EM3568 Linux6.1 User Manual

V1.1

Boardcon Embedded Designer

Overview

The content of this document is intended solely for the EM3568 development board, aiming to help users quickly understand, apply, and test the EM3568 development board.

System Support

Development Board	Debian12	Buildroot
CM3568_V2.0 EM3568_V4	Y	Y

Revision History

Version	Date	Author	Revision History
V1.0	2024-02-07	Liu Yuan	Initial version
V1.1	2025-08-08	Liu Yuan	Add support mipi display

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.

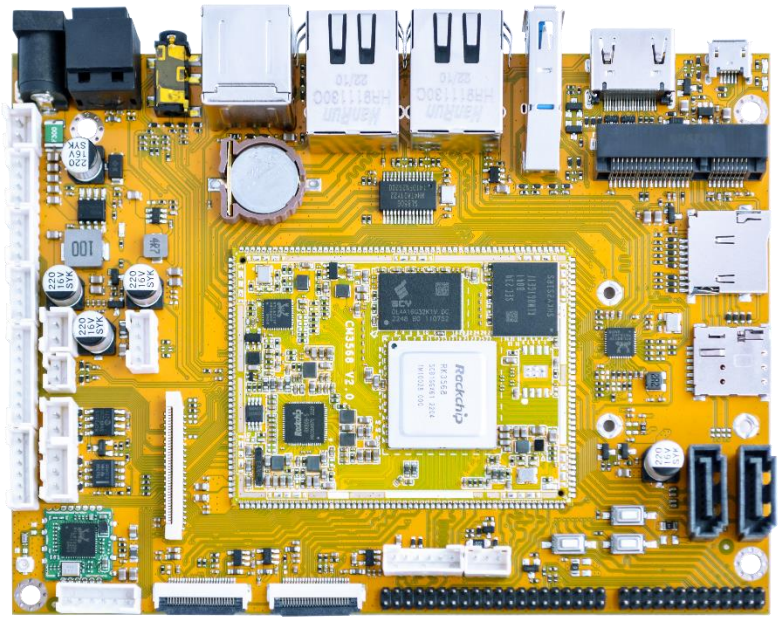
Boardcon embedded design limited
2007-11 Haofang Tianji Plaza, 11008 Beihuan Avenue, Nanshan District,
Shenzhen, Guangdong, China. 518051
URL: www.armdesigner.com | www.boardcon.com
Email: market@armdesigner.com
Technical Support Inquiries: support@armdesigner.com
Tel: +86-755-26481393 | +86-755-27571591

Content

1.Introduction

1.1 Overview

The EM3568 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.



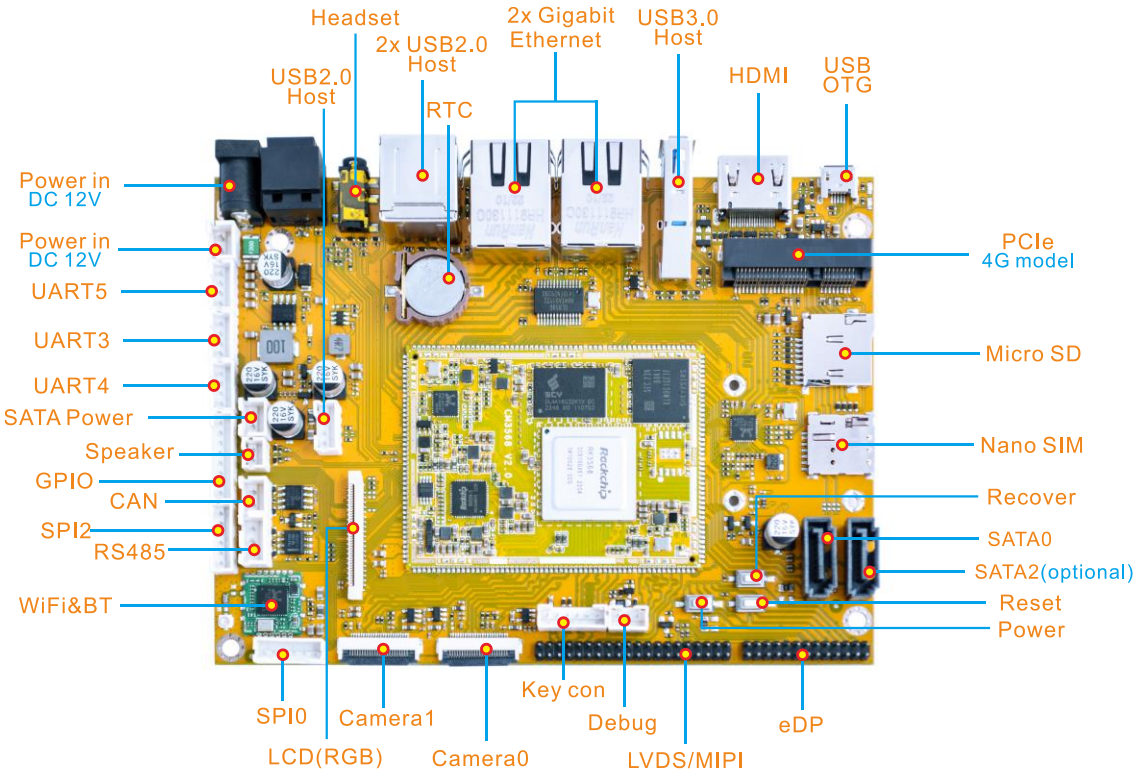
1.2 Product Parameters

Basic Parameters	
SOC	• RK3568
CPU	• Quad-core 64-bit ARM Cortex-A55@ up to 2.0GHz
GPU	• OpenCL 2.0 • OpenGLES 1.1/2.0/3.2 • Vulkan 1.1

NPU		• 1 TOPS AI computing power • Supports int8/int16/fp16/bfp16 hybrid MAC operations
Video	Decoder	• Support 4K@60fps H.265/H.264/VP9 video decoding • Support 1080P@60fps VP8/VC1/MPEG-4,2,1 video decoding • Support 720x576@60fps H.263 video decoding
	Encoder	• Support 1080P@60fps H.265/H.264 video encoding • Support YUV/RGB video source with rotation and mirror
RAM		• 2GB LPDDR4X (up to 8GB)
ROM		• 8GB eMMC (up to 64GB)
Support system		Android, Debian, Buildroot
Hardware Parameters		
Extended Storage		• Support SATA • Support MicroSD Card
Display		• Support HDMI TX 4K@60fps display • Support LVDS display
Audio		• Support HDMI TX audio output • Support Headphone output/input • Support Speaker output
USB		• Support USB3.0 • Support 3x USB2.0
Network		• Support 2x Gigabit Ethernet • Support WIFI/BT module • Support 4G module
Camera		• Support 2x Camera (ov13850)
Peripheral communication		• Support CAN • Support RS485 • Support 3xUART

Other parameters	Support Debug, IR, RTC, OTG.
Electrical Parameters	
Power supply input voltage	12V/3A
RTC input voltage	3V/0.6uA
Operating temperature	0 ~ 70°
Storage temperature	-40 ~ 85°
Structural Parameters	
Core board dimensions	60.0mm x 45.0mm
Motherboard dimensions	135.0mm x 100.0mm

1.3 Hardware Interface Introduction



Interface parameters	
Power in DC 12V	12V DC power input interface
USB2.0 Host	USB expansion interface
Headset	Headset output/input
2xUSB2.0 Host	Dual-layer USB2.0 HOST interface
RTC	RTC coin cell connector
2xGigabit Ethernet	Gigabit Ethernet RJ45 interface
USB3.0 Host	USB3.0 Host interface
HDMI	HDMI2.0 TX interface
USB OTG	OTG download interface
PCIe 4G model	4G module interface
Micro SD	MicroSD card slot
Nano SIM	Nano SIM card port
Recover	Recovery key
SATA0	SATA0 interface
SATA2 optional	SATA2 interface
Reset	Reset key
Power	Power key
eDP	eDP screen display interface
LVDS/MIPI	LVDS/MIPI screen display interface
Debug	UART2, debug the serial port
Key con	Including PWM3_IR/Reset/Recover/Power GPIO
Camera0	MIPI camera interface
Camera1	MIPI camera interface
LCD(RGB)	RGB screen display interface
SPI0	SPI0 interface
WIFI&BT	Realtek RTL8723DU module

RS485	RS485 communication interface
SPI2	SPI2 interface
CAN	CAN communication interface
GPIO	GPIO/I2C5 extension interface
Speaker	Speaker interface
SATA Power	SATA power interface(5V)
UART4	UART4,TTL level interface
UART3	UART3,TTL level interface
UART5	UART5,TTL level interface
Power in DC 12V	12V DC power I/O, GPIO interface

2.Install Drivers and Tool

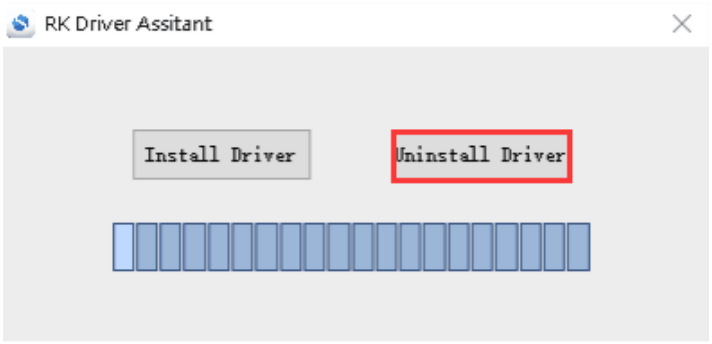
To download firmware and debug in the terminal, the following drivers and software need to be installed (for Windows computers):

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

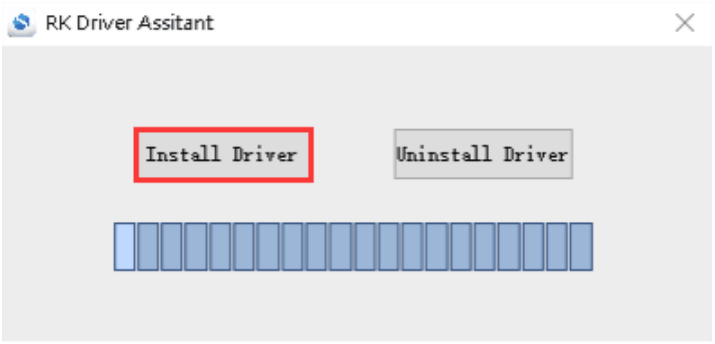
2.1 Install RK Driver Assitant

Step 1: Open *DriverAssitant_v5.1.1/DriverInstall.exe*.

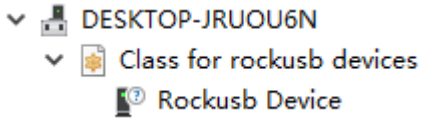
Step 2: To avoid driver conflicts, click **"Uninstall Driver"** to uninstall the driver.



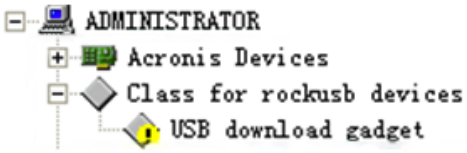
Step 3: Click button **"Install Driver"** to install.



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.

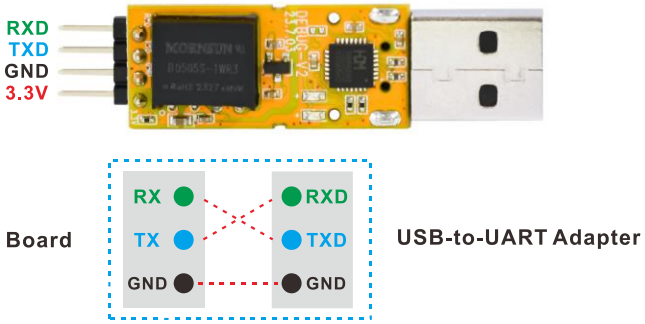


Step 6: The WINDOW will pop up found New Hardware Wizard dialog box, choose to install from the specified location, and then select: *DriverAssitant_v5.1.1/ADBDriver.*

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



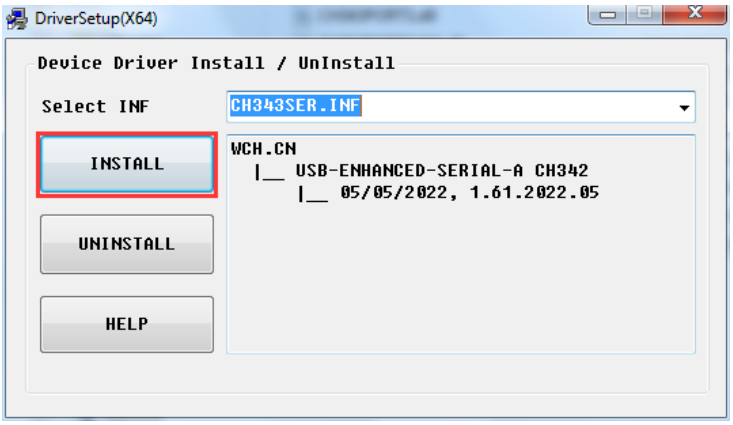
Pin	Connection Description
RXD	Receive, connect to TX pin of the board.
TXD	Transmit, connect to RX pin of the board.
GND	Ground, connect to GND pin of the board.
3V3	No need to connect.

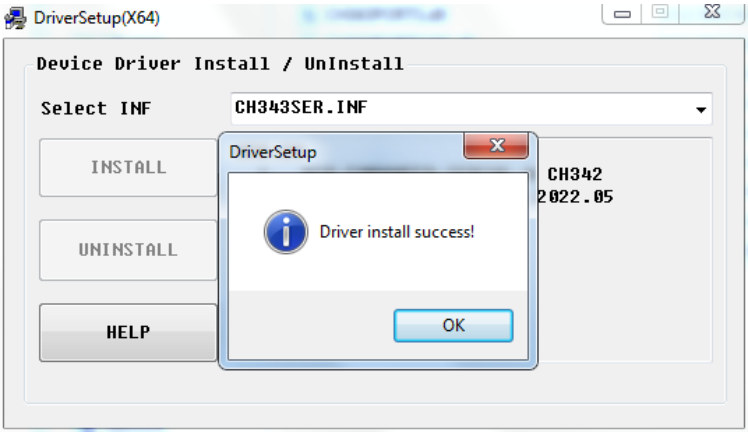
2.2.2 Install Driver

Step 1: Plug the CH9102X Module to the PC

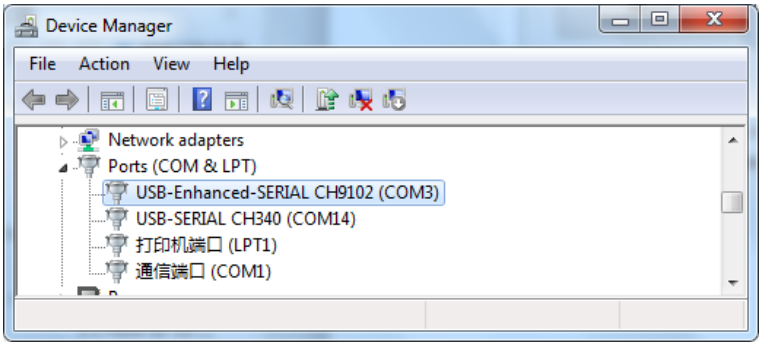
Step 2: Unzip *CH343SER.ZIP* on Windows.

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.

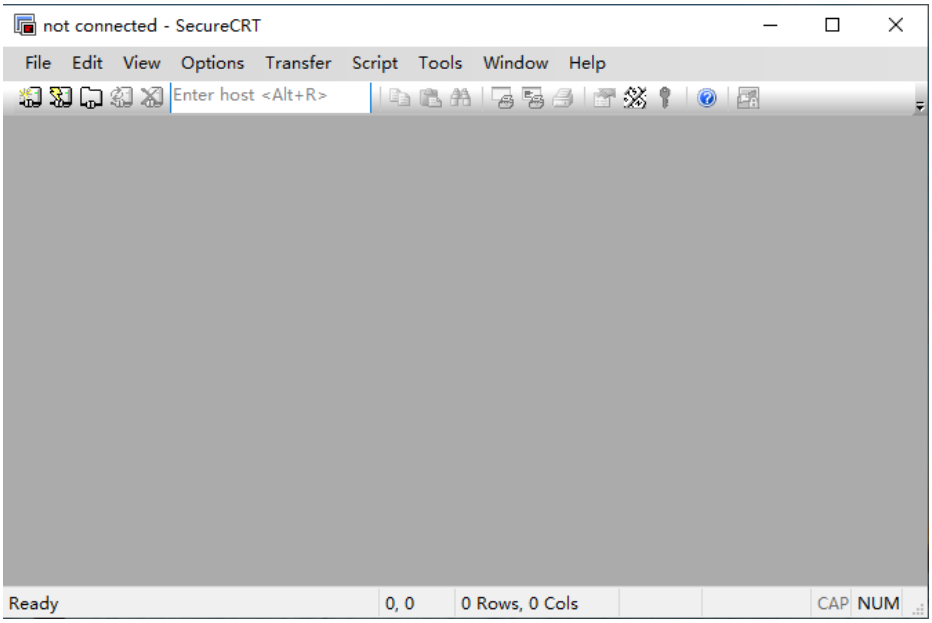


2.3 Install Serial Terminal Tool

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

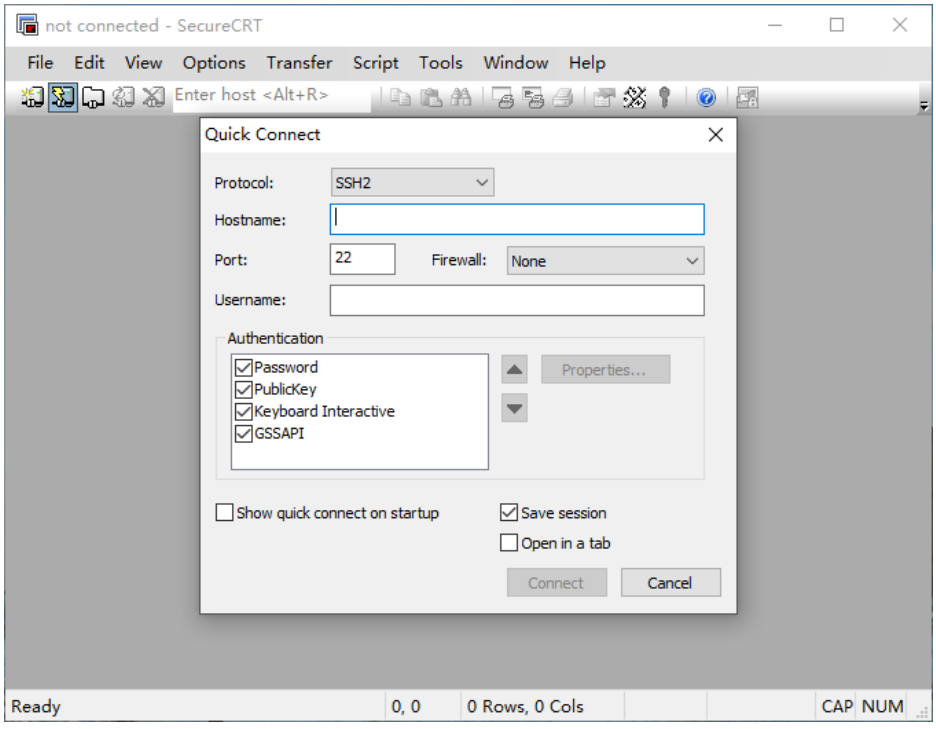
Step 1: Unzip *Platform/SecureCRT.rar* on PC.

