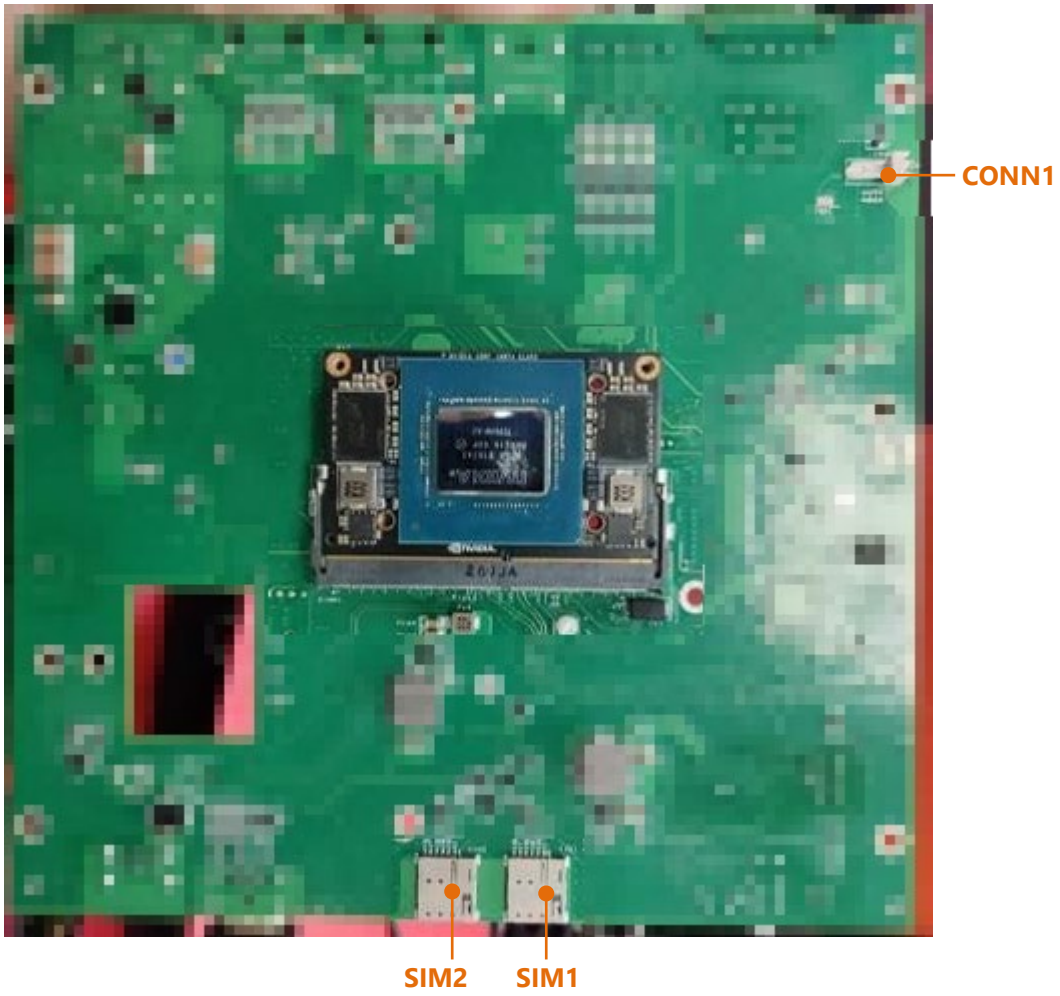
Block Diagram

The block diagram indicates how data flows among components on the motherboard.



Internal Jumpers and Connector





J1: Force Recovery

Install Jumper for SOM upgrade.

PIN	Description
1	FORCE_RECOVERY_N
2	GND

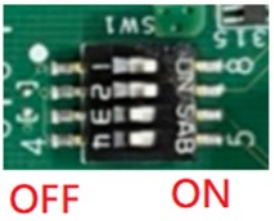
USB1: Micro USB for SOM Upgrade

Install J1 jumper and flash SOM via this micro USB Port

PIN	Description
1	VBUS_SENSE
2	USB_DN
3	USB_DP
4	NC
5	GND

SW1: MCU UART Trace Switch

Latch 1 & Latch 2 turn OFF, Latch 3 & Latch 4 turn ON for MCU upgrade program



PIN	Description
1	MCU_UART_RX
2	MCU_UART_TX
3	MCU_UART_RX
4	MCU_UART_TX
5	MCU_UART_TX_ISP
6	MCU_UART_RX_ISP
7	NC
8	NC

J7: MCU ISP MODE

(1-2) = Normal Operation (Default)

(2-3) = ISP MODE.

PIN	Description
1	Pull up 10K to 3V3
2	PIO0_12
3	GND

J8: MCU Watch Dog

(1-2) = Watch Dog Enable

(2-3) = Watch Dog Disable (Default)

PIN	Description
1	+P3V3_MCU
2	MCN_WDG
3	GND

J13: SOM Debug UART

PIN	Description
1	UART2_PWR
2	UART2_TXD
3	UART2_RXD
4	GND

JPOESD1: Enable/Disable PoE Function

Install jumper for disable PoE channel

(1-2) = Disable LAN1 PoE

(3-4) = Disable LAN2 PoE

PIN	Description
1	GND
2	POE_SD1_1
3	GND
4	POE_SD2_1
5	NC
6	NC

JBAT1: RTC Battery

PIN	Description
1	VBAT_R
2	GND

JCASEOPEN1

PIN	Description
1	GND
2	SIM_OPENCASE_PU

JCASEOPEN2

PIN	Description
1	GND
2	JCASEOPEN1_R

CONN1: Heater CONN.

