



**Secrecy Level  
S3**

# **Maintenance Work Guide For TBG2033**

**NO: BT-ENG-TBG2033-401-100-D0001  
2009-12-09**

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## 1. Breviary, Phrase And Reference Literature

### 1.1 Breviary


abbreviation	Full words
HW	Hardware
ID	Industry Design
MD	Mechanic design

### 1.2 Phrase

Phrase	explanation

### 1.3 Reference Literature

Serial number	Document	Data	Author	subject

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## **2. INTRODUCTION**

### **2.1 Compile Objective**

This document ENG\_TBG2033\_401\_100\_D0001 is the maintenance work guide for TBG2033. The compile objective is to describe the detail theory of TBG2033 and to offer a maintenance guide for the later mass production and after service.

The readers of the document should be the debug worker of SMT and after-service. It will be the work guide for them. At the same time, the other members of the TBG2033 project group can also refer to the documents.


### **2.2 Project Background**

TBG2033 is a GSM systems project designed by us, according to the marketing evaluation, based on a platform from MTK.

Project name: TBG2033

Project presenter: Mr. Li Yong Qing

Project undertaker: TBG2033 project group

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### 3. TBG2033 summary

TBG2033 is a project developed on MTK Platform. The mainboard system is composed of RF parts (MT6140+ SKY77344) and BB parts (MT6235).

TBG2033 supports the two working frequency, GSM900MHz , DCS1800MHz and PCS1900MHz, MP3, MPEG4, USB storage, USB charger, video record and play, Bluetooth, FM, and so on.

#### 3.1 TBG2033 Component Layout

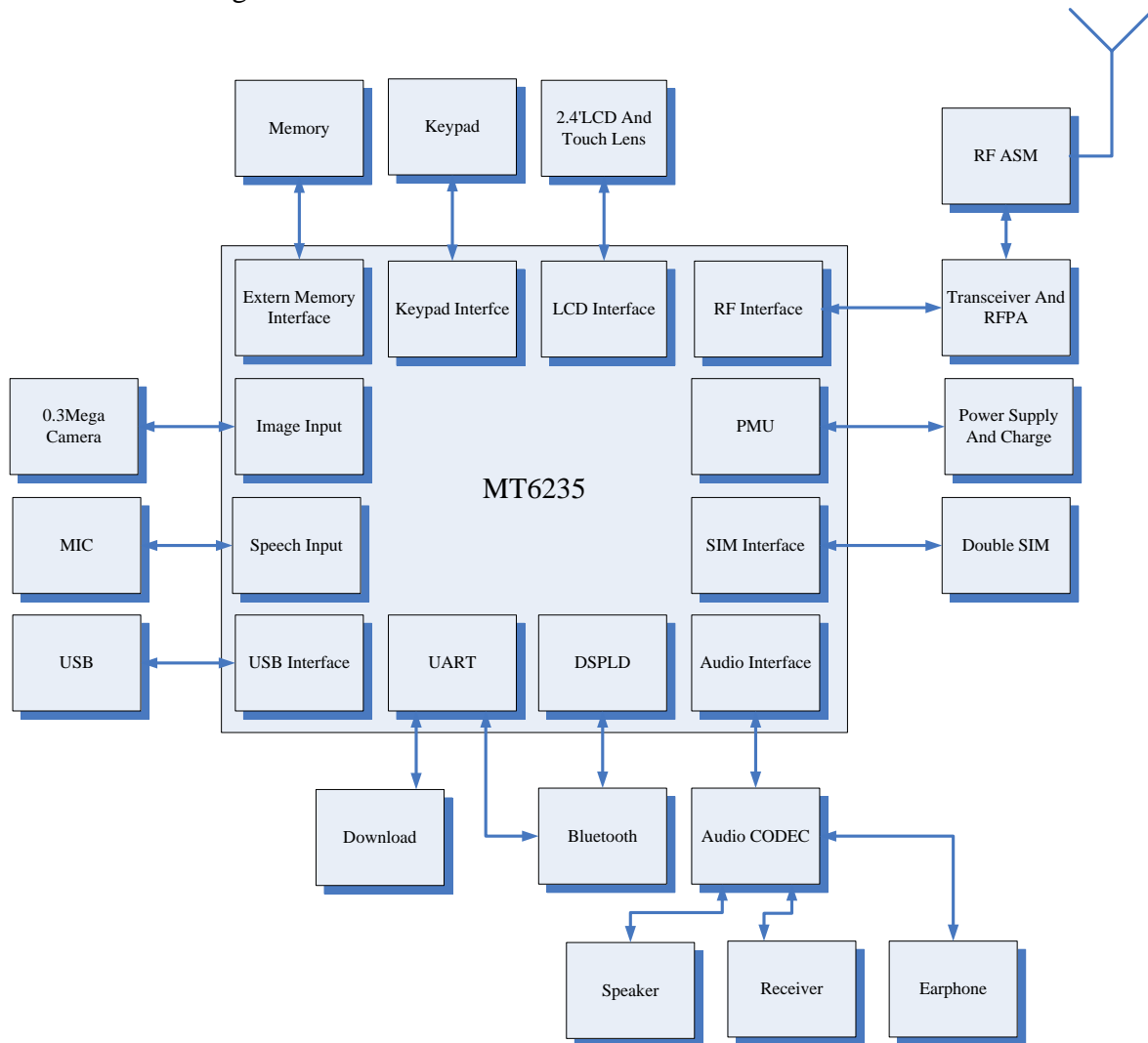
- 1、Assembly components on TOP layer as follow:
- 2、Assembly components on Bottom layer as follow:

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## 3.2 TBG2033 Hardware Diagram


The HW Diagram as follow:



## 3.3 TBG2033 Main Components


### 3.3.1 Mainboard

1. U101 MT6235 Baseband CPU
2. U303 SDRAM/NAND Flash
4. U704 SKY77344 RF Power Amplifier
5. U603 Antenna Switch (dual band)
6. U604 MT6140 RF Transceiver

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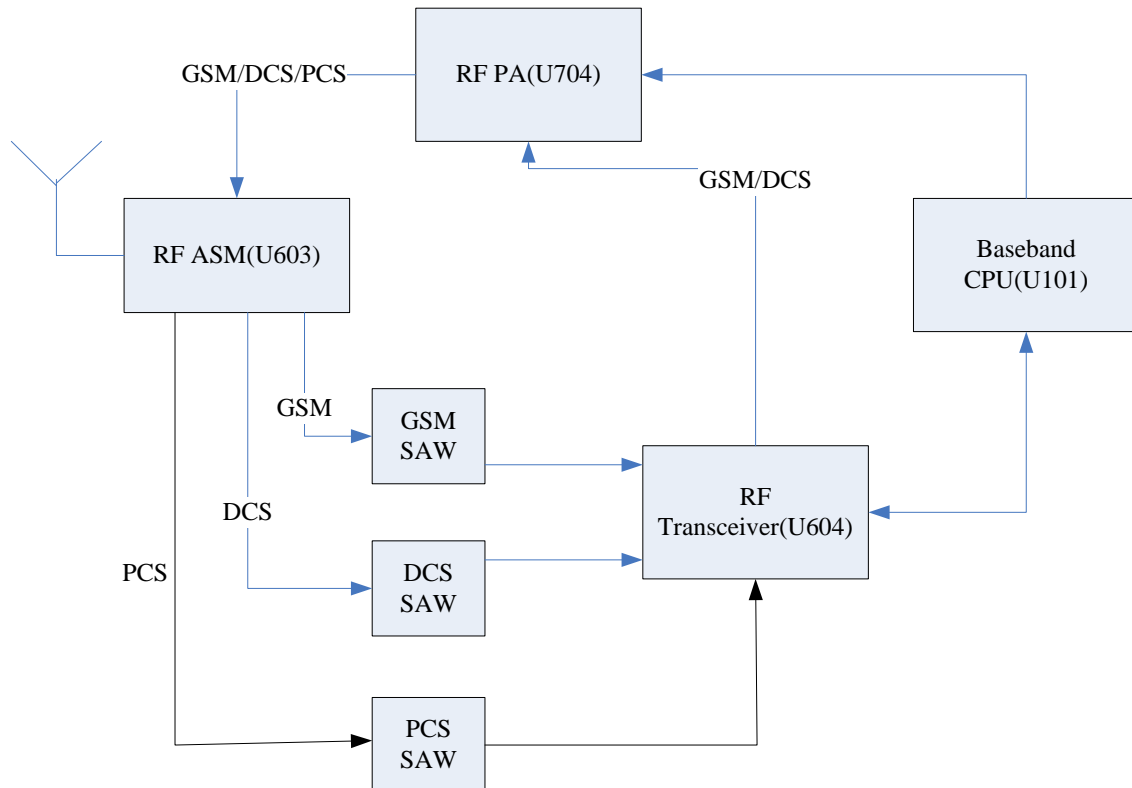
7. U605 GSM SAW filter
8. U606 DCS SAW filter
9. U607 PCS SAW filter
10. X601 26M crystal
11. U206 Motion Sensor
12. U1102 Bluetooth Chipset & FM
13. U907 Bluetooth Balance Filter
14. U601 2.8V LDO For RF
15. U602 1.8/2.8V Dual LDO For Camera
16. X101 32.768K Crystal
17. U508 Backlight Driver IC
18. J502 LCD Connector
19. J202, 701: SIM Connector
20. J5 Battery Connector
21. J2 I/O, Charger Connector
22. J17 Keypad Connector
23. J501 Camera Connector



