EC3000

AI Edge Computing System
For NVIDIA® Jetson Orin™ NX/ Jetson Orin Nano™ AI Modules

User Manual

Version 1.0
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iBASE

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Compliance

CE

This product has passed CE testing for environmental specifications and limits, in accordance with the directives of the European Union (EU). If users modify and/or install additional devices in this equipment, the CE declaration of conformity may no longer apply.

FC

This product has been tested and found to comply with the limits for a Class B device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the manufacturer's instructions, it may cause harmful interference to radio communications.

WEEE

This product must not be disposed of as regular household waste, in accordance with the EU Directive on Waste Electrical and Electronic Equipment (WEEE – 2012/19/EU). Instead, it should be taken to an appropriate municipal recycling collection point. Please check local regulations for the proper disposal of electronic products.

Green IBASE

This product complies with RoHS 2 restrictions, which prohibit the use of certain hazardous substances in electrical and electronic equipment. The following substances must not exceed the specified concentrations:

- Hexavalent chromium: 100 ppm
- Poly-brominated biphenyls (PBBs): 1,000 ppm
- Poly-brominated diphenyl ethers (PBDEs): 1,000 ppm
- Cadmium: 100 ppm
- Mercury: 1,000 ppm
- Lead: 1,000 ppm
- Bis(2-ethylhexyl) phthalate (DEHP): 1,000 ppm
- Butyl benzyl phthalate (BBP): 1,000 ppm
- Dibutyl phthalate (DBP): 1,000 ppm

  Diisobutyl phthalate (DIBP): 1,000 ppm

Important Safety Information

Carefully read the precautions before using the device.

Environmental conditions:

- Place the device horizontally on a stable surface to prevent it from falling.
- Leave plenty of space around the device and do not block the openings for ventilation. *Never drop or insert any objects of any kind into the ventilation openings.*
- Slots and openings on the chassis are for ventilation. Do not block or cover these openings. Make sure you leave plenty of space around the device for ventilation.

Care for your IBASE products:

- Before cleaning the device, turn it off and unplug all cables such as power since a small amount of current may still flow.
- Use neutral cleaning agents or diluted alcohol to clean the device chassis with a cloth. Then wipe the chassis with a dry cloth.
- Vacuum the dust with a computer vacuum cleaner to prevent the air vent or slots from being clogged.

WARNING

Attention during use:

- Do not place heavy objects on the top of the device.
- Operate this device from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your distributor or local power company.
- Do not walk on the power cord or allow anything to rest on it.
- If you use an extension cord, make sure that the total ampere rating of the product plugged into the extension cord does not exceed its limits.

Avoid Disassembly

Do not disassemble, repair or make any modification to the device. Disassembly, modification, or any attempt at repair could generate hazards and cause damage to the device, even bodily injury or property damage, and will void any warranty.

CAUTION

Risk of explosion if the RTC lithium coin-cell is replaced with an incorrect type. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Warranty Policy

- **IBASE standard products:**

  24-month (2-year) warranty from the date of shipment. If the date of shipment cannot be ascertained, the product serial numbers can be used to determine the approximate shipping date.

- **3rd-party parts:**

  12-month (1-year) warranty from delivery for the 3rd-party parts that are not manufactured by IBASE, such as CPU, memory, HDD, power adapter, panel and touchscreen.

* Products, however, that fail due to misuse, accident, improper installation or unauthorized repair shall be treated as out of warranty and customers shall be billed for repair and shipping charges.

Technical Support & Services

1. Visit the IBASE website at www.ibase.com.tw to find the latest information about the product.
2. If you need any further assistance from your distributor or sales representative, prepare the following information of your product and elaborate upon the problem.

   - Product model name
   - Product serial number
   - Detailed description of the problem
   - The error messages in text or in screenshots if there is any
   - The arrangement of the peripherals
   - Software in use (such as OS and application software, including the version numbers)

3. If repair service is required, visit the IBASE website to fill out the RMA form or contact your distributor or sales representative.

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Table of Contents

Chapter 1
General Information

The information provided in this chapter includes:

- Introduction
- Features
- Product View

1.1 Introduction

The EC3000 is a compact, high-performance AI edge computing system built around NVIDIA® Jetson Orin NX™ and Orin Nano™ modules. Measuring just **130 mm × 102 mm × 47.5 mm** and weighing only **0.8 kg**, it delivers powerful AI performance in a small footprint. It supports **Ubuntu 22.04 (JetPack 6.1)** and offers up to **8GB LPDDR5 memory (SKU-dependent)**, with a wide range of I/O including HDMI, USB 3.2 Gen2, USB 2.0, dual serial ports, and M.2 expansion slots for 4G/5G or NVMe storage. With a **12–24V DC input via terminal block**, the EC3000 is ideal for smart vision, robotics, and AI inference at the edge.

1.2 Features

- Supports NVIDIA® Jetson Orin™ NX and Orin Nano™ modules for scalable AI performance
- 1× Gigabit Ethernet (RJ-45) for high-speed networking
- 1× HDMI Type-A display output
  Up to 4K output (up to 60Hz with Orin NX, up to 30Hz with Orin Nano)
- Versatile USB I/O:
  - 2x USB 3.2 Gen2 (Type-A)
  - 2× USB 2.0 (Type-A)
  - 1× Micro-USB (supports Recovery Mode and OTG)
- M.2 Expansion Slots:
  - 1× M.2 3042/3052 B-key (4G/5G module or M.2 2242 B+M Key SSD)
  - 1× M.2 2230 E-key (Wi-Fi/BT or NVME SSD)
  - 1× Nano SIM socket
- Wide-range DC power input: 12V–24V via 2-pin terminal block
- Includes external power adapter (regional power cords available)
- Integrated passive thermal solution (fanless design)
- RTC support with battery
- Compact and lightweight: 130 mm × 102 mm × 47.5 mm, 0.8 kg
- Reliable operation: –15°C to 60°C operating temperature, –40°C to 85°C storage temperature
  Certified for global markets: CE, FCC class A

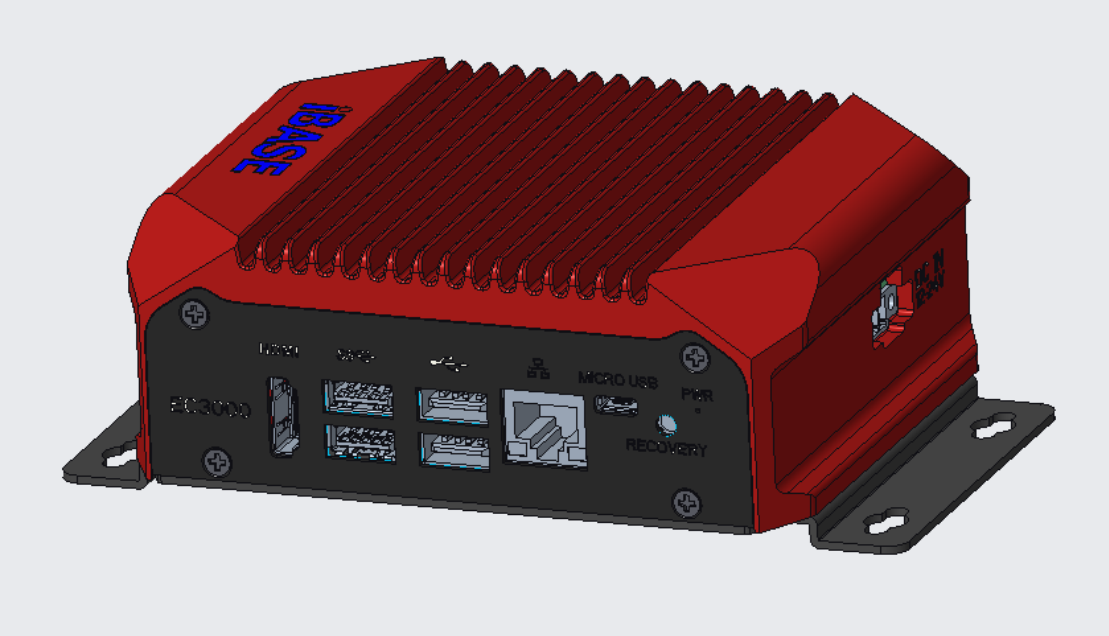
1.3 Packing List

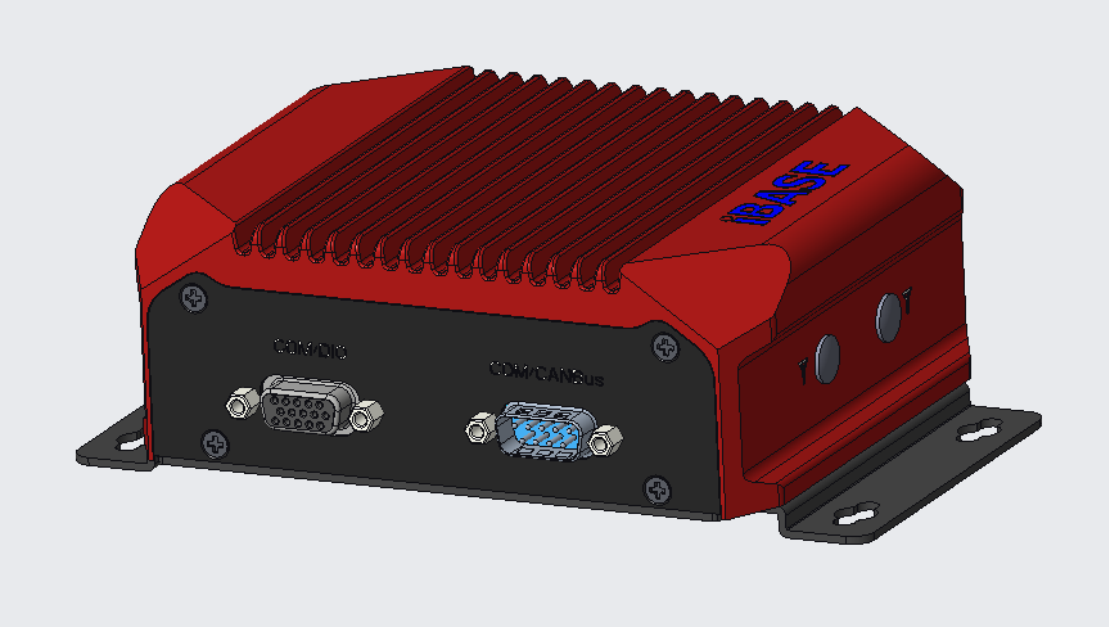
Your product package should include the items listed below.

