

# *SBC3568 Linux6.1 User Manual*

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V1.0



*Boardcon Embedded Designer*

## Overview

The content of this document is intended solely for the SBC3568 development board, aiming to help users quickly understand, apply, and test the SBC3568 development board.

## System Support

| Development Board | Debian12 | Buildroot |
|-------------------|----------|-----------|
| mini3568_V2.0     | Y        | Y         |
| SBC3568_V3        |          |           |

## Revision History

| Version | Date       | Author      | Revision History |
|---------|------------|-------------|------------------|
| V1.0    | 2024-04-27 | Xue Junchao | Initial version  |

## Disclaimer

The information in this manual is for reference only. While Boardcon strives to ensure its accuracy, no guarantees are made regarding its completeness or correctness. All content is subject to change without prior notice. Boardcon reserves the right to revise the content of this manual without prior notification.

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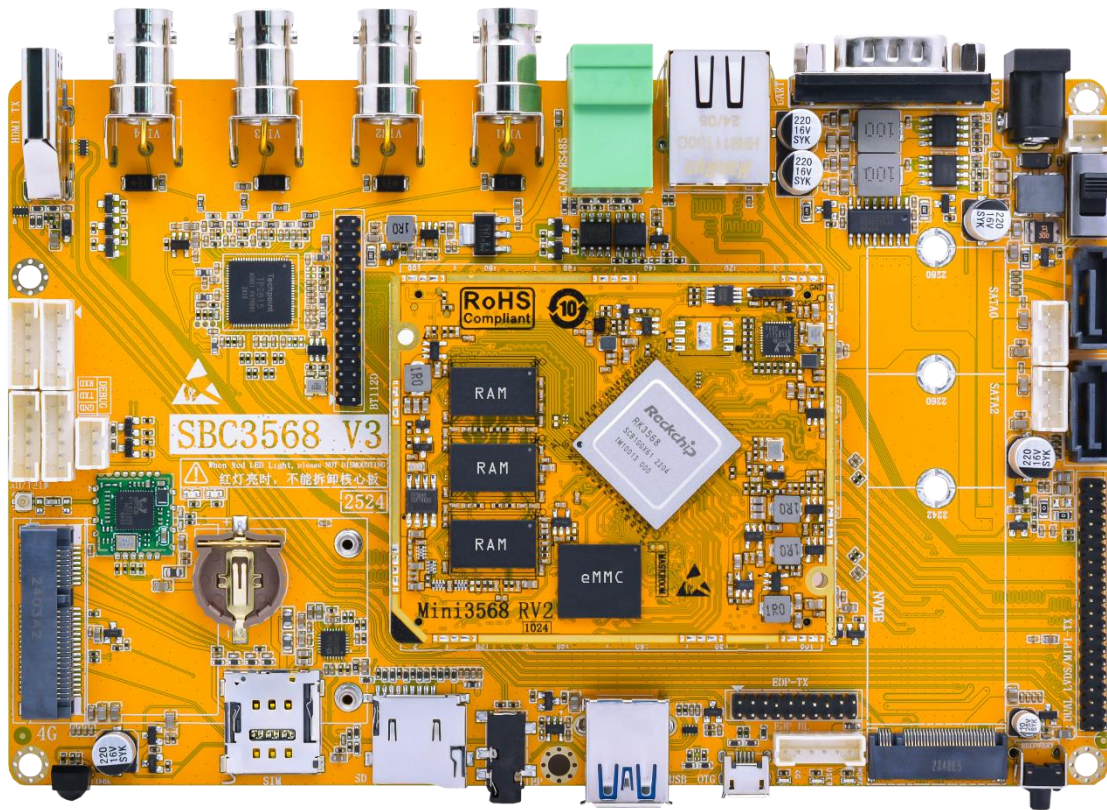
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# 1.Introduction

## 1.1 Overview

The SBC3568 development board is equipped with the RK3568 quad-core ARM Cortex-A55 processor. This processor delivers high performance with low power consumption, supporting nearly all H.264 decoding at 4K@60fps, H.265 decoding at 4K@60fps, H.264/H.265 encoding at 1080p@60fps, and high-quality JPEG encoding/decoding. The RK3568 is ideal for personal mobile internet devices and AIoT applications.



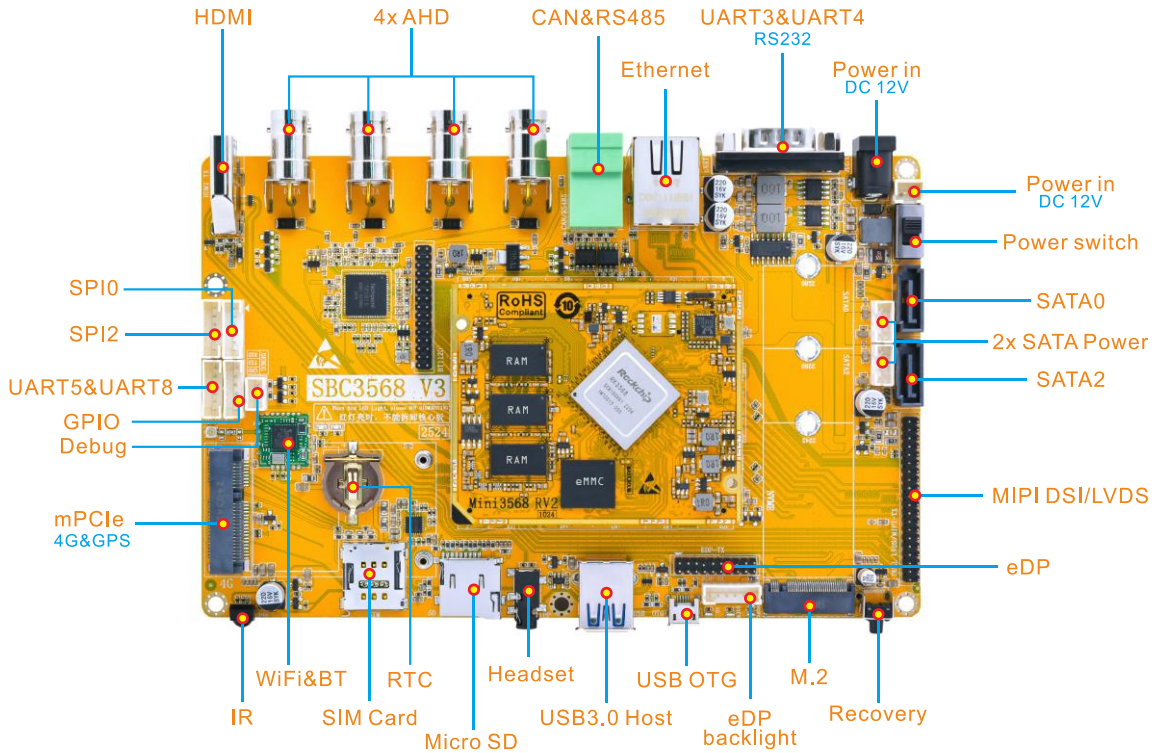
## 1.2 Product Parameters

| Basic Parameters |   |
|------------------|---|
| SOC              | • RK3568  |
| CPU              | • Quad-core 64-bit ARM Cortex-A55@ up to 2.0GHz |

|                            |         |  |
|----------------------------|---------|--|
| GPU                        |         | <ul style="list-style-type: none"> <li>• OpenCL 2.0</li> <li>• OpenGL ES 1.1/2.0/3.2</li> <li>• Vulkan 1.1</li> </ul>  |
| NPU                        |         | <ul style="list-style-type: none"> <li>• 1 TOPS AI computing power</li> <li>• Supports int8/int16/float16/bfloat16 hybrid MAC operations</li> </ul>  |
| Video                      | Decoder | <ul style="list-style-type: none"> <li>• Support 4K@60fps H.265/H.264/VP9 video decoding</li> <li>• Support 1080P@60fps VP8/VC1/MPEG-4,2,1 video decoding</li> <li>• Support 720x576@60fps H.263 video decoding</li> </ul> |
|                            | Encoder | <ul style="list-style-type: none"> <li>• Support 1080P@60fps H.265/H.264 video encoding</li> <li>• Support YUV/RGB video source with rotation and mirror</li> </ul>  |
| RAM                        |         | <ul style="list-style-type: none"> <li>• 2GB LPDDR4X (up to 8GB)</li> </ul>  |
| ROM                        |         | <ul style="list-style-type: none"> <li>• 8GB eMMC (up to 64GB)</li> </ul>  |
| Support system             |         | Android, Debian, Buildroot   |
| <b>Hardware Parameters</b> |         |  |
| Extended Storage           |         | <ul style="list-style-type: none"> <li>• Support 2x SATA</li> <li>• Support MicroSD Card</li> <li>• Support 1x M.2 SSD</li> </ul>  |
| Display                    |         | <ul style="list-style-type: none"> <li>• Support HDMI TX 4K@60fps display</li> <li>• Support LVDS display</li> </ul>   |
| Audio                      |         | <ul style="list-style-type: none"> <li>• Support HDMI TX audio output</li> <li>• Support Headphone output/input</li> </ul>   |
| USB                        |         | <ul style="list-style-type: none"> <li>• Support USB3.0</li> </ul>   |
| Network                    |         | <ul style="list-style-type: none"> <li>• Support 1x Gigabit Ethernet</li> <li>• Support WIFI/BT module</li> <li>• Support 4G module</li> </ul>   |
| Camera                     |         | <ul style="list-style-type: none"> <li>• Support 4x AHD Camera</li> </ul>  |

|                              |  |
|------------------------------|--|
| Peripheral communication     | <ul style="list-style-type: none"> <li>• Support CAN</li> <li>• Support RS485</li> <li>• Support 2xUART</li> <li>• Support 2xRS232</li> <li>• Support 2xSPI</li> </ul> |
| Other parameters             | Support Debug, IR, RTC, OTG, GPIO.   |
| <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        | 70.0mm x 58.0mm  |
| Motherboard dimensions       | 175.0mm x 112.0mm  |

## 1.3 Hardware Interface Introduction



| Interface parameters |                                 |
|----------------------|---------------------------------|
| Power in DC 12V      | 12V DC power input interface    |
| USB3.0 Host          | USB expansion interface         |
| Headset              | Headset output/input            |
| RTC                  | RTC coin cell connector         |
| Gigabit Ethernet     | Gigabit Ethernet RJ45 interface |
| HDMI                 | HDMI2.0 TX interface            |
| USB OTG              | OTG download interface          |
| mPCIe 4G&GSD         | 4G&GPS module interface         |
| Micro SD             | MicroSD card slot               |
| SIM Card             | SIM card port                   |
| Recovery             | Recovery key                    |
| SATA0                | SATA0 interface                 |

|                   |                                    |
|-------------------|------------------------------------|
| SATA2             | SATA2 interface                    |
| 2xSATA Power      | SATA Power out interface, 5V       |
| Power switch      | Power key                          |
| LVDS/MIPI         | LVDS/MIPI screen display interface |
| eDP               | eDP screen display interface       |
| eDP backlight     | eDP backlight interface            |
| Debug             | UART2, debug the serial port       |
| IR                | infrared receiver                  |
| 4xAHD             | AHD camera interface               |
| SPI0              | SPI0 interface                     |
| SPI2              | SPI2 interface                     |
| GPIO              | GPIO interface                     |
| WIFI&BT           | Realtek RTL8723DU module           |
| RS485             | RS485 communication interface      |
| UART3&UART4 RS232 | RS232 communication interface      |
| CAN               | CAN communication interface        |
| UART5&UART8       | UART5, UART8, TTL level interface  |
| Power in DC 12V   | 12V DC power I/O, GPIO interface   |

## 2. Install Drivers and Tool

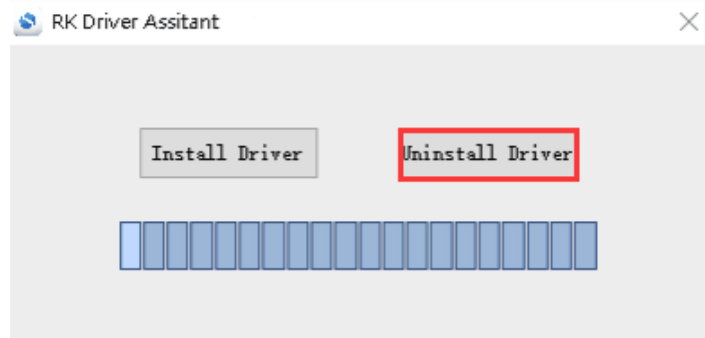
To download firmware and debug in the terminal, the following drivers and software need to be installed (for Windows computers):

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

## 2.1 Install RK Driver Assitant

**Step 1:** Open *DriverAssitant\_v5.1.1/DriverInstall.exe*.

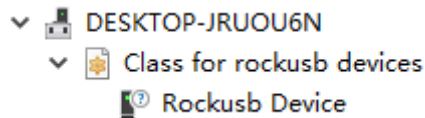
**Step 2:** To avoid driver conflicts, click “**Uninstall Driver**” to uninstall the driver.



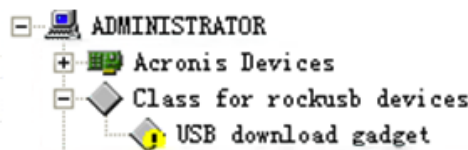
**Step 3:** Click button “**Install Driver**” to install.



**Step 4:** After the installation is complete, connect the board and PC with Micro USB cable and press the **Recovery** key and hold then power the board, the following information is displayed in the Computer **Device Manager**, indicating that the USB driver was successfully installed.

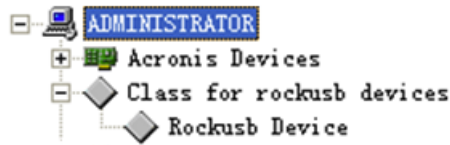


**Step 5:** If the following device information appears in the **Device Manager** after the operation in Step 4, user need to proceed to the next step.



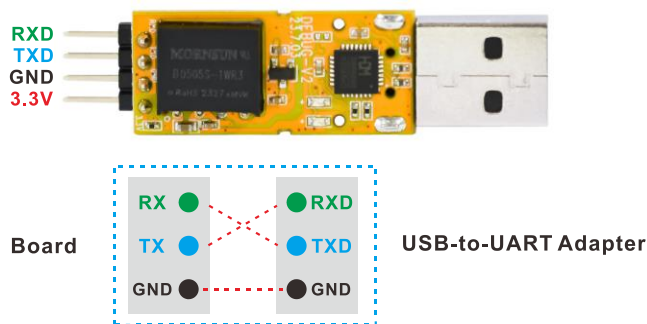
**Step 6:** The WINDOW will pop up found New Hardware Wizard dialog box, choose to install from the specified location, and then select: *DriverAssitant\_v5.1.1/ADBDriver*.

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



## 2.2 Install CH9102X Driver

### 2.2.1 How to Connect the Serial Port Tool



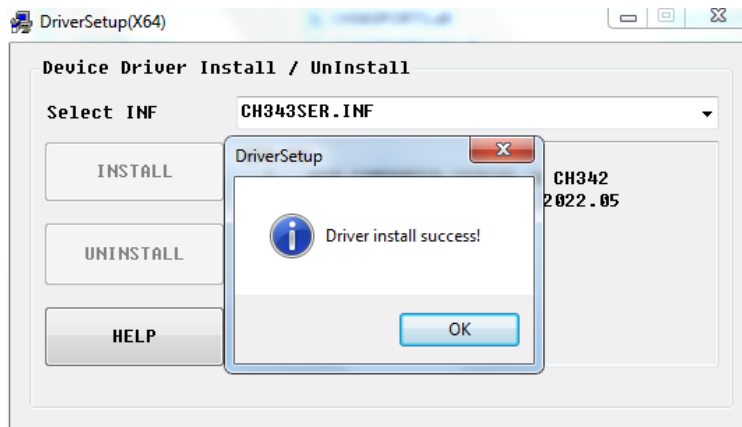
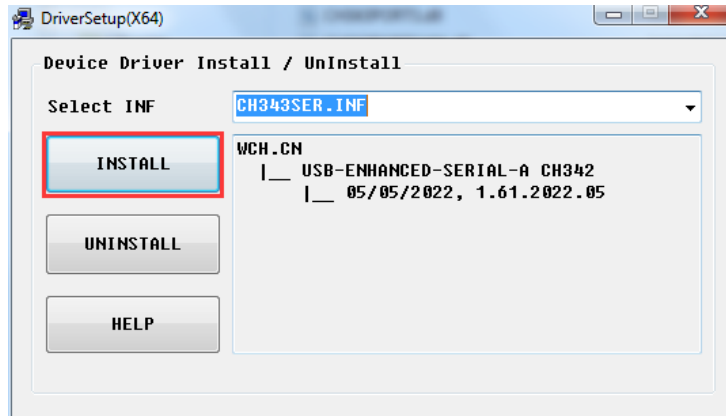
| Pin | Connection Description                    |
|-----|---|
| RXD | Receive, connect to TX pin of the board.  |
| TXD | Transmit, connect to RX pin of the board. |
| GND | Ground, connect to GND pin of the board.  |
| 3V3 | No need to connect.                       |

### 2.2.2 Install Driver

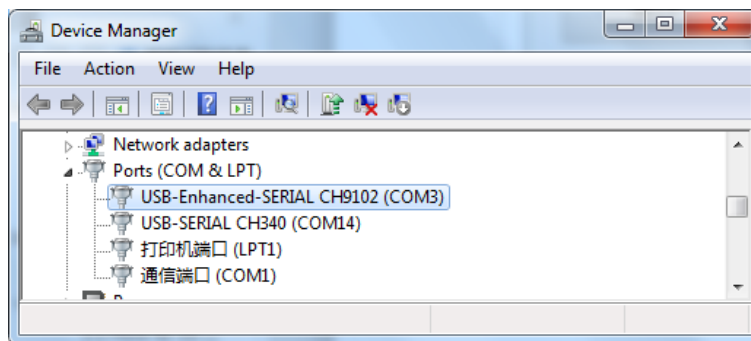
**Step 1:** Plug the CH9102X Module to the PC

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

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



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

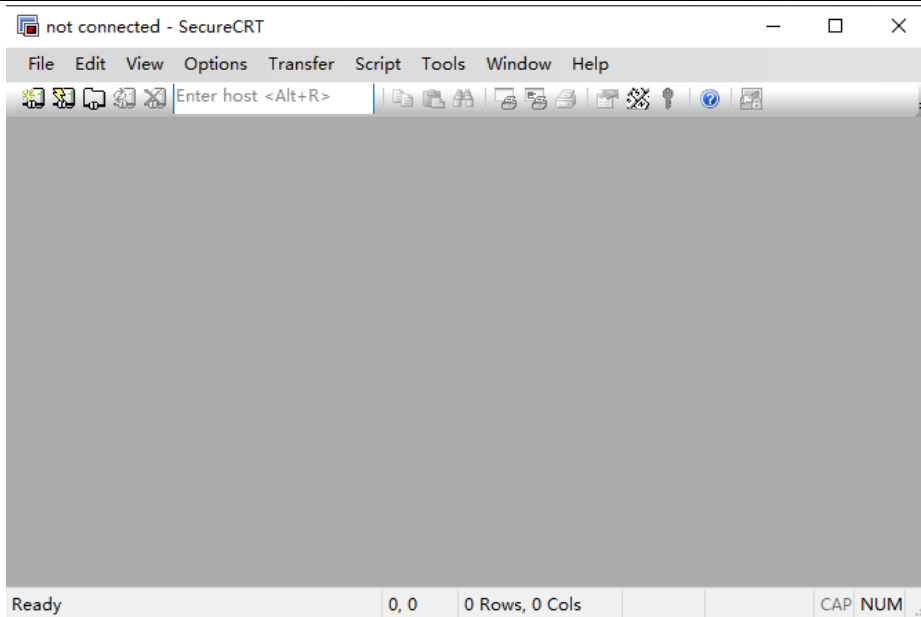


## 2.3 Install Serial Terminal Tool

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

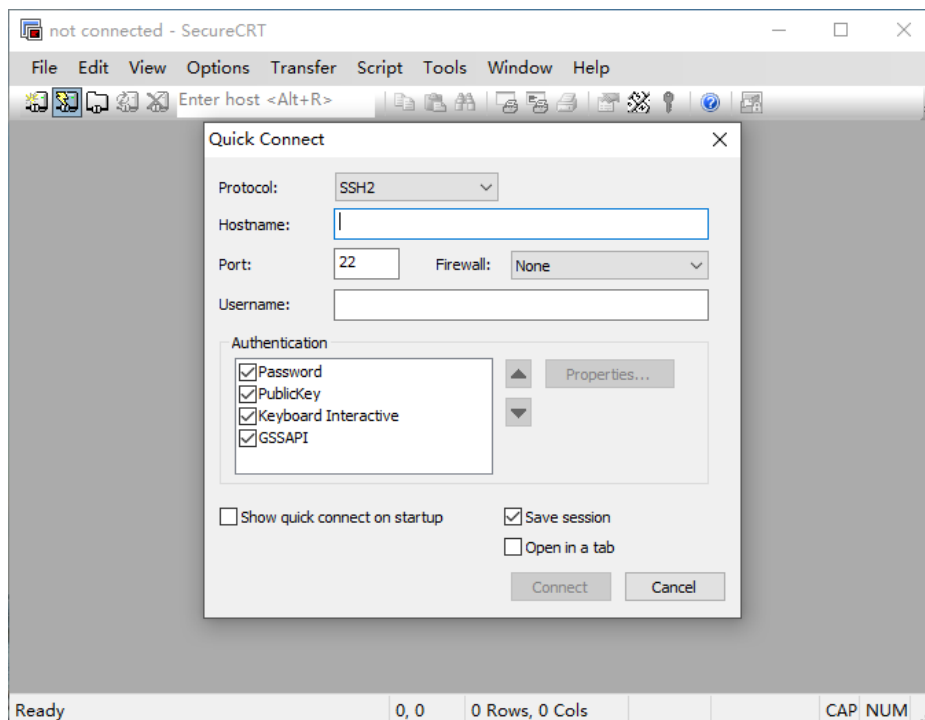
**Step 1:** Unzip *Platform/SecureCRT.rar* on PC.

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

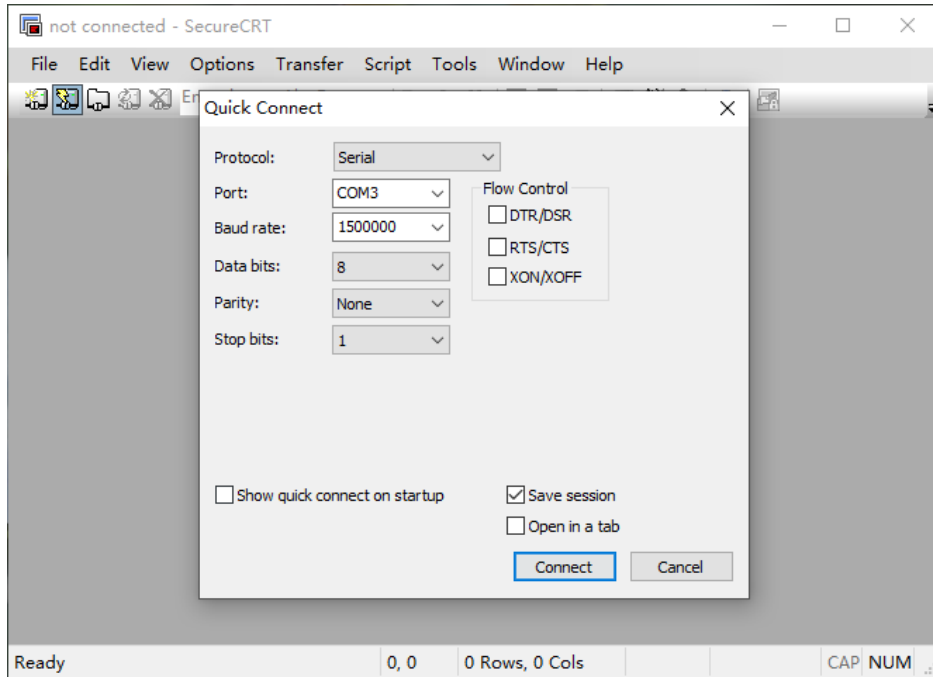


**Step 3:** Confirm that the CH9102X driver has been installed and the CH9102X module is connecting to the PC.

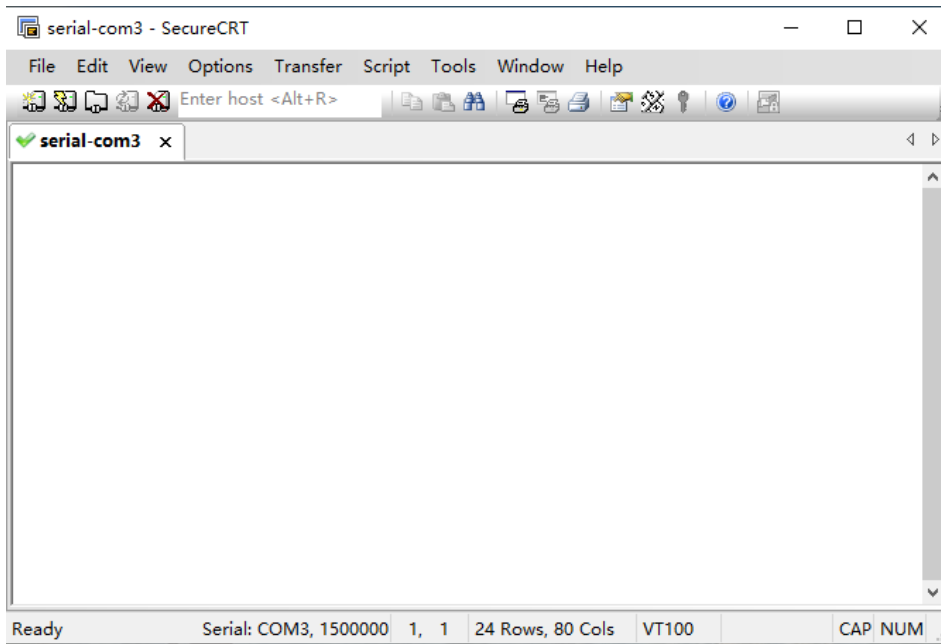
**Step 4:** Click the “**Quick Connect**” button to go to the Quick Connect configuration screen.



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



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



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# 3. Upgrade Introduction

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## 3.1 Upgrade Mode

The firmware can be upgraded via USB cable in two modes:

### 1. Loader Mode:

The standard mode used for firmware upgrades.

### 2. MaskRom Mode:

A last-resort mode used when the device is bricked. Entering MaskRom mode requires hardware manipulation, which involves certain risks. It should only be attempted if Loader mode is unavailable.

#### • Prerequisite

Before upgrading the firmware via USB cable, ensure that the necessary drivers are installed. For installation instructions, refer to the section [Install RK Driver Assistant](#).

