DEBIX Mini PC (BPC-iMX8MP-08) User Guide

Version：V1.2 (2024-11)

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

DEBIX Mini PC (BPC-iMX8MP-08) is a mini personal computer based on the SoC, NXP i.MX 8M Plus. It consists of the DEBIX motherboard (EMB-iMX8MP-07), an aluminum alloy enclosure, and antennas. It provides rich interfaces for IoT gateways, edge computing, security, building control and industrial applications. And it has a variety of anti-harsh environment features, including robustness, dust, shock, shock, wide temperature, portability and more.

Figure 1 DEBIX Mini PC (BPC-iMX8MP-08)

REVISION HISTORY		
Rev.	Date	Description
1.0	2024.10.17	First edition
1.1	2024.10.29	1. Optimized the content 2. Added the part of 2.3.12. RTC
1.2	2024.11.08	1. Added the mark of USB 3.0 OTG interface in the part of 2.3.2. USB 3.0 2. Added the flash method and steps in the part of 3.1.Software Installation

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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 supply cable from the device whenever there is no workload required on it. Do not connect the power cable while the power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electricians should open the device enclosure.
Caution! 	Always ground yourself to remove any static electric charge before touching *DEBIX Mini PC (BPC-iMX8MP-08)*. 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. During installation, set the device down on a reliable surface. Drops and bumps will lead to damage.

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

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

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

sudden over-voltage.

7. Do not pour liquid into the venting holes of the enclosure or on the board without enclosure, as this could cause fire or electric shock.

8. If one of the following situations occurs, get the equipment checked by service personnel:

- The power supply cable 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.

9. Do not place the device outside the specified ambient temperature range (-40℃/-40℉~85℃/185℉). This will damage the machine. It needs to be kept in an environment at controlled temperature.

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

1.3. Technical Support

1. Visit DEBIX website (https://www.debix.io/), where you can find the latest information about the product.
2. Contact your distributor, sales representative or Polyhex'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

Technical Support:

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

Email: *info@debix.io*

Chapter 2 Introduction

DEBIX Mini PC (BPC-iMX8MP-08) is a NXP i.MX 8M Plus based DEBIX Mini PC. It is designed for industrial applications, which can be used in a wide range of schemes that require high reliability, including machine vision and machine learning, advanced multimedia, smart cities, and edge computing.

Main Features:

- Support dual Gigabit Ethernet, 2.4GHz & 5GHz dual-band Wi-Fi, Bluetooth 5.3 and 4G/5G.
- Support 6 x USB 3.0, 1 x System UART Debug, 8 x GPIO, 1 x I2C, 1 x SPI, 1 x CAN, 2 x RS232/RS485.
- Support Android, Ubuntu, Yocto, Debian, Windows 10 IoT OS.

2.1. Overview

DEBIX Mini PC (BPC-iMX8MP-08) is composed of the DEBIX motherboard (EMB-iMX8MP-07), an aluminum alloy enclosure and antennas (antennas are optional).

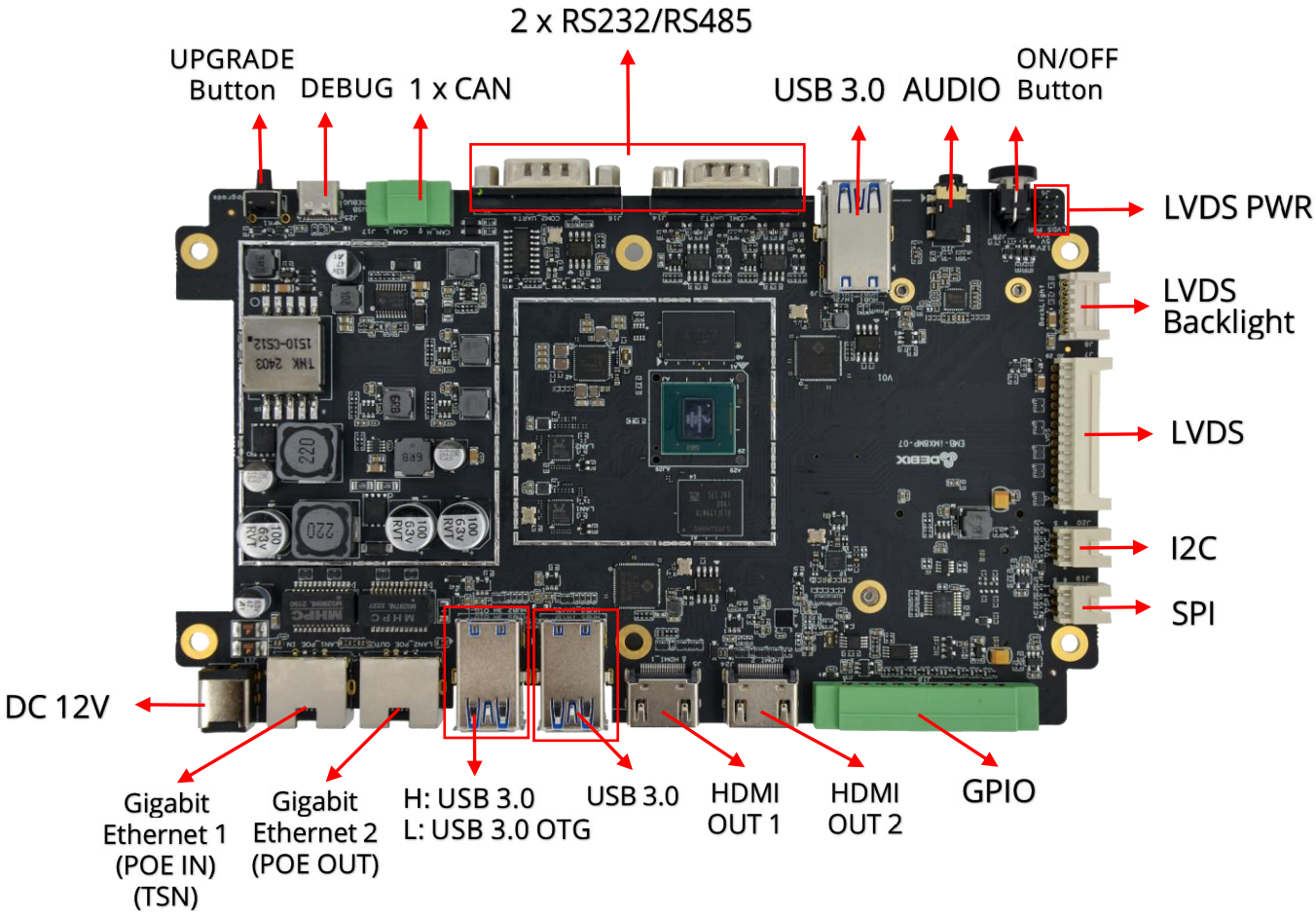


Figure 2 DEBIX Motherboard (EMB-iMX8MP-07) Front View

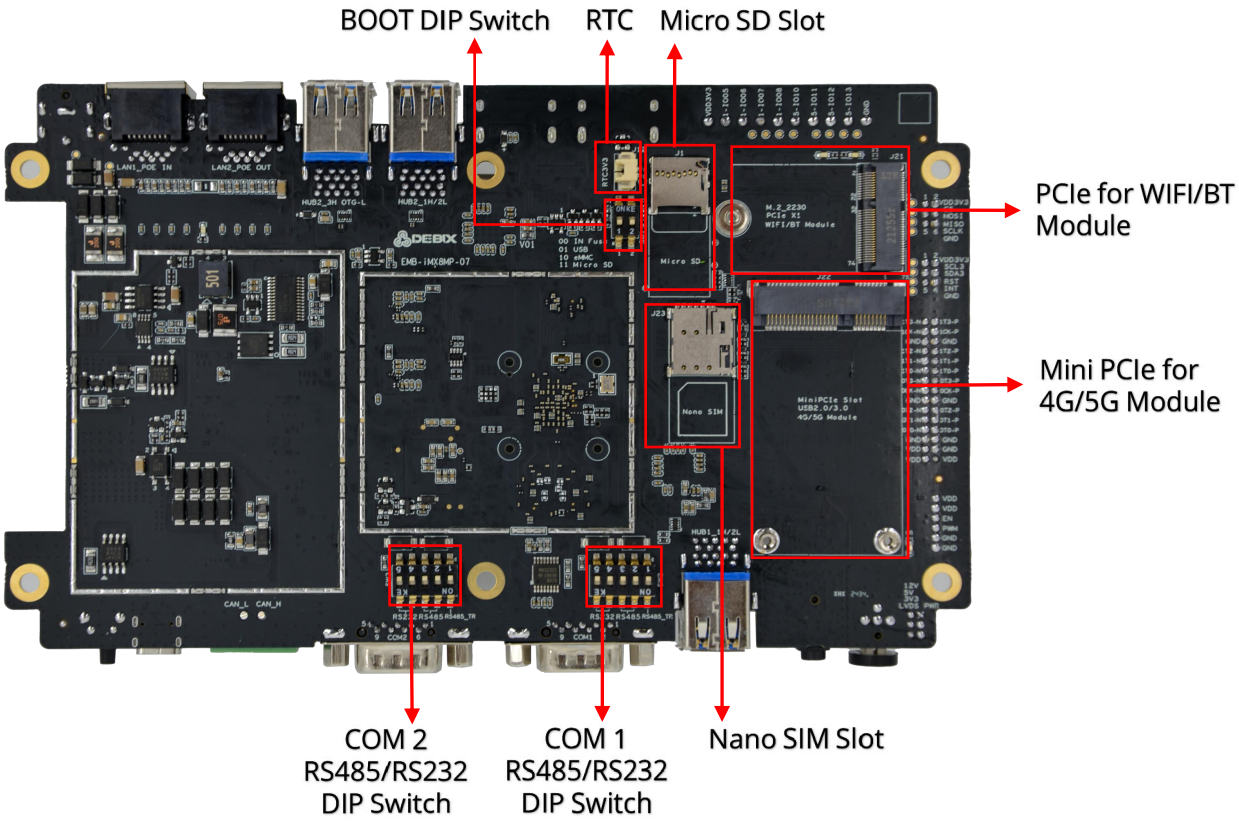
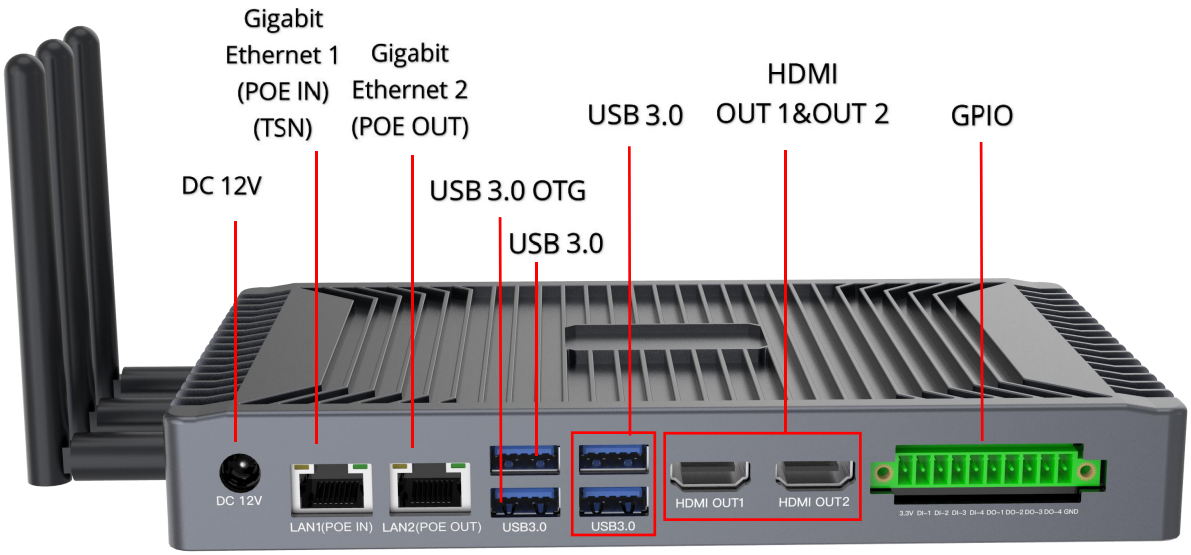


Figure 3 DEBIX Motherboard (EMB-iMX8MP-07) Back View



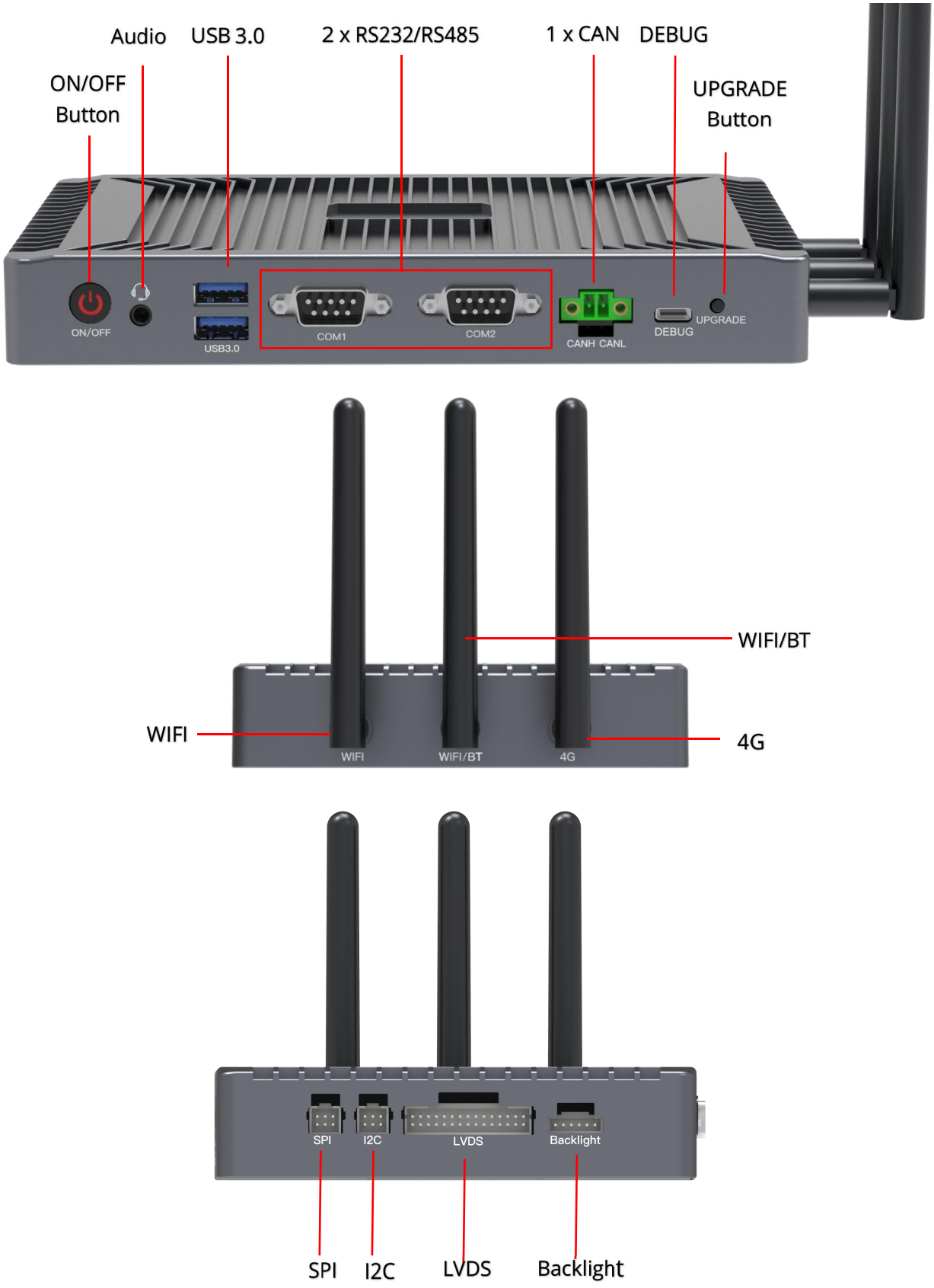


Figure 4 DEBIX Mini PC (BPC-iMX8MP-08)