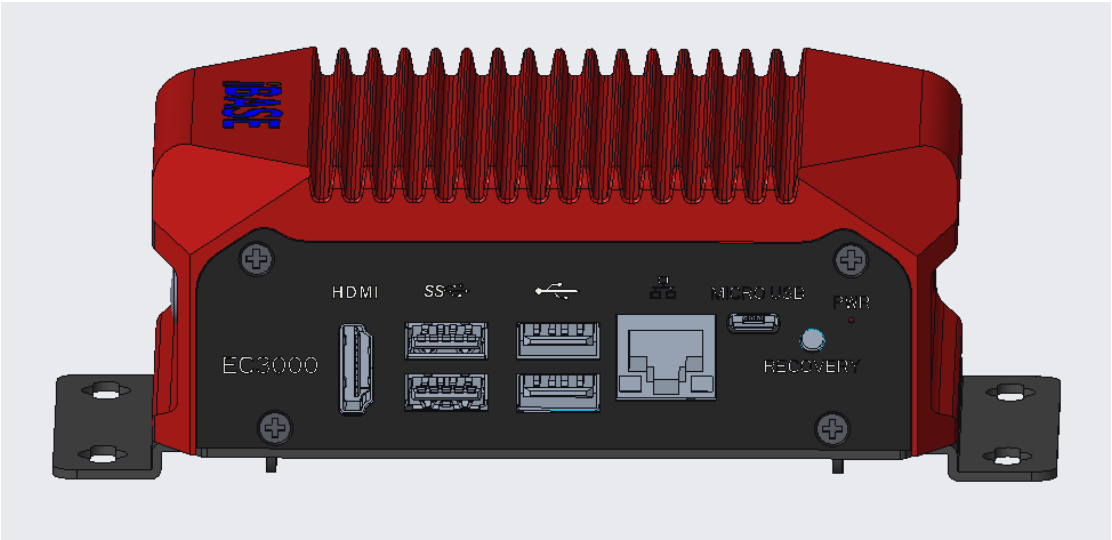
- NVIDIA® Jetson Orin Nano™ Edge AI Computer with mounting bracket
- Power adaptor
- Power cord

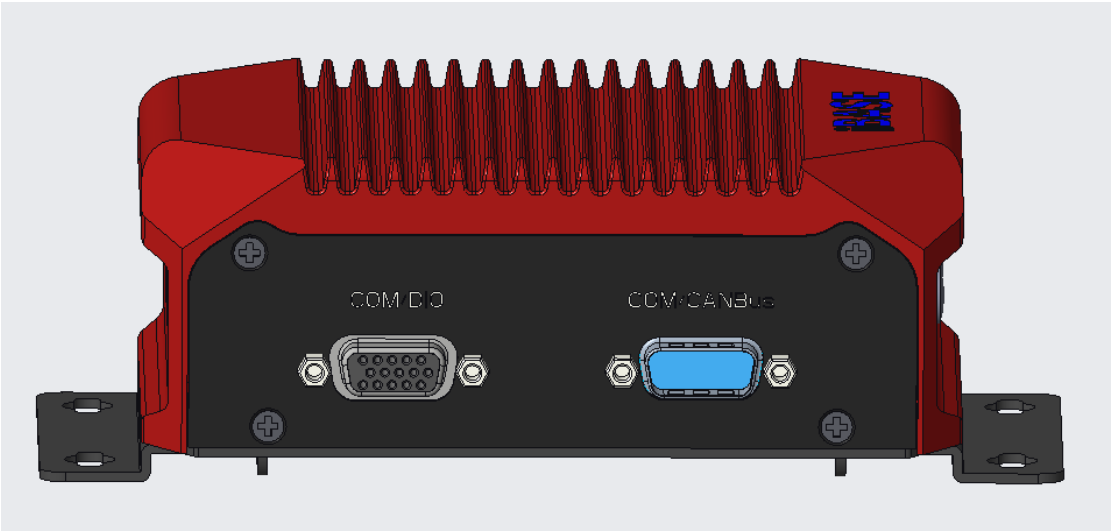
Remarks: The user manual can be downloaded from the IBASE website.

1.4 Product View






HDMI
EC3000
RECOVERY


COM DIO

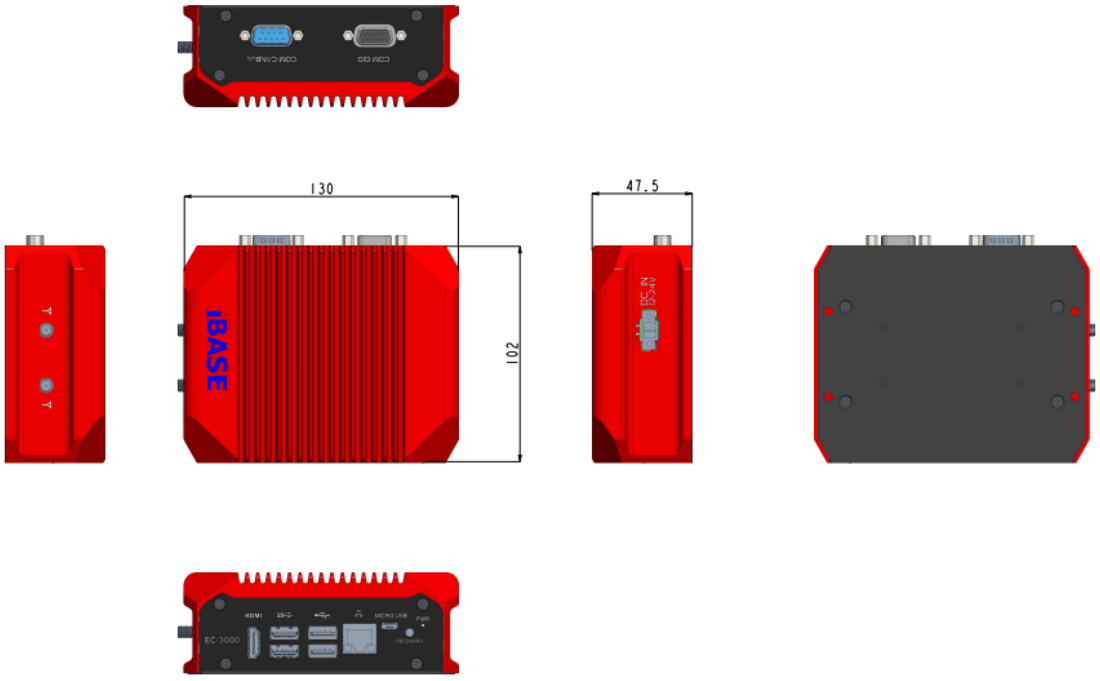
1.5 Specifications

Product Name	EC3000
System Motherboard	NVIDIA® Jetson Orin™ NX and Orin Nano™ modules
System	
Operating System	Ubuntu 22.04 Jetpack 6.1
CPU Type	**NVIDIA® Jetson Orin™ NX 8GB**: 6-core Arm® Cortex®-A78AE v8.2 64-bit CPU, 1.5 MB L2 + 4 MB L3 **NVIDIA® Jetson Orin Nano™ 8GB**: 6-core Arm® Cortex®-A78AE v8.2 64-bit CPU 1.5MB L2 + 4MB L3 **NVIDIA® Jetson Orin Nano™ 4GB**: 6-core Arm® Cortex®-A78AE v8.2 64-bit CPU 1.5MB L2 + 4MB L3
Memory	Orin NX: 8GB 128-bit LPDDR5, 102.4 GB/s Orin Nano: 8GB 128-bit LPDDR5, 102 GB/s Orin Nano: 4GB 64-bit LPDDR5, 51.2 GB/s
Storage	1× M.2 3042/3052 B-key (for 4G/5G module or M.2 2242 B+M-key SSD)(NVMe support 128GB) 1× M.2 2230 E-key (for Wi-Fi/BT or NVME SSD)
Display	1× HDMI Type-A
Network	1 x RJ-45 GbE LAN
I/O Ports	
Display	HDMI 2.1 for Jetson Orin™ NX HDMI 1.4 for Jetson Orin™ Nano
LAN	1 x RJ45 GbE LAN
I/O Interface	2 × USB 3.2 Gen2 Type-A 2 × USB 2.0 Type-A 1 × Micro-USB (supports Recovery Mode/OTG) 1 × DB9 RS232 COM 1 × DB9 CANBus 1 × DB15 RS232/422/485 + 8 DIO 1 × Recovery button 2 × Antenna
Expansion Slots	1 × M.2 3042/3052 B-key (4G/5G or 2242 SSD) 1 × M.2 2230 E-key (Wi-Fi/BT or NVMESSD) 1 × SIM socket
Other Features	

LED	1 x Power LED
Watchdog Timer	Yes (256 segments, 0, 1, 2…128 secs)

Mechanical and Power	
Weight	0.8 kg
Chassis Color	Black and Red
Power Requirement	12V~24V DC In with 2-pin terminal block
Power Adaptor (included)	160W external adaptor with power cord
Dimensions (W x H x D)	130 mm (L) x 102 mm (W) x 47.5 mm (H)
Environment	
Temperature	Operating: -15°C~60°C (-4°F~140°F) Storage: -40°C~80°C (-40°F~176°F)
Relative Humidity	5% ~ 95% @40°C, non-condensing
Certifications & Compliance	
RoHS	Yes
Certification	CE, FCC Class A