PIN	Description
1	PHEAT
2	GND

J2: Power-up Mode

(1-2) = Auto-ON (Default)

(2-3) = Manual ON

PIN	Description
1	NC
2	BMCU_ACOK_CN
3	Pull down 10K to GND

CON1: MCU Upgrade UART Port

PIN	Description
1	+P3V3_MCU
2	MCU_UART_RX_ISP
3	MCU_UART_TX_ISP
4	GND

SW2: Install Jumper Depends on Different WWAN Module

(1-2) (3-4) = EM99x's Function PIN

Install Jumper for EM9x9x

NC for other WWAN Module

(5-6) (7-8) (9-10) = EM9x9x's Power PIN

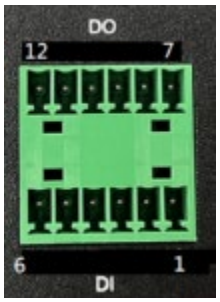
Install Jumper for EM9x9x

NC for other WWAN Module

PIN	Description
1	5G1_PCIE_DIS
2	Pull-up 10K to 1V8
3	5G1_VBUS_SENSE
4	3V3
5	5G1_EM9x9x_VCC1
6	3V3
7	5G1_EM9x9x_VCC2
8	3V3
9	5G1_EM9x9x_VCC3
10	3V3

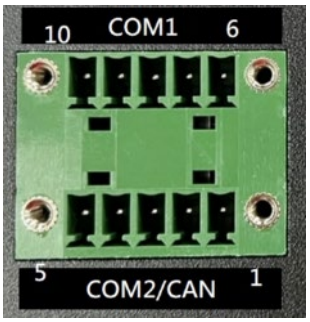
DIO1

PIN	12	11	10	9	8	7
Define	DIO GND	DO 4	DO 3	DO 2	DO 1	DIO GND
PIN	6	5	4	3	2	1
Define	DIO GND	DI 4	DI 3	DI 2	DI 1	DI COM



COM1

PIN	10	9	8	7	6
RS-232	GND	SOUT	SIN		
RS-422	GND	RX+	RX-	TX-	TX+
RS-485	GND	RX+	RX-	TX-	TX+
RS-485	GND			D-	D+



COM2

PIN	5	4	3	2	1
CAN	GND	CANH	CANL		
RS-232	GND	SOUT	SIN		
RS-422	GND	RX+	RX-	TX-	TX+
RS-485	GND	RX+	RX-	TX-	TX+
RS-485	GND			D-	D+

NGFF1: M.2 M-Key

PIN	Description	PIN	Description	PIN	Description
1	GND	27	GND	53	PCIE_CLK_N
2	3V3	28	NC	54	PCIE_WAKE
3	GND	29	PCIE_RX1_N	55	PCIE_CLK_P
4	3V3	30	NC	56	NC
5	PCIE_RX3_N	31	PCIE_RX1_P	57	GND
6	NC	32	NC	58	NC
7	PCIE_RX3_P	33	GND	67	NC
8	NC	34	NC	68	NC
9	GND	35	PCIE_TX1_M2_N	69	M2_M_PEDET
10	LED	36	NC	70	3V3
11	PCIE_TX3_M2_N	37	PCIE_TX1_M2_P	71	GND
12	3V3	38	NC	72	3V3
13	PCIE_TX3_M2_P	39	GND	73	GND

14	3V3	40	I2C SCL	74	3V3
15	GND	41	PCIE_RX0_P	75	GND
16	3V3	42	I2C SDA	77	NC
17	PCIE_RX2_N	43	PCIE_RX0_P	76	NC
18	3V3	44	ALERT_N		
19	PCIE_RX2_P	45	GND		
20	NC	46	NC		
21	GND	47	PCIE_TX0_M2_N		
22	NC	48	NC		
23	PCIE_TX2_M2_N	49	PCIE_TX0_M2_P		
24	NC	50	PCIE_RST_R		
25	PCIE_TX2_M2_P	51	GND		
26	NC	52	PCIE_CLK_REQ		

J6: M.2 B-Key

PIN	Description	PIN	Description	PIN	Description
1	NC	35	USDSS_TX_N	61	NC
2	3V3	36	UIM1_PWR	62	NC
3	GND	37	USDSS_TX_P	63	NC
4	3V3	38	NC	64	NC
5	GND	39	GND	65	NC
6	FULL_CARD_PWROFF_N	40	NC	66	SIM_DET
7	USB2_D+	41	NC	67	RESET
8	W_DIS1#	42	NC	68	NC
9	USB2_D-	43	NC	69	NC
10	WWAN_LED#	44	NC	70	3V3
11	GND	45	GND	71	GND
20	M2B_P20_PCIE_DIS	46	NC	72	3V3
21	NC	47	NC	73	GND
22	M2B_P22_VBUS_SENSE	48	NC	74	3V3
23	NC	49	NC	75	NC
24	NC	50	NC	76	NC
25	NC	51	GND	77	NC
26	M2B_P26_GPS_DISABLE#	52	NC		
27	GND	53	NC		
28	NC	54	NC		
29	USDSS_RX_N	55	NC		

