

Compact3588s Linux6.1 User Manual

V2.0



Boardcon Embedded Design

Overview

The content of this document is only described for the development board Compact3588S, aiming to help users quickly understand, apply and develop the Idea3588 development board.

System Support

Development Board	Debian12	Buildroot
Compact3588s_V1 CM3588_V2.0	Y	Y

Revision History

Version	Date	Author	Revision History
V2.0	2024-10-14	Wugk	Initial version
V1.0	2025-05-06	Wugk	PCB revised to [Rev.2] Upgraded software to Linux6.1 RKR5

Disclaimer

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

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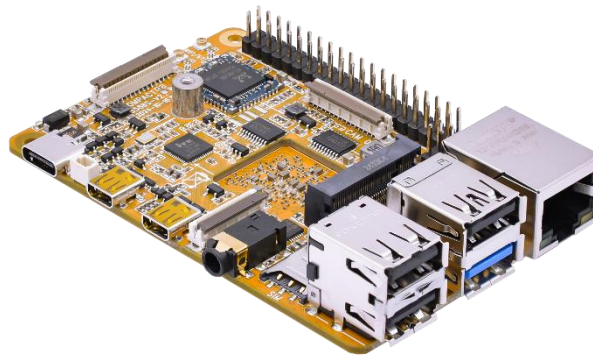


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1.Introduction

1.1 Overview

The Compact3588s adopts the Rockchip RK3588 next-generation eight core 64 bit low-power high-performance processor, supporting 8K video encoding and decoding, 8K video output, and rich interfaces, supporting 4G, WIFI/BT, Gigabit Ethernet, and more. For ARM-based PC and Edge Computing device, personal mobile internet device and other digital multimedia applications.

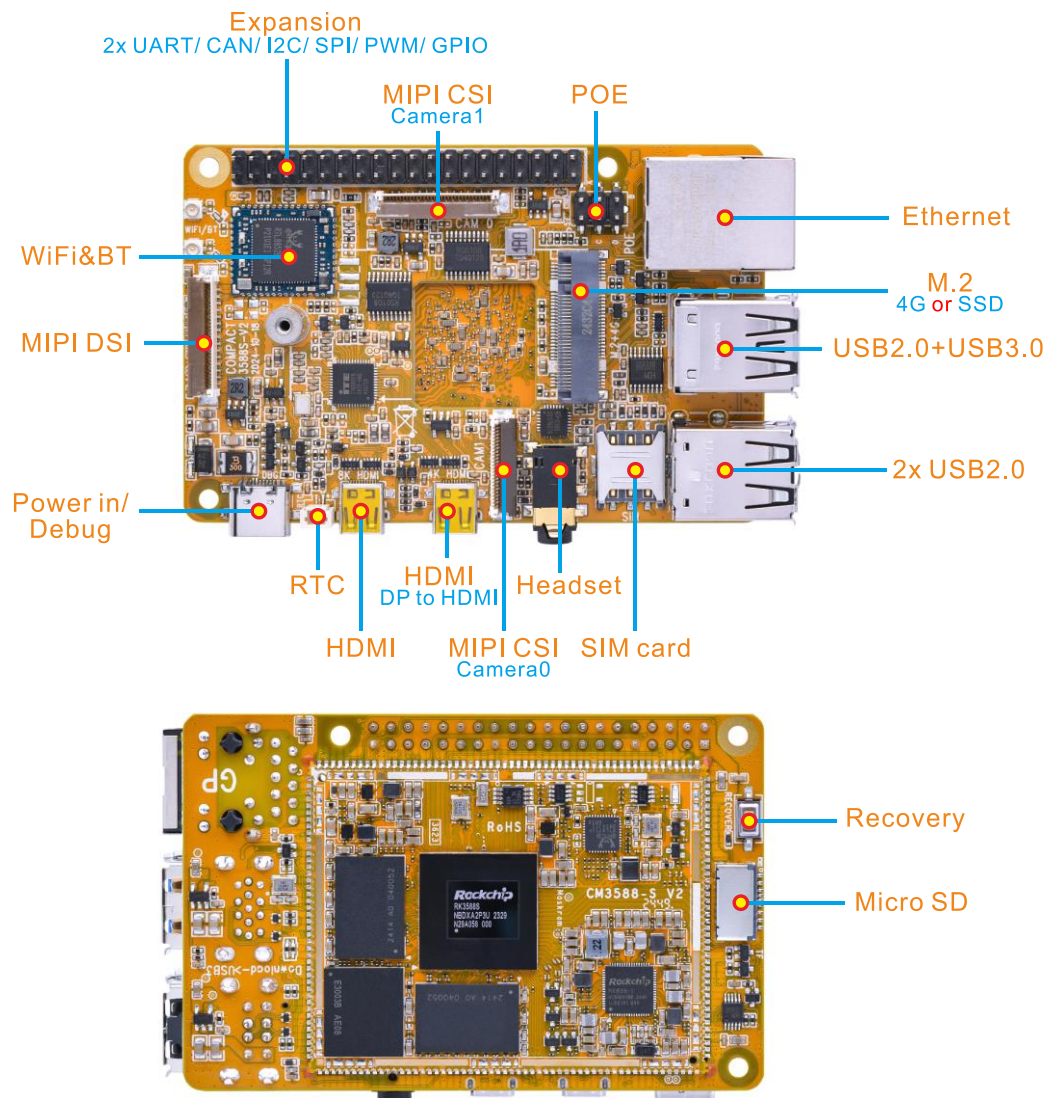


1.2 Product Parameters

Basic Parameters		
SOC		RK3588S
CPU		Octa-core 64-bit size core architecture, Quad-core Cortex-A76 + Quad-core Cortex-A55
GPU		• ARM Mali-G610 MP4 • OpenGL ES 1.1/2.0/3.2 • Vulkan 1.2 • OpenCL 2.2
NPU		6TOPS AI computing power, three-core architecture, supporting INT4/INT8/INT16/FP16/BF16/TF32
Video	Decoder	• Support 8K@60fps H.265/VP9/AVS2 video decoding • Support 8K@30fps H.264 video decoding • Support 4K@60fps AV1 video decoding • Support 1080P@60fps MPEG-2/MPEG-1/VC-1/VP8 video decoding
	Encoder	Support H.264/H.265 video encoding, up to 8K@30fps
RAM		8GB LPDDR4X

ROM	32GB eMMC
Support system	Debian12, Buildroot
Hardware Parameters	
Extended Storage	• Support MicroSD Card
Display	• Support HDMI2.1 TX 8K@60fps display • Support HDMI2.0 TX 4K@60fps display • Support MIPI_DSI 800X1280@60fps display
Audio	• Support 2x HDMI TX audio output • Support 1x Headphone output/input
USB	• Support 1xUSB3.0 • Support 3xUSB2.0
Network	• Support 1x Gigabit Ethernet • Support 1x WIFI/BT module • Support 1x 4G module
Camera	Support 2xCamera
Peripheral communication	• Support 2xUART
Other parameters	Support 1xDebug, 1xRTC
Electrical Parameters	
Power supply input voltage	5V/3A
RTC input voltage	3V/0.6uA
Operating temperature	0~70°
Storage temperature	-40~85°
Structural Parameters	
Core board dimensions	67mm x 53mm
Motherboard dimensions	85mm x 56mm

1.3 Hardware Interface Introduction



Interface parameters	
Power in	5V DC power input interface
HDMI_OUT	HDMI2.1 TX interface
USB 3.0 Type-A	USB3.0 Host interface, OTG download interface
Ethernet	Gigabit Ethernet RJ45 interface
3XUSB2.0 Host	USB2.0 HOST interface
Recover	Recovery key
WIFI&BT	WIFI&Bluetooth module
2XUART	• UART0, TTL level interface

	• UART7, TTL level interface
PCIe2.0 4G model	4G model interface
RTC	RTC coin cell connector
Audio I/O	Earphone output/input
Nano SIM	4G card
Debug	debug the serial port
MIPI_CSI0	Camera0 interface
MIPI_CSI1	Camera1 interface
MIPI_DSI	DSI display 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	CH340	CH341SER.EXE	Serial port debugging driver
3	Serial Terminal Tool	SecureCRT.exe	Debugging tool

2.1 Install RK Driver Assitant

Step 1: Open [DriverAssitant_v5.13/DriverInstall.exe](#).

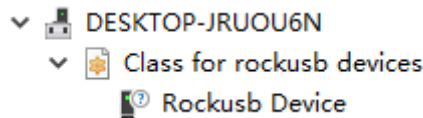
Step 2: To avoid driver conflicts, click **“Uninstall Driver”** to uninstall the driver.



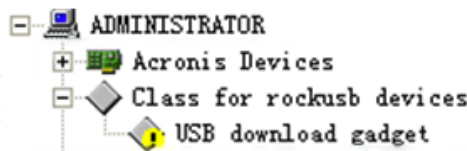
Step 3: Click button **“Install Driver”** to install.



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

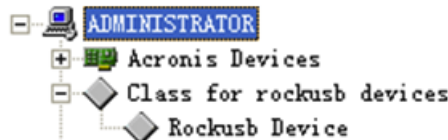


Step 5: If the following device information appears in the **Device Manager** after the operation in Step 4, user need to proceed to the next step.



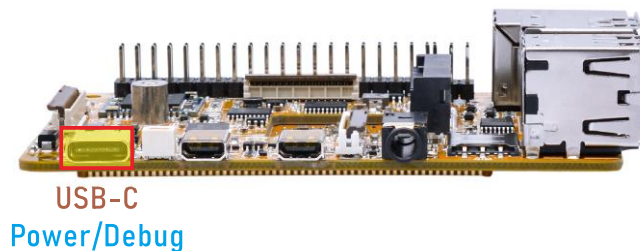
Step 6: The WINDOW will pop up found New Hardware Wizard dialog box, choose to install from the specified location, and then select: [DriverAssitant_v5.1.3/ADBDriver](#).

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

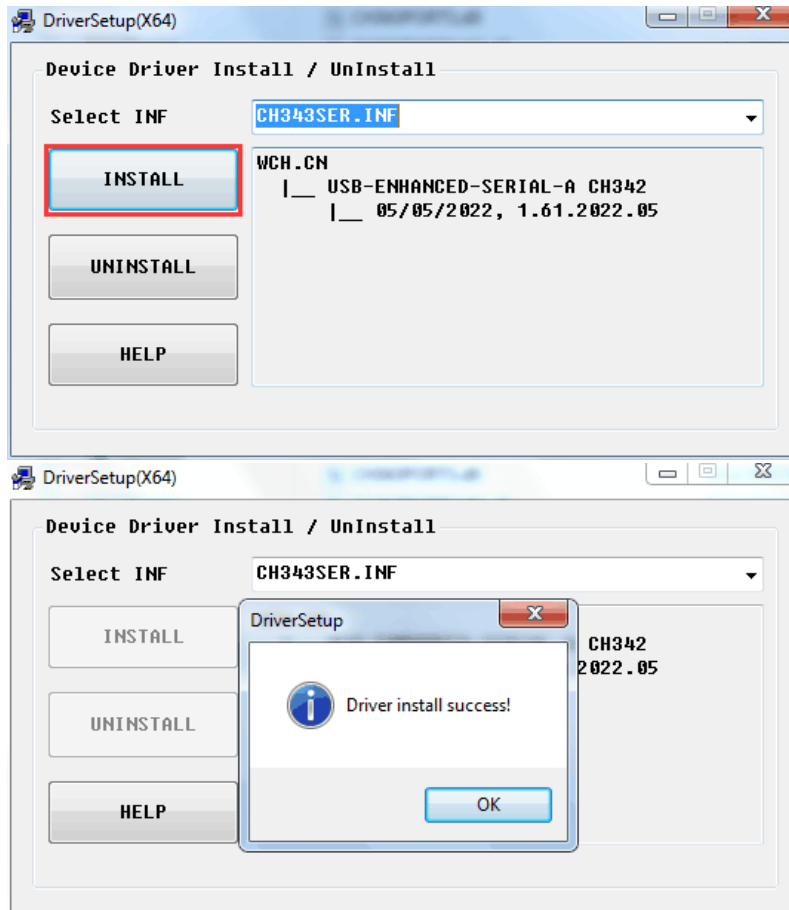


2.2 Install CH340 Driver

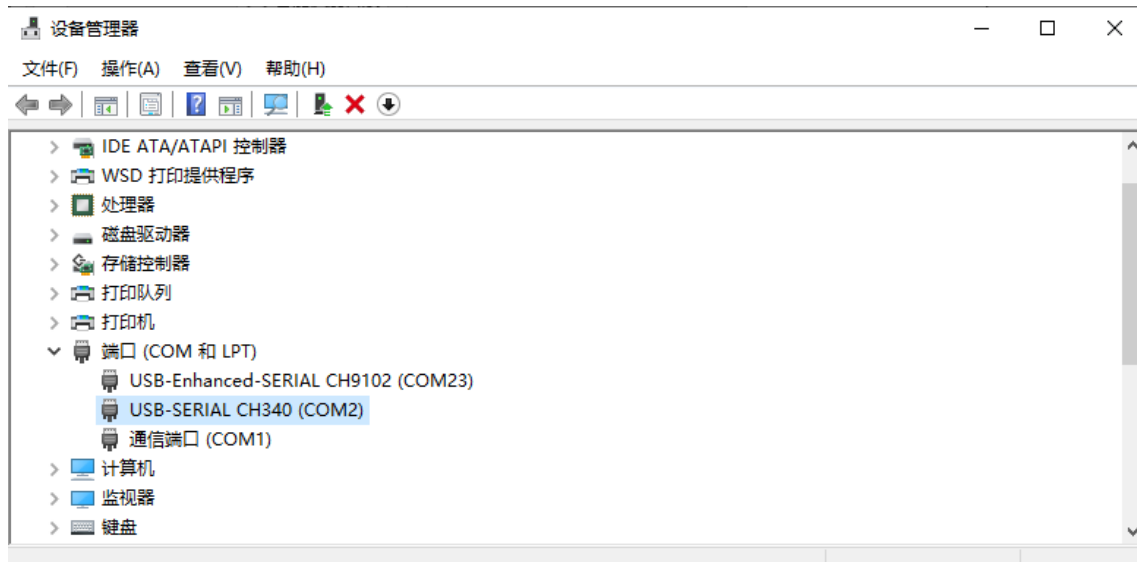
Step 1: Connect the computer to the type-c interface of the board using a data cable.



Step 3: Select and install the corresponding [CH341SER.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.

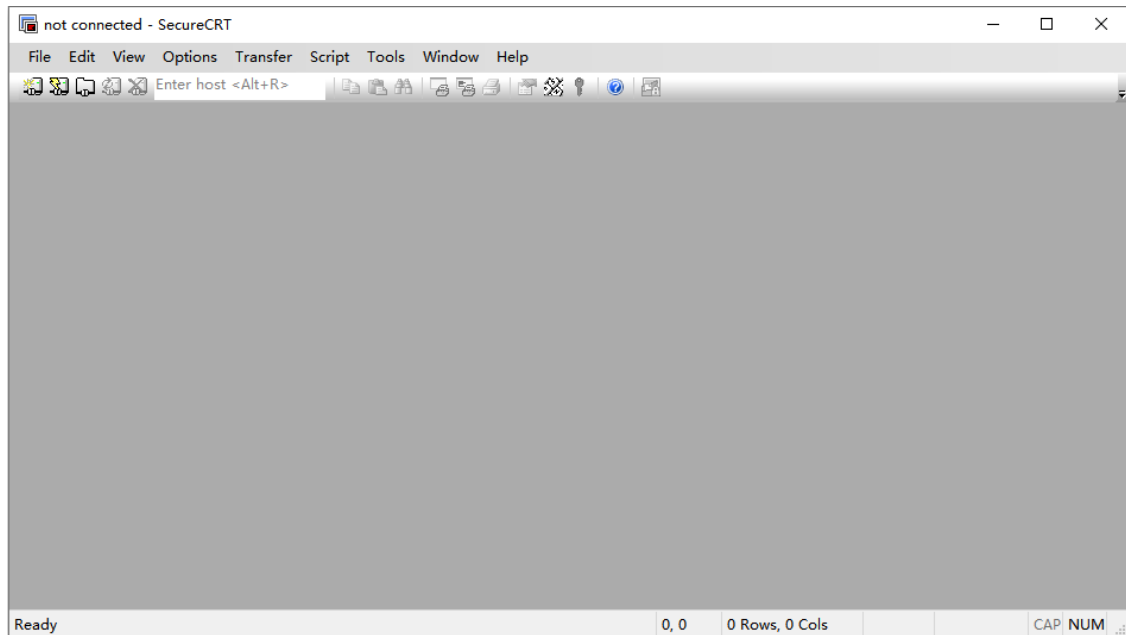


2.3 Install Serial Terminal Tool

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

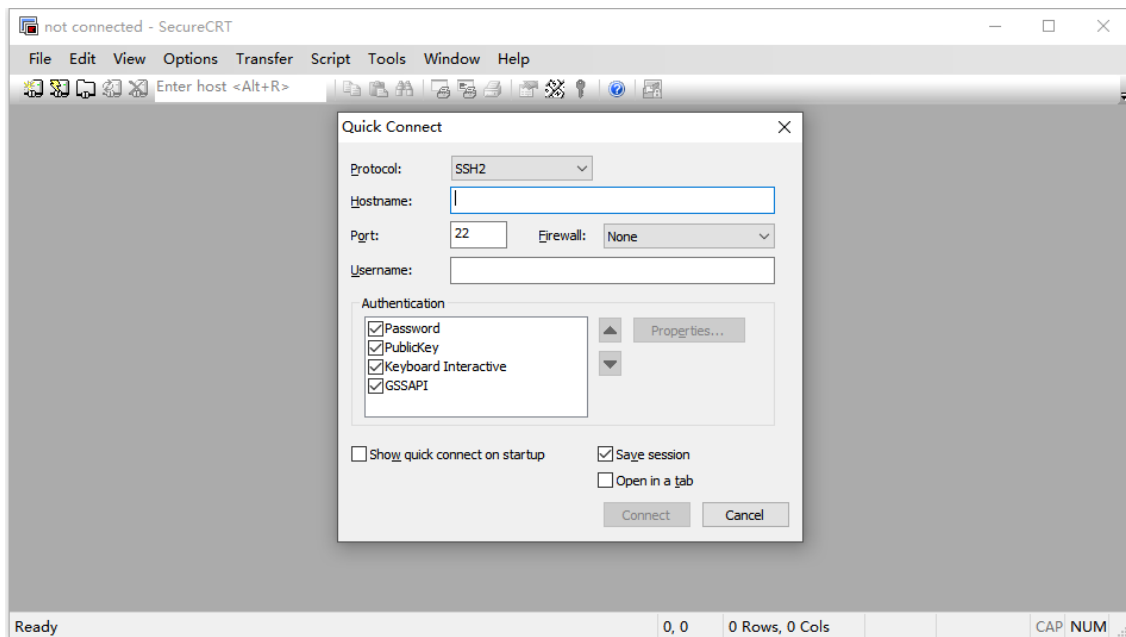
Step 1: Unzip *Platform/SecureCRT.rar* on PC.

