DEBIX R3576-01 User Guide

Version: V1.1 (2025-4)

Compiled by: Polyhex Technology Company Limited (http://www.polyhex.net/)

The DEBIX R3576-01 is a commercial-grade single-board computer based on the Rockchip RK3576, which provides comprehensive system software development and rich I/O interfaces for rapid application in intelligent robotics, edge computing, Internet of Things and security.

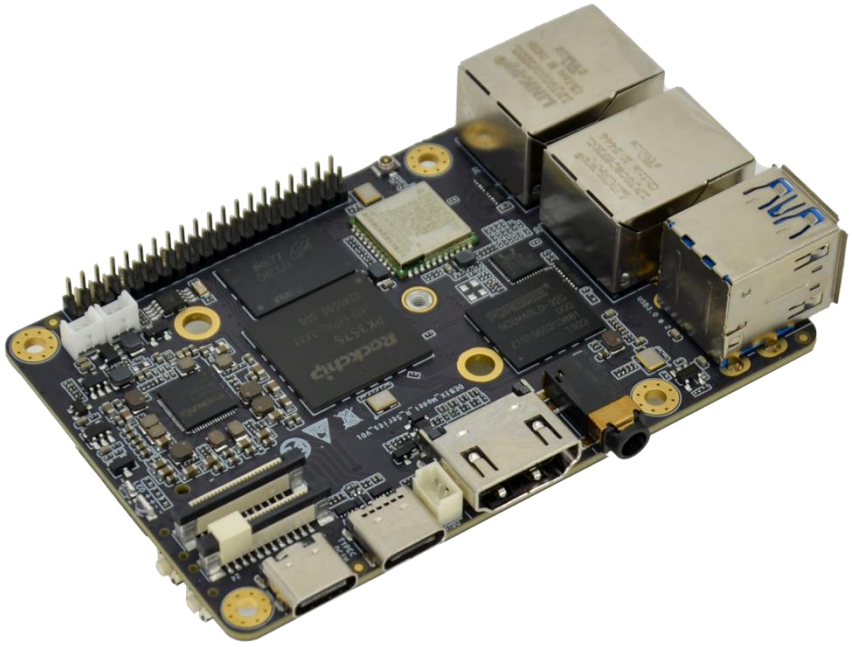

Figure 1 DEBIX R3576-01

REVISION HISTORY		
Rev.	**Date**	**Description**
1.0	2025.3.17	First edition
1.1	2025.04.30	Added 1.3.Declaration of Compliance

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Chapter 1 Security

1.1. Safety Precaution

This document informs how to make each cable connection. In most cases, you will simply need to connect a standard cable.

Table 1 Terms and conventions

Symbol	Meaning
Warning! 	Always disconnect the power cord from the SBC whenever there is no workload required on it. Do not connect the power cable while the power is on. Sudden power surges can damage sensitive electronic components.
Caution! 	Always ground yourself to remove any static electric charge before touching the *DEBIX R3576-01* product. Modern electronic devices are very sensitive to electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.

1.2. Safety Instruction

To avoid malfunction or damage to this product please observe the following:

1. Disconnect the device from the DC power supply before cleaning. Use a cloth. Do not use liquid detergents or spray-on detergents.

2. Keep the device away from moisture.

3. Before connecting the power supply, ensure that the voltage is in the required range, and the way of wiring is correct.

4. Carefully put the power cable in place to avoid stepping on it.

5. If the device is not used for a long time, power it off to avoid damage caused by sudden overvoltage.

6. If one of the following situations occur, get the equipment checked by service personnel:

- The power cord or plug is damaged.
- Liquid has penetrated into the equipment.
- The equipment has been exposed to moisture.
- The equipment does not work well, or you cannot get it to work according to the user's manual.
- The equipment has been dropped and damaged.
- The equipment has obvious signs of breakage.

7. Do not place the device outside the specified ambient temperature range. This will damage the machine. It needs to be kept in an environment at controlled temperature.

8. Due to the sensitive nature of the equipment, it must be stored in a restricted access location, only accessible by qualified engineer.

DISCLAIMER: Polyhex assumes no liability for the accuracy of any statement of this

instructional document.

1.3. Declaration of Compliance

This product has passed the following certifications:

Table 2 Compliance Certification

Symbol	Meaning
CE	This equipment has passed CE certified.
RoHS	This equipment is manufactured in compliance with RoHS regulations.
UK CA	This equipment has passed UKCA certified.
FC	This equipment has passed FCC certified.

1.4. Technical Support

1. Visit DEBIX website https://www.debix.io/ where you can find the latest information about the product.

■ Quick Links:

Debix Documentation: https://debix.io/Document/manual.html

Debix Blog: https://debix.io/Software/blog.html

Debix GitHub: https://github.com/debix-tech

2. Contact your distributor, sales representative or DEBIX's customer service center for

technical support if you need additional assistance. Please have the following info ready before you call:

- Product name and memory size
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

■ TechSupport Platforms:

Discord Community (recommended): https://discord.com/invite/adaHHaDkH2

Email: teksupport@debix.io

Chapter 2 Introduction

The DEBIX R3576-01 is a robust, commercial-grade single-board computer built around the powerful Rockchip RK3576 processor. It provides a comprehensive software development environment and a rich set of I/O interfaces, making it ideal for accelerating the development of intelligent robotics, edge computing, IoT, and security solutions.

Main features:

- **Powerful Performance:** Built for demanding commercial or consumer applications, DEBIX R3576-01 boasts a quad-core ARM Cortex-A72 and a quad-core ARM Cortex-A53 CPU up to 2.2GHz and up to 16GB LPDDR4/LPDDR4X RAM. This combination ensures smooth operation even for complex processing tasks.
- **Commercial-grade Build:** Designed for harsh environments, DEBIX R3576-01 features commercial-grade components and a wide CPU temperature range of 0℃ to 70℃.
- **Rich Connectivity:** DEBIX R3576-01 offers a comprehensive range of connectivity range of connectivity options, including Gigabit Ethernet, 2.4GHz

& 5GHz Wi-Fi 6, Bluetooth 5.4, high-speed USB 3.0, and PCIe support. This allows for easy connection and control of various peripherals.

2.1. Overview

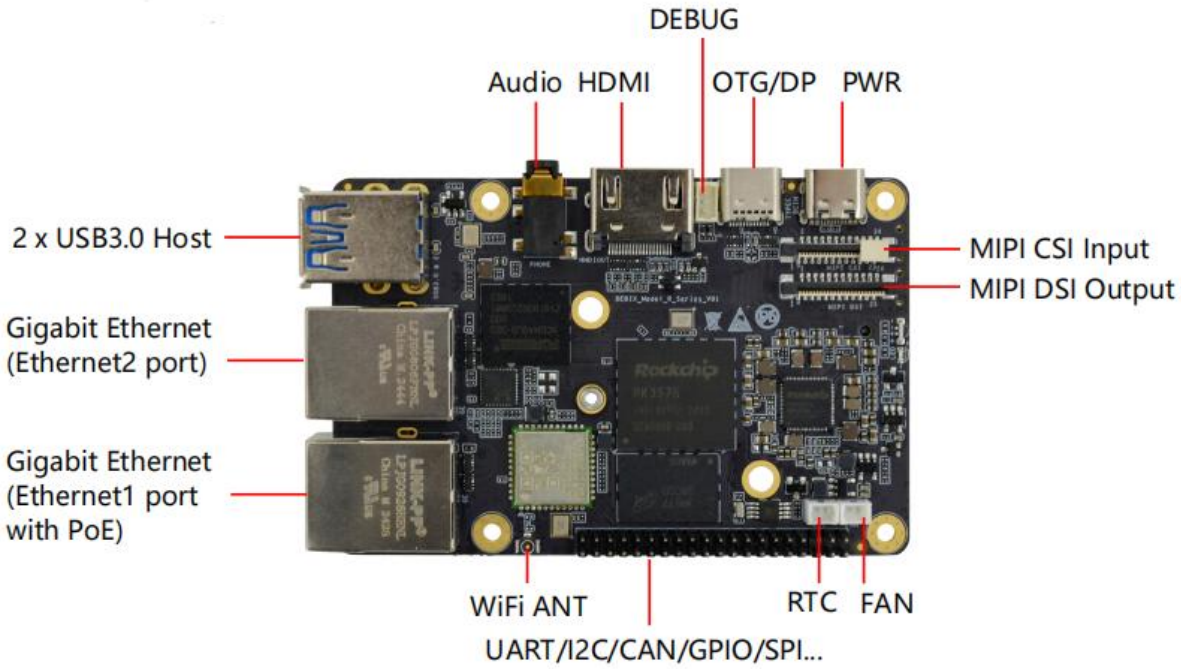


Figure 2 Front View of the DEBIX R3576-01

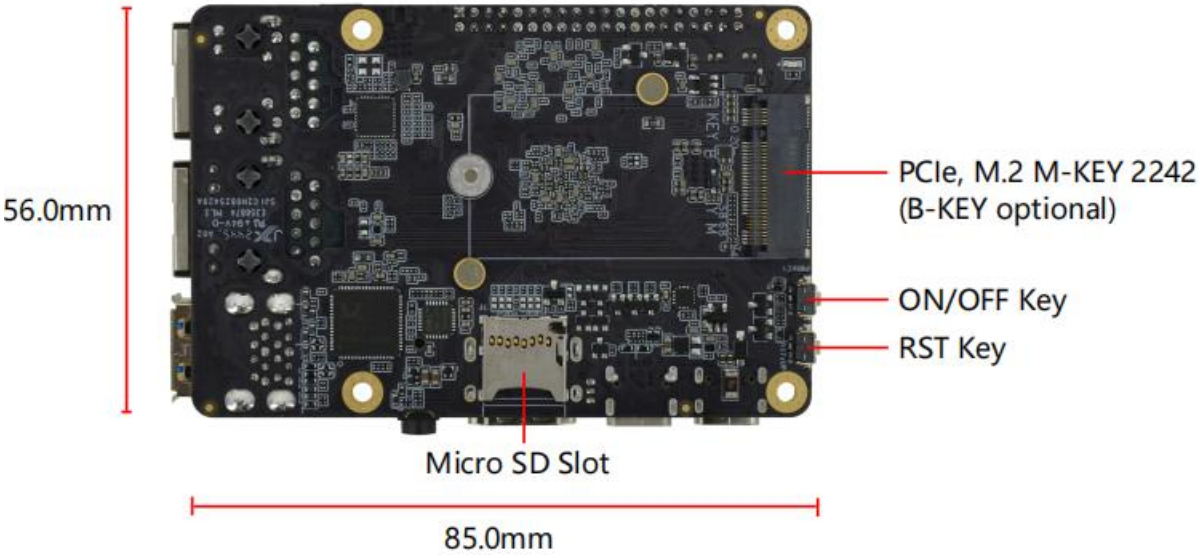


Figure 3 Back View of the DEBIX R3576-01

Using Rockchip RK3576 as SoC, DEBIX R3576-01 supports Gigabit Ethernet, dual-band wireless network and Bluetooth 5.4, etc. The data specifications are as below:

Table 2 Specification of the DEBIX R3576-01

DEBIX R3576-01	
System	
CPU	Rockchip RK3576, 4 x Cortex-A72 + 4 x Cortex A53 up to 2.2GHz, comes with an integrated neural processing unit (NPU) that delivers up to 6 TOPS (RKNN), and with GPU G52MC3
Memory	2GB LPDDR4 (4GB/8GB optional)
Storage	1) Default: Micro SD Card