### 3.1.1 How to Enter Loader Mode

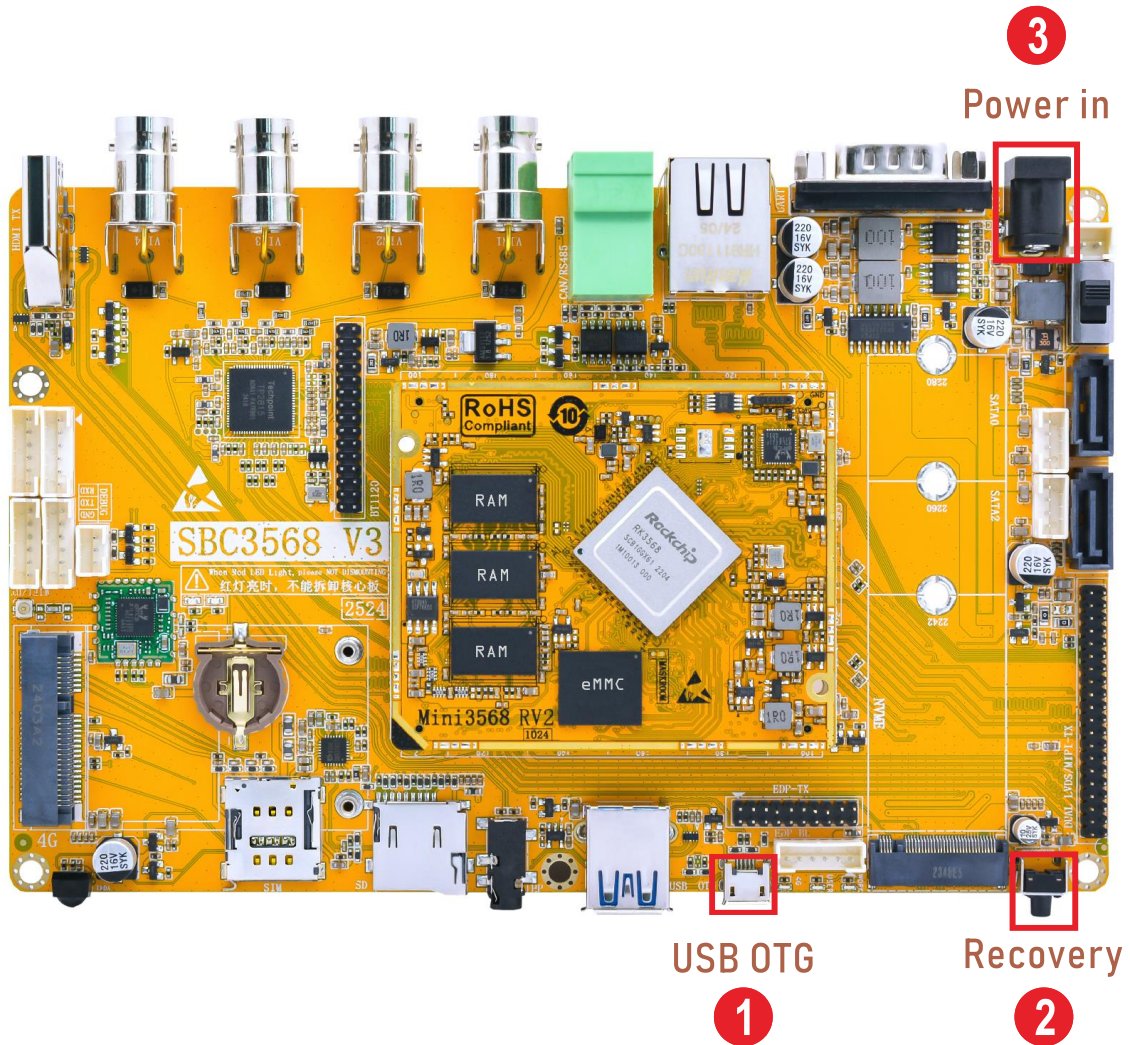
#### 3.1.1.1 Hardware

**Step 1:** Disconnect the power adapter.

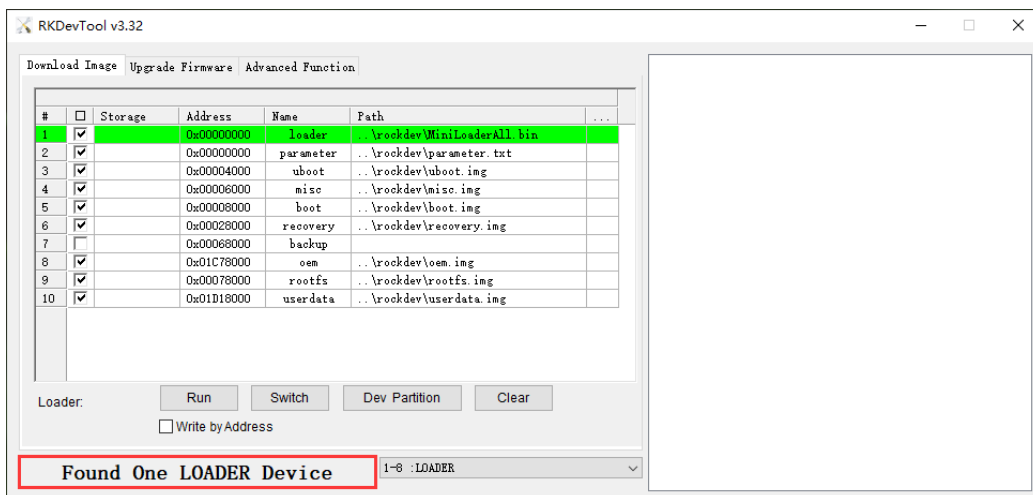
**Step 2:** Connect one end of the Micro cable to the host and the other end to the development board.

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

**Step 4:** Connect the power supply.



**Step 5:** After a few seconds, release the **Recovery** button when the flashing tool shows “**Found one LOADER Device**”.



### 3.1.1.2 Software

After connecting the Micro cable, execute the following command in the serial debug

terminal or adb shell.

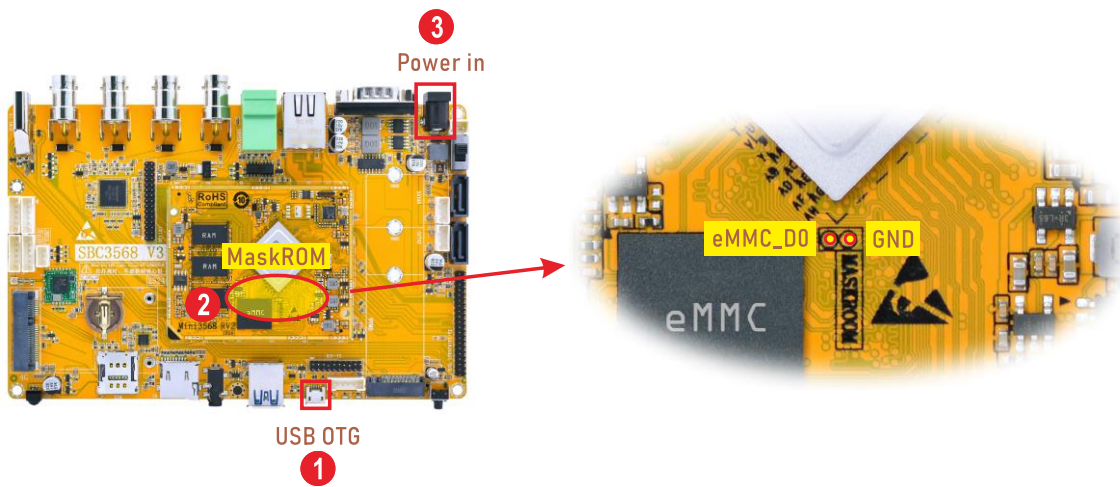
```
# reboot loader
```

### 3.1.2 How to Enter MaskRom Mode

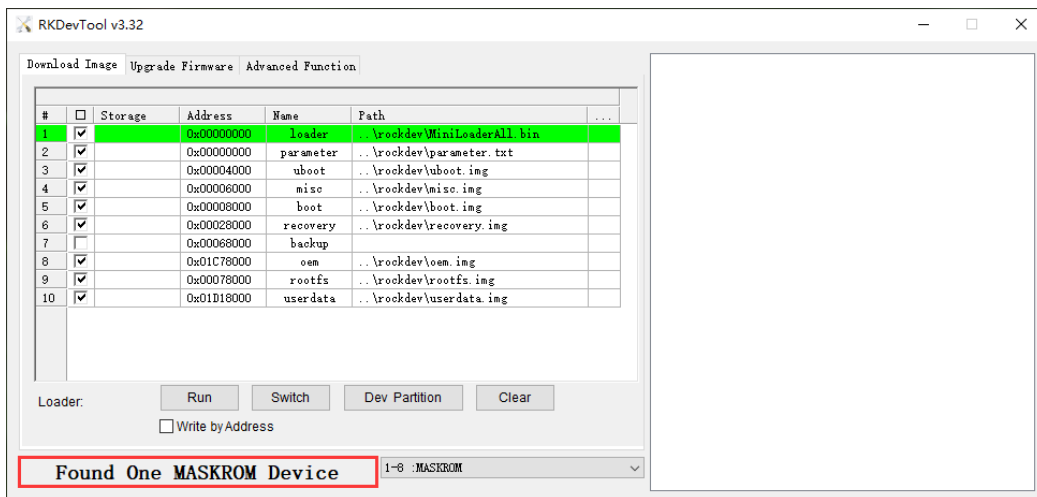
**Step 1:** Disconnect the power adapter.

**Step 2:** Connect one end of the Micro cable to the host and the other end to the development board.

**Step 3:** Use tweezers to short the two test points on the core board mini3568.



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



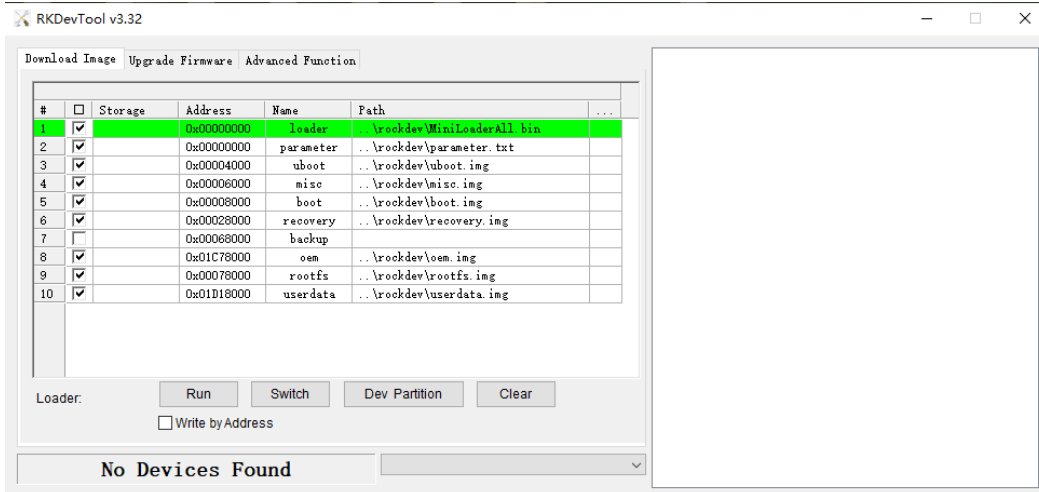
## 3.2 Burn firmware

**Environment:** Windows OS (Operating System).

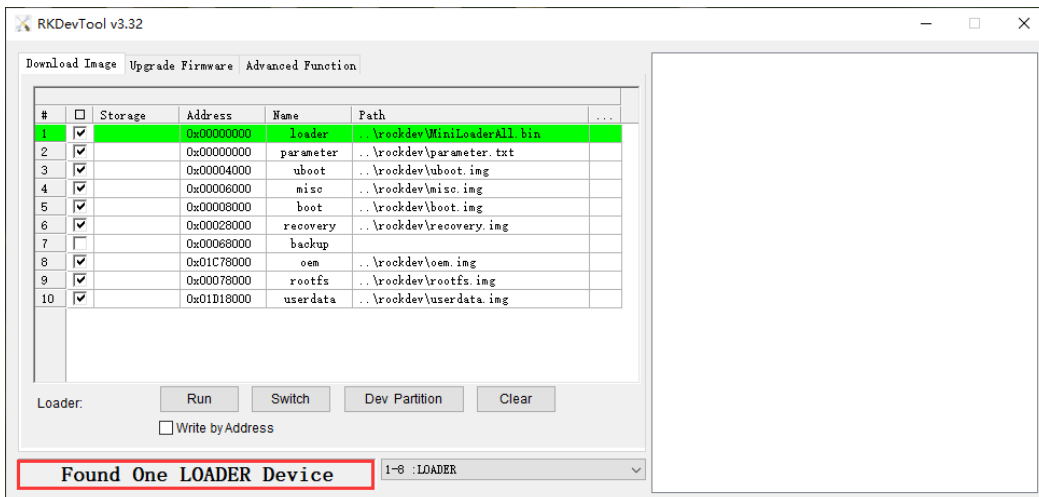
## 3.2.1 Burn Update.img Firmware

**Step 1:** Unzip *RKDevTool.rar* on Windows.

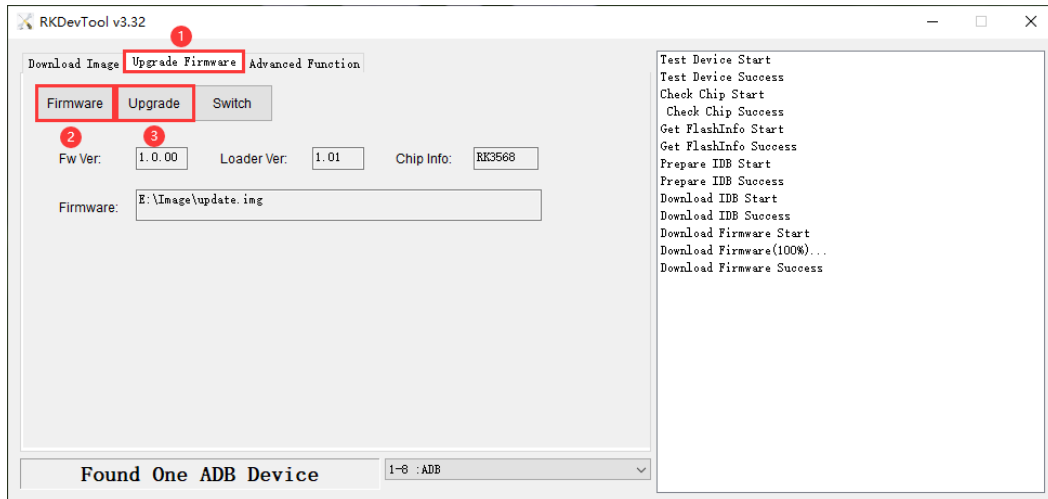
**Step 2:** Open *RKDevTool\RKDevTool\_Release\RKDevTool.exe*.



**Step 3:** Switch to loader mode. ([How to Enter Loader Mode](#))



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



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

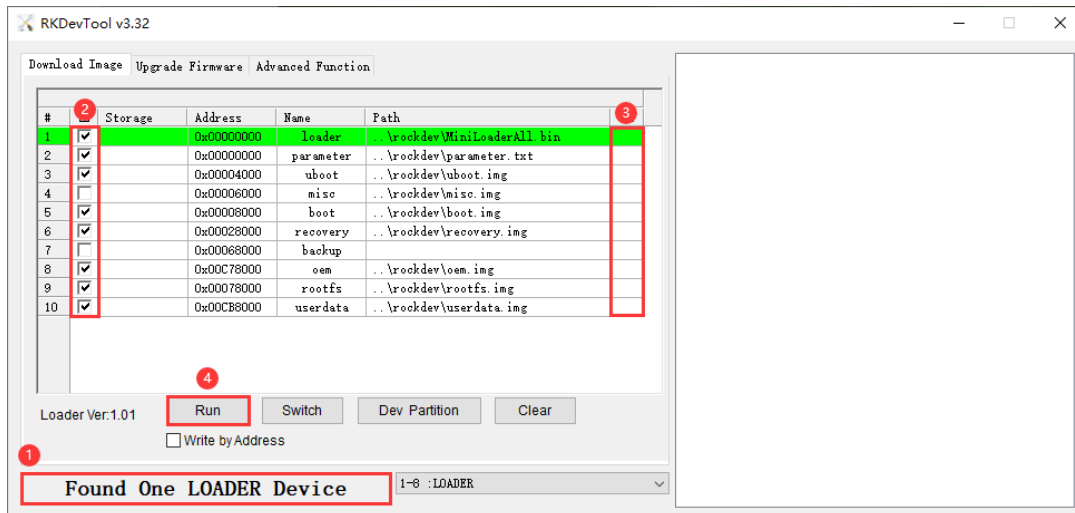
### 3.2.2 Burn Split Firmware

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

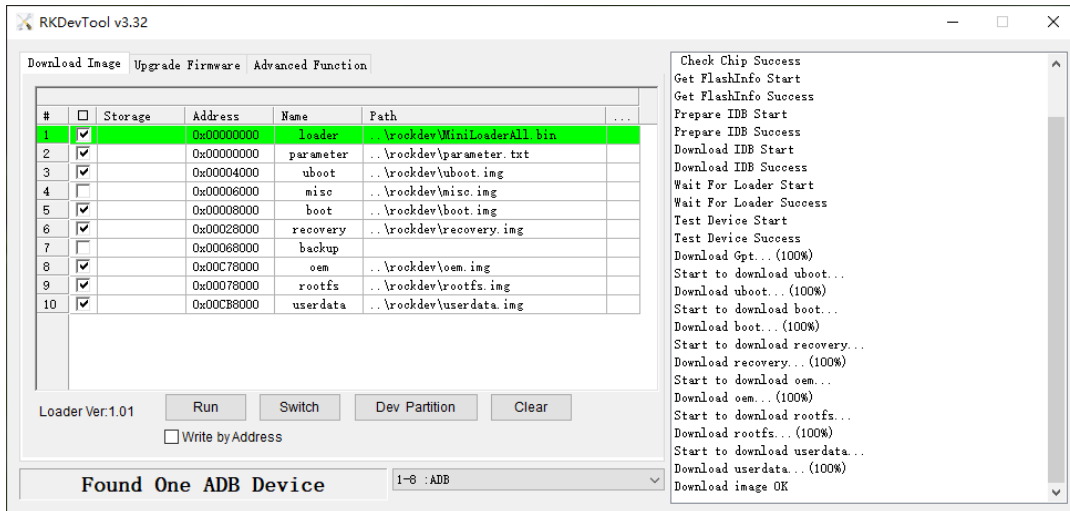
**Step 2:** Check the partitions to be flashed, multiple partitions can be selected.

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

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



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



## 4. Development Environment

### 4.1 Preparing the Development Environment

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

| Hardware requirements  | Software requirements |
|--|-----------------------|
| 64-bit system, hard disk space should be greater than 80G. If you do multiple builds, you will need more hard drive space. | Ubuntu 22.04          |

### 4.2 Installing Libraries and Toolkits

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

| PC OS | Network | Permission |
|-------|---------|------------|
|-------|---------|------------|

Ubuntu 22.04

online

root

To install the required tools, execute the following commands:

```
$ sudo apt-get install git ssh make gcc libssl-dev liblz4-tool libmpc-dev
$ sudo apt-get install expect g++ patchelf chrpath gawk texinfo chrpath diffstat
$ sudo apt-get install binfmt-support live-build bison flex fakeroot libgmp-dev
$ sudo apt-get install cmake gcc-multilib g++-multilib unzip device-tree-compiler
$ sudo apt-get install ncurses-dev libgucharmap-2-90-dev bzip2 expat gpgv2
$ sudo apt-get install cpp-aarch64-linux-gnu g++-aarch64-linux-gnu
$ sudo apt install python2 python-is-python3
```

## 5. Compile Source

**Note:** The Debian system and Buildroot system use the same SDK source package. The difference lies in the [rootfs.img](#) used, meaning the steps for building the filesystem are different, while the other steps are the same.

### Step 1: Unzip the Source

To extract the source files, execute the following commands:

```
$ tar xvf sbc3568_linux6.1-rkr5_20250429.tar.bz2
$ cd sbc3568_linux6.1-rkr5_20250429/
```

### Step 2: Configure the Compiled Board

To configure the board, execute:

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

After running `./build.sh lunch`, the system will list available defconfig files. Select the 2th option:

**2. boardcon\_sbc3568\_v3\_linux\_defconfig**, this ensures compatibility with the SBC3568 development board. Using other options may cause kernel mismatches and prevent proper booting.

```
xuejunchao@boardcon:~/3568/sbc3568_linux6.1-rkr5_20250429$ ./build.sh lunch
##### Rockchip Linux SDK #####
Manifest: rk3566_rk3568_linux6.1_release_v1.1.0_20241220.xml
Log colors: message notice warning error fatal
Log saved at /home/xuejunchao/3568/sbc3568_linux6.1-rkr5_20250429/output/sessions/2025-04-29_17-37-57
Pick a defconfig:
1. rockchip_defconfig
2. boardcon_sbc3568_v3_linux_defconfig
3. rockchip_rk3566_evb2_lp4x_v10_32bit_defconfig
4. rockchip_rk3566_evb2_lp4x_v10_defconfig
5. rockchip_rk3568_evb1_ddr4_v10_32bit_defconfig
6. rockchip_rk3568_evb1_ddr4_v10_defconfig
7. rockchip_rk3568_evb8_lp4_v10_32bit_defconfig
8. rockchip_rk3568_evb8_lp4_v10_defconfig
9. rockchip_rk3568_pcie_ep_lp4x_v10_defconfig
Which would you like? [1]: 2
Switching to defconfig: /home/xuejunchao/3568/sbc3568_linux6.1-
rkr5_20250429/device/rockchip/.chip/boardcon_sbc3568_v3_linux_defconfig
#configuration written to /home/xuejunchao/3568/sbc3568_linux6.1-rkr5_20250429/output/.config
#Using last kernel version(6.1)
```

### Step 3: Compile U-Boot

To compile uboot, execute the following command:

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

### Step 4: Compile the Kernel

To compile the kernel, execute the following command:

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

### Step 5: Compile Recovery

To compile recovery, execute the following command:

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

### Step 6: Compile rootfs

#### (1) Compile Debian12 (Permission: root)

To compile debian12, execute the following command:

```
$ sudo ./build.sh debian
```

After compilation, a **linaro-rootfs.img** is generated in the debian directory.

**Note:** Related dependencies must be installed beforehand.

```
$ cd debian
$ sudo apt-get install binfmt-support qemu-user-static live-build
$ sudo dpkg -i ubuntu-build-service/packages/*
$ sudo apt-get install -f
```

## (2) Compile Buildroot

To compile buildroot, execute the following command:

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

## Step 7: Generate and Check Firmwares

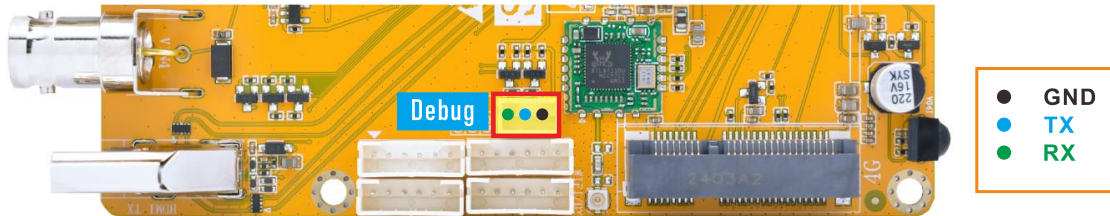
To generate firmware, execute the following command:

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

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

# 6. Debian12 Test

## 6.1 Serial Terminal



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

```

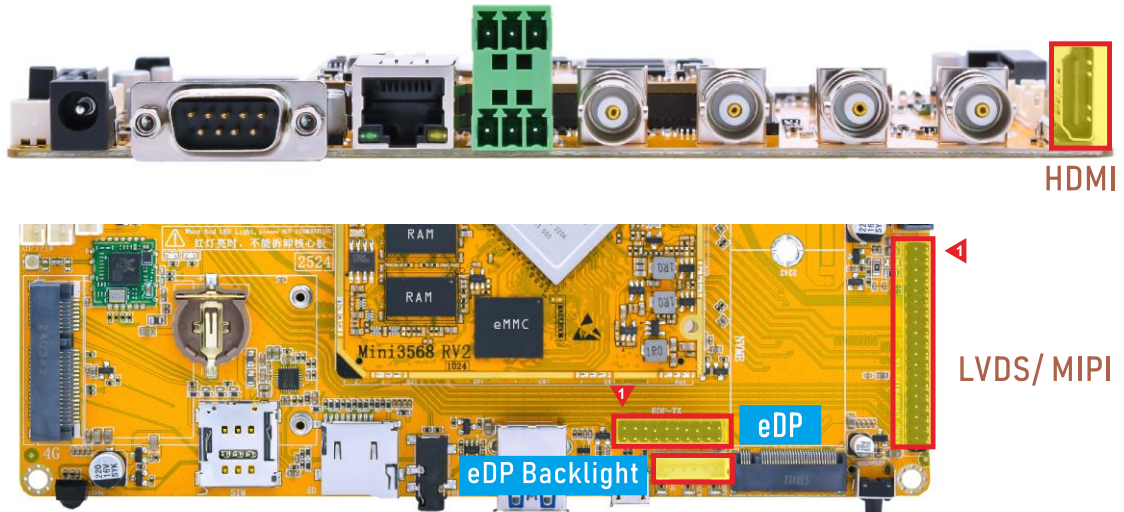
serial-com5 - SecureCRT
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
Session Manager
serial-com5
bf9653e864b745dc8dad78d411029b3/user-1000.journal corrupted or uncleanly shut d
own, renaming and replacing.
[ 15.552287] Freeing drm_logo memory: 1384K
[ 16.078036] dwhdmi-rockchip fe0a0000.hdmi: Rate 0 missing; compute N dynamica
tty
[ 16.078890] dwhdmi-rockchip fe0a0000.hdmi: Rate 0 missing; compute N dynamica
tty
[ 16.081370] dwhdmi-rockchip fe0a0000.hdmi: Rate 0 missing; compute N dynamica
tty
[ 16.082135] dwhdmi-rockchip fe0a0000.hdmi: Rate 0 missing; compute N dynamica
tty
[ 20.549361] platform mtd_vendor_storage: deferred probe pending

root@linaro-alip:/#
root@linaro-alip:/#
root@linaro-alip:/#
root@linaro-alip:/#
root@linaro-alip:/# ls
bin      home      mnt        root      sha256sum.txt  udisk
boot    info      oem        run       srv            userdata
data    lib       opt        sbin     sys           usr
dev     lost+found  proc      sdcards  system        var
etc     media    rockchip-test  sha256sum.README  tmp          vendor
root@linaro-alip:/#
Ready          Serial: COM5, 1500000  24, 21  24 Rows, 80 Cols  Xterm  CAP NUM

```

## 6.2 Display

The SBC3568 Debian12 system supports dual displays with independent output interfaces, including LVDS and HDMI.

