

RTSO-6001B

Product Manual

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Revision History

Revision	Date	Reason for change	Applicable hardware version	Editor
V1.0	2020-02	Initial release	V1.0	
V1.1	2020-06	Add notes and indicators	V1.0	RT0086
V1.2	2022-03-08	Add software version supporting instructions	V1.0	RT0086



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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 RTSO-6001B). 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: 1 year (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: 010-84284669

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): <http://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: 010-84284669

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 010-84284669 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 Nano module is NVIDIA's deep learning machine processor with powerful computing power and a module the size of a credit card. Mainly aimed at the rapid development of artificial intelligence market in recent years, such as unmanned aerial vehicle, automatic driving system, etc., has a relatively broad application prospect. RTSO-6001B is an industrial-grade load plate for Nano, with a working temperature of $-40^{\circ}\text{C} \sim +80^{\circ}\text{C}$, low power consumption and high safety level, which can meet various harsh conditions.

1.1 Features

- Compatible with nvidia Jetson Nano module
- 1x USB Type A, support usb2.0 and usb3.0 signal, 1A max output current
- 1x USB Type A, support usb2.0 signal only, 1A max output current
- 1x Micro USB, support usb host mode and usb device mode, 1A max output current
- 1x Gigabit Ethernet
- 1x RTC battery interface
- 1x Mini- HDMI 2.0 (6Gbps, 24bpp, 4096x2160@60Hz)
- 1x Mini-PCIe interface
- 1x MIPI interface
- FAN interface with PWM
- 2 x 3.3v functional ports UART, 1 x Debug UART, 2 x I2C, 2 x SPI and GPIO reuse
- Size: 87mm × 57mm × 26.37mm
- Power input: +5V
- Temperature: $-40 \sim +80^{\circ}\text{C}$
- Weight: 56g

1.2 Ordering Information

Model Options	Description
RTSO-6001B	Support Jetson NANO module, 1 x GbE, 1 x Mini-PCie, 1 x mini-HDMI, 1 x MIPI CSI-2/2 Lane, 1 x USB OTG, 1 x USB 2.0, 1 x USB 3.0, 2 x I2C, 2 x SPI, 2 x UART, 12 x GPIOs(optional), 1 x Micro SIM, 1 x Micro SD, RoHS Compliant, provide Rite-Hite RTS Linux4Tegra software support package
RTSO-6001B-Cables	1 x Mini HDMI to HDMI cable; 1 x USB OTG; 4 x multi-function double row pin extension cables (UART, I2C, UART, SPI); 1 x RTC battery
RTS-NANO-AC/DC	NANO carrier board (Feiyun Smart Box) power adapter, 100-240VAC/5V/4A 20W
RTS-NANO-HS02(optional)	Active heat sink for NANO module (fan stack type)
RTS-NANO-HS03(optional)	Active radiator for NANO module (fan embedded type)
RPI Camera V2(optional)	Raspberry Pi MIPI camera, 8MP, Sony IMX219 module
FAW-1233-03(optional)	MIPI Camera Cable, Micro Coax I-PEX Cable, 300mm
RTSV-6911i (optional) Pro Capture Mini SDI (optional) Pro Capture Mini HDMI (optional)	Mini-pcie Video Capture Card ,RTSV-6911i (8-channel D1 NTSC/PAL video input), Pro Capture Mini SDI (single-channel SDI video input),Pro Capture Mini HDMI (single-channel HDMI Video Input)
miniPCie to M.2.M (optional)	mini-PCie to M.2 Key M interface card
Eco Capture Dual SDI M.2 (optional) Eco Capture Quad SDI M.2(optional)	M.2 Video capture card,Eco Capture Dual SDI M.2 (dual-channel SDI video input), Eco Capture Quad SDI M.2(four-channel SDI Video input)
ME909S-821(optional)	mini-PCie Full netcom 4G module

