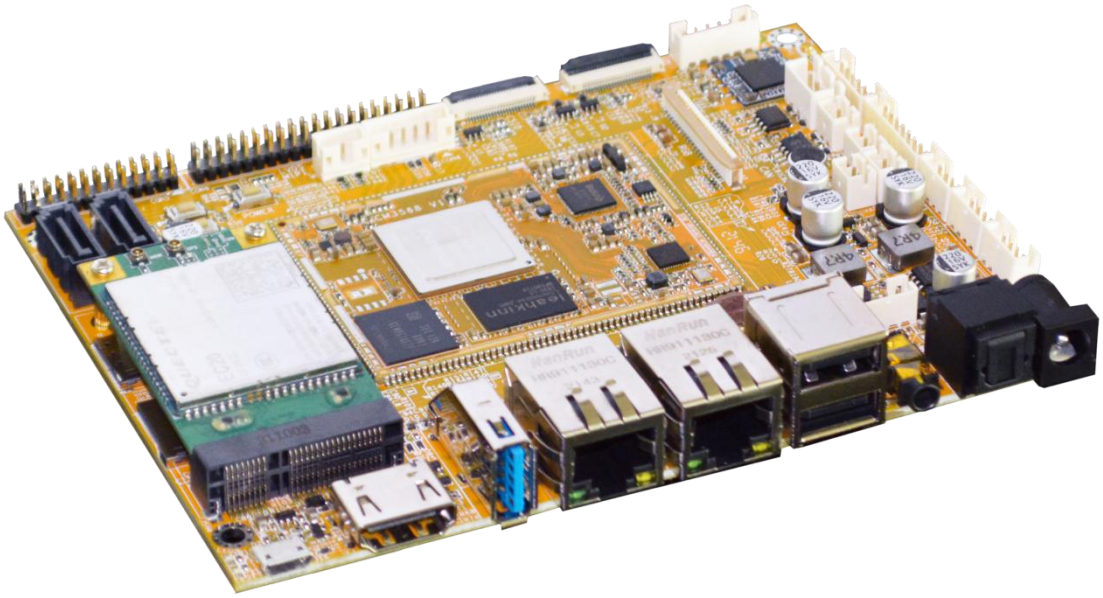
EM3568 Android11 User Manual

V1.1



Boardcon Embedded Design

www.boardcon.com

1. Introduction

1.1. About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2. Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website (www.boardcon.com , www.armdesigner.com). These include manuals, application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence, If you have questions, comments, or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3. Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lighting or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

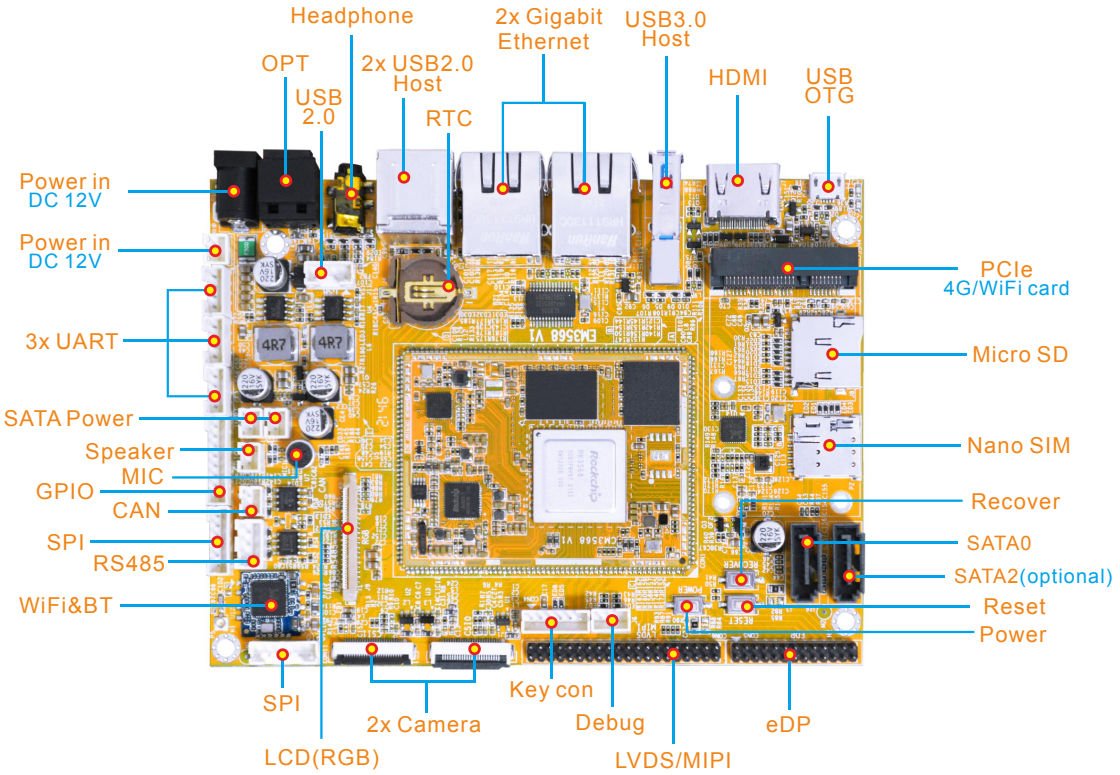
Repairs make after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.

Revision History

Ver	Description	Author	Date
V1.0	Initial version	Liu Yuan	2022-01-21
V1.1	Modified version	Zhou Lijun	2022-02-15

Content

1 EM3568 Introduction



Specifications	
CPU	Rockchip RK3568 Quad-core Cortex-A55 @ up to 2.0 GHz
GPU	ARM Mali-G52 GPU with support for OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1
NPU	0.8 TOPS
Storage	8GB eMMC flash (up to 128GB) MicroSD card slot 2x SATA3.0 (SATA2 shared with PCIe2.0)
Power Supply	12V/3A DC input jack
USB	1x USB OTG 2.0 3x USB Host 2.0 (USB-AF or 4-pin connector) 1x USB 3.0
Connectivity	2x Gigabit Ethernet RJ45 ports via Realtek RTL8211F-CG controller 2.4G WiFi (802.11b/g/n) with Bluetooth 4.0 PCIe socket with Nano SIM card port to support 4G modules (PCIe socket integrated PCIe2.0 for WiFi Card)

Serial	1x Serial port for debug, 3-pin connector 3x UART, 4-pin connectors 1x RS485, 3-pin connector
Video	HDMI 2.0, 4Kp60 MIPI DSI/LVDS, 1080p60 (40-pin header) EDP 1.3, 2560x1600@60Hz (30-pin header) RGB, up to 1920x1080@60Hz (40-pin FPC connector)
Audio	3.5mm audio I/O jack 8-channel audio via HDMI SPDIF out Speaker (2-pin connector) MIC
Camera(optional)	2x MIPI Cameras, 24-pin FPC connector.
Keys	Recover, Reset, Power
Other features	RTC with battery connector; GPIO&I2C; CAN; Key connector(PWM3_IR/Reset / Recover /Power)
Dimension	Based board - 135mm x 100mm; CPU module - 45mm x 60mm

2 Compiler Environment

2.1 Vmware10.0+ubuntu18.04

Install Vmware10.0 in windows OS, and then install ubuntu18.04 in VMware to compile. Please visit the official website http://www.ubuntu.com/ to download and install ubuntu operating system.

2.2 Install OpenJDK1.8

sudo mkdir /usr/lib/java
sudo tar zxvf java-8-openjdk-amd64.tar.gz –C /usr/lib/java/
Add the following information in the end of "**/etc/profile**"
export JAVA_HOME=/usr/lib/java/java-8-openjdk-amd64
export JRE_HOME=/usr/lib/java/java-8-openjdk-amd64/jre
export CLASSPATH=.:$JAVA_HOME/lib:$JRE_HOME/jre/lib:$CLASSPATH
export PATH=$JAVA_HOME/bin:$JRE_HOME/jre/bin:$PATH
source /etc/profile
Check if the jdk has been installed successfully and check the revised version:
java -version

2.3 Install Tools

PC OS: ubuntu system
Network: online
Permission: root
$ sudo apt-get install build-essential zlib1g-dev flex libx11-dev gperf libncurses5-dev bison lsb-core lib32z1-dev g++-multilib lib32ncurses5-dev uboot-mkimage g++-4.4-multilib repo git ssh make gcc libssl-dev liblz4-tool expect g++ patchelf chrpath gawk texinfo chrpath diffstat binfmt-support qemu-user-static live-build bison flex fakeroot cmake gcc-multilib g++-multilibdevice-tree-compiler python-pip ncurses-dev pyelftools unzip

3 Compile Source

Step 1, unzip the source and set the compile board
$ tar xvf sdk-11.0.tar.gz
$ cd sdk-11.0

Step 2, compile uboot
$ cd u-boot
$ ./make.sh rk3568

Step 3, compile the kernel
$ cd kernel
$ make ARCH=arm64 rockchip_defconfig rk356x_evb.config android-11.config
$ make ARCH=arm64 rk3568-evb2-lp4x-v10.img -j24

Android11.0 kernel.img and resource.img are included in boot.img, if you only update the kernel, you can compile the kernel separately with the following command. After compiling, you can directly flash the boot.img under kernel directory.
$ make ARCH=arm64 rockchip_defconfig rk356x_evb.config android-11.config
$ make ARCH=arm64 BOOT_IMG=../rockdev/Image-rk3568_r/boot.img rk3568-evb2-lp4x-v10.img -j24

Step 4, compile Android
$ source build/envsetup.sh
$ lunch rk3568_r-userdebug
$ make -j12

Step 5, Generated image file
$ ./mkimage.sh
$ ./build.sh -u (packaged in the update.img)
$ cd rockdev
$ ls
Images and update.img are generated in current directory.

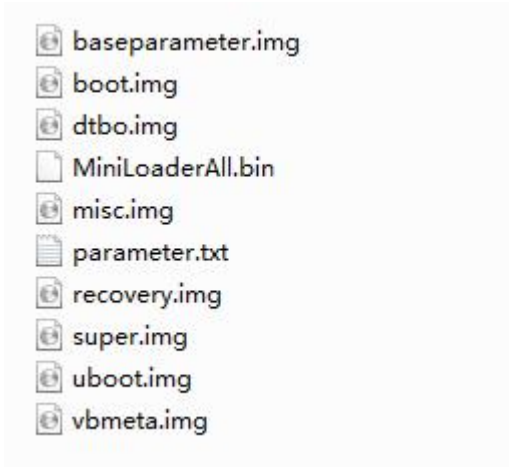
4 Images Operation

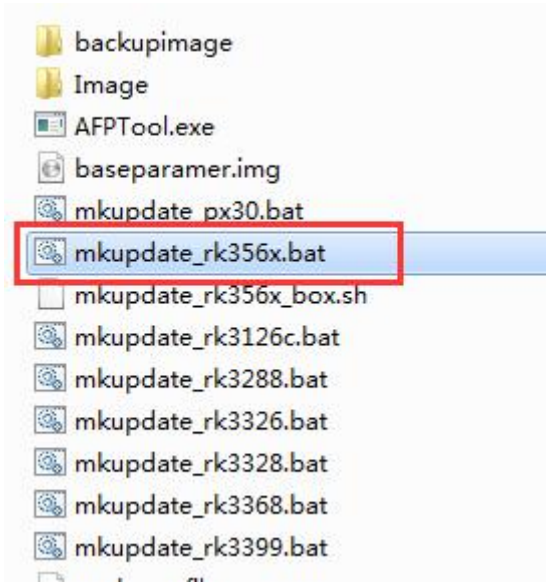
4.1 Pack Image

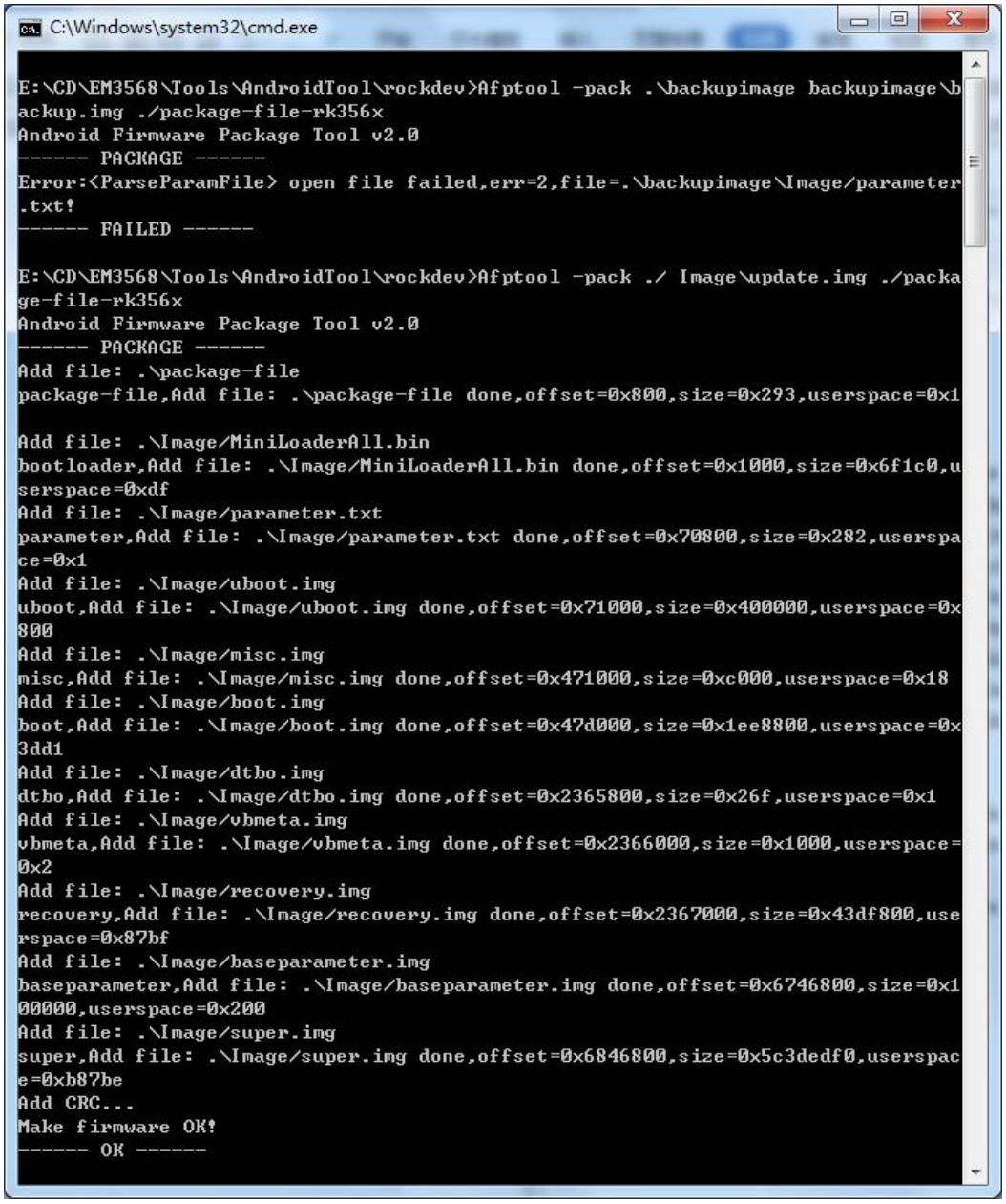
Step 1, copy all the files in Android directory **rockdev/Image** to the windows **AndroidTool/rockdev/Image**

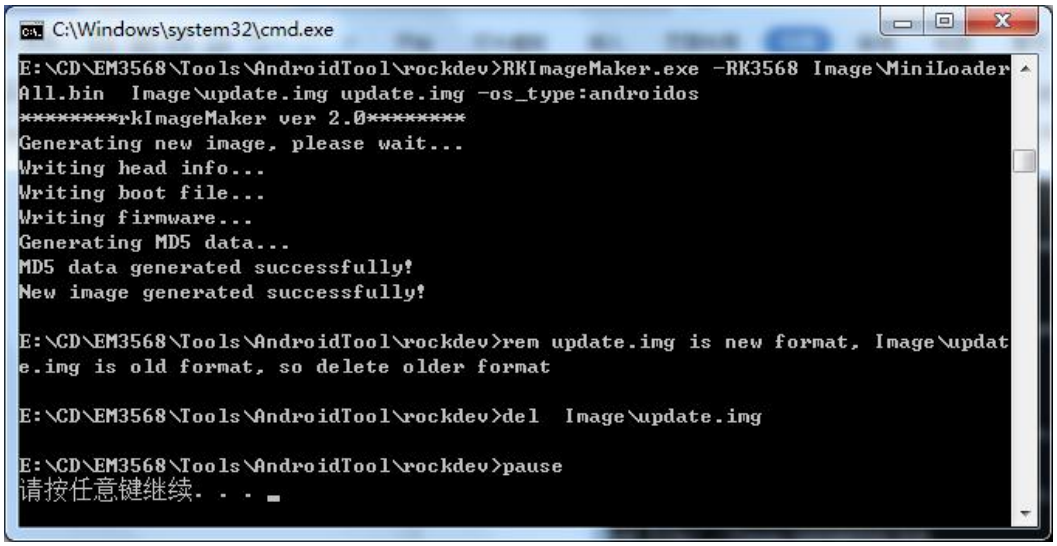
Step 2, enter **AndroidTool/rockdev/**, double-click to run **mkupdate_rk356x.bat.**

