GF-RK3399-Kit Android User Manual

Ver.:2.0

2021.04

QIYANG TECHNOLOGY Co., Ltd

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Version Record

Version	Hardware Platform	Description	Date	Revisor
1.0	GF-RK3399-MB-V2_01	Initial Version	2021-02	wwx
2.0	GF-RK3399-MB-V2_01		2021-04	wwx

Catalogue

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Notice: This manual introduces the Android7.1 User Manual of the GF-RK3399-KIT development kit.

I. Preface

Company Profile

Zhejiang Qiyang Intelligent Technology Co., Ltd., established in 2007, which locates in Hangzhou, Zhejiang, PRC. It is a high-end technological enterprise that specializes in exploitation, fabrication, and selling embedded computer mainboards. With 10 years of experiences, Qiyang has established the completed service chain from the design concept to mass production successfully.

The R&D team is organized by 30 more technical engineers. Qiyang focus on providing functional embedded hardware, software tool and customization solutions. It has been applied to Industrial Control, Internet of Things, New Retail, Smart Medical, Electricity Device, Environmental Surveillance, Charging Pile etc.

With the growth of the business, Qiyang has set up a SMT factory in Zhuji, Zhejiang province, which is 5000 ㎡, with a 2xSMT production lines. The SMT factory performs the ISO9001 Quality Management System strictly. Relying on the solid production ability, the SMT factory's annual capacity is about a million sets, which totally guarantee the delivery date.

Qiyang has a thorough sales marketing network, professional sales, and after-sales team to provide full technical support and service. The business has spread over 120 countries and areas, it helps the clients to introduce the products into the market efficiently and successfully. The combination and extension of research and development, production capacity, and market, that provide a solid foundation for Qiyang to provide specialized, globalized embedded hardware and software.

We offer:

I. Software/Hardware Mainboard

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Based on the CPU solution from NXP, Rockchip, MTK, Renesas, TI, Atmel, Cirrus Logic, etc. Qiyang provides the ARM development kit/system on module/industrial board and periphery products, paired tools and software for the user do further exploitation.

2. Customization Service

Fully taking the advantage of the technical accumulation on the ARM platform and Linux, Android, Ubuntu OS. Qiyang provides the efficient OEM/ODM service to the users.

Sincerely thanks for using Qiyang's product, we will try our best to offer you the technical supports!

II. Tutorial

2.1. Preparation

***The standard kit of GF-RK3399-Kit includes the following accessories:

Nos.	List		Qty
1	Core Board	GF-RK3399-CM-V1_00 Core board	1
2	Base Board	GF-RK3399-MB-V2_01 Base Board	1
3	Crossed serial cable	Crossed serial cable(double female)	1
4	Serial cable	3PIN2.0 pitch serial cable with buckle	3
5	USB patch cord	4 PIN 2.0 pitch USB patch cord with buckle	2

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6	USB cable	USB Type-C data downloading cable	1
7	Power adapter	DC 12V/2.5A	1

Note: 7-inch LCD screen is selectable, you can buy it separately.

Below accessories may be needed while using.

Network equipment: 100M/100M Ethernet cable, and wired router equipment;

Display equipment: monitor with HDMI interface, and HDMI cable;

Others: USB flash disk, USB mouse, TF card and other devices.

The GF-RK3399-kit development kit supports booting from eMMC by default. The development kit has been programmed with firmware before delivery, and it can be directly powered on for testing.

For detailed interface description, please refer to GF-RK3399-Kit Hardware Manual V2.0.pdf.

2.2. Serial Debugging

If you are doing pre-testing or kernel development, serial debugging is very useful for checking the system startup log, especially if there is no graphical interface.

Hardware Connection:

The common desktop has RS232 port, if your desktop doesn't have the serial port or use laptop to test, you need to prepare a USB to RS232 serial port cable.

Remark: USB to RS232 serial cable can be purchased from online shop. There are many types. Sorted by chip, there are CH340, PL2303, CP2104;

Serial port connection: Connect the DEBUG port (J7) on the development kit to the serial port in host computer through a 3-Pin serial cable and a crossed serial cable.

Driver Installation：

If the host computer uses a USB to RS232 serial cable, it is necessary to install the

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corresponding driver according to the specific model purchased.

After the driver is installed successfully, please insert the USB to RS232 serial cable. The system will prompt the new hardware and initialization, and then you can find the corresponding COM port in the device manager. As shown below:

As shown in the figure above, COM1 is the host computer's serial port, and COM3 is the USB-to-Serial

Using serial debugging on Windows:

Putty, SecureCRT or other serial terminal software is generally used on Windows. The specific method can be found online, which is relatively simple.

Here we take SecureCRT as an example:

1. Open File-Quick Connect

2. Select Protocol as Serial

3. Modify the port to the COM port found in the device management

4. Baud Rate: 115200, Data Bits: 8, Stop Bits: 1, Parity: None, Flow Control: None.

5. Click the [Connect] button.

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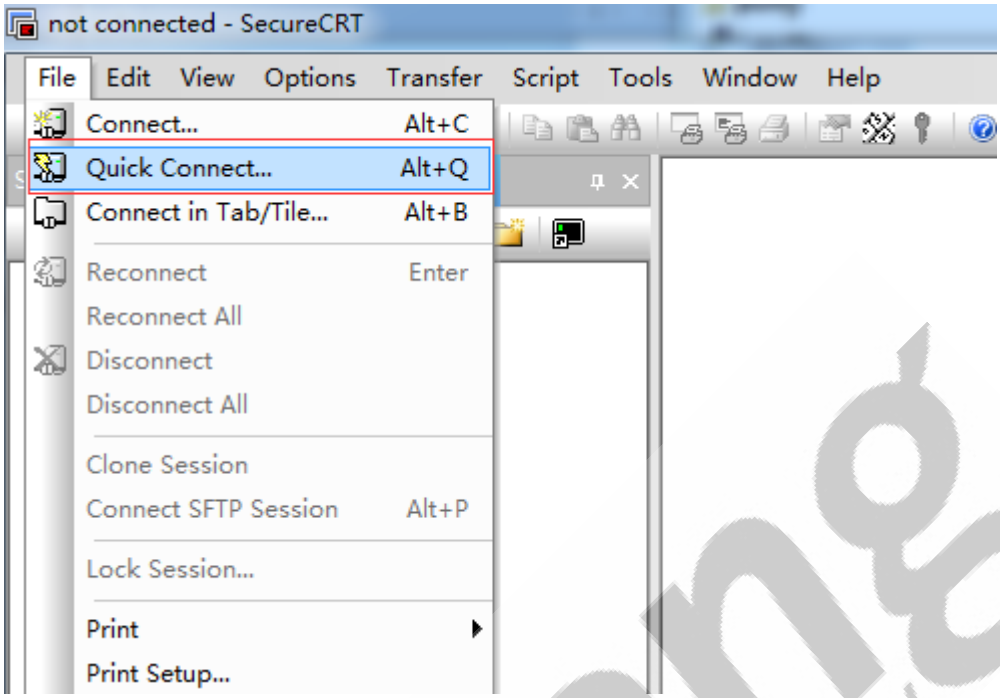

