Rockchip Linux System Test User Guide

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Preface

Overview

The document mainly presents Rockchip Linux SDK system software test methods and steps, aiming to help engineers get started with system testing and related debugging methods faster.

Intended Audience

This document (this guide) is mainly intended for:

Technical support engineers

Software development engineers

Chipset Supported

Chipset	Buildroot	Debian 9	Debian 10	Yocto
PX30	Y	Y	Y	Y
RK3326	Y	Y	Y	Y
RK3288	Y	Y	Y	Y
RK3399	Y	Y	Y	Y
RK3399Pro	Y	Y	Y	Y

Revision History

Date	Version	Date	Change Description
2017-01-15	V1.0.0	CQ	Initial version
2020-03-24	V1.1.0	CQ	Update test items
2020-03-30	V1.1.1	Caesar Wang	Update the format
2020-08-02	V1.1.2	Ruby Zhang	Update the format
2020-12-18	V1.1.3	Ruby Zhang	Update some contents

Contents

1. Functions Test

1.1 Buildroot

1.1.1 Restore Moving Layer Down

When the touch screen of the device is invalid and serial port input is available, the layer is set to move down, which can be restored with the following command:

```
/etc/init.d/S50launcher stop (Close lanucher first)
/etc/init.d/S50launcher start (Then open lanucher)
```

1.1.2 Remove Background Applications

Example: remove background audio.

Search the audio playing:

```
ps | grep audio
[root@rk3399pro:/]# ps | grep audio
  569 root      557m S    /usr/bin/audioservice
 1248 root      2412 S    grep audio
```

Remove background audio playback: kill 569.

1.1.3 Video

Video:

```
rkisp_demo --device=/dev/video1 --output=/tmp/isp.yuv --
iqfile=/etc/iqfiles/OV5695.xml
```

Play video:

Pull the file in the /tmp/cif.yuv directory to PC: `adb pull /tmp/cif.yuv /tmp/cif.yuv`, and play it through a YUV tool.

1.1.4 Recording

arecord -c channel -r sampling frequency -f sampling bits -d recording duration/recording storage path/recording file name. Channel ch_tbl="2 4 6 8"

Sampling frequency: fs_tbl="8000 11025 16000 22050 32000 44100 48000 64000 88200 96000 176400 192000"

Sampling bits: bits_tbl="S16_LE S24_LE S32_LE"

Package format = "wmv, wav, mp3, etc."

For example:

Time-limited recording- after recording for 10 seconds will exit and save automatically:

```
arecord -c 2 -r 44100 -f S16_LE -d 10 /tmp/record.wav
```

Unlimited time recording -ctrl+c: exit to save:

```
arecord -c 2 -r 44100 -f S16_LE /tmp/record.wav
```

Play recording files:

```
aplay /tmp/record.wav
```

1.1.5 Wi-Fi Connecting

First way:

```
cp data/cfg/wpa_supplicant.conf userdata/
vi /userdata/cfg/wpa_supplicant.conf
```

Add the following configuration items:

```
network={
ssid="WiFi-AP" // Wi-Fi name
psk="12345678" // Wi-Fi password
key_mgmt=WPA-PSK // Encryption
key_mgmt=NONE // Not encrypted
}

```

Re-read the above configuration: wpa_cli reconfigure

And reconnect: wpa_cli reconnect

Ping baidu.com

Second way:

```
./usr/sbin/wpa_supplicant -D nl80211 -i wlan0 -c /etc/wpa_supplicant.conf &
#Open Wi-Fi
wpa_cli -i wlan0 add_network  #add a network connection ID number, which is
used in steps 3-6
wpa_cli -i wlan0 set_network 0 ssid \"pzb\"    #add the SSID of the router to
be connected, such as: pzb
wpa_cli -iwlan0 set_network 0 psk \"123456789\"    #add the ap password to be
connected, such as: 123456789
wpa_cli -iwlan0 enable_network 0   #0 here is obtained according to step 2,
so that the network ID can be used
wpa_cli -iwlan0 select_network 0  #0 here is obtained according to step 2,
connect the ID
wpa_cli -iwlan0 set_network 0 psk \""    #(No password)
ifconfig 以及ping baidu.com    #if you can get an IP address and can ping
normally, it means you can connect to network
```

1.1.6 Music Player

```
aplay /media/usb0/musicdemo.wmv
```

1.1.7 System Time Checking and Setting

```
date                                #check system time
date --set='2018-12-24 15:17:42'    #Set system time
hwclock --show                      #check hardware time
hwclock --systohc                   #synchronous display of hardware time and
system time
```

1.1.8 RTC Clock Test

`cat /path/time` is used to check whether the time has changed in the current state or after restart.

