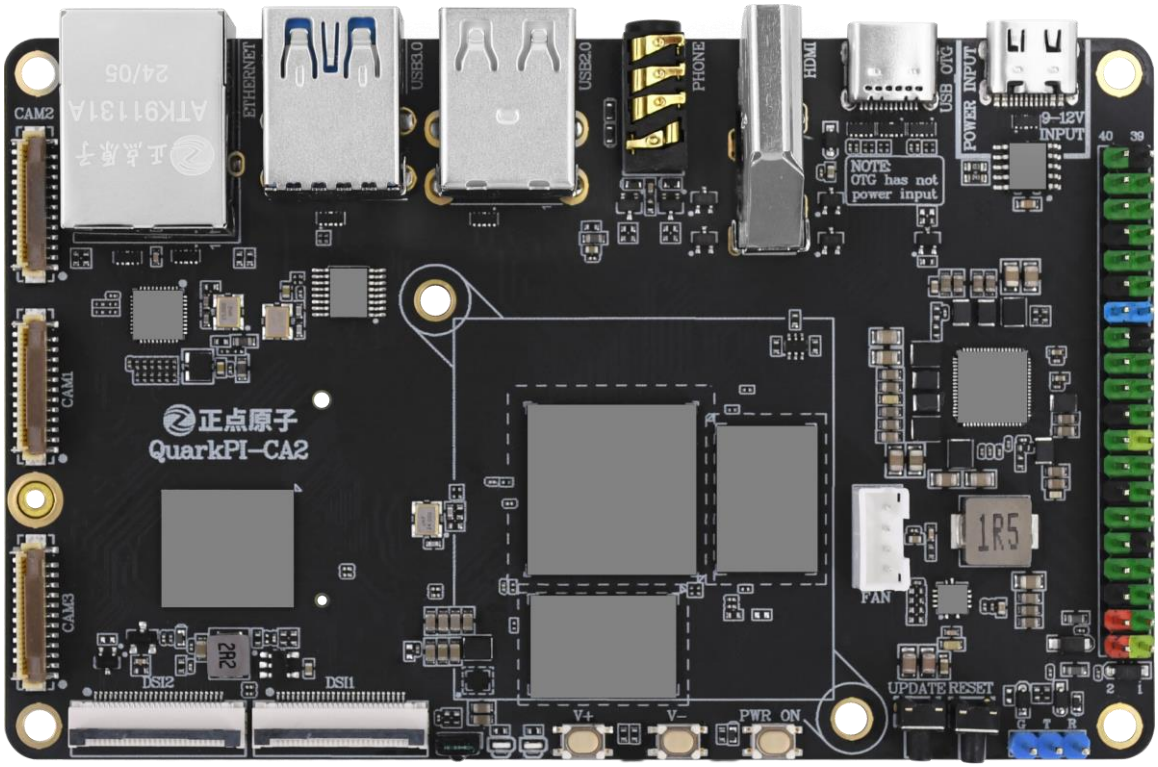
QuarkPi-CA2 Android

Quick test manual

V1.0



ALIENTEK

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TMALL: https://zhengdianyuanzi.tmall.com

TAOBAO: https://openedv.taobao.com

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In order to get the latest version of product information, please regularly visit the download center or contact the customer service of Taobao ALIENTEK flagship store. Thank you for your tolerance and support.

Revision History:

Version	Version Update Notes	Responsible person	Proofreading	Date
V1.0	release officially	ALIENTEK	ALIENTEK	

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Chapter 1. Preparations Before Using the Card Computer

Here we will introduce the matters that need attention when using the card computer. Please read patiently. Because if these matters are not paid attention to, it may lead to unsuccessful experiments or damage to the card computer, etc. So please be sure to pay attention.

1.1 Precautions before Powering On

- First, check if the power is plugged in. If it is, make sure the power strip switch is on and the power supply is normal.
- Also, after prolonged use, pay attention to observe if there are any foreign objects on the development board to prevent short circuits. Be cautious about water, moisture, and dust prevention.

1.2 Serial Port Software Installation

The ALIENTEK Card computer uses the domestic chip CH340 to achieve USB to serial port conversion, and can directly connect the debugging serial port of the board card to the computer via a USB cable, without the need for a USB to serial port adapter cable. This is convenient for users. However, the debugging serial port of the board card needs to be recognized by installing the CH340 driver under Windows.

The board card data package has already provided the installation file of the CH340 driver for users. The path is: Development Board CD-ROM A Drive - Basic Materials -> 03_softwares -> CH343SER.EXE. Double-click the executable file CH343SER.EXE to install the CH340 driver (do not connect the debugging serial port of the board card before installation as shown in Figures 1.2.1 to 1.2.2):

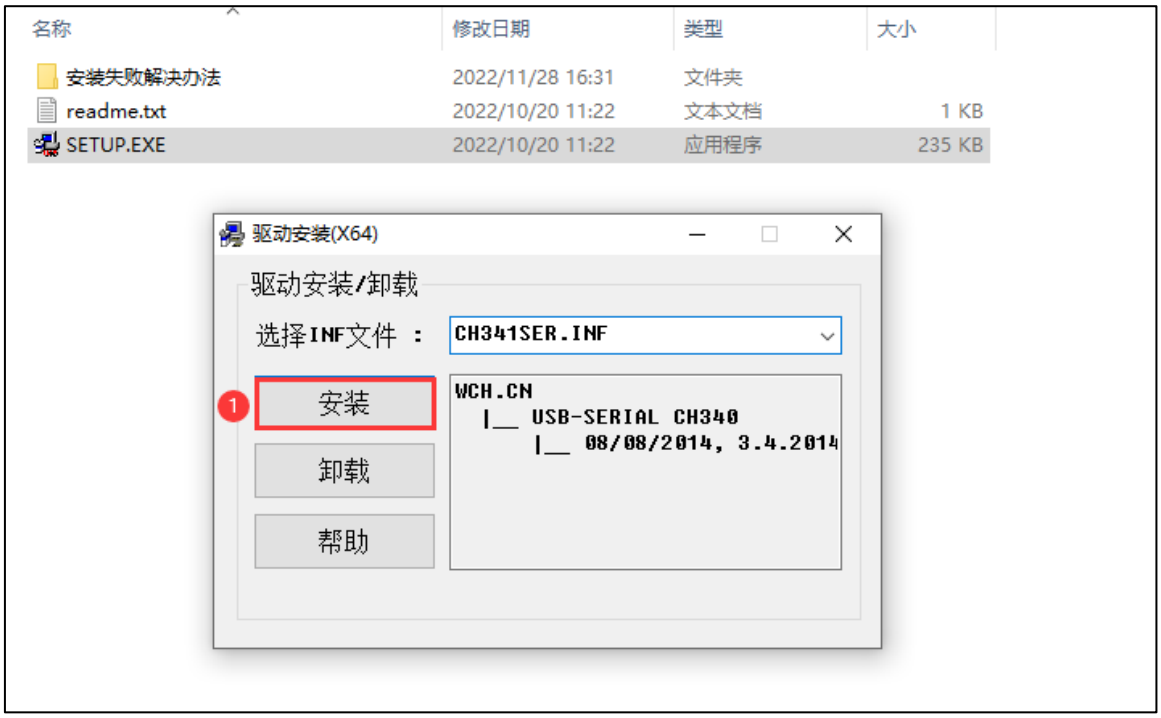


Figure 1.2-1 Install CH340 driver (1)

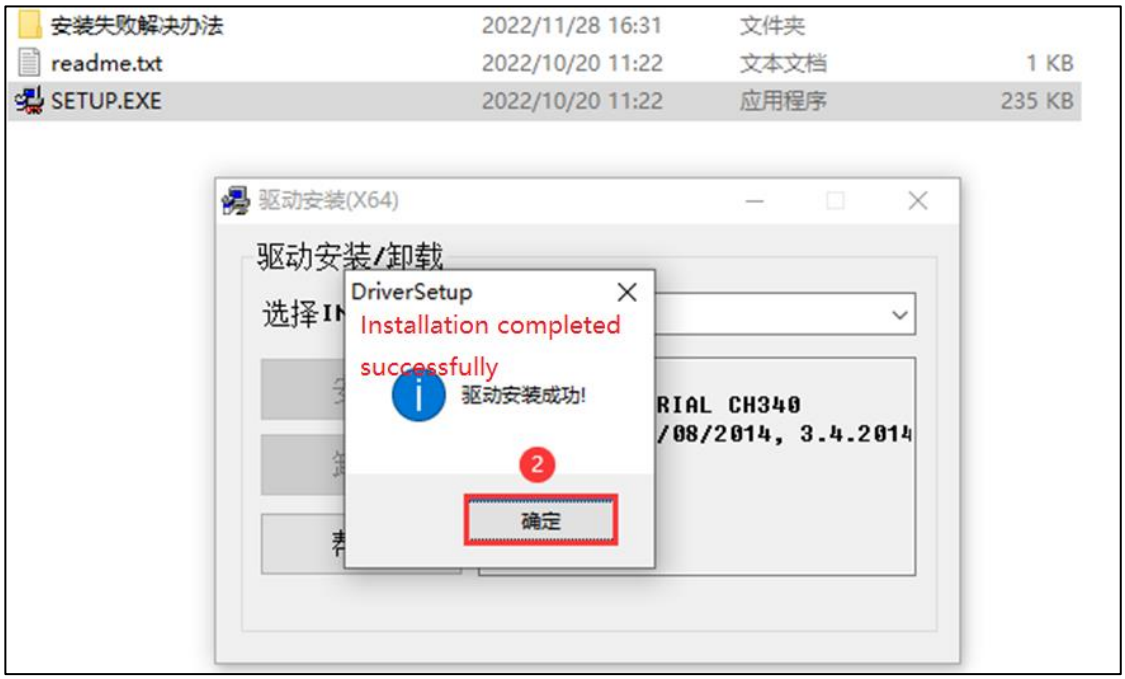


Figure 1.2-2 Install CH340 driver (2)

After the installation is completed, connect the debugging serial port of the board card to the computer via a USB cable. The connection method is shown in Figure 1.2.3:

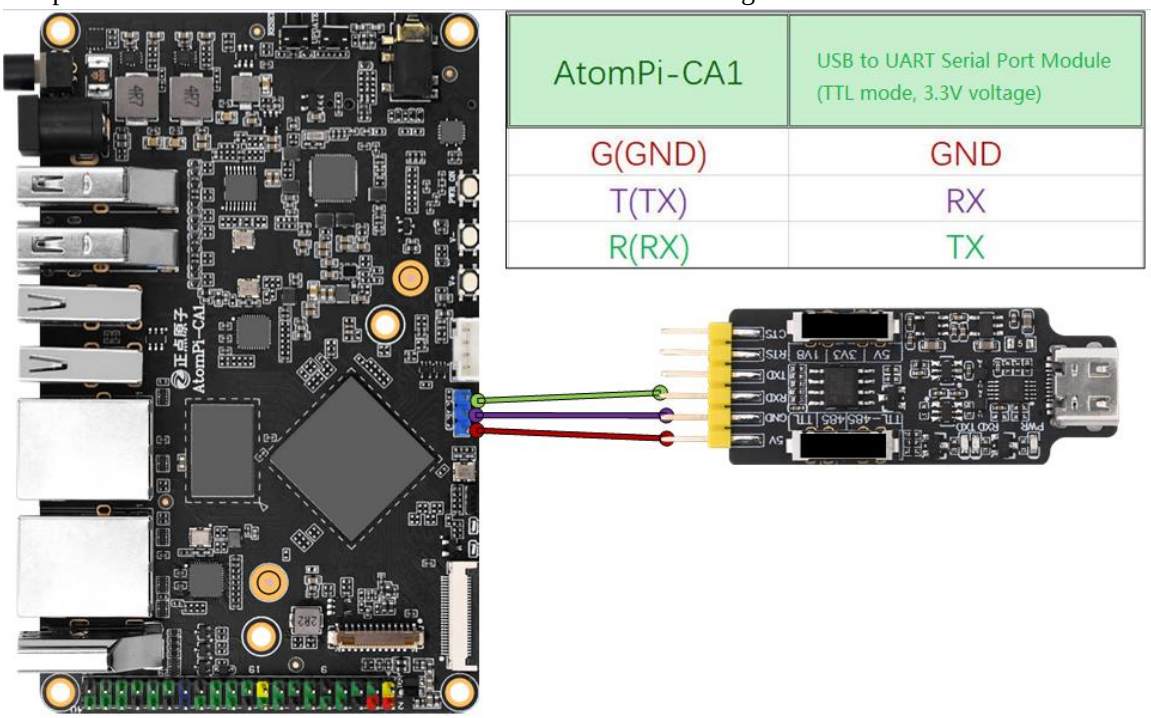


Figure 1.2-3 Board card debugging: Connect the serial port to the computer.

After the connection is successful, at this point, the computer will detect a USB device and open the Windows Device Manager:

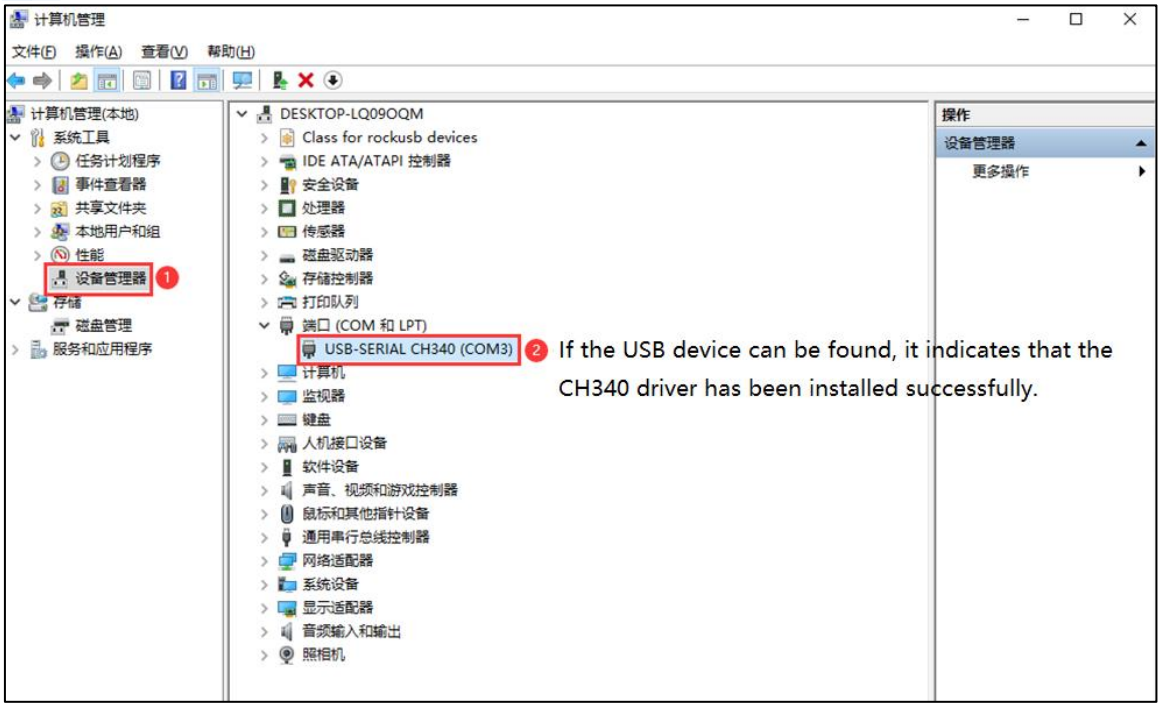


Figure 1.2-4 Windows Device Manager

If a device named "**USB-SERIAL CH340**" can be found under "**Device Manager→Ports (COM & LPT)**", it indicates that the CH340 driver has been installed successfully! If the device named "**USB-SERIAL CH340**" cannot be found, please have the user check if the hardware connection is incorrect! You can unplug the USB cable, reconnect it, or try connecting to another USB port on the computer.

1.2.1 Installation of MobaXterm Software

MobaXterm is a versatile remote terminal software with powerful functions and is free (there are also paid versions). It supports numerous remote connection features such as SSH, Telnet, Rsh, Xdmc, RDP, VNC, FTP, SFTP, serial port (Serial COM), etc. MobaXterm offers a user-friendly interface and is extremely powerful, so it is recommended that users use this terminal software.

- Download of MobaXterm software

The board card data package has already provided the installation package of MobaXterm to users. The path is: Development board optical disc A disk - Basic materials -> 03_softwares -> MobaXterm_Installer_v24.1.zip; Users can also download it themselves through the link address: https://mobaxterm.mobatek.net/download.html

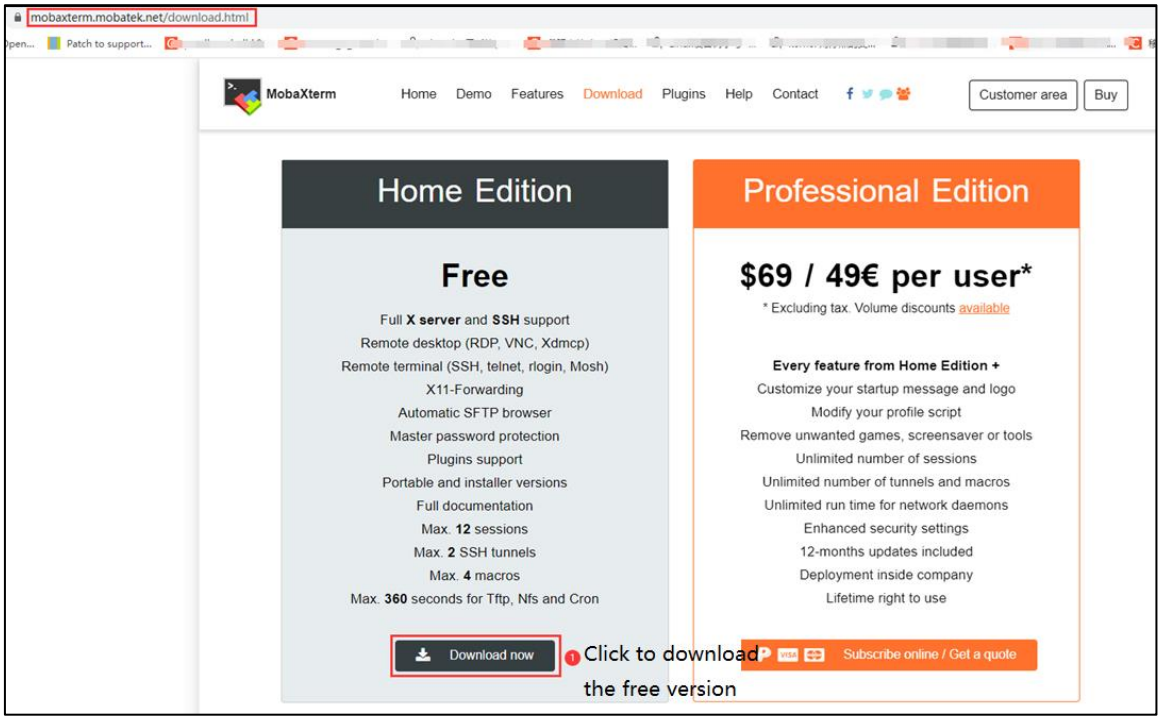


Figure 1.2-5 Download the MobaXterm software (1)

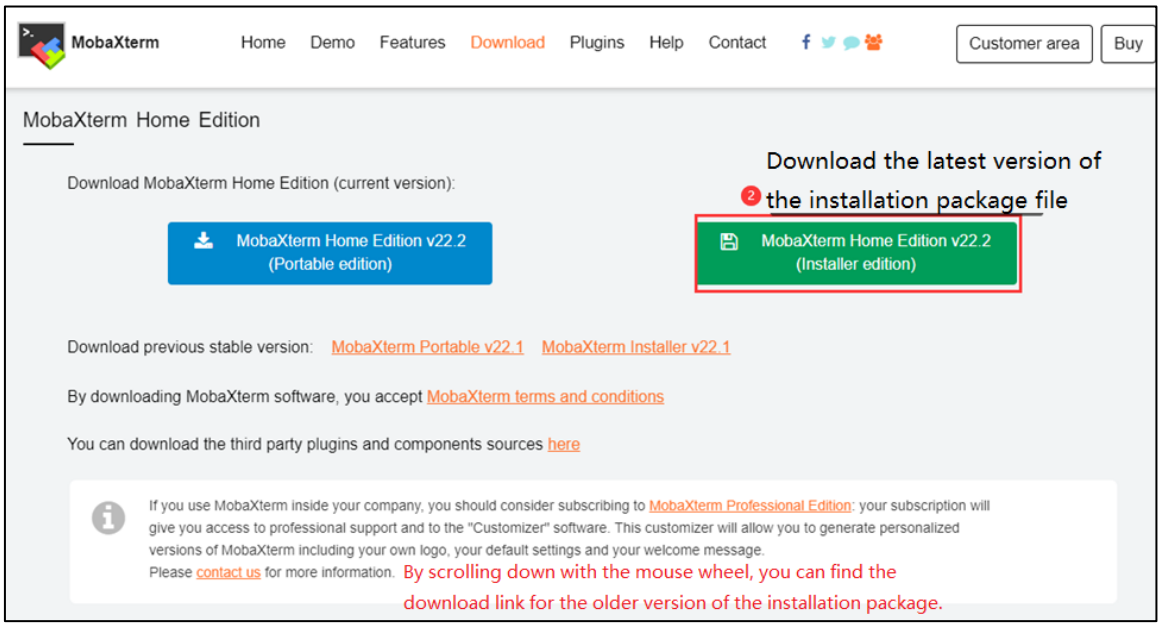


Figure 1.2-6 Download the MobaXterm software (2)

After the download is completed, a compressed file named MobaXterm_Installer_vxxx.zip (where xxx represents the version number) will be obtained. The current latest version is 22.2. The version of the installation package provided for users in the data package is 12.3. Using the new version is fine, or the old version is also acceptable. It doesn't matter which one you choose. Here, we will take the 12.3 version as an example.

- Installation of MobaXterm software

Extract the MobaXterm_Installer_v12.3.zip compressed file. After extraction, it will look like this:

Figure 1.2-7 The files after extracting MobaXterm_Installer_v12.3.zip

Then double-click to run the MobaXterm_Installer_v12.3.msi file and follow the steps shown in Figures 1.2.2.4 to 1.2.2.8 to install the MobaXterm software:

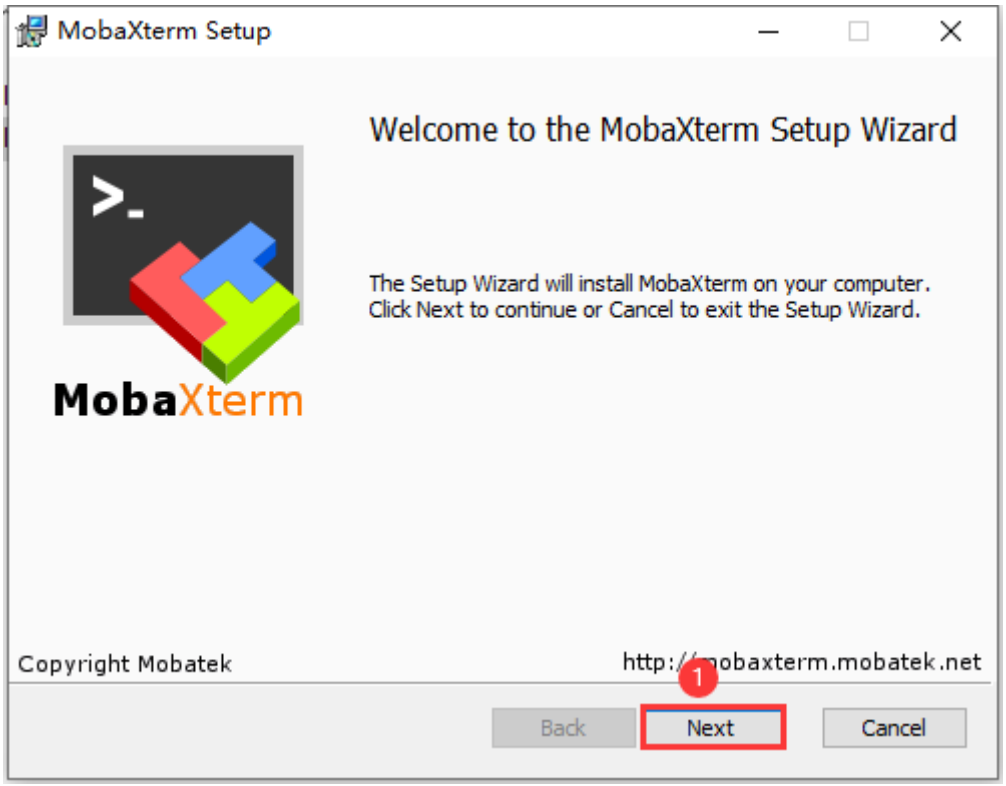


Figure 1.2-8 Install the MobaXterm software (1)

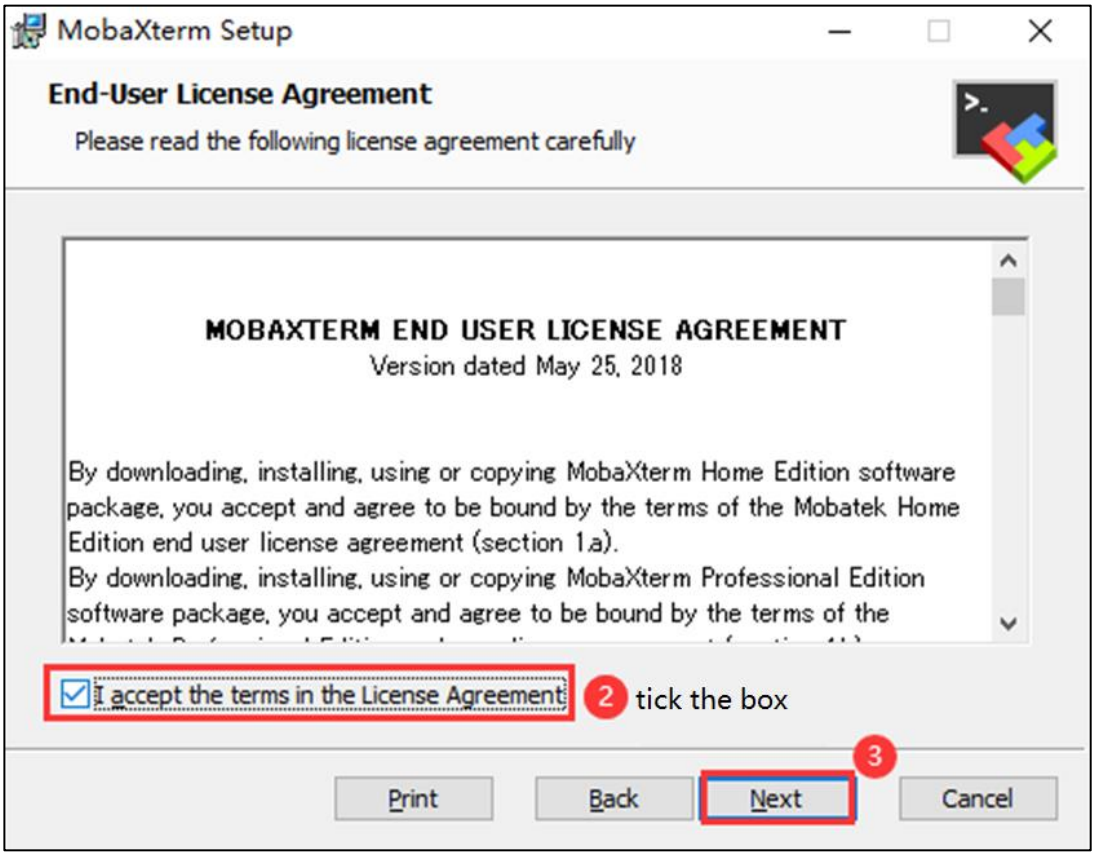


Figure 1.2-9 Install the MobaXterm software (2)

