IAC-RK3568-Kit Functional Description And Test Manual

Ver.:1.0
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QIYANG TECHNOLOGY Co., Ltd

Version Record

Version	Hardware Platform	Description	Date	Reviser
1.0	IAC-RK3568-MB-BETA-V1_00	Initial Version	2022-06	wwx

Catalogue

Reading before test: This manual is mainly introduce the tests on interface.

Ⅰ. Preface

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

Before testing, please read ***IAC-RK3568-Kit Hardware Manual***, IAC-RK3568-Kit Linux User Manual first.

Before leaving the factory, the board was loaded with Debian 10 (Linux4.19.219 kernel), so it could be tested directly.

UART Debug

Please test the UART by referring to the IAC-RK3568-Kit Linux User Manual

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

```
         Starting Advanced IEEE 802_/WPA/WPA2/EAP Authenticator...
[FAILED] Failed to start Advanced I_1X/WPA/WPA2/EAP Authenticator.
See 'systemctl status hostapd.service' for details.
         Starting Bluetooth service...
[  OK  ] Started Bluetooth service.
[   11.626449] ttyFIQ ttyFIQ0: tty_port_close_start: tty->count = 1 port count = 2

Debian GNU/Linux 10 linaro-alip ttyFIQ0

linaro-alip login: root (automatic login)

Last login: Wed Aug 24 08:19:43 UTC 2022 on ttyFIQ0
Linux linaro-alip 4.19.219 #207 SMP Wed Aug 24 10:13:56 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.
root@linaro-alip:~# [   13.102317] EXT4-fs (mmcblk0p8): mounting ext2 file system using t
he ext4 subsystem
[   13.104008] EXT4-fs (mmcblk0p8): warning: mounting unchecked fs, running e2fsck is rec
ommended
[   13.104751] EXT4-fs (mmcblk0p8): mounted filesystem without journal. Opts: (null)
[   13.281045] EXT4-fs (mmcblk0p7): mounting ext2 file system using the ext4 subsystem
[   13.283373] EXT4-fs (mmcblk0p7): warning: mounting unchecked fs, running e2fsck is rec
ommended
[   13.284119] EXT4-fs (mmcblk0p7): mounted filesystem without journal. Opts: (null)

root@linaro-alip:~#
```

The test program is located at directory ***/usr/test/***, then enter into this directory, the following test are processing under this directory.

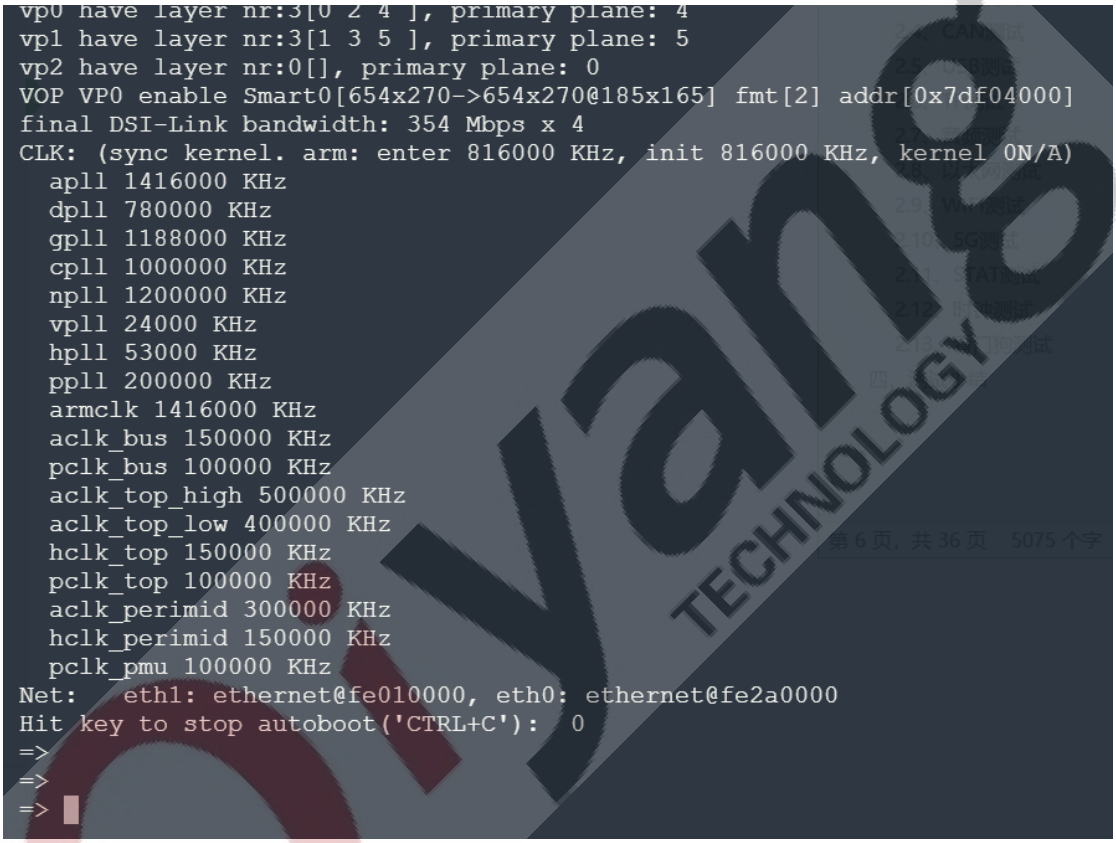
```
cd /usr/test/

ls
```

```
root@linaro-alip:~# cd /usr/test/
root@linaro-alip:/usr/test# ls
ad_cc_test  qt_test          rs485_A3_B3_test  serial_one_test
ad_test     rs232_test       rs485_A4_B4_test  spi_test
bcmdhd.ko   rs485_A1_B1_test rs485_test        watchdog_feed_test
can_test    rs485_A2_B2_test rtc_test          watchdog_notfeed_test
root@linaro-alip:/usr/test#
```

Uboot Environment:

At the early stage of testing, it needs to set relative parameters in Uboot environment, for example, the LCD parameter etc.