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## 4. RF PARTS

### 4.1 Basic diagram




The RF part of TBG2033 consists of a transceiver (MT6140), a PA (SKY77344) and an ASM. The two functions of the RF circuit as below:

- 1、 The receiver circuit will receive the high frequency signal from the antenna, select out the necessary signals and demodulate them into I/Q signals, transmit them to the BB (MT6235).
- 2、 The transmit circuit will modulate the I/Q signals from the BB to specified frequency , amplify it's power, then transmit it to the antenna.

### 4.2 TX Parts

#### 4.2.1 TX Circuit

The modulation circuit is composed of PA and ASM. The PLL circuit is mainly built in the MT6140. At first, the I/Q signals come into the pin 30~33 of MT6140 and then are modulated into RF signals after going through the PLL circuit. The RF signals are sent out

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from the pin38 and pin39 to the SKY77344 (U704). After sent into the SKY77344, the signals are amplified and transmitted as the electromagnetic wave by the antenna after passing through the ASM. Between the MT6140 and SKY77344, there are some  $\pi$  circuits used as attenuation circuit. And the ASM do the selects of RX、TX and GSM、DCS.

#### 4.2.2 Power Amplifier - SKY77344 (704)

This part is controlled by the way of voltage control. It's used to amplifier the power of the signals according to the requirements of the system. The power of the signals is amplified to different levels by VRAMP. The power level of the GSM\_OUT signal is at 5 to19, 3.2mW to 2W; The DCS\_OUT is at 0 to15, 1mW to 1W. The ENABLE will control the working state of the chipset and the output power of PA will be controlled by the VRAMP. The PA's working states is not continuous and its frequency is decided by the signal from pin BS.

#### 4.3 RX Circuit

At first, the GSM signals received by the antenna will go through the front model SAW filter to the transceiver MT6140. They are amplified, mixed and modulated into the I/Q carried by the 100KHz wave, done by the band pass filter, amplifier (controlled gain), filter, amplifier(controlled gain) and mixer. Then the 4 tracks of I/Q signals are sent out from the transceiver and to the CPU(BB).

The FEM is the ASM ,a select switch of RX and TX, GSM and DCS. By this way, the isolation will be well strengthened and signals will be well protected and avoid the phenomenon crosstalk.

#### 4.4 RF Part examine and Repair -TX

##### 4.4.1 Necessary condition

- Test condition1: Voltage=3.8V-4.2V
- Test condition2: GSM Band
- Test condition3: DCS Band
- Test Instrument: CMU200、Oscillograph 、 spectrum analyze

##### 4.4.2 TX Part Examine and Related Wave form

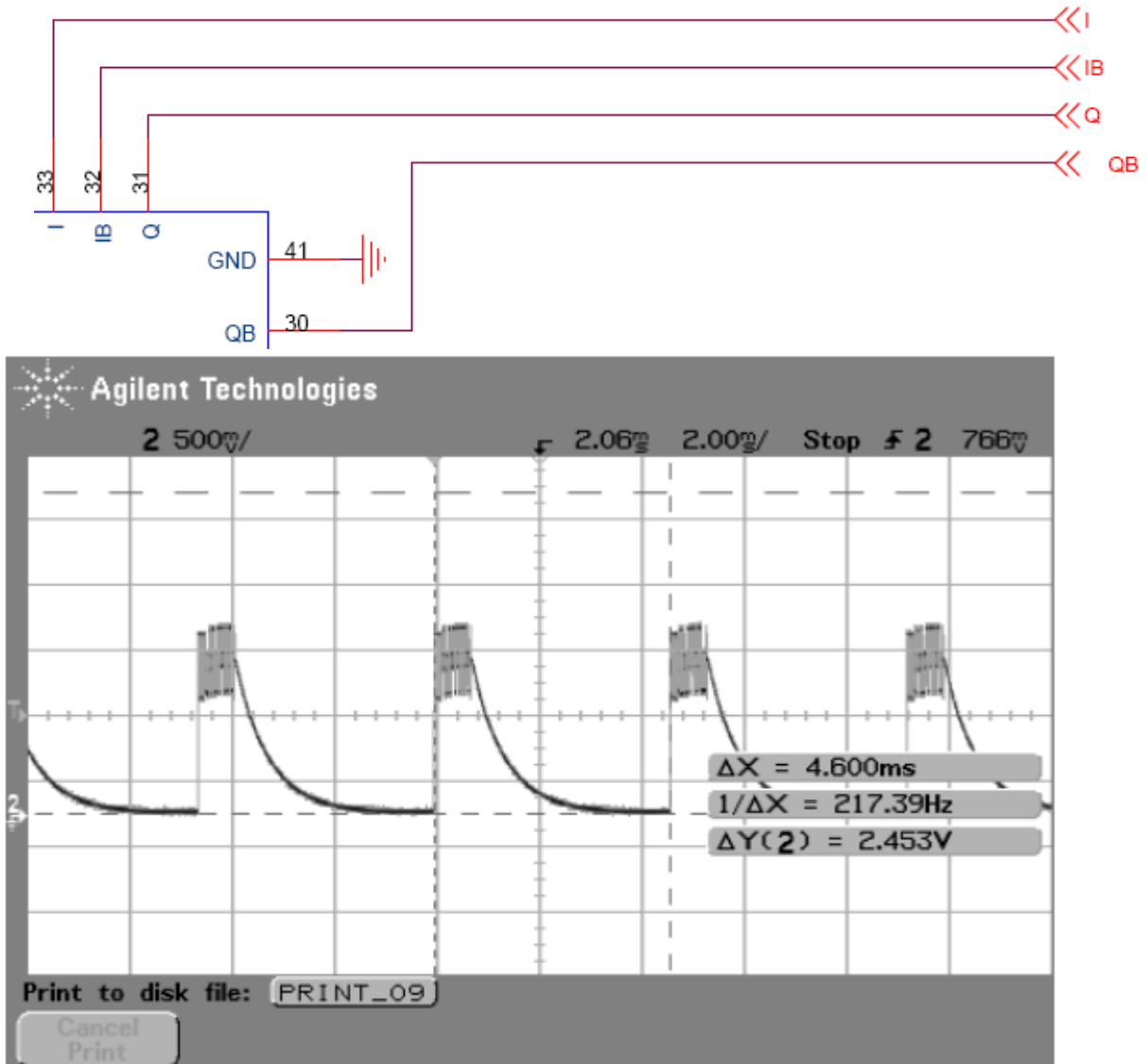
Make the mainboard into the transmit states by using the special software. In the GSM band, select the 62<sup>nd</sup> channel, 5<sup>th</sup> power level. In the DCS band, select the 699<sup>th</sup> channel, 0 power level. Then observe whether the current will raise and check the wave by using the spectrum analyzer or the oscillograph .

