

# *IdeaT527 Linux5.15 User Manual*

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V2.0



**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	Debian11	Buildroot
IDEAT527 V3 CMT527_RV3.0	Y	Y

## Revision History

Version	Date	Author	Revision History
V2.0	2025-12-26	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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## Content

1.Introduction.....	6
1.1 Overview.....	6
1.2 Product Parameters .....	7
1.3 Hardware Interface Introduction.....	9
2.Install Drivers and Tool .....	10
2.1 Install CH9102X Driver.....	11
2.1.1 How to Connect the Serial Port Tool.....	11
2.1.2 Install Driver .....	11
2.2 Install Serial Terminal Tool.....	12
3.Development Environment.....	15
3.1 Preparing the Development Environment.....	15
3.2 Installing Libraries and Toolkits.....	15
4.Compile Source.....	16
4.Burn Image .....	20
5.Debian Test.....	24
5.1 Serial Terminal .....	24
5.2 Normal display.....	25
5.3 USB2.0.....	27
5.3.1 USB2.0 Host .....	27
5.3.2 USB2.0 OTG .....	28
5.4 Ethernet.....	29
5.5 4G.....	30
5.6 Micro SD card.....	33
5.7 Audio .....	34
5.7.1 Audio input .....	34
5.7.2 Audio output .....	35

---

5.8 WIFI & Bluetooth .....	36
5.8.1 WIFI test .....	37
6.8.2 Bluetooth test .....	39
5.9 IR .....	41
5.10 RS485.....	42
5.11 CAN .....	43
6.12 RS232.....	45
5.13 RTC.....	46
5.14 ADC .....	47
5.14.1 LRADC .....	47
5.14.2 GPADC .....	48
6.Buildroot Test .....	49
5.1 Serial Terminal .....	49
5.2 Normal display.....	50
5.3 USB2.0.....	52
5.3.1 USB2.0 Host .....	52
5.3.2 USB2.0 OTG .....	52
5.4 Ethernet.....	53
5.5 4G.....	54
5.6 Micro SD card.....	57
5.7 Audio .....	58
5.7.1 Audio input .....	58
5.7.2 Audio output .....	59
5.8 WIFI & Bluetooth.....	60
5.8.1 WIFI test .....	60
6.8.2 Bluetooth test .....	62
5.9 IR .....	64
5.10 RS485.....	65

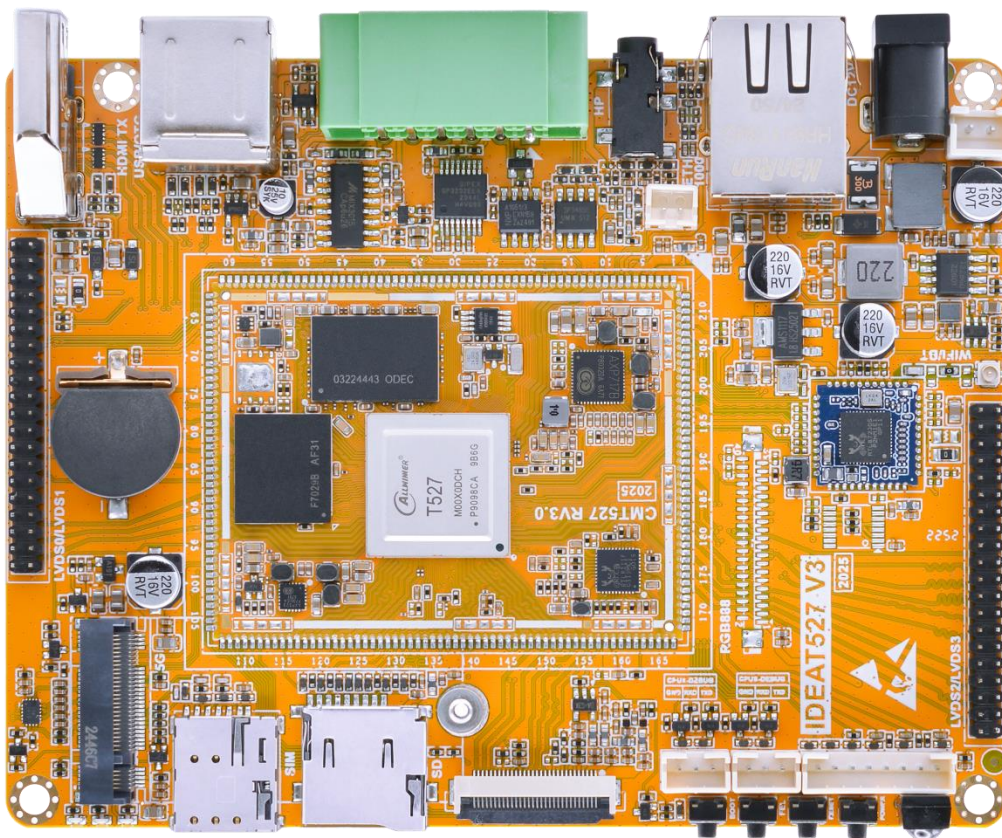


5.11 CAN .....	66
6.12 RS232.....	68
5.13 RTC.....	68
5.14 ADC .....	70
5.14.1 LRADC .....	70
5.14.2 GPADC .....	70

# 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.

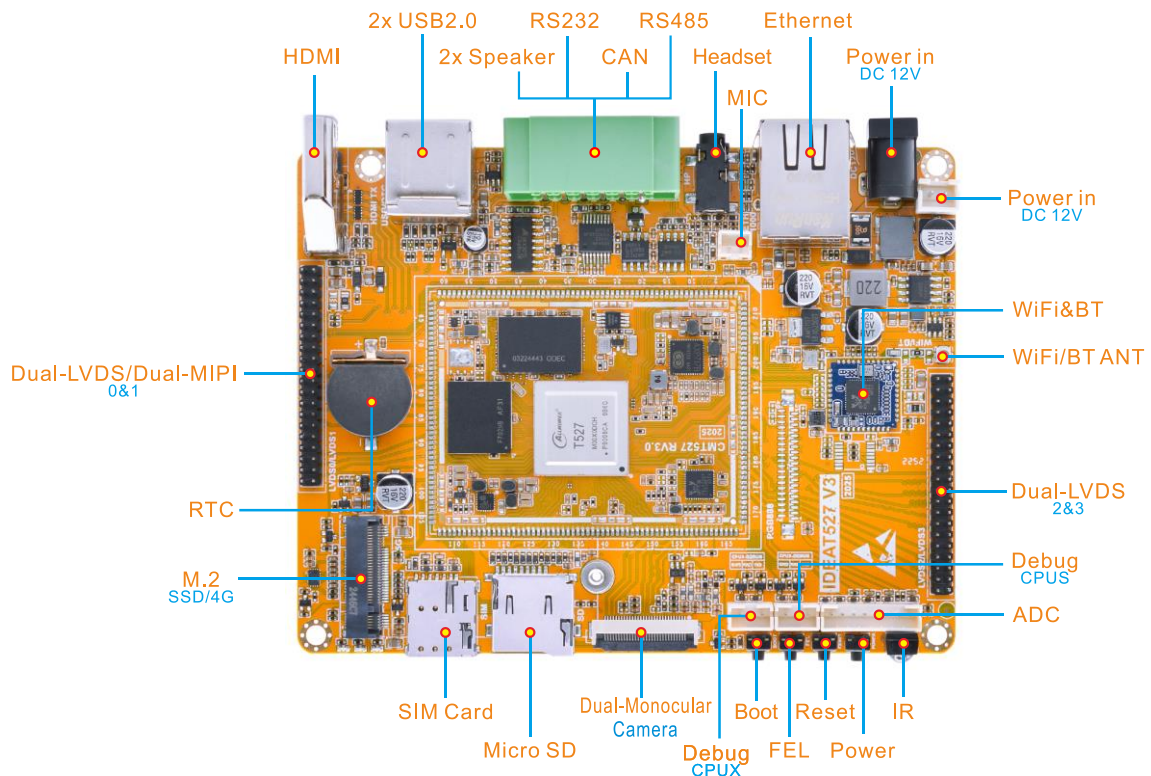


## 1.2 Product Parameters

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

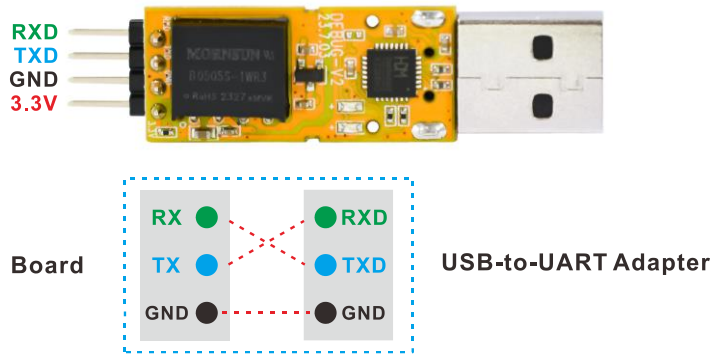
## 2. Install Drivers and Tool

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



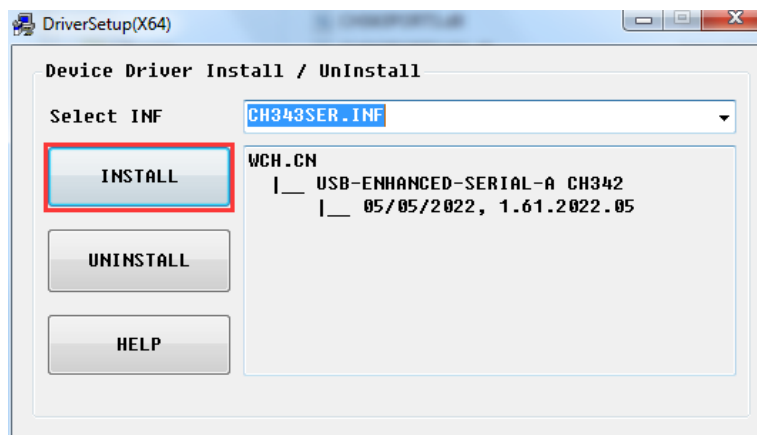
Pin	Connection Description
RXD	Receive, connect to TX pin of the board.
TXD	Transmit, connect to RX pin of the board.
GND	Ground, connect to GND pin of the board.
3V3	No need to connect.

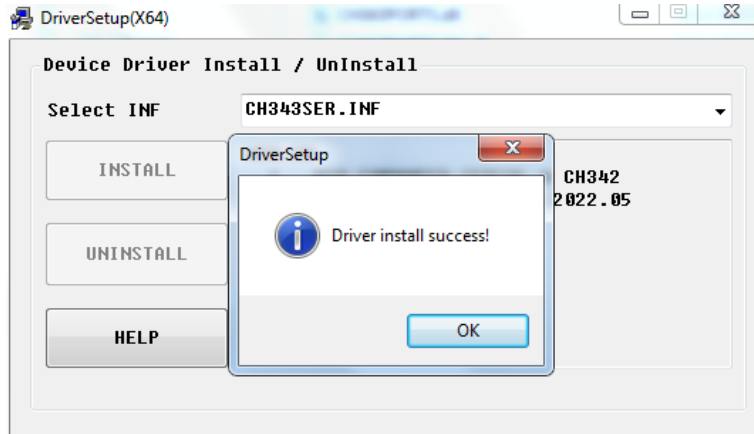
### 2.1.2 Install Driver

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

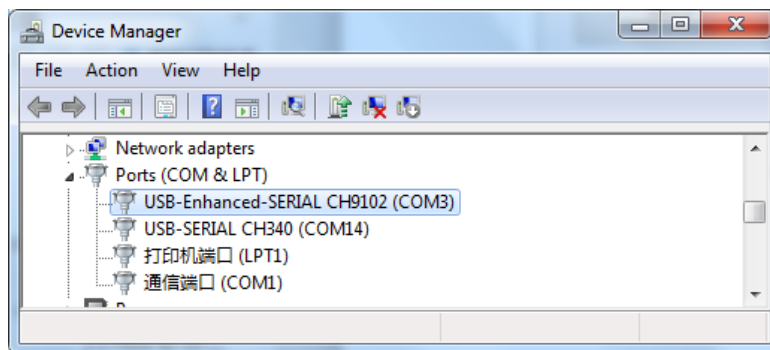
**Step 2:** Unzip *CH343SER.ZIP* on Windows.

**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.

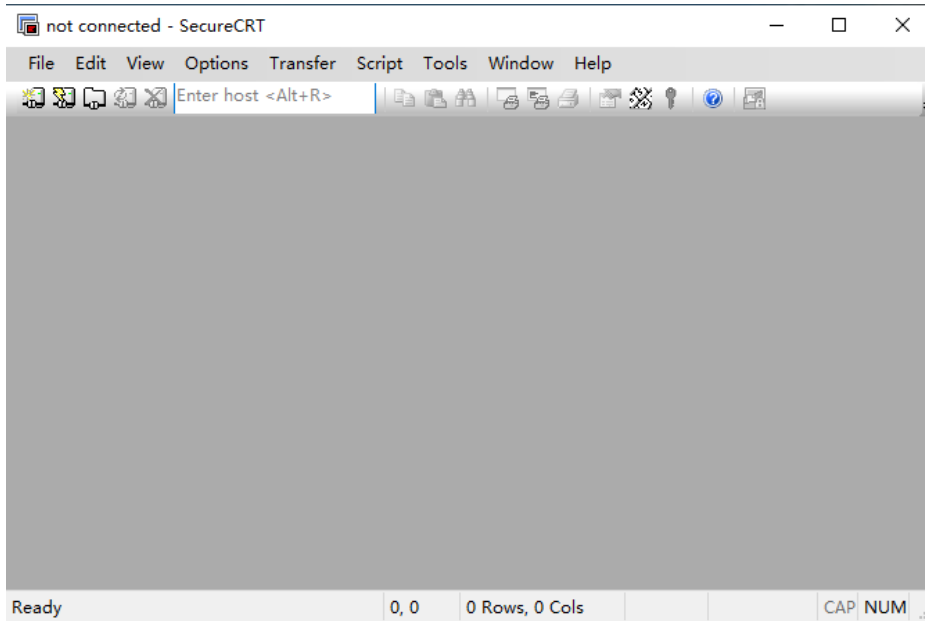


## 2.2 Install Serial Terminal Tool

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

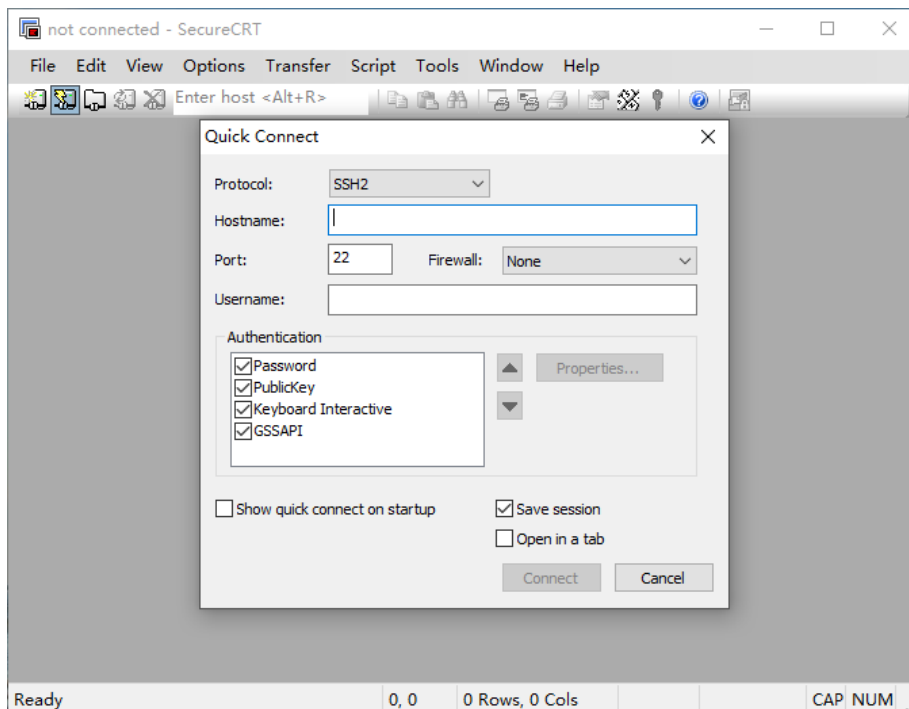
**Step 1:** Unzip *Platform/SecureCRT.rar* on PC.

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

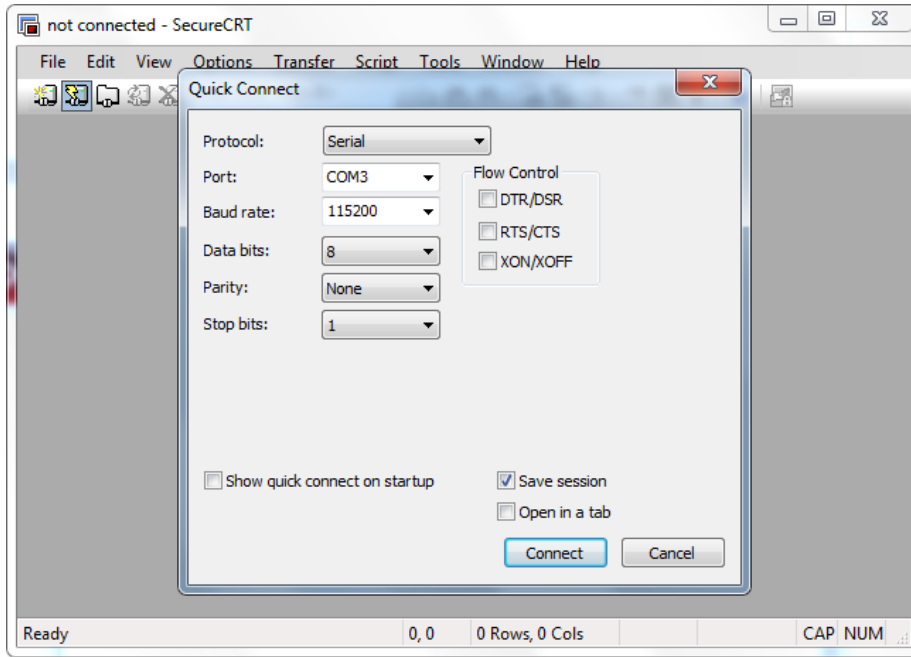


**Step 3:** Confirm the CH9102X driver has been installed and the CH9102X module is connecting to the PC.

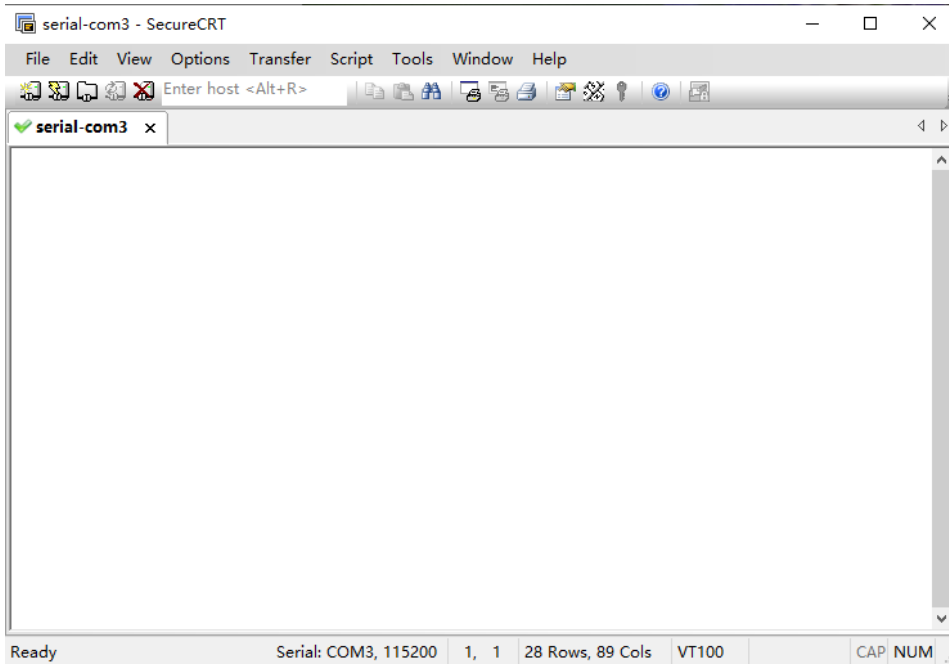
**Step 4:** Click the “**Quick Connect**” button to go to the Quick Connect configuration screen.