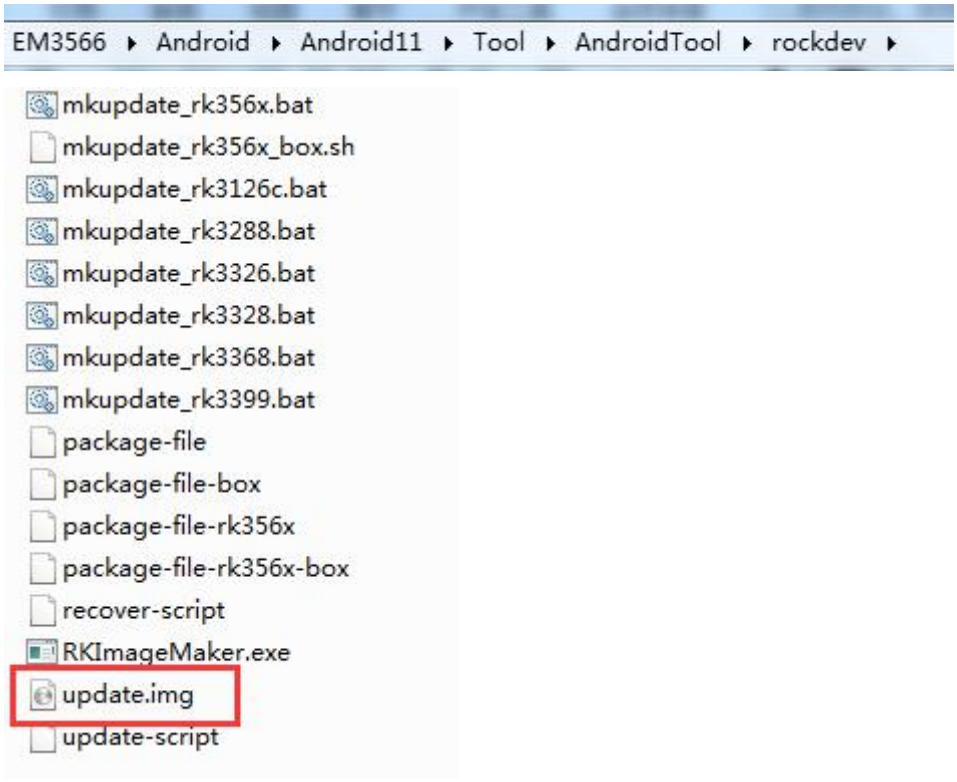
Step 3, the **update.img** will be generated in **rockdev** directory.






C:\Windows\system32\cmd.exe
E:\CD\EM3568\Tools\AndroidTool\rockdev>Afptool -pack .\backupimage backupimage\backup.img ./package-file-rk356x
Android Firmware Package Tool v2.0
------ PACKAGE ------
Error:<ParseParamFile> open file failed,err=2,file=.\backupimage\Image/parameter.txt!
------ FAILED ------
E:\CD\EM3568\Tools\AndroidTool\rockdev>Afptool -pack ./ Image\update.img ./package-file-rk356x
Android Firmware Package Tool v2.0
------ PACKAGE ------
Add file: .\package-file
package-file,Add file: .\package-file done,offset=0x800,size=0x293,userspace=0x1
Add file: .\Image/MiniLoaderAll.bin
bootloader,Add file: .\Image/MiniLoaderAll.bin done,offset=0x1000,size=0x6f1c0,userspace=0xdf
Add file: .\Image/parameter.txt
parameter,Add file: .\Image/parameter.txt done,offset=0x70800,size=0x282,userspace=0x1
Add file: .\Image/uboot.img
uboot,Add file: .\Image/uboot.img done,offset=0x71000,size=0x400000,userspace=0x800
Add file: .\Image/misc.img
misc,Add file: .\Image/misc.img done,offset=0x471000,size=0xc000,userspace=0x18
Add file: .\Image/boot.img
boot,Add file: .\Image/boot.img done,offset=0x47d000,size=0x1ee8800,userspace=0x3dd1
Add file: .\Image/dtbo.img
dtbo,Add file: .\Image/dtbo.img done,offset=0x2365800,size=0x26f,userspace=0x1
Add file: .\Image/vbmeta.img
vbmeta,Add file: .\Image/vbmeta.img done,offset=0x2366000,size=0x1000,userspace=0x2
Add file: .\Image/recovery.img
recovery,Add file: .\Image/recovery.img done,offset=0x2367000,size=0x43df800,userspace=0x87bf
Add file: .\Image/baseparameter.img
baseparameter,Add file: .\Image/baseparameter.img done,offset=0x6746800,size=0x100000,userspace=0x200
Add file: .\Image/super.img
super,Add file: .\Image/super.img done,offset=0x6846800,size=0x5c3dedf0,userspace=0xb87be
Add CRC...
Make firmware OK!
------ OK ------


C:\Windows\system32\cmd.exe
E:\CD\EM3568\Tools\AndroidTool\rockdev>RKImageMaker.exe -RK3568 Image\MiniLoaderAll.bin Image\update.img update.img -os_type:androidos
********rkImageMaker ver 2.0********
Generating new image, please wait...
Writing head info...
Writing boot file...
Writing firmware...
Generating MD5 data...
MD5 data generated successfully!
New image generated successfully!
E:\CD\EM3568\Tools\AndroidTool\rockdev>rem update.img is new format, Image\update.img is old format, so delete older format
E:\CD\EM3568\Tools\AndroidTool\rockdev>del Image\update.img
E:\CD\EM3568\Tools\AndroidTool\rockdev>pause
请按任意键继续. . .



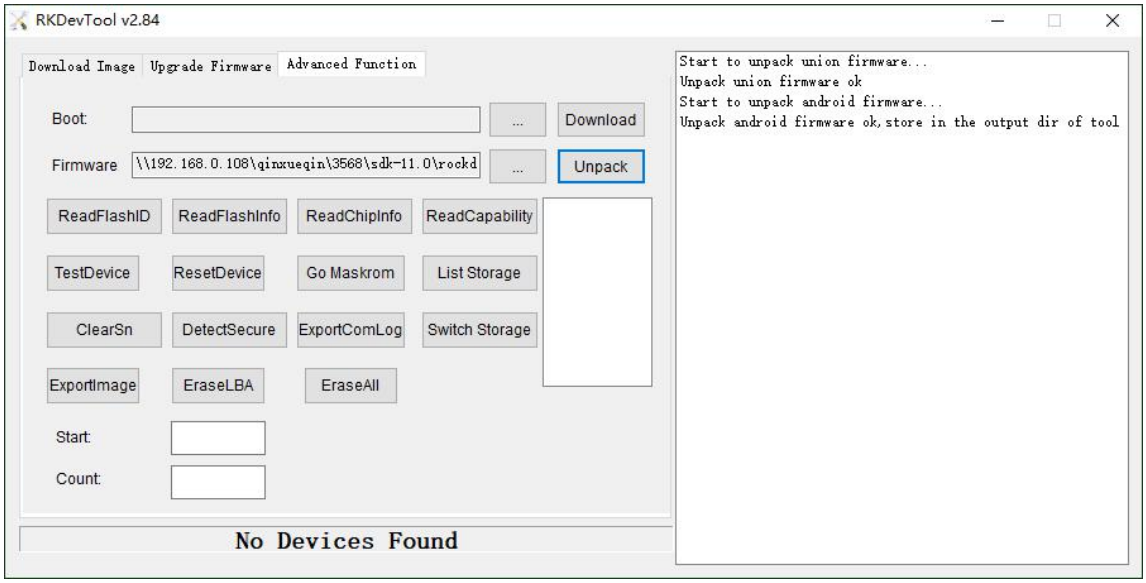
4.2 Unzip Firmware

Unzip Firmware in windows.

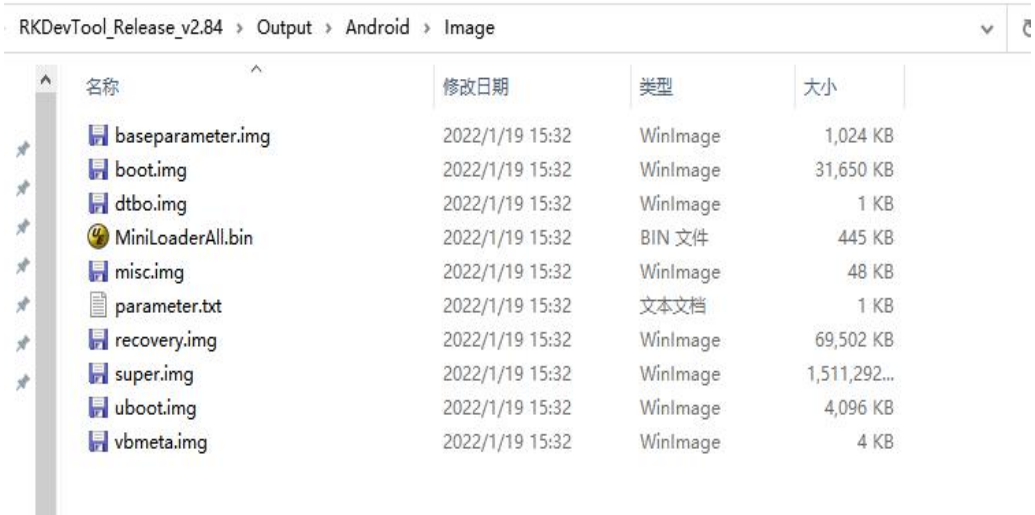
Step1, open **RKDevTool.exe** (*Path:RKDevTool_Release_v2.84*\RKDevTool.exe)

Step 2, click **Advanced Function** -> **Firmware**, select update.img. Click **Unpack** to Unzip.

Step 3, Unpack finish as follow:



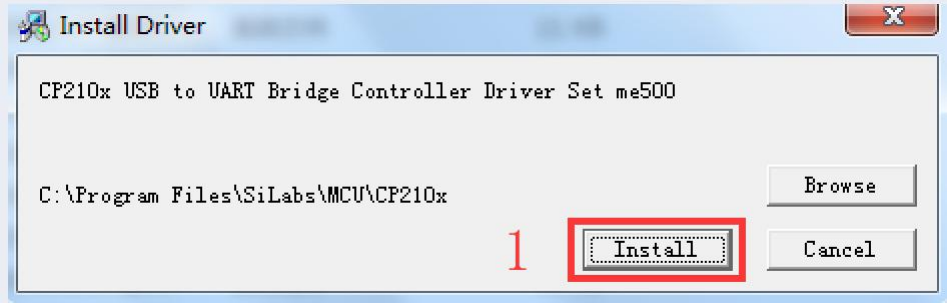
The unzip files will be generated in **\RKDevTool\RKDevTool_Release_v2.84\Output\Android\Image** directory.

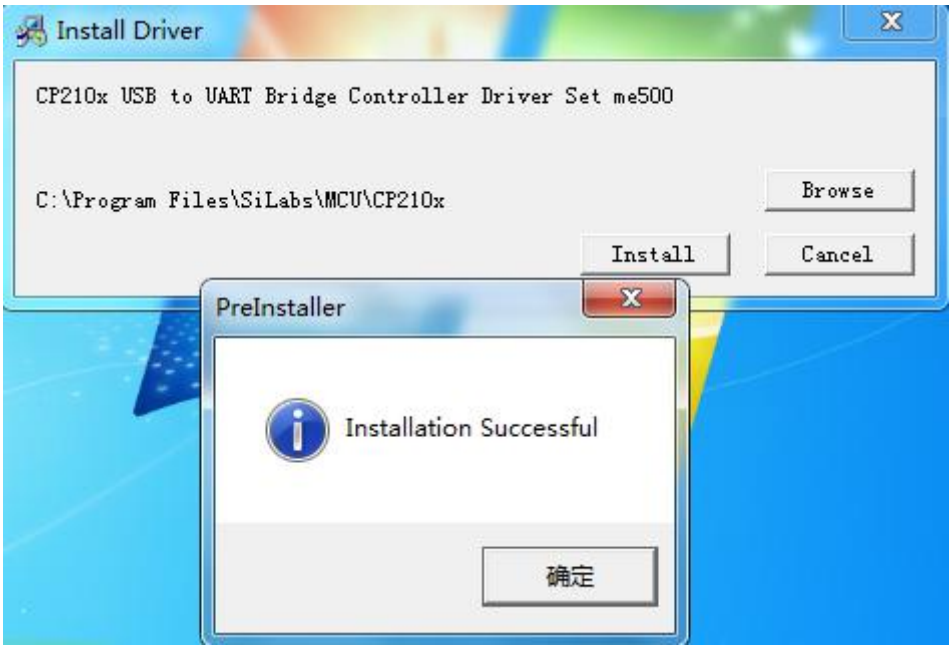


5 Install Tools

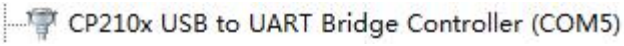
5.1 Install CP2102 Driver

Plug the **USB-to-UART cable CP2102** to the PC, unzip **CP2102WIN7.rar** on Windows, then click **preInstaller.exe** to install



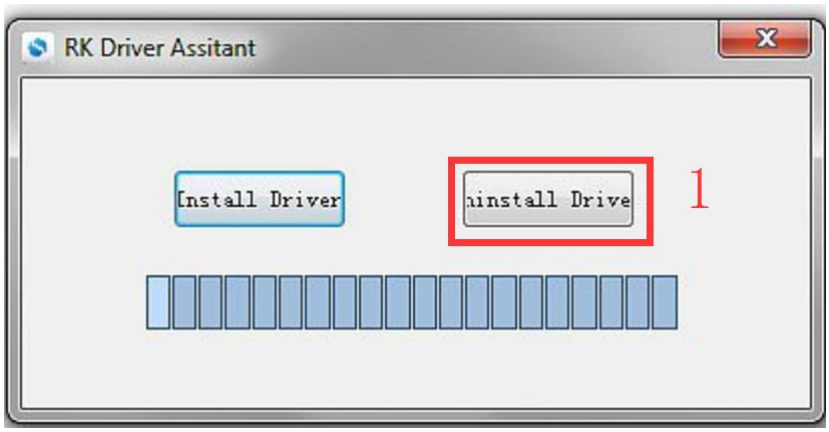


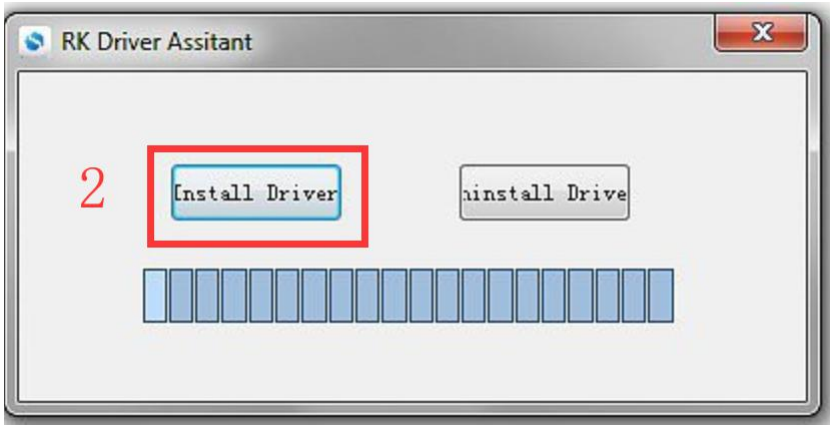
Now the device will be listed under **Device Manager -> PORTS** with unique serial port assigned



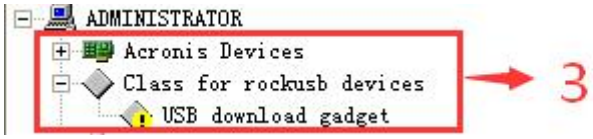
5.2 Install Rockchip Driver Assistant

Path: DriverAssitant_v5.1.1/DriverInstall.exe





After the installation is complete, connect the board and PC with Micro USB cable and press the "Recover" key and hold then power the board, in *Computer Management* can see the following information:



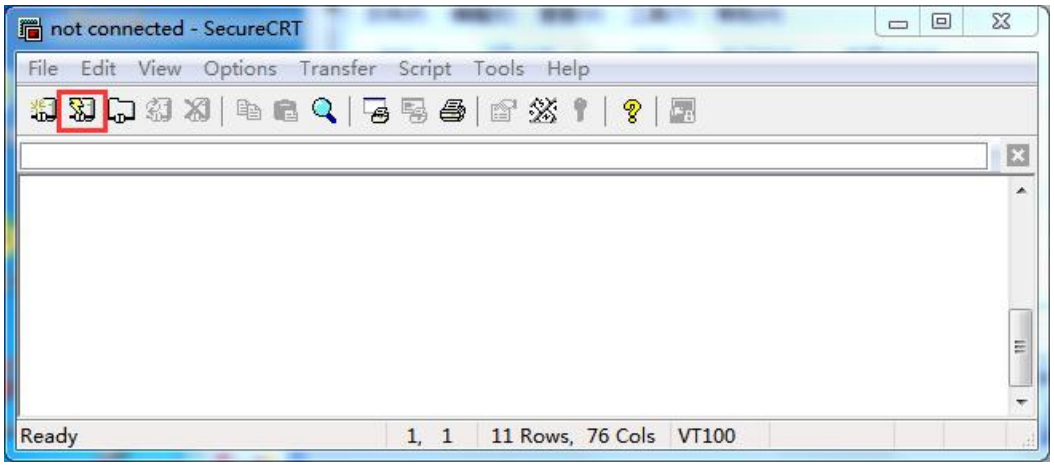
The WINDOW will pop up found New Hardware Wizard dialog box, choose to install from the specified location, and then select \DriverAssitant_v5.11\DriverAssitant_v5.1.1\ADBDriver.