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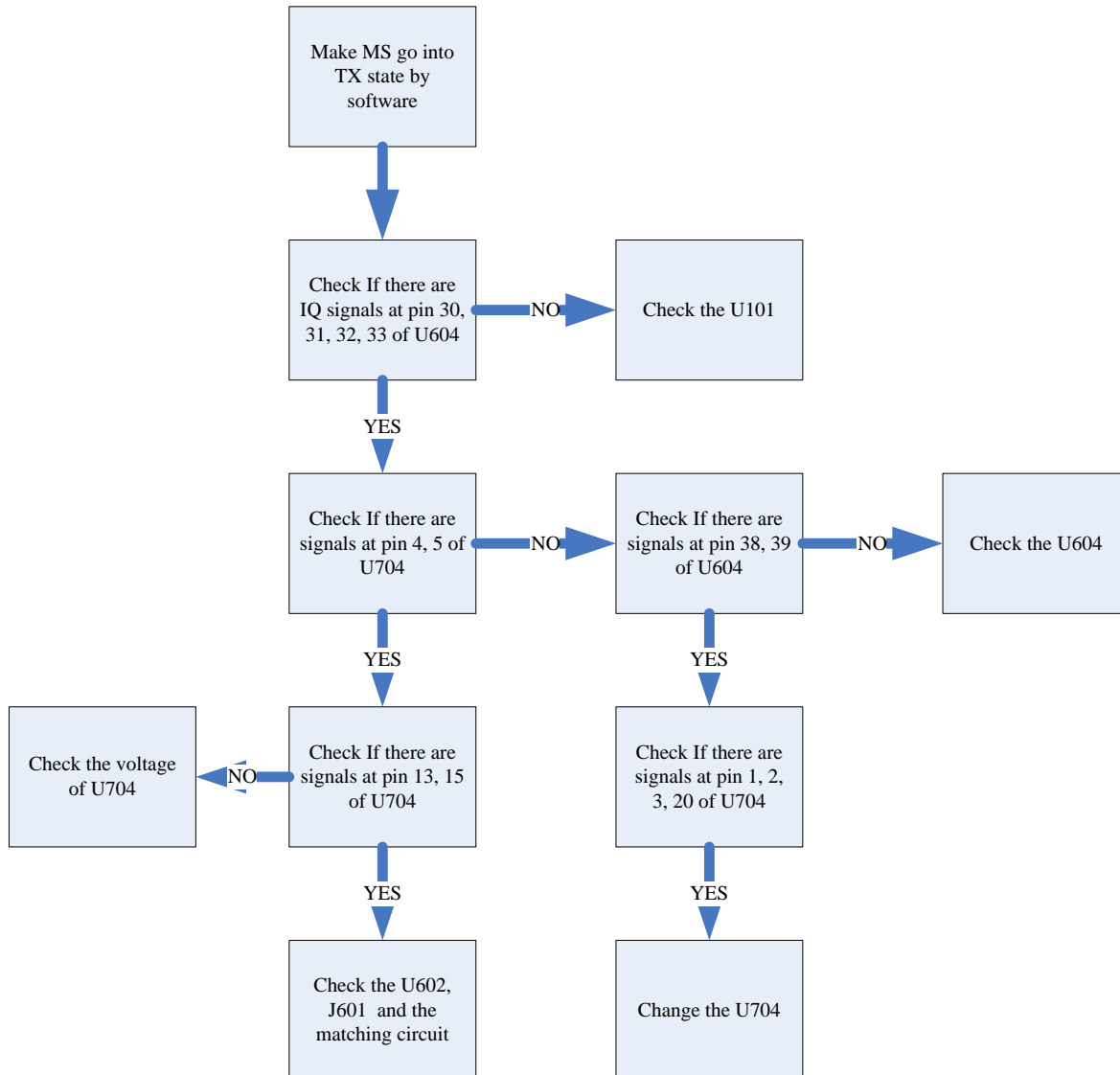
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- a. The wave form of the pin30~33 I/Q signal at transmit state as below






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## 4.6 RF Part examine and Repair -RX

### 4.6.1 Necessary condition

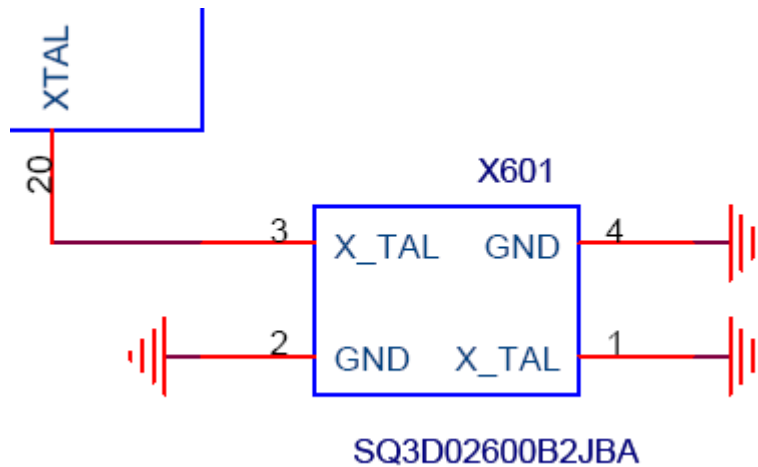
- a Test condition1: Vbat =3.8V-4.2V
- b Test condition1: GSM Band
  - RX mod: CH62
  - Input power: -60dbm

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- c Test condition1: DCS Band  
RX mode: CH700  
Input power: -60dbm
- d signal generator

