SMARC-RK3568-Kit Android Test Manual

Ver. No.：1.0

2023.03

Version Record

Version	Hardware Platform	Description	Date	Revisor
1.0	SMARC-RK3568	Initial Version	2023.03	wangwx

Contents

Ⅰ.Preface

1.1 Company Profile

Zhejiang Qiyang Intelligent Technology Co., Ltd. was founded in Hangzhou in 2007, is a national high-tech enterprise focusing on the development, production and sales of ARM embedded products. 10 years of accumulation and precipitation, successfully built a product development to mass production service chain.

As the core of the company, Qiyang R&D team consists of more than 30 embedded engineers, dedicated to providing users with easy-to-use embedded hardware, software tools and customized product solutions. It has been widely used in industrial control, Internet of Things, new retail, medical, electric power, environmental monitoring, charging pile and other fields.

The production base in Zhuji provides a strong guarantee for Qiyang, covering an area of 5,000 square meters, with 2 SMT production lines, through and strictly follow the ISO9001 quality management system certification to guide production. Relying on the strong production strength, the annual production capacity can reach 1 million sets to ensure the delivery time of users and solve the worries.

Qiyang has a perfect sales and marketing network, professional sales and after-sales team to provide users with a full range of technical support and services. Business has spread to more than 120 countries and regions, successfully helping more than 2000 users to bring their products to market quickly and efficiently.

The combination and extension of R&D, production capacity and market has laid a solid foundation for Qiyang Intelligence to become a professional and global supplier of embedded software and hardware.

We offer:

- **Multi-platform software/hardware products**

NXP, Rockchip, MTK, Renesas, TI, Atmel, Cirrus Logic and other multi-platform ARM development boards/core boards/industrial control boards and peripheral hardware products, as well as supporting tools and software resources to support rapid secondary development of users.

- **Customized Services**

We fully utilize our accumulated technology on ARM platform and Linux, Android, Ubuntu and Debian operating systems to provide customized embedded product services (OEM/ODM).

Thank you for using Qiyang's products, we will do our best to provide you with technical assistance! Wish you good luck in your work!

Ⅱ. Preparation

Read before testing: This manual mainly introduces the interfaces' functional testing on SMARC-RK3568-Kit development board.

Please refer ***to SMARC-RK3568-Kit Hardware Manual, SMARC-RK3568-Kit Debian & Android User Manual***, the development board has been loaded the firmware before leaving the factory, please test directly.

UART Debugging

Please test the UART by referring to the ***IAC-RK3568-Kit Debian & Android User Manual.***

Power on the mainboard, connect to the Debug UART, then enter to the board's file system through Debug UART.

```
[   24.144361] audit: audit_lost=1 audit_rate_limit=5 audit_backlog_limit=64
[   24.144387] audit: rate limit exceeded
[   24.150563] type=1400 audit(1677057105.730:89): avc: denied { bind } for comm="ip" scont
tcontext=u:r:qy_init:s0 tclass=netlink_route_socket permissive=1
[   24.150780] type=1400 audit(1677057105.730:90): avc: denied { getattr } for comm="ip" sc
s0 tcontext=u:r:qy_init:s0 tclass=netlink_route_socket permissive=1
[   24.252870] IPv6: ADDRCONF(NETDEV_UP): can0: link is not ready
[   24.252919] IPv6: ADDRCONF(NETDEV_CHANGE): can0: link becomes ready
[   24.310275] IPv6: ADDRCONF(NETDEV_UP): can1: link is not ready
[   24.355814] zram0: detected capacity change from 0 to 1026560000
[   24.377143] IPv6: ADDRCONF(NETDEV_UP): can2: link is not ready
[   24.428625] mkswap: Swapspace size: 1002496k, UUID=83775dcc-8e36-4927-be91-60913bffdcc4
[   24.430061] Adding 1002496k swap on /dev/block/zram0.  Priority:-2 extents:1 across:1002
[   25.264859] IPv6: ADDRCONF(NETDEV_CHANGE): can1: link becomes ready
[   25.264988] IPv6: ADDRCONF(NETDEV_CHANGE): can2: link becomes ready
[   25.870787] type=1400 audit(1677057107.456:94): avc: denied { write } for comm="RenderTh
y_service" dev="tmpfs" ino=12876 scontext=u:r:priv_app:s0:c512,c768 tcontext=u:object_r:pro
ass=sock_file permissive=1 app=com.android.launcher3
[   26.238366] audit: audit_lost=4 audit_rate_limit=5 audit_backlog_limit=64
[   26.238401] audit: rate limit exceeded
[   35.586335] vcc3v3_lcd0_n: disabling
[   35.586416] vcc3v3_lcd1_n: disabling
[   35.586450] pcie30_3v3: disabling

console:/ $
```

ADB Debugging

Please to do ADB debugging by refer to the ***SMARC-RK3568-Kit Debian & Android User Manual***.

The system enables adb debugging by default. If no adb device connection is detected, please check whether the jumper at the J5 pin header in the lower right corner of the development board is connected.

Note: All the following command are carried out under serial port debugging.

Ⅲ. Mainboard Test

2.1 Display Test

It supports LVDS screen and HDMI screen.