**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 T527_Tina5.0_AIOT*.tar.bz2
$ cd T527_Tina5.0_AIOT_V1.4.6
```

### 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\_hdmi:** LVDS0 + HDMI enabled by default
- **1. boardcon\_lvds0\_lvds2:** LVDS0 + LVDS2 enabled by default (dual single-channel LVDS displays)
- **2. boardcon\_mipi0\_hdmi:** MIPI0 (DSI0) + HDMI enabled by default

## Select Debian:

```
liuyuan@boardcon:~/opt/t527/ideat527/linux/T527_Tina5.0_AIOT_V1.4.6$ ./build.sh config
=====ACTION List: mk_config ;=====
options :
All available platform:
  0. android
  1. linux
Choice [linux]: 1
All available linux_dev:
  0. bsp
  1. dragonboard
  2. buildroot
  3. debian
  4. yocto
Choice [buildroot]: 3
All available kern_name:
  0. linux-5.10
  1. linux-5.15
Choice [linux-5.15]: 1
All available ic:
  0. a523
  1. a527
  2. a733
  3. t527
  4. t736
Choice [t527]: 3
All available board:
  0. boardcon_lvds0_hdmi
  1. boardcon_lvds0_lvds2
  2. boardcon_mipi0_hdmi
  3. demo_linux_aiot
  4. demo_linux_aiot_nand
  5. demo_linux_aiot_spinand
  6. demo_linux_auto-v_virt
Choice [boardcon_lvds0_lvds2]: 0
All available flash:
  0. default
  1. nor
Choice [default]: 0
All available rootfs files:
  0. linaro-bullseye-gnome-arm64.tar.gz
  1. linaro-bullseye-lite-arm64.tar.gz
  2. linaro-bullseye-lxde-arm64.tar.gz
  3. linaro-bullseye-xfce-arm64.tar.gz
  4. linaro-bullseye-xfce-ros2-humble-arm64.tar.gz
Choice [linaro-bullseye-xfce-arm64.tar.gz]: 3
Setup BSP files
```

## Select Buildroot:

```
liuyuan@boardcon:~/opt/t527/ideat527/linux/T527_Tina5.0_AIOT_V1.4.6$ ./build.sh config
=====ACTION List: mk_config ;=====
options :
All available platform:
  0. android
  1. linux
Choice [linux]: 1
All available linux_dev:
  0. bsp
  1. dragonboard
  2. buildroot
  3. debian
  4. yocto
Choice [debian]: 2
All available ic:
  0. a523
  1. a527
  2. a733
  3. t527
  4. t736
Choice [t527]: 3
All available board:
  0. boardcon_lvds0_hdmi
  1. boardcon_lvds0_lvds2
  2. boardcon_mipi0_hdmi
  3. demo_linux_aiot
  4. demo_linux_aiot_nand
  5. demo_linux_aiot_spinand
  6. demo_linux_auto-v_virt
Choice [boardcon_lvds0_lvds2]: 0
All available flash:
  0. default
  1. nor
Choice [default]: 0
All available kern_name:
  0. linux-5.10
  1. linux-5.15
Choice [linux-5.15]: 1
Setup BSP files
```

## Step 3: Compile

To start compile, execute the following command:

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

## Step 4: Pack Image

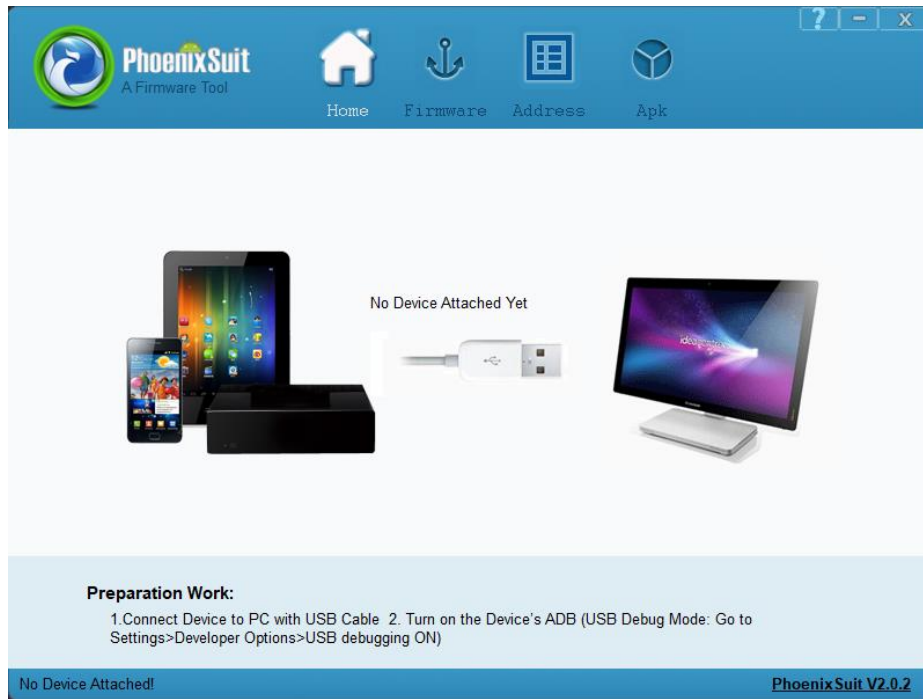
To pack image, execute the following command:

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

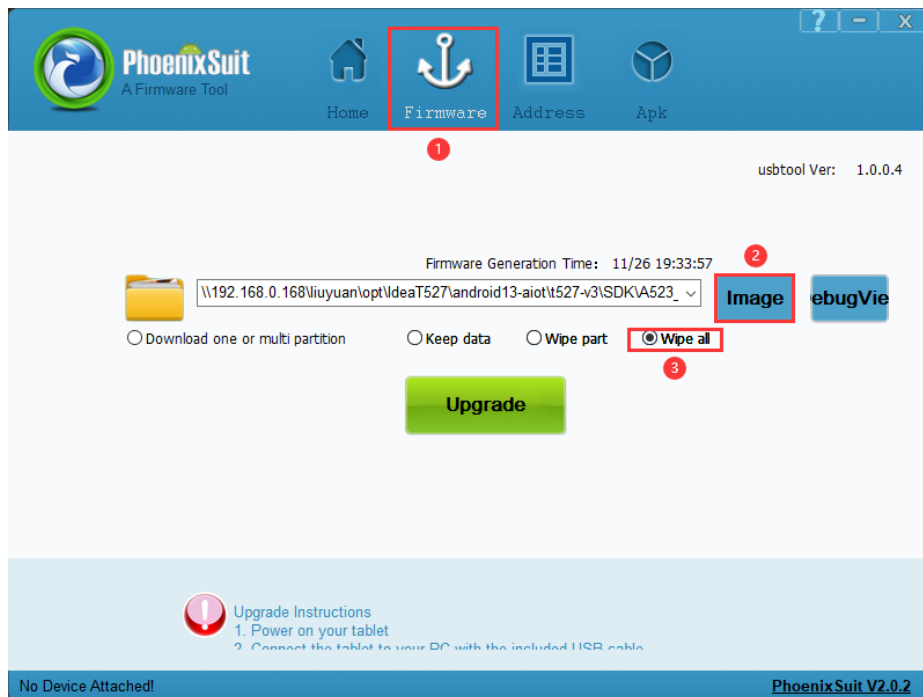
After compiling all, the image will be generated in *T527\_Tina5.0\_AIOT\_V1.4.6/out*.

# 4. Burn Image

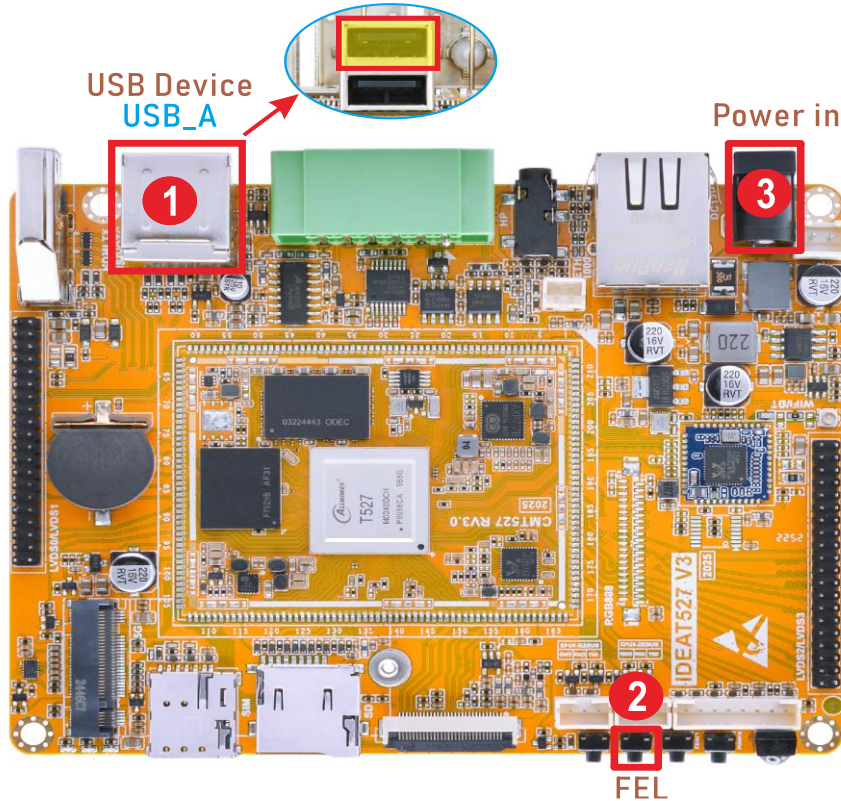
**Step 1:** Open *PhoenixSuit V2.0.2\PhoenixSuit.exe*.



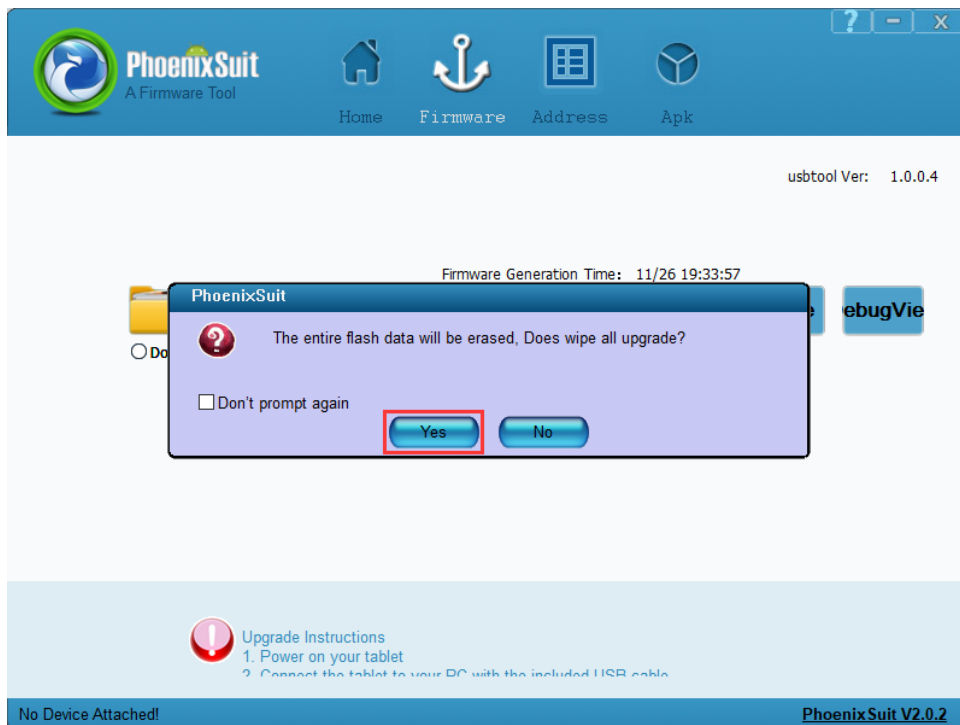
**Step 2:** Click **Firmware** -> **Image**, select **Image**, and choose “**Wipe all**” as the upgrade mode.

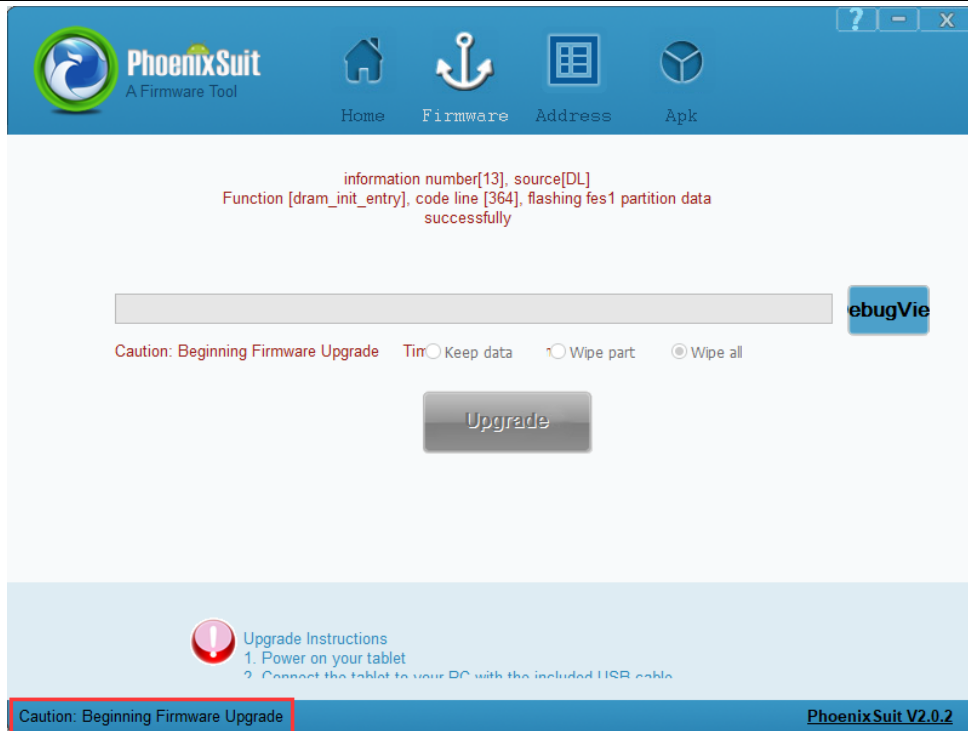


**Step 3:** Connect PC and development board with Type\_A USB cable, keep pressing the **FEL Key**, Power on the board until the pop-up window appears as shown below, or the flashing tool displays **“Beginning Firmware Upgrade”**.

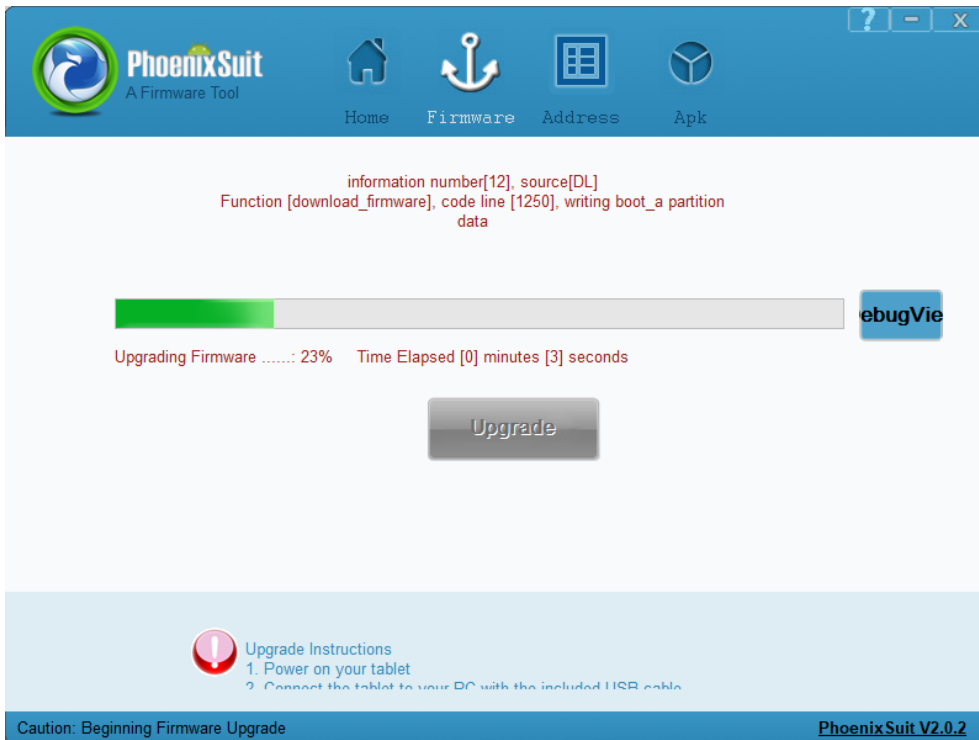


Click **“Yes”**

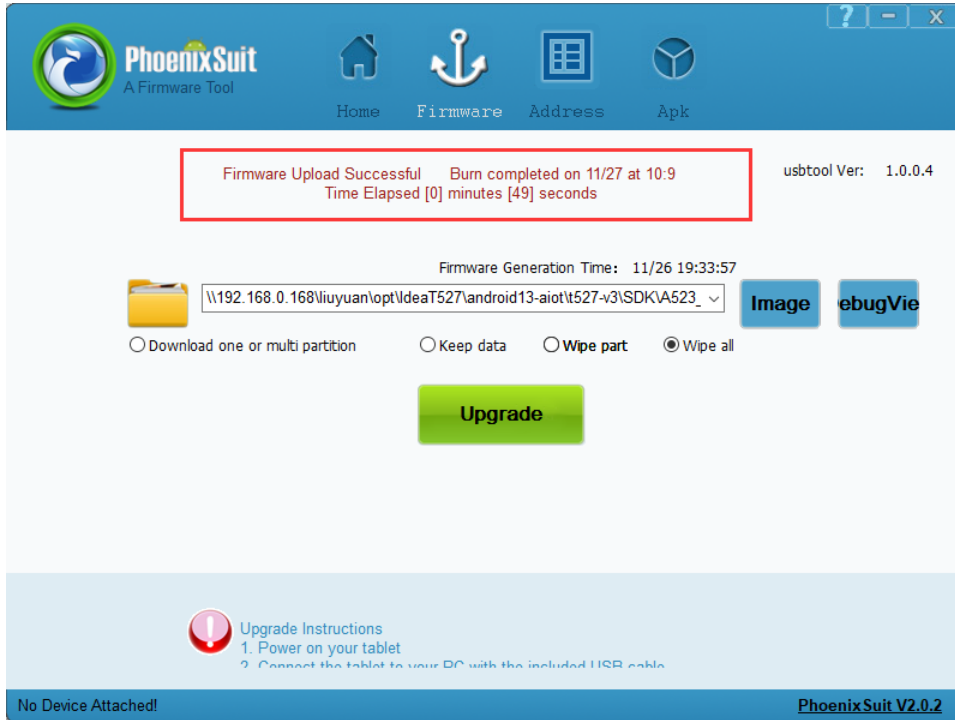




**Step 4:** Release the button, the download will start automatically.



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



**PhoenixSuit**  
A Firmware Tool

Home Firmware Address Apk

Firmware Upload Successful Burn completed on 11/27 at 10:9  
Time Elapsed [0] minutes [49] seconds

usbtool Ver: 1.0.0.4


Firmware Generation Time: 11/26 19:33:57

\\192.168.0.168\liuyuan\opt\IdeaT527\android13-aiot\t527-v3\SDKVA523\_

Image ebugVie

Download one or multi partition  Keep data  Wipe part  Wipe all

**Upgrade**

 Upgrade Instructions  
1. Power on your tablet  
2. Connect the tablet to your PC with the included USB cable.

No Device Attached! PhoenixSuit V2.0.2

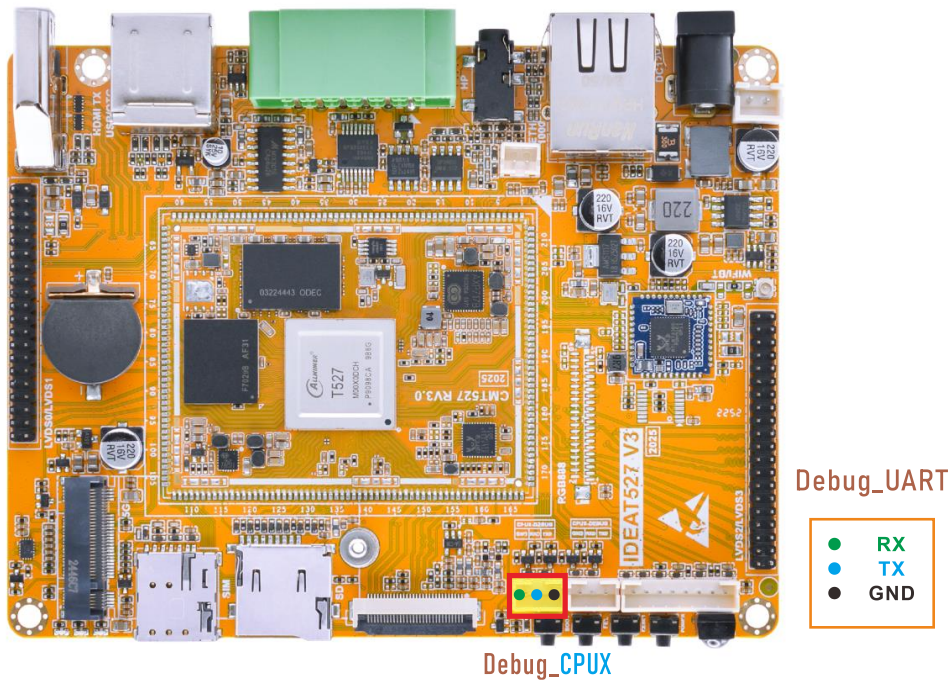
# 5. Debian Test

**Account:** root

**Password:** root

## 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
21.910414 [drm] [LVDS]sunxi_lvds_connector_get_modes start
21.917059 [drm] sunxi-hdmi: drm hdmi detect: disconnect
21.924151 [drm] [LVDS]sunxi_lvds_connector_get_modes start
21.930801 [drm] sunxi-hdmi: drm hdmi detect: disconnect
21.937270 [drm] [LVDS]sunxi_lvds_connector_get_modes start
21.943881 [drm] sunxi-hdmi: drm hdmi detect: disconnect
24.722582 sunxi:sunxi_pd_test-0.pd-ve-test:[WARN]: runtime_suspend disable clock
24.731167 sunxi:sunxi_pd_test-0.pd-vi-test:[WARN]: runtime_suspend disable clock
24.739660 sunxi:sunxi_pd_test-0.pd-vo0-test:[WARN]: runtime_suspend disable clock
24.748287 sunxi:sunxi_pd_test-0.pd-vo1-test:[WARN]: runtime_suspend disable clock
24.756909 sunxi:sunxi_pd_test-0.pd-de-test:[WARN]: runtime_suspend disable clock
24.765422 sunxi:sunxi_pd_test-0.pd-nand-test:[WARN]: runtime_suspend disable clock
24.774135 sunxi:sunxi_pd_test-0.pd-pcie-test:[WARN]: runtime_suspend disable clock
24.782843 sunxi:sunxi_pd_test-0.pd-dsp-test:[WARN]: runtime_suspend disable clock
24.791454 sunxi:sunxi_pd_test-0.pd-npu-test:[WARN]: runtime_suspend disable clock
24.800065 sunxi:sunxi_pd_test-0.pd-sram-test:[WARN]: runtime_suspend disable clock
24.808777 sunxi:sunxi_pd_test-0.pd-riscv-test:[WARN]: runtime_suspend disable clock

localhost login: root
Password:
Linux localhost 5.15.147 #1 SMP PREEMPT Thu Dec 18 14:59:10 CST 2025 aarch64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

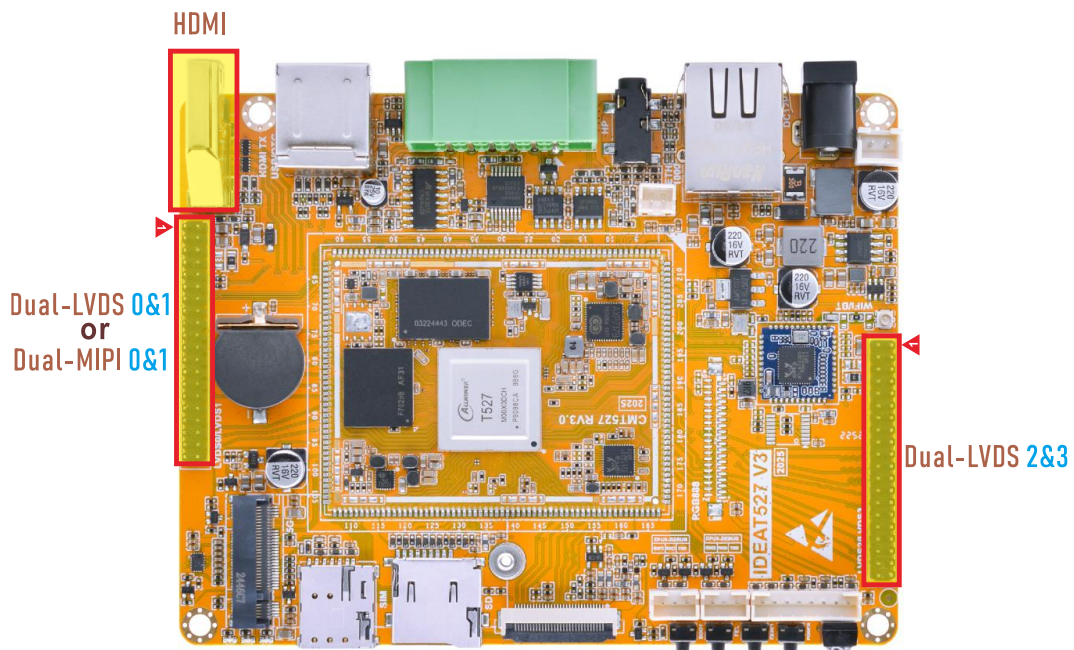
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sun Aug 25 19:07:01 UTC 2024 on ttyAS0
root@localhost:~#
root@localhost:~#
root@localhost:~#

Ready Serial: COM4, 115200 32, 19 32 Rows, 96 Cols VT100 CAP NUM

