RTSO-3002
Product Manual

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Revision History

Revision	Date	Reason for change	Applicable hardware version	Editor
V1.0	2023-04-14	Initial release	V1.0	RT0086
V1.1	2023-08-21	1. Modify the Mipi camera interface. 2. Multi-function interface content modification; 3. Some content is corrected	V2.0	RT0086
V1.2	2023-08-25	1. Modify part of the content expression; 2. Update the interface picture and structure diagram	V2.0	RT0086

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COPYRIGHT NOTICE **28**

Electronic components and circuits are very sensitive to electrostatic discharge. Although our company designs anti-static protection for the main interfaces on the card when designing circuit board products, it is difficult to achieve anti-static safety protection for all components and circuits. Therefore, it is recommended to observe anti-static safety precautions when handling any circuit board component (including RTS0-3002). Anti-static safety protection measures include, but are not limited to the following:

a) The smart box should be placed in an anti-static bag during transportation and storage, and then the board should not be taken out during installation and deployment.
b) Before touching the smart box, discharge the static electricity stored in the body: wear a discharge grounding wrist strap.
c) Operate the smart box only within the safe area of the electrostatic discharge point.
d) Avoid moving smart boxes in carpeted areas.

Precautions and after-sales maintenance

matters needing attention

Before using the product, please read this manual carefully and keep it for future reference;

- Please pay attention to and follow all warning and guidance information marked on the product;
- Please use matching power adapter to ensure the stability of voltage and current;
- Please use this product in a cool, dry and clean place;
- Do not use this product in cold and hot alternate environment to avoid condensation damage components;
- Do not splash any liquid on the product. Do not use organic solvent or corrosive liquid to clean the product;
- Do not use the product in dusty and messy environment. If it is not used for a long time, please pack the product;
- Do not use in the environment with excessive vibration, any dropping or knocking may damage the circuit and components;
- Do not plug and unplug the core board and peripheral modules when power is on;
- Please do not repair or disassemble the product by yourself. In case of any fault, please contact our company in time for maintenance;
- Do not modify or use unauthorized accessories by yourself, and the damage caused will not be

warranted;
After sales maintenance
1) Warranty period
- Base plate, core plate : 3 year (non-human damage)
- Other peripherals sold by the company:1year(non-human damage)

2) Warranty description
- Within 7 days: the product (base plate, core module) is not damaged by human, our company will replace / repair it free of charge, and bear the return freight; (because the core module needs NVIDIA to confirm that it can meet the requirements of repair, it will take a long time, we will coordinate as soon as possible, please forgive for the inconvenience)
- From 7 days to 36 months: the product (base plate, core module) is not damaged by human, our company will repair it free of charge, and bear the return freight; (because the core module needs NVIDIA to confirm that it can meet the requirements of repair, it will take a long time, we will coordinate as soon as possible, please forgive for the inconvenience)
- Artificial damage in more than 3 year or 3 year: the product (carrier plate) shall be tested after it is sent to the customer, and the customer shall be informed of whether it can be repaired and the maintenance cost in detail. After reaching an agreement, the product shall be repaired and returned to the customer, and the company shall bear the return freight;
- The starting time shall be subject to the date of express delivery receipt;

3) Contact information
Official website: www.realtimesai.com
Taobao website: https://shop340963258.taobao.com/
Address: 11, block B, Heping Xiyuan, Heping West Street, Chaoyang District, Beijing
Attention: RMA
Tel: 400-100-8358
Mailing notice: contact with the company's sales department in advance, arrange technical support personnel to check and eliminate errors caused by misoperation as soon as possible, fill in the product after-sale return to factory maintenance form after verification, and send it to rma@realtimes.cn Mail box, please attach the list of items to facilitate verification, so as to avoid loss and loss in the process of express delivery. The company does not receive any delivery

Technical support and development customization

1. Scope of technical support
1) The company releases the electrical characteristics and use of industrial carrier boards and modules;
2) Physical dimension of hardware, relevant structure diagram and line sequence definition of specific interface;
3) Burn in verification of all BSP support packages provided by the company;
4) The company released burn environment construction, entry-level use. ;
5) Various peripheral module drivers released by the company;
6) The company's product fault diagnosis and after-sales maintenance services;
2. Scope of technical discussion
Due to the wide range of embedded system knowledge and various types of involvement, we can not guarantee that all kinds of questions can be answered one by one. The following content is not available for technical support, only suggestions can be provided.

1) Knowledge beyond the course published by our company;
2) Specific software program design;
3) Technical support for industrial carrier not issued by the company;
4) All kinds of driving support for industrial carrier board not issued by the company;
5) Hardware principle and drive design of peripheral module not issued by our company;

3. Technical support mode

1)Official website or email questions (recommended):https://www.realtimesai.com/cn/download.html techsupport@realtimes.cn

2) Official Taobao through Alibaba Wangwang consultation: https://shop340963258.taobao.com/

3) Wechat group consultation (wechat Group No. consults Taobao customer service or sales, and Taobao purchase order No. needs to be provided for verification);

4) Technical support email: techsupport@realtimes.cn

5) Tel: 400-100-8358

4. Technical support time

Monday to Friday; 8:30-12:00 am; 1:00-17:30 PM;

The company arranges the rest according to the national legal holidays, during which it may not be able to provide technical support, please send the problem to the technical support email. We will reply to you as soon as possible on weekdays.

5. Complaints and suggestions

If you are not satisfied with us or have suggestions, you can send an email to yu.qin @ realtimes.cn For feedback, please call 400-100-8358 for further improvement.

6. Customized development services

The company provides the embedded operating system driver based on NVIDIA Jetson series and the paid customized development service of hardware carrier board to shorten your product development cycle.

Please email the request to info@realtimes.cn

Data acquisition and subsequent update

1. Access to information

Download on our website

The company's website contains supporting information of its products, including product user manual, NVIDIA Jetson series module data manual, BSP driver support package for carrier board, supporting peripheral driver files, interface test verification method, FAQ, system burning guide, etc. get into www.realtimesai.com , select "data download" in the navigation bar, find the data you need, and click download.

