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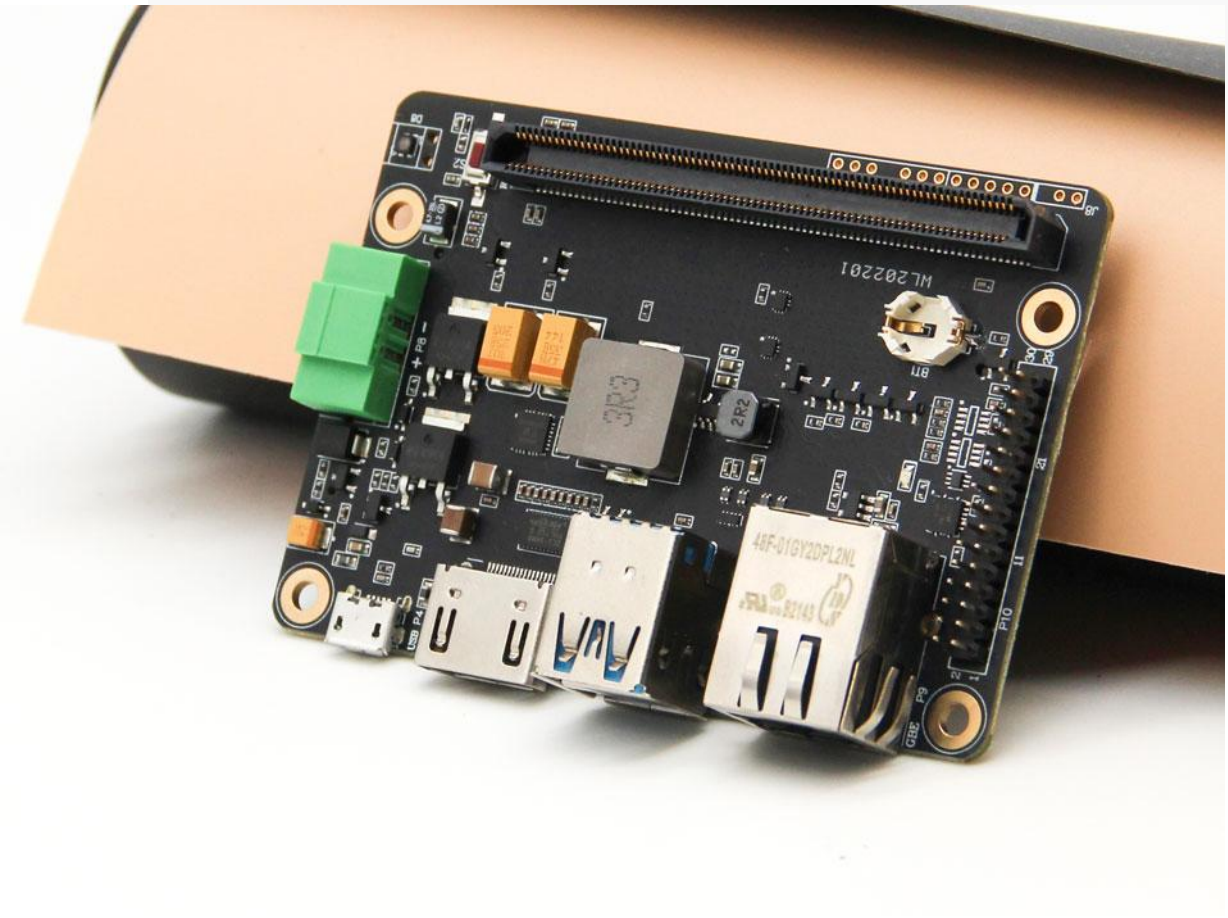
PLink-AI

AI Development Carrier Board

Y-C1

Datasheet



Version V2.1

Date 2025-01-06

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Document History

Version	Date	Description of Change	Hardware Version
V 1.0	2019-12-21	Preliminary Release	V 1.0
V 1.1	2020-02-20	1. Added Y-C1 order type description. 2. Added LED indicator color description.	V 1.0
V 2.0	2023-11-16	1. Modify the datasheet template. 2. Added the description of interface function test.	V 1.0
V 2.1	2024-01-06	Modify font	V 1.0

