Service Manual

Model : LG-A110

Internal Use Only

Service Manual

LG-A110

Date: September, 2010 / Issue 1.0

Table Of Contents

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 expect 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.

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
GPIB	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

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
STMR	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. PERFORMANCE

2.1 H/W Features

Item	Feature	Comment
Standard Battery	Lithium-ion r, 3.7V 950mAh	
Stand by TIME	Up to 800 hrs : Paging Period 9, RSSI 85dBm	
Talk time	Up to 780 min : GSM Tx Level 10	
Charging time	Approx. 3.5 hours	
RX Sensitivity	GSM, EGSM: -108dBm, DCS: -108dBm	
TX output power	GSM, EGSM: 32.5dBm(Level 5), DCS , PCS: 29.5dBm(Level 0)	
GPRS compatibility	Not Support	
SIM card type	3V Small	
Display	MAIN : 1.5" TFT 128 × 128 pixel 65K 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	Not Support	
Speech coding	EFR/FR/HR	
Data and Fax	Yes	
Vibrator	Yes	
Loud Speaker	Yes	
Voice Recoding	Not Support	
Microphone	Yes	

2. PERFORMANCE

Item	Feature	Comment
Speaker/Receiver	18x12Φ Speaker/ Receiver	
Travel Adapter	Yes	
MIDI	32 poly	
Camera	Not Support	
FM Radio	Not supported	

2.2 Technical Specification

<table>
<tr><th>Item</th><th>Description</th><th colspan="6">Specification</th></tr>
<tr><td>1</td><td>Frequency Band</td><td colspan="6">EGSM
TX: 880 ~ 915MHz
RX: 925 ~ 960 MHz

DCS
TX: 1710 ~ 1785 MHz
RX: 1805 ~ 1880 MHz</td></tr>
<tr><td>2</td><td>Phase Error</td><td colspan="6">RMS < 5 degrees
Peak < 20 degrees</td></tr>
<tr><td>3</td><td>Frequency Error</td><td colspan="6">< 0.1 ppm</td></tr>
<tr><td rowspan="20">4</td><td rowspan="20">Power Level</td><td colspan="6">GSM850/EGSM</td></tr>
<tr><td>Level</td><td>Power</td><td>Toler.</td><td>Level</td><td>Power</td><td>Toler.</td></tr>
<tr><td>5</td><td>33dBm</td><td>±2dB</td><td>13</td><td>17dBm</td><td>± 3dB</td></tr>
<tr><td>6</td><td>31dBm</td><td>±3dB</td><td>14</td><td>15dBm</td><td>± 3dB</td></tr>
<tr><td>7</td><td>29dBm</td><td>±3dB</td><td>15</td><td>13dBm</td><td>± 3dB</td></tr>
<tr><td>8</td><td>27dBm</td><td>±3dB</td><td>16</td><td>11dBm</td><td>± 5dB</td></tr>
<tr><td>9</td><td>25dBm</td><td>±3dB</td><td>17</td><td>9dBm</td><td>± 5dB</td></tr>
<tr><td>10</td><td>23dBm</td><td>±3dB</td><td>18</td><td>7dBm</td><td>± 5dB</td></tr>
<tr><td>11</td><td>21dBm</td><td>±3dB</td><td>19</td><td>5dBm</td><td>± 5dB</td></tr>
<tr><td>12</td><td>19dBm</td><td>±3dB</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">DCS/PCS</td></tr>
<tr><td>Level</td><td>Power</td><td>Toler.</td><td>Level</td><td>Power</td><td>Toler.</td></tr>
<tr><td>0</td><td>30dBm</td><td>±2dB</td><td>8</td><td>14dBm</td><td>± 3dB</td></tr>
<tr><td>1</td><td>28dBm</td><td>±3dB</td><td>9</td><td>12dBm</td><td>± 4dB</td></tr>
<tr><td>2</td><td>26dBm</td><td>±3dB</td><td>10</td><td>10dBm</td><td>± 4dB</td></tr>
<tr><td>3</td><td>24dBm</td><td>±3dB</td><td>11</td><td>8dBm</td><td>± 4dB</td></tr>
<tr><td>4</td><td>22dBm</td><td>±3dB</td><td>12</td><td>6dBm</td><td>± 4dB</td></tr>
<tr><td>5</td><td>20dBm</td><td>±3dB</td><td>13</td><td>4dBm</td><td>± 4dB</td></tr>
<tr><td>6</td><td>18dBm</td><td>±3dB</td><td>14</td><td>2dBm</td><td>± 5dB</td></tr>
<tr><td>7</td><td>16dBm</td><td>±3dB</td><td>15</td><td>0dBm</td><td>± 5dB</td></tr>
</table>