2. . Subsequent updates

Updates of subsequent documents, BSP, driver files and other official account will be updated in time. We will pay close attention to our developments in order to ensure that your information is up to date. We will push through WeChat public.

Product presentation

1 Introduction

The NVIDIA Jetson Orin NX/Orin Nano module is a deep learning processor from Nvidia with powerful computing power and a module the size of a credit card. It mainly targets at the rapidly developing artificial intelligence market in recent years, such as UAV, automatic driving system, etc., which has a relatively broad application prospect. RTSO-3002 is an industrial carrier for Jetson Orin NX/Orin Nano, operating temperature -40℃~+85℃, low power consumption, high safety level, can meet a variety of harsh conditions.

1.1 Features

Type / Interface	RTSO-3002
Adaptation Core	Jetson Orin NX/Orin Nano
USB	2 x USB 3.1 Type-A interfaces; 1 x Micro USB interface, support OTG and flash function;
Display	1 x Mini HDMI
Network	1 x GbE independent network port
Multifunctional interface 1	2.0mm_2*5 multi-function interface, 2*CAN (default with 120R terminal resistor), 1*Debug Uart TTL, 1*I2C;
Multifunctional interface 2	2.0mm_2*10 multi-function interface, 1*SPI, 2*GPI, 2*GPO, 1*I2S, 2*Uart TTL;
M.2	1 x M.2 B Key port, support 4G/5G. 1 x Nano SIM card; 1 x M.2 M Key port, support NVMe 2242 SSDS. 1 x M.2 E Key port, support wifi;
Camera	2 x 0.5mmFPC x 22pins camera interfaces, while supporting 2 MIPI CSI camera access;
RTC	1 x RTC battery port;
FAN	Support 5V fans;
Button	1 x RESET button, 1 x RECOVERY button, 1 x POWER button;
Indicator light	3 x Indicators, including POWER, USER, and HDD;
Size	87mm*65mm*27mm
Requirements	DC 9~20V
Temperature	-40℃~+85℃
Weight	About 70g

1.2 Ordering Information

Model Options	Description
RTSO-3002	Supports NVIDIA Jetson Orin NX/Orin Nano modules, 1 x Mini HDMI 2.0,2 x USB 3.1, 1 x GbE,2 x CAN, 1 x Debug Uart TTL,2 x Uart TTL, 2 x GPI, 2 x GPO, 1 x I2S,1 x I2C,1 x SPI,1 x M.2 B Key, 1 x M.2 M Key, 1 x M.2 E Key,2 x MIPI CSI,1 x FAN, 1 x RTC,2 x GPI, 2 x GPO, 1 x I2s,1 x I2C,1 x SPI,1 x M. Provide the Realtimes_L4T_R35.3.1_rtso-3002-v2.0_orin-nx-nano_20230807 .tbz2 software support package.

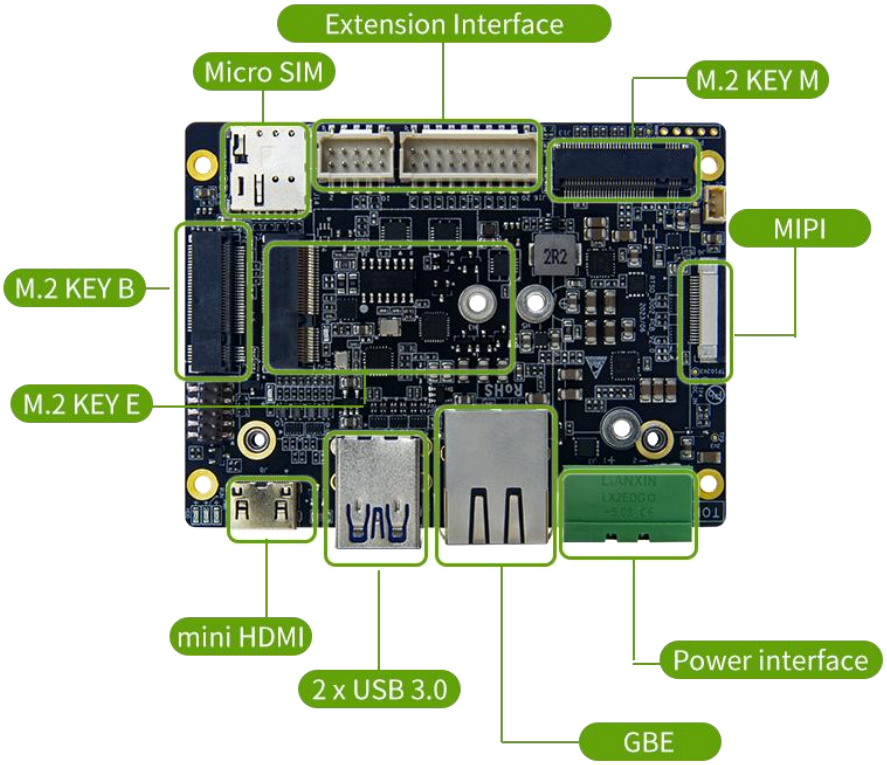
1.3 Matching Cables package

The order type of supporting cable package of RTSO-3002 is:RTSO-3002_Cables. Contains the following components:

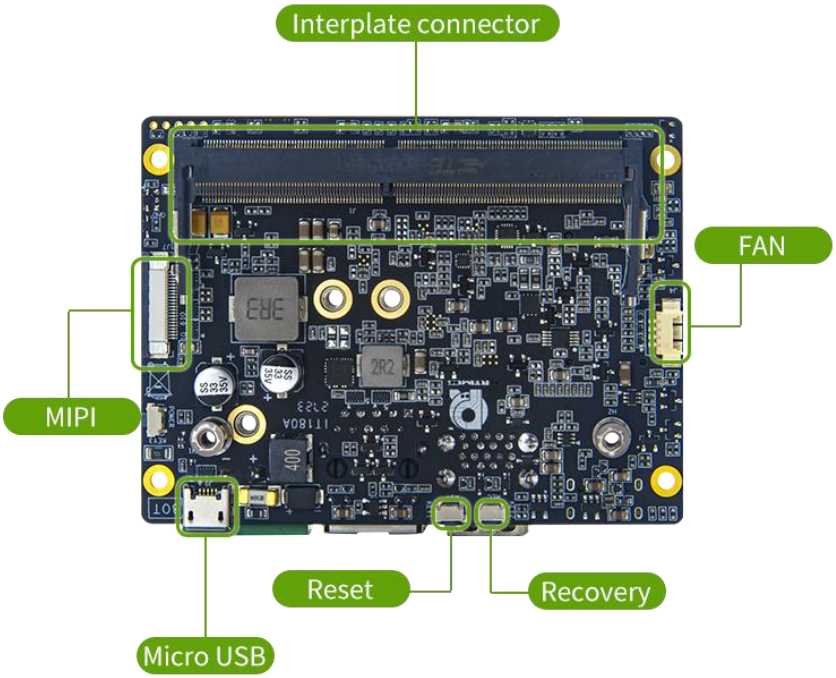
Subassembly	Number	Description
RTSO-3002_Cables	1	Matching Cables package

