SERVICE MANUAL

For Cellular Phone

Model Name: PSP3502

Version: A

Effective Date: 2014.04.27

Note:

This manual is guide to after-sales repair of DA34681 mobile phone, the repair of product shall only be carried out by trained and well experienced technical person and use of this manual by any other person for the service of the product may result in serious damage to the product

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9.1 Principle of operation
9.2 AGC failure
9.3 AFC failure
9.4 APC Failure

10. Maintenance tools

1. **Introduction**:

1.1 **Purpose**:

The main purpose of this manual is to provide a basic foundation for electrical and mechanical repairs

1.2 General Safety guidelines and use:

Safety guidelines:

The product contains polar capacitors, which must not be short-circuited or connected with polarities reversed. During repairs, due attention shall be paid to static protection in order not to damage the ESD-sensitive components of this device. It is strictly forbidden to use mobile phone dial up in the plane. It is strictly forbidden to use this device near aerosol sprays or explosive gases

Use of mobile phone:

Please do not make mobile phone approach or touch the exposed parts of the body(especially face or eye), If the user holds the mobile phone like the receiver of a common telephone, it has best efficiency when its antenna is upwards and above the shoulder. Please speak to microphone.

Each driver shall always pay attention to safety, Use of a mobile phone when she/he drives in some areas is an illegal act.

2. General characters:

2.1 Overview:

DA34681 mobile phone are based upon platform MT6582, including baseband circuit and frequency circuits, Baseband parts is mainly comprised of master chip MT6582 and its controlled peripheral circuits. DA34681 is equipped with dual SIM and dual standby, double camera, single battery, CTP，G-sensor，WIFI，FM, Bluetooth and single memory card.

Main Features:

- Main dimension: 146*73*10.1 mm
- Smart phone
- Optional band (GSM 900 \ 1800 \ 850 \ 1900\W2100)
- Display: 5.0’HD
- Camera: 8M\5M image elements
- Voice recording

- Antenna: GSM antenna, FM earphone antenna, BT/WiFi/GPS antenna
- Charger: Micro USB charger
- SIM: dual band and dual standby
- Support MSN, Yahoo, Message, face book, ect

3. **Introduction to capability and index**:

- Operating temperature: -10℃ ~ +55℃
- Storage temperature: -10 ℃ ~ +60℃
- Relative humidity: 10% ~ 95%
- Transmit power: Class 4(2W)/(EGSM/GSM850)
  Class 1(1W)/(DCS/PCS)
  Class 3(200mW)(W2100/W850)
- Voltage range: 3.7 ~ 4.2V
- Battery capacity: 1850mAh

Item	GSM Technical Indexes	DCS Technical Indexes
Frequency Range	Transmit : 880~915MHz Receiver : 925~960MHz	Transmit: 1710~1785MHz Receiver: 1805~1880MHz
Channel	174 Carrier wave, 8 channels per carrier wave	174 Carrier wave, 8 channels per carrier wave
Phase Error	RMS Less than 5 degrees, Peak value less than 20 degrees	RMS Less than 5 degrees, Peak value less than 20 degrees
Bit Error Rate	<2%	<2%
Receiving Sensitivity	<-102dBm	<-102dBm
Voltage Range	3.2~4.5V	
Temperature Range	—10℃ ~+55 ℃	
Item	GSM850 Technical Indexes	PCS Technical Indexes
Frequency Range	Transmit : 824~849MHz Receiver : 869~894MHz	Transmit: 1850~1910MHz Receiver: 1930~1990MHz
Channel	174 Carrier wave, 8 channels per carrier wave	174 Carrier wave, 8 channels per carrier wave
Phase Error	RMS Less than 5 degrees, Peak value less than 20 degrees	RMS Less than 5 degrees, Peak value less than 20 degrees
Bit Error Rate	<2%	<2%
Receiving Sensitivity	<-102dBm	<-102dBm
Voltage Range	3.2~4.5V	
Temperature Range	—10℃ ~+55 ℃	

Output powers of transmitters of different power levels (GSM900)

Power Control level	Output Power of transmitter	Error	
dBm		Normal(dB)	Limit(dB)
5 33		±3	±4
6 31		±3	±4
7 29		±3	±4
8 27		±3	±4
9 25		±3	±4
10 23		±3	±4
11 21		±3	±4
12 19		±3	±4
13 17		±3	±4
14 15		±3	±4
15 13		±3	±4
16 11		±5	±6
17 9		±5	±6
18 7		±5	±6
19 5		±5	±6

Output powers of transmitters of different power levels (GSM850)

Power Control level	Output Power of transmitter	Error	
dBm		Normal(dB)	Limit(dB)
5 33		±3	±4
6 31		±3	±4
7 29		±3	±4
8 27		±3	±4
9 25		±3	±4
10 23		±3	±4
11 21		±3	±4
12 19		±3	±4
13 17		±3	±4
14 15		±3	±4
15 13		±3	±4
16 11		±5	±6
17 9		±5	±6
18 7		±5	±6
19 5		±5	±6

Output powers of transmitters of different power levels (DCS1800)

Power Control level	Output Power of transmitter	Error	
dBm		Normal(dB)	Limit(dB)
0 30		±3	±4
1 28		±3	±4
2 26		±3	±4
3 24		±3	±4
4 22		±3	±4
5 20		±3	±4
6 18		±3	±4
7 16		±3	±4
8 14		±3	±4
9 12		±4	±5
10 10		±4	±5
11 8		±4	±5
12 6		±4	±5
13 4		±4	±5
14 2		±5	±6
15 0		±5	±6

Output powers of transmitters of different power levels (PCS1900)

Power Control level	Output Power of transmitter	Error	
dBm		Normal(dB)	Limit(dB)
0 30		±3	±4
1 28		±3	±4
2 26		±3	±4
3 24		±3	±4
4 22		±3	±4
5 20		±3	±4
6 18		±3	±4
7 16		±3	±4
8 14		±3	±4
9 12		±4	±5
10 10		±4	±5
11 8		±4	±5
12 6		±4	±5
13 4		±4	±5
14 2		±5	±6

15 0	±5	±6

4. **How the GSM system work**:

4.1 **General**:

The following is a basic introduction to the GSM (Global system for mobile communication) cellular network. This introduction has been greatly simplified and cannot describe all the working performances and technologies or technologies used by the system.

4.2 Introduction of GSM:

Unlike analog cellular systems, GSM use digital wireless technology, compared with previous analog systems, GSM system has the benefits,:

- International roaming: Thanks to international consistency and standardization, calls can be sent and received in any country supporting GSM.

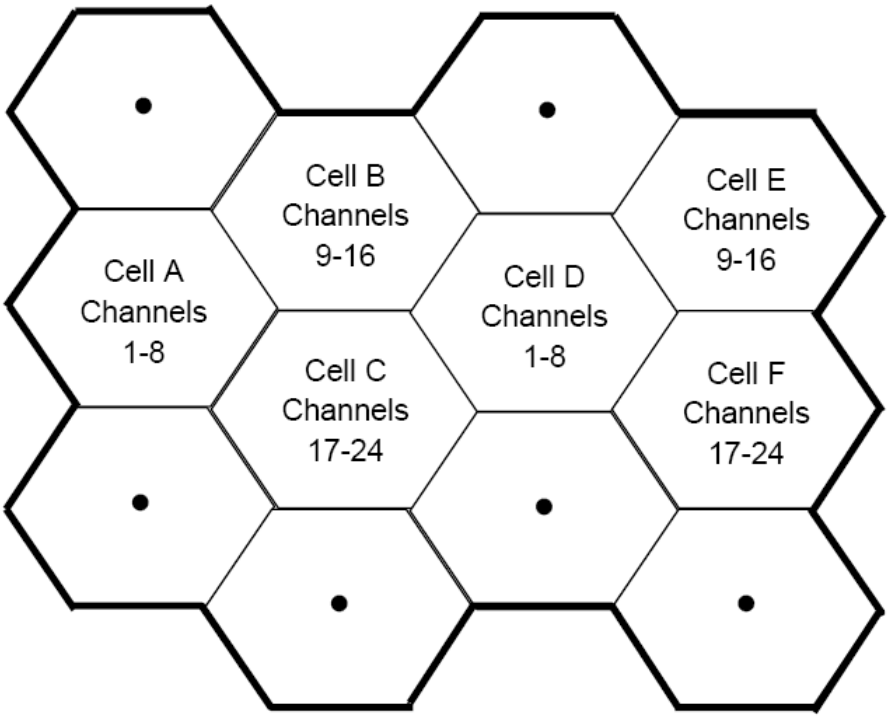
- Digital air interface: The connection between GSM phones and base station is fully digital, and furthermore, GSM digitally connects to switching subsystems and accesses the public switched telephone network.

- Security: Calls made over analog system can be listened in with ease using the appropriate radio receiver. GSM greatly improves security as data is sent after being digitally encrypted.

- Better voice quality: Digital systems are more effective at dealing with same channel interference, transmission interruption and attenuation. Voice quality can also be improved through error correction (by rebuilding lost information)

- Efficiency: The GSM system can make more efficient use of spectrum resources than analog system of the past.

In the following diagram, the think line represents the total coverage area of a hypothetical system. This area is further divided into a number of cells, each of which includes a cell station (base station), each base station works on a set of given channels, and connects wireless phone subscribers and the telephone switching system.



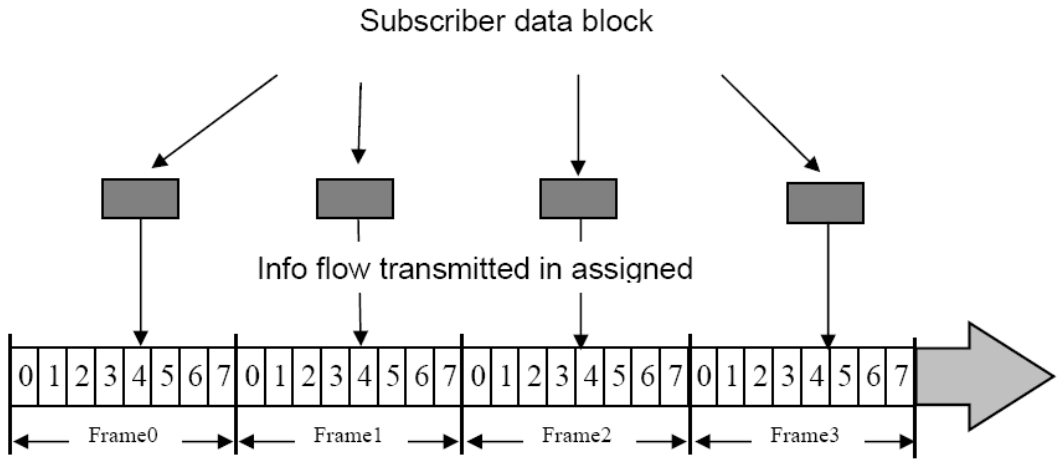
For example, assuming that cell A works in channels 1~8(Numbering is arbitrary), cell B works in channels 9~16 and cell C works in channels 17~24, cell D can works in channels 1~8(reusing the channels used by cell A). In this system, subscribers in cells A and D can use channels 1~8 at the same time.

This means that cells using the same frequencies can be physically closer in a GSM system than in an analog system, consequently, the advantages of reusing frequencies become all the more obvious with a GSM system. In dense subscriber areas, a GSM system can achieve an enhanced traffic handing rate.

A wireless telephone itself can work on any channel of a system and in this way, it can work in any cell, because only very low power is necessary for the communications between a wireless phone and a base station within a specific cell.

Frequency reuse technology improves the system's call handling ability without requiring an increase in the number of channels. However, when the same frequency is used within a small scope, same-channel interference may occur. By using digital modulation, forward error correction and load balancing technology, a GSM system can tolerate more same-channel interference than analog system.
Through the use of Time Division Multiple Access(TDMA) technology, multiple calls can share the same carrier. The carrier is divided into continuous TDMA frame streams. Each frame is divided into 8 time slots. As a connection is

made, the system allocates a dedicated time slot from each TDMA frame, and, after digitalization, the subscriber data(voice/data) is broken up into blocks. The subscriber data blocks are sent in the allocated slots of each TDMA frame in the form of an information pulse.



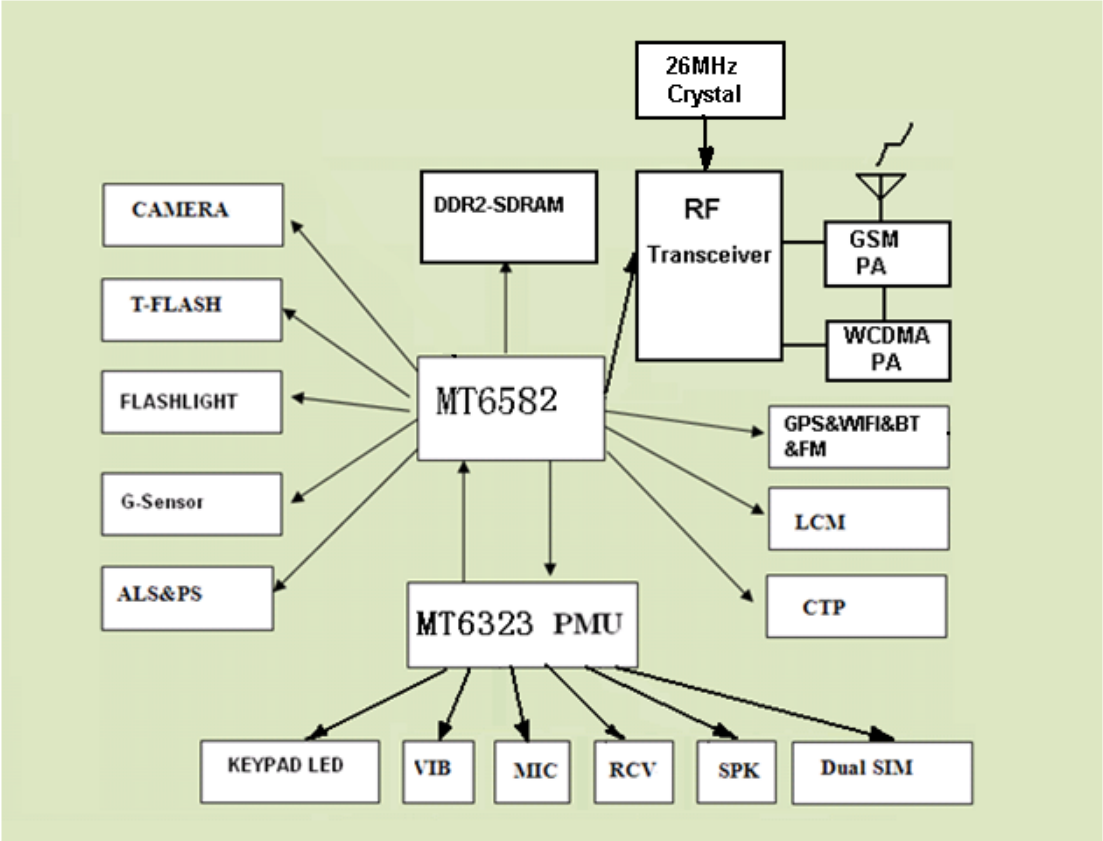
Utilize Gaussian Minimum Shift keying(GMSK) --- a highly efficient method of phase modulation, to modulate the data blocks into the carrier.

An information pulse is sent each time and different information pulses may be sent at different frequencies. This process is referred to as frequency hopping, Frequency hopping reduces the effect of attenuation and increased the security of a link. A GSM wireless phone does not need to continuously transmit but rather only send a pulse in each frame, making the mobile phone even more power efficient.
Each wireless phone shall be allowed to be moved from one cell to another cell without causing inconvenience to the subscriber. The mobile phone itself can measure the signal neighboring cells and quality of a voice channel is measured together by the mobile phone and base station. Through precise transfer criteria, transfer should be completed before the subscriber perceives that the quality of the channel deteriorates.