30	UIMH_RST1	56	NC		
31	USDSS_RX_P	57	GND		
32	UIMH_CLK1	58	NC		
33	GND	59	NC		
34	UIMH_DATA1	60	NC		

M2_E_KEY1: M.2 E-Key

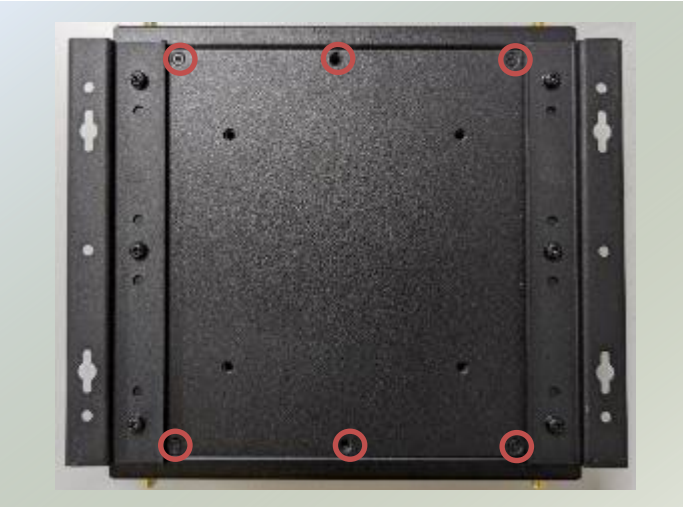
PIN	Description	PIN	Description	PIN	Description
1	GND	35	PCIE_TXP	61	NC
2	3V3	36	NC	62	ALERT_N
3	USB2_D+	37	PCIE_TXN	63	GND
4	3V3	38	NC	64	NC
5	USB2_D-	39	GND	65	NC
6	LED1_N	40	NC	66	NC
7	GND	41	PCIE_RXP	67	NC
8	NC	42	NC	68	NC
9	NC	43	PCIE_RXN	69	GND
10	NC	44	NC	70	NC
11	NC	45	GND	71	NC
12	NC	46	NC	72	3V3
13	NC	47	PCIE_CLKP	73	NC
14	NC	48	NC	74	3V3
15	NC	49	PCIE_CLKN	75	GND
16	LED2_N	50	SUSCLK_32KHZ	76	NC
17	NC	51	GND	77	NC
18	GND	52	PCIE_RESET_N		
19	NC	53	PCIE_CLKREQ_N		
20	NC	54	PCIE_DISABLE2		
21	NC	55	PCIE_WAKE_N		
22	NC	56	PCIE_DISABLE1		
23	NC	57	GND		
32	NC	58	12C_SDA		
33	GND	59	NC		
34	NC	60	12C_SCL		

CHAPTER 3: HARDWARE SETUP

To reduce the risk of personal injury, electric shock, or damage to the unit, please remove all power connections to completely shut down the device, and wear ESD protection gloves when handling the installation steps.

Opening the Chassis

1. Power off the system and disconnect the power cord. Turn the system over. Unscrew the six (6) screws on the bottom chassis cover.



2. Lift and open the chassis.

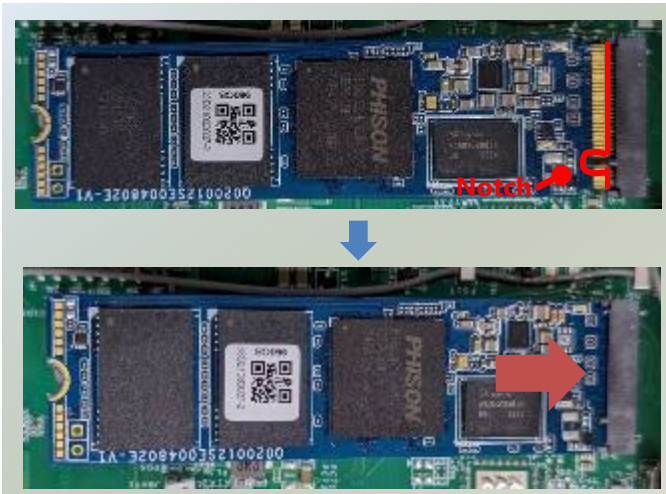
Installing Storage Module Card (Optional)

The system supports one M.2 M-Key module card for additional memory storage. Please follow the steps for installation.

1. Power off the system, turn the system around, and open the bottom chassis cover.
2. Locate the M.2 M-Key slot on the motherboard.

3. Next, thermal pad placement. Remove the protective film on the Thermal Pad (included in accessory pack) and gently place on the mother board. The thermal pad needs to be underneath the module card.

4. Align the notch of the M.2 storage module card with the socket key in the pin slot.
5. Insert the M.2 module card pins at 30 degrees into the socket until it is fully seated.



