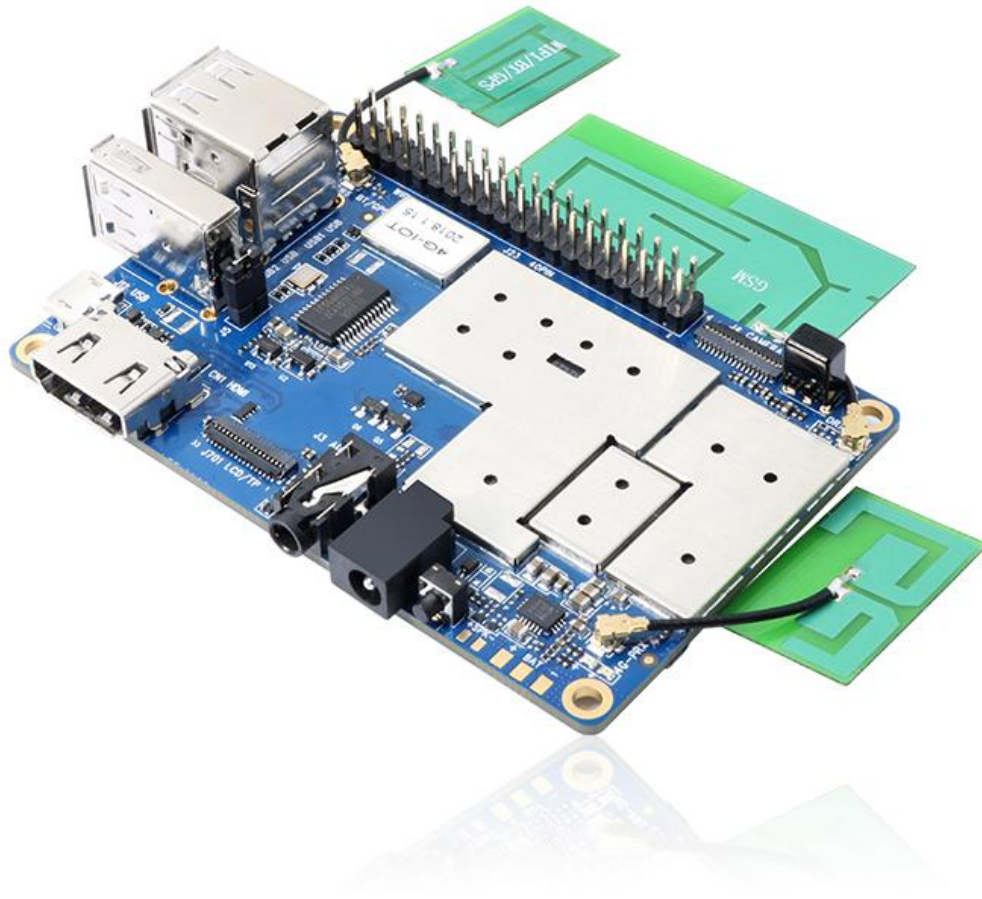




Orange Pi 4G-IoT User Manual





History

Ver	Data	Author	Brief	Publish	Memo
1.1	2018-01-26	Younix	Create File	2018-3-27	
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Contents

I. Orange Pi Introduction.....	1
1. What is Orange Pi 4G-IOT?.....	1
2. What can I do with Orange Pi 4G-IOT?.....	1
3. Who is it for?.....	1
4. Orange Pi 4G-IOT Hardware Specification.....	1
Interface instructions:.....	4
II. Using Method.....	5
1. Prepare the Hardware and Software.....	5
2. Power Methods.....	5
3. Before Usage.....	5
III. Android Compilation Environment Construction.....	7
1. Download SDK compression package.....	7
2. Construct Compilation Environment.....	7
3. Compilation of SDK Source Code.....	8
4. Generated Firmware.....	10
IV. Android Firmware Flashing.....	12
1. Flash Tool Introduction.....	13
2. Method for Image Flashing.....	14
3. FAQ.....	17



I. Orange Pi Introduction

1. What is Orange Pi 4G-IOT?

It's an open-source single-board computer. It can run Android 6.0 Image. It uses the MTK serial MT6737 SoC, and has 1GB DDR3 SDRAM.

2. What can I do with Orange Pi 4G-IOT?

You can use it to build...

- A computer
- A wireless server
- Games
- Music and sounds
- HD video
- A speaker
- Android
- Scratch

Pretty much anything else, because Orange Pi 4G-IOT is open source.

3. Who is it for?

Orange Pi 4G-IOT is for anyone who wants to start creating with technology – not just consuming it. It's a simple, fun, useful tool that you can use to start taking control of the world around you.

