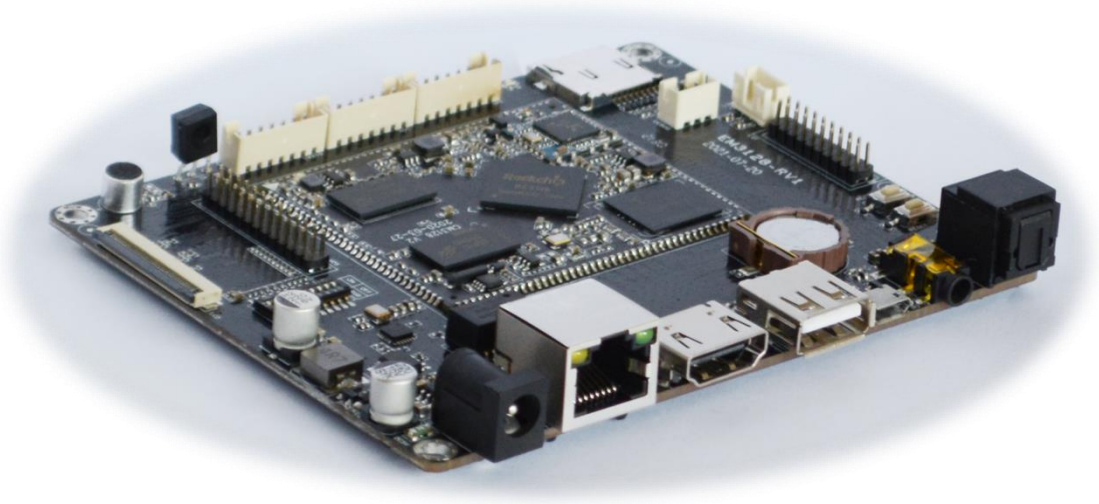
EM3128 Android7.1 User Manual

V1.1



Boardcon Embedded Design

www.armdesigner.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 android7.1	Liu Yuan	2021-10-29
V1.1	Modify test	Zhou Lijun	2021-11-15

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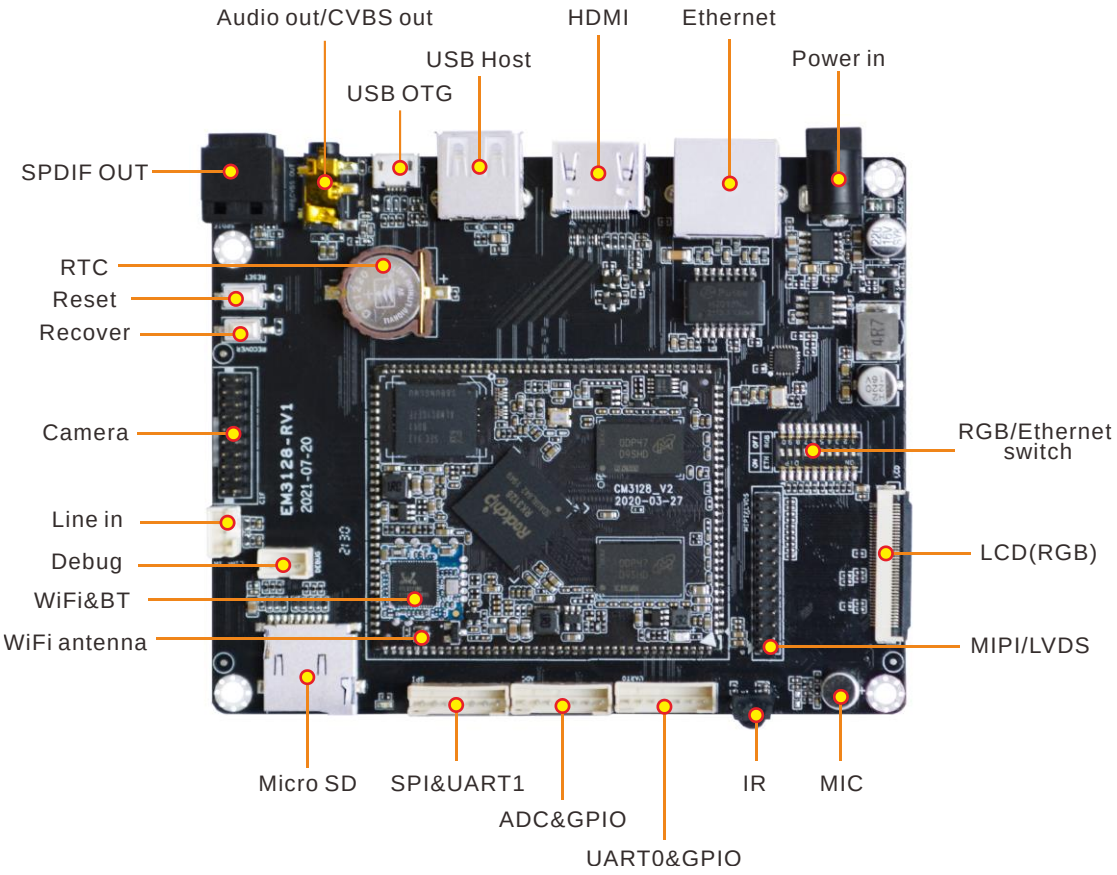
1 EM3128 Introduction



Feature	Specifications
CPU	Rockchip RK3128 Quad-core ARM Cortex-A7MP Core processor, 1.2GHz
GPU	Mali-400MP2 GPU, support OpenGL ES1.1/2.0. Built-in 2D acceleration hardware
Memory	512MB/1GB
Flash	4/8/16/32GB eMMC Flash
Power	5V/3A
USB	1x USB2.0 Host, 1x USB2.0 OTG
LCD	1x 26-pin MIPI&LVDS for 10.1-inch 1280 x 800 LCD with multi-dot capacitive touchscreen; 1x 40-pin TTL LCD connector
Ethernet	10/100M, RJ45 interface. LAN8720A controller
Serial port	1x 3pin connector, for debug
HDMI	HDMI V1.4, up to 1080@60fps. Audio sync-output
Audio	3.5mm jacks, MIC
SD card	1x Micro SD card slot
WiFi	RTL8723BU module. WiFi - 2.4GHz, 802.11b/g/n.

Camera	Supporting CIF camera
RTC	Real Time Clock, powered by external lithium battery
Button	Reset, Recover
Other interfaces	1x SPI, 1x ADC, 1x UART0, 1x SPDIF, 1x Lithium battery interface
Dimension	112 x 90mm

2 Compiler Environment

2.1 Vmware10.0+ubuntu16.04

Install Vmware10.0 in windows OS, and then install ubuntu16.04 in VMware to compile. Please visit the official website http://www.ubuntu.com/ to download and install ubuntu operating system. Running ubuntu needs a relatively large memory space temporarily, so it is recommended not to install 1 virtual machine but to install the ubuntu system directly on the computer.

Note: Android7.1 should be complied by ubuntu 64bit OS.

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
sudo apt-get install zlib1g-dev
sudo apt-get install flex
sudo apt-get install libx11-dev

```
# sudo apt-get install gperf
# sudo apt-get install libncurses5-dev
# sudo apt-get install bison
# sudo apt-get install lsb-core
# sudo apt-get install lib32z1-dev
# sudo apt-get install g++-multilib
# sudo apt-get install lib32ncurses5-dev
# sudo apt-get install uboot-mkimage
# sudo apt-get install g++-4.4-multilib
```

3 Compile Source

Step 1, unzip the source.

```
# tar zxvf rk3128_android7.1.tar.bz2
```

Step 2, compile uboot

```
$ cd u-boot/
$ make rk3128_box_defconfig
$ make -j8
```

rk3128_loader_v2.05.240.bin and **uboot.img** are generated in current directory.

Step 3, compile the kernel

```
$ cd kernel/
$ make rockchip_defconfig
$ make rk3128-sdk.img
```

kernel.img, resource.img are generated in current directory.

Step 4, compile the android

```
$ source build/envsetup.sh
$ lunch rk3126c-userdebug
$ make -j8
```

Step 5, Generated image file

```
# ./mkimage.sh
# cd rockdev/Image-rk3126c
# ls
```

Images are generated in current directory.

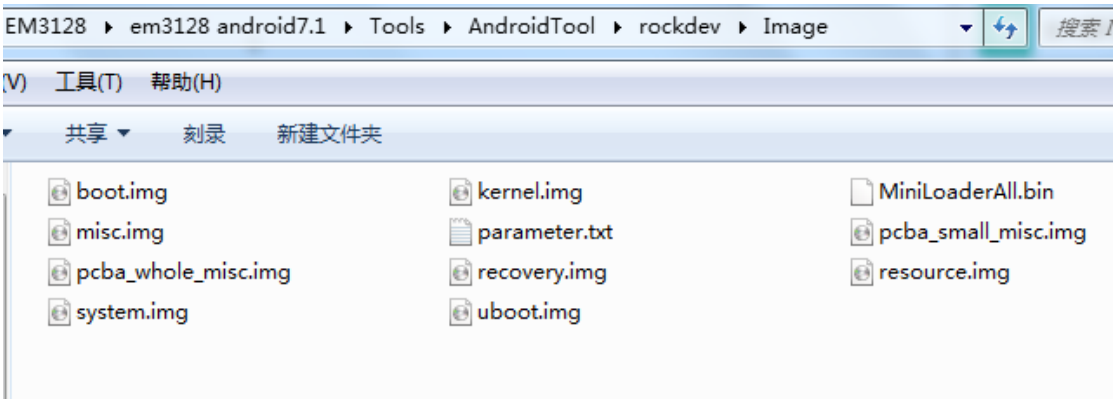
4 Images Operation

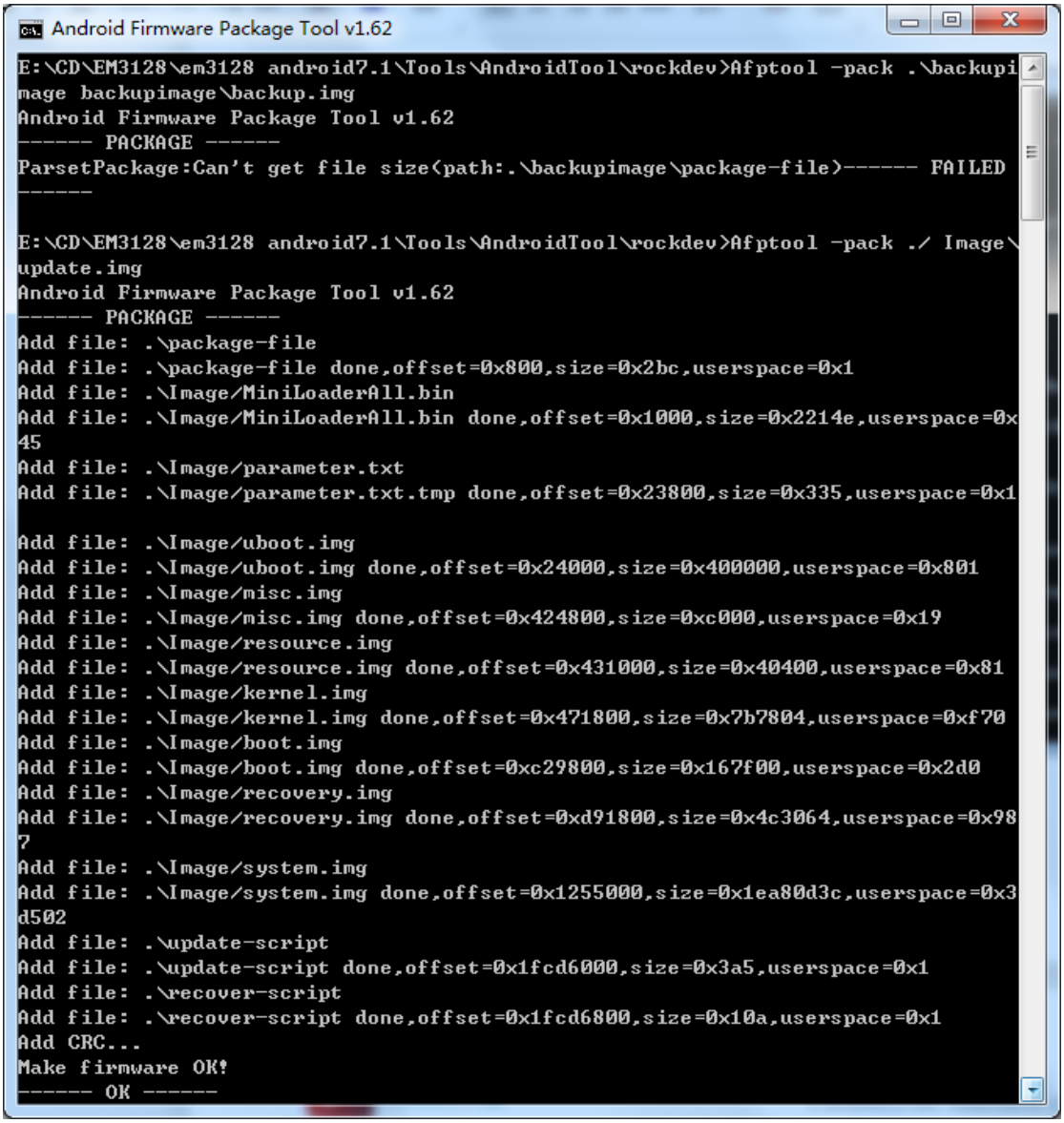
4.1 Pack Image

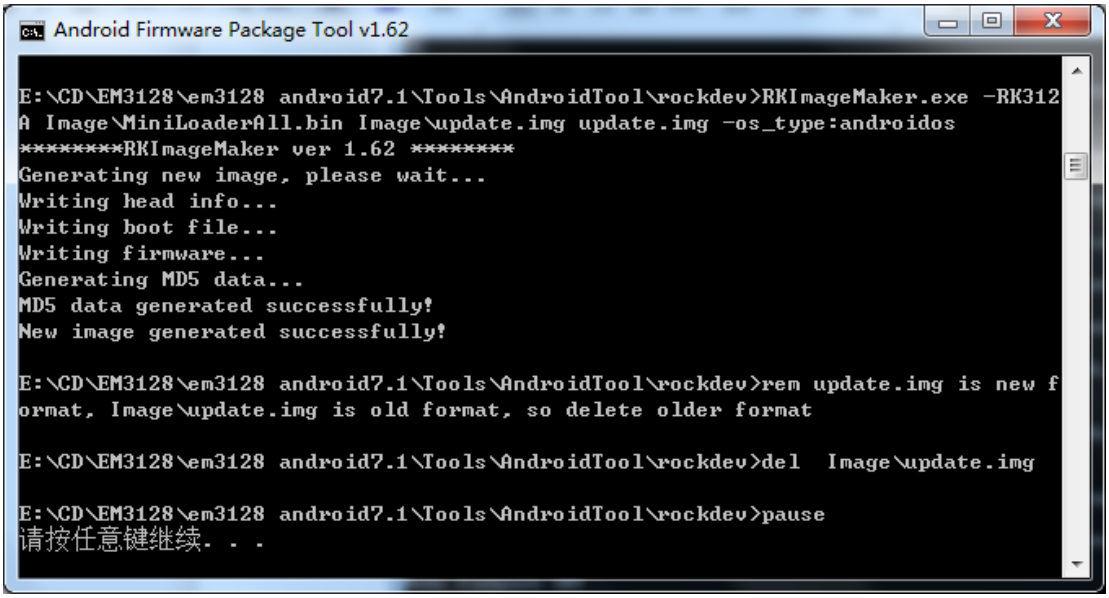
Step 1, copy all the files in Ubuntu system directory **rockdev/Image-rk3126c** to the windows **AndroidTool/rockdev/Image**