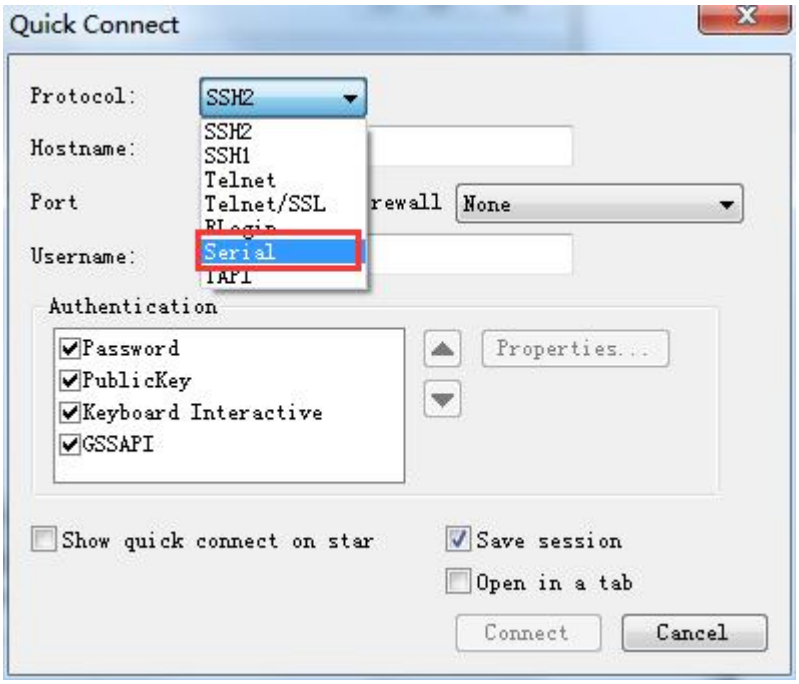
After the installation is complete in *Computer Management* can see the following information:

5.3 Install Serial Terminal Tool

The serial terminal SecureCRT is used for debugging. It can be used directly after decompression.

Open SecureCRT.exe after copy to PC (path: tools\windows\SecureCRT.exe), then click the icon **Quick Connect** to config





Set the parameters as follow:

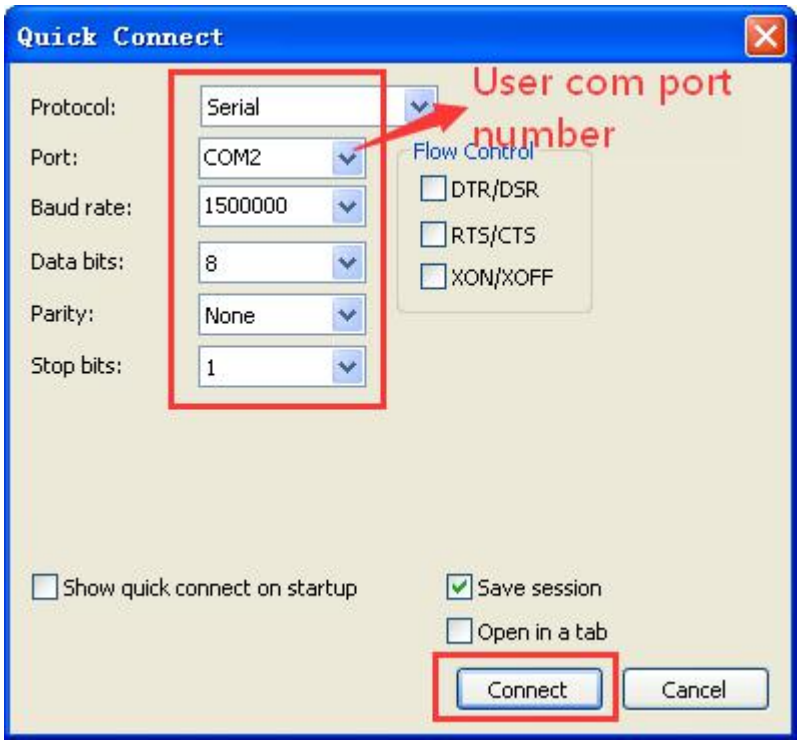
Protocol: Serial

Port: To be specified by user PC

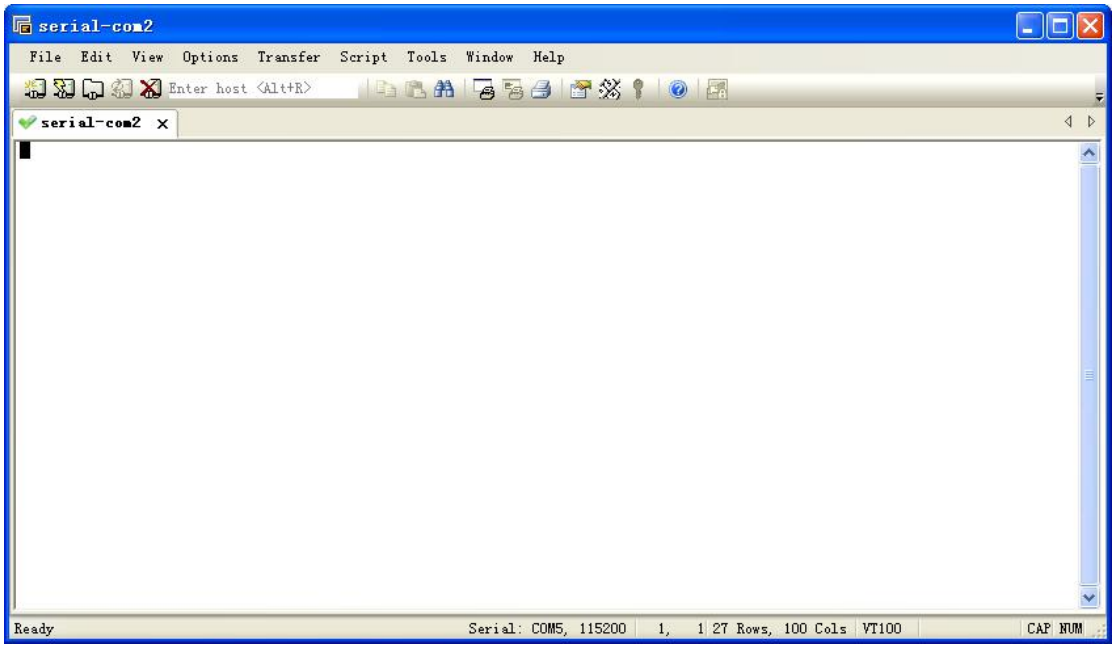
Baud rate: 1500000

Please check XON/XOFF not selected

Check Save session is selected



After all, click **connect**



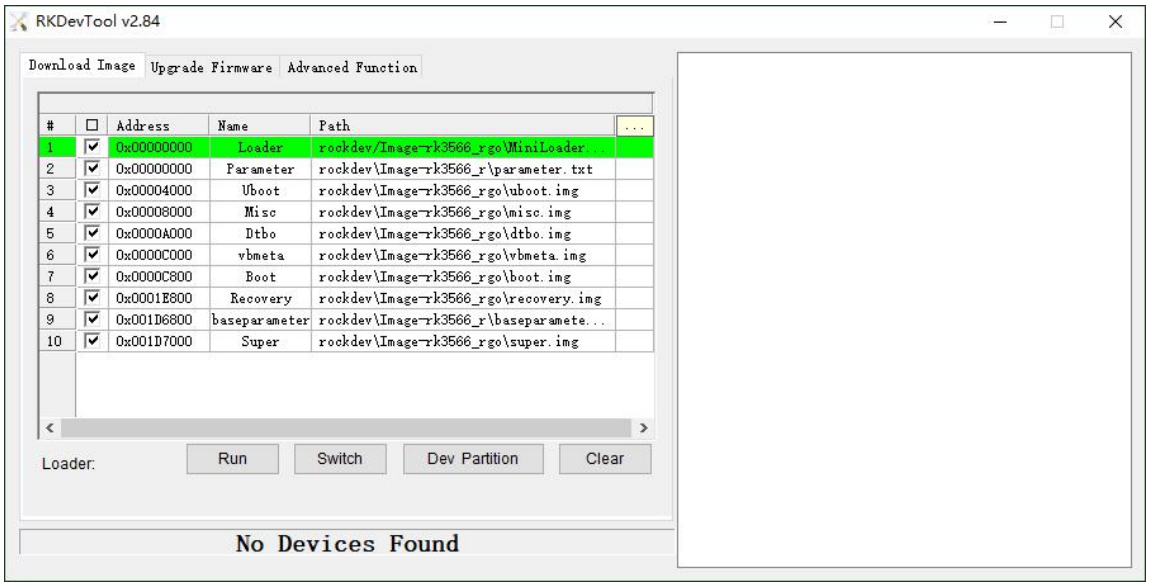
Illusion: If open more than one serial terminal tools, and they use the same serial port, there will be reported **the port is busy**.

Solution: Turn off the serial tool that unnecessary.

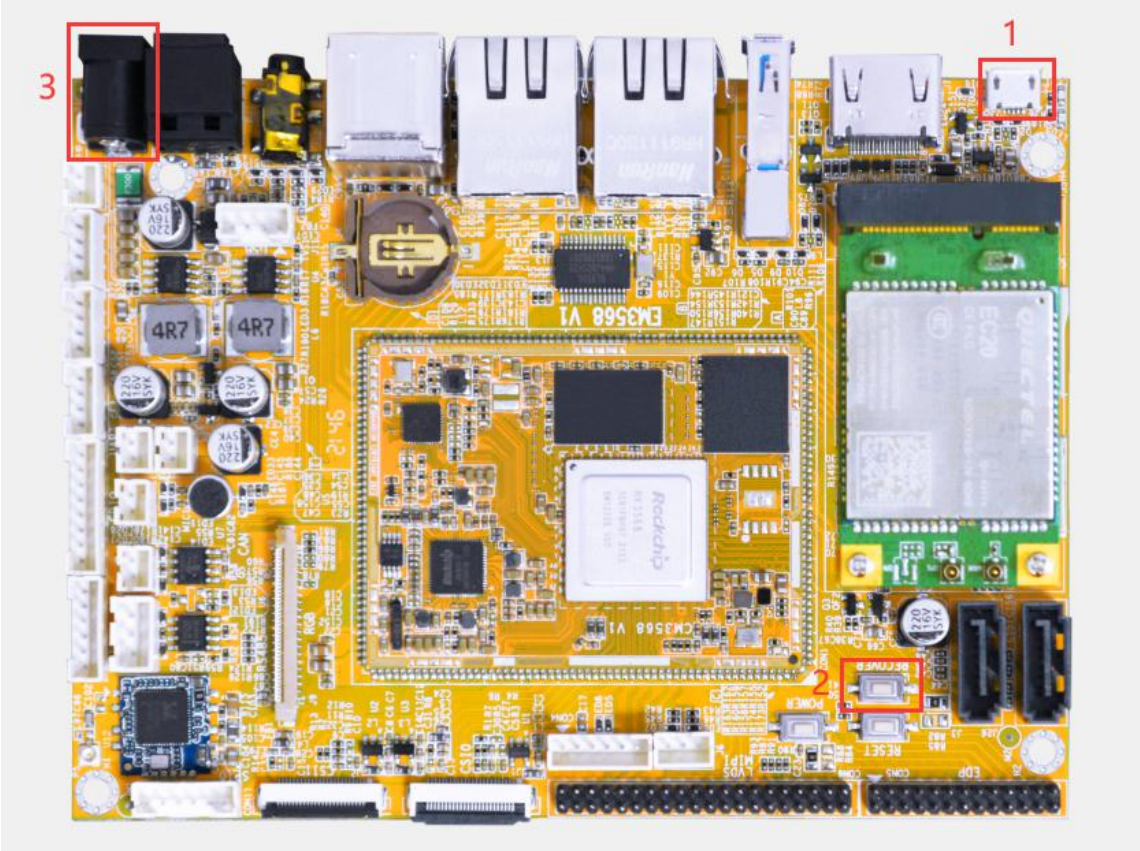
6 Burn Images

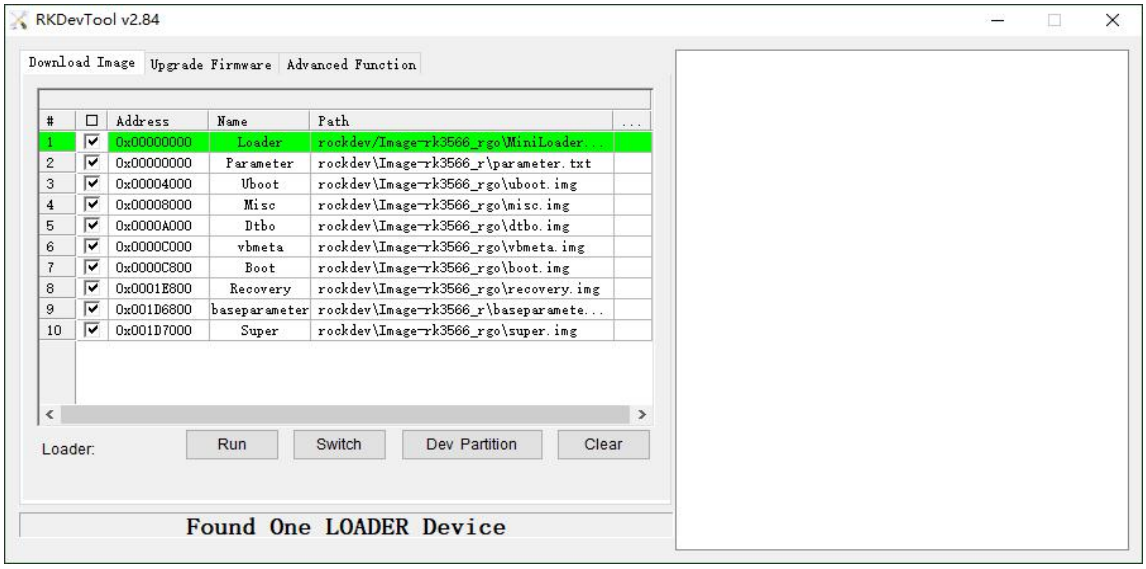
Step 1, unzip **RKDevTool_Release_v2.84.zip** on Windows.