4. Orange Pi 4G-IOT Hardware Specification

Orange Pi 4G-IoT Specification	
Processor	MT6737



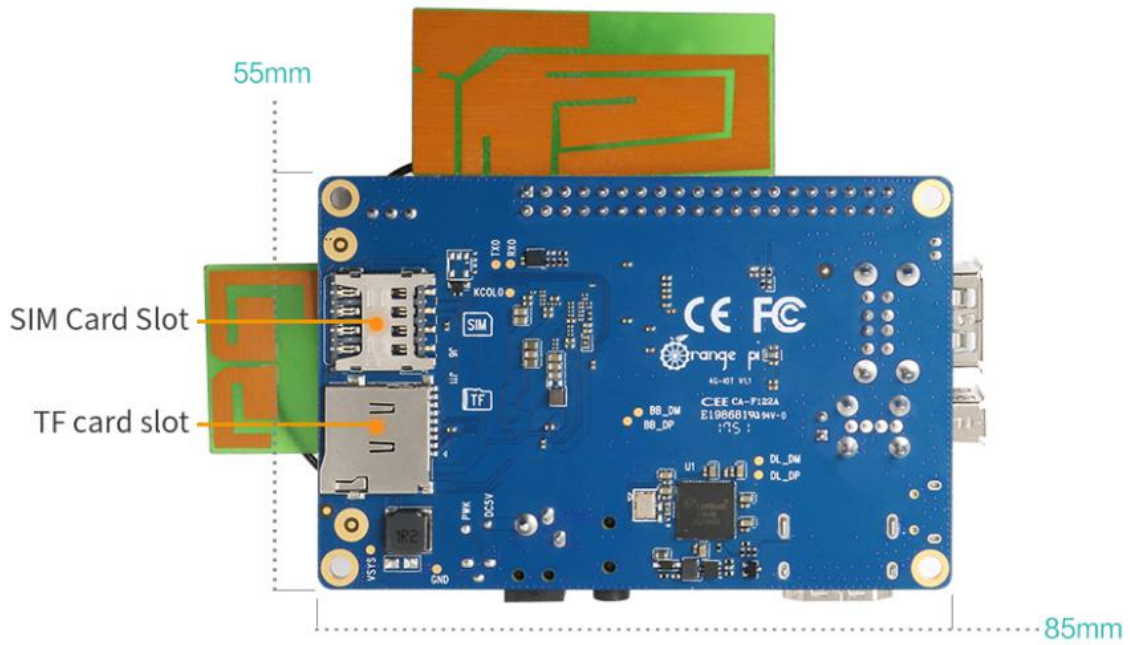
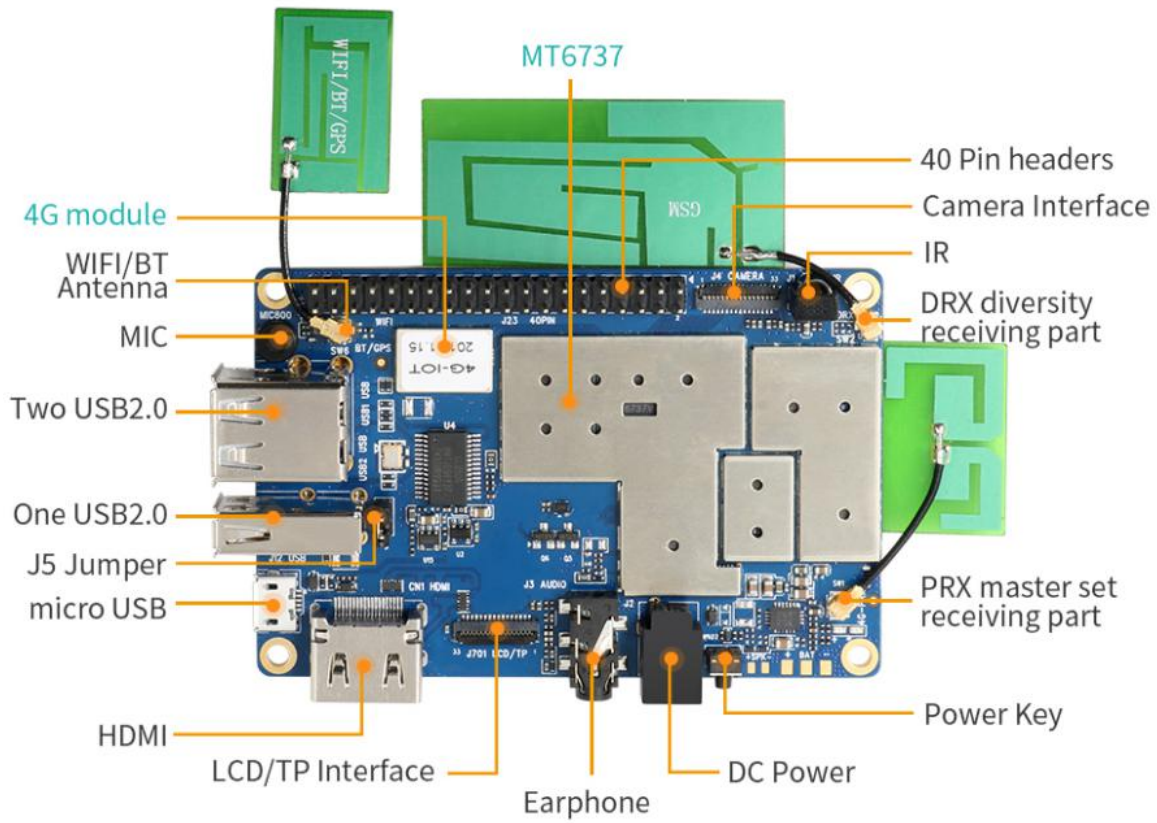
CPU		Quad core ARM® Cortex-A53, Main frequency up to 1.25GHz
GPU		ARM Mali-T720 MP1
Memory		1GB DDR3
Emmc		8GB EMMC Flash
Wireless		WIFI / BT / FM / GPS Four in one
Radio frequency	GSM	900/1800 (850/1900 optional)
	WCDMA	B1/B8 (B2/B4/B5 optional)
	TD-CDMA	/
	CDMA2000	/
	FDD-LTE	B1/B3/B7/B20 (B2/B4/B17 optional)
	TDD-LTE	B38/40/41B
Display		HD
Capacitance touch		Support
Camera		13M (25pin ZIF Connector)
Accelerometer Sensor		Support
IR Control		Support (Adapted iDroid remote controller)
Fingerprint Identification		Support
SIM Card		mini Single SIM Card
TF Card		Support hot-plugging
Audio	Earphone	For audio input / output
	Mic	For audio input
USB	USB Host × 3	Support OTG
	Micro USB × 1	Only for writing image
LED	Power Indicator LED	Red
	Status Indicator LED	Green
Key		Power
HDMI		Support