7-Inch LVDS screen test:

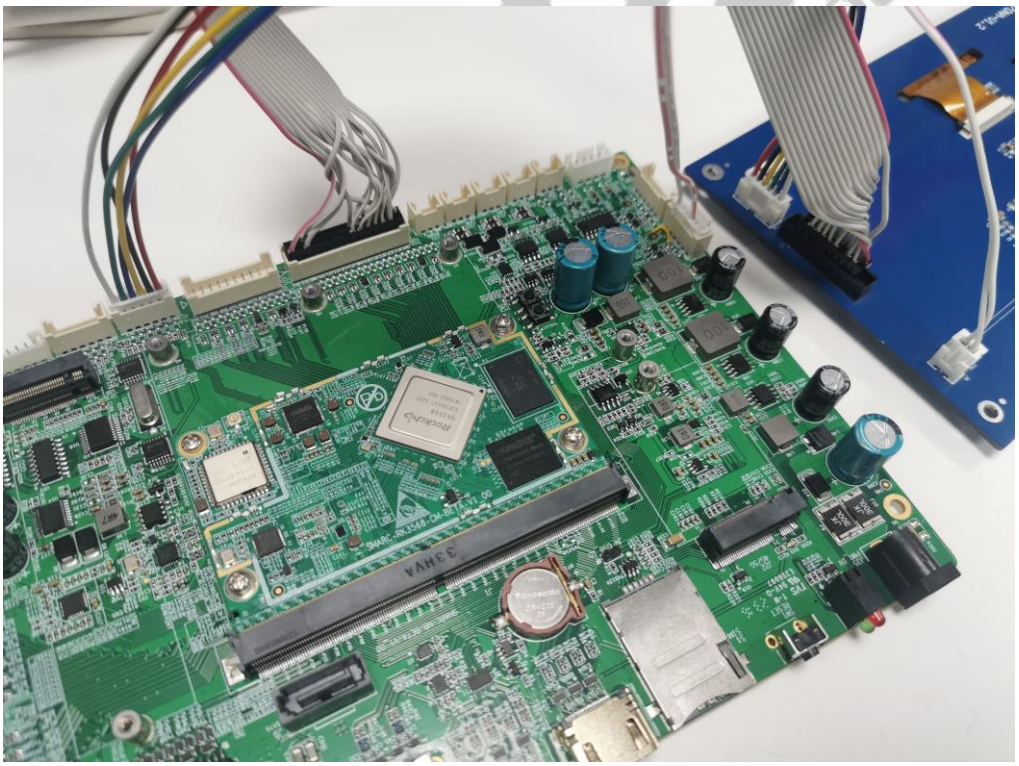
It supports the paired 7 inch LVDS screen (Capacitive Touch Panel), model no.: QY-HJ070NA-V1.2, resolution:1024x600. Please purchase it additionally, if required.

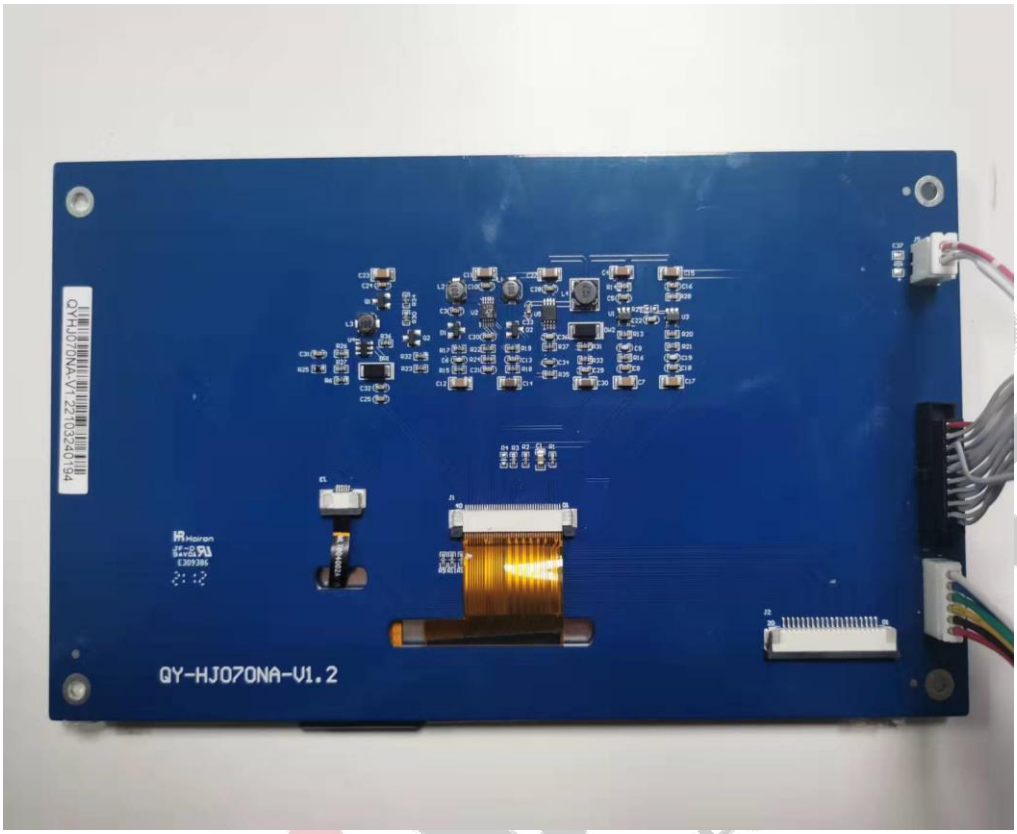
LVDS port-J11

LVDS backlight port: J1

I2C capacitive touch panel -J13

Connection diagram between the mainboard with LVDS screen:





When the system starts normally, you can see the LCD screen shows the Android system operation interface.