#### 4.6.2 26M Clock (sine wave)

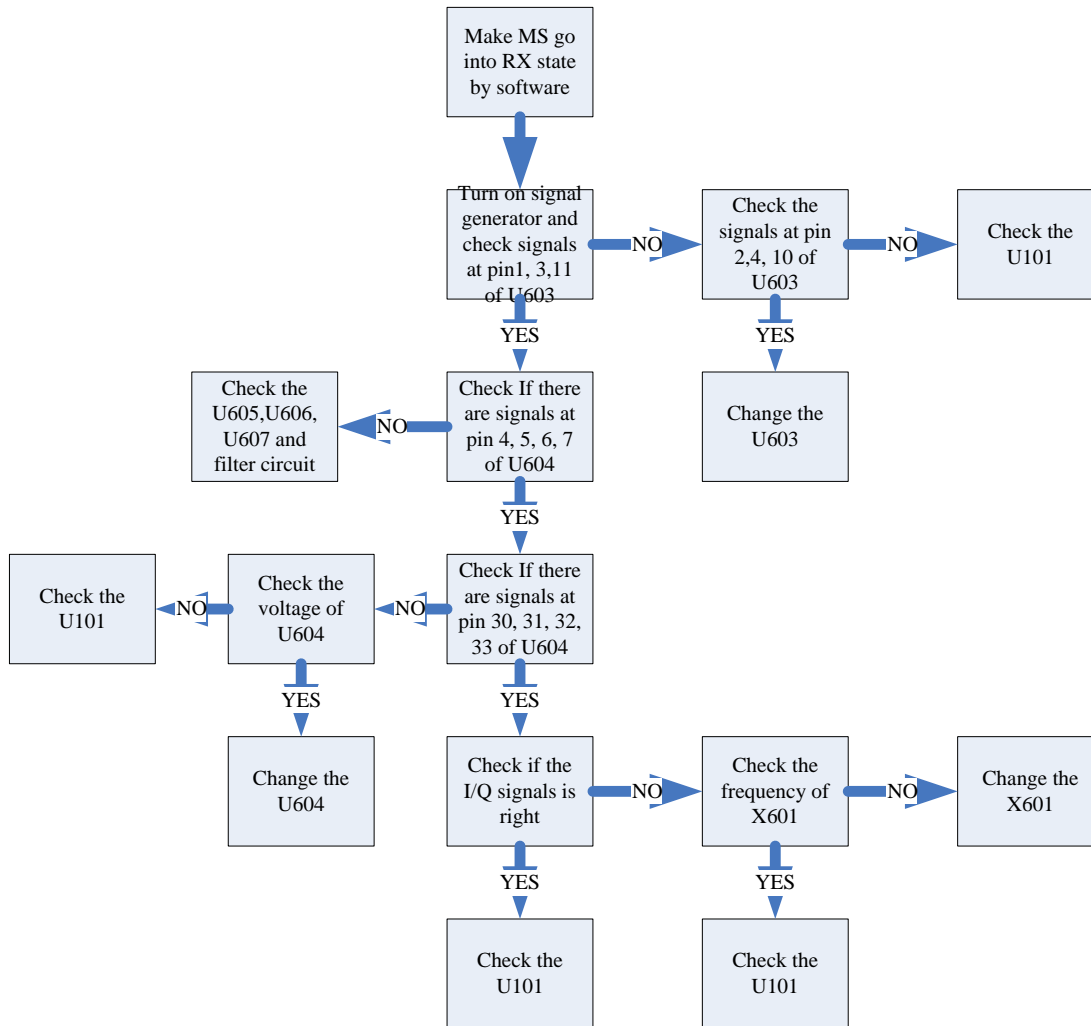
X601 outputs the accuracy 26MHz to the U604's pin20 XTAL.



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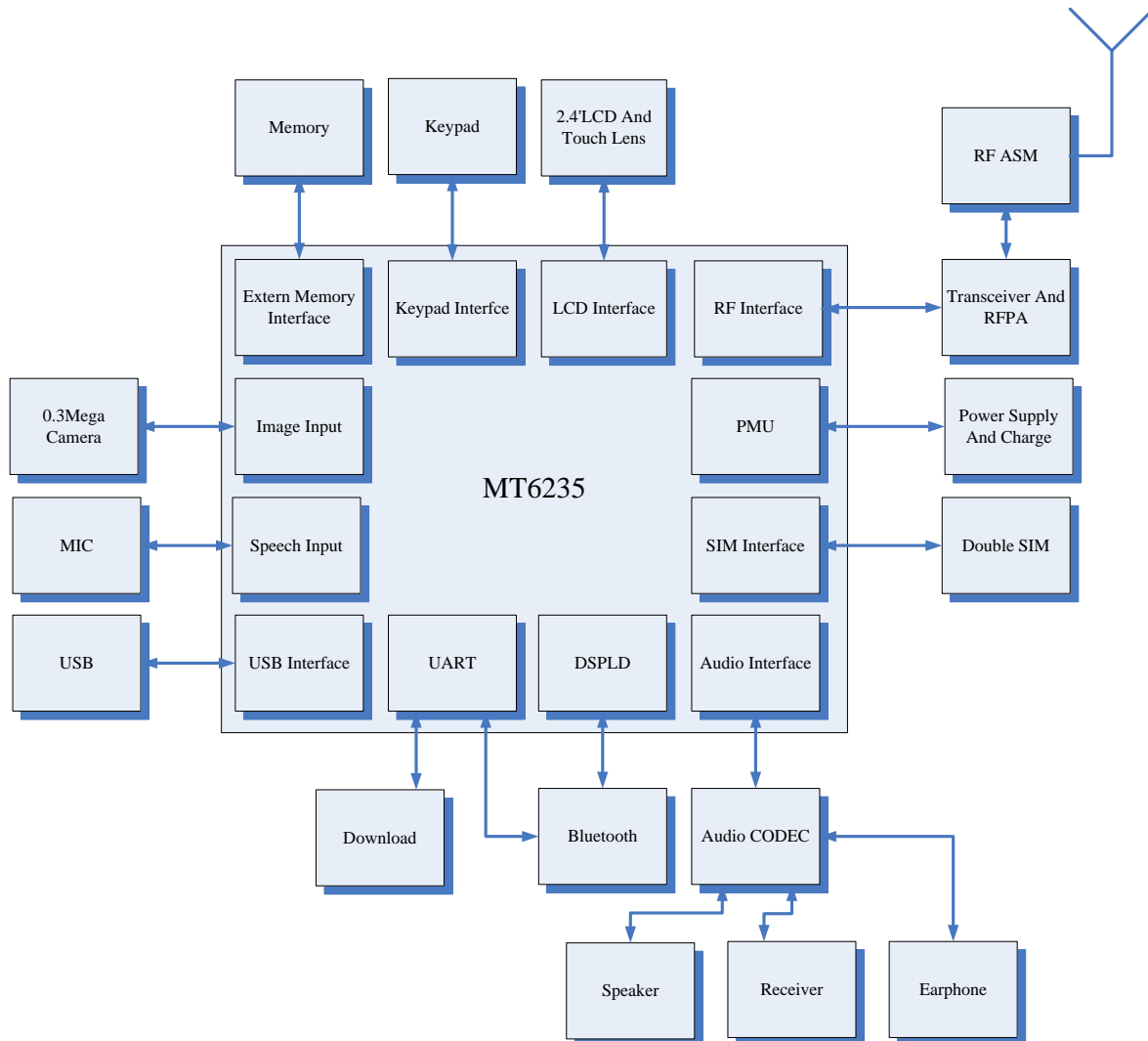
## 4.7 RX examine and repair flow chart



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## 5. BASEBAND PARTS



TBG2033's baseband is composed of MT6235(BB IC). The MT6235 is the core chipset with responsibility for the audio, communication and the control of all parts of the system.

The digital baseband in MT6235 is the strengthen GSM processor with integrated channel encoder/decoder, complex/de-complex, encrypt/decrypt and other subsystems of coder/decoder.