```

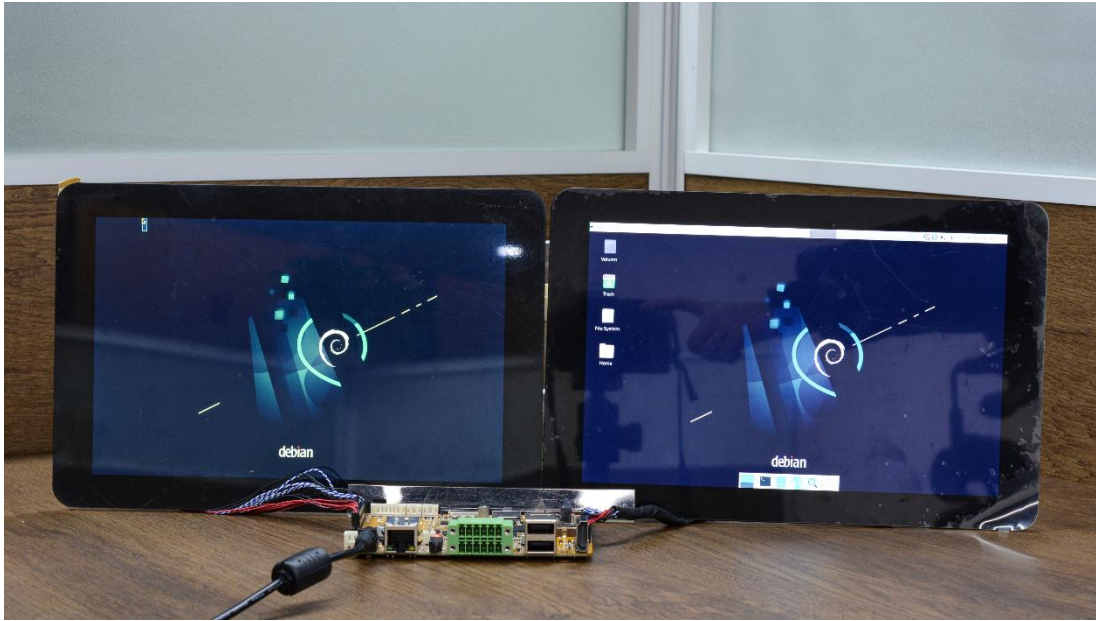
## 5.2 Normal display

On IdeaT527 debian11, the default configuration supports the following display combinations: LVDS0 + LVDS2, LVDS0 + HDMI, and MIPI0 + HDMI.



**Display output combinations:**

**lvds0 + lvds2**



**lvds0 + hdmi**



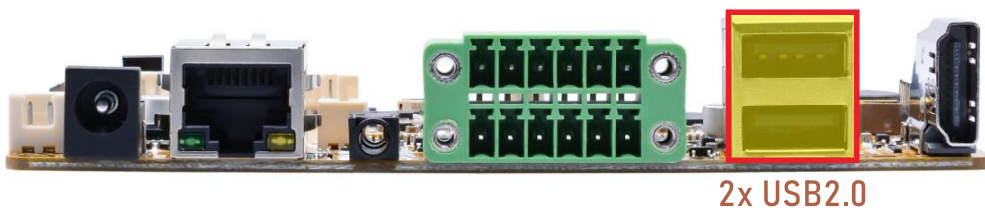
**mipi0 + hdmi**



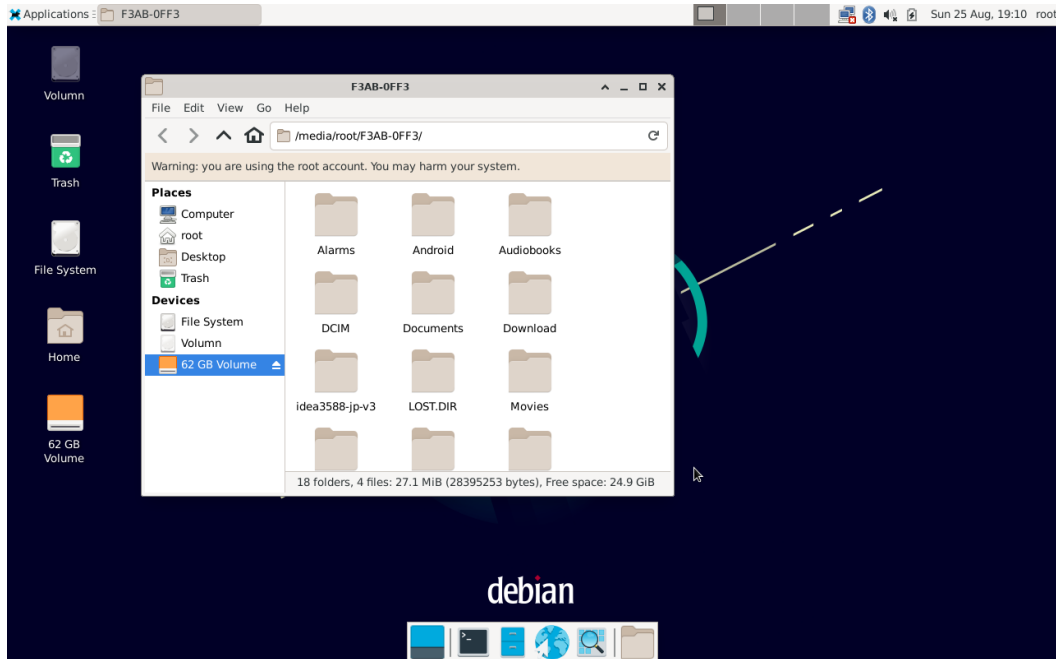
## 5.3 USB2.0

The IdeaT527 debian11 supports two USB 2.0 Host interfaces, one of which is OTG-compatible and is configured as Device mode by default.

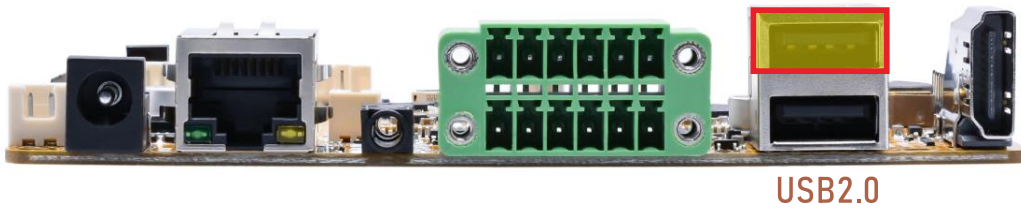
### 5.3.1 USB2.0 Host



After connecting the USB flash drive, if the device is successfully recognized, an icon will appear on the desktop. Users need to double-click the icon in order to access the files on the device.



### 5.3.2 USB2.0 OTG



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

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

```

root@localhost:~# echo usb_host >
/sys/devices/platform/soc@3000000/10.usbc0/otg_role
[ 214.399298] sunxi:sunxi_usbc:[INFO]: rmmmod_device_driver@3000000/10.usbc0/otg_role
[ 214.407420] sunxi:sunxi_usbc:[INFO]: insmod_host_driver
[ 214.414993] sunxi:ehci_sunxi:[INFO]: [ehci0-controller]: sunxi_usb_enable ehci
[ 214.423115] sunxi:ehci_sunxi:[INFO]: [sunxi-ehci0]: probe, pdev->name: 4101000.ehci0-controller,
sunxi_ehci: 0xffffffc00963b5e8, 0xffffffc009bb5000, irq_no:88
[ 214.439297] sunxi-ehci 4101000.ehci0-controller: supply hci not found, using dummy regulator
[ 214.450064] sunxi-ehci 4101000.ehci0-controller: EHCI Host Controller
[ 214.457318] sunxi-ehci 4101000.ehci0-controller: new USB bus registered, assigned bus number 5
[ 214.467060] sunxi-ehci 4101000.ehci0-controller: irq 136, io mem 0x04101000
[ 214.490610] sunxi-ehci 4101000.ehci0-controller: USB 2.0 started, EHCI 1.00
[ 214.498699] usb usb5: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 5.15
[ 214.508036] usb usb5: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 214.516202] usb usb5: Product: EHCI Host Controller
[ 214.522516] usb usb5: Manufacturer: Linux 5.15.147 ehci_hcd
[ 214.528886] usb usb5: SerialNumber: sunxi-ehci
[ 214.534986] hub 5-0:1.0: USB hub found
[ 214.539290] hub 5-0:1.0: 1 port detected
[ 214.544170] sunxi:ohci_sunxi:[INFO]: [ohci0-controller]: sunxi_usb_enable ohci
[ 214.553851] sunxi:ohci_sunxi:[INFO]: [sunxi-ohci0]: probe, pdev->name: 4101400.ohci0-controller,
sunxi_ohci: 0xffffffc00963c278
[ 214.568161] sunxi-ohci 4101400.ohci0-controller: supply hci not found, using dummy regulator
[ 214.581256] sunxi-ohci 4101400.ohci0-controller: OHCI Host Controller
[ 214.588497] sunxi-ohci 4101400.ohci0-controller: new USB bus registered, assigned bus number 6
[ 214.598202] debugfs: Directory 'sunxi-ohci' with parent 'ohci' already present!
[ 214.606445] sunxi-ohci 4101400.ohci0-controller: irq 137, io mem 0x04101400
[ 214.674788] usb usb6: New USB device found, idVendor=1d6b, idProduct=0001, bcdDevice= 5.15
[ 214.684047] usb usb6: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 214.692168] usb usb6: Product: OHCI Host Controller
[ 214.697654] usb usb6: Manufacturer: Linux 5.15.147 ohci_hcd
[ 214.703911] usb usb6: SerialNumber: sunxi-ohci
[ 214.709287] hub 6-0:1.0: USB hub found
[ 214.713520] hub 6-0:1.0: 1 port detected
  
```

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

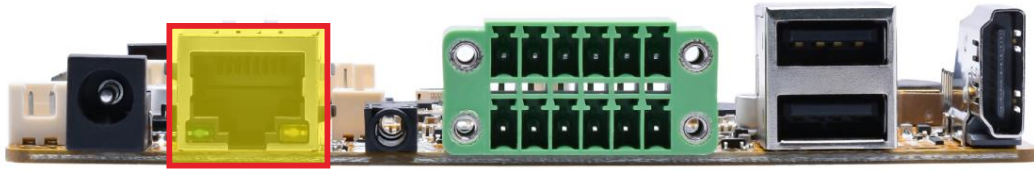
```
# echo usb_device > /sys/devices/platform/soc@3000000/10.usbc0/otg_role
```

```

root@localhost:~# echo
usb_device > /sys/devices/platform/soc@3000000/10.usbc0/otg_role
[ 532.907282] sunxi:sunxi_usbc:[INFO]: rmmmod_host_driver/soc@3000000/10.usbc0/otg_role
[ 532.907282]
[ 532.914842] sunxi:ehci_sunxi:[INFO]: [ehci0-controller]: sunxi_usb_disable ehci
[ 532.923084] sunxi:ehci_sunxi:[INFO]: [sunxi-ehci0]: remove, pdev->name: 4101000.ehci0-
controller, sunxi_ehci: 0xffffffc00963b5e8
[ 532.936076] sunxi-ehci 4101000.ehci0-controller: remove, state 4
[ 532.942822] usb usb5: USB disconnect, device number 1
[ 532.948997] sunxi-ehci 4101000.ehci0-controller: USB bus 5 deregistered
[ 532.956767] sunxi:ohci_sunxi:[INFO]: [ohci0-controller]: sunxi_usb_disable ohci
[ 532.964982] sunxi:ohci_sunxi:[INFO]: [sunxi-ohci0]: remove, pdev->name: 4101400.ohci0-
controller, sunxi_ohci: 0xffffffc00963c278
[ 532.977966] sunxi-ohci 4101400.ohci0-controller: remove, state 4
[ 532.984716] usb usb6: USB disconnect, device number 1
[ 532.991093] sunxi-ohci 4101400.ohci0-controller: USB bus 6 deregistered
[ 532.998984] sunxi:sunxi_usbc:[INFO]: insmod_device_driver
[ 532.998984]
root@localhost:~#
  
```

## 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.

```
root@localhost:~# [ 120.653124] sunxi-gmac 4500000.gmac0 eth0: Link is Up - 1Gbps/Full - flow control off  
[ 120.662102] IPv6: ADDRCONF (NETDEV_CHANGE): eth0: link becomes ready
```

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

```
# ifconfig
```

```
root@localhost:~# ifconfig  
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
inet 192.168.0.36 netmask 255.255.255.0 broadcast 192.168.0.255  
inet6 fe80::80e7:226a:415b:5e96 prefixlen 64 scopeid 0x20<link>  
ether de:e4:39:05:0e:30 txqueuelen 1000 (Ethernet)  
RX packets 153 bytes 12976 (12.6 KiB)  
RX errors 0 dropped 18 overruns 0 frame 0  
TX packets 18 bytes 1938 (1.8 KiB)  
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
device interrupt 173
```

**Step 3:** Network connection test.

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

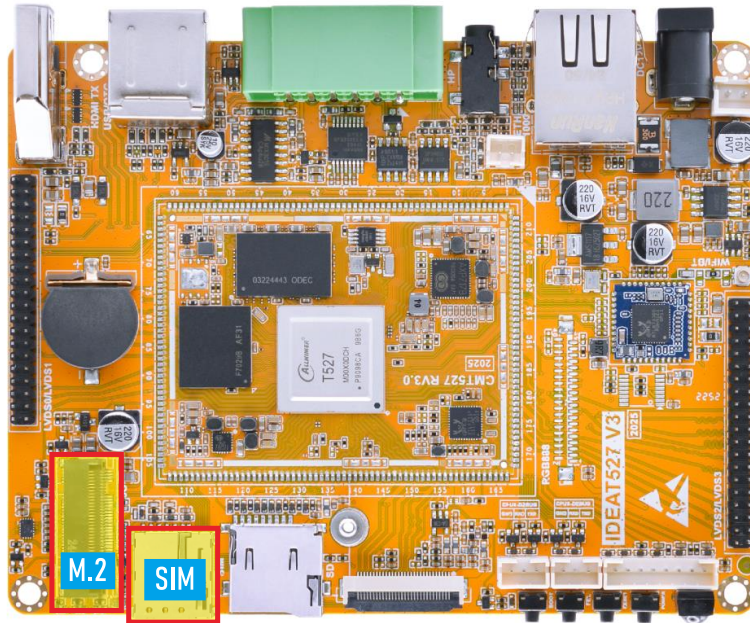
```
root@localhost:~# ping -I eth0 www.armdesigner.com  
PING www.armdesigner.com (67.222.54.196) from 192.168.0.36 eth0: 56(84) bytes of data.  
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=49 time=189 ms  
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=49 time=210 ms  
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=49 time=205 ms  
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=49 time=234 ms  
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=49 time=225 ms  
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=49 time=204 ms  
^C  
--- www.armdesigner.com ping statistics ---  
6 packets transmitted, 6 received, 0% packet loss, time 5000ms  
rtt min/avg/max/mdev = 189.204/211.286/233.520/14.514 ms
```

**Note:**

NetworkManager has been disabled. Use ifup/ifdown to bring the network interface up or down.

## 5.5 4G

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



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



**Step 3:** Initiate the PPP connection.

```
# pppd call quectel-ppp &
```

```

root@localhost:~# pppd call quectel-ppp &
[1] 1213
root@localhost:~# pppd options in effect:
debug          # (from /etc/ppp/peers/quectel-ppp)
nodetach       # (from /etc/ppp/peers/quectel-ppp)
dump           # (from /etc/ppp/peers/quectel-ppp)
noauth         # (from /etc/ppp/peers/quectel-ppp)
user test      # (from /etc/ppp/peers/quectel-ppp)
password ????? # (from /etc/ppp/peers/quectel-ppp)
remotename 3gpp # (from /etc/ppp/peers/quectel-ppp)
/dev/ttyUSB3  # (from /etc/ppp/peers/quectel-ppp)
115200        # (from /etc/ppp/peers/quectel-ppp)
lock          # (from /etc/ppp/peers/quectel-ppp)
connect chat -s -v -f /etc/ppp/peers/quectel-chat-connect # (from /etc/ppp/peers/quectel-ppp)
disconnect chat -s -v -f /etc/ppp/peers/quectel-chat-disconnect # (from /etc/ppp/peers/quectel-ppp)
nocrtscts     # (from /etc/ppp/peers/quectel-ppp)
modem         # (from /etc/ppp/peers/quectel-ppp)
asynctest 0   # (from /etc/ppp/options)
lcp-echo-failure 4 # (from /etc/ppp/options)
lcp-echo-interval 30 # (from /etc/ppp/options)
hide-password # (from /etc/ppp/peers/quectel-ppp)
novj          # (from /etc/ppp/peers/quectel-ppp)
novjccomp    # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-local # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-remote # (from /etc/ppp/peers/quectel-ppp)
ipparam 3gpp # (from /etc/ppp/peers/quectel-ppp)
noipdefault  # (from /etc/ppp/peers/quectel-ppp)
ipcp-max-failure 30 # (from /etc/ppp/peers/quectel-ppp)
defaultroute # (from /etc/ppp/peers/quectel-ppp)
usepeerdns   # (from /etc/ppp/peers/quectel-ppp)
nocc         # (from /etc/ppp/peers/quectel-ppp)
noipx        # (from /etc/ppp/options)
abort on (BUSY)
abort on (NO CARRIER)
abort on (NO DIALTONE)
abort on (ERROR)
abort on (NO ANSWER)
timeout set to 30 seconds
send (AT^M)
expect (OK)
AT^M^M
OK
-- got it

send (ATE0^M)
expect (OK)
^M

```

**Step 2:** Check the status of the network interfaces.

```
# ifconfig
```

```

root@localhost:~# ifconfig
ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST> mtu 1500
    inet 10.54.2.148 netmask 255.255.255.255 destination 10.64.64.64
    ppp txqueuelen 3 (Point-to-Point Protocol)
    RX packets 4 bytes 52 (52.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 14 bytes 198 (198.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

```

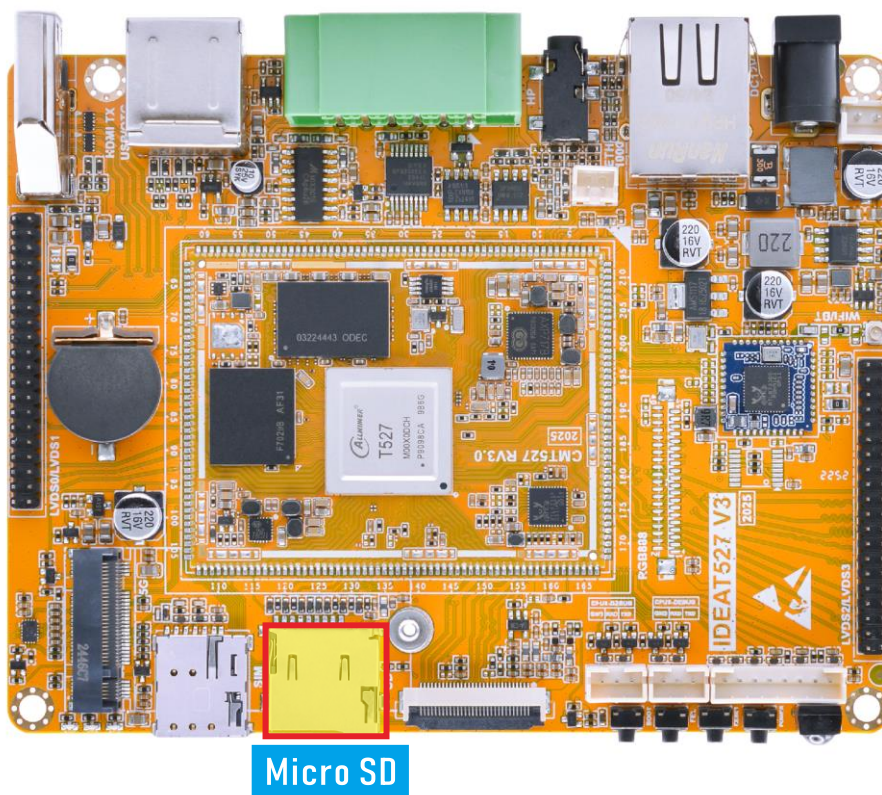
**Step 3:** Test the PPP connection.

```
# ping -I ppp0 www.armdesigner.com
```