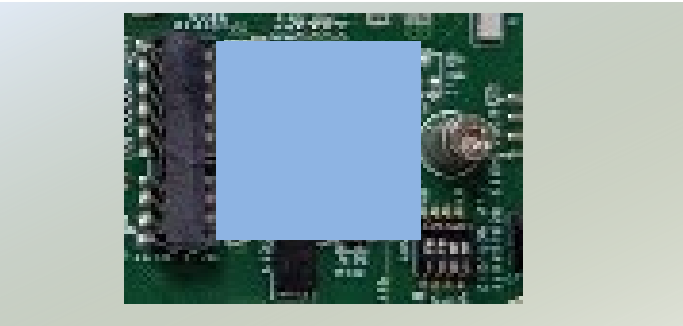
6. Push down on the module card and secure it with one screw.

Installing Wi-Fi Module Card (Optional)

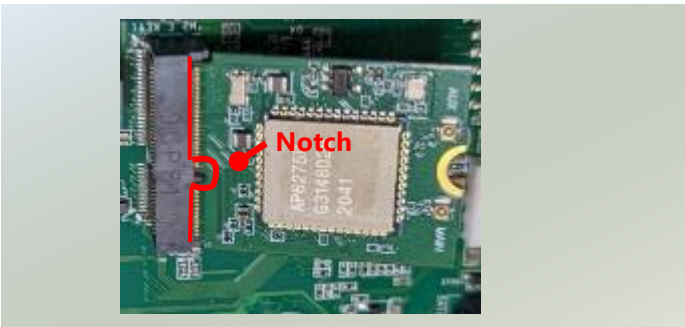
The system supports one M.2 E-Key slot for a Wi-Fi module card, an optional accessory. Wi-Fi module requires two antennas. Please follow the steps to install the Wi-Fi module card.

1. Power off the system, turn the system around, and open the bottom chassis cover.
2. Locate the M.2 E-Key slot on the motherboard.

3. Next, thermal pad placement. Remove the protective film on the thermal pad (included in accessory pack) and gently place on the motherboard. The thermal pad needs to be underneath the module card.



3. Align the notch of the Wi-Fi module card with the socket key in the pin slot.
4. Insert the Wi-Fi module card pins at 30 degrees into the socket until it is fully seated.



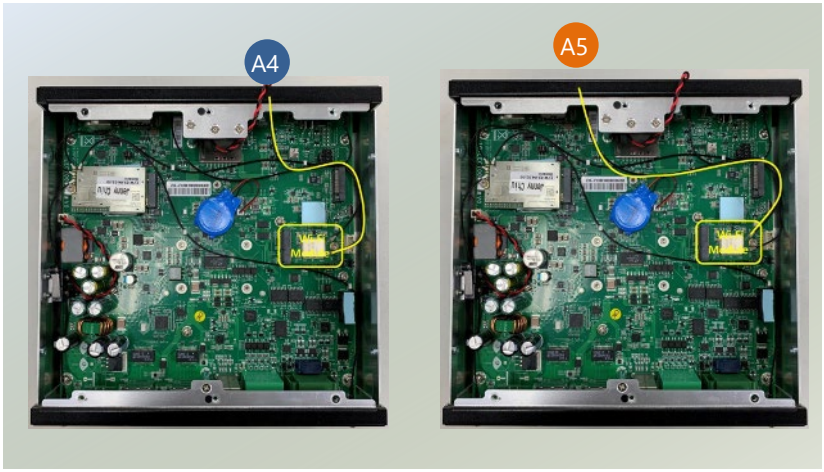
5. Push down on the module card and secure it with one screw.

Installing Wi-Fi Antennas

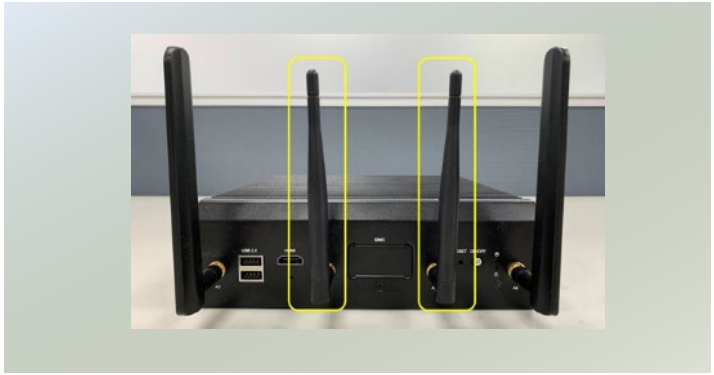
Front Panel

1. Locate the two (2) antenna locations (A4, A5). Locate the two (2) IPEX connectors on the 5G module card.

2. Connect the RF cables to the 5G module card.



3. Screw on the two (2) antennas on the outside of the system.



Installing 5G Module Card (Optional)

This system features one M.2 B-Key slot for a 5G module card, supporting a dual SIM design. 5G module will require four antennas. Please follow the procedures for the installation of the 5G module card.

1. Power off the system, turn the system around, and open the bottom chassis cover.
2. Locate the M.2 B-Key slot on the motherboard.

3. Next, thermal pad placement. Remove the protective film on the thermal pad (included in accessory pack) and gently place on the motherboard. The thermal pad needs to be underneath the module card.

4. Align the notch of the 5G module card with the socket key in the pin slot.
5. Insert the 5G module card pins at 30 degrees into the socket until it is fully seated.