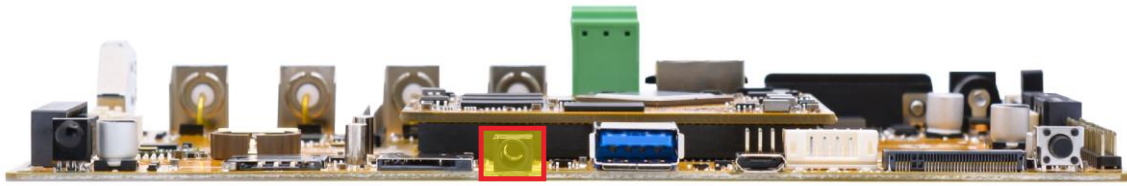


The display effect diagram is as follows:



## 6.3 Headset and Speaker

**Step 1:** Plug the headset into the headset jack.

**Headset****Step 2: View sound card.**

```
# cat /proc/asound/cards
```

```
root@linaro-alip:/# cat /proc/asound/cards
0 [rockchip-es8388 ]: rockchip-es8388 - rockchip-es8388
  rockchip-es8388
1 [rockchiphdmi  ]: rockchip-hdmi - rockchip-hdmi
  rockchip-hdmi
```

**Step 3: Headset recording.**

```
# arecord -Dhw:0,0 -f cd record.wav
```

```
root@linaro-alip:/# arecord -Dhw:0,0 -f cd record.wav
Recording WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

**Step 4: Headset/speaker play audio.**

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

```
root@linaro-alip:/# aplay -Dhw:0,0 record.wav
Playing WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

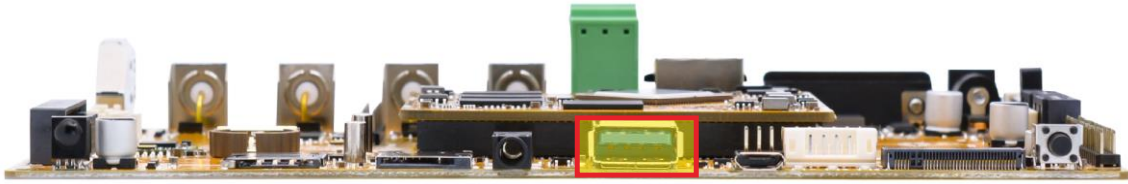
**Note:**

- When the headset is connected, audio is output through the headset.
- Supplementary instructions on audio output:

```
# aplay -Dhw:0,0 record.wav // Headset/Speaker audio output
# aplay -Dhw:1,0 record.wav // HDMI TX audio output
```

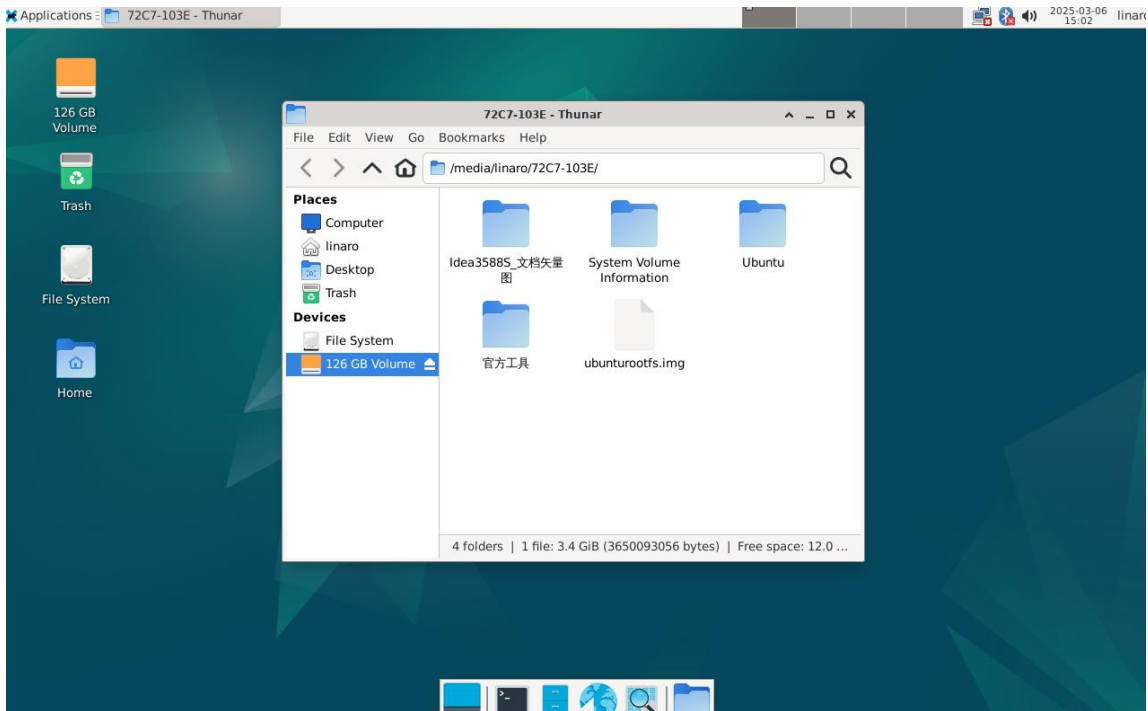
## 6.4 USB3.0 Host

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



**USB3.0**

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



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

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

```

root@linaro-alip:/# [ 100.401796] usb 5-1.1: new high-speed USB device number 5 using ehci-platform
[ 100.540580] usb 5-1.1: New USB device found, idVendor=0dd8, idProduct=3b00, bcdDevice= 0.02
[ 100.540631] usb 5-1.1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[ 100.540654] usb 5-1.1: Product: OnlyDisk
[ 100.540674] usb 5-1.1: Manufacturer: Netac
[ 100.540715] usb 5-1.1: SerialNumber: 0A6544CD10427AB2
[ 100.542566] usb-storage 5-1.1:1.0: USB Mass Storage device detected
[ 100.543718] scsi host1: usb-storage 5-1.1:1.0
[ 101.684785] scsi 1:0:0:0: Direct-Access Netac OnlyDisk 8.01 PQ: 0 ANSI: 6
[ 101.690705] sd 1:0:0:0: [sdb] 121610240 512-byte logical blocks: (62.3 GB/58.0 GiB)
[ 101.691923] sd 1:0:0:0: [sdb] Write Protect is off
[ 101.692854] sd 1:0:0:0: [sdb] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
[ 101.701334] sdb: sdb1
[ 101.701915] sd 1:0:0:0: [sdb] Attached SCSI removable disk
    
```

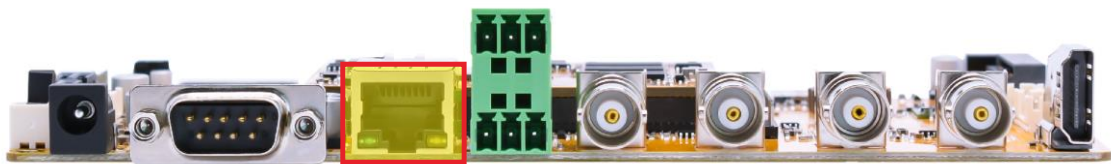
- USB3.0 print information in **SuperSpeed** mode.

```

root@linaro-alip:~# [ 667.590292] usb 2-1: new SuperSpeed USB device number 2 using xhci-hcd
[ 667.621251] usb 2-1: New USB device found, idVendor=0ddd, idProduct=3b00, bcdDevice= 0.02
[ 667.621301] usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[ 667.621324] usb 2-1: Product: OnlyDisk
[ 667.621343] usb 2-1: Manufacturer: Netac
[ 667.621363] usb 2-1: SerialNumber: 0A6544CD10427AB2
[ 667.623814] usb-storage 2-1:1.0: USB Mass Storage device detected
[ 667.625045] scsi host1: usb-storage 2-1:1.0
[ 668.863371] scsi 1:0:0:0: Direct-Access Netac OnlyDisk 8.01 PQ: 0 ANSI: 6
[ 668.867339] sd 1:0:0:0: [sdb] 121610240 512-byte logical blocks: (62.3 GB/58.0 GiB)
[ 668.868328] sd 1:0:0:0: [sdb] Write Protect is off
[ 668.869049] sd 1:0:0:0: [sdb] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
[ 668.874950] sdb: sdb1
[ 668.875290] sd 1:0:0:0: [sdb] Attached SCSI removable disk
  
```

## 6.5 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@linaro-alip:~# [ 537.145698] rk_gmac-dwmac fe2a0000.ethernet end0: Link is Up - 1Gbps/Full - flow control rx/tx
[ 537.145781] IPv6: ADDRCONF(NETDEV_CHANGE): end0: link becomes ready
  
```

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

```
# ifconfig end0
```

```

root@linaro-alip:~# ifconfig end0
end0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.83 netmask 255.255.255.0 broadcast 192.168.0.255
    inet6 fe80::d009:326d:23e2:73ad prefixlen 64 scopeid 0x20<link>
    ether 7e:c2:07:db:60:ce txqueuelen 1000 (Ethernet)
    RX packets 211 bytes 20596 (20.1 KiB)
    RX errors 0 dropped 23 overruns 0 frame 0
    TX packets 103 bytes 9320 (9.1 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 58
  
```

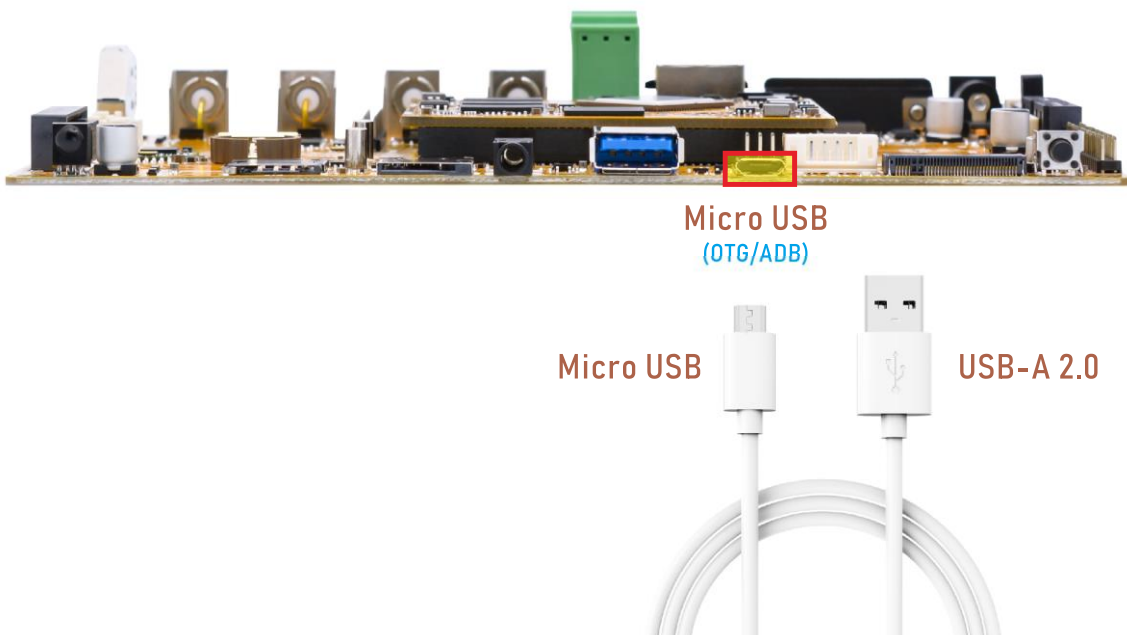
**Step 3:** Network connection test.

```
# ping -I end0 www.armdesigner.com
```

```
root@linaro-alip:~# ping -I end0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.83 end0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=172 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=172 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=172 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=172 ms
^C
--- www.armdesigner.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5005ms
rtt min/avg/max/mdev = 171.409/171.674/171.880/0.188 ms
```

## 6.6 ADB

**Step 1:** Connect the board and PC host with Micro usb cable.



**Step 2:** Install ADB driver on Windows system.

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

**Step 4:** Execute the following commands to view and connect adb device.

```
# adb devices
```

```
# adb -s <device number> shell
```

```

C:\Windows\system32\cmd.e. x + v
Microsoft Windows [Version 10.0.22631.5189]
(c) Microsoft Corporation. 保留所有权利。

C:\Users\28675>adb devices
List of devices attached
0960252da9d89752    device

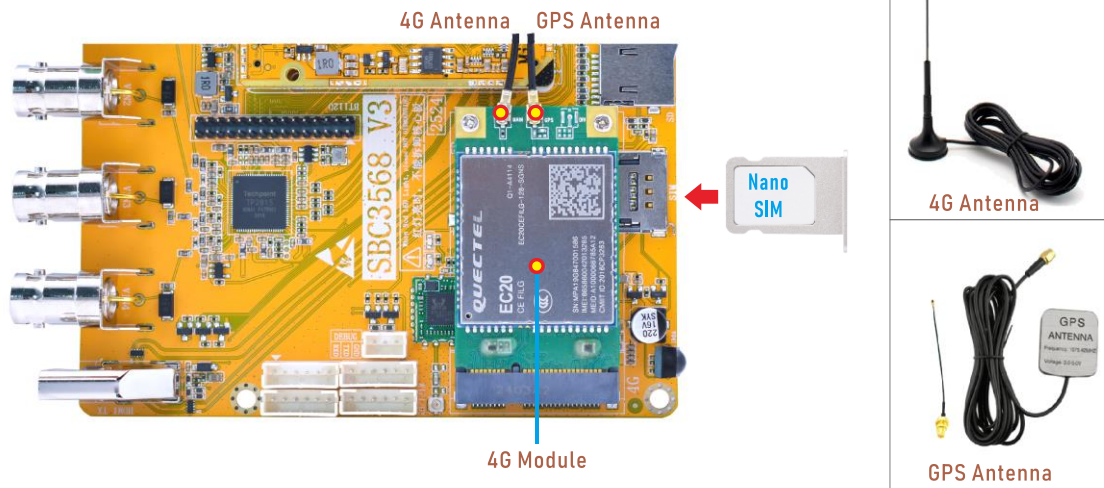
C:\Users\28675>adb -s 0960252da9d89752 shell
root@linaro-alip:/# |
  
```

## 6.7 4G & GPS

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

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

**Step 3:** Power on.



### 6.7.1 4G Test

**Step 1:** Initiate the PPP connection.



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



```
root@linaro-alip:/# pppd call quectel-ppp &
[1] 2554
root@linaro-alip:/# 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 3gppp # (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)
noctrlcts # (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)
lcp-accept-local # (from /etc/ppp/peers/quectel-ppp)
lcp-accept-remote # (from /etc/ppp/peers/quectel-ppp)
ipparam 3gppp # (from /etc/ppp/peers/quectel-ppp)
noipdefault # (from /etc/ppp/peers/quectel-ppp)
lcp-max-failure 30 # (from /etc/ppp/peers/quectel-ppp)
defaulttroute # (from /etc/ppp/peers/quectel-ppp)
usepeerdns # (from /etc/ppp/peers/quectel-ppp)
noccp # (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
ATE0^M^M
OK
-- got it

send (ATI;+CSUB;+CSQ;+CPIN?;+COPS?;+CGREG?;&D2^M)
expect (OK)
^M
^M
Quectel^M
EC25^M
Revision: EC25EUXGAR08A17M1G^M
^M
SubEdition: V01^M
^M
+CSQ: 31,99^M
^M
+CPIN: READY^M
^M
+COPS: 0,0,"CHINA MOBILE",7^M
^M
+CGREG: 0,1^M
^M
OK
-- got it
send (AT+CGDCONT=1,"IP","3gnet",,0,0^M)
expect (OK)
^M
^M
OK
-- got it

send (ATD*99#^M)
expect (CONNECT)
^M
^M
CONNECT
-- got it

Script chat -s -v -f /etc/ppp/peers/quectel-chat-connect finished (pid 2555), status = 0x0
Serial connection established.
using channel 1
Using interface ppp0
Connect: ppp0 <--> /dev/ttyUSB3
sent [LCP ConfReq id=0x1 <asynctest 0x0> <magic 0x6ff22c2e> <pcmp> <accomp>]
rcvd [LCP ConfReq id=0x0 <asynctest 0x0> <auth chap MD5> <magic 0x3b1465ce> <pcmp> <accomp>]
sent [LCP ConfAck id=0x0 <asynctest 0x0> <auth chap MD5> <magic 0x3b1465ce> <pcmp> <accomp>]
```

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

```
# ifconfig ppp0
```

```
root@linaro-alip:/# ifconfig ppp0
ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST> mtu 1500
    inet 10.3.92.218 netmask 255.255.255.255 destination 10.64.64.64
    ppp txqueuelen 3 (Point-to-Point Protocol)
    RX packets 47 bytes 3882 (3.7 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 57 bytes 3624 (3.5 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

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

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

```
root@linaro-alip:/# ping -I ppp0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 10.3.92.218 ppp0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=49 time=318 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=49 time=276 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=49 time=557 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=49 time=517 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=49 time=477 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=49 time=445 ms
^C
--- www.armdesigner.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5000ms
rtt min/avg/max/mdev = 276.468/431.782/557.435/101.977 ms
```

## 6.7.2 GPS Test

**Step 1:** Verify whether /dev/ttyUSB3 is currently in use. If it is, please kill the associated process.

```
# lsof /dev/ttyUSB3
# kill -9 <PID>
```

```
root@linaro-alip:/# lsof /dev/ttyUSB3
COMMAND PID USER  FD  TYPE DEVICE SIZE/OFF NODE NAME
pppd    2324 root   10u  CHR 188,3      0t0  584 /dev/ttyUSB3
root@linaro-alip:/# kill -9 2324
root@linaro-alip:/#
[1]+  Killed                  pppd call quectel-ppp
```

**Step 1:** Enable GPS functionality.

```
# echo -e "AT+QGPS=1\r\n" > /dev/ttyUSB2
```

**Step 2:** Read GPS data.

```
# cat /dev/ttyUSB1
```

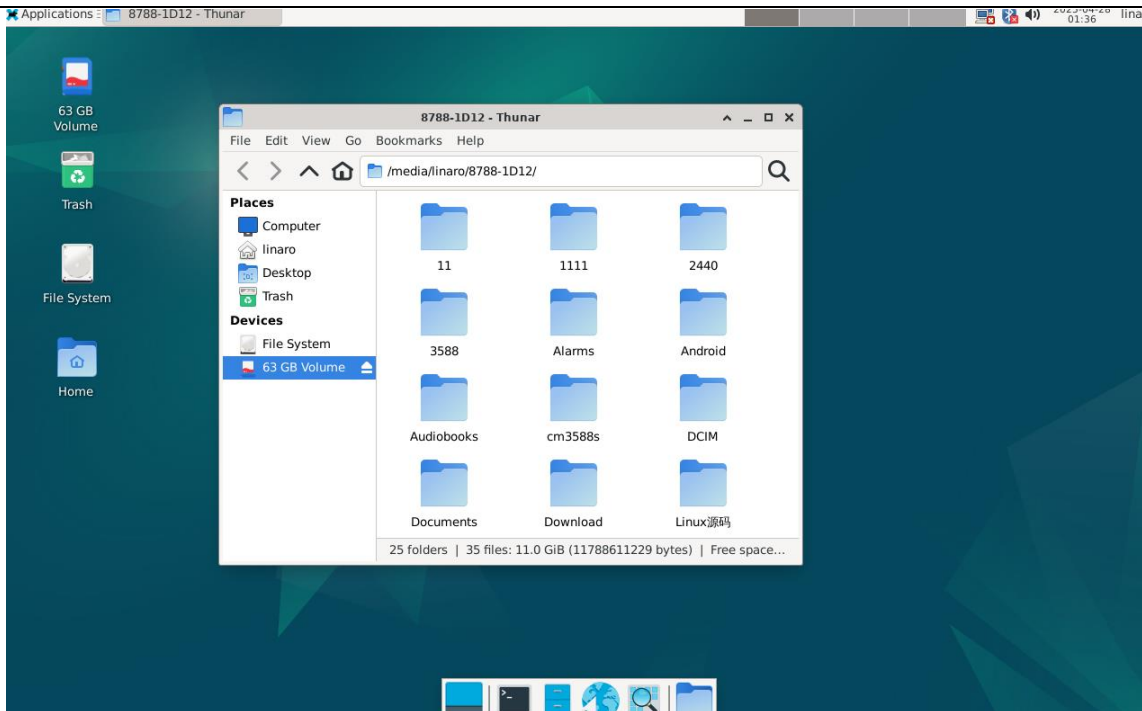
```
root@linaro-alip:/# echo -e "AT+QGPS=1\r\n" > /dev/ttyUSB2
root@linaro-alip:/# cat /dev/ttyUSB1
$GPVTG,,T,,M,,N,,K,N*2C
$GPGSA,A,1,,,,,,,,,,,,,*32
$GPGGA,,,,,0,,,,,,*66
$GPRMC,,V,,,,,,,,,N,V*29
$GPVTG,,T,,M,,N,,K,N*2C
$GPGSA,A,1,,,,,,,,,,,,,*32
$GPGGA,,,,,0,,,,,,*66
$GPRMC,,V,,,,,,,,,N,V*29
$GPVTG,,T,,M,,N,,K,N*2C
$GPGSA,A,1,,,,,,,,,,,,,*32
$GPGGA,,,,,0,,,,,,*66
$GPRMC,,V,,,,,,,,,N,V*29
$GPVTG,,T,,M,,N,,K,N*2C
$GPGSA,A,1,,,,,,,,,,,,,*32
$GPGGA,,,,,0,,,,,,*66
$GPRMC,,V,,,,,,,,,N,V*29
$GPVTG,,T,,M,,N,,K,N*2C
$GPGSA,A,1,,,,,,,,,,,,,*32
$GPGGA,,,,,0,,,,,,*66
$GPRMC,,V,,,,,,,,,N,V*29
$GPVTG,,T,,M,,N,,K,N*2C
$GPGSA,A,1,,,,,,,,,,,,,*32
$GPGGA,,,,,0,,,,,,*66
$GPRMC,,V,,,,,,,,,N,V*29
$GPVTG,,T,,M,,N,,K,N*2C
```

## 6.8 SD Card

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



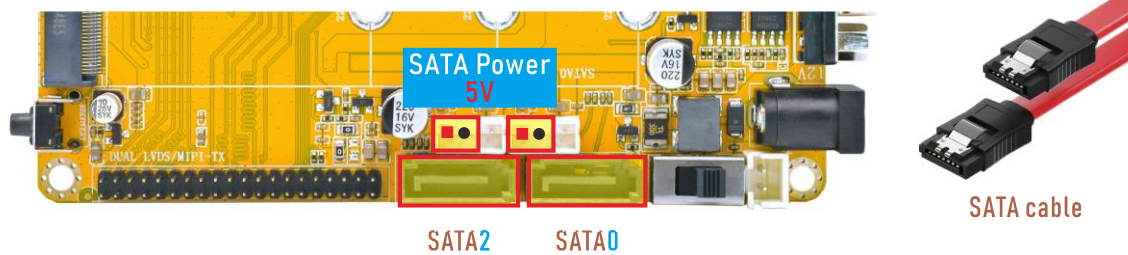
**Step 2:** After inserting the SD card, if it is recognized successfully, an icon will appear on the desktop. Users need to click the icon in order to access the SD card.



## 6.9 SATA

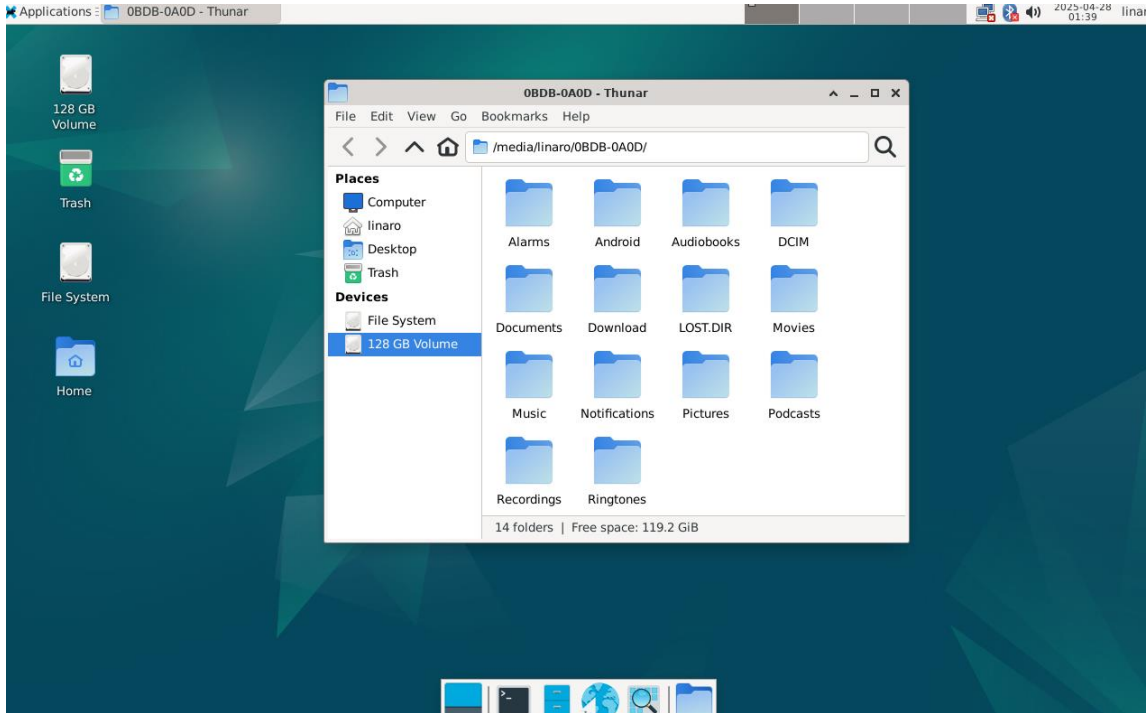
The SATA on Debian 12 only supports the ext4 format.

**Step 1:** Connect the sata and sata power, then power on.



**Step 2:** If the SATA device is successfully recognized, an icon will appear on the desktop.

Users can click the icon to access the SATA device.

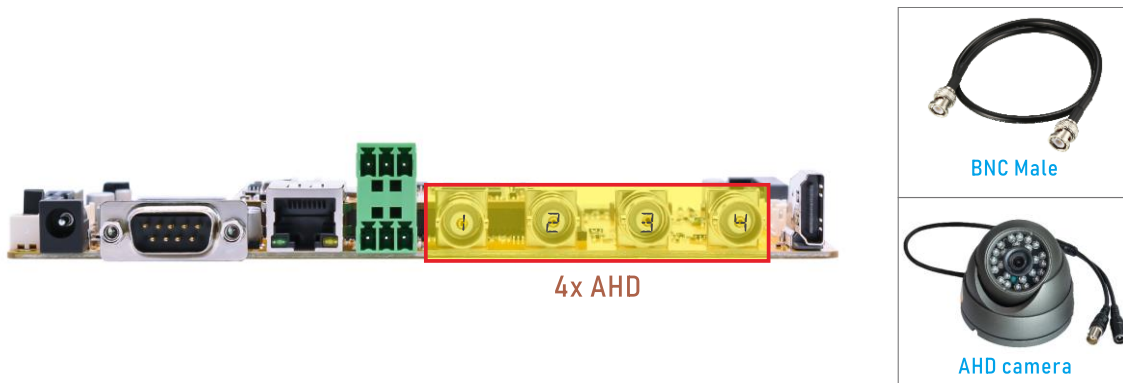


Note: If devices that are not in ext4 format, the user can choose to format them on the board. After formatting, **the files on the device will be permanently lost**, so please proceed with caution.

```
# mke2fs -t ext4 /dev/sda1
```

## 6.10 Camera

The SBC3568 Debian12 system supports simultaneous preview of up to 4xAHD-1080P cameras. Connect the camera to the development board using a signal cable and input a 12v power supply to the camera.