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

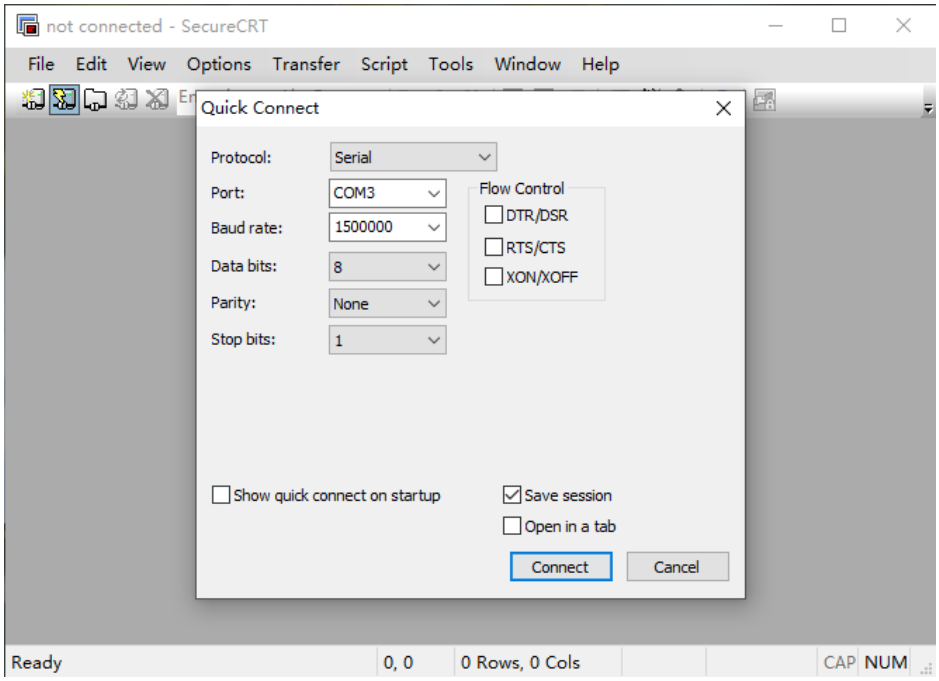


Step 3: Confirm that the CH9102X driver has been installed and the CH9102X module is connecting to the PC.

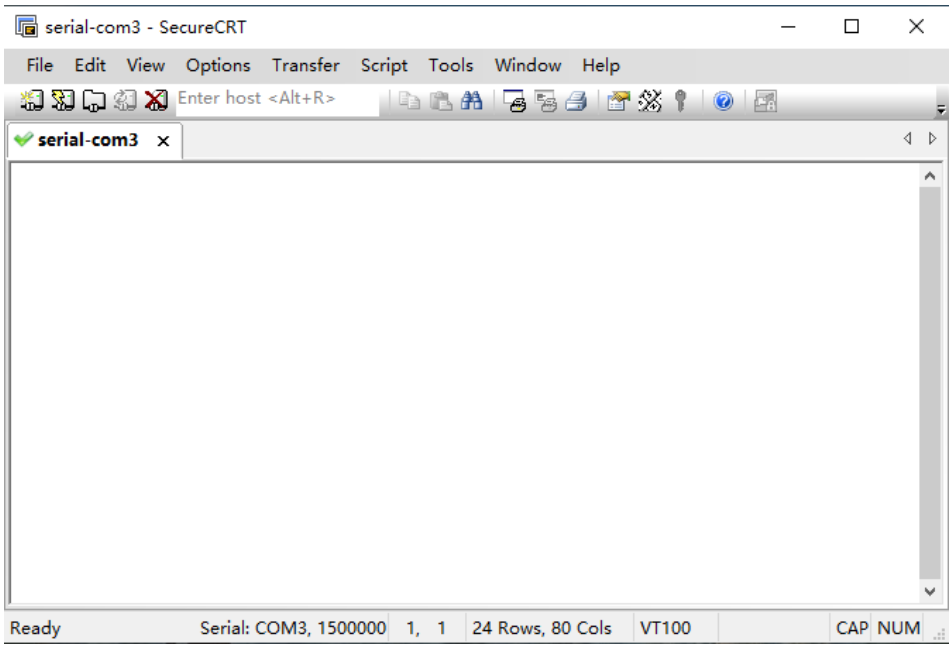
Step 4: Click the **"Quick Connect"** button to go to the Quick Connect configuration screen.



Step 5: Configure as shown in the following figure.



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



3.Upgrade Introduction

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

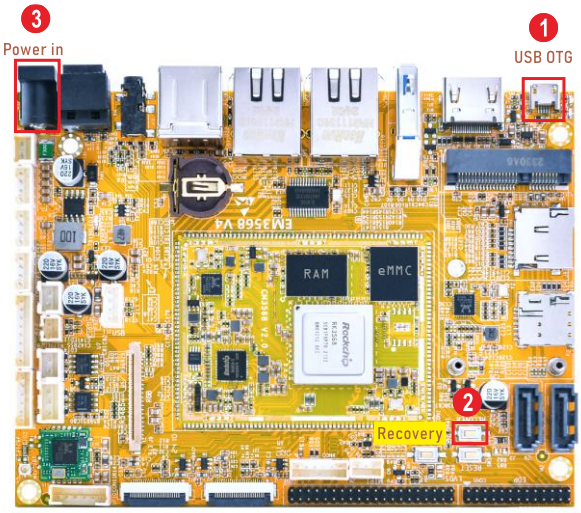
3.1.1.1 Hardware

Step 1: Disconnect the power adapter.

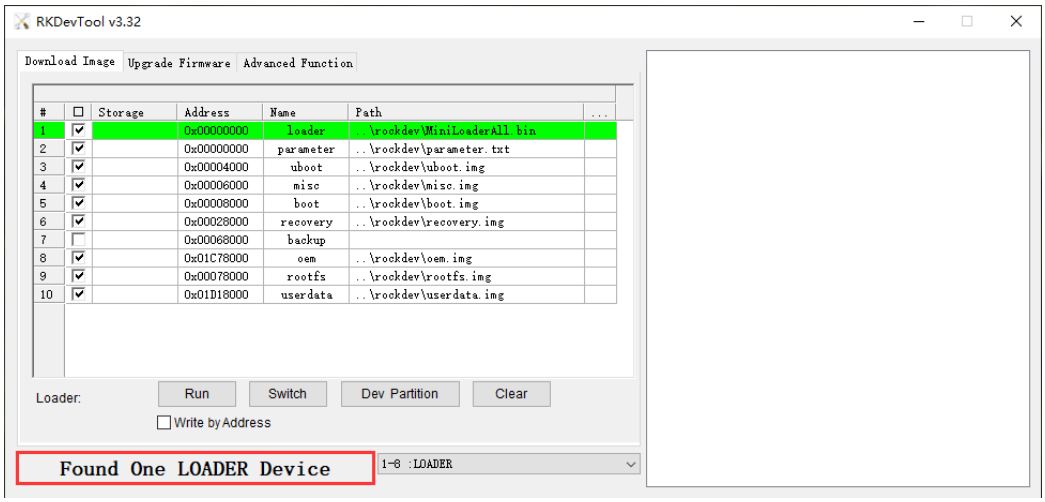
Step 2: Connect one end of the Micro cable to the host and the other end to the development board.

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 Devic"**.



3.1.1.2 Software

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

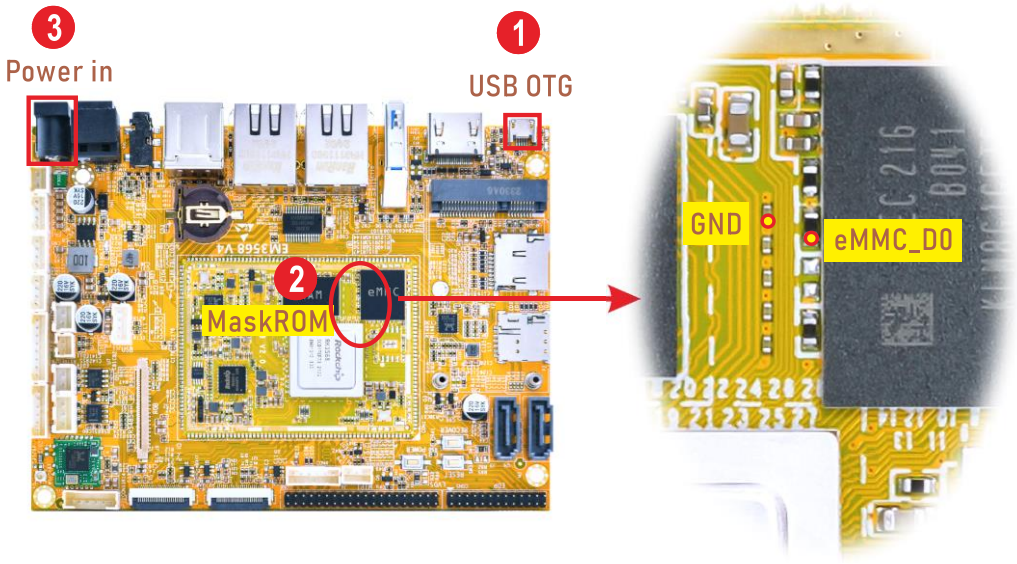
```
# reboot loader
```

3.1.2 How to Enter MaskRom Mode

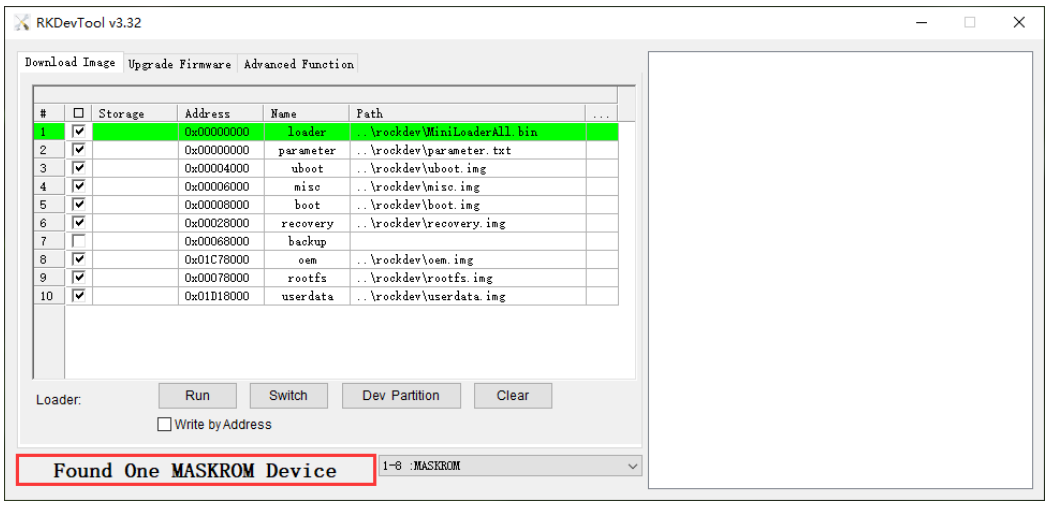
Step 1: Disconnect the power adapter.

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 CM3568.



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



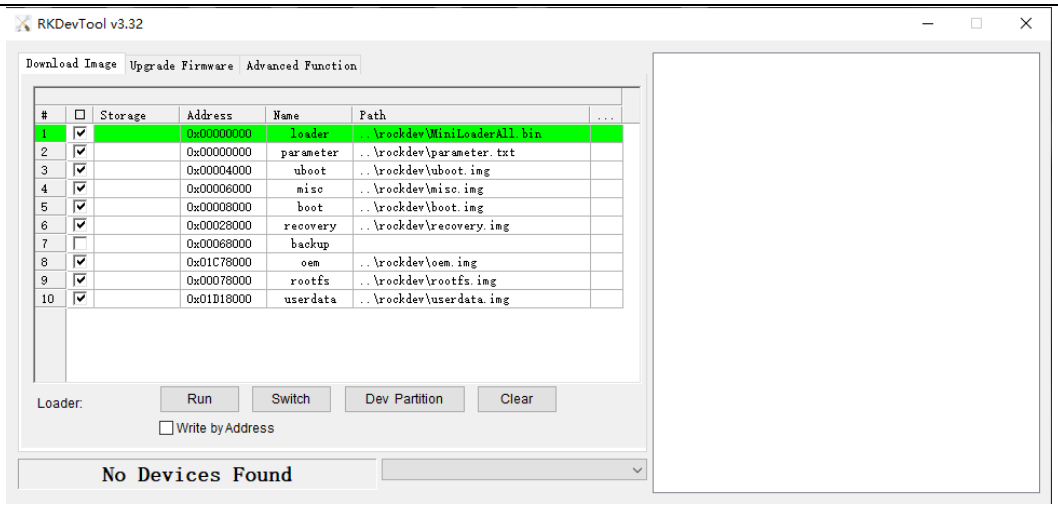
3.2 Burn firmware

Environment: Windows OS (Operating System).

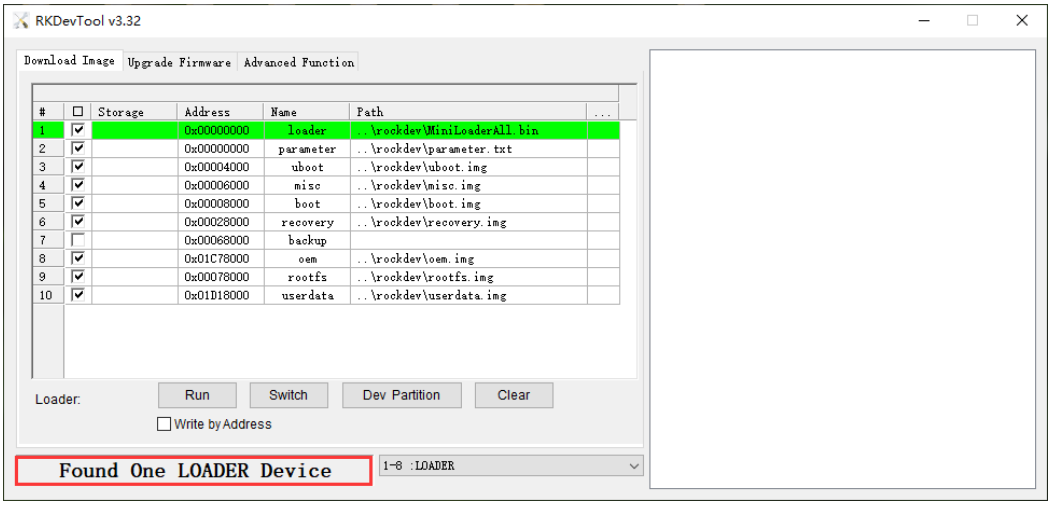
3.2.1 Burn Update.img Firmware

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

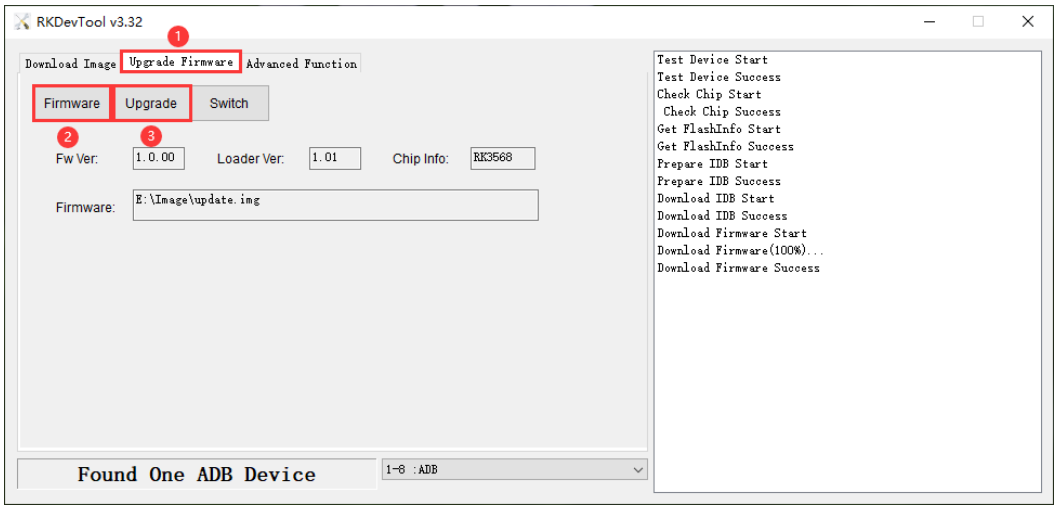
Step 2: Open *RKDevTool\RKDevTool_Release\RKDevTool.exe*.



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.