Hardware Update History

Version	Date	Description of Change
V 1.0	2019-12-21	Initial version

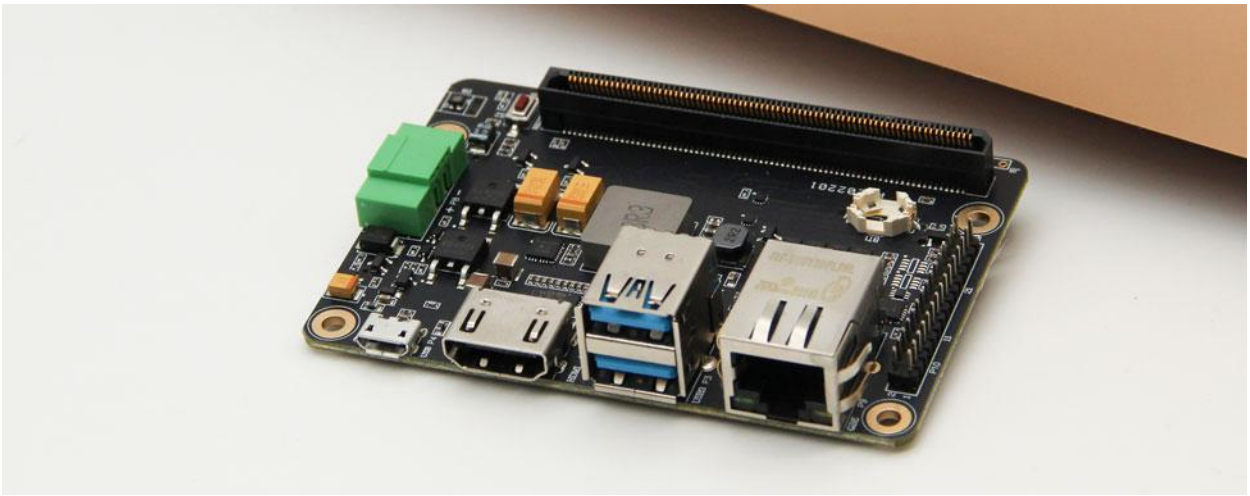
Electronic components and circuits are very sensitive to electrostatic discharge, although the company will design the main interface on the board card to do anti-static protection design, but it is difficult to do anti-static safety protection for all components and circuits. Therefore, it is recommended that you take ESD safety measures when handling any circuit board component.

ESD safety measures include but are not limited to the following:

1. Put the card in an ESD bag during transportation or storage. Do not take out the card until installation and deployment.
2. Before touching the board, release the static electricity stored in the body: Wear a grounding wrist strap.
3. Operate circuit boards only in electrostatic discharge safe areas.
4. Avoid moving circuit boards in carpeted areas.
5. Avoid direct contact with electronic components on the board through edge contact.

Table of Contents

1 Introduction



Y-C1 is a low-cost, compact carrier board with NVIDIA® Jetson™ TX1/TX2/TX2-4GB/TX2i series core modules for compact deployment needs. For industrial deployment applications, the main interfaces are designed for electrostatic safety protection, and a high-reliability power supply application scheme is adopted. The input power supply has overvoltage and reverse polarity protection functions, and has a variety of external interfaces, All components on the board adopt wide-temperature models.

Y-C1 has a 150-pin high-speed signal expansion connector, which can generate SATA / PCIe / MIPI CSI / I2C / I2S / SPI / DP and other signals. It can be used directly on the company's expansion carrier board Y-C1-E1.

2 Specifications

	Feature
Y-C1	Carrier Board
Module	NVIDIA Jetson TX1/TX2 Series Modules
Temperature	-40 ~ +85°C
Dimensions (L×W×H)	87mm * 60mm * 16mm (Including I/O ports and mounting holes)
Weight	51g