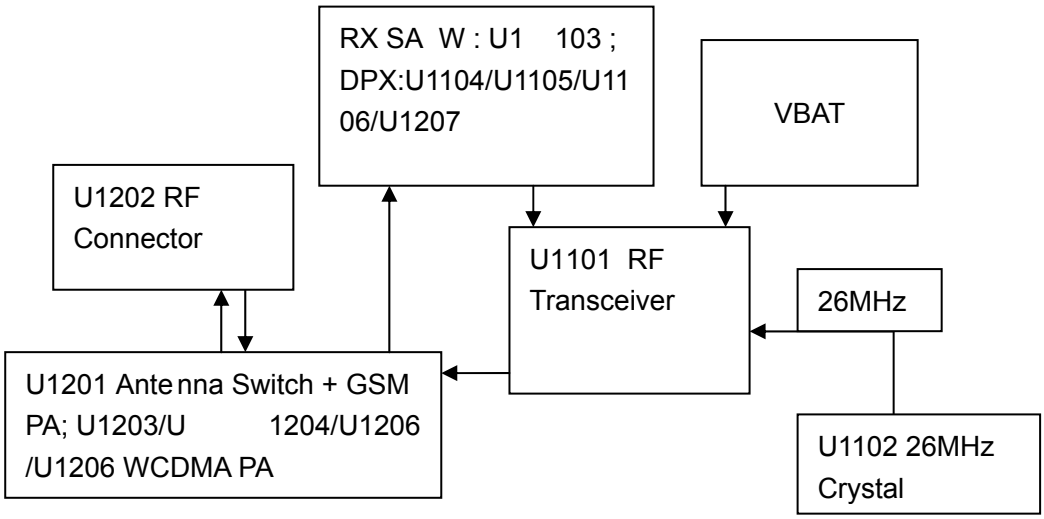
When a wireless phone is located in the middle of a cell, signal intensity will be very high. The intensity and quality of the signal will decrease with the movement of the wireless phone toward the edge of the cell.

Signal information indicates the distance of a subscriber from the base station. When a wireless phone moves between cells, control is also transferred among the base station. This type of transfer is carried out by the wireless phone and the base station and is fully transparent to the subscriber.

5. **System overview**:



RF part :



RF (Radio Frequency) section is composed of 26MHz crystal, RF main chip, Saw filter, RF connector, Antenna Switch, RF Amplifier

- 26MHz Crystal circuit: Mainly comprised of U1102 (Output frequency 26MHz and ±10ppm accuracy) and related RC components.
- RF main chip: RF master chip internally integrates RF IC (U1101), Mixer,

LNA, PGA, Amplifier, GMSK modem (GMSK modem exclude from RF chip), PLL etc.

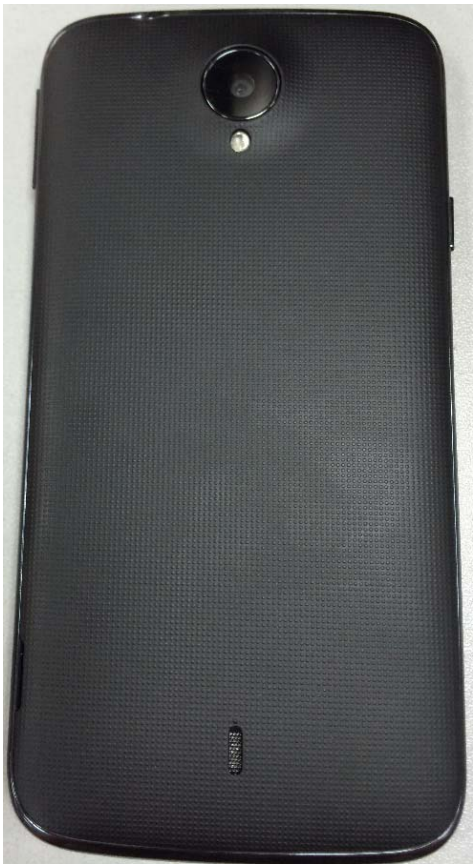
- RF Amplifier circuit U1201: The periphery of U1101 mainly includes resistance, capacitor and inductance components. U1201 is directly powered by batteries.

BB Parts:
Include analog baseband chip, Flash, audio, keys, SIM Card slot, battery connector, micro USB connector (5pin), charger circuit etc.

6. **Assembly and Disassembly**:

Product appearance:

Front view



Back view

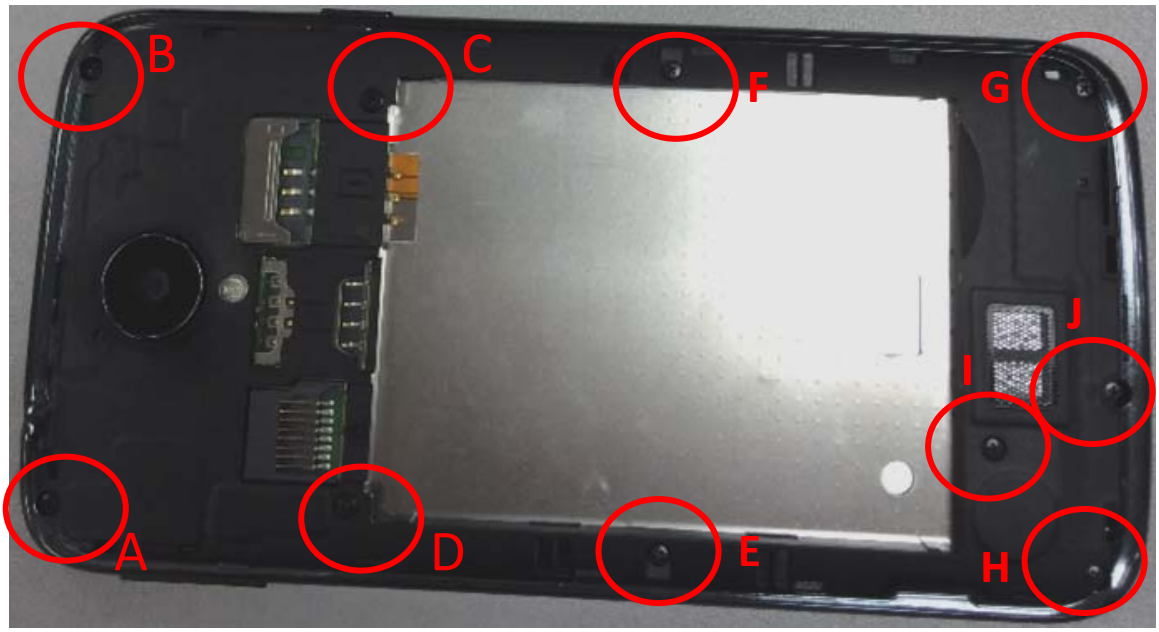
Instruction of disassembly:

- Tool for repair: Tweezers, case removing tool, standard cross head screwdriver

- Disassem bly Steps:

Removing the battery : Push the battery cover in the direction of the red arrow, and take the battery cover off, and take the battery off.

Removing the upper house:
Unscrew the 10 screws fixed on lower housing, the position of screws shown as red circles of the following picture, and according to the order of A--->B--->C--->D--->E--->F--->G--->H--->I--->J:



Poke on the ZIF cover on motherboard, remove the FPC, Unscrew

7. **Repair requirement**:

- Precautions:

A reliable work area must be available so that ESD-sensitive components are safely used and no electrostatic shock occurs. This work area must be configured as follows:
Work surfaces ----- All work surfaces must be covered with anti-static mats. For the protection of powered equipment these mats must be grounded through a connection with 1.2ohm resistance
Bracelet ----- A fixture with a soft wire and built-in resistance of 5.2ohm to 1.2ohm for quick dissipation of static electricity. The soft wire connection is attached to common-ground.

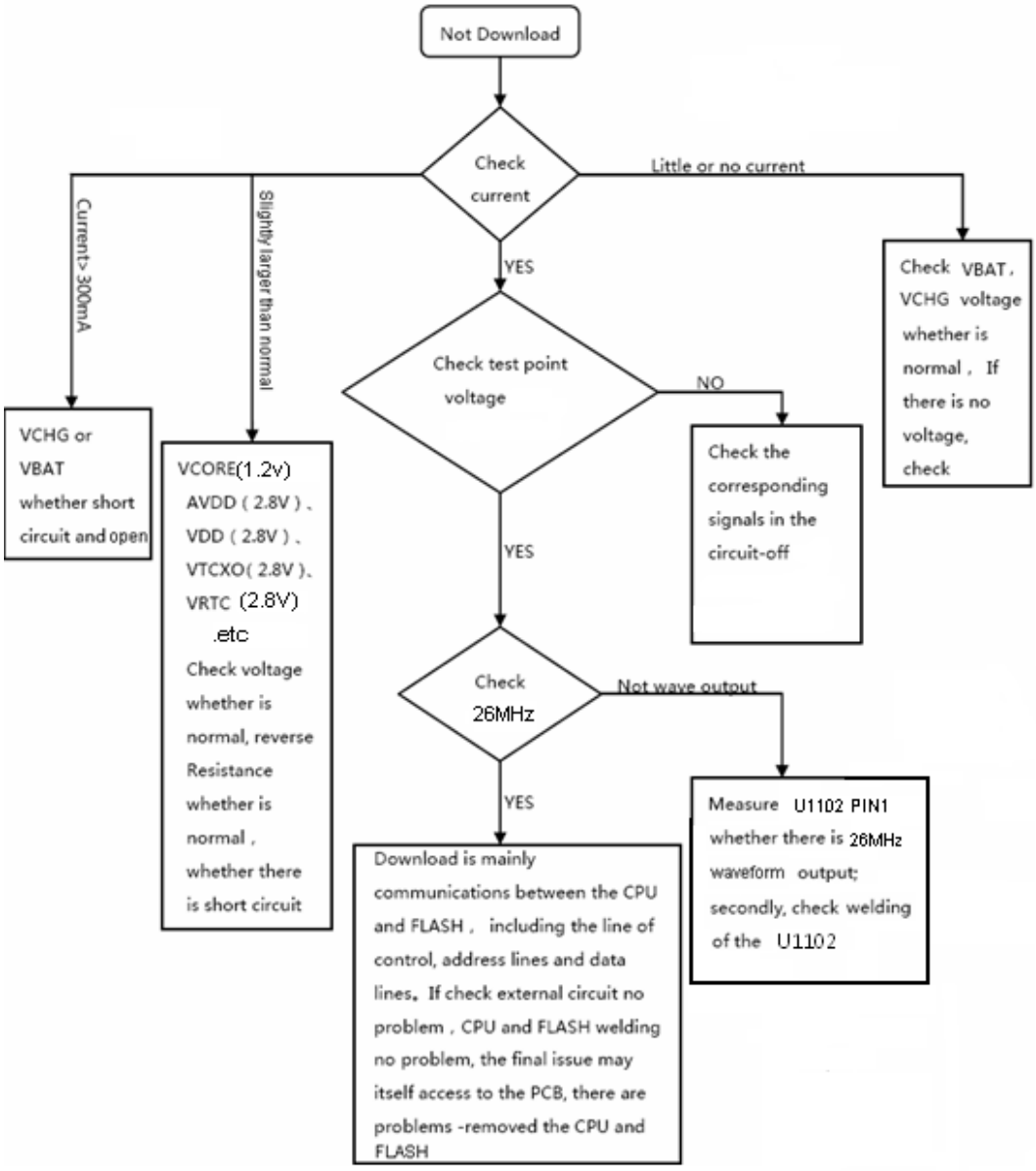
- Posy-rep air Testing:

After repairs, tests must be carried out on the product to assure that its operation is normal. When the component on main board is replaced, mobile phone must be tested out on the fixture to assure that its operation is normal. Testing is even more important in the case of replacement of logic or RF compatible communications analyzer.
Attention: You must have the necessary equipment as well as the necessary service training in order to repair CPU flash…

8. Baseband Trouble

8.1 Flash programming does not download

Analysis Process：



8.2 Phone does not “power on”

Power on principle of phone:

When the power supply is connected with the phone, through internal switching circuit in the boot it will form a trigger High-level, when press boot button long enough, the boot high-level change to low-level because of connecting with GND, and the signal reaches PMU block, PMU will activate the internal voltage regulator and output stable voltage, as a logical part of the core CPU will gain power supply.

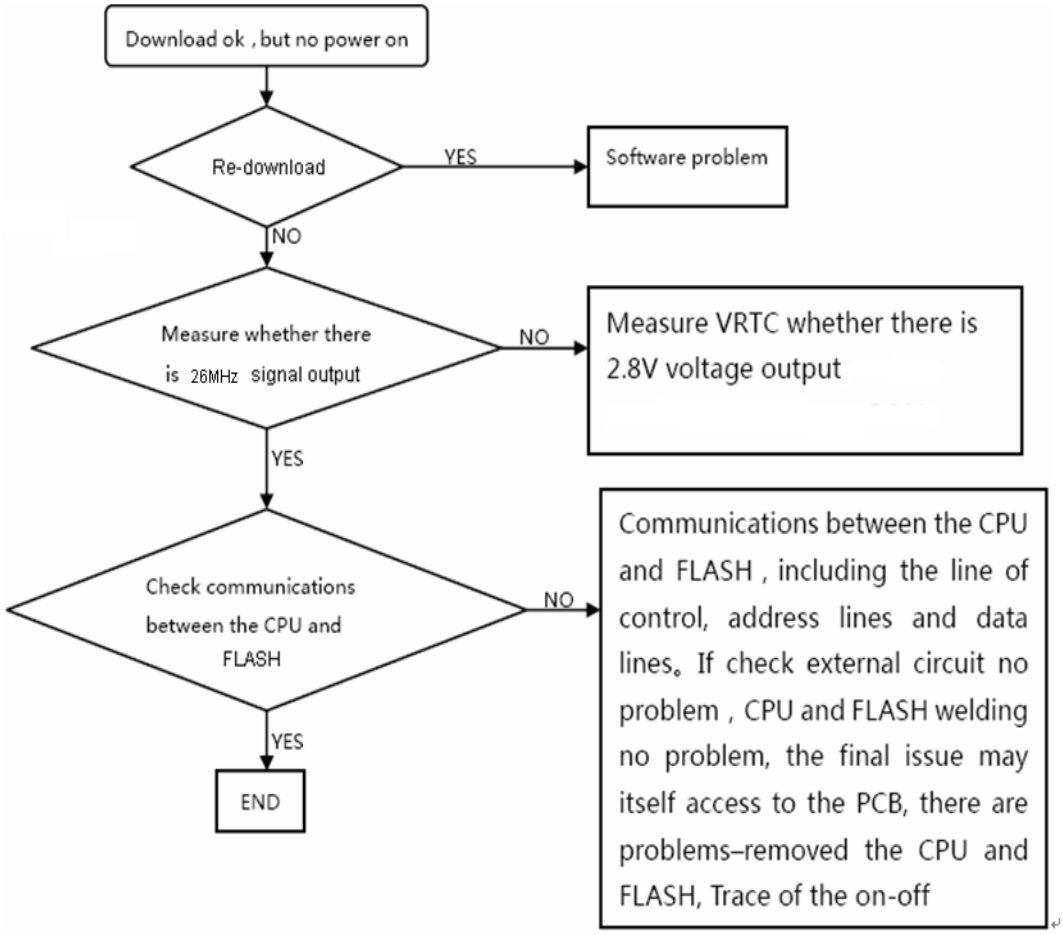
We know phone boot in three necessary conditions: Power Supply, clock and reset. Now power supply has been provided, then Crystal will produce 26

MHz clock signal, on the one hand it will be taken as a RF reference clock, on the other hand, it will be sent to logic to the clock signal. After the clock signal reaches the microprocessor, the memory before need be cleared, therefore PMU will send reset signal to it for initialization. After the initialization is finished, it outputs control commands to memory, then memory will change to permit state, and then through address line to look up where boot program is, after finding the boot program it will be sent to CPU internal DSP circuit through data lines. After the successful operation, the CPU output signal to PMU, the power supply will continuously output voltage to complete booting.