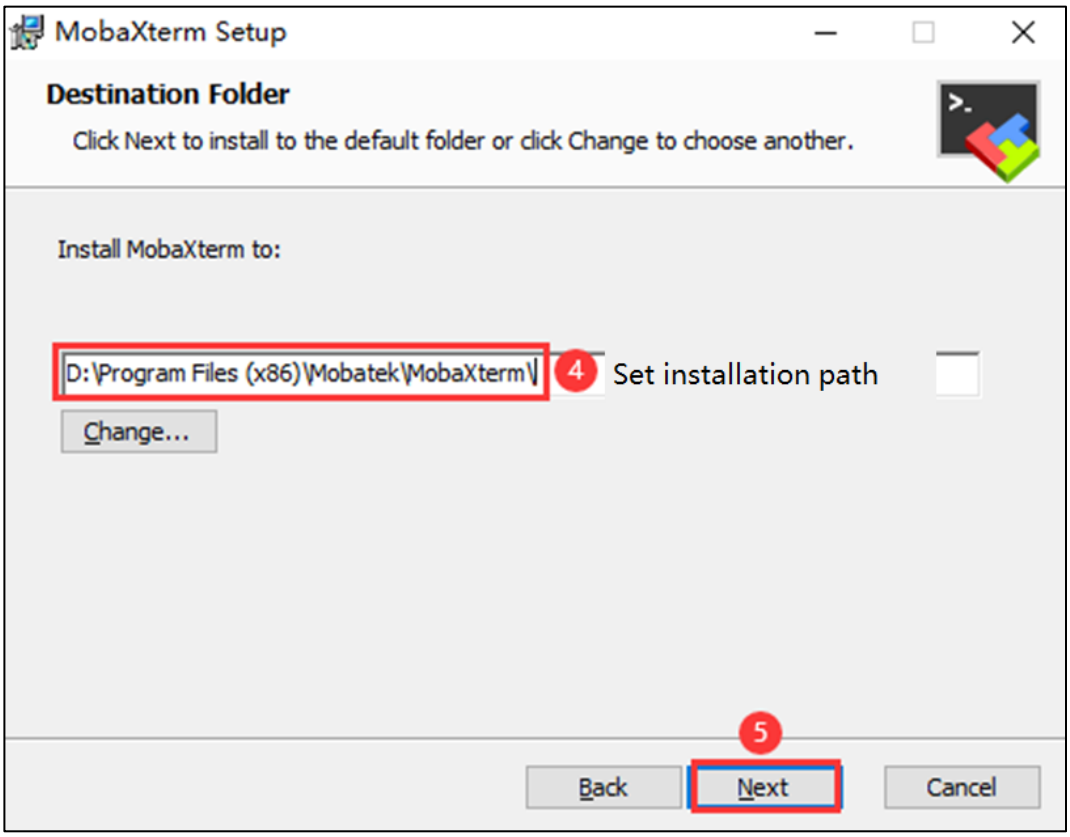


Figure 1.2-10 Install the MobaXterm software (3)

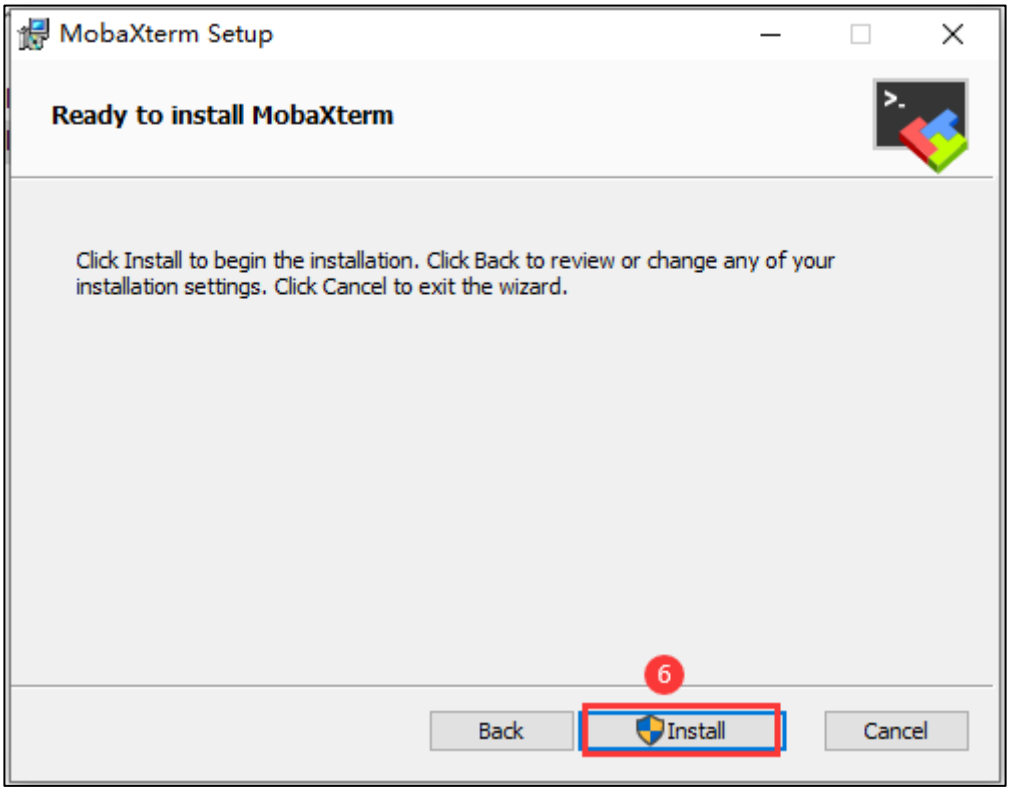


Figure 1.2-11 Install the MobaXterm software (4)

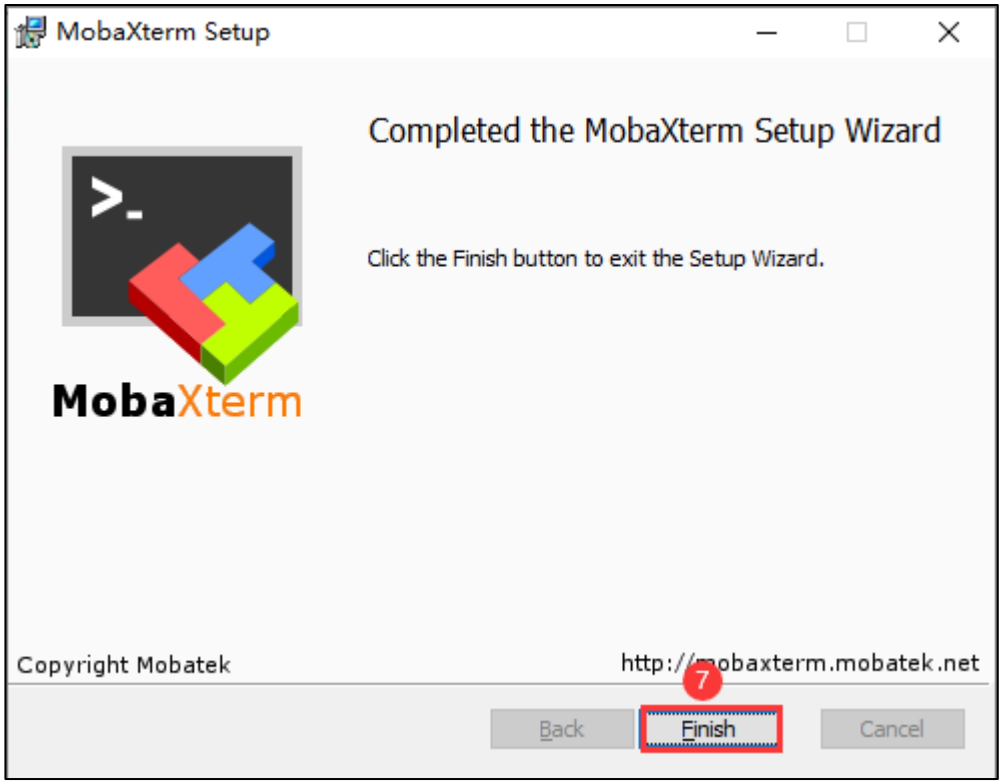


Figure 1.2-12 Install the MobaXterm software (5)

At this point, the software installation is complete. The desktop will automatically generate a shortcut icon for the MobaXterm software.

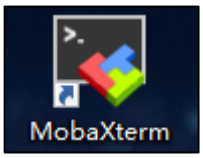


Figure 1.2-13 MobaXterm software desktop icon

1.2.2 Use of serial ports in MobaXterm software

Double-click the MobaXterm desktop icon to open the software, as shown in Figure 1.2.14:

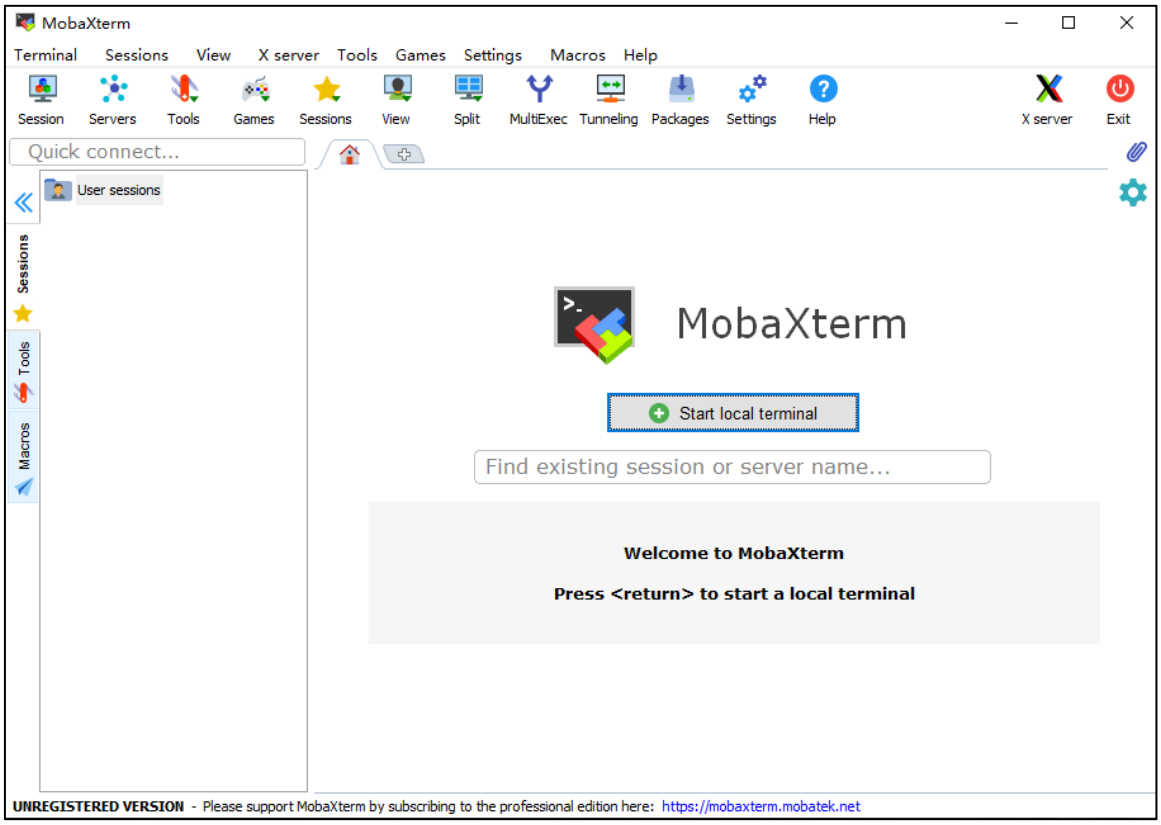


Figure 1.2-14 The main interface of MobaXterm software

Next, I will introduce how to establish a Serial (serial port) connection and an SSH remote connection.

1. Serial connection

The card computer has a debugging serial port that can be directly connected to the computer via a USB cable. The serial port is one of the most common communication interfaces for embedded devices. It not only enables data transmission between the computer and the embedded device, but also allows the computer to control the embedded device. In the embedded development process, it is usually used as a debugging interface (serial port debugging) to debug the embedded device.

During the development process, we interact with the card computer through information exchange, usually via the serial port. Of course, it can also be done through the network. The network needs to know the IP address of the card computer first. Therefore, the serial port is very important at this time.

1、Connect one end of the serial port module to the computer, and the other end to the pins G (GND), R (RX), and T (TX) of the card computer. The connection diagram is as follows:

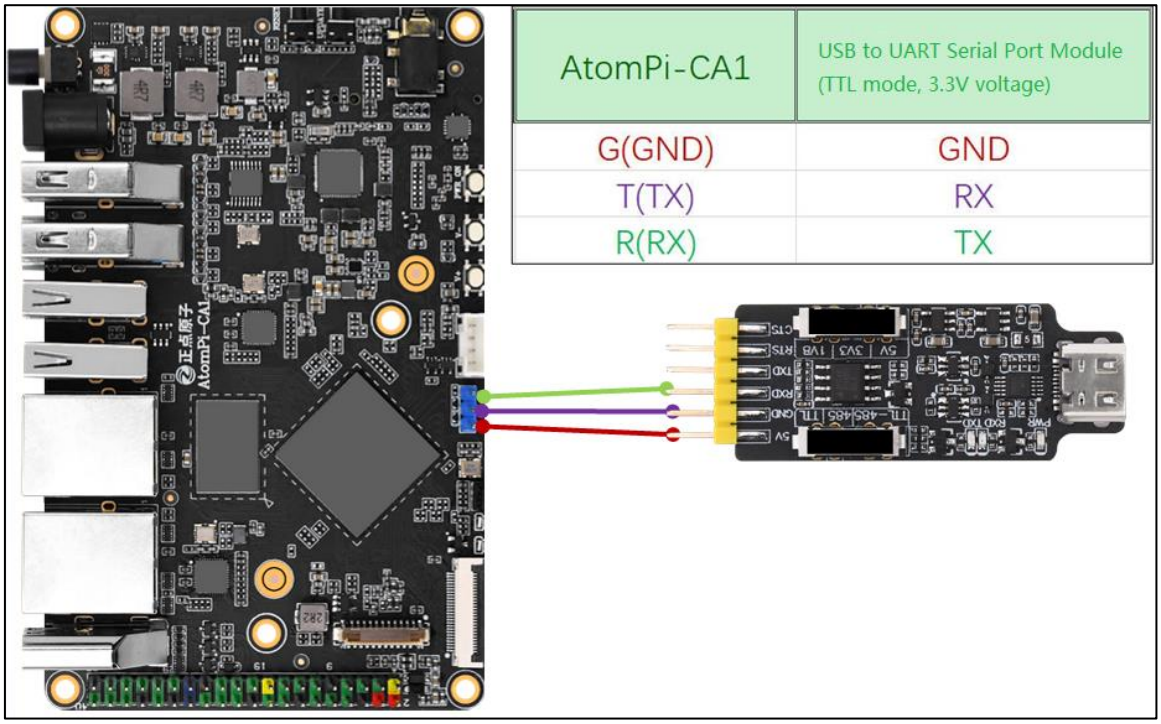


Figure 1.2-15 Connection diagram

Serial module mode selection: Select TTL mode, voltage selection: 3.3V mode.

Follow the operation steps shown in Figures 1.2.16 to 1.2.19 to establish a Serial connection (before establishing the connection, the debugging serial port of the card computer needs to be connected to the computer via a USB cable, and the CH340 driver has been installed):

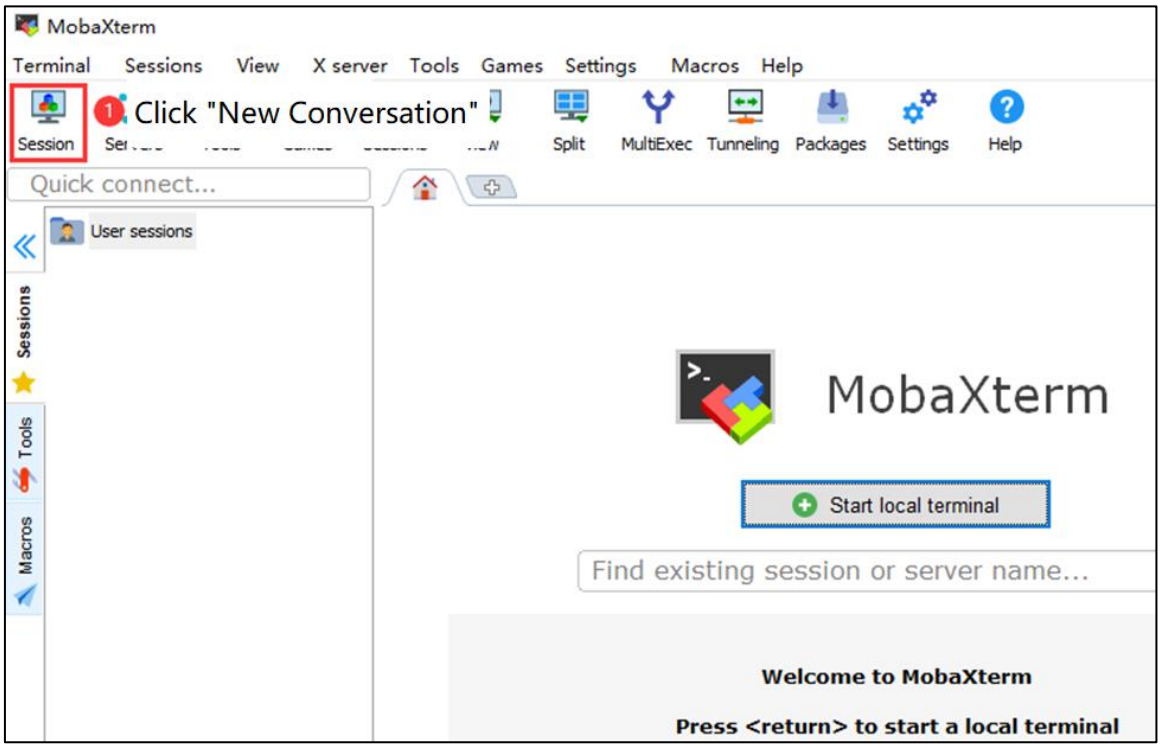


Figure 1.2-16 Establish serial port connection (1)

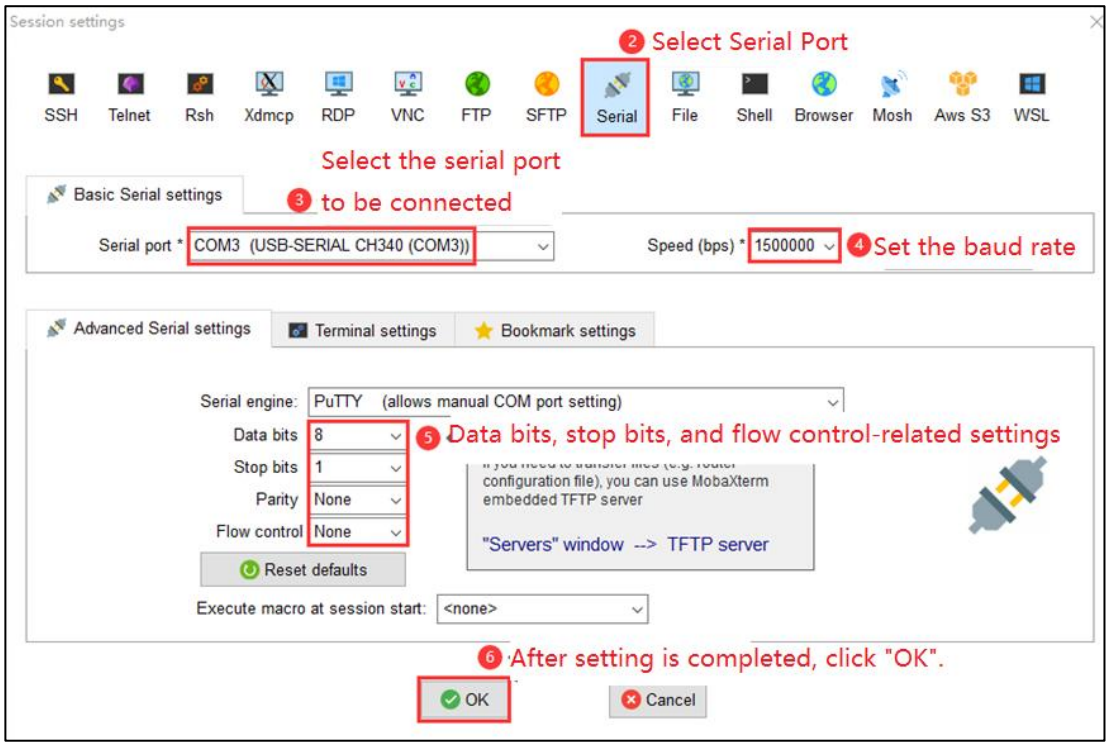


Figure 1.2-17 Establishing Serial Port Connection (2)

First, select the serial port that needs to be connected. Ensure that the debugging serial port of the card computer is connected to the computer via a USB cable and that the CH340 driver has been successfully installed ("Device Manager Ports (COM and LPT)") and can be found as a device named "USB-SERIAL CH340". Only then can the MobaXterm software recognize the debugging serial port of the card computer. We can find the corresponding serial port of the card computer (USB-SERIAL CH340) in the "Serial port" drop-down list, and then select it!

Next, set the serial communication baud rate. This should be done according to the actual situation. The debugging serial port of the QuarkPi-CA2 platform has a default baud rate of 1500000 (1.5M). Then, set the data bits, stop bits, and flow control, etc. After the settings are completed, click the "OK" button.

The serial connection has been successfully established, as shown in Figure 1.2.3.5:

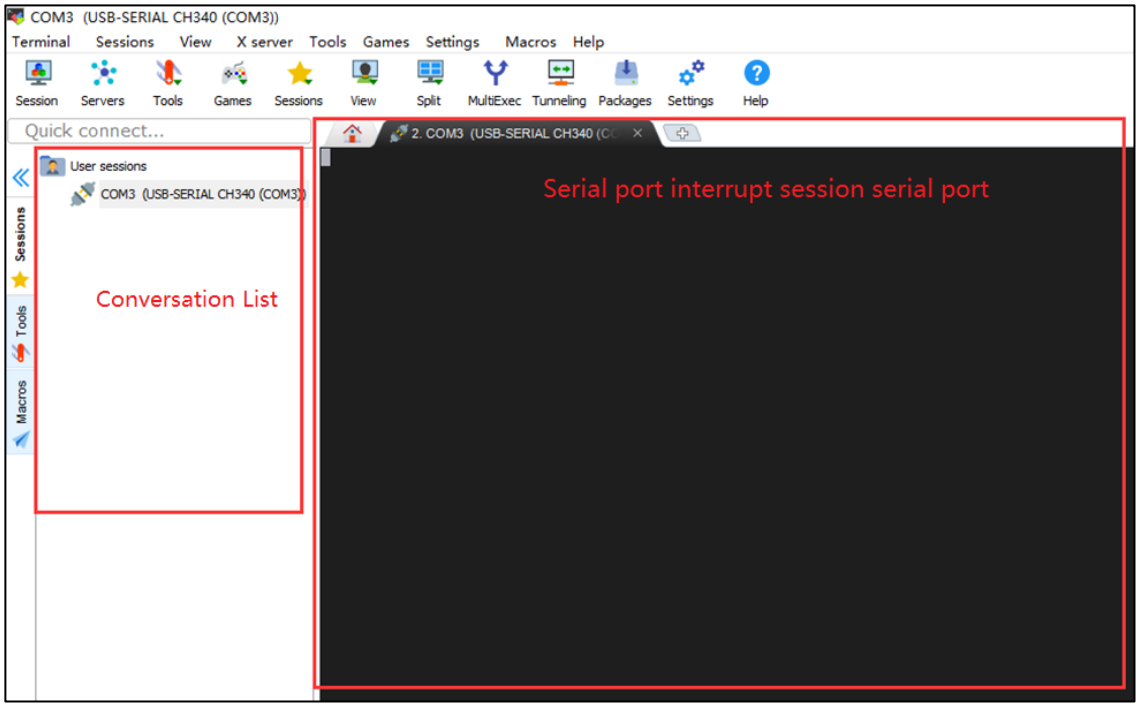


Figure 1.2-18 Establish serial port connection (3)

Turn on the power switch, power on, and the pre-installed system is the Debian system. The information output through the serial port is as follows.

