

SERVICE MANUAL

For WILEY FOX STORM Only

MOBILE TERMINAL (V1.0)

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Chapter 1: Summary



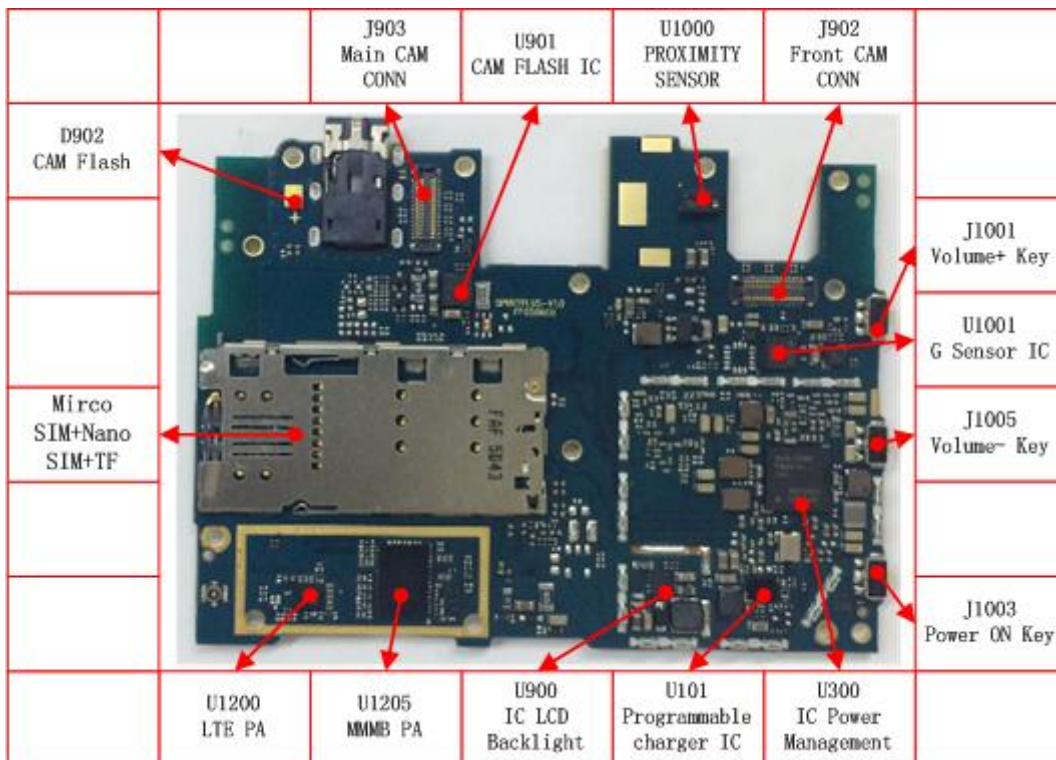
The STORM is an excellent smartphone and running Google's latest Android 5.0 OS. The details of specification shows as below:

| | |
|------------------|--|
| Phone Type | Full Touch |
| OS System | Android 5.0 |
| Antenna Type | PIFA |
| Dimension | Length/Width/Thickness:155.6mm/77.3mm/9.2 mm |
| Platform | MSM 8939 |
| Band | GSM/GPRS:850/900/1800/1900 MHz WCDMA(UMTS): BAND1(2100)\BAND8(900) FDD-LTE:800/900/1800/2600 MHZ |
| SIM Card | Dual SIM, Dual online, One talk |
| eMMC | 32G Byte+24G bit |
| RAM | N/A |
| Nand Flash | N/A |
| Expansion Memory | Single T-FLASH CARD (Don't support hot plug) |

| | |
|------------------------------|---|
| Maximum Capacity of T-F card | (32G) Byte |
| Battery Capacity | (2500) mAh |
| Charging Time | < (TBD) Minutes |
| Talk Time | > (TBD) Minutes |
| Standby Time | (TBD) Hours |
| Main LCD | SIZE/Resolution/Screen Material:5.5'/FHD1920*1080/TFT |
| Touch Screen | Capacitive |
| Function Key | N/A |
| Side Key | Yes(Power key , Volume key) |
| Top Key | N/A |
| Back Camera Pixel | 20M AF |
| Front Camera Pixel | 8.0Mega Fixed Focus |
| Bluetooth | Bluetooth 4.0 |
| USB | USB 2.0 |
| Wi-Fi | YES, Support Access Point |
| PC Sync | N/A |
| IrDA | N/A |
| Input Method | Google input |
| SMS | Yes |
| MMS | Yes |
| STK | Yes |
| Polyphonic Melody | 64-Tone Wavetable |
| Stereo | Yes |
| Melody Format | MP3/MIDI/WAV/AMR/AAC/AAC+ |
| Video Format | MP4/3GP |
| Recorder | Yes |
| FM Radio | Only support FM RX |
| TV | N/A |
| TV-OUT | N/A |
| I/O Connector | 5PIN Micro USB |
| Independent Earphone Jack | Φ3.5mm |
| Sensor | G-Sensor, Proximity, ALS, Magnetic, Gyro |
| Number& Type of Speakers | (1) PCS (1318) Speaker |
| Vibrator Mode | Independent vibrator |
| GPS | Yes, with navigation |
| Voice Recognize | N/A |
| Others | N/A |

Chapter 2: PCBA Overview

2.1STORM-TOP SIDE-Layout



2.2STORM-BACK SIDE-Layout

| | | | | | | |
|---|---------------------------|------------------|----------------------|--------------------------------|--------------------------|---------------------------------------|
| | U1504 WIFI/BT/FM IC | MIC 801 MIC | D901 CAM FLASH | J901 TP CONN | J800 Earphone jack | |
| ANT1500-1501 WIFI/BT/GPS ANT CONN | | | | | | ANT1401-1403 DIVERSITY ANT CONN |
| CN1500 CONN RF ANTENNA | | | | | | CN1401 CONN RF ANT |
| | | | | | | U1401 IC Antenna Switch |
| U600 MSM8939 | | | | | | U1103 WTR4905 RF IC |
| U700 FLASH NAND/ LPDDR3 | | | | | | U1302 IC Antenna Switch |
| | | | | | | CN1302 CONN RF ANT |
| | | | | | | |
| U1005 IC charge switch | U1601 IC LED DRIVER | J900 ICD CONN | J100 Battery CONN | J1600 Sub-board FPC CONN | | |

Chapter 3: Explanation of Schematic

3.1 Base Band Chip MSM8939 Features

The MSM8x36/MSM8x39 is fabricated using the advanced 28 nm LP CMOS process, and is available in the 760 NSP (a 14 x 12 x 1.04 mm package with many ground pins for improved electrical grounding, mechanical strength, and thermal continuity). See [Chapter 2](#) for pin assignment details and [Chapter 4](#) for mechanical information. The MSM8x36/MSM8x39 supports high-performance applications worldwide using a variety of wireless networks (depending upon IC variant):

- GSM/GPRS/EDGE
- CDMA2000 1x, 1x Advanced and 1xEV-DOorA
- WCDMA R99, Rel 5 HSDPA, Rel 6 HSUPA, and Rel 7 HSPA+ (42 Mbps)
- TD-SCDMA with 4.2 Mbps DL and 2.2 Mbps UL option
- LTE Cat 4
- GPS, GNSS, Galileo, and Beidou

Complementary ICs within the MSM8x36/MSM8x39 chipset include:

- Wafer-level RFICs: WTR4905 (80-NL713-x), WTR1605L (80-N5420-x) and WTR2605/WTR2100 (80-N9978-x)
- Power management: PM8916 (80-NK808-x)
- Wireless connectivity: WCN3680B/WCN3660B/WCN3620 for WLAN, Bluetooth, and FM (80-WL007-x)
- NFC connectivity: QCA1990 (80-Y0597-x)

The MSM8x36/MSM8x39 chipset and system software solution supports the Convergence Platform for mobile applications by leveraging the years of systems expertise and field experience with CDMA, WCDMA, GSM, TD-SCDMA, LTE and GNSS technologies that QTI brings. QTI works with its partners to develop products that meet the exact needs of the growing wireless market, providing its customers with complete, verifiable solutions, including fully segmented product families, systems software, testing, and support. Since the MSM8x36/MSM8x39 includes so many diverse functions, its operation is more easily understood by considering major functional blocks individually. Therefore, the MSM8x36/MSM8x39 document set is organized according to the following block partitioning:

- Architecture and baseband processors
- Memory support
- Air interfaces
- Multimedia
- Connectivity
- Internal functions
- Interfaces to other functions (including the other ICs within the chipset)
- Configurable general-purpose input/output (GPIO) ports

3.2 Power Manager Unit PM8916 introduction

The PM8916 device integrates all wireless handset power management, general housekeeping, and user interface support functions into a single mixed-signal IC. The versatile design is suitable for multimode, multiband phones and other wireless products such as data card and PDAs. The PM8916 mixed-signal HV-CMOS device is available in the 176-pin package (NSP) that includes several ground pins for improved electrical ground, mechanical stability, and thermal continuity. Since the PM8916 device includes so many diverse functions, its operation can be understood better by studying the major functional blocks individually. Therefore, the PM8916 document is organized by the device functionality as follows:

- Input power management
- Output power management
- General housekeeping
- User interfaces
- IC interfaces

Configurable pins – either multipurpose pins (MPPs) or general-purpose input/output (GPIOs) – that can be configured to function within some of the other categories.

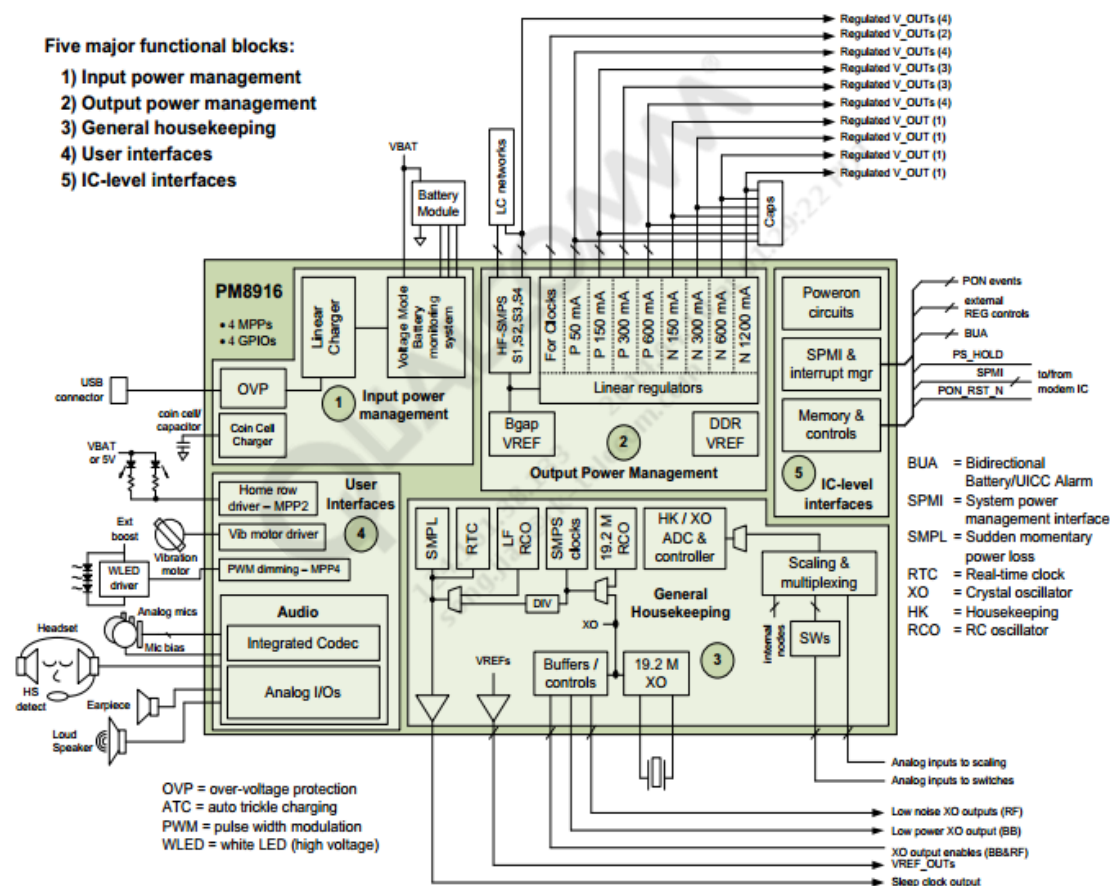


Figure 3.2 PM8916 Function Block Diagram

3.3 RF Chip WTR4905 device introduction

The WTR4x05 device is a highly-integrated multimode, multiband RF CMOS transceiver IC. The WTR4x05 device cannot be used as stand-alone on MSM9x35/MSM8994 andMDM9x40/MDM9x45 modems.

All chipsets support advance RF techniques by adding a second RFIC

- WTR4905-based designs
 - Add WTR2100 to support DSDA and/or SG-LTE
 - Add WTR2605 to support SV-LTE
- WTR3925-based designs supporting MSM8994, MSM8996, MDM9x35M, MDM9x45, and Fusion 4.5
 - Add WTR4605 to support DSDA, SG-LTE, and/or SV-LTE

It integrates RF

receive and transmit features into a 3.22 × 3.22 × 0.57 mm package to simplify handset design, minimize parts count, and reduce DC power consumption.

