EM3566 Android14 User Manual

V1.0

Boardcon Embedded Designer

Overview

The content of this document is only described for the development board Idea3588s, aiming to help users quickly understand, apply and develop the Idea3588s development board.

System Support

Development Board	Android14	N
EM3566_V3 CM3566_V3	Y	N

Revision History

Version	Date	Author	Revision History
V1.0	2025-01-21	Wugk	Initial version

Disclaimer

The information provided in this document is not warranted for accuracy and is subject to change without notice. Boardcon explicitly reserves the right to amend or alter the content of this document at any time without prior notification.

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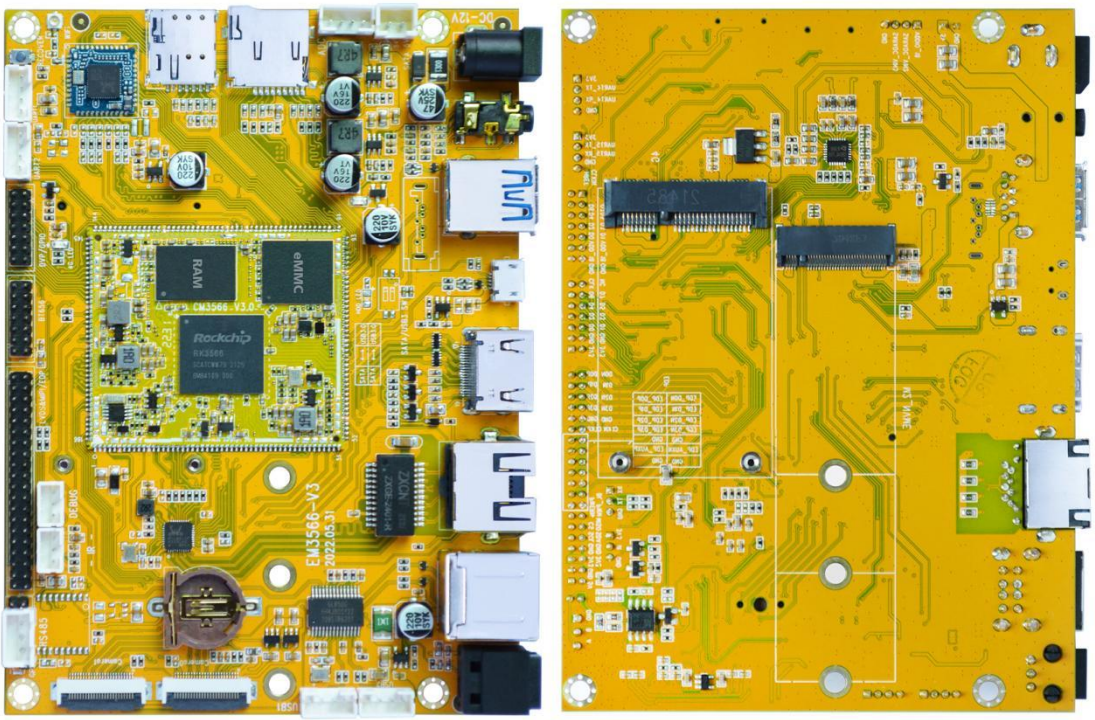
Content

1.Introduction

1.1 Overview

EM3566 is a development board designed based on Boardcon core board CM3566. The core board of CM3566 uses RK3566 as the core chip of the system. It is a quad-core ARM Cortex-A55 processor with low power consumption and high performance, designed for personal mobile Internet devices and AIoT devices. CM3566 core board supports RAM up to 8G, eMMC flash up to 128G,H.264 decoder support 4K@60fps, H.265 decoder support 4K@60fps, H.264/H.265 encoder support 1080p@60fps, And high quality JPEG codec.

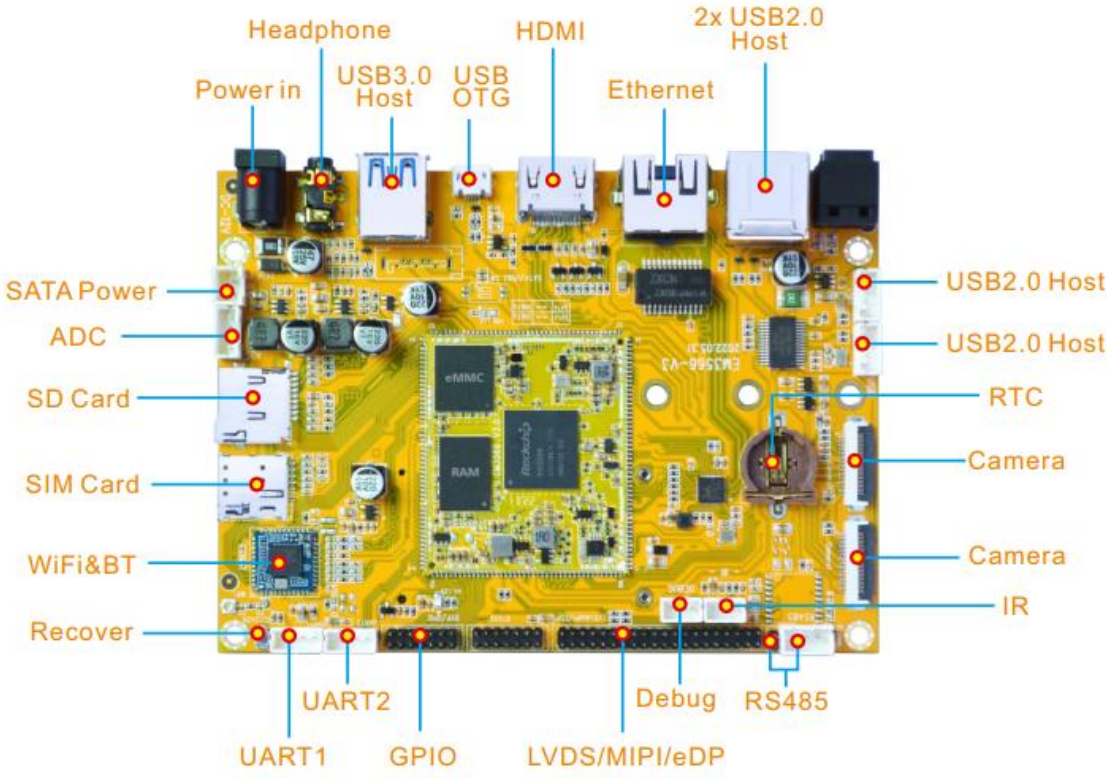
EM3566 provides rich peripheral functions, support video display output up to 4K@60fps, support WIFI and Bluetooth, support Ethernet, support 4G module, support USB3.0, support external storage, etc.

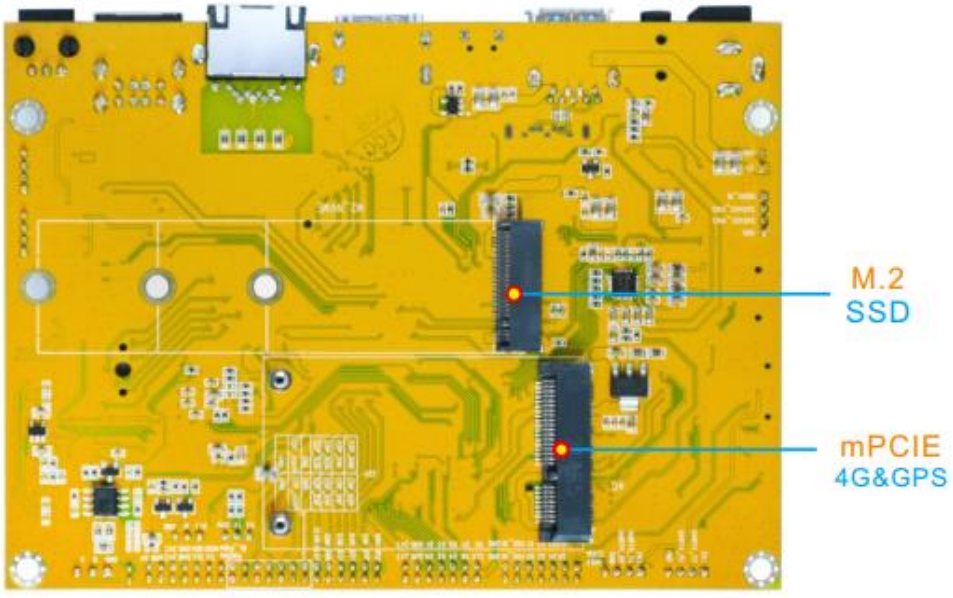


1.2 Product Parameters

Basic Parameters	
SOC	RK3566
CPU	Quad-core 64-bit ARM Cortex-A55@ up to 1.8GHz
GPU	Support OpenGL ES 1.1/2.0/3.2,OpenCL 2.0 and Vulkan 1.1
NPU	Support INT8/INT16/FP16/BFP16 MAC hybrid operation
Video	Support 4K 60fps H.265/H.264/VP9 video decoding Support 1080P@60fps H.265/H.264 video encoding
RAM	Support 2GB/4GB/8GB
Storage	Support 32GB/64GB/128GB eMMC
Extended Storage	Support M.2 PCIe 2.0 NVME SSD Support TF Card Slot
Support system	Android14
Electrical Parameters	
Power supply input voltage	12V/3A
RTC input voltage	3V
Operating temperature	0~70°
Storage temperature	-40~85°
Structural Parameters	
Motherboard dimensions	135mm x 95mm
Plate layer	4 floors

1.3 Hardware Interface Introduction





Interface parameters	
Power in	12V DC power input

Headphone	Earphone output, earphone recording
USB3.0 Host	USB3.0 Host interface
USB OTG	OTG download interface
HDMI	HDMI2.0 output interface
Ethernet	Gigabit Ethernet RJ45 interface, via Realtek RTL8211F-CG controller
2xUSB2.0 Host	Dual-layer USB2.0 HOST interface
USB2.0 Host(1)	USB2.0 HOST interface, USB expansion port
USB2.0 Host(2)	USB2.0 HOST interface, USB expansion port
RTC	RTC coin cell connector
Camera(1)	MIPI camera interface, connect the camera OV13850
Camera(2)	MIPI camera interface, reuse I2C4 with camera1
IR	PWM3 control interface, connected to the infrared receiving head
RS485	RS485 data transmission interface
Debug	UART2, debug the serial port
LVDS/MIPI/EDP	Display interface, capacitive touch screen LVDS is used by default
GPIO	GPIO extension interface
UART2	UART5,TTL level interface
UART1	UART4,TTL level interface
Recovery	Recovery button, which is used when upgrading, or volume + button
WIFI&BT	RTL8723DS, 802.11b/g/n 150Mbps 1T1R SDIO WiFi and BT combo Module
SIM Card	Nano SIM card port
SD Card	MicroSD card slot
ADC	ADC output interface

SATA Power	5V voltage output
M.2 SSD	M.2 PCIe 2.0 socket
mPCIE 4G&GPS	The EC20 4G module is used by default

2.Install Drivers and Tool

To download firmware and debug in the terminal, the following drivers and software need to be installed (for Windows computers):

Number	Driver name	Driver	Use
1	RK Driver Assitant	DriverInstall.exe	OTG USB driver installation assitant
2	CH9102x	SETUP.EXE	Serial port debugging driver
3	Serial Terminal Tool	SecureCRT.exe	Debugging tool

2.1 Install RK Driver Assitant

Step 1: Open *DriverAssitant_v5.1.3/DriverInstall.exe*.

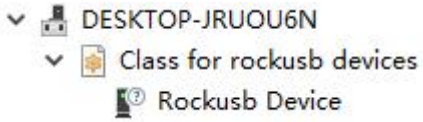
Step 2: To avoid driver conflicts, click **"Uninstall Driver"** to uninstall the driver.

Step 3: Click button **"Install Driver"** to inst

all.

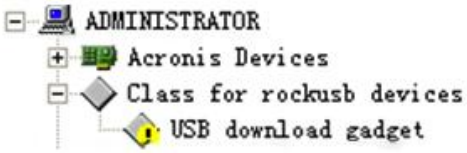
Step 4: After the installation is complete, co

nnect the board and PC with Type-C USB cable and press the **Recovery** key and hold then power the board, the following information is displayed in the Computer **Device Manager**, indicating that the USB driver was successfully installed.



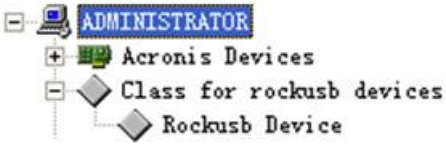
Step 5: If the following device information a

ppears in the **Device Manager** after the operation in Step 4, user need to proceed to the next step.



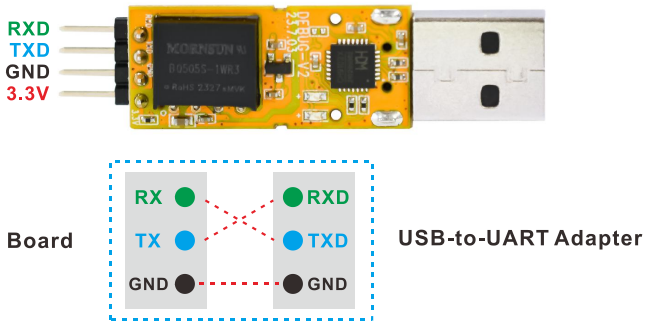
Step 6: The WINDOW will pop up found New Hardware Wizard dialog box, choose to install from the specified location, and then select: *DriverAssitant_v5.1.3/ADBDriver.*

Step 7: After the installation is completed, the following device information can be seen in the Computer **Device Manager**.



2.2 Install CH9102X Driver

2.2.1 How to Connect the Serial Port Tool



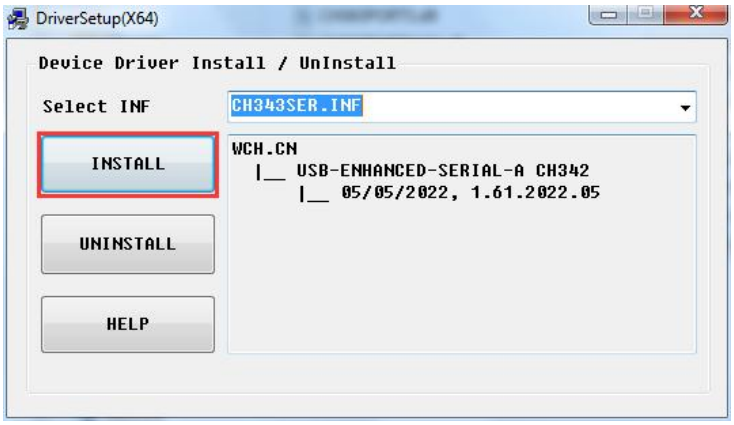
Pin	Connection Description
RXD	Receive, connect to TX pin of the board.
TXD	Transmit, connect to RX pin of the board.
GND	Ground, connect to GND pin of the board.
3V3	No need to connect.

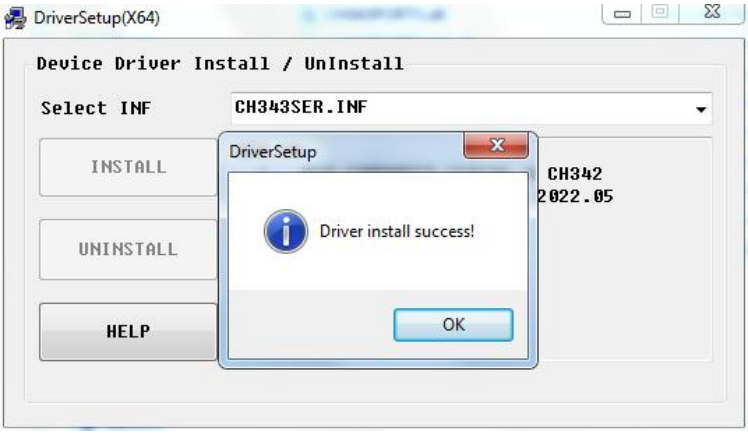
2.2.2 Install Driver

Step 1: Plug the CH9102X Module to the PC

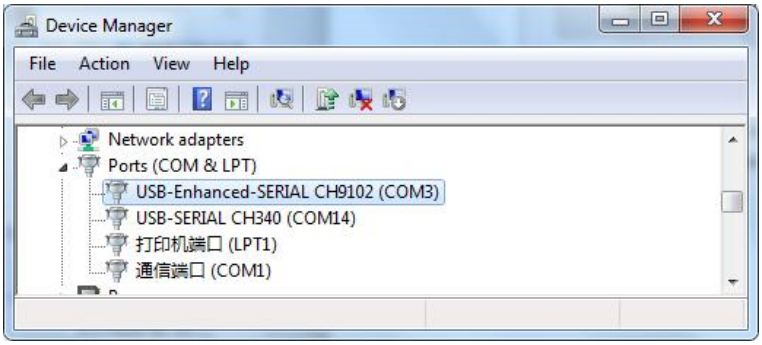
Step 2: Unzip *CH343SER.ZIP* on Windows.

Step 3: Select and install the corresponding *SETUP.EXE* according to the computer properties.





Step 4: After the installation is completed, the device will be listed under **Device Manager** ports with unique serial port assigned.

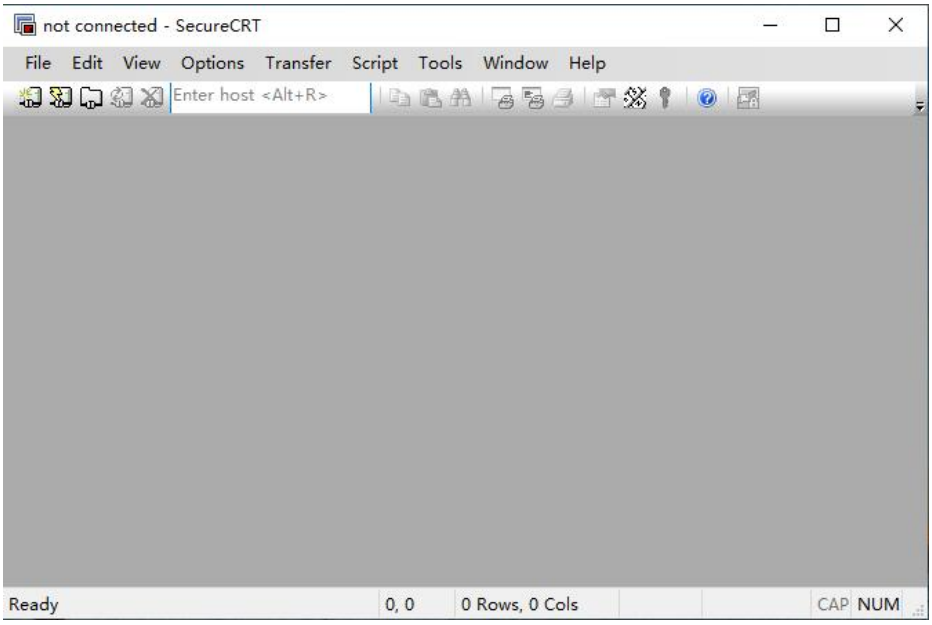


2.3 Install Serial Terminal Tool

The serial terminal SecureCRT is used for debugging in Windows. It can be used directly after decompression.

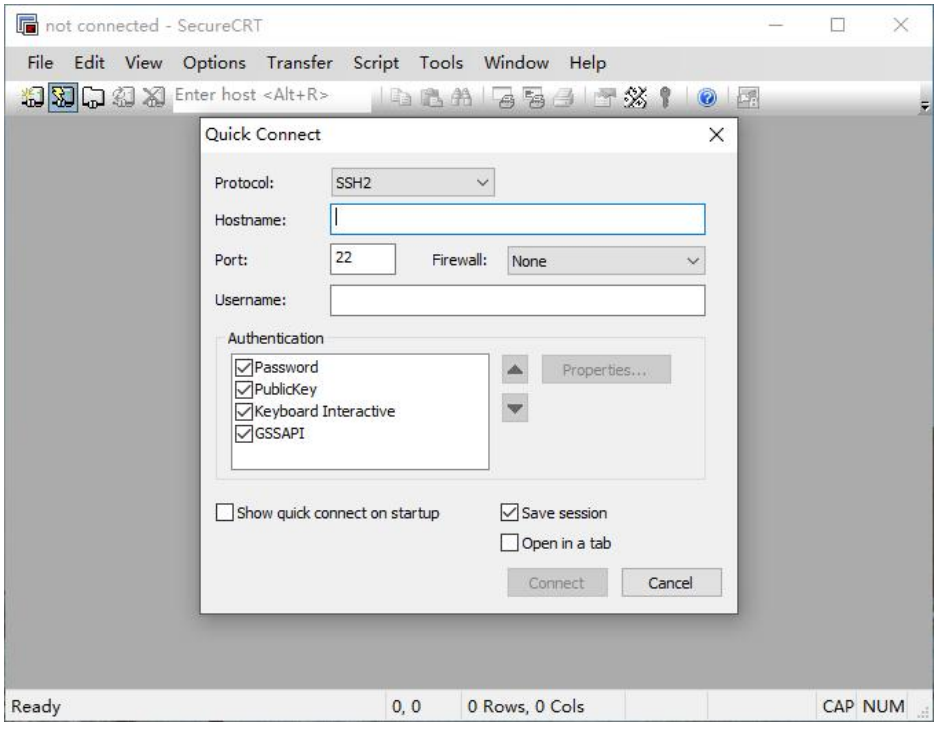
Step 1: Unzip *Platform/SecureCRT.rar* on PC.

Step 2: Click *SecureCRT/SecureCRT.exe* open the SecureCRT.

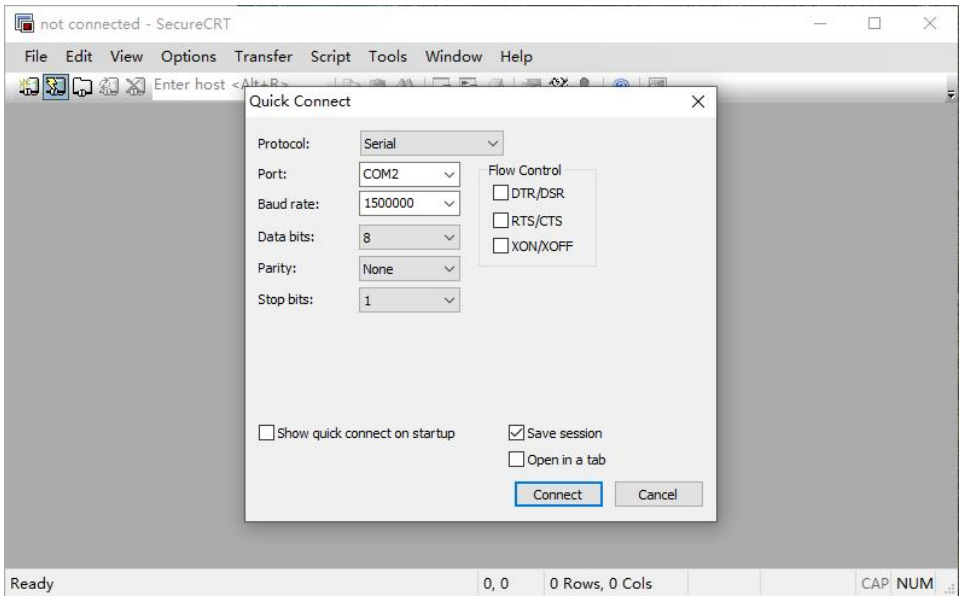


Step 3: Confirm that the CH9102X driver has been installed and the CH9102X module is connecting to the PC.

