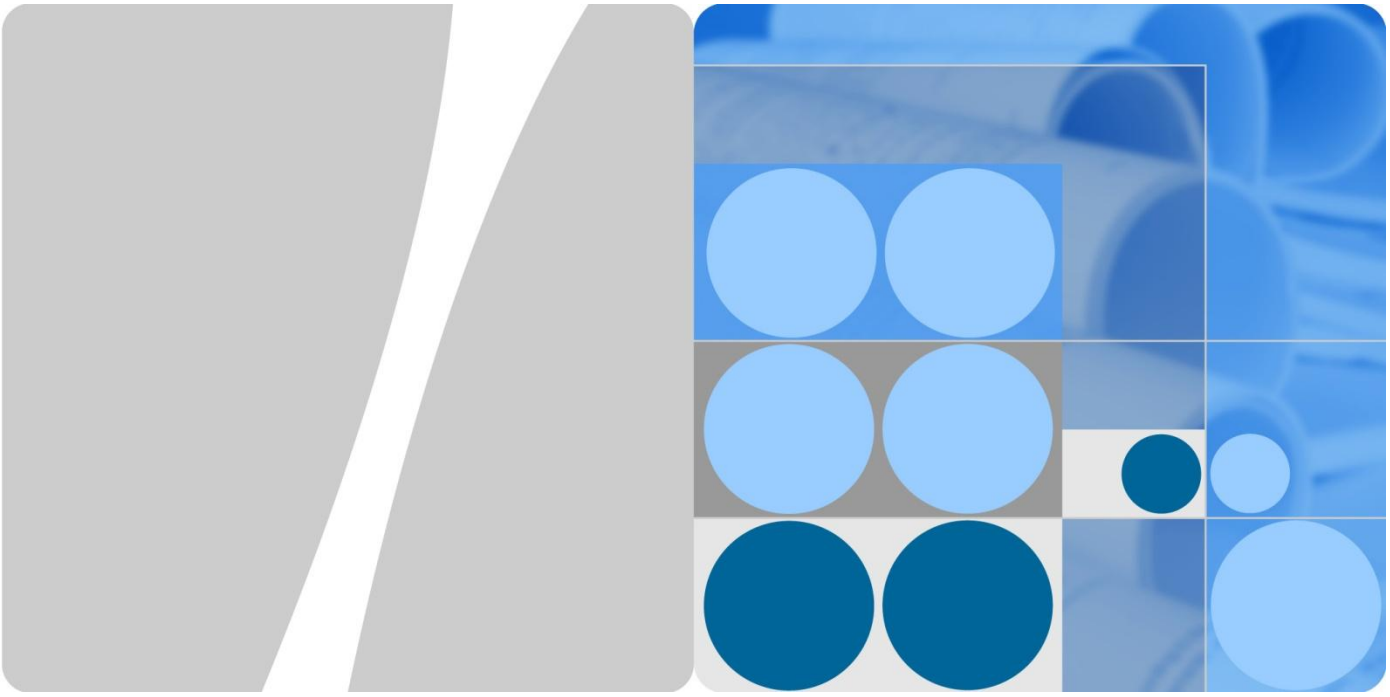

U8185
Maintenance Manual

Issue 1.0

Date 2012-03-23

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About This Document

Purpose

Prepared by	R&D	**Date**	2012-03-20
Reviewed by	Maintenance support team	**Date**	2012-03-23
Approved by	Service representative	**Date**	2012-03-23

Change History

Date	Version	Change Reason	Section	Description	Author
2012-03-20	V1.0	Released the first issue.			R&D

Contents

1 Product Introduction

1.1 Appearance

Figure 1-1 U8185

1.2 Specifications

Category	Description
Dimensions (H x W x D)	106.5 mm x 56 mm x 10.9 mm
Technical standard	WCDMA/GSM

Category		Description
Frequency bands		U8185-1: • WCDMA 900MHz: 880–915 MHz (UL), 925–960 MHz (DL) • WCDMA 2100 MHz: 1920–1980 MHz (UL), 2110–2170 MHz (DL) • GSM 850 MHz: 824–849 MHz (UL), 869–894 MHz (DL) • GSM 900 MHz: 880–915 MHz (UL), 925–960 MHz (DL) • GSM 1800 MHz: 1710–1785 MHz (UL), 1805–1880 MHz (DL) • GSM 1900 MHz: 1850–1910 MHz (UL), 1930–1990 MHz (DL) U8185-5: • WCDMA 850MHz: 824–849 MHz (UL), 869–894 MHz (DL) • WCDMA 1900MHz: 1850–1910 MHz (UL), 1930–1990 MHz (DL) • GSM 850 MHz: 824–849 MHz (UL), 869–894 MHz (DL) • GSM 900 MHz: 880–915 MHz (UL), 925–960 MHz (DL) • GSM 1800 MHz: 1710–1785 MHz (UL), 1805–1880 MHz (DL) • GSM 1900 MHz: 1850–1910 MHz (UL), 1930–1990 MHz (DL) U8185-7: • WCDMA 850MHz: 824–849 MHz (UL), 869–894 MHz (DL) • WCDMA 2100 MHz: 1920–1980 MHz (UL), 2110–2170 MHz (DL) • GSM 850 MHz: 824–849 MHz (UL), 869–894 MHz (DL) • GSM 900 MHz: 880–915 MHz (UL), 925–960 MHz (DL) • GSM 1800 MHz: 1710–1785 MHz (UL), 1805–1880 MHz (DL) • GSM 1900 MHz: 1850–1910 MHz (UL), 1930–1990 MHz (DL)
Weight		About 100 g with battery
Form factor		Bar
Antenna		Built-in
UIM		Support for the USIM card
Charger		• 5 V, 500 mA • 5 V, 400 mA
Battery	1050 mAH Li-ion	• Talk time: up to 200 minutes • Standby time: up to 280 hours
Display	Resolution	240 RGB x 320 pixel
	Type	TFT-LCD
	Color	262 k
	Size	2.83 inches
Connectors	Charging port	Micro USB connector
	USB port	Micro USB connector

Category		Description
	microSD card slot	microSD card slot
	Headset jack	3.5 mm headset jack
Maximum transmit power	• WCDMA: +24 dBm (Power Class 3) • GSM/GPRS 850/900 MHz: +33 dbm (Power Class 4) • GSM/GPRS 1800/1900 MHz: +30 dbm (Power Class 1)	
Static sensitivity	• WCDMA 850 MHz: better than –104.7 dBm/3.84 MHz • WCDMA 900 MHz: better than –103.7 dBm/3.84 MHz • WCDMA 1900 MHz: better than –104.7 dBm/3.84 MHz • WCDMA 2100 MHz: better than –106.7 dBm/3.84 MHz • GSM 850/900/1800/1900 MHz: better than –102 dBm/200 kHz	
Temperature	• Operating temperature: –10 ℃ to +55 ℃ • Storage temperature: –40 ℃ to +70 ℃	
Humidity	Operating humidity: 5% to 95% RH	

2 Applicable Scope and Precautions

2.1 Applicable Scope

This document provides repair instructions for technicians at service centers authorized by Huawei. This maintenance manual is confidential and accessible to authorized service centers (ASCs) and authorized service providers (ASPs) only. While every effort has been made to ensure the accuracy of this document, errors may still exist. If you find any errors or have any suggestions, please contact Huawei's customer service.

2.2 Precautions

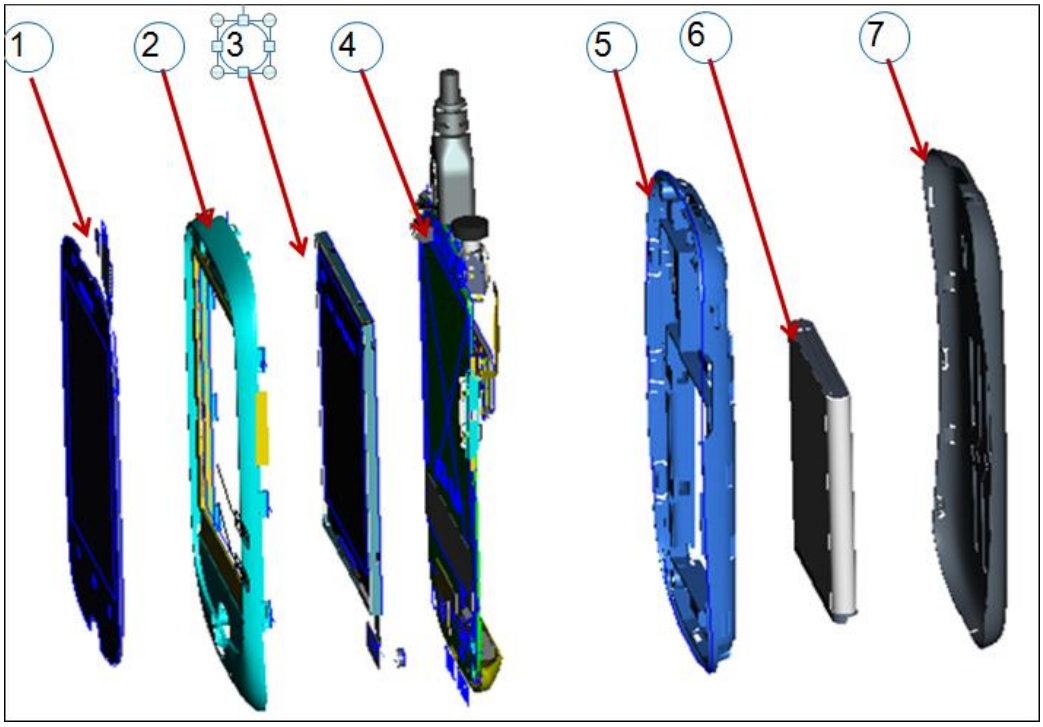
- Only qualified technicians are allowed to perform repair and calibration.
- Perform all operations in electrostatic discharge (ESD) rooms and wear ESD wrist straps throughout the operations.
- Ensure that all the components, screws, and insulators are properly installed after repair and calibration. Ensure that all cables and wires are installed and connected correctly.
- Ensure that the soldering is lead-free and compliant with eco-friendly requirements.

ESD is the main cause of damage to electrostatic-sensitive components. Each ASC must exercise caution to avoid ESD damage and comply with the ESD protection requirements in this manual.

2.3 How to Obtain Product and Repair Information

To obtain product and maintenance information, visit Huawei website at:
http://www.huaweidevice.com/cn/technicaIndex.do

3 Exploded View



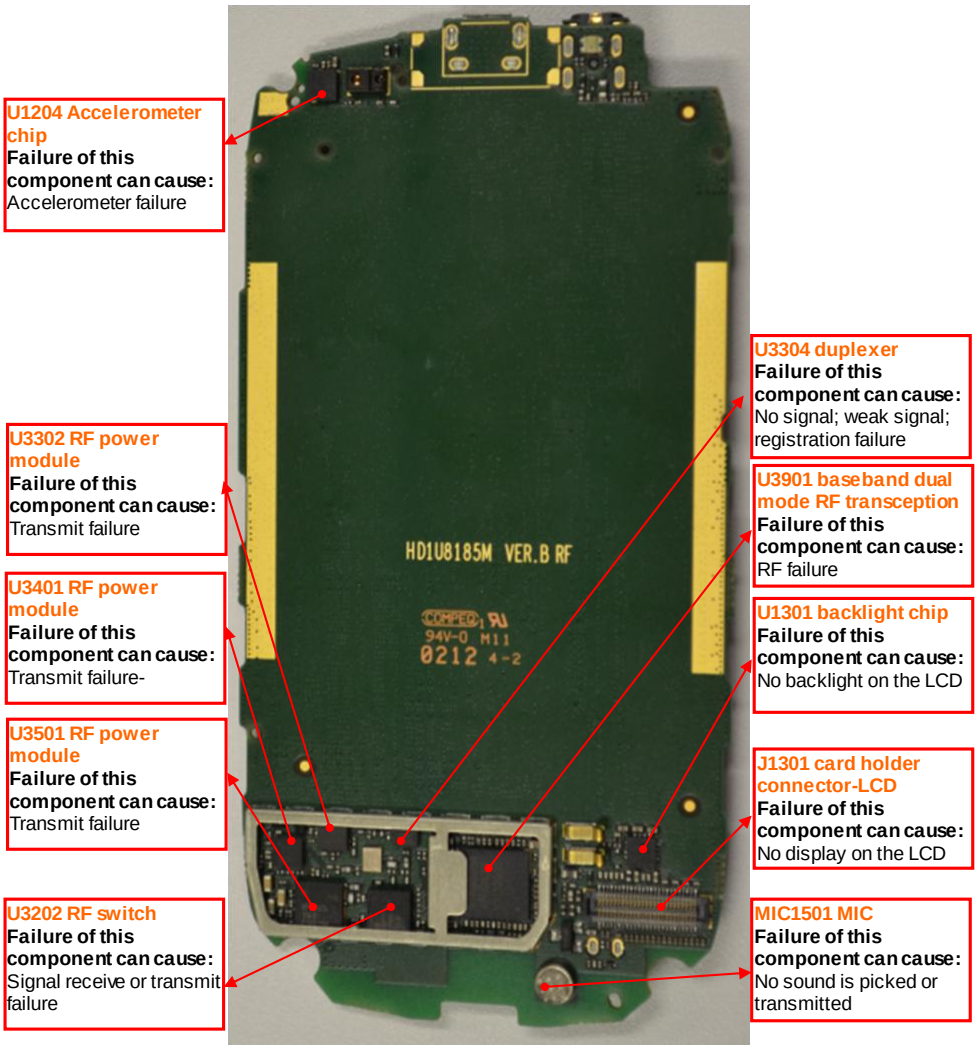
Note: The components listed in the following table are structural parts of the phone, and cannot be used as reference when requesting spare parts.

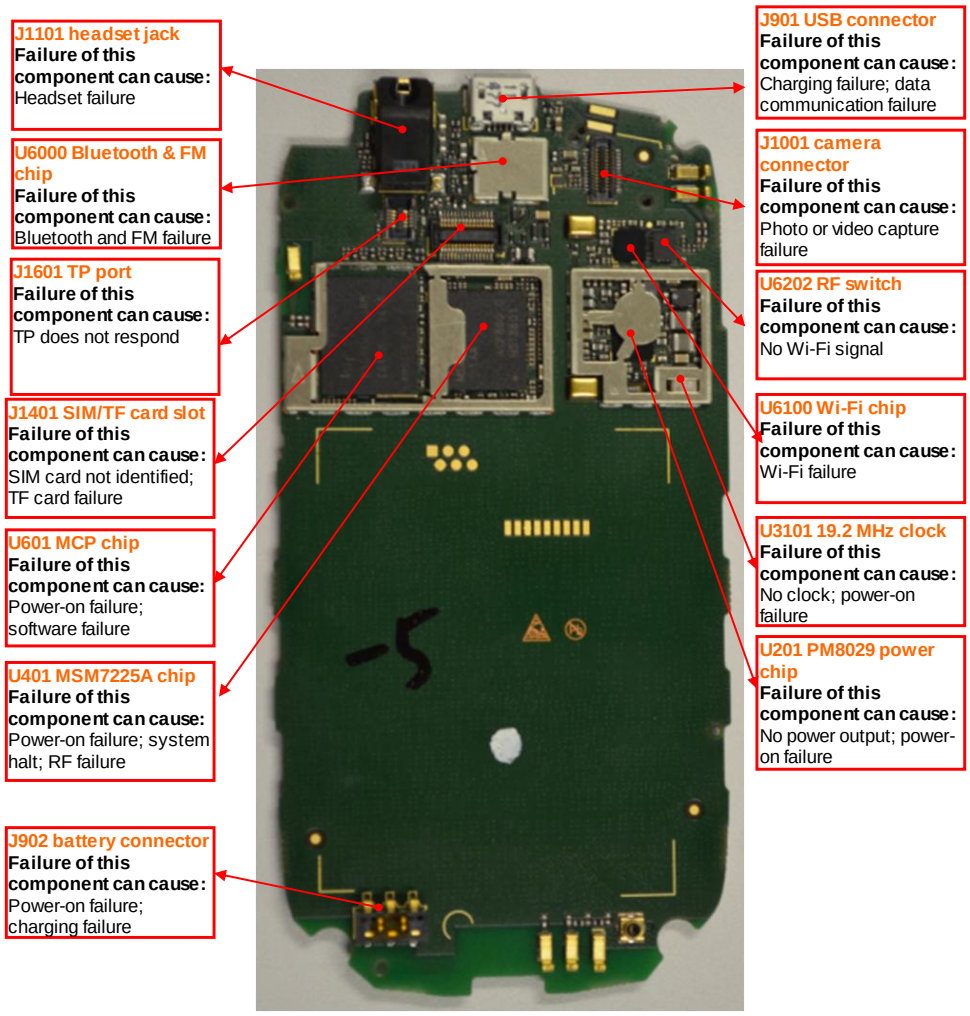
Table 3-1 List of components in the exploded view drawing

No.	Description	Quantity
1	Touch panel (TP)	1
2	Front cover assembly	1
3	LCM	1
4	Printed circuit board assembly (PCBA)	1
5	Rear cover assembly	1

No.	Description	Quantity
6	Battery	1
7	Battery cover	1

4 Components on the PCBA





The following list of components is provided for reference only. This list is subject to change without notice. The latest component list is available on Huawei's ITEM information system. If you have any questions, please contact your local technical support.

Table 4-1 Components on the PCBA

BOM	Description	Location
15010251	Schottky diode	D1401, D301, D302
15040311	Transient voltage suppression diode	D1101, D1102, D1103, D1104, D1501, D1502, D1503, D1504, D1600, D1601, D1605, D1606, D901
15020111	Light emitting diode	D1200
19040121	Fuse suite-fast acting fuse	F901
10100150	Terminal dedicated EMI bead	LB1601, LB301, LB302

BOM	Description	Location
10100084	Terminal dedicated EMI bead	LB1102, LB1103, LB1104, LB1106
22050053	Microphone	MIC1501
15060228	MOSFET-P channel	Q201
15060238	MOSFET-N channel	Q1601
40060329	MCP	U601
38020055	Analog switch-P-channel MOSFET	U1001
38140023	Accelerometer	U1204
39110581	LDO	U1301
12070034	Temperature compensated oscillator-19.2 MHz	U3101
14240004	RF connector	U3201
47140048	RF switch	U3202
13010186	SAW filter	U3301
47100397	RF power module	U3302
13080065	Duplexer	U3304
47100387	RF power module	U3401
13010189	SAW filter	U3402
13080104	Duplexer	U3404
47100377	RF power module	U3501
13010262	SAW filter	U3702
39200333	Terminal dedicated baseband IC	U3901
13010180	SAW filter	U4102, U4103
47090042	RF low-noise amplifier	U5002
39210040	Bluetooth & FM chip	U6000
39210039	WLAN chip	U6100
47140101	RF switch	U6202
12020125	Crystal resonator	X301

5 Software Upgrade

5.1 Upgrade Preparation

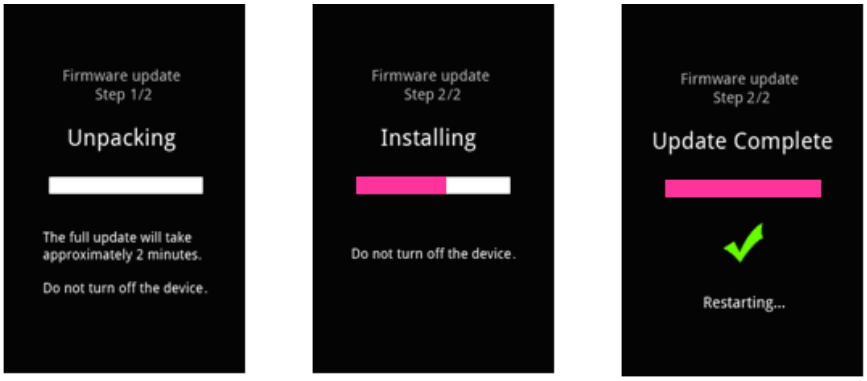
Category	Item	Description
Upgrade environment	Computer	To copy upgrade software
	microSD card	With more than 512 MB free space
	Battery	With at least 30% power remaining
Upgrade file	Main upgrade pack	dload/UPDATE.APP
	Vendor upgrade pack	vendor_XXX_XXX/UPDATE.APP
Upgrade method	microSD card upgrade	Normal upgrade
		Forcible upgrade

5.2 Upgrade Procedure

1. Format the microSD card.
2. Create a folder named **dload** in the root directory of the microSD card.
3. Copy the upgrade file to the **dload** folder.
4. Install the microSD card to the phone. Power the phone on, and enter ***#*#2846579#*#*** in the idle screen.
5. Select **SD card upgrade**, and then touch **Confirm** to start the upgrade.

Before the upgrade, NV items backup is performed (if the phone's NV items has not been backed up before). Then the phone restarts and the upgrade starts.

The upgrade progress is displayed on the LCD.



Step1 Step2 Step3

After the upgrade is completed, the phone restarts and the NV items are restored.

6. After the phone is upgraded using the main upgrade pack, upgrade the phone using the vendor upgrade pack in the same way.

If the phone cannot be properly powered on, use one of the following two methods to forcibly upgrade the phone:

- Install the battery on the phone (if the screen is jittering, remove the battery and wait for 5 seconds before installing the battery again). Press and hold the Volume+ and Volume– keys, and press the Power key. The phone enters the SD forcible upgrade mode in which the upgrade process is similar to the normal upgrade.
- While the phone has no battery installed, press and hold the Volume+ and Volume– keys, and connect the charger to the phone. The phone enters the SD forcible upgrade. This method is recommended. If the forcible upgrade still fails, use another microSD card and try forcible upgrade again.

5.3 Troubleshooting

Failure	Solution
The port cannot be found in USB cable upgrade mode.	• Check that there is no other driver conflicting with the USB driver for the upgrade. • Check that the USB driver has been installed properly. • Check that the USB cable has been properly connected.
The phone fails to be upgraded in USB cable upgrade mode.	• Check that the USB cable has been properly connected. • Perform the upgrade again.
The phone fails to be upgraded in microSD card upgrade mode.	• Check that the upgrade file is correct. • Check that the upgrade method is correct. • Check that the microSD card functions properly. • Perform the upgrade again.

6 Maintenance Tools

	Name: constant-temperature heat gun Usage: to heat components
	Name: constant-temperature heat gun Usage: to heat components
	Name: soldering iron Usage: to maintain and solder components
	Name: DC power supply Usage: to supply DC current
	Name: soldering table Usage: to secure the PCBA

	Name: pb-free solder wire Usage: to solder components
	Name: digital multimeter Usage: to measure during repair
	Name: toolkit Usage: to assemble and disassemble components
	Name: electric screwdriver Usage: to fasten and remove screws

7 Disassembly Procedure

1. Wear an ESD wrist strap, and ensure that the strap is grounded properly.

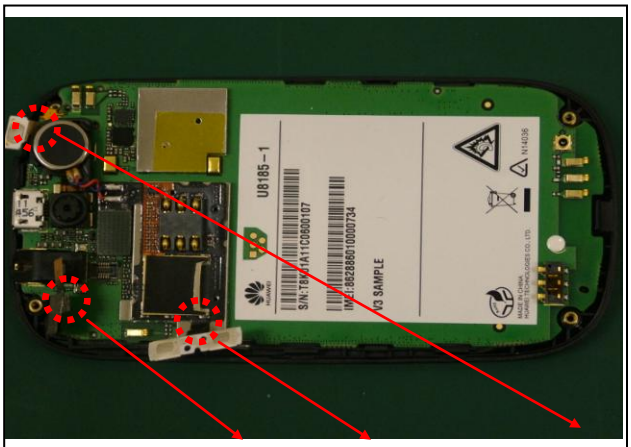
2. U8185 before disassembly

3. Remove the battery cover.

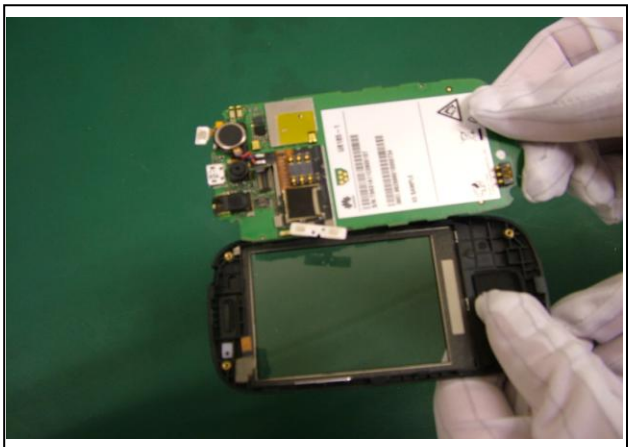
4. Remove the four screws from rear cover.

5. Release the latches between front and rear covers.

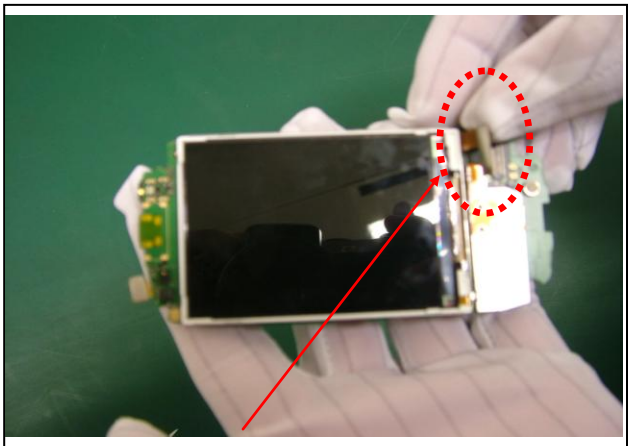
6. Remove the rear cover.



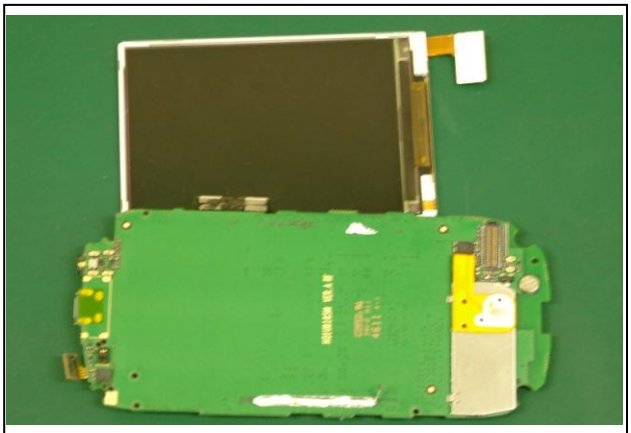
7. Use tweezers to release the TP connector, Volume key dome, and Power key dome.



8. Remove the PCBA from the front cover.



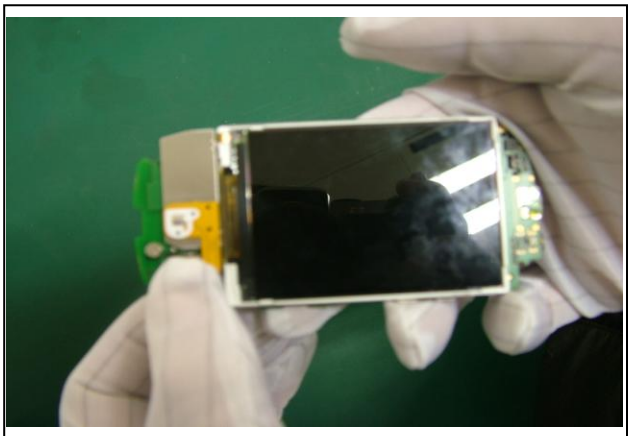
9. Open the LCD connector.