3.4 Interface Functional Circuit

3.4.1 Charging Circuit

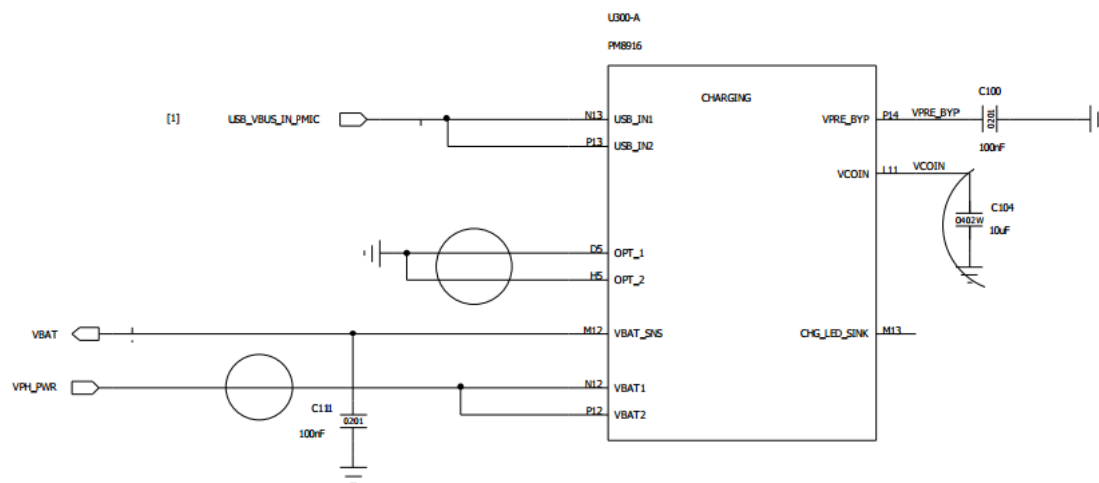


Figure 3.4.1-STORM Charging Circuit

3.4.4 Receiver Interface

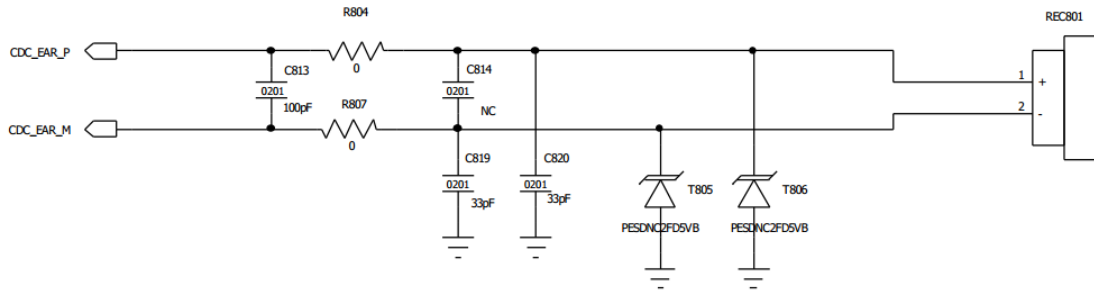


Figure 3.4.4 STORM Receiver Circuit

3.4.5 LCD Connector Interface

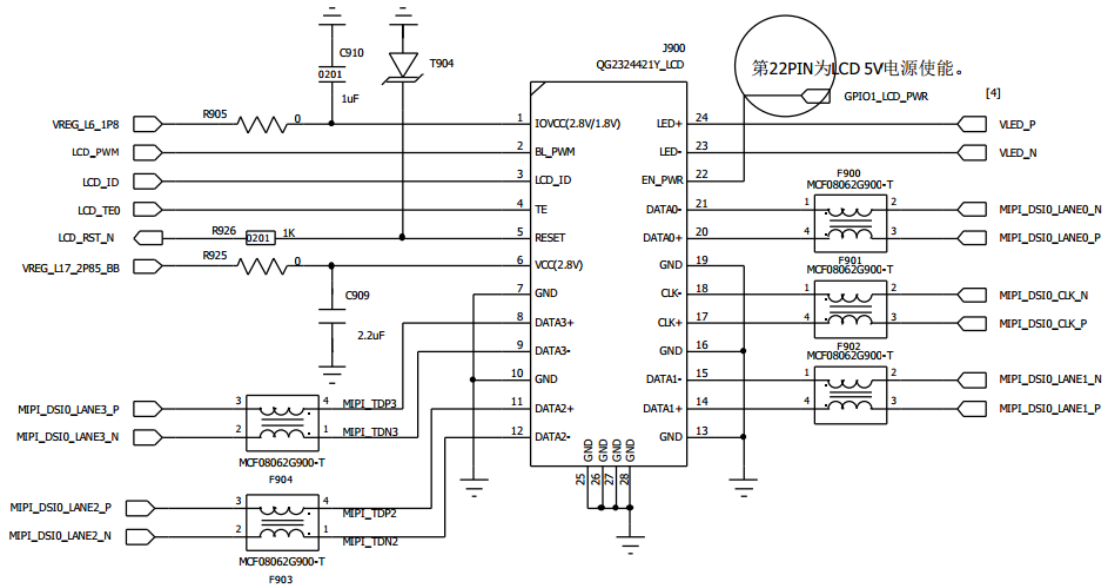


Figure 3.4.5-1 STORM LCD Connector Interface

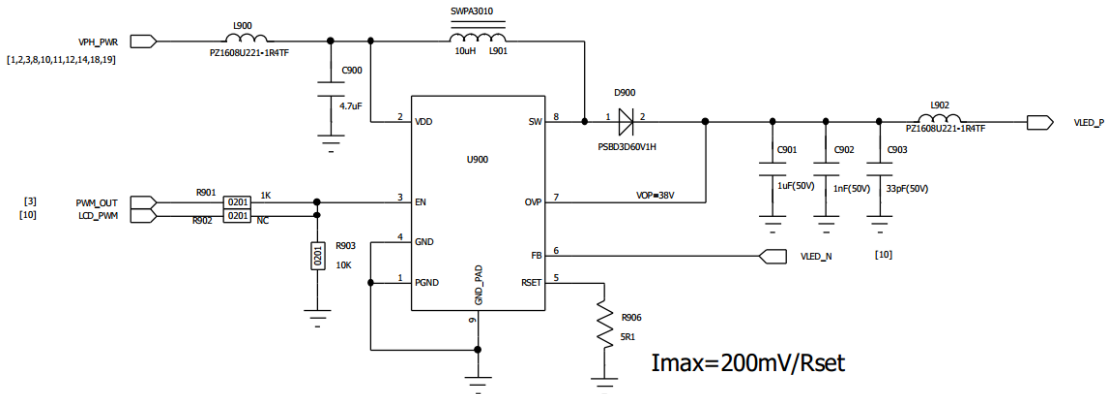


Figure 3.4.5-2 STORM LCD Backlight Circuit

3.4.6 Camera Interface Circuit

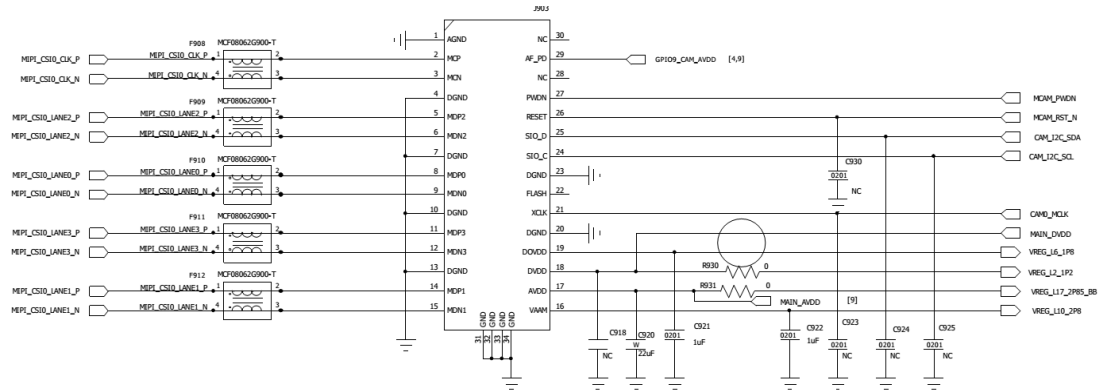


Figure 3.4.6-1 STORM Main Camera circuit

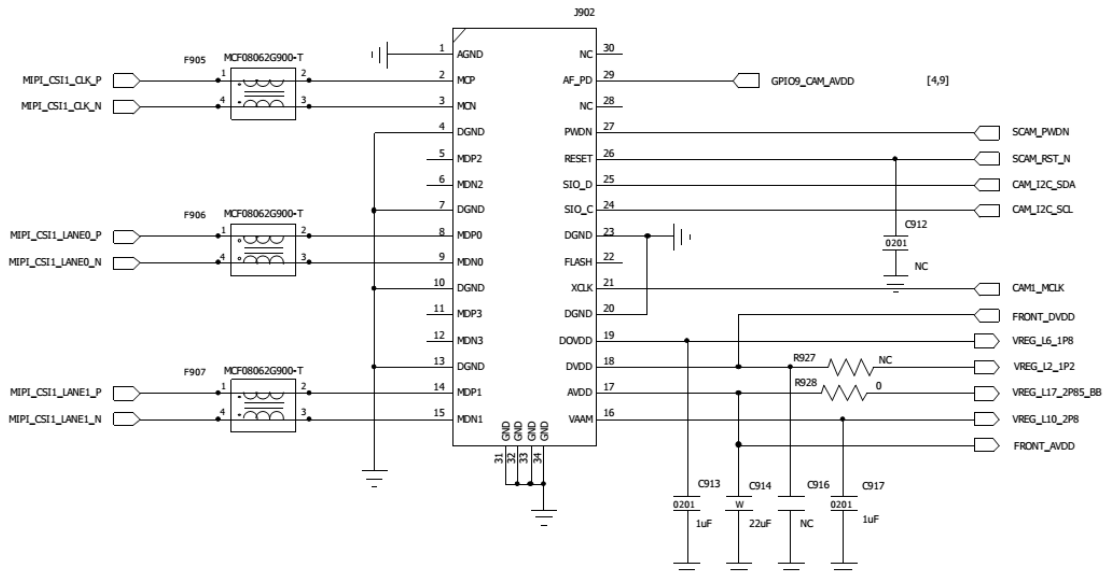


Figure 3.4.6-2 STORM Front Camera circuit

3.4.7 SIM Card Connector Interface

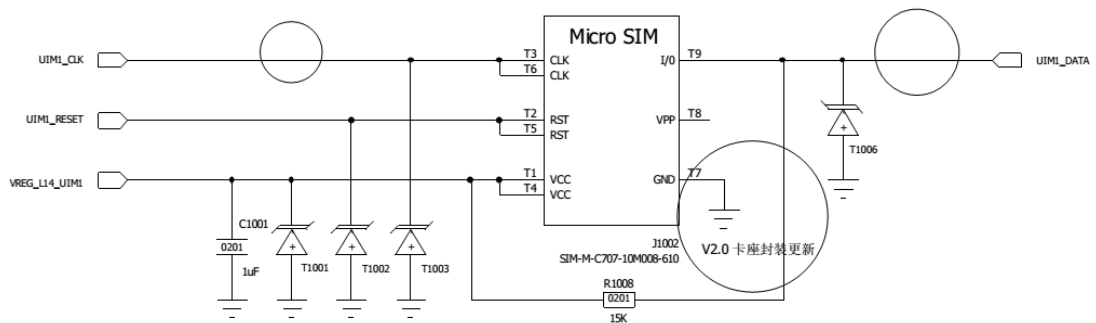


Figure 3.4.7-1 STORM SIM1 Connector

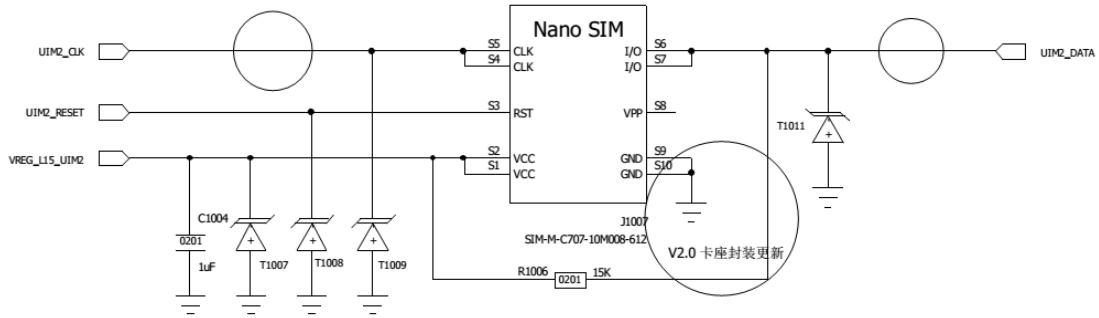


Figure 3.4.7-2 STORM SIM2 Connector

3.4.8 TF card Interface

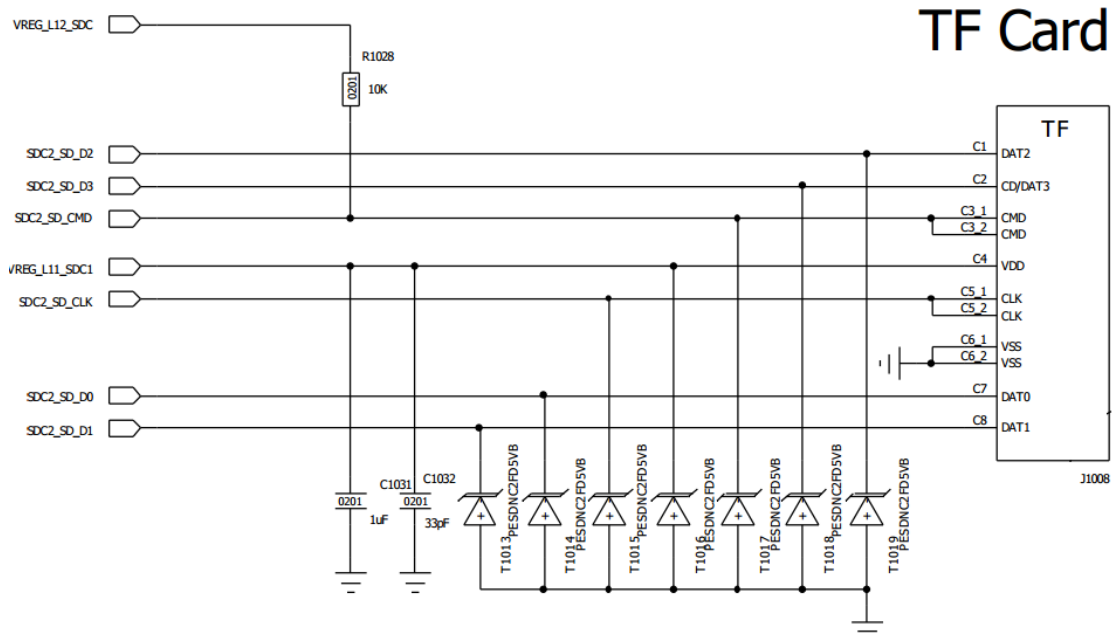


Figure 3.4.8 STORM TF-Card Interface

3.4.9 Sensor Interface

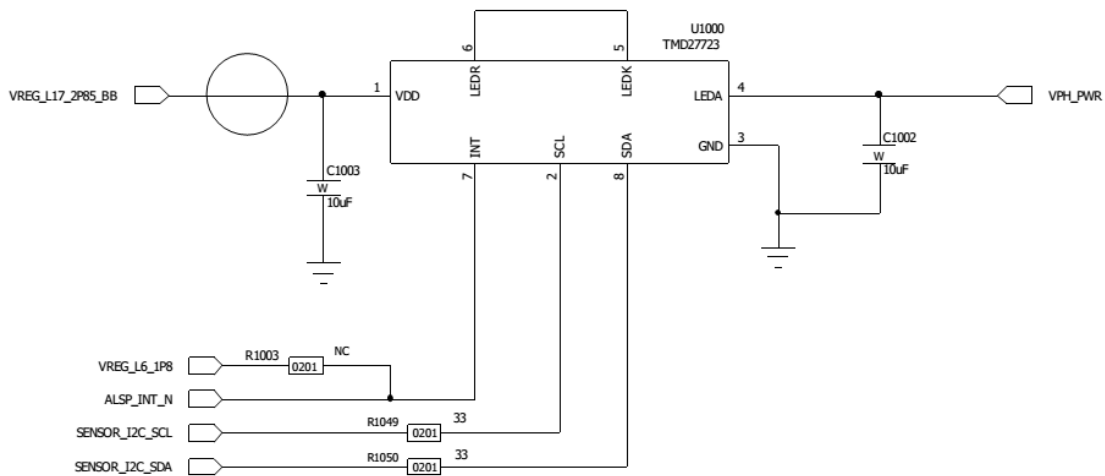


Figure 3.4.9-1 STORM Ambient light and Proximity Sensor Circuit

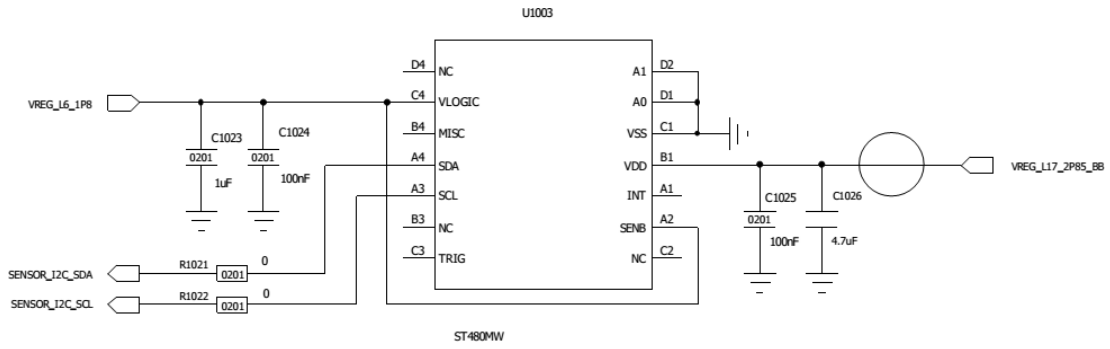


Figure 3.4.9-2 STORM Magnetic Sensor

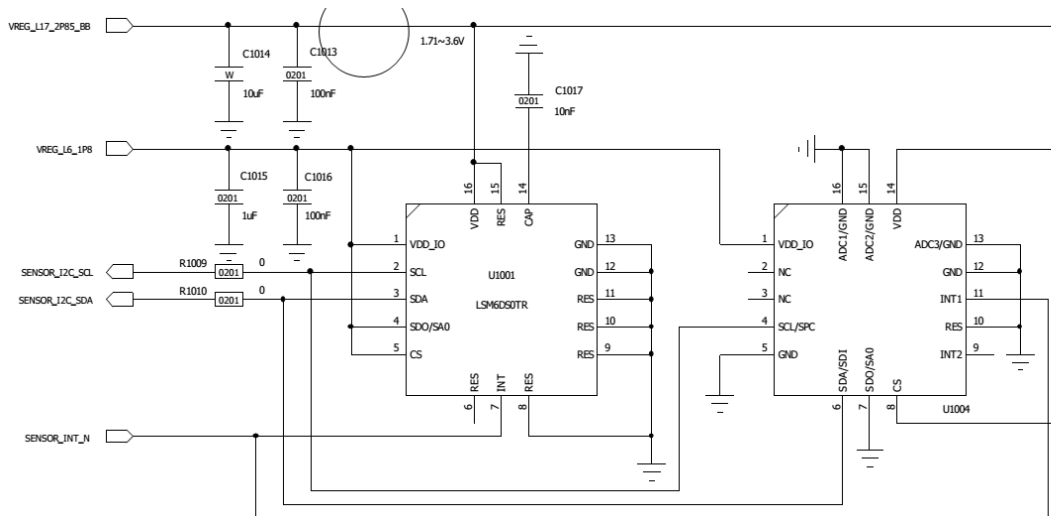


Figure 3.4.9-3 STORM Gyro and G-sensor connector

Chapter 4: Mobile Failure Analysis

Basically, STORM main failure cases including:

- Power on problem (No power on, Auto-Power on/off, Phone totally dead, Restart automatically)
- Charging problem (No charging)
- Camera issue (cannot connect camera)
- Touch failure (Cannot touch, shift)
- Display failure (No display, LCD backlight malfunction, Segments missing, Black display, and Contrast malfunction)
- Signal problem (No signal, Weak signal, No signal intermittent)
- Other Function problem (No ringing tone, No vibration, Vibrator abnormality, Cannot read SIM /T-F card, Phone password locked, Cannot upgrade software, Show "high temperature", FM Radio fault, Bluetooth issue, Wi-Fi issue, etc.)

