

# *IdeaT527 Android13 User Manual*

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V3.0



**Boardcon Embedded Design**

## Overview

This document applies only to the IDEAT527 development board. It is intended to help users quickly understand the hardware platform and to guide them in completing environment setup, source code compilation, firmware flashing, and functional testing of all hardware interfaces on the board.

## System Support

Development Board	Android13
IDEAT527 V3 CMT527_RV3.0	Y

## Revision History

Version	Date	Author	Revision History
V2.0	2025-12-03	Liu Yuan	Update

## Disclaimer

The information in this manual is provided for reference only. While Boardcon has made every effort to ensure the accuracy and reliability of the content, no guarantee is given regarding its completeness or correctness. All information in this manual is subject to change without prior notice.

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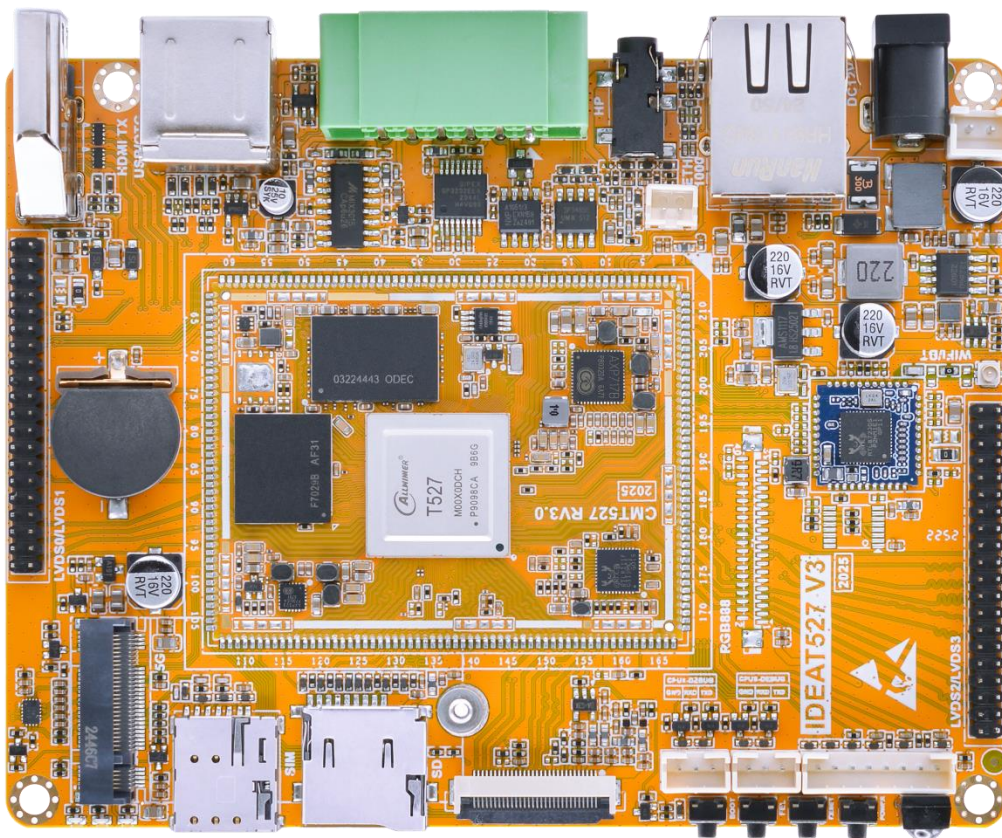
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# 1.Introduction

## 1.1 Overview

IdeaT527 is based on the Allwinner T527 octa-core Cortex™-A55 SoC, integrating HiFi4 DSP, 2 TOPS NPU, and Mali-G57 MC1 GPU, and featuring a 32-bit LPDDR4 DRAM interface to cover a wide range of AI and multimedia applications. The platform provides a PCIe 2.1 high-speed expansion interface and a CAN automotive interface. For display, it supports 2×LVDS / MIPI-DSI / HDMI outputs; for capture, it provides MIPI CSI input. With 4K UHD video encode/decode capability and support for DI and the AWonder system, it delivers smooth display performance and professional-grade AI vision effects, and is suitable for content sharing and self-service interactive terminals, smart manufacturing, and other commercial and industrial devices.

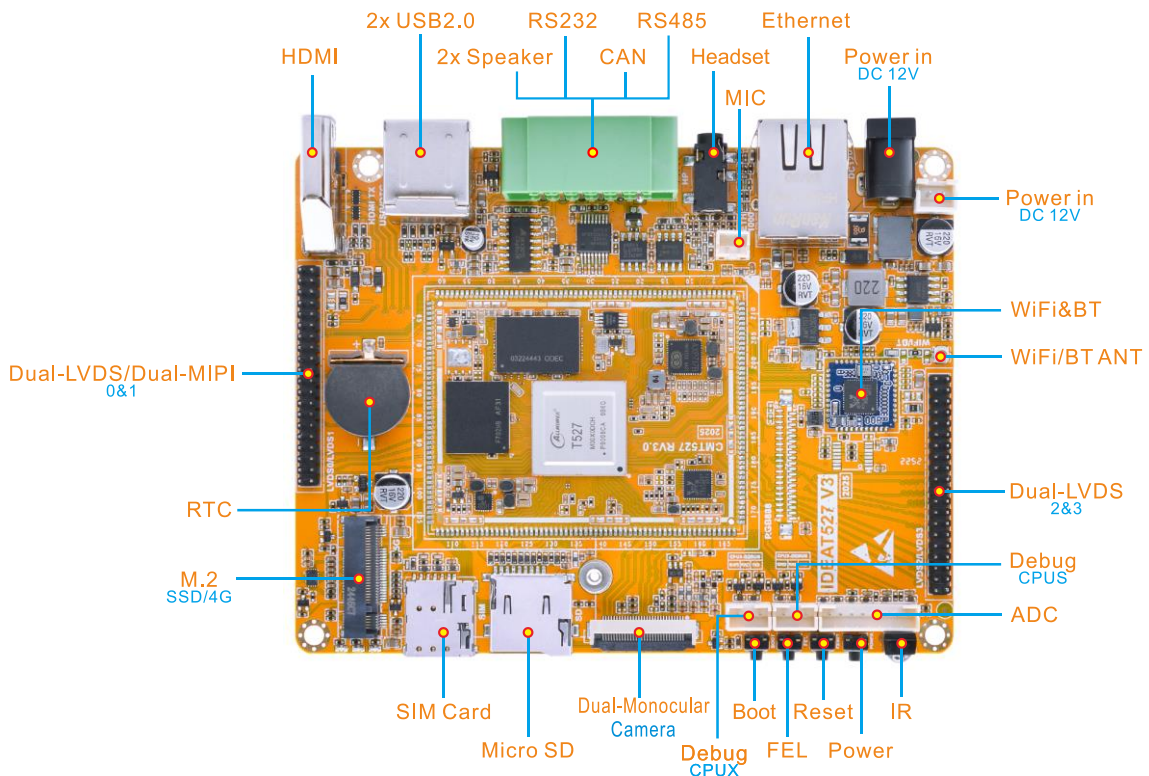


## 1.2 Product Parameters

Basic Parameters	
SOC	Allwinner T527
CPU	Octa-core ARM Cortex-A55, up to 1.8GHz
NPU	2 TOPS
GPU	<ul style="list-style-type: none"> <li>• ARM Mali-G57 MC1</li> <li>• Supports OpenGL ES 3.2/2.0/1.1, Vulkan1.1/1.2/1.3, and OpenCL2.2</li> </ul>
Video	Decoder <ul style="list-style-type: none"> <li>• Supports ITU-T H.265 Main/Main10, VP9 Profile0/ Profile2, level 6.1 up to 3840x2160@60fps</li> <li>• Supports ITU-T H.264 Base/Main/High Profile@Level 4.2 3840x2160@30fps</li> </ul>
	Encoder <ul style="list-style-type: none"> <li>• Support BP/MP/HP encoding up to 3840x2160@25fps</li> <li>• Support JPEG/ MJPEG baseline encoding up to 3840x2160@15fps</li> </ul>
RAM	2GB
ROM	32GB eMMC flash
Support system	Android13
Hardware Parameters	
Extended Storage	<ul style="list-style-type: none"> <li>• Support 1x MicroSD Card</li> <li>• Support 1x M.2 SSD</li> </ul>
Display	<ul style="list-style-type: none"> <li>• Support 1x HDMI up to 4096x2160@60fps display</li> <li>• Support 2x LVDS up to 1920x1080@60fps display</li> <li>• Support 1x MIPI DSI up to 4096 x 2160@45fps display</li> </ul>
Video input	<ul style="list-style-type: none"> <li>• Support 1x Camera input</li> </ul>
Audio	<ul style="list-style-type: none"> <li>• Support 1x MIC input</li> </ul>

	<ul style="list-style-type: none"> <li>• Support 2x Speaker output</li> <li>• Support 1x Headset</li> </ul>
USB	<ul style="list-style-type: none"> <li>• Support 2x USB2.0 Host</li> </ul>
Network	<ul style="list-style-type: none"> <li>• Support 1x Gigabit Ethernet</li> <li>• Support 1x WIFI/BT module</li> <li>• Support 1x 4G module</li> </ul>
Peripheral communication	<ul style="list-style-type: none"> <li>• Support 1x RS485</li> <li>• Support 1x CAN</li> </ul>
Other parameters	Support Debug, RTC, IR, ADC, Power key , Reset key, FEL key
<b>Electrical Parameters</b>	
Power supply input voltage	12V/3A
RTC input voltage	3V/0.6uA
Operating temperature	0~70 °
Storage temperature	-40~85 °
<b>Structural Parameters</b>	
Core board dimensions	56.0mm x 42.5mm
Motherboard dimensions	120.0mm x 92.0mm

## 1.3 Hardware Interface Introduction



Interface parameters	
Power in	12V DC power input interface
Ethernet	Gigabit Ethernet RJ45 interface
MIC	Microphone
Headset	Audio output/input
RS485	RS485 interface
CAN	CAN interface
2x Speaker	Audio output
2x USB2.0	Download interface, compatible with USB 2.0
HDMI	HDMI interface
Dual-LVDS/Dual-MIPI 0&1	LVDS/MIPI display interface

RTC	RTC coin cell connector
M.2 <a href="#">SSD&amp;4G</a>	M.2 SSD or 4G model interface
SIM Card	SIM Card slot
Micro SD	Micro SD slot
Dual-Monocular <a href="#">Camera</a>	Power key
Debug <a href="#">CPUX</a>	Debug the serial port (default use)
Boot	Boot key
FEL	FEL key
Reset	Reset key
Power	Power key
Boot	Boot key
IR	Infrared receiver
ADC	LRADC and GPADC interface
Debug <a href="#">CPUS</a>	Debug the serial port
Dual-LVDS <a href="#">2&amp;3</a>	LVDS interface
WiFi/BT ANT	WiFi&Bluetooth antenna
WiFi&BT	WiFi&Bluetooth module (RTL8723DS)
Power in <a href="#">DC 12V</a>	12V DC power input interface

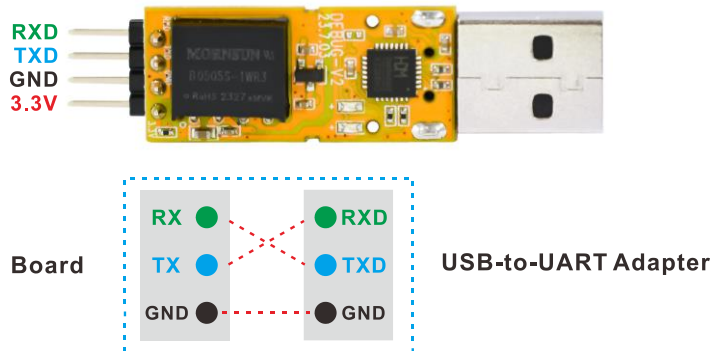
## 2. Install Drivers and Tool

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

Number	Driver name	Driver	Use
1	CH9102x	SETUP.EXE	Serial port debugging driver
2	Serial Terminal Tool	SecureCRT.exe	Debugging tool

## 2.1 Install CH9102X Driver

### 2.1.1 How to Connect the Serial Port Tool



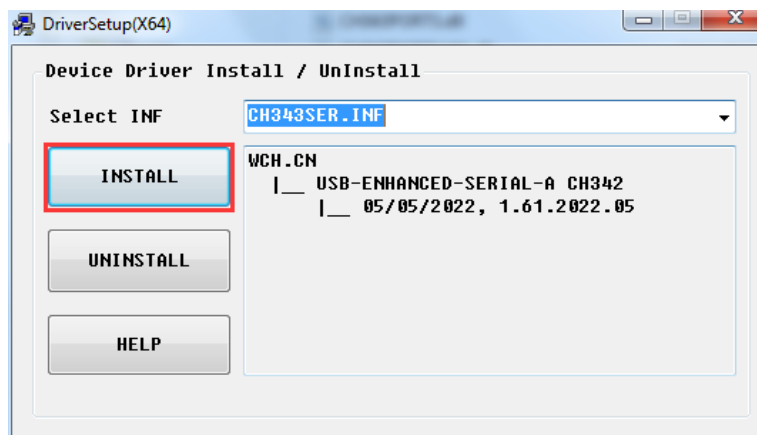
Pin	Connection Description
RXD	Receive, connect to TX pin of the board.
TXD	Transmit, connect to RX pin of the board.
GND	Ground, connect to GND pin of the board.
3V3	No need to connect.

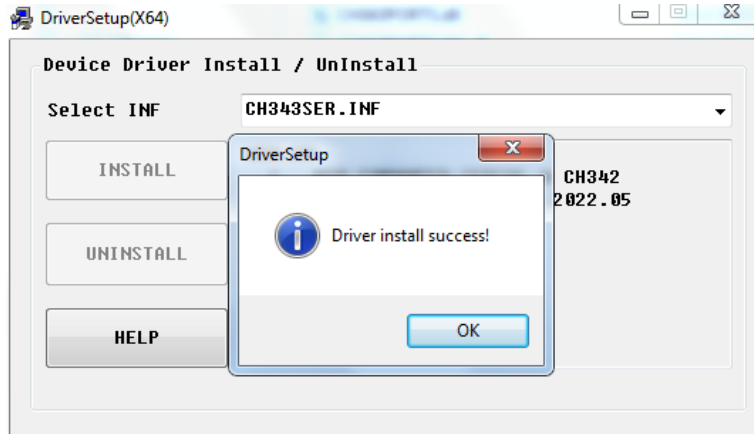
### 2.1.2 Install Driver

**Step 1:** Plug the CH9102X Module to the PC

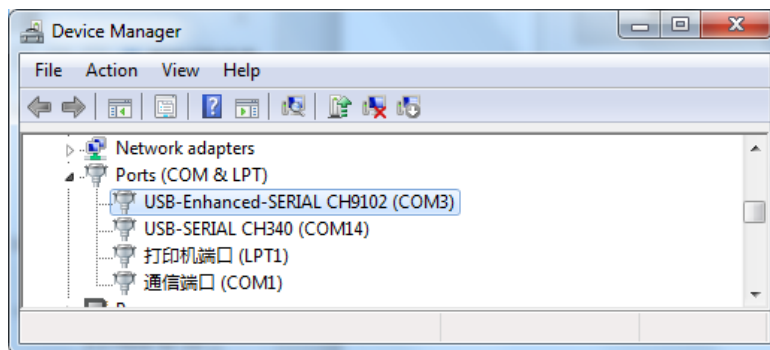
**Step 2:** Unzip *CH343SER.ZIP* on Windows.

**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.

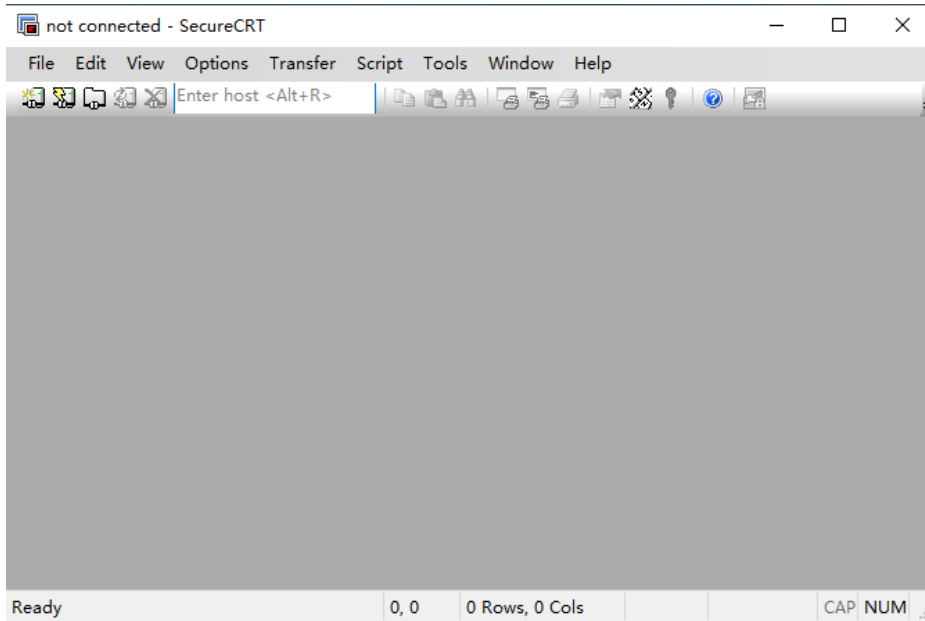


## 2.2 Install Serial Terminal Tool

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

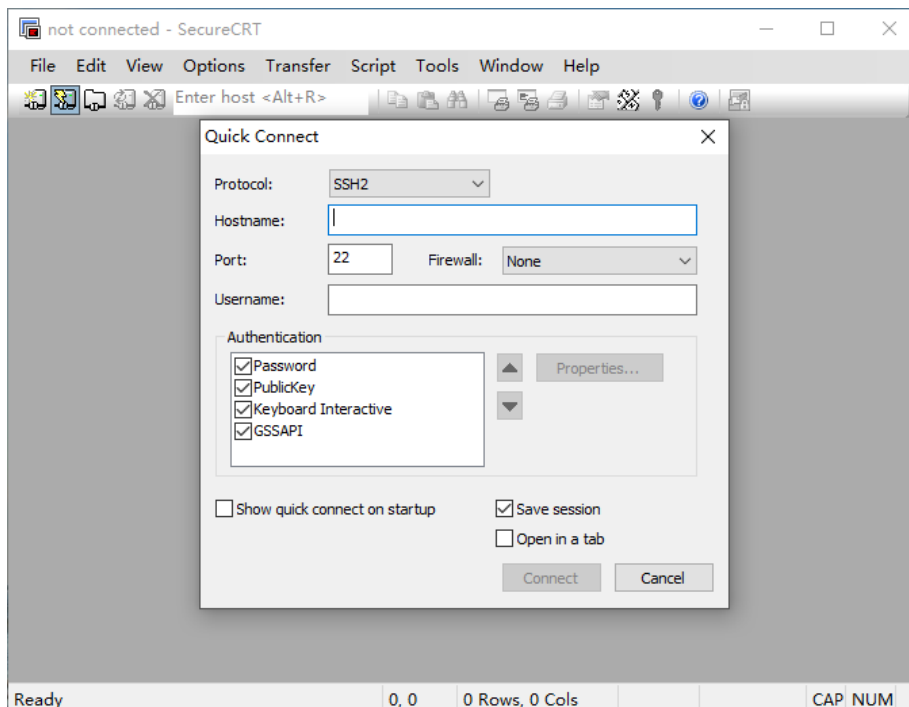
**Step 1:** Unzip *Platform/SecureCRT.rar* on PC.