DEBIX Mini PC (BPC-iMX8MP-08) uses NXP i.MX 8M Plus as SoC, supporting Ethernet, wireless network, Bluetooth 5.3, 4G/5G module, etc. The specification is as follows:

Table 2 Specification of DEBIX Mini PC (BPC-iMX8MP-08)

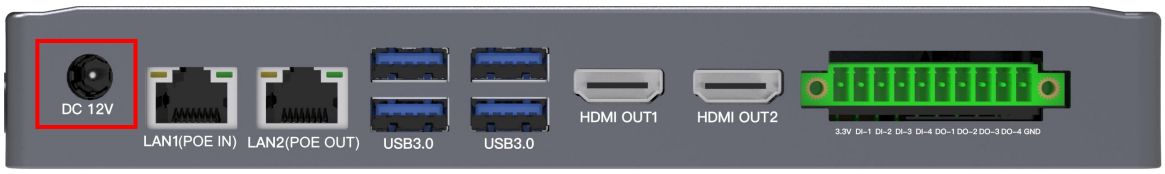
System	
Product Model	BPC-iMX8MP-08
CPU	i.MX 8M Plus/MIMX8ML4CVNKZAB, 4 x ARM Cortex-A53, 1.6GHz, 2.3 TOPS NPU
Memory	2GB LPDDR4 (4GB/8GB is optional)
Storage	Onboard 16GB eMMC (32GB/64GB/128GB/256GB is optional)
OS	Android 11, Ubuntu 20.04, Debian 12.6, Yocto-L6.6.23_2.2.0, Windows 10 IoT Enterprise (Notice: only 4GB/8GB LPDDR4 supports Windows 10 IoT Enterprise)
BOOT Mode	● Boot from eMMC (Default) ● Boot from Micro SD Card ● USB Flash
Communication	
Gigabit Ethernet	2 x Gigabit Ethernet ports (independent MAC address), support IEEE 802.3af (1 x POE PD & TSN, 1 x POE PSE)
Wi-Fi & BT	1 x M.2 2230 2.4GHz & 5GHz WiFi and BT 5.3 combo module (optional)
4G	1 x Mini PCIe for 4G/5G module (optional)
Antenna	3 x ANT (1 x 4G main ANT, 1 x WiFi main ANT, 1 x WiFi diversity ANT + BT main ANT)
Video & Audio	
HDMI	2 x HDMI OUT
LVDS	1 x LVDS. Single & dual channel 8 bit. The connector is 2 x 15PIN wafer.
Backlight	1 x Backlight. The connector is 1 x 6PIN wafer.

Audio	1 x 3.5mm headphone and Mic combo port
I/O Interface	
USB 3.0	6 x USB 3.0 Host Type-A
Debug	1 x System UART Debug. UART to USB Type-C
COM	2 x COM (The default option is RS232. RS485 is supported through the internal DIP switch). The connector is DB9 male.
CAN	1 x CAN. The connector is 2PIN phoenix terminal
GPIO	4 x GPIO OUT, 4 x GPIO IN. The connectors are 10PIN phoenix terminals.
I2C	1 x I2C. The connector is 2 x 3PIN wafer.
SPI	1 x SPI. The connector is 2 x 3PIN wafer.
LED & Button	● 1 x ON/OFF Button with LED (Red) ● 1 x Upgrade Button (eMMC firmware upgrade and update for system storage)
DC IN	1 x DC IN socket, supports 5.5 x 2.1mm plug
Power Supply	
Power Supply	DC 12V/3A
Mechanical & Environmental	
Dimension (L x W x H)	200.0mm x 121.0mm x 28.0mm(±0.5mm)
Net Weight (EMB-iMX8MP-07)	175g (±0.5g)
Net Wright (DEBIX Mini PC)	610g (±0.5g)
Operating Temp.	● -20℃~70℃ ● -40℃~85℃ (optional)
Enclosure Color	Grey (Black is optional)
Enclosure Material	Aluminum alloy

2.2. Interface

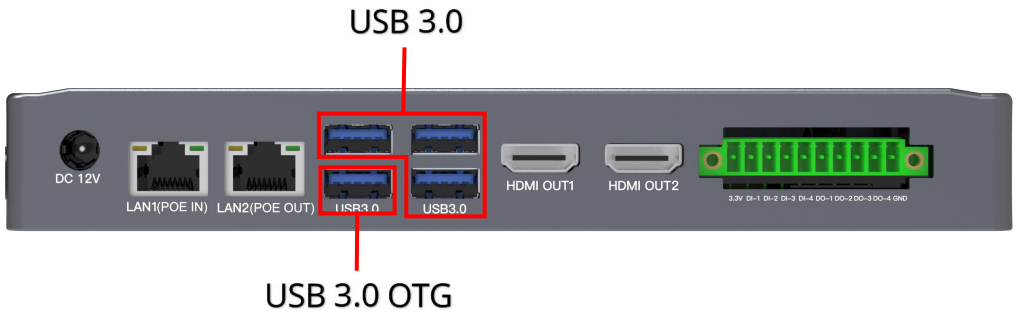
2.3.1. Power Interface

DEBIX Mini PC (BPC-iMX8MP-08) provides one 5.5 x 2.1mm DC IN female. Default input: DC 12V/3A.



2.3.2. USB 3.0

DEBIX Mini PC (BPC-iMX8MP-08) provides six USB 3.0 interfaces:

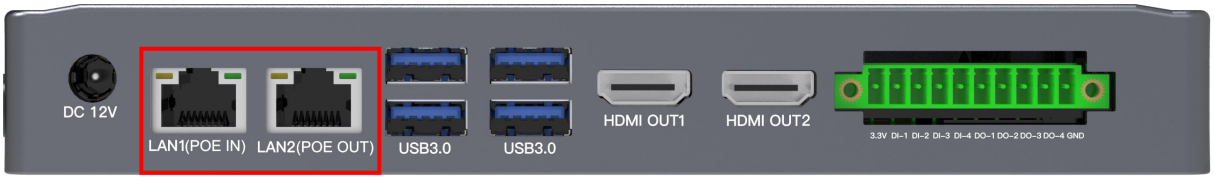


2.3.3. Ethernet Interface

DEBIX Mini PC (BPC-iMX8MP-08) provides two Gigabit Ethernet ports with independent MAC address:

- ETH-1 supports POE PD.

- ETH-2 supports POE PSE.



Connect the DEBIX Mini PC (BPC-iMX8MP-08) 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

2.3.4. Display Interface

DEBIX Mini PC (BPC-iMX8MP-08) supports:

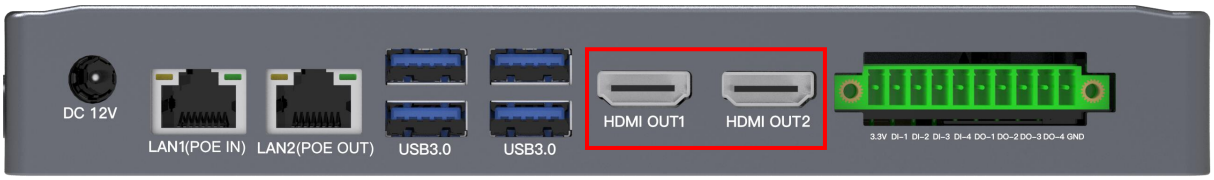
- Two LCDIF drive HDMI 2.0a Tx. HDMI resolution up to 4kp30
- One LCDIF drives LVDS Tx. LVDS resolution up to 1920x1080p60

When less than or equal to 2 LCD interfaces are used at the same time, each LCD interface supports 1920x1200p60 display.

When the three LCD interfaces are used at the same time, supports two 1080p60 + one HDMI 4kp30.

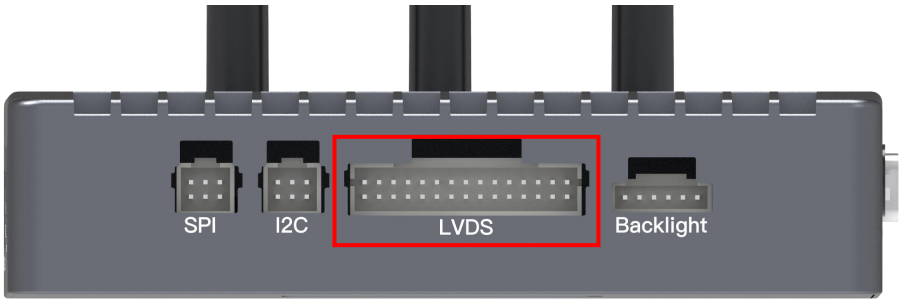
2.3.4.1. HDMI Interface

DEBIX Mini PC (BPC-iMX8MP-08) provides two HDMI interface: Their refdes. are J5 and J24 respectively. Support 4K@30Hz + 1080P@60Hz dual screen extended display.

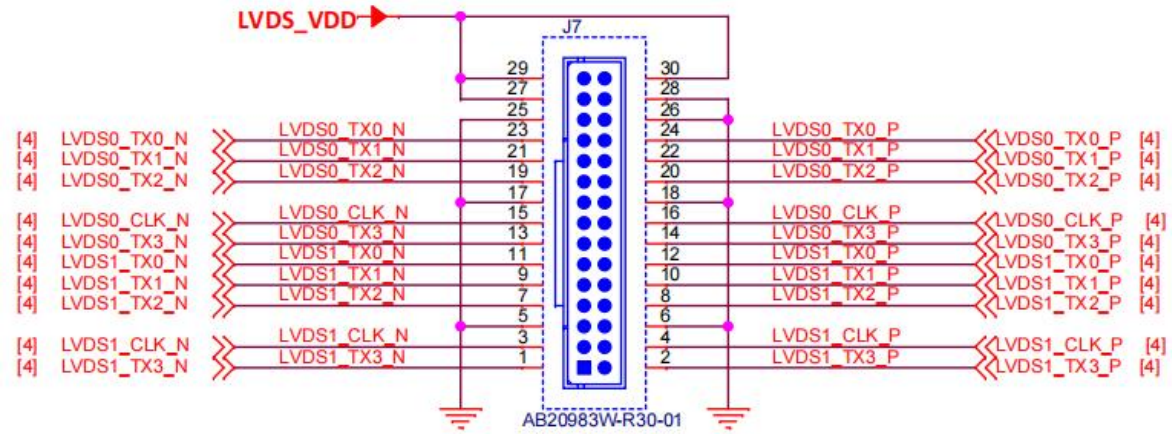


2.3.4.2. LVDS Interface

DEBIX Mini PC (BPC-iMX8MP-08) provides one LVDS interface: The refdes. is J7. The connector is the 2 x 15PIN wafer. It can be used to connect monitors, televisions or projectors. The resolution is 1080p@60Hz.



The pin sequence of LVDS interface is shown as below:



The LVDS interface is defined as follows:

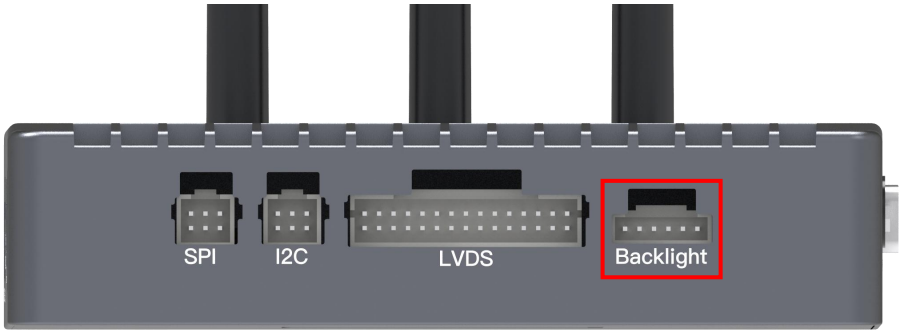
Table 4

Pin	Definition	Pin	Definition
1	LVDS1_TX3_N	2	LVDS1_TX3_P
3	LVDS1_CLK_N	4	LVDS1_CLK_P

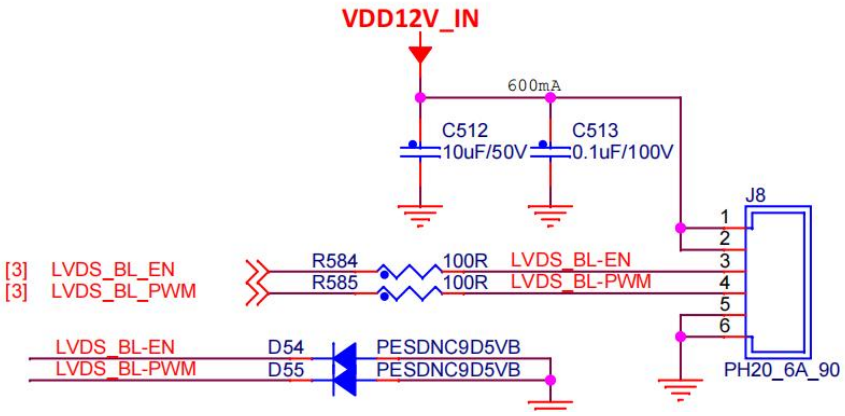
5	GND	6	GND
7	LVDS1_TX2_N	8	LVDS1_TX2_P
9	LVDS1_TX1_N	10	LVDS1_TX1_P
11	LVDS1_TX0_N	12	LVDS1_TX0_P
13	LVDS1_TX3_N	14	LVDS1_TX3_P
15	LVDS1_CLK_N	16	LVDS1_CLK_P
17	GND	18	GND
19	LVDS1_TX2_N	20	LVDS1_TX2_P
21	LVDS1_TX1_N	22	LVDS1_TX1_P
23	LVDS1_TX0_N	24	LVDS1_TX0_P
25	GND	26	GND
27	LVDS_VDD	28	GND
29	LVDS_VDD	30	LVDS_VDD

2.3.4.3.LVDS Backlight Control Adjustment Interface

DEBIX Mini PC (BPC-iMX8MP-08) provides one 6Pin/2.0mm LVDS backlight control adjustment Interface: The refdes. is J8. Through it, the LVDS backlight can be turned on or off and the backlight brightness can be adjusted.



