SMARC_RK3568_Debian User Manual

V1.0

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REVISION HISTORY

Time	Version	Purpose	Author	Comment
2023/2/8	1.0	Initial	wj	

1. Linux OS Installation

Burning tool preparation：USB Type-A cable*1、12V power supply*1

1.1 Driver Installation

Download and install DriverAssitant_v5.0 on PC.

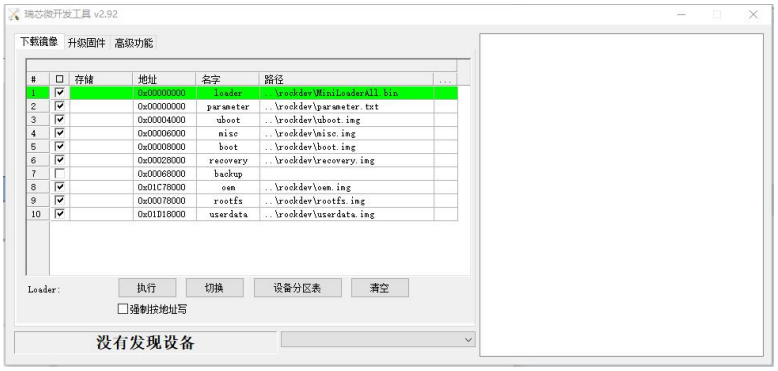
Link：https://pan.baidu.com/s/1rC9wLfxLoHSrSYnoMdPbjA

Key：znmg

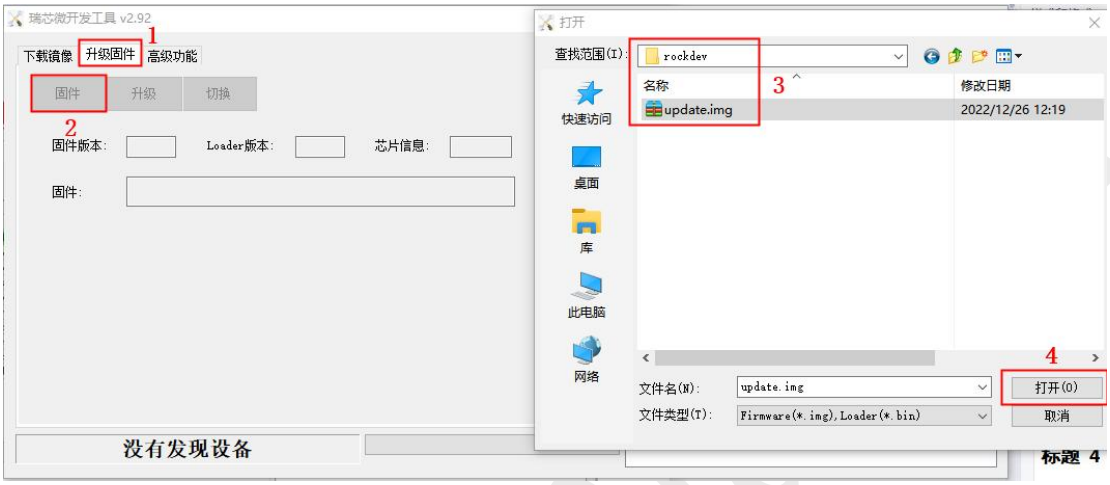
Double-click to open DriverAssitant_v5.0, then double-click DriverInstall.exe and click "Driver Install", click OK after success.

1.2 Upgrade Firmware

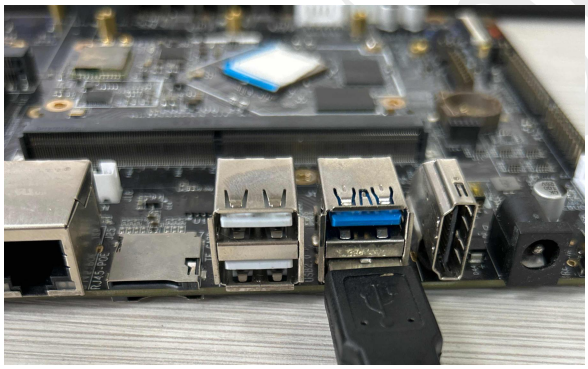
Download and unzip the firmware, double click to open RKDevTool_Release>RKDevTool.exe.



Click upgrade firmware, then click firmware, select rockdev->update.img to upload.

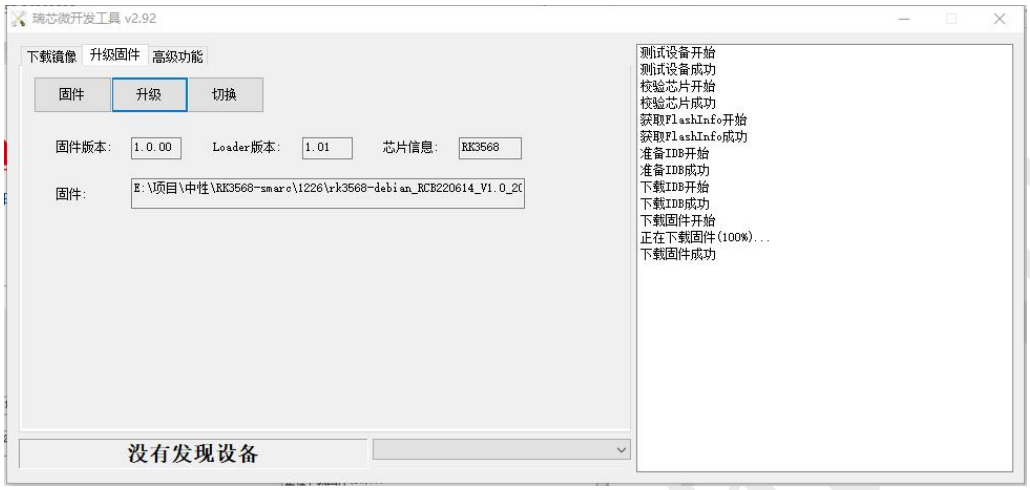


Plug the USB cable into one of the bottom port of the duallayer USB3.0, and the other end into the PC.