Such as:

RK3399 excavator EVB:

```
cat /sys/devices/platform/ff3c0000.i2c/i2c-0/0-001b/rk808-rtc/rtc/rtc0/time
```

PX30 EVB：

```
cat /sys/devices/platform/ff3c0000.i2c/i2c-0/0-001b/rk808-rtc/rtc/rtc0/time
```

RK3399Pro EVB：

```
cat /sys/devices/platform/ff3c0000.i2c/i2c-0/0-0020/rk808-rtc/rtc/rtc0/time
```

Different platforms correspond to different node paths of time. You can find the above similar nodes through this command: `find ./ -name time`.

```
[root@px30_64:/]# find ./ -name time
./usr/bin/time
./sys/devices/system/cpu/cpu0/cpuidle/state0/time
./sys/devices/system/cpu/cpu0/cpuidle/state1/time
./sys/devices/system/cpu/cpu0/cpuidle/state2/time
./sys/devices/system/cpu/cpu1/cpuidle/state0/time
./sys/devices/system/cpu/cpu1/cpuidle/state1/time
./sys/devices/system/cpu/cpu1/cpuidle/state2/time
./sys/devices/system/cpu/cpu2/cpuidle/state0/time
./sys/devices/system/cpu/cpu2/cpuidle/state1/time
./sys/devices/system/cpu/cpu2/cpuidle/state2/time
./sys/devices/system/cpu/cpu3/cpuidle/state0/time
./sys/devices/system/cpu/cpu3/cpuidle/state1/time
./sys/devices/system/cpu/cpu3/cpuidle/state2/time
./sys/devices/platform/ff180000.i2c/i2c-0/0-0020/rk808-rtc/rtc/rtc0/time
./sys/module/printk/parameters/time
[root@px30_64:/]#
```

1.1.9 Screen Rotation

Write in the /etc/xdg/weston/weston.ini configuration file:

```
[output]
name=eDP-1
transform=90
```

The name needs to be written according to the actual situation and obtained through `ls /sys/class/drm`:

```
[root@rk3399:/]# ls /sys/class/drm/
card0 card0-HDMI-A-1  controlD64    version card0-DP-1     card0-eDP-1
renderD128
```

For example, the drm device here is card0-eDP-1, and the name="eDP-1".

1.1.10 Video Playback

Video playback in single window:

```
gst-play-1.0 /oem/SampleVideo_1280x720_5mb.mp4
```

Video playback in multi-window:

First find the multi-window script and then execute:

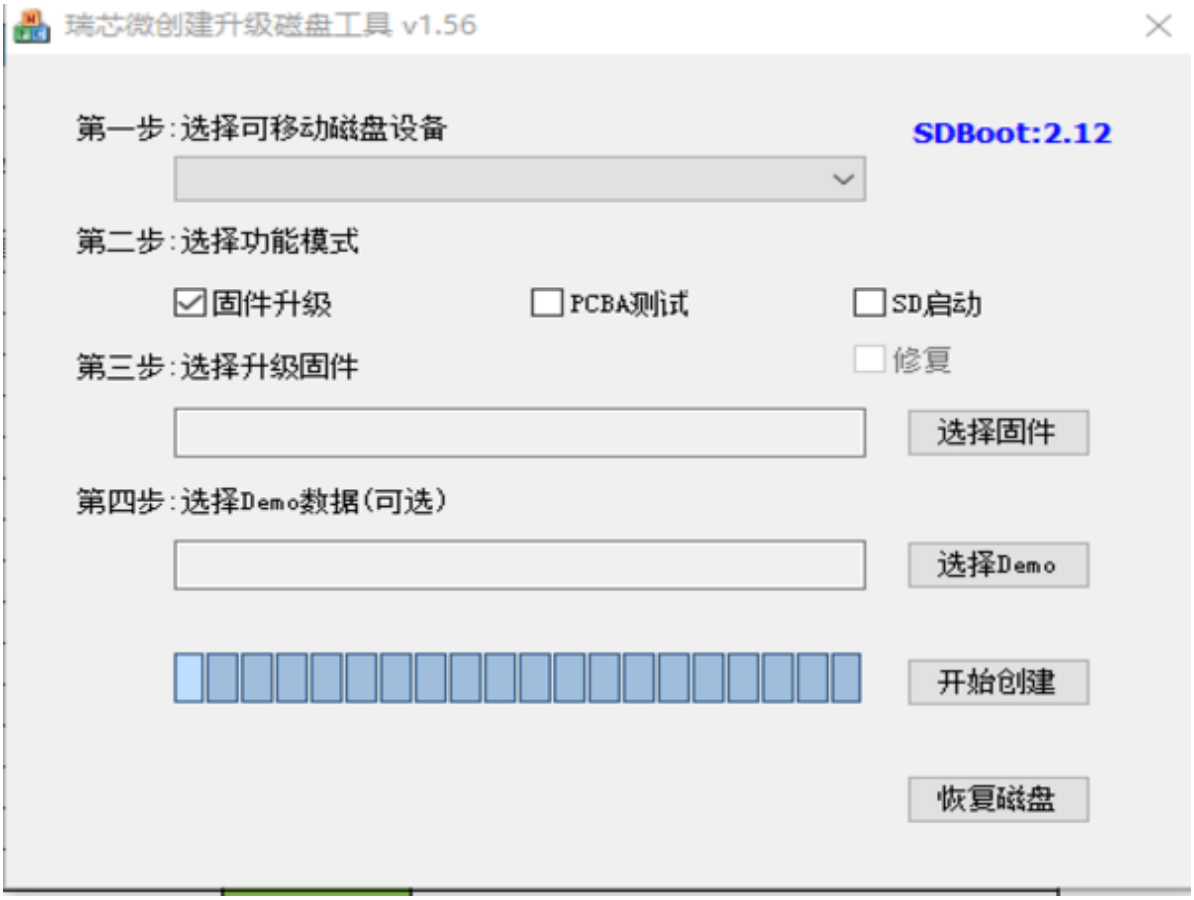
```
cd rockchip_test/video/
sh test_gst_multivideo.sh test  #it is not this name probably, but
test_multivideo.sh
```

Stop multi-window:

```
killall videowidget
etc/init.d/S50launcher stop
etc/init.d/S50launcher start
```

1.1.11 SD Card Upgrade and Boot

- Insert the SD card into PC, execute the SD_Firmware_Tool.exe on PC, select firmware upgrade/SD boot, select firmware-update.img, and start creating.
- After the SDK enters the maskrom and erases the flash, power off.
- Insert the prepared SD card, power on the SDK, and it will automatically burn the firmware.



1.1.12 Search the File

```
find ./ -name \*.sh
```

1.1.13 Check Memories

```
cat /proc/meminfo or free -h
```

```
[root@rk3399pro:/]# cat /proc/meminfo
MemTotal:        3873936 kB
MemFree:         3166144 kB
MemAvailable:    3563428 kB
Buffers:           15820 kB
Cached:           368236 kB
SwapCached:            0 kB
Active:           187468 kB
Inactive:         298124 kB
Active(anon):     104068 kB
Inactive(anon):    88664 kB
Active(file):      83400 kB
Inactive(file):   209460 kB
Unevictable:           0 kB
Mlocked:               0 kB
SwapTotal:             0 kB
SwapFree:              0 kB
Dirty:                16 kB
Writeback:             0 kB
AnonPages:        101540 kB
Mapped:           185792 kB
Shmem:             91192 kB
Slab:             154376 kB
SReclaimable:     135888 kB
SUnreclaim:        18488 kB
KernelStack:        4096 kB
PageTables:         4040 kB
NFS_Unstable:          0 kB
Bounce:                0 kB
WritebackTmp:          0 kB
CommitLimit:     1936968 kB
Committed_AS:    1014036 kB
VmallocTotal:   258867136 kB
VmallocUsed:           0 kB
VmallocChunk:          0 kB
[root@rk3399pro:/]# free -h
              total        used        free      shared    buffers     cached
Mem:          3873936      707900     3166036       91192       15836      368236
-/+ buffers/cache:      323828     3550108
Swap:            0           0           0
```