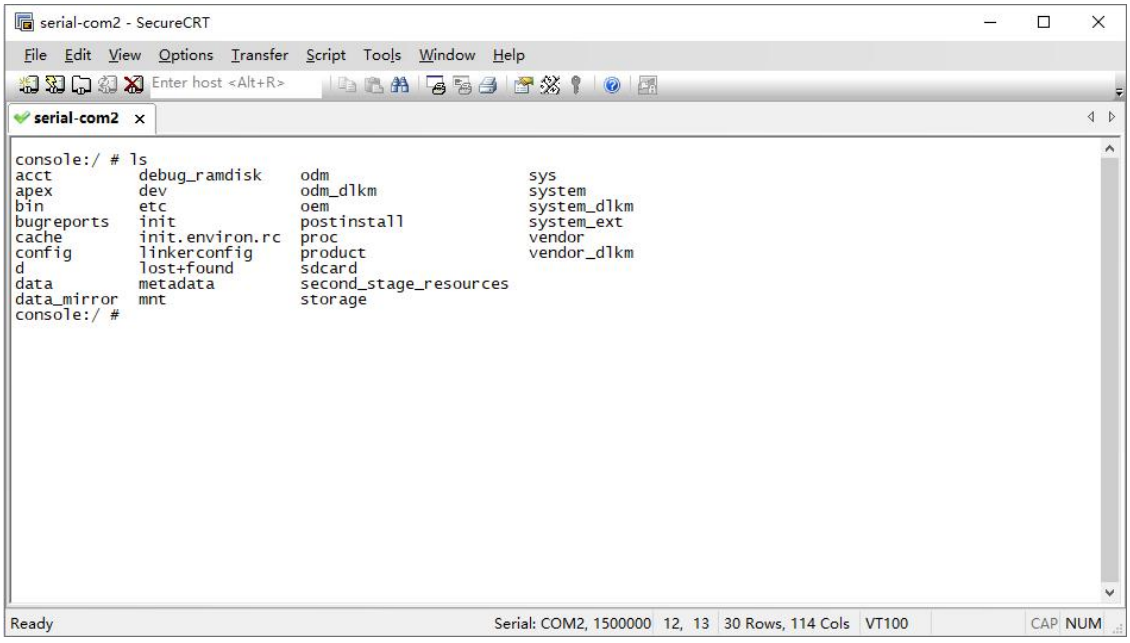
Step 4: Click the **"Quick Connect"** button to go to the Quick Connect configuration screen.



Step 5: Configure as shown in the following figure.



Step 6: After clicking **"Connect"** button, the terminal serial interface will be successfully accessed.



3.Upgrade Introduction

3.1 Upgrade Mode

(1) Before upgrading the firmware via USB cable, ensure the necessary drivers are installed. Please refer to the section *Install RK Driver Assistant* for installation instructions.

(2) There are two modes for upgrading the firmware via USB cable:

- **Loader Mode:** This is the standard mode used for firmware upgrades.
- **MaskRom Mode:** This is the last resort when the device is bricked. Forcing entry into MaskRom requires hardware manipulation, which carries certain risks, and should only be attempted when Loader mode is unavailable.

3.1.1 How to Enter Loader Mode

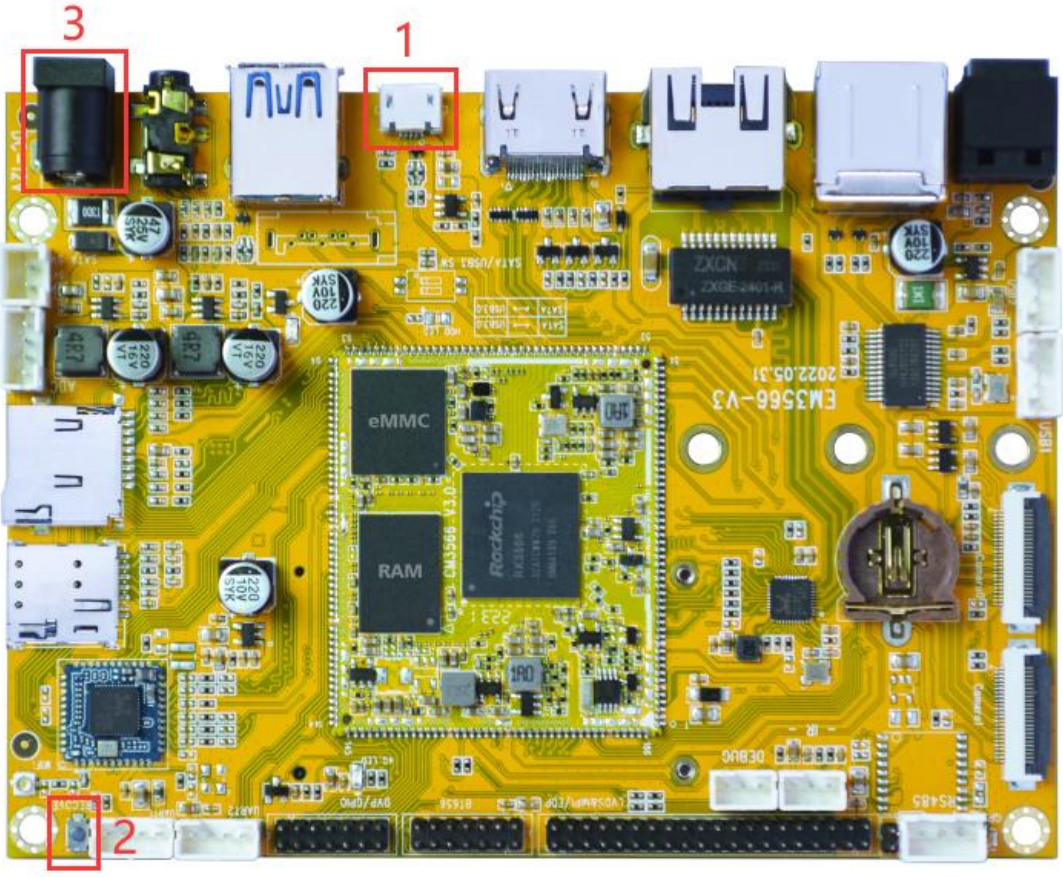
3.1.1.1 Hardware

Step 1: Disconnect the power adapter.

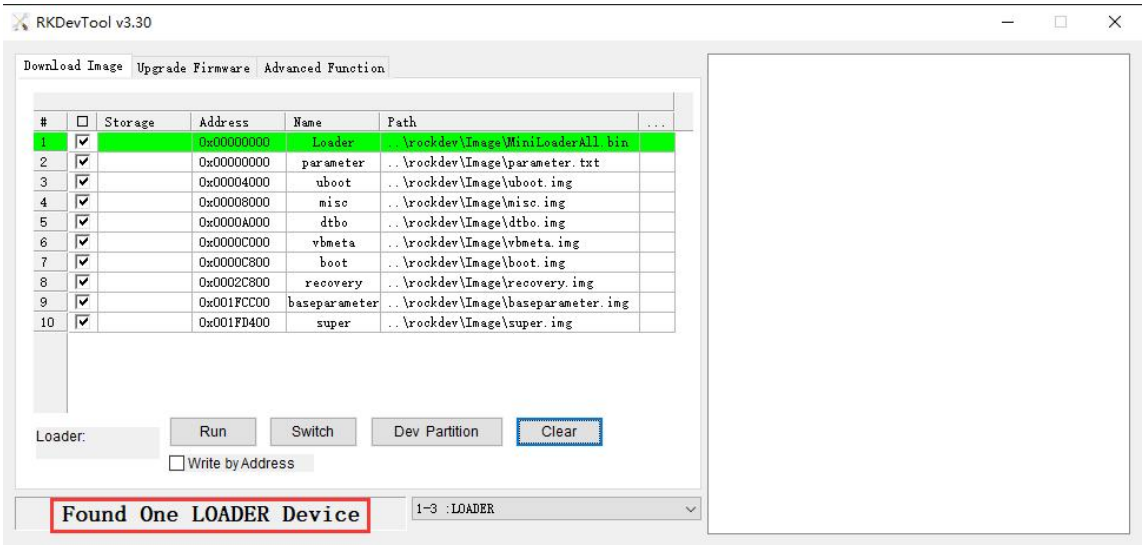
Step 2: Connect one end of the Type-C cable to the host and the other end to the development board.

Step 3: Press and hold the **Recovery** button on the board.

Step 4: Connect the power supply.



Step 5: After about two seconds, release the **Recovery** button.



In the flashing tool, **"Found one LOADER Device"** indicates that the device is in Loader mode.

3.1.1.2 Software

After connecting the Type-C cable, execute the following command in the serial debug terminal or adb shell.

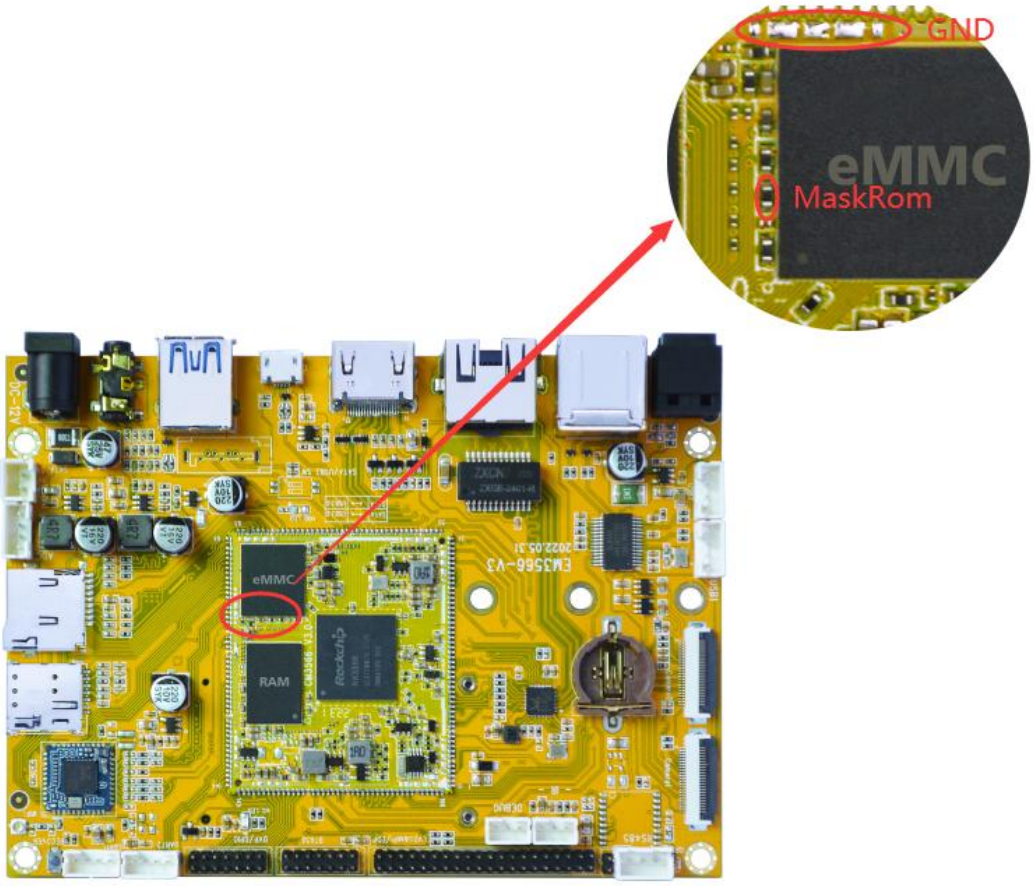
```
# reboot loader
```

3.1.2 How to Enter MaskRom Mode

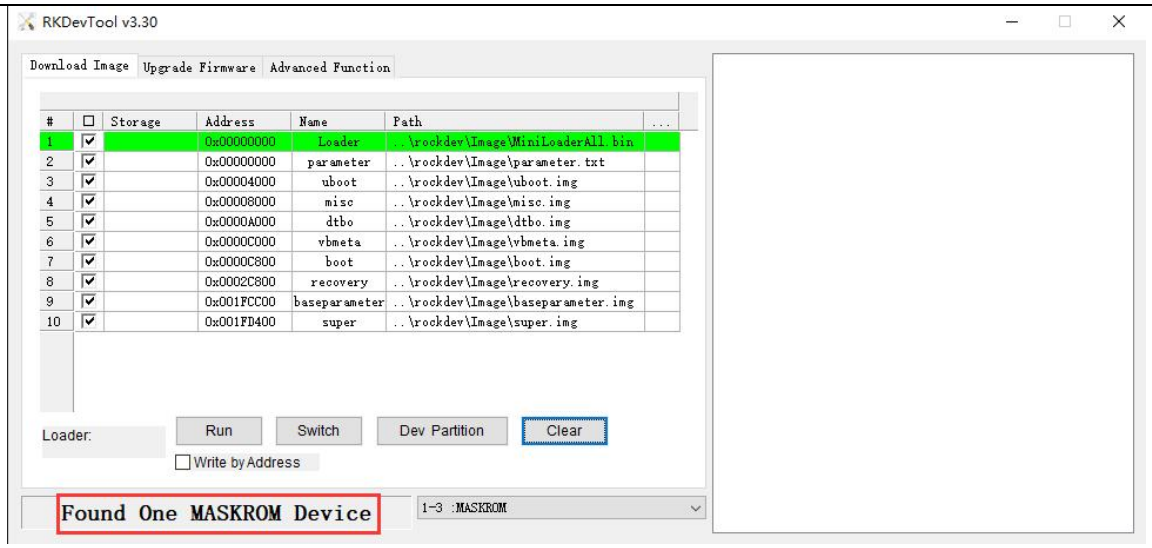
Step 1: Disconnect the power adapter.

Step 2: Connect one end of the Type-C cable to the host and the other end to the development board.

Step 3: Use tweezers to short the two test points on the CM3566.



Step 4: After connecting the power cable, the device will enter MaskRom mode.



3.2 Burn firmware

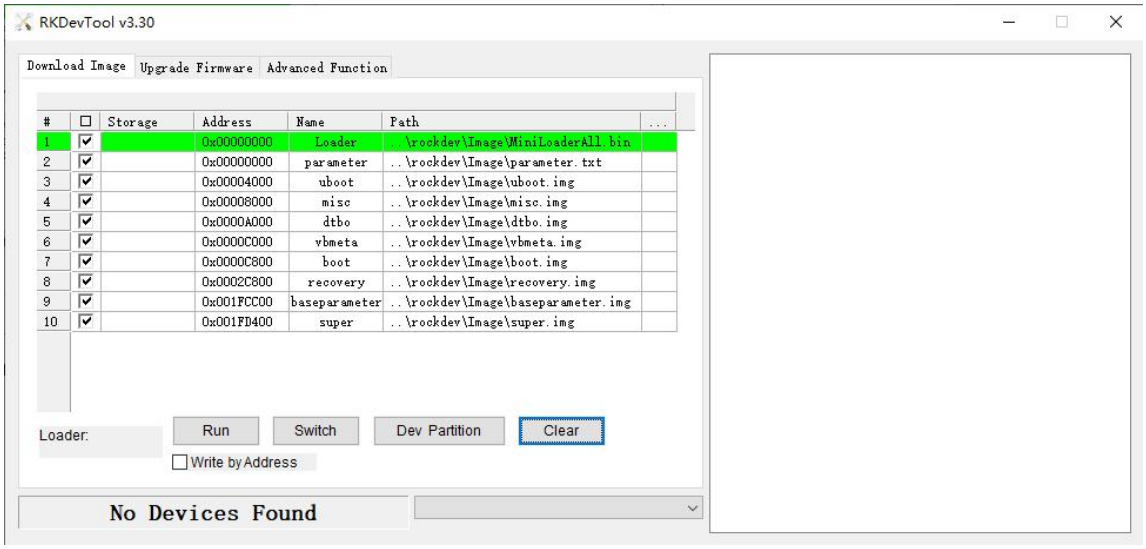
Environment: Windows OS (Operating System).

3.2.1 Burn Update.img Firmware

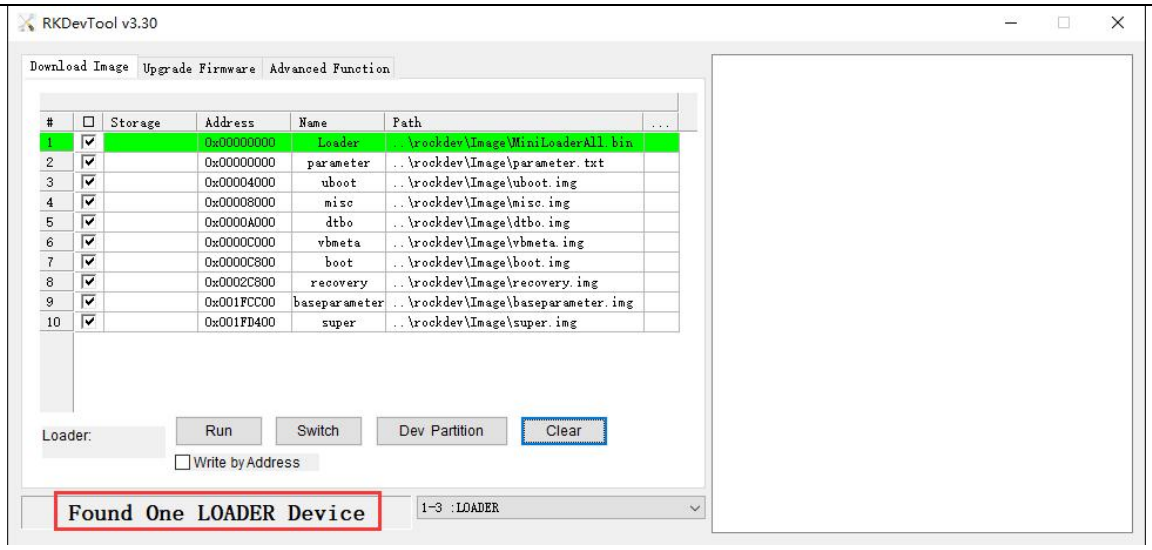
Step 1: Unzip *RKDevTool_v3.30_for_window.zip* on Windows.

Step 2: Open

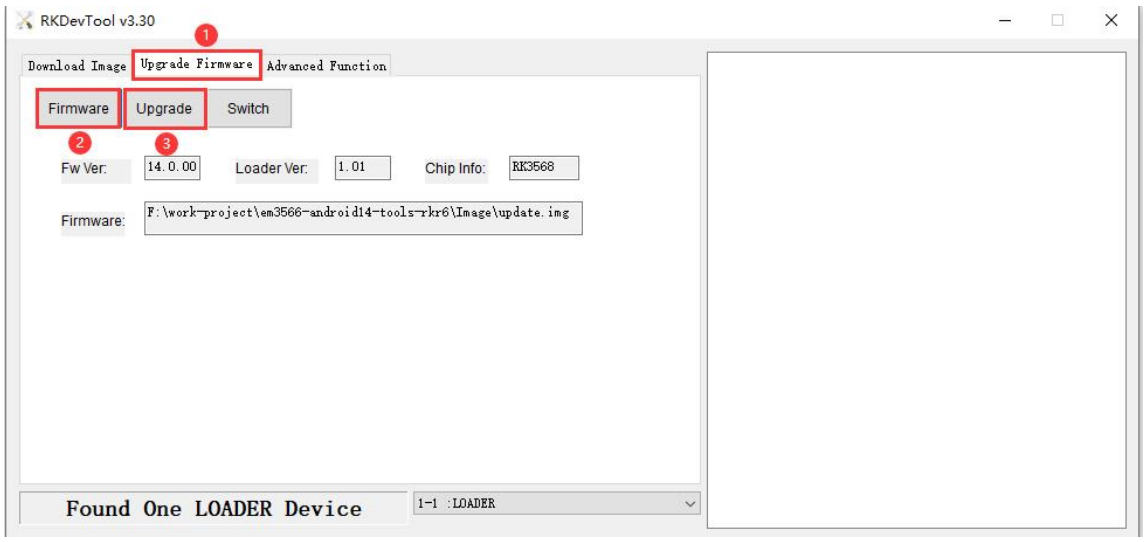
RKDevTool_v3.30_for_window\RKDevTool_v3.30_for_window\RKDevTool_v3.30_for_window\RKDevTool.exe.

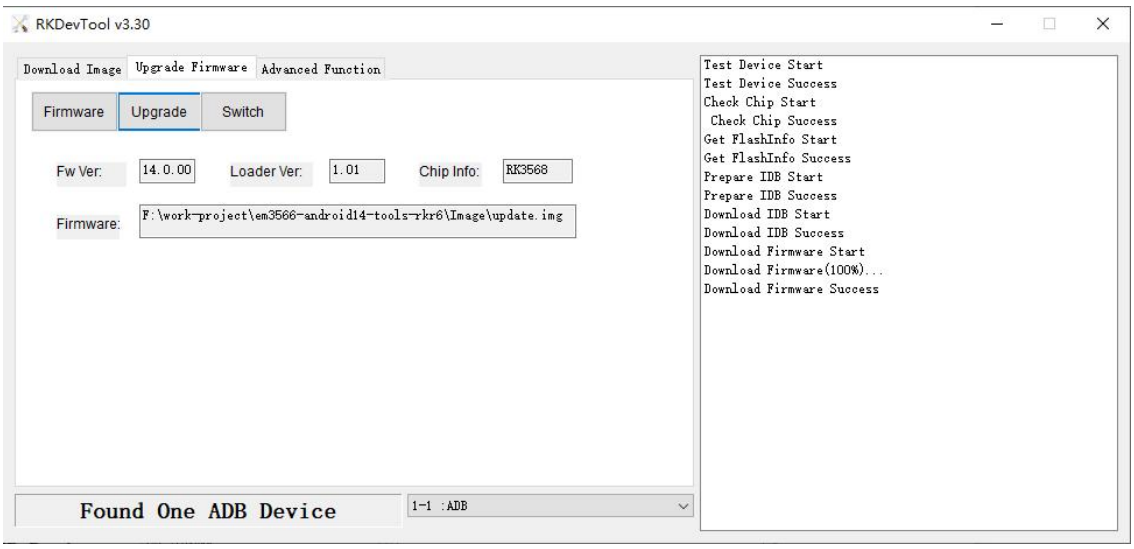


Step 3: Switch to **loader mode**.



Step 4: Click **Upgrade Firmware** -> **Firmware**, select **update.img**, then click **Upgrade** to flash.





After the flashing is complete, the board will automatically reboot.

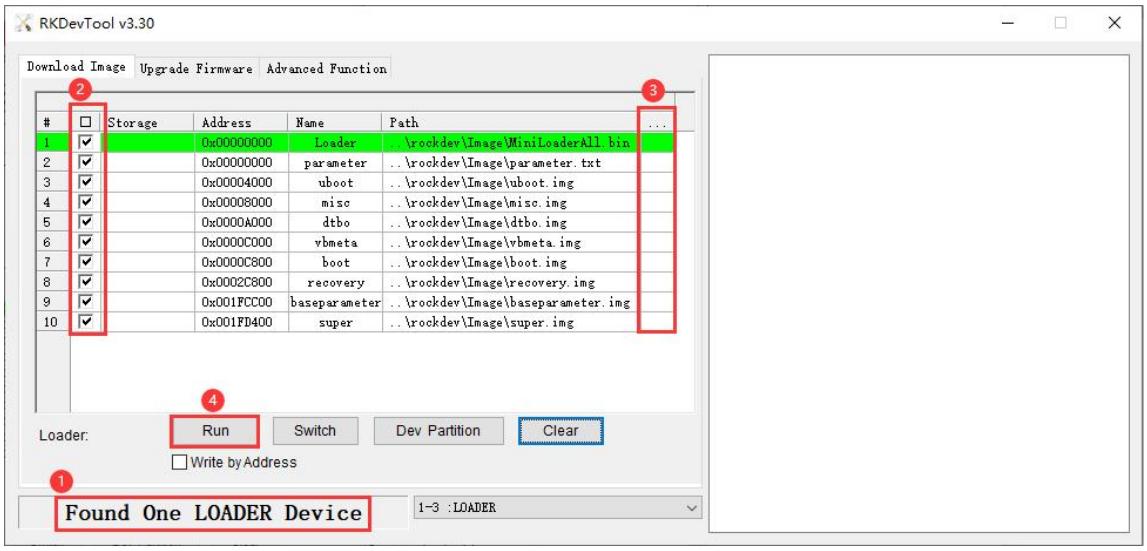
3.2.2 Burn Split Firmware

Step 1: Switch to **Loader mode**.