If you do not purchase a 7-inch LVDS screen, you can use an HDMI monitor for testing.

2.2. WIFI Test

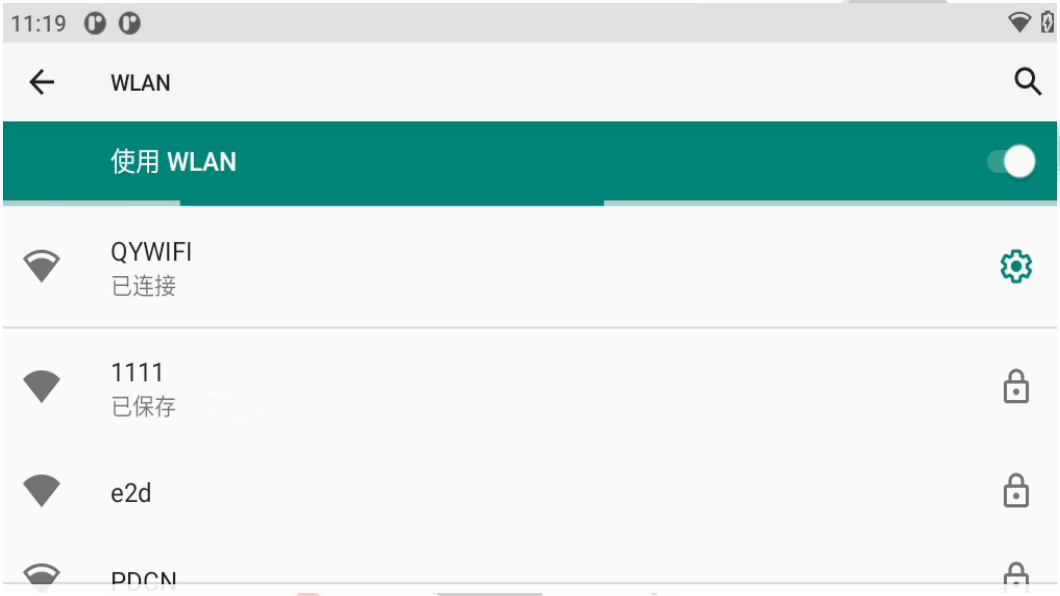
The onboard wifi chip AP6212 on the development board supports 2.4Ghz frequency band. Please make sure that the J1 wifi antenna is connected normally and the connected network is 2.4G.

Serial debugging operational interface: Input ***ifconfig*** to check whether wlan0 node is

generated

```
console:/ # ifconfig wlan0
wlan0     Link encap:Ethernet  HWaddr 08:e9:f6:9f:f2:d2  Driver bcmsdh_sdmmc
          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 TX bytes:0
```

GUI : Settings->Network and Internet->WLAN, connect to wifi for Internet testing



2.3. Bluetooth test

The development board has a Bluetooth chip AP6212 onboard, which supports Bluetooth 4.1 (BLE is not supported), please check the J1 antenna is connected.

GUI: Settings -> Connected Devices -> Pair New Devices -> Connect Bluetooth Devices

Start file transmitting and receiving test

2.4. LAN Test

The development board is equipped with two Gigabit Ethernet J2 and J3.

J2 corresponds to eth0,

J3 corresponds to eth1,

The PHY chip is on the backside of the carrier board. The current version is YT8531. If the LAN port does not work, please check the PHY chip on the backside, whether they are consistent. If not, you can contact our sales or FAE for help

Serial debugging operational interface: Input ***Ifconfig*** to check whether eth1 and eth0 nodes are
generated

```
eth1      Link encap:Ethernet  HWaddr ee:39:67:49:23:70  Driver rk_gmac-dwmac
          inet addr:192.168.1.229  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::f375:d411:42ab:2801/64 Scope: Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:25 errors:0 dropped:0 overruns:0 frame:0
          TX packets:18 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:4440 TX bytes:2206
          Interrupt:46

eth0      Link encap:Ethernet  HWaddr f2:39:67:49:23:70  Driver rk_gmac-dwmac
          inet addr:192.168.1.245  Bcast:192.168.1.255  Mask:255.255.255.0
          inet6 addr: fe80::7a59:6ffa:95b6:7878/64 Scope: Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:156 errors:0 dropped:1 overruns:0 frame:0
          TX packets:24 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:16238 TX bytes:2642
          Interrupt:39
```