When the mainboard boots, press ***Ctrl+C*** on keyboard within 3 seconds, then you can enter into Uboot environment, input [Print] to print the basic parameters;



Ⅲ. Mainboard Test

2.1 Display Test

IAC-RK3568-Kit supports HDMI, MIPI-DSI, LVDS multiple display port; Here, we take an example of LVDS display port.

2.1. LVDS Display

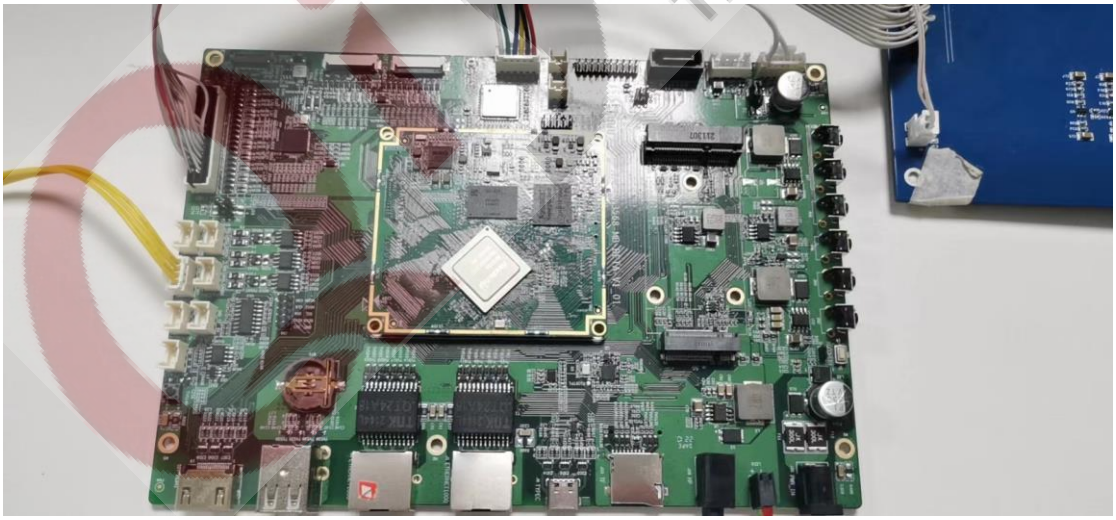
It supports the paired 7 inch LVDS displayer (Capacitive Touch Panel), model no.: QY-HJ070NA-V1.2, resolution:1024x600. Please purchase it additionally, if required.

LVDS port-J19, (Please pay attention to J48 (Power Interface) jumper wire, 3.3V)

LVDS displayer backlight port: J25, (Please pay attention to J24 (Power Interface) jumper wire, 5V)

I2C capacitive touch panel -J23

Connection diagram between the mainboard with LVDS screen:



Test Procedures & Test Result:

The system use Debian as default;

2.2. Touch Panel Test

IAC-RK3568-Kit supports LVDS and capacitive touch panel (I2C port)

Test Principle:

To read the reported value through [input] subsystem.

Test Procedures & Test Result:

1. Start [evtest] test program
evtest

```
root@linaro-alip:~# evtest
No device specified, trying to scan all of /dev/input/event*
Available devices:
/dev/input/event0:      fe6e0030.pwm
/dev/input/event1:      rk805 pwrkey
/dev/input/event2:      icn8503f
/dev/input/event3:      adc-keys
/dev/input/event4:      rockchip,hdmi rockchip,hdmi
Select the device event number [0-4]: 2
```

2.To check the reported value from [input] subsystem by touching coordinates, X-axis ,Y-axis values will change.

```
Event: time 1660895871.912185, type 3 (EV_ABS), code 54 (ABS_MT_POSITION_Y), value 579
Event: time 1660895871.912185, -------------- SYN_REPORT ------------
Event: time 1660895871.922176, type 3 (EV_ABS), code 53 (ABS_MT_POSITION_X), value 1000
Event: time 1660895871.922176, type 3 (EV_ABS), code 54 (ABS_MT_POSITION_Y), value 581
Event: time 1660895871.922176, -------------- SYN_REPORT ------------
Event: time 1660895871.932165, type 3 (EV_ABS), code 53 (ABS_MT_POSITION_X), value 1002
Event: time 1660895871.932165, type 3 (EV_ABS), code 54 (ABS_MT_POSITION_Y), value 582
Event: time 1660895871.932165, -------------- SYN_REPORT ------------
Event: time 1660895871.942157, type 3 (EV_ABS), code 53 (ABS_MT_POSITION_X), value 1003
Event: time 1660895871.942157, -------------- SYN_REPORT ------------
Event: time 1660895871.952150, type 3 (EV_ABS), code 53 (ABS_MT_POSITION_X), value 1004
Event: time 1660895871.952150, type 3 (EV_ABS), code 54 (ABS_MT_POSITION_Y), value 583
```

2.3. UART Test

On carrier board, 2-ch UART are as RS232 (J11 J13)

Description:

UART#	Location	Device Node
COM4（To connect UART）	J11_PIN1=COM4_RXD; J11_PIN2=COM4_TXD; J11_PIN3=GND	/dev/ttyS4
COM5（To connect UART）	J13_PIN1=COM5_RXD J13_PIN2=COM5_TXD J13_PIN3=GND	/dev/ttyS5

1-ch as RS485

UART To RS485	Location	Device Node
UART4 To RS485_A1/B	J10_PIN1=RS485_A1 J10_PIN2=RS485_B1	/dev/ttyS7

Test Principles:

Test program achieves a UART to send the character ["/dev/ttyXXXX" test string!,]every second, includes [x] is the device node which is actual tested, meanwhile, it could block reading and printing from serial ports through multi-threading.

Test Procedures & Test Result:

RS232 Test

The computer should connect with two UARTs when doing UART test.