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

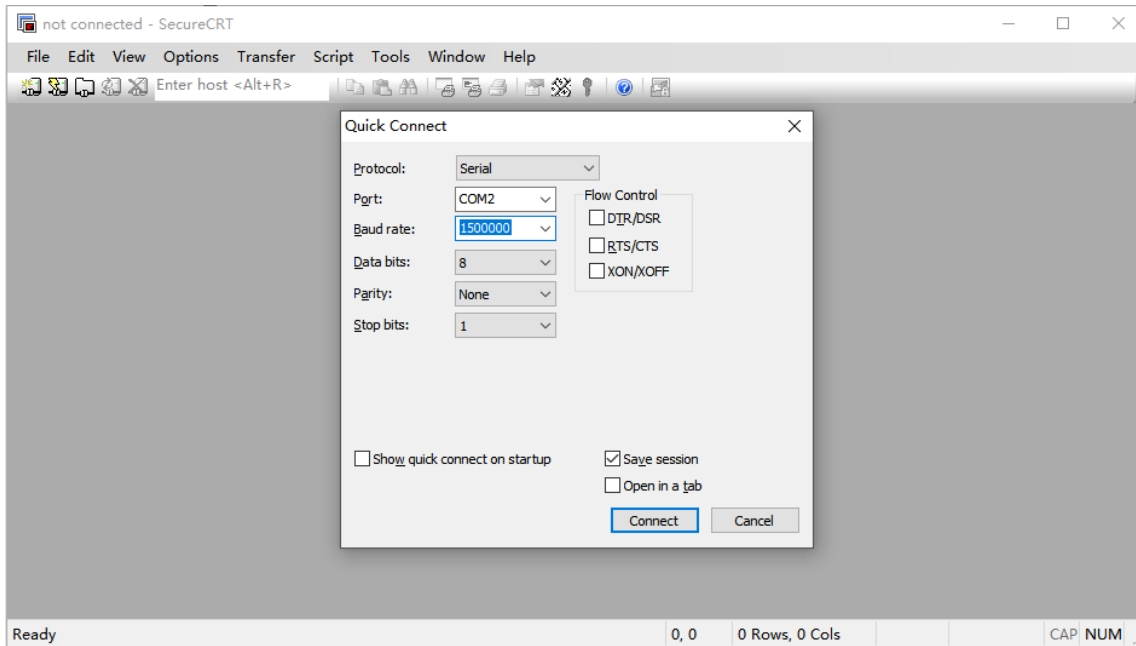


Step 3: Confirm that the CH340 driver has been installed and the CH340 module is connecting to the PC.

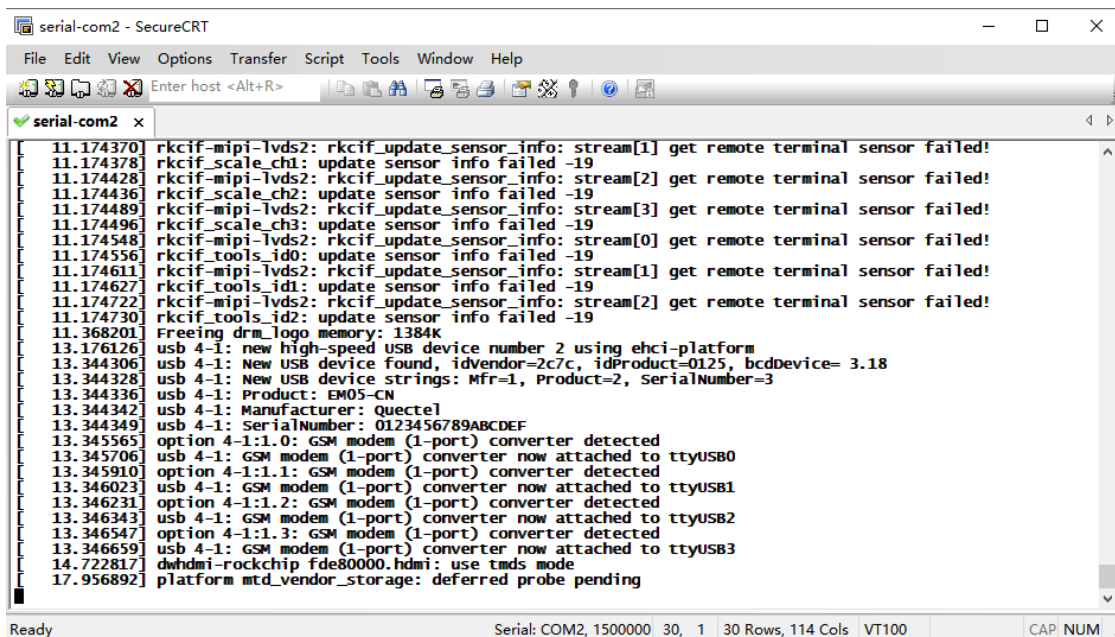
Step 4: Click the **“Quick Connect”** button to go to the Quick Connect configuration screen.



Step 5: Configure as shown in the following figure.



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



3. Upgrade Introduction

3.1 Upgrade Mode

- (1) Before upgrading the firmware via USB cable, ensure the necessary drivers are installed. Please refer to the section [Install RK Driver Assistant](#) for installation instructions.
- (2) There are two modes for upgrading the firmware via USB cable:

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

3.1.1 How to Enter Loader Mode

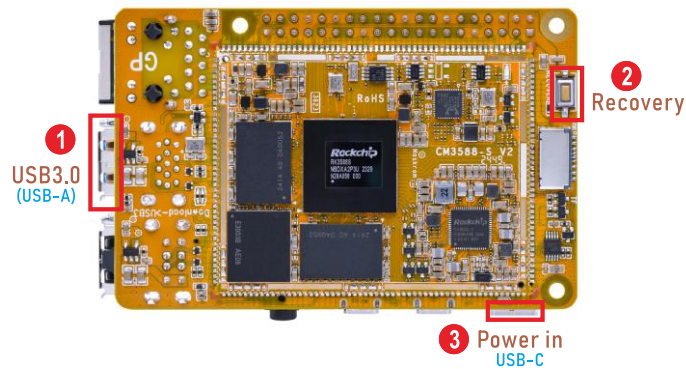
3.1.1.1 Hardware

Step 1: Disconnect the power adapter.

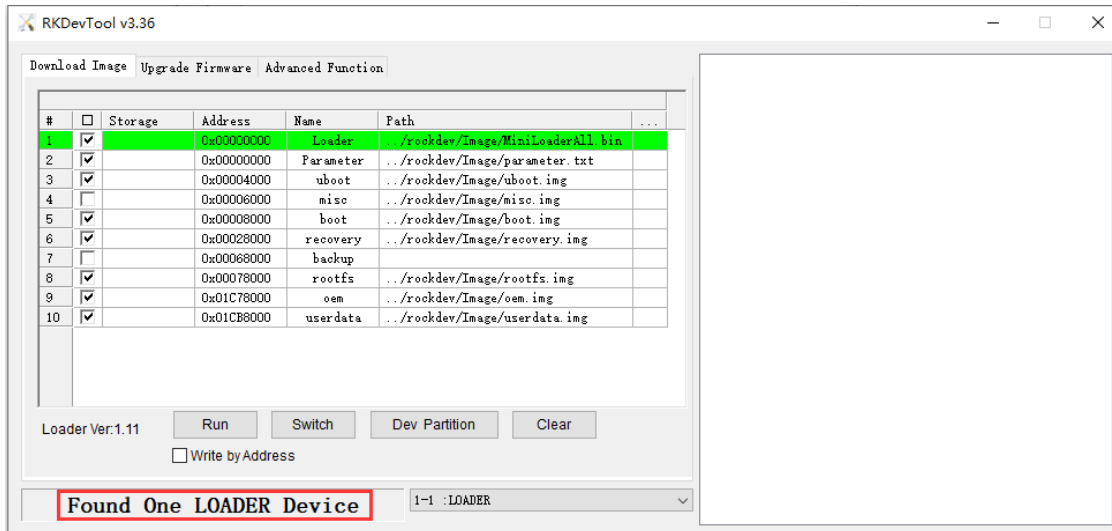
Step 2: Connect one end of the Type-A cable to the host and the other end to the development board.

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

Step 4: Connect the power supply.



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



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

3.1.1.2 Software

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

shell.

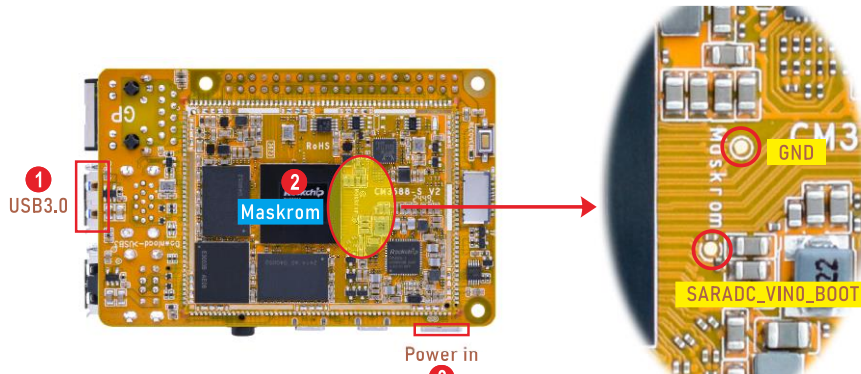
```
# reboot loader
```

3.1.2 How to Enter MaskRom Mode

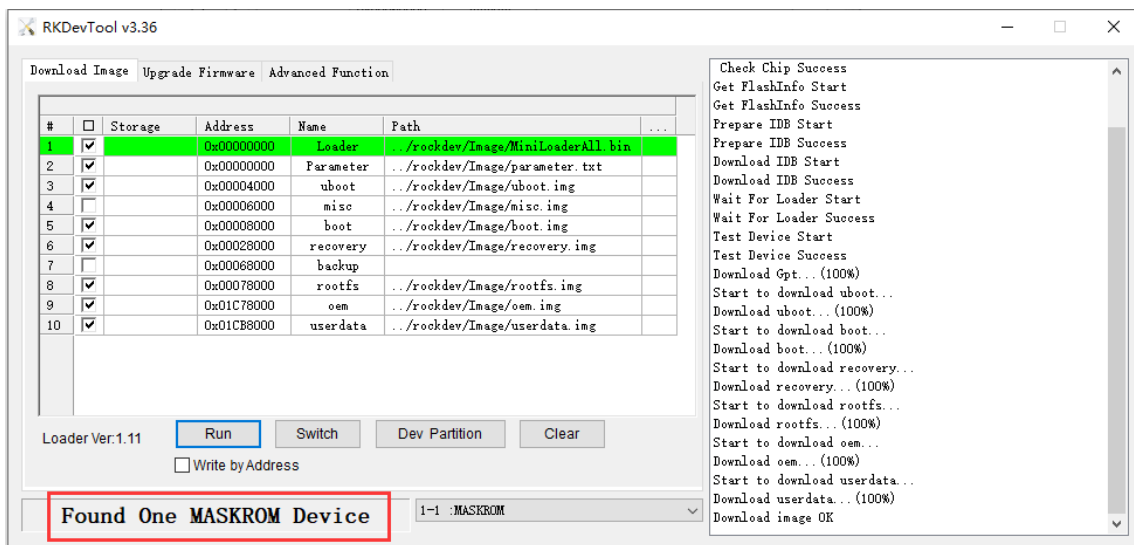
Step 1: Disconnect the power adapter.

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

Step 3: Use tweezers to short the two test points on the CM3588-S.



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



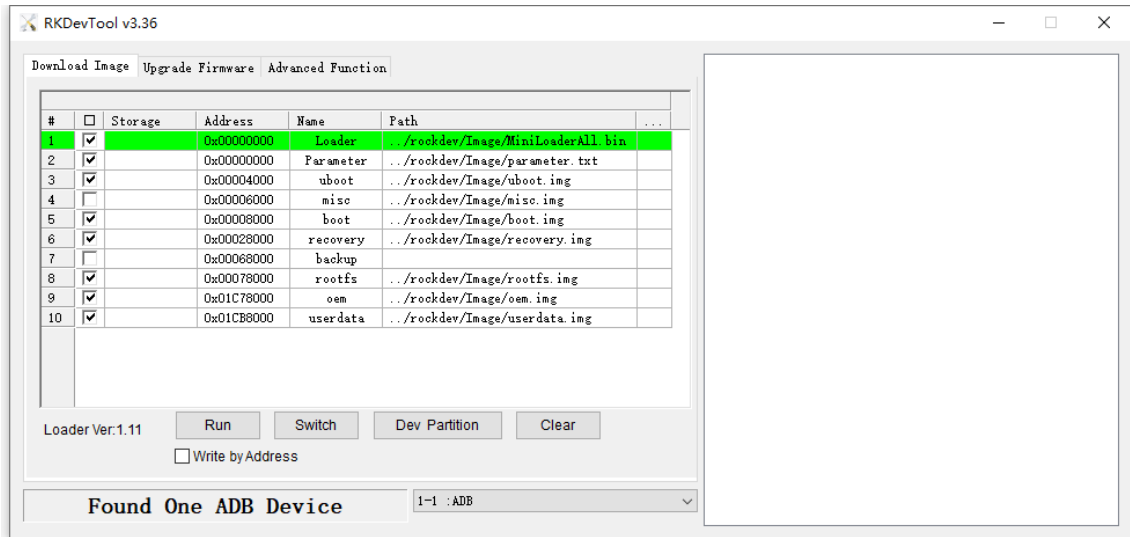
3.2 Burn firmware

Environment: Windows OS (Operating System).

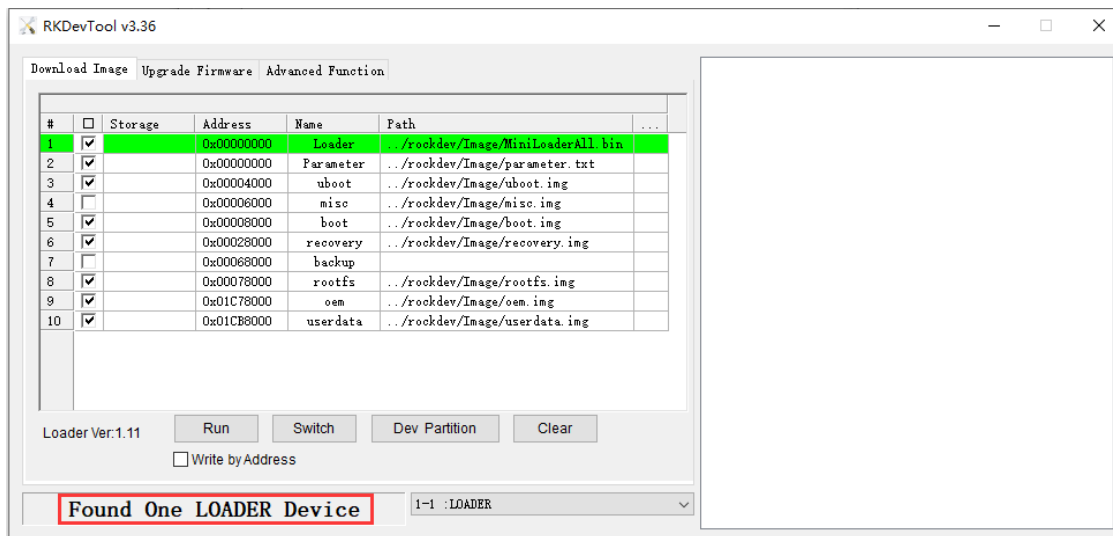
3.2.1 Burn Update.img Firmware

Step 1: Unzip [RKDevTool.rar](#) on Windows.