TCP

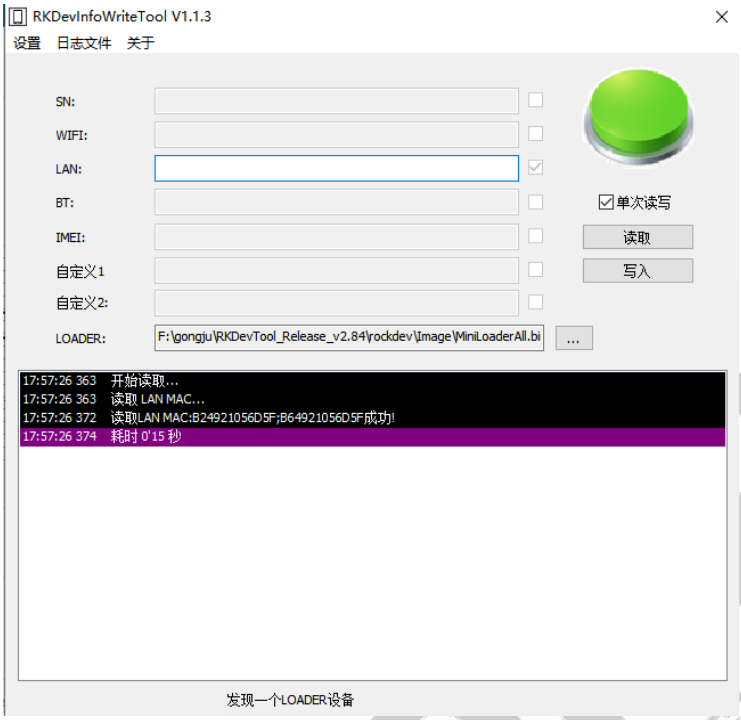
Test

```
console:/ #
console:/ # iperf -s -p 5001 -i 1 -M 1000M
WARNING: attempt to set TCP maxmimum segment size to 1048576000 failed.
Setting the MSS may not be implemented on this OS.
------------------------------------------------------------
Server listening on TCP port 5001
TCP window size: 1.00 MByte (default)
------------------------------------------------------------
[  4] local 192.168.1.245 port 5001 connected with 192.168.1.9 port 44126
[  968.189569] healthd: battery l=50 v=3 t=2.6 h=2 st=3 fc=100 chg=au
[ ID] Interval       Transfer     Bandwidth
[  4]  0.0- 1.0 sec   112 MBytes   936 Mbits/sec
[  4]  1.0- 2.0 sec   111 MBytes   935 Mbits/sec
[  4]  2.0- 3.0 sec   112 MBytes   940 Mbits/sec
[  4]  3.0- 4.0 sec   112 MBytes   938 Mbits/sec
[  4]  4.0- 5.0 sec   112 MBytes   941 Mbits/sec
[  4]  5.0- 6.0 sec   111 MBytes   935 Mbits/sec
[  4]  6.0- 7.0 sec   110 MBytes   923 Mbits/sec
[  4]  7.0- 8.0 sec   112 MBytes   936 Mbits/sec
[  4]  8.0- 9.0 sec   112 MBytes   939 Mbits/sec
[  4]  9.0-10.0 sec   110 MBytes   920 Mbits/sec
[  4]  0.0-10.0 sec  1.09 GBytes   935 Mbits/sec
```

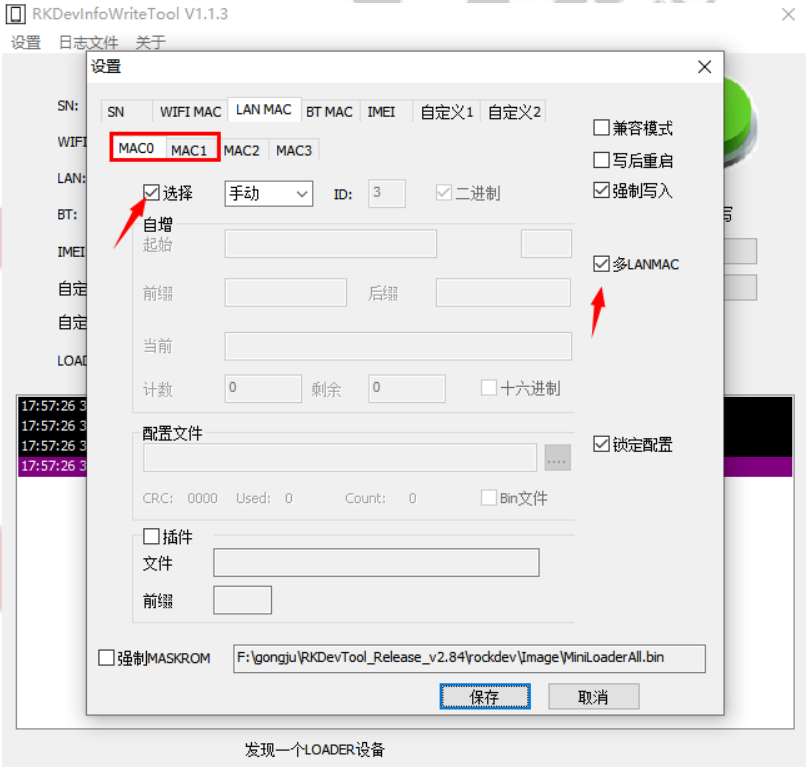
Modify MAC address:

It requires RKDevInfoWriteTool_1.1.3 in Windows if you want to change MAC address, open the software interface, it shows as below:

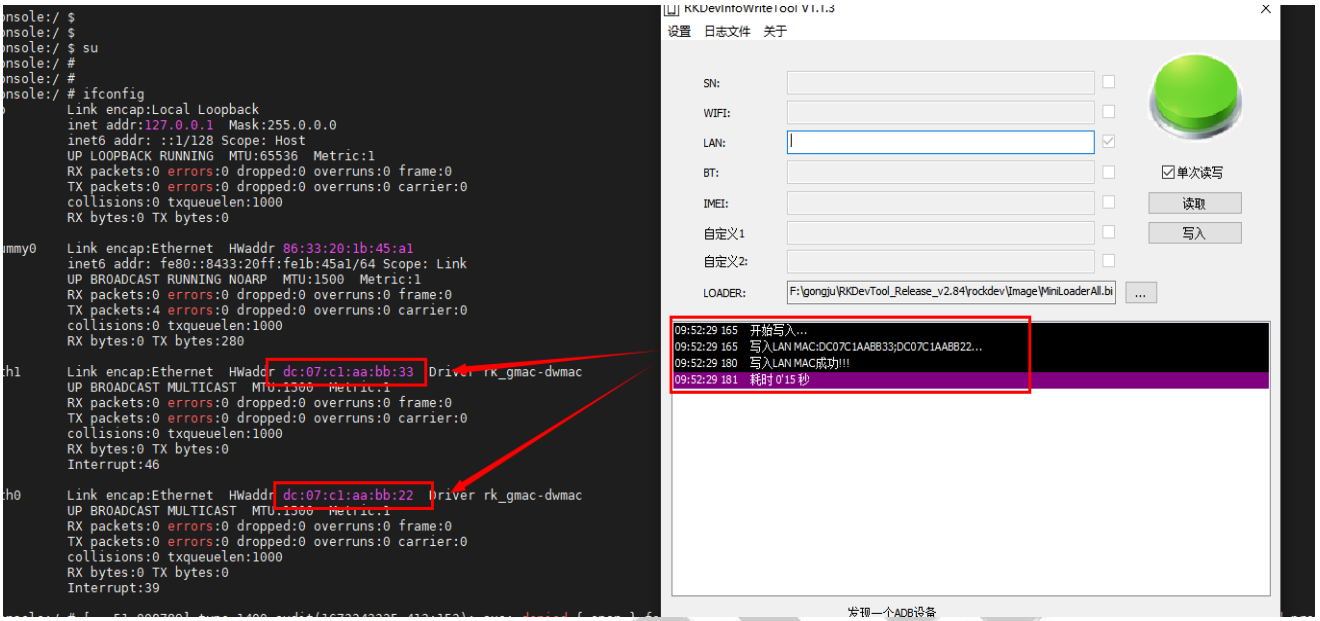
(Noted: The development board should enter to loader mode (Details, please refer to ***SMARC-RK3568-Kit Debian & Android User Manual)***



Click Setting, then enter to the interface as below picture shown:



Set, as the below picture shown:



2.5. RS232/RS485 Port Test

The development board is equipped with 5-ch RS232: J25,J27,J28,J29,J30 and 1-ch RS485:J31.

J25, J31 is directly lead out from CPU, please test carefully.

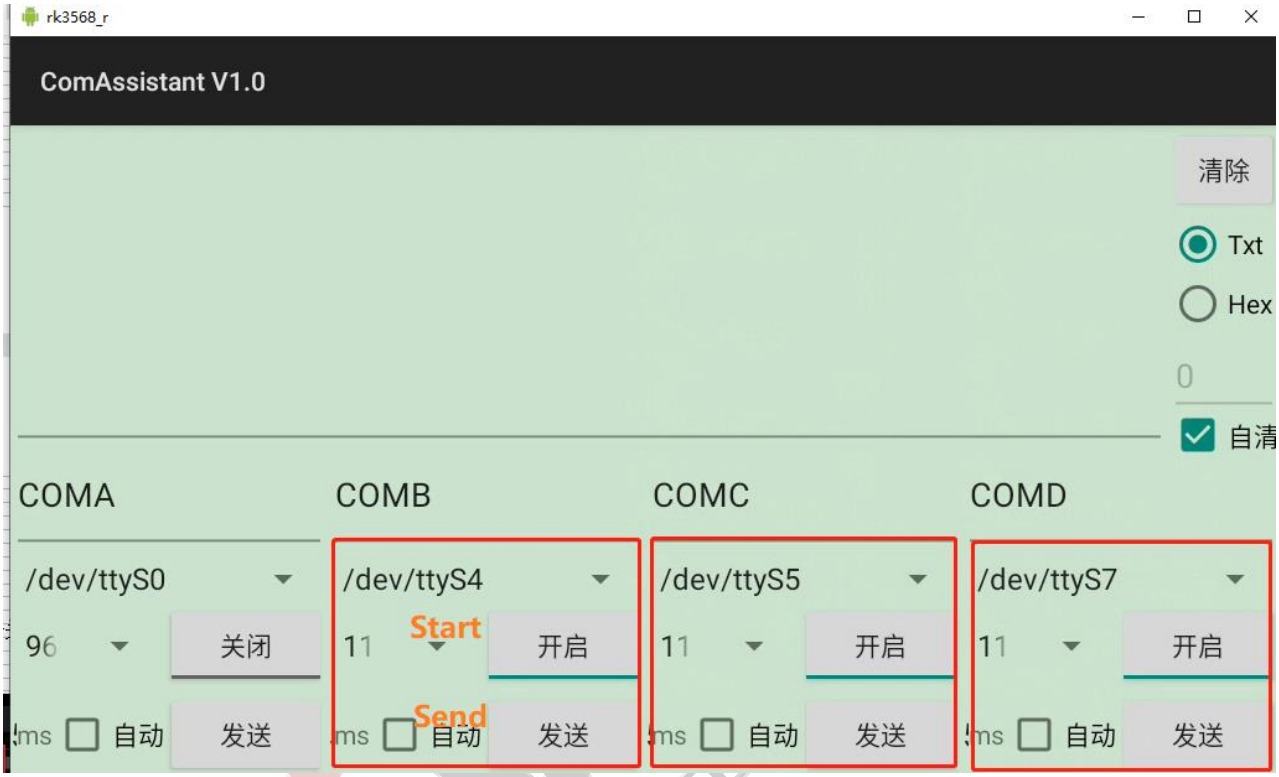
Other serial ports are extended from SPI signal.