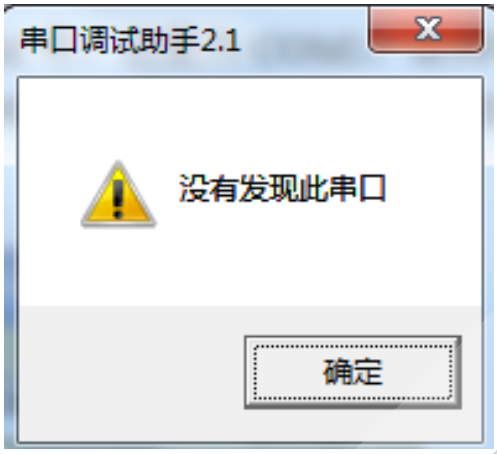
①.One to connect debug port, for interaction;

②.One to connect under test UART, for receiving and transmitting data;

Based on the UART and hardware relation tablet, select the under-tested UART, then connects the under-test UART with PC UART through the specific UART converter cable.

Open serial debug assistant from the SDK.

If it hints as below:



It means the COM port on computer has been occupied, close the occupied terminal, then open the serial debug assistant again.

Set UART properties, the UART accords to the COM number on PC, here ,we take the example of COM5, Baud Rate:[115200], Data Bit:[8], Stop Bit:[1], Parity Check:[None].

After setting UART properties, then start to test.

To test COM1, COM2, COM3, COM4 separately.

Here, we take an example of COM2, other UART test method is same.

```
# ./rs232_test /dev/ttyS4 115200
```

The debug port starts receiving data

```
root@linaro-alip:/usr/test# ./rs232_test /dev/ttyS4 115200
receive 8 datas: 11111111
receive 8 datas: 11111111
receive 8 datas: 11111111
```

As the RS485 flow control pin is controlled by hardware, RS485 test method is same as RS232.

2.4. CAN Test

IAC-RK3568-Kit development kit has 3-ch CAN port.

Description:

CAN#	Location	Device Node
CAN0	J14	CAN0
CAN1	J15	CAN1
CAN2	J16	CAN2

Test Principles:

The mainboard provides 3-ch CAN, the file system tells the method how to test the CAN, please use CAN tool to test.

CAN0(PIN_H, PIN_L are at J14)

CAN1(PIN_H, PIN_L are at J15)

CAN2(PIN_H,PIN_L are at J16)

Test Procedures & Test Result:

Here, we take example of CAN1.

1. Connect CAN1(PIN_H,PIN_L) on Mainboard #1 with CAN1(PIN_H,PIN_L) on Mainboard #2

2.Power on, two Mainboards configure CAN1.

2.1 Set mainboard CAN boot parameter

```
# ip link set can0 type can bitrate 125000
# ifconfig can0 up
# ip link set can1 type can bitrate 125000
# ifconfig can1 up
# ip link set can2 type can bitrate 125000
# ifconfig can2 up
# ifconfig
```

```
root@linaro-alip:~# ifconfig
can0: flags=193<UP,RUNNING,NOARP>  mtu 16
        unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  txqueuelen 10  (UNSPEC)
        RX packets 2  bytes 16 (16.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1  bytes 8 (8.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 63

can1: flags=193<UP,RUNNING,NOARP>  mtu 16
        unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  txqueuelen 10  (UNSPEC)
        RX packets 1  bytes 8 (8.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2  bytes 16 (16.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 64

can2: flags=193<UP,RUNNING,NOARP>  mtu 16
        unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  txqueuelen 10  (UNSPEC)
        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 65
```

2.2 Test by inputting [can_test]

./can_test can0 0&

./can_test can1 1

After tested successfully, it shows as below

```
root@linaro-alip:~# ./can_test can1 1
QY-IAC-RK3568-MB-BETA-V1.x 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.
root@linaro-alip:~#
```

Till now, CAN1 test is finished, CAN0 and CAN2 test method are same as CAN1.

2.5. USB Test

There are 5-ch USB port on IAC-RK3568-Kit development kit.

Description:

USB	Location	Description
USB-Type-C	J6（Type-C）	Image flash
USB-HOST（USB3.0）	J7（USB3.0）	USB-HOST, to connect external USB device.
USB-HOST（USB3.0）	J4（M.2 socket）	To connect 5G module (USB3.0)

Test Principle:

The development kit supports USB hot swap, to insert USB flash disk into the mainboard, it will print relative information of the USB flash disk automatically.

It will generate the device node [/dev/sda] in [/dev] directory and partition node [/dev/sda1](If there has many partitions, the partition number will be increased accordingly)

Test Procedures & Test Result:

Here, we tested the USB flash disk which has only one partition.

1. Insert the normal USB flash disk into the mainboard, the debug port prints the information as below:

```
root@linaro-alip:~# ifconfig
can0: flags=193<UP,RUNNING,NOARP>  mtu 16
        unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  txqueuelen 10  (UNSPEC)
        RX packets 2  bytes 16 (16.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 1  bytes 8 (8.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 63

can1: flags=193<UP,RUNNING,NOARP>  mtu 16
        unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  txqueuelen 10  (UNSPEC)
        RX packets 1  bytes 8 (8.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 2  bytes 16 (16.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
        device interrupt 64

can2: flags=193<UP,RUNNING,NOARP>  mtu 16
        unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  txqueuelen 10  (UNSPEC)
        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 65
```

As the above picture shown, it shows the basic information of the USB flash disk, USB flash disk device node is [sda], child node is [sda1]

2. Use[fdisk] command to check [sda] information.

fdisk -l /dev/sda

```
root@qiyang:~# fdisk -l /dev/sda
Disk /dev/sda: 29.8 GiB, 31981568000 bytes, 62464000 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: 0x39ad0681

Device     Boot Start      End  Sectors  Size Id Type
/dev/sda1  *      224 62463999 62463776 29.8G  c W95 FAT32 (LBA)
```

3.Mount USB flash disk

#mount /dev/sda1 /media

4. Check the contents in USB flash disk

ls -l /media/

```
root@linaro-alip:~# ls /media/
 1080p_fps30.mp4   FOUND.000  'System Volume Information'
```

5. You can test a USB flash disk to test the USB flash disk's reading and writing by creating, copying, and deleting files.

6. Use the same method to test 2*USB_Host, finish testing, then pull out the USB flash disk, it prints as below:

```
root@qiyang:~# usb 1-1.2: USB disconnect, device number 5
sd 3:0:0:0: [sda] Synchronizing SCSI cache
sd 3:0:0:0: [sda] Synchronize Cache(10) failed: Result: hostbyte=DID_NO_CONNECT driverbyte=DRIVER_OK
FAT-fs (sda1): unable to read boot sector to mark fs as dirty
```

2.6. TF Card Test

IAC-RK3568-Kit provides 1-ch TF card (J33) for user using.