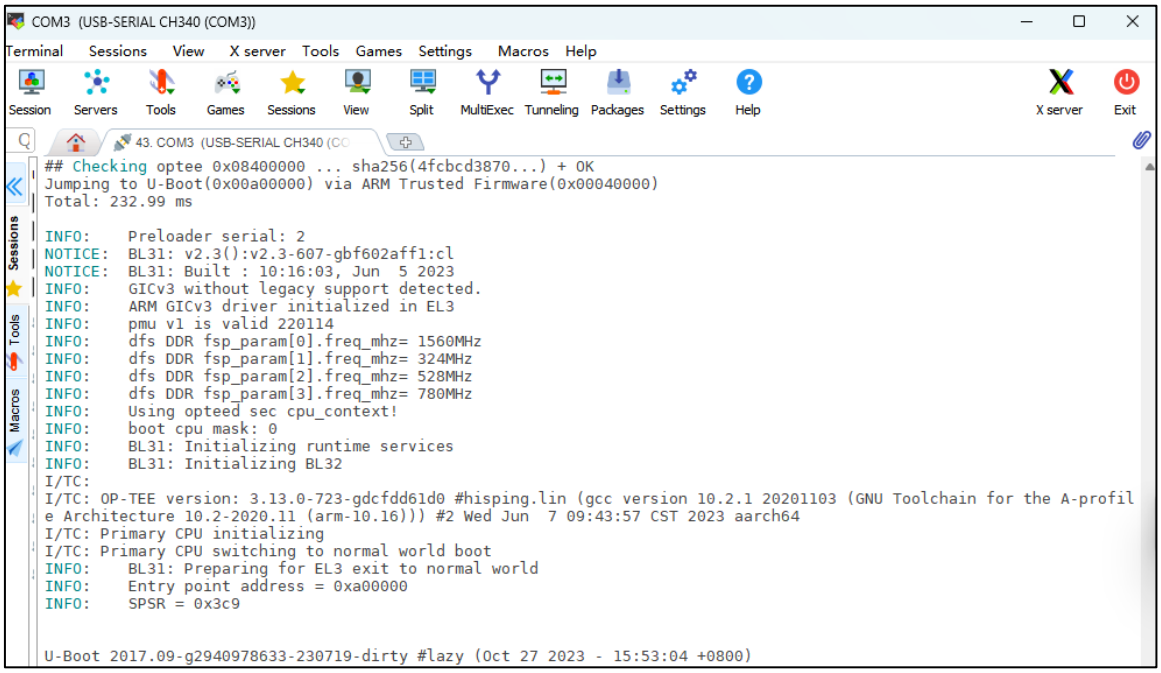


Figure 1.2-19 Serial port logging of logs

1.2.3 The Use of SSH in MobaXterm Software

Next, we will introduce how to establish an SSH remote connection. Through SSH, it is possible to remotely log in to the Debian system of the card computer. Before establishing the SSH remote connection, it is necessary to first use the debugging serial port of the card computer to input "ifconfig"

to check the IP address of the card computer. By default, the card computer does not have a static address and needs to obtain the IP address automatically through the connection to the router. According to the operation steps shown in Figures 1.2.20 to 1.2.24, establish the SSH remote connection and achieve the remote login operation:

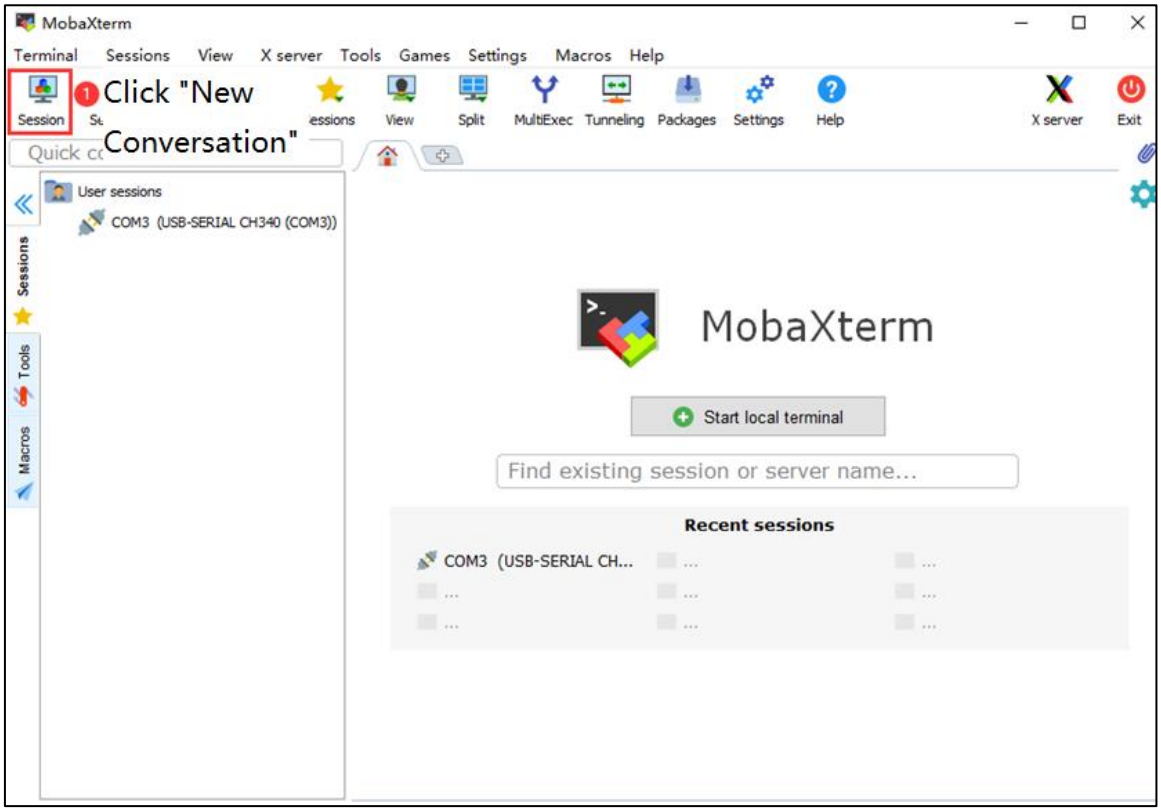


Figure 1.2-20 Establish SSH remote connection (1)

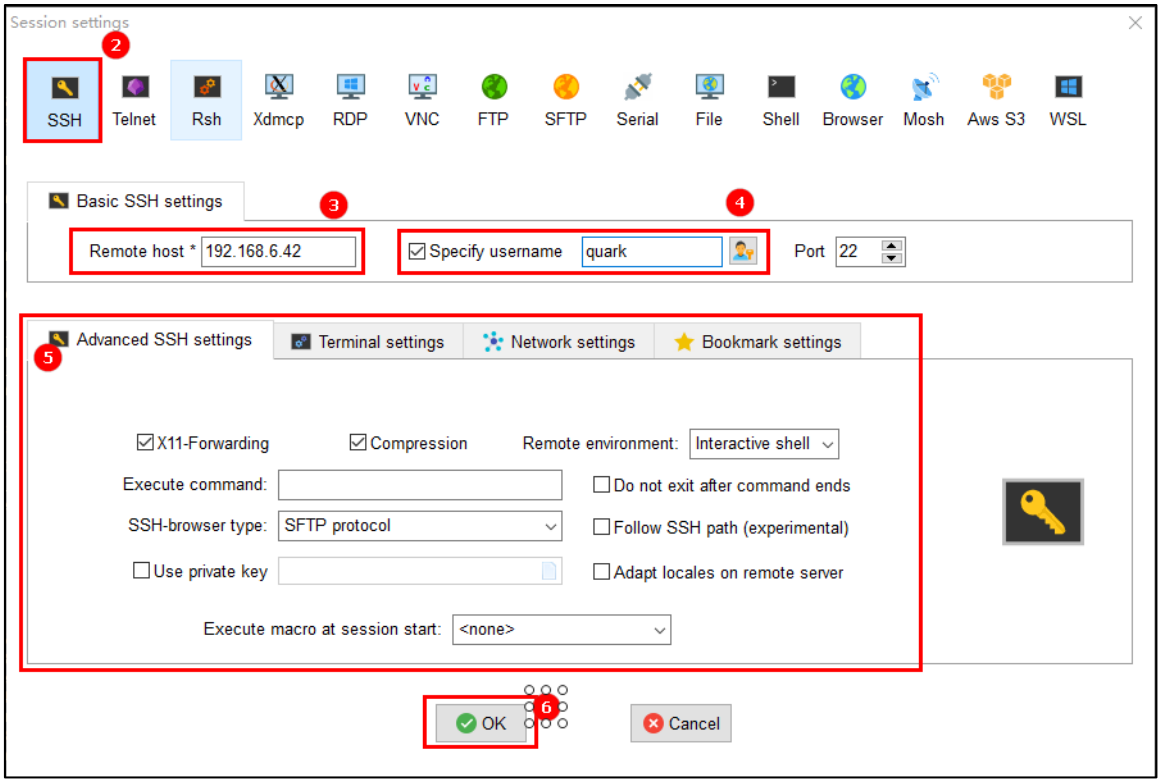


Figure 1.2-21 Establish SSH remote connection (2)

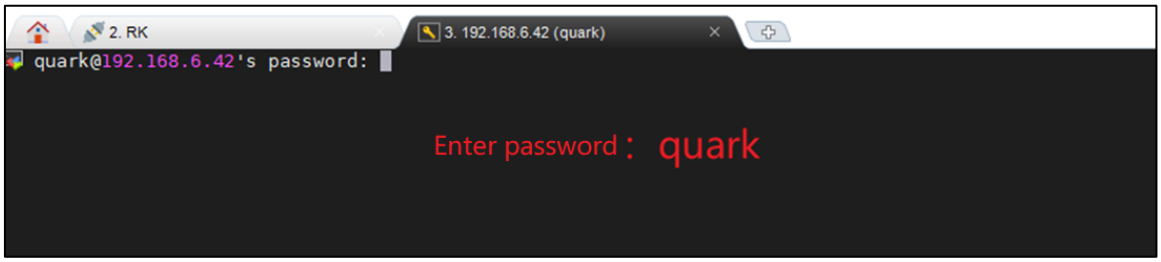


Figure 1.2-22 Establish SSH remote connection (3)

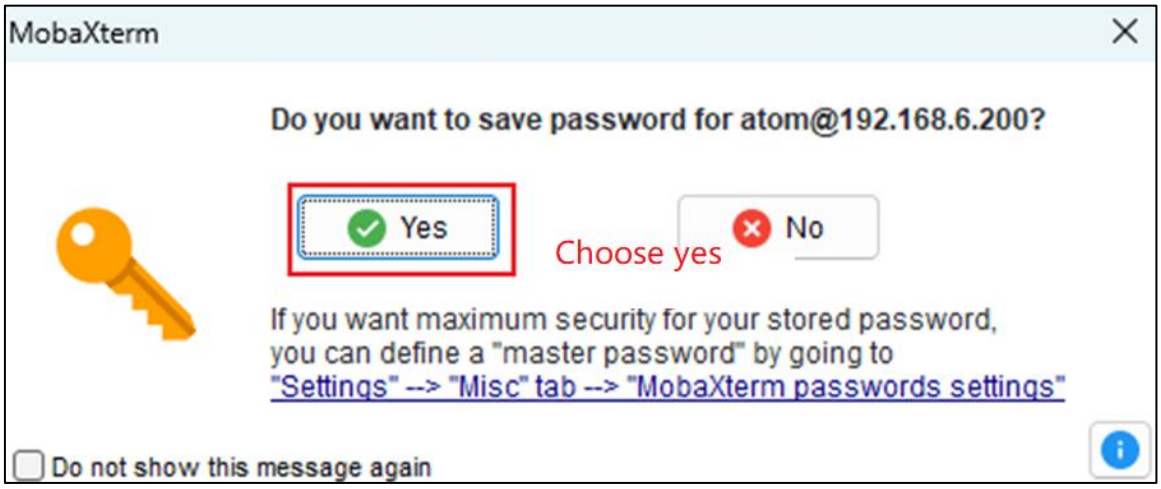


Figure 1.2-23 Establishing SSH remote connection (4)

A pop-up window asks the user if they need to save the password. We can choose "Yes" to save the password or "No" to not save it, depending on personal preference. At this point, the SSH remote connection has been successfully created, as shown in Figure 1.2.24:

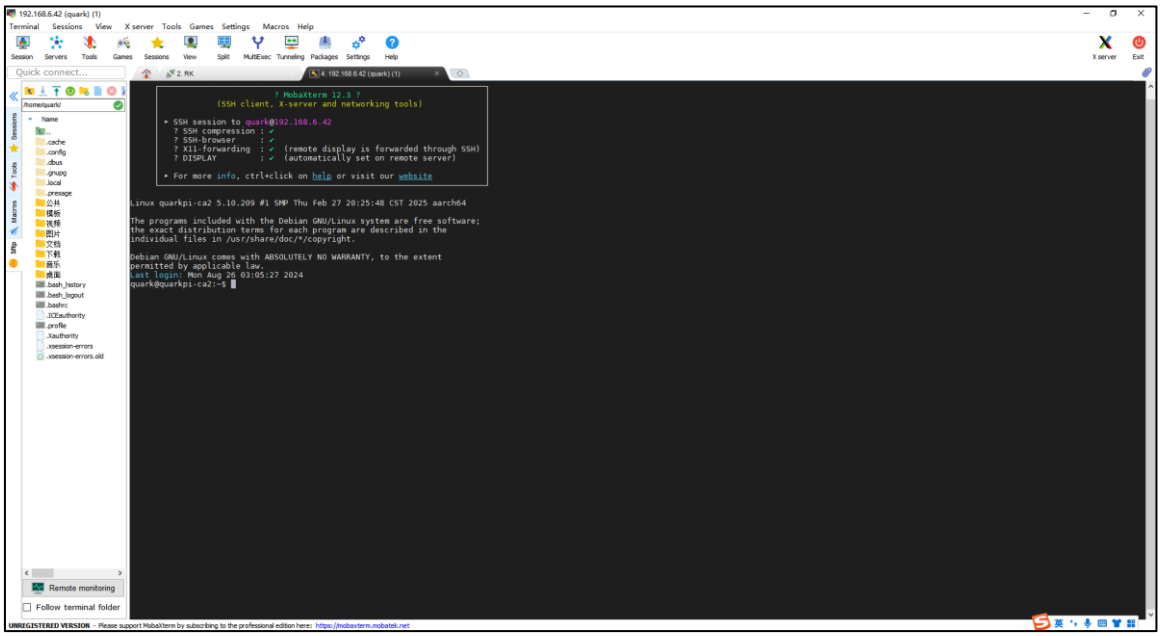


Figure 1.2-24 SSH remote login was successful.

Under the condition of SSH remote login, we can also use the MobaXterm software to achieve file transfer between Windows and Ubuntu (using the SFTP protocol for file transmission).

1.3 Installing SFTP Client on Windows

We need to install an FTP client software on the Windows system. Here, we choose FileZilla as the FTP client software. It is a free FTP client software.

The FileZilla software installation package has been provided to users in the card computer data package. The path is: Development Board CD-ROM A Disk - Basic Materials -> 04_softwares -> FileZilla_3.61.0_win64-setup.exe. Users can also download and install the package file through the link address: https://www.filezilla.cn/download/client.

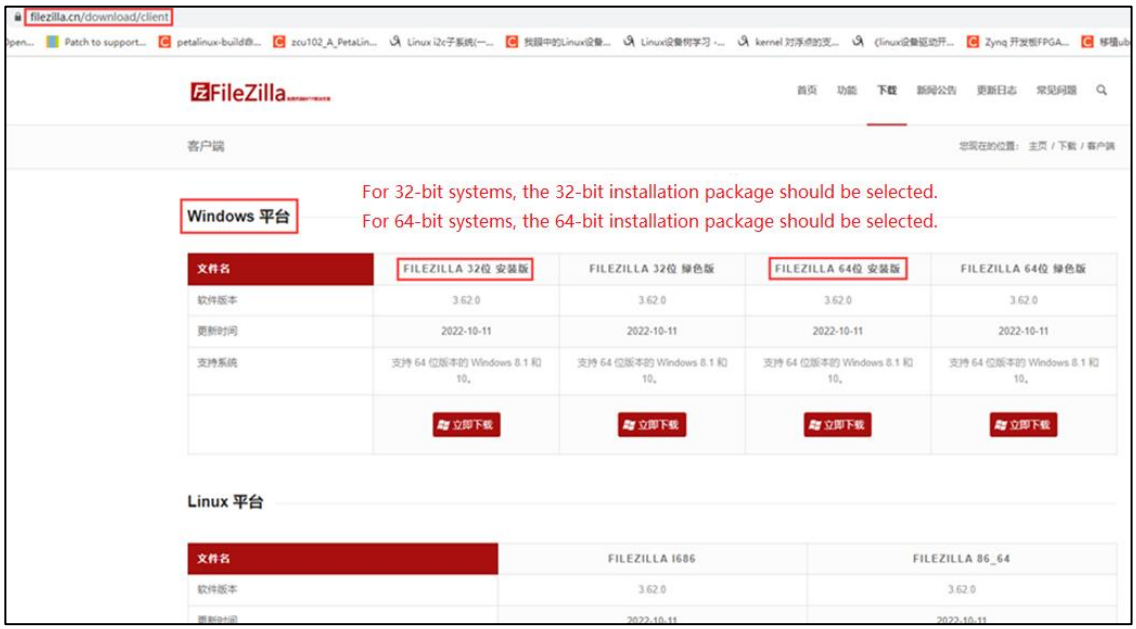


Figure 1.3-1 Download the installation package of FileZilla software

After the download is complete, it is as shown in Figure 1.3.2:

Figure 1.3-2 FileZilla software installation package

Next, double-click the installation package file FileZilla_3.61.0_win64-setup.exe and follow the steps shown in Figures 1.3.3 to 1.3.8 for installation:

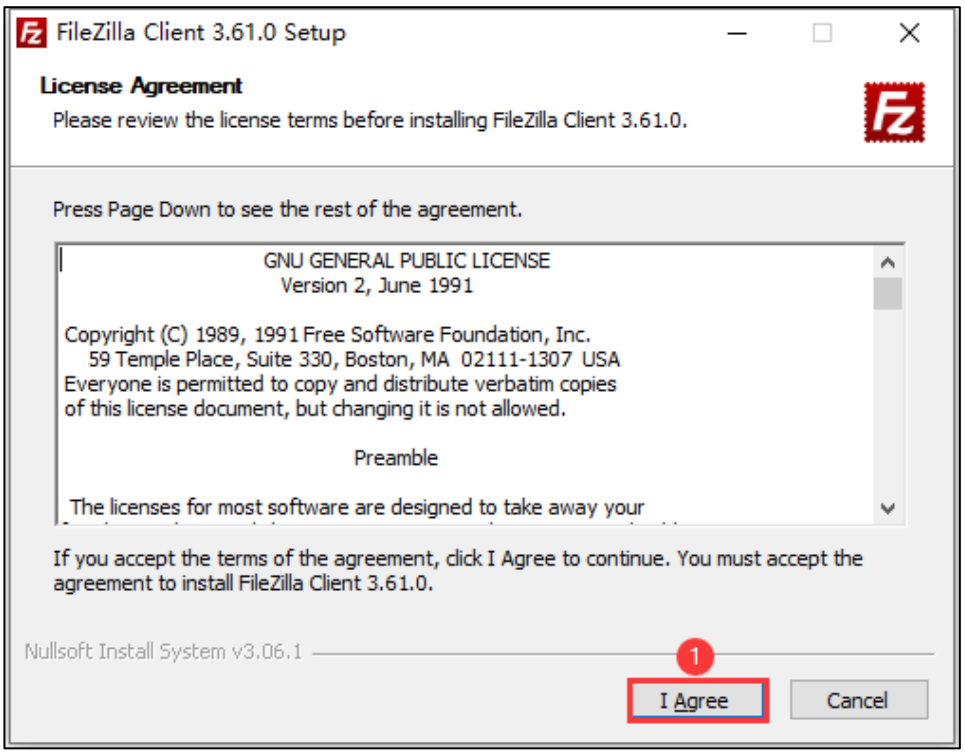


Figure 1.3-3 Install the FileZilla software (1)

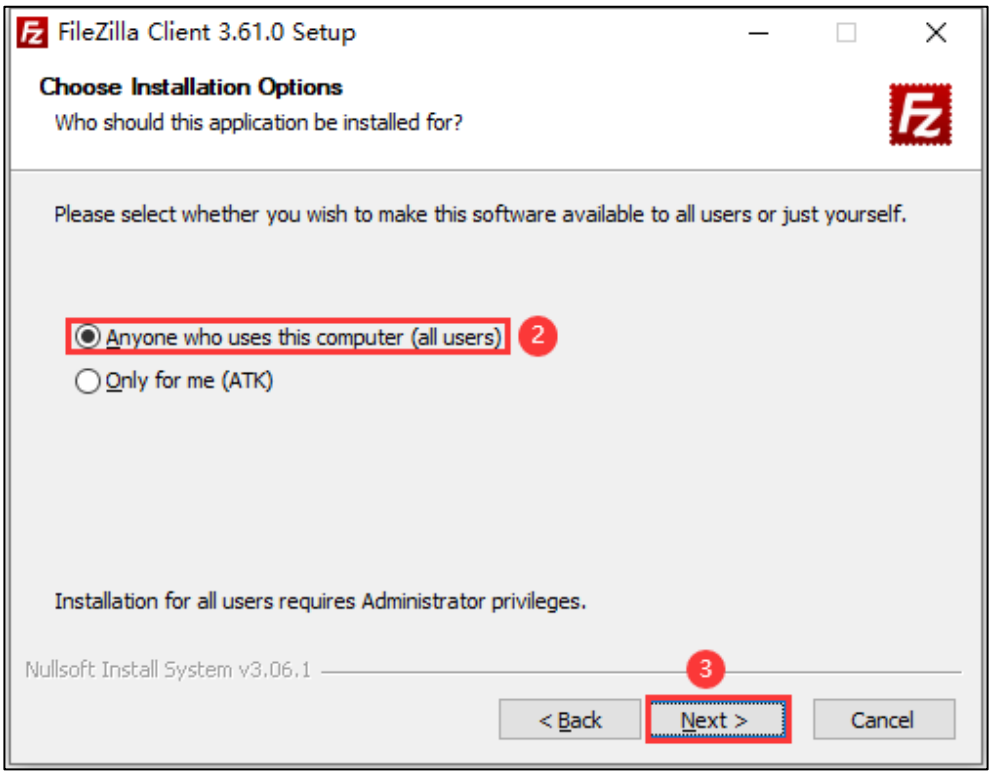


Figure 1.3-4 Install the FileZilla software (2)

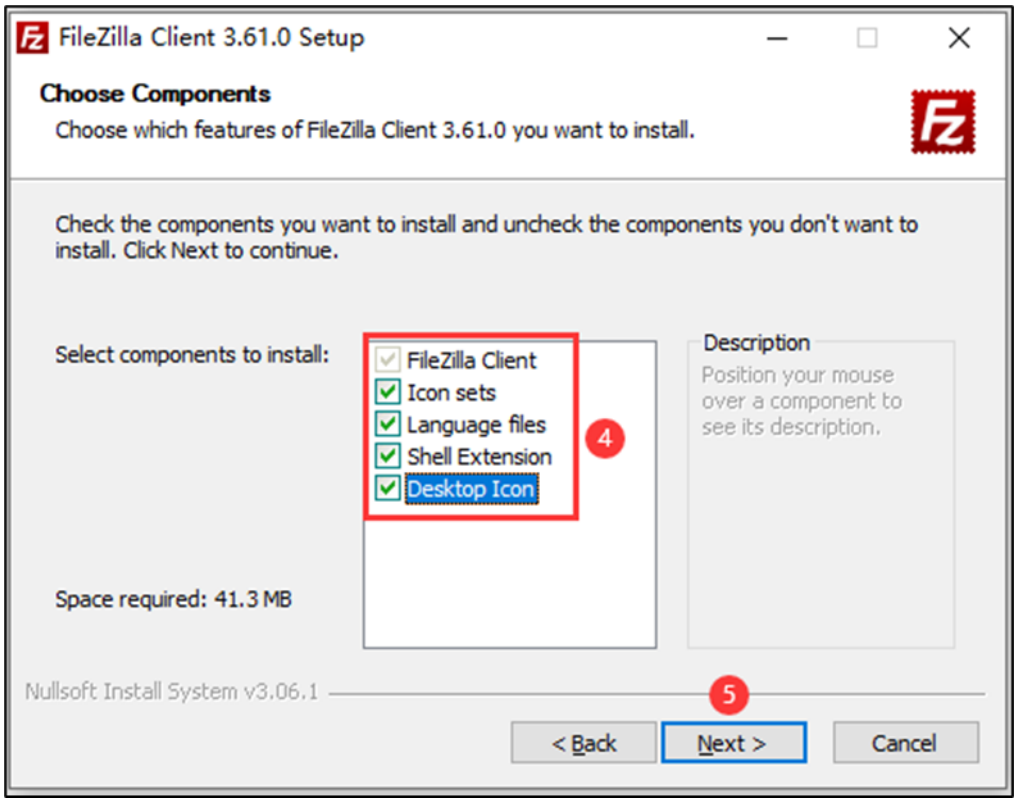


Figure 1.3-5 Install the FileZilla software (3)

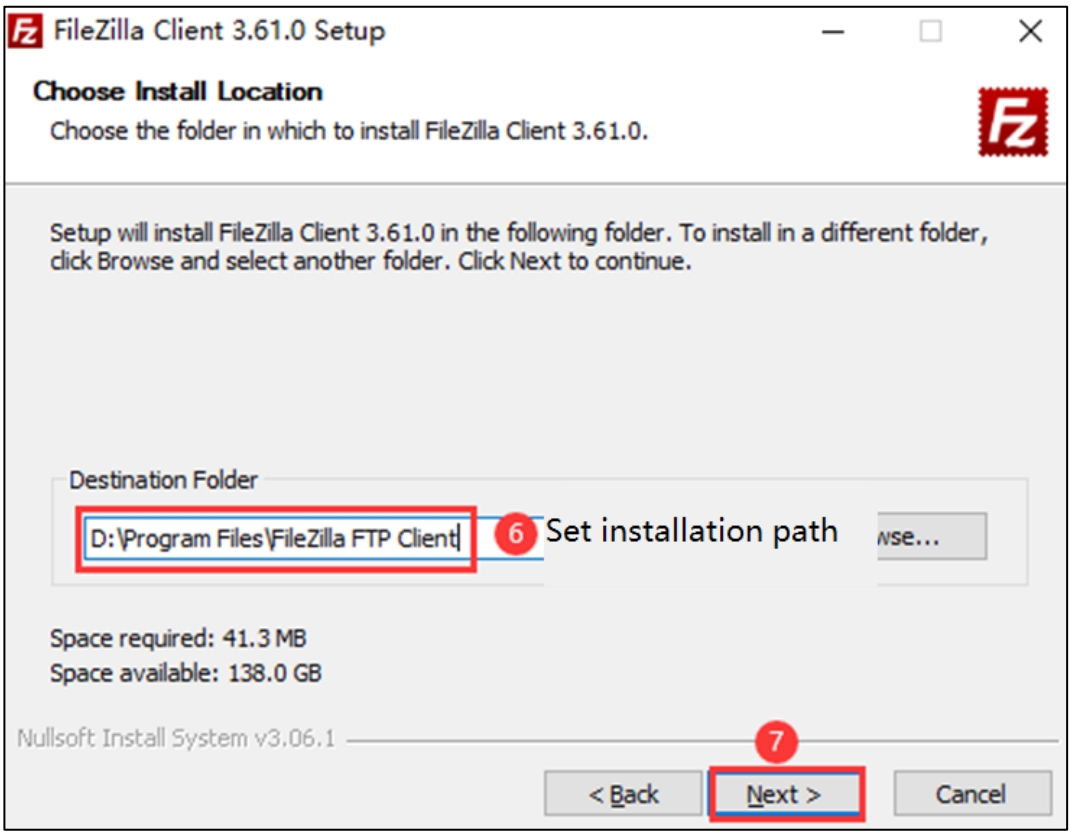


Figure 1.3-6 Install the FileZilla software (4)

