Minrray

Integrated Endpoint UT30, UT31 User Manual

Document Version: V1.0

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CONTENT

1. Product Introduction

1.1 Product Features

Integrated audiovisual intelligent terminal platform UT30/UT31, adopts Snapdragon 625 processor, supports Android operating system and a variety of video conferencing software and Apps. The terminal platform features an all-in-one integrated design, embedded 4K ultra-high-definition optical lens and sensor with a variety of audio and video interfaces, which integrates audio and video interaction, desktop sharing, multimedia sharing, and recording functions to meet the mid-to-high end of various conference systems.

1. Integrated platform design:

Support 2 channel HDMI outputs, LAN interface, 2 channel USB2.0 interfaces, 2.4G/5G WIFI, and Bluetooth.

2. Snapdragon 625 processor:

The Snapdragon 625 processor uses the world-leading 14-nanometer technology and integrates the Qualcomm Adreno 506 PC-level graphics processor.

3. Ingenuous design

Lightweight design, built in lens and multiple interfaces, convenient to use and easy to install.

4. Open hardware platform and SDK:

Support users' secondary development to meet customized needs.

5. Excellent platform compatibility:

Support user customized development such as H.323/SIP and other protocol stacks, which allows good intercommunication with mainstream standard terminals and MCUs in the industry,convenient for customers to expand and upgrade;

6. Wireless WIFI

Support standard wireless protocols, simple to install devices.

7. Local storage

Support storage in SD card and U disk, storage space is up to 64G.

8. Ultra HD.

1/2.5-inch 8.28 million high-quality image sensor, maximum resolution is up to 4K with output 30frame per second;

9. Low noise and high SNR

Low-noise CMOS effectively guarantees the ultra-high SNR of the camera video. Adopt advanced 2D and 3D noise reduction technology to further reduce noise while ensuring image clarity;

10. Multiple video compression format:

Support H.265/H.264 video compression

11. Low-power sleep function:

Support low-power sleep/wake-up;

12. Multiple application

Conference, education, medical, government affairs, cloud video, collaborative office, multimedia integration, emergency command, broadcasting, judicial, public security, military and other system applications;

1.2 Technical Parameter

Input/Output Interfaces	
HDMI Input	1 mainstream HDMI output (support audio output) 1 auxiliary stream HDMI output
HDMI Output	Available in UT30 not in UT31
USB Interface	2 USB2.0 ports, support external keyboard, mouse, storage device, etc.; 1 Micro USB interface, support OTG upgrade/debug
LAN	100/10BASE-TX
Wireless WIFI	Support 802.11ac protocol, support 2.4G, 5G
Built in Microphone	Built-in 2 analog MIC inputs
Bluetooth	Support Bluetooth 4.1, low power consumption, support Bluetooth device connection
Audio Input/Output	3.5mm linear input/output
SD Card	Support SD Card storage
Wireless Remote Control	Built-in wireless receiving module, supporting 2.4GHz carrier frequency
Power Interface	HEC3800 power socket (DC12V)
Android Platform Parameter	
Main Chip	Snapdragon 625 processor
CPU	CPU core: eight-core CPU, ARM Cotex-A53 CPU clock speed: main frequency up to 2.0GHz CPU architecture: 64-bit
GPU Model	GPU：Qualcomm® Adreno™ 509 GPU API：OpenGL ES 3.1+
DSP	Qualcomm® Hexagon™ DSP Qualcomm All-Ways Aware™
RAM	Capacity: 2.0G; Storage speed: 933MHz; Storage type: LPDDR3
Storage	eMMC：eMMC 5.1；Space：16G
Network	802.11 ac Wi-Fi
Camera, Lens Parameters	
Image Sensor	1/2.5 inch high quality 4K CMOS sensor
Effective Pixels	8.28 million, 16:9
Video Compression Format	H.265、H.264
Focal Length	3.24mm
Field of View	94.8°(D), 86.6°(H), 56°(V).
Aperture	F2.1
DNR	2D & 3D
White Balance	Auto/Manual/Fluorescence/Incandescent/Daylight/Cloudy
Exposure	Auto/Manual
Video Adjustment	Saturation, contrast, sharpness, wide dynamic range

SNR	>55dB
Other Parameter	
Power Adapter	AC110V-AC220V to DC12V/1.5A
Input Voltage	DC12V±10%
Input Currency	1A(Max)
Power Consumption	12W(Max)
Storage Temperature	-10℃-- +60℃
Storage Humidity	20%-- 95%
Operation Temperature	-10℃-- +50℃
Operation Humidity	20%-- 80%
Dimension	UT30： 408mm×75mm×89mm UT31： 222mm×93.25mm×56.5mm
Environment	Indoors
Accessories	Manual, warranty card, power adapter, wireless remote control