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

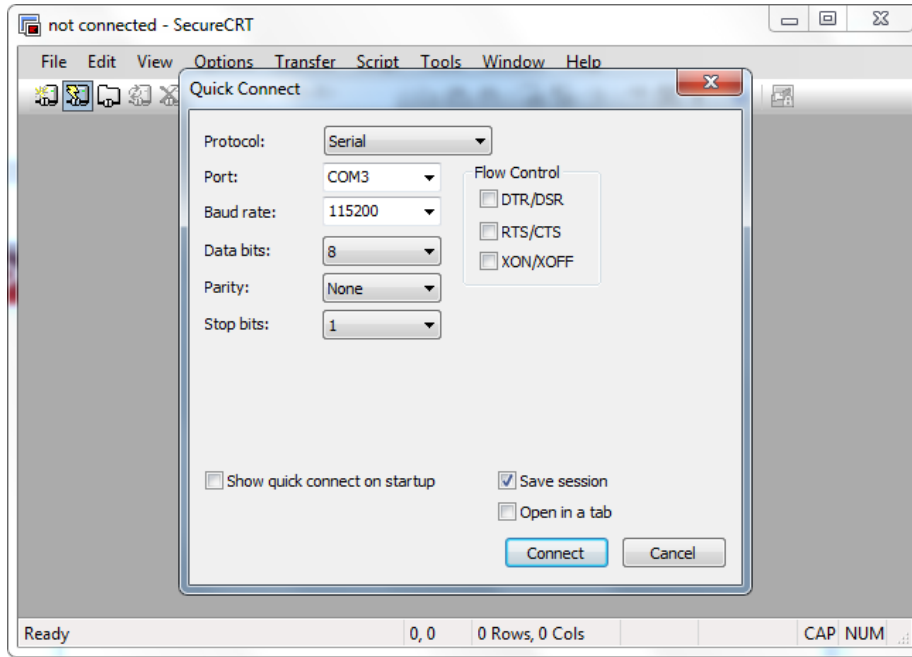


**Step 3:** Confirm the CH9102X driver has been installed and the CH9102X module is connecting to the PC.

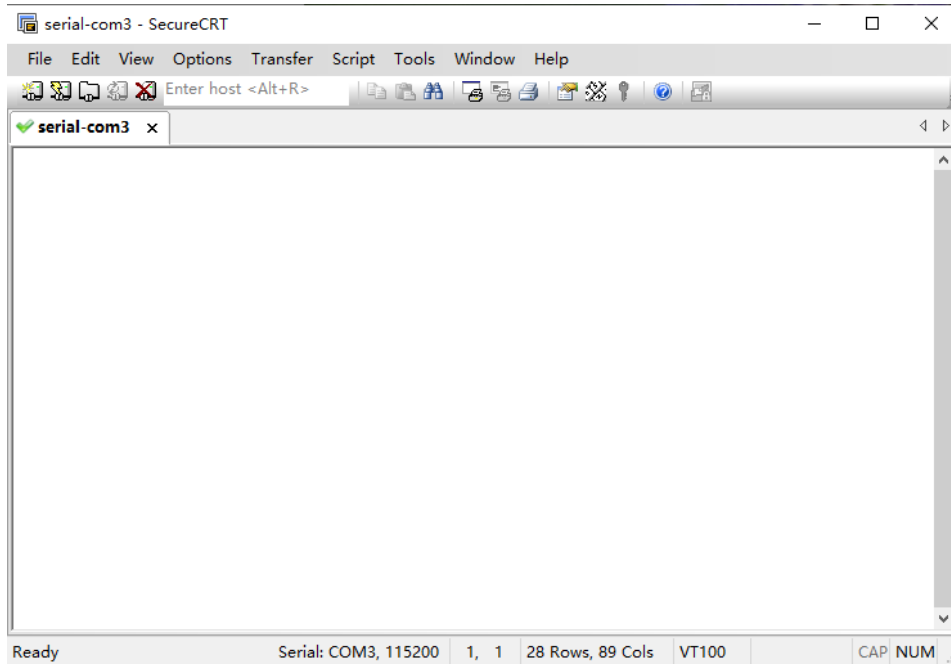
**Step 4:** Click the “**Quick Connect**” button to go to the Quick Connect configuration screen.



**Step 5:** Configure as shown in the following figure:



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



## 3. Development Environment

### 3.1 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 60G. If you do multiple builds, you will need more hard drive space.	Ubuntu 22.04

### 3.2 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 install -y adb bison build-essential cifs-utils ctags curl fastboot
$ sudo apt install -y flex gawk git g++-multilib jq libelf-dev libncurses5
$ sudo apt install -y libncurses5-dev libncurses-dev libncursesw5 libncursesw5-dev
$ sudo apt install -y libssl-dev libxml2-utils mysql-client-core-8.0 net-tools
$ sudo apt install -y openjdk-11-jre openssl openssh-server python repo sshfs vim
$ sudo apt install -y xrdp zlib1g zlib1g:i386
```

## 4. Compile Source

### Step 1: Unzip the Source

To extract the source files, execute the following commands:

```
$ tar xvf IdeaT527-android13*.tar.bz2
$ cd IdeaT527-android13
```

### Step 2: Configure the Compiled Board

To configure the board, execute:

```
$ ./build.sh config
```

Note: “**All available board**” option selection (display interface differences)

These options differ only in the default display output interface/combination. Select according to the panels actually connected:

- **0. Boardcon:** LVDS0 + LVDS1 enabled by default (dual single-channel LVDS displays)
- **1. boardcon\_lvds0:** LVDS0 + HDMI enabled by default
- **2. boardcon\_mipi0:** MIPI0 (DSI) + HDMI enabled by default

```
====ACTION List: mk_config ;====
options :
All available platform:
  0. android
  1. linux
Choice [android]: 0
All available ic:
  0. a523
  1. a527
  2. a733
  3. t527
  4. t736
Choice [t527]: 3
All available board:
  0. boardcon
  1. boardcon_lvds0
  2. boardcon_mipi0
  3. demo
  4. demo_battery
  5. demo_car
  6. demo_fastboot
  7. demo_kylo
Choice [boardcon]: 0
All available flash:
  0. default
  1. nor
Choice [default]: 0
Setup BSP files
```

### Step 3: Compile U-Boot and Kernel

To compile u-boot and kernel, execute the following command:

```
$ ./build.sh
```

### Step 5: Compile Android and Pack

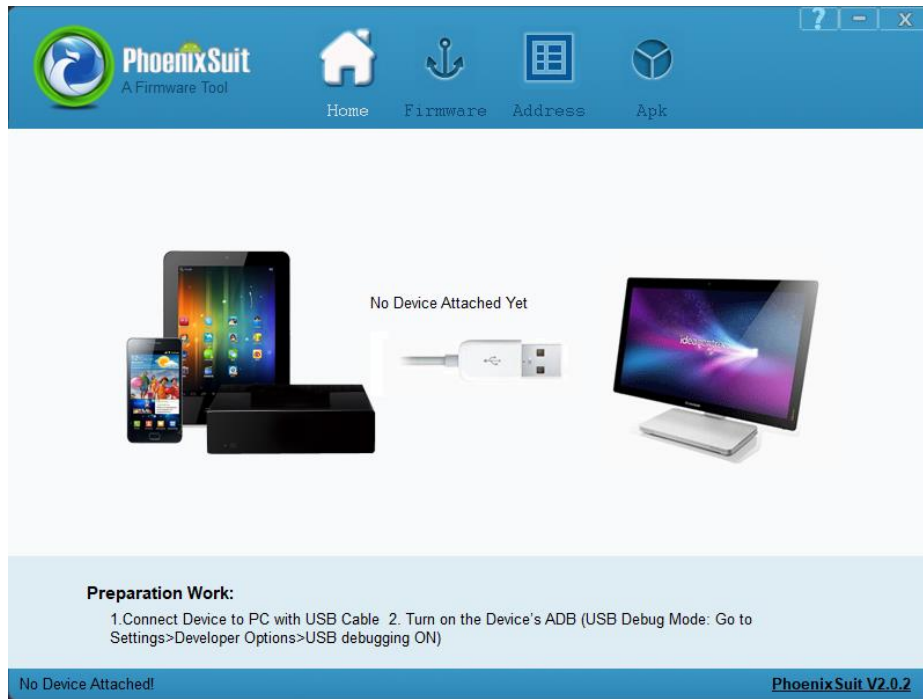
To compile Android and pack, execute the following command:

```
$ cd ../
$ source build/envsetup.sh
$ lunch t527_boardcon_arm64-userdebug
$ make -j8
$ pack
```

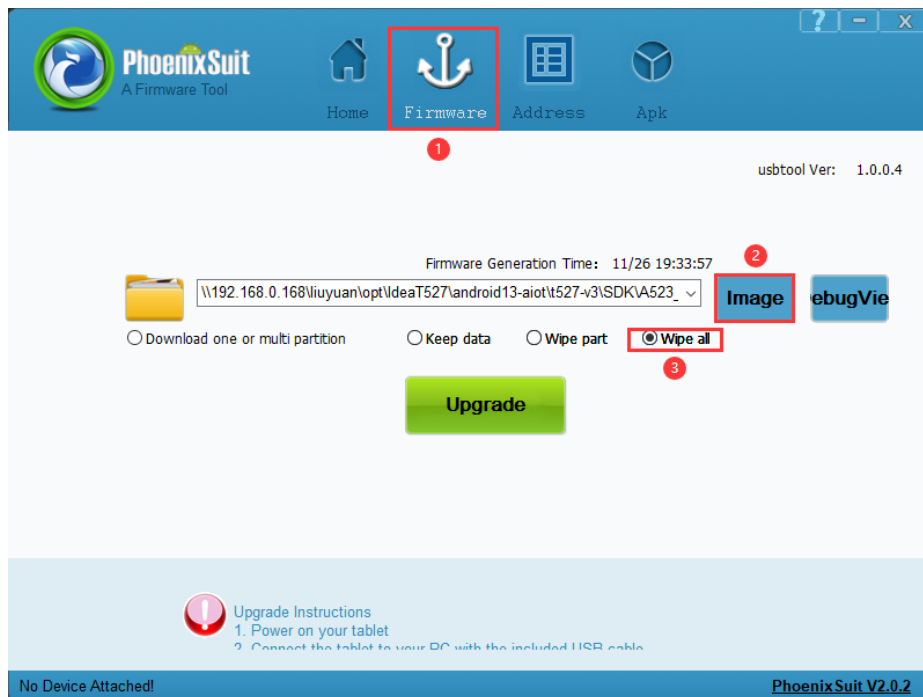
After compiling all, the image will be generated in *IdeaT527-android13/longan/out/*.

# 4. Burn Image

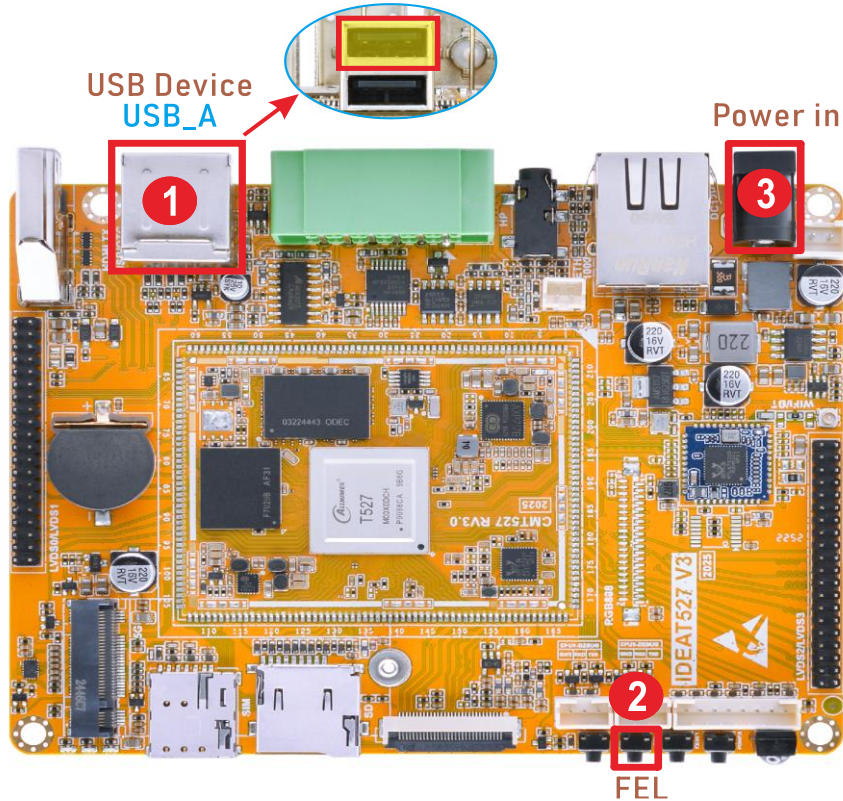
**Step 1:** Open *PhoenixSuit V2.0.2\PhoenixSuit.exe*.



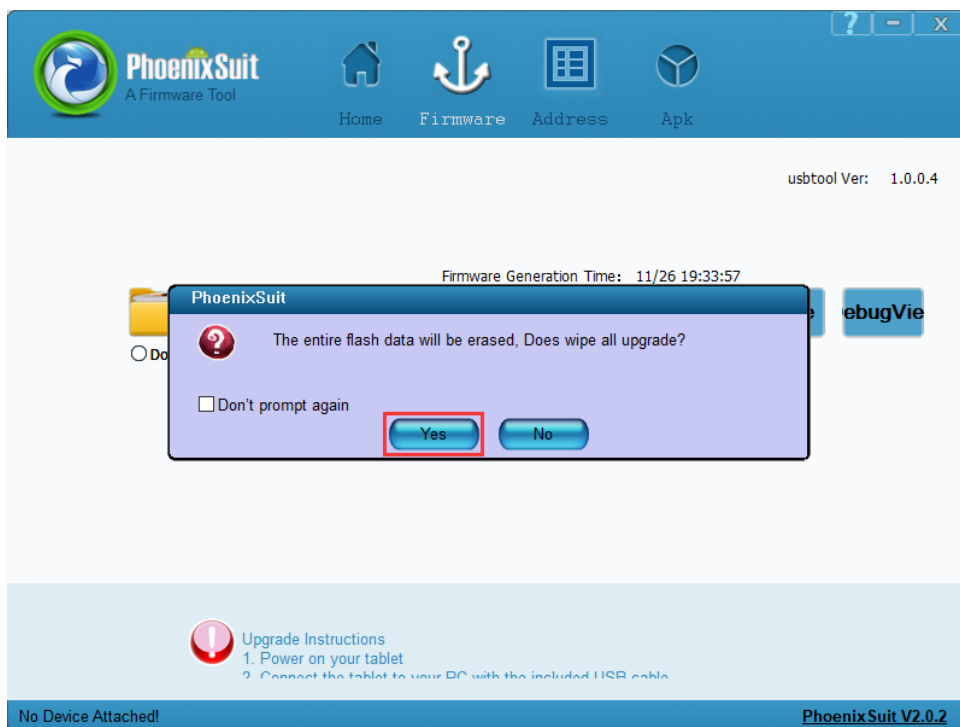
**Step 2:** Click **Firmware** -> **Image**, select **Image**, and choose “**Wipe all**” as the upgrade mode.

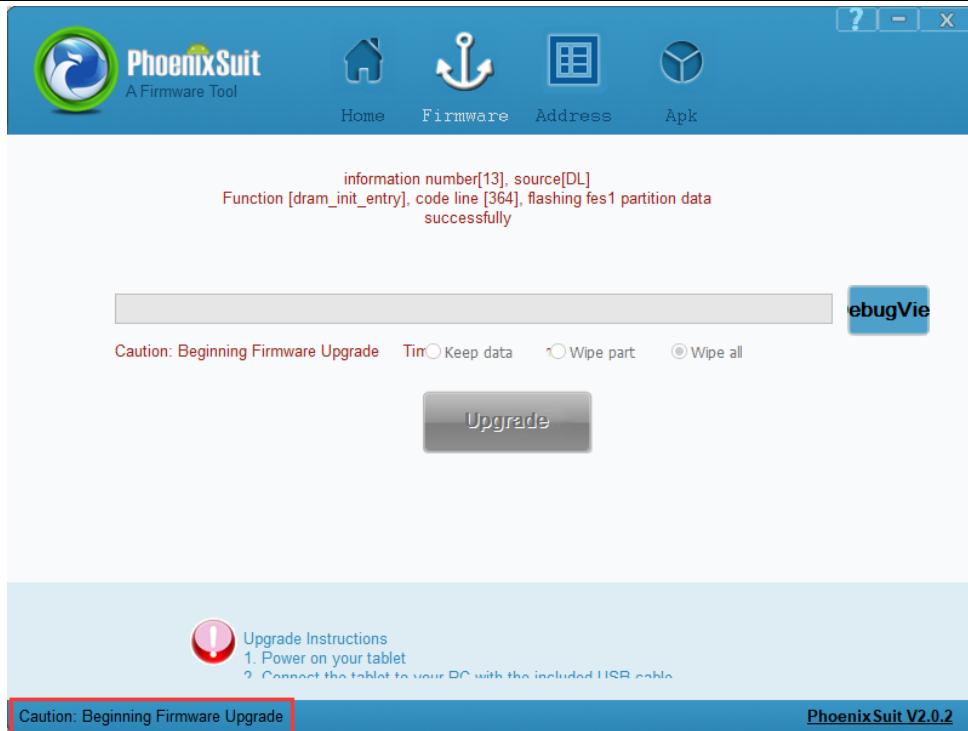


**Step 3:** Connect PC and development board with Type\_A USB cable, keep pressing the **FEL Key**, Power on the board until the pop-up window appears as shown below, or the flashing tool displays **“Beginning Firmware Upgrade”**.

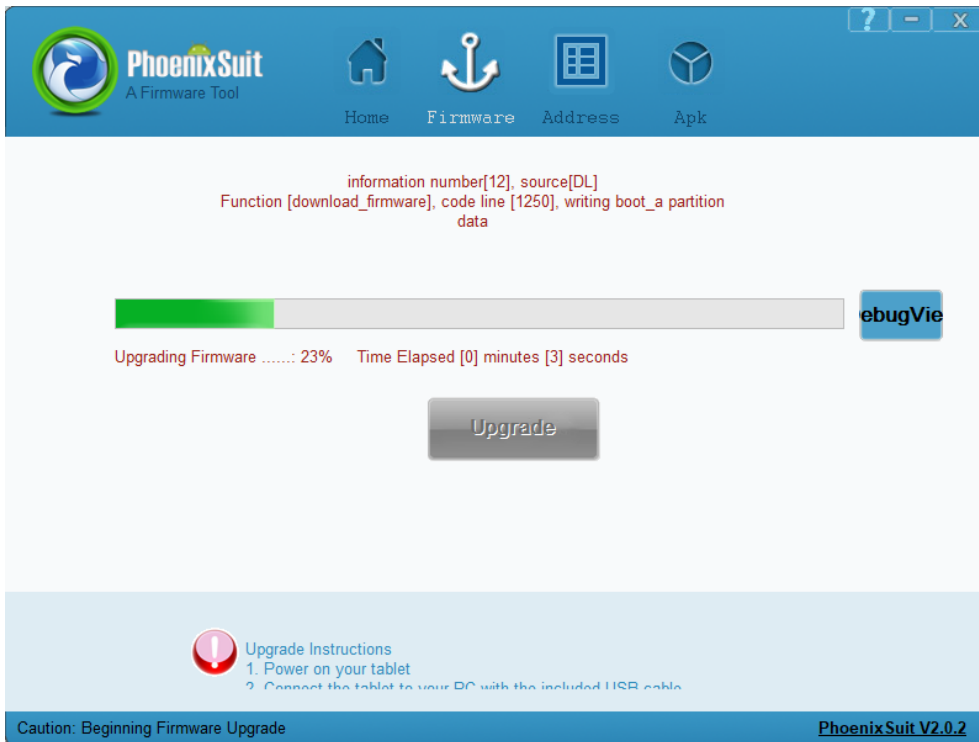


Click **“Yes”**

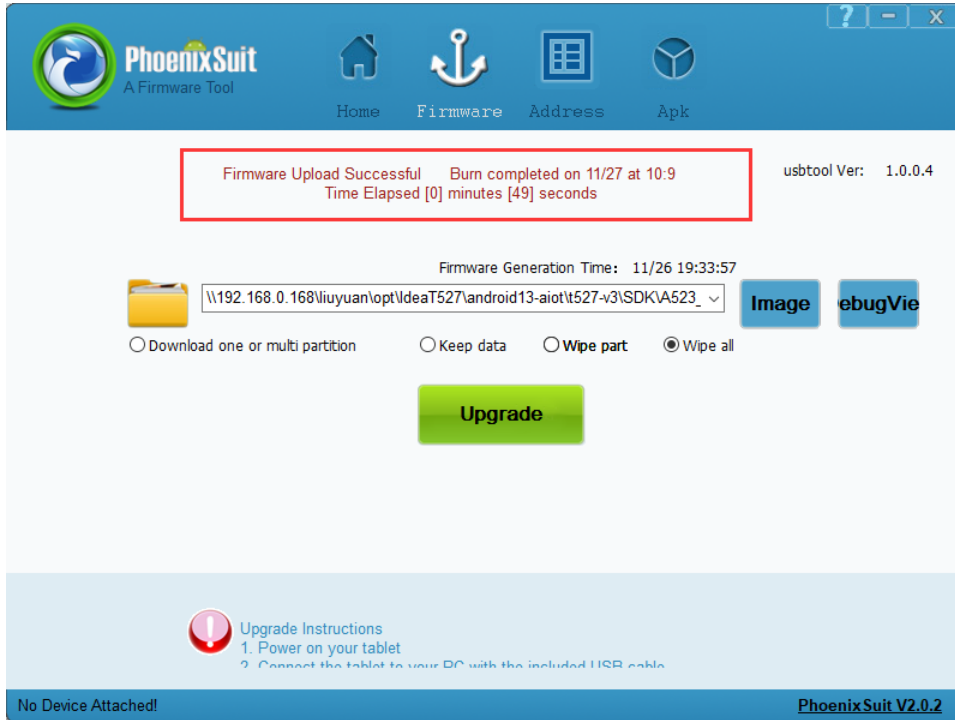




**Step 4:** Release the button, the download will start automatically.



**Step 5:** After the upgrade is complete, it will be displayed as follows.

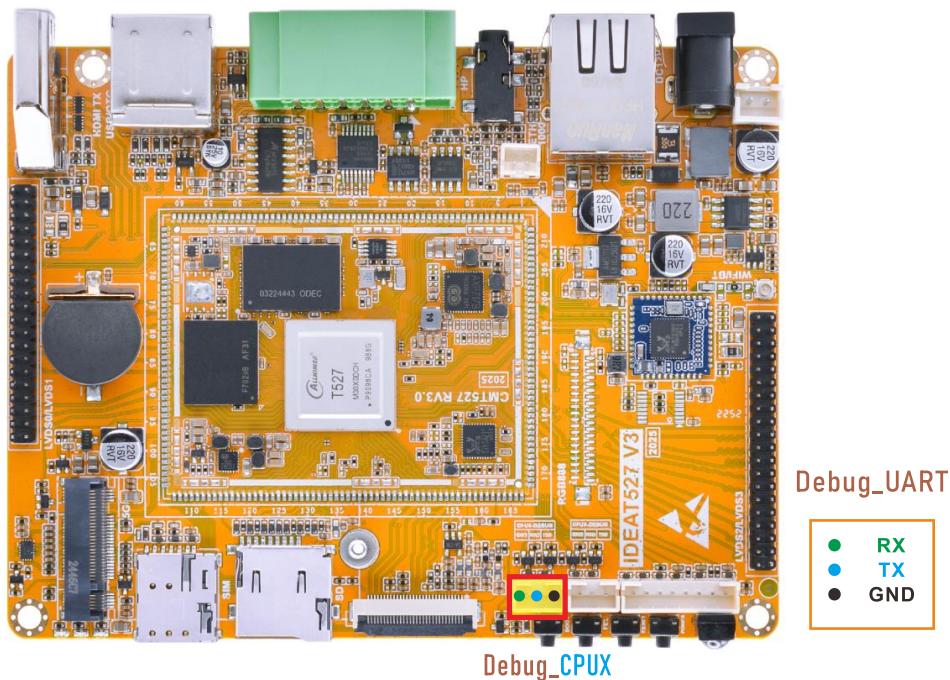


The screenshot displays the PhoenixSuit A Firmware Tool interface. At the top, there is a navigation bar with icons for Home, Firmware, Address, and Apk. A red-bordered box highlights a success message: "Firmware Upload Successful Burn completed on 11/27 at 10:9 Time Elapsed [0] minutes [49] seconds". To the right, it shows "usbtool Ver: 1.0.0.4". Below this, a file path is selected in a dropdown menu: "\\192.168.0.168\liyuan\opt\IdeaT527\android13-aiot\t527-v3\SDKVA523\_". There are two buttons: "Image" and "ebugVie". Below the file path, there are radio button options: "Download one or multi partition", "Keep data", "Wipe part", and "Wipe all" (which is selected). A large green "Upgrade" button is centered below these options. At the bottom left, there is a red warning icon and "Upgrade Instructions" with a list: "1. Power on your tablet", "2. Connect the tablet to your PC with the included USB cable". The bottom status bar shows "No Device Attached!" on the left and "PhoenixSuit V2.0.2" on the right.

# 5. Android13 Test

## 5.1 Serial Terminal

Connect the board and PC with USB Serial cable, then power on, the terminal will output boot information. The default baudrate is 115200.



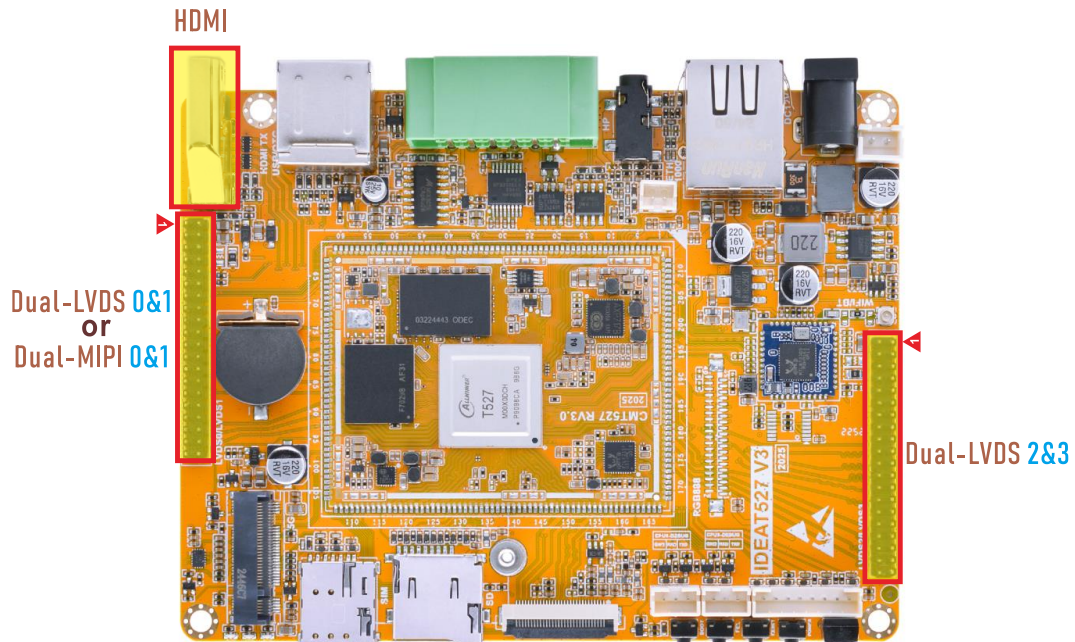
```

serial-com4 - SecureCRT
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
serial-com4 x
[ 30.243004] [ T1] init: processing action (persist.service.dragon.start=0) from /system/etc/init/drag
[ 30.256993] [ T1] init: Sending signal 9 to service 'dragonservice' (pid 2002) process group...
[ 30.278391] [ T1] libprocessgroup: Successfully killed process cgroup uid 0 pid 2002 in 10ms
[ 30.290516] [ T1] init: service 'dragonservice' (pid 2002) received signal 9
[ 35.970130] [ T108] axp2202-aldo1: disabling
[ 35.975165] [ T108] axp2202-aldo2: disabling
[ 35.980295] [ T108] axp2202-bldo4: disabling
[ 35.985317] [ T108] axp2202-cldo2: disabling
[ 35.990514] [ T108] axp2202-cldo4: disabling
[ 35.995582] [ T108] axp2202-vmid: disabling
[ 36.943841] [ T215] type=1400 audit(1764210053.472:199): avc: denied { read } for comm="aw_thermal" name
r:shell:s0 tcontext=u:object_r:sysfs:s0 tclass=file permissive=1
[ 36.965469] [ T215] type=1400 audit(1764210053.472:200): avc: denied { open } for comm="aw_thermal" path
.s_twi0/i2c-6/6-0035/axp2202-usb-power-supply.0/power_supply/axp2202-usb/present" dev="sysfs" ino=34919 scc
s:s0 tclass=file permissive=1
[ 44.512740] [ T1] init: processing action (debug.launcher3.exit=1) from /vendor/etc/init/init.schedul
[ 64.137096] [ T1] init: Service 'vendor.drm-clearkey-service' (pid 1962) exited with status 0 oneshot
[ 64.152317] [ T1] init: sending signal 9 to service 'vendor.drm-clearkey-service' (pid 1962) process g
[ 64.164754] [ T1] libprocessgroup: Successfully killed process cgroup uid 1013 pid 1962 in 0ms
[ 64.207499] [ T1] init: Service 'vendor.drm-widevine-hal' (pid 1968) exited with status 0 oneshot serv
[ 64.222388] [ T1] init: sending signal 9 to service 'vendor.drm-widevine-hal' (pid 1968) process group
[ 64.234187] [ T1] libprocessgroup: Successfully killed process cgroup uid 1013 pid 1968 in 0ms
[ 78.966160] [ T296] healthd: battery none chg=u
[ 138.967737] [ T296] healthd: battery none chg=u
[ 198.969716] [ T296] healthd: battery none chg=u
console:/ $
console:/ $
console:/ $
console:/ $
Ready Serial: COM4, 115200 31, 13 31 Rows, 106 Cols VT100 CAP NUM

```

## 5.2 Normal display

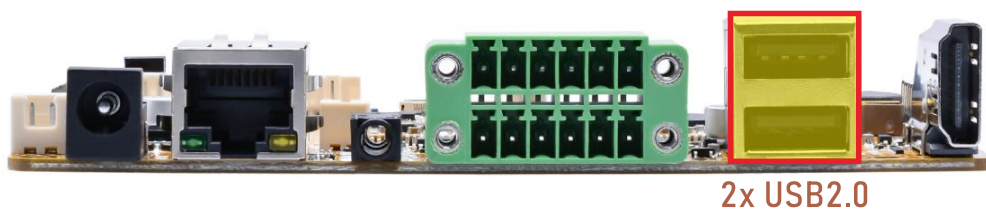
On IdeaT527 Android 13, the default configuration supports the following display combinations: LVDS0 + LVDS2, LVDS0 + HDMI, and MIPI0 + HDMI.



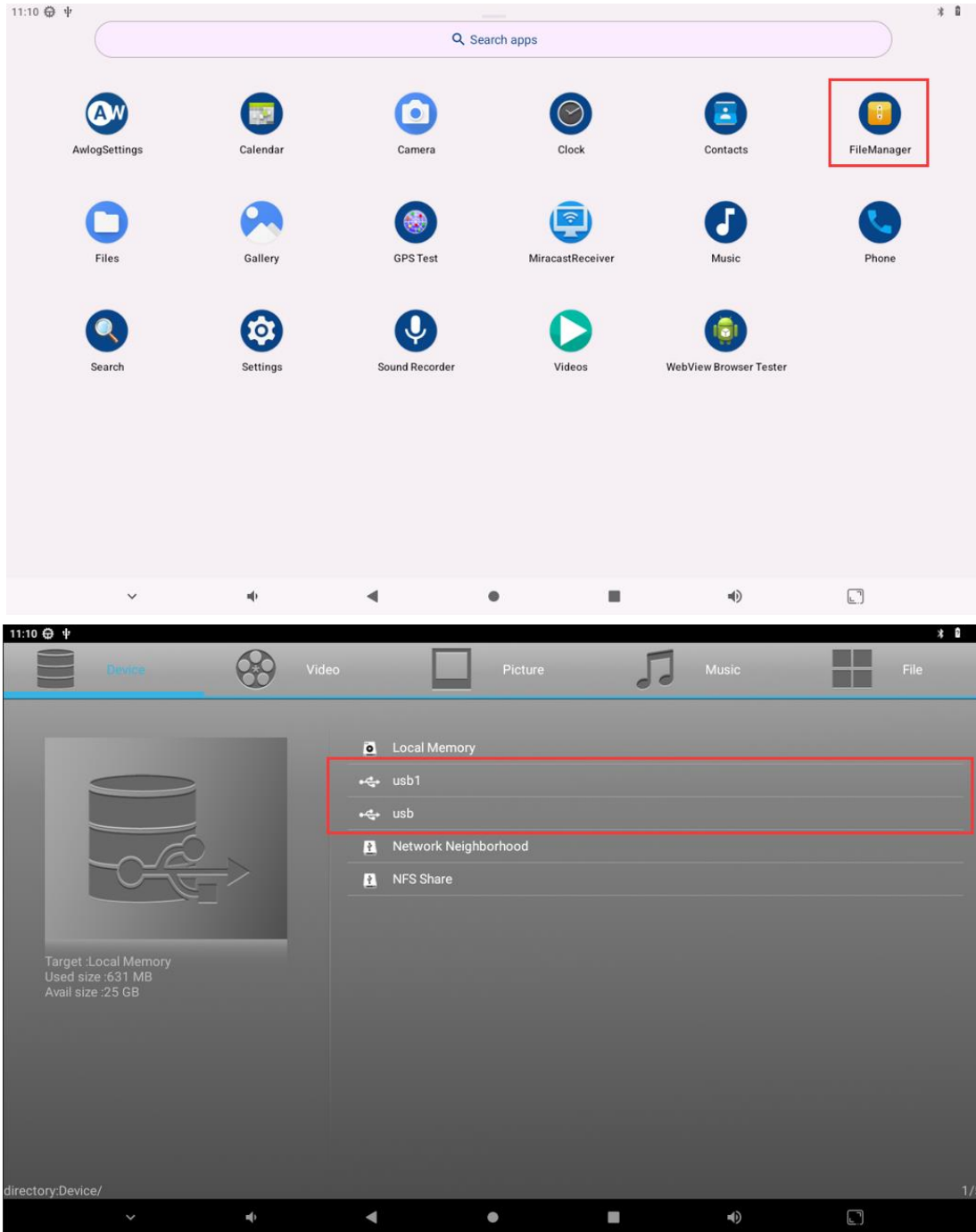
## 5.3 USB2.0

The IdeaT527 supports two USB 2.0 Host interfaces, one of which is OTG-compatible and is configured as Host mode by default.

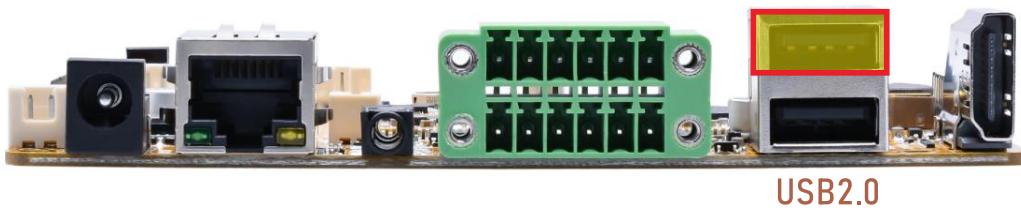
### 5.3.1 USB2.0 Host



After connecting the USB flash drive, the device will automatically mount, and it can be accessed directly through the **FileManager** app.



### 5.3.2 USB2.0 OTG



If users wish to switch to Device mode, user can execute the following command:

```
# echo usb_device > /sys/devices/platform/soc@3000000/10.usbc0/otg_role
```

```
console:/ #
ce > /sys/devices/platform/soc@3000000/10.usbc0/otg_role <
[ 3622.018705][ T2203] sunxi:sunxi_usb:[INFO]: rmmmod_host_driver
[ 3622.018705][ T2203]
[ 3622.028053][ T2203] sunxi:ehci_sunxi:[INFO]: [ehci0-controller]: sunxi_usb_disable_ehci
[ 3622.038658][ T2203] sunxi:ehci_sunxi:[INFO]: [sunxi-ehci0]: remove, pdev->name: 4101000.ehci0-
controller, sunxi_ehci: 0xffffffc0019d2030
[ 3622.053072][ T2203] sunxi-ehci 4101000.ehci0-controller: remove, state 4
[ 3622.060951][ T2203] usb usb5: USB disconnect, device number 1
[ 3622.071555][ T296] healthd: battery none chg=u
[ 3622.076674][ T2203] sunxi-ehci 4101000.ehci0-controller: USB bus 5 deregistered
[ 3622.078868][ T2203] sunxi:ohci_sunxi:[INFO]: [ohci0-controller]: sunxi_usb_disable_ohci
[ 3622.094215][ T2203] sunxi:ohci_sunxi:[INFO]: [sunxi-ohci0]: remove, pdev->name: 4101400.ohci0-
controller, sunxi_ohci: 0xffffffc0019d24b0
[ 3622.108858][ T296] healthd: battery none chg=u
[ 3622.110328][ T2203] sunxi-ohci 4101400.ohci0-controller: remove, state 4
[ 3622.115340][ T296] healthd: battery none chg=u
[ 3622.122514][ T2203] usb usb6: USB disconnect, device number 1
[ 3622.128084][ T296] healthd: battery none chg=u
[ 3622.140110][ T2203] sunxi-ohci 4101400.ohci0-controller: USB bus 6 deregistered
[ 3622.141346][ T296] healthd: battery none chg=u
[ 3622.149608][ T2203] sunxi:sunxi_usb:[INFO]: insmod_device_driver
[ 3622.149608][ T2203]
[ 3622.156931][ T296] healthd: battery none chg=u
[ 3622.163044][ T2203] sunxi_usb_udc 4100000.udc-controller: supply udc not found, using dummy
regulator
[ 3622.170034][ T296] healthd: battery none chg=u
[ 3622.186592][ T296] healthd: battery none chg=u
[ 3622.193347][ T296] healthd: battery none chg=u
console:/ # [ 3622.429471][ T2421] android_work: sent uevent USB_STATE=CONNECTED
[ 3622.470429][ T2421] android_work: sent uevent USB_STATE=CONFIGURED
```

To switch Device mode to Host mode, users can execute the following command:

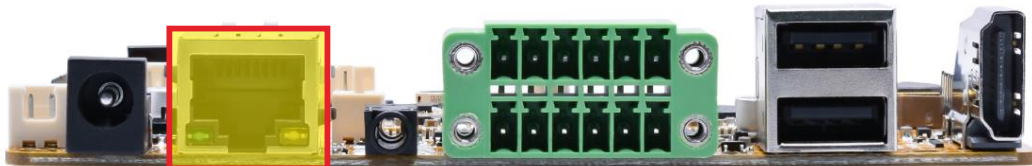
```
# echo usb_host > /sys/devices/platform/soc@3000000/10.usbc0/otg_role
```

```

console:/ #
> /sys/devices/platform/soc@3000000/10.usbc0/otg_role <
[ 3711.414712][ T2203] sunxi:sunxi_usbc:[INFO]: rmmmod_device_driver
[ 3711.424325][ T2421] android_work: did not send uevent (0 0 0000000000000000)
[ 3711.434868][ T2203] sunxi:sunxi_usbc:[INFO]: insmod host_driver
[ 3711.447001][ T2203] sunxi:ehci_sunxi:[INFO]: [ehci0-controller]: sunxi_usb_enable_ehci
[ 3711.459902][ T2203] sunxi:ehci_sunxi:[INFO]: [sunxi-ehci0]: probe, pdev->name: 4101000.ehci0-
controller, sunxi_ehci: 0xffffffc0019d2030, 0xffffffc00ce7d000, irq_no:8b
[ 3711.480447][ T296] healthd: battery none chg=u
[ 3711.482753][ T2203] sunxi-ehci 4101000.ehci0-controller: supply hci not found, using dummy regulator
[ 3711.499732][ T296] healthd: battery none chg=u
[ 3711.502190][ T2203] sunxi-ehci 4101000.ehci0-controller: EHCI Host Controller
[ 3711.513721][ T2203] sunxi-ehci 4101000.ehci0-controller: new USB bus registered, assigned bus number 5
[ 3711.524967][ T2203] sunxi-ehci 4101000.ehci0-controller: irq 139, io mem 0x04101000
[ 3711.546034][ T2203] sunxi-ehci 4101000.ehci0-controller: USB 2.0 started, EHCI 1.00
[ 3711.554959][ T2203] usb usb5: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 5.15
[ 3711.565031][ T2203] usb usb5: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 3711.573895][ T2203] usb usb5: Product: EHCI Host Controller
[ 3711.580155][ T2203] usb usb5: Manufacturer: Linux 5.15.119 ehci_hcd
[ 3711.587198][ T2203] usb usb5: SerialNumber: sunxi-ehci
[ 3711.604915][ T2203] hub 5-0:1.0: USB hub found
[ 3711.616444][ T2203] hub 5-0:1.0: 1 port detected
[ 3711.629276][ T2203] sunxi:ohci_sunxi:[INFO]: [ohci0-controller]: sunxi_usb_enable_ohci
[ 3711.629285][ T2203] sunxi:ohci_sunxi:[INFO]: [sunxi-ohci0]: probe, pdev->name: 4101400.ohci0-
controller, sunxi_ohci: 0xffffffc0019d24b0
[ 3711.631720][ T2203] sunxi-ohci 4101400.ohci0-controller: supply hci not found, using dummy regulator
[ 3711.634286][ T2203] sunxi-ohci 4101400.ohci0-controller: OHCI Host Controller
[ 3711.634310][ T2203] sunxi-ohci 4101400.ohci0-controller: new USB bus registered, assigned bus number 6
[ 3711.634353][ T2203] debugfs: Directory 'sunxi-ohci' with parent 'ohci' already present!
[ 3711.634430][ T2203] sunxi-ohci 4101400.ohci0-controller: irq 140, io mem 0x04101400
[ 3711.698231][ T2203] usb usb6: New USB device found, idVendor=1d6b, idProduct=0001, bcdDevice= 5.15
[ 3711.764164][ T2203] usb usb6: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 3711.773092][ T2203] usb usb6: Product: OHCI Host Controller
[ 3711.779381][ T2203] usb usb6: Manufacturer: Linux 5.15.119 ohci_hcd
[ 3711.786447][ T2203] usb usb6: SerialNumber: sunxi-ohci
  
```

## 5.4 Ethernet

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



**Ethernet**

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

```

console:/ # [ 4279.426567][ T2454] sunxi-gmac 4500000.gmac0 eth0: Link is Up - 1Gbps/Full - flow
control off
[ 4279.437015][ T2454] IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready
  
```

**Step 2:** View network interface information.

```
# ifconfig
```

```
console:/ # ifconfig
eth0  Link encap:Ethernet HWaddr a0:e3:91:de:5e:74 Driver sunxi-gmac
      inet addr:192.168.0.156 Bcast:192.168.0.255 Mask:255.255.255.0
      inet6 addr: fe80::7e5a:2a9d:fa57:f798/64 Scope: Link
      UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
      RX packets:290 errors:0 dropped:0 overruns:0 frame:0
      TX packets:68 errors:0 dropped:0 overruns:0 carrier:0
      collisions:0 txqueuelen:1000
      RX bytes:32352 TX bytes:7591
      Interrupt:176
```

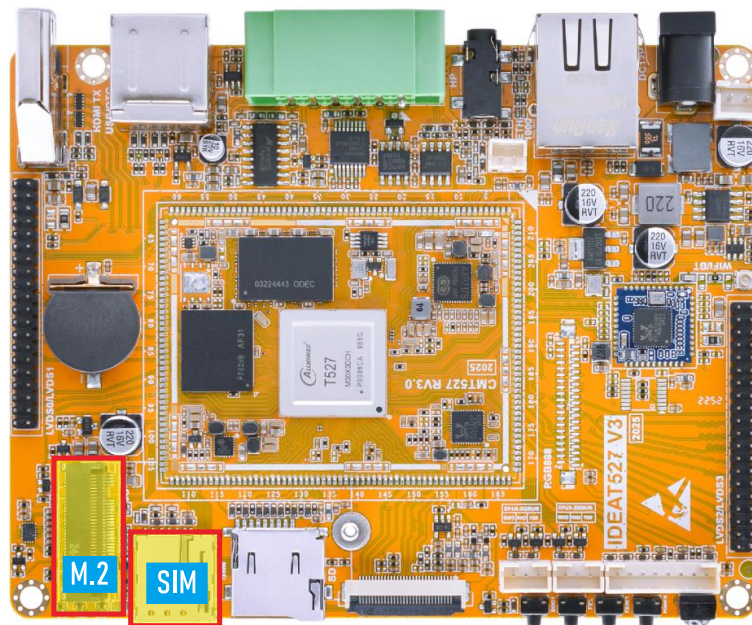
### Step 3: Network connection test.

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

```
console:/ # ping -I eth0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.156 eth0: 56(84) bytes of data.
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=1 ttl=49 time=206 ms
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=2 ttl=49 time=208 ms
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=3 ttl=49 time=205 ms
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=4 ttl=49 time=208 ms
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=5 ttl=49 time=205 ms
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=6 ttl=49 time=205 ms
^C
--- www.armdesigner.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5004ms
rtt min/avg/max/mdev = 205.330/206.663/208.644/1.349 ms
```

## 5.5 M.2

The M.2 interface is compatible with both 4G modules and SSD storage modules.



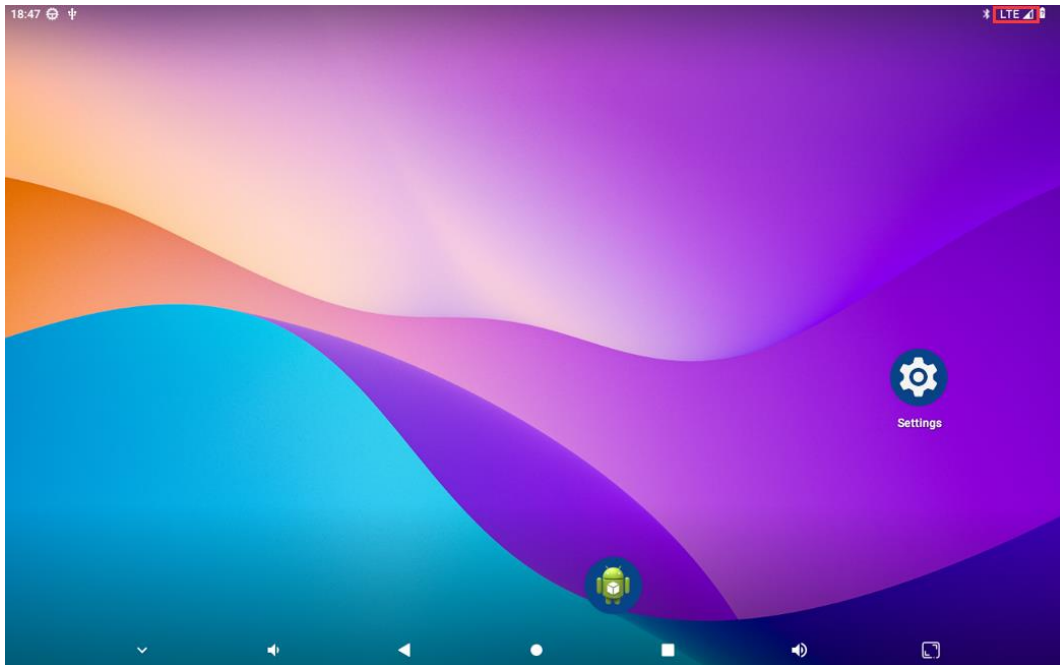
### 5.5.1 4G Test

**Step 1:** Insert 4G module to M.2 socket (4G model: EM05).

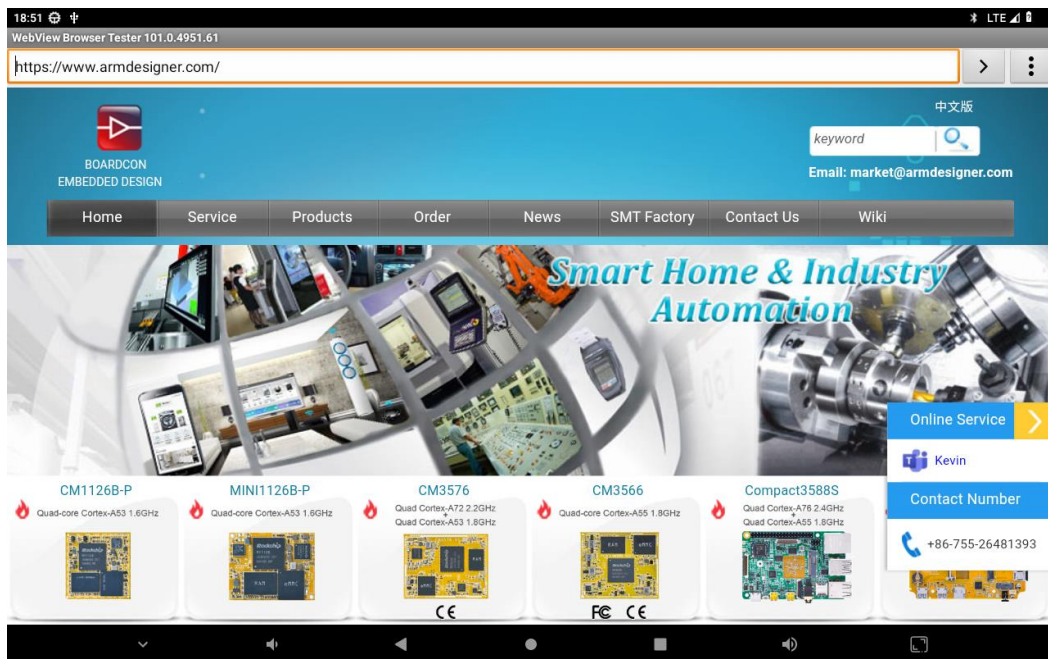
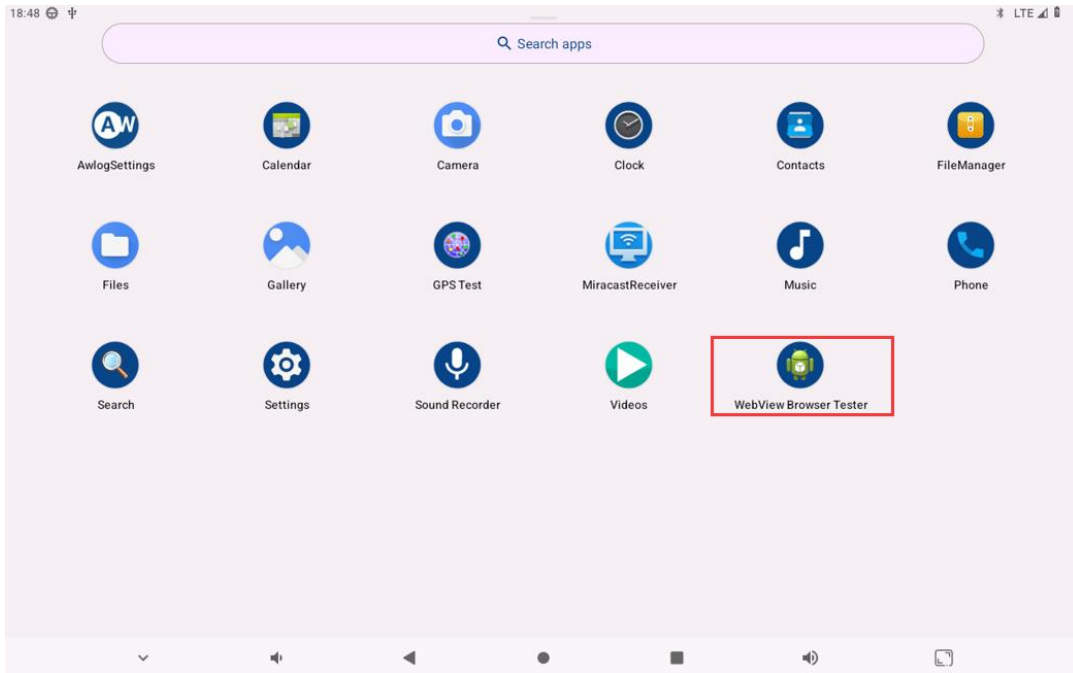
**Step 2:** Connect antenna and insert SIM card.



**Step 3:** After power-on, the following icon appears in the upper-right corner of the desktop, indicating that the 4G connection is successful.



**Step 4:** Test the 4G connection.



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

(1) View network interface information.