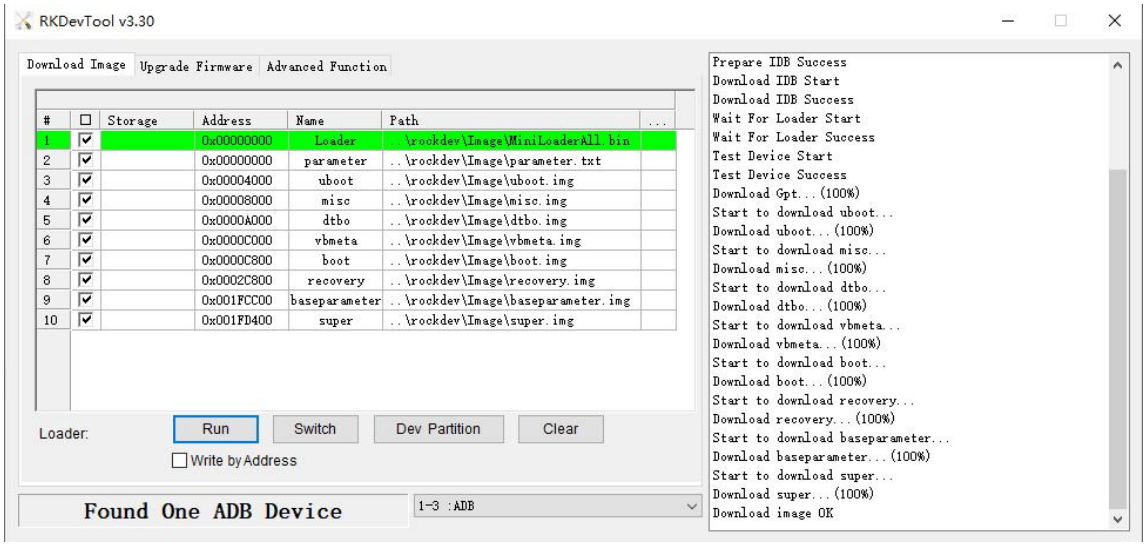
Step 2: Check the partitions to be flashed, multiple partitions can be selected.

Step 3: Ensure the image file path is correct. If necessary, click the blank cell next to the path to reselect it.

Step 4: Click the **Run** button to flash the image.



After the flashing is complete, the board will automatically reboot.



4.Development Environment

4.1 Preparing the Development Environment

It is recommended to use Ubuntu 22.04 or higher version for compilation. If you encounter an error during compilation, user can check the error message and install the corresponding software packages accordingly. Other Linux versions may need to adjust the software package accordingly. In addition to the system requirements, there are other hardware and software requirements.

Hardware requirements	Software requirements
64-bit system, hard disk space should be greater than 200G. If you do multiple builds, you will need more hard drive space.	Ubuntu 22.04

4.2 Installing Libraries and Toolkits

The contents of this directory only provide the software package installation commands that are needed to build the compiled SDK environment. Please install other tools such as samba and ssh yourself.

PC OS	Network	Permission
Ubuntu 22.04	online	root

To install the required tools, execute the following commands:

```
$ sudo apt-get install git-core gnupg flex bison gperf build-essential zip curl \
zlib1g-dev gcc-multilib g++-multilib libc6-dev-i386 \
lib32ncurses5-dev x11protocore-dev \
libx11-dev lib32z-dev ccache libgl1-mesa-dev libxml2-utils xsltproc \
unzip python-pyelftools python3-pyelftools device-tree-compiler libfdt-dev \
libfdt1 libssl-dev liblz4-tool python-dev
```

4.3 Install JDK

```
$ sudo apt-get update
$ sudo apt-get install openjdk-8-jdk
```

5.Compile Source

Step 1: Unzip the Source

To extract the source files, execute the following commands:

```
$ tar xvf em3566_android14_250121.tar.gz
$ cd em3566-android14
```

Step 2: Select the corresponding board level

```
$ source build/envsetup.sh
$ lunch rk3566_u-userdebug
```

Step 3: Compile U-Boot

To compile U-Boot, execute the following command:

```
$ ./build.sh -U
```

Step 4: Compile the Kernel

To compile the kernel, execute the following command:

```
$ ./build.sh -K
```

Other compiling instruction

Only compile kernel to generate boot.img

Export clang to the environment:

```
$ cd kernel-6.1
export PATH=../prebuilts/clang/host/linux-x86/clang-r487747c/bin:$PATH
alias msk='make CROSS_COMPILE=aarch64-linux-gnu- LLVM=1 LLVM_IAS=1'
msk ARCH=arm64 rockchip_defconfig android-14.config rk356x.config
msk ARCH=arm64 BOOT_IMG=../rockdev/Image-rk3566_u/boot.img rk3566-evb2-lp4x-v10.img
-j8
```

user can flash **boot.img** under the catalogue of kernel-6.1 directly to boot position of machine after compiling, and please load the partition table (**parameter.txt**) when flashing, for fear of flashing to the wrong place.

Step 5: Compile Android

To compile android, execute the following command:

```
$ ./build.sh -A
```

Step 6: Generate and Check Firmwares

To generate firmware, execute the following command:

```
$ ./build.sh -u
```

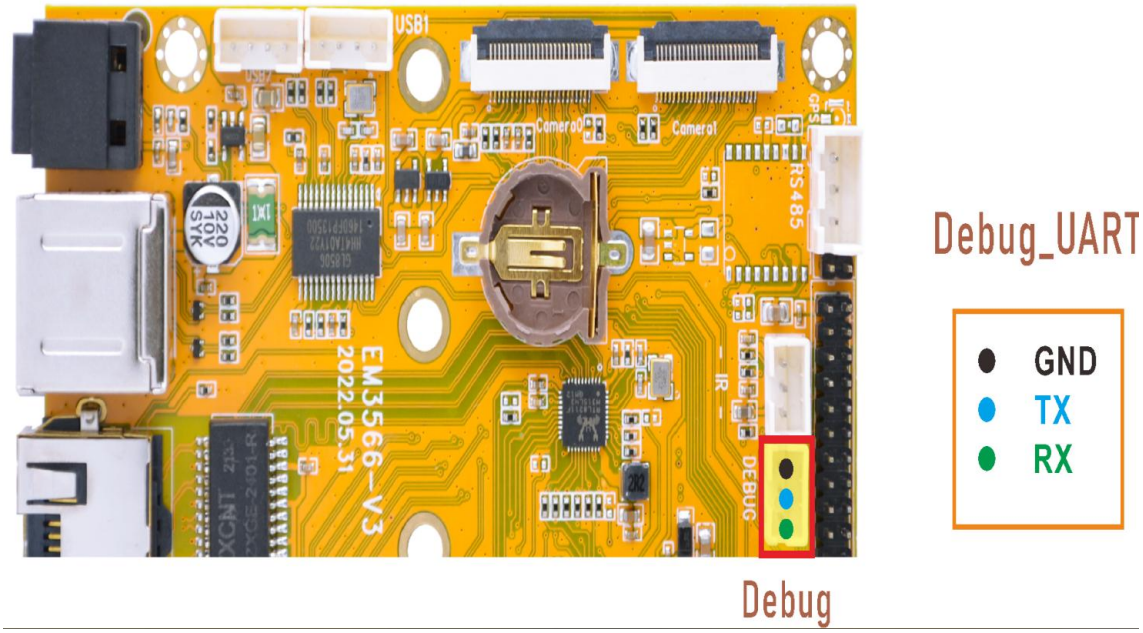
Images and **update.img** are generated in *rockdev/* directory.

One-click compilation

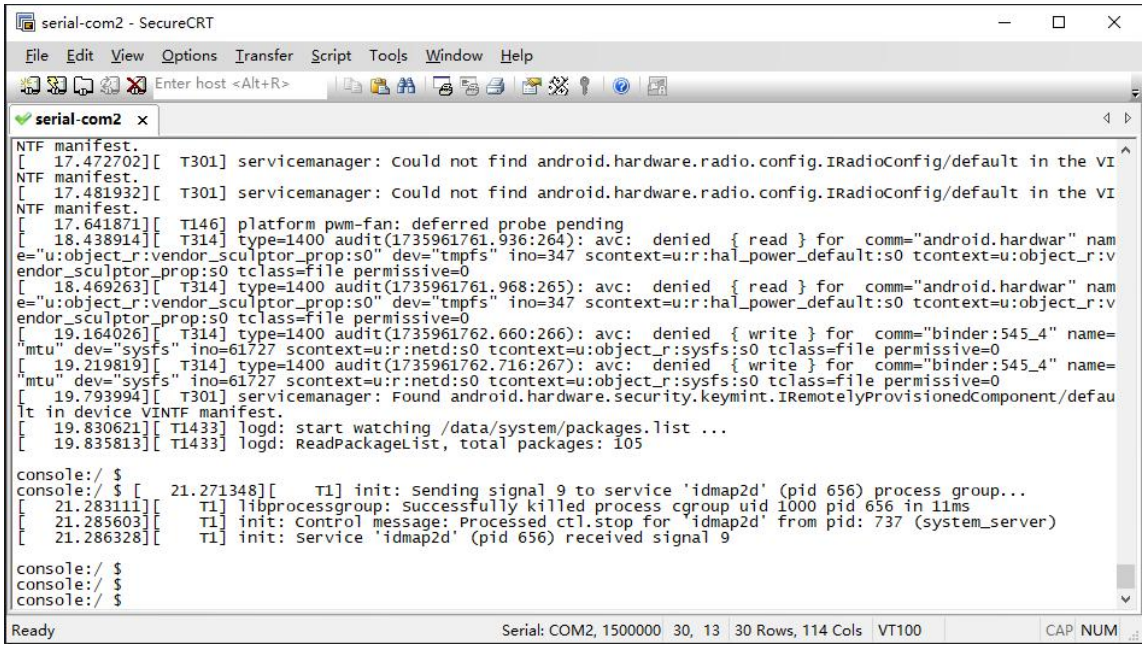
```
$ source build/envsetup.sh
$ lunch rk3566_u-userdebug
$ ./build.sh -AUCKu
```

6.Android14 Test

6.1 Serial Terminal

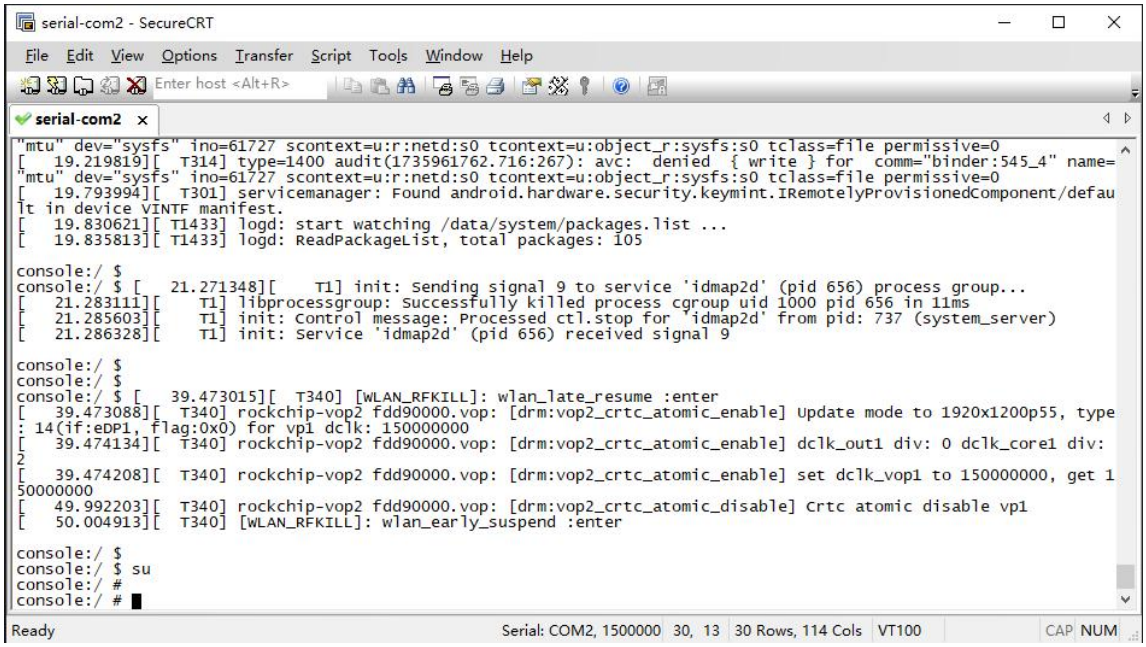


Connect the board and PC with USB Serial cable, then power on, the terminal will output boot information. The default baudrate is 1500000.



Execute the following command to switch to root mode:

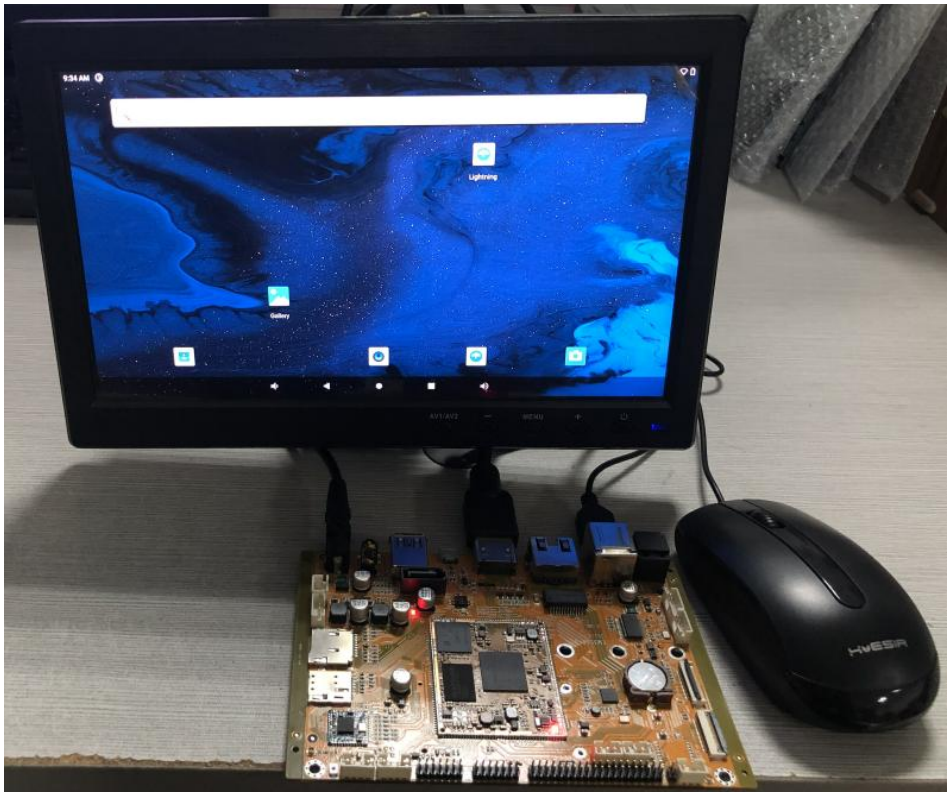
```
$ su
```



6.2 Display

Connect the board and monitor with a HDMI cable, then start up.

The display effect diagram is as follows:



6.3 MICRO USB

6.3.1 ADB

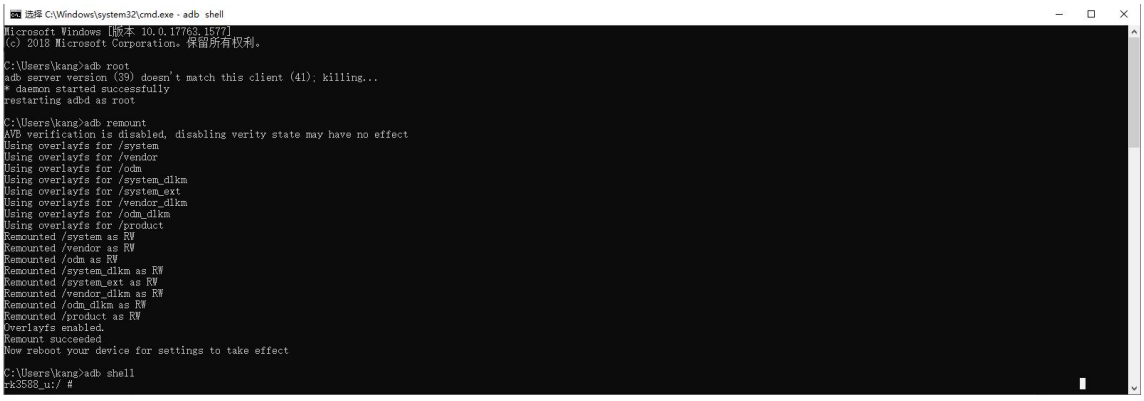
Step 1: Connect the board and PC host with micro USB.

Step 2: Install ADB driver on Windows system.

Step 3: Press **Windows + R** to open the Run program. Type "cmd" and press Enter.

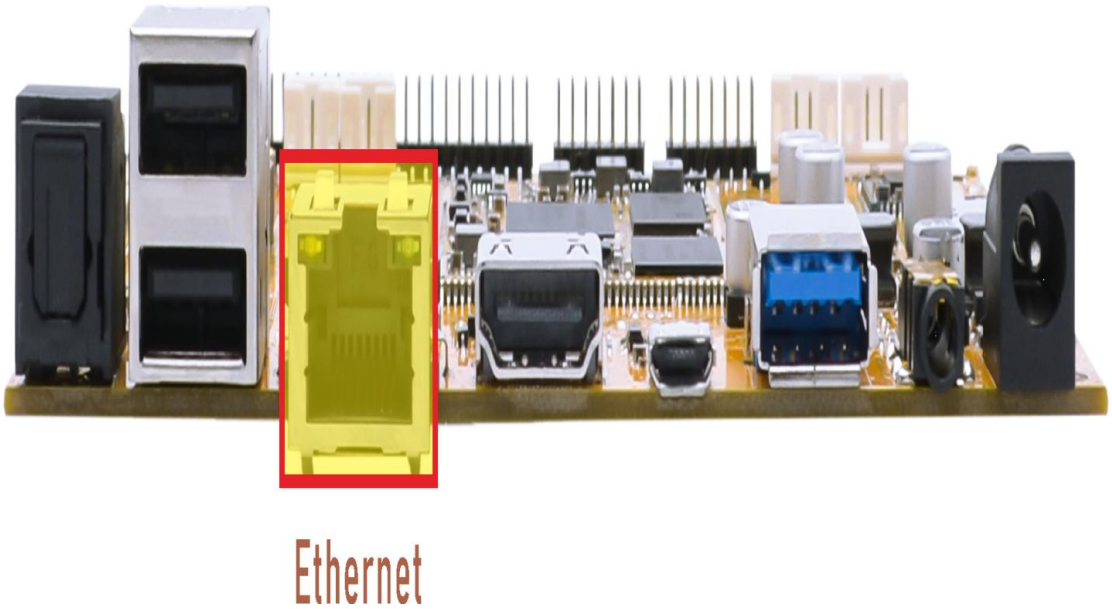
Step 4: Execute the following command to enable ADB.

```
# adb root
# adb remount
# adb shell
```



6.4 Ethernet

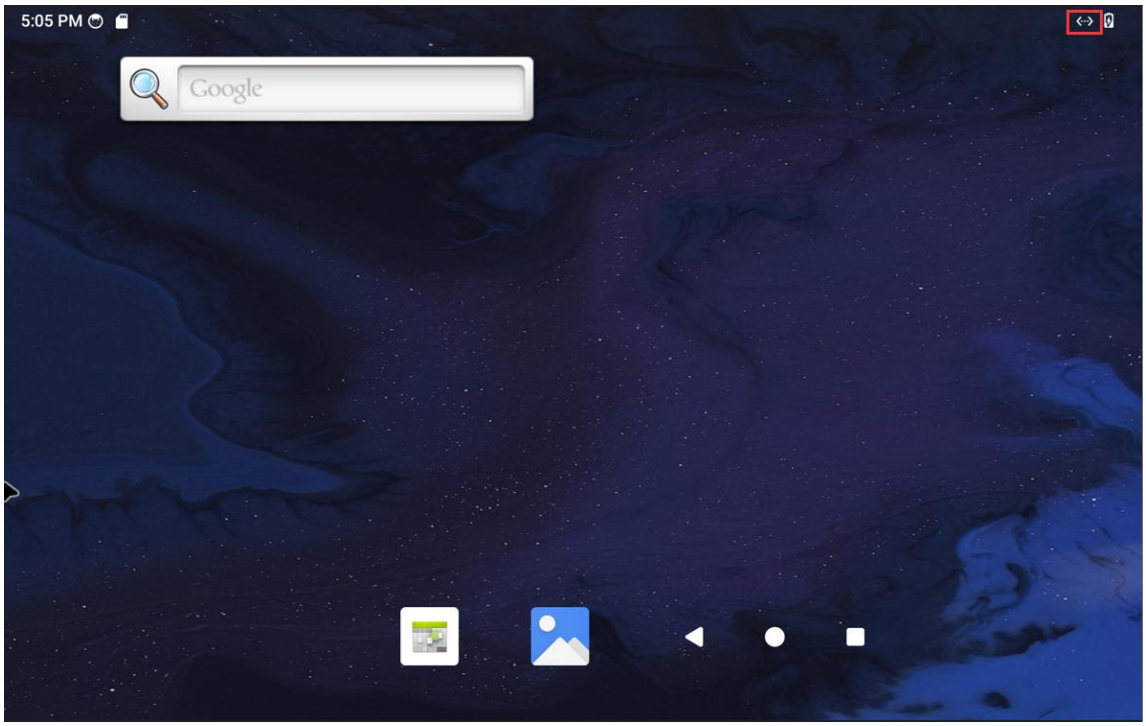
Step 1: Connect the network cable to the Ethernet port.



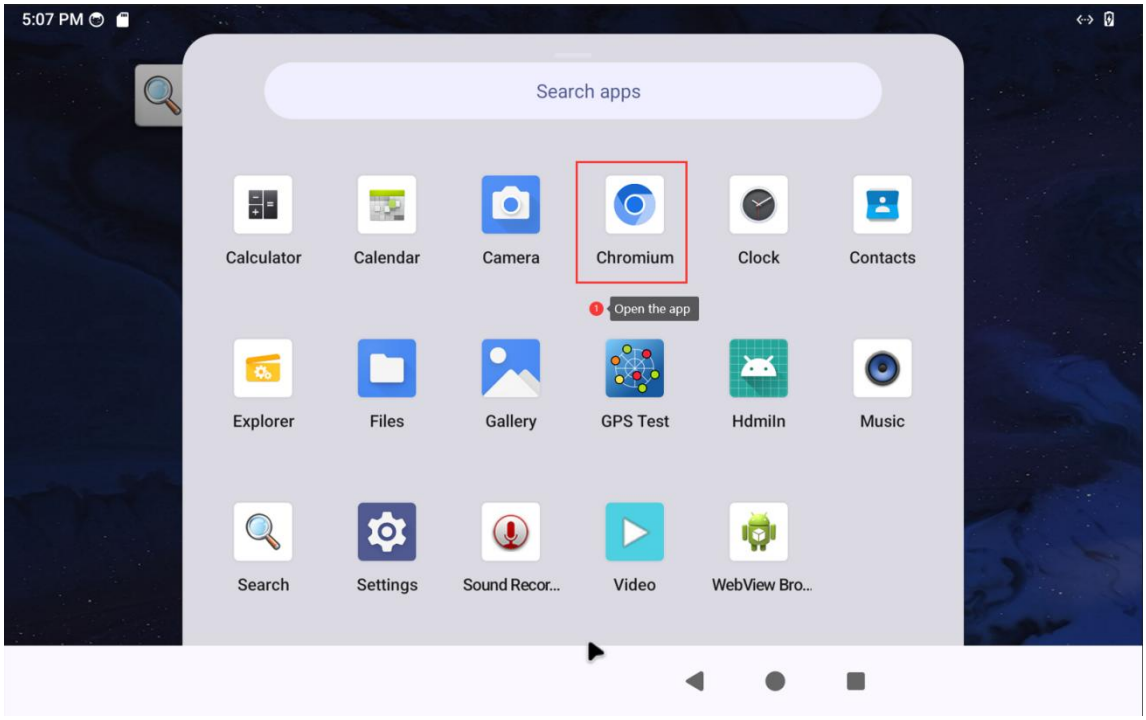
According to the log, it can be seen that the Gigabit Ethernet recognition is successful.