In the mobile circuit system, all the electrical connecting trace can be divided into three types, such as power supply trace, controlling trace and data/ signal trace. When analyzing the RF failure case, for the active circuit we should first check the power supply, then control circuit followed by the signal flow path to remove the failure step by step. When debugging the RF malfunction, we should diagnose the RX part first before TX.

4.1 Power on issue analysis

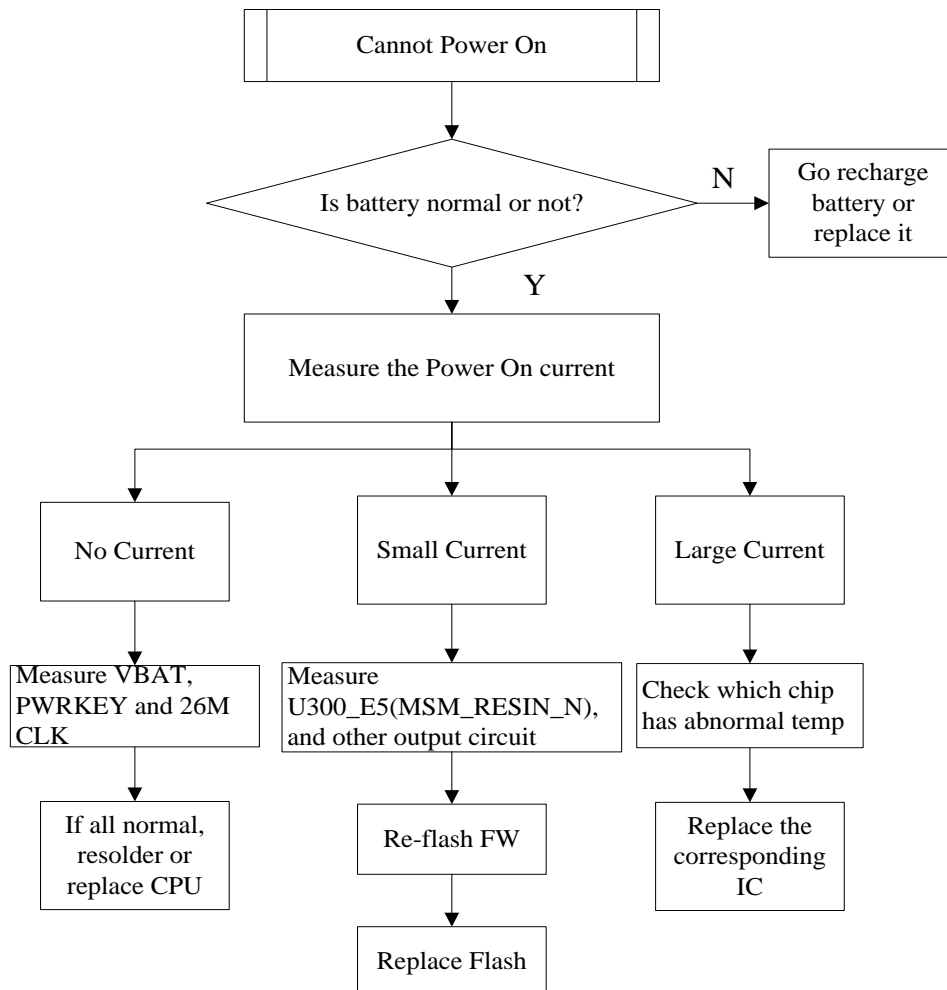


Figure 4.1 Power on failure repair process

1) *Battery cannot power on*

① Check the battery is normal or not, if the battery is broken or lower voltage, replace it;
 ② Check battery connector (J100) is normal or not, if the connector is broken, missing, disconnect, re-solder or replace it; ③ Check the power on switcher is normal or not, if it is abnormal, replace it; completed all above steps, you still cannot solve this issue, please follow the next steps.

2) *No power on Current*

① If the mobile phone can't powered on by battery, we can use the DC Power Supply to check the mobile phone's power on current. After connect mobile phone with DC Power Supply, press power on key, then check the current value; ② For No current (0mA) issue, it means power supply circuit problem, and we can follow the product circuit diagram to check this power supply circuit

step by step until find out the defective component.

3) Small power on Current

For small current issue, it means software or periphery circuit problem, we can try to upgrade the new software or check all of the periphery circuit.

4) Large power on Current

For high current issue, it means this mobile phone must be short circuit, the most probable cause chipset are Baseband IC (U600), Memory IC, RF IC, RF PA (GSM & WCDMA), ESD protection Diode, etc.). We can attempt to touch these chipset, and feel the temperature is normal or not. If one of the chipset's temperatures is abnormal, replace it.