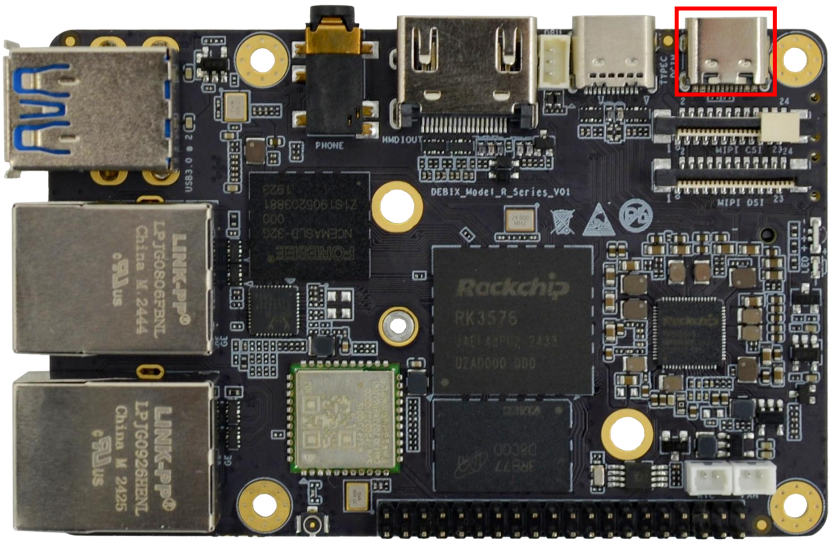
	(8GB/16GB/32GB/64GB/128GB/256GB optional) 2) Onboard eMMC (8GB/16GB/32GB/64GB/128GB/256GB optional)
OS	Android 14, Debian 12
Boot Mode	Boot from eMMC
Communication	
Gigabit Network	2 x Gigabit Ethernet Interfaces: 1) 1 x RJ45 with PoE power supply (need PoE power supply module) 2) 1 x RJ45
Wi-Fi & BT	2.4GHz & 5GHz Wi-Fi 6, BT 5.4, external Wi-Fi SMA antenna connector
Video & Audio	
HDMI	1 x HDMI output, the connector is Type A HDMI female
MIPI CSI	1 x MIPI CSI, support 4-lane, 24Pin/0.5mm Pitch FPC socket
MIPI DSI	1 x MIPI DSI, support 4-lane, 24Pin/0.5mm Pitch FPC socket
Audio	1 x 3.5mm headphone and microphone combo port
DP	1 x DP display support MST with Type-C
External I/O Interface	
USB	● 2 x USB 3.0 Host with double layer Type-A

	● 1 x USB 2.0 PWR with Type-C for DC 5V power input ● 1 x USB 3.0 OTG + DP DISPLAY support MST with Type-C
PCIe	1 x PCIe, M.2 M-KEY 2242 (B-KEY optional)
40-Pin Double-Row Headers	1) Default: 3 x UART, 2 x SPI, 2 x I2C, 2 x CAN, 6 x GPIO, refer to DEBIX website "DEBIX Model A GPIO Pin Multiplexing Function List", which can be configured to I2S, PWM, SPDIF, GPIO, etc. via software 2) 5V power supply, system reset, ON/OFF
Slot	1 x Micro SD slot
RTC	1 x RTC, 1*2Pin/1.25mm wafer connector
FAN	1 x FAN, 1*2Pin/1.25mm wafer connector
Debug	1 x Debug, 1*3Pin/1.25mm wafer connector
Power Supply	
Power Input	Default DC 5V/3A power input, Type-C
Mechanical & Environmental	
Size (L x W)	85.0mm x 56.0mm (±0.5mm)
Net Weight	48g (±0.5g)
Operating Temp.	Commercial grade: 0°C~70°C

2.2. Interface

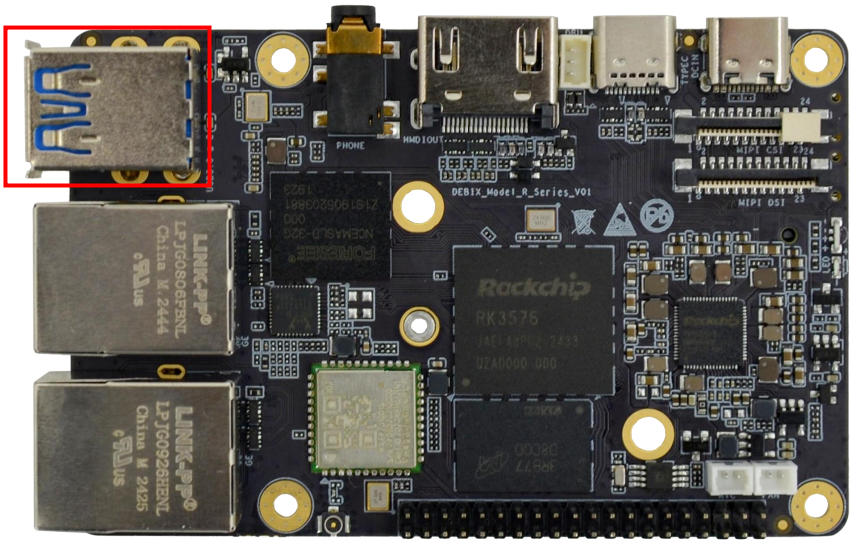
2.2.1. Power Interface

DEBIX R3576-01 provides **one power supply interface**: the refdes. is J1. The connector is USB type-C. Default input: DC 5V/3A.



2.2.2. USB Interface

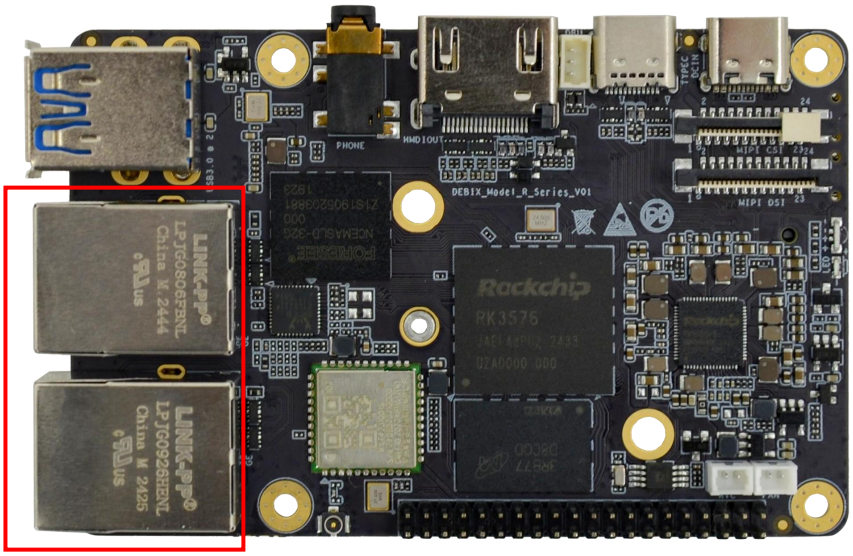
DEBIX R3576-01 provides **one dual-USB 3.0 type-A interface**, supports USB 3.0: the refdes. is J5.



2.2.3. Ethernet Interface

DEBIX R3576-01 provides **two Gigabit Ethernet ports** with independent MAC address:

- Gigabit Ethernet (ETH-1 with PoE): the refdes. is J12.
- Gigabit Ethernet (ETH-2): the refdes. is J13.



Connect the DEBIX R3576-01 to the network through a network cable in the RJ45 connector. A set of status indicators below the interface displays the status signal. The green one indicates **Link**, which is network connection indicator, and the yellow one does **Active**, which is signal transmission indicator.

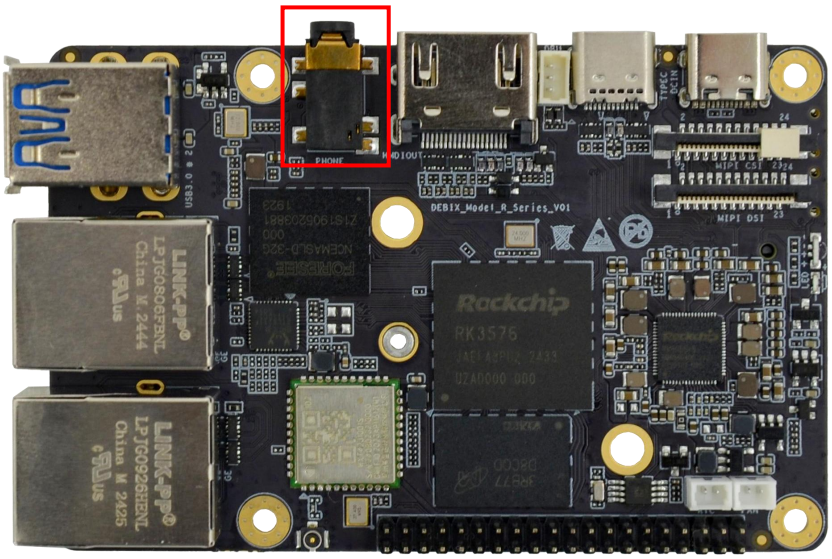
Table 3 Description of Gigabit Ethernet Port Status Indicators

LED	Color	Description
Link	Green	Light, the network cable is plugged in, network connection status is good
Active	Yellow	Blinking, network data is being transmitted

2.2.4. Audio Interface

DEBIX R3576-01 provides **one combined HP&MIC input interface**: the refdes. is

J14. The connector is 3.5mm socket, with audio in/out function, and supports rated voltage 1.5V MIC audio input.



NOTE

DEBIX R3576-01 uses MIC and only supports four-segment headphones. The definition is shown in the following figure, which includes left channel, right channel, GND, and MIC recording. It is necessary to connect to the audio interface according to the GND and MIC connection lines for normal use.

2.2.5. Display Interface

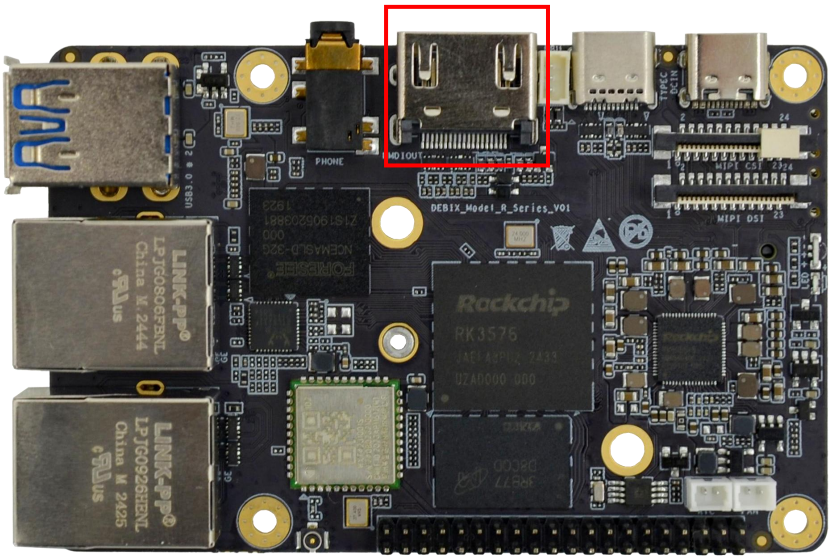
DEBIX R3576-01 supports the following displays:

- One LCDIF drives **HDMI v2.1 Tx**, up to 4K@120Hz;
- One LCDIF drives **MIPI DSI v1.1 Tx,** up to 2560x1600@60Hz;
- One LCDIF drives **DP v1.4 Tx**, up to 4K@120Hz.

Multiple displays up to 4K@120 + 2.5K@60 + 2K@60.

2.2.5.1.HDMI Interface

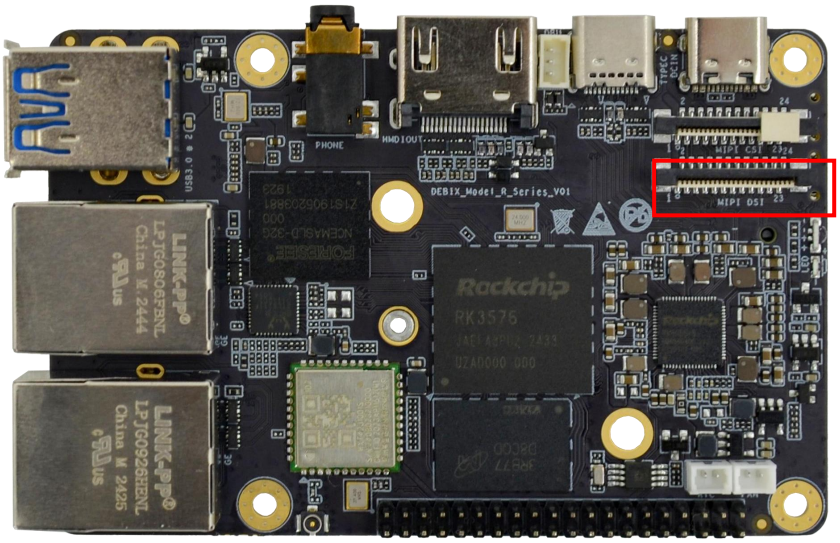
DEBIX R3576-01 provides **one HDMI Type-A female interface**: the refdes. is J10. It supports up to 4K@120Hz.