The pin sequence of the LVDS backlight control adjustment interface is shown as below:



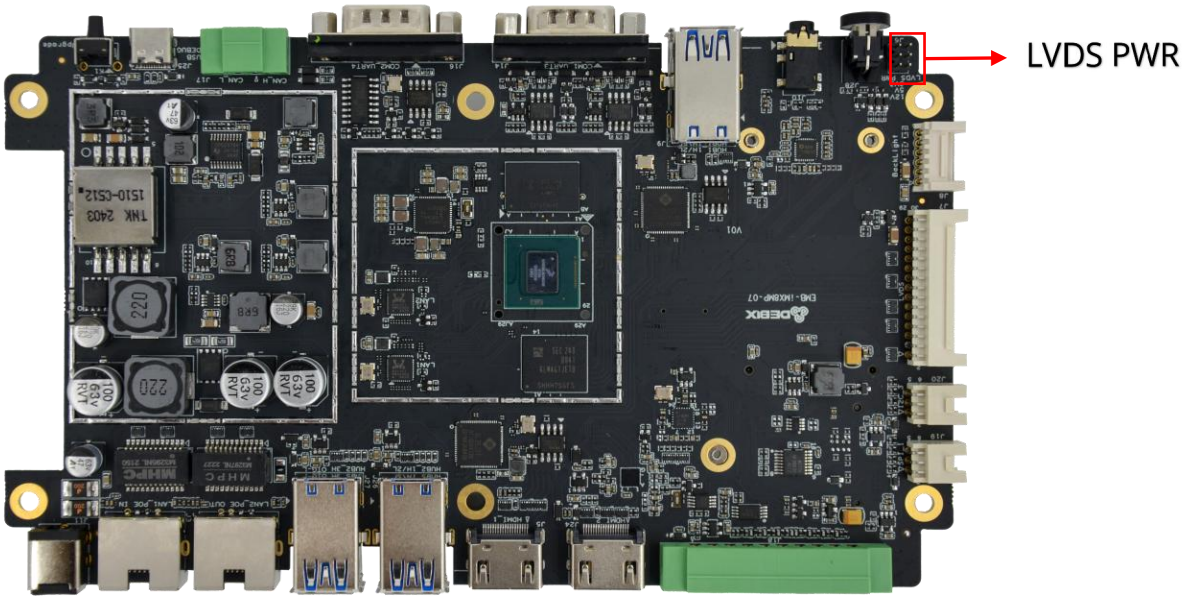
LVDS backlight control adjustment interface is defined as follows:

Table 5

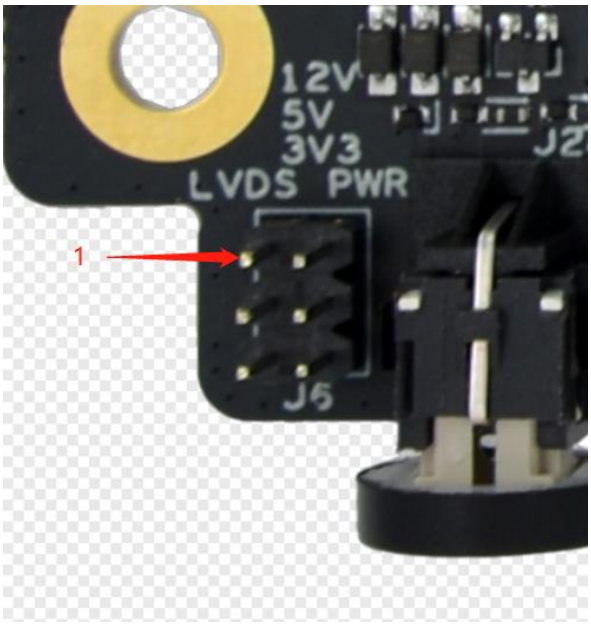
Pin	Definition	Description
1	DC_IN	The range of DC：12-36V
2	DC_IN	The range of DC：12-36V
3	LVDS_BL_EN	Backlight switch enabled
4	LVDS_BL_PWM	Backlight brightness PWM control
5	GND	To ground
6	GND	To ground

2.3.4.4. LVDS PWR

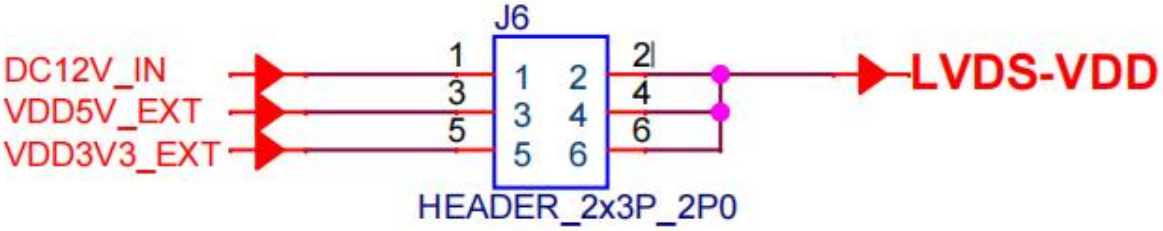
DEBIX Mini PC (BPC-iMX8MP-08) provides one LVDS PWR interface on the DEBIX motherboard: The refdes. is J6.



The figure of the LVDS PWR's PCBA pin sequence is shown as below:



The pin sequence of the LVDS PWR interface is shown as below:



LVDS PWR interface is defined as follows:

Table 6

Pin	Definition	Pin	Definition
1	DC12V_IN	2	LVDS-VDD
3	VDD5V_EXT	4	LVDS-VDD
5	VDD3V3_EXT	6	LVDS-VDD

2.3.5. Audio

DEBIX Mini PC (BPC-iMX8MP-08) provides one combined headphone and microphone input interface. The connector is a standard 3.5mm headphone jack, with audio in/out function, and supports rated voltage 1.5V MIC audio input.

NOTICE

DEBIX only supports four-segment headphone plug for using MIC. 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 DEBIX audio interface according to the definition of GND and MIC for normal use.

2.3.6. Debug

DEBIX Mini PC (BPC-iMX8MP-08) provides one Debug interface as the UART TTL 3.3V

debugging serial port. The connector is UART to USB Type-C.

2.3.7. RS232/RS485

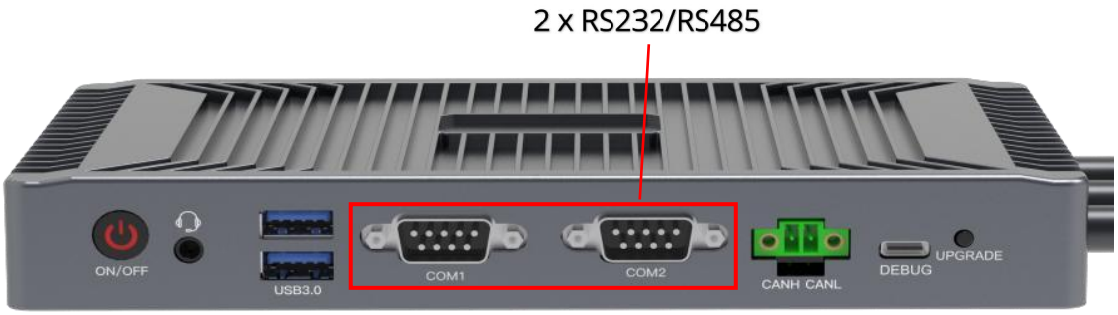
DEBIX Mini PC (BPC-iMX8MP-08) provides two COM interfaces: COM 1 and COM 2.

- COM 1: 1 x RS232/RS485
- COM 2: 1 x RS232/RS485

COM 1 and COM 2 interfaces are RS232/RS485 serial ports. Their refdes. are: J14 and J16 respectively.

NOTE

RS232 is the default configuration. It can be change to RS485 through the internal DIP switch. Please refer to parts of 2.3.14.2. COM1 RS485/RS232 DIP Switch and 2.3.14.3. COM2 RS485/RS232 DIP Switch.



The pin sequence of COM 1 and COM 2 (2 x RS232/RS485) is shown as below:

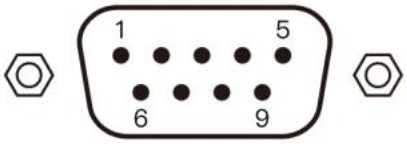
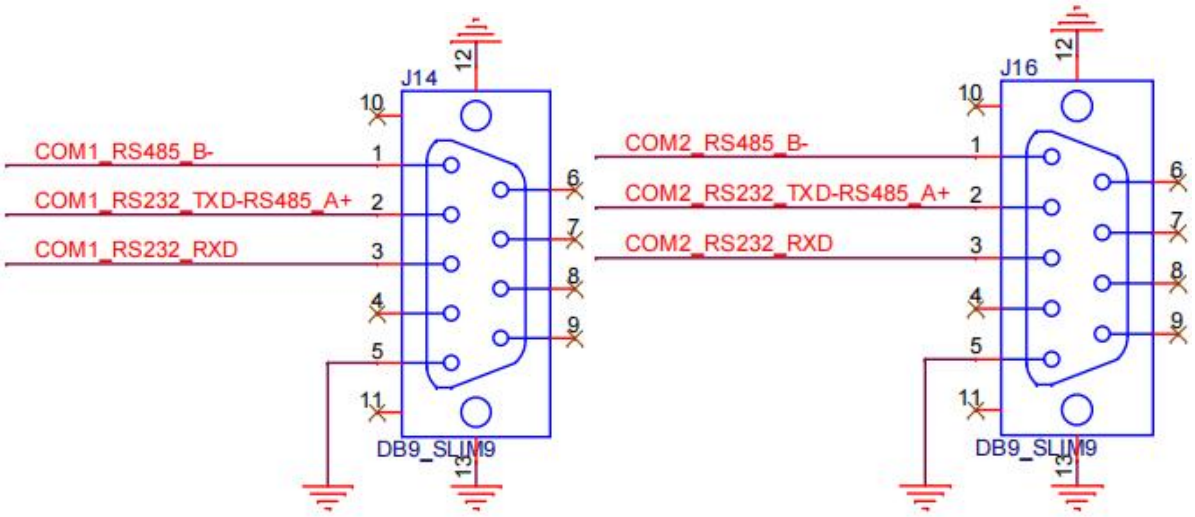


Table 7 Device Node of COM Interface

	Definition	description	Device Node
COM 1	RS485_B-	RS485 differential signal line B	/dev/ttymxc2
	RS232_TXD-RS485_A+	RS232 transmitting terminal/ RS485 differential signal line A	
	RS232_RXD	RS232 receiving terminal	
COM 2	RS485_B-	RS485 differential signal line B	/dev/ttymxc3
	RS232_TXD-RS485_A+	RS232 transmitting terminal/ RS485 differential signal line A	
	RS232_RXD	RS232 receiving terminal	

The pin sequence of COM 1 (Left) and COM 2 (Right) is shown as below:



2 x COM interfaces (RS232/RS485) are defined as follows:

Table 8

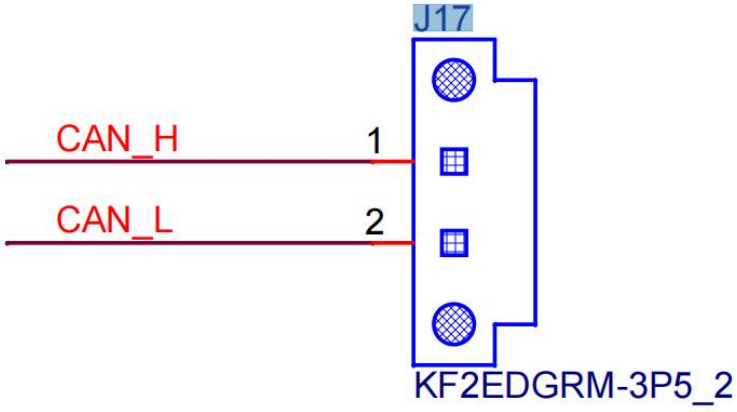
Pin	Definition	Pin	Definition

1	RS485_B-	2	RS232_TXD-RS485_A+
3	RS232_RXD	4	NC
5	GND	6	NC
7	NC	8	NC
9	NC	10	NC
11	NC	12	GND
13	GND		

2.3.8. CAN

DEBIX Mini PC (BPC-iMX8MP-08) provides one 2Pin CAN interface: The refdes. is J17.

The pin sequence of CAN interface is shown as below:



The 2PIN CAN interface is defined as follows:

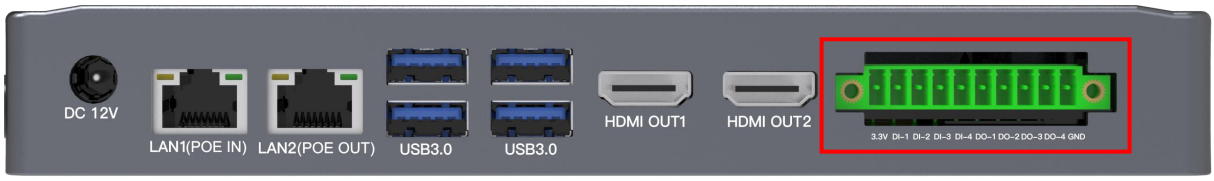
Table 9

Pin	Definition	Description

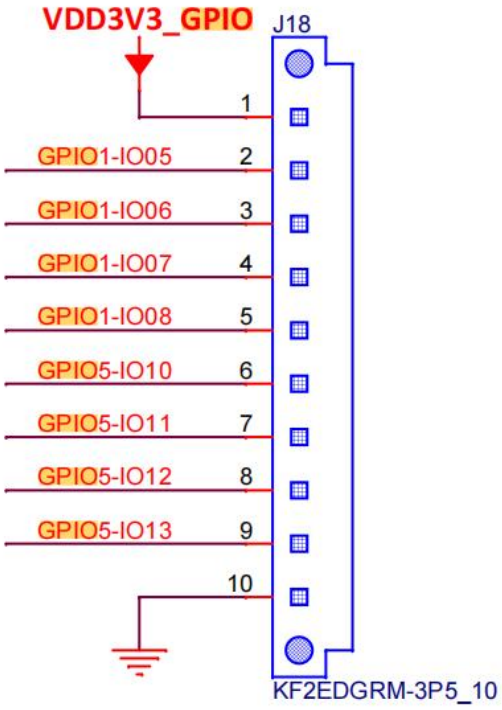
1	CAN_H	CAN differential signal line H
2	CAN_L	CAN differential signal line L

2.3.9. GPIO

DEBIX Mini PC (BPC-iMX8MP-08) provides one 4 x DI, 4 x DO GPIO interface：The refdes. is J18.



The pin sequence of GPIO interface is shown as below:



GPIO interface is defined as follows:

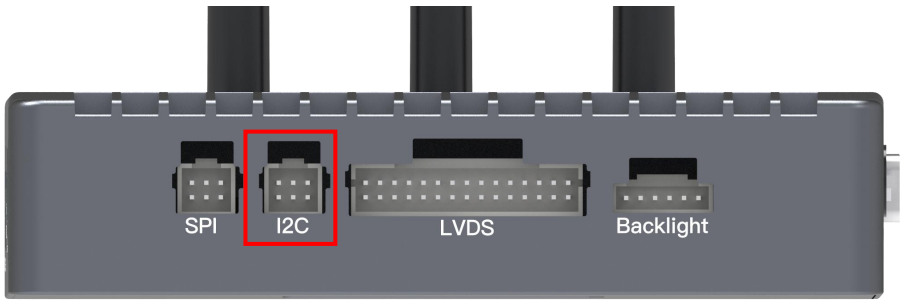
Table 10

Pin	Definition
1	VDD3V3_GPIO

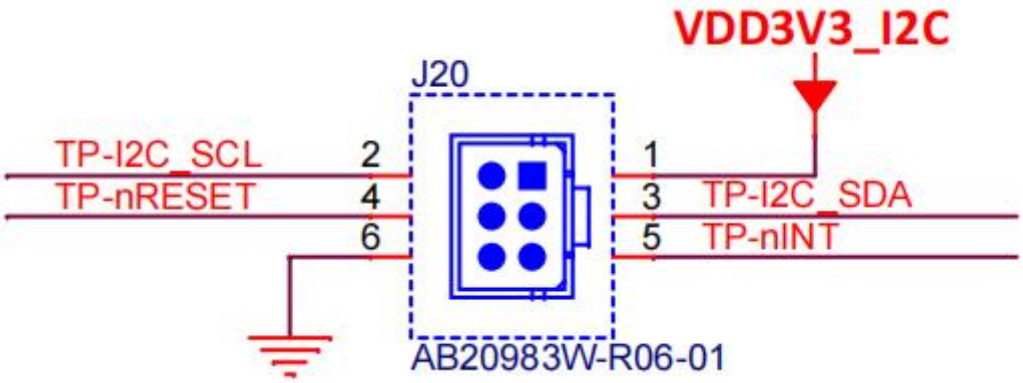
2	GPIO1-IO05
3	GPIO1-IO06
4	GPIO1-IO07
5	GPIO1-IO08
6	GPIO5-IO10
7	GPIO5-IO11
8	GPIO5-IO12
9	GPIO5-IO13
10	GND

2.3.10. I2C

DEBIX Mini PC (BPC-iMX8MP-08) provides one I2C interface: The refdes. is J20.