4.2 Charging issue analysis

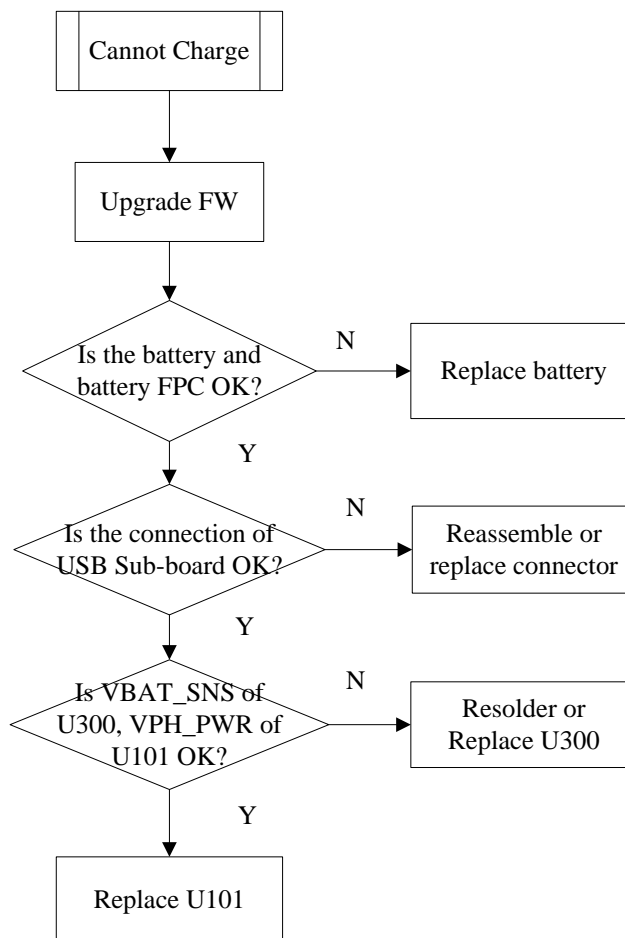
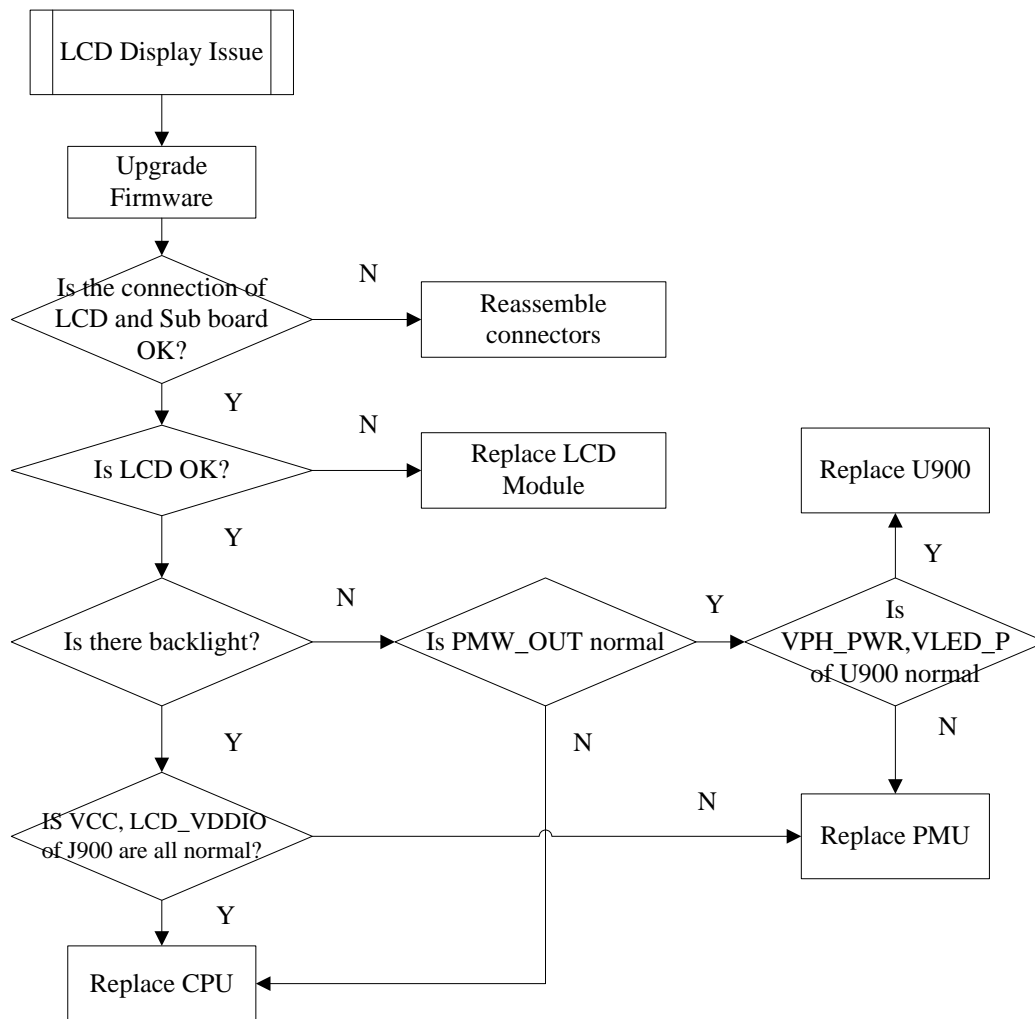


Figure 4.2 Charging failure repair process

① Upgrade new software for the mobile phone; ② Check Battery and Charger; ③ Check Battery

Connector (J100) , USB Connector; ④ Replace the Switching charger U101 or PMU U300 and test it again. If problem still not solved, you need to follow the product circuit diagram to check CPU; ⑤ After repaired, enter into ‘Factory Mode’ by press “Power on” key, volume “-”key the same time for three seconds. Select “Battery” and then plug in USB cable you can verify the function now.

4.3 Display issue analysis



1

Figure 4.3 Display failure repair process

① Upgrade new software for the mobile phone; ② STORM’s LCD is connected to mainboard with FPC. We can check the FPC and FPC connector (J900) is normal or not, if it is abnormal, resolder or replace it. ③ After upgrade new software and LCD replaced, the problem is still not solved. Please try to follow the product circuit diagram to check the LCD data path, LCD power

supply path and CPU.

4.4 No Incoming & Outgoing Voice issue analysis

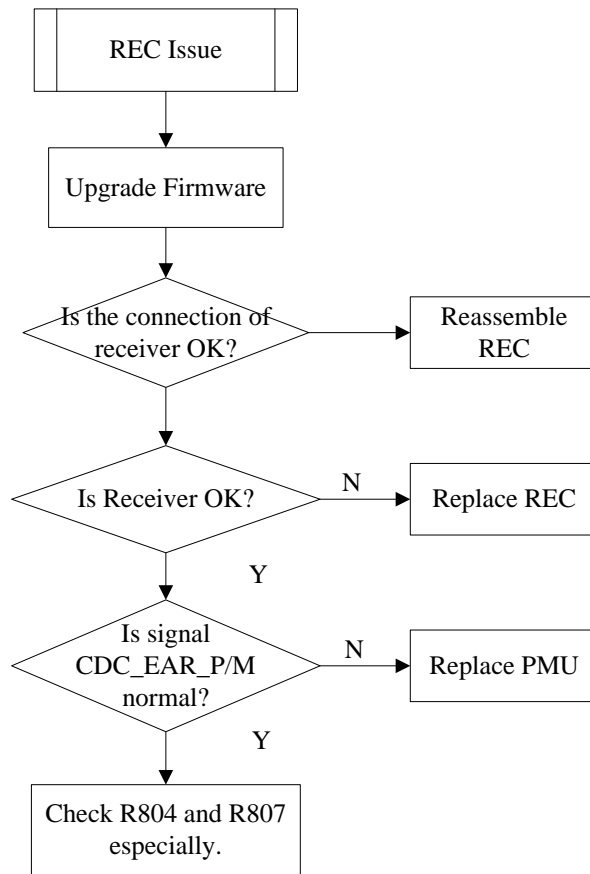


Figure 4.4-1 No received voice failure repair process

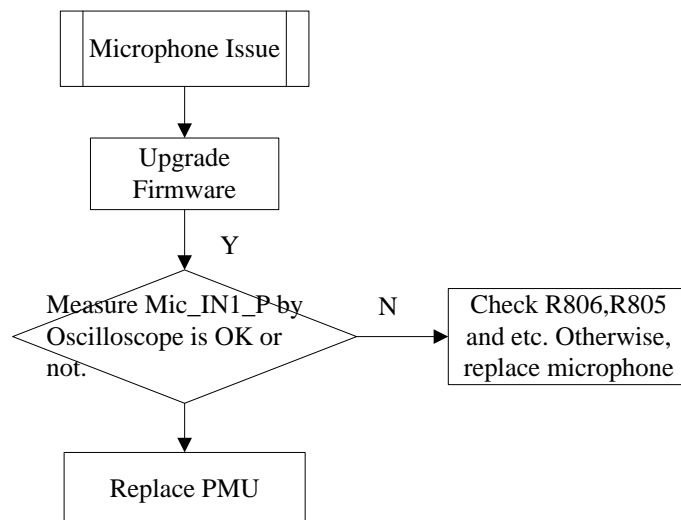


Figure 4.4-2 No outgoing voice failure repair process

These issues often occur in a mobile phone.

For incoming no voice failure

- ① Upgrade the latest firmware and try again;
- ② Check the phone call volume is OK or not;
- ③ Check if the connection of receiver is ok or not;
- ④ Measure the resistance of receiver and check if it's normal.

For outgoing no voice failure:

- ① You can enter into 'Factory Mode' by keep press "Power on" key, volume "-" key the same time;
- ② Select " Audio Handset" and blow at main microphone, the echo at the receiver indicate the microphone is OK;
- ③ If test fail, please check the microphone bias circuit, test bias voltage and output signal.

4.5 Headset issue analysis

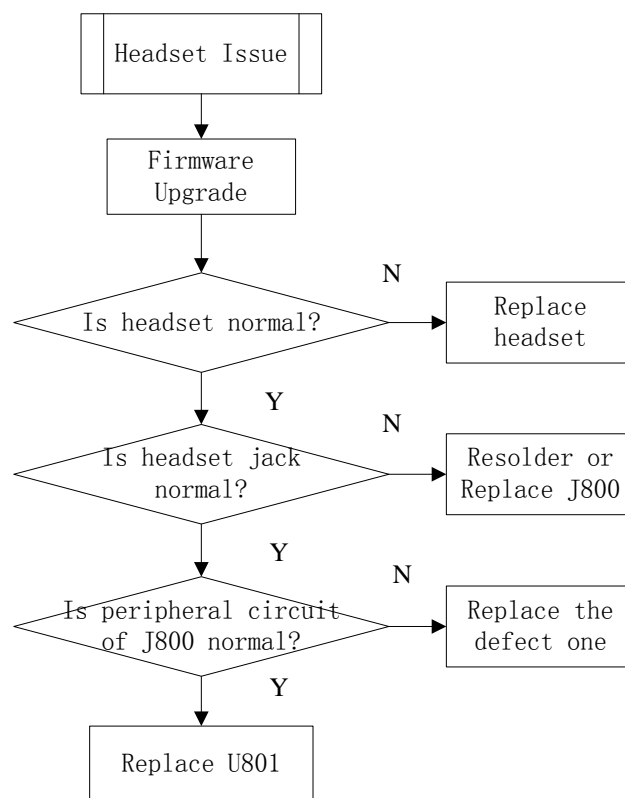


Figure 4.5 Headset failure repair process

This issue often occurs in a mobile phone. ① You can enter into 'Factory Mode' by keep press "Power on" key, volume "-" key the same time; ② Select "Audio Handset" and you will hear a

beep sound if the headset is good; ❸ Otherwise you need to check the Earphone Jack (J800) and its circuit to find the original issue and solve it.

4.6 No voice in Speaker issue analysis

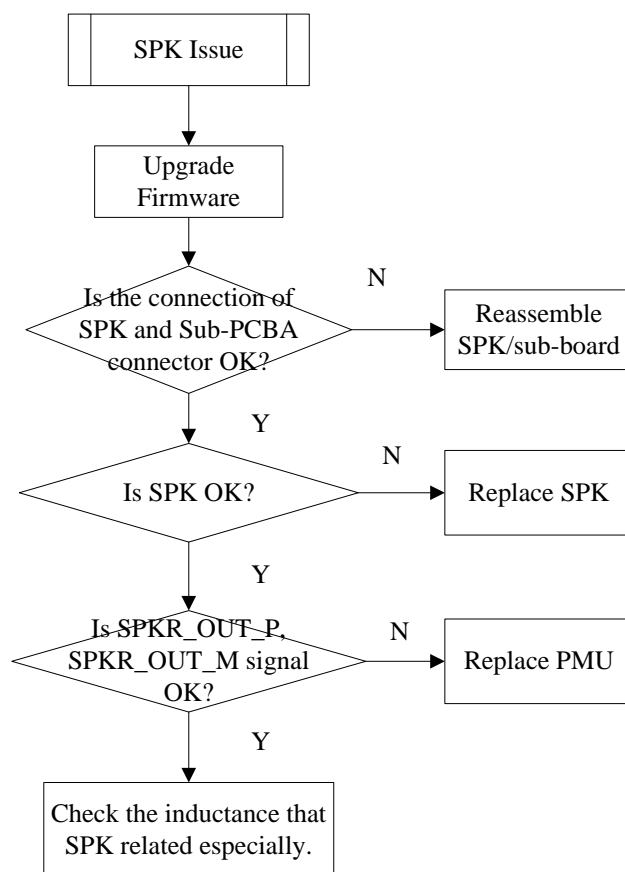


Figure 4.6 No voice in speaker failure repair process

❶ Check whether the audio source can output from baseband chip with a headset; ❷ Then check speaker resistance to confirm whether the resistance of Speaker is 8ohm. If not, it means the speaker is broken. Otherwise we need to check the Audio PA circuit to find out the problem; ❸ When we solved the original issue, we can go to 'Factory Mode' by press "Power on" key, volume "-"key the same time; ❹ Select " Audio Loudspeaker" to test the speaker function.