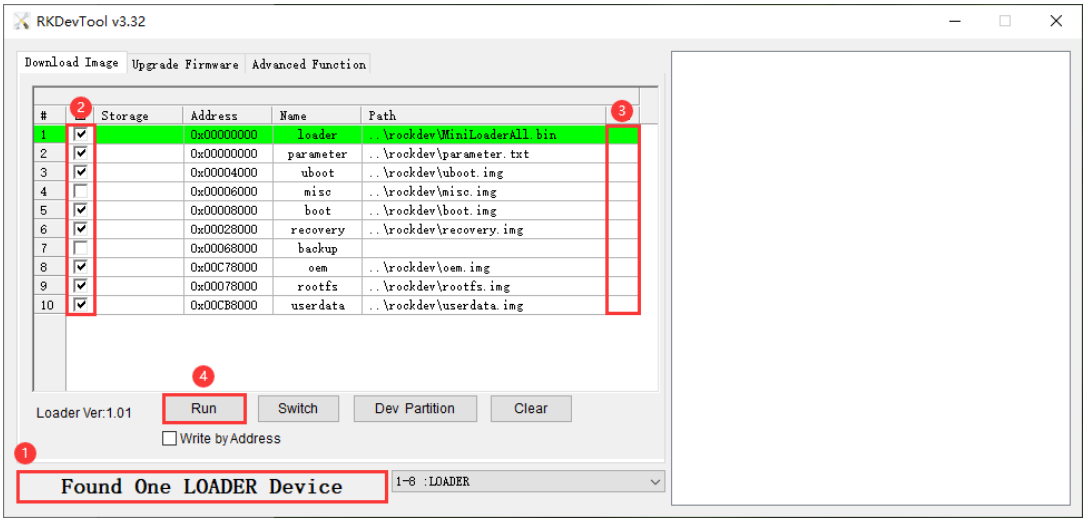
3.2.2 Burn Split Firmware

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

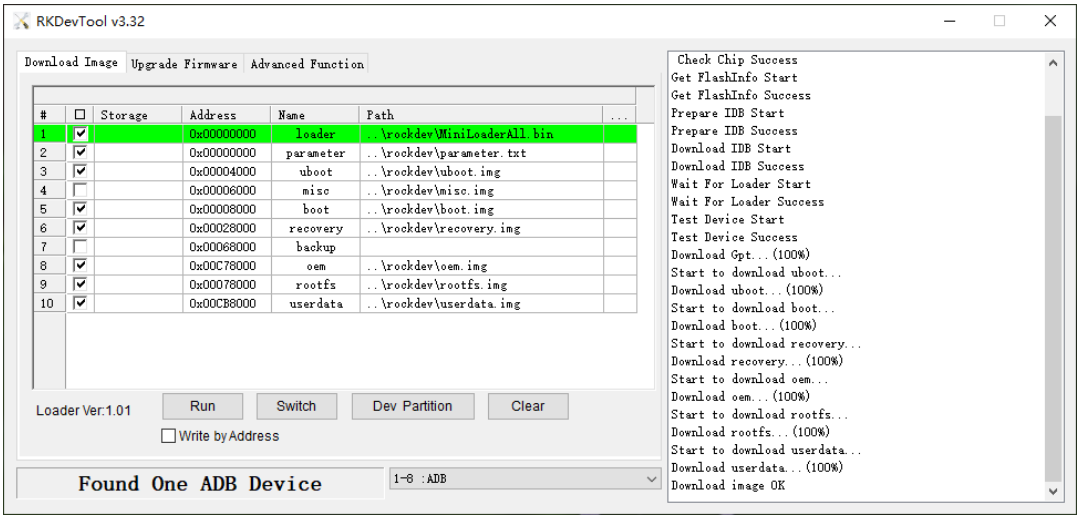
Step 2: Check the partitions to be flashed, multiple partitions can be selected.

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 EM3568_Linux6.1-rk*.tar.bz2
$ cd EM3568_Linux6.1-rkr5/
```

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.

• To use LVDS (1280x800) as the display, select:

2. boardcon_rk3568_em3568_v4_v2_lvds_defconfig

• To use MIPI (800x1280) as the display, select:

3. boardcon_rk3568_em3568_v4_v2_mipi_defconfig

Example (MIPI display):

.

```
liuyuan@boardcon:~/opt/EM3568/Linux6.1/linux6.1-rkr5/bcn0/EM3568_Linux6.1-rkr5$ ./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/liuyuan/opt/EM3568/Linux6.1/linux6.1-rkr5/bcn0/EM3568_Linux6.1-
rkr5/output/sessions/2025-08-08_09-43-16
Pick a defconfig:
1. rockchip_defconfig
2. boardcon_rk3568_em3568_v4_v2_lvds_defconfig
3. boardcon_rk3568_em3568_v4_v2_mipi_defconfig
4. rockchip_rk3566_evb2_lp4x_v10_32bit_defconfig
5. rockchip_rk3566_evb2_lp4x_v10_defconfig
6. rockchip_rk3568_evb1_ddr4_v10_32bit_defconfig
7. rockchip_rk3568_evb1_ddr4_v10_defconfig
8. rockchip_rk3568_evb8_lp4_v10_32bit_defconfig
9. rockchip_rk3568_evb8_lp4_v10_defconfig
10. rockchip_rk3568_pcie_ep_lp4x_v10_defconfig
Which would you like? [1]: 3
Switching to defconfig: /home/liuyuan/opt/EM3568/Linux6.1/linux6.1-rkr5/bcn0/EM3568_Linux6.1-
rkr5/device/rockchip/.chip/boardcon_rk3568_em3568_v4_v2_mipi_defconfig
#
# configuration written to /home/liuyuan/opt/EM3568/Linux6.1/linux6.1-rkr5/bcn0/EM3568_Linux6.1-
rkr5/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

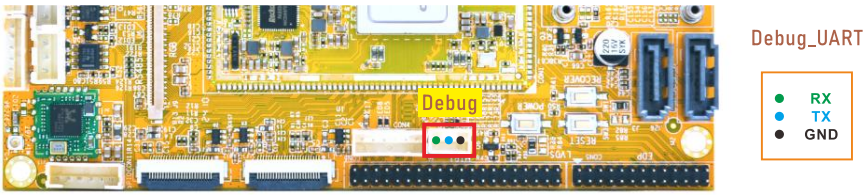
To generate firmware, execute the following command:

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

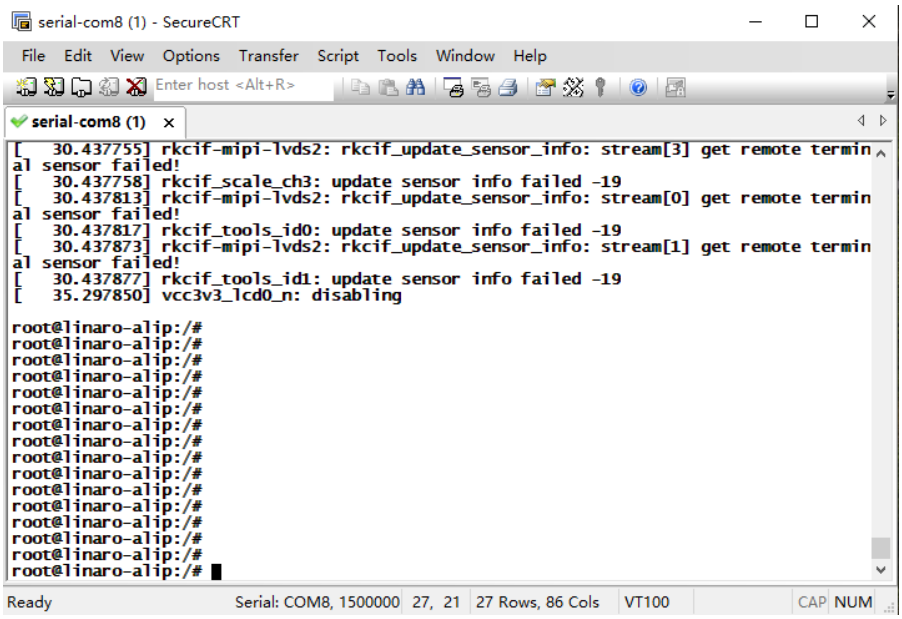
Images and **update.img** are generated in *rockdev/* directory.

6.Debian12 Test

6.1 Serial Terminal

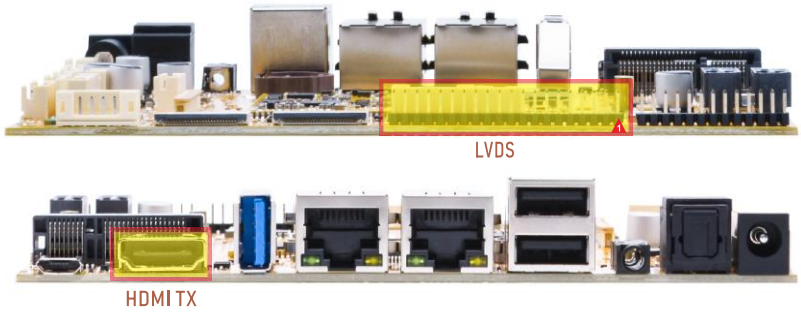


Connect the board and PC with USB Serial cable, then power on, the terminal will output boot information. The default baudrate is 1500000.



6.2 Display

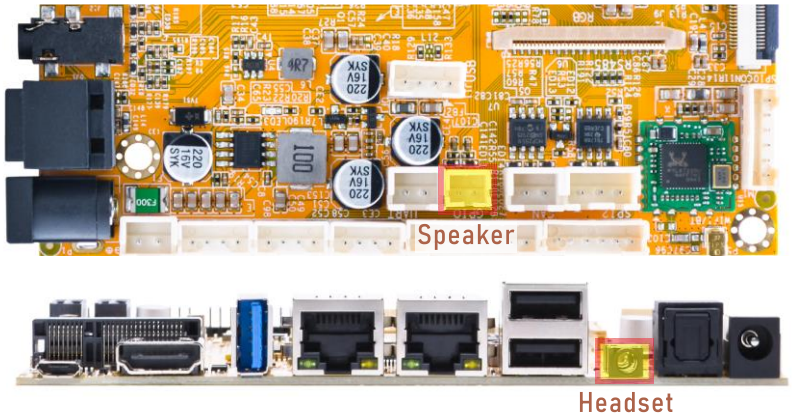
The EM3568 Debian12 system supports dual displays with independent output interfaces, including LVDS/MIPI and HDMI.



The display effect diagram is as follows:

6.3 Headset and Speaker

Step 1: Plug the headset into the headset jack and connect the speaker.



Step 2: View sound card.

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

```
root@linaro-alip:/# cat /proc/asound/cards
 0 [rockchiprk809  ]: rockchip-rk809 - rockchip-rk809
                      rockchip-rk809
 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.

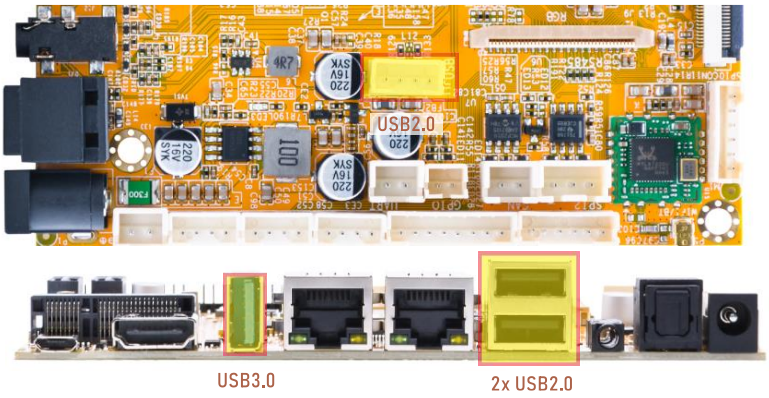
• When no headset is connected, audio is output through the speaker.

• Supplementary instructions on audio output:

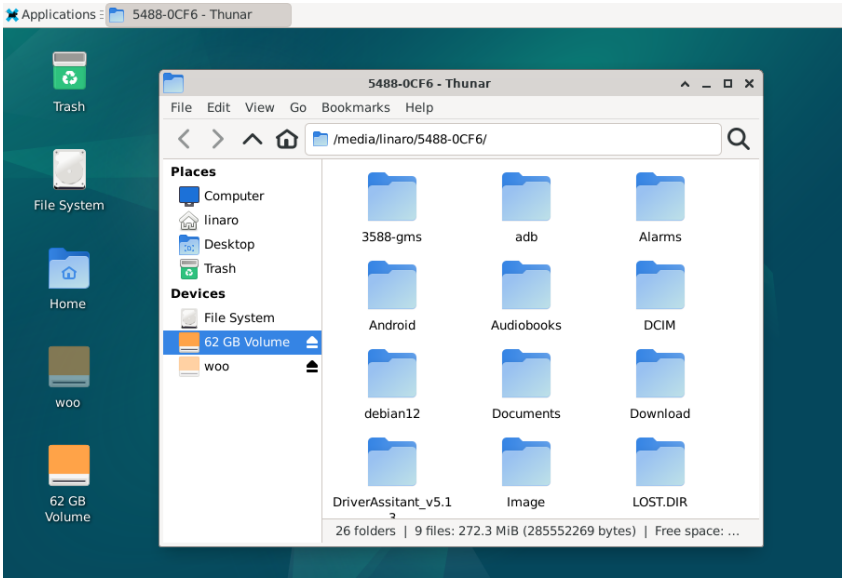
```
# aplay -Dhw:0,0 record.wav   // Headset/Speaker audio output
# aplay -Dhw:1,0 record.wav   // HDMI TX audio output
```

6.4 USB Host

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



After connecting the USB flash drive, 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.

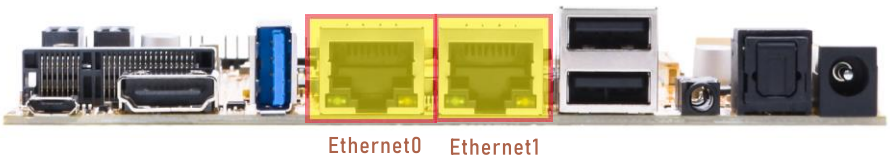
```
root@linaro-alip:/# [  100.401796] usb 5-1.1: new high-speed USB device number 5 using ehci-platform
[  100.540580] usb 5-1.1: New USB device found, idVendor=0dd8, idProduct=3b00, bcdDevice= 0.02
[  100.540631] usb 5-1.1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[  100.540654] usb 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=0dd8, 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.



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

```
root@linaro-alip:/# [  692.796677] rk_gmac-dwmac fe2a0000.ethernet end0: Link is Up - 1Gbps/Full - flow
control rx/tx
[  692.796927] IPv6: ADDRCONF(NETDEV_CHANGE): end0: link becomes ready
root@linaro-alip:/# [  701.021088] rk_gmac-dwmac fe010000.ethernet end1: Link is Up - 1Gbps/Full - flow
control rx/tx
[  701.021324] IPv6: ADDRCONF(NETDEV_CHANGE): end1: link becomes ready
```

Step 2: View network interface information.

```
# ifconfig
```

```
root@linaro-alip:/# ifconfig
end0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.166  netmask 255.255.255.0  broadcast 192.168.0.255
        inet6 fe80::409e:9682:242:7712  prefixlen 64  scopeid 0x20<link>
        ether 3a:1a:24:6f:bd:ba  txqueuelen 1000  (Ethernet)
        RX packets 113  bytes 13038 (12.7 KiB)
        RX errors 0  dropped 3  overruns 0  frame 0
        TX packets 89  bytes 8284 (8.0 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 56

end1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.167  netmask 255.255.255.0  broadcast 192.168.0.255
        inet6 fe80::df1f:fec7:a33b:72c5  prefixlen 64  scopeid 0x20<link>
        ether 3e:1a:24:6f:bd:ba  txqueuelen 1000  (Ethernet)
        RX packets 8  bytes 1044 (1.0 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 12  bytes 1370 (1.3 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 54
```

Step 3: Network connection test.

```
# ping -I end0 www.armdesigner.com
# ping -I end1 www.armdesigner.com
```

```
root@linaro-alip:/# ping -I end0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.166 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=205 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=204 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=205 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=205 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=47 time=205 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=47 time=205 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=47 time=205 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6003ms
rtt min/avg/max/mdev = 204.492/204.793/205.157/0.237 ms
root@linaro-alip:/#
root@linaro-alip:/#
root@linaro-alip:/# ping -I end1 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.167 end1: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=47 time=207 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=47 time=204 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=47 time=206 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=47 time=205 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=47 time=205 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=47 time=205 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=47 time=205 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6009ms
rtt min/avg/max/mdev = 204.464/205.261/207.274/0.917 ms
```

6.6 ADB

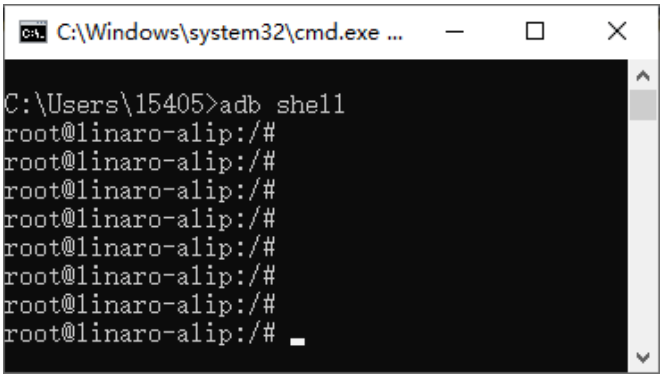
Step 1: Connect the board and PC host with Micro usb cable.

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 command to enable ADB.

```
# adb shell
```

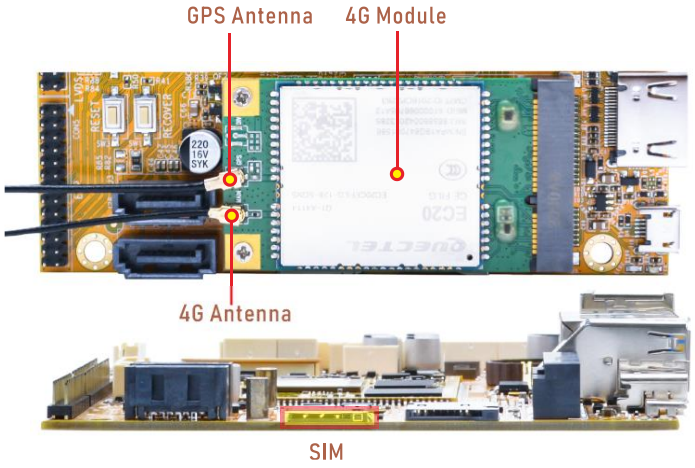


6.7 4G & GPS

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)
nocrtscts              # (from /etc/ppp/peers/quectel-ppp)
modem          # (from /etc/ppp/peers/quectel-ppp)
asyncmap 0             # (from /etc/ppp/options)
lcp-echo-failure 4             # (from /etc/ppp/options)
lcp-echo-interval 30           # (from /etc/ppp/options)
hide-password          # (from /etc/ppp/peers/quectel-ppp)
novj           # (from /etc/ppp/peers/quectel-ppp)
novjccomp              # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-local              # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-remote             # (from /etc/ppp/peers/quectel-ppp)
ipparam 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)
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 <asyncmap 0x0> <magic 0x6ff22c2e> <pcomp> <accomp>]
rcvd [LCP ConfReq id=0x0 <asyncmap 0x0> <auth chap MD5> <magic 0x3b1465ce> <pcomp> <accomp>]
sent [LCP ConfAck id=0x0 <asyncmap 0x0> <auth chap MD5> <magic 0x3b1465ce> <pcomp> <accomp>]
```

Step 2: Check the status of the network interfaces.