1.6 Dimensions



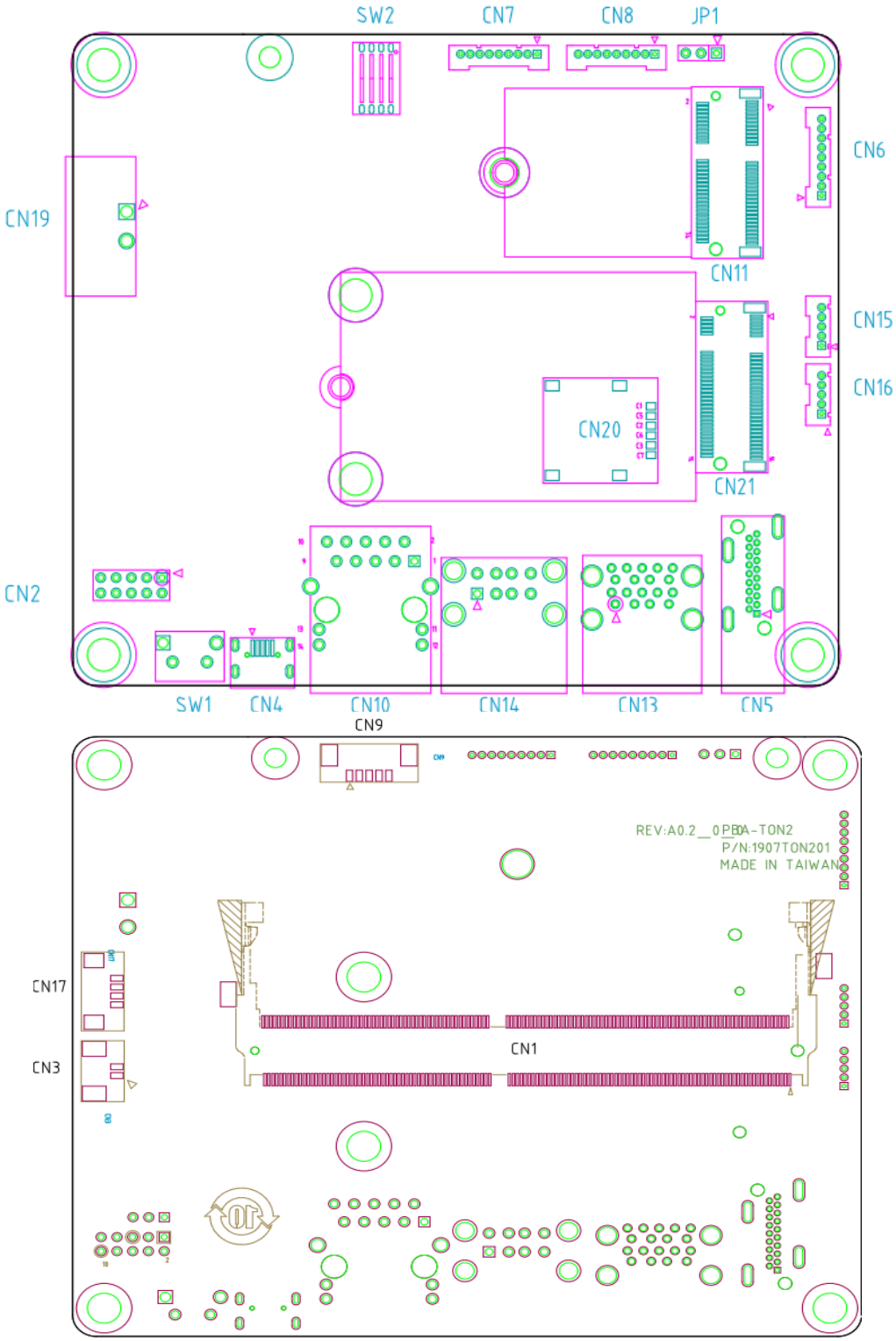
130 mm (L) x 102 mm (W) x 47.5 mm (H)

Chapter 2
Hardware Configuration

The information provided in this chapter includes:

- Connectors Locations
- Connectors List

2.1 Connectors Locations



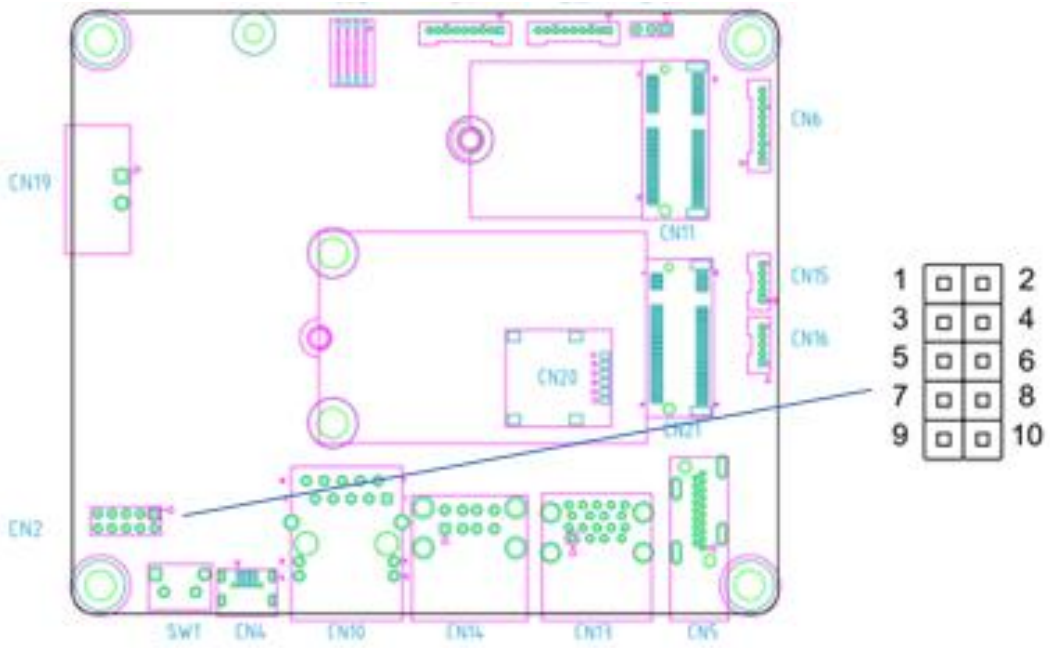
2.2 Connectors List

The board has a number of connectors that allow you to configure your system to suit your application.

The table below shows the function of each of the board's connectors:

Label	Function
CN1	Jetson Orin NX/Nano Connector
CN2	Front Panel Connector
CN3	RTC Battery Connector
CN4	Micro USB for Flash OS
CN5	HDMI Connector
CN6	RS-232 + CAN bus Connector (/dev/ttyTHS1)
CN7	RS-232/485 Connector (/dev/ttyTHS0)
CN8	GPIO Wafer Connector
CN9	UART Debug Wafer
CN10	GIGA RJ45 Connector
CN11	M.2 2230 E-Key Connector
CN13	USB 3.2 Dual Port Gen 2 (Type-A)
CN14	USB 2.0 (Type-A)
CN15	USB 2.0 Wafer
CN16	USB 2.0 Wafer
CN17	FAN(5V) Wafer Connector (option)
CN19	DC12-24V Power In Connector (3.81mm)
CN20	Nano SIM Connector
CN21	M.2 3052 B-Key Connector

2.2.1 (CN2) Front Panel Connector

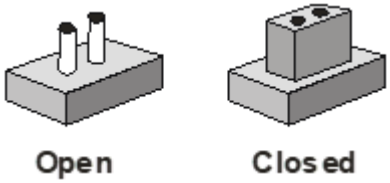


Pin	Signal	Pin	Signal
1	Button power	2	GND
3	Recovery	4	GND
5	System Reset	6	GND
7	AC OK	8	PD 10Kohm
9	3.3V AO	10	5V AO

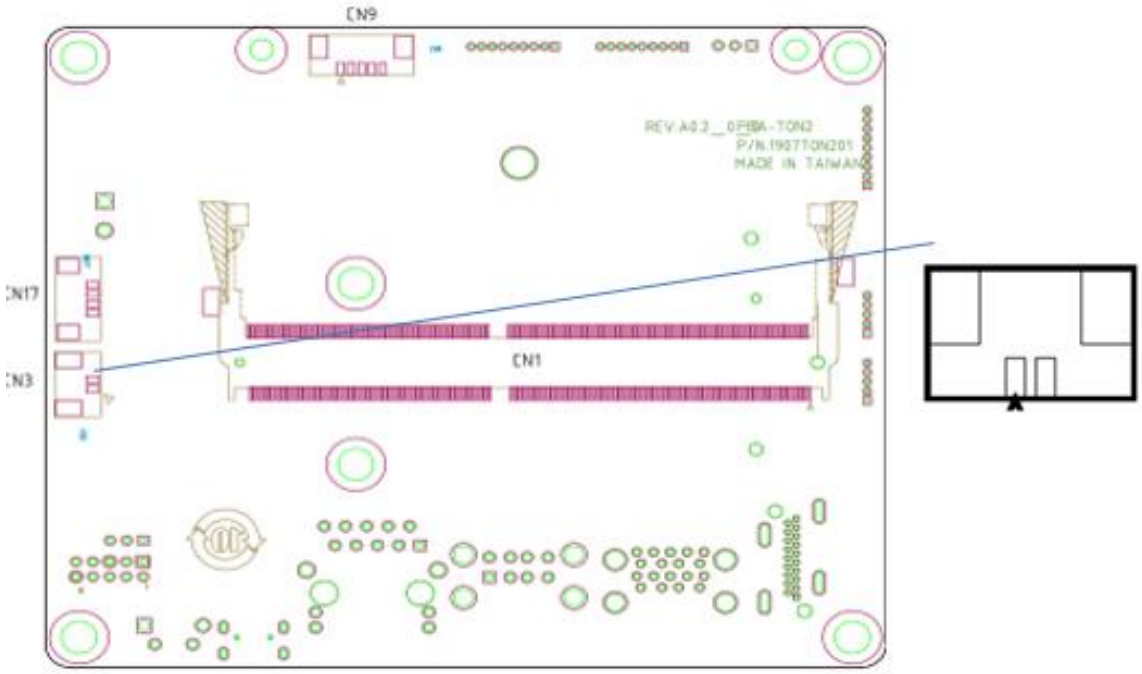
2.2.1.1 AT/ATX Mode Selection (CN2)

CN2	Pin	Function
7-8	Open	ATX (Default)
7-8	Close	AT

Note: Pins 7 and 8 of CN2 form a jumper switch consisting of two metal pins and a small metal clip (often covered by a plastic cap) that connects the pins when placed over them. To close pins 7–8, place the jumper clip across both pins. To open, remove the clip. See the illustration below.