To prepare a TF card: 8GB,16GB; To support TF card format:FAT32

Test Principle:

Onboard SD card supports hot swap, after inserting SD card, the system will recognize the SD card automatically, and it will print the relative information of SD card.

It will generate the device node and partition node in [/dev] directory, then the system will mount all partitions to [/run/media/] directory automatically, to judge whether the interface is normal through reading or writing the corresponding files from this directory.

Test Procedures & Test Result:

The following test procedures are executing on the SD card which has only one partition, if there are several partitions, the test method is similar.

Insert a TF card, it will create the device node [/dev/mmcblk1], partition n means the corresponding device node is [/dev/mmcblk1pn].

Here ,we insert a 8G SD card, it prints the information as below:

```
root@linaro-alip:~# [ 4147.437285] mmc_host mmc1: Bus speed (slot 0) = 375000Hz (slot req 400000Hz, actual 375000HZ div = 0)
[ 4147.463957] mmc1: error -110 whilst initialising SD card
[ 4147.479748] mmc_host mmc1: Bus speed (slot 0) = 375000Hz (slot req 300000Hz, actual 187500HZ div = 1)
[ 4147.492515] mmc_host mmc1: Bus speed (slot 0) = 375000Hz (slot req 375000Hz, actual 375000HZ div = 0)
[ 4147.513724] mmc_host mmc1: Bus speed (slot 0) = 375000Hz (slot req 200000Hz, actual 187500HZ div = 1)
[ 4147.526539] mmc_host mmc1: Bus speed (slot 0) = 375000Hz (slot req 375000Hz, actual 375000HZ div = 0)
[ 4147.546926] mmc_host mmc1: Bus speed (slot 0) = 375000Hz (slot req 100000Hz, actual 93750HZ div = 2)
[ 4147.559633] mmc_host mmc1: Bus speed (slot 0) = 375000Hz (slot req 375000Hz, actual 375000HZ div = 0)
[ 4147.684968] mmc_host mmc1: Bus speed (slot 0) = 50000000Hz (slot req 50000000Hz, actual 50000000HZ div = 0)
[ 4147.685162] mmc1: new high speed SDHC card at address 1234
[ 4147.690259] mmcblk1: mmc1:1234 SA08G 7.21 GiB

root@linaro-alip:~#
```

As above picture shown, it shows the basic information of the SD card. The device node is [mmcblk1], partition is [p1].

You could also use [fdisk] command to check the information from SD card.

fdisk -l /dev/mmcblk1

```
root@linaro-alip:~# fdisk -l /dev/mmcblk1
Disk /dev/mmcblk1: 7.2 GiB, 7744782336 bytes, 15126528 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
root@linaro-alip:~#
```

Mount SD card:

#mount /dev/mmcblk1 /media/

```
root@linaro-alip:/# mount /dev/mmcblk1 /media/
[ 4304.470219] EXT4-fs (mmcblk1): recovery complete
root@linaro-alip:/# [ 4304.474206] EXT4-fs (mmcblk1): mounted filesystem with ordered data mode. Opts: (null)
```

You can use [df] command to check mounting information.

```
root@linaro-alip:/media/lost+found# df
Filesystem                1K-blocks       Used Available Use% Mounted on
/dev/root                   3601980    2958464    440844  88% /
devtmpfs                    1000336          0   1000336   0% /dev
tmpfs                       1009328          0   1009328   0% /dev/shm
tmpfs                       1009328      17180    992148   2% /run
tmpfs                          5120          4      5116   1% /run/lock
tmpfs                       1009328          0   1009328   0% /sys/fs/cgroup
tmpfs                        201864          0    201864   0% /run/user/0
192.168.1.7:/home/luoqt 7751250944 7224600576 135987200  99% /mnt
/dev/mmcblk1                7378872      33252   6951076   1% /media
```

Test SD card reading and writing through creating, copying, deleting files.

Pull out SD card, it prints the information as below:

```
root@linaro-alip:~# [ 4412.093685] mmc1: card 1234 removed
```

2.7. Audio Test

IAC-RK3568-Kit provides 1-ch binaural audio output port (Earphone socket)-J28,1-ch MIC recording port-J30.

Test Principle:

Use [aplay] command to play audio file, it could record by [arecord] command, the recording port-J30

Test Procedures & Test Result:

1. Recording Test

Use Microphone to connect J30, then input [arecord -f cd -d 10 record.wav]command in terminal, the recording file name [record.wav]

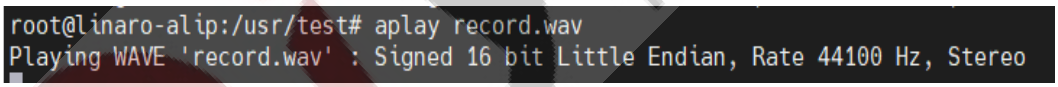
```
# arecord -f cd -d 10 record.wav
```

2. Play audio test

Through earphone (J28)

Play [record.wav] by inputting [aplay record.wav] command.

```
# aplay record.wav
```



Test Tool:

arecord、aplay

2.8. Ethernet Test

IAC-RK3568-Kit provides 2-ch Gigabit Ethernet port, eth0 is J2, eth1 is J1;

2-ch Gigabit Ethernet is working at different segments, the test is using eth0.

Test Principle:

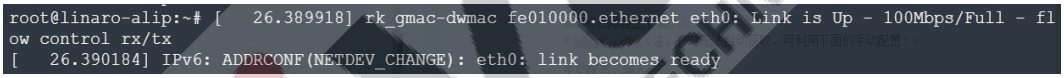
Set mainboard network, use [ping] to check if the network is connected.