Product specifications

1 Connector Locations

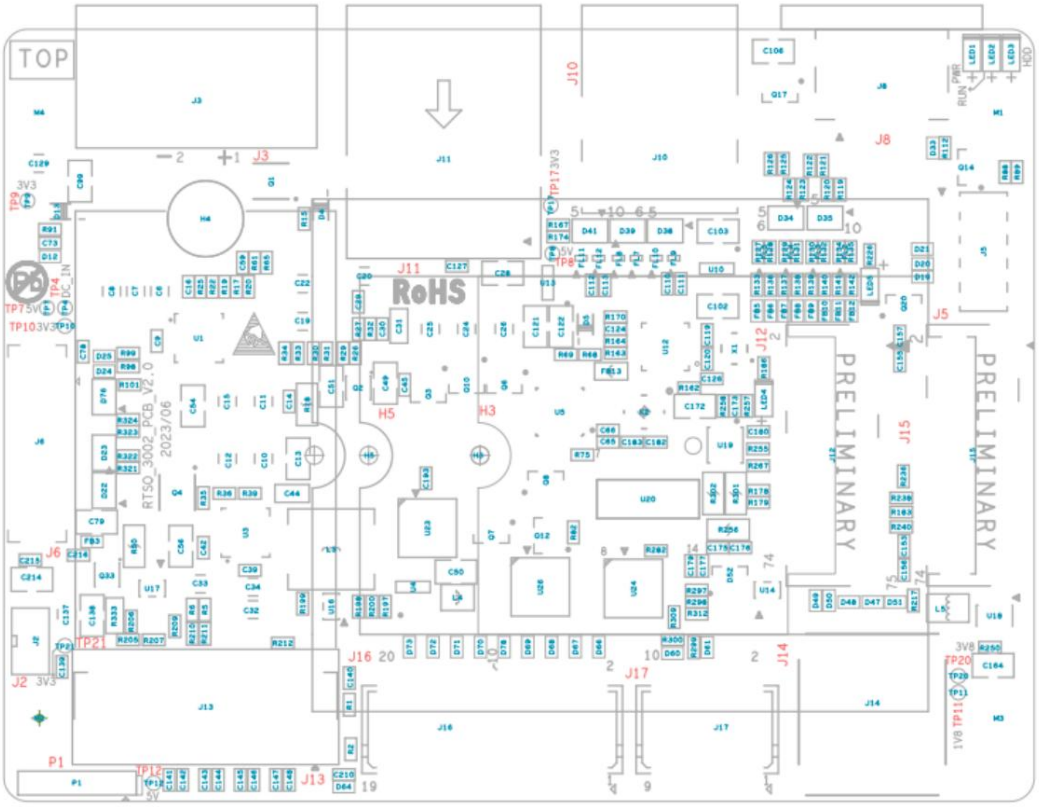


RTSO-3002 FRONT

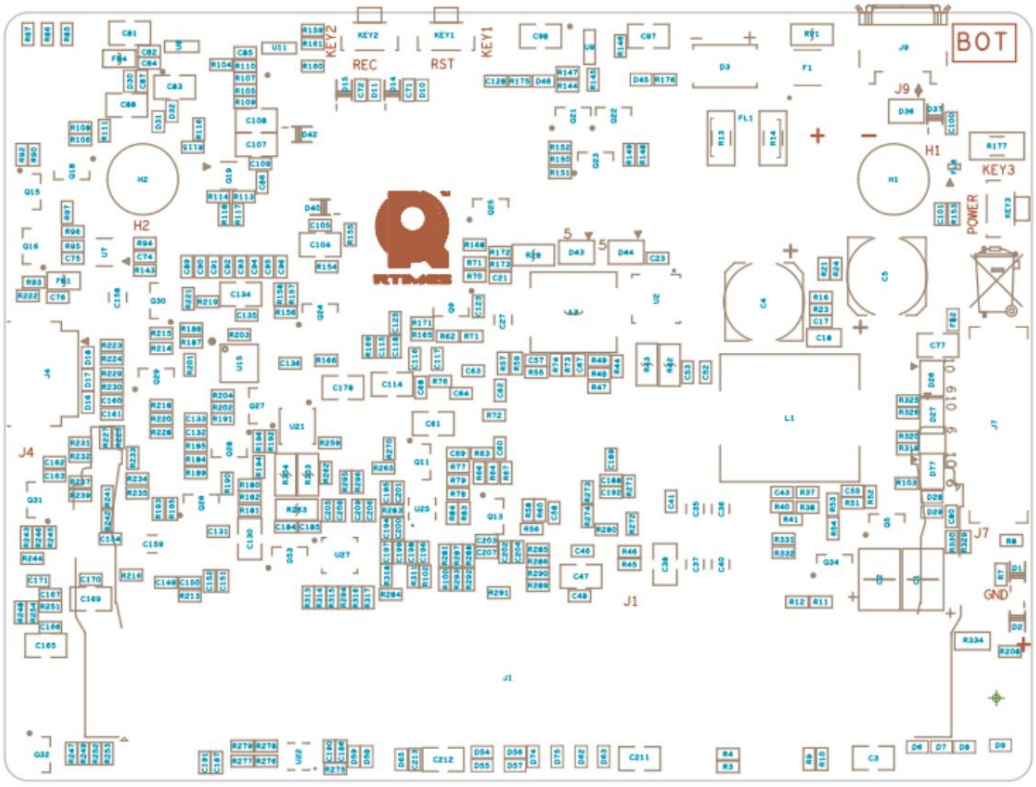


RTSO-3002 BACK

1.1 Component location diagram



RTSO-3002 FRONT



RTSO-3002 BACK

1.2 Functional connector

Marking	Function description
J1	260 Pin,Connect to the NVIDIA Jetson Orin NX/Orin Nano core module
J2	RTC battery port
J3	Power input interface
J5	External button and LED double row pin interface
J6 J7	MIPI CSI interface
J8	Mini HDMI interface
J9	Mirco USB interface
J10	Dual-layer USB3.0 TYPEA interface
J11	RJ45 Gigabit network port
J12	M.2 EKEY interface
J13	M.2 MKEY interface(NVME 2242)
J15	M.2 BKEY interface
J14	Nano SIM card slot
J16	Multifunctional interface 1
J17	Multifunctional interface 2

1.3 Button

Marking	Function description
KEY1	RESET button: Click the short touch to reset the system
KEY2	RECOVERY button: Click the short touch to make the core module enter the recovery mode
KEY3	POWER button: Click the short touch to hard shutdown and startup of the board

1.4 LED indicator light

Marking	Function description
LED1	POWER,Power indicator, flickers when there is electricity
LED2	RUN,Run indicator, the flashes after core startup
LED3	HDD,Hard disk indicator,Blinking when reading or writing hard disks

2 Connectors Description

2.1 Module interface

Function	Connect NVIDIA Jetson Orin NX/Orin Nano core module
Marking	J1
Type	260 Pin SO-DIMM
Pin define	For pin definitions of this connector, refer to the pin definition instructions in the NVIDIA Jetson Orin NX/Orin Nano Core Module Data Manual.

2.2 RTC battery interface

Function	RTC battery pin
Marking	J2
Type	1.25mm spacing 1x3Pin single-row in-line pins /A1251WV-3P
Pin define	

Pin	Signal	Pin	Signal
1	GND	2	NC
3	+3V		

Pin 1: marked in the green box of the picture on the right.

2.3 Micro USB interface

Function	Micro USB connector
Marking	J9
Type	Micro USB 2.0
Pin define	

Pin	Signal	Pin	Signal
1	VBUS	2	USB 2.0 D-
3	USB 2.0 D+	4	USB ID
5	GND		

When USB-OTG is set to host mode,USB ID pin must be empty.

When USB-OTG is set to slave mode,USB ID pin must be grounded.

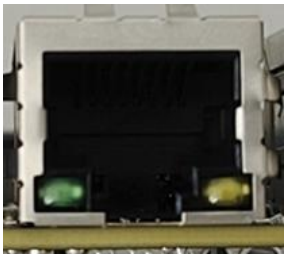
2.4 USB3.0 interface

Function	USB connector	
Marking	J10	
Type	Double-layer USB Type-A port	
Pin define		

Layer	Superstratum		
Type	USB 3.0 and USB 2.0		
Pin	Signal	Pin	Signal
1	VBUS	2	USB 2.0 D-
3	USB 2.0 D+	4	GND
5	SSRX-	6	SSRX+
7	GND	8	SSTX-
9	SSTX+		
Layer	Substratum		
Type	USB 3.0 and USB 2.0		
Pin	Signal	Pin	Signal
1	VBUS	2	USB 2.0 D-
3	USB 2.0 D+	4	GND
5	SSRX-	6	SSRX+
7	GND	8	SSTX-
9	SSTX+		

Note: Two USB2.0 in the J10 dual-layer USB port are extended is the same USB2.0 HUB.

2.5 Gigabit network interface

Function	Ethernet connector	
Marking	J11	
Type	RJ45 network interface	
Pin define		

Pin	Signal	Pin	Signal
1	TP0+	2	TP0-
3	TP1+	4	TP2+
5	TP2-	6	TP1-
7	TP3+	8	TP3-

2.6 Display interface

Function	HDMI display connector			
Marking	J8			
Type	Mini HDMI interface			
Pin define				

Pin	Signal	Pin	Signal
1	TMDS Data2+	2	TMDS Data2 GND
3	TMDS Data2-	4	TMDS Data1+
5	TMDS Data1 GND	6	TMDS Data1-
7	TMDS Data0+	8	TMDS Data0 GND
9	TMDS Data0-	10	TMDS Clock+
11	TMDS Clock GND	12	TMDS Clock-
13	CEC	14	No Connect
15	DDC clock	16	DDC data
17	DDC GND	18	+5V Power
19	Hot Plug Detect		

2.7 MIPI Camera interface

Function	Camera interface 1			
Marking	J6			
Type	JS(Jusuo Electronics) AFC07-S22FCC-00 22pins x 0.5mm pitch drawer type down connection			
Pin define				

Pin	Signal	Pin	Signal
1	GND	2	CSI0_D0_N
3	CSI0_D0_P	4	GND
5	CSI0_D1_N	6	CSI0_D1_P
7	GND	8	CSI0_CLK_N
9	CSI0_CLK_P	10	GND
11	CAM0_PWDN	12	CAM0_MCLK
13	I2C1_CLK	14	I2C1_DAT
15	3V3		

Attention:

1.J6 can be connected to Senyun 4lane camera (model: SG2-1MX390C-MIPI-H60F), but only supports 2lane data;