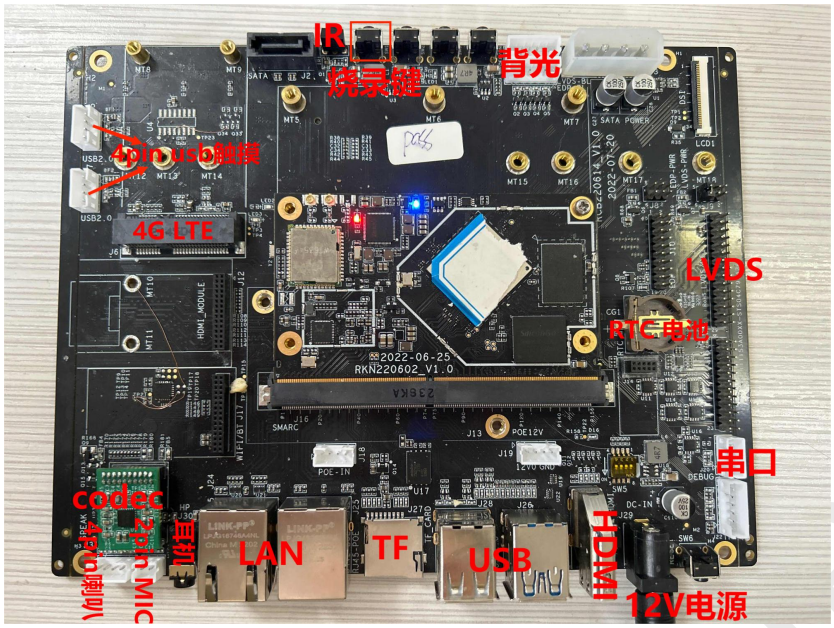
Press and hold the recovery button and turn on the power until the burn tool displays "A LOADER device is recognized", click Upgrade.

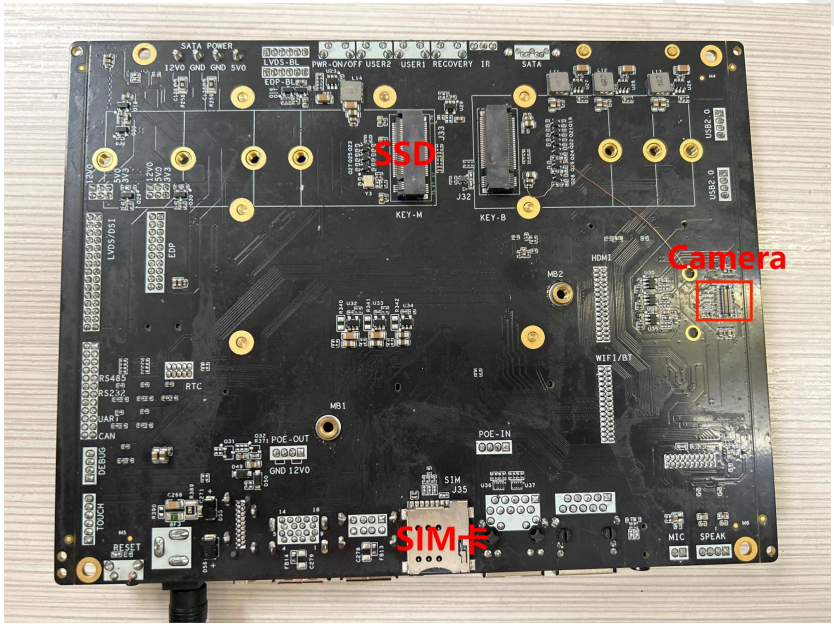

瑞芯微开发工具 v2.92
下载镜像
升级固件
高级功能
固件
升级
切换
2
固件版本:
1.0.00
Loader版本:
1.01
芯片信息:
RK3568
固件:
E:\项目\中性\RK3568-smarc\1226\rk3568-debian_RCB220614_V1.0_2(
测试设备开始
测试设备成功
校验芯片开始
校验芯片成功
获取FlashInfo开始
获取FlashInfo成功
准备IDB开始
准备IDB成功
下载IDB开始
下载IDB成功
下载固件开始
正在下载固件(1%)...
1
发现一个LOADER设备
2-8 :LOADER


瑞芯微开发工具 v2.92
下载镜像
升级固件
高级功能
固件
升级
切换
固件版本:
1.0.00
Loader版本:
1.01
芯片信息:
RK3568
固件:
E:\项目\中性\RK3568-smarc\1226\rk3568-debian_RCB220614_V1.0_2(
测试设备开始
测试设备成功
校验芯片开始
校验芯片成功
获取FlashInfo开始
获取FlashInfo成功
准备IDB开始
准备IDB成功
下载IDB开始
下载IDB成功
下载固件开始
正在下载固件(100%)...
下载固件成功
没有发现设备

2. Function Description

2.1 Hardware interface diagram





2.2 System Access

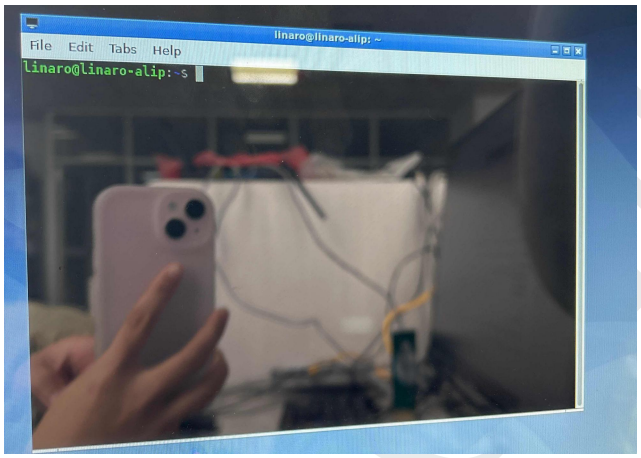
2.2.1 Serial port access：

Prepare a serial cable*1, connect it to the debug port, and connect the other end to the PC. open Device Manager->Port.