1.3 Product Structure

1.3.1 Product Dimension Figure

UT30: 408mm×75mm×89mm

UT31: 222mm×93.25mm×56.5mm

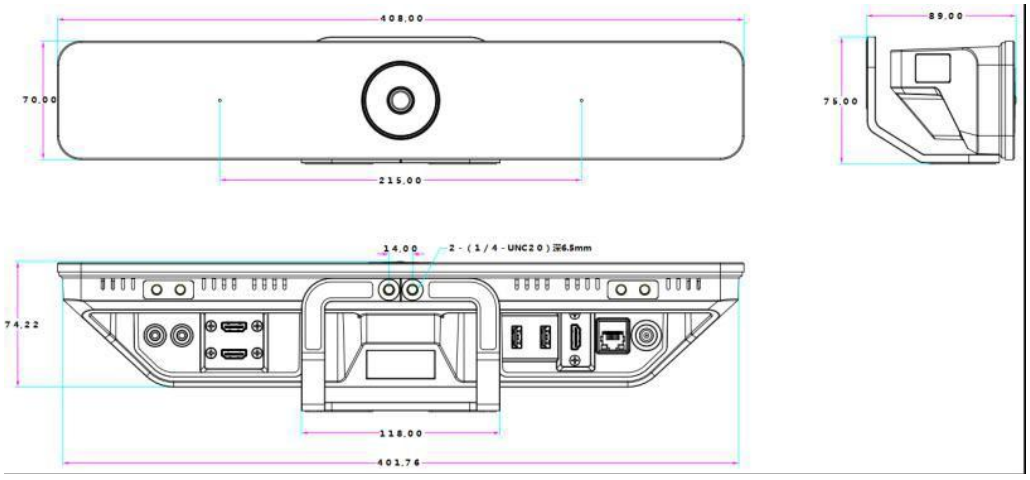
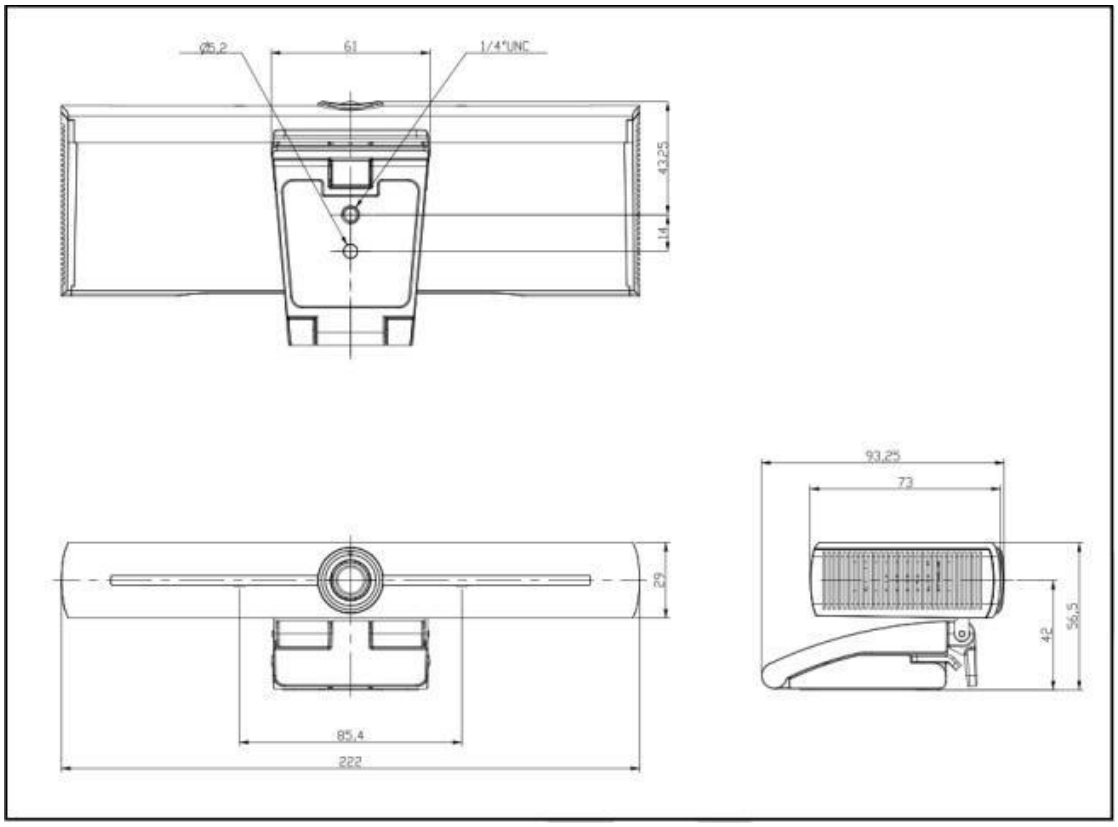


