



Service Manual

# Service Manual

## LG620GM



Model : LG620GM

# Table Of Contents

<b>1. Introduction .....</b>	<b>5</b>	4.6 Vibrator Trouble .....	82
1.1 Purpose .....	5	4.7 LCD Trouble .....	84
1.2 Regulatory Information .....	5	4.8 Camera Trouble .....	88
1.3 Abbreviation .....	7	4.9 Speaker Trouble .....	92
<b>2. System Specification .....</b>	<b>9</b>	4.10 Earphone Trouble .....	95
2.1 H/W Features .....	9	4.11 Receiver Trouble .....	98
2.2 Technical Specification .....	11	4.12 Microphone Trouble .....	101
<b>3. Technical brief .....</b>	<b>16</b>	4.13 SIM Card Interface Trouble .....	103
3.1 Digital Main Processor .....	16	4.14 KEY backlight Trouble .....	105
3.2 Power Management .....	21	4.15 Micro SD Trouble .....	108
3.3 FEM with integrated Power Amplifier Module (SKY77547, U304) .....	35	4.16 Bluetooth Trouble .....	110
3.4 Crystal(26 MHz, X101) .....	38	4.17 FM Radio Trouble .....	112
3.5 RF Subsystem of PMB8810 (U102) .....	39	4.18 Slide on/off Trouble .....	118
3.6 MEMORY(PF38F5060M0Y0BE, U101) .....	44	<b>5. Download .....</b>	<b>116</b>
3.7 BT Module .....	46	<b>6. Block diagram .....</b>	<b>122</b>
3.8 SIM Card Interface .....	48	<b>7. Circuit Diagram .....</b>	<b>123</b>
3.9 LCD Interface .....	49	<b>8. BGA Pin Map .....</b>	<b>129</b>
3.10 Battery Charger Interface .....	52	<b>9. PCB Layout .....</b>	<b>131</b>
3.11 Keypad Interface .....	53	<b>10. Engineering mode .....</b>	<b>137</b>
3.12 Audio Front-End .....	55	<b>11. Stand Alone Test .....</b>	<b>138</b>
3.13 Camera Interface(1.3M Fixed Focus Camera) .....	61	<b>12 Auto Calibration .....</b>	<b>143</b>
3.14 KEY BACKLIGHT LED Interface .....	63	<b>13. Exploded view &amp; Replacement part list .</b>	<b>149</b>
3.15 Vibrator Interface .....	64	13.1 Exploded view .....	149
3.16 Slide SW Interface .....	65	13.2 Replacement Parts .....	151
<b>4. Trouble Shooting .....</b>	<b>66</b>	13.3 Accessory .....	166
4.1 RF Component .....	66		
4.2 RX Trouble .....	67		
4.3 TX Trouble .....	72		
4.4 Power On Trouble .....	77		
4.5 Charging Trouble .....	80		



# 1. Introduction

## 1.1 Purpose

This manual provides the information necessary to repair, calibration, description and download the features of this model.

## 1.2 Regulatory Information

### A. Security

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services. System users are responsible for the security of own system. There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common-carrier telecommunication service of facilities accessed through or connected to it.

The manufacturer will not be responsible for any charges that result from such unauthorized use.

### B. Incidence of Harm

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

### C. Changes in Service

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the this phone or compatibility with the network, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

### D. Maintenance Limitations

Maintenance limitations on this model must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs except as specifically noted in this manual. Therefore, note that unauthorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

# 1. Introduction

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## E. Notice of Radiated Emissions

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

## F. Pictures

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

## G. Interference and Attenuation

Phone may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

## H. Electrostatic Sensitive Devices

### ATTENTION

**Boards, which contain Electrostatic Sensitive Device (ESD), are indicated by the sign. Following information is ESD handling:**



- Service personnel should ground themselves by using a wrist strap when exchange system boards.
- When repairs are made to a system board, they should spread the floor with anti-static mat which is also grounded.
- Use a suitable, grounded soldering iron.
- Keep sensitive parts in these protective packages until these are used.
- When returning system boards or parts like EEPROM to the factory, use the protective package as described.

## 1.3 Abbreviations

For the purposes of this manual, following abbreviations apply:

APC	Automatic Power Control
BB	Baseband
BER	Bit Error Ratio
CC-CV	Constant Current – Constant Voltage
DAC	Digital to Analog Converter
DCS	Digital Communication System
dBm	dB relative to 1 milli watt
DSP	Digital Signal Processing
EEPROM	Electrical Erasable Programmable Read-Only Memory
ESD	Electrostatic Discharge
FPCB	Flexible Printed Circuit Board
GMSK	Gaussian Minimum Shift Keying
GPIO	General Purpose Interface Bus
GSM	Global System for Mobile Communications
IPUI	International Portable User Identity
IF	Intermediate Frequency
LCD	Liquid Crystal Display
LDO	Low Drop Output
LED	Light Emitting Diode
OPLL	Offset Phase Locked Loop

## 1. Introduction

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PAM	Power Amplifier Module
PCB	Printed Circuit Board
PGA	Programmable Gain Amplifier
PLL	Phase Locked Loop
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RLR	Receiving Loudness Rating
RMS	Root Mean Square
RTC	Real Time Clock
SAW	Surface Acoustic Wave
SIM	Subscriber Identity Module
SLR	Sending Loudness Rating
SRAM	Static Random Access Memory
PSRAM	Pseudo SRAM
STM	Side Tone Masking Rating
TA	Travel Adapter
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
UART	Universal Asynchronous Receiver/Transmitter
VCO	Voltage Controlled Oscillator
VCTCXO	Voltage Control Temperature Compensated Crystal Oscillator
WAP	Wireless Application Protocol

## 2. System Specification

### 2.1 H/W Features

Item	Feature	Comment
Standard Battery	Lithium-ion r, 3.7V 900mAh	
Stand by TIME	Up to 200 hrs : Paging Period 5, RSSI 85dBm	
Talk time	Up to 200min : GSM Tx Level 7	
Stand by time	Up to 200 hours (Paging Period: 5, RSSI: -85 dBm)	
Charging time	Approx. 4 hours	
RX Sensitivity	GSM, EGSM: -109dBm, DCS: -109dBm	
TX output power	GSM, EGSM: 32.5dBm(Level 5), DCS , PCS: 29.5dBm(Level 0)	
GPRS compatibility	Class 10	
SIM card type	3V Small	
Display	MAIN : 2.2" TFT 176 × 220 pixel 262K Color	
Status Indicator	Hard icons. Key Pad 0 ~ 9, #, *, Up/Down Left/Right Navigation Key Send Key, PWR Key ,Soft Key(Left/Right)	
ANT	Internal	
EAR Phone Jack	Yes	
PC Synchronization	Yes	
Speech coding	EFR/FR/HR	
Data and Fax	Yes	
Vibrator	Yes	
Loud Speaker	Yes	
Voice Recoding	Yes	
Microphone	Yes	

## 2. System Specification

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Item	Feature	Comment
Speaker/Receiver	18x12Φ Speaker/ Receiver	
Travel Adapter	Yes	
MIDI	SW MIDI (Mono SPK)	
Camera	1.3M	
Bluetooth / FM Radio	Bluetooth version 2.1 / 76~108MHz supported	

### 2.2 Technical Specification

Item	Description	Specification					
1	Frequency Band	<b>GSM850</b> TX: 824 ~ 849 MHz RX: 869 ~ 894 MHz		<b>EGSM</b> TX: 880 ~ 915MHz RX: 925 ~ 960 MHz			
		<b>DCS</b> TX: 1710 ~ 1785 MHz RX: 1805 ~ 1880 MHz					
		<b>PCS</b> TX: 1850 ~ 1910 MHz RX: 1930 ~ 1990 MHz					
2	Phase Error	RMS < 5 degrees Peak < 20 degrees					
3	Frequency Error	< 0.1 ppm					
4	Power Level	<b>GSM850/EGSM</b>					
		Level	Power	Toler.	Level	Power	Toler.
		5	33dBm	±2dB	13	17dBm	± 3dB
		6	31dBm	±3dB	14	15dBm	± 3dB
		7	29dBm	±3dB	15	13dBm	± 3dB
		8	27dBm	±3dB	16	11dBm	± 5dB
		9	25dBm	±3dB	17	9dBm	± 5dB
		10	23dBm	±3dB	18	7dBm	± 5dB
		11	21dBm	±3dB	19	5dBm	± 5dB
		12	19dBm	±3dB			
		<b>DCS/PCS</b>					
		Level	Power	Toler.	Level	Power	Toler.
		0	30dBm	±2dB	8	14dBm	± 3dB
		1	28dBm	±3dB	9	12dBm	± 4dB
		2	26dBm	±3dB	10	10dBm	± 4dB
		3	24dBm	±3dB	11	8dBm	± 4dB
		4	22dBm	±3dB	12	6dBm	± 4dB
		5	20dBm	±3dB	13	4dBm	± 4dB
		6	18dBm	±3dB	14	2dBm	± 5dB
		7	16dBm	±3dB	15	0dBm	± 5dB

## 2. System Specification

Item	Description	Specification	
5	Output RF Spectrum (due to modulation)	<b>GSM850/ EGSM</b>	
		Offset from Carrier (kHz).	Max. dBc
		100	+0.5
		200	-30
		250	-33
		400	-60
		600~ <1,200	-60
		1,200~ <1,800	-60
		1,800~ <3,000	-63
		3,000~ <6,000	-65
		6,000	-71
		<b>DCS/PCS</b>	
		Offset from Carrier (kHz).	Max. dBc
		100	+0.5
		200	-30
		250	-33
		400	-60
		600~ <1,200	-60
		1,200~ <1,800	-60
		1,800~ <3,000	-65
3,000~ <6,000	-65		
6,000	-73		
6	Output RF Spectrum (due to switching transient)	<b>GSM850/ EGSM</b>	
		Offset from Carrier (kHz).	Max. dBm
		400	-19
		600	-21
		1,200	-21
		1,800	-24

## 2. System Specification

Item	Description	Specification		
6	Output RF Spectrum (due to switching transient)	<b>DCS/PCS</b>		
		Offset from Carrier (kHz).	Max. dBm	
		400	-22	
		600	-24	
		1,200	-24	
		1,800	-27	
7	Spurious Emissions	Conduction, Emission Status		
8	Bit Error Ratio	<b>GSM850, EGSM</b> BER (Class II) < 2.439% @-102 dBm		
		<b>DCS,PCS</b> BER (Class II) < 2.439% @-100 dBm		
9	RX Level Report Accuracy	±3 dB		
10	SLR	8±3 dB		
11	Sending Response	Frequency (Hz)	Max.(dB)	Min.(dB)
		100	-12	-
		200	0	-
		300	0	-12
		1,000	0	-6
		2,000	4	-6
		3,000	4	-6
		3,400	4	-9
		4,000	0	-
12	RLR	2±3 dB		

## 2. System Specification

Item	Description	Specification			
		Frequency (Hz)	Max.(dB)	Min.(dB)	
13	Receiving Response	100	-12	-	
		200	0	-	
		300	2	-7	
		500	*	-5	
		1,000	0	-5	
		3,000	2	-5	
		3,400	2	-10	
		4,000	2		
		* Mean that Adopt a straight line in between 300 Hz and 1,000 Hz to be Max. level in the range.			
		14	STMR	18±5 dB	
15	Stability Margin	> 6 dB			
16	Distortion	dB to ARL (dB)	Level Ratio (dB)		
		-35	17.5		
		-30	22.5		
		-20	30.7		
		-10	33.3		
		0	33.7		
		7	31.7		
		10	25.5		
17	Side Tone Distortion	Three stage distortion < 10%			
18	System frequency (13 MHz) tolerance	≤ 2.5 ppm			
19	32.768KHz tolerance	≤ 30 ppm			
20	Ringer Volume	At least 65 dBspl under below conditions: 1. Ringer set as ringer. 2. Test distance set as 50 cm			

## 2. System Specification

Item	Description	Specification	
21	Charge Current	Fast Charge : Typ. 400 mA Slow Charge : Typ. 80mA Total Charging Time : < 3 hours	
22	Antenna Display	Bar Number	Power
		7	-92
		7 -> 5	-93 ± 2
		5 -> 4	-98 ± 2
		4 -> 2	-101 ± 2
		2 -> 1	-104 ± 2
		1 -> 0	-106 ± 2
		0 -> OFF	-106
23	Battery Indicator	Battery Bar Number	Voltage
		3	≥ 3.708 ± 0.05 V
		3 -> 2	3.707 ± 0.05 V
		2 -> 1	3.604 ± 0.05 V
		1 -> 0	3.451 ± 0.05 V
24	Low Voltage Warning ( Blinking Bar)	≤ 3.45 ± 0.05V (Call), one time per one minute	
		≤ 3.45 ± 0.05V (Standby), one time per three minute	
25	Forced shut down Voltage	3.33 ± 0.05V	
26	Sustain RTC without battery	Over 50 hours	
27	Battery Type	Lithium-Ion Battery Standard Voltage = 3.7 V Battery full charge voltage = 4.2 V Capacity: 900mAh	
28	Travel Charger	Switching-mode charger Input: 100 ~ 350V, 50/60 Hz Output: 4.8 V, 400 mA	



### 3.1.1 General

Technology:

- SoC, Monolithic, 65 nm CMOS
- Package:
  - eWLB, 8x8x0.8 mm
  - 0.5 mm pitch
  - 217 balls / 6-layer PCB

### 3.1.2 RF Transceiver

- Dual-band direct conversion receiver
- Tri/Quad-band possible with external circuitry
- Fully integrated digital controlled X0
- Additional buffer for 2 external system clocks
- Fully digital RF-Synthesizer incl.  $\Sigma\Delta$ -Transmitter

### 3.1.3 Baseband

- DSP:
  - 156 MHz TeakLite™
- MCU:
  - ARM1176® @ 208 MHz
- MCU RAM:
  - 3.00Mbit
- Memory I/F:
  - 512 Mbit (can be extended to 2 Gbit in AD-Mux/Demux, and up to 4 Gbit in AAD-Mux mode)
- Modem:
  - GPRS class 12, (RX/TX CS1-CS4)
  - EGPRS class 12, (RX MCS1-MCS9, TX MCS1-MCS4)
- Cipher Units:
  - A51/2/3
  - GEA-1/2/3
- Security:
  - OMTP TR0
  - Secure Boot
  - RSA(ROM)/SHA-1(HW accel.)
  - OCDS disabling
  - Certificate Management

## 3. Technical brief

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- Speech Codec:
  - FR / HR / EFR / NB-AMR
- Audio Codec (running on ARM1176):
  - SP-MIDI
  - SB-ADPCM
  - MP3
  - WB-AMR
  - AAC/AAC+/eAAC+
- Others:
  - DARP (SAIC)
  - TTY
- Customization:
  - E-Fuses

### 3.1.4 External Memory

- External Bus Unit
  - 25-bit address bus (512 Mbit) - can be extended to 27 address bits (2 Gbit)
  - 16-bit data bus
  - 1.8V & 2.8V support
- Flash / RAM
  - NOR Type
  - Serial Flash SPI and SPI-4
  - Parallel Flash (Page & Burst Mode)
  - 16-bit Demultiplexed
  - 16-bit AD-multiplexed
  - 16-bit AAD-multiplexed
  - iNAND Type e.g. oneNAND
- Memory card
  - SD/MMC card interface with 1 or 4 data lines

### 3.1.5 Connectivity

- 3xUSIF (configurable either as SPI or UART), I2C, I2S; Interfaces @ 1.8V
- Direct (U)SIM 1.8/3V
- USB2.0 up to 480 Mbit/s (High Speed) w/ external USB Phy over ULPI interface
- Stereo Headset (Amplifier integrated)
- 3 external analog measurement PIN's
- Bluetooth, A-GPS, WLAN support (I2C, I2S, SPI)

### 3.1.6 Mixed Signal

- Improved audio performance
- Loudspeaker Audio Class D Amplifier, 700 mW@8  $\Omega$  mono for hands-free and ringing
- Stereo Headset 2x30 mW@16  $\Omega$  w/o coupling C
- Mono Earpiece 100 mW@16  $\Omega$
- Digital microphone supported
- Differential microphone inputs

### 3.1.7 FM Radio

- Integrated FM radio
  - FM Stereo RDS Receiver
  - Sensitivity 2  $\mu$ V EMF
  - Support for US & EU bands
  - Stereo recording

### 3.1.8 Power Management

- Direct-to-Battery Connection
  - LDOs (incl. capless)
  - DC/DC step-down converter
  - DC/DC step-up for white LED supply
- Battery Type
  - Li-Ion
- Charging control
  - Battery temperature
  - Watchdog protection
  - Start-up on flat battery
- External Charger
  - Switch mode
- USB battery charging
  - USB charging spec 1.0 compliant
- Backlight
  - Up to 4 serial white LEDs (integrated LDO)

## 3. Technical brief

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### 3.1.9 Display

- Type
  - 176\*220, QCIF, 262k color (parallel)
- Interface
  - Parallel 8/9bit MIPI-DBI Type B
  - Serial MIPI-DBI Type C
  - Interf. voltage at 1.8V or 2.8V
- gRacr - Display Controller (Hardware)
  - 30 fps Display update without DMA (up to 60 fps) (full or partial)
  - Video post processing Scaling, Rotation (90° steps), Mirroring
  - Overlay with alpha blending
  - Color conversion YUV -> RGB
  - 2D vector graphics (Lines, filled rectangles, Bit block transfer (e.g. sprites, scrolling, antialiased bitmap fonts)

### 3.1.10 Camera

- 1.3 Mpx YUV parallel interface
- HW JPEG encoder (39 Mpx/sec)
- 39 MHz Pixel Rate
- 15 fps@1.3 Mpx full resolution

### 3.1.11 Video Capabilities

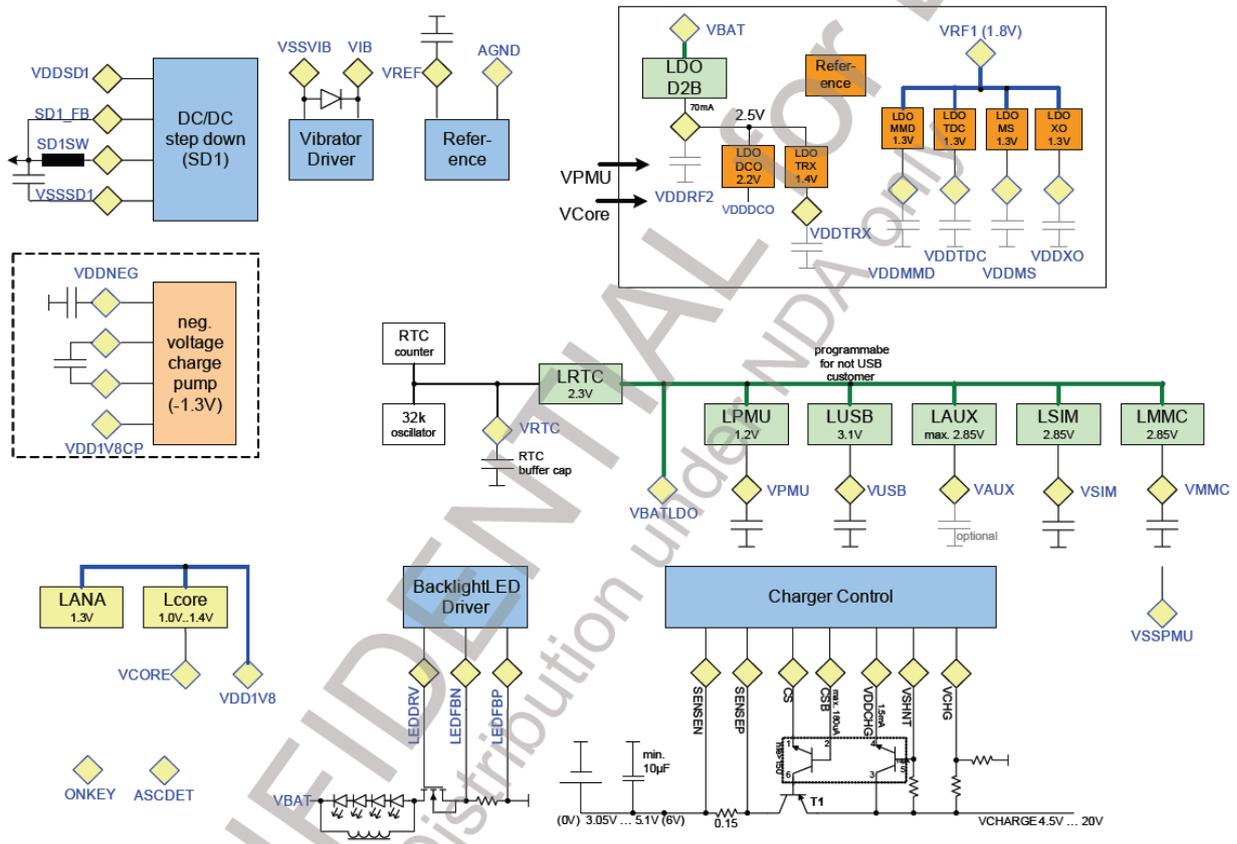
- Video Decoding MPEG-4/H.263
  - QCIF@30 fps
  - QVGA@15fps
- Video Encoding MPEG-4/H.263
  - QCIF@15 fps

### 3.1.12 Audio Capabilities

- Polyphonic ring tones
  - 64 voices MIDI, SP-MIDI
  - FM synthesizer
- AMR-WB
- True ring tones (MP3)
- MP3, eAAC+
- G.722 SB-ADPCM encoding/decoding

### 3.2 Power Management

A mobile platform requires power supplies for different functions. These power supplies are generated in the integrated power management Unit (PMU). The PMU is designed to deliver the power for a typical standard phone.



▪ **DC/DC Step Down Converter for 1.8V (SD1)**

The DC/DC converter generates a 1.8V supply rail. This voltage rail is used to supply main parts of the system, like the digital core of the chip (via LDO LCORE), some parts of the mixed signal macro, parts of the RF macro and the external memory if a 1.8V memory is used. The efficiency of the DC/DC converter is optimized for an average load current of 100mA. That is the load current estimated for the GSM talk mode.

### 3. Technical brief

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#### ▪ **Linear voltage Regulators (low dropout) LDOs**

The LDOs are used to generate the supply for the different supply domains not directly supplied out of the DC/DC converter.

The VSIM output current is high enough to drive USB SIM cards.

#### ▪ **LCORE**

The LCORE LDO provides the VCORE supply used for most of the digital parts of the chip

#### ▪ **LPMU**

The LPMU provides VPMU used for the PMU supply, e.g. for the startup state machine and analog parts like ADC, sense amplifier etc.

#### ▪ **LUSB**

The LUSB LDO generates the supply for the USB transceiver (output driver and input). If no USB interface is required, LUSB can be used as general purpose LDO.

#### ▪ **LAUX**

The LAUX generates VAUX. It is a general purpose LDO and can be used for different functions depending on the phone application, e.g. for the display or Camera.

#### ▪ **LMMC**

The LMMC generates VMMC. It is a general purpose LDO and can be used e.g. for memory cards

#### ▪ **LSIM**

The LSIM LDO generates the VSIM supply for the SIM card and interface. It is designed to supply Standard SIM cards.

#### ▪ **Other LDOs**

The RF module has implemented several LDO's for different RF Power domain.

The mixed signal module has some LDO's for the audio driver and microphone supply.

Supply Domain LDO Name	Voltage	Max. Current	Output Cap	Input Domain	Comment
VBAT	0 ... 6.0 V				Operating range is 3.05 V ... 5.5 V, system emergency switch off voltage is about 2.8 V
VDD1V8	1.8 V	450 mA	22 $\mu$ F	VBAT	This voltage is generated by the DC/DC converter with 3.3 $\mu$ H inductor, The voltage is used for: Memory supply, and via LDO's for digital core supply, mixed signal supply and RF supply.
LCORE	1.2 V	300 mA	2x100 nF	VDD1V8	
LANA	1.3 V	10 mA	No	VDD1V8	No ball
LRTC	2.3 V	2 mA	$\geq$ 100 nF	VBAT	This supply is only used for the HPBG, the 32.768 kHz oscillator and the real-time clock counter required during the sleep- and low-power mode.
LPMU	1.2 V	15 mA	100 nF	VBAT	Supply for the digital part of the PMU including digital control of DC/DC converter. This voltage is also used for the N-DEMOS driver of DC/DC converter and the class-D amplifier and the core PLL.
LUSB	3.1 V	40 mA	100 nF	VBAT	Used for the USB driver supply or as general purpose LDO with programmable output voltages (2.5 V, 2.85 V, 3.1 V)
LAUX	1.5 V ... 2.85 V	150 mA	470 nF	VBAT	General purpose LDO for e.g. Display, Bluetooth, Camera etc. Programmable output voltages are (1.5 V, 1.8 V, 2.5 V, 2.85 V)
LSIM	1.8 V / 2.85 V	30 mA	$\geq$ 100 nF	VBAT	LDO dedicated to the SIM-Card supply. It is chip internal connected to the SIM interface driver.
LMMC	1.5 V ... 2.85 V	150 mA	$\geq$ 470 nF	VBAT	General purpose LDO, targeted for MMC/SD card supply.
VDDNEG	-1.3 V	100 mA	100 nF	VDD1V8	Negative voltage for the bipolar headset audio driver. Generated by a charge pump.

**Table. 3-2-1 Power supply Domains (without RF)**

## 3. Technical brief

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### 3.2.1 Power on and startup

#### ▪ Analog startup Circuit

Because the POR circuit and the LPBG are directly connected to the battery, it is not possible to switch them off. If the battery voltage exceed the power on reset threshold (2.5V), the power on reset is released, the LPMU regulator and the LRTC voltage regulator are switched on. The LPMU regulator starts in its ultra-low power mode

The LPMU regulator generates a control signal (lpmu\_OK) that enables the 50KHZ PMU oscillator. The output clock of the oscillator is checked with a fully coded counter. A counter overflow releases the reset (vpmu\_rst\_n) signal for the small PMU state-machine.

#### ▪ Small first digital State-Machine

The small PMU state-machine is always connected to VPMU After starting from reset the small startup state machine enters the SYSTEM OFF state and only continuous the startup procedure if a switch on event like first connect, on-key, wake up or charge detect occurs.

#### ▪ PMU-main State-Machine

The main PMU state-machine is always connected to VPMU also. The power up sequence driven by the PMU state-machine can be seen in Figure18. After enabling the reference (HPGB) and waiting for the settling time, the battery voltage is measured and compared with the power on threshold. If the battery voltage is high enough, the SD1 DC/DC converter and the LCOLE LDO are started. A timer ensures that the supply voltage will be stable before the DCXO is enabled. The DCXO settling time is ensured using a fixed timer. After an overflow of this timer, the reset is released for the rest of the system. The PMU state machine remains in this System-ON state until the system is switched into the OFF state. For example the system sleep mode is completely configured by software( for example switching off the LDO's, switching of the DCXO etc.) and controlled by the VCXO\_enable signal. The reason for the startup is stored in the ResetSourceRead register.

#### ▪ Battery Measurement

The ADC and the oscillator for the ADC needs the VDD\_ADC supply voltage from the LADC LDO. LADC uses either the charger voltage VDD\_CHARGE or VDDRTC as input voltage. The input voltage is selected automatically by a bulk switch circuit. LADC, the ADC and the oscillator are enabled on request for every battery measurement if the charger unit is not running. This is handled by an ADC control block in one of the state-machines. If the charger unit is running the ADC is controlled by the charger state-machine

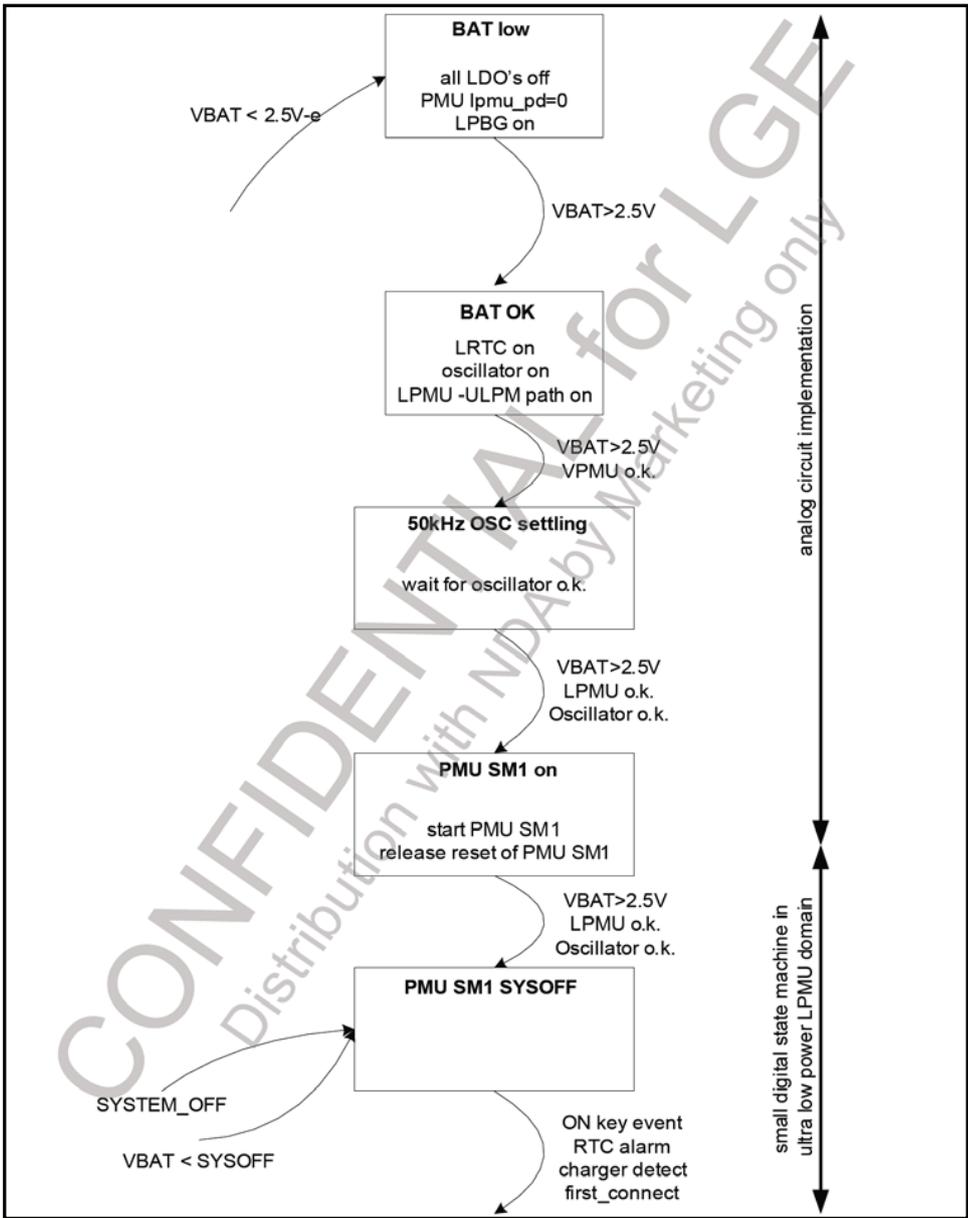


Figure.3.2.1 First Part of the State Machine, Running in Different Power Domains than the Second Part

### 3. Technical brief

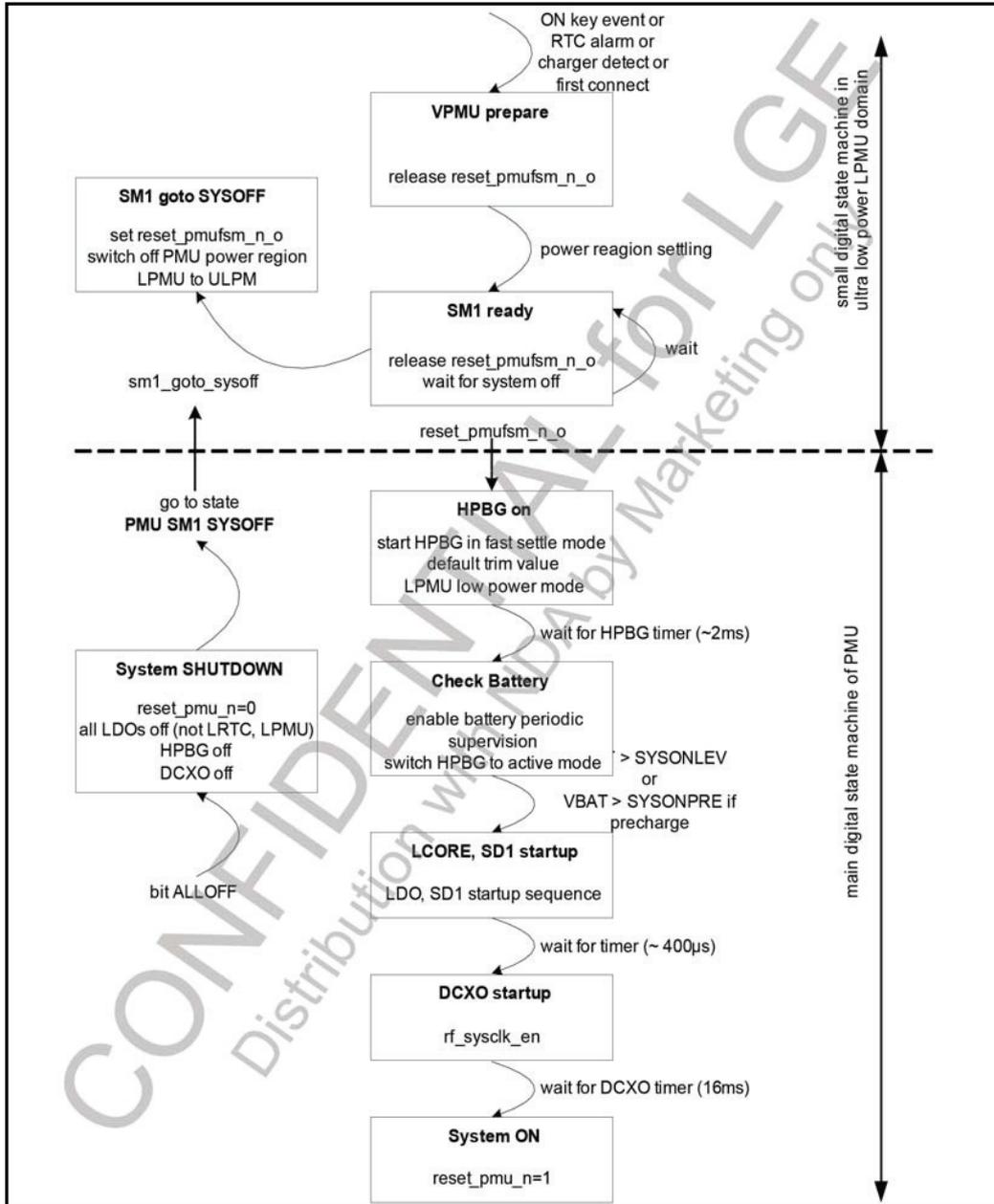


Figure 3.2.2 Second (Main) Part of the Startup State Machine in the VPMU Domain

### 3.2.2 Switching on due to first connect

If the battery voltage is connected the first time, that means the system enters the first time the SYSOFF state, this is stored in a first connect flag. If the first connect flag is set, the system will start immediately and not wait for any other system on event in the SYSOFF state.

### 3.2.3 Switching on due to on-Key event

The on key is connected to the ONKEY pad. The ESD protection and the input structure of this pad are connected to VRTC. If the ONKEY pad is forced to VRTC by an external key or similar circuit, the system starts. The ONKEY is sampled with the PMU clock. It has to be sampled four times high before a valid on event is generated. The status of the ON key can be read in the PMU registers, so it can be used as a functional key during phone operation also.

### 3.2.4 Switching on due to RTC alarm

The real time clock can generate a wakeup signal called RTC alarm. This signal is sampled from the state-machine and after successfully detecting a high, the system is switched on.

### 3.2.5 Switching on due to charging

When a battery with a voltage below the SSONLEV level is inserted, the state machine will not start the system. As long as the battery voltage stays lower than SYSONLEV the system will stay off. The only possibility to start up the system is due to an external charger.

If an external charger is connected and detected and the battery is charged above the SYSONPRE voltage level the system will start up.

The PMU main state machine waits in the Check battery state until the battery voltage condition is fulfilled. The charger state machine provides the necessary pre-charge indication signal. This pre-charge signal is denounced in a small counter to have a stable signal. This is important, especially in half/full-wave charging where the charger detection is switching between charger detected/not detected according to the AC supply frequency. For details on pre-charging see the charger chapter. The charger is controlled by an independent state machine. The pre-charge signal is used to trigger the pre-charge functionality. The charger state machine fully controls the pre-charge, the PMU-state machine now changes to state HPBG on state and the system starts. This state change is indicated to the charger state-machine to enable the charger watchdog for safety.

## 3. Technical brief

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### 3.2.6 Power Supply Start-up sequence

In order to avoid an excessive drop on the battery voltage caused by in-rush current during system power-on, possibly leading to system instability and “hick-ups” a staggered turn-on approach for the regulators is implemented. The regulators are turned on in a well defined sequence, thus spreading the in-rush current transients over time.

The IO's of X-GOLD TM 213 are isolated in OFF mode (core supply is off). The isolation signal is controlled by the PMU state machine. This ensures that the PADs are in a well defined state during core supply settling. This allows to power up the LCORE core regulator and wait for the core to reach reset state before powering up the I/O supply regulators.

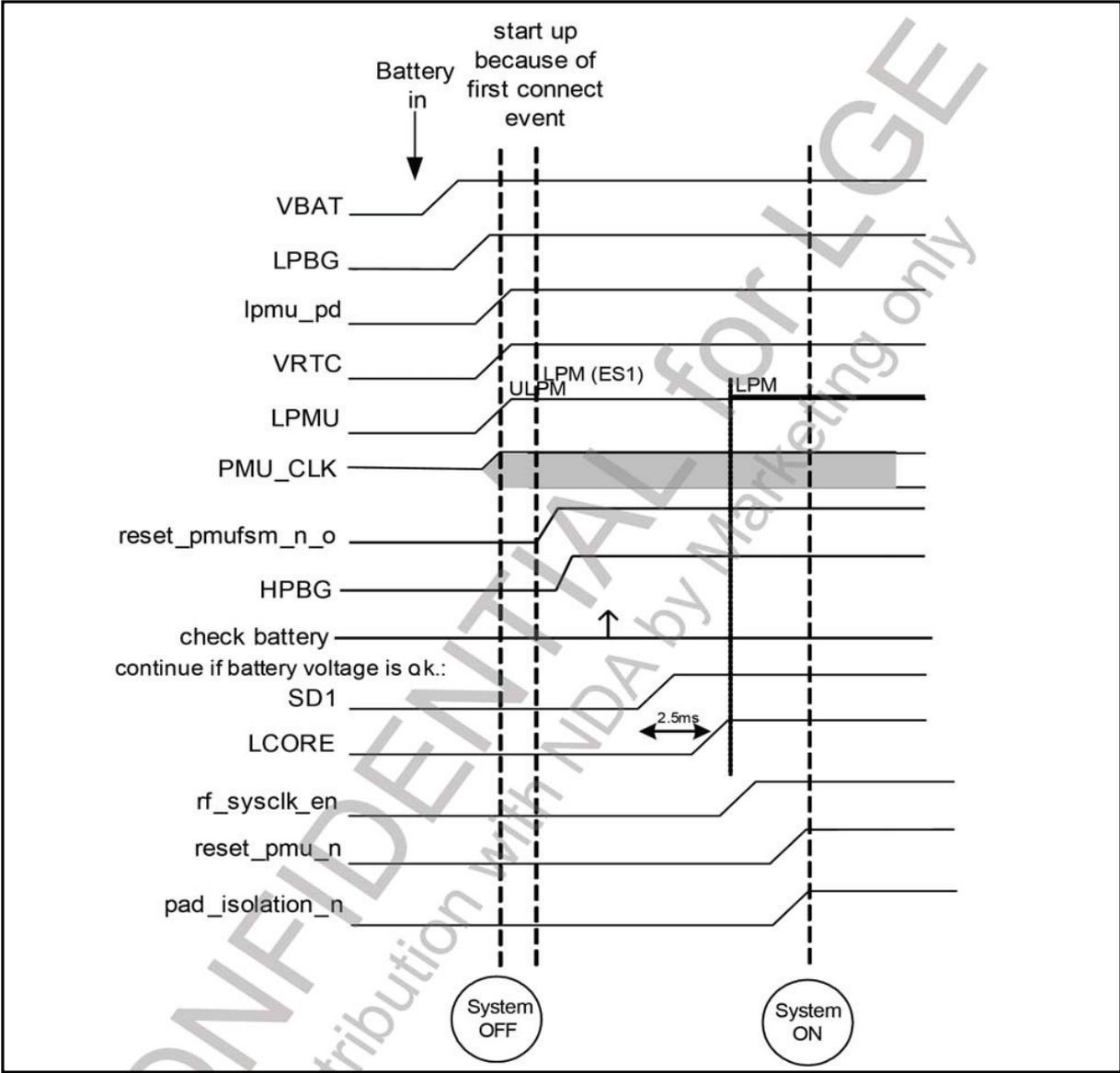


Figure 3.2.3 Start Up Sequence (triggered by First Connect Event)

## 3. Technical brief

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### 3.2.7 External Reset Handling

The chip reset can be controlled by an external RESET\_N ball. If this ball is pulled low, the chip will be reset. All PMU registers are reset during the external reset including LSIM control bits. The PMU statemachines are also not reset from the external reset. An SW or watchdog reset will not reset the PMU registers. A SW and Watchdog reset is seen on the reset\_n pad to allow the reset of external devices. Basically there are three reset sources, first the reset signal controlled by the PMU (reset\_pmu\_n\_o), second the reset signal controlled by the SCU (resetout\_o) and third the external reset (RESET\_N). The SCU reset is triggered by SW (for example due to a SW reset or watchdog reset). The PMU reset is controlled by the PMU state machine. The output of the reset handling block is the reset\_postscu\_n\_o signal. This signal controls for example the  $\mu$ C subsystem and releases reset for the controller. During normal start up, the PMU releases the reset\_pmu\_n\_o signal after entering the SYSTEM ON state. At this time the resetout\_o signal is high, the RESET\_N pad is not pulled low and therefore the reset\_postscu\_n\_o signal follows the reset\_pmu\_n\_o signal. That means the  $\mu$ C reset will be released and the  $\mu$ C starts operation. If the SW triggers an external reset via the SCU, signal resetout\_o will be forced to low for a certain time and RESET\_N will be forced to low by the open drain driver. At the same time the feedback to the SCU will be masked to not reset the baseband. The RESET\_N pad is in the VDDRTC domain but the internal pull up is connected to the VDD\_VDIG1 (1.8V) domain. That allows the pad to be used as reset for external devices running in the VDD1V8 domain. The RESET\_N pad can also be used to monitor the chip internal reset condition during startup.

The open drain driver is a weak driver, that means it can be forced to high during debug from external pushing some current into the pad. In testmode signal reset\_pmu\_n\_o is high, that means the chip reset is fully controlled from external.

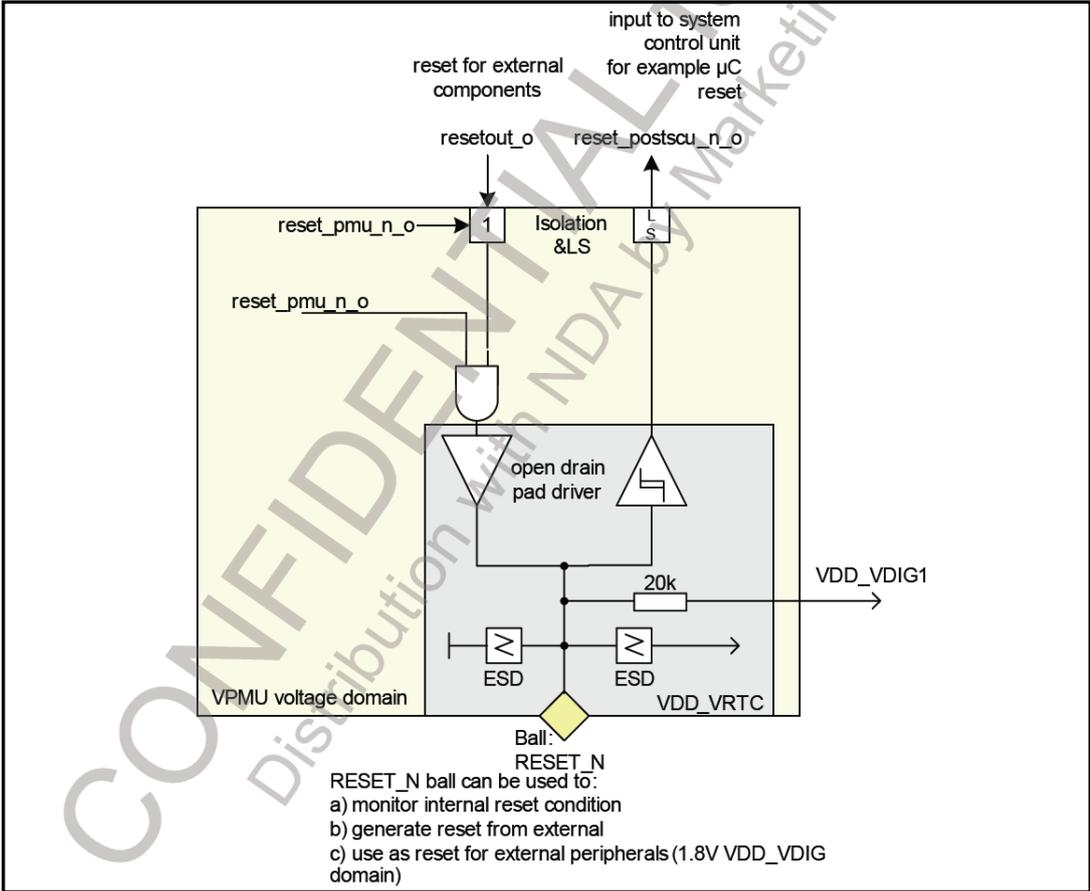


Figure 3.2.4 PMU, CGU and External Reset

3.2.8 Sysclock Switching

The PMU controls the rf\_sysclk\_en signal of the DCXO in the RF macro. During startup the PMU enables the DCXO. After the system is running the DCXO is controlled by the SCU of the baseband by using the vcxo\_enable signal. This is handled by a dedicated logic in the PMU, see **Figure 21**. As long as rf\_sysclk\_en\_pmu, the output of the PMU state-machine is high, vcxo\_enable controls the rf\_sysclk\_en signal to the RF. If rf\_sysclk\_en\_pmu is low, the DXCO is switched off, independent from vcxo\_enable.

### 3. Technical brief

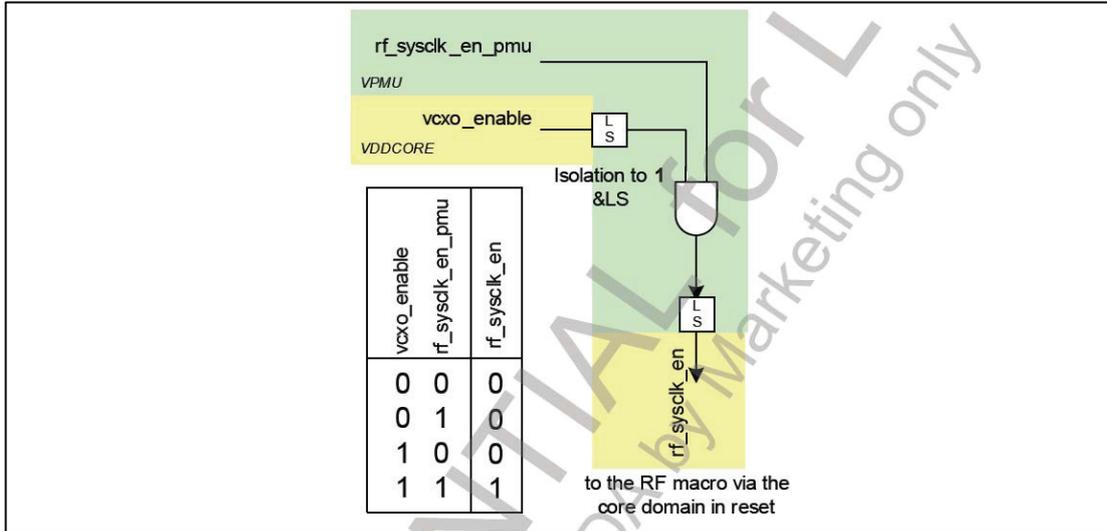


Figure 3.4.2 How sysclock Enable is Routed in the PMU

#### 3.2.9 Undervoltage Shutdown

In active mode the PMU periodically measures the battery voltage using the ADC from the charger unit. If the battery is measured to be below the programmable shut-down level (called SYSOFF), the system changes to OFF mode. This is done via the SHUTDOWN state of the PMU state machine. (see chapter switch OFF)

#### 3.2.10 Software Reset

A software reset does not affect any PMU register. The PMU register are reset with the `reset_pmufsm_n_o` signal. That means all PMU register are reset in OFF state. For details about the SW reset see chapter **External Reset Handling**

### 3.2.11 PMU Clock

During the first startup (for example plugging in a battery) a PMU internal oscillator is used for generation of the PMU clock (pmu\_clock). The frequency is slightly above 32 kHz (typ. 50 kHz) to be out of the audio band also for worst case devices. After first startup the software shall enable the 32 kHz crystal oscillator. It is not possible to use the 32 kHz oscillator during first startup, because the settling time of the oscillator can be quite long. After the 32 kHz oscillator is running and settled the software shall switch the PMU clock to the 32 kHz clock and disable the internal PMU oscillator for power saving reasons. The 32 kHz oscillator shall never be disabled after the PMU clock has been switched. The ADC in the charger unit has its own oscillator generating a frequency of about 10 MHz. This oscillator is running during charging and during battery measurements triggered by the PMU. It is off otherwise.

### 3.2.12 System Sleep Mode

The sleep mode is controlled by using the VCXO\_enable signal. This signal is used to switch the LDO's and the DC/DC converter SD1 in a programmable way into its low power mode (PFM). In addition DC/DC converter SD1 can be configured to change the output voltage to a lower value for additional power saving. VCXO\_enable is also used to deactivate the HPBG and setting LDO LPMU in the ultra-low-power mode. In addition the DCXO is switched off by the VCXO\_enable signal. The VCXO\_enable signal is also used to switch some LDO's (software configured) to sleep and/or off mode or to change the output voltages of said LDO's. The state of the main PMU state machine is not changed due to VCXO\_enable.

### 3.2.13 DC/DC Pre-Load Register Handling

The DC/DC converter works in different modes. If the mode is switched from PFM to PWM the pulse-width of the DC/DC converter depends on the current battery voltage (and on the output voltage). The PMU state-machine knows the battery voltage because of the battery supervision function. Depending on this value it selects a startup pulse-width for the DC/DC converter out of a register table. (4-values)

## 3. Technical brief

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### 3.2.14 Power Down Sequence

Setting bit OFF in the GeneralControl register switches the system into OFF mode. After the turn off event, the state-machine switches to the SHUTDOWN state. The reset\_pmu\_n\_o signal changes to low, the I/O pads are isolated using the padisolation\_n signal, the LDCORE LDO and the SD1 DC/DC converter are switched off, the LPMU LDO is switched to ultra-low power mode, the DCXO is turned off and the bandgap buffer is disabled. Before switching OFF the software shall have enabled the 32 kHz oscillator and has switched the PMU clock to the 32 kHz clock to archive the target OFF current

### 3.3 FEM with integrated Power Amplifier Module (SKY77547, U304)

#### 3.3.1 Internal Block Diagram

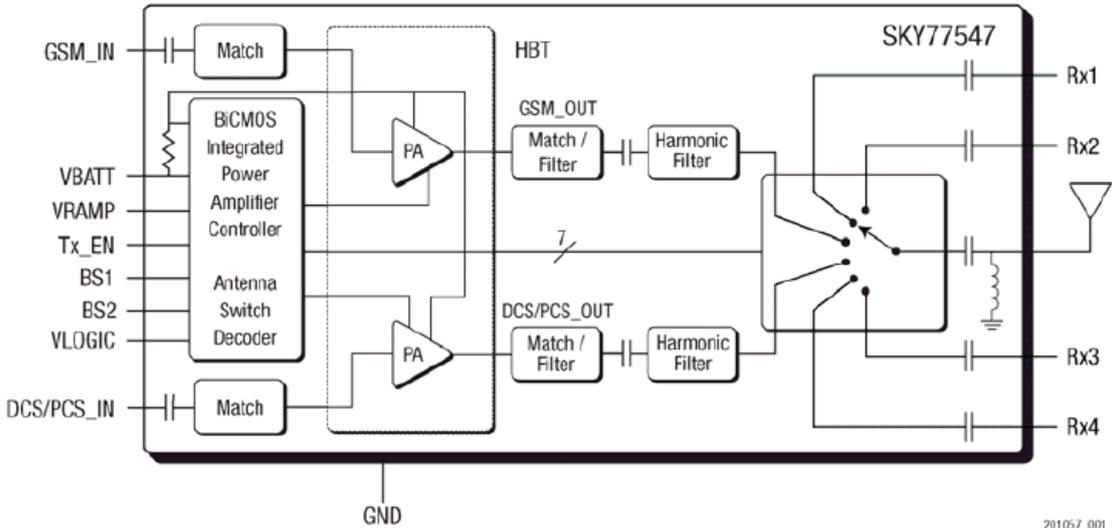


Figure. 3.3.1 SKY77547 FUNCTIONAL BLOCK DIAGRAM

## 3. Technical brief

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### 3.3.2 General Description

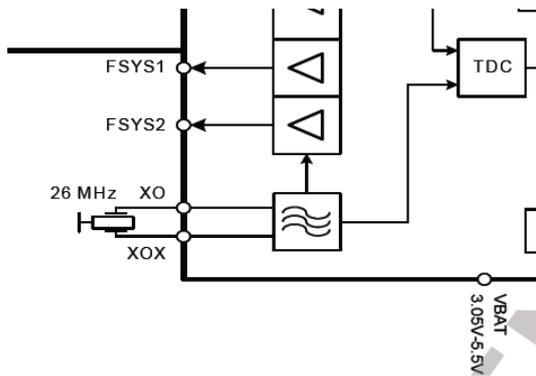
The **SKY77547** is a transmit and receive front-end module (FEM) with Integrated Power Amplifier Control for quad-band cellular handsets comprising GSM850/900 and DCS1800/PCS1900 operation. Designed in a low profile, compact form factor.