4.7 Touch Screen issue analysis

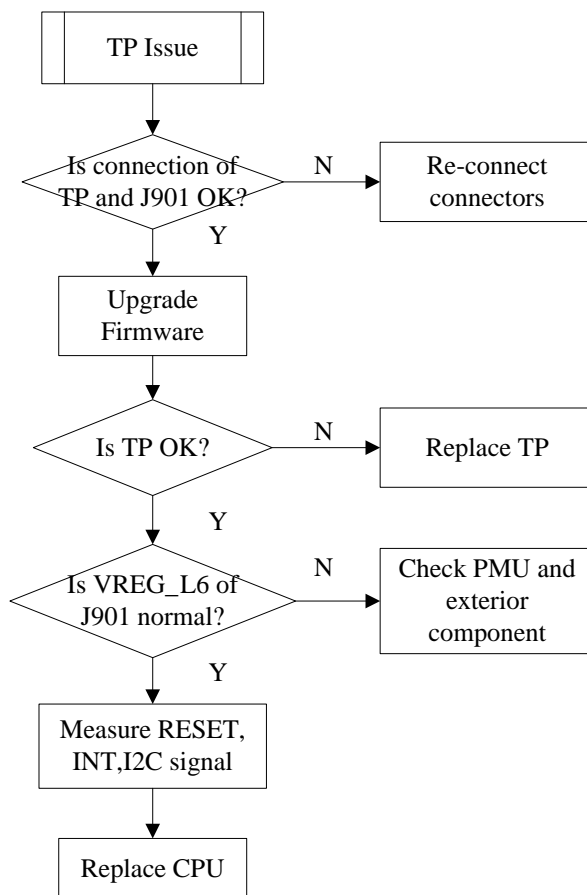


Figure 4.7 TP failure repair process

① Upgrade new software for the mobile phone; ② Check FPC and TP connector (J901); ③ If problem still not solved, you need to replace a new TP or CPU (U600); ④ After repaired, enter into 'Factory Mode' by press "Power on" key, volume "-" key the same time. Go to "Touch" → Test TP function.

4.8 Camera issue analysis

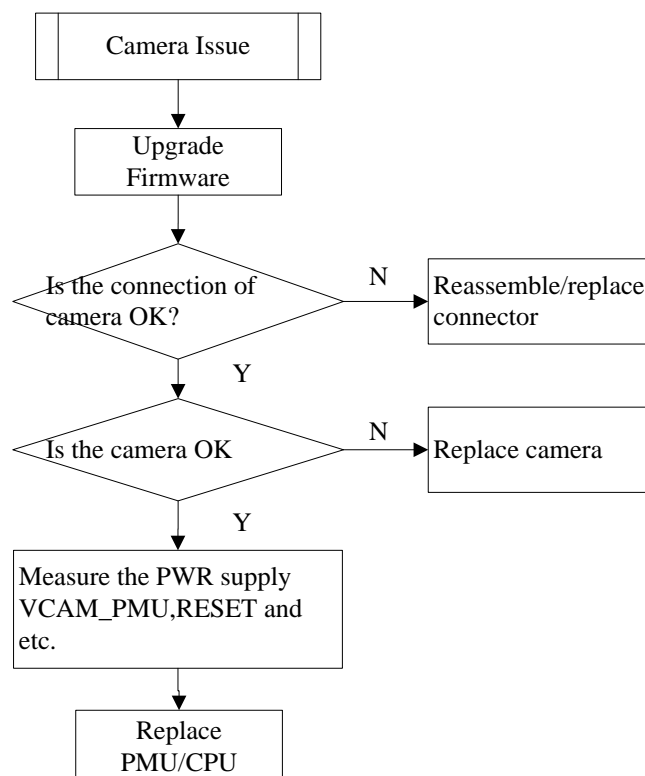


Figure 4.8 Camera failure repair process

① Upgrade new software for the mobile phone; ② Replace camera module and test it again. If problem still not solved, you need to follow the product circuit diagram to check the corresponding components and CPU (U600); ③ After repaired, enter into 'Factory Mode' by keep press "Power on" key, volume "-" key the same time. Choose "Camera Back or Camera Front" → test the function.

4.9 Vibrating issue analysis

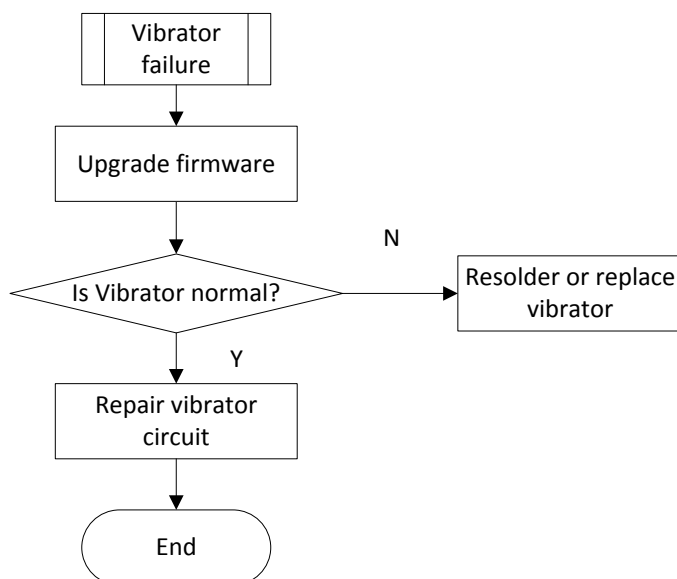


Figure 4.9 Vibrator failure repair process

① Upgrade new software for the mobile phone; ② Check Vibrator; ③ Replace Vibrator and test it again. If problem still not solved, you need to follow the product circuit diagram to corresponding components; ④ After repaired, enter into 'Factory Mode' by press "Power on" key, volume "-"key the same time. Select "Vibrator" and then you can test the function.

4.10 BT/Wi-Fi issue analysis

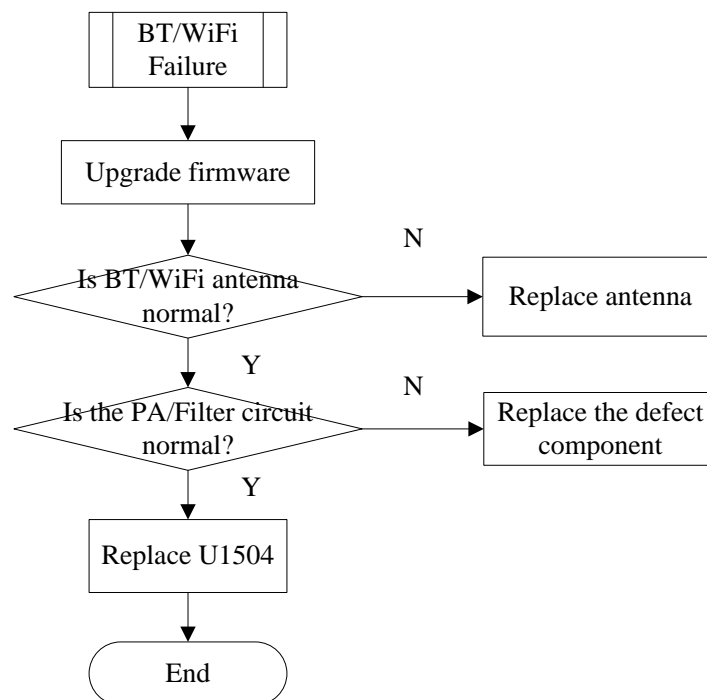


Figure 4.10 BT failure repair process

① Upgrade new software for the mobile phone; ② Check BT/Wi-Fi (Co-ANT); ③ Clean or Replace the ANT and test it again. If problem still not solved, you need to follow the product circuit diagram to check the PA, Filter and U1504; ④ After repaired, enter into 'Factory Mode' by press "Power on" key, volume "-" key the same time, select "Bluetooth" and then you can test the function.

4.11 FM issue analysis

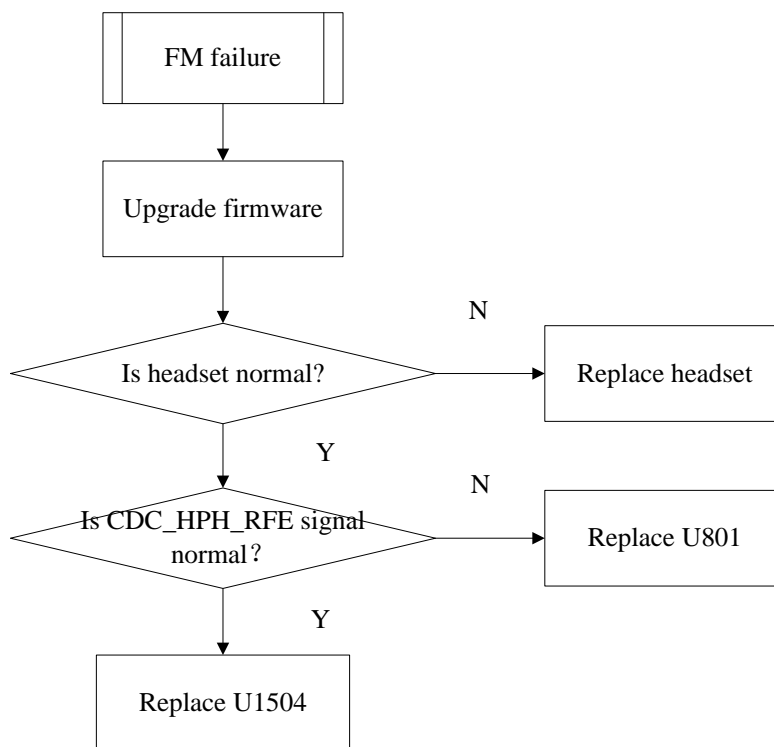


Figure 4.11 FM failure repair process

① Upgrade new software for the mobile phone; ② Check Headset already insert to Mobile phone or not; ③ Enter into 'Factory Mode' by keep press "Power on" key, volume "-" key the same time. Then go to "FM" → Click "Search Next" to change the radio channel. If the FM function is OK, you will hear the FM channel voice; ④ If the FM cannot work well, you can check FM power supply path, FM clock signal path is working normally or not. Any of the abnormal components, replace it.

4.12 GPS issue analysis

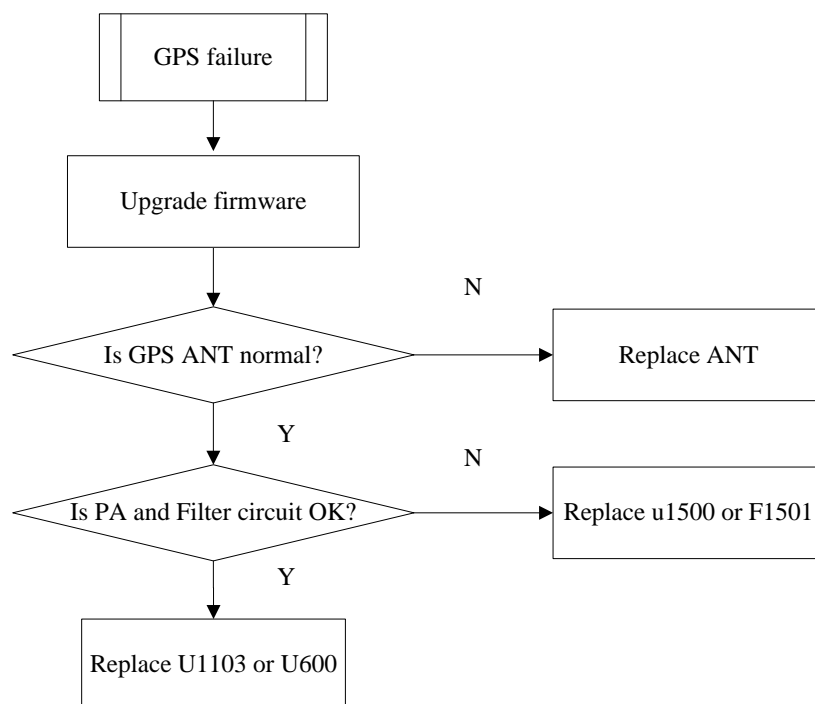


Figure 4.12 GPS failure repair process

① Upgrade new software for the mobile phone; ② Check the connection of GPS ANT; ③ Clean or Replace the GPS ANT and test it again. If problem still not solved, you need to follow the product circuit diagram to check U1104 and corresponding components; ④ After repaired, enter into 'Factory Mode' by press "Power on" key, volume "-" key the same time, select 'GPS' and test the function.

4.13 Cannot download software

There are many reasons would cause download failure. First of all, you must make sure that the download procedure is correct. You can follow the instruction in the chapter below. There are many kinds of phenomenon when the problem occurs:

- ✓ PC can't recognize the phone

Change for another download cable and try again. Otherwise, you need to check whether the PINs of the system interface are broken. If everything is ok, please re-solder or replace the corresponding I/O connector and baseband CPU.