2. PERFORMANCE

Item	Description	Specification	
5	Output RF Spectrum (due to modulation)	**GSM850/ EGSM**	
		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
		DCS/PCS	
		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)	**GSM850/ EGSM**	
		Offset from Carrier (kHz).	Max. dBm
		400	-19
		600	-21
		1,200	-21
		1,800	-24

<table>
<tr><th>Item</th><th>Description</th><th colspan="3">Specification</th></tr>
<tr><td rowspan="6">6</td><td rowspan="6">Output RF Spectrum
(due to switching
transient)</td><td colspan="3">DCS/PCS</td></tr>
<tr><td colspan="2">Offset from Carrier (kHz).</td><td>Max. dBm</td></tr>
<tr><td colspan="2">400</td><td>-22</td></tr>
<tr><td colspan="2">600</td><td>-24</td></tr>
<tr><td colspan="2">1,200</td><td>-24</td></tr>
<tr><td colspan="2">1,800</td><td>-27</td></tr>
<tr><td>7</td><td>Spurious Emissions</td><td colspan="3">Conduction, Emission Status</td></tr>
<tr><td>8</td><td>Bit Error Ratio</td><td colspan="3">GSM850, EGSM
BER (Class II) < 2.439% @-102 dBm
DCS,PCS
BER (Class II) < 2.439% @-100 dBm</td></tr>
<tr><td>9</td><td>RX Level Report Accuracy</td><td colspan="3">±3 dB</td></tr>
<tr><td>10</td><td>SLR</td><td colspan="3">13±4 dB</td></tr>
<tr><td rowspan="10">11</td><td rowspan="10">Sending Response</td><td>Frequency (Hz)</td><td>Max.(dB)</td><td>Min.(dB)</td></tr>
<tr><td>100</td><td>-12</td><td>-</td></tr>
<tr><td>200</td><td>0</td><td>-</td></tr>
<tr><td>300</td><td>0</td><td>-12</td></tr>
<tr><td>1,000</td><td>0</td><td>-6</td></tr>
<tr><td>2,000</td><td>4</td><td>-6</td></tr>
<tr><td>3,000</td><td>4</td><td>-6</td></tr>
<tr><td>3,400</td><td>4</td><td>-9</td></tr>
<tr><td>4,000</td><td>0</td><td>-</td></tr>
<tr><td>12</td><td>RLR</td><td colspan="3">2±3 dB</td></tr>
</table>

2. PERFORMANCE

<table>
<tr><th>Item</th><th>Description</th><th colspan="3">Specification</th></tr>
<tr><td rowspan="11">13</td><td rowspan="11">Receiving Response</td><td>Frequency (Hz)</td><td>Max.(dB)</td><td>Min.(dB)</td></tr>
<tr><td>100</td><td>-12</td><td>-</td></tr>
<tr><td>200</td><td>0</td><td>-</td></tr>
<tr><td>300</td><td>2</td><td>-7</td></tr>
<tr><td>500</td><td>*</td><td>-5</td></tr>
<tr><td>1,000</td><td>0</td><td>-5</td></tr>
<tr><td>3,000</td><td>2</td><td>-5</td></tr>
<tr><td>3,400</td><td>2</td><td>-10</td></tr>
<tr><td>4,000</td><td>2</td><td></td></tr>
<tr><td colspan="3">* Mean that Adopt a straight line in between 300 Hz and 1,000 Hz to be Max. level in the range.</td></tr>
<tr><td>14</td><td>STMR</td><td colspan="3">Over 17 dB</td></tr>
<tr><td>15</td><td>Stability Margin</td><td colspan="3">> 6 dB</td></tr>
<tr><td>16</td><td>System frequency
(13 MHz) tolerance</td><td colspan="3">≤ 2.5 ppm</td></tr>
<tr><td>17</td><td>32.768KHz tolerance</td><td colspan="3">≤ 30 ppm</td></tr>
<tr><td>18</td><td>Ringer Volume</td><td colspan="3">At least 65 dBspl under below conditions:
1. Ringer set as ringer.
2. Test distance set as 50 cm</td></tr>
<tr><td>19</td><td>Charge Current</td><td colspan="3">Fast Charge : Typ. 410 mA
Total Charging Time : < 3.5 hours</td></tr>
</table>