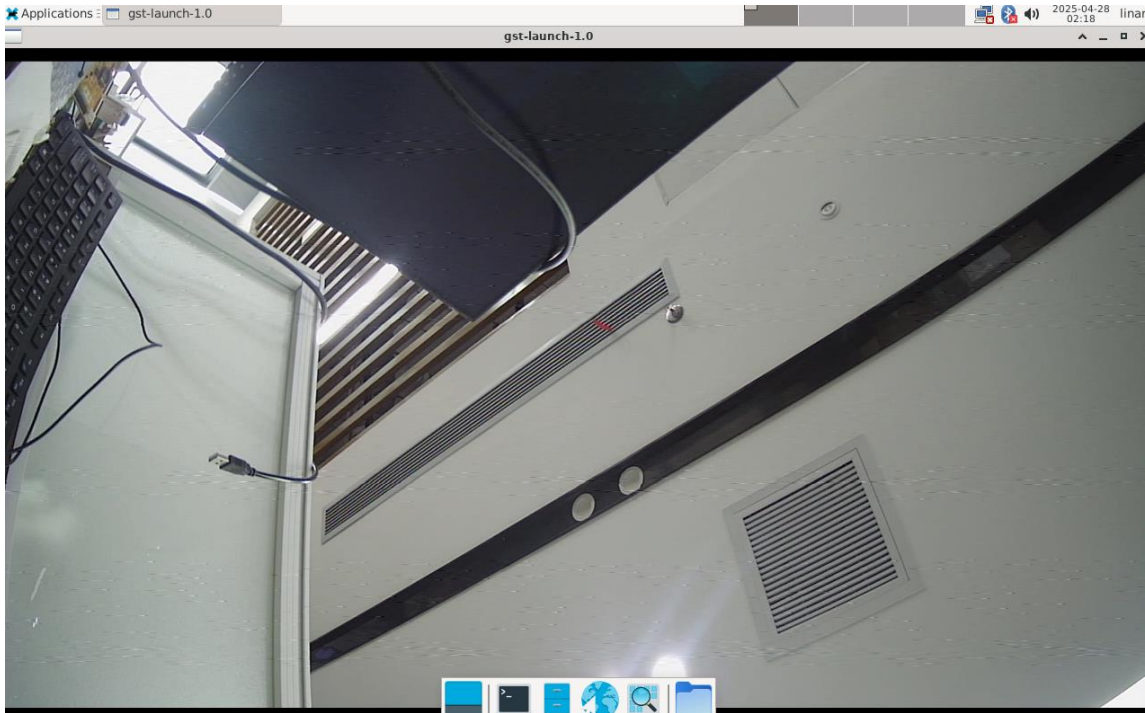


## Step 1: Preview separately.

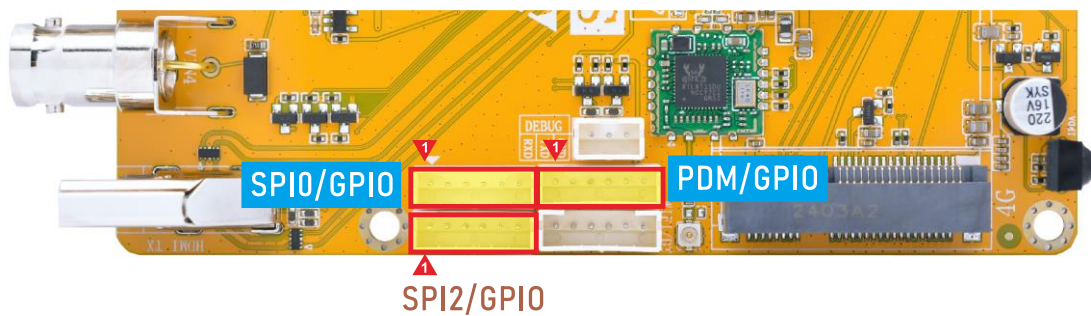
```
# gst-launch-1.0 v4l2src device=/dev/video3 ! video/x-  
raw,format=NV16,width=1920,height=1080, framerate=25/1 ! xvimagesink //VIN4  
# gst-launch-1.0 v4l2src device=/dev/video2 ! video/x-  
raw,format=NV16,width=1920,height=1080, framerate=25/1 ! xvimagesink //VIN3  
# gst-launch-1.0 v4l2src device=/dev/video1 ! video/x-  
raw,format=NV16,width=1920,height=1080, framerate=25/1 ! xvimagesink //VIN2  
# gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-  
raw,format=NV16,width=1920,height=1080, framerate=25/1 ! xvimagesink //VIN1
```

```
root@linaro-alip:/# gst-launch-1.0 v4l2src device=/dev/video3 ! video/x-  
raw,format=NV16,width=1920,height=1080, framerate=25/1 ! xvimagesink  
Setting pipeline to PAUSED ...  
Using mplane plugin for capture  
Pipeline is live and does not need PREROLL ...  
Pipeline is PREROLLED ...  
Setting pipeline to PLAYING ...  
New clock: GstSystemClock  
[ 1050.630433] [drm] only support 1 gamma  
[ 1050.715834] rkCIF_mipi_lvds: stream[3] start streaming  
[ 1050.719255] rkCIF_mipi_lvds: Allocate dummy buffer, size: 0x003f5000  
[ 1050.719415] rockchip-mipi-csi2 mipi-csi2: stream on, src_sd: 0000000069cf5970, sd_name:rockchip-csi2-  
dphy0  
[ 1050.719444] rockchip-mipi-csi2 mipi-csi2: stream ON  
[ 1050.719550] rockchip-csi2-dphy0: dphy0, data_rate_mbps 594  
[ 1050.719626] rockchip-csi2-dphy csi2-dphy0: csi2_dphy_s_stream stream on:1, dphy0, ret 0  
[ 1050.720863] techpoint 2-0047: detect channel 0 is not supported, default 1080P_25  
[ 1050.721631] techpoint 2-0047: set channel 0 1080P_25  
[ 1050.761534] techpoint 2-0047: detect channel 1 is not supported, default 1080P_25  
[ 1050.762786] techpoint 2-0047: set channel 1 1080P_25  
[ 1050.801340] techpoint 2-0047: detect channel 2 is not supported, default 1080P_25  
[ 1050.802375] techpoint 2-0047: set channel 2 1080P_25  
[ 1050.841413] techpoint 2-0047: detect channel 3 1080P_25  
[ 1050.842314] techpoint 2-0047: set channel 3 1080P_25  
[ 1050.891815] (0xfdfb0000)MIPI_CSI2 ERR1:0xd00 (f_seq,vc: 0 2 3)  
[ 1050.891883] (0xfdfb0000)MIPI_CSI2 ERR1:0x200 (f_seq,vc: 1)  
[ 1050.894514] (0xfdfb0000)MIPI_CSI2 ERR1:0x400ccc (fs/fe mis,vc: 2 3) (f_seq,vc: 2 3) (crc,vc: 2)  
[ 1050.894612] (0xfdfb0000)MIPI_CSI2 ERR1:0x110 (fs/fe mis,vc: 0) (f_seq,vc: 0)  
[ 1050.895894] (0xfdfb0000)MIPI_CSI2 ERR1:0x200 (f_seq,vc: 1)  
Redistribute latency...  
0:00:14.4 / 99:99:99.
```

Preview the effect drawing separately:



## 7.11 SPI+GPIO



| Connector | Pin Order | Pin Name                   | Pin Number |
|-----------|-----------|----------------------------|------------|
| SPI0/GPIO | 1         | SPI0_MISO_M1/GPIO2_D0_d    | 88         |
| SPI0/GPIO | 2         | SPI0_MOSI_M1/GPIO2_D1_d    | 89         |
| SPI2/GPIO | 2         | SPI2_MOSI_M1/GPIO2_D6_d    | 94         |
| SPI2/GPIO | 3         | SPI2_MISO_M1/GPIO2_D7_d    | 95         |
| PDM/GPIO  | 1         | PDM_CLK0_M0/GPIO1_A6_d     | 38         |
| PDM/GPIO  | 2         | PDM_SDI1_M0_ADC/GPIO1_B2_d | 42         |
| PDM/GPIO  | 3         | PDM_SDI2_M0_ADC/GPIO1_B1_d | 41         |
| PDM/GPIO  | 4         | PDM_SDI3_M0_ADC/GPIO1_B0_d | 40         |

## 7.11.1 SPI Test

**Step 1:** short circuit MISO\_M1 and MOSI\_M1 pins of SPI.

**Step 2:** Execute the test script: `spidev0.0_test` or `spidev2.0_test`.

- `spidev0.0_test` corresponds to the SPI0 device.
- `spidev2.0_test` corresponds to the SPI2 device.
- The following test uses SPI0 as an example.

```
# spidev0.0_test
```

```
root@linaro-alip:/# spidev0.0_test
spi mode: 0x0
bits per word: 8
max speed: 500000 Hz (500 kHz)
TX | FF FF FF FF FF FF 40 00 00 00 00 95 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF F0 0D
|.....@.....|
RX | FF FF FF FF FF FF 40 00 00 00 00 95 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF F0 0D
|.....@.....|
```

- The following test uses SPI2 as an example.

```
# spidev2.0_test
```

```
root@linaro-alip:/# spidev2.0_test
spi mode: 0x0
bits per word: 8
max speed: 500000 Hz (500 kHz)
TX | FF FF FF FF FF FF 40 00 00 00 00 95 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF F0 0D
|.....@.....|
RX | FF FF FF FF FF FF 40 00 00 00 00 95 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF F0 0D
|.....@.....|
```

## 7.11.2 GPIO Test

The PDM/GPIO connector can only be used as a regular GPIO.

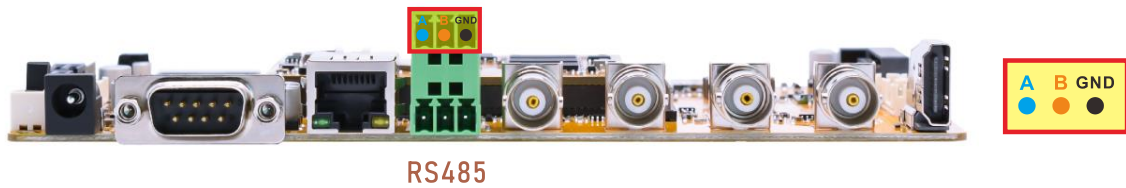
Execute the following commands to control GPIO1\_A6.

```
# echo 38 > /sys/class/gpio/export           // Create a GPIO node
# echo out > /sys/class/gpio/gpio38/direction // Set GPIO direction to output
# echo 0 > /sys/class/gpio/gpio38/value      // Assignment 0
# cat /sys/class/gpio/gpio38/value          // Gets the current value
# echo 1 > /sys/class/gpio/gpio38/value      // Assignment 1
# cat /sys/class/gpio/gpio38/value          // Gets the current value
# echo 38 > /sys/class/gpio/unexport        // Destory a GPIO node
```

```
root@linaro-alip:/# echo 38 > /sys/class/gpio/export
root@linaro-alip:/# echo out > /sys/class/gpio/gpio38/direction
root@linaro-alip:/# echo 0 > /sys/class/gpio/gpio38/value
root@linaro-alip:/# cat /sys/class/gpio/gpio38/value
0
root@linaro-alip:/# echo 1 > /sys/class/gpio/gpio38/value
root@linaro-alip:/# cat /sys/class/gpio/gpio38/value
1
root@linaro-alip:/# echo 38 > /sys/class/gpio/unexport
```

Other GPIO pins can be controlled using the same command, just by changing the number of the GPIO.

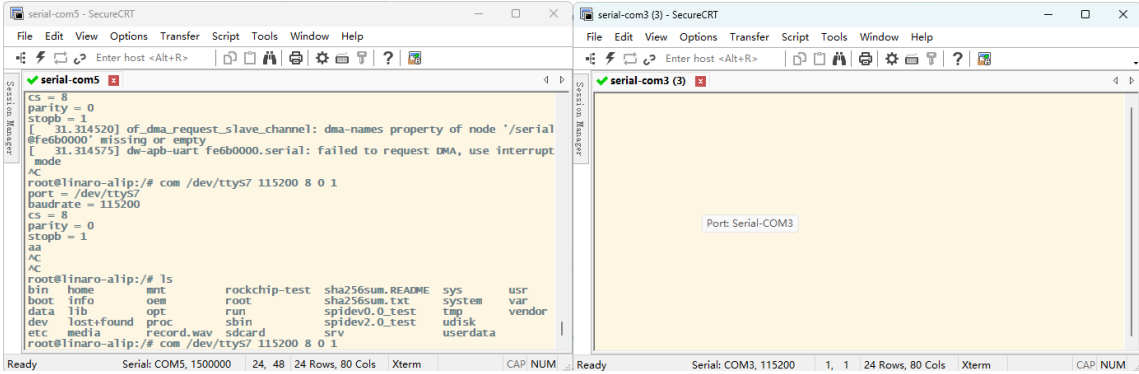
## 6.12 RS485



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

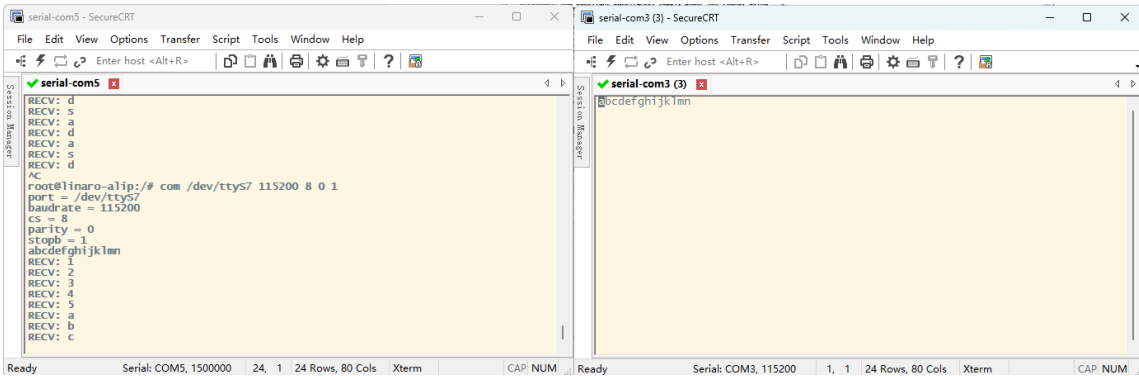


**Step 2:** Open the corresponding serial terminal, set the baud rate of the board to 1500000, and set the baud rate of the RS485 test tool to 115200.

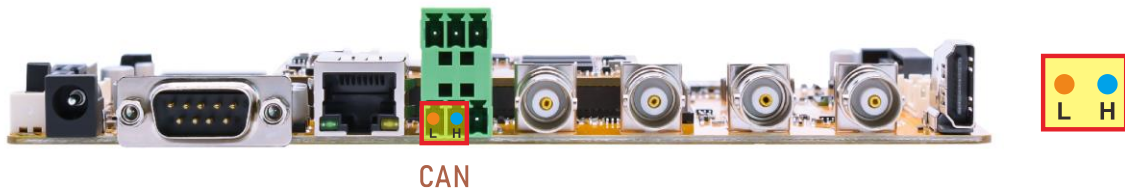


**Step 3:** Execute the following command on the board to test the RS485 transmission and reception functionality.

```
# com /dev/ttyS7 115200 8 0 1
```



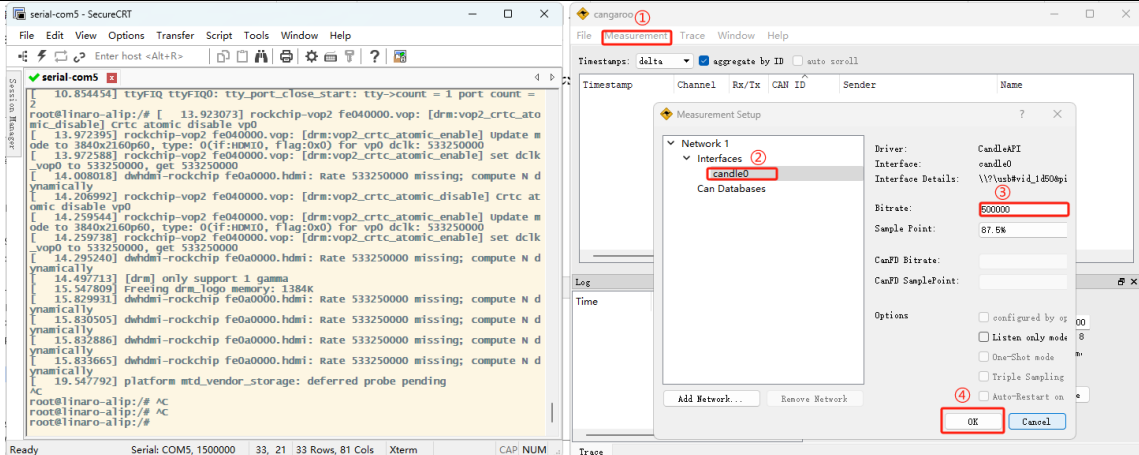
## 6.13 CAN



**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 500000.

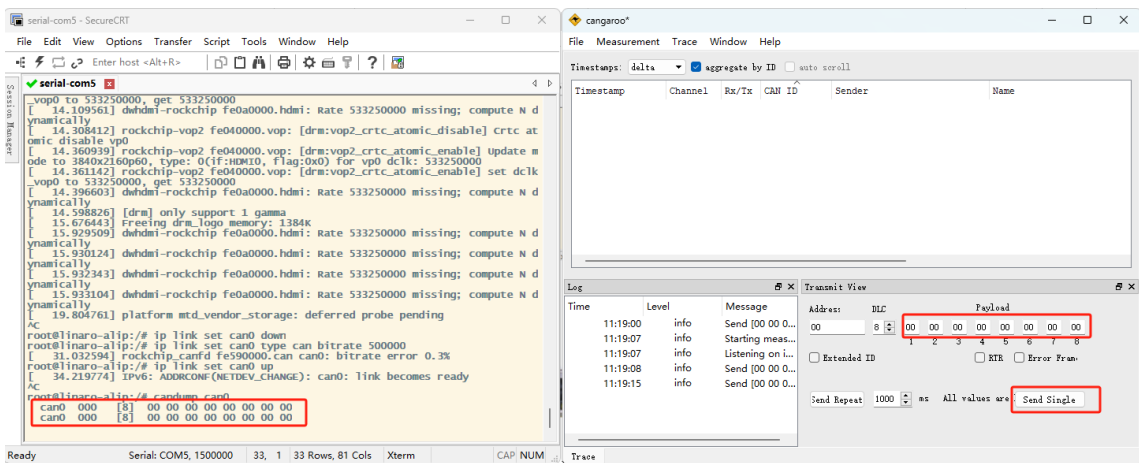


**Step 3:** Configure and activate the CAN network, setting the bitrate to 500000.

```
# ip link set can0 down
# ip link set can0 type can bitrate 500000
# ip link set can0 up
```

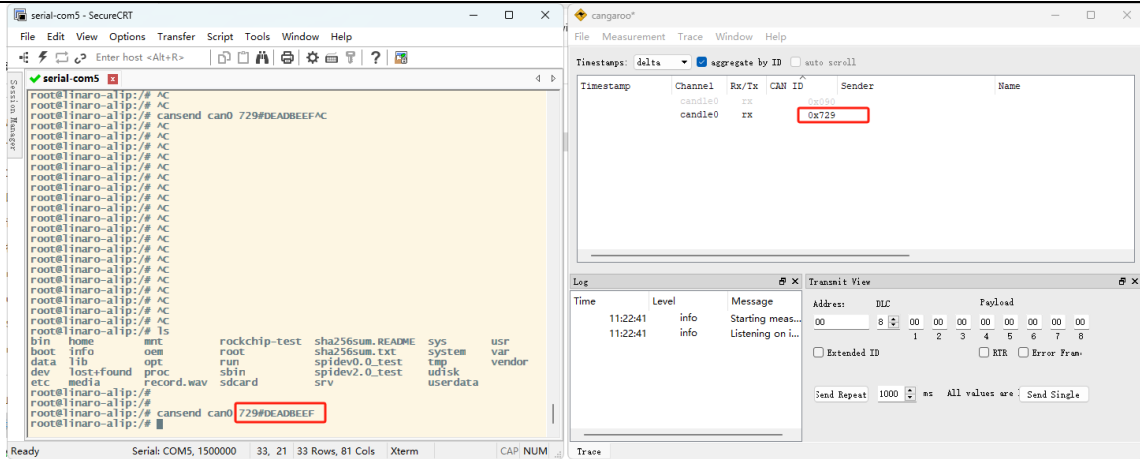
**Step 4:** Configure CAN as the receiver.

```
# candump can0
```



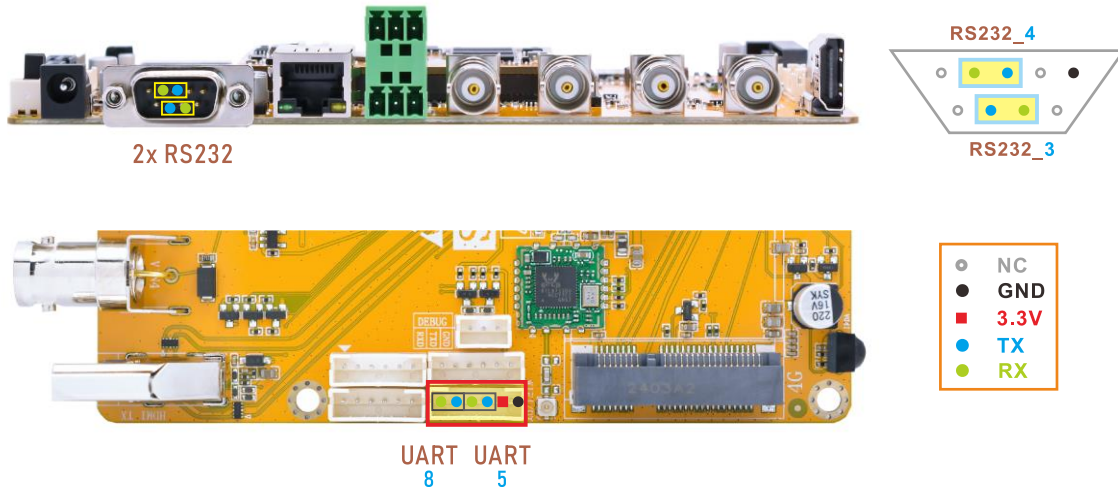
**Step 5:** Configure CAN as the sender.

```
# cansend can0 729#DEADBEEF
```



## 6.14 UART

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



**Step 2:** RS232\_4 test.

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

```
root@linaro-alip:~# com /dev/ttyS4 115200 8 0 1
port = /dev/ttyS4
baudrate = 115200
cs = 8
parity = 0
stopb = 1
ab
RECV: ab
cdefg
RECV: cdefg
123456
RECV: 123456
```

**Step 3:** RS232\_3 test.

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

```
root@linaro-alip:/# com /dev/ttyS3 115200 8 0 1
port = /dev/ttyS3
baudrate = 115200
cs = 8
parity = 0
stopb = asdsad
RECV: asdsad
hhhhh
RECV: hhhhhh
123456
RECV: 123456
```

#### Step 4: UART5 test.

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

```
root@linaro-alip:/# com /dev/ttyS5 115200 8 0 1
port = /dev/ttyS5
baudrate = 115200
cs = 8
parity = 0
stopb = 1
abcdefg
RECV: abcdefg
1234567890
RECV: 1234567890
```

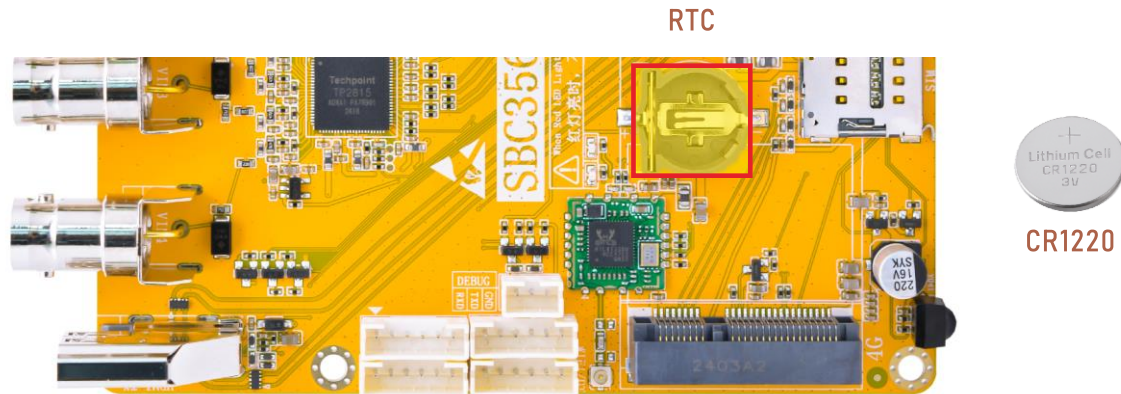
#### Step 4: UART8 test.

```
# com /dev/ttyS8 115200 8 0 1
```

```
root@linaro-alip:/# com /dev/ttyS8 115200 8 0 1
port = /dev/ttyS8
baudrate = 115200
cs = 8
parity = 0
stopb = 1
qwerty
RECV: qwerty
asdfgh
RECV: asdfgh
0987654321
RECV: 0987654321
```

## 6.15 RTC

### Step 1: Install the coin cell battery.



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

```
# date -s "2025-04-28 14:45:30"
```

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

```
# hwclock -w
```

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

```
# hwclock
```

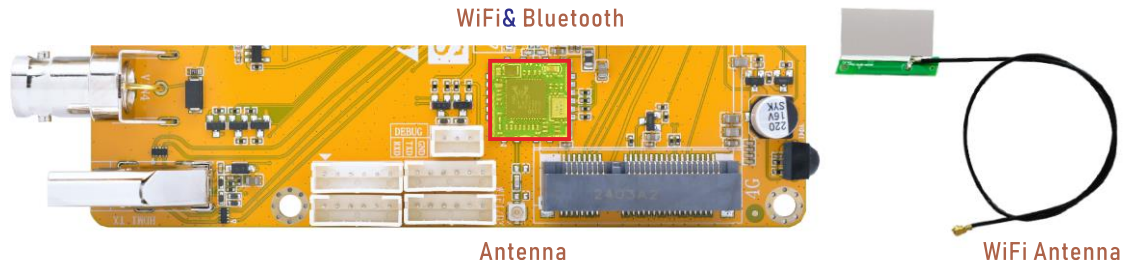
```
root@linaro-alip:/# date -s "2025-04-28 14:45:30"
Mon Apr 28 14:45:30 UTC 2025
root@linaro-alip:/# hwclock -w
root@linaro-alip:/# hwclock
2025-04-28 14:45:37.403754+00:00
root@linaro-alip:/# hwclock
2025-04-28 14:45:44.180372+00:00
root@linaro-alip:/# hwclock
2025-04-28 14:45:55.290597+00:00
```

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

```
root@linaro-alip:/# hwclock
2025-04-28 14:46:50.297448+00:00
root@linaro-alip:/# hwclock
2025-04-28 14:46:56.148048+00:00
root@linaro-alip:/# hwclock
2025-04-28 14:47:01.630869+00:00
```

## 6.16 WiFi & Bluetooth

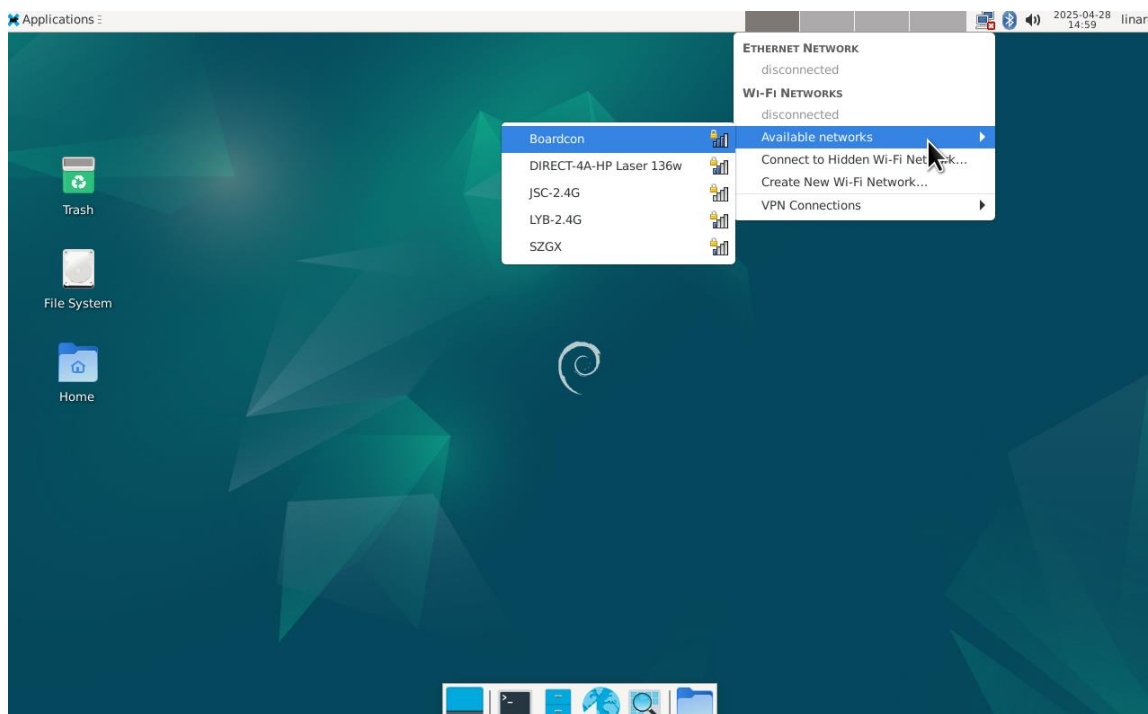
To use Wi-Fi and Bluetooth functions properly, the antenna needs to be connected.