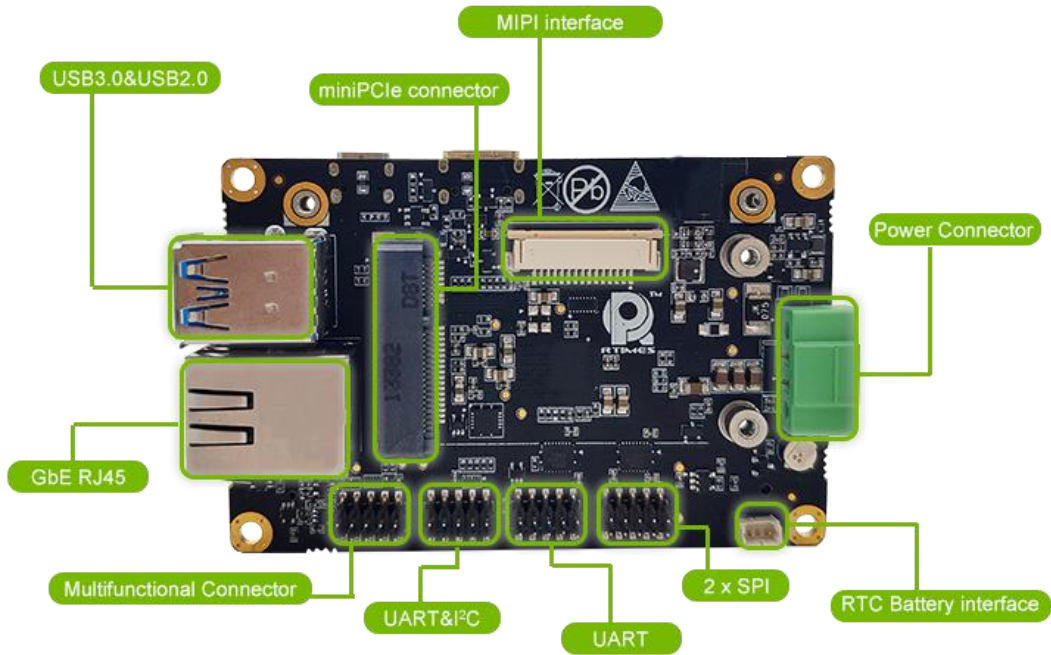
Order online

<https://shop340963258.taobao.com>

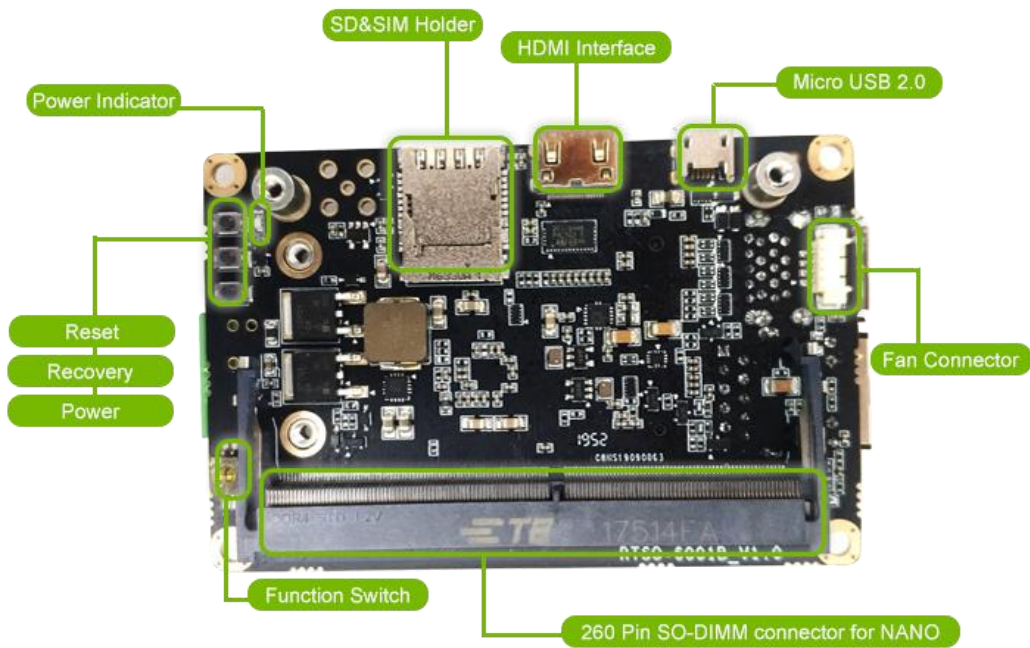
<https://mall.jd.com/index-824786.html>

Product specifications

1 External interface function and location




RTSO-6001B Top side




RTSO-6001B Bottom side

2 Connectors Description

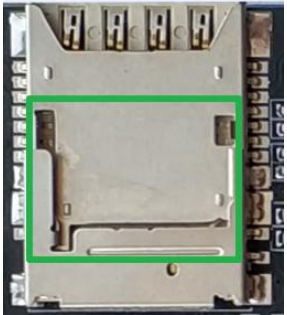
2.1 Module interface

Function	Connect NVIDIA Jetson Nano core module	
Type	260 Pin DDR4 SO-DIMM	
Pin define	Refer to the pin definition instructions in the NVIDIA Jetson Nano core module data book.	

2.2 Fan interface

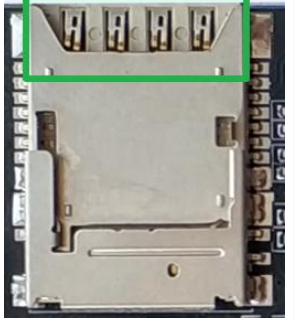
Function	Connect external cooling fan												
Type	Molex PicoBlade Header												
Pin define	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>GND</td> <td>2</td> <td>+5V</td> </tr> <tr> <td>3</td> <td>TACH</td> <td>4</td> <td>PWM</td> </tr> </tbody> </table>		Pin	Signal	Pin	Signal	1	GND	2	+5V	3	TACH	4
Pin	Signal	Pin	Signal										
1	GND	2	+5V										
3	TACH	4	PWM										

2.3 Micro SD card slot

Function	Micro SD (TF) slot																									
Marking	TOP																									
Type	Micro SD (TF)																									