The pin sequence of I2C interface is shown as below:



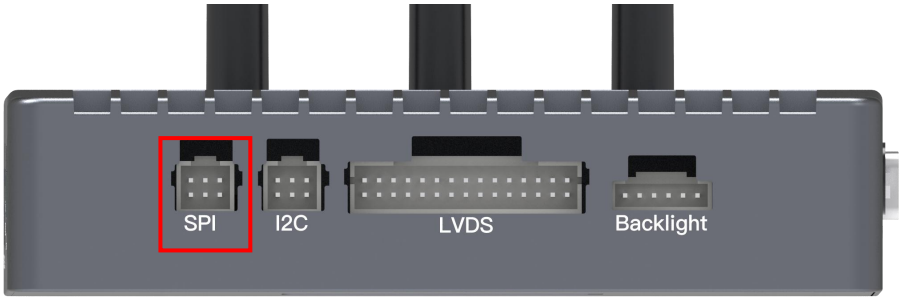
I2C interface is defined as follows:

Table 11

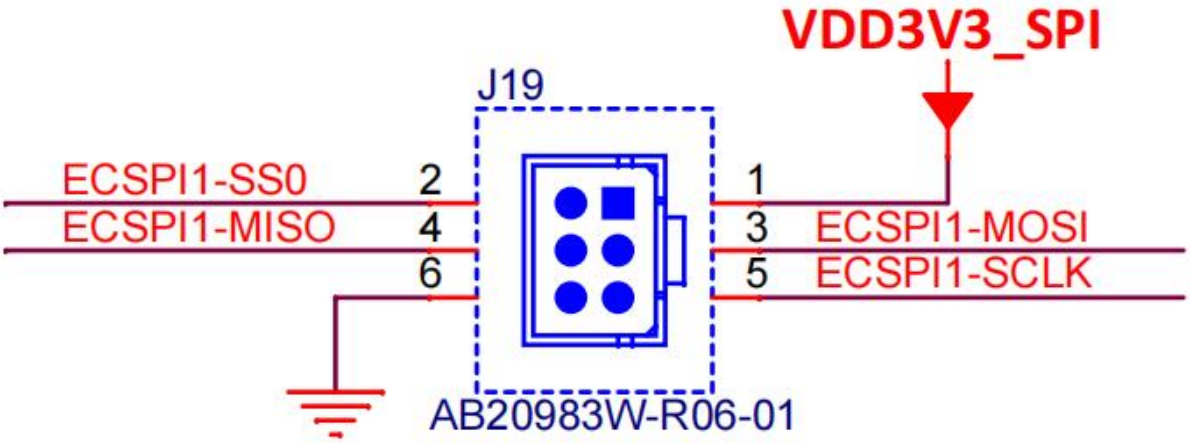
Pin	Definition	Pin	Definition
1	VDD3V3_I2C	2	TP-I2C-SCL
3	TP-I2C-SDA	4	TP-nRESET
5	TP-nINT	6	GND
7	NC		

2.3.11. SPI

DEBIX Mini PC (BPC-iMX8MP-08) provides one 6Pin SPI interface: The refdes. is J19.



The pin sequence of SPI interface is shown as below:



SPI interface is defined as follows:

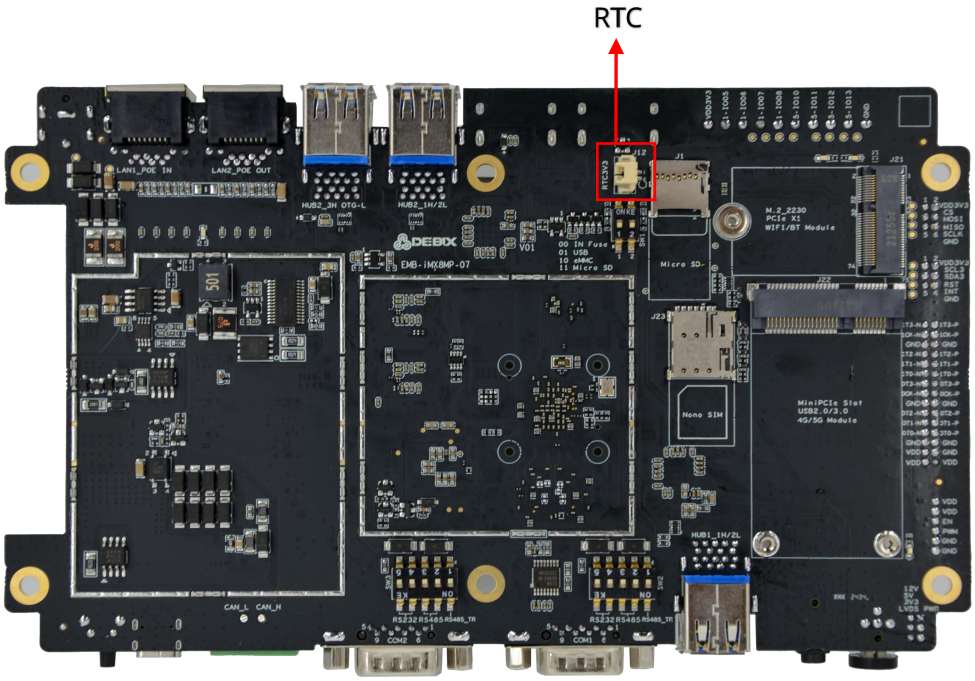
Table 12

Pin	Definition	Pin	Definition
1	VDD3V3_SPI	2	ECSPI1-SS0
3	ECSPI1-MOSI	4	ECSPI1-MISO

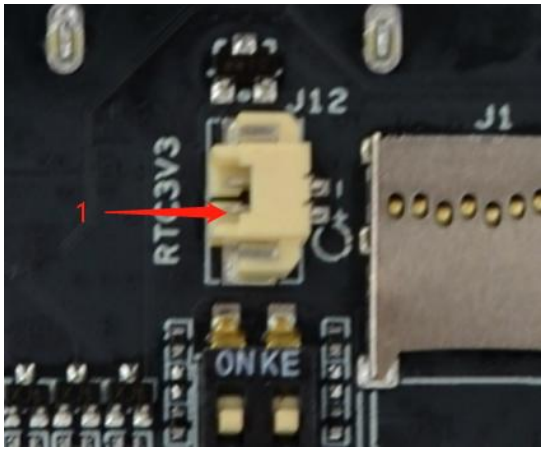
5	ECSPI1-SCLK	6	GND
7	NC		

2.3.12. RTC

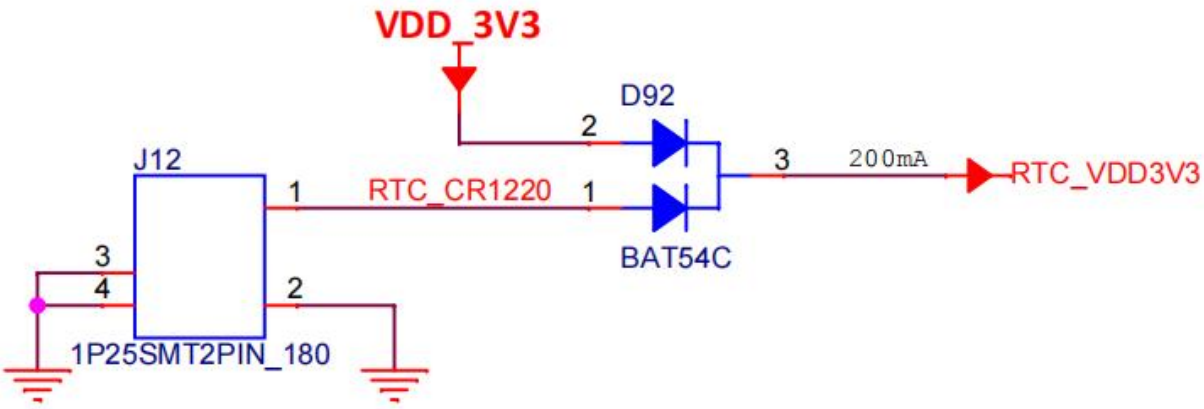
DEBIX Mini PC (BPC-iMX8MP-08) provides one RTC interface on the DEBIX motherboard: The refdes. is J12.



The figure of the RTC interface's PCBA pin sequence is shown as below:



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



The RTC interface is defined as follows:

Table 13

Pin	Definition	Description
1	RTC_VDD3V3	3.3 voltage input
2	GND	To ground

2.3.13. LED & Button

DEBIX Mini PC (BPC-iMX8MP-08) provides one ON/OFF button with LED (Red) and one UPGRADE button. The specific status is described as follows:

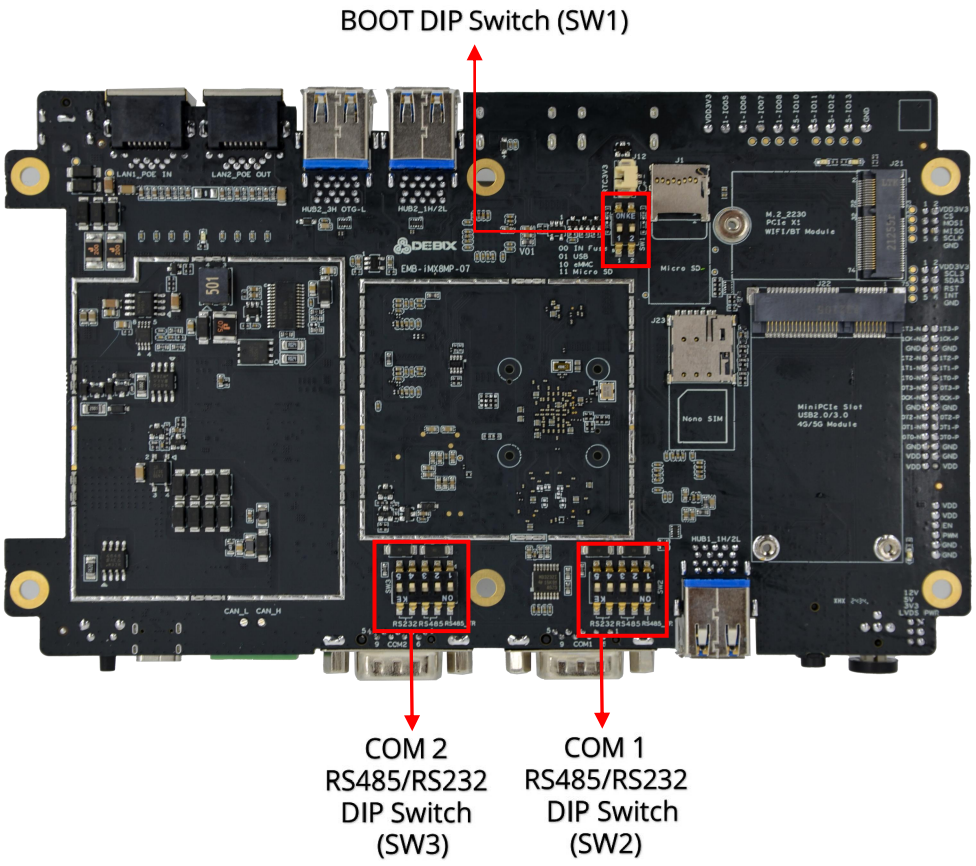
Table 14 Description of the Button Status

Function	Condition	Description
ON/OFF Button with LED	Short press	Sleep/Wake up
	Long press	Power off/Power on
UPGRADE Button	Press	Press and hold down, and then power the device on. The device enters the USB upgrade mode

2.3.14. DIP Switch

DEBIX Mini PC (BPC-iMX8MP-08) provides three onboard DIP switches, each bit of which has two states, “ON” and “OFF”. Switch to the “ON” side indicating the on-state.

- BOOT DIP switch (Refdes.: SW1)
- COM 1 RS485/RS232 DIP switch (Refdes.: SW2)
- COM 2 RS485/RS232 DIP switch (Refdes.: SW3)



WARNING

It needs to be operated in the state of power off when setting the DIP switch!

2.3.14.1. BOOT DIP Switch (Refdes.: SW1) :

DEBIX Mini PC (BPC-iMX8MP-08) has three BOOT modes:

- 01--USB flashing mode
- 10--eMMC booting mode
- 11--Micro SD card booting mode

Three modes of the BOOT DIP switch are shown as below:

01--USB flashing mode

10--eMMC booting mode

11--Micro SD card booting mode

2.3.14.2. COM 1 RS232/RS485 DIP Switch (Refdes.: SW2) ：

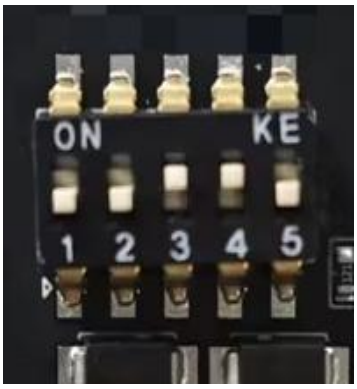
The COM 1 interface has two serial port modes:

- 00110--RS232
- 11001--RS485

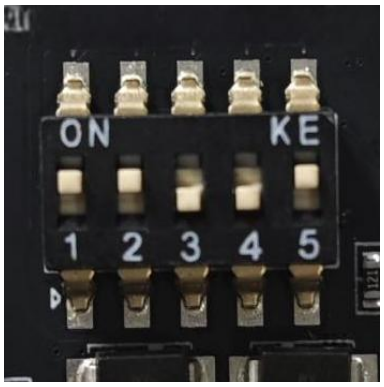
NOTICE

“00110”--RS232 is the default configuration.

Two modes of the COM 1 RS232/RS485 DIP switch are shown as below:



00110--RS232



11001--RS485

2.3.14.3. COM 2 RS232/RS485 DIP Switch (Refdes.: SW3) :

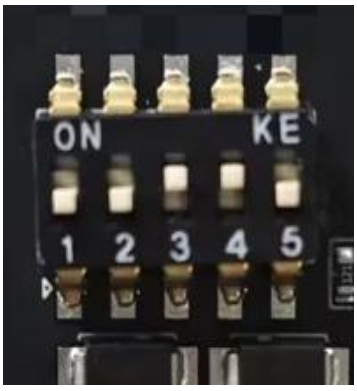
The COM 2 interface has two serial port modes:

- 00110--RS232
- 11001--RS485

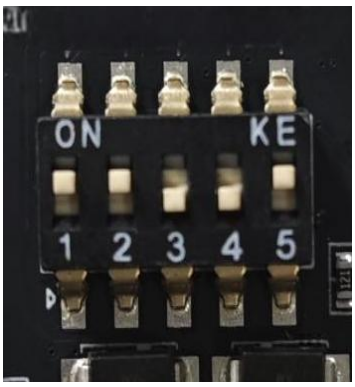
NOTICE

"00110"--RS232 is the default configuration.

Two modes of COM 2 RS232/RS485 DIP switch are shown as below:



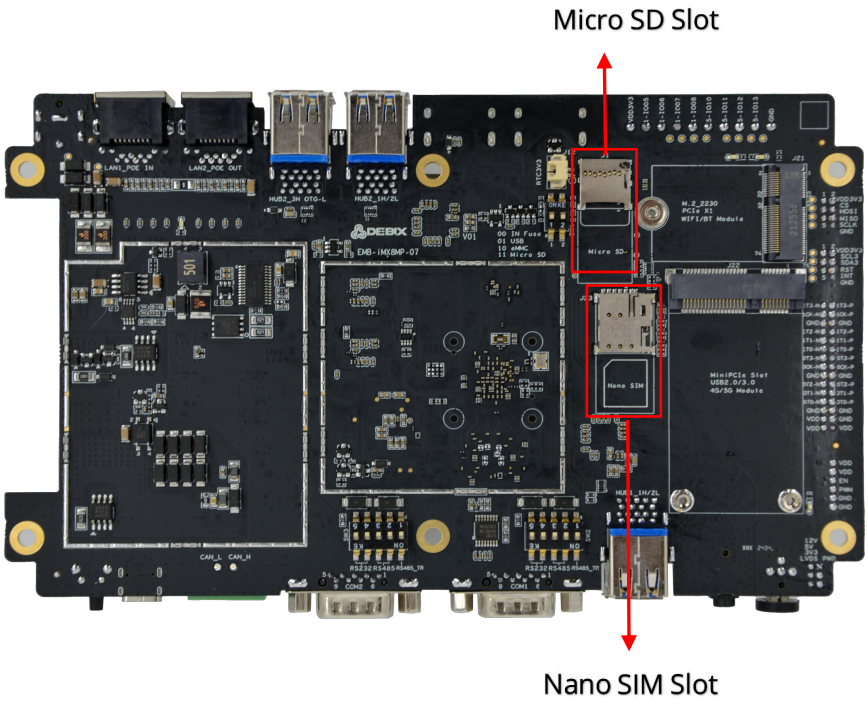
00110--RS232



11001--RS485

2.3.15. Slot

DEBIX Mini PC (BPC-iMX8MP-08) provides one Micro SD slot and one Nano SIM slot.