After phone powers on, the CPU calls RF parameters from flash, through radio BCCH to receive the signal intensity in the area, if your phone has a SIM card or UIM cards, Mobile phone will send the information in SIM card to the BS, and receives information from the BS, thus achieve network connections.

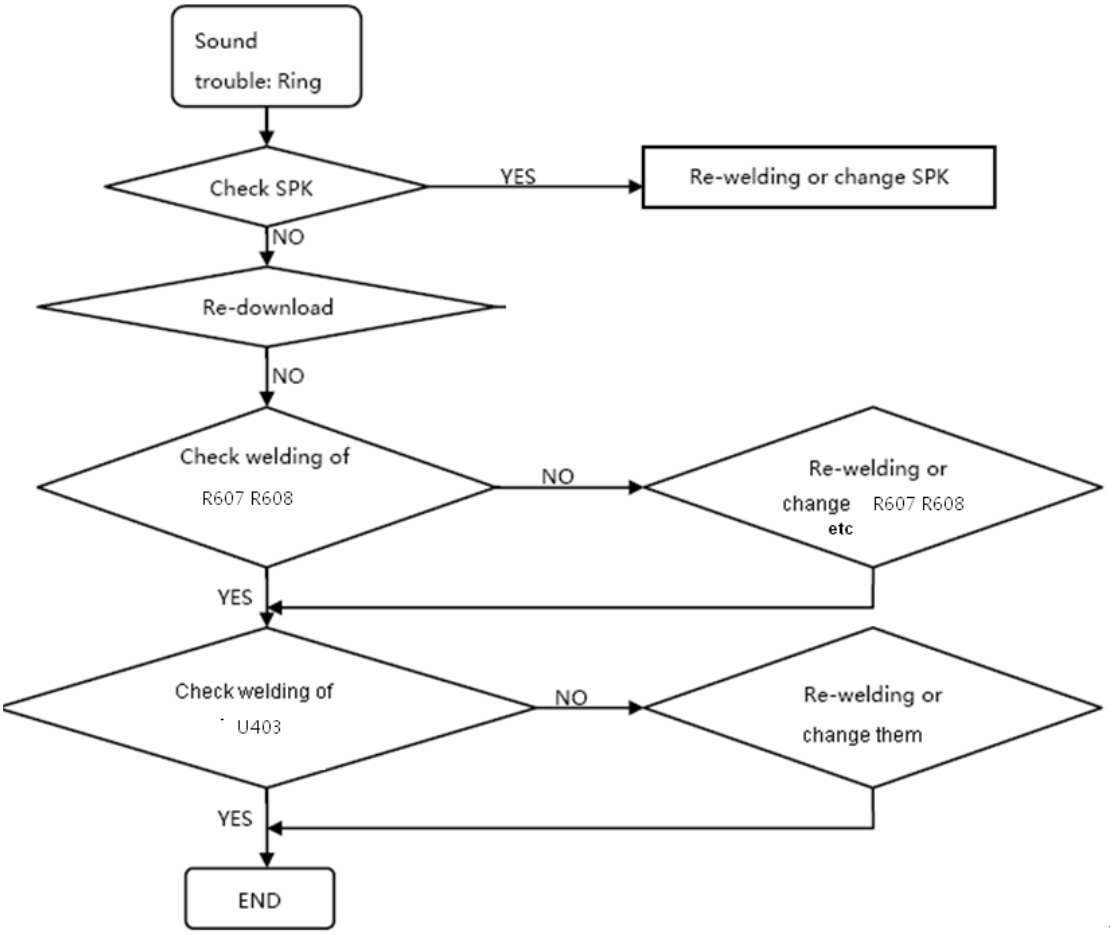
After being connected with networks, mobile phones will be in an idle mode, but also mobile phones through SACCH periodically exchange some information with base stations, such as signal strength and frequency synchronization, receiving level, and receiving quality.

Analysis Process：

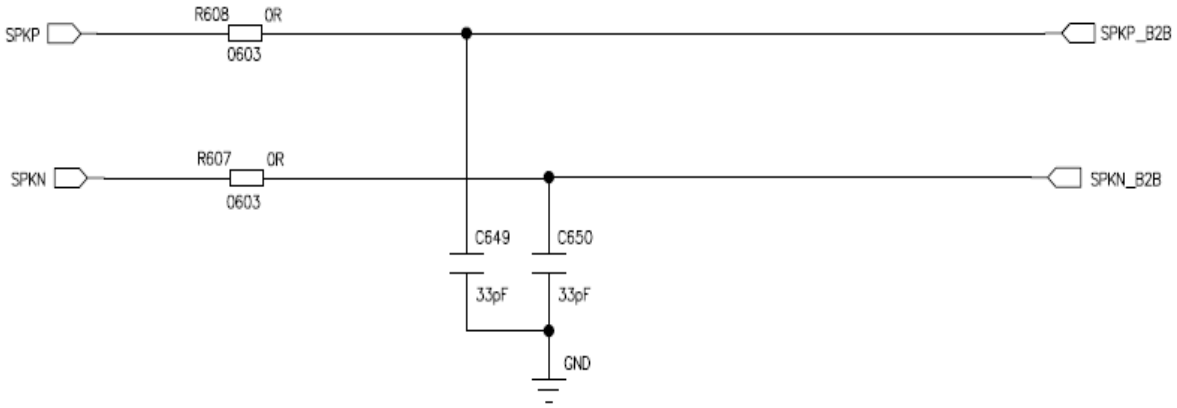


8.3 Sound trouble

Analysis Process：



Reference circuit as follows：



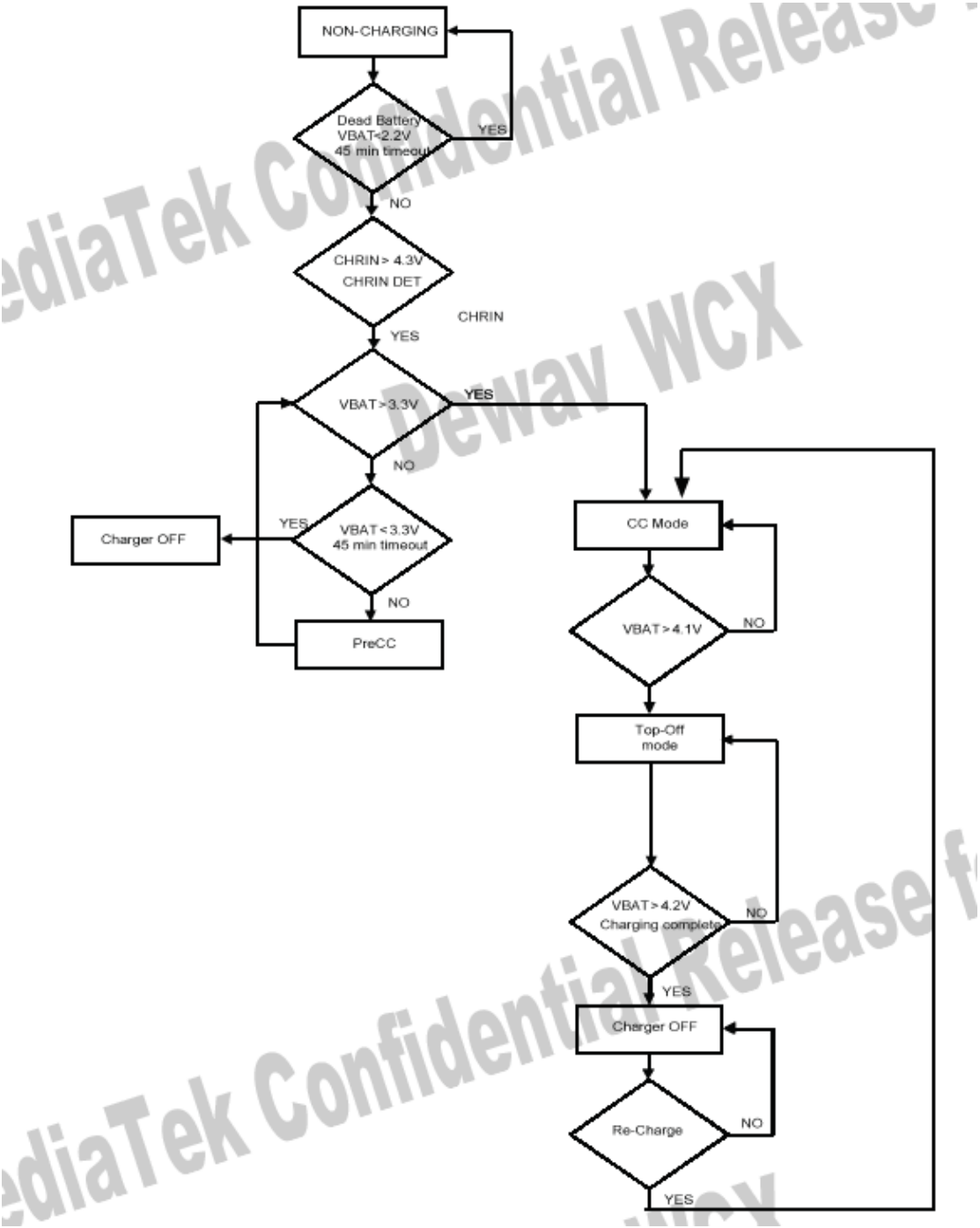
8.4 Can not charge up

Charging principle introduction:

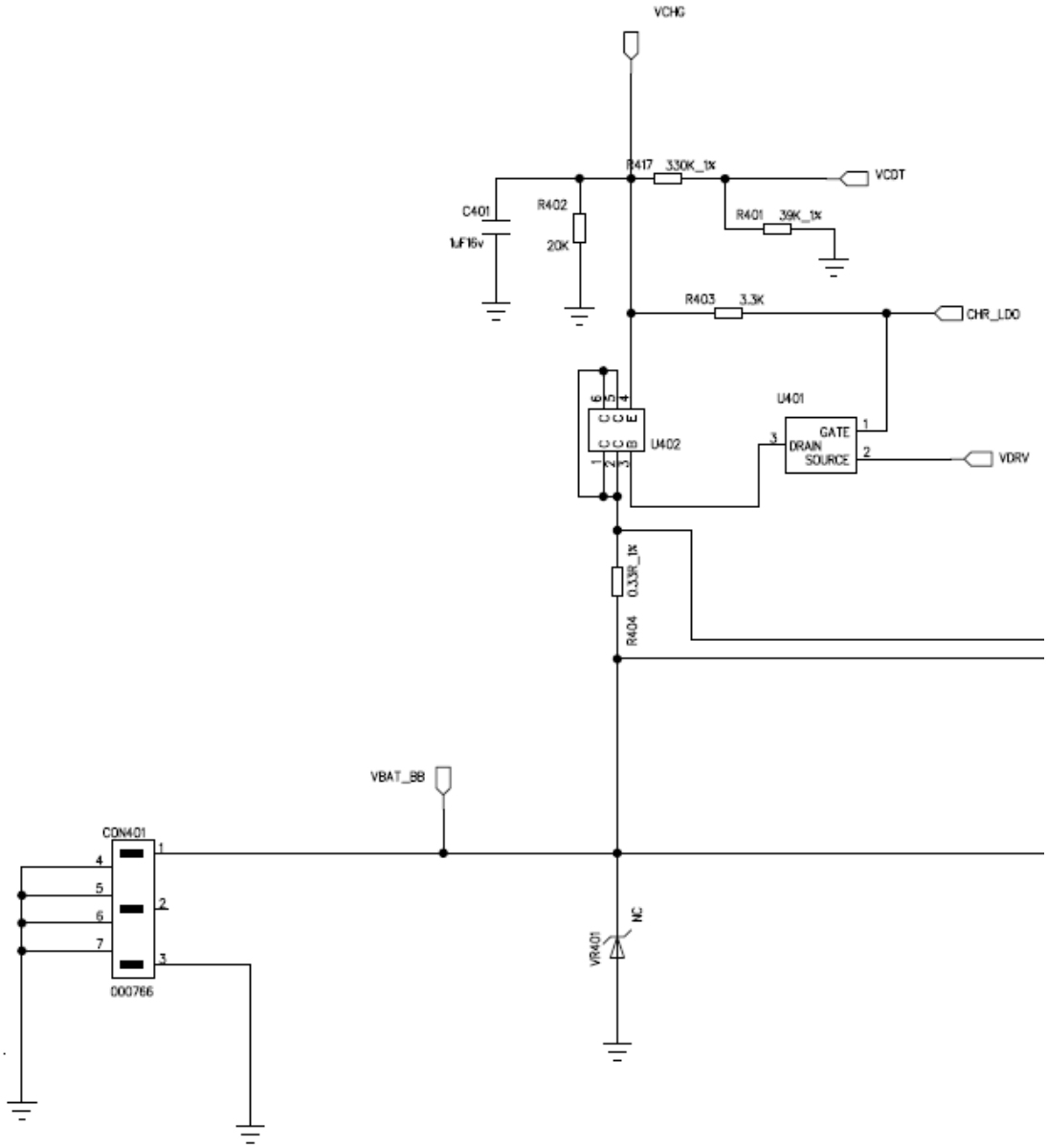
The battery charger is optimized for the Li-ion batteries. The typical

charging procedure can be divided into three phases: pre-charging, constant current mode charging, and constant voltage mode charging. Follow figure shows the flow chart of the charging procedure. Most of the charger circuits are integrated in the PMU except for one PNP transistor, one NMOS and one accurate resistor for current sensing. Those components should be applied externally.