Power

Power Supply	Spec
Input Type	DC
Input Voltage	+7V ~ +19V

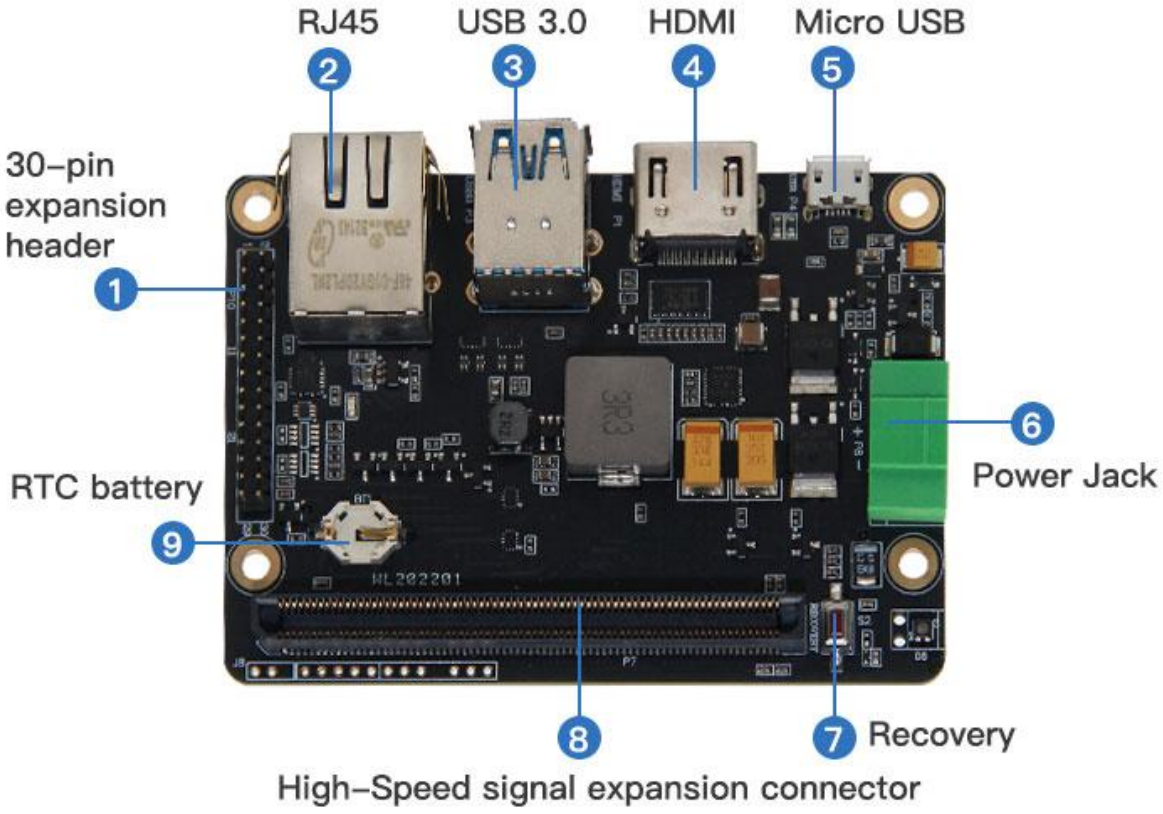
I/O Ports

Interface	Quantity	Interface	Quantity
USB3.0 Type-A	2	Micro USB	1
RJ45	1	HDMI	1
Recovery Button	1	LED	1
RTC Battery Holder	1	DC power Jack	1
30pin Connector	1(4*UART\4*GPIO\1*I2C\2*CAN)		
150pin Connector	1(DP\PCIe\MIPI CSI\SATA\I2C\I2S\SPI)		
Note: The CAN bus interface function is not available when used with the Jetson TX1 module.			

NVIDIA Jetson Series Modules Technical Specifications

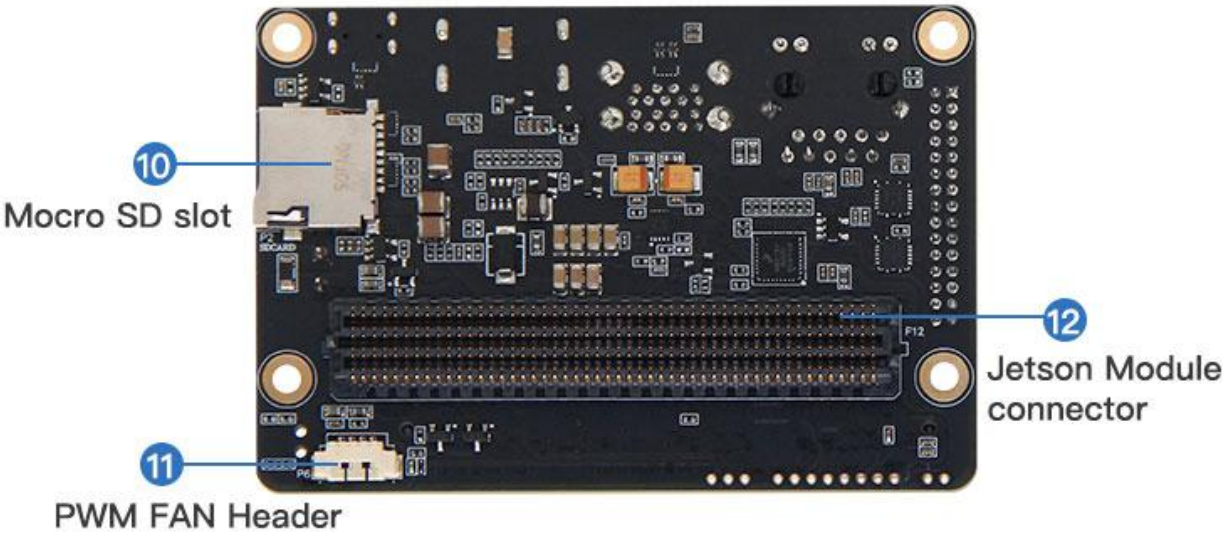
Module	TX2 4GB	TX2 8GB	TX2 Industrial
AI Performance	1.33 TFLOPS		1.26 TFLOPS
GPU	256-core NVIDIA Pascal™ architecture GPU		
CPU	Dual-core NVIDIA Denver™ 2 64-bit CPU and quad-core Arm® Cortex®-A57 MPCore processor		
Memory	4GB 128-bit LPDDR4 51.2GB/s	8GB 128-bit LPDDR4 59.7GB/s	8GB 128-bit LPDDR4 (ECC Support) 51.2GB/s
Storage	16GB eMMC 5.1	32GB eMMC 5.1	
Video Encode	1x 4K60 (H.265) 3x 4K30 (H.265) 4x 1080p60 (H.265)		
Video Decode	2x 4K60 (H.265) 7x 1080p60 (H.265) 14x 1080p30 (H.265)		
CSI Camera	Up to 6 cameras (12 via virtual channels) 12 lanes MIPI CSI-2 D-PHY 1.2 (up to 30 Gbps)		
Power	7.5W - 15W		10W - 20W
Mechanical	87mm x 50mm 400-pin connector Integrated Thermal Transfer Plate		