Step 2, open **RKDevTool.exe** (*Path:RKDevTool_Release_v2.84*\RKDevTool.exe)

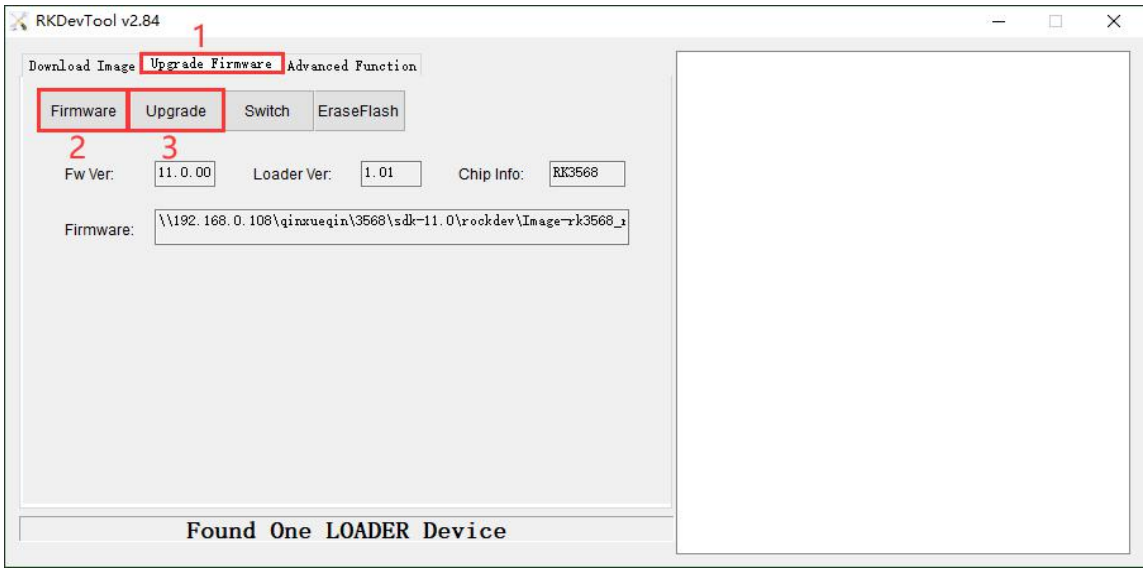


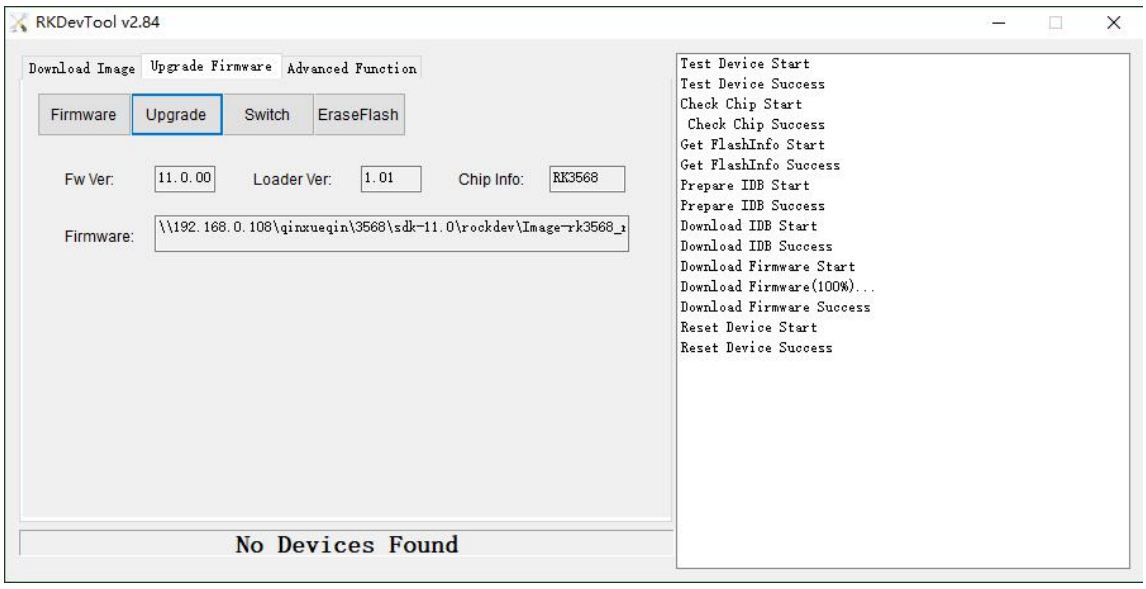
Step 3, connect PC and development board with Micro USB cable, keep pressing the **Recover Key** and power the board until the windows PC shows **Found one LOADER Device.**





Step 4, click **Upgrade Firmware** -> **Firmware**, select update.img. Click **Upgrade** to flash.



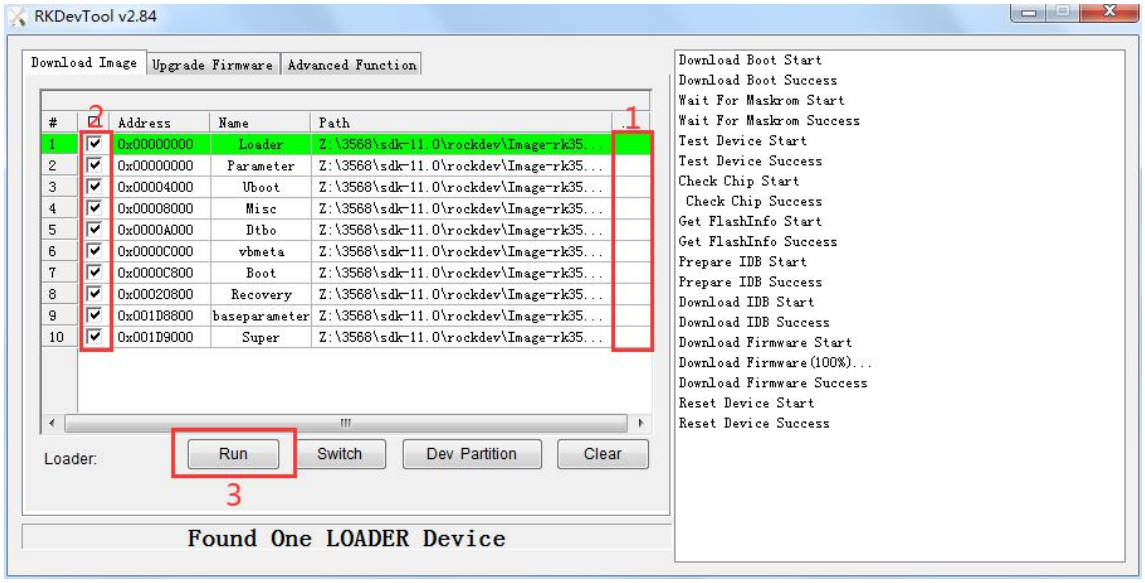


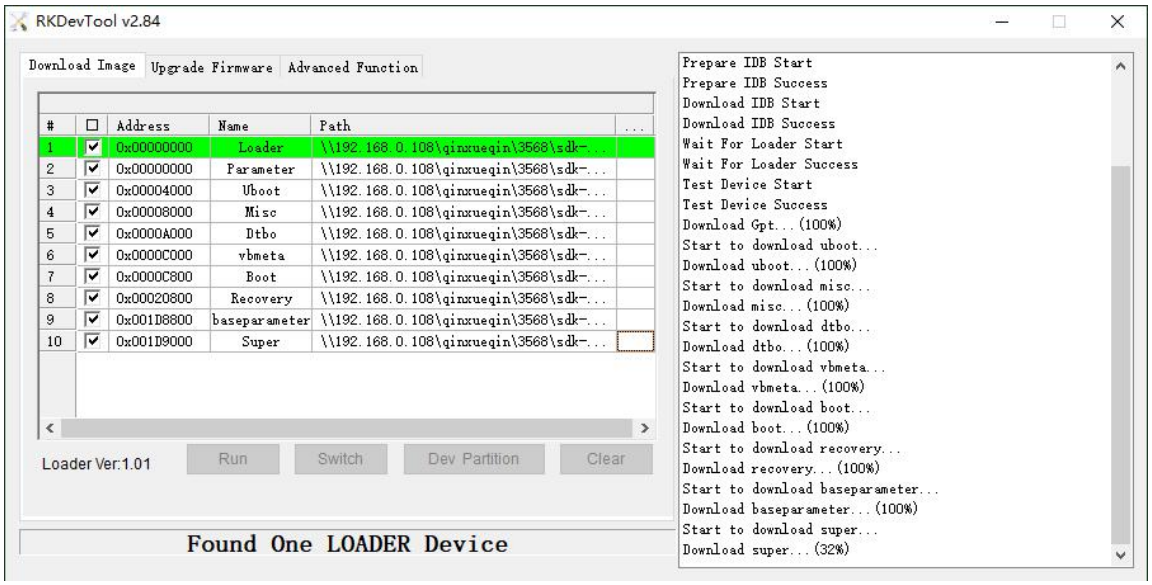
User can also update the firmware separately.

Step 1, Click the column on the right side for the path of the file want to flash.

Step 2, Select the checkbox on the left.

Step 3, Click “run” to flash the image.

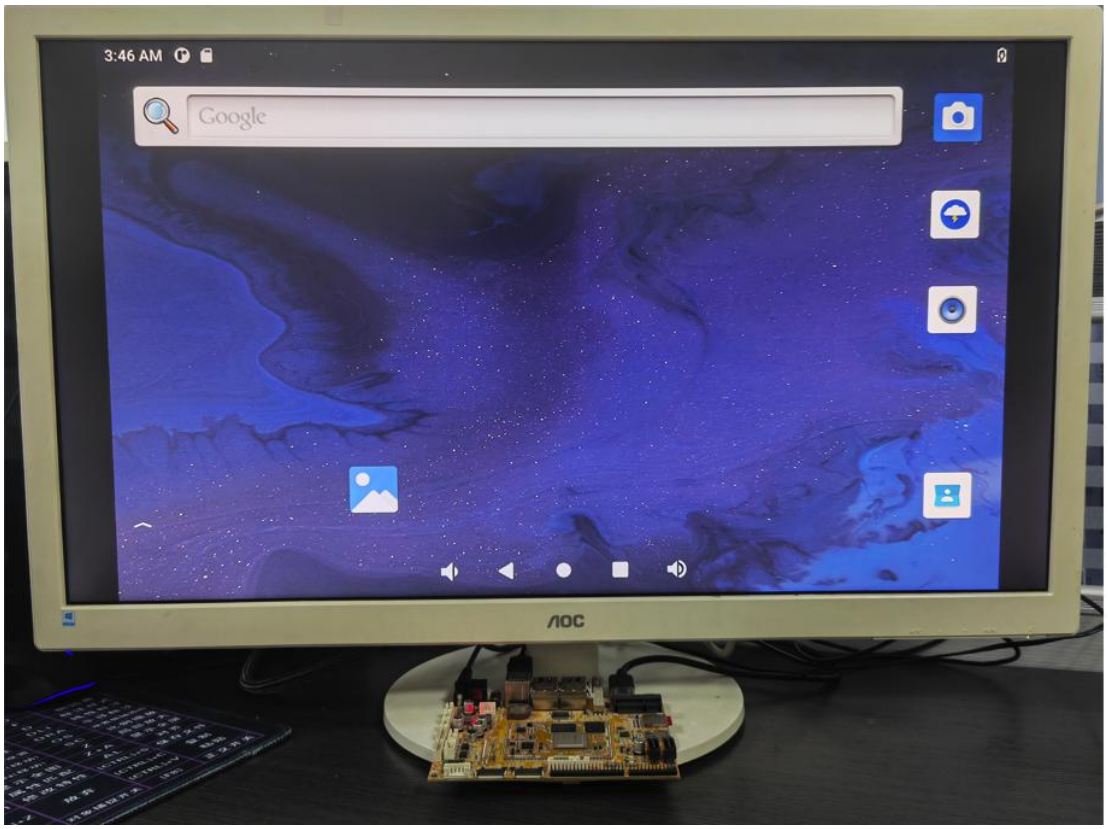




7 Buildroot Application

7.1 HDMI Display

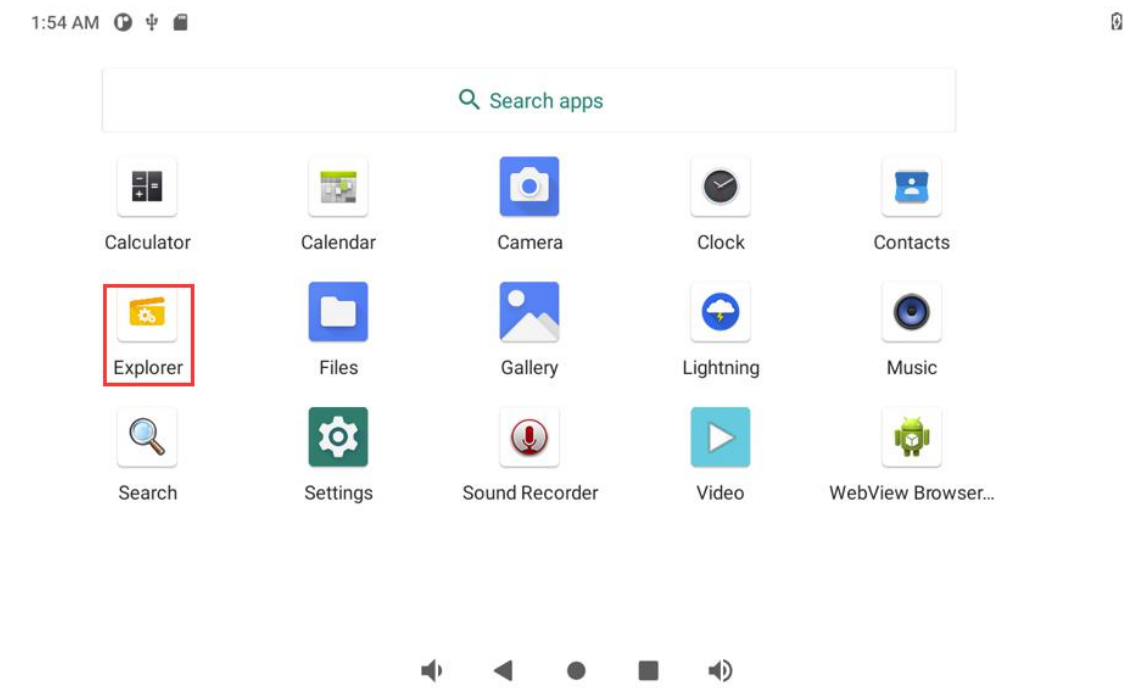
Connect the board and monitor with a HDMI cable, then start up.

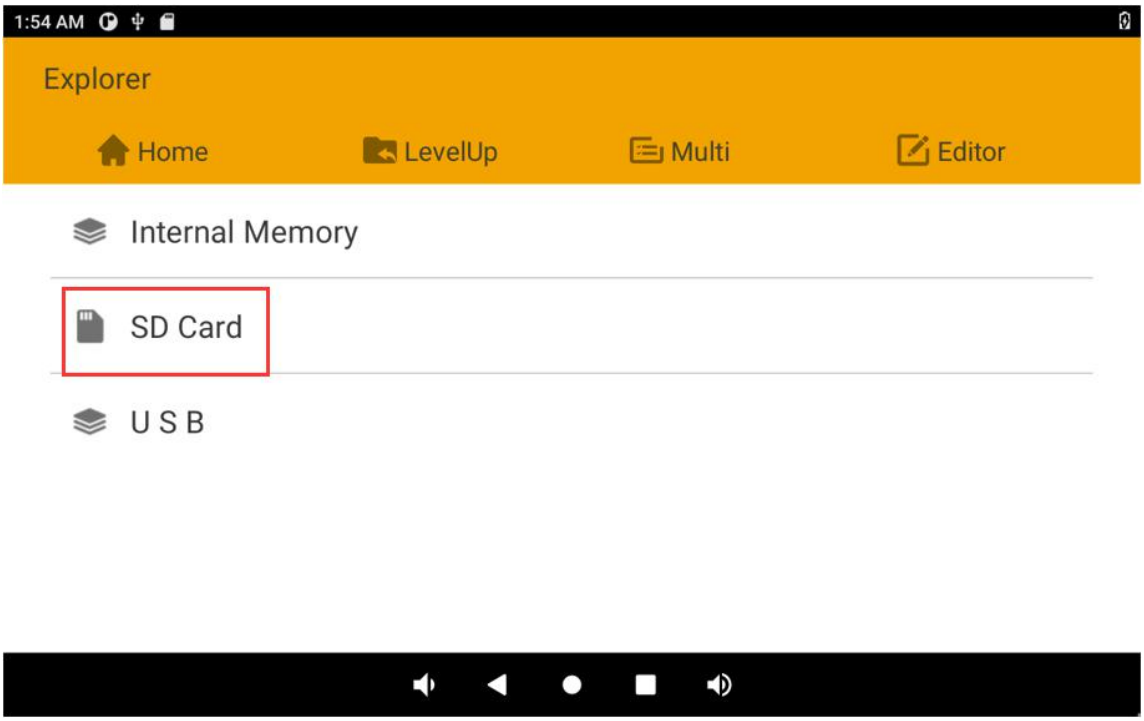


Note: The system default support HDMI and LVDS synchronous output.