<table>
<tr><th>Item</th><th>Description</th><th colspan="2">Specification</th></tr>
<tr><td rowspan="7">20</td><td rowspan="7">Antenna Display</td><td>Bar Number</td><td>Power</td></tr>
<tr><td>5</td><td>-92 ± 2</td></tr>
<tr><td>5 -> 4</td><td>-93 ± 2</td></tr>
<tr><td>4 -> 2</td><td>-101± 2</td></tr>
<tr><td>2 -> 1</td><td>-104 ± 2</td></tr>
<tr><td>1 -> 0</td><td>-106 ± 2</td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="5">21</td><td rowspan="5">Battery Indicator</td><td>Battery Bar Number</td><td>Voltage</td></tr>
<tr><td>3</td><td>> 3.75± 0.05 V</td></tr>
<tr><td>3 -> 2</td><td>3.75 ± 0.05 V</td></tr>
<tr><td>2 -> 1</td><td>3.67 ± 0.05 V</td></tr>
<tr><td>1 -> 0</td><td>3.6 ± 0.05 V</td></tr>
<tr><td rowspan="2">22</td><td rowspan="2">Low Voltage Warning
(Blinking Bar)</td><td colspan="2">Once per 1 minute. (Receiver)</td></tr>
<tr><td colspan="2">Once per 3 minute.(Speaker)</td></tr>
<tr><td>23</td><td>Forced shut down
Voltage</td><td colspan="2">3.3 ± 0.05V</td></tr>
<tr><td>24</td><td>Battery Type</td><td colspan="2">Lithium-Ion Battery
Standard Voltage = 3.7 V
Battery full charge voltage = 4.2 V
Capacity: 950mAh</td></tr>
<tr><td>25</td><td>Travel Charger</td><td colspan="2">Switching-mode charger
Input: 100 ~ 240V, 50/60 Hz
Output: 4.8 V, 400 mA</td></tr>
</table>