The FEM also supports Class 12 General Packet Radio Service (GPRS) multi-slot operation. The module consists of a GSM850/900 PA block and a DCS1800/PCS1900 PA block, impedance matching circuitry for 50  $\Omega$  input and output impedances, TX harmonics filtering, high linearity and a low insertion loss PHEMT RF switch, and a Power Amplifier Control (PAC) block with internal current sense resistor. A custom BiCMOS integrated circuit provides the internal PAC function and decoder circuitry to control the RF switches. The two Heterojunction Bipolar Transistor (HBT) PA blocks are fabricated onto a single Gallium Arsenide (GaAs) die. One PA block supports the GSM850/900 bands and the other PA block supports the DCS1800/PCS1900 bands. Both PA blocks share common power supply pads to distribute current. The output of each PA block and the outputs to the four receive pads are connected to the antenna pad through a PHEMT RF switch. The GaAs die, PHEMT die, Silicon (Si) die and passive components are mounted on a multi-layer laminate substrate. The assembly is encapsulated with plastic overmold.



### 3. Technical brief

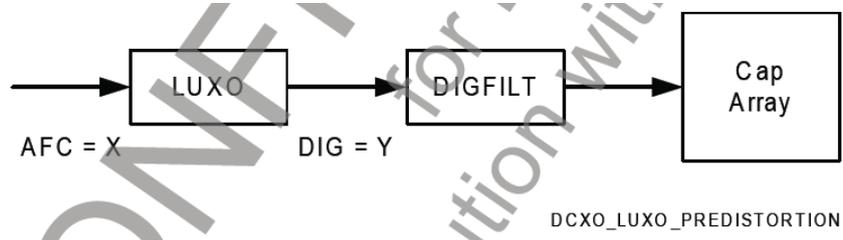
#### 3.4 Crystal(26 MHz, X101)



**Figure. 3.4.1 Crystal Oscillator External Connection**

The X-GOLDTM213 RF-Subsystem contains a fully integrated 26 MHz digitally controlled crystal oscillator, designed for 8 pF crystals. The only external part of the oscillator is the crystal itself. Overall pulling range of the DCXO is approximately  $\pm 55$  ppm, controllable by a 13-bit tuning word.

This frequency serves as comparison frequency within the RF-PLL and as clock frequency for the digital circuitry. The 26 MHz reference clock can also be applied to external components like Bluetooth or GPS, via the two buffered output signals FSYS1 and FSYS2



**Figure. 3.4.2 Digital PREDISTORTION with LUXO**

The DCXO tuning characteristic should be a first order linear function of the programming word AFC. The variable capacitance array is a first order linear function of the digital word DIG, which leads to a nonlinear curve ppm vs. DIG (and also a nonlinear ppm vs. AFC for DIG=AFC). In order to linearize the ppm vs. AFC curve the implementation of a predistortion is necessary.

To get the wanted linear ppm vs. AFC tuning curve some digital predistortion of the AFC word is required. This predistortion is performed by the linearization unit for crystal oscillator (LUXO). The LUXO calculates the corresponding DIG value according to the given AFC value.

### 3.5 RF Subsystem of PMB8810 (U102)

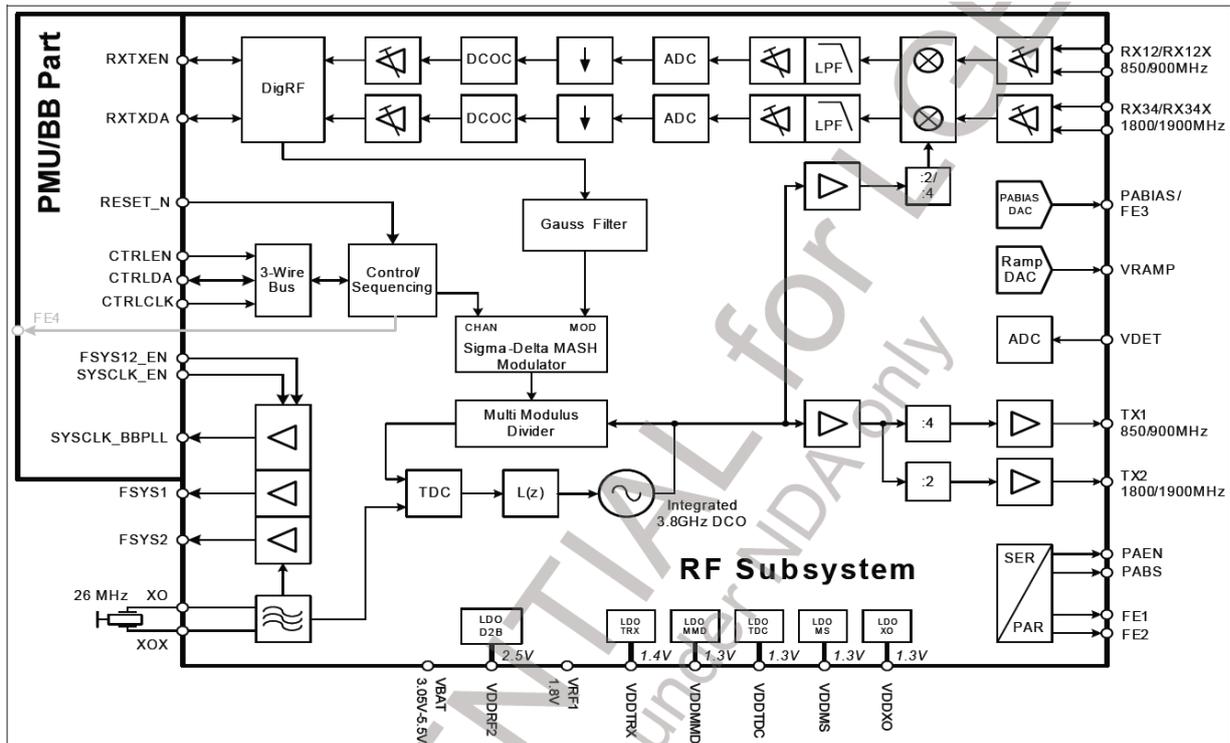


Figure. 3-5-1 Block DIAGRAM of RF Subsystem

#### 3.5.1 GENERAL DESCRIPTION

The PMB8810 RF subsystem is designed for dual-band GSM voice and data applications (GPRS class 12). The system can be configured to support one low band, GSM850 or EGSM900, and one high band, DCS1800 or PCS1900. A block diagram of the RF subsystem is given in Figure 3-4-1.

### 3. Technical brief

#### 3.5.2 FUNCTIONAL DESCRIPTION

##### 3.5.2.1 Receiver

The X-GOLD™213 dual-band receiver is based on a Direct Conversion Receiver (DCR) architecture. Input impedance of the LNAs is optimized to achieve a matching without (external) high quality inductors. By use of frequency dividers (by 2/4) the LO frequency is derived from the RF frequency synthesizer.

The receive path is fully differential to suppress the on-chip interferences and reduce DC-offsets. The analog chain of the receiver contains two LNAs (low/high band), a quadrature mixer followed by an analog baseband filter and 14-bit continuous-time delta-sigma analog-to-digital converter. The filtered and digitized signal is fed into the digital signal processing chain, which provides decimation, DC offset removal and programmable gain control.

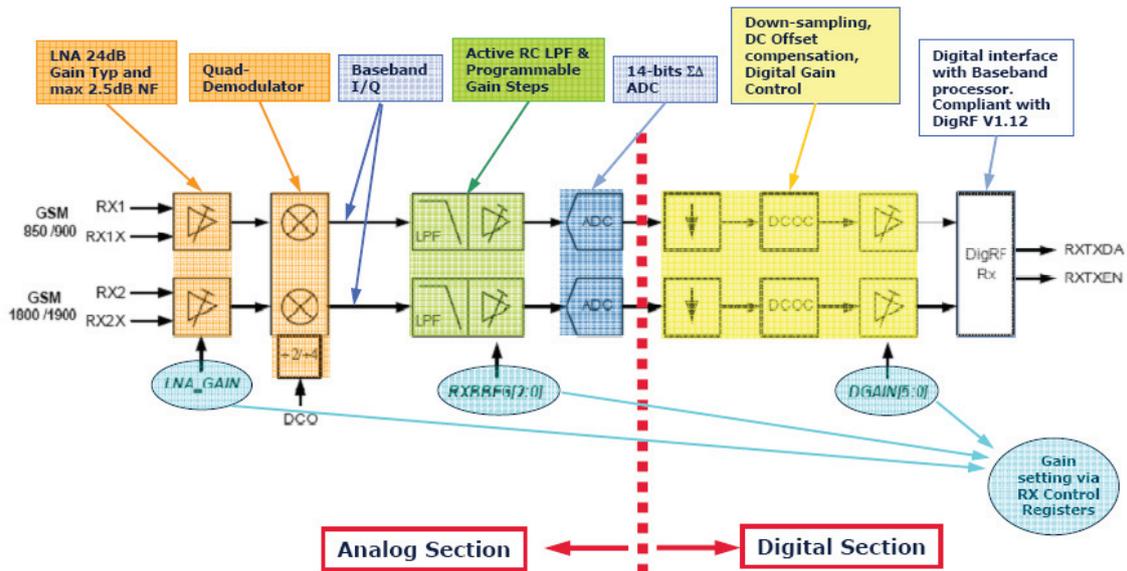


Figure. 3.5.2 RECEIVER CHAIN BLOCK DIAGRAM

### 3.5.2.2 Transmitter

The GMSK transmitter supports power class 4 for GSM850 or GSM900 as well as power class 1 for DCS1800 or PCS1900. The digital transmitter architecture is based on a fractional-N sigma-delta synthesizer for constant envelope GMSK modulation. This configuration allows a very low power design without any external components.

Up- and down-ramping is performed via the ramping DAC connected to VRAMP.

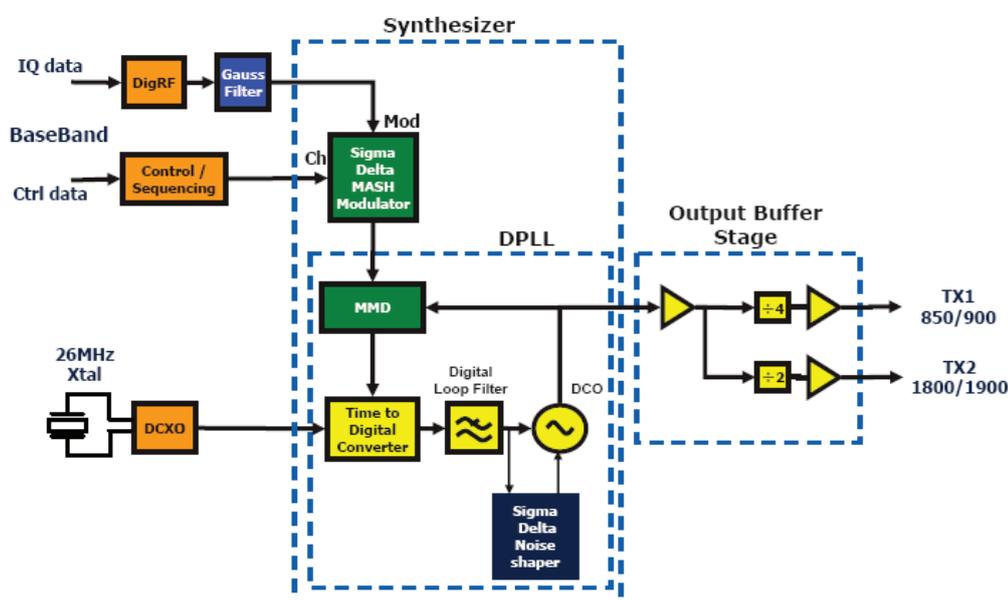


Figure. 3.5.3 TRANSMITTER CHAIN BLOCK DIAGRAM

### RF synthesizer

The RF subsystem contains a fractional-N sigma-delta synthesizer for the frequency synthesis. Respective to the chosen band of operation the phase locked loop (PLL) operates at twice or forth of the target signal frequency. In receive operation mode the divided output signal of the digital controlled oscillator output (DCO) serves as local oscillator signal for the balanced mixer. For transmit operation the fractional-N sigma-delta synthesizer is used as modulation loop to process the phase/frequency signal. The 26 MHz reference signal of the phase detector incorporated in the PLL is provided by the reference oscillator.

### 3. Technical brief

#### 3.5.2.3 Front-end/PA Control Interface

Two outputs (FE1, FE2) for direct control of antenna switch modules enable to select RX- and TX-mode as well as low- and high-band operation.

An extra band select signal PABS for the power amplifier is used, to support discrete PA and switching modules. Time accurate power dissipation of the PA is achieved by the control signal PAEN.

A minor set of power amplifiers require a bias voltage to enhance power efficiency. Support of this power amplifiers is achieved by the implemented bias DAC.

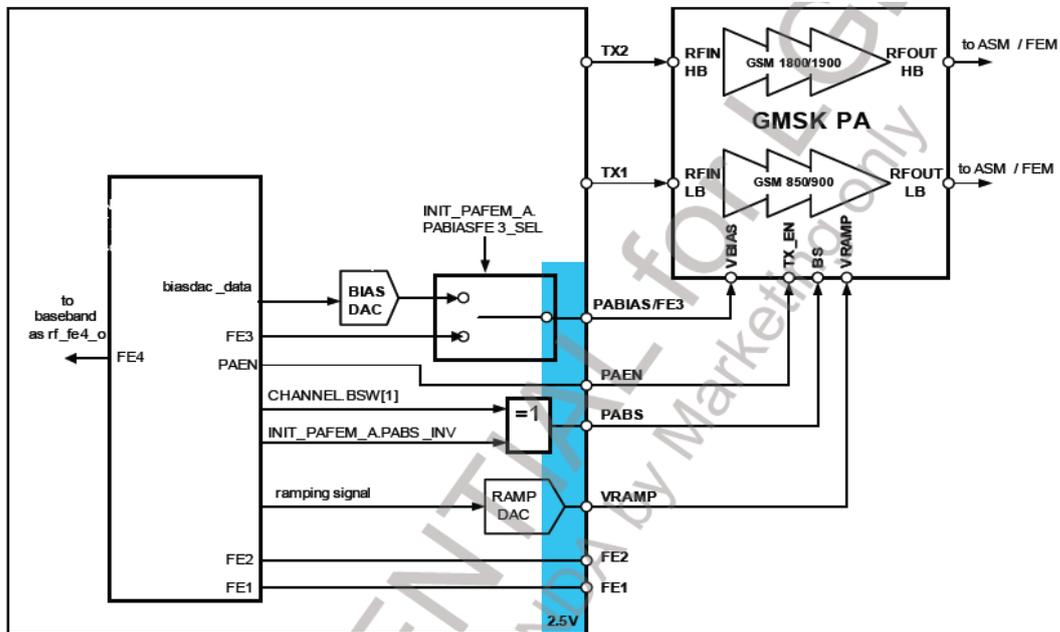
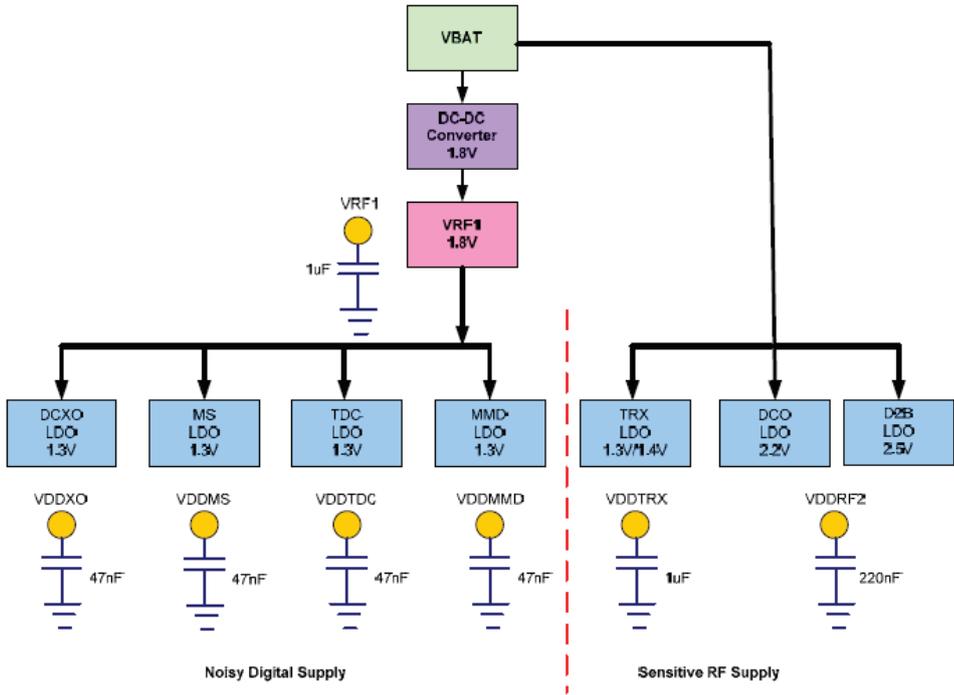


Figure. 3.5.4 PA AND FEM CONTROL BLOCK DIAGRAM

**3.5.2.4 Power Supply**

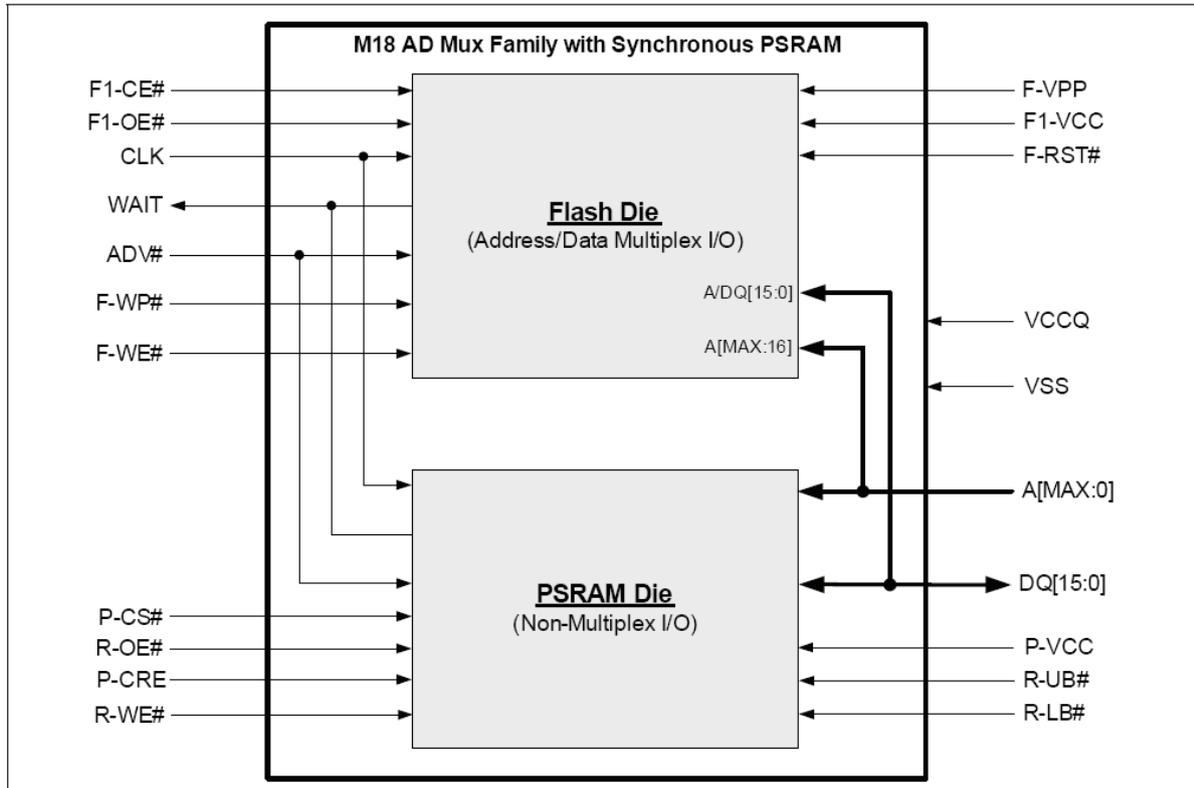
To increase power efficiency most parts of the RF subsystem are supplied by the DCDC converter situated in the PMU subsystem. Conversion of the 1.8 V output voltage of the DCDC to the 1.3 V/1.4 V circuit supply voltages is achieved by several Low-DropOut regulators (LDO). One embedded direct-to-battery LDO provides the 2.5 V supply voltage for the remaining circuits.



**Figure. 3.5.5 POWER SUPPLY BLOCK DIAGRAM**

### 3. Technical brief

#### 3.6 MEMORY(PF38F5060M0Y0BE, U101 )



**Figure. 3.6.1 MEMORY BLOCK DIAGRAM**

The Numonyx™ StrataFlash® Cellular Memory (M18) device provides high read and write performance at low voltage on a 16-bit data bus. The flash memory device has a multi-partition architecture with read-while-program and read-while-erase capability. The device supports synchronous burst reads up to 108 MHz using ADV# and CLK address-latching (legacy-latching) on some litho/density combinations and up to 133 MHz using CLK address-latching only on some litho/density combinations. It is listed below in the following table.

Litho (nm)	Density (Mbit)	Supports frequency up to (MHz)	Sync read address-latching
90	256	133	CLK-latching
	512	108	Legacy-latching
65	128	133	CLK-latching
	256	133	CLK-latching
	512	108	Legacy-latching
	512	133	CLK-latching
	1024	108	Legacy-latching
	1024	133	CLK-latching

**Table 3\_6\_1 M18 Frequency combinations**

In continuous-burst mode, a data Read can traverse partition boundaries.

Upon initial power-up or return from reset, the device defaults to asynchronous arrayread mode. Synchronous burst-mode reads are enabled by programming the Read Configuration Register. In synchronous burst mode, output data is synchronized with a user-supplied clock signal. A WAIT signal provides easy CPU-to-flash memory synchronization.

Designed for low-voltage applications, the device supports read operations with VCC at 1.8 V, and erase and program operations with VPP at 1.8 V or 9.0 V. VCC and VPP can be tied together for a simple, ultra-low power design. In addition to voltage flexibility, a dedicated VPP connection provides complete data protection when VPP is less than VPPLK.

A Status Register provides status and error conditions of erase and program operations.

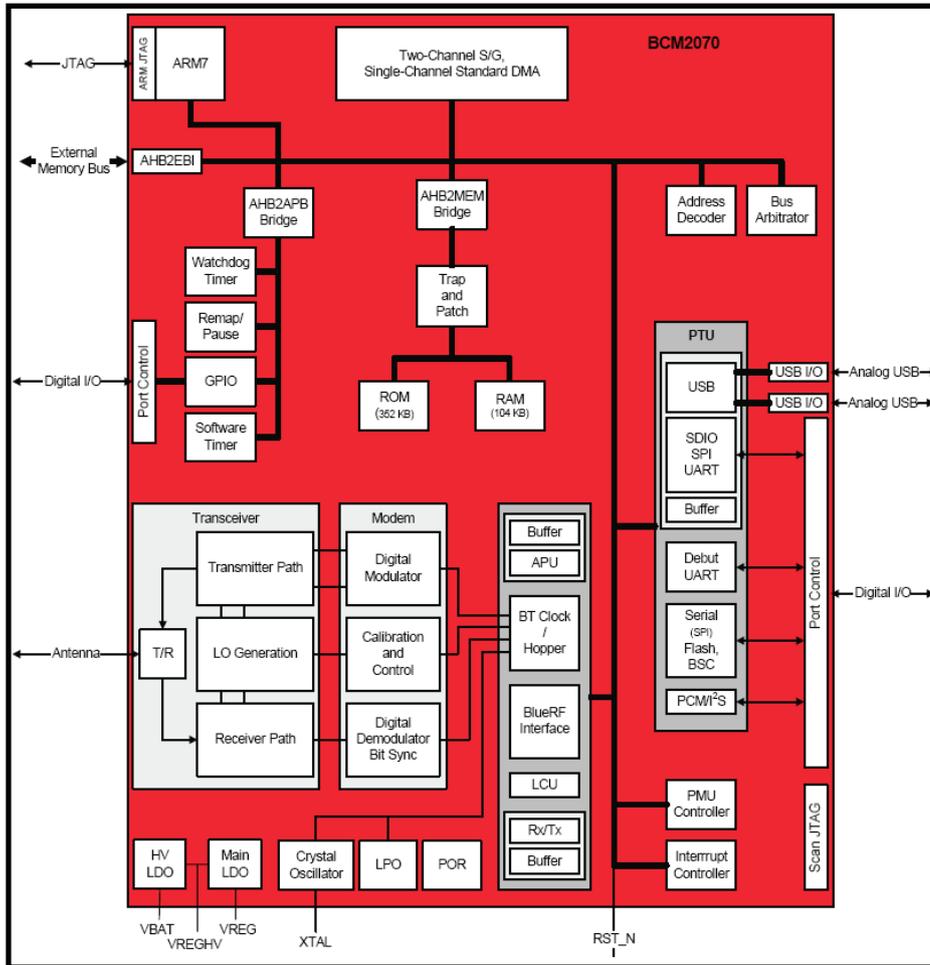
One-Time-Programmable (OTP) registers allow unique flash device identification that can be used to increase flash content security. Also, the individual block-lock feature provides zero-latency block locking and unlocking to protect against unwanted program or erase of the array.

The flash memory device offers three power savings features:

- Automatic Power Savings (APS) mode: The device automatically enters APS following a read-cycle completion.
- Standby mode: Standby is initiated when the system deselects the device by deasserting CE#.
- Deep Power-Down (DPD) mode: DPD provides the lowest power consumption and is enabled by programming in the Enhanced Configuration Register. DPD is initiated by asserting the DPD pin.

### 3. Technical brief

#### 3.7 BT module



**Figure 3.7.1. BT BLOCK DIAGRAM**

This module has an integrated radio transceiver that has been optimized for use in 2.4GHz Bluetooth Wireless systems. It has been designed to provide low-power, robust communications for applications Operating in the globally available 2.4GHz unlicensed ISM band. It is fully compliant with the Bluetooth Radio Specification and enhanced data rate specification and meets or exceed the requirement to provide the highest communication link quality of service.

### 3.7.1 Transmitter path

This module features a fully integrated zero IF transmitter. The baseband transmitted data is digitally modulated in the modem block and up-converted to the 2.4GHz ISM band in the Transmitter path. The transmitter path consists of signal filtering, I/Q up-conversion, high-output power amplifier(PA), and RF filtering. It also incorporates modulation schemes P/4-DQPSK for 2 Mbps and 8-DPSK for 3 Mbps to support enhanced data rate.

- **Digital modulator**

The digital modulator performs the data modulation and filtering required for the GFSK, B/4DQPSK, and 8-DPSK signal. The fully digital modulator minimizes any frequency drift or anomalies in the modulation characteristics of the transmitted signal and is much more stable than direct VCO modulation schemes.

- **Power Amplifier**

The integrated PA for the BCM2070 is configurable for Class 2 operation, transmitting up to +4 dBm as well as Class 1 operation and transmit power up to +12 dBm at the chip, GFSK, >2.5V supply. Due to the linear nature of the PA, combined with some integrated filtering, no external filters are required for meeting Bluetooth and regulatory harmonic and spurious requirements. For integrated mobile handset applications, where Bluetooth is integrated next to the cellular radio, minimal external filtering can be applied to achieve near thermal noise levels for spurious and radiated noise emissions.

Using a highly linearized, temperature compensated design the PA can transmit +12 dBm for Basic rate and +10 dBm for enhanced data rates(2 to 3 Mbps). A flexible supply voltage range allows the PA to operate from 1.2V to 3.0V. The minimum supply voltage at VDDTF is 1.8V to achieve +10dBm of transmit power.

### 3.7.2 Receiver path

The receiver path uses a low IF scheme to down-convert the received signal for demodulation in the digital demodulator and bit synchronizer. The receiver path provides a high degree of linearity, an extended dynamic range, and high order on-chip channel filtering to ensure reliable operation in the noisy 2.4GHz ISM band. The front-end topology, with built-in out-of-band attenuation, enables the device to be used in most applications with no off-chip filtering. For integrated handset operation where the Bluetooth function is integrated close to the cellular transmitter, minimal external filtering is required to eliminate the desensitization of the receiver by the cellular transmit signal.

### 3. Technical brief

## 3.8 SIM Card Interface

### SIM\_CONNECTOR

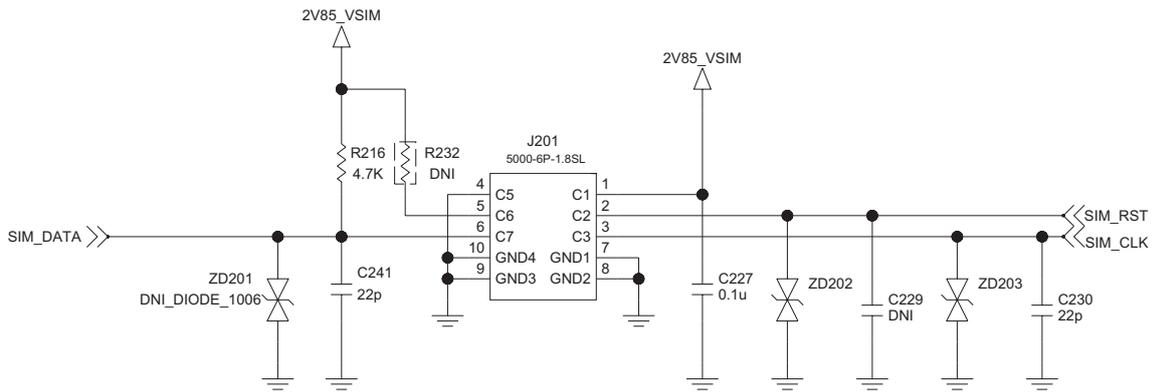


Figure 3.8.1. SIM CARD Interface

The Main Base Band Processor(XMM2130) provides SIM Interface Module. The XMM2130 checks status Periodically During established call mode whether SIM card is inserted or not, but it doesn't check during deep sleep mode. In order to communicate with SIM card, 3 signals SIM\_DATA, SIM\_CLK, SIM\_RST. And This model supports 3V SIM Card.

Signal	Description
SIM_RST	This signal makes SIM card to HW default status.
SIM_CLK	This signal is transferred to SIM card.
SIM_DATA	This signal is interface datum.

### 3.9 LCD Interface

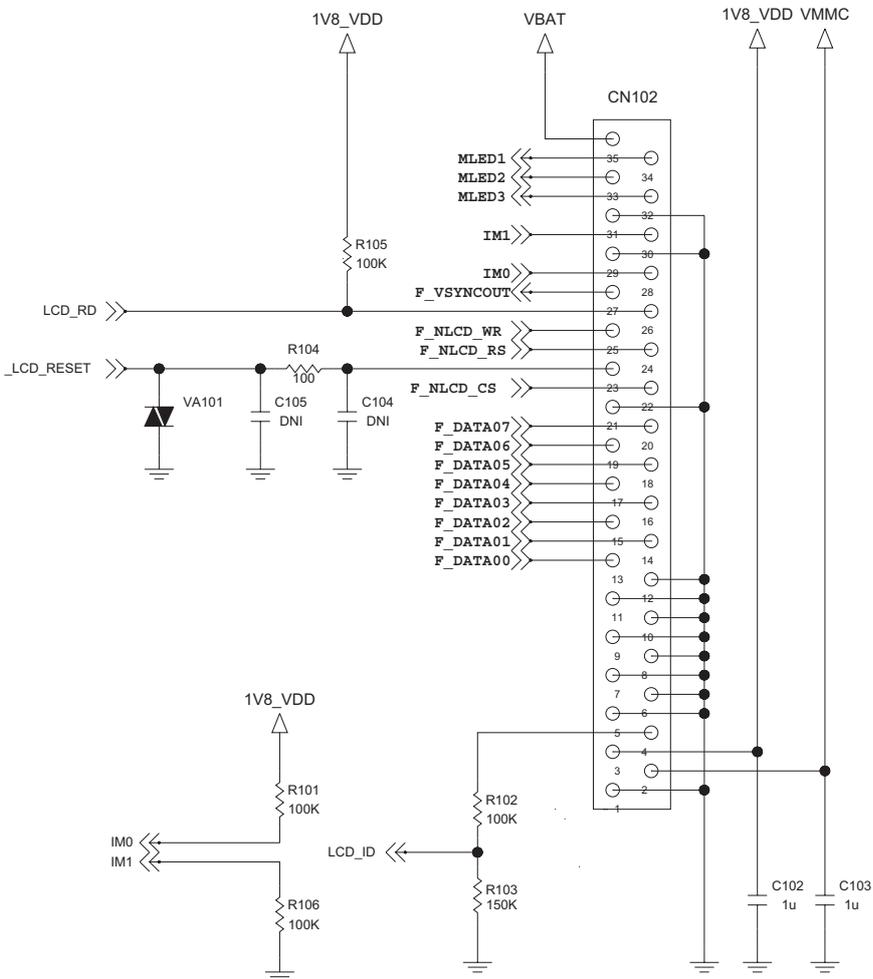
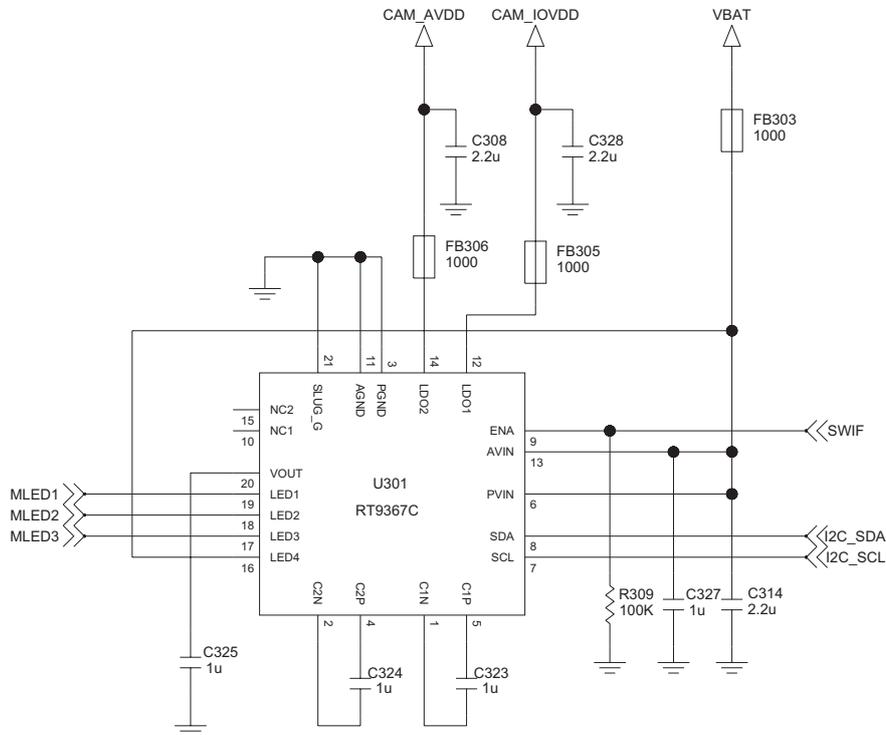


Figure 3.9.1. LCD Interface

LGDP4525B is a 262,144-color one-chip SoC driver for a-TFT liquid crystal display with resolution of 176RGBx220 dots, comprising a 528-channel source driver, a 220-channel gate driver, 87120 bytes RAM for graphic data of 176RGBx220 dots, and power supply circuit. LGDP4525B can operate with low I/O interface power supply up to 1.65V, with an incorporated voltage follower circuit to generate voltage levels for driving an LCD. The LGDP4525B also supports a function to display in 8 colors and a standby mode, allowing for precise power control by software. These features make the LGDP4525B an ideal LCD driver for medium or small size portable products such as digital cellular phones or small PDA, where long battery life is a major concern.

### 3. Technical brief



**Figure 3.9.2. RT9367C CIRCUIT DIAGRAM**

The RT9367C is a high efficiency charge pump LED driver using Semtech’s proprietary mAhXLife™ technology. Performance is optimized for use in single-cell Li-ion battery applications.

The charge pump provides backlight current in conjunction with four matched current sinks. The load and supply conditions determine whether the charge pump operates in 1x, 1.5x, or 2x mode. An optional fading feature that gradually adjusts the backlight current is provided to simplify control software. The RT9367C also provides two low-dropout, low-noise linear regulators for powering a camera module or other peripheral circuits.

The RT9367C uses the proprietary SemWire™ single wire interface. The interface controls all functions of the device, including backlight current and two LDO voltage outputs. The single wire implementation minimizes microcontroller and interface pin counts.

In sleep mode, the device reduces quiescent current to 100µA while continuing to monitor the serial interface. The two LDOs can be enabled when the device is in sleep mode. Total current reduces to 0.1µA in shutdown.

### LED Backlight Current Sinks

The backlight current is set via the SemWire interface. The current is regulated to one of 32 values between 0.5mA and 25mA. The step size varies depending upon the current setting. Between 0.5mA and 12mA, the step size is 0.5mA. The step size increases to 1mA for settings between 12mA and 15mA and 2mA for settings greater than 15mA. This feature allows finer adjustment for dimming functions in the low current setting range and coarse adjustment at higher current settings where small current changes are not visibly noticeable in LED brightness.

All backlight current sinks have matched currents, even when there is variation in the forward voltages ( $\Delta V_F$ ) of the LEDs. A  $\Delta V_F$  of 1.2V is supported when the input voltage is at 3.0V. Higher  $\Delta V_F$  LED mis-match is supported when  $V_{IN}$  is higher than 3.0V. All current sink outputs are compared and the lowest output is used for setting the voltage regulation at the  $V_{OUT}$  pin. This is done to ensure that sufficient bias exists for all LEDs.

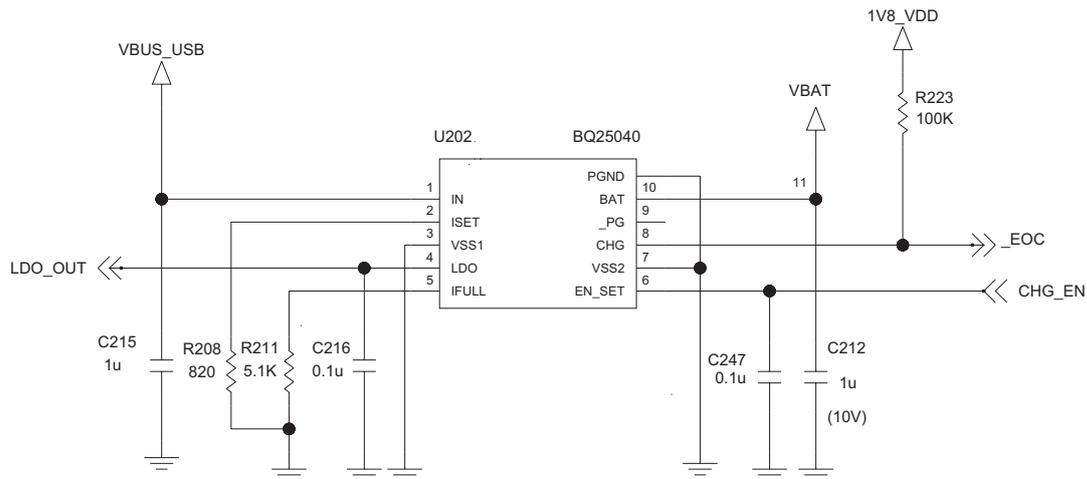
The backlight LEDs default to the off state upon powerup. For backlight applications using less than four LEDs, any unused output must be left open and the unused LED driver must remain disabled. When writing to the Backlight Enable Control register, a zero (0) must be written to the corresponding bit of any unused output.

### Backlight Quiescent Current

The quiescent current required to operate all four backlights is reduced by 1.5mA when backlight current is set to 4.0mA or less. This feature results in higher efficiency under light-load conditions. Further reduction in quiescent current will result from using fewer than four LEDs.

## 3.10 Battery Charger Interface

### CHARGING IC



**Figure 3.10.1 BATTERY CHARGER BLOCK**

The BQ25040 is an intelligent, stand-alone constant current, constant-voltage (CCCV), thermally regulated dual input linear charger designed for charging a single-cell lithium-ion (Li+) battery.

The IC controls the charging sequence from the prequalification state through constant current fast charge, top-off charge, and full-charge indication. Proprietary thermal-regulation circuitry limits the die temperature during fast charging or when the IC is exposed to high ambient temperatures, allowing maximum charging current without damaging the IC.

The BQ25040 accepts input supply range from -0.3V to 28V, but disables charging if the input voltages exceed +6.9V to protect against unqualified or faulty AC adapters cables. The IC operates over the extended temperature range (-40°C to +85°C)

### 3.11 Keypad Interface

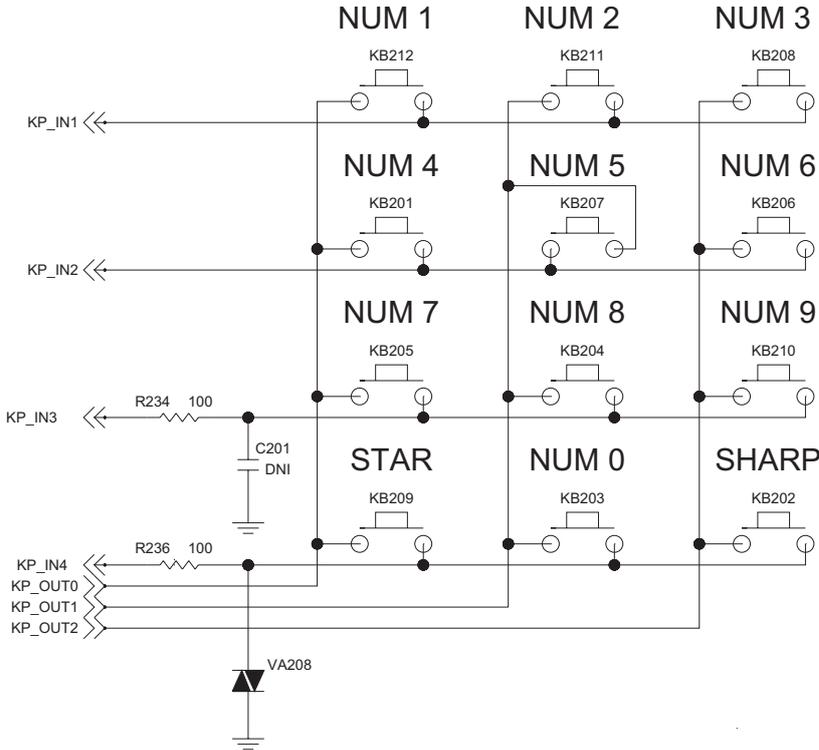


Figure 3.11.1 MAIN KEY STRUCTURE

The Keypad Interface is a peripheral controller, which can be used for scanning external keypad matrices with up to 8 rows and 8 columns (that is 64 standard keys). By adding an additional row of keys connected to ground the number of keys can be extended by up to 8 keys. This results in a maximum number of 72 keys to be identified by the Keypad Interface Controller. The Keypad Scan Module reduces the number of interrupts and polling through the processor and therefore reduces the power consumption. The module is able to debounce and scan the external keypad matrix automatically without any software intervention. After debouncing it generates an interrupt. The interface controller contains information about the key (or key combination) that was pressed and how long it was pressed.

### 3. Technical brief

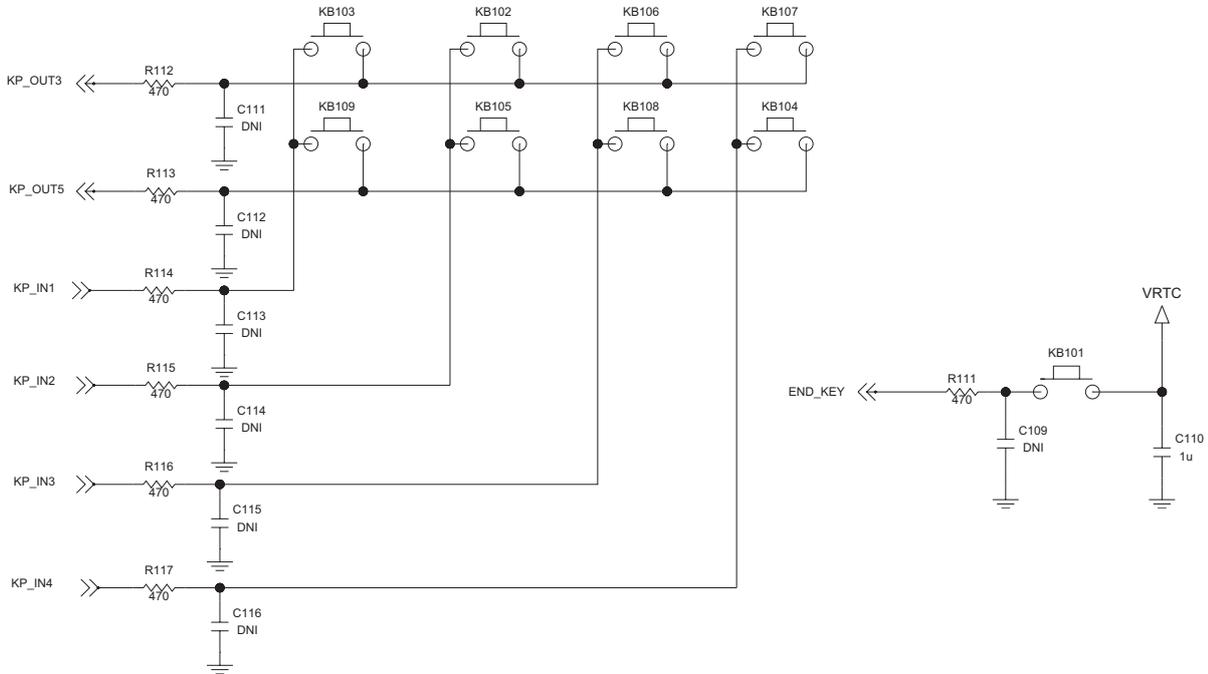


Figure 3.11.2 SLIDE KEY STRUCTURE

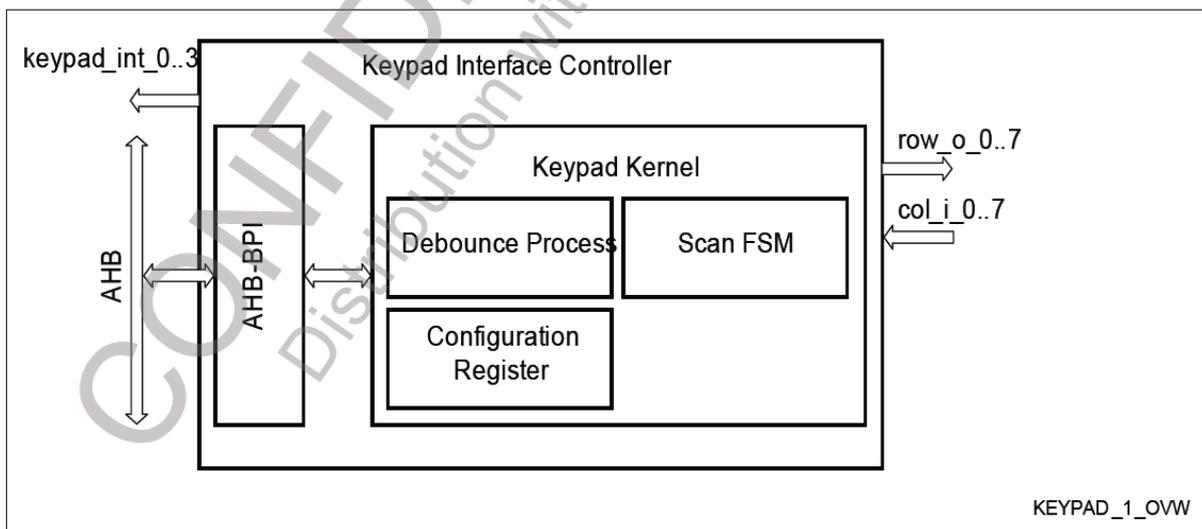


Figure 3.11.3 Block Diagram and System Integration of the KPD

### 3.12 Audio Front-End

#### 3.12.1 Functional Overview

The audio front-end of X-GOLD™213 offers the digital and analog circuit blocks for both receive and transmit audio operation, from a mobile phone perspective (called audio-in and audio-out subsequently). It features a high-quality, stereo digital-to-analog path with amplifier stages for connecting acoustic transducers to X-GOLD™213. In audio-in path the supply voltage generation for electret microphones, a low-noise amplifier and analog to digital conversion are integrated in X-GOLD™213. A more detailed functional description will be given in the following sections.

The audio front-end itself can be considered to be organized in three sub-blocks:

- Interface to processor cores (TEAKLite® and - indirectly - ARM)
- Digital filters
- Analog part

The following figure shows an architecture overview of the Audio section.

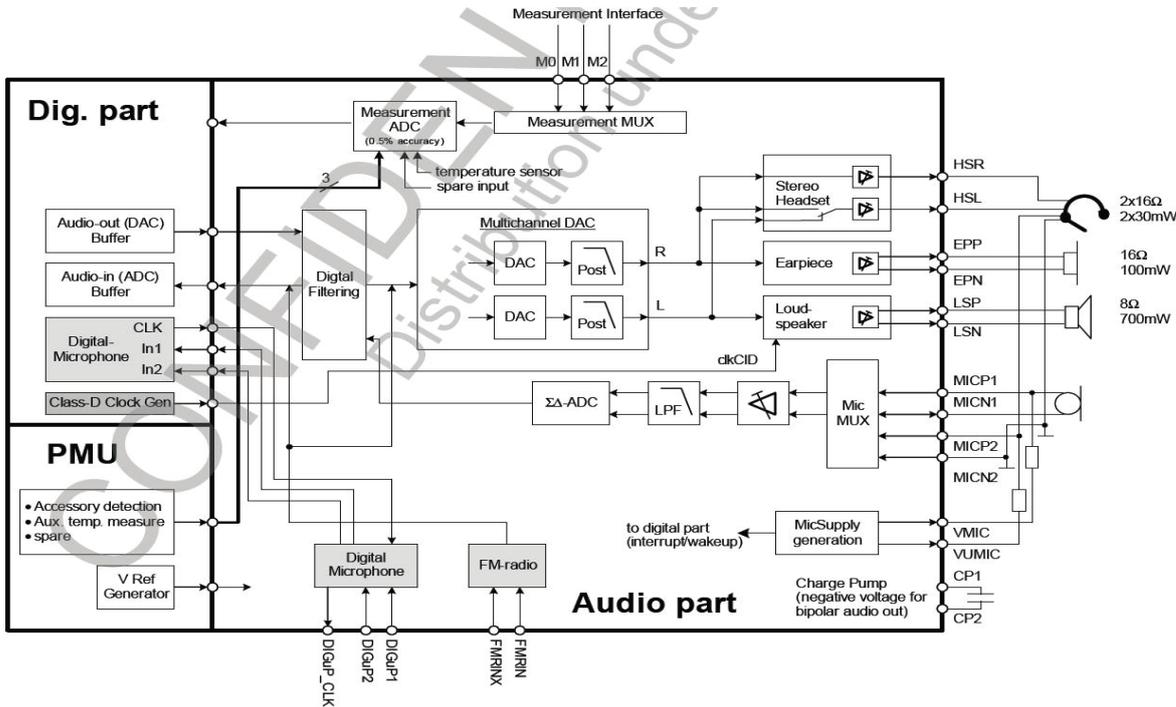


Figure 3.12.1 Audio Section Overview

### 3. Technical brief

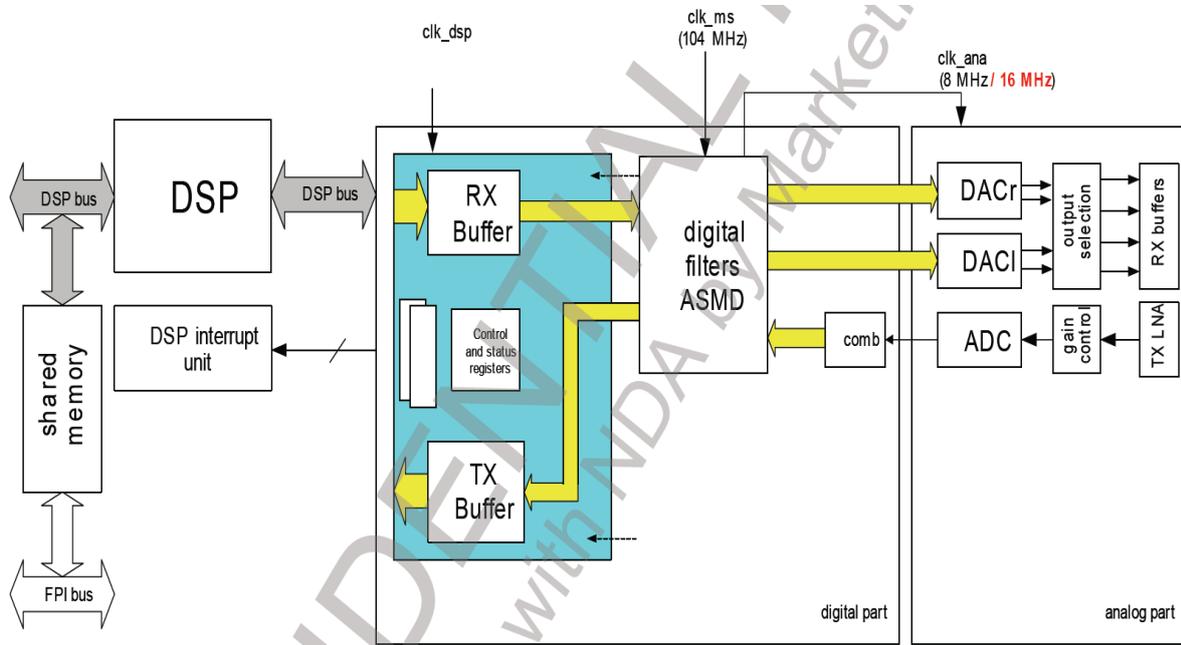


Figure 3.12.2 Overview of Clocking and Interfaces of Audio Front End

#### The audio front-end of X-GOLD™213 has the following major operation modes:

- Power-down: All analog parts are in power down and all clocks of the digital part are switched off.
- Audio mode: Digital decimation/interpolation filters are connected to the interface buffers and the analog part is enabled.

#### These major modes can be modified by certain control register settings.

- Due to the new gain settings in the TX path, the maximum input voltage is limited to 0.8 Vpp.
- In both voiceband paths, the value range for voice samples is confined to 97.5%, i.e. to [-31948, 31947] or [8334H, 7CCBH] in X-GOLD™213.
- On the TX path, 83% "1"s on the VTPDM line correspond to a 16-bit value of 7CCBH and 17% "1"s correspond to a 16-bit value of 8334H at the digital filter output. Thus the usable range is 66%. This range can be scaled to 100% by Firmware.
- The high-pass functions of the voiceband filters have to be implemented in firmware on TEAKLite®.

### 3.12.2 Digital Part

The digital part of the X-GOLD™213 audio front-end comprises an interface to the TEAKLite® bus, interfaces to the interrupt units of TEAKLite®, digital interpolation filters for oversampling digital-to-analog conversion, digital decimation filters for analog-to-digital conversion and an interface to the analog part of the audio front-end. For the digital microphone all the filtering is done in a dedicated hardware. The output sample stream is then fed in a duplicated ring buffer structure like the data from the analog microphone path (after A/D conversion and subsequent digital filtering).