```
# ifconfig
```

```

console:/ # ifconfig
wlan0    Link encap:Ethernet HWaddr 5a:b4:2d:9a:d6:e6  Driver qmi_wlan_g
         inet addr:10.90.15.125 Mask:255.255.240.0
         inet6 addr: fe80::58b4:2dff:fe9a:d6e6/64 Scope: Link
         UP RUNNING NOARP MTU:1500 Metric:1
         RX packets:4120 errors:0 dropped:0 overruns:0 frame:0
         TX packets:4323 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:1000
         RX bytes:4302895 TX bytes:448985
  
```

## (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 10.90.15.125 wlan0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=41 time=257 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=41 time=222 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=41 time=220 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=41 time=233 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=41 time=244 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=41 time=232 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 6 received, 14% packet loss, time 6029ms
rtt min/avg/max/mdev = 220.356/235.038/257.592/12.804 ms
  
```

## 5.5.2 SSD Test

The SSD on Android 13 only supports the ext4 format.

Step 1: Connect the M.2 SSD, then power on.



Step 2: Execute the follow command to mount ssd:

```

$ su
# mkdir /mnt/ssd1
# mount /dev/block/nvme0n1p1 /mnt/ssd1
# ls /mnt/ssd1
  
```

```

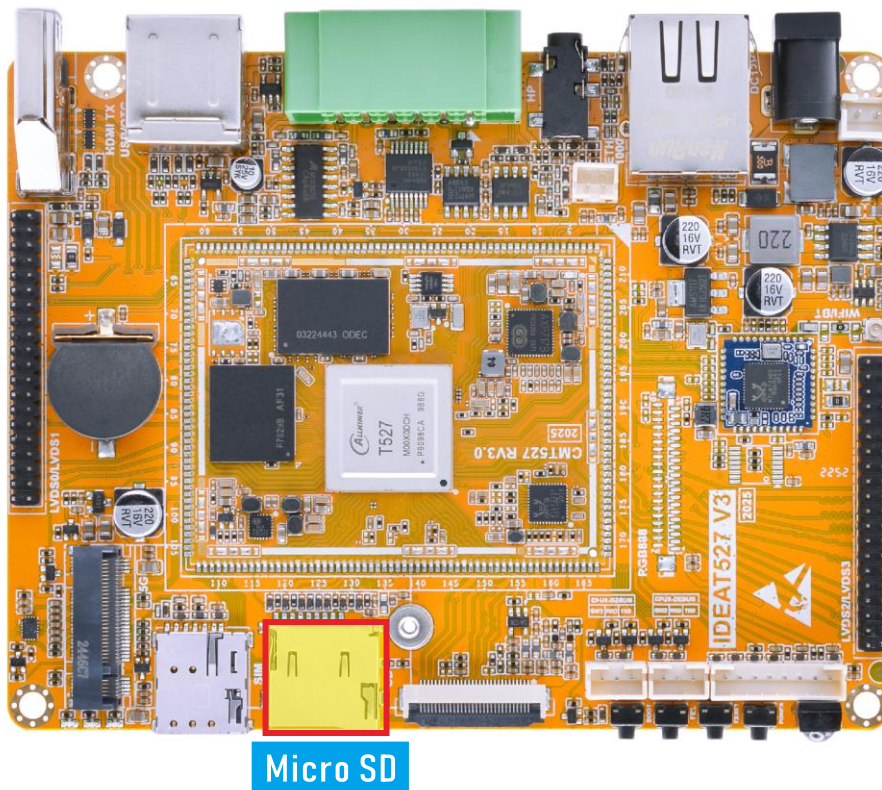
console:/ $ su
130|console:/ # mkdir /mnt/ssd1
console:/ # mount /dev/block/nvme0n1p1 /mnt/ssd1
[ 86.480227][ T2052] exFAT-fs (nvme0n1p1): Volume was not properly unmounted. Some data may be
corrupt. Please run fsck.
console:/ #
console:/ # ls /mnt/ssd1
Alarms          DCIM            Download Music  Pictures Recordings
Audiobooks Documents Movies  Notifications Podcasts Ringtones
console:/ #
  
```

Note: If devices that are not in ext4 format, the user can choose to format them on the board. After formatting, **the files on the device will be permanently lost**, so please proceed with caution.

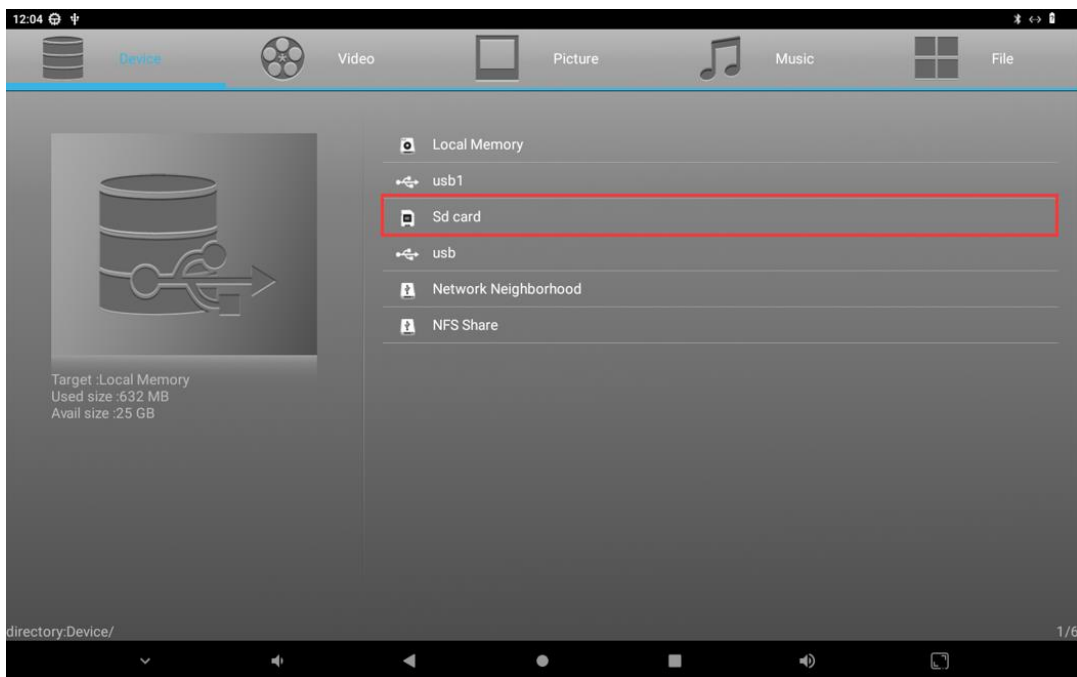
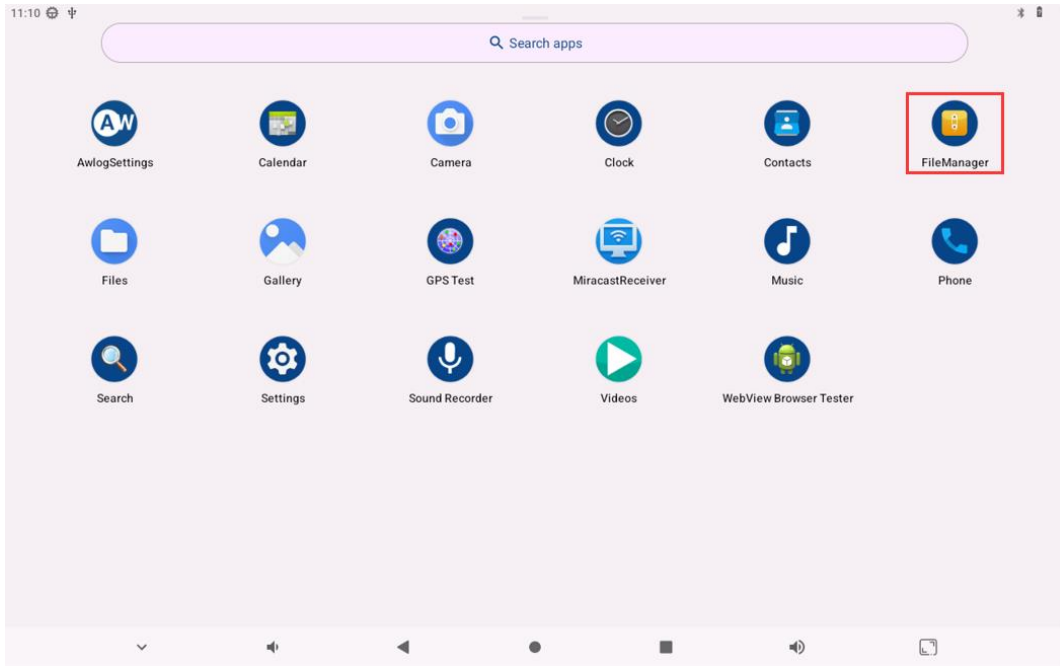
```
# mke2fs -t ext4 /dev/block/nvme0n1p1
```

## 5.6 Micro SD card

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



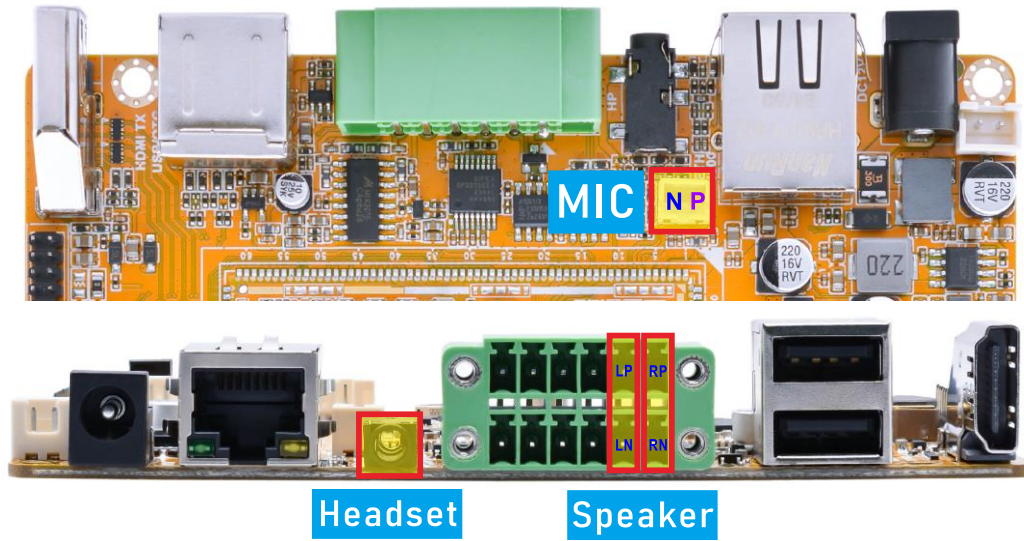
Step 2: Open the **FileManager** APP to view the SD card drive device auto-mount directory.



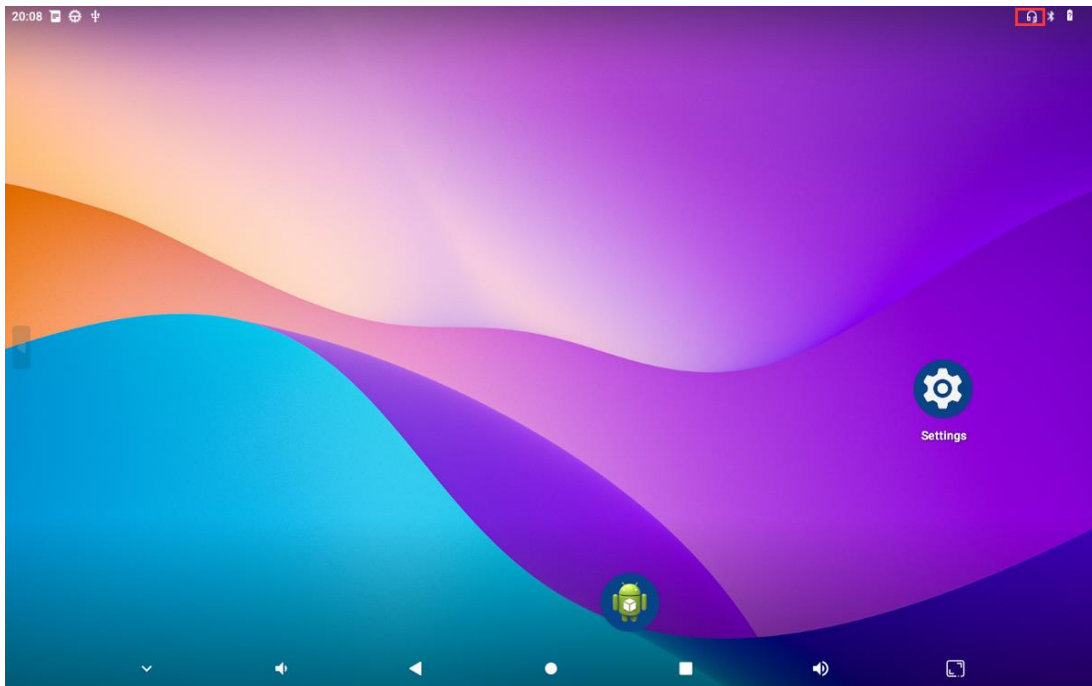
## 5.7 Audio

Audio input priority: **headset** > **MIC**; audio output priority: **headset** > **HDMI** > **speaker**.

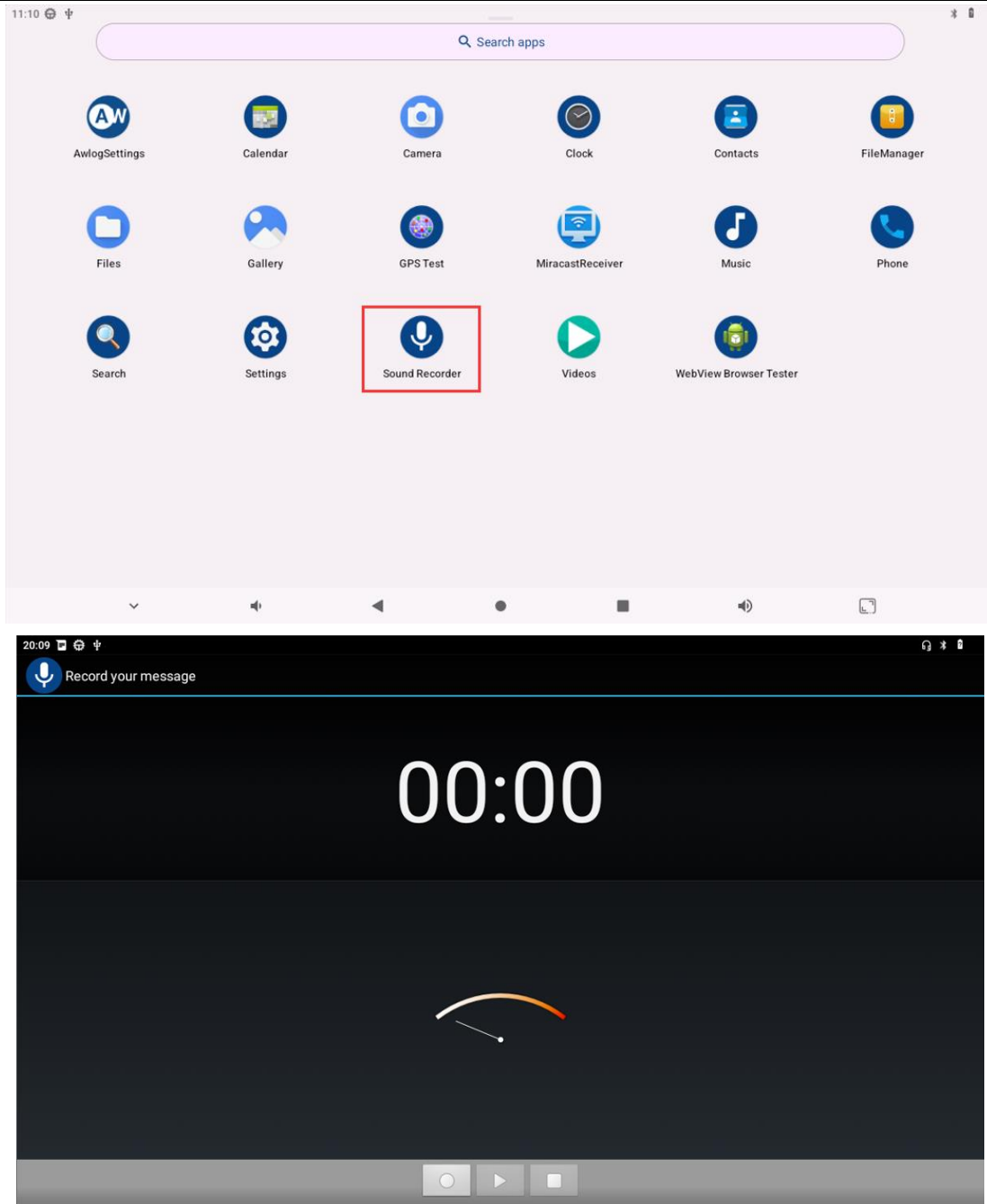
Step 1: Connect the headset, MIC, and speaker.