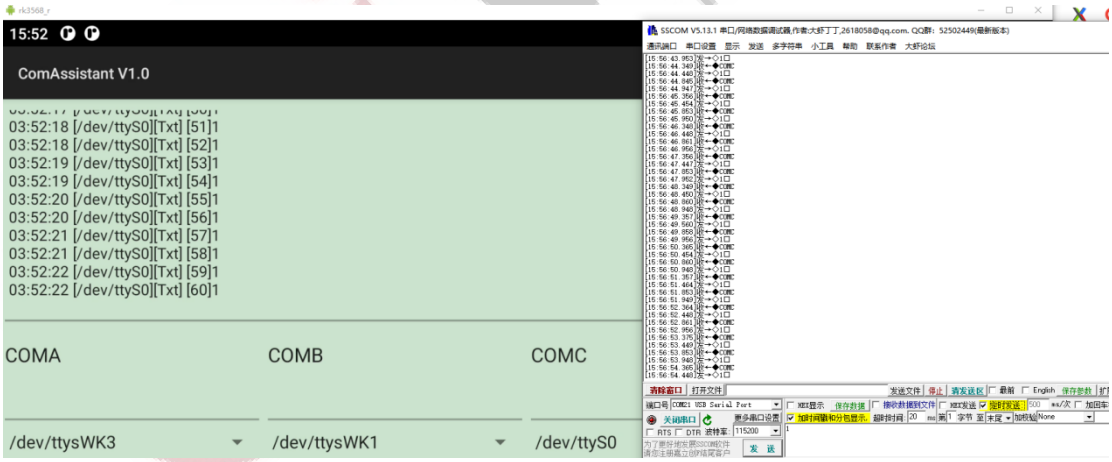
The software and hardware mapping relationship are shown in the table below

Location	Device Node
J25	ttyS3
J27	ttyWK0
J28	ttyWK1
J29	ttyWK2
J30	ttyWK3

J31	ttyS0

GUI Interface is as below picture shown:



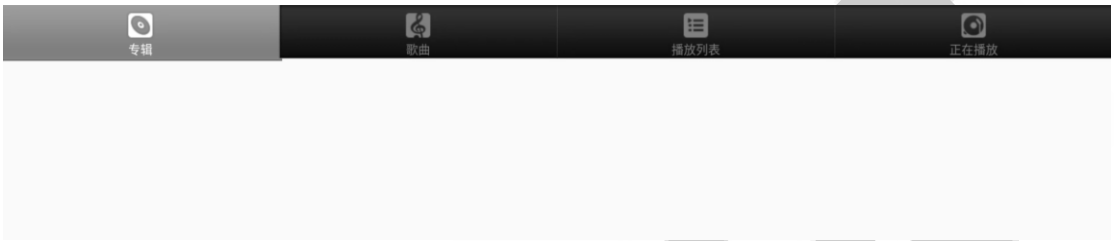


2.6. Audio Test

The development board is equipped with 2-ch audio outputs and 1-ch audio input interface, of which J18 is HeadPhone interface, J20,J21 is Speaker interface, J19 is MIC interface, and the Speaker parameter is 8Ω/1.3W.

Because the audio interface is directly led out from the PMIC, please be careful when testing to prevent the SOM module from damage.