```
# ifconfig
```

```
root@linaro-alip:/# ifconfig
ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST>  mtu 1500
        inet 10.33.147.246  netmask 255.255.255.255  destination 10.64.64.64
        ppp  txqueuelen 3  (Point-to-Point Protocol)
        RX packets 141  bytes 10464 (10.2 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 180  bytes 12814 (12.5 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 10.33.147.246 ppp0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=47 time=212 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=47 time=210 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=47 time=209 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=47 time=208 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=47 time=206 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=47 time=229 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=47 time=208 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=8 ttl=47 time=207 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=9 ttl=47 time=220 ms
^C
--- www.armdesigner.com ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 8010ms
rtt min/avg/max/mdev = 206.463/211.970/228.782/7.196 ms
```

6.7.2 GPS Test

Step 1: Enable GPS functionality.

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

Step 2: Read GPS data.

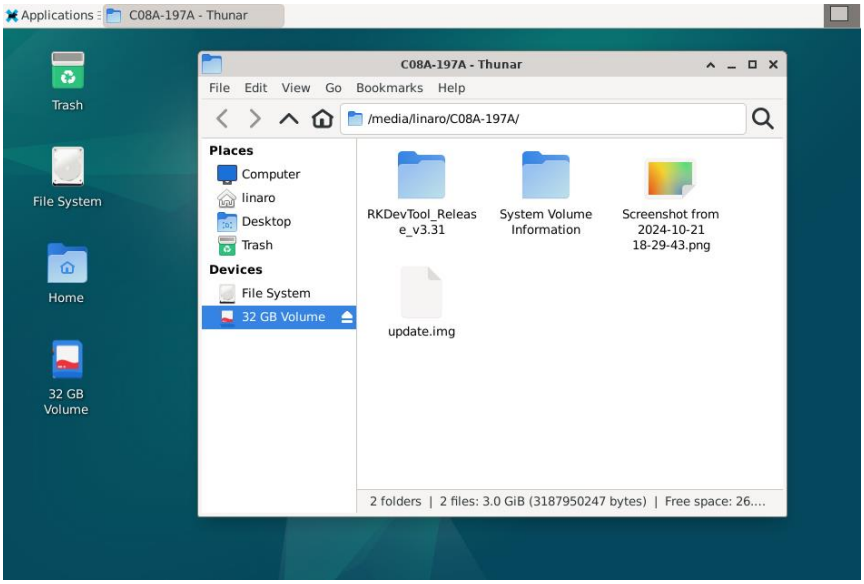
```
# cat /dev/ttyUSB1
```

```
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
```

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.

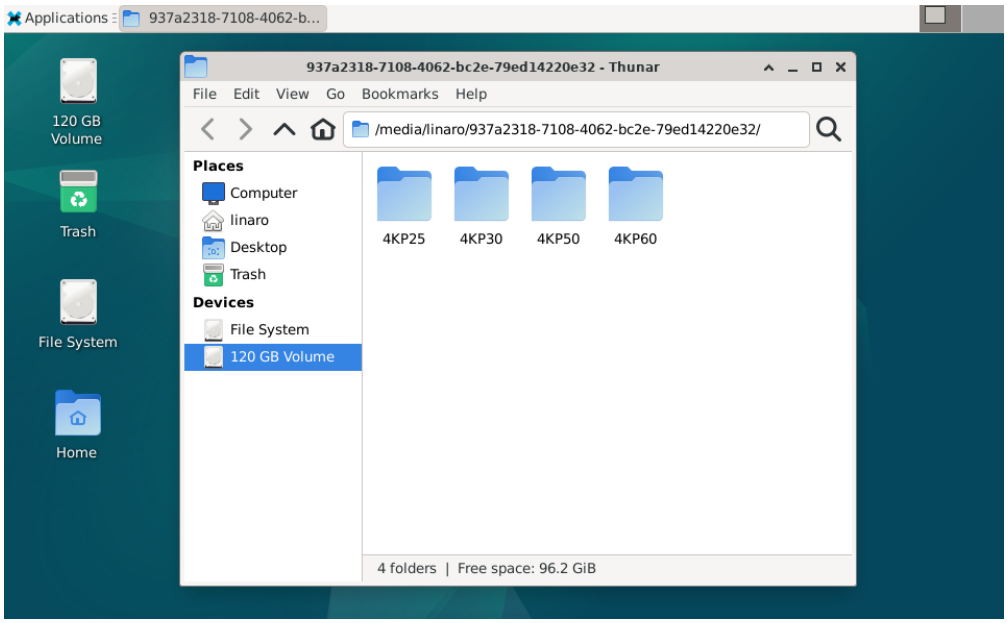


6.9 SATA

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.

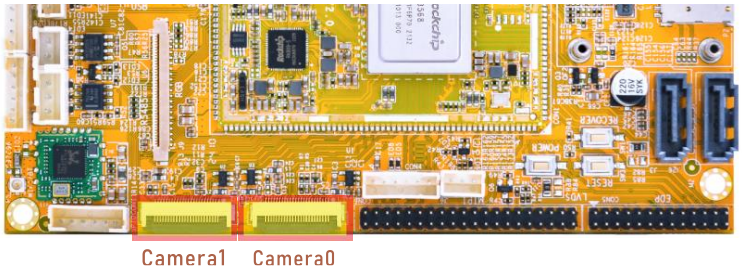


Note: If devices that are not in ext4 format, the user can choose to format them on the board. After formatting, the files on the device will be permanently lost, so please proceed with caution.

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

6.10 Camera

The EM3568 Debian12 system is configured with two cameras (ov13850) by default. To preview them normally, please make sure both cameras are connected.



Step 1: View the device channel.

```
# grep "" /sys/class/video4linux/v*/name | grep mainpath
# grep "" /sys/class/video4linux/v*/name | grep selfpath
```

```
root@linaro-alip:/# grep "" /sys/class/video4linux/v*/name | grep mainpath
/sys/class/video4linux/video18/name:rkisp_mainpath
/sys/class/video4linux/video8/name:rkisp_mainpath
root@linaro-alip:/# grep "" /sys/class/video4linux/v*/name | grep selfpath
/sys/class/video4linux/video19/name:rkisp_selfpath
/sys/class/video4linux/video9/name:rkisp_selfpath
```

• **Camera0** corresponds to the device node **/dev/video8** or **/dev/video9**.

• **Camera1** corresponds to the device node **/dev/video18** or **/dev/video19**.

• The following test uses Camera0 as an example.

Step 2: Preview camera.

```
# gst-launch-1.0 v4l2src device=/dev/video8 ! video/x-
raw,format=NV12,width=1280,height=800, framerate=30/1 ! xvimagesink
```

```
root@linaro-alip:/# gst-launch-1.0 v4l2src device=/dev/video8 ! video/x-
raw,format=NV12,width=1280,height=800, framerate=30/1 ! xvimagesink
Setting pipeline to PAUSED ...-1.0 v4l2src device=/dev/video8 ! video/x-
raw,format=NV12,width=1280,height=800, framerate=30/1 ! xvimagesink
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
[  390.346464] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[  390.377996] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
[  390.378111] rockchip-csi2-dphy csi2-dphy1: csi2_dphy_s_stream stream on:1, dphy1, ret 0
[  390.435308] rkisp-vir0: tx stream:4 lose frame:0, isp state:0x20001 frame:0
Redistribute latency...
0:00:05.9 / 99:99:99.
```

Step 3: Record the video.

```
# gst-launch-1.0 v4l2src device=/dev/video8 num-buffers=100 ! \
video/x-raw,format=NV12,width=1920,height=1088,framerate=30/1 ! \
videoconvert ! mpph264enc ! h264parse ! mp4mux ! \
filesink location=/tmp/h264.mp4
```

```
root@linaro-alip:/# gst-launch-1.0 v4l2src device=/dev/video8 num-buffers=100 ! \
video/x-raw,format=NV12,width=1920,height=1088,framerate=30/1 ! \-buffers=100 ! \
videoconvert ! mpph264enc ! h264parse ! mp4mux ! \merate=30/1 ! \
filesink location=/tmp/h264.mp44parse ! mp4mux ! \
Setting pipeline to PAUSED ...4
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
New clock: GstSystemClock
[ 1629.373671] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[ 1629.384098] rkisp rkisp-vir0: first params buf queue
[ 1629.384248] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
[ 1629.384299] rockchip-csi2-dphy csi2-dphy1: csi2_dphy_s_stream stream on:1, dphy1, ret 0
[ 1629.456547] rkisp-vir0: tx stream:4 lose frame:0, isp state:0x20001 frame:12
Redistribute latency...
Redistribute latency...
0:00:02.3 / 99:99:99.
```

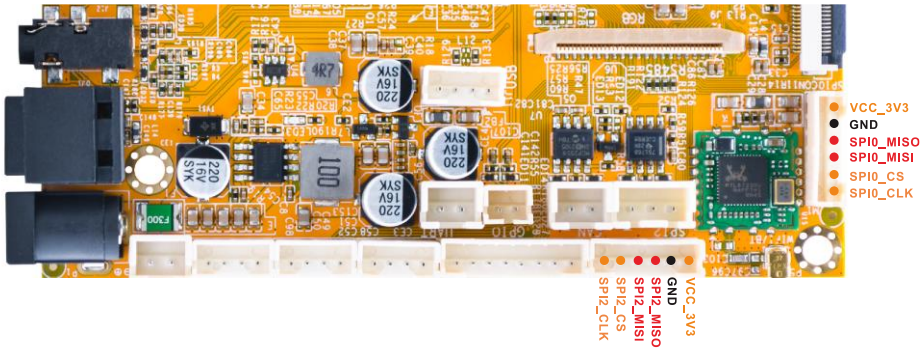
Step 4: Take photos.

```
# gst-launch-1.0 -v v4l2src device=/dev/video8 num-buffers=10 ! \
video/x-raw,format=NV12,width=1280,height=800 ! mppjpegenc ! \
multifilesink location=/tmp/test%05d.jpg
```

```
root@linaro-alip:/# gst-launch-1.0 -v v4l2src device=/dev/video8 num-buffers=10 ! \
video/x-raw,format=NV12,width=1280,height=800 ! mppjpegenc ! \o8 num-buffers=10 ! \
multifilesink location=/tmp/test%05d.jpgt=800 ! mppjpegenc ! \
Setting pipeline to PAUSED ...st%05d.jpg
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
/GstPipeline:pipeline0/GstV4l2Src:v4l2src0: crop-bounds = < (int)0, (int)0, (int)2112, (int)1568 >
New clock: GstSystemClock
/GstPipeline:pipeline0/GstV4l2Src:v4l2src0.GstPad:src: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstCapsFilter:capsfilter0.GstPad:src: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMppJpegEnc:mppjpegenc0.GstPad:src: caps = image/jpeg, width=(int)1280,
height=(int)800, pixel-aspect-ratio=(fraction)1/1, framerate=(fraction)120/1, interlace-
mode=(string)progressive, colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMultiFileSink:multifilesink0.GstPad:sink: caps = image/jpeg, width=(int)1280,
height=(int)800, pixel-aspect-ratio=(fraction)1/1, framerate=(fraction)120/1, interlace-
mode=(string)progressive, colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMppJpegEnc:mppjpegenc0.GstPad:sink: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstCapsFilter:capsfilter0.GstPad:sink: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
[  929.451468] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[  929.471828] rkisp rkisp-vir0: first params buf queue
[  929.472125] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
```

6.11 SPI

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.

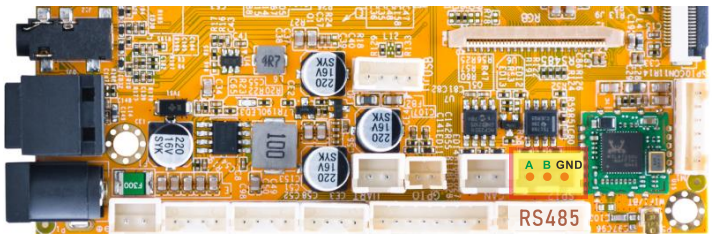
• **spidev2.0_test** corresponds to the SPI2 device.

• The following test uses SPI0 as an example.

```
# spidev0.0_test
```

```
root@linaro-alip:/# spidev0.0_test
spi mode: 0
bits per word: 8
max speed: 500000 Hz (500 KHz)

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 FF FF FF
DE AD BE EF BA AD
F0 0D
```

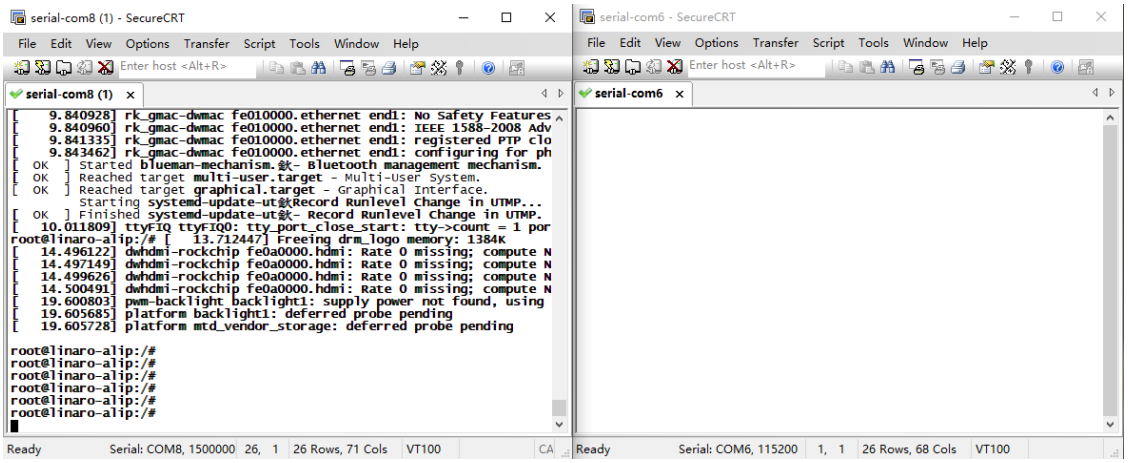
6.12 RS485



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

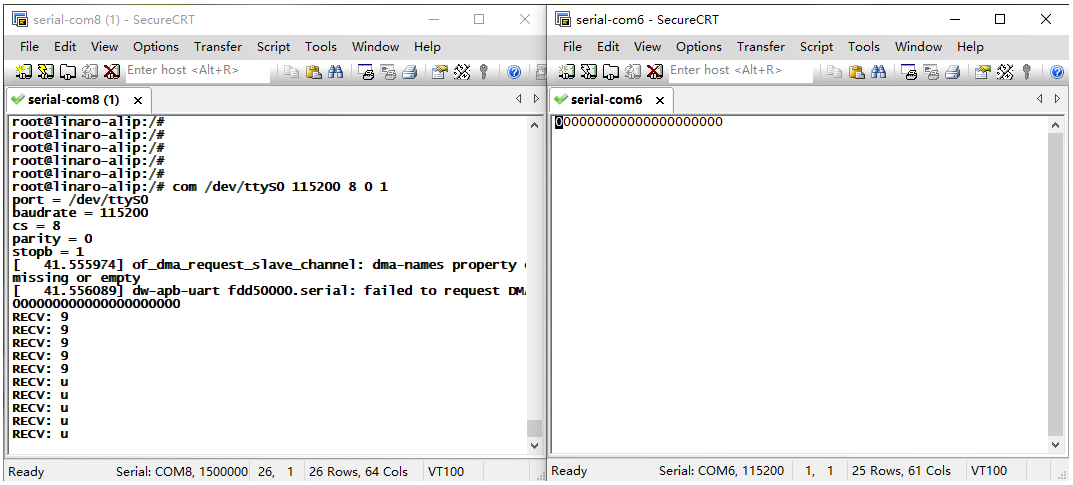
Step 2: Open the corresponding serial terminal, set the baud rate of the board to 1500000,

and set the baud rate of the RS485 test tool to 115200.

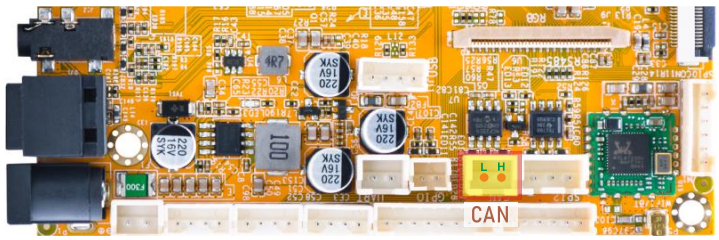


Step 3: Execute the following command on the board to test the RS485 transmission and reception functionality.