6. Push down on the module card and secure it with one screw.

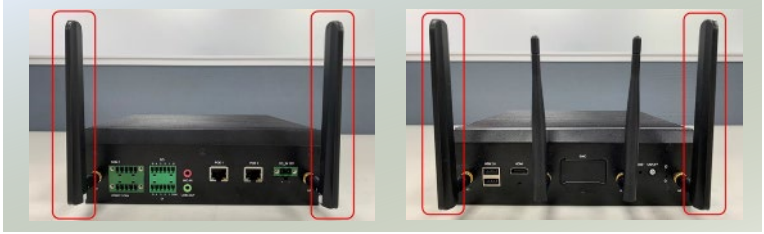
Installing 5G Antennas

Rear & Front Panel

Locate the four (4) antenna locations (A1, A2, A3, A6). Locate the four (4) IPEX connectors on the 5G module card.

2. Connect the RF cables to the 5G module card.

3. Screw on the four (4) antennas to the outside of the system.

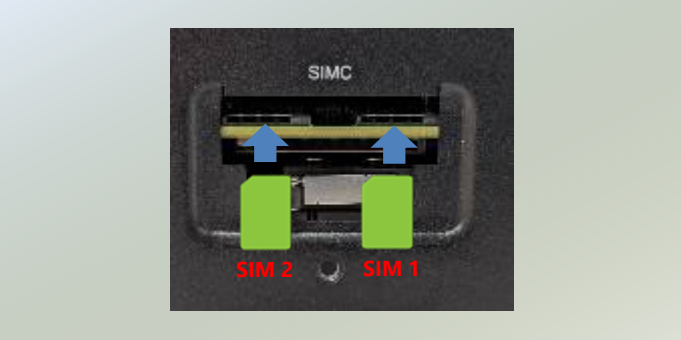


Installing Nano SIM Card

The SIM slot on the front panel supports 2x Nano SIM cards. The SIM socket supports the push-push mechanism, allowing inserting and ejecting the SIM card to be as easy as one push.

1. Locate the SIM card cover on the front panel.
2. Loosen and unscrew the one screw on the SIM card cover and remove the cover.

3. Two Nano SIM cards can be placed on the top layer. Insert and push the SIM card, gold contacts facing downwards, all the way in until it clicks into place. Repeat if placing two SIM cards.

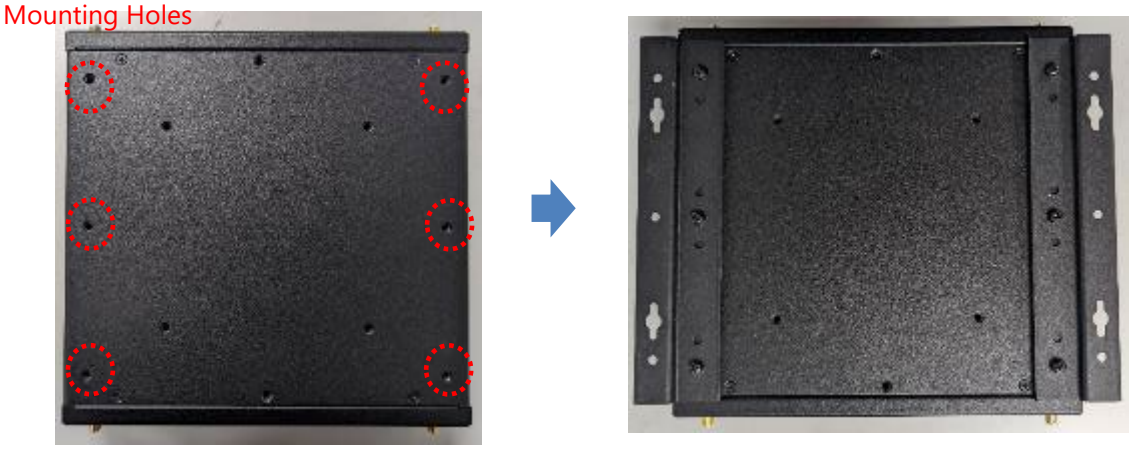


4. To remove the SIM card, use your fingertips to push it once, to have the card automatically eject.
5. Place the cover back and secure with one screw.

Wall Mounting

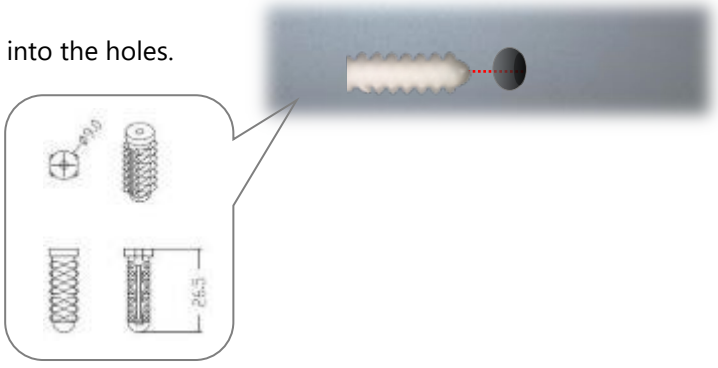
The system can be mounted on a flat surfaced wall. Please take the following into considerations when mounting the system onto the wall.