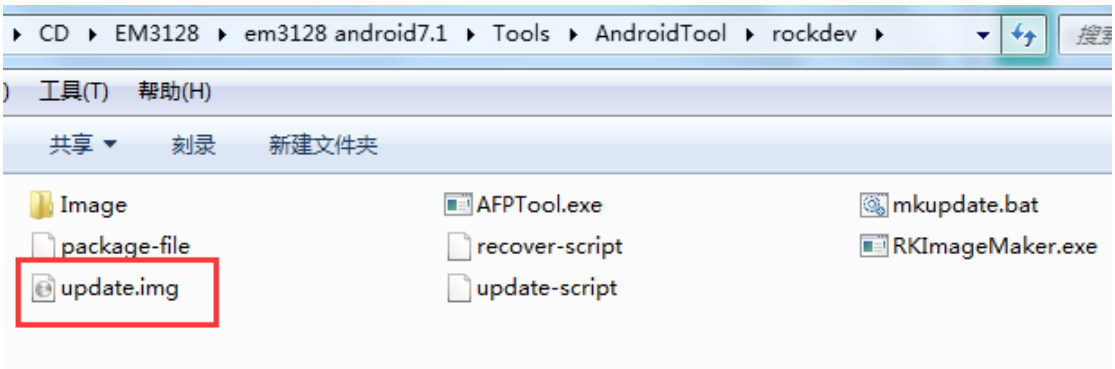
Step 2, enter **AndroidTool/rockdev/**, double-click to run **mkupdate.bat.**

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









Note: If an error occurs, it may be in the script is not the same bootloader version, follow the prompts to modify the file **mkupdate.bat** and **package-file** the same version of the current directory.

4.2 Unzip Firmware

Unzip Firmware in ubuntu.

Step 1, copy **update.img** to the android source directory **RKTools/linux/Linux_Pack_Firmware/rockdev/**

Step 2, execute the following command

```
# cd RKTools/linux/Linux_Pack_Firmware/rockdev/
# chmod 777 unpack.sh
# ./unpack.sh
# ls output/Image/
```

The unzip files will be generated in **output/Image** directory.

```
unexpand                    unity-settings-daemon       unopkg
unflatten                   unity-webapps-desktop-file  unpack200
unicode_start               unity-webapps-qml-launcher  unset
liuyuan@boardcon:~/opt/rk3128/rk3128_android7.1/RKTools/linux/Linux_Pack_Firmware/rockdev$ chmod 777 unpack.sh
liuyuan@boardcon:~/opt/rk3128/rk3128_android7.1/RKTools/linux/Linux_Pack_Firmware/rockdev$
liuyuan@boardcon:~/opt/rk3128/rk3128_android7.1/RKTools/linux/Linux_Pack_Firmware/rockdev$ ./unpack.sh
start to unpack update.img...
********RKImageMaker ver 1.63********
Unpacking image, please wait...
Exporting boot.bin
Exporting firmware.img
Unpacking image success.
Android Firmware Package Tool v1.62
Check file... OK
------- UNPACK ------
package-file    0x0000000000000800      0x00000000000002A4
Image/MiniLoaderAll.bin 0x0000000000001000      0x000000000002214E
Image/parameter.txt     0x0000000000023800      0x0000000000000329
Image/uboot.img 0x0000000000024000      0x0000000000400000
Image/misc.img  0x0000000000424800      0x000000000000C000
Image/resource.img      0x0000000000431000      0x0000000000040400
Image/kernel.img        0x0000000000471800      0x00000000007B7804
Image/boot.img  0x0000000000C29800      0x0000000000167F00
Image/recovery.img      0x0000000000D91800      0x00000000004C3064
Image/system.img        0x0000000001255000      0x000000001EA80D3C
update-script   0x000000001FCD6000      0x00000000000003A5
recover-script  0x000000001FCD6800      0x000000000000010A
Unpack firmware OK!
------ OK ------
Unpacking update.img OK.
Press any key to quit:
liuyuan@boardcon:~/opt/rk3128/rk3128_android7.1/RKTools/linux/Linux_Pack_Firmware/rockdev$ ls output/
Image  MiniLoaderAll.bin  package-file  parameter.txt  recover-script  update-script
liuyuan@boardcon:~/opt/rk3128/rk3128_android7.1/RKTools/linux/Linux_Pack_Firmware/rockdev$ ls output/Image/
boot.img  kernel.img  misc.img  recovery.img  resource.img  system.img  uboot.img
liuyuan@boardcon:~/opt/rk3128/rk3128_android7.1/RKTools/linux/Linux_Pack_Firmware/rockdev$
```

Unzip Firmware in windows.

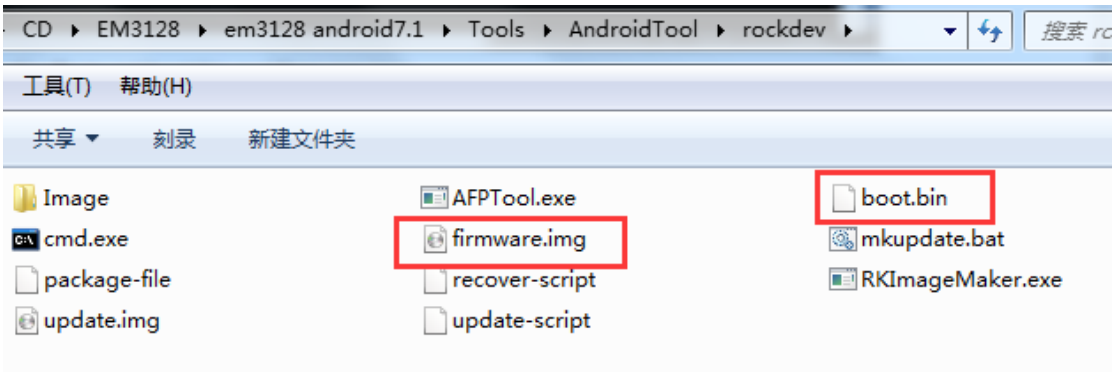
Step 1, copy **update.img** to the windows directory **AndroidTool/rockdev/**

Step 2, open **AndroidTool/rockdev/cmd.exe** then execute the following command in CMD

RKImageMaker.exe -unpack ./update.img ./

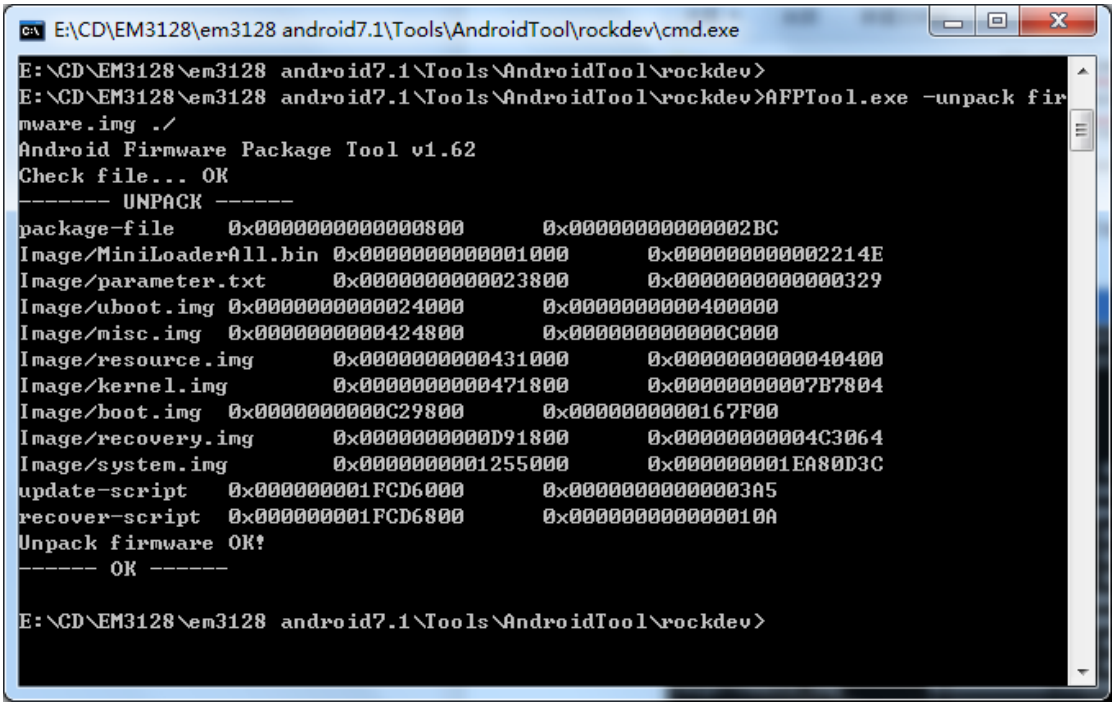
```
E:\CD\EM3128\em3128 android7.1\Tools\AndroidTool\rockdev\cmd.exe
Microsoft Windows XP [版本 6.1.7601]
(C) 版权所有 1985-2001 Microsoft Corp.

E:\CD\EM3128\em3128 android7.1\Tools\AndroidTool\rockdev>RKImageMaker.exe -unpac
k ./update.img ./
********RKImageMaker ver 1.62 ********
Unpacking image, please wait...
Exporting boot.bin
Exporting firmware.img
Unpacking image success.

E:\CD\EM3128\em3128 android7.1\Tools\AndroidTool\rockdev>
```

After unzip the file to get boot.bin and firmware.img

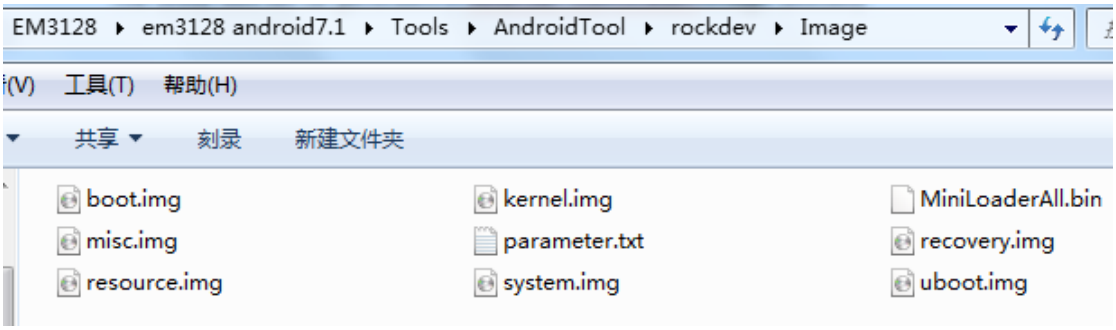


Step 3, execute the following command in CMD to unzip **firmware.img**

AFPTool.exe -unpack firmware.img ./



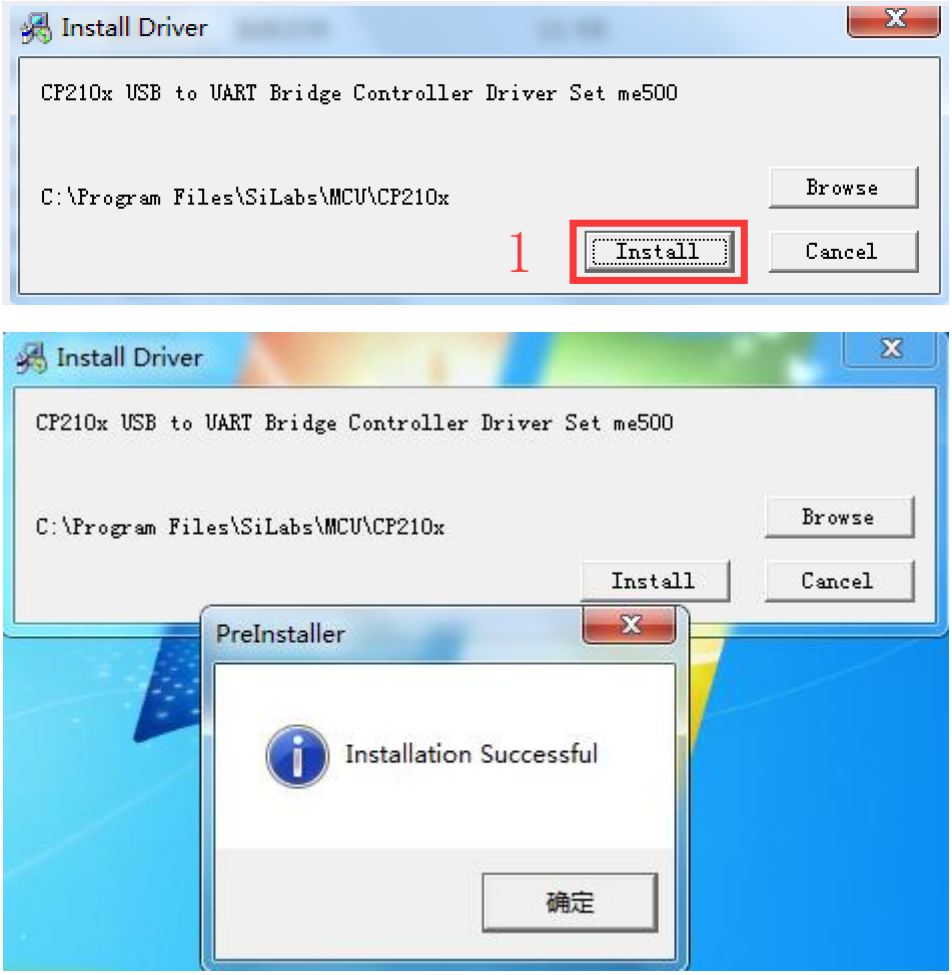
The unzip files will be generated in **AndroidTool\rockdev\Image** directory