#### ▪ Interpolation Filter

The interpolation path of the X-GOLD™213 audio front-end increases the sampling rate of the audio samples to the rate of the digital-to-analog converter. Because the input sampling rates can vary between 8 kHz and 47.619 kHz the filter characteristic and oversampling ratio can be adjusted to the respective sampling rate. The requirements for the interpolation filters depend on the sampling rate, because a sufficient out-of-band discrimination in the audio frequency band (20 Hz,...,20 kHz) has to be ensured.

#### ▪ Decimation Filter

The digital decimation filter on X-GOLD™213 has two operating modes: 8 kHz output sampling rate and 16 kHz output sampling rate (or 16 kHz output sample rate and 16kHz bandwidth in case of doubled ASMD clock).

### 3.12.3 Analog Part

The analog part of the X-GOLD™213 audio front-end in audio-out direction consists of a stereo digital to analog converter (multi-bit oversampling converter) which transforms the output of the digital interpolation filter into analog signals. It is followed by the gain control/amplifier section. The DAC outputs can be switched to several output buffers. In audio-in section there is an input multiplexer which selects either one of two differential microphone inputs to be connected to the low-noise amplifier and analog pre-filter. The signals from the analog pre-filter are input to a second-order sigma-delta analog-to-digital converter. In addition there is a connection for FM-radio playing.

#### ▪ Audio-out Part

The analog audio-out part consists of two multi-bit digital-to-analogue converters (DAC) and an output stage. The signal sources are switched to the output drivers in the output stage. The output drivers consist of: a) one mono, differential class-D Loudspeaker driver, b) one mono, differential Earpiece driver and c) one stereo, single-ended (with uni- or bipolar signals), Headset driver.

### 3. Technical brief

#### ▪ Digital-to-analog converters

The multi-bit oversampling DACs of the X-GOLD™213 audio front-end convert the 16-bit data words coming from the digital interpolation filters to analogue signals.

#### ▪ Output Amplifier

The different output buffers in X-GOLD™213 are driven by the outputs of the selection block. The differential earpiece driver can be used to drive a 16 Ω earpiece and works in differential. The two single ended headset drivers can be used to drive a 16 Ω headset. They can work unipolar mode, where an AC coupling of the headset might be needed, or can work also in bipolar mode. The differential loudspeaker driver can be used to drive a 8 Ω loudspeaker. As it is a class-D amplifier the needed suppression of the higher harmonics of the switching signals has to be achieved by the external circuitry. The buffers are designed to be short circuit protected.

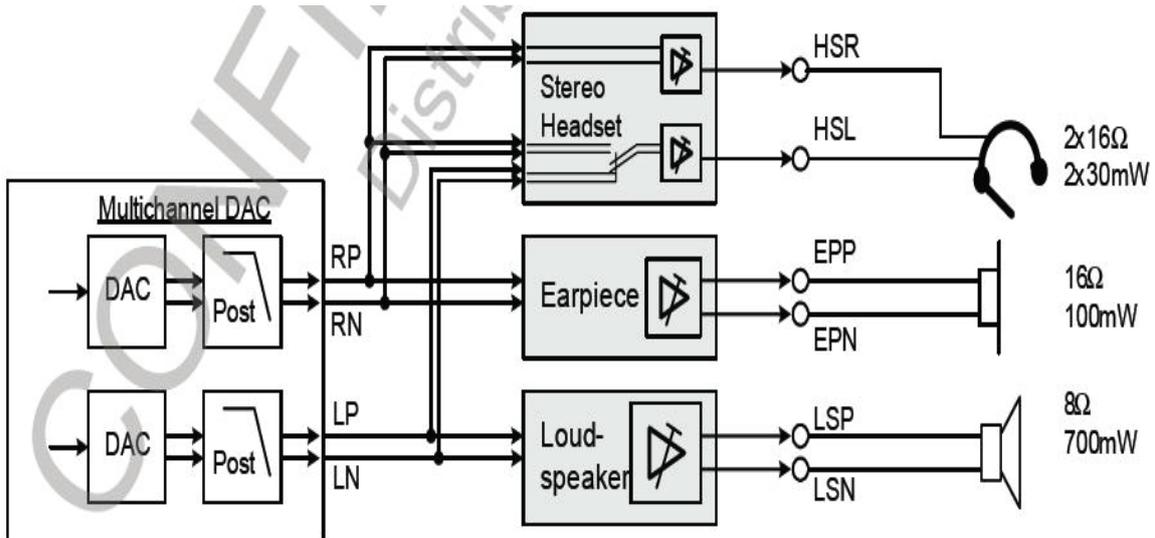
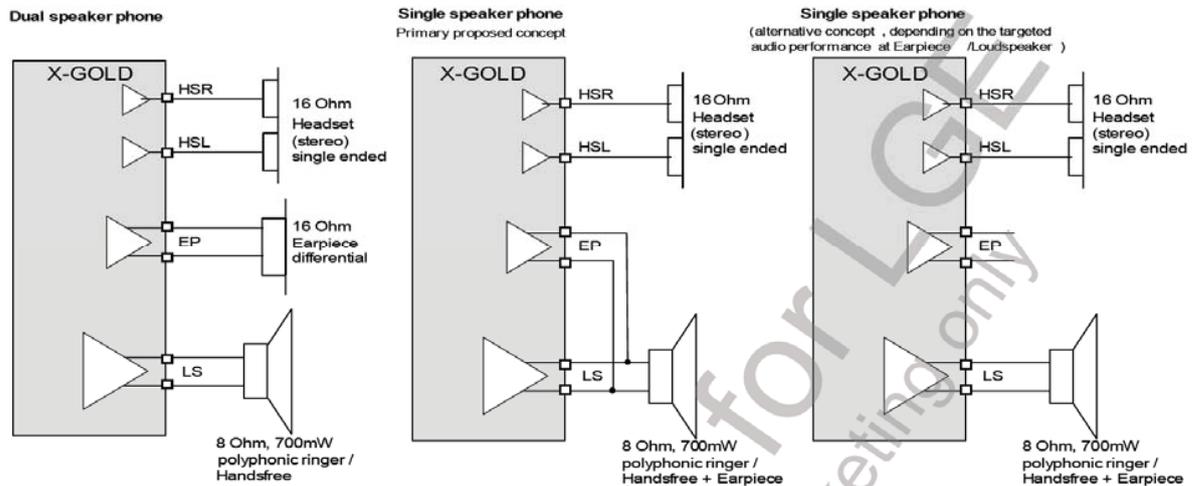


Figure 3.12.3 Switching for R/L DACs onto Buffers



**Figure 3.12.4 Different Application Scenarios**

In order to achieve the single-speaker concept by parallel connection of Earpiece and Headset amplifier the Earpiece amplifier have to sustain the up to 5 V voltage of the class-D amplifier.

#### ▪ Audio-in Path

The audio-in path of X-GOLD™213 provides two differential microphone input sources, MIC1 and MIC2.

- The inputs for microphone MIC1 are MICP1 and MICN1.
- The inputs for microphone MIC2 are MICP2 and MICN2.

The audio-in path consists of an input selector, a low noise amplifier and following pre-filter with gain control, a second order  $\Sigma\Delta$ -converter and a digital decimation filter. It supports both standard GSM (bandwidth 3.5 kHz) and wideband (bandwidth 7 kHz) speech bands.

The differential input signal from the microphone first passes a low noise amplifier and following pre-filter and an anti-aliasing pre-filtering stage achieving an overall variable gain ranging from 0 dB to +39 dB. The signal is then modulated by a second order  $\Sigma\Delta$ -converter which is clocked with the same clock rate as the digital to analog converters. The  $\Sigma\Delta$ -converter delivers a 1-bit pulse density modulated data stream at a rate of 2 MHz to the digital decimation filter which reduces the rate to 8 kHz or 16 kHz, depending on the current mode.

To improve SNR the sample frequency can be doubled in dedicated modes and the modulated data stream is 4MHz instead of 2 MHz.

### 3. Technical brief

#### ▪ Microphone Supply

X-GOLD™213 has a single ended power-supply concept for electret microphones:

For both modes a minimal load capacitance of t.b.d. nF is necessary to guarantee stable operation of the buffer.

The maximal load capacitance must not exceed t.b.d. nF.

2 microphone supplies VMIC and VUMIC are available. The supply VUMIC has a ultra-low-power mode, where the current consumption is minimum, whilst at the same time the noise performance is reduced.

For this purpose the VUMIC is directly supplied out of the VMIC regulator, the Mic-Buffer can be switched off and only the quiescent current of the VMIC regulator is present. This mode can be used to supply a headset and allow accessory detection with highly reduced current consumption For normal operation the supply can be switched to normal operation mode with improved noise performance. In case of an digital microphone VMIC can be used for supplying this microphone.

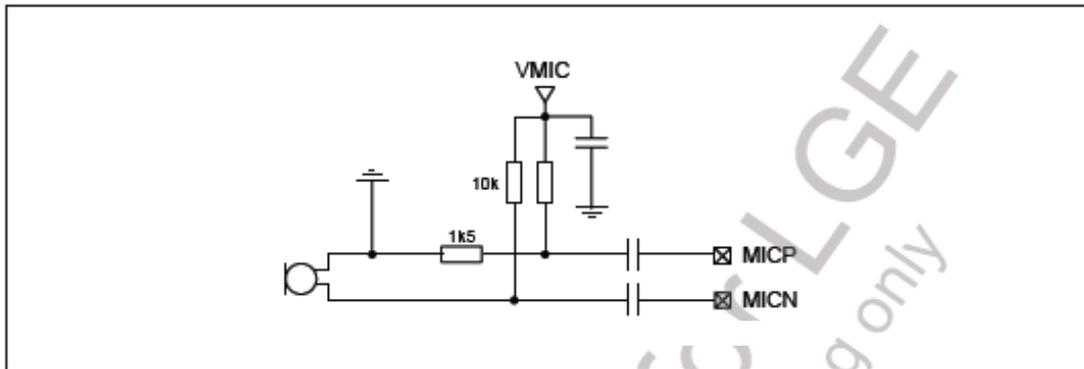


Figure 3.12.5 Typical Microphone Supply Generation (alternative)

### 3.13 Camera Interface(1.3M Fixed Focus Camera)

#### 3.13.1 PMB8810 Camera Interface

The Camera Interface (CIF) represents a complete video and still picture input interface (see Figure 26).

The CIF contains image processing, scaling, and compression functions. The integrated image processing unit supports image sensors with integrated  $YCbCr$  processing. Scaling is used for downsizing the sensor data for either displaying them on the LCD, or for generating data streams for MPEG-4 compression. In general,  $YCbCr$  4:2:2 JPEG compressed images should use the full sensor resolution, but they can also be downscaled to a lower resolution for smaller JPEG files. Scaling also can be used for digital zoom effects, because the scalers are capable of up-scaling as well.

CIF

All data is transmitted via the memory interface to an AHB bus system using a bus master interface. Programming is done by register read/write transactions using an AHB slave interface.

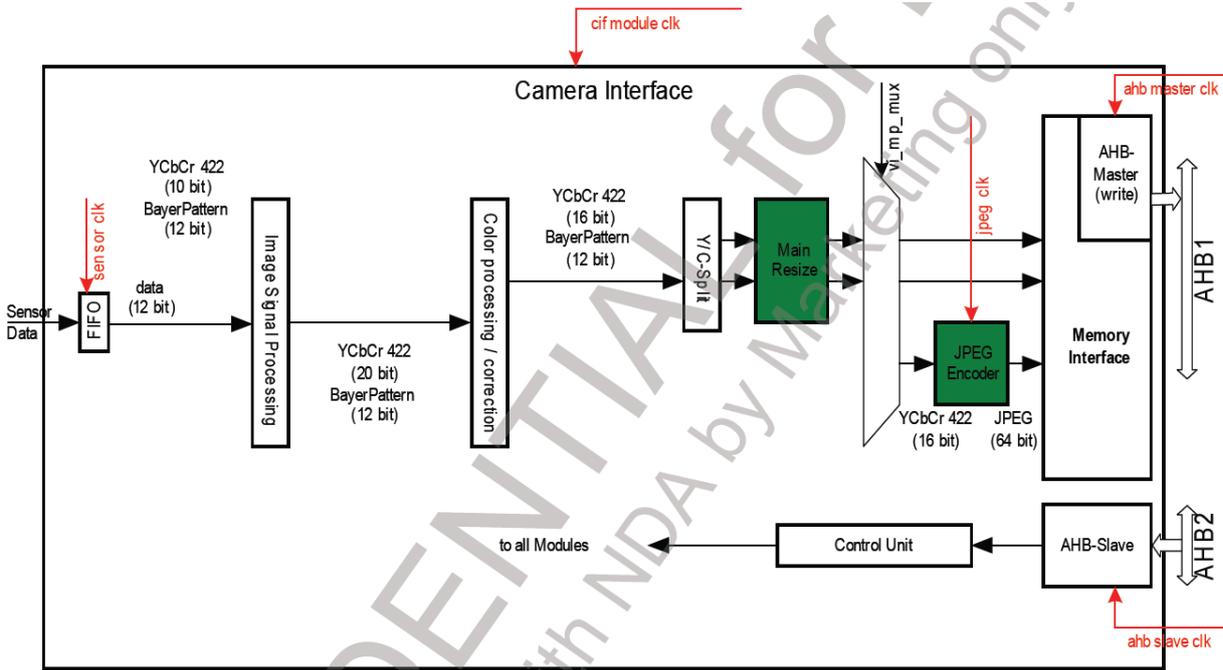


Figure 3.13.1 Block Diagram of Camera Interface

### 3. Technical brief

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#### Functional Overview of CIF

The following list gives an overview over the CIF's functionality:

- 78 MHz system clock
- 78 MHz sensor clock
- 78 MHz JPEG encoder clock
- 32-bit AHB slave programming interface
- ITU-R BT 601 compliant video interface supporting  $YCbCr$
- ITU-R BT 656 compliant video interface supporting  $YCbCr$  data
- 8-bit camera interface
- 12-bit resolution per color component internally
- $YCbCr$  4:2:2 processing
- Hardware JPEG encoder incl. JFIF1.02 stream generator and programmable quantization and Huffman tables
- Windowing and frame synchronization
- Continuous resize support
- Frame skip support for video (e.g. MPEG-4) encoding
- Macro block line, frame end, capture error, data loss interrupts and sync. (h\_start, v\_start) interrupts
- Programmable polarity for synchronization signals
- Luminance/chrominance and chrominance blue/red swapping for YUV input signals
- Maximum input resolution of 3 Mpixels (2048x1536 pixels)
- Main scaler with pixel-accurate up- and down-scaling to any resolution between 3 MP (2048x1536) and 32x16
- pixel in processing mode
- Buffer in system memory organized as ring-buffer
- Buffer overflow protection for raw data and JPEG files
- Asynchronous reset input, software reset for the entire IP and separate software resets for all sub-modules
- Interconnect test support
- Semi planar storage format
- Color processing (contrast, saturation, brightness, hue)
- Power management by software controlled clock disabling of currently not needed sub-modules

### 3.14 KEY BACKLIGHT LED Interface

Key Backlight LED is controlled by switch (Q201, Q101). If KEY\_BL\_EN is high, Current is flowing from VBAT to LED. Then Light emitted from The LED.

KEY\_BL\_EN is operating PWM. It is reducing current consumption.

[Main Key backlight LED interface]

[Slide Key backlight LED interface]

KEY BACKLIGHT

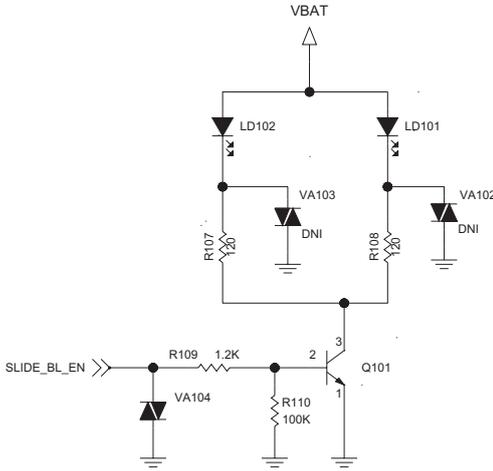
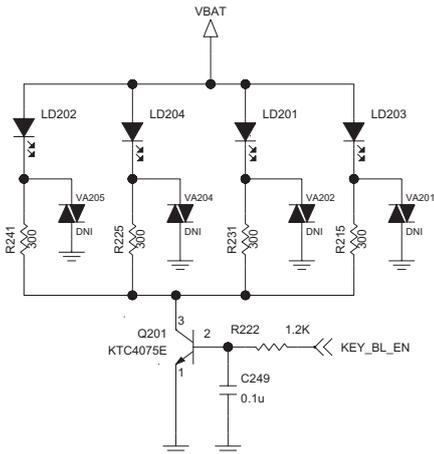


Figure 3.14.1 Key Backlight Block

### 3. Technical brief

#### 3.15 Vibrator Interface

Support PWM signal which generated by hardware itself via register control  
Direct connect to the VIB and VSSVIB pin from XMM2130 without any external component required  
It is capable to driver the vibrator motor up to 150mA

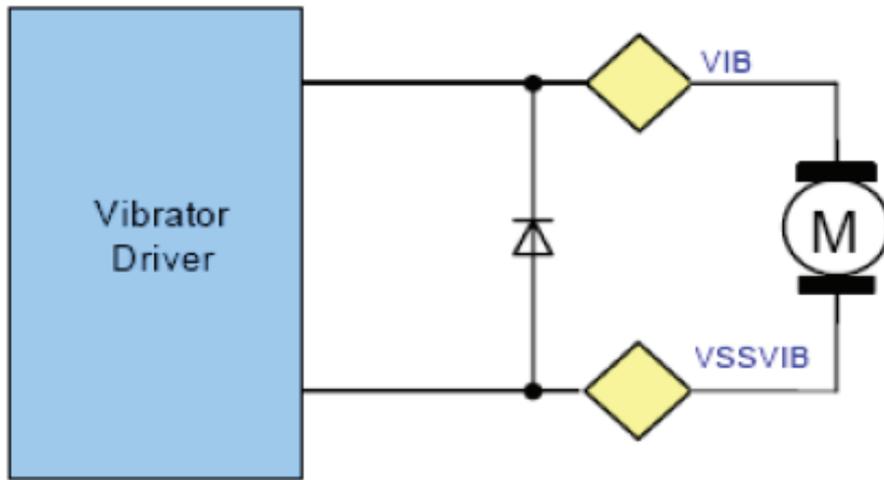


Figure 3.15.1 Vibrator Driver Block Diagram

#### VIBRATOR

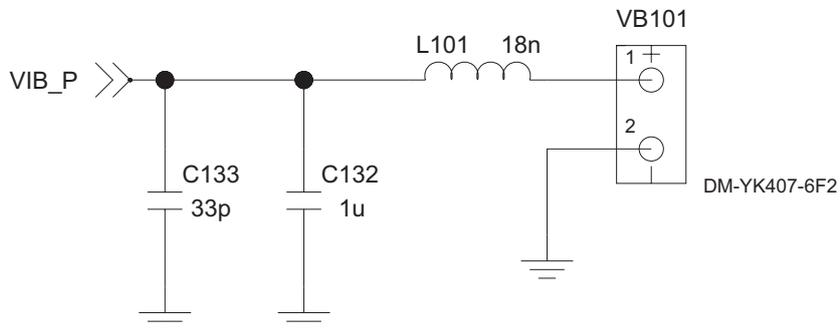


Figure 3.15.2 Vibrator Driver Block

### 3.16 Slide SW Interface

Hall sensor respond to the magnetic field. If it is used for mobile phones, It is used for opening of the slide. A little magnet attached to the slide. If slide is opened, Hall sensor is ON. Therefore, to see whether the opening of the slide.

## SLIDE SW

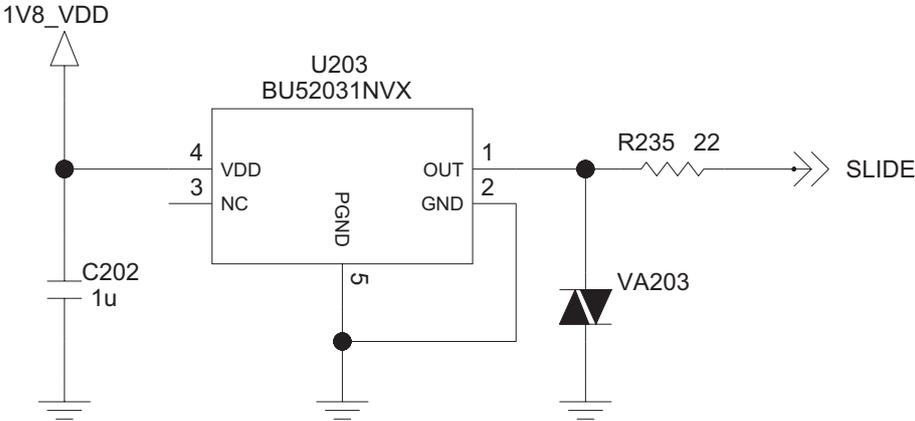


Figure 3-16-1 Hall effect switch Block Diagram

## 4. Trouble Shooting

### 4. Trouble Shooting

#### 4.1 RF Component

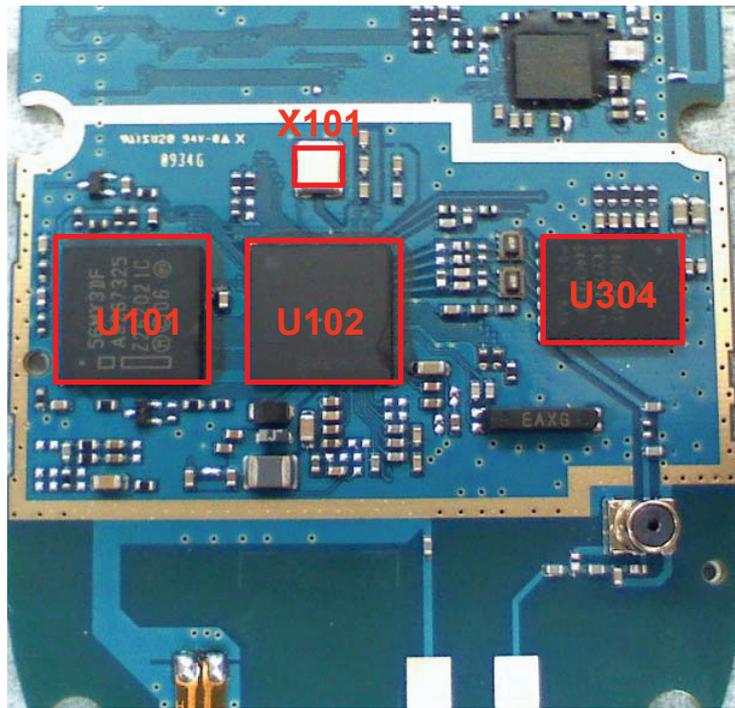
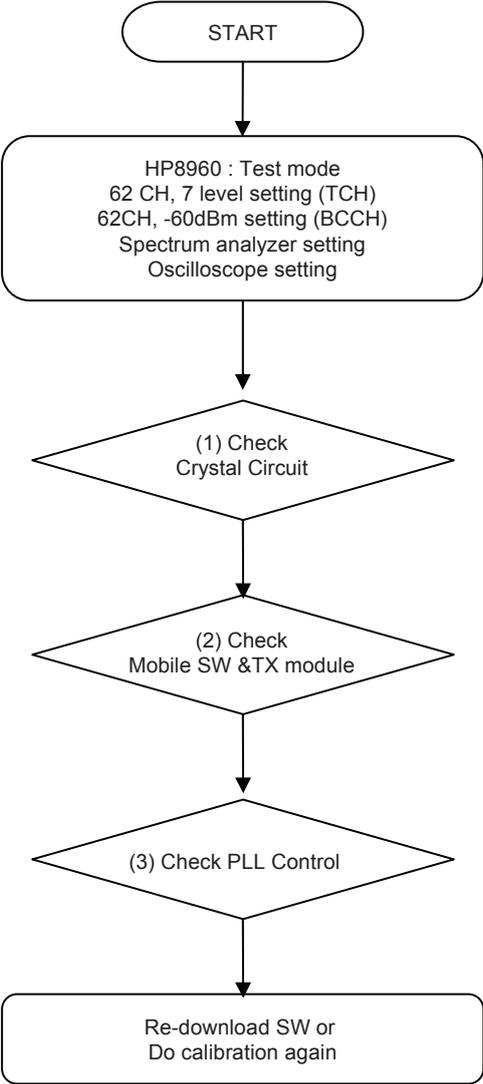


Figure 4.1

U101	Memory(512NOR/128pSDRAM) PF38F5060M0Y3DF
U102 (PMB8810)	Main Chip (A-GOLDRADIO)
U304	FEM(Tx Module)
X101	Crystal, 26MHz Clock

4.2 RX Trouble

CHECKING FLOW



# 4. Trouble Shooting

## (1) Checking Crystal Circuit

TEST POINT

CHECKING FLOW

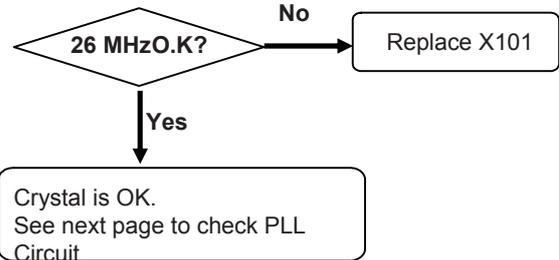
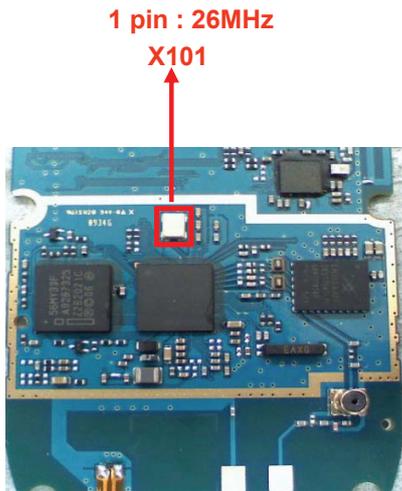


Figure 4.2.1

CIRCUIT

WAVEFORM

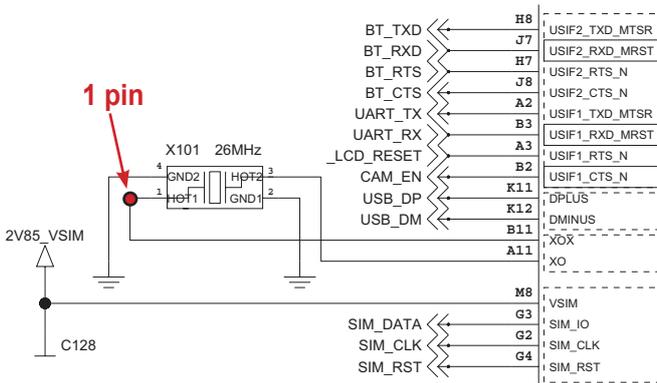


Figure 4.2.2

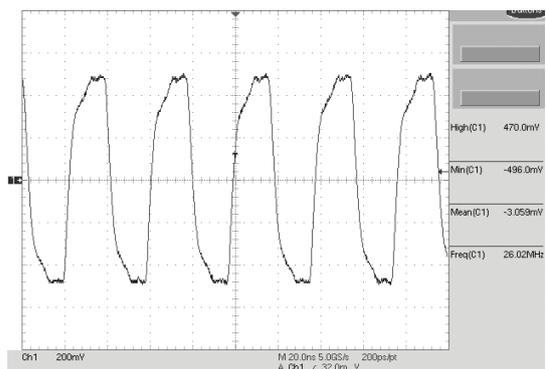


Figure 4.2.3

4.2.2 Checking Mobile SW &FEM

TEST POINT

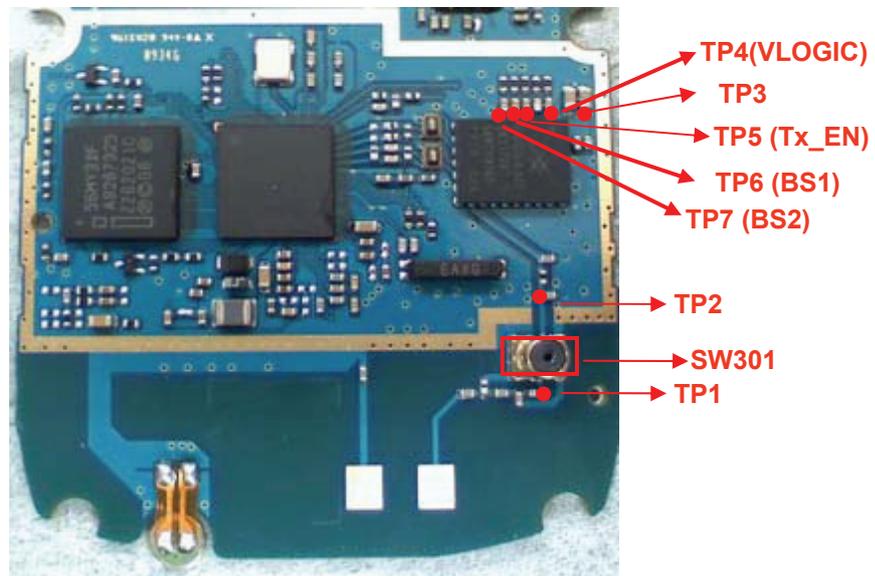
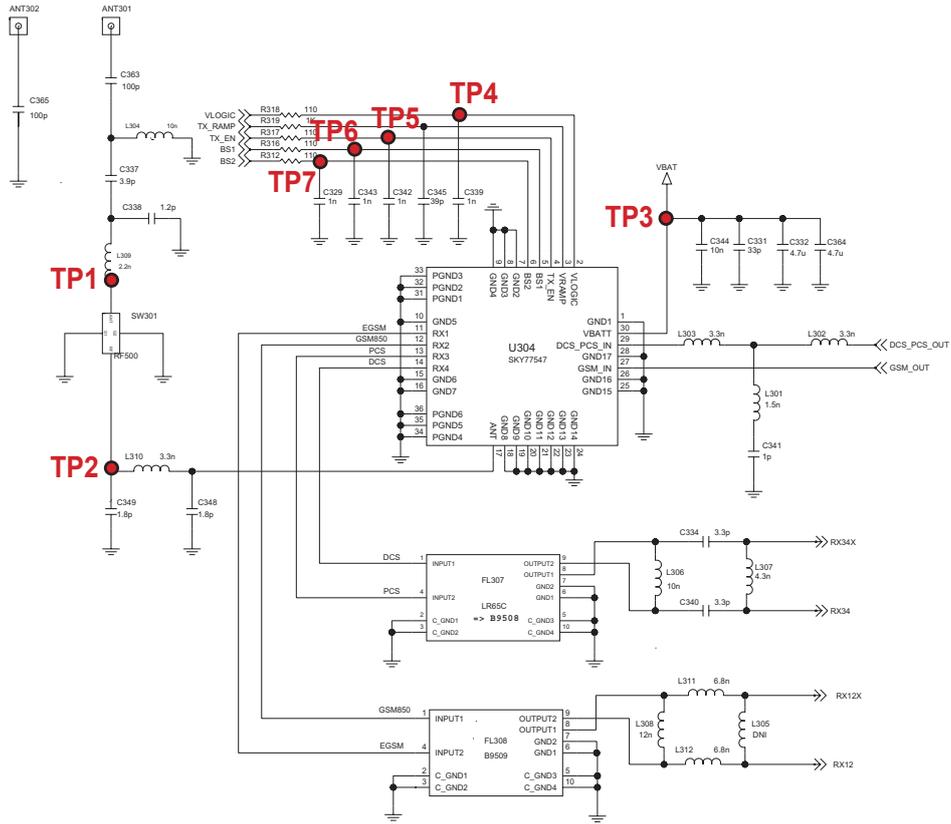


Figure 4.2.4

# 4. Trouble Shooting

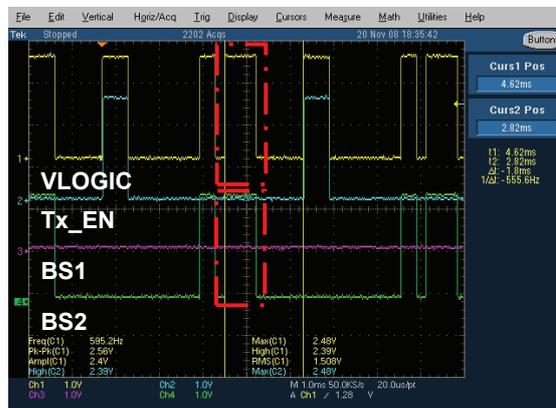
## (2) Checking Mobile SW &FEM

CIRCUIT

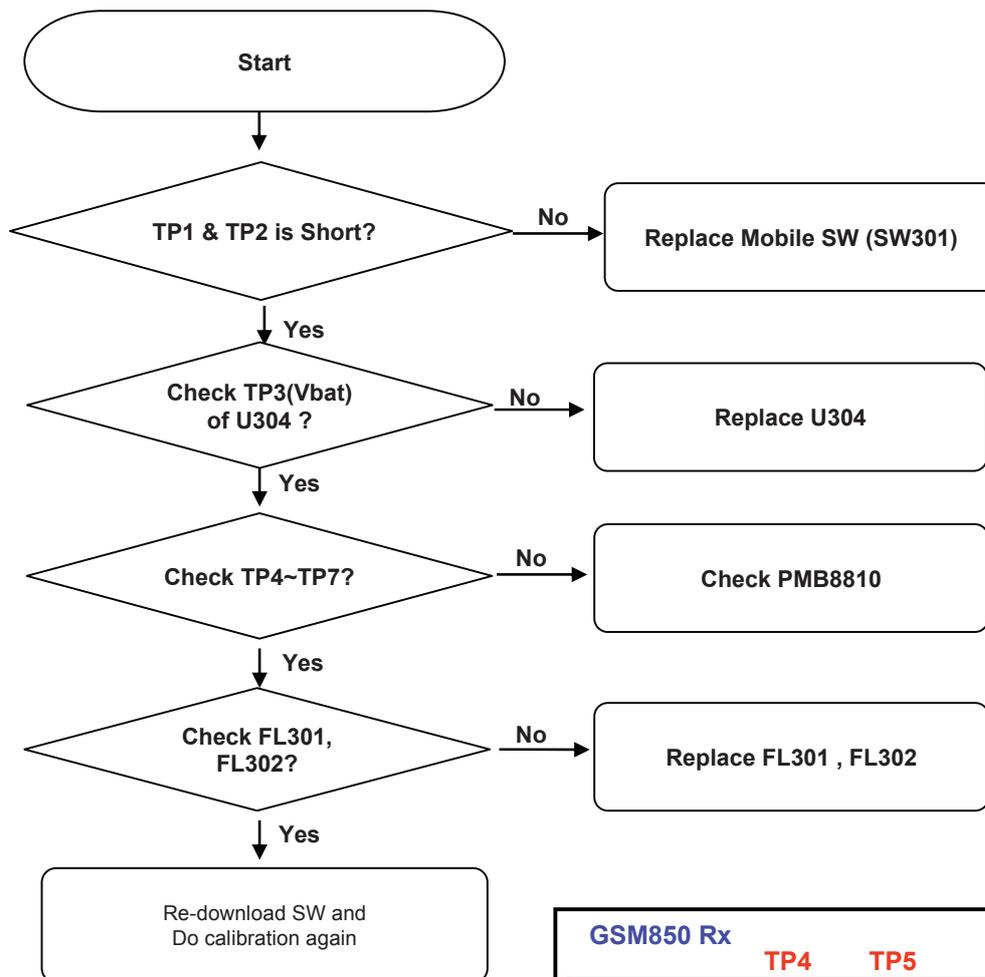


CONTROL LOGIC

### EGSM Rx



### CHECKING FLOW

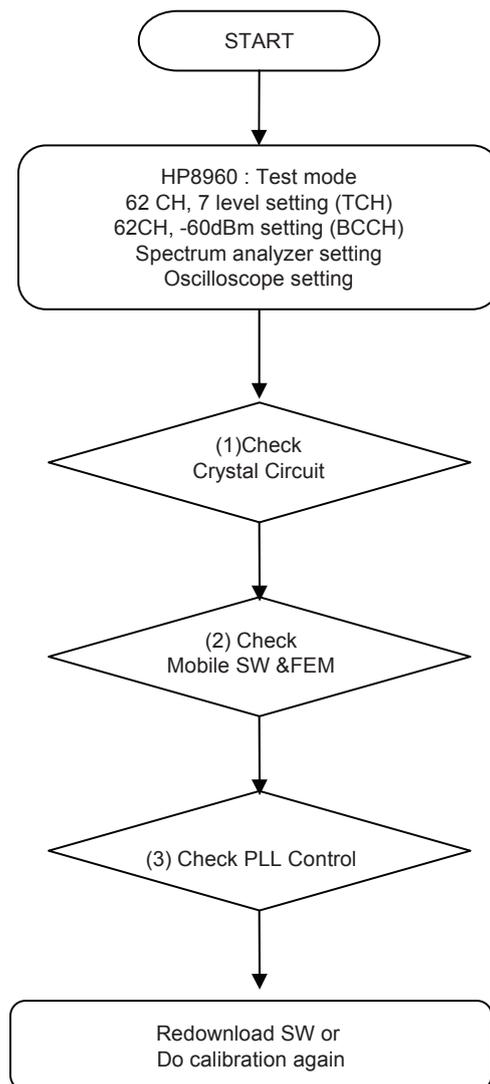


GSM850 Rx				
	TP4	TP5	TP6	TP7
MODE	VLOGIC	TX_EN	BS1	BS2
STANDBY	LOW	X	X	X
EGSM_RX	HIGH	LOW	LOW	LOW
GSM850_RX	HIGH	LOW	LOW	HIGH
PCS_RX	HIGH	LOW	HIGH	HIGH
DCS_RX	HIGH	LOW	HIGH	LOW
LB_TX	HIGH	HIGH	LOW	X
HB_TX	HIGH	HIGH	HIGH	X

## 4. Trouble Shooting

### 4.3 TX Trouble

#### CHECKING FLOW



## (1) Checking Crystal Circuit

TEST POINT

CHECKING FLOW

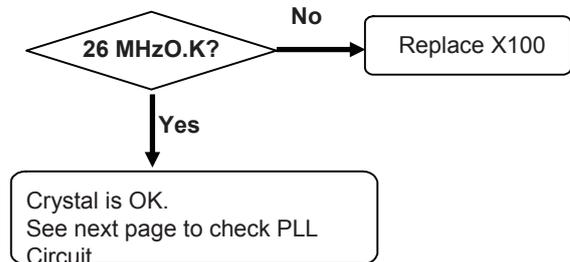
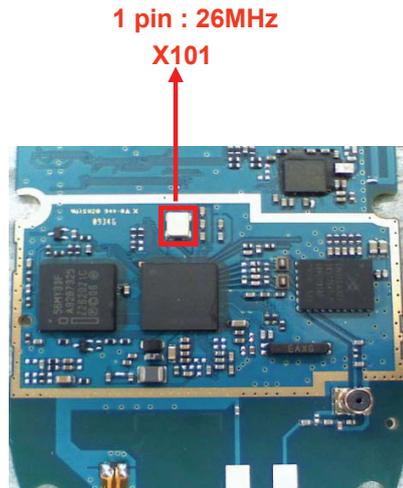


Figure 4.3.1

CIRCUIT

WAVEFORM

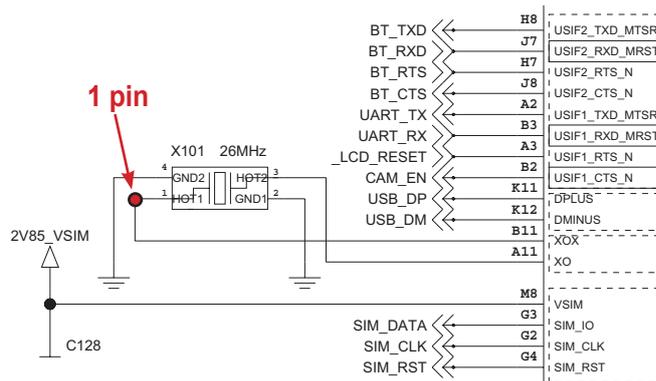


Figure 4.3.2

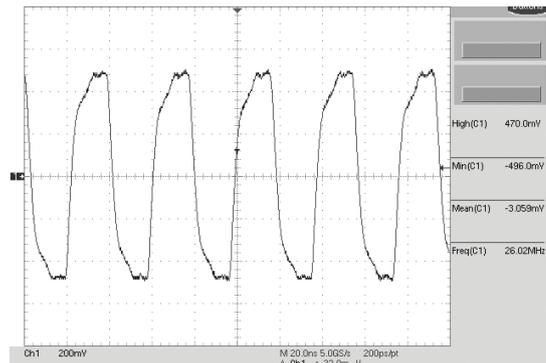


Figure 4.3.3

## 4. Trouble Shooting

### 4.3.2 Checking Mobile SW & TX Module

TEST POINT

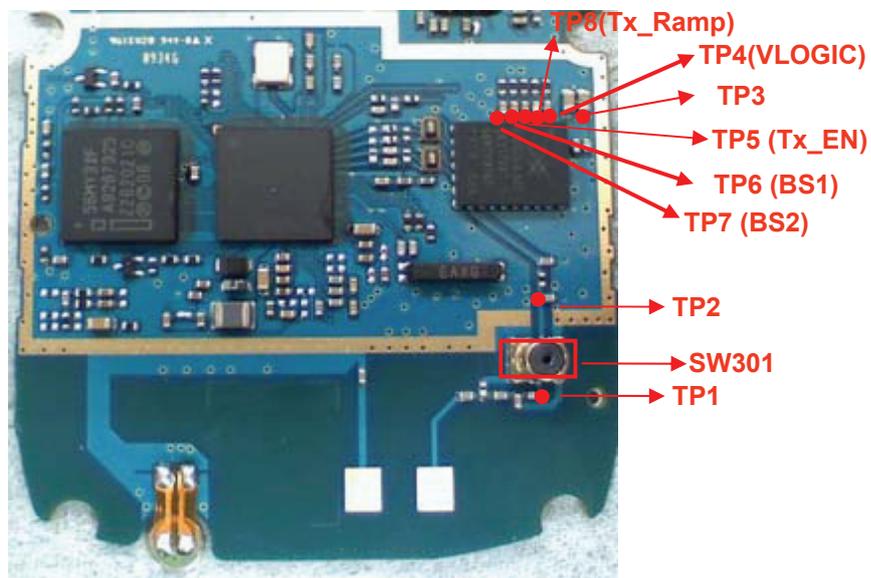


Figure 4.3.4

## CIRCUIT

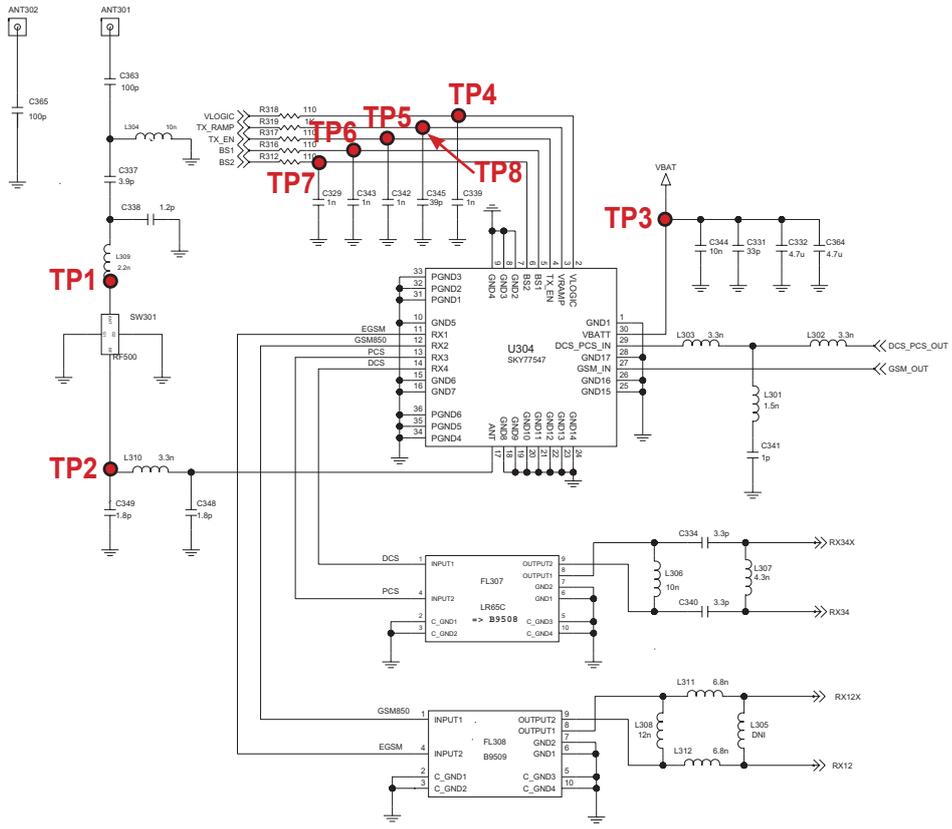


Figure 4.3.5

## CONTROL LOGIC

### Low Band Tx



Figure 4.3.6

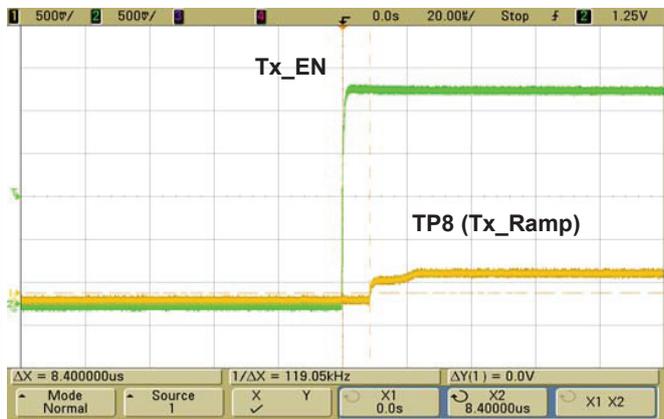
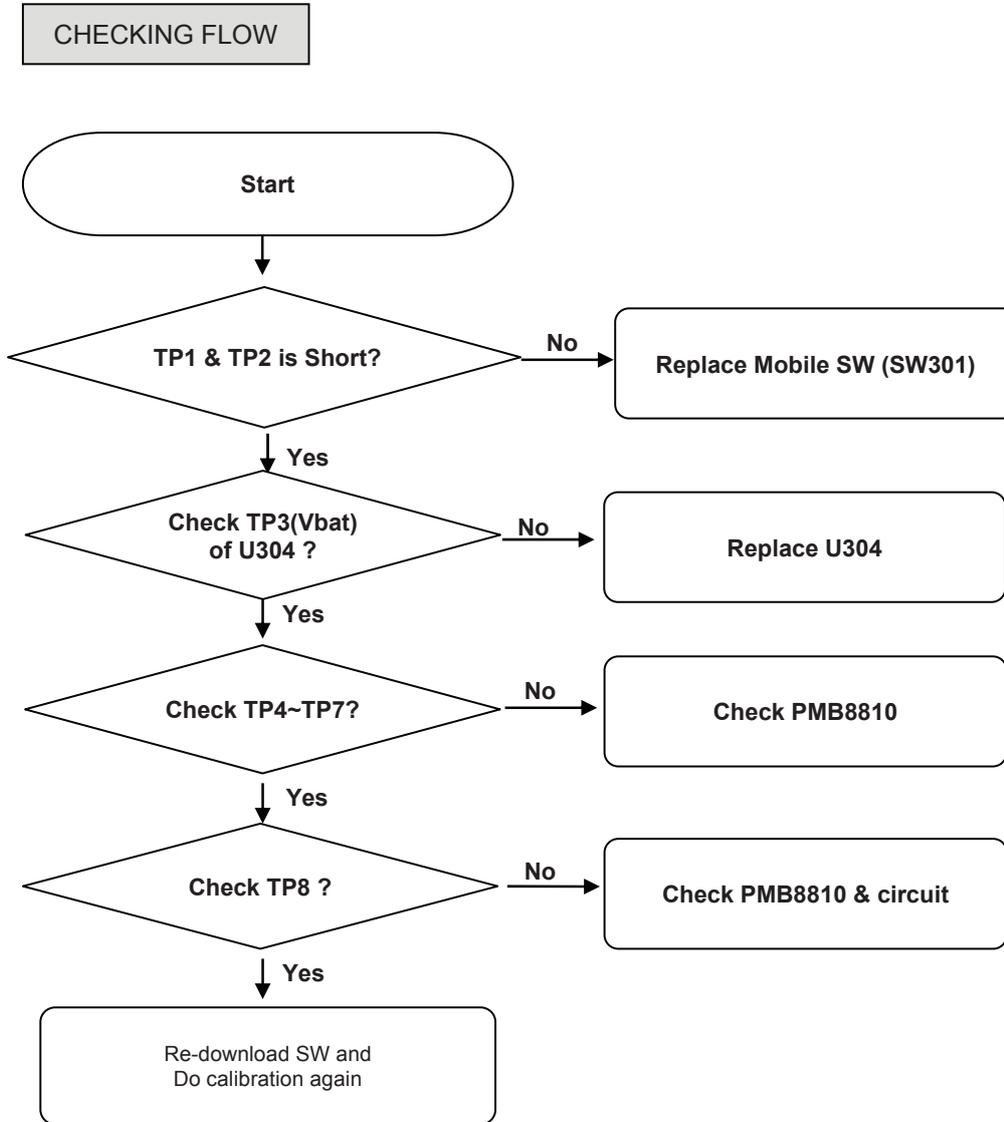


Figure 4.3.7

## 4. Trouble Shooting



	<b>TP4</b>	<b>TP5</b>	<b>TP6</b>	<b>TP7</b>
MODE	VLOGIC	TX_EN	BS1	BS2
STANDBY	LOW	X	X	X
EGSM_RX	HIGH	LOW	LOW	LOW
GSM850_RX	HIGH	LOW	LOW	HIGH
PCS_RX	HIGH	LOW	HIGH	HIGH
DCS_RX	HIGH	LOW	HIGH	LOW
LB_TX	HIGH	HIGH	LOW	X
HB_TX	HIGH	HIGH	HIGH	X

