# Operation description

## 1. - key features

### 1.1 - brief introduction

The development and design of the - PCBA is based on SC9832A platform. The mainboard system mainly consists of the chip SC9832A + SC2723G2 + SC2342A, which are responsible for three part functions, namely, baseband, radio frequency and BLUETOOTH/FM chip. - PCBA is an all-in-one phone mainboard, which supports GSM, LTE and covers Bluetooth, Camera, FM functions, and so forth.

The maintenance of mainboard is one of the important links among mobile products rear-end producing. The speed and quality of maintenance relate to the rate of good products, production efficiency, and cost control throughout the producing. In the case of a reasonable design of product, in the end-producing, finding the significant proportion in the bad board should be SMT bad and component incoming material bad. So, when maintaining, first, start with the two aspects. The principal means of fault diagnosis are: (1) find that bad welding spots or components by microscopic examination and visual inspection; (2) guess failure positions from the fault phenomena; (3) confirm the fault units by signal detection.

### 1.2 Main IC Names

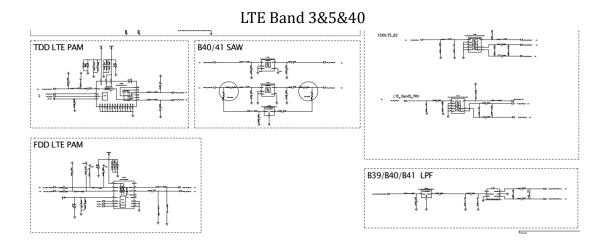| Number | Name | Product model | location |
|--------|------|---------------|----------|
| 1 | FCVFBGA,11.7x11.7,477Balls_1.5GHz_Quad Core__3.3V,1.8V | SC9832A | U2100 |
| 2 | FCVFBGA,6.6x6.2,170BALLS_PMU_ | SC2723G2 | U0200 |
| 3 | FBGA,11.5*13.0*(0.9±0.1,max 1.0) mm,221ball_8+1G_emmc+LPDDR3_VCCQ=1.8V/1.3V_R 120MB/S,W 4MB/S | 08EMCP08-NL3DT227 | U0500 |
| 4 | Quad-Band GSM/ EDGE, Dual-Band TD-SCDMA and TD-LTE_3.5v | STM7910-31 | U1201 |
| 5 | LTE High Band power Amplifiter Module_3.4v | SPM6424-21 | U1202 |
| 6 | broadband power amplifier module for WCDMA/HSDPA/HSUPA/HSPA+/CDMA/LTE_3.4V | SPM6569-12 | U1206 |
| 7 | LTE BAND 40 TRx Filter 1.4×1.1×0.5 5pin lay-out_2350MHz | SFDG35AQ102 | U1203 |

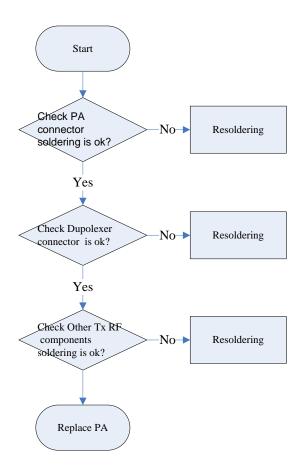| 8 | GSM B8 RF TRx Filter | SFH942PA002 | U1207 |
|---|---|---|---|
| 9 | SAW;1900 Rx 1960MHz/GSM 1800 Rx 1842.5MHz | SFRG42KB002 | U1208 |
| 10 | SAW Duplexer LTE/E-UTRA Band3 | B39182B8656P810 | U1209 |
| 11 | 1814_TxRx:836.5/881.5MHz_ | D5RB881M5E1BH | U1210 |
| 12 | SP4T for LTE diversity and RX | MXD8641 | U1301 |
| 13 | SR3592;85;BGA;4.3x4.9;040;RF;4G | SR3592 | U1300 |
| 14 | Single chip for BT&FM tuner 4*4mm 32-pin QFN_CMOS_1.8 to 5.5 V | RDA5876 | U1701 |
| 15 | Low-Noise-Amplifier voltage: 1.5V~3.6V_ | AW5017DNR | U1702 |