Figure 1.0 UT30 Dimension



Fifure2.0 UT31 Dimension

1.3.2 Product Interface Figures

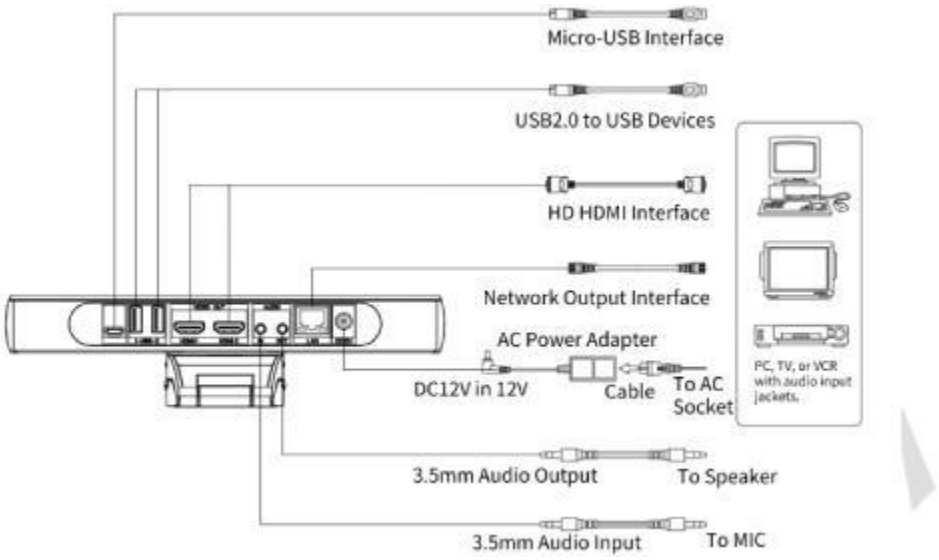


Figure 4.0 UT31 Interface Figures

1.4 Product Images

1.4.1 Front Images

Figure5.0 UT30 Front Image

Figure 6.0 UT31 Front Image

1.5 Standard Remote Control

Note:
1. The remote control has no delete button icon. Our company has used  as a delete button. If customers need to modify it, please refer to 4.8 “Customiz Remote Control Keys”

2. Long press  (over 3s) to switch  up, down, left, and right.

2. Video Development

Integrated endpoints are developed based on Android 7.0 system, compatible with camera on Android platform and camera2 standard API. UT30 and UT31 support 4K

2.1 Input System

The integrated terminal is equipped with a 4K lens and an HDMI IN input device (not equipped in UT31). In the Android development, our company will take “Camera” as the front camera (CAMERA_FACING_FRONT), HDMI as the rear camera (CAMERA_FACING_BACK).

2.1.1 Sensor Configuration

Sensor Model	SONY IMX274	Maximum Frame	30FPS
Data Format	yuv420sp,yuv420p,nv12-venus		
Resolution			
framesize _3840x2160			
framesize_1920x1080			
framesize_1280x720			
framesize_1024x768			
framesize_1024x576			
framesize_960x540			
framesize_800x600			
framesize_720x576			
framesize_720x480			
framesize_704x576			
framesize_640x480			
framesize_640x360			
framesize_352x288			
framesize_320x240			
framesize_320x180			
framesize_176x144			

2.2 Output System

The integrated terminal has two HDMI 1080P 60HZ outputs, among which HDMI_0 is the main stream and HDMI_1 is the auxiliary stream, supporting dual-screen different display mode (need

to be implemented in the APP), the main stream has audio, and the auxiliary stream does not have audio.

2.3 Frequent Problems of Camera Development

1. No pictures in the camera coming with program
Switch the front and back to see if they are reversed.
Check whether the camera is loose, if it is please contact our after-sales service.

2. The client App has no picture or the opposite end shows red and green flip.
Test whether the built-in camera is normal. If normal, check the preview format setting when the camera is enabled. The default format is NV21(YUV420SP), if other format is required, please set by yourself.（Android Camera1 Interface setPreviewFormat(ImageFormat.xxx)）

3. The image is freeze and frame is low when use the API of Camera2.
The Android Camera2 interface cannot process YUV data in the callback function of the camera to obtain data. If processing, there will be a great delay, resulting in a very serious image freeze.

4. How to view real-time frame rate?
View through adb shell mode:
1: adb set the property setprop persist.debug.sf.showfps 1: turn on the frame rate display switch
2: logcat | grep debugShowPreviewFPS view fps

5. No images through HDMI cable
1. Check if there is a bad connection. If it is, please insert the HDMI cable stably.
2. For UT30, check whether the the cable is into HDMI IN port. If yes, please change it into HDMI port.

3. Audio Development

This chapter mainly describes the audio input and output of the integrated terminal. The integrated terminal is equipped with two built-in pickups and a 3.5mm microphone input interface, one 3.5mm audio output interface. Audio can also be output to HDMI device through HDMI_0. It is built-in echo cancellation algorithm.

3.1 Audio Parameter

Sound card:
The integrated terminal uses the sound card chip of Texas Instruments TLV320AIC3101, which is a low-power stereo audio codec with a stereo headphone amplifier, and multiple input and output interfaces.

Peripherals:
The integrated terminal is equipped with two high-definition, long-distance pickups, which can adjust the gain with TLV320AIC3101, and the pickup distance can reach 4 meters.

Software parameter:
Support Android standard API (AudioRecord, AudioTrack, OpenSL), stereo acquisition, and support 8K, 16K, 32K, 44.1K, 48K multiple sampling rates.