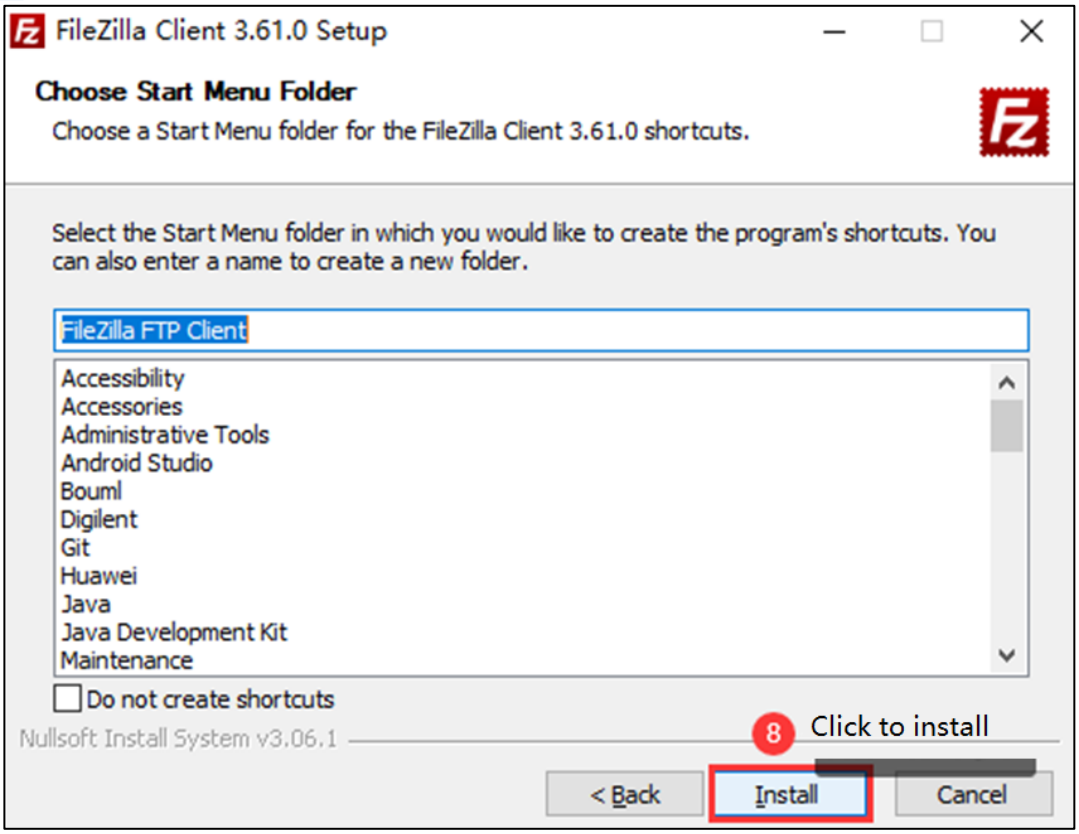


Figure 1.3-7 Install the FileZilla software (5)

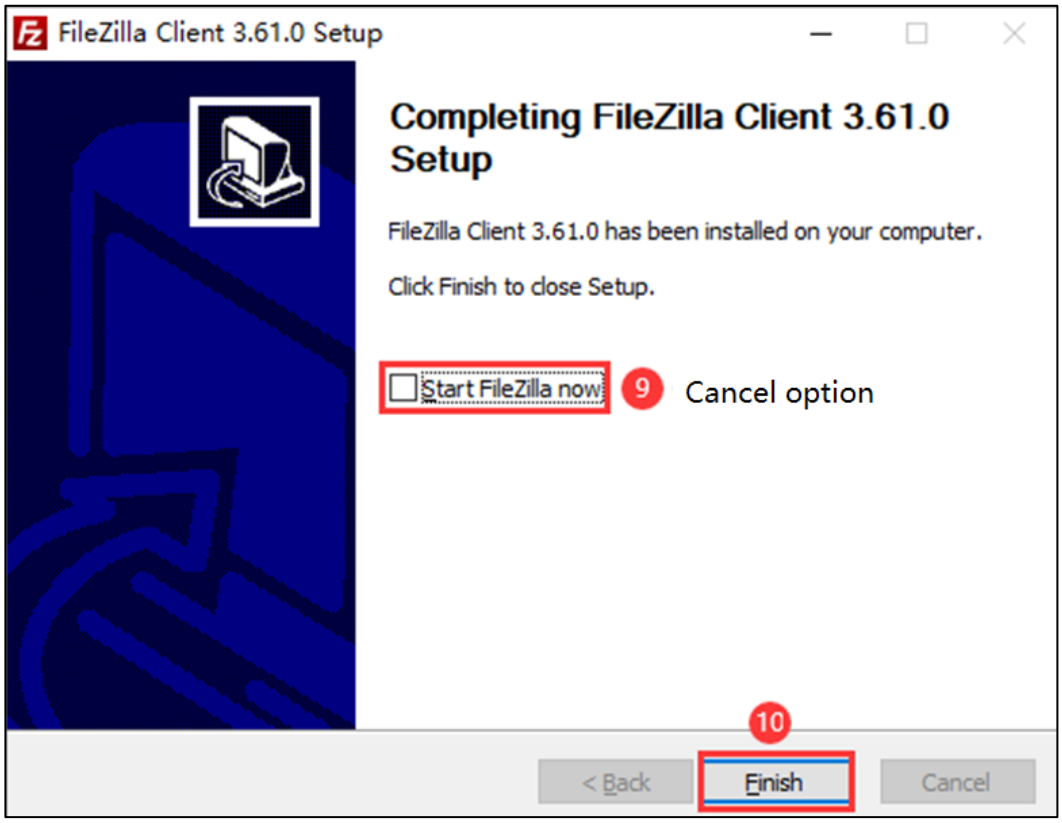


Figure 1.3-8 Install the FileZilla software (6)

At this point, the software installation is complete and a corresponding shortcut will be created on the desktop.

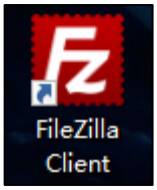


Figure 1.3-9 FileZilla desktop icon

1.3.1 How to Use FileZilla

Now, let's introduce the usage method of FileZilla. First, double-click the FileZilla desktop icon to open the software:

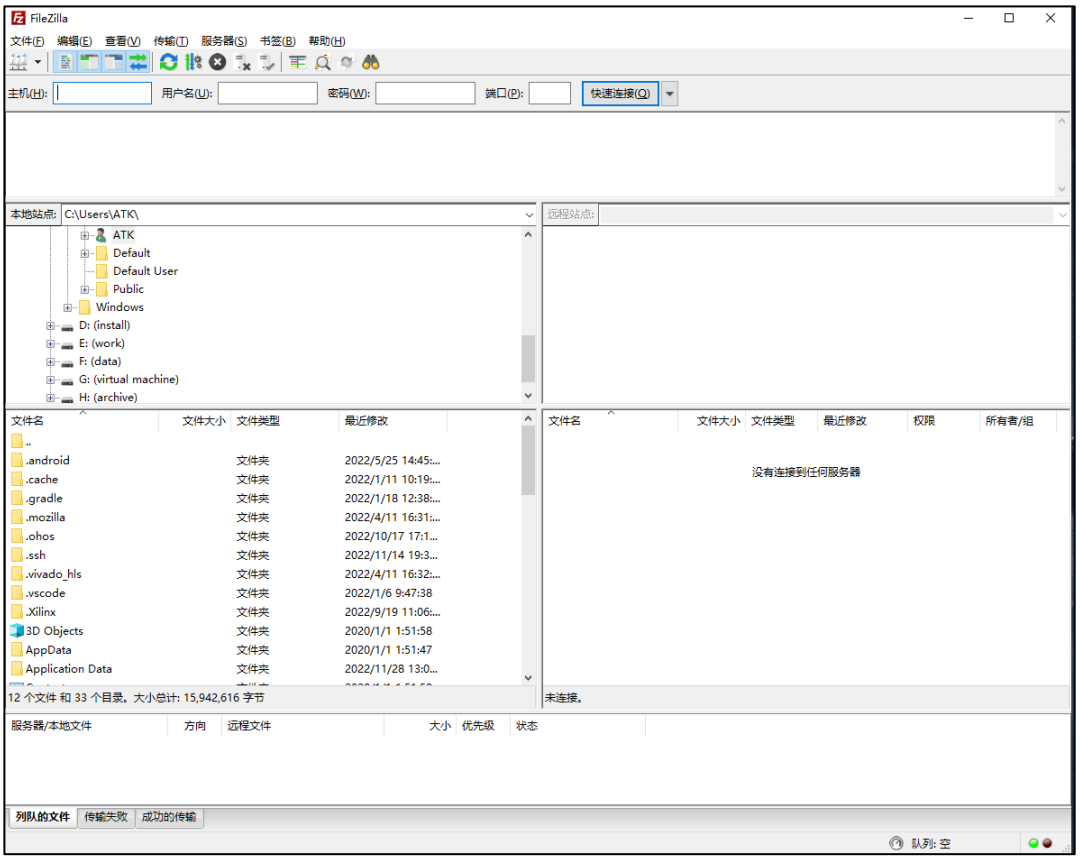


Figure 1.3-10 FileZilla software interface

When using a card computer as the FTP server and Windows as the FTP client, before conducting file transfer, the client needs to connect to the server first. Follow the steps shown in Figures 1.3.1.2 to 1.3.1.7 to connect to the FTP server:

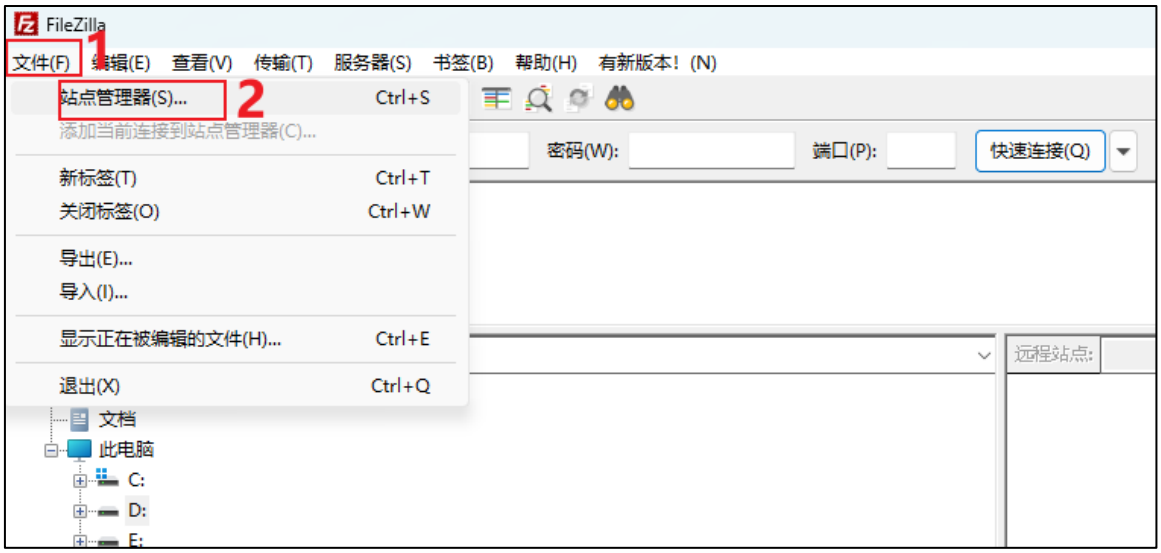


Figure 1.3-11 FTP client connects to the FTP server (1)

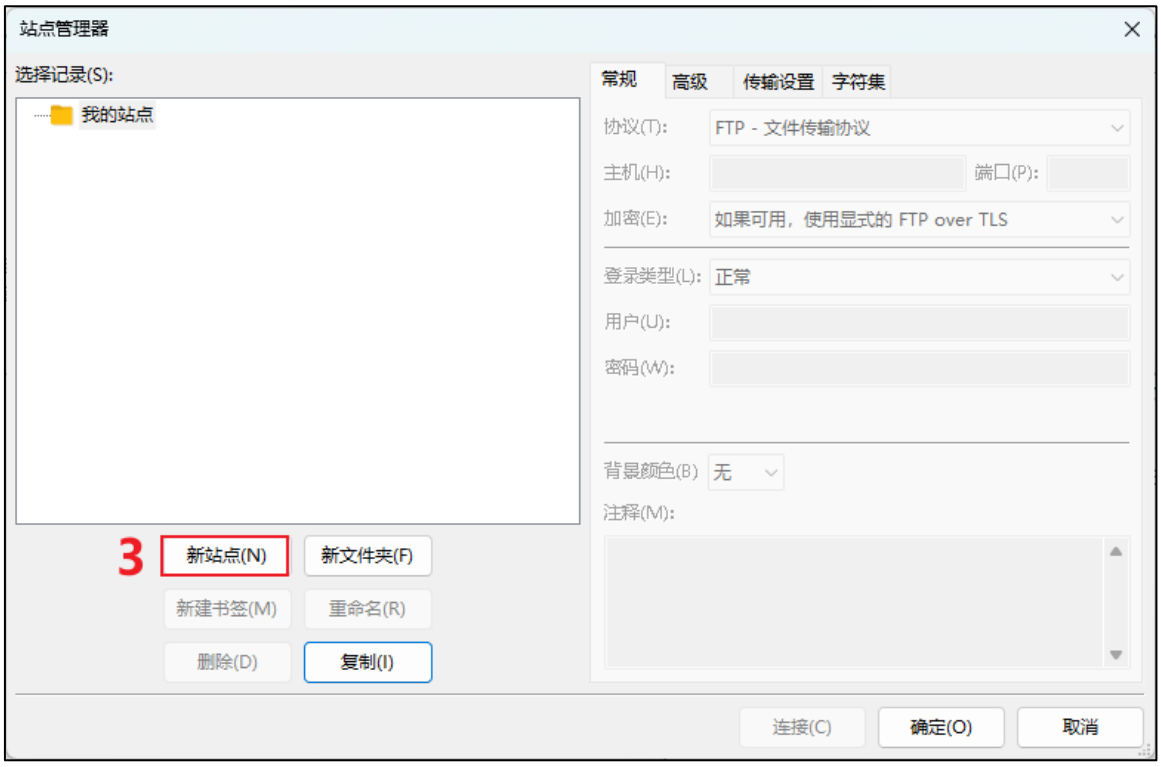


Figure 1.3-12FTP client connects to the FTP server (2)

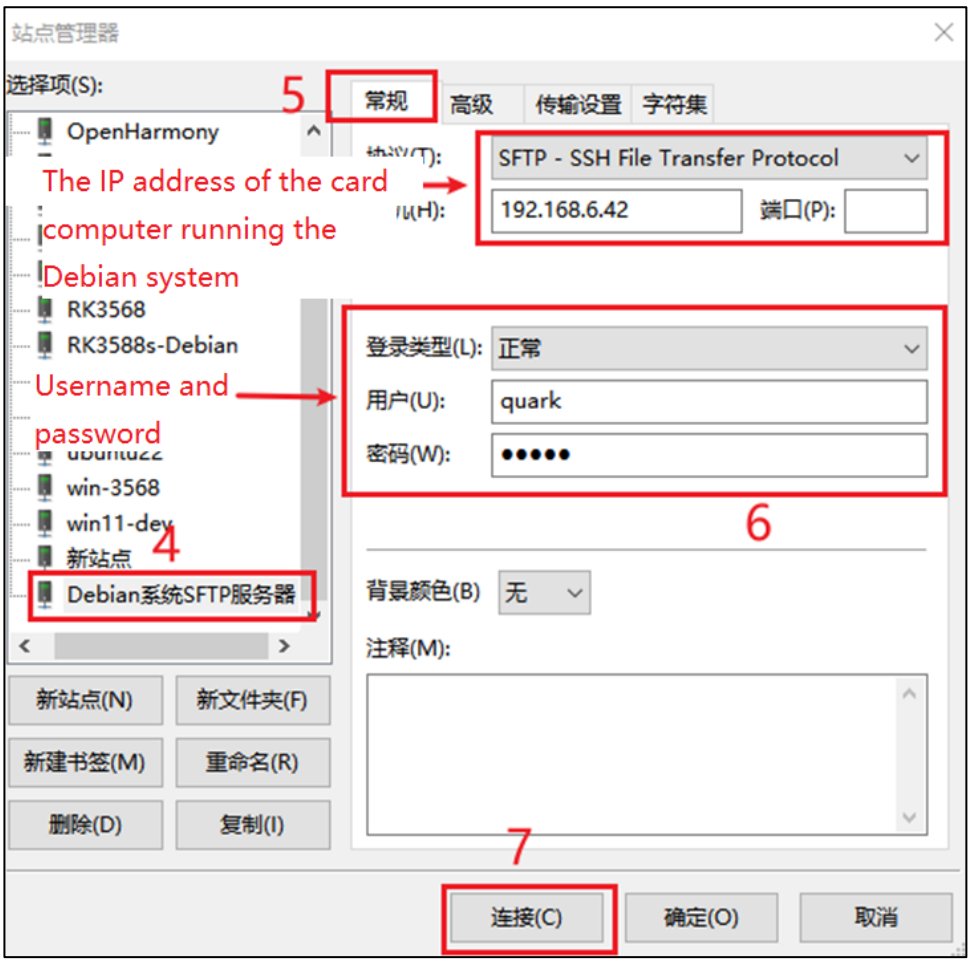


Figure 1.3-13 The FTP client connects to the FTP server (3)

Figure 1.3-14 The FTP client connects to the FTP server (4)

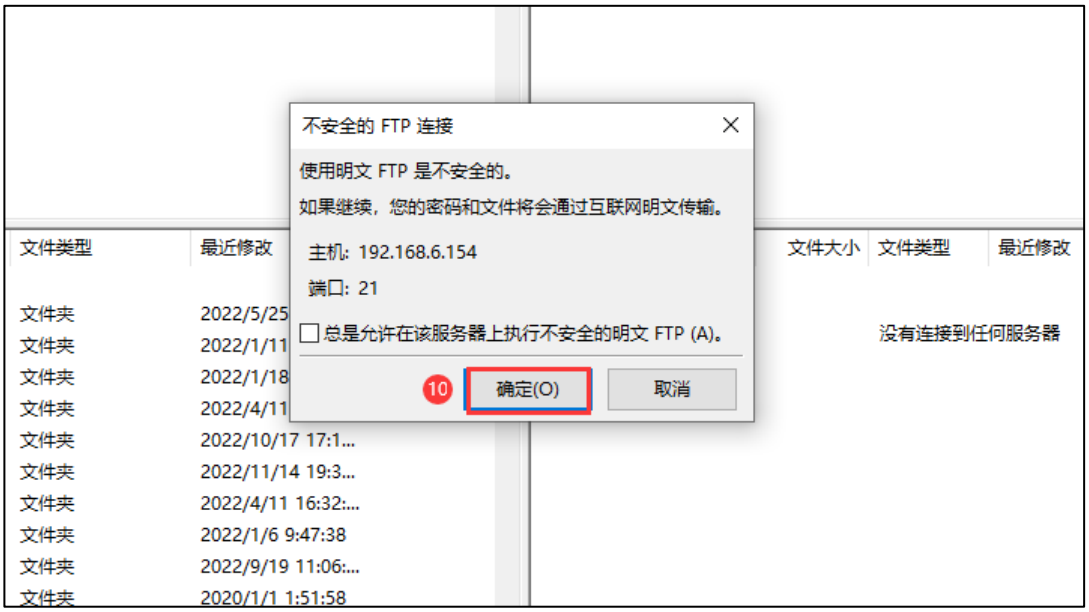


Figure 1.3-15 The FTP client connects to the FTP server (5)

The connection is successful as shown in Figure 1.3.1.7:

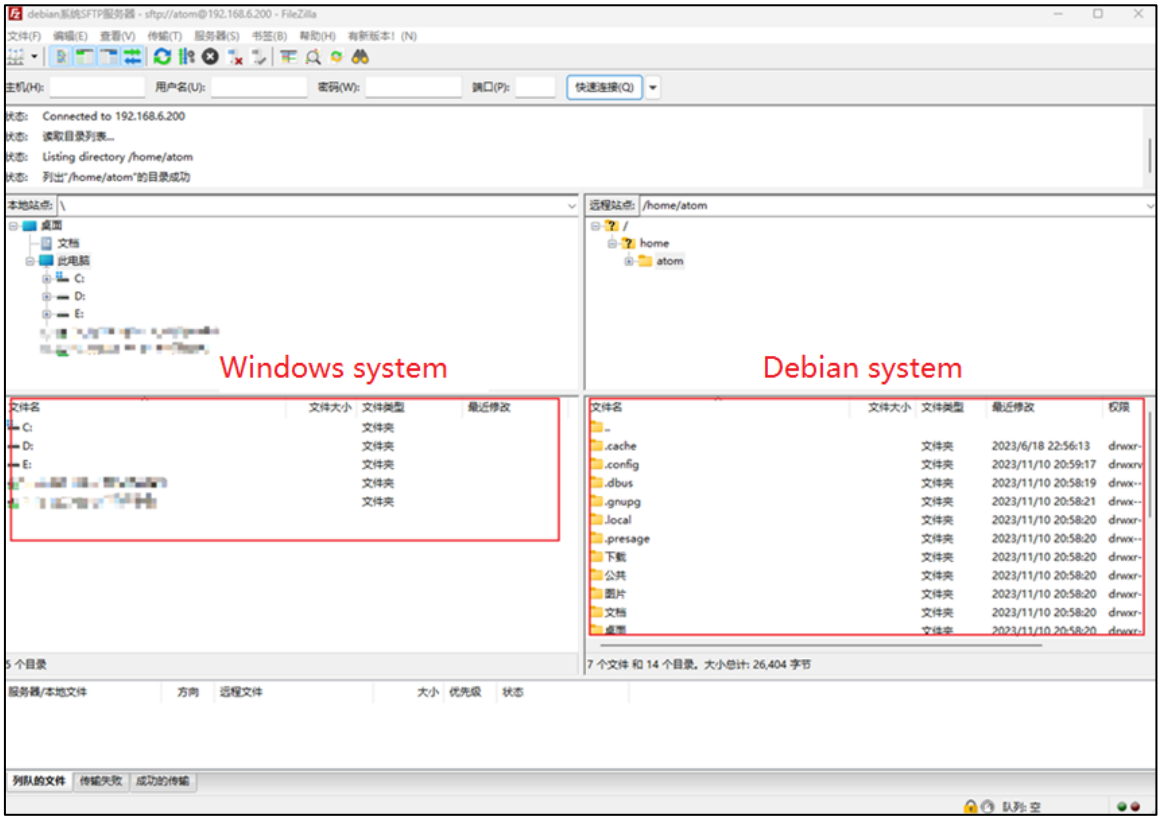


Figure 1.3-16 Connection successful

After the client successfully connects to the server, file transfer can be carried out. The transfer method is very simple. Select the file to be transferred, and directly use the left mouse button to drag it to the Windows directory area or the card computer system directory area! For example, to copy the test.txt file under the Windows system to the card computer system, first find this file test.txt in the left Windows directory area, then use the left mouse button to drag it to the right card computer directory

area and release it; similarly, the copying of files from the card computer system to the Windows system is also the same!

1.4 Installation and Use of ADB

1.4.1 Installation of ADB Commands

The full name of ADB commands is "Android Debug Bridge", and from the English name, it is clear that it is mainly used as an Android debugging tool. ADB commands are becoming increasingly popular in embedded development. On the QuarkPi-CA2, OTG is defaulted to act as an ADB function (it can be used to reuse other functions), so we need to install the ADB tool on Windows (Linux has been successfully installed through the command). The installation package has been placed on the card computer CD-ROM, and the path is: Development Board CD-ROM A - Basic Materials -> 04_tools -> 01, ADB Debugging Tools -> platform-tools_r33.0.3-windows.zip. Unzip it to the custom installation directory. Then, in Windows, we open the Run dialog by pressing "win" + "R", and the result is as follows:

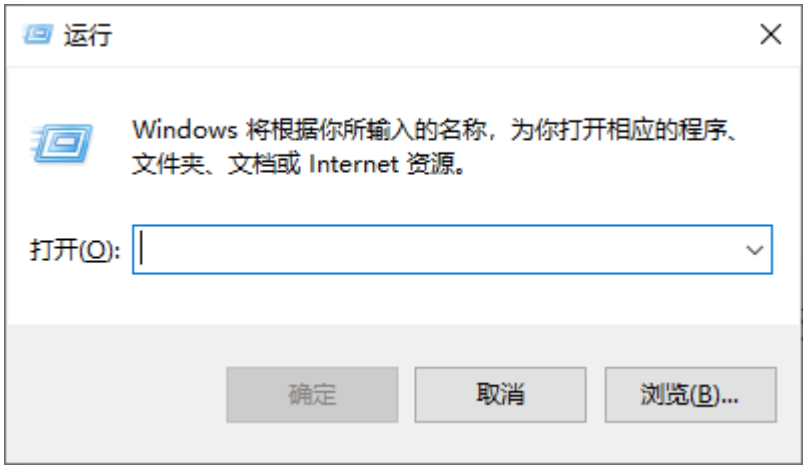


Figure 1.4-1 Running Windows 10

After opening the Run dialog box, enter "sysdm.cpl" and press Enter to open the System Properties, as shown in the figure below.