Analysis Process：

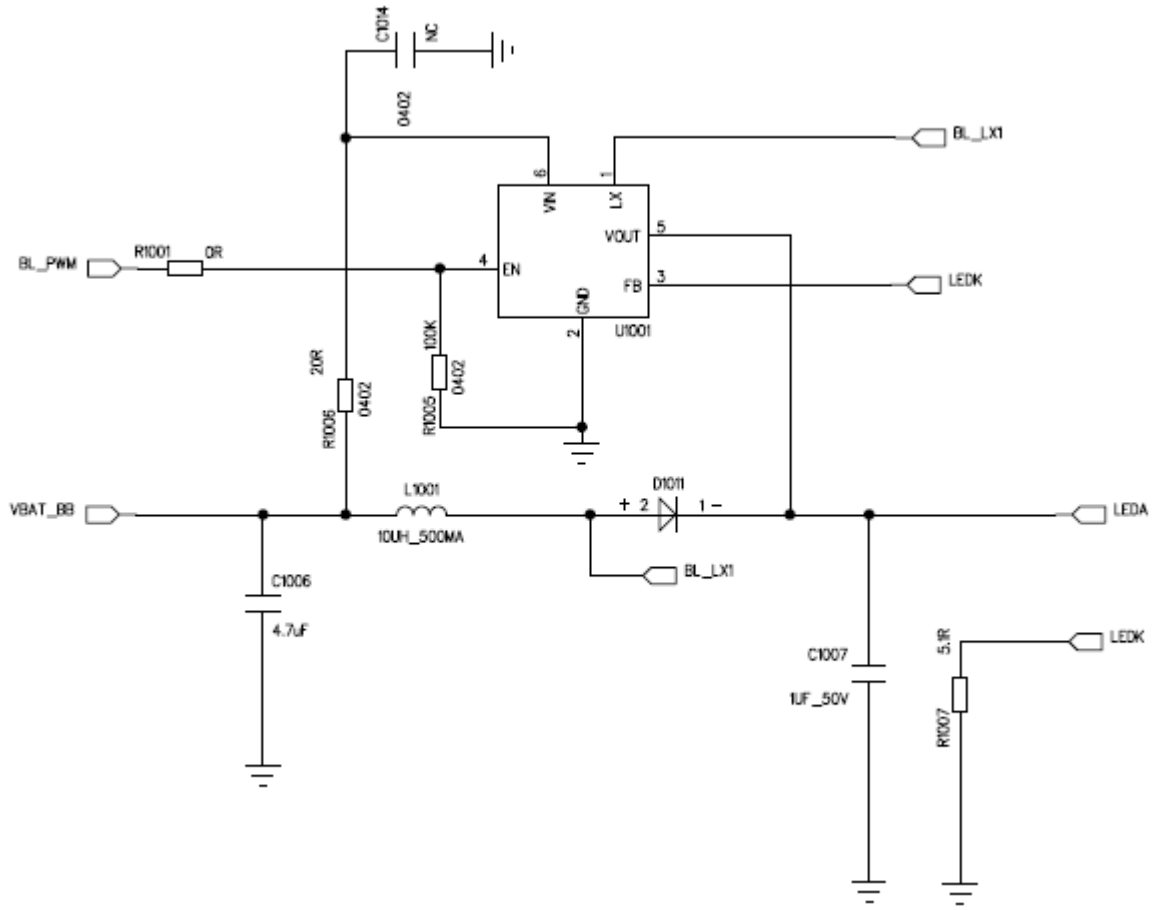


Reference circuit as follows：

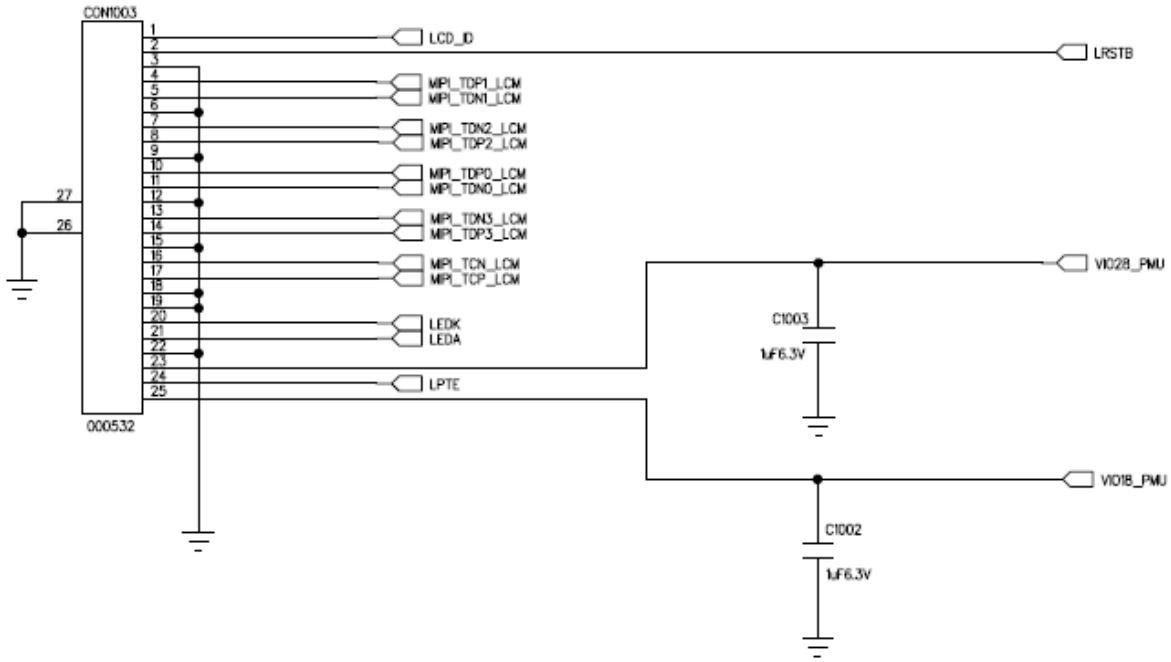


8.5 LCD trouble

LCD backlight driver circuit:

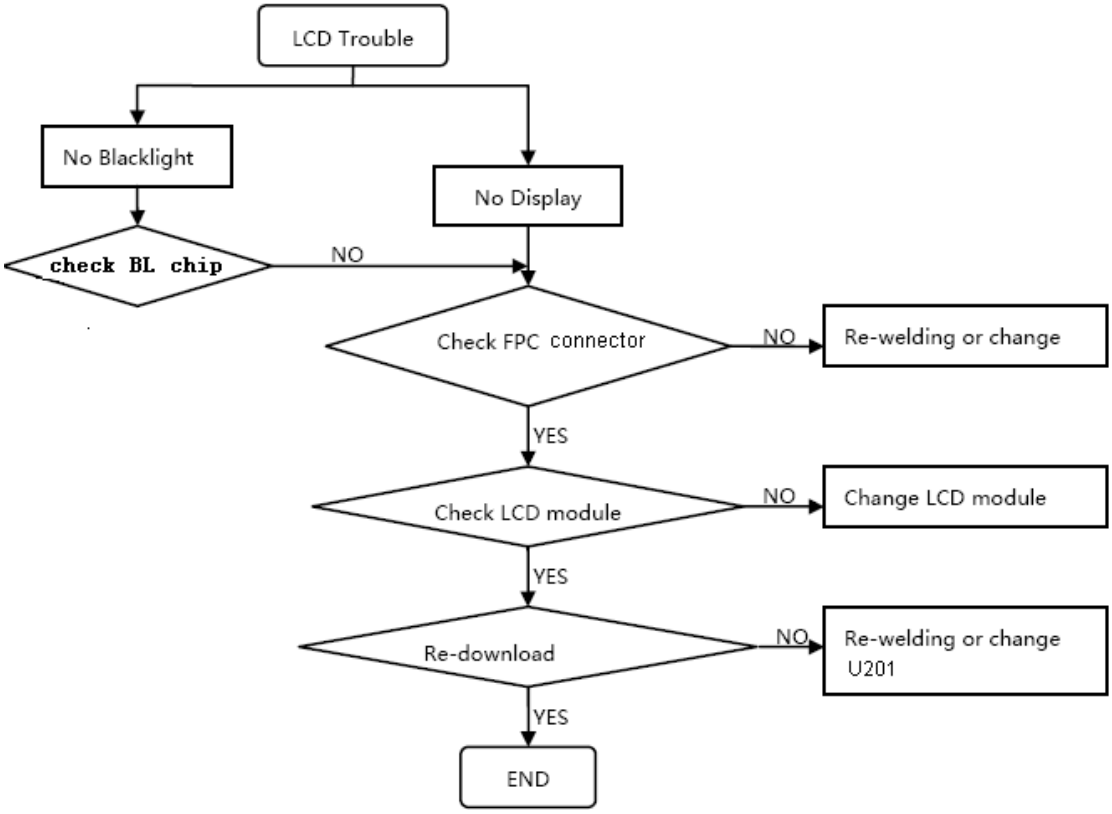


BL chip



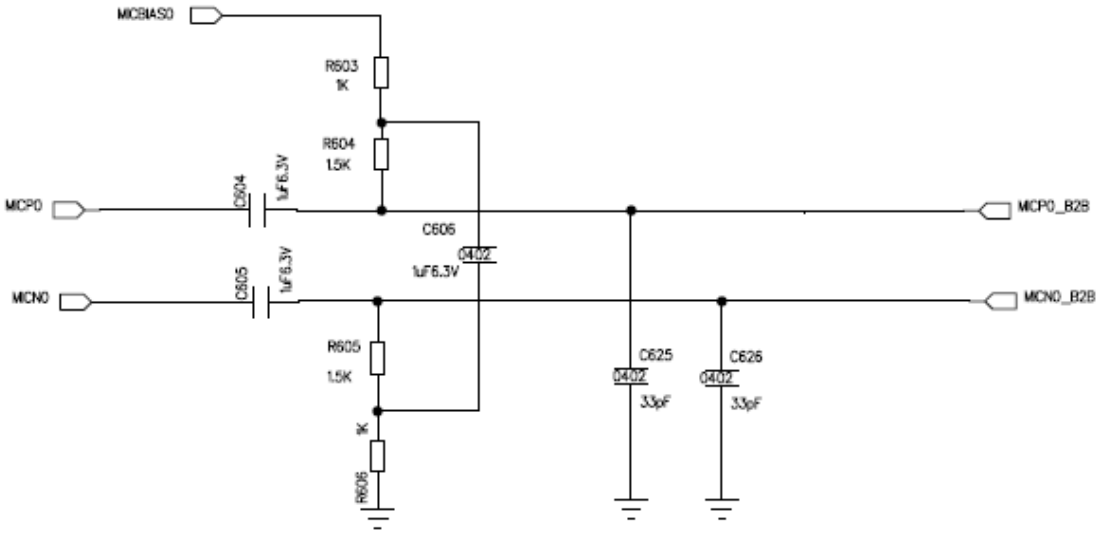
LCM part

Analysis Process：

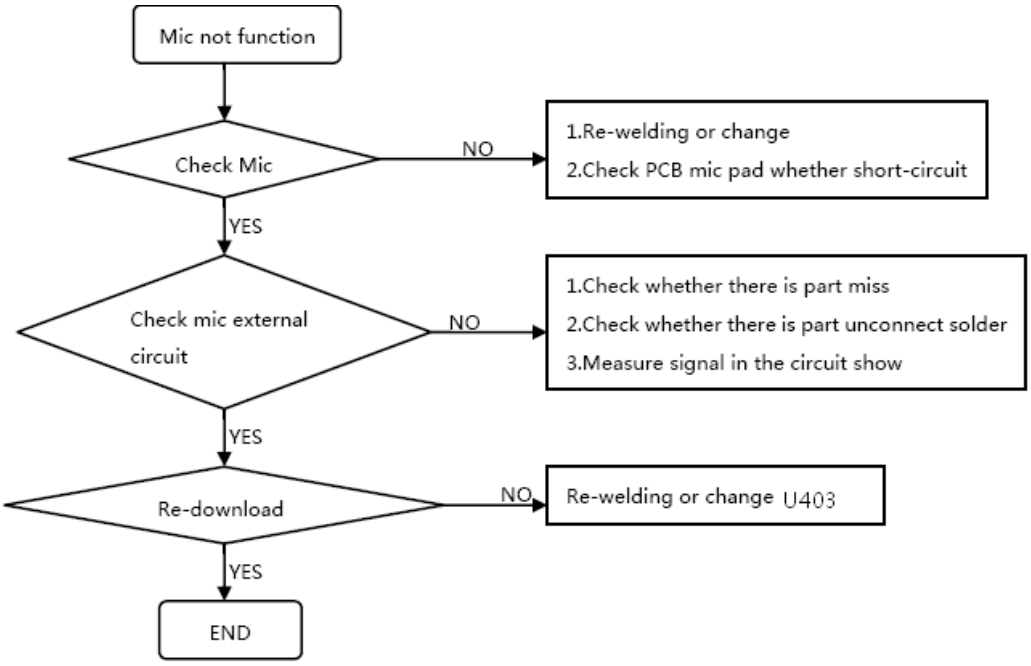


8.6 Microphone trouble

Reference circuit as follows：



Analysis Process：

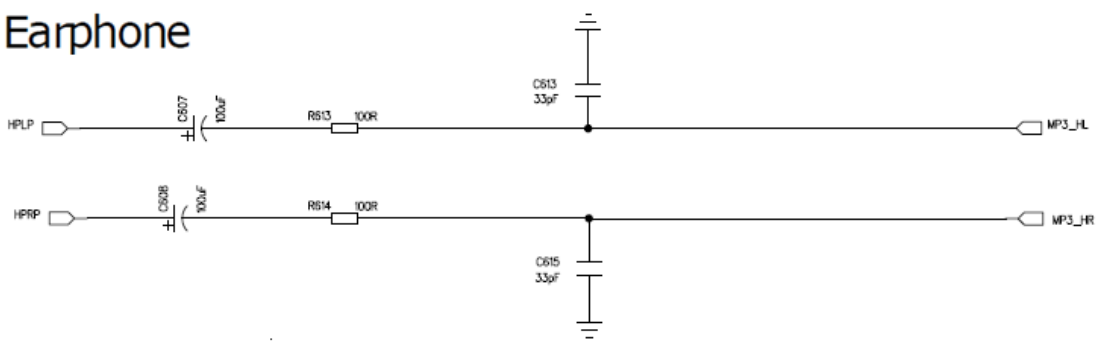


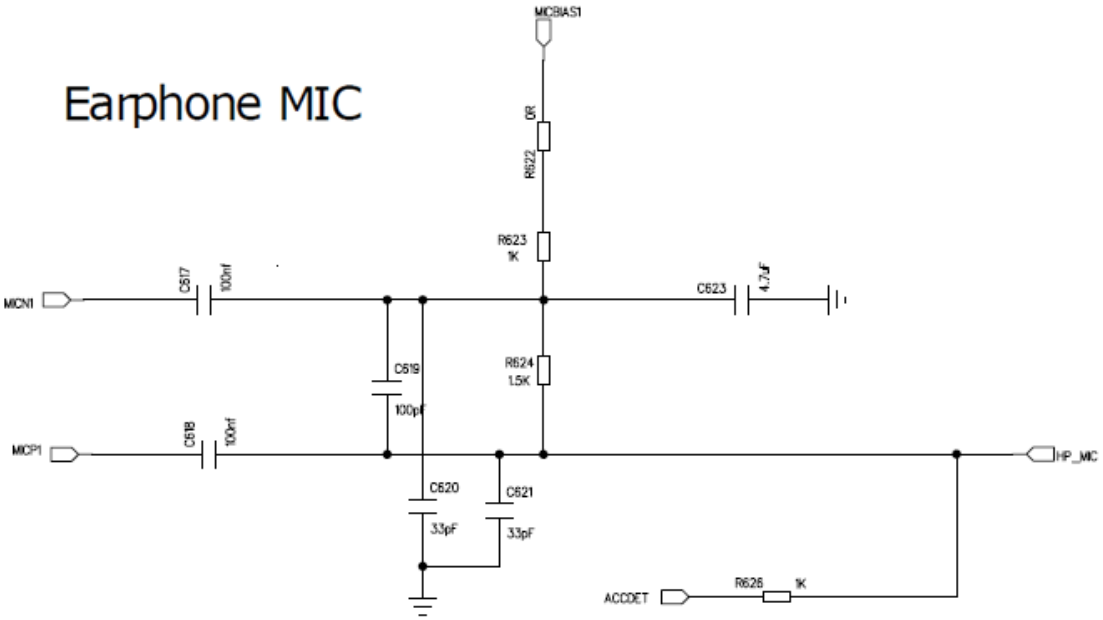
8.7 Earphone part trouble

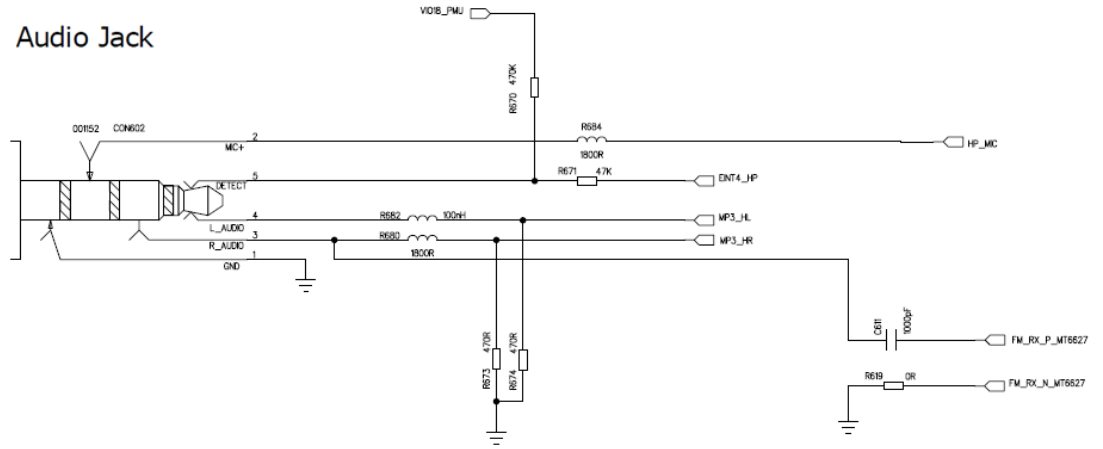
Earphone Circuit Working Principle：

1、Bias voltage：MICBIASP（1.9V）.
2、Headphone detection signal: EINT4_HP: When insert earphone, due to EINT4_HP connection with MP3_OUTL ，EINT4_HP will be pull down，Trigger interrupt to the CPU，Will show "Insert headphone".
3、Headset to hang up signal detection：ACCDET：This signal is used to detect whether the headphones of the hang up button Press，when the headset hang up button is pressed, HP_MIC signal will be shorted, ACCDET will be shorted at one time.