## 4.4 Power On Trouble

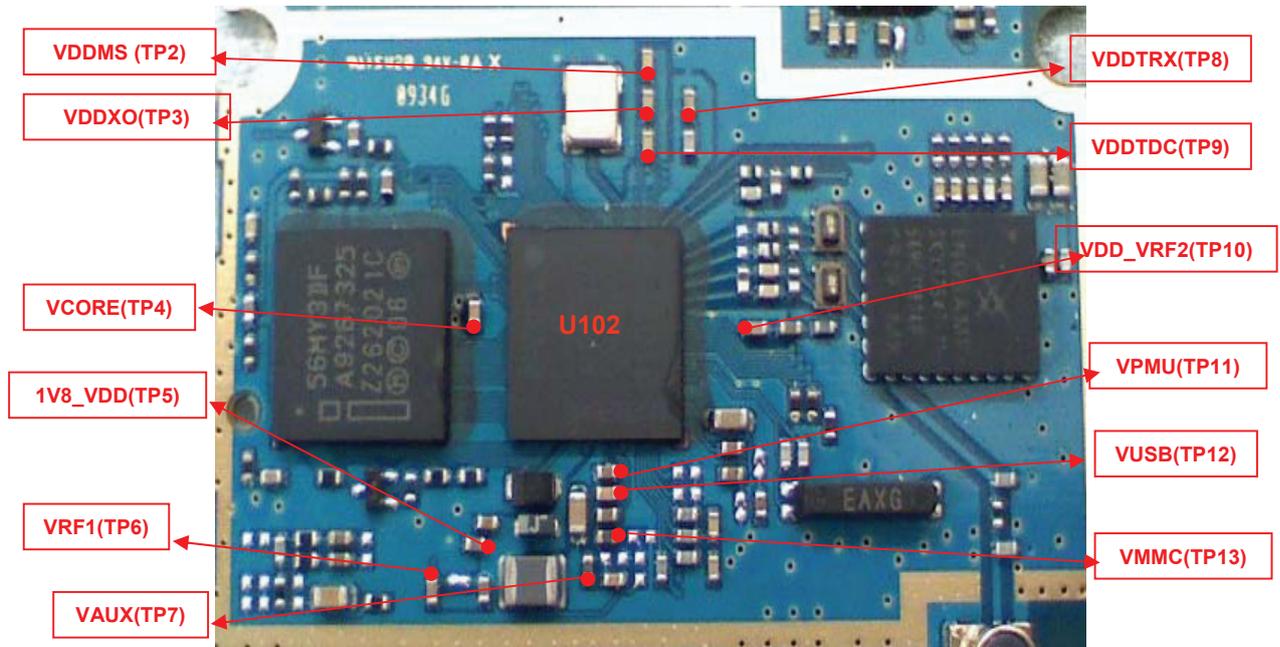


Figure 4.4.1

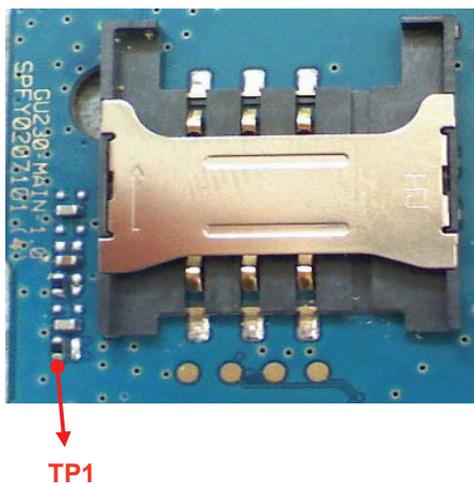


Figure 4.4.2

### POWER ON

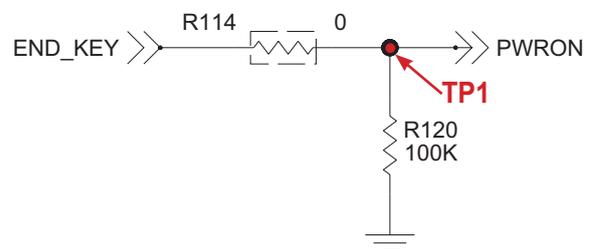


Figure 4.4.3 Remote power on

# 4. Trouble Shooting

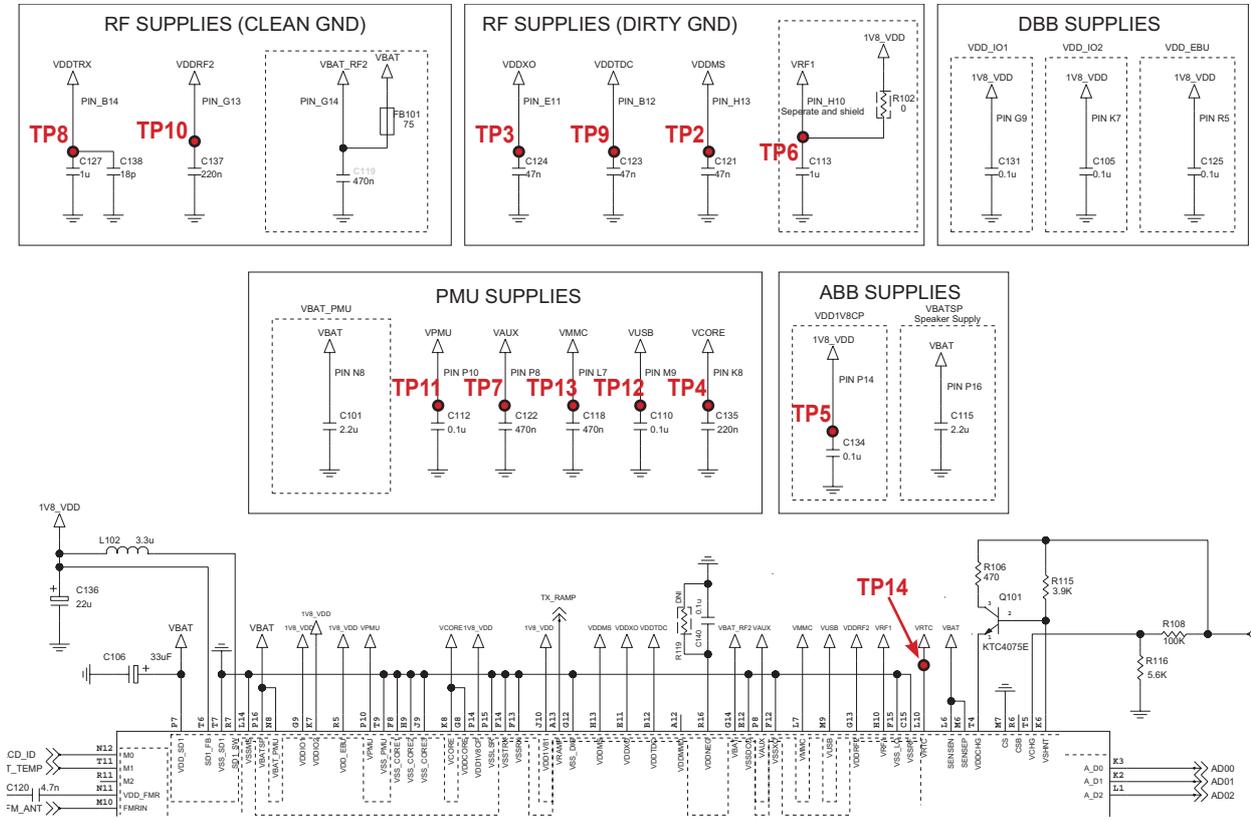
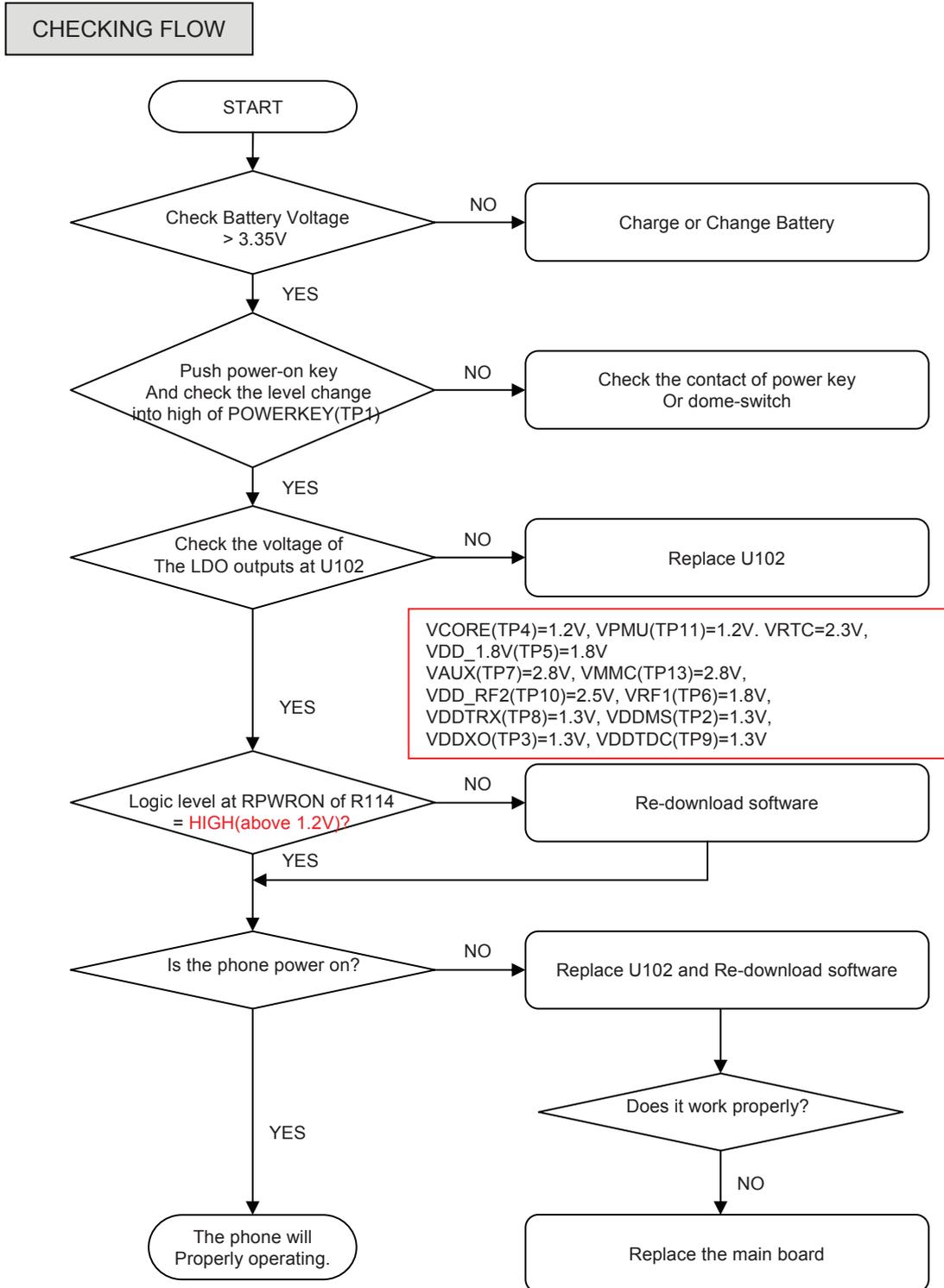


Figure 4.4 power block of GU230



# 4. Trouble Shooting

## 4.5 Charging Trouble

TEST POINT

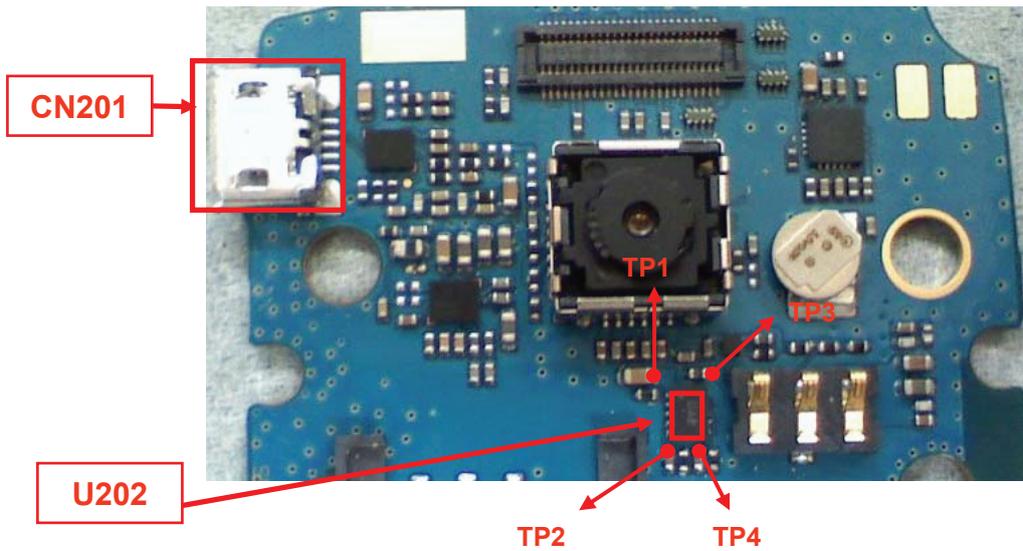


Figure 4.5.1

CIRCUIT

### CHARGING IC

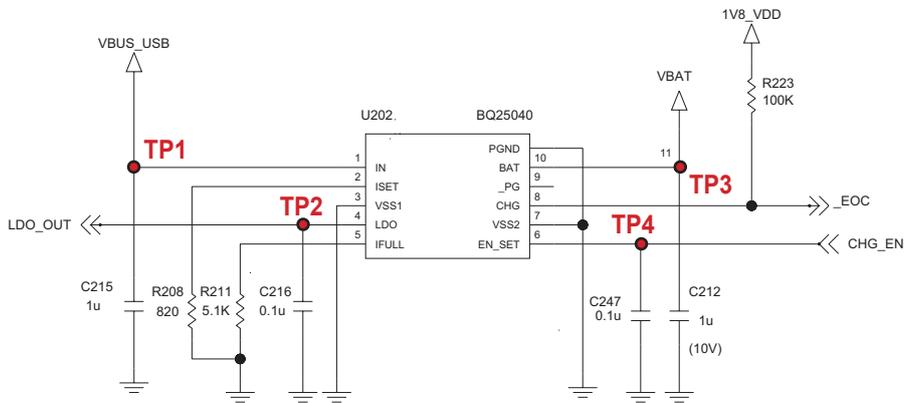
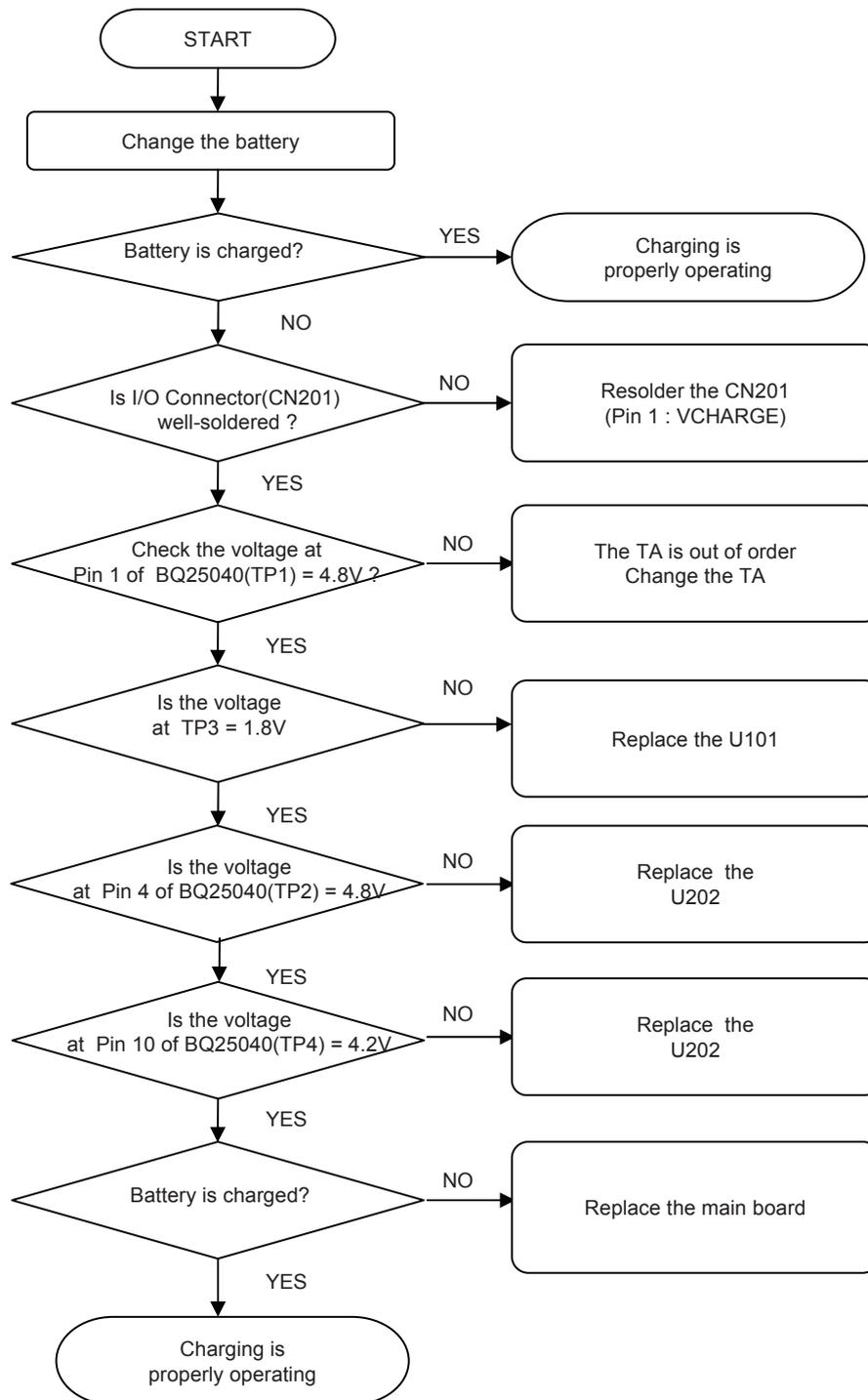


Figure 4.5.2

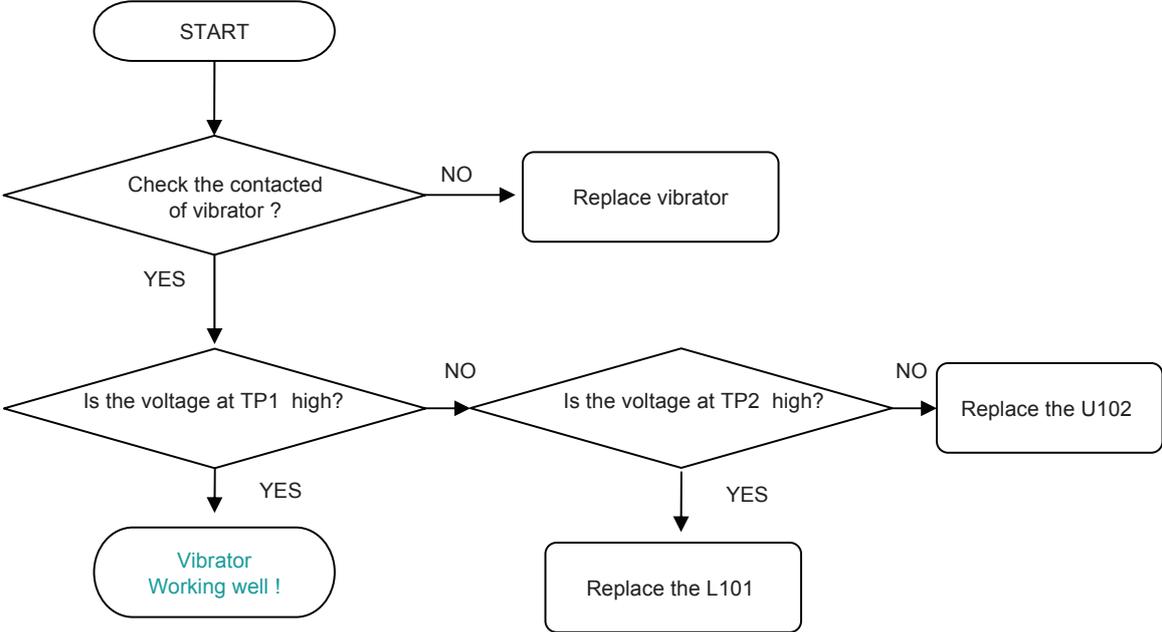
### CHECKING FLOW





CHECKING FLOW

SETTING : Enter the engineering mode, and set vibrator on at vibration of BB test menu



## 4. Trouble Shooting

### 4.7 LCD Trouble

TEST POINT

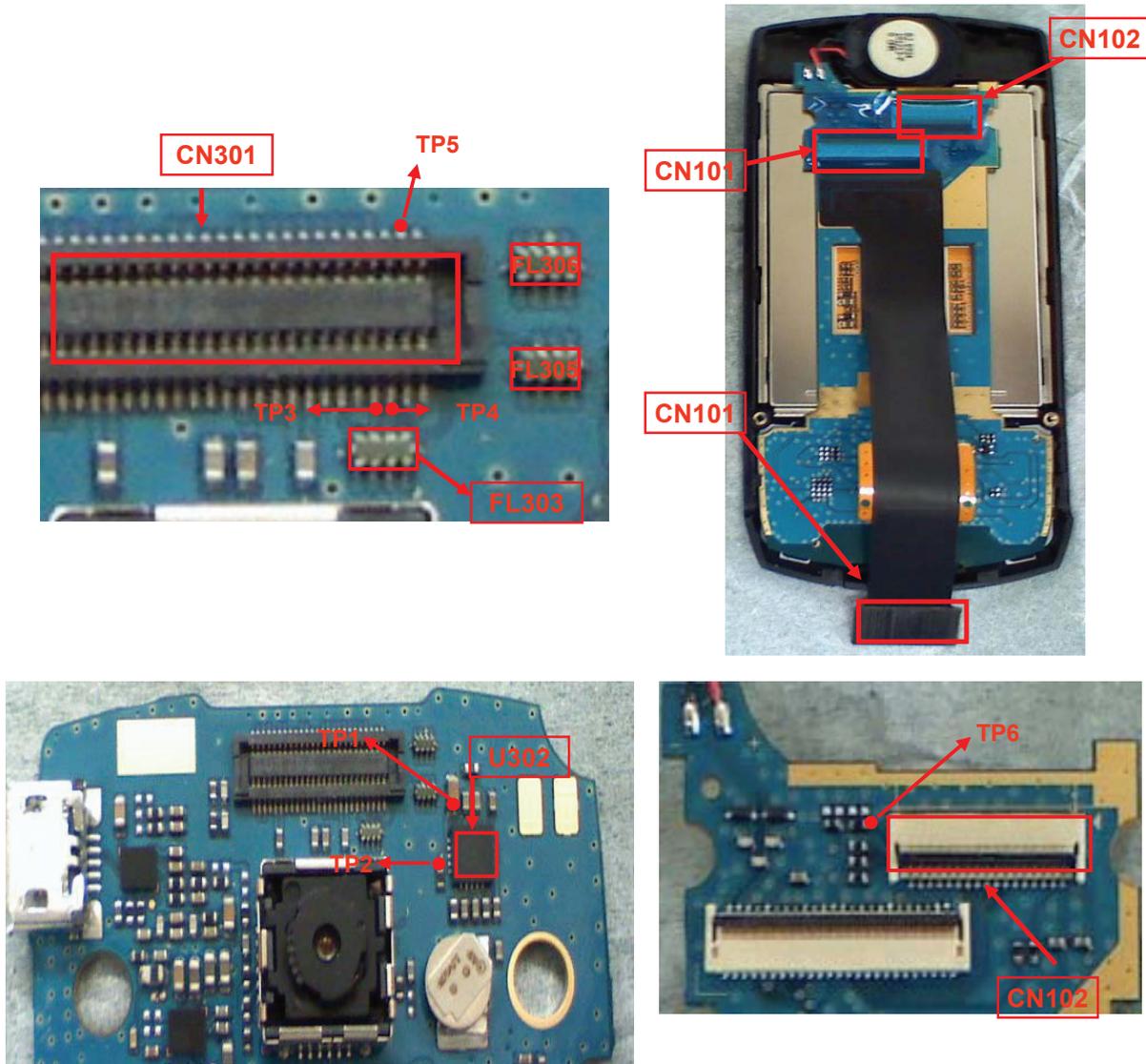


Figure 4.7.1

# 4. Trouble Shooting

## CIRCUIT

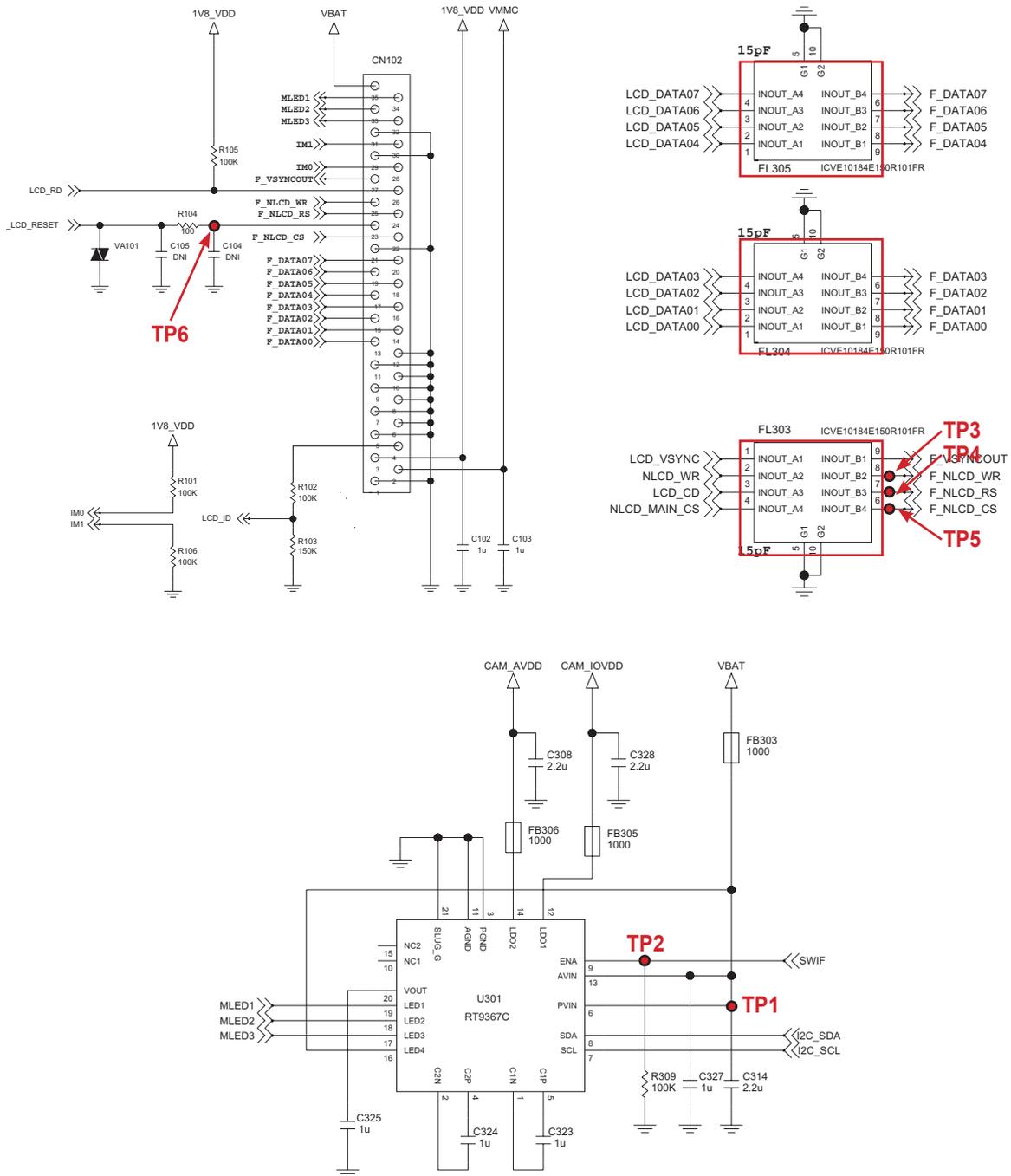
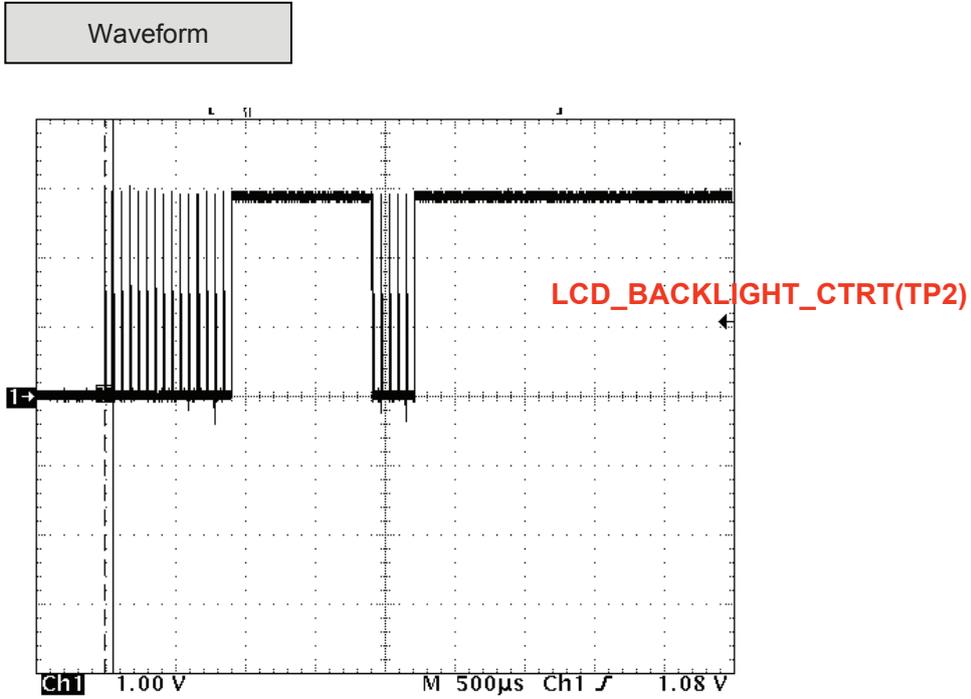
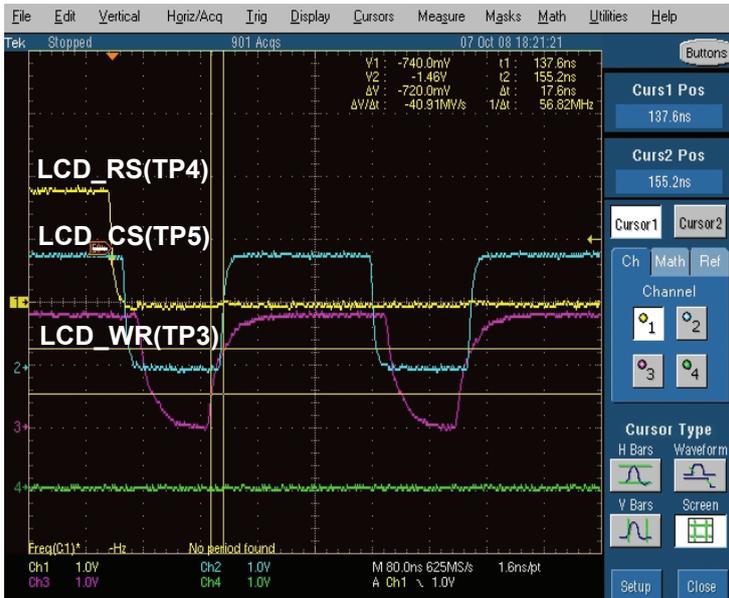


Figure 4.7.2

# 4. Trouble Shooting

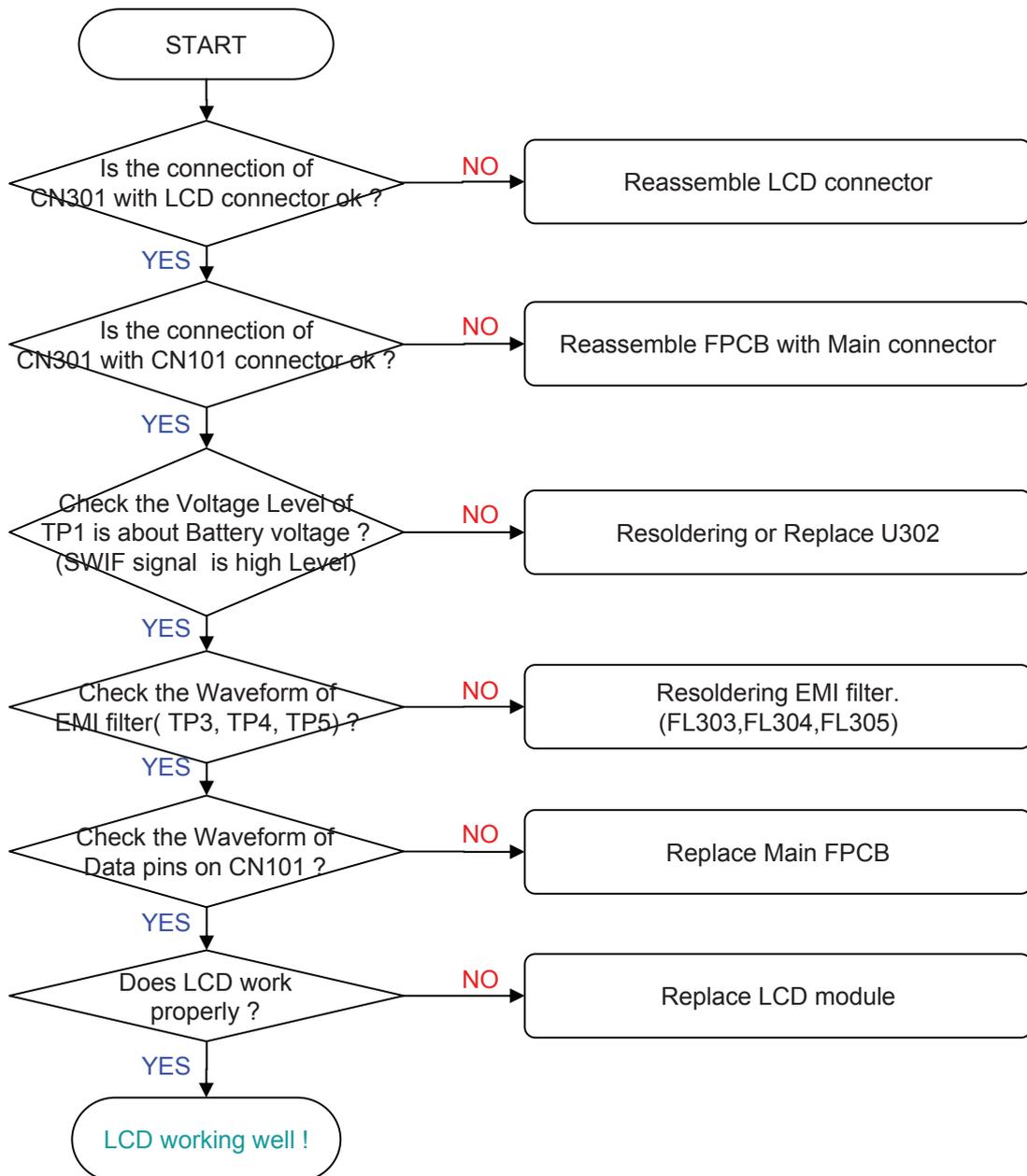


**Graph 4.7.1. LCD Backlight Control Signal Waveform**



**Graph 4.7.2. LCD Data Waveform**

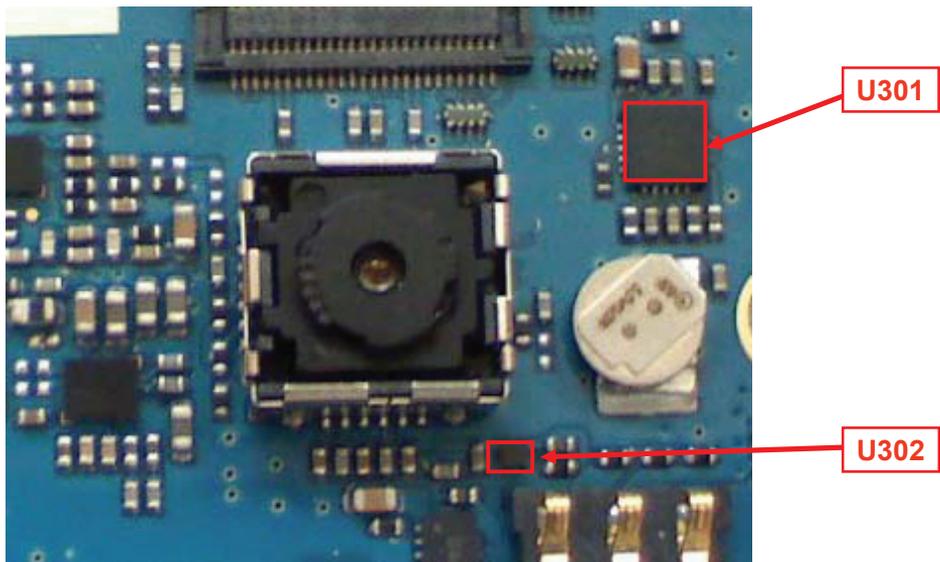
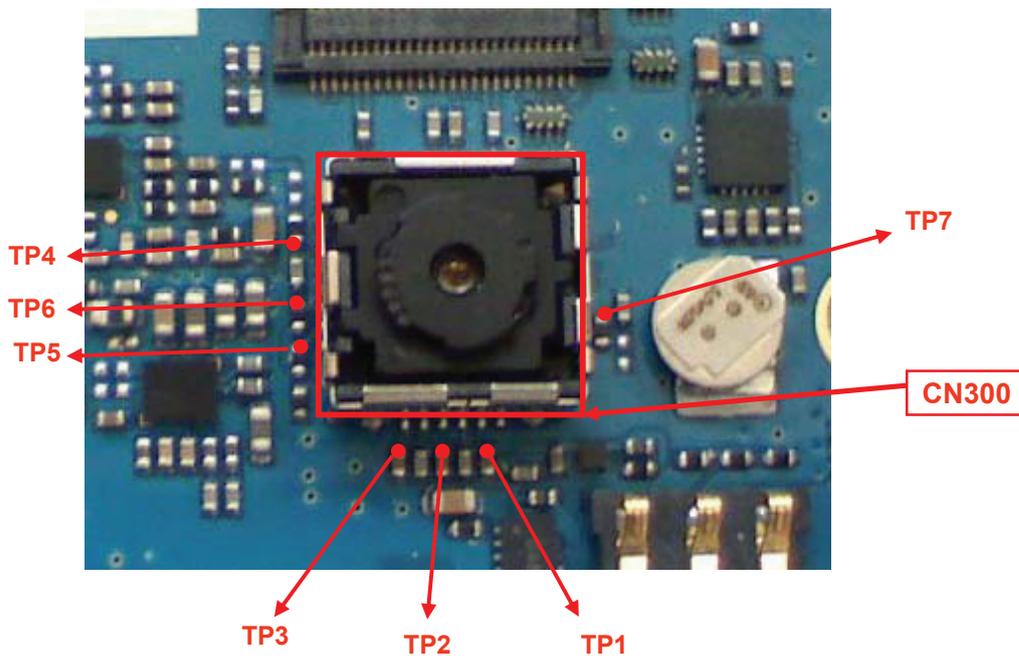
### CHECKING FLOW



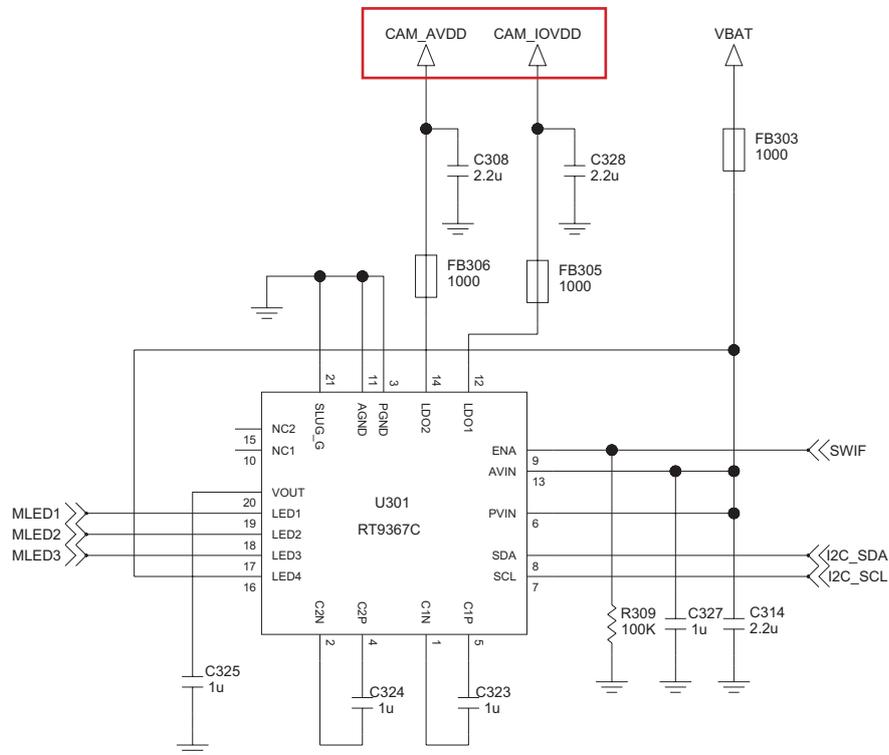
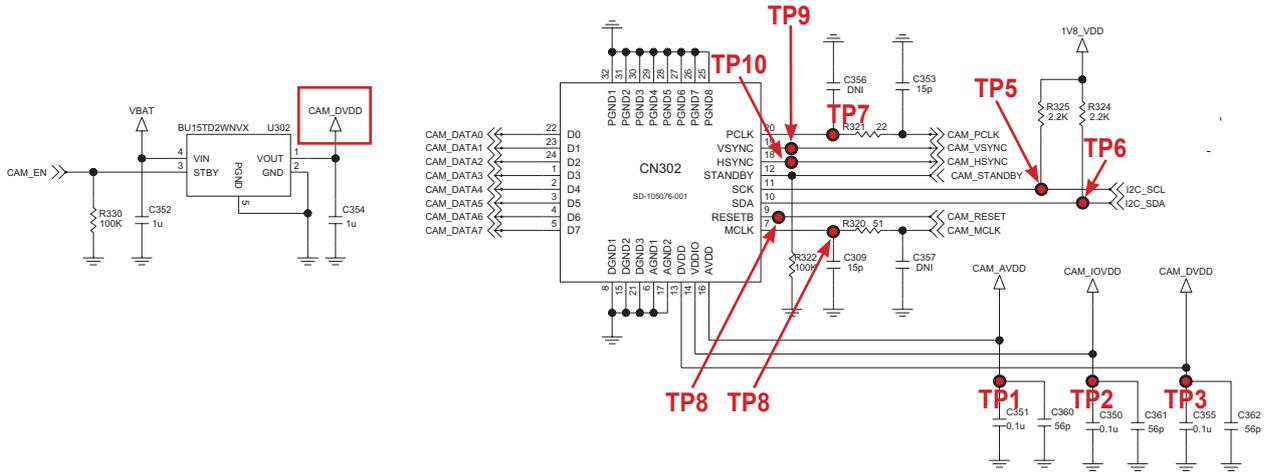
## 4. Trouble Shooting

### 4.8 Camera Trouble

TEST POINT

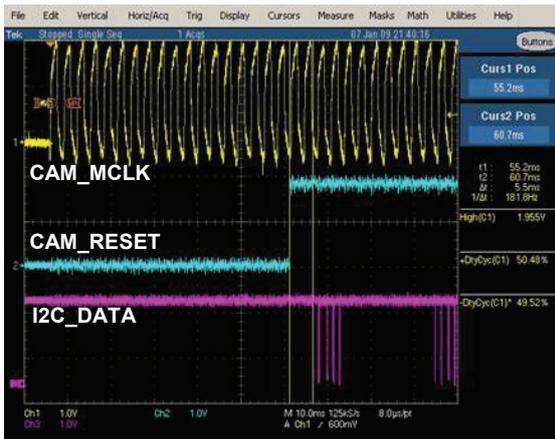


## CIRCUIT

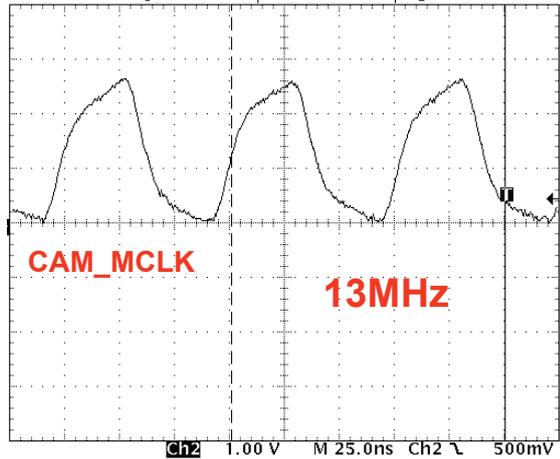


# 4. Trouble Shooting

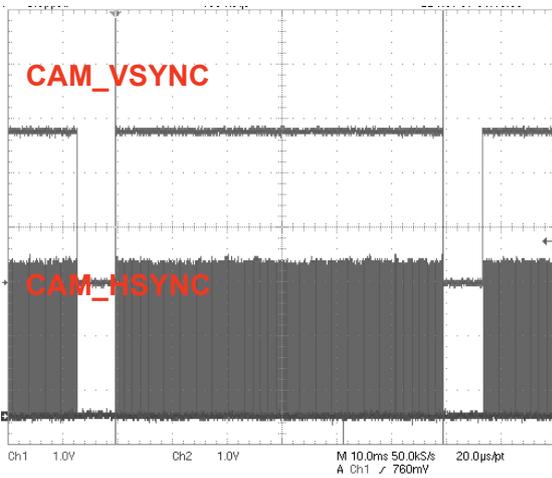
Waveform



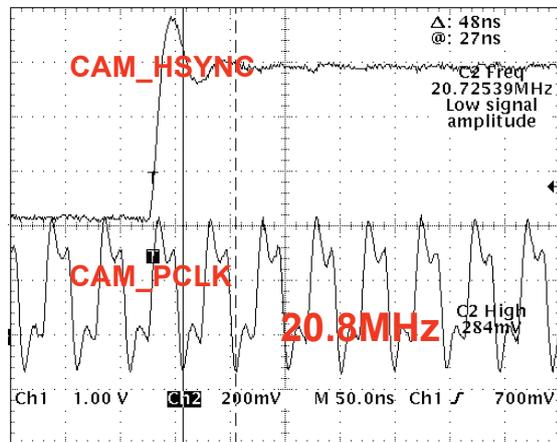
Graph 4.8.1. I2C Data Waveform



Graph 4.8.2. MCLK Waveform



Graph 4.8.3. CAM\_VSYNC vs. CAM\_HSYNC Waveform



Graph 4.8.4. CAM\_HSYNC vs. CAM\_PCLK Waveform

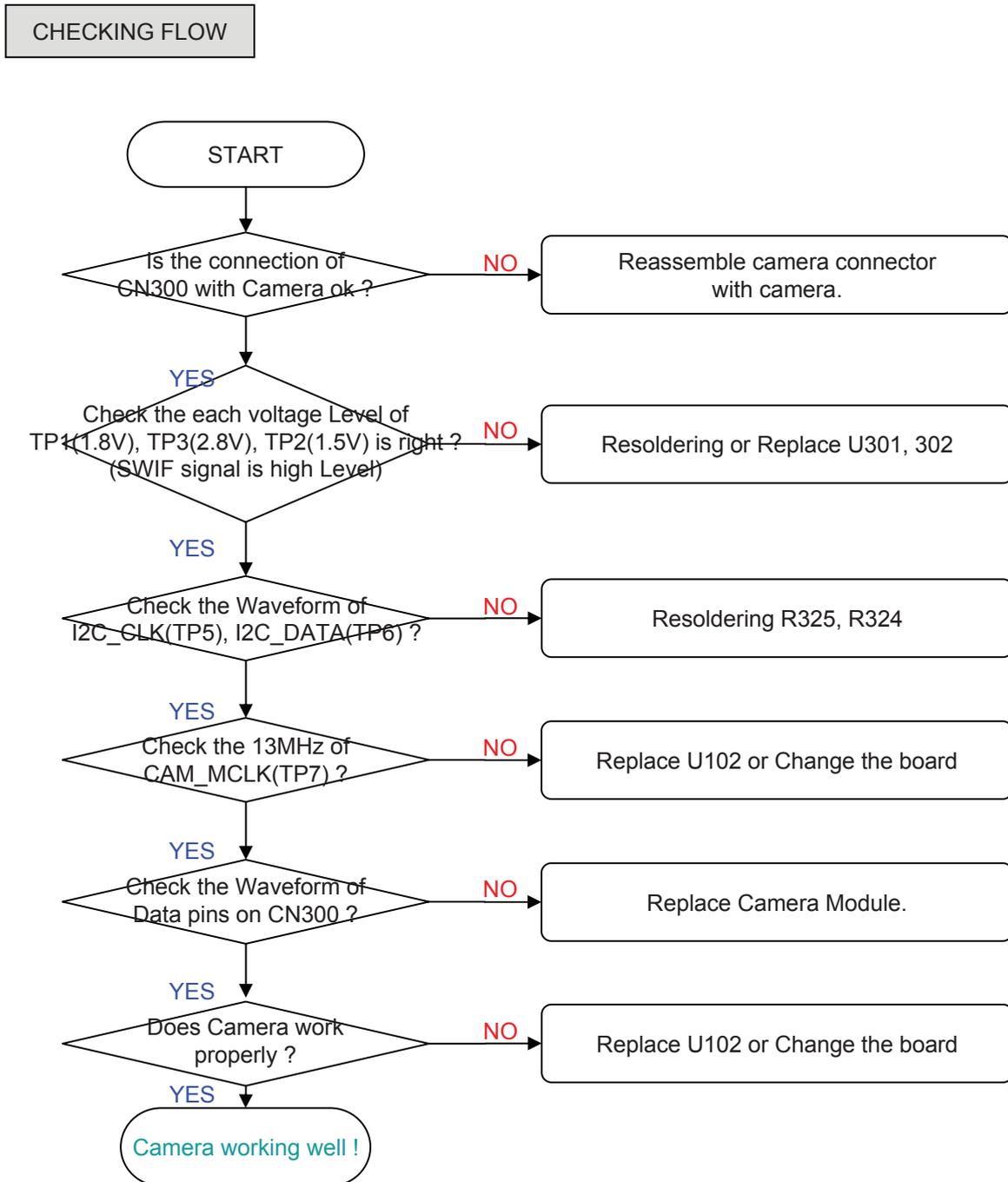


Figure 4.8.5.

# 4. Trouble Shooting

## 4.9 Speaker Trouble

TEST POINT

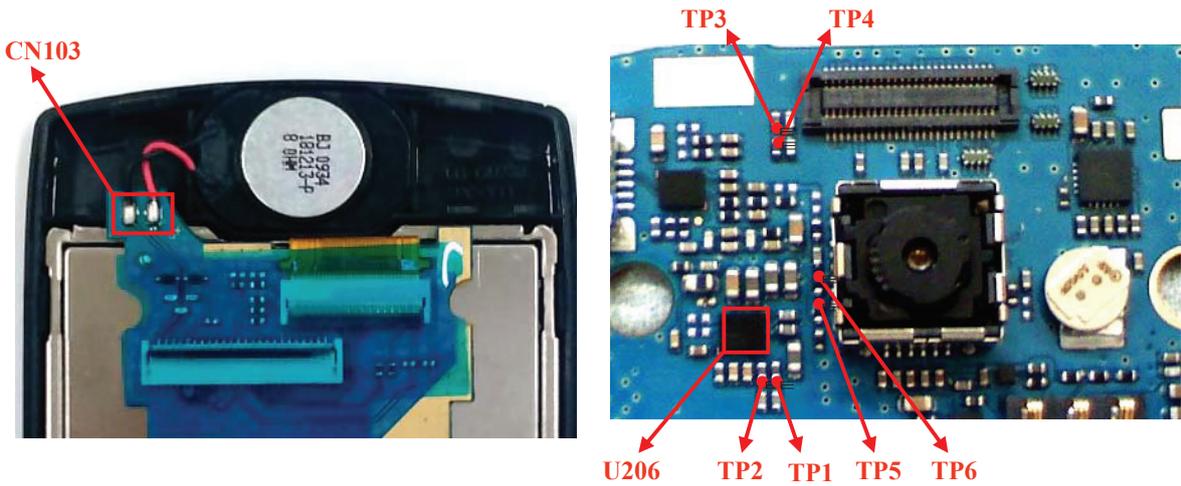
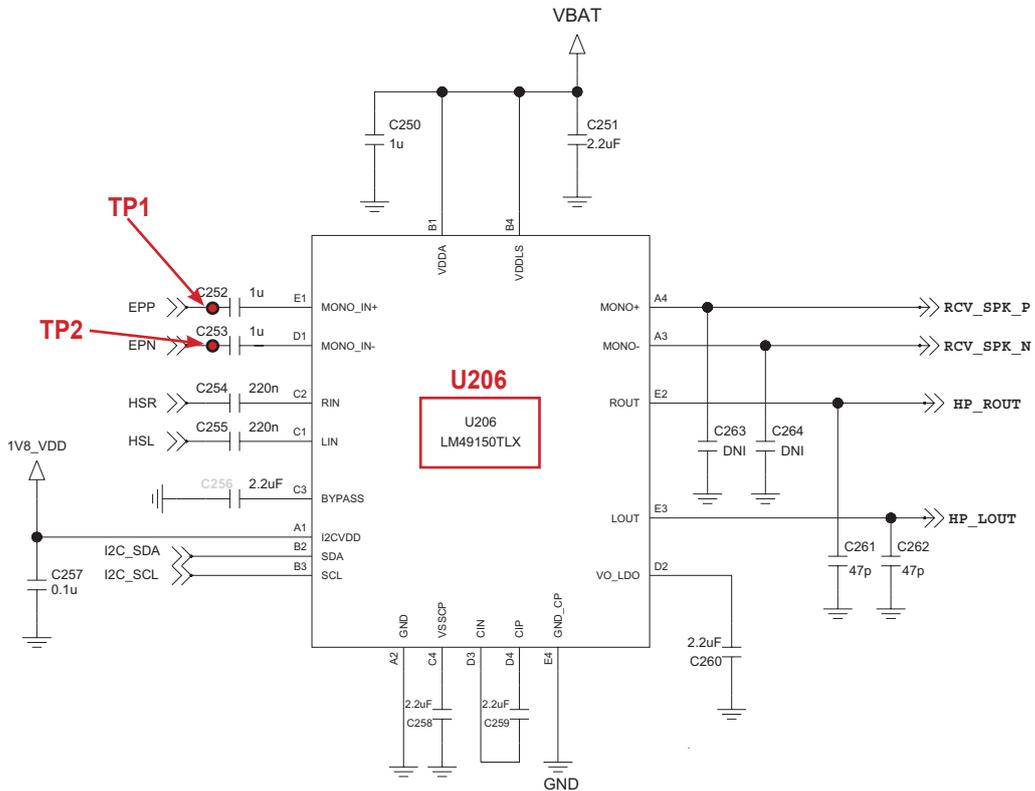


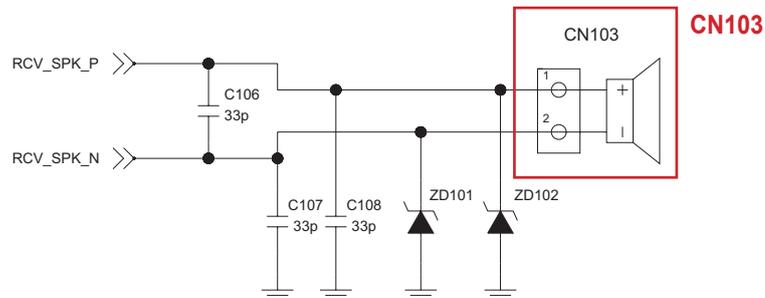
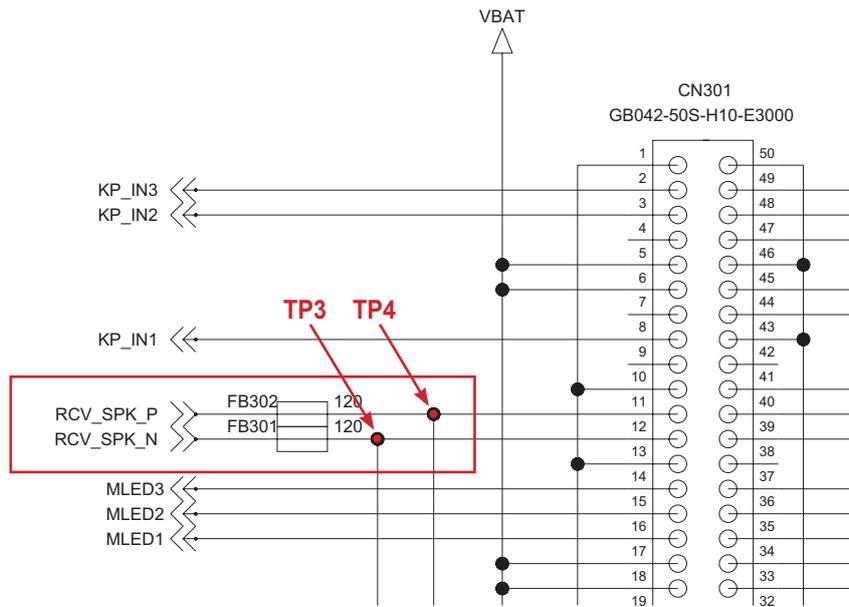
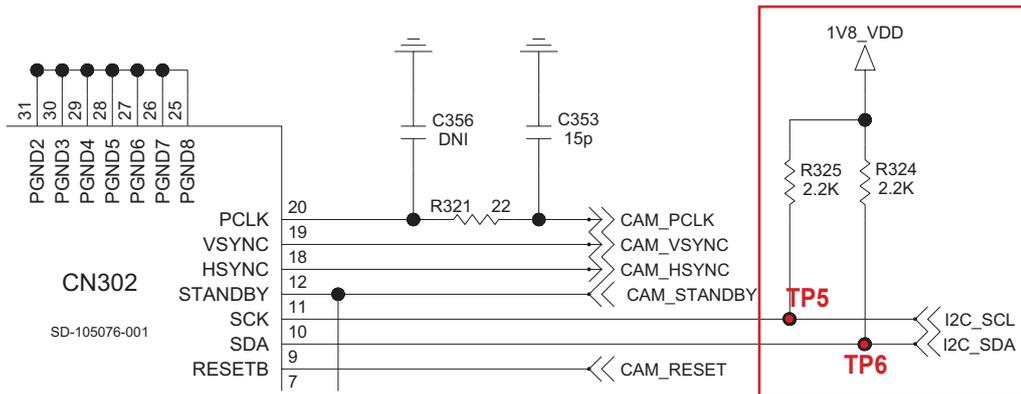
Figure 4.9.1