Low-level peripherals	40pin Headers	1.8V, SPI \times 2 , I2C \times 3, UART \times 2
Power	DC	5V 2A
	Battery	Connection through a weld plate
OS/Software		
OS	Android 6.0	
Programming support	C、C++、 Kotlin、 Java、 Shell、 Pyhon	
Interface definition		
Size	55mm*85mm	
Weight	43g	
Orange Pi™ is trademark of Shenzhen Xunlong Software CO., Limited		



Interface instructions:





II. Using Method

1. Prepare the Hardware and Software

Hardware Requirement:

- Orange Pi 4G-IoT Development Board
 - A PC for compilation with following specs:
 - 64bit CPU
 - Up to 16GB RAM
 - UP to 40GB spare disk space
 - Operation system should up to Ubuntu12.04, it would be better if it is Ubuntu16.04
- You could refer to Google file for more details: <https://source.android.com/source/building>

Software Requirement:

- Orange Pi 4G-IoT SDK
- Orange Pi 4G-IoT Firmware
- Android-image-flash-tool

2. Power Methods

There are two methods for power supply:

- DC (5V 2A) in for power:
- Battery in for power:

Usually use 3.7V battery to solder on the back side of the development board.

3. Before Usage

After receiving the product, please put the antennas of the product from the position of Pic 1 to the position of Pic 2 (or to the outside of the board), which can not be attached to the board so as not to affect the signal.



Pic 1

Pic 2



III. Android Compilation Environment Construction

1. Download SDK compression package

- **Android 6.0**

Take OrangePi_4G-IoT_Android6.0_V1.0_2018_0126.tar.gz as an example, after get the original compression package:

```
mkdir OrangePi_4G-IoT
tar zxvf OrangePi_4G-IoT_Android6.0_V1.0_2018_0126.tar.gz -C
OrangePi_4G-IoT
cd OrangePi_4G-IoT
```

- **Android 8.1**

After downloaded compression package, you will have 11packages named x00, x01, x02, x03 ...x10.Put packages on the same directory like the following:

```
Create directory
mkdir OrangePi_4G-IOT_Android8.1
Copy compress package
cp -rf x00 x01 x02 ... x10
Merge compression package
cat x*>OrangePi_4G-IOT_Android8.1.tar.gz
Decompression
tar xzvf OrangePi_4G-IOT_Android8.tar.gz
```

2. Construct Compilation Environment

It could also refer to Google file: <http://source.android.com/source/initializing.html>

- **Install JDK**

Compilation of Android6.0 is based on JAVA7, it needs to first install OpenJDK before compilation.

Command for installing:

```
sudo apt-get install openjdk-7-jdk
```

Configure environment variable of JAVA, here is the path for installation:



```
/usr/lib/jvm/java-7-openjdk-amd64
```

It could configure on the terminal with the following command:

```
export JAVA_HOME=/usr/lib/jvm/java-7-openjdk-amd64
export PATH=$JAVA_HOME/bin:$PATH
export CLASSPATH=.:$JAVA_HOME/lib:$JAVA_HOME/lib/tools.jar
```

● Install Software Package

For Ubuntu12.04:

```
sudo apt-get update
sudo apt-get install git-core gnupg flex bison ccache gperf libssl1.2-dev
libesd0-dev libxgtk2.6-dev build-essential zip curl libncurses5-dev
zlib1g-dev valgrind libc6-dev lib32ncurses5-dev x11proto-core-dev
libx11-dev lib32readline-gplv2-dev lib32z1-dev libgl1-mesa-dev gcc-4.4
g++-4.4 g++-4.4-multilib g++-multilib mingw32 tofrodos python-markdown
libxml2-utils xsltproc wine
```