1.1.14 Check Memory Usage

df -h：

```
[root@rk3399pro:/]# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/root       5.9G  840M  4.8G  15% /
devtmpfs        1.9G     0  1.9G   0% /dev
tmpfs           1.9G     0  1.9G   0% /dev/shm
tmpfs           1.9G   14M  1.9G   1% /tmp
tmpfs           1.9G  300K  1.9G   1% /run
/dev/mmcblk0p7   63M  6.0M   54M  11% /oem
/dev/mmcblk0p9  8.2G  5.5M  8.2G   1% /userdata
[root@rk3399pro:/]#
```

1.1.15 Default Path of U Disk or SD Card Mount Automatically

U disk: /media/usb0/

SD car: /sdcard/

1.1.16 Copy Files

Copy files from U disk to device:

```
cp -r /media/usb0/3399-linux/ /userdata
```

1.2 Debian

1.2.1 Disable Standby

Enter the command on the Debian terminal:

```
sudo xset -dpms
sudo xset s off
xset dpms force off (Turn off the screen immediately)
```

Note: after restarting the device, the above settings will become disabled.

Terminal position: start at the bottom left corner of the main interface -> System Tools -> LXTerminal

1.2.2 Wi-Fi Connection

Enter the following command in the serial port:

```
nmcli r wifi on  #steps 1: turn on Wi-Fi
nmcli dev wifi   #steps 2: scan nearby AP
#steps 3: connect AP
nmcli dev wifi connect "DIR-803" password "839919060" ifname wlan0
nmcli r wifi off #steps 4: turn off Wi-Fi
```

1.2.3 Dual-screen with Different Display

Use hdmi-toggle to make sure how many display devices there are. For example, the following two devices, HDMI-1 and DP-1 can be detected:

```
root@linaro-alip:/# hdmi-toggle
cat: /sys/class/drm/card0-VGA-1/status: No such file or directory
Screen 0: minimum 320 x 200, current 2720 x 768, maximum 8192 x 8192
HDMI-1 connected primary 1360x768+0+0 (normal left inverted right x axis y a
   1360x768      60.37*+
   1920x1080     60.00    50.00    59.94
   1920x1080i    60.00    60.00    50.00    59.94
   1280x1024     60.02
   1280x720      60.61    60.00    50.00    59.94
   1024x768      60.00
   800x600       60.32
   720x576       50.00
   720x576i      50.00
   720x480       60.00    59.94
   720x480i      60.00    59.94
   640x480       60.00    59.94
DP-1 connected 1360x768+1360+0 (normal left inverted right x axis y axis) 1(
   1360x768      60.37*+
   1920x1080     60.00    50.00    59.94
   1280x1024     60.02
   1280x720      60.61    60.00    50.00    59.94
   1024x768      60.00
   800x600       60.32
   720x576       50.00
   720x480       60.00    59.94
   640x480       60.00    59.94
```

xrandr is used to set the relationship between the two screens:

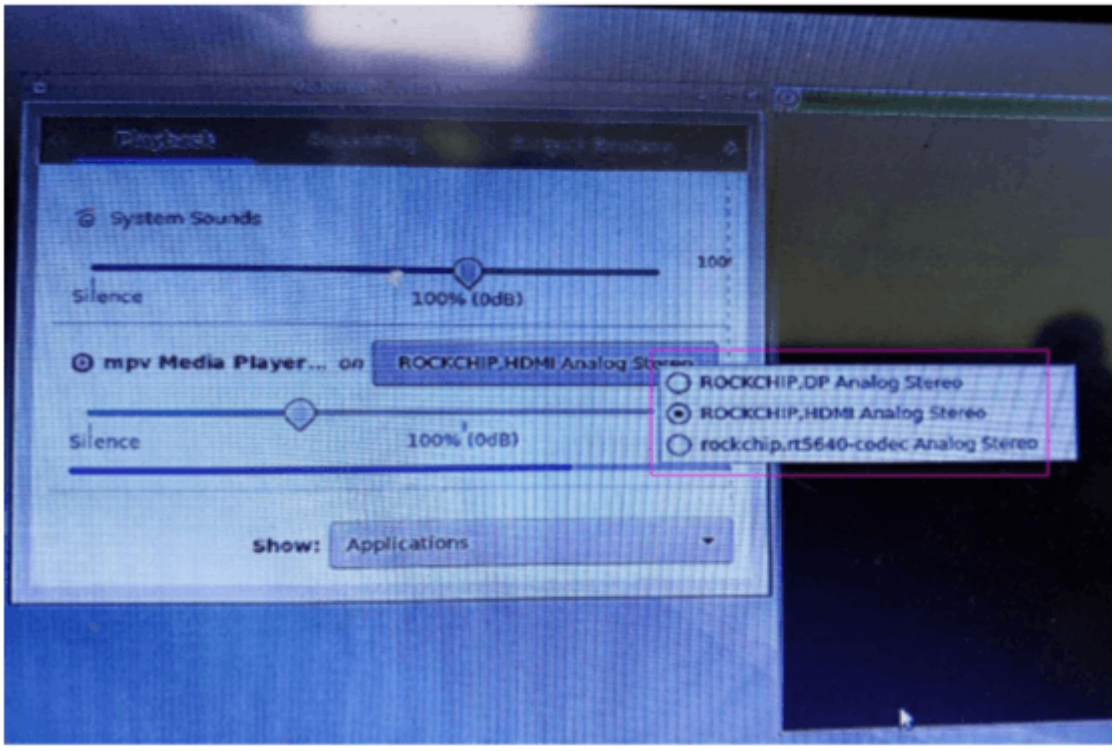
```
1 su linaro-c "DISPLAY=:0xrandr--outputHDMI-1--aboveDP-1"
```

The --above can be replaced by right-of, left-of, below, same-as, preferred, off, etc.

In this way to realize the dual-screen with different display function.

1.2.4 Dual-screen with Different Audio

Open the Sound&Video---->PulseAudio Volume Control in the bottom left corner, and then select the song to play. which sound card for playback can be selected as follows:



You can also use aplay to confirm the sound card and select the sound card to play:

aplay-l:


```
rt5640: aplay-Dplughw:0,0/dev/urandom
hdmiaudio: aplay-Dplughw:1,0/dev/urandom
DPaudio: aplay-Dplughw:2,0/dev/urandom
```

Open a song and drag it from the main screen to the secondary screen, and then select a sound card to play in the same way on the main screen to complete the dual-screen with different audio function.

1.2.5 Display Rotation

Rotation normal/left/right:

```
vi /etc/X11/xorg.conf.d/20-modesetting.conf
```

You can change the normal to left/right/ and it will take effect after reboot.

1.2.6 The Default Path for Automatic Mounting of U Disk

/media/linaro/B4EA-8716

Note: Different USB drives with different names, it depends actually.

2. Performance Test

2.1 Disk Read and Write Test

Check the node before testing: `fdisk -l`.

mmcblk1p9 is used to check the partition that can be readable and writable, the maximum capacity of this partition is 13.5G, the capacity of other P1-8 is relatively small with the capacity of 3.5G. After reading and writing this disk, it is easy to cause system damage. Restart the device and find that it cannot be turned on, so please choose p9.