- ✓ Download tool hangs when downloading

You need to check the corresponding FLASH chip, baseband chip and trace between baseband CPU and FLASH.

4.14 Signal issue analysis

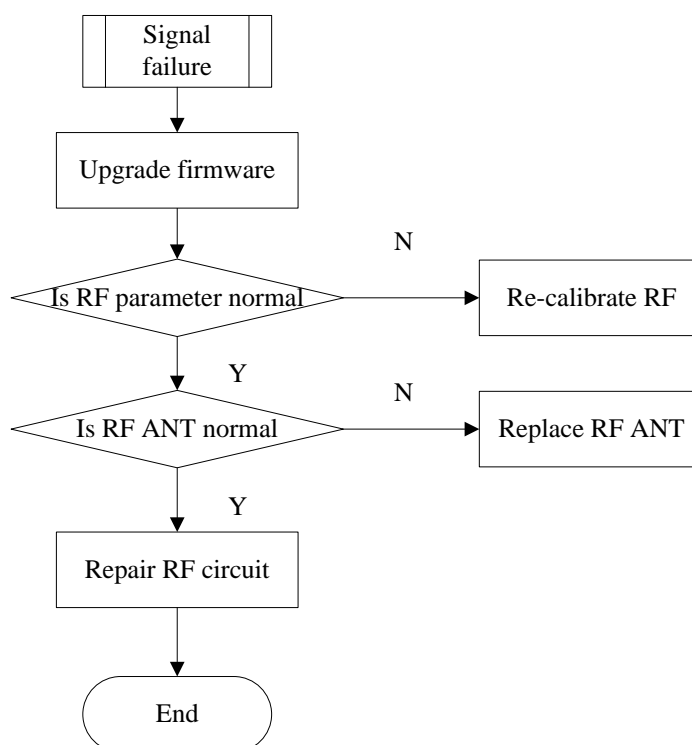


Figure 4.14 Signal failure repair process

RF failure often occurs in calibration or capability test, the best diagnostic method is to use wireless universal tester, spectrum analyzer and signal source matched with META tool to test it. Corresponding components including: Antenna switch, Saw filters, matching circuit etc. We need to check whether one of them is bad soldering or damaged. If power received is too low maybe the RF circuit is cut off, you need to check saw filter, matching circuit, antenna switch, and control signal etc. If the bit error is too high, it maybe because of the saw filter is not qualified.

Chapter 5: Software Upgrade Guidance

5.1 Preparations before Upgrade

| Item | Description | Remarks |
|--------------------|-------------------------|--|
| Upgrade file list | MSM8939_Android_scatter | Scatter-downloading file |
| Upgrade Tools list | Battery for STORM | It gives the power to Mobile phone. |
| | Smart phone Flash Tool | QFil |
| | QC USB_Driver | USB Driver for Smart phone |
| | USB Data Cable | “USB Driver Installer” must be installed. |
| | Personal Computer (PC) | <p>Recommended PC HW requirements:</p> <ul style="list-style-type: none"> • Computer processor: Pentium 700 MHz or higher • RAM 256 MB or higher • Disk space 100-200 MB or higher <p>Supported operating systems:</p> <ul style="list-style-type: none"> • Windows 2000 Service Pack 3 or higher • Windows XP Service Pack 2 or higher • Windows Vista or 7 32-bit system |

5.2 USB Cable Driver Install

QC USB Port Driver Install

Step 1: Find the file of “QCUSB_Driver” package path, and then run the “QCUSB_Driver”.

(Attention: Do not connect the cable with PC when you install the “USB Driver”.)

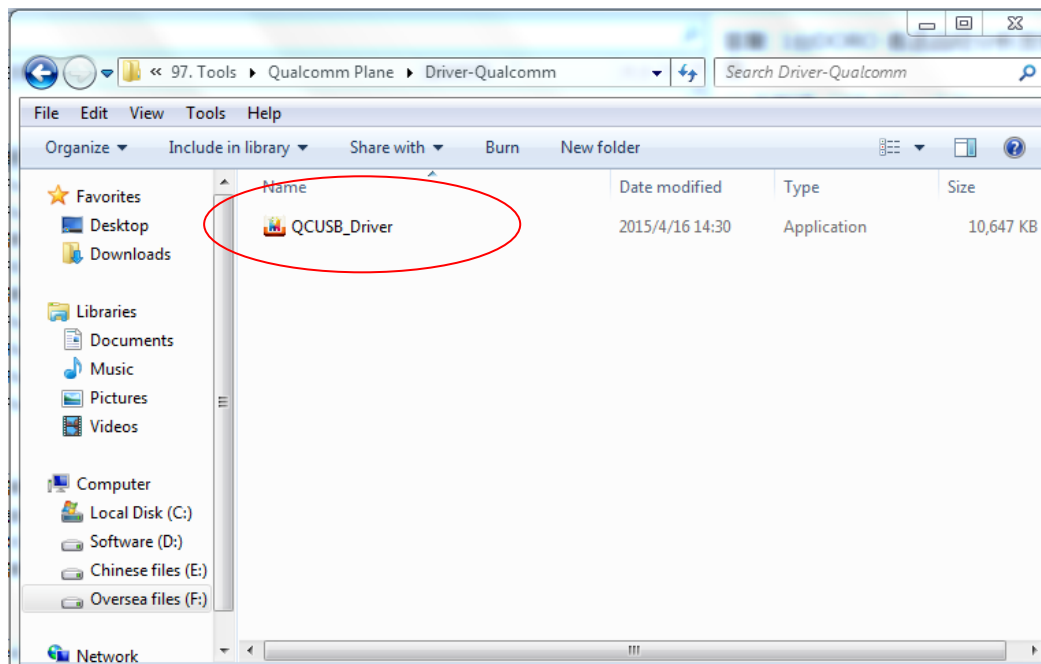


Figure 5.2-1 “QCUSB_Driver” Package

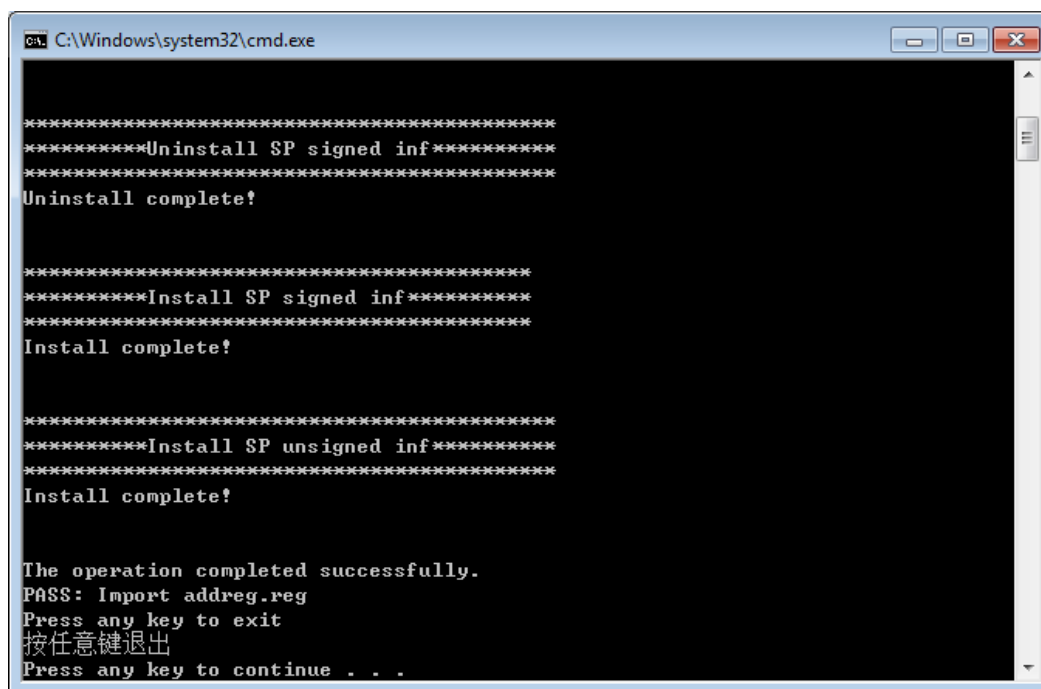


Figure 5.2-2 USB driver installing progress

Step 2: When the “QCUSB_Driver” install completely, you can connect the USB data Cable with PC or Laptop now. The figure shows as below:

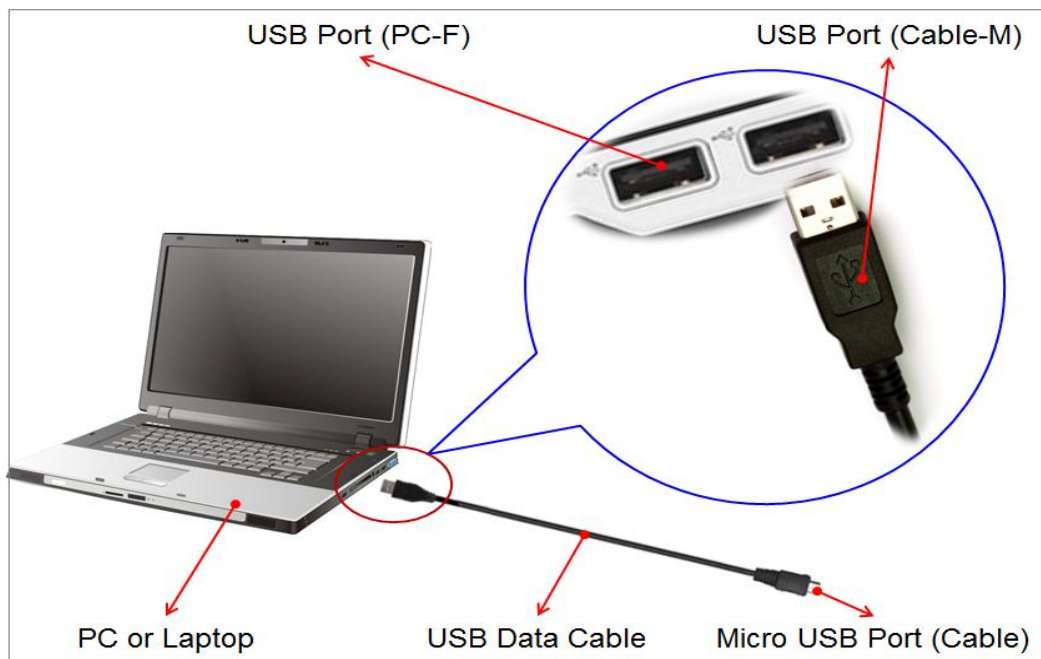


Figure 5.2-3 USB Data Cable Connect Structure

Step 3: ① Power off the Smart phone → ② Press power, volume +/- the same time for 3s, the device will vibrated a short time, and then connect USB Data cable with Smart phone → ③ PC screen will pop-up some message, you need to waiting for few minutes. The figure shows as below → ④ After new driver installed successfully, disconnect the Smart phone with USB Data cable.

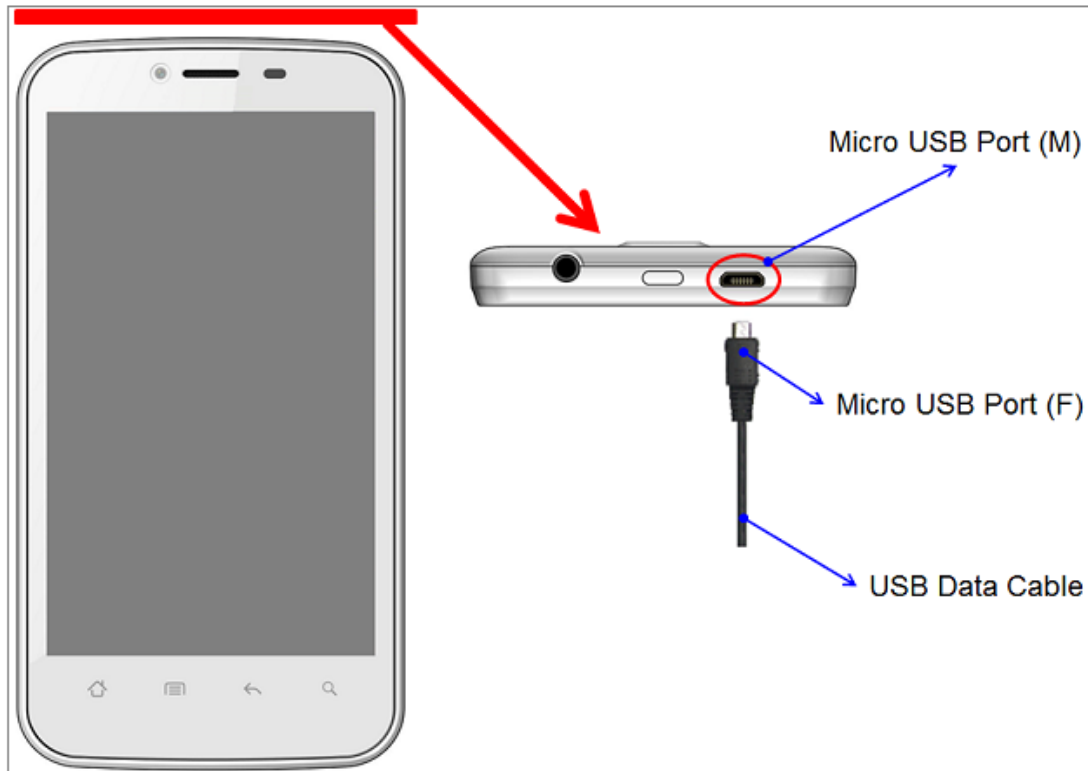


Figure 5.2-4 USB Data Cable Connect Structure

The COM port will appear shortly in device manager as below picture:

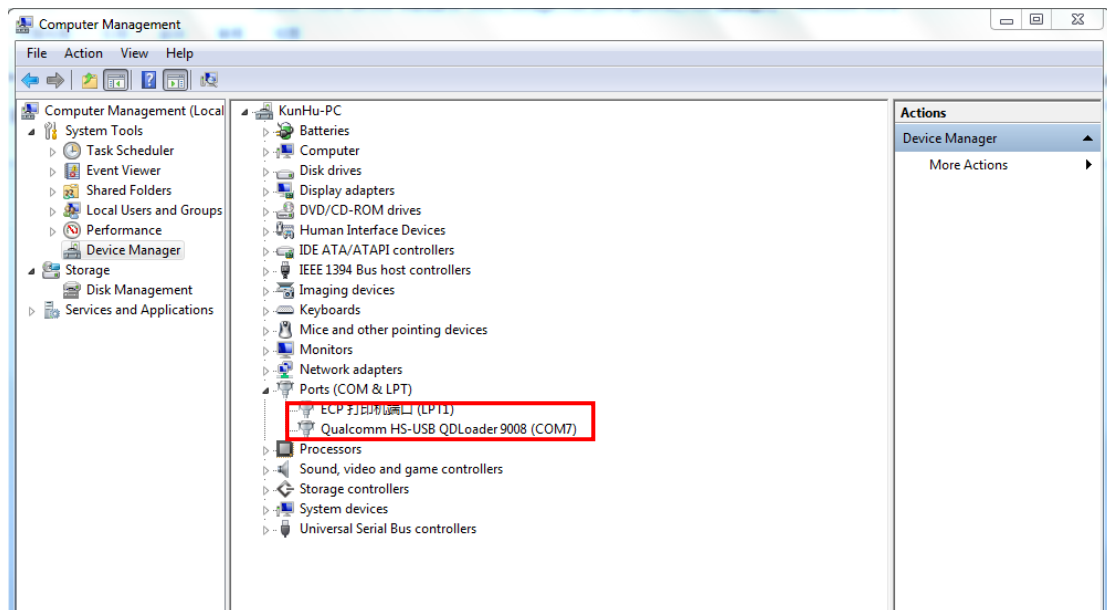


Figure 5.2-5 Virtual COM port in device manager

5.3 Software Upgrade Procedure

Attention: Don't pull out the USB cable during downloading process. Otherwise, the handset's memory will be broken by the unfinished upgrade process and cause the handset cannot be powered on.

Step 1: double click the executable file "QDownload" to run the flash tool

The flash tool interface is as below:

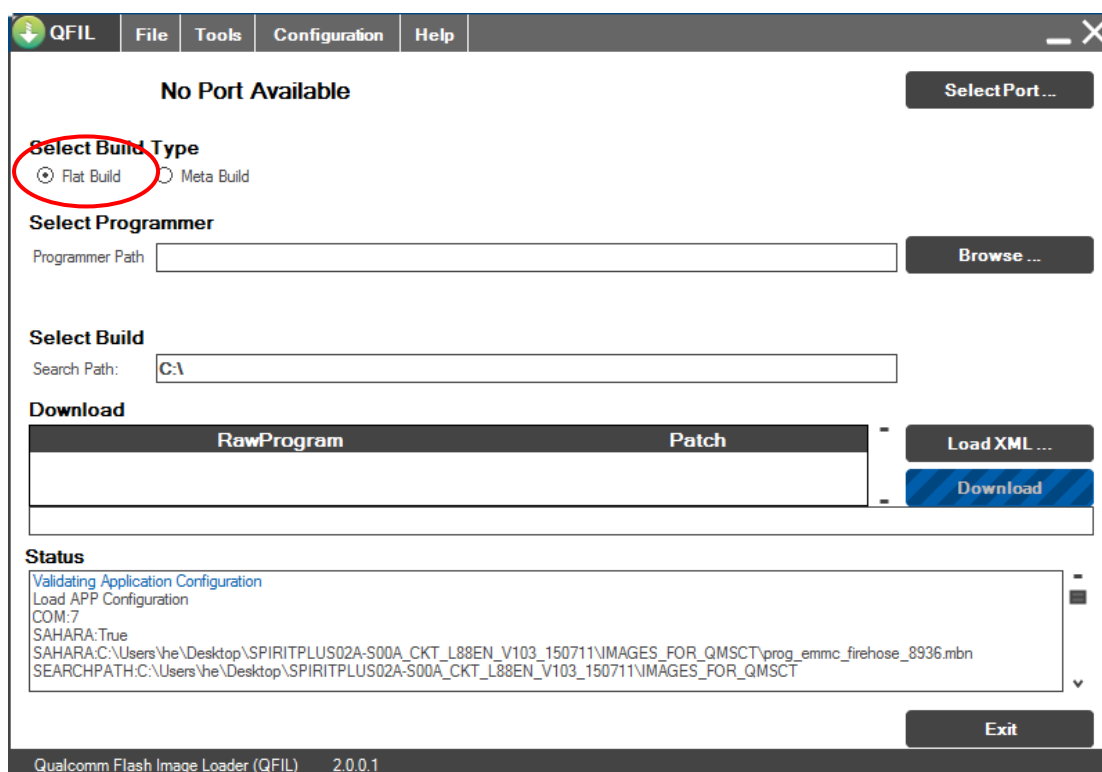


Figure 5.3-1: Smart Phone Flash Tool Download window

Step 2: click the icon “Browser” to choose the file “prog_emmc_firehose_8936.mbn” which is located in firmware folder, showing as Figure 5.3-2;

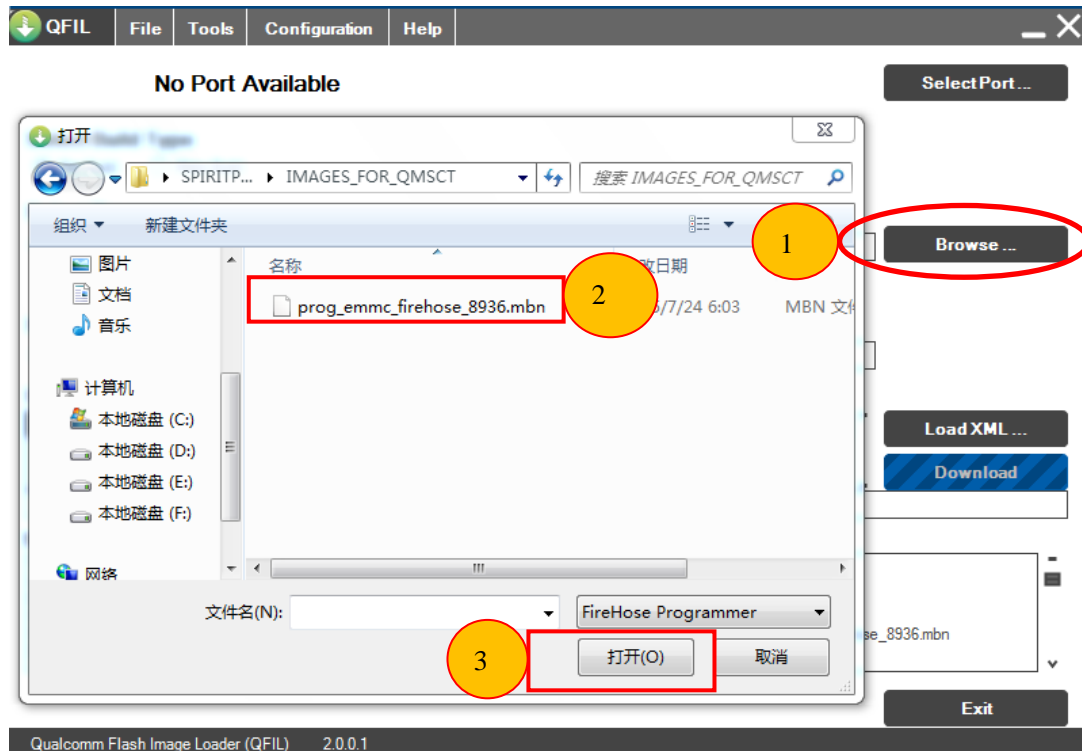


Figure 5.3-2: Choose mbn file

Step 3: click “Load XML” to choose the build files as Figure 5.3-3

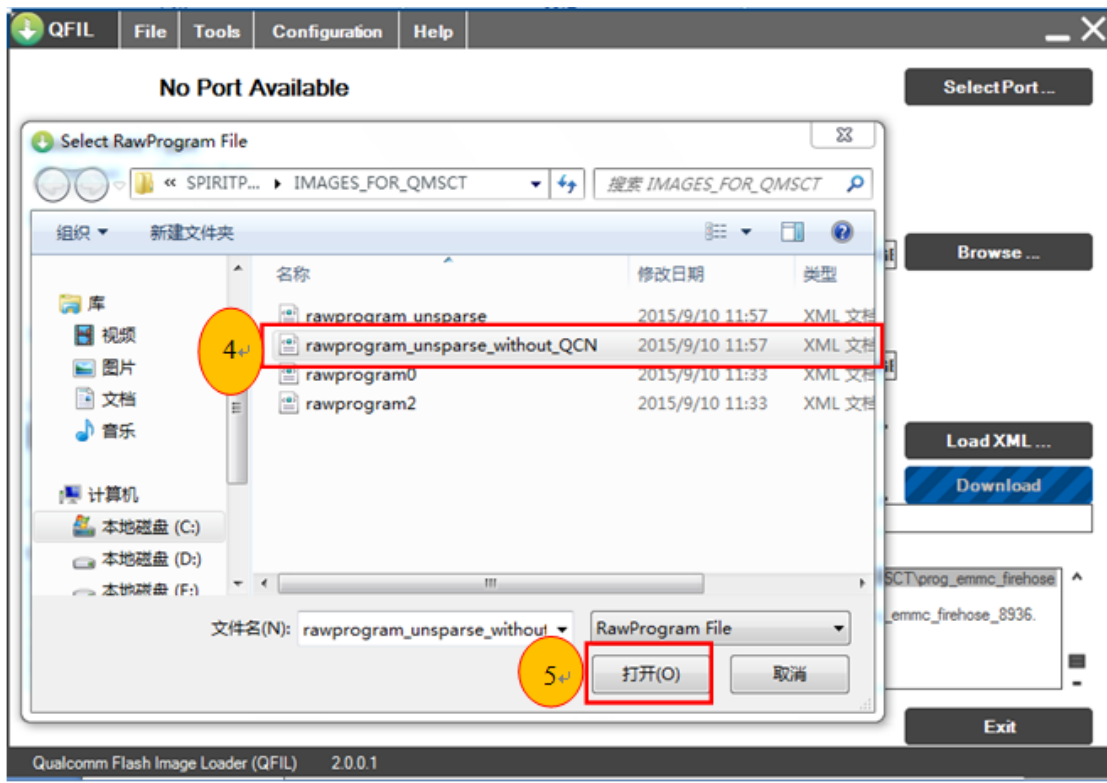


Figure 5.3-3: Choose build file

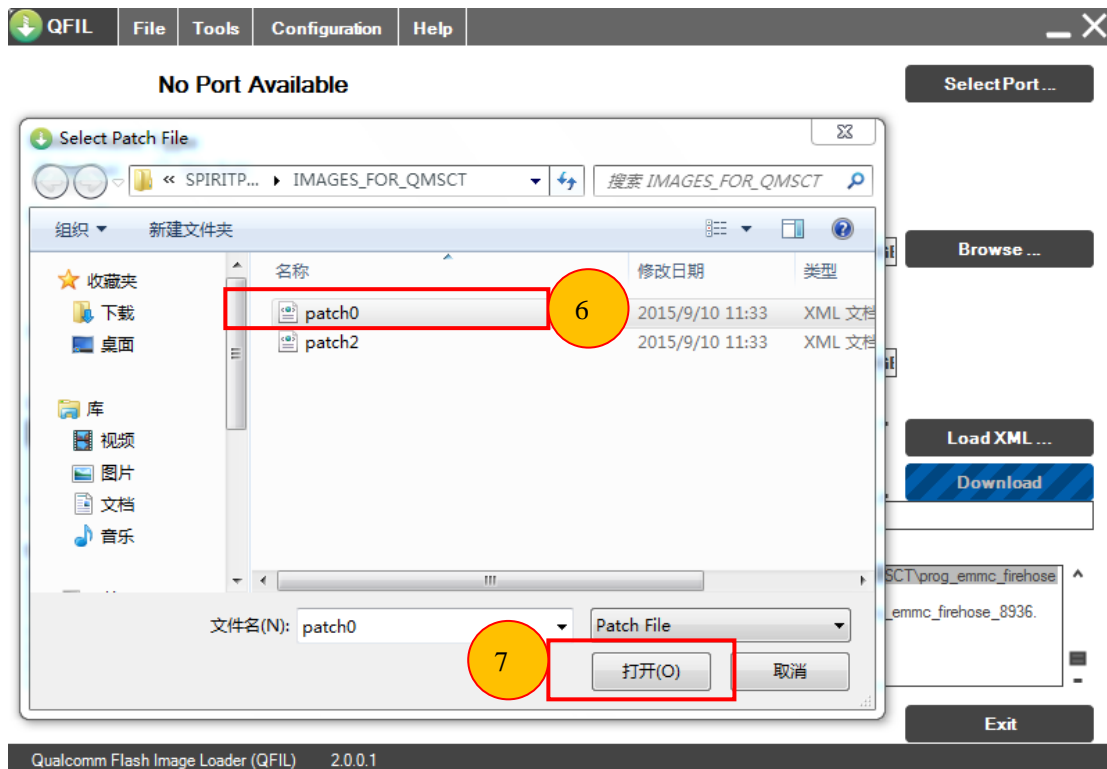


Figure 5.3-4: choose both “patch0” file

Step 4: Power off phone, hold the volume up and down key and power key at the same time, there will vibrate lightly one time (phone entered the EDL mode), connect phone to PC with USB cable, select the com port and then click “Download”.