```
# com /dev/ttyS0 115200 8 0 1
```

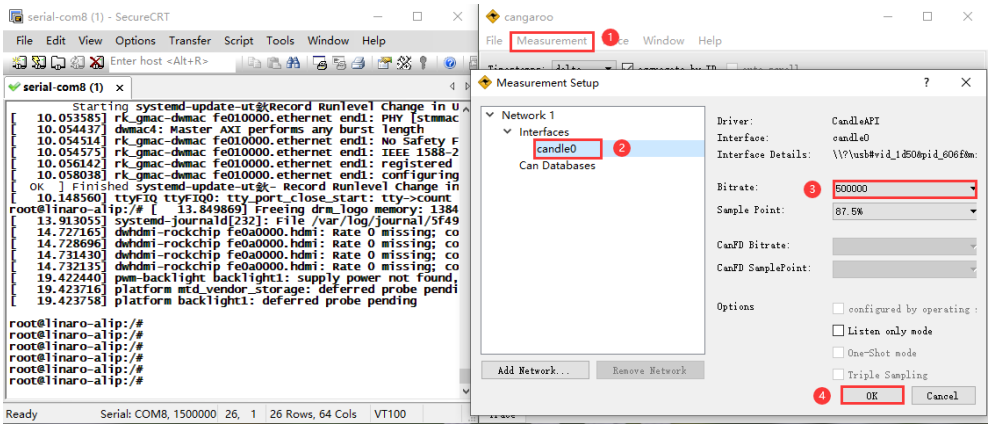


6.13 CAN



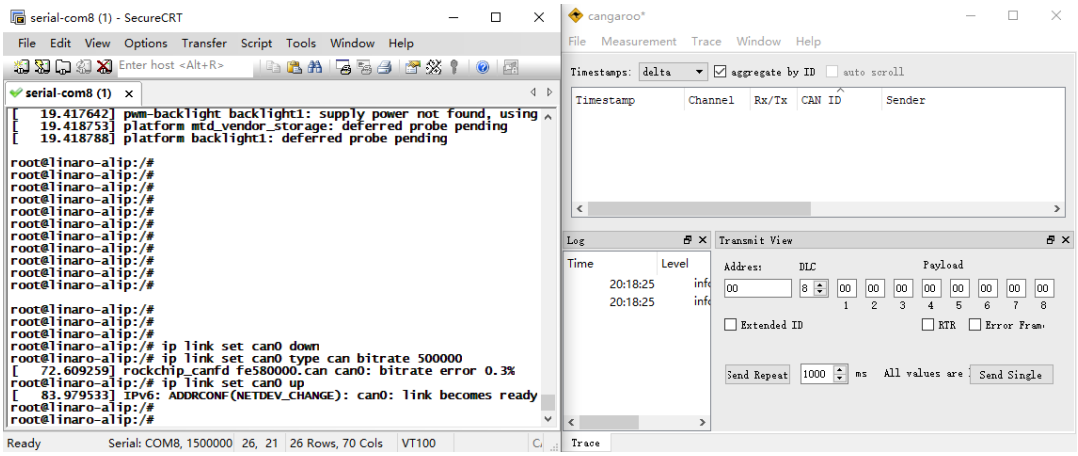
Step 1: Connect the CAN test tool to the board as shown in the diagram below.

Step 2: Open the CAN test software and set the baud rate to 500000.



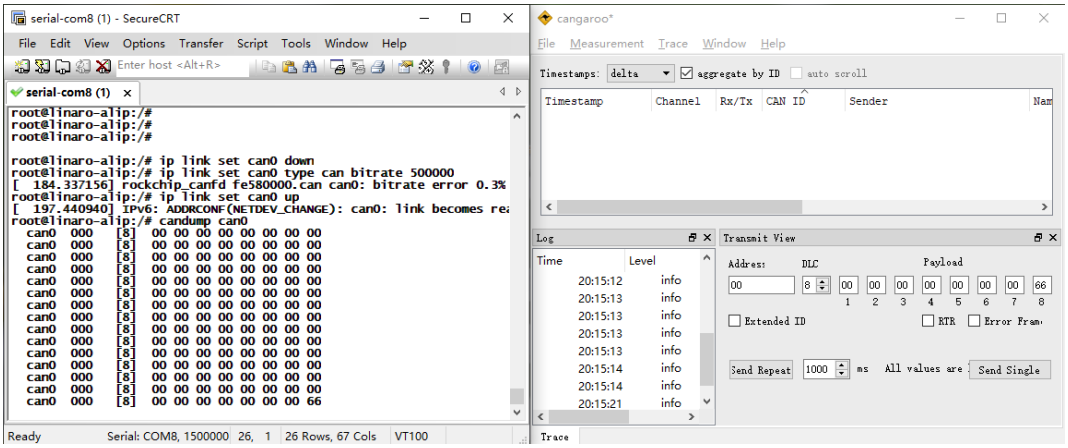
Step 3: Configure and activate the CAN network, setting the bitrate to 500000.

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



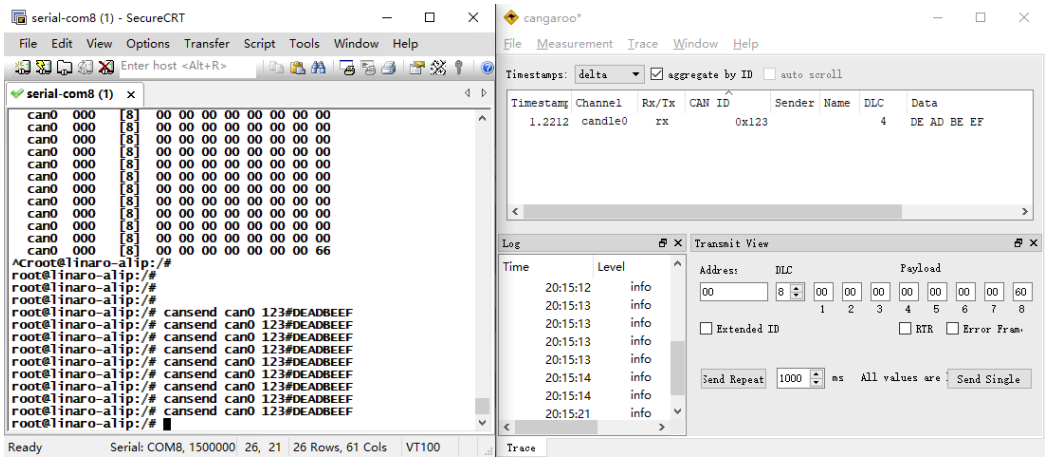
Step 4: Configure CAN as the receiver.

```
# candump can0
```



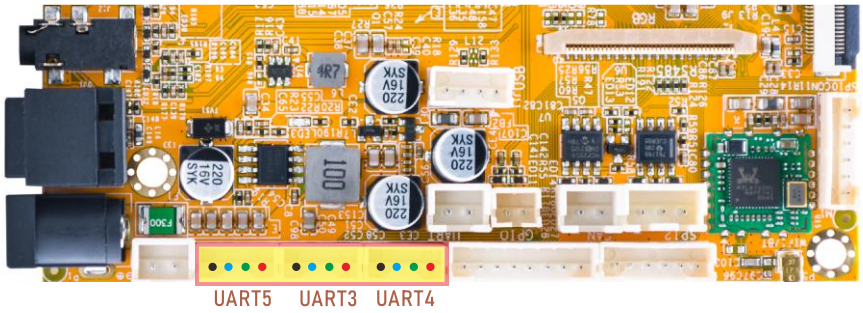
Step 5: Configure CAN as the sender.

```
# cansend can0 123#DEADBEEF
```



6.14 UART

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



Step 2: UART4 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
rrrrrrrrrr
RECV: rrrrrrrrrr
88888888
RECV: 88888888
opuuy
RECV: opuuy
0000
```

Step 3: UART3 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 = 1
rrrrrrrrrrr0
RECV: rrrrrrrrrrr0
56565656
RECV: 56565656
yu1
RECV: yu1
```

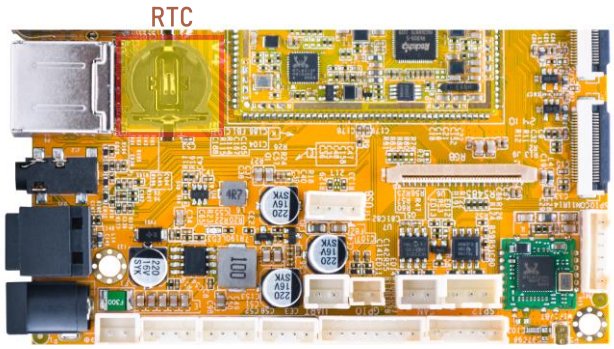
Step 4: UART5 test.

```
# 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
rtrtrtrt44
RECV: rtrtrtrt44
5656pp
RECV: 5656pp
tt
RECV: tt
55
RECV: 55
```

6.15 RTC

Step 1: Install the coin cell battery.



Step 2: Set the system time.

```
# date -s "2024-11-27 14:45:30"
```

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

```
# hwclock -w
```

Step 4: Display the current hardware clock time.

```
# hwclock
```

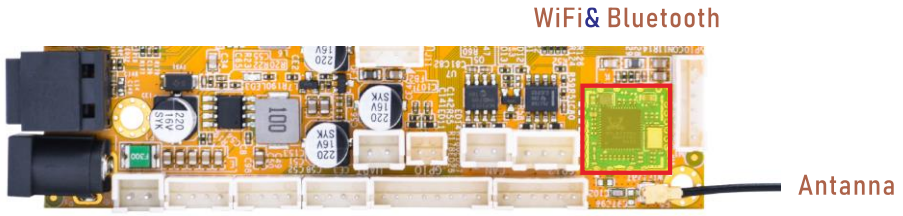
```
root@linaro-alip:/# date -s "2024-11-27 14:45:30"
Wed Nov 27 14:45:30 UTC 2024
root@linaro-alip:/# hwclock -w
root@linaro-alip:/# hwclock
2024-11-27 14:45:36.256490+00:00
root@linaro-alip:/# hwclock
2024-11-27 14:46:04.285064+00:00
root@linaro-alip:/# hwclock
2024-11-27 14:46:35.383927+00:00
```

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
2024-11-27 15:22:23.071969+00:00
root@linaro-alip:/# hwclock
2024-11-27 15:23:18.106270+00:00
root@linaro-alip:/# hwclock
2024-11-27 15:24:18.183721+00:00
root@linaro-alip:/# hwclock
2024-11-27 15:27:41.025372+00:00
```

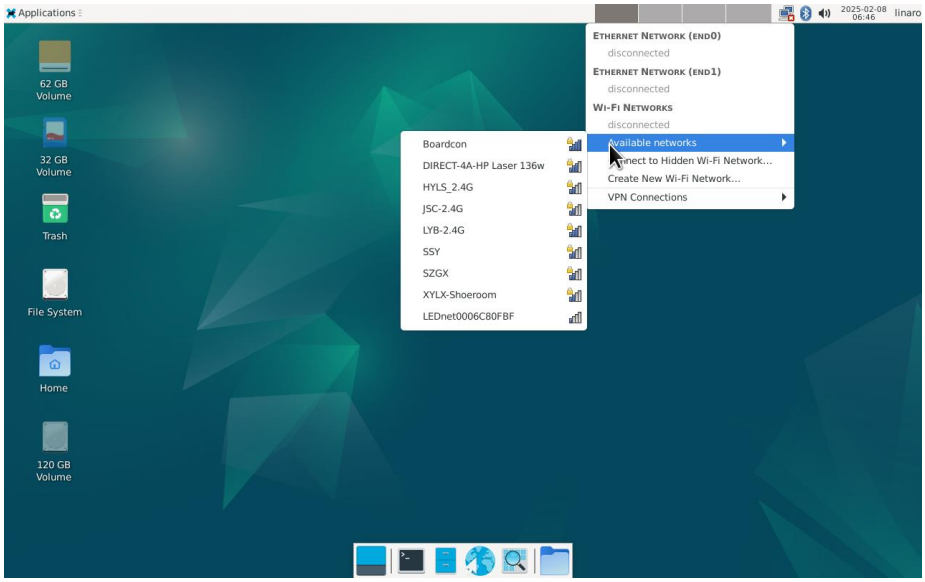
6.16 WiFi & Bluetooth

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

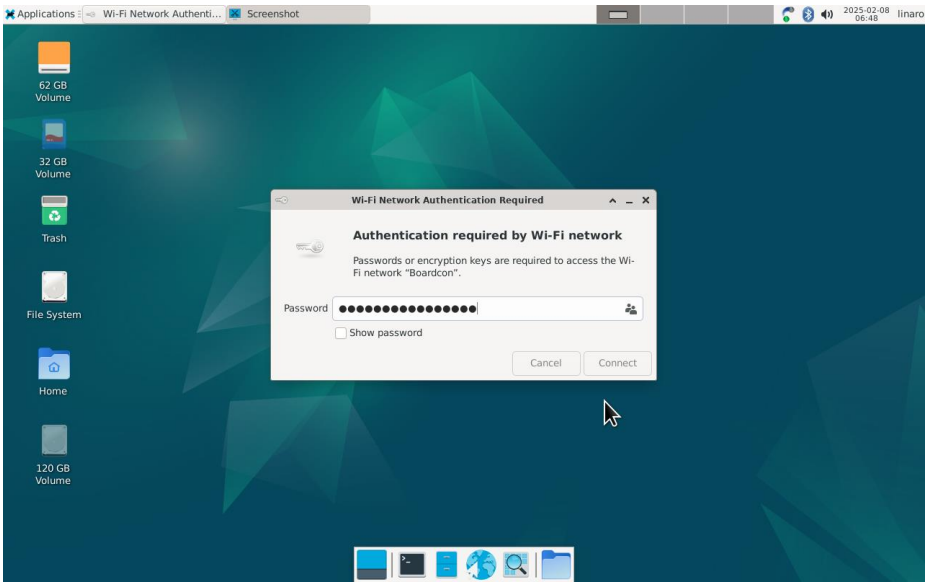


6.16.1 WiFi

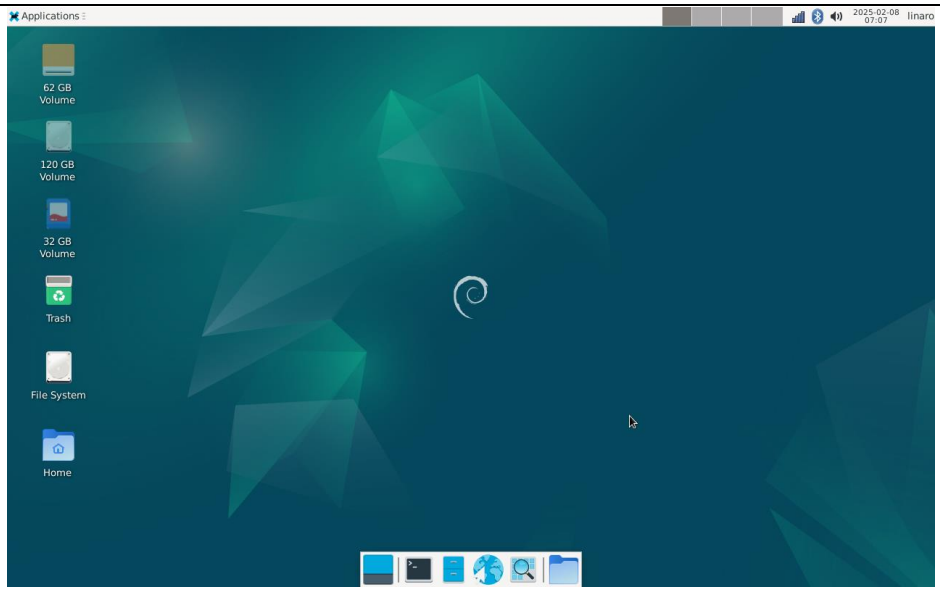
Step 1: Click the network icon in the top right corner of the interface, then select the **"Available Networks"** option to view the list of available hotspots.



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
```

```
root@linaro-alip:/# ifconfig
wlx9803cfe5e009: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.0.126  netmask 255.255.255.0  broadcast 192.168.0.255
        inet6 fe80::5ae:7d44:3d65:99f1  prefixlen 64  scopeid 0x20<link>
        ether 98:03:cf:e5:e0:09  txqueuelen 1000  (Ethernet)
        RX packets 412  bytes 59521 (58.1 KiB)
        RX errors 0  dropped 60  overruns 0  frame 0
        TX packets 150  bytes 17797 (17.3 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

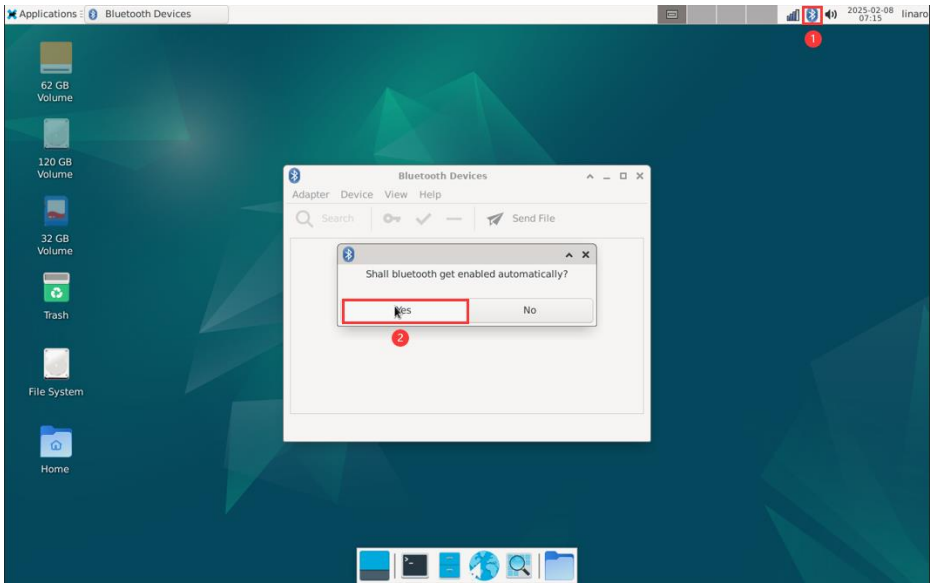
(2) Network connection test.

```
# ping -I wlx9803cfe5e009 www.armdesigner.com
```

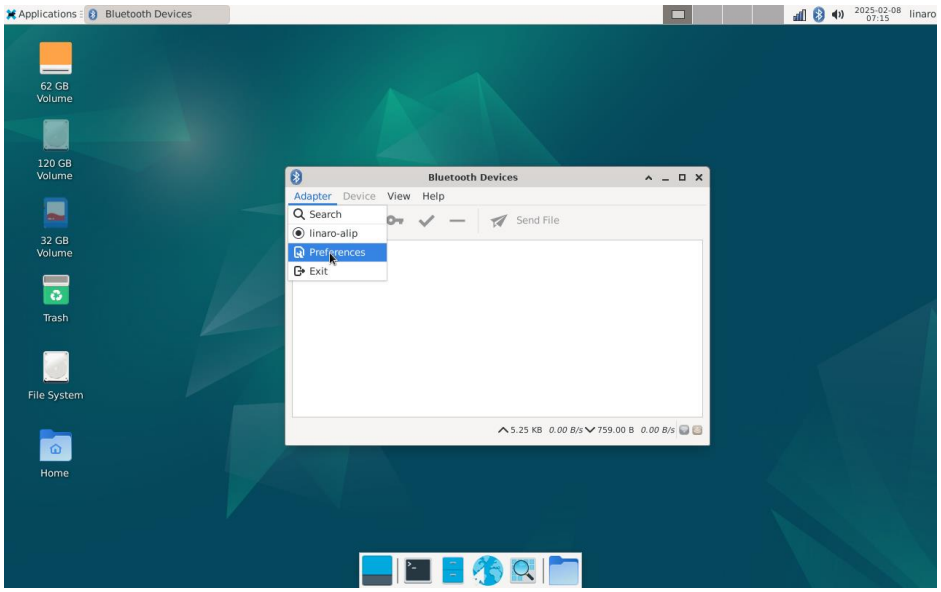
```
root@linaro-alip:/# ping -I wlx9803cfe5e009 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.126 wlx9803cfe5e009: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=279 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=212 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=193 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=188 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=189 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=192 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=8 ttl=48 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=9 ttl=48 time=282 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=10 ttl=48 time=192 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=11 ttl=48 time=192 ms
^C
--- www.armdesigner.com ping statistics ---
11 packets transmitted, 11 received, 0% packet loss, time 20423ms
rtt min/avg/max/mdev = 188.298/209.258/282.383/34.272 ms
```