Test Procedures & Test Result:

Before testing, please prepare the network cable and network environment (Router or switcher)

1. Network cable to Eth0 (J4) and switcher; To make sure the switcher's network environment could access Internet.

The serial debug terminal prints below information after connecting network cable:



2. Configure IP address

IP address configuration supports DHCP and static IP setting;

DHPC configure automatically, input
udhcpc -i eth0 (Remark: If it can't be obtained automatically, please input below command by manual configuration)

Manually configure, input
ifconfig eth0 192.168.1.71 (The board has been set as default)
echo nameserver 114.114.114.114 > /etc/resolv.conf
route add default gw 192.168.1.1 dev eth0

3. Test Intranet, input
ping -I eth0 192.168.1.1

```
root@linaro-alip:~# ping 192.168.1.1 -I eth0
PING 192.168.1.1 (192.168.1.1) from 192.168.1.143 eth0: 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=254 time=0.860 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=254 time=1.08 ms
64 bytes from 192.168.1.1: icmp_seq=3 ttl=254 time=1.14 ms
64 bytes from 192.168.1.1: icmp_seq=4 ttl=254 time=1.02 ms
64 bytes from 192.168.1.1: icmp_seq=5 ttl=254 time=1.18 ms
64 bytes from 192.168.1.1: icmp_seq=6 ttl=254 time=1.14 ms
64 bytes from 192.168.1.1: icmp_seq=7 ttl=254 time=1.19 ms
```

4. Test Internet, input

ping -I eth0 www.baidu.com

```
root@linaro-alip:~# ping -I eth0 www.baidu.com
PING www.a.shifen.com (180.101.49.11) from 192.168.1.143 eth0: 56(84) bytes of data.
64 bytes from 180.101.49.11 (180.101.49.11): icmp_seq=1 ttl=52 time=8.08 ms
64 bytes from 180.101.49.11 (180.101.49.11): icmp_seq=2 ttl=52 time=8.08 ms
64 bytes from 180.101.49.11 (180.101.49.11): icmp_seq=3 ttl=52 time=8.21 ms
64 bytes from 180.101.49.11 (180.101.49.11): icmp_seq=4 ttl=52 time=8.33 ms
64 bytes from 180.101.49.11 (180.101.49.11): icmp_seq=5 ttl=52 time=8.54 ms
64 bytes from 180.101.49.11 (180.101.49.11): icmp_seq=6 ttl=52 time=8.21 ms
```

2.9. WIFI Test

IAC-RK3568-Kit is onboard with WIFI module.

Test Principle

To connect wifi by using [wpa_passphrase] and [wpa_supplicant] command.

Test Procedures & Test Result:

1.Mount driver (Note: It requires about one minute for matching)

insmod /usr/test/bcmdhd.ko

```
[   23.711018] mmc3: queuing unknown CIS tuple 0x80 (2 bytes)
[   23.712849] mmc3: queuing unknown CIS tuple 0x80 (3 bytes)
[   23.714615] mmc3: queuing unknown CIS tuple 0x80 (3 bytes)
[   23.717786] mmc3: queuing unknown CIS tuple 0x80 (7 bytes)
[   23.721619] mmc3: queuing unknown CIS tuple 0x81 (9 bytes)
[   23.835584] mmc_host mmc3: Bus speed (slot 0) = 50000000Hz (slot req 50000000Hz, actual 50000000HZ div = 0
[   23.835940] [dhd] sdioh_start: set sd_f2_blocksize 256
[   23.836803] [dhd] dhd_bus_devreset: == Power ON ==
[   23.837346] [dhd] F1 signature read @0x18000000=0x1541a9a6
[   23.842394] [dhd] F1 signature OK, socitype:0x1 chip:0xa9a6 rev:0x1 pkg:0x4
[   23.844397] [dhd] DHD: dongle ram size is set to 524288(orig 524288) at 0x0
[   23.844675] [dhd] dhd_bus_devreset: making DHD_BUS_DOWN
[   23.844790] [dhd] dhdsdio_probe_init: making DHD_BUS_DOWN
[   23.849939] [dhd] dhd_conf_read_config : Ignore config file /system/etc/firmware/config.txt
[   23.850018] [dhd] dhd_conf_set_path_params : Final fw_path=/system/etc/firmware/fw_bcm43438a1.bin
[   23.850043] [dhd] dhd_conf_set_path_params : Final nv_path=/system/etc/firmware/nvram_ap6212a.txt
[   23.850065] [dhd] dhd_conf_set_path_params : Final clm_path=/system/etc/firmware/clm_bcm43438a1.blob
[   23.850085] [dhd] dhd_conf_set_path_params : Final conf_path=/system/etc/firmware/config.txt
[   23.851345] [dhd] dhd_os_open_image1: /system/etc/firmware/fw_bcm43438a1.bin (436966 bytes) open success
[   23.921492] [dhd] dhd_os_open_image1: /system/etc/firmware/nvram_ap6212a.txt (1017 bytes) open success
[   23.922036] [dhd] NVRAM version: AP6212A_NVRAM_V1.0.2_20191121
[   23.922826] [dhd] dhdsdio_write_vars: Download, Upload and compare of NVRAM succeeded.
[   23.977612] [dhd] dhd_bus_init: enable 0x06, ready 0x06 (waited 0us)
[   23.978834] [dhd] dhd_tcpack_suppress_set: TCP ACK Suppress mode 2 -> mode 0
[   23.980127] [dhd] dhd_apply_default_clm: Ignore clm file /system/etc/firmware/clm_bcm43438a1.blob
```

2. Set wifi user name:QYWIFI, password:QY@2019.com, if different, please modify.

```
# wpa_passphrase QYWIFI QY@2019.com >> /etc/wpa_supplicant.conf
# sync
```