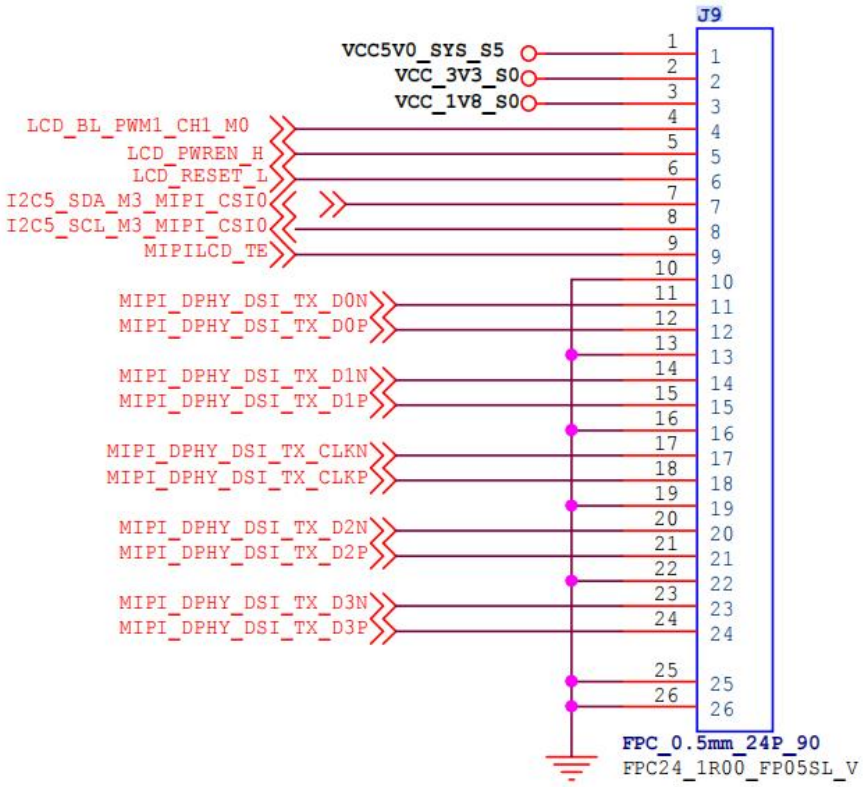
2.2.5.2. MIPI DSI Interface

DEBIX R3576-01 provides **one MIPI DSI interface** (The refdes. is J9), with a

24Pin/0.5mm Pitch FPC connector, which can be used to connect a MIPI display touch screen. It supports up to 2560x1600@60Hz.



The pin sequence is shown in the figure:



The MIPI DSI interface is defined as follows:

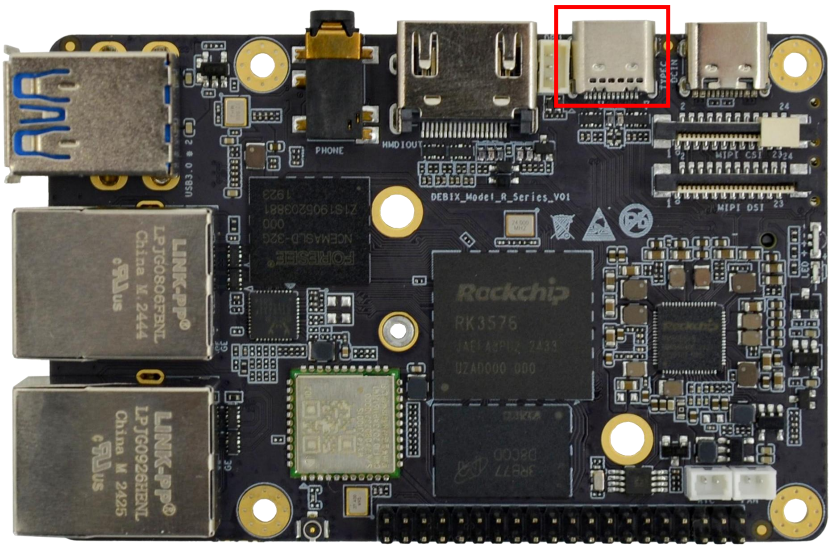
Table 4 The Pin definition of MIPI DSI

Pin	Definition	Description
1	VCC5V0_SYS_S5	5V output
2	VCC_3V3_S0	3.3V output
3	VCC_1V8_S0	1.8V output
4	LCD_BL_PWM1_CH1_M0	Backlight control signal
5	LCD_PWREN_H	LCD enable signal high level
6	LCD_RESET_L	LCD reset signal low level

7	I2C5_SDA_M3_MIPI_CSI0	The data terminal of I2C (Controlled by I2C5)
8	I2C5_SCL_M3_MIPI_CSI0	The clock terminal of I2C (Controlled by I2C5)
9	MIPILCD_TE	MIPI LCD Timing Engine
10	GND	To Ground
11	MIPI_DPHY_DSI_TX_D0N	DSI Differential data channel 0 (–)
12	MIPI_DPHY_DSI_TX_D0P	DSI Differential data channel 0 (+)
13	GND	To Ground
14	MIPI_DPHY_DSI_TX_D1N	DSI Differential data channel 1 (–)
15	MIPI_DPHY_DSI_TX_D1P	DSI Differential data channel 1 (+)
16	GND	To Ground
17	MIPI_DPHY_DSI_TX_CLKN	DSI Differential Clock Channels (–)
18	MIPI_DPHY_DSI_TX_CLKP	DSI Differential Clock Channels (+)
19	GND	To Ground
20	MIPI_DPHY_DSI_TX_D2N	DSI Differential data channel 2 (–)
21	MIPI_DPHY_DSI_TX_D2P	DSI Differential data channel 2 (+)
22	GND	To Ground
23	MIPI_DPHY_DSI_TX_D3N	DSI Differential data channel 3 (–)
24	MIPI_DPHY_DSI_TX_D3P	DSI Differential data channel 3 (+)
25	GND	To Ground
26	GND	To Ground

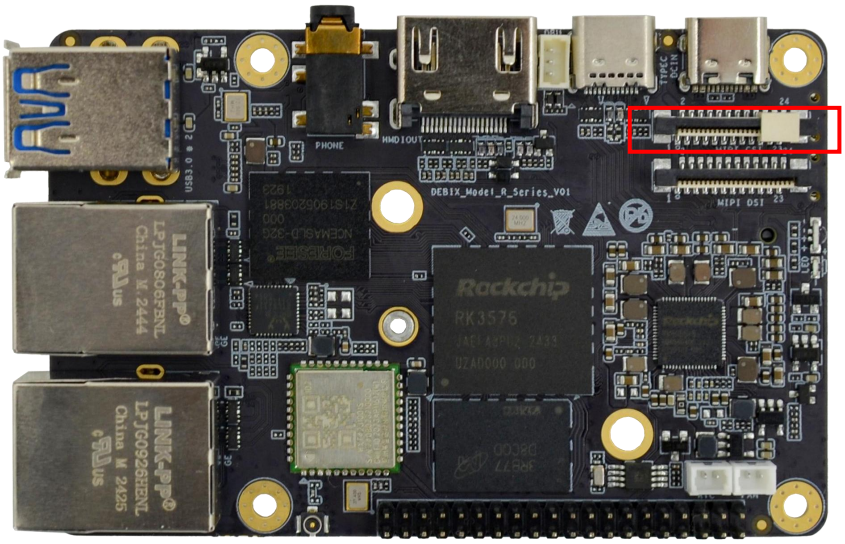
2.2.5.3. DP

DEBIX R3576-01 provides **one DP interface** with the USB OTG Type-C connector: the refdes. is J4. It supports up to 4K@120Hz.

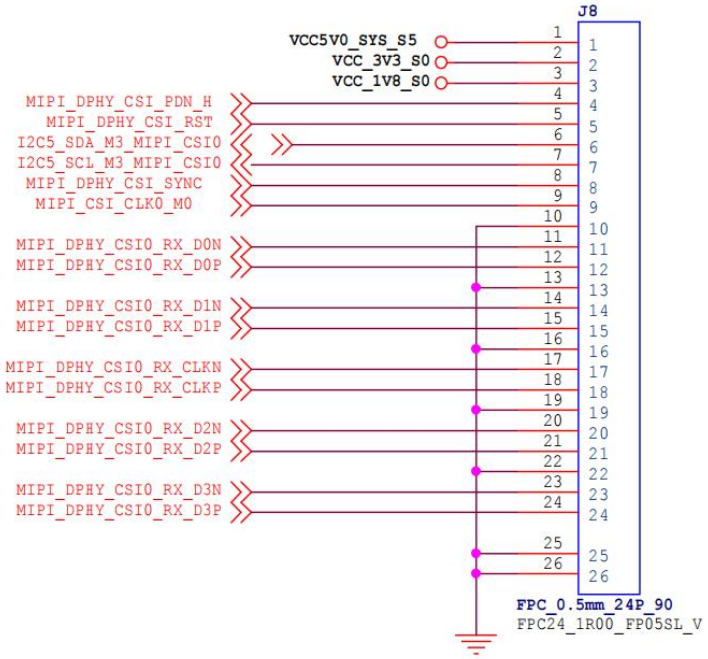


2.2.6. MIPI CSI Interface

DEBIX R3576-01 provides **one MIPI CSI interface** (The refdes. is J8), with a 24Pin/0.5mm Pitch FPC socket for connecting the camera module.



The pin sequence is shown in the figure:



The MIPI CSI interface is defined as follows:

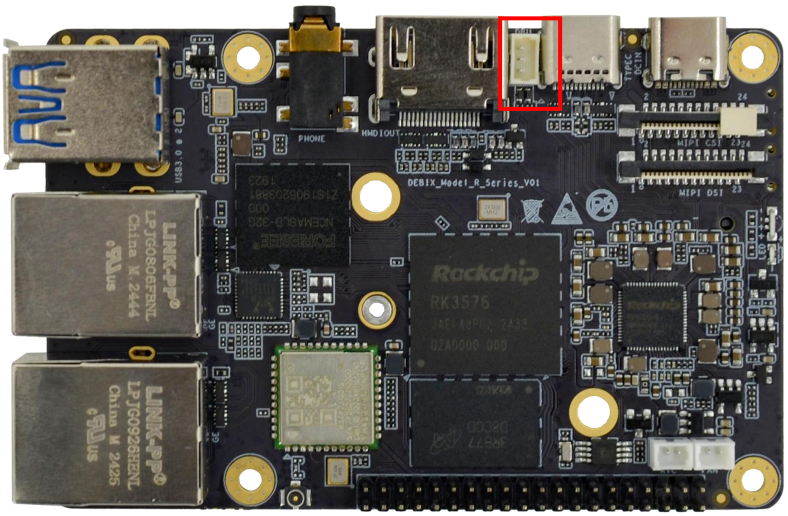
Table 5 The Pin Definition of MIPI CSI

Pin	Definition	Description
1	VCC5V0_SYS_S5	5V output
2	VCC_3V3_S0	3.3V output
3	VCC_1V8_S0	1.8V output
4	MIPI_DPHY_CSI_PDN_H	CSI low power mode
5	MIPI_DPHY_CSI_RST	CSI reset signal
6	I2C5_SDA_M3_MIPI_CSI0	I2C data signal
7	I2C5_SCL_M3_MIPI_CSI0	I2C clock signal
8	MIPI_DPHY_CSI_SYNC	CSI synchronization signal
9	MIPI_CSI_CLK0_M0	CSI external clock input
10	GND	To Ground
11	MIPI_DPHY_CSI_RX_D0N	CSI Differential data channel 0 (–)
12	MIPI_DPHY_CSI_RX_D0P	CSI Differential data channel 0 (+)
13	GND	To Ground
14	MIPI_DPHY_CSI_RX_D1N	CSI Differential data channel 1 (–)
15	MIPI_DPHY_CSI_RX_D1P	CSI Differential data channel 1 (+)
16	GND	To Ground
17	MIPI_DPHY_CSI_RX_CLKN	CSI Differential Clock Channels (–)
18	MIPI_DPHY_CSI_RX_CLKP	CSI Differential Clock Channels (+)
19	GND	To Ground