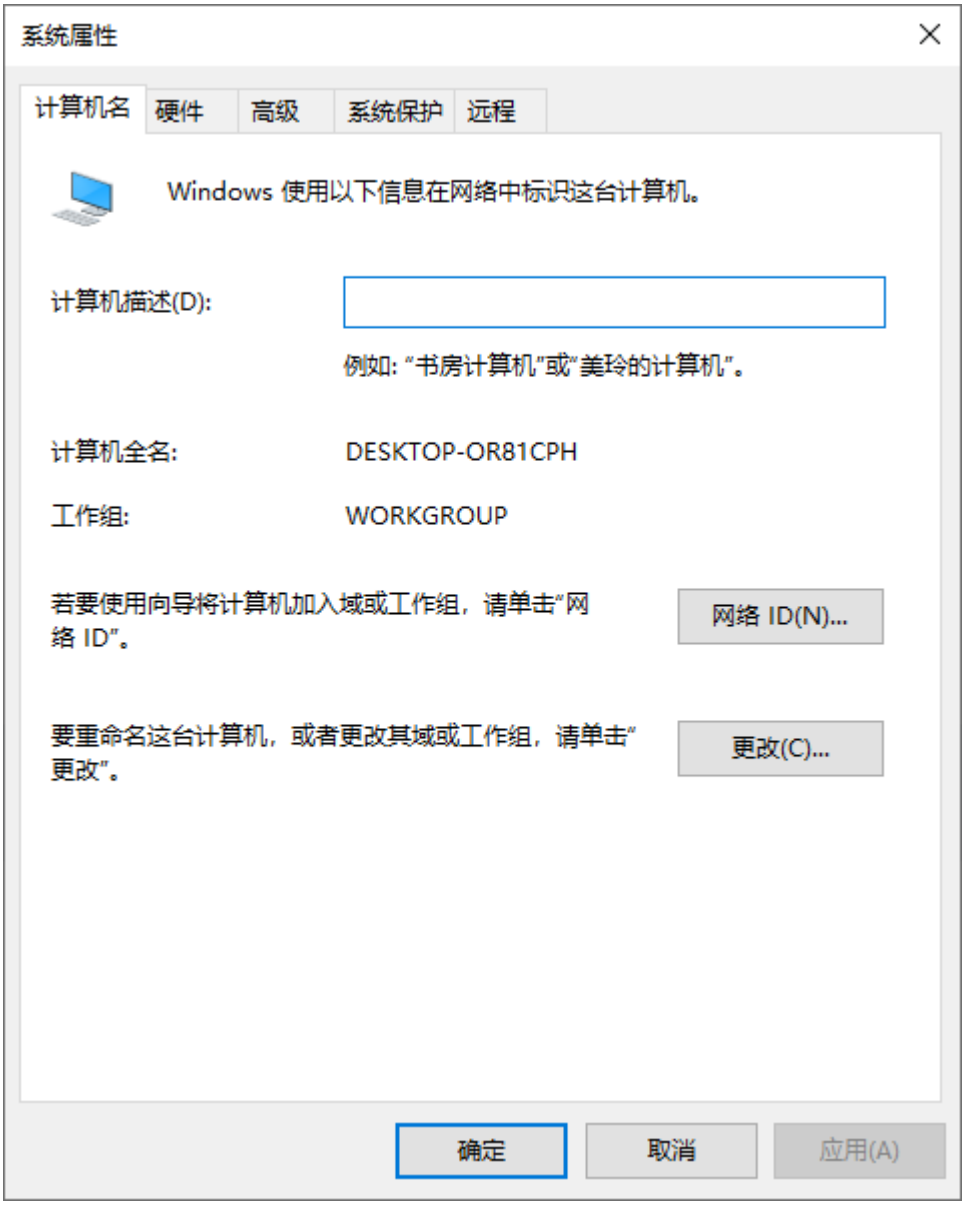


Figure 1.4-2 System Properties

Click "Advanced" in Figure 1.4.1.2 to enter the environment variable setting interface, as shown in the following figure:

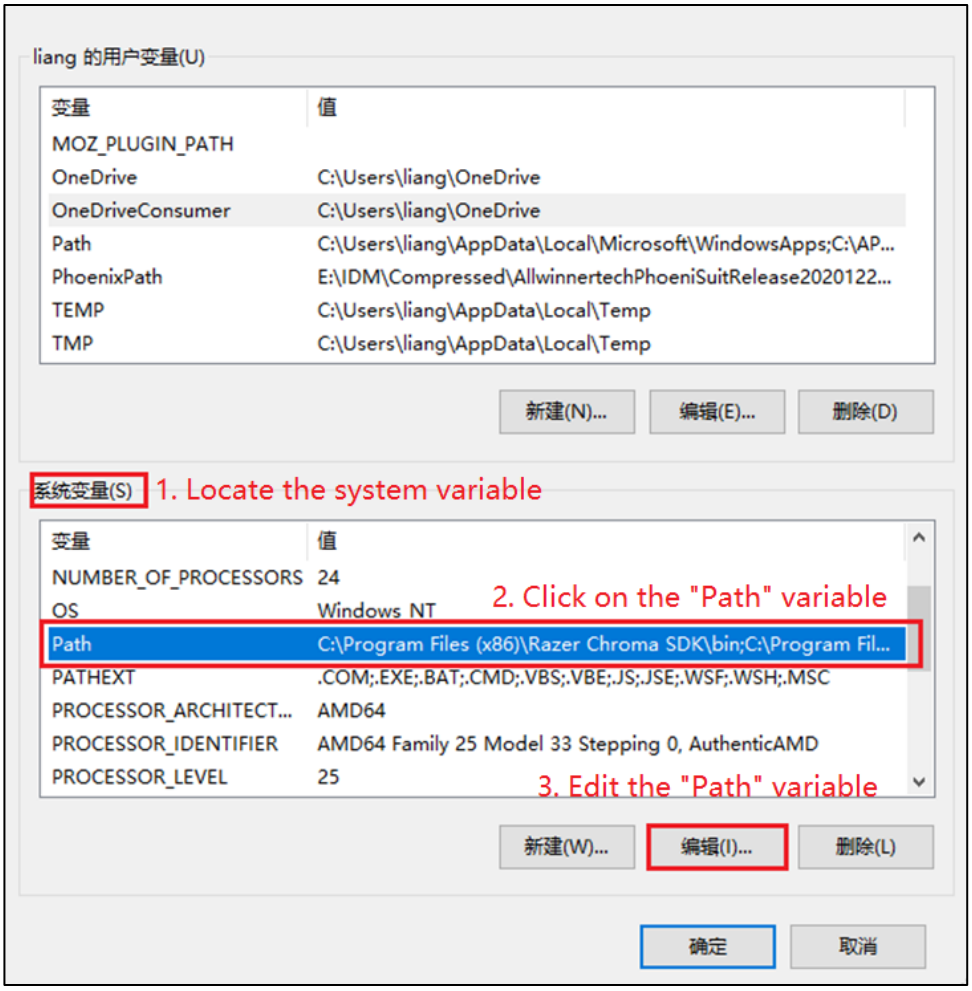


Figure 1.4-3 Environment variables

Next, we can add the path of ADB to the system variables. Follow the steps in the above picture to enter the "Path" variable and add it, as shown in the following picture:

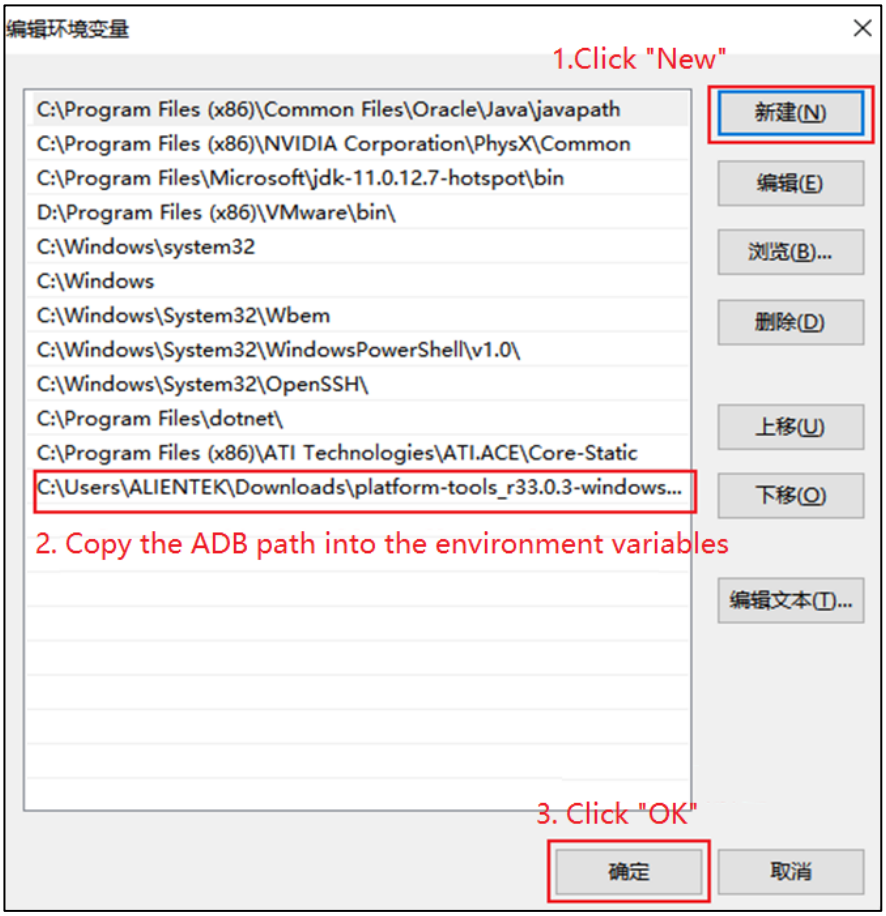


Figure 1.4-4 Edit the environment variables

According to the steps in Figure 1.4.1.4, add the path of ADB to the Path system environment variable (it is recommended to click twice to confirm). Here, the path of the author is: C:\Users\ALIENTEK\Downloads\platform-tools_r33.0.3-windows\platform-tools. Run the CMD terminal and input the command to check if the installation is successful. The command is as follows:

```
adb --version
```

The results are shown as follows:

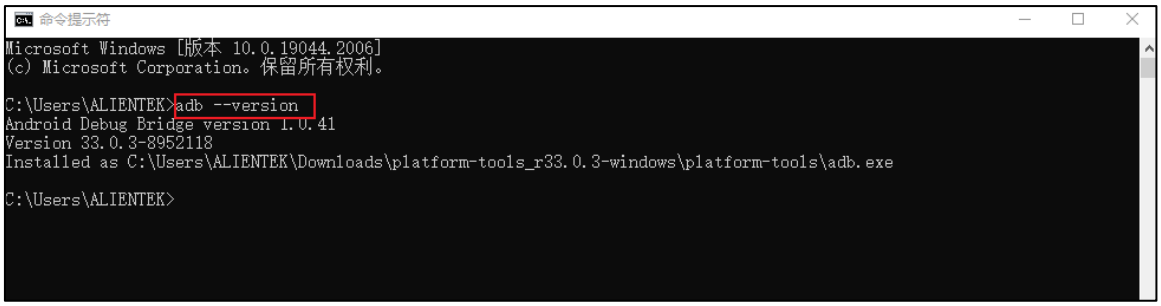


Figure 1.4-5 ADB version verification

1.4.2 Connecting the card computer device via adb

The card computer runs the Debian system and is connected to the PC via a USB cable (only the USB OTG interface is supported), as shown in Figure 1.4.2.1. By default, the device will connect to the

Windows system. At this point, opening the Windows Device Manager will reveal a device named "Android ADB Interface", as shown in Figure 1.4.2.1:

Note: If the device still cannot be detected after re-plugging and unplugging the USB OTG, it is recommended to restart the card computer. There is a less compatible situation between the Debian system and the adb service program. We will optimize this function as the situation allows. Currently, the recommended method is to use SSH connection.

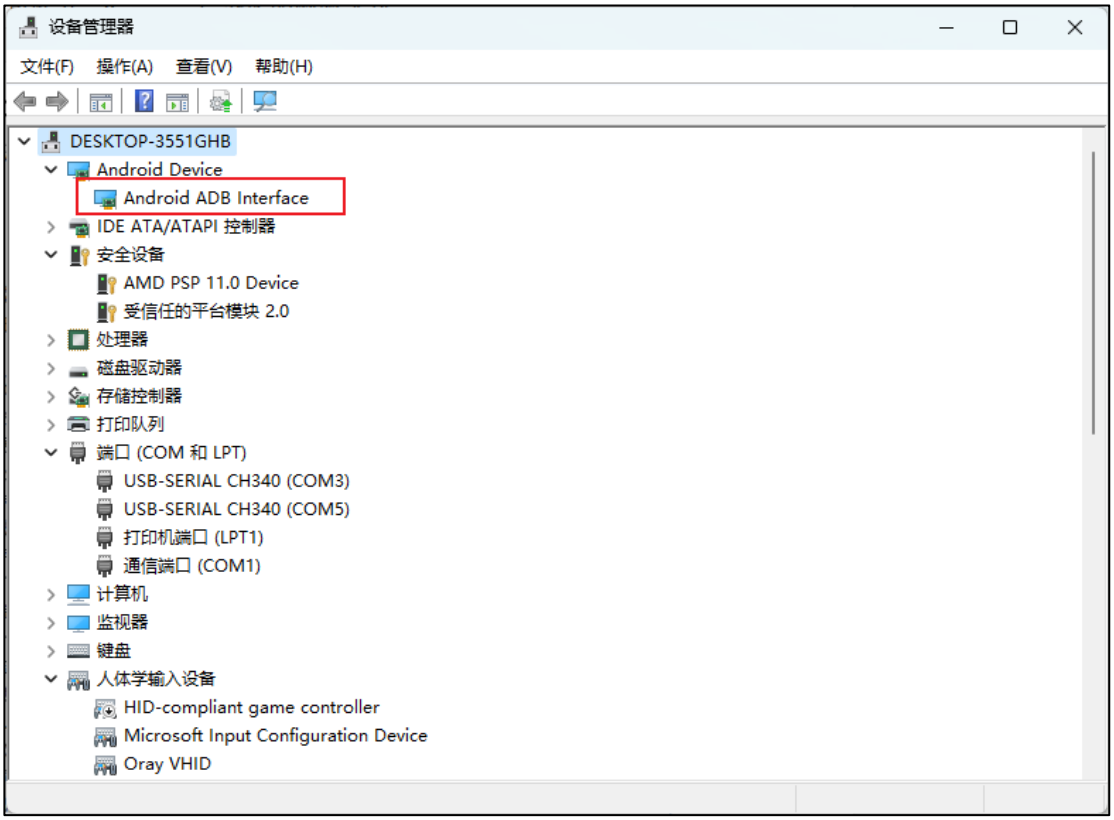


Figure 1.4-6 Android Device Interface

Open the cmd command line window under Windows, and execute "adb devices" to view the currently connected devices:

```
C:\Users\ALIENTEK>
C:\Users\ALIENTEK>adb devices
List of devices attached
d2d267fb73ddb295        device


C:\Users\ALIENTEK>
```

Figure 1.4-7 Running shell

This indicates that the adb server has established a connection with the device "d2d267fb73ddb295".

1.4.3 Running the Shell

Executing the "adb shell" command in Windows allows you to run the device's shell (command-line terminal), as shown below:

```
PS C:\Users\ALIENTEK> adb devices
* daemon not running; starting now at tcp:5037
* daemon started successfully
List of devices attached
7a4bd0cacb8d2e9f        device

PS C:\Users\ALIENTEK> adb shell
root@quarkpi-ca2:/#
root@quarkpi-ca2:/#
root@quarkpi-ca2:/# ls
bin   etc          lib         mnt   root  sha256sum.README  sys  var
boot  etctimezone  lost+found  opt   run   sha256sum.txt     tmp
dev   home         media       proc  sbin  srv               usr
```

Figure 1.4-8 Check the currently connected devices.

You can exit the shell by executing the "exit" command.

1.4.4 File Transfer

The "adb push" command can be used to copy local files to the device:

```
adb push local remote
```

"local" refers to local files, while "remote" refers to a certain directory on a remote device. To copy a local file to a certain directory on a remote device, for example:

```
adb push .\led.bin /
```

```
PS C:\Users\ALIENTEK\Desktop> adb devices
List of devices attached
d2d267fb73ddb295        device

PS C:\Users\ALIENTEK\Desktop> adb push .\led.bin /
.\led.bin: 1 file pushed, 0 skipped. 0.4 MB/s (160 bytes in 0.000s)
PS C:\Users\ALIENTEK\Desktop>
```

Figure 1.4-9 Copying files to the device under Windows

```
root@atompi-ca1:/# ls
 bin                                                    proc
 boot                                                   rockchip
 dev                                                    root
'EB'$'\201''@'$'\204''4'$'\200''M1'$'\220''@'$'\200''H'  run
 etc                                                    sbin
 home                                                   sha256sum.README
 led.bin                                                sha256sum.txt
 lib                                                    srv
 lost+found                                             sys
 media                                                  tmp
 mnt                                                    usr
 opt                                                    var
root@atompi-ca1:/#
```

Figure 1.4-10 View the directory under the device

Conversely, the files in the device can also be copied to the Windows environment using the "adb pull" command:

```
adb pull remote local
```

"remote" refers to a certain file on a remote device, while "local" refers to a certain directory on Windows. Copy a certain file from the remote device to the Windows system, for example:

```
C:\Users\ALIENTEK\Desktop\test>adb devices
List of devices attached
d2d267fb73ddb295        device


C:\Users\ALIENTEK\Desktop\test>adb pull /led.bin ./
/led.bin: 1 file pulled, 0 skipped. 0.2 MB/s (160 bytes in 0.001s)

C:\Users\ALIENTEK\Desktop\test>ls
 驱动器 C 中的卷没有标签。
 卷的序列号是 970D-7CC5

 C:\Users\ALIENTEK\Desktop\test 的目录

2023/11/16  16:41    <DIR>          .
2023/11/16  16:37    <DIR>          ..
2023/11/16  16:41               160 led.bin
               1 个文件            160 字节
               2 个目录 96,941,010,944 可用字节

C:\Users\ALIENTEK\Desktop\test>
```

Figure 1.4-11 Copy the files in the device to the local area.

Chapter 2. Function Testing of the Android System

This chapter explains how to test the QuarkPi-CA2 card computer.

2.1 Power On Startup

Turn on the power switch of the development board and start the Android system. During the system startup process, a logo and the Android startup animation will be displayed, as shown below:

Figure 2.1-1 Boot-up logo

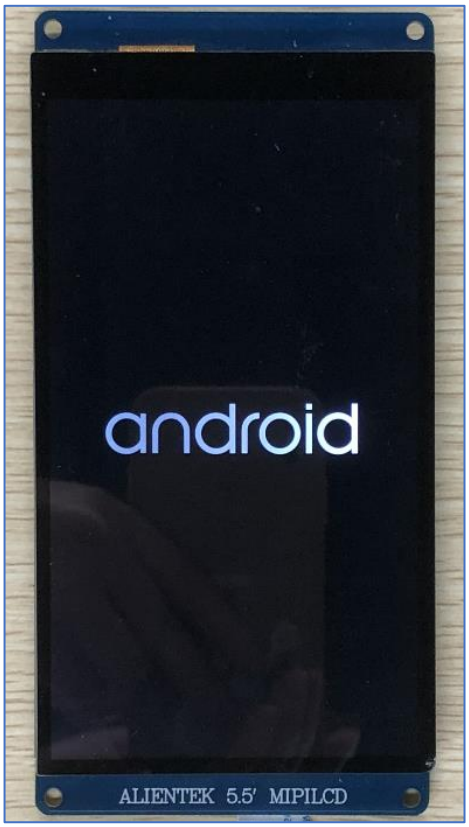


Figure 2.1-2 Android startup animation

After successful startup, the Android system main interface will be displayed, as shown below:

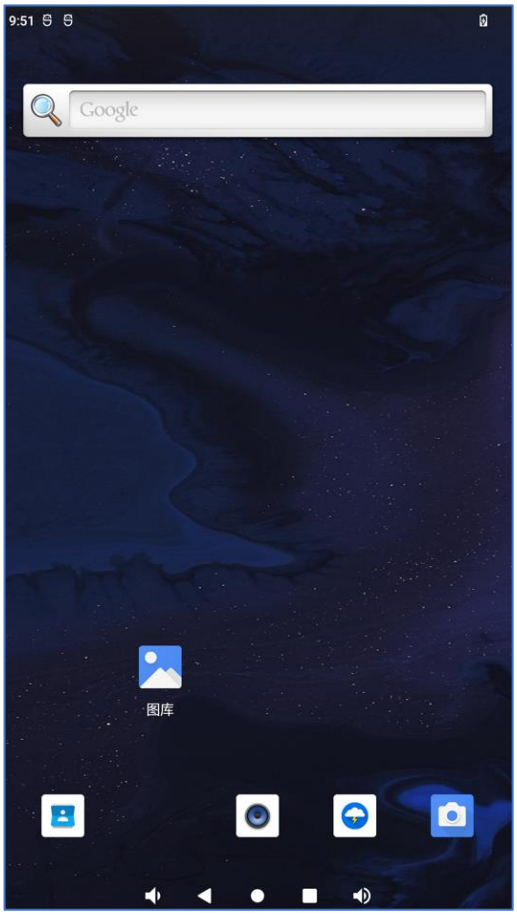


Figure 2.1-3 Android system main interface (MIPI screen)

2.2 Connect serial port terminal

Connect the debugging serial port pins of the development board to the computer using a USB cable and a USB serial port module. Open the MobaXterm software and create a Serial port session (select USB SERIAL CH343 (the CH343 is displayed according to the actual chip signal of the serial port module)), set the serial port baud rate to 1500000 (1.5M). After the connection is successful, it will be as follows:

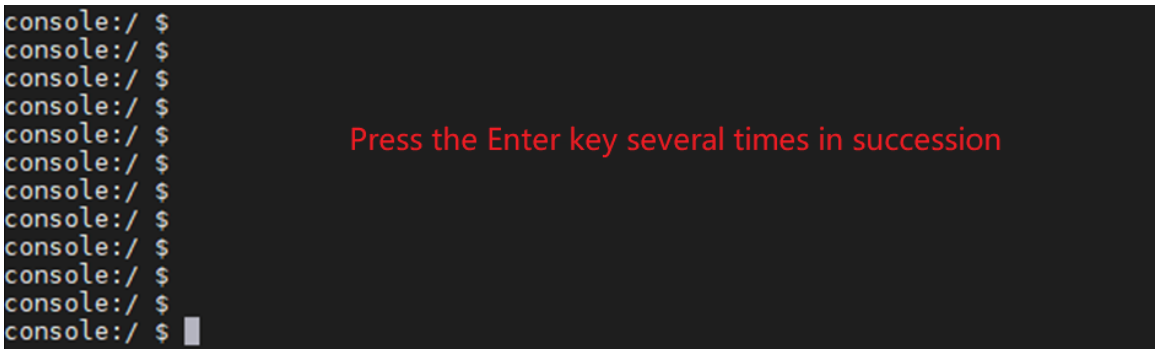


Figure 2.2-1 Debugging serial port output

We can execute commands through the serial port terminal, such as ls, ifconfig, etc.

2.3 ADB Connection

Connect the TYPE-C0 interface of the development board to the computer using a USB cable. Open the command prompt window in Windows (make sure to install the ADB tool first), as shown below:

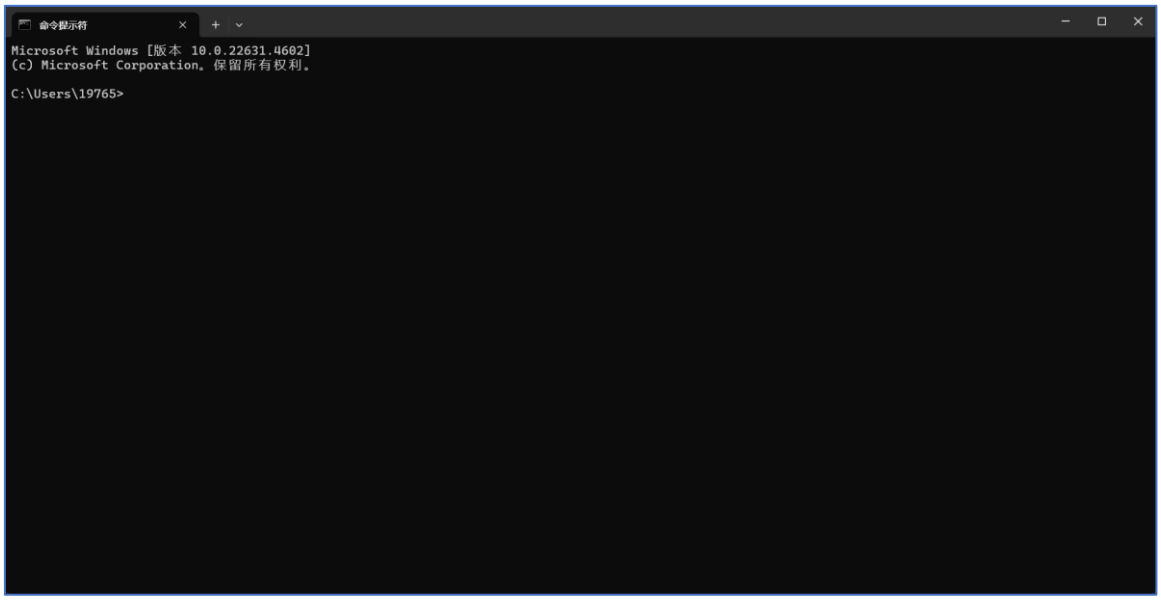


Figure 2.3-1 Windows command prompt window

Enter the command "adb devices" to check if the development board is currently connected:

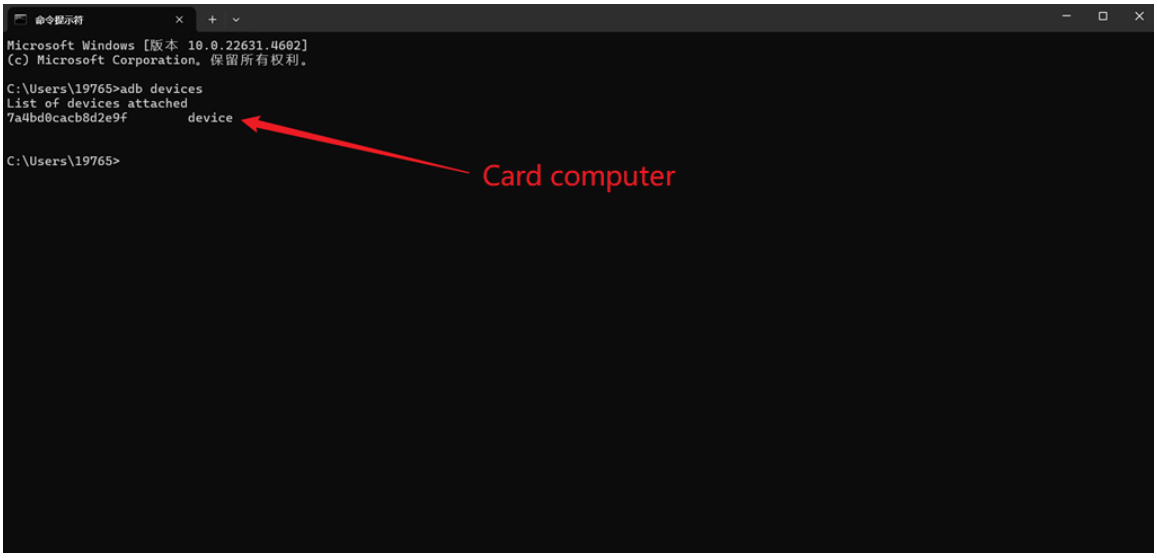


Figure 2.3-2 Check if it is connected to the card computer

If the connection fails, you can try unplugging the USB cable from the TYPE-C port of the development board, then reinsert it. If that doesn't work, you can try several more times!

After confirming that adb is connected to the development board, execute the "adb shell" command to run the shell of the Android device, as shown below:

```
C:\Users\19765>adb shell
atk_quarkpi_ca2:/ $
atk_quarkpi_ca2:/ $
atk_quarkpi_ca2:/ $ ls
acct        cache   data_mirror    init             metadata  oem          sdcard                  system
apex        config  debug_ramdisk  init.environ.rc  mnt       postinstall  second_stage_resources  system_ext
bin         d       dev            linkerconfig     odm       proc         storage                 vendor
bugreports  data    etc            lost+found       odm_dlkm  product      sys                     vendor_dlkm
atk_quarkpi_ca2:/ $
```

Figure 2.3-3 Run the shell of the device

Run the shell command line of the Android device to execute commands for corresponding tests.