7.2 SD Card

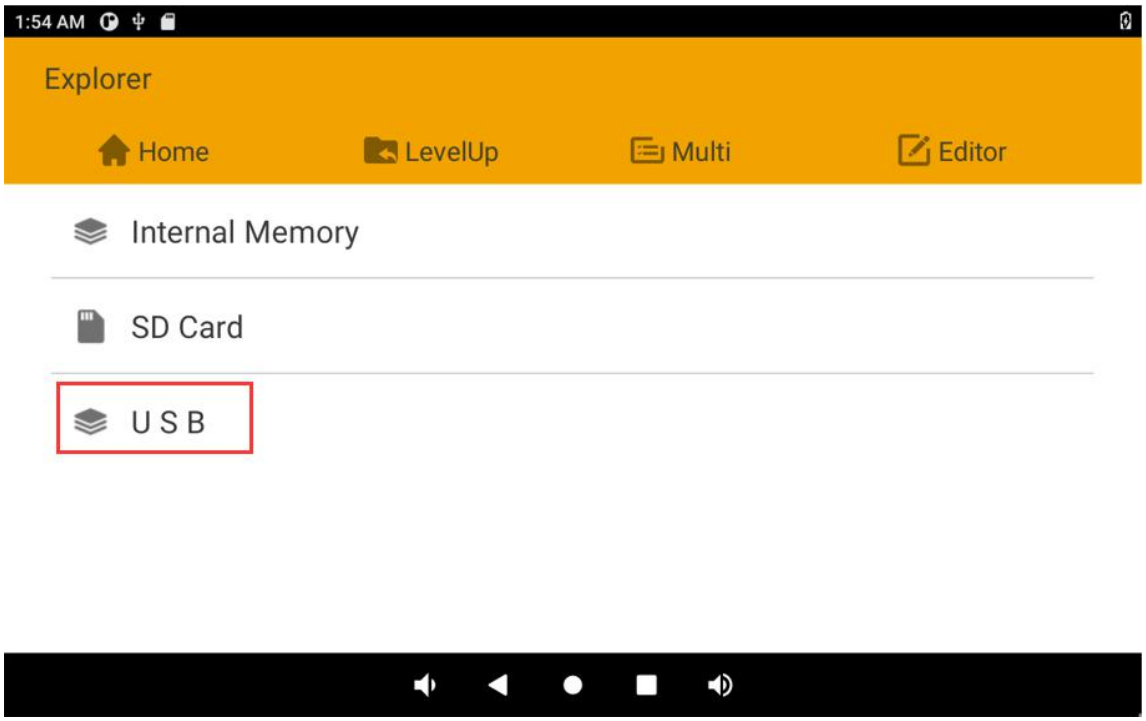
EM3568 supports SD Hot-plug.





7.3 USB Host

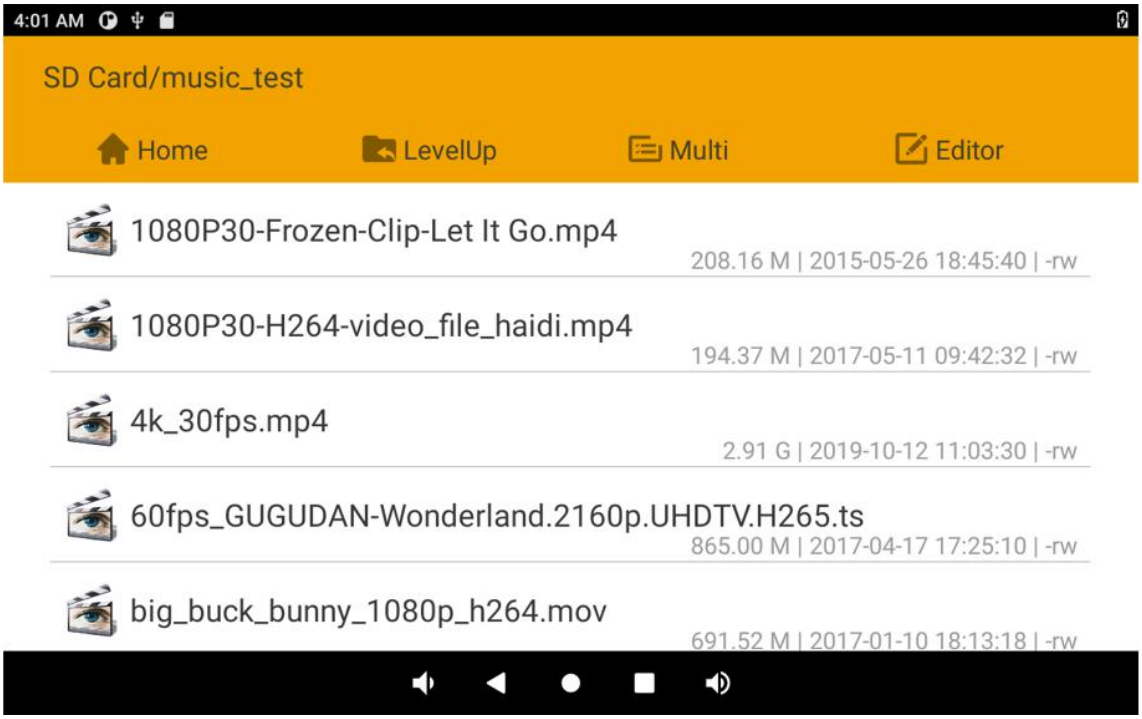
The USB Host can be used to connect USB mouse, USB keyboard, U-Disk or other USB devices.



Note: The USB2.0 and USB3.0 interfaces are separate.

7.4 Video Player

Copy video file to sdcard/udisk then insert it to the board. After system boot open sdcard/udisk and click video file to play.



If inserted the headset will switch to the headset play audio automatically, plug out the headset will switch to the HDMI or speaker play audio.(The playback priority : headset > HDMI > speaker)

7.5 Ethernet

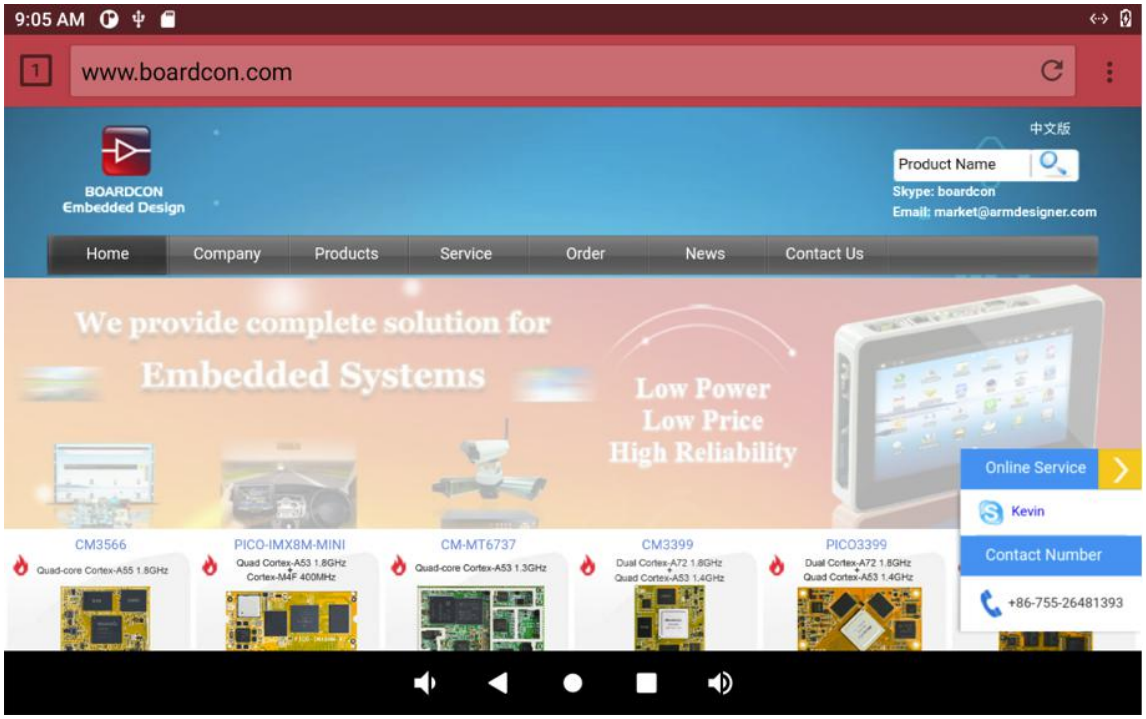
Connect the Board and router with an Ethernet cable (default DHCP=Yes). User can ping URL/IP at terminal. or open the browser to test Network.

ifconfig

ping www.boardcon.com

```
console:/ #
console:/ # ifconfig
lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope: Host
          UP LOOPBACK RUNNING  MTU:65536  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

dummy0    Link encap:Ethernet  HWaddr b2:11:4c:18:ee:21
          inet6 addr: fe80::b011:4cff:fe18:ee21/64 Scope: Link
          UP BROADCAST RUNNING NOARP  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 TX bytes:420

eth1      Link encap:Ethernet  HWaddr 46:65:2f:3c:de:b6  Driver rk_gmac-dwmac
          inet addr:192.168.0.120  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::cfScope: Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500 ackets:595 errors:0 dropped:0 overruns:0 frame:0
          TX opped:0 overruns:0 carrier:0
          collisions:0 txqueuelenbytes:38775 TX bytes:3845
          Interrupt:46

eth0     addr 4a:65:2f:3c:de:b6  Driver rk_gmac-dwmac
          inet addt:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe804 Scope: Link
          UP BROADCAST RUNNING MULTICAST  MTU:150X packets:591 errors:0 dropped:0 overruns:0 frame:0
           dropped:0 overruns:0 carrier:0
          collisions:0 txqueuebytes:37470 TX bytes:3394
          Interrupt:41

console:/ #
```

```
console:/ #
console:/ # ping www.boardcon.com
PING www.boardcon.com (67.222.54.196) 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=49 time=190 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=49 time=198 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=49 time=190 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=49 time=199 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=49 time=196 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=8 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=9 ttl=49 time=198 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=10 ttl=49 time=193 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=11 ttl=49 time=190 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=12 ttl=49 time=199 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=13 ttl=49 time=196 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=14 ttl=49 time=189 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=15 ttl=49 time=196 ms
```



When two Ethernet interfaces are used at the same time, eth0 ping the Internet and eth1 ping the Intranet by default.

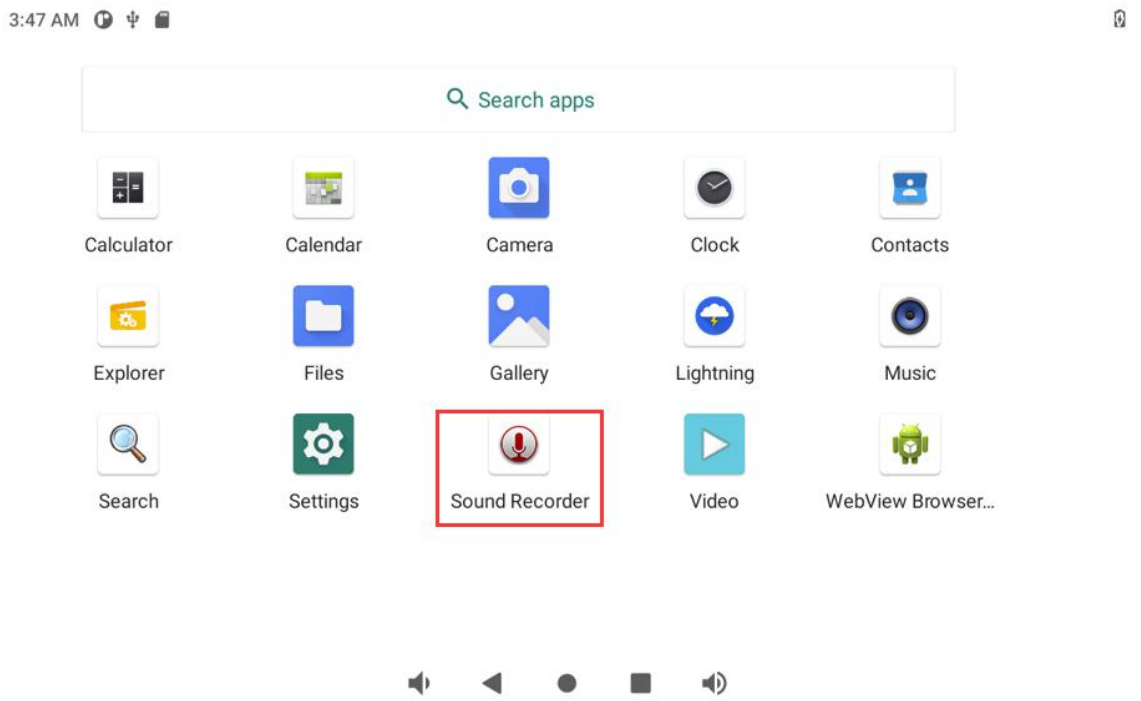
```
console:/ #
console:/ # ping -I eth0 www.boardcon.com
PING www.boardcon.com (67.222.54.196) from 192.168.0.119 eth0: 56(84) bytes of data.
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=1 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=4 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=5 ttl=49 time=198 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=6 ttl=49 time=194 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=7 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=8 ttl=49 time=194 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=9 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=10 ttl=49 time=191 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=11 ttl=49 time=192 ms
^Cÿ
--- www.boardcon.com ping statistics ---
11 packets transmitted, 11 received, 0% packet loss, time 10436ms
rtt min/avg/max/mdev = 191.036/192.741/198.439/2.264 ms
console:/ #
console:/ # ping -I eth1 192.168.0.2
PING 192.168.0.2 (192.168.0.2) from 192.168.0.120 eth1: 56(84) bytes of data.
64 bytes from 192.168.0.2: icmp_seq=1 ttl=64 time=7.44 ms
64 bytes from 192.168.0.2: icmp_seq=2 ttl=64 time=3.61 ms
64 bytes from 192.168.0.2: icmp_seq=3 ttl=64 time=4.86 ms
64 bytes from 192.168.0.2: icmp_seq=4 ttl=64 time=1.81 ms
64 bytes from 192.168.0.2: icmp_seq=5 ttl=64 time=1.93 ms
64 bytes from 192.168.0.2: icmp_seq=6 ttl=64 time=1.79 ms
64 bytes from 192.168.0.2: icmp_seq=7 ttl=64 time=1.84 ms
64 bytes from 192.168.0.2: icmp_seq=8 ttl=64 time=1.90 ms
64 bytes from 192.168.0.2: icmp_seq=9 ttl=64 time=2.04 ms
64 bytes from 192.168.0.2: icmp_seq=10 ttl=64 time=1.88 ms
^C
--- 192.168.0.2 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9013ms
rtt min/avg/max/mdev = 1.794/2.915/7.449/1.796 ms
console:/ #
```

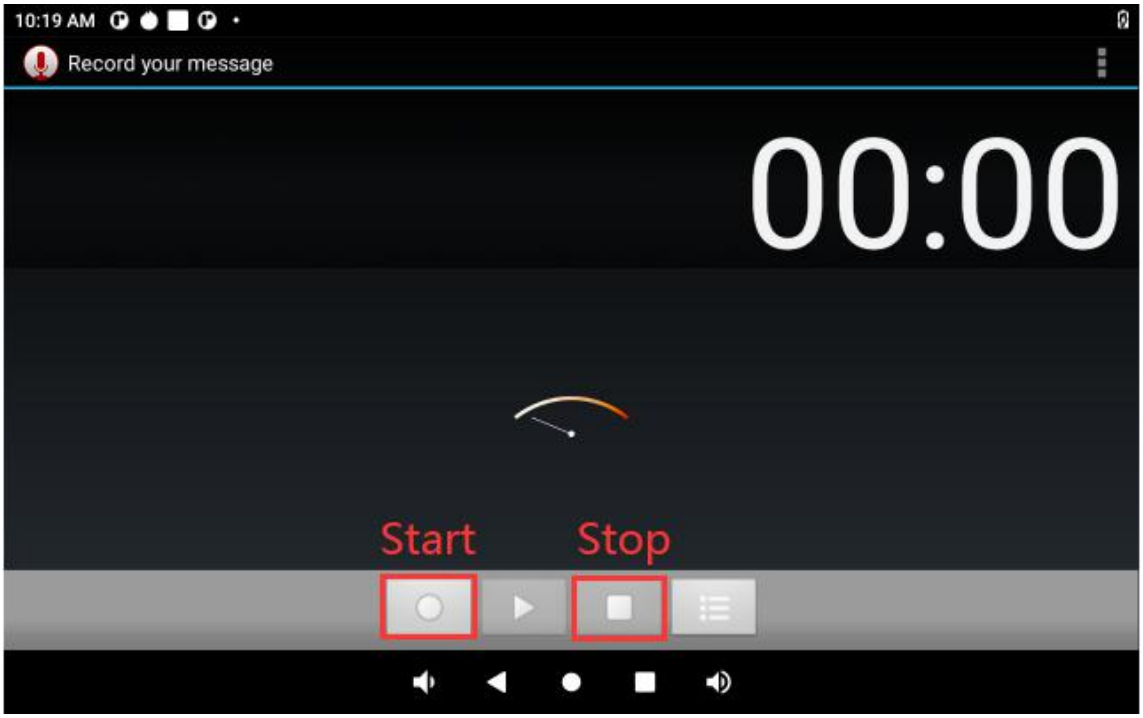
7.6 Record

Step 1, open the APP Sound Recorder in Android.