10. Remove the LCD. The phone is then disassembled.

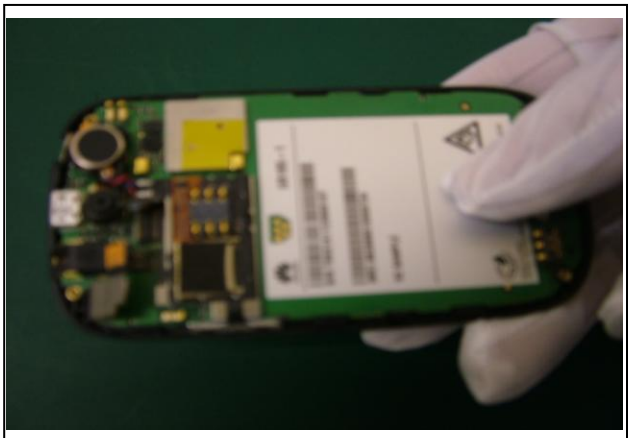
8 Assembly Procedure

1. Wear an ESD wrist strap, and ensure that the strap is grounded properly.



2. Install the LCD connector.

3. Install the PCBA on the front cover. Do not cover the TP connector FPC under the PCBA.



4. Install the TP connector, Volume key dome, and Power key dome, and then snap latch between the PCBA and front cover in place.

5. Install the Power key and Volume key, and snap the front and rear covers.

6. Install the four screws into the rear cover.

7. Install the battery cover.

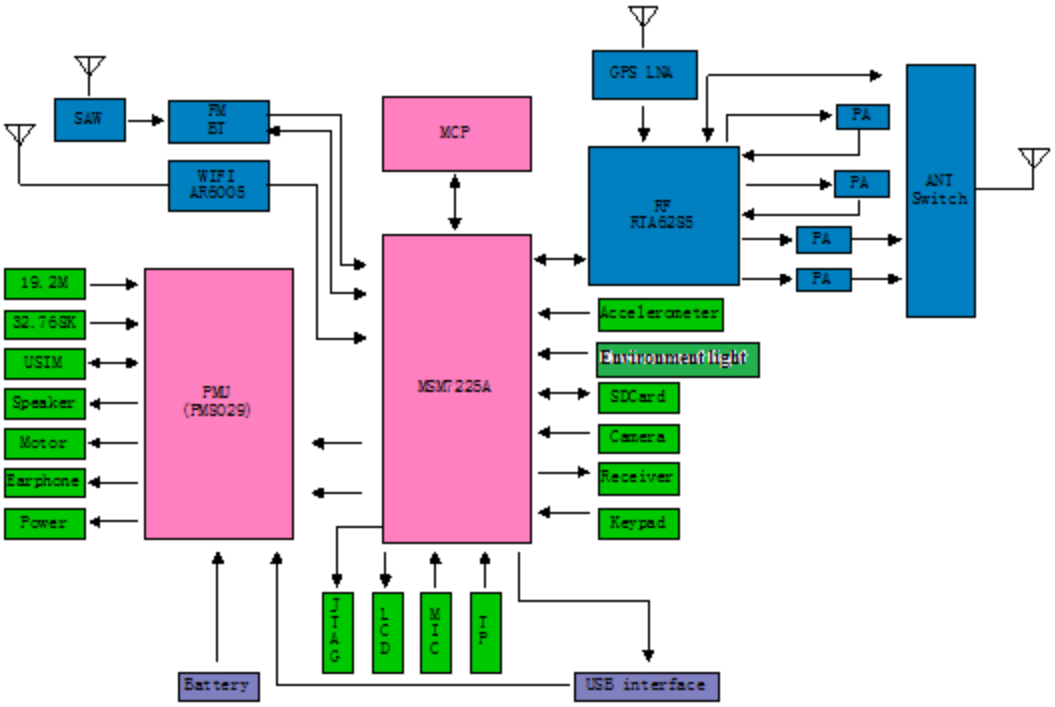
8. The phone is now assembled.

9 Principles and Failure Analysis

Before repairing a phone, ensure that the failure of the phone is not caused by environmental factors or incorrect functional settings. It is recommended that you restore the phone to its factory settings.

9.1 Block Diagram

Figure 9-1 U8185 block diagram



HD1U8185M.pdf

The MSM7X2XA (the U8185 uses the MSM7225A) is the baseband signal processing chip, mainly responsible for processing the input and output of IMAGE, VIDEO, AUDIO, RF INTERFACES, and CONECTIVITY signals. The baseband chip provides keypad, LCD, microSD card, Wi-Fi, camera, and microphone interfaces.

The PM8029 provides analog multi-channel switch, real-time clock circuit, TCXO clock circuit, motor driver circuit, and programmable current source.

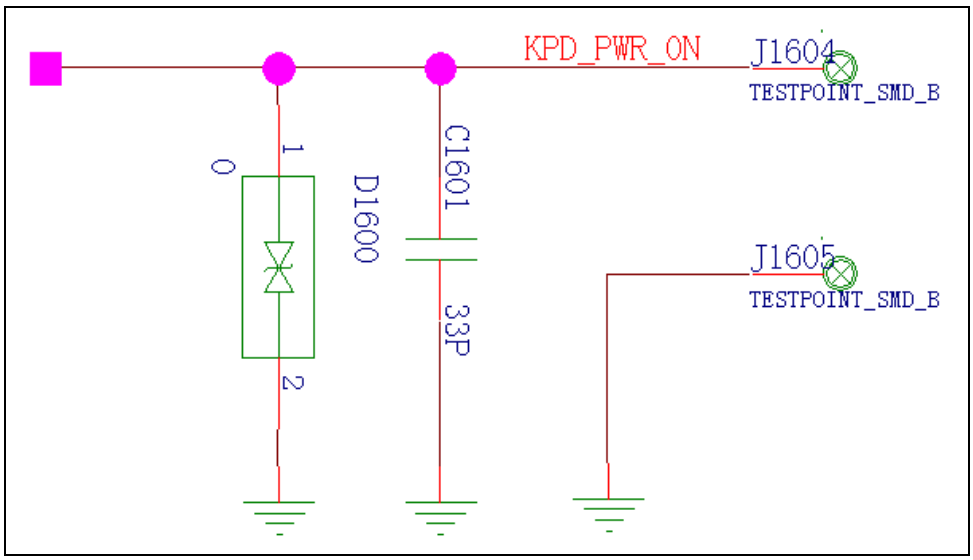
The RTR6285A is the RF signal processing chip, responsible for converting uplink/downlink RF signals.

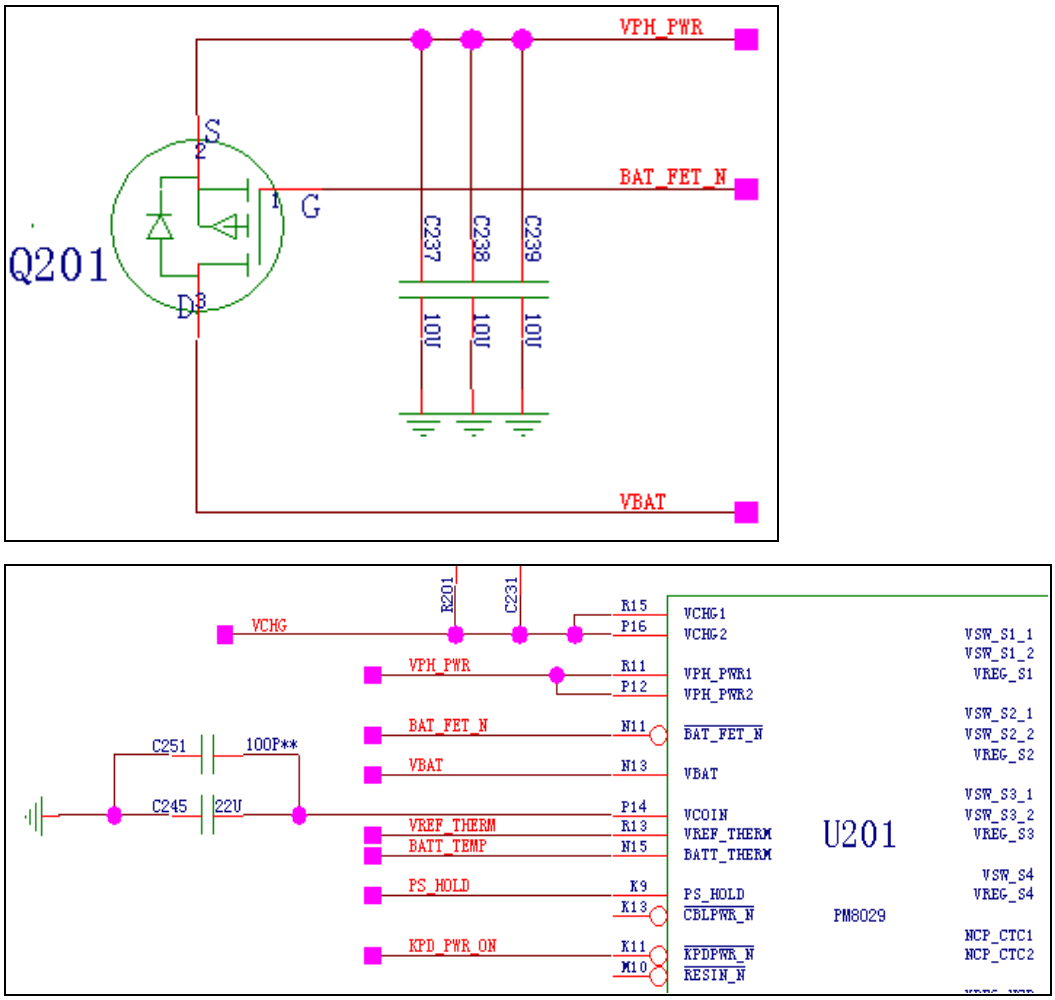
The PCBA can be divided into four sub-systems: baseband, RF, power supply, and user interfaces.

9.2 Baseband Unit

9.2.1 Power-on Management Circuits

Figure 9-2 Circuit schematic diagram





Analysis

After the Power key is pressed, the phone powers on. VHP_PWR (main power voltage) powers the PM8029. The power management chip then provides the voltages listed in the following table.

Type/name [1]	Default conditions [5] OPT_1 = GND	Operating range	Intended use [6]
SMPS – Buck			
S1 (1.2 A)	On, 1.100 V	0.750 to 3.050 V	Processor core
S2 (1.2 A)	On, 1.100 V	0.750 to 3.050 V	Application processor
S3 (800 mA)	On, 1.800 V	0.750 to 3.050 V	Digital pads and EBI
S4 (800 mA)	Off, 2.350 V	0.750 to 3.050 V	High-voltage RF circuits
Linear – 300 mA			
L1 (PMOS)	Off, 2.100 V	1.500 to 3.050 V	RF front-end circuits
L2 (PMOS)	Off, 2.100 V	1.500 to 3.050 V	RF front-end circuits
L7 (PMOS) [6]	On, 2.600 V	1.500 to 3.050 V	RF analog circuits and headphone amp
L12(PMOS)	On, 2.850 V	1.500 to 3.050 V	Camera, LCD, and touch screen circuits
L13 (PMOS)	Off, 2.850 V	1.500 to 3.050 V	Secure digital circuits
L17 (PMOS)	Off, 3.000 V	1.500 to 3.050 V	Wireless connectivity circuits
Linear – 150 mA			
L3 (NMOS)	On, 1.200 V	0.750 to 1.525 V	MIPI DSI circuits
L4 (NMOS)	On, 1.100 V	0.750 to 1.525 V	Digital PLLs
L5 (NMOS)	Off, 1.300 V	0.750 to 1.525 V	Wireless connectivity circuits
L6 (NMOS)	Off, 1.200 V	0.750 to 1.525 V	Wireless connectivity circuits
L9 (PMOS)	On, 1.800 V	1.500 to 3.050 V	TCXO_OUT_D0 buffer, low V USB circuits, MIPI CSI
L10 (PMOS)	On, 3.000 V	1.500 to 3.050 V	eMMC
L14 (PMOS)	On, 3.075 V	1.500 to 3.400 V	High voltage USB circuits
L15 (PMOS)	Off, 1.800 V	1.500 to 3.050 V	USIM2/UICC2 circuits
L16 (PMOS)	Off, 1.800 V	1.500 to 3.050 V	USIM1/UICC1 circuits
L18 (PMOS)	Off, 2.700 V	1.500 to 3.050 V	RF analog circuits
L19 (PMOS)	Off, 1.200 V	1.200 to 3.050 V	Wireless connectivity circuits
Linear – 50 mA			
L8 (PMOS) [2, 3]	On, 2.850 V	1.500 to 3.050 V	VCTCXO circuits and buffers and D flip-flop
L11 (PMOS) [3]	On, 1.800 V	1.500 to 3.050 V	TCXO_OUT_D1 buffer, AMUX, and XO ADC circuits
NCP (200 mA) [4]	Off, -1.800 V	-1.700 to -1.900 V	Headphone circuits

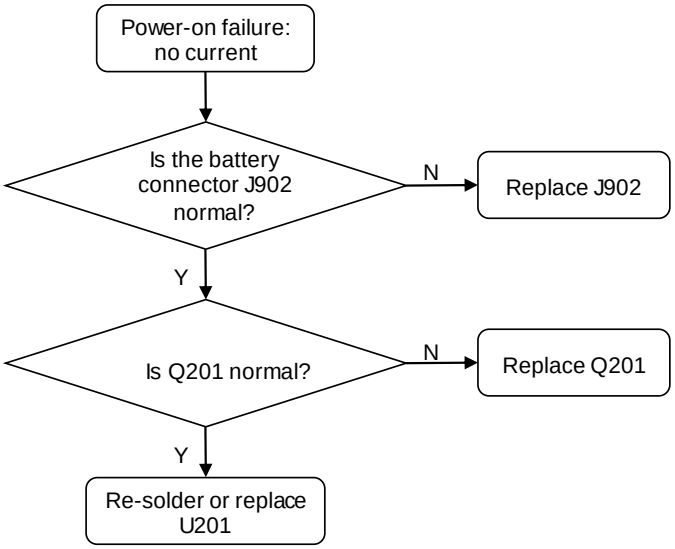
Troubleshooting Process

Fault symptom: power-on failure

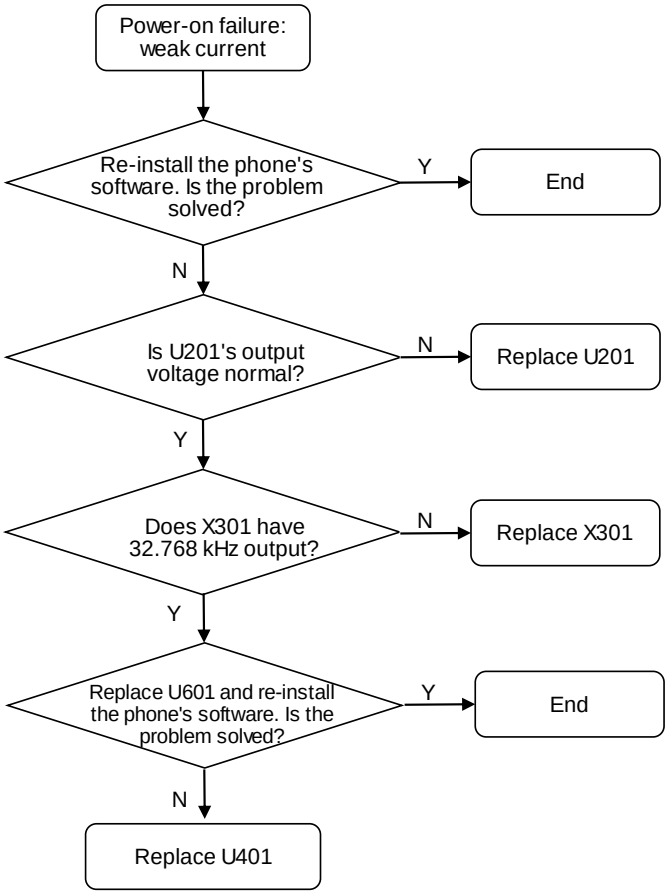
To troubleshoot the power-on failure, firstly check whether the I/O connector (battery connector) is damaged. If the I/O connector (battery connector) is not damaged, use a DC regulated power supply to supply power to the phone, and test the phone's current.

The power-on failure may be caused by any of the following conditions:

- No current

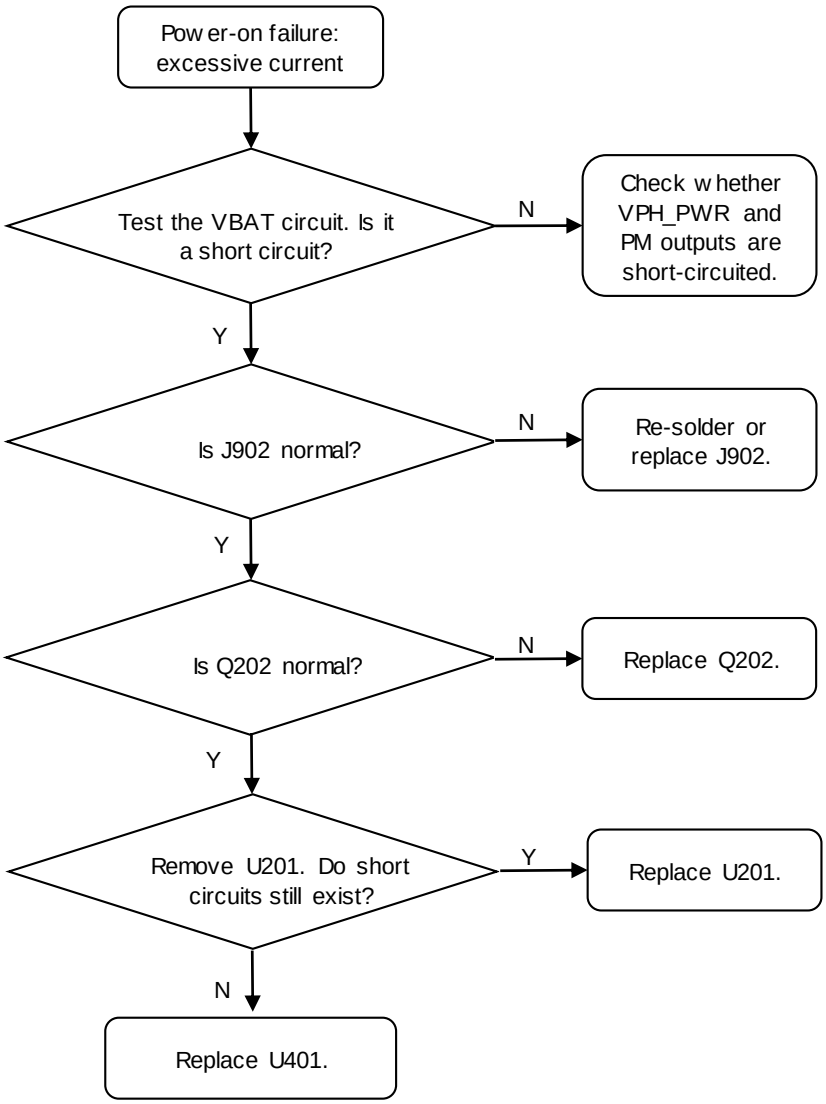


- Weak current



- Excessive current

Excessive current is caused by short circuits. When excessive current occurs, to prevent damage to components, do not connect the charger to the phone. Power-on failure due to excessive current is usually the result of short-circuited VBAT circuit.

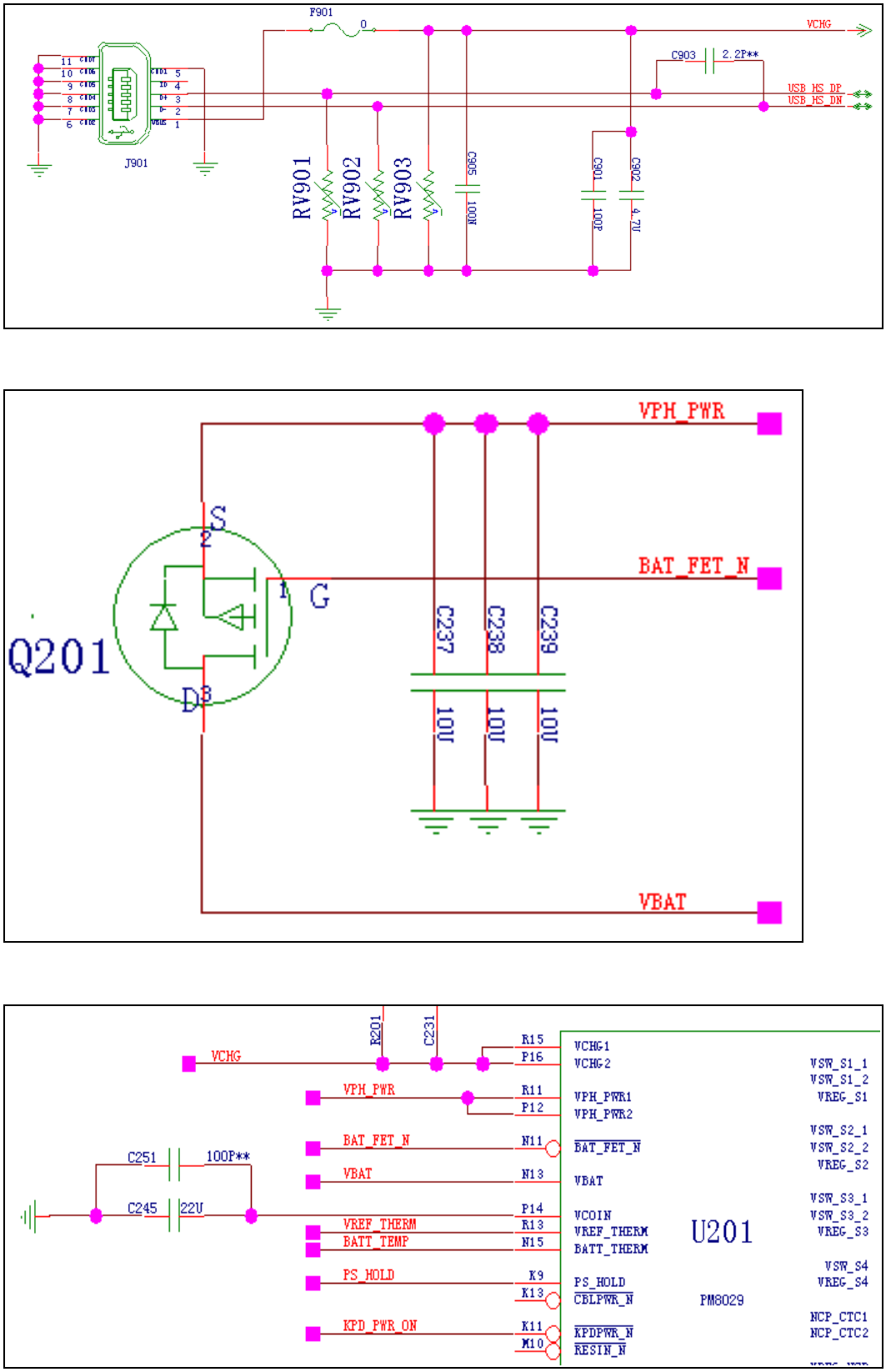


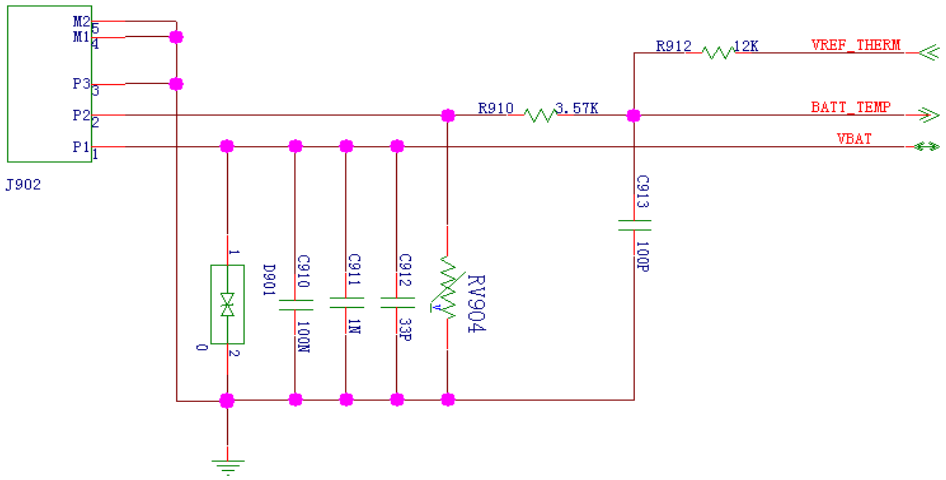
Circuit Diagram Signal Summary

See Table 9-1 in section 9.2.2 "Charging Management Circuits."

9.2.2 Charging Management Circuits

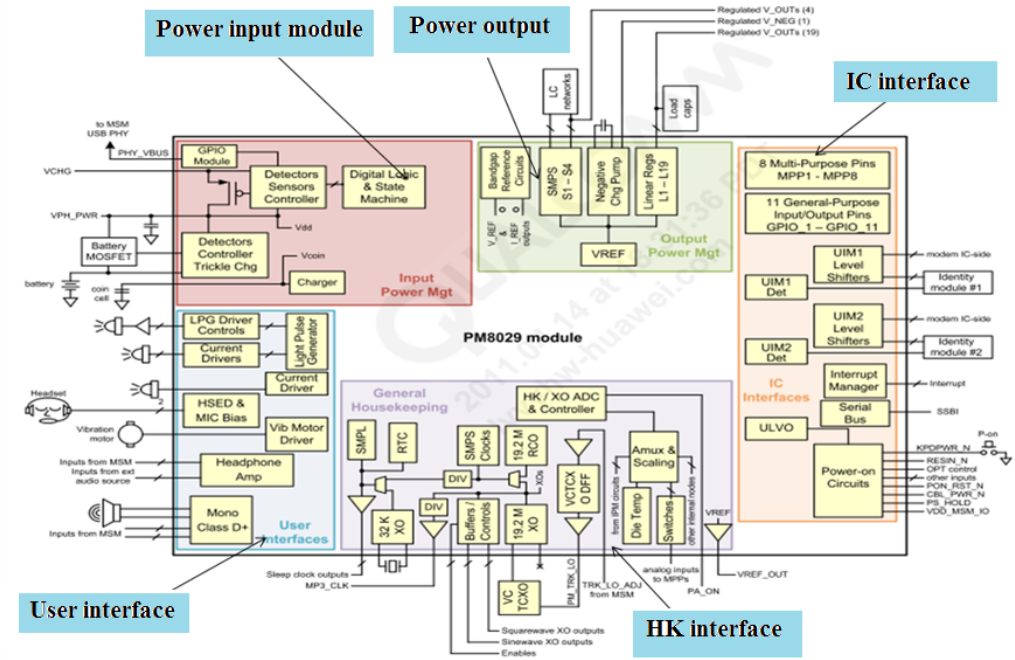
Figure 9-3 Circuit schematic diagram



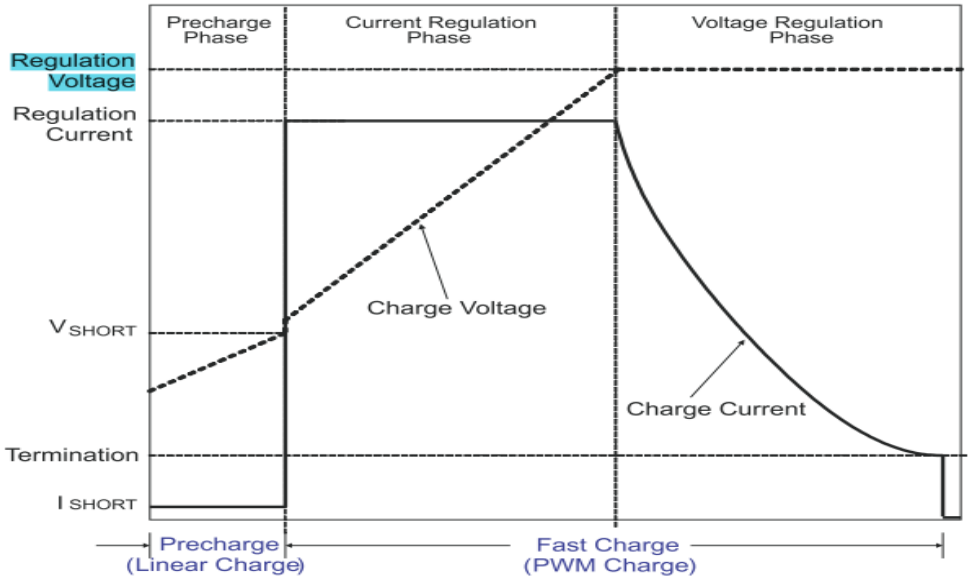


Analysis

The U8185 uses the PM8029 solution for its charging management. The following figure shows the internal structure of the PM8029. The PM8029 has three charging states: trickle charging, constant current charging, and constant voltage charging. A universal charging channel is used: VEXT_DC→VCHG→Q201, pin3→VBAT



External PMOS is controlled through BAT_FET_N to implement the charging functions including trickle charging, constant current charging, constant voltage charging, and pulsed charging. The following figure shows a common charging curve.