1. Fix the wallmount brackets onto the system bottom by securing them with **six** provided screws.



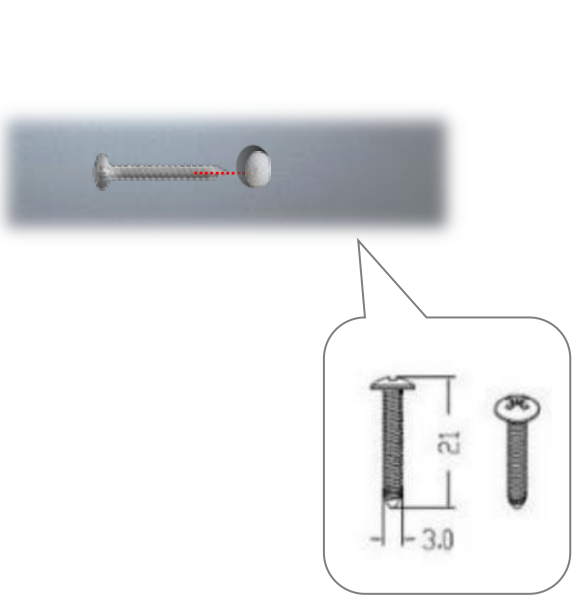
2. On the wall, measure the exact place where you want to hang the system, and drill four holes that match the four mounting holes on both brackets.

3. Insert **four** (4) anchoring bolts into the holes.



4. Align the four mounting holes on the system's brackets with the four anchoring bolts you just installed on the wall.

5. Drive **four** (4) long screws into the anchoring bolts to secure the system.



CHAPTER 4: INITIAL SETUP AND PERIPHERAL CONTROL

Initial Setup

EAI-I131 uses NVIDIA® JetPack 5.1.1 version.

The latest version of the software installation package can be found on Lanner Developer Site page with a login account and password. For technical support or register for a Lanner Account, please contact your distributor or sales representative, or submit a request at our Lanner Technical Support to contact our technical support department.

Peripheral Control

The Read and Write control by i2c driver.

Version

MCU FW Version:

CMD: 0x13h

Data Width: 2 Bytes

~#i2ctransfer -f -y 2 w1@0x37 0x13 r2

0x00 0x0a

DIGITAL_OUT

CMD: 0x21

Data Width: 1

BIT	Function
2	DI_DRY_EN
1	SIM card switch
0	LTE_PWR

DI_DRY_EN

0-Wet Power enable (Default)

1-Dry Power enable

SIM Card Switch

0-SIM I (Default)

1-SIM2

LTE_PWR

0-Enable power (Default)

1-Disable power

COM1_MODE

CMD: 0x3c

Data Width: 1

BIT	Function
2	THRM_COM1
1	MODE2_COM1
0	MODE0_COM1

THRM_COM1: The terminal resistor of RS422 and RS485 for COM1

1-Enable

0-Disable (Default)

Mode2,0

00 = Loop Back (Default)

01 = RS232

11 = RS422

10 = RS485

COM2_MODE

CMD: 0x3d

Data Width: 1

BIT	Function
2	THRM_COM1
1	MODE2_COM2
0	MODE0_COM2

THRM_COM2: The terminal resistor of RS422 and RS485 for COM2

1-Enable

0-Disable (Default)

Mode2,0

00 = Loop Back (Default)

01 = RS232

11 = RS422

10 = RS485

DIGITAL_DO

CMD: 0x23

Data Width: 1

BIT	Function
3	DIO3 Output
2	DIO2 Output
1	DIO1 Output
0	DIO0 Output

DIGITAL_DI

CMD: 0x22

Data Width: 1

DIGITAL_OUT bit2 must set 1.

BIT	Function
3	DIO3 Output
2	DIO2 Output
1	DIO1 Output
0	DIO0 Output

Note: When the voltage gets High, the register will display Low.

CASE_STATUS (RO)

CMD: 0x41

Data Width: 1

BIT	Function
1	SIM Cover
0	Chassis Cover

SIM Cover: real-time status

0-Close

1-Open

Chassis Cover: real-time status

0-Close

1-Open

CASE_TOUCHED

CMD: 0x40

Data Width: 1

BIT	Function
1	SIM Cover
0	Chassis Cover

SIM Cover: touched status

0-Normal

1-Trigger

Chassis Cover: touched status

0-Normal

1-Trigger

Write 0: Lock Current Status. If any change, the status will set 1, keep status until cleared.

POE Control

CMD	Function	Data Width
0x2f	PORT_SELECT	1
0x31	PORT_DISABLE	1
0x32	PORT_IM	2
0x33	PORT_VM	2

Test Sample

COM1/COM2

Pin define

Slot	Function
3	Com2 RX
4	Com2 TX
8	Com1 RX
9	Com1 TX

UART Config Tool

```
~# ./eai_i131_uart_conf.sh
Usage : ./eai_i131_uart_conf.sh [UART] [Mode]
Uart  : 1 for COM1
        2 for COM2
        3 initial RTS
Mode  : 1 for RS232
        2 for RS422/RS485(Full) with Disable Terminator Resistor
        3 for RS422/RS485(Full) with Enable  Terminator Resistor
        4 for RS485(Half)       with Disable Terminator Resistor
        5 for RS485(Half)       with Enable  Terminator Resistor
        6 for RTS Transmit
        7 for RTS Receive
~#
```