Step 2, click on the APP to start recording, speech in front of the microphone then can record.

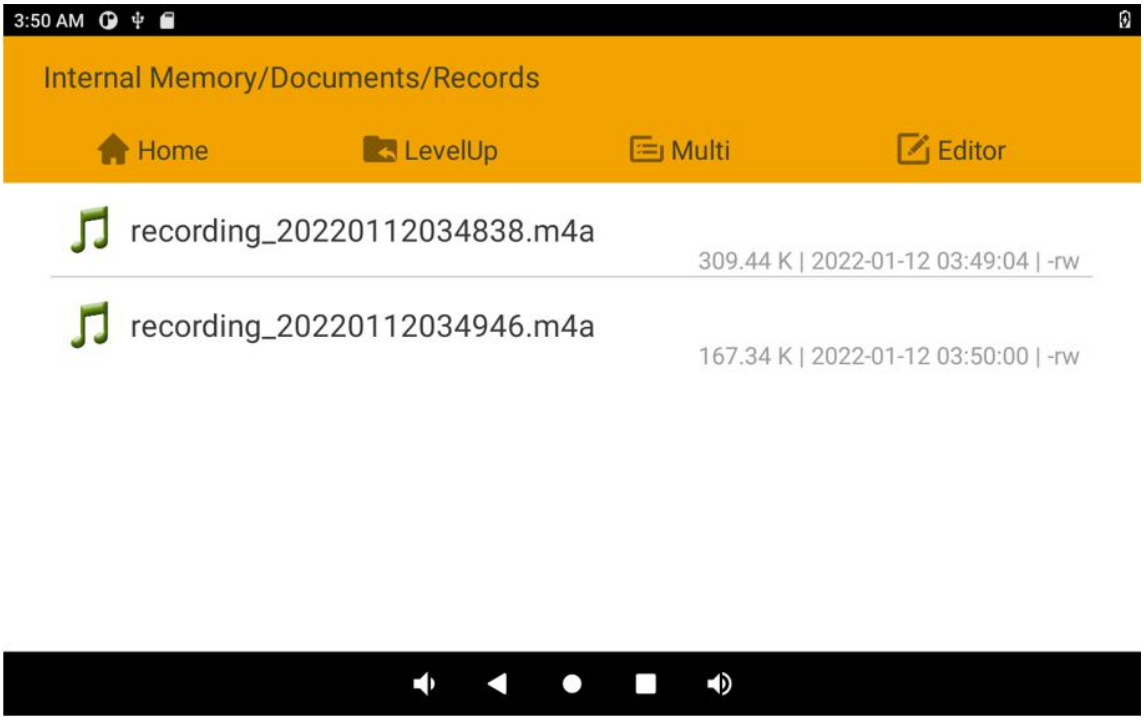
(The recording priority : headset recording > mic recording)





After finish recording, click **stop** menu and select **Save** to store file.

The default storage path is **Internal Memory/Documents/Records.**

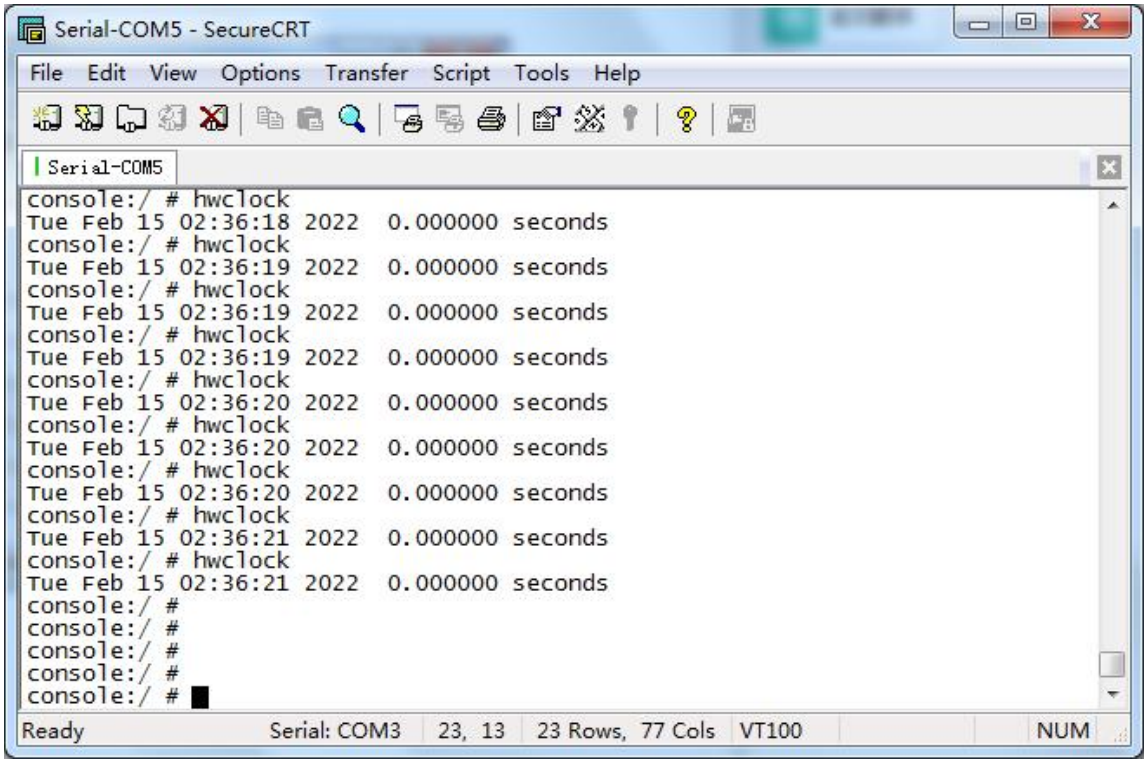


7.7 RTC

Execute the command **hwclock** at CRT terminal

hwclock

Wait a minute then run **hwclock** again, it can be seen the time has changed.

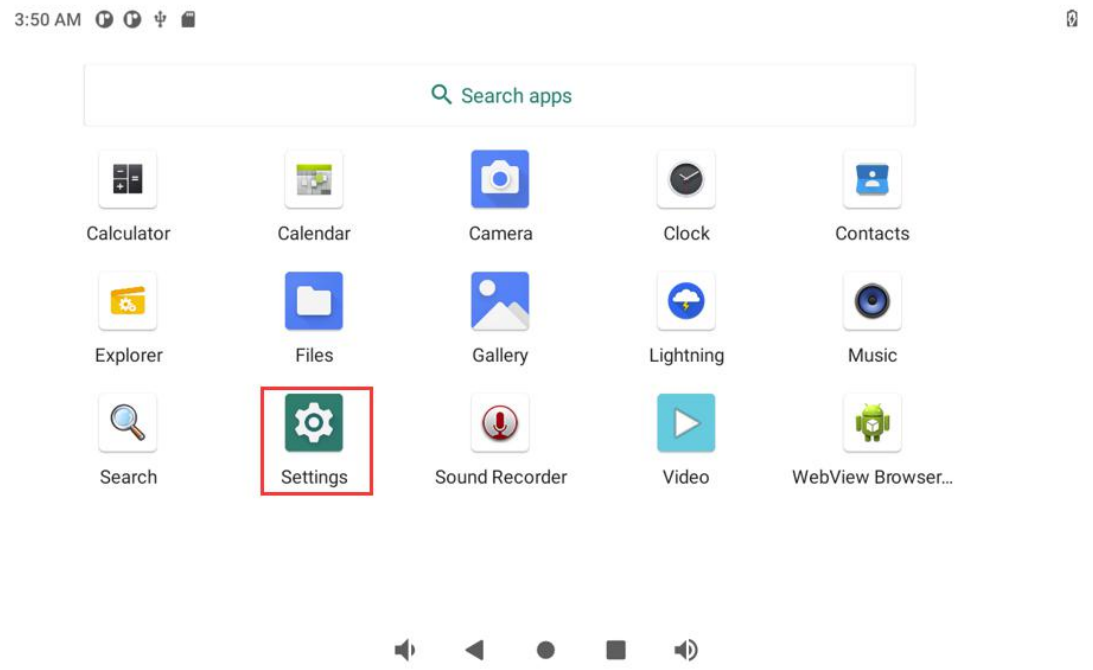


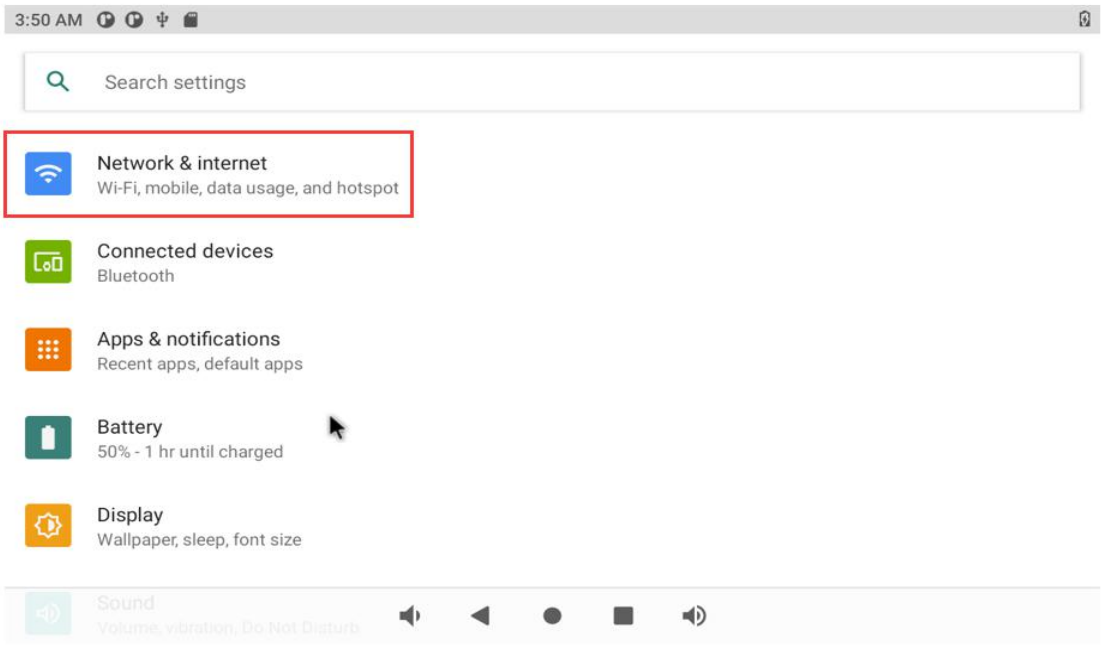
7.8 WiFi

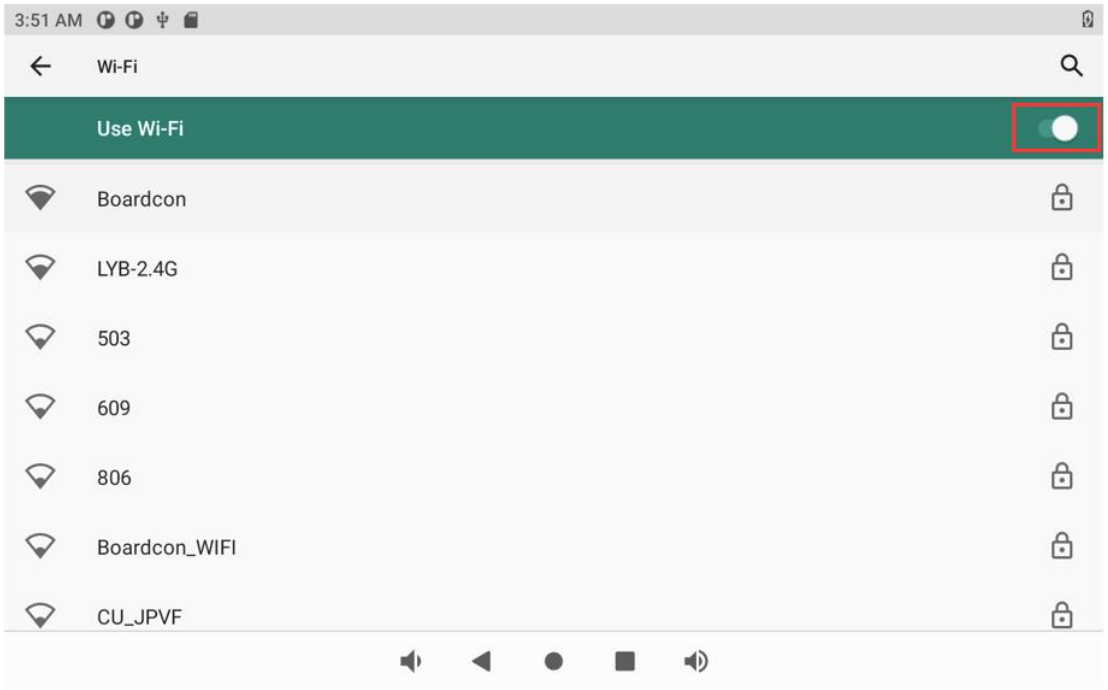
Connect the WiFi antenna, then click **Settings -> Network&internet -> Wi-Fi -> turn on**, select the SSID from the list of available networks and enter the password.

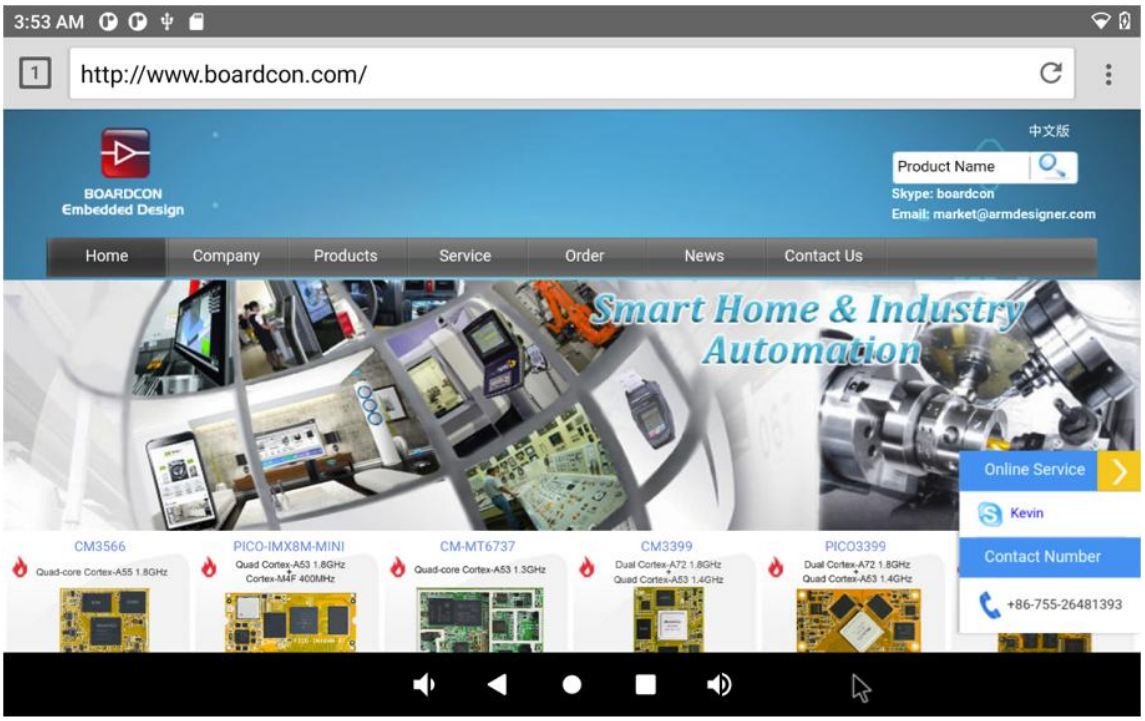
After connected, user can ping URL/IP at terminal. or open the browser to test Network.