For Ubuntu14.04:

```
sudo apt-get update
sudo apt-get install git-core gnupg flex bison ccache gperf libssl1.2-dev
libesd0-dev libxgtk2.8-dev build-essential zip curl libncurses5-dev
zlib1g-dev valgrind libc6-dev lib32ncurses5-dev x11proto-core-dev
libx11-dev lib32readline-gplv2-dev lib32z1-dev libgl1-mesa-dev
g++-multilib g++-4.8-multilib mingw32 tofrodos python-markdown
libxml2-utils xsltproc libc6-dev-i386 lib32z1 lib32ncurses5 lib32bz2-1.0
lib32readline-gplv2-dev wine
```

We could process to SDK compilation after finished the above.

3. Compilation of SDK Source Code

There are many compilation shell scripts for development.

● Android 6.0

The directory would be: SDK/code/orangepi/scripts

```
$ cd code/orangepi/scripts
$ ls
```



```
anr_LM.sh auto.sh clean.sh codegen.sh init_project.sh tar_img.sh
```

auto.sh is automatically compilation script

clean.sh automatically scavenging the compiled result script

On the directory of code/orangepi/scripts, execute the automatically compilation script:

```
$ ./auto.sh IoT_bd6737m_35g_b_m0_op_smt_hd720_pcb_v2 v00 eng
```

The meaning of the parameter is:

#\$1 project_info [eg: IoT_bd6737m_35g_b_m0_op_smt_hd720_pcb_v2]

#\$2 version_info [eg: v00 v01 ...]

#\$3 compile_mode [eng:user userdebug eng]

● Android 8.1

The directory would be: SDK/code/orangepi/scripts

```
$ cd code/orangepi/scripts
$ ls
anr_LM.sh auto.sh clean.sh codegen.sh init_project.sh tar_img.sh
```

auto.sh--scripts for automatic compilation

clean.sh--scripts for automatically cleaning the compiled result

On the directory of code/orangepi/scripts, execute automatic compilation scripts:

```
$ ./auto.sh IoT_k37mv1_bsp_ry_smt_hd720_pcb_v2 v00 eng
```

Definition of the three parameters:

#\$1 project_info [eg: IoT_k37mv1_bsp_ry_smt_hd720_pcb_v2]

#\$2 version_info [eg: v00 v01 ...]

#\$3 compile_mode [eng:user userdebug eng]

Execute command to compile:

```
source build/envsetup.sh
```

```
luncher ----->full_k37mv1_bsp-eng
```

```
make -j4
```

Module compilation



Here would take an example of only compilation launcher:

mm packages/apps/Launcher3/ or enter into directory of packages/apps/Launcher3/, execute mm

Please note that some modules depend on the relationship of package, you need to run mma.

4. Generated Firmware

● Android6.0

After compiled, the firmware will gather in the directory of: code/IoT_op_smt_hd720_pcb_v2, pack it and name it like the following: IoT_op_smt_hd720_pcb_v2_v00_eng_20180126140300.tar.gz

```
$ tree IoT_op_smt_hd720_pcb_v2
IoT_op_smt_hd720_pcb_v2
├── images
│   ├── boot.img
│   ├── cache.img
│   ├── lk.bin
│   ├── logo.bin
│   ├── MT6737M_Android_scatter.txt
│   ├── preloader_bd6737m_35g_b_m0.bin
│   ├── recovery.img
│   ├── secro.img
│   ├── system.img
│   ├── trustzone.bin
│   └── userdata.img
└── modem
    ├── APDB_MT6735_S01_alps-mp-m0.mp1_W17.21
    ├── _APDB_MT6735_S01_alps-mp-m0.mp1_W17.21.check
    └── APDB_MT6735_S01_alps-mp-m0.mp1_W17.21_ENUM
```

Except the above method, it could also be generated into update.image via Linux_Pack_Firmware.

● Android8.1

After compiled, the firmware will gather in the directory of: code/IoT_ry_smt_hd720_pcb_v2, pack it and name it like the following: IoT_ry_smt_hd720_pcb_v2_v09_eng_20180504163653.tar.gz

```
$ tree IoT_op_smt_hd720_pcb_v2
IoT_op_smt_hd720_pcb_v2
├── images
│   ├── boot.img
│   ├── cache.img
│   ├── lk.bin
│   └── logo.bin
```