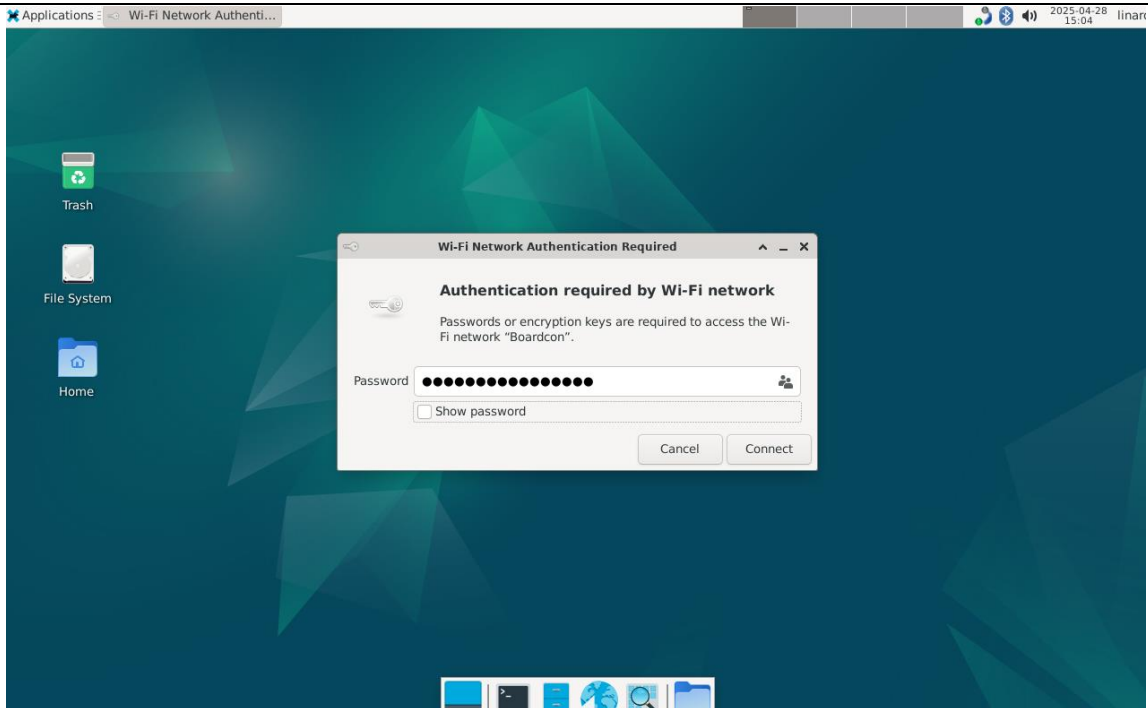
Due to hardware limitations, WiFi&BT cannot be used simultaneously with USB-OTG. Therefore, during the process of loading the WiFi&BT driver at system startup, the connection of USB-OTG is disconnected. And when the system is using WiFi&BT, USB-OTG cannot be connected either.

### 6.16.1 WiFi

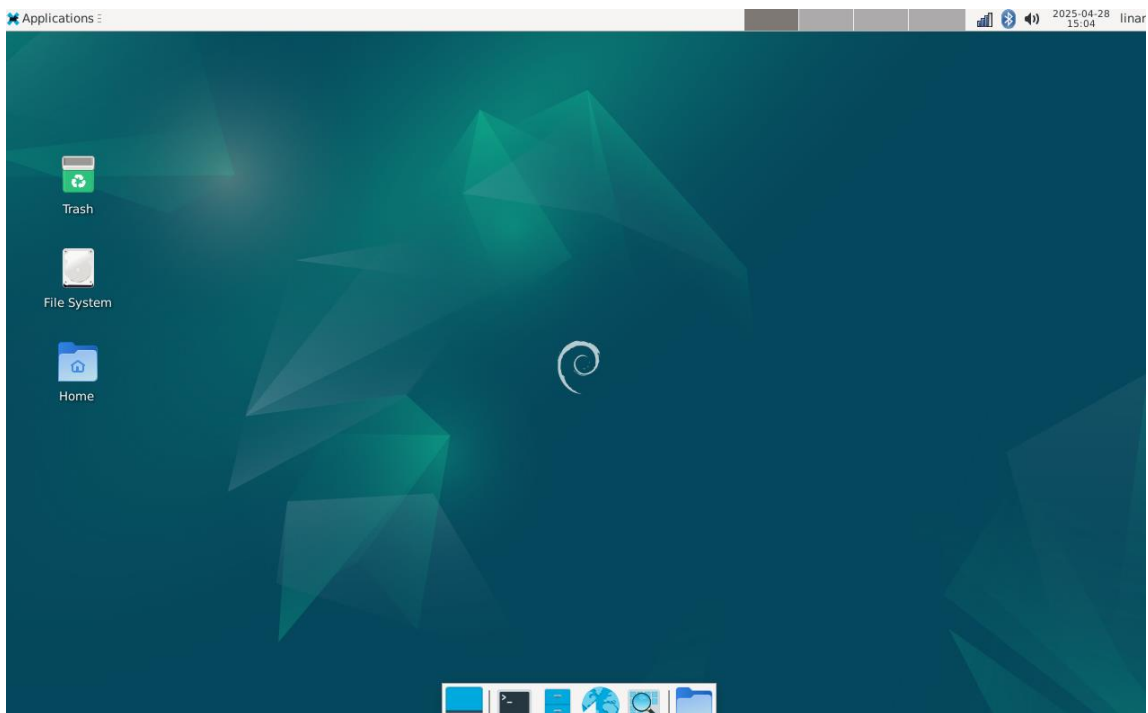
**Step 1:** Click the network icon in the top right corner of the interface, then select the "Available Networks" option to view the list of available hotspots.



**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:** Users can test network connectivity using the desktop's built-in browser or verify it through the following command method.

(1) View network interface information.

```
# ifconfig
```

```
wlxc8fe0f022f36: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 192.168.0.51 netmask 255.255.255.0 broadcast 192.168.0.255
inet6 fe80::c7dd:2f1c:27a6:456f prefixlen 64 scopeid 0x20<link>
ether c8:fe:0f:02:2f:36 txqueuelen 1000 (Ethernet)
RX packets 444 bytes 55695 (54.3 KiB)
RX errors 0 dropped 42 overruns 0 frame 0
TX packets 121 bytes 14240 (13.9 KiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

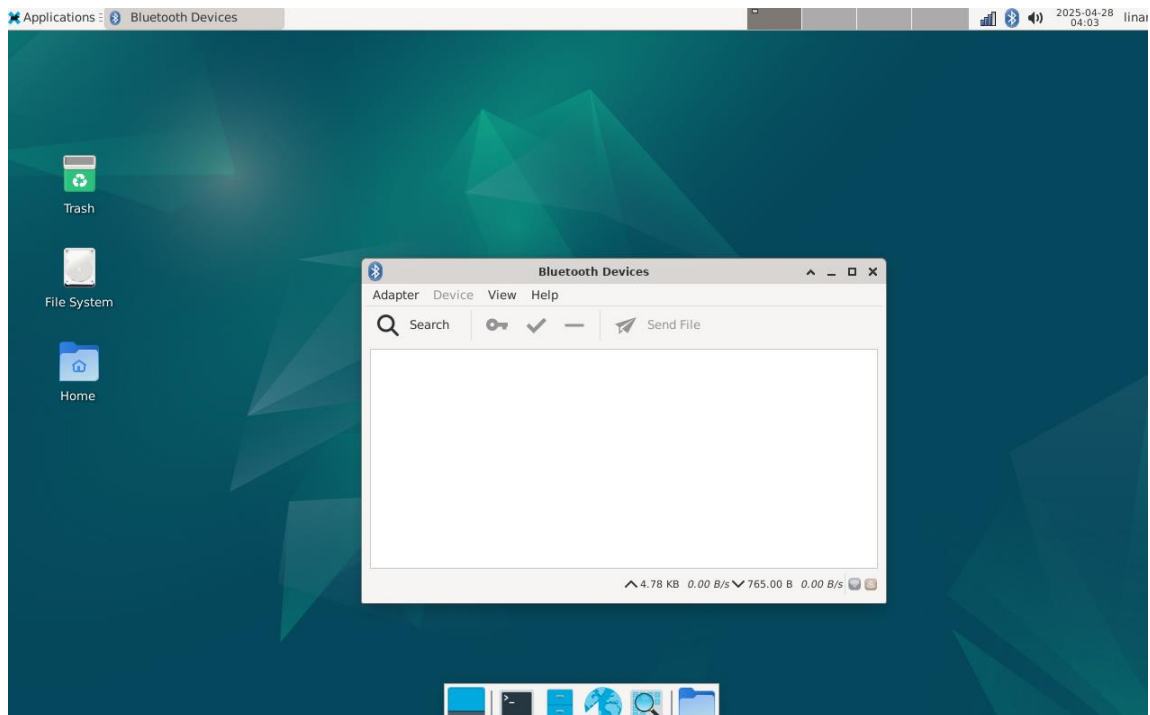
(2) Network connection test.

```
# ping -I wlxc8fe0f022f36 www.armdesigner.com
```

```
root@linaro-alip:/# ping -I wlxc8fe0f022f36 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.51 wlxc8fe0f022f36: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=177 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=177 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=175 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=187 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=182 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=175 ms
^C
--- www.armdesigner.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5005ms
rtt min/avg/max/mdev = 174.596/178.936/187.147/4.446 ms
```

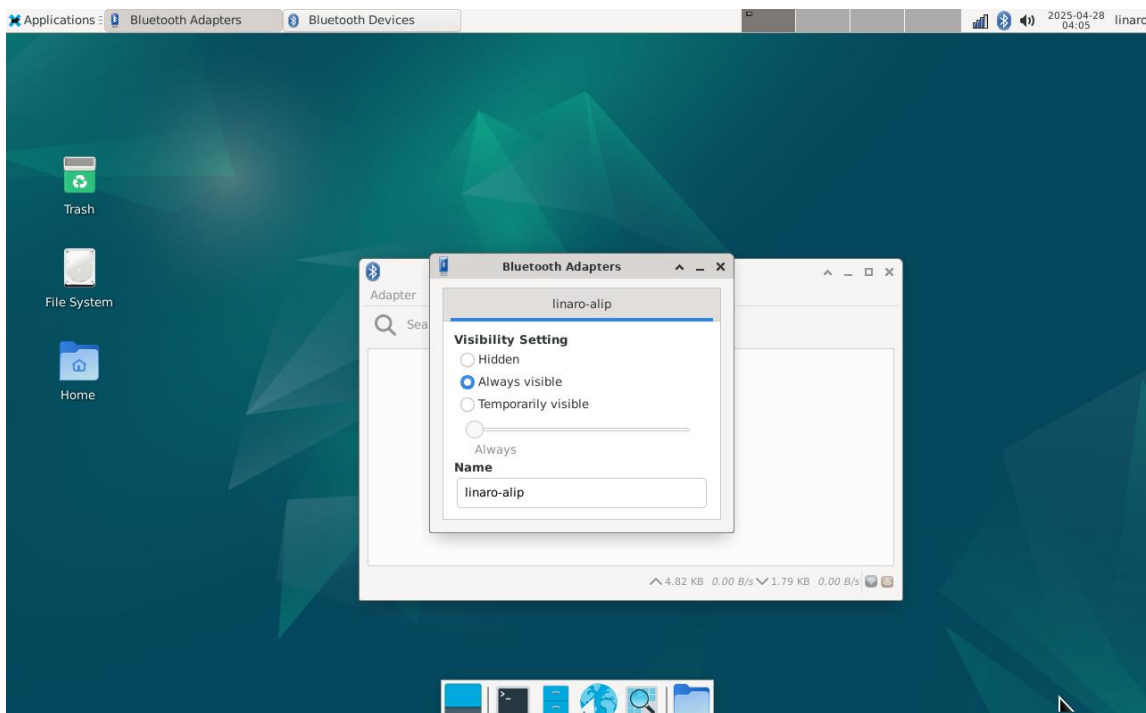
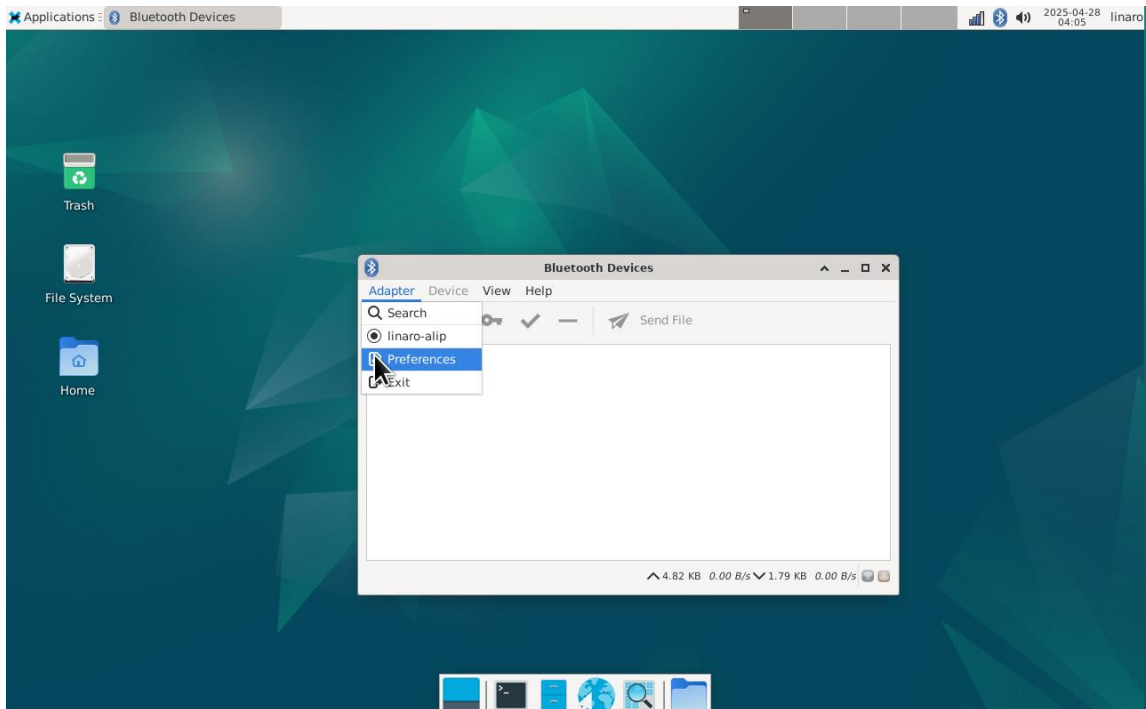
## 6.16.2 Bluetooth

**Step 1:** Click the Bluetooth icon in the top right corner of the desktop.

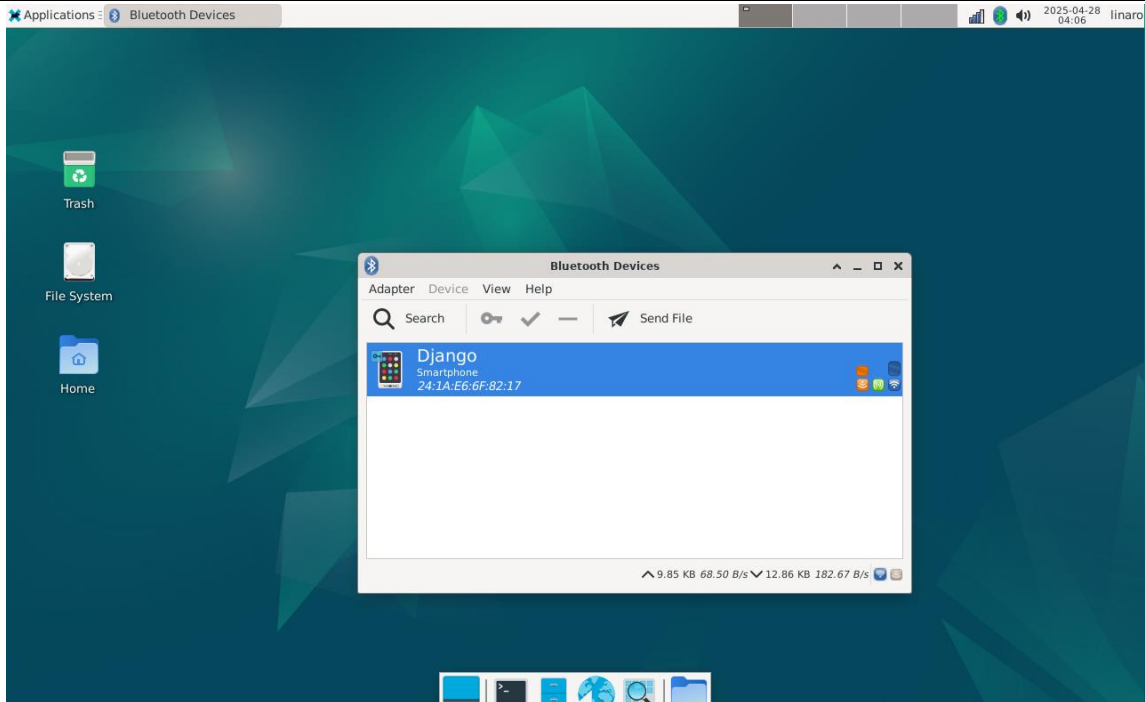


**Step 2:** The Bluetooth device name is hidden by default. Set it to be visible by clicking

**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.

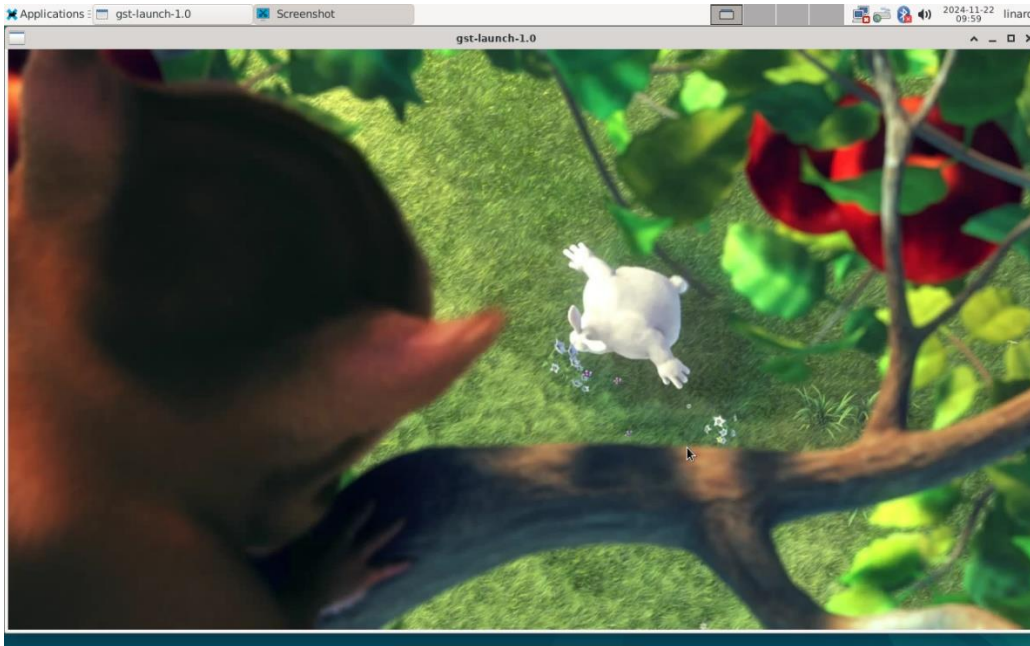
## 6.17 Video Playback

(1) The directory for the built-in video testing scripts in the system: */rockchip-test/video*

```
root@linaro-alip:/# ls /rockchip-test/video/
test_dec-gst.sh      test_enc-gst.sh      test_gst_video_maxfps.sh
test_dec-mpv.sh     test_gst_multivideo.sh video_stresstest.sh
test_dec-parole.sh  test_gst_video.sh    video_test.sh
test_dec-qt.sh      test_gst_video_fps.sh
```

Simply execute the script.

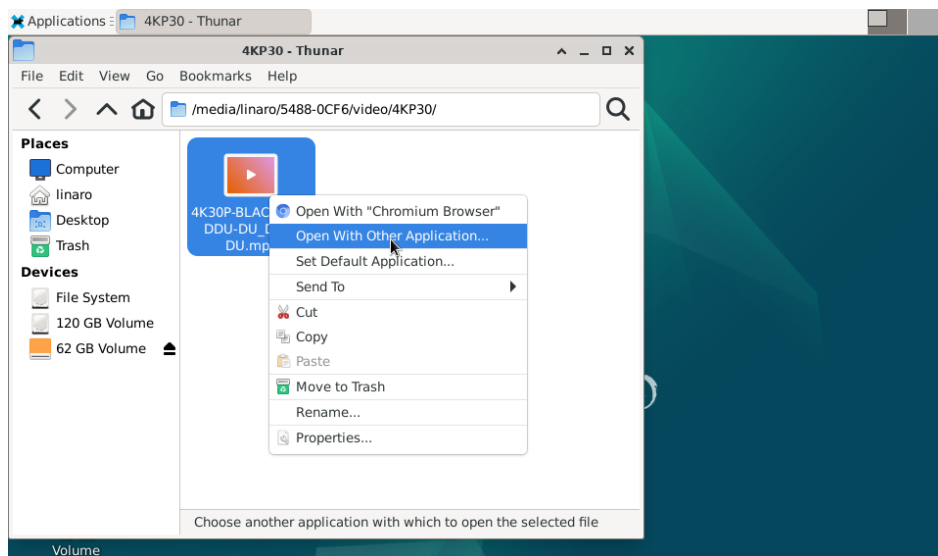
```
root@linaro-alip:/rockchip-test/video# ./test_gst_video.sh
Setting pipeline to PAUSED ...
Pipeline is PREROLLING ...
Redistribute latency...
mpp[2852]: mpp_info: mpp version: 48962a10 author: Hongjin Li    2024-09-19 fix[avsd]: Fix attach dev error issue
mpp[2852]: mpp_info: mpp version: 48962a10 author: Hongjin Li    2024-09-19 fix[avsd]: Fix attach dev error issue
mpp[2852]: mpp_info: mpp version: 48962a10 author: Hongjin Li    2024-09-19 fix[avsd]: Fix attach dev error issue
mpp[2852]: mpp: unable to create enc vp8 for soc rk3568 unsupported
mpp[2852]: mpp_info: mpp version: 48962a10 author: Hongjin Li    2024-09-19 fix[avsd]: Fix attach dev error issue
mpp[2852]: mpp_info: mpp version: 48962a10 author: Hongjin Li    2024-09-19 fix[avsd]: Fix attach dev error issue
Redistribute latency...
mpp[2852]: h264d_api: is_avcC=1
Pipeline is PREROLLED ...0 %
Prerolled, waiting for async message to finish...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
Redistribute latency...
0:00:02.3 / 0:00:29.5 (7.9 %)
```



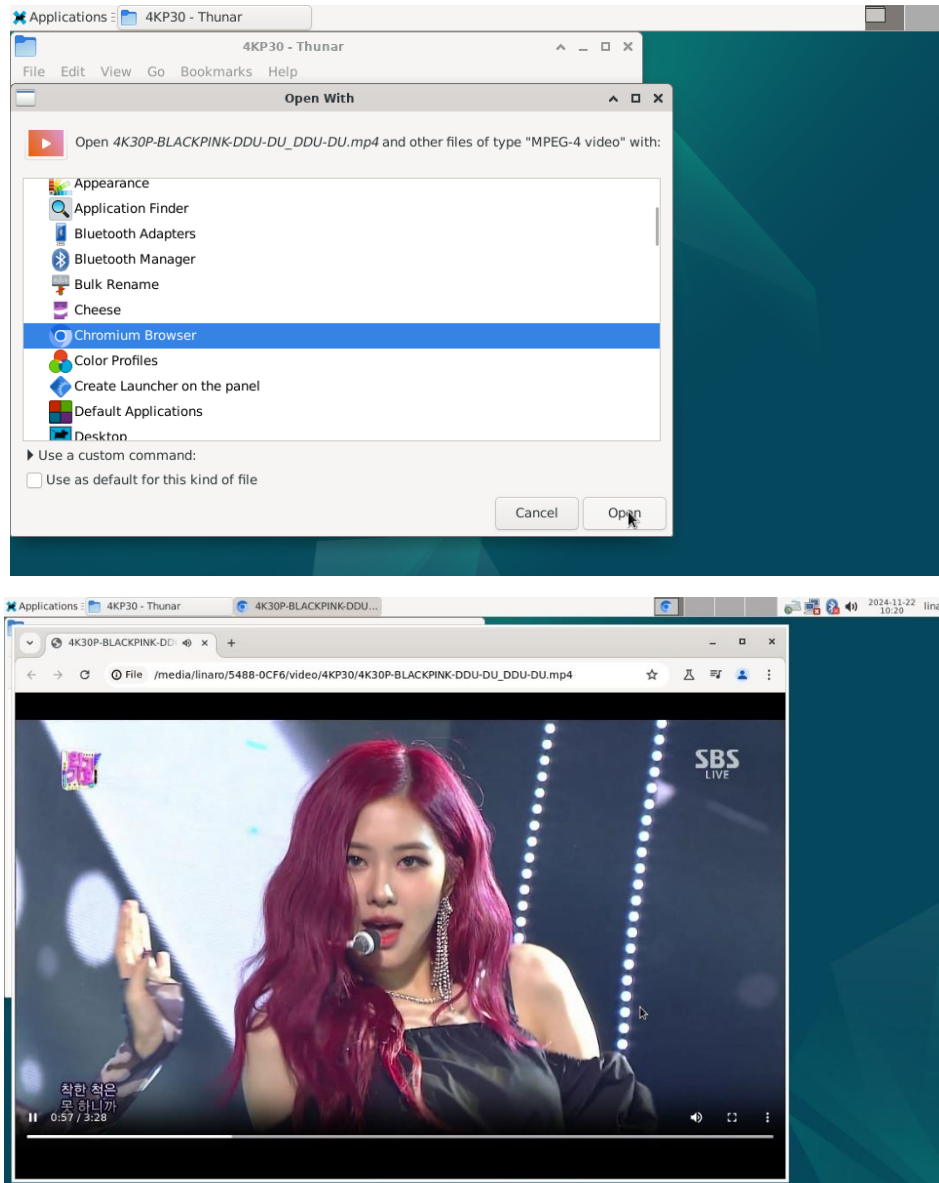
(2) Play the video using Google Chrome.

- Google Chrome supports video playback up to 4K at 60Hz, with support for the following decoding formats: VP8, H.264, H.265, VP9, and AV1.
- However, it is only compatible with certain H.265 video files.

**Step 1:** Select the video file, right-click, and choose “**Open With Other Application...**”.



**Step 2:** Find **Chromium Browser** in the list, select it, and click “**Open**” to play the video file.



(3) Use the `gst-play-1.0` command to play the video.

Execute the following command to view the information related to the display plane.

According to the plane number, you can specify on which monitor the video is played.