3.2 Echo Cancellation Algorithm

The integrated terminal integrates the echo cancellation algorithm developed by our company. The echo cancellation algorithm is in the bottom layer, and the echo cancellation function can be realized by selecting the setting interface to turn on the echo cancellation algorithm on the App.
Setting ---- Audio --- Echo Cancellation

Note: The current echo cancellation algorithm only supports 48KHz sampling rate, the format is: AUDIO_FORMAT_PCM_16_BIT. If other sampling rates are required, application layer resampling is required, otherwise echo cancellation cannot be used.

3.2.1 Echo Cancellation Parameter

1. Audio Gain: The parameter is changed to adjust the sound level of the audio input. This parameter 0-20 means software gain, 20-40 means hardware gain. And the parameter should not be too large, otherwise it will affect the effect of echo cancellation. The recommended range

(hardware gain 0-10), the default is 0.

2.Echo Cancellation AGC:
Automatic Gain AGC, you can turn down the input sound, 28 means no gain, lower than 28 means negative gain (decrease sound), higher than 28 is a positive gain (increase sound). This parameter cannot be too large, otherwise, the sound will become unstable. Normally, no gain is OK to all of users.

3. Echo Cancellation Delay
This parameter vital to the effect of echo cancellation. The change parameter is the delay between echo cancellation after the speaker plays and then the Mic picks up the sound played by the Speaker (that is, the echo). The recommended range is 10-80 with default value 80. If the echo is obvious, it can be adjusted down.

4. Echo cancellation dual-talk: If the algorithm recognizes the dual-talk mode (two people are talking at the same time), it will not do echo cancellation. If the voice of one part is suppressed, this parameter can be adjusted. The default parameter is 32. Adjusting this parameter can improve the suppression effect. At this time, echo may be generated.If so, adjust the echo cancellation delay parameter.

5. Echo cancellation with voice noise reduction: when the voice is detected, the default degree of noise suppression value is 0, the smaller the value, the more obvious the suppression.

6. Echo cancellation without voice noise reduction: When no voice is detected, the default degree of noise suppression is 0, and degree 29 is not suppressed. The smaller the value,The more obvious the suppression.

Note: The fixed sampling rate of the echo cancellation algorithm is 48KHZ, only if used in the built -in pickup, it is effective (3.5mm interface is also considered built-in), if it is an external USB MIC, it will not take effect. Algorithm parameters are recommended to be slightly tuned on the default factory parameters.

3.3 Frequent Problems in Audio

No voice through HDMI cable.
Check if the HDMI cable is plugged into HDMI_1, which is without audio output.

How to integrate echo cancellation parameter into client's App.
App control can be realized through code
(1) Obtain Android AudioSystem service
audioManager = (AudioManager) getSystemService(AUDIO_SERVICE);
(2) Set parameter
For example, to set the audio gain:

audioManager.setParameters("mr_aec_pga="+gain value);

The same way to get gain

audioManager.getParameters("mr_aec_pga", value);

Get value = "mr_aec_pga=gain value"

Parameter list:

Parameter	String	Value Range
Audio gain	"mr_aec_pga"	0-20 software gain, 20-40 hardware gain (hardware gain is recommended)
Echo cancellation switch	"mr_aec_switch"	1 turn on, 0 turn off.
Echo Cancellation AGC	"mr_aec_agc"	0 - 50
Echo Cancellation delay	"mr_aec_delay"	0 – 500ms, interval is 20ms
Echo Cancellation dual-talk	"mr_aec_double_talk"	0 – 128
Echo cancellation with noise reduction	"mr_aec_denoise_off"	0 – 29
Echo cancellation without noise reduction	"mr_aec_denoise_on"	0 – 29
Remark: All of the parameter type is int.		

Pick up distance is too short for built-in voice pick up.

The integrated terminal does not turn on the audio input gain by default. If the customer feels that the pickup distance is too short, you can adjust the input audio gain. The adjustment method is as follows:

Audio gain adjustment method

- APP control can be realized in code

(1): Obtain Android AudioSystem service

audioManager = (AudioManager) getSystemService(AUDIO_SERVICE);

(2): Set the gain

audioManager.setParameters("mr_aec_pga="+gain value);

- Set --- Sound Adjust --- Audio Gain

Note: Setting the audio input gain is based on different users and different scenarios, please test for specifics.

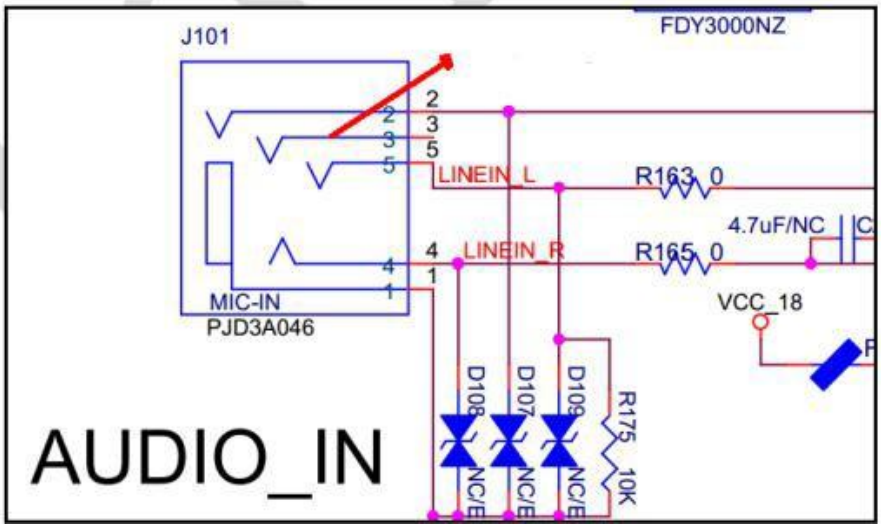
Built-in voice pick-up is not valid.