CIRCUIT

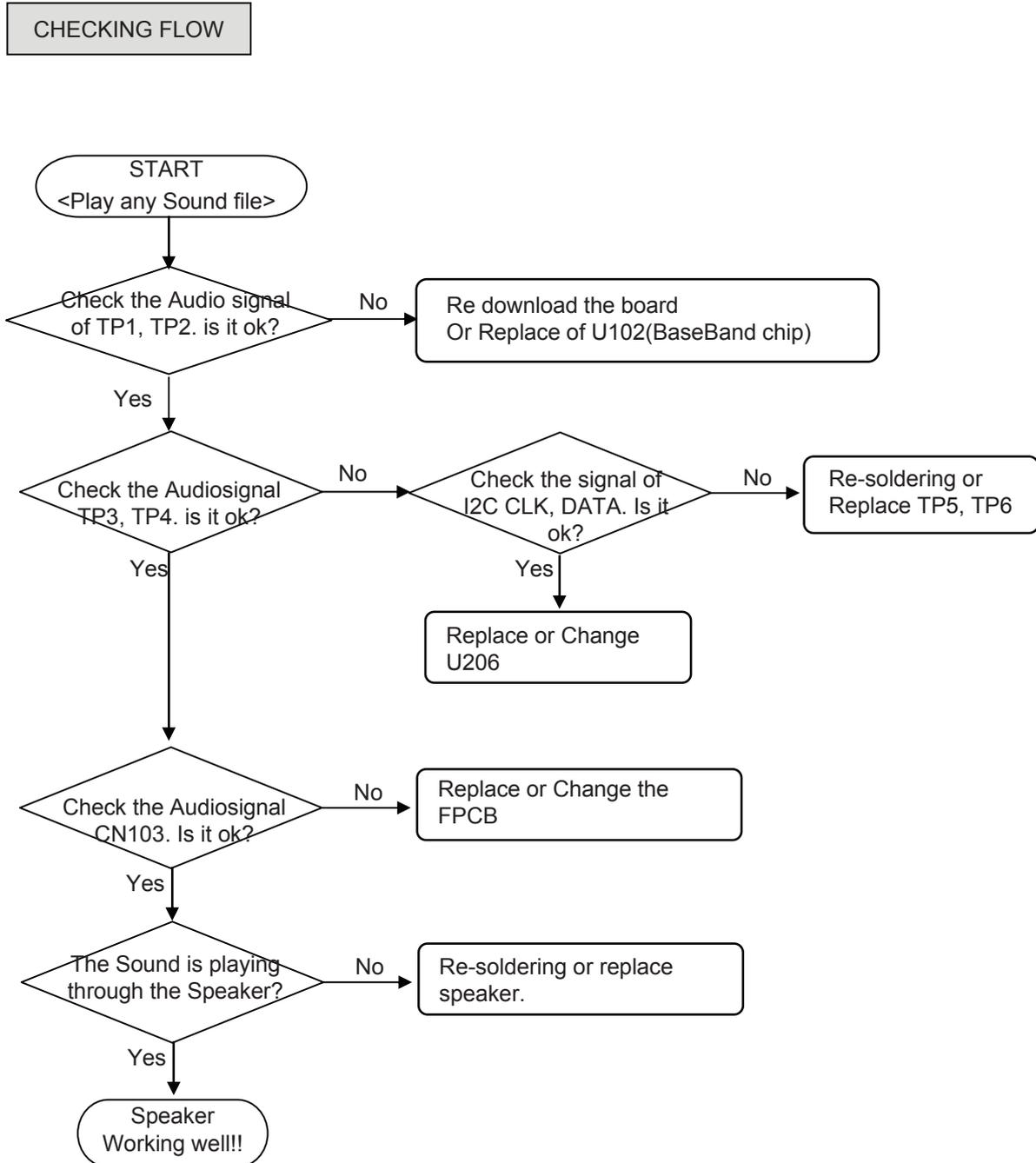


## 4. Trouble Shooting

### CIRCUIT



## 4. Trouble Shooting



### 4.10 Earphone Trouble

TEST POINT

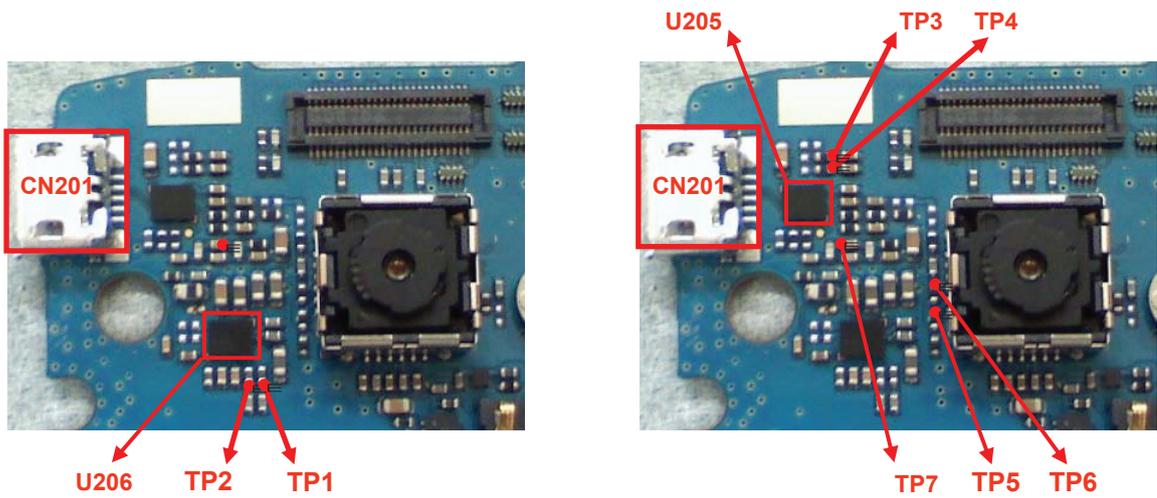
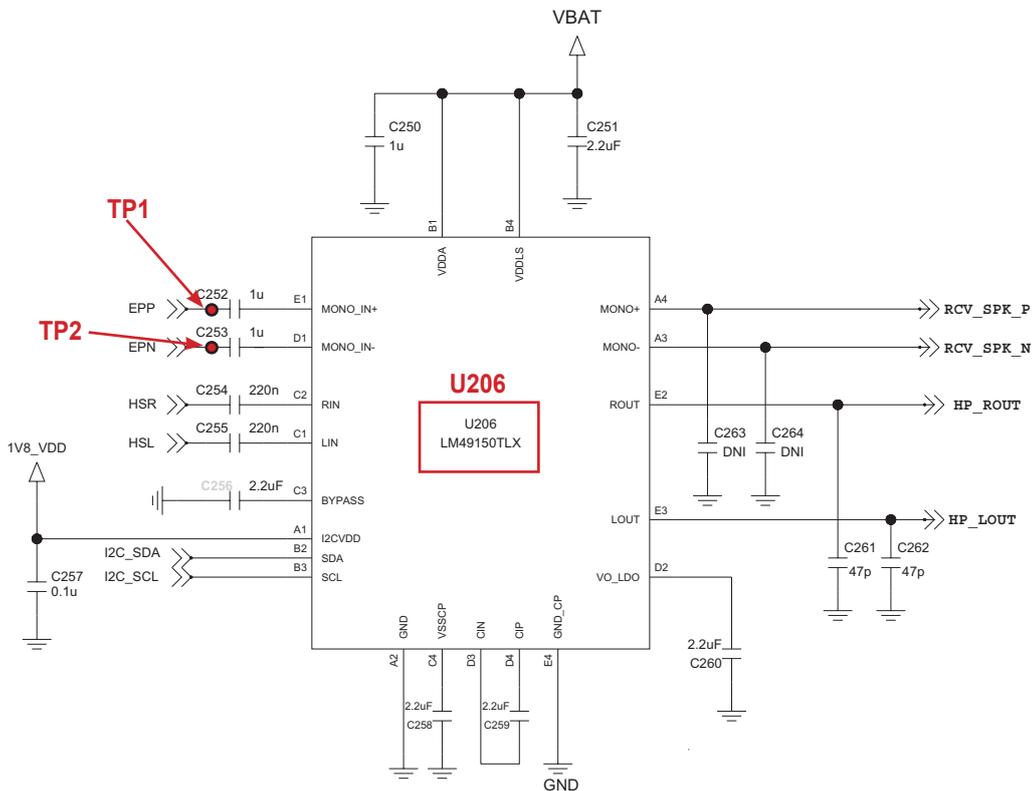


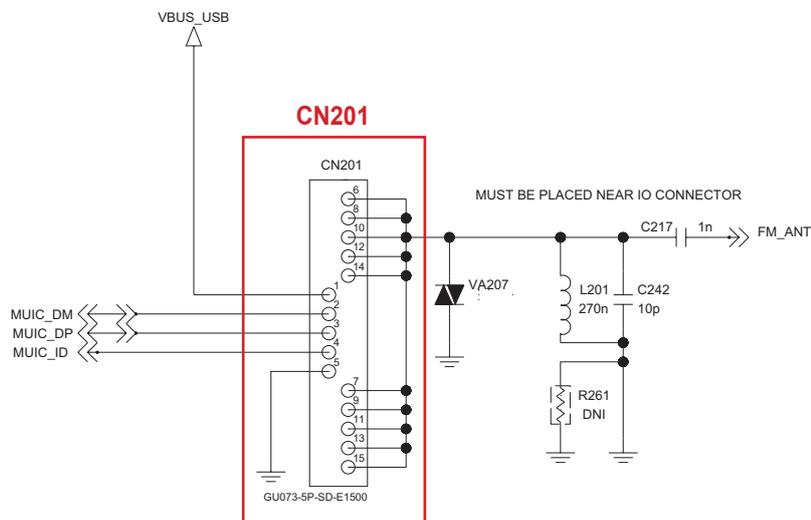
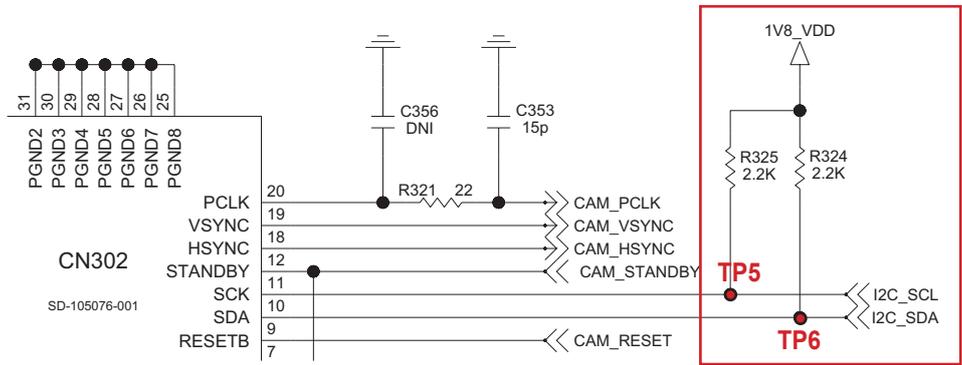
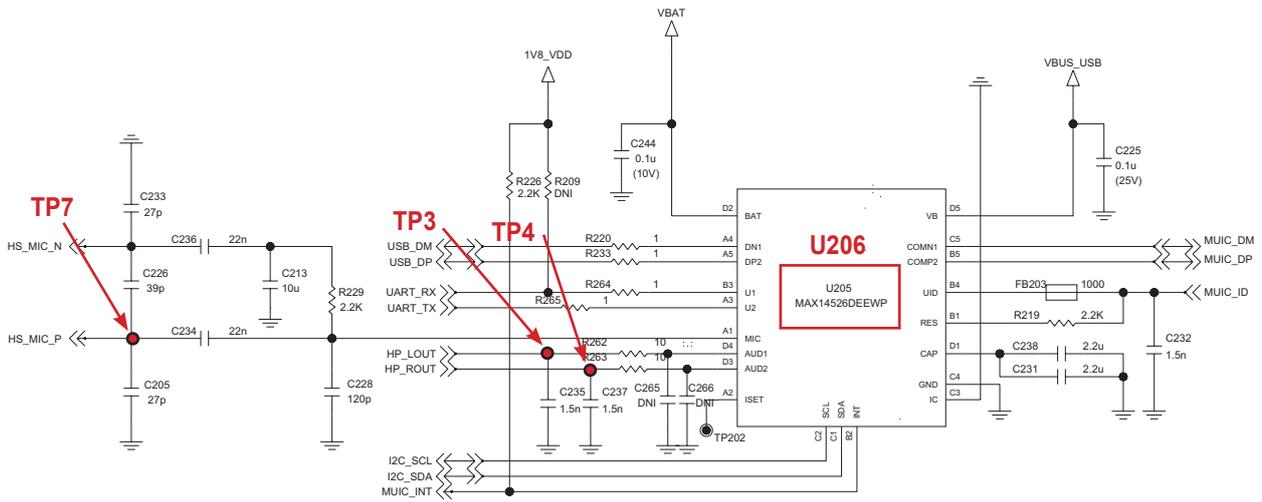
Figure 4.10.1

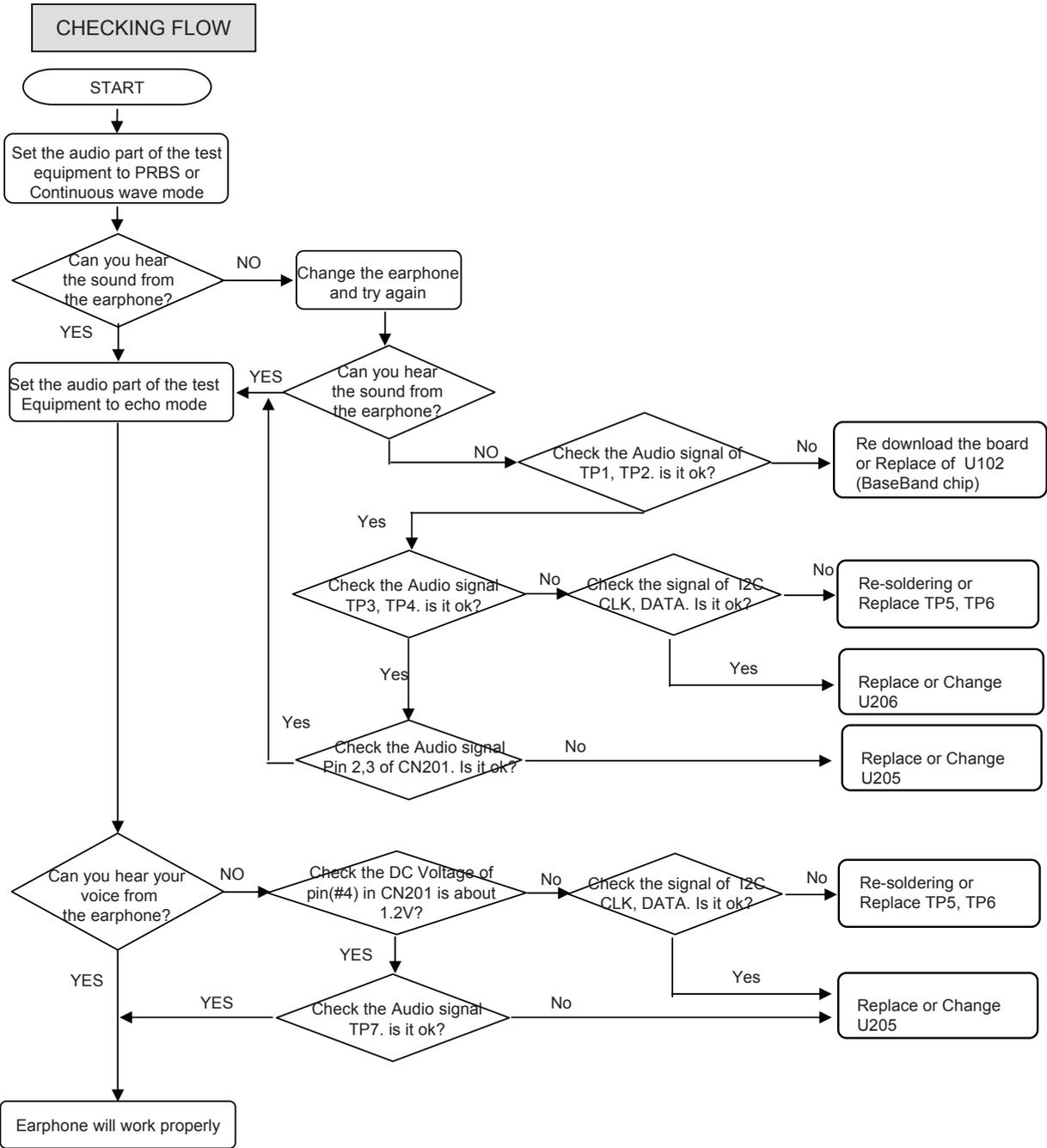
CIRCUIT



# 4. Trouble Shooting

## CIRCUIT





# 4. Trouble Shooting

## 4.11 Receiver Trouble

TEST POINT

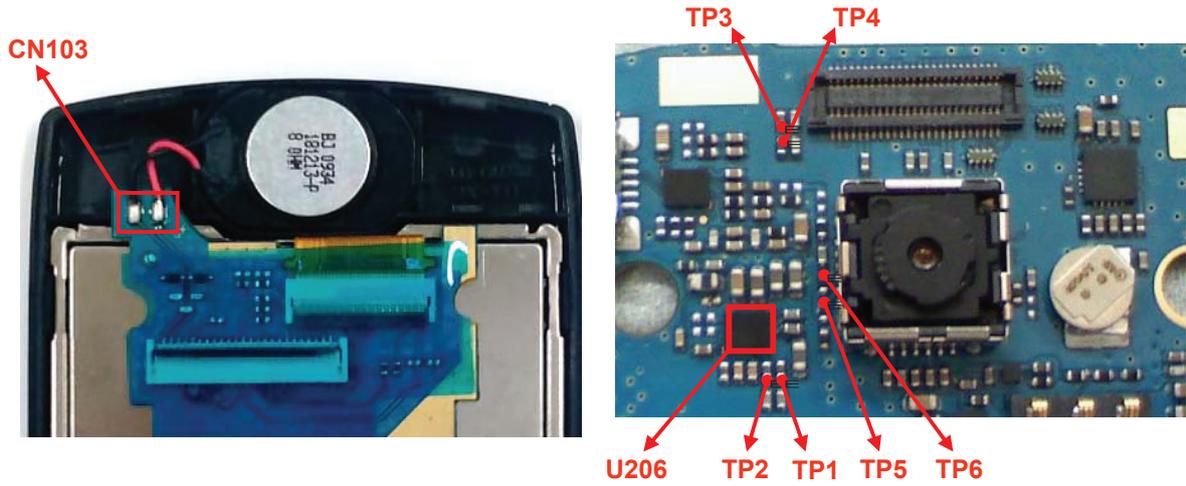
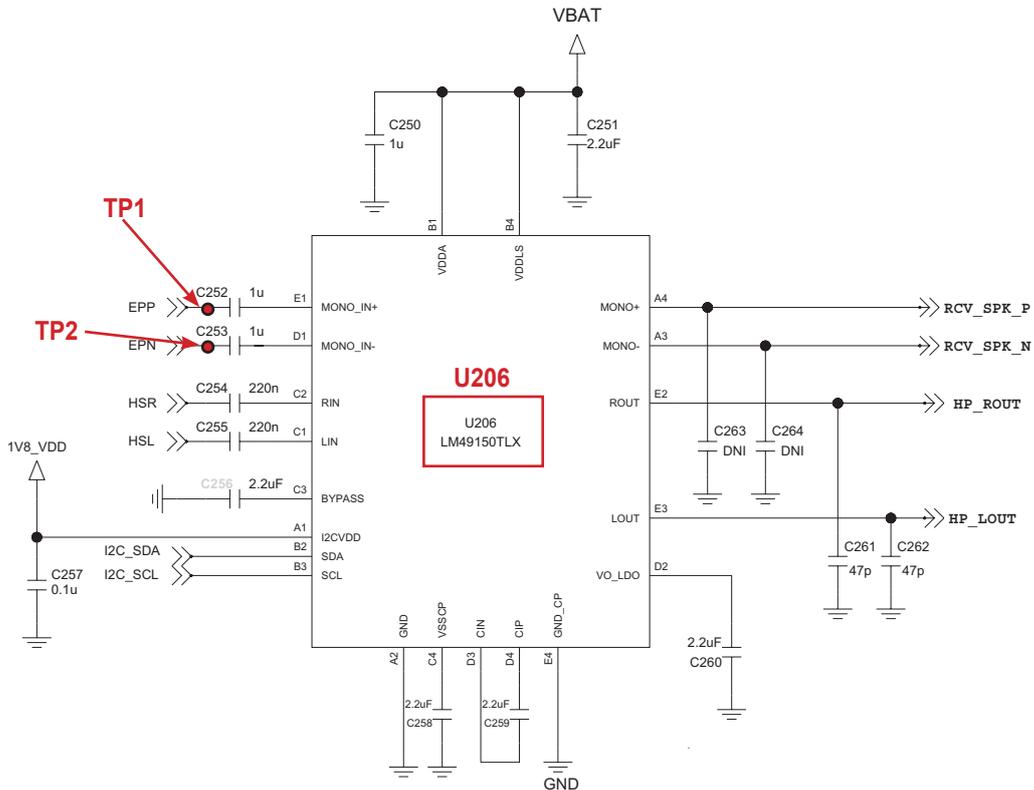
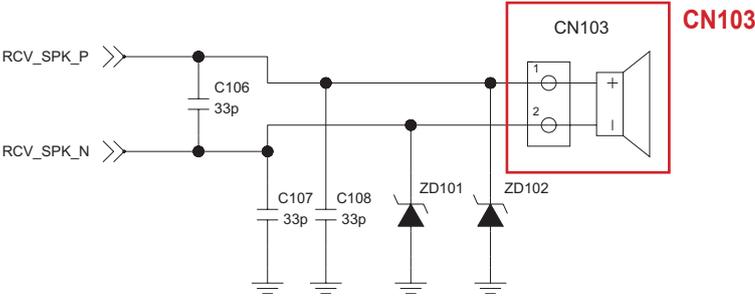
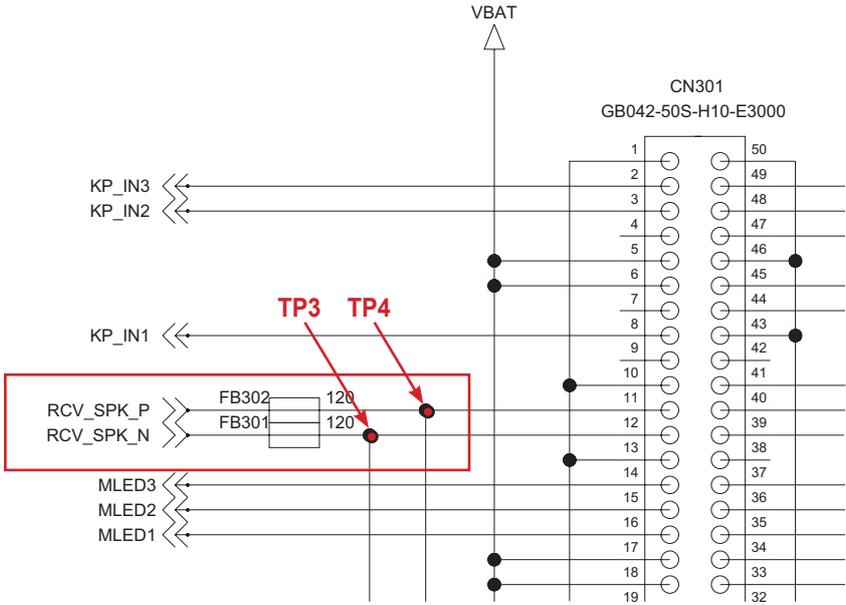
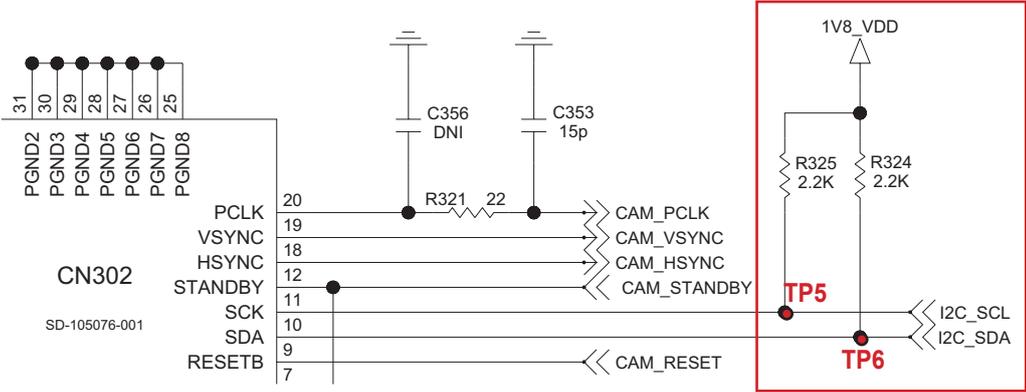


Figure 4.11.1

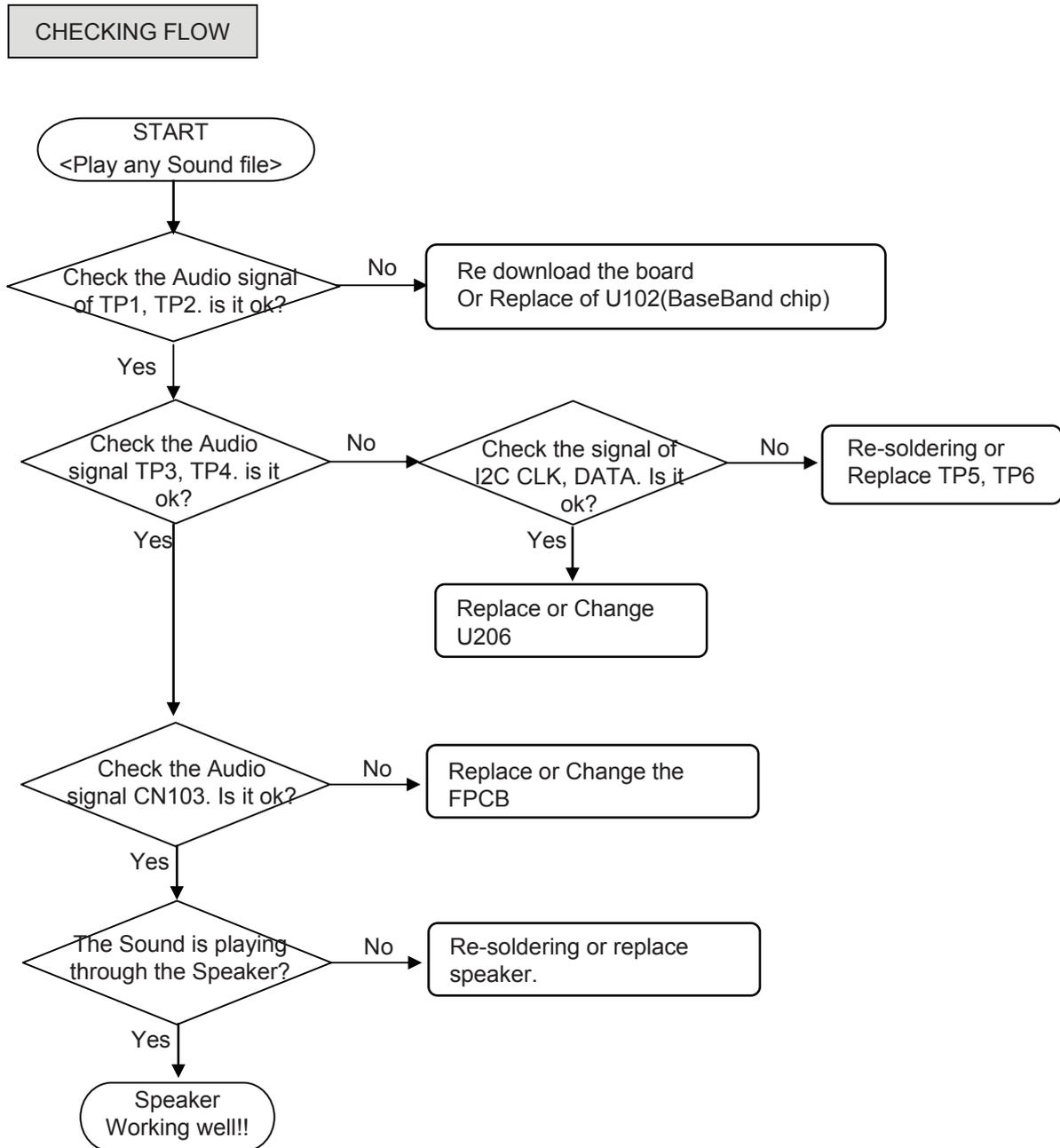
CIRCUIT



CIRCUIT



## 4. Trouble Shooting



### 4.12 Microphone Trouble

TEST POINT

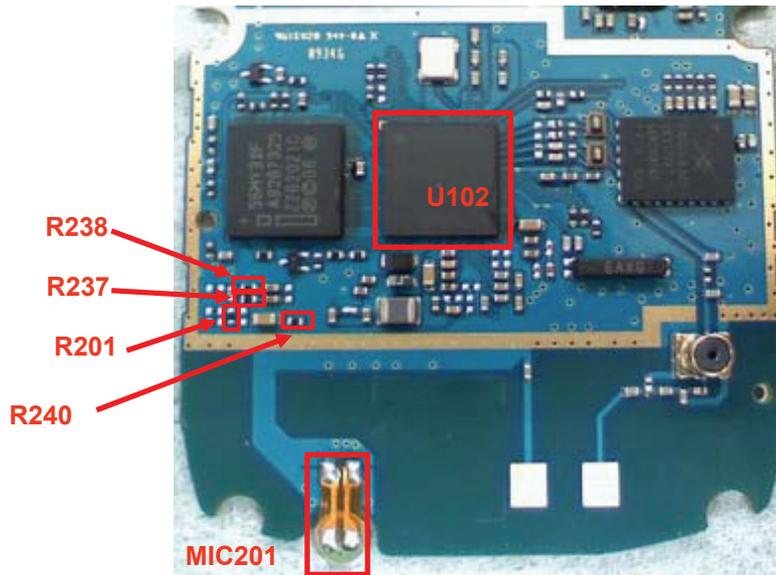
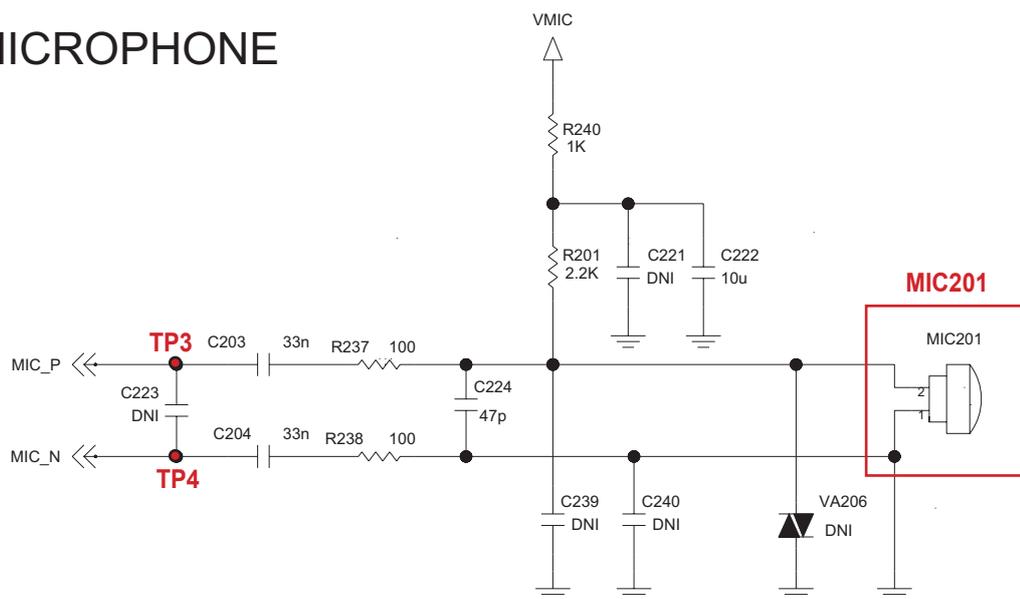


Figure 4.12.1

CIRCUIT

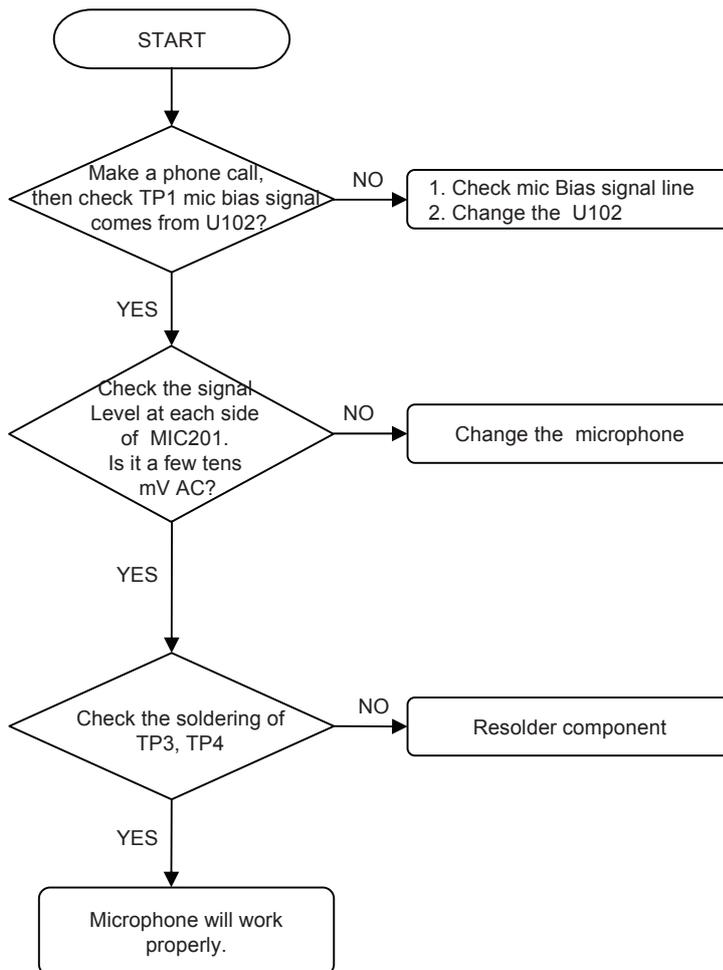
### MICROPHONE



## 4. Trouble Shooting

### CHECKING FLOW

SETTING : After initialize Agilent 8960, Test EGSM900, DCS mode ( or GSM850, PCS mode )



4.13 SIM Card Interface Trouble

TEST POINT

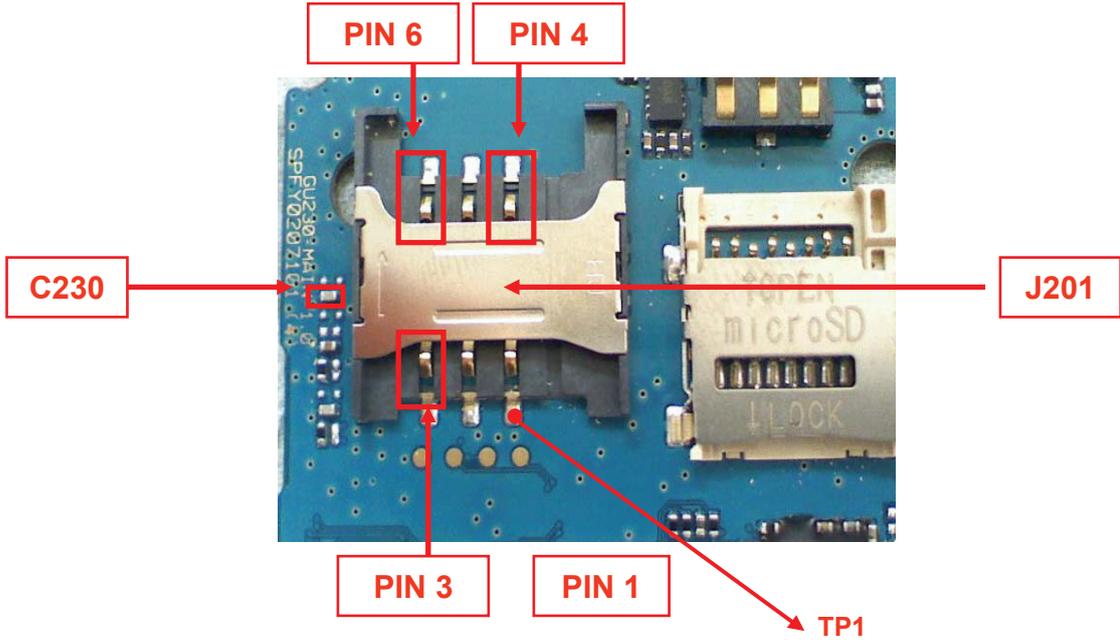
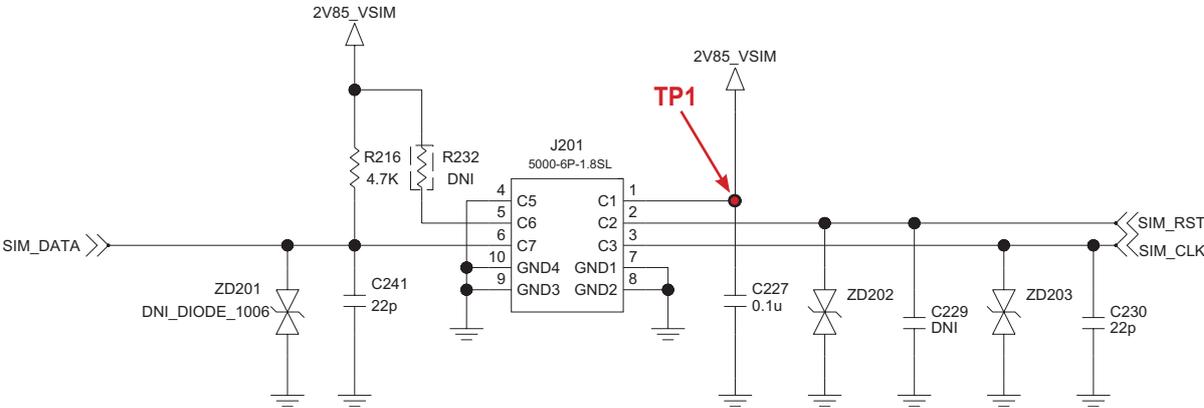


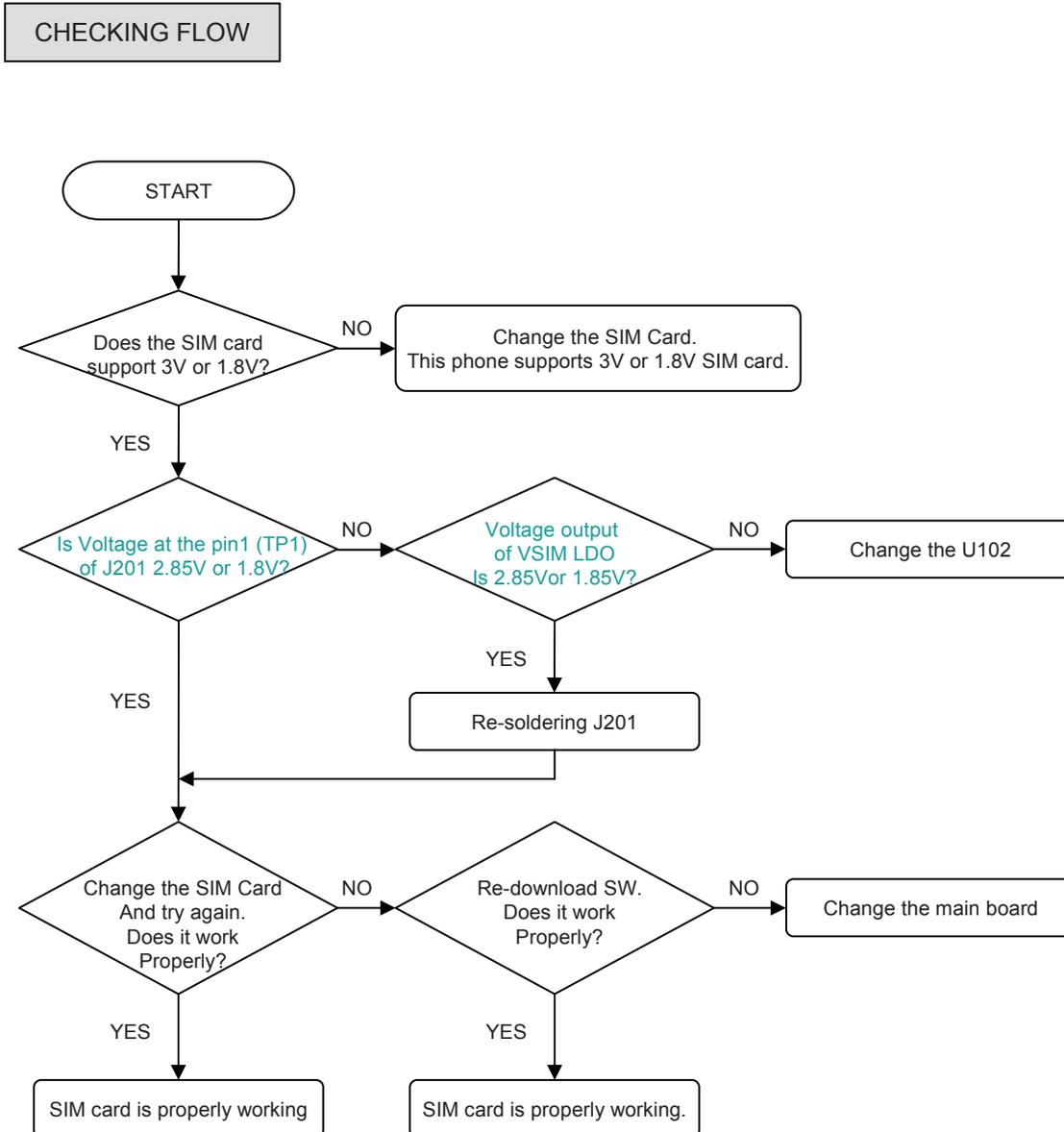
Figure 4.13.1

CIRCUIT

SIM\_CONNECTOR



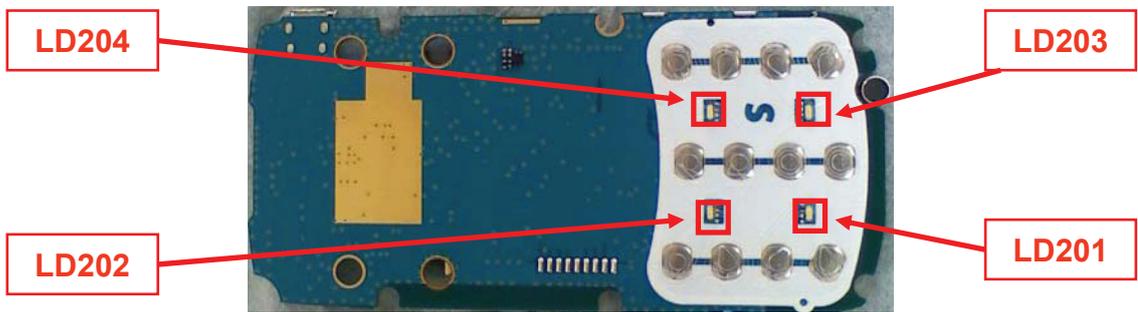
## 4. Trouble Shooting



4.14 KEY backlight Trouble

TEST POINT

Main - TOP



Main -BOTTOM

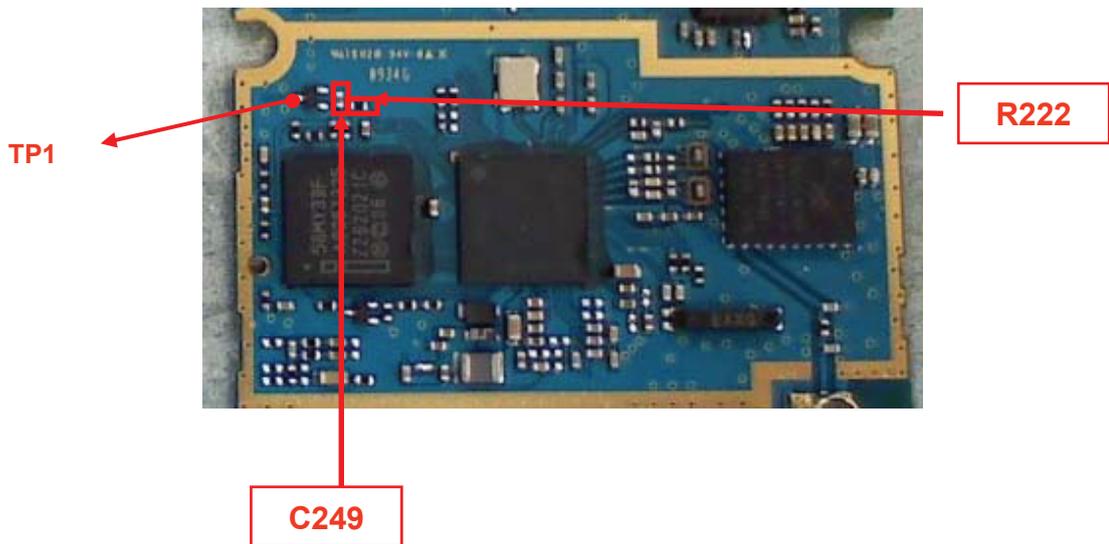
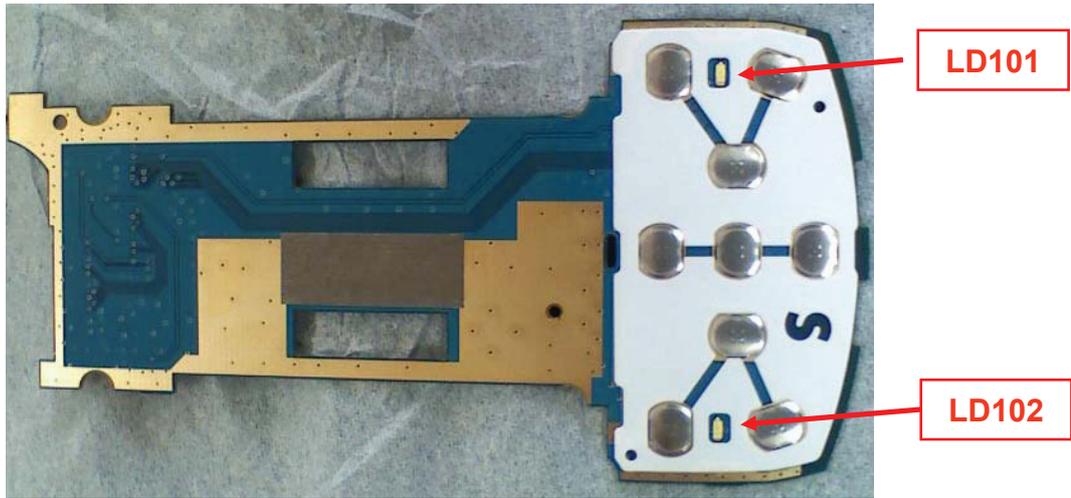


Figure 4.14.1

## 4. Trouble Shooting

TEST POINT

Sub -TOP



Sub -BOTTOM

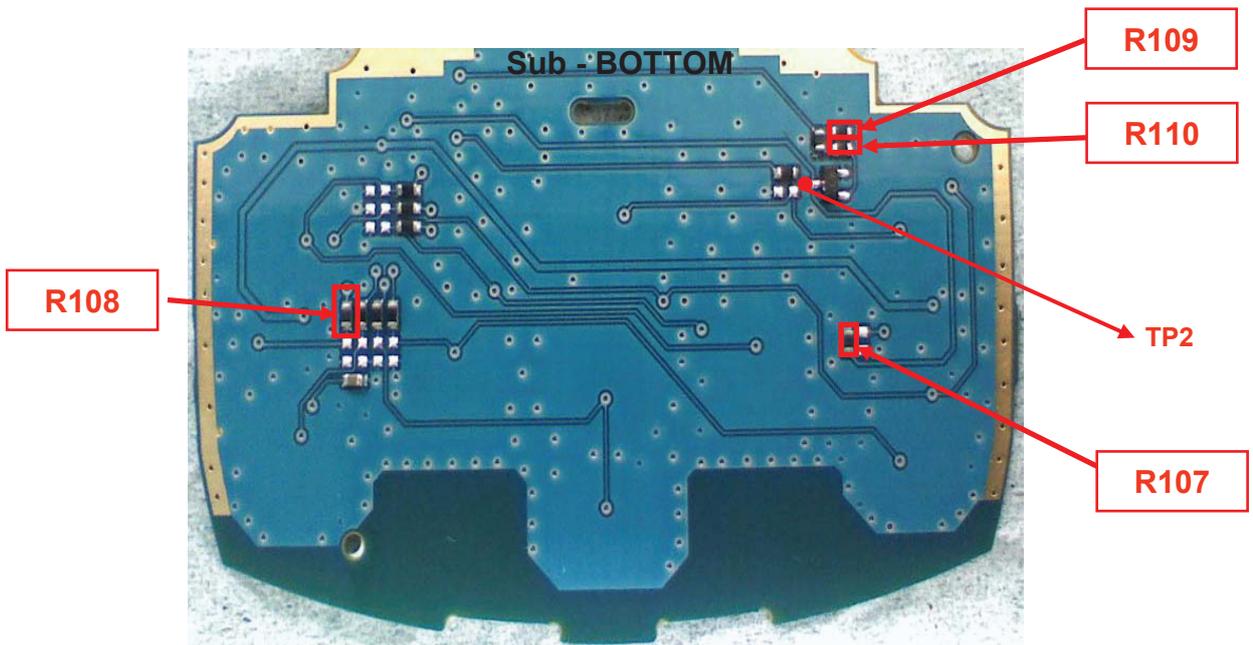
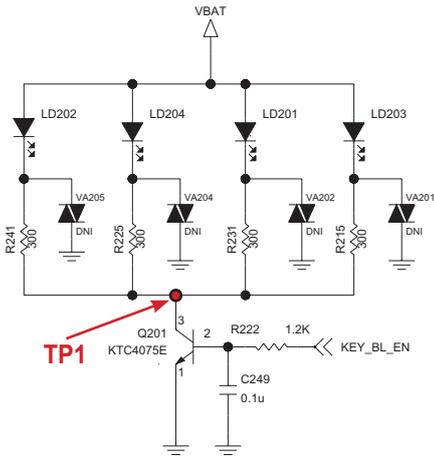


Figure 4.14.2

CIRCUIT

[Main Key backlight LED interface]



[Slide Key backlight LED interface]

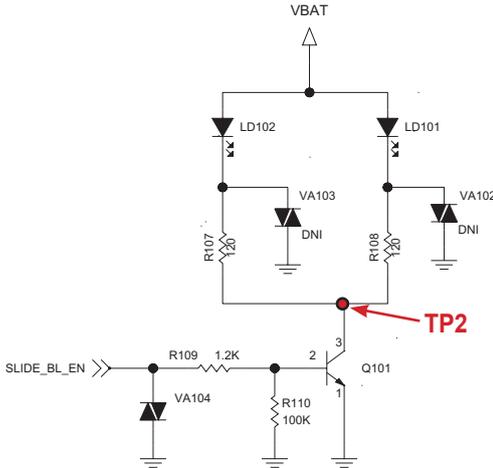
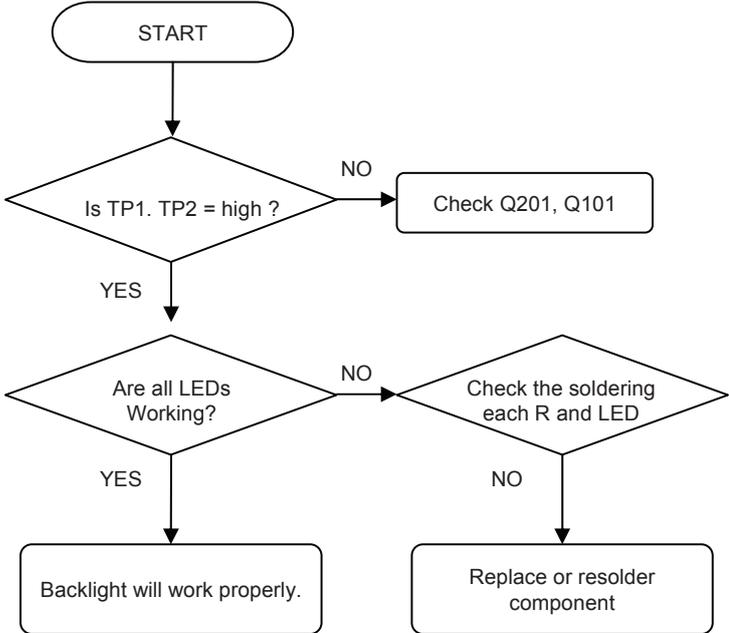