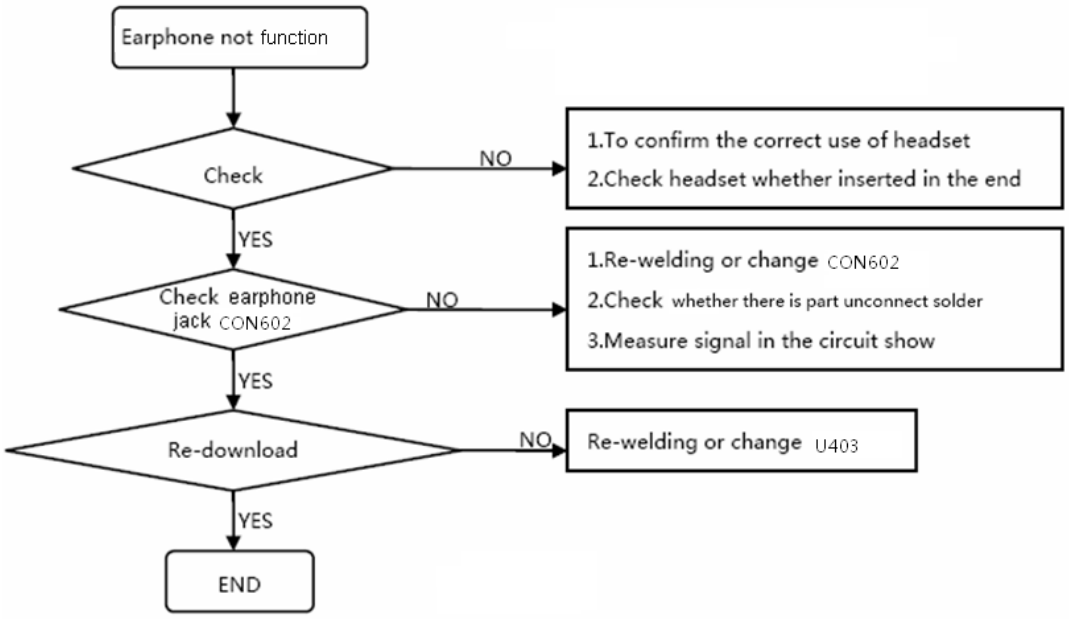
Reference circuit as follows：





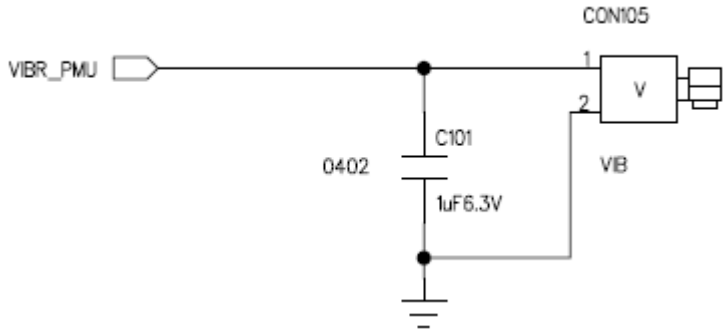


Analysis Process :