20	MIPI_DPHY_CSI_RX_D2N	CSI Differential data channel 2 (–)
21	MIPI_DPHY_CSI_RX_D2P	CSI Differential data channel 2 (+)
22	GND	To Ground
23	MIPI_DPHY_CSI_RX_D3N	CSI Differential data channel 3 (–)
24	MIPI_DPHY_CSI_RX_D3P	CSI Differential data channel 3 (+)
25	GND	To Ground
26	GND	To Ground

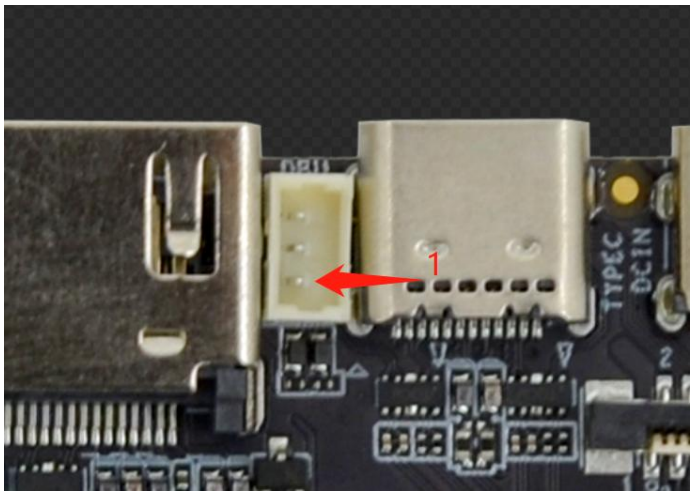
2.2.7. DEBUG

DEBIX R3576-01 provides one 1*3Pin/1.25mm Pitch **debug interface**: the refdes. is J15.

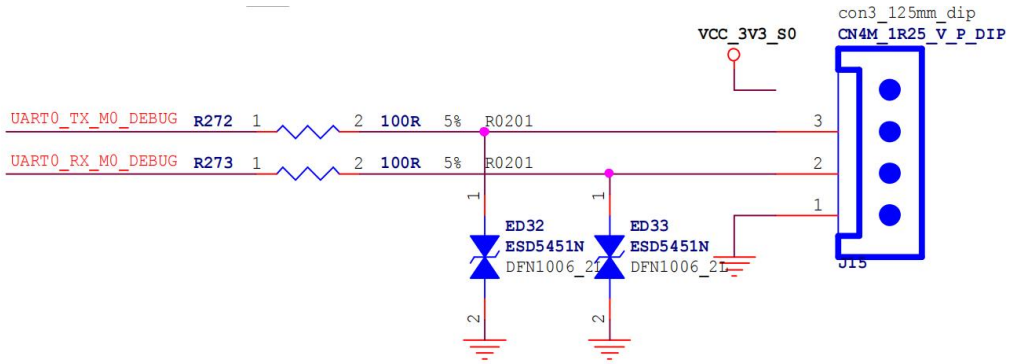


The PCBA physical pin sequence of **the debug interface** is shown in the

figure below:



The pin sequence of **the debug interface** is shown below:



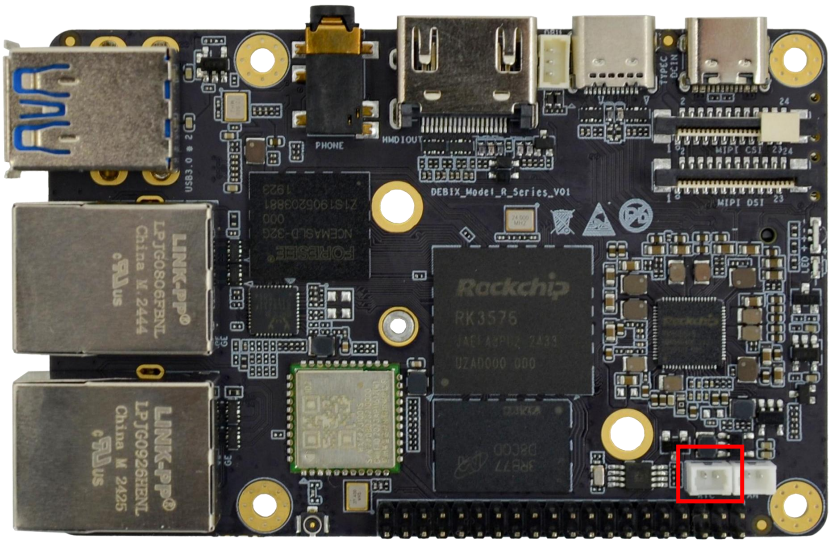
The debug interface is defined as follows:

Table 6 The Pin Definition of DEBUG

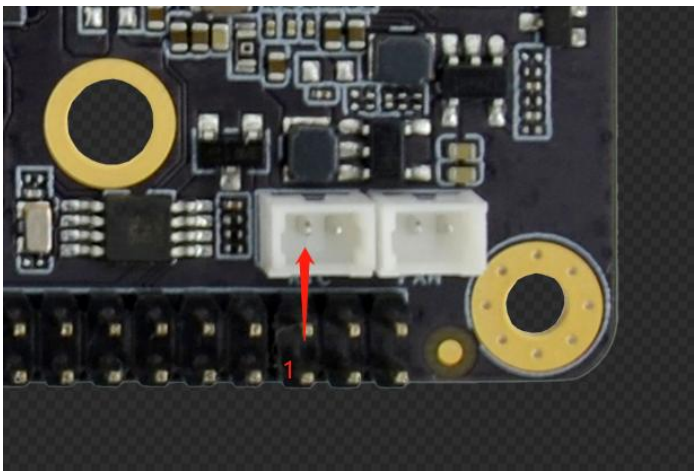
Pin	Definition	Description
1	GND	To ground
2	UART0_TX_M0_DEBUG	Transmitting data
3	UART0_RX_M0_DEBUG	Receiving data

2.2.8. RTC

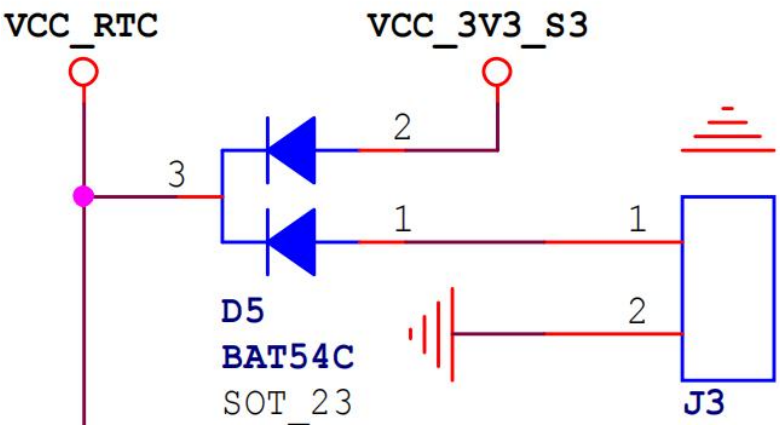
DEBIX R3576-01 provides one 1*2Pin/1.25mm **RTC interface**: the refdes. is J3.



The PCBA physical pin sequence of **the RTC interface** is shown in the figure below:



The pin sequence of **the RTC interface** is shown as below:



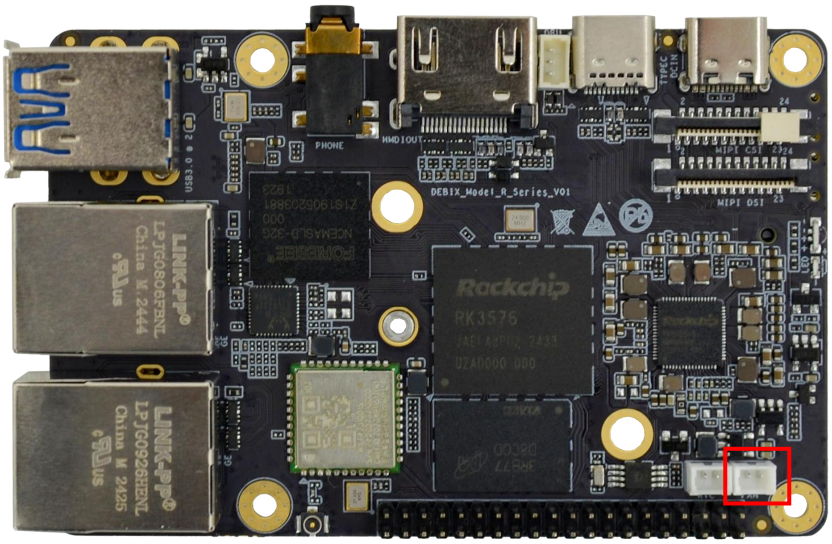
The RTC interface is defined as follows:

Table 7 The Pin Definition of RTC

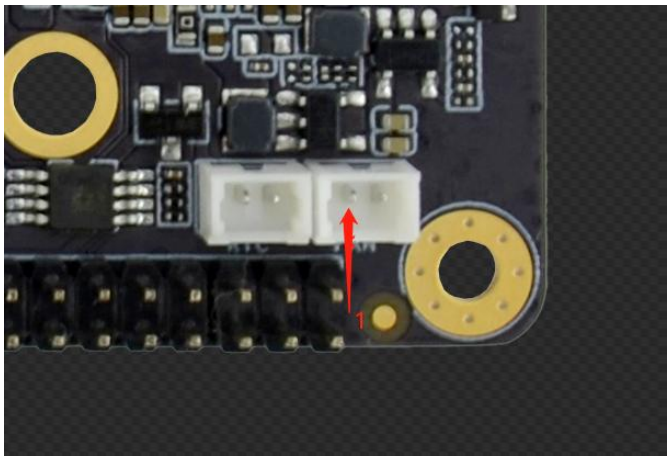
Pin	Definition	Description
1	VCC_3V3_S3	3.3 voltage input
2	GND	To ground

2.2.9. FAN

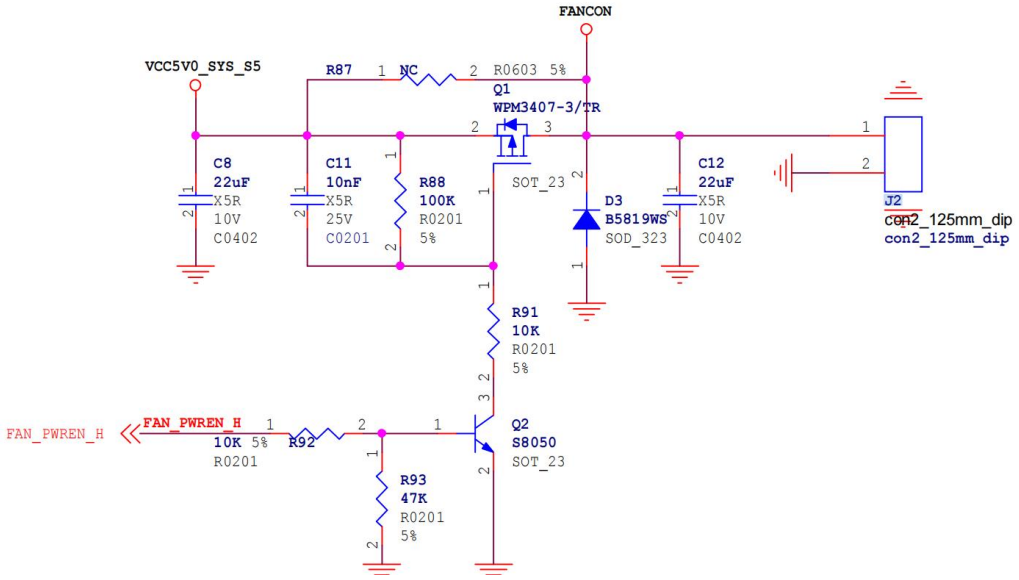
DEBIX R3576-01 provides one 1*2Pin/1.25mm **FAN interface**. The refdes. is J2.