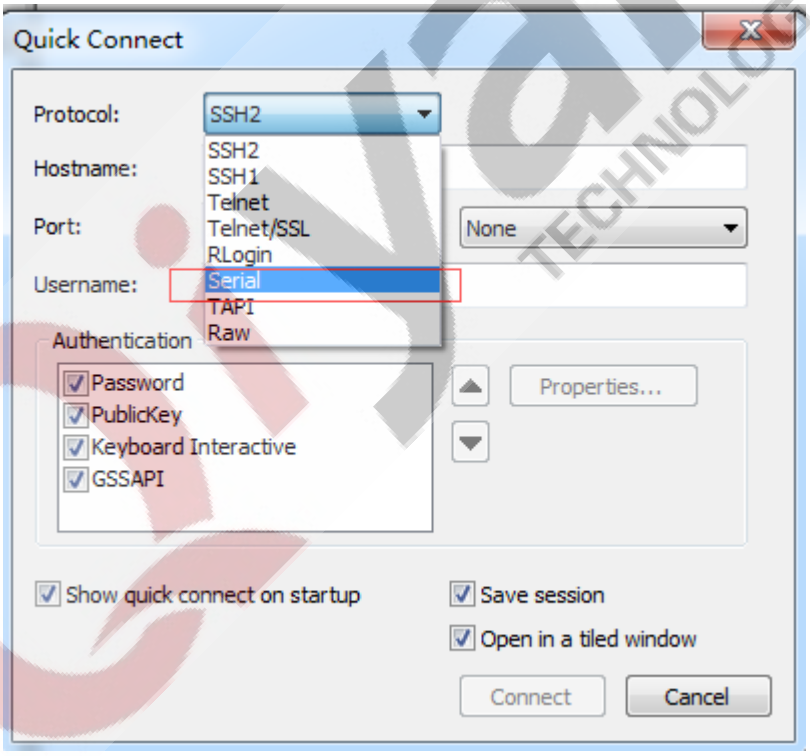

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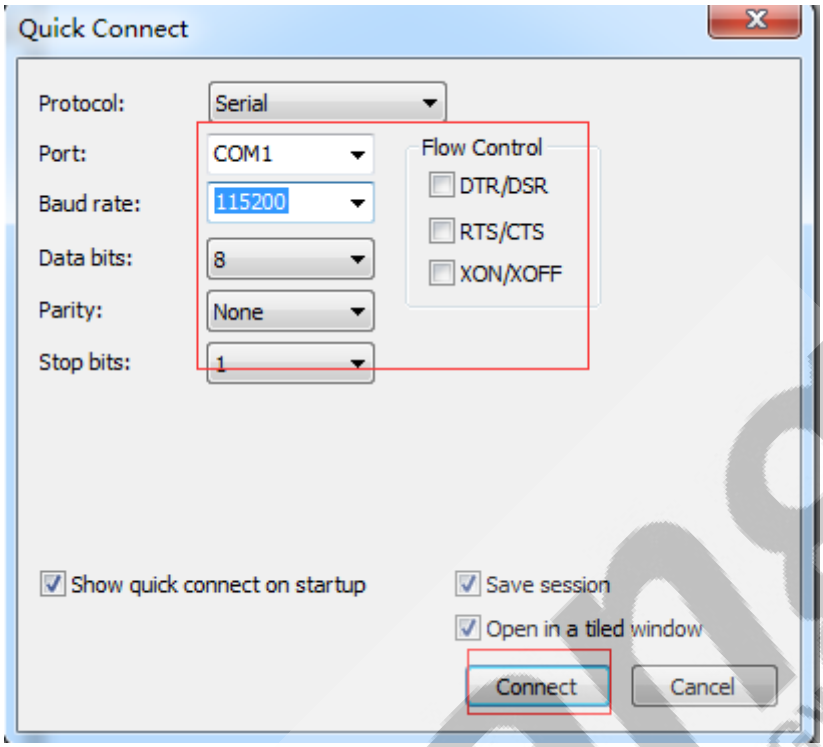

Use serial port debugging on Ubuntu:

Generally, Ubuntu uses minicom, picocom or other serial terminal software. The specific method can be found online, which is relatively simple.

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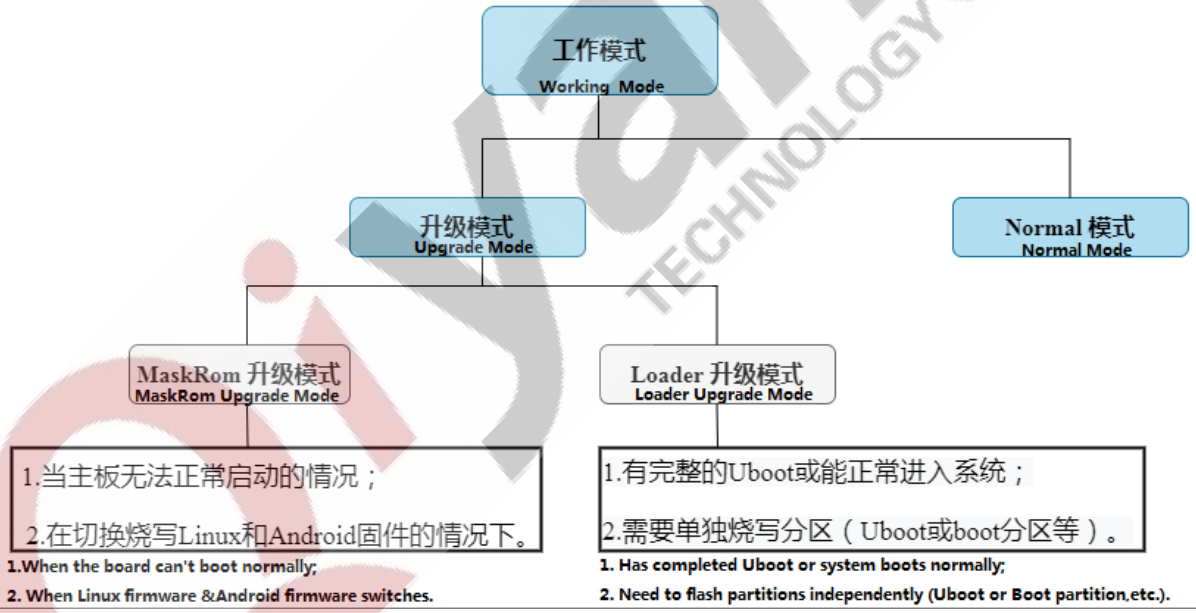
III. Firmware Upgrade