```
# cat /sys/kernel/debug/dri/0/state | grep "plane\[
```

```
root@linaro-alip:/# cat /sys/kernel/debug/dri/0/state | grep "plane\[
plane[56]: Smart1-win0
plane[72]: Cluster1-win0
plane[96]: Smart0-win0
plane[112]: Cluster0-win0
plane[136]: Esmart1-win0
plane[152]: Esmart0-win0
```

The Cluster0-win0 plane is configured to be associated with the LVDS display. The plane number of the Cluster0-win0 plane is 112.

Execute the following command to play a 4KP60 MP4 file on the LVDS display

```
# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
# gst-play-1.0 --flags=3 --videosink="kmssink plane-id=112" /4KP60-exist.mp4 --
audiosink="alsasink device=hw:0,0"
```

**Command explanation:**

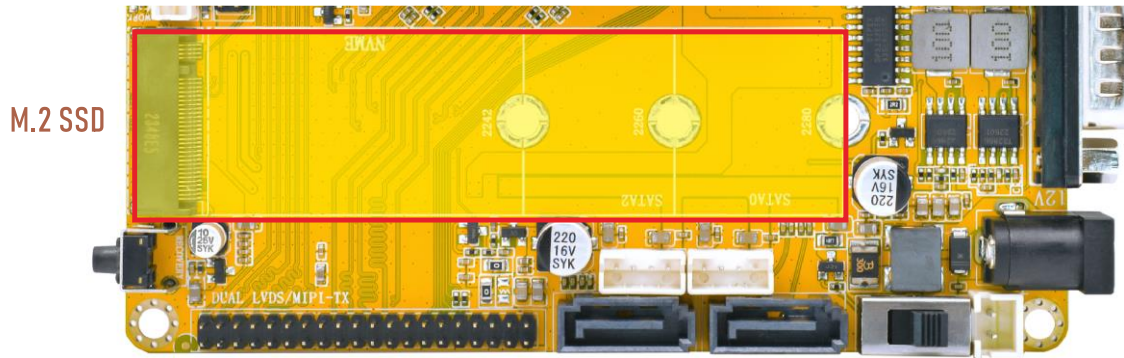
- `export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1`: Open AFBC.
- `--videosink="kmssink plane-id=112"`: Specifies the plane. Which can be viewed using the command: `cat /sys/kernel/debug/dri/0/state | grep "plane\[\"`.
- `/4KP60-exist.mp4`: The media file path to be played.
- `--audiosink="alsasink device=hw:0,0"`: Specifies the audio output device as `hw:0,0`.

```
root@linaro-alip:/# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
root@linaro-alip:/# gst-play-1.0 --flags=3 --videosink="kmssink plane-id=112" /userdata/4KP60-exist.mp4 -
-audiosink="alsasink device=hw:0,0"
Press 'k' to see a list of keyboard shortcuts.
Now playing /userdata/4KP60-exist.mp4
Redistribute latency...
Redistribute latency...
WARNING No volume control found
WARNING debug information: ../gst/playback/gstplaysink.c(2908): gen_audio_chain ():
/GstPlayBin:playbin/GstPlaySink:playsink:
Volume/mute is not available
Redistribute latency...
Redistribute latency...
Redistribute latency...
0:00:06.3 / 0:04:01.9
```

**Note:** Users can run the following command to switch video playback from the LVDS screen to the HDMI screen: `echo off > /sys/class/drm/card0-LVDS-1/status`. After executing this command, the LVDS screen will be turned off. Execute the following commands and the video will be displayed on the HDMI screen.

```
# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
# gst-play-1.0 --flags=3 --videosink="kmssink plane-id=152" /4KP60-exist.mp4 --
audiosink="alsasink device=hw:0,0"
```

## 6.18 SSD

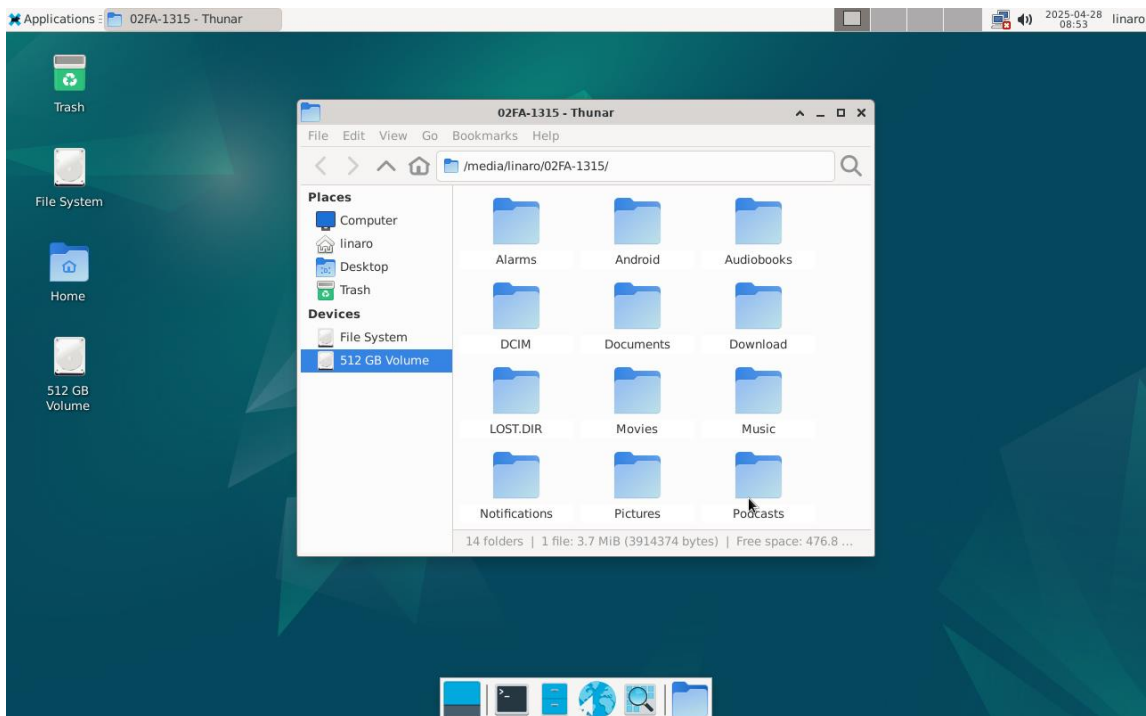


**Step 1:** Power off.

**Step 2:** Connect M.2 SSD device.

**Step 3:** Power on.

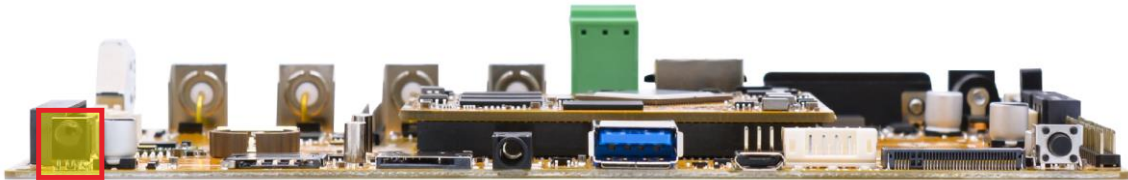
**Step 4:** Click the icon to access the M.2 SSD device, and the M.2 SSD device will be automatically mounted.



Note: The SBC3568 Debian12 system supports only the M.2 SSD device in etx4 format. If the M.2 SSD device in use is etx4, do not execute this command. Otherwise, execute the following command to format the M.2 SSD device, **the files on the M.2 SSD device will be permanently lost.**

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

## 6.19 IR



IR

**Step 1:** Enable IR debugging print.

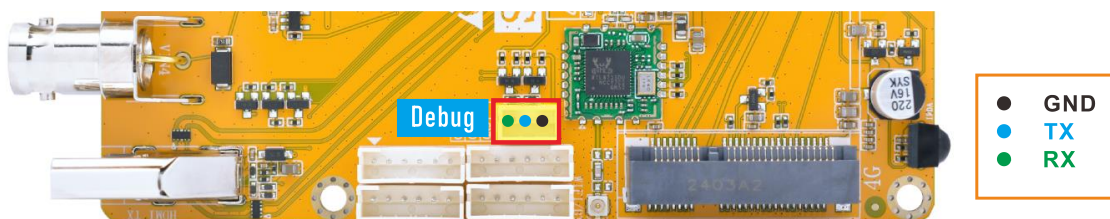
```
# echo 1 > /sys/module/rockchip_pwm_remotectl/parameters/code_print
```

**Step 2:** Using the infrared remote control to press a button and the IR receiver will print the key code in the log.

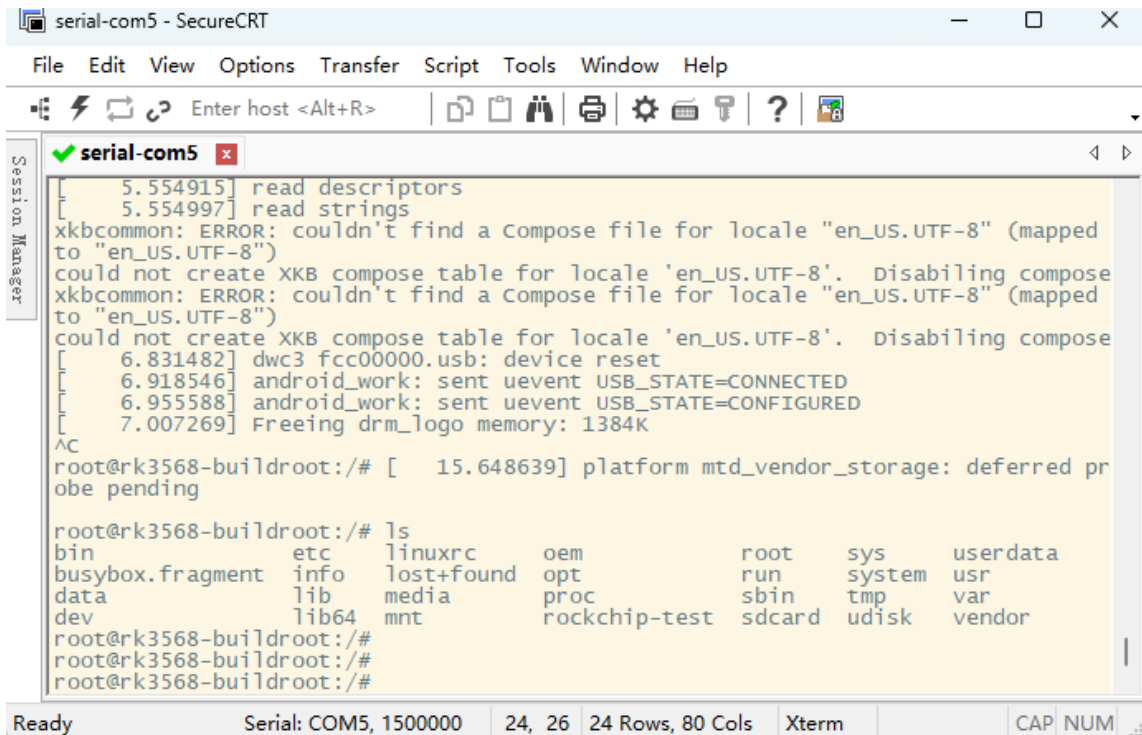
```
root@linaro-alip:/# [ 133.267831] USERCODE=0x234
[ 133.290233] RMC_GETDATA=50
[ 133.435742] USERCODE=0x234
[ 133.459240] RMC_GETDATA=70
[ 134.581683] USERCODE=0x23c
[ 134.604091] RMC_GETDATA=50
[ 134.749682] USERCODE=0x23c
[ 134.773136] RMC_GETDATA=70
[ 135.081856] USERCODE=0x33c
[ 135.104167] RMC_GETDATA=50
[ 135.251879] USERCODE=0x33c
[ 135.275379] RMC_GETDATA=70
[ 135.693020] USERCODE=0x23c
[ 135.715422] RMC_GETDATA=50
[ 135.860934] USERCODE=0x23c
[ 135.884471] RMC_GETDATA=70
```

## 7. Buildroot Test

### 7.1 Serial Terminal

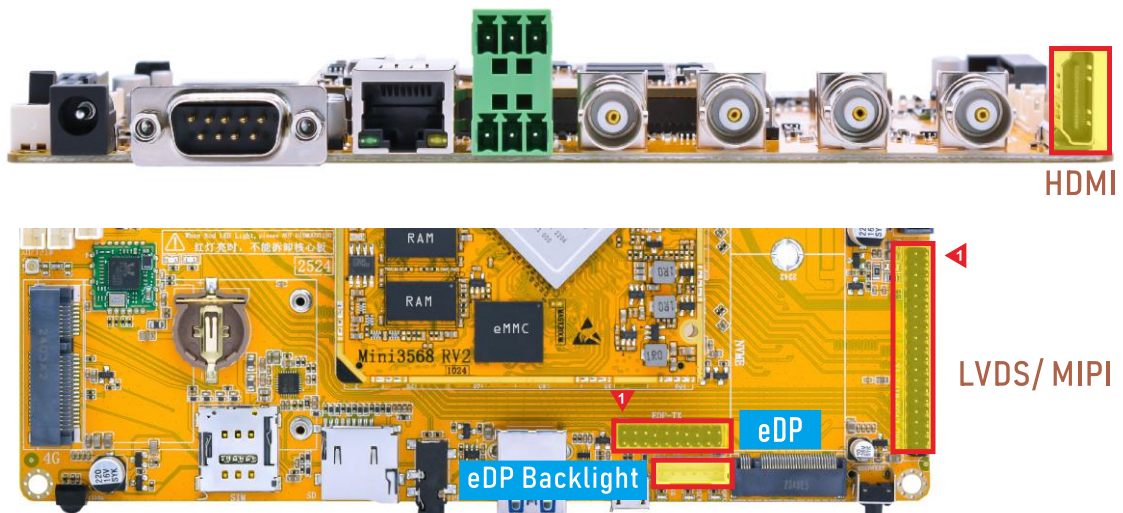


Connect the board and PC with USB Serial cable, then power on, the terminal will output boot information. The default baudrate is 1500000.



## 7.2 Display

The SBC3568 Buildroot system supports dual displays with independent output interfaces, including LVDS and HDMI.

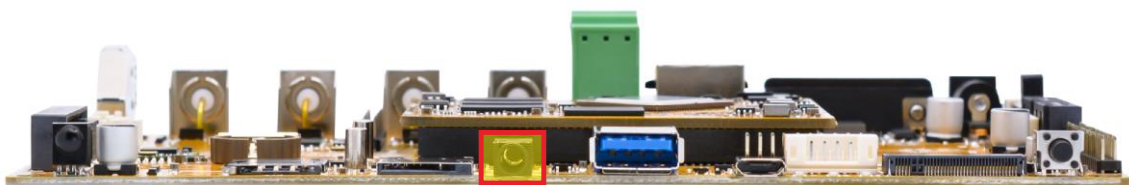


The display effect diagram is as follows:



## 7.3 Headset

**Step 1:** Plug the headset into the headset jack.



Headset

**Step 2:** View sound card.

```
# cat /proc/asound/cards
```

```
root@rk3568-buildroot:/# cat /proc/asound/cards
0 [rockchipes8388 ]: rockchip-es8388 - rockchip-es8388
  rockchip-es8388
1 [rockchiphdmi  ]: rockchip-hdmi - rockchip-hdmi
  rockchip-hdmi
```

**Step 3:** Headset recording.

```
# arecord -Dhw:0,0 -f cd record.wav
```

```
root@rk3568-buildroot:/# arecord -Dhw:0,0 -f cd record.wav
Recording WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

#### Step 4: Headset/speaker play audio.

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

```
root@rk3568-buildroot:/# aplay -Dhw:0,0 record.wav
Playing WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
```

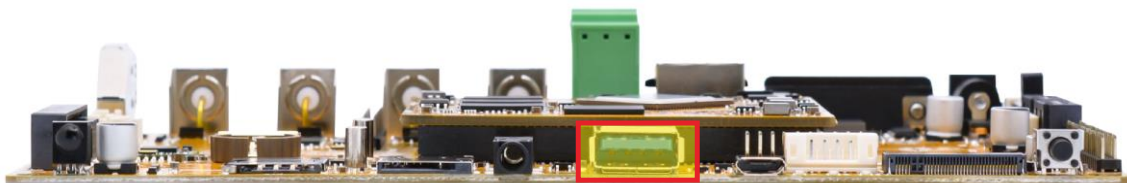
#### Note:

- When the headset is connected, audio is output through the headset.
- Supplementary instructions on audio output:

```
# aplay -Dhw:0,0 record.wav // Headset audio output
# aplay -Dhw:1,0 record.wav // HDMI TX audio output
```

## 7.4 USB3.0 Host

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



USB3.0

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

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

```

root@rk3568-buildroot:/# [ 179.888192] usb 6-1.3: new high-speed USB device number 6 using ehci-platform
[ 180.023320] usb 6-1.3: New USB device found, idVendor=0dd8, idProduct=3b00, bcdDevice= 0.02
[ 180.023472] usb 6-1.3: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[ 180.023516] usb 6-1.3: Product: OnlyDisk
[ 180.023551] usb 6-1.3: Manufacturer: Netac
[ 180.023586] usb 6-1.3: SerialNumber: C0E8BFA3EC38F796
[ 180.027444] usb-storage 6-1.3:1.0: USB Mass Storage device detected
[ 180.031107] scsi host2: usb-storage 6-1.3:1.0
[ 180.033259] pwm-backlight backlight1: supply power not found, using dummy regulator
[ 181.307619] scsi 2:0:0:0: Direct-Access Netac OnlyDisk 8.01 PQ: 0 ANSI: 6
[ 181.317725] sd 2:0:0:0: [sdc] 121610240 512-byte logical blocks: (62.3 GB/58.0 GiB)
[ 181.318968] sd 2:0:0:0: [sdc] Write Protect is off
[ 181.319786] sd 2:0:0:0: [sdc] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
[ 181.329552] sdc: sdc1
[ 181.330329] sd 2:0:0:0: [sdc] Attached SCSI removable disk
  
```

- USB3.0 print information in **SuperSpeed** mode.

```

root@rk3568-buildroot:/# [ 150.924867] usb 2-1: new SuperSpeed USB device number 2 using xhci-hcd
[ 150.956208] usb 2-1: New USB device found, idVendor=0dd8, idProduct=3b00, bcdDevice= 0.02
[ 150.956320] usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[ 150.956362] usb 2-1: Product: OnlyDisk
[ 150.956395] usb 2-1: Manufacturer: Netac
[ 150.956428] usb 2-1: SerialNumber: 0A6544CD10427AB2
[ 150.960781] usb-storage 2-1:1.0: USB Mass Storage device detected
[ 150.964311] scsi host1: usb-storage 2-1:1.0
[ 150.965920] pwm-backlight backlight1: supply power not found, using dummy regulator
[ 152.100051] scsi 1:0:0:0: Direct-Access Netac OnlyDisk 8.01 PQ: 0 ANSI: 6
[ 152.106459] sd 1:0:0:0: [sdb] 121610240 512-byte logical blocks: (62.3 GB/58.0 GiB)
[ 152.107081] sd 1:0:0:0: [sdb] Write Protect is off
[ 152.107443] sd 1:0:0:0: [sdb] Write cache: disabled, read cache: enabled, doesn't support DPO or FUA
[ 152.114714] sdb: sdb1
[ 152.116313] sd 1:0:0:0: [sdb] Attached SCSI removable disk
  
```

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

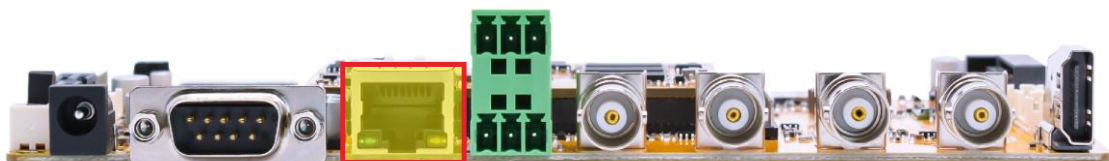
```
# df -h
```

```

root@rk3568-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  719M  5.0G  13% /
devtmpfs        967M   8.0K  967M   1% /dev
tmpfs           979M  140K  979M   1% /tmp
tmpfs           979M  332K  979M   1% /run
tmpfs           979M  128K  979M   1% /var/log
tmpfs           979M   0  979M   0% /dev/shm
/dev/mmcblk0p7  123M   12M  108M  10% /oem
/dev/mmcblk0p8  936M  451M  470M  49% /userdata
/dev/sda1       118G  106G   13G  90% /mnt/udisk
  
```

## 7.5 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.

```
[ 117.315969] rk_gmac-dwmac fe2a0000.ethernet eth0: Link is Up - 1Gbps/Full - flow control rx/tx  
[ 117.316031] IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready
```

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

```
# ifconfig eth0
```

```
root@rk3568-buildroot:/# ifconfig eth0  
eth0      Link encap:Ethernet  HWaddr 7E:C2:07:DB:60:CE  
          inet addr:192.168.0.83  Bcast:192.168.0.255  Mask:255.255.255.0  
          inet6 addr: fe80::cf79:2966:9d25:b14c/64 Scope:Link  
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
          RX packets:163 errors:0 dropped:40 overruns:0 frame:0  
          TX packets:11 errors:0 dropped:0 overruns:0 carrier:0  
          collisions:0 txqueuelen:1000  
          RX bytes:16395 (16.0 KiB)  TX bytes:1410 (1.3 KiB)  
          Interrupt:58
```

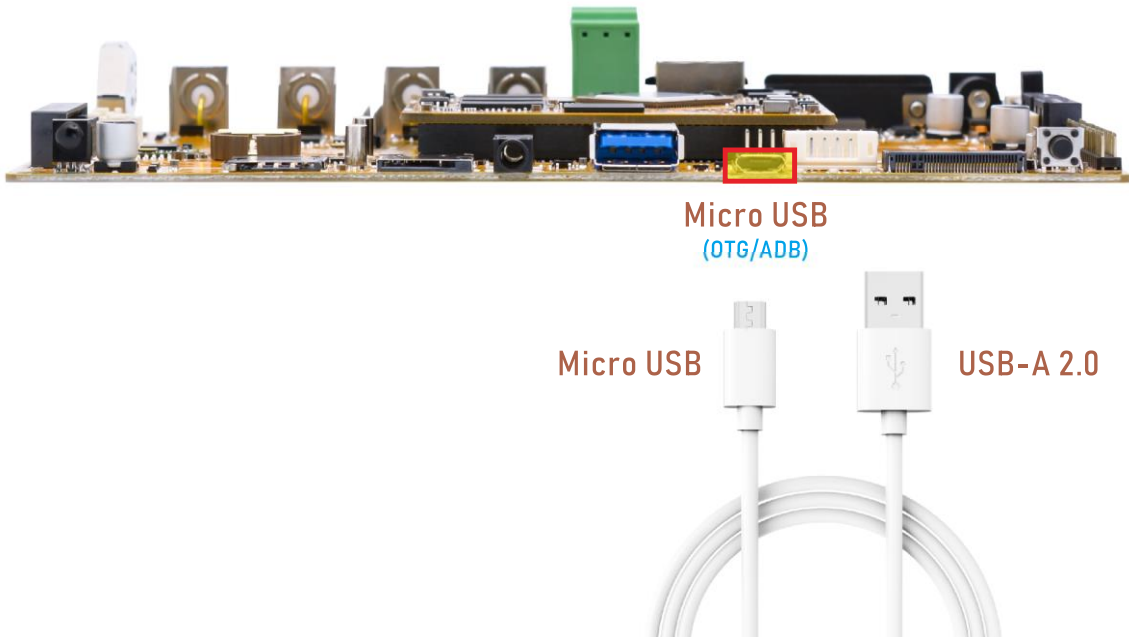
**Step 3:** Network connection test.