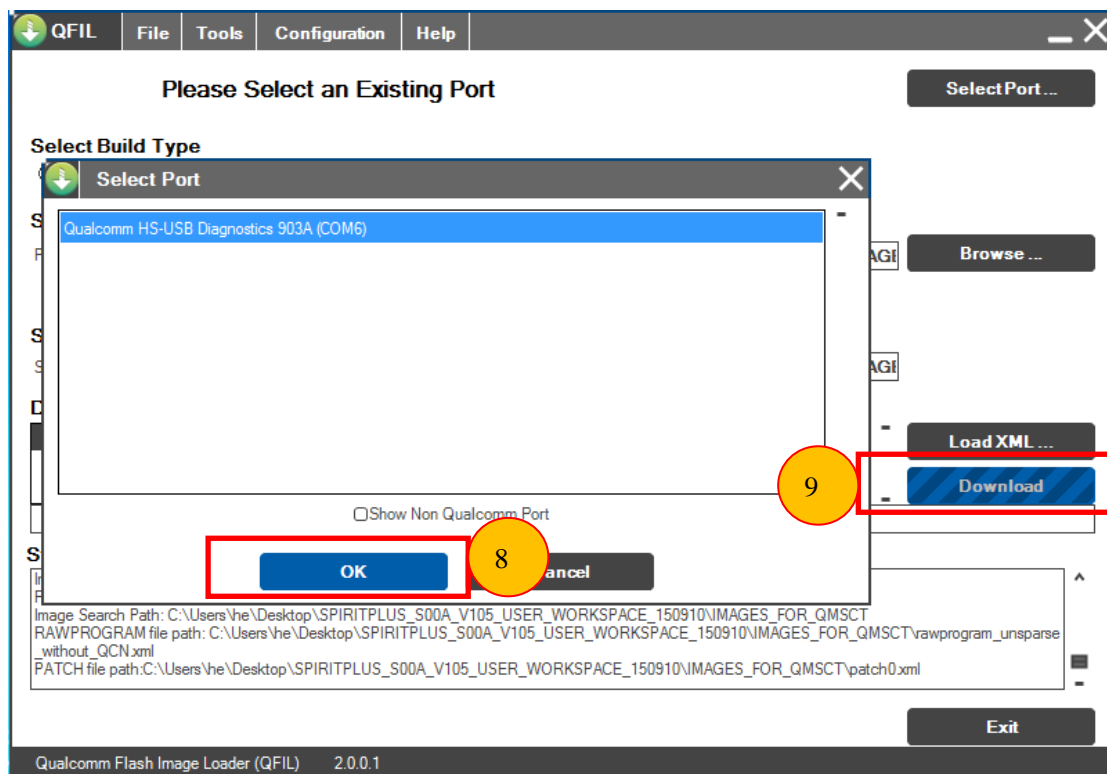


Figure 5.3-5: Connect to PC and Start Download

Step 5: The upgrade procedure will start automatically as below picture:

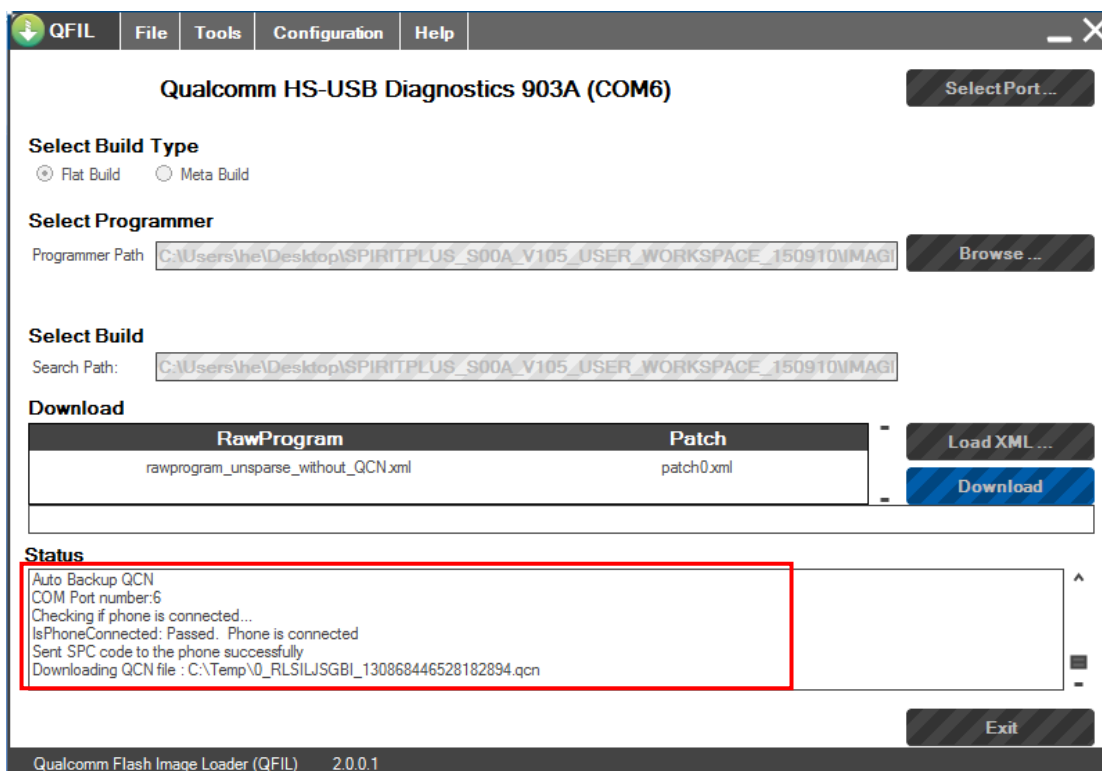


Figure 5.3-6: Firmware upgraded progress

Step 5: Once the progress finished, there will be information shows in the status box as shown as figure 5.3-7:

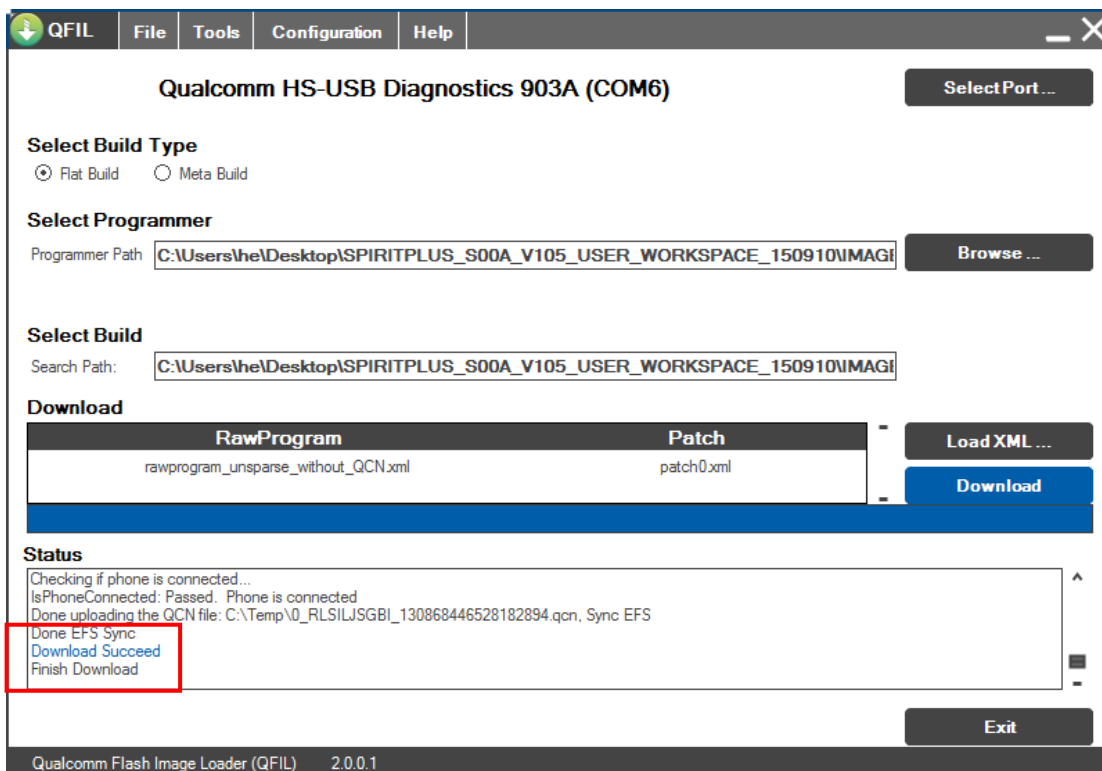


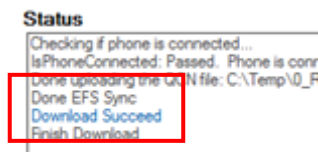
Figure 5.3-7: Firmware upgraded success

5.4 SW Download Troubleshooting

Case one: How to confirm the downloading already successful?

Solution: When download successful, there will be “Download Succeed” in the status box;

If download failed, there will show failure reason.

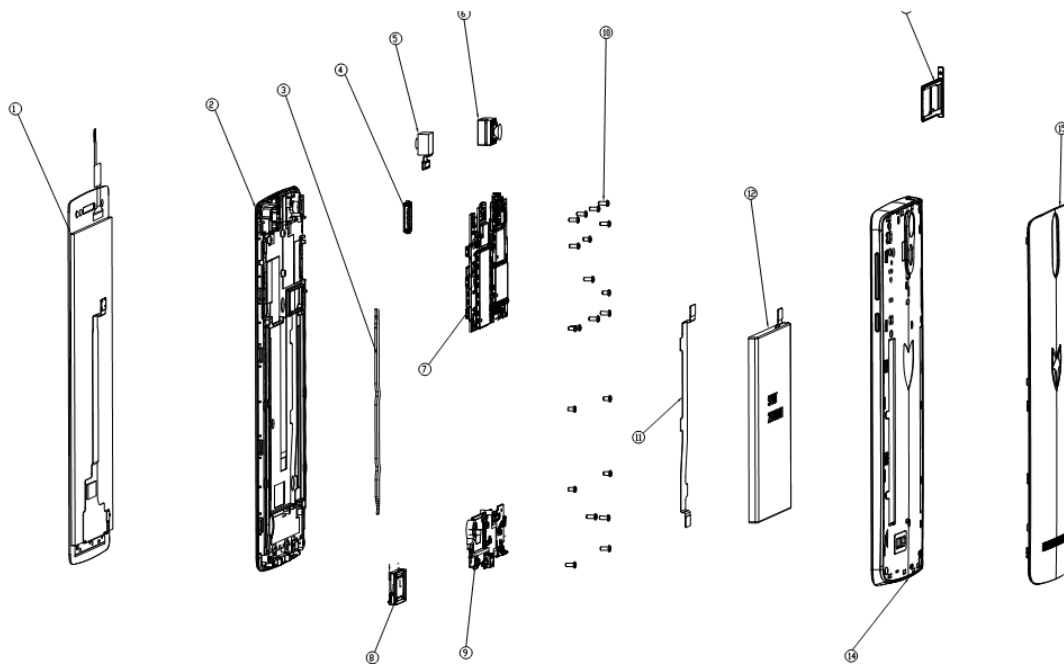


Case two: What should we do, when the downloading process is completely?

Solution:

You should check if the “IMEI” is existed. Otherwise you should re-write the IMEI. The code to check the IMEI: ***#06#**

Chapter 6: Product Explode View



| | | | | | |
|---|-------------|----|--------------|----|---------------|
| 1 | LCD MODULE | 6 | MAIN CAM | 11 | MAIN FPC FLEX |
| 2 | FRONT COVER | 7 | MAIN PCBA | 12 | BATTERY |
| 3 | CABLE LINE | 8 | SPEAKER | 13 | SIM TRAY |
| 4 | EARPICECE | 9 | SPEAKER PCBA | 14 | REAR COVER |
| 5 | VICE CAM | 10 | SCREWS | 15 | BATTERY |