# 2. RF

## 2.1 LTE RF power trouble

Check points

-PA connector soldering
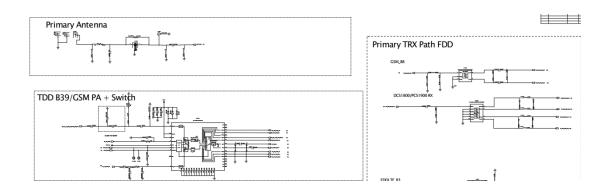-Duplexer connector soldering
-Other Tx RF Component soldering

LTE Band 3&5&40

```
                          ┌──────────┐
                          │  Start   │
                          └────┬─────┘
                               │
                               ▼
        ╱──────────────╲
       ╱  Check PA      ╲        No    ┌──────────────┐
      ╱   connector      ╲──────────── │ Resoldering  │
       ╲ soldering is ok?╱             └──────────────┘
        ╲──────────────╱
               │ Yes
               ▼
        ╱──────────────╲
       ╱ Check Dupolexer ╲       No    ┌──────────────┐
       ╲ connector is ok?╱──────────── │ Resoldering  │
        ╲──────────────╱              └──────────────┘
               │ Yes
               ▼
        ╱──────────────╲
       ╱ Check Other Tx RF╲     No     ┌──────────────┐
      ╱    components      ╲────────────│ Resoldering  │
       ╲ soldering is ok? ╱             └──────────────┘
        ╲──────────────╱
               │
               ▼
          ┌──────────┐
          │Replace PA│
          └──────────┘
```

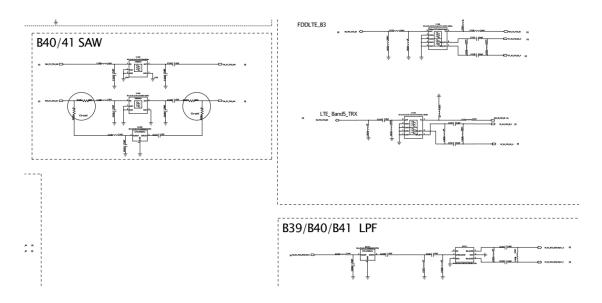## 2.2 **GSM RF power trouble**

### Check points

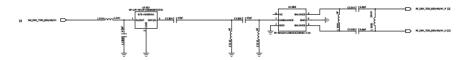-Tranceiver connector soldering
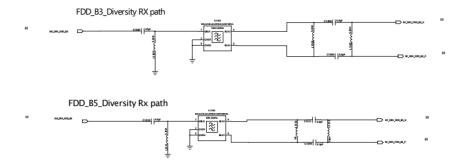
-PA connector solderin