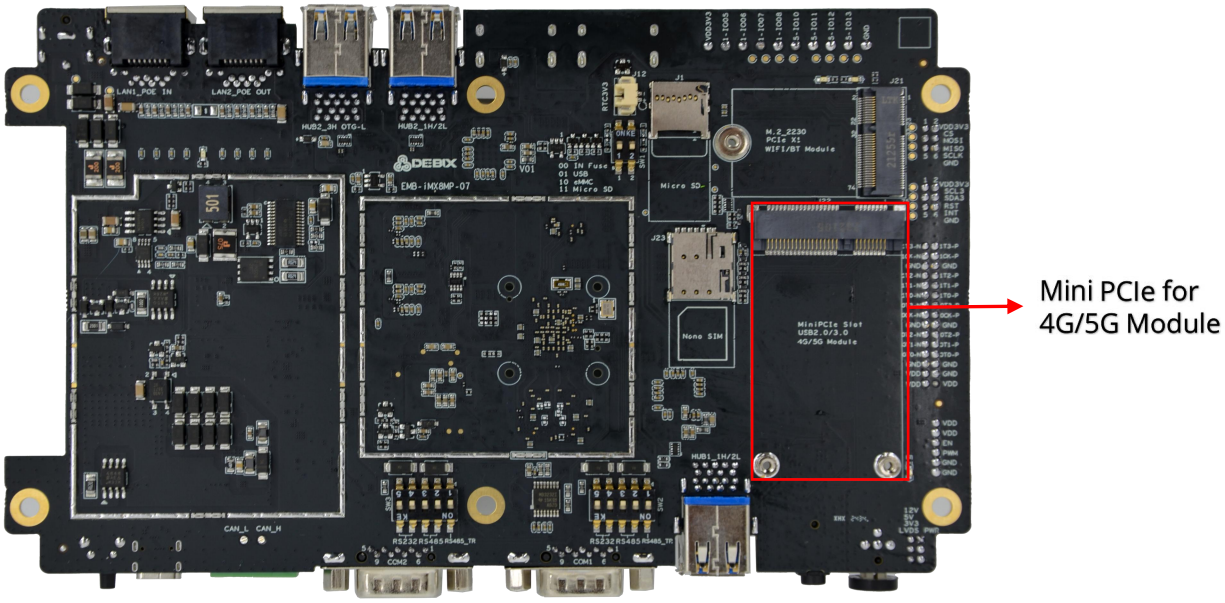


(1) Micro SD Slot: The refdes. is J1. Micro SD card can be used as a system boot card, insert the Micro SD card with the system installed here, and then power on the device to start the system in the Micro SD card. When the BOOT DIP switch is set to other modes and the device is power on, the Micro SD card can be used as a standard memory card to save user data.

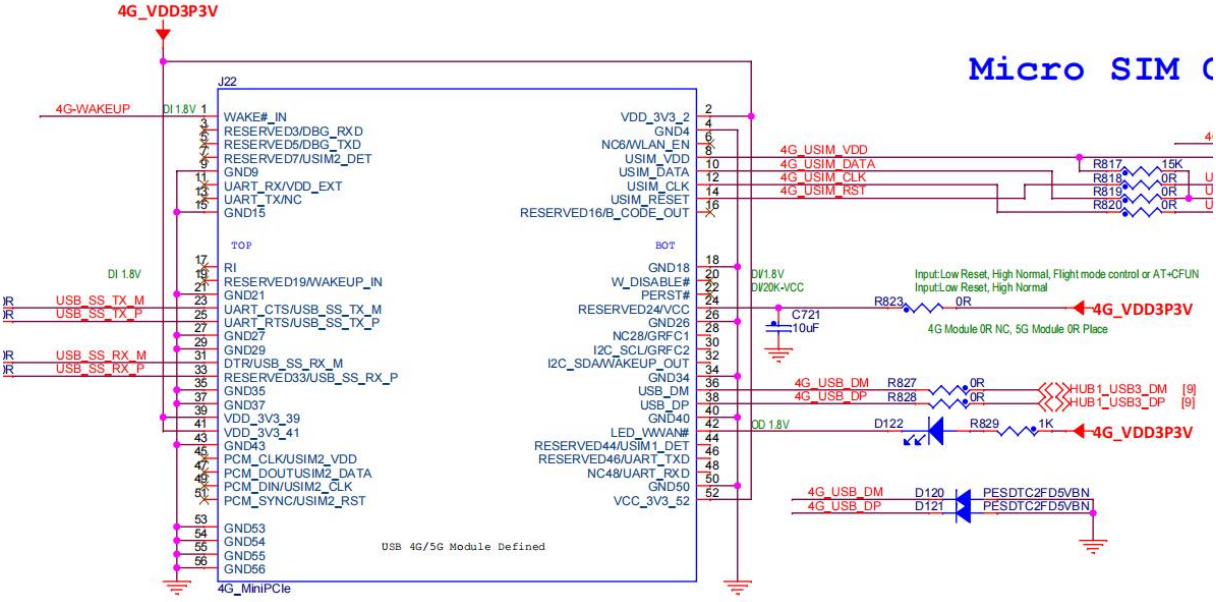
(2) Nano SIM Slot: The refdes. is J23. It is used to install Nano SIM card and provide network connection and data transmission for 4G module.

2.3.16. Mini PCIe Slot

DEBIX Mini PC (BPC-iMX8MP-08) provides one Mini PCIe slot：The refdes. is J22. It is used for 4G/5G modules, and the communication protocol is USB2.0/USB3.0.



The pin sequence of Mini PCIe slot interface is shown as below:



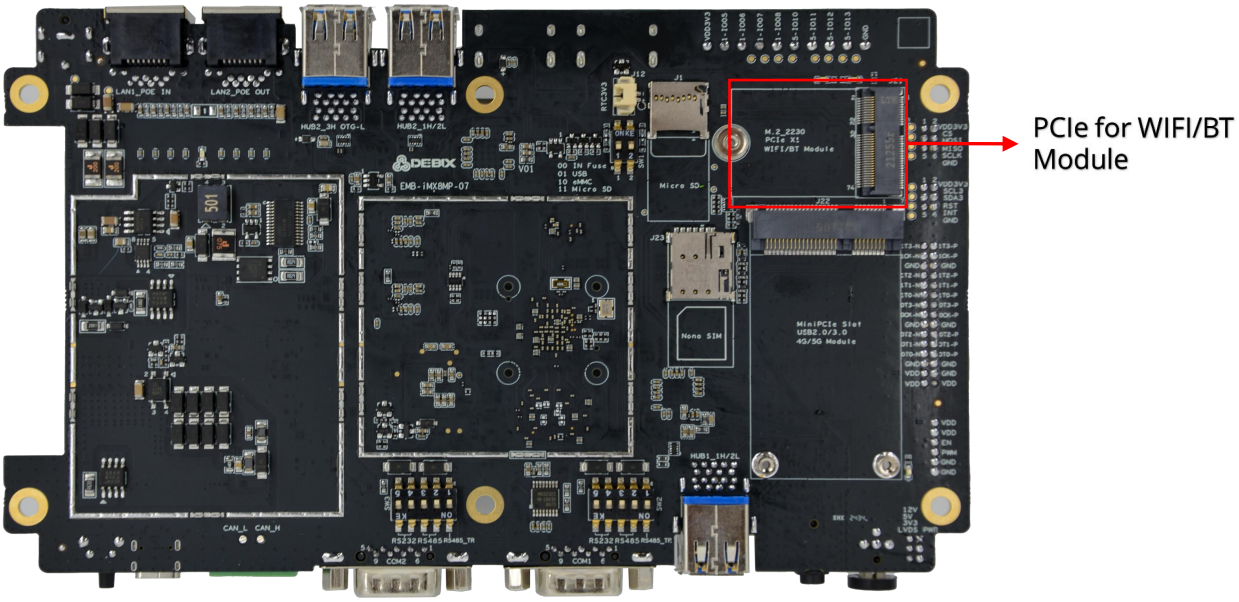
Mini PCIe slot interface is defined as follows:

Table15

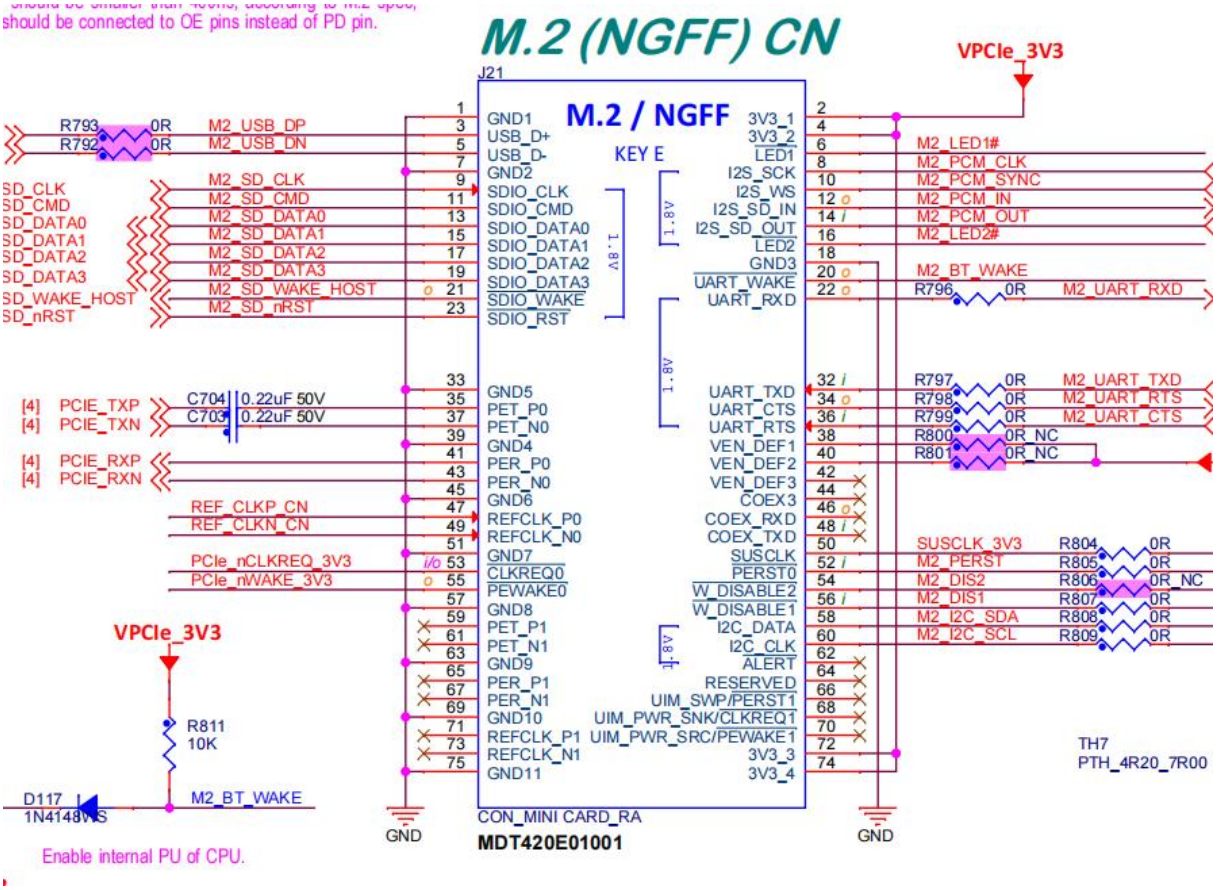
Pin	Definition	Pin	Definition
1	4G-WAKEUP	2	4G_VDD3P3V
3	NC	4	GND
5	NC	6	NC
7	NC	8	4G_USIM_VDD
9	GND	10	4G_USIM_DATA
11	NC	12	4G_USIM_CLK
13	NC	14	4G_USIM_RST
15	GND	16	NC
17	NC	18	GND
19	NC	20	NC
21	GND	22	NC
23	USB_SS_TX_M	24	4G_VDD3P3V
25	USB_SS_TX_P	26	GND
27	GND	28	NC
29	GND	30	NC
31	USB_SS_RX_M	32	NC
33	USB_SS_RX_M	34	GND
35	GND	36	4G_USB_DM
37	GND	38	4G_USB_DP
39	4G_VDD3P3V	40	GND
41	4G_VDD3P3V	42	4G_VDD3P3V
43	GND	44	NC
45	NC	46	NC
47	NC	48	NC
49	NC	50	GND
51	NC	52	4G_VDD3P3V

2.3.17. M.2 NGFF KEY E Slot

DEBIX Mini PC (BPC-iMX8MP-08) provides one M.2 NGFF KEY E slot: The refdes. is J21. It is used for WIFI&BT module, and the communication protocols are PCIe, SDIO and UART.



The pin sequence of the M.2 NGFF KEY E Slot interface is shown as below:



The M.2 NGFF KEY E slot interface is defined as follows:

Table16

Pin	Definition	Pin	Definition
1	GND	2	VPCIe_3V3
3	M2_USB_DP	4	VPCIe_3V3
5	M2_USB_DN	6	M2_LED1#
7	GND	8	M2_PCM_CLK
9	M2_SD_CLK	10	M2_PCM_SYNC
11	M2_SD_CMD	12	M2_PCM_IN
13	M2_SD_DATA0	14	M2_PCM_OUT
15	M2_SD_DATA1	16	M2_LED2#
17	M2_SD_DATA2	18	GND
19	M2_SD_DATA3	20	M2_BT_WAKE

21	M2_SD_WAKE_HOST	22	M2_UART_RXD
23	M2_SD_nRST	32	M2_UART_TXD
33	GND	34	M2_UART_RTS
35	PCIE_TXP	36	M2_UART_CTS
37	PCIE_TXN	38	VDD_1V8
39	GND	40	VDD_1V8
41	PCIE_RXP	42	NC
43	PCIE_RXN	44	NC
45	GND	46	NC
47	REF_CLKP_CN	48	NC
49	REF_CLKN_CN	50	SUSCLK_3V3
51	GND	52	M2_PERST
53	PCIe_nCLKREQ_3V3	54	M2_DIS2
55	PCIe_nWAKE_3V3	56	M2_DIS1
57	GND	58	M2_I2C_SDA
59	NC	60	M2_I2C_SCL
61	NC	62	NC
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	NC
71	NC	72	VPCIe_3V3
73	NC	74	VPCIe_3V3
75	GND		

2.3. Packing List

- 1 x DEBIX Mini PC (BPC-iMX8MP-08)
- 2 x phoenix terminal male (GPIO + CAN)
- 1 x packing box
- 1 x foam pouch

Chapter 3 Getting Started

3.1. Software Installation

DEBIX Mini PC (BPC-iMX8MP-08) is shipped with the operating system burned into eMMC, and the system will boot from eMMC. Connect the monitor and power it on. And then the device will boot up and work normally. If you need to reinstall the system, refer to the steps below.

3.1.1. Flash Method

(1) Flash to eMMC

- **Method 1: Flash to eMMC via USB (This user guide only details the steps of the Method 1)**
- **Method 2: Flash to eMMC via Micro SD card (This method requires disassembly)**

The brief introduction to the steps of the method 2: Use the SD card burning tool to burn the corresponding image to the SD card. After the motherboard is booted from the SD card, the SD card will automatically flash the image to eMMC. For details, please refer to the 3.1.2.System Boot in Debix Model A User Guide.