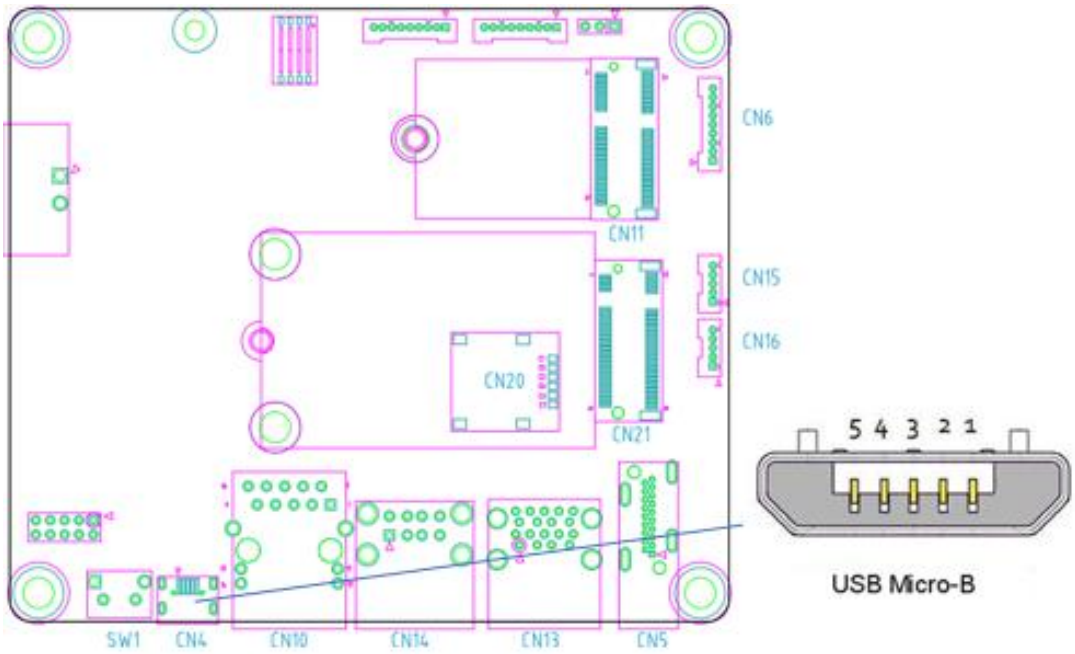


2.2.2 (CN3) RTC Connector



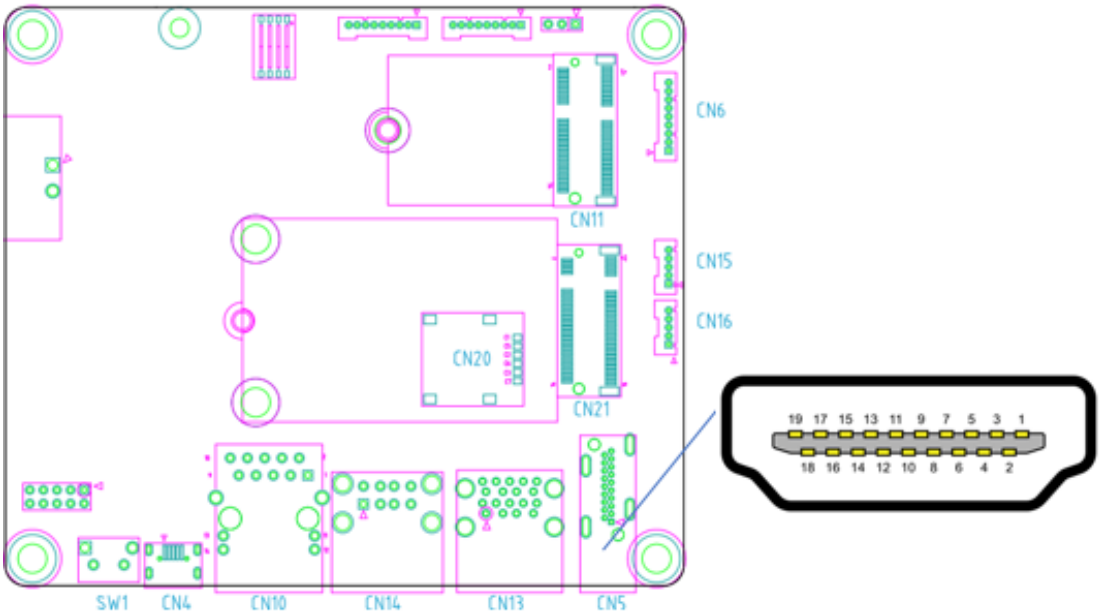
Pin	Signal	Pin	Signal
1	+3V	2	GND

2.2.3 (CN4) Micro USB (Flash OS)



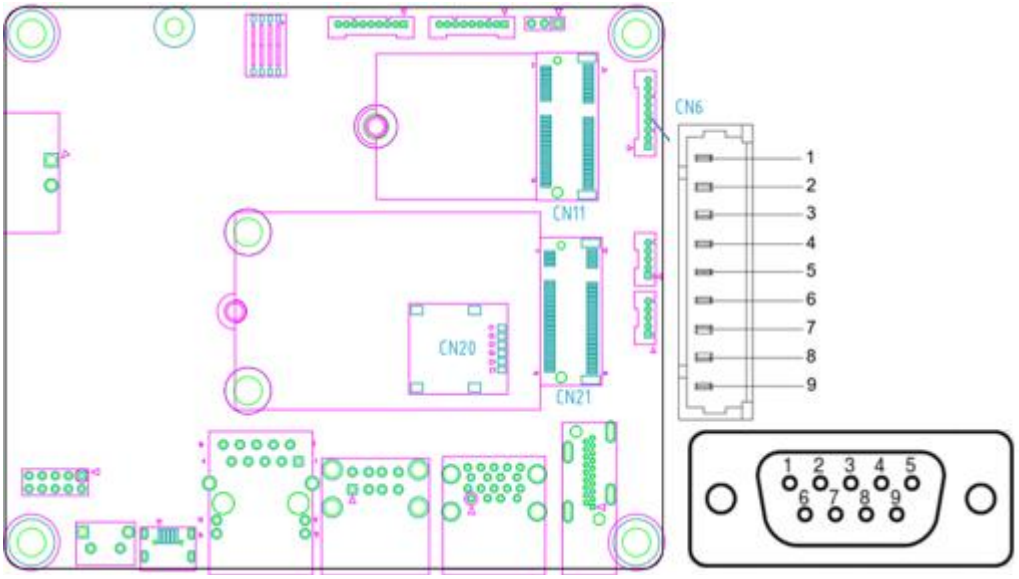
Pin	Signal	Pin	Signal
1	+5V	2	USB1-
3	USB1+	4	
5	GND		

2.2.4 (CN5) HDMI Connector



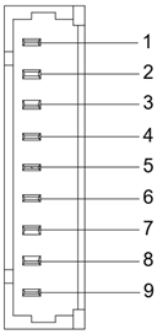
Pin	Signal	Pin	Signal
1	HDMI_DATA2_P	2	GND
3	HDMI_DATA2_N	4	HDMI_DATA1_P
5	GND	6	HDMI_DATA1_N
7	HDMI_DATA0_P	8	GND
9	HDMI_DATA0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	NC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	HDMI_PWR
19	HDMI_HDP		

2.2.5 (CN6) COM Port Connector (RS232 + CAN bus)



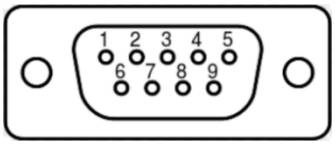
RS232 + CAN bus Connector

Pin	RS232	CAN BUS
1		CAN0_L
2		CAN0_H
3	RXD	
4	RTS#	
5	TXD	
6	CTS#	
7		
8		
9	GND	GND

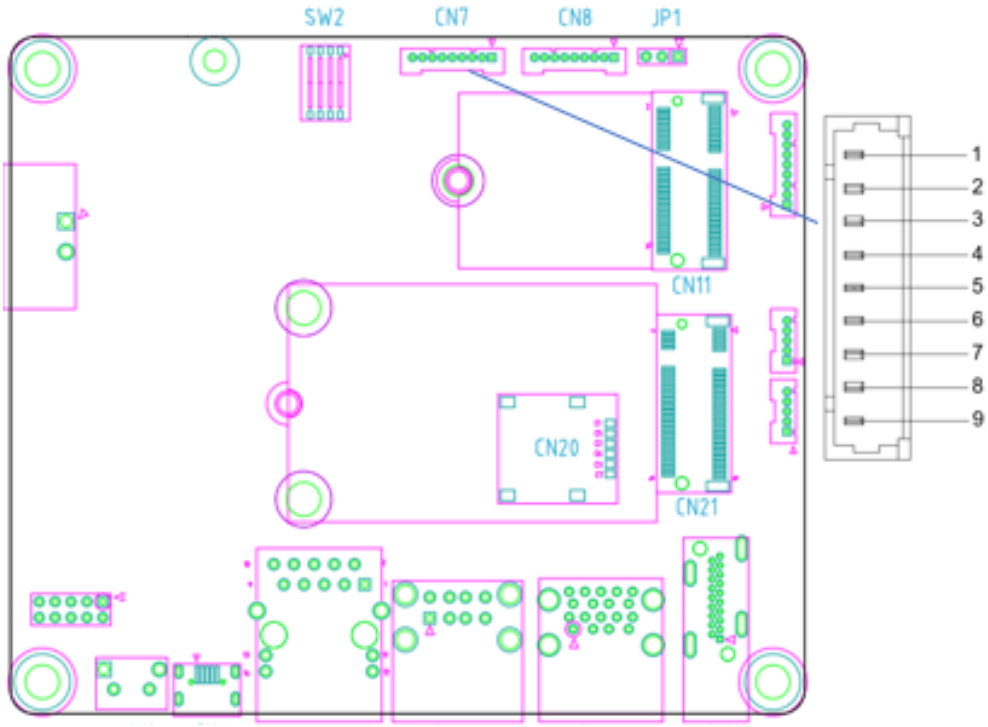


DB-9 Port(Male)