2. The board with "△" is pin1;

3. For details about MIPI signal, GPIO, and I2C resource device names, see the BSP documentation.

Function	Camera interface 2
Marking	J7
Type	JS(Jusuo Electronics) AFC07-S22FCC-00 22pins x 0.5mm pitch drawer type down connection
Pin define	

Pin	Signal	Pin	Signal
1	3v3	2	I2C1_SDA
3	I2C1_SCL	4	GND
5	CAM1_MCLK	6	CAM1_PWDN
7	GND	8	CSI3_D1_P
9	CSI3_D1_N	10	GND
11	CSI3_D0_P	12	CSI3_D0_N
13	GND	14	CSI2_CLK_P
15	CSI2_CLK_N	16	GND
17	CSI2_D1_P	18	CSI2_D1_N
19	GND	20	CSI2_D0_P
21	CSI2_D0_N	22	GND

Attention:

1.J7 supports Senyun 4lane camera (Model: SG2-1MX390C-MIPI-H60F)

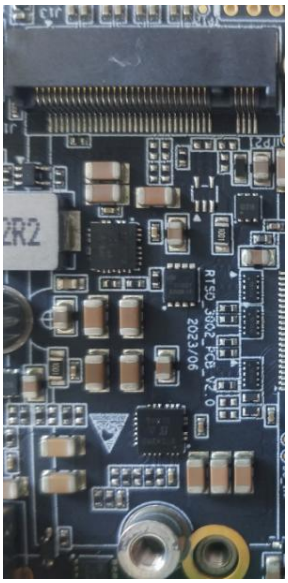
2. The board with "△" is pin1;

3. For details about MIPI signal, GPIO, and I2C resource device names, see the BSP documentation.

2.8 M.2 MKEY interface

Function	M.2-MKEY slot
Marking	J13
Type	M.2-MKEY 2242
Pin define	

引脚	信号	引脚	信号
1	GND	2	3.3
3	GND	4	3.3
5	PCIE_RX3_N	6	NC
7	PCIE_RX3_P	8	NC
9	GND	10	LED
11	PCIE_TX3_N	12	3.3
13	PCIE_TX3_P	14	3.3
15	GND	16	3.3
17	PCIE_RX2_N	18	3.3
19	PCIE_RX2_P	20	NC
21	GND	22	NC



23	PCIE_TX2_N	24	NC	
25	PCIE_TX2_P	26	NC	
27	GND	28	NC	
29	PCIE_RX1_N	30	NC	
31	PCIE_RX1_P	32	NC	
33	GND	34	NC	
35	PCIE_TX1_N	36	NC	
37	PCIE_TX1_P	38	NC	
39	GND	40	PCIE_CLK	
41	PCIE_RX0_N	42	PCIE_DATA	
43	PCIE_RX0_P	44	ALERT	
45	GND	46	NC	
47	PCIE_TX0_N	48	NC	
49	PCIE_TX0_P	50	PERST#	
51	GND	52	CLKREQ#	
53	PCIE_CLK_N	54	PEWAKE#	
55	PCIE_CLK_P	56	NC	
57	GND	58	NC	
59	GND	60	GND	
61	GND	62	GND	
63	GND	64	GND	
65	GND	66	GND	
67	NC	68	SUSCLK(32KHZ)	
69	NC	70	3.3	
71	GND	72	3.3	
73	GND	74	3.3	
75	GND	76		

Note: The length of M.2-M KEY SSD is 2242.

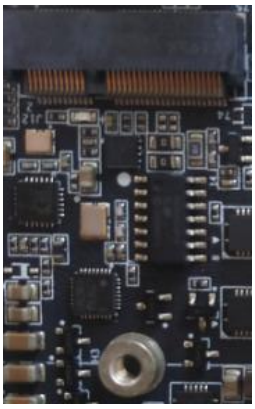
2.9 M.2-EKEY interface

Function	M.2-EKEY slot	
Marking	J12	
Type	M.2-EKEY 2230	

Pin define

Pin	Signal	Pin	Signal
2	3.3V	1	GND
4	3.3V	3	USB_DP
6	LED1	5	USB_DN
8	I2S1_SCLK	7	GND
10	I2S1_LRCK	9	NC
12	I2S1_DIN	11	NC
14	I2S1_DOUT	13	NC
16	M.2_KEY_E_LED2	15	NC
18	GND	17	NC
20	M2_KEY_E_WAKE	19	NC
22	UART1_RXD2	21	NC
24	NC	23	NC
26	NC	25	NC
28	NC	27	NC
30	NC	29	NC
32	UART1_TXD2	31	NC
34	UART1_CTS	33	GND
36	UART1_RTS2	35	PER1_N/USB3.0_TX_N
38	NC	37	PER1_P/USB3.0_TX_P
40	NC	39	GND
42	NC	41	DPCIE0_RX0_N
44	NC	43	DPCIE0_RX0_P
46	NC	45	GND
48	NC	47	DPCIE0_TX0_N
50	CLK_32K_OUT	49	DPCIE0_TX0_P
52	PCIE_RESET	51	GND
54	BT_RST_KEY_E#	53	DPCIE0_CLK_N
56	WIFI_DISABLE1	55	DPCIE0_CLK_P
58	I2C1_SDA	57	GND
60	I2C1_SCL	59	NC
62	GPIO10_SMB_ALERT	61	NC
64	NC	63	NC
66	NC	65	NC
68	NC	67	RESET
70	NC	69	NC
72	3.3V	71	GND
74	3.3V	73	NC
		75	NC