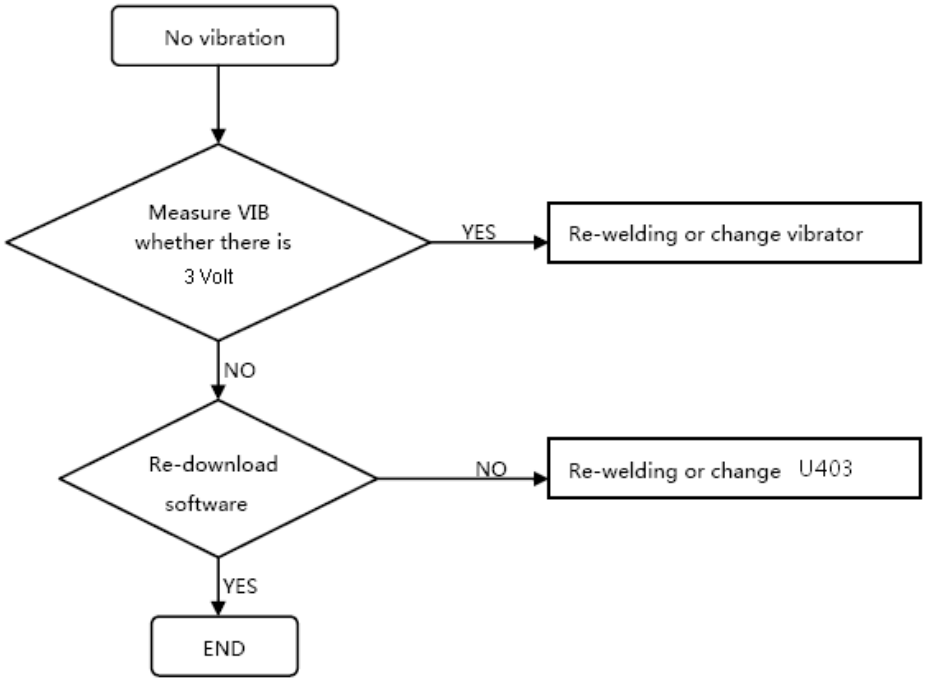


8.8 Vibrator trouble

Reference circuit as follows：

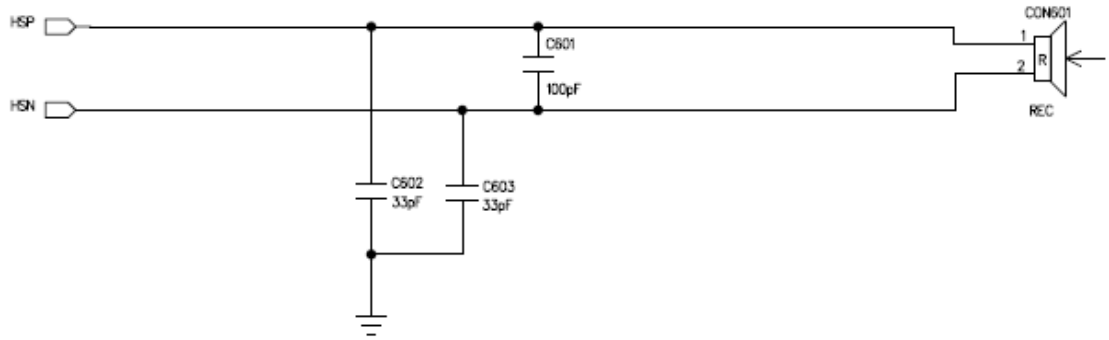


Analysis Process：

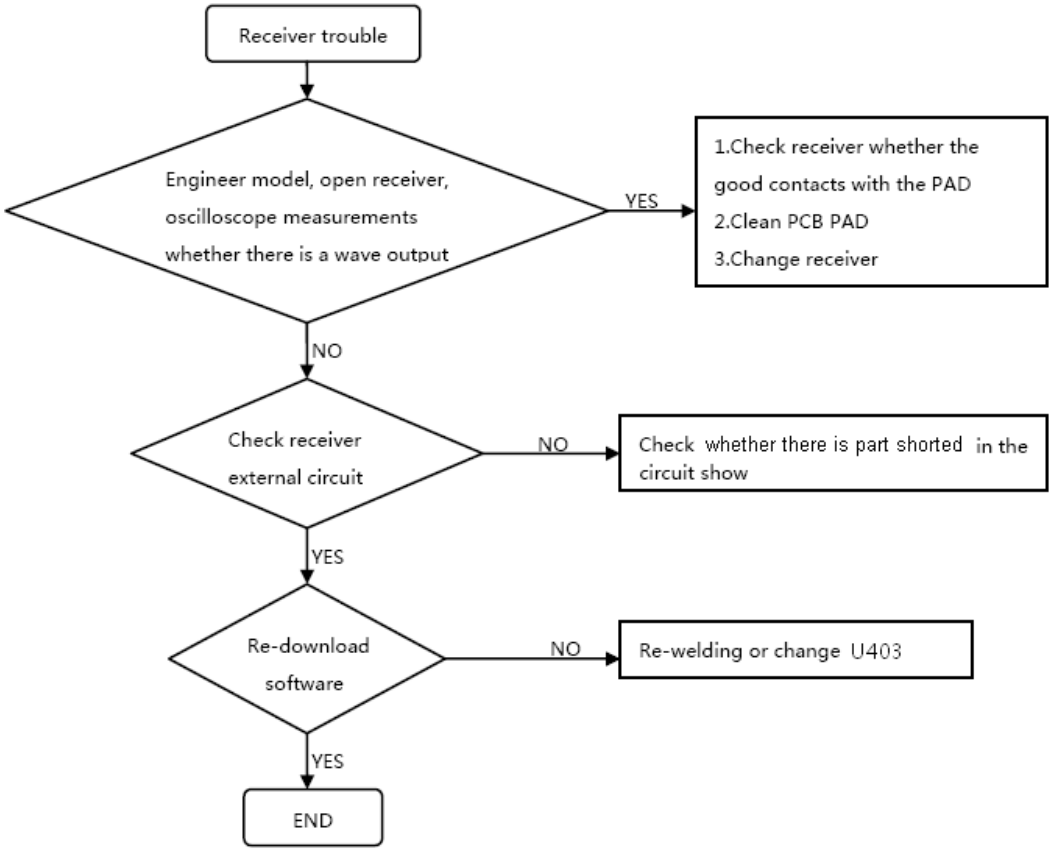


8.9 Receiver does not work

Reference circuit as follows：

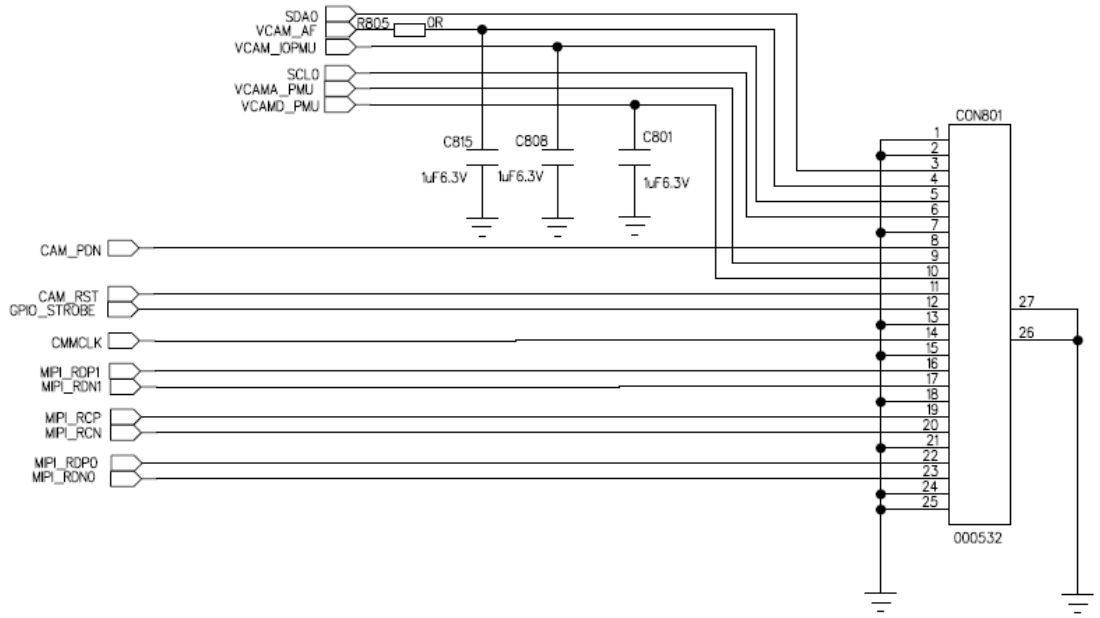


Analysis Process：

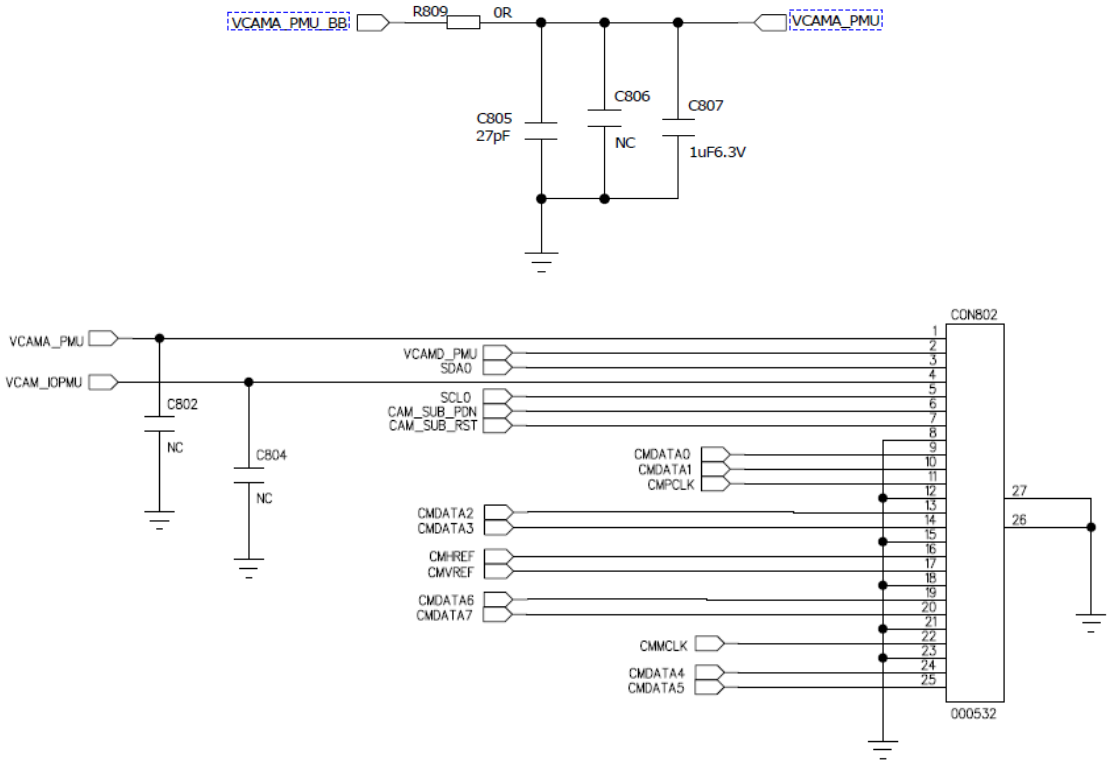


8.10 Camera trouble

Reference circuit as follows：

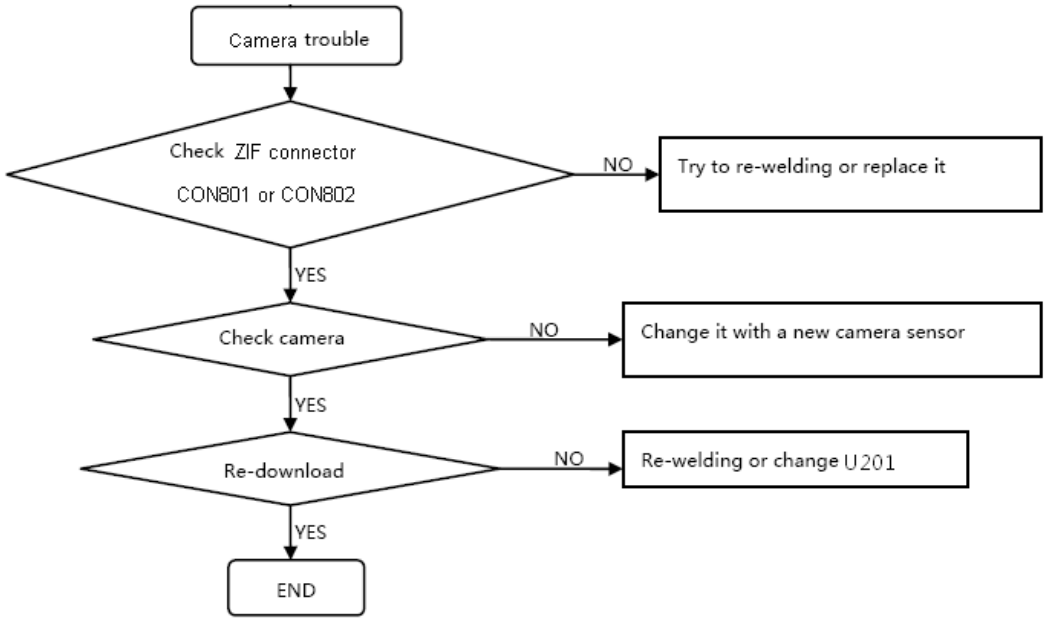


Main camera



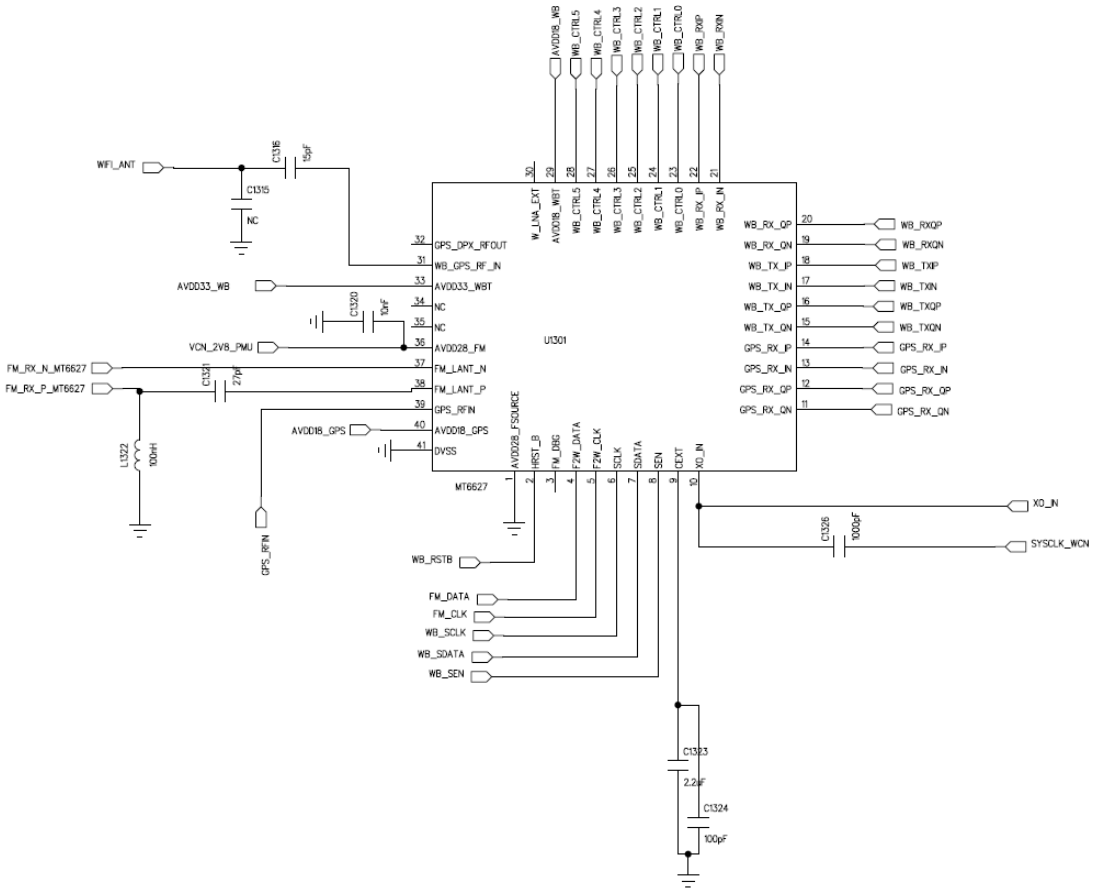
Sub camera

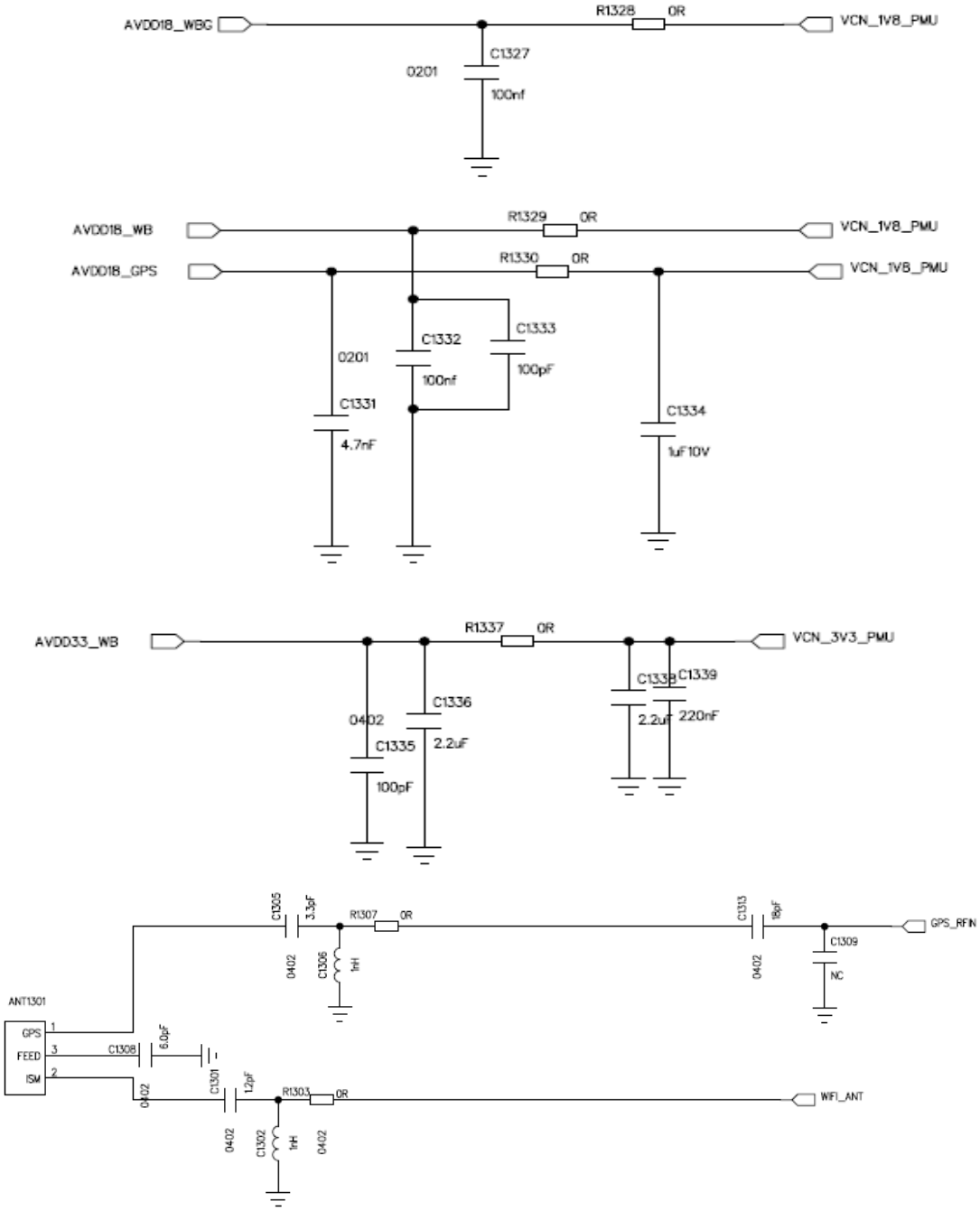
Analysis Process：



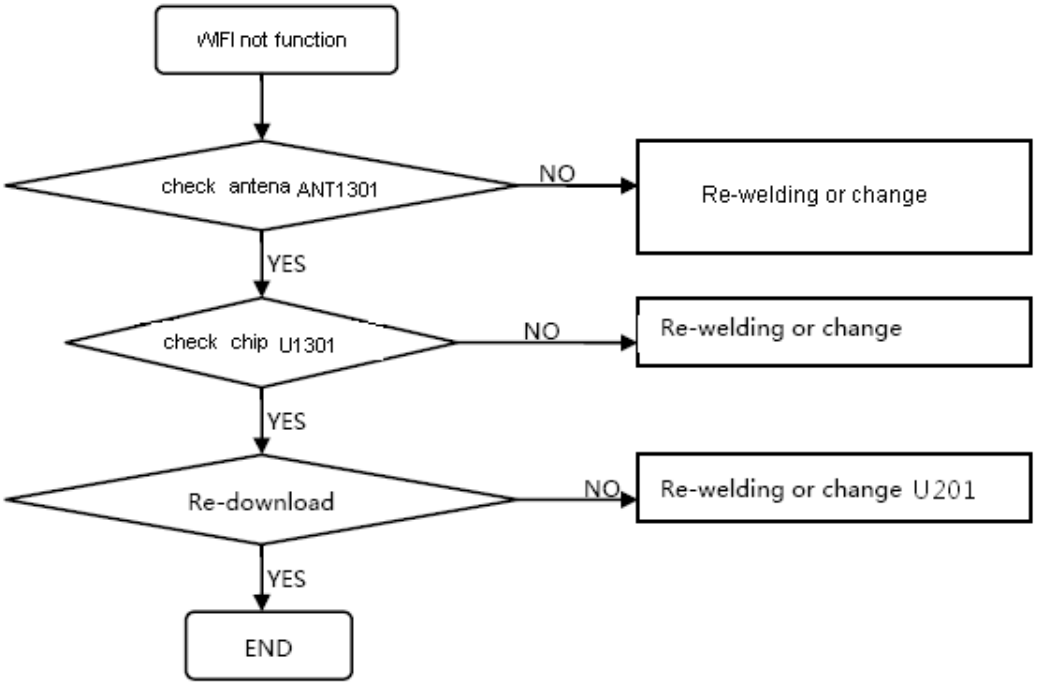
8.11 WIFI、FM and BT an GPS circuit trouble

Reference circuit as follows：

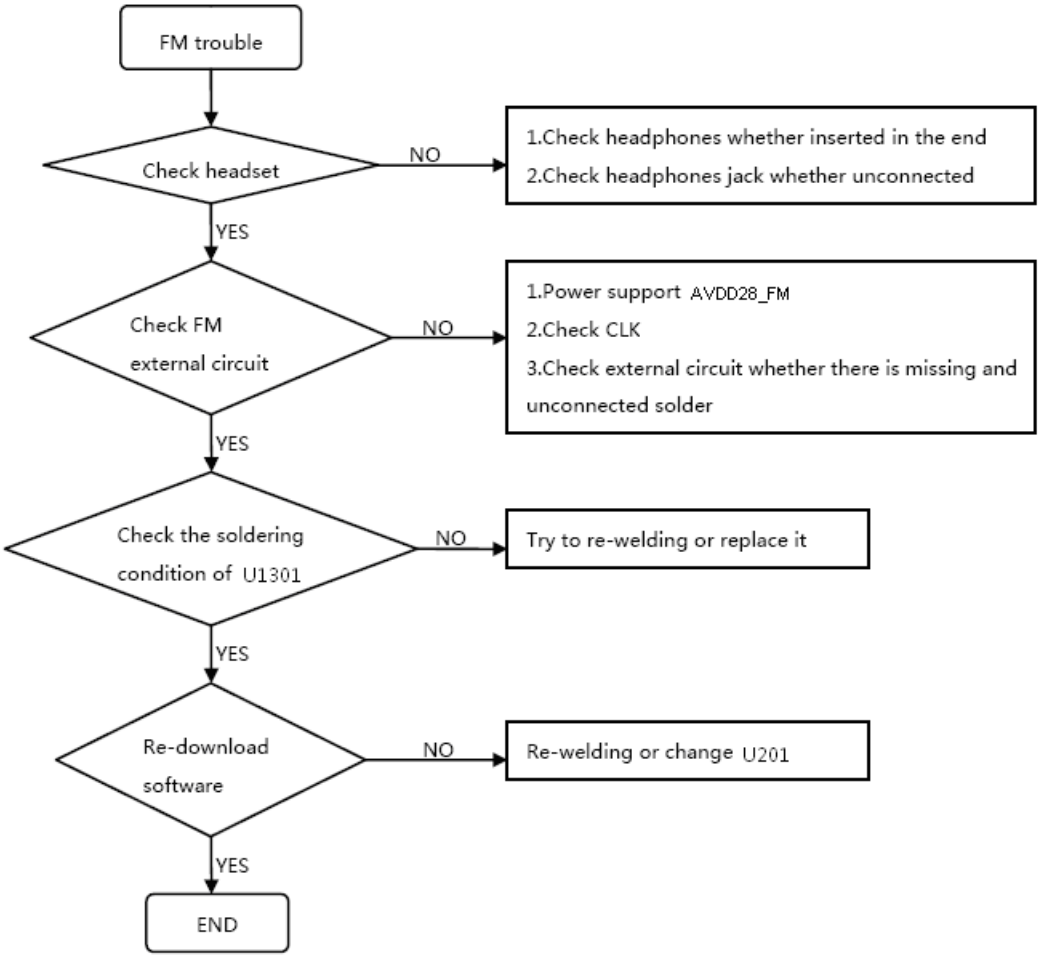



AVDD18_WBG
R1328
0R
VCN_1V8_PMU
C1327
0201
100nf
AVDD18_WB
AVDD18_GPS
R1329
0R
R1330
0R
VCN_1V8_PMU
VCN_1V8_PMU
C1332
C1333
0201
100nf
100pF
C1331
4.7nF
C1334
1uF10V
AVDD33_WB
R1337
0R
VCN_3V3_PMU
C1338
C1339
2.2uF
220nF
C1336
0402
C1335
2.2uF
100pF
C1305
3.3pF
R1307
0R
C1313
18pF
GPS_RFIN
0402
C1306
1nH
0402
C1309
NC
ANT1301
GPS
FEED
ISM
1
3
2
C1308
6.0pF
0402
C1301
1.2pF
R1303
0R
WIFI_ANT
0402
C1302
1nH
0402