2.1.1 e Read and Write

Write to disk:

```
dd if=/dev/zero of=/dev/mmcblk1p9 bs=1M count=2000 oflag=direct,nonblock
```

Read disk:

```
dd if=/dev/mmcblk1p9 of=/dev/null bs=1M count=2000 iflag=direct,nonblock
```

2.1.2 U disk Read and Write

Write to disk:

```
dd if=/dev/zero of=/dev/sda1 bs=1M count=2000 oflag=direct,nonblock
```

Read disk:

```
dd if=/dev/sda1 of=/dev/null bs=1M count=2000 iflag=direct,nonblock
```

2.2 Set Performance Mode

First way:

```
echo performance | tee $(find /sys/ -name *governor)
```

Second way:

Set small core and large core respectively:

```
echo performance > /sys/devices/system/cpu/cpufreq/policy0/scaling_governor
echo performance > /sys/devices/system/cpu/cpufreq/policy4/scaling_governor
```

2.3 Check Current CPU Frequency

```
cat /sys/devices/system/cpu/cpufreq/policy0/scaling_cur_freq
cat /sys/devices/system/cpu/cpufreq/policy4/scaling_cur_freq
```

2.4 glmark2 Performance Score

Buildroot glmark2

Display screen performance score:

```
sh /rockchip_test/gpu/test_glmark2_fullscreen.sh
```

Do not display screen performance score:

```
sh /rockchip_test/gpu/test_glmark2_offscreen.sh
```

Debian glmark2

Display screen performance score:

```
cd /usr/local/bin/
sh test_glmark2_fullscreen.sh
```

Do not display screen performance score:

```
cd /usr/local/bin/
sh test_glmark2_offscreen.sh
```

3. Stress Test

List of stress tests:

```
[root@rk3399pro:/]# sh /rockchip_test/rockchip_test.sh
************************************************************
***                                                      ***
***          **********************                      ***
***         *ROCKCHIPS TEST TOOLS*                       ***
***          *                    *                      ***
***          **********************                      ***
***                                                      ***
************************************************************
************************************************************
ddr test :              1 (memtester & stressapptest)
cpufreq test:           2 (cpufreq stresstest)
flash stress test:      3
bluetooth test:         4 (bluetooth on&off test)
audio test:             5
recovery test:          6 (default wipe all)
suspend_resume test:    7 (suspend & resume)
wifi test:              8
ethernet test:          9
auto reboot test:       10
ddr freq scaling test   11
npu stress test         12
camera test             13 (use rkisp_demo)
video test              14 (use gstreamer-wayland and app_demo)
gpu test                15 (use glmark2)
chromium test           16 (chromium with video hardware acceleration)
************************************************************
please input your test moudle:
```

3.1 glmark2

Buildroot

The script under the stress test table cannot be tested in a loop, use the command to test:

```
while true; do /rockchip_test/gpu/test_glmark2_fullscreen.sh sleep 2; done
```

Debian

```
while true; do /usr/local/bin/test_glmark2_fullscreen.sh sleep 2; done
```

3.2 Reboot Test

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 10 in the stress test list)
- Exit the test

```
echo off > /data/cfg/rockchip_test/reboot_cnt
```

3.3 Recovery Test

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 6 in the stress test list)
- Exit the test

```
echo off > /oem/rockchip_test/reboot_cnt
```

3.4 memtester Test

First way:

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 1 in the stress test list)
- Then select the serial number corresponding to memtester test (default memtester is 128M)

Second way:

- Directly execute memtester 300M

Note: 300MB can be set according to the actual DDR size, for example: 100MB, 200MB, but this value cannot be greater than the DDR size.

3.5 stressapptest

First way:

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 1 in the stress test list)
- Then select the corresponding serial number of stressapptest (is 48 hours by default).

Second way:

```
stressapptest -s 86400 -i 4 -C 4 -W --stop_on_errors -M 300 #The test will
stop automatically after 24 hours
```

3.6 cpufreq Test

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 2 in the stress test list)
- Then select "cpu freq stress test" and "cpu freq test": (with out stress test) corresponding serial number.

3.7 Flash Stress Test

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 3 in the stress test list)

3.8 Bluetooth Test

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 4 in the stress test list)

3.9 suspend_resume Test

Buildroot

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 7 in the stress test list)
- Then select auto suspend (resume by rtc) corresponding serial number 3 to start the test.

Debian

- cd /usr/local/bin/
- sh test_suspend_resume.sh
- Then select auto suspend (resume by rtc) corresponding serial number 3 to start the test.