3.1. Working Mode Description

GF-RK3399-Kit development kit has 2 working modes: normal mode and upgrade mode.

Under normal circumstances, the GF-RK3399-Kit development kit will enter 'Normal' mode when system starts. If needs upgradation, please choose the suitable upgrade mode to do firmware upgradation.

Note: The Android 7.1 system is programmed before delivery.



Normal Mode:

Normal mode is the normal startup process, each component is loaded in sequence and enters in the system normally.

Upgrade Mode:

Upgrade modes include MaskRom upgrade mode, Loader upgrade mode, and SD card upgrade mode; SD card upgrade mode will not be described now.

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MaskRom Upgrade Mode:

MaskRom mode is used for system recovery when the bootloader is damaged. Under normal circumstances, it is not necessary to enter MaskRom mode. Only when the bootloader verification fails (the IDR block cannot be read, or the bootloader is damaged), the BootRom code will enter to MaskRom mode. At that time, the BootRom code waits for the host computer to transfer the bootloader code through the USB interface, load and run it.

Loader Upgrade Mode:

In Loader mode, the bootloader will enter the upgrade state, waiting for the host computer's command for firmware upgrade, etc. To enter Load mode, the bootloader must detect a RECOVERY, press the button at startup mode and the USB is connected:

1. Make sure the device is connected to the power adapter and power on;

2. Connect the device and the host with the USB OTG cable;

3. Press and hold the RECOVERY (recovery-SW4) key on the device;

4. Short press the RESET (reset-SW1) button;

5. After about 2 seconds, loosen the RECOVERY (SW4) button.

Note: If the device is not found after pressing the RESET button, please long press the POWERON (SW2) button while the RECOVERY button is pressed, and then loosen the RECOVERY button.

3.2.Firmware Description

Android firmware has two types:

1. A single unified firmware: update.img, which packed the boot parameter loader, parameters and all partitions' image file together for firmware release use.

By default, a unified upgrade firmware image file is provided, which can be obtained from the image folder in network disk.

2. Multiple partition images: files such as kernel.img, boot.img, recovery.img, etc., are generated in the development stage.

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3.3.Firmware Programming

The GF-RK3399-Kit development kit has been programmed with Android 7.1 system before delivery.

Preparation:

1.GF-RK3399-Kit development kit;

2.USB Type-C data downloading cable

3.Image firmware: Obtainable from Image file in the network disk;

4.Host computer: Support Windows7 (32/64 bit), Windows10 (32/64 bit)

To flash the firmware, you need to use the AndroidTool_xxx (version number) programming tool, and you need to install the RK USB driver before using the programming tool. If the driver is already installed, skip this step.

Install RK USB driver:

The Rockchip_DriverAssitant_v4.5 driver file can be obtained from the network

Copy the DriverAssitant_v4.5 rar driver to the host computer, decompress it, and then run the DriverInstall.exe inside. In order to use the updated driver for all devices, please select ‘Driver Uninstall’ (right one) first, and then select ‘Driver Installation’(left one), as shown below:

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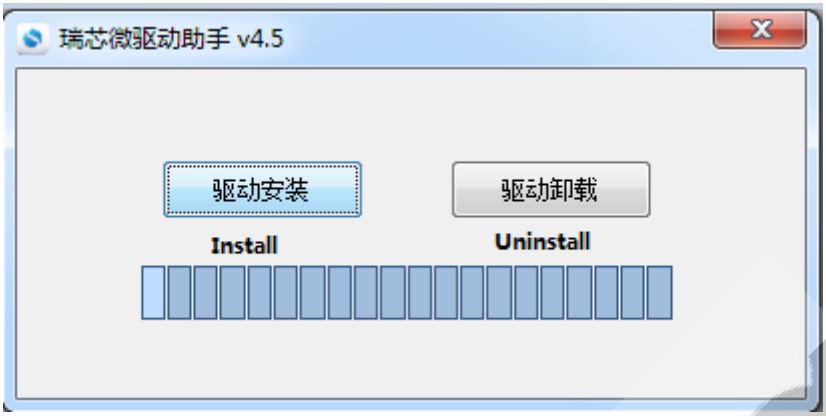

1. Make sure the device is connected to the power adapter and powered on.
2. Connect the device and the host computer by a USB Type-C cable.
3. Press and hold the RECOVERY (SW4) button on the device.
4. Short press the RESET (SW1) button.
5. After about two seconds, loosen the RECOVERY button.

Note: If the device is still not found after pressing the RESET button, please press and hold the RECOVERY button while long pressing the POWERON (SW2) button, and then loosen the RECOVERY button.

The host computer will prompt that new hardware was discovered and configured successfully. Open device manager, you will find the new device 'Rockusb Device', as shown below:

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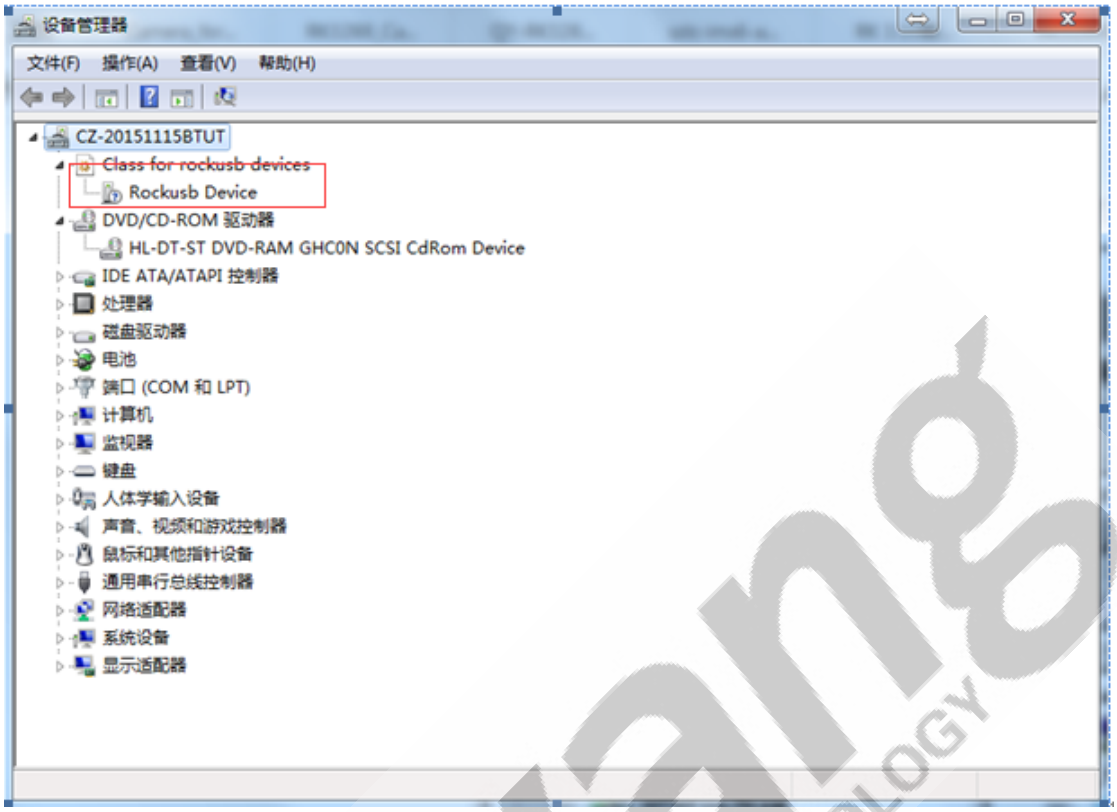

If not, you need to go back to the previous step to reinstall the RK USB driver.

Flash Firmware：

Open the programming tool software AndroidTool_Release_v2.65, which can be obtained from network disk.

Open tools->AndroidTool_Release_v2.65->AndroidTool_Release_v2.65, run [AndroidTool.exe] in the directory, and click [Execute], as shown below:

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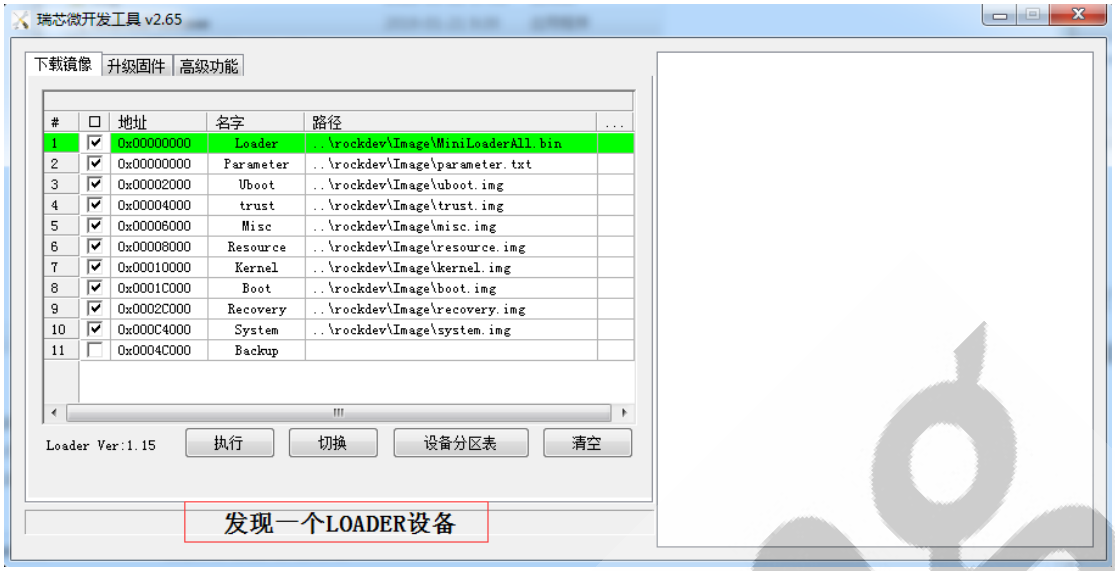

As above picture shown: a LOADER device is found, and image programming can be performed.

Flash Unified Firmware

1.Switch to the ‘Upgrade Firmware’ page, as shown below:

2.Press the ‘Firmware’ button, open the firmware file to be upgraded (under the AndroidTool_Release_v2.65\rockdev\ directory). The upgrade tool will display detailed firmware information.

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3.Press the ‘Upgrade’ button to upgrade.

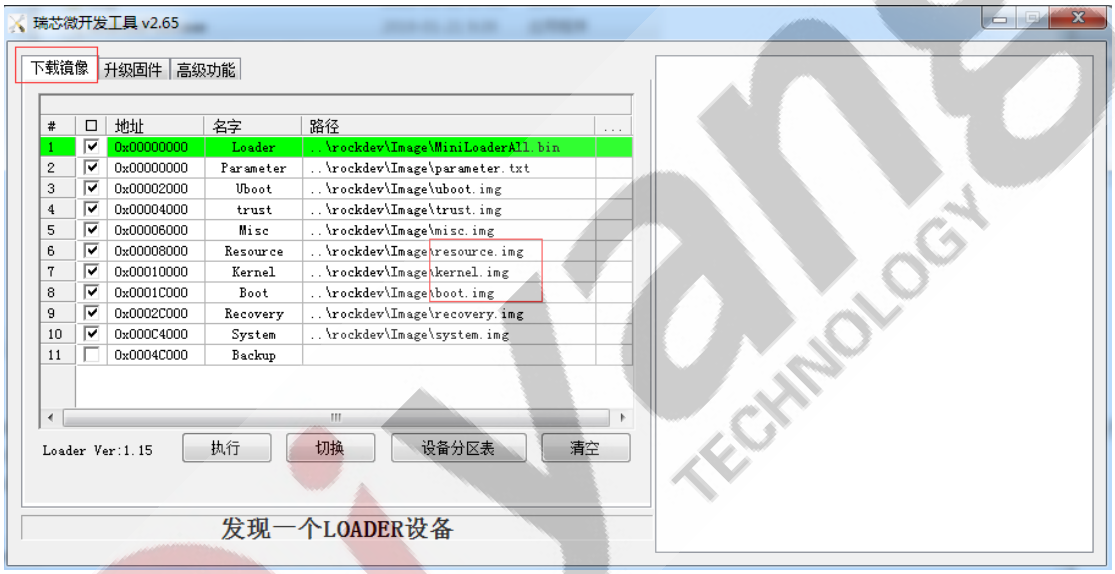
4.If the upgrade fails, you can try the ‘Erase Flash’ button to erase the Flash, and then upgrade again.