3. TECHNICAL BRIEF

3.1 Digital Main Processor

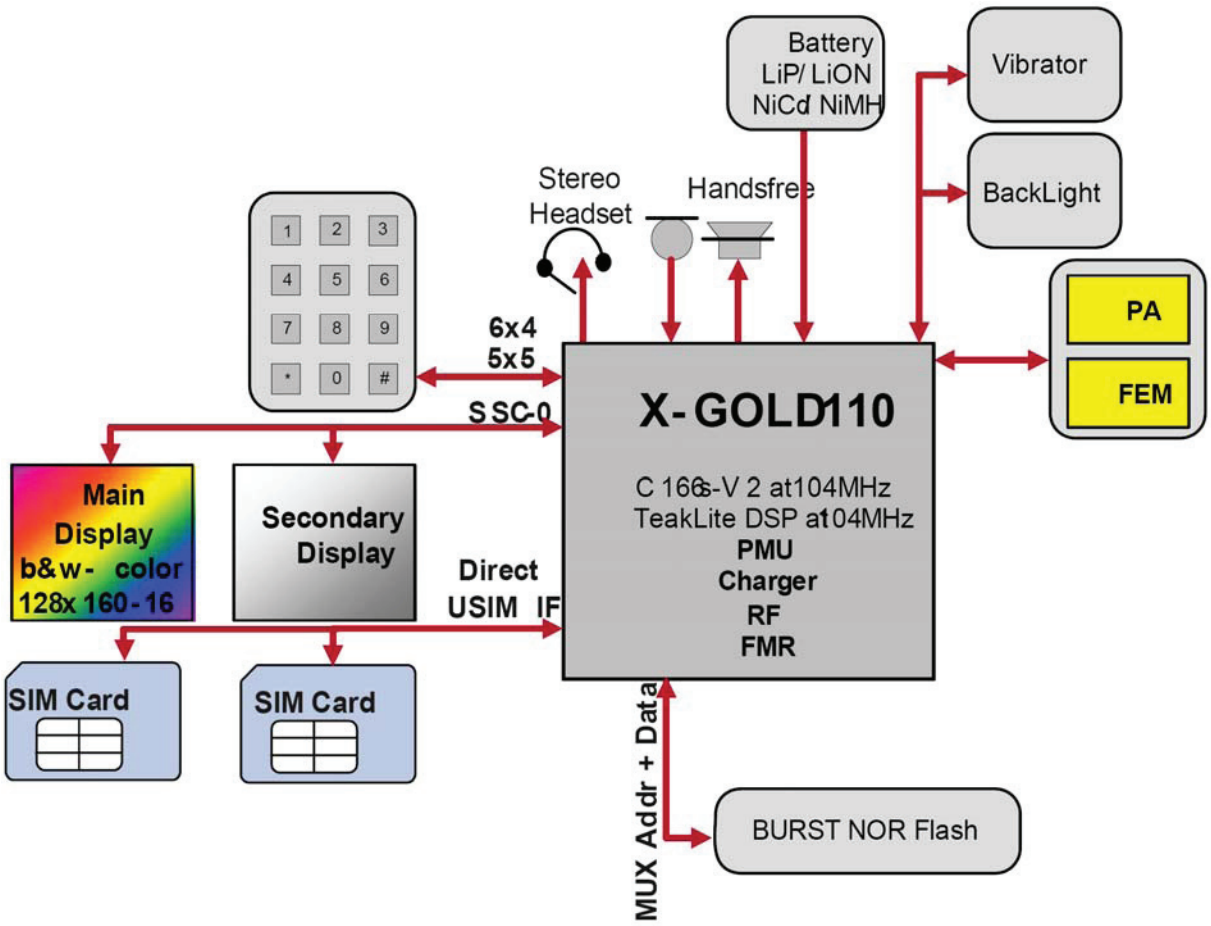


Figure. 3.1.1 X-Gold tm 110 Hardware Block Diagram

3.1.1 General

Technology:
– SoC, Monolithic, 65 nm CMOS
• Package:
– WFWLB, 8x8x0.8 mm
– 0.5 mm pitch
– 217 balls

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. ΣΔ-Transmitter

3.1.3 Baseband

• High performance fixed-point TEAKlite DSP
• C166S-V2 high performance microcontroller with a 16KB Instruction Cache and a Data cache Buffer.
• FM Stereo Radio Receiver with RDS
• There are several Interfaces:
– I2S interface for DAI connections (for Tape Approval) and external Audio component connection.
– High Speed SSC Interface for connection of companion chips (like Serial SD Cards)
– High Speed SSC Interface dedicated to Display control
– USIM Interface with support of Protocol T=1 and Dual USIM support.
– Keypad Interface (6x4 or 5x5 keys)
– External Memory Controller (EBU) for external RAM/NOR FLASH/Busrt Flash/NAND Flash/Serial Flash (SPI/SQI) and Parallel Display connection
– Asynchronous serial interface.
– Asynchronous serial interface for WLAN/BT/GPS control (incl. IrDA support capability) .
– JTAG Interface, OCDS, Multi-Core Debug and Real Time Trace facilities.
– Black & white and 128x160 - 16bit color displays are supported
– PWM source to drive vibrator
– Keypad and display backlight supported.
– HASH Unit support for hashing.