Software Setting

~# stty -F /dev/ttyTHS0 115200 -echo -echoe

~# sty -F /dev/ttyTHS1 115200 echo echoe

Enable COM1 / COM2 RS232:

```
~# i2ctransfer -f -y 2 w2@0x37 0x3c 0x01 ; sleep 1
~# i2ctransfer -f -y 2 w2@0x37 0x3c r1
0x01
~# i2ctransfer -f -y 2 w2@0x37 0x3d 0x01 ; sleep 1
~# i2ctransfer -f -y 2 w2@0x37 0x3d r1
0x01
```

Enable COM1 / COM2 RS422 / RS485 (Full):

```
~# i2ctransfer -f -y 2 w2@0x37 0x3c 0x07 ; sleep 1
~# i2ctransfer -f -y 2 w1@0x37 0x3c r1
0x07
~# i2ctransfer -f -y 2 w2@0x37 0x3d 0x07 ; sleep 1
~# i2ctransfer -f -y 2 w1@0x37 0x3d r1
0x07
~# ./eai_i131_uart_conf.sh 3
Initial GPIO RTS default value to 1
```

Enable COM1 / COM2 RS485(Half): COM1 TX COM RX

```
~# i2ctransfer -f -y 2 w2@0x37 0x3c 0x06 ; sleep 1
~# i2ctransfer -f -y 2 w1@0x37 0x3c r1
0x06
~# i2ctransfer -f -y 2 w2@0x37 0x3d 0x06 ; sleep 1
~# i2ctransfer -f -y 2 w1@0x37 0x3d r1
0x06
~# ./eai_i131_uart_conf.sh 3
Initial GPIO RTS default value to 1
~# ./eai_i131_uart_conf.sh 1 6
com1 set RTS to Transmit,value=0
~# ./eai_i131_uart_conf.sh 2 7
com2 set RTS to Receive,value=1
```

DIDO

Pin define

Function	Slot	BIT
DO	8	DO bit0
DO	9	DO bit1
DO	10	DO bit2
DO	11	DO bit3
DI	2	DI bit0
DI	3	DI bit1
DI	4	DI bit2
DI	5	DI bit3

Software Setting

Enable DIDO Dry Power enable, DIGITAL_OUT Bit2 = 1

```
~# i2ctransfer -f -y 2 w1@0x37 0x21 r1
0x0
~# i2ctransfer -f -y 2 w2@0x37 0x21 0x4
```

DI Setting

DI (RO)

```
~# i2ctransfer -f -y 2 w1@0x37 0x22 r1
0x0
```

DO Setting

DO (RW): Loopback Test

```
~# i2ctransfer -f -y 2 w2@0x37 0x23 0x0 ; sleep 1
~# i2ctransfer -f -y 2 w1@0x37 0x22 r1
0x0f
~# i2ctransfer -f -y 2 w2@0x37 0x23 15 ; sleep 1
~# i2ctransfer -f -y 2 w1@0x37 0x22 r1
0x00
```

Chassis and SIM Cover

Pin define

BIT	Function
1	SIM Cover
0	Chassis Cover

Software Setting

Get current case status

0-Case Open

1-Case Close

```
~# i2ctransfer -f -y 2 w1@0x37 0x41 r1
0x00
```

Get Touched Status

1. Check case_status must be 0

```
~# i2ctransfer -f -y 2 w1@0x37 0x41 r1
0x00
```

2. To clear case_touch, lock current status for close status. If open, that status will set.

```
~# i2ctransfer -f -y 2 w2@0x37 0x40 0
~# i2ctransfer -f -y 2 w1@0x37 0x40 r1
0x00
/**open sim's Cover ***/
~# i2ctransfer -f -y 2 w1@0x37 0x40 r1
0x02
/**open Chassis Cover ***/
~# i2ctransfer -f -y 2 w1@0x37 0x40 r1
0x03
```

Audio Control

Software Setting

Enable Audio Line-in / Line-out

```
amixer -c 1 cset name='codec-x rate' 4
amixer -c 1 cset name='TI-TLV320 ADCFGA Left Mute Switch' 0
amixer -c 1 cset name='TI-TLV320 ADCFGA Right Mute Switch' 0
amixer -c 1 cset name='TI-TLV320 CM_L to Left Mixer Negative Resistor' 2
amixer -c 1 cset name='TI-TLV320 CM_R to Right Mixer Negative Resistor' 2
amixer -c 1 cset name='TI-TLV320 IN1_L to Left Mixer Positive Resistor' 2
amixer -c 1 cset name='TI-TLV320 IN1_R to Right Mixer Positive Resistor' 2
amixer -c 1 cset name='TI-TLV320 PCM Playback Volume' 70,70
amixer -c 1 cset name='TI-TLV320 LO Driver Gain Volume' 35,35
amixer -c 1 cset name='TI-TLV320 LOL Output Mixer L_DAC Switch' 1
amixer -c 1 cset name='TI-TLV320 LOR Output Mixer R_DAC Switch' 1
amixer -c 1 cset name='TI-TLV320 LO DAC Playback Switch' 1
```

Record and Play

```
~# arecord -D hw:APE,0 -r 48000 -c 2 -f S32_LE  record.wav
~# aplay -D hw:APE,0 record.wav
```