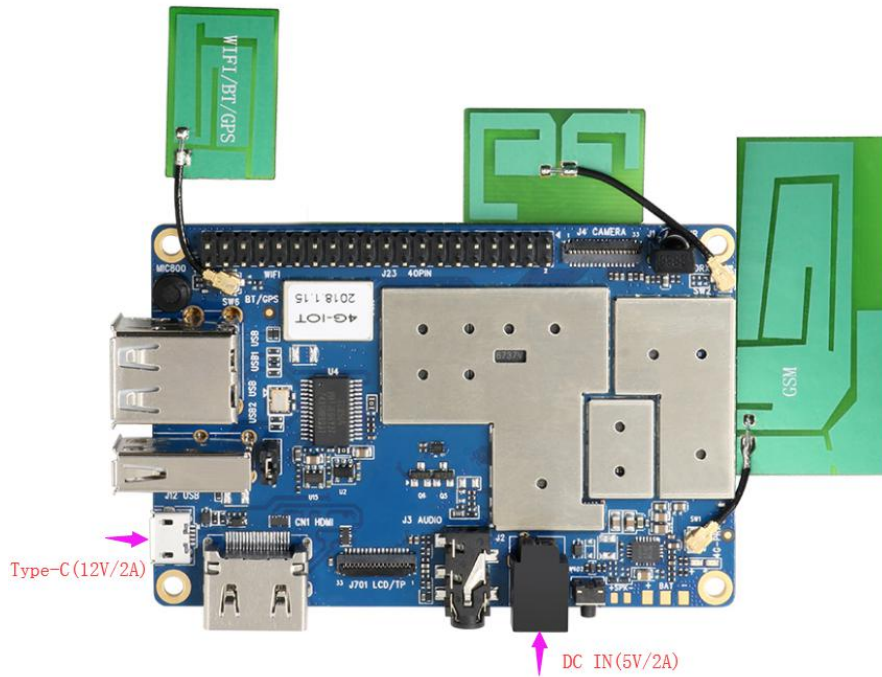


```
|
|   |—— MT6737M_Android_scatter.txt
|   |—— preloader_k37mv1_bsp.bin
|   |—— recovery.img
|   |—— secro.img
|   |—— system.img
|   |—— trustzone.bin
|   |—— userdata.img
|—— modem
|   |—— APDB_MT6735_S01_alps-mp-m0.mp1_W18.04
|   |—— _APDB_MT6735_S01_alps-mp-m0.mp1_W18.04.check
|   |—— APDB_MT6735_S01_alps-mp-m0.mp1_W18.04_ENUM
```



IV. Android Firmware Flashing

Relevant keys and connectors for firmware flashing of **Orange Pi 4G-IoT**:



List of generated firmwares:

IoT_op_smt_hd720_pcb_v2

- ├── images
 - | ├── boot.img
 - | ├── cache.img
 - | ├── lk.bin
 - | ├── logo.bin
 - | ├── MT6737M_Android_scatter.txt
 - | ├── preloader_bd6737m_35g_b_m0.bin
 - | ├── recovery.img
 - | ├── secro.img
 - | ├── system.img
 - | ├── trustzone.bin
 - | └── userdata.img
- └── modem
 - | └── APDB_MT6735_S01_alps-mp-m0.mp1_W17.21



- └── _APDB_MT6735_S01_alps-mp-m0.mp1_W17.21.check
- └── APDB_MT6735_S01_alps-mp-m0.mp1_W17.21_ENUM

You could download the packed image partition files from the official website:
<http://www.orangepi.org/downloadresources/>

Unzip the file with the following command:

```
$ tar zxvf IoT_op_smt_hd720_pcb_v2_v00_eng_20180126140300.tar.gz
```

You could get the file which mentioned on the list of generated files, or you could also compile it by yourself with reference of to the part of Android Compilation Environment Construction.

Supporting OS of PC:

- Windows 10
- Windows 7 (32/64 bit)
- Windows 8 (32/64 bit)
- Ubuntu10.04 / 12.04 / 14.04 (32/64bit)

1. Flash Tool Introduction

You could download the **Smart Phone Flash Tool** on the download page of Orange Pi 4G-IoT part. There are tools for Windows and Linux version, you could select a suitable version according to your PC environment.

Interface like the following:





Using method for both Windows and Linux versions are same, here will illustrate with Linux version.

2. Method for Image Flashing

- **Unzip and open flash tool**

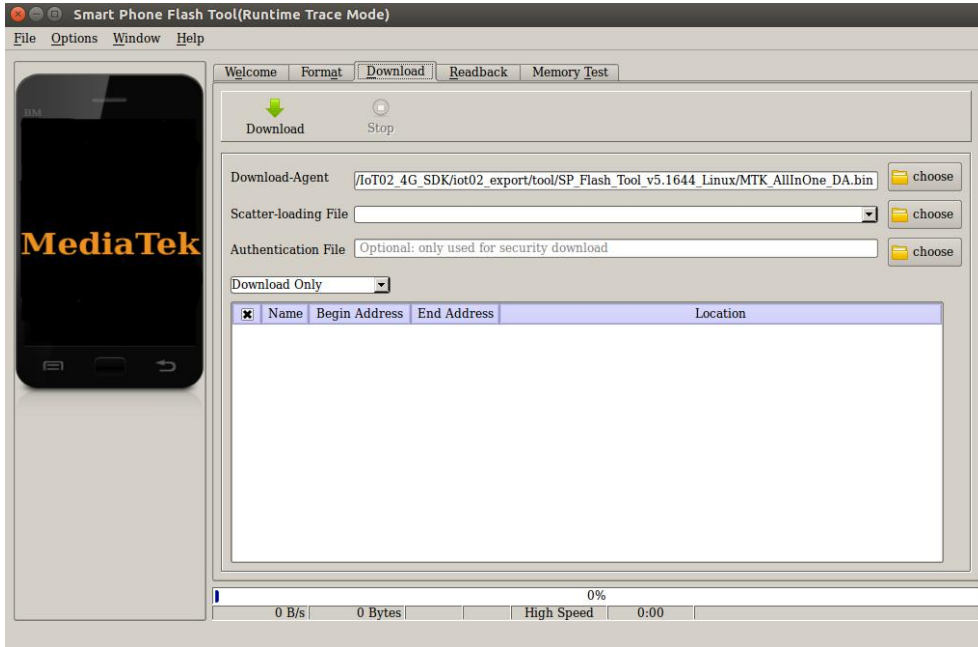
```
$ unzip SP_Flash_Tool_v5.1644_Linux.zip  
$ cd SP_Flash_Tool_v5.1644_Linux  
$ sudo ./flash_tool.sh
```