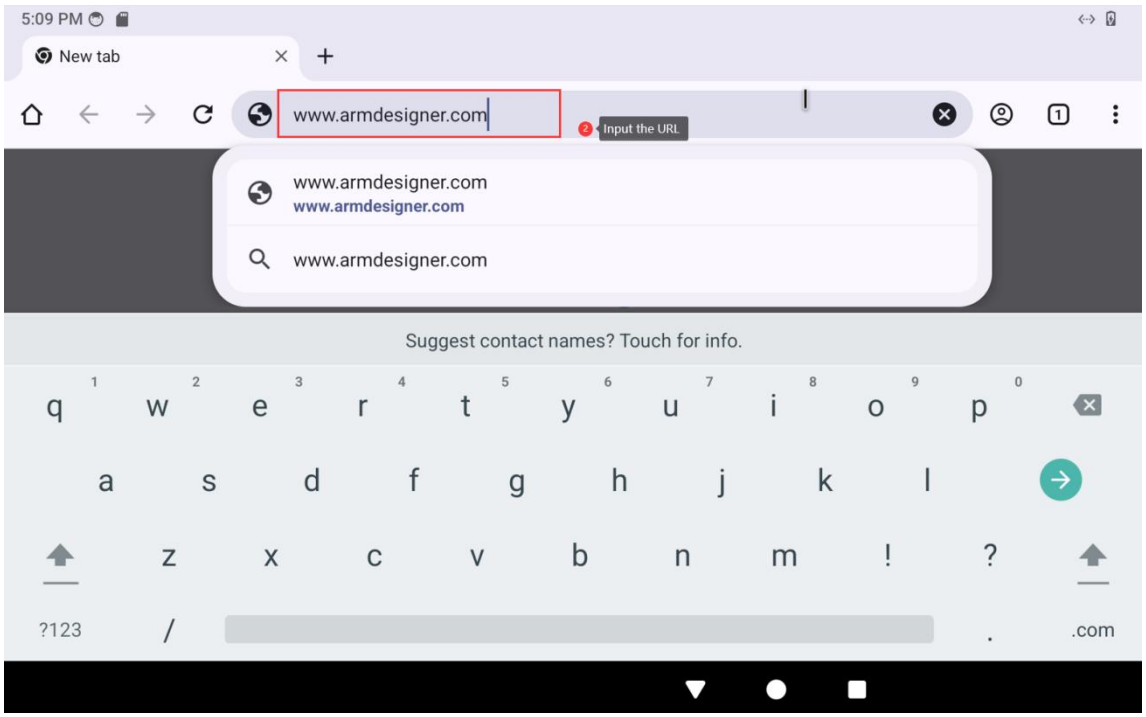
```
console:/ # [ 1557.959326][ T2286] rk_gmac-dwmac fe1c0000.ethernet eth0: Link is Up - 1Gbps/Full - flow control rx/tx
[ 1557.959416][ T2286] IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready
```

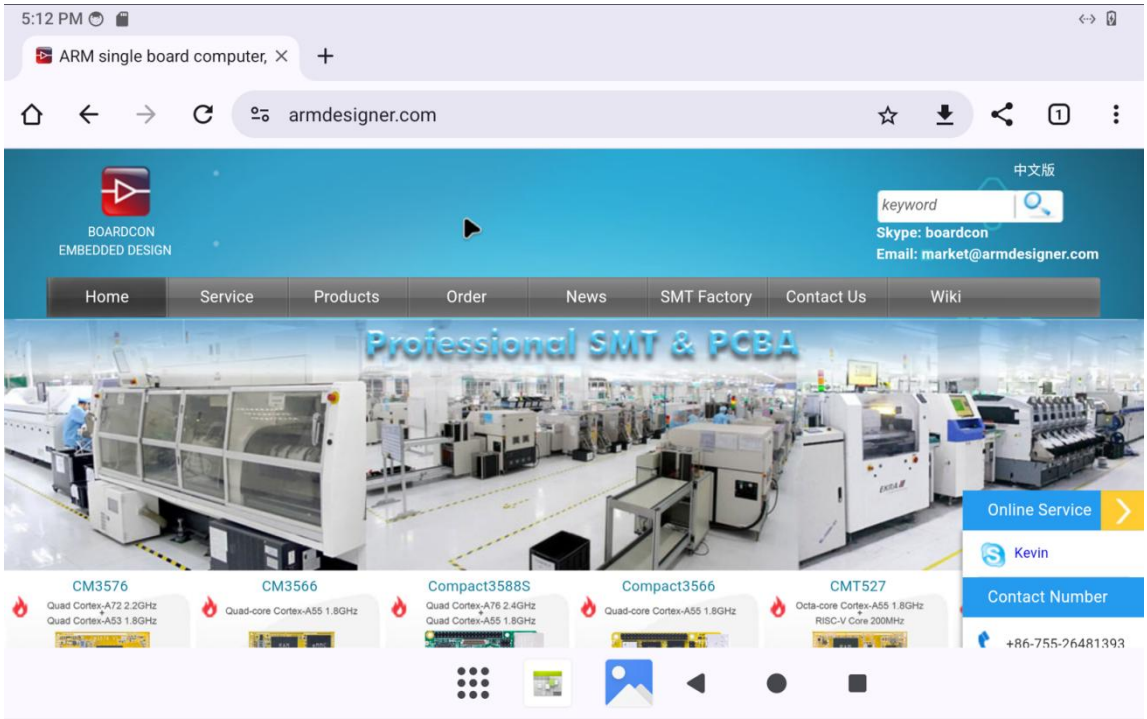
Step 2: After connecting the Ethernet cable, the following icon will appear in the upper right corner of the desktop, indicating that the Ethernet connection is successful.



Step 3: Test the ethernet connection.







Users can also choose to use the ping command to test the connectivity of the Ethernet, as shown below:

- View network interface information.

```
$ su
# ifconfig
```

```
console:/ # ifconfig
lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope: Host
          UP LOOPBACK RUNNING  MTU:65536  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

dummy0    Link encap:Ethernet  HWaddr 0a:08:79:72:0a:08
          inet6 addr: fe80::808:79ff:fe72:a08/64 Scope: Link
          UP BROADCAST RUNNING NOARP  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:9 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 TX bytes:630

eth0      Link encap:Ethernet  HWaddr 2a:98:78:a2:1c:15  Driver rk_gmac-dwmac
          inet addr:192.168.0.157  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::829e:4817:dc5c:477c/64 Scope: Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:8403 errors:0 dropped:0 overruns:0 frame:0
          TX packets:3494 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:7796822 TX bytes:437766
          Interrupt:70

console:/ #
```

- Network connection test.

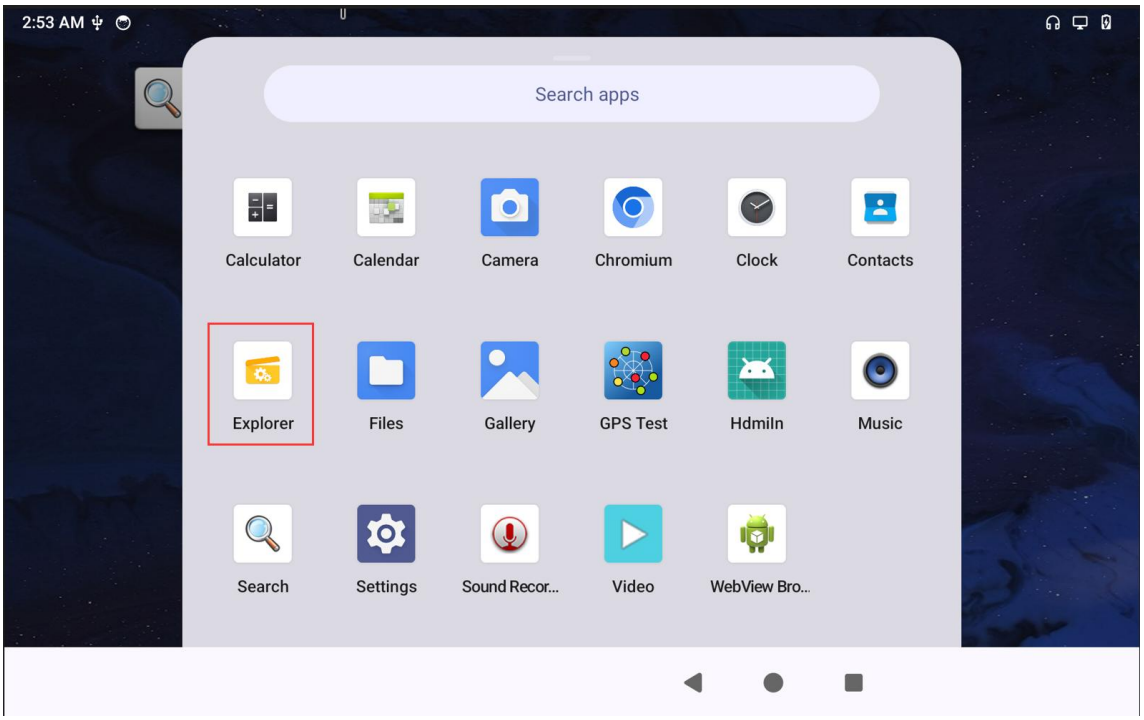
```
# ping -I eth0 www.armdesigner.com
```

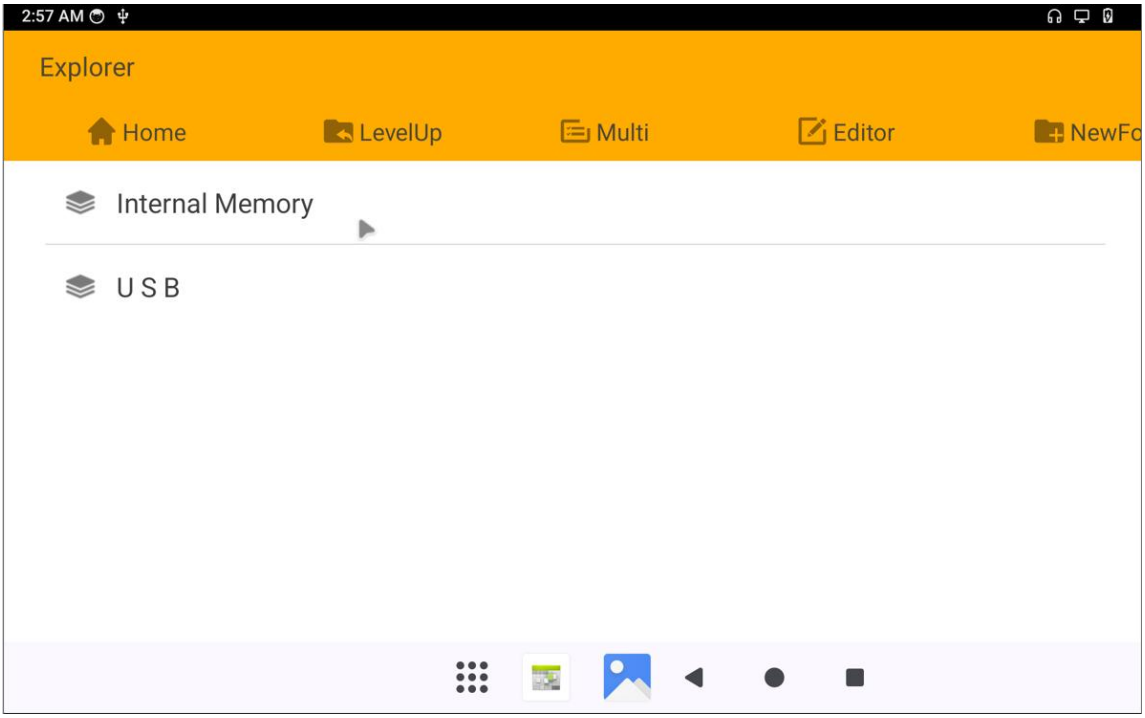
```
console:/ # ping -I eth0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.157 eth0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=187 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=187 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=187 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=187 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=187 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=188 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=187 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=8 ttl=48 time=188 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=9 ttl=48 time=187 ms
```

6.5 USB Host

The USB host can be used to connect devices such as USB mouse, USB keyboards, USB flash drives, and other USB peripherals.

After connecting the USB flash drive, users can open the app to check the auto-mount status, and then access the device contents.





The user can identify whether the mounted flash drive is USB 2.0 or USB 3.0 from the debug log.

• USB2.0 print information in high-speed mode.

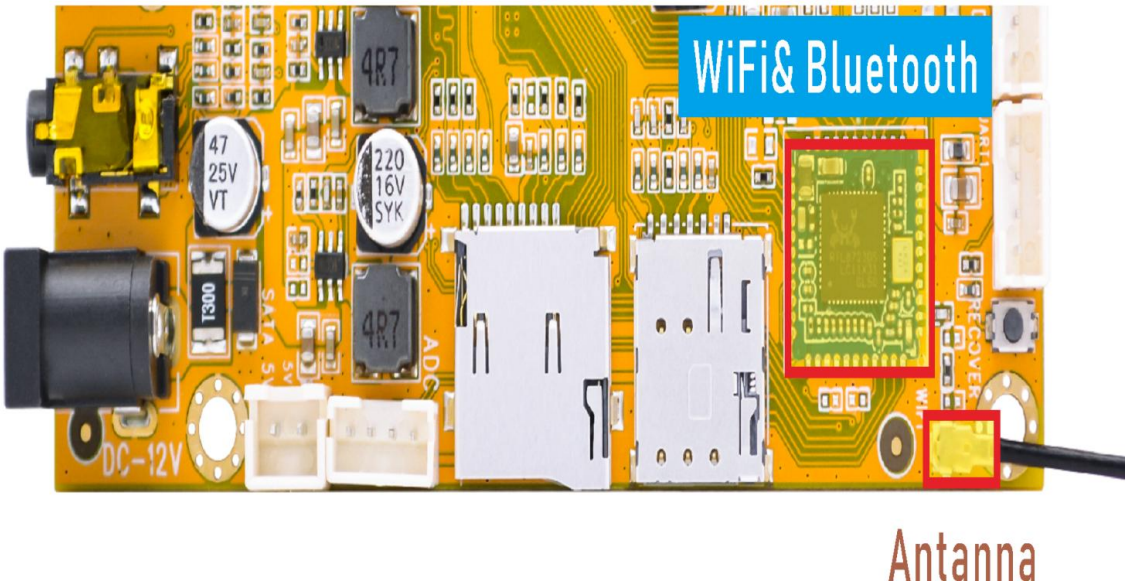
```
console:/ # [  167.566377][  T208] usb 3-1.1: new high-speed USB device number 4 using xhci-hcd
[  167.724806][  T208] usb 3-1.1: New USB device found, idVendor=0dd8, idProduct=3b00, bcdDevice= 0.02
[  167.724900][  T208] usb 3-1.1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[  167.724943][  T208] usb 3-1.1: Product: OnlyDisk
[  167.724982][  T208] usb 3-1.1: Manufacturer: Netac
[  167.725021][  T208] usb 3-1.1: SerialNumber: C5E966D6F3DF5397
[  167.730080][  T208] usb-storage 3-1.1:1.0: USB Mass Storage device detected
[  167.732438][  T208] scsi host1: usb-storage 3-1.1:1.0
[  168.949604][   T10] scsi 1:0:0:0: Direct-Access     Netac    OnlyDisk         8.01 PQ: 0 ANSI: 6
[  168.959051][  T131] sd 1:0:0:0: [sda] 121610240 512-byte logical blocks: (62.3 GB/58.0 GiB)
[  168.959434][  T131] sd 1:0:0:0: [sda] Write Protect is off
[  168.959744][   T10] sd 1:0:0:0: Attached scsi generic sg0 type 0
[  168.959785][  T131] sd 1:0:0:0: [sda] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
```

• USB3.0 print information in SuperSpeed mode.

```
console:/ # [10931.102282][ T2350] usb 2-1: new SuperSpeed USB device number 2 using xhci-hcd
[10931.133216][ T2350] usb 2-1: New USB device found, idVendor=0dd8, idProduct=3b00, bcdDevice= 0.02
[10931.133274][ T2350] usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[10931.133290][ T2350] usb 2-1: Product: OnlyDisk
[10931.133302][ T2350] usb 2-1: Manufacturer: Netac
[10931.133313][ T2350] usb 2-1: SerialNumber: C5E966D6F3DF5397
[10931.149138][ T2350] usb-storage 2-1:1.0: USB Mass Storage device detected
[10931.152091][ T2350] scsi host0: usb-storage 2-1:1.0
```

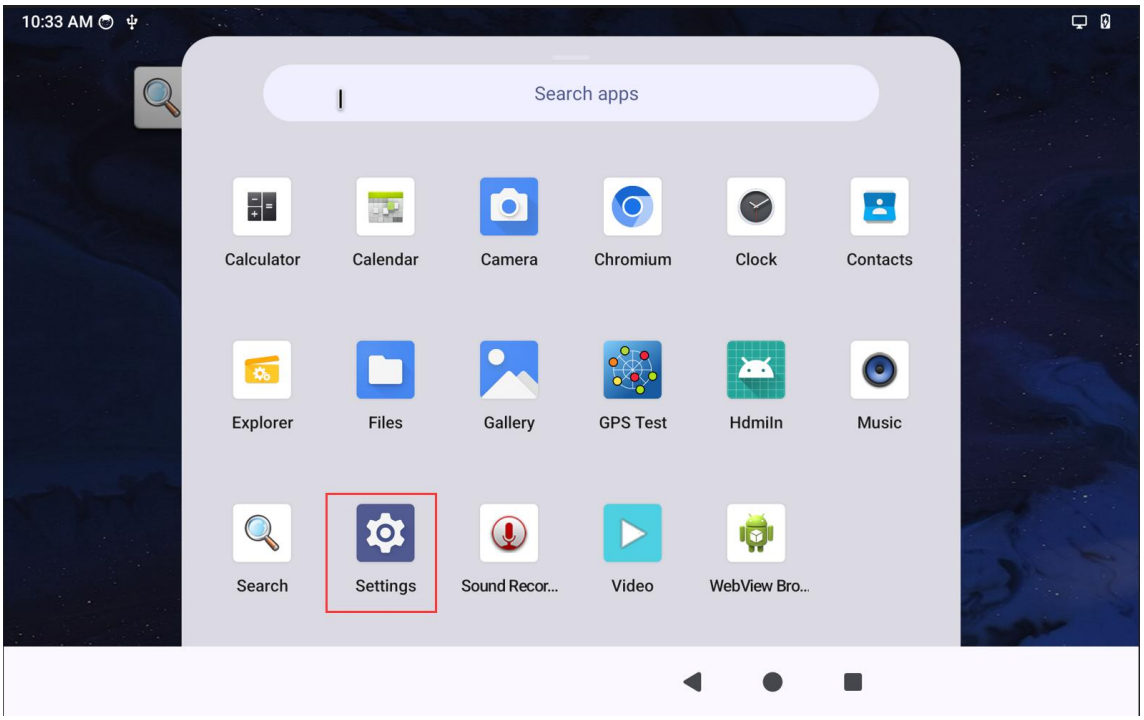
6.6 WiFi & Bluetooth

To use Wi-Fi and Bluetooth functions properly, the antenna needs to be connected.

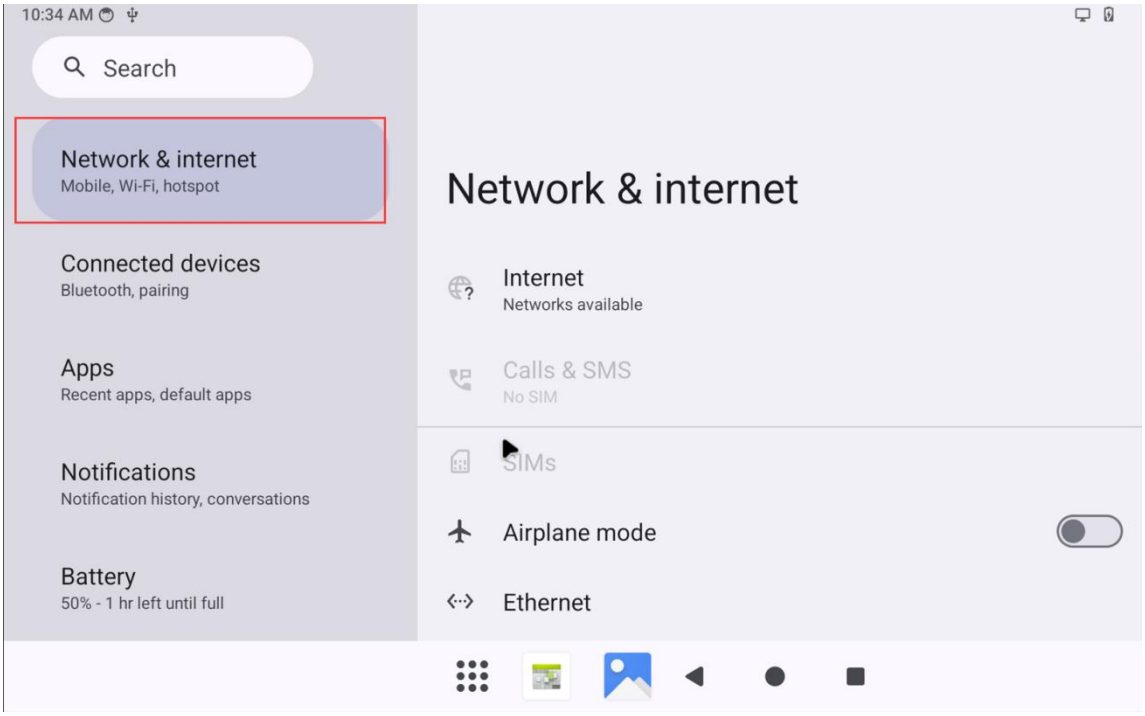


6.6.1 WiFi

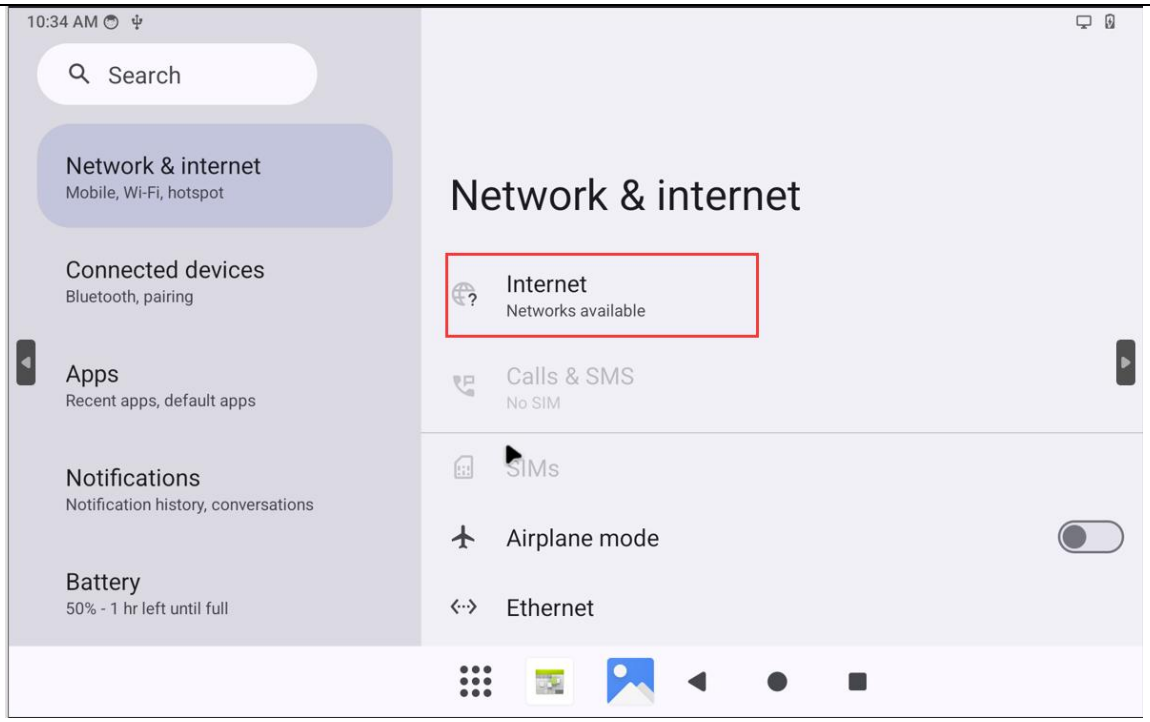
Step 1: Open the **Settings** app.