Note: If the firmware loader version you have flashed is inconsistent with the original machine, please execute ‘Erase Flash’ before upgrading the firmware.

Flash the partition image

Partition image programming can be used during development

1.Switch to the ‘Download Image’ page, as shown below:



2.Click the partitions to be flashed, you can do multiple choices.

3.Make sure the path of the image file is correct, if necessary, reselect from the blank table cell of the right side of the path.

4.Click the ‘Execute’ button to start the upgrade, and the device will restart automatically after upgradation.

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3.4.Network MAC address programming

By default, the Ethernet has already been flashed with MAC address. If you erase the image, you need to re-flash the MAC address.

2* Ethernet corresponding nodes: Ethernet 0 - J36 and Ethernet 1 - J37.

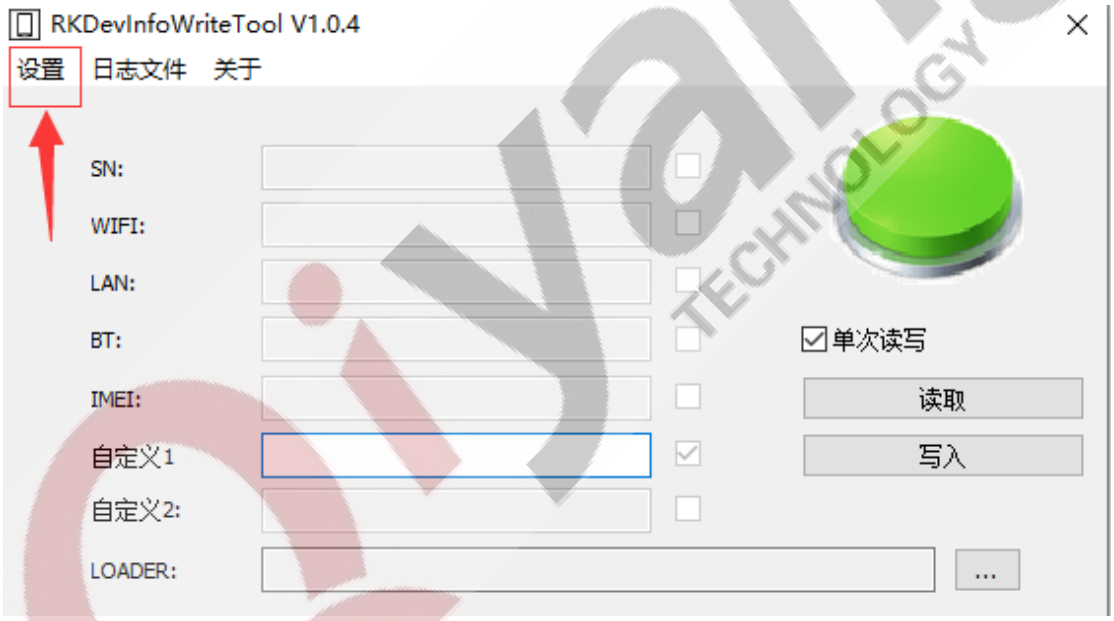
Flashing tool: RKDevInfoWriteTool_Setup_V1.0.4_0422, which can be obtained in the network disk link tool path. Please refer to RKDevInfoWriteTool User Guide.pdf for detailed steps.

Ethernet 0:

Corresponding interface: Ethernet 0 - J36

Flashing method:

1. Open RKDevInfoWriteTool, click ‘Setting’



2. Select’ LAN MAC’, ‘Select’

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3.Select in the ‘auto-increment’ mode. For the specific configuration method, please refer to: RKDevInfoWriteTool User Guide.pdf

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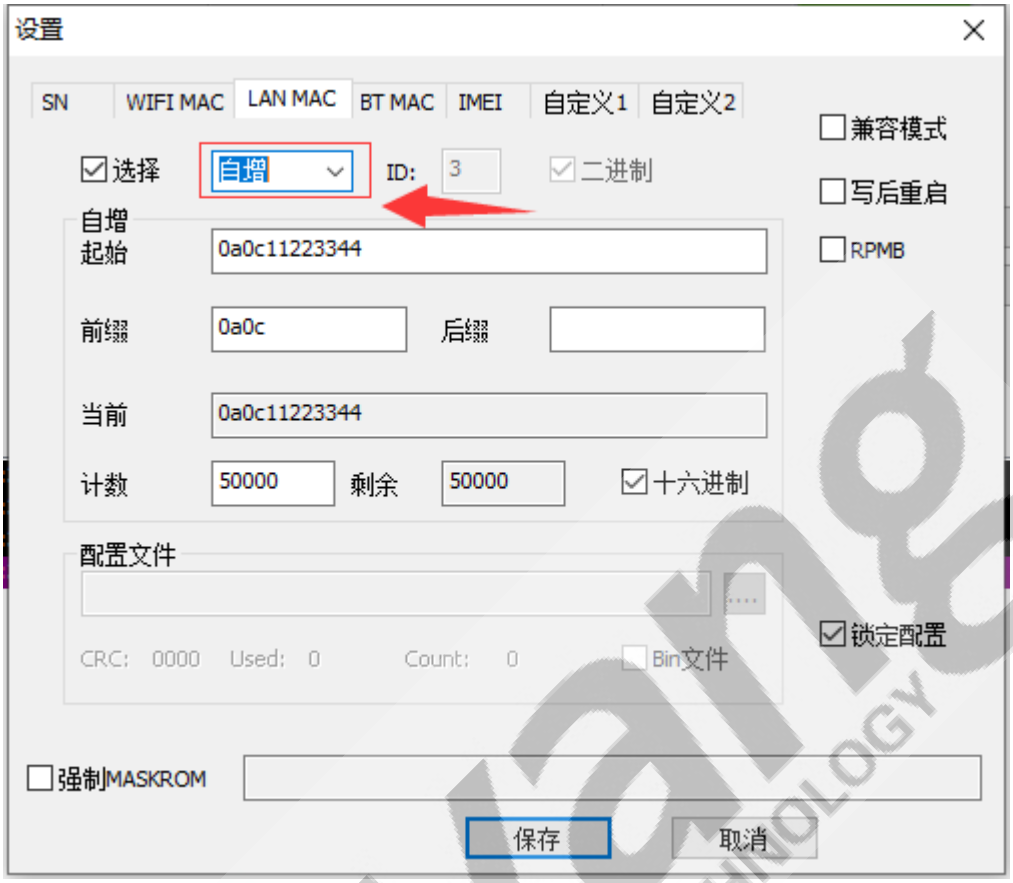