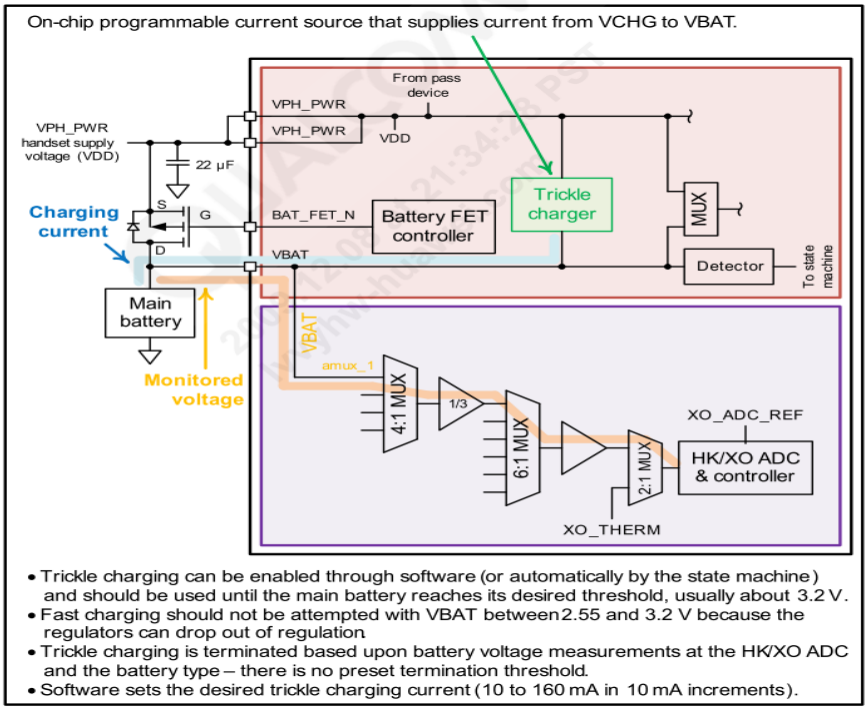


The PM8029 checks the pin voltage of VCHG. If the voltage meets the requirements listed in the following table, the PM8029 notifies the MSM by generating the ITCHGVAL interrupt. When VCHG–VDD is lower than 100 mV, the PM8029 shuts off its internal transistor, deems the power supply as disconnected, and generates an interrupt.

Parameter	Comments	Min	Typ	Max	Units
Lower valid threshold [1]					
Rising, entering valid range		3.201	3.300	3.399	V
Falling, leaving valid range		2.910	3.000	3.090	V
Upper valid threshold [1]		6.860	7.000	7.140	V
Poweron threshold [2]		1.0	–	–	V
Hysteresis	At min and max thresholds	270	300	330	mV
Removal detection offset	V_{CHG} - V_{BAT}	20	30	40	mV

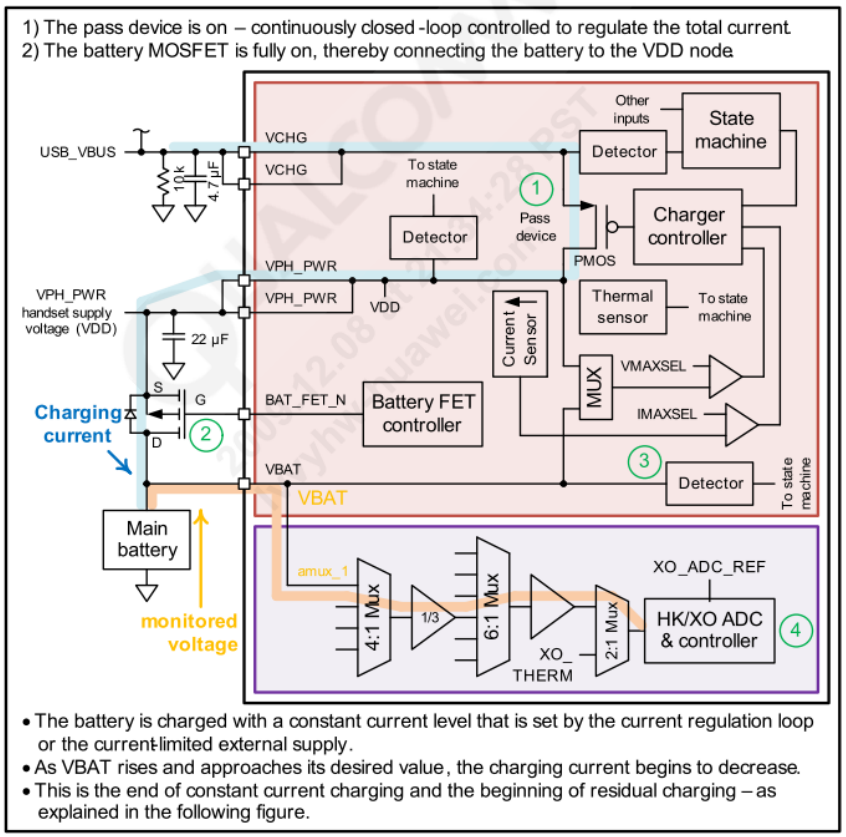
The PM8029 detects the charger to select power input mode and switch between charger and battery modes. If V (VCHG) > V (B+), the charger voltage is higher than the battery voltage and the pass transistor is enabled. The phone is then powered by the charger. If V (VCHG) ≤ V (B+), the battery voltage is higher than the charger voltage and the pass transistor is disabled. The phone is then powered by the battery. To disable the phone to automatically switch to use the charger power, you can configure the phone software. VCHG is grounded by connecting in parallel with a 47 k resistor and a 4.7 uf capacitor. If no charger is connected to the phone, the resistor can pull VCHG to 0 V to make sure that the charger is detected as not connected. The parallel connected capacitor protects the EMC, provides linear filter, and ensures circuit stability.

- Trickle charging



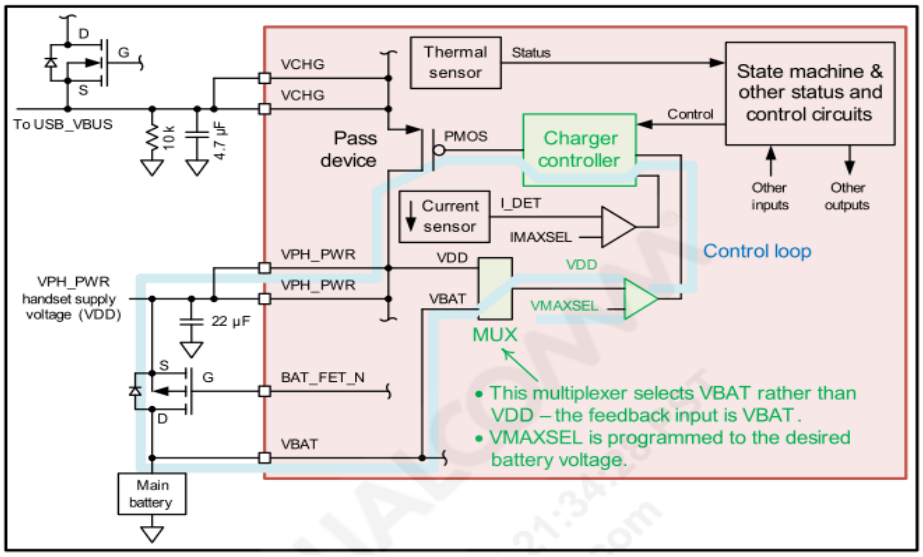
If the battery is fully discharged, Vbat < Vweak and the typical voltage is 3.2 V. To protect the VDD from being pulled down, trickle charging is performed.

- Constant current charging



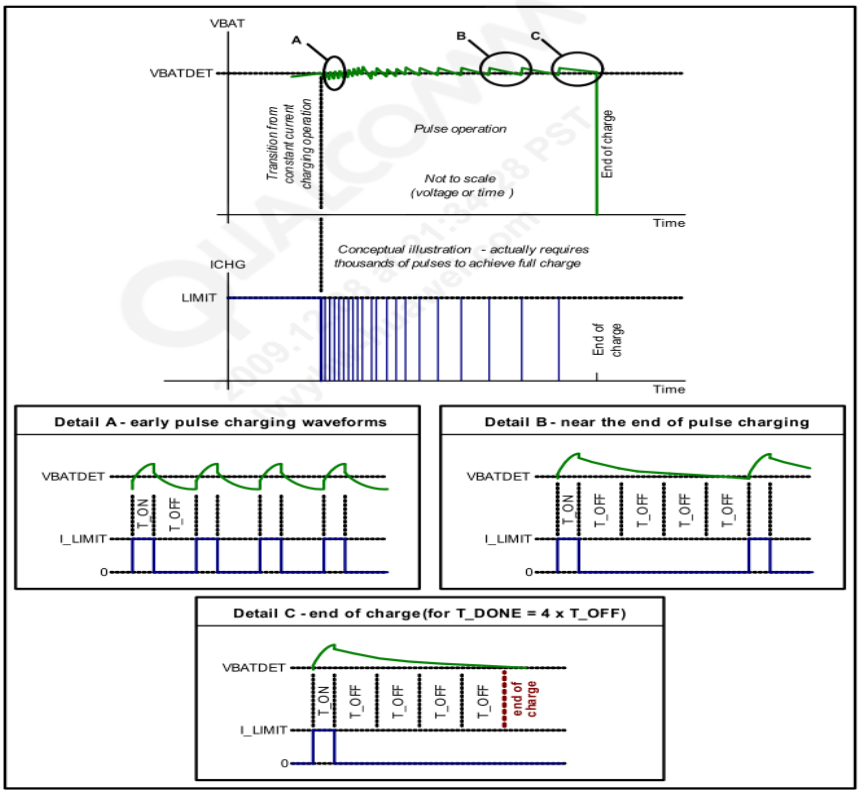
When Vweak < Vbat < Vmax (typical value: 3.2–4.2 V), constant current charging is performed. The charging current remains unchanged. When VBAT reaches Vmaxsel, the charging current decreases and the constant current charging is complete.

- Constant voltage charging



During constant voltage charging, the VDD voltage remains unchanged. When Vbat is equal to Vmaxsel and the charging current is lower than the threshold, the charging is complete.

- Pulsed charging



Compared with constant voltage charging, pulsed charging performs better in charging accuracy, charging speed, and efficiency. The software enables or disables the transistor to charge the battery.

Troubleshooting Process

There are two types of common charging failures:

- The phone does not respond when a charger is connected to it.
- A charging indicator is displayed after a charger is connected to the phone but the phone cannot be charged.

To troubleshoot charging failure, firstly check whether the battery connector is damaged.

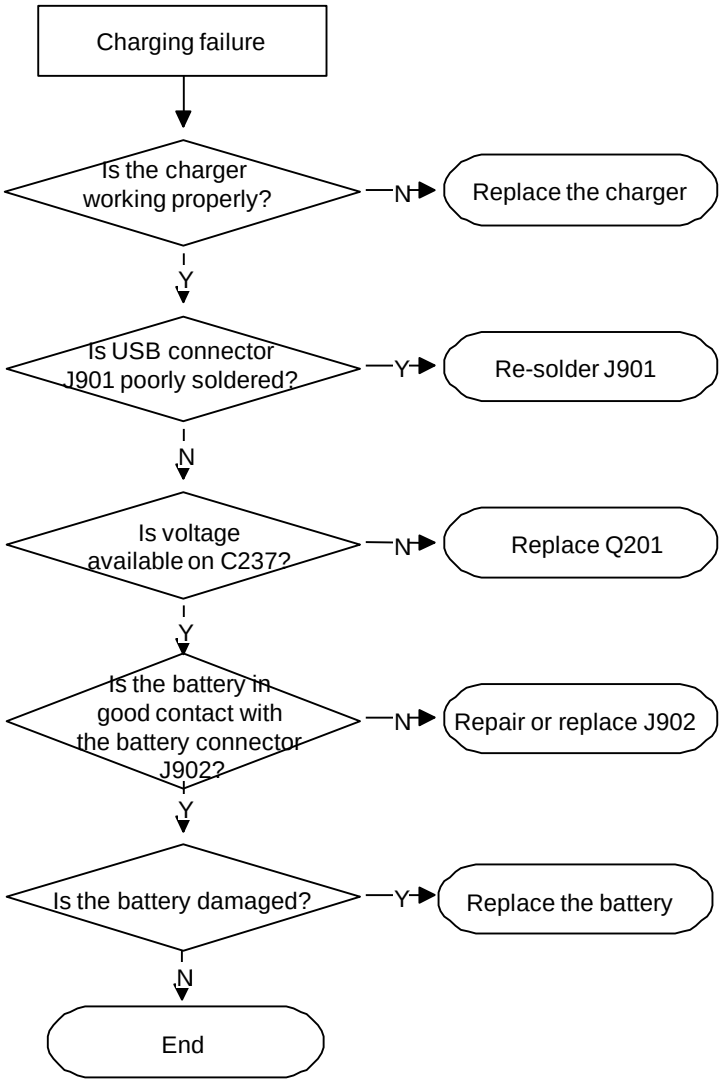


Table 9-1 Circuit diagram signal summary

Signal	Description	Reference Measurement or Wave Form
VCHG	• Charging current input from a charger • Used for detecting the connection of a charger	Detection range: 0–18 V
VPH_PWR	Main power supply, supplying power to the main chip's power unit	Voltage range: 0–4.2 V
BAT_FET_N	Control signal of the MOS (Q201)	
VBAT	Input end for battery voltage detection and output end for trickle charging.	Battery voltage, range: 0–4.2 V
VCOIN	• Backup power supply, NC • When sudden loss of power occurs, the backup power supply (if any) will supply power to the phone until the main battery power recovers, so that the phone will not shut down.	None.
BATT_THERM	• Battery temperature detection. • Detects the voltage of the thermistor inside the battery to determine the battery's temperature.	Cd
VREG_S1	Supplies power to the processor core.	1.1 V
VREG_S2	Supplies power to the MSM application processor.	1.1 V
VREG_S3	Supplies power to the memory and digital I/O.	1.8 V
VREG_S4	Supplies power to the RF and analog section.	2.35 V
VREG_L1	NC	
VREG_L2	Supplies power to the RF's front end.	
VREG_L3	Supplies power to the MIPI DSI circuit.	
VREG_L4	Supplies power to the digital PLL.	
VREG_L5		
VREG_L6	NC	
VREG_L7	Supplies power to the MSM's analog section.	
VREG_L8	TCXO power supply; controlled by internal TCXO.	2.85 V
VREG_L9	Supplies power to the MIPI CSI circuit.	
VREG_L10		
VREG_L11	Supplies power to the eMMC module on the MSM.	
VREG_L12	Supplies power to the TCXO_OUT_D1 buffer, AMUX, and XO ADC circuits.	
VREG_L13	Supplies power to the SD circuit.	

Signal	Description	Reference Measurement or Wave Form
VREG_L14		
VREG_L15	Supplies power to the camera.	
VREG_L16	Supplies power to the UIM card.	
VREG_L17	Supplies power to the Bluetooth and Wi-Fi modules.	
VREG_L18	Supplies power to the RTR6285A.	
VREG_L19	Supplies power to the AR6005 Wi-Fi module.	1.8 V

9.2.3 Clock Circuit

Circuit Schematic Diagram

Figure 9-4 32.768 kHz clock

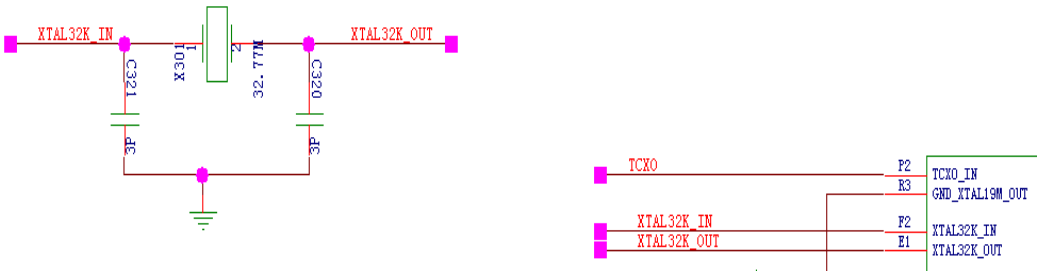
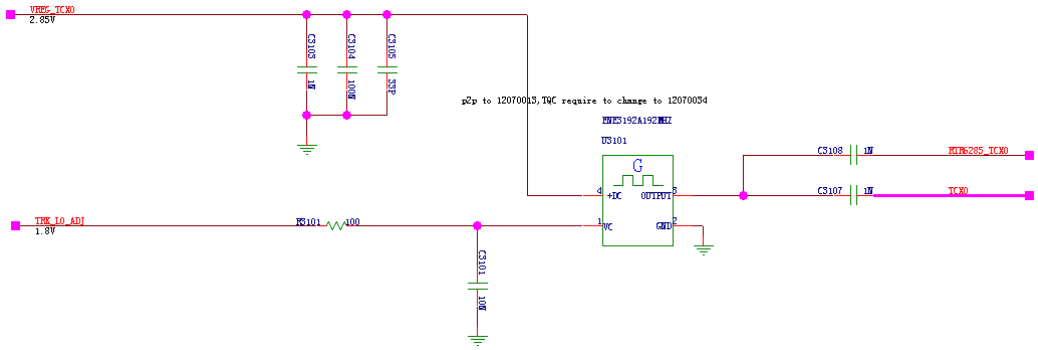
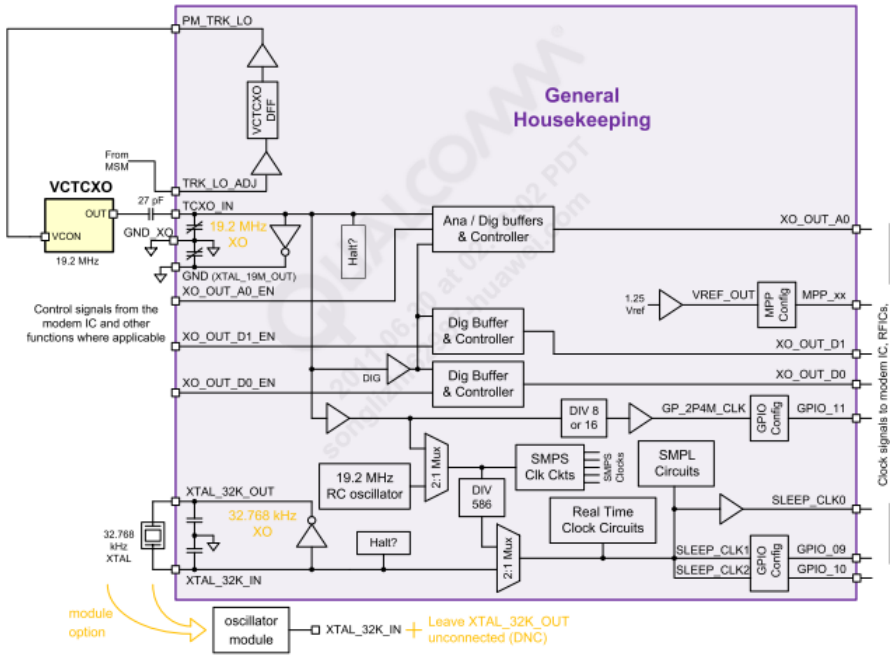


Figure 9-5 19.2 MHz system clock



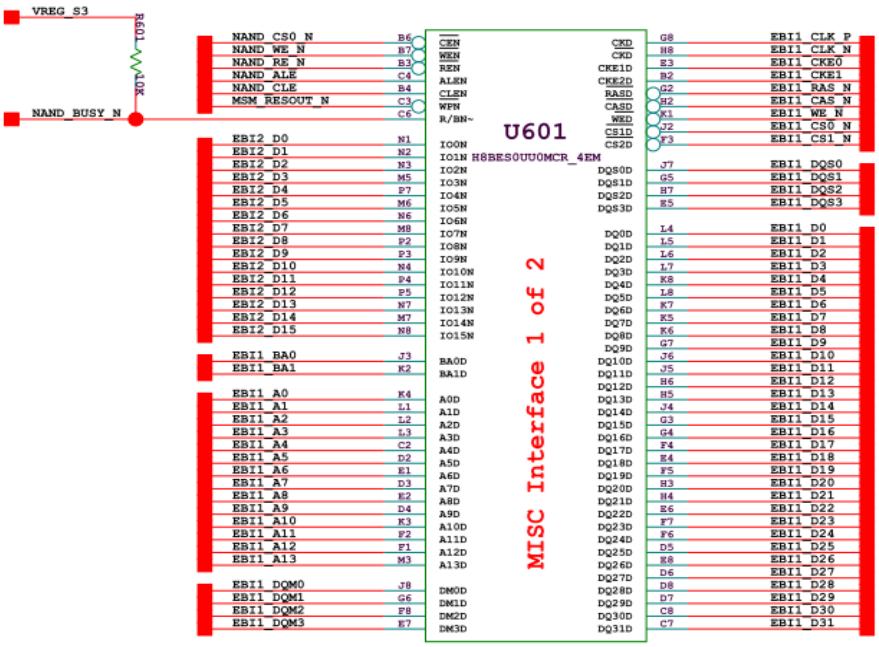
Analysis

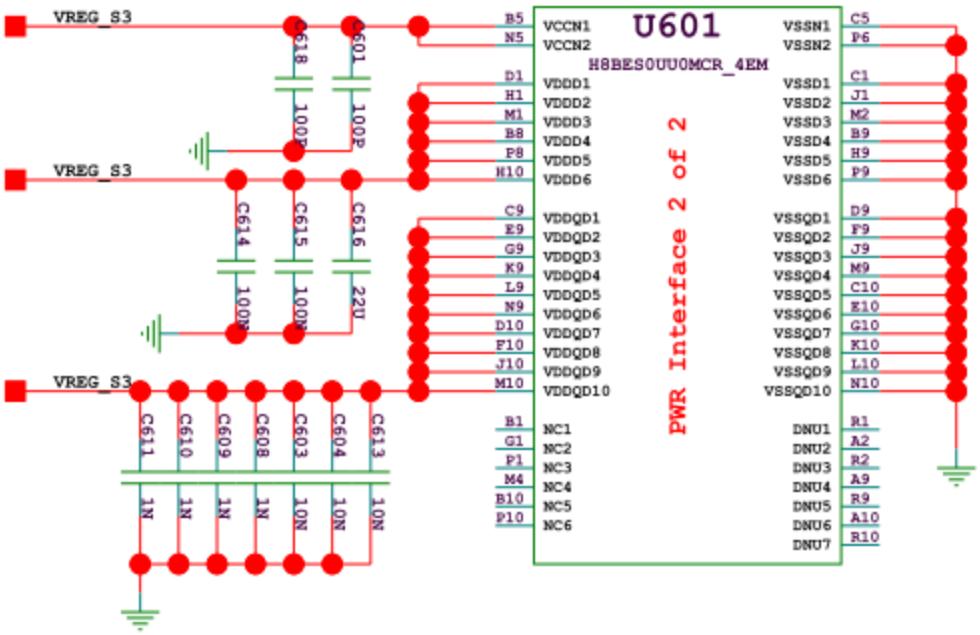


The crystal oscillator generates the 19.2 MHz clock as the system clock, and the crystal X301 generates the 32.768 kHz clock, as shown in the preceding figure.

9.2.4 Memory Circuit

Figure 9-6 Circuit schematic diagram





Analysis

The memory is NUMONNYX's MCP storage chip including 4 GB (256 MB x 16) NAND flash and 2 GB (64 MB x 32) mobile DDR SDRAM. The memory provides space for the storage of codes, file system, and data and program running. The MCP memory and the MSM7225A are connected with the data bus, address bus, and control signal cable.

Troubleshooting Process

Failure symptom: The phone cannot be powered on, or the power-on current is less than 100 mA.

Solution: Upgrade or load the phone's software, and check whether the Flash VREG_MSME1 voltage and peripheral components are normal. If the problem persists, replace the U601.

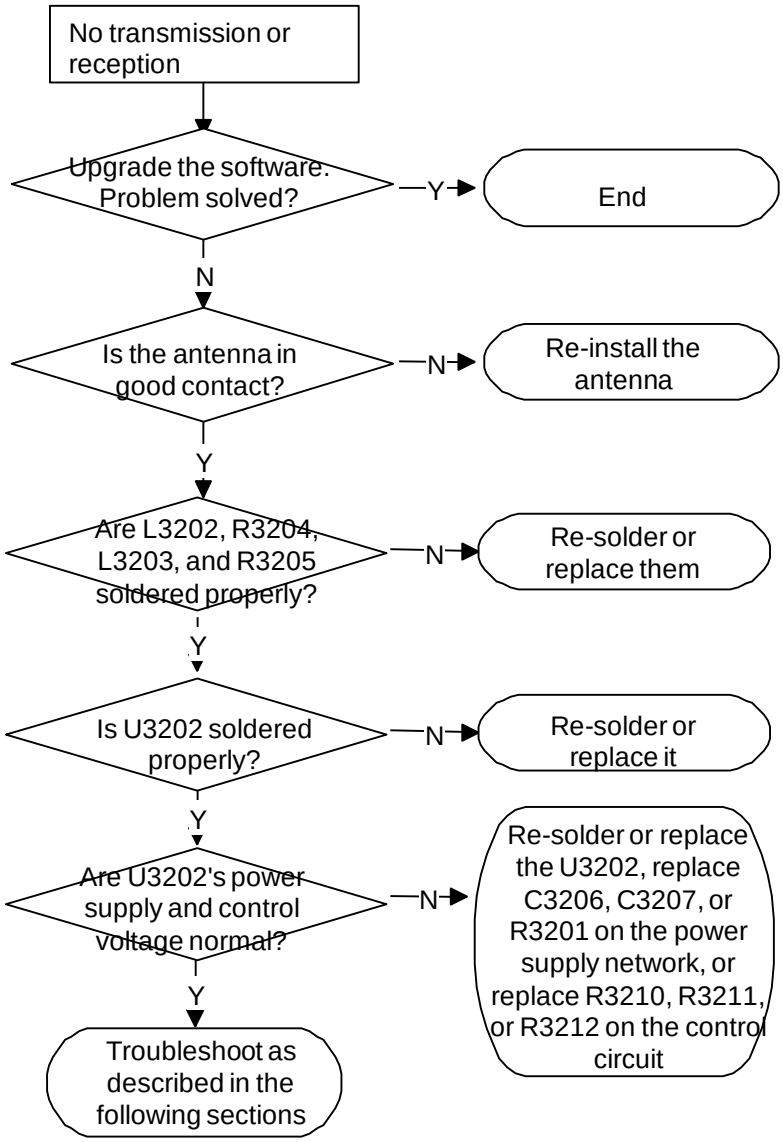
Table 9-2 Circuit diagram signal summary

Signal	Description	Reference Measurement or Wave Form
VREG_S3	Power supply	1.8 V
NAND_CS0_N	Enable pin for the flash chip; valid when at low level	None.
NAND_RE_N	Flash read enable; valid when at low level	None.
NAND_WE_N	Flash write enable; valid when at low level	None.
NAND_CLE	Flash command latch enable	None.