3. Connect WIFI

```
# wpa_supplicant -Dnl80211 -i wlan0 -c /etc/wpa_supplicant.conf -B
```

```
[   55.347173]
[   55.416467] [dhd][wlan0] wl_iw_event : Link UP with 54:75:95:7d:ca:d1
[   55.416540] [dhd][wlan0] wl_ext_iapsta_event : [S] Link UP with 54:75:95:7d:ca:d1
[   55.418740] [dhd][wlan0] wl_iw_event : [0 times] disconnected with 54:75:95:7d:cc:1b, event 5, reason 7
[   55.418812] [dhd][wlan0] wl_ext_iapsta_event : [S] Link down with 54:75:95:7d:cc:1b, WLC_E_DEAUTH(5), reason 7
[   55.422474] [dhd][wlan0] wl_bss_connect_done : Report connect result - connection succeeded
[   55.422609] [dhd] CFG80211-ERROR) wl_is_linkdown : Link down Reason : WLC_E_DEAUTH
[   55.422629] [dhd] CFG80211-ERROR) wl_is_linkdown : Link down Reason : WLC_E_DEAUTH
[   55.422649] [dhd] CFG80211-ERROR) wl_notify_connect_status : link down--clearing disconnect IEs
[   55.448890] [dhd][wlan0] wl_add_keyext : key index (0)
[   55.458768] [dhd] CFG80211-ERROR) wl_notify_connect_status : BSSID of event is not the connected BSSID(ignore it) cur: 54:75:95:7d:ca:d1 event: 54:75:95:7d:cc:1b
[   55.460621] IPv6: ADDRCONF(NETDEV_CHANGE): wlan0: link becomes ready
```

4.Obtain IP automatically

```
# busybox udhcpc -i wlan0
```

```
root@linaro-alip:~# busybox udhcpc -i wlan0busybox udhcpc -i wlan0
udhcpc: started, v1.30.1
udhcpc: sending discover
udhcpc: sending select for 192.168.3.156
udhcpc: lease of 192.168.3.156 obtained, lease time 86400
```

5. Static IP

If the network segment is [192.168.3.1], the IP command should be as below:

```
ifconfig wlan0 192.168.3.xxx
```

If needs to connect Internet, it requires to add the default gateway

```
route del default
route add default gw 192.168.3.1 dev wlan0
echo nameserver 114.114.114.114 > /etc/resolv.conf
```

6. Ping Baidu

```
# ifconfig eth0 down
# ping -I wlan0 www.baidu.com
```

```
root@linaro-alip:~# ping www.baidu.com -I wlan0
PING www.a.shifen.com (180.101.49.12) from 192.168.3.156 wlan0: 56(84) bytes of data.
64 bytes from 180.101.49.12 (180.101.49.12): icmp_seq=1 ttl=52 time=9.88 ms
64 bytes from 180.101.49.12 (180.101.49.12): icmp_seq=2 ttl=52 time=14.5 ms
64 bytes from 180.101.49.12 (180.101.49.12): icmp_seq=3 ttl=52 time=25.0 ms
64 bytes from 180.101.49.12 (180.101.49.12): icmp_seq=4 ttl=52 time=11.4 ms
64 bytes from 180.101.49.12 (180.101.49.12): icmp_seq=5 ttl=52 time=14.2 ms
```

Remark: If there is packet loss, please connect an antenna.

2.10. 5G Test

IAC-RK3568-Kit provides M.2 port (USB signal), to connect 4G/5G module.

Here, we tested by using 5G module, it requires a 5G module (Model No.: Quectel_RM500U), antenna and SIM card. If not required, please skip this chapter.

Test Principle:

To connect 5G module, and then to do dial-up test.

Test Procedures & Test Result:

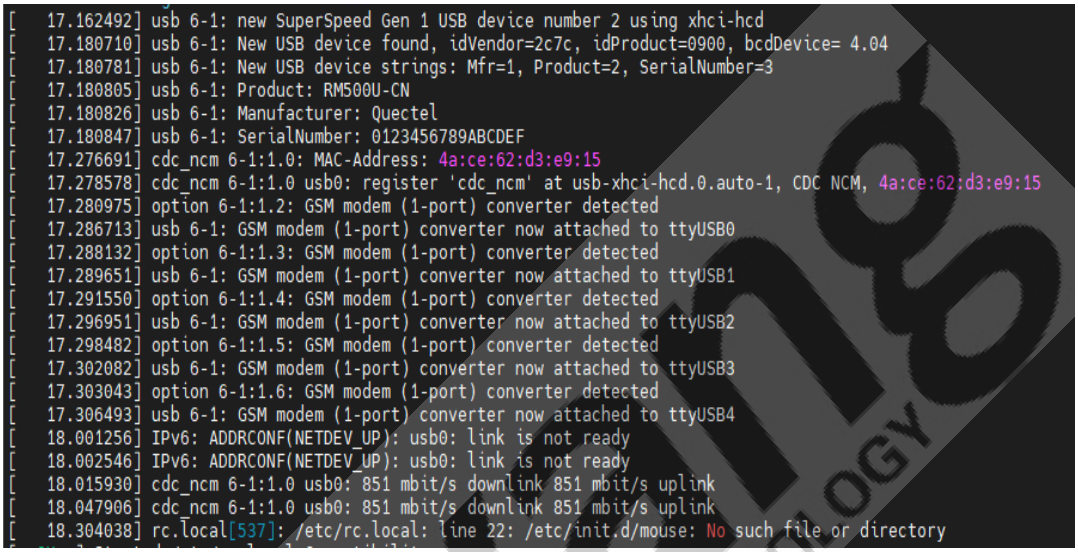
Firstly, to execute below commands to kill these three processes.

```
# killall tds_pppd.sh
```

killall pppd

killall chat

The mainboard 5G module used the RM500U-CN, to insert RM500U-CN module, 5G antenna, and SIM card, the terminal will print below information after inserting 5G module.



Use below command to open 5G's power

ls /dev/ttyUSB*

echo 1 > com_switch_io // Open 5G's power

Below node will be seen:

To run [pppd] tool in terminal, and assign the executable script file; Here, we used the 5G script file [F03X]; The script file is located at [/etc/ppp/peers], the [chat] configuration file which the script file called is located at [/etc/ppp/peers/F03X-chat-connect)].