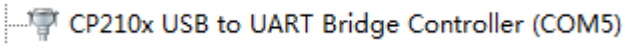
5 Install Tools

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

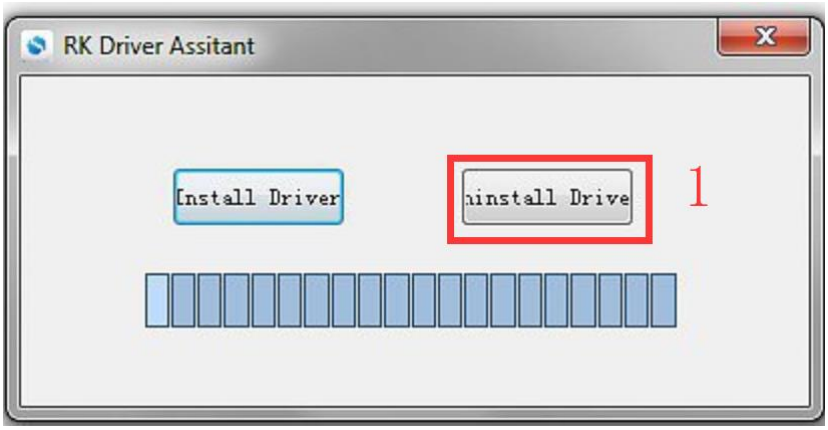


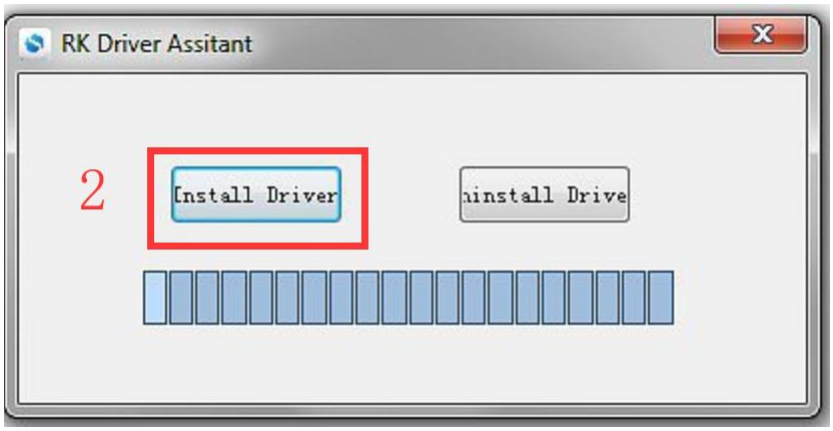
Now the device will be listed under **Device Manager -> PORTS** with unique serial port assigned



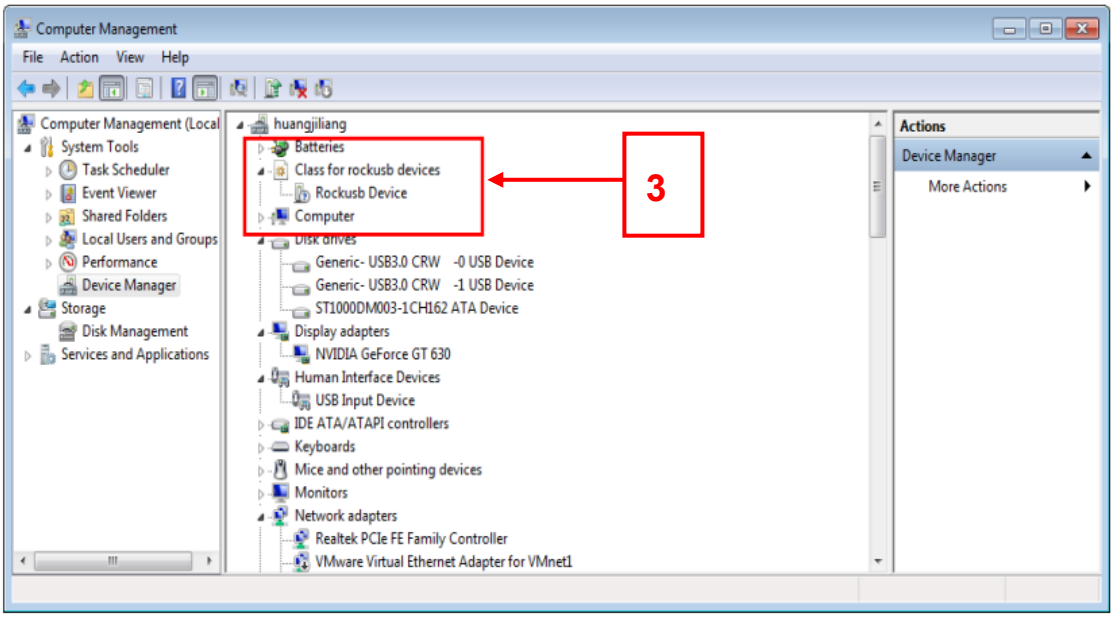
5.2 Install Rockchip Driver Assistant

Path: Release_DriverAssitant/DriverInstall.exe





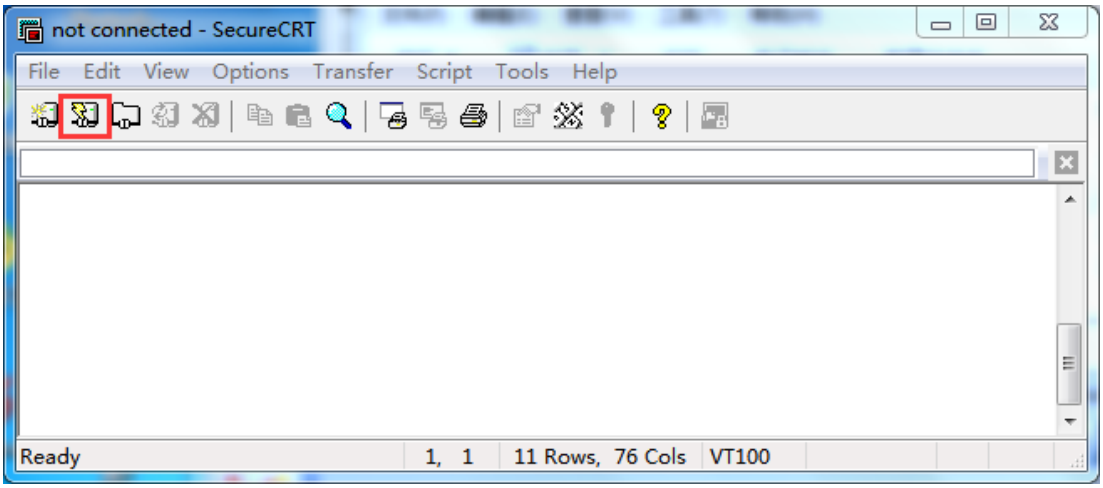
After the installation is complete, connect the board and PC with Micro USB cable Then press the RECOVER key and hold (USB powered), In *Computer Management* can see the following information:

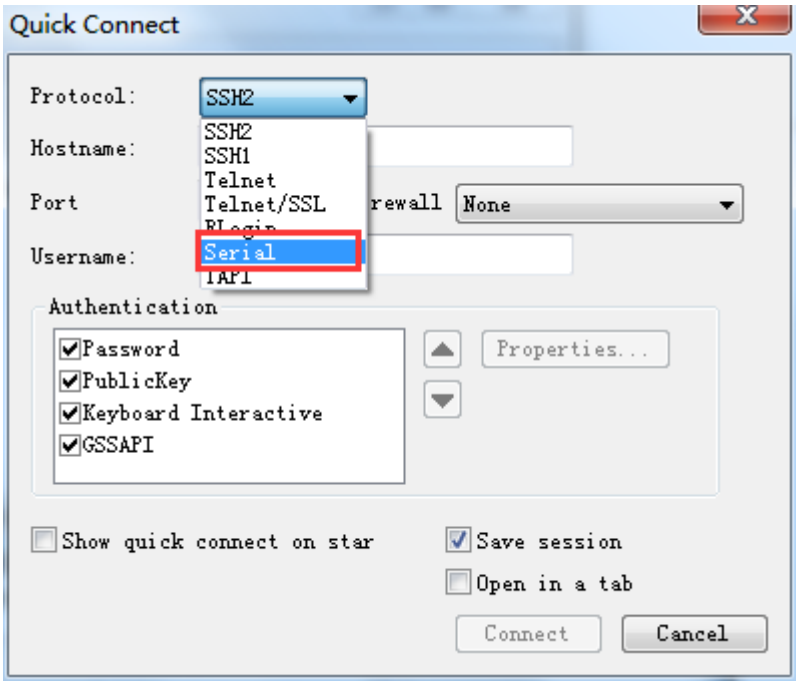


5.3 Install Serial Terminal Tool

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:

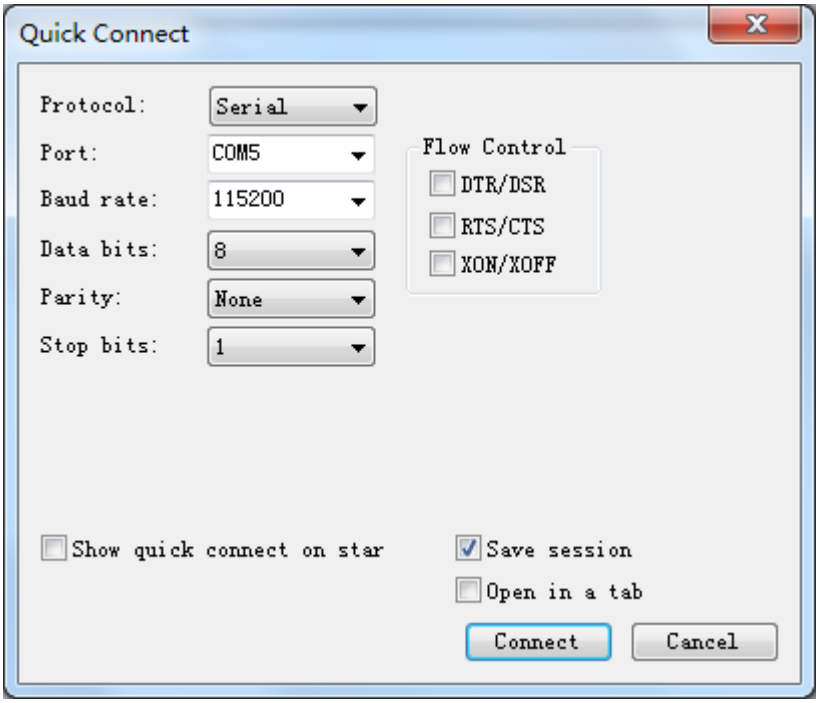
Protocol: Serial

Port: To be specified by user PC

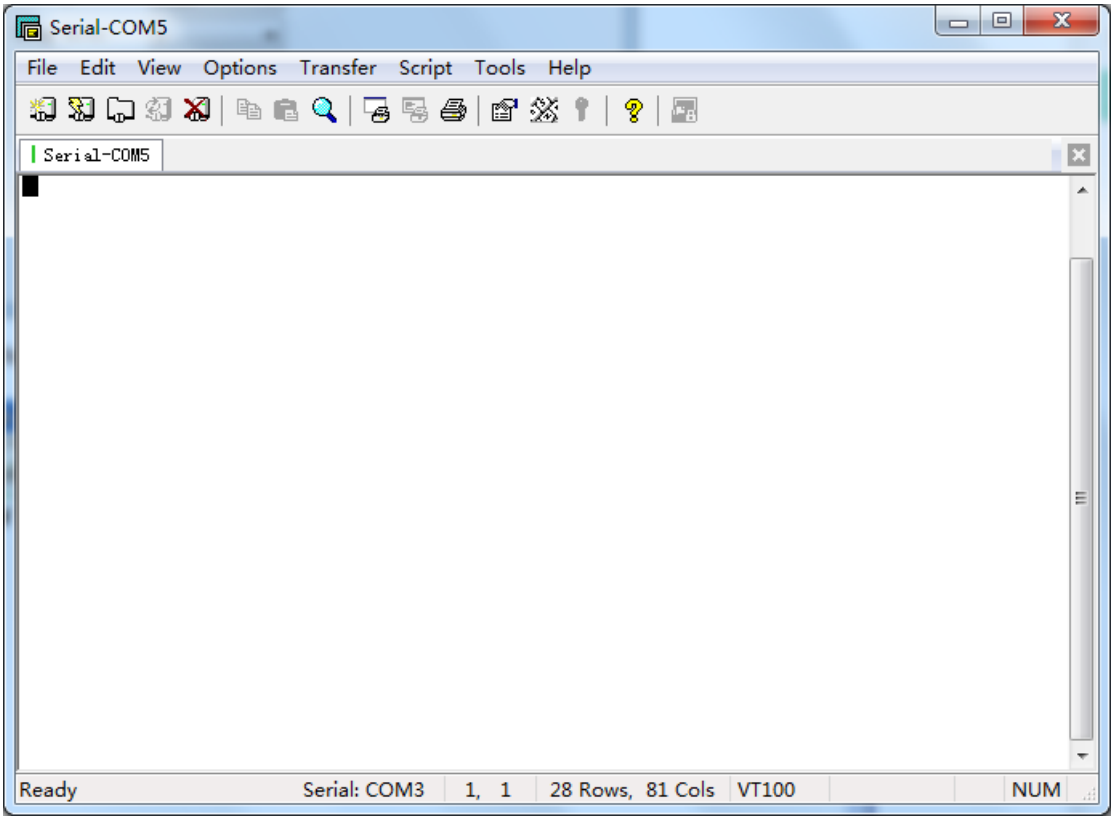
Baud rate: 115200

Please check XON/XOFF and RTS/CTS not selected

Check Save session selected



After all, click **connect**



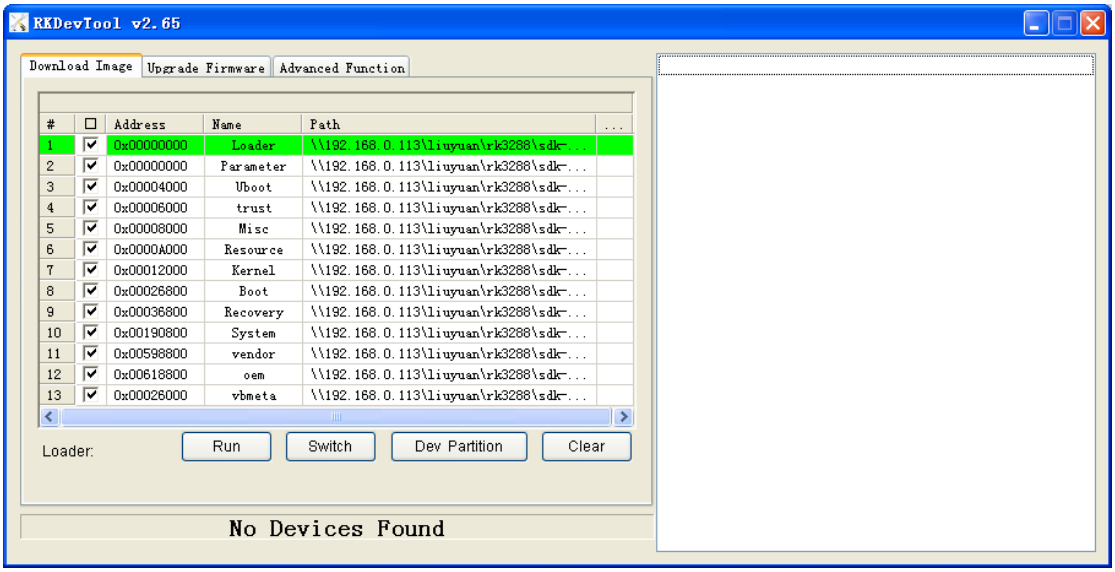
Illusion: If open more than one serial terminal tools, and they use the same serial port, there will be reported **the port is busy**.