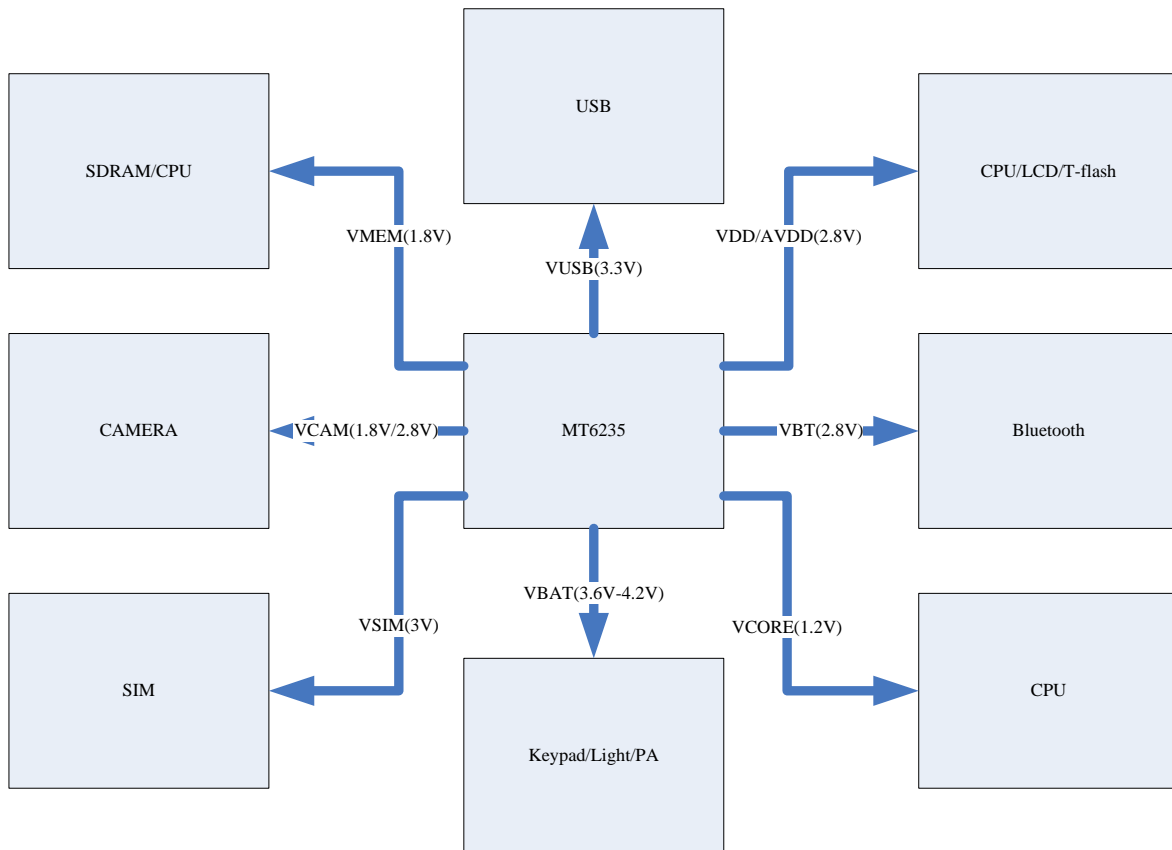
The analog parts mainly include the analog part of the MT6235, audio part of MT6235 and the coder/decoder in it. The analog part of the chipset integrate three function modules: two separates audio input/output channel, the audio decoder for buzzer; the differential I/Q input/output, GMSK modulator, and A/D、D/A coder/decoder; Besides these, they also include the parts of AFC DAC、RAMP DAC、AGC DAC and a auxiliary four



channels A/D converter. And also, an integrated watch dog interface is used to enhance the stabilization of the system.

The MT6235 integrate the power management unit. Most of the power supply of the system is made by it's integrated LDOs. And the chipset also has the function of management of the charge.

### 5.1 Power Management Part Diagram

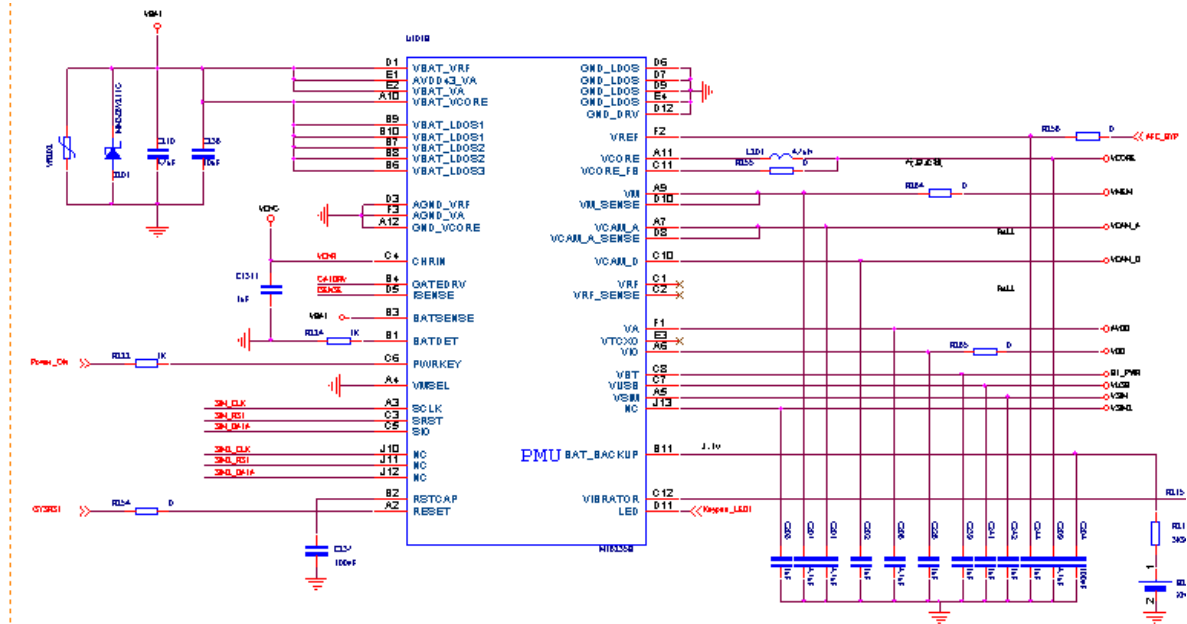


The power management part is composed of the PMU chipset and the periphery charging circuit. The logic level translation of SIM card and the reset signal of the system are all made by the PMU. The output of the LDO integrated in the chipset as below:  
Vcore: 1.2V, VIO: 2.8V, VA: 2.8V, VTCXO: 2.8V, VRTC: 1.5V, VMEM: 1.8V。

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## 5.2 Schematic



## 5.3 Power on

### 1) Normal Power On

The normal way of power on is press the power on key, then the PWRKEY is pulled down and the system is powered on. At this time, all of the LDOs integrated in the PMU are started except the VSIM and the VCORE starts the reset timer. After the time out, the reset signal will be sent out(H), then the digital baseband will be also started. That means the MT6235 goes to the working states. They will begin polling and detecting the state of the PWRKEY. In case of the pulling up of the PWRKEY, the power on key can be released. This is the first process of the power on.

### 2) Schedule Power On/OFF

The RTC module can also realize the power on because it can pull up the PWRKEY and start all the LDOs. This way can be used as Schedule Power On/OFF.

### 3) Charge Power On

When the charger is plugged in, the system will also come into a special power on state. It is detected by the CHRIN of the PMU.

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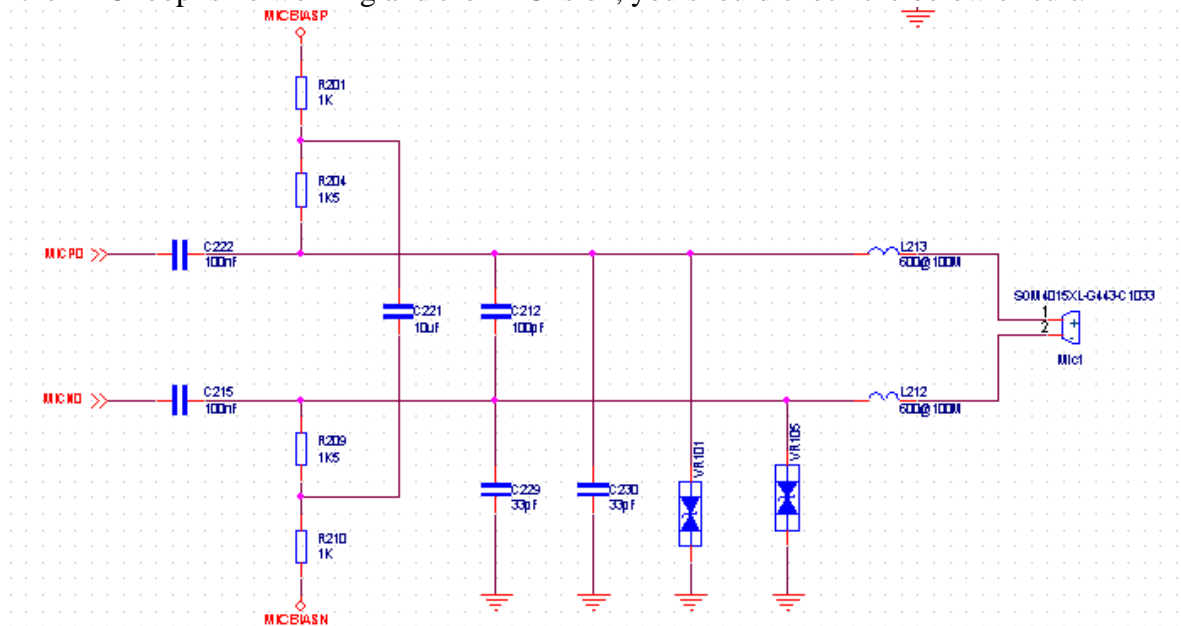
## 5.4 Audio Part

### 5.4.1 Speaker Circuit

TBG2033 is the music phone, so it use the MT6235 internal CODEC part for speaker, earphone.