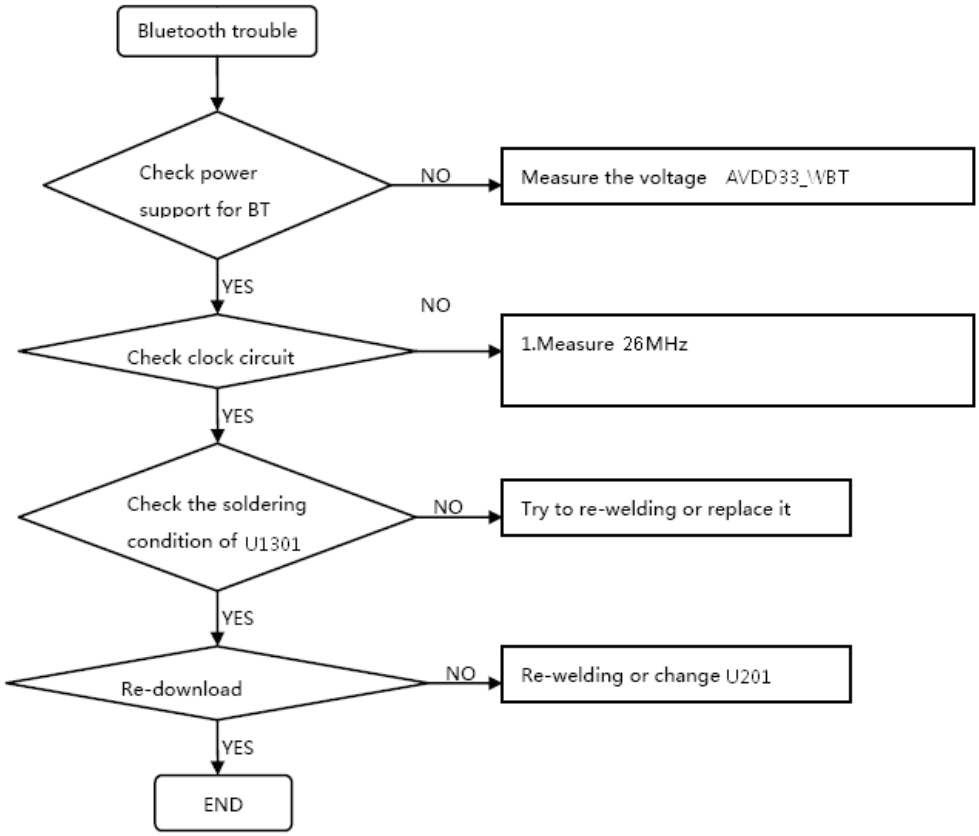
WIFI Analysis Process：



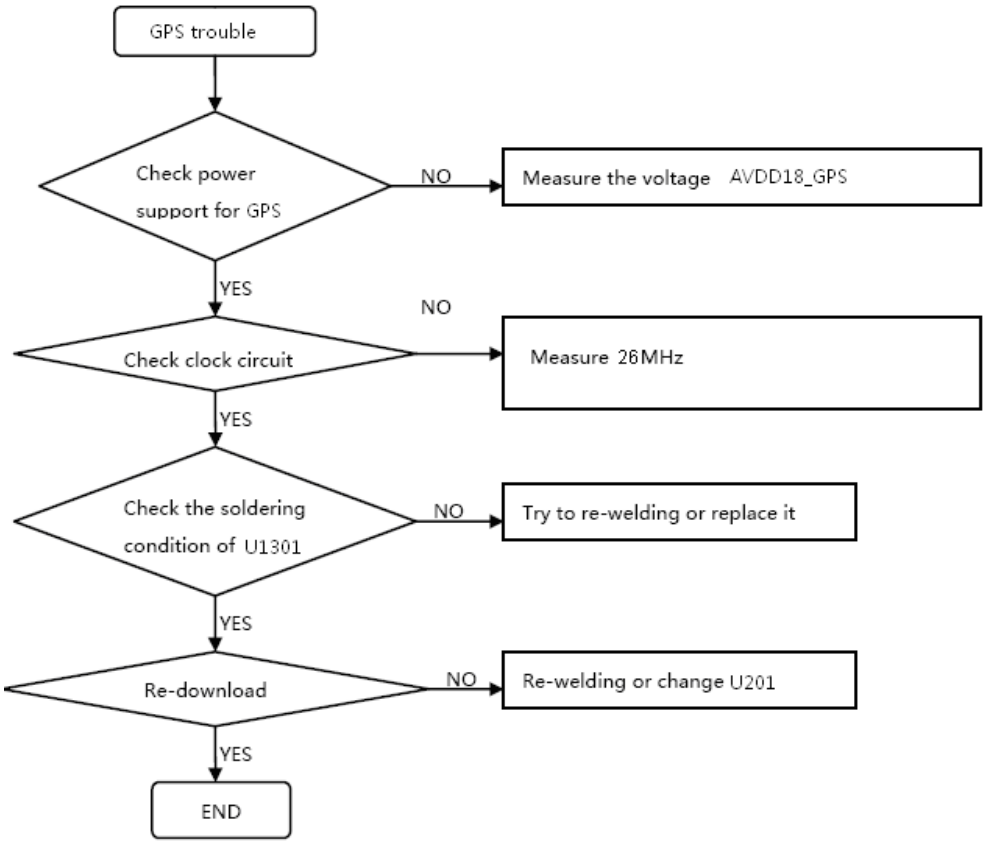
FM Analysis Process：



BT Analysis Process：

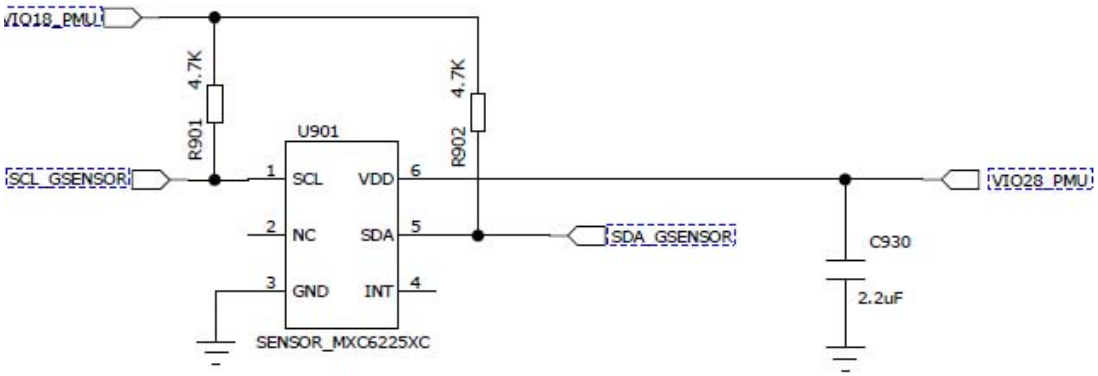


GPS Analysis Process

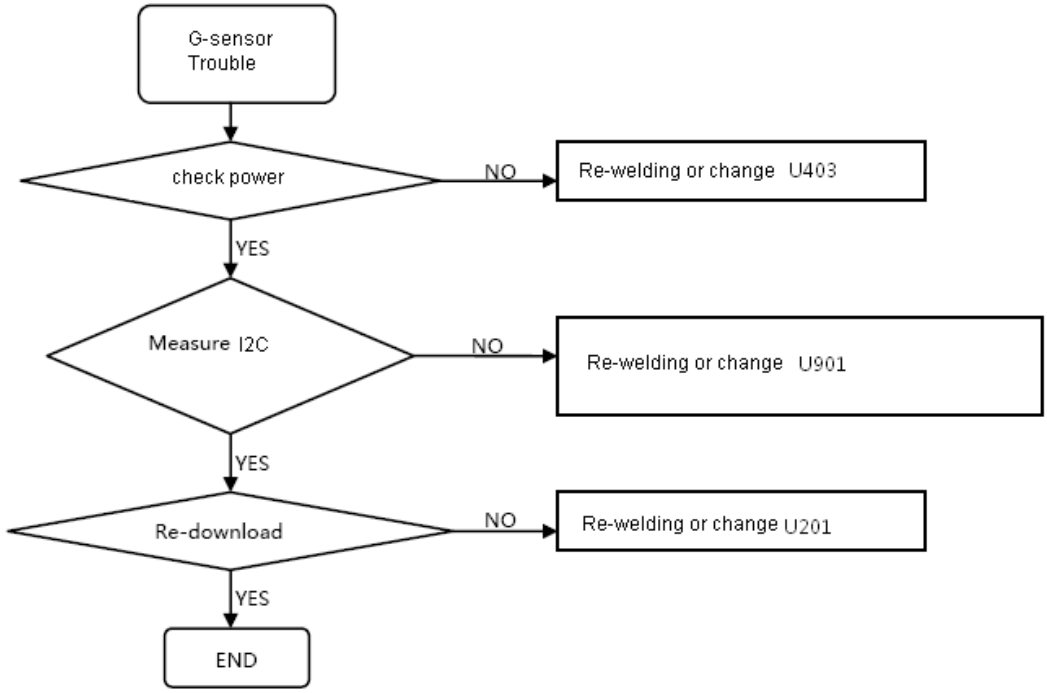


8.12 G-sensor has not function

Reference circuit as follows：



Analysis Process：



8.13 Phone can not access SIM card

SIM Circuit Working Principle：

SIM cards signal Description:

SIM_IO: data signals;

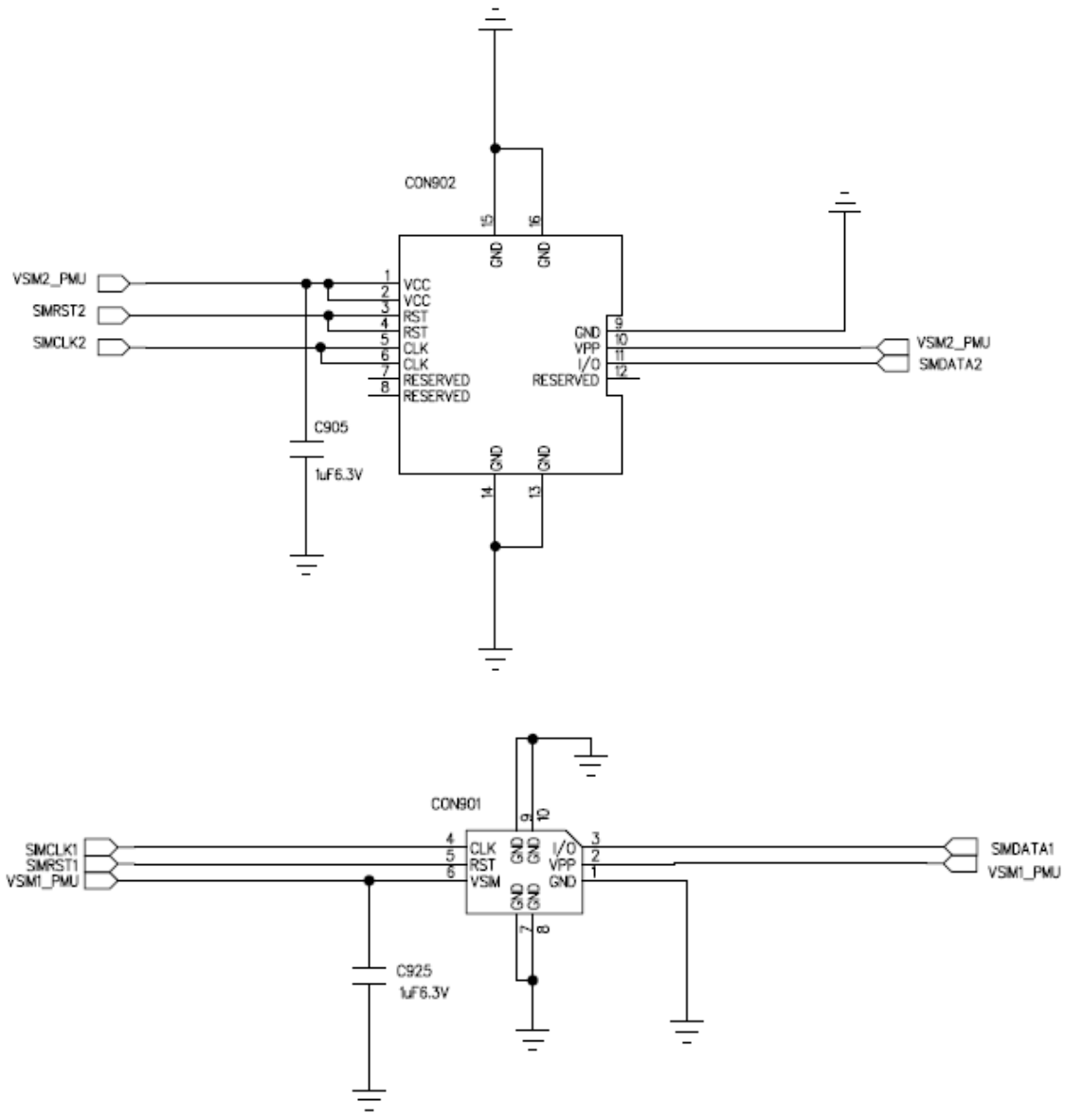
SIM_RST: SIM card reset signal;

SIM_CLK: SIM card clock signal;

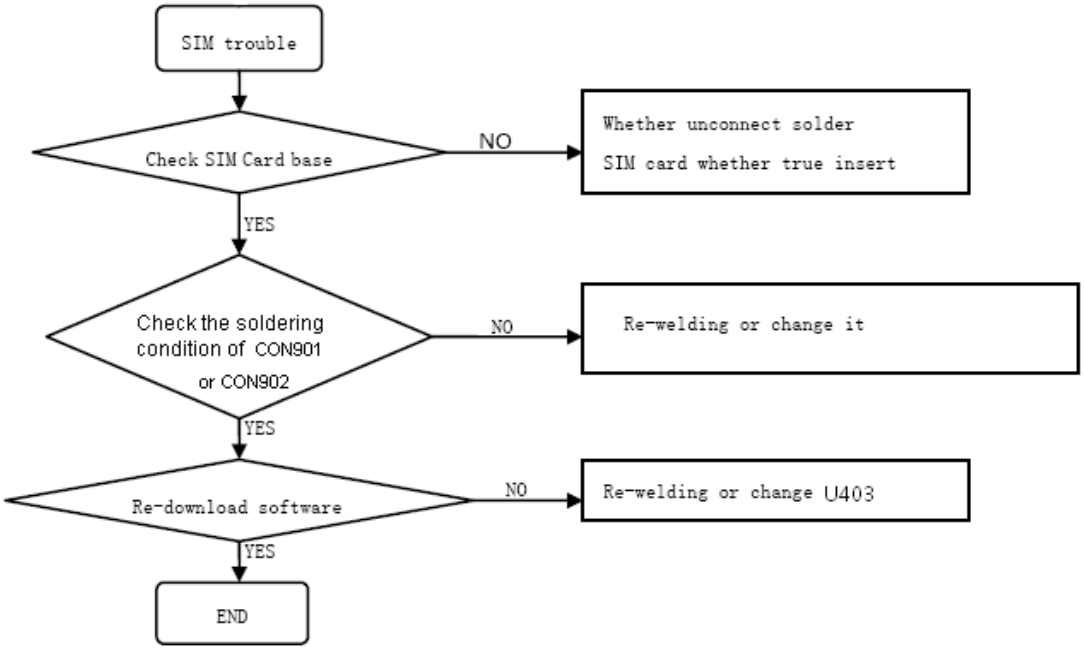
VSIM: SIM card power supply;

Boot process, VSIM power supply through the SIM card I / O port from the CPU detection SIM card, such as card not detected, the software will soon be closed VSIM.