Solution: Turn off the serial tool that unnecessary.

6 Burn Images

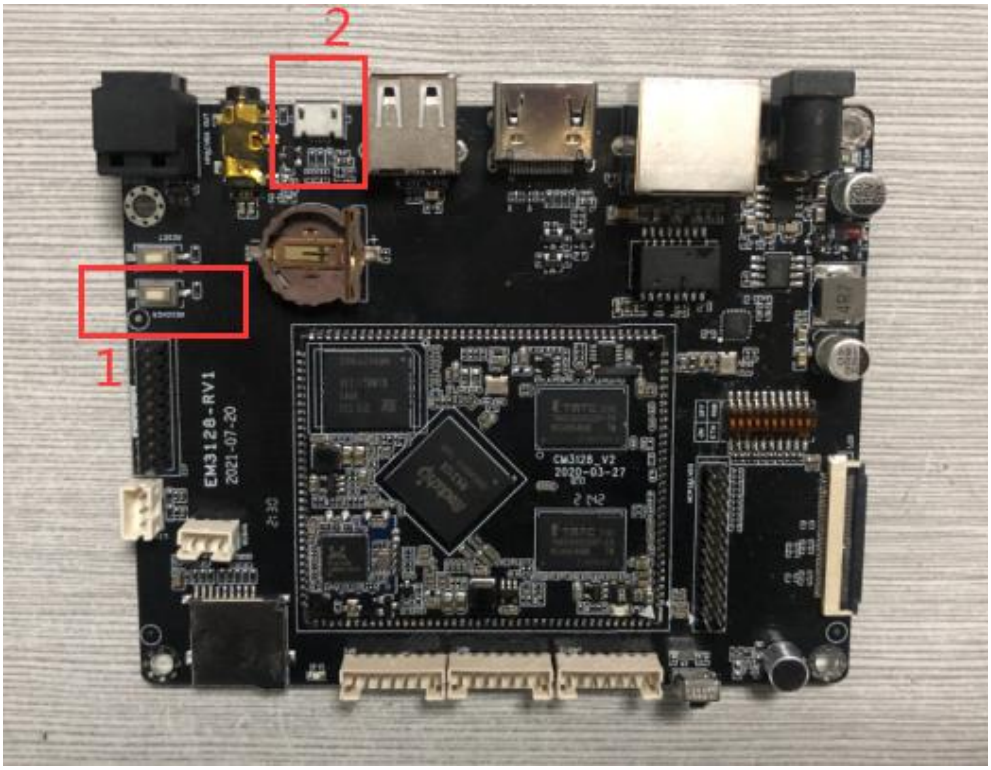
Step 1, unzip **AndroidTool** on Windows.

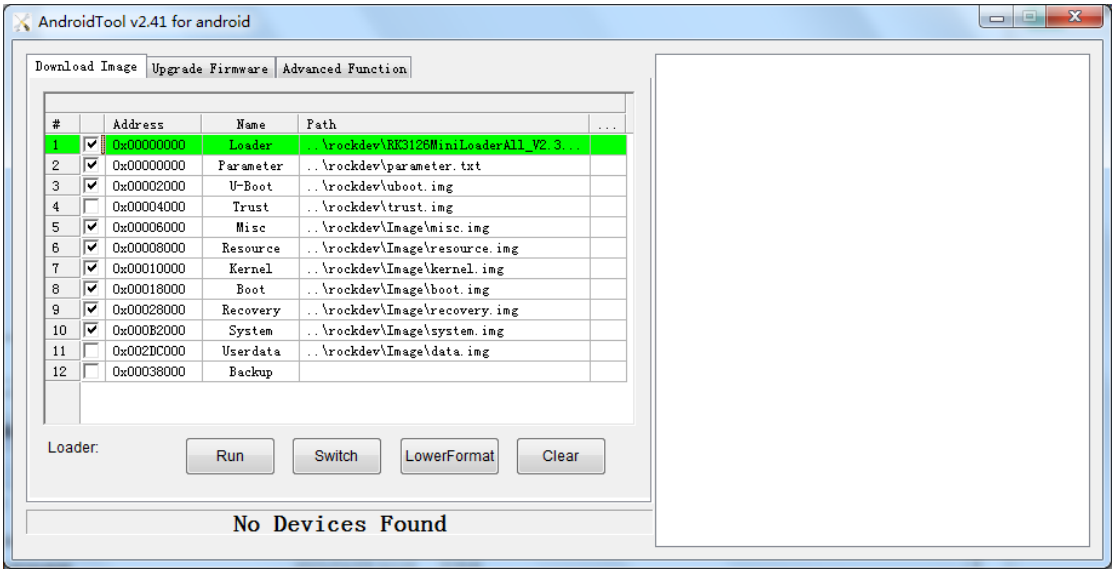
Step 2, open **AndroidTool.exe** (*Path: AndroidTool_Release_v2.41\AndroidTool.exe*)



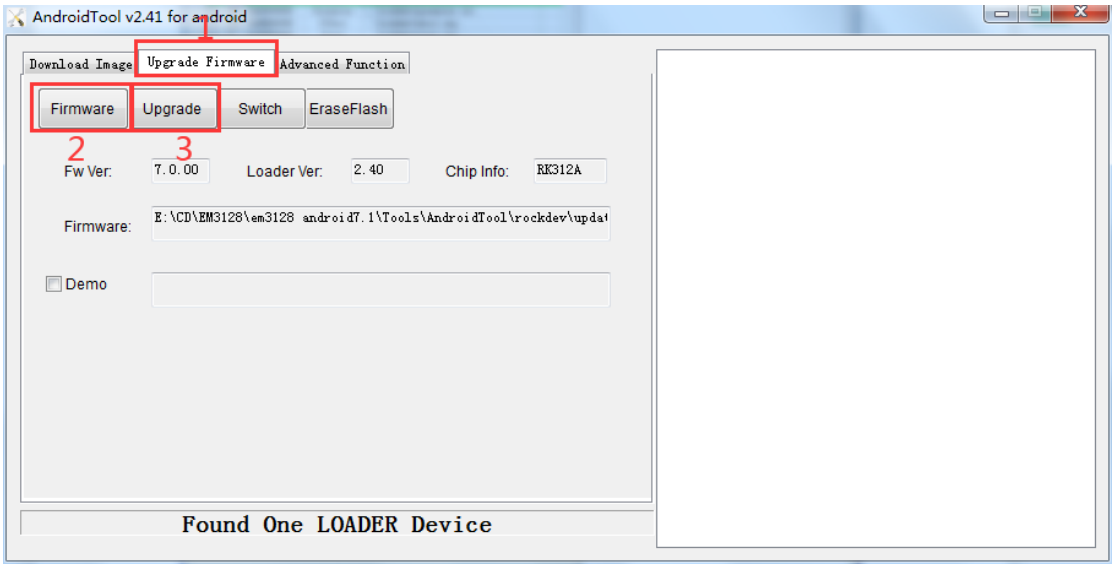
Step 3, keep pressing the **Recover Key,** then connect PC and development board with Micro USB cable until the windows PC shows **Found one LOADER Device.**

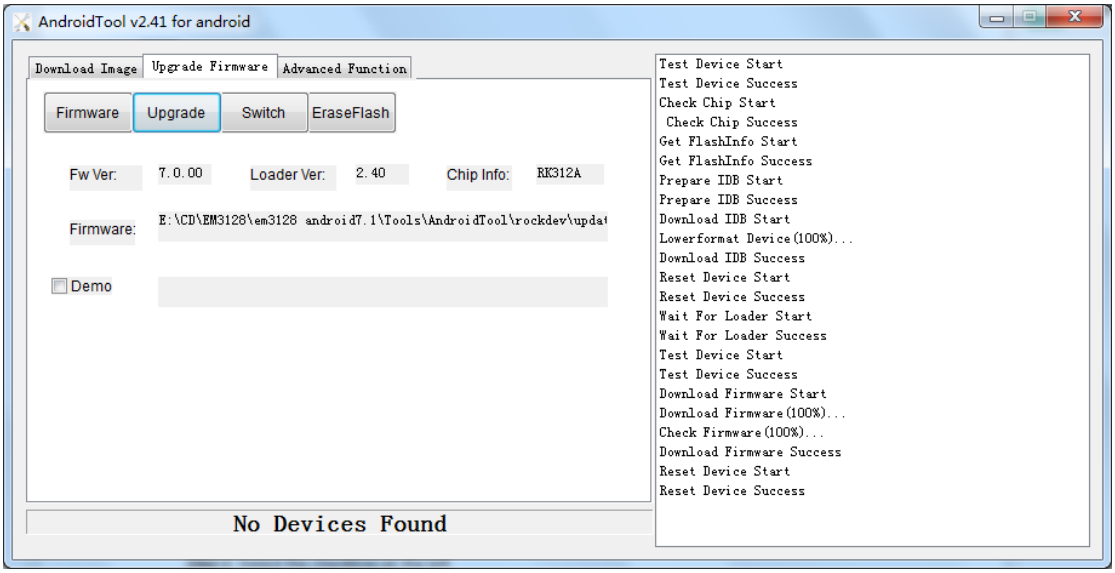
The USB power supply is only available for programming, and the current is not enough for the board to run.





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



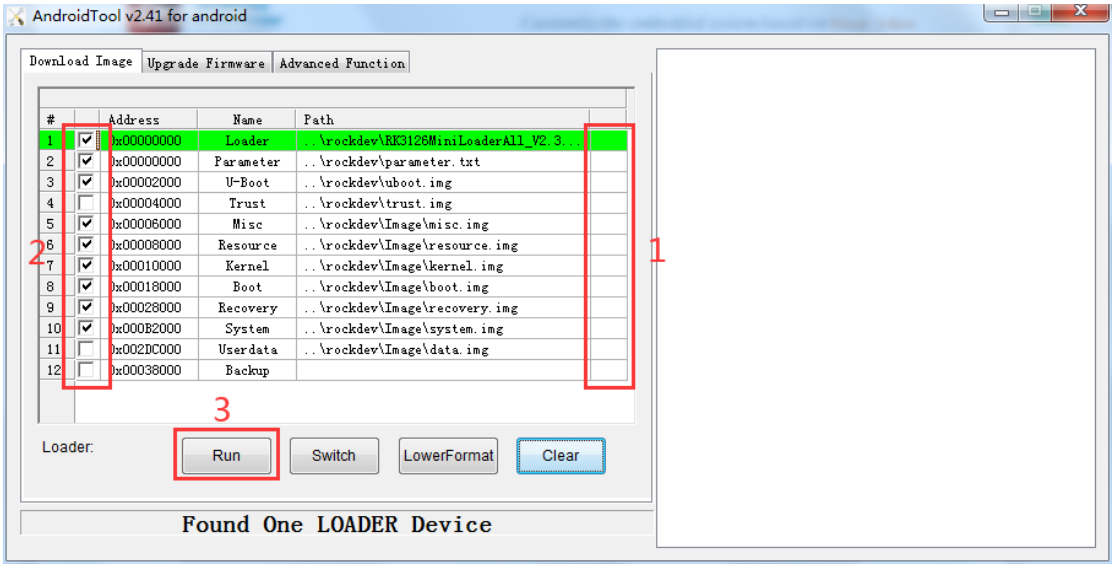


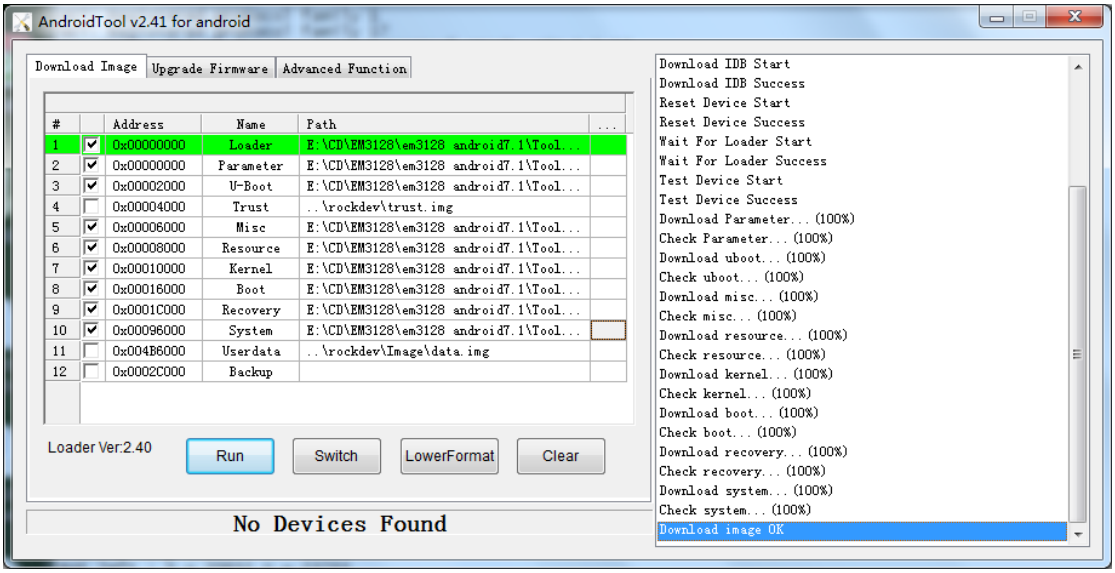
User can also update the firmware separately.