Signal	Description	Reference Measurement or Wave Form
NAND_ALE	Flash address latch enable	None.
NAND_BUSY_N	Ready/Busy output	None.
EBI2_D0~EBI2_D15	Flash data input and output	None.
EBI1_WE_N	DDR write enable; valid when at low level	None.
EBI1_RAS_N	DDR row address select; valid when at low level	None.
EBI1_CAS_N	DDR column address select; valid when at low level	None.
EBI1_CS0_N/ EBI1_CS1_N	DDR chip select signal; valid when at low level	None.
EBI1_CKE0/ EBI1_CKE1	DDR clock enable signal	None.
EBI1_CLK_P/ EBI1_CLK_N	DDR differential clock	None.
EBI1_DQS0~ EBI1_DQS3	DDR data select	None.
EBI1_DQM0~ EBI1_DQM3	Input data mask	None.
EBI1_BA0~ EBI1_BA1	DDR bank address	None.
EBI1_A0~ EBI1_A13	DDR address input	None.
EBI1_D0~ EBI1_D31	DDR data input and output	None.

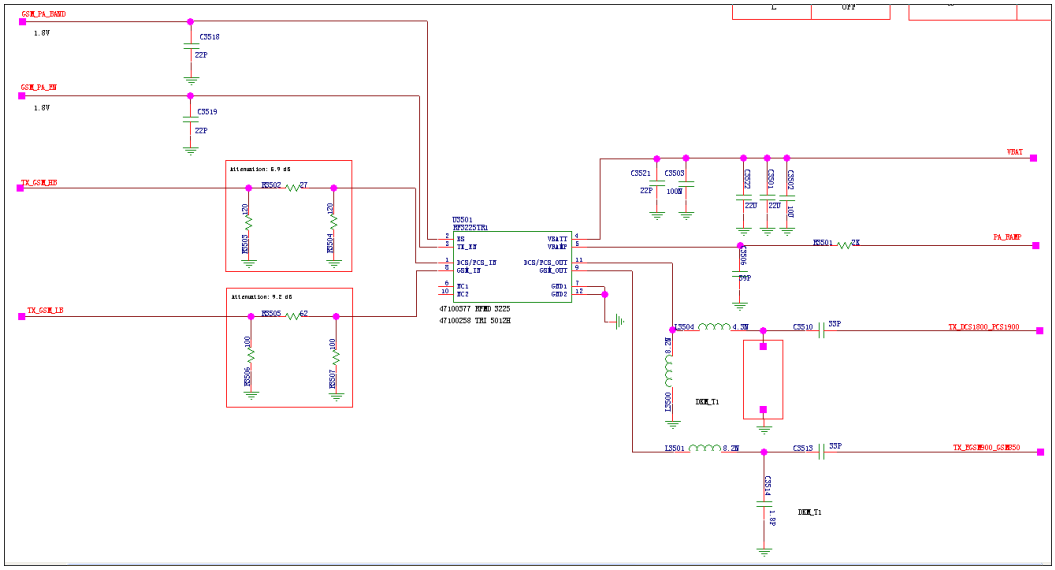
9.3 RF Unit

The RF unit transmits signals between the baseband and the antenna. If any problem occurs during transmission and reception, troubleshoot according to the following flowchart.



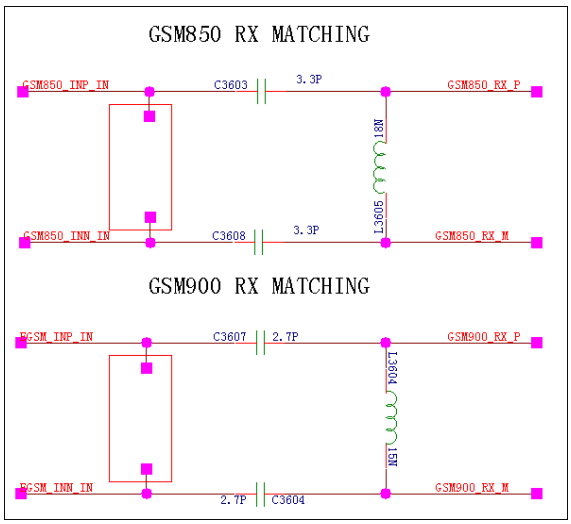
9.3.1 GSM Quad Band Transception Circuit

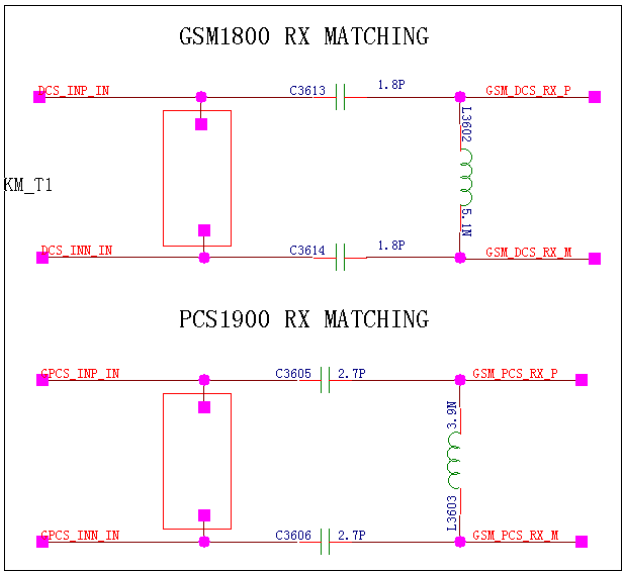
Figure 9-7 Transmitting circuit



The transmitting circuit includes the attenuation network and power amplifier. (The output end of the power amplifier is connected to the antenna switch. The antenna switch transmits signals to the antenna.) Transmission channel: I/Q signals from the CPU are amplified by the amplifier in the RF transmitter > I/Q signals are modulated by Quadrature Upconverter and become RF signals > Signals are amplified > Signals are output to the attenuation network from the RF transmitter > Signals are amplified by the power amplifier > Signals are transmitted out from the antenna switch after frequency switchover.

Figure 9-8 Receiving circuit



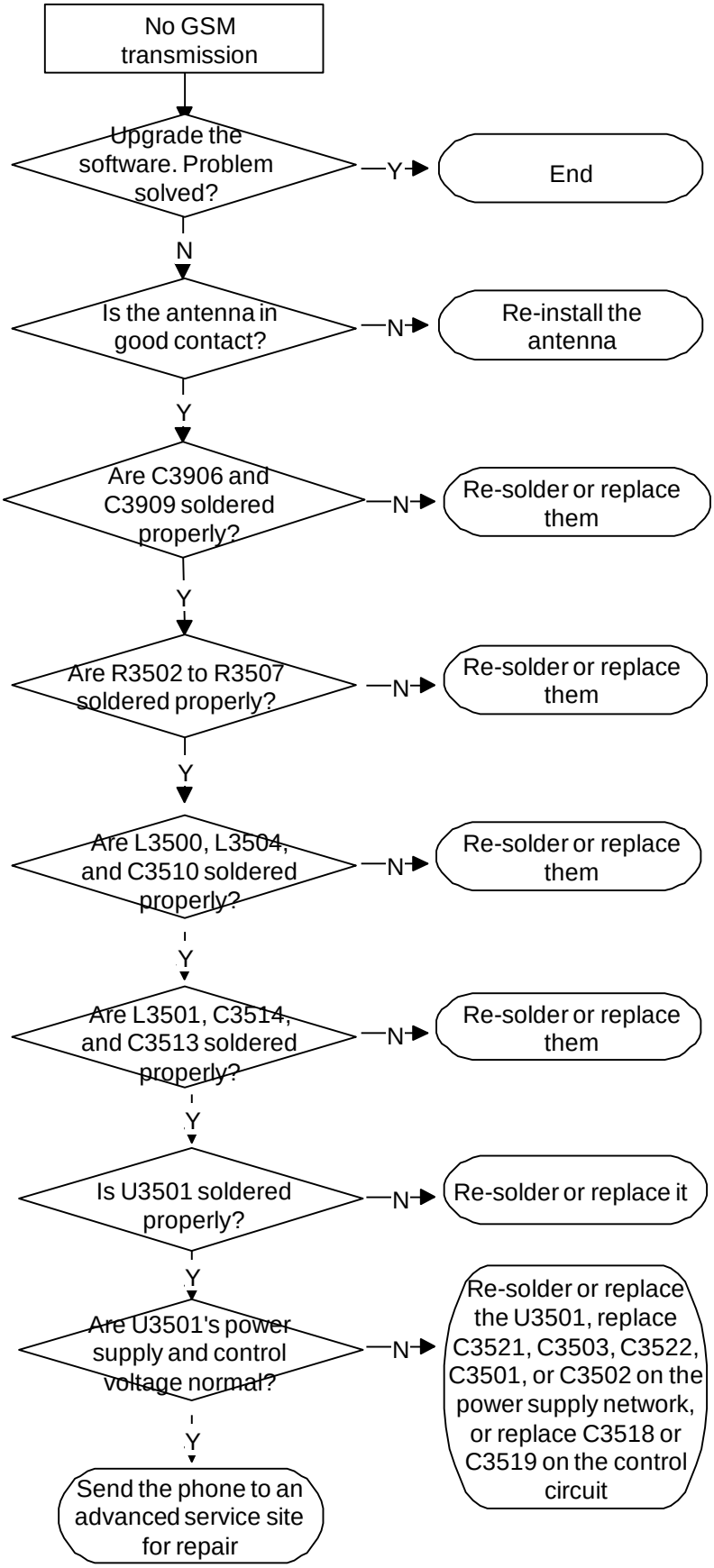


GSM quad band adopts differentiated reception to match the network.

Troubleshooting Process

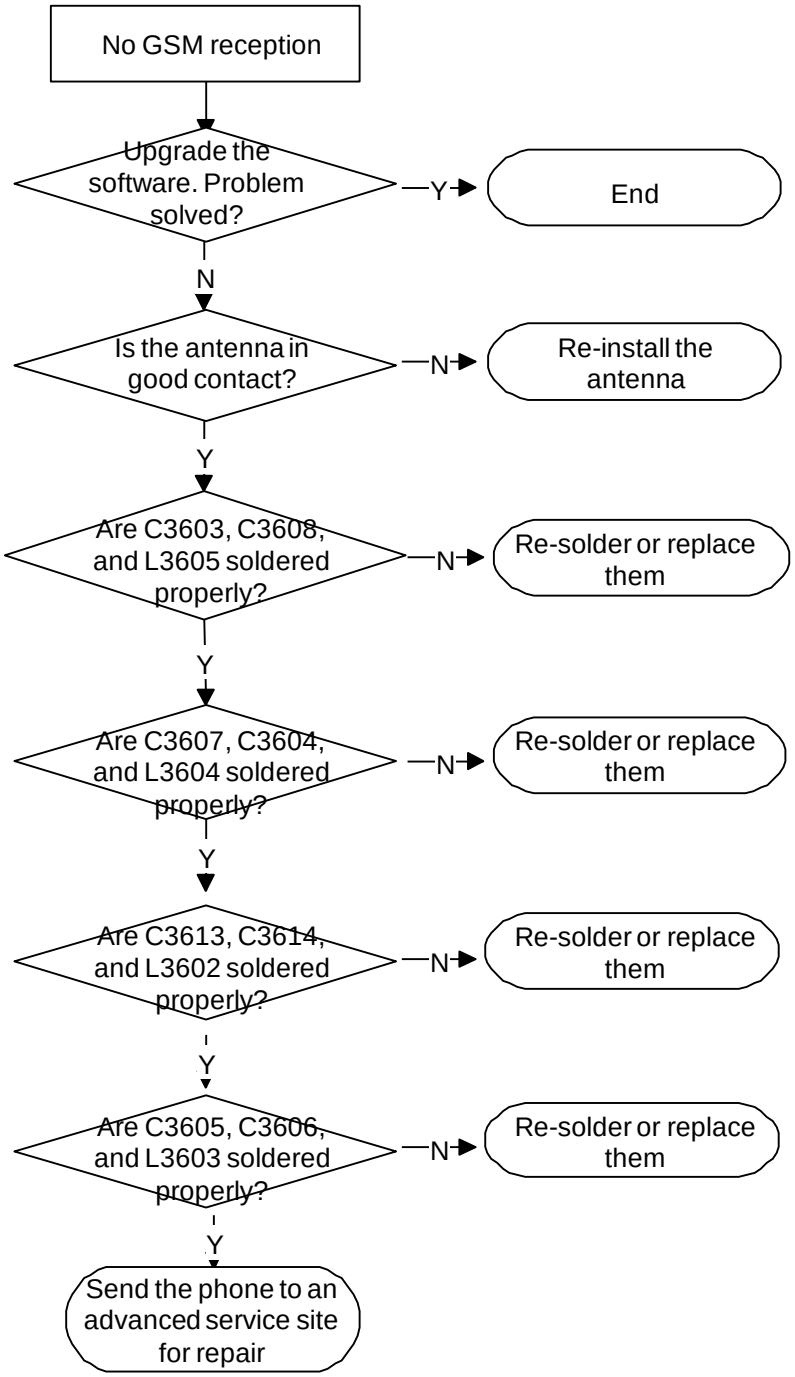
Failure: No transmission; the phone cannot initiate or receive a call.

Solution:



Failure: No reception; the phone cannot initiate or receive a call.

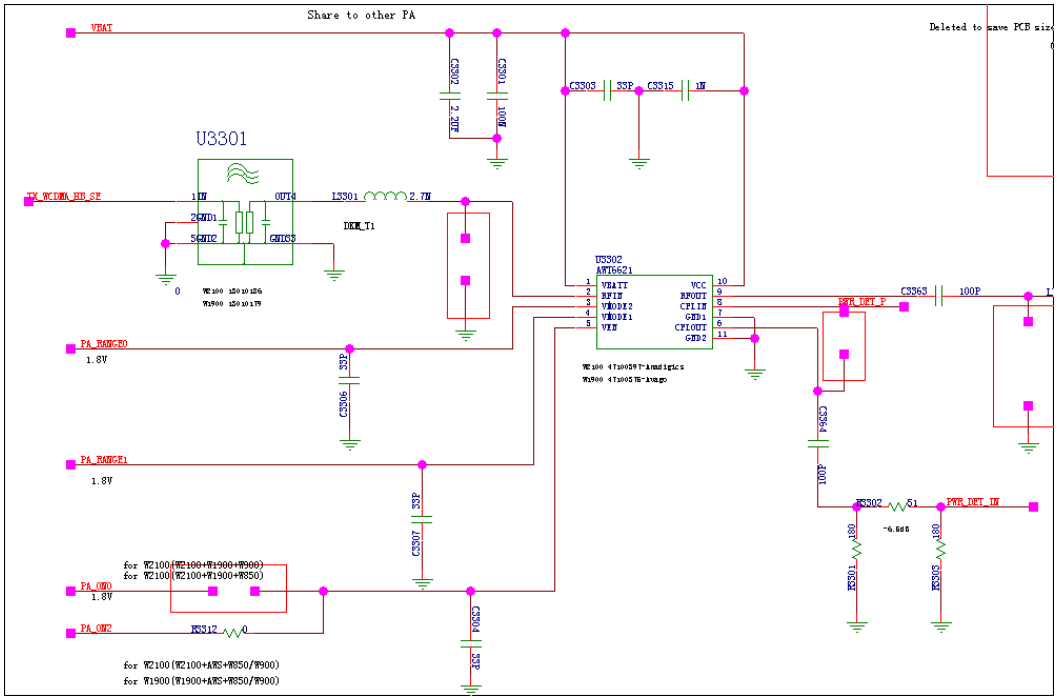
Solution:



9.3.2 WCDMA2100/1900 Transception Circuit

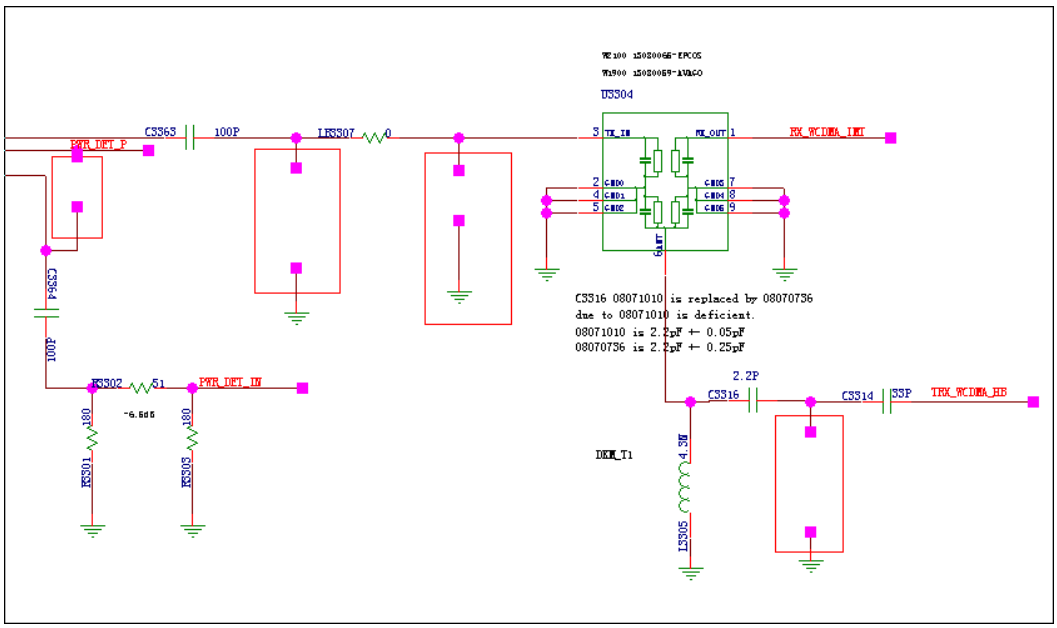
W2100/1900 RF transception circuit filter, PA, duplexer, and antenna switch

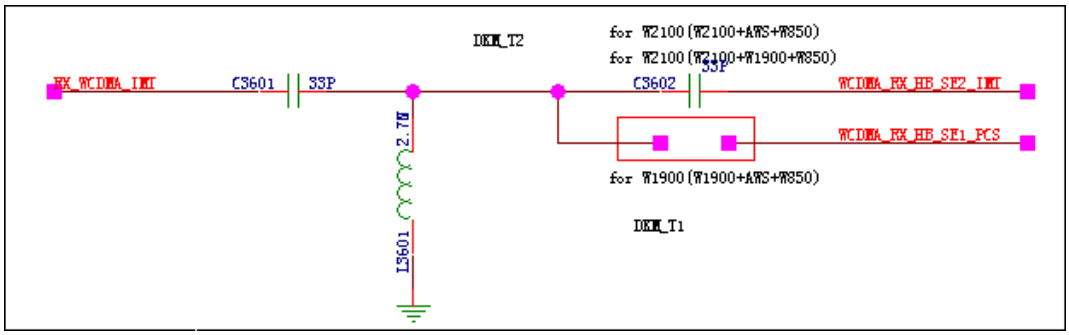
Figure 9-9 Transmitting circuit

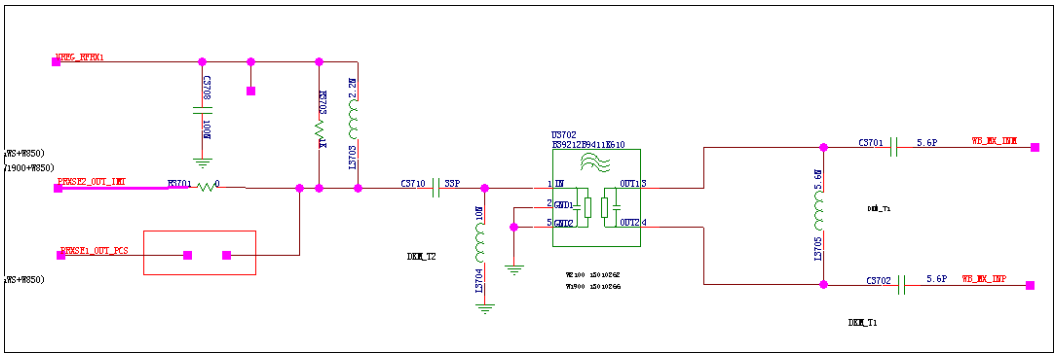


The main antenna receives and transmits RF signals. The duplexer separates the receiving and transmitting signals. The receiving signals are received from the ANT end of the duplexer and transmitted out from the Rx end; the transmitting signals are received from the Tx end and transmitted from the ANT end to the duplexer and then sent out through the antenna. The duplexer's Rx and Tx ends are isolated, preventing transmission signals from interfering to receiving signals and thereby affecting antenna sensitivity.

- Receiving circuit





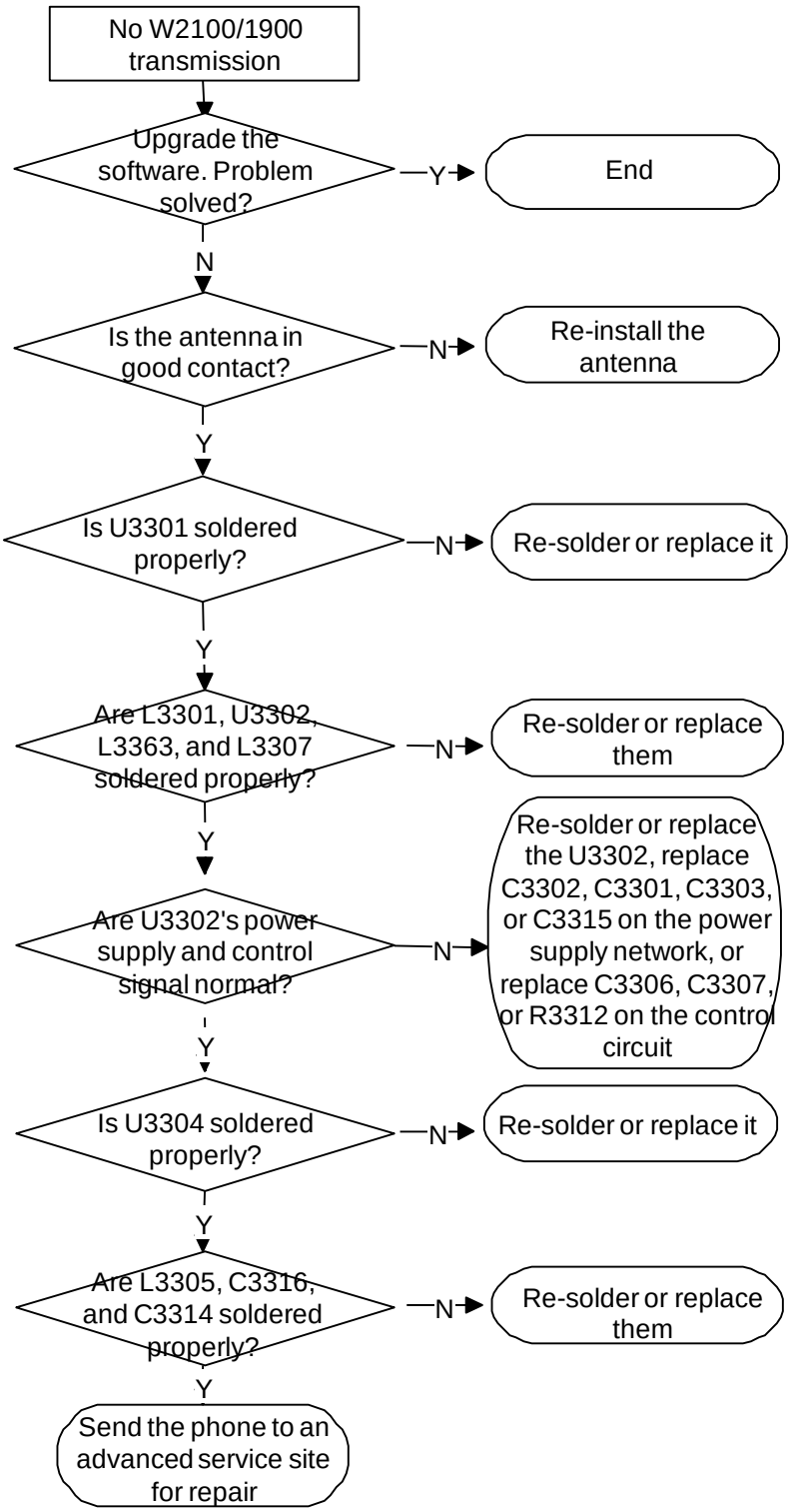


The reception channel includes the antenna, duplexer, RTR6285A's internal LNA and receiver, and external single-ended to differential filter. Reception channel: Signals are received from the antenna > After frequency selection and filtering on the duplexer, receiving signals are transmitted to the RF receiver > Signals are amplified by the LNA > Signals are processed by the single-ended to differential filter > Signals are amplified > Signals are modulated by Quadrature Downconverter and become I/Q signals > After analog-to-digital conversion (ADC), signals are transmitted to CPU for processing.

Troubleshooting Process

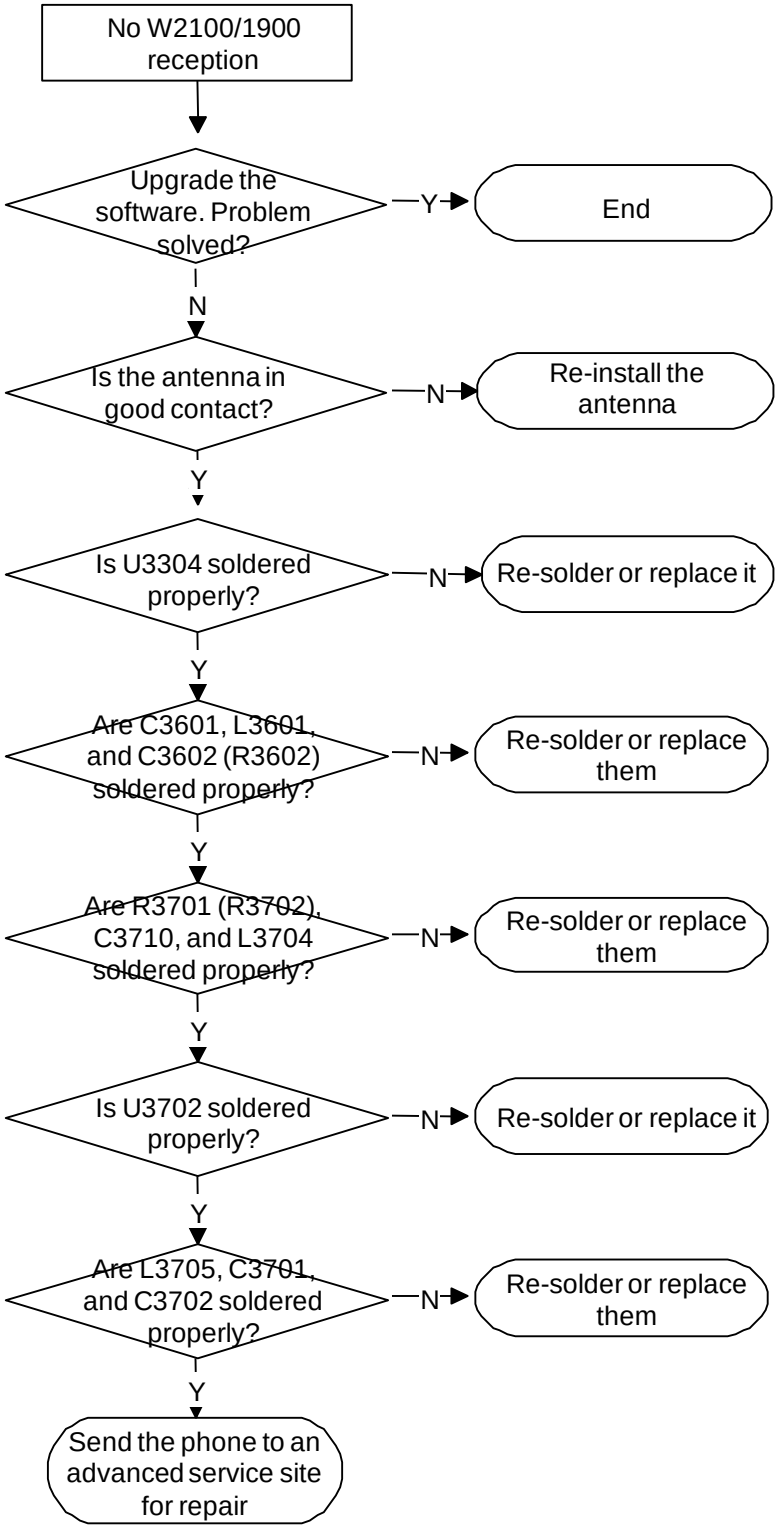
Failure: No transmission; the phone cannot initiate or receive a call, or access the network.