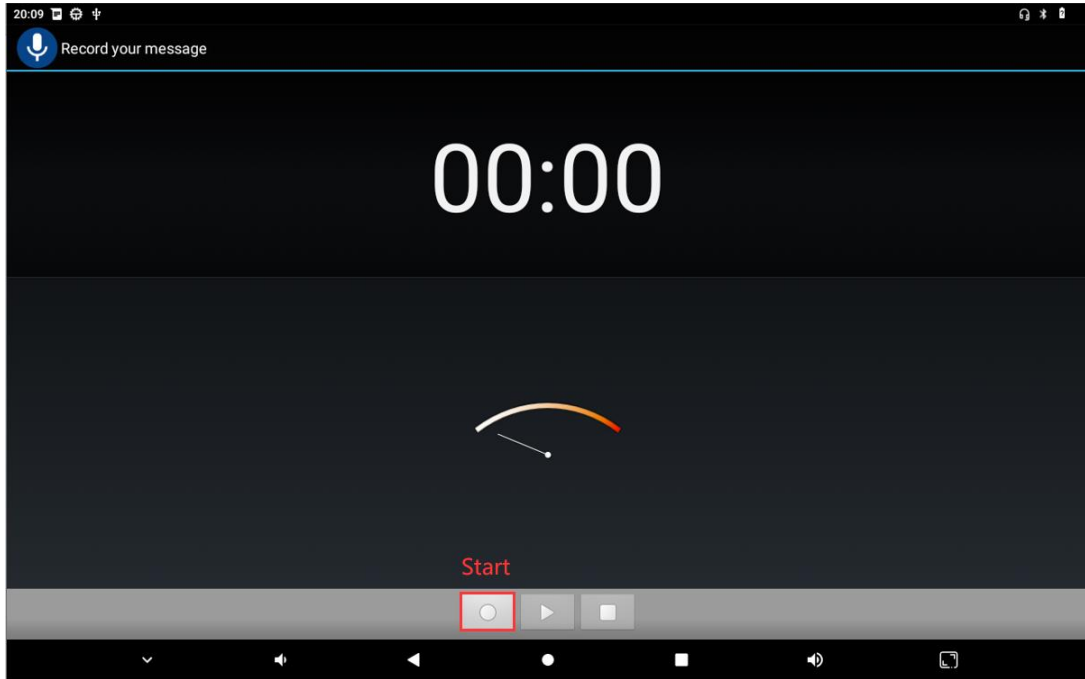
The following icon appears in the upper right corner of the desktop, indicating that the headphones are successfully plugged in.



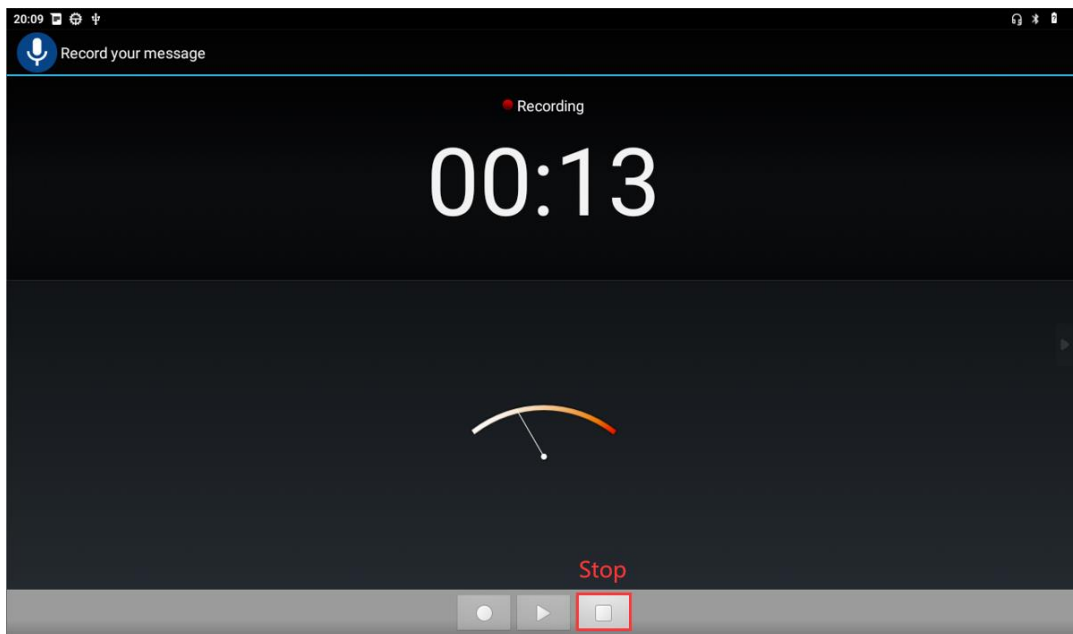
Step 2: Open the **Sound Recorder** app.

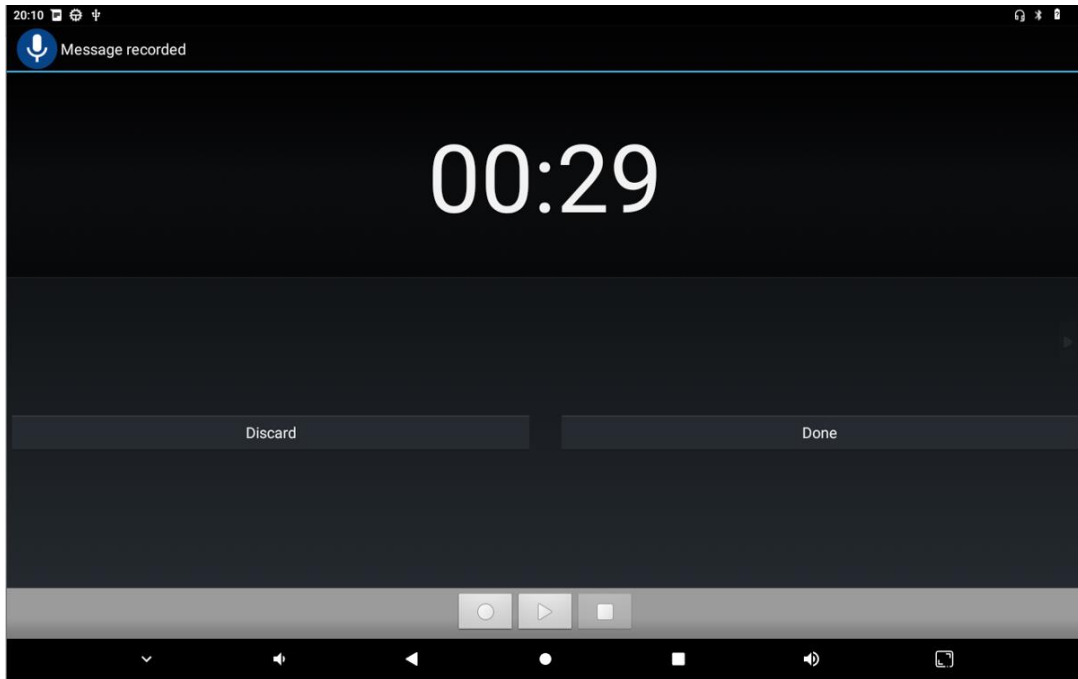


Step 3: Click the button shown in the figure below to start recording.

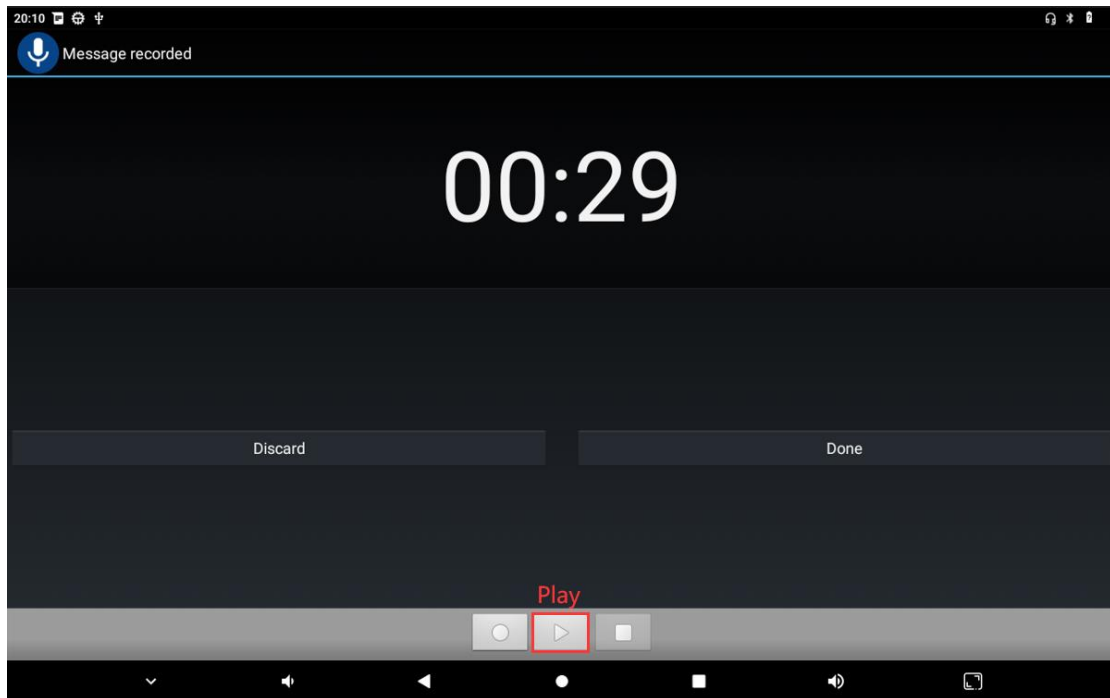


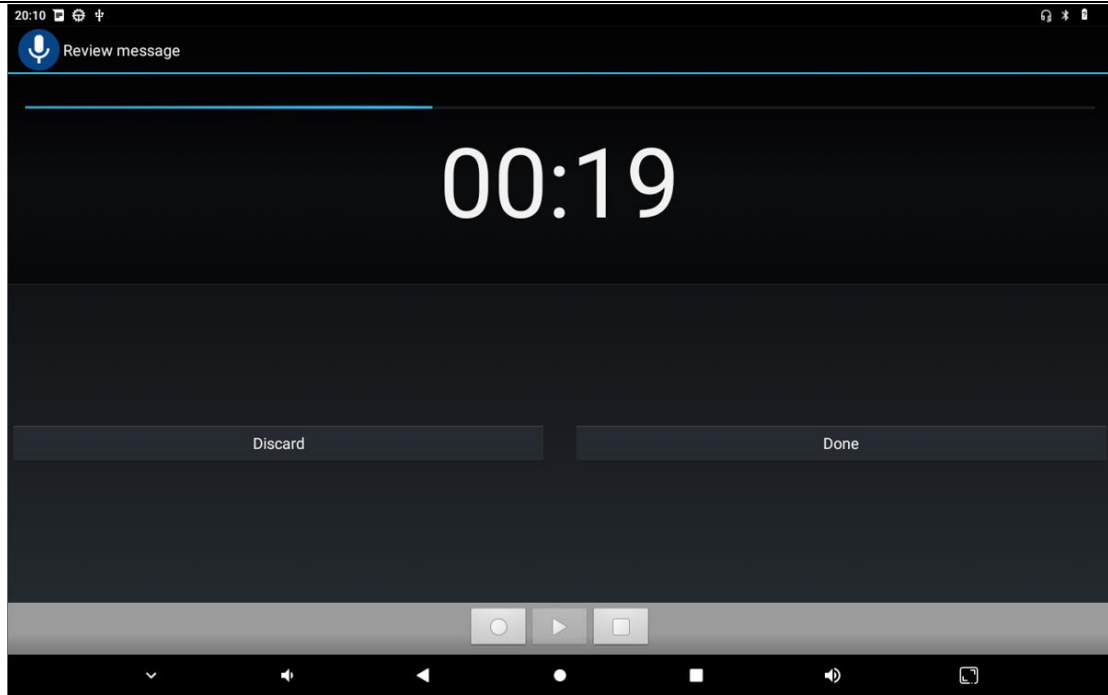
Step 4: Click the button shown in the figure below to stop recording.





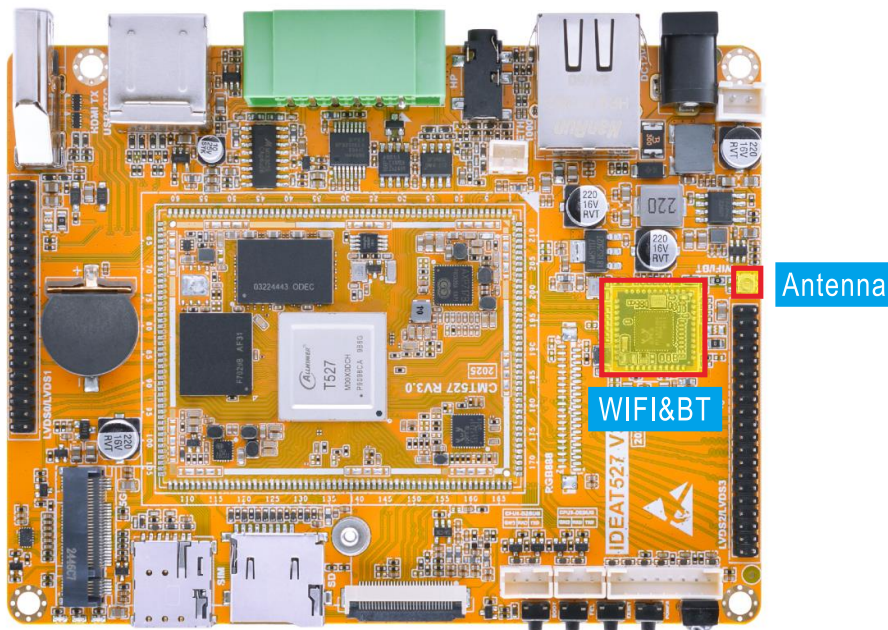
Step 5: Click the button shown in the figure below to play the recording.