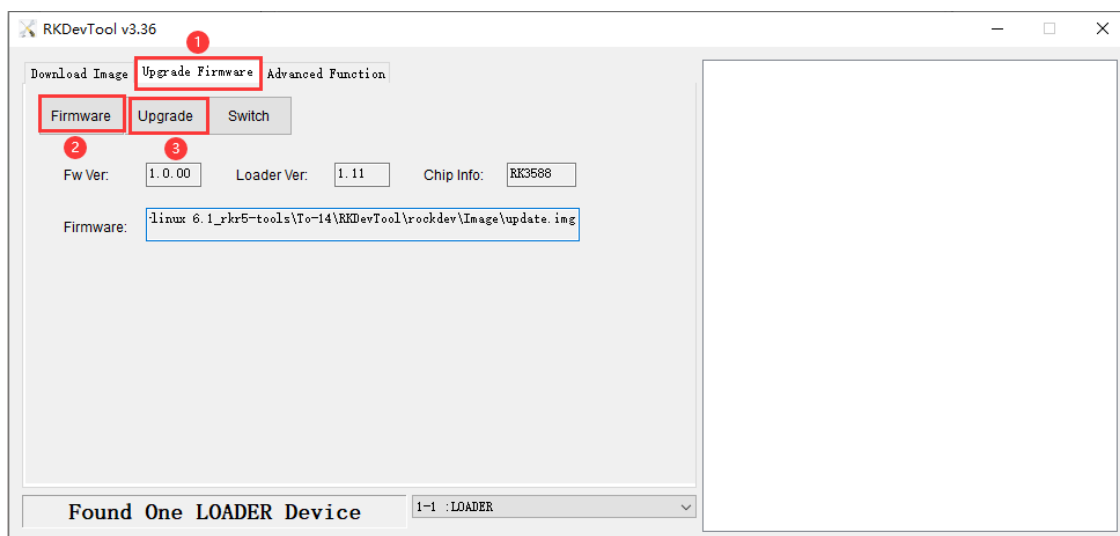
Step 2: Open [RKDevTool\RKDevTool_Release\RKDevTool.exe](#).



Step 3: Switch to loader mode.



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



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

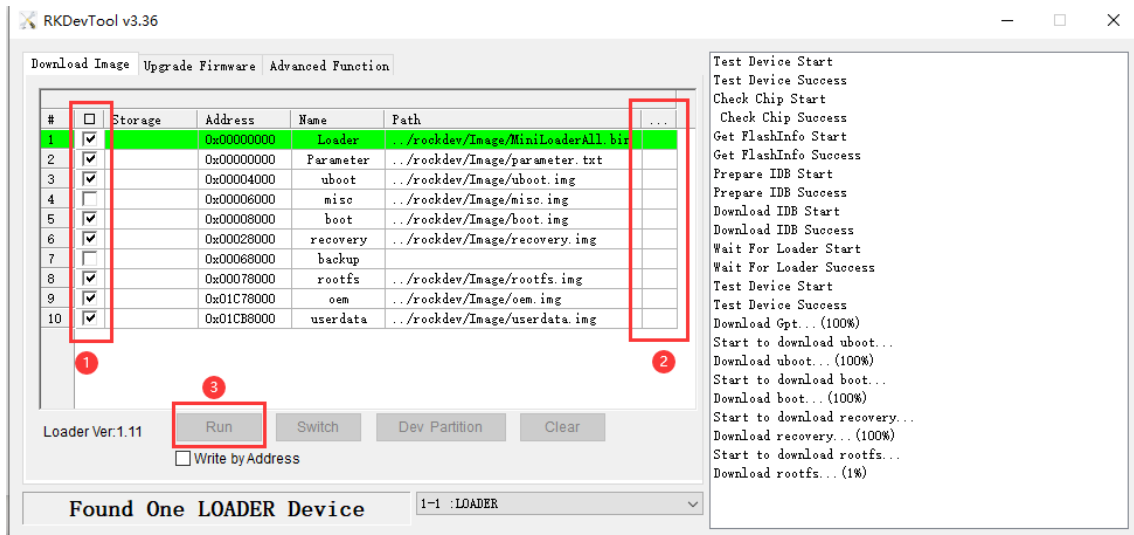
3.2.2 Burn Split Firmware

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 above. If encounter errors during compilation, please 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 100G. 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

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

5. Compile Source

Step 1, unzip the source

```
$ tar xvf compact3588s-linux6.1-rkr5-250522.tar.gz  
$ cd compact3588s-linux6.1-rkr5
```

Step 2, configure the compiled board

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



```
wuguankang@boardcon:~/opt/CM3588S/compact3588s-linux6.1-rkr5$ ./build.sh lunch
Log colors: message notice warning error fatal

Log saved at /home/wuguankang/opt/CM3588S/compact3588s-linux6.1-rkr5/output/sessions/2025-05-22_10-45-43
Pick a defconfig:

1. rockchip_defconfig
2. boardcon_rk3588s_defconfig
3. rockchip_rk3588_evb1_lp4_v10_amp_defconfig
4. rockchip_rk3588_evb1_lp4_v10_defconfig
5. rockchip_rk3588_evb1_lp4_v10_mcu_defconfig
6. rockchip_rk3588_evb7_v11_defconfig
7. rockchip_rk3588_ipc_evb1_v10_defconfig
8. rockchip_rk3588_ipc_evb7_lp4_v11_defconfig
9. rockchip_rk3588_multi_ipc_evb1_v10_defconfig
10. rockchip_rk3588s_evb1_lp4x_v10_defconfig
11. rockchip_rk3588s_evb4_lp4x_v10_defconfig
Which would you like? [1]: 2 // select 2:boardcon_rk3588s_defconfig
Switching to defconfig: /home/wuguankang/opt/CM3588S/compact3588s-linux6.1-rkr5/device/rockchip/.chip/boardcon_rk3588s_defconfig
#
# configuration written to /home/wuguankang/opt/CM3588S/compact3588s-linux6.1-rkr5/output/.config
#
Using last kernel version(6.1)
```

Step 3, compile uboot

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

Step 4, compile the kernel

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

Step 5, compile recovery

```
$ ./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
```

Step7, generate and check firmwares

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

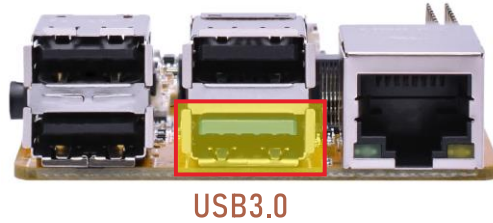
6. Debian12 Test

6.1 Display

Compact3588s Debian12 system supports HDMI TX, DP_TO_HDMI TX, MIPI LCD three-screen different display, connect the display as shown in the figure and then power on.

6.2 USB

6.2.1 USB3.0



① ADB: // Please install the ADB driver on your computer by yourself
 Step 1, connect USB Type-A cable.

Step 2, use the shortcut keys WIN + R to open the Windows command run box, type: cmd, and open the Windows console command window.

```
C:\Users\kang>
C:\Users\kang>
C:\Users\kang>
C:\Users\kang>
C:\Users\kang>
```

Step 3, execute the following command to enable ADB.

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

```
C:\Windows\system32\cmd.exe - adb shell

C:\>adb root
restarting adbd as root

C:\>adb remount
AVB verification is disabled, disabling verity state may have no effect
Remounted /system as RW
Remounted /vendor as RW
Remounted /odm as RW
Remounted /system_dkms as RW
Remounted /system_ext as RW
Remounted /vendor_dkms as RW
Remounted /odm_dkms as RW
Remounted /product as RW
Remount succeeded

C:\>adb shell
rk3588s_u:/ #
```

② USB3.0 HOST:

Step 1, Switch the usb host mode on the serial port CLI
 # echo host > /sys/kernel/debug/usb/fc000000.usb/mode



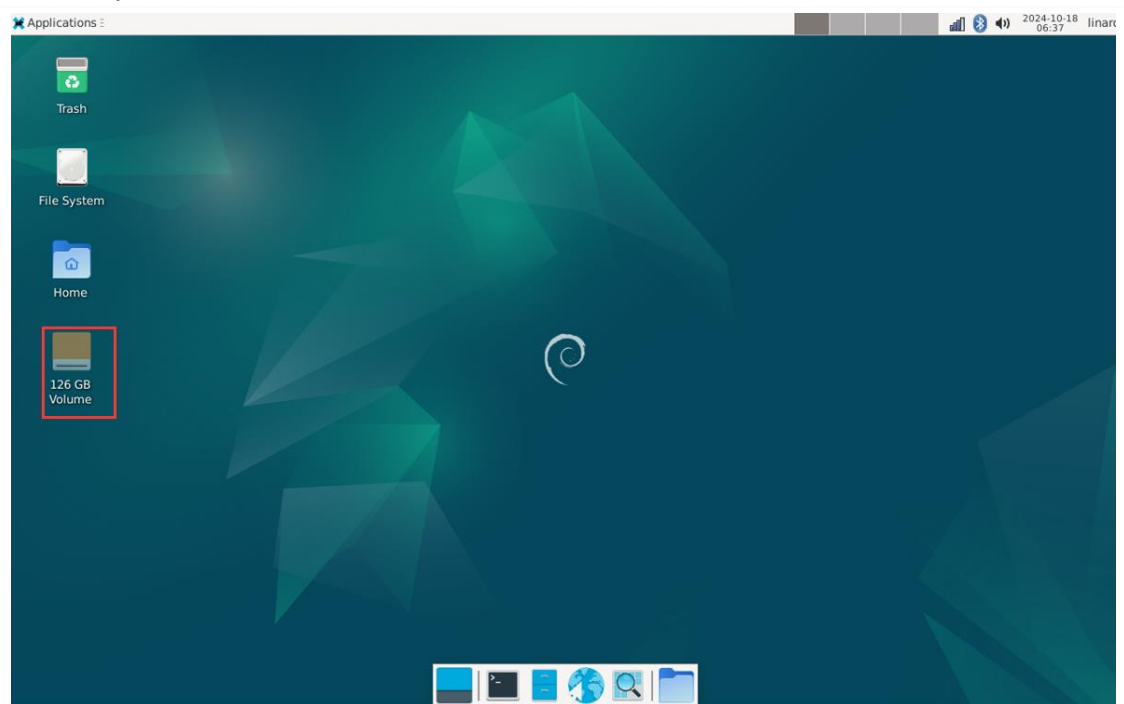
```
root@linaro-alip:~# echo host > /sys/kernel/debug/usb/fc000000.usb/mode
root@linaro-alip:~# [ 24.417627] dwc3_fc000000.usb: request 00000000e2ff1d79 was not queued to ep0out
[ 24.417716] android_work: did not send uevent (0 0 0000000000000000)
[ 24.526357] xhci-hcd xhci-hcd.9.auto: xHCI Host Controller
[ 24.526958] xhci-hcd xhci-hcd.9.auto: new USB bus registered, assigned bus number 5
[ 24.527132] xhci-hcd xhci-hcd.9.auto: hcc params 0x0220fe64 hci version 0x110 quirks 0x0000800002010010
[ 24.527179] xhci-hcd xhci-hcd.9.auto: irq 81, io mem 0xfc000000
[ 24.527330] xhci-hcd xhci-hcd.9.auto: xHCI Host Controller
[ 24.527801] xhci-hcd xhci-hcd.9.auto: new USB bus registered, assigned bus number 6
[ 24.527820] xhci-hcd xhci-hcd.9.auto: Host supports USB 3.0 SuperSpeed
[ 24.527962] usb usb5: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 6.01
[ 24.527981] usb usb5: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 24.527995] usb usb5: Product: xHCI Host Controller
[ 24.528008] usb usb5: Manufacturer: Linux 6.1.75 xhci-hcd
[ 24.528021] usb usb5: SerialNumber: xhci-hcd.9.auto
[ 24.528508] hub 5-0:1.0: USB hub found
[ 24.528535] hub 5-0:1.0: 1 port detected
[ 24.528822] usb usb6: We don't know the algorithms for LPM for this host, disabling LPM.
[ 24.528886] usb usb6: New USB device found, idVendor=1d6b, idProduct=0003, bcdDevice= 6.01
[ 24.528897] usb usb6: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 24.528907] usb usb6: Product: xHCI Host Controller
[ 24.528915] usb usb6: Manufacturer: Linux 6.1.75 xhci-hcd
[ 24.528924] usb usb6: SerialNumber: xhci-hcd.9.auto
[ 24.529335] hub 6-0:1.0: USB hub found
[ 24.529356] hub 6-0:1.0: 1 port detected
```

Step 2, Insert the USB flash drive into the usb3.0 seat.

Step 3, The serial port of the terminal will display the following message, indicating that the USB3.0 device is successfully recognized.

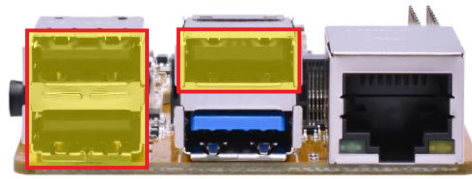
```
root@linaro-alip:~# [ 312.093049] usb 6-1: new SuperSpeed USB device number 5 using xhci-hcd
[ 312.114002] usb 6-1: LPM exit latency is zeroed, disabling LPM.
[ 312.115072] usb 6-1: New USB device found, idVendor=17ef, idProduct=38af, bcdDevice= 2.00
[ 312.115101] usb 6-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[ 312.115118] usb 6-1: Product: Disk 20
[ 312.115131] usb 6-1: Manufacturer: USB
[ 312.115143] usb 6-1: SerialNumber: 23062783850130
[ 312.116090] usb-storage 6-1:1.0: USB Mass Storage device detected
[ 312.117059] scsi host0: usb-storage 6-1:1.0
[ 313.142386] scsi 0:0:0:0: Direct-Access      Lenovo      SS260 128G          3.00 PQ: 0 ANSI: 4
[ 313.145995] sd 0:0:0:0: [sda] 246988800 512-byte logical blocks: (126 GB/118 GiB)
[ 313.146533] sd 0:0:0:0: [sda] Write Protect is off
[ 313.147068] sd 0:0:0:0: [sda] No Caching mode page found
[ 313.147104] sd 0:0:0:0: [sda] Assuming drive cache: write through
[ 313.152576] sda: sda1
[ 313.153200] sd 0:0:0:0: [sda] Attached SCSI removable disk
root@linaro-alip:~# █
```

Step 4, after inserting the USB3.0 flash drive, an icon will appear on the desktop. Click the icon to automatically mount the device.





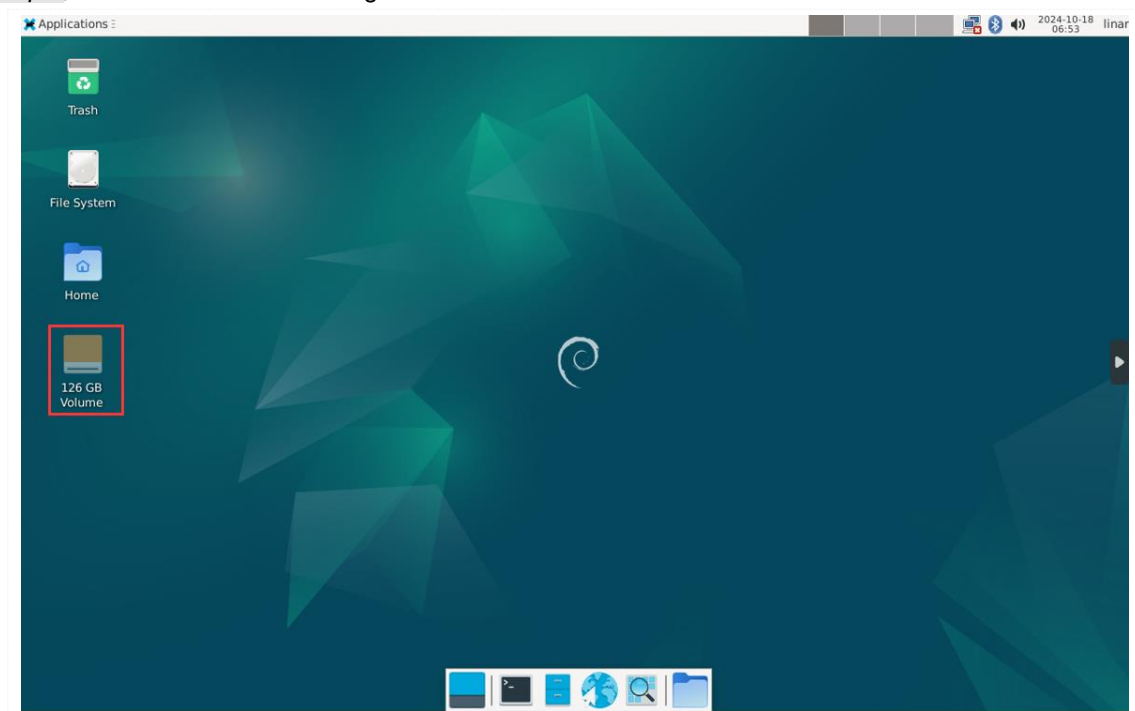
6.2.2 USB2.0



3x USB2.0 Host

Step 1, insert the USB flash drive into the USB2.0 interface.