Solution:



Failure: No reception; the phone cannot initiate or receive a call, or access the network.

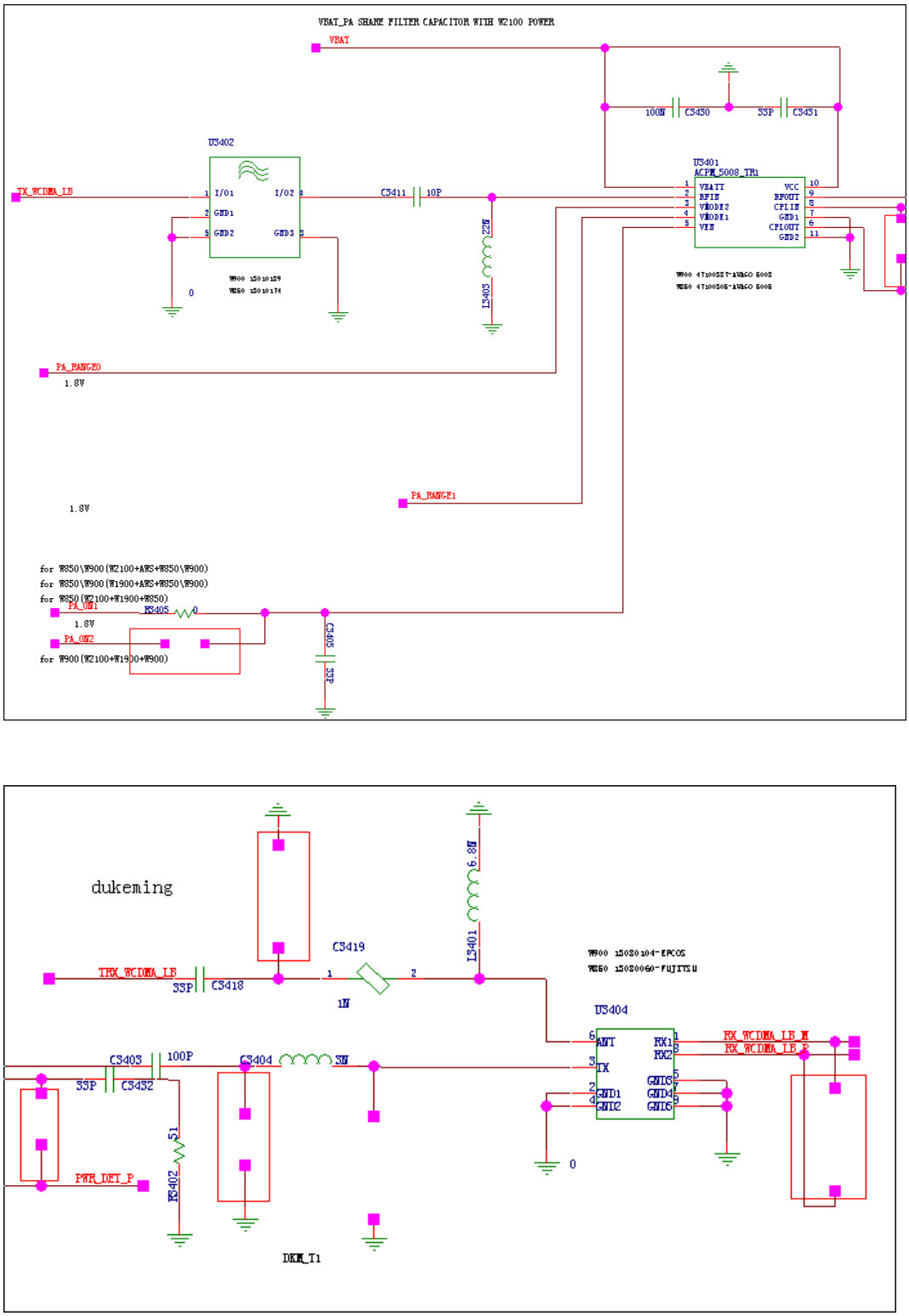
Solution:



9.3.3 W900/850 Transception Circuit

W900/850 RF transception circuit filter, PA, duplexer, and antenna switch

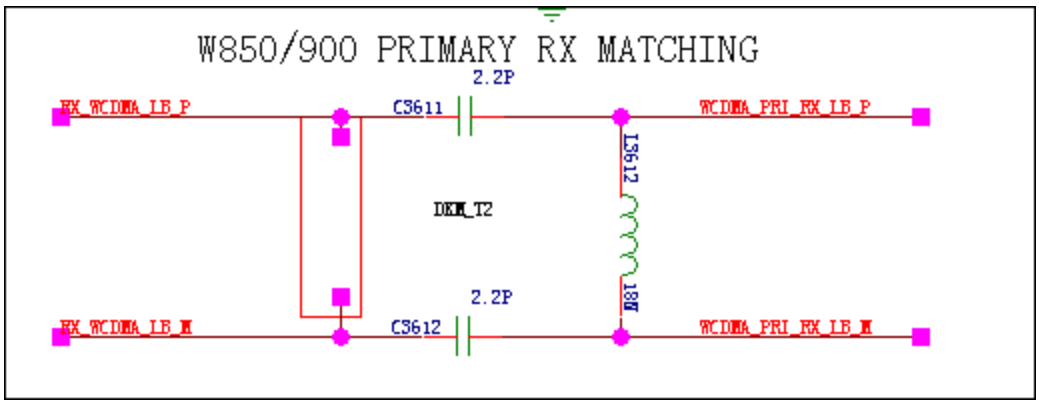
Figure 9-10 Transmitting circuit



The main antenna receives and transmits RF signals. The duplexer separates the receiving and transmitting signals. The receiving signals are received from the ANT end of the duplexer and transmitted out from the Rx end; the transmitting signals are received from the Tx end and

transmitted from the ANT end to the duplexer and then sent out through the antenna. The duplexer's Rx and Tx ends are isolated, preventing transmission signals from interfering to receiving signals and thereby affecting antenna sensitivity.

Figure 9-11 Receiving circuit

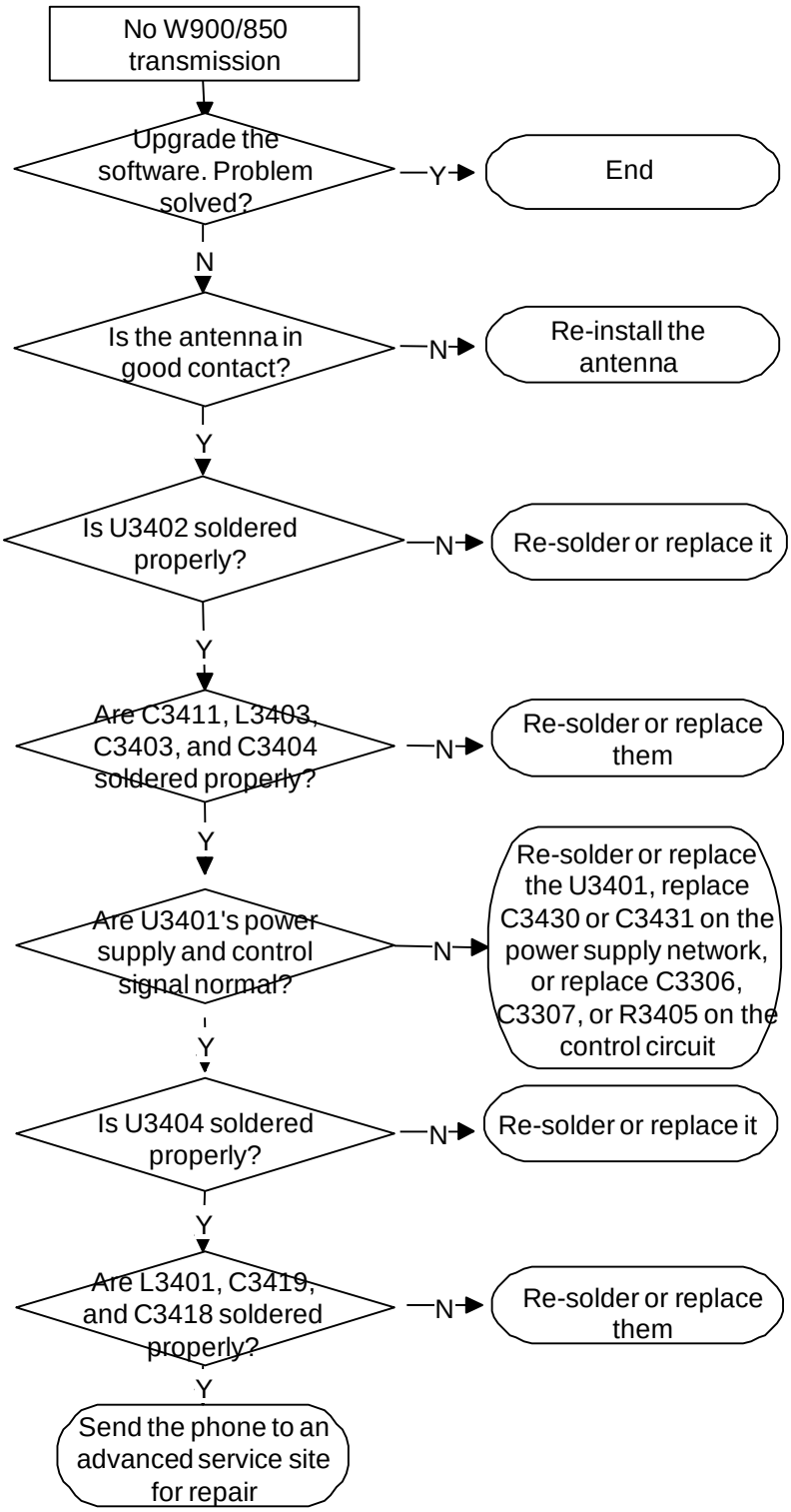


The reception channel includes the antenna, duplexer, RTR6285A's internal LNA and receiver, and external single-ended to differential filter. Reception channel: Signals are received from the antenna > After frequency selection and filtering on the duplexer, receiving signals are transmitted to the RF receiver > Signals are amplified by the LNA > Signals are processed by the single-ended to differential filter > Signals are amplified > Signals are modulated by Quadrature Downconverter and become I/Q signals > After analog-to-digital conversion (ADC), signals are transmitted to CPU for processing.

Troubleshooting Process

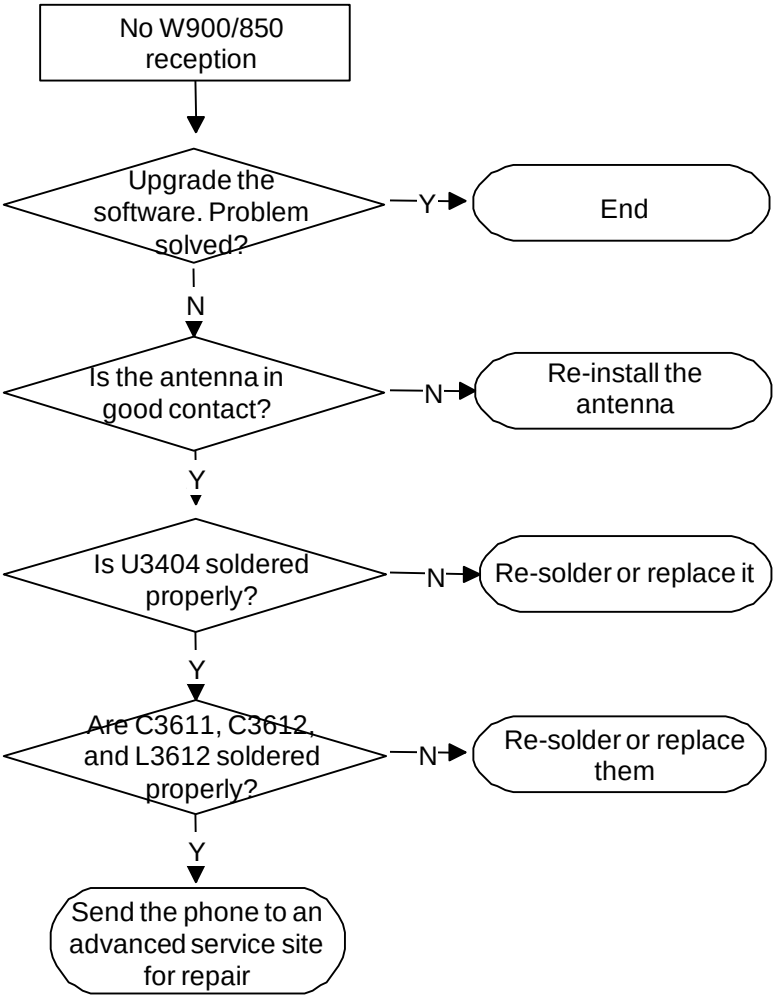
Failure: No transmission; the phone cannot initiate or receive a call, or access the network.

Solution:



Failure: No reception; the phone cannot initiate or receive a call, or access the network.

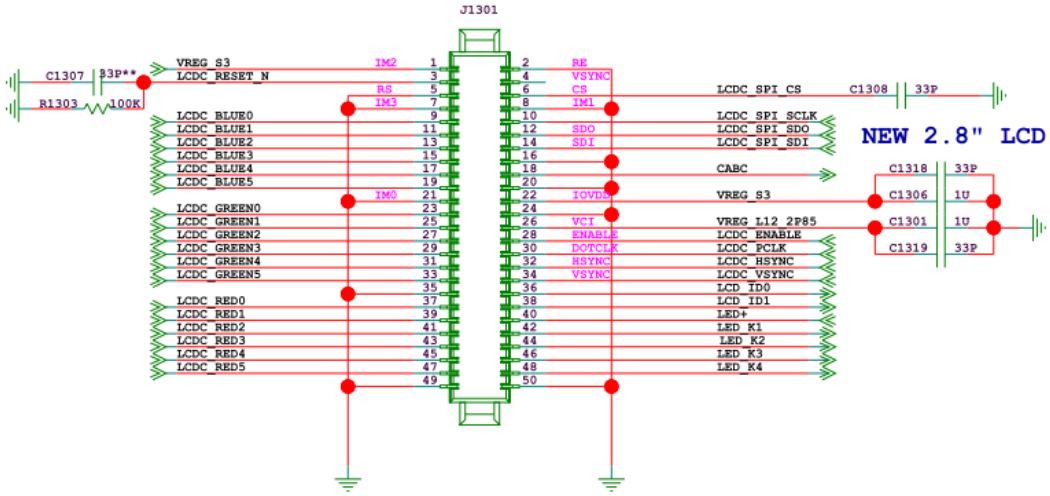
Solution:



9.4 Peripheral Circuits

9.4.1 Display

Figure 9-12 Circuit schematic diagram



Analysis

The U8185's LCM uses a 262k TFT-LCD (240 x 320 pixels) and a serial interface with synchronous clock. The MSM7225A provides the drive current. The LCM is provided by the supplier directly.

Troubleshooting Process

Failure: The phone can be powered on, but its LCD is blank.

Solution: Check the LCD.

Figure 9-13 Troubleshooting for LCD display failure

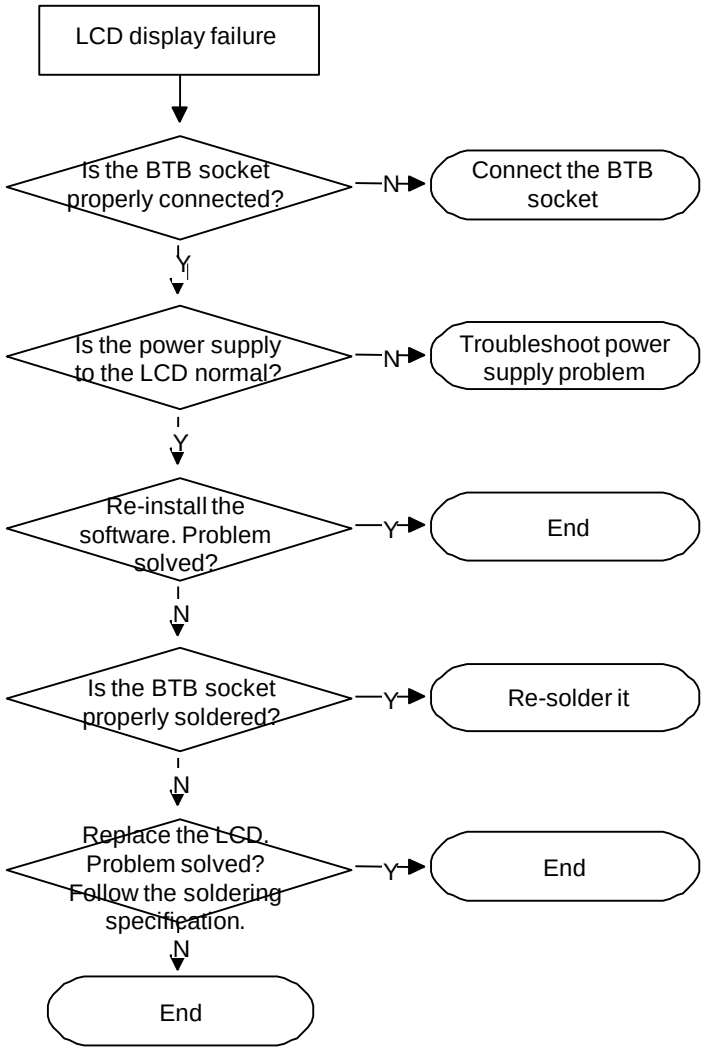


Table 9-3 Circuit diagram signal summary

Signal	Description	Reference Measurement or Wave Form
LCDC_RESET_N	Reset signal; valid when at low level	None.
LCDC_BLUE	Blue data bus	None.
LCDC_GREEN	Green data bus	None.
LCDC_RED	Red data bus	None.
LCDC_SPI_CS	Chip select signal; valid when at low level	None.
LCDC_SPI_SCLK	Serial clock signal	None.
LCDC_SPI_SDO	Serial data output signal	None.
LCDC_SPI_SDI	Serial data input signal	None.

Signal	Description	Reference Measurement or Wave Form
CABC	Content adaptation brightness control	None.
LCDC_ENABLE	Data enable	None.
LCDC_PCLK	Dot clock signal	None.
LCDC_HSYNC	Horizontal synchronization signal	None.
LCDC_VSYNC	Vertical synchronization signal	None.
LCD_ID0/LCD_ID1	LCD_ID0 and LCD_ID1 are LCD's vendor indicators.	00 indicates that the LCD is from TRULY. 11 indicates that the LCD is from BYD. In this case, the software can call LCD initiation programs for different LCDs.
LED+	LED anode	None.
LED_K1/LED_K2/LED_K3/ LED_K4/	LED cathode	None.
VREG_L12_2P85	Supplies power to the analog section.	None.
VREG_S3	Supplies power to the I/O port circuit.	None.

9.4.2 Keypad

Circuit Schematic Diagram

Figure 9-14 Power key

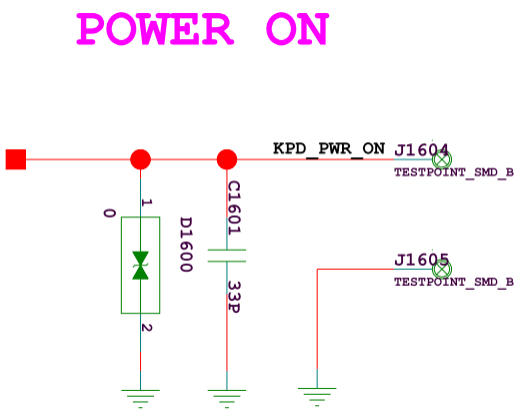


Figure 9-15 Home key

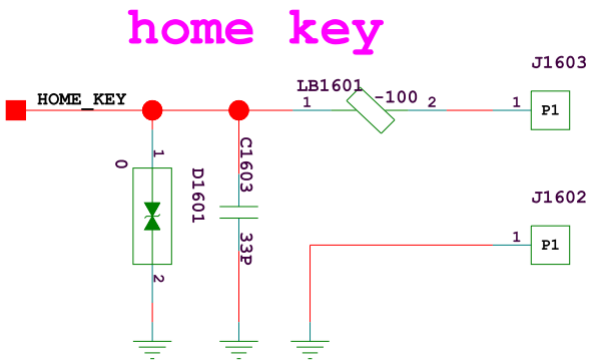
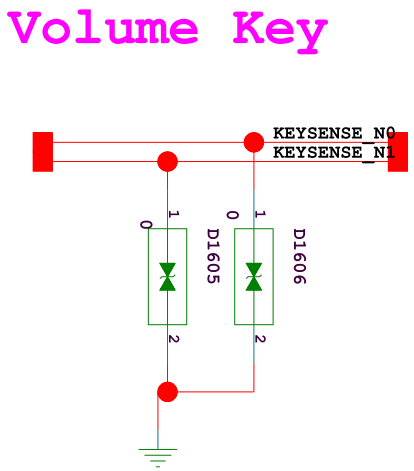


Figure 9-16 Volume key



Analysis

The U8185 has a Power key, Volume key, and Home key.

When the phone is powered off, press the Power key (PWR_ON). The KPD_PWR_ON signal is then pulled down. This signal is connected to the control switch of the power management module and triggers the power management module to power on. Then the entire system is powered on. When the phone is working properly, press the Power key, the KPD_PWR_ON receives the triggering signal and transmits the signal to the CPU for processing. The working principle of the Home key is the same as that of the Power key. When being pressed, the key generates a low level signal and triggers the CPU to process the signal.

Troubleshooting Process

- Power key failure
- Home key failure
- Volume key failure

Figure 9-17 Power key failure

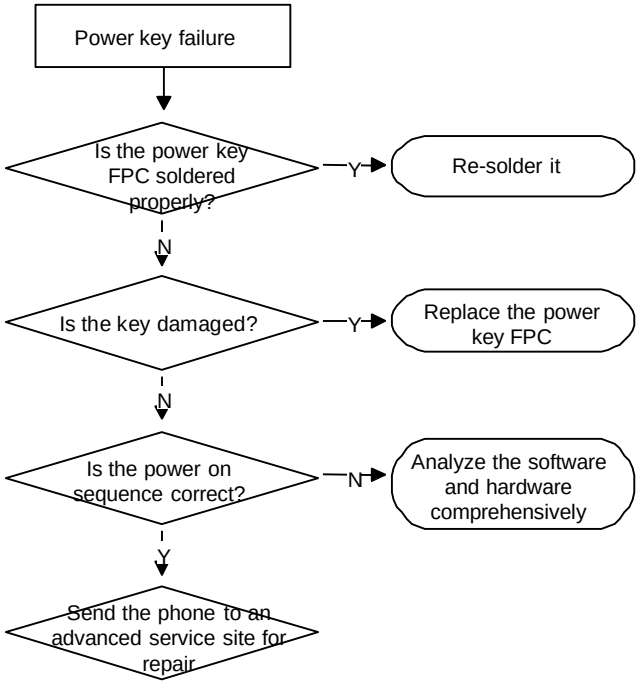


Figure 9-18 Home key failure

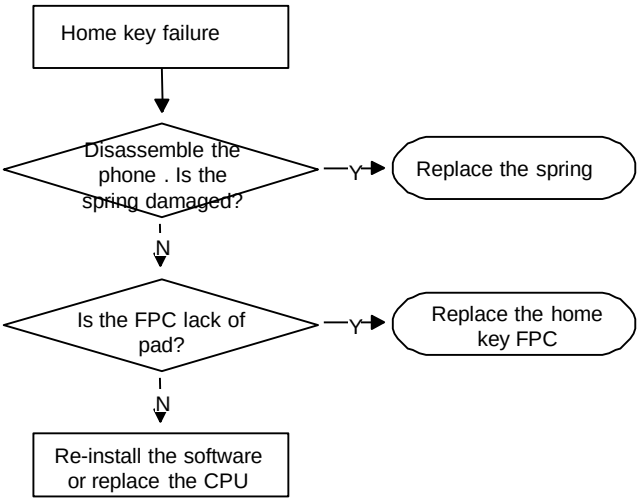
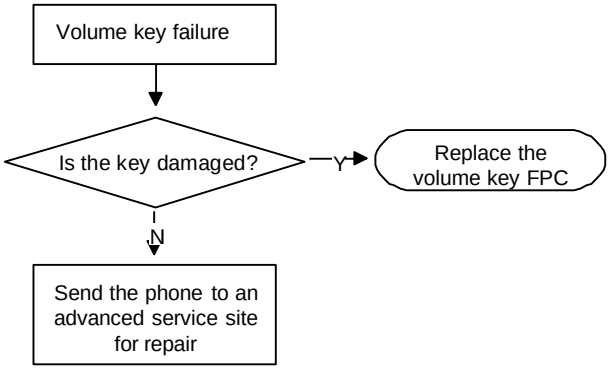


Figure 9-19 Volume key failure

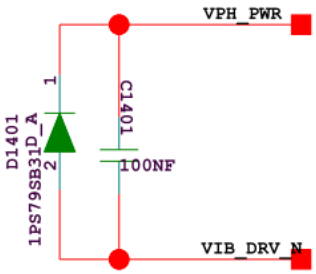


Circuit Diagram Signal Summary

None.

9.4.3 Vibration

Figure 9-20 Circuit schematic diagram



Analysis

The vibration motor is powered by VPH_PWR and controlled by PM8029. The PM8029's VIB_DRV_N pin functions as the drive pin of the motor. The motor is installed on a support over the camera BTB socket. When the motor is not vibrating, VPH_PWR and VIB_DRV_N are both at high level.

Troubleshooting Process

Failure: The motor fails to vibrate.