Pin	RS232	CAN BUS
1		CAN0_L
2	RXD	
3	TXD	
4		
5	GND	
6		CAN0_H
7	RTS#	
8	CTS#	
9		

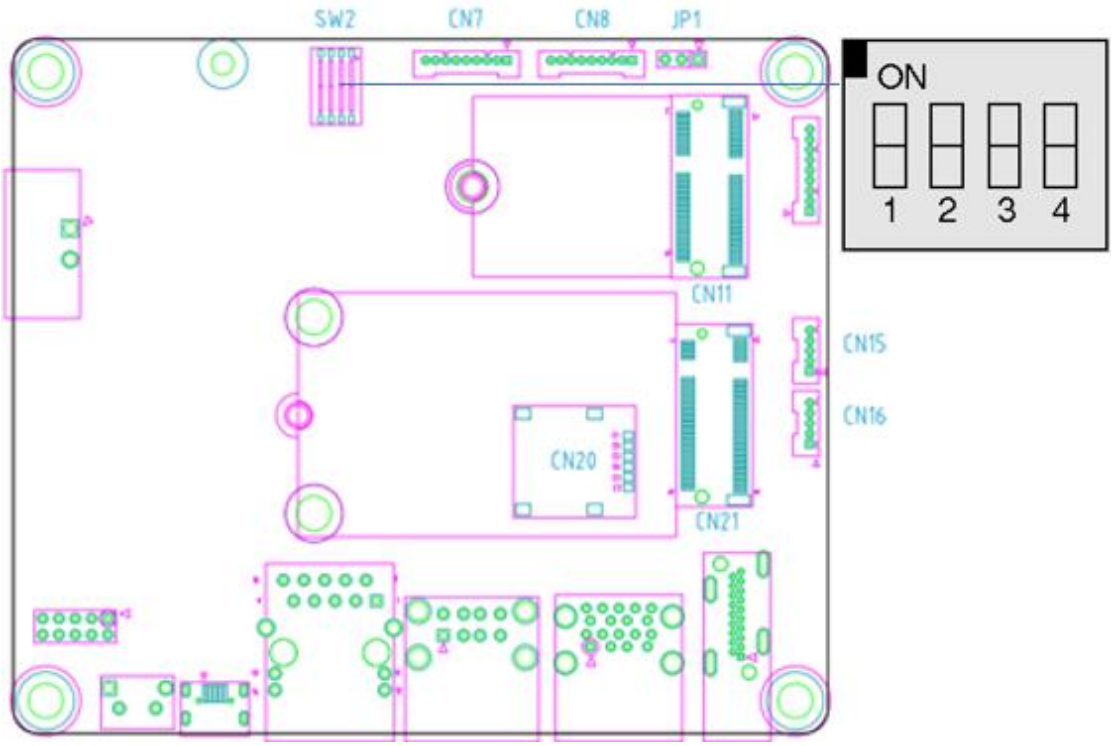


2.2.6 (CN7, SW2) COM Port Connector (RS232/422/485)



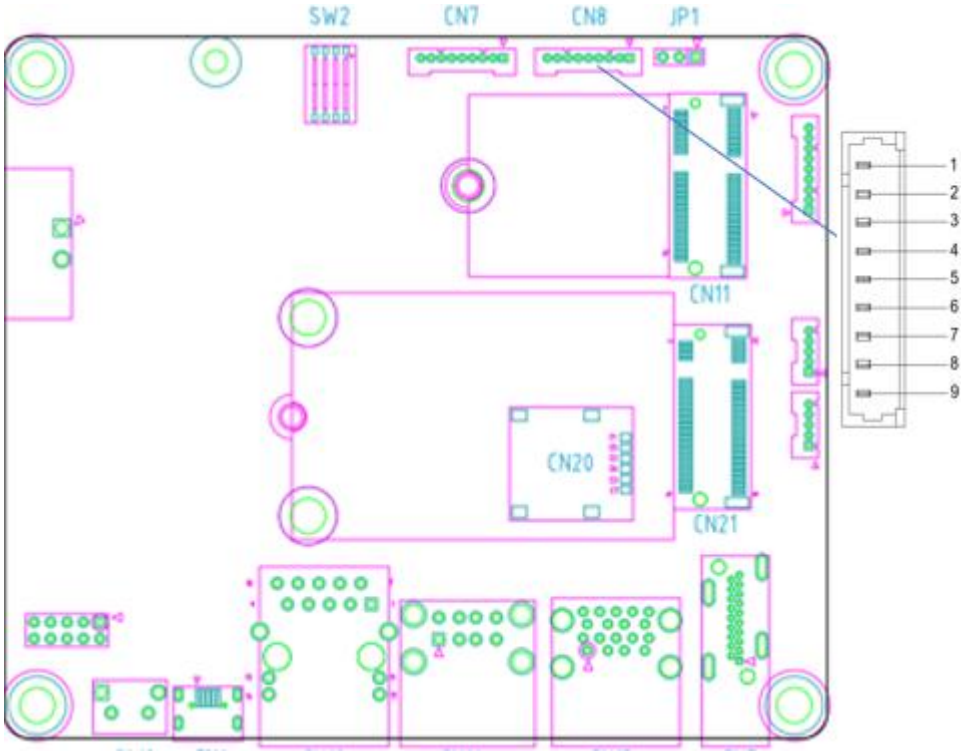
Pin	RS-232	RS-422	RS-485
1		TXD-	TXD-
2			
3	RXD	RXD+	TXD+
4			
5	TXD	TXD+	
6			
7		RXD-	
8			
9	GND	GND	GND

2.2.7 (SW2) RS-232/422/485 Select



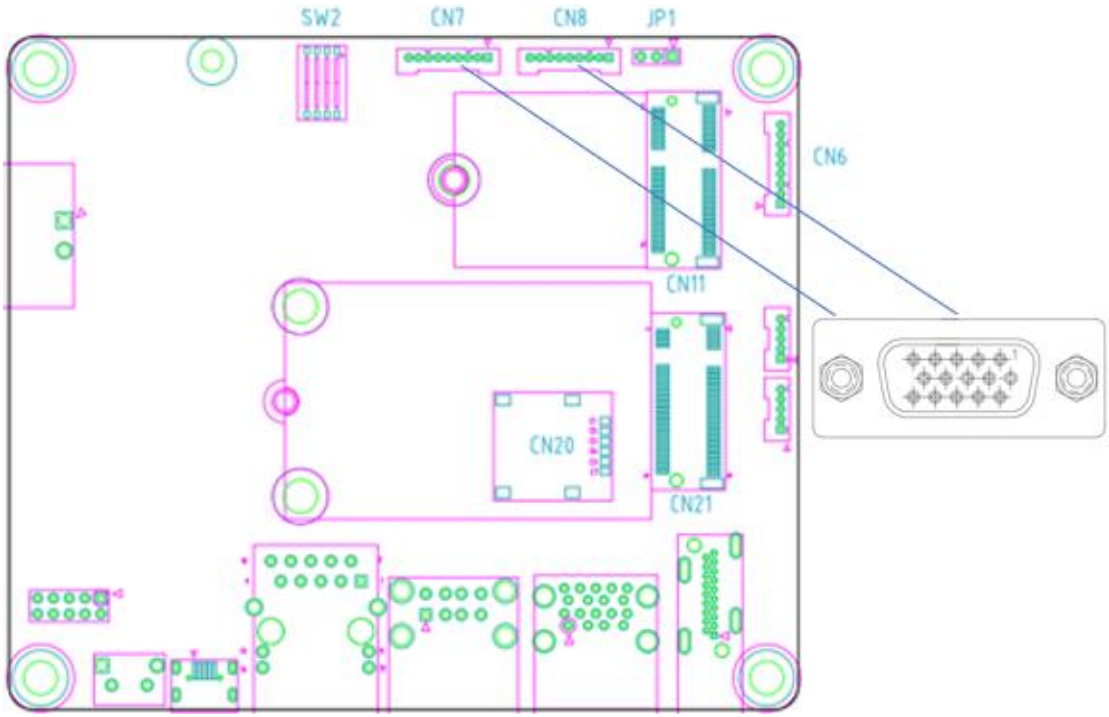
Mode	S-1	S-2	S-3	S-4
1T/1R RS-232	On	On		
1T/1R RS-422	On	Off		
1T/1R RS-485	Off	On		
Low power shutdown	Off	Off		
250kbps for RS-232 and RS-485/RS-422				On
RS-232 to 3Mbps and RS-485/RS-422 to 20Mbps				Off
Enable RS-422/RS-485 bias and termination resistors.			On	
Disable RS-422/RS-485 bias and termination resistors.			Off	

2.2.8 (CN8) DIO Port Connector



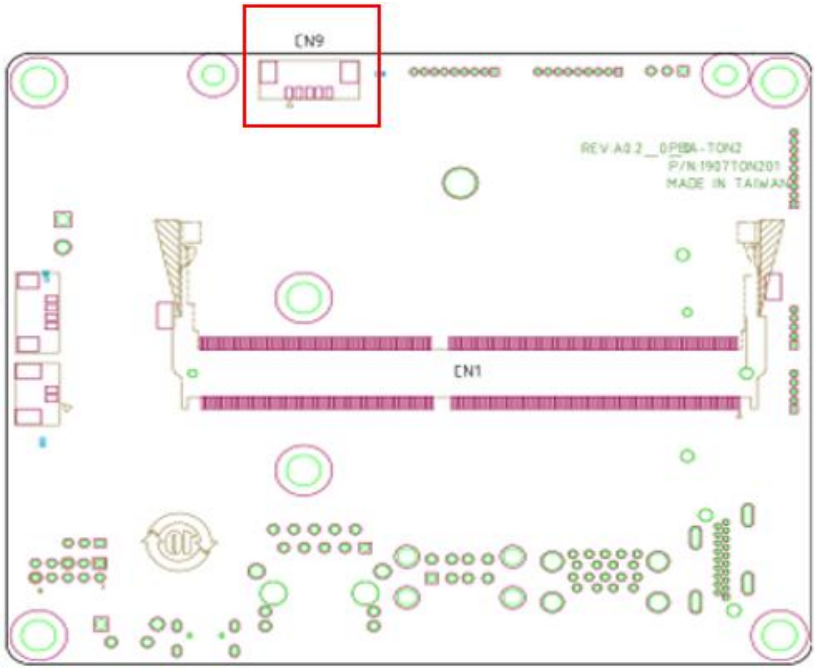
Pin	Function	DTS Name	GPIO
1	GPIO13	PH.00	391
2	I2S0 LRCK	PI.02	401
3	GPIO11	PQ.06	454
4	I2S0 SDIN	PI.01	400
5	GPIO09	PAC.06	492
6	I2S0 SDOUT	PI.00	399
7	GPIO01	PQ.05	453
8	I2S0 SCLK	PH.07	398