Check the recognized port number. Then open the serial debugging software and select COM port with baud rate 1500000.

2.2.2 Graphical interface access：

Connect the board and monitor with HDMI cable, enter the desktop, click on the bottom left corner -> System Tools - > LXTerminal to open the terminal software, enter “sudo su” to log in.



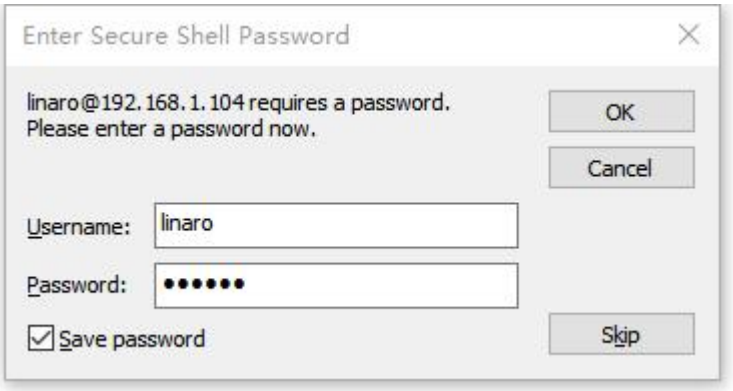
2.2.3 SSH remote connection： ：

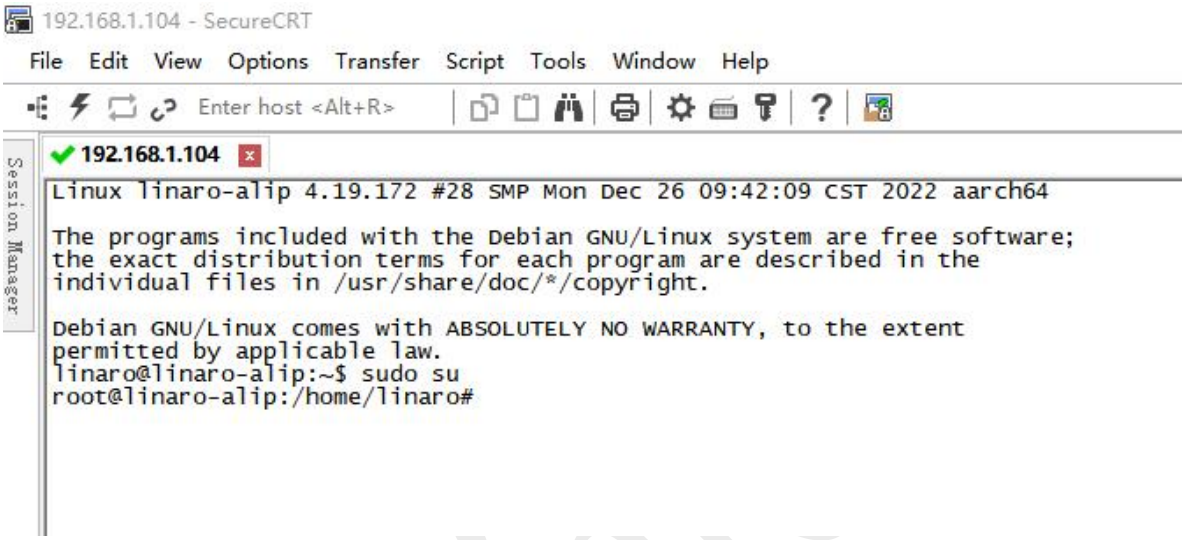
Connect PC and the board on the same LAN, get the IP address and use SSH to connect through the serial port tool（SecureCRT/TeraTerm）

Protocol: SSH2

Username： linaro

Password: linaro


Enter Secure Shell Password
linaro@192.168.1.104 requires a password.
Please enter a password now.
OK
Cancel
Username:
linaro
Password:
Save password
Skip


192.168.1.104 - SecureCRT
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
Session Manager
192.168.1.104
Linux linaro-alip 4.19.172 #28 SMP Mon Dec 26 09:42:09 CST 2022 aarch64
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
linaro@linaro-alip:~$ sudo su
root@linaro-alip:/home/linaro#

2.3 Wired Ethernet

1) Power on the board, connect the network cable to the port (J24/J25).

2) Execute the command “ifconfig” to see the IP address or open the browser to check whether can browse the web normally.

```
root@linaro-alip:~# ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.1.104  netmask 255.255.255.0  broadcast 192.168.1.255
        inet6 fe80::57e6:7b7a:60d4:cc80  prefixlen 64  scopeid 0x20<link>
        ether ac:db:da:59:8a:f4  txqueuelen 1000  (Ethernet)
        RX packets 6  bytes 934 (934.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 21  bytes 2192 (2.1 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 41

eth1: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        ether ac:db:da:59:8a:f5  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 51
```

2.4 TF Card

1) Insert the TF card (hot-swappable) into the slot.