Crystal Oscillator

• Fully digital controlled crystal oscillator core with a highly linear tuning characteristic

Mixed Signal and Power Management Unit

• Embedded stepdown converter (1.8V)
• DC/DC boost for voltages up to 15 V for driving White or Blue LEDs
• 8-Ω loud speaker driver (700 mW)
• 16-Ω earpiece driver
• 32-Ω headset driver
• Measurement interfaces (PA temperature, battery voltage, battery temperature, and ambient temperature)
• Accessory Detection
• PCB ID detection as part of measurement interface.
• Differential microphone input
• System start up circuitry
• Charger circuitry for NiCd, NiMh and LiIon cells with integrated Control Current/Voltage Charging.
• Integrated regulators for direct connection to battery.

C166S-V2 Buses

The C166S-V2 is connected to four buses:
1. IMB (Internal Program) bus (64b - 0 cycle instruction bus))
2. DPMI (Data-Program) Bus (16b - 0 cycle data bus)
3. X-Bus (16b - 3 cycle peripheral bus)
4. PD-Bus (16b 0 cycle peripheral bus)

Bus Interconnections

The interconnection between the X-Bus and the TEAKlite Bus uses:
• Multicore Synchronization
• Shared Memory.

3.1.4 FM Radio

• Not supported

3.1.5 Display

• Type

– 128*128, QQVGA, 65k color (parallel)

• Interface

– Parallel 8/9bit MIPI-DBI Type B

– 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)

3.2 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.

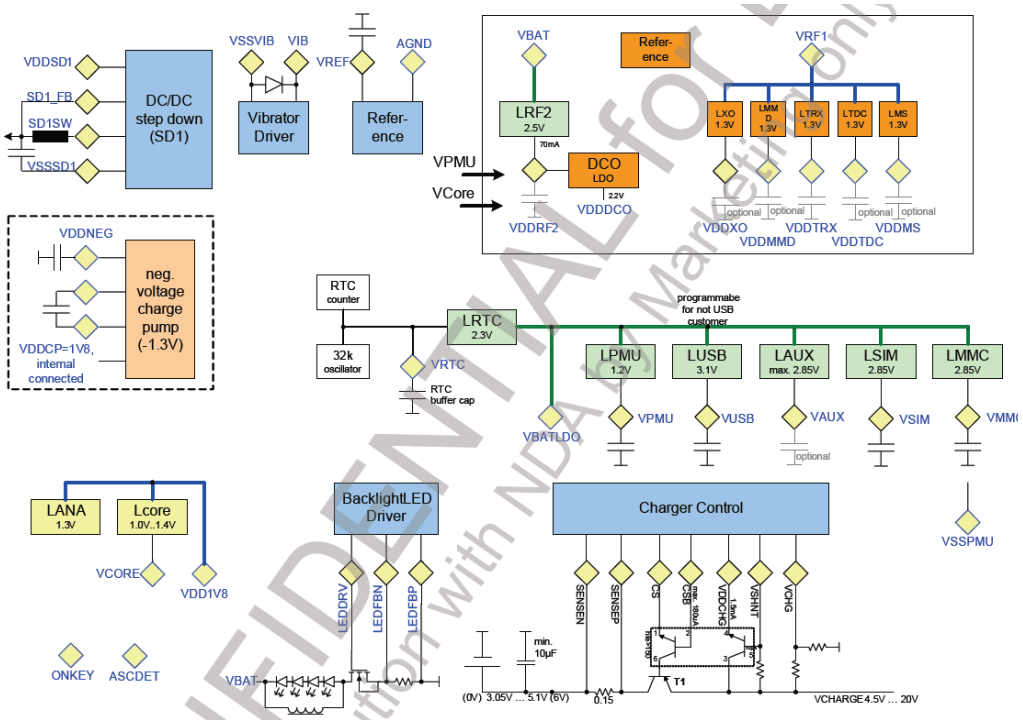


Figure. 3-2-1 Block Figure of the PMU Modules X-Gold tm 110

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

The DC/DC converter generates a 1.8 V supply rail. This voltage rail is used to supply main parts of the system, like the digital core of the chip (via LDO LCORE), parts of the mixed signal macro, parts of the RF macro and the external memory if a 1.8V memory is used.

▪ **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.

▪ **LCORE**

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

▪ **LPMU**

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

▪ **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.