Figure 9-21 Vibration failure

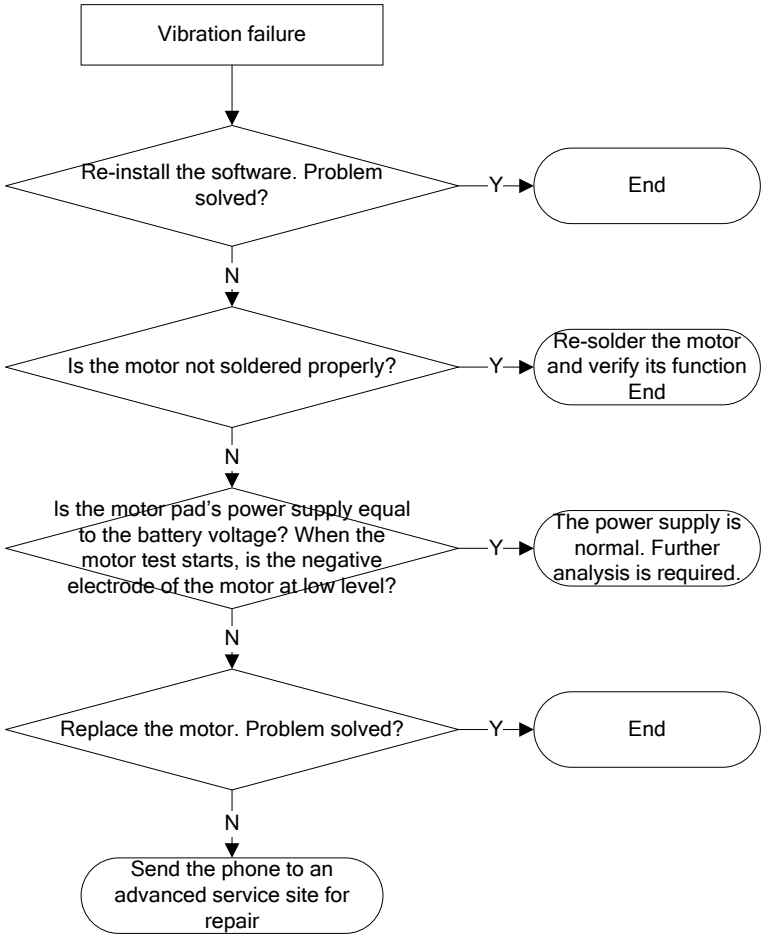
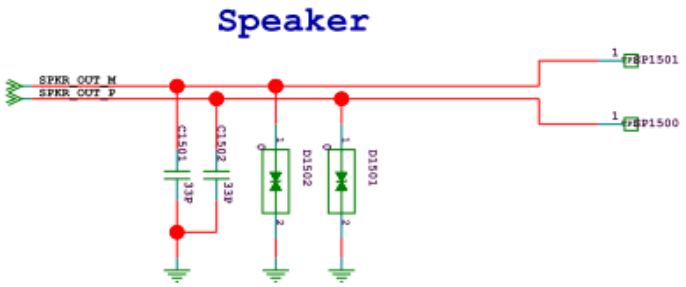


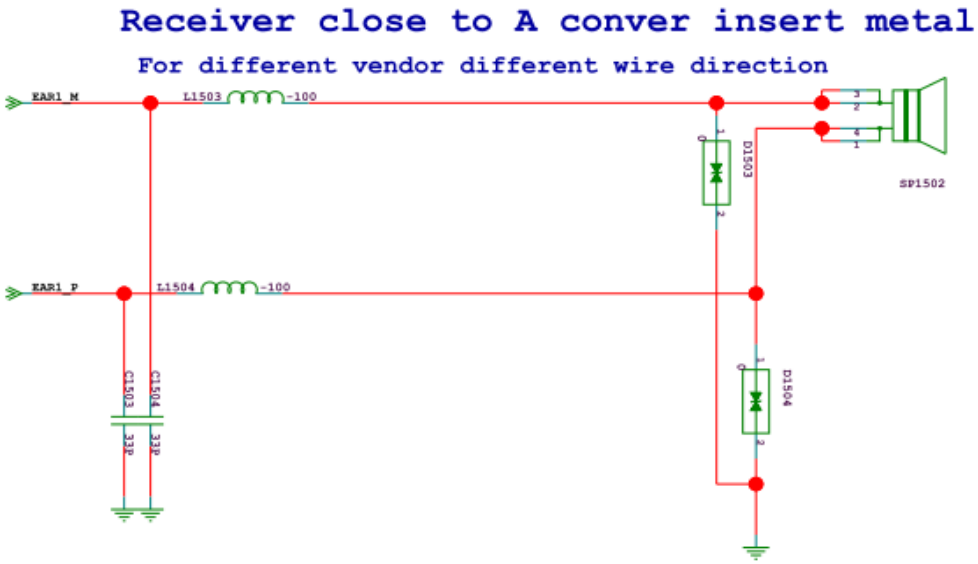
Table 9-4 Circuit diagram signal summary

Signal	Description	Reference Measurement or Wave Form
VPH_PWR	Main power supply, supplying power to the motor	None.
VIB_DRV_N	Motor drive signal pin, connected to the motor's negative electrode	None.

9.4.4 Voice Reception

Figure 9-22 Circuit schematic diagram





Analysis

Figure 9-23 MSM7225A's internal audio structure

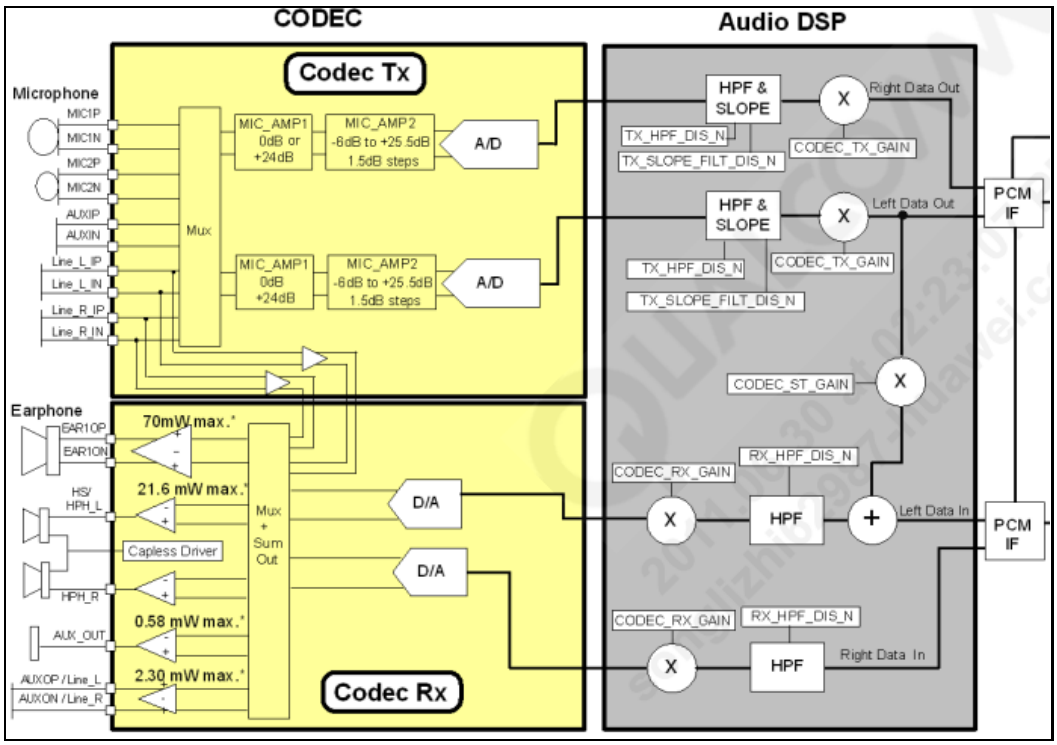
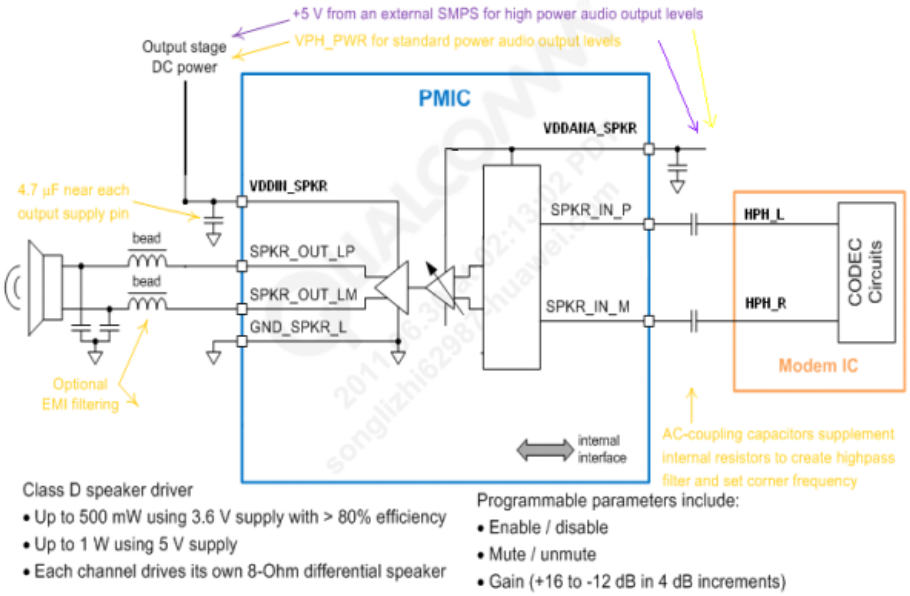


Figure 9-24 PM8029's internal audio structure



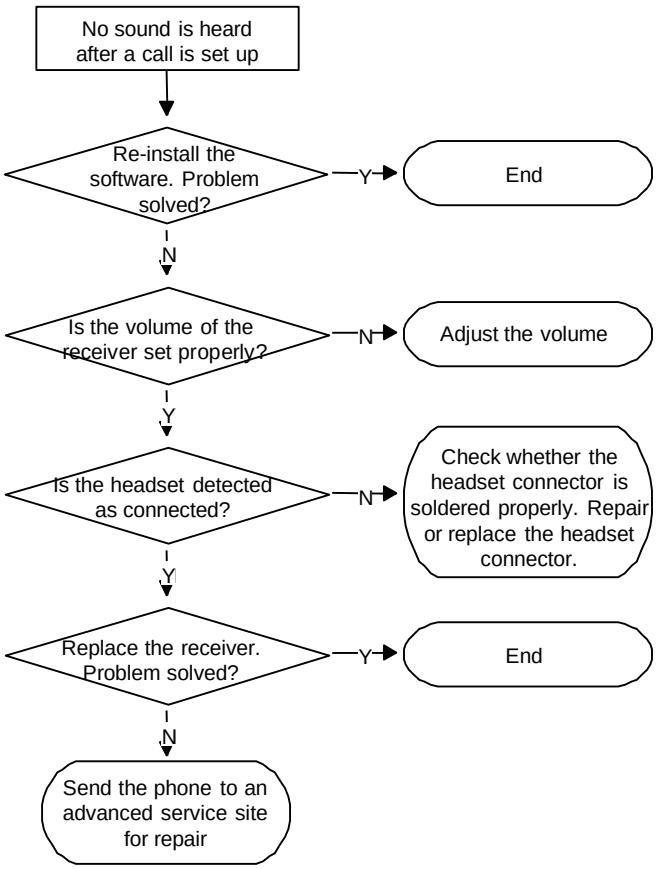
The U8185 provides three types of audio output:

1. Receiver output: The receiver on the top of the phone's upper board receives EAR1_M/ EAR1_P signals from the MSM7225A for voice receiving in normal mode, and connects to a 32 ohm load.
2. Speaker output: The audio signals from the MSM7225A are amplified in the PM8029 and then output from the speaker. The speaker is used for the playback of polyphonic ringtones and voice output in handsfree mode. The speaker is connected to an 8 ohm load and outputs 500 mW power. The speaker is on the rear cover and is in contact with the PCBA through a spring.
3. Headset output: The U8185 is designed with a stereo headset.

Troubleshooting Process

Failure: After a call is established, no sound can be heard.

Figure 9-25 No sound heard during a call

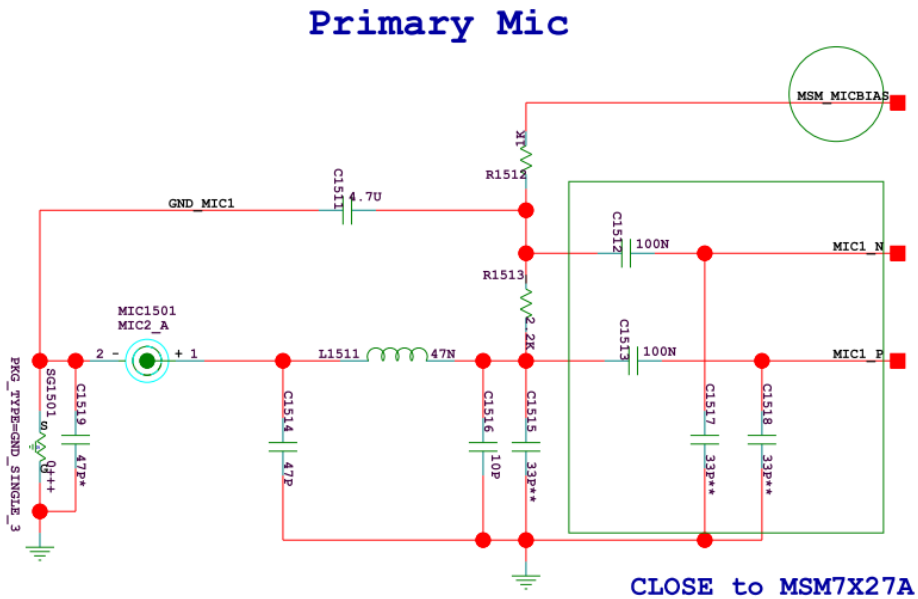


Circuit Diagram Signal Summary

See section 9.4.6 "Headset."

9.4.5 Voice Transmission

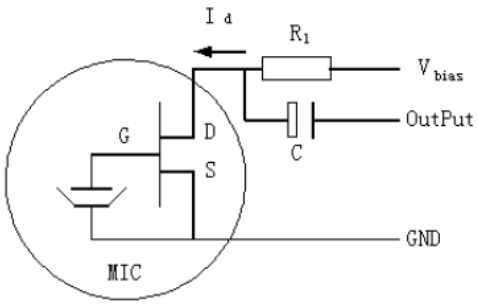
Figure 9-26 Circuit schematic diagram



Analysis

The U8185 has two microphone circuits: the main microphone and headset microphone circuits. The main microphone circuit uses a –44 dB omnidirectional electret condenser microphone with differential outputs to the MSM7225A's MIC1_P and MIC1_N. The name of electret condenser microphone comes from its sound sensing structure similar to a condenser (capacitor). The following figure shows its schematic diagram.

Figure 9-27 Schematic diagram of an electret condenser microphone

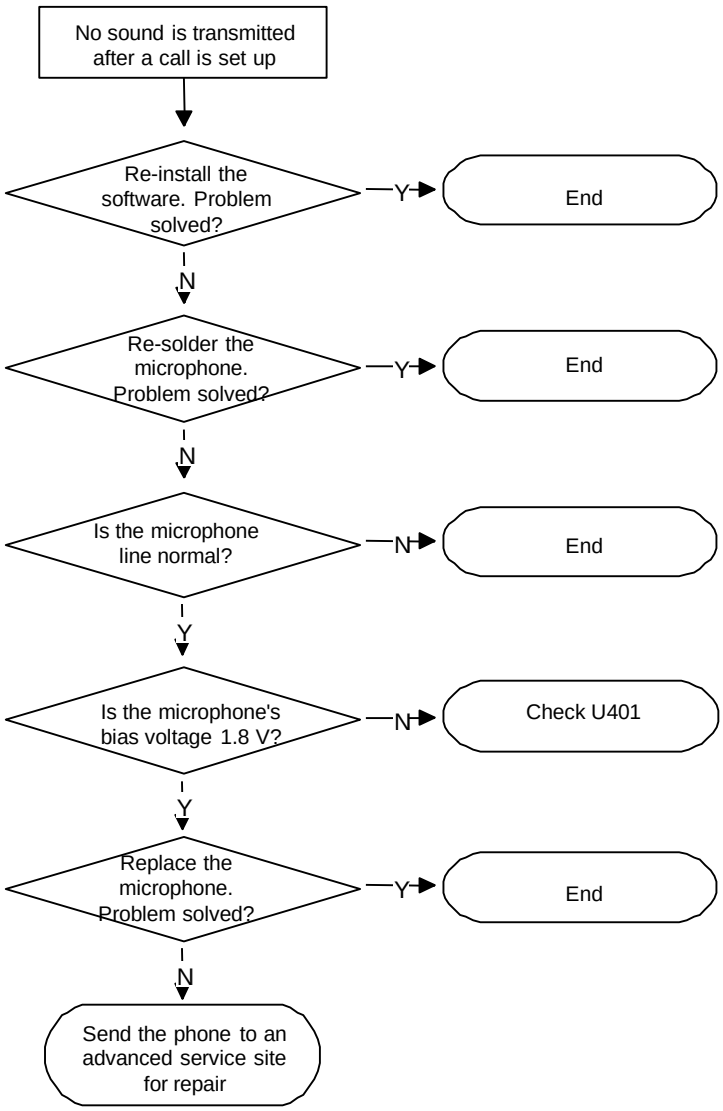


The bias voltage for the electret condenser microphone is provided by the MSM7225A. The working principle of the headset microphone is similar to that of the main microphone. MIC2_P and MIC2_N are output to MSM7225A. The bias voltage is provided by the PM8029.

Troubleshooting Process

Failure: No sound is picked up or transmitted during a call.

Figure 9-28 No sound transmitted during a call

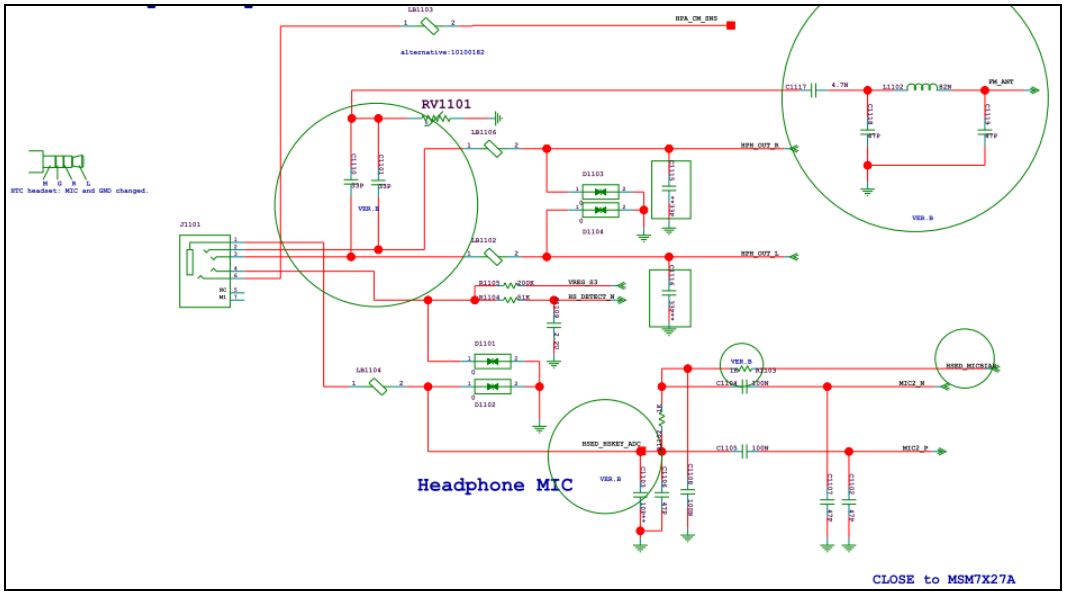


Circuit Diagram Signal Summary

See section 9.4.6 "Headset."

9.4.6 Headset

Figure 9-29 Circuit schematic diagram



Analysis

The U8185 adopts a stereo headset design. The headset port is in the IO. The headset output uses the amplifier of the PM8029.

Troubleshooting Process

Failure: No sound can be heard from the headset.

Solution: Replace the headset or the headset connector.

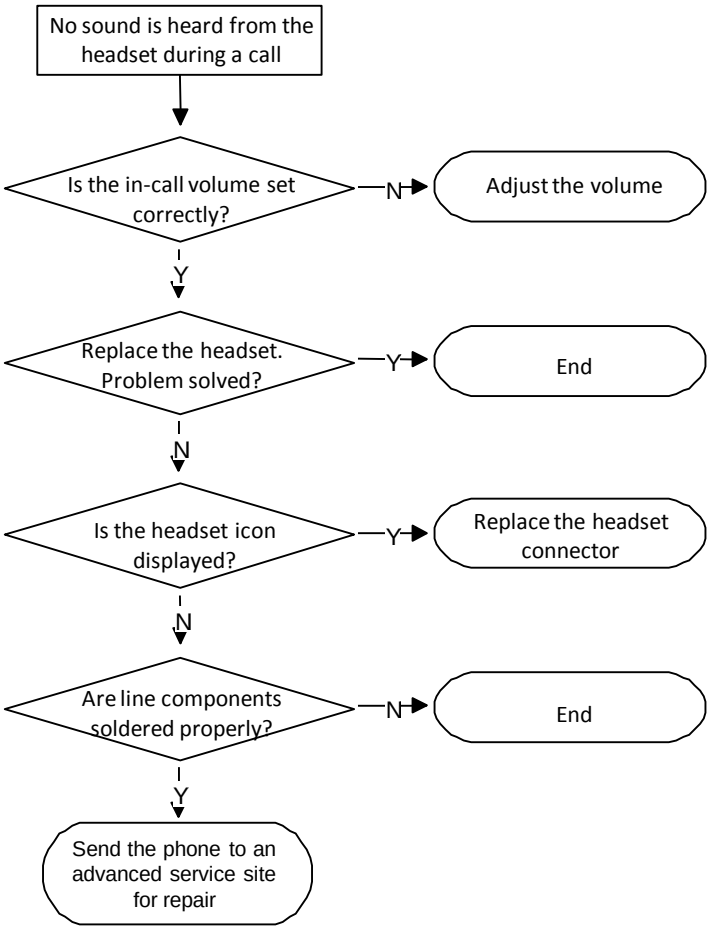
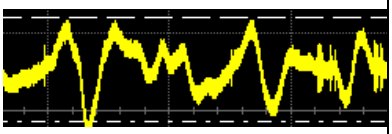
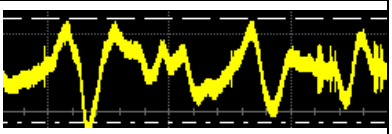
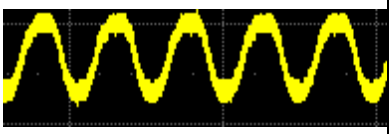
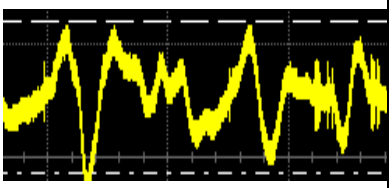
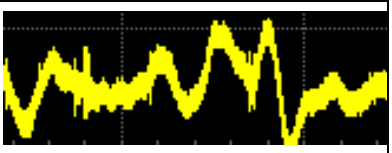
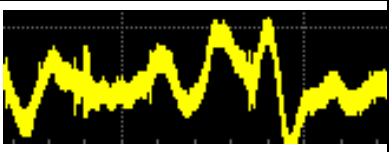


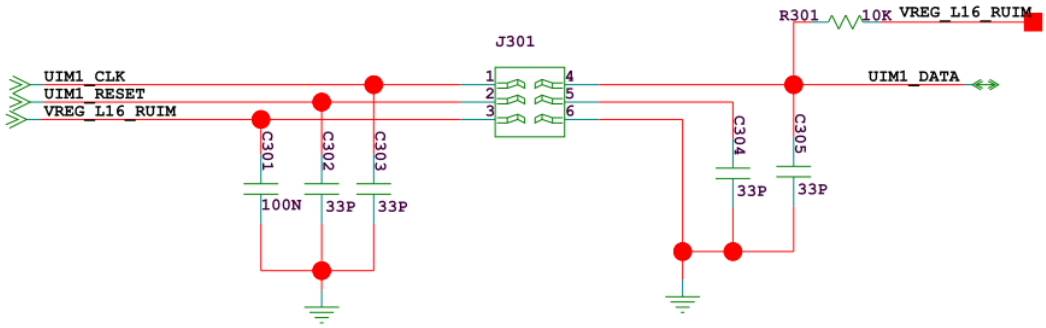
Table 9-5 Circuit diagram signal summary

Signal	Description	Reference Measurement or Wave Form
SPKR_OUT_M	Speaker's negative electrode	
SPKT_OUT_P	Speaker's positive electrode	Speaker wave forms measured over its two electrodes
EAR1_M	Receiver's negative electrode	
EAR1_P	Receiver's positive electrode	Receiver wave forms measured over its two electrodes, receiving mono sound

Signal	Description	Reference Measurement or Wave Form
MSM_MICBIAS	• DC bias voltage for the microphone • A certain DC voltage and AC current voltage are required for the microphone to function.	1.8 V
MIC1_P	MIC (+)	 Microphone wave form measured over its two electrodes, receiving mono sound
MIC1_N	MIC (–)	
MIC2_P	• Microphone #2 input (+) • Connected to the headset microphone	
MIC2_N	Microphone #2 input (–)	Headset microphone measured over its two electrodes
HPH_OUT_R	Output to the headset's right audio channel	
HPH_OUT_L	Output to the headset's left audio channel	
HS_DETECT_N	• Headset presence detection pin • When no headset is inserted, EAR_DETECT is at high level. When a headset is inserted, EAR_DETECT is at low level.	

9.4.7 SIM Card

Figure 9-30 Circuit schematic diagram



Analysis

The U8185 supports the R_UIM card and connects the R_UIM card through the UIM card slot. The PM8029 provides the card slot with VREG_L16_RUIM power of 2.85 V. The R_UIM card's reset, clock, and data signals can be sent to and received from the PM8029 directly.

Troubleshooting Process

Failure: The phone cannot detect UIM cards.

Solution: Check whether the UIM card slot functions properly.