The PCBA physical pin sequence of **the FAN interface** is shown in the figure below:



The pin sequence of **the FAN interface** is shown below:



The FAN interface is defined as follows:

Table 8 The Pin Definition of FAN

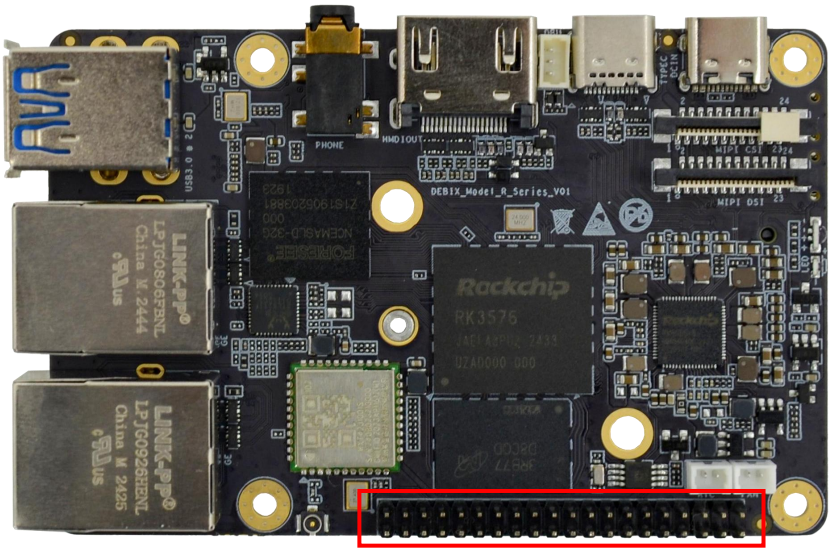
Pin	Definition	Description
1	VCC5V0_SYS_S5	5V output
2	GND	To ground

2.2.10. GPIO

DEBIX R3576-01 has a set of 2*20Pin/2.0mm **GPIO interface**: the refdes. is J7. It can be used for external hardware such as LED, button, sensor, function modules, etc.

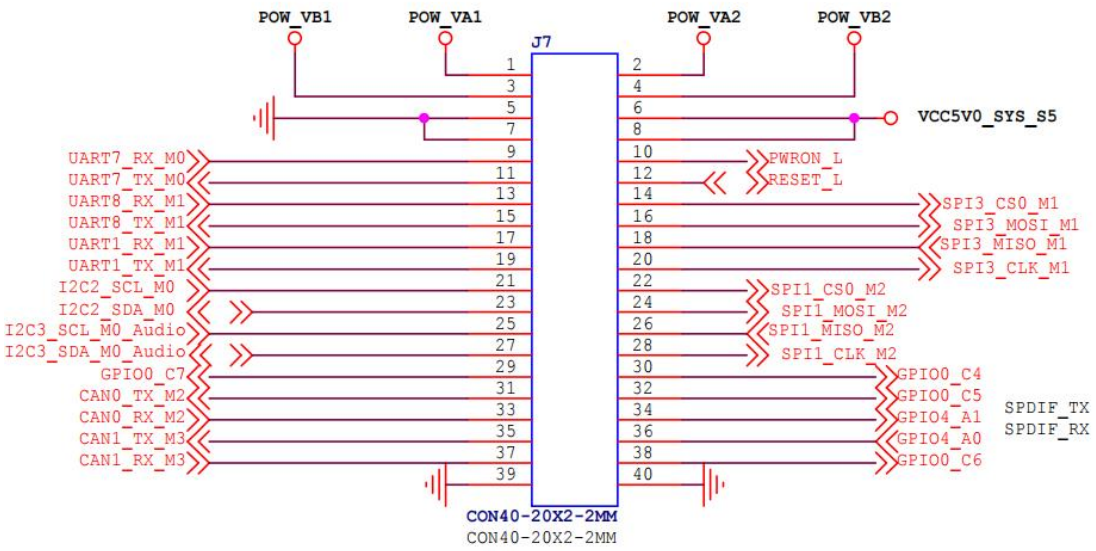
- The voltage of I2C, UART, CAN, SPI, GPIO pin is 3.3V.

- 5V pins (pin6, pin8) can be used to power to DEBIX R3576-01 or peripherals.



The PCBA physical pin sequence of **the GPIO interface** is shown in the figure below:

The pin sequence of **the GPIO interface** is shown below:



The GPIO interface is defined in the table below; please refer to "DEBIX Model A GPIO Pin Multiplexing Function List" on the DEBIX website for pin function mapping definitions.

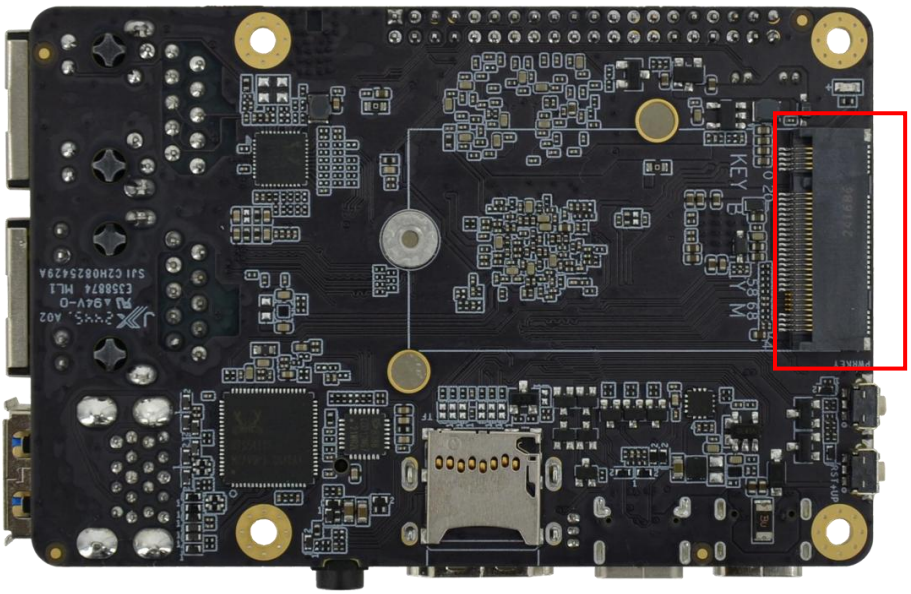
Table 9 The Pin definition of GPIO

Pin	Definition	Pin	Definition
1	POW_VA1	2	POW_VA2
3	POW_VB1	4	POW_VB2
5	GND	6	VCC5V0_SYS_S5
7	GND	8	VCC5V0_SYS_S5
9	UART7_RX_M0	10	PWRON_L
11	UART7_TX_M0	12	RESET_L
13	UART8_RX_M1	14	SPI3_CS0_M1
15	UART8_TX_M1	16	SPI3_MOSI_M1

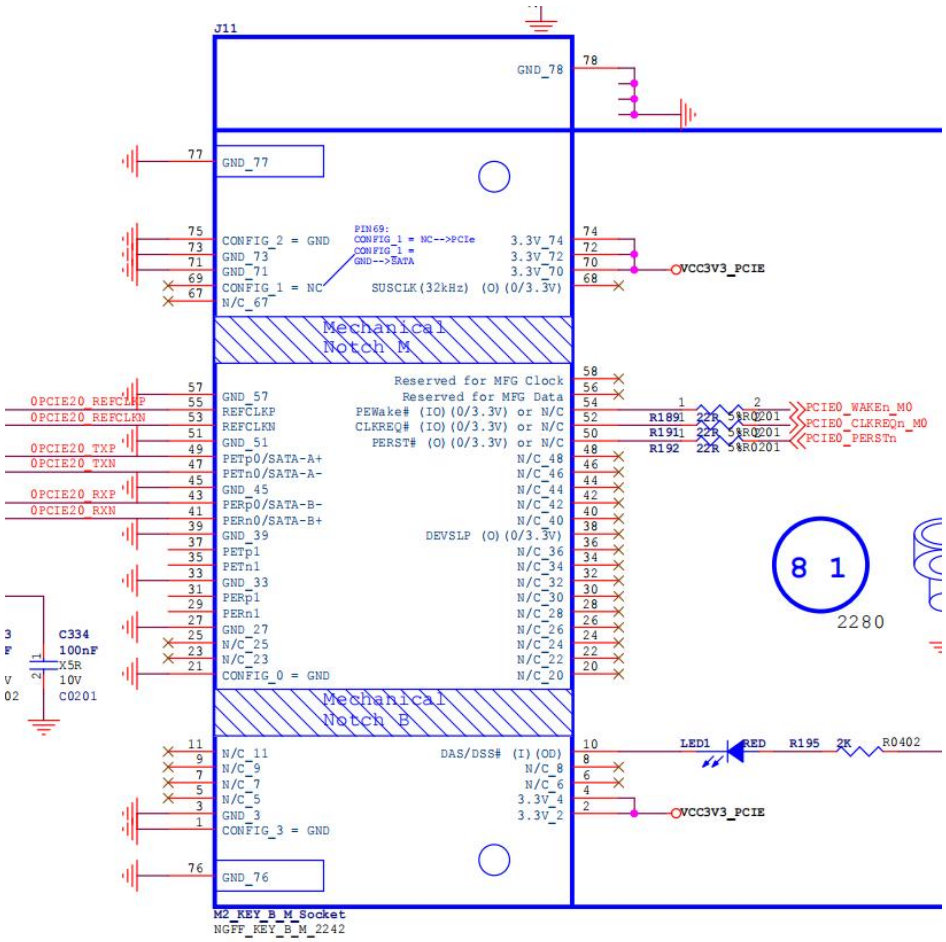
17	UART1_RX_M1	18	SPI3_MISO_M1
19	UART1_TX_M1	20	SPI3_CLK_M1
21	I2C2_SCL_M0	22	SPI1_CS0_M2
23	I2C2_SDA_M0	24	SPI1_MOSI_M2
25	I2C3_SCL_M0_Audio	26	SPI1_MISO_M2
27	I2C3_SDA_M0_Audio	28	SPI1_CLK_M2
29	GPIO0_C7	30	GPIO0_C4
31	CAN0_TX_M2	32	GPIO0_C5
33	CAN0_RX_M2	34	GPIO4_A1
35	CAN1_TX_M3	36	GPIO4_A0
37	CAN1_RX_M3	38	GPIO0_C6
39	GND	40	GND

2.2.11. PCIe, M.2 M-KEY 2242 Slot

DEBIX R3576-01 provides **one PCIe, M.2 M-KEY 2242 slot**: the refdes. is J11.