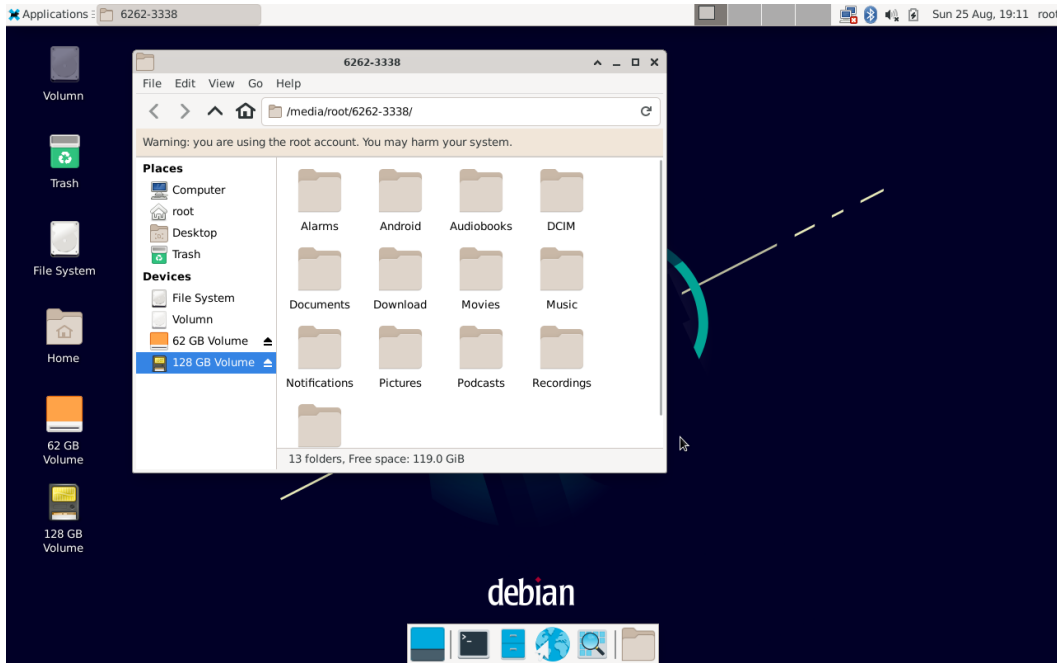
```
root@localhost:~# ping -I ppp0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 10.54.2.148 ppp0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=42 time=324 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=42 time=290 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=42 time=258 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=42 time=264 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=42 time=296 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=42 time=257 ms
^C
--- www.armdesigner.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5000ms
rtt min/avg/max/mdev = 256.983/281.440/324.067/24.307 ms
```

## 5.6 Micro SD card

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

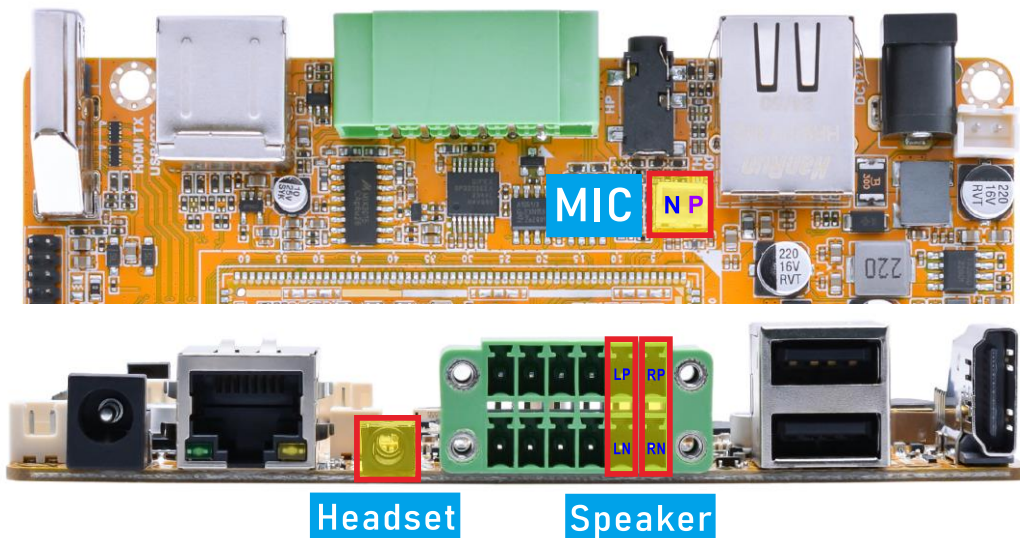


**Step 2:** After inserting the SD card, if it is recognized successfully, an icon will appear on the desktop. Users need to double-click the icon in order to access the SD card.



## 5.7 Audio

**Step 1:** Plug in the headset, connect the speaker, and connect the MIC.



### 5.7.1 Audio input

This platform supports two audio input sources for recording: **Headset input** and **MIC input**.

**Note:** Headset input and MIC input cannot be enabled at the same time. Switch input source by disabling the current one first.

- **Headset input**

Execute the following command to switch the recording source to the **headset** channel:

```
# amixer -c 0 cset name='MIC1 Switch' on
```

```
root@localhost:~# amixer -c 0 cset name='MIC1 Switch' on
numid=26,iface=MIXER,name='MIC1 Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
```

- **MIC input**

Execute the following command to switch the recording source to the **MIC** channel:

```
# amixer -c 0 cset name='MIC2 Switch' on
```

```
root@localhost:~# amixer -c 0 cset name='MIC2 Switch' on
numid=27,iface=MIXER,name='MIC2 Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
```

- **Recording**

Execute the following command to start recording:

```
# arecord -Dhw:0,0 -d 10 -r 48000 -f S16_LE test.wav
```

```
root@localhost:~# arecord -Dhw:0,0 -d 10 -r 48000 -f S16_LE test.wav
Recording WAVE 'test.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
```

## 5.7.2 Audio output

- **Headset Output**

Execute the following command to switch the audio output to the **headset** channel:

```
# amixer -c 0 cset name='HPOUT Switch' on
```

```
root@localhost:~# amixer -c 0 cset name='HPOUT Switch' on
numid=31,iface=MIXER,name='HPOUT Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
```

- **Speaker Output**

Execute the following command to switch the audio output to the **speaker** channel:

```
# amixer -c 0 cset name='SPK Switch' on
# amixer -c 0 cset name='LINEOUTL Switch' on
# amixer -c 0 cset name='LINEOUTR Switch' on
```

```
root@localhost:~# amixer -c 0 cset name='SPK Switch' on
numid=32,iface=MIXER,name='SPK Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
root@localhost:~# amixer -c 0 cset name='LINEOUTL Switch' on
numid=29,iface=MIXER,name='LINEOUTL Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
root@localhost:~# amixer -c 0 cset name='LINEOUTR Switch' on
numid=30,iface=MIXER,name='LINEOUTR Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
```

### • Play Audio

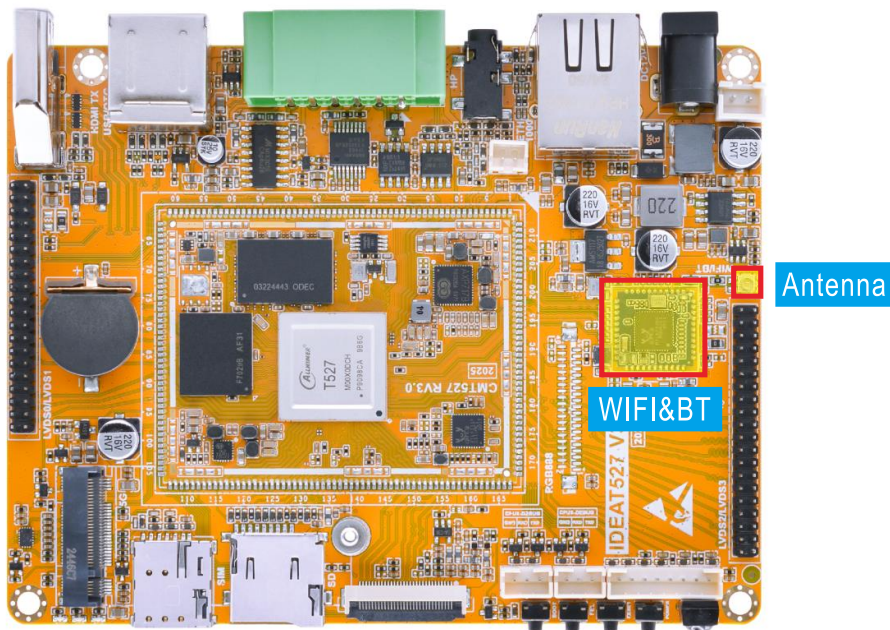
Execute the following command to play audio:

```
# aplay -Dhw:0,0 test.wav
```

```
root@localhost:~# aplay -Dhw:0,0 test.wav
Playing WAVE 'test.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
```

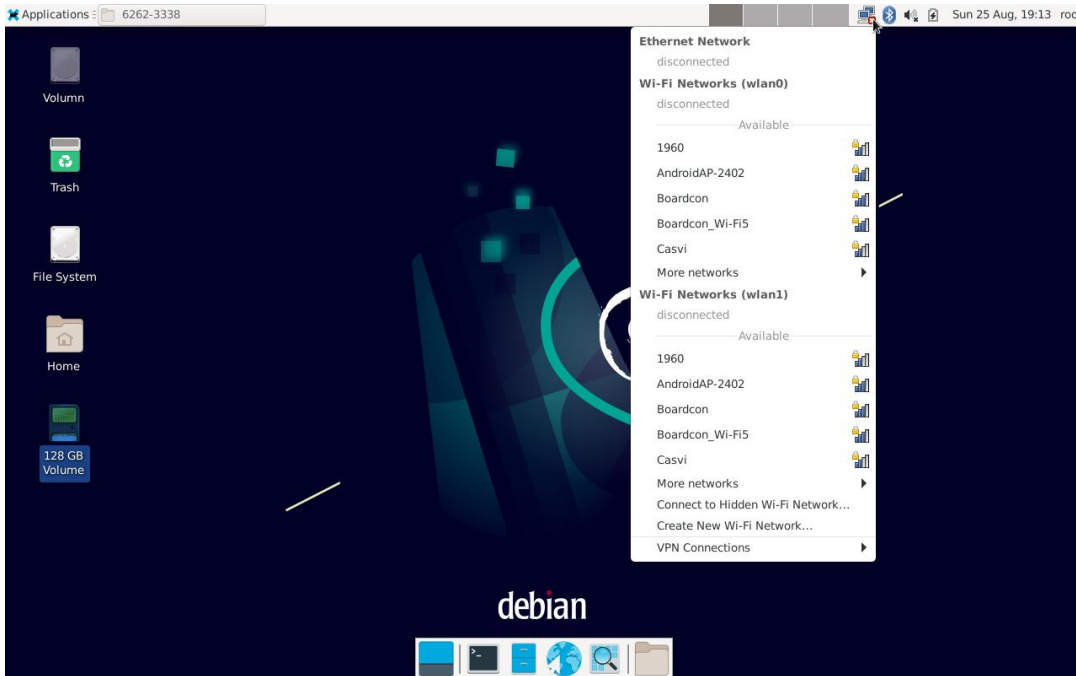
## 5.8 WIFI & Bluetooth

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

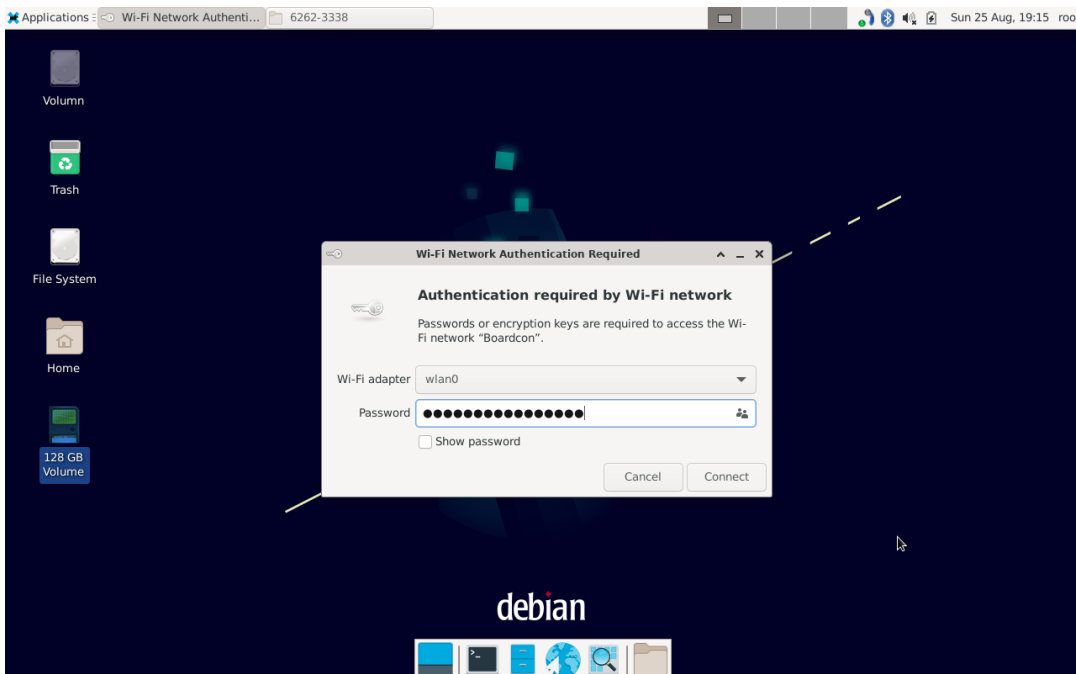


## 5.8.1 WIFI test

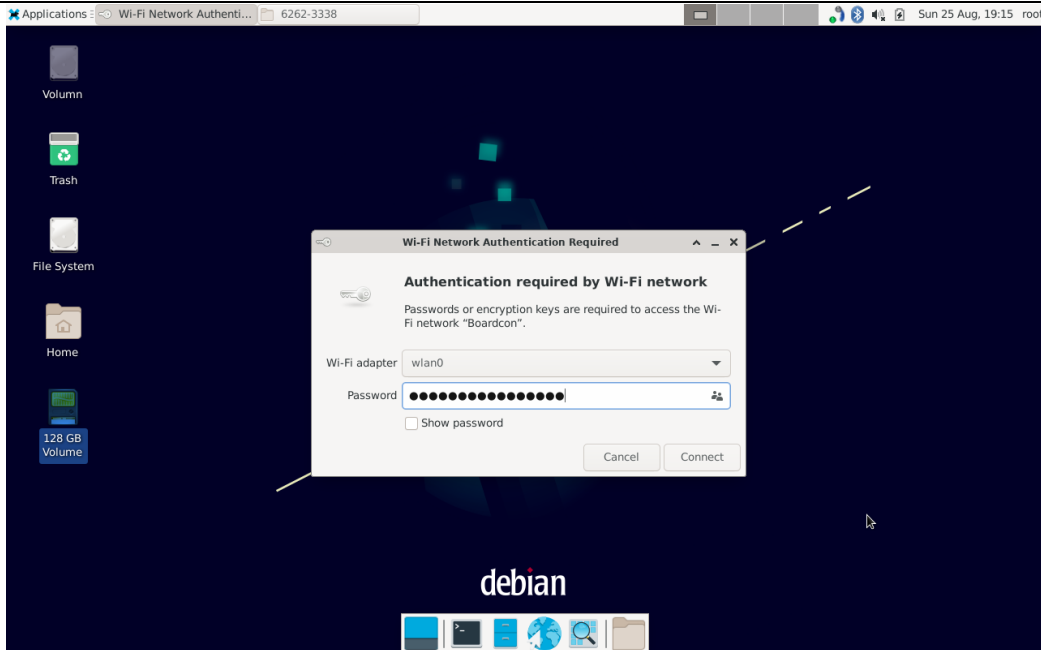
**Step 1:** Click the network icon in the top right corner of the interface, to view the list of available hotspots.



**Step 2:** Select the SSID from the list of available networks and enter the password.



**Step 3:** After the WiFi successfully connects to the hotspot, the system will display the corresponding connection status icon in the top right corner.