3 External I/O Ports



Y-C1 Front Ports

Sign	Function	Sign	Function
P1	Type A HDMI	P3	USB 3.0 Type A
P4	Micro USB	P7	150pin multifunctional high-speed signal extension connector
P8	Power In(+7V ~ +19V)	P9	RJ45 Jack (10/100/1000Mbps Ethernet)
P10	Multi-function pin(30 pin)	BT1	621 RTC Battery Socket(3.3V)
S2	RECOVERY Button，used to set the core module to recovery mode		



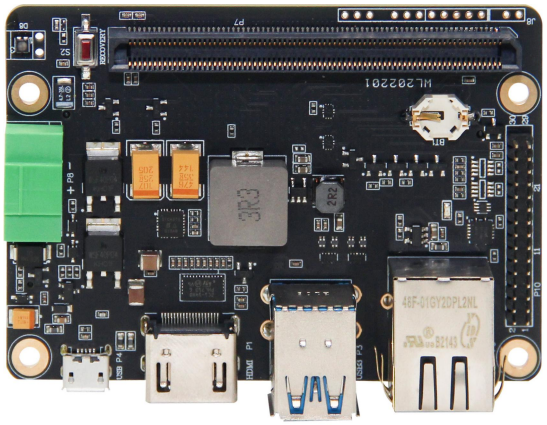
Y-C11 Back Ports

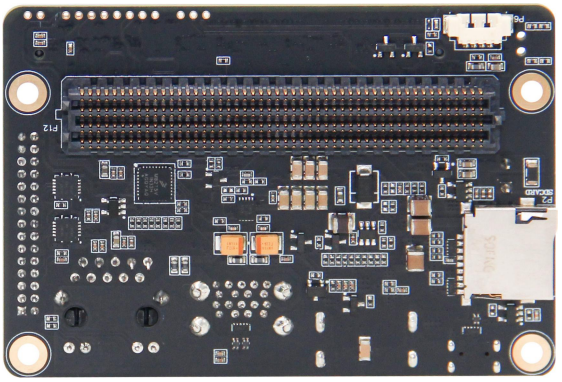
Sign	Function	Sign	Function
P2	Micro SD Slot	P6	PWM FAN
P12	400-pin connector for Jetson TX1/TX2/TX2-4GB/TX2i modules		