## 2.3 LTE RX trouble

### Check points

-Tranceiver connector soldering

-Duplexer connector soldering

-ASM switch connector soldering

-Other Rx RF Component (L/C) soldering



B40/41 SAW



FDDLTE_B3

LTE_Band5_TRX

B39/B40/B41 LPF

## Diversity TDDLTE RX Path



## Diversity FDDLTE RX Path

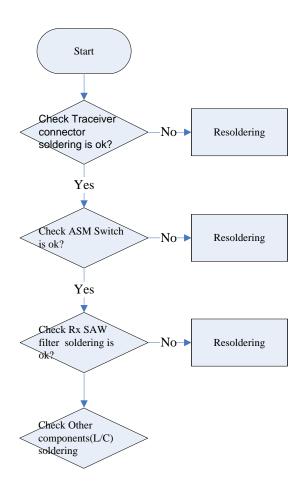FDD_B3_Diversity RX path

FDD_B5_Diversity Rx path

## 2.4 GSM RX trouble

Check points

-Tranceiver connector soldering

-ASM switch connector soldering

-Rx SAW filter connector soldering

-Other Rx RF Component (L/C) soldering

# Primary TRX Path FDD
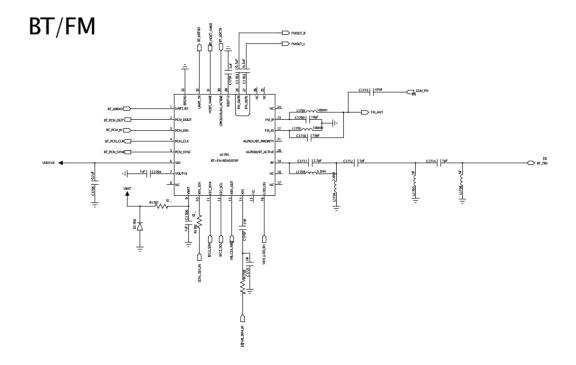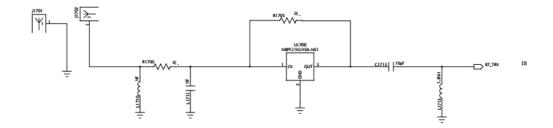
GSM_B8

DCS1800/PCS1900 RX

```
          ┌─────────┐
          │  Start  │
          └────┬────┘
               │
               ▼
        ◇ Check Traceiver
          connector          ──No──▶ ┌────────────┐
          soldering is ok?           │ Resoldering │
               │                     └────────────┘
              Yes
               │
               ▼
        ◇ Check ASM Switch
          is ok?             ──No──▶ ┌────────────┐
               │                     │ Resoldering │
              Yes                    └────────────┘
               │
               ▼
        ◇ Check Rx SAW
          filter soldering is ──No──▶ ┌────────────┐
          ok?                         │ Resoldering │
               │                      └────────────┘
               ▼
        ◇ Check Other
          components(L/C)
          soldering
```

## 2.5 BT Part

### 2.5.1 BT Part

# BT/FM



## BT ANT



BT signal is entered by antenna, through U1700 2.4GHZ filter, filter sideband unwanted signal. The clock uses 26M clock.

Bluetooth main problem：

Bluetooth does not need calibration, only need to check the function, if unable to search the device or Bluetooth can not be opened, check whether the U1700 is welding bad or body bad.

# 3. Baseband section

## 3.1 Outline

Baseband circuit completes main functions: the procedure data storage, keyboard input, and the communication between the RF module, RF power control, the control of the power management module, RUIM card interface, serial download interface,

Camera, T-flash, Bluetooth, and MMI (man-machine interface, such as the display, backlight, buzzer, speaker, microphone, motors, etc.).

### 3.1.1 Memory

The baseband part has an eMMC/LPDDR3 MCP. Wherein the amount of eMMC storage 8GB, it stores a communication protocol layer and application layer software, and storing various system parameters, calibration parameters, such as RF control correction value of an audio signal, the IMEI number, and other important information and store user settings data such as phone number, CALL volume, and tone; LPDDR3 memory 8Gb, temporary variables stored phone program run。

### 3.1.2 Battery

1300mAh 3.8V lithium-ion battery.

### 3.1.3 SIM Card

SIM card interface is SIM card interface provided by SC9832A.

### 3.1.4 Audio frequency

The microphone is omnidirectional capacitor type. The largest impedance is 1KΩ。

Headset as a standard 3.5mm headphone jack port, the nominal resistance 32Ω。

Speaker adopts 11*15 specification, Receiver adopts 12*06 specification.

### 3.1.5 I/O Interface

I/O Connector MICRO USB interface standard. Mainly used for software, download picture messages。

### 3.1.6 Display

The main screen is 4.5inch。4.5inch color screen   FWVGA

## 3.2 Common Failure Analysis and Maintenance

Before cutting board after the completion of the production line SMT X-RAY inspection, according to the actual situation, X-RAY examination can not be found 100% badness, X-RAY inspection may omissions some fault plate flow down. If found fault plate in the testing process, the first step is to re-check of the X-RAY and carefully to see if there is even welding, lap welding, Weld, if normal, analyze the situation following the positioning。

### 3.2.1 Power failure Check

The failure phenomenon caused by a power failure: can not boot, shutdown leakage current boot large current.

The main reason for the problem: Weld, electrical the original filtering or ESD device to short-circuit, burning with the device is connected to a power source.

Positioning as well as steps to solve this type of problem is as follows：

1，Troubleshoot and connected to the power supply components of the welding, Weld, or the peripheral devices even tin。

2，with a multimeter rule out whether there is power to short-circuit, and step by step to troubleshoot the cause of the short (mainly: even tin, IC burned, ESD protection device breakdown, capacitor breakdown)。

3，boot to test the power output is normal。

If a power output value is not normal, whether the view filter capacitor welding problems, whether the breakdown, filter capacitor is broken, replace; excluded one by one, and finally you can navigate to the main chip damage。