Step 2, for the automatic mounting method.



6.3 Ethernet



Ethernet

Step 1, connect the network cable to the Ethernet port.

Step 2, According to the log, the Gigabit Ethernet was recognized successfully.

```
root@linaro-alip:/# [ 878.747033] rk_gmac-dwmac fe1c0000.ethernet eth0: Link is up - 1Gbps/Full - flow control rx/tx  
[ 878.747123] IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready
```

```
# ifconfig
```



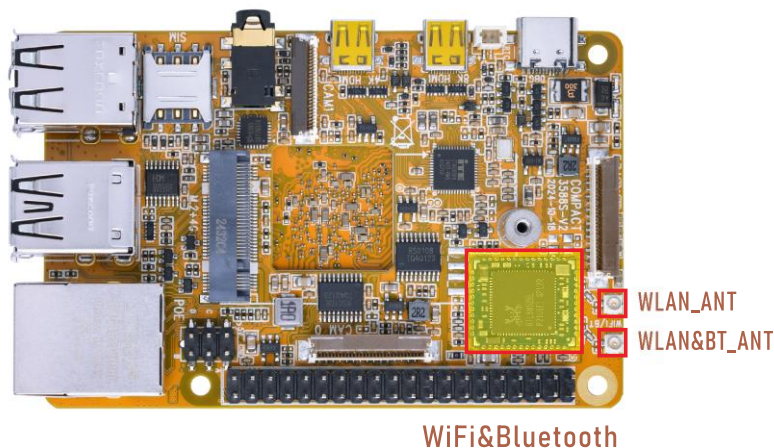
```
root@linaro-alip:/# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.223 netmask 255.255.255.0 broadcast 192.168.0.255
    inet6 fe80::b2d4:e052:3b2:105b prefixlen 64 scopeid 0x20<link>
    ether b6:0e:57:d5:94:5b txqueuelen 1000 (Ethernet)
    RX packets 31 bytes 2436 (2.3 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 16 bytes 1620 (1.5 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
    device interrupt 79
```

Step 3, internet test.

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

```
root@linaro-alip:/# ping -I eth0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.223 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=171 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=184 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=172 ms
```

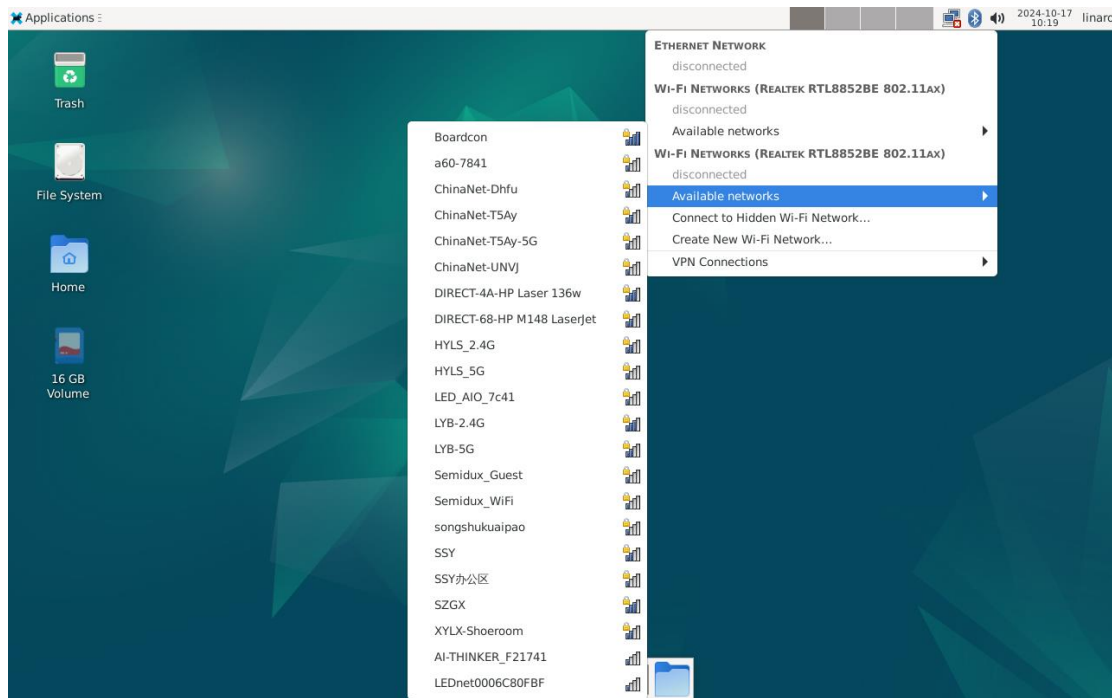
6.4 WiFi & Bluetooth



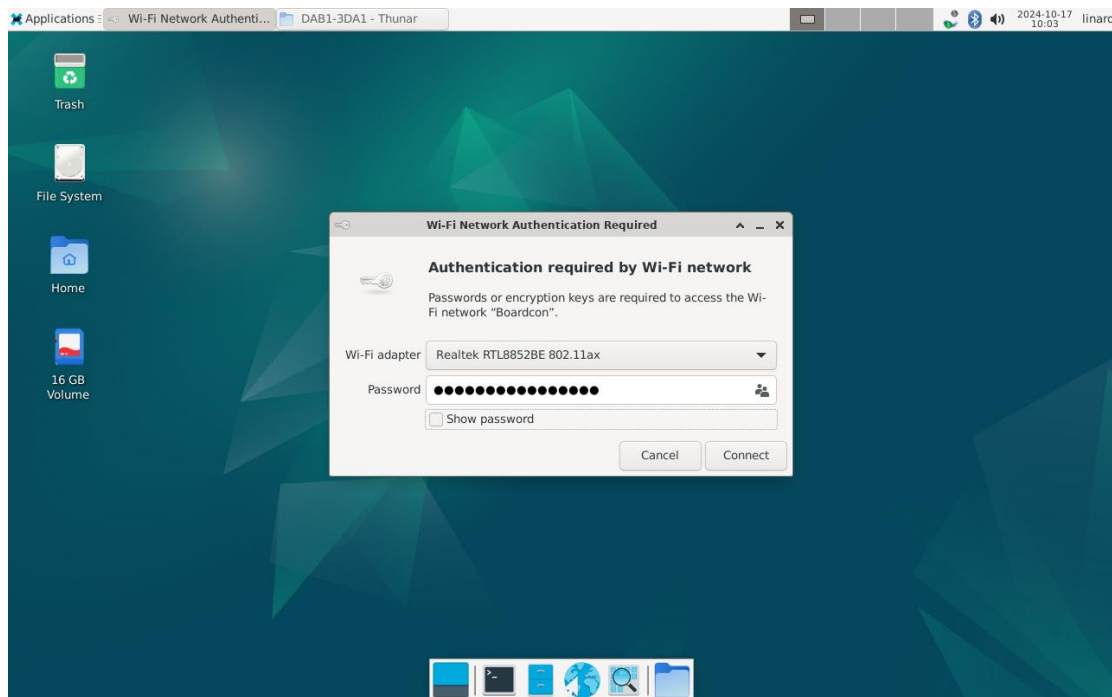
6.4.1 WiFi

Step 1, connect the Antenna.

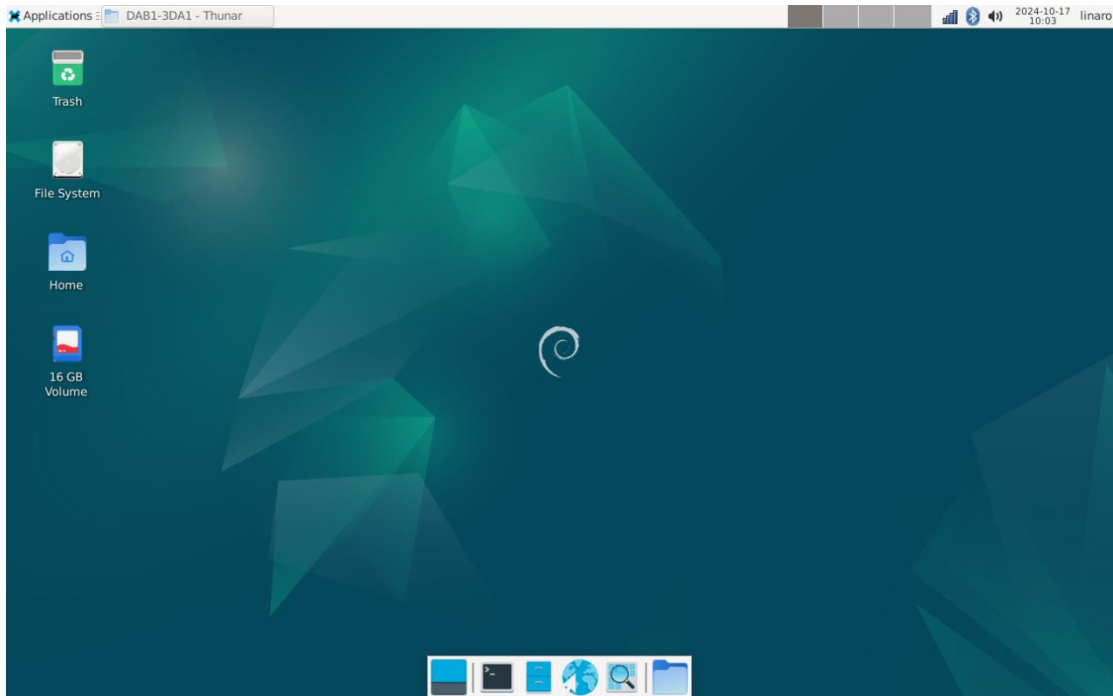
Step 2, click the network icon in the top-right corner of the user interface. Under the "Available networks" option, you will see the available WiFi hotspots.



Step 3, select the SSID from the list of available networks and enter the password.



Step 4, after a successful connection, a signal icon will appear in the top-right corner.



Step 5, execute the following to view the network interface status:

```
# ifconfig
```

```
wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.0.154 netmask 255.255.255.0 broadcast 192.168.0.255
    inet6 fe80::83fe:7937:d1cc:1929 prefixlen 64 scopeid 0x20<link>
    ether 2c:c3:e6:5c:90:12 txqueuelen 1000 (Ethernet)
    RX packets 557 bytes 75265 (73.5 KiB)
    RX errors 0 dropped 47 overruns 0 frame 0
    TX packets 290 bytes 21267 (20.7 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

Step 4, internet test:

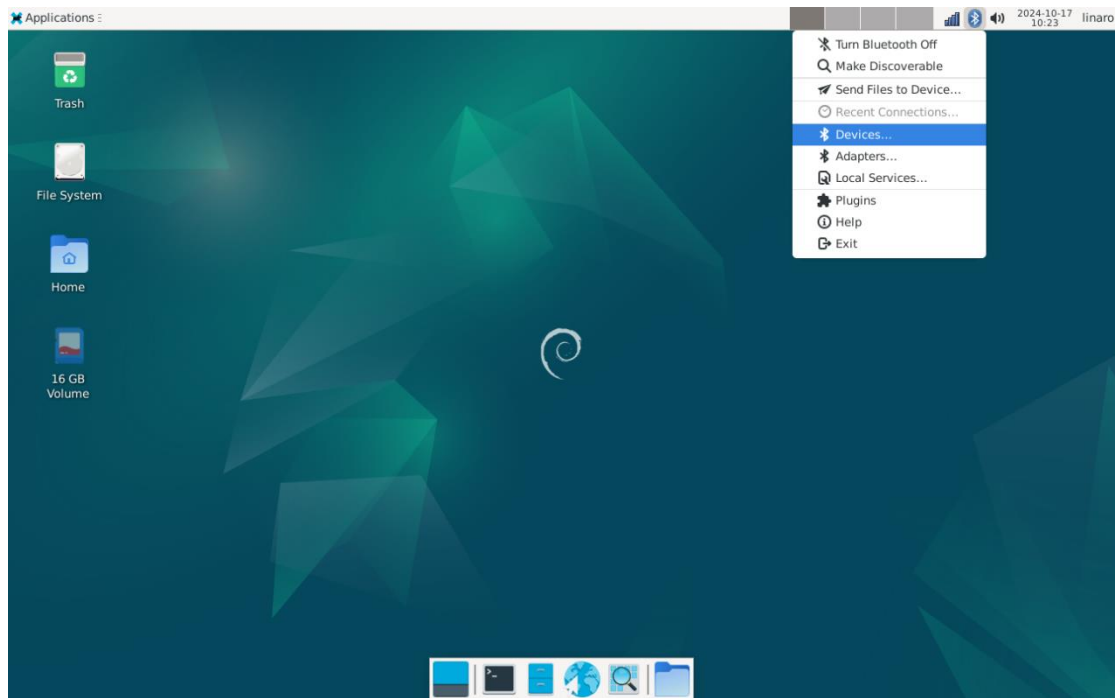
```
# ping -I wlan0 www.armdesigner.com
```