Figure 4.14.3

CHECKING FLOW



## 4. Trouble Shooting

### 4.15 Micro SD Trouble

TEST POINT

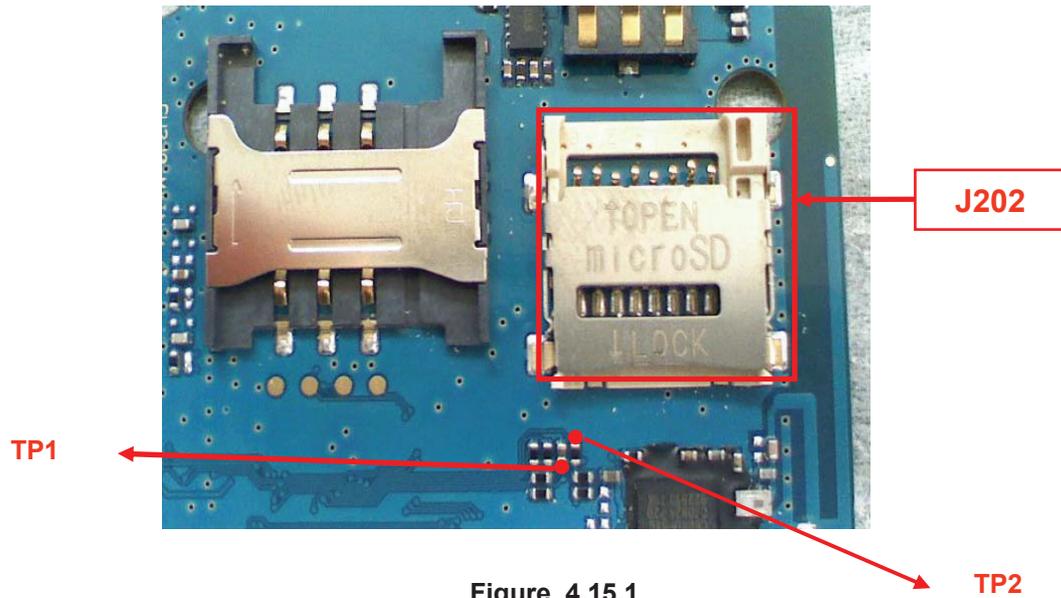
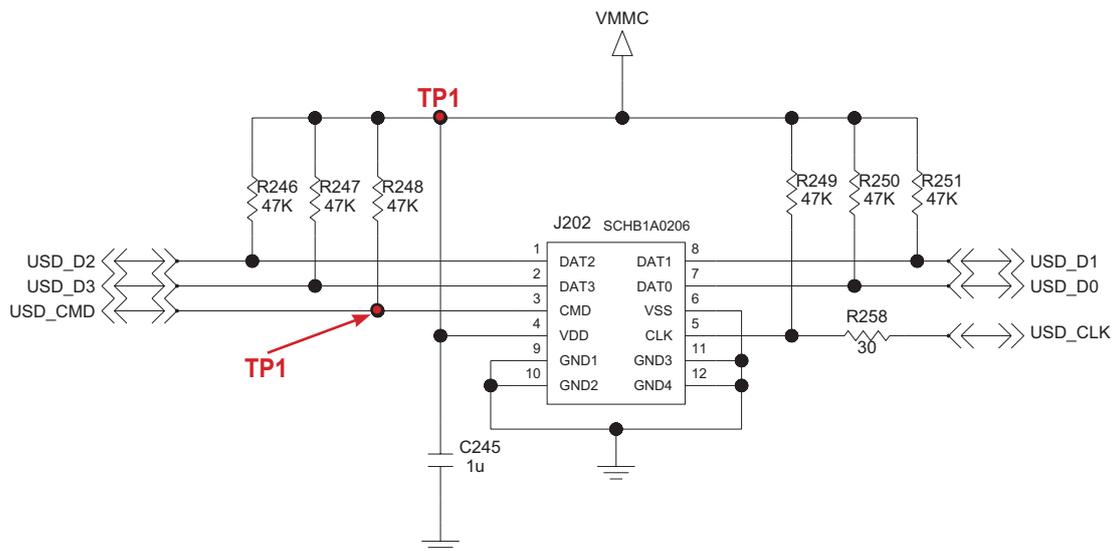
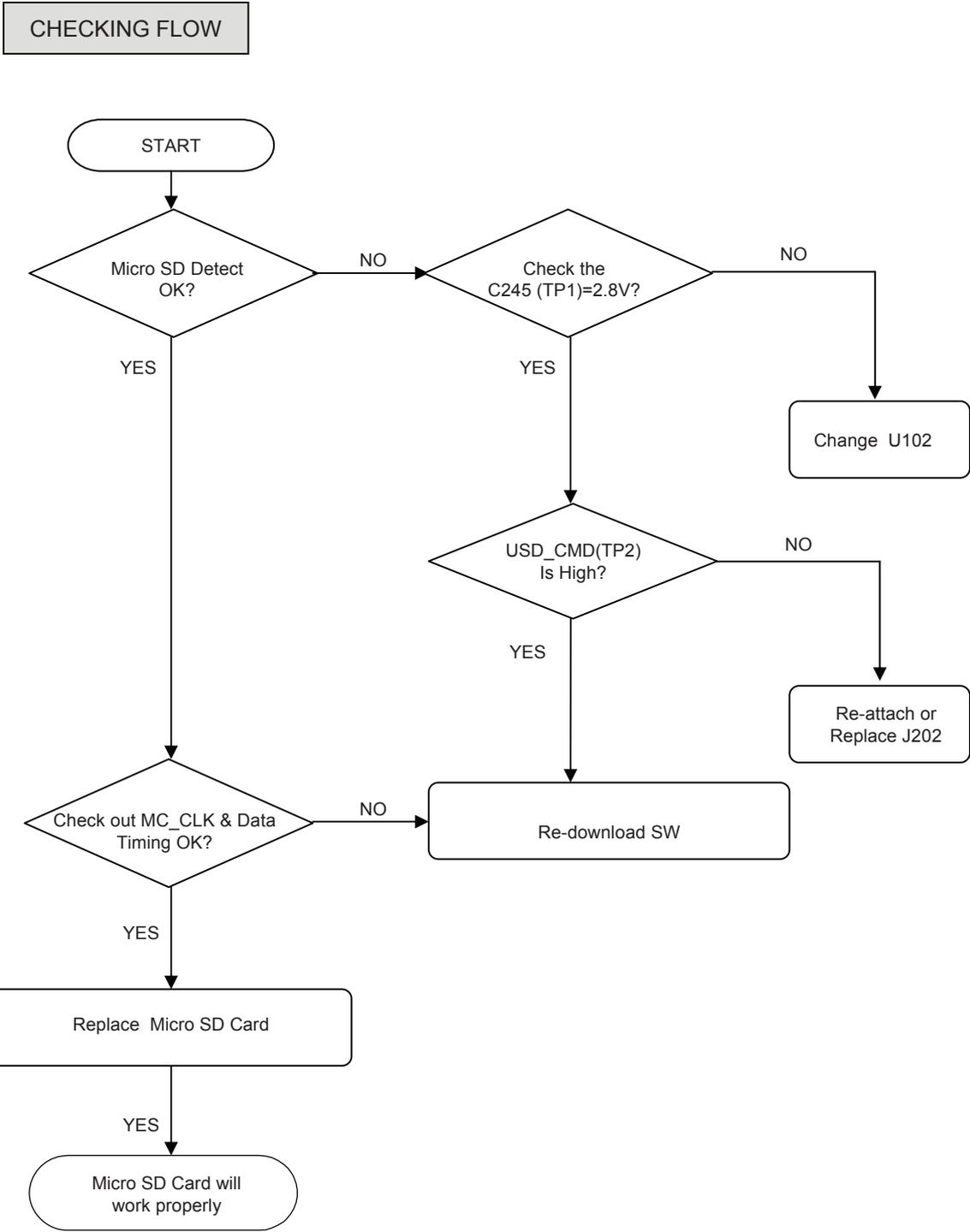


Figure 4.15.1

CIRCUIT

### u-SD CARD





# 4. Trouble Shooting

## 4.16 Bluetooth Trouble

TEST POINT

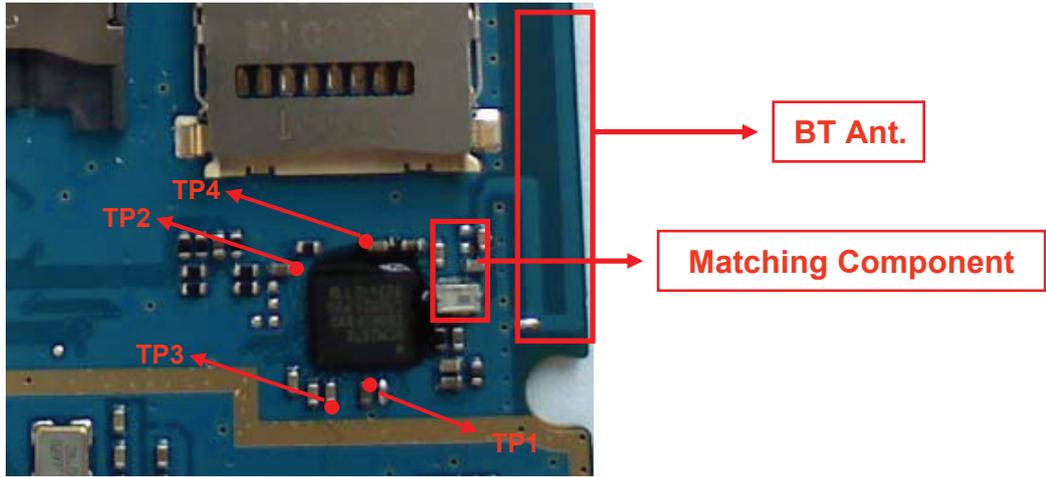
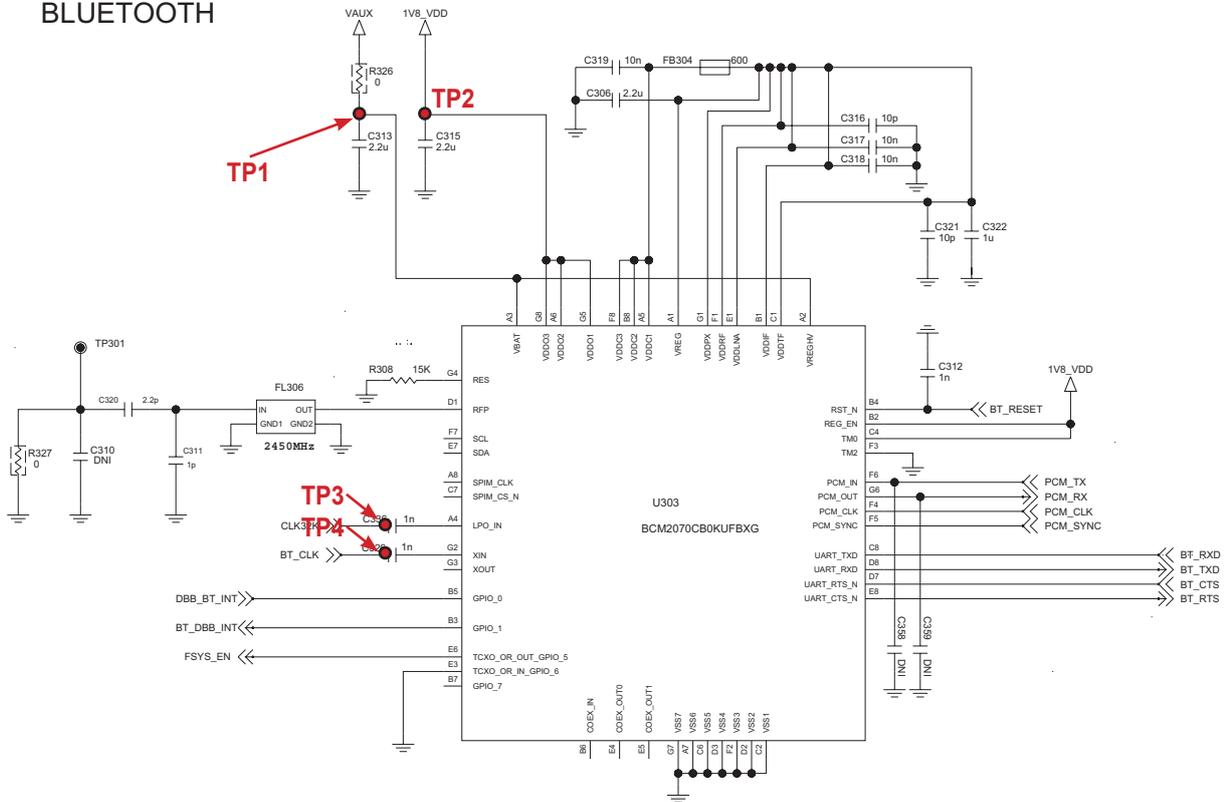


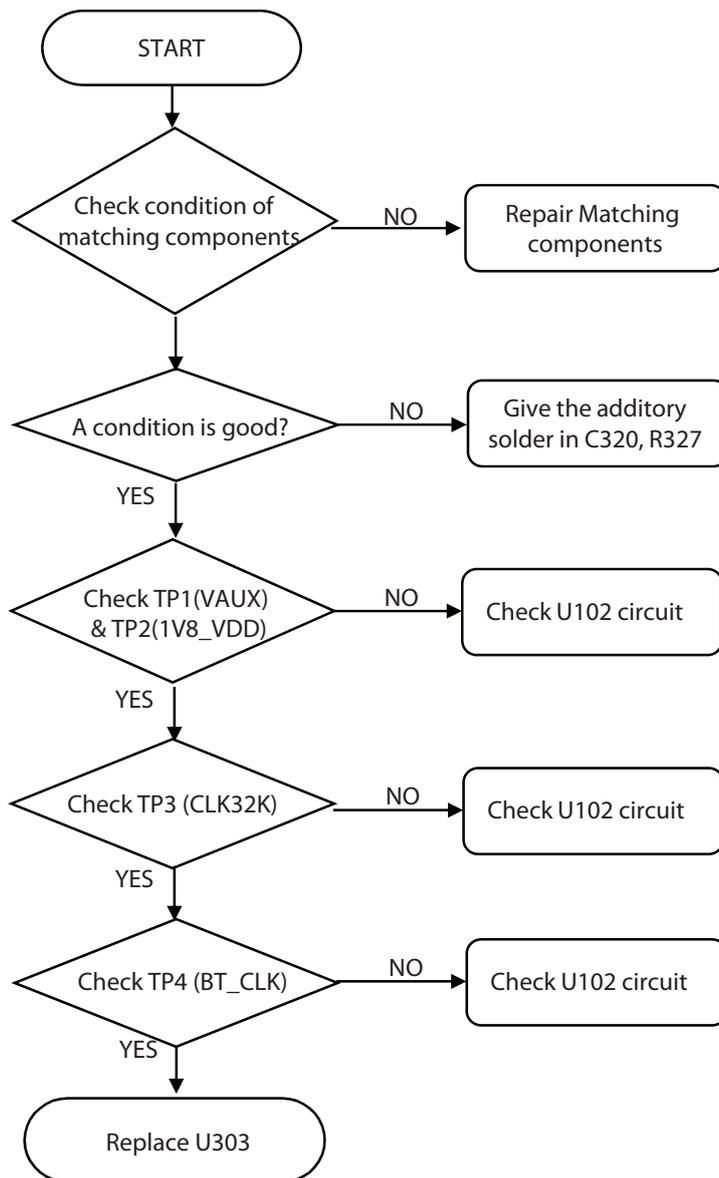
Figure 4.16.1

CIRCUIT

### BLUETOOTH



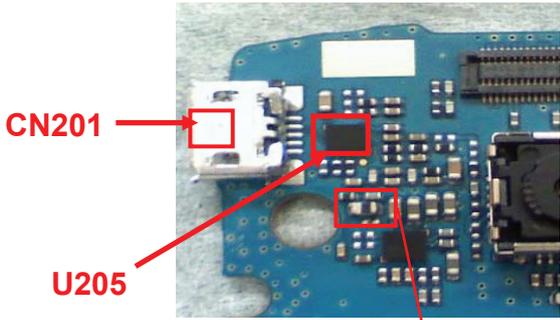
CHECKING FLOW



# 4. Trouble Shooting

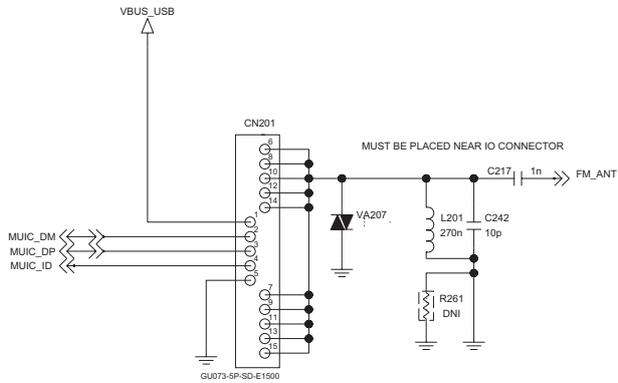
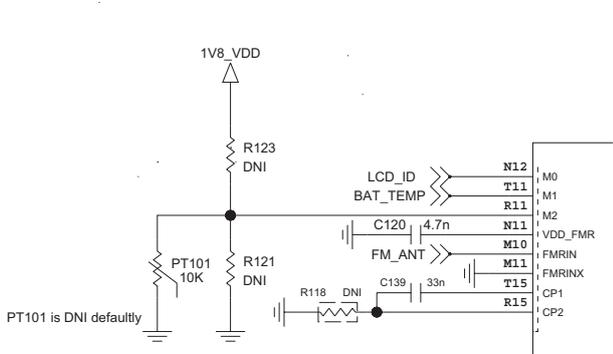
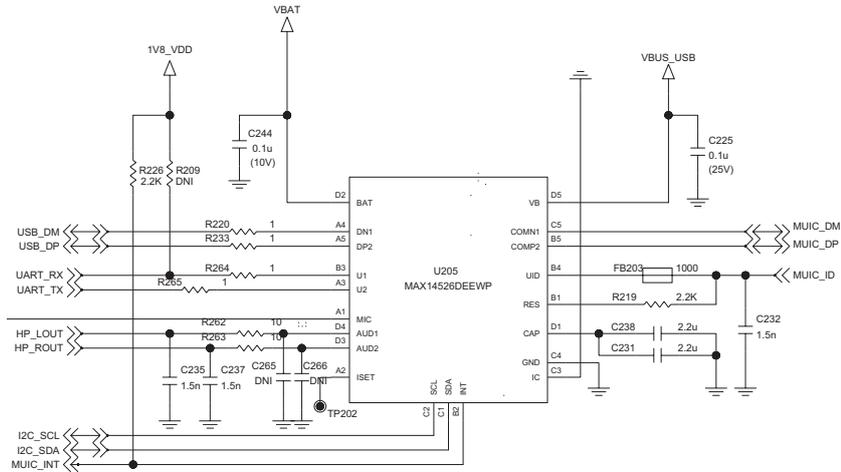
## 4.17 FM Radio Trouble

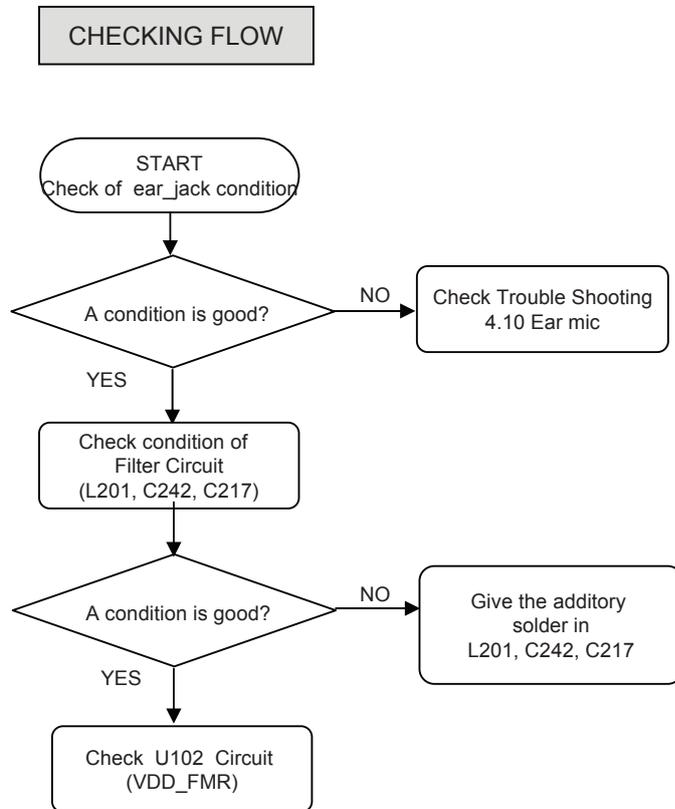
TEST POINT



CIRCUIT

Filter Circuit





# 4. Trouble Shooting

## 4.18 Slide on/off Trouble

TEST POINT

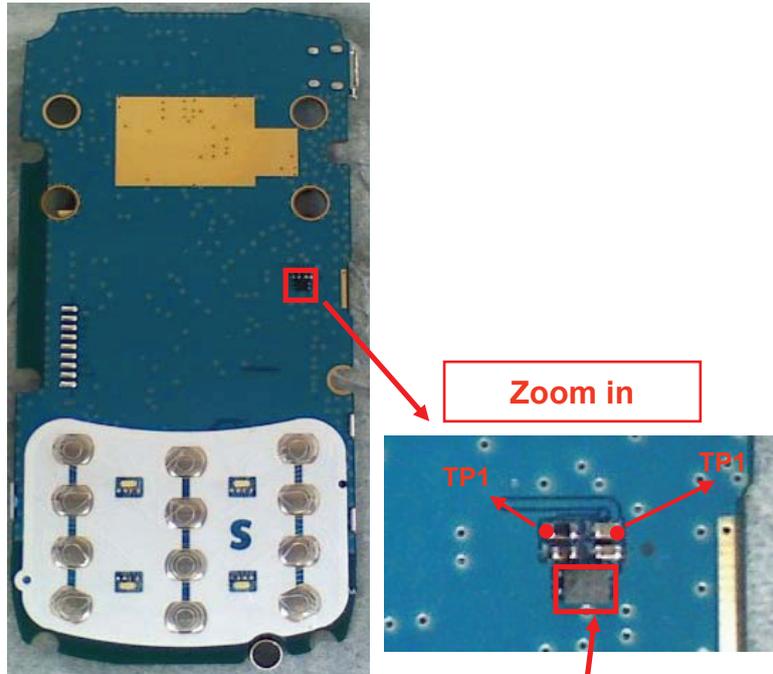
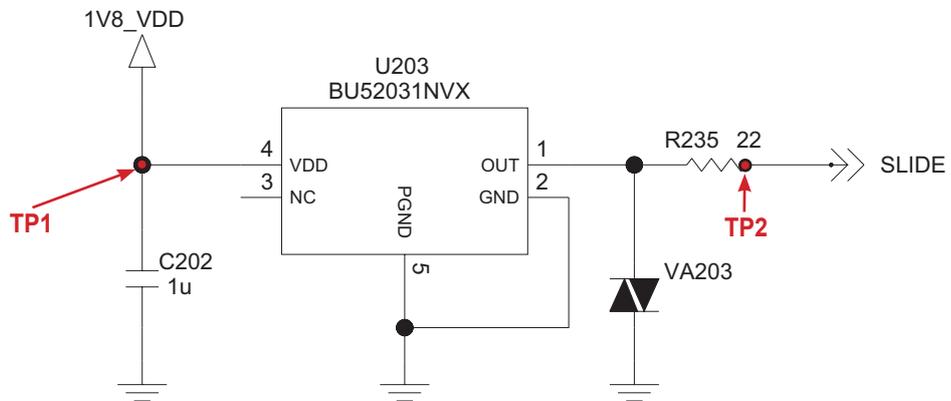
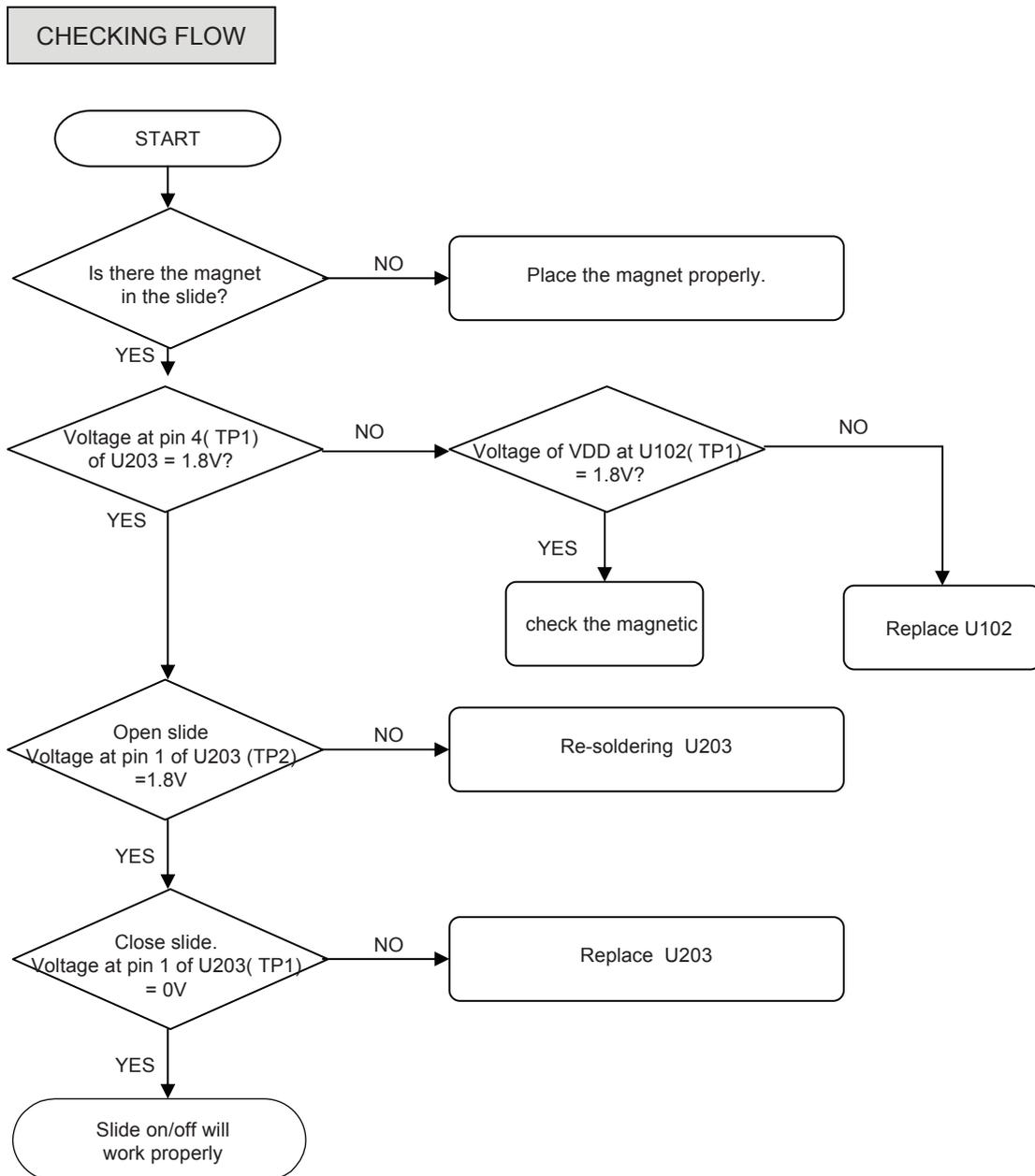


Figure 4.18.1

CIRCUIT

### SLIDE SW





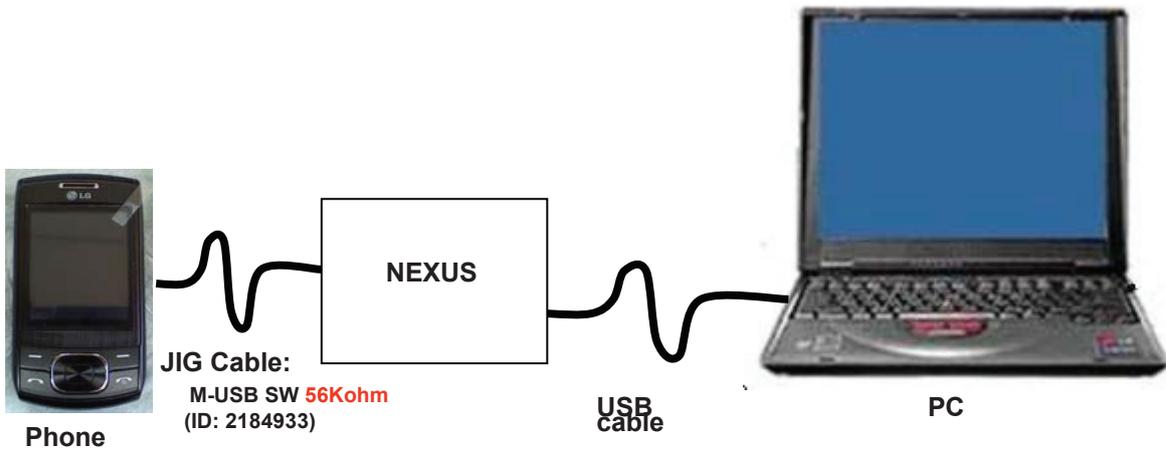
## 5. Download

### 5. Download

#### 5.1 S/W Download

##### Preparation

- Target terminal
- Nexus2 or Nexus3 with JIG Cable ( M-USB SW 56Kohm )
- PC supporting USB with Windows 2000 or newer.



##### • Nexus 3 Setting method

✓ USB

M18: 3G\_SP  
VCHAR: 5.0V  
USB DOWNLOAD  
REMOTE PWR: 0.0V

CABLE:  
M-USB SW 56Kohm  
(ID: 2184933)

##### • Nexus 2 Setting Method

✓ USB     : Switch On

USB	HIGH	DC
SERIAL	LOW	BATT

5.0V / M0 mode

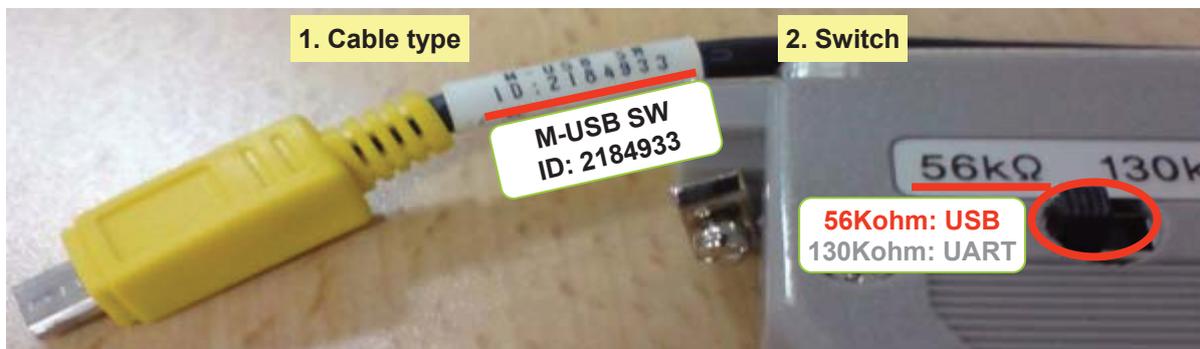
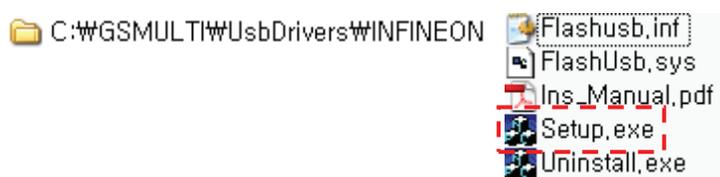


Figure 5.1. S/W download & upgrade setup

### 5.2 Download program user guide

#### 1. USB Driver Installation to Downloading – INFINEON

- Run "Setup.exe" for Installation Infineon usb driver.
- Click Install button.
- Click Exit button after installation completion.



## 5. Download

---

### 2. Device Detection

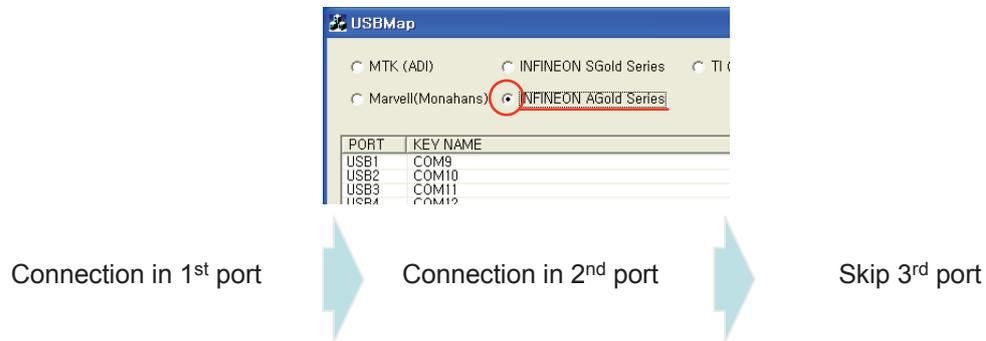
- a. Connect cable within the device.
- b. Windows will pop-up Found new hardware wizard and detect the new usb device.
- c. Check “Install the software automatically (Recommended)” button, install driver for the device. (or set specific location.)
- d. In case of Infineon, “Flash Loader utility” will be installed..
- e. If you have several usb ports for usb download, you have to repeat installation from No. a to No. c for each the usb port.

Eg. In case of Infineon, “Flash Loader utility” will be installed as shown below.



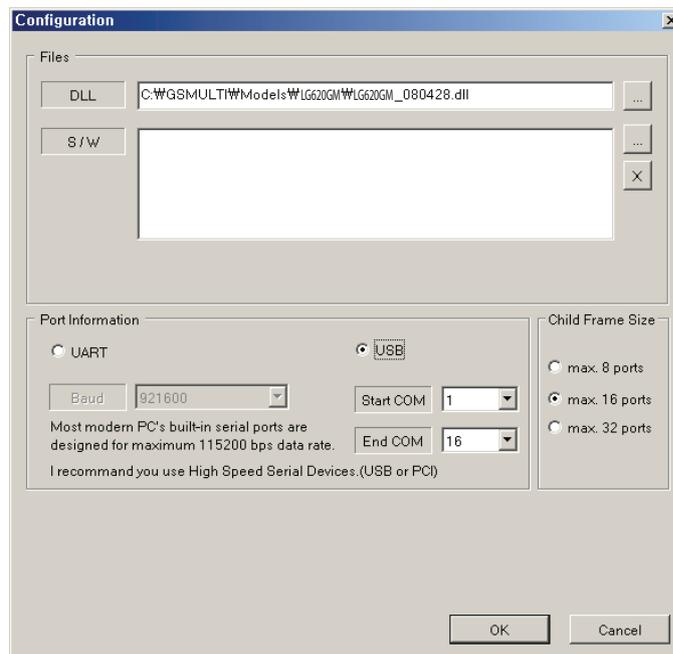
### 3. USB Port Mapping

- a. Setup\_USB\_PortMapping\_04.zip
- b. Run USB Map Program and check solution, click mapping start.
- c. Connect the usb or nexus cable with the device in order of port number.
- d. If you have the disable port, click “SKIP” button.
- e. After mapping is completed, click “Save & Exit” button.



### 4. Configuration to Download

- Run GSMULTI after version 3.0.
- Select "Model DLL" file (.LG620GM.zip- LG620GM\_090917.dll)
- LG620GM is supported usb download, USB button will be appeared.

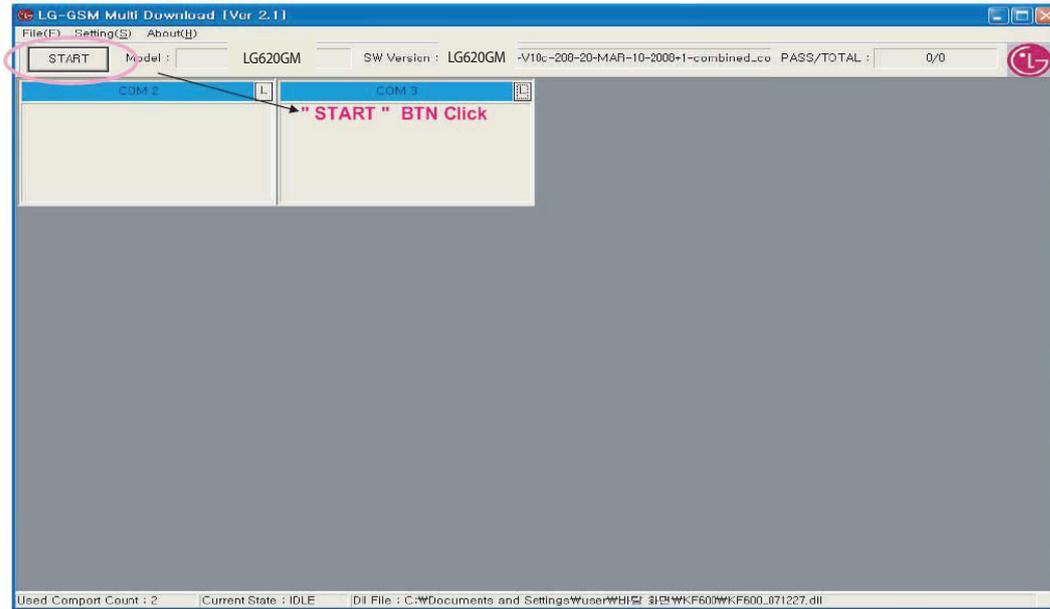


## 5. Download

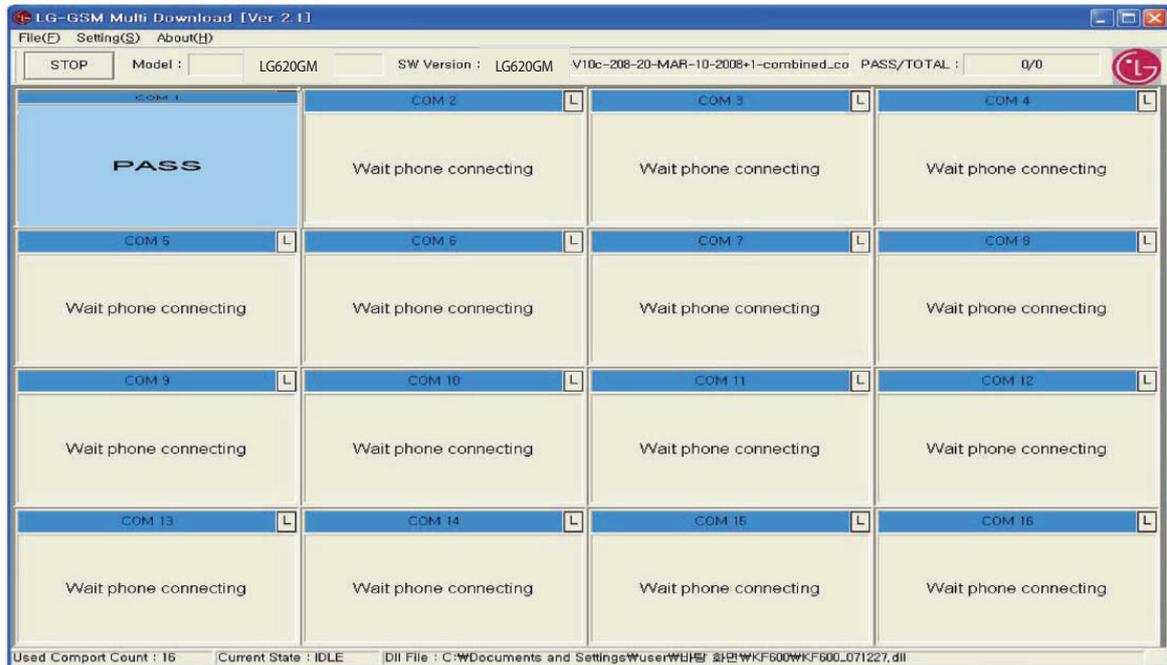
---

### 5. Multi-Download Program Setting (Model-Base)

#### ■ Setting Completed

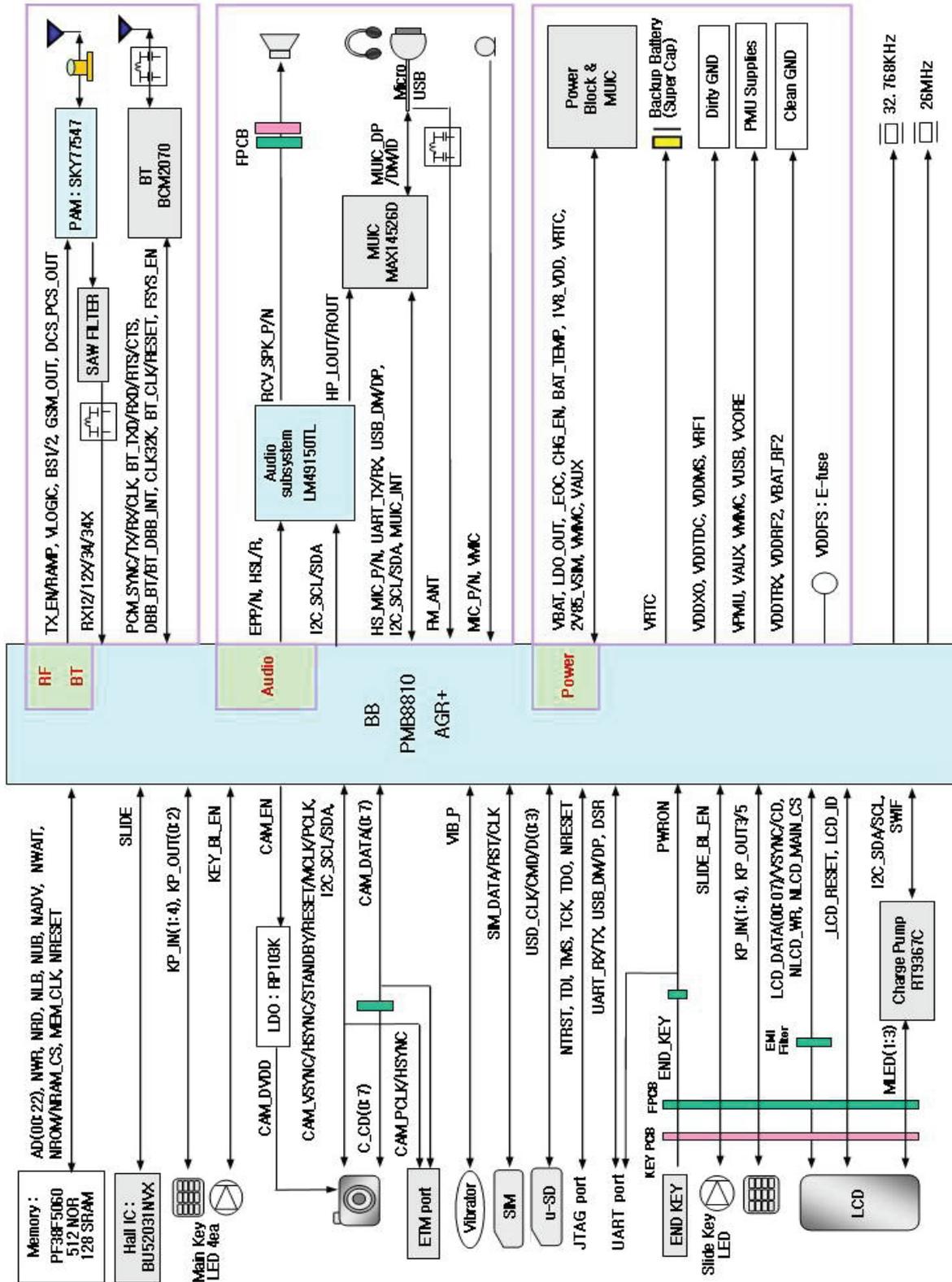


■ Stand-by Condition: “Wait phone connecting” confirm -> Phone connection

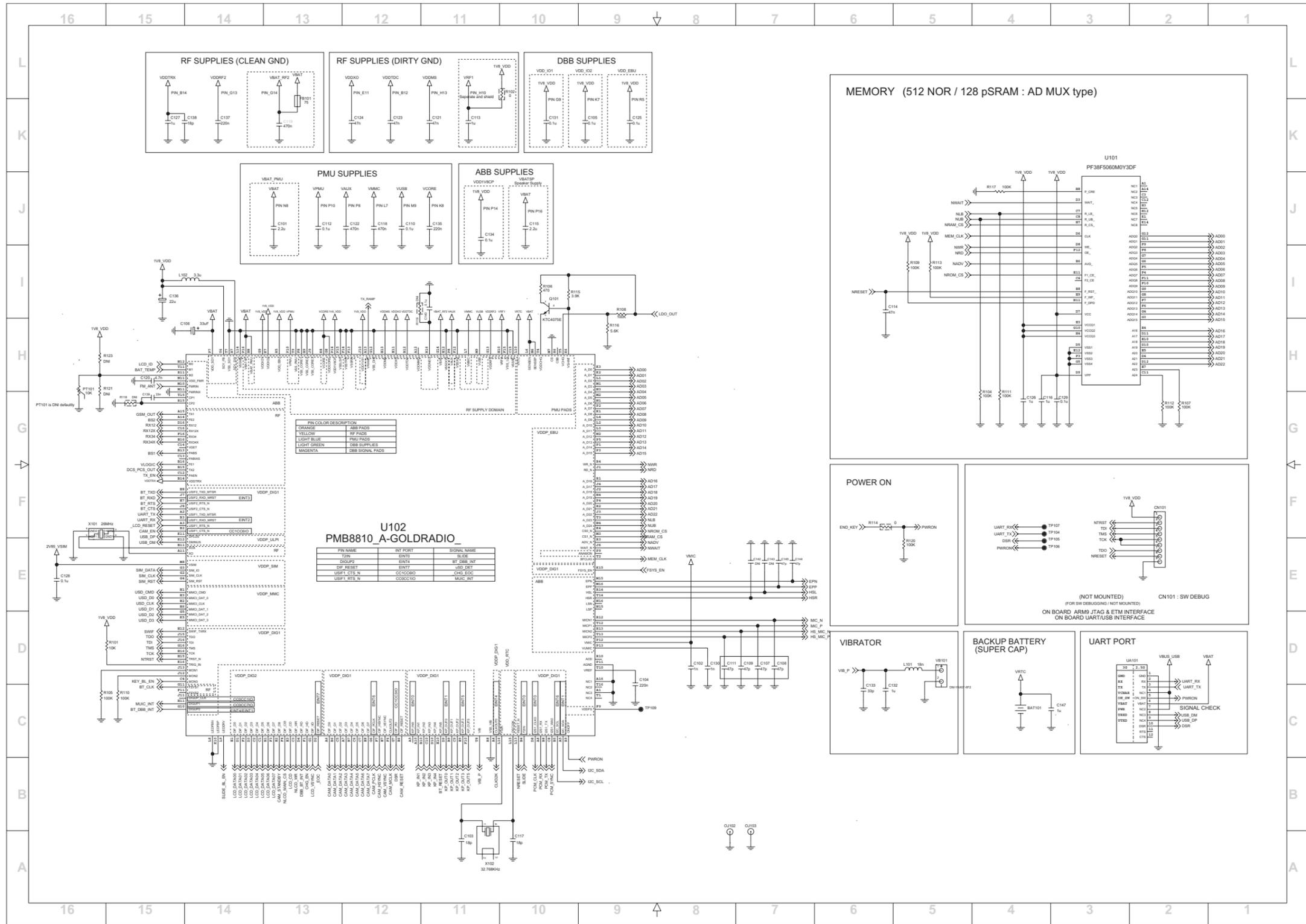


## 6. Block diagram

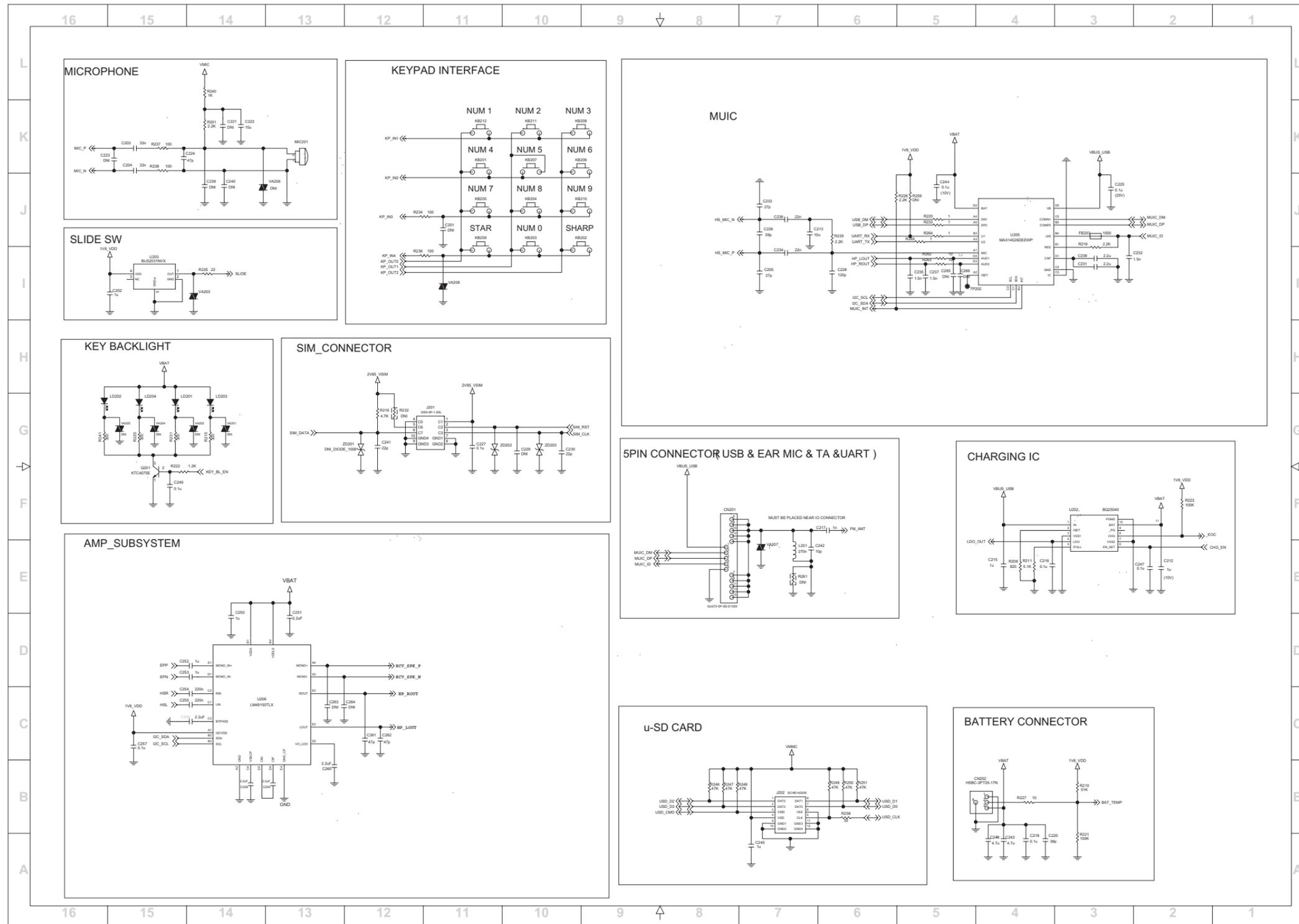
## 6. Block diagram



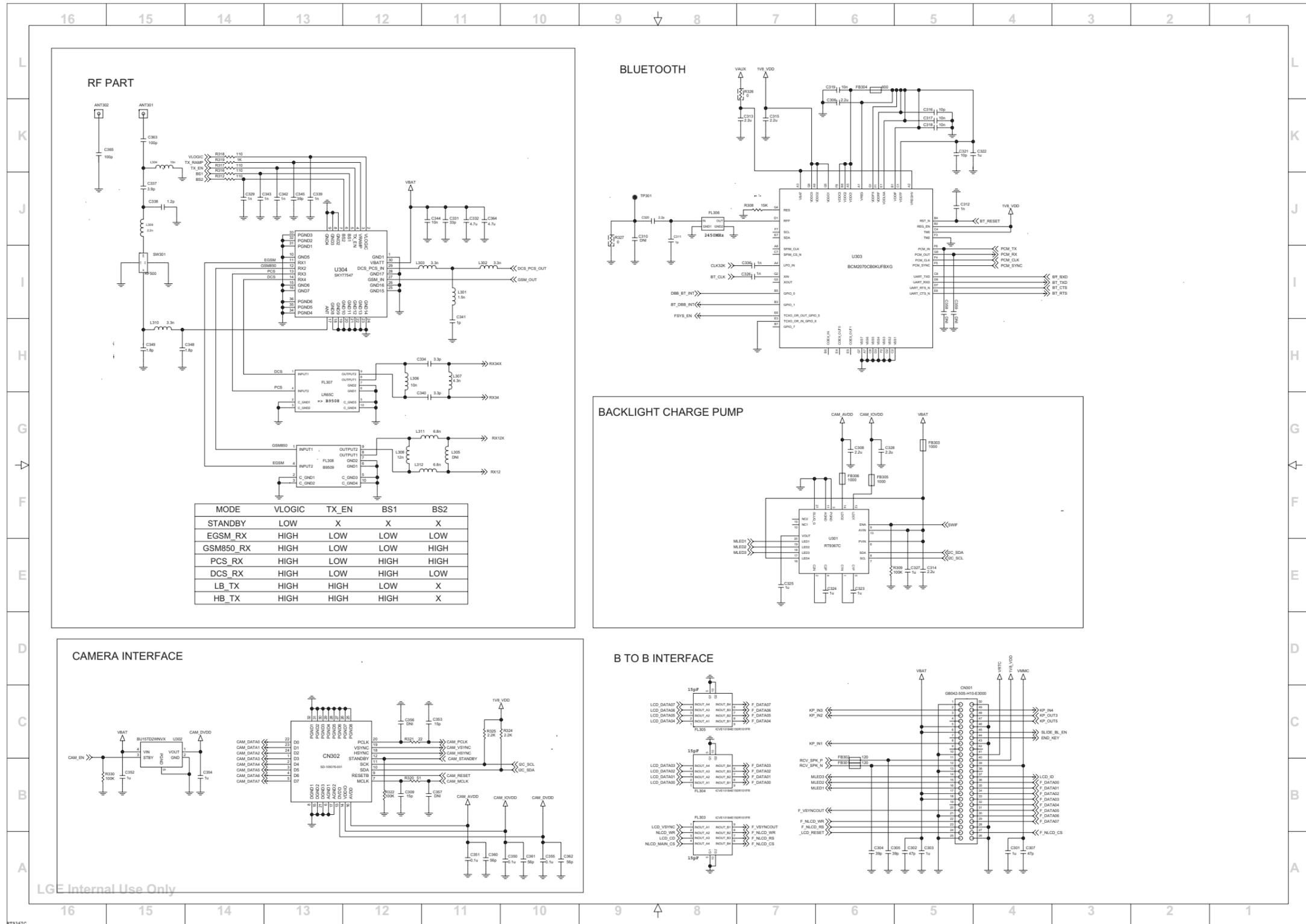
# 7. Circuit diagram



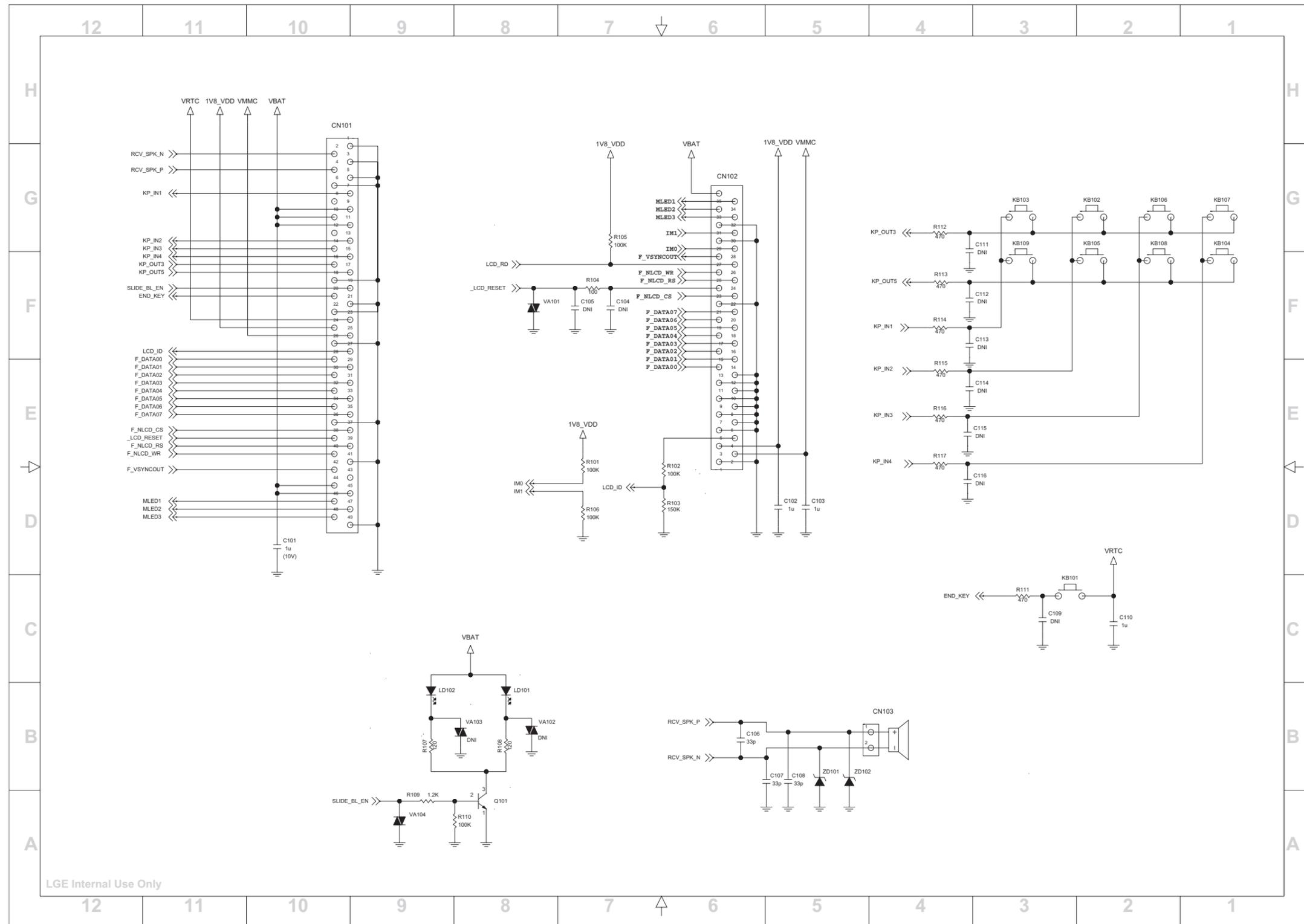
# 7. Circuit diagram



# 7. Circuit diagram

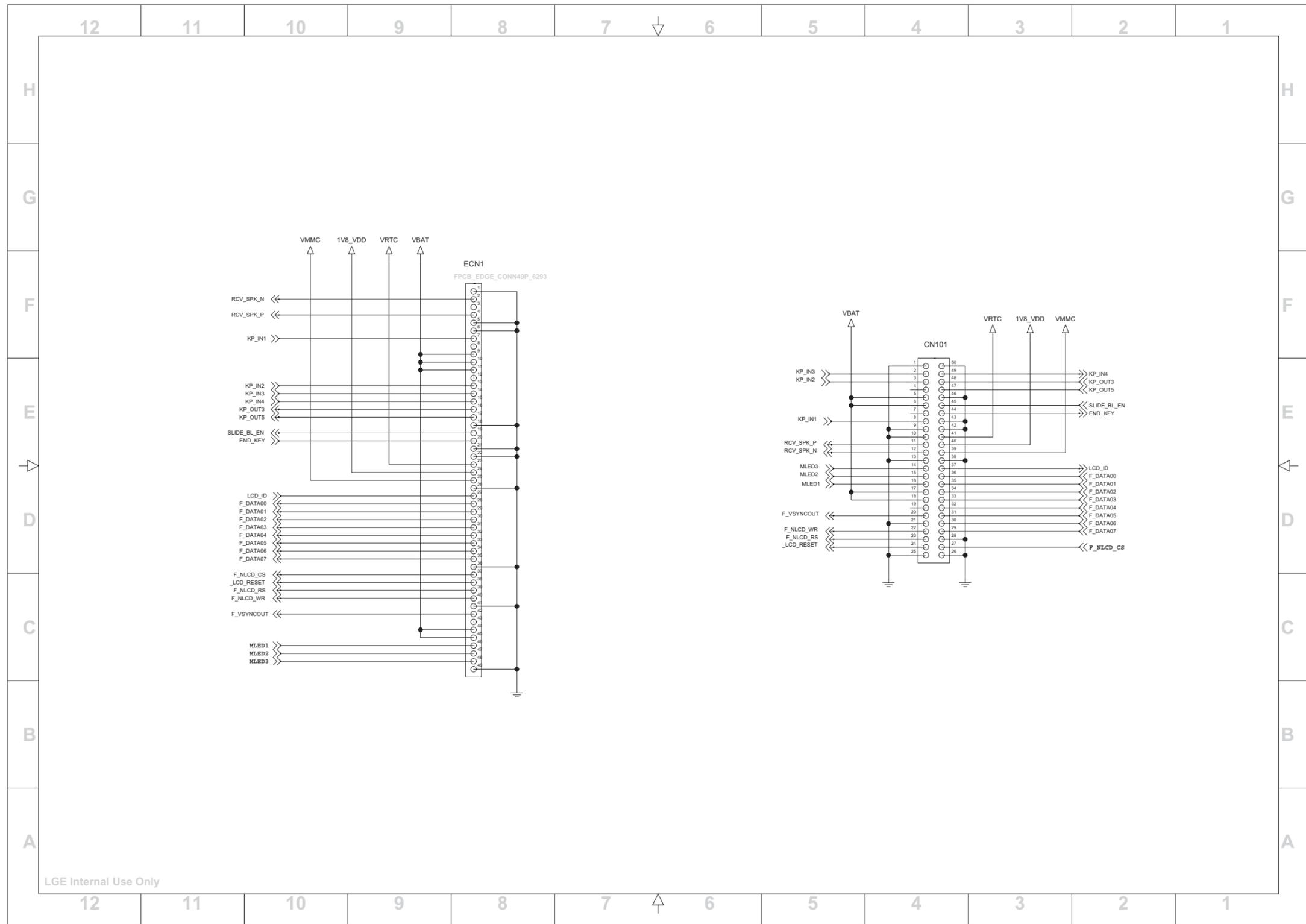


# 7. Circuit diagram



LGE Internal Use Only

# 7. Circuit diagram



LGE Internal Use Only



## 8. BGA Pin Map

### 8.1 BGA IC pin check (U102)

▪ Ball Diagram (Top View), PMB8810(A-GOLDRADIO+)