2.4 LED Test

The ALIENTEK QuarkPi-CA2 card computer is equipped with a user LED. As shown in the figure below:

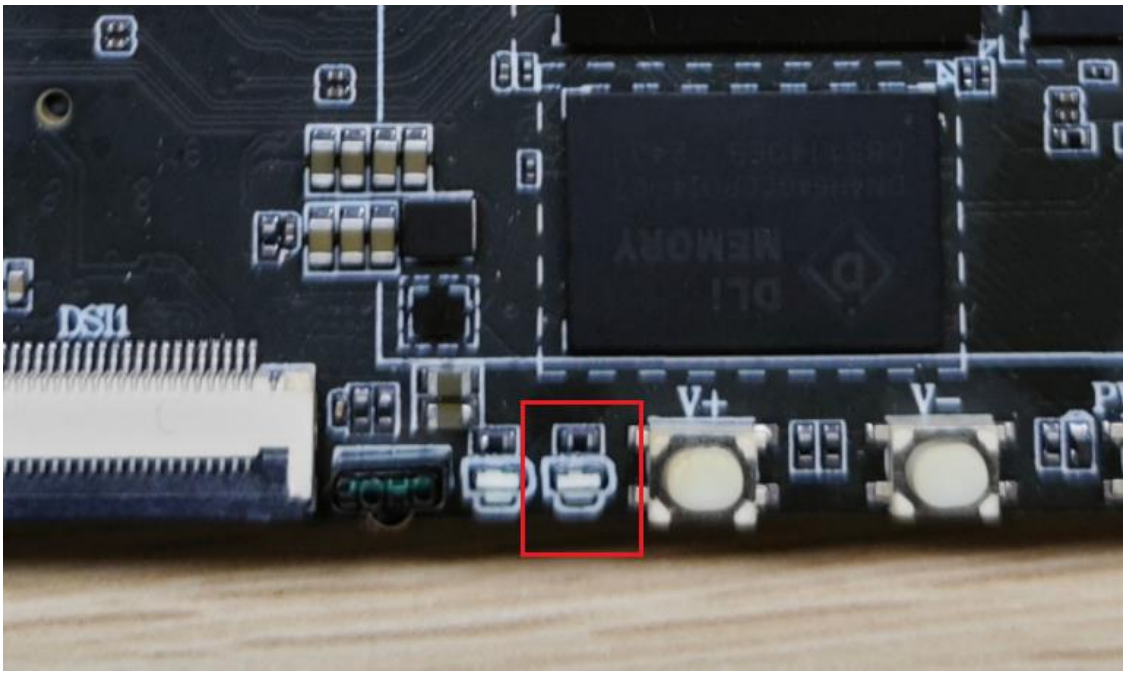


Figure 2.4-1 The distribution of LEDs on the development board

After the system starts, the small LED lights will flash (heartbeat lights), which are generally used to indicate whether the system is running.

In the Android system, we can control the state of the LEDs by executing the following commands through the serial port terminal or adb shell:

```
su root                                  # First, switch to the root user; otherwise, you won't have the permission to execute the following commands.
cat /sys/class/leds/work/trigger         # View the current trigger mode of LED0 and the supported trigger modes. The default mode is [heartbeat].
echo none > /sys/class/leds/work/trigger # Change the trigger mode of LED0
echo 1 > /sys/class/leds/work/brightness # Turn off LED0. At this moment, it is in the off state.
echo 0 > /sys/class/leds/work/brightness # Turn on LED0. At this point, it is in a constant state.
```

2.5 Key Test

The QuarkPi-CA2 card computer of ALIENTEK Corporation is equipped with 5 keys. As shown in the following figure:

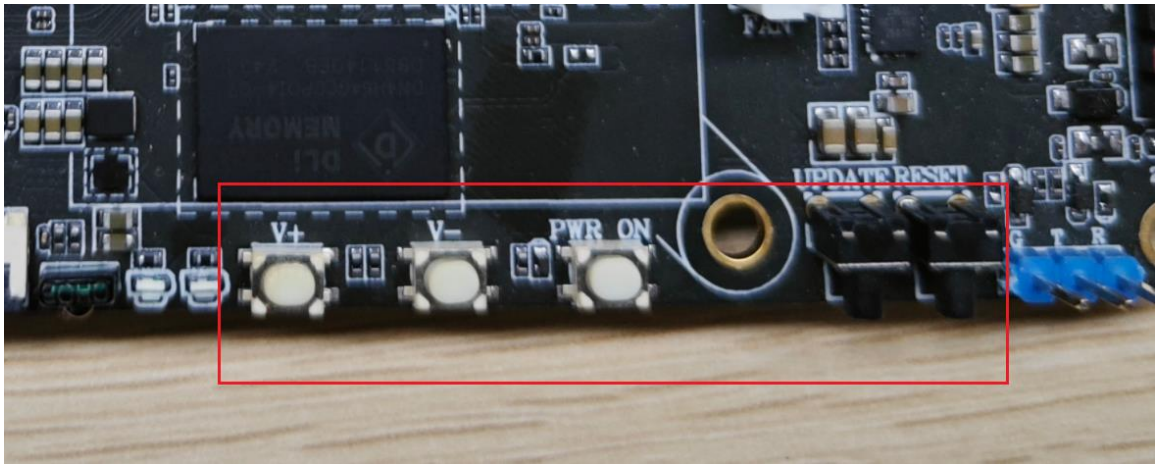


Figure 2.5-1 The distribution of buttons on the development board

There are 4 user buttons: V-, V+. These two user buttons are analogized through ADC. When different buttons are pressed, their corresponding ADC values are different, as shown in the table below:

	KEY4	KEY5
Name of the button	V+	V-
ADC value collected	40	950

Figure 5.5.2 ADC Value

In the Android system, when the V+ button is pressed, the media volume will increase, and when the V- button is pressed, the media volume will decrease. Therefore, these two buttons can be used to adjust the volume level, as shown below:

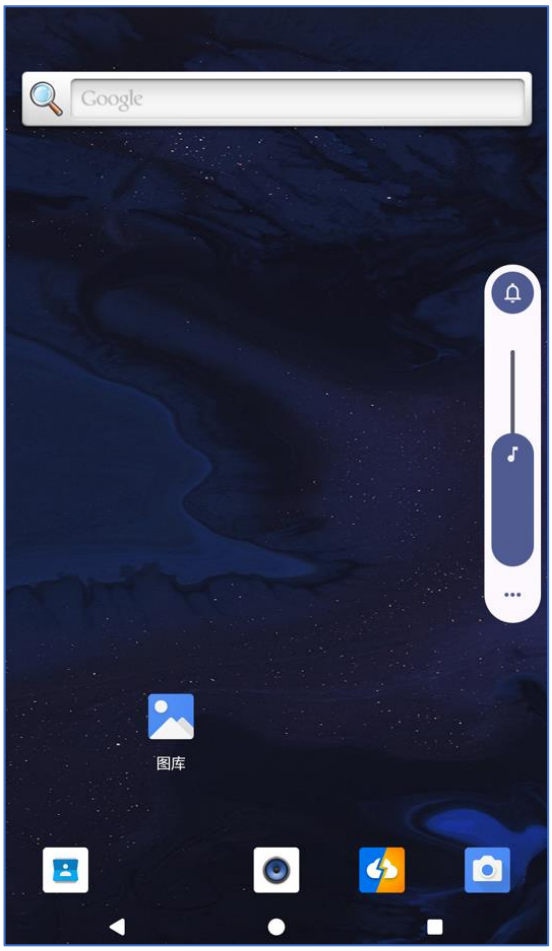


Figure 2.5-2 Press the button to adjust the volume

2.6 Brightness adjustment

Slide down on the Android system interface to open the Android pull-down menu, and find the brightness adjustment slider, as shown below:

Figure 2.6-1 Brightness adjustment control

Move the slider to adjust the screen brightness (only effective for MIPI screens), test it yourself!

2.7 Audio interface test

The QuarkPi-CA2 card computer has an onboard audio codec chip ES8388 for implementing audio playback and recording functions.

There is a headphone interface on the baseboard (for connecting headphones, it can be used for playing and recording). As shown below, before the audio test, insert the headphones first, and for the recording test, an earphone with a microphone is also required.

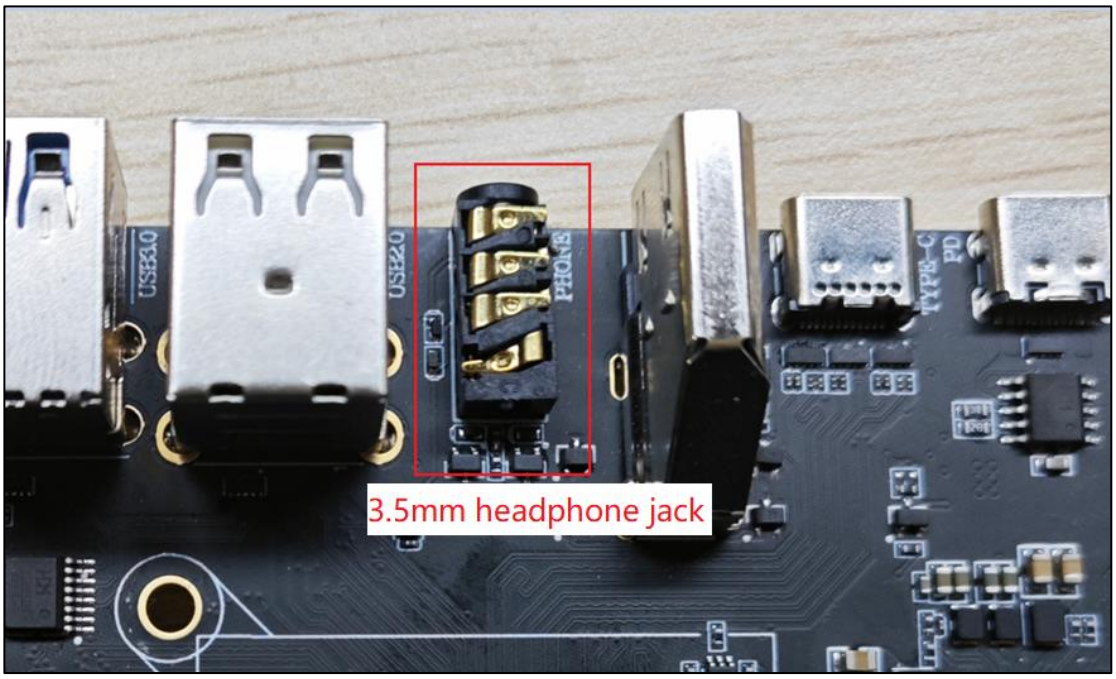


Figure 2.7-1 Headphones, microphone and speaker

2.7.1 Audio playback test

Before the test, prepare an MP3 audio file. Open the Windows Command Prompt window, and execute the following command in the Windows Command Prompt window to push the prepared MP3 audio file to the /sdcard/Music directory of the development board:

```
adb root                                  # Obtain root access
adb remount                               # Re-mount the root file system
adb push ./test_music.mp3 /sdcard/Music   # Send the "test_music.mp3" file in the current directory to the development board.
```

After the push operation is completed, then execute the following command again to restart the Android system:

```
adb shell sync        # synchronization
adb shell reboot      # Restart the system
```

After the Android system is restarted, then open the "Music" App as shown below:

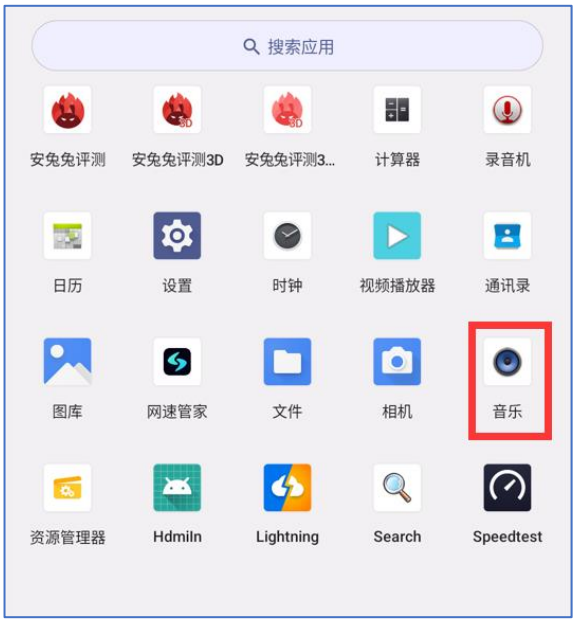


Figure 2.7-2 Music App

Open the music app and insert it into the headphone jack of the development board. At this point, the Android system will detect the insertion of the headphones, and a headphone icon will appear in the upper right corner (the icon disappears when the headphones are unplugged), as shown below:

Figure 2.7-3 Headphone icon

2.7.2 Recording Test

Open the "Recorder" app in the Android system and conduct a test of the recording function (you can record using the built-in microphone or through the microphone on the headphones). As shown below:

Figure 2.7-4 Audio App

2.8 Camera Test

The QuarkPi-CA2 card computer has 3 MIPI CSI camera interfaces, supporting the simultaneous use of 3 MIPI cameras. It supports the IMX415 camera sold by ALIENTEK Store. The camera interfaces are shown as follows in the figure:

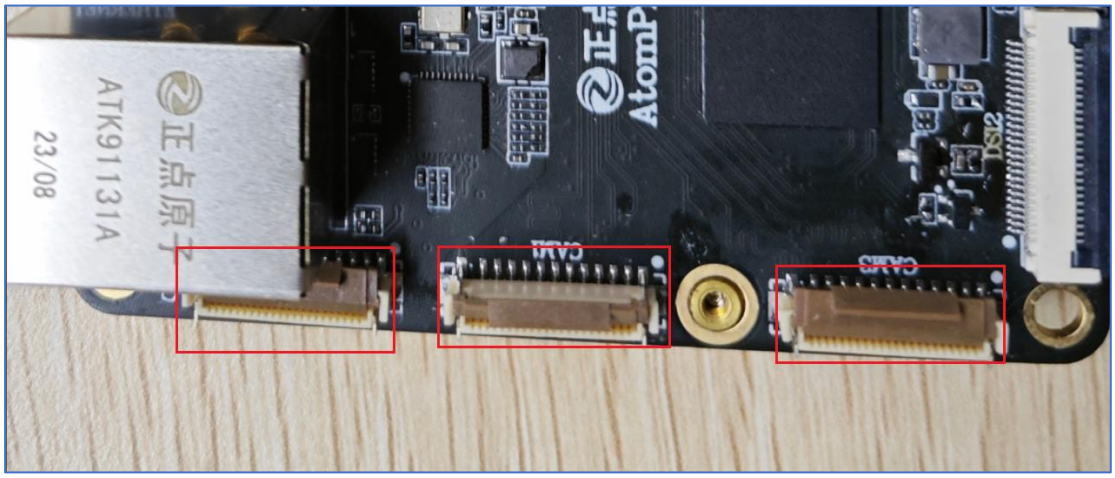


Figure 2.8-1 Camera interface

Before the test, the card computer should be powered off. Insert the camera into the CAM interface on the card computer (any one of the three interfaces will do). The installation method is shown in the following picture:

Note: The camera module should be connected when the card computer is powered off. Do not operate with power on!

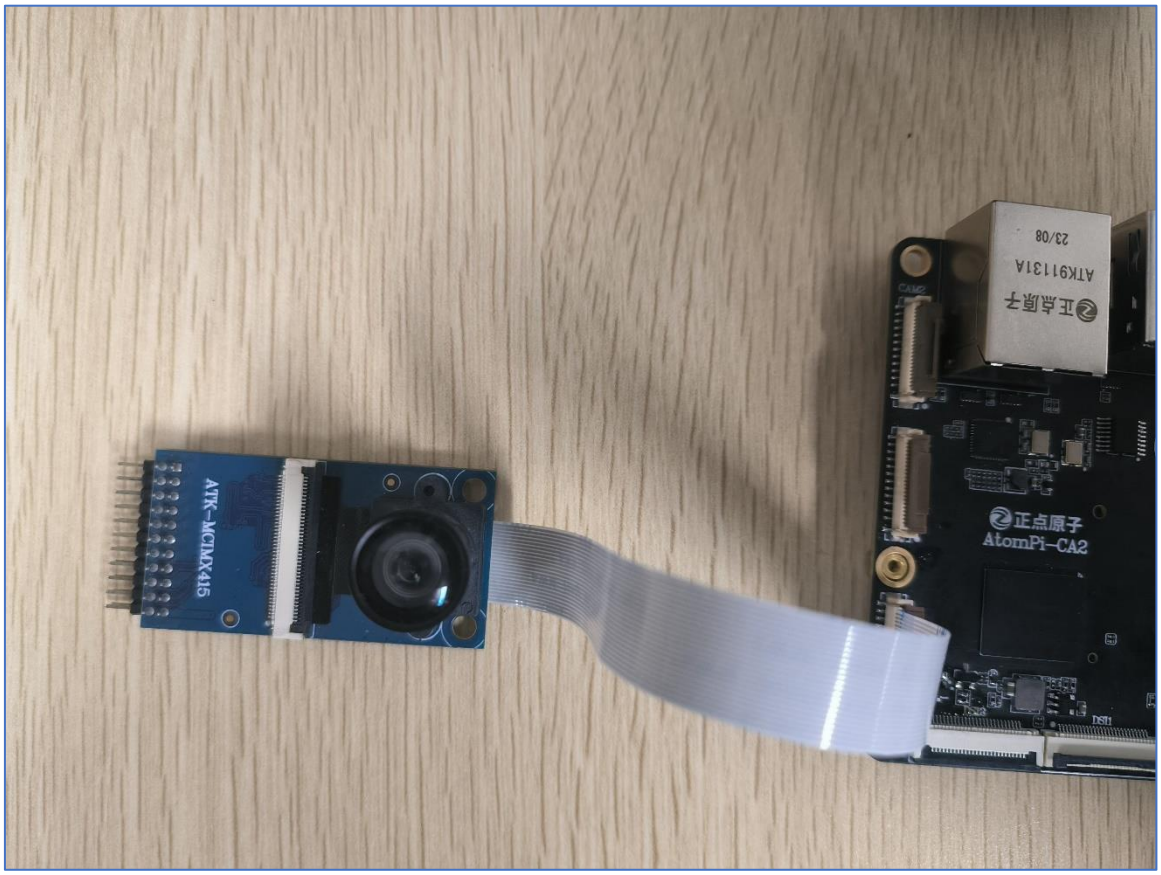


Figure 2.8-2 Camera Installation Example Diagram

After installing the camera, power on the development board and enter the Android system. Then, open the "Camera" app for testing, as shown below:

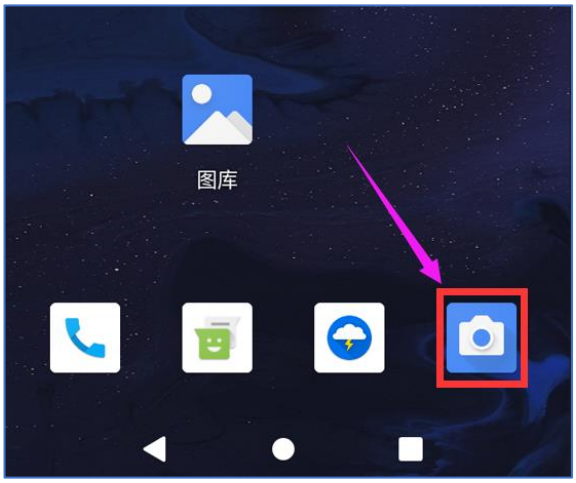
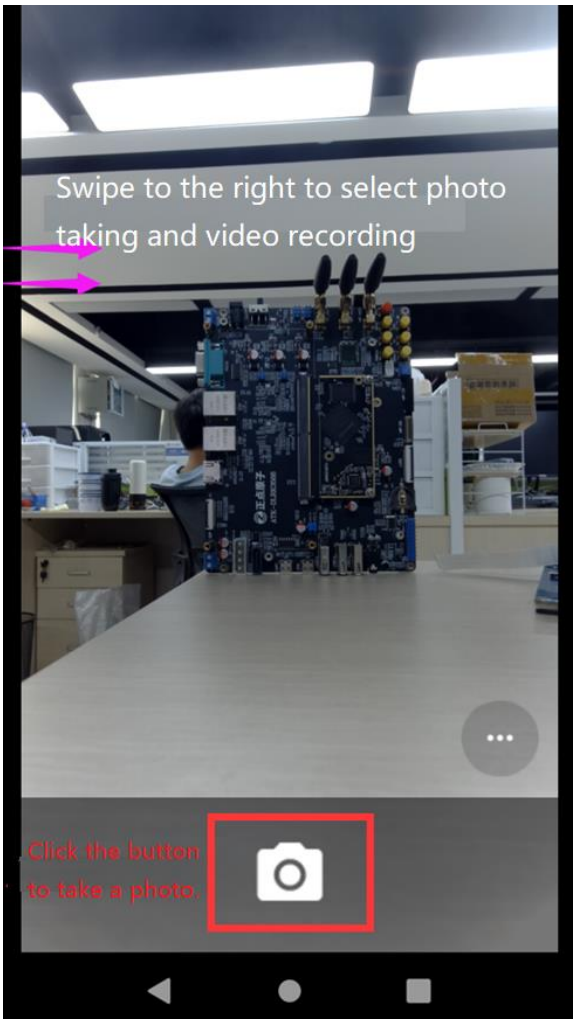
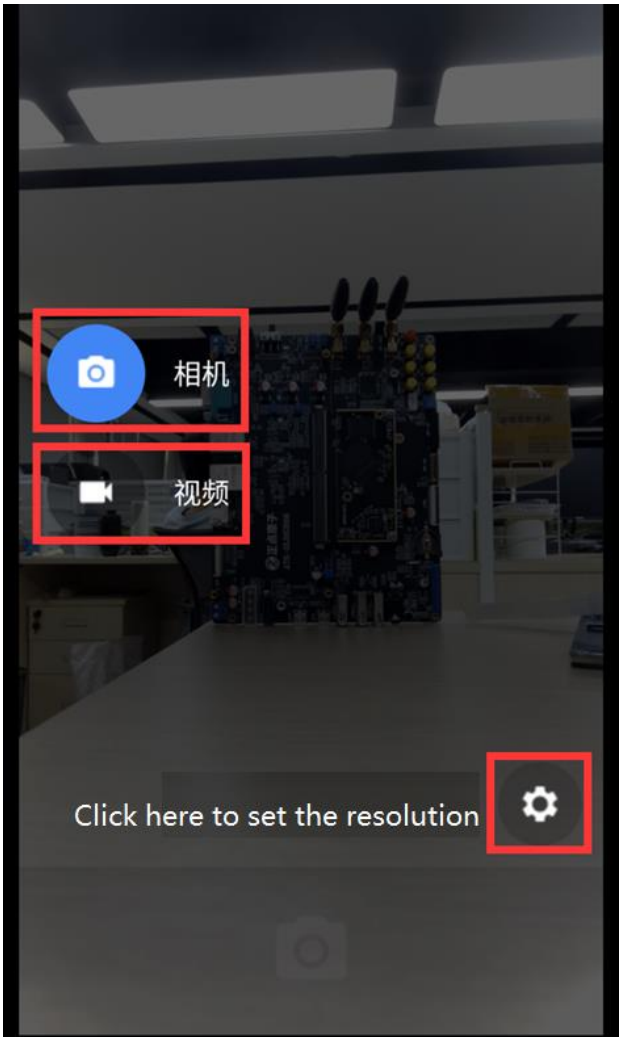


Figure 2.8-3 Camera App icon





If the user has multiple cameras, it is also possible to test functions such as simultaneous preview of multiple cameras and switching between front and rear cameras.

2.9 USB HOST interface test

The QuarkPi-CA2 card computer has 4 USB HOST interfaces, including 1 USB 3.0 and 3 USB 2.0, as shown below. The interfaces indicated by the arrows are USB 3.0, and the rest are USB 2.0:

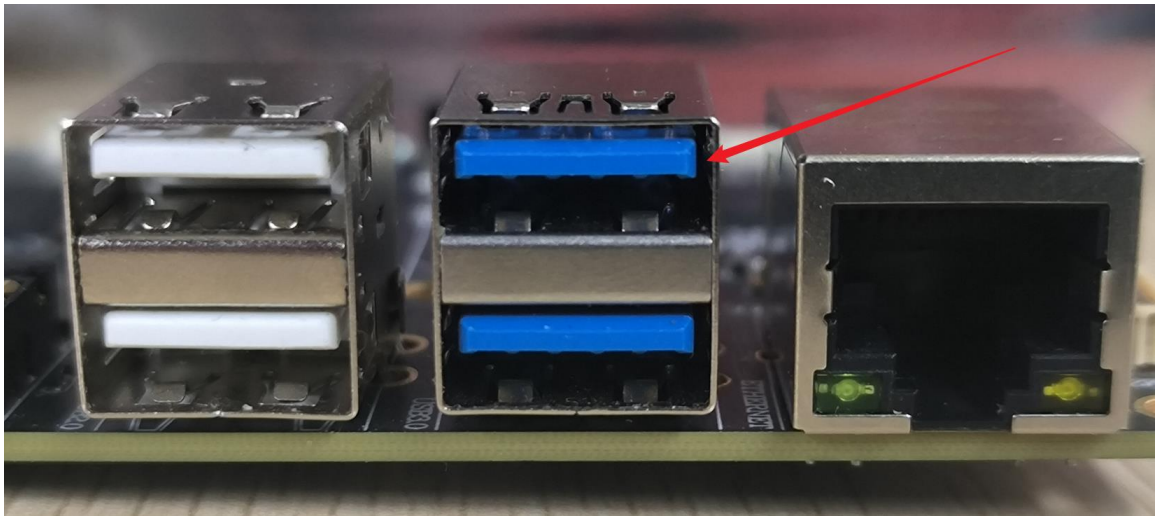


Figure 2.9-1 USB Interface Distribution Diagram

The USB HOST interface on the development board can be used to connect USB peripherals to test whether the USB HOST interface functions properly. For example, USB drives, USB mice, USB keyboards, etc.

① Testing by connecting a USB mouse: After connecting the mouse to the USB HOST interface, a mouse pointer will appear on the Android system desktop. We can operate through the mouse.