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.

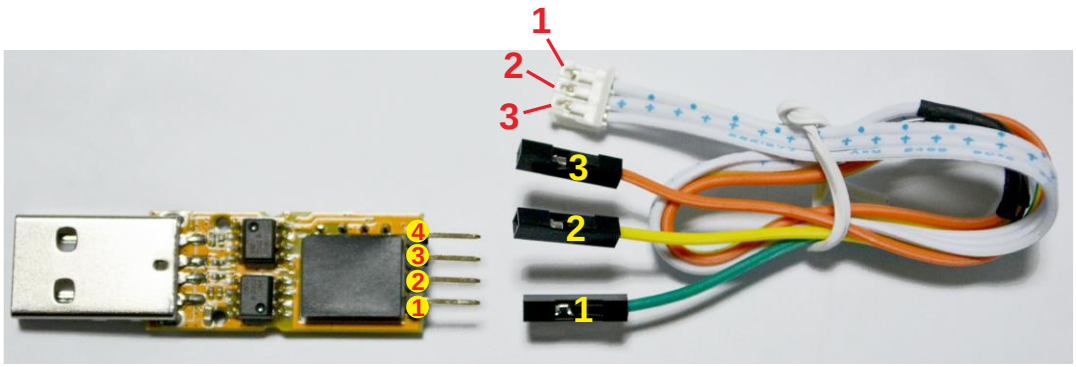


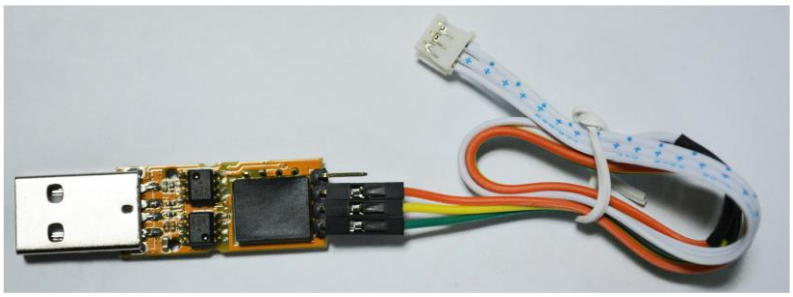


7 Android Application

7.1 Serial Terminal

Connect the board and PC with USB Serial cable, then power on, the terminal will output startup information.



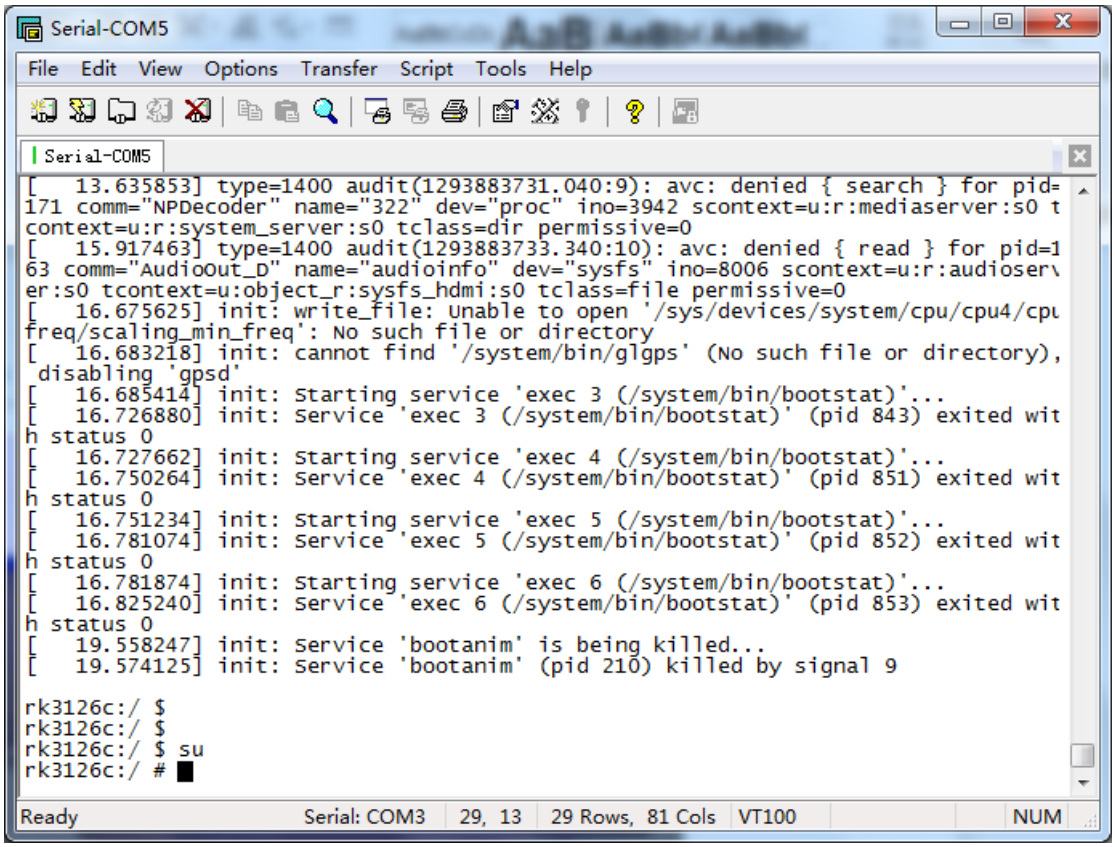


1- RX

2- TX

3- GND

4- 5V

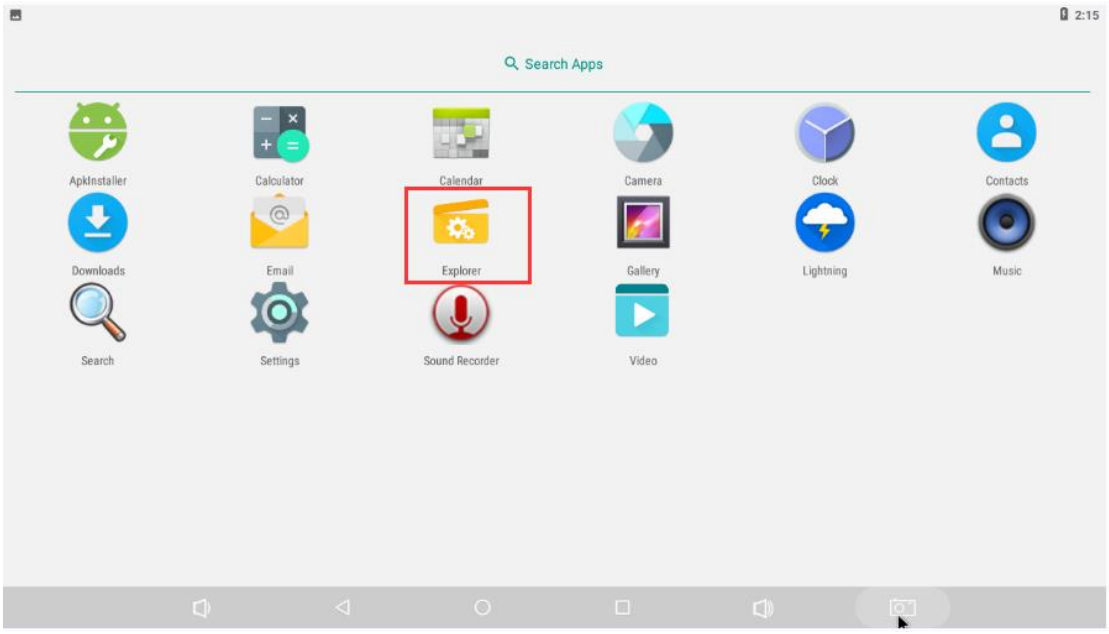


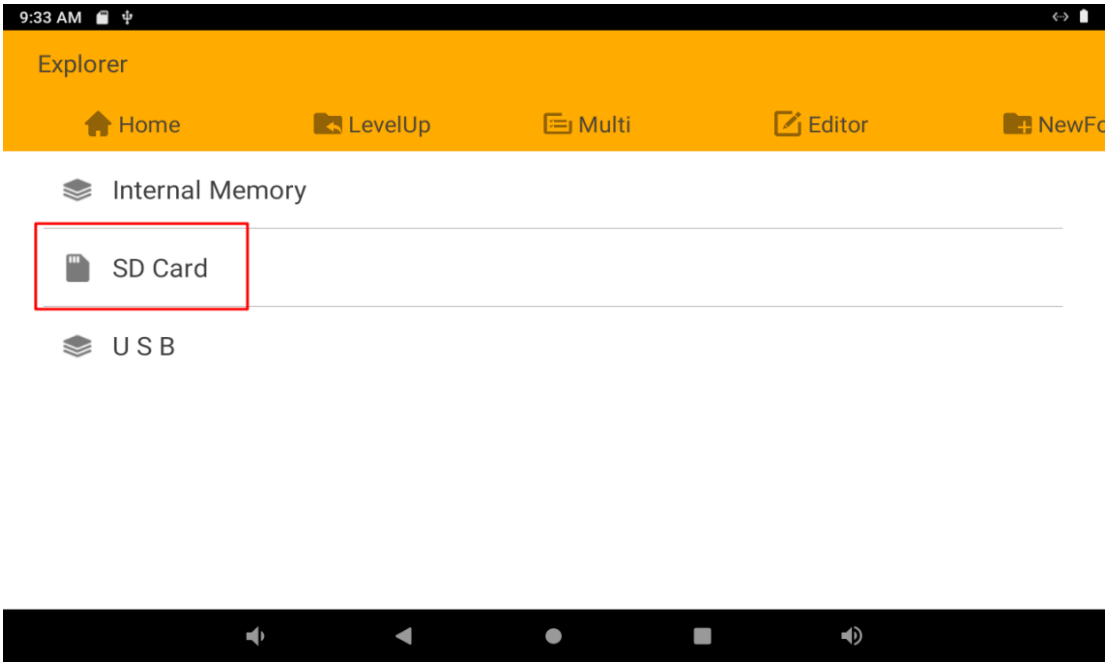
7.2 HDMI Display

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

7.3 SD Card

EM3128 supports SD Hot-plug.

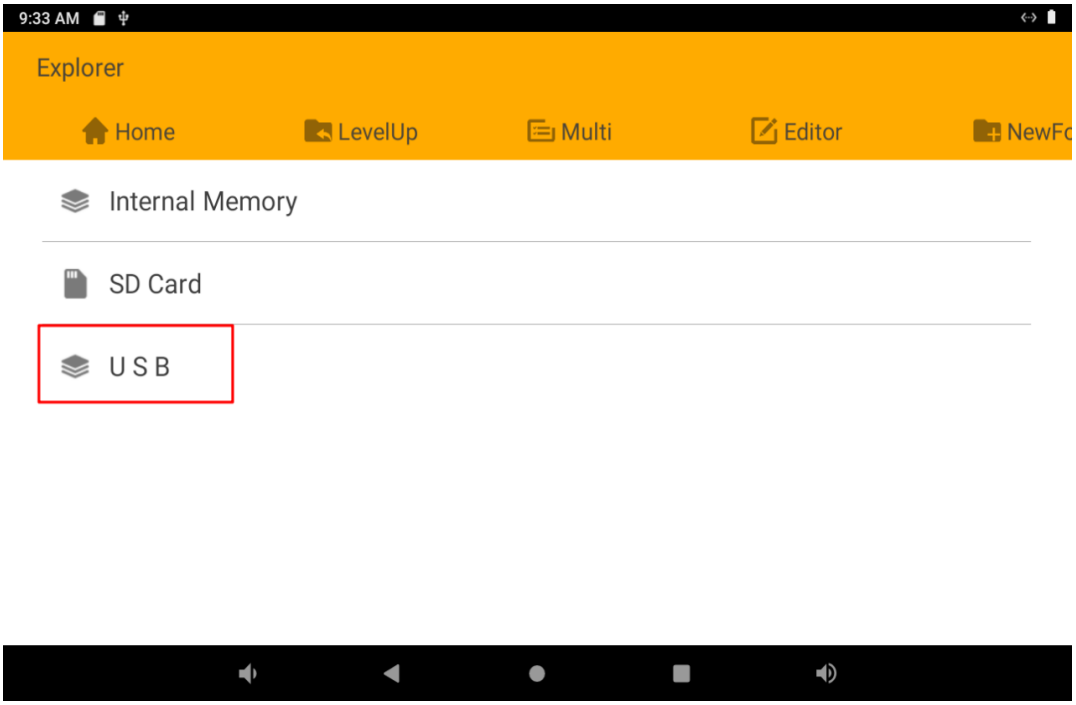




Note: SDcard and debug port function interfaces are shared, so you can only choose to use one of them.

7.3 USB Host

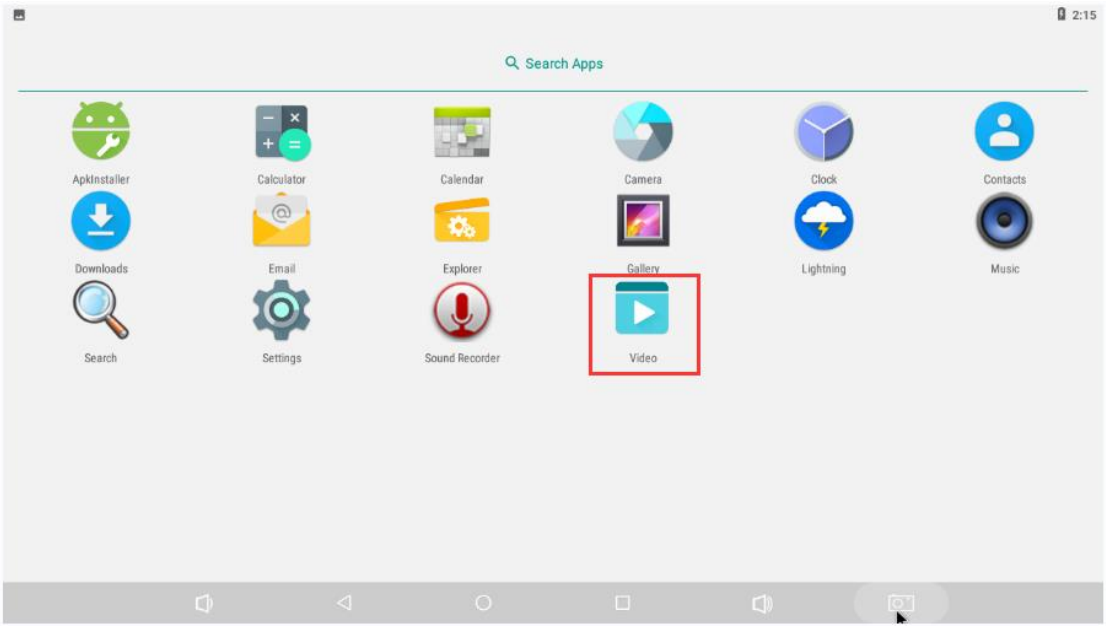
The USB Host can be used to connect USB mouse, USB keyboard, U-Disk or other USB devices.