▪ **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 µF optional 10 µF	VBAT	This voltage is generated by the DC/DC converter with 3.3 µH inductor, (10 µF output cap is preferred but needs to be checked) The voltage is used for: Memory supply, and via LDOs for digital core supply, mixed signal supply and RF supply.
LCORE	1.2 V	100 mA	2x100 nF	VDD1V8	Assumption: C166 core clock 104 MHz, DSP clock 104 MHz
LANA	1.3 V	10 mA	No	VDD1V8	No ball
LRTC	2.3 V	2 mA	>=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	1.3 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.
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	>=100 nF	VBAT	LDO dedicated to the SIM-Card supply. It is chip internal connected to the SIM interface driver.
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)

3.2.1 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 LCORE 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

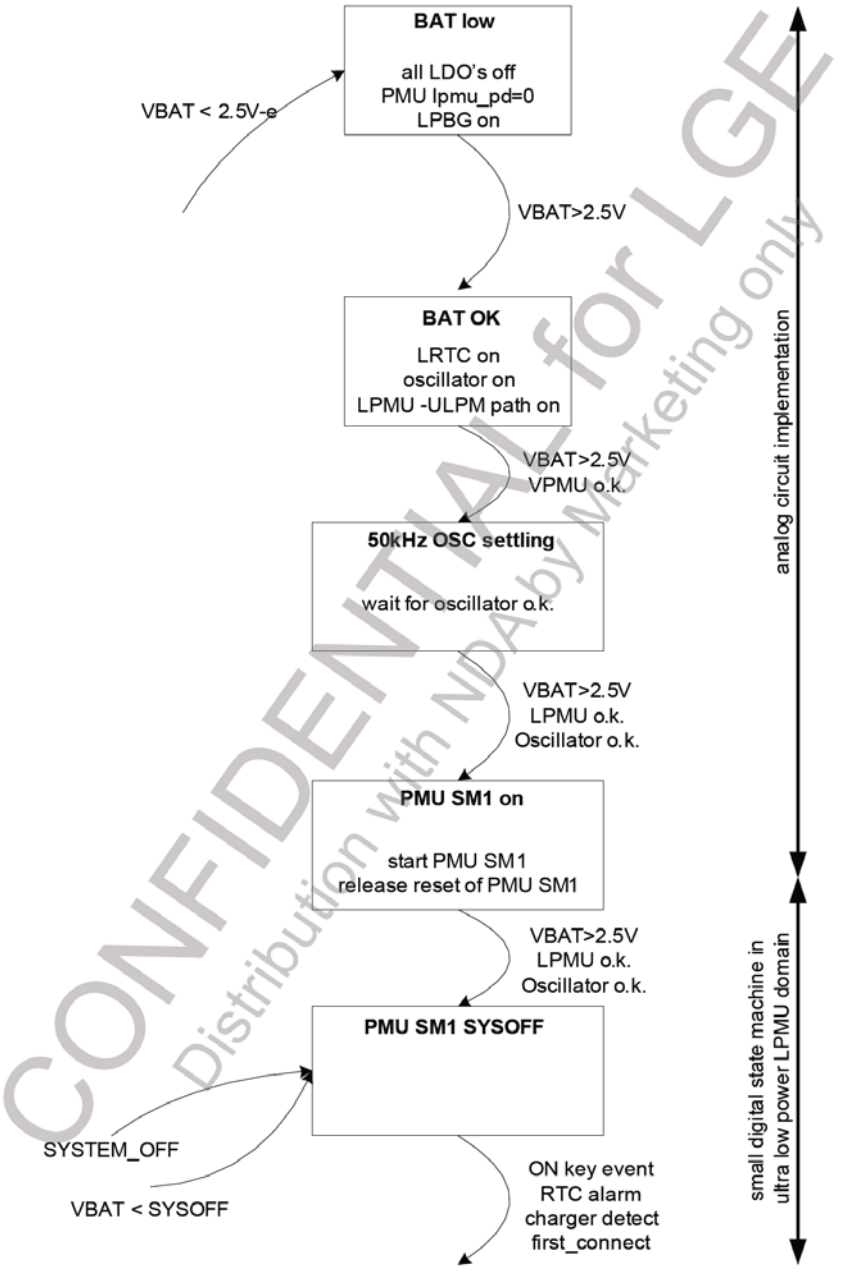


Figure.3.2.1 First Part of the State Machine,
Running in Different Power Domains than the Second Part