Note: The length of M.2-EKEY wifi module is 2230



2.10 M.2-BKEY interface

Function	M.2-BKEY slot
Marking	J15
Type	M.2-BKEY 3052
Pin define	

Pin	Signal	Pin	Signal
2	3.3V	1	NC
4	3.3V	3	GND
6	Full_Card_Power	5	GND
8	W_DISABLE1	7	USB_DP
10	GPIO9	9	USB_DN
12	NC	11	GND
14	NC	13	NC
16	NC	15	NC
18	NC	17	NC
20	NC	19	NC
22	NC	21	NC
24	NC	23	WANKE_ON
26	NC	25	NC
28	NC	27	GND
30	UIM1_RESET	29	PET1_N/USB3.0_RX_N
32	UIM1_CLK	31	PET1_P/USB3.0_RX_P
34	UIM1_DATA	33	GND
36	UIM1_PWR	35	PER1_N/USB3.0_TX_N
38	NC	37	PER1_P/USB3.0_TX_P
40	NC	39	GND
42	NC	41	DPCIE0_RX0_N
44	NC	43	DPCIE0_RX0_P
46	NC	45	GND
48	NC	47	DPCIE0_TX0_N
50	PCIE_RESET	49	DPCIE0_TX0_P
52	PCIE_CLK_REQ	51	GND
54	PCIE_WAKE	53	DPCIE0_CLK_N
56	NC	55	DPCIE0_CLK_P
58	NC	57	GND
60	NC	59	NC
62	NC	61	NC
64	NC	63	NC
66	UIM1_DETECE	65	NC
68	CLK_32K	67	RESET
70	GND	69	NC

	72	GND	71	GND
	74	GND	73	NC
	76	GND	75	NC

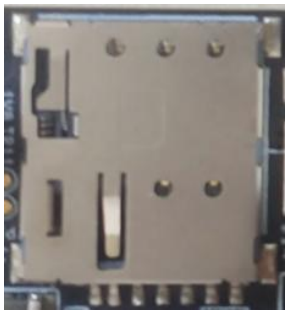
Note: The length of M.2-BKEY 5G module is 3052

2.11 Nano SIM card slot

Function	SIM card slot
Marking	J14
Type	Nano SIM card slot/SNO-1303-X
Pin define	

Pin	Signal	Pin	Signal
S1	UIM_PWR	S2	UIM_RESET
S3	UIM_CLK	S4	NC
S5	GND	S6	NC
S7	UIM_DATA		

Note: SIM card notch facing inward.



2.12 Multifunctional interface

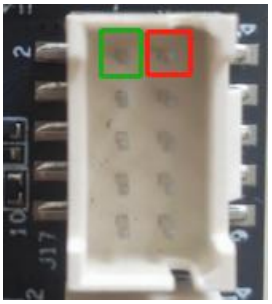
Function	Multifunctional interface1
Marking	J16
Type	2.0mm space 2x10Pin double-row in-line pin buckle /A2008WV-S-2X10P
Pin define	

Pin	Signal	Pin	Signal
1	SPI0_SCK_3V3	2	I2S0_SDOUT_3V3
3	SPI0_MISO_3V3	4	I2S0_SDIN_3V3
5	SPI0_MOSI_3V3	6	I2S0_LRCK_3V3
7	SPI0_CS0_3V3	8	I2S0_SCLK_3V3
9	GPIO_IN0	10	GPIO09_AUD_MCLK_3V3
11	GPIO_IN1	12	UART0_TXD_3V3
13	GPIO_OUT0	14	UART0_RXD_3V3
15	GPIO_OUT1	16	UART1_TXD_3V3
17	3v3	18	UART1_RXD_3V3
19	GND	20	GND

pin 1: marked in the red box of the picture on the right.
Pin 2: marked in the green box of the picture on the right.

Note:

	1. For the names of GPIO,UART, SPI, and I2S resource devices, see the BSP documentation. **2.GPIO_OUT0/1 is input by default. If it is used as output, GPIO_IN0/1 can also be set as output by command.** **3.GPIO input and output level 3.3V, 100K pull-up resistor, maximum output current 50mA.**	

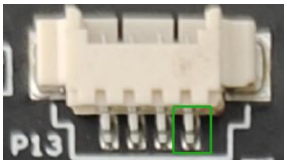
Function	Multifunctional interface2	
Marking	J17	
Type	2.0mm spacing 2x5Pin double-row in-line pin buckle /A2008WV-S-2X5P	
Pin define		

管脚	信号	管脚	信号
1	CAN2_H	2	CAN1_H
3	CAN2_L	4	CAN1_L
5	UART2_TXD_DEBUG_3V3	6	I2C1_SCL
7	UART2_RXD_DEBUG_3V3	8	I2C1_SDA
9	3v3	10	GND

pin 1: marked in the red box of the picture on the right.
Pin 2: marked in the green box of the picture on the right.

Note: For the names of I2C,UART, and CAN resource devices, refer to the BSP documentation

2.13 Fan interface

Function	Connect the external heat dissipation fan	
Marking	J4	
Type	Molex PicoBlade Header/53261-0471	
Pin define		

Pin	Signal	Pin	Signal
1	GND	2	+5V
3	TACH	4	PWM

Pin 1: marked in the green box of the picture on the right.