### 5.4.2 MIC Circuit

If the MIC loop is no working and the MIC is ok, you should check the below circuit.



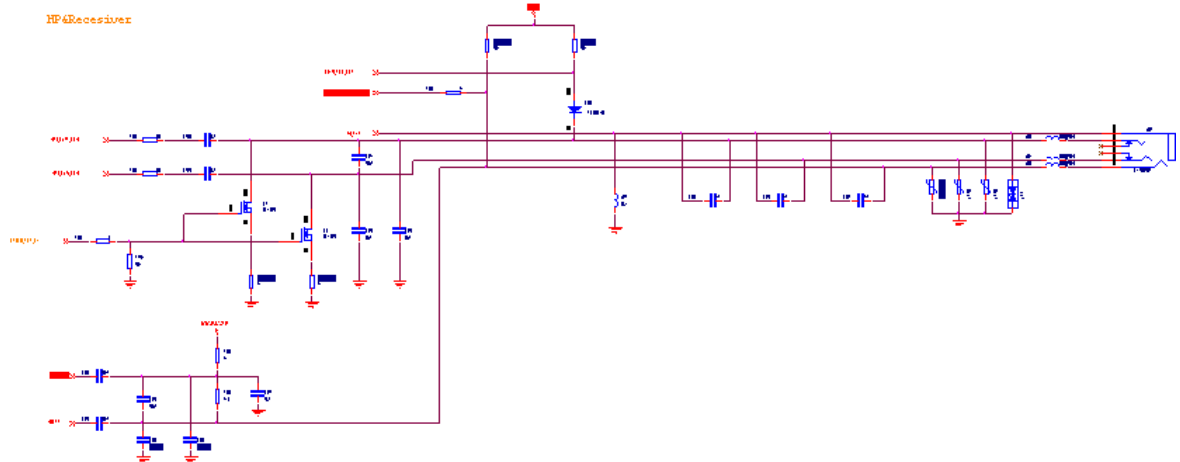
### 5.4.3 Earphone Circuit

In this circuit, there are earphone\_speaker and earphone\_MIC, two signals channels.

If the earphone is good, plugged into the audio jack, but it doesn't work normally, such as no speaker audio, no mic audio please check the circuit below:

The EINT0\_HEADSET is the interrupt request from the plugged earphone to the CPU.

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## 5.5 Download

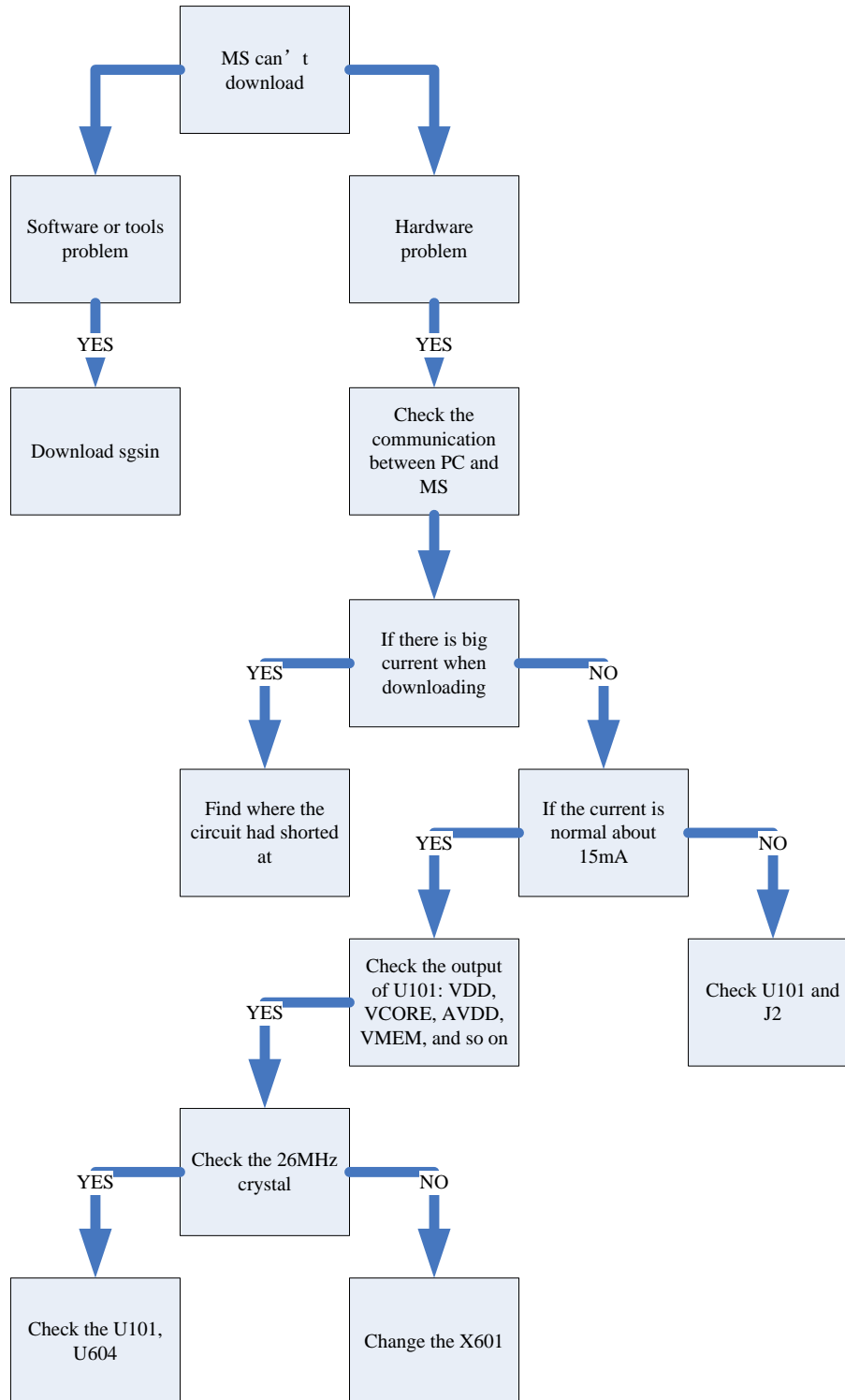
### 5.5.1 NAND Flash Download Issue


The download cable's pin include as the follow: BAT、TX、RX、GND、CHARGE .

Most of the mainboards download failed are due to the false solder or short solder. So you should check the connection of the UART between PC and mainboard. If it is not good working, there must be something wrong with the MT6235, J2 or TX、RX pin. So, please check the solder of the components carefully, and plug the download cable into the mainboard, observe the total current. If the current is very high, it means the VCHG or VBAT is shorted with GND. Please cut the power and find out the short point; If the current is higher than the normal current (about 30mA), but not too high, it means that some of the LDOs' output is abnormal. So the Vcore(1.2V)、VDD(2.8V)、AVDD(2.8V)、VTCXO(2.8V)、VRTC(1.5V)、VMEM(1.8V) should be checked and measured. If the output is abnormal, maybe it is bad connected. If the output current is very low or not exists, please mainly check the MT6235 and J2's solder. When it is downloaded, the 26MHz clock is necessary besides the LDOs. The clock can be measured by the oscilloscope.