4. If you select ‘Manual’ mode

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5. Click ‘Save’

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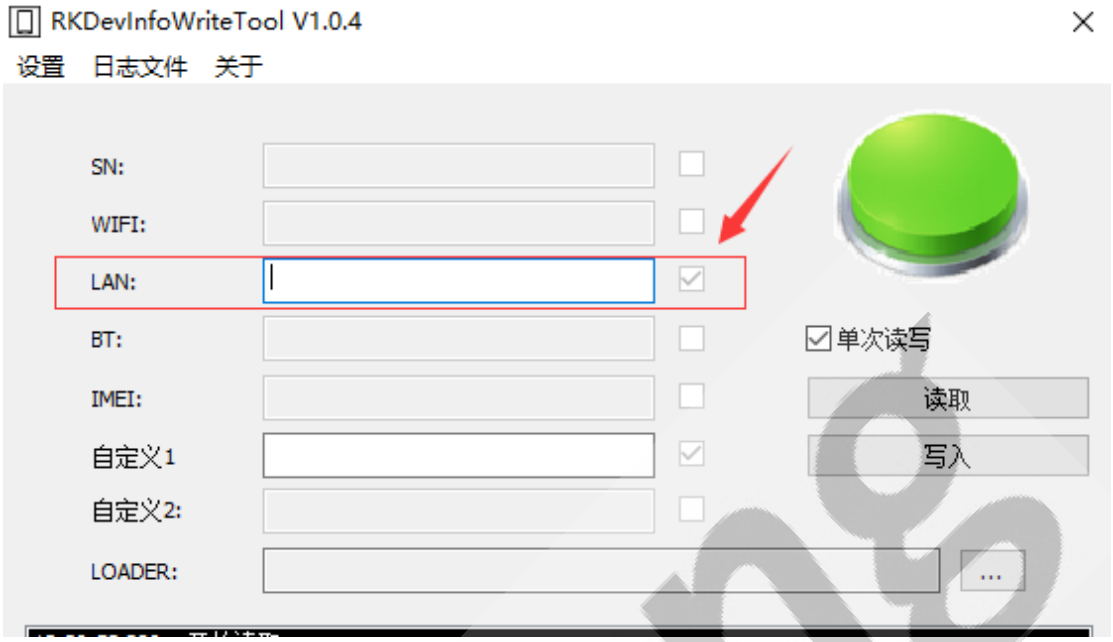
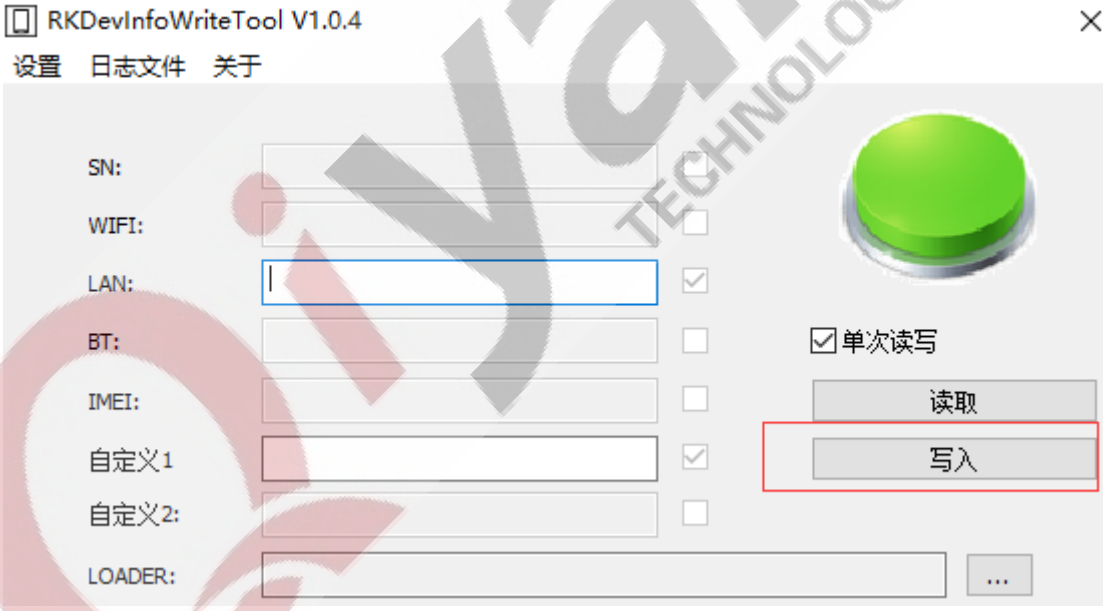


6. You can input MAC address in the 'LAN' column, then click 'Write'.



7. If the write successfully, a similar prompt will be reported

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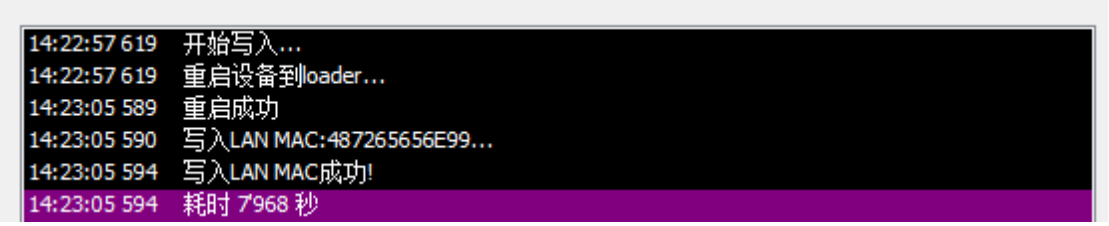
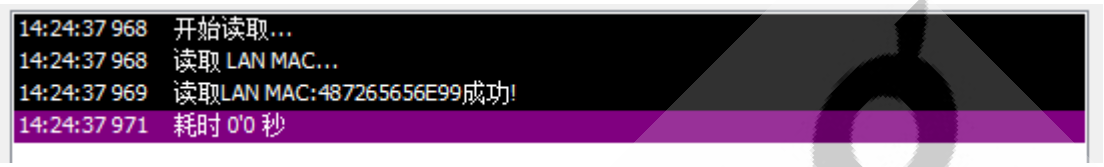