7.4 Video Player

Copy Video file to sdcard or udisk insert the board. After power the board open **Video** and select file

to play.

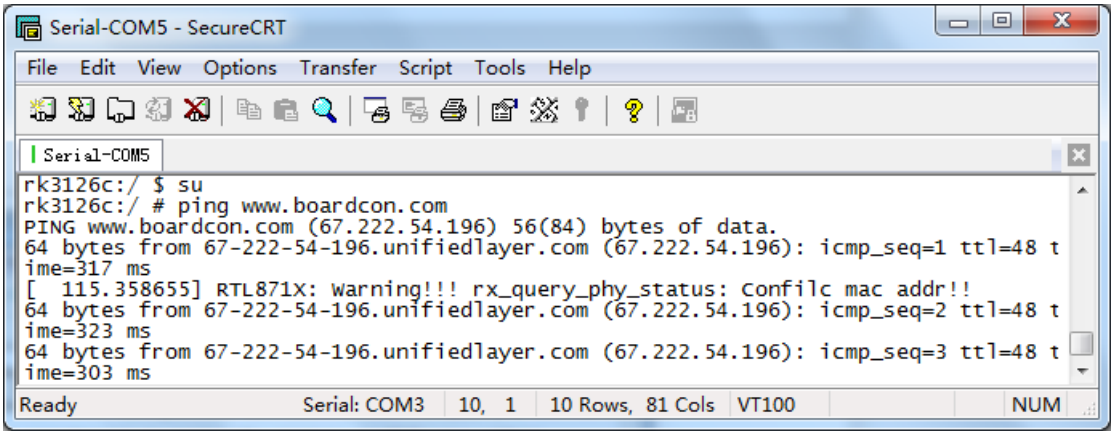


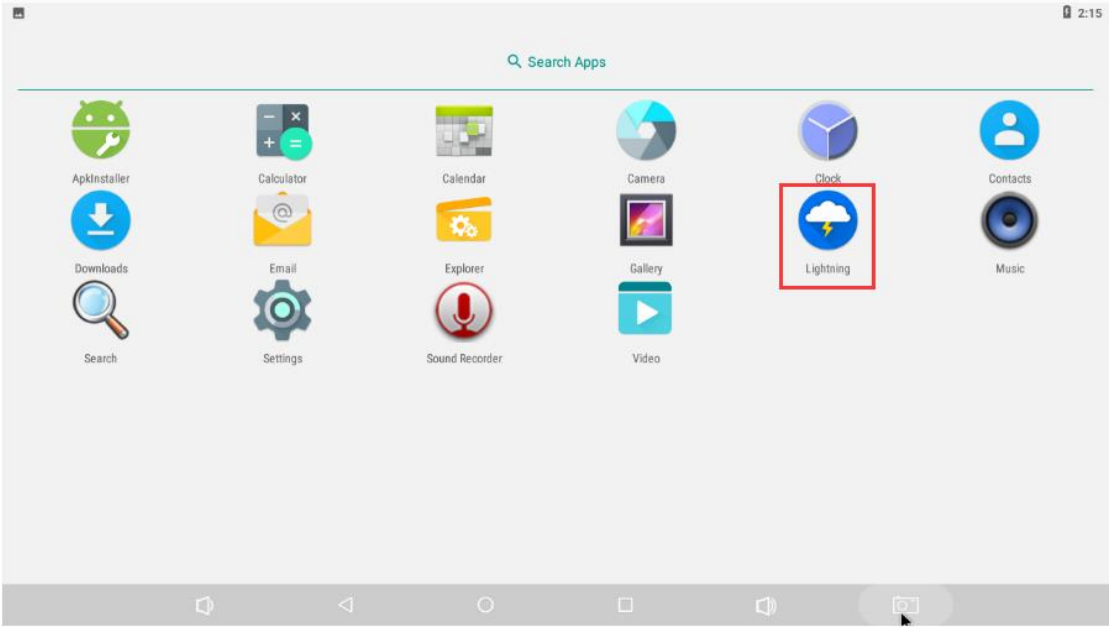
Note: The HDMI and earphone output audio sync.

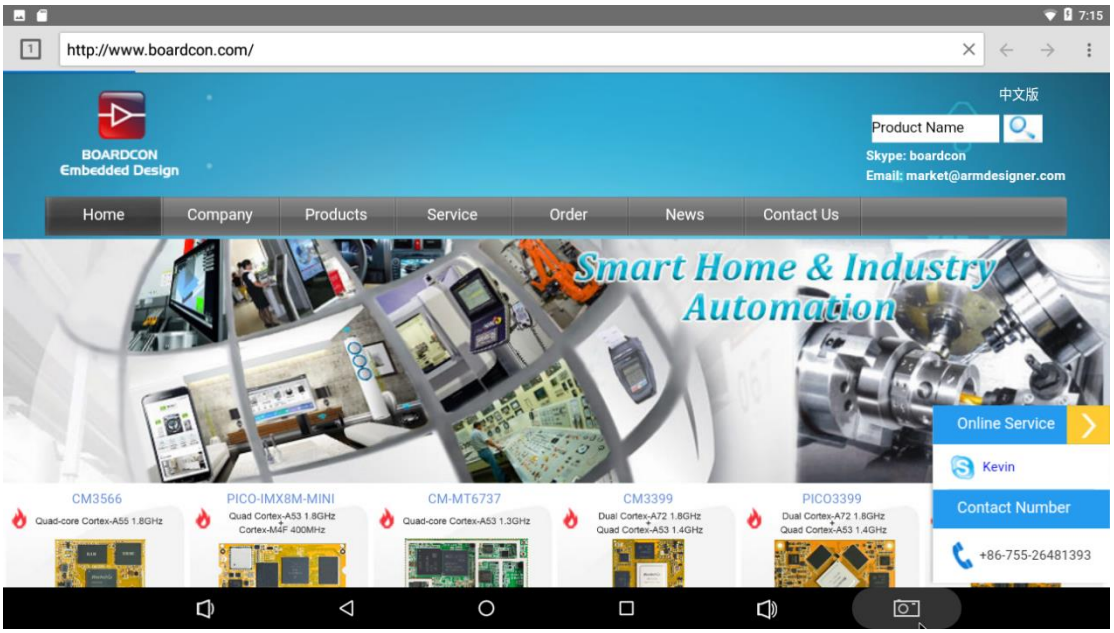
7.5 Ethernet

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.

```
# su
# ping www.boardcon.com
```


Serial-COM5 - SecureCRT
File Edit View Options Transfer Script Tools Help
Serial-COM5
rk3126c:/ $ su
rk3126c:/ # 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=48 time=317 ms
[115.358655] RTL871X: Warning!!! rx_query_phy_status: Confilc mac addr!!
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=2 ttl=48 time=323 ms
64 bytes from 67-222-54-196.unifiedlayer.com (67.222.54.196): icmp_seq=3 ttl=48 time=303 ms
Ready
Serial: COM3
10, 1
10 Rows, 81 Cols
VT100
NUM


2:15
Search Apps
ApkInstaller
Calculator
Calendar
Camera
Clock
Contacts
Downloads
Email
Explorer
Gallery
Lightning
Music
Search
Settings
Sound Recorder
Video

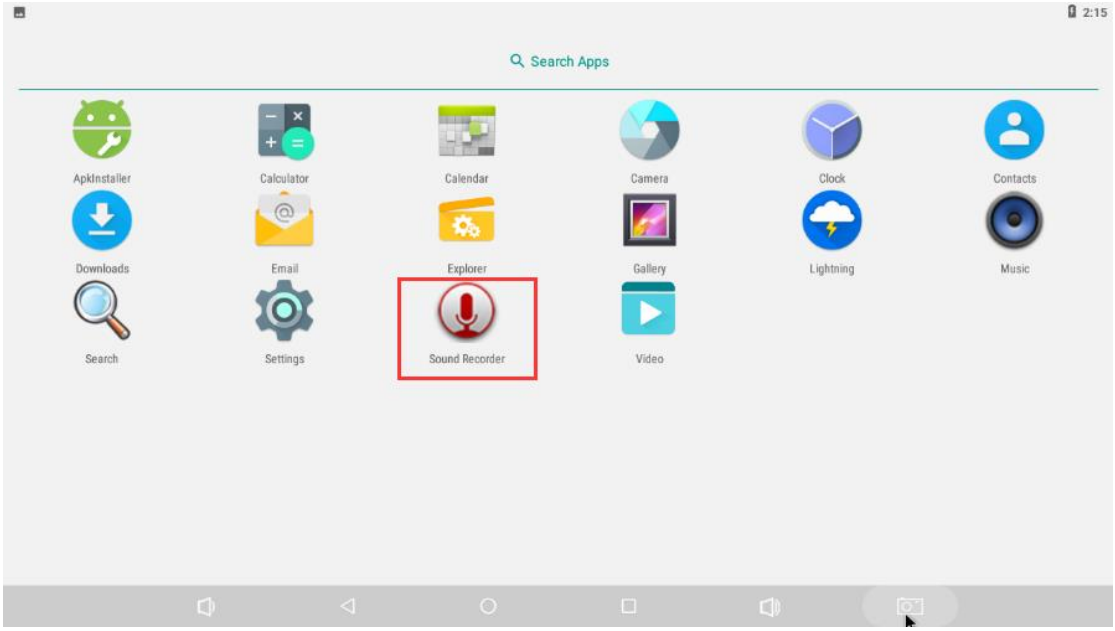

7:15
http://www.boardcon.com/
BOARDCON
Embedded Design
中文版
Product Name
Skype: boardcon
Email: market@armdesigner.com
Home
Company
Products
Service
Order
News
Contact Us
Smart Home & Industry Automation
Online Service
Kevin
Contact Number
+86-755-26481393
CM3566
PICO-IMX8M-MINI
CM-MT6737
CM3399
PICO3399

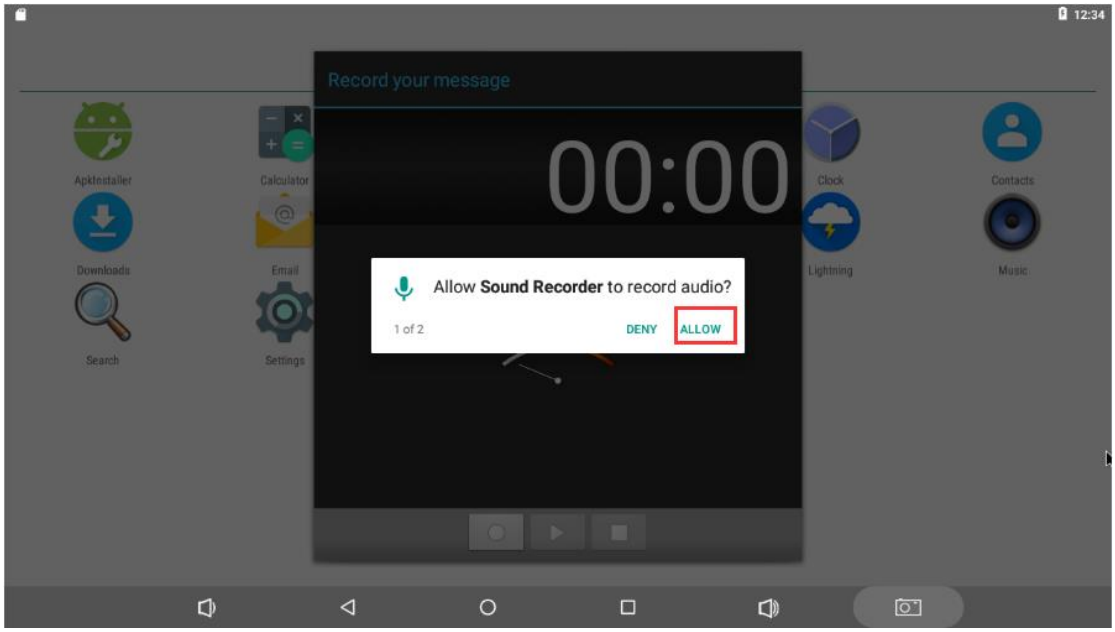
Note: ethernet and TTL port function interfaces are shared, so you can only choose to use one of them. The default use ethernet.

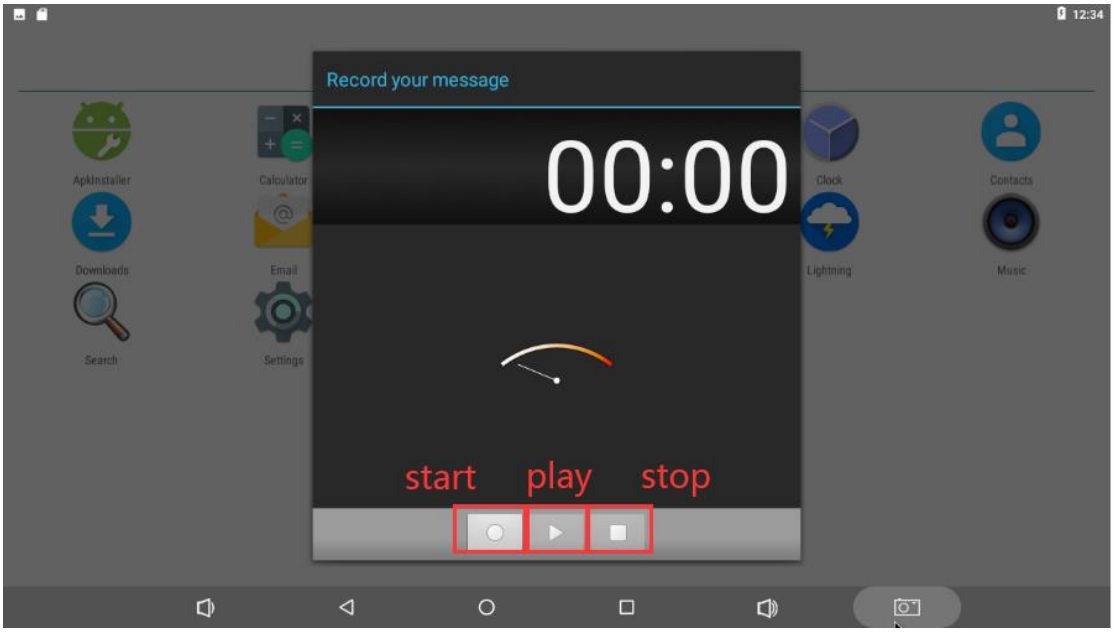
7.6 Record

Step 1, open the APP Recorder in Android.
Step 2, click on the APP to start recording, speech in front of the microphone then can record.