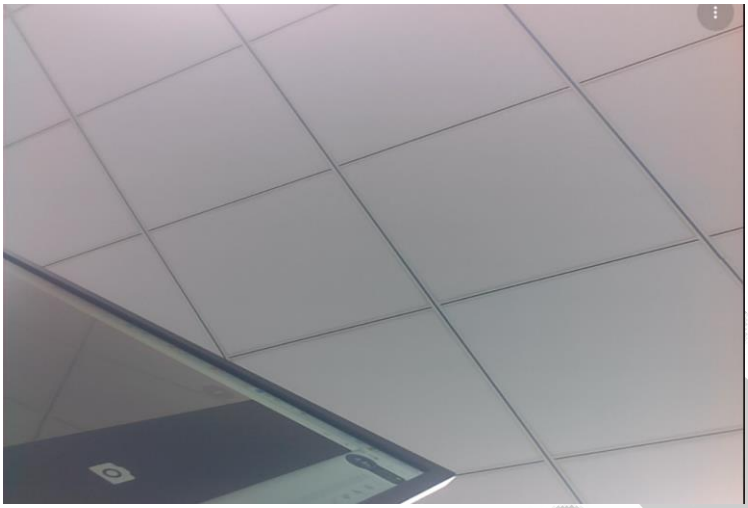
GUI Test: Music -> Play



2.7. Camera Test

The development board is equipped with 2-ch MIPI camera interfaces J16 and J17, which is adaptive to OV5648 by default. Here, we used the Android built-in camera application to test and open one camera J16.

GUI Interface:



2.8. 4G/5G Test

The development board is equipped with one M.2_ J23 port, M.2 is adaptive to protocol USB3.0, paired 5G module is RM500U-CN.

Serial port operational interface: Input ***ifconfig*** to check whether relevant nodes are generated, among which the 5G node is ***usb0***

```
console:/ # ifconfig usb0
usb0      Link encap:Ethernet  HWaddr 6e:b9:fb:e3:32:ee  Driver cdc_ncm
          inet addr:10.17.49.41  Bcast:10.17.49.255  Mask:255.255.255.0
          inet6 addr: fe80::6cb9:fbff:fee3:32ee/64 Scope: Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:29 errors:0 dropped:0 overruns:0 frame:0
          TX packets:46 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2653 TX bytes:3663
```

PING command test:

```
console:/ # ping www.baidu.com
PING www.a.shifen.com (112.80.248.75) 56(84) bytes of data.
64 bytes from 112.80.248.75: icmp_seq=1 ttl=54 time=58.2 ms
64 bytes from 112.80.248.75: icmp_seq=2 ttl=54 time=75.4 ms
64 bytes from 112.80.248.75: icmp_seq=3 ttl=54 time=41.4 ms
64 bytes from 112.80.248.75: icmp_seq=4 ttl=54 time=39.9 ms
64 bytes from 112.80.248.75: icmp_seq=5 ttl=54 time=38.4 ms
64 bytes from 112.80.248.75: icmp_seq=6 ttl=54 time=40.1 ms
64 bytes from 112.80.248.75: icmp_seq=7 ttl=54 time=35.9 ms
64 bytes from 112.80.248.75: icmp_seq=8 ttl=54 time=37.4 ms
64 bytes from 112.80.248.75: icmp_seq=9 ttl=54 time=33.2 ms
64 bytes from 112.80.248.75: icmp_seq=10 ttl=54 time=33.4 ms
64 bytes from 112.80.248.75: icmp_seq=11 ttl=54 time=29.3 ms
```

GUI :

2.9. CAN BUS Test

There are 2-ch CAN bus on development board, all of which come directly from the CPU. At present, the RK3568 CAN bus may cause frame errors when sending extended frames. It CAN'T be solved. Please to do multiple tests if you are using standard frames. And it is recommended to have external connection while using extended frames.

The mapping relationship between software and hardware is shown in the table

Location	Device Node
J1	can0
J15	can1
J16	can2

Serial port operational interface: Input ***ifconfig*** to check whether there is a can node generated

```
console:/ # ifconfig can0
can0      Link encap:UNSPEC    Driver rockchip_canfd
          UP RUNNING NOARP  MTU:16  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:10
          RX bytes:0 TX bytes:0
          Interrupt:64

console:/ # ifconfig can1
can1      Link encap:UNSPEC    Driver rockchip_canfd
          UP RUNNING NOARP  MTU:16  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:10
          RX bytes:0 TX bytes:0
          Interrupt:65
```