When a 3.5mm microphone input is inserted, the built-in microphone won’t work, and only the external microphone works. The built-in microphone and the external 3.5mm microphone can’t work at the same time.

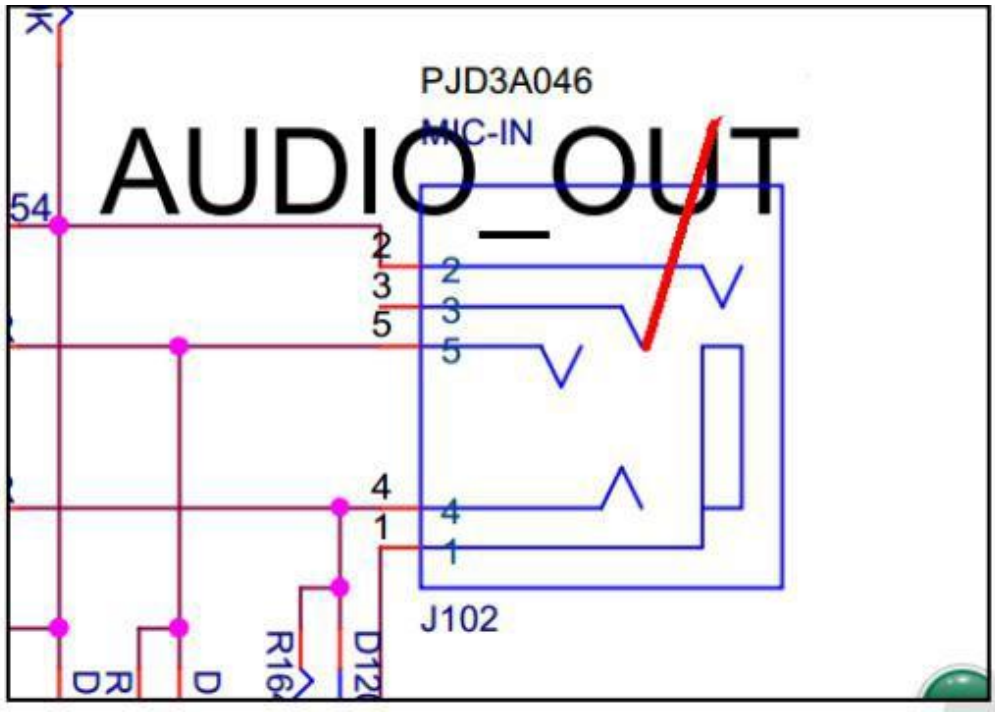
3.5mm audio interface description

The device is equipped with two 3.5mm ports, one is Mic input and the other is Audio output.

The Mic interface does not have a power supply, the external Mic must be an active Mic (the microphone is an externally powered one), otherwise it will not be able to record normally



The Audio output interface does not have Mic input, and earphones can only be used as audio output but not as input



No response when inserted with USB omnidirectional microphone

Check whether the USB omnidirectional microphone is recognize successfully.

#cat /proc/asound/cards

```
0 [msm8953sndcardm]: msm8953-snd-car - msm8953-snd-card-mtp
msm8953-snd-card-mtp
```

```
2 [U0x5720x529 ]: USB-Audio - USB Device 0x572:0x529 /*  设备检测成功  */
```

Some USB omnidirectional microphones will have a longer detection time (about 1 min) when connected with a USB cable.

Check the application layer code, but please do not set.

```
AudioManager.setMode(AudioManager.MODE_IN_COMMUNICATION);
```

In this way, USB devices can not be detected.

4. System Setting

4.1 View System Version Number

Set --- About Mobil phone --- forge ap version
UT_30_31-MINGRI_EQ0_544E791CD61_181213_100_V01_T28 is the version format released by us.

4.2 MircUSB Cable and USB Device Unable to Work Simultaneous

When the mirc_usb interface is plugged in, UT30 UT31 becomes a USB host; when a common USB device is plugged in, UT30 UT31 is a USB slave. The two share the same USB controller, so they cannot take effect at the same time. Common USB will fail when mirc_usb is inserted, including wired network cards.

4.3 Remote Controller Operation

Battery: AAA7 battery

Remote controller normal function: The remote control interface includes 28 buttons and 1 indicator light. The operations and instructions are as follows:
Press the button, the indicator light turns on; after releasing it, the indicator light turns off;

Pairing method:

The wireless 2.4G remote control have possibility to operates multiple devices through one remote control, so the remote control and the devices needs to be paired. The remote control is not paired by factory default.