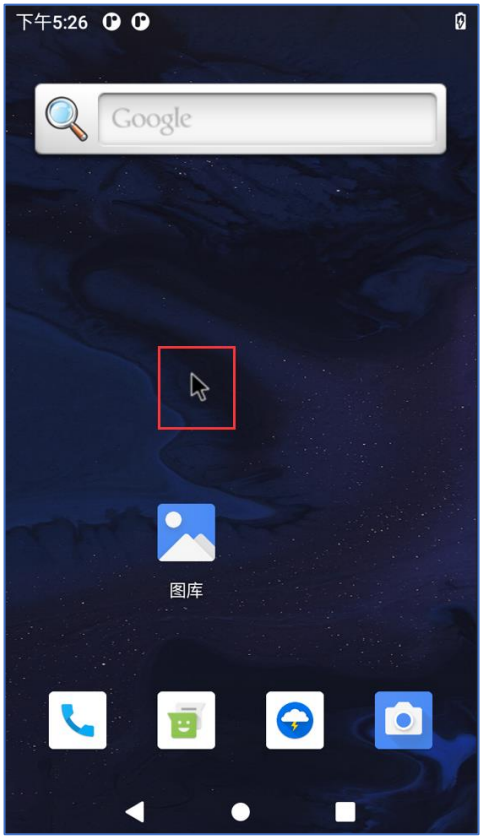


Figure 2.9-2 Connect the mouse

② Connection test for USB drive: After connecting the USB drive (supporting formats such as FAT32 and exFAT) to the USB HOST interface, a prompt will appear at the top of the Android system interface:

Figure 2.9-3 Identified the insertion of the USB drive

Click on "General USB Drive" to view the contents of this USB drive, as shown in the following picture:

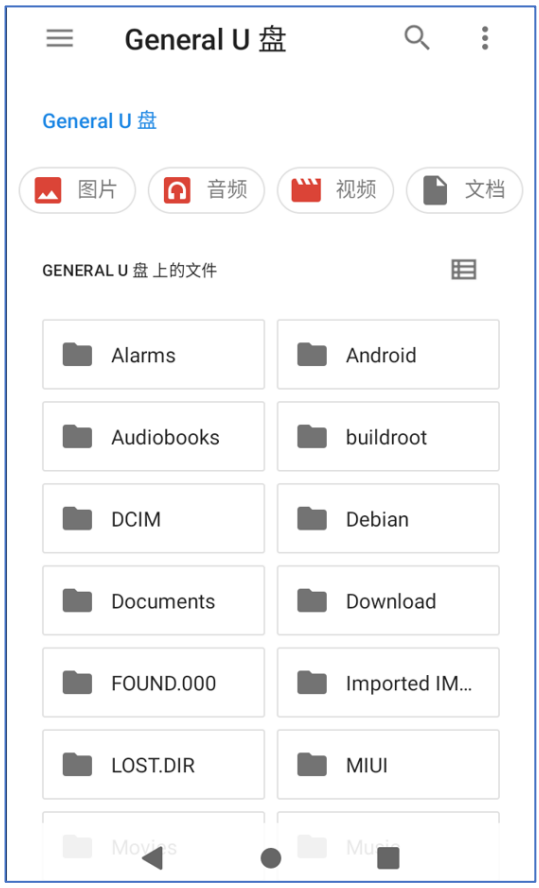
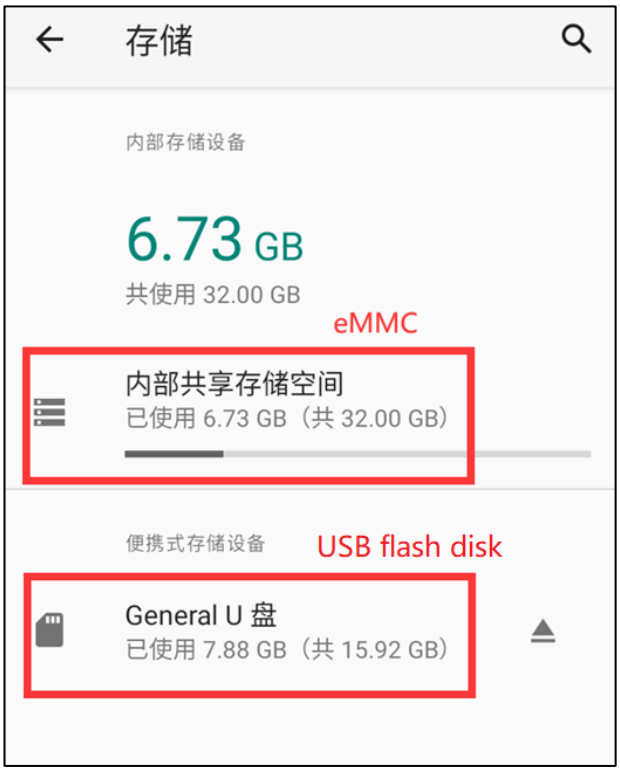


Figure 2.9-4 View the contents in the USB device

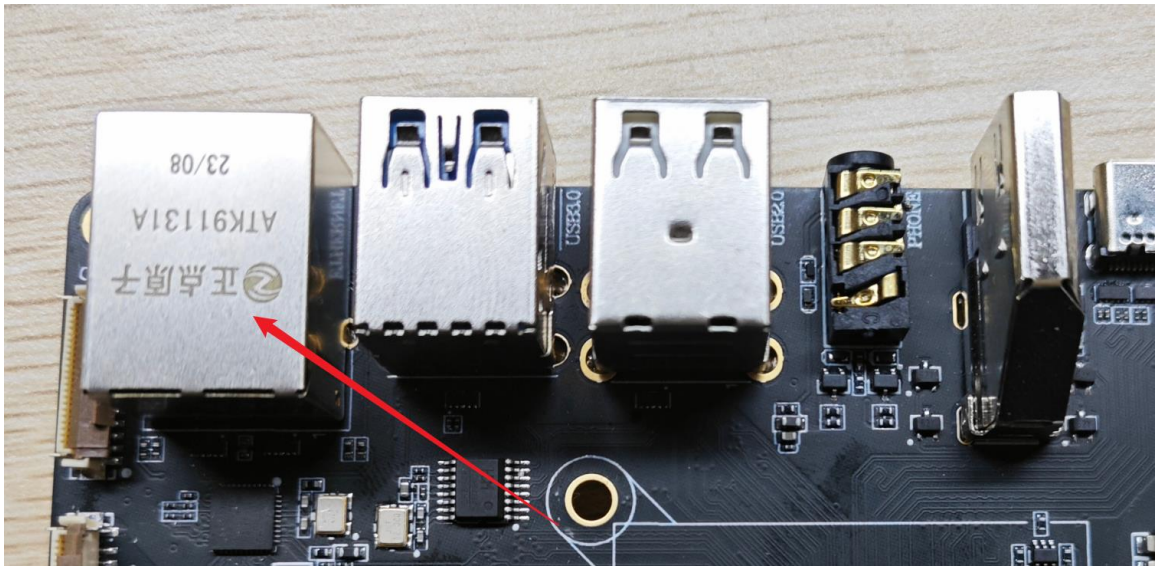
Similarly, we can open the "Settings" app, find the "Storage" item, and we can see the USB device we have inserted:



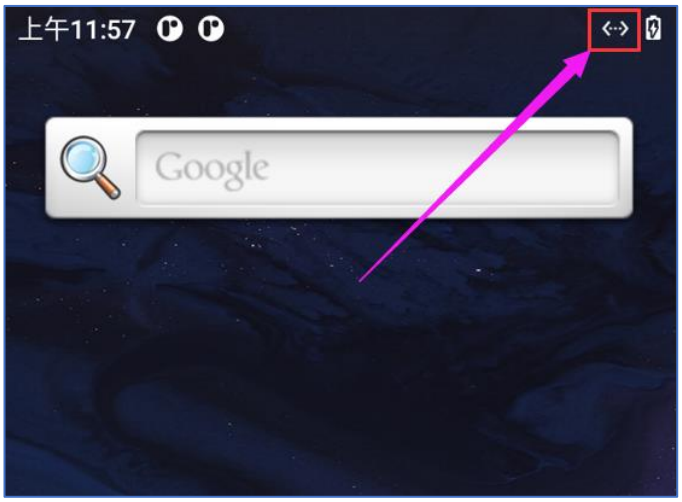
If you want to test the read and write speed of the USB device, you can install the "Antutu Benchmark" App for testing, or directly use commands (such as the dd command) for testing.

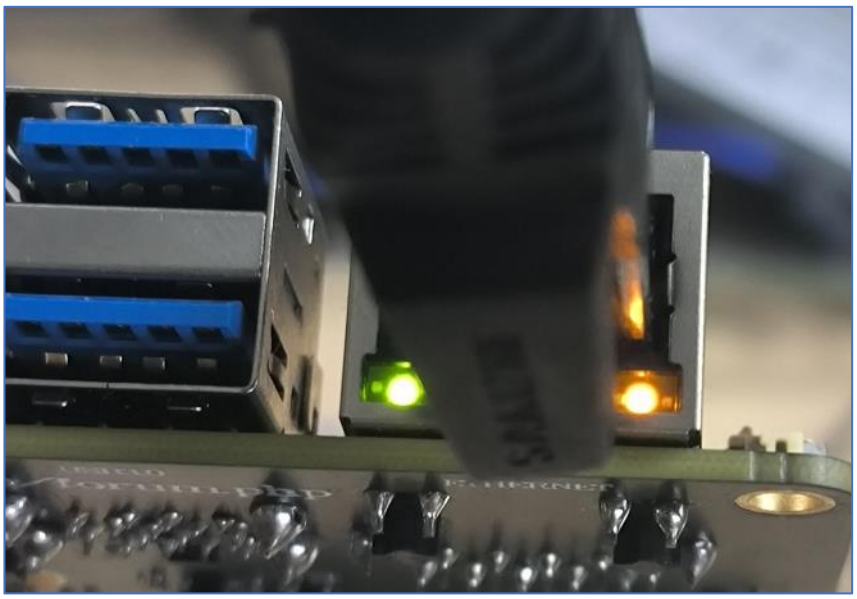
2.10 Gigabit Ethernet Test

The QuarkPi-CA2 card computer is equipped with a Gigabit Ethernet interface, which can adapt to 10/100/1000M working modes. The network port has two indicator lights, the left one is light green and the right one is yellow:



Connect the network cable (preferably a gigabit one) to the gigabit Ethernet interface of the development board (do not turn on the Wi-Fi). After the connection is successful, a "< >" icon will appear in the upper right corner of the Android system, as shown in the following picture:





At this moment, the wired network connection is normal, and the yellow indicator light of the network port will flash, while the light of the light green indicator remains constantly on (it will only light up when working in the 1000M rate mode, so this light can be used to determine whether the current mode is 1000M rate). By executing the "ifconfig" command in the serial port terminal, you can view the IP address of the Ethernet, as shown below:

```
console:/ #
console:/ # ifconfig
eth1      Link encap:Ethernet  HWaddr d2:33:20:75:0c:e7  Driver rk_gmac-dwmac
          inet addr:192.168.6.247  Bcast:192.168.6.255  Mask:255.255.255.0
          inet6 addr: fe80::762b:538f:4c2:6174/64 Scope: Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:106898 errors:0 dropped:0 overruns:0 frame:0
          TX packets:60719 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:84223631 TX bytes:129411536
          Interrupt:53

eth0      Link encap:Ethernet  HWaddr d6:33:20:75:0c:e7  Driver rk_gmac-dwmac
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 TX bytes:0
          Interrupt:41
```

Figure 2.10-1 Check the Gigabit Ethernet IP address

We open the built-in browser "Lightning" of Android (it is recommended to install a domestic browser app by yourself, as Lightning is basically unusable for accessing the internet), and test whether the development board can access the external network:

Figure 2.10-2 Browser Internet Test

We can also configure the Ethernet. Open the "Settings" app, and then find "Network and Internet" "Ethernet" one by one:

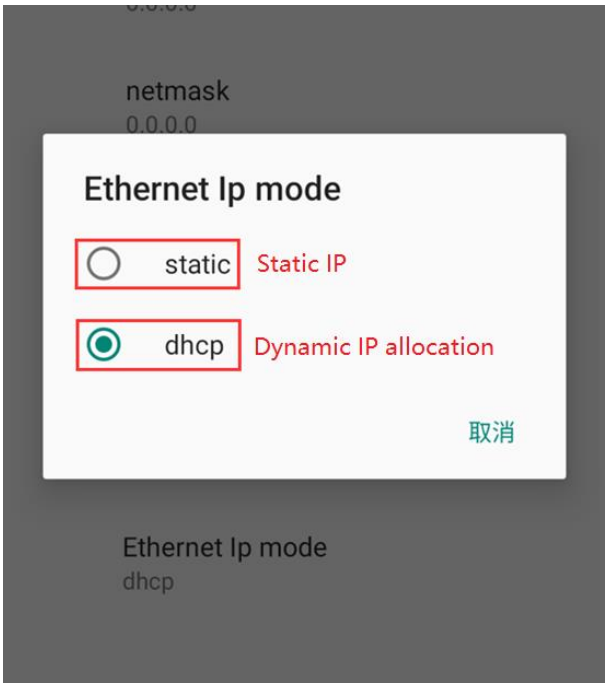


Figure 2.10-3 Configure IP mode

If you need to test the bandwidth of Gigabit Ethernet, you can use the iperf3 tool in the serial terminal (or adb) for testing (the specific testing method can be referred to in the QuarkPi-CA2_Linux System Quick Experience Document).

2.11 TF (SD) card test

The computer of QuarkPi-CA2 has a TF card slot on the back, as shown in the figure below, which is used to insert a TF card. The TF card can be used as an external storage device for the Android system (eMMC is an internal storage device and cannot be moved).

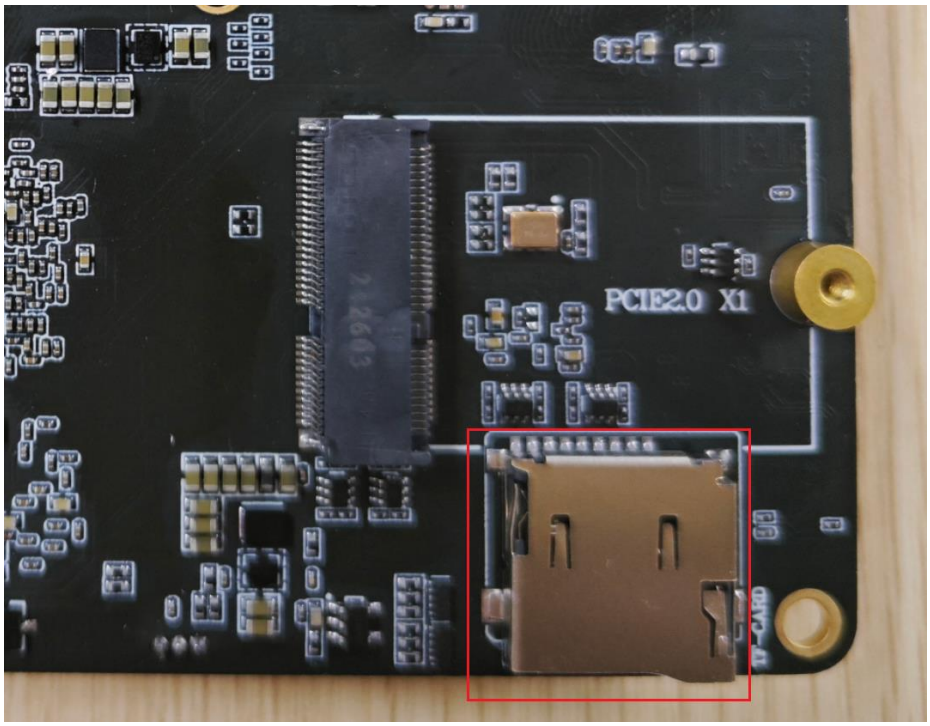
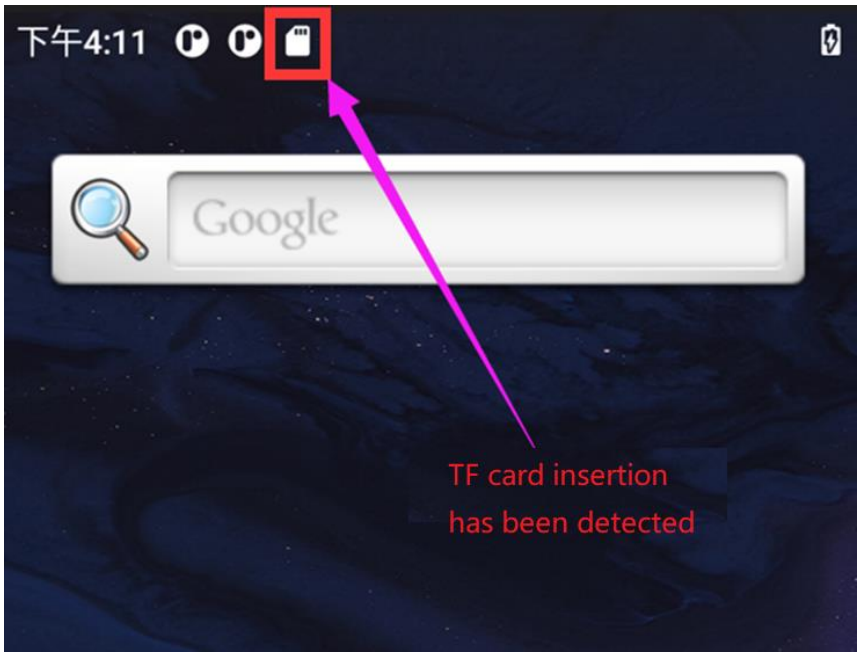


Figure 2.11-1 The TF card slot on the back of the base plate

Prepare a TF card and insert it into the TF card slot of the development board. After insertion, the Android system will recognize the insertion of the TF card:



Click on "SD card" to view the contents on the TF card, as shown in the following picture:

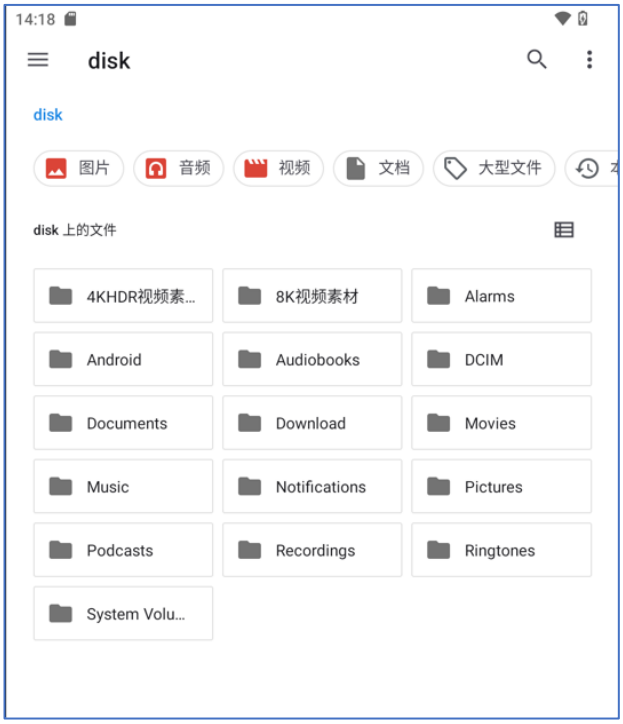


Figure 2.11-2 View the contents on the TF card

Open the "Settings" app, find the "Storage" option, and you can view the TF card device as shown in the following picture:

If you want to test the read and write speed of the TF card, you can do it through a command (such as the dd command) in the serial port terminal.

2.12 CPU Temperature

In the serial port terminal (or via adb), execute the cat command to view the current CPU temperature. The unit of the value is millikelvin:

```
cat /sys/class/thermal/thermal_zone0/temp   # Check the temperature of CPU1
cat /sys/class/thermal/thermal_zone1/temp   # Check the temperature of CPU2
cat /sys/class/thermal/thermal_zone*/temp   # Check the temperatures of all CPU cores
```

```
atk_quarkpi_ca2:/ #
atk_quarkpi_ca2:/ # cat /sys/class/thermal/thermal_zone*/temp
39769
39769
39769
39769
39769
39769
39769
2600
atk_quarkpi_ca2:/ #
```

Figure 2.12-1 CPU temperature

39769 indicates 39.769 degrees Celsius. RK3588S is an eight-core processor, so this will display the current temperatures of the eight CPU cores.

2.13 CPU frequency

To view the current running frequency of the CPU, execute the following command in the serial terminal (or adb):

```
cat /sys/devices/system/cpu/cpu*/cpufreq/cpuinfo_cur_freq
```

```
atk_quarkpi_ca2:/ # cat /sys/devices/system/cpu/cpu*/cpufreq/cpuinfo_cur_freq
1008000
1008000
1008000
1008000
1200000
1200000
408000
408000
atk_quarkpi_ca2:/ #
```

Figure 2.13-1 Check the current running frequency of the CPU

The RK3588S is an eight-core processor, so here it will display the current running frequencies of the eight CPU cores.

2.14 PCIE WiFi&BT test

On the QuarkPi-CA2 card computer (on the back), there is a PCIE WiFi interface (M.2 E-Key) that can be used to connect a PCIE WiFi module, supporting Bluetooth (Bluetooth via USB, WiFi via PCIE). Currently, the QuarkPi-CA2 Android system (including Android 12 and Android 13) has been adapted to the RTL8852BE PCIE WIFI module in the ALIENTEK store:

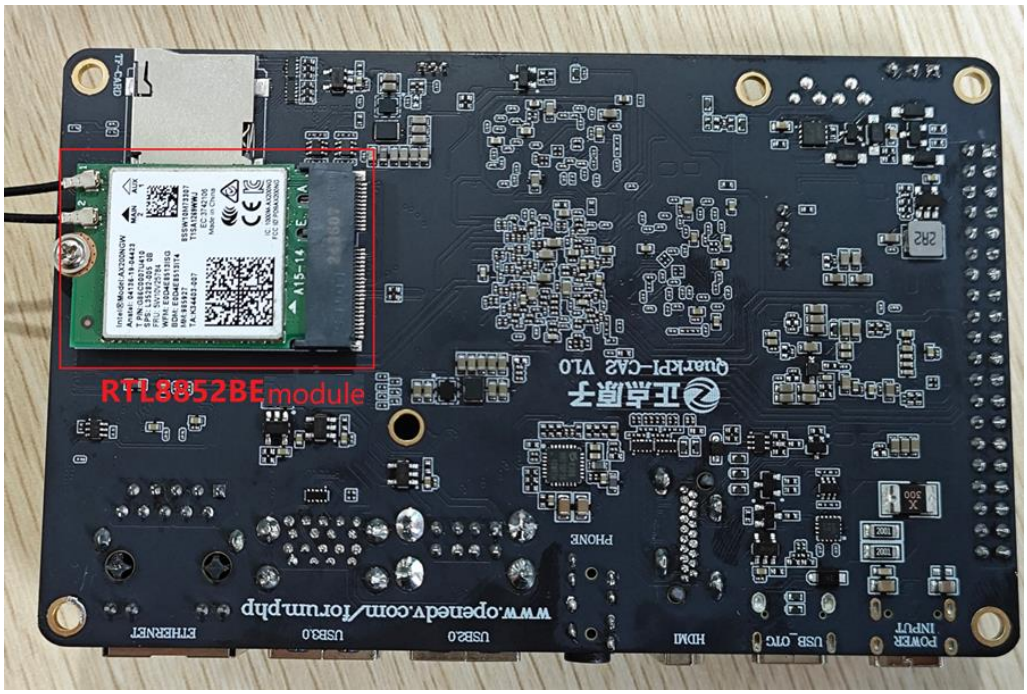


Figure 2.14-1 PCIE WIFI interface

2.14.1 WIFI test

Connect the RTL8852BE PCIE WIFI module properly and power on the card computer. Then, slide down the MIPI screen to display the notification bar, as shown in the following picture.

Figure 2.14-2 Notification Bar

Then click on the "Internet" shortcut, and a WIFI connection window will pop up, as shown in the following picture.

Figure 2.14-3 WLAN interface

Turn on the "WLAN" switch, select a strong-signal WIFI connection, a password box will pop up, enter the password, and click "Connect", as shown in the figure below.

Figure 2.14-4 Connect to WIFI

When the message "Connected" appears, you can access the network normally.

Figure 2.14-5 Connect to WIFI

Here, we test the use of the "Lightning" app to access Bilibili. The results are as follows:

Figure 2.14-6 Network connection test

2.14.2 Bluetooth test

Drag the MIPI screen downward to bring up the notification bar, as shown in the figure below.

Figure 2.14-7 Notification Bar

Long press and click on the "Bluetooth" shortcut, and you will enter the Bluetooth settings interface, as shown in the following picture:

Figure 2.14-8 Bluetooth Settings Interface

Click "Pair with New Device" to enter the pairing interface. At this point, the system will automatically scan nearby Bluetooth devices, as shown in the following image:

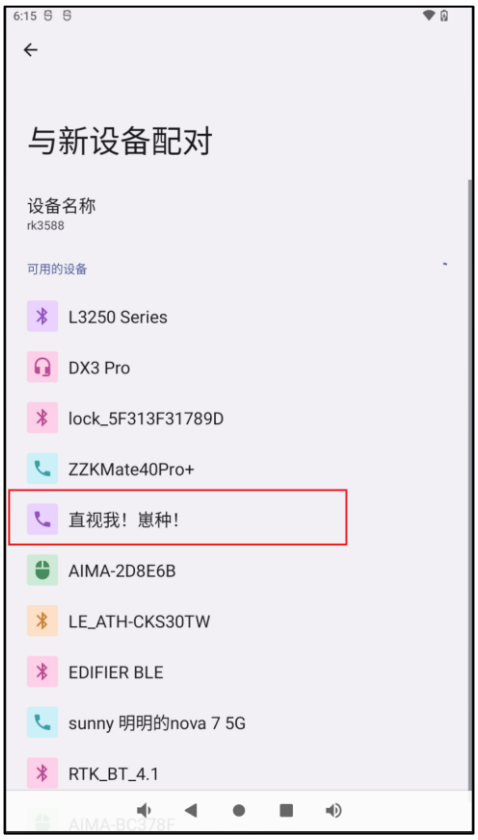


Figure 2.14-9 Bluetooth pairing interface

Click on your own mobile device to initiate the pairing process. A pairing box will pop up on the MIPI screen and the mobile phone screen respectively.

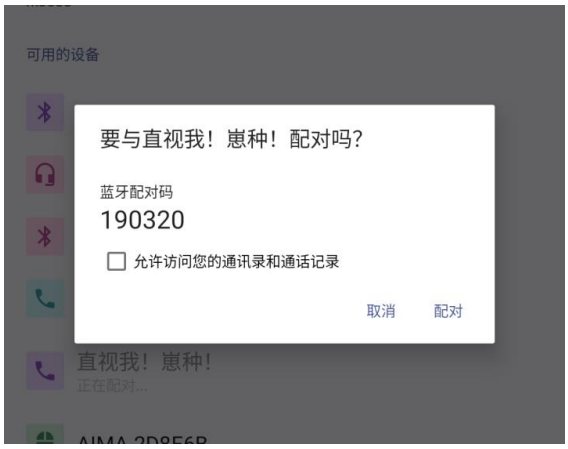


Figure 2.14-10 MIPI display screen

Figure 2.14-11 Mobile phone screen

After pairing is completed, exit the upper-level interface of the card computer. You will see that our mobile device has been displayed in the "Previously Connected Devices" column, as shown in the following picture:

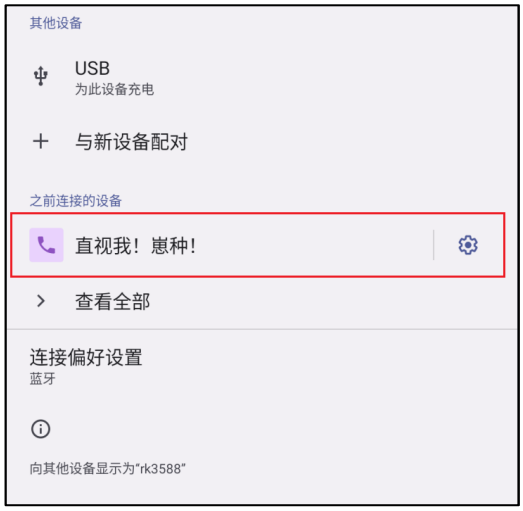
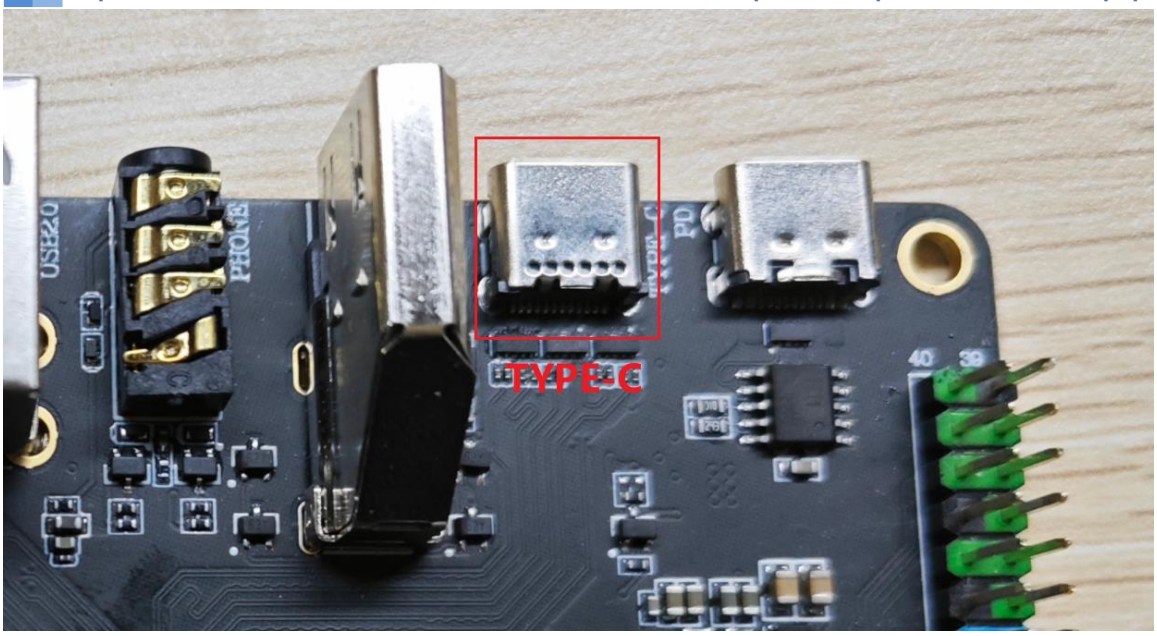


Figure 2.14-12 Paired devices

Now, you can select an image from your phone and send it to the card computer (except for Apple phones) via Bluetooth. After the transmission is completed, you can view it in the gallery of the card computer's Android system.