The maintenance flow of the NAND Flash as below:

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## 5.6 Keypad Part

In the project, the array scanning is used for the keypad circuit. When a key is pressed, the scan signal will be triggered and the CPU can recognize the correspondent line and row, then read the function of it by the software.

### The Common Malfunction

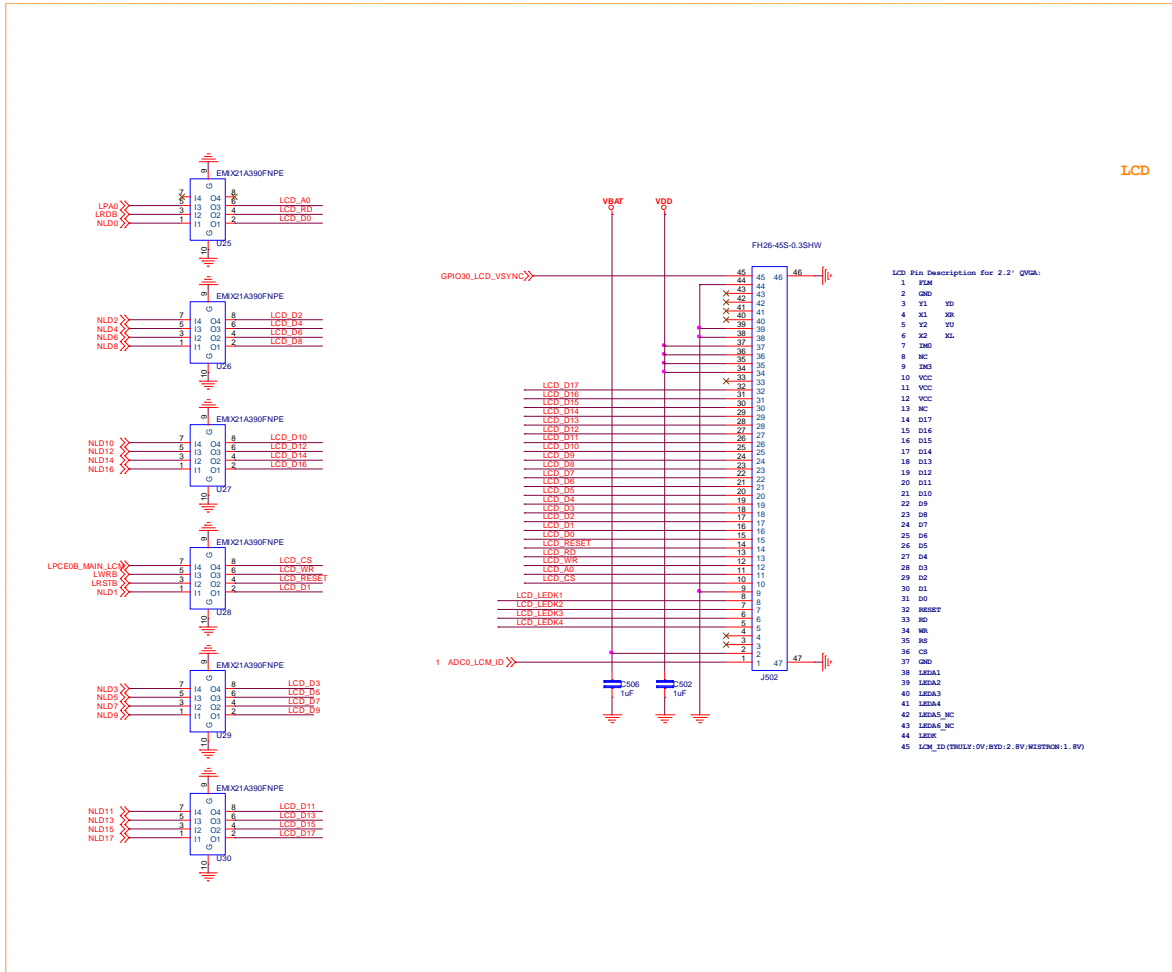
- 1、 The mobile can normally start, but all the keys can not work. The reason is that one key is short.  
The Analysis step as follow:
  - A. Inspects whether the side key has the phenomenon of short-circuits and so on.
  - B. Inspects whether the DOME of keyboard and circuit exists the trouble.
- 2、 Several keys' simultaneously malfunction (the general performance is that a row or a line of keys' malfunction)  
This reason is generally that any of the keys is pressed for a long time, then make the CPU can not detect the other lines or rows of keys pressed. Most of these trouble is caused by the incorrect assembly or mechanical design.
- 3、 one key's malfunction  
In this situation, the dome of the key should be checked First ,whether exists some dirty or not. If it is ok, check the circuit.

## 5.7 LCD Part

### 5.8.1 Circuit and Maintenance.

The LCM is connected by an FPC and an odd ZIF connector. The circuit of the connector as below:

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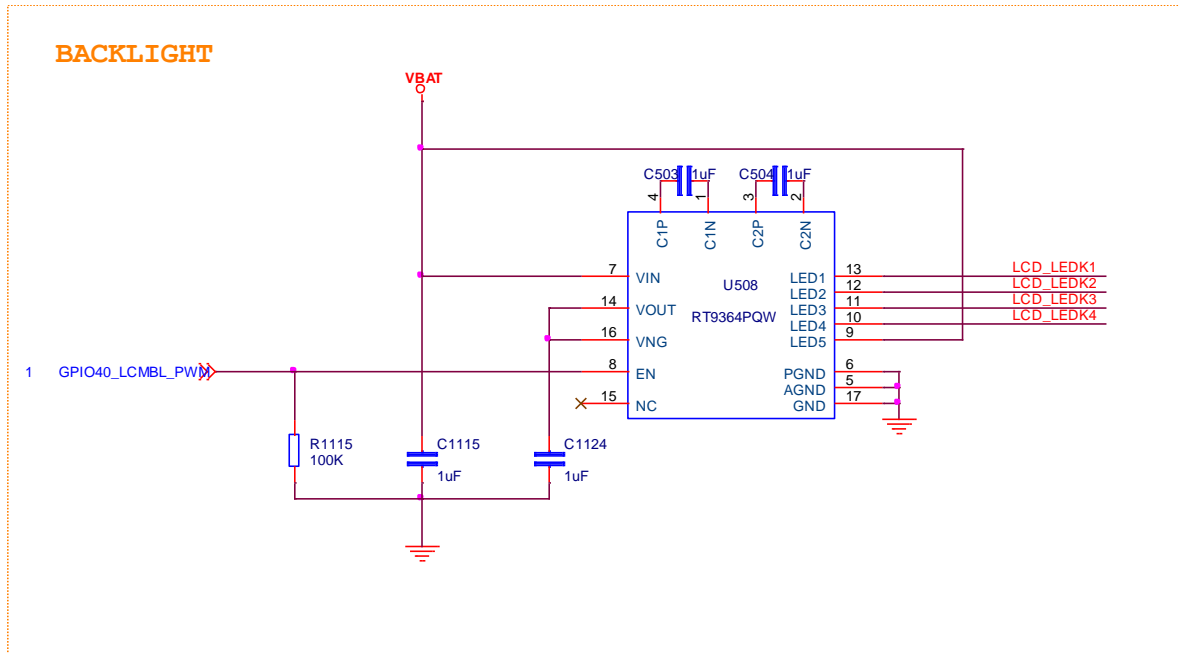
Most of the Malfuntions in this part are such as white screen, black screen, lack of color and snow screen. The check steps as below:

1. If White screen, first check the connection of the FPC. Then check the solder of the connector's pin. If all of these are ok, please check the solder of EMI Filters for the connector.
2. If Black screen, check the voltage of the LCM first, then repeat the white screen's check steps. After that, check the connector's solder.
3. Lack of color, repeat the white and black screen's steps.