A. Code

After powering on the remote control, long press "OK" + "*" for 3 seconds, the LED light will blink from off. After releasing the button, the LED light will keep blinking, and the receiving end will be powered on or restarted after power off. If the code is successfully coded, the LED light will be on Always on for 2 seconds and off; if the unsuccessful, the LED flashes for 20 seconds and then flashes slowly for 3 times to enter sleep mode.

B. Clear the code data:

After the remote control is powered on, long press "OK" + "#" for 3 seconds, the LED light will flash from off. When the paired receiver is powered on, the LED light will go out after the button is released, and the code matching is cleared successfully. When the paired receiving end is

powered off, the LED light keeps flashing after releasing the button, the receiving end is powered on, and the code matching is cleared successfully. The LED light goes out; if the code is cleared unsuccessfully, the LED light flashes for 20 seconds and then goes off to sleep.

C. No need to match code in default setting. Any receiving terminal and any remote control can be used directly after power on.

D. Pairing operation requirements:

Such as 1#, 2#, 3# remote control and A, B, C receiver example description

After 1# remote control and receiver A are successfully paired (the other two remote controls and receivers are not paired in the default state), 1# remote control can control A, B, C receivers at the same time 2#, 3# remote control cannot control A receiver.

Sleep Mode and Wake Up.

If no operation in working state, the device immediately enter sleep mode, press any key to wake up.

Combination Key Switch

Long press the "  " button for 3 seconds, the LED flashes 3 times and then the switch is successful, composite key: 1B/1C/38/5F/60/61/62

Operation Method of Device Learning

a. Press and hold the "TV" button for about 3 seconds until the LED light flashes, release the button and the LED will turn on and enter the learning state.
b. Press the "TV" button, the LED starts to flash, indicating that it is waiting for the learning signal;
c. Aim the two remote control transmitters within 2cm, press the button to be learned of the remote control for more than 1 second, and the LED will flash 3 times quickly
d. Turns to long light to indicate successful learning (flashing 5 times quickly indicates failure of learning).
e. After the learning is completed, press the "TV" button twice to exit the learning mode, or automatically exit the learning mode without any operation for 15 seconds.
f. Press and hold the "TV+Return" button for about 3 seconds until the LED light goes out from flashing 3 times, and the "TV" button restores the default code.

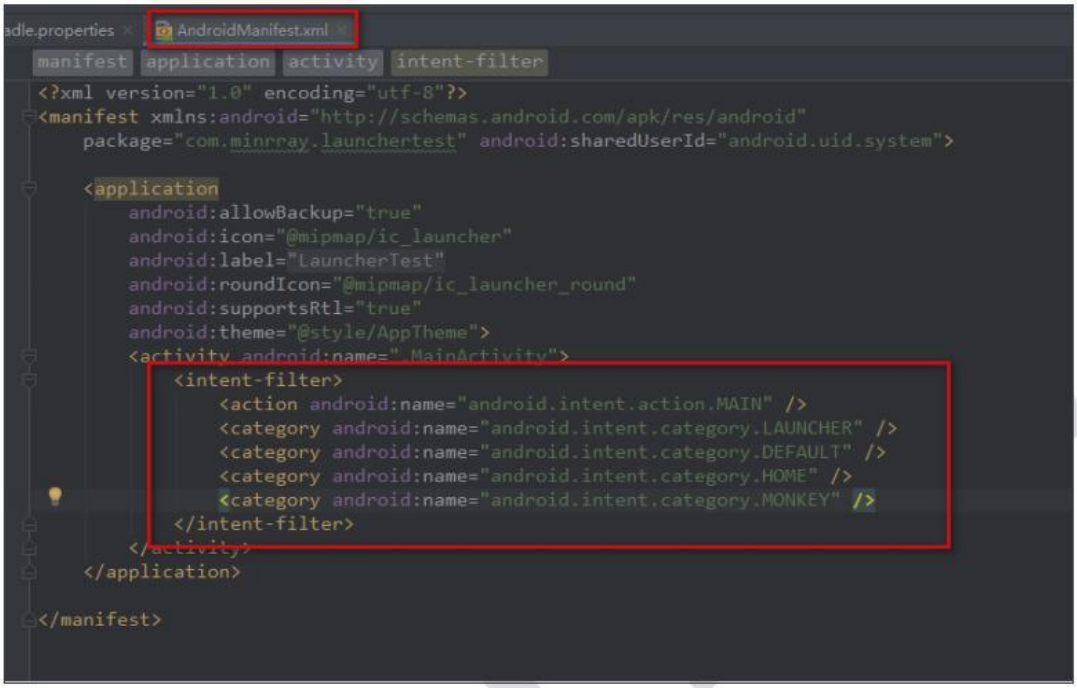
4.4 Open File System Write Permission

For easy to debug, sometimes it is necessary to replace a certain file of the file system, such as /system/bin/xx, /system/lib/xx, etc. These paths do not have the write permission. Open the file system write permission operation in Android7.0 as follows:

1. Connect the adb debugging cable (mirc usb, network port can be used).
2. adb root (this step will disconnect all adb connections, so you must execute adb connect xx again if you use the network port).
3.adb disable-verity
4.adb reboot (The above operation only needs to be executed once before the flashing, and it needs to be executed again after the flashing)
5.adb root
6.adb remount (Permission has been opened)

4.5 Modify Launcher

Add content to the AndroidManifest.xml of the App as shown in the figure below. For details, refer to demo: LauncherTest.zip



Add the code snippet shown in the following table to the AndroidManifest.xml of the client's apk:

```
<intent-filter>
    <action android:name="android.intent.action.MAIN"/>
    <category android:name="android.intent.category.LAUNCHER"/>
    <category android:name="android.intent.category.DEFAULT"/>
    <category android:name="android.intent.category.HOME"/>
    <category android:name="android.intent.category.MONKEY"/>
</intent-filter>
```

After installing the customized launcher, the launcher selection interface will appear on the screen. The selection interface is as follows:

Only this time: the next time you turn on the machine, there will be an interface for selecting the starter, and the customer needs to select the starter;

Always: The starter selection interface will not appear at the next boot, and the system will enter the last selected starter.

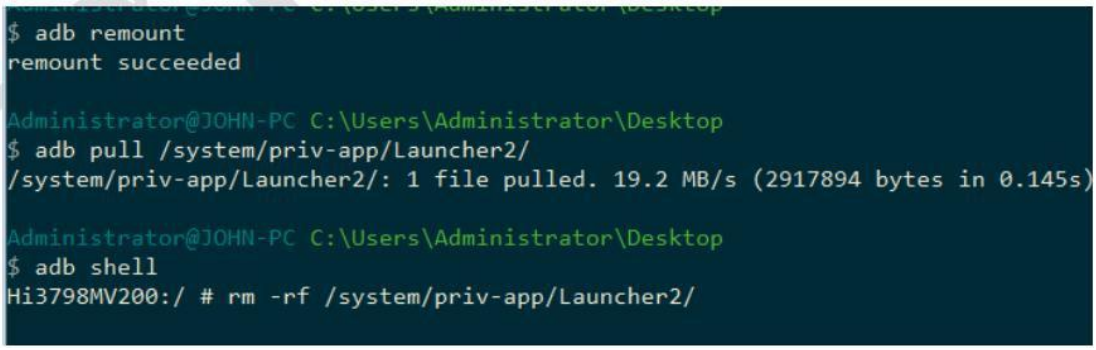
If the customer chooses to always use a custom launcher, the system default launcher needs to be restored. Uninstall the customized launcher and restart the device and the system restores the default launcher.

If the customer does not need the system default launcher, delete the system launcher, the operation method is as follows:

 # Delete launcher2

adb remount # Remount the system
adb pull /system/priv-app/Launcher2/ # backup launcher2
adb shell # login terminal
rm -rf /system/priv-app/Launcher2/ # Delete the system default launcher2
Import launcher2
adb remount
adb pushLauncher2/system/priv-app/
adb reboot

Delete the system default launcher, as shown in the following figure:



Import the system default launcher, as shown in the figure below:

```
$ adb remount
remount succeeded

Administrator@JOHN-PC C:\Users\Administrator\Desktop
$ adb push Launcher2 /system/priv-app/
Launcher2\: 1 file pushed. 19.6 MB/s (2917894 bytes in 0.142s)

Administrator@JOHN-PC C:\Users\Administrator\Desktop
$ adb reboot
```

4.6 Android System Upgrade

4.6.1 “Setting” Upgrade Mode

The integrated terminal does not support upgrading under settings, and can only be upgraded through a USB flash drive.

4.6.2 U Disk Upgrade Mode

Format the U disk storage type FAT32: Select "Restore device defaults", and then format the U disk.

Upgrading Steps:

1. Copy the upgrade program provided by our company to update.zip to the root directory of the U disk;
2. Insert the U disk into the device and see if it is recognized. If not, please format it on the device, and then return to step 1

3. If the device version is T28 and above, power off and restart the device to upgrade, if the device version is T28 or below:

4. Adb debugging input: adb reboot recovery (note: if the adb debugging cable is plugged in, please unplug it, otherwise the upgrade will not succeed)