ping www.boardcon.com





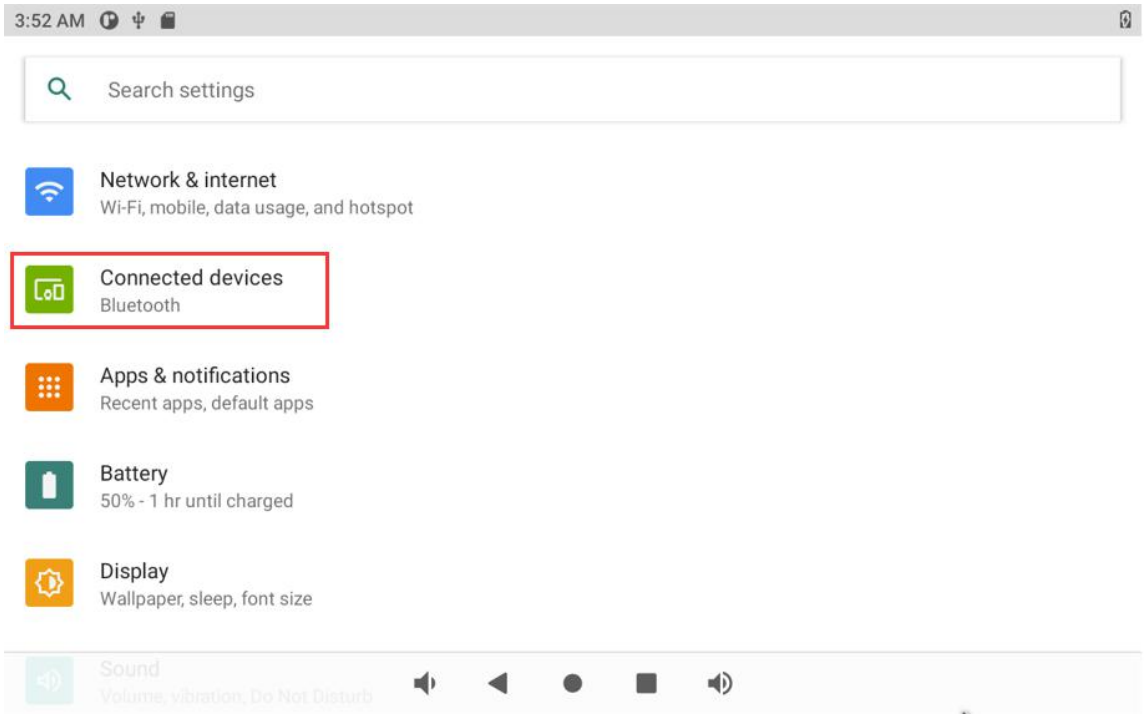

3:51 AM
Wi-Fi
Use Wi-Fi
Boardcon
LYB-2.4G
503
609
806
Boardcon_WIFI
CU_JPVF

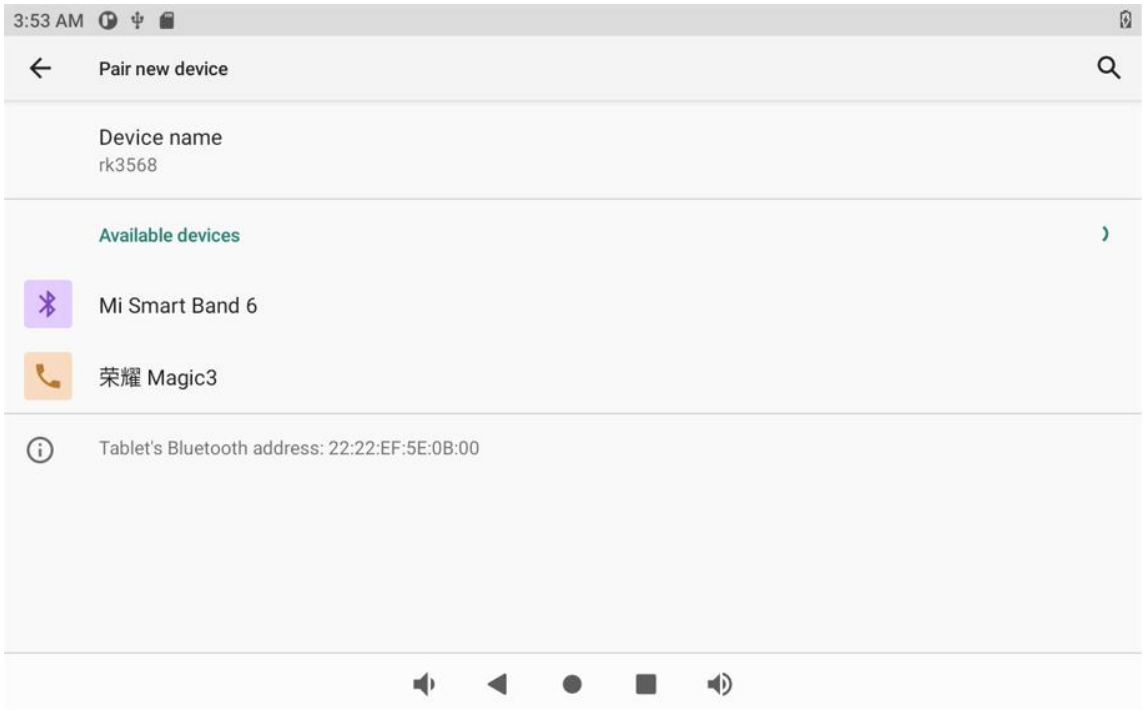

3:53 AM
http://www.boardcon.com/
BOARDCON
Embedded Design
中文版
Product Name
Skype: boardcon
Email: market@armdesigner.com
Home
Company
Products
Service
Order
News
Contact Us
Smart Home & Industry Automation
Online Service
Kevin
Contact Number
+86-755-26481393
CM3566
PICO-IMX8M-MINI
CM-MT6737
CM3399
PICO3399

7.9 Bluetooth

Click **Settings -> Connected devices -> Pair new device**

Select the available device in the list to pair.

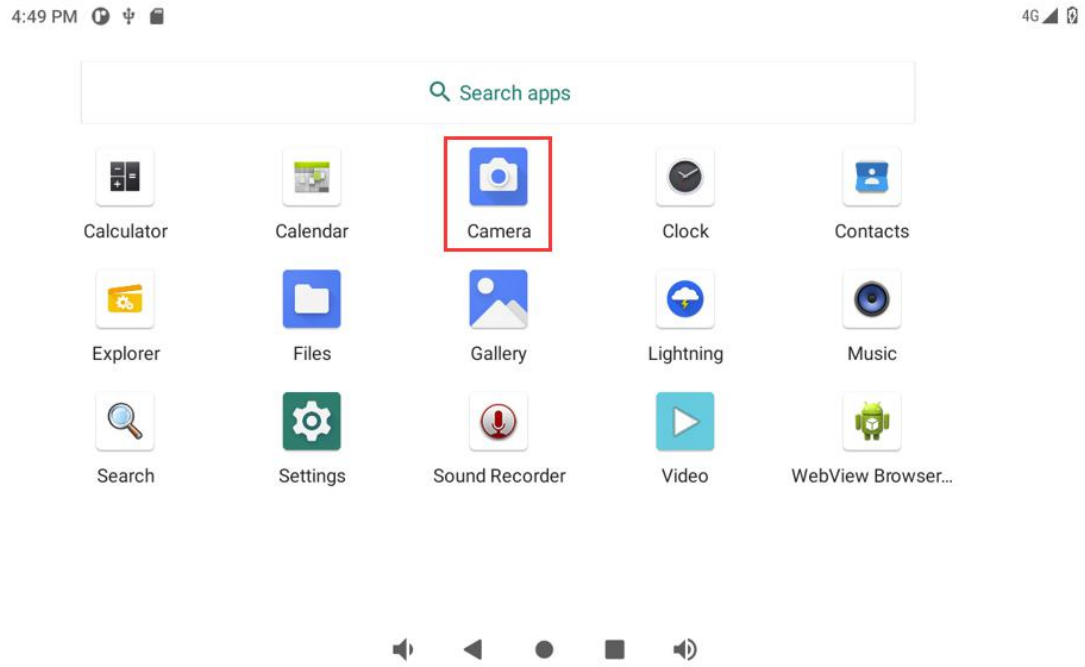




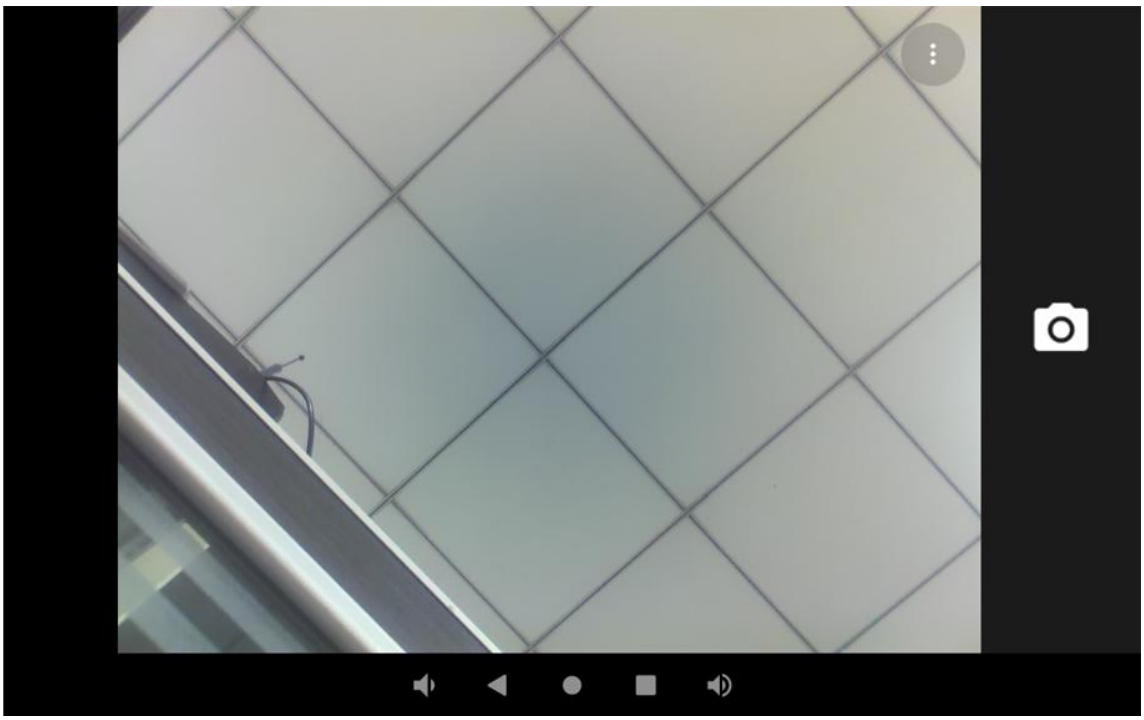
After pairing, devices can connect with each other automatically.

7.10 Camera

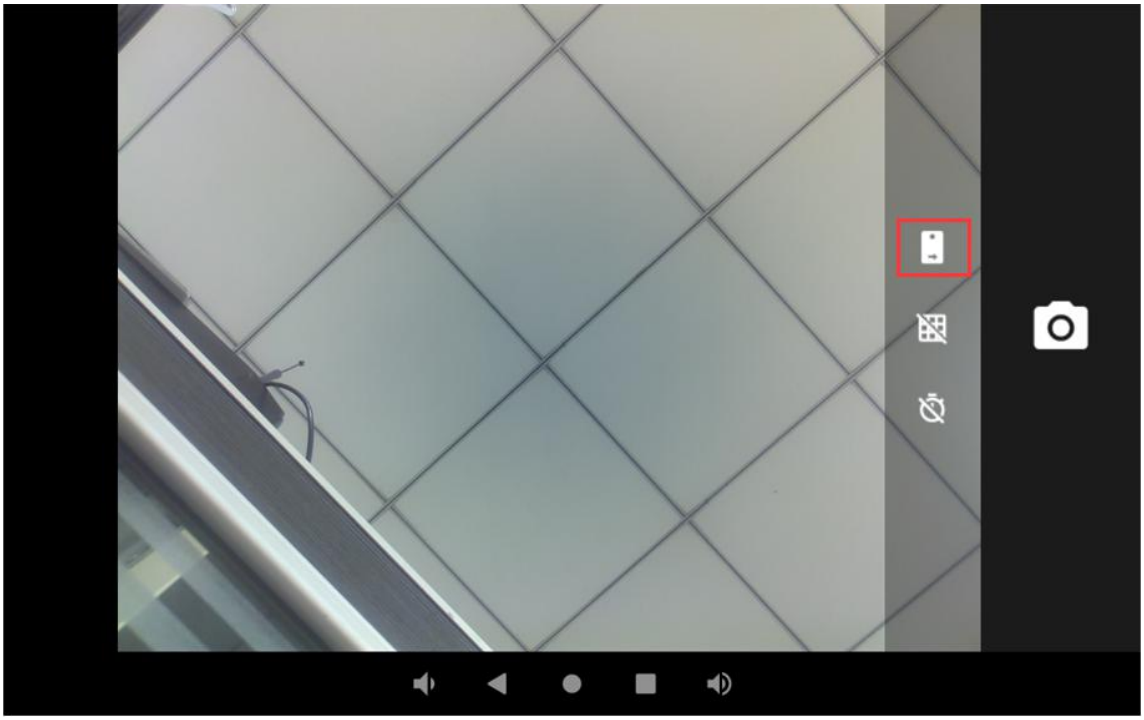
Connect the camera module (OV13850) to the development board CSI0(front Camera) and CSI1(back camera) **before power on**，then click the camera app to test.



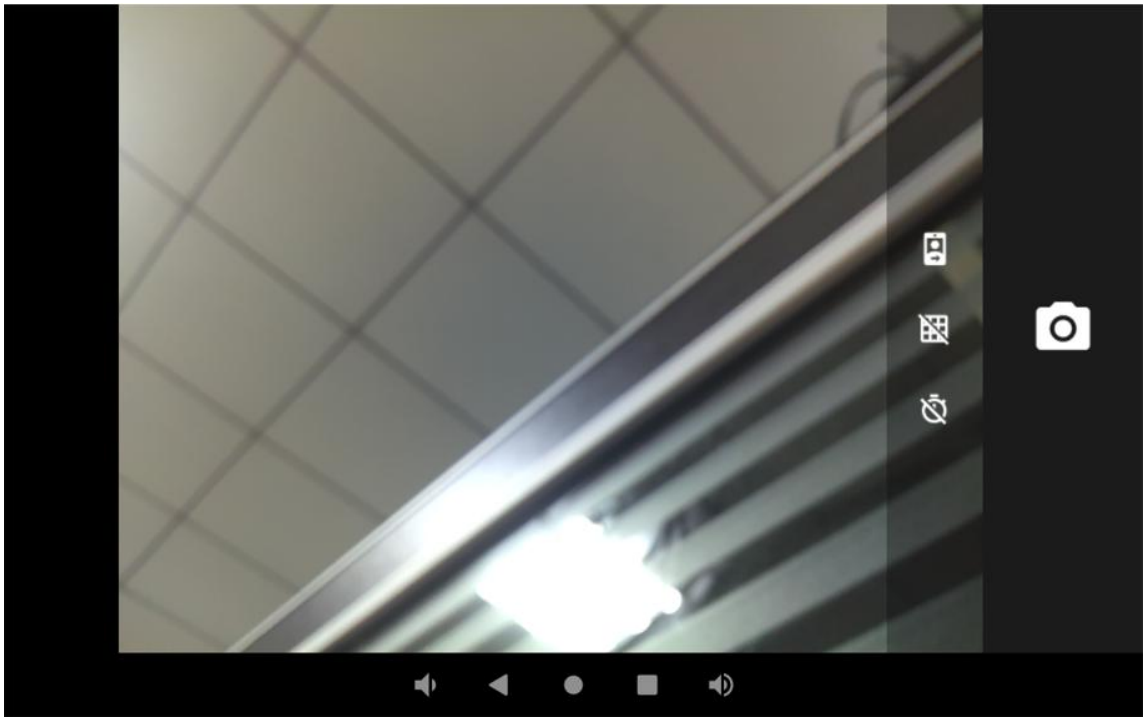
Front camera:



Switch buttons for front and back cameras:

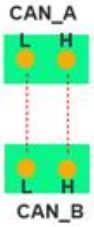


Back camera:



7.11 CAN

Connect CAN ports of Board A and Board B with the test line.