If it prints the below information, it means the network is working.

```
Script chat -s -v -f /etc/ppp/peers/F03X-chat-connect -T CMNET finished (pid 6711), status = 0x0
Serial connection established.
using channel 2
Using interface ppp0
Connect: ppp0 <--> /dev/ttyUSB3
rcvd [LCP ConfReq id=0x1 <asyncmap 0x0> <magic 0x419d185d> <pcomp> <accomp>]
Warning - secret file /etc/ppp/pap-secrets has world and/or group access
sent [LCP ConfReq id=0x1 <asyncmap 0x0> <magic 0xf9aee65e> <pcomp> <accomp>]
sent [LCP ConfAck id=0x1 <asyncmap 0x0> <magic 0x419d185d> <pcomp> <accomp>]
rcvd [LCP ConfAck id=0x1 <asyncmap 0x0> <magic 0xf9aee65e> <pcomp> <accomp>]
sent [LCP EchoReq id=0x0 magic=0xf9aee65e]
sent [IPCP ConfReq id=0x1 <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns2 0.0.0.0>]
rcvd [CCP ConfReq id=0x1 <deflate 15> <deflate(old#) 15> <bsd v1 15>]
Unsupported protocol 'Compression Control Protocol' (0x80fd) received
sent [LCP ProtRej id=0x2 80 fd 01 01 00 0f 1a 04 78 00 18 04 78 00 15 03 2f]
rcvd [LCP EchoRep id=0x0 magic=0x419d185d]
rcvd [IPCP ConfReq id=0x1 <compress VJ 0f 01> <addr 192.168.168.1>]
sent [IPCP ConfRej id=0x1 <compress VJ 0f 01>]
rcvd [IPCP ConfNak id=0x1 <addr 10.120.18.135> <ms-dns1 211.140.11.66> <ms-dns2 211.140.188.188>]
sent [IPCP ConfReq id=0x2 <addr 10.120.18.135> <ms-dns1 211.140.11.66> <ms-dns2 211.140.188.188>]
rcvd [IPCP ConfReq id=0x2 <addr 192.168.168.1>]
sent [IPCP ConfAck id=0x2 <addr 192.168.168.1>]
rcvd [IPCP ConfAck id=0x2 <addr 10.120.18.135> <ms-dns1 211.140.11.66> <ms-dns2 211.140.188.188>]
local  IP address 10.120.18.135
remote IP address 192.168.168.1
primary   DNS address 211.140.11.66
secondary DNS address 211.140.188.188
Script /etc/ppp/ip-up started (pid 6796)
Script /etc/ppp/ip-up finished (pid 6796), status = 0x0
[  140.034455] cdc_ncm 6-1:1.0 usb0: 851 mbit/s downlink 851 mbit/s uplink
```

Visit Internet, press [ctrl+c] to exit after the testing finished.

```
# route del default dev ppp0
```

```
# ping www.baidu.com
```

```
root@linaro-alip:~# ping www.baidu.com
PING www.a.shifen.com (36.152.44.96) 56(84) bytes of data.
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=1 ttl=51 time=82.6 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=2 ttl=51 time=32.9 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=3 ttl=51 time=51.7 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=4 ttl=51 time=49.6 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=5 ttl=51 time=48.0 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=6 ttl=51 time=47.1 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=7 ttl=51 time=45.4 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=8 ttl=51 time=64.1 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=9 ttl=51 time=85.9 ms
^C
--- www.a.shifen.com ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 131ms
rtt min/avg/max/mdev = 32.894/56.367/85.886/16.717 ms
```

Dial-up, it could ping Internet to do network test; If it has been connected by wired and wireless network, it needs to off other network connection.

1.route del default // Delete the default router

2.route add default gw xxx Add router, the gateway should be usb0's IP address (XXX is gateway)

Remark: Use [ifconfig] to check usb0's IP address

It ensures the default gateway points to usb0 network card.

```
root@linaro-alip:~# route
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
default         10.0.0.1        0.0.0.0         UG    100    0        0 usb0
10.0.0.0        0.0.0.0         255.0.0.0       U     100    0        0 usb0
192.168.168.1   0.0.0.0         255.255.255.255 UH    0      0        0 ppp0
```

3. ping www.baidu.com

```
root@linaro-alip:~# ping www.baidu.com
PING www.a.shifen.com (36.152.44.96) 56(84) bytes of data.
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=1 ttl=51 time=82.6 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=2 ttl=51 time=32.9 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=3 ttl=51 time=51.7 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=4 ttl=51 time=49.6 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=5 ttl=51 time=48.0 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=6 ttl=51 time=47.1 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=7 ttl=51 time=45.4 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=8 ttl=51 time=64.1 ms
64 bytes from 36.152.44.96 (36.152.44.96): icmp_seq=9 ttl=51 time=85.9 ms
^C
--- www.a.shifen.com ping statistics ---
9 packets transmitted, 9 received, 0% packet loss, time 131ms
rtt min/avg/max/mdev = 32.894/56.367/85.886/16.717 ms
```

2.11. SATA Test

IAC-RK3568-Kit is onboard with SATA interface, it could connect external SATA disk

It requires a SATA disk, if not required, please skip this chapter.

Test Principle:

Inserting SATA disk into a mainboard to write in and write out.

Test Procedures & Test Result:

1.To insert SATA disk, it has below information after booting:

```
root@linaro-alip:~# [   64.186879] ata1: SATA link up 6.0 Gbps (SStatus 133 SControl 300)
[   64.187357] ata1.00: ATA-9: GLOWAY FER120GS3-S7, SN08413, max UDMA/133
[   64.187402] ata1.00: 234441648 sectors, multi 1: LBA48 NCQ (depth 32)
[   64.187927] ata1.00: configured for UDMA/133
[   64.189110] scsi 0:0:0:0: Direct-Access     ATA      GLOWAY FER120GS3 413  PQ: 0 ANSI: 5
[   64.192457] sd 0:0:0:0: [sdb] 234441648 512-byte logical blocks: (120 GB/112 GiB)
[   64.192627] sd 0:0:0:0: [sdb] Write Protect is off
[   64.192849] sd 0:0:0:0: [sdb] Write cache: enabled, read cache: enabled, doesn't support DPO or FUA
[   64.198663]  sdb:
[   64.202520] sd 0:0:0:0: [sdb] Attached SCSI disk
```

2.fdisk -l | grep dev (It has node [/dev/sdb])

```
root@linaro-alip:~# fdisk -l |grep dev
Disk /dev/ram0: 4 MiB, 4194304 bytes, 8192 sectors
Disk /dev/mmcblk0: 7.3 GiB, 7818182656 bytes, 15269888 sectors
/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 15269823  2195392    1G unknown
Disk /dev/sdb: 111.8 GiB, 120034123776 bytes, 234441648 sectors
root@linaro-alip:~#
```