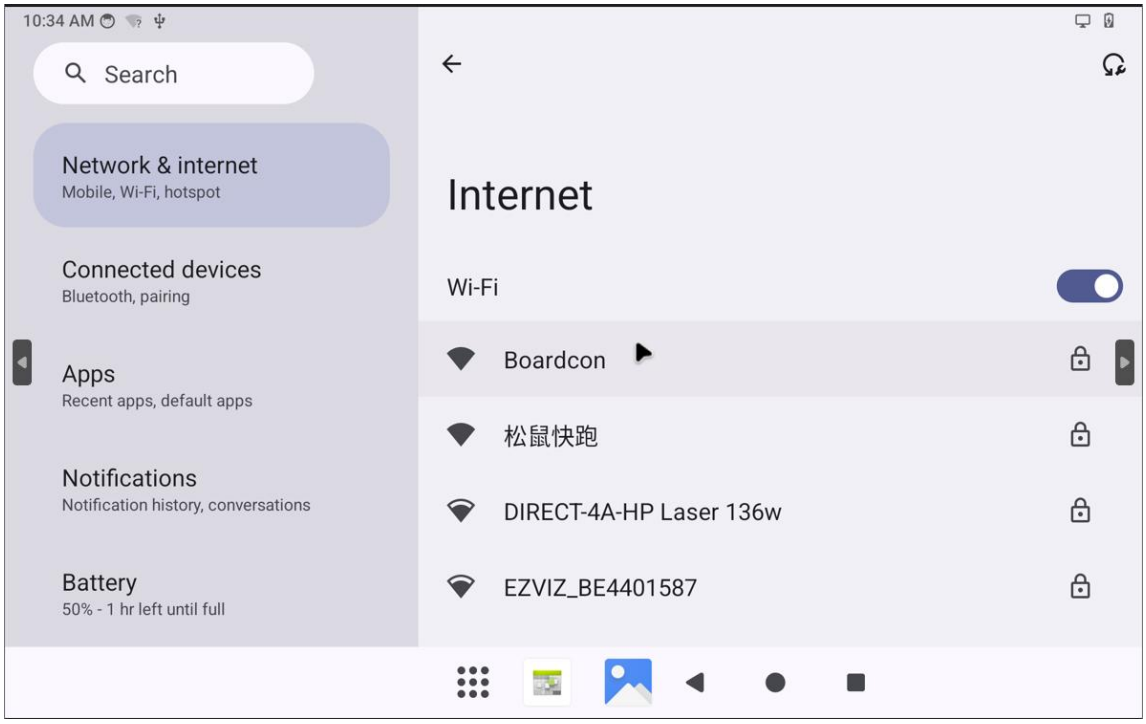


Step 2: Open the **"Network & Internet"** option.

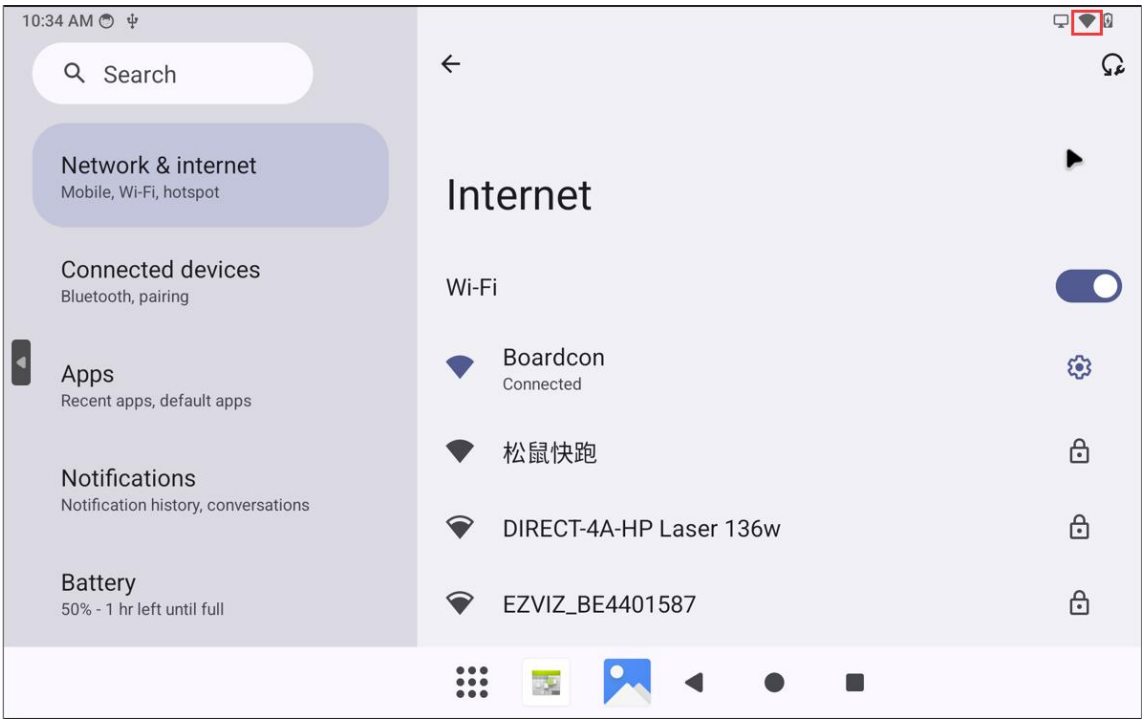


Step 3: Open the **"Internet"** option.

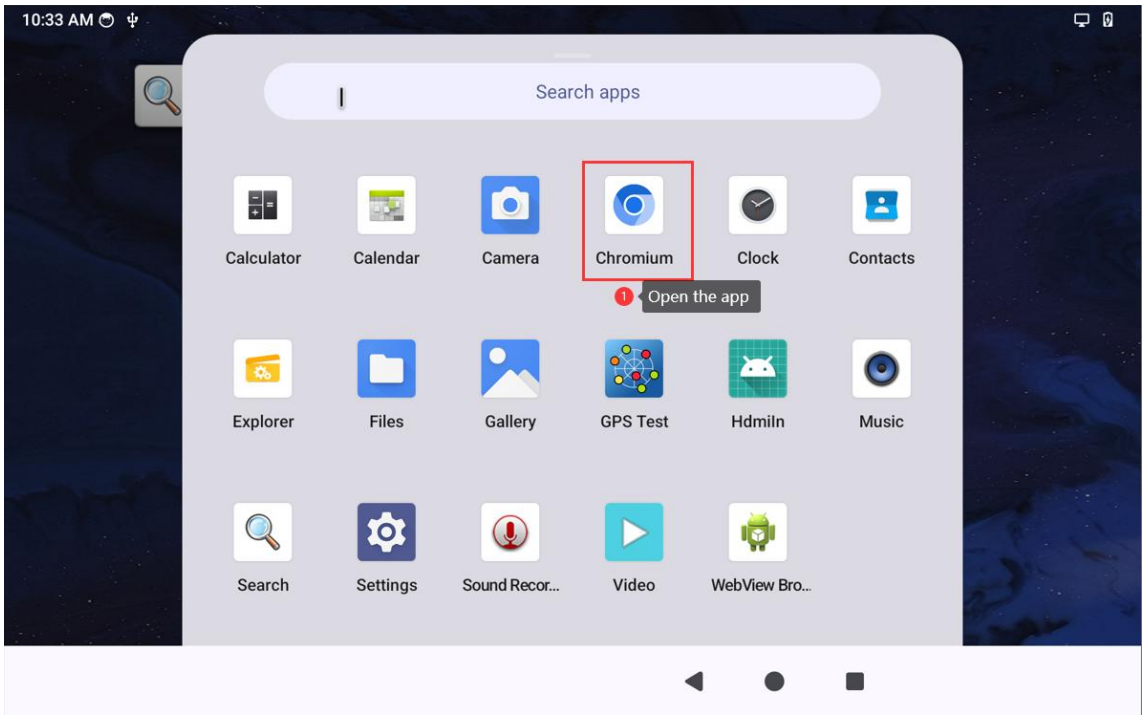


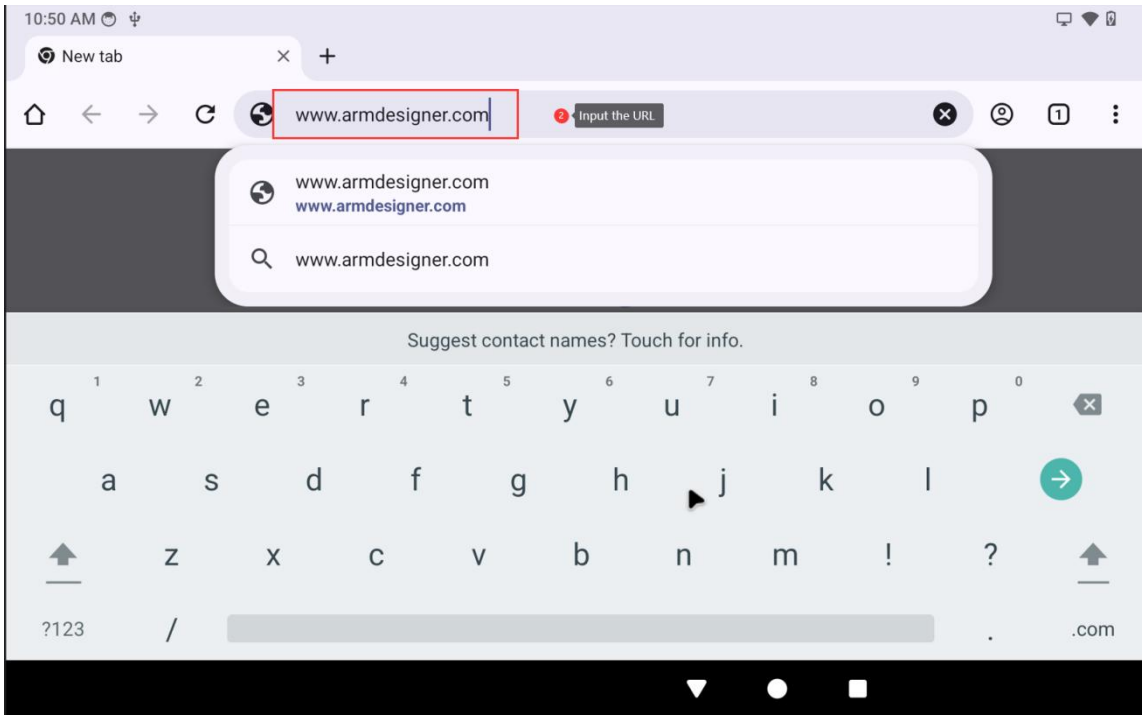


Step 4: Select and connect to the hotspot from the Wi-Fi list.



Step 5: Wi-Fi connection test.





Users can also choose to use the ping command to test the connectivity of the wifi, as shown below:

(1) View network interface information.

```
$ su
# ifconfig
```

```
console:/ # ifconfig
lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope: Host
          UP LOOPBACK RUNNING  MTU:65536  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

dummy0    Link encap:Ethernet  HWaddr da:56:5f:de:b4:56
          inet6 addr: fe80::d856:5fff:fede:b456/64 Scope: Link
          UP BROADCAST RUNNING NOARP  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:8 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 TX bytes:560

eth0      Link encap:Ethernet  HWaddr 2a:98:78:a2:1c:15  Driver rk_gmac-dwmac
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:1510 errors:0 dropped:0 overruns:0 frame:0
          TX packets:102 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:206887 TX bytes:12203
          Interrupt:70

wlan0     Link encap:Ethernet  HWaddr cc:64:1a:32:8b:84  Driver rtl8852bs
          inet addr:192.168.0.165  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::a28b:ad32:bcb2:c543/64 Scope: Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:84 errors:0 dropped:0 overruns:0 frame:0
          TX packets:53 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:12118 TX bytes:4593

console:/ #
```

(2)

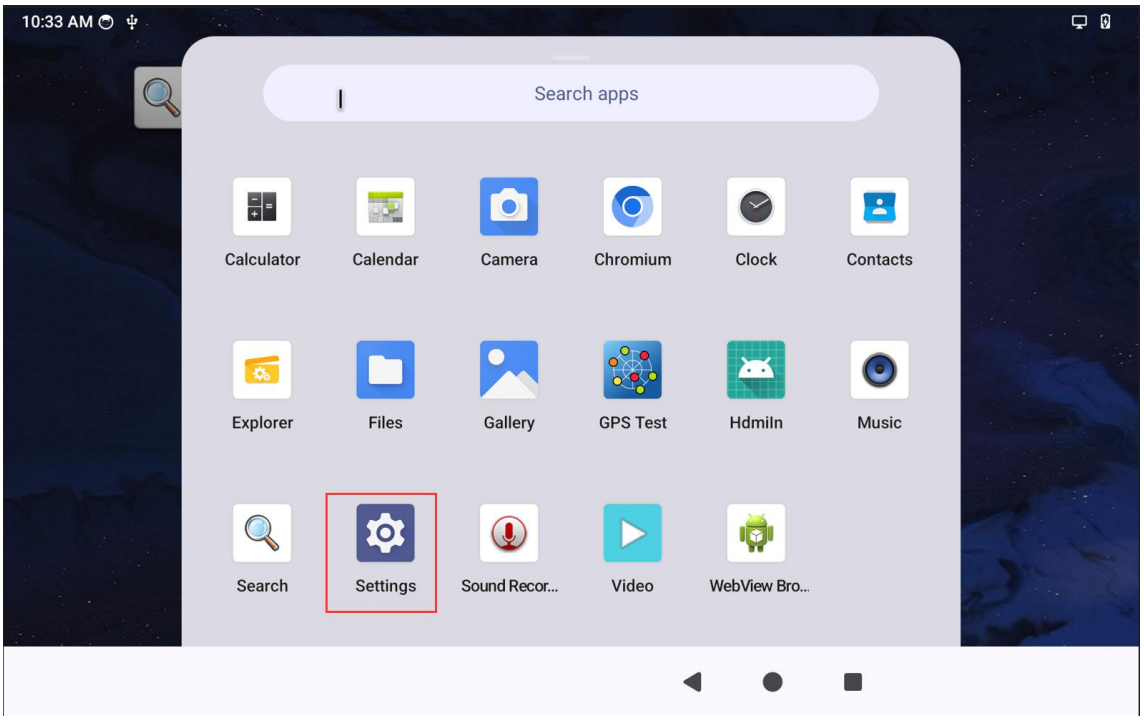
Network connection test.

```
# ping -I wlan0 www.armdesigner.com
```

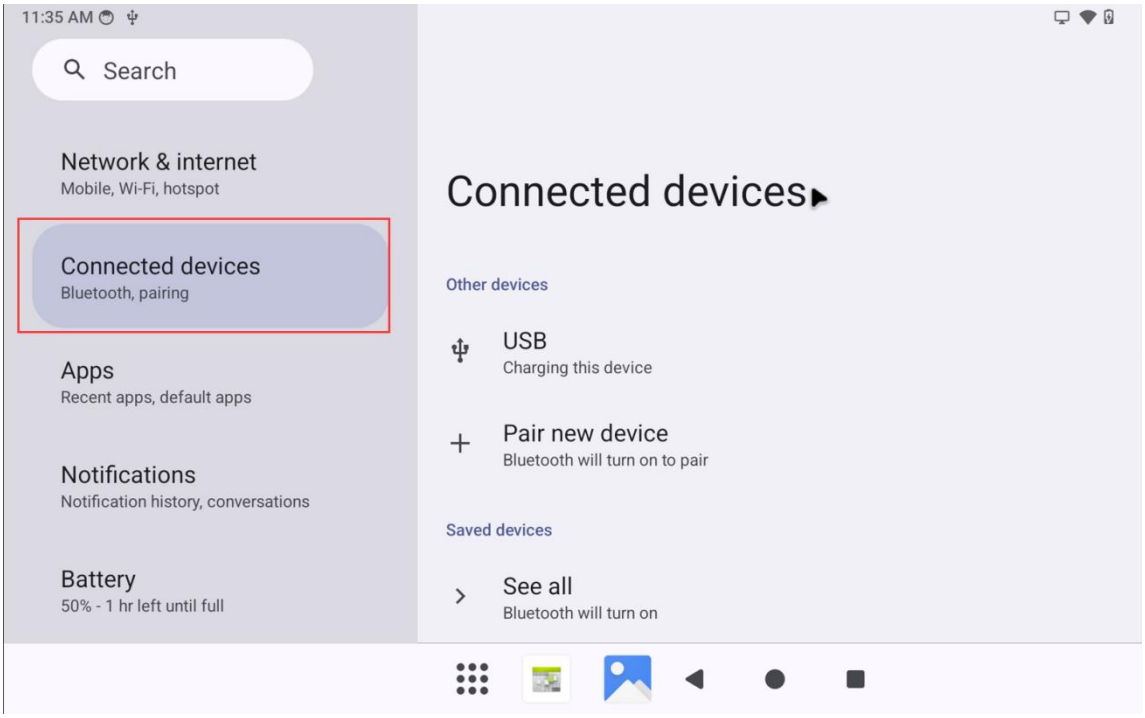
```
console:/ #  ping -I wlan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.165 wlan0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=189 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=193 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=190 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=427 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=332 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=213 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=8 ttl=48 time=404 ms
```

6.6.2 Bluetooth

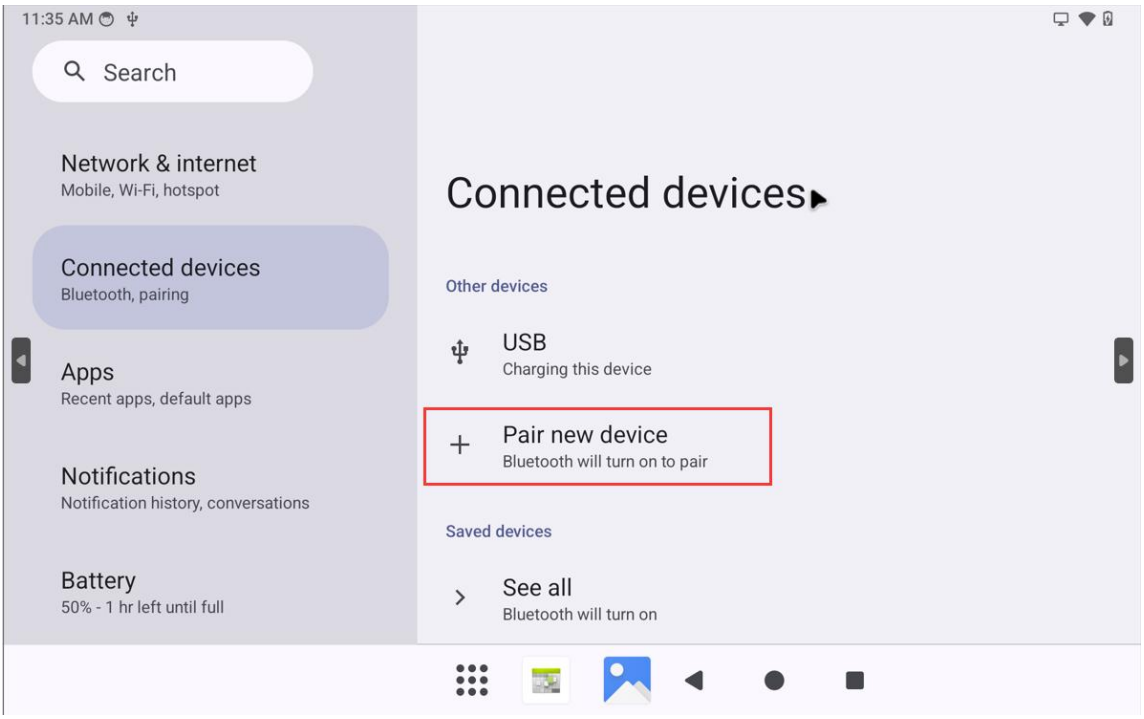
Step 1: Open the **Settings** app.



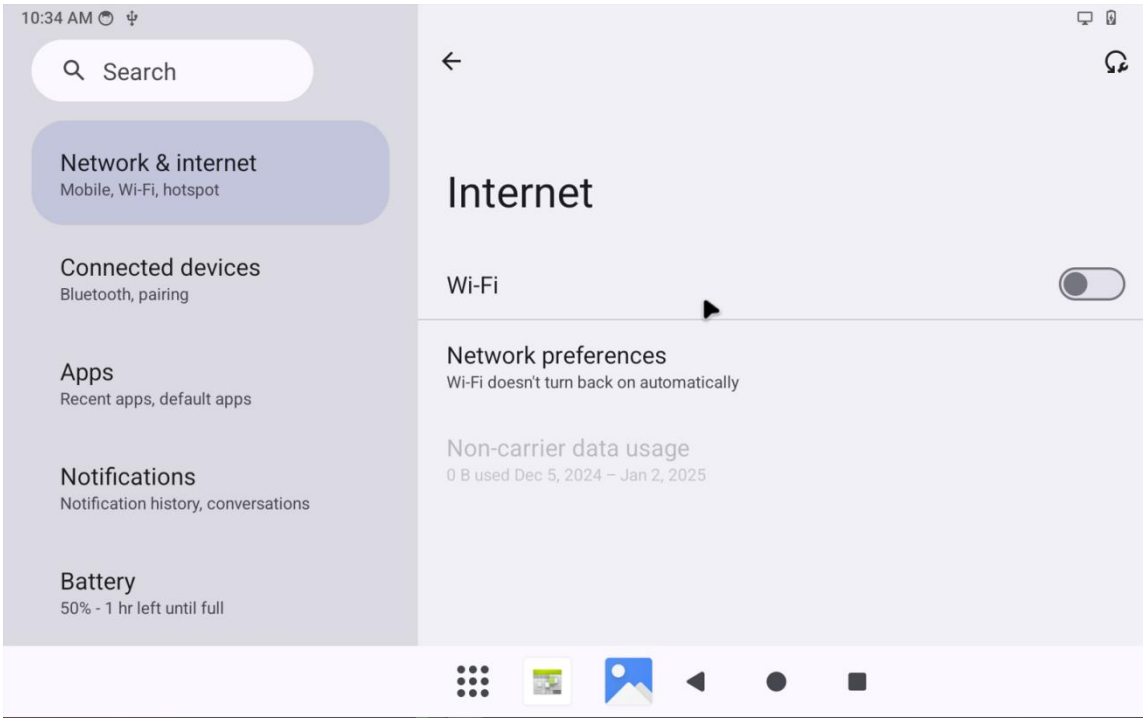
Step 2: Open the **"Connected devices"** option.



Step 3: Open the **"Pair new device"** option, and start scanning for devices.



Step 3: User can pair themselves in the Bluetooth device list.