Reference circuit as follows：



Analysis Process：



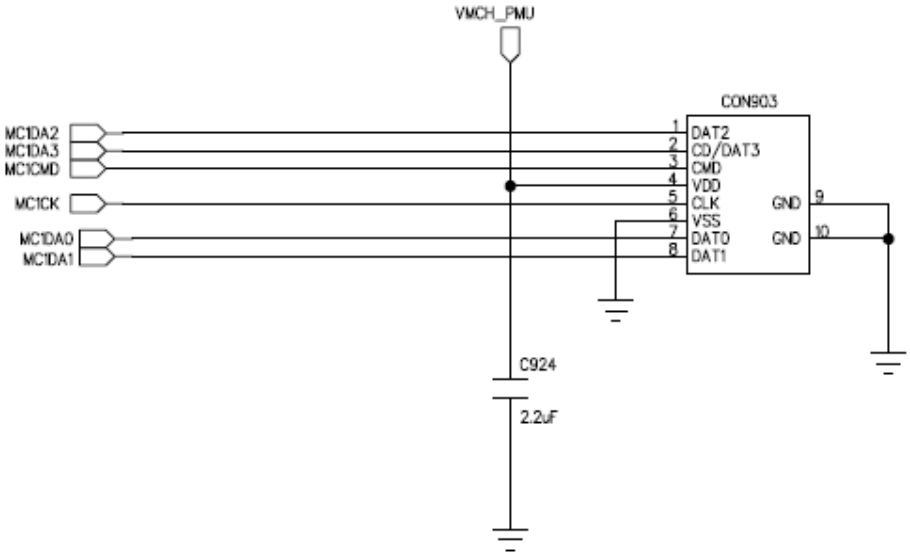
8.14 TF card trouble TF card Circuit Working Principle

Multi-media card primarily is used to expand data storage capacity, relatively simple interface circuits, including power signals, clock signals and data signals.

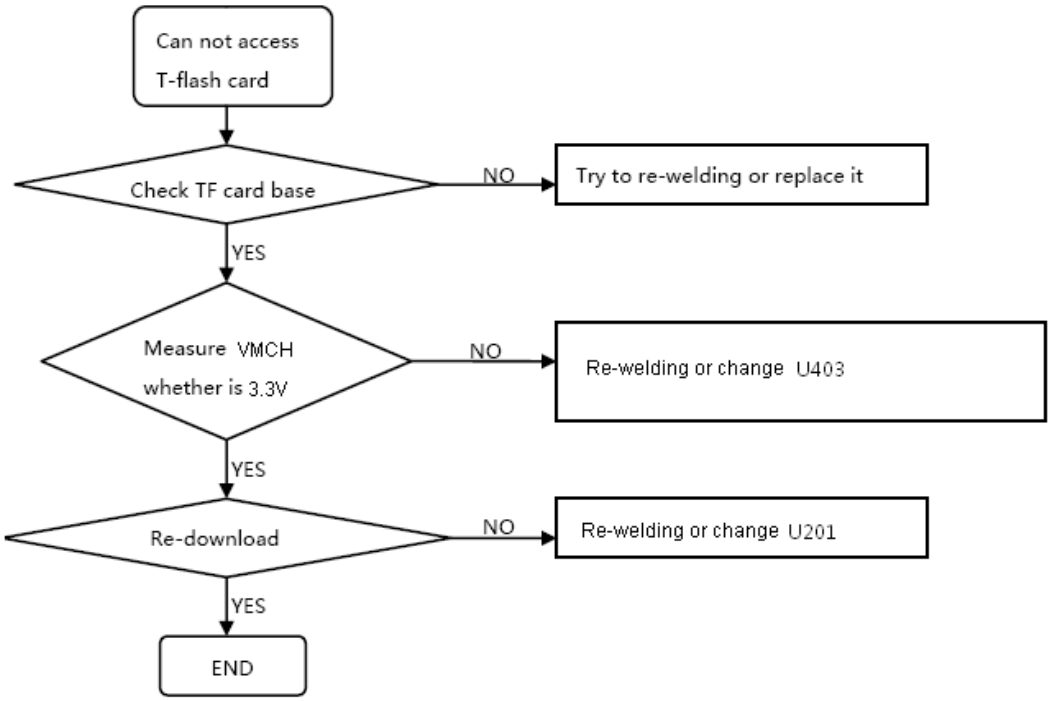
Repair inspection contact pin of the welding, and the existence of foot subsidence;

Multi-meter measurements reverse protect the voltage drop to determine the existence of disconnected lines, ruled out after the above-mentioned problems of the measures taken to replace the CPU.

Reference circuit as follows:



Analysis Process：



9. RF Trouble

9.1 Principle of operation：

Signal TX processes:

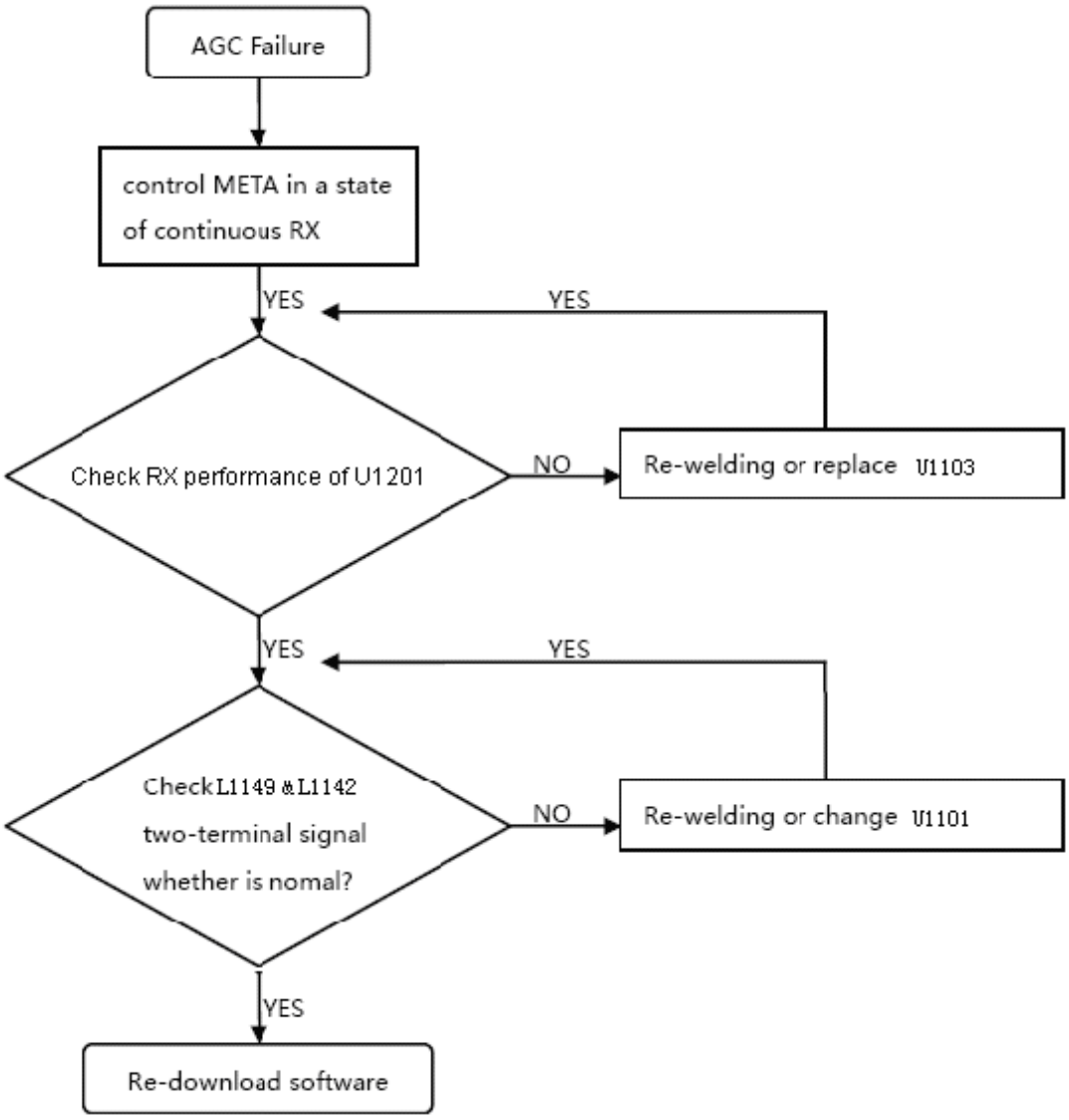
Acquisition voice - Amplification - ADC - filter - Speech Code - Complect - encryption – Channel Equalization - GMSK modulation -- (into RF part) IQ modulation (IQ modulator) - filter – Frequency phase (phase frequency) - filter - TX_VCO mixer (Mixer Mixer) - power amplifier (PA) - duplex -- Antenna matching circuit - antenna TX.

Signal RX process:

Antenna RX - antenna matching circuit – duplex Filter - SAW filter - LAN - RX_VCO mixer - Amplification - filter - IQ demodulation (IQ Modulator) - GMSK demodulator - Channel Equalization - decrypt – Cutting Complect - voice codec's - filter -- DAC - Amplification - voice output.

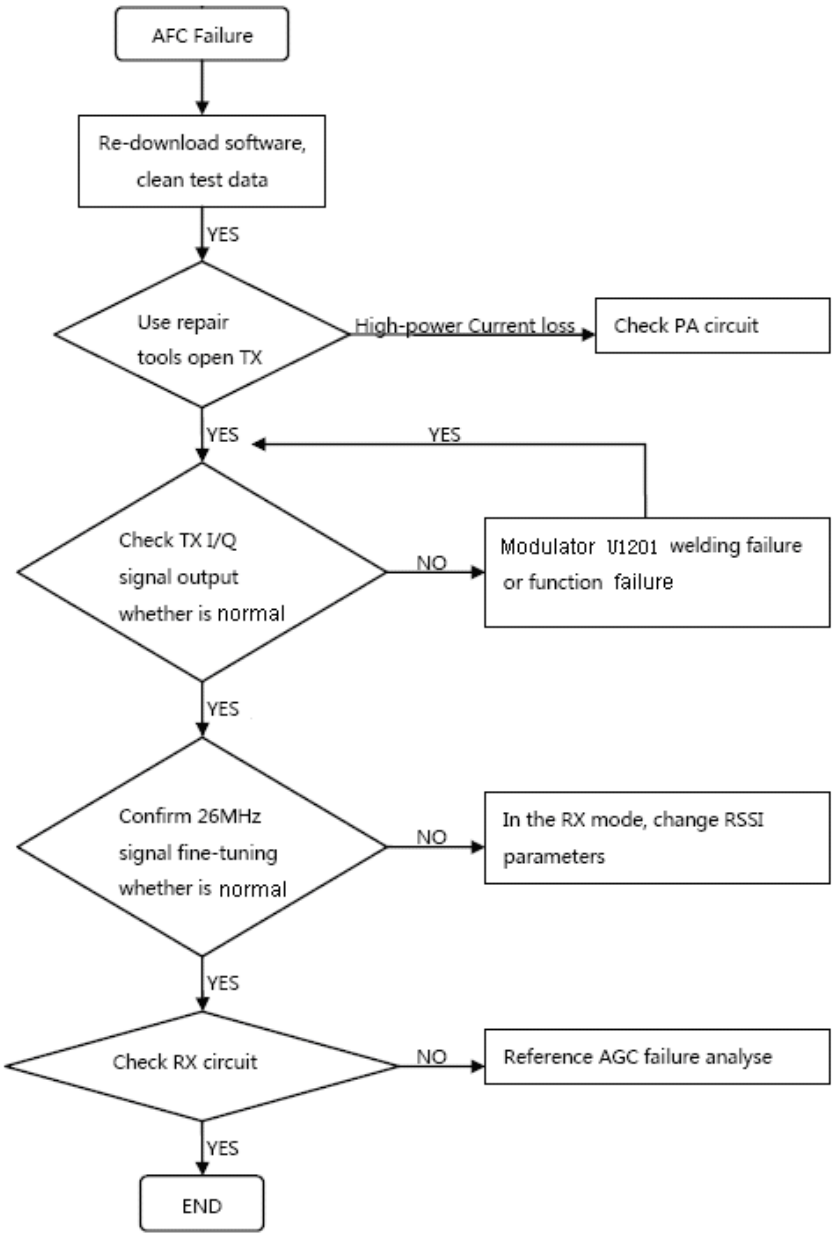
9.2 AGC failure

Analysis Process：



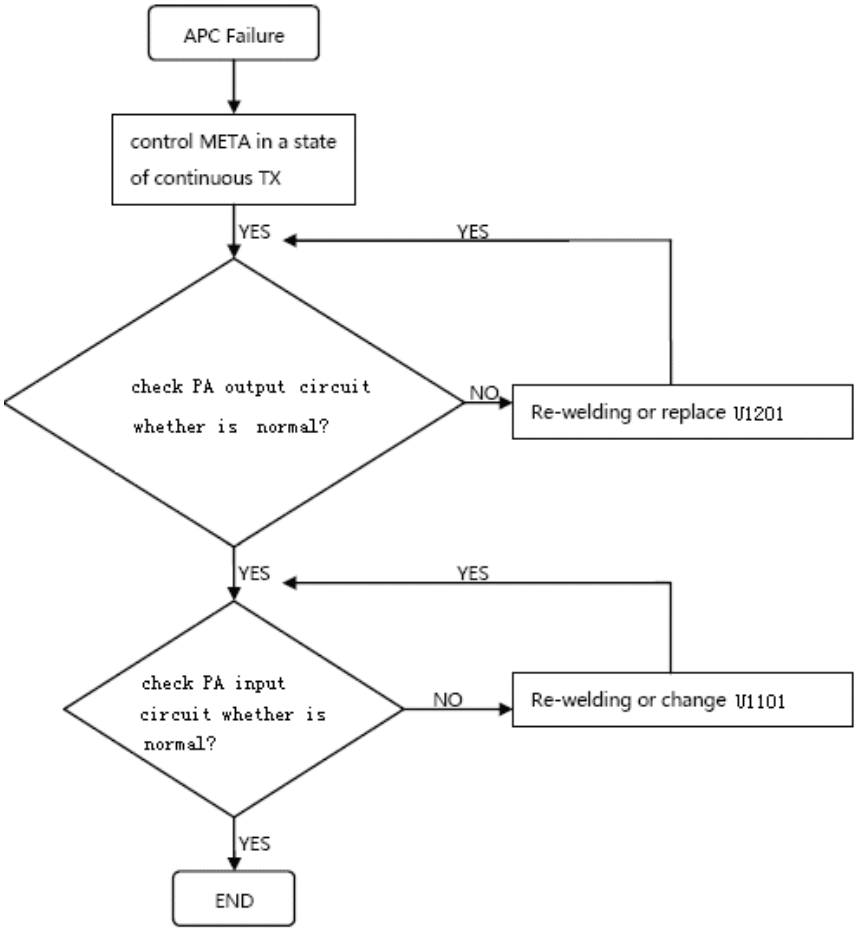
9.3 AFC failure

Analysis Process:



9.4 APC Failure

Analysis Process：



10. Maintenance tools

- RF Test Apparatus Agilent 8960 or CMU200
- Oscilloscope
- DC Power Supply
- MultiMate
- Iron
- Hot wind gun
- RF test cable
- USB downloads cable
- Screwdriver
- nippers, etc.