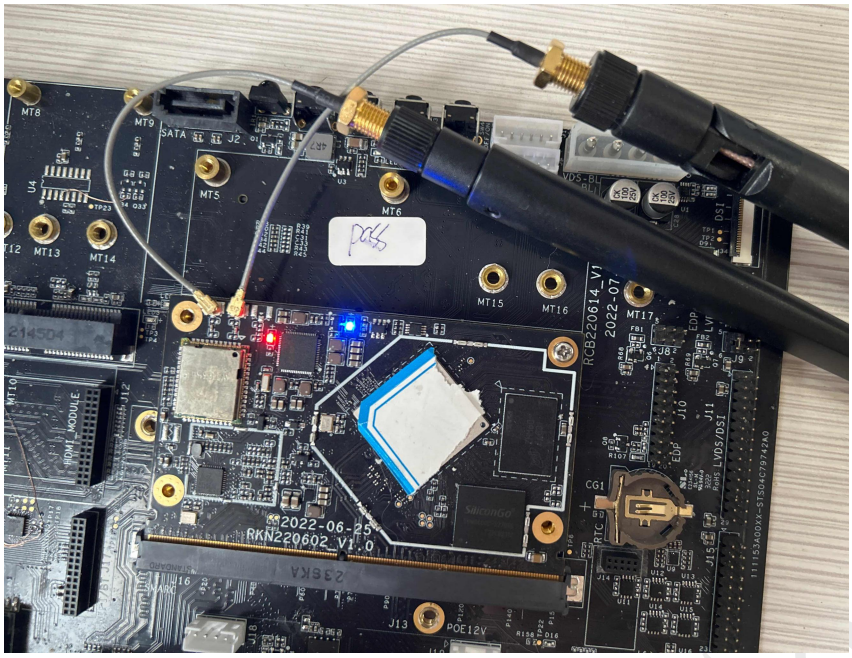
2)Through command ”fdisk -l“ to view partition information//View partition

3) Through command “df -h” to check the mounting status//View mount

```
root@linaro-alip:~# fdisk -l
Disk /dev/ram0: 4 MiB, 4194304 bytes, 8192 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/mmcblk0: 7.3 GiB, 7818182656 bytes, 15269888 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: B9460000-0000-4D59-8000-1C8F00003FF2

Device           Start      End  Sectors  Size Type
/dev/mmcblk0p1   16384    24575     8192    4M unknown
/dev/mmcblk0p2   24576    32767     8192    4M unknown
/dev/mmcblk0p3   32768    98303    65536   32M unknown
/dev/mmcblk0p4   98304   163839    65536   32M unknown
/dev/mmcblk0p5  163840   229375    65536   32M unknown
/dev/mmcblk0p6  229376 12812287 12582912    6G unknown
/dev/mmcblk0p7 12812288 13074431   262144  128M unknown
/dev/mmcblk0p8 13074432 13090815    16384    8M unknown
/dev/mmcblk0p9 13090816 15269823  2179008    1G unknown

Disk /dev/mmcblk1: 1.9 GiB, 1999110144 bytes, 3904512 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x00000000

Device         Boot Start     End Sectors  Size Id Type
/dev/mmcblk1p1        129 3904511 3904383  1.9G  6 FAT16
root@linaro-alip:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            853M     0  853M   0% /dev
tmpfs           185M   11M  175M   6% /run
/dev/mmcblk0p6  5.9G  2.5G  3.2G  45% /
tmpfs           922M     0  922M   0% /dev/shm
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
tmpfs           922M     0  922M   0% /sys/fs/cgroup
tmpfs           185M  4.0K  185M   1% /run/user/1000
/dev/mmcblk0p9 1016M  2.7M  997M   1% /media/linaro/c9b1174b-f335-422d-b34c-e53ec315de7b
/dev/mmcblk0p7  126M   13M  107M  11% /media/linaro/b709e899-101d-43e5-93cb-a36a5e05ddec
tmpfs           185M     0  185M   0% /run/user/0
/dev/mmcblk1p1  1.9G   32M  1.9G   2% /media/linaro/DISK CARD
```

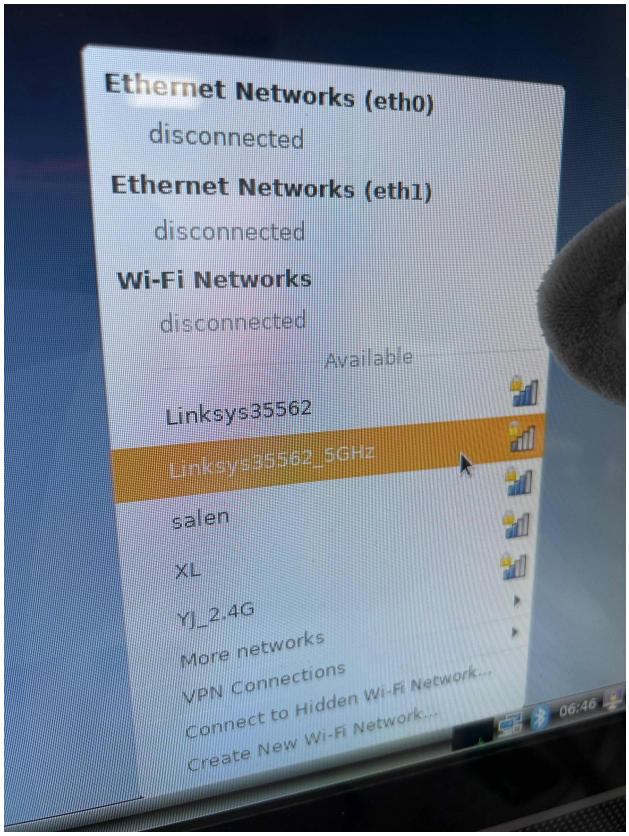
2.5 WiFi

Connected the antenna like the picture below:



Click on the network in the bottom right corner of the desktop

Select WiFi connection

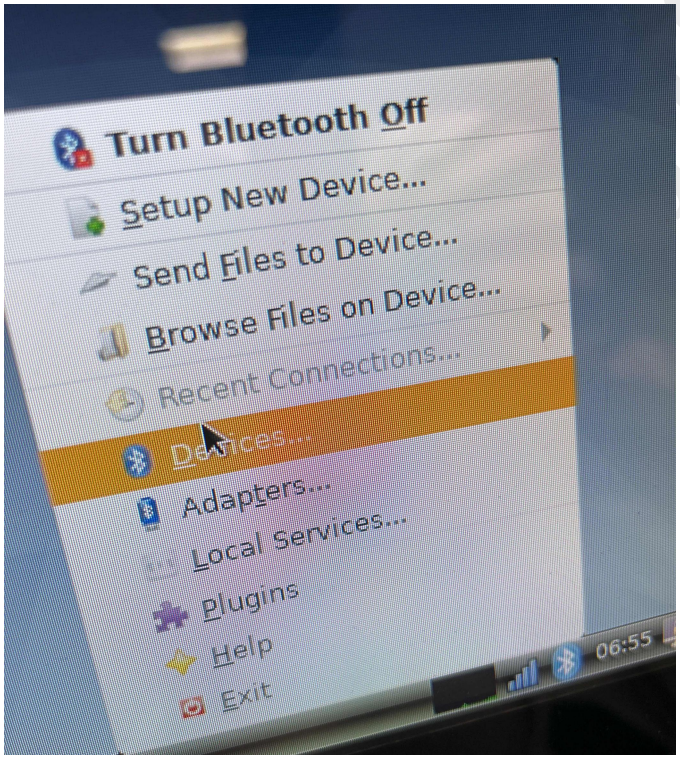


Connected successfully

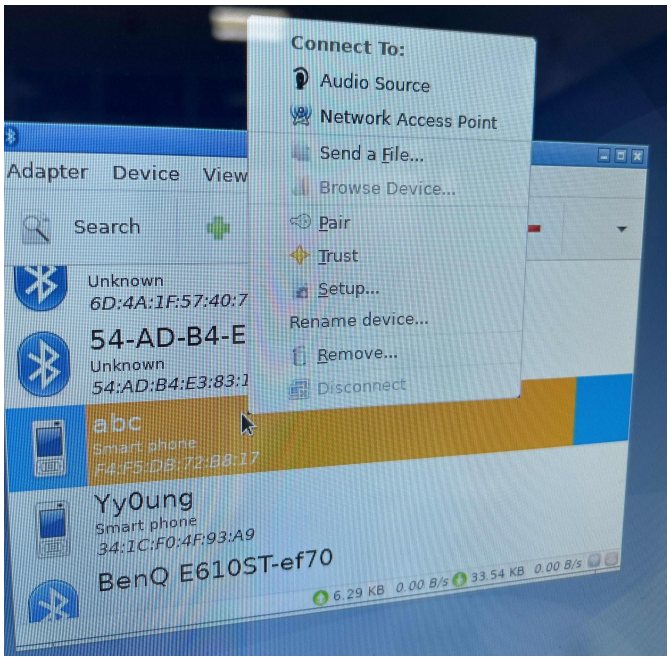
2.6 Bluetooth

Same steps as WiFi to connect two antennas.

Click on the Bluetooth icon in the bottom right corner and select "Devices" .

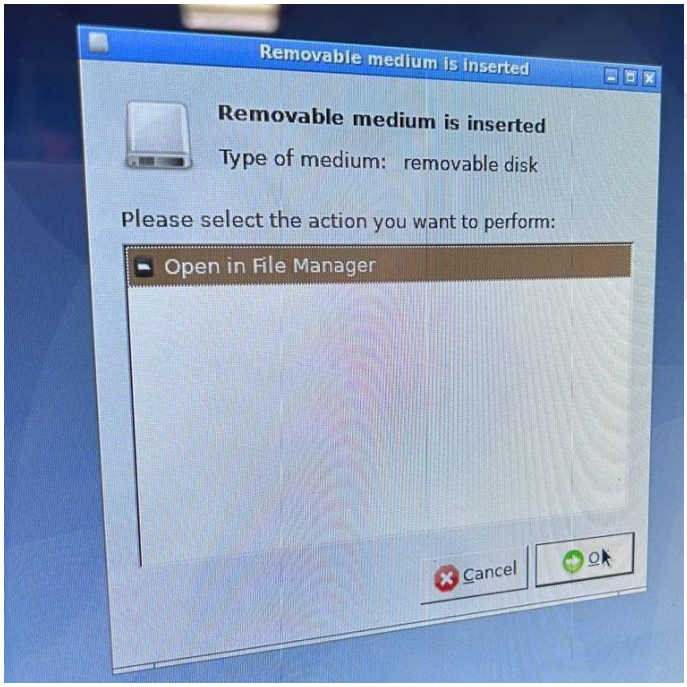


Click "search" to search, pair and connect Bluetooth devices.



2.7 USB

Access U disk,interface will pop-up window, click OK and open to check the content of U disk.



2.8 Audio interface

1) Access 4pin speaker (no earphones), play music **aplay -Dhw:0,0 test.wav**（Music file name). The sound came from the speaker.

2) Access 2pin MIC and enter the command "**arecord-Dhw :0,0 -f dat -r 48000 -t wav -c 2 test.wav**"to record. Press Ctrl+C to end the recording. Then enter "**aplay-Dhw :0,0 test.wav**" to play the recording.

```
root@linaro-alip:/media/linaro/USB/vedio/常用测试音频/wav# arecord -Dhw:0,0 -f dat -r 48000 -t wav -c 2 test.wav
Recording WAVE 'test.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Stereo
[  380.187949] Entering es8388_set_dai_sysclk
[  380.188036] #83xx#check with es8388_pcm_hw_params() 905 rate[48000Hz with 12288000Hz MCLK] cnt[4][12]
[  380.189695] #83xx#check with es8388_pcm_hw_params() 955 rate[48000Hz with 12288000Hz MCLK] cnt[4][12]
^CAborted by signal Interrupt...
root@linaro-alip:/media/linaro/USB/vedio/常用测试音频/wav#
```