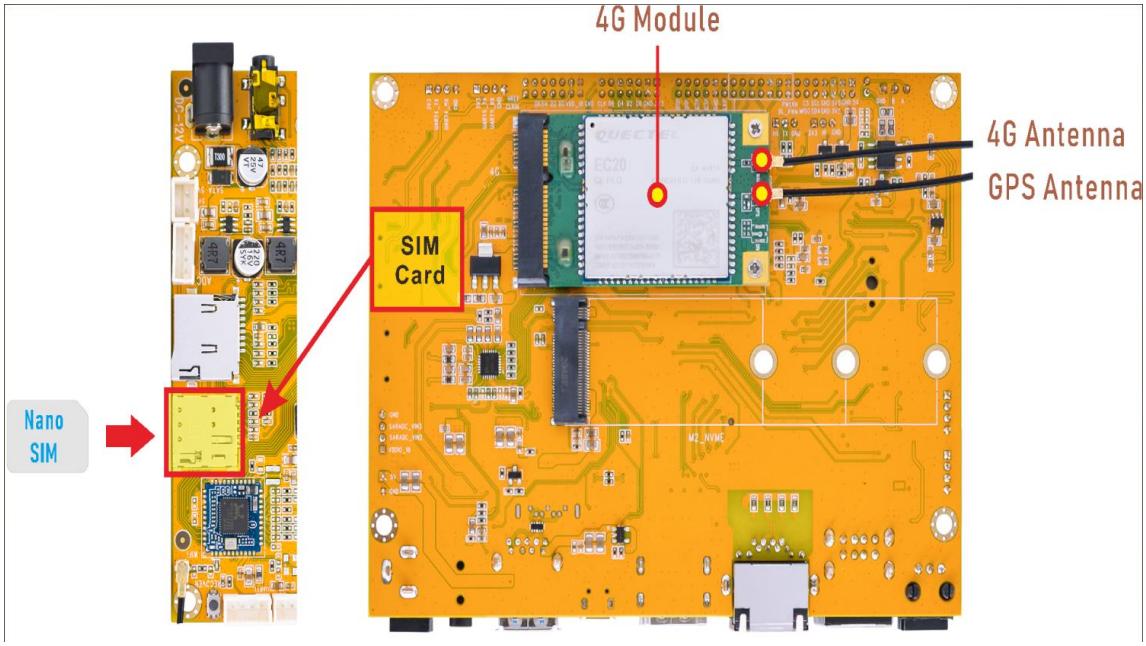
After successful configuration, Bluetooth devices can communicate with each other directly.

6.7 4G & GPS

Step 1: Insert 4G module to PCIe socket (4G model: EC20).

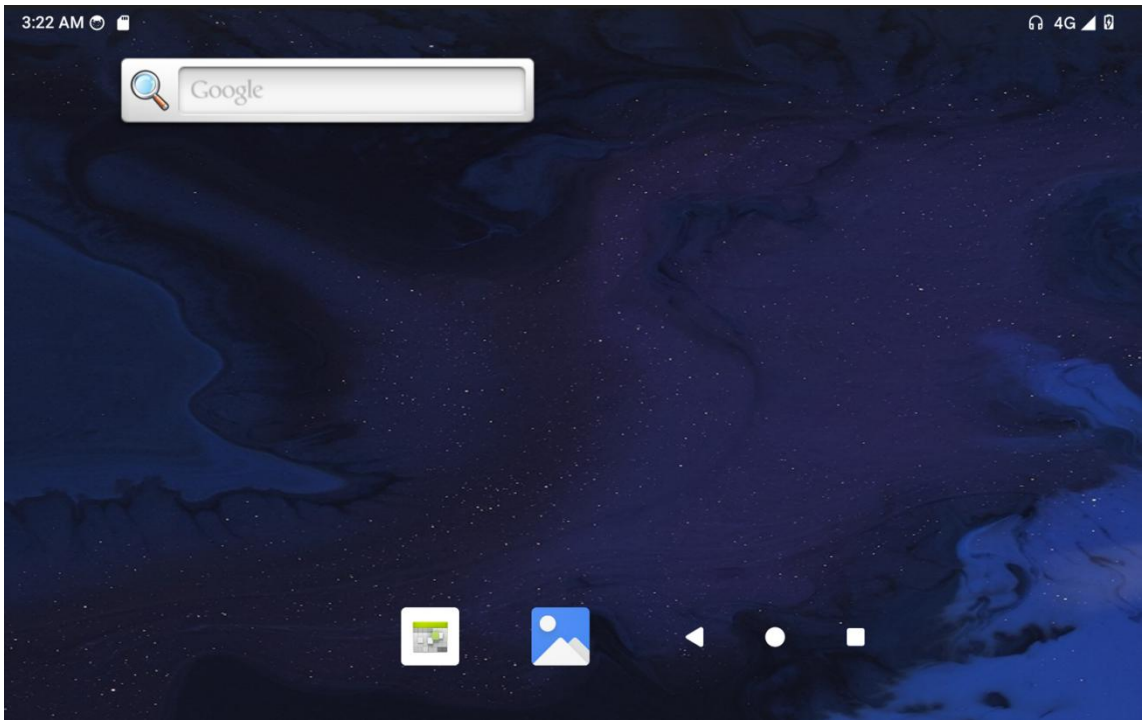
Step 2: Connect antenna and insert SIM card.

Step 3: Power on.

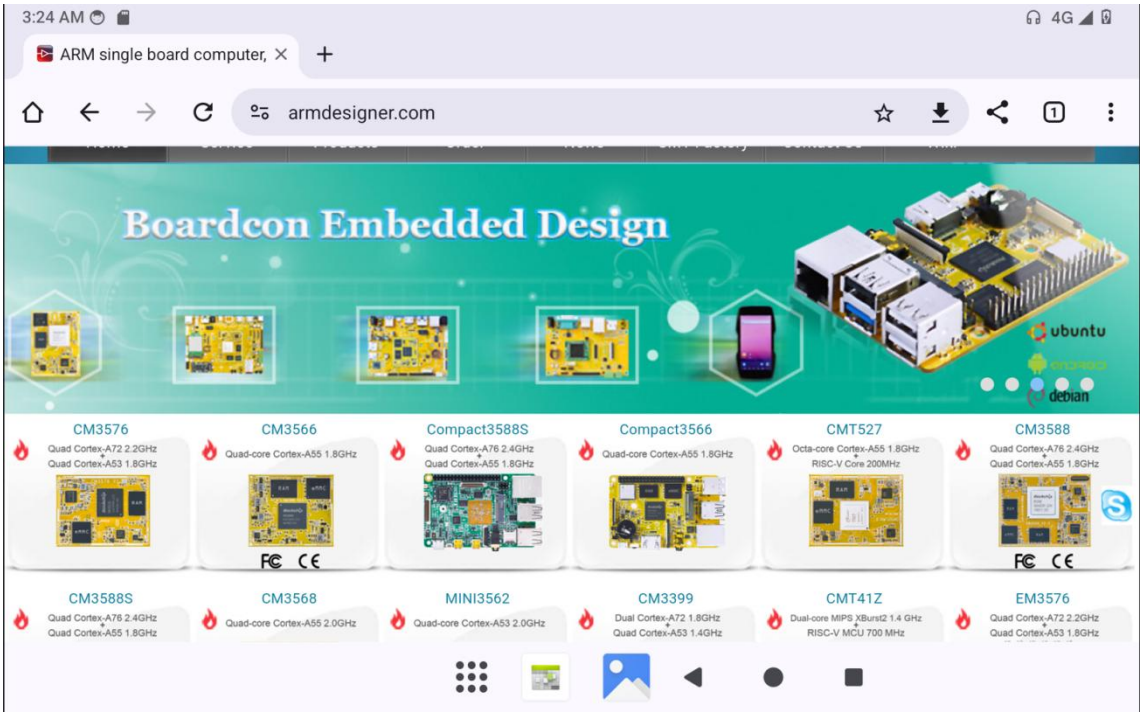


6.7.1 4G Test

The following icon appears in the upper right corner of the desktop, indicating that the 4G connection is successful.



Test the 4G connection:



Users can also choose to use the ping command to test the connectivity of the 4G, as shown below:

• View network interface information.

```
$ su
# ifconfig
```

```
console:/ # ifconfig
lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope: Host
          UP LOOPBACK RUNNING  MTU:65536  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

dummy0    Link encap:Ethernet  HWaddr 0e:27:4e:81:fa:b5
          inet6 addr: fe80::c27:4eff:fe81:fab5/64 Scope: Link
          UP BROADCAST RUNNING NOARP  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 TX bytes:420

eth0      Link encap:Ethernet  HWaddr 2a:98:78:a2:1c:15  Driver rk_gmac-dwmac
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:68 errors:0 dropped:0 overruns:0 frame:0
          TX packets:53 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:12216 TX bytes:6558
          Interrupt:70

wwan0     Link encap:Ethernet  HWaddr ae:a6:a6:1c:ee:94  Driver qmi_wwan_q
          inet addr:10.38.103.75  Mask:255.255.240.0
          inet6 addr: fe80::aca6:a6ff:fe1c:ee94/64 Scope: Link
          UP RUNNING NOARP  MTU:1500  Metric:1
          RX packets:1920 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1939 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1900411 TX bytes:279804

console:/ #
```

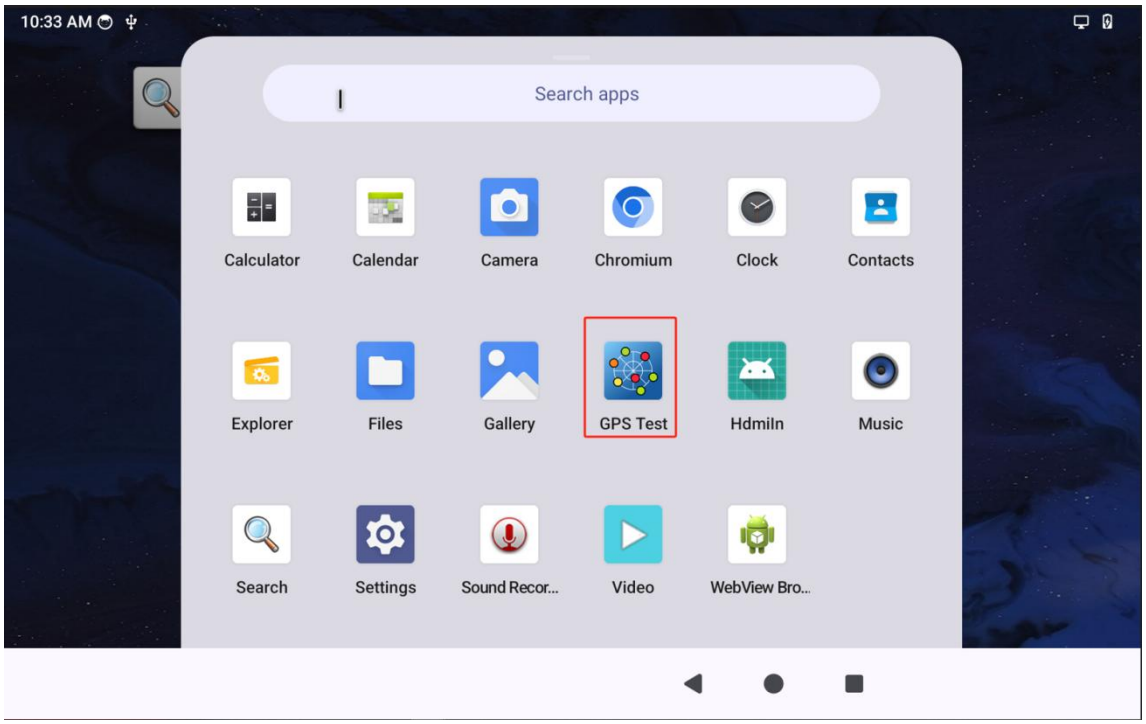
• Network connection test.

```
# ping -I wwan0 www.armdesigner.com
```

```
console:/ # ping -I wwan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 10.38.103.75 wwan0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=46 time=232 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=46 time=287 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=46 time=238 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=46 time=223 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=46 time=249 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=46 time=239 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=46 time=247 ms
```

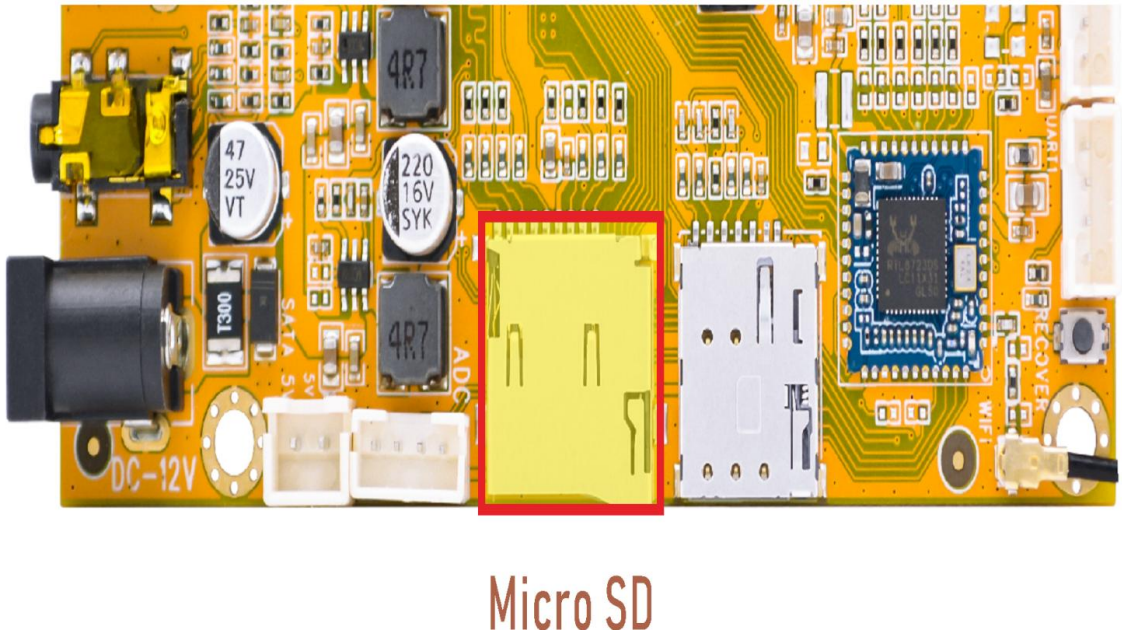
6.7.2 GPS Test

Open the app to check the number of satellites and their positioning.

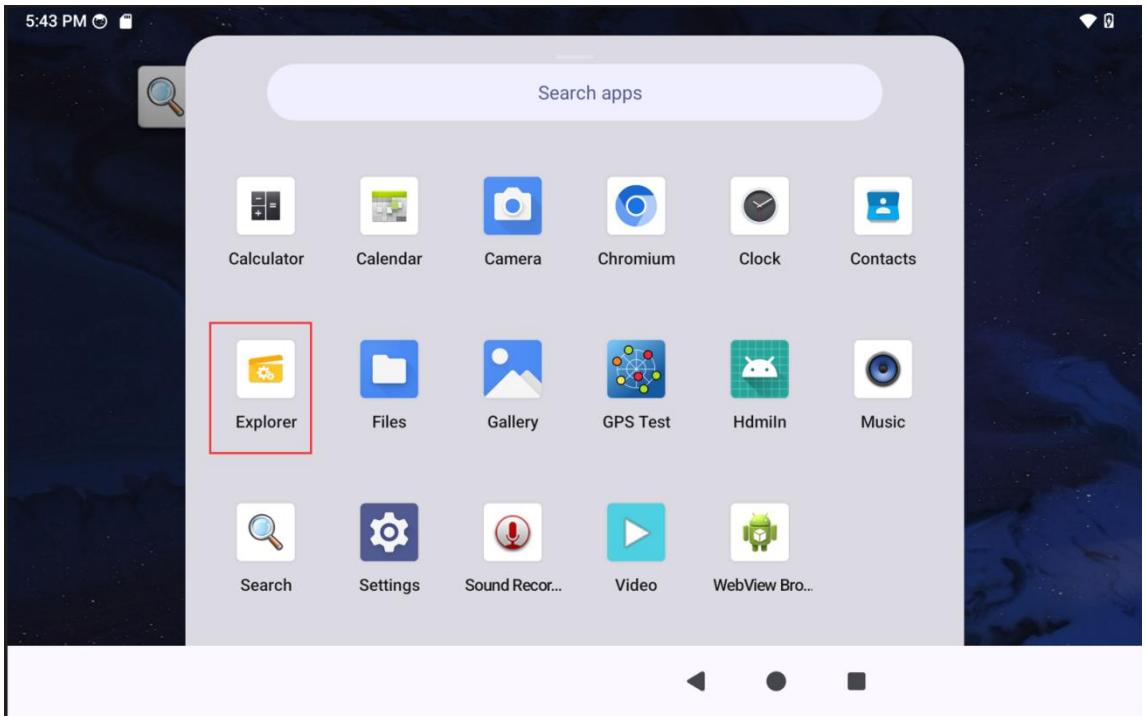


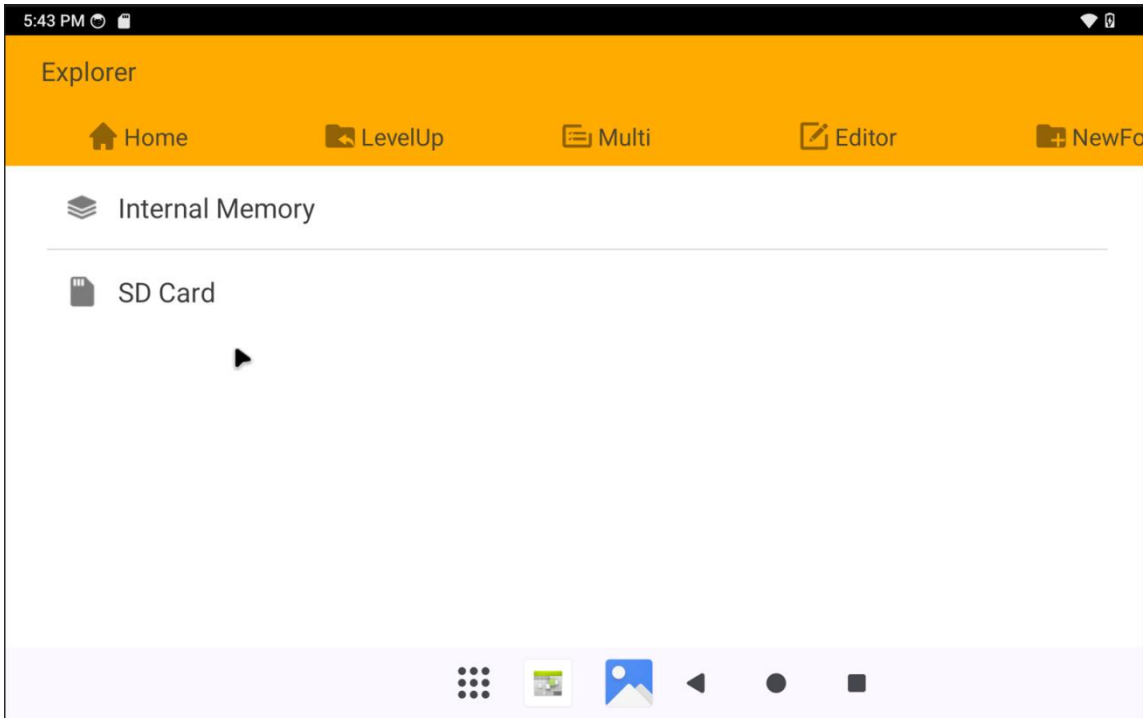
6.8 SD Card

Step 1: Insert the micro SD card into the card slot.



Step 2: Users can open the app to check the auto-mount status, and then access the device contents.

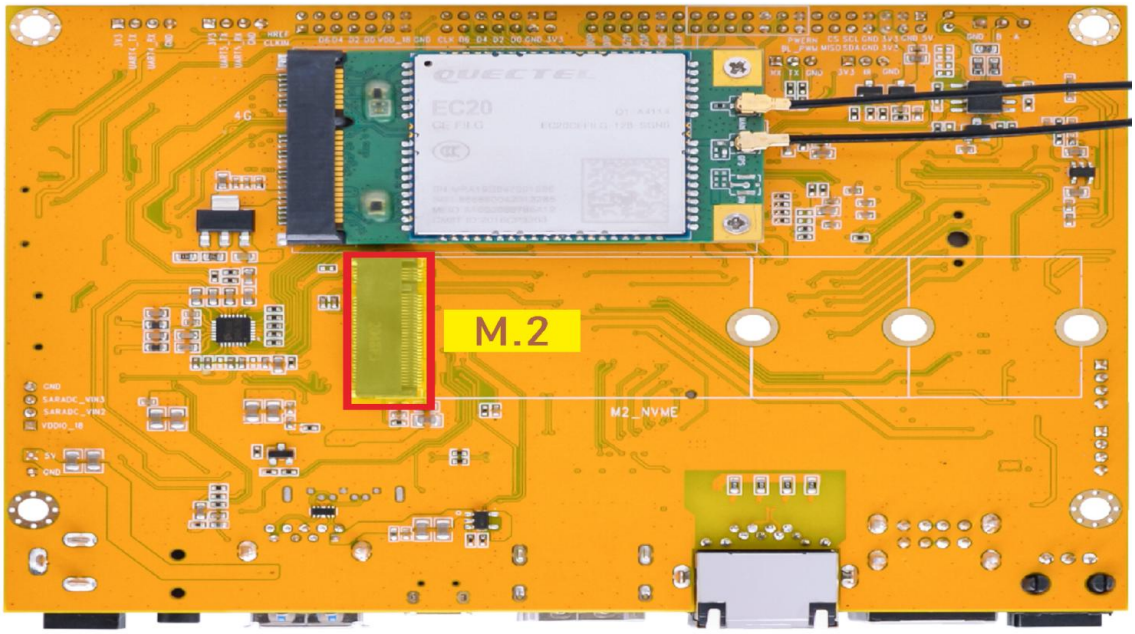




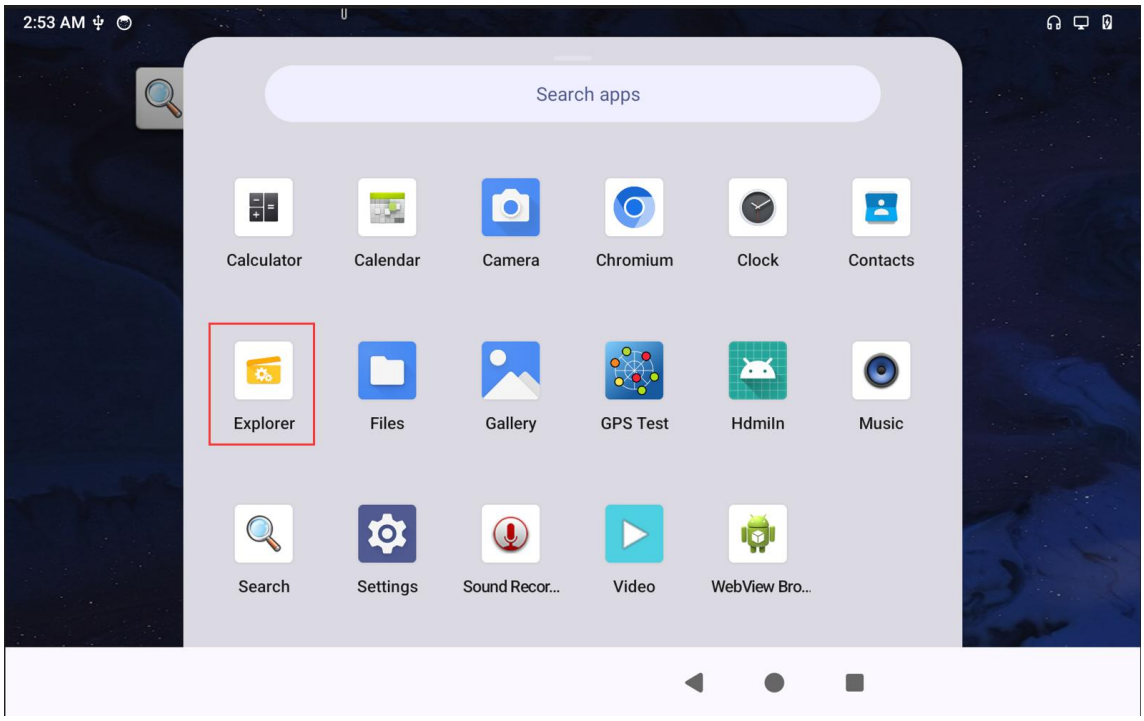
6.9 M.2 SSD

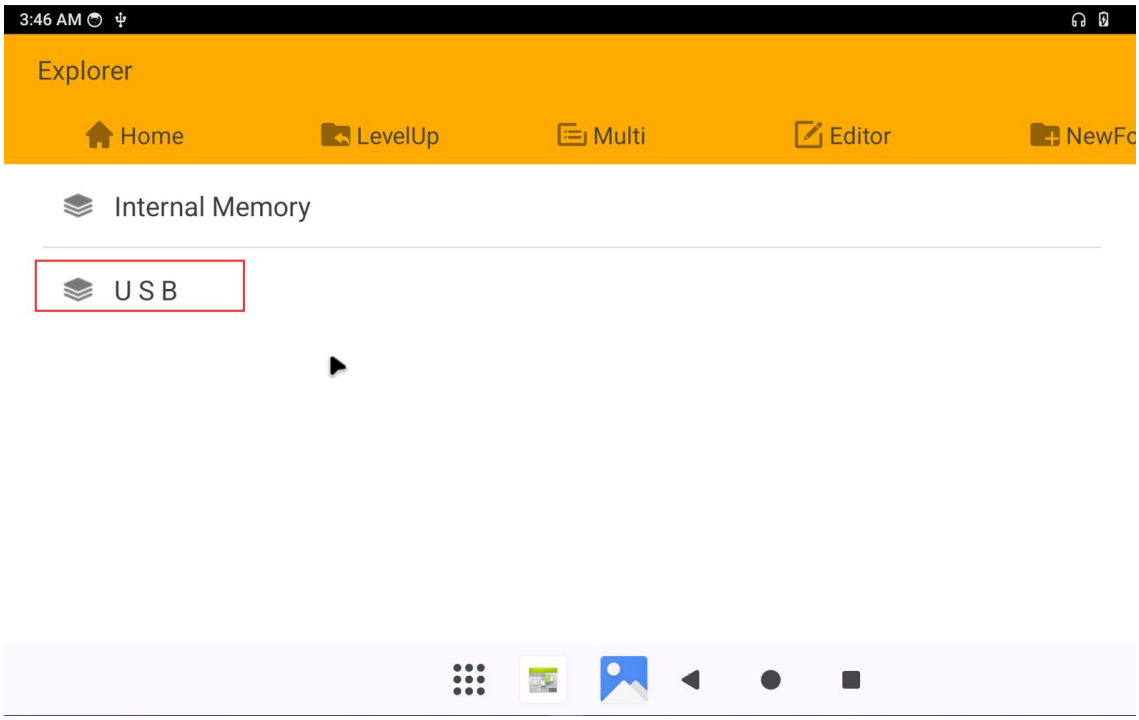
For the first time, format the m.2 ssd on the Android operating system.