Pin define	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>SDIO_DATA2</td> <td>2</td> <td>SDIO_DATA3</td> </tr> <tr> <td>3</td> <td>SDIO_CMD</td> <td>4</td> <td>SDIO_VCC</td> </tr> <tr> <td>5</td> <td>SDIO_CLK</td> <td>6</td> <td>GND</td> </tr> <tr> <td>7</td> <td>SDIO_DATA0</td> <td>8</td> <td>SDIO_DATA1</td> </tr> <tr> <td>9</td> <td>GND</td> <td>10</td> <td>SDIO_CD</td> </tr> </tbody> </table>		Pin	Signal	Pin	Signal	1	SDIO_DATA2	2	SDIO_DATA3	3	SDIO_CMD	4	SDIO_VCC	5	SDIO_CLK	6	GND	7	SDIO_DATA0	8	SDIO_DATA1	9	GND	10	SDIO_CD
Pin	Signal		Pin	Signal																						
1	SDIO_DATA2	2	SDIO_DATA3																							
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5	SDIO_CLK	6	GND																							
7	SDIO_DATA0	8	SDIO_DATA1																							
9	GND	10	SDIO_CD																							


2.4 Micro SIM slot

Function	SIM slot			
Marking	down			
Type	Micro SIM			
Pin define	Pin		Signal	
	S1	UIM_PWR	S2	UIM_RESET
	S3	UIM_CLK	S4	NC
	S5	GND	S6	UIM_VPP
	S7	UIM_DATA	S8	NC
	SIM card facing: notch facing inward			



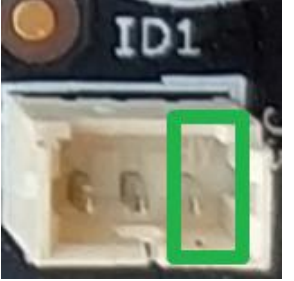
2.5 MiPi camera interface

Function	MiPi camera			
Type	FPC connector			
Pin define	Pin		Signal	
	1	GND	2	CON_CSI_A_D0_N
	3	CON_CSI_A_D0_P	4	GND
	5	CON_CSI_A_D1_N	6	CON_CSI_A_D1_P
	7	GND	8	CON_CSI_A_CLK_N
	9	CON_CSI_A_CLK_P	10	GND
	11	CON_CAM1_PWDN	12	CON_CAMA_MCLK
	13	CAM_I2C_SCL	14	CAM_I2C_SDA
	15	VDD_3V3	16	