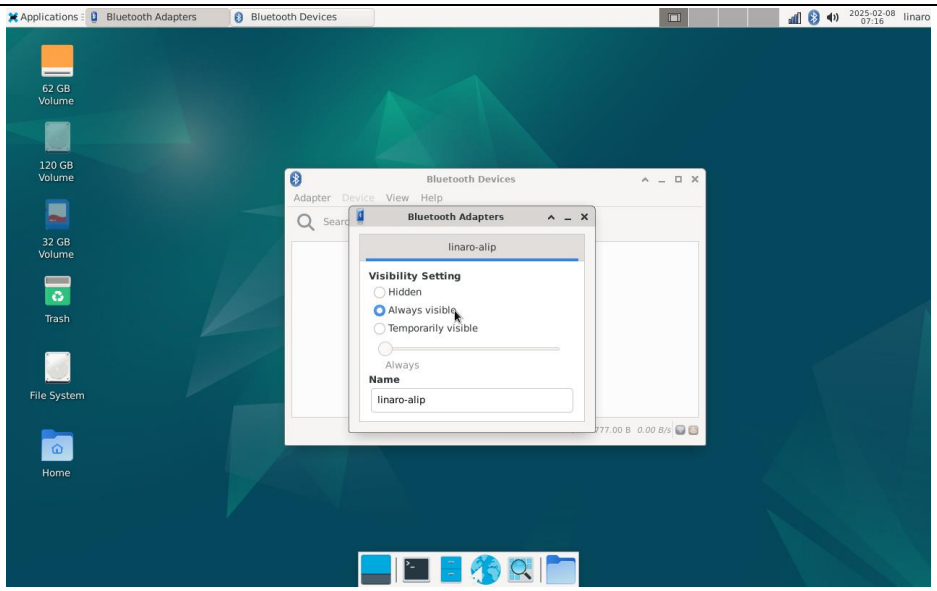
6.16.2 Bluetooth

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

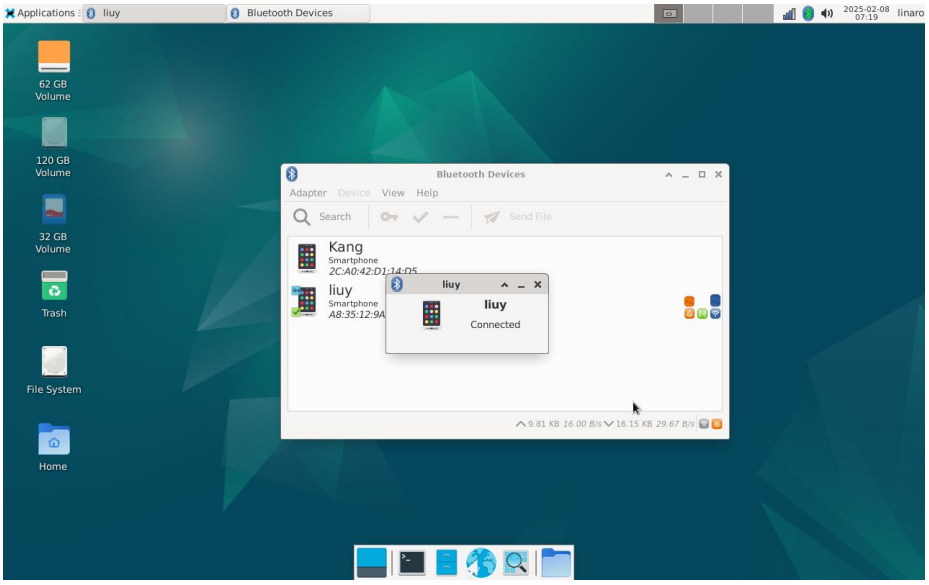


Step 2: The Bluetooth device name is hidden by default. Set it to be visible by clicking **Adapter** -> **Preferences** -> **Always visible**.





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.

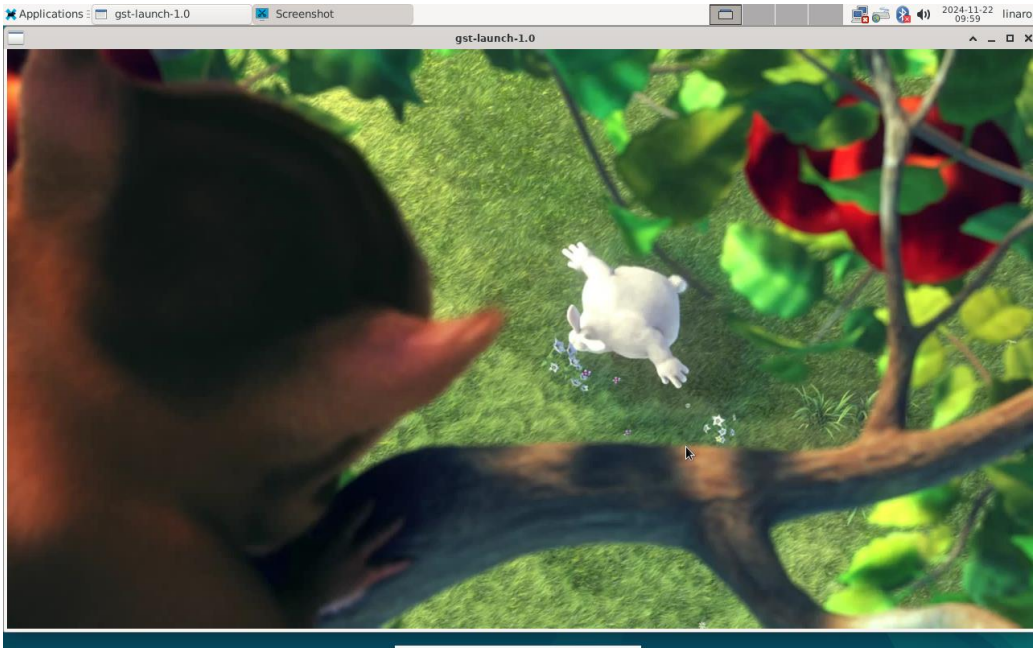
6.17 Video Playback

(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 %)
```

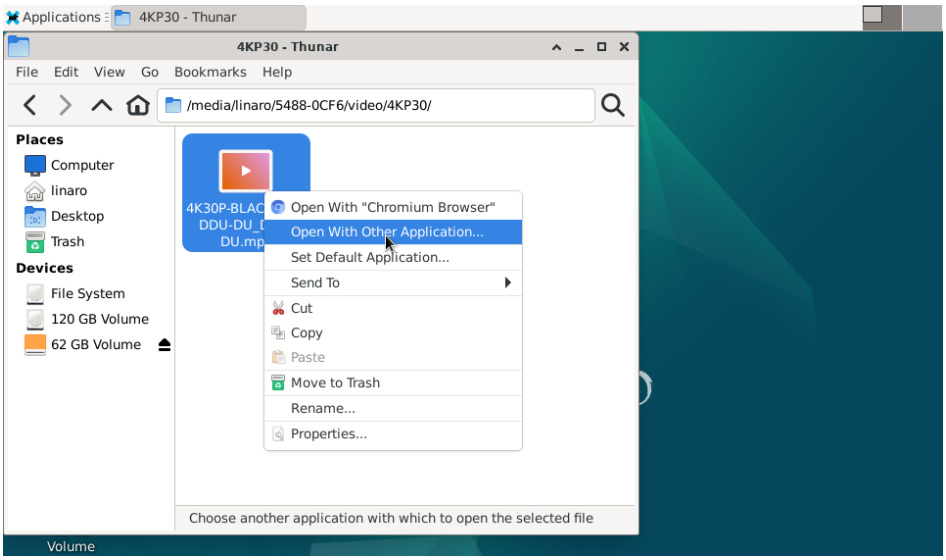


(2) Play the video using Google Chrome.

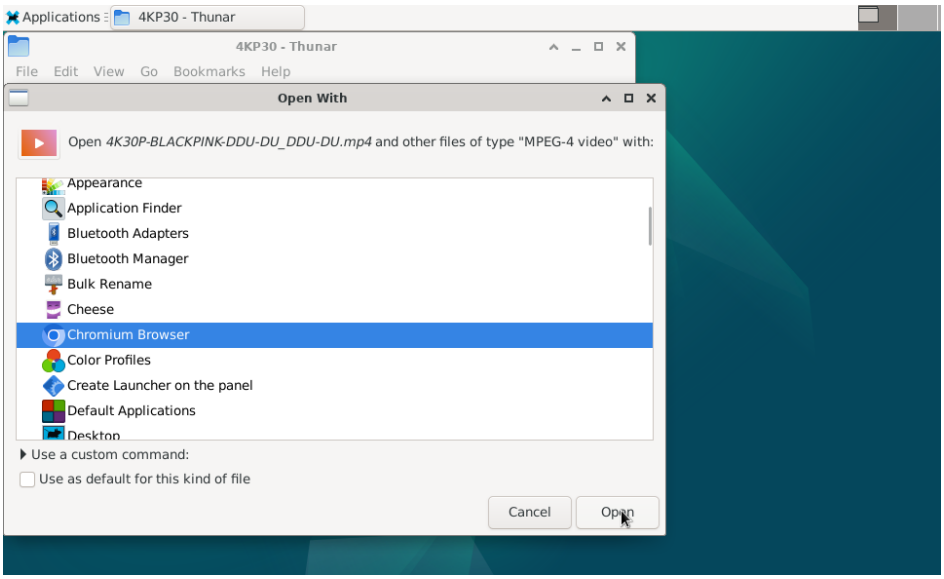
• Google Chrome supports video playback up to 4K at 60Hz, with support for the following decoding formats: VP8, H.264, H.265, VP9, and AV1.

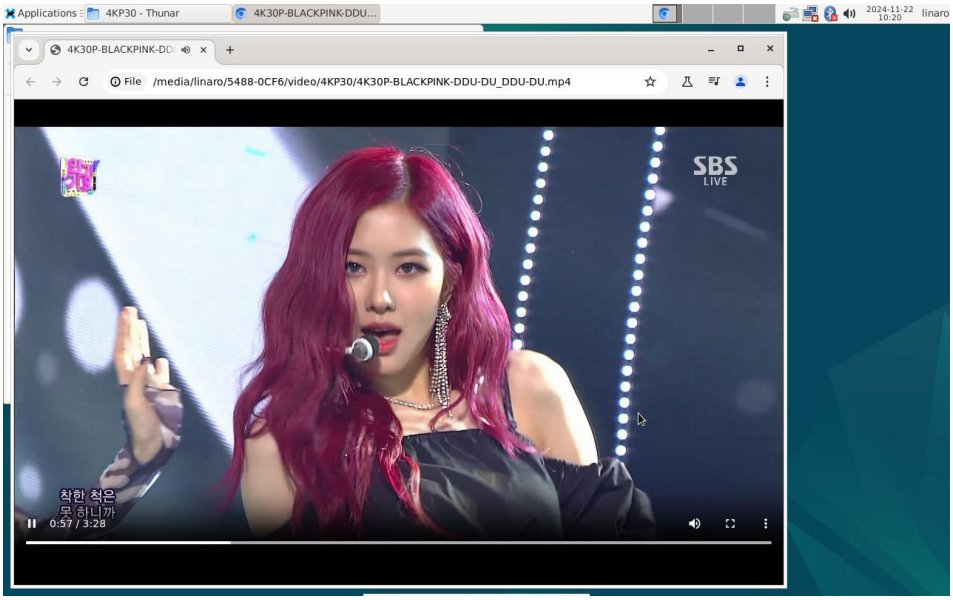
• However, it is only compatible with certain H.265 video files.

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.

```
# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
# gst-play-1.0 --flags=3 --videosink="kmssink plane-id=136" /media/linaro/5488-0CF6/video/4KP60/4KP60-exist.mp4  --audiosink="alsasink device=hw:0,0"
```

Command explanation:

• export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1: Open AFBC.

• --videosink="kmssink plane-id=136": Specifies the plane. Which can be viewed using the command: cat /sys/kernel/debug/dri/0/state | grep "plane\[".

• /media/linaro/5488-0CF6/video/4KP60/4KP60-exist.mp4: The media file path to be played.

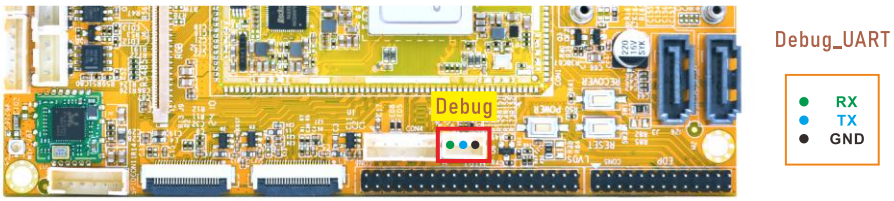
• --audiosink="alsasink device=hw:0,0": Specifies the audio output device as hw:0,0.

```
root@linaro-alip:/# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
gst-play-1.0 --flags=3 --videosink="kmssink plane-id=136" /media/linaro/5488-0CF6/video/4KP60/4KP60-exist.mp4  --audiosink="alsasink device=hw:0,0"
Press 'k' to see a list of keyboard shortcuts.ideosink="kmssink plane-id=136" /media/linaro/5488-0CF6/video/4KP60/4KP60-exist.mp4  --audiosink="alsasink device=hw:0,0"
Now playing /media/linaro/5488-0CF6/video/4KP60/4KP60-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...
0:00:39.6 / 0:04:01.9
```

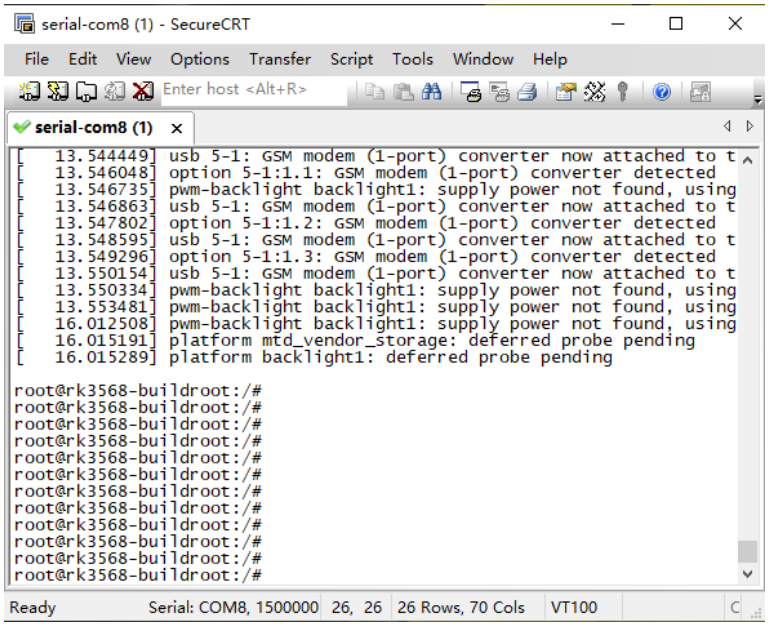
Note: Users can run the following command to switch video playback from the LVDS screen to the HDMI screen: echo off > /sys/class/drm/card0-LVDS-1/status. After executing this command, the LVDS screen will be turned off, and the video will be displayed on the HDMI screen.

7.Buildroot Test

7.1 Serial Terminal

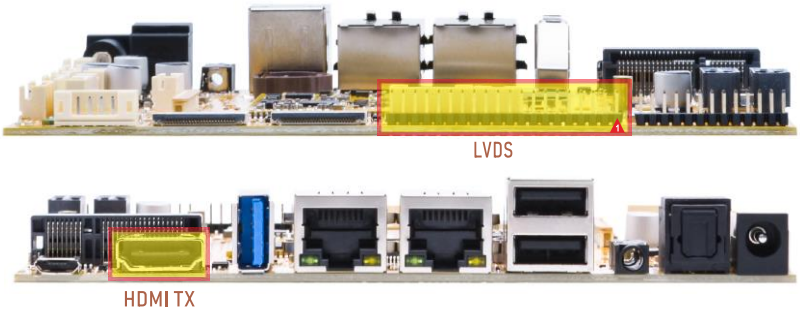


Connect the board and PC with USB Serial cable, then power on, the terminal will output boot information. The default baudrate is 1500000.



7.2 Display

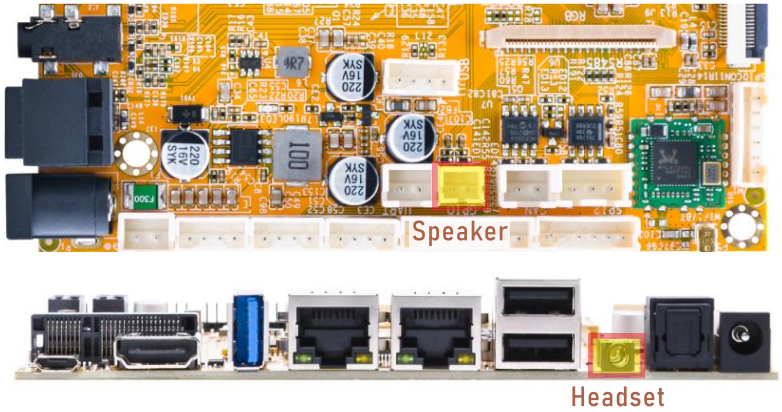
The EM3568 Buildroot system supports dual displays with independent output interfaces, including LVDS/MIPI and HDMI.



The display effect diagram is as follows:

7.3 Headset and Speaker

Step 1: Plug the headset into the headset jack and connect the speaker.



Step 2: View sound card.

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

```
root@rk3568-buildroot:/# cat /proc/asound/cards
 0 [rockchiprk809  ]: rockchip-rk809 - rockchip-rk809
                      rockchip-rk809
 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.