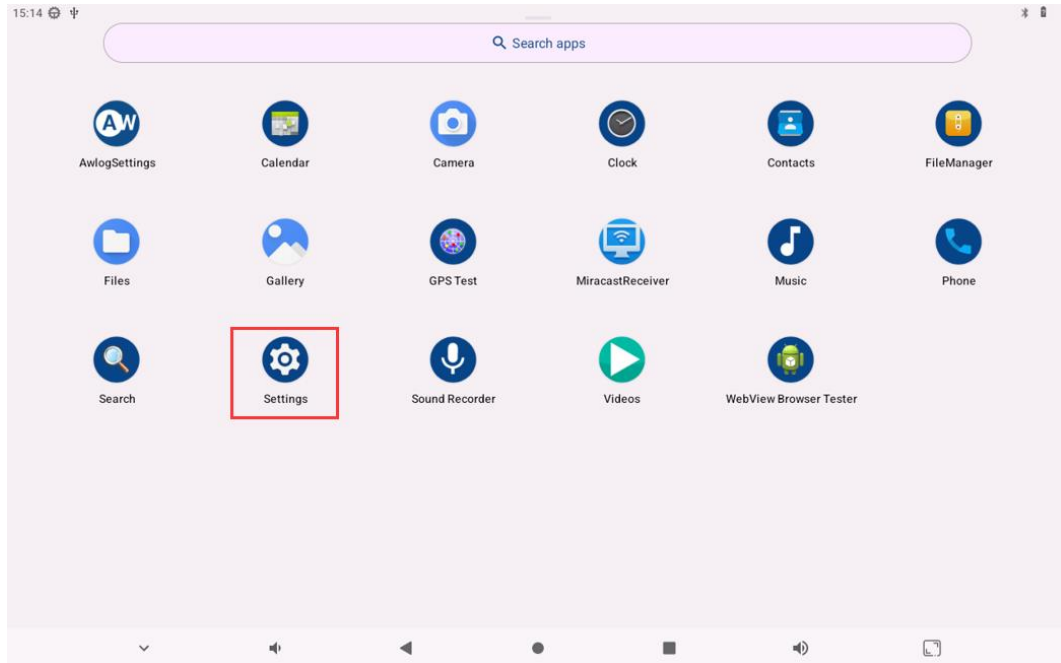
## 5.8 WIFI & Bluetooth

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

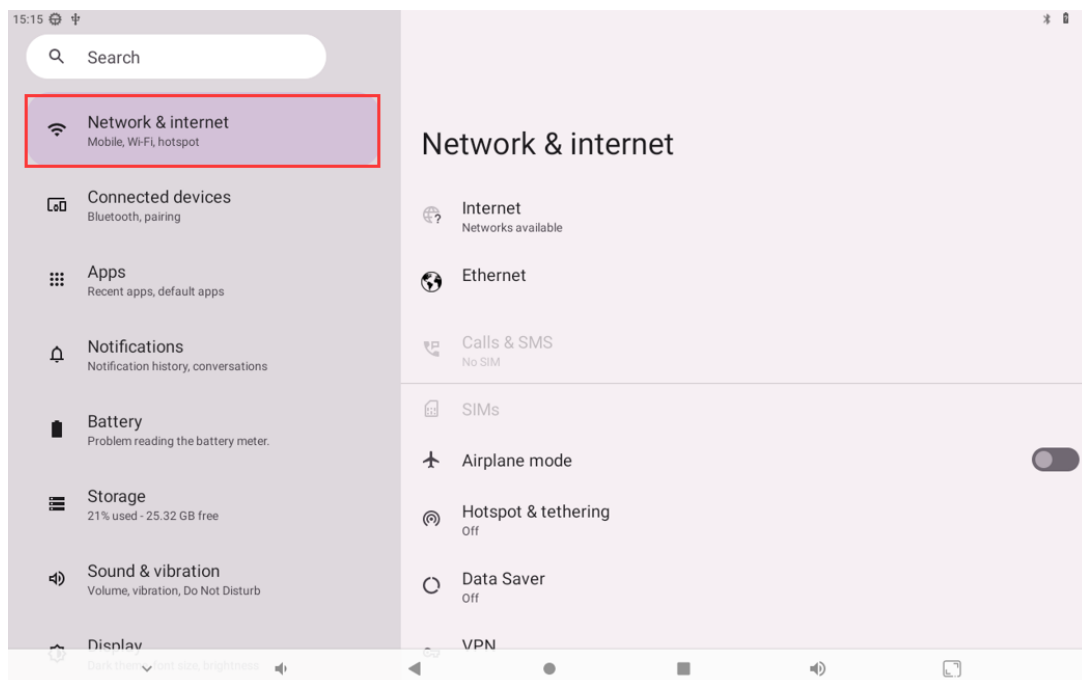


### 5.8.1 WiFi test

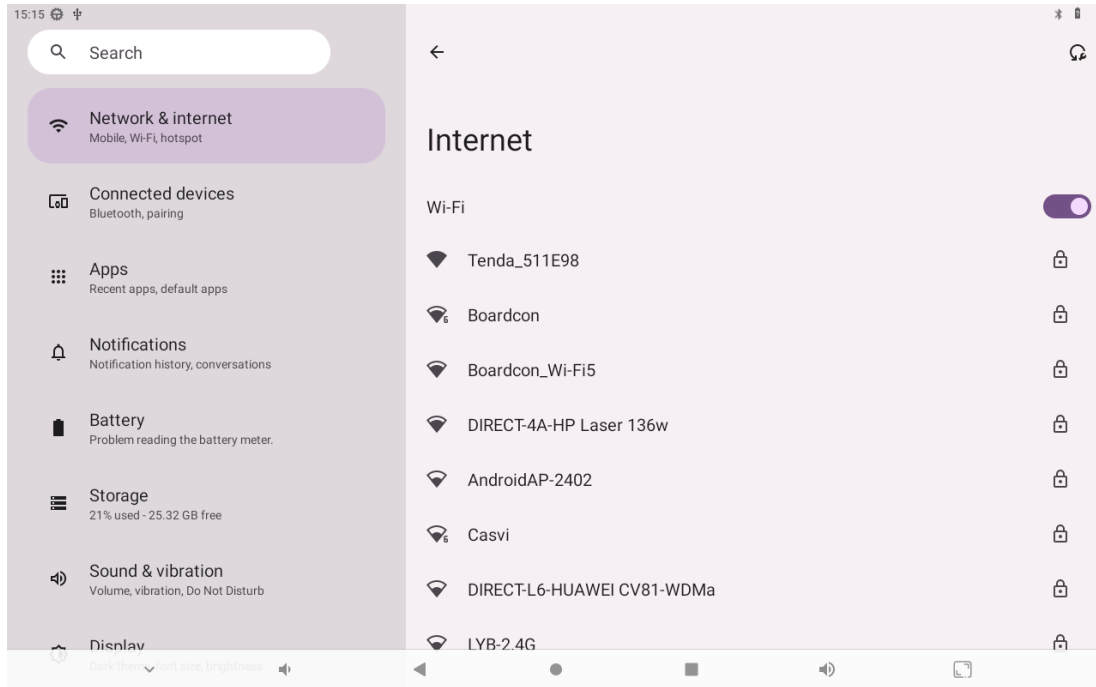
**Step 1:** Open the **Settings** app:



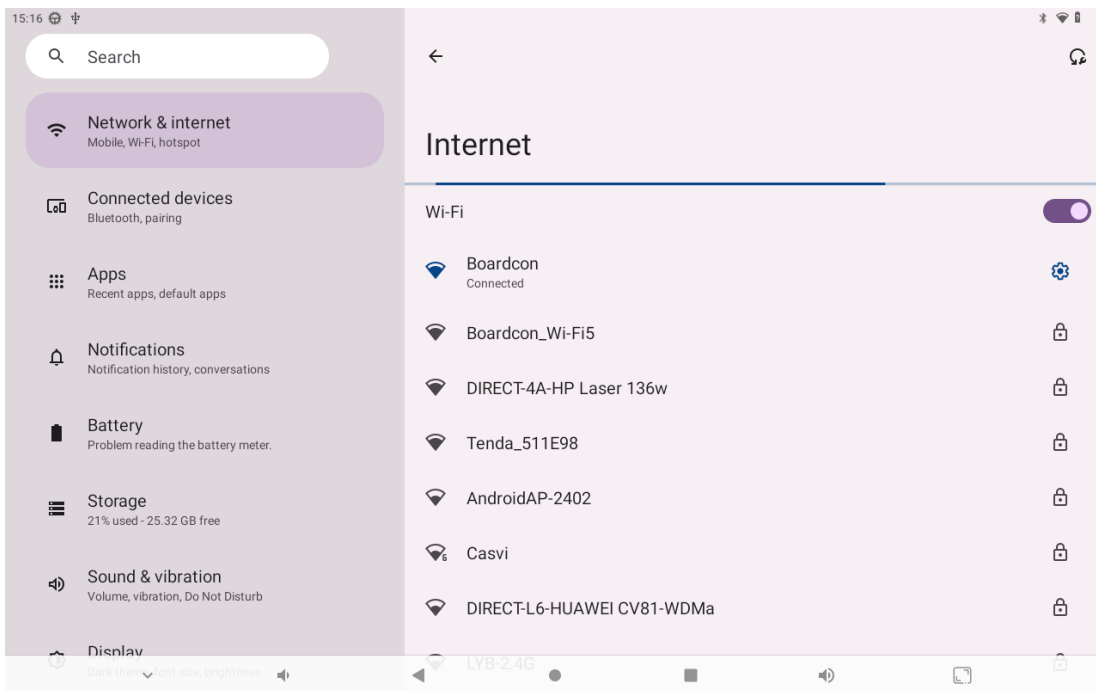
**Step 2: Go to Network & Internet:**



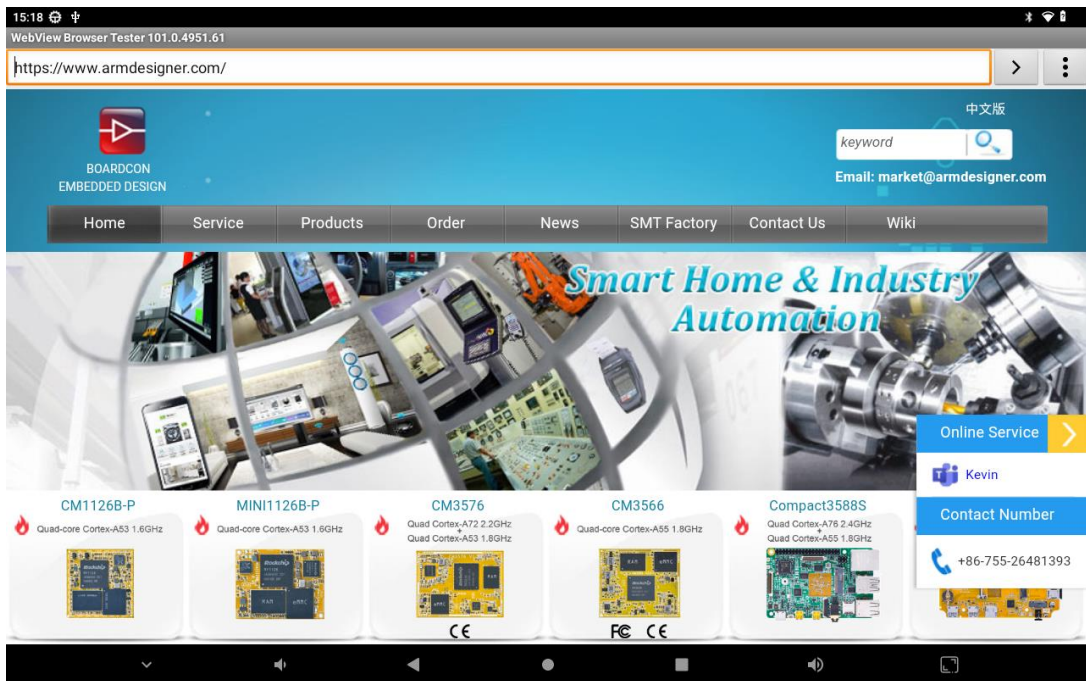
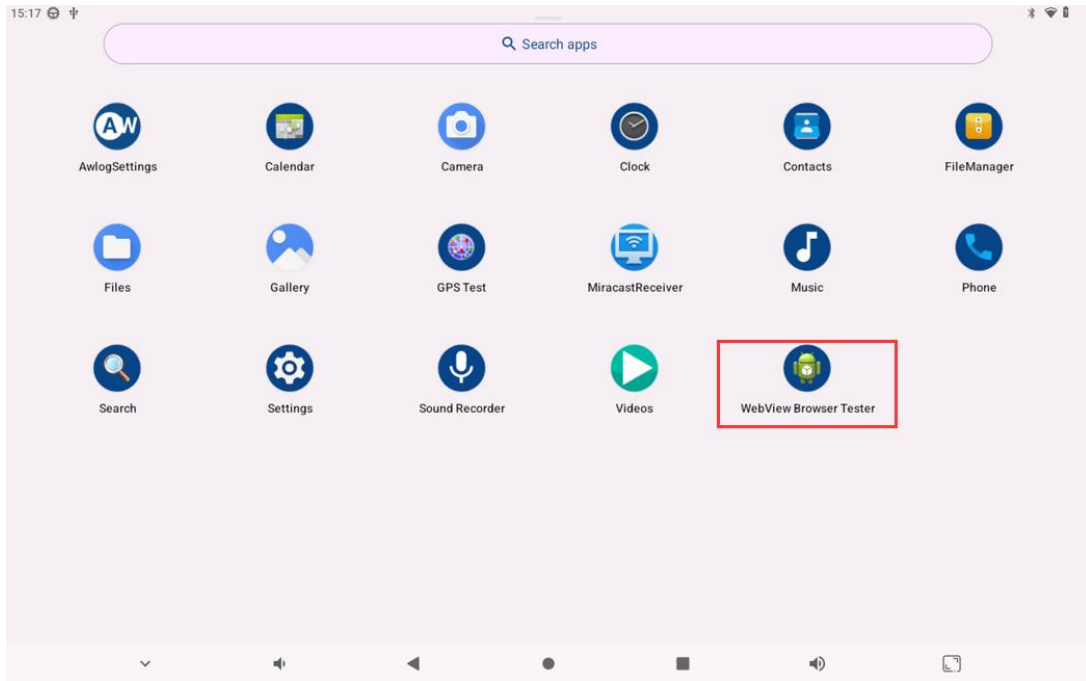
**Step 3: Tap Internet:**



**Step 4:** Select an available Wi-Fi hotspot from the list and connect:



**Step 5:** Internet 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.

```
# ifconfig
```

```
console:/ # ifconfig
wlan0   Link encap:Ethernet HWaddr c6:34:d4:1e:1c:49 Driver rtl8723ds
        inet addr:192.168.0.9 Bcast:192.168.0.255 Mask:255.255.255.0
        inet6 addr: fe80::c434:d4ff:fe1e:1c49/64 Scope: Link
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:155 errors:0 dropped:0 overruns:0 frame:0
        TX packets:55 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:34022 TX bytes:7235
```

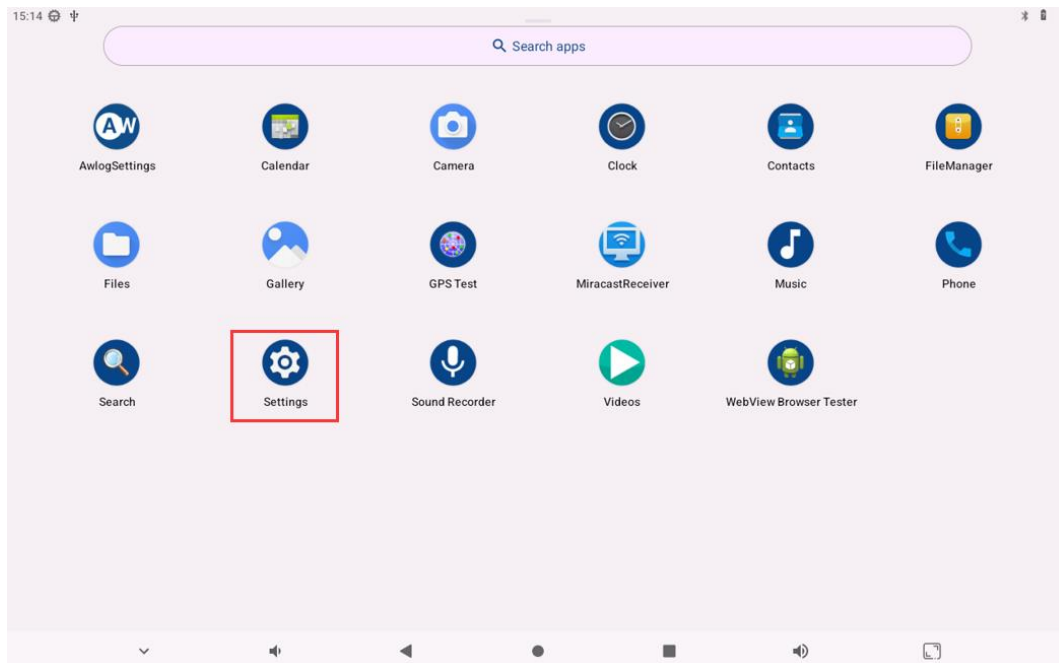
(2) Network connection test.

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

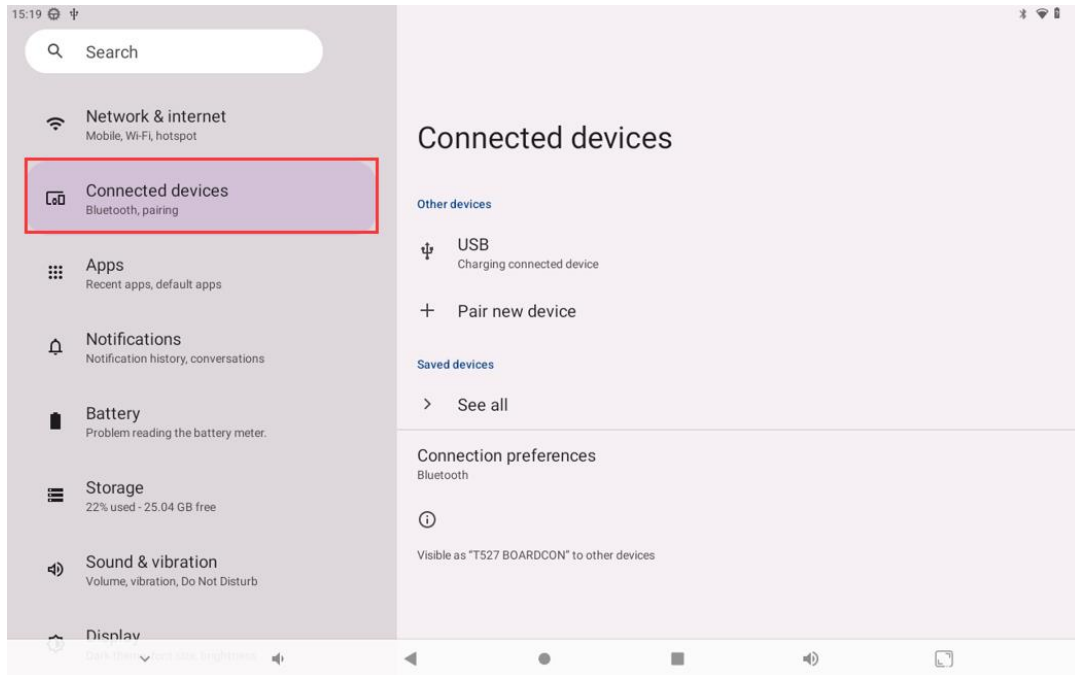
```
console:/ # ping -I wlan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.9 wlan0: 56(84) bytes of data.
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=1 ttl=49 time=213 ms
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=2 ttl=49 time=220 ms
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=3 ttl=49 time=575 ms
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=4 ttl=49 time=255 ms
64 bytes from www.armdesigner.com (67.222.54.196): icmp_seq=5 ttl=49 time=219 ms
^C
--- www.armdesigner.com ping statistics ---
8 packets transmitted, 5 received, 37% packet loss, time 7057ms
rtt min/avg/max/mdev = 213.111/296.952/575.757/140.198 ms
```

## 6.8.2 Bluetooth test

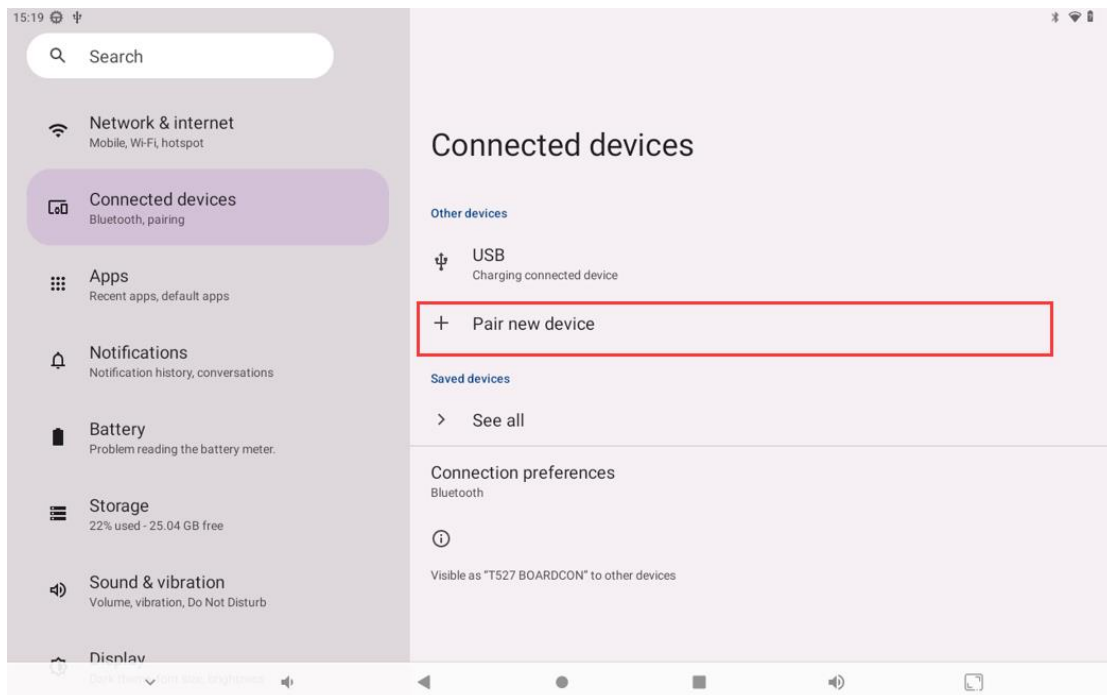
Step 1: Open the Settings app.