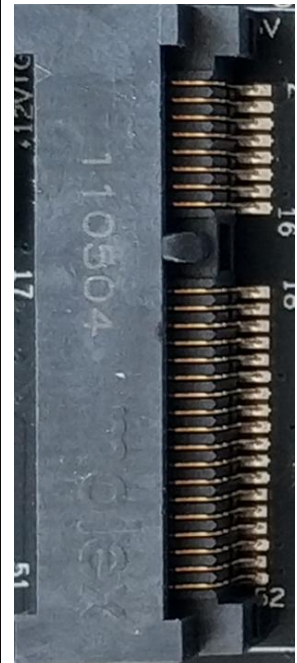
2.6 RTC battery interface

Function	RTC battery			
Type	1.0mm Pitch 1x3Pin SIP			
Pin define	Pin		Signal	
	1	GND	2	NC
	3	+3V	4	
	Pin-1: The green box on the right .			



2.7 Mini PCIE slot

Function	Mini PCIE slot																																																																																																															
Type	Mini PCIE																																																																																																															
Pin define	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr><td>1</td><td>WAKE</td><td>2</td><td>3.3V</td></tr> <tr><td>3</td><td>NC</td><td>4</td><td>GND</td></tr> <tr><td>5</td><td>NC</td><td>6</td><td>1.5V</td></tr> <tr><td>7</td><td>PCIE_CLKREQ</td><td>8</td><td>UIM_PWR</td></tr> <tr><td>9</td><td>GND</td><td>10</td><td>UIM_DATA</td></tr> <tr><td>11</td><td>PCIE_REFCLK-</td><td>12</td><td>UIM_CLK</td></tr> <tr><td>13</td><td>PCIE_REFCLK+</td><td>14</td><td>UIM_RESET</td></tr> <tr><td>15</td><td>GND</td><td>16</td><td>UIM_VPP</td></tr> <tr><td>17</td><td>NC</td><td>18</td><td>GND</td></tr> <tr><td>19</td><td>NC</td><td>20</td><td>W_DISABLE</td></tr> <tr><td>21</td><td>GND</td><td>22</td><td>PCIE_REST</td></tr> <tr><td>23</td><td>PCIE_RX-</td><td>24</td><td>3.3V</td></tr> <tr><td>25</td><td>PCIE_RX+</td><td>26</td><td>GND</td></tr> <tr><td>27</td><td>GND</td><td>28</td><td>1.5V</td></tr> <tr><td>29</td><td>GND</td><td>30</td><td>SMB_CLK</td></tr> <tr><td>31</td><td>PCIE_TX-</td><td>32</td><td>SMB_DAT</td></tr> <tr><td>33</td><td>PCIE_TX+</td><td>34</td><td>GND</td></tr> <tr><td>35</td><td>GND</td><td>36</td><td>CON_USB2_D-</td></tr> <tr><td>37</td><td>GND</td><td>38</td><td>CON_USB2_D+</td></tr> <tr><td>39</td><td>VCC_3V3_PCIE</td><td>40</td><td>GND</td></tr> <tr><td>41</td><td>VCC_3V3_PCIE</td><td>42</td><td>NC</td></tr> <tr><td>43</td><td>GND</td><td>44</td><td>NC</td></tr> <tr><td>45</td><td>NC</td><td>46</td><td>NC</td></tr> <tr><td>47</td><td>NC</td><td>48</td><td>1.5V</td></tr> <tr><td>49</td><td>NC</td><td>50</td><td>GND</td></tr> <tr><td>51</td><td>NC</td><td>52</td><td>3.3V</td></tr> </tbody> </table>				Pin	Signal	Pin	Signal	1	WAKE	2	3.3V	3	NC	4	GND	5	NC	6	1.5V	7	PCIE_CLKREQ	8	UIM_PWR	9	GND	10	UIM_DATA	11	PCIE_REFCLK-	12	UIM_CLK	13	PCIE_REFCLK+	14	UIM_RESET	15	GND	16	UIM_VPP	17	NC	18	GND	19	NC	20	W_DISABLE	21	GND	22	PCIE_REST	23	PCIE_RX-	24	3.3V	25	PCIE_RX+	26	GND	27	GND	28	1.5V	29	GND	30	SMB_CLK	31	PCIE_TX-	32	SMB_DAT	33	PCIE_TX+	34	GND	35	GND	36	CON_USB2_D-	37	GND	38	CON_USB2_D+	39	VCC_3V3_PCIE	40	GND	41	VCC_3V3_PCIE	42	NC	43	GND	44	NC	45	NC	46	NC	47	NC	48	1.5V	49	NC	50	GND	51	NC	52	3.3V
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2.8 Power interface