Each the power test position and the normal boot value is shown in the following table
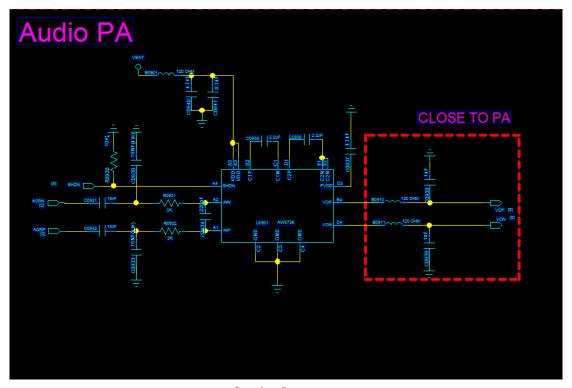
| VDDCORE | 1.0V |
| --- | --- |
| VDDARM | 1.0V |
| VDDMEM | 1.2V |

### 3.2.2 Audio faults

The audio part has main four parts including the speaker, receiver, mic and headphone. First undesirable phenomena distinguish what part of the problem, and then analyzed according to the following respective module。

(1) Speaker loop
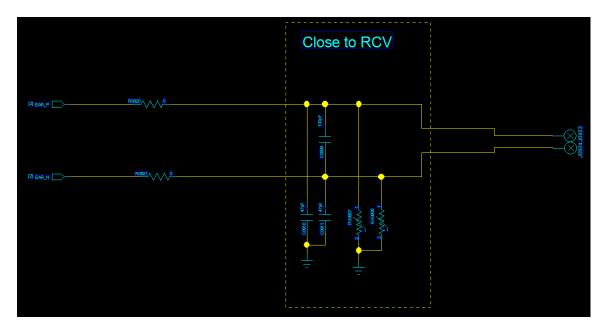
The - phone's speaker circuit is as follow

Speaker Loop

Speaker Common faults and reasons：

1,SPK Ringtones reasons:

  1) light board, SPK itself is bad,    not in place

  2) relevant component there is dry welding

  3 ) software problems

2,SPK ringtones or murmur:

   1) software volume settings

   2) SPK ontology reasons

3,Switch machine ringtones, but engineering tests SPK OK:

  1) scene mode is set to switch machine ringer off

  2) software problems, itself boot ringtones;

**(2) Receiver circuit**

- phone receiver is embedded in the mobile phone front shell through shrapnel and motherboard

connection. Mainly used for the call. Receiver circuit diagram as shown below.
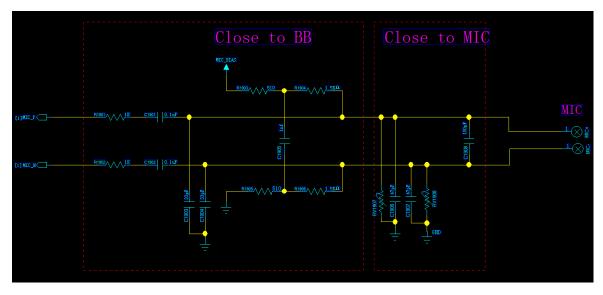
Receive Loop

Receiver Common faults and reasons：

1, Receiver without sound:
 1) Receiver assembly adverse, the shrapnel and board poor contact
 2) Receive ontology bad
 3) the volume settings or software problems
2, Receiver noise or volume:
 1) Receiver incoming material, whether caused by pad short circuit
 2) relevant components have solder skips
 3) software problems

## (3) Mic loop
The SC9832A contains two MIC circuits, the main MIC and headphone MIC. The main MIC was inserted needle. - main MIC circuit is on sub board.Loop schematic diagram as following:
Main MIC common faults and causes
1 MIC unable to send words or recording:
 1) MIC poor welding
 2) MIC body bad
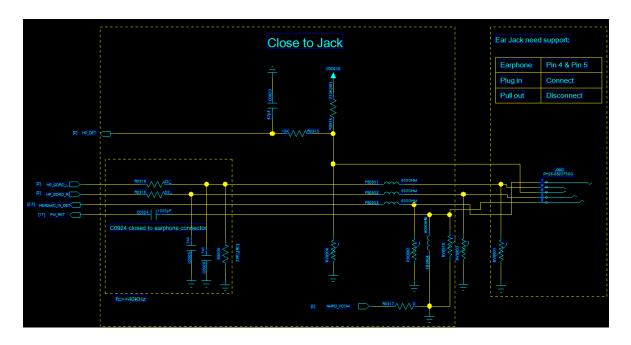2 MIC noise or sound:
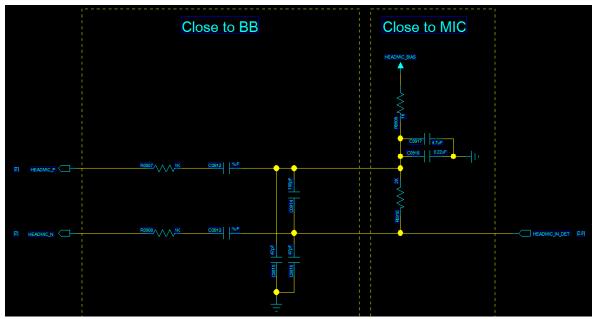 1) MIC ontology bad
 2) software problems.