The pin sequence of **the PCIe, M.2 M-KEY 2242 interface** is shown as below:



The PCIe, M.2 M-KEY 2242 slot is defined as follows:

Table 10 The Pin Definition of M.2 M-KEY 2242 Slot

Pin	Definition	Pin	Definition
1	GND	2	VCC3V3_PCIE
3	GND	4	VCC3V3_PCIE
5	Not connected	6	Not connected
7	Not connected	8	Not connected
9	Not connected	10	VCC3V3_PCIE
11	Not connected	–	–

–	–	20	Not connected
21	GND	22	Not connected
23	Not connected	24	Not connected
25	Not connected	26	Not connected
27	GND	28	Not connected
29	PERn1	30	Not connected
31	PERp1	32	Not connected
33	GND	34	Not connected
35	PETn1	36	Not connected
37	PETp1	38	Not connected
39	GND	40	Not connected
41	PCIE0_RXN	42	Not connected
43	PCIE0_RXP	44	Not connected
45	GND	46	Not connected
47	PCIE0_TXN	48	Not connected
49	PCIE0_TXP	50	PCIE0_PERSTn
51	GND	52	PCIE0_CLKREQn_M0
53	PCIE0_REFCLKN	54	PCIE0_WAKEn_M0
55	PCIE0_REFCLKP	56	Not connected
57	GND	58	Not connected

–	–	–	–
67	Not connected	68	Not connected
69	Not connected	70	VCC3V3_PCIE
71	GND	72	VCC3V3_PCIE
73	GND	74	VCC3V3_PCIE
75	GND		

2.2.12. LED & Key

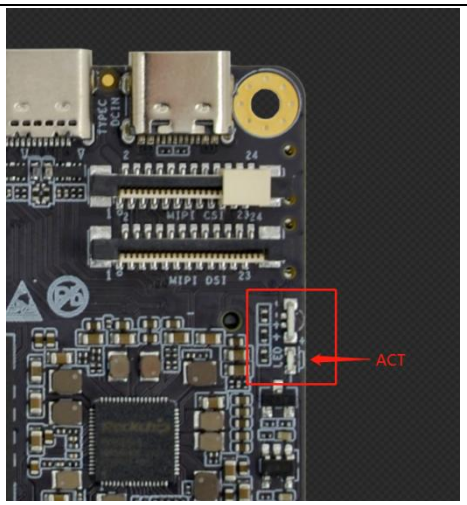
DEBIX R3576-01 has **two LED indicators** and **two keys** on the board:

- **LED**
  - 1 x ACT LED (Red)
  - 1 x PWR LED (Blue and blue-violet)

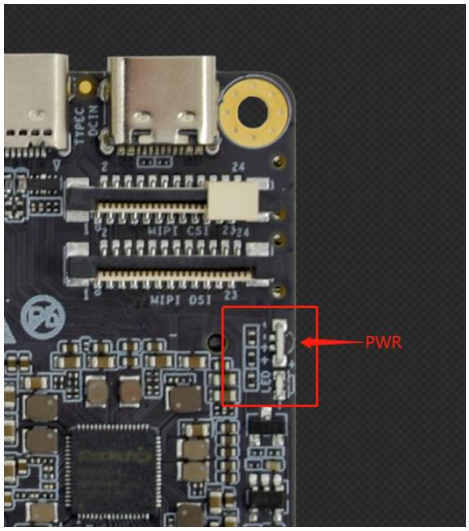
- **KEY**
  - 1 x ON/OFF Key.
  - 1 x RST Key.

The layout of **LEDs** and **keys** on the PCBA is shown in the figures below:

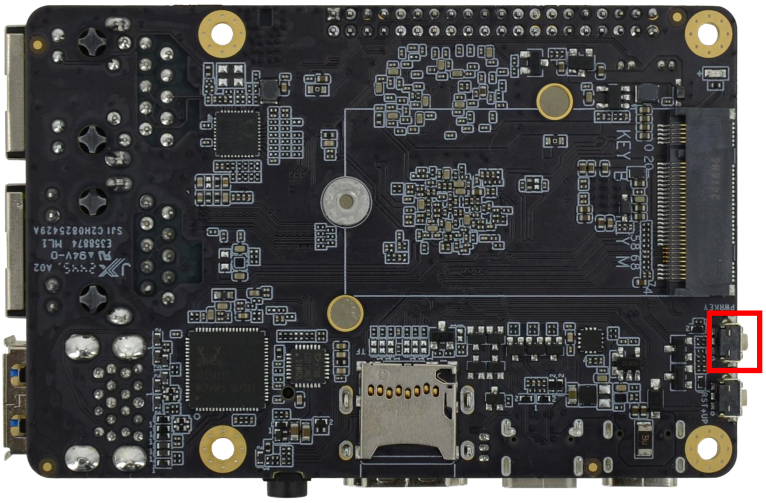
(1) 1 x ACT LED (Red):



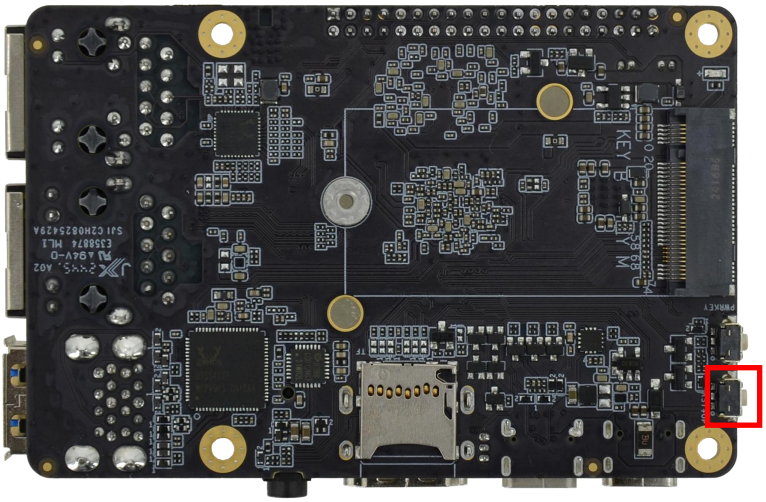
(2) 1 x PWR LED (Blue and blue-violet):



(3) 1 x ON/OFF Key (The refdes. is K1):



(4) 1 x RST Key (The refdes. is K2):



The specific states are described in the following table:

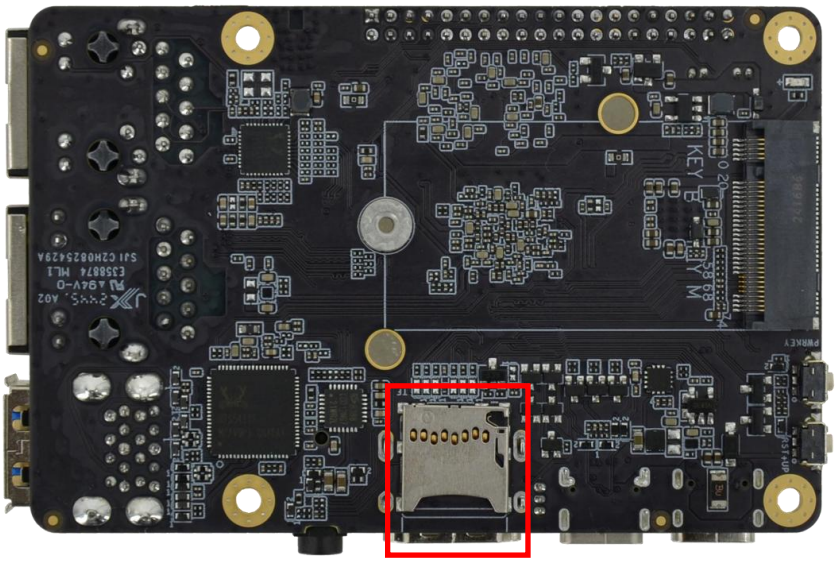
Table 11 Description of LEDs and Keys

Function Name		Status	Description
LED	ACT LED	Blinking	System is normal

		off	System fault
	PWR LED	Lighting (Blue-violet)	Power is on, and the device is on the operating state
		Lighting (Blue)	The device is turned off, but the power supply remains
Key	ON/OFF Key	Short press	Sleep/Wake up
		Long press	Power off/on
	RST Key	Press	System reset

2.2.13. Micro SD Slot

DEBIX R3576-01 provides **one Micro SD slot**: the refdes. is J6.



Chapter 3 Getting started

3.1. Software Installation

- **Component Preparation**

✓ DEBIX R3576-01 board

✓ USB Type-C data cable

✓ DC 5V/3A power adapter

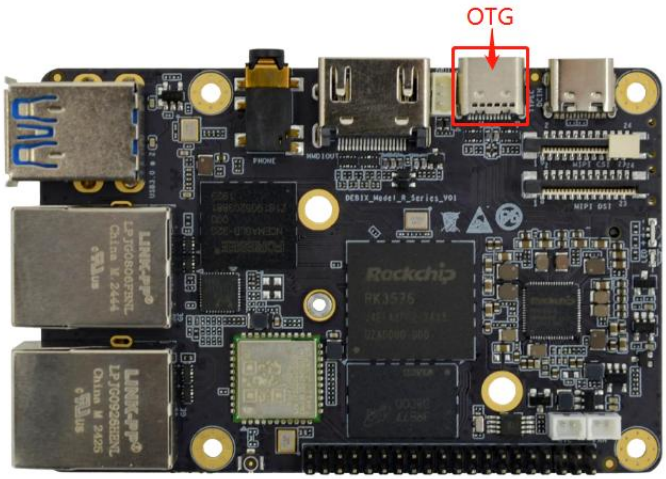
✓ PC (windows 10/11)

- **Burning to eMMC via USB**

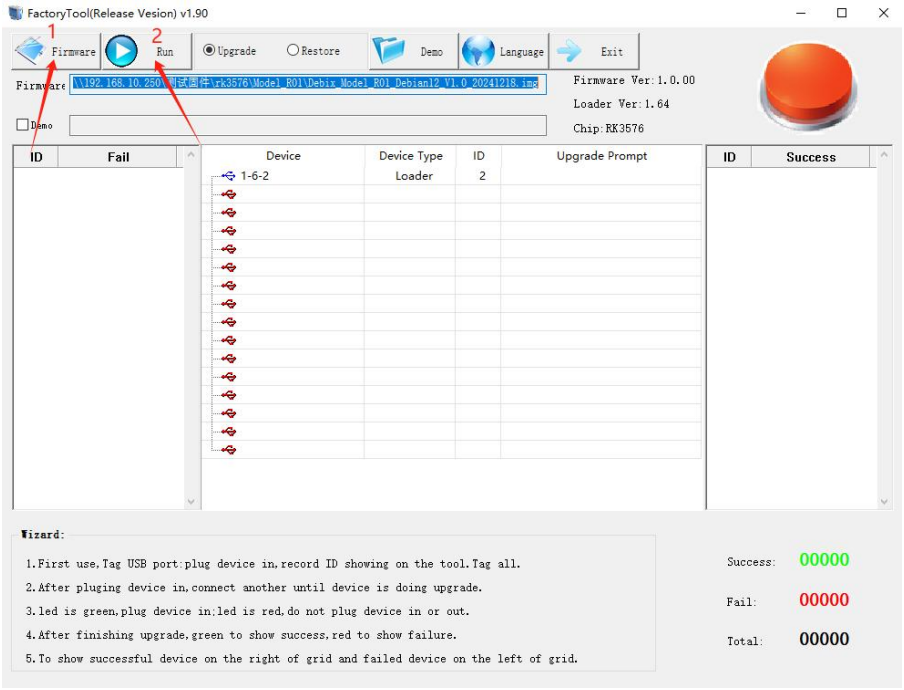
1. Download the corresponding **image** and the flashing tool **FactoryTool** from the software download page of DEBIX official website on your PC;
2. Power on the DEBIX R3576-01, open the **Terminal** on the DEBIX R3576-01, and then run the following command to enter **Loader Mode**.

```
reboot loader
```

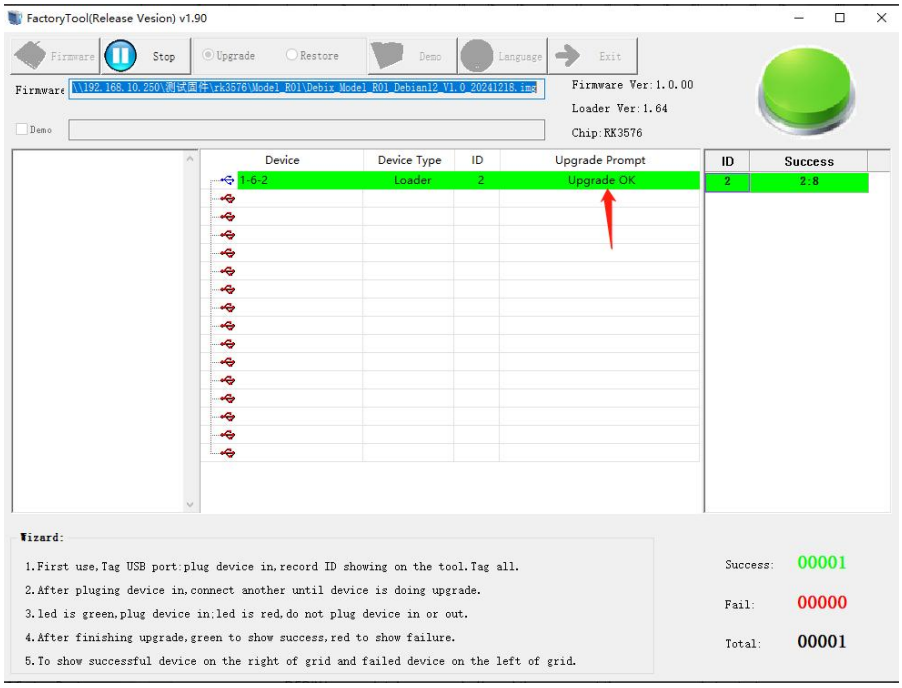
3. Use USB Type-C data cable to connect the OTG port of the DEBIX R3576-01 to the USB port of your PC;



4. Run the flashing tool **FactoryTool,** click **[Firmware]** to load the system image you just downloaded from DEBIX official website, and then click **[Run]** to start the burning process. Please refer to the following figure.