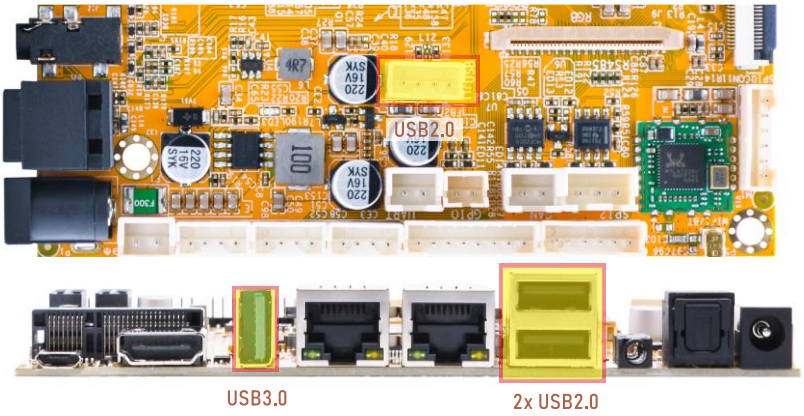
• When no headset is connected, audio is output through the speaker.

• 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
```

7.4 USB Host

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



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
```

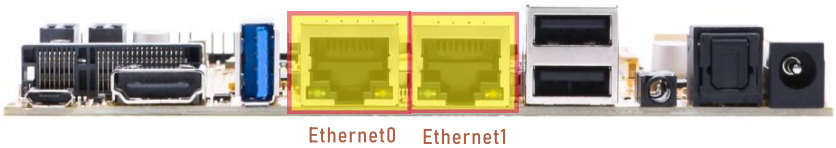
After connecting the USB flash drive, it will be automatically mounted, execute the following command to view the path where the device is mounted:

```
# df -h
```

```
root@rk3568-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  717M  5.0G  13% /
devtmpfs        967M  8.0K  967M   1% /dev
tmpfs           979M  136K  979M   1% /tmp
tmpfs           979M  548K  978M   1% /run
tmpfs           979M  144K  979M   1% /var/log
tmpfs           979M     0  979M   0% /dev/shm
/dev/mmcblk0p7  123M   12M  108M  10% /oem
/dev/mmcblk0p8  936M  340K  920M   1% /userdata
/dev/mmcblk1p1   30G  752K   30G   1% /mnt/sdcard
/dev/sdb1        58G   34G   25G  59% /mnt/udisk
/dev/sdc1        31G   20G   11G  66% /media/udisk1
```

7.5 Ethernet

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



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

```
[   33.614297] rk_gmac-dwmac fe010000.ethernet eth0: Link is Up - 1Gbps/Full - flow control rx/tx
[   33.614531] IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready

root@rk3568-buildroot:/# [   45.005735] rk_gmac-dwmac fe2a0000.ethernet eth1: Link is Up - 1Gbps/Full -
flow control rx/tx
[   45.005986] IPv6: ADDRCONF(NETDEV_CHANGE): eth1: link becomes ready
```

Step 2: View network interface information.

```
# ifconfig
```

```
root@rk3568-buildroot:/# ifconfig
eth0      Link encap:Ethernet  HWaddr 3E:1A:24:6F:BD:BA
          inet addr:192.168.0.167  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::c695:6602:8be2:319/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:89 errors:0 dropped:3 overruns:0 frame:0
          TX packets:11 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:26528 (25.9 KiB)  TX bytes:1410 (1.3 KiB)
          Interrupt:52

eth1      Link encap:Ethernet  HWaddr 3A:1A:24:6F:BD:BA
          inet addr:192.168.0.166  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::a62b:c29:f547:fea7/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:45 errors:0 dropped:1 overruns:0 frame:0
          TX packets:9 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:11322 (11.0 KiB)  TX bytes:1270 (1.2 KiB)
          Interrupt:54
```

Step 3: Network connection test.

```
# ping -I eth0 www.armdesigner.com
# ping -I eth1 www.armdesigner.com
```

```
root@rk3568-buildroot:/# ping -I eth0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.167 eth0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=174 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=173 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=177 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=174 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=173 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=177 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=174 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6380ms
rtt min/avg/max/mdev = 173.338/174.577/177.125/1.464 ms
root@rk3568-buildroot:/#
root@rk3568-buildroot:/# ping -I eth1 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.166 eth1: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=1191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=182 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=174 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=174 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=177 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=173 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=176 ms
^C
--- www.armdesigner.com ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6016ms
rtt min/avg/max/mdev = 173.469/320.831/1190.813/355.178 ms, pipe 2
root@rk3568-buildroot:/#
```

7.6 ADB

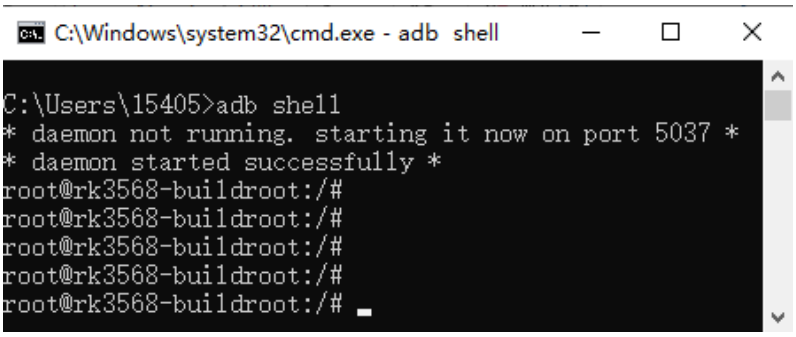
Step 1: Connect the board and PC host with Micro usb cable.

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 command to enable ADB.

```
# adb shell
```

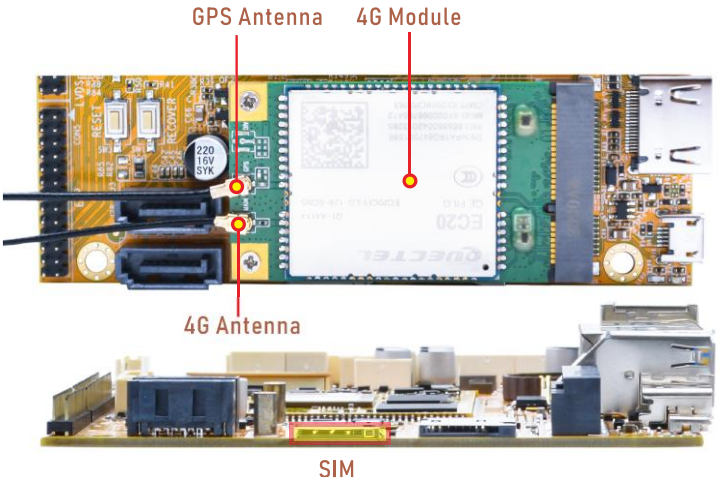


7.7 4G & GPS

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)
noccp           # (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
```

```
root@rk3568-buildroot:/# ifconfig
ppp0      Link encap:Point-to-Point Protocol
          inet addr:10.38.117.205  P-t-P:10.64.64.64  Mask:255.255.255.255
          UP POINTOPOINT RUNNING NOARP MULTICAST  MTU:1500  Metric:1
          RX packets:4 errors:0 dropped:0 overruns:0 frame:0
          TX packets:13 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:3
          RX bytes:52 (52.0 B)  TX bytes:184 (184.0 B)
```

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 10.38.117.205 ppp0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=46 time=488 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=46 time=388 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=46 time=346 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=46 time=290 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=46 time=569 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=46 time=528 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=46 time=496 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=8 ttl=46 time=463 ms
^C
--- www.armdesigner.com ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7082ms
rtt min/avg/max/mdev = 289.656/445.847/568.590/89.425 ms
```

7.7.2 GPS Test

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:/# 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.

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  716M  5.0G  13% /
devtmpfs        967M  8.0K  967M   1% /dev
tmpfs           979M  136K  979M   1% /tmp
tmpfs           979M  592K  978M   1% /run
tmpfs           979M  164K  979M   1% /var/log
tmpfs           979M     0  979M   0% /dev/shm
/dev/mmcblk0p8  936M  324K  936M   1% /userdata
/dev/mmcblk0p7  123M   12M  110M  10% /oem
/dev/mmcblk1p1   30G  752K   30G   1% /mnt/sdcard
/dev/sdb1        58G   34G   25G  59% /mnt/udisk
```
.

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
```

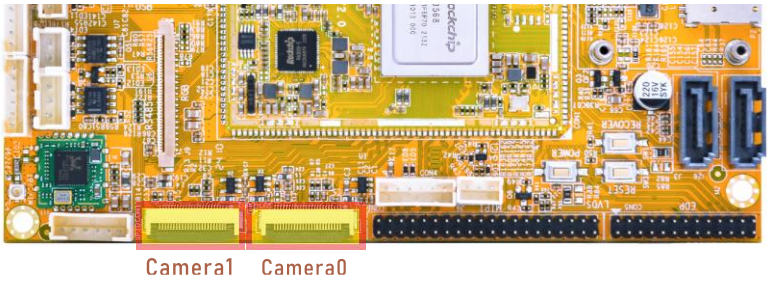
```
root@rk3568-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  716M  5.0G  13% /
devtmpfs        967M  8.0K  967M   1% /dev
tmpfs           979M  136K  979M   1% /tmp
tmpfs           979M  548K  978M   1% /run
tmpfs           979M  148K  979M   1% /var/log
tmpfs           979M     0  979M   0% /dev/shm
/dev/mmcblk0p8  936M  324K  936M   1% /userdata
/dev/mmcblk0p7  123M   12M  110M  10% /oem
/dev/sda        110G  7.8G   97G   8% /mnt/storage
/dev/mmcblk1p1   30G  752K   30G   1% /mnt/sdcard
/dev/sdc1        31G   20G   11G  66% /mnt/udisk
/dev/sdb1        58G   34G   25G  59% /media/udisk1
```

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/sda
```

7.10 Camera

The EM3568 Buildroot system is configured with two cameras (ov13850) by default. To preview them normally, please make sure both cameras are connected.



Step 1: View the device channel.

```
# grep "" /sys/class/video4linux/v*/name | grep mainpath
# grep "" /sys/class/video4linux/v*/name | grep selfpath
```

```
root@rk3568-buildroot:/# grep "" /sys/class/video4linux/v*/name | grep mainpath
/sys/class/video4linux/video18/name:rkisp_mainpath
/sys/class/video4linux/video8/name:rkisp_mainpath
root@rk3568-buildroot:/# grep "" /sys/class/video4linux/v*/name | grep selfpath
/sys/class/video4linux/video19/name:rkisp_selfpath
/sys/class/video4linux/video9/name:rkisp_selfpath
```

• **Camera0** corresponds to the device node **/dev/video8** or **/dev/video9**.

• **Camera1** corresponds to the device node **/dev/video18** or **/dev/video19**.

• The following test uses Camera0 as an example.

Step 2: Preview camera.

```
# gst-launch-1.0 v4l2src device=/dev/video8 ! video/x-
raw,format=NV12,width=1280,height=800, framerate=30/1 ! waylandsink
```

```
root@rk3568-buildroot:/#
,format=NV12,width=1280,height=800, framerate=30/1 ! waylandsinko8 ! video/x-raw,
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
[  451.816692] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[  451.823244] rkcif_mipi_lvds: stream[0] start streaming
[  451.830090] rkcif_mipi_lvds: Allocate dummy buffer, size: 0x01944000
[  451.830255] rockchip-mipi-csi2 mipi-csi2: stream on, src_sd: 00000000e98d5e0c, sd_name:rockchip-csi2-
dphy1
[  451.830276] rockchip-mipi-csi2 mipi-csi2: stream ON
[  451.830323] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
[  451.830363] rockchip-csi2-dphy csi2-dphy1: csi2_dphy_s_stream stream on:1, dphy1, ret 0
Redistribute latency...
[07:29:09.481] seeing the first app
0:00:07.9 / 99:99:99.
```

Step 3: Record the video.

```
# gst-launch-1.0 v4l2src device=/dev/video8 num-buffers=100 ! \
video/x-raw,format=NV12,width=1920,height=1088,framerate=30/1 ! \
videoconvert ! mpph264enc ! h264parse ! mp4mux ! \
filesink location=/tmp/h264.mp4
```

```
root@rk3568-buildroot:/#
t ! mpph264enc ! h264parse ! mp4mux ! filesink location=/tmp/h264.mp4videoconvert
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
[  516.449013] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[  516.474250] rkisp rkisp-vir0: first params buf queue
[  516.474947] rkcif_mipi_lvds: stream[0] start streaming
[  516.481842] rkcif_mipi_lvds: Allocate dummy buffer, size: 0x01944000
[  516.481942] rockchip-mipi-csi2 mipi-csi2: stream on, src_sd: 00000000e98d5e0c, sd_name:rockchip-csi2-
dphy1
[  516.481957] rockchip-mipi-csi2 mipi-csi2: stream ON
[  516.481997] rockchip-csi2-dphy1: dphy1, data_rate_mbps 600
[  516.482033] rockchip-csi2-dphy csi2-dphy1: csi2_dphy_s_stream stream on:1, dphy1, ret 0
Redistribute latency...
Redistribute latency...
0:00:01.4 / 99:99:99.
```

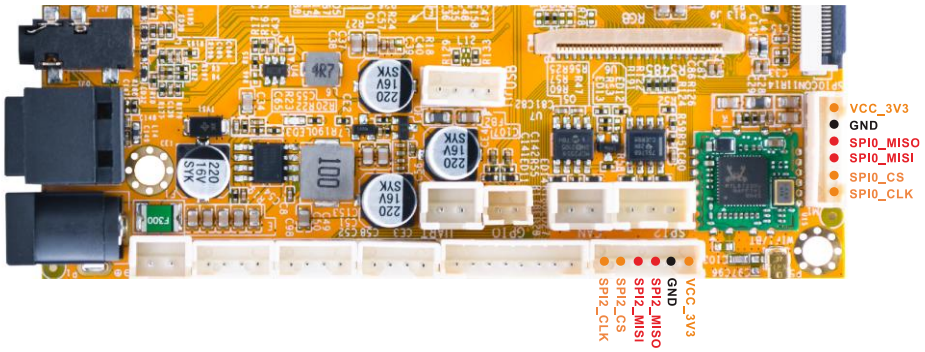
Step 4: Take photos.

```
# gst-launch-1.0 -v v4l2src device=/dev/video8 num-buffers=10 ! \
video/x-raw,format=NV12,width=1280,height=800 ! mppjpegenc ! \
multifilesink location=/tmp/test%05d.jpg
```

```
s=10 ! \568-buildroot:/# gst-launch-1.0 -v v4l2src device=/dev/video8 num-buffers
> video/x-raw,format=NV12,width=1280,height=800 ! mppjpegenc ! \
> multifilesink location=/tmp/test%05d.jpg
Setting pipeline to PAUSED ...
Using mplane plugin for capture
Pipeline is live and does not need PREROLL ...
Pipeline is PREROLLED ...
Setting pipeline to PLAYING ...
/GstPipeline:pipeline0/GstV4l2Src:v4l2src0: crop-bounds = < (int)0, (int)0, (int)2112, (int)1568 >
New clock: GstSystemClock
/GstPipeline:pipeline0/GstV4l2Src:v4l2src0.GstPad:src: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstCapsFilter:capsfilter0.GstPad:src: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMppJpegEnc:mppjpegenc0.GstPad:src: caps = image/jpeg, width=(int)1280,
height=(int)800, pixel-aspect-ratio=(fraction)1/1, framerate=(fraction)120/1, interlace-
mode=(string)progressive, colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMultiFileSink:multifilesink0.GstPad:sink: caps = image/jpeg, width=(int)1280,
height=(int)800, pixel-aspect-ratio=(fraction)1/1, framerate=(fraction)120/1, interlace-
mode=(string)progressive, colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstMppJpegEnc:mppjpegenc0.GstPad:sink: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
/GstPipeline:pipeline0/GstCapsFilter:capsfilter0.GstPad:sink: caps = video/x-raw, format=(string)NV12,
width=(int)1280, height=(int)800, framerate=(fraction)120/1, interlace-mode=(string)progressive,
colorimetry=(string)1:3:5:1
[  540.261060] rkisp_hw fdff0000.rkisp: set isp clk = 297000000Hz
[  540.286062] rkisp rkisp-vir0: first params buf queue
[  540.286675] rkcif_mipi_lvds: stream[0] start streaming
```

7.11 SPI

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.

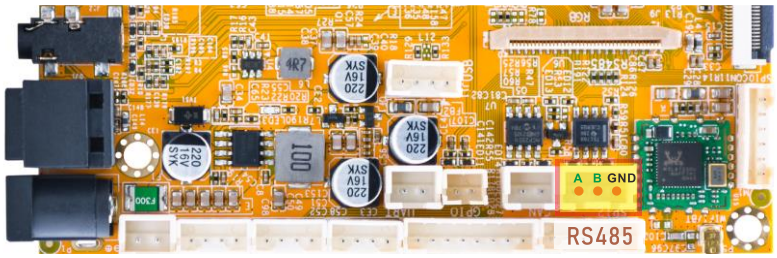
• **spidev2.0_test** corresponds to the SPI2 device.

• The following test uses SPI0 as an example.