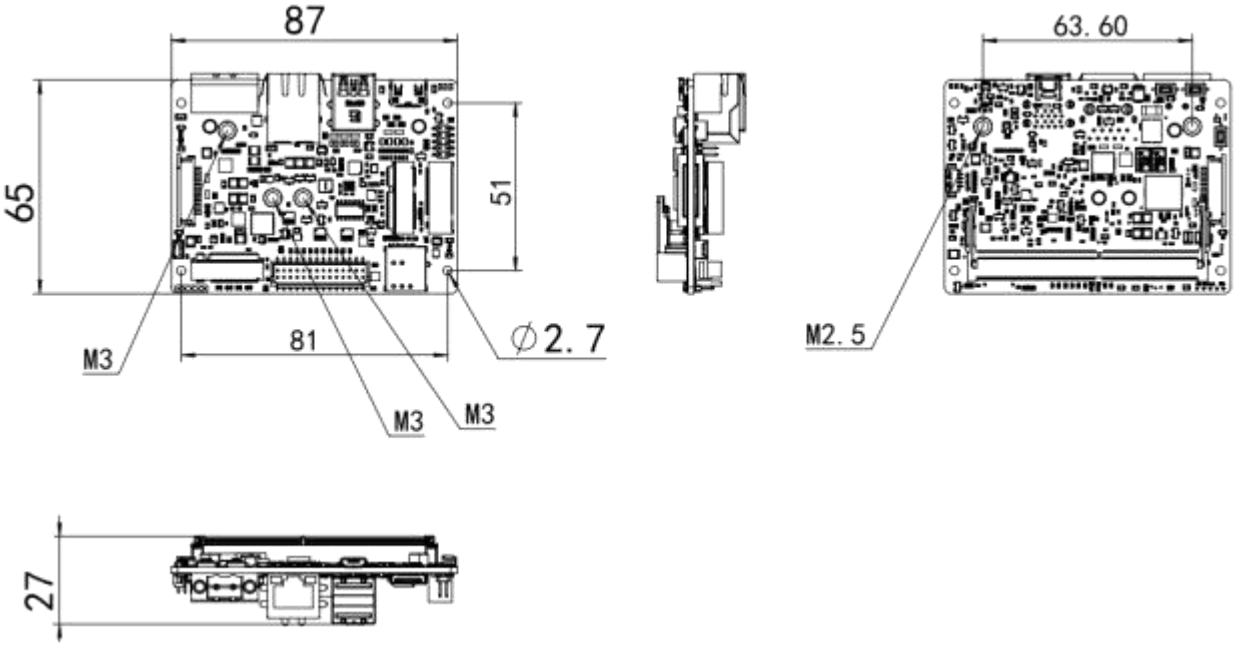
2.14 Power interface

<table>
<tr><td>Function</td><td colspan="2">Power interface</td><td rowspan="4"> </td></tr>
<tr><td>Marking</td><td colspan="2">J3</td></tr>
<tr><td>Type</td><td colspan="2">2 pin terminal /5.08 Pitch Green terminal</td></tr>
<tr><td>Pin define</td><td colspan="2">
<table>
<tr><th>Pin</th><th>Signal</th><th>Pin</th><th>Signal</th></tr>
<tr><td>1</td><td>VCC (+)</td><td>2</td><td>GND (-)</td></tr>
</table>

Pin 1 position: "+" mark on the board at the red box mark on the right side of the picture.

Input voltage range: 9-20V single +12V
Do not connect cables live!
</td></tr>
</table>

3 Product size



4 Hardware update history

RTSO-3002 Board hardware update history

Version	Update description
V1.0	EVT version
V2.0	DVT version

Software version supporting instructions

1 Installation and use

1.1 Picture of products

1.2 How to use the board

Before using the RTSO-3002 carrier, you must verify that the Jetson Orin NX/Orin Nano core module is installed with the operating system loaded with Realtimes BSP.

Power supply description:

The RTSO-3002 carrier board and Jetson Orin NX/Orin Nano module device require +9V~+20V power supply. Realtimes comes with a power adapter that connects to the on-board power socket [J3].

a) Ensure that all external system voltages are turned off

b) Install the Jetson Orin NX/Orin Nano core module onto the 260-Pin SO-DIMM connector. Align the connectors with even force, and install the fixing screws.

c) Install necessary external cables. (For example, the cable to the HDMI display, the power input cable to the system, USB cable for keyboard and mouse...)

d) Connect the power cord to the power supply.

e) RTSO-3002 adopts automatic power-on design. Turn on the power and the system starts to work.

f) For the system without protective cover, do not move the whole system after the system is powered on, and do not touch the circuit board and its electronic components with your body.

1.3 Recovery mode

The core module of Jetson Orin NX/Orin Nano can work in normal mode and RECOVERY mode. In RECOVERY mode, file system update, kernel update, boot loader update, BCT update and other operations can be carried out.

The steps to enter the Recovery mode are as follows:

a) Turn off the power supply to the system.

b) Connect the Micro-USB OTG port (J9) of the RTSO-3002 to the host USB port of the PC using a Micro-USB cable.

c) Press and hold down the RECOVERY button to power the device. Keep the power on for more than 3 seconds, and then release the RECOVERY button

d) When the system enters the RECOVERY mode, you can perform subsequent operations.

2 Board level support Package (BSP)

When the RTSO-3002 board works on the system burning the original NVIDIA Linux For Tegra (L4T), most of the hardware interfaces do not work properly, and all the support of the RTSO-3002 onboard interface needs to load the supporting driver patch.

NVIDIA's original LT4 package can be downloaded from the following link:

https://developer.nvidia.com/embedded/linux-tegra

RTSO-3002 Driver patch support package (system burning) Download address:

http:// www.realtimes.cn/download/

System Flash method (help document) :

https://www.realtimes.cn/cn/help.html

Note: The Ruitai cloud space account password needs to contact technical support to obtain.

RTSO-3002 board-level patch support package Download Skip link:

https://www.realtimes.cn/cn/software.html

3 Other related introductions

3.1 Jetpack

Nvidia jetpack sdk is the most comprehensive solution for building AI applications. It includes software libraries and APIs, samples, developer tools and documentation for the latest and previous versions of Jetson products.

3.1.1 Jetpack Component summary

This section briefly introduces each component of JetPack. For more detailed information about these components, please refer to JetPack's online documentation.

OS Image

JetPack includes a reference file system derived from Ubuntu. (Development kit system, no need to install)

Libraries and APIs

JetPack library and API include:

•TensorRT and cuDNN for high-performance deep learning applications

•CUDA for multi-domain GPU accelerated applications

•NVIDIA Container Runtime for containerized GPU accelerated applications

•Multimedia API package for camera application and sensor driver development

•VisionWorks, OpenCV and VPI for visual computing applications

•Sample application

3.1.2 How to install Jetpack

Overview of process steps

Installing JetPack to your Jetson device requires you to perform the following steps:

1. Download and install the NVIDIA SDK Manager on the Linux host.
2. Connect your jetson device to the Linux host (Micro-USB OTG or network (same network segment).
3. Test your device can connect via ssh.
4. Use SDK Manager to select and install the required components.