5. Wait for the system burning to finish. When it shows **"Upgrade OK"**, it means the burning is finished.



6. After burning, disconnect the power supply and OTG USB cable, make sure the DEBIX R3576-01 is completely powered off, and then connect the power supply again to start.

Chapter 4 Software Application Examples

All examples within this chapter were performed on the Debian 12 operating system. Both of the account and password of this OS are linaro.

4.1. Usage of Debug

DEBIX R3576-01 has one 1*3Pin/1.25mm Pitch Debug port which is used as

a UART TTL 3.3V system debugging serial port.

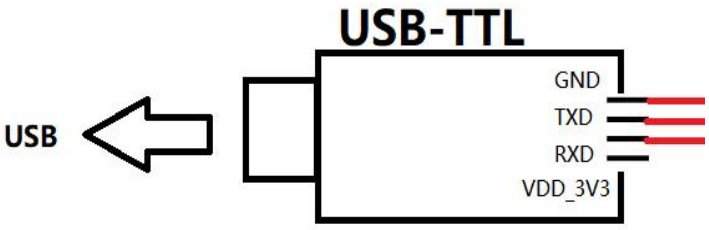
NOTE

The IO level of the debug serial port is 3.3V.

(1) Hardware connection

Connect the debug serial port to the USB–TTL module, as shown in the figure below:

- Connect the RXD of the debug serial port to the TXD port of the USB–TTL module
- Connect the TXD of the debug serial port to the RXD port of the USB–TTL module
- Connect the GND of the debug serial port to the GND port of the USB–TTL module



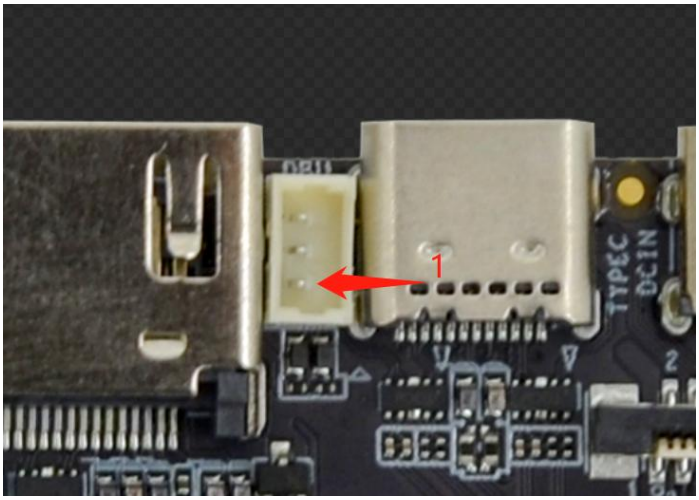


Table 12 The Pin Definition of Debug

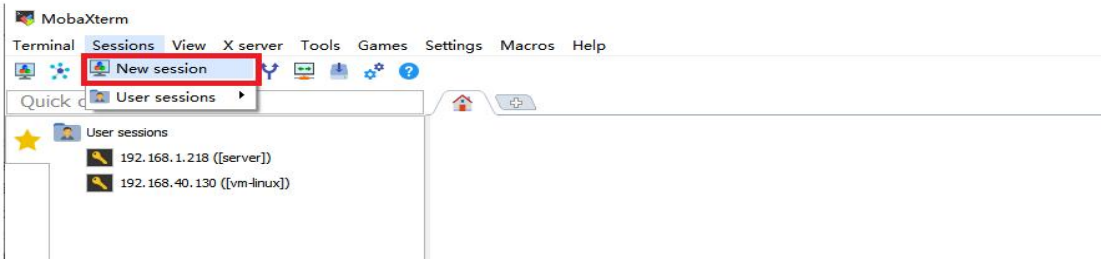
Pin	Definition	Description
1	GND	To ground
2	UART0_TX_M0_DEBUG	Transmitting data
3	UART0_RX_M0_DEBUG	Receiving data

(2)Open the **Windows Device Manager** and check the serial port number of the **USB-TTL 3.3V device**.

E.g.

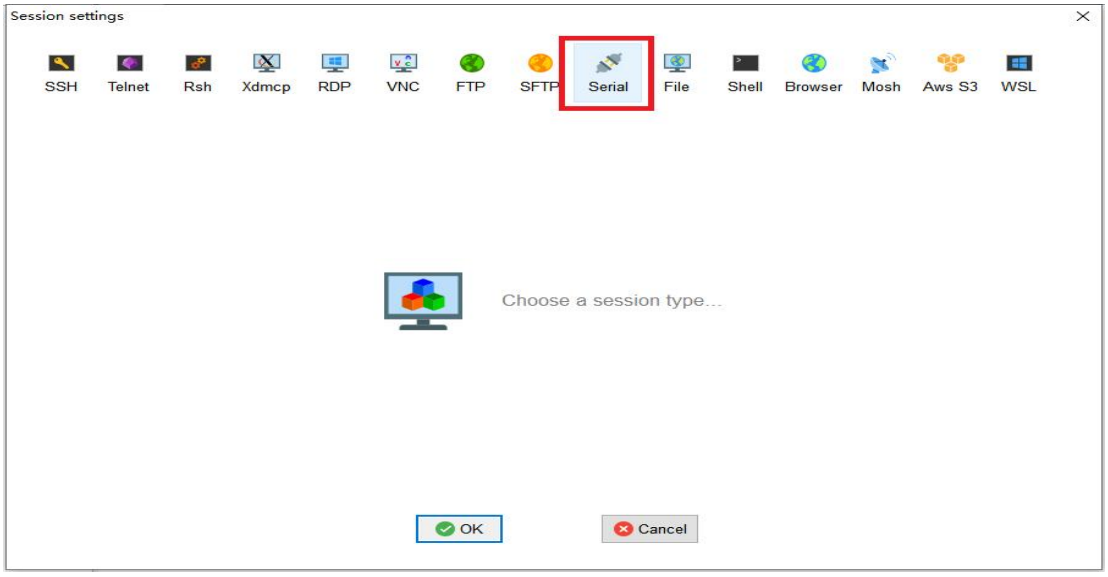
(3)Open the **MobaXterm** tool, click the **[Sessions]** on the menu, choose the **[New session]**.

E.g.



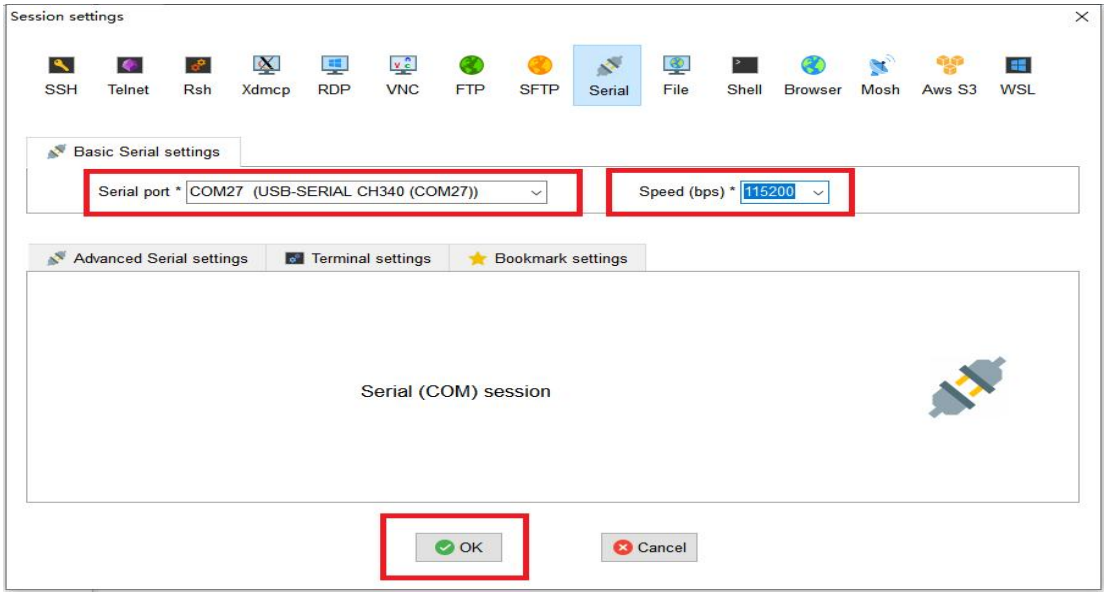
(4)Select **[Serial]** in the pop-up "**Session settings**" dialog box.

E.g.



(5)Change **the port number** to **the COM port found in the device manager**, set the **Speed (bps)** to **115200**, and click **[OK]**.

E.g.



(6)On the terminal, you can see the boot process logs output by Uboot, Kernel, and System. After the system boot is complete, it will enter the serial console.

4.2. Usage of Ethernet

Open the **Terminal** and run the command ifconfig to query the Gigabit Ethernet port LAN1:

```
ifconfig
```

E.g.

```
To restore this content, you can run the 'unminimize' command.
Last login: Tue Apr 12 00:32:18 UTC 2022 on ttymxc1
debix            ~$ ifconfig
LAN1: flags=-28669<UP,BROADCAST,MULTICAST,DYNAMIC>  mtu 1500
        ether 96:11:b1:b7:8c:e6  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 50

LAN2: flags=-28669<UP,BROADCAST,MULTICAST,DYNAMIC>  mtu 1500
        ether 66:8c:c3:80:a4:85  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 216  bytes 16258 (16.2 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 216  bytes 16258 (16.2 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

4.3. Usage of GPIO

IMPORTANT

> The GPIO voltage input of DEBIX R3576-01 only supports 3.3V. If the input is higher than 3.3V, it may cause damage to the GPIO interface and CPU.

See Table 13 for GPIO pin definition and control commands:

Table 13 The GPIO Pin Definition&control commands

Pin	Definition	Command

		Output High	Output Low
pin29	GPIO0_C7	gpioset 0 23=1	gpioset 0 23=0
pin30	GPIO0_C4	gpioset 0 20=1	gpioset 0 20=0
pin32	GPIO0_C5	gpioset 0 21=1	gpioset 0 21=0
pin34	GPIO4_A1	gpioset 4 1=1	gpioset 4 1=0
pin36	GPIO4_A0	gpioset 4 0=1	gpioset 4 0=0
pin38	GPIO0_C6	gpioset 0 22=1	gpioset 0 22=0

E.g.1: To set Pin29 GPIO0_C7 to output high, run the command `gpioset 0 23=1`, then GPIO0_C7 will output 3.3V.

```
gpioset 0 23=1
```

E.g.2: To set Pin29 GPIO0_C7 to output low, run the command `gpioset 0 23=0`, then GPIO0_C7 will output 0.0V.