#### Step 4: View network interface information.

```
# ifconfig
```

```
root@localhost:~# ifconfig
wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.48 netmask 255.255.255.0 broadcast 192.168.0.255
    inet6 fe80::b601:4553:12d9:724 prefixlen 64 scopeid 0x20<link>
    ether a8:b5:8e:b9:3c:10 txqueuelen 1000 (Ethernet)
    RX packets 535 bytes 73775 (72.0 KiB)
    RX errors 0 dropped 45 overruns 0 frame 0
    TX packets 100 bytes 12136 (11.8 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
    ether ce:9d:d7:a9:c8:e3 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

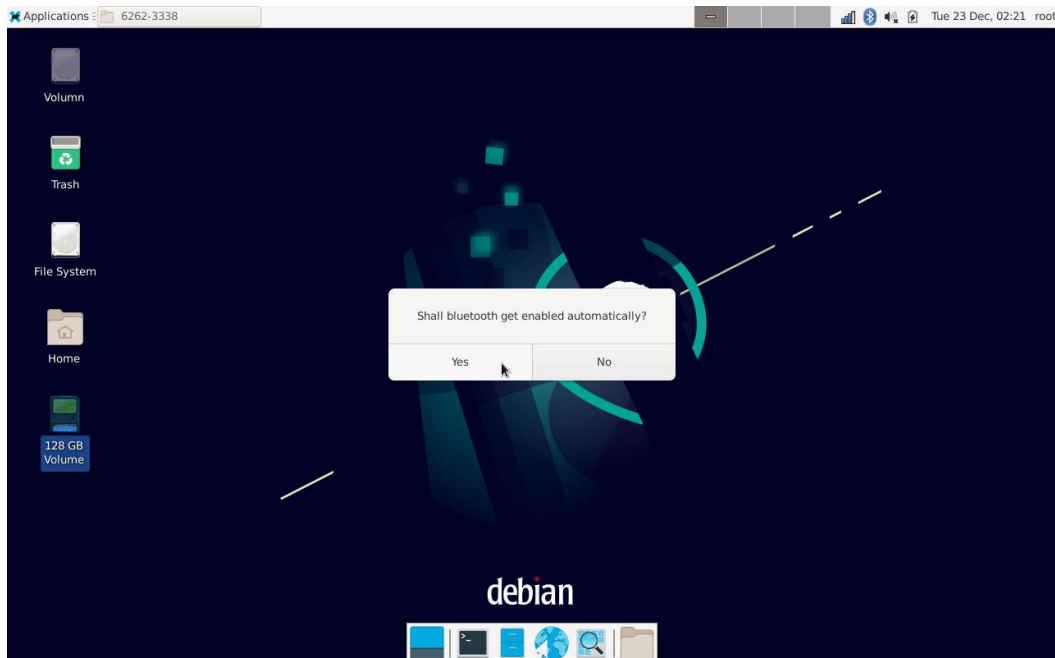
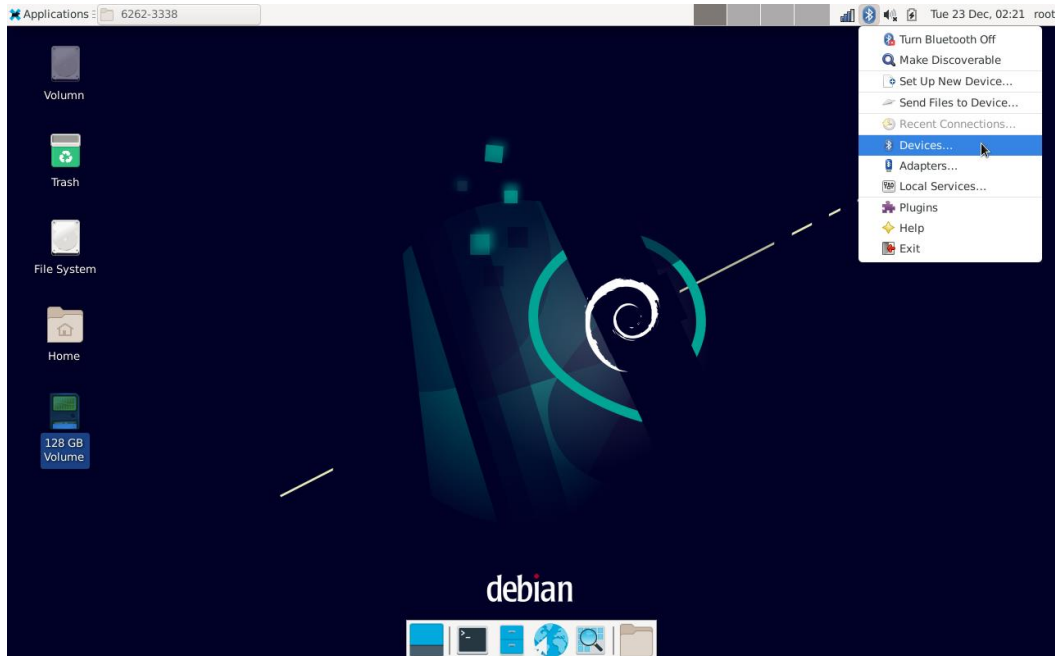
#### Step 5: Network connection test.

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

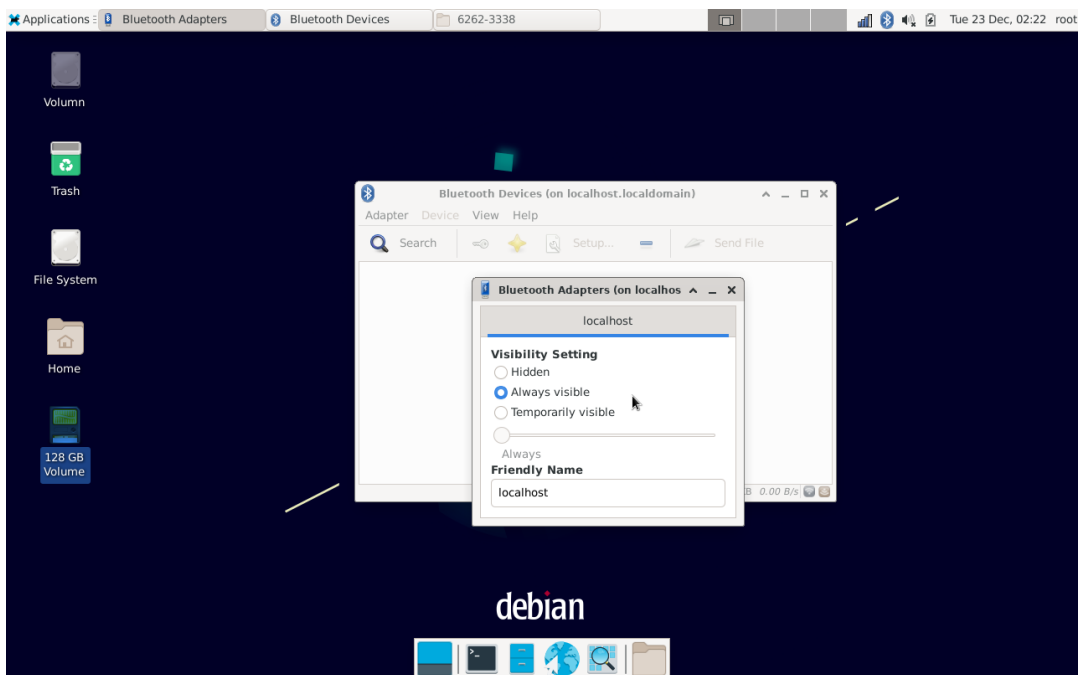
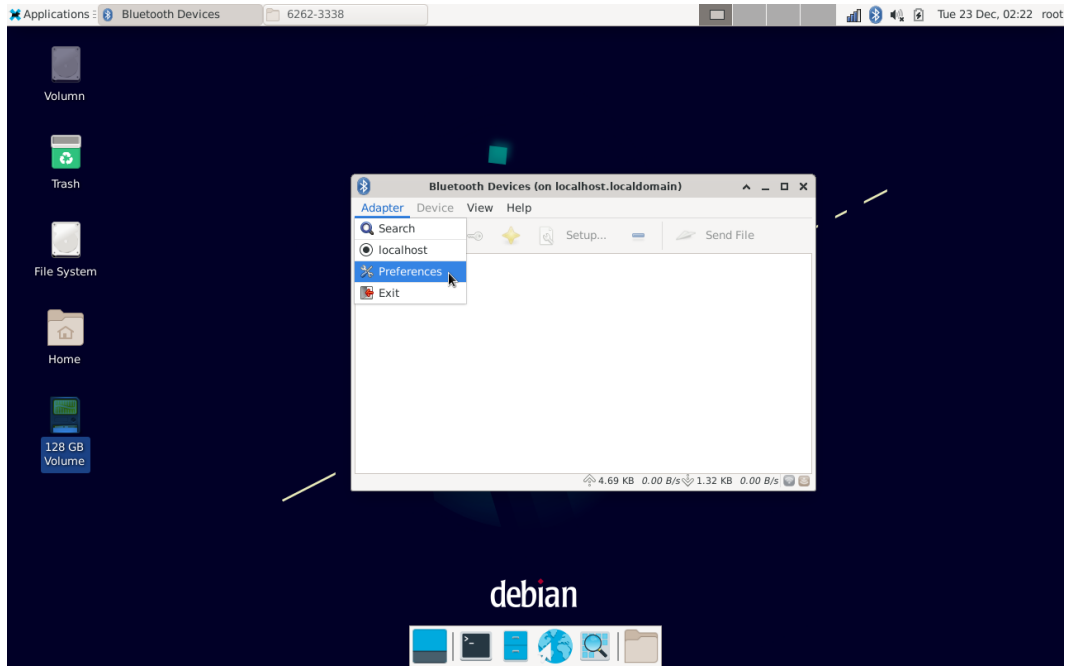
```
root@localhost:~# ping -I wlan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.48 wlan0: 56(84) bytes of data:
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=49 time=246 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=49 time=202 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=49 time=198 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=49 time=198 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=49 time=194 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=49 time=358 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=49 time=246 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6000ms
rtt min/avg/max/mdev = 193.902/234.592/357.953/54.606 ms
```

## 6.8.2 Bluetooth test

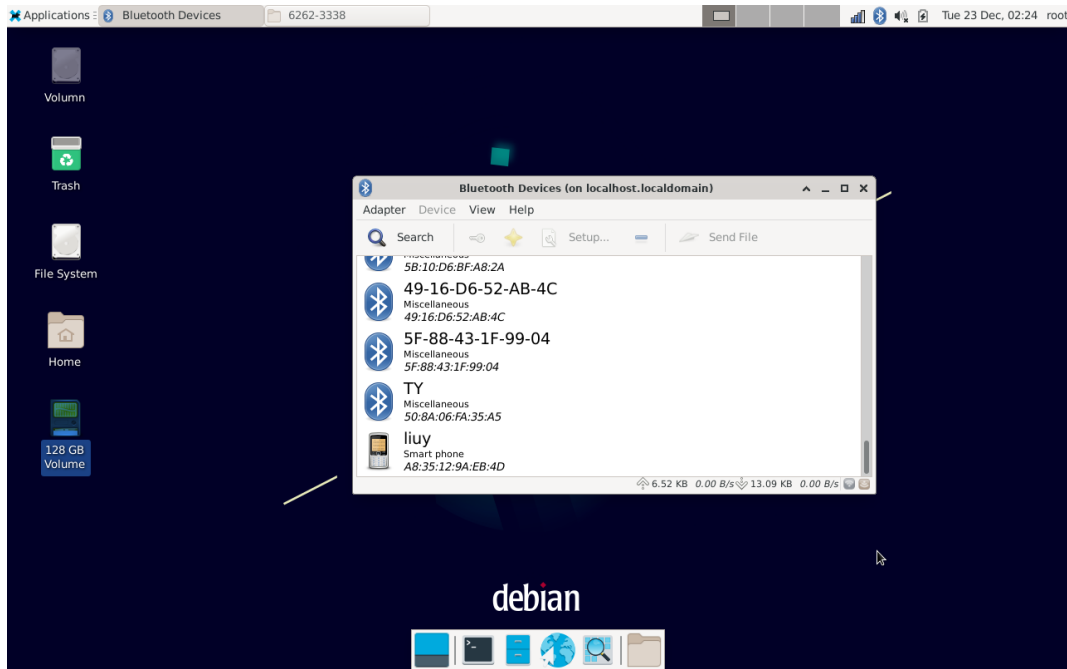
**Step 1:** Click the Bluetooth icon in the top right corner of the desktop, then right-click and choose “**Devices...**”.



**Step 2:** The Bluetooth device name is hidden by default. Set it to be visible by clicking **Adapter -> Preferences -> Always visible**.

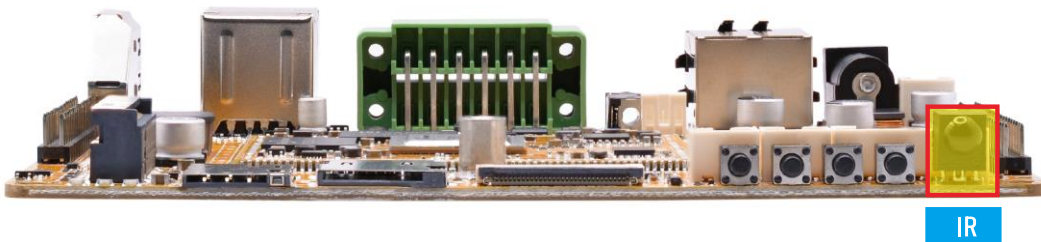


**Step 3:** Click Search to start searching and select the available device in the list to pair.



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

## 5.9 IR



Execute the following command to retrieve the data reported by the IR module:

```
# hexdump /dev/input/event1
```

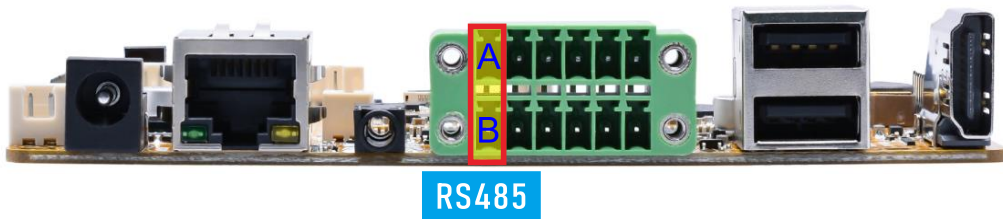
```

root@localhost:~# hexdump /dev/input/event1
0000000 4019 694a 0000 0000 eb1d 0007 0000 0000
0000010 0004 0004 1864 0018 4019 694a 0000 0000
0000020 eb1d 0007 0000 0000 0000 0000 0000 0000
0000030 4019 694a 0000 0000 d960 0008 0000 0000
0000040 0004 0004 1864 0018 4019 694a 0000 0000
0000050 d960 0008 0000 0000 0000 0000 0000 0000
0000060 401a 694a 0000 0000 b8e8 0003 0000 0000
0000070 0004 0004 1865 0018 401a 694a 0000 0000
0000080 b8e8 0003 0000 0000 0000 0000 0000 0000
0000090 401a 694a 0000 0000 a4fb 0004 0000 0000
00000a0 0004 0004 1865 0018 401a 694a 0000 0000
00000b0 a4fb 0004 0000 0000 0000 0000 0000 0000
00000c0 401a 694a 0000 0000 325b 0009 0000 0000
00000d0 0004 0004 1865 0018 401a 694a 0000 0000
00000e0 325b 0009 0000 0000 0000 0000 0000 0000
00000f0 401a 694a 0000 0000 1e5c 000a 0000 0000
0000100 0004 0004 1865 0018 401a 694a 0000 0000
0000110 1e5c 000a 0000 0000 0000 0000 0000 0000
  
```

View the event node for the input device corresponding to the IR-RX module:

```
# cat /proc/bus/input/devices
```

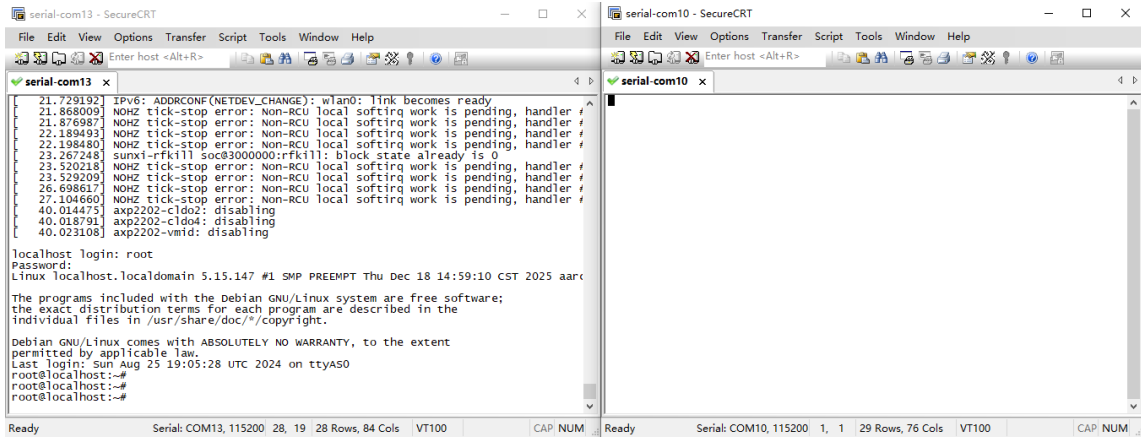
## 5.10 RS485



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

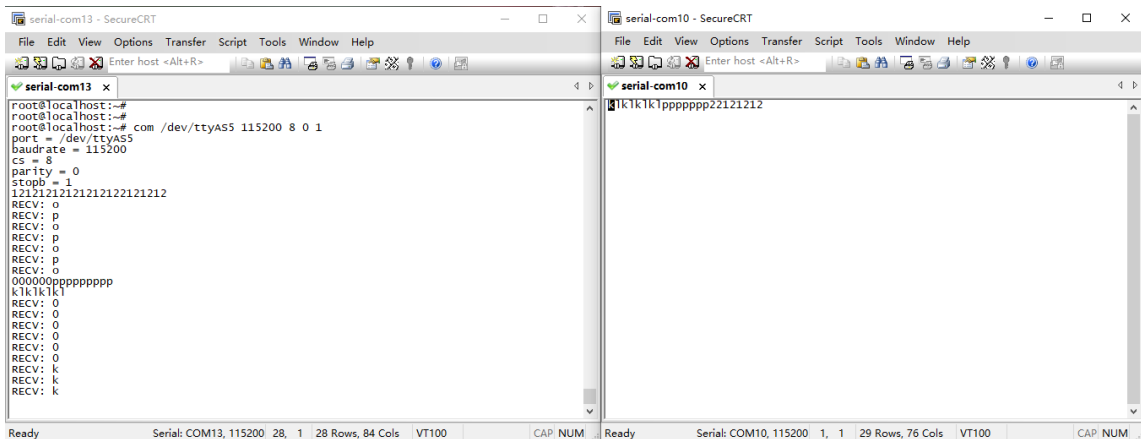


**Step 2:** Open the corresponding serial terminals, setting the baud rate to 115200.

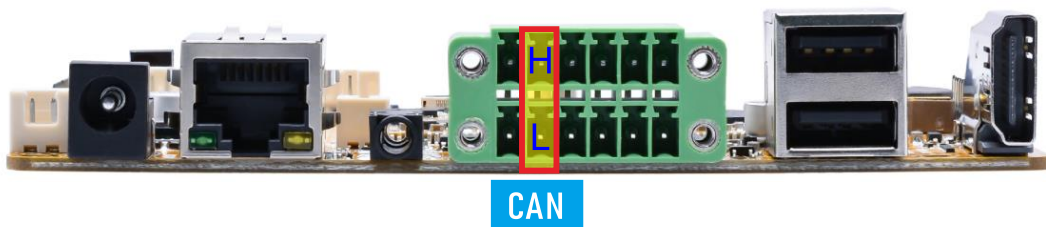


**Step 3:** Execute the following command in the board's serial terminal to test the RS485 transmission and reception functionality.

```
# com /dev/ttyAS5 115200 8 0 1
```



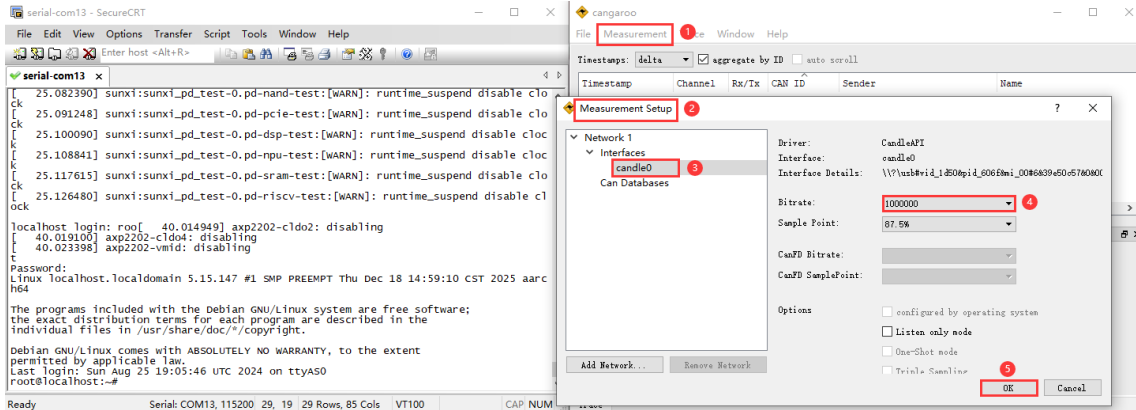
## 5.11 CAN



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

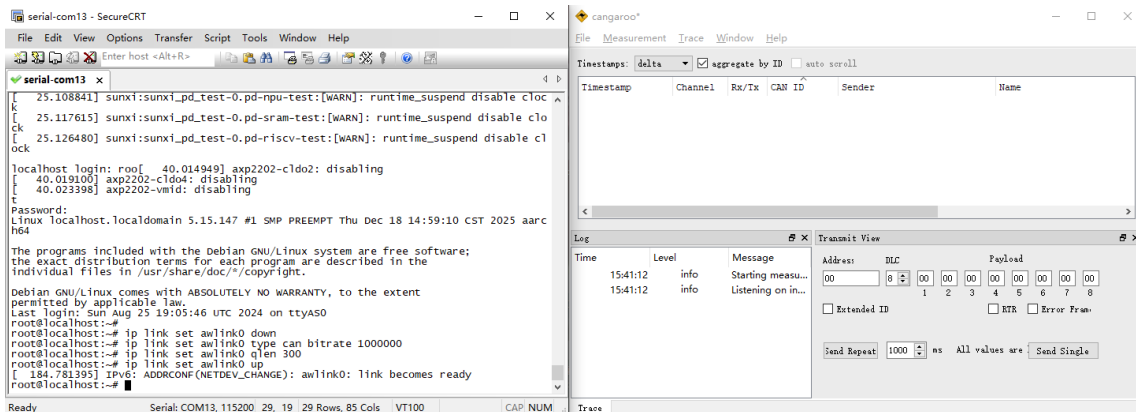


**Step 2:** Open the CAN test software and set the baud rate to 1000000.



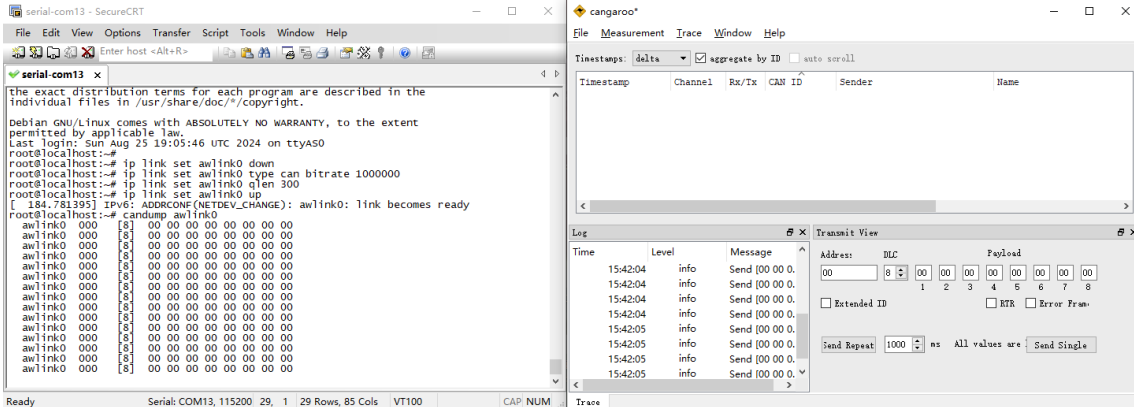
**Step 3:** Configure and activate the CAN network, setting the bitrate to 500000.

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



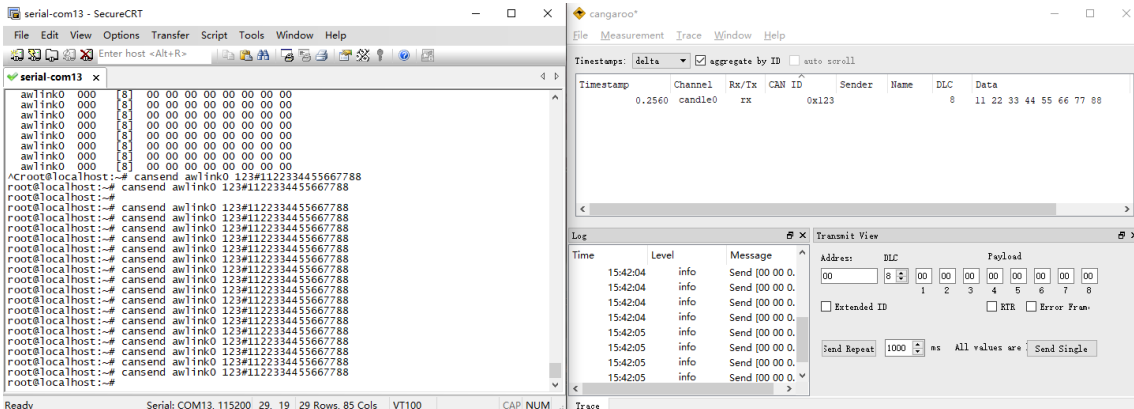
**Step 4:** Configure CAN as the receiver.