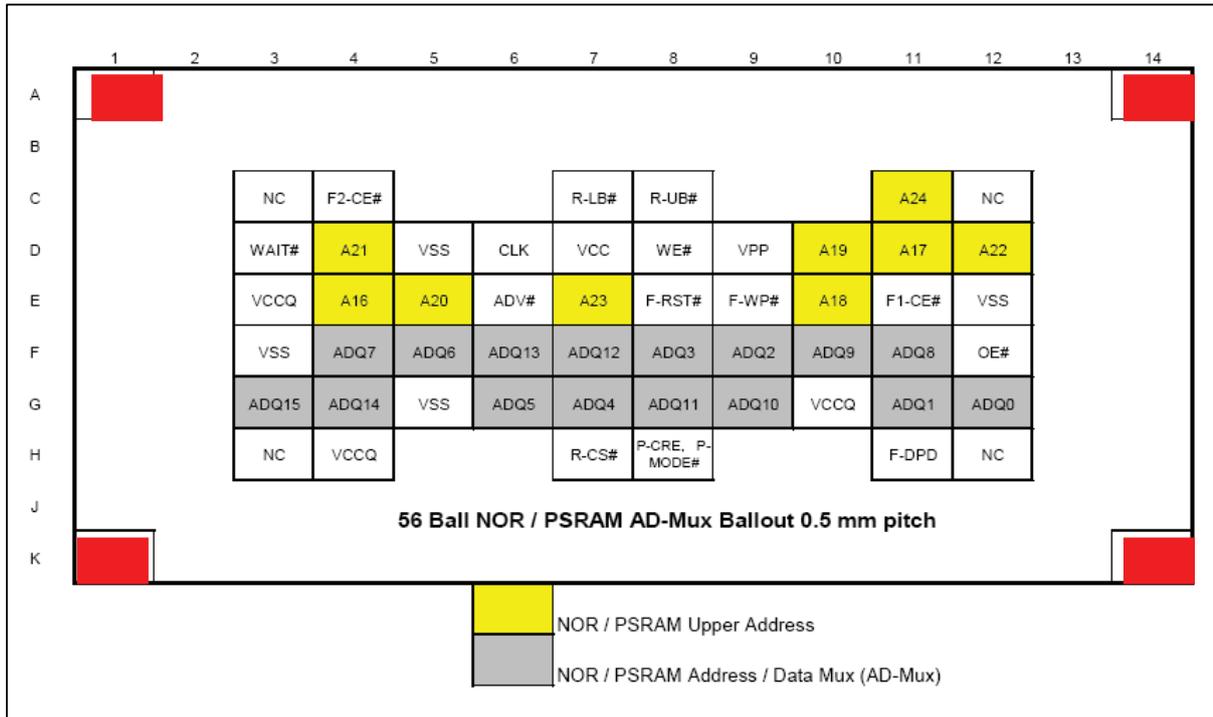
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T	
16	VSSRF2	FE1	RX12X	RX12	RX34X	RX34	TMS	TCK	TDI	TRIG_IN	F32K	EPP	LSN	VBATSP	VDDNEG		16
15	TX1	TX2	VSSRF			VSSLO		TRST_n	TDO	FSYS_EN	OSC32K	EPN	LSP	VSSLSR	CP2	CP1	15
14	FE2	VDDTRX	VDET			VSSTRX	VBAT					VSSMS		VDD1V8CP	HSL	HSR	14
13	VRAMP	PABS	PABIAS			VSSRX	VDDRF2	VDDM3	MON1		RESET_N			VUMIC	MICN2	MICP2	13
12	VDDMD	VDDTDC	PAEN		VSSDCO	VSSXO	VSSDIG	SWIF_TXRX	MON2	DMNUS			M0	VMIC	MICN1	MICP1	12
11	X0	XOX			VDDX0	FSYS2	FSYS1	DIGuP1	DIGuP_CLK	DPLUS		FMRINX	VDD_FMR	AGND	M2	M1	11
10	KP_IN1	KP_IN2	KP_IN3	KP_IN4	KP_IN5	KP_OUT5	DIGuP2	VRF1	VDD1V81	LEDFBP	VRTC	FMRIN		VPMU	ACD	VREF	10
9	KP_IN0	KP_OUT1	KP_OUT2	KP_OUT0	KP_OUT3	VDDFS	VDDIG1	VSSCORE2	VSSCORE3		LEDDR	VUSB		ANAMON	ONOFF	VSS_PMU	9
8	I2S1_RX	I2S1_TX	I2S1_WA0	I2S1_CLK0	CIF_D7	VSSCORE1	VDDCORE	USIF2_TXD_MTSR	USIF2_CTS_n	VCORE	LEDFBN	VSIM	VBAT_PMU	VALUX	VSS_VIB	VIB	8
7	CIF_D3	CIF_D4	CIF_D6		CIF_VSYNC	CIF_HSYNC	CIF_PD	USIF2_RTS_n	USIF2_RXD_MRSR	VDDIO2	VMMC	CS		VDD_SD1	SD1SW	VSS_SD1	7
6	CIF_D0	CIF_D1	CIF_D5		CIF_RESET	CLKOUT2	CIF_PCLK	MMCL_DAT1	WAIT_n	VSHNT	SENSEN	SENSEP			CSB	SD1_FB	6
5	I2C_SDA	I2C_SCL	CIF_D2				MMCL_DAT2			MMCL_DAT3				A/D13	VDD_EBU	VCHG	5
4	CLKOUT0	T2IN	MON3	DIF_RD		DIF_CS1	CC_RST	A19	A17	CS0_n	A/D9		A24	A20	WR_n	VDDCHG	4
3	USIF1_RTS_n	USIF1_RXD_MRSR	DIF_WR	DIF_D3	DIF_CD	DIF_D7	CC_IO	MMCL_DAT0	A22	A/D0	A/D11	CS1_n	A/D4	A/D15	ADV_n	A23	3
2	USIF1_TXD_MTSR	USIF1_CTS_n	DIF_D4	DIF_RESET	DIF_D8	DIF_D2	CC_CLK	MMCL_CLK	A18	A/D1	A/D10	A/D5	A/D12	A/D7	A21	BFCKO	2
1	VSSCORE4	DIF_D6	DIF_D5	DIF_D1	DIF_D0	DIF_HD	DIF_VD	MMCL_CMD	RD_n	A/D8	A/D2	A/D3	A/D6	A/D14	A16		1

 : not in use

## 8. BGA Pin Map

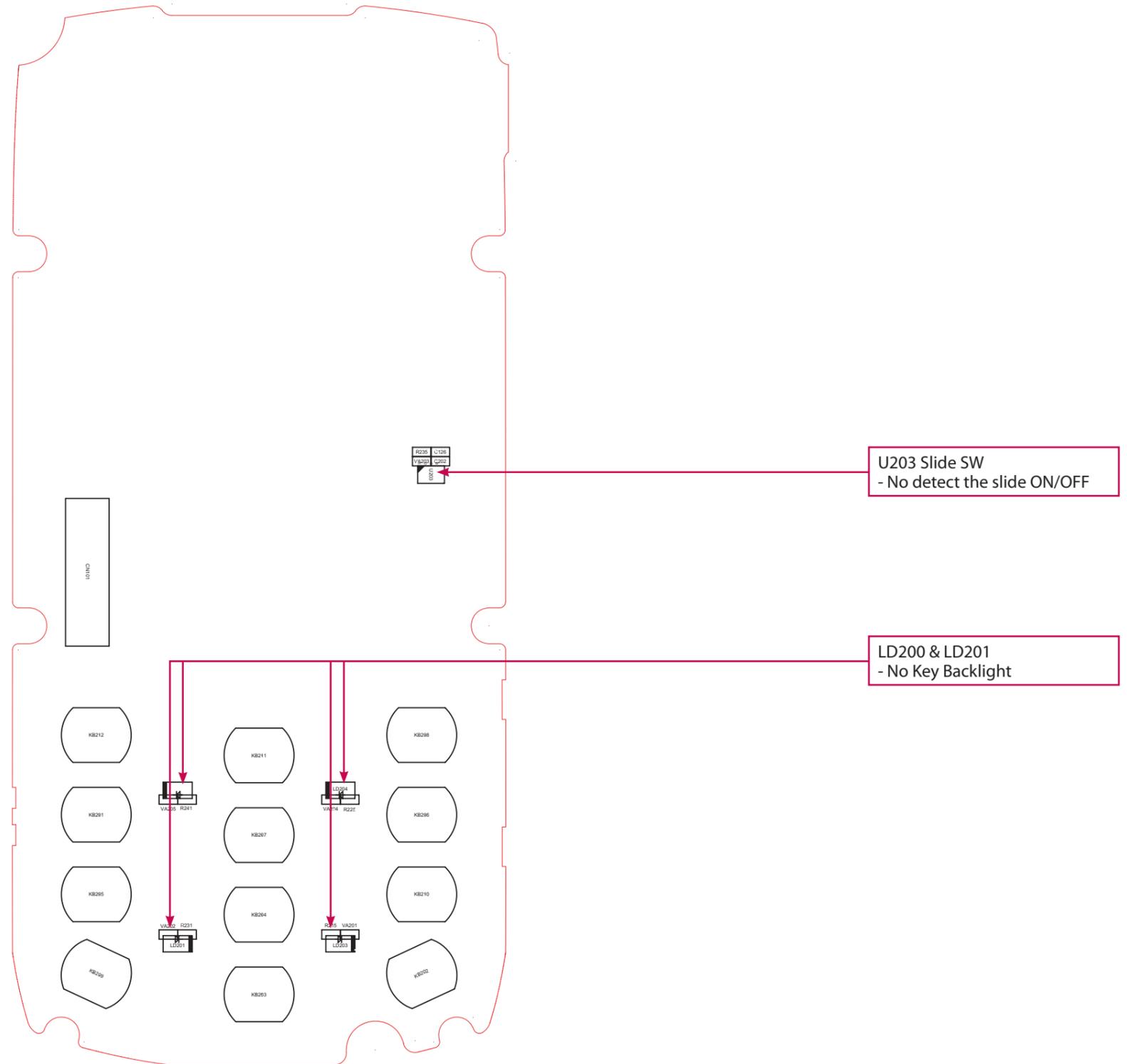
### 8.2 BGA IC pin check (U101)

- Ball Diagram (Top View), PF38F5060M0Y3DF



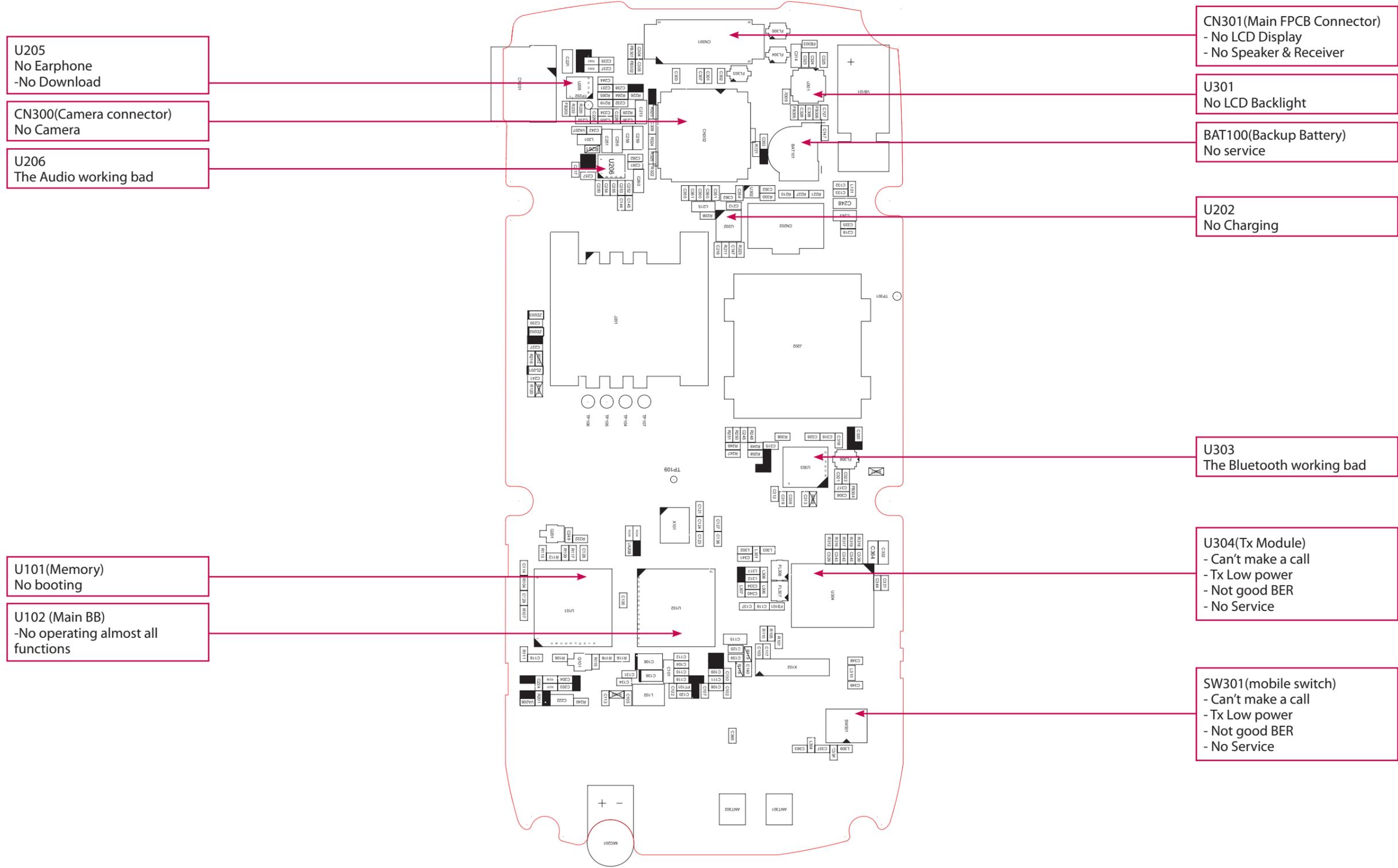
: not in use

# 9. PCB Layout



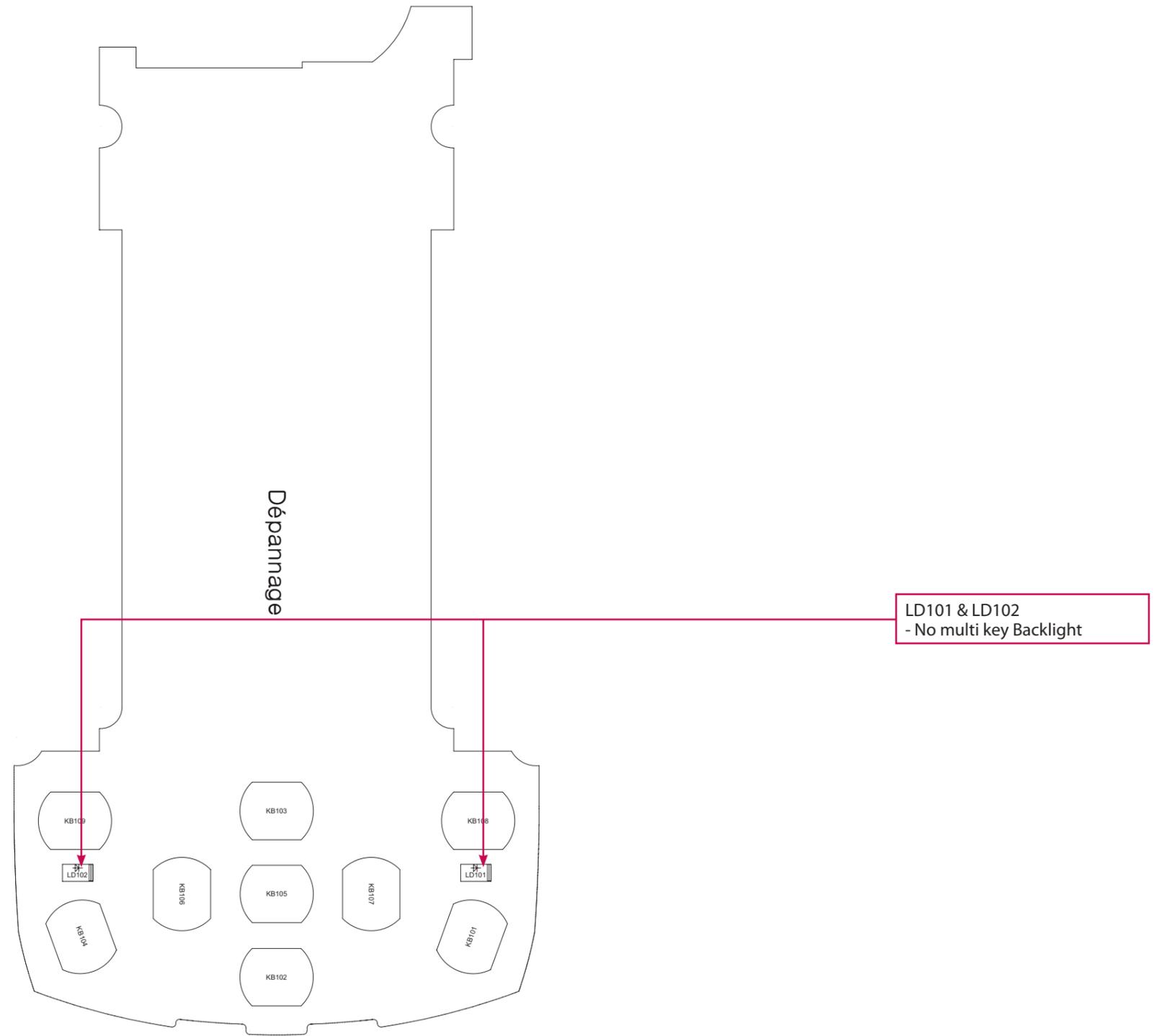
LG620GM \_MAI N\_SPFY0207101\_1.0-TOP

# 9. PCB Layout



LG620GM\_MAI N\_SPFY0207101\_1.0-BOT

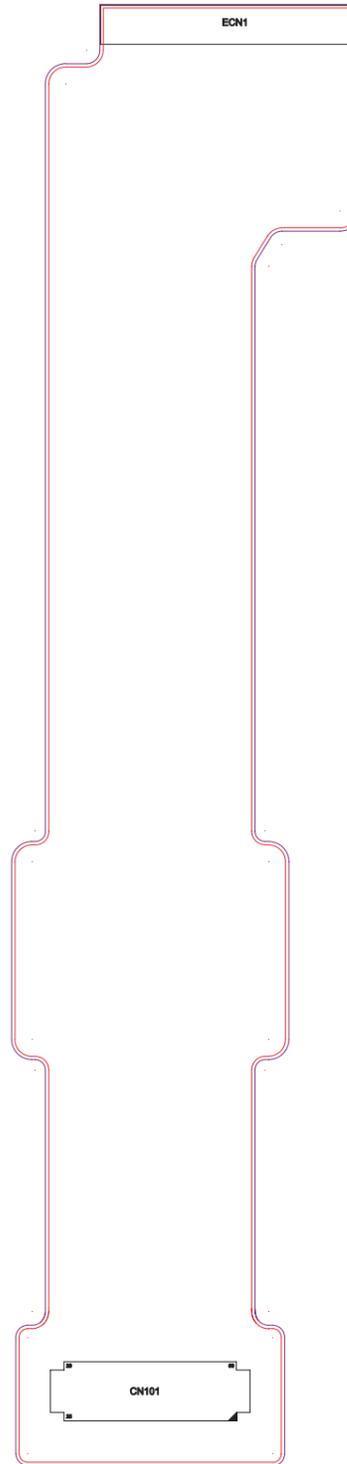
## 9. PCB Layout



LG620GM\_KEY\_SPEY0063201-1.0\_TOP



## 9. PCB Layout



LG620GM\_F\_LCD\_SPCY0193701-1.0\_TOP



## 10. Engineering Mode

Engineering mode is designed to allow a service man/engineer to view and test the basic functions provided by a handset. The key sequence for switching the engineering mode on is “\*1809#\*230# “Select. Pressing END will switch back to non-engineering mode operation. Use Up and Down key to select a menu and press ‘select’ key to progress the test. Pressing ‘back key will switch back to the original test menu.

### [1] BB TEST

#### [1-1] Battery Info

[1-1-1] BattInfo

#### [1-2] Bluetooth Test

[1-2-1] Enter Test Mode  
 [1-2-2] OnOff Test  
 [1-2-3] Headset Test  
 [1-2-4] BT Test1  
 [1-2-5] BT Test2  
 [1-2-6] Xhtml Compose Print  
 [1-2-7] Xhtml Print Test

### [2] Model Version

[2-1] Version

### [3] Eng Mode

#### [3-1] Cell environ.

#### [3-2] PS Layer Info

[3-2-1] Mobility  
 [3-2-2] RadioRes  
 [3-2-1] Gprs

#### [3-3] Layer1 Info

#### [3-4] Reset Information

#### [3-5] Memory Configurarion

#### [3-6] MemGenConf

#### [3-7] MemAllUse

#### [3-8] MemDetUse

#### [3-9] MemDump

#### [3-10] Change Frequency Band

### [4] Call Timer

### [5] Factory Reset

### [6] MF TEST

#### [6-1] All Auto Test

#### [6-2] Backlight

[6-2-1] BacklightOn  
 [6-2-2] BacklightOff

#### [6-3] Audio

[6-3-1] Audio Test

#### [6-4] Vibrator

[6-4-1] VibratorOn  
 [6-4-2] VibratorOff

#### [6-5] LCD

[6-5-1] Auto LCD

#### [6-6] Key pad

#### [6-7] Mic Speaker

#### [6-8] Camera

[6-8-1] Camera Main Preview  
 [6-8-2] FlashOn  
 [6-8-3] FlashOff  
 [6-8-4] CameraFlashBunning

#### [6-9] FM Radio

[6-9-1] FM Radio Test

#### [6-10] Touchpad Test

### [7] Network selection

#### [7-1] Automatic

#### [7-2] GSM850

#### [7-3] EGSM

#### [7-4] DCS

#### [7-5] PCS

# 11. Stand Alone Test

## 11. Stand Alone Test

### 11.1 Introduction

This manual explains how to examine the status of RX and TX of the model.

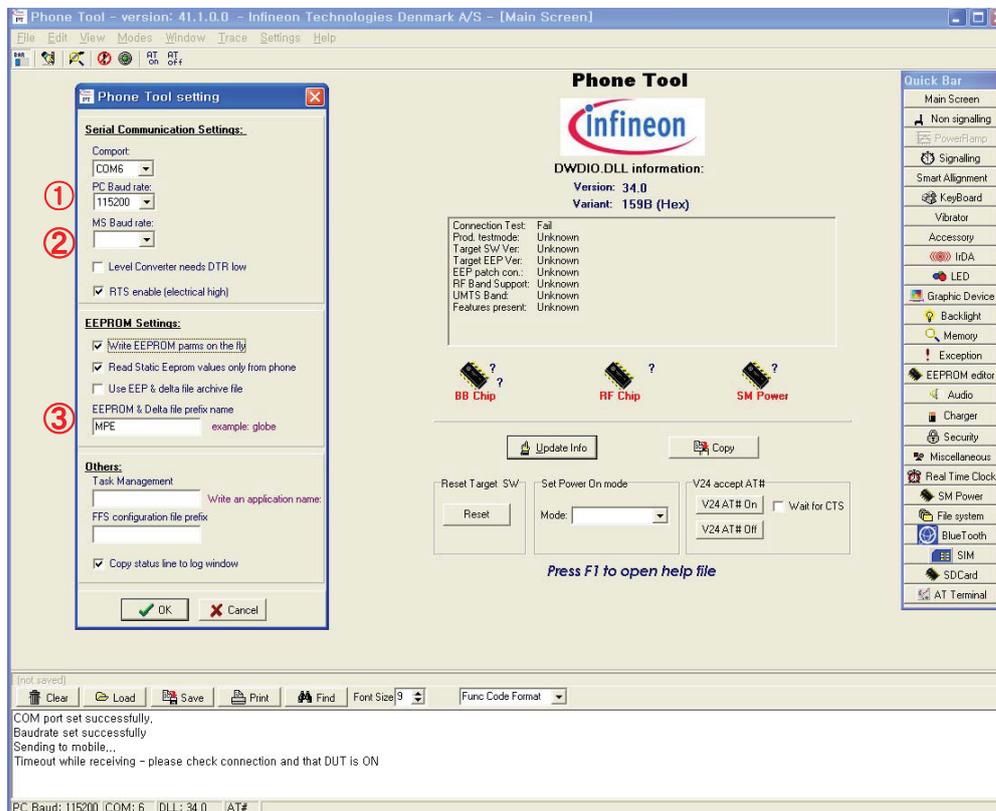
#### A. Tx Test

TX test - this is to see if the transmitter of the phones is activating normally.

#### B. Rx Test

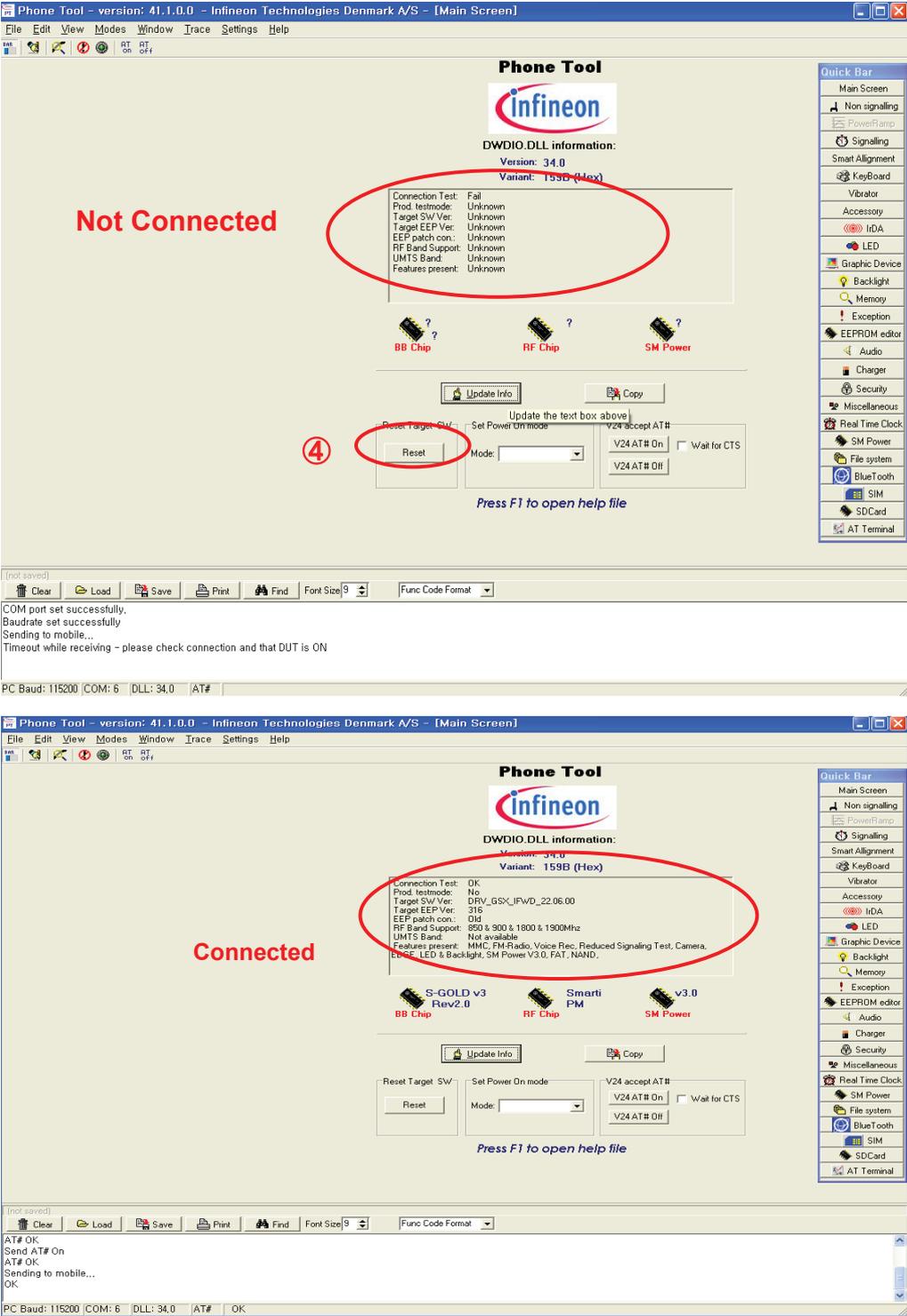
RX test - this is to see if the receiver of the phones is activating normally.

### 11.2 Setting Method



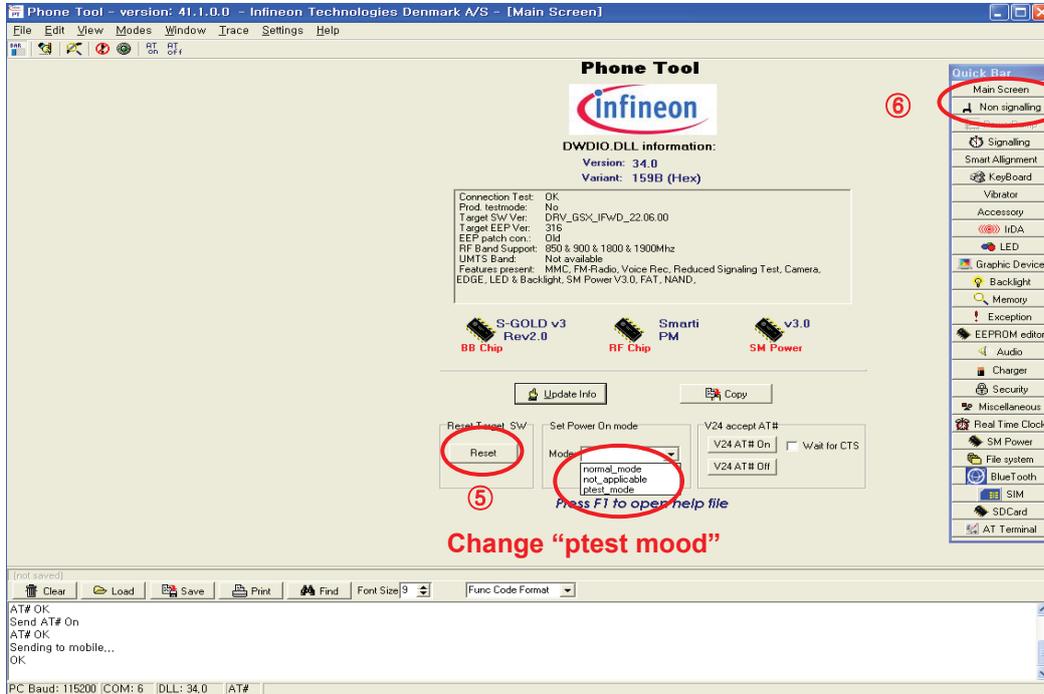
1. Set COM Port
2. Check PC Bau Rate
3. Confirm EEPROM & Delta file prefix name
4. Click "Update Info" for communicating Phone and Test-Program

# 11. Stand Alone Test



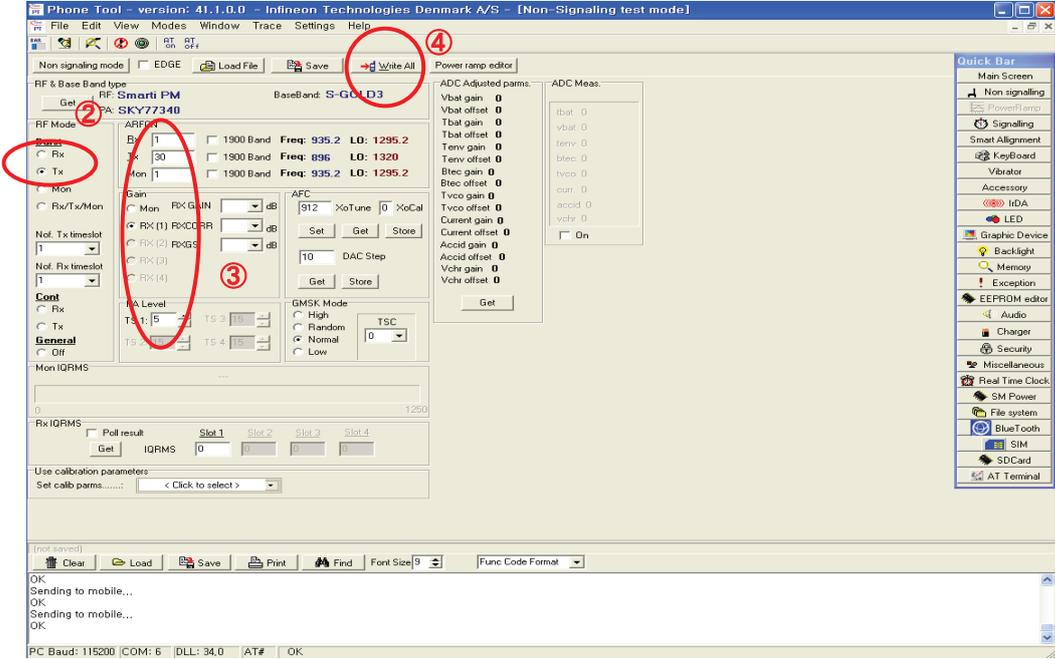
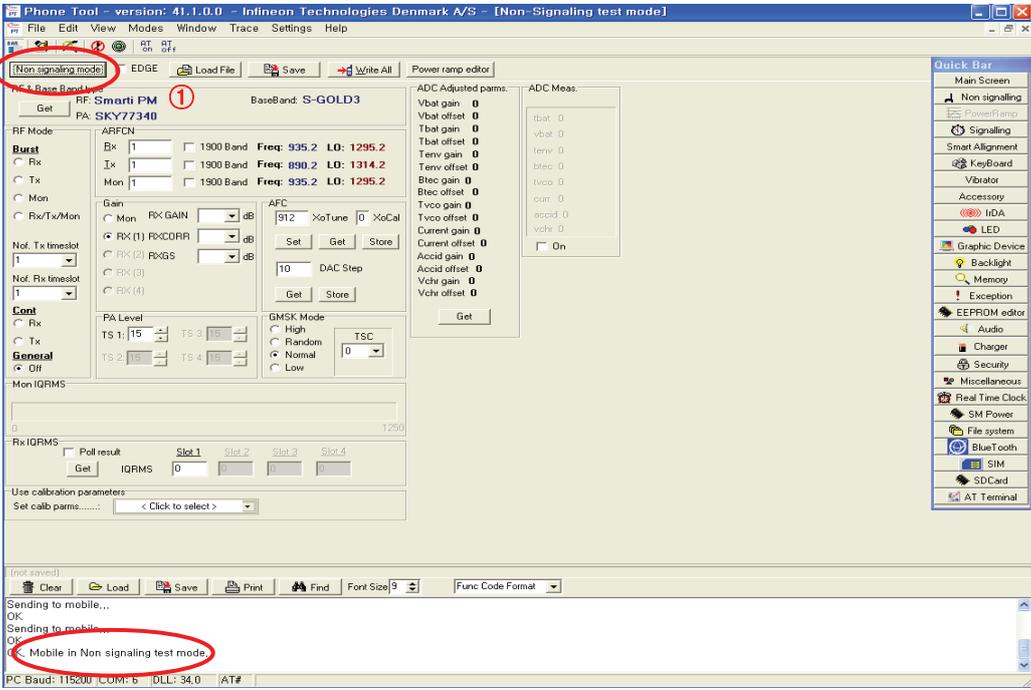
4. Click "Update Info" for communicating Phone and Test-Program

# 11. Stand Alone Test



5. For the purpose of the Standalone Test, Change the Phone to "ptest mode" and then Click the "Reset" bar.
6. Select "Non signalling" in the Quick Bar menu. Then Standalone Test setup is finished.

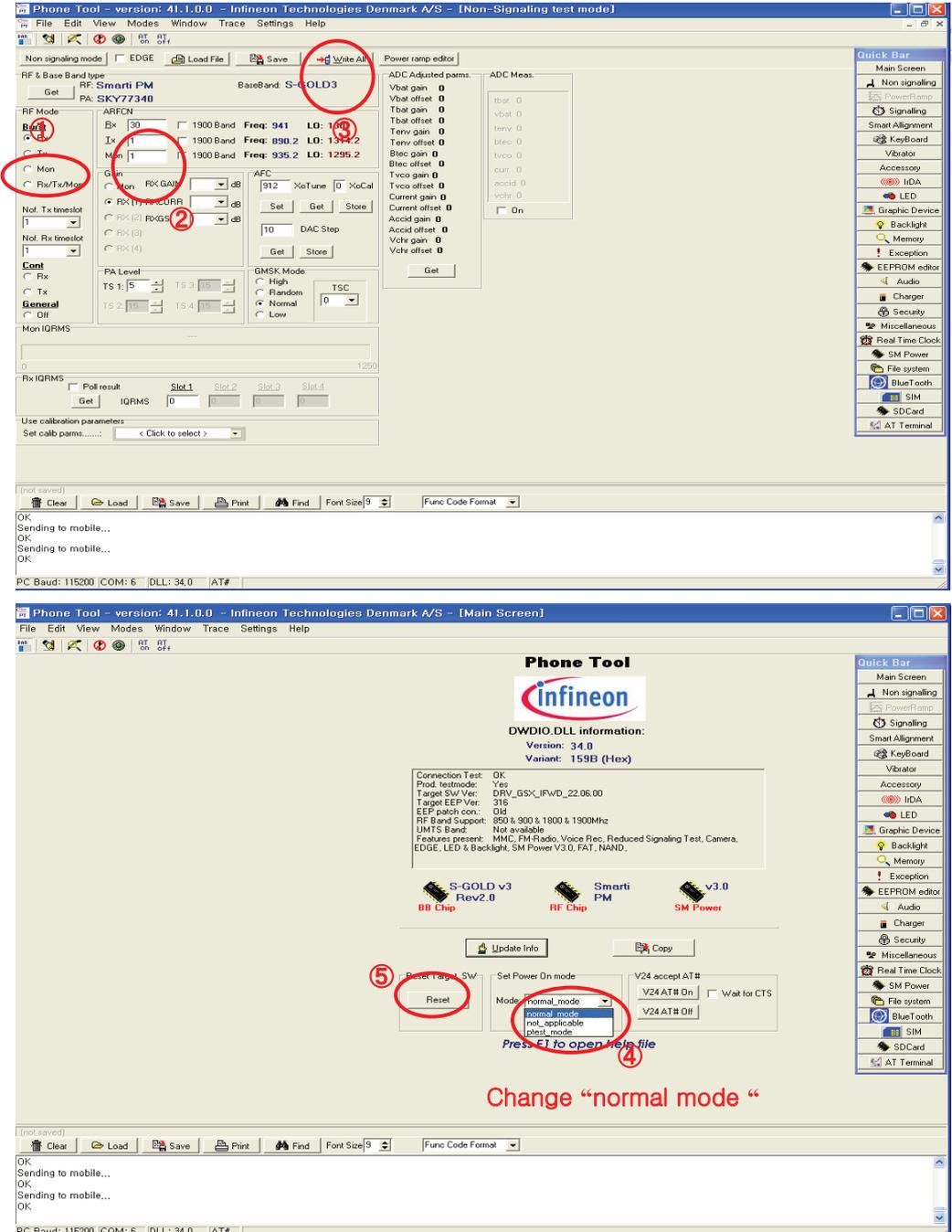
11.3 Tx Test



1. "Non signaling mode" bar and then confirm "OK" text in the command line.
2. Put the number of TX Channel in the ARFCN
3. Select "Tx" in the RF mode menu and "PCL" in the PA Level menu.
4. Finally, Click "Write All" bar and try the efficiency test of Phone.

# 11. Stand Alone Test

## 11.4 Rx Test



1. Put the number of RX Channel in the ARFCN.
2. Select "Rx" in the RF mode menu.
3. Finally, Click "Write All" bar and try the efficiency test of Phone.
4. The Phone must be changed "normal mode" after finishing Test.
5. Change the Phone to "normal mode" and then Click the "Reset" bar.

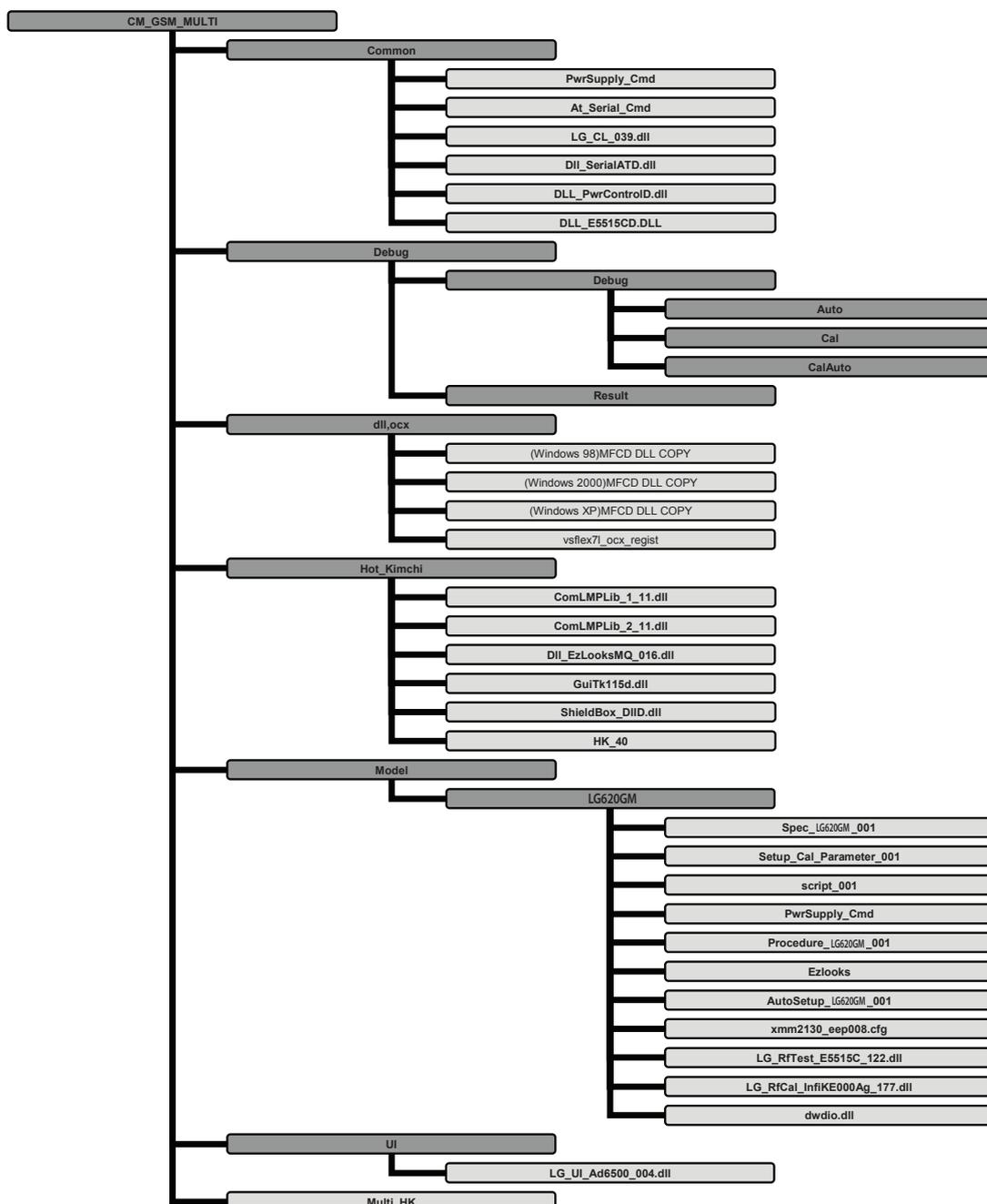
## 12. Auto Calibration

### 12.1 Overview

Auto-cal (Auto Calibration) is the PC side Calibration tool that perform Tx, Rx and Battery Calibration with Agilent 8960(GSM call setting instrument) and Tektronix PS2521G(Programmable Power supply).

Auto-cal generates calibration data by communicating with phone and measuring equipment then write it into calibration data block of flash memory in GSM phone.

### 12.2 Configuration of HotKimchi



## 12. Auto Calibration

---

### 12.3 Description of Basic File.

#### 1. Common

- **LG\_CL\_039.dll** : Common logic dll, Module In Charge of Reading PID & S/W Version, Booting.
- **Dll\_SerialATD.dll** : Serial Communication Module From Phone by AT Command.
- **DLL\_PwrControlID.dll** : Communication Module From Power supply.
- **DLL\_E5515CD.DLL** : Communication Module From Agilent 8960(Test Set).
- **At\_Serial\_Cmd.xml** : Definition File of AT Command.
- **PwrSupply\_Cmd.xml** : Definition File of Power supply command.

#### 2. Debug

- **Debug** - Cal : Result File of Calibration.  
Auto : Result File of Auto Test.  
CalAuto : Result File of Cal & Auto Test.

#### 3. dll, ocx

- **vsflex7l\_ocx\_regist** : Registration File for System use
- **Windows XXX)MFCD DLL** : Registration File for System use

#### 4. HotKimchi

- **HK\_40.exe** : Execute File, HK\_XX → XX is File Version.
- **ComLMPLib\_1\_11.dll** : Communication Module With PLC or Shield Box In Automation Rack.  
Support to J&S Shield Box and Tescom TC-5981A.
- **ComLMPLib\_2\_11.dll** : Communication Module With PLC or Shield Box In Automation Rack.  
Support to J&S Shield Box and Tescom TC-5981A.
- **Dll\_EzLooksMQ\_005.dll** : Communication Module with ezTray Installed In Local PC.
- **GuiTk115d.dll** : control library
- **ShieldBox\_DIID.dll** : Communication with Shield Box. Support to Tescom TC-5952B.

#### 5. Model

- **LG\_RfCal\_InfiKE000Ag\_177.dll** : Main Module of Calibration
- **LG\_RfTest\_E5515C\_122.dll** : Main Module of Auto Test
- **Xmm2130\_eep008.cfg** : Cal Data Save binary Module.
- **AutoSetup\_LG620GM\_100.xml** : RF TEST Setup Module.
- **Ezlooks.xml** : Calibration ezLooks Item & Cal Spec Definition Module.
- **Procedure\_LG620GM\_001.xml** : RF TEST Procedure Definition Module.
- **Script\_001.xml** : RF TEST Setup & calibration Setup Module.
- **Spec\_LG620GM\_001.xml** : Definition Module of Auto Test Spec
- **Setup\_Cal\_Parameter\_001.xml** : Calibration Definition Module.

#### 6. UI

- **LG\_UI\_Ad6500\_002.dll** : ADI Model UI Dll.

### 7. Multi\_HK

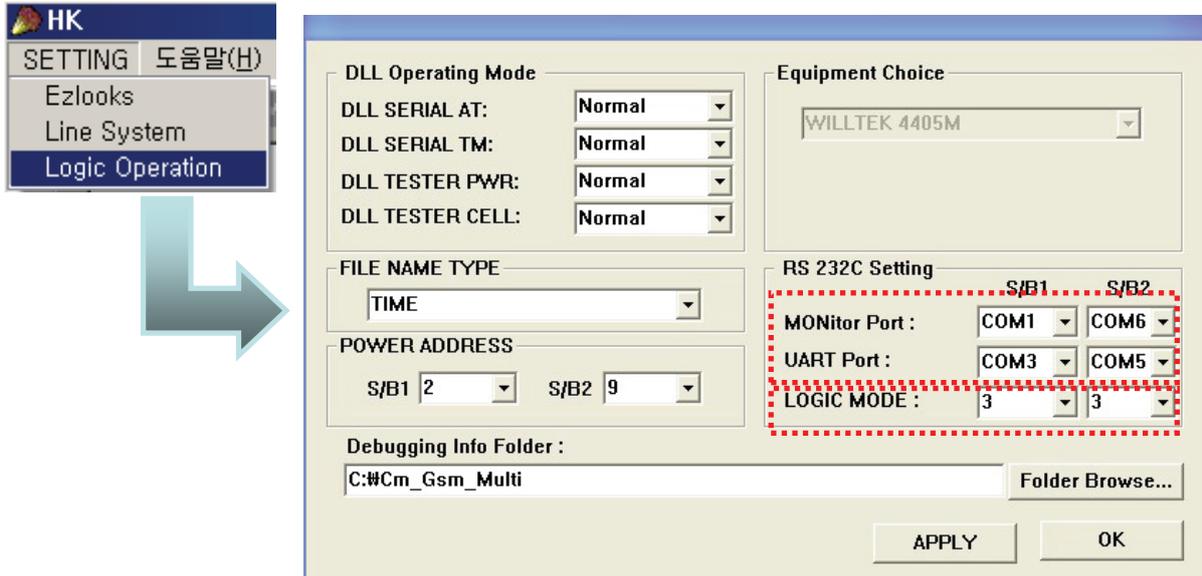
-. Registration File For System Setting.