2.15 Full-function Type-C interface test

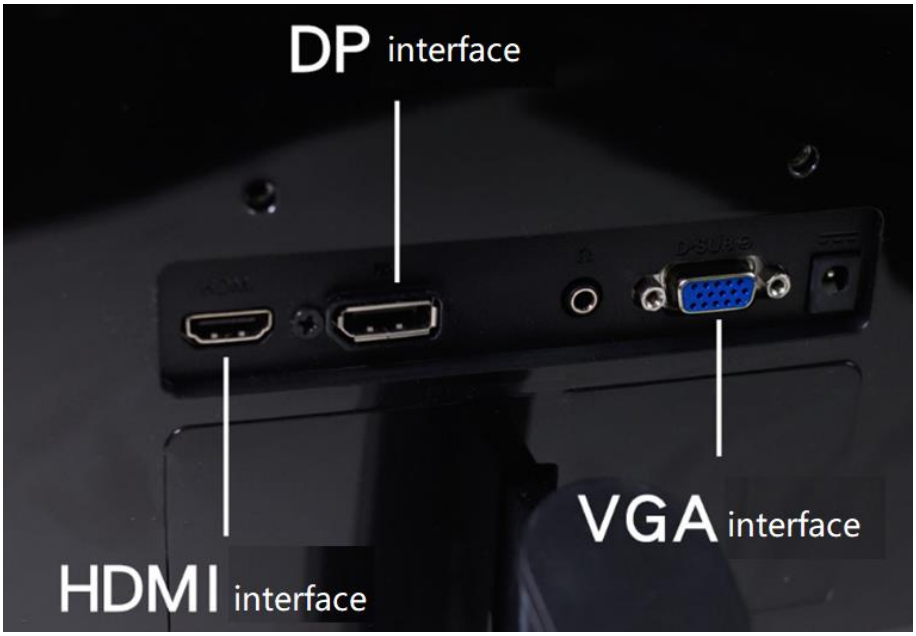
There is a full-function Type-C interface on the ALIENTEK QuarkPi-CA2 card computer, supporting USB 3.0 and DP display (DisplayPort), as shown in the following figure:



Type-C can serve as both a mirroring burn-in port and an Android system adb port (used for adb connection), and it can also be used as a display interface to connect a DP monitor; both of the former two are used as USB interface functions, while the latter one is used as a video output display function.

2.15.1 DP Display Test

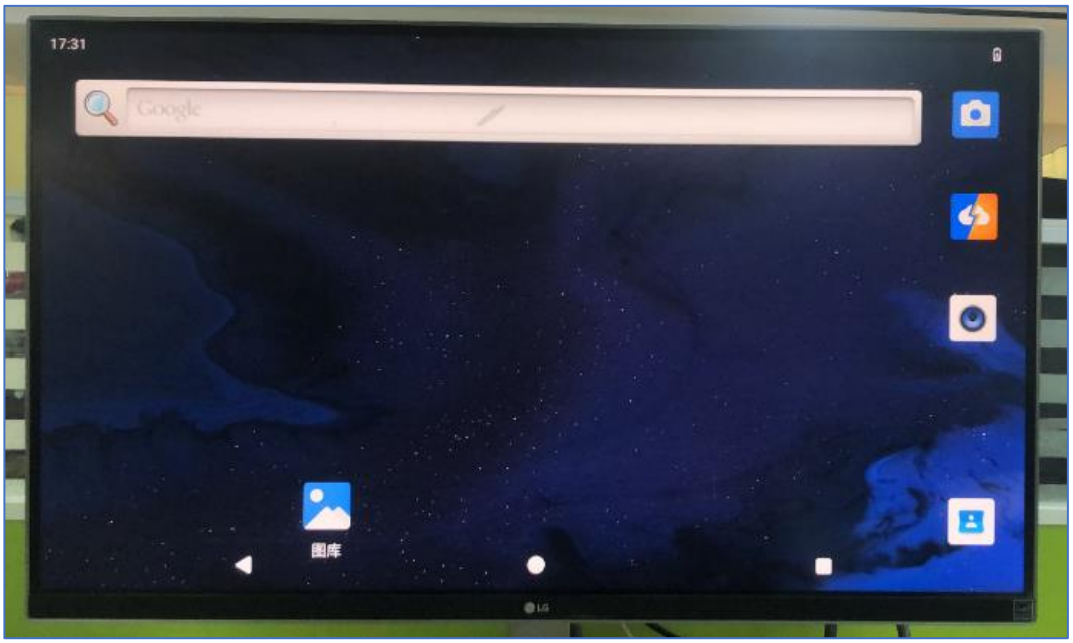
First, you need to prepare a monitor that supports the DP interface, as shown in the following figure:



In addition, you need to prepare a Type-C to DP adapter cable (bring your own, available for purchase online, DP 1.4 standard). As shown in the following picture:

Use the type-C to DP cable, with one end connected to the development board and the other end connected to the DP display. If a MIPI screen is connected, remove the MIPI screen before starting the development board; otherwise, the DP display will not display (only for the Android image provided by ALIENTEK).

After the Android system is started, the screen will display.



After entering the Android system, open the "Settings" app, find "Display"→"HDMI"→ "Resolution Settings" (DisplayPort), and you can set the resolution of the DP display (in this test, the author used a DP display that supports 4K resolution), as shown below:

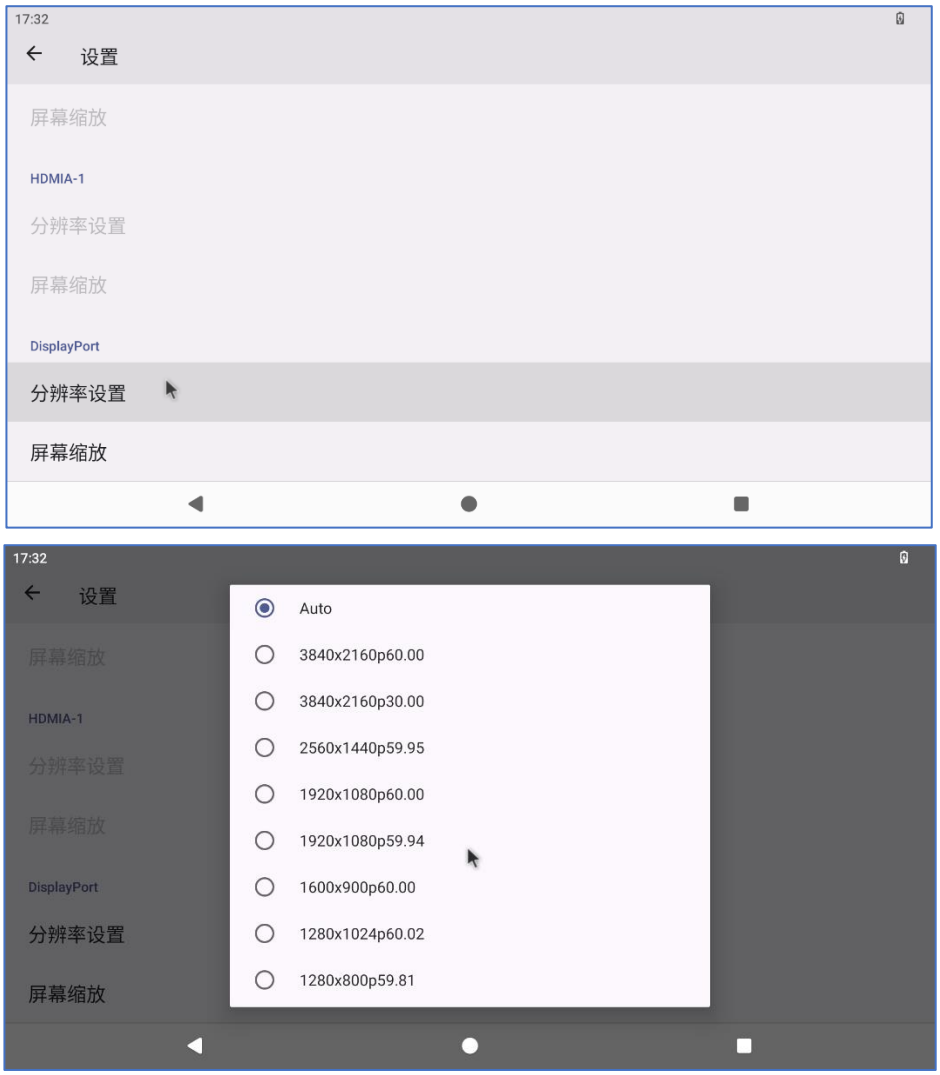


Figure 2.15-1 Set the resolution of the DP display

The QuarkPi-CA2 full-function Type-c interface supports audio, and users can conduct their own tests. A DP display that supports audio functionality is required.

2.16 USB 3.0 test

The full-function Type-c interface supports high-speed data transmission via USB 3.0 and OTG. It can automatically switch between host/device modes. This section mainly tests the USB 3.0 HOST function. A USB drive that supports Type-c interface is found, such as the one shown in the following picture, which supports both USB interface and Type-c interface (USB interface on the left, Type-c interface on the right):

Figure 2.16-1 Type-C USB drive

Or use a Type-C to USB adapter for connection:

Figure 2.16-2 Adapter

Insert the USB drive into the Type-C0 port of the development board. The Android system will recognize the insertion of the USB drive, and then you can view the files in the USB drive. No further explanation is needed here!

You can also use a Type-C to USB adapter to connect USB peripherals such as a USB mouse and keyboard to the TYPE-C port of the card computer for testing. Users are advised to conduct the test themselves!

2.17 HDMI TX Test

If the user has connected a MIPI screen, the MIPI screen must be removed as HDMI will not display (this is only applicable to the Android image provided by us).

There is an HDMI output interface on the QuarkPi-CA2, which can be used to connect an HDMI display, as shown in the following figure:

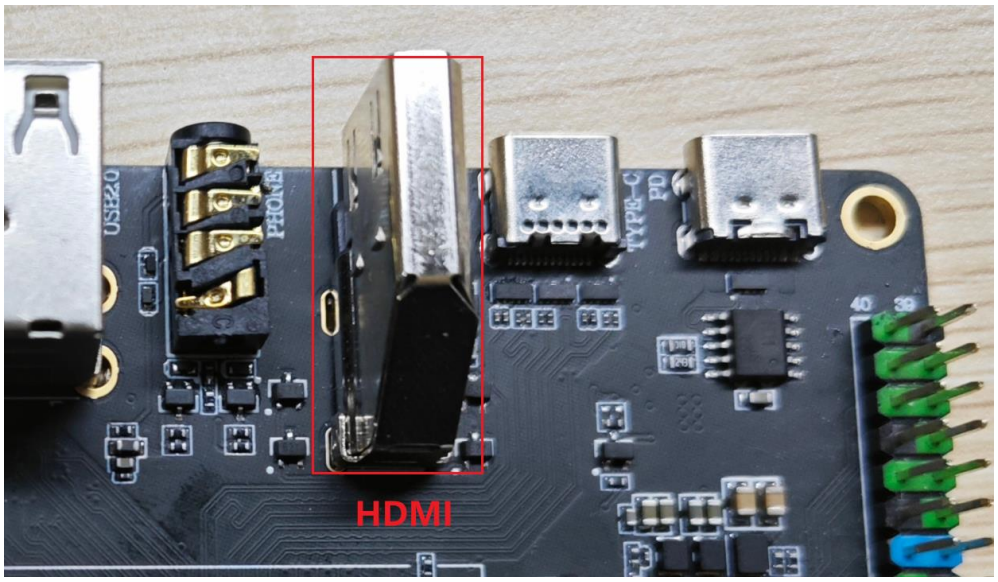
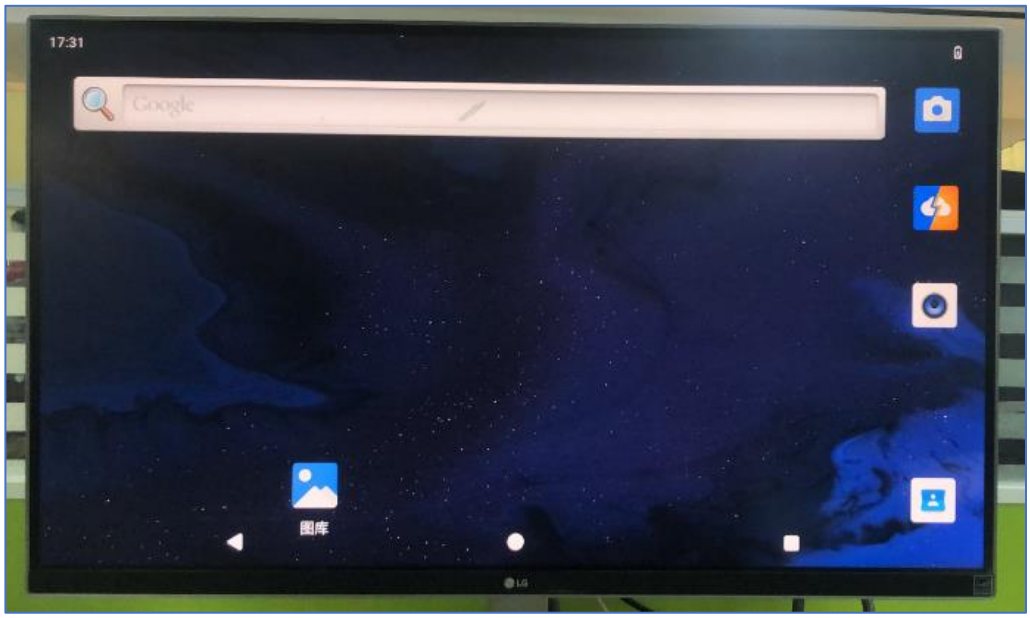


Figure 2.17-1 HDMI output interface

Before the test, prepare a display device that supports the HDMI interface and an HDMI cable. Connect one end of the HDMI cable to the development board and the other end to the display. If a MIPI screen is connected, remove the MIPI screen first, then start the development board. Otherwise, the HDMI display will not show (only for the Android image provided by ALIENTEK).

During the Android system startup process, a startup logo and Android startup animation will be displayed.



After entering the Android system, open the "Settings" app, find "Display" "HDMI" "Resolution Settings" (HDMIA), and you can set the resolution of the HDMI display (in this test, the author used an HDMI display that supports 4K resolution), as shown below:

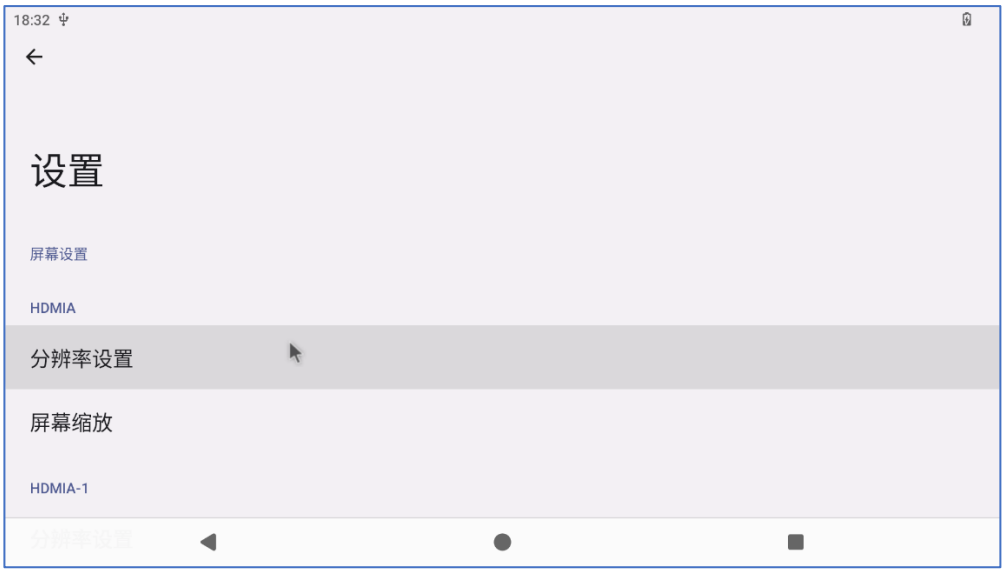


Figure 2.17-2 Set the resolution of the HDMI display

The HDMI TX interface of QuarkPi-CA2 supports audio, and users can conduct their own tests. An HDMI display that supports audio functionality is required.

2.18 View NPU information

By executing the following command in the serial port terminal, you can view the usage rate of the NPU:

```
cat /sys/kernel/debug/rknpu/load
```

2.19 Heat Dissipation Fan Test

The heat dissipation fan is an optional accessory. If the user selects the heat dissipation fan, they can follow the instructions below to test whether the fan's cooling function is working properly.

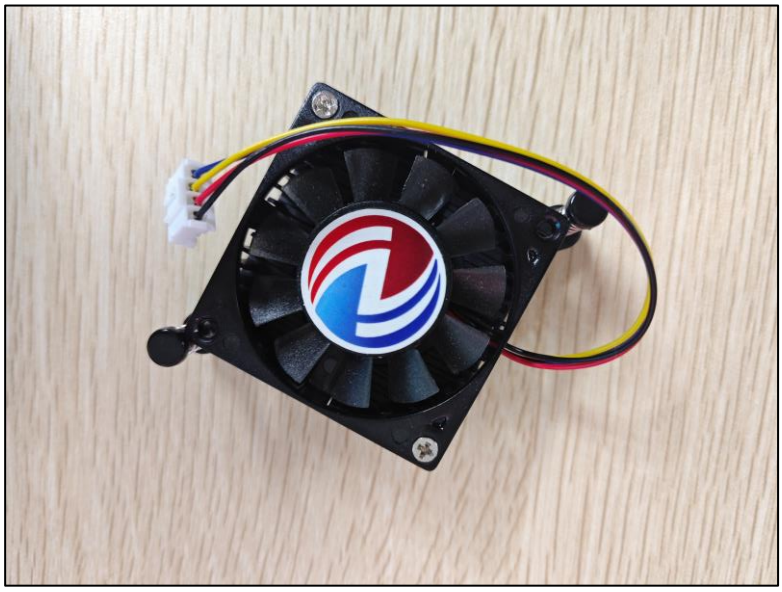


Figure 2.19-1 A fan for cooling down

Before the test, the development board should be powered off first. Install the fan on the card computer (Just align the two self-locking seats of the fan with the two reserved holes on the base plate and install it. During the installation process, apply thermal silicone on the surface of the RK3588S chip to achieve better heat dissipation!) . Connect the 4-pin terminals of the fan to the corresponding positions on the development board, as shown in the following figure:

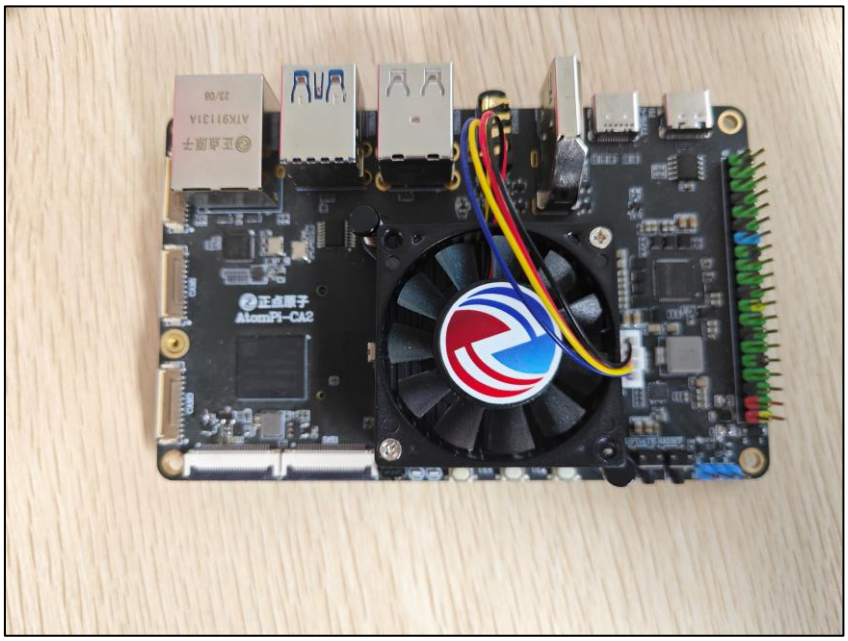


Figure 2.19-2 Fan Installation Diagram

After installing the fan, power on the development board. The fan will keep rotating. If it doesn't rotate, please immediately cut off the power and check!

In fact, we can also manually start or stop the fan rotation by executing the following instructions (switch to the root user first).

```
echo 0 > /sys/class/hwmon/hwmon12/pwm1          # Write "0" to stop the rotation.
```

You can write a number between 0 and 255 (including 0 and 255) into the file /sys/class/hwmon/hwmon13/pwm1. The higher the number, the faster the fan speed will be.

```
echo 255 > /sys/class/hwmon/hwmon12/pwm1        # The fan is running at full speed.
```

```
atk_quarkpi_ca2:/ #
atk_quarkpi_ca2:/ # echo 255 > /sys/class/hwmon/hwmon12/pwm1
atk_quarkpi_ca2:/ #
```

2.20 PWRON Button Test

There is a PWRON button on the QuarkPi-CA2 card computer, as shown in the following picture:

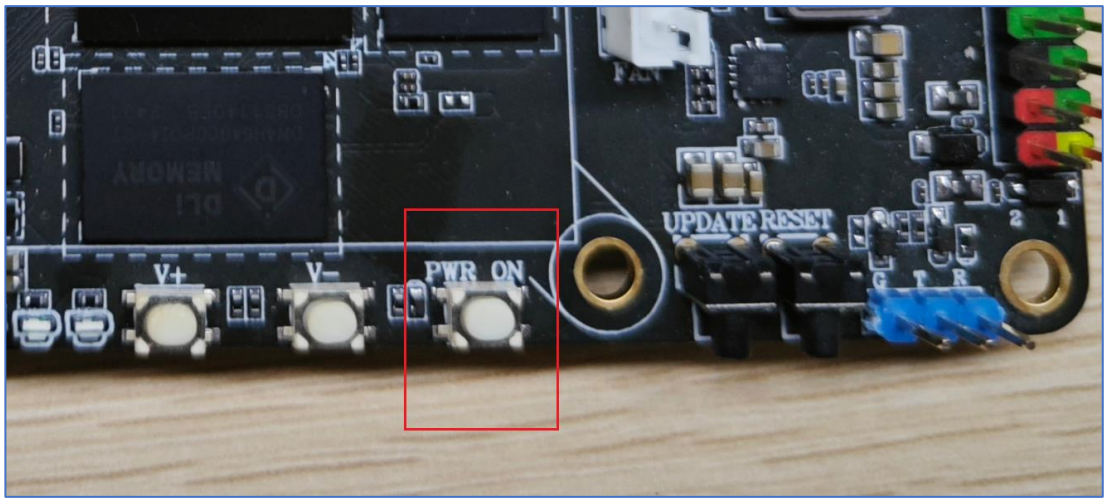
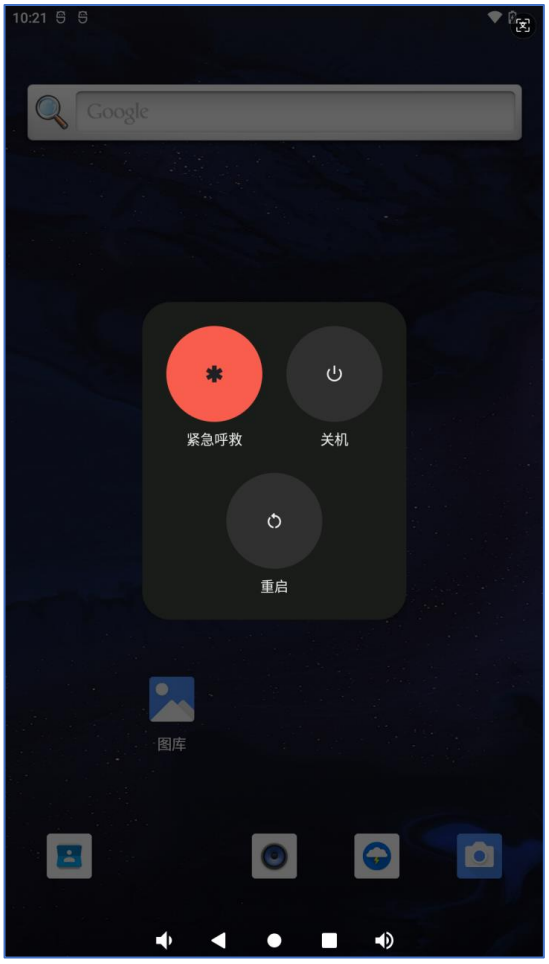


Figure 2.20-1 PWRON button

In the Android system, when this button is pressed, the screen will turn off (pressing it again will turn the screen on). You can test it yourself.

Apart from the screen-sleeping function, the PWRON button is also used for system shutdown/startup operations. By simultaneously pressing the PWRON button and the V+ button (the volume increase button), the Android system interface will display three buttons as shown in the following picture:



They correspond respectively to the functions of "shutting down", "restarting" and "emergency call (the card computer is not a mobile device and this function cannot be used)".

Clicking the "shutting down" button will put the system into a shutdown state. In this shutdown state, pressing the PWRON button again will restart the system.