```
# candump awlink0
```



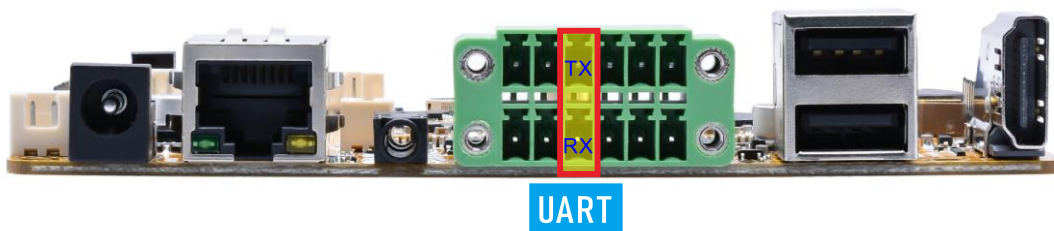
### Step 5: Configure CAN as the sender.

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



## 6.12 RS232

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



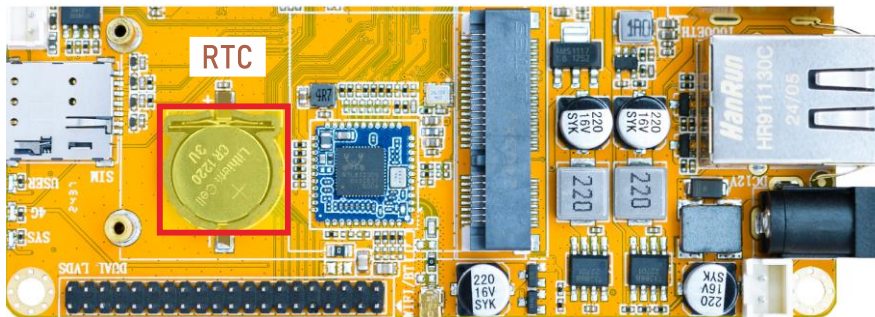
### Step 2: RS232 test.

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

```
root@localhost:~# com /dev/ttyAS3 115200 8 0 1
port = /dev/ttyAS3
baudrate = 115200
cs = 8
parity = 0
stopb = 1
jkjkjkjk
RECV: jkjkjkjk
kkkkkkk
RECV: kkkkkkk
0000023232uu
RECV: 0000023232uu
jkjkj
RECV: jkjkj
```

## 5.13 RTC

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



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

```
# date -s "2025-12-23 15:52:30"
```

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

```
# hwclock -w
```

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

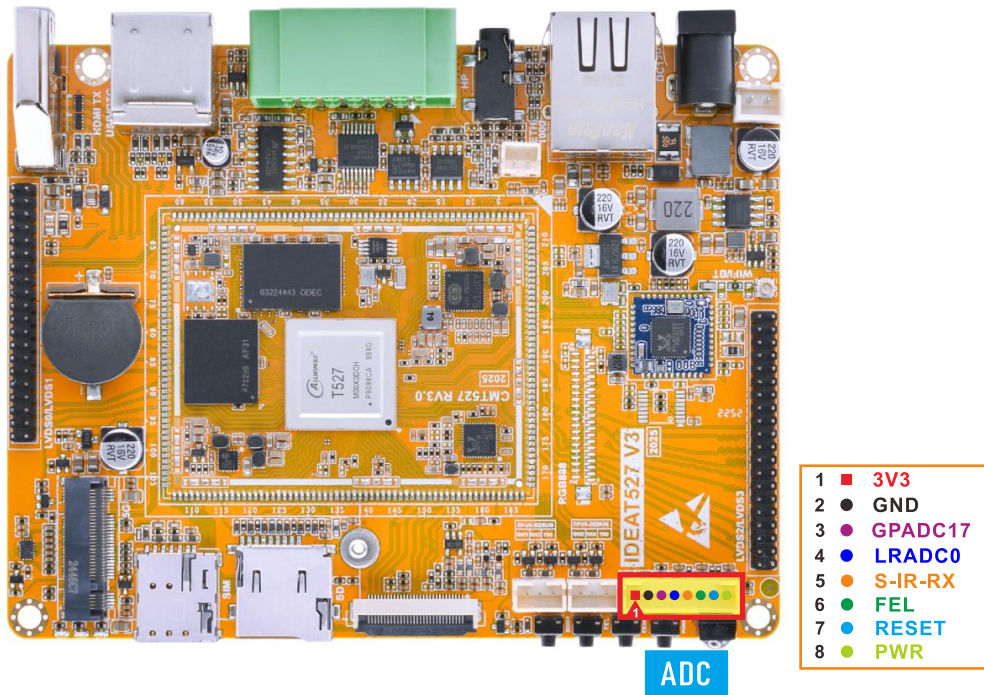
```
# hwclock
```

```
root@localhost:~# date -s "2025-12-23 15:52:30"
Tue Dec 23 15:52:30 UTC 2025
root@localhost:~# hwclock -w
root@localhost:~# hwclock
2025-12-23 15:52:39.613111+00:00
root@localhost:~# hwclock
2025-12-23 15:52:56.377440+00:00
root@localhost:~# hwclock
2025-12-23 15:53:04.700175+00:00
```

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

```
root@localhost:~# hwclock
2025-12-23 16:06:34.955326+00:00
root@localhost:~# hwclock
2025-12-23 16:06:55.580567+00:00
root@localhost:~# hwclock
2025-12-23 16:07:11.684560+00:00
```

## 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:

```
root@localhost:~# cat /sys/bus/iio/devices/iio\:device0/in_voltage0_raw
0
root@localhost:~# cat /sys/bus/iio/devices/iio\:device0/in_voltage0_raw
1323
```

## 5.14.2 GPADC

GPADC test command:

```
# cat /sys/bus/iio/devices/iio\:device1/in_voltage5_raw
```

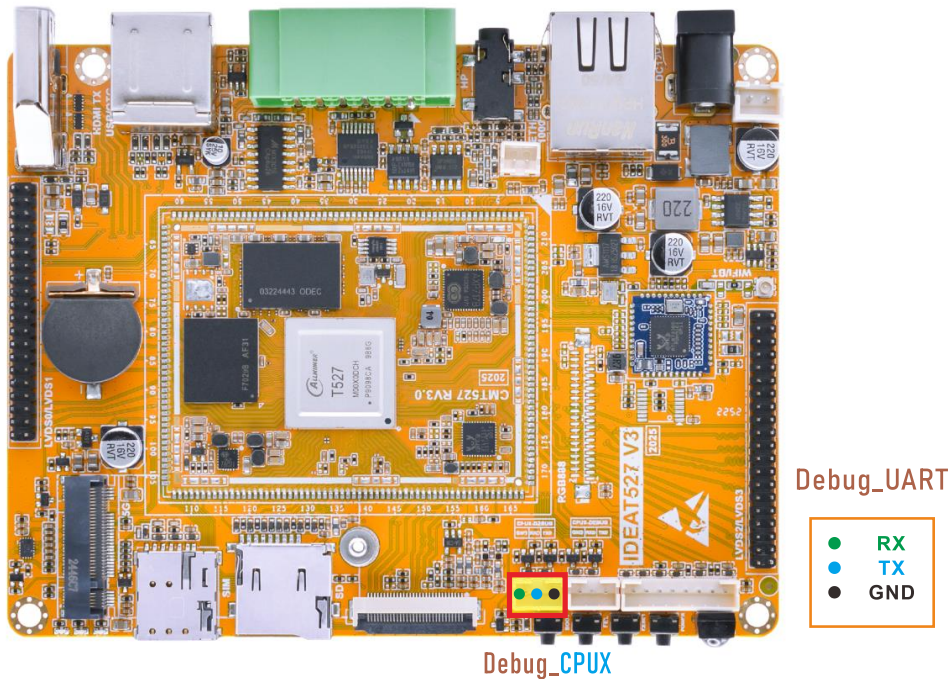
The following logs show the ADC readings when the ADC input is connected to 0V and 1.8 V, respectively:

```
root@localhost:~# cat /sys/bus/iio/devices/iio\:device1/in_voltage5_raw
0
root@localhost:~# cat /sys/bus/iio/devices/iio\:device1/in_voltage5_raw
1797
```

# 6. Buildroot 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.



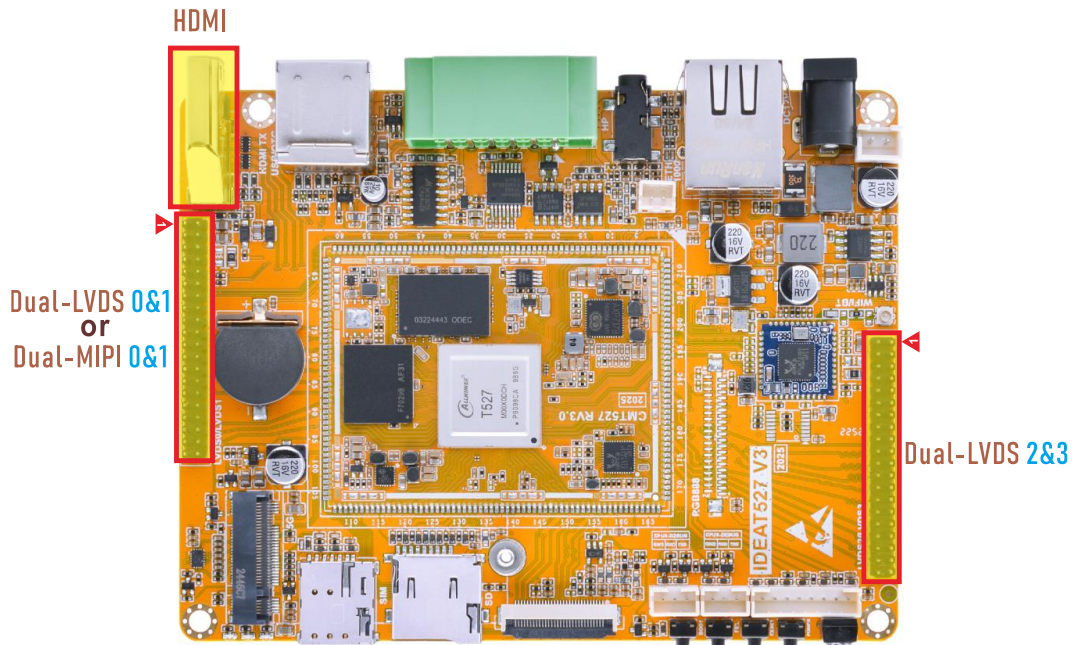
```

serial-com13 - SecureCRT
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
serial-com13 x
[00:08:04.542] xserver lis[ 9.552775] [drm] [LVDS]sunxi_lvds_connector_get_modes start
tensing on display :0
[00:08:04.[ 9.560239] [drm] sunxi-hdmi: drm hdmi detect: disconnect
542] launching '/usr/libexec/weston-desktop-shell'
could not load cursor 'dnd-move'
could not load cursor 'dnd-move'
could not load cursor 'dnd-copy'
could not load cursor 'dnd-copy'
could not load cursor 'dnd-none'
could not load cursor 'dnd-none'
[ 9.596233] random: weston-keyboard: uninitialized urandom read (8 bytes read)
[ 9.596570] random: weston-desktop: uninitialized urandom read (8 bytes read)
[ 9.605978] random: weston-keyboard: uninitialized urandom read (8 bytes read)
# [ 10.893261] random: crng init done
[ 10.897083] random: 76 urandom warning(s) missed due to ratelimiting
xkbcommon: ERROR: couldn't find a compose file for locale "c" (mapped to "c")
could not create XKB compose table for locale 'c'. Disabling compose
xkbcommon: ERROR: couldn't find a compose file for locale "c" (mapped to "c")
could not create XKB compose table for locale 'c'. Disabling compose

#
#
#
#
#
#
Ready Serial: COM13, 115200 28, 3 28 Rows, 96 Cols VT100 CAP NUM
  
```

## 5.2 Normal display

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



**Display output combinations:**

**lvds0 + lvds2**



**lvds0 + hdmi**



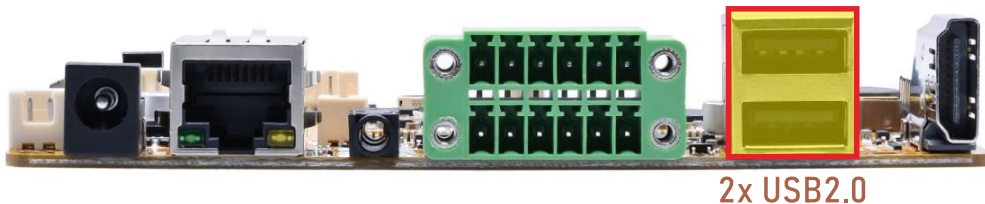
**mipi0 + hdmi**



## 5.3 USB2.0

The IdeaT527 buildroot 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

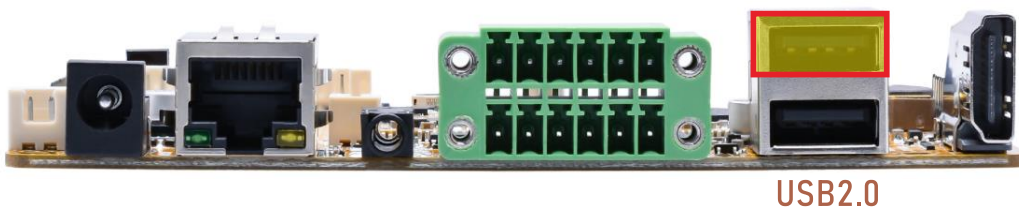


After connecting the USB flash drive, it will be automatically mounted. Execute the following command to view the path where the device is mounted:

```
# df -h
```

```
# df -h
Filesystem      Size      Used Available Use% Mounted on
/dev/root       1.9G      568.0M    1.4G   29% /
tmpfs           972.1M    356.0K    971.7M    0% /tmp
tmpfs           972.1M    248.0K    971.8M    0% /run
devtmpfs        939.2M     0        939.2M    0% /dev
cgroup          972.1M     0        972.1M    0% /sys/fs/cgroup
/dev/sda1       58.0G     33.1G     24.9G   57% /mnt/usb/sda1
/dev/mmcblk0p6  26.8G     16.0K     26.8G    0% /mnt/UDISK
/dev/root       1.9G      568.0M    1.4G   29% /var/lib/docker
/dev/mmcblk1p1  30.0G      4.5G     25.4G   15% /mnt/sdcard/mmcblk1p1
```

### 5.3.2 USB2.0 OTG



To switch to Device mode user can execute the following command:

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

```
# echo usb_device > /sys/devices/platform/soc@3000000/10.usbc0/otg_role
[ 1475.876799] sunxi:sunxi_usbc:[INFO]: rmmmod_host_driver
[ 1475.876799]
[ 1475.884236] sunxi:ehci_sunxi:[INFO]: [ehci0-controller]: sunxi_usb_disable_ehci
[ 1475.892442] sunxi:ehci_sunxi:[INFO]: [sunxi-ehci0]: remove, pdev->name: 4101000.ehci0-controller, sunxi_ehci: 0xffffffffc009511a48
[ 1475.905434] sunxi-ehci 4101000.ehci0-controller: remove, state 4
[ 1475.912172] usb usb5: USB disconnect, device number 1
[ 1475.918951] sunxi-ehci 4101000.ehci0-controller: USB bus 5 deregistered
[ 1475.927054] sunxi:ohci_sunxi:[INFO]: [ohci0-controller]: sunxi_usb_disable_ohci
[ 1475.935265] sunxi:ohci_sunxi:[INFO]: [sunxi-ohci0]: remove, pdev->name: 4101400.ohci0-controller, sunxi_ohci: 0xffffffffc0095126d8
[ 1475.948253] sunxi-ohci 4101400.ohci0-controller: remove, state 4
[ 1475.955002] usb usb6: USB disconnect, device number 1
[ 1475.961874] sunxi-ohci 4101400.ohci0-controller: USB bus 6 deregistered
[ 1475.970164] sunxi:sunxi_usbc:[INFO]: insmod_device_driver
[ 1475.970164]
[ 1475.978068] sunxi_usb_udc 4100000.udc-controller: supply udc not found, using dummy regulator
```

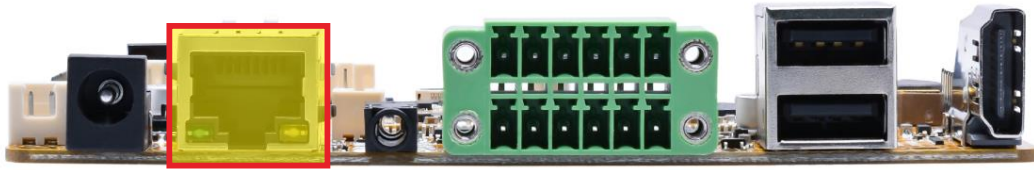
To switch Device mode to Host mode, users can execute the following command:

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

```
# echo usb_host > /sys/devices/platform/soc@3000000/10.usbc0/otg_role
[ 1510.916735] sunxi:sunxi_usbc:[INFO]: rmmmod_device_driver
[ 1510.916735]
[ 1510.924725] sunxi:sunxi_usbc:[INFO]: insmod_host_driver
[ 1510.924725]
[ 1510.932250] sunxi:ehci_sunxi:[INFO]: [ehci0-controller]: sunxi_usb_enable_ehci
[ 1510.940356] sunxi:ehci_sunxi:[INFO]: [sunxi-ehci0]: probe, pdev->name: 4101000.ehci0-controller, sunxi_ehci: 0xffffffffc009511a48, 0xffffffffc0099b5000, irq_no:88
[ 1510.956677] sunxi-ehci 4101000.ehci0-controller: supply hci not found, using dummy regulator
[ 1510.967556] sunxi-ehci 4101000.ehci0-controller: EHCI Host Controller
[ 1510.974820] sunxi-ehci 4101000.ehci0-controller: new USB bus registered, assigned bus number 5
[ 1510.984631] sunxi-ehci 4101000.ehci0-controller: irq 136, io mem 0x04101000
[ 1511.008476] sunxi-ehci 4101000.ehci0-controller: USB 2.0 started, EHCI 1.00
[ 1511.016529] usb usb5: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 5.15
[ 1511.025794] usb usb5: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 1511.033894] usb usb5: Product: EHCI Host Controller
[ 1511.039362] usb usb5: Manufacturer: Linux 5.15.147 ehci_hcd
[ 1511.045606] usb usb5: SerialNumber: sunxi-ehci
[ 1511.051335] hub 5-0:1.0: USB hub found
[ 1511.055628] hub 5-0:1.0: 1 port detected
[ 1511.060616] sunxi:ohci_sunxi:[INFO]: [ohci0-controller]: sunxi_usb_enable_ohci
[ 1511.068704] sunxi:ohci_sunxi:[INFO]: [sunxi-ohci0]: probe, pdev->name: 4101400.ohci0-controller, sunxi_ohci: 0xffffffffc0095126d8
[ 1511.082749] sunxi-ohci 4101400.ohci0-controller: supply hci not found, using dummy regulator
[ 1511.092527] sunxi-ohci 4101400.ohci0-controller: OHCI Host Controller
[ 1511.099783] sunxi-ohci 4101400.ohci0-controller: new USB bus registered, assigned bus number 6
[ 1511.109509] debugfs: Directory 'sunxi-ohci' with parent 'ohci' already present!
[ 1511.117744] sunxi-ohci 4101400.ohci0-controller: irq 137, io mem 0x04101400
[ 1511.188694] usb usb6: New USB device found, idVendor=1d6b, idProduct=0001, bcdDevice= 5.15
[ 1511.197970] usb usb6: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 1511.206072] usb usb6: Product: OHCI Host Controller
[ 1511.211538] usb usb6: Manufacturer: Linux 5.15.147 ohci_hcd
[ 1511.217789] usb usb6: SerialNumber: sunxi-ohci
[ 1511.223487] hub 6-0:1.0: USB hub found
[ 1511.227777] hub 6-0:1.0: 1 port detected
```

## 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.

```
[ 34.383585] sunxi-gmac 4500000.gmac0 eth0: Link is Up - 1Gbps/Full - flow control off  
[ 34.392365] IPv6: ADDRCONF (NETDEV_CHANGE): eth0: link becomes ready
```

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

```
# ifconfig
```

```
# ifconfig  
eth0      Link encap:Ethernet  HWaddr D2:8F:10:82:93:74  
          inet addr:192.168.0.40  Bcast:192.168.0.255  Mask:255.255.255.0  
          inet6 addr: fe80::afbe:e1fa:c0e8:8642/64  Scope:Link  
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
          RX packets:266  errors:5  dropped:0  overruns:0  frame:0  
          TX packets:16  errors:0  dropped:0  overruns:0  carrier:0  
          collisions:0  txqueuelen:1000  
          RX bytes:24588 (24.0 KiB)  TX bytes:1620 (1.5 KiB)  
          Interrupt:173
```

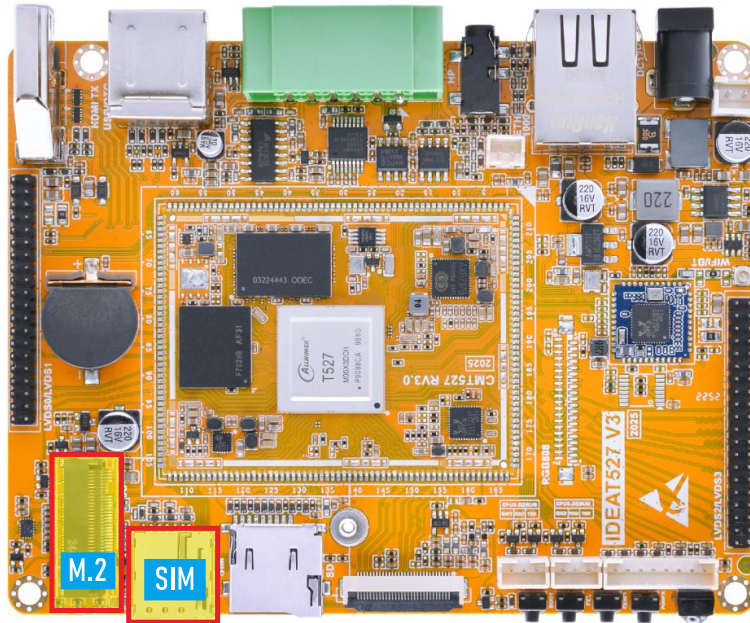
**Step 3:** Network connection test.

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

```
# ping -I eth0 www.armdesigner.com  
PING www.armdesigner.com (67.222.54.196): 56 data bytes  
64 bytes from 67.222.54.196: seq=0 ttl=49 time=181.806 ms  
64 bytes from 67.222.54.196: seq=1 ttl=49 time=183.407 ms  
64 bytes from 67.222.54.196: seq=2 ttl=49 time=181.398 ms  
64 bytes from 67.222.54.196: seq=3 ttl=49 time=184.866 ms  
64 bytes from 67.222.54.196: seq=4 ttl=49 time=183.466 ms  
64 bytes from 67.222.54.196: seq=5 ttl=49 time=181.048 ms  
^C  
--- www.armdesigner.com ping statistics ---  
6 packets transmitted, 6 packets received, 0% packet loss  
round-trip min/avg/max = 181.048/182.665/184.866 ms
```

## 5.5 4G

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



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



**Step 3:** Initiate the PPP connection.