Step 1, connect M.2 SSD device.



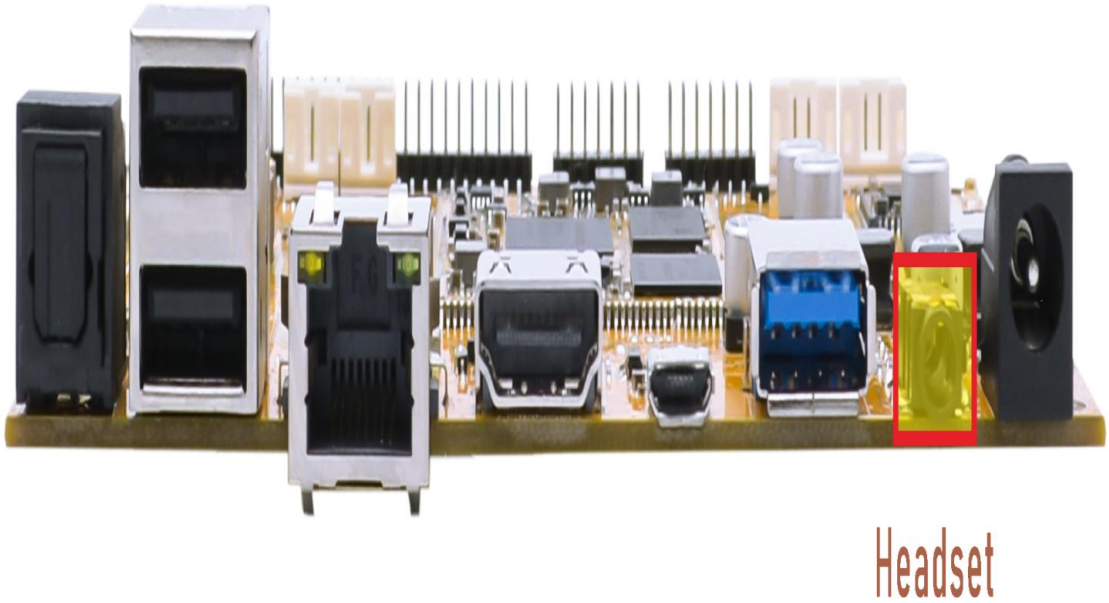
Step 2, open the **Explorer** APP to view the M.2 SSD device auto-mount directory.



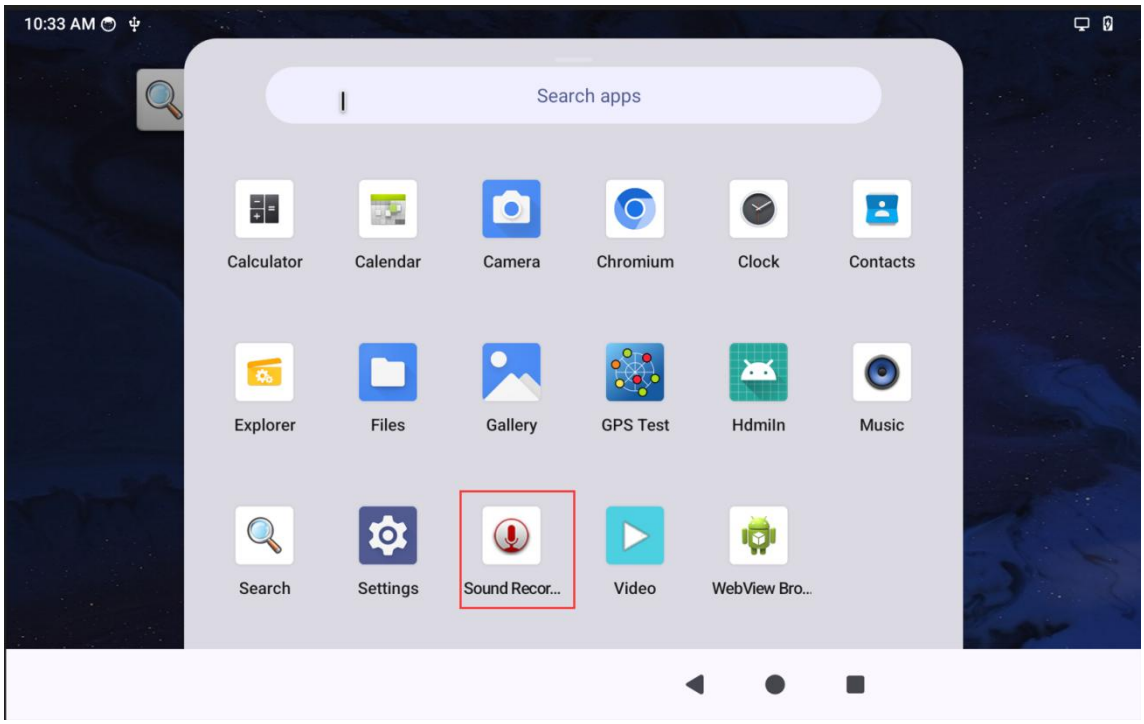


6.10 Headset

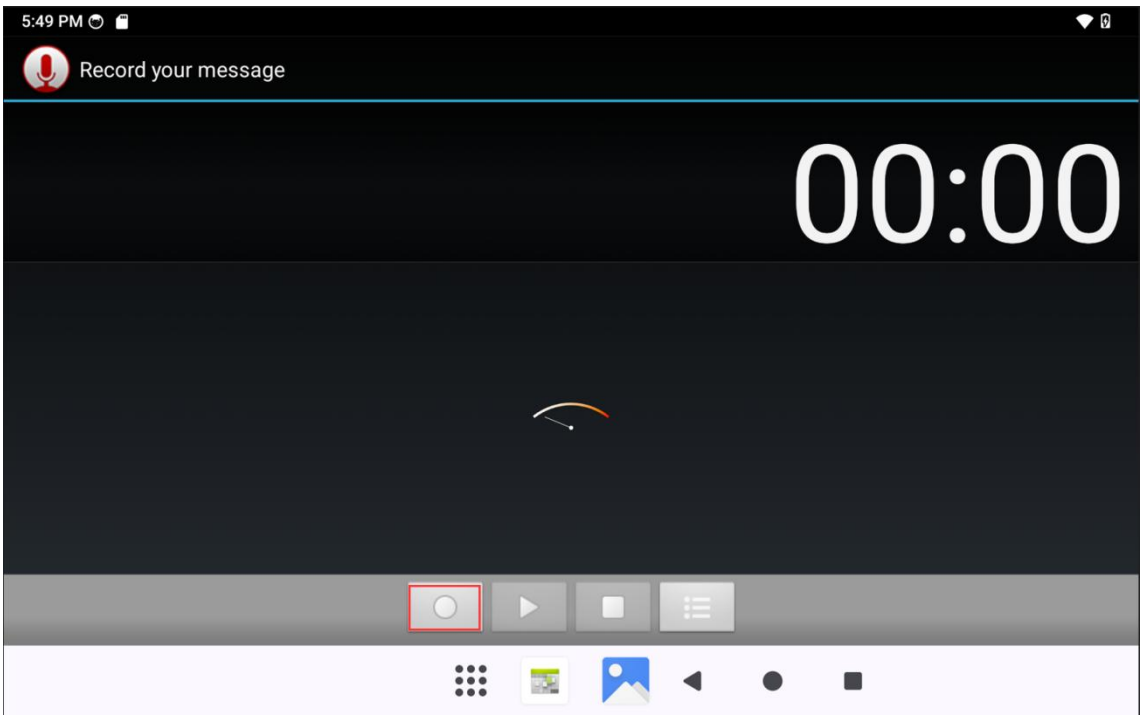
Step 1, plug the headphones into the headphone jack.



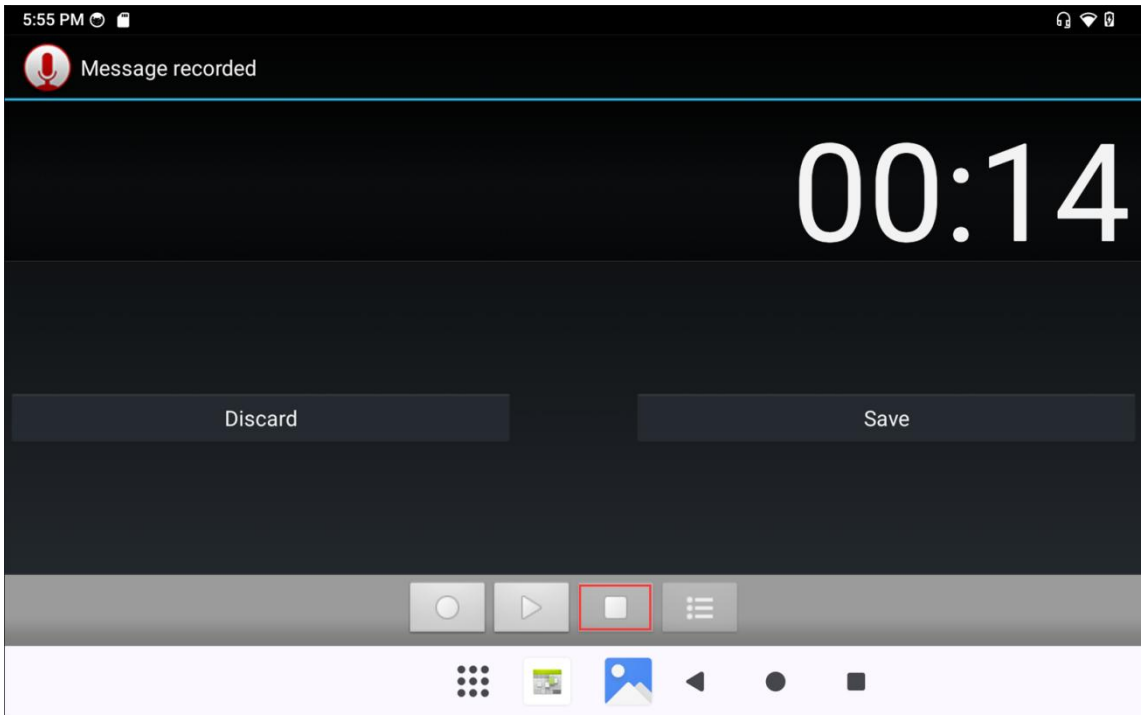
Step 2, open the **Sound Recorder** app for a recording test.



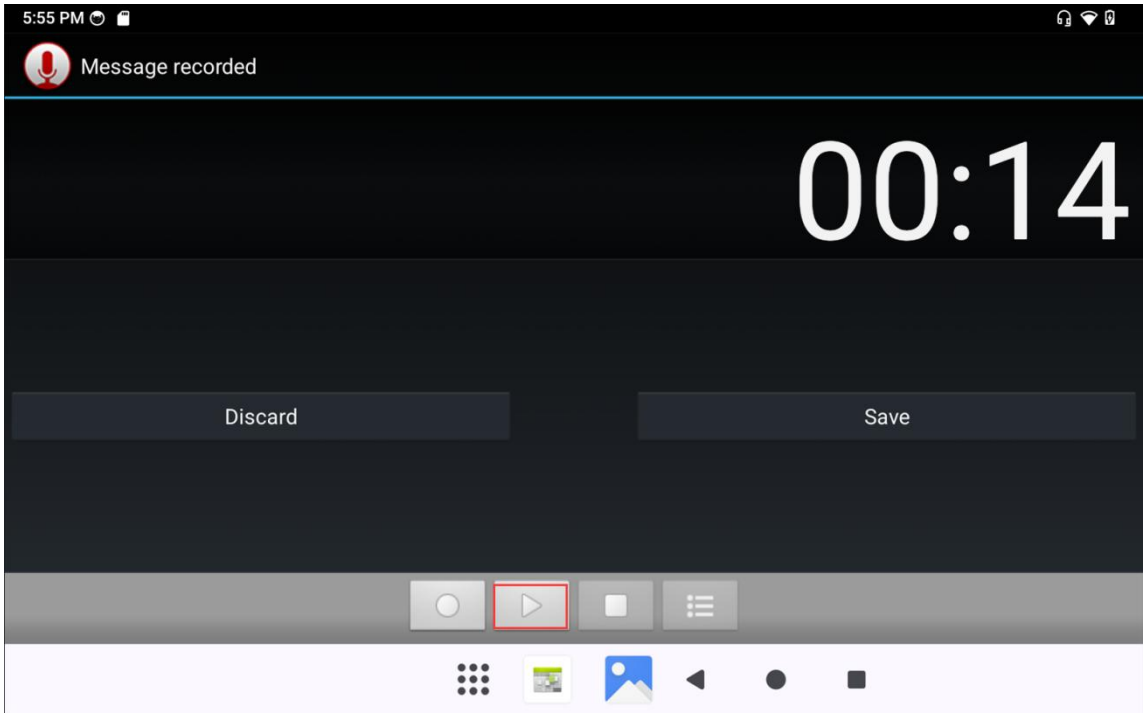
Step 3, click the button as shown below to start recording.



Step 4, click the button as shown below to end the recording.

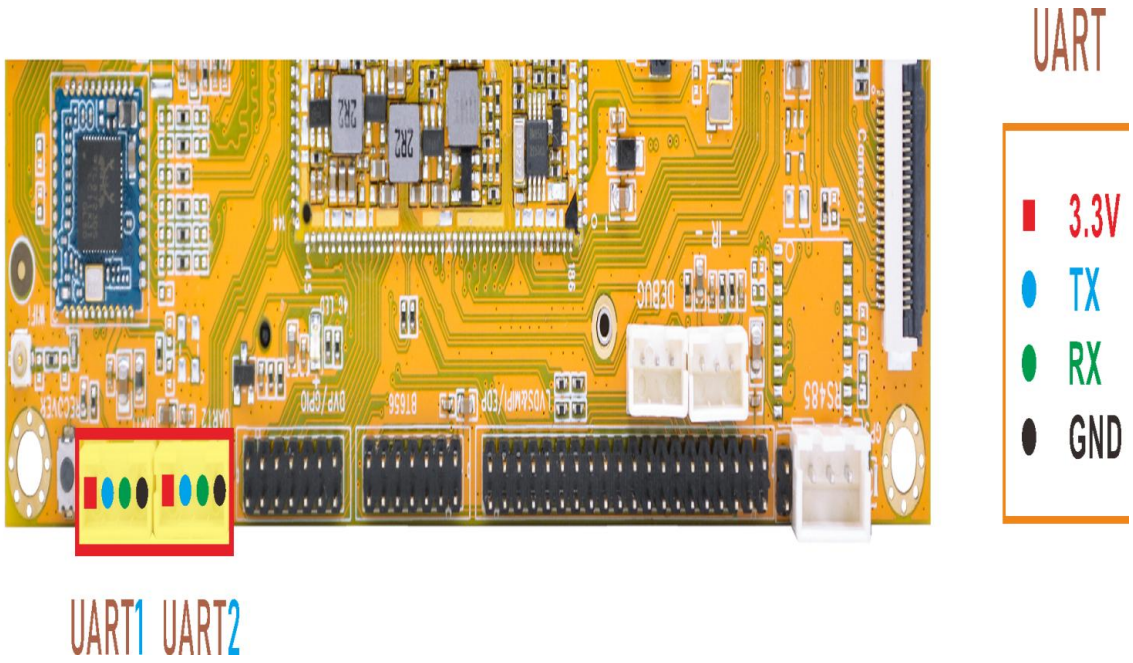


Step 5, click the button as shown below to play the recording.



6.11 UART

Step 1: Short circuit RX and TX pins of UART.



Step 2: UART1 test.

```
# com /dev/ttyS4 115200 8 0 1
```

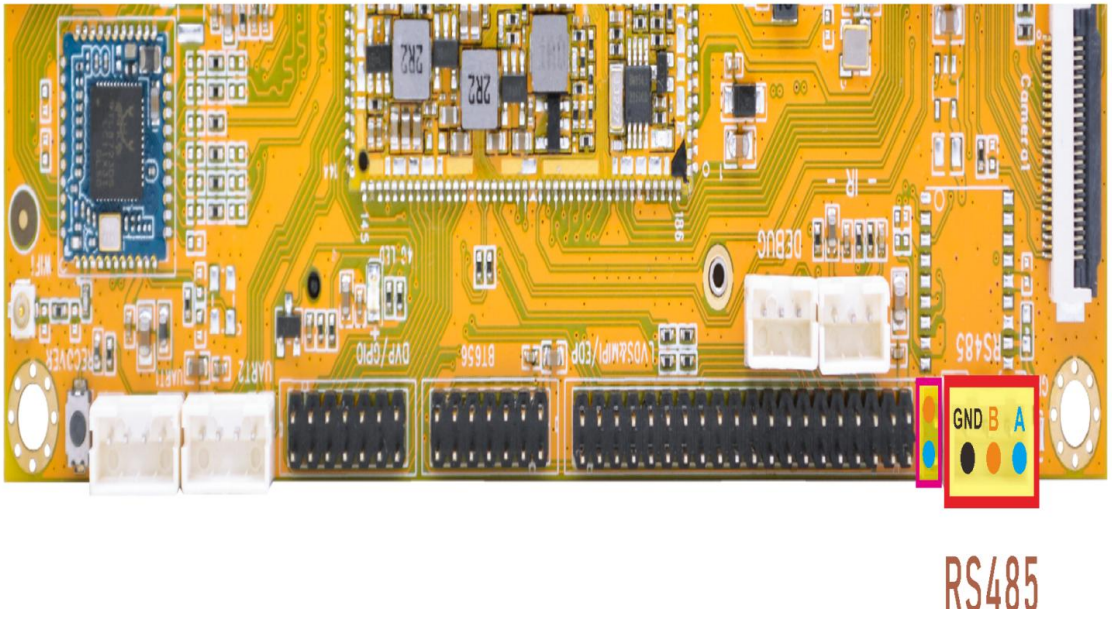
```
console:/ # com /dev/ttyS4 115200 8 0 1
port = /dev/ttyS4
baudrate = 115200
cs = 8
parity = 0
stopb = 1
1234567890
RECV: 1234567890
qwertyuiop
RECV: qwertyuiop
```

Step 3, UART2 test.

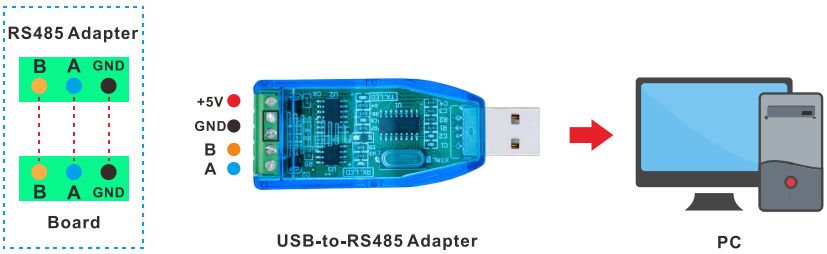
```
# com /dev/ttyS5 115200 8 0 1
```

```
console:/ # com /dev/ttyS5 115200 8 0 1
port = /dev/ttyS5
baudrate = 115200
cs = 8
parity = 0
stopb = 1
1234567890
RECV: 1234567890
qwertyuiop
RECV: qwertyuiop
```

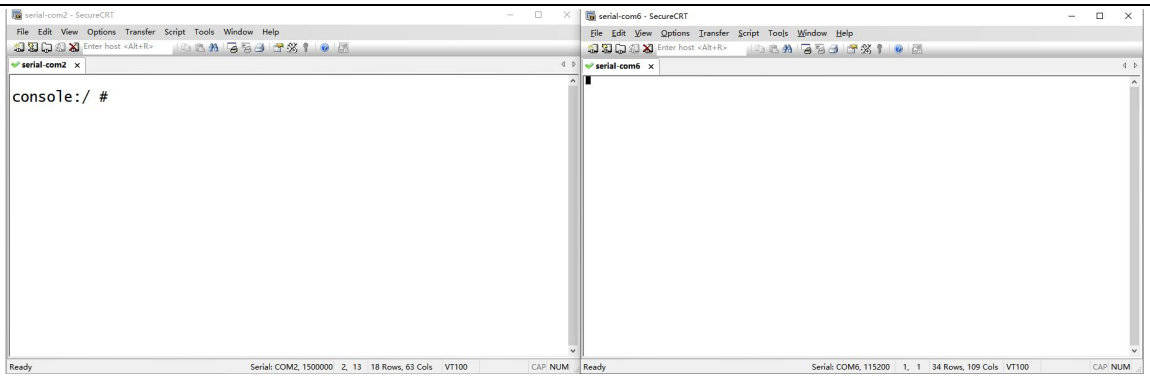
6.12 RS485



Step 1: As shown in the diagram, connect the RS485 test tool to the development board.