LTE Control

LTE Power Control

```
~# i2ctransfer -f -y 2 w1@0x37 0x21 r1
0x00
/**********SIM card 1 and LTE power down******************/
~# i2ctransfer -f -y 2 w2@0x37 0x21 0x01
~# i2ctransfer -f -y 2 w1@0x37 0x21 r1
0x01
/**********SIM card 1 and LTE power on******************/
~# i2ctransfer -f -y 2 w2@0x37 0x21 0x00
~# i2ctransfer -f -y 2 w1@0x37 0x21 r1
0x00
/**********SIM card 2 and LTE power down******************/
~# i2ctransfer -f -y 2 w2@0x37 0x21 0x03
~# i2ctransfer -f -y 2 w1@0x37 0x21 r1
0x03
/**********SIM card 2 and LTE power on******************/
~# i2ctransfer -f -y 2 w2@0x37 0x21 0x02
~# i2ctransfer -f -y 2 w1@0x37 0x21 r1
0x02
```

PoE Control

PoE Disable

```
//*****Disable POE 1**************//
~# i2ctransfer -f -y 2 w2@0x37 0x2f 0
~# i2ctransfer -f -y 2 w2@0x37 0x30 1
//*****Disable POE 2**************//
~# i2ctransfer -f -y 2 w2@0x37 0x2f 1
~# i2ctransfer -f -y 2 w2@0x37 0x30 1
```

PoE1 IM and VM

~# i2ctransfer -f -y 2 w2@0x37 0x2f 0

~# i2ctransfer-f -y 2 w2@0x37 0x30 1

~# i2ctransfer -f -y 2 w1@0x37 0x32 r2

~# i2ctransfer -f -y 2 w1@0x37 0x33 r2

0x23 0xc0

IM

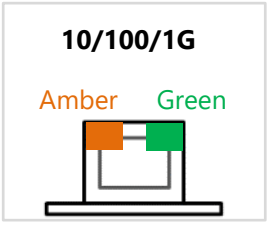
IM = (0x06 * 256 + 0x35) * 122.07 = 193969.23 uA

VM

VM = (0X23 * 256 + 0xc0) * 5.835 = 53401.920 mV

APPENDIX A: LED INDICATOR EXPLANATIONS

- **RJ-45 LAN LED**



Speed	Amber (Active)	Green (Link)
10M	Blinking / Data access	OFF
100M	Blinking / Data access	ON
1G	Blinking / Data access	ON
1. When cable is plug-in and network is linked. Both LED will be bright. The behavior is as defined. 2. Without the Cable plug-in, the LED should be off. 3. If LAN Driver controls the LED, the behavior will follow the driver.		

APPENDIX B: TERMS AND CONDITIONS

Warranty Policy

1. All products are under warranty against defects in materials and workmanship for a period of one year from the date of purchase.
2. The buyer will bear the return freight charges for goods returned for repair within the warranty period; whereas the manufacturer will bear the after service freight charges for goods returned to the user.
3. The buyer will pay for the repair (for replaced components plus service time) and transportation charges (both ways) for items after the expiration of the warranty period.
4. If the RMA Service Request Form does not meet the stated requirement as listed on "RMA Service," RMA goods will be returned at customer's expense.
5. The following conditions are excluded from this warranty:
   - Improper or inadequate maintenance by the customer
   - Unauthorized modification, misuse, or reversed engineering of the product
   - Operation outside of the environmental specifications for the product.

RMA Service

Requesting an RMA#

1. To obtain an RMA number, simply fill out and fax the "RMA Request Form" to your supplier.
2. The customer is required to fill out the problem code as listed. If your problem is not among the codes listed, please write the symptom description in the remarks box.
3. Ship the defective unit(s) on freight prepaid terms. Use the original packing materials when possible.
4. Mark the RMA# clearly on the box.

Note: Customer is responsible for shipping damage(s) resulting from inadequate/loose packing of the defective unit(s). All RMA# are valid for 30 days only; RMA goods received after the effective RMA# period will be rejected.

RMA Service Request Form

When requesting RMA service, please fill out the following form. Without this form enclosed, your RMA cannot be processed.

RMA No:	Reasons to Return: ▫ Repair(Please include failure details) ▫ Testing Purpose
Company:	Contact Person:
Phone No.	Purchased Date:
Fax No.:	Applied Date:
Return Shipping Address: _____ Shipping by: ▫ Air Freight ▫ Sea ▫ Express_____ ▫ Others:_____	

Item	Model Name	Serial Number	Configuration

Item	Problem Code	Failure Status

*Problem Code:

01:D.O.A.	07: BIOS Problem	13: SCSI	19: DIO
02: Second Time R.M.A.	08: Keyboard Controller Fail	14: LPT Port	20: Buzzer
	09: Cache RMA Problem	15: PS2	21: Shut Down
03: CMOS Data Lost	10: Memory Socket Bad	16: LAN	22: Panel Fail
04: FDC Fail	11: Hang Up Software	17: COM Port	23: CRT Fail
05: HDC Fail	12: Out Look Damage	18: Watchdog Timer	24: Others (Pls specify)
06: Bad Slot			

Request Party

Authorized Signature / Date

Confirmed By Supplier

Authorized Signature / Date