Function	Power IN											
Type	3.5mm											
Pin define	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>VCC (+)</td> <td>2</td> <td>GND (-)</td> </tr> </tbody> </table>				Pin	Signal	Pin	Signal	1	VCC (+)	2	GND (-)
	Pin	Signal	Pin	Signal								
1	VCC (+)	2	GND (-)									
Pin-1: The green box on the right . Max in: single +5V												




2.9 LED

Indication sign	Function description	Status description
ADD	Power indicator	Normally on - power on

2.10 Mini HDMI

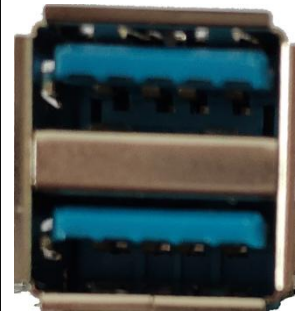
Function	HDMI				
Type	Mini HDMI				
Pin define	Pin	Signal	Pin	Signal	
	1	TMDS Data2+	2	TMDS Data2 GND	
	3	TMDS Data2-	4	TMDS Data1+	
	5	TMDS Data1 GND	6	TMDS Data1-	
	7	TMDS Data0+	8	TMDS Data0 GND	
	9	TMDS Data0-	10	TMDS Clock+	
	11	TMDS Clock GND	12	TMDS Clock-	
	13	CEC	14	No Connect	
	15	DDC clock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

2.11 Gigabit Ethernet

Function	Gigabit Ethernet				
Type	RJ45				
Pin define	Pin	Signal	Pin	Signal	
	1	TP0+	2	TP0-	
	3	TP1+	4	TP2+	
	5	TP2-	6	TP1-	
	7	TP3+	8	TP3-	

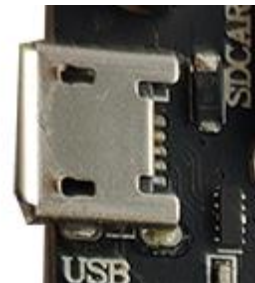
2.12 USB

Function	USB			
Type	Double USB Type-A			
Pin define	layer		top	
	Type		USB 3.0	
	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		bottom	
	Type		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+			
<p>USB2.0 enable depends on the dialing switch 1 located at the OFF position</p>				



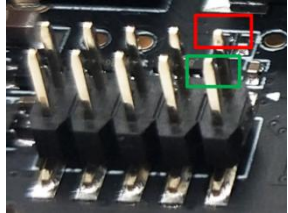

2.13 OTG-USB2.0

Function	USB2.0			
Type	USB 2.0 MicroType-B			
Pin define	Pin	Signal	Pin	Signal
	1	VBUS	2	USB 2.0 D-
	3	USB 2.0 D+	4	USB ID
	5	GND		
	<p>When usb-otg is in host mode, the USB ID Pin needs to float. When usb-otg is slave mode, USB ID Pin needs to be grounded.</p>			