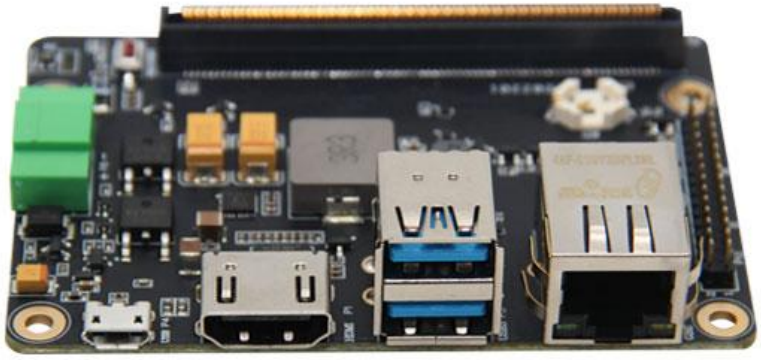
LED Description

<table>
<tr><th>Sign</th><th>Function</th></tr>
<tr><td>D9</td><td>1.8V power status lamp</td></tr>
<tr><td>D8</td><td>Three-color multi-function status indicator
<table>
<tr><th>Lamp status</th><th>Statements</th></tr>
<tr><td>Green light shining</td><td>The core module is powered on properly</td></tr>
<tr><td>Green light on</td><td>The input voltage is smaller than the required startup voltage</td></tr>
<tr><td>Blue light shining</td><td>Wait to press the power button to turn it on</td></tr>
<tr><td>Cyan lights(blue + green) shining</td><td>The carrier board is working, core module is not working</td></tr>
<tr><td>Purple light(bule + red) shining</td><td>Operating system shutdown</td></tr>
<tr><td>Red light shining</td><td>Entered maintenance mode</td></tr>
</table></td></tr>
</table>

4 All-Round Display

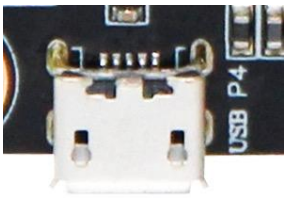






5 Connector Description

Jetson module Connector（P12）		
Function	Connect NVIDIA Jetson TX1/TX2 Series Modules	
Sign	P12	
Type/Model	Samtec：SEAM-50-03.5-S-08-2-A-K	
Explain	See the L4T Development Guide for details about software support for those modules.	

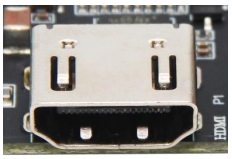
Micro USB 2.0（P4）		
Function	USB 2.0 Connector	
Sign	P4	
Type/Model	Type-B standard Micro USB 2.0 connector	
Pin definition	<table><tr><th>Pin</th><th>Signal</th><th>Pin</th><th>Signal</th></tr><tr><td>1</td><td>VBUS</td><td>2</td><td>USB 2.0 D-</td></tr><tr><td>3</td><td>USB 2.0 D+</td><td>4</td><td>USB ID</td></tr><tr><td>5</td><td>GND</td><td></td><td></td></tr></table> When USB-OTG is in host mode，the USB ID pin must float。 When USB-OTG is in device mode，the USB ID pin must be GND。	

HDMI Connector（P1）

Function	HDMI Display Connector
Sign	P1
Type/Model	Type-A Standard HDMI Connectors

Pin definition

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	NC
15	DDC clock	16	DDC data
17	DDC GND	18	+5V
19	Hot Plug Detect		



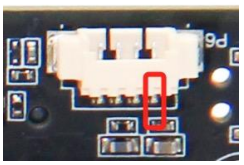
Fan Header（P6）

Function	4-pin fan header for 5V PWM fan
Sign	P6
Type/Model	Molex PicoBlade Header

Pin definition

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

Pin 1 Position: right picture identification.

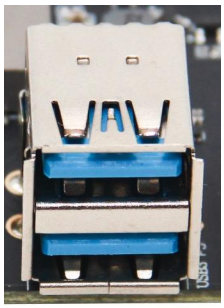


USB 3.0 Connector（P3）

Function	USB 3.0 Connector
Sign	P3
Type/Model	USB3.0 Type-A (x2 Stacked)