3) Access earphones (connect earphones and speaker at the same time, priority earphone output), play music **aplay -Dhw:0,0 test.wav**（Music file name). The sound came from the speaker.

```
root@linaro-alip:/media/linaro/USB/vedio/常用测试音频/wav#
root@linaro-alip:/media/linaro/USB/vedio/常用测试音频/wav# aplay -Dhw:0,0 101-red_hot_chili_peppers-dani_california.wav
Playing WAVE '101-red_hot_chili_peppers-dani_california.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
Warning: rate is not accurate (requested = 44100Hz, got = 48000Hz)
         please, try the plug plugin
[  355.650723] Entering es8388_set_dai_sysclk
[  355.650757] #83xx#check with es8388_pcm_hw_params() 905 rate[48000Hz with 12288000Hz MCLK] cnt[2][8]
[  355.652555] #83xx#check with es8388_pcm_hw_params() 955 rate[48000Hz with 12288000Hz MCLK] cnt[2][8]
[  355.657536] #83xx-01#check es8388_DEF_VOL with es8388_mute  990  cnt[2] [30 : 30]
[  356.073391] [dhd-wlan0] wl_run_escan : LEGACY_SCAN sync ID: 8, bssidx: 0
```

2.9 4G LTE

1) Connect 4G LTE module, then connect the antenna, plug in 4G SIM card, and enter the command “ifconfig” on the terminal to check whether ppp0 node is obtained.

```
root@linaro-alip:~# ifconfig
eth0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        ether ac:db:da:59:8a:f4  txqueuelen 1000  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 41

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 128  bytes 8576 (8.3 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 128  bytes 8576 (8.3 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

ppp0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST>  mtu 1500
        inet 10.110.94.240  netmask 255.255.255.255  destination 10.64.64.64
        ppp  txqueuelen 3  (Point-to-Point Protocol)
        RX packets 10  bytes 543 (543.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 16  bytes 714 (714.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.3.192  netmask 255.255.255.0  broadcast 192.168.3.255
        inet6 fe80::72f8:c586:4716:42a9  prefixlen 64  scopeid 0x20<link>
        ether fc:c2:de:c3:08:6a  txqueuelen 1000  (Ethernet)
        RX packets 12  bytes 1598 (1.5 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 63  bytes 9026 (8.8 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

2.10 HDMI

Use HDMI cable to connect the board and HDMI display. After power-on, the HDMI display can be normal means ok.

2.11 SSD

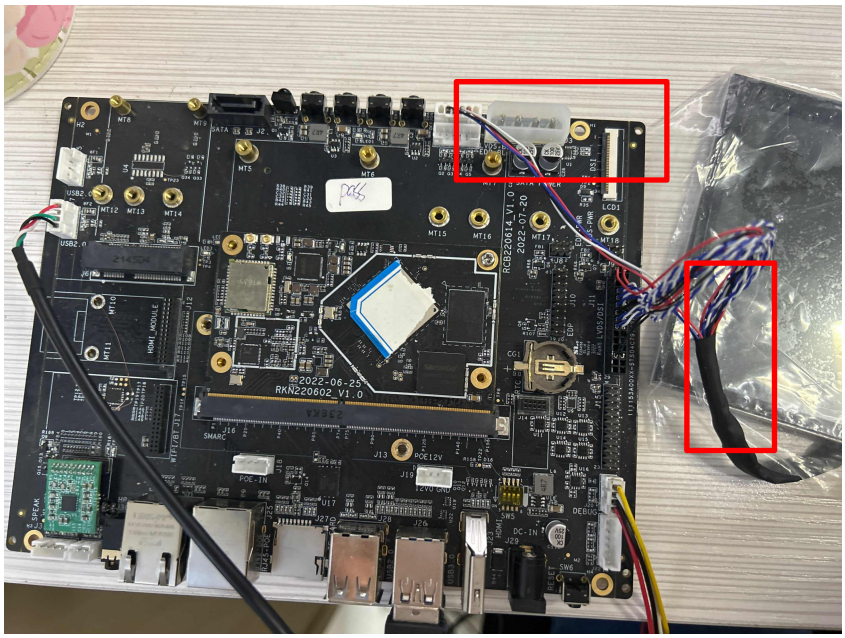
1) Switch on SSD

2) **fdisk -l** //View partition

3) **df -h** //View mount

```
root@linaro-alip:~# fdisk -l
Disk /dev/ram0: 4 MiB, 4194304 bytes, 8192 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes


Disk /dev/mmcblk0: 7.3 GiB, 7818182656 bytes, 15269888 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: B9460000-0000-4D59-8000-1C8F00003FF2

Device            Start      End  Sectors  Size Type
/dev/mmcblk0p1    16384    24575     8192    4M unknown
/dev/mmcblk0p2    24576    32767     8192    4M unknown
/dev/mmcblk0p3    32768    98303    65536   32M unknown
/dev/mmcblk0p4    98304   163839    65536   32M unknown
/dev/mmcblk0p5   163840   229375    65536   32M unknown
/dev/mmcblk0p6   229376 12812287 12582912    6G unknown
/dev/mmcblk0p7 12812288 13074431   262144  128M unknown
/dev/mmcblk0p8 13074432 13090815    16384    8M unknown
/dev/mmcblk0p9 13090816 15269823  2179008    1G unknown