```
root@linaro-alip:/# ping -I wlan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.154 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=173 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=199 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=173 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=173 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=206 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=173 ms
```

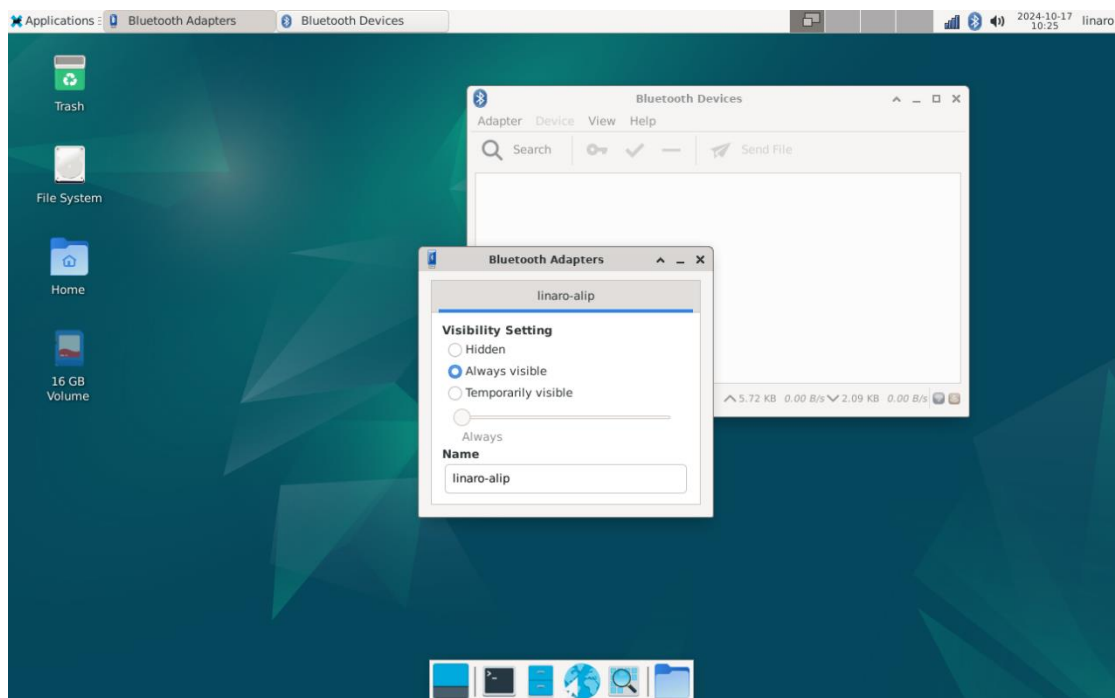
6.4.2 Bluetooth

Step 1, connect Antenna.

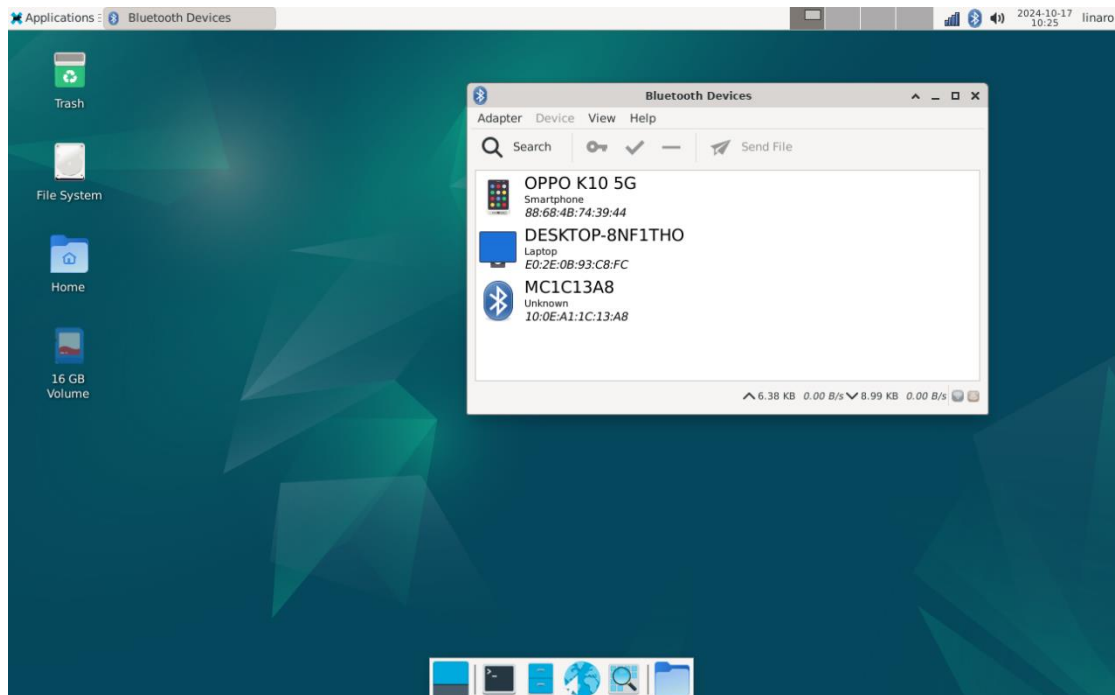
Step 2, in the top-right corner of the user interface, select the Bluetooth icon, right-click the menu bar, and click the "**Devices...**" option to enter the Bluetooth search interface.



Step 3, the Bluetooth device name is hidden by default. Set the Bluetooth device name to be visible according to the following settings.

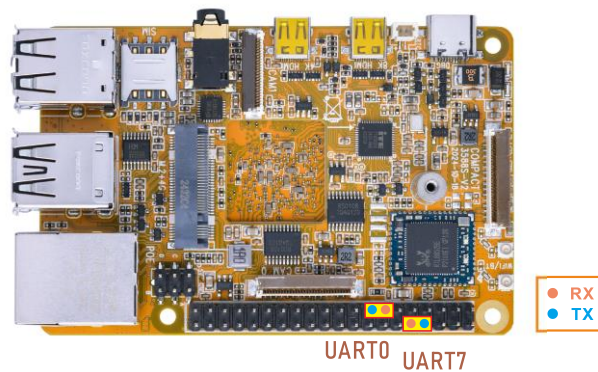


Step 4, click the **“Search”** button to start searching and select the available device in the list to pair.



6.5 UART

Step 1, short circuit RX and TX pins of UART.



Step 2, UART0 test:

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

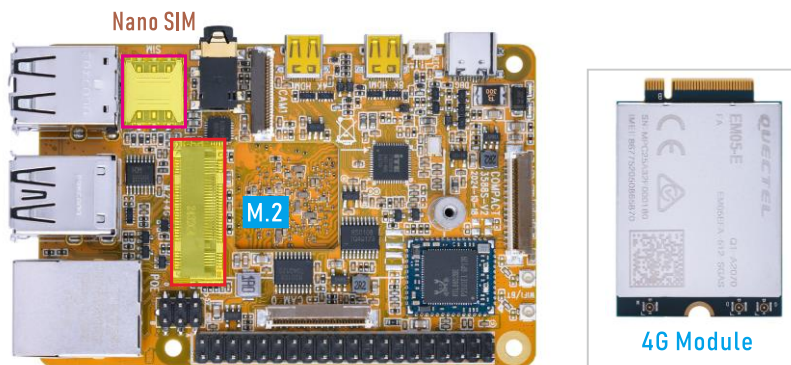
```
root@linaro-alip:/# com /dev/ttyS0 115200 8 0 1
port = /dev/ttyS0
baudrate = 115200
cs = 8
parity = 0
stopb = 1
1234567890
RECV: 1234567890
```

Step 3, UART7 test:

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

```
root@linaro-alip:/# com /dev/ttys7 115200 8 0 1
port = /dev/ttys7
baudrate = 115200
cs = 8
parity = 0
stopb = 1
1234567890
RECV: 1234567890
```

6.6 4G (EM05)



Step 1, insert 4G module to PCIe slot (4G model: EM05), then connect Antenna.

Step 2, power on after inserting the SIM card.

Step 3, execute the following command to realize ppp dialing:

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



```

root@linaro-alip:/# pppd call quectel-ppp &
[1] 2328
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)
asynctest 0 # (from /etc/ppp/options)
lcp-echo-failure 4 # (from /etc/ppp/options)
lcp-echo-interval 30 # (from /etc/ppp/options)
hide-password # (from /etc/ppp/peers/quectel-ppp)
novj # (from /etc/ppp/peers/quectel-ppp)
novjccomp # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-local # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-remote # (from /etc/ppp/peers/quectel-ppp)
ipparam 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)
usepeerdn # (from /etc/ppp/peers/quectel-ppp)
nocrp # (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)
AM
OK
-- got it

send (ATE0+M)
expect (OK)
AM
AM
OK
-- got it

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

Script chat -s -v -f /etc/ppp/peers/quectel-chat-connect finished (pid 2329), status = 0x0
Serial connection established.
using channel 2
Using interface ppp0
Connect: ppp0 <-> /dev/ttyUSB3
sent [LCP ConfReq id=0x1 <asynctest 0x0> <magic 0x9a259c08> <pcmp> <accomp>]
rcvd [LCP ConfAck id=0x2 <asynctest 0x0> <auth chap MD5> <magic 0xd103378c> <pcmp> <accomp>]
sent [LCP ConfAck id=0x2 <asynctest 0x0> <auth chap MD5> <magic 0xd103378c> <pcmp> <accomp>]
rcvd [LCP ConfAck id=0x1 <asynctest 0x0> <magic 0x9a259c08> <pcmp> <accomp>]
sent [LCP EchoReq id=0x0 magic=0x9a259c08]
rcvd [LCP DiscReq id=0x3 magic=0xd103378c]
rcvd [CHAP Challenge id=0x1 <75090277dde735f8cb0b861438416880>, name = "UMTS_CHAP_SRV"]
sent [CHAP Response id=0x1 <ce1cac401fbb0402435e56743d2f525e>, name = "test"]
rcvd [LCP EchoReq id=0x0 magic=0xd103378c 9a 25 9c 08]
rcvd [CHAP Success id=0x1 ""]
CHAP authentication succeeded
CHAP authentication succeeded
sent [IPCP ConfReq id=0x1 <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns2 0.0.0.0>]
sent [IPV6CP ConfReq id=0x1 <addr fe80::8d0b:7678:3b2a:bd3e>]
rcvd [IPCP ConfReq id=0x2]
sent [IPCP ConfNak id=0x2 <addr 0.0.0.0>]
rcvd [IPCP ConfNak id=0x1 <addr 10.78.182.189> <ms-dns1 120.80.80.80> <ms-dns2 221.5.88.88>]
sent [IPCP ConfReq id=0x2 <addr 10.78.182.189> <ms-dns1 120.80.80.80> <ms-dns2 221.5.88.88>]
rcvd [IPCP ConfReq id=0x3]
sent [IPCP ConfAck id=0x3]
rcvd [IPCP ConfAck id=0x2 <addr 10.78.182.189> <ms-dns1 120.80.80.80> <ms-dns2 221.5.88.88>]
Could not determine remote IP address: defaulting to 10.64.64.64
Script /etc/ppp/ip-pre-up started (pid 2336)
Script /etc/ppp/ip-pre-up finished (pid 2336), status = 0x0
local IP address 10.78.182.189
remote IP address 10.64.64.64
primary DNS address 120.80.80.80
secondary DNS address 221.5.88.88
Script /etc/ppp/ip-up started (pid 2339)
Script /etc/ppp/ip-up finished (pid 2339), status = 0x0
sent [IPV6CP ConfReq id=0x1 <addr fe80::8d0b:7678:3b2a:bd3e>]
sent [IPV6CP ConfReq id=0x1 <addr fe80::8d0b:7678:3b2a:bd3e>]
sent [IPV6CP ConfReq id=0x1 <addr fe80::8d0b:7678:3b2a:bd3e>]
sent [IPV6CP ConfReq id=0x1 <addr fe80::8d0b:7678:3b2a:bd3e>]
sent [IPV6CP ConfReq id=0x1 <addr fe80::8d0b:7678:3b2a:bd3e>]
sent [IPV6CP ConfReq id=0x1 <addr fe80::8d0b:7678:3b2a:bd3e>]
sent [IPV6CP ConfReq id=0x1 <addr fe80::8d0b:7678:3b2a:bd3e>]

```

Step 4, execute the following to view the network interface status:

```
# ifconfig
```

```

ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST> mtu 1500
    inet 10.78.182.189 netmask 255.255.255.255 destination 10.64.64.64
    ppp txqueuelen 3 (Point-to-Point Protocol)
    RX packets 31 bytes 2104 (2.0 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 52 bytes 3086 (3.0 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

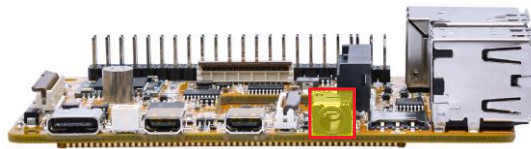
```

Step 5, execute the following to check the connectivity of the detection network:

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

```
root@linaro-alip:/# ping -I ppp0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 10.78.182.189 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=318 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=46 time=274 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=46 time=655 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=46 time=594 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=46 time=477 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=46 time=429 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=46 time=389 ms
■
```

6.7 Audio I/O



Headset

Step 1, plug the headphones into the headphone jack.

Step 2, view sound card:

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

```
root@linaro-alip:/# cat /proc/asound/cards
0 [rockchip-es8388 ]: rockchip-es8388 - rockchip-es8388
rockchip-es8388
1 [rockchipdp0    ]: rockchip-dp0 - rockchip-dp0
rockchip-dp0
2 [rockchiphdmi0  ]: rockchip-hdmi0 - rockchip-hdmi0
rockchip-hdmi0
root@linaro-alip:/#
root@linaro-alip:/# ■
```

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 play audio:

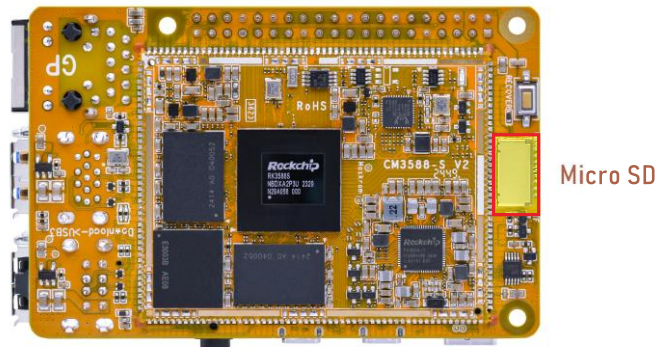
```
# aplay -Dhw:0,0 record.wav
```

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


Supplementary instructions on audio output:

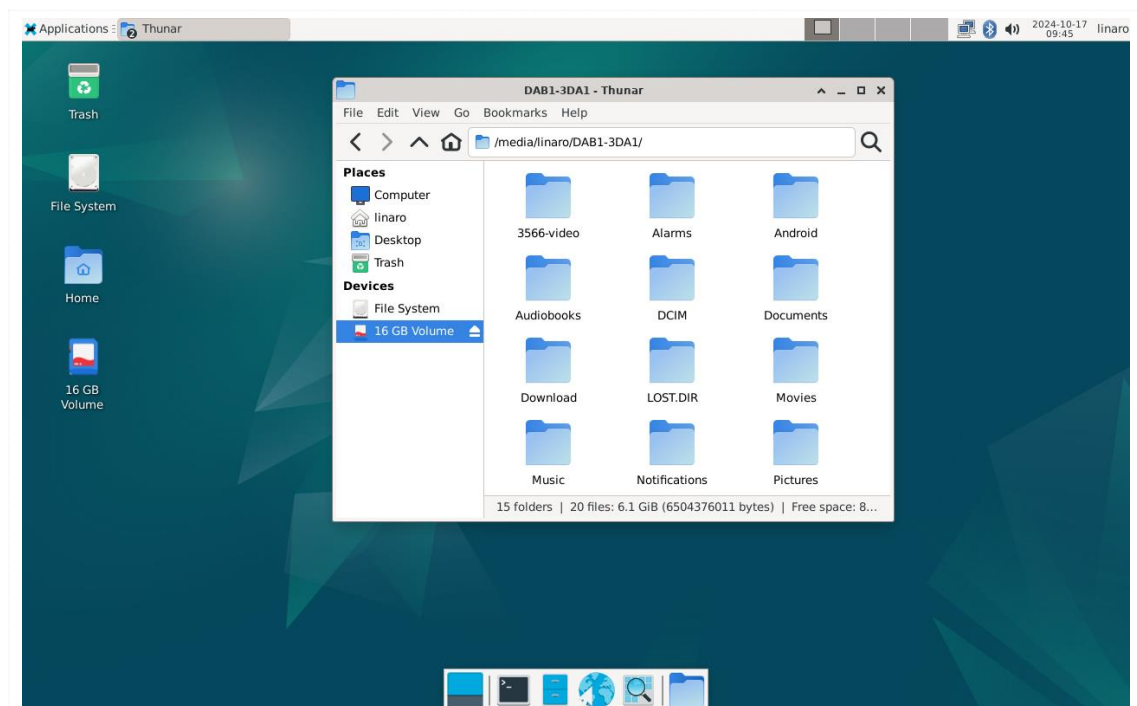
```
# aplay -Dhw:0,0 record.wav // Headset audio output
# aplay -Dhw:1,0 record.wav // DP_TO_HDMI TX audio output
# aplay -Dhw:2,0 record.wav // HDMI TX audio output
```

6.8 SD card

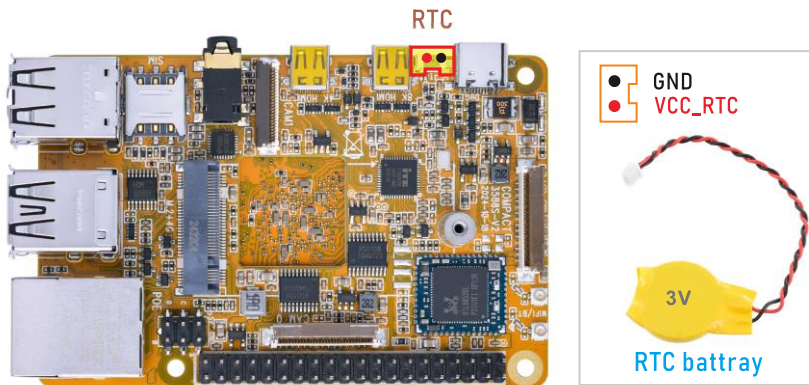


Step 1, insert the micro SD card into the card slot, then power on.

Step 2, for the automatic mounting method, please refer to the chapter [USB3.0](#).



6.9 RTC



Step 1, install the coin cell battery.

Step 2, execute the follow command to set the RTC time:

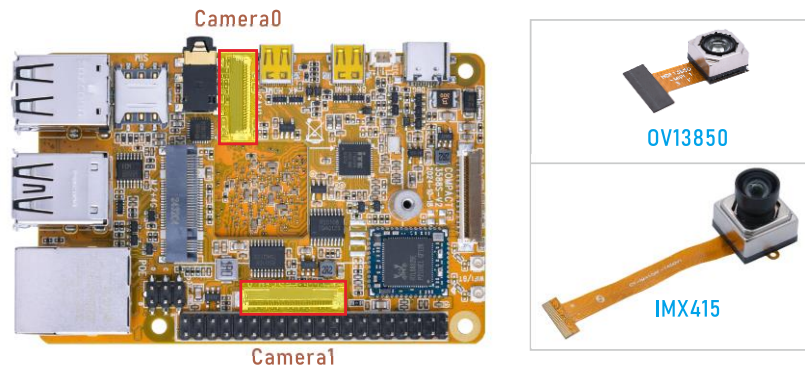
```
#date -s "2024-10-17 09:18:30" //use the command date -s "YY-MM-DD hh:mm:ss" to modify
the date and time of the system
# hwclock -w // set RTC from system time
# hwclock
```

```
root@linaro-alip:/# date -s "2024-10-17 09:18:30"
Thu Oct 17 09:18:30 UTC 2024
root@linaro-alip:/#
root@linaro-alip:/#
root@linaro-alip:/# hwclock -w
root@linaro-alip:/#
root@linaro-alip:/# hwclock
2024-10-17 09:18:38.538780+00:00
root@linaro-alip:/#
root@linaro-alip:/#
root@linaro-alip:/# hwclock
2024-10-17 09:19:03.251182+00:00
root@linaro-alip:/#
```

Step 3, after the power is off, turn on the power after a period of time to check whether the time is saved.

```
root@linaro-alip:/# hwclock
2024-10-17 09:25:15.428013+00:00
root@linaro-alip:/#
```


6.10 Camera



The Compact3588s Debian system is configured with camera0 and camera1 by default, and the cameras module used are OV13850, IMX415. If you want to preview the camera normally, be sure to connect the camera module to camera0 and camera1.