## 5.9 Backlight Part

### ● 5.9.1 Circuit

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## ● 5.9.2 Circuit and Maintenance

If the LCM has no display or bad display and it is not the problem as the 5.8's description, please check the GPIO40\_LCM\_BL\_PWM's voltage level and the current and voltage of LCD\_LEDK1、LCD\_LEDK2、LCD\_LEDK3、LCD\_LEDK4. After that, check the solder of the LCM connector's pin.

## 5.13 Bluetooth Part

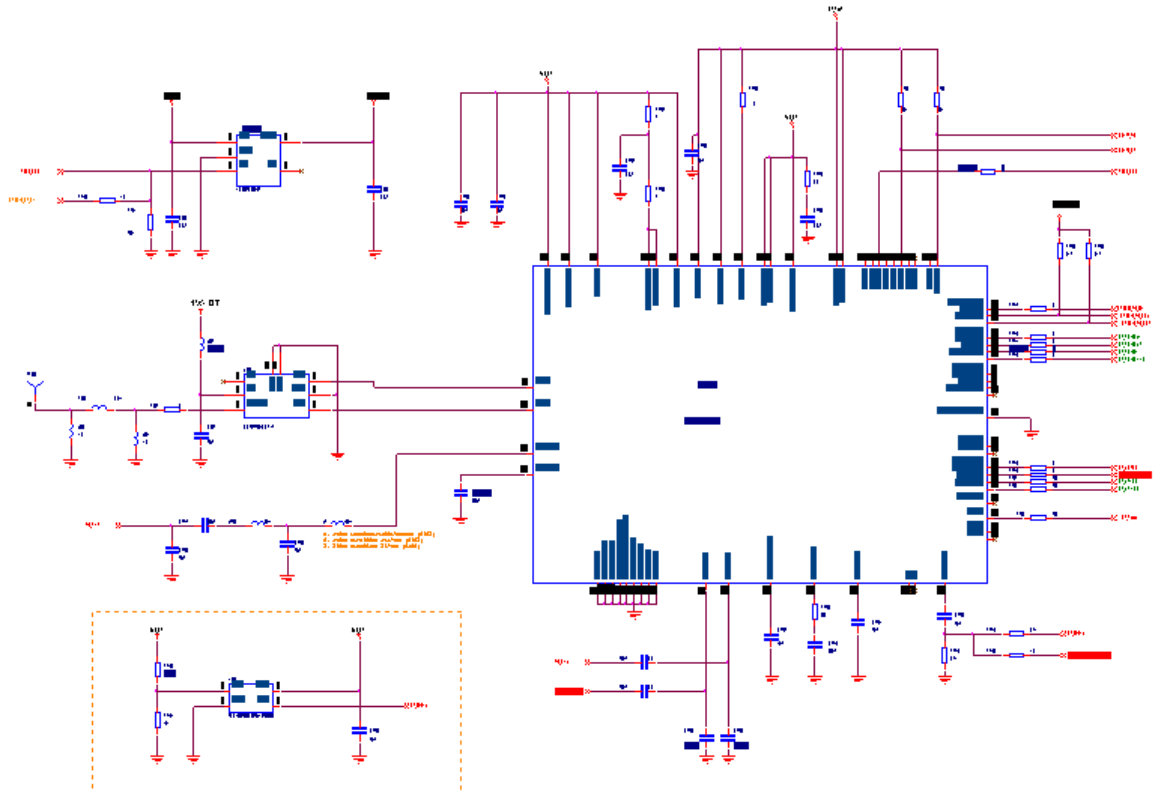
### 5.13.1 Circuit



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## 5.13.2 Check and Maintenance

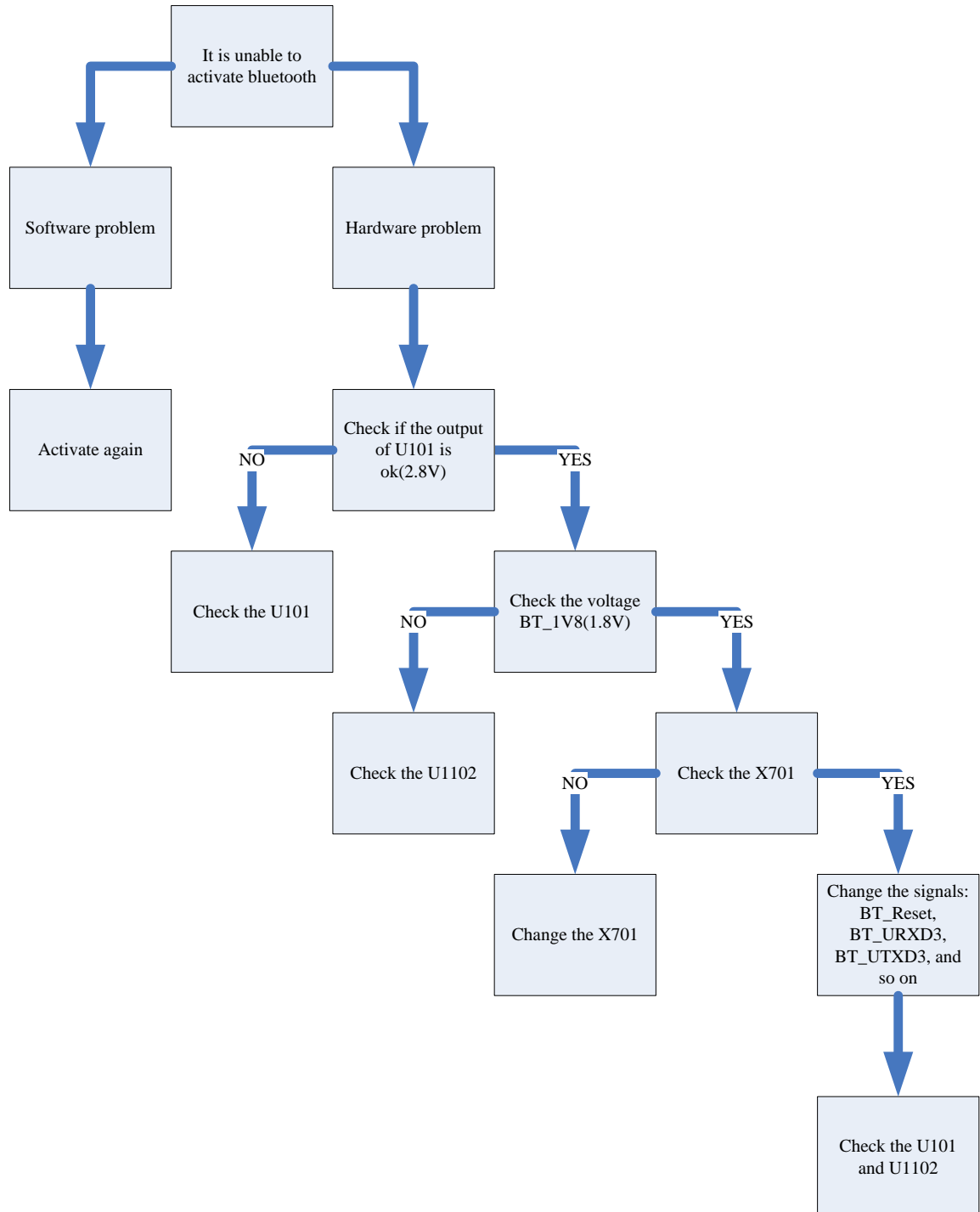
The common malfunctions as below :


- 1、 Power on the Bluetooth fail  
Check the U101 output BT\_PWR
- 2、 Search the audio device fail:  
First, check the X602, R1143, U1102, In the end, check the BT\_EINT.
- 3、 No data transmit:  
At first check the BT\_PCMCLK, BT\_PCMIN, BT\_PCMOUT, BT\_PCMSYNC, BT\_UTXD3, BT\_URXD3, BT\_Reset, if they are ok, please check the U1102's solder.

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**6. The Tag**

This article described the examination and maintenance of the TBG2033’s hardware.  
It should be modified and improved in the later work for better.  
Thanks.