Download and install the NVIDIA SDK Manager on the Linux host.

You must have a Linux host with internet access to run SDK Manager and refresh the developer kit. The supported host operating systems are:

Ubuntu Linux x64 Version 18.04 or 16.04

Download and install NVIDIA SDK Manager.

sdkmanager Installation package： **sdkmanager-[version].[build#].deb**

The current version is： **sdkmanager_1.2.0**

sdkmanager install

$ sudo apt install ./sdkmanager-[version].[build#].deb

Connect your jetson device to the Linux host

Prepare your Jetson device for the following settings. (If the equipment system is not initialized, the system user needs to initialize after power-on)

- Connect the monitor, keyboard, and mouse to the RTSO-3002 device (refer to the interface description above).
- Use a USB cable to connect the Linux host and the Micro USB OTG interface of the RTSO-3004 carrier board (or network (same network segment))
- During the setup process, SDK Manager will provide internet connection to your jetson device via Micro-USB OTG or network connection.
- Connect the supplied power adapter to the DC jack of the Jetson device and plug the AC port into an AC outlet.

Test that your device can connect via ssh.

If connected via Micro-USB OTG, enter lsusb under the Linux host terminal to see the nvidia crop

The device can be accessed through ping or ssh commands

$ ping 192.168.55.1

or

$ ssh <jetson_user>@192.168.55.1

If connected via a network, check whether the device ip address is in the same network segment as the Linux host on the RTSO-3002, and the RTSO-3002 device can be accessed through the ping or ssh command.

$ ping <jetson_ip>

or

$ ssh <jetson_user>@<jetson_device_ip>

Use SDK Manager to select and install the required components

NVIDIA SDK Manager supports installing software to Jetson core (Flying Cloud Smart Box). For complete instructions, please refer to Chapter 5 of "Orin NX System Programming Manual".

3.2 Developer tools

JetPack includes the following development tools. Some are used directly on the Jetson system, and some run on a Linux host connected to the Jetson system.

• Application development and debugging tools

• NSight Eclipse version for GPU-accelerated application development: runs on a Linux host. All Jetson products are supported.

• CUDA-GDB for application debugging: Runs on a Jetson system or a Linux host. All Jetson products are supported.

• CUDA-MEMCHECK to debug application memory errors: run on Jetson systems. All Jetson products are supported.

• Application analysis and optimization tools

• NSight Systems for application multi-core CPU profiling: runs on a Linux host. Helps you improve application performance by identifying slow parts of your code. All Jetson products are supported.

• NVIDIA® Nsight™ compute kernel profiler: an interactive profiling tool for CUDA applications. It provides detailed performance metrics and API debugging through the user interface and command line tools.

• NSight Graphics for Graphics Application Debugging and Profiling: A consolegrade tool for debugging and optimizing OpenGL and OpenGL ES programs. Running on a Linux host. All Jetson products are supported.

3. 3 Documentation

Documents related to developers using JetPack include:

• JetPack Documentation
• VisionWorks Documentation
• Nsight Eclipse Edition Documentation
• CUDA-GDB Documentation
• CUDA-MEMCHECK Documentation
• TensorRT Documentation
• cuDNN Documentation
• CUDA Toolkit
• NVIDIA Container Runtime
• OpenCV Documentation
• Jetson Linux Multimedia API Reference
• Nsight Systems
• nvprof
• Visual Profiler
• Nsight Graphics
• Nsight Compute CLI
• VPI–Vision Programming Interface

Terms of Warranty

Important note

Each embedded product provided by Realtimes Technology is free from any defects in material and process,fully in line with the specifications officially issued by the original factory.

Realtimes Technology warranty covers the original products,If the parts configured by the dealer are out of order, please consult with the dealer to solve the problem. All the baseplate and core modules provided by Ruitai New Era (Beijing) Technology Co., Ltd. are guaranteed for 3 years, while the other peripherals are guaranteed for 1 year (life-long maintenance service is provided if the warranty period is beyond the warranty period).The warranty period starts from the date of delivery, for the products repaired within the warranty period, the repair parts shall be extended for 12 months.Unless notified by Realtimes Technology, the date of your original invoice shall be the date of shipment.

How do I get warranty services

If the product does not work properly, Please contact Realtimes Technology or dealer for warranty service, please show invoice when product warranty(this is the proof for you getting warranty service).

Warranty solution

When you ask for warranty service, please follow Realtimes Technology warranty process,You will need to receive your first diagnosis from a technicial engineer by phone or by email,at that time,we need you to cooperate with us to fill in all the questions on the RMA form provided by us. Once we accurately determine the cause of the fault and the location of the damage ,we will provide the charge list for the out of warranty products,which needs your confirmation.Realtimes Technology keep the right to repair or replace the products. If the product is replaced or repaired, the replaced faulty product or the repaired and replaced faulty parts will be returned to Realtimes Technology.

For products under warranty,the customer shall bear the freight when the product is returned to the manufacturer,Realtimes Technology will bear the ship cost of the products after maintenance.

The following conditions are not covered by the warranty terms

a) Improper installation, improper use, misuse and abuse of products(Overloading, for example).
b) Improper maintenance and storage（Such as fire, explosion, etc）or natural disasters（such as lightning stroke,earthquake,typhoon,etc）
c) Personal unauthorized changing the product(such as changing circuit characteristics, mechanical characteristics, software characteristics,Conformal coating).
d) Other failures which are clearly due to misuse(such as overvoltage,polarity reversal, the pin bent or broken,the wrong connection,drop damage,transportation damage,damage due to over operating temperature and so on).
e) The logo and part number on the product have been deleted or removed.
f) The product is out of warranty.

Special concerns

If the same fault multiple occurrence for the products,in order to find out the reason causing the problem,we will request the users to provide the specific documents or information of peripheral equipment,such as monitor,I/O boards,cables,power supply, diagram and structure of the system,etc.If such documents or information are not available,we have the right to refuse to perform the warranty, the repairments will be charged accordingly.

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