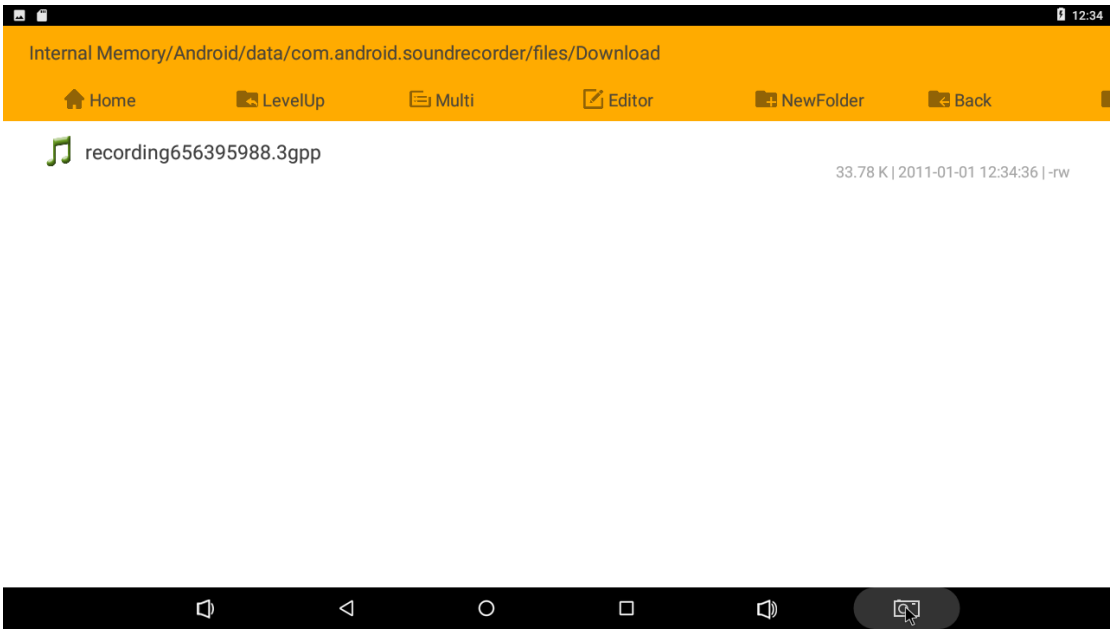
Note: Default microphone recording, if inserted the headset will switch to the headset recording automatically.







After finish recording, click **stop** menu and select **Done** to store file. The default storage path is **Internal Memory/Android/data/com.android.soundrecorder/files/Download**

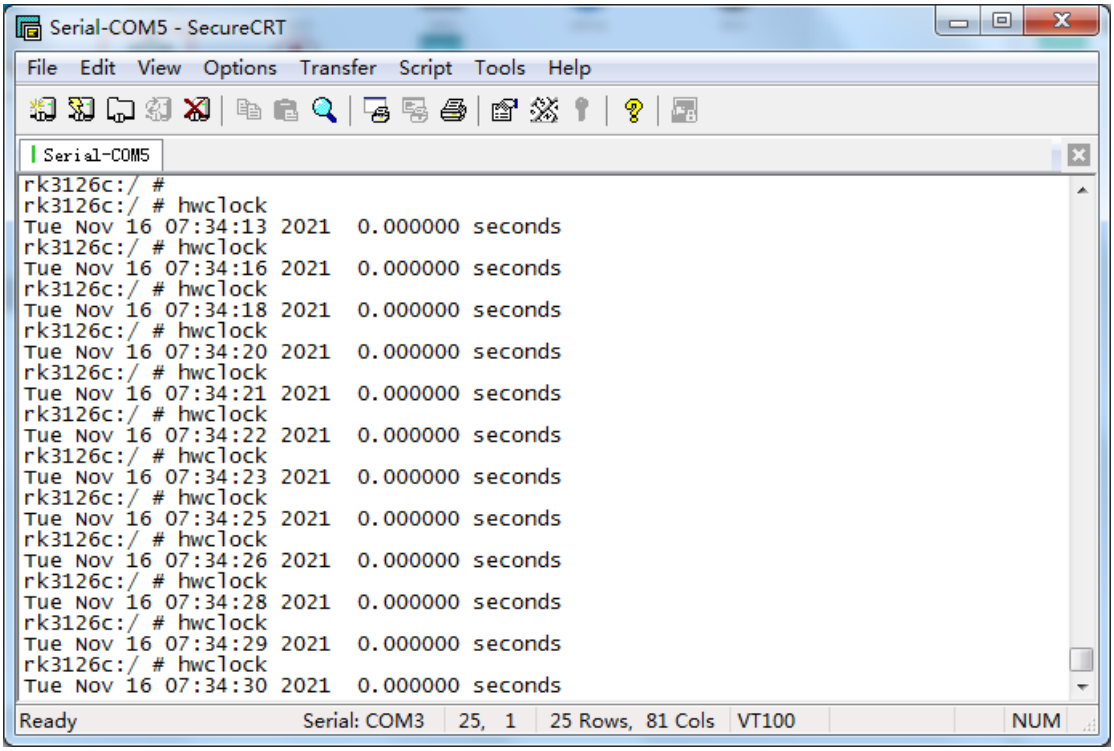


7.7 RTC

Execute the command **hwclock** at CRT terminal

hwclock

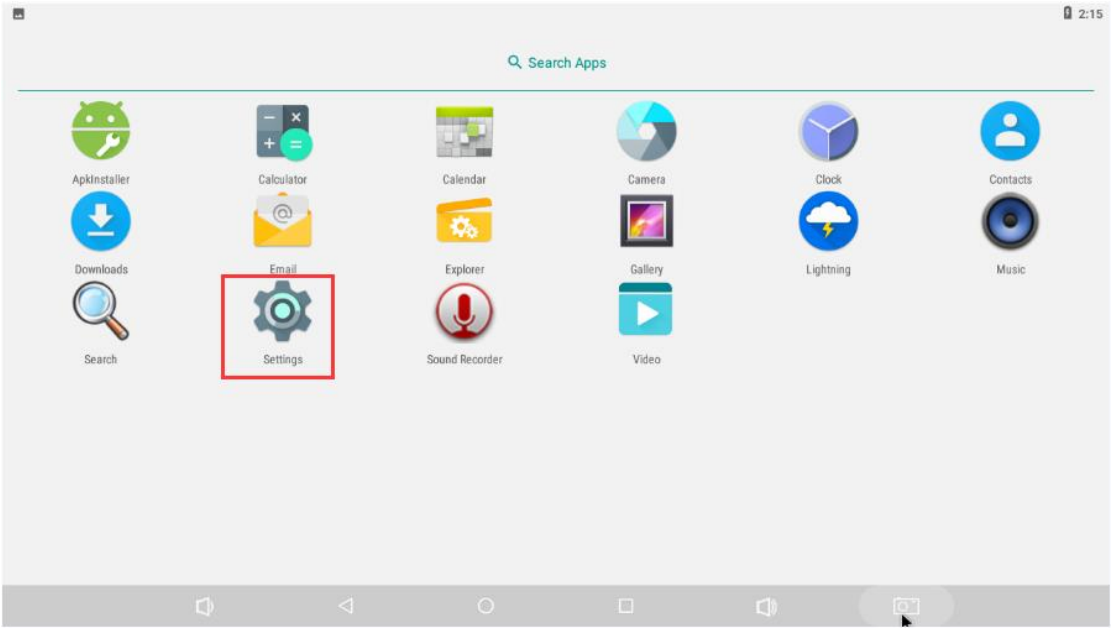
Wait a minute then run **hwclock** again, it can be seen the time has changed.

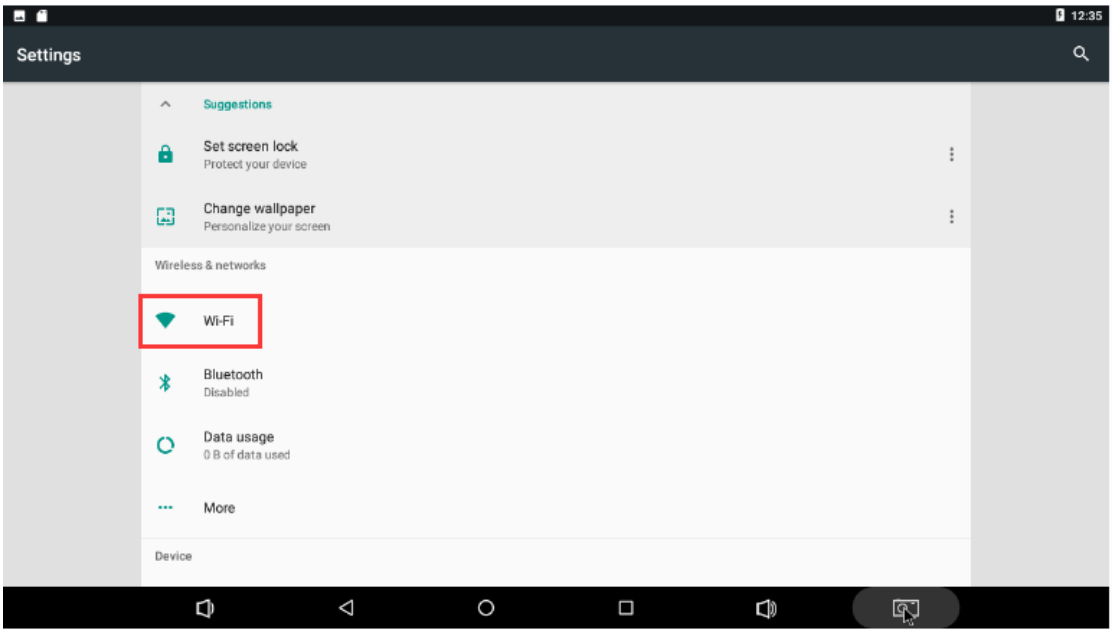


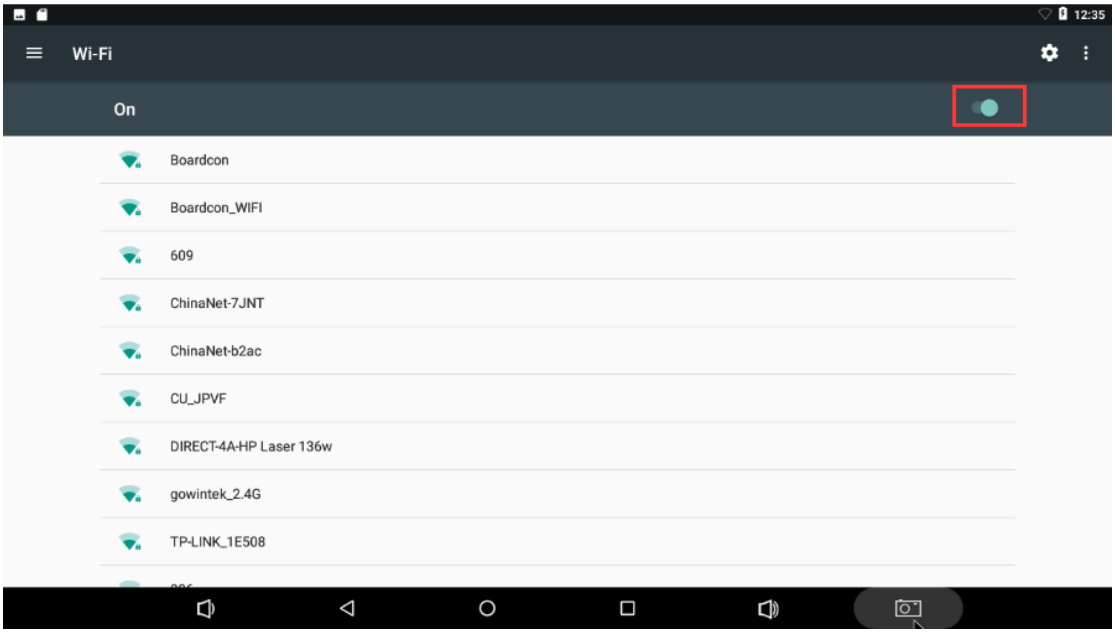
7.8 WiFi

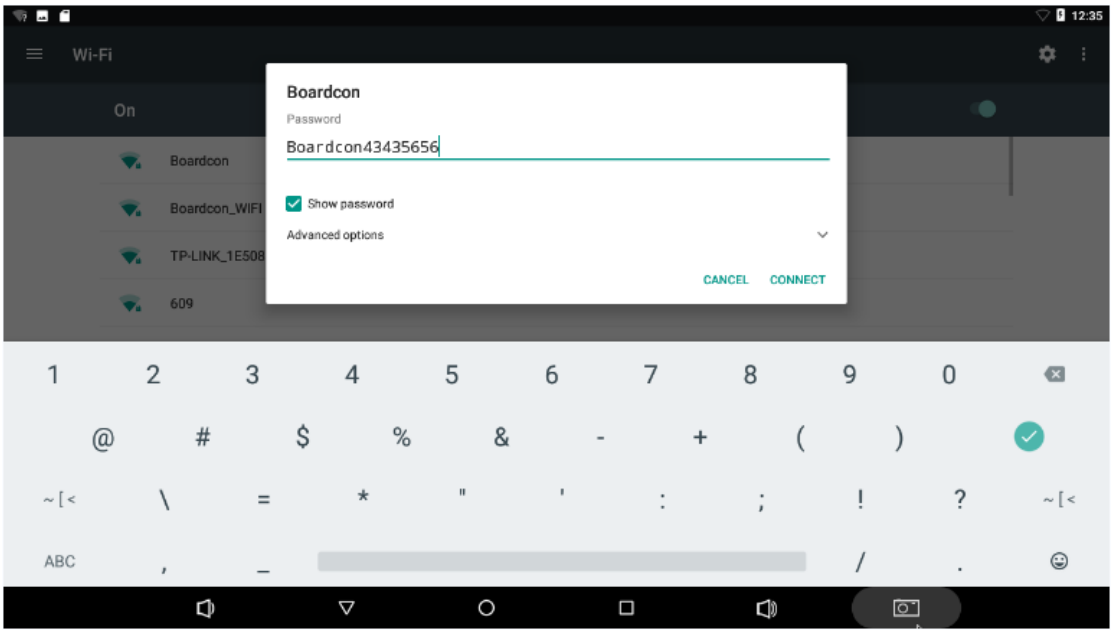
Connect the WiFi antenna, then click **Settings -> WiFi -> turn on**, select the SSID from the list of available networks and enter the password.