Pin definition

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+		

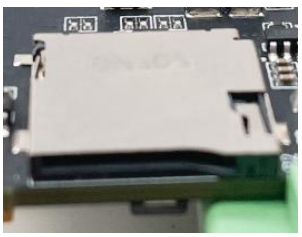


Micro SD Card Slot（P2）

Function	Micro SD（TF）Card Slot
Sign	P2
Type/Model	Micro SD（TF）

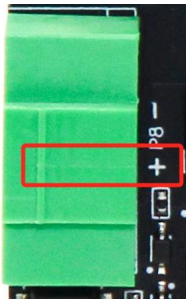
Pin definition

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



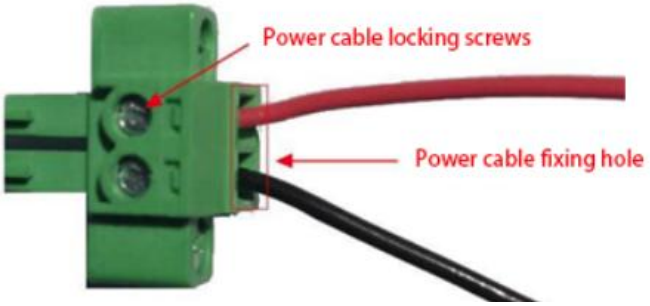
Power Jack（P8）

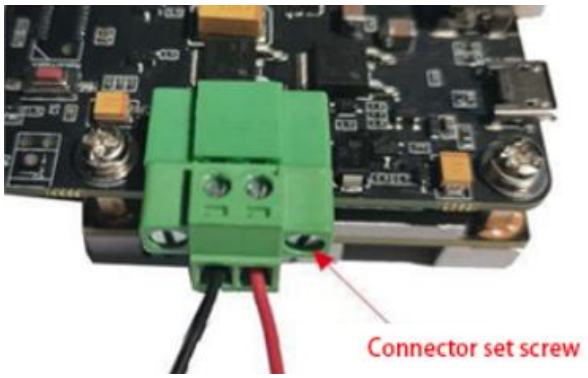
Function	Power supply input terminal（Female head）
Sign	P8
Type/Model	The 3.5mm power supply terminals
Pin definition	Pin 1: Signal VCC(+); Pin 2: Signal GND(-) Input voltage range: +7V ~ +19V.



Power cable connection step:

1. Loosen the power cable locking screw of the power terminal(male head) in the accessory bag;
2. Insert the cable into the cable fixing hole on the wiring terminal(male head);
3. Tighten the power cable locking screw of the power terminal(male)(pay attention to the polarity of the power cable);
4. Insert the male power terminal into the female power terminal on the board card;
5. Tighten the fastening screws on the power terminal connector.

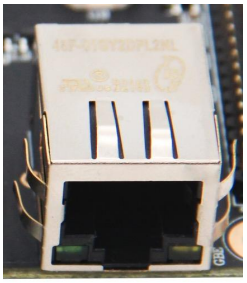




Ethernet Jack（P9）

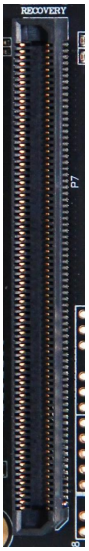
Function	10/100/1000 BASE-T Ethernet
Sign	P9
Type/Model	RJ45 Ethernet Connector
Pin definition	

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



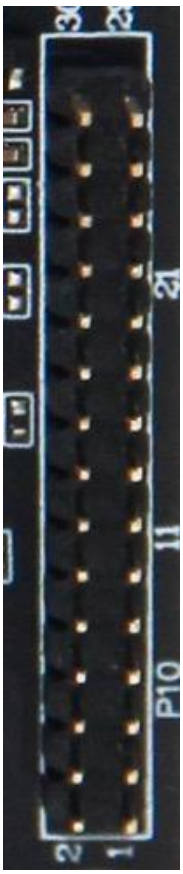
High-speed Signal Expansion Connector（P7）

Function	150pin high-speed signal expansion connector
Sign	P7
Type/Model	Pinlink-20202204150
Pin definition	Signals that can be drawn from this connector: 1. Second DP display signal; 2. PCIe x2 + PCIe x1 signal or PCIe x1 + PCIe x1 +USB3.0 x1 signal; 3. 6Lane MIPI CSI signal; 4. SATA signal; 5. Multiple I2C, I2S, SPI signals. Please contact sales for a detailed documentation of this interface!



30-pin Extension Header（P10）

Function	Multi-function signal extension interface
Sign	P10
Type/Model	30-pin(2.0mm pitch, 2*15)



Pin definition

Pin	Signal	Pin	Signal
1	3.3V	2	3.3V
3	UART0_RX	4	UART0_TX
5	UART1_RX	6	UART1_TX
7	UART2_RX	8	UART2_TX
9	UART3_TX	10	UART3_RX
11	GPIO0	12	GPIO1
13	GPIO2	14	GPIO3
15	GND	16	GND
17	I2C_DAT	18	I2C_CLK
19	CAN1_L	20	CAN1_H
21	CAN0_K	22	CAN0_H
23	GND	24	GND
25	POWER_BUTTON	26	GND
27	RESET_BUTTON	28	RECOVERY_BUTTON
29	REC_BAT_IN（+3V）	30	5V

The four serial ports UART0 to UART3 are all 3.3v TTL logic levels. UART0 is the kernel debugging serial port, used to output c-boot, u-boot, and Linux kernel information. After the Linux kernel is started, UART0 is used as the serial port of the display and control terminal. The default serial port of TX1/TX2 series is 115200bps, 8N1. The TX1 modules does not support UART3.
The following table lists the device file names mapped in Linux:

UART0	UART1	UART2	UART3
/dev/ttyS0	/dev/ttyTHS2	/dev/ttyTHS1	/dev/ttyTHS3

The GPIO high level voltage is 3.3V, and the GPIO mapping number is shown in the following table:

	GPIO0	GPIO1	GPIO2	GPIO3
TX1	187	186	89	202
TX2	388	298	480	486

The I2C bus corresponds to the IIC-0 bus in the Linux system. pin29 supplies power to the RTC clock.