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

```
root@rk3568-buildroot:/# ping -I eth0 www.baidu.com  
PING www.baidu.com (183.2.172.177) from 192.168.0.83 eth0: 56(84) bytes of data.  
64 bytes from www.baidu.com (183.2.172.177): icmp_seq=1 ttl=54 time=6.14 ms  
64 bytes from www.baidu.com (183.2.172.177): icmp_seq=2 ttl=54 time=5.98 ms  
64 bytes from www.baidu.com (183.2.172.177): icmp_seq=3 ttl=54 time=6.07 ms  
64 bytes from www.baidu.com (183.2.172.177): icmp_seq=4 ttl=54 time=6.42 ms  
64 bytes from www.baidu.com (183.2.172.177): icmp_seq=5 ttl=54 time=6.22 ms  
64 bytes from www.baidu.com (183.2.172.177): icmp_seq=6 ttl=54 time=6.34 ms  
^C  
--- www.baidu.com ping statistics ---  
6 packets transmitted, 6 received, 0% packet loss, time 5008ms  
rtt min/avg/max/mdev = 5.980/6.195/6.417/0.150 ms
```

## 7.6 ADB

**Step 1:** Connect the board and PC host with Micro usb cable.



**Step 2:** Install ADB driver on Windows system.

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

**Step 4:** Execute the following commands to view and connect adb device.

```
# adb devices
```

```
# adb -s <device number> shell
```

```
C:\Windows\system32\cmd.e  x  +  v
Microsoft Windows [Version 10.0.22631.5189]
(c) Microsoft Corporation. 保留所有权利。

C:\Users\28675>adb devices
List of devices attached
0960252da9d89752      device

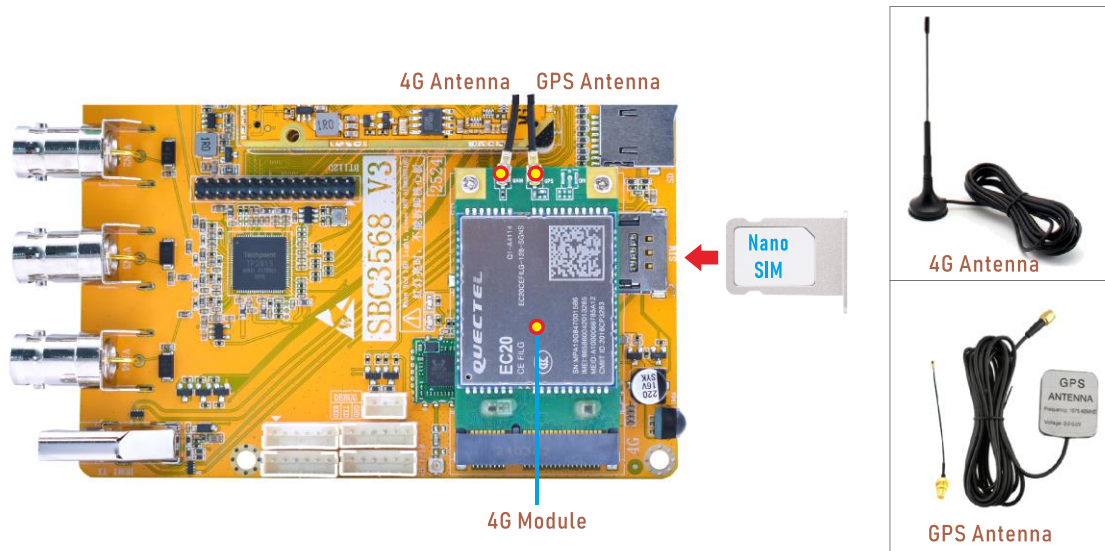
C:\Users\28675>adb -s 0960252da9d89752 shell
root@rk3568-buildroot:/# |
```

## 7.7 4G & GPS

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

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

**Step 3:** Power on.



### 7.7.1 4G Test

**Step 1:** Initiate the PPP connection.

```
# mkdir -p var/run/pppd/lock  
# pppd call quectel-ppp &
```

```

root@rk3568-buildroot:/# mkdir -p var/run/pppd/lock
root@rk3568-buildroot:/# pppd call quectel-ppp &
[1] 1316
root@rk3568-buildroot:/# 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 3gppp # (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 3gppp # (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)
noccip      # (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

send (ATI;+CSUB;+CSQ;+CPIN?;+COPS?;+CGREG?;&D2^M)
expect (OK)
^M

```

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

```
# ifconfig ppp0
```

```

root@rk3568-buildroot:/# ifconfig ppp0
ppp0      Link encap:Point-to-Point Protocol
          inet addr:10.7.88.235  P-t-P:10.64.64.64  Mask:255.255.255
          UP POINTOPOINT RUNNING NOARP MULTICAST MTU:1500 Metric:1
          RX packets:22 errors:0 dropped:0 overruns:0 frame:0
          TX packets:36 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:3
          RX bytes:1835 (1.7 KiB)  TX bytes:1896 (1.8 KiB)

```

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

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

```
root@rk3568-buildroot:/# ping -I ppp0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 10.7.88.235 ppp0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=336 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=289 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=574 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=525 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=486 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=445 ms
^C
--- www.armdesigner.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5005ms
rtt min/avg/max/mdev = 289.323/442.557/574.430/100.782 ms
```

## 7.7.2 GPS Test

**Step 1:** Verify whether /dev/ttyUSB3 is currently in use. If it is, please kill the associated process.

```
# lsof /dev/ttyUSB3
# kill -9 <PID>
```

```
root@rk3568-buildroot:/# ps
PID TTY          TIME CMD
 554 ttyFIQ0    00:00:00 sh
 1134 ttyFIQ0    00:00:00 pppd
 1185 ttyFIQ0    00:00:00 ps
root@rk3568-buildroot:/# kill -9 1134
root@rk3568-buildroot:/#
[1]+  Killed                  pppd call quectel-ppp
```

**Step 1:** Enable GPS functionality.

```
# echo -e "AT+QGPS=1\r\n" > /dev/ttyUSB2
```

**Step 2:** Read GPS data.

```
# cat /dev/ttyUSB1
```

```

root@rk3568-buildroot:/# echo -e "AT+QGPS=1\r\n" > /dev/ttyUSB2
root@rk3568-buildroot:/#
root@rk3568-buildroot:/# cat /dev/ttyUSB1
$GPVTG,,T,,M,,N,,K,N*2C

$GPGSA,A,1,,,,,,,,,,,,,32

$GPGGA,,,,,0,,,,,,*66

$GPRMC,,V,,,,,,,,,N,V*29

$GPVTG,,T,,M,,N,,K,N*2C

$GPGSA,A,1,,,,,,,,,,,,,32

$GPGGA,,,,,0,,,,,,*66

$GPRMC,,V,,,,,,,,,N,V*29

$GPVTG,,T,,M,,N,,K,N*2C

$GPGSA,A,1,,,,,,,,,,,,,32

$GPGGA,,,,,0,,,,,,*66

$GPRMC,,V,,,,,,,,,N,V*29

$GPVTG,,T,,M,,N,,K,N*2C

$GPGSA,A,1,,,,,,,,,,,,,32

$GPGGA,,,,,0,,,,,,*66

$GPRMC,,V,,,,,,,,,N,V*29

$GPVTG,,T,,M,,N,,K,N*2C

$GPGSA,A,1,,,,,,,,,,,,,32

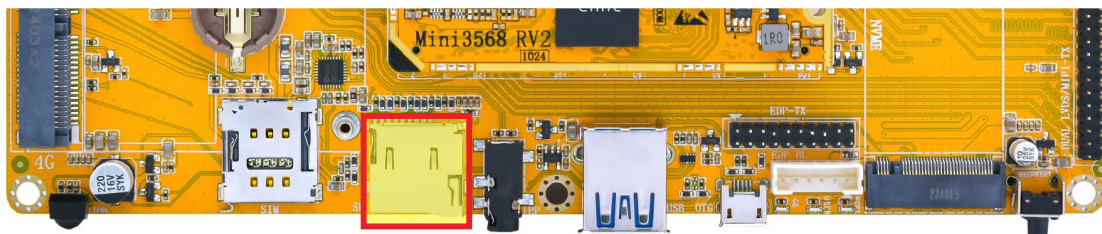
$GPGGA,,,,,0,,,,,,*66

$GPRMC,,V,,,,,,,,,N,V*29

```

## 7.8 SD Card

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



Micro SD

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

```
# df -h
```

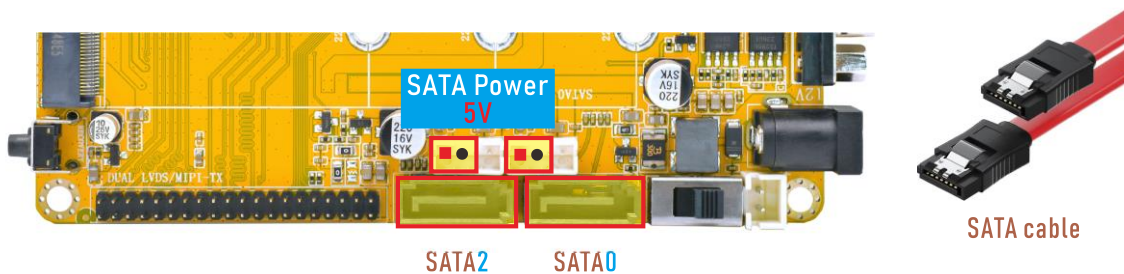
```

root@rk3568-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  719M  5.0G  13% /
devtmpfs       967M   8.0K  967M   1% /dev
tmpfs          979M  140K  979M   1% /tmp
tmpfs          979M  324K  979M   1% /run
tmpfs          979M  136K  979M   1% /var/log
tmpfs          979M   0 979M   0% /dev/shm
/dev/mmcblk0p7 123M   12M  108M  10% /oem
/dev/mmcblk0p8 936M  451M  470M  49% /userdata
/dev/mmcblk1p1 59G   58G  766M  99% /mnt/sdcard
  
```

## 7.9 SATA

The SATA on Buildroot only supports the ext4 format.

**Step 1:** Connect the sata and sata power, then power on.



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

```
# df -h
```

```

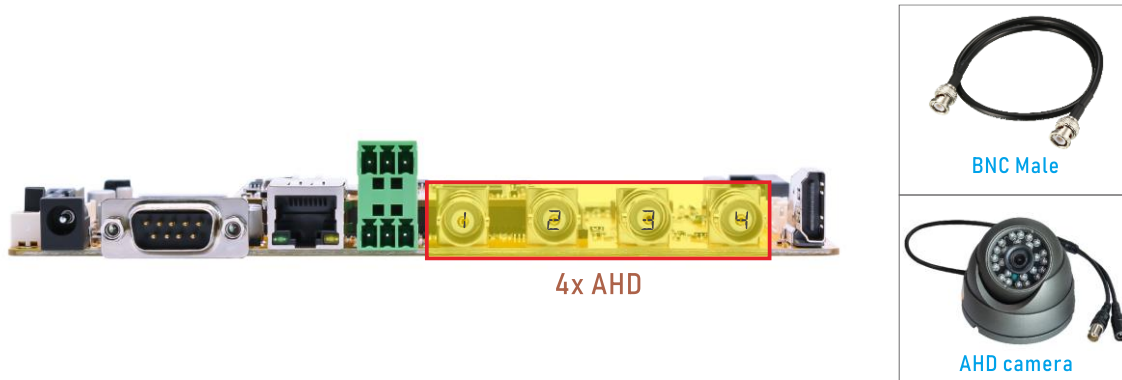
root@rk3568-buildroot:/# df -h
[ 16.215549] platform mtd_vendor_storage: deferred probe pending
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  719M  5.0G  13% /
devtmpfs       967M   8.0K  967M   1% /dev
tmpfs          979M  140K  979M   1% /tmp
tmpfs          979M  380K  979M   1% /run
tmpfs          979M  132K  979M   1% /var/log
tmpfs          979M   0 979M   0% /dev/shm
/dev/mmcblk0p7 123M   12M  108M  10% /oem
/dev/mmcblk0p8 936M  451M  470M  49% /userdata
/dev/sda1       120G  1.2M  120G   1% /mnt/storage
  
```

**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/sda1
```

## 7.10 Camera

The SBC3568 Debian12 system supports simultaneous preview of up to 4xAHD-1080P cameras. Connect the camera to the development board using a signal cable and input a 12v power supply to the camera.

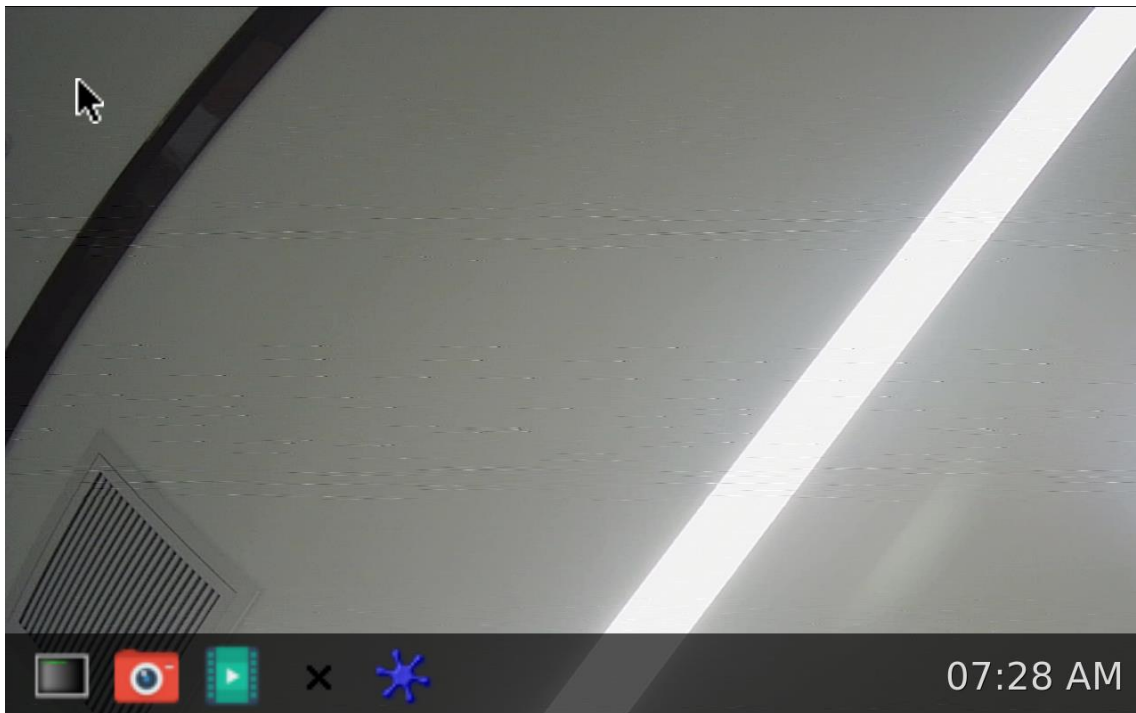


**Step 1:** Preview separately.

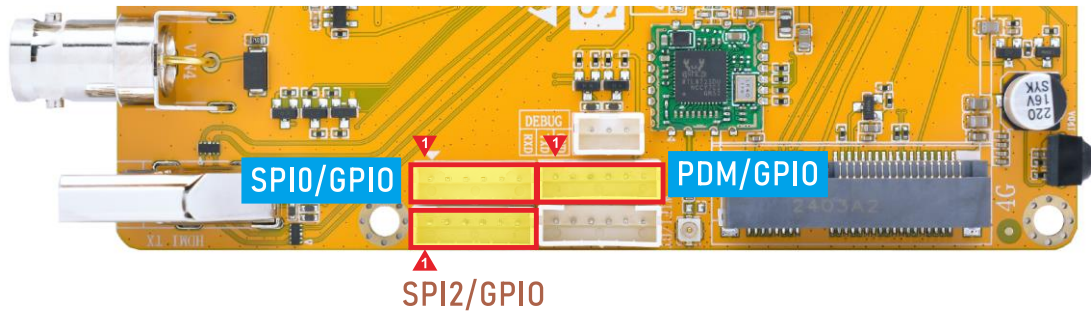
```
# gst-launch-1.0 v4l2src device=/dev/video3 ! video/x-raw,format=NV16,width=1920,height=1080, framerate=25/1 ! waylandsink //VIN4
# gst-launch-1.0 v4l2src device=/dev/video2 ! video/x-raw,format=NV16,width=1920,height=1080, framerate=25/1 ! waylandsink //VIN3
# gst-launch-1.0 v4l2src device=/dev/video1 ! video/x-raw,format=NV16,width=1920,height=1080, framerate=25/1 ! waylandsink //VIN2
# gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=NV16,width=1920,height=1080, framerate=25/1 ! waylandsink //VIN1
```

```
root@rk3568-buildroot:/# gst-launch-1.0 v4l2src device=/dev/video3 ! video/x-raw,format=NV16,width=1920,height=1080,framerate=25/1 ! waylandsink
Setting pipeline to PAUSED ...
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
[ 178.046732] rkcif_mipi_lvds: stream[3] start streaming
[ 178.048478] rkcif_mipi_lvds: Allocate dummy buffer, size: 0x003f5000
[ 178.048528] rockchip-mipi-csi2 mipi-csi2: stream on, src_sd: 00000000a4bc663b, sd_name:rockchip-csi2-dphy0
[ 178.048546] rockchip-mipi-csi2 mipi-csi2: stream ON
[ 178.048590] rockchip-csi2-dphy0: dphy0, data_rate_mbps 594
[ 178.048633] rockchip-csi2-dphy0 csi2-dphy0: csi2_dphy_s_stream stream on:1, dphy0, ret 0
[ 178.049853] techpoint 2-0047: detect channel 0 is not supported, default 1080P_25
[ 178.050607] techpoint 2-0047: set channel 0 1080P_25
[ 178.088364] techpoint 2-0047: detect channel 1 is not supported, default 1080P_25
[ 178.089188] techpoint 2-0047: set channel 1 1080P_25
[ 178.130493] techpoint 2-0047: detect channel 2 is not supported, default 1080P_25
[ 178.131638] techpoint 2-0047: set channel 2 1080P_25
[ 178.174220] techpoint 2-0047: detect channel 3 1080P_25
[ 178.175235] techpoint 2-0047: set channel 3 1080P_25
[ 178.228087] (0xfdfb0000)MIPI_CSI2 ERR1:0xf00 (f_seq,vc: 0 1 2 3)
[ 178.230857] (0xfdfb0000)MIPI_CSI2 ERR1:0x4000cc0 (fs/fe mis,vc: 2 3) (f_seq,vc: 2 3) (crc,vc: 2)
[ 178.230999] (0xfdfb0000)MIPI_CSI2 ERR1:0x220 (fs/fe mis,vc: 1) (f_seq,vc: 1)
Redistribute latency...
0:00:04.7 / 99:99:99.
```

Preview the effect drawing separately:



## 7.11 SPI+GPIO



| Connector | Pin Order | Pin Name                   | Pin Number |
|-----------|-----------|----------------------------|------------|
| SPI0/GPIO | 1         | SPI0_MISO_M1/GPIO2_D0_d    | 88         |
| SPI0/GPIO | 2         | SPI0_MOSI_M1/GPIO2_D1_d    | 89         |
| SPI2/GPIO | 2         | SPI2_MOSI_M1/GPIO2_D6_d    | 94         |
| SPI2/GPIO | 3         | SPI2_MISO_M1/GPIO2_D7_d    | 95         |
| PDM/GPIO  | 1         | PDM_CLK0_M0/GPIO1_A6_d     | 38         |
| PDM/GPIO  | 2         | PDM_SDI1_M0_ADC/GPIO1_B2_d | 42         |
| PDM/GPIO  | 3         | PDM_SDI2_M0_ADC/GPIO1_B1_d | 41         |
| PDM/GPIO  | 4         | PDM_SDI3_M0_ADC/GPIO1_B0_d | 40         |

### 7.11.1 SPI Test

**Step 1:** short circuit MISO\_M1 and MOSI\_M1 pins of SPI.

**Step 2:** Execute the test script: **spidev0.0\_test** or **spidev2.0\_test**.

- **spidev0.0\_test** corresponds to the SPI0 device.
- **spidev2.0\_test** corresponds to the SPI2 device.
- The following test uses SPI0 as an example.

```
# spidev0.0_test
```

```
root@rk3568-buildroot:/# spidev0.0_test
spi mode: 0x0
bits per word: 8
max speed: 500000 Hz (500 kHz)
TX | FF FF FF FF FF FF 40 00 00 00 00 95 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF F0 0D
|.....@.....|
RX | FF FF FF FF FF FF 40 00 00 00 00 95 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF F0 0D
|.....@.....|
```

- The following test uses SPI2 as an example.

```
# spidev2.0_test
```

```
root@rk3568-buildroot:/# spidev2.0_test
spi mode: 0x0
bits per word: 8
max speed: 500000 Hz (500 kHz)
TX | FF FF FF FF FF FF 40 00 00 00 95 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF F0 0D
|.....@.....|
RX | FF FF FF FF FF FF 40 00 00 00 95 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF F0 0D
|.....@.....|
```

## 7.11.2 GPIO Test

The PDM/GPIO connector can only be used as a regular GPIO.

Execute the following commands to control GPIO1\_A6.

```
# echo 38 > /sys/class/gpio/export           // Create a GPIO node
# echo out > /sys/class/gpio/gpio38/direction // Set GPIO direction to output
# echo 0 > /sys/class/gpio/gpio38/value      // Assignment 0
# cat /sys/class/gpio/gpio38/value           // Gets the current value
# echo 1 > /sys/class/gpio/gpio38/value      // Assignment 1
# cat /sys/class/gpio/gpio38/value           // Gets the current value
# echo 38 > /sys/class/gpio/unexport         // Destory a GPIO node
```

```
root@rk3568-buildroot:/# echo 38 > /sys/class/gpio/export
root@rk3568-buildroot:/# echo out > /sys/class/gpio/gpio38/direction
root@rk3568-buildroot:/# echo 0 > /sys/class/gpio/gpio38/value
root@rk3568-buildroot:/# cat /sys/class/gpio/gpio38/value
0
root@rk3568-buildroot:/# echo 1 > /sys/class/gpio/gpio38/value
root@rk3568-buildroot:/# cat /sys/class/gpio/gpio38/value
1
root@rk3568-buildroot:/# echo 38 > /sys/class/gpio/unexport
```

Other GPIO pins can be controlled using the same command, just by changing the number of the GPIO.

## 7.12 RS485

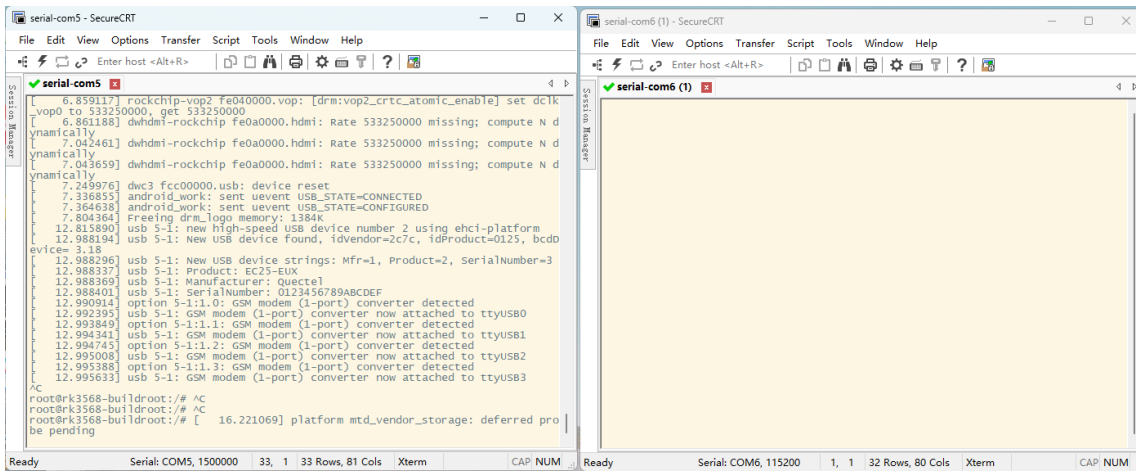


RS485

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

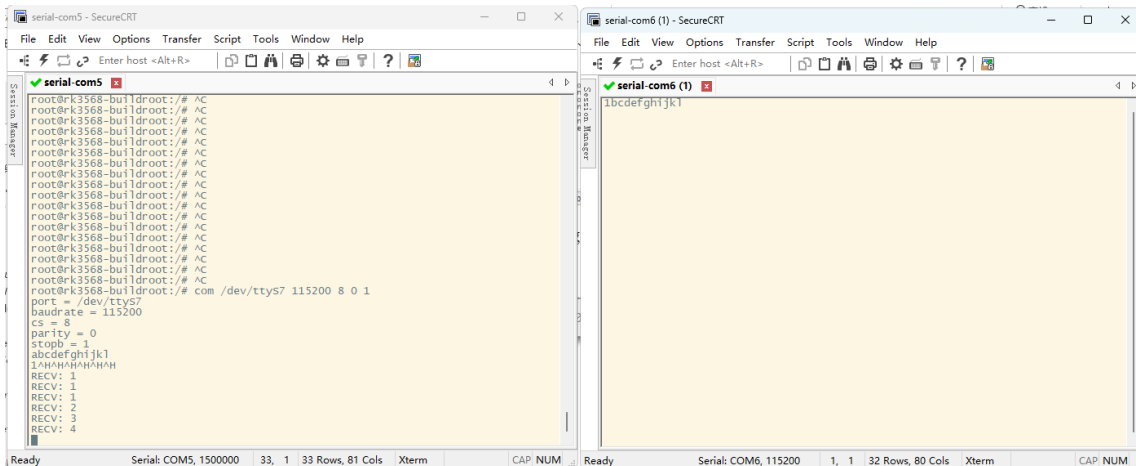


**Step 2:** Open the corresponding serial terminal, set the baud rate of the board to 150000, and set the baud rate of the RS485 test tool to 115200.

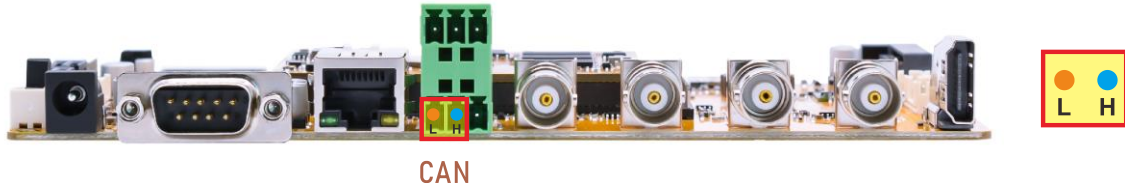


**Step 3:** Execute the following command on the board to test the RS485 transmission and reception functionality.

```
# com /dev/ttyS7 115200 8 0 1
```



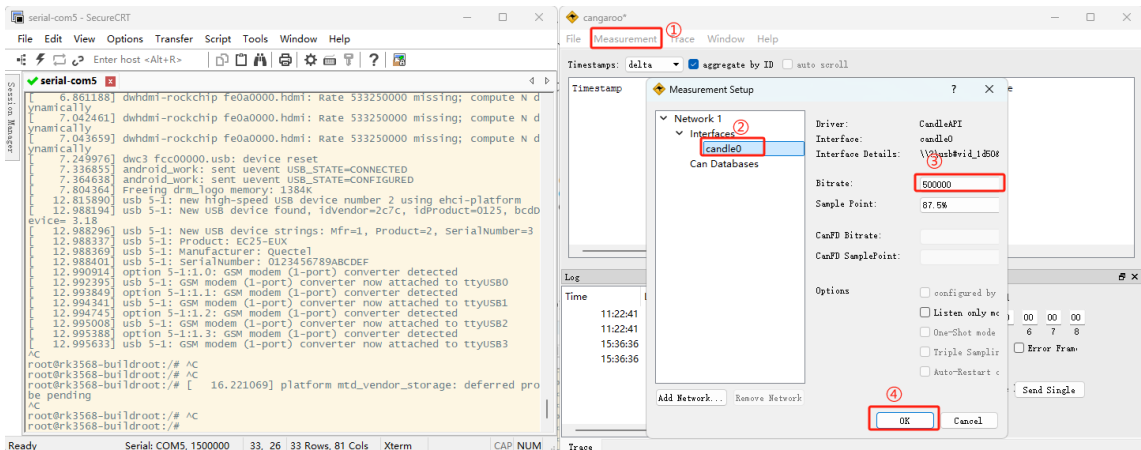
## 7.13 CAN



**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 500000.

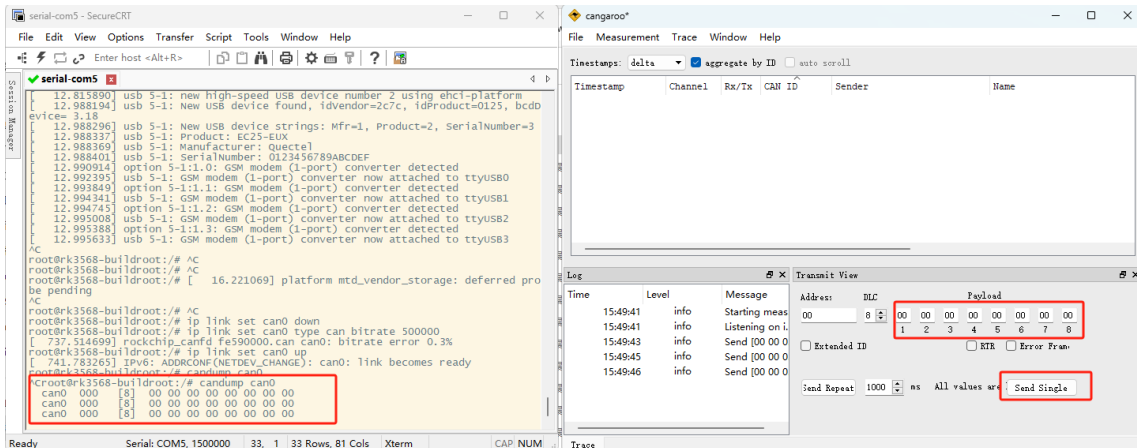


**Step 3:** Configure and activate the CAN network, setting the bitrate to 500000.