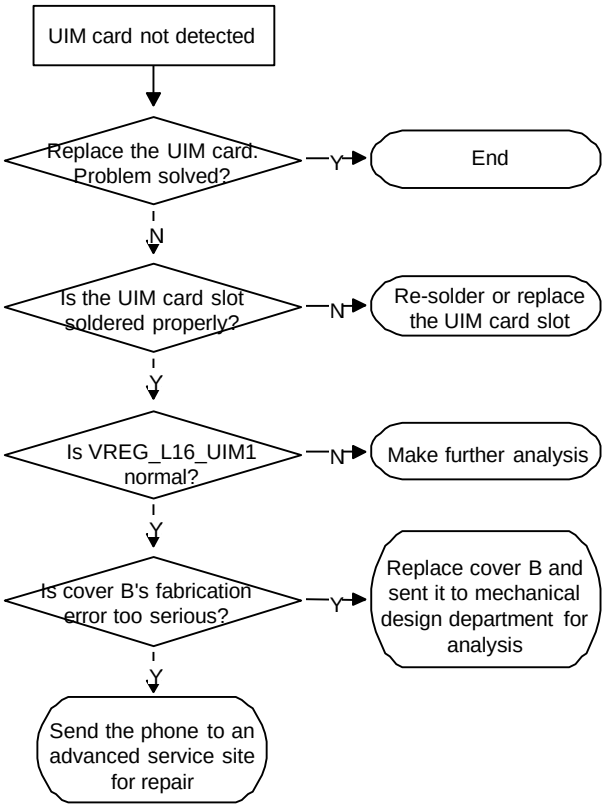
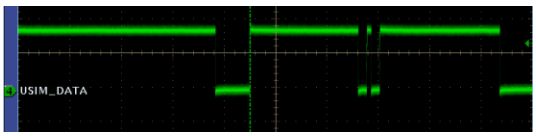
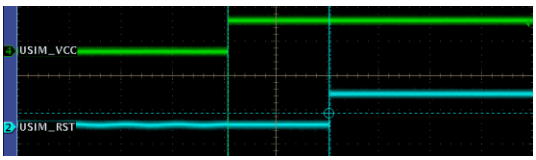
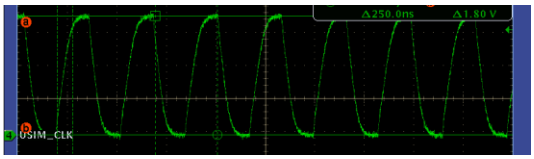


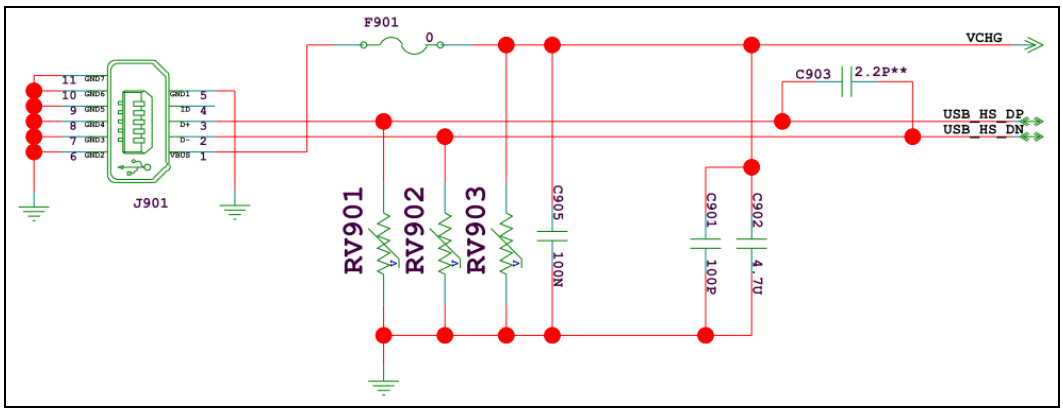
Table 9-6 Circuit diagram signal summary

Signal	Description	Reference Measurement or Wave Form
VREG_L16_RUIM	Supplies power to the UIM card.	2.85v
UIM1_DATA	UIM card data signals	
UIM1_DATA_ESD	• ESD protection for UIM card data signals • Connected to the ESD protection component D606	None.
UIM1_RESET	• UIM card reset signal • Valid at high level • Kept at low level after the phone is powered on.	
UIM1_RESET_ESD	• ESD protection for the UIM card reset signal • Connected to the ESD protection component D606	None.

Signal	Description	Reference Measurement or Wave Form
UIM1_CLK	UIM card clock	
UIM1_CLK_ESD	• ESD protection for the UIM card clock signal • Connected to the ESD protection component D606	None.

9.4.8 I/O Connector

Figure 9-31 Circuit schematic diagram



Analysis

When being connected to the I/O connector, a charger provides the VCHG charging voltage to charge the battery. When the phone is connected to a computer using a USB cable, USB_HS_DN and USB_HS_DP are used for communication between the phone and the computer (for example upgrading the phone's software or reading information from the phone).

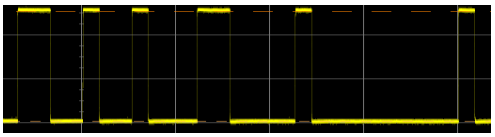
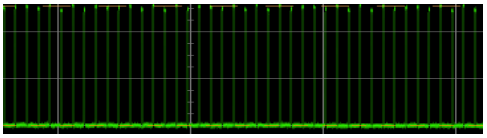
Troubleshooting Process

Failure: The phone cannot be charged or detected by a computer.

Solution: Clean, re-solder or replace the USB connector.

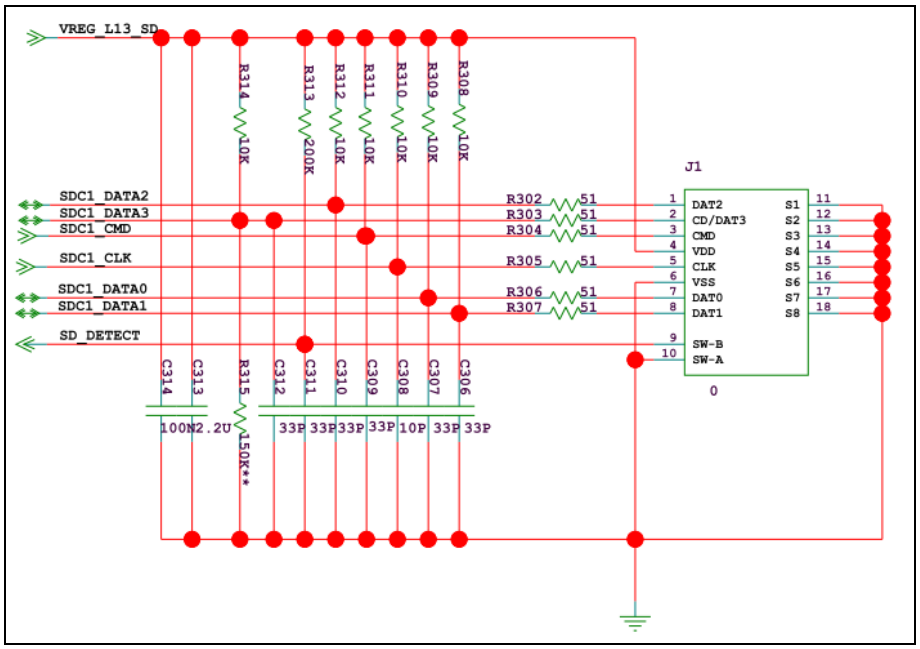
Table 9-7 Circuit diagram signal summary

Signal	Description	Reference Measurement or Wave Form
VCHG	Charging current input	High level, 5 V

Signal	Description	Reference Measurement or Wave Form
USB_DM	Digital signal	
USB_DP	Digital signal	

9.4.9 microSD Card Connector

Figure 9-32 Circuit schematic diagram



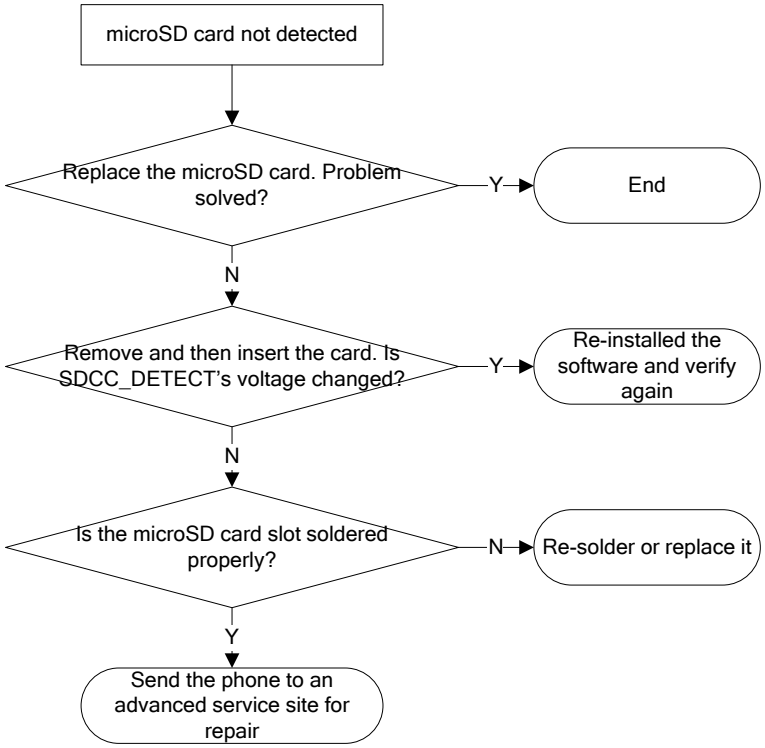
Analysis

The U8185 supports 8 GB microSD cards. The power consumption of 512 MB and 256 MB microSD cards is low, while the power consumption for microSD cards of 1 GB or higher is comparatively high, which is normal. To increase RF capability, 33 pF capacitors are added to all data lines.

Troubleshooting Process

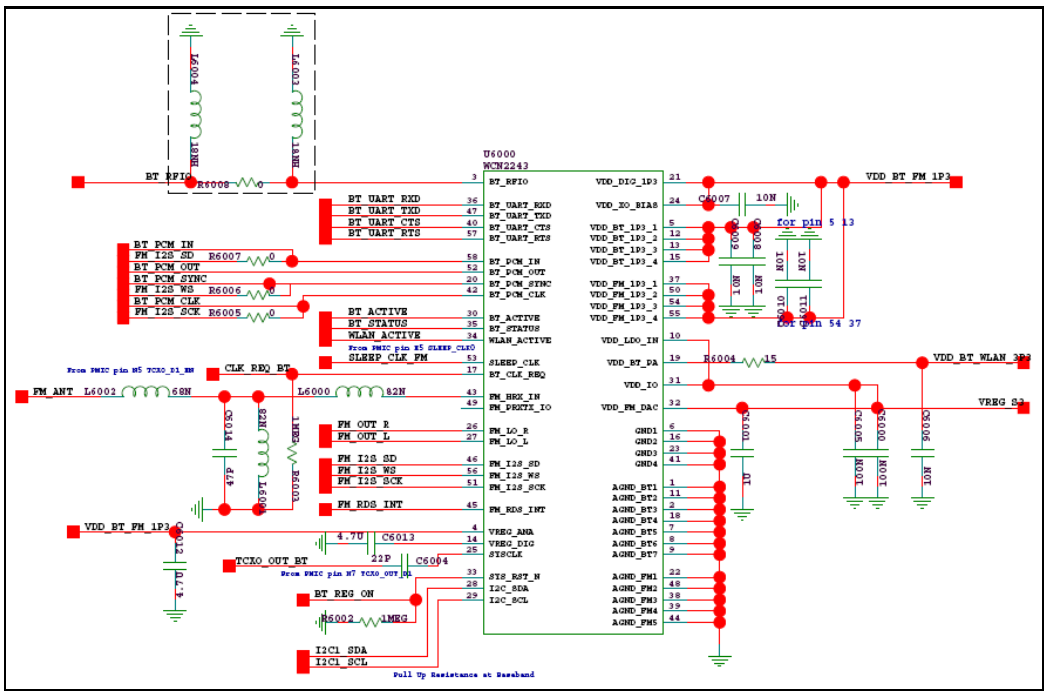
Failure: The microSD card cannot be detected or read.

Figure 9-33 microSD card not detected



9.4.10 FM

Figure 9-34 Circuit schematic diagram

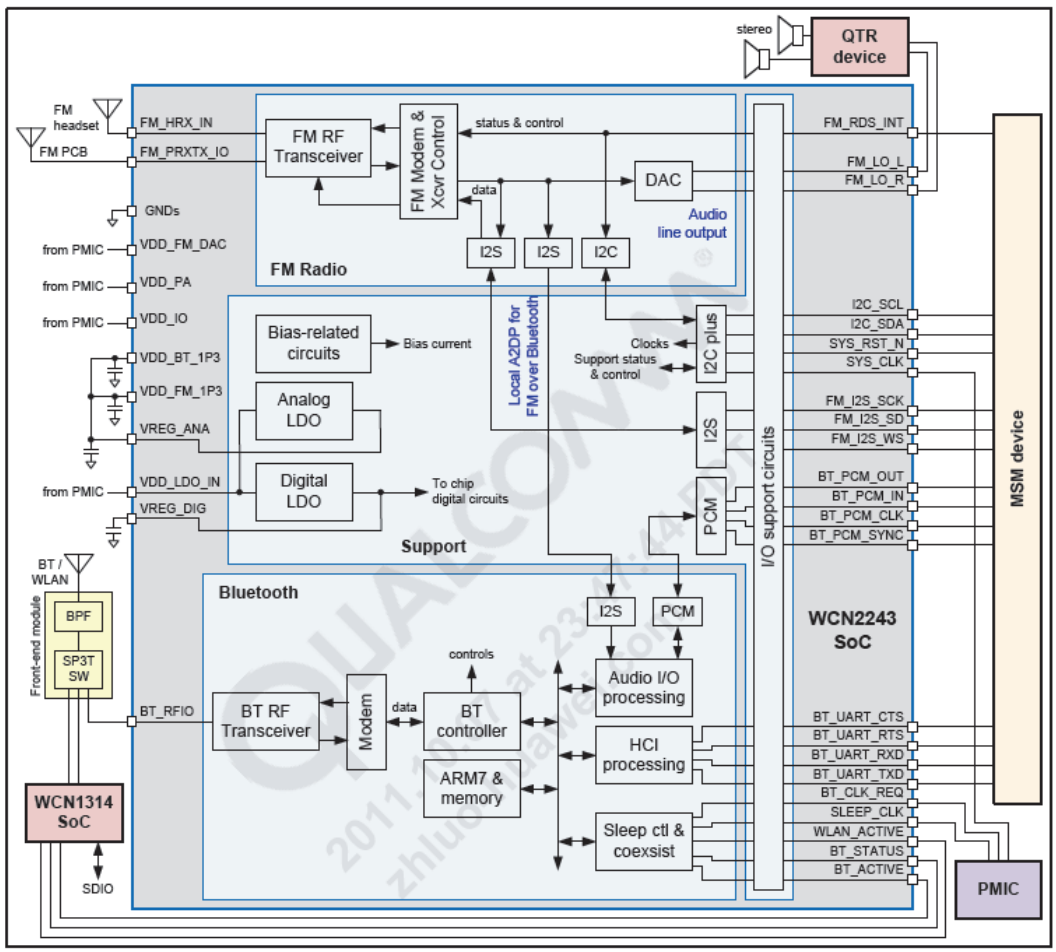


Analysis

The U8185 uses Qualcomm's WCN2243 FM/Bluetooth chip to receive and process FM signals and realize the FM function. The stereo signals from the FM module are amplified by the MSM7225A and then sent to the headset or speaker.

WCN2243 FM section's major features:

- Broad frequency range (76–108 MHz); channel interval: 50 kHz
- Transceiver integrated with an FM modem and a frequency synthesizer
- Complying with RDS and RBDS
- Manual and automatic tuning
- Automatic gain control
- Automatic frequency control
- Adaptive noise reduction
- Adjustment-free stereo decoder
- Programmable de-emphasis
- Standby mode
- I2C, I2S, and PCM interfaces



The WCN2243 has the following modules integrated:

- Frequency modulation
- Frequency reception and mixing
- Frequency demodulation
- MPX decoder
- I^2C interface

When the WCN2243 is operating, it sends the frequency that is expected to be received through the I^2C interface to the frequency selection module. The frequency mixing circuit mixes the signals in the specified frequencies (76–108 MHz) into the intermediate frequency. The signals then go through the intermediate frequency filter, demodulation module, decoding module, and are converted to audio output.

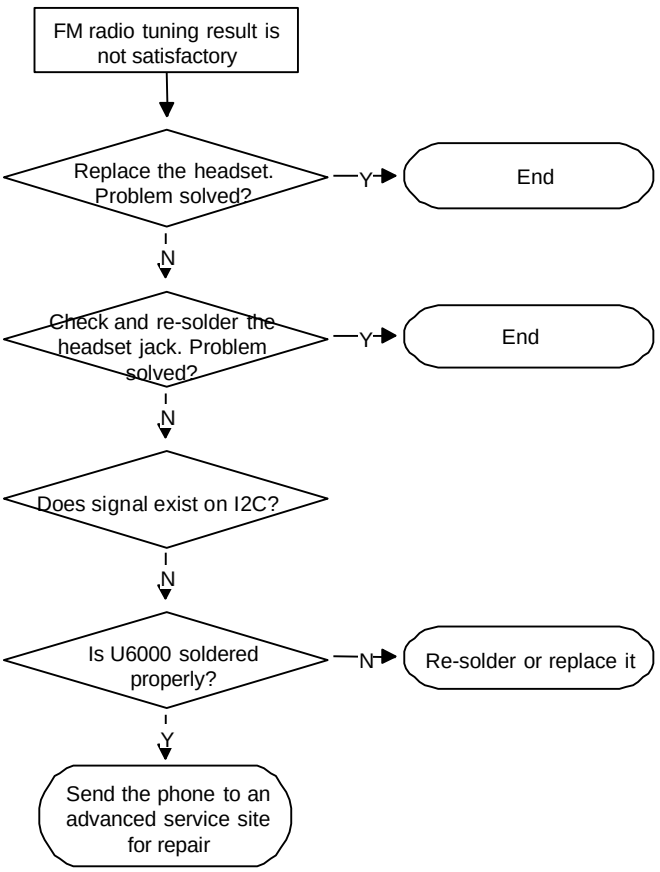
The FM radio uses a headset as the antenna. Therefore, a headset must be inserted for the FM radio to function.

Troubleshooting Process

Failure: The FM radio is malfunctioning.

Solution: If signals can be received but not sound is heard, check the headset line.

- No FM signal
- No sound for FM radio

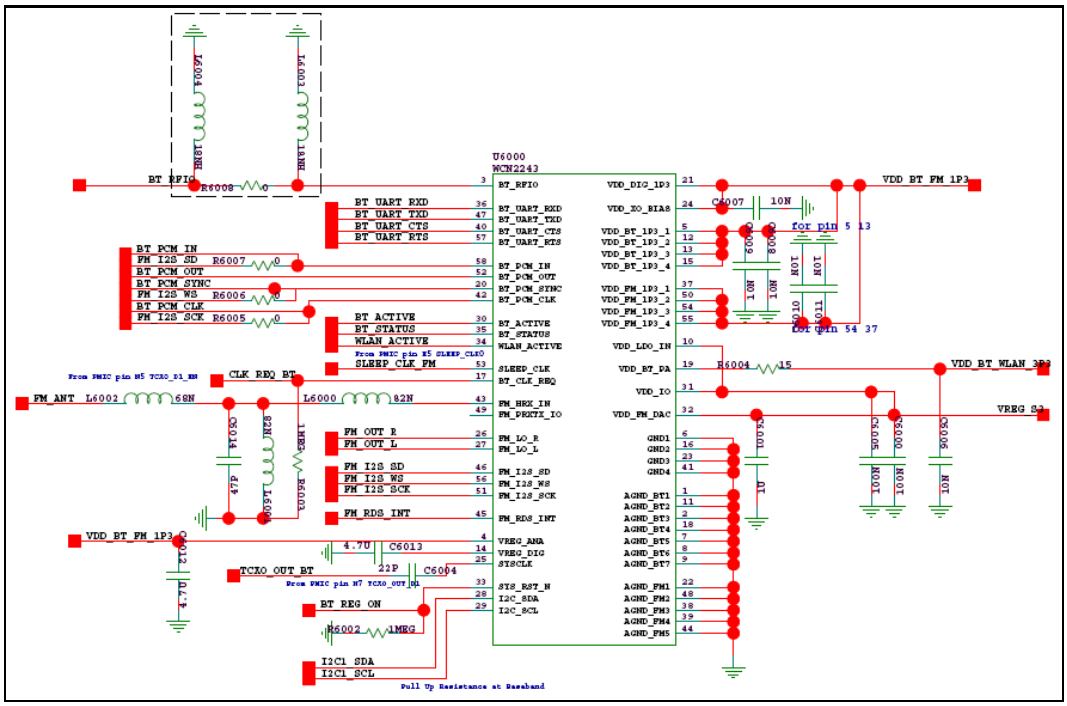


Circuit Diagram Signal Summary

See section 9.4.11 "Bluetooth."

9.4.11 Bluetooth

Figure 9-35 Circuit schematic diagram



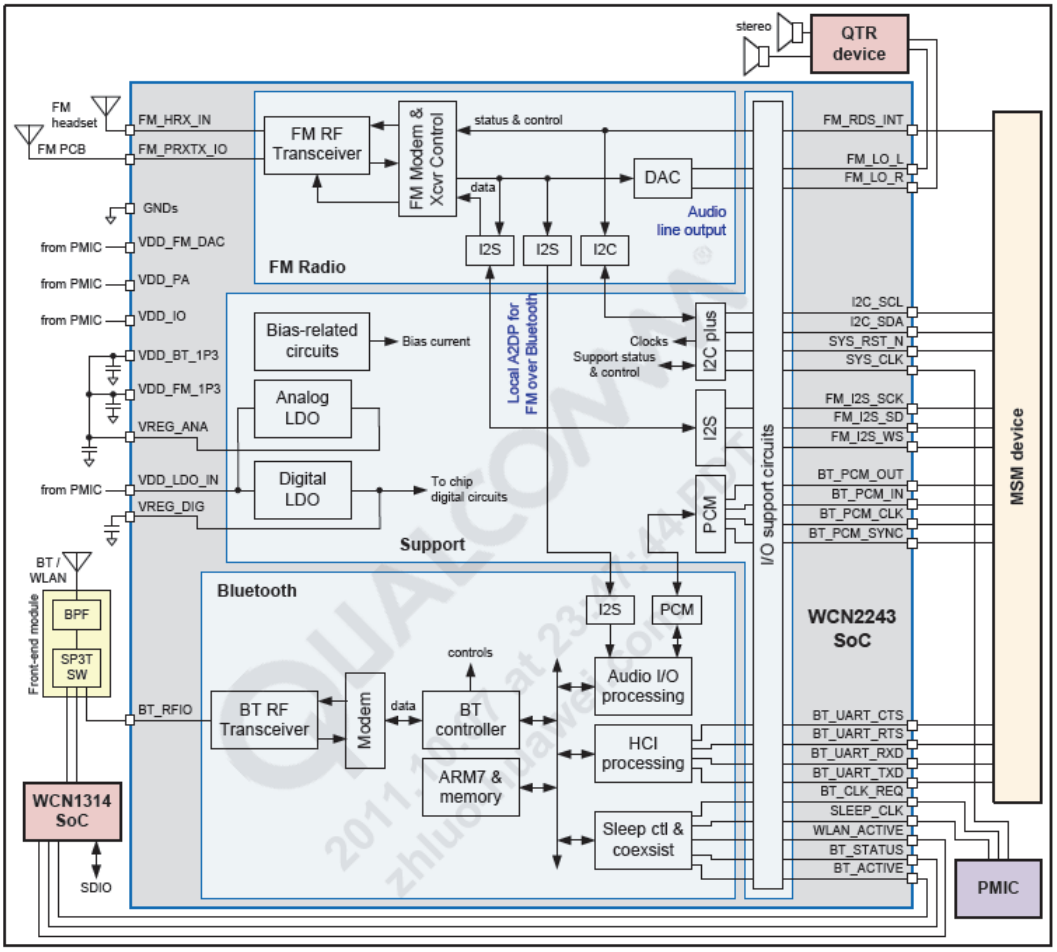
Analysis

The U8185 uses Qualcomm's WCN2243 FM/Bluetooth chip to receive and process Bluetooth signals and realize the Bluetooth function.

WCN2243 Bluetooth section's major features:

- Bluetooth baseband processor integrated with 2.4 GHz transceiver
- Backward compatible with BT1.x, 2.x+EDR, and Bluetooth 3.0
- Support for GFSK, π/4-DQPSK, and 8DPSK modulation
- High capacity, high performance ARM7TDMI processor
- Support for up to seven concurrent wireless connections
- Support for Class 1 and Class 2 transmission without any additional PA
- Low-power-consumption page scanning, reducing the phone's power consumption
- HCI UART interface
- Audio PCM interface
- Software sleep and wake-up control
- PTZ mode coexisting with the 802.11 WLAN
- Clock and power request control

- Integrated VCO frequency synthesizer
- Automatic temperature calibration; no additional calibration required

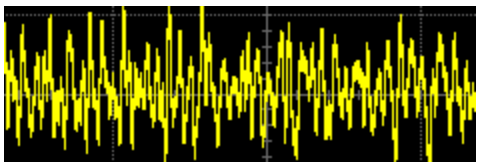
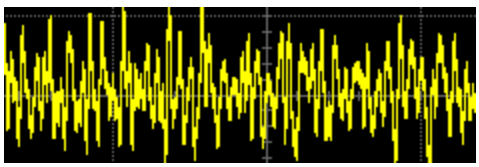


The WCN2243's Bluetooth section has the following modules integrated:

- Bluetooth RF transceiver
- Bluetooth controller
- ARM7 and memory
- Audio I/O processing module
- HCI processing module
- Sleep control and coexisting
- I2S interface
- PCM interface

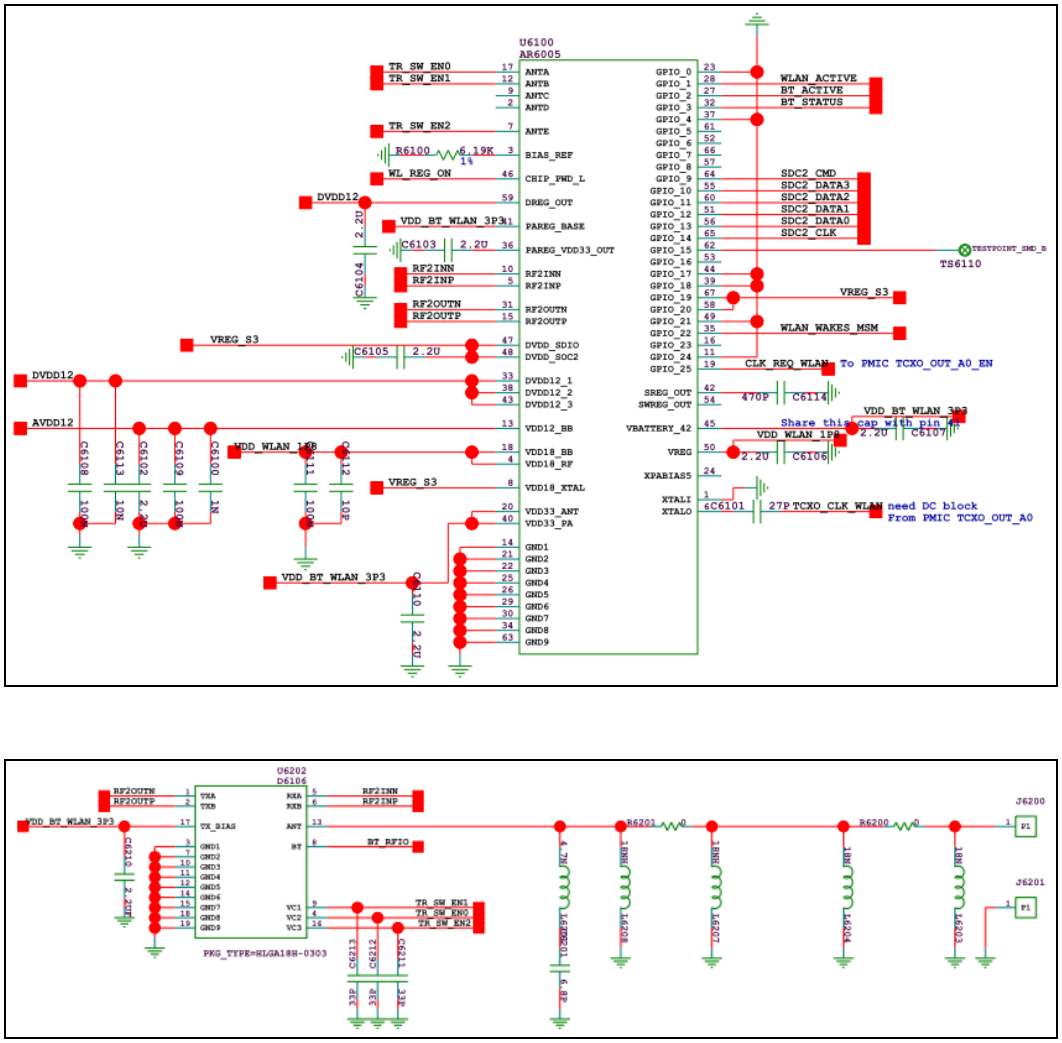
Table 9-8 Circuit diagram signal summary

Signal	Description	Reference Measurement or Wave Form
BT_RFIO	RF transmission and reception	

Signal	Description	Reference Measurement or Wave Form
BT_UART_RXD BT_UART_TXD BT_UART_CTS BT_UART_RTS	UART interface	
BT_PCM_IN BT_PCM_OUT BT_PCM_SYNC BT_PCM_CLK	PCM interface	
BT_ACTIVE	PTA Bluetooth active	
BT_ACTIVE	PTA status	
WLAN_ACTIVE	PTA WLAN active	
SLEEP_CLK	External low power consumption clock input and digital 32.768 kHz clock	
BT_CLK_REQ	Bluetooth requests a master reference	
FM_HRX_IN	FM headset RF receiver terminal	
FM_PRXTX_IO	FM primary RF receiver/transmitter terminal	
FM_OUT_R	Left audio channel output of the FM radio	
FM_OUT_L	Right audio channel output of the FM radio	
I2C_SCL	I2C bus clock	
I2C_SDA	I2C bus data	
FM_I2S_SD	I2S bus data	
FM_I2S_WS	I2S bus byte-select line	
FM_I2S_SCK	I2S bus clock	
FM_RDS_INT	FM RDS interrupt	

9.4.12 Wi-Fi

Figure 9-36 Circuit schematic diagram



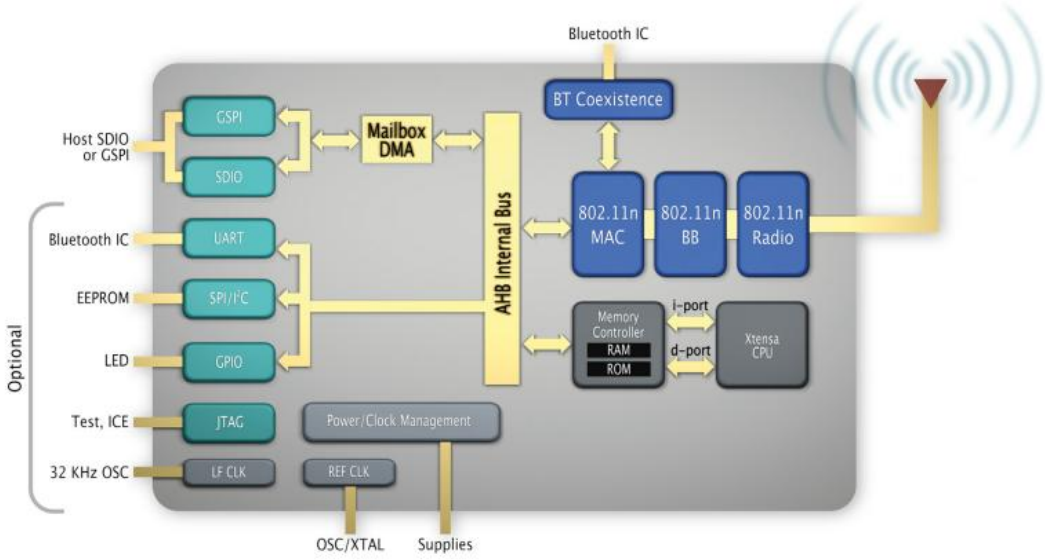
Analysis

The U8185 uses QUALCOMM's AR6005 chip to realize the Wi-Fi function and support 802.11n.