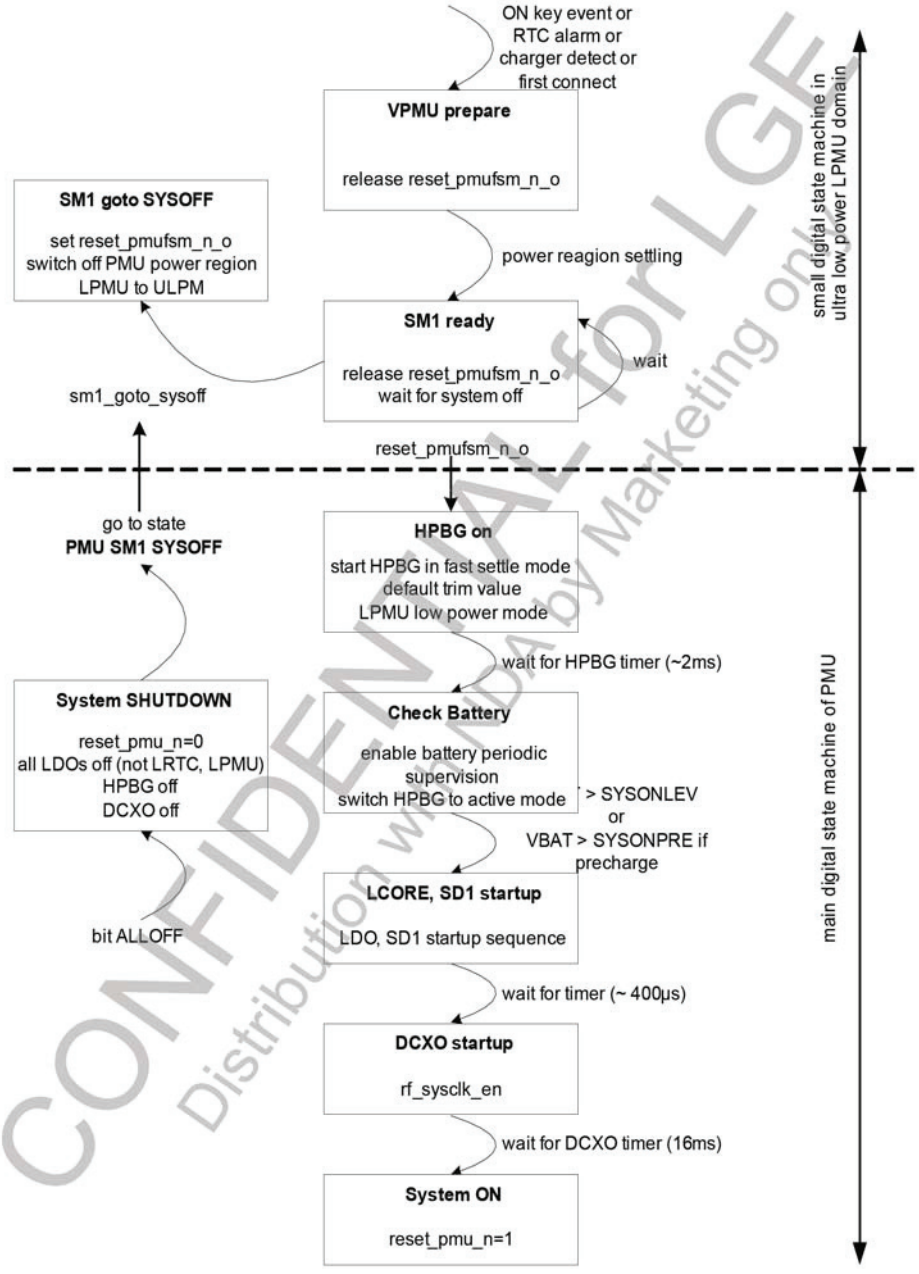


Figure 3.2.2 Second (Main) Part of the Startup State Machine in the VPMU Domain

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 lover 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 the AC supply frequency. Reasons 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 signal is used to trigger the pre-charge functionality. The charger state machine fully control 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.