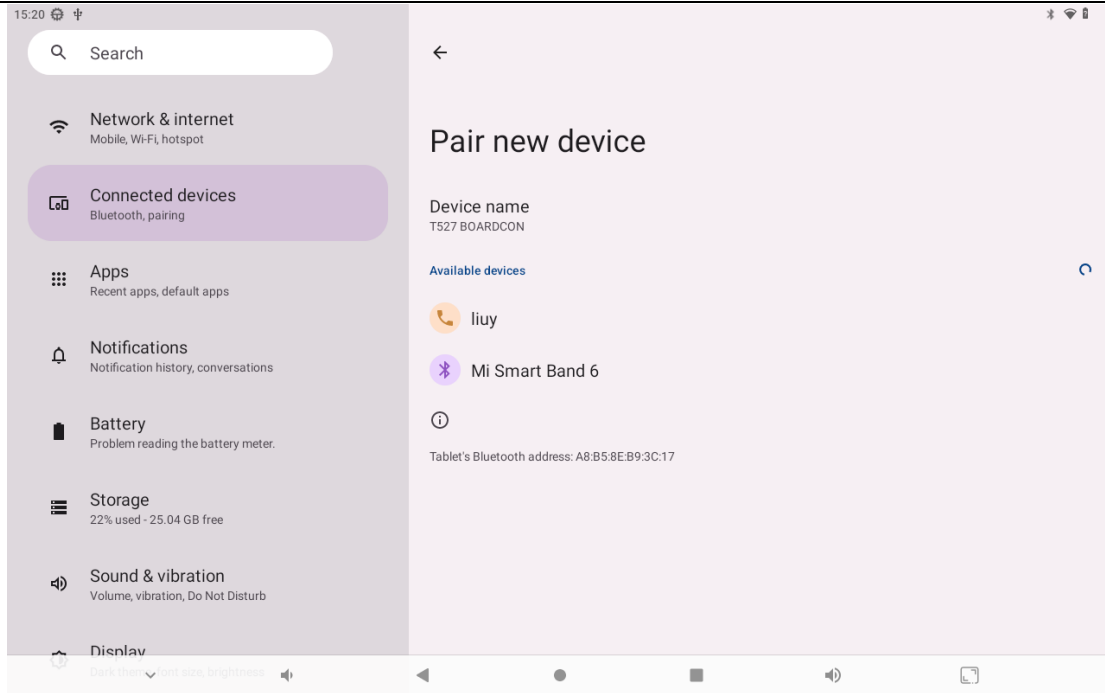
Step 2: Click on the option **Connected devices**



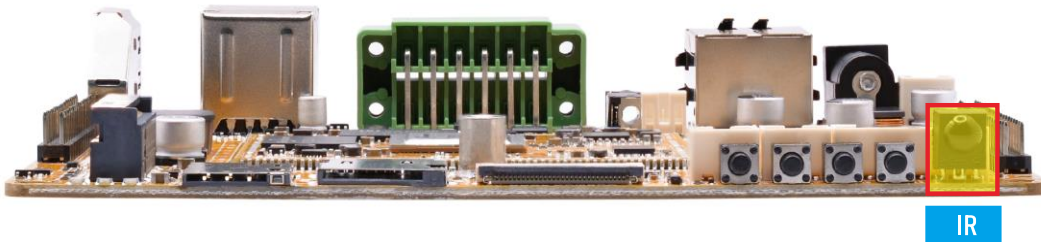
**Step 3:** Click on the option **Pair new device**.



**Step 4:** User can pair themselves in the Bluetooth device list.

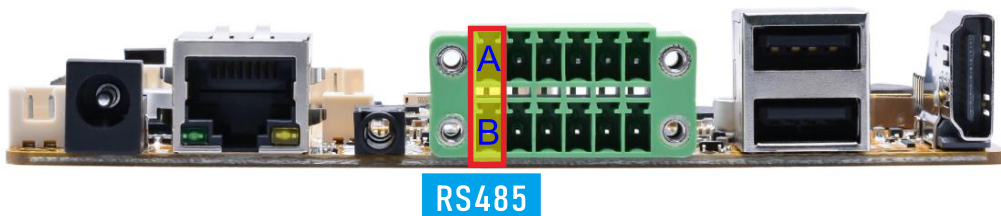


## 5.9 IR



The system supports infrared remote control by default. If the user requires this feature, they need to configure the corresponding remote control.

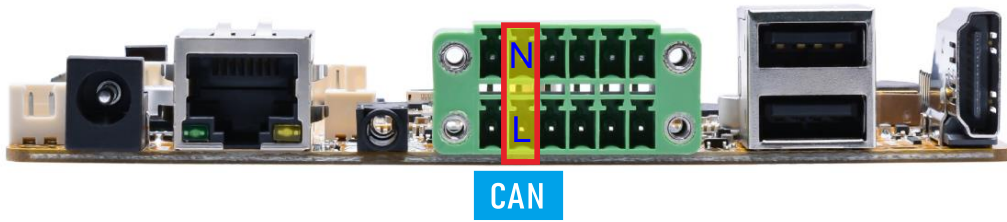
## 5.10 RS485



**Step 1:** Connect the RS485 test tool to the board as shown in the diagram below.



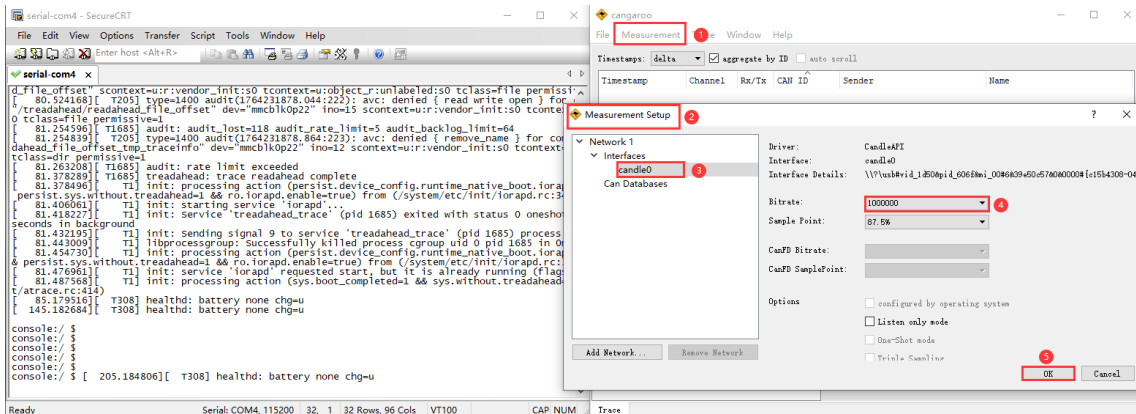
## 5.11 CAN



**Step 1:** Connect the CAN test tool to the board as shown in the diagram below.

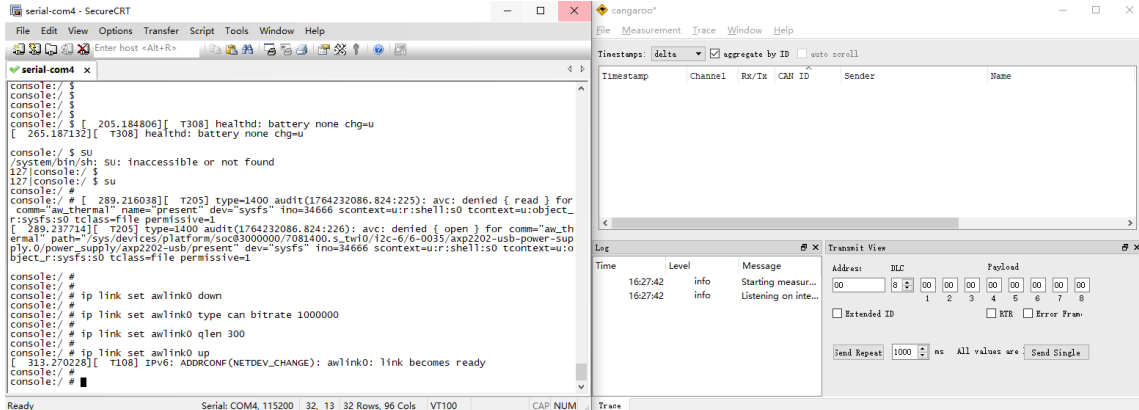


**Step 2:** Open the CAN test software and set the baud rate to 1000000.



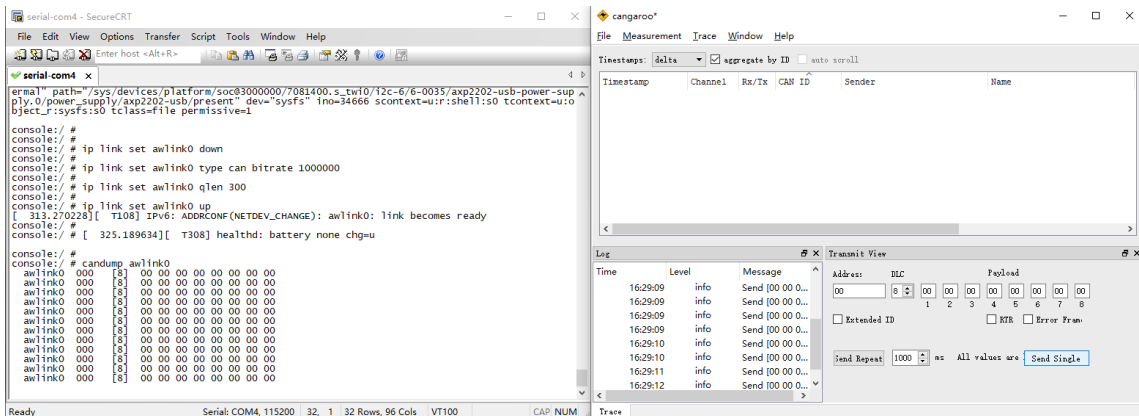
**Step 3:** Configure and activate the CAN network, setting the bitrate to 500000.

```
# ip link set awlink0 down
# ip link set awlink0 type can bitrate 1000000
# ip link set awlink0 qlen 300
# ip link set awlink0 up
```



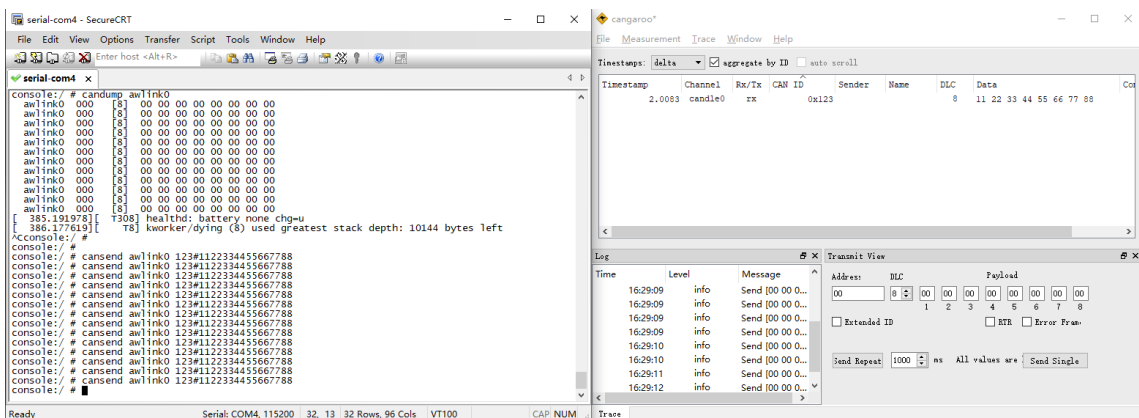
#### Step 4: Configure CAN as the receiver.

```
# candump awlink0
```



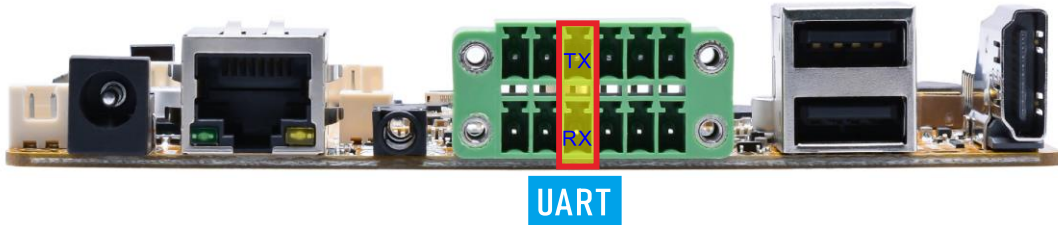
#### Step 5: Configure CAN as the sender.

```
# cansend awlink0 123#1122334455667788
```



## 6.12 RS232

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



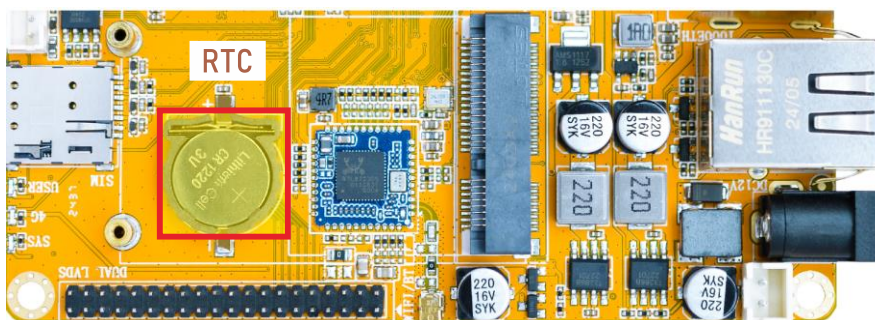
**Step 2:** RS232 test.

```
# com /dev/ttyAS3 115200 8 0 1
```

```
console:/ #: com /dev/ttyAS3 115200 8 0 1
port = /dev/ttyAS3
baudrate = 115200
cs = 8
parity = 0
stopb = 1
vvvvvvvvvvvvvvvvvvvvvv
RECV: vvvvvvvvvvvvvvvvvvvvvvv
uuuuuuuuuuuuuuuuuuuuuu
RECV: uuuuuuuuuuuuuuuuuuuuu
ooythj1111
RECV: ooythj1111
.....
RECV: .....
```

## 5.13 RTC

**Step 1:** Install the coin cell battery, then power on.



**Step 2:** Set the system time.

```
# date -s "2025-11-27 16:30:30"
```

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

```
# hwclock -w
```

**Step 4:** Display the current hardware clock time.

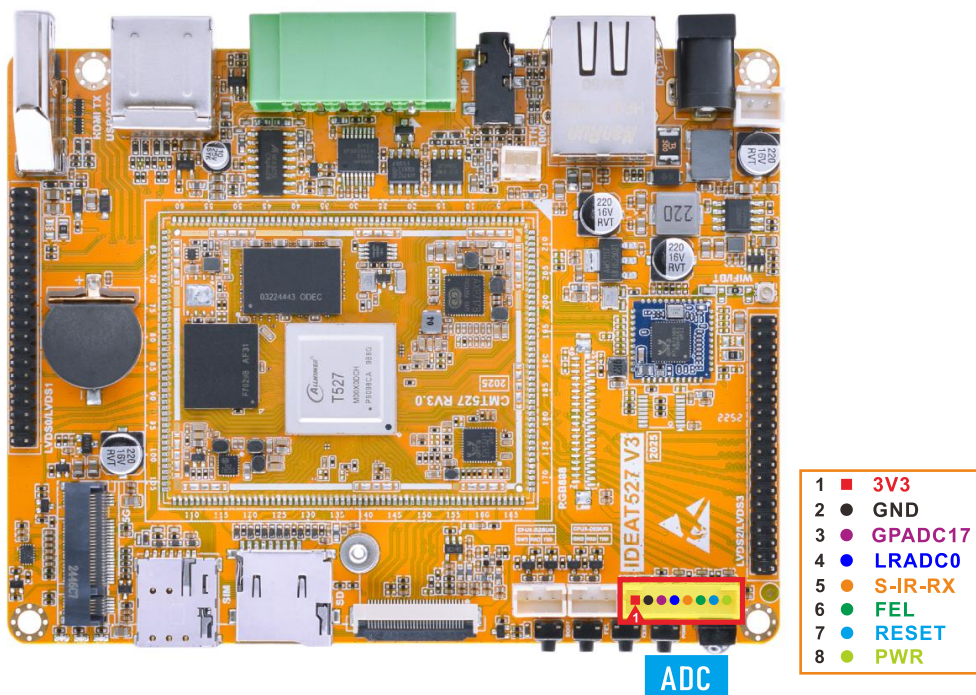
```
# hwclock
```

```
console:/ # date -s "2025-11-27 16:30:30"
Thu Nov 27 16:30:30 CST 2025
console:/ # hwclock -w
130|console:/ # hwclock
2025-11-27 08:30:41+0000
console:/ # hwclock
2025-11-27 08:30:57+0000
console:/ # hwclock
2025-11-27 08:31:09+0000
```

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

```
console:/ # hwclock
2025-11-27 09:01:26+0000
console:/ # hwclock
2025-11-27 09:01:37+0000
console:/ # hwclock
2025-11-27 09:02:05+0000
console:/ # hwclock
2025-11-27 09:02:18+0000
```

## 5.14 ADC



**Note:** The ADC input voltage must not exceed 1.8 V.

## 5.14.1 LRADC

LPADC test command:

```
# cat /sys/bus/iio/devices/iio\:device0/in_voltage0_raw
```

The following logs show the ADC readings when the ADC input is connected to 0V and 1.8 V, respectively:

```
console:/ # cat /sys/bus/iio/devices/iio\:device0/in_voltage0_raw
0
console:/ #
console:/ # cat /sys/bus/iio/devices/iio\:device0/in_voltage0_raw
1323
```