```
# killall pppd  
# pppd call quectel-ppp &
```

```
# pppd call quectel-ppp &
[1] 634
# pppd options in effect:
debug          # (from /etc/ppp/peers/quectel-ppp)
nodetach       # (from /etc/ppp/peers/quectel-ppp)
dump           # (from /etc/ppp/peers/quectel-ppp)
noauth         # (from /etc/ppp/peers/quectel-ppp)
user test     # (from /etc/ppp/peers/quectel-ppp)
password ????? # (from /etc/ppp/peers/quectel-ppp)
remotename 3gpp # (from /etc/ppp/peers/quectel-ppp)
/dev/ttyUSB3 # (from /etc/ppp/peers/quectel-ppp)
115200       # (from /etc/ppp/peers/quectel-ppp)
lock         # (from /etc/ppp/peers/quectel-ppp)
connect chat -s -v -f /etc/ppp/peers/quectel-chat-connect # (from /etc/ppp/peers/quectel-ppp)
disconnect chat -s -v -f /etc/ppp/peers/quectel-chat-disconnect # (from /etc/ppp/peers/quectel-ppp)
nocrtscts    # (from /etc/ppp/peers/quectel-ppp)
modem        # (from /etc/ppp/peers/quectel-ppp)
hide-password # (from /etc/ppp/peers/quectel-ppp)
novj         # (from /etc/ppp/peers/quectel-ppp)
novjccomp    # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-local # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-remote # (from /etc/ppp/peers/quectel-ppp)
ipparam 3gpp # (from /etc/ppp/peers/quectel-ppp)
noipdefault  # (from /etc/ppp/peers/quectel-ppp)
ipcp-max-failure 30 # (from /etc/ppp/peers/quectel-ppp)
defaultroute # (from /etc/ppp/peers/quectel-ppp)
usepeerdns   # (from /etc/ppp/peers/quectel-ppp)
noccps       # (from /etc/ppp/peers/quectel-ppp)
abort on (BUSY)
abort on (NO CARRIER)
abort on (NO DIALTONE)
abort on (ERROR)
abort on (NO ANSWER)
timeout set to 30 seconds
send (AT^M)
expect (OK)
AT^M^M
OK
-- got it

send (ATE0^M)
expect (OK)
^M
ATE0^M^M
OK
-- got it
```

**Step 2:** Check the status of the network interfaces.

```
# ifconfig
```

```
# ifconfig
ppp0      Link encap:Point-to-Point Protocol
          inet addr:10.53.108.177 P-t-P:10.64.64.64 Mask:255.255.255.255
          UP POINTOPOINT RUNNING NOARP MULTICAST MTU:1500 Metric:1
          RX packets:6 errors:0 dropped:0 overruns:0 frame:0
          TX packets:16 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:3
          RX bytes:96 (96.0 B) TX bytes:254 (254.0 B)
```

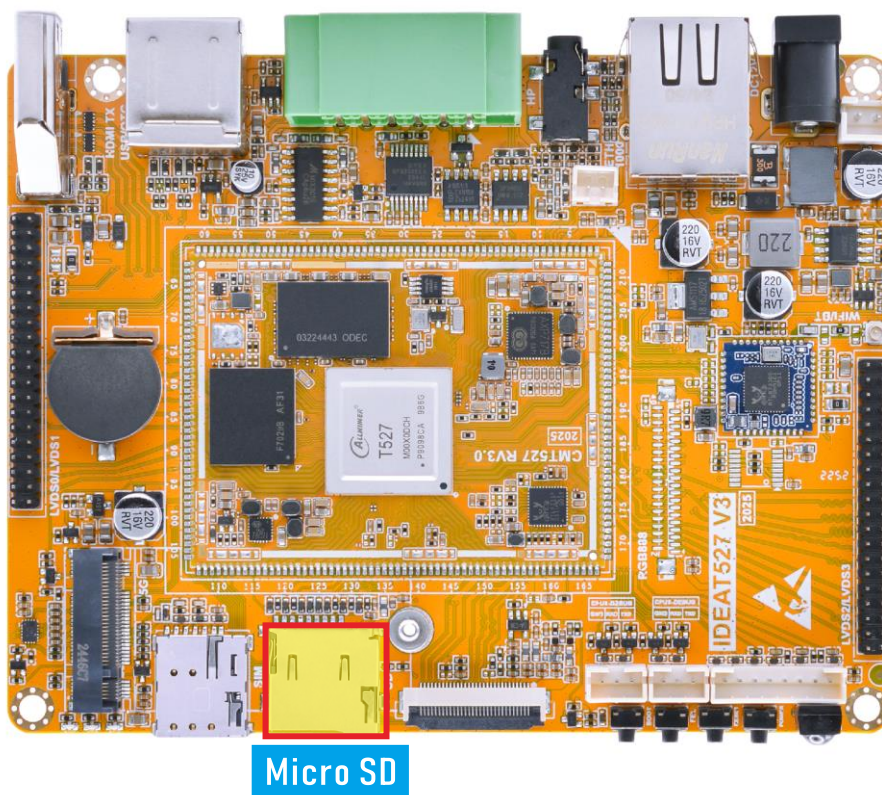
**Step 3:** Test the PPP connection.

```
# ping -I ppp0 www.armdesigner.com
```

```
# ping -I ppp0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196): 56 data bytes
64 bytes from 67.222.54.196: seq=0 ttl=49 time=316.754 ms
64 bytes from 67.222.54.196: seq=1 ttl=49 time=284.508 ms
64 bytes from 67.222.54.196: seq=2 ttl=49 time=396.862 ms
64 bytes from 67.222.54.196: seq=3 ttl=49 time=357.051 ms
64 bytes from 67.222.54.196: seq=4 ttl=49 time=315.873 ms
64 bytes from 67.222.54.196: seq=5 ttl=49 time=284.217 ms
64 bytes from 67.222.54.196: seq=6 ttl=49 time=395.615 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 packets received, 0% packet loss
round-trip min/avg/max = 284.217/335.840/396.862 ms
```

## 5.6 Micro SD card

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



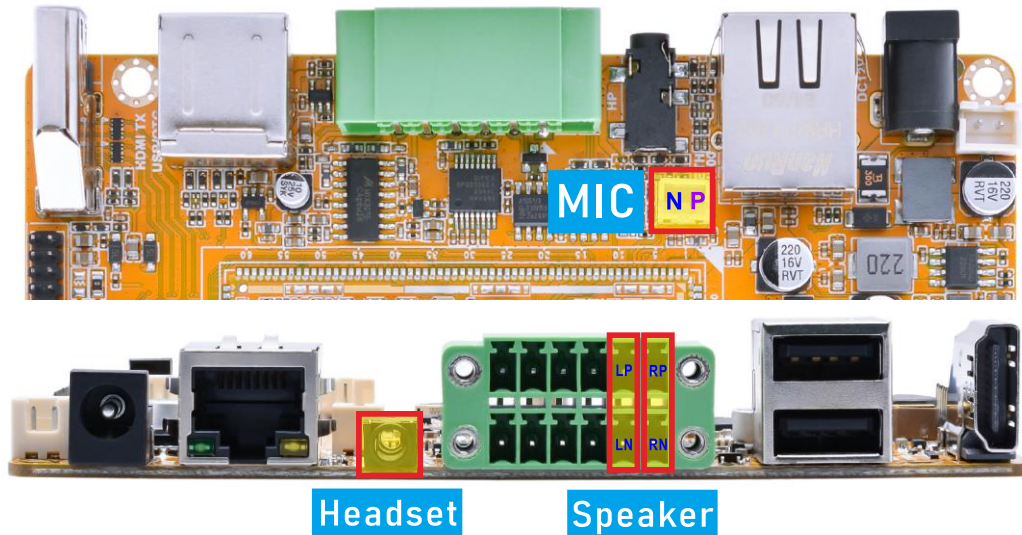
**Step 2:** The system will automatically mount it, view the device mount path.

```
# df -h
```

```
# df -h
Filesystem      Size      Used Available Use% Mounted on
/dev/root        1.9G      567.6M      1.4G   29% /
tmpfs            971.9M      540.0K      971.4M    0% /tmp
tmpfs            971.9M      248.0K      971.7M    0% /run
devtmpfs         939.0M         0      939.0M    0% /dev
/dev/nvme0n1     468.4G      40.0K      444.5G    0% /mnt/nvme
cgroup           971.9M         0      971.9M    0% /sys/fs/cgroup
/dev/mmcblk0p6   26.8G      48.0K      26.8G    0% /mnt/UDISK
/dev/root        1.9G      567.6M      1.4G   29% /var/lib/docker
```

## 5.7 Audio

**Step 1:** Plug in the headset, connect the speaker, and connect the MIC.



### 5.7.1 Audio input

This platform supports two audio input sources for recording: **Headset input** and **MIC input**.

**Note:** Headset input and MIC input cannot be enabled at the same time. Switch input source by disabling the current one first.

- **Headset input**

Execute the following command to switch the recording source to the **headset** channel:

```
# amixer -c 0 cset name='MIC1 Switch' on
# amixer -c 0 cset name='MIC2 Switch' off
```

```
# amixer -c 0 cset name='MIC1 Switch' on
numid=26,iface=MIXER,name='MIC1 Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
```

- **MIC input**

Execute the following command to switch the recording source to the **MIC** channel:

```
# amixer -c 0 cset name='MIC1 Switch' off
# amixer -c 0 cset name='MIC2 Switch' on
```

```
# amixer -c 0 cset name='MIC2 Switch' on
numid=27,iface=MIXER,name='MIC2 Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
```

- Recording

Execute the following command to start recording:

```
# arecord -Dhw:0,0 -d 10 -r 48000 -f S16_LE test.wav
```

```
# arecord -Dhw:0,0 -d 10 -r 48000 -f S16_LE test.wav
Recording WAVE 'test.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
```

## 5.7.2 Audio output

- Headset Output

Execute the following command to switch the audio output to the **headset** channel:

```
# amixer -c 0 cset name='HPOUT Switch' on
```

```
# amixer -c 0 cset name='HPOUT Switch' on
numid=31,iface=MIXER,name='HPOUT Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
```

- Speaker Output

Execute the following command to switch the audio output to the **speaker** channel:

```
# amixer -c 0 cset name='SPK Switch' on
# amixer -c 0 cset name='LINEOUTL Switch' on
# amixer -c 0 cset name='LINEOUTR Switch' on
```

```
# amixer -c 0 cset name='SPK Switch' on
numid=32,iface=MIXER,name='SPK Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
# amixer -c 0 cset name='LINEOUTL Switch' on
numid=29,iface=MIXER,name='LINEOUTL Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
# amixer -c 0 cset name='LINEOUTR Switch' on
numid=30,iface=MIXER,name='LINEOUTR Switch'
; type=BOOLEAN,access=rw-----,values=1
: values=on
```

- Play Audio

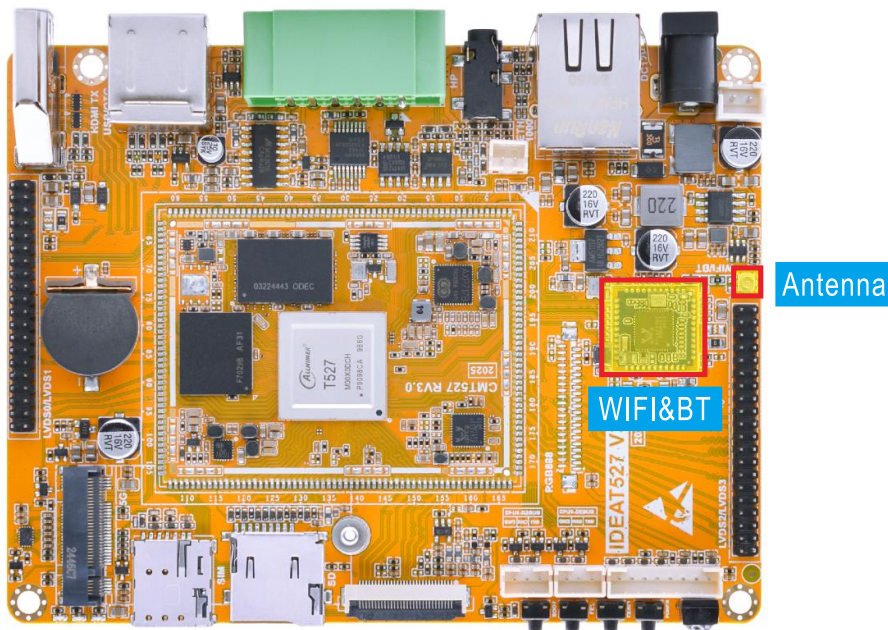
Execute the following command to play audio:

```
# aplay -Dhw:0,0 test.wav
```

```
# aplay -Dhw:0,0 test.wav
Playing WAVE 'test.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Mono
```

## 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: View the device information.

```
# ifconfig
```

```
# ifconfig
wlan0  Link encap:Ethernet HWaddr A8:B5:8E:B9:3C:10
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 (0.0 B) TX bytes:0 (0.0 B)

wlan1  Link encap:Ethernet HWaddr AA:B5:8E:B9:3C:10
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 (0.0 B) TX bytes:0 (0.0 B)
```

Step 2: Scan for available WiFi hotspots.

```
# iw wlan0 scan
```

```
# iw wlan0 scan
BSS b4:f1:8c:6d:d1:24(on wlan0)
  TSF: 49047311 usec (0d, 00:00:49)
  freq: 2412
  beacon interval: 100 TUs
  capability: ESS Privacy ShortPreamble ShortSlotTime RadioMeasure (0x1431)
  signal: -52.00 dBm
  last seen: 0 ms ago
  Information elements from Probe Response frame:
  SSID: Boardcon
  Supported rates: 1.0* 2.0* 5.5* 6.0 9.0 11.0* 12.0 18.0
  DS Parameter set: channel 1
  TPC report: TX power: 30 dBm
  RM enabled capabilities:
    Capabilities: 0x73 0x02 0x00 0x00 0x00
      Link Measurement
      Neighbor Report
      Beacon Passive Measurement
      Beacon Active Measurement
      Beacon Table Measurement
      Channel Load
    Nonoperating Channel Max Measurement Duration: 0
    Measurement Pilot Capability: 0
  ERP: <no flags>
```

### Step 3: Connect to the hotspot.

```
# wifi-connect.sh SSID PSK
```

```
# wifi-connect.sh Boardcon Boardcon43435656
connect to WiFi ssid: Boardcon, Passwd: Boardcon43435656
killall: wpa_supplicant: no process killed
Successfully initialized wpa_supplicant
# [ 367.018170] NOHZ tick-stop error: Non-RCU local softirq work is pending, handler #08!!!
[ 367.027145] NOHZ tick-stop error: Non-RCU local softirq work is pending, handler #08!!!
[ 367.055255] NOHZ tick-stop error: Non-RCU local softirq work is pending, handler #08!!!
[ 367.064224] NOHZ tick-stop error: Non-RCU local softirq work is pending, handler #08!!!
[ 367.073911] IPv6: ADDRCONF(NETDEV_CHANGE): wlan0: link becomes ready
```

### Step 4: View the network interface status.

```
# ifconfig
```

```
wlan0  Link encap:Ethernet HWaddr A8:B5:8E:B9:3C:10
       inet addr:192.168.0.48 Bcast:192.168.0.255 Mask:255.255.255.0
       inet6 addr: fe80::8320:e977:30b6:216/64 Scope:Link
       UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
       RX packets:57 errors:0 dropped:1 overruns:0 frame:0
       TX packets:26 errors:0 dropped:0 overruns:0 carrier:0
       collisions:0 txqueuelen:1000
       RX bytes:7274 (7.1 KiB) TX bytes:3196 (3.1 KiB)

wlan1  Link encap:Ethernet HWaddr AA:B5:8E:B9:3C:10
       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 (0.0 B) TX bytes:0 (0.0 B)
```

### Step 5: Test the WiFi network.

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

```
# ping -I wlan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196): 56 data bytes
64 bytes from 67.222.54.196: seq=0 ttl=49 time=234.074 ms
64 bytes from 67.222.54.196: seq=1 ttl=49 time=415.370 ms
64 bytes from 67.222.54.196: seq=2 ttl=49 time=324.711 ms
64 bytes from 67.222.54.196: seq=3 ttl=49 time=301.084 ms
64 bytes from 67.222.54.196: seq=5 ttl=49 time=304.134 ms
64 bytes from 67.222.54.196: seq=7 ttl=49 time=190.645 ms
^C
--- www.armdesigner.com ping statistics ---
8 packets transmitted, 6 packets received, 25% packet loss
round-trip min/avg/max = 190.645/295.003/415.370 ms
```

## 6.8.2 Bluetooth test

The audio output channel is disabled by default. When the device is used as a Bluetooth speaker, the audio output channel needs to be manually enabled.

```
# amixer -c 0 cset name='SPK Switch' 1
# amixer -c 0 cset name='LINEOUTL Switch' 1
# amixer -c 0 cset name='LINEOUTR Switch' 1
```

Step 1: Enable Bluetooth.

```
# bt-init.sh
```

```
# bt-init.sh
[ 64.529034] sunxi-rfkill soc@3000000:rfkill: block state already is 1
[ 65.040463] sunxi-rfkill soc@3000000:rfkill: set block: 0
[ 65.058640] sunxi-rfkill soc@3000000:rfkill: bt power on success
Realtek Bluetooth :Realtek Bluetooth init uart with init speed:115200, type:HCI UART H5
Realtek Bluetooth :Realtek hciattach version 3.1.390bad8.20220519-142434
```

Step 2: View the Bluetooth device status.

```
# hciconfig -a
```

```
# hciconfig -a
hci0: Type: Primary Bus: UART
BD Address: A8:B5:8E:B9:3C:11 ACL MTU: 1021:8 SCO MTU: 255:12
UP RUNNING PSCAN ISCAN
RX bytes:1187 acl:0 sco:0 events:41 errors:0
TX bytes:1803 acl:0 sco:0 commands:41 errors:0
Features: 0xff 0xff 0xff 0xfa 0xdb 0xbf 0x7b 0x87
Packet type: DM1 DM3 DM5 DH1 DH3 DH5 HV1 HV2 HV3
Link policy: RSWITCH HOLD SNIFF PARK
Link mode: SLAVE ACCEPT
Name: 'BlueZ 5.54'
Class: 0x000400
Service Classes: Unspecified
Device Class: Audio/Video, Uncategorized
HCI Version: 4.1 (0x7) Revision: 0xbab7
LMP Version: 4.1 (0x7) Subversion: 0x6f72
Manufacturer: Realtek Semiconductor Corporation (93)
```

Step 3: Control and configure the Bluetooth device.

```
# bluetoothctl
```

```
# bluetoothctl
[bluetooth]# bluetoothd[630]: src/agent.c:add_default_agent() Default agent set to :1.2 /org/bluez/agent
bluetoothd[630]: src/adapter.c:set_mode() sending set mode command for index 0
bluetoothd[630]: src/agent.c:agent_ref() 0x55b501fa70: ref=1
bluetoothd[630]: src/agent.c:register_agent() agent :1.2
bluetoothd[630]: src/adapter.c:new_settings_callback() Settings: 0x00000adb
bluetoothd[630]: src/adapter.c:settings_changed() Changed settings: 0x00000010
bluetoothd[630]: src/adapter.c:settings_changed() Pending settings: 0x00000000
Agent registered
[CHG] Controller A8:B5:8E:B9:3C:11 Pairable: yes
[bluetooth]#
```

Step 4: Scan for nearby Bluetooth devices.

(After scanning, turn off scanning to prevent continuous searching and refreshing.)

```
[bluetooth]# scan on          # Enable scanning
[bluetooth]# scan off       # Disable scanning
[bluetooth]# devices        # List devices
```

```
[bluetooth]# scan on
...
[bluetooth]# scan off
...
[bluetooth]# devices
Device 48:EE:FF:F4:91:D1 48-EE-FF-F4-91-D1
Device 5D:C1:CC:1D:E7:D3 NPE0GtpSvkMsA8PJ7WnsqBMIs
Device 72:FD:40:EE:02:69 72-FD-40-EE-02-69
Device 78:C1:42:64:6D:0D 78-C1-42-64-6D-0D
Device 68:A2:9D:23:CE:E6 68-A2-9D-23-CE-E6
Device 74:F0:3A:40:39:71 74-F0-3A-40-39-71
Device 54:67:06:C6:25:D6 OPPO Reno6 5G
Device 5D:36:9A:87:03:86 5D-36-9A-87-03-86
Device 68:5B:FB:9C:F9:22 68-5B-FB-9C-F9-22
Device 6E:86:63:2F:0A:39 6E-86-63-2F-0A-39
Device 69:7A:4C:AE:98:29 69-7A-4C-AE-98-29
Device 7E:35:47:65:69:B7 7E-35-47-65-69-B7
Device 55:AB:57:07:A9:6F 55-AB-57-07-A9-6F
Device 72:39:81:54:C5:D0 72-39-81-54-C5-D0
Device 5E:AE:76:B7:2D:7A 5E-AE-76-B7-2D-7A
Device 50:8A:06:FA:35:A5 TY
Device A8:35:12:9A:EB:4D liuy
```

Step 5: Pair the device.