8. At this time, you can also click ‘Read’ to see if it can be read successfully



Ethernet 1:

Ethernet 0 - J37；

Corresponding interface: Ethernet 0 - J37

Flashing method:

1. Open RKDevInfoWriteTool, click ‘Setting’, after entering the setting interface, please select ‘Custom 1’

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2. Check ‘Select’ and set the mode to ‘Manual’

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3. Note: ‘ID’ item must be set to ‘18’, ‘Binary’ must be selected

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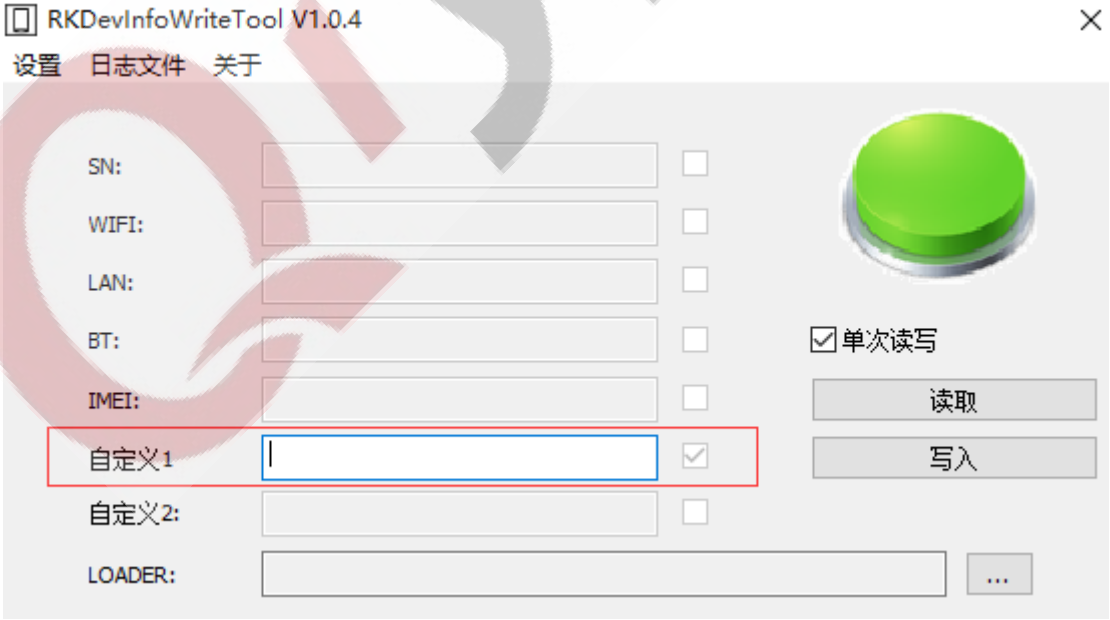
4.Click ‘Save’, you can set on ‘Custom 1’ column.



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5. Subsequent operations can refer to Ethernet 0 setting

If the setting is set to ‘auto-increment’ mode, please refer to the ‘LAN MAC’ format for setting.

Note: When setting up Ethernet 1, the ‘ID’ item must be set to 18, and ‘Binary’ is selected.

IV. Android development

4.1.ADB usage

ADB (Android Debug Bridge), is a command-line debugging tool for Android, which can complete various functions, such as tracking system logs, uploading and downloading files, and following application APK, etc.

Ready to connect:

By default, ADB is open in Android system for GF-RK3399-KIT Development kit, if not, please open it by following steps:

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1. Connect the GF-RK3399-Kit development kit to the host computer by Type-C USB cable, and power on to start the Android system
2. Android interface-Setting->Developer Selection->Select ‘USB Debugging Selection’

ADB Installation in Windows:

First, install the driver by referring to RK USB Driver Installation.

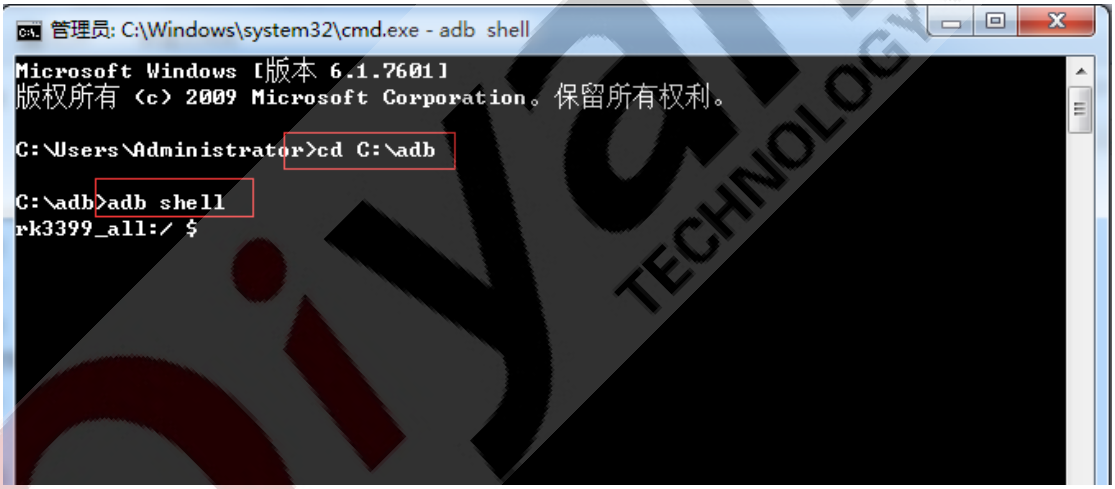
Obtain ADB tool, which can be obtained in the network disk link tool path folder, adb.zip

Decompress to C:\adb for easy invocation.

Open a command line window, input:

```
cd C:\adb

adb shell
```



If all is normal, enter the ‘adb shell’ and run commands in device.