For Board A, execute the follow commands at **Serial terminal A** to set CAN_A as Receiver.

ip link set can0 down
ip link set can0 type can bitrate 1000000 dbitrate 3000000 fd on
ip link set can0 up
candump can0 (set CAN0 as receive)

For Board B, execute the follow commands at **Serial terminal B** to set CAN_B as Transmitter.

ip link set can0 down
ip link set can0 type can bitrate 1000000 dbitrate 3000000 fd on
ip link set can0 up
cansend can0 123##1DEADBEEF (CAN0 send characters 0xDE 0xAD 0xBE 0xEF)

The Transmitter and receiver can be converted by execute the command

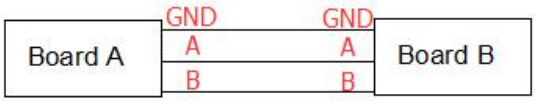
candump can0 (Receiver)

or

cansend can0 123#DEADBEEF (Transmitter)

7.12 RS485

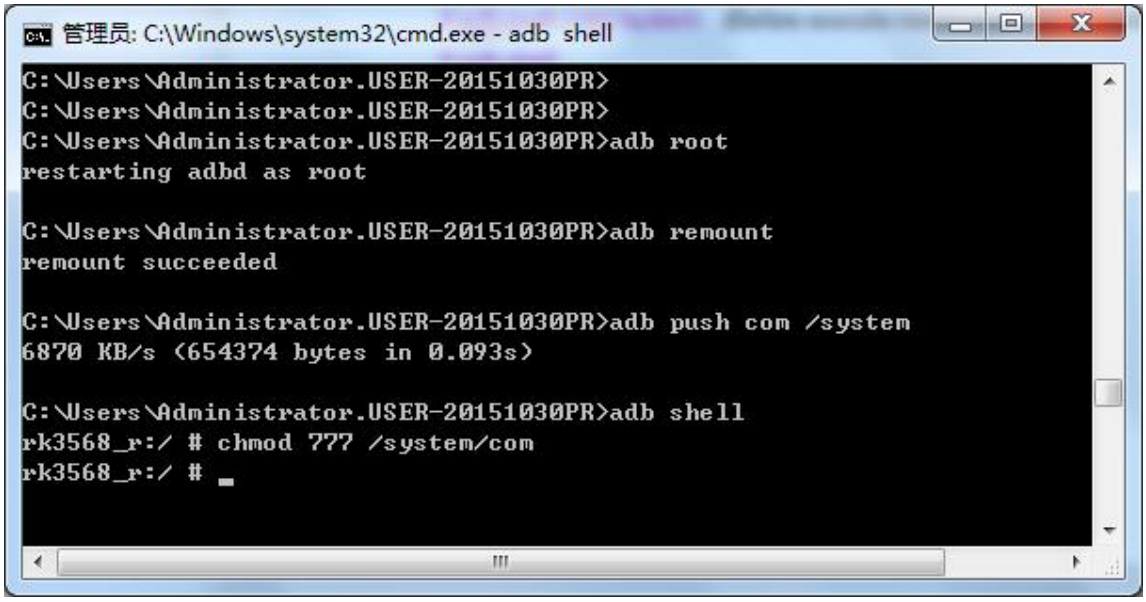
Connect the RS485 ports of Board A and B with the test line.



Open cmd.exe of PC (Path: Test\cmd.exe). After power on, the PC will report that found new hardware if it never install the usb adb driver (tools\adb). At this time user need to click InstallADB(x64).bat or InstallADB(x86).bat to install.

After install driver execute the commands at cmd:

adb root
adb remount
adb push com /system (Before execute need copy com to windows C:\Users\Administrator)
adb shell
chmod 777 /system/com (Modify COM properties)

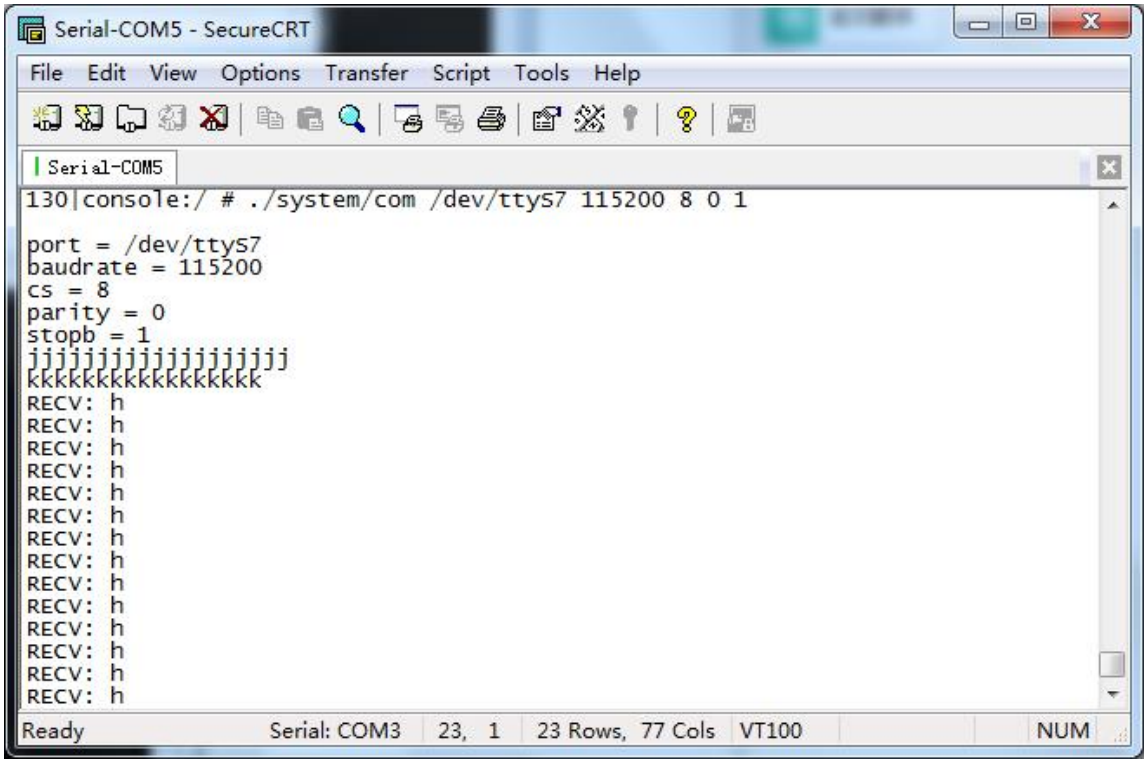


For Board A, execute the follow commands at **Serial terminal A** to set RS485 as Receiver or send.

```
# ./system/com /dev/ttyS7 115200 8 0 1
```

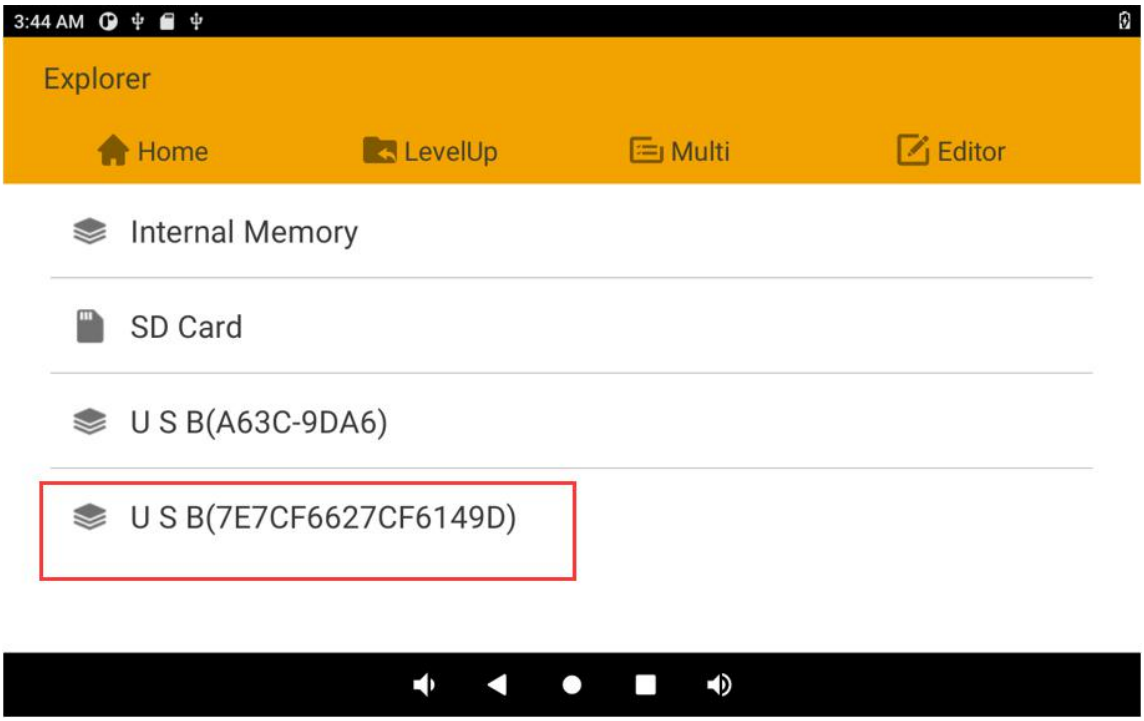
For Board B, execute the follow commands at **Serial terminal B** to set RS485 as Receiver or send.

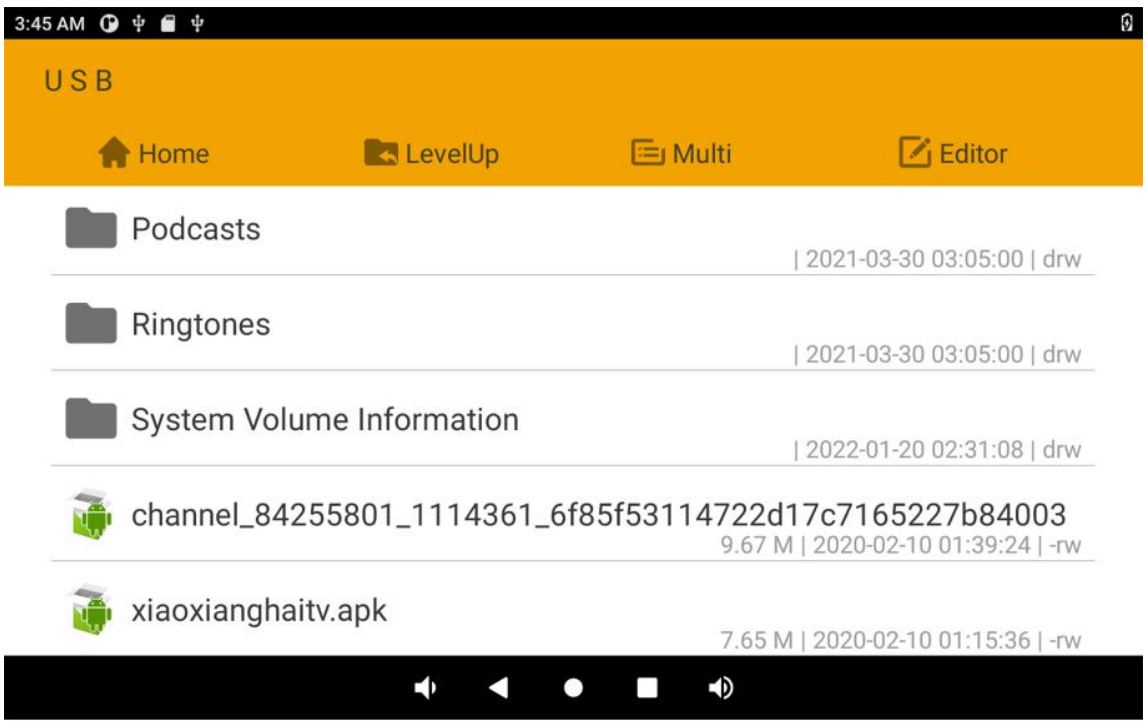
```
# ./system/com /dev/ttyS7 115200 8 0 1
```



7.13 SATA

Connect the sata and the sata power to the board(Sata0). Automatically mount SATA after system boot.





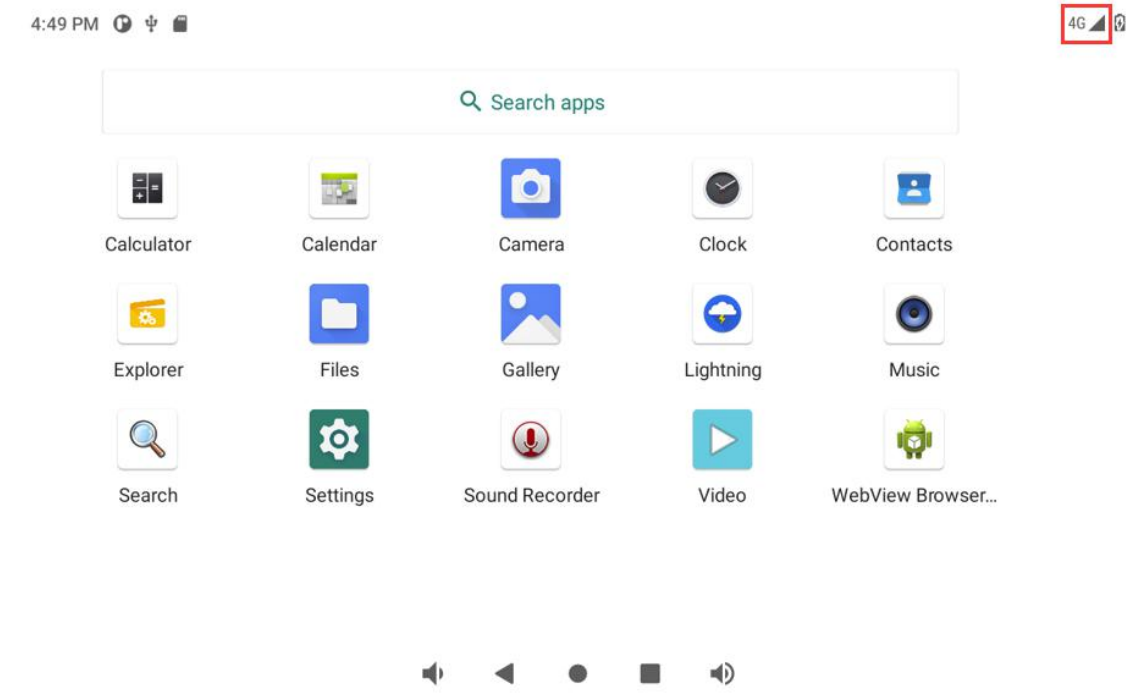
Note: EM3568 not support Sata Hot-plug.

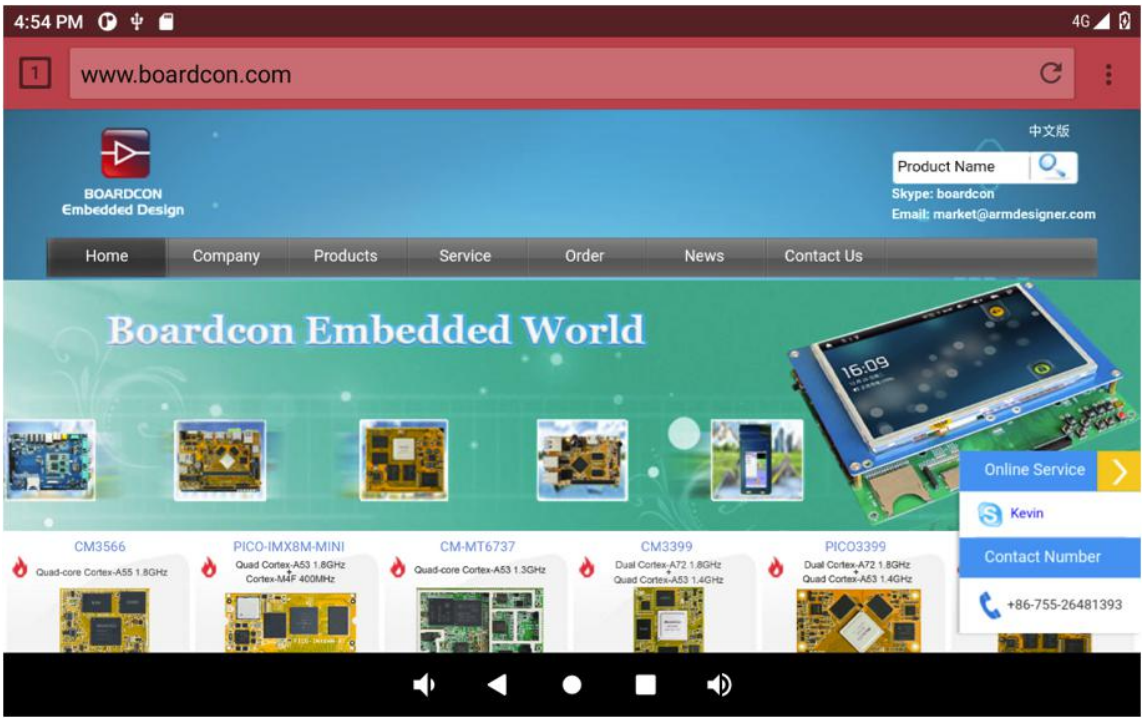
7.14 4G

Step 1, Insert 4G module to PCIe slot (4G model:EC20).

Step 2, Connect antenna and insert SIM card.

Step 3, The default connection is 4G network after power on





(The Network priority : Ethernet > WIFI > 4G).