1. Connect as Fig 6-2(RS232 serial cable is connected between COM port of PC and MON port of TEST JIG, in general)
2. Set the Power Supply 4.0V
3. Set the 3<sup>rd</sup>, 4<sup>th</sup> of DIP SW ON state always
4. Press the Phone power key, if the Remote ON is used, 1<sup>st</sup> ON state

### 12.4 Procedure

1. Copy the file to C:\Cm\_Gsm\_Multi
2. Copy the files of((Windows XXX)MFCD DLL, vsflex7l\_ocx\_regist to C:\Cm\_Gsm\_Multi\dl,ocx
3. Select MFCD DLL of your computer OS
4. Click on "vsflex7l\_ocx\_regist"
5. Click on "Multi\_HK reg"
6. Connect as Fig 11-2 (RS232 serial cable is connected between COM port of PC, in general.
7. Run HK\_40exe to start calibration.
8. Click " Logic Operation" of "SETTING" menu bar

## 12. Auto Calibration

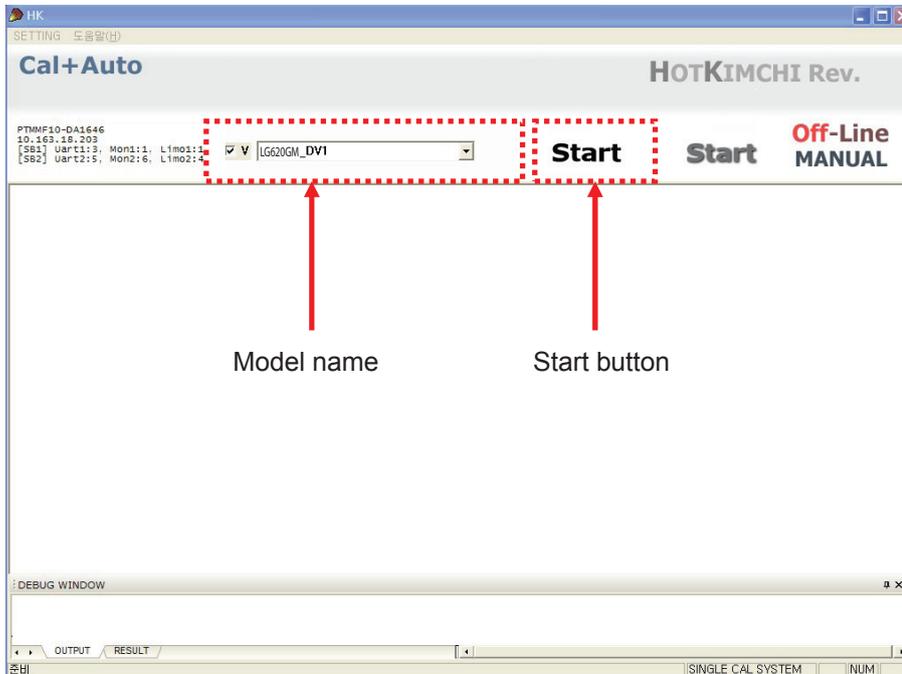


9. Set PORT (using RS232 cable) that PC can communicate with the phone

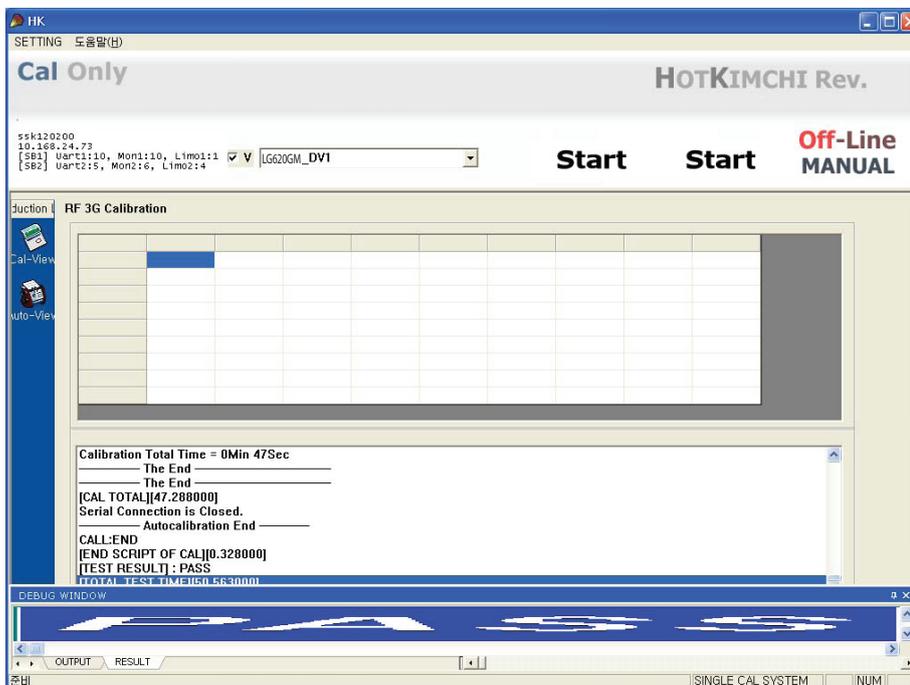
10. Select " LOGIC MODE" that you want

Logic mode: 1-> Calibration only  
2-> Auto test only  
3-> Cal & Auto

11. Select the model name “LG620GM”



12. Click “start” button



## 12. Auto Calibration

---

### 12.5 AGC

This procedure is for Rx calibration.

In this procedure, We can get RSSI correction value. Set band EGSM and press Start button the result window will show correction values per every power level and gain code and the same measure is performed per every frequency.

### 12.6 APC

This procedure is for Tx calibration.

In this procedure you can get proper scale factor value and measured power level.

### 12.7 ADC

This procedure is for battery calibration.

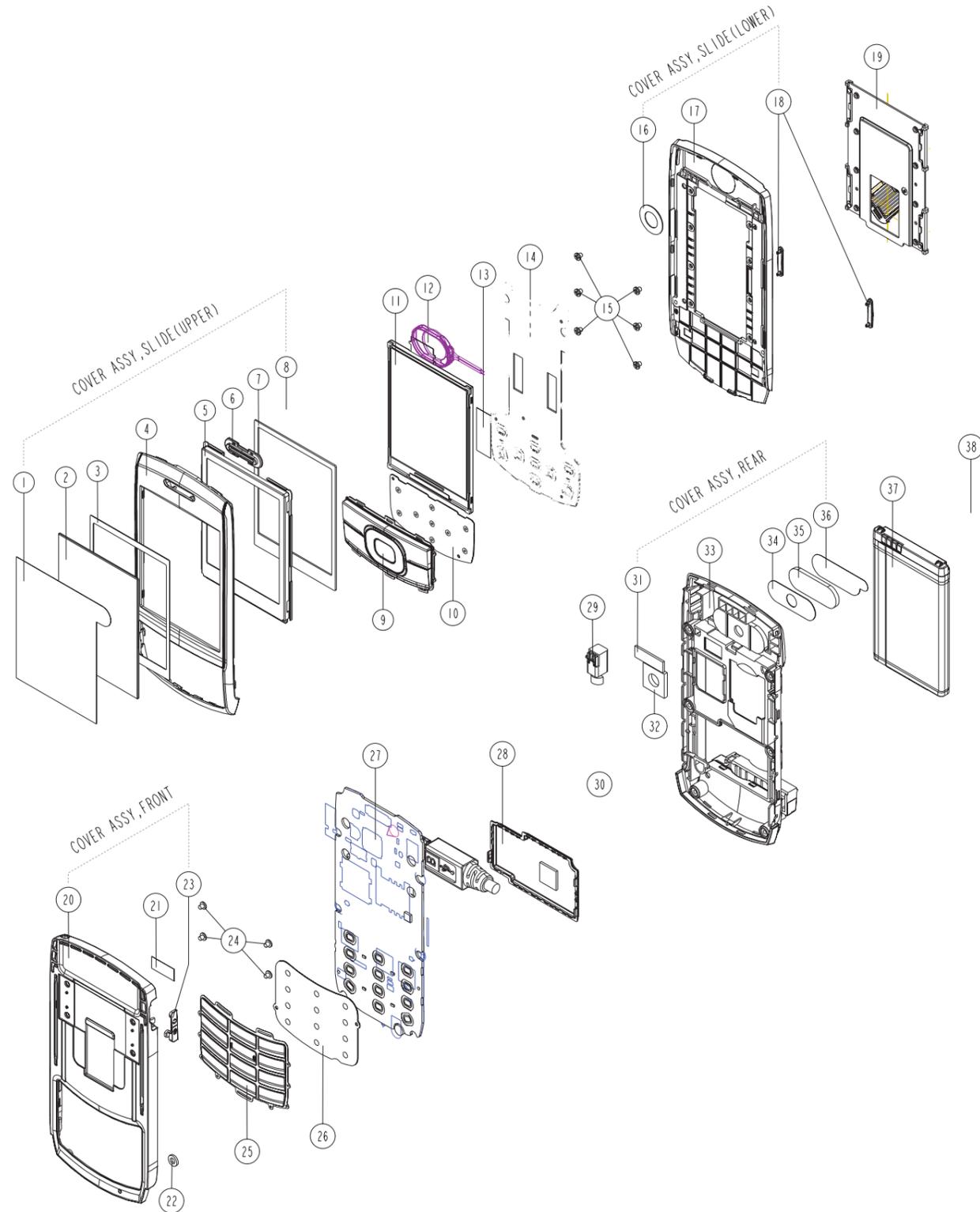
You can get main Battery Config Table and temperature Config Table will be reset.

### 12.8 Target Power

BAND	Description	Low	Middle	High
GSM 850	Channel	128	191	251
	Frequency	824.2 MHz	836.8 MHz	848.8 MHz
	Max power	32.5 dBm	32.5 dBm	32.5 dBm
EGSM 900	Channel	975	37	124
	Frequency	880.2 MHz	897.4 MHz	914.8 MHz
	Max power	32.5 dBm	32.5 dBm	32.5 dBm
DCS1800	Channel	512	699	885
	Frequency	1710.2 MHz	1747.6 MHz	1784.8 MHz
	Max power	29.5 dBm	29.5 dBm	29.5 dBm
PCS 1900	Channel	512	661	810
	Frequency	1850.2 MHz	1880 MHz	1909.8 MHz
	Max power	29.5 dBm	29.5 dBm	29.5 dBm

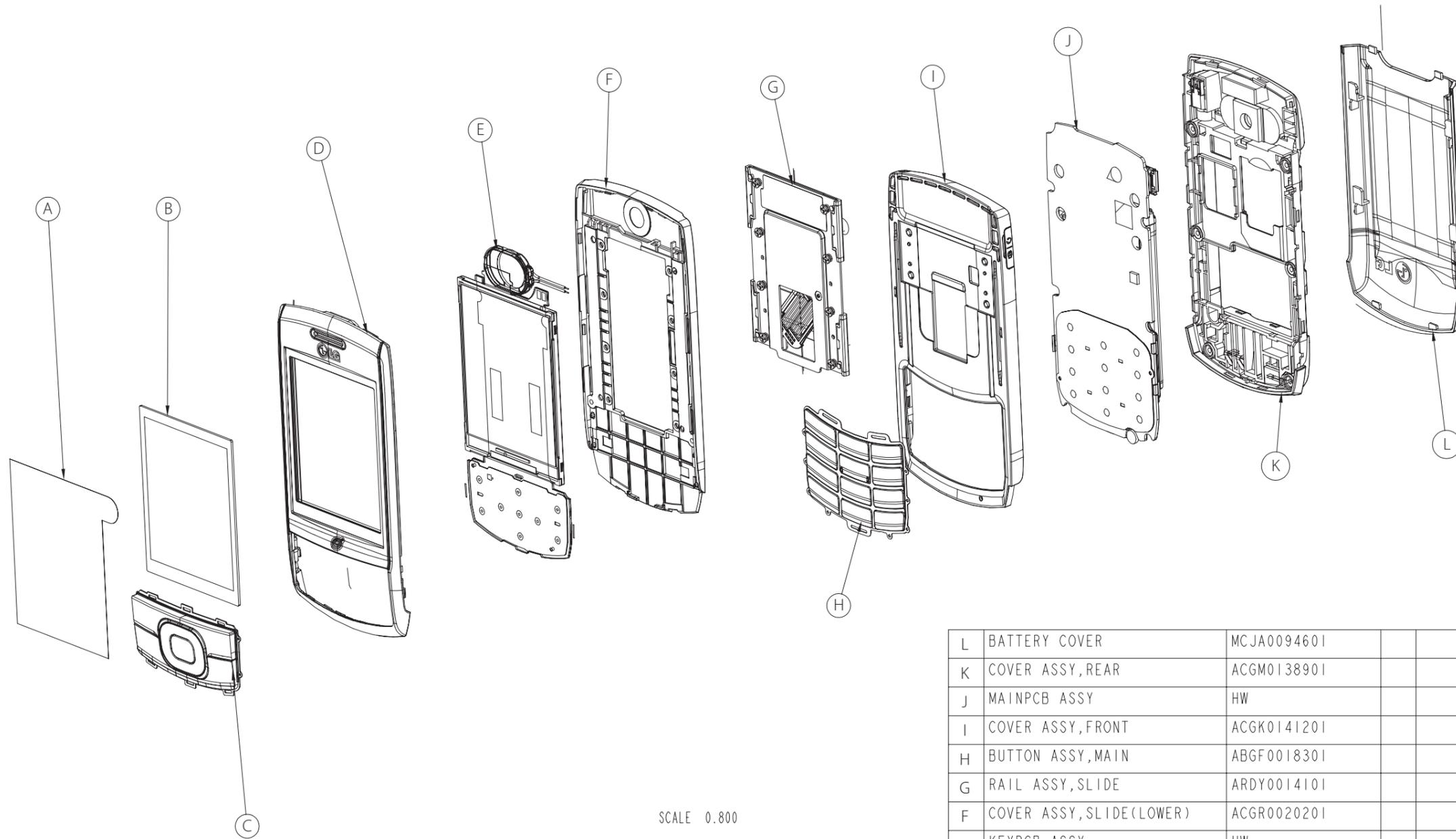
# 13. Exploded view & Replacement part list

## 13.1 Exploded view



38	COVER, BATTERY	MCJA0094601	1	
37	BATTERY	H/W	1	
36	TAPE, PROTECTION	MTAB0328801	1	
35	WINDOW, CAMERA	MWAE0050501	1	
34	TAPE, CAMERA	MTAK0028201	1	
33	COVER, REAR	MCJN0107001	1	
32	PAD, CAMERA	MPBT0080601	1	
31	PAD, CONNECTOR	MPBU0077201	1	
30	ANTENNA	H/W	1	
29	VIBRATOR, MOTOR	SJMY0007905	1	
28	CAN, SHIELD	MCBA0055001	1	
27	PCB[MAIN]	H/W	1	
26	DOME ASSY, METAL (MAIN)	ADCA0102002	1	
25	BUTTON ASSY, MAIN	ABGF0018301	1	
24	SCREW MACHINE (1.8H)	GMEY0011502	4	
23	CAP, EARPHONE JACK	MCCC0067501	1	
22	FILTER, MIKE	MFB00040301	1	
21	TAPE, DECO	MTAA0200401	1	
20	COVER, FRONT	MCJK0111301	1	
19	RAIL ASSY, SLIDE	ARDY0009801	1	
18	DECO, LOWER	MDAF0011601	2	
17	COVER, SLIDE (LOWER)	MCJH0048701	1	
16	PAD, SPEAKER	MPBN0076501	1	
15	SCREW MACHINE (1.5H)	GMZZ0019003	6	
14	PCB[SLIDE]	H/W	1	
13	TAPE	-	1	
12	SPEAKER	H/W	1	
11	LCD MODULE	H/W	1	
10	DOME ASSY, METAL (SLIDE)	ADCA0102001	1	
9	BUTTON ASSY, SUB	ABGG0011801	1	
8	FILTER, SPEAKER	MFBC0053601	1	
7	PAD, LCD	MPBG0097101	1	
6	DECO, SPEAKER	MDAN0018101	1	
5	BRACKET, LCD	MBFF0028201	1	
4	TAPE, WINDOW	MTAD0112101	1	
3	WINDOW, LCD	MWAC0125101	1	
2	TAPE, PROTECTION	MTAB0328601	1	
1	COVER, SLIDE (UPPER)	MCJJ0058701	1	
No	Part Name	Part Number	Q'ty	Remark

# ASS'Y Exploded view



SCALE 0.800

L	BATTERY COVER	MCJA0094601		
K	COVER ASSY, REAR	ACGM0138901		
J	MAINPCB ASSY	HW		
I	COVER ASSY, FRONT	ACGK0141201		
H	BUTTON ASSY, MAIN	ABGF0018301		
G	RAIL ASSY, SLIDE	ARDY0014101		
F	COVER ASSY, SLIDE (LOWER)	ACGR0020201		
E	KEYPCB ASSY	HW		
D	COVER ASSY, SLIDE (UPPER)	ACGS0030201		
C	BUTTON ASSY SUB	ABGG0011801		
B	WINDOW MAIN	MWAC0125101		
A	TAPE, PROTECTION	MTAB0328601	1	
No	Part Name	Part Number	Q'ty	Remark

## 13. Exploded view & Replacement part list

### 13.2 Replacement Parts <Mechanic component>

**Note:** This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	Part Number	Spec	Color	Remark
1		GSM(SLIDE)	TGLL0029801		METALLIC BLACK	
2	AAAY00	ADDITION	AAAY0430602		METALLIC BLACK	
3	MCJA	COVER,BATTERY	MCJA0094601	MOLD, PC LUPOY SC-1004A, , , ,	GRAY SILVER	L, 38
2	APAY00	PACKAGE	APAY0082704		BLACK	
3	ABED00	BOX ASSY,INNER PAD	ABED0000601	BOX ASSY,INNER PAD(for HUB_Package)	Without Color	
4	1BEG00	BOX,INNER PAD	MBEG0013302	BOX,INNER PAD(for HUB_Package_pad2)	Silver	
4	MBEG01	BOX,INNER PAD	MBEG0013301	BOX,INNER PAD(for HUB_Package_pad1)	Silver	
3	MBAD00	BAG,VINYL(PE)	MBAD0005204	COMPLEX, (empty), , , ,	WITHOUT COLOR	
3	MBAD01	BAG,VINYL(PE)	MBAD0003101	1700*1700*0.04t	WITHOUT COLOR	
3	MBEE00	BOX,MASTER	MBEE0054101	BOX, TW, , , ,	Silver	
3	MBEG00	BOX,INNER PAD	MBEG0013303	BOX,INNER PAD(for HUB_Package_pad3)	Silver	
3	MCCL	CAP,BOX	MCCL0001504	BOX, TW, , , ,	Without Color	
3	MLAC00	LABEL,BARCODE	MLAC0004501	Export(105*40)	WITHOUT COLOR	
3	MLAJ00	LABEL,MASTER BOX	MLAJ0004201	New_TDR_Shipping Label	WITHOUT COLOR	
3	MLAZ05	LABEL	MLAZ0050901	PRINTING, (empty), , , ,	WITHOUT COLOR	
3	MPBZ	PAD	MPBZ0036841	BOX, SW, , , , 1 COLOR	WITHOUT COLOR	
3	MPCY00	PALLET	MPCY0005202	COMPLEX, (empty), , , ,	Without Color	
2	APEY00	PHONE	APEY0903603		METALLIC BLACK	
3	ACGY00	COVER ASSY,EMS	ACGY0070001		METALLIC BLACK	
4	ACGM	COVER ASSY,REAR	ACGM0161001		METALLIC BLACK	
5	MCJN00	COVER,REAR	MCJN0107001	MOLD, PC LUPOY SC-1004A, , , ,	GRAY SILVER	33

## 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
5	MLAB	LABEL,A/S	MLAB0001102	C2000 USASV DIA 4.0	WHITE	
5	MPBT00	PAD,CAMERA	MPBT0080601	COMPLEX, (empty), , , ,	WITHOUT COLOR	32
5	MPBU00	PAD,CONNECTOR	MPBU0077201	COMPLEX, (empty), , , ,	WITHOUT COLOR	31
5	MPBZ00	PAD	MPBZ0256001	COMPLEX, (empty), , , ,	WITHOUT COLOR	
5	MTAK00	TAPE,CAMERA	MTAK0028201	COMPLEX, (empty), , , ,	WITHOUT COLOR	34
5	MWAE00	WINDOW,CAMERA	MWAE0050501	CUTTING, Tempered Glass, 0.8, , , ,	SILVER	35
4	ACGQ	COVER ASSY,SLIDE	ACGQ0049901		METALLIC BLACK	
5	ABGF00	BUTTON ASSY,MAIN	ABGF0023301	Drawing No. ABGF0018301	MATALLIC BLACK	H, 25
5	ABGG00	BUTTON ASSY,SUB	ABGG0012701	Drawing No. ABGG0011801	MATALLIC BLACK	C, 9
5	ACGK00	COVER ASSY,FRONT	ACGK0141201		BLACK	I
6	MCJK00	COVER,FRONT	MCJK0111301	COMPLEX, (empty), , , ,	GRAY SILVER	20
6	MDAG00	CAP,EARPHONE JACK	MCCC0067501	MOLD, Urethane Rubber S190A, , , ,	WITHOUT COLOR	23
6	MFBD00	FILTER,MIKE	MFBD0040301	COMPLEX, (empty), , , ,	GRAY SILVER	22
6	MTAA01	TAPE,DECO	MTAA0200401	COMPLEX, (empty), , , ,	GRAY SILVER	21
5	ACGR00	COVER ASSY,SLIDE(LOWER)	ACGR0020201		BLACK	F
6	MCJH00	COVER,FOLDER(LOWER)	MCJH0048701	MOLD, PC LUPOY SC-1004A, , , ,	BLACK	17
6	MDAF00	DECO,FOLDER(LOWER)	MDAF0011601	MOLD, POM LUCEL N109-LD, , , ,	BLACK	18
6	MMAA	MAGNET,SWITCH	MMAA0009501	COMPLEX, (empty), , , ,	Black	
6	MPBN00	PAD,SPEAKER	MPBN0076501	COMPLEX, (empty), , , ,	WITHOUT COLOR	16
5	ACGS00	COVER ASSY,SLIDE(UPPER)	ACGS0031301		BLACK	
6	MBFF00	BRACKET,LCD	MBFF0028201	CUTTING, STS, 0.3, , , ,	WITHOUT COLOR	5
6	MCJJ00	COVER,FOLDER(UPPER)	MCJJ0059201	MOLD, PC LUPOY SC-1004A, , , ,	BLACK	
6	MDAN00	DECO,SPEAKER	MDAN0018101	COMPLEX, (empty), , , ,	WITHOUT COLOR	6

## 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
6	MFBC00	FILTER,SPEAKER	MFBC0053601	COMPLEX, (empty), , , , ,	WITHOUT COLOR	8
6	MPBG00	PAD,LCD	MPBG0097101	COMPLEX, (empty), , , , ,	WITHOUT COLOR	7
6	MTAD00	TAPE,WINDOW	MTAD0112101	COMPLEX, (empty), , , , ,	WITHOUT COLOR	4
5	ARDY00	RAIL ASSY,SLIDE	ARDY0014101		BLACK	G
5	GMEY00	SCREW MACHINE,BIND	GMEY0011201	1.4 mm,3 mm,MSWR3(BK) ,N ,+ ,NYLOK	WITHOUT COLOR	
5	GMEY01	SCREW MACHINE,BIND	GMEY0019501	1.4 mm,1.6 mm,SWCH18A ,N ,+ ,NYLOK ,; ,BH ,+ ,3.5 ,0.5 ,SWCH ,WHITE ,N ,[empty]	SILVER	
5	GMZZ00	SCREW MACHINE	GMZZ0019003	3.5 mm,1.5 mm,MSWR3 ,N ,+ , - ,NYLOK Coating (ZnB-BLACK)	Black	15
5	MGAZ00	GASKET	MGAZ0077901	COMPLEX, (empty), , , , ,	WITHOUT COLOR	
5	MGAZ01	GASKET	MGAZ0089701		WITHOUT COLOR	
5	MIDZ00	INSULATOR	MIDZ0220801	COMPLEX, (empty), , , , ,	WITHOUT COLOR	
5	MIDZ01	INSULATOR	MIDZ0242801	COMPLEX, (empty), , , , ,	WITHOUT COLOR	
5	MTAB00	TAPE,PROTECTION	MTAB0401001		WITHOUT COLOR	
5	MWAC00	WINDOW,LCD	MWAC0125101	CUTTING, PMMA MR 200, 0.64, , , ,	WITHOUT COLOR	B, 3
7	ADCA00	DOME ASSY,METAL	ADCA0102001		WITHOUT COLOR	10, 26
7	MTAZ00	TAPE	MTAZ0256301	COMPLEX, (empty), , , , ,	WITHOUT COLOR	13
4	GMEY	SCREW MACHINE,BIND	GMEY0011201	1.4 mm,3 mm,MSWR3(BK) ,N ,+ ,NYLOK	WITHOUT COLOR	
7	MCBA00	CAN,SHIELD	MCBA0055001	PRESS, STS, 0.2, , , ,	WITHOUT COLOR	28
7	MPBZ00	PAD	MPBZ0247101	COMPLEX, (empty), , , , ,	WITHOUT COLOR	
6	ADCA00	DOME ASSY,METAL	ADCA0106901		WITHOUT COLOR	
6	MLAZ00	LABEL	MLAZ0038301	PID Label 4 Array	WITHOUT COLOR	
3	MLAA00	LABEL,APPROVAL	MLAA0062301	COMPLEX, (empty), , , , ,	WITHOUT COLOR	



### 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
8	CN102	CONNECTOR,FFC/FPC	ENQY0014901	35 ,0.3 mm,ETC , , , ; , .0.30MM ,FPC ,STRAIGHT ,BOTH ,SMD ,R/TP ,[empty] ,		
8	L101	INDUCTOR,CHIP	ELCH0001401	15 nH,J ,1005 ,R/TP ,Pb Free		
8	L102	INDUCTOR,CHIP	ELCH0001401	15 nH,J ,1005 ,R/TP ,Pb Free		
8	Q101	TR,BJT,NPN	EQBN0007601	SOT-23 ,0.15 W,R/TP ,EMT3		
8	R101	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
8	R102	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
8	R103	RES,CHIP,MAKER	ERHZ0000423	150 Kohm,1/16W ,J ,1005 ,R/TP		
8	R104	RES,CHIP	ERHY0003301	100 ohm,1/16W ,J ,1005 ,R/TP		
8	R105	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
8	R106	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
8	R107	RES,CHIP,MAKER	ERHZ0000411	120 ohm,1/16W ,J ,1005 ,R/TP		
8	R108	RES,CHIP,MAKER	ERHZ0000411	120 ohm,1/16W ,J ,1005 ,R/TP		
8	R109	RES,CHIP,MAKER	ERHZ0000412	1200 ohm,1/16W ,J ,1005 ,R/TP		
8	R110	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
8	R111	RES,CHIP,MAKER	ERHZ0000484	470 ohm,1/16W ,J ,1005 ,R/TP		
8	R112	RES,CHIP,MAKER	ERHZ0000484	470 ohm,1/16W ,J ,1005 ,R/TP		
8	R113	RES,CHIP,MAKER	ERHZ0000484	470 ohm,1/16W ,J ,1005 ,R/TP		
8	R114	RES,CHIP,MAKER	ERHZ0000484	470 ohm,1/16W ,J ,1005 ,R/TP		
8	R115	RES,CHIP,MAKER	ERHZ0000484	470 ohm,1/16W ,J ,1005 ,R/TP		
8	R116	RES,CHIP,MAKER	ERHZ0000484	470 ohm,1/16W ,J ,1005 ,R/TP		
8	R117	RES,CHIP,MAKER	ERHZ0000484	470 ohm,1/16W ,J ,1005 ,R/TP		
8	VA101	VARISTOR	SEVY0004001	18 V , ,SMD ,3pF, 1005		
8	VA104	VARISTOR	SEVY0003901	5.5 V , ,SMD ,Vdc 5.5, Vb 8, Cp 420, 1.0*0.5*0.6 , ,5.5 , ,480 ,1.0*0.5*0.6 ,[empty] ,SMD ,R/TP		
8	ZD101	DIODE,TVS	EDTY0008610	SOD-523 ,5 V,250 W,R/TP ,PB-FREE		
8	ZD102	DIODE,TVS	EDTY0008610	SOD-523 ,5 V,250 W,R/TP ,PB-FREE		
7	SAED00	PCB ASSY,KEYPAD,SMT TOP	SAED0033702			
8	LD101	DIODE,LED,CHIP	EDLH0015109	White ,1608 ,R/TP ,0.2t ,; ,[empty] ,2.7~3.1V ,25mA ,112~285mcd , ,95mW ,[empty] ,[empty] ,2P		
8	LD102	DIODE,LED,CHIP	EDLH0015109	White ,1608 ,R/TP ,0.2t ,; ,[empty] ,2.7~3.1V ,25mA ,112~285mcd , ,95mW ,[empty] ,[empty] ,2P		



## 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
7	C118	CAP,CHIP,MAKER	ECZH0001217	470 nF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C119	CAP,CHIP,MAKER	ECZH0001210	470 nF,10V ,Z ,Y5V ,HD ,1005 ,R/TP		
7	C120	CAP,CERAMIC,CHIP	ECCH0000151	4.7 nF,25V,K,X7R,HD,1005,R/TP		
7	C121	CAP,CERAMIC,CHIP	ECCH0002002	47000 pF,10V ,K ,B ,HD ,1005 ,R/TP		
7	C122	CAP,CHIP,MAKER	ECZH0001217	470 nF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C123	CAP,CERAMIC,CHIP	ECCH0002002	47000 pF,10V ,K ,B ,HD ,1005 ,R/TP		
7	C124	CAP,CERAMIC,CHIP	ECCH0002002	47000 pF,10V ,K ,B ,HD ,1005 ,R/TP		
7	C125	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C127	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C128	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C129	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C130	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
7	C131	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C132	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C133	CAP,CHIP,MAKER	ECZH0000830	33 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C134	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C135	CAP,CHIP,MAKER	ECZH0001216	220 nF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C136	CAP,TANTAL,CHIP	ECTH0001903	22 uF,6.3V ,M ,L ,ESR ,1608 ,R/TP		
7	C137	CAP,CHIP,MAKER	ECZH0001216	220 nF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C138	CAP,CERAMIC,CHIP	ECCH0000113	18 pF,50V,J,NP0,TC,1005,R/TP		
7	C139	CAP,CERAMIC,CHIP	ECCH0000161	33 nF,16V,K,X7R,HD,1005,R/TP		
7	C140	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C144	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
7	C145	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
7	C147	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C203	CAP,CERAMIC,CHIP	ECCH0000161	33 nF,16V,K,X7R,HD,1005,R/TP		
7	C204	CAP,CERAMIC,CHIP	ECCH0000161	33 nF,16V,K,X7R,HD,1005,R/TP		
7	C205	CAP,CERAMIC,CHIP	ECCH0000117	27 pF,50V,J,NP0,TC,1005,R/TP		
7	C212	CAP,CHIP,MAKER	ECZH0001215	1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C213	CAP,CERAMIC,CHIP	ECCH0005604	10000000 pF,6.3V ,M ,X5R ,TC ,1608 ,R/TP , . . [empty] , [empty] , [empty] , [empty] , [empty] , 0.8 mm		

## 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
7	C215	CAP,CHIP,MAKER	ECZH0003503	1 uF,25V ,K ,X5R ,HD ,1608 ,R/TP		
7	C216	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C217	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
7	C218	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C220	CAP,CERAMIC,CHIP	ECCH0000120	39 pF,50V,J,NP0,TC,1005,R/TP		
7	C222	CAP,TANTAL,CHIP	ECTH0004101	22 uF,6.3V ,M ,STD ,1608 ,R/TP		
7	C224	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
7	C225	CAP,CHIP,MAKER	ECZH0003504	100 nF,25V ,K ,X7R ,HD ,1608 ,R/TP		
7	C226	CAP,CERAMIC,CHIP	ECCH0000120	39 pF,50V,J,NP0,TC,1005,R/TP		
7	C227	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C228	CAP,CERAMIC,CHIP	ECCH0000129	120 pF,50V,J,NP0,TC,1005,R/TP		
7	C230	CAP,CERAMIC,CHIP	ECCH0000115	22 pF,50V,J,NP0,TC,1005,R/TP		
7	C231	CAP,CERAMIC,CHIP	ECCH0000198	2.2 uF,6.3V ,M ,X5R ,TC ,1005 ,R/TP		
7	C232	CAP,CERAMIC,CHIP	ECCH0000145	1.5 nF,50V,K,X7R,HD,1005,R/TP		
7	C233	CAP,CERAMIC,CHIP	ECCH0000117	27 pF,50V,J,NP0,TC,1005,R/TP		
7	C234	CAP,CERAMIC,CHIP	ECCH0000179	22 nF,16V ,K ,X5R ,HD ,1005 ,R/TP		
7	C235	CAP,CERAMIC,CHIP	ECCH0000145	1.5 nF,50V,K,X7R,HD,1005,R/TP		
7	C236	CAP,CERAMIC,CHIP	ECCH0000179	22 nF,16V ,K ,X5R ,HD ,1005 ,R/TP		
7	C237	CAP,CERAMIC,CHIP	ECCH0000145	1.5 nF,50V,K,X7R,HD,1005,R/TP		
7	C238	CAP,CERAMIC,CHIP	ECCH0000198	2.2 uF,6.3V ,M ,X5R ,TC ,1005 ,R/TP		
7	C241	CAP,CERAMIC,CHIP	ECCH0000115	22 pF,50V,J,NP0,TC,1005,R/TP		
7	C242	CAP,CERAMIC,CHIP	ECCH0000110	10 pF,50V,D,NP0,TC,1005,R/TP		
7	C243	CAP,CERAMIC,CHIP	ECCH0007802	4.7 uF,10V ,M ,X5R ,TC ,1608 ,R/TP		
7	C244	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C245	CAP,CHIP,MAKER	ECZH0001215	1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C247	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C248	CAP,CERAMIC,CHIP	ECCH0007802	4.7 uF,10V ,M ,X5R ,TC ,1608 ,R/TP		
7	C249	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C250	CAP,CHIP,MAKER	ECZH0001215	1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C251	CAP,CERAMIC,CHIP	ECCH0005603	2.2 uF,10V ,K ,X5R ,TC ,1608 ,R/TP		
7	C252	CAP,CHIP,MAKER	ECZH0001215	1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP		

## 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
7	C253	CAP,CHIP,MAKER	ECZH0001215	1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C254	CAP,CHIP,MAKER	ECZH0001216	220 nF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C255	CAP,CHIP,MAKER	ECZH0001216	220 nF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C256	CAP,CHIP,MAKER	ECZH0001421	2.2 uF,6.3V ,K ,X5R ,HD ,1608 ,R/TP		
7	C257	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C258	CAP,CHIP,MAKER	ECZH0001421	2.2 uF,6.3V ,K ,X5R ,HD ,1608 ,R/TP		
7	C259	CAP,CHIP,MAKER	ECZH0001421	2.2 uF,6.3V ,K ,X5R ,HD ,1608 ,R/TP		
7	C260	CAP,CHIP,MAKER	ECZH0001421	2.2 uF,6.3V ,K ,X5R ,HD ,1608 ,R/TP		
7	C261	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C262	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C301	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C302	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C303	CAP,CHIP,MAKER	ECZH0001215	1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C304	CAP,CERAMIC,CHIP	ECCH0000120	39 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C305	CAP,CERAMIC,CHIP	ECCH0000120	39 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C306	CAP,CERAMIC,CHIP	ECCH0000198	2.2 uF,6.3V ,M ,X5R ,TC ,1005 ,R/TP		
7	C307	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C308	CAP,CERAMIC,CHIP	ECCH0000198	2.2 uF,6.3V ,M ,X5R ,TC ,1005 ,R/TP		
7	C309	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C311	CAP,CHIP,MAKER	ECZH0000802	1 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP		
7	C312	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V ,K ,X7R ,HD ,1005 ,R/TP		
7	C313	CAP,CERAMIC,CHIP	ECCH0000198	2.2 uF,6.3V ,M ,X5R ,TC ,1005 ,R/TP		
7	C314	CAP,CERAMIC,CHIP	ECCH0005603	2.2 uF,10V ,K ,X5R ,TC ,1608 ,R/TP		
7	C315	CAP,CERAMIC,CHIP	ECCH0000198	2.2 uF,6.3V ,M ,X5R ,TC ,1005 ,R/TP		
7	C316	CAP,CERAMIC,CHIP	ECCH0000110	10 pF,50V ,D ,NP0 ,TC ,1005 ,R/TP		
7	C317	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V ,K ,X7R ,HD ,1005 ,R/TP		
7	C318	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V ,K ,X7R ,HD ,1005 ,R/TP		
7	C319	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V ,K ,X7R ,HD ,1005 ,R/TP		
7	C320	CAP,CERAMIC,CHIP	ECCH0000901	2.2 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP		
7	C321	CAP,CERAMIC,CHIP	ECCH0000110	10 pF,50V ,D ,NP0 ,TC ,1005 ,R/TP		
7	C322	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		

## 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
7	C323	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C324	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C325	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C326	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
7	C327	CAP,CHIP,MAKER	ECZH0001215	1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C328	CAP,CERAMIC,CHIP	ECCH0000198	2.2 uF,6.3V ,M ,X5R ,TC ,1005 ,R/TP		
7	C329	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
7	C331	CAP,CHIP,MAKER	ECZH0000830	33 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C332	CAP,CERAMIC,CHIP	ECCH0007802	4.7 uF,10V ,M ,X5R ,TC ,1608 ,R/TP		
7	C334	CAP,CERAMIC,CHIP	ECCH0000180	3.3 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP		
7	C336	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
7	C337	CAP,CERAMIC,CHIP	ECCH0000180	3.3 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP		
7	C338	CAP,CHIP,MAKER	ECZH0000802	1 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP		
7	C339	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
7	C340	CAP,CERAMIC,CHIP	ECCH0000180	3.3 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP		
7	C341	CAP,CHIP,MAKER	ECZH0000802	1 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP		
7	C342	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
7	C343	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
7	C344	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V,K,X7R,HD,1005,R/TP		
7	C345	CAP,CERAMIC,CHIP	ECCH0000120	39 pF,50V,J,NP0,TC,1005,R/TP		
7	C348	CAP,CHIP,MAKER	ECZH0000822	1.5 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP		
7	C349	CAP,CHIP,MAKER	ECZH0000822	1.5 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP		
7	C350	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C351	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C352	CAP,CHIP,MAKER	ECZH0001215	1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP		
7	C353	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
7	C354	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
7	C355	CAP,CHIP,MAKER	ECZH0003103	0.1 uF,10V ,K ,X7R ,HD ,1005 ,R/TP		
7	C360	CAP,CHIP,MAKER	ECZH0000841	56 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C361	CAP,CHIP,MAKER	ECZH0000841	56 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C362	CAP,CHIP,MAKER	ECZH0000841	56 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		

## 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
7	C363	CAP,CHIP,MAKER	ECZH0000813	100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	C364	CAP,CERAMIC,CHIP	ECCH0007802	4.7 uF,10V ,M ,X5R ,TC ,1608 ,R/TP		
7	C365	CAP,CHIP,MAKER	ECZH0000813	100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP		
7	CN201	CONNECTOR,I/O	ENRY0008801	5 , mm,ANGLE , , , , ,0.64MM ,ANGLE ,[empty] ,DIP ,[empty] ,		
7	CN202	CONNECTOR,ETC	ENZY0020402	3 ,2.5 mm,BOTTOM , ,		
7	CN301	CONNECTOR,BOARD TO BOARD	ENBY0040501	50 PIN,0.4 mm,ETC , ,H=1.0, Socket		
7	CN302	CONN,SOCKET	ENSY0023701	24 ,ETC , ,0.7 mm,7x7x3.95t, (1.3M Socket)		
7	FB101	FILTER,BEAD,CHIP	SFBH0007103	75 ohm,1005 ,CHIP BEAD, 300mA		
7	FB203	FILTER,BEAD,CHIP	SFBH0000912	1000 ohm,1005 ,		
7	FB301	FILTER,BEAD,CHIP	SFBH0007101	120 ohm,1005 ,Ferrite Bead		
7	FB302	FILTER,BEAD,CHIP	SFBH0007101	120 ohm,1005 ,Ferrite Bead		
7	FB303	FILTER,BEAD,CHIP	SFBH0000912	1000 ohm,1005 ,		
7	FB304	FILTER,BEAD,CHIP	SFBH0000903	600 ohm,1005 ,		
7	FB305	FILTER,BEAD,CHIP	SFBH0000912	1000 ohm,1005 ,		
7	FB306	FILTER,BEAD,CHIP	SFBH0000912	1000 ohm,1005 ,		
7	FL303	FILTER,EMI/POWER	SFEY0010501	SMD ,SMD ,18 V,4ch. EMI_ESD Filter (100Ohm,15pF), Pb-free		
7	FL304	FILTER,EMI/POWER	SFEY0010501	SMD ,SMD ,18 V,4ch. EMI_ESD Filter (100Ohm,15pF), Pb-free		
7	FL305	FILTER,EMI/POWER	SFEY0010501	SMD ,SMD ,18 V,4ch. EMI_ESD Filter (100Ohm,15pF), Pb-free		
7	FL306	FILTER,CERAMIC	SFCY0000901	2450 MHz,2.00*1.25*0.95 ,SMD ,Bluetooth Band Pass Filter		
7	FL307	FILTER,SAW,DUAL	SFSB0002302	1842.5 MHz,75 MHz,3.5 dB,10 dB,1960 MHz,60 MHz,3.5 dB,10 dB,1.8*1.4*0.68 ,SMD ,1805M~1880M,1930M~1990M,10p,B,100,DCS+PCS Rx,LH,DIP_OUT , ,1842.5+1960 ,1.8*1.4*0.68 ,SMD ,R/TP		
7	FL308	FILTER,SAW,DUAL	SFSB0002301	881.5 MHz,25 MHz,2.6 dB,30 dB,942.5 MHz,35 MHz,30 dB,15 dB,1.8*1.4*0.68 ,SMD ,869M~894M,925M~960M,10p,B,150,LH,GSM850+EGS M Rx,DIP_OUT , ,881.5+942.5 ,1.8*1.4*0.68 ,SMD ,R/TP		
7	J201	CONN,SOCKET	ENSY0018701	6 PIN,ETC , ,2.54 mm,H=1.8		
7	J202	CONN,SOCKET	ENSY0021401	8 PIN,ETC , , mm,		
7	L101	INDUCTOR,CHIP	ELCH0001402	18 nH,J ,1005 ,R/TP ,Pb Free		
7	L102	INDUCTOR,SMD,POWER	ELCP0008003	3.3 uH,M ,2.5*2.0*1.0 ,R/TP ,Chip power		

## 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
7	L201	INDUCTOR,CHIP	ELCH0001556	270 nH,J ,1608 ,R/TP ,		
7	L301	INDUCTOR,CHIP	ELCH0001033	1.5 nH,S ,1005 ,R/TP ,PBFREE		
7	L302	INDUCTOR,CHIP	ELCH0003826	3.3 nH,S ,1005 ,R/TP ,chip		
7	L303	INDUCTOR,CHIP	ELCH0003826	3.3 nH,S ,1005 ,R/TP ,chip		
7	L304	INDUCTOR,CHIP	ELCH0001409	10 nH,J ,1005 ,R/TP ,PBFREE		
7	L306	INDUCTOR,CHIP	ELCH0001409	10 nH,J ,1005 ,R/TP ,PBFREE		
7	L307	INDUCTOR,CHIP	ELCH0004733	4.3 nH,S ,1005 ,R/TP ,Coil		
7	L308	INDUCTOR,CHIP	ELCH0003819	12 nH,J ,1005 ,R/TP ,		
7	L309	INDUCTOR,CHIP	ELCH0005001	2.2 nH,S ,1005 ,R/TP ,		
7	L310	INDUCTOR,CHIP	ELCH0003826	3.3 nH,S ,1005 ,R/TP ,chip		
7	L311	INDUCTOR,CHIP	ELCH0001408	6.8 nH,J ,1005 ,R/TP ,Pb Free		
7	L312	INDUCTOR,CHIP	ELCH0001408	6.8 nH,J ,1005 ,R/TP ,Pb Free		
7	PT101	NOT ASSEMBLE	9999999999	NOT ASSEMBLE	Color Unfixed	
7	Q101	TR,BJT,NPN	EQBN0020501	ESM ,0.15 W,R/TP , , ,NPN ,5V ,60V ,50V ,150mA ,0.1uA MAX ,10 MIN 700 MAX ,100mW ,ESM ,R/TP ,3P		
7	Q201	TR,BJT,NPN	EQBN0020501	ESM ,0.15 W,R/TP , , ,NPN ,5V ,60V ,50V ,150mA ,0.1uA MAX ,10 MIN 700 MAX ,100mW ,ESM ,R/TP ,3P		
7	R101	RES,CHIP,MAKER	ERHZ0000405	10 Kohm,1/16W ,J ,1005 ,R/TP		
7	R104	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R105	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R106	RES,CHIP,MAKER	ERHZ0000484	470 ohm,1/16W ,J ,1005 ,R/TP		
7	R107	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R108	RES,CHIP,MAKER	ERHZ0000204	100 Kohm,1/16W ,F ,1005 ,R/TP		
7	R109	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R110	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R111	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R112	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R113	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R115	RES,CHIP,MAKER	ERHZ0000475	3900 ohm,1/16W ,J ,1005 ,R/TP		
7	R116	RES,CHIP,MAKER	ERHZ0000499	5600 ohm,1/16W ,J ,1005 ,R/TP		
7	R117	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		

### 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
7	R120	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R201	RES,CHIP,MAKER	ERHZ0000443	2200 ohm,1/16W ,J ,1005 ,R/TP		
7	R208	RES,CHIP,MAKER	ERHZ0000513	820 ohm,1/16W ,J ,1005 ,R/TP		
7	R210	RES,CHIP,MAKER	ERHZ0000295	51 Kohm,1/16W ,F ,1005 ,R/TP		
7	R211	RES,CHIP,MAKER	ERHZ0000530	5.1 Kohm,1/16W ,J ,1005 ,R/TP		
7	R216	RES,CHIP,MAKER	ERHZ0000485	4700 ohm,1/16W ,J ,1005 ,R/TP		
7	R219	RES,CHIP,MAKER	ERHZ0000443	2200 ohm,1/16W ,J ,1005 ,R/TP		
7	R220	RES,CHIP,MAKER	ERHZ0000434	1 ohm,1/16W ,J ,1005 ,R/TP		
7	R221	RES,CHIP,MAKER	ERHZ0000204	100 Kohm,1/16W ,F ,1005 ,R/TP		
7	R222	RES,CHIP,MAKER	ERHZ0000412	1200 ohm,1/16W ,J ,1005 ,R/TP		
7	R223	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R226	RES,CHIP,MAKER	ERHZ0000443	2200 ohm,1/16W ,J ,1005 ,R/TP		
7	R227	RES,CHIP,MAKER	ERHZ0000206	10 ohm,1/16W ,F ,1005 ,R/TP		
7	R229	RES,CHIP,MAKER	ERHZ0000443	2200 ohm,1/16W ,J ,1005 ,R/TP		
7	R233	RES,CHIP,MAKER	ERHZ0000434	1 ohm,1/16W ,J ,1005 ,R/TP		
7	R234	RES,CHIP	ERHY0003301	100 ohm,1/16W ,J ,1005 ,R/TP		
7	R236	RES,CHIP	ERHY0003301	100 ohm,1/16W ,J ,1005 ,R/TP		
7	R237	RES,CHIP	ERHY0003301	100 ohm,1/16W ,J ,1005 ,R/TP		
7	R238	RES,CHIP	ERHY0003301	100 ohm,1/16W ,J ,1005 ,R/TP		
7	R240	RES,CHIP,MAKER	ERHZ0000404	1 Kohm,1/16W ,J ,1005 ,R/TP		
7	R246	RES,CHIP,MAKER	ERHZ0000486	47 Kohm,1/16W ,J ,1005 ,R/TP		
7	R247	RES,CHIP,MAKER	ERHZ0000486	47 Kohm,1/16W ,J ,1005 ,R/TP		
7	R248	RES,CHIP,MAKER	ERHZ0000486	47 Kohm,1/16W ,J ,1005 ,R/TP		
7	R249	RES,CHIP,MAKER	ERHZ0000486	47 Kohm,1/16W ,J ,1005 ,R/TP		
7	R250	RES,CHIP,MAKER	ERHZ0000486	47 Kohm,1/16W ,J ,1005 ,R/TP		
7	R251	RES,CHIP,MAKER	ERHZ0000486	47 Kohm,1/16W ,J ,1005 ,R/TP		
7	R258	RES,CHIP,MAKER	ERHZ0000457	30 ohm,1/16W ,J ,1005 ,R/TP		
7	R262	RES,CHIP,MAKER	ERHZ0000402	10 ohm,1/16W ,J ,1005 ,R/TP		
7	R263	RES,CHIP,MAKER	ERHZ0000402	10 ohm,1/16W ,J ,1005 ,R/TP		
7	R264	RES,CHIP,MAKER	ERHZ0000434	1 ohm,1/16W ,J ,1005 ,R/TP		
7	R265	RES,CHIP,MAKER	ERHZ0000434	1 ohm,1/16W ,J ,1005 ,R/TP		

## 13. Exploded view & Replacement part list

Level	Location No.	Description	Part Number	Spec	Color	Remark
7	R308	RES,CHIP,MAKER	ERHZ0000422	15 Kohm,1/16W ,J ,1005 ,R/TP		
7	R309	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R312	RES,CHIP,MAKER	ERHZ0000408	110 ohm,1/16W ,J ,1005 ,R/TP , ,110 OHM ,5% ,1/16W ,1005 ,R/TP		
7	R316	RES,CHIP,MAKER	ERHZ0000408	110 ohm,1/16W ,J ,1005 ,R/TP , ,110 OHM ,5% ,1/16W ,1005 ,R/TP		
7	R317	RES,CHIP,MAKER	ERHZ0000408	110 ohm,1/16W ,J ,1005 ,R/TP , ,110 OHM ,5% ,1/16W ,1005 ,R/TP		
7	R318	RES,CHIP,MAKER	ERHZ0000408	110 ohm,1/16W ,J ,1005 ,R/TP , ,110 OHM ,5% ,1/16W ,1005 ,R/TP		
7	R319	RES,CHIP,MAKER	ERHZ0000404	1 Kohm,1/16W ,J ,1005 ,R/TP		
7	R320	RES,CHIP	ERHY0000105	51 ohm,1/16W,F,1005,R/TP		
7	R321	RES,CHIP,MAKER	ERHZ0000441	22 ohm,1/16W ,J ,1005 ,R/TP		
7	R322	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	R324	RES,CHIP,MAKER	ERHZ0000443	2200 ohm,1/16W ,J ,1005 ,R/TP		
7	R325	RES,CHIP,MAKER	ERHZ0000443	2200 ohm,1/16W ,J ,1005 ,R/TP		
7	R330	RES,CHIP,MAKER	ERHZ0000406	100 Kohm,1/16W ,J ,1005 ,R/TP		
7	SW301	CONN,RF SWITCH	ENWY0004501	,SMD , dB,H=3.6, Straight type		
7	U101	IC	EUSY0368502	BGA ,56 ,R/TP ,512M NOR + 128M pSRAM 1.8V AD_AAD MUX, 8 by 8 ,56 ,R/TP , , ,IC,MCP		
7	U102	IC	EUSY0366601	BGA ,210 ,R/TP ,EDGE RF, BB, PM, FM RDS Onechip BB, 216pin, 0.5mm pitch , ,IC,Digital Baseband Processor		
7	U202	IC	EUSY0388501	DFN ,10 ,R/TP ,Cal Test Mode Single Charger IC for Micro USB , ,IC,Charger		
7	U205	IC	EUSY0405401	CSP ,20 ,R/TP ,MUIC , ,IC,Analog Multiplexer		
7	U206	IC	EUSY0365301	Micro SMD ,20 ,R/TP ,Class D, Bypass , ,IC,Audio Sub System		
7	U301	IC	EUSY0344402	QFN ,20 ,R/TP ,4CH,2LDO,3X3 , ,IC,Sub PMIC		
7	U302	IC	EUSY0405501	SSON004 ,4 ,R/TP ,150mA 1.5V Single LDO , ,IC,LDO Voltage Regulator		
7	U303	IC	EUSY0382201	FPBGA ,50 ,R/TP ,4.5x4.0x0.6, BT2.1, 0.5pitch , ,IC,Bluetooth		
7	U304	RF MODULE,HANDSET	SMRH0005601	MHz, MHz,GSM Quad Tx Module 6x8 ,		
7	VA207	DIODE,TVS	EDTY0008606	DFN-2 ,7.82 V,150 mW,R/TP ,PB-FREE		
7	VA208	VARISTOR	SEVY0004101	5.6 V ,SMD ,360pF, 1005		



## 13. Exploded view & Replacement part list

### 13.3 Accessory

**Note:** This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

Level	Location No.	Description	Part Number	Spec	Color	Remark
3	SBPL00	BATTERY PACK,LI-ION	SBPL0090902	3.7 V,900 mAh,1 CELL,PRISMATIC ,CU720 IP BATT, Pb-Free ; , 3.7V ,900mAh ,0.2C ,PRISMATIC ,50x34x46 , ,BLACK ,Innerpack ,North America Label	BLACK	
3	SSAD00	ADAPTOR,AC-DC	SSAD0034401	100-240V ,5060 Hz,4.8 V,0.4 A,UL / CSA ,AC-DC ADAPTOR ; ,90Vac~264Vac ,4.8Vdc ,400mA ,5060 , ,WALL 2P ,USB ,		
3		ADAPTOR,AC-DC	SSAD0034402	100-240V ,5060 Hz,4.8 V,4 A,UL / CSA ,AC-DC ADAPTOR ; ,90Vac~264Vac ,4.8Vdc ,400mA ,5060 , - ,WALL 2P ,USB ,		
3		ADAPTOR,AC-DC	SSAD0034403	100-240V ,5060 Hz,4.8 V,4 A,UL / CSA ,AC-DC ADAPTOR ; ,90Vac~264Vac ,4.8Vdc ,400mA ,5060 , - ,WALL 2P ,USB ,		