NOTE

For the Method 2, please download the following image:

Download Link:

https://debix-oss.oss-cn-hongkong.aliyuncs.com/DEBIX%20MINIPC/EMB-IMX8MP-07-TF-upgrade-V1.02-20241012.img

Image Name: EMB-IMX8MP-07-TF-upgrade-V1.02-20241012. img

MD5: BE01E4D6F7E6F65FD002F4819AB123D9

(2) Flash to Micro SD card

- **Flash to Micro SD card and boot from it. (This method requires disassembly)**

The brief introduction to the steps: Use the SD card burning tool to burn the corresponding image to the SD card. Then set the BOOT DIP switch to boot from Micro SD card, and the motherboard will boot from the SD card after connecting to the power supply. For details, please refer to the 3.1.2.System Boot in Debix Model A User Guide.

NOTE

For the Method of flashing to Micro SD card, please download the following image:

Download Link:

https://debix-oss.oss-cn-hongkong.aliyuncs.com/DEBIX%20MINIPC/EMB-IMX8MP-07-SD-Start-V1.02-20241012.img

Image Name: EMB-IMX8MP-07-SD-Start-V1.02-20241012.img

MD5: 95DCF8B5D56157AC279C8DD9E9EFDBE4

3.1.2. Flash Steps (Flash to eMMC via USB)

- **Component Preparation**
  - ✓ DEBIX Mini PC (BPC-iMX8MP-08)
  - ✓ USB Type-A to Type-A OTG data cable
  - ✓ DC 12V/3A Power Adapter
  - ✓ PC (windows 10/11)
- **Download the Image and the UUU Tool**

(1) Download the Image

Download Link:

https://debix-oss.oss-cn-hongkong.aliyuncs.com/DEBIX%20MINIPC/EMB-IMX8MP-07-SD-Start-V1.02-20241012.img

Image Name: EMB-IMX8MP-07-SD-Start-V1.02-20241012.img

MD5: 95DCF8B5D56157AC279C8DD9E9EFDBE4

(2) Download the UUU Tool

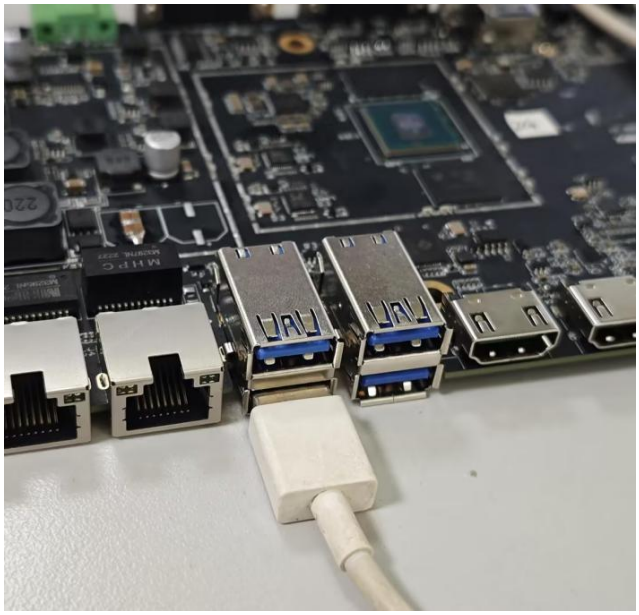
Download Link:

https://debix-oss.oss-cn-hongkong.aliyuncs.com/DEBIX%20MINIPC/UUU.zip

MD5: 36E1A2B299B776AEE854F3B1F3899F74

- **Flash to eMMC via USB**

1. Use a USB Type-A to Type-A OTG data cable to connect the OTG interface of the DEBIX Mini PC (BPC-iMX8MP-08) and the USB interface of the PC. Press and hold the UPGRADE button on the DEBIX Mini PC, and then connect the DC 12V/3A power supply. The system will enter the USB flashing mode;



2. Open the **Windows Command Prompt** as administrator on your PC;
3. Type the cd command to enter the root directory of the unzipped UUU tool file. For example:

```
cd D:\UUU
```

4. Run the following command to download the file and start flashing the system to eMMC;

```
uuu -b emmc_all imx-boot-imx8mpevk-sd. bin-flash_evk
EMB-IMX8MP-07-SD-Start-V1.02-20241012.img
```

```
D:\桌面\UUU升级>uuu -b emmc_all  imx-boot-imx8mpevk-sd.bin-flash_evk EMB-IMX8MP-07-SD-Start-V1.02-20241012.img
uuu (Universal Update Utility) for nxp imx chips -- libuuu_1.5.21-0-g1f42172

Success 0    Failure 0

1:33     4/ 8 [                4%                ] FB: flash -raw2sparse all EMB-IMX8MP-07-SD-Start-V1.02-20241012.img
```

5. Wait for the system burning to finish; When the terminal shows green “Done”, it means the burning is finished.

```
D:\桌面\UUU升级>uuu -b emmc_all  imx-boot-imx8mpevk-sd.bin-flash_evk EMB-IMX8MP-07-SD-Start-V1.02-20241012.img
uuu (Universal Update Utility) for nxp imx chips -- libuuu_1.5.21-0-g1f42172

Success 1    Failure 0

1:33     8/ 8 [Done                              ] FB: done

D:\桌面\UUU升级>
```

6. After burning, disconnect the power supply and OTG USB cable, make sure the device is completely powered off, and then connect the power supply to start.

3.2. Hardware Connection

Connect the power adapter to the DC power input interface (DC 12V interface is shown in the figure 5 below) and then press the ON/OFF button (ON/OFF power button is shown in the figure 6). When the LED on the ON/OFF button lights up, it proves that the DEBIX Mini PC (BPC-iMX8MP-08) has been normally powered on.

Figure 5

Figure 6

Chapter 4 Functional Examples

4.1. Usage of Ethernet

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

```
ifconfig
```

```
To restore this content, you can run the 'unminimize' command.
Last login: Tue Apr 12 00:32:18 UTC 2022 on ttymxc1
debix@imx8mpevk:~$ 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
```

4.2. Usage of USB3.0

- Write Speed Test

Run the command below to mount the U disk:

```
mount /dev/sdb1 /mnt
```

Run the command below to enter the U disk directory:

```
cd /mnt
```

Run the command below to get the write speed:

```
echo 3 > /proc/sys/vm/drop_caches"          #clear cache
dd if=/dev/zero of=bbb bs=1GB count=1
```

Write speed: 29.8MB/s

```
root@imx8mpevk:/mnt# dd if=/dev/zero of=bbb bs=1GB count=1
1+0 records in
1+0 records out
1000000000 bytes (1.0 GB, 954 MiB) copied, 33.523 s, 29.8 MB/s
```

- **Read Speed Test**

Run the command below to get the read speed:

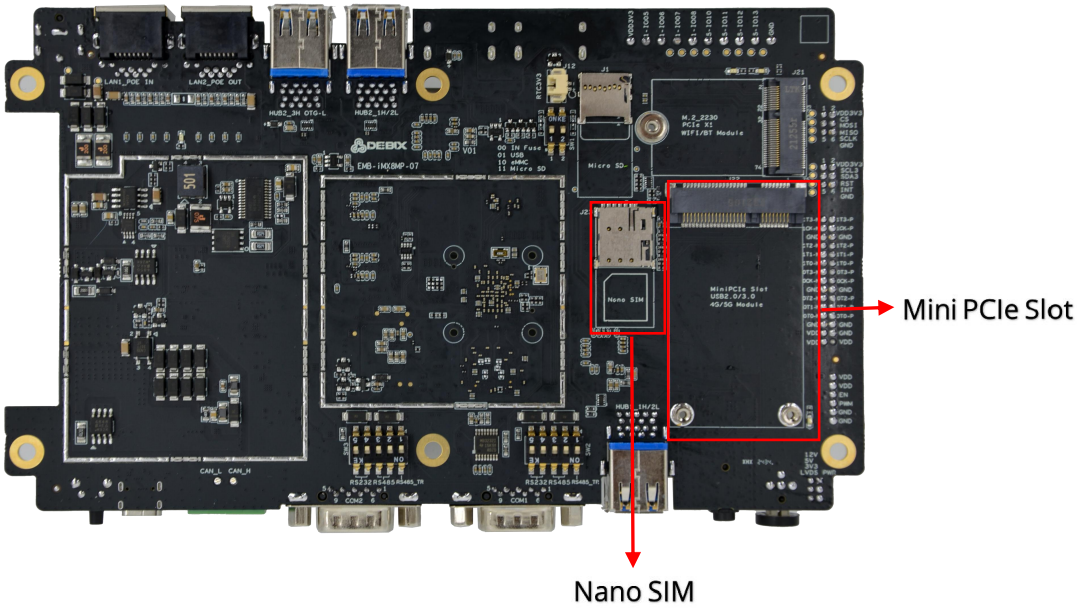
```
echo 3 > /proc/sys/vm/drop_caches"          #clear cache
dd if=/mnt/bbb of=aaa bs=1GB count=1
```

Read speed: 26.7MB/s

```
root@imx8mpevk:~# dd if=/mnt/bbb of=aaa bs=1GB count=1
1+0 records in
1+0 records out
1000000000 bytes (1.0 GB, 954 MiB) copied, 37.3963 s, 26.7 MB/s
root@imx8mpevk:~#
```

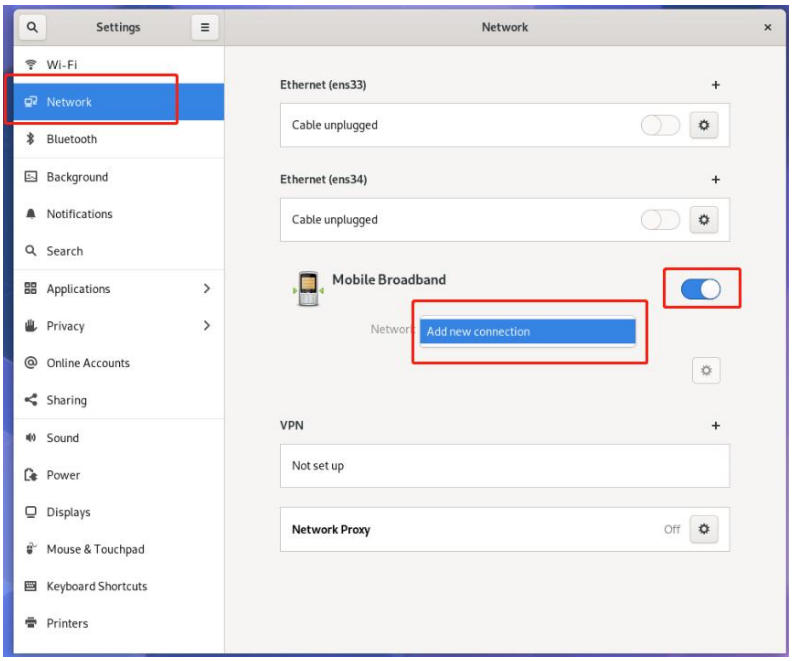
4.3. Usage of 4G/5G Network

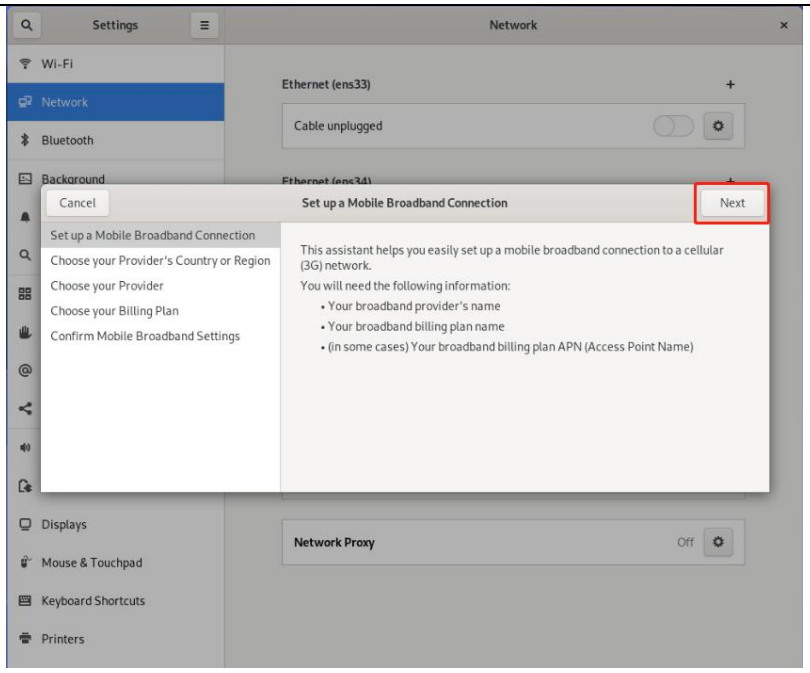
- **Hardware Connection:** Install the 4G/5G module to the Mini PCIe Slot interface (J22), and lock screws CM2.0 x 4 to fix it. Then insert the Nano SIM card into the Nano SIM slot (J23):



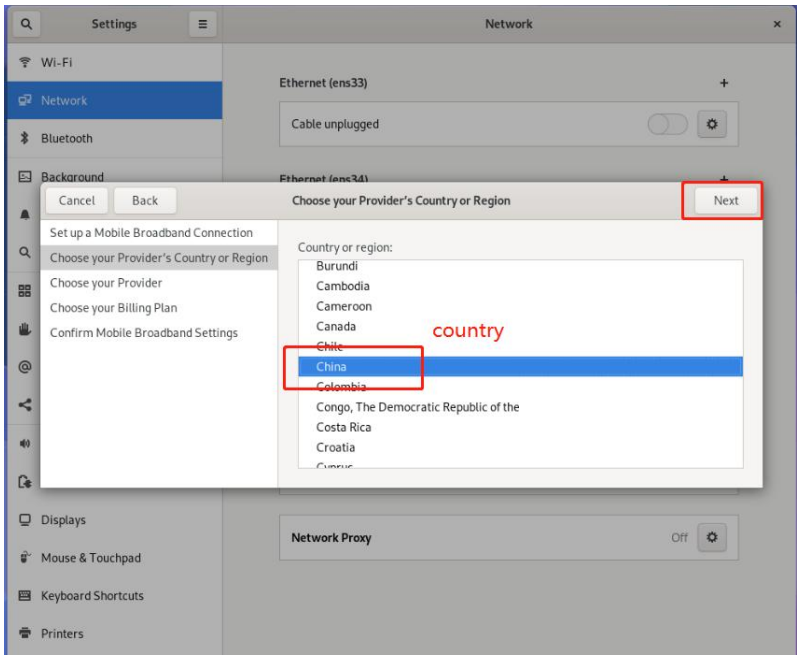
- **Software Setting:**

1. **Dial-up:** Click to open "Setting" application, select **Network**, enable "Mobile Broadband", set Network to **Add new connection.** And then the "Set up a Mobile Broadband Connection" dialog box pops u. Click **Next**.