Main MIC

**（4）Headphone loop**

- phone use headphones with a standard 3.5mm headphone. Its circuit diagram is as follows:
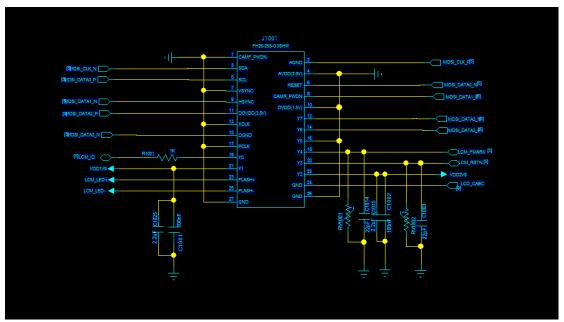
Headphones common faults and reasons:

1, headphones only one channel sound:

  1) the headset is not inserted in place

  2) Relevant component Weld

  3) Relevant component breakdown shorted to ground;

2, headphone left and right channels are no sound:

  1) the headset is not inserted in place

  2) Relevant component breakdown on the short circuit

3, unplug the headphones bank borrowing does not recognize:

  1) Relevant component Weld

  2) whether headphones Block shrapnel and motherboard good contact

  3) software reasons

4, headset MIC no transmitter:

  1) the headset is not inserted in place

  2) Relevant component Weld
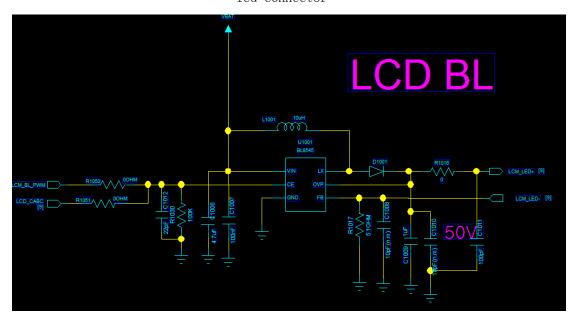
  3) Relevant component breakdown on short-circuit;

### 3.2.3 LCD Fault

4.5-inch FWVGA LCD, The part of the circuit schematic as shown below. Common problems and causes of the LCD module：

1, LCD screen is blank

 1) LCD is not installed or and fixture poor contact

 2) LCD backlight circuit is bad, check backlight so that the foot is pulled, check backlight IC whether Weld or shorted to ground

 3) LCD itself fault.

lcd connector



2, LCD blurred screen and white screen. Description LCD backlight circuit OK, just shows abnormal. The cause of the malfunction is usually:

1) LCD connector poor contact, poor welding and fixture poor contact

2) related components Weld or even tin short circuit

3) software problems

3, LCD black spots, bright spots, black lines, stripes Failure: LCD ontology bad.

### 3.2.4 FM

The CPU controls FM IC working condition through the I2C signal, when FM is working,

should insert headphone as its antenna. FM outputs audio signal to the CPU Codec, amplify playing or record. FM common faults and causes:
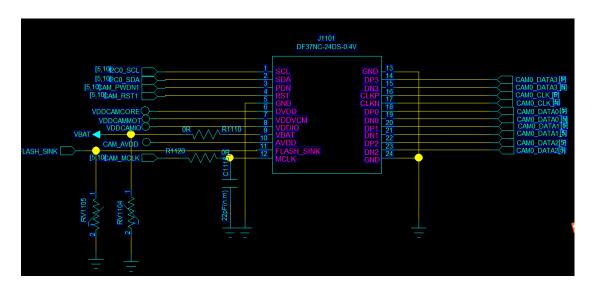
1, FM cannot search frequency or less frequency reason:

 1) headphone without inserting or not insert good

 2) surrounding environment is bad, such as plant, garage, etc. FM signals itself is weak or no FM signals source