```
# cd /rockchip-test/camera/
```

```
root@linaro-alip:/rockchip-test/camera# ls
camera0_rkisp_test.sh  camera_stresstest_rkisp_demo.sh  camera_usb_test.sh
camera1_rkisp_test.sh  camera_stresstest_v4l2.sh
camera_rkisp_test.sh  camera_test.sh
root@linaro-alip:/rockchip-test/camera#
root@linaro-alip:/rockchip-test/camera#
root@linaro-alip:/rockchip-test/camera# █
```

Preview the OV13850 image

```
# ./camera0_rkisp_test.sh
```

```
root@linaro-alip:/rockchip-test/camera# ./camera0_rkisp_test.sh
Start RKISP Camera Preview!
[ 298.988443] dw9714 3-000c: cmd 0x80685600 not supported
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
[ 299.848124] rkisp_hw fdc00000.rkisp: set isp clk = 300000000Hz
[ 299.855164] rkisp rkisp0-vir0: first params buf queue
[ 299.855626] rkcf-mipi-lvds1: stream[0] start streaming
[ 299.859124] rkcf-mipi-lvds1: Allocate dummy buffer, size: 0x01944000
[ 299.859256] rockchip-mipi-csi2 mipi1-csi2: stream on, src_sd: 00000000d6412bca, sd_name:rockchip-csi2-dphy0
[ 299.859269] rockchip-mipi-csi2 mipi1-csi2: stream ON
[ 299.859299] rockchip-csi2-dphy0: dphy0, data_rate_mbps 600
[ 299.859601] rockchip-csi2-dphy csi2-dcphy1: csi2_dphy_s_stream stream on:1, dphy0, ret 0
Redistribute latency...
0:00:05.4 / 99:99:99.
```

Preview the IMX415 image

```
# ./camera1_rkisp_test.sh
```

6.11 Video Testing

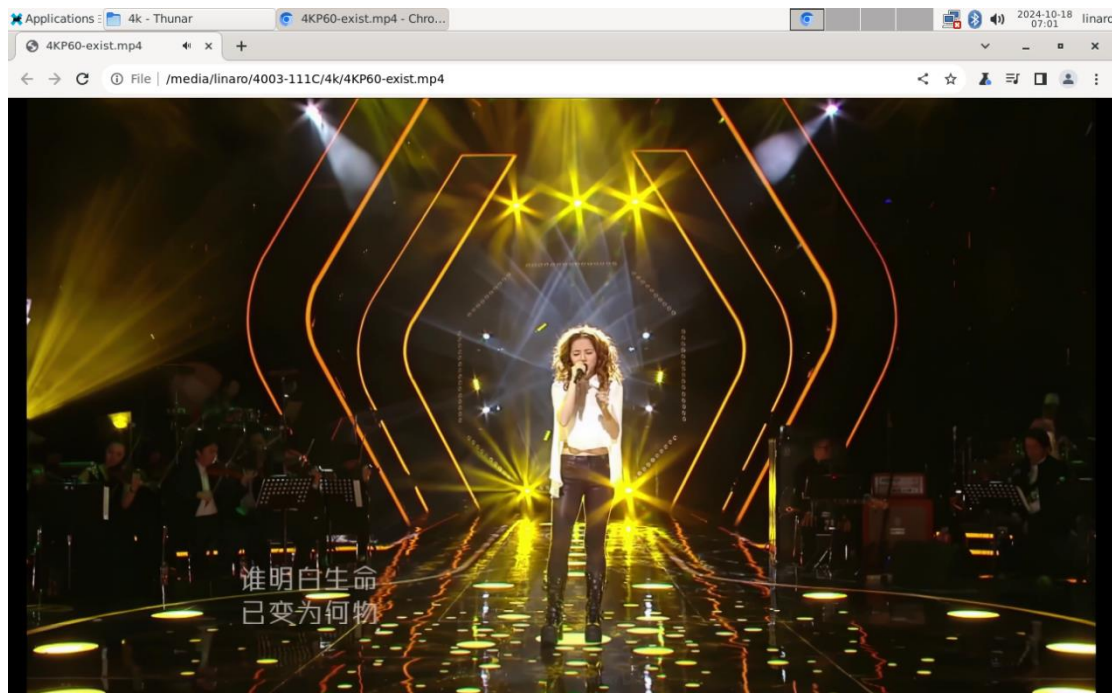
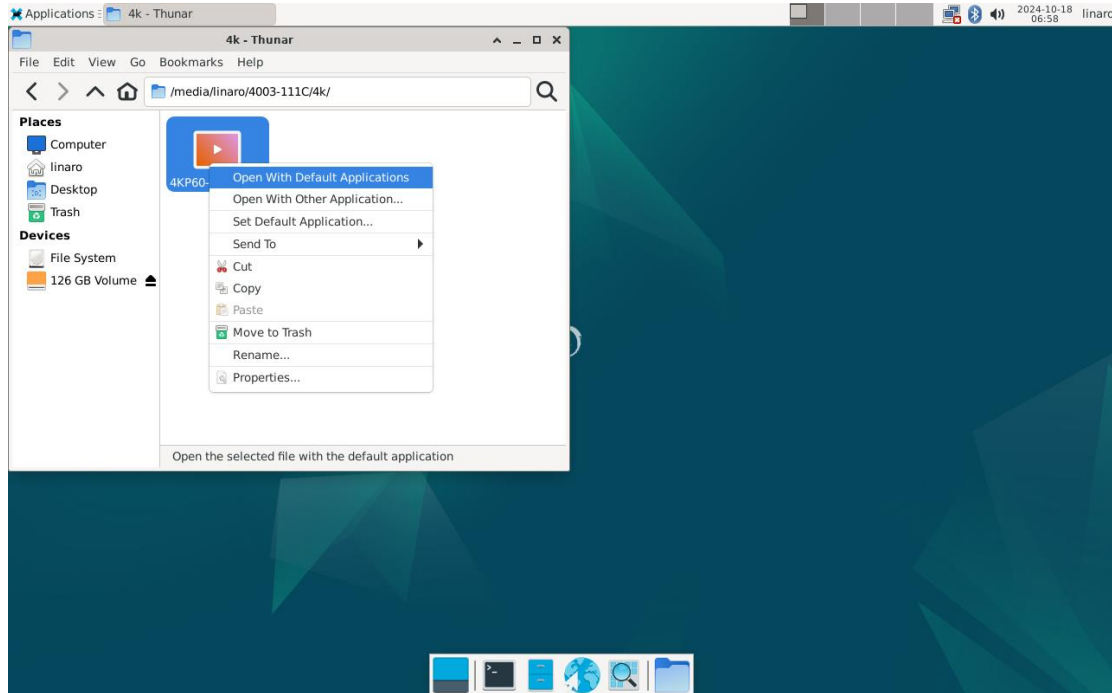
① System built-in video test mode.

- Execute the corresponding script to perform video testing:

```
root@linaro-alip:/# /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
root@linaro-alip:/# /rockchip-test/video/
```

- ② Use **Chromium Browser** to play the video file.

- For example: Select Video File , Right-click and select **Chromium Browser** Play.



- ③ Playback using command line.

```
# gst-play-1.0 --videosink=xvimagesink /media/linaro/5488-0CF6/video/8KP30/H265_8KP30-2.mp4
```

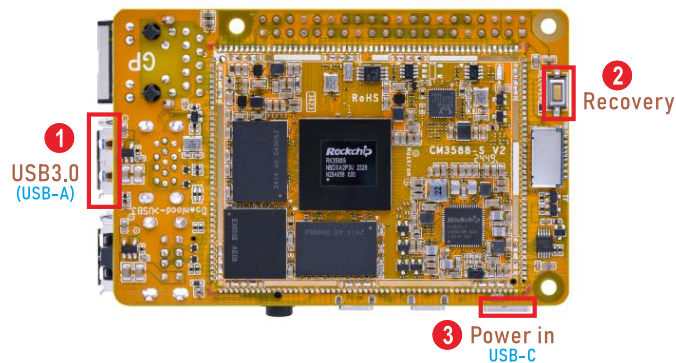
```
root@linaro-alip:/#
root@linaro-alip:/# gst-play-1.0 --videosink=xvimagesink /media/linaro/5488-0CF6/video/8KP30/H265_8KP30-2.mp4
Press 'k' to see a list of keyboard shortcuts.
Now playing /media/linaro/5488-0CF6/video/8KP30/H265_8KP30-2.mp4
Redistribute latency...
XDG_RUNTIME_DIR (/var/run/user/1000) is not owned by us (uid 0), but by uid 1000! (This could e.g. happen if you try to connect to a non-root PulseAudio
rotocol. Don't do that.)
Redistribute latency...
Redistribute latency...
Redistribute latency...
[ 678.962991] dwhdmi-rockchip fde80000.hdmir: Rate 198000000 missing; compute N dynamically
Redistribute latency...
00:39.4 / 0:13:10.5
```

- For 8KP60 video playback:

```
# echo performance | tee $(find /sys/ -name *governor)
# export GST_MPP_VIDEODEC_DEFAULT_ARM_AFBC=1
# gst-play-1.0 --flags=3 --videosink="xvimagesink sync=false" --audiosink="alsasink
device=hw:0,0 sync=false" Great-Colors_8K_VP9_HDR_OLED_60FPS.mkv
```

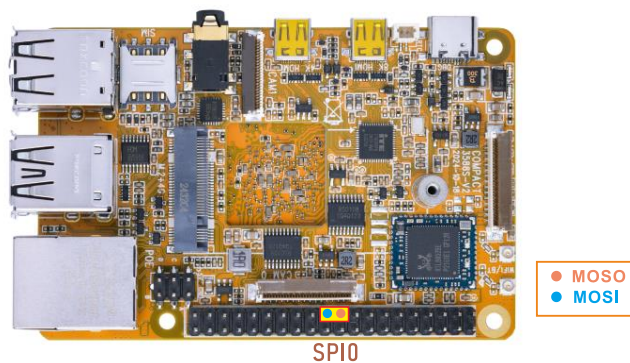
6.12 Key

Recover key.



It is used when burning the image, connect the USB 3.0 Type_A cable, press and hold the Recover key, and then turn on the power, it will enter the loader burning mode.

6.13 SPI



Step 1, Run `spidev_test` to view the printed data

```
root@linaro-alip:/# spidev_test
spi mode: 0
bits per word: 8
max speed: 10000000 Hz (10000 KHz)

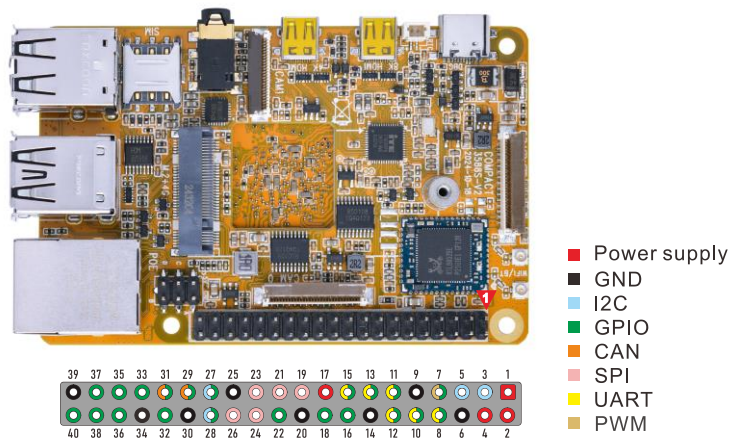
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF
root@linaro-alip:/#
```

Step 2, Short-circuit pins `SPI0_MOSI_M2` and `SPI0_MISO_M2`, and run `spidev_test` again to check whether data is sent or received successfully

```
root@linaro-alip:/# spidev_test
spi mode: 0
bits per word: 8
max speed: 10000000 Hz (10000 KHz)

EE 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
```

6.14 GPIO



Pin	GPIO	GPIO device number	pin	GPIO	GPIO device number
3	I2C3_SDA_M0_3V3	48	12	GPIO4_B5_d	141
5	I2C3_SCL_M0_3V3	49	16	GPIO1_A2_d	34
7	GPIO3_D5_d	125	18	GPIO1_A3_d	35
11	GPIO4_A6_d	134	22	GPIO1_D0_d	56
15	GPIO4_A3_d	131	28	GPIO3_D2_d	122
27	GPIO3_D3_d	123	32	GPIO3_C6_u	118
29	GPIO3_C4_u	116	36	GPIO3_B7_d	111
31	GPIO3_C5_u	117	38	GPIO1_C2_d	50
33	GPIO1_C6_d	54	37	GPIO1_B0_u	40
35	GPIO1_D5_d	61	40	GPIO4_A7_d	135

```
# echo 141 > /sys/class/gpio/export
# echo "out" > /sys/class/gpio/gpio141/direction
# echo 1 > /sys/class/gpio/gpio141/value
//The GPIO4_B5 will output high voltage
# echo 0 > /sys/class/gpio/gpio141/value
//The GPIO4_B5 will output low voltage
# echo 141> /sys/class/gpio/unexport
//The GPIO4_B5 will unexport
Other GPIO use same test method.
```

6.Buildroot Test

6.1 Display

Compact3588s Buildroot system supports HDMI TX, DP_TO_HDMI TX, MIPI LCD three-screen different display, connect the display as shown in the figure and then power on.

6.2 USB

6.2.1 USB3.0



① **ADB:** // Please install the ADB driver on your computer by yourself

Step 1, connect USB Type-A cable.

Step 2, use the shortcut keys **WIN + R** to open the Windows command run box, type: **cmd**, and open the Windows console command window.



```
C:\Users\kang>
C:\Users\kang>
C:\Users\kang>
C:\Users\kang>
C:\Users\kang>
```

Step 3, execute the follow commands to enable ADB.

```
# adb shell
```

```
C:\Users\kang>adb shell
root@rk3588s-buildroot:/#
root@rk3588s-buildroot:/#
root@rk3588s-buildroot:/#
```

② USB3.0 HOST:

Step 1, Switch the usb host mode on the serial port CLI

```
# echo host > /sys/kernel/debug/usb/fc000000.usb/mode
```

```
root@rk3588s-buildroot:/# echo host > /sys/kernel/debug/usb/fc000000.usb/mode
root@rk3588s-buildroot:/# [ 19.532448] dwc3 fc000000.usb: request 0000000025239b57 was not queued to ep0out
[ 19.534196] android_work: did not send uevent (0 0 0000000000000000)
[ 19.644568] xhci-hcd xhci-hcd.9.auto: xHCI Host Controller
[ 19.645396] xhci-hcd xhci-hcd.9.auto: new USB bus registered, assigned bus number 5
[ 19.645603] xhci-hcd xhci-hcd.9.auto: hcc params 0x0220fe64 hci version 0x110 quirks 0x0000800002010010
[ 19.645649] xhci-hcd xhci-hcd.9.auto: irq 128, io mem 0xfc000000
[ 19.645781] xhci-hcd xhci-hcd.9.auto: xHCI Host Controller
[ 19.646484] xhci-hcd xhci-hcd.9.auto: new USB bus registered, assigned bus number 6
[ 19.646508] xhci-hcd xhci-hcd.9.auto: Host supports USB 3.0 SuperSpeed
[ 19.646698] usb usb5: New USB device found, idVendor=1d6b, idProduct=0002, bcdDevice= 6.01
[ 19.646715] usb usb5: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 19.646726] usb usb5: Product: xHCI Host Controller
[ 19.646736] usb usb5: Manufacturer: Linux 6.1.75 xhci-hcd
[ 19.646746] usb usb5: SerialNumber: xhci-hcd.9.auto
[ 19.647828] hub 5-0:1.0: USB hub found
[ 19.647865] hub 5-0:1.0: 1 port detected
[ 19.648656] usb usb6: we don't know the algorithms for LPM for this host, disabling LPM.
[ 19.648741] usb usb6: New USB device found, idVendor=1d6b, idProduct=0003, bcdDevice= 6.01
[ 19.648756] usb usb6: New USB device strings: Mfr=3, Product=2, SerialNumber=1
[ 19.648768] usb usb6: Product: xHCI Host Controller
[ 19.648778] usb usb6: Manufacturer: Linux 6.1.75 xhci-hcd
[ 19.648801] usb usb6: SerialNumber: xhci-hcd.9.auto
[ 19.649632] hub 6-0:1.0: USB hub found
[ 19.649666] hub 6-0:1.0: 1 port detected
```

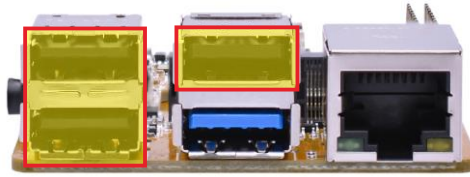
Step 2, Insert the USB flash drive into the usb3.0 seat.

Step 3, use the command: `df -h` to view the device auto-mount directory.