3. Quickly partition and format hard disk

fdisk /dev/sdb

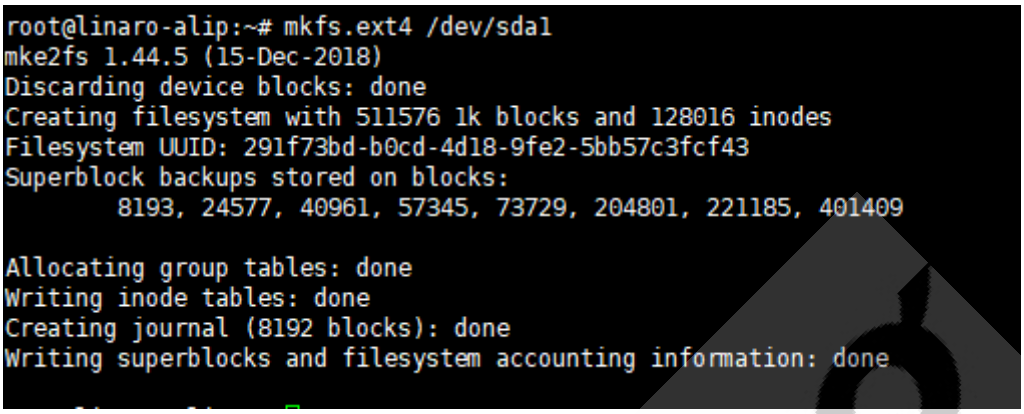
> n

> p

> Press ***Enter*** for three times

> w

mkfs.ext4 /dev/sdb1



4.Mount it

mount /dev/sdb1 /mnt/

5. To test SATA hard disk's reading and writing by creating ,copying ,and deleting files.

2.12. RTC Test

IAC-RK3568-Kit adopts PCF8563 chipset as external hardware clock by using I2C to connect carrier board, please ensure you have installed battery before testing RTC.

Test Principle:

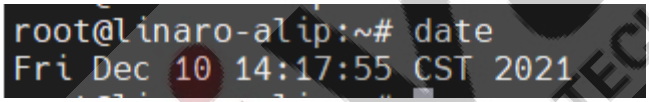
To set system's time by using [date] command, write system time into hardware clock by using [hwclock] command, to read hardware clock by using [rtc_test] command and print it.

Power off and restart, please check if the time is accurate.

Test Procedures & Test Result:

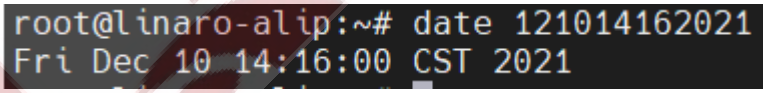
1.Execute [date] command on board, to check the current system time.

date



2.Set system time by using [date] command, such as to set as current PC's time.

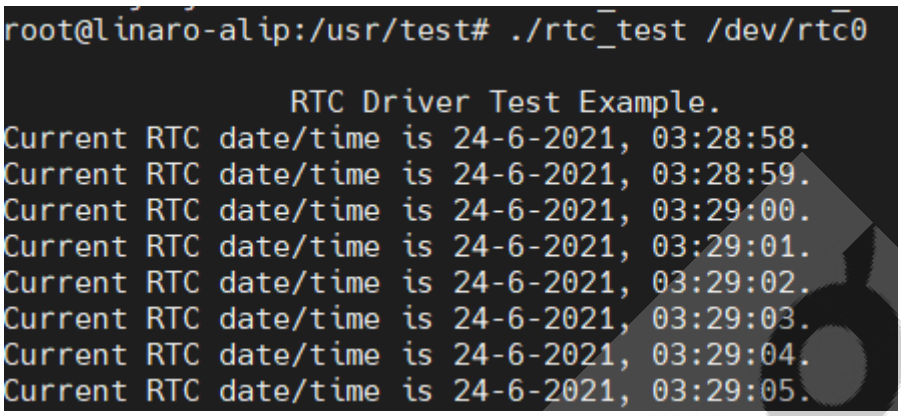
date 121014162021 */*Month Date Hour Minute Year*/*



3.Write system time into hardware clock chipset by using [hwclock] command.
hwclock -w

4.Check hardware time by using [hwclock] command.

5.Finally, execute [rtc_test] test program after setting successfully.
./rtc_test /dev/rtc0



The program prints 10 messages of the current hardware time , then exit, press ***ctrl+c*** if exit the program in advance.

Check if the time is accurate, and if there is any second loss.

6.Power off, then power on, to check system and hardware clock, to see if the time is saved. And if the clock goes accurately.

Device Node:
/dev/rtc
/dev/rtc0

Driver Code:
drivers\rtc\rtc-pcf8563.c

The corresponding option:
CONFIG_RTC_DRV_PCF8563=y

2.13. Watchdog Test

IAC-RK3568-Kit has designed hardware watchdog timer circuit.

Test Principle:

To reset the mainboard by executing ***feed dog*** or ***not feed dog*** test program.

Test Procedures & Test Result:

1.Switch to [/usr/test] directory

```
# cd /usr/test/
```

2.Run [watchdog_feed_test], the mainboard does not restart.

```
# ./watchdog_feed_test /dev/qy_watchdog
```

```
root@linaro-alip:/usr/test# ./watchdog_feed_test /dev/qy_watchdog
Invalid arguments!
[ 2226.042644] watchdog: enable watchdog
Usage: ./watchdog_feed_test <device>
 <device> -- for example: /dev/qy_watchdog

FEED DOG: Inappropriate ioctl for device
```

Till now, the program will feed dog circularly, press ***ctrl+z*** to exit, it stops feeding dog, the mainboard will restart automatically.

3. Not feed dog command:

```
# ./watchdog_notfeed_test   /dev/qy_watchdog
```

At this moment, the system will restart.

Device Node:

/dev/qy_watchdog

Test Code:

watchdog_feed_test.c
watchdog_notfeed_test.c

Driver Code:

drivers\misc\qiyang_watchdog.c

Ⅳ.Summary

Till now, the basic functions are all tested, if any error appears, please check the test code.

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