2.2.9 (CN7/SW2+CN8) DIO+COM port Connector



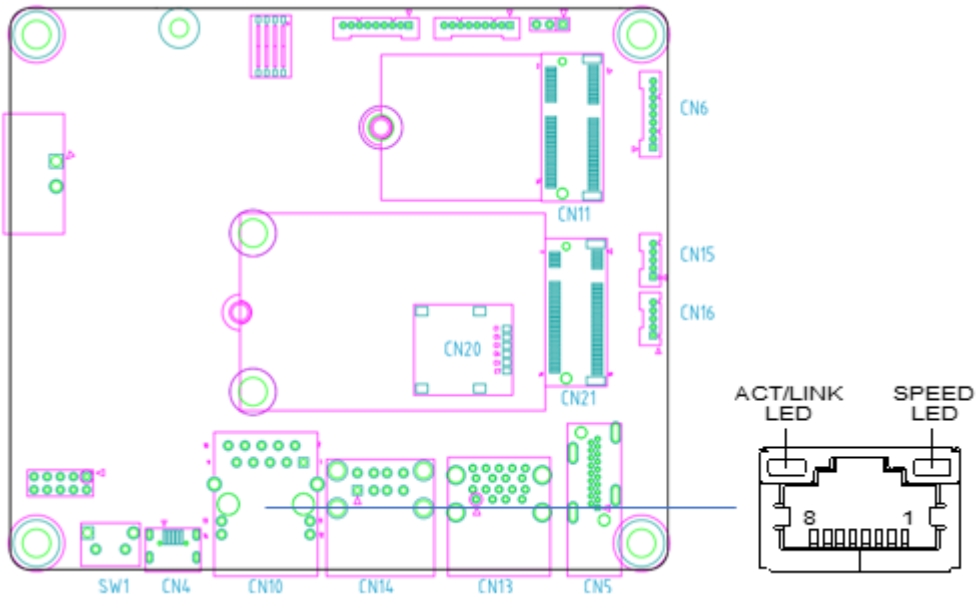
Pin	RS-232(Default)	RS-422	RS-485
1		TX-	D-
2	RXD	TX+	D+
3	TXD	RX+	
4		RX-	
5	GND		
Pin	**Function**	**DTS Name**	**GPIO No.**
6	GPIO13	PH.00	391
7	GPIO11	PQ.06	454
8	GPIO09	PAC.06	492
9	GPIO01	PQ.05	453
10	GND		
11	I2S0_LRCK	PI.02	401
12	I2S0_SDIN	PI.01	400
13	I2S0_SDOUT	PI.00	399
14	I2S0_SCLK	PH.07	398
15	NC		

2.2.10 (CN9) UART Debug port connector



Pin	Signal
1	VCC 3.3V
2	UART TX
3	UART RX
4	GND
5	GND

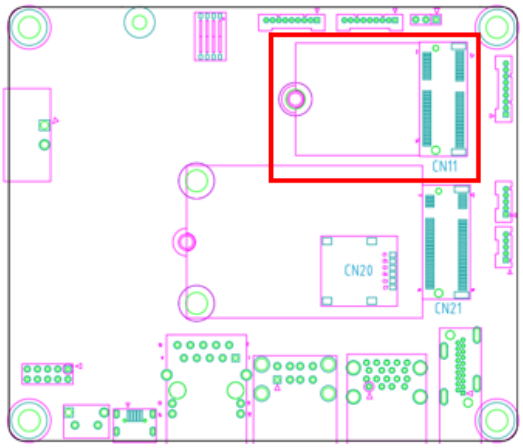
2.2.11 (CN10) Gigabit LAN Connector



Pin	Signal	Pin	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI1-
5	MDI2+	6	MDI2-
7	MDI3+	8	MDI3-

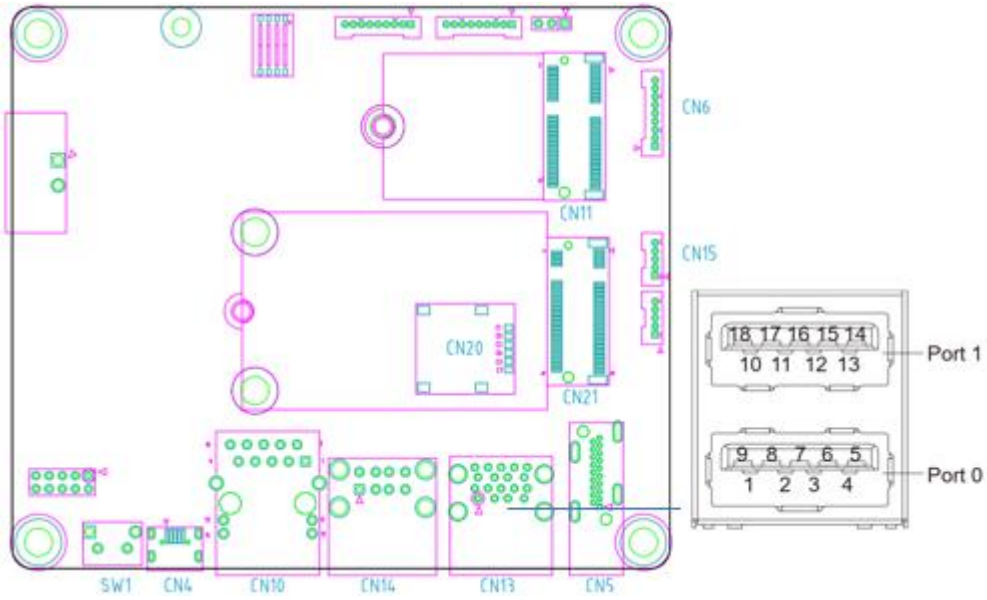
P.S: Speed LED 1000BaseT Green, 10/100 BaseT no LED

2.2.12 (CN11) M.2 2230 E-key Connector



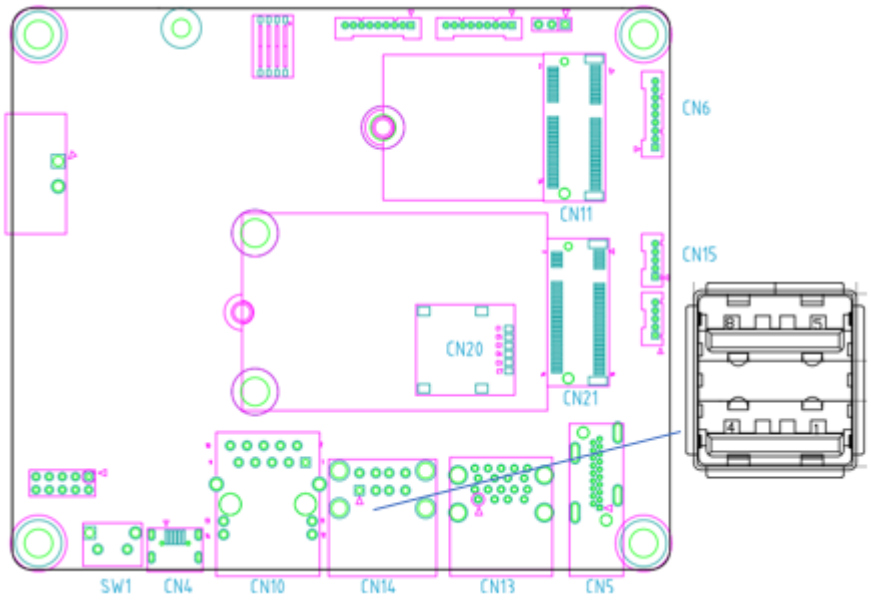
74	3.3V	GND	75
72	3.3V	RESERVED/REFCLKn1	73
70	UIM_POWER_SRC/GPIO1/PEWAKE1#	RESERVED/REFCLKp1	71
68	UIM_POWER_SNK/CLKREQ1#	GND	69
66	UIM_SWP/PERST1#	RESERVED/PETn1	67
64	RESERVED	RESERVED/PETp1	65
62	ALERT# (O)(0/3.3V)	GND	63
60	I2C_CLK (I)(0/3.3V)	RESERVED/PERn1	61
58	I2C_DATA (I/O)(0/3.3V)	RESERVED/PERp1	59
56	W_DISABLE1# (I)(0/3.3V)	GND	57
54	W_DISABLE2# (I)(0/3.3V)	PEWAKE0# (I/O)(0/3.3V)	55
52	PERST0# (I)(0/3.3V)	CLKREQ0# (I/O)(0/3.3V)	53
50	SUSCLK(32kHz) (I)(0/3.3V)	GND	51
48	COEX1 (I/O)(0/1.8V)	REFCLKn0	49
46	COEX2(I/O)(0/1.8V)	REFCLKp0	47
44	COEX3(I/O)(0/1.8V)	GND	45
42	VENDOR DEFINED	PETn0	43
40	VENDOR DEFINED	PETp0	41
38	VENDOR DEFINED	GND	39
36	UART CTS (I)(0/1.8V)	PERn0	37
34	UART RTS (O)(0/1.8V)	PERp0	35
32	UART RXD (I)(0/1.8V)	GND	33
	Module Key	Module Key	
	Module Key	Module Key	
	Module Key	Module Key	
	Module Key	Module Key	
22	UART TXD (O)(0/1.8V)	SDIO RESET# (I)(0/1.8V)	23
20	UART WAKE# (O)(0/3.3V)	SDIO WAKE# (O)(0/1.8V)	21
18	GND	SDIO DATA3(I/O)(0/1.8V)	19
16	LED2# (O)(OD)	SDIO DATA2(I/O)(0/1.8V)	17
14	PCM_IN/I2S SD_IN (I)(0/1.8V)	SDIO DATA1(I/O)(0/1.8V)	15
12	PCM_OUT/I2S SD_OUT (O)(0/1.8V)	SDIO DATA0(I/O)(0/1.8V)	13
10	PCM_SYNC/I2S WS (I/O)(0/1.8V)	SDIO CMD(I/O)(0/1.8V)	11
8	PCM_CLK/I2S SCK (I/O)(0/1.8V)	SDIO CLK(I)(0/1.8V)	9
6	LED1# (O)(OD)	GND	7
4	3.3V	USB_D-	5
2	3.3V	USB_D+	3
		GND	1