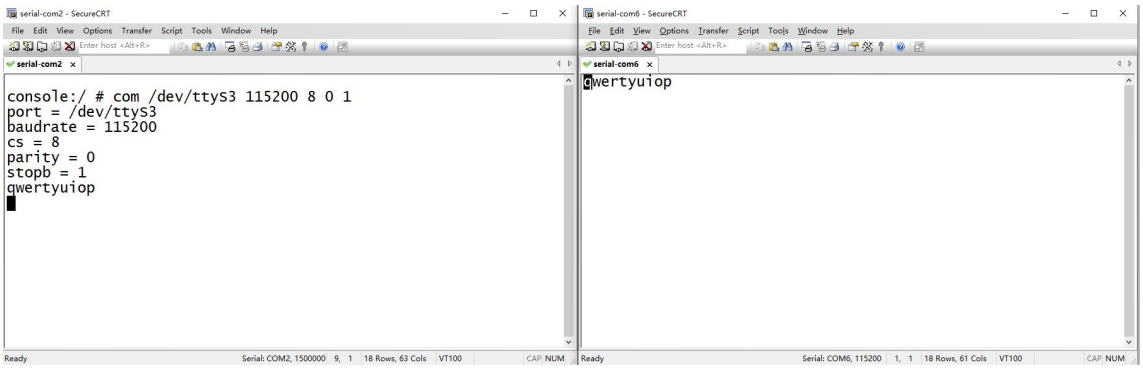


Step 2: Open the corresponding serial terminal, set the baud rate of the board to 1500000, and set the baud rate of the RS485 test tool to 115200.

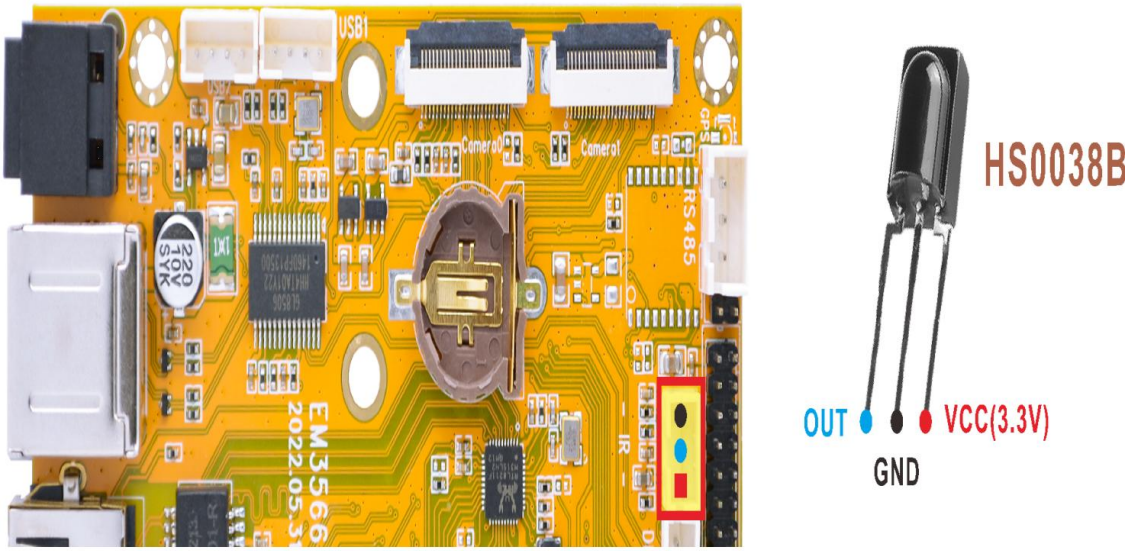


Step 3: Execute the following command on the board to test the RS485 transmission and reception functionality.

```
# com /dev/ttyS3 115200 8 0 1
```



6.13 IR



IR

Step 1: Open IR debugging print.

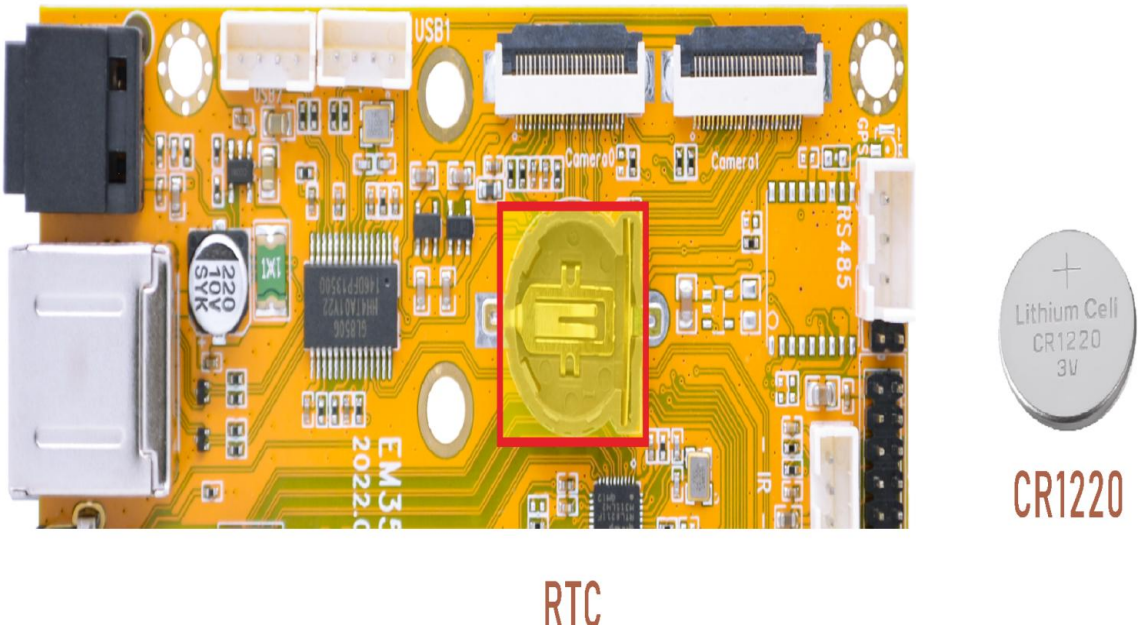
```
# echo 1 > /sys/module/rockchip_pwm_remotectl/parameters/code_print
```

Step 2: When pressing a button on the remote control towards the IR receiver, the key value will be printed to the log.

```
console:/ # [ 1967.907721][    C1] USERCODE=0xd728
[ 1967.934810][    C1] RMC_GETDATA=f8
[ 1968.347910][    C1] USERCODE=0xd728
[ 1968.375002][    C1] RMC_GETDATA=f8
[ 1968.705226][    C1] USERCODE=0xd728
[ 1968.732323][    C1] RMC_GETDATA=f8
[ 1969.033860][    C1] USERCODE=0xd728
[ 1969.060954][    C1] RMC_GETDATA=f8
[ 1969.312642][    C1] USERCODE=0xd728
[ 1969.339736][    C1] RMC_GETDATA=f8
[ 1970.707625][    C1] USERCODE=0xd728
[ 1970.734722][    C1] RMC_GETDATA=e8
[ 1971.099773][    C1] USERCODE=0xd728
[ 1971.126869][    C1] RMC_GETDATA=e8
[ 1971.429100][    C1] USERCODE=0xd728
[ 1971.456110][    C1] RMC_GETDATA=e8
[ 1971.805290][    C1] USERCODE=0xd728
[ 1971.832385][    C1] RMC_GETDATA=e8
```

6.14 RTC

Step 1: Install the coin cell battery.



Step 2: Set the system time.

```
# date -s "2025-01-21 18:35:00"
```

Step 3: Write the system time to the hardware clock.

```
# hwclock -w
```

Step 4: Display the current hardware clock time.

```
# hwclock
```

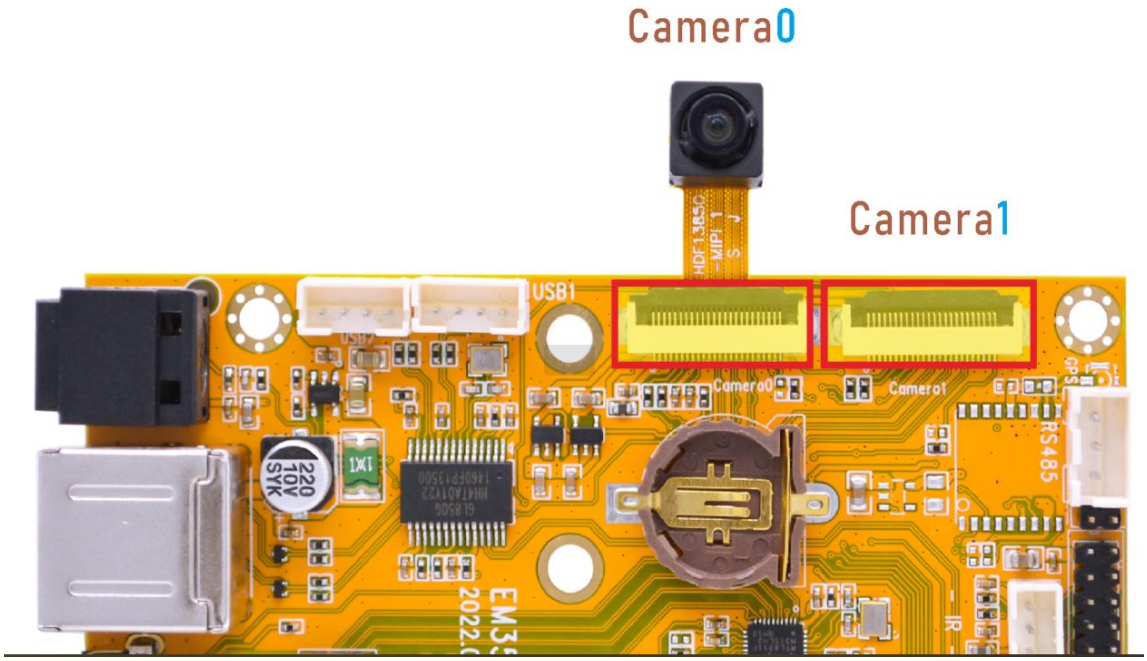
```
console:/ # date -s "2025-01-21 18:35:00"
Tue Jan 21 18:35:00 GMT 2025
console:/ # hwclock -w
console:/ # hwclock
2025-01-21 18:35:02+0000
console:/ # hwclock
2025-01-21 18:35:05+0000
console:/ # hwclock
2025-01-21 18:35:07+0000
console:/ # _
```

Step 5: Power off, after a period of time to turn on the power again, check whether the time is saved.

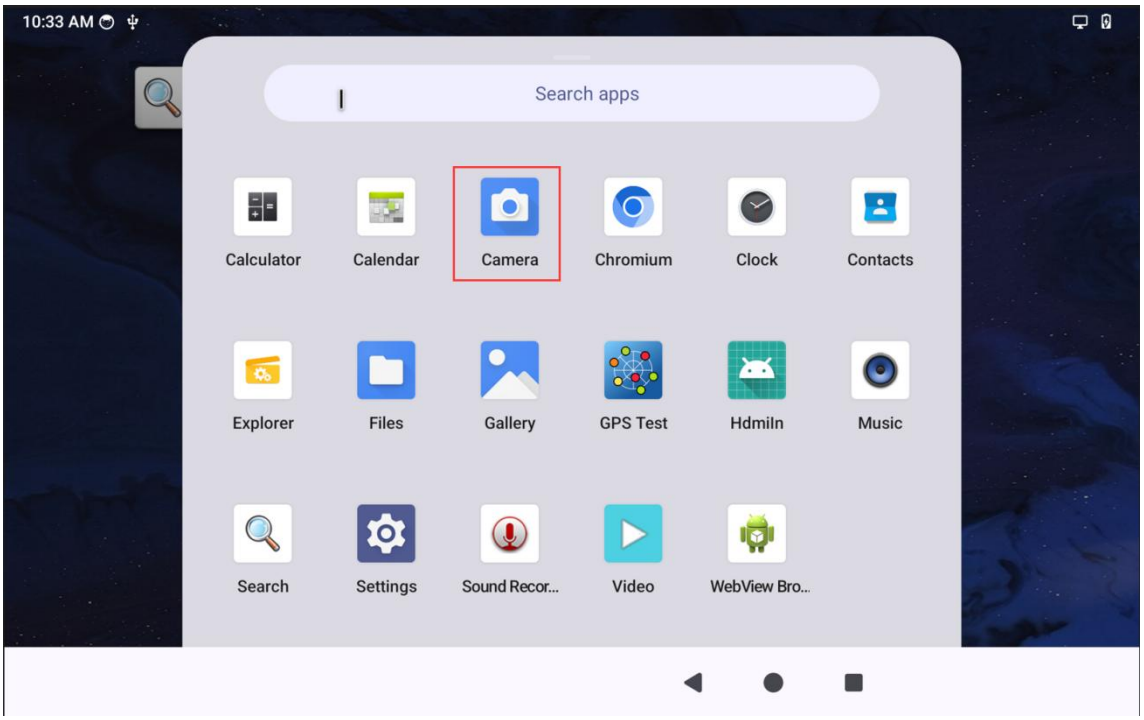
```
console:/ # hwclock
2025-01-21 18:37:22+0000
console:/ # hwclock
2025-01-21 18:37:24+0000
console:/ # hwclock
2025-01-21 18:37:24+0000
console:/ # hwclock
2025-01-21 18:37:25+0000
console:/ # hwclock
2025-01-21 18:37:25+0000
console:/ # hwclock
2025-01-21 18:37:26+0000
```

6.15 Camera

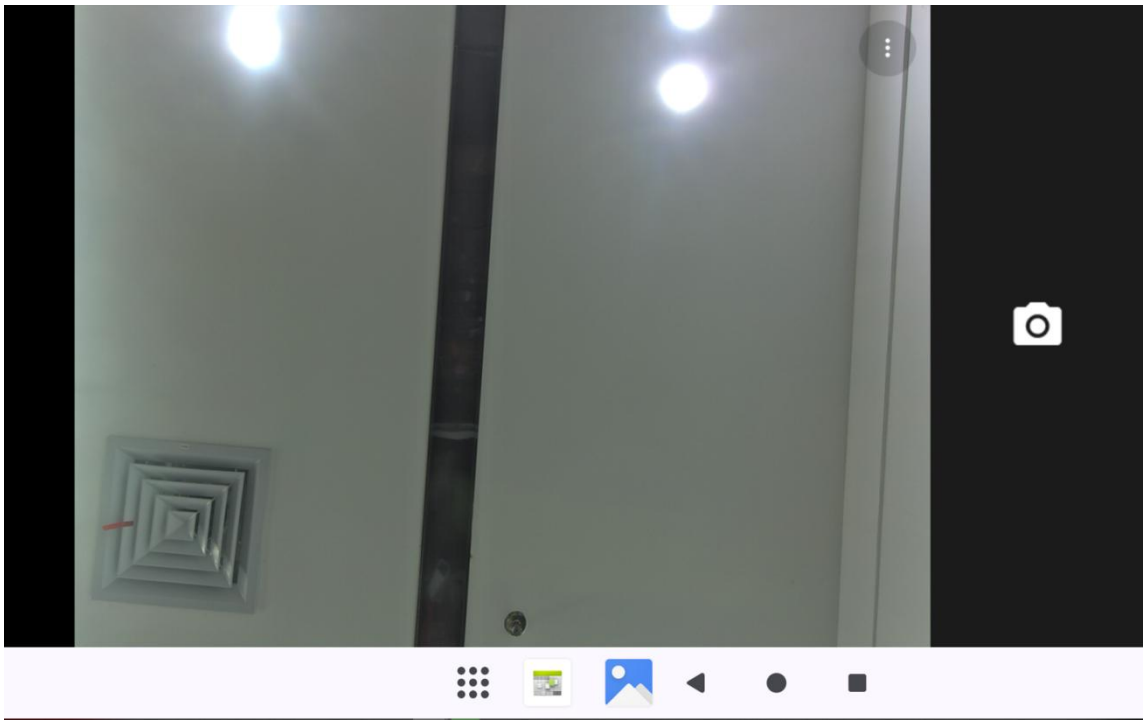
EM3566 Android14 system is configured with the camera0 by default, as shown in the figure below.



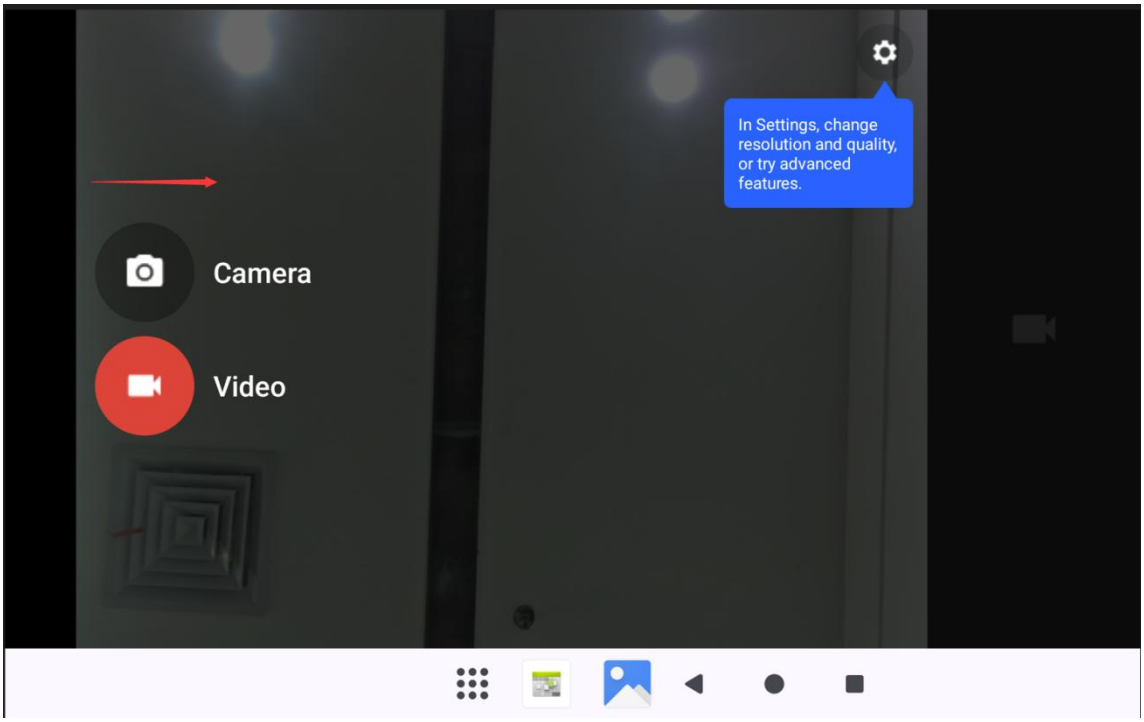
Step 1: Open the **Camera** app.



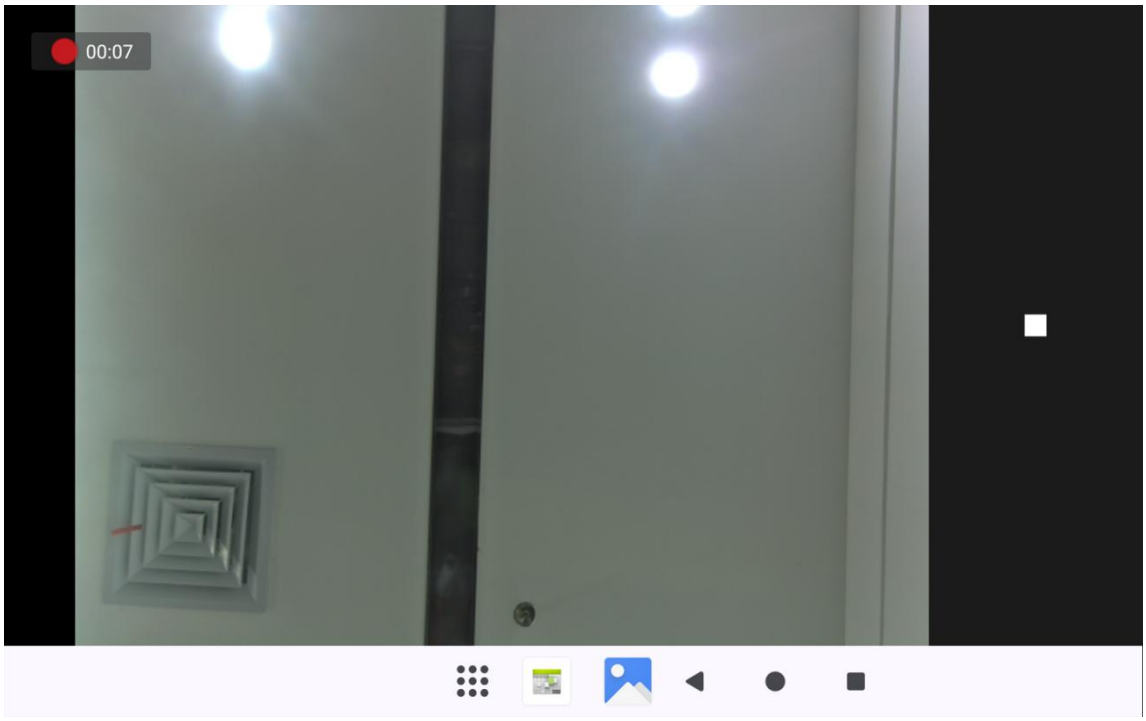
Step 2: Take a picture.



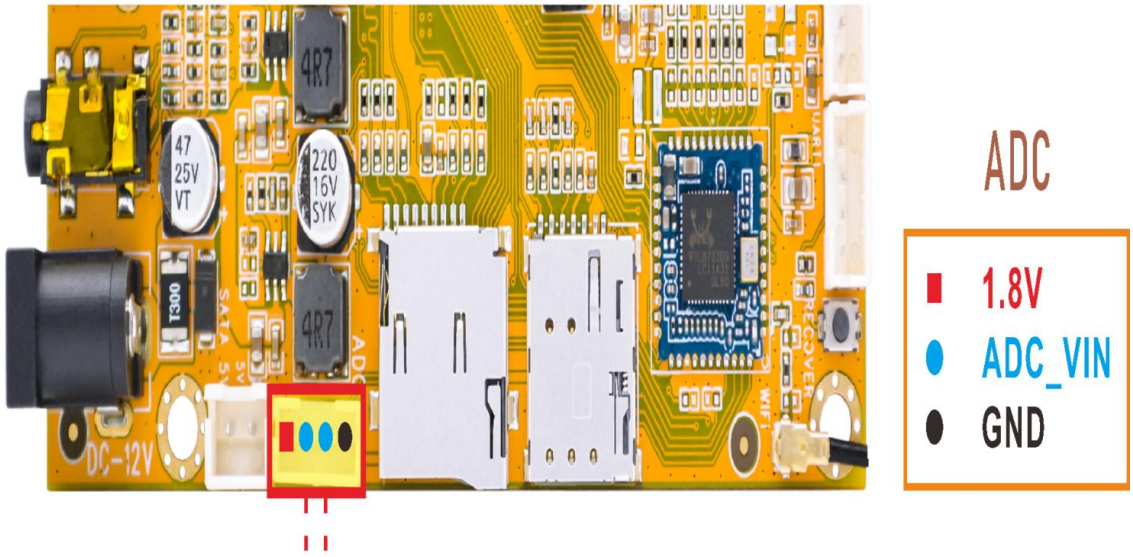
Step 3: Switch to video recording mode by swiping from the left side of the screen to the right.



Step 4: Video recording.



6.16 ADC



Execute the following command to test ADC:

```
# cat /sys/devices/platform/fe720000.saradc/iio:device0/in_voltage2_raw
```

```
console:/ # cat /sys/devices/platform/fe720000.saradc/iio:device0/in_voltage2_raw
887
```

Connect SARADC_VIN2 to VDDIO_18 execute command again:

```
# cat /sys/devices/platform/fe720000.saradc/iio:device0/in_voltage2_raw
```

```
console:/ # cat /sys/devices/platform/fe720000.saradc/iio:device0/in_voltage2_raw
1023
```

Connect SARADC_VIN2 to GND execute command again:

```
# cat /sys/devices/platform/fe720000.saradc/iio:device0/in_voltage2_raw
```

```
console:/ # cat /sys/devices/platform/fe720000.saradc/iio:device0/in_voltage2_raw
11
```

The testing method for SARADC_VIN3 will be the same as that used for SARADC_VIN2.

```
# cat /sys/devices/platform/fe720000.saradc/iio:device0/in_voltage3_raw
```