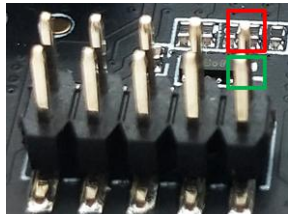

2.14 Function pin

Function	Function pin			
Type	2.0mm pitch 2x5Pin Dip			
Pin define	Pin	Signal	Pin	Signal
	1	DEV_3V3	2	GND
	3	DEV_3V3	4	GND
	5	BUTTON_PWR_ON	6	GND
	7	FORCE_RECOVERY	8	GND
	9	PMIC_SYS_RST	10	GND
<p>Pin-1: the mark in the red box on the right side of the picture.</p> <p>Pin-2: the mark in the green box of the picture on the right.</p> <p>Pin location: marked by the blue box on the right.</p>				

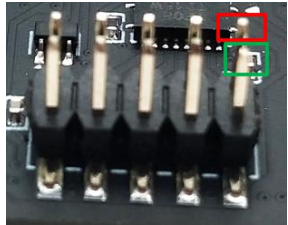

2.15 UART & I2C

Function	UART & I2C			
Type	2.0mm pitch 2x5Pin Dip			
Pin define	Pin	Signal	Pin	Signal
	1	GEN1_I2C_SCL	2	GEN2_I2C_SCL
	3	GEN1_I2C_SDA	4	GEN2_I2C_SDA
	5	DEV_3V3	6	DEV_3V3
	7	UART1_TXD_DBG	8	UART1_RXD_DBG
	9	GND	10	GND
<p>Pin-1: the mark in the red box on the right side of the picture.</p> <p>Pin-2: the mark in the green box of the picture on the right.</p> <p>Pin location: marked by the blue box on the right.</p> <p>UART1 Debug serial port, 3.3V TTL logic level The mapping file on the Linux system is ttyS0 in the /dev directory.</p> <p>The derived GEN1_I2C and GEN2_I2C buses correspond to the iic-1 and iic-0 buses in the Linux system.</p>				

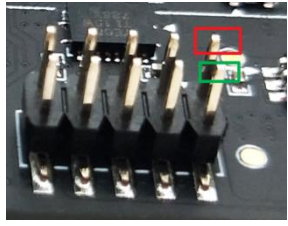

2.16 Serial port

Function	Serial port			
Type	2.0mm pitch 2x5Pin Dip			
Pin define	Pin	Signal	Pin	Signal
	1	UART2_RXD	2	UART2_TXD
	3	UART2_CTS	4	UART2_RTS
	5	UART3_RXD	6	UART3_TXD
	7	UART3_CTS	8	UART3_RTS
	9	DEV_3V3	10	GND
<p>Pin-1: the mark in the red box on the right side of the picture. Pin-2: the mark in the green box of the picture on the right.</p> <p>Pin location: marked by the blue box on the right.</p> <p>The two serial ports, UART2~ UART3, are both 3.3v TTL logic level.</p> <p>The mapping files for UART2 and UART3 on the Linux system are ttyTHS1 and ttyTHS2 in the /dev directory.</p>				

2.17 SPI

Function	SPI			
Type	2.0mm pitch 2x5Pin Dip			
Pin define	Pin	Signal	Pin	Signal
	1	SPI1_SCK	2	SPI1_MISO
	3	SPI1_MOSI	4	SPI1_CS0
	5	SPI2_SCK	6	SPI2_MISO
	7	SPI2_MOSI	8	SPI2_CS0
	9	DEV_3V3	10	GND
<p>Pin-1: the mark in the red box on the right side of the picture. Pin-2: the mark in the green box of the picture on the right.</p> <p>Pin location: marked by the blue box on the right.</p> <p>The mapping files for SPI1 and SPI2 on Linux systems are spi0.0 and spi1.0 in the /dev directory.</p>				