 3) FM antenna circuit exists poor soldering or short circuit, lead to unable to receive FM signals or FM signals leak

 4) software reason

2, FM without sound reasons or murmur

 1) this FM radio frequency is invalid

 2) FM weak signal

 3）related component bad-welding

 4) headphone was not put in place

 5) whether headphone socket shrapnel contacts with the mainboard well

 6) whether headphone socket welding is OK

3, FM module operation failed

 1）Check whether the I2C and CLK signal are normal or not

 2）Software fault

### 3.2.5 Camera fault
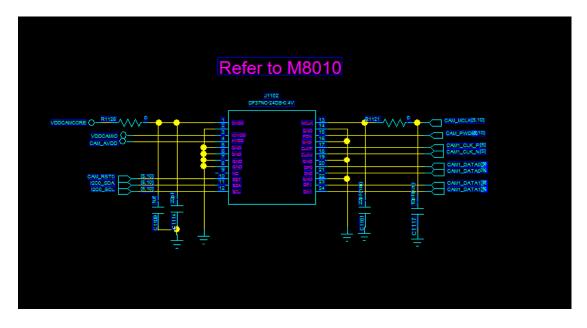
Connect with the CPU through a dedicated Camera IF port. Camera control is done through the I2C bus. Camera common fault and why:

1, Camera initialization failed, could not enter the Camera the main interface

 1) Camera poor welding or poor contact

 2) the Camera Ontology failure

 3) Camera Power supply is not normal (Weld, or short-circuit led to)

 4) related components welding problems

2, Camera Preview shows blurred screen or color is not normal

 1) Camera poor welding or poor contact

2) related components welding

3) restore the factory settings after restart

3, Camera other problems, please replace the Camera try to confirm whether the Camera body has problems.
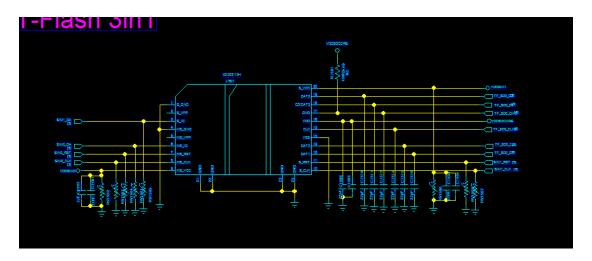


Back camera



Front camera

### 3.2.6 SIM card failure

- SIM card module circuit is connected directly with PMIC through eight-path signal from SUIM slot. The major failure of the module does not know the card, the reason

usually:

 1) USIM card GSM card and USIM deck poor contact

 2) poor USIM card socket welding

 3) software problem cause the phone to pick a card, change the card to confirm

 4) SIM card holder exist Weld

 5) card exceeds the itinerary or inserted upside



SIM card circuit

## 3.2.7 T-Flash fault

- T - Flash circuit is connected with CPU through the special SDIO bus, circuit diagram shown below. T - Flash the common faults and reasons are:

1, T-Flash read-write test is failure

 1) T - flash for fault card or and T card seat have had no contact with good

 2) below the resistance there may be short circuit, or virtual welding phenomenon. Capacitance may on short circuit. (using a multimeter to test whether T card signal and ground and VMCH short circuit can eliminate)

 3) software reason

2, T card not to know card: T holder PIN feet virtual welding, on MLV welding reverse and capacitance breakdown

3, T - Flash can't through the USB for transmission

1) T - Flash itself, speaking, reading and writing test failure fault

2) software fault

3) USB fault

### 3.2.8 Cannot boot failure

Can't boot failure is the phone fault with highest probability of occurrence. Software problems, welding problem, device failure is the main factor causing failing to boot. Maintenance process can cooperate with LCD and startup current, as well as the keyboard and so on to orientate approximately.

1, Power off leak current is large. The main failure reason is VBAT connected components had gnd short circuit problem. Usually radio frequency PA burned or welding problem cause. The simpler method is looking for is a hot devices, general such devices have larger power on short circuit.