```
root@rk3588s-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        14G   708M   13G   6% /
devtmpfs         3.9G   8.0K   3.9G   1% /dev
tmpfs            3.9G  140K   3.9G   1% /tmp
tmpfs            3.9G  596K   3.9G   1% /run
tmpfs            3.9G  184K   3.9G   1% /var/log
tmpfs            3.9G    0   3.9G   0% /dev/shm
/dev/mmcblk0p7  123M   12M   108M  10% /oem
/dev/mmcblk0p8   15G   332K   15G   1% /userdata
/dev/sda1       118G   8.2G  110G   7% /mnt/udisk
root@rk3588s-buildroot:/#
```



6.2.2 USB2.0



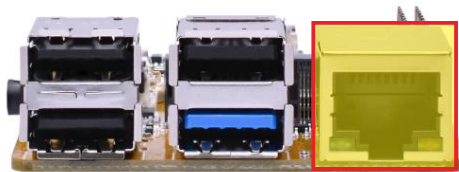
3x USB2.0 Host

Step 1, insert the USB2.0 USB flash drive into the USB2.0 interface.

Step 2, use the command: `df -h` to view the device auto-mount directory.

```
root@rk3588s-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        14G   712M   13G   6% /
devtmpfs         3.9G   8.0K   3.9G   1% /dev
tmpfs            3.9G  136K   3.9G   1% /tmp
tmpfs            3.9G  588K   3.9G   1% /run
tmpfs            3.9G  176K   3.9G   1% /var/log
tmpfs            3.9G    0   3.9G   0% /dev/shm
/dev/mmcblk0p7   123M   12M   108M  10% /oem
/dev/mmcblk0p8    15G  472K   15G   1% /userdata
/dev/sda1        118G   8.2G  110G   7% /mnt/udisk
root@rk3588s-buildroot:/#
```

6.3 Ethernet



Ethernet

Step 1, connect the network cable to the Ethernet port.

Step 2, according to the terminal serial port printing information, it can be seen that the Gigabit Ethernet recognition is successful.

```
# ifconfig
```

```
root@rk3588s-buildroot:/# [ 566.389256] rk_gmac-dwmac fe1c0000.ethernet eth0: Link is up - 1Gbps/Full - flow control rx/tx
[ 566.389451] IPV6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready

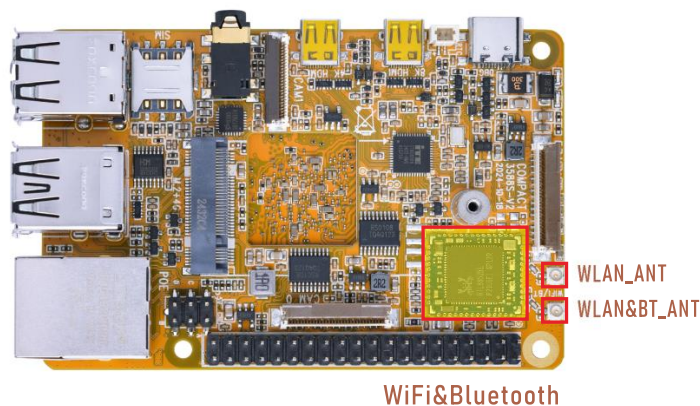
root@rk3588s-buildroot:/#
root@rk3588s-buildroot:/# ifconfig
root@rk3588s-buildroot:/# ifconfig
eth0      Link encap:Ethernet  HWaddr 1A:5D:3C:E8:EC:D8
          inet addr:192.168.0.231  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::6c36:36e5:f170:8cdd/64  Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:46 errors:0 dropped:1 overruns:0 frame:0
          TX packets:10 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:15919 (15.5 KiB)  TX bytes:1340 (1.3 KiB)
          Interrupt:79
```

Step 3, internet test.

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

```
root@rk3588s-buildroot:/# ping -I eth0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.231 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=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=171 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=172 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=172 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=48 time=174 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=48 time=172 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=48 time=177 ms
■
```

6.4 WiFi & Bluetooth



6.4.1 WiFi

Step 1, connect WiFi Antenna.

Step 2, check whether the wifi device **wlan0** exists:

```
# ifconfig
```




```
root@rk3588s-buildroot:/# ifconfig
eth0      Link encap:Ethernet  HWaddr D6:81:FB:92:AC:0F
          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)
          Interrupt:79

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:97 errors:0 dropped:0 overruns:0 frame:0
          TX packets:97 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:6301 (6.1 KiB)  TX bytes:6301 (6.1 KiB)

p2p0     Link encap:Ethernet  HWaddr 56:EF:33:94:C6:28
          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)

wlan0    Link encap:Ethernet  HWaddr 54:EF:33:94:C6:28
          inet addr:192.168.0.109  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::6b0:ecfb:573b:e25e/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:39368 errors:0 dropped:4245 overruns:0 frame:0
          TX packets:8239 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:12610668 (12.0 MiB)  TX bytes:830609 (811.1 KiB)

root@rk3588s-buildroot:/#
```

Step 3, search for available WiFi hotspots:

```
# iwlist wlan0 scan
```

```
root@rk3588s-buildroot:/# iwlist wlan0 scan
wlan0    Scan completed :
          Cell 01 - Address: D8:32:14:25:B7:A8
                  ESSID:"LYB-2.4G"
                  Protocol:IEEE 802.11bgn
                  Mode:Master
                  Frequency:2.412 GHz (channel 1)
                  Encryption key:on
                  Bit Rates:300 Mb/s
                  Extra:wpa_ie=dd160050f20101000050f20401000050f20401000050f202
                  IE: WPA Version 1
                        Group Cipher : CCMP
                        Pairwise Ciphers (1) : CCMP
                        Authentication Suites (1) : PSK
                  Extra:
                  IE: IEEE 802.11i/WPA2 Version 1
                        Group Cipher : CCMP
                        Pairwise Ciphers (1) : CCMP
                        Authentication Suites (1) : PSK
                  IE: Unknown: DDAD0050F204104A0001101044000102103800010310470010112233445566778899AAD8321425B7A01021001B5265616C7
4656B2053656D69636F66E647563746F7220436F72702E1023000752544C387878781024000045562D323031302D30392D32301042000F31323334353637383930313
23334371054000800060050F2040001101100135265616C74656B20576972656C657373204150100800020100103C0001031049000600372A000120
                  Quality=49/100  Signal level=49/100
                  Extra:fm=0003
                  Cell 02 - Address: 6C:21:A2:F5:10:F8
                  ESSID:"LED_AIO_7c41"
                  Protocol:IEEE 802.11bgn
```

Step 4, connecting hotspots:

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

```
root@rk3588s-buildroot:/# wifi-connect.sh Boardcon Boardcon43435656
connect to WiFi ssid: Boardcon, Passwd: Boardcon43435656
Successfully initialized wpa_supplicant
```

Step 6, execute the following to view the network interface status:

```
# ifconfig
```



```
wlan0      Link encap:Ethernet  HWaddr 2C:C3:E6:5C:90:5C
            inet addr:192.168.0.232  Bcast:192.168.0.255  Mask:255.255.255.0
            inet6 addr: fe80::720:fa37:e7d9:7ff4/64  Scope:Link
            UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
            RX packets:30 errors:0 dropped:6 overruns:0 frame:0
            TX packets:11 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1000
            RX bytes:4469 (4.3 KiB)  TX bytes:1364 (1.3 KiB)
```

Step 7, internet test:

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

```
root@rk3588s-buildroot:/# ping -I wlan0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 192.168.0.232 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=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=178 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=48 time=177 ms
```

6.

6.4.2 Bluetooth

Step 1, connect bluetooth Antenna.

Step 2, viewing device status:

```
# hciconfig -a
```

```
root@rk3588s-buildroot:/# hciconfig -a
hci0:      Type: Primary  Bus: UART
           BD Address: 2C:C3:E6:5C:90:5D  ACL MTU: 1021:5  SCO MTU: 255:11
           UP RUNNING
           RX bytes:1787 acl:0 sco:0 events:61 errors:0
           TX bytes:2818 acl:0 sco:0 commands:61 errors:0
           Features: 0xff 0xff 0xff 0xfa 0xdb 0xbf 0x7b 0x87
           Packet type: DM1 DM3 DM5 DH1 DH3 DH5 HV1 HV2 HV3
           Link policy: RSWITCH HOLD SNIFF PARK
           Link mode: PERIPHERAL ACCEPT
           Name: 'BlueZ 5.72'
           Class: 0x6c0000
           Service Classes: Rendering, Capturing, Audio, Telephony
           Device class: Miscellaneous,
[ 214.923517] rtk_btcoex: BTCOEX hci_rev 0xdec8
[ 214.923600] rtk_btcoex: BTCOEX lmp_subver 0x34cf
           HCI Version: 5.2 (0xb)  Revision: 0xdec8
           LMP Version: 5.2 (0xb)  Subversion: 0x34cf
           Manufacturer: Realtek Semiconductor Corporation (93)
```

```
root@rk3588s-buildroot:/# █
```

Step 3, allow Bluetooth to search and be found:

```
# hciconfig hci0 piscan
```

```
root@rk3588s-buildroot:/# hciconfig hci0 piscan
root@rk3588s-buildroot:/#
```

Step 4, enter **bluetoothctl** for Bluetooth connection testing:

```
# bluetoothctl
```



```
root@rk3588s-buildroot:/# bluetoothctl
hci0 new_settings: powered bondable ssp br/edr le secure-conn cis-central cis-peripheral
Agent registered
[CHG] Controller 2C:C3:E6:5C:90:5D Pairable: yes
[bluetooth]#
```

Step 5, Search for Bluetooth devices.

```
[bluetooth]# scan on
```

```
[bluetooth]# scan on
SetDiscoveryFilter success
[bluetooth]# [ 665.194233] rtk_btcoex: hci (periodic)inq start
hci0 type 7 discovering on
Discovery started
[CHG] Controller 2C:C3:E6:5C:90:5D Discovering: yes
[CHG] Device E2:73:E7:E5:99:79 RSSI: 0xffffffffa0 (-96)
[NEW] Device 6E:C0:FA:03:FA:30 6E-C0-FA-03-FA-30
[CHG] Device 6C:0D:C4:24:3D:12 LegacyPairing: no
[CHG] Device 6C:0D:C4:24:3D:12 RSSI: 0xffffffff9c (-100)
[NEW] Device 2C:A0:42:D1:14:D5 Kangkang
[CHG] Device C1:14:88:1E:63:B5 RSSI: 0xffffffffb2 (-78)
[CHG] Device 4B:EB:BD:21:36:4A RSSI: 0xffffffffb8 (-72)
[CHG] Device 4B:EB:BD:21:36:4A TxPower: 0x000c (12)
[CHG] Device 4B:EB:BD:21:36:4A ManufacturerData.Key: 0x004c (76)
[CHG] Device 4B:EB:BD:21:36:4A ManufacturerData.Value: ..
10 00 50 10 00 00 00 00 00 00 00 00 00 00 00 00
```

Command to disable Bluetooth discovery state:

```
[bluetooth]# scan off
```

```
[bluetooth]# scan off
[bluetooth]# [ 929.569007] rtk_btcoex: hci (periodic)inq cancel/exit
hci0 type 7 discovering off
Discovery stopped
```

Step 6, Connect to Bluetooth device.

```
[bluetooth]# connect 2C:A0:42:D1:14:D5
```



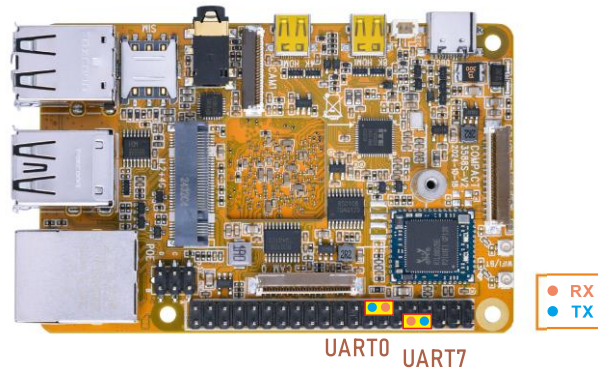
```
[bluetooth]# connect 2C:A0:42:D1:14:D5
Device 2C:A0:42:D1:14:D5 not available
[DEL] Device 46:F8:28:39:DF:FB 46-F8-28-39-DF-FB
[bluetooth]# [ 1640.601881] rtk_btcoex: hci (periodic)inq start
hci0 type 7 discovering on
[CHG] Device 7C:EC:28:56:38:18 RSSI: 0xfffffdd4 (-44)
[NEW] Device 78:61:13:F2:7A:57 78-61-13-F2-7A-57
[CHG] Device 6E:B0:69:43:4A:54 ManufacturerData.Key: 0x004c (76)
[CHG] Device 6E:B0:69:43:4A:54 ManufacturerData.Value:
10 07 48 1f 01 4e 17 6f 78 ..H..N.ox
[NEW] Device 2C:A0:42:D1:14:D5 KangKang
[CHG] Device 4D:91:C6:57:56:C3 ManufacturerData.Key: 0x004c (76)
[CHG] Device 4D:91:C6:57:56:C3 ManufacturerData.Value:
10 06 13 1a 84 e9 b4 d7 .....
[DEL] Device 44:87:25:E1:AD:D6 44-87-25-E1-AD-D6
[CHG] Device 6C:0D:C4:24:3D:12 LegacyPairing: yes
[CHG] Device 88:68:4B:74:39:44 RSSI: 0xffffffc0 (-64)
[DEL] Device EC:3C:BB:47:1A:91 â Žâ“Ÿçš,,nova 6 (5G)
[CHG] Device 88:68:4B:74:39:44 RSSI: 0xffffffc8 (-56)
[CHG] Device 4D:91:C6:57:56:C3 RSSI: 0xffffffa8 (-88)
[CHG] Device C1:14:88:1E:63:B5 RSSI: 0xffffffa4 (-92)
[DEL] Device 65:44:92:53:51:67 65-44-92-53-51-67
[CHG] Device 4D:91:C6:57:56:C3 RSSI: 0xffffffb0 (-80)
[bluetooth]# connect 2C:A0:42:D1:14:D5
Attempting to connect to 2C:A0:42:D1:14:D5
```

During the Bluetooth connection process, some permissions may be requested. Generally, just enter 'yes'.

```
[NEW] Device 70:D1:D5:45:9B:40 70-D1-D5-45-9B-400-00805f9b34fb (yes/no):
[NEW] Device A0:94:1A:65:A9:D6 OPPO Reno6 5G
[NEW] Device 54:6C:EB:38:31:3B DELL
[CHG] Device 6C:0D:C4:24:3D:12 RSSI: 0xffffffac (-84)
[CHG] Device 88:68:4B:74:39:44 LegacyPairing: yes
[kangKang]# [ 1692.525254] rtk_btcoex: update_hci_active_state: handle 0x0001, interval 0
[ 1692.525341] rtk_btcoex: HID not connected, nothing to be down
[ 1692.541290] rtk_btcoex: l2cap op 6, len 16, out 1
[ 1692.541394] rtk_btcoex: TX l2cap disconn req, hnd 0x0001, dcid 0x0044, scid 0x0044
[ 1692.541432] rtk_btcoex: handle_l2cap_discon_req: handle 0x0001, dcid 0x0044, scid 0x0044, dir 1
[ 1692.541470] rtk_btcoex: update_profile_connection: is_add 0, profile_index 3
[ 1692.541500] rtk_btcoex: update_profile_connection: phci_conn->profile_bitmap 0x0c
[ 1692.541527] rtk_btcoex: Delete profile: hnd 0x0001, psm 0x0003, dcid 0x0044, scid 0x0044
[ 1692.557492] rtk_btcoex: l2cap op 6, len 16, out 0
[ 1692.557629] rtk_btcoex: RX l2cap disconn req, hnd 0x0001, dcid 0x0044, scid 0x0044
[ 1692.557664] rtk_btcoex: handle_l2cap_discon_req: handle 0x0001, dcid 0x0044, scid 0x0044, dir 0
[ 1693.014109] rtk_btcoex: count_pan_packet_timeout: pan_packet_count 4
[CHG] Device C1:14:88:1E:63:B5 RSSI: 0xffffffb4 (-76)
[CHG] Device 6C:0D:C4:24:3D:12 LegacyPairing: no
[CHG] Device 6C:0D:C4:24:3D:12 RSSI: 0xffffffa4 (-92)
[CHG] Device 6C:0D:C4:24:3D:12 RSSI: 0xffffff9c (-100)
[kanqKang]# [ 1698.857601] rtk_btcoex: inquiry complete