3.2.6 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.

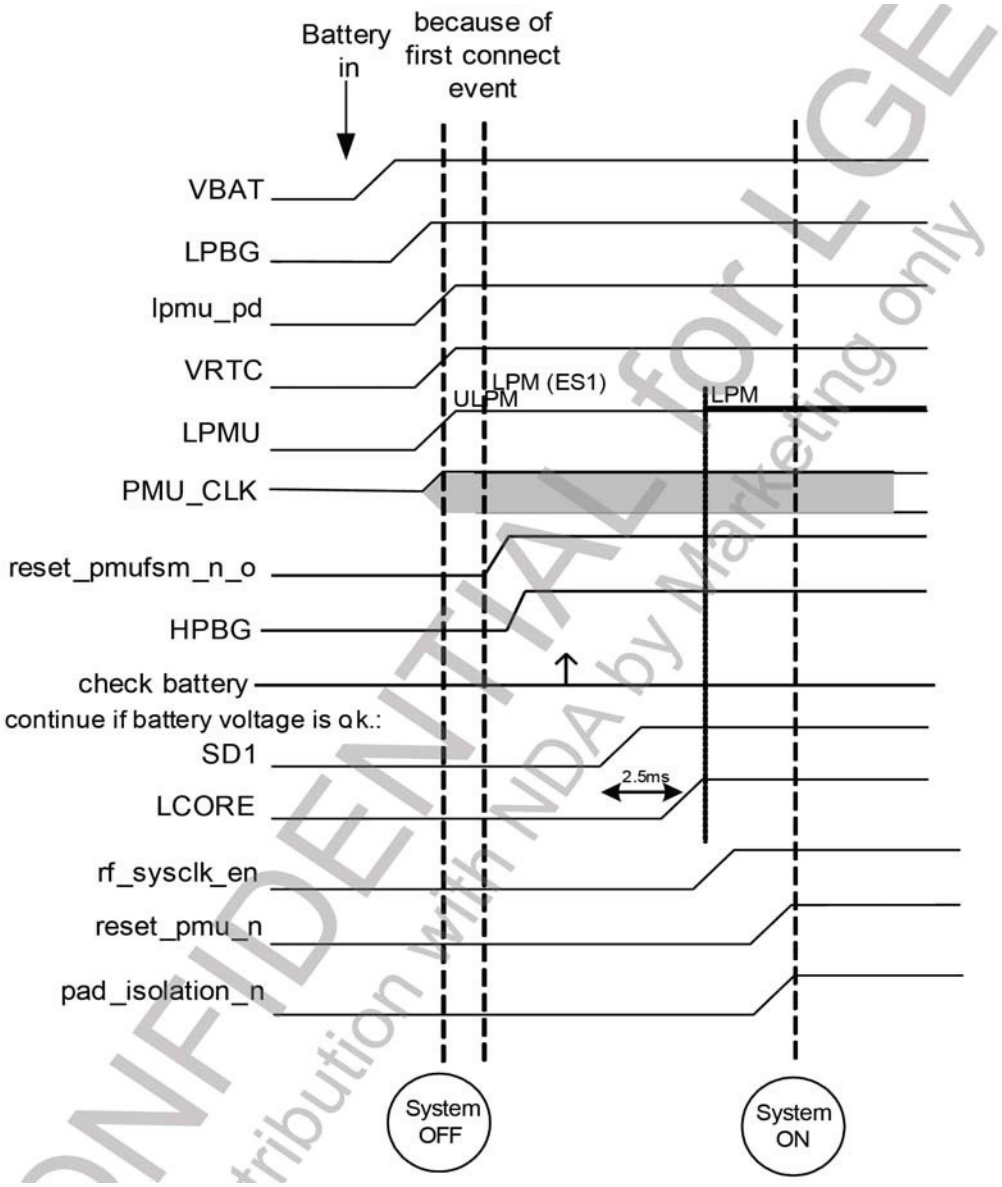


Figure 3.2.3 Start Up Sequence (triggered by First Connect Event)