AR6005 chip's major features:

- Support for IEEE 802.11b/g/n
- High throughput
- Integrated with high efficiency PA and LNA to reduce cost
- Support for SDIO V2.0 (50 MHz, 4-bit and 1-bit)
- Low power consumption
- Support for 19.2–52 MHz reference clock

Figure 9-37 AR6005's internal structure



Troubleshooting Process

Failure: No Wi-Fi signals are received.

Table 9-9 Circuit diagram signal summary

Signal	Description	Reference Measurement or Wave Form
ANTA/ANTB/ ANTC/ANTD/	RF's front end control signal	
ANTE	Shared antenna switch control signal	
BIAS_REF	Internal analog bias reference	
RF2INN/RF2INP	2.4 GHz input	
RF2OUTN/RF2OUTP	2.4 GHz output	
XPABIAS5	External PA bias voltage	
GPIO	GPIO interface	

10 Solder Points on the PCB and BGA Chip

- Red (R: 255, G: 0, B: 0)  : Vacant point
- Green (R: 0, G: 255, B: 0)  : Ground point
- Blue (R: 0, G: 0, B: 255)  : Solder point

Magnified views of sections:

Figure 10-1 PM section

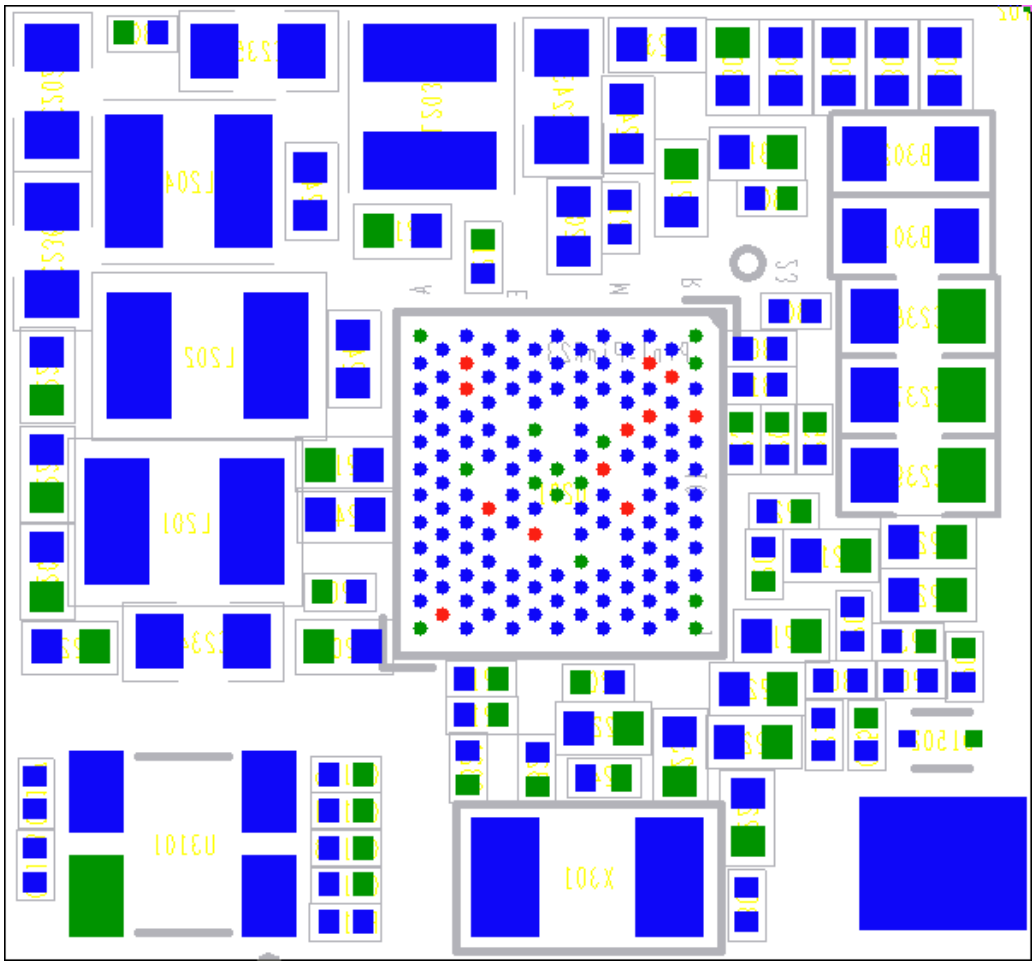


Figure 10-2 MSM7225A+NAND MCP section

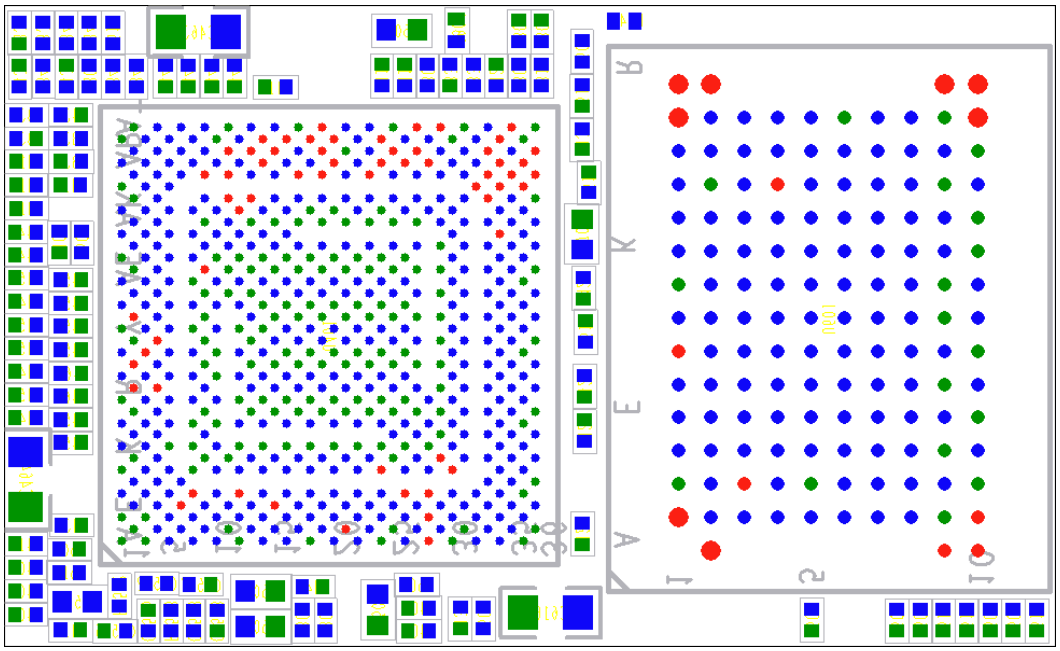


Figure 10-3 Bluetooth/FM section

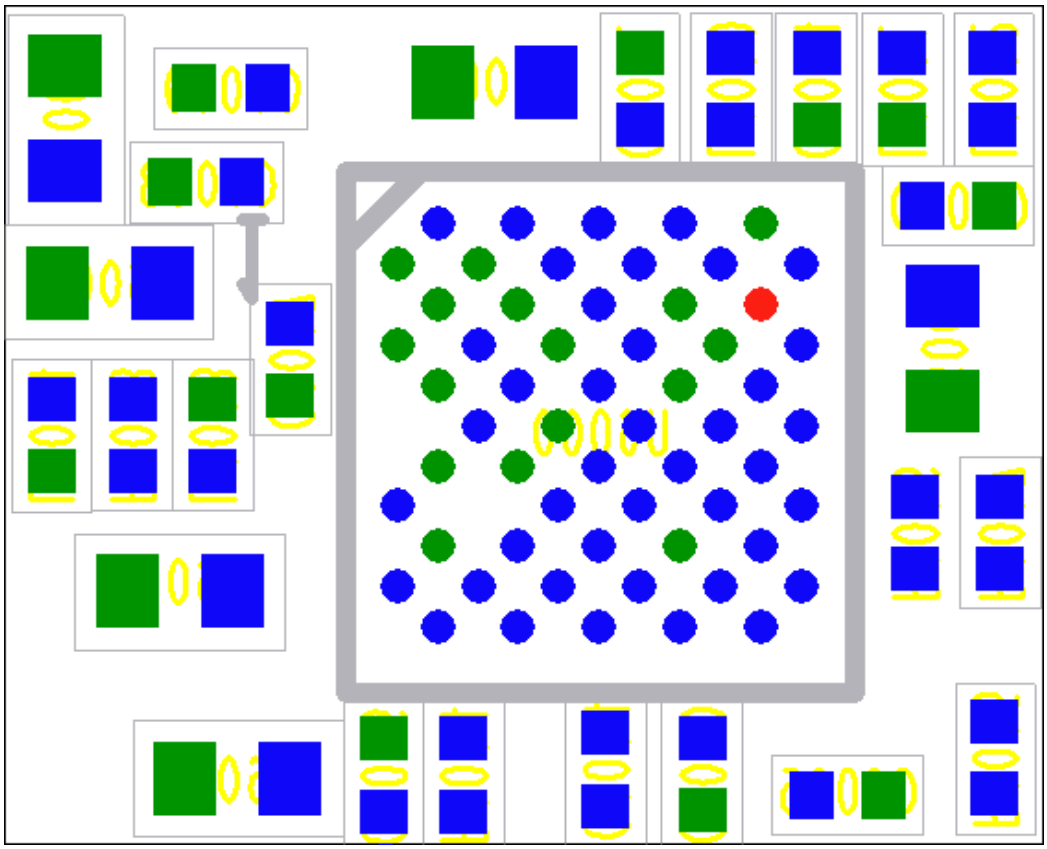


Figure 10-4 Wi-Fi section

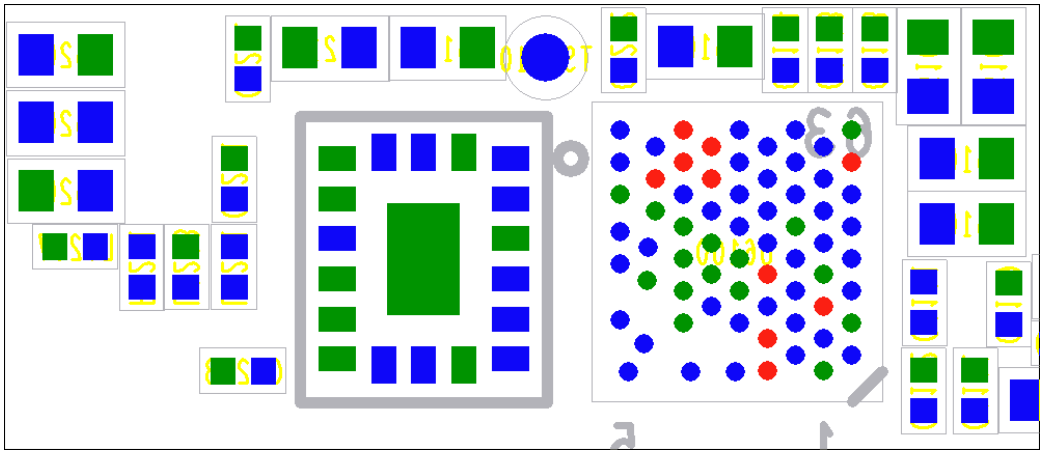


Figure 10-5 RTR8285A section

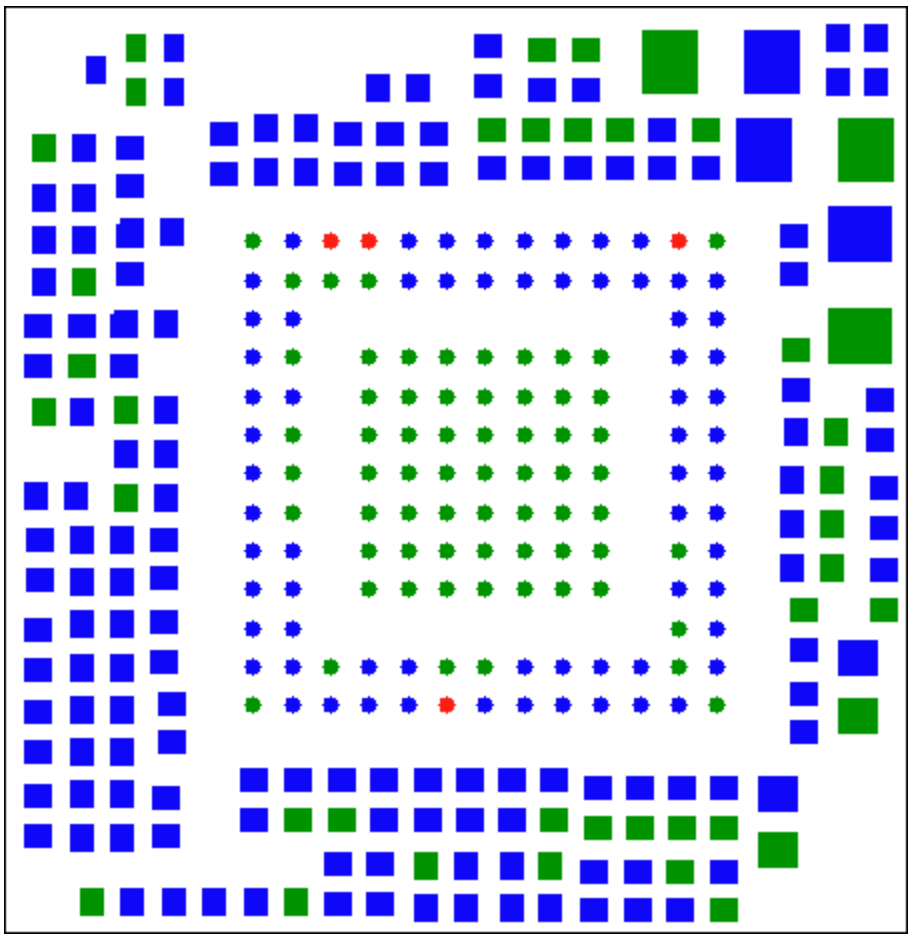


Figure 10-6 Top surface

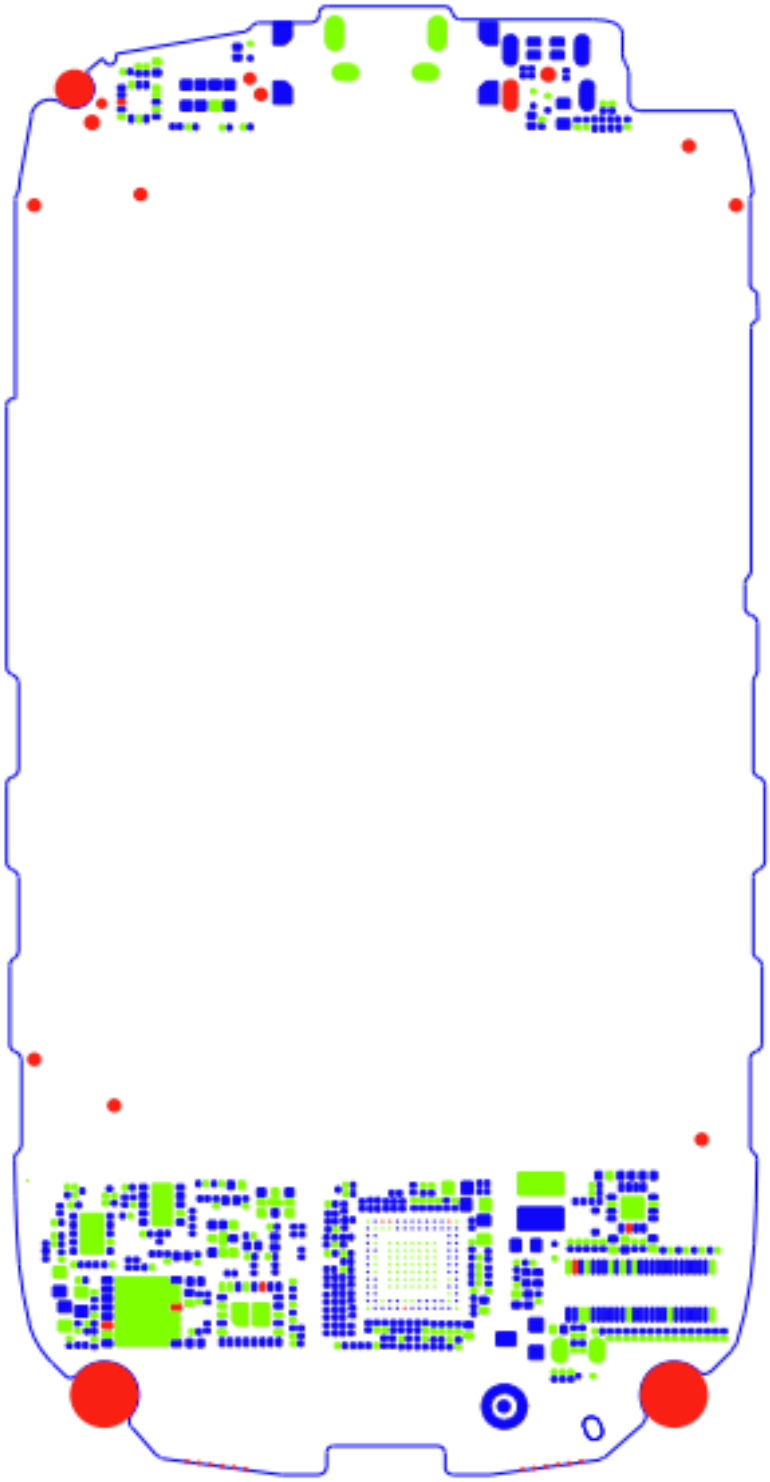
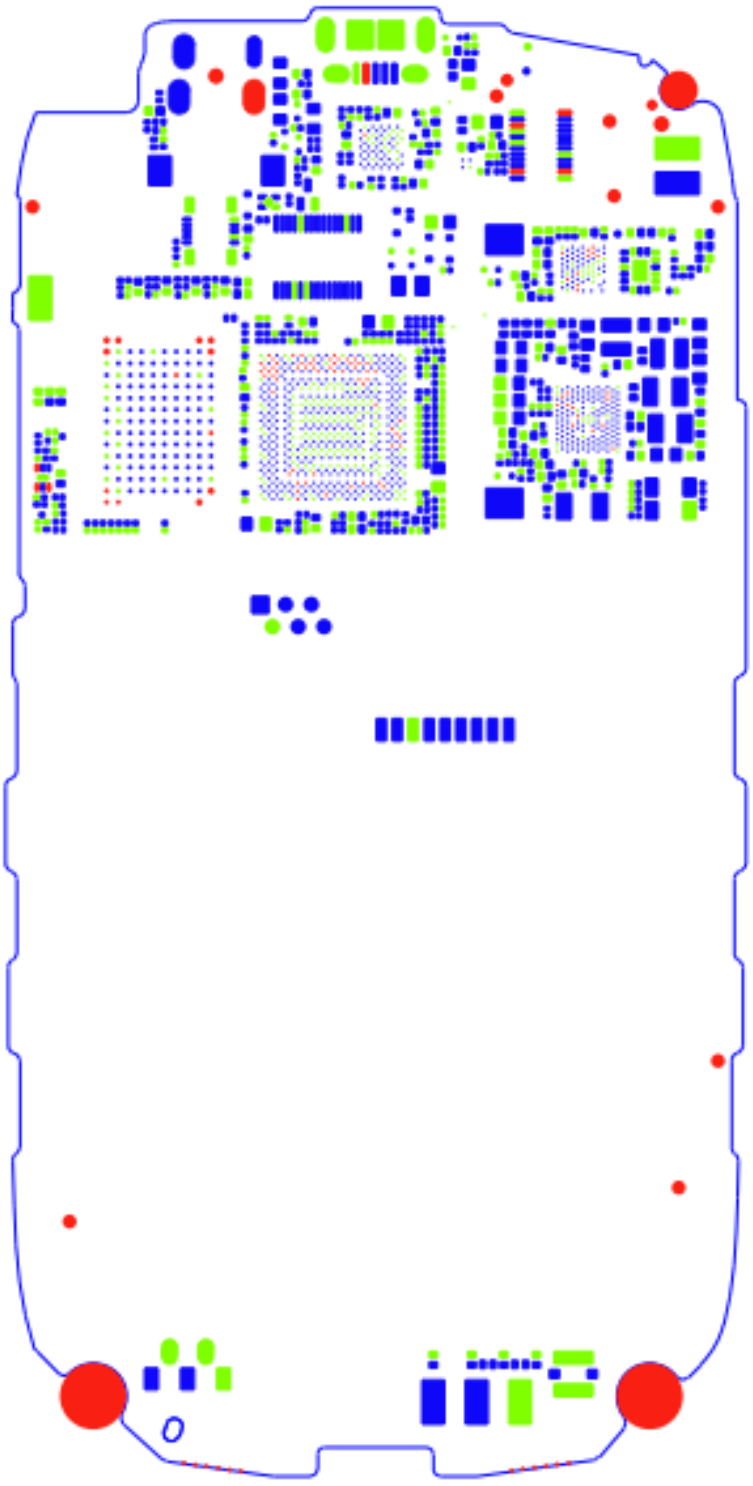


Figure 10-7 Bottom surface



11 Functional Tests

11.1 Keys

11.2 MMI Test

On the Home, enter ***#*#2846579#*#*** to enter the MMI test mode. Press the Volume– key to start a test. Touch the Menu key on the touchscreen panel to skip the current test and go to the next step. Touch the Back key to return to the previous test.

No.	Category	Step	Item	Test Method
1	microSD card test	1	microSD card test	Automatically test the microSD card functions. If a microSD card is found and is available, the phone passes this test. Press the Volume– key to start the next test.
2	SIM card test	2	SIM card test	Automatically test whether the SIM card can be recognized.
3	Keypad test	3	Keys	Press or touch all the keys. When a key is pressed or touched, the color of the corresponding key displayed on the screen will change. After all keys are tested, press the Volume– key to start the next test.
4	LCD test	4	• White screen • Black screen • Color screen	• Press the Volume– key to display the white screen. • Press the Volume– key to display the black screen. • Press the Volume– key to display triple color bars (red, green and blue).
5	LCD backlight test	5	LCD backlight	If the LCD backlight repeatedly turns on and off, the LCD backlight is normal. Press the Volume– key to start the next test.
6	Camera test	6	Camera	Automatically test the camera. The phone's camera is turned on, and the LCD displays the preview. Press the Volume– key to start the next test.
7	Touchscreen panel test	8	Touchscreen panel	Place your figure on the touchscreen panel, and slide your figure along the touchscreen panel edges. The areas near the route that your figure passes should turn red. Press the Volume– key to start the next test.
8	Vibration test	11	Vibration motor	The motor will vibrate intermittently. Press the Volume– key to start the next test.
9	Speaker test	12	Speaker	Automatically test the speaker. (Do not insert the headset.) If the speaker emits sound during the test, the phone passes this test. Press the Volume– key to start the next test.
10	Microphone loopback test	13	Microphone	Touch **Record**. Speak to the microphone, and then touch **Play**. If the microphone functions properly, you can hear the voice recording from the receiver. Test the main microphone, secondary microphone, and dual microphone (main and secondary) in the same way. Press the Volume– key to start the next test.

No.	Category	Step	Item	Test Method
11	FM test	14	FM	After a headset is inserted, the phone will search for and play an FM channel. If you hear the program from the headset, the phone passes this test. Press the Volume– key to start the next test.
12	Headset button test	15	Headset button	Insert the headset. The IN icon will turn green. Remove the headset, and the OUT icon will turn green. Press the Volume– key to start the next test.
13	Bluetooth test	16	Bluetooth	Automatically test the Bluetooth functions. During the test, the phone will search for Bluetooth devices, and display the devices that have been found. Press the Volume– key to start the next test. (Note: This test requires another device with Bluetooth enabled.)
14	Gravity sensing test	17	Gravity sensor	The LCD displays the current acceleration in the X, Y and Z axes. Place the phone in a position where the angles between the X, Y and Z axes are 45°. If the acceleration in the X, Y and Z axes is equal to each other, the phone passes this test.
15	Wi-Fi test	19	Wi-Fi	Automatically test the Wi-Fi functions. If the phone receives Wi-Fi signals properly, it passes the test. (Note: This test requires an active hotspot in the testing environment.)
The MMI test is complete, and the test results are displayed on the LCD.				

11.3 Voice Call Test

1. Install a UIM card and battery on the phone.
2. Press the Power key to power the phone on.
3. Check whether the signal strength displayed on the LCD is normal.
4. Make a call to a fixed-line phone, and check the voice quality during the call.
5. If no problems are found during the test, finish the voice call test. If any problems are found, troubleshoot the phone or send it to an advanced service site for repair.