```
gpioset 0 23=1
```

4.4. Usage of UART7/UART8/UART1

- **Hardware Connection:**

Connect two of UART serial ports (TX1 to RX2, RX1 to TX2). The table of pin sequence and the PCBA are shown in the below:

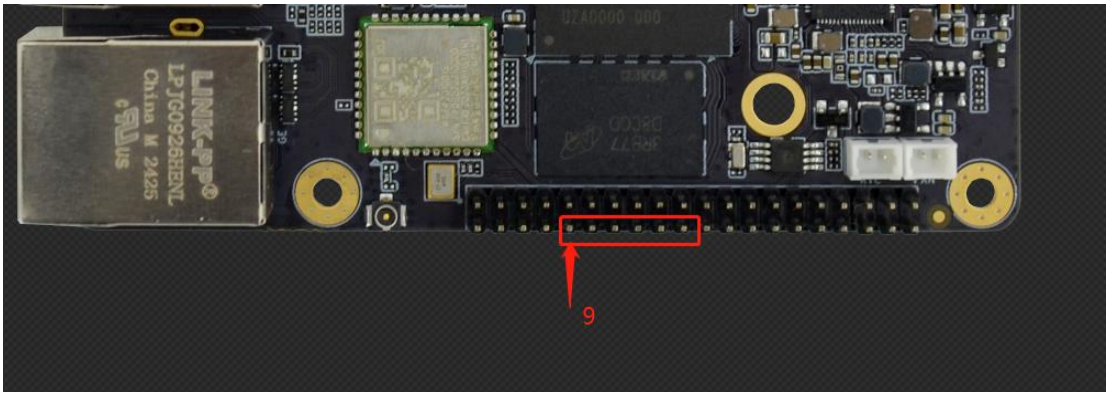


Figure 4 PCBA Pin Sequence of the UART Interfaces

Table 14 The Pin definition of UART7/UART8/UART1

Function	Interface	Pin	Definition	Device Node
UART	J7	9	UART7_RX_M0	/dev/ttyS7
		11	UART7_TX_M0	
		13	UART8_RX_M1	/dev/ttyS8
		15	UART8_TX_M1	
		17	UART1_RX_M1	/dev/ttyS1
		19	UART1_TX_M1	

- **Software Setting：(Using UART7 and UART8 communication as an example)**

(1) Open a **Terminal** on the DEBIX R3576-01. Run the following command to install **cutecom** serial port tool:

```
sudo apt update
sudo apt install cutecom qtwayland5
```

(2) Open the **cutecom** tool and set the serial port parameters as shown in the following table:

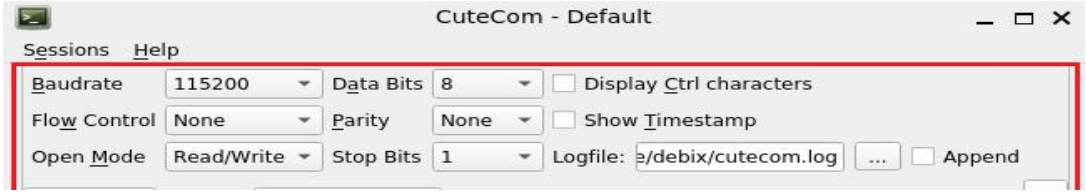
Table 15 Cutecom Parameters Setting

Parameter	Value
Baudrate	115200
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	None

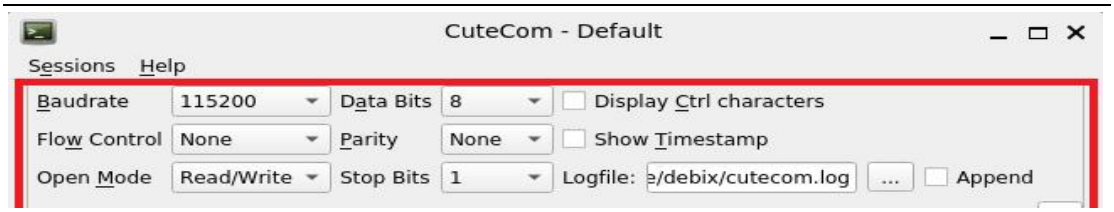
NOTICE

UART7/UART8/UART1 supports multiple baud rates. And the baud rates of both communicating sides have to be set to the same. In this example, the

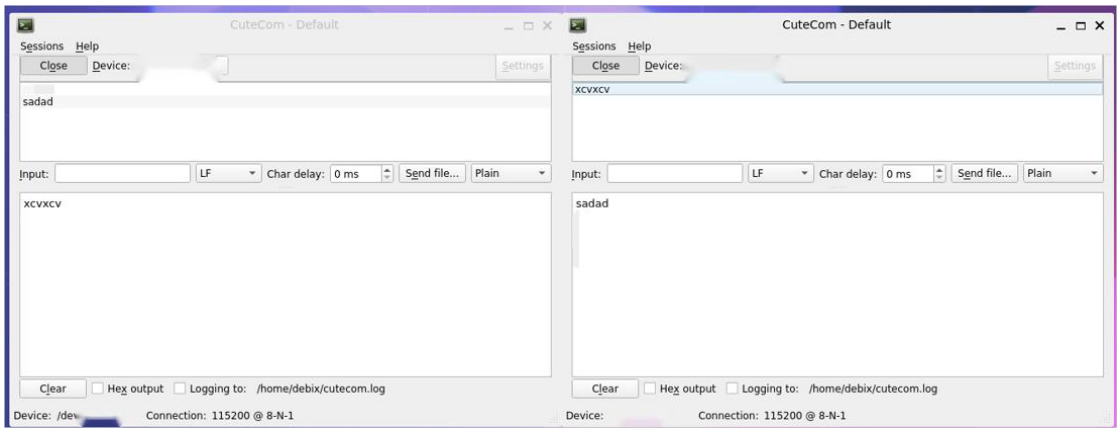
(3) Open the **cutecom** tool, set the **Device** to `/dev/ttyS7` and other parameters as shown in the table. Then click **[Open]**.



(4) Open the other **cutecom** tool, set the **Device** to `/dev/ttyS8` and other parameters as shown in the table. Then click **[Open]**.



(5) **Send and receive data via cutecom:** Type the test string in the **cutecom** input box, press the **[Enter key]** on your keyboard to send. Then you can see that the other **cutecom** receiving box received the same message, which indicates that the communication is successful. The reference result is as follows:



4.5. Usage of CAN

DEBIX R3576-01 has two CAN communication interfaces. The CAN interface needs to be used in conjunction with a CAN transceiver peripheral for CAN communication, such as DEBIX I/O Board, or other CAN transceiver modules.

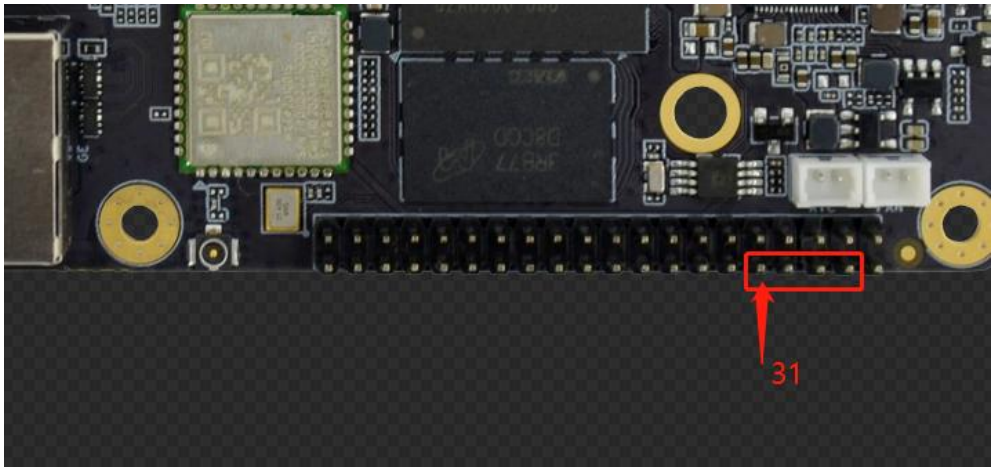


Table 16 The Pin definition of CAN

Function	Interface	Pin	Definition	Device Node
CAN	J7	31	CAN0_TX_M2	can0
		33	CAN0_RX_M2	
		35	CAN1_TX_M3	can1
		37	CAN1_RX_M3	

For CAN verification, refer to the CAN verification description of the DEBIX I/O Board.

4.6. Usage of SPI

DEBIX R3576-01 has two SPI interfaces which can communicate with external slave devices. This test program is to attach the device with at24 eeprom for reading and writing test

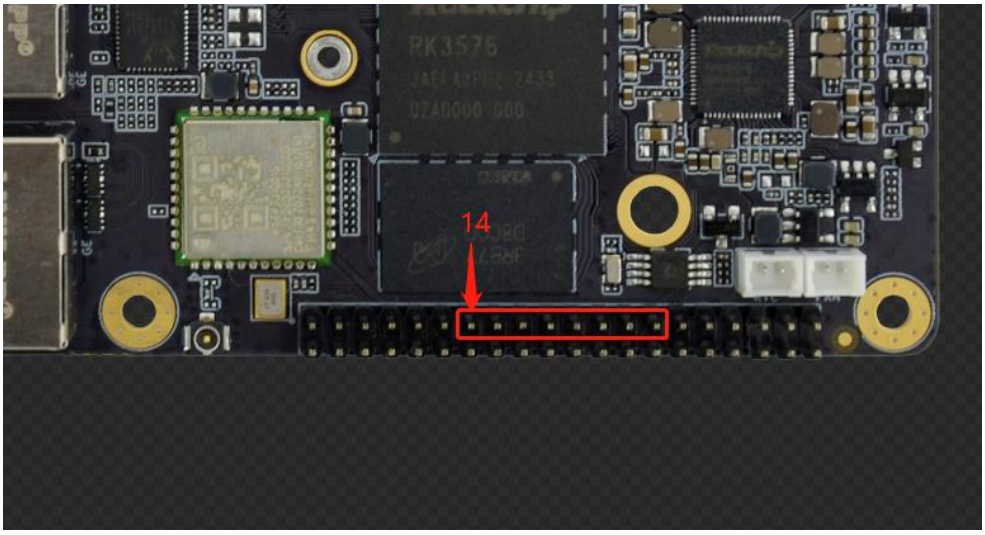


Table 17 The Pin definition of SPI

Function	Interface	Pin	Definition
SPI	J7	14	SPI3_CS0_M1
		16	SPI3_MOSI_M1
		18	SPI3_MISO_M1
		20	SPI3_CLK_M1
		22	SPI1_CS0_M2
		24	SPI1_MOSI_M2
		26	SPI1_MISO_M2
		28	SPI1_CLK_M2

Run the following command to verify SPI1:

```
rk3576_spi_1_test
```

Run the following command to verify SPI3:

```
rk3576_spi_3_test
```

4.7. Verification of RTC

1. **Confirm that the HYM8563S driver module is loaded successfully:** open the terminal, run the command `dmesg | grep rtc-hym8563`, and printout rtc-hym8563, which proves that the module is loaded successfully;

```
[      2.329714] rtc-hym8563 3-0051: registered as rtc1
```

2. **Set and read the RTC time:**

- Read the RTC time, run the command `sudo hwclock -r`.
- Modify the current system time, run the command `sudo date -s “2022-12-08 8:45:00”`.
- Write the system time to RTC, run the command `sudo hwclock -w`.

```
linaro@linaro-alip:~$ sudo hwclock -w
linaro@linaro-alip:~$ sudo hwclock
2025-01-03 09:24:44.187083+00:00
linaro@linaro-alip:~$
```

4.8. Usage of FAN

Run the following commands to control the FAN interface:

```
echo 0 > /sys/class/leds/fan_en/brightness          #turn off
echo 1 > /sys/class/leds/fan_en/brightness          #turn on
```

4.9. Usage of M.2 SSD

Check the disk size via the command fdisk –l /dev/nvme0n1.

```
fdisk –l /dev/nvme0n1
```

E.g.

```
root@          /home/debix# fdisk -l /dev/nvme0n1
Disk /dev/nvme0n1: 1.84 TiB, 2000398934016 bytes, 3907029168 sectors
Disk model: Samsung SSD 970 EVO Plus 2TB
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x6d97b25f

Device         Boot Start        End    Sectors  Size Id Type
/dev/nvme0n1p1       2048 3907029167 3907027120  1.8T 83 Linux
```