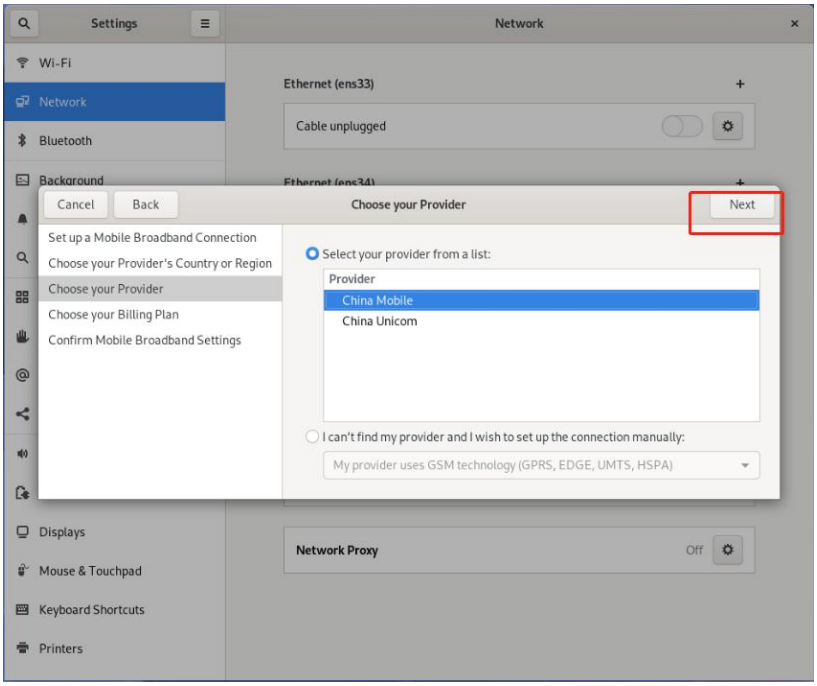




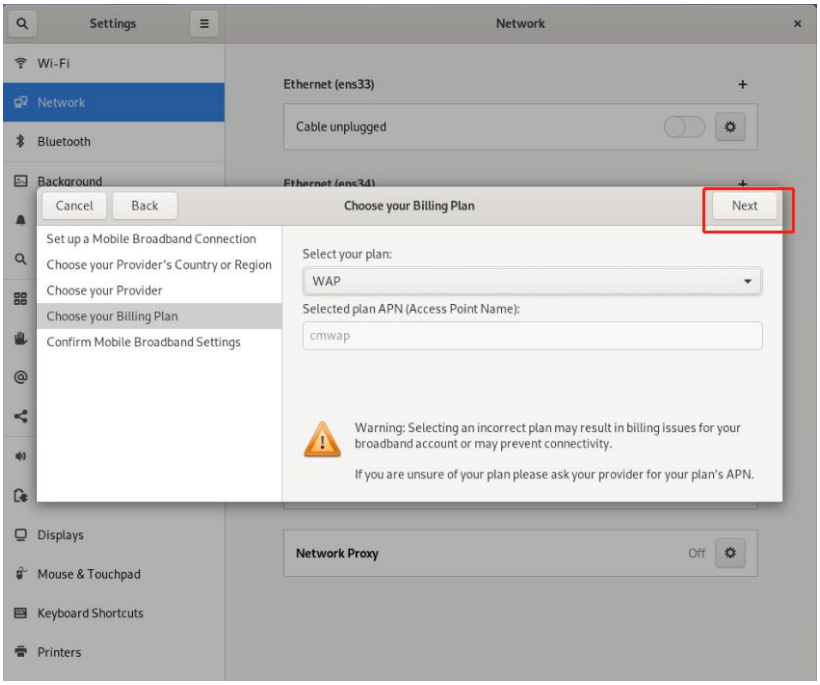
2. In the "Choose your Provider's Country or Region" dialog box, select the country as needed. Here "China" was chosen. Click **Next.**



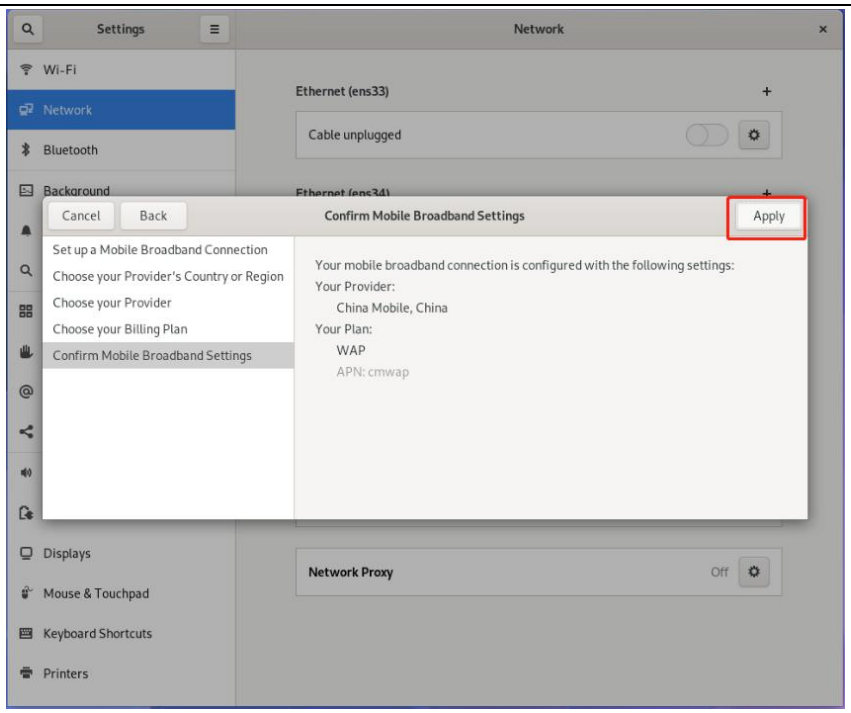
3. In the "Choose your Provider" dialog box, select "China Mobile" and click **Next**.



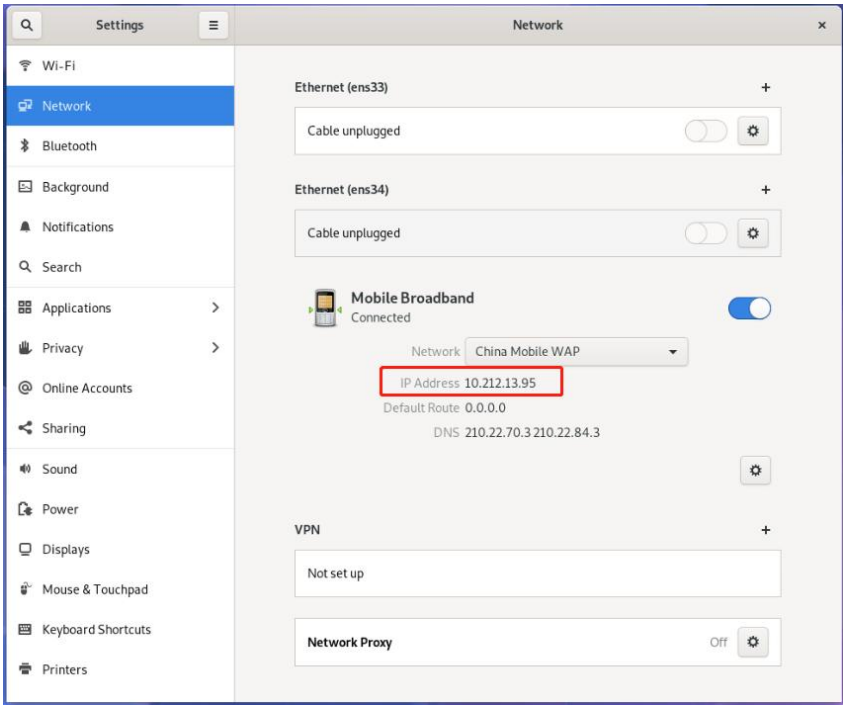
4. In the "Choose your Billing Plan" dialog box, click **Next**.



5. In the "Confirm Mobile Broadband Settings" dialog box, make sure the settings are correct, and then click **Apply**.



6. Get the dial-up IP address.



- **4G network test:** Open a PuTTY window, run the following command to verify whether the network connection is normal:

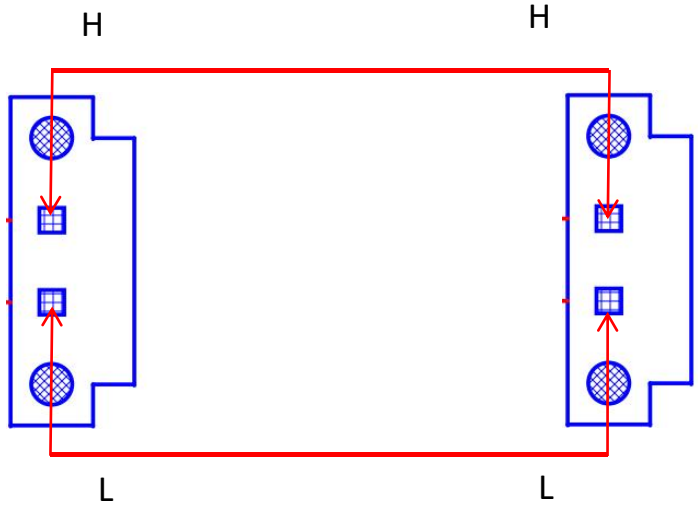
```
/home/debix# ping -I ppp0 baidu.com
```

COM3 - PuTTY

```
    link/ether 66:9f:18:3d:60:7e brd ff:ff:ff:ff:ff:ff
4: can0: <NOARP,ECHO> mtu 16 qdisc noop state DOWN group default qlen 10
    link/can
5: wlp1s0: <BROADCAST,MULTICAST> mtu 1500 qdisc mq state DOWN group default qlen
 1000
    link/ether 10:68:38:9e:1e:5f brd ff:ff:ff:ff:ff:ff
6: ppp0: <POINTOPOINT,MULTICAST,NOARP,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UNKNOWN group default qlen 3
    link/ppp
    inet 10.21.64.148/32 scope global noprefixroute ppp0
       valid_lft forever preferred_lft forever
root@imx8mpevk:/home/debix# ping -I ppp0 baidu.com
PING baidu.com (110.242.68.66) from 10.21.64.148 ppp0: 56(84) bytes of data.
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=1 ttl=47 time=153 ms
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=2 ttl=47 time=139 ms
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=3 ttl=47 time=211 ms
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=4 ttl=47 time=96.9 ms
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=5 ttl=47 time=115 ms
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=6 ttl=47 time=130 ms
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=7 ttl=47 time=206 ms
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=8 ttl=47 time=91.4 ms
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=9 ttl=47 time=111 ms
64 bytes from 110.242.68.66 (110.242.68.66): icmp_seq=10 ttl=47 time=108 ms
```

4.4. Usage of CAN

- **Hardware Connection:** Connect two CAN interfaces (H to H, L to L). Here, we take an example of DEBIX Mini PC's CAN interface communicating with the CAN interface of the DEBIX Model A + IO Board, as shown in the following figure:



- **Software Setting:**

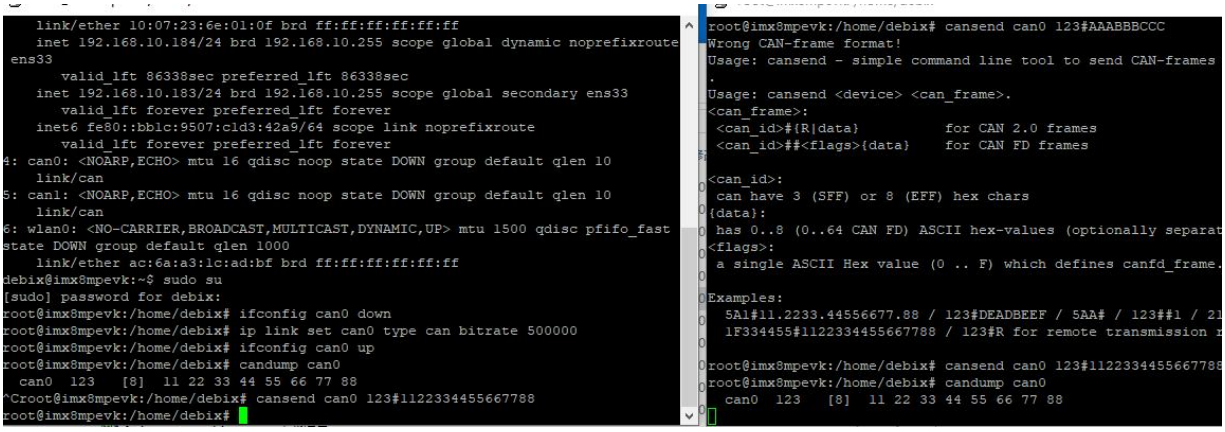
(1) Open the **Terminal** window on the two devices. And run the command below to configure CAN1:

```
sudo su

ifconfig can0 down

ip link set can0 type can bitrate 500000

ifconfig can0 up
```

(2)Run the following command to set the one as transmitting data equipment, and the other as receiving data equipment:

```
Receive：candump can0

Transmit：cansend can0 123#1122334455667788
```

When the CAN serial port can receive and transmit the corresponding information (cano 123 [8] 11 22 33 44 55 66 77 88), the communication is successful. As shown below:



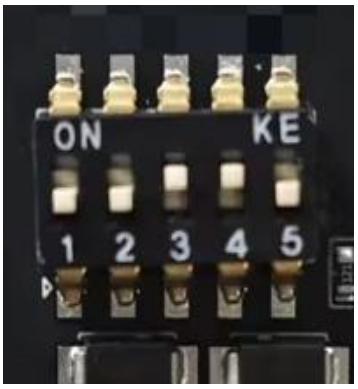
4.5. Usage of RS232/RS485

- Hardware Connection:

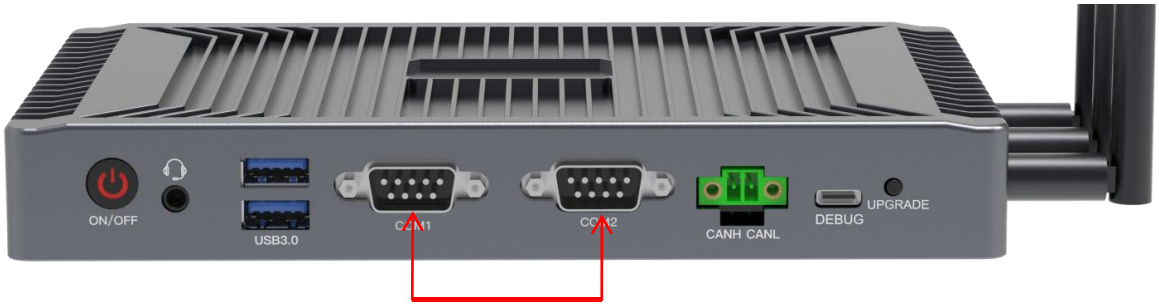
(1) **RS232:** Make sure the COM 1 and COM 2 RS232/RS485 DIP switches are set to "00110"--RS232 mode. Connect the two RS232 serial ports (T to R, R to T), namely the two COM interfaces. As shown in the below:

IMPORTANT

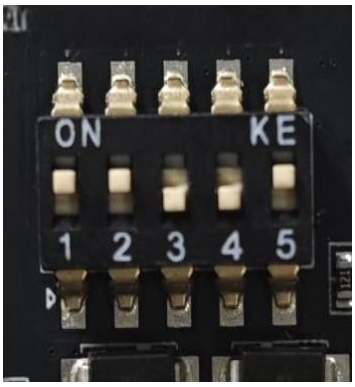
- RS232 is the default configuration of COM 1 and COM 2 .
- On one COM connector, only one kind of serial port can be used at a time, namely either RS232 or RS485. It is switched through the internal DIP switch. For details about DIP switch operations, please refer to parts of 2.3.14.2 and 2.3.14.3 of this user guide.