Disk /dev/nvme0n1: 119.2 GiB, 128035676160 bytes, 250069680 sectors
Disk model: Lenovo SL700 PCI-E M.2 128G
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
root@linaro-alip:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            853M     0  853M   0% /dev
tmpfs           185M   11M  175M   6% /run
/dev/mmcblk0p6  5.9G  2.6G  3.1G  46% /
tmpfs           922M     0  922M   0% /dev/shm
tmpfs           5.0M  4.0K  5.0M   1% /run/lock
tmpfs           922M     0  922M   0% /sys/fs/cgroup
/dev/nvme0n1    117G   11G  101G  10% /mnt/ssd
tmpfs           185M  4.0K  185M   1% /run/user/1000
/dev/mmcblk0p9 1016M  2.7M  997M   1% /media/linaro/c9b1174b-f335-422d-b34c-e53ec315de7b1
/dev/mmcblk0p7  126M   13M  107M  11% /media/linaro/b709e899-101d-43e5-93cb-a36a5e05ddec1
tmpfs           185M     0  185M   0% /run/user/0
```

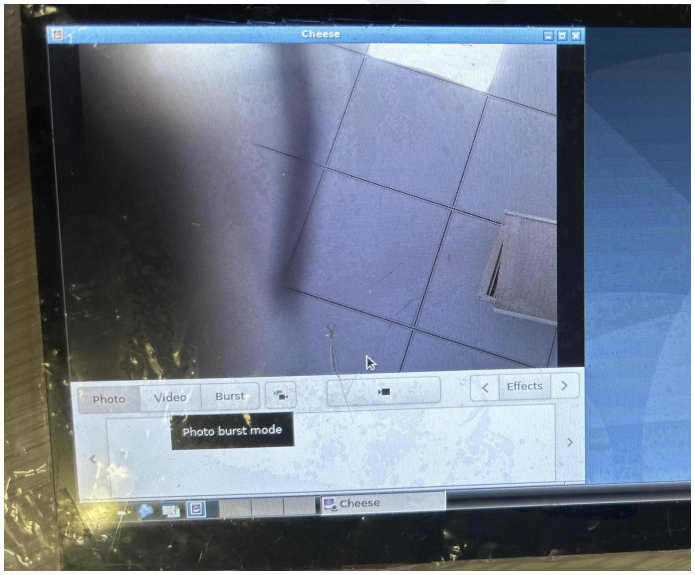
2.12 LVDS&touch



1) As shown in the picture, connect LVDS with the board, paying attention to the direction of the first foot.
2) Power on and start the device. Check whether LVDS can display the desktop properly.
3) touch any app icon with your finger that can open means "touch" is normal

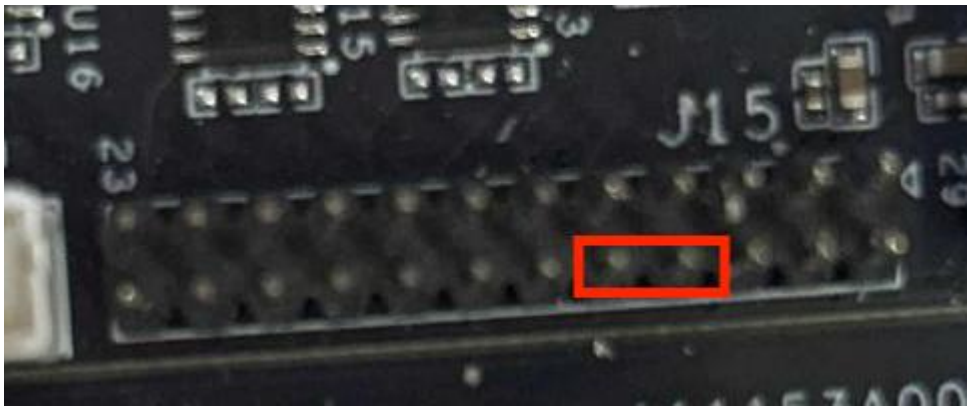
2.13 Camera

1) Connected camera to interface.
2） Click on the bottom left corner of the desktop-> sound&video->cheese open. The screen can displays what the camera show is ok



2.14 SPI

1) Short-circuit connected Pin 8/10 of J15.



2) Copy the file"spidev_test" to the board.

3) Enter into the store path"spidev_test" .

Run the command./spidev_test -v // to check whether the TX and RX output are consistent. If they are consistent, the function is normal.

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

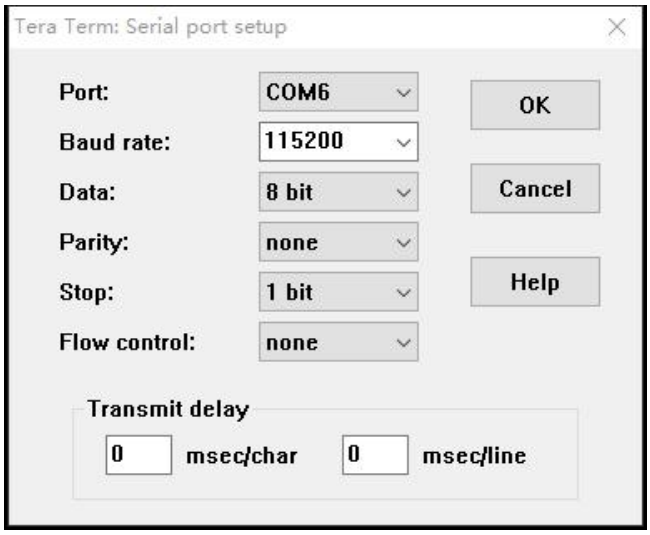
2.15 UART

1) Use DuPont cable to connect the TX, RX and 11/13 pins of J15

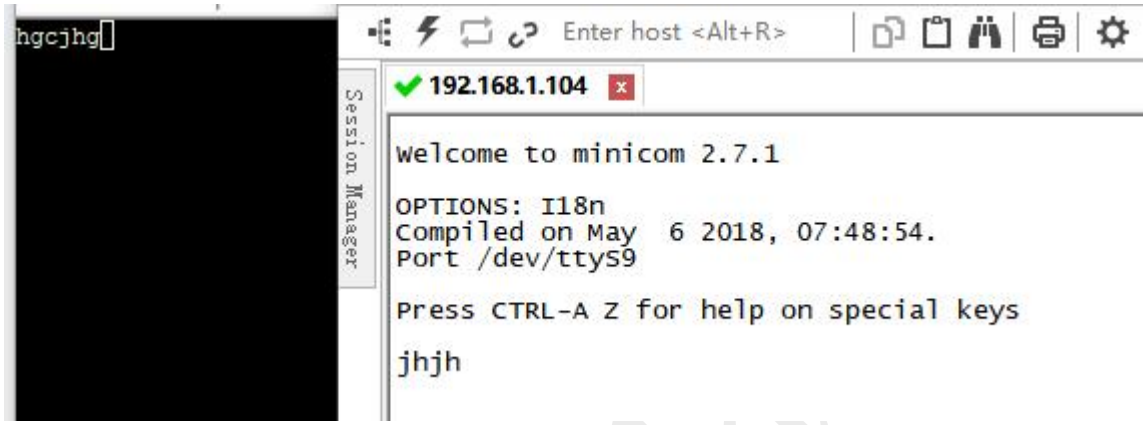
2) Enter the command "minicom -s" in the terminal of the development board, select "serial port setup", press the "A" button to change "/dev/modem" to "/dev/ttyS9" and enter to save. Press the "F" button again to change "YES" to "NO" and enter to save and exit

3) Select "**Save setup as dfl**", then select "**Exit**" enter "minicom"

4) Open another terminal software of the PC, change the port to the recognized port number (Device Manager - > Port View), and select 115200 baud rate



The two windows send data to each other and receive it successfully.



The remaining UART ports are ttyS0 corresponding to J15 5/7 pin, ttyS4 corresponding to J15 18/20 pin, ttyS5 corresponding to J15 17/19 pin, the operation steps are the same

2.16 CAN

1) Short-circuit access 23/24 pins of J15, connect network cable

2) **apt-get install can-utils**

3) Execute the command：

ifconfig -a

ip link set can0 down

ip link set can0 type can bitrate 1000000 dbitrate 1000000 fd on

ip -details link show can0

ip link set can0 up

candump can0,#ffffffff &

io -4 0xfe580000 0x8405

cansend can0 123#12345678

4) Print **can0 123 [4] 12 34 56 78**