```
# spidev0.0_test
```

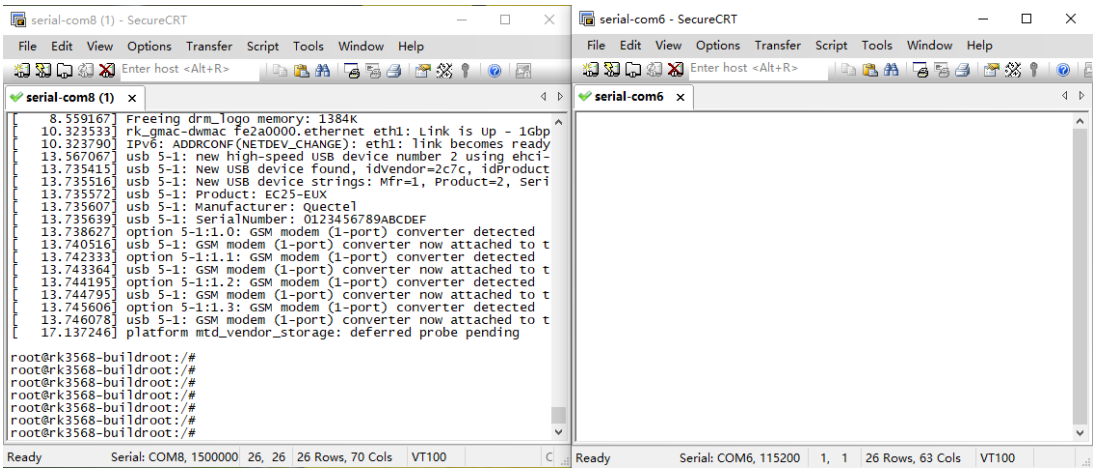
```
root@rk3568-buildroot:/# spidev0.0_test
spi mode: 0
bits per word: 8
max speed: 500000 Hz (500 KHz)

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 FF FF FF
DE AD BE EF BA AD
F0 0D
```

7.12 RS485



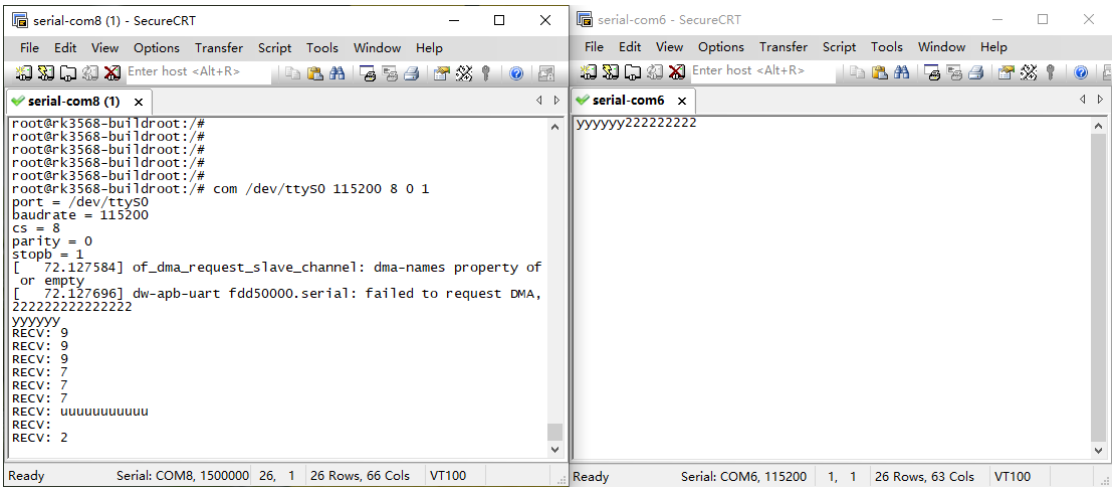
Step 1: As shown in the diagram, connect the RS485 test tool to the development board.

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.

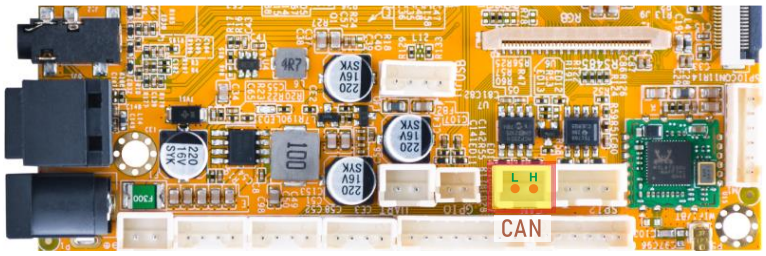


Step 3: Execute the following command on the board to test the RS485 transmission and reception functionality.

```
# com /dev/ttyS0 115200 8 0 1
```

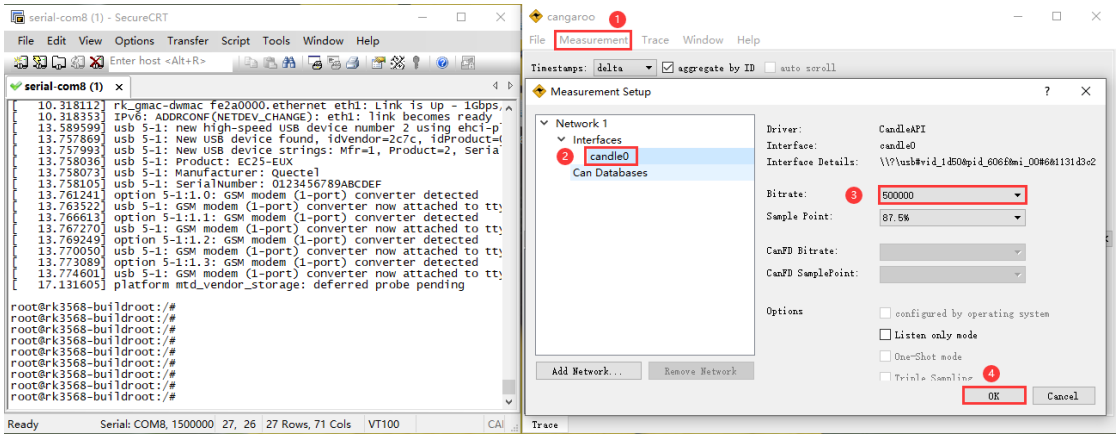


7.13 CAN



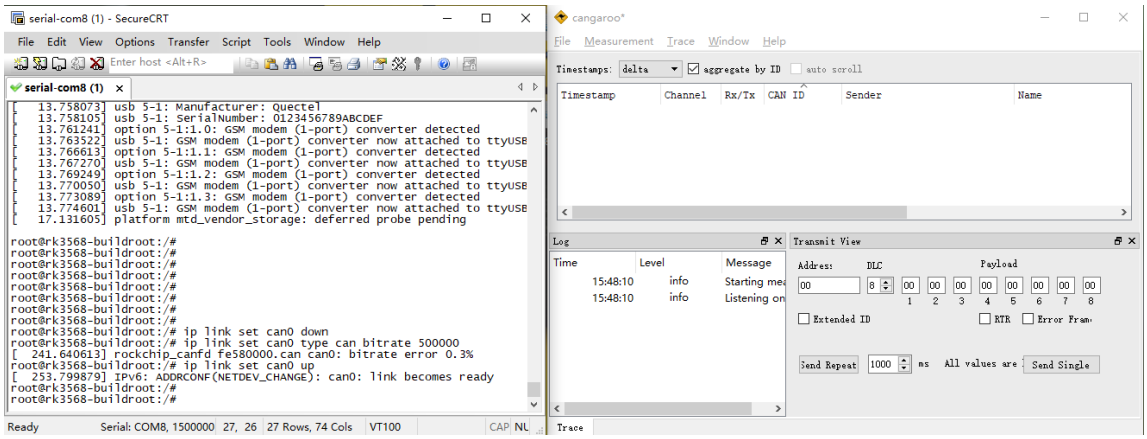
Step 1: Connect the CAN test tool to the board as shown in the diagram below.

Step 2: Open the CAN test software and set the baud rate to 500000.



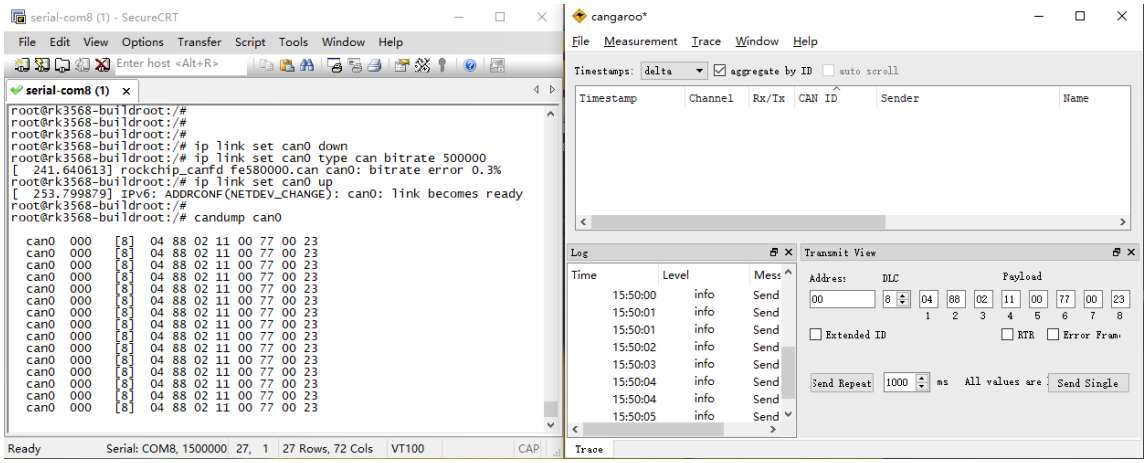
Step 3: Configure and activate the CAN network, setting the bitrate to 500000.

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



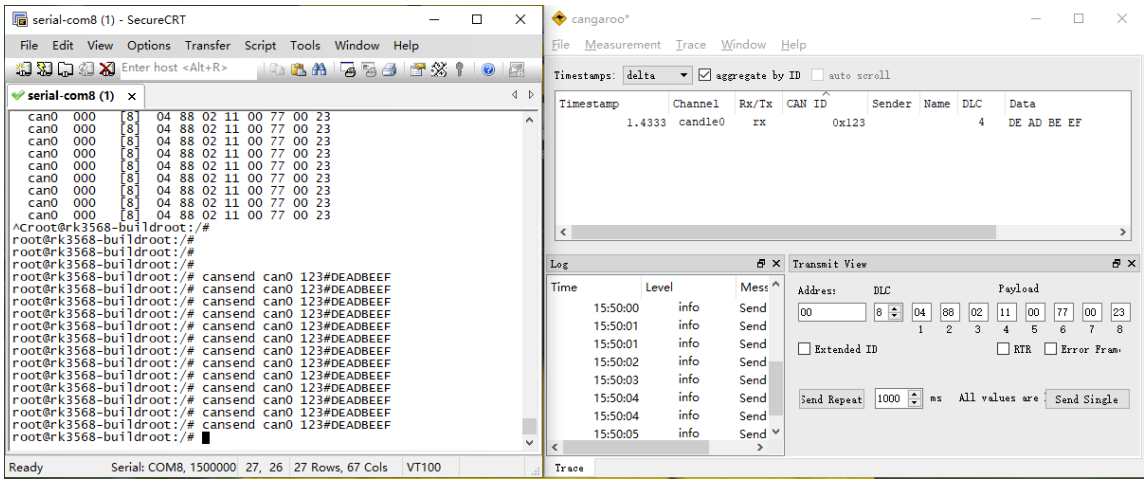
Step 4: Configure CAN as the receiver.

```
# candump can0
```



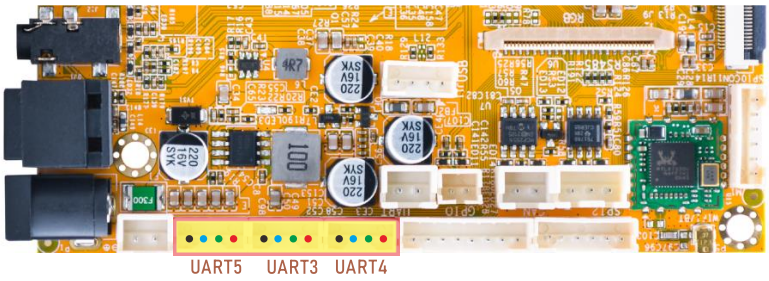
Step 5: Configure CAN as the sender.

```
# cansend can0 123#DEADBEEF
```



7.14 UART

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



Step 2: UART4 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
jjjjjjkkk
RECV: jjjjjjkkk
ioioiooiyyy
RECV: ioioiooiyyy
232323223.
RECV: 232323223.
55
RECV: 55
```

Step 3: UART3 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 = 1
1212121211212
RECV: 1212121211212
eeeeeeeee
RECV: eeeeeeeee
nmnmnmbb
RECV: nmnmnmbb
```

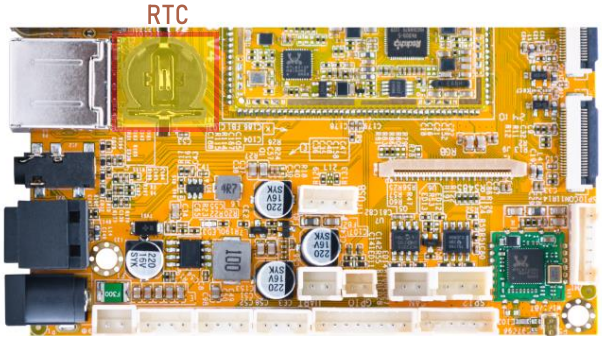
Step 4: UART5 test.

```
# 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
rtrtrtrtrtrtrt
RECV: rtrtrtrtrtrtrt
222222222
RECV: 222222222
ooooooo
RECV: ooooooo
898989j
RECV: 898989j
```

7.15 RTC

Step 1: Install the coin cell battery.



Step 2: Set the system time.

```
# date -s "2024-11-25 11:26:00"
```

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

```
# hwclock -w
```

Step 4: Display the current hardware clock time.

```
# hwclock
```

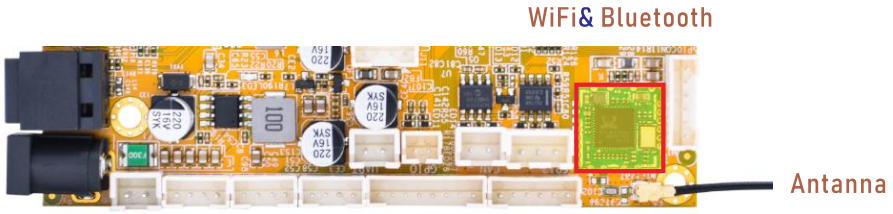
```
root@rk3568-buildroot:/# date -s "2024-11-25 16:17:30"
Mon Nov 25 16:17:30 UTC 2024
root@rk3568-buildroot:/# hwclock -w
root@rk3568-buildroot:/# hwclock
Mon Nov 25 16:17:38 2024  0.000000 seconds
root@rk3568-buildroot:/# hwclock
Mon Nov 25 16:18:18 2024  0.000000 seconds
root@rk3568-buildroot:/# hwclock
Mon Nov 25 16:19:18 2024  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 Nov 25 17:45:10 2024  0.000000 seconds
root@rk3568-buildroot:/# hwclock
Mon Nov 25 17:45:22 2024  0.000000 seconds
root@rk3568-buildroot:/# hwclock
Mon Nov 25 17:48:54 2024  0.000000 seconds
root@rk3568-buildroot:/# hwclock
Mon Nov 25 17:49:10 2024  0.000000 seconds
```

7.16 WiFi & Bluetooth

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



7.16.1 WiFi

Step 1: View the device information.

```
# ifconfig
```

```
root@rk3568-buildroot:/# ifconfig
wlan0     Link encap:Ethernet  HWaddr 98:03:CF:E5:E0:09
          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 01 - Address: 82:AE:54:45:E2:42
                    ESSID:""
                    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
                    Quality=100/100  Signal level=27/100
                    Extra:fm=0002
          Cell 02 - Address: 80:AE:54:45:E2:42
                    ESSID:"JSC-2.4G"
                    Protocol:IEEE 802.11bgn
```

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
[  606.760951] RTW: nolinked power save enter
Successfully initialized wpa_supplicant
```

Step 4: View the network interface status.

```
# ifconfig
```

```
root@rk3568-buildroot:/# ifconfig
wlan0     Link encap:Ethernet  HWaddr 98:03:CF:E5:E0:09
          inet addr:192.168.0.126  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::a9c3:40a2:613f:5a23/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:17 errors:0 dropped:1 overruns:0 frame:0
          TX packets:13 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2540 (2.4 KiB)  TX bytes:1790 (1.7 KiB)
```

Step 5: Test the WiFi network.

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

```
root@rk3568-buildroot:/# ping -I wlan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.126 wlan0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=48 time=297 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=207 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=192 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=192 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=206 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=190 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=199 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=8 ttl=48 time=190 ms
^C
--- www.armdesigner.com ping statistics ---
8 packets transmitted, 8 received, 0% packet loss, time 7005ms
rtt min/avg/max/mdev = 190.313/209.279/296.509/33.566 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.

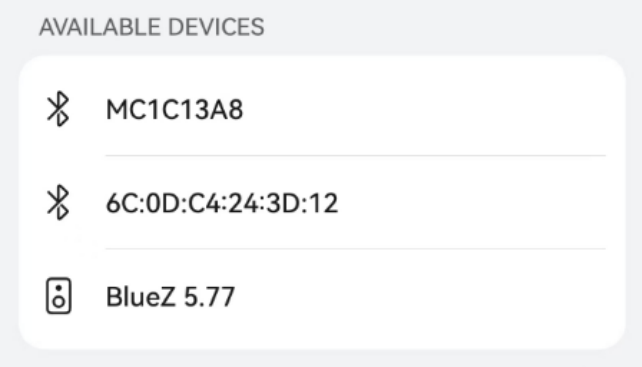
```
# hciconfig hci0 piscan
```

Step 2: Control and configure the Bluetooth device.

```
# bluetoothctl
```

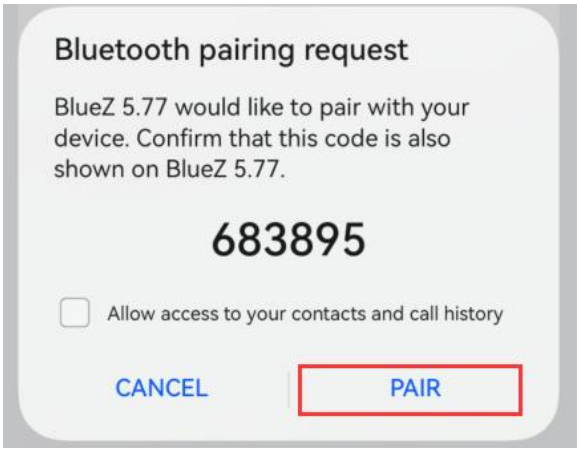
```
root@rk3568-buildroot:/# hciconfig hci0 piscan
root@rk3568-buildroot:/# bluetoothctl
hci0 new_settings: powered connectable discoverable bondable ssp br/edr le secure-conn
Agent registered
[CHG] Controller 98:03:CF:E5:E0:0A Pairable: yes
[bluetooth]#
```

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.

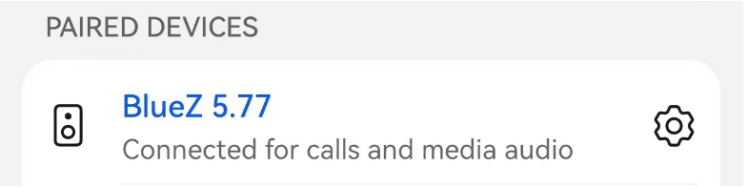
Phone:



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 connected eir_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
```