3.10 Wi-Fi Test

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 8 in the stress test list)

3.11 DDR freq Scaling Test

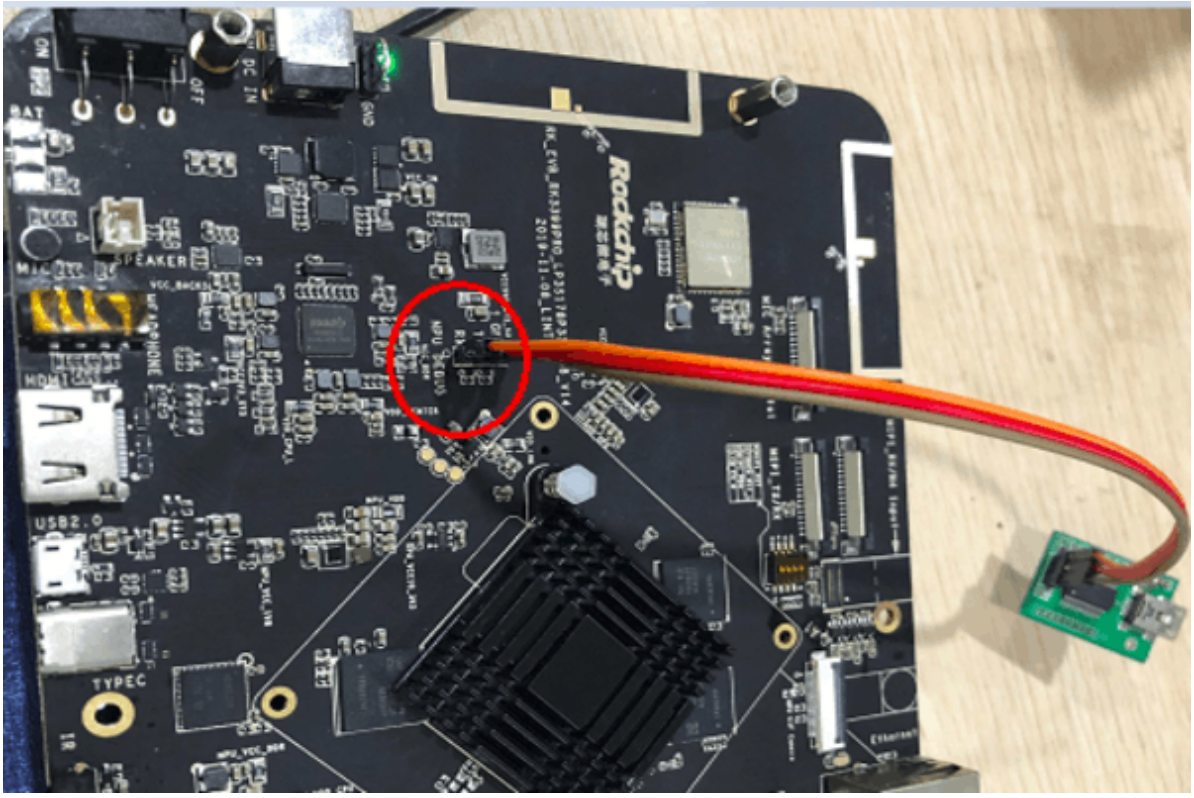
- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 11 in the stress test list)

3.12 NPU Stress Test

Connect the SDK serial port to the NPU port:




```
stressapptest -s 86400 -i 4 -C 4 -W --stop_on_errors -M 300  #The test will stop within 24 hours automatically
```

3.13 Camera Test

- Open the stress test list:

```
sh rockchip_test/rockchip_test.sh
```

- Start testing (select the test item with the serial number 13 in the stress test list)
- Then select camera stresstest corresponding series number 3 to start the test.

3.14 Video Test

The player cannot play all the videos in a loop by executing the script.

Firstly, copy the video folder and script included all English video files into the device, and then execute the script to test:

```
cp -r /media/usb0/video /userdata
cp /media/usb0/video.sh /userdata
chmod 777 /userdata/video.sh
./video.sh
```