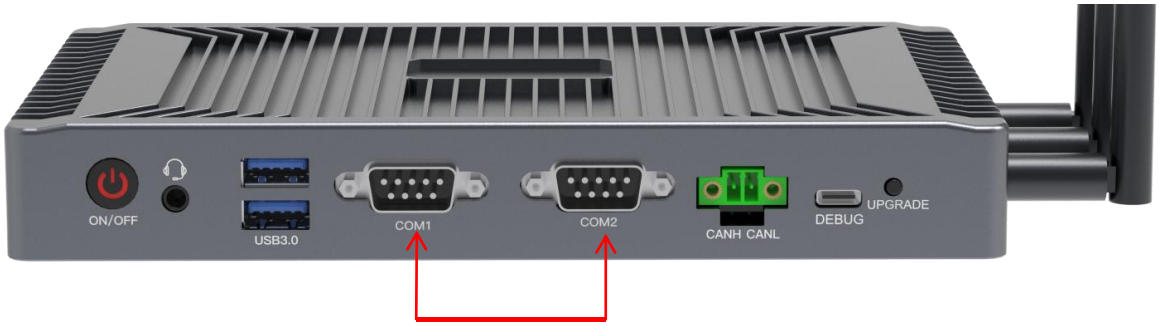
00110--RS232



(2) RS485: Make sure the COM1 and COM2 RS232/RS485 DIP switches are set to "11001"--RS485 mode. Connect the two RS485 serial ports (A to A, B to B), namely the two COM interfaces. As shown in the below:



11001--RS485



- **Software Setting:**

(1) Open a **Terminal** on the DEBIX Mini PC (BPC-iMX8MP-08). 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:

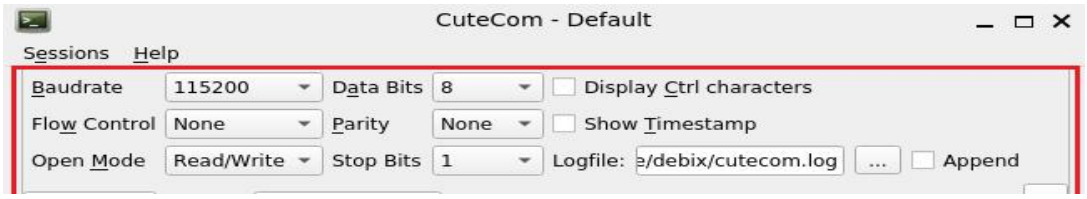
Table 17 Cutecom Parameters Setting

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

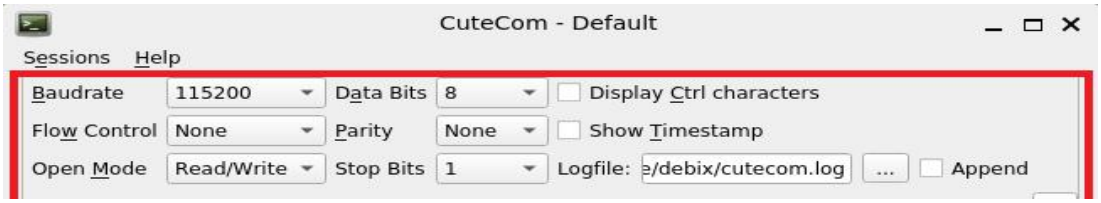
NOTICE

RS232/RS485 supports multiple baud rates. And the baud rates of both communicating sides have to be set to the same. In this example, the baud rates of both communicating sides are set to 115200.

(3) Open the **cutecom** tool, set the **Device** to /dev/ttymxc2 and other parameters as shown in the table. Then click **Open**.

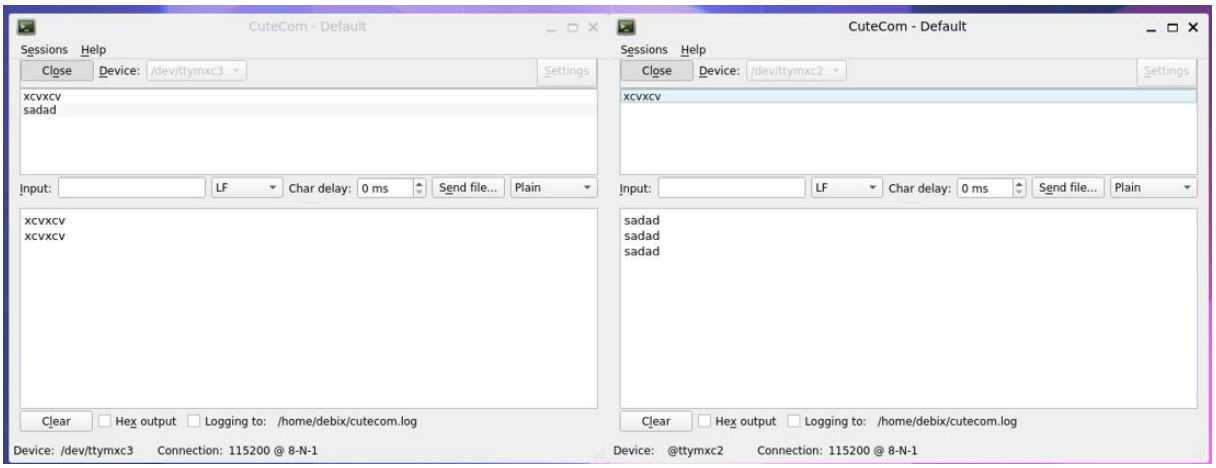


(4) Open the other **cutecom** tool, set the **Device** to /dev/ttymxc3 and other parameters as shown in the table. Then click **Open**.



(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:



4.6. Usage of Debug

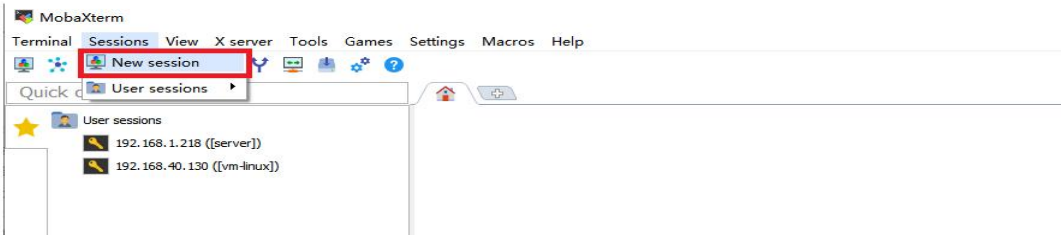
NOTICE

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

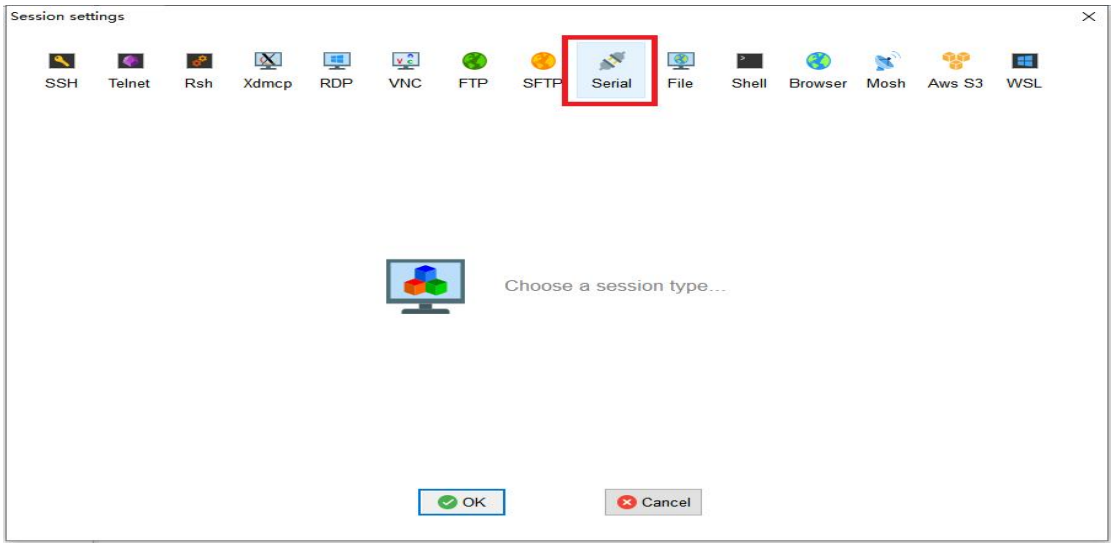
1. **Hardware Connection:** Using a USB Type-C cable to connect the Debug interface of DEBIX Mini PC (BPC-iMX8MP-08) with the USB interface of the PC.

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

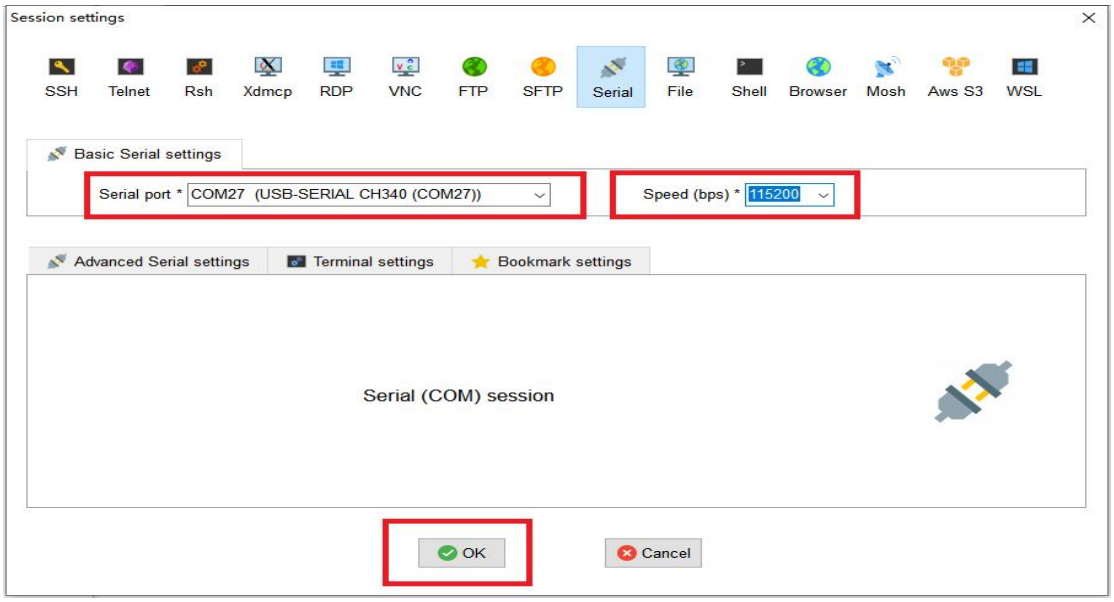
3. Open **MobaXterm**, click **Sessions** on the menu bar, select **New session**.



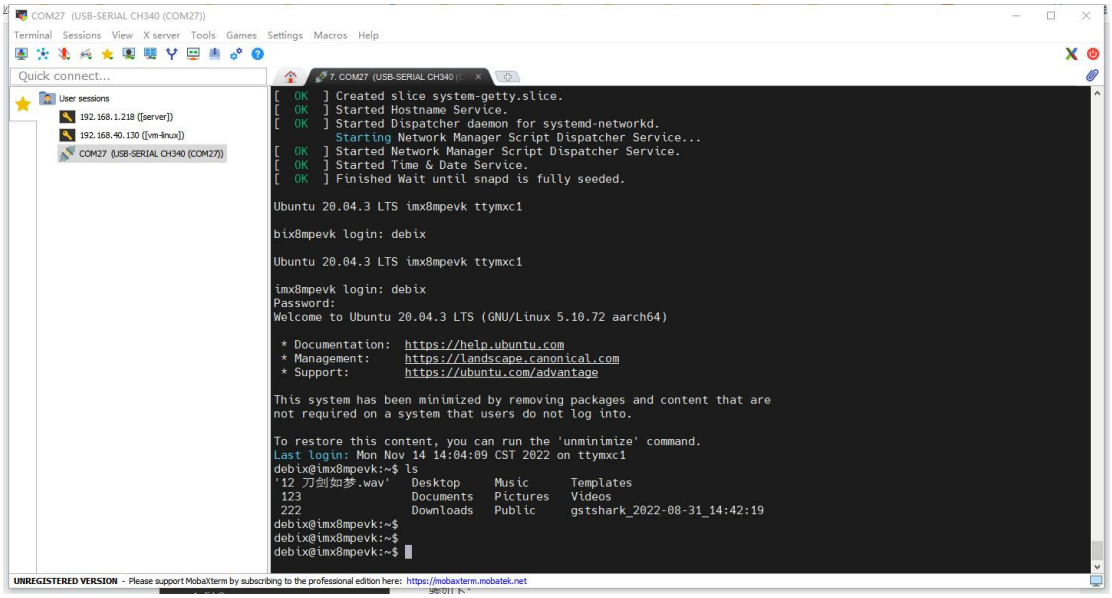
4. Select **Serial** in the pop-up "Session settings" dialog box.



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

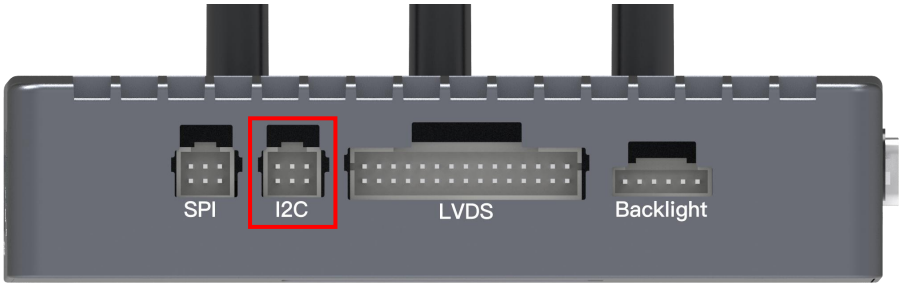


6. On the **terminal**, you can see the boot process log output by the Uboot, Kernel, and System. After the system is started, enter the default user name and password (both are "debix") on the terminal to access the serial port console.



4.7. Usage of I2C

The J20 connector is I2C communication interface and two GPIOs. This test program is to connect the device with EEPROM for testing, and to short-circuit two GPIOs for sending and receiving test.



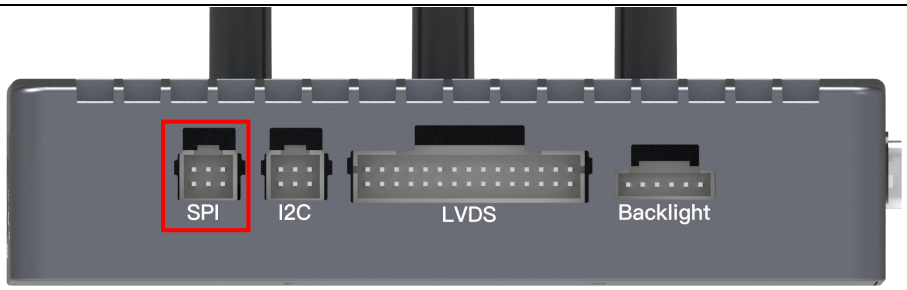
Run the following command to verify I2C:

EMB-IMX8MP-07_J20_i2c_gpio_test.sh

```
root@imx8mpevk:~# EMB-IMX8MP-07_J20_i2c_gpio_test.sh
 === start check i2c ===
 have eeprom 0x52
wirte 0x10 to 0x1f
wirte 0x11 to 0x2f
wirte 0x12 to 0x3f
=========================
 read 0x10=0x1f
 read 0x11=0x2f
 read 0x12=0x3f
=========================
 === start check TP irq reset gpio ===
=========================
 TP reset io ok
 TP int io ok
=========================
```

4.8. Usage of SPI

The J19 connector is SPI communication interface, which can communicate with external slave devices. This test program is to attach the device with NOR-FLASH for reading and writing test



Run the following command to verify SPI:

EMB-IMX8MP-07_J19_spi

```
root@imx8mpevk:~# EMB-IMX8MP-07_J19_spi
spi mode: 4
spi bits per words : 8
spi max speed : 3000000hz (3000kHz)
Written file size =  43
chip_ID: ManufactureID  MemoryTypeID  CapacityID   :ef 60 17
Now begin erase foresee size = 1 ,  please waiting...
Erase_Sector:      000000  selector erase done ..
Erase subitable selector done , erase_times = 1
now begin write , write_selector_number = 1
wait for idle ...
write  selector  000000  ok
writed  done , write_times = 1
Read 256 bytes :48 65 6c 6c 6f 20 50 6f 6c 79 68 65 78 20 45 4d 42 2d 49 4d 58 3
8 4d 50 2d 30 37 20 53 50 49 20 74 65 73 74 20 6f 6b 21 21 21 00 ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff f
f ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
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f ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
 ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
====================

Hello Polyhex EMB-IMX8MP-07 SPI test ok!!!

====================

root@imx8mpevk:~#
```

4.9. Usage of GPIO

Run the following command, the GPIO pin cyclically outputs high and low levels:

EMB-IMX8MP-07_J18_TEST.sh

```
root@imx8mpevk:~# EMB-IMX8MP-07_J18_TEST.sh
TEST EMB-IMX8MP-07 J18 [GPIO on off]
```