```
[bluetooth]# pair A8:35:12:9A:EB:4D
```

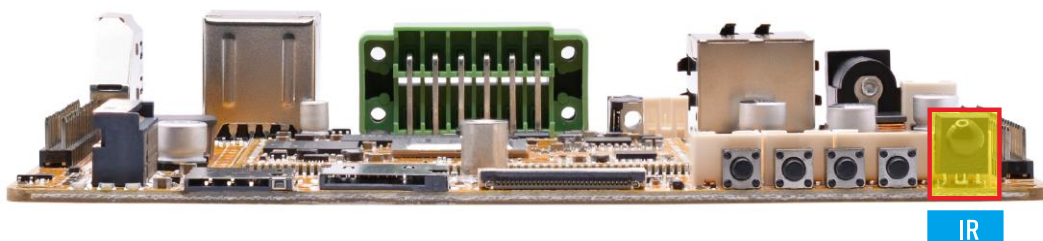
```
[bluetooth]# pair A8:35:12:9A:EB:4D
Attempting to pair with A8:35:12:9A:EB:4D
bluetoothd[684]: src/device.c:btd_device_set_temporary() temporary 0
bluetoothd[684]: src/agent.c:agent_ref() 0x559112d4e0: ref=2
bluetoothd[684]: src/device.c:bonding_request_new() Requesting bonding for A8:35:12:9A:EB:4D
bluetoothd[684]: src/agent.c:agent_ref() 0x559112d4e0: ref=3
bluetoothd[684]: src/agent.c:agent_unref() 0x559112d4e0: ref=2
bluetoothd[684]: src/adapter.c:suspend_discovery()
bluetoothd[684]: src/adapter.c:adapter_bonding_attempt() hci0 bdaddr A8:35:12:9A:EB:4D type 0 io_cap 0x04
bluetoothd[684]: src/adapter.c:add_whitelist_complete() A8:35:12:9A:EB:4D added to kernel whitelist
[bluetooth]# bluetoothd[684]: src/adapter.c:connected_callback() hci0 device A8:35:12:9A:EB:4D connected
eir_len 11
[CHG] Device A8:35:12:9A:EB:4D Connected: yes
[liuy]# bluetoothd[684]: src/adapter.c:user_confirm_request_callback() hci0 A8:35:12:9A:EB:4D confirm_hint 0
bluetoothd[684]: src/device.c:new_auth() Requesting agent authentication for A8:35:12:9A:EB:4D
bluetoothd[684]: src/agent.c:agent_ref() 0x559112d4e0: ref=3
bluetoothd[684]: src/agent.c:agent_request_confirmation() Calling Agent.RequestConfirmation: name=:1.3,
path=/org/bluez/agent, passkey=658812
Request confirmation
[agent] Confirm passkey 658812 (yes/no): yes
[liuy]# bluetoothd[684]: src/agent.c:agent_ref() 0x559112d4e0: ref=4
```

Step 6: Connect the device.

```
[bluetooth]# connect A8:35:12:9A:EB:4D
```

```
[bluetooth]# connect A8:35:12:9A:EB:4D
Attempting to connect to A8:35:12:9A:EB:4D
bluetoothd[684]: src/device.c:connect_profiles() /org/bluez/hci0/dev_A8_35_12_9A_EB_4D (all), client :1.3
bluetoothd[684]: profiles/audio/a2dp.c:a2dp_source_connect() path /org/bluez/hci0/dev_A8_35_12_9A_EB_4D
bluetoothd[684]: profiles/audio/avdtp.c:avdtp_ref() 0x5591141ca0: ref=1
bluetoothd[684]: profiles/audio/avdtp.c:avdtp_ref() 0x5591141ca0: ref=2
bluetoothd[684]: profiles/audio/a2dp.c:setup_ref() 0x5591148f40: ref=1
bluetoothd[684]: profiles/audio/source.c:source_set_state() State changed
/org/bluez/hci0/dev_A8_35_12_9A_EB_4D: SOURCE_STATE_DISCONNECTED -> SOURCE_STATE_CONNECTING
bluetoothd[684]: profiles/audio/source.c:source_connect() stream creation in progress
bluetoothd[684]: src/service.c:change_state() 0x5591136be0: device A8:35:12:9A:EB:4D profile a2dp-source
state changed: disconnected -> connecting (0)
[bluetooth]# bluetoothd[684]: src/adapter.c:connected_callback() hci0 device A8:35:12:9A:EB:4D connected
eir_len 11
[CHG] Device A8:35:12:9A:EB:4D Connected: yes
```

## 5.9 IR



Execute the following command to retrieve the data reported by the IR module:

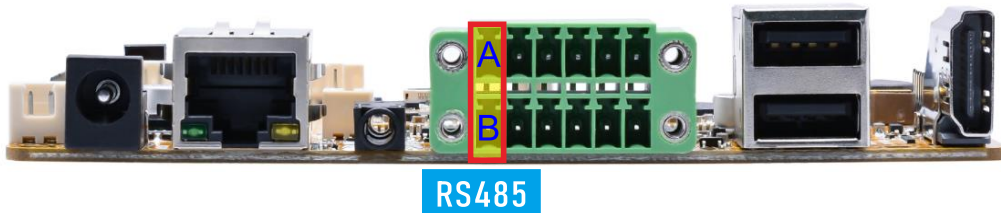
```
# hexdump /dev/input/event1
```

```
# hexdump /dev/input/event1
00000000 d8ea 694b 0000 0000 385b 0007 0000 0000
00000010 0004 0004 1865 0018 d8ea 694b 0000 0000
00000020 385b 0007 0000 0000 0000 0000 0000 0000
00000030 d8ea 694b 0000 0000 2465 0008 0000 0000
00000040 0004 0004 1865 0018 d8ea 694b 0000 0000
00000050 2465 0008 0000 0000 0000 0000 0000 0000
00000060 d8eb 694b 0000 0000 409b 0002 0000 0000
00000070 0004 0004 1865 0018 d8eb 694b 0000 0000
00000080 409b 0002 0000 0000 0000 0000 0000 0000
00000090 d8eb 694b 0000 0000 2c75 0003 0000 0000
000000a0 0004 0004 1865 0018 d8eb 694b 0000 0000
000000b0 2c75 0003 0000 0000 0000 0000 0000 0000
```

View the event node for the input device corresponding to the IR-RX module:

```
# cat /proc/bus/input/devices
```

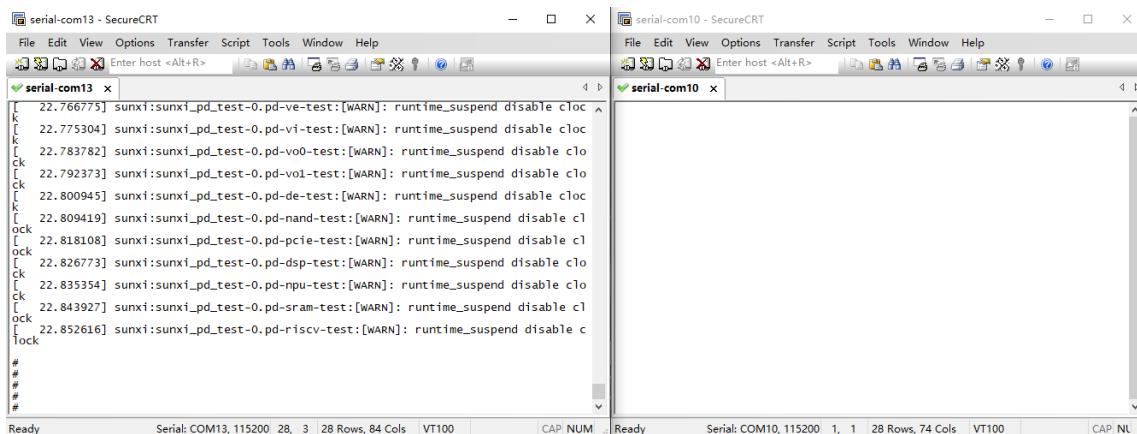
## 5.10 RS485



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

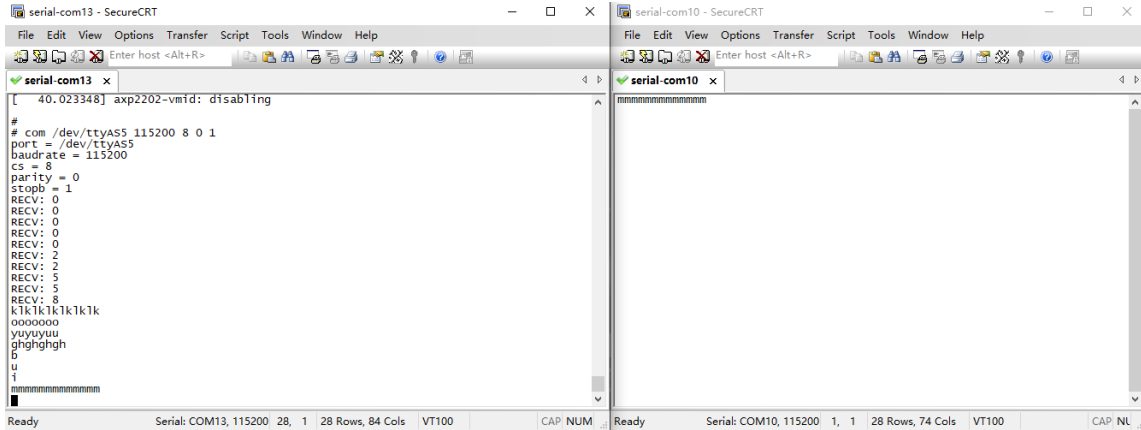


**Step 2:** Open the corresponding serial terminals, setting the baud rate to 115200.

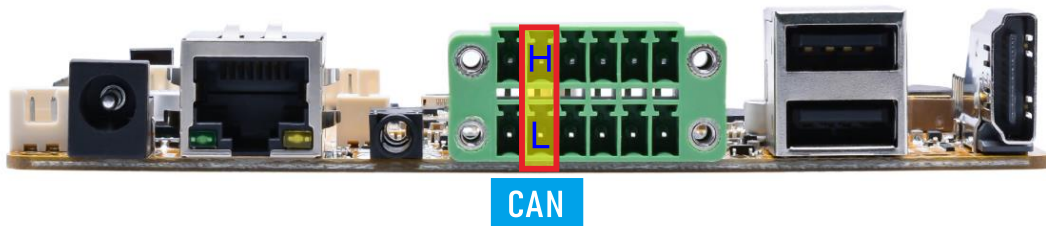


**Step 3:** Execute the following command in the board's serial terminal to test the RS485 transmission and reception functionality.

```
# com /dev/ttyAS5 115200 8 0 1
```



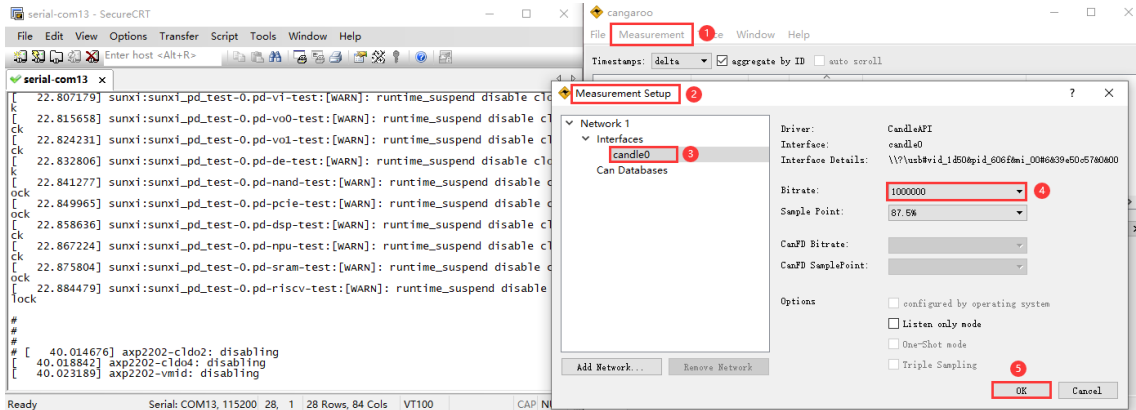
## 5.11 CAN



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

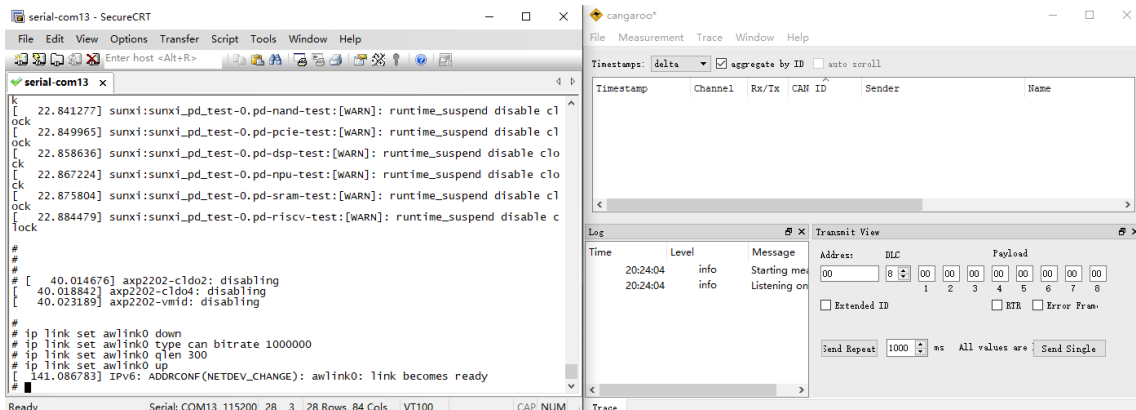


**Step 2:** Open the CAN test software and set the baud rate to 1000000.



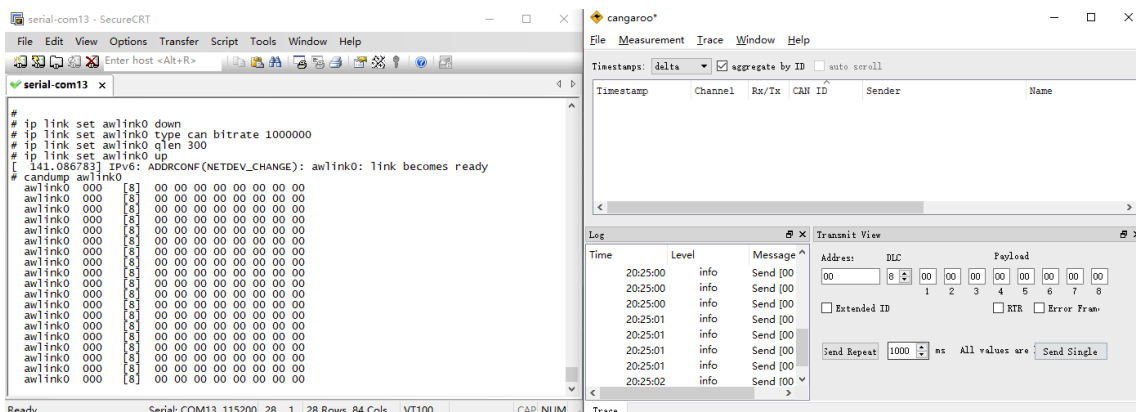
**Step 3:** Configure and activate the CAN network, setting the bitrate to 500000.

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



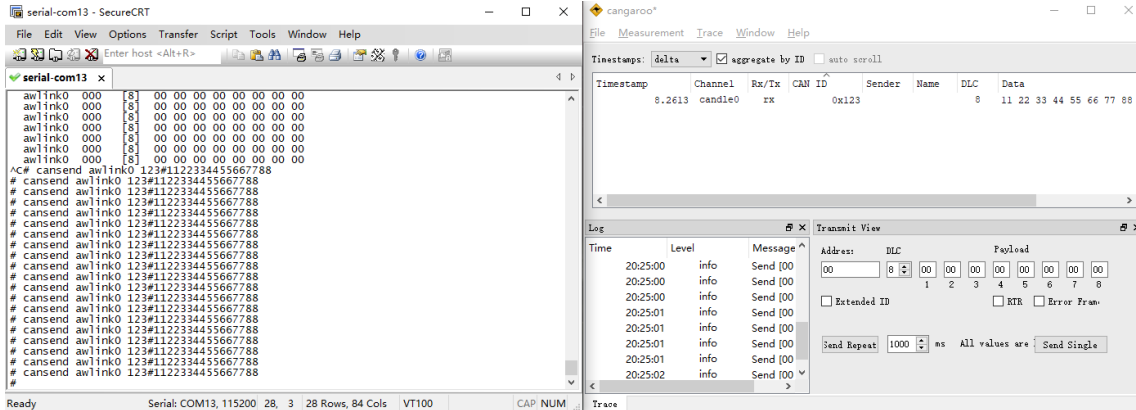
**Step 4:** Configure CAN as the receiver.

```
# candump awlink0
```



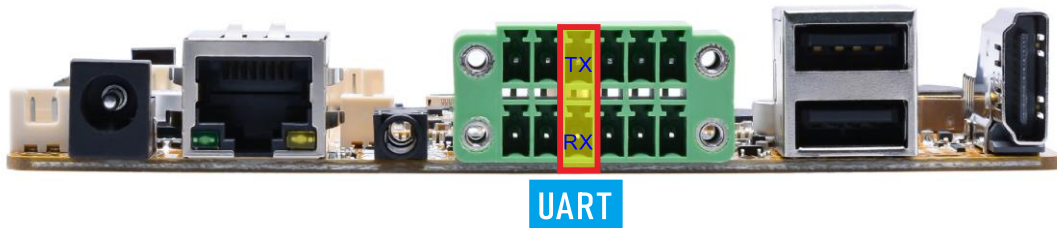
### Step 5: Configure CAN as the sender.

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



## 6.12 RS232

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



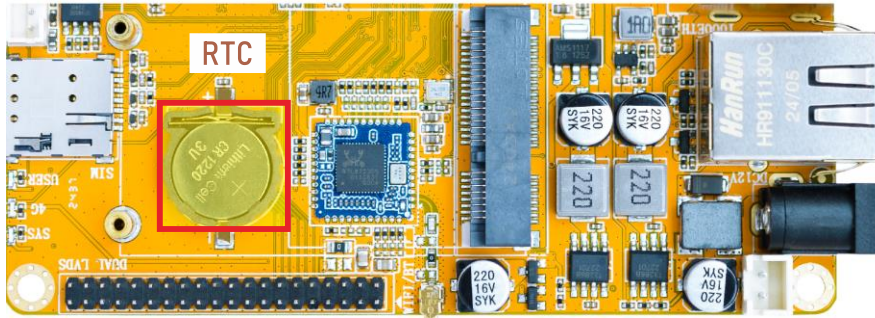
### Step 2: RS232 test.

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

```
# com /dev/ttyAS3 115200 8 0 1
port = /dev/ttyAS3
baudrate = 115200
cs = 8
parity = 0
stopb = 1
mmmmm
RECV: mmmm
klklklkl
RECV: klklklkl
5656ioioioi
RECV: 5656ioioioi
1111
RECV: 1111
```

## 5.13 RTC

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



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

```
# date -s "2025-12-25 09:37:00"
```

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

```
# hwclock -w
```

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

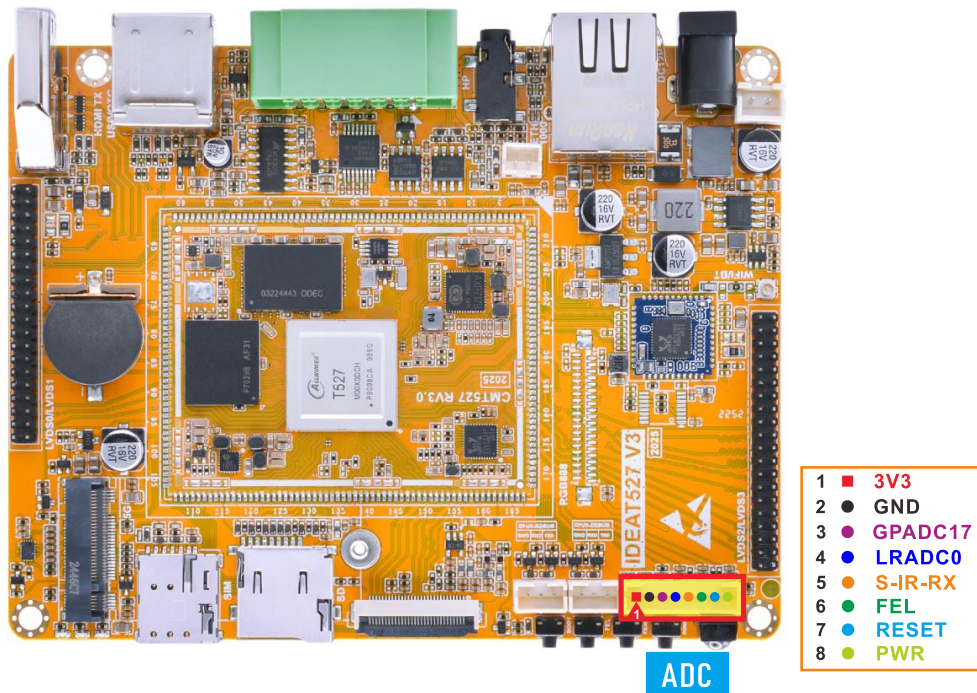
```
# hwclock
```

```
# date -s "2025-12-25 09:37:00"
Thu Dec 25 09:37:00 UTC 2025
# hwclock -w
# hwclock
Thu Dec 25 09:37:07 2025 0.000000 seconds
# hwclock
Thu Dec 25 09:37:40 2025 0.000000 seconds
# hwclock
Thu Dec 25 09:38:19 2025 0.000000 seconds
```

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

```
# hwclock
Thu Dec 25 09:53:00 2025 0.000000 seconds
# hwclock
Thu Dec 25 09:53:12 2025 0.000000 seconds
# hwclock
Thu Dec 25 09:53:49 2025 0.000000 seconds
```

## 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:

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

### 5.14.2 GPADC

GPADC test command:

```
# cat /sys/bus/iio/devices/iio\:device1/in_voltage5_raw
```

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

```
# cat /sys/bus/iio/devices/iio\:device1/in_voltage5_raw
0
# cat /sys/bus/iio/devices/iio\:device1/in_voltage5_raw
1797
```