2.2.13 (CN13) USB 3.2 Type-A Connector



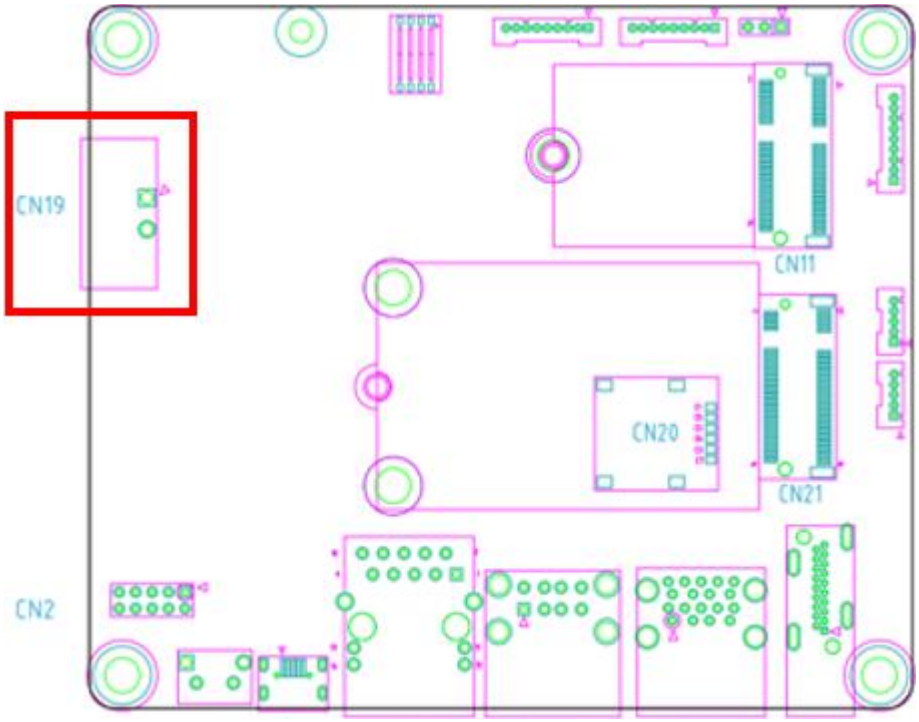
Pin	Signal	Pin	Signal
U1	VBUS_1	U10	VBUS_2
U2	(A)D-	U11	(B)D-
U3	(A)D+	U12	(B)D+
U4	GND	U13	GND
U5	(A)SSRX-	U14	(B)SSRX-
U6	(A)SSRX+	U15	(B)SSRX+
U7	GND	U16	GND
U8	(A)SSTX-	U17	(B)SSTX-
U9	(A)SSTX+	U18	(B)SSTX+

2.2.14 (CN14) USB 2.0 Type-A Connector



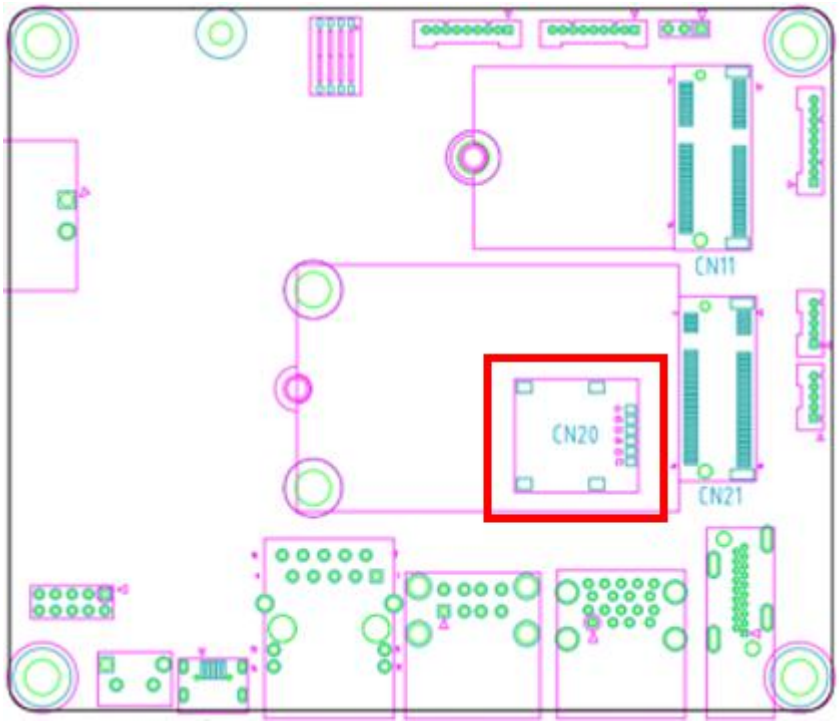
Pin	Signal	Pin	Signal
1	VBUS_1	5	VBUS_2
2	(A)D-	6	(B)D-
3	(A)D+	7	(B)D+
4	GND	8	GND