```
# ip link set can0 down
# ip link set can0 type can bitrate 500000
# ip link set can0 up
```

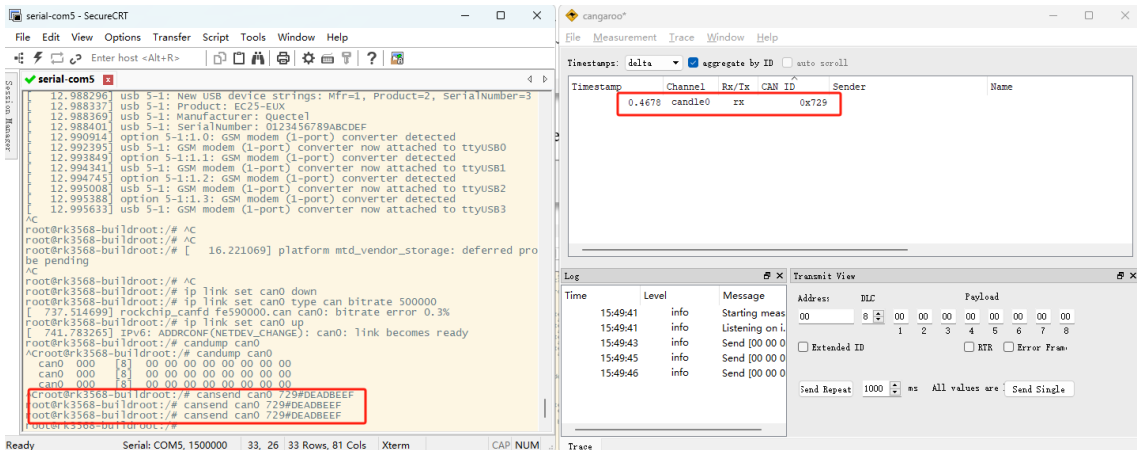
**Step 4:** Configure CAN as the receiver.

```
# candump can0
```



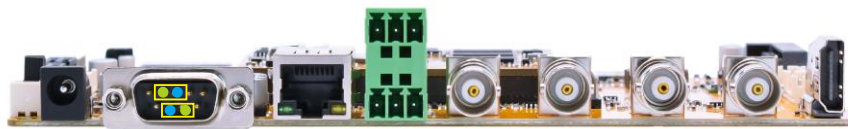
### Step 5: Configure CAN as the sender.

```
# cansend can0 729#DEADBEEF
```

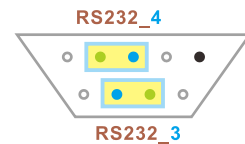


## 7.14 UART

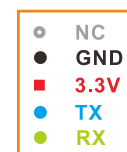
### Step 1: Short circuit RX and TX pins of UART.



2x RS232



UART 8 5



**Step 2: RS232\_4 test.**

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

```
root@rk3568-buildroot:/# com /dev/ttyS4 115200 8 0 1
port = /dev/ttyS4
baudrate = 115200
cs = 8
parity = 0
stopb = 1
ab
RECV: ab
cdefg
RECV: cdefg
123456
RECV: 123456
```

**Step 3: RS232\_3 test.**

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

```
root@rk3568-buildroot:/# com /dev/ttyS3 115200 8 0 1
port = /dev/ttyS3
baudrate = 115200
cs = 8
parity = 0
stopb = asdsad
RECV: asdsad
hhhhh
RECV: hhhhh
123456
RECV: 123456
```

**Step 4: UART5 test.**

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

```
root@rk3568-buildroot:/# com /dev/ttyS5 115200 8 0 1
port = /dev/ttyS5
baudrate = 115200
cs = 8
parity = 0
stopb = 1
abcdefg
RECV: abcdefg
1234567890
RECV: 1234567890
```

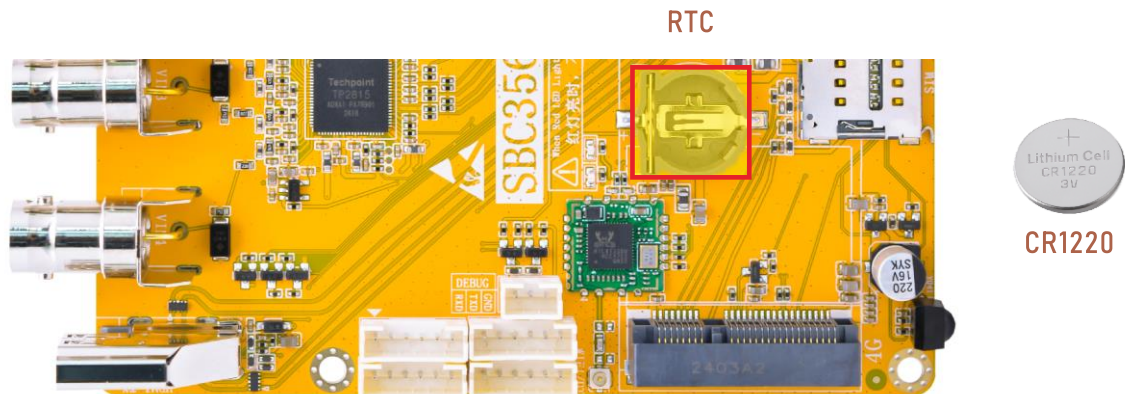
**Step 4: UART8 test.**

```
# com /dev/ttyS8 115200 8 0 1
```

```
root@rk3568-buildroot:/# com /dev/ttyS8 115200 8 0 1
port = /dev/ttyS8
baudrate = 115200
cs = 8
parity = 0
stopb = 1
qwernty
RECV: qwernty
asdfgh
RECV: asdfgh
0987654321
RECV: 0987654321
```

## 7.15 RTC

**Step 1:** Install the coin cell battery.



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

```
# date -s "2025-04-28 16:30:00"
```

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

```
# hwclock -w
```

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

```
# hwclock
```

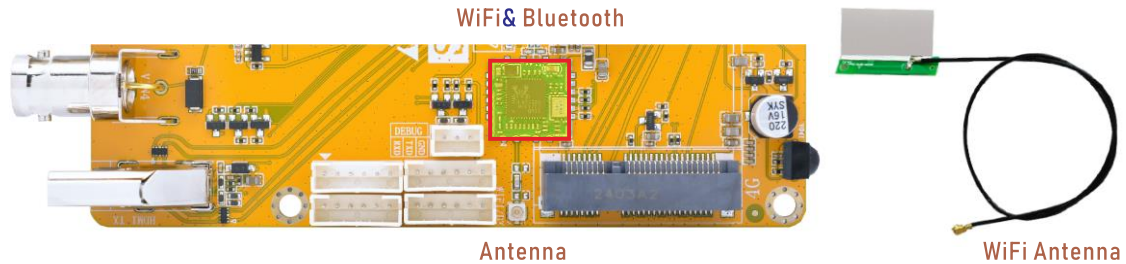
```
root@rk3568-buildroot:/# date -s "2025-04-28 16:30:00"
Mon Apr 28 16:30:00 UTC 2025
root@rk3568-buildroot:/# hwclock -w
root@rk3568-buildroot:/# hwclock
Mon Apr 28 16:30:06 2025 0.000000 seconds
root@rk3568-buildroot:/# hwclock
Mon Apr 28 16:30:15 2025 0.000000 seconds
root@rk3568-buildroot:/# hwclock
Mon Apr 28 16:30:31 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.

```
root@rk3568-buildroot:/# hwclock
Mon Apr 28 16:31:10 2025 0.000000 seconds
root@rk3568-buildroot:/# hwclock
Mon Apr 28 16:31:18 2025 0.000000 seconds
root@rk3568-buildroot:/# hwclock
Mon Apr 28 16:31:28 2025 0.000000 seconds
```

## 7.16 WiFi & Bluetooth

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



Due to hardware limitations, WiFi&BT cannot be used simultaneously with USB-OTG. Therefore, during the process of loading the WiFi&BT driver at system startup, the connection of USB-OTG is disconnected. And when the system is using WiFi&BT, USB-OTG cannot be connected either.

### 7.16.1 WiFi

**Step 1:** View the device information.

```
# ifconfig wlan0
```

```
root@rk3568-buildroot:/# ifconfig wlan0
wlan0  Link encap:Ethernet HWaddr C8:FE:0F:02:2F:36
        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.

```
# iwlist wlan0 scan
```

```

root@rk3568-buildroot:/# iwlist wlan0 scan
wlan0 Scan completed :
      Cell 03 - Address: B4:F1:8C:6D:D1:24
      ESSID:"Boardcon"
      Protocol:IEEE 802.11bgn
      Mode:Master
      Frequency:2.412 GHz (Channel 1)
      Encryption key:on
      Bit Rates:300 Mb/s
      Extra:wpa_ie=dd160050f20101000050f20401000050f20401000050f202
      IE: WPA Version 1
          Group Cipher : CCMP
          Pairwise Ciphers (1) : CCMP
          Authentication Suites (1) : PSK
      Extra:
      IE: IEEE 802.11i/WPA2 Version 1
          Group Cipher : CCMP
          Pairwise Ciphers (1) : CCMP
          Authentication Suites (1) : PSK
      IE: Unknown:
DD910050F204104A0001101044000102103B00010310470010123456789ABCDEF01234B4F18C6DD124102100194875617765692054
6563686E6F6C6F677920436F2E2C4C74641023000B576972656C657373204150102400033132331042000531323334351054000800
060050F2040001101100095443373130322D3130100800020780103C0001011049000600372A000120
      Quality=100/100 Signal level=43/100
      Extra:fm=0003
  
```

### Step 3: Connect to the hotspot.

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

```

root@rk3568-buildroot:/# wifi-connect.sh Boardcon Boardcon43435656
connect to WiFi ssid: Boardcon, Passwd: Boardcon43435656
[ 347.286727] RTW: nolinked power save leave
Successfully initialized wpa_supplicant
root@rk3568-buildroot:/# [ 348.826497] RTW: nolinked power save enter
[ 349.606724] RTW: nolinked power save leave
[ 351.141375] RTW: rtw_set_802_11_connect(wlan0) fw_state=0x00000008
[ 351.520580] RTW: start auth
[ 351.839481] RTW: auth success, start assoc
[ 351.847416] RTW: assoc success
[ 351.852320] RTW: recv eapol packet 1/4
[ 351.853226] RTW: ===== STA [b4:f1:8c:6d:d1:24] =====
[ 351.853301] RTW: mac_id : 0
[ 351.853331] RTW: wireless_mode : 0x0b
[ 351.853357] RTW: mimo_type : 0
[ 351.853381] RTW: static smps : N
[ 351.853405] RTW: bw_mode : 40MHz, ra_bw_mode : 40MHz
[ 351.853430] RTW: rate_id : 1
[ 351.853453] RTW: rssi : 43 (%), rssi_level : 0
[ 351.853481] RTW: is_support_sgi : Y, is_vht_enable : N
[ 351.853507] RTW: disable_ra : N, disable_pt : N
[ 351.853532] RTW: is_noisy : N
[ 351.853554] RTW: txrx_state : 0
[ 351.853579] RTW: curr_tx_rate : CCK_1M (L)
[ 351.853604] RTW: curr_tx_bw : 20MHz
[ 351.853627] RTW: curr_retry_ratio : 0
[ 351.853650] RTW: ra_mask : 0x000000000000ffff
[ 351.853650]
[ 351.854255] RTW: send eapol packet 2/4
[ 351.863253] RTW: recv eapol packet 3/4
[ 351.864412] RTW: send eapol packet 4/4
[ 351.866271] IPv6: ADDRCONF(NETDEV_CHANGE): wlan0: link becomes ready
[ 351.876124] RTW: set pairwise key camid:0, addr:b4:f1:8c:6d:d1:24, kid:0, type:AES
[ 351.878872] RTW: set group key camid:1, addr:b4:f1:8c:6d:d1:24, kid:1, type:AES
  
```

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

```
# ifconfig wlan0
```

```
root@rk3568-buildroot:/# ifconfig wlan0
wlan0    Link encap:Ethernet  HWaddr C8:FE:0F:02:2F:36
         inet addr:192.168.0.51  Bcast:192.168.0.255  Mask:255.255.255.0
         inet6 addr: fe80::9189:dff5:cc5:410b/64  Scope:Link
         UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
         RX packets:210 errors:0 dropped:41 overruns:0 frame:0
         TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:1000
         RX bytes:29378 (28.6 KiB)  TX bytes:2584 (2.5 KiB)
```

### Step 5: Test the WiFi network.

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

```
root@rk3568-buildroot:/# ping -I wlan0 www.baidu.com
PING www.a.shifen.com (183.2.172.17) from 192.168.0.51 wlan0: 56(84) bytes of data.
64 bytes from www.baidu.com (183.2.172.17): icmp_seq=1 ttl=54 time=11.3 ms
64 bytes from www.baidu.com (183.2.172.17): icmp_seq=2 ttl=54 time=9.76 ms
64 bytes from www.baidu.com (183.2.172.17): icmp_seq=3 ttl=54 time=15.8 ms
64 bytes from www.baidu.com (183.2.172.17): icmp_seq=4 ttl=54 time=28.5 ms
64 bytes from www.baidu.com (183.2.172.17): icmp_seq=5 ttl=54 time=16.6 ms
64 bytes from www.baidu.com (183.2.172.17): icmp_seq=6 ttl=54 time=83.5 ms
^C
--- www.a.shifen.com ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5009ms
rtt min/avg/max/mdev = 9.762/27.589/83.509/25.722 ms
```

## 7.16.2 Bluetooth

On Buildroot, Bluetooth is by default configured to be used as a Bluetooth speaker.

### Step 1: Set the Bluetooth adapter to be discoverable.

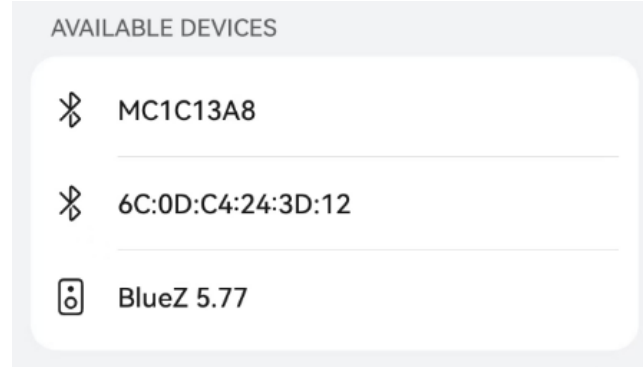
```
# hciconfig hci0 piscan
```

### Step 2: Control and configure the Bluetooth device.

```
# bluetoothctl
```

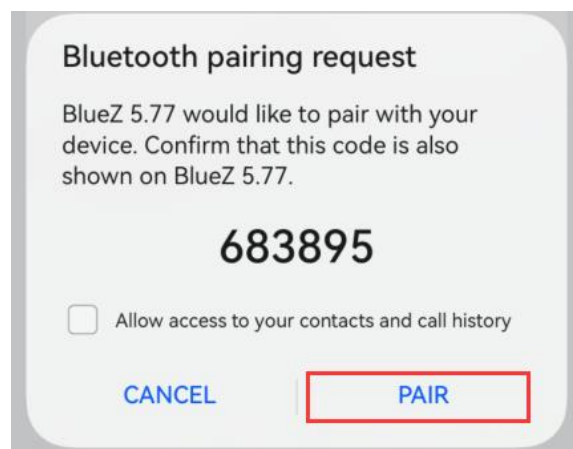
```
root@rk3568-buildroot:/# hciconfig hci0 piscan
root@rk3568-buildroot:/# bluetoothctl
hci0 new_settings: powered connectable discoverable bondable ssp br/edr le secure-conn
Agent registered
[CHG] Controller C8:FE:0F:02:2F:37 Pairable: yes
[bluetooth]#
```

**Step 3:** On the phone, locate the device name of the speaker: **BlueZ 5.77**, and click to connect.



**Step 4:** Permissions must be confirmed on both the phone and the speaker.

Phone:

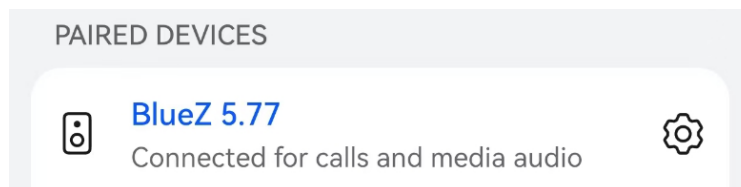


Bluetooth speaker:

```

root@rk3568-buildroot:/# hciconfig hci0 piscan
root@rk3568-buildroot:/# bluetoothctl
hci0 new_settings: powered connectable discoverable bondable ssp br/edr le secure-conn
Agent registered
[CHG] Controller 98:03:CF:E5:E0:0A Pairable: yes
hci0 A8:35:12:9A:EB:4D type BR/EDR connectedeir_len 11
[CHG] Device A8:35:12:9A:EB:4D INFO: 0x000f (15)
[CHG] Device A8:35:12:9A:EB:4D Connected: yes
Request confirmation
[agent] Confirm passkey 683895 (yes/no): yes
hci0 new_link_key A8:35:12:9A:EB:4D type 0x05 pin_len 0 store_hint 1
Authorize service
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): yes
Authorize service
[agent] Authorize service 0000110d-0000-1000-8000-00805f9b34fb (yes/no): yes
[NEW] Endpoint /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/sep1
[NEW] Endpoint /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/sep2
[NEW] Endpoint /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/sep3
[NEW] Endpoint /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/sep4
[NEW] Transport /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/fd0
[liuy]# W: [pulseaudio] module-loopback.c: Configured latency of 200.00 ms is smaller than minimum
latency, using minimum instead
W: [pulseaudio] module-loopback.c: Cannot set requested sink latency of 35.20 ms, adjusting to 39.91 ms
W: [pulseaudio] module-loopback.c: Cannot set requested source latency of 66.67 ms, adjusting to 250.00 ms
[NEW] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 [default]
[liuy]# [08:43:25.307] event12 - liuy (AVRCP): is tagged by udev as: Keyboard
[08:43:25.307] event12 - liuy (AVRCP): device is a keyboard
[08:43:25.307] libinput: configuring device "liuy (AVRCP)".
[08:43:25.307] associating input device event12 with output LVDS-1 (none by udev)
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Repeat: off
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Shuffle: off
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Type: Audio
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Subtype: None
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Status: paused
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Name: Bluetooth Player
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Status: stopped
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Track.Title: Not Provided
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Track.TrackNumber: 0x00000001 (1)
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Track.NumberOfTracks: 0x00000001 (1)
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Track.Duration: 0x00000000 (0)
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Position: 0xffffffff (-1)
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Position: 0xffffffff (-1)
[CHG] Player /org/bluez/hci0/dev_A8_35_12_9A_EB_4D/player0 Position: 0xffffffff (-1)
[liuy]#
  
```

**Step 5:** The connection is successful.



## 7.17 Video Playback

(1) The directory for the built-in video testing scripts in the system: */rockchip-test/video*

```

root@rk3568-buildroot:/# ls /rockchip-test/video/
test_gst_multivideo.sh  test_gst_video_fps.sh  video_stresstest.sh
test_gst_video.sh      test_gst_video_maxfps.sh  video_test.sh
  
```

Simply execute the script.

```

root@rk3568-buildroot:/# /rockchip-test/video/test_gst_video.sh
Setting pipeline to PAUSED ...
Pipeline is PREROLLING ...
Redistribute latency...
mpp[1317]: mpp_info: mpp version: eff1e2ed author: Tingjin Huang 2024-09-29 fix[vepu580]: Add md info
internal buffer
mpp[1317]: mpp_info: mpp version: eff1e2ed author: Tingjin Huang 2024-09-29 fix[vepu580]: Add md info
internal buffer
mpp[1317]: mpp_info: mpp version: eff1e2ed author: Tingjin Huang 2024-09-29 fix[vepu580]: Add md info
internal buffer
mpp[1317]: mpp: unable to create enc vp8 for soc rk3568 unsupported
mpp[1317]: mpp_info: mpp version: eff1e2ed author: Tingjin Huang 2024-09-29 fix[vepu580]: Add md info
internal buffer
mpp[1317]: mpp_info: mpp version: eff1e2ed author: Tingjin Huang 2024-09-29 fix[vepu580]: Add md info
internal buffer
Redistribute latency...
mpp[1317]: h264d_api: is_avcC=1
Pipeline is PREROLLED ...
Prerolled, waiting for async message to finish...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
Redistribute latency...
[16:20:51.064] seeing the first app
0:00:03.2 / 0:00:29.5 (11.0 %)
  
```

(2) Play the video using Google Chrome.

- Google Chrome supports video playback up to 4K at 60Hz, with support for the following decoding formats: VP8, H.264, H.265, VP9, and AV1.
- However, it is only compatible with certain H.265 video files.

Execute the following command to play the video using Google Chrome:

```
# chromium /mnt/udisk/video/4KP30/4K30P-BLACKPINK-DDU-DU_DDU-DU.mp4
```

#### Command explanation:

- **chromium**: Launches the Chromium browser.
- **/mnt/udisk/video/4KP30/4K30P-BLACKPINK-DDU-DU\_DDU-DU.mp4**: The media file path to be played.

```

DDU-DU.mp4 -buildroot:/# chromium /mnt/udisk/video/4KP30/4K30P-BLACKPINK-DDU-DU_D
[1616:1635:1125/162734.968706:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server
address: Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1616:1635:1125/162734.969326:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server
address: Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1616:1635:1125/162734.969451:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server
address: Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1616:1635:1125/162734.969520:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server
address: Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1616:1635:1125/162735.094616:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server
address: Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1616:1635:1125/162735.094929:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server
address: Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1616:1634:1125/162735.178411:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server
address: Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1616:1632:1125/162735.178466:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server
address: Unknown address type (examples of valid types are "tcp" and on UNIX "unix")

(process:1616): Glib-GIO-CRITICAL **: 16:27:35.184: g_settings_schema_source_lookup: assertion 'source !=
NULL' failed
[1616:1616:1125/162735.435624:ERROR:object_proxy.cc(576)] Failed to call method:
org.freedesktop.DBus.NameHasOwner: object_path= /org/freedesktop/DBus: unknown error type:
[1616:1616:1125/162735.435954:ERROR:object_proxy.cc(576)] Failed to call method:
org.freedesktop.DBus.NameHasOwner: object_path= /org/freedesktop/DBus: unknown error type:
[1616:1631:1125/162735.435997:ERROR:bus.cc(407)] Failed to connect to the bus: Could not parse server
address: Unknown address type (examples of valid types are "tcp" and on UNIX "unix")
[1616:1704:1125/162735.488691:ERROR:object_proxy.cc(576)] Failed to call method:
org.freedesktop.DBus.Properties.Get: object_path= /org/freedesktop/UPower:
org.freedesktop.DBus.Error.ServiceUnknown: The name org.freedesktop.UPower was not provided by any .service
files
[1616:1704:1125/162735.489608:ERROR:object_proxy.cc(576)] Failed to call method:
org.freedesktop.UPower.GetDisplayDevice: object_path= /org/freedesktop/UPower:
  
```

(3) Use the `gst-play-1.0` command to play the video.

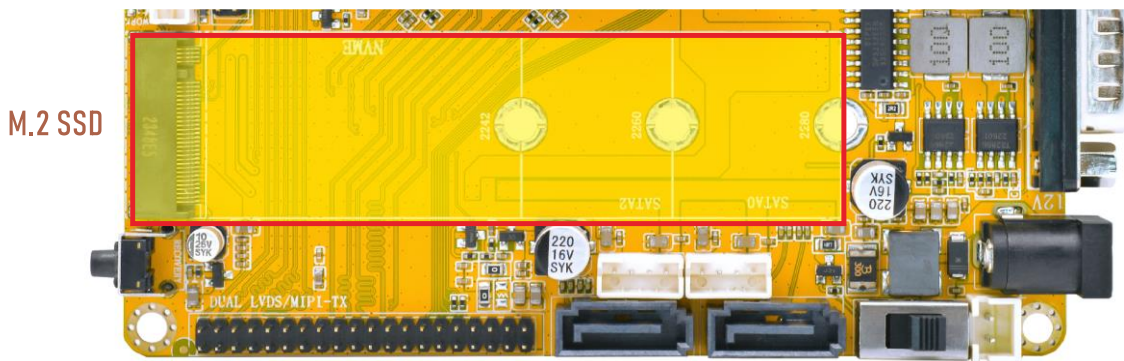
```
# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
# gst-play-1.0 --videosink="waylandsink fullscreen=true"
/mnt/udisk/video/4KP60/4KP60-exist.mp4 --audiosink="alsasink device=hw:0,0"
```

**Command explanation:**

- export GST\_MPP\_VIDEODEC\_DEFAULT\_ARM\_AFBC=1: Open AFBC.
- /mnt/udisk/video/4KP60/4KP60-exist.mp4: The media file path to be played.
- --audiosink="alsasink device=hw:0,0": Specifies the audio output device as hw:0,0.

```
root@rk3568-buildroot:/# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
root@rk3568-buildroot:/#
/mnt/udisk/video/4KP60/4KP60-exist.mp4 --audiosink="alsasink device=hw:0,0"rue" /
Press 'k' to see a list of keyboard shortcuts.
Now playing /mnt/udisk/video/4KP60/4KP60-exist.mp4
Redistribute latency...
Redistribute latency...
Redistribute latency...
Redistribute latency...
Redistribute latency...
0:00:44.7 / 0:04:01.9
```

## 7.18 SSD



**Step 1:** Power off.

**Step 2:** Connect M.2 SSD device.

**Step 3:** Power on.

**Step 4:** The system will automatically mount M.2 SSD device. Execute the following commands to view the M.2 SSD device node, it is mounted to the /mnt/storage path.

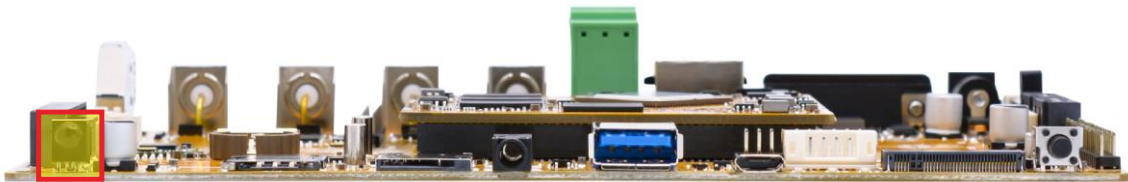
```
# ls /dev/nvme0n1
# df -h
```

```

root@rk3568-buildroot:/# ls /dev/nvme0n1
/dev/nvme0n1
root@rk3568-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  719M  5.0G  13% /
devtmpfs        967M   8.0K  967M   1% /dev
tmpfs           979M  140K  979M   1% /tmp
tmpfs           979M  332K  979M   1% /run
tmpfs           979M  124K  979M   1% /var/log
tmpfs           979M    0  979M   0% /dev/shm
/dev/mmcblk0p7  123M   12M  108M  10% /oem
/dev/mmcblk0p8  936M  324K  920M   1% /userdata
/dev/nvme0n1p1  477G   4.8M  477G   1% /mnt/storage
  
```

Note: The SBC3568 Buildroot system supports only the M.2 SSD in ex4 format. If the M.2 SSD in use is ex4, do not execute this command. Otherwise, execute the following command to format the M.2 SSD device, **the files on the M.2 SSD device will be permanently lost.**

## 7.19 IR



### IR

**Step 1:** Enable IR debugging print.

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

**Step 2:** Using the infrared remote control to press a button and the IR receiver will print the key code in the log.

```

root@rk3568-buildroot:/# [ 128.053030] USERCODE=0x234
[ 128.075340] RMC_GETDATA=50
[ 128.220937] USERCODE=0x234
[ 128.244343] RMC_GETDATA=70
[ 129.966073] USERCODE=0x23c
[ 129.988473] RMC_GETDATA=50
[ 130.133984] USERCODE=0x23c
[ 130.157491] RMC_GETDATA=70
[ 130.579377] USERCODE=0x33c
[ 130.601776] RMC_GETDATA=50
[ 130.749497] USERCODE=0x33c
[ 130.772993] RMC_GETDATA=70
[ 131.274534] USERCODE=0x23c
[ 131.296937] RMC_GETDATA=50
[ 131.442501] USERCODE=0x23c
[ 131.466003] RMC_GETDATA=70
  
```