6 Ordering Information

Order Type	Description
Y-C1	NVIDIA® Jetson™ TX1/TXX2/TX2-4GB/TX2i core module is equipped with miniaturized carrier board.
Y-C1-L	Non-welded Multi-function high-speed Signal Expansion Connector (P7) version Y-C1 carrier board

E-commerce Platform

Taobao Store Address: https://shop333807435.taobao.com/

Jingdong Store Address: https://mall.jd.com/index-11467104.html?from=pc

Ali International Station Address: https://plink-ai.en.alibaba.com/

7 Recovery Mode

Jetson core module can work in normal mode and Recovery mode. In Recovery mode, it can perform file system update, kernel update, Bootloader/UEFI update, BCT update and other operations.

To enter the Recovery mode, perform the following steps:

Power off the system.

Use a Micro-USB cable to connect the Micro-USB port (P7) of the Y-C1 to the Jetson development host USB port.

The Jetson development host should be Ubuntu18.04 or Ubuntu20.04 based on X86 architecture.

Press the Recovery key (S2) to power the system. Hold down the Recovery key (S2) for more than 3 seconds, and then release the Recovery key (S2).

When the system enters Recovery mode, you can perform subsequent operations.

8 Method of Application

- Make sure all external system voltages are off.
- Install the Jetson core module onto the P12 high-speed connector. Ensure that the connectors are aligned with even force. After the module is installed in place, install the core module fixing screws.
- Install necessary external cables. (such as: the display line connected to the HDMI display, the power input line for the system power supply, the USB cable connecting the keyboard and mouse...)
- Follow the power input interface (P8) instructions, Connect the power cord to the power supply. (Make sure that the heat dissipation device on the core module is installed before power-on).
- For a system without a protective cover, do not move the hardware system after the system is powered on. Do not touch the circuit board or any electronic components on the circuit board with your body

9 GPIO Test

Y-C1 leads to the 4-way GPIO of the core module. Programmable output voltage 3.3V, please note that the input voltage does not exceed 3.3V.Take the TX2 8GB module, GPIO0 as an example:

The content after the '#' in the following command is a comment and does not need to be added when executing the command.

- sudo su
- echo 388 > /sys/class/gpio/export #Enable GPIO（Or initialize GPIO）
- echo out > /sys/class/gpio/gpio388/direction
  #Set the GPIO input and output directions to out or in.
- echo 1 > /sys/class/gpio/gpio388/value
  # Set the GPIO output high/low level to 1 for high and 0 for low.

The preceding absolute path name is based on the actual path name generated after GPIO is enabled.

When set to the input state, you can only read values. When set to the output state, you can read and write values.

- cat /sys/class/gpio/gpio388/value #Get GPIO value。

The output state can be measured using a multimeter to measure the voltage between the specific lead heel GND.

10 CAN Test

When Y-C1 is configured with TX2 modules, two CAN channels are standard. If you need to connect an external CAN device to test, connect the **CAN_H** of the device to the **CAN_H** of the device under test and the **CAN_L** to the **CAN_L** of the device under test. Two CAN buses can also be tested. During the test, connect the **CAN0_H** of the device to **CAN1_H** and the **CAN0_L** to **CAN1_L**. The test command is as follows：

- sudo apt-get install busybox can-utils

Writes the specified value to a register

- sudo busybox devmem 0x0c303020 w 0x458
- sudo busybox devmem 0x0c303018 w 0x400
- sudo busybox devmem 0x0c303010 w 0x458
- sudo busybox devmem 0x0c303008 w 0x400
- sudo modprobe can #Load the CAN bus subsystem support module
- sudo modprobe can_raw #Load the original CAN protocol module.
- sudo modprobe mttcan#Load CAN interface support
- sudo ip link set can0 type can bitrate 500000
  # Set CAN0 bit rate to 500k bps
- sudo ip link set can1 type can bitrate 500000
  #Set CAN1 bit rate to 500k bps
- sudo ip link set up can0 #Open CAN0
- sudo ip link set up can1 #Open CAN1
- candump can0 #Set CAN0 to recvive
- cansend can1 1F223344#1122334455667788