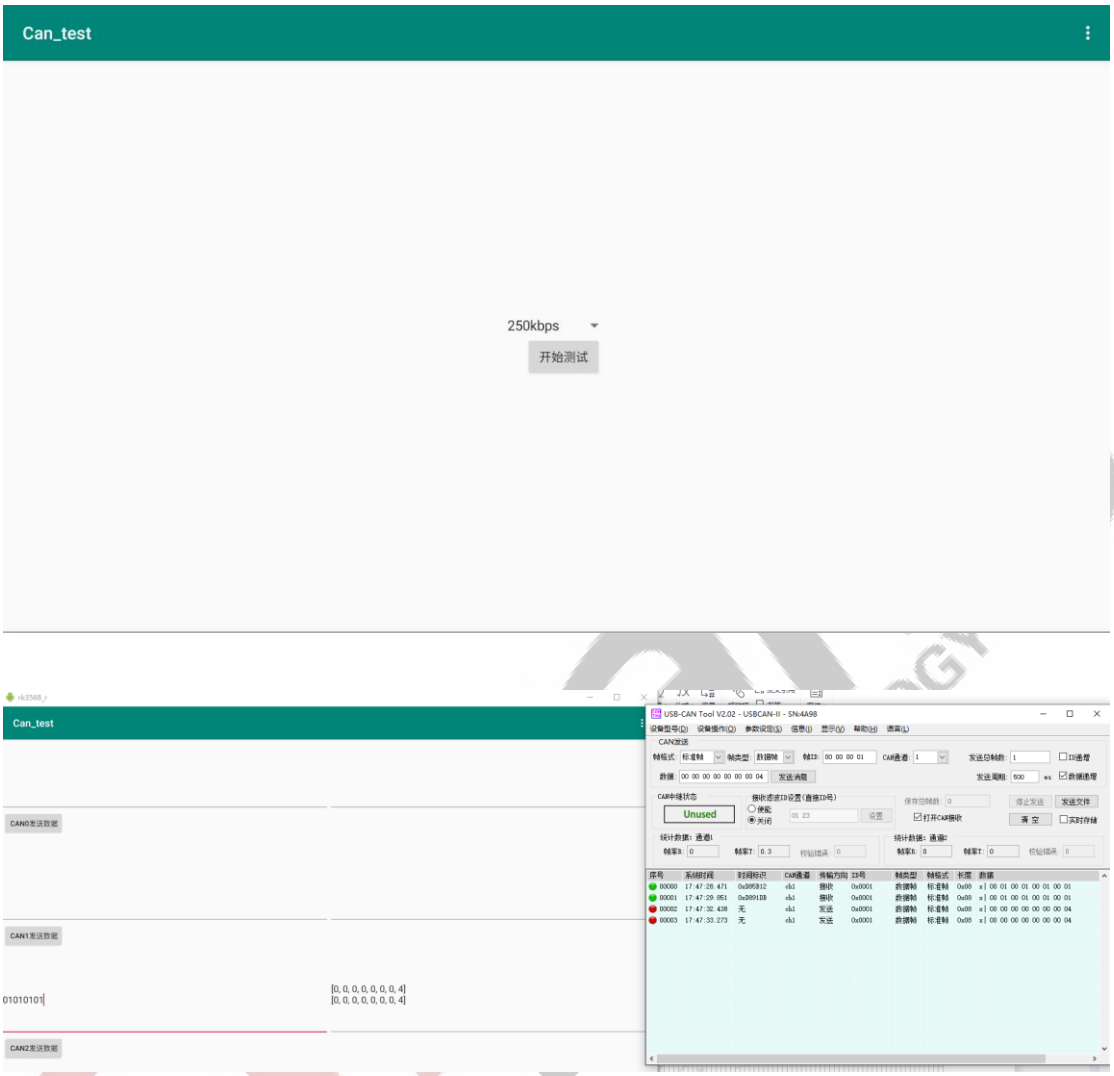
To connect CAN analyzer

Test command: ***can_test can0 1/0*** 1: Send 0: Receive

```
console:/ # can_test can2 1
CAN Start Testing ...
send can datas: can_id = 0x123,data_len = 8
data[0] = 0x0
data[1] = 0x1
data[2] = 0x2
data[3] = 0x3
data[4] = 0x4
data[5] = 0x5
data[6] = 0x6
data[7] = 0x7
Test Success.
console:/ #
```

GUI Interface: Open ***can_test APK***, select Bit Rate, then start the test. Here, 250k is

selected.



2.10. SSD Test

The development kit is equipped with a PCIE protocol supported M.2 B-KEY port, it is adaptive to SSD_PCIE device, the location is J22.

Then, input df -h in serial terminal, then identify it and mount SSD.

```
console:/ # df -h
Filesystem                  Size  Used Avail Use% Mounted on
tmpfs                       978M  820K  978M   1% /dev
tmpfs                       978M     0  978M   0% /mnt
/dev/block/mmcblk2p11        11M  144K   11M   2% /metadata
/dev/block/dm-0             937M  934M  2.8M 100% /
/dev/block/dm-2             344M  343M  1.0M 100% /vendor
/dev/block/dm-4             592K  588K  4.0K 100% /odm
/dev/block/dm-3             203M  203M  632K 100% /product
/dev/block/dm-1             118M  117M  380K 100% /system_ext
tmpfs                       978M     0  978M   0% /apex
tmpfs                       978M  264K  978M   1% /linkerconfig
/dev/block/mmcblk2p10       356M  768K  355M   1% /cache
/dev/block/dm-5             3.0G   28M  3.0G   1% /data
tmpfs                       978M     0  978M   0% /data_mirror
/dev/fuse                   3.0G   28M  3.0G   1% /mnt/user/0/emulated
/dev/block/vold/public:259,1 477G  640K  477G   1% /mnt/media_rw/3EA1-A2FD
/dev/fuse                   477G  640K  477G   1% /mnt/user/0/3EA1-A2FD
console:/ #
```

2.11. SATA Test

The development kit has 1-ch SATA port, please insert the SATA hard disk before starting up, the contents in the hard disk will be shown.

Ⅳ.Summary

Till now, the basic functional tests are all done, if any errors, please check the test code.

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