[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): 01 c9 05 ...
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): [ 1682.846801] rtk_btcoex: inquiry complete
[CHG] Device 6E:B0:69:43:4A:54 RSSI: 0xffffffa4 (-92)
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): hci0 type 7 discovering off
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): [DEL] Device 77:7D:57:A8:27:38 77-7D-57-A8-27-38
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): [ 1688.607586] rtk_btcoex: hci (periodic)inq start
hci0 type 7 discovering on
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): [NEW] Device 63:DF:02:E2:0F:81 63-DF-02-E2-0F-81
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): [CHG] Device 5B:DD:85:82:ED:78 RSSI: 0xffffffa6 (-90)
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): [CHG] Device E0:2E:08:93:C8:FC RSSI: 0xfffffc6 (-58)
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): [CHG] Device 6C:0D:C4:24:3D:12 LegacyPairing: yes
[agent] Authorize service 00001108-0000-1000-8000-00805f9b34fb (yes/no): Request canceled
[NEW] Device 70:D1:D5:45:9B:40 70-D1-D5-45-9B-400-00805f9b34fb (yes/no):
[NEW] Device A0:94:1A:65:A9:D6 OPPO Reno6 5G
[NEW] Device 54:6C:EB:38:31:3B DELL
[CHG] Device 6C:0D:C4:24:3D:12 RSSI: 0xffffffac (-84)
[CHG] Device 88:68:4B:74:39:44 LegacyPairing: yes
```

6.5 UART



Step 1, short circuit RX and TX pins of UART.

Step 2, UART0 test:

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

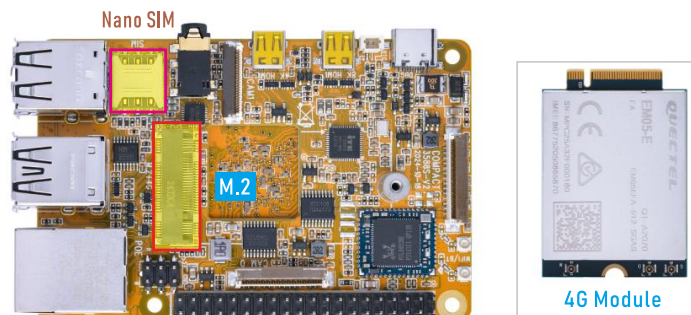
```
root@rk3588s-buildroot:/# com /dev/ttyS0 115200 8 0 1
port = /dev/ttyS0
baudrate = 115200
cs = 8
parity = 0
stopb = 1
1234567890
RECV: 1234567890
```

Step 2, UART7 test:

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

```
root@rk3588s-buildroot:/# com /dev/ttyS7 115200 8 0 1
port = /dev/ttyS7
baudrate = 115200
cs = 8
parity = 0
stopb = 1
1234567890
RECV: 1234567890
```

6.6 4G(EM05)



Step 1, insert 4G module to PCIe slot (4G model:EC20), then connect Antenna.

Step 2, power on after inserting the SIM card.



Step 3, execute the following command to realize ppp dialing:

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

```
root@rk3588s-buildroot:/# mkdir -p /var/run/pppd/lock
root@rk3588s-buildroot:/#
root@rk3588s-buildroot:/# pppd call quectel-ppp &
[1] 1574
root@rk3588s-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 3gpp # (from /etc/ppp/peers/quectel-ppp)
/dev/ttyUSB3  # (from /etc/ppp/peers/quectel-ppp)
115200       # (from /etc/ppp/peers/quectel-ppp)
lock         # (from /etc/ppp/peers/quectel-ppp)
connect chat -s -v -f /etc/ppp/peers/quectel-chat-connect # (from /etc/ppp/peers/quectel-ppp)
disconnect chat -s -v -f /etc/ppp/peers/quectel-chat-disconnect # (from /etc/ppp/peers/quectel-ppp)
nocrtscts     # (from /etc/ppp/peers/quectel-ppp)
modem         # (from /etc/ppp/peers/quectel-ppp)
hide-password # (from /etc/ppp/peers/quectel-ppp)
novj          # (from /etc/ppp/peers/quectel-ppp)
novjcomp      # (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)
noccps        # (from /etc/ppp/peers/quectel-ppp)
abort on (BUSY)
abort on (NO CARRIER)
abort on (NO DIALTONE)
abort on (ERROR)
abort on (NO ANSWER)
timeout set to 30 seconds
send (AT^M)
expect (OK)
AT^MM^M
OK
-- got it
```

Step 4, execute the following to view the network interface status:

```
# ifconfig
```

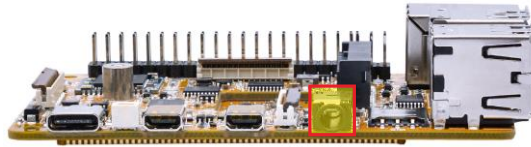
```
ppp0      Link encap:Point-to-Point Protocol
          inet addr:10.34.39.132 P-t-P:10.64.64.64 Mask:255.255.255.255
          UP POINTOPOINT RUNNING NOARP MULTICAST MTU:1500 Metric:1
          RX packets:4 errors:0 dropped:0 overruns:0 frame:0
          TX packets:14 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:3
          RX bytes:52 (52.0 B) TX bytes:198 (198.0 B)
```

Step 3, execute the following to check the connectivity of the detection network:

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

```
root@rk3588s-buildroot:/# ping -I ppp0 www.armdesigner.com
PING www.armdesigner.com (67.222.54.196) from 10.34.39.132 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=340 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=46 time=299 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=46 time=579 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=46 time=539 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=46 time=499 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=46 time=459 ms
```

6.7 Audio I/O



Headset

Step 1, plug the headphones into the headphone jack.

Step 2, view sound card:

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

```
root@rk3588s-buildroot:/# cat /proc/asound/cards
0 [rockchip-es8388 ]: rockchip-es8388 - rockchip-es8388
                        rockchip-es8388
1 [rockchipdp0    ]: rockchip-dp0 - rockchip-dp0
                        rockchip-dp0
2 [rockchiphdmi0  ]: rockchip-hdmi0 - rockchip-hdmi0
                        rockchip-hdmi0
root@rk3588s-buildroot:/# █
```

Step 3, headset recording:

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

```
root@rk3588-buildroot:/#
root@rk3588-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 play audio:

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

```
root@rk3588-buildroot:/#
root@rk3588-buildroot:/# aplay -Dhw:0,0 record.wav
Playing WAVE 'record.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
█
```

Supplementary instructions on audio output:

```
# aplay -Dhw:0,0 record.wav // Headset audio output
# aplay -Dhw:1,0 record.wav // DP_TO_HDMI TX audio output
# aplay -Dhw:2,0 record.wav // HDMI TX audio output
```


6.8 SD card



Micro SD

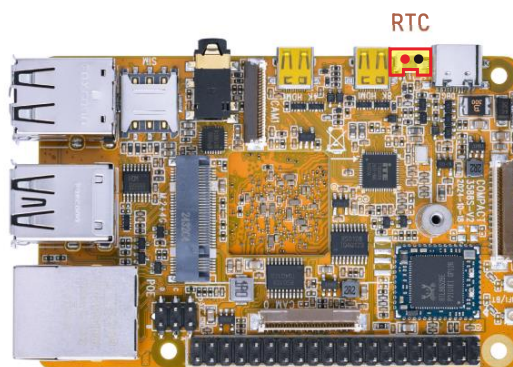
Step 1, insert the micro SD card into the card slot, then power on.

Step 2, view the SD card automatic mount directory.

```
# df -h
```

```
root@rk3588s-buildroot:/# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        14G   747M   13G    6% /
devtmpfs         3.9G   8.0K   3.9G    1% /dev
tmpfs            3.9G  264K   3.9G    1% /tmp
tmpfs            3.9G  572K   3.9G    1% /run
tmpfs            3.9G  304K   3.9G    1% /var/log
tmpfs            3.9G    0     3.9G    0% /dev/shm
/dev/mmcblk0p8   15G   484K   15G    1% /userdata
/dev/mmcblk0p7   123M   12M   108M   10% /oem
/dev/mmcblk1p1   15G   8.6G   6.4G   58% /mnt/sdcard
/dev/sda1        59G   9.7G   49G    17% /mnt/udisk
root@rk3588s-buildroot:/#
```

6.9 RTC



RTC



Step 1, install the coin cell battery.

Step 2, execute the follow command to set the RTC time:

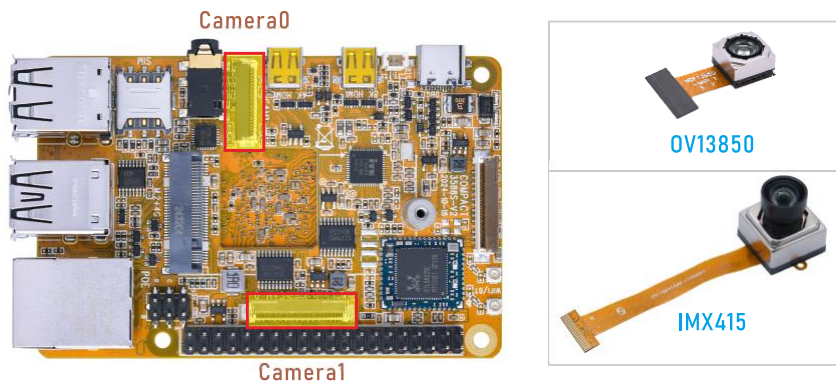
```
# date -s "2024-10-18 16:25:30" //use the command date -s "YY-MM-DD hh:mm:ss" to modify
the date and time of the system
# hwclock -w // set RTC from system time
# hwclock
```

```
root@rk3588s-buildroot:/# date -s "2024-10-18 16:25:30"
Fri Oct 18 16:25:30 UTC 2024
root@rk3588s-buildroot:/#
root@rk3588s-buildroot:/#
root@rk3588s-buildroot:/# hwclock -w
root@rk3588s-buildroot:/# hwclock
Fri Oct 18 16:25:36 2024 0.000000 seconds
root@rk3588s-buildroot:/#
```

Step 3, after the power is off, turn on the power after a period of time to check whether the time is saved

```
root@rk3588s-buildroot:/# hwclock
Fri Oct 18 16:27:14 2024 0.000000 seconds
root@rk3588s-buildroot:/#
root@rk3588s-buildroot:/# hwclock
Fri Oct 18 16:27:16 2024 0.000000 seconds
```

6.10 Camera



Compact3588s Buildroot system is configured with camera0 and camera1 by default, and the cameras module used are OV13850、IMX415. If you want to preview the camera normally, be sure to connect the camera module to camera0 and camera1.

```
# cd /rockchip-test/camera/
```

```
root@linaro-alip:/rockchip-test/camera# ls
camera0_rkisp_test.sh  camera_stresstest_rkisp_demo.sh  camera_usb_test.sh
camera1_rkisp_test.sh  camera_stresstest_v4l2.sh
camera_rkisp_test.sh   camera_test.sh
root@linaro-alip:/rockchip-test/camera#
root@linaro-alip:/rockchip-test/camera#
root@linaro-alip:/rockchip-test/camera# █
```

Preview the OV13850 image

```
# ./camera0_rkisp_test.sh
```



```

root@linaro-alip:/rockchip-test/camera# ./camera0_rkisp_test.sh
Start RKISP Camera Preview!
[ 298.988443] dw9714 3-000c: cmd 0x80685600 not supported
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
[ 299.848124] rkisp_hw fdcb0000.rkisp: set isp clk = 300000000Hz
[ 299.855164] rkisp rkisp0-vir0: first params buf queue
[ 299.855626] rkCIF-mipi-lvds1: stream[0] start streaming
[ 299.859124] rkCIF-mipi-lvds1: Allocate dummy buffer, size: 0x01944000
[ 299.859256] rockchip-mipi-csi2 mipi1-csi2: stream on, src_sd: 00000000d6412bca, sd_name:rockchip-csi2-dphy0
[ 299.859269] rockchip-mipi-csi2 mipi1-csi2: stream ON
[ 299.859299] rockchip-csi2-dphy0: dphy0, data_rate_mbps 600
[ 299.859601] rockchip-csi2-dphy cs12-dcphy1: cs12_dphy_s_stream stream on:1, dphy0, ret 0
Redistribute latency...
0:00:05.4 / 99:99:99.

```

Preview the IMX415 image

```
# ./camera1_rkisp_test.sh
```

```

root@linaro-alip:/rockchip-test/camera# ./camera1_rkisp_test.sh
Start RKISP Camera Preview!
[ 111.661800] dw9714 3-000c: cmd 0x80685600 not supported
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
[ 112.534240] rkisp_hw fdcc0000.rkisp: set isp clk = 396000000Hz
[ 112.561849] rkisp rkisp1-vir0: first params buf queue
[ 112.562466] rkCIF-mipi-lvds2: stream[0] start streaming
[ 112.565767] rkCIF-mipi-lvds2: Allocate dummy buffer, size: 0x01944000
[ 112.565897] rockchip-mipi-csi2 mipi2-csi2: stream on, src_sd: 00000000e8d86624, sd_name:rockchip-csi2-dphy0
[ 112.565909] rockchip-mipi-csi2 mipi2-csi2: stream ON
[ 112.565939] rockchip-csi2-dphy0: dphy0, data_rate_mbps 892
[ 112.565973] rockchip-csi2-dphy cs12-dphy0: cs12_dphy_s_stream stream on:1, dphy0, ret 0
[ 112.565983] imx415 3-0036: s_stream: 1. 3864x2192, hdr: 0, bpp: 10
Redistribute latency...
0:00:02.0 / 99:99:99.

```

6.11 Video Testing

① System built-in video test mode.

- Execute the corresponding script to perform video testing:

```

root@rk3588-buildroot:/# /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

```

② Use **Chromium Browser** to play the video file.

- For example:

```
# chromium 4KP60-exist.mp4
```

③ Playback using command line

- For 4KP60 video playback:

```

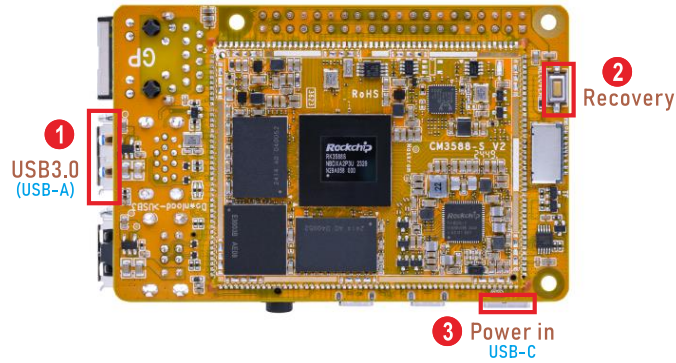
# gst-launch-1.0 uridecodebin uri=file:///mnt/udisk/video/H265_HEVC/I.O.I-
Dream.Girl.2160p.UHDTV.H265.ts name=dec ! queue ! waylandsink fullscreen=true dec. !
queue ! alsasink device=hw:0,0

```

- For 8K video playback:

```
# gst-play-1.0 --flags=3 --videosink="waylandsink sync=false fullscreen=true"H265_8KP30-3.mp4
```

6.12 Key



Recover key.

It is used when burning the image, connect the USB 3.0 Type-A cable, press and hold the Recover key, and then turn on the power, it will enter the loader burning mode.

6.13 SPI



Step 1, Run spidev_test to view the printed data

```
root@rk3588s-buildroot:/# spidev_test
spi mode: 0
bits per word: 8
max speed: 10000000 Hz (10000 KHz)

FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF FF FF FF FF
FF FF
root@rk3588s-buildroot:/#
```

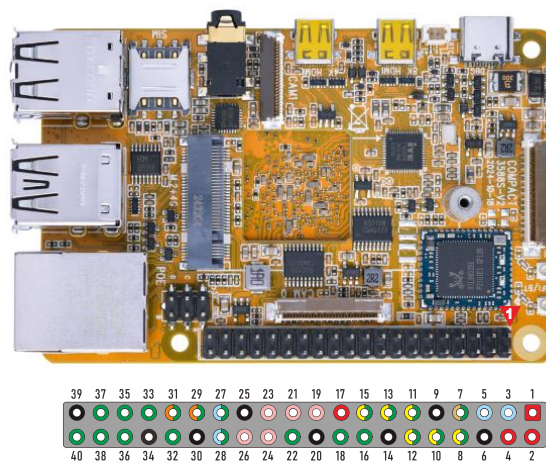
Step 2, Short-circuit pins SPI0_MOSI_M2 and SPI0_MISO_M2, and run spidev_test again to check whether data is sent or received successfully



```
root@rk3588s-buildroot:/# spidev_test
spi mode: 0
bits per word: 8
max speed: 10000000 Hz (10000 KHz)
```

```
EE 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
```

6.14 GPIO



Pin	GPIO	GPIO device number	pin	GPIO	GPIO device number
3	I2C3_SDA_M0_3V3	48	12	GPIO4_B5_d	141
5	I2C3_SCL_M0_3V3	49	16	GPIO1_A2_d	34
7	GPIO3_D5_d	125	18	GPIO1_A3_d	35
11	GPIO4_A6_d	134	22	GPIO1_D0_d	56
15	GPIO4_A3_d	131	28	GPIO3_D2_d	122
27	GPIO3_D3_d	123	32	GPIO3_C6_u	118
29	GPIO3_C4_u	116	36	GPIO3_B7_d	111
31	GPIO3_C5_u	117	38	GPIO1_C2_d	50
33	GPIO1_C6_d	54	37	GPIO1_B0_u	40
35	GPIO1_D5_d	61	40	GPIO4_A7_d	135



```
# echo 141 > /sys/class/gpio/export
# echo "out" > /sys/class/gpio/gpio141/direction
# echo 1 > /sys/class/gpio/gpio141/value
//The GPIO4_B5 will output high voltage
# echo 0 > /sys/class/gpio/gpio141/value
//The GPIO4_B5 will output low voltage
# echo 141> /sys/class/gpio/unexport
//The GPIO4_B5 will unexport
Other GPIO use same test method.
```