5. Wait for the system to be upgraded, it will restart after the system complete upgrade

6. To check whether the upgrade is successful.

Steps: settings --- about phone --- forge ap version

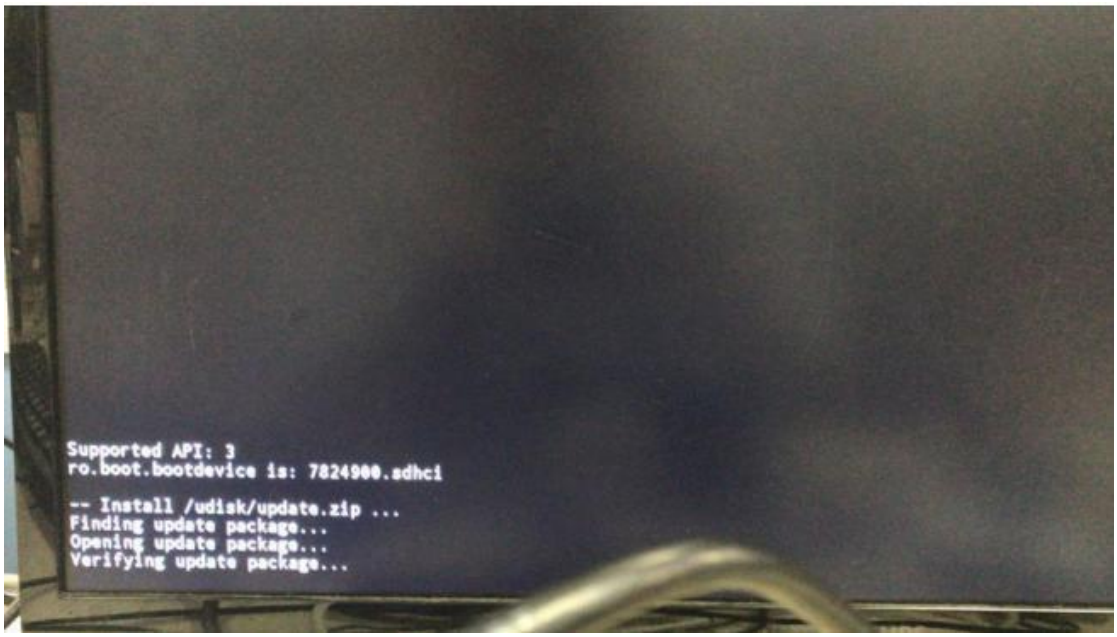


Figure: Upgrading Process

4.7 Device Shutdown and Reboot

4.7.1 Reboot

```
// code snippet one
Intent intent2 =new Intent(Intent.ACTION_REBOOT);
intent2.putExtra("nowait",1);
intent2.putExtra("interval",1);
intent2.putExtra("window",0);
sendBroadcast(intent2);
// code snippet two
PowerManager pManager=(PowerManager) getSystemService(Context.POWER_SERVICE);
pManager.reboot(null);
```

4.8 Customize Remote Control Keys

Mainly modify key.xml, the path in the android system: /system/etc/key.xml

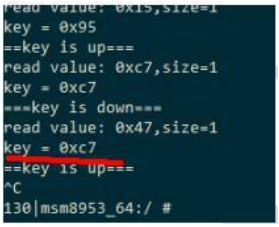
4.8.1 Modify key.xml

1.adb pull /system/etc/key.xml # Export the key.xml file and modify the infrared key-value mapping relationship of key.xml

```
<!-- Before Modify -->
<ut30-key>
<key value="0xc6" name="KEY_UP" /><!--key up-->
<key value="0x96" name="KEY_DOWN" /><!--key down-->
<ut30-key>
<!-- After Modify -->
<ut30-key>
<key value="0x11" name="KEY_UP" /><!--key up-->
<key value="0x22" name="KEY_DOWN" /><!--key down-->
<ut30-key>
```

In above code, value means code value of the infrared remote control, and name is the corresponding Linux code value. You can search for all the code values of Linux on the Internet. The infrared remote control code can be obtained through the ir_user program, as shown below.

adb root
adb remount
adb shell
#ir_user Operate the corresponding key to print the corresponding key value



4.8.2 Import key.xml

adb remount
adb push key.xml /system/etc/
adb reboot

Import key.xml into the integrated terminal and restart the device to use the new remote control.

4.9 ADB Install Uninstall and Launch APK

Get the APK package tool aapt.exe in the SDK subdirectory: android\sdk\build-tools\26.0.0\

aapt dump badging newmrcamera.apk
package: name='**com.minrray.camera**' versionCode='1' versionName='1.0'
platformBuildVersionName=''
sdkVersion:'17'
targetSdkVersion:'24'
.....
application-debuggable
launchable-activity: name='**com.minrray.camera.gui.MainActivity**' label='' icon=''
uses-permission: name='android.permission.READ_EXTERNAL_STORAGE'

```
# Start apk newmrcamera
adb shell am start com.minrray.camera/com.minrray.camera.gui.MainActivity
# Install apk
adb install newmrcamera.apk # Ordinary installation
adb install --r newmrcamera.apk # Mandatory installation
# Uninstall application
adb uninstall com.minrray.camera (package name)
```

4.10 Obtain the System Log and Save It Locally

```
adb logcat v time > logcat.txt
```

5. File Link

File List

Integrated terminal UT30 UT31 development document.pdf	Update Irregularly
UT_30_31-MINGRI_EQ0_544E791CD61_181213_100_V01_T28.zip	System Latest Upgrading Package
Development tools/aarch64-linux-android-4.9.tar.gz	UT30, UT31 compilation tool
Development tools/signature file.zip	UT30、UT31 system signature file
msm8953 Download Environment.rar	Firmware package downloaded by fastboot
Android Upgrade Package	The latest updated upgrade package will be stored here

File Download Link:

Link: https://pan.baidu.com/s/1yFrAQJvIwcgY89n9M0wK1A
Extraction code: td3y

FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.