If it is the first time you use this software, you might receive the warn like the following. It is normal to receive this, you could click OK enter into the software. In the future you could manually specified the path of Scatter File.

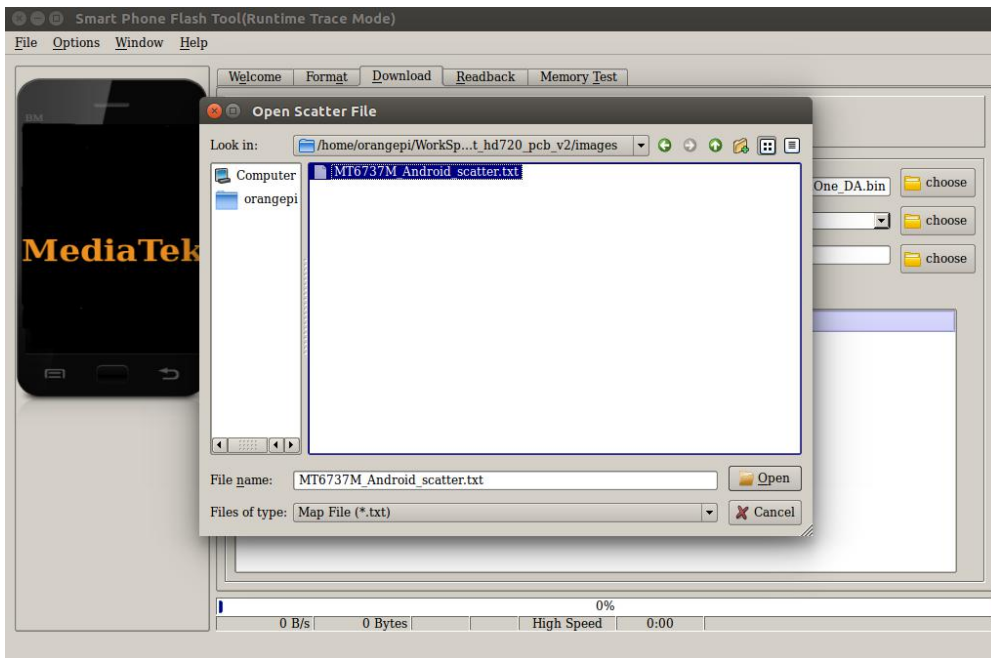


- **Enter into flash mode**

a. Switch into Download page like the following:

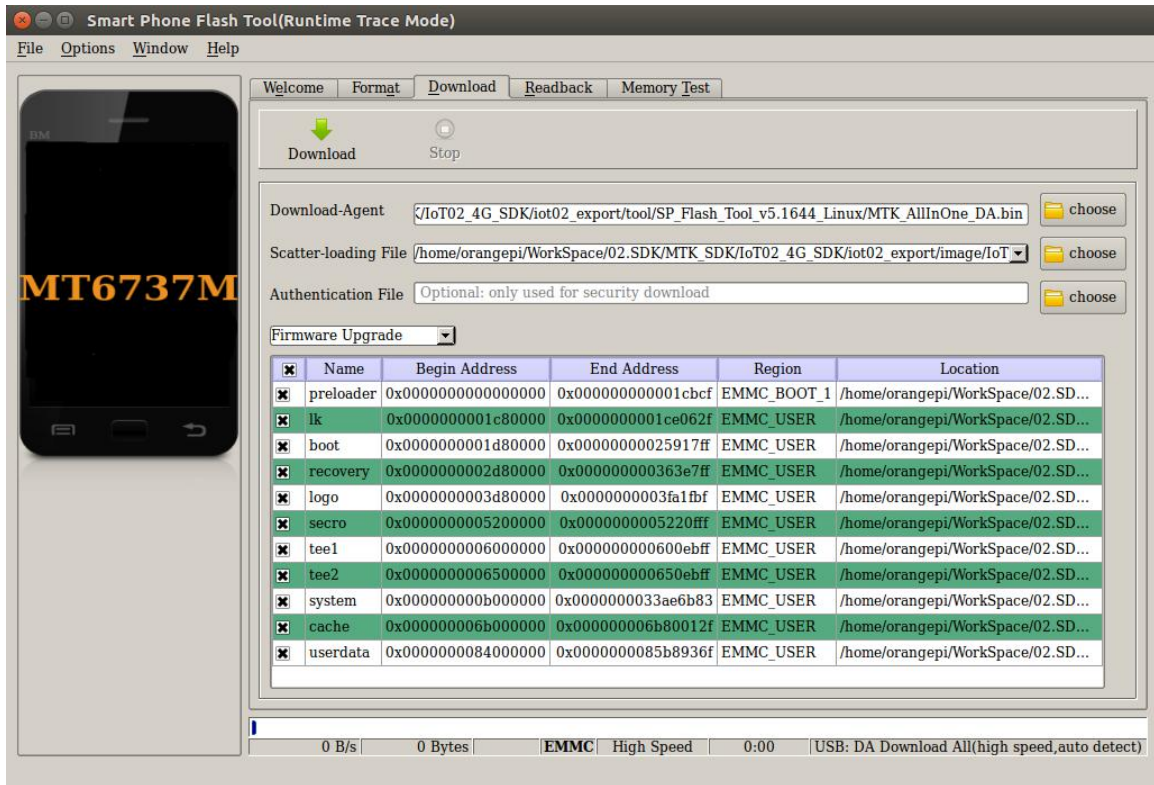


b. Click choose on the right side of Scatter-loading File and select the path of Scatter File like the following:





c. After double click the selection, the **partition information display section** will automatically fill the path of each partition file and the absolute starting address to which they are to be flashed.



d. In the top left corner of **partition information display section**, there would be a drop-down menu. Three of this options:

Format All + Download // Format all information on the partitions and re-download the selected partition

Firmware Upgrade // Update the difference on the selected partition

Download Only // Re-download no matter there is difference or not

Please note it: Usually update firmware you only need to select **Firmware Upgrade**, please **do not** select **Format All + Download**

If you select Format All, you will lose the calibration information which we worked before sending out products. If this situation is inadvertent, please contact the Orange Pi service and obtain the calibration parameters through the machine code, and re-flash the calibration parameters.

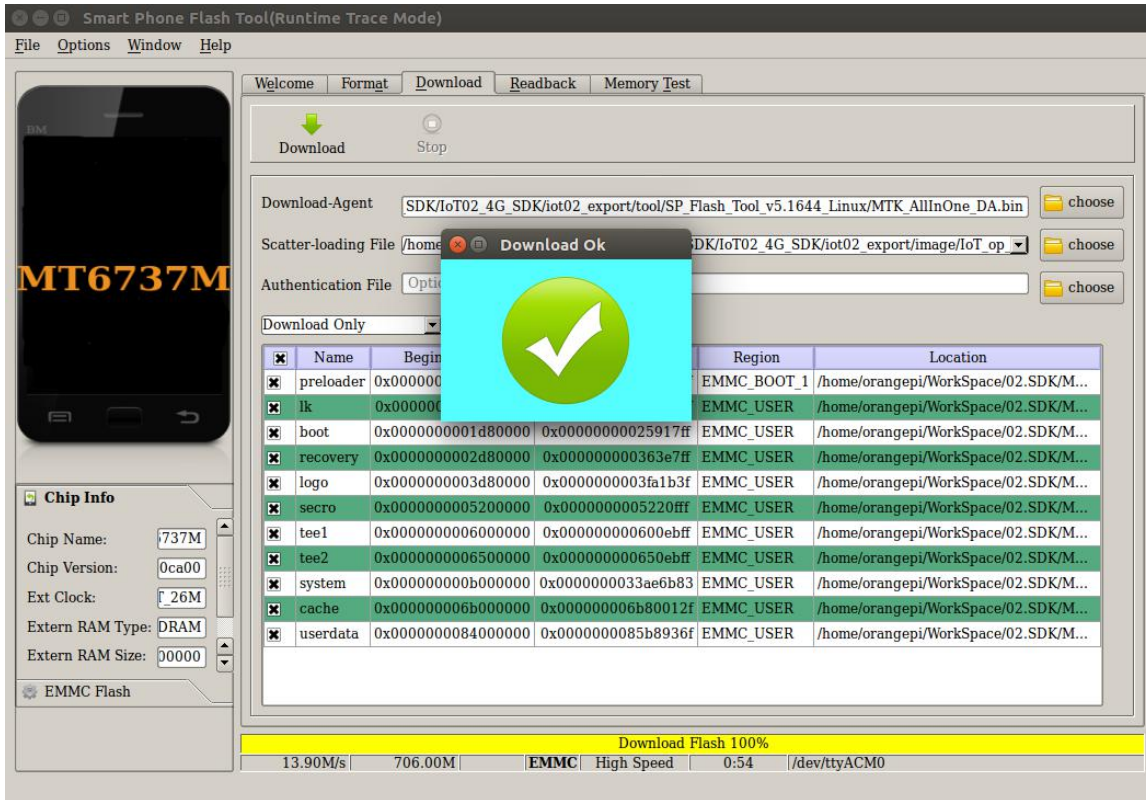
e. Use USB data cable to connect PC and Orange Pi, the right side of Orange Pi will be in red LED.