```
root@linaro-alip:~# ip link set can0 down
root@linaro-alip:~# [  229.106038] [dhd-wlan0] wl_run_escan : LEGACY_SCAN sync ID: 6, bssidx:
ip link set can0 type can bitrate 1000000 dbitrate 1000000 fd on
root@linaro-alip:~# ip -details link show can0
2: can0: <NOARP,ECHO> mtu 72 qdisc noop state DOWN mode DEFAULT group default qlen 10
    link/can  promiscuity 0 minmtu 0 maxmtu 0
    can <FD> state STOPPED (berr-counter tx 0 rx 0) restart-ms 0
          bitrate 1000000 sample-point 0.750
          tq 10 prop-seg 37 phase-seg1 37 phase-seg2 25 sjw 1
          rockchip_canfd: tseg1 1..128 tseg2 1..128 sjw 1..128 brp 1..256 brp-inc 2
          dbitrate 1000000 dsample-point 0.750
          dtq 50 dprop-seg 7 dphase-seg1 7 dphase-seg2 5 dsjw 1
          rockchip_canfd: dtseg1 1..32 dtseg2 1..16 dsjw 1..16 dbrp 1..256 dbrp-inc 2
          clock 200000000numtxqueues 1 numrxqueues 1 gso_max_size 65536 gso_max_segs 65535
root@linaro-alip:~# ip link set can0 up
root@linaro-alip:~# [  239.189565] IPv6: ADDRCONF(NETDEV_UP): can0: link is not ready
[  239.189728] IPv6: ADDRCONF(NETDEV_CHANGE): can0: link becomes ready

root@linaro-alip:~# candump can0,#ffffffff &
[1] 21218
root@linaro-alip:~# io -4 0xfe500000 0x0405
root@linaro-alip:~# cansend can0 123#12345678
  can0  123   [4]  12 34 56 78
```


2.17 IR

1) Enter “evtest” in the terminal and select “0”

2) Press the up, down, left and right buttons of the infrared remote control, it will show logo information.

```
Testing ... (interrupt to exit)
Event: time 1672297054.647337, type 1 (EV_KEY), code 108 (KEY_DOWN), value 1
Event: time 1672297054.647337, -------------- SYN_REPORT ------------
[  259.884090] rockchip-vop2 fe040000.vop: [drm:vop2_crtc_atomic_enable] Update mode to 1
), type: 7 for vp2
[  259.927322] panel_simple_enable
Event: time 1672297054.831151, type 1 (EV_KEY), code 108 (KEY_DOWN), value 0
Event: time 1672297054.831151, -------------- SYN_REPORT ------------
Event: time 1672297055.837550, type 1 (EV_KEY), code 108 (KEY_DOWN), value 1
Event: time 1672297055.837550, -------------- SYN_REPORT ------------
Event: time 1672297056.021141, type 1 (EV_KEY), code 108 (KEY_DOWN), value 0
Event: time 1672297056.021141, -------------- SYN_REPORT ------------
Event: time 1672297056.715965, type 1 (EV_KEY), code 103 (KEY_UP), value 1
Event: time 1672297056.715965, -------------- SYN_REPORT ------------
Event: time 1672297056.804478, type 1 (EV_KEY), code 103 (KEY_UP), value 0
Event: time 1672297056.804478, -------------- SYN_REPORT ------------
Event: time 1672297057.028132, type 1 (EV_KEY), code 103 (KEY_UP), value 1
Event: time 1672297057.028132, -------------- SYN_REPORT ------------
Event: time 1672297057.117799, type 1 (EV_KEY), code 103 (KEY_UP), value 0
Event: time 1672297057.117799, -------------- SYN_REPORT ------------
Event: time 1672297057.741485, type 1 (EV_KEY), code 28 (KEY_ENTER), value 1
```

2.18 RTC

1) Connect RTC battery

2) **date -s “2023-2-9 23:58:00”** //could set a different time

3) **hwclock -w** // Write hardware time

4) **hwclock -r** // Read hardware time

5) **date** // Check the system time

6) Waiting 1 minute to sync to hardware time

7) Power off and waiting for over 1 minute before starting

8) **date** or **hwclock -r** check if the desktop time is advancing normally