Common commands of ‘adb’ can be obtained and viewed through ‘adb help’, or searched online, which will not be introduced here.

Network ADB

To be completed!

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4.2. Build Compilation Environment

Mainly for Android system development, if not involved, it can be ignored.

Ready to work:

Need a higher configuration host computer which is used for compiling Android.

1.64-bit CPU;

2.16GB physical memory + swap memory

3.50GB of free disk is used for construction, the source tree occupied about 30GB, and 150GB of disk space is required to compile the source code.

4.RK corporation recommends Ubuntu16.04 operating system, or higher version Ubuntu system environment.

Install OpenJDK8:

Install 'apt-get':

sudo apt-get install openjdk-8-jdk

4.3. Compile Image

Download Source Code:

Since Android source code is large, it is about 200GB, it can be obtained from the network disk separately.

Compile Android SDK

Overall Compilation:

Enter in SDK root directory:

Execute the following command:

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source build/envsetup.sh

lunch rk3399_all-userdebug

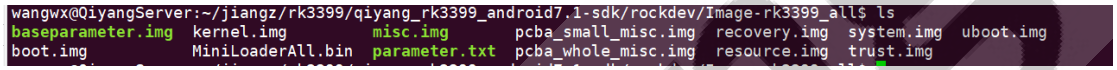
make -j4

Next, start compiling. The first compilation takes a long time, and the virtual machine compilation takes about 12 hours.

After compiling, input

./mkimage.sh

Generate the required image files in the'rockdev/ Image-rk3399_all 'directory, as shown below:



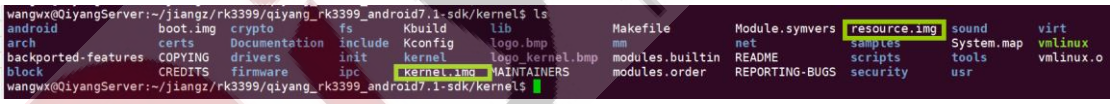
Compile separately:

Compile the kernel separately:

cd kernel

make ARCH=arm64 rockchip_defconfig && make ARCH=arm64 rk3399-sapphire-excavator-edp.img -j25

Generate a kernel image in the kernel directory, as shown below:



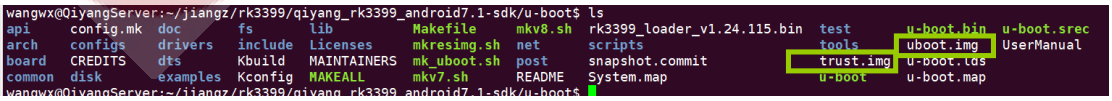
Compile uboot separately:

cd u-boot

make rk3399_defconfig

make ARCH=aarch64 -j20

Generate a uboot image in the u-boot directory, as shown below:



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4.4. Flash Partition Image

After compiling, the following image files will be generated:

boot.img: **Android**'s initial image file, responsible for initializing and loading the system partition.

Kernel.img: Kernel image.

misc.img: **misc**:Partition image, responsible for parameter transfer of boot mode switching and emergency mode.

Recovery.img: Emergency mode image.

resource.img: Resource image, including boot image and kernel device tree information.

system.img : Android's system partition image, in **ext4** file system format.

If you are using **Windows** system, copy the above image file to' **rockdev\Image'** directory of **AndroidTool** (firmware upgrade tool under Windows), and then refer to the upgrade document to flash the partition image. The advantage is that you can use the default configuration. Do not modify the path of the file.

4.5. Make Unified Firmware

There is a' mkupdate.bat' script file in the 'rockdev' directory of the programming tool.

This script file is used for creating unified firmware. Before double-click, please make sure that there are enough image files in the Image path, as shown below:

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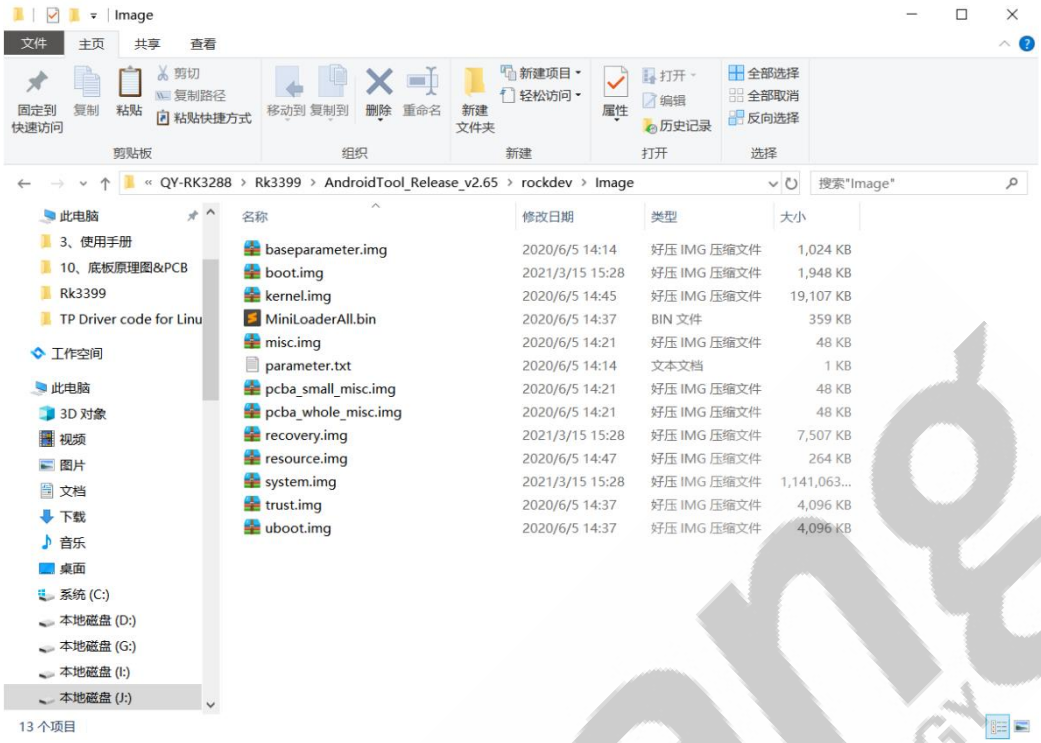

After confirmation, double-click '**mkupdate.bat'** to generate '**update.img'** unified firmware in the **'rockdev'** directory.

V.FAQ

FAQ

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