In this case do not need to connect DC power supply.



f. Click Download button

g. The interface would show like the following after downloaded:



h. Take of the USB cable and insert DC power supply

Wait around 5 seconds, it will display the charging interface of shutdown

When the Power button is loosened after 5 seconds, the system will start to enter the system

When the updated partition is more, the first boot will take a long time (the full partition update needs 8min), please be patient.

3. FAQ

Android8.1 compilation tool chain uses the new Jack server to replace the old compilation tool chain.

● Configure Jack server before compilation

① **Modify** .jack file on the path of \$HOME:



```

Server settings
SERVER=false
SERVER_PORT_SERVICE=8072
SERVER_PORT_ADMIN=8073
#SERVER_PORT_SERVICE=8096
#SERVER_PORT_ADMIN=8097
SERVER_COUNT=1
SERVER_NB_COMPILE=4
SERVER_TIMEOUT=60
SERVER_LOG=${SERVER_LOG:=${SERVER_DIR}/jack-${SERVER_PORT_SERVICE}.log}
JACK_VM_COMMAND=${JACK_VM_COMMAND:=java}
# Internal, do not touch
SETTING_VERSION=2
~
~

```

② **Modify** jack-settings file on the path of \$HOME:

```

Server settings
SERVER_HOST=127.0.0.1
SERVER_PORT_SERVICE=8096
SERVER_PORT_ADMIN=8097

# Internal, do not touch
SETTING_VERSION=4
~
~
~
~
http://blog.csdn.net/xz10561

```

(These two files TCP port should not be used before, and these two files and ports should be with same configure.)

③code/prebuilts/sdk/tools/ directory, execute ./jack-admin kill-server and ./jack-admin restart-server

● Failed to contact Jack server

If you meet the following error when compilation:

```

FAILED: /bin/bash -c "(prebuilts/sdk/tools/jack-admin install-server
prebuilts/sdk/tools/jack-launcher.jar prebuilts/sdk/tools/jack-server-4.8.ALPHA.jar 2>&1 || (exit 0) )
&& (JACK_SERVER_VM_ARGUMENTS=\"-Dfile.encoding=UTF-8 -XX:+TieredCompilation\"
prebuilts/sdk/tools/jack-admin start-server 2>&1 || exit 0 ) && (prebuilts/sdk/tools/jack-admin update
server prebuilts/sdk/tools/jack-server-4.8.ALPHA.jar 4.8.ALPHA 2>&1 || exit 0 ) &&
(prebuilts/sdk/tools/jack-admin update jack prebuilts/sdk/tools/jacks/jack-2.28.RELEASE.jar
2.28.RELEASE || exit 47; prebuilts/sdk/tools/jack-admin update jack

```



```
prebuilts/sdk/tools/jacks/jack-3.36.CANDIDATE.jar 3.36.CANDIDATE || exit 47;
prebuilts/sdk/tools/jack-admin update jack prebuilts/sdk/tools/jacks/jack-4.7.BETA.jar 4.7.BETA ||
exit 47)"
```

Writing client settings in /home/user3/.jack-settings

Installing jack server in "/home/user3/.jack-server"

Modify: On directory of code/prebuilts/sdk/tools/, execute ./jack-admin kill-server and ./jack-admin restart-server, then re-compilation

- **Out of memory error**

First stop running jack server,

Then execute jack-admin on the directory of kill-server prebuilts/sdk/tools to kill Jack server

Then open jack-admin file, search JACK_SERVER_COMMAND on the file, then change

```
JACK_SERVER_COMMAND="java -XX:MaxJavaStackTraceDepth=-1
-Djava.io.tmpdir=$TMPDIR $JACK_SERVER_VM_ARGUMENTS -cp $LAUNCHER_JAR
$LAUNCHER_NAME" into JACK_SERVER_COMMAND="java -Xmx3g
-XX:MaxJavaStackTraceDepth=-1 -Djava.io.tmpdir=$TMPDIR
$JACK_SERVER_VM_ARGUMENTS -cp $LAUNCHER_JAR $LAUNCHER_NAME". Which is
add option of -Xmx3g.
```

- **FAILED: setup-jack-server**

FAILED: setup-jack-server

Jack server installation not found

Solution: Execute the following command on the directory of prebuilts/sdk/tools: ./jack-admin install-server jack-launcher.jar jack-server-4.11.ALPHA.jar

jack-launcher.jar, jack-server-4.11.ALPHA.jar is up to the file name on the directory of prebuilts/sdk/tools.

- **Test Issue**

When the sim card cannot be recognized, you need to format SD card when it could not recognize it, and need to formatting flash.