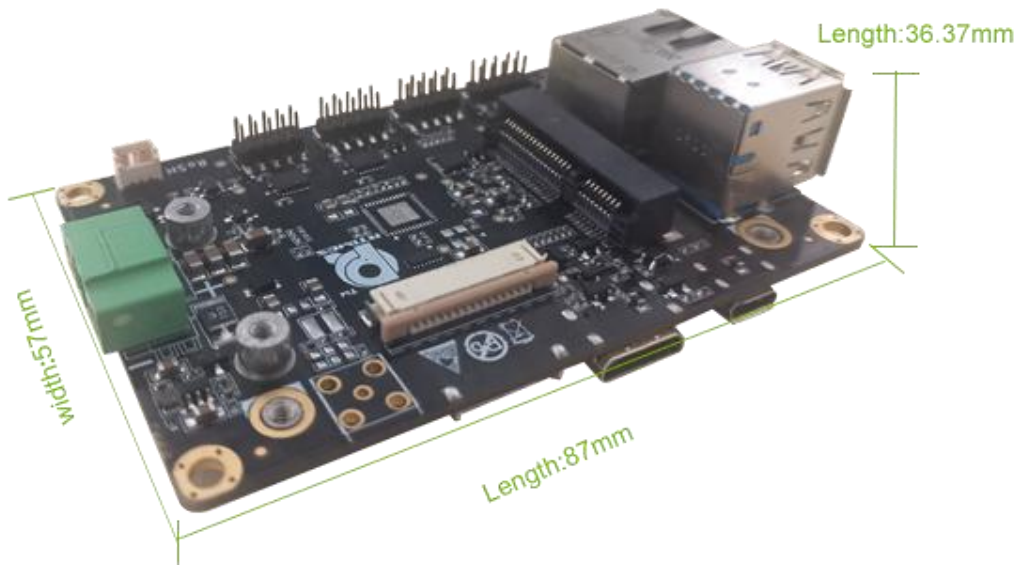



2.18 Dip Switch

Function	Dip Switch															
Type	2BIT Dip Switch															
Pin define	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #92d050;"> <th style="width: 10%;">bit</th> <th style="width: 15%;">status</th> <th style="width: 75%;">Fun</th> </tr> </thead> <tbody> <tr> <td rowspan="2">BIT1</td> <td>OFF</td> <td>default: enables USB2.0, Mini PCIE disables USB2.0</td> </tr> <tr> <td>ON</td> <td>disables USB2.0, Mini PCIE enables USB2.0</td> </tr> <tr> <td rowspan="2">BIT2</td> <td>OFF</td> <td>default: enables Micro USB2.0 power supplies to carrier board</td> </tr> <tr> <td>ON</td> <td>disables Micro USB2.0 power supplies to carrier board</td> </tr> </tbody> </table>			bit	status	Fun	BIT1	OFF	default: enables USB2.0, Mini PCIE disables USB2.0	ON	disables USB2.0, Mini PCIE enables USB2.0	BIT2	OFF	default: enables Micro USB2.0 power supplies to carrier board	ON	disables Micro USB2.0 power supplies to carrier board
bit	status	Fun														
BIT1	OFF	default: enables USB2.0, Mini PCIE disables USB2.0														
	ON	disables USB2.0, Mini PCIE enables USB2.0														
BIT2	OFF	default: enables Micro USB2.0 power supplies to carrier board														
	ON	disables Micro USB2.0 power supplies to carrier board														