After connected, user can open the browser to browse the web.




12:35
Settings
Suggestions
Set screen lock
Protect your device
Change wallpaper
Personalize your screen
Wireless & networks
Wi-Fi
Bluetooth
Disabled
Data usage
0 B of data used
More
Device

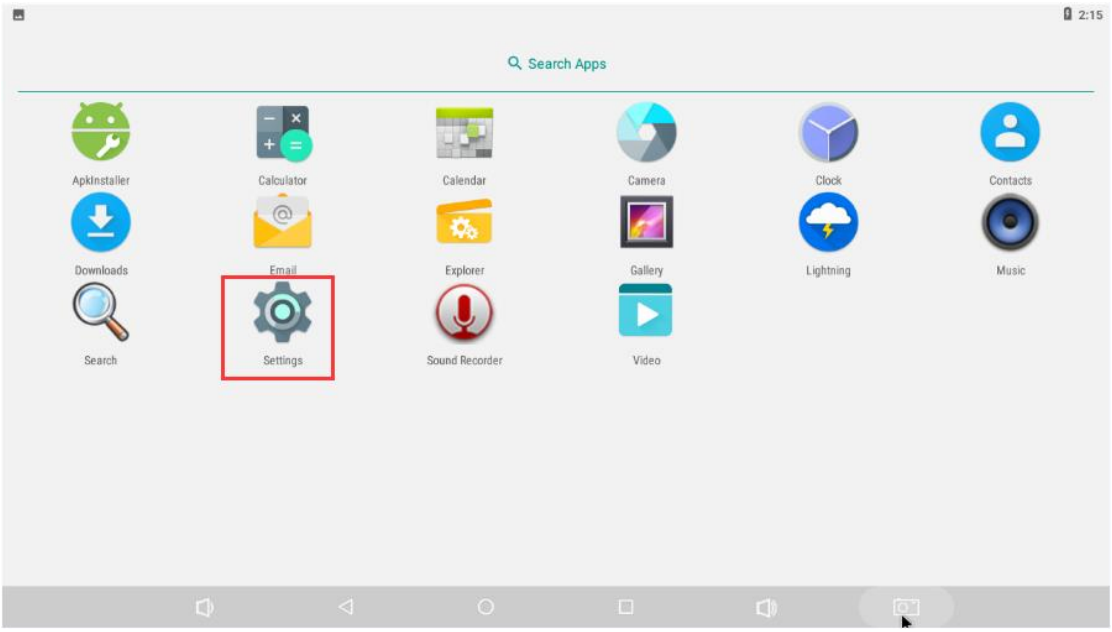

12:35
Wi-Fi
On
Boardcon
Boardcon_WIFI
609
ChinaNet-7JNT
ChinaNet-b2ac
CU_JPVF
DIRECT-4A-HP Laser 136w
gowintek_2.4G
TP-LINK_1E508

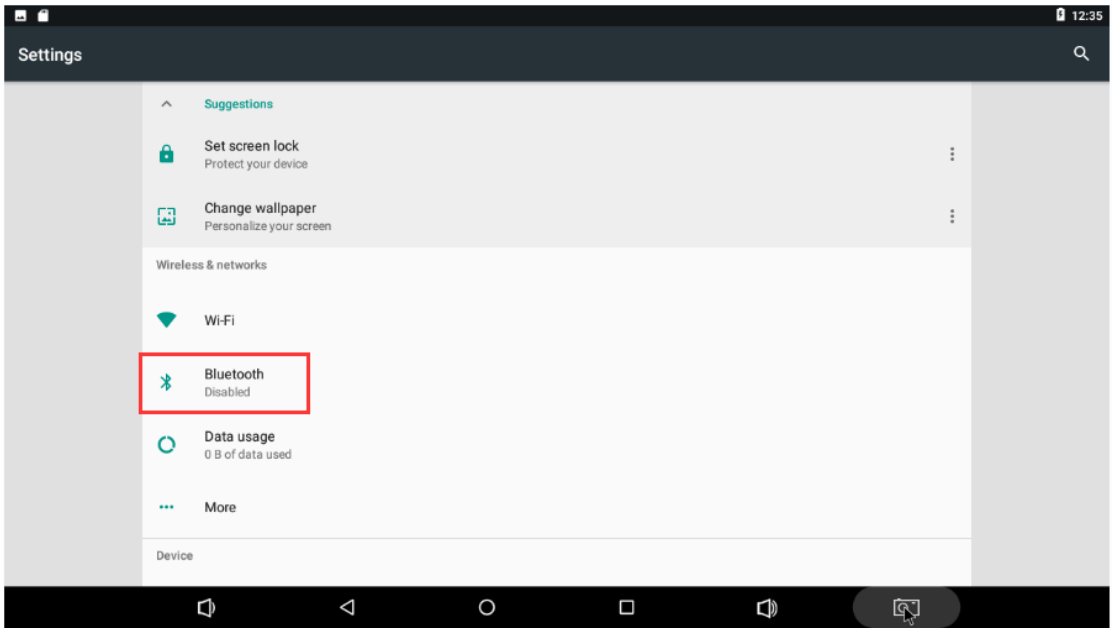


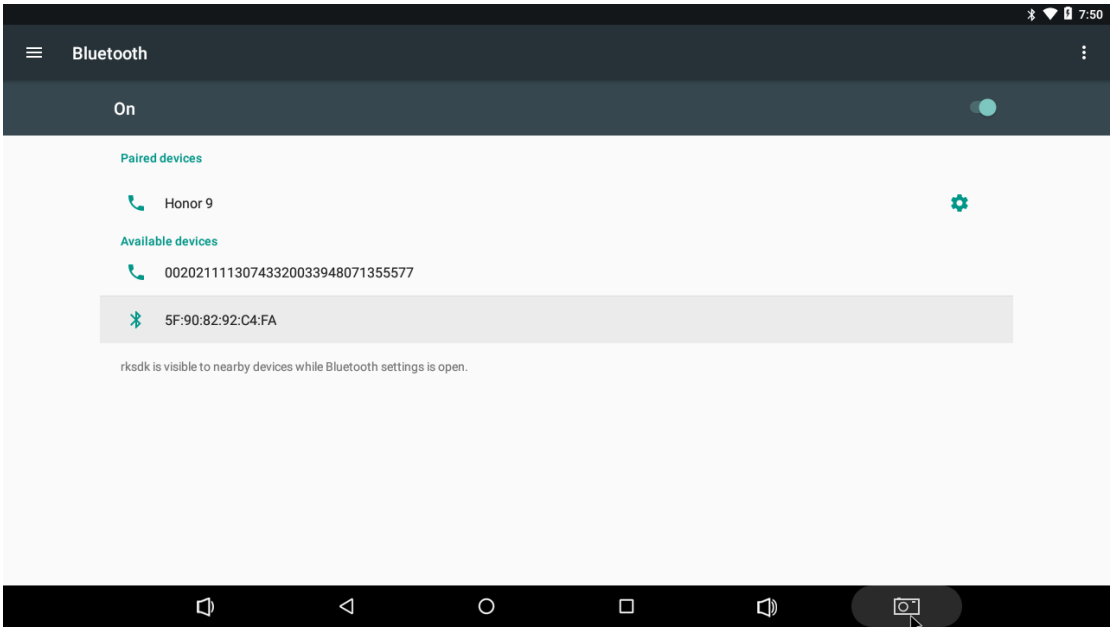
7.9 Bluetooth

Click **Settings ->Bluetooth -> turn on**

Select the available device in the list to pair.





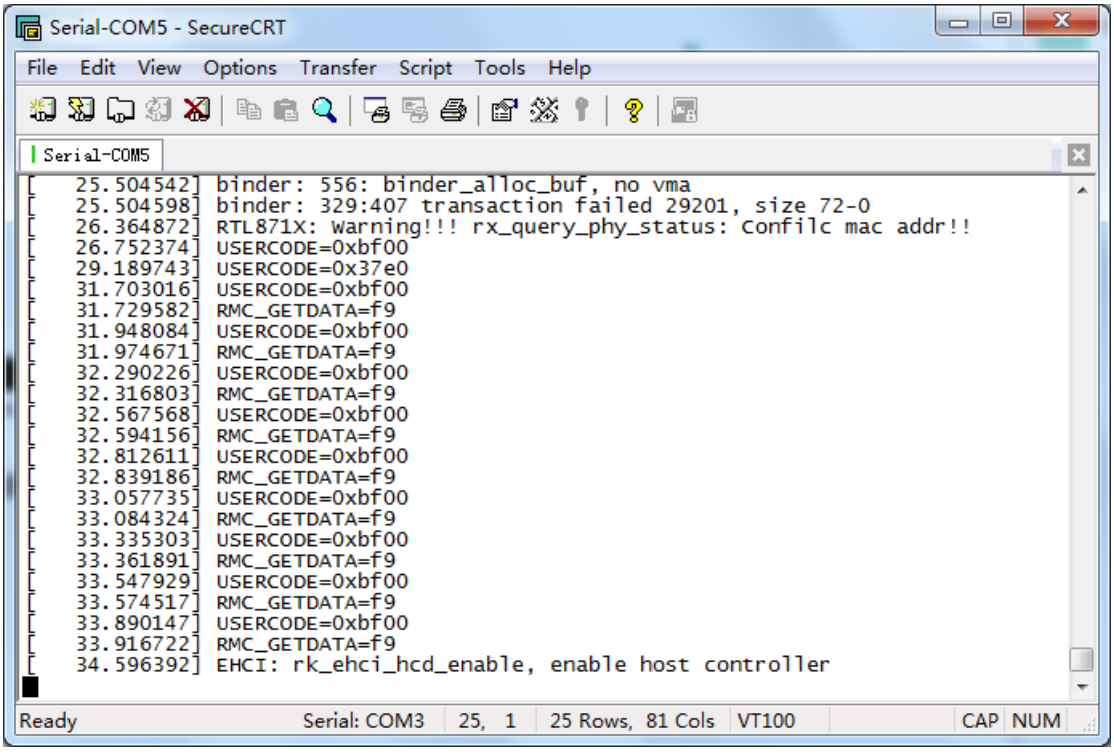


After pairing, devices can connect with each other automatically

7.10 IR

The EM3128 support IR receiver.

The infrared remote control is as follows:



7.10 OTG

Use the OTG usb cable to connect the PC and the EM3128 board before the system starts. After the system starts, The OTG is used as ADB. If connect the OTG to HOST device before startup, use it as HOST after startup.

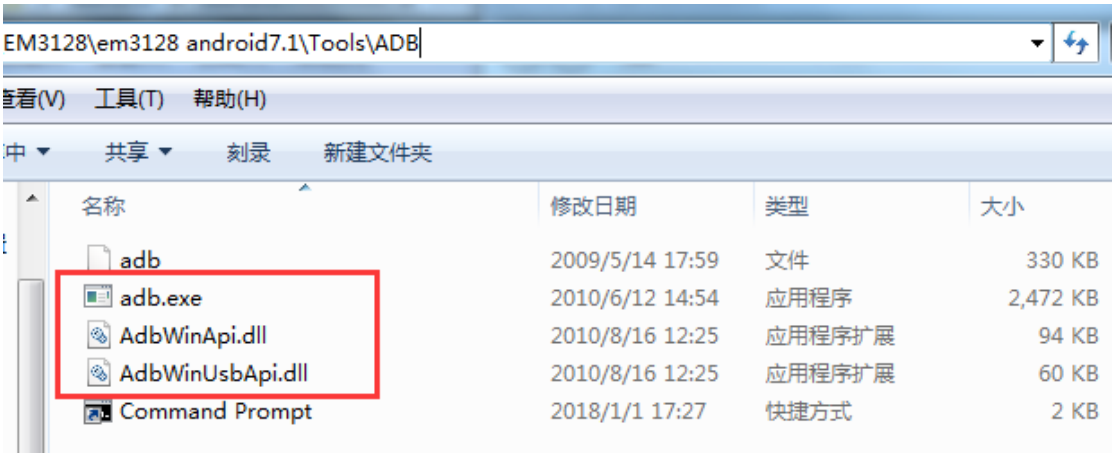
Install ADB and usb_adb_driver

Step 1, Install usb_adb_driver

Open cmd.exe **(path: Test\cmd.exe)**，Connect the OTG cable to the EM3128 and the computer before powering on. After powering on the board. If the computer has never installed the usb adb driver(tools\ADB\usb_adb_driver), the computer will report that “new hardware has been found”. and the user needs to install the driver at this time.

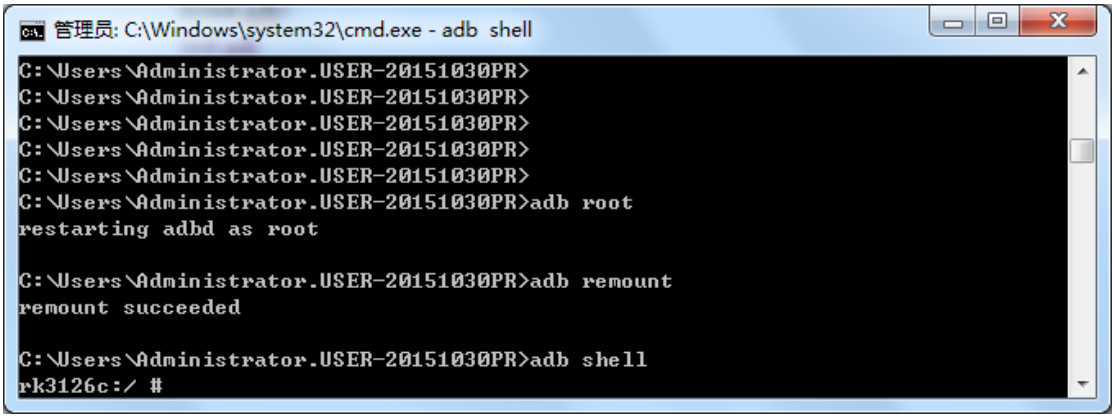
Step 2, Install ADB

Install ADB only need to copy the three files in **Tools/ADB** to **\\WINDOWS\system32.** After copy can use the ADB.



After install open cmd.exe **(path: Tools\ADB\Command Prompt)**，execute follow command in cmd to test adb：

root adb

adb remount

adb shell