2, Boot without current, LCD no display, keyboard, etc not bright

 1) boot key SMT bad

 2) battery connector bad contact (through the plug charging machines)

3, Crashed when boot

 1) can try to re-download the software

 2) replace memory

4, Current is large when boot. LCD displays normally, even can enter the IDIE interface, single board is very hot

The individual power circuit short circuit to ground phenomenon exists in the phone, which is usually the problem that ESD protective devices of module circuit breakdown short circuit to ground or weld problems.

| 2G: | |
|---|---|
| Support Network: | GSM, GPRS, EGPRS |
| Support Band: | GSM850, PCS1900 |
| Modulation: | GSM/GPRS/EGPRS: GMSK |
| Transmit Frequency: | GSM850: 824.20MHz-848.80MHz<br>PCS1900: 1850.20MHz-1909.80MHz |
| Receive Frequency: | GSM850: 869.20MHz-893.80MHz<br>PCS1900: 1930.20MHz-1989.80MHz |
| GPRS Class: | 12 |
| EGPRS Class: | 12 |
| Antenna type: | PIFA Antenna |
| Antenna gain: | GSM850: 1.2 dBi<br>PCS1900: 1.2 dBi |
| 3G: | |
| Operation Band: | FDD Band II and FDD Band V |
| Power Class: | Power Class 3 |
| Modilation Type: | QPSK/16QAM/64QAM/HSUPA/HSDPA |
| DC-HSUPA Release Version: | Not Supported |
| Antenna type: | PIFA Antenna |
| Antenna gain: | Band II: 1.2 dBi,Band V: 1.2dBi |

| RF Technical Description | | | | | | |
|---|---|---|---|---|---|---|
| ☒FDD Band 2 | | | | | | |
| Operation Frequency: | Uplink:1850.7 MHz – 1909.3 MHz<br>Downlink: 1930.7 MHz – 1989.3 MHz | | | | | |
| Channel bandwidth: | ☒<br>1.4MHz | ☒<br>3MHz | ☒<br>5MHz | ☒<br>10MHz | ☒<br>15MHz | ☒<br>20MHz |
| ☒FDD Band 4 | | | | | | |
| Operation Frequency: | Uplink:1710.7 MHz – 1754.3 MHz<br>Downlink: 2110.7 MHz – 2154.3 MHz | | | | | |
| Channel bandwidth: | ☒<br>1.4MHz | ☒<br>3MHz | ☒<br>5MHz | ☒<br>10MHz | ☒<br>15MHz | ☒<br>20MHz |
| ☒FDD Band 5 | | | | | | |
| Operation Frequency: | Uplink:824.7 MHz – 848.3 MHz<br>Downlink: 869.7 MHz – 893.3 MHz | | | | | |
| Channel bandwidth: | ☒<br>1.4MHz | ☒<br>3MHz | ☒<br>5MHz | ☒<br>10MHz | ☐<br>15MHz | ☐<br>20MHz |
| ☒FDD Band 7 | | | | | | |
| Operation Frequency: | Uplink:2502.5 MHz – 2567.5 MHz<br>Downlink: 2622.5 MHz – 2687.5 MHz | | | | | |
| Channel bandwidth: | ☐<br>1.4MHz | ☐<br>3MHz | ☒<br>5MHz | ☒<br>10MHz | ☐<br>15MHz | ☐<br>20MHz |
| Power Class: | ☐ Class 1 | ☐ Class 2 | ☒ Class 3 | ☐ Class 4 | | |
| Modulation type: | ☒QPSK | ☒16QAM | ☐64QAM | | | |
| Antennna type: | PIFA Antenna | | | | | |
| Antenna gain: | 1.2dBi, | | | | | |

| WIFI | |
| --- | --- |
| Supported type: | 802.11b/802.11g/802.11n(HT20) |
| Modulation: | DSSS for 802.11b<br>OFDM for 802.11g/802.11n(HT20) |
| Operation frequency: | 2412MHz~2462MHz |
| Channel number: | 11 |
| Channel separation: | 5MHz |
| Antenna type: | PIFA Antenna |
| Antenna gain: | 0.8 dBi |
| **Bluetooth** | |
| Version: | Supported BT4.0+EDR |
| Modulation: | GFSK, π/4DQPSK, 8DPSK |
| Operation frequency: | 2402MHz~2480MHz |
| Channel number: | 79 |
| Channel separation: | 1MHz |
| Antenna type: | PIFA Antenna |
| Antenna gain: | 0.8 dBi |
| **Bluetooth** | |
| Version: | Supported BT4.0+BLE |
| Modulation: | GFSK |
| Operation frequency: | 2402MHz~2480MHz |
| Channel number: | 40 |
| Channel separation: | 2MHz |
| Antenna type: | PIFA Antenna |
| Antenna gain: | 0.8 dBi |