2.2.15 (CN19) DC-In Connector



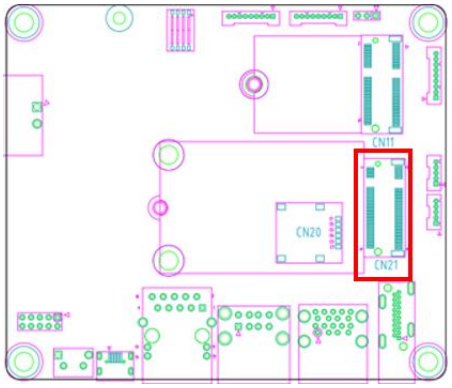
Pin	Signal	Pin	Signal
1	PWR_IN	2	GND

2.2.16 (CN20) NX/Nano SIM Connector



Pin	Signal
C1	VCC
C2	RST
C3	CLK
C5	GND
C6	VPP
C7	I/O

2.2.17 (CN21) M.2 3052 B-key Connector

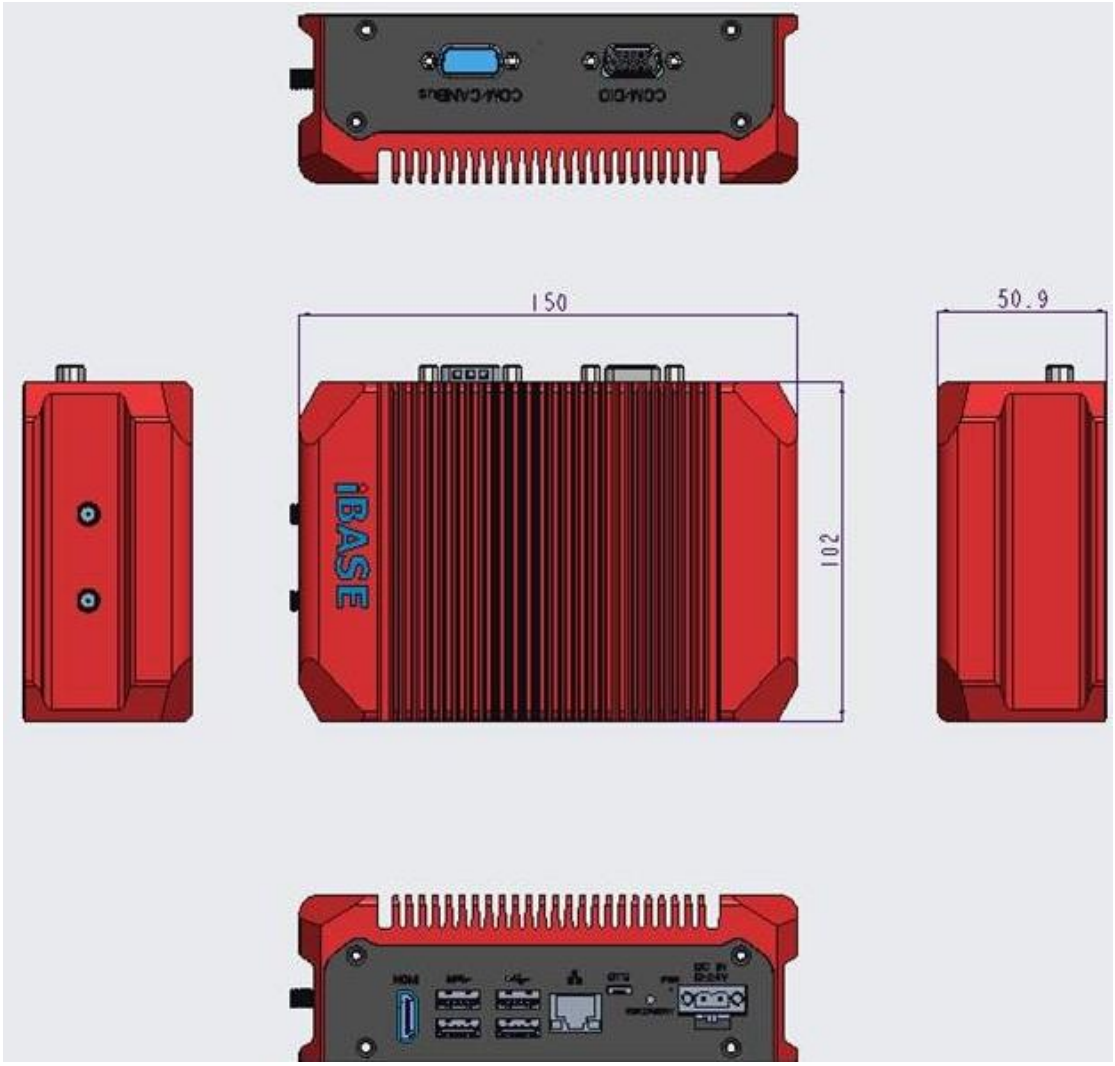


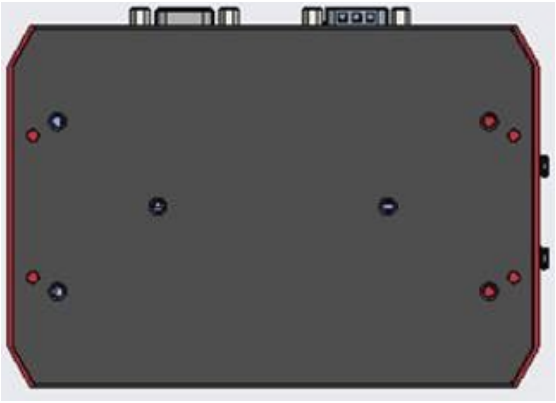
74	3.3V	GND	75
72	3.3V	GND	73
70	3.3V	GND	71
68	SUSCLK(32kHz) (O)(0/3.3V)	PEDET (NC-PCIe/GND-SATA)	69
	Connector Key	N/C	67
	Connector Key	Connector Key	
	Connector Key	Connector Key	
	Connector Key	Connector Key	
	Connector Key	Connector Key	
58	N/C	GND	57
56	N/C	REFCLKp	55
54	PEWAKE# (I/O)(0/3.3V) or N/C	REFCLKn	53
52	CLKREQ# (I/O)(0/3.3V) or N/C	GND	51
50	PERST# (O)(0/3.3V) or N/C	PETp0/SATA-A+	49
48	N/C	PETn0/SATA-A-	47
46	N/C	GND	45
44	N/C	PERp0/SATA-B-	43
42	N/C	PERn0/SATA-B+	41
40	N/C	GND	39
38	DEVSLP (O)	PETp1	37
36	N/C	PETn1	35
34	N/C	GND	33
32	N/C	PERp1	31
30	N/C	PERn1	29
28	N/C	GND	27
26	N/C	PETp2	25
24	N/C	PETn2	23
22	N/C	GND	21
20	N/C	PERp2	19
18	3.3V	PERn2	17
16	3.3V	GND	15
14	3.3V	PETp3	13
12	3.3V	PETn3	11
10	DAS/DSS# (I/O)/LED1# (I)(0/3.3V)	GND	9
8	N/C	PERp3	7
6	N/C	PERn3	5
4	3.3V	GND	3
2	3.3V	GND	1

Chapter 3
Dimensions and Drawings

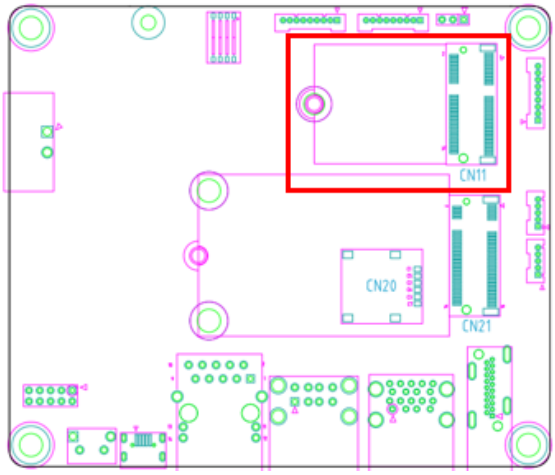
This chapter covers the following:
- Dimensions
- Installation of M.2 E-key Card on CN11
- Installation of M.2 B-key Card on CN21

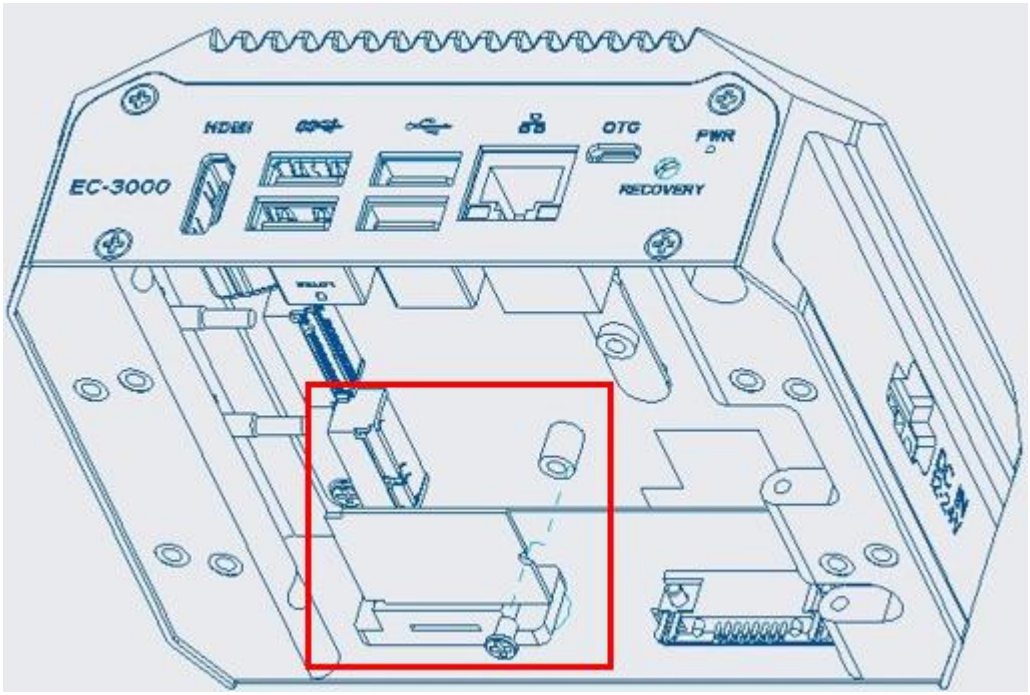
3.1 Dimensions



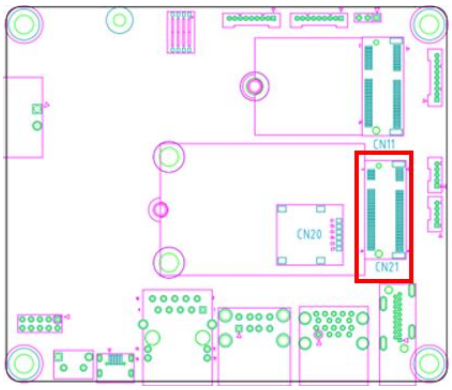


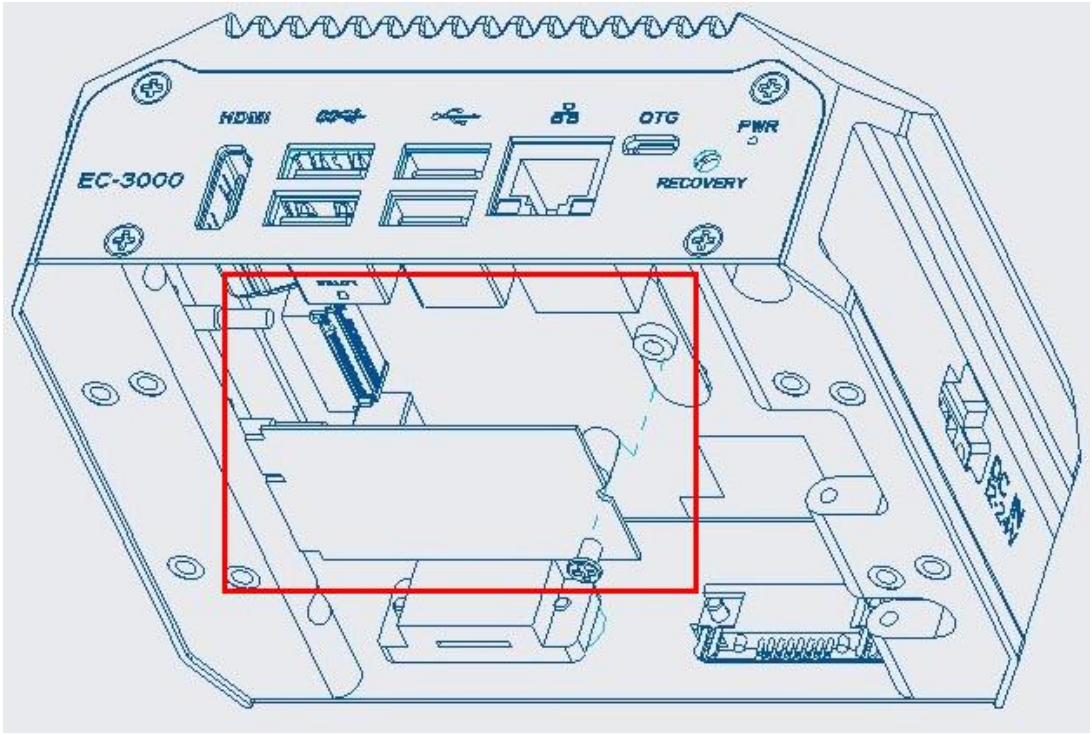
3.2 Installation of M.2 E-key Card on CN11





3.3 Installation of M.2 B-key Card on CN21





Chapter 4
BSP Flash Guide

The information provided in this chapter includes:

- Before Installation
- Initial Setup

4.1 Before Installation

Note: This is for advanced users with the IBASE standard image file only.

IBASE NVIDIA® Jetson™ products include a built-in BSP, so users do not need to install it after receiving the product. However, because we develop our own BSP, users may need to follow the BSP installation SOP to reinstall, upgrade, or downgrade the BSP. For installation guides, BSPs, and technical tips, please visit the IBASE website or contact an IBASE FAE.

4.2 Initial Setup

4.2.1 Method 1: Use flash script

1 Download release image tar file and flash script

```
$ cp mfi_jetson-orin-nano-devkit_<img_ver>.tar.gz <dst_folder>
$ cp flash_release.sh <dst_folder>

$ cd <dst_folder>
$ sudo chmod a+x flash_release.sh
```

2. Run script to flash release image

```
$ ./flash_release.sh <platform> <img_ver>
```

For example, we can flash target device with command below:

```
$ ./flash_release.sh ORIN_NX V0.0.1_NX_8GB
$ ./flash_release.sh ORIN_NANO V0.0.1_NANO_4GB
```

3. Follow instructions on screen to flash device

4.2.2 Method 2: Use manual command

1. Untar official release image package

```
$ sudo tar xpfv mfi_jetson-orin-nano-devkit_<img_ver>.tar.gz
```

2. Switch target device to force recovery mode

3. Run command to flash image to target device

```
$ cd mfi_jetson-orin-nano-devkit
$ sudo ./tools/backup_restore/l4t_backup_restore.sh -e
  nvme0n1 -r jetson-orin-nano-devkit
```