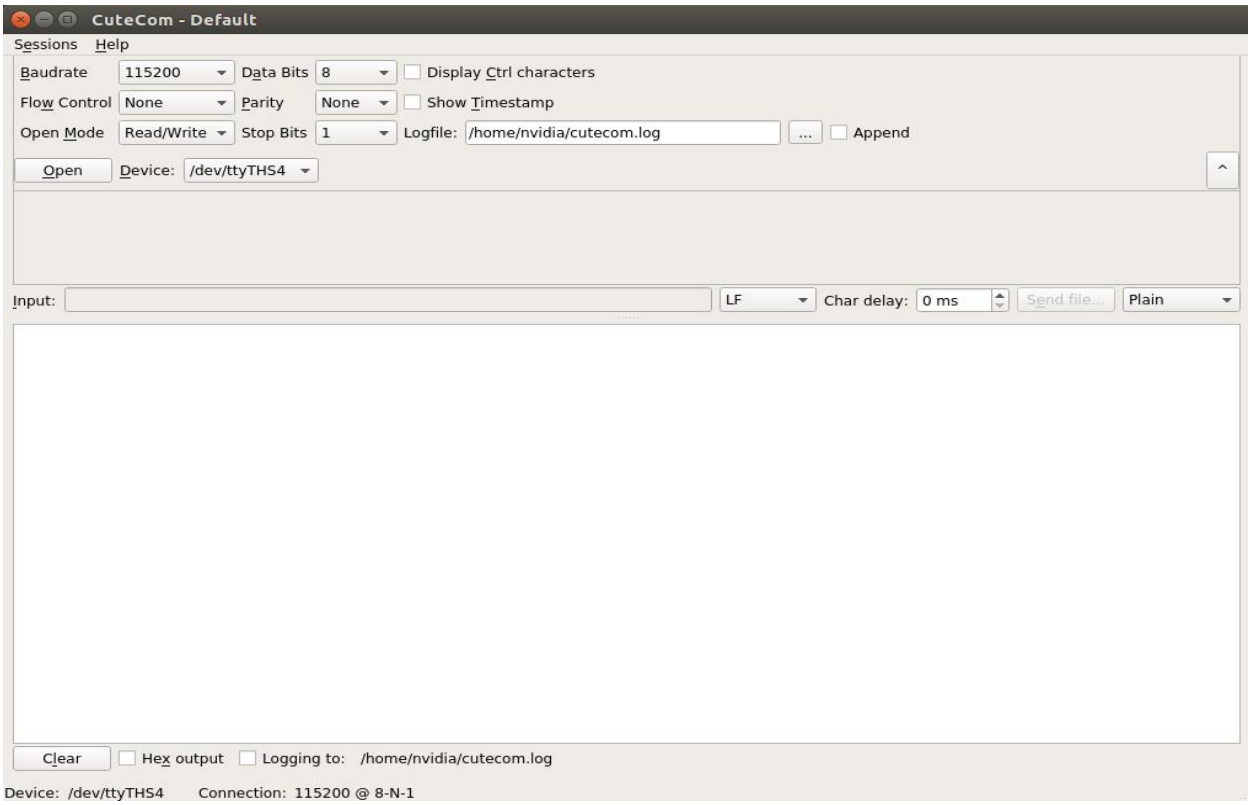
  # Open another terminal to send data through CAN1. After sending, there will be data echo at the receiving end of CAN0.

11 Serial Port Test

When the Y-C1 is configured with the TX2 module, it is equipped with three 3.3V TTL serial ports as standard, which can be used for self-collecting test of a single serial port and interconnection test of two serial ports. The command is as follows：

- sudo apt-get install cutecom #install the serial port test tool
- sudo cutecom
- When testing a single serial port, connect the RX of a single serial port to the TX. When the two serial ports are connected, the RX of UART1 is connected to the TX of UART2, and the TX of UART1 is connected to the RX of UART2.

The interface of the serial port test tool cutecom is as follows:



12 Special Instructions

- Initial system username: **nvidia** , password: **nvidia**， no password su. If root permissions are required, use sudo to grant permissions, or use sudo su to access the root user.
- The pre-installed system is pure by default and does not contain Jetpack software. You can use the following command to install the software. Do not replace or modify the default software source before installation:
    - sudo apt-get update
    - sudo apt-get install nvidia-jetpack
- It can also be installed over the network using SDKmanager software.
- For more information please refer to :Jetson wiki (plink-ai.com)