3 Product size



4 Hardware update history

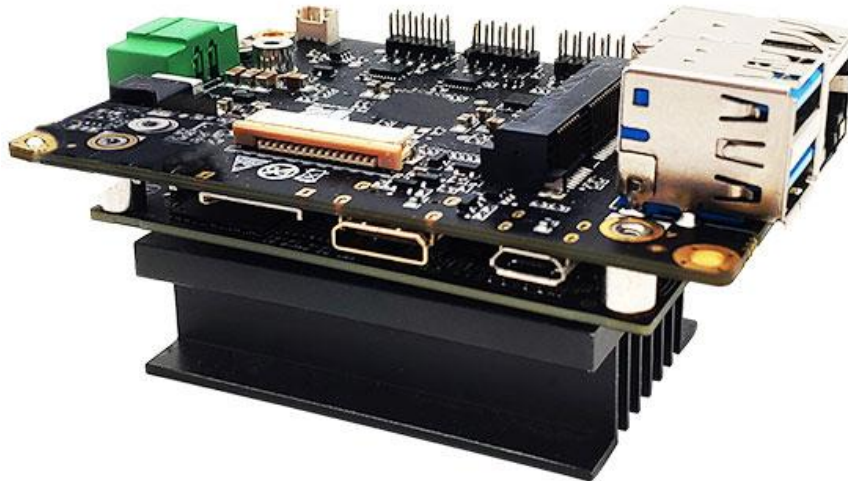
RTSO-6001B update history

Version	Reason for change
V1.0	Initial release

Software version supporting instructions

1 Installation and use

1.1 picture of products



1.2 How to use the board

The carrier board cannot work alone, it needs to be used in conjunction with the Nano module. After aligning the inter-board connector with the module high-speed connector, press evenly with both hands to connect it; and use the screws provided with the product to reinforce and fix it.

Before using the 6001B carrier board, you must confirm that the Nano core module has an operating system loaded with realtimes BSP. For the installation of the operating system and jetpack, please refer to the [Nano system instruction manual](#) (Ruitai cloud network disk/help document).

- a) Ensure all external system voltages are turned off
- b) install the core module of Nano on the 260 Pin so-dimm connector. Please pay attention to the alignment between connectors during the installation process, apply uniform force, and install the fixing screw at the same time.
- c) install necessary external cables.(e.g., the display cable to the HDMI monitor, the power input cable to power the system, the USB cable to connect the keyboard and mouse...)
- d) connect the power cord to the power supply.
- e) RTSO-6001B adopts automatic/manual power on design. Turn on the power and the system starts to work.
- f) for systems without protective enclosure, please avoid moving the whole system after the system is powered on. It is strictly prohibited to touch the circuit board and its electronic components.

Jetson Nano modules are designed to optimize power efficiency and support multiple software-defined power modes. These power modes limit the budget of the module to around 5W or 10W

by limiting the GPU and CPU frequencies and the number of CPU cores online to pre-approved levels. For detailed information and settings of the power mode, you can check the help document [Jetson platform working mode settings and tegrastats status query](#).

1.3 Recovery Mode

Jetson Nano core module can work in normal mode and Recovery mode, in which file system update, kernel update, boot loader update, BCT update and other operations can be performed.

Procedure to place system in Force USB Recovery Mode:

- a) Power down the device.
- b) Use a USB cable to connect the Micro USB (OTG) port of RTSO-6001B to the Host (PC) development host USB port.
- c) Press the Recovery button and do not release it. Power supply to the system will be maintained for more than 3 seconds, and then release the Recovery button
- d) The system enters the Recovery mode, and subsequent operations can be carried out at this time.

2 L4T (Linux for Tegra Abbreviation “L4T”)

The RTSO-6001B board works on systems that burn using the official original NVIDIA Linux For Tegra (L4T) ,HDMI, gigabit Ethernet, USB2.0, serial port, GPIO, I2C bus, fan interface, superstratum USB3.0 can be supported. But SD card, substratum USB3.0 can't work normally.

NVIDIA LT4 package can be downloaded from the following link:

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

RTSO-6001B Driver patch support package download:

<https://www.realtimesai.com/en/software.html>

For the installation of the operating system and jetpack, please refer to the [Nano system instruction manual](#) (Ruitai Cloud Network Disk/Help Documentation/Jetsonx System Burning and Backup Directory).

RTSO-6001B board level patch support package download jump 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 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 Jetson device (please refer to the interface description above).

- Use the USB cable to connect the Micro USB OTG interface (or network (same network segment)) with the USB cable connecting the Linux host and the RTSO-6001B carrier.
- During the setup process, SDK Manager will provide Internet connection for your jetson Feiyun Smart Box via USB or network connection.
- Connect the supplied power adapter to the DC jack of the Feiyun Smart Box, and plug the AC interface into an AC power outlet.

Test that your device can connect via ssh.

If connected via Micro USB, 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 Feiyun Smart Box, and the Feiyun Smart Box 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 "[Nano 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 technical 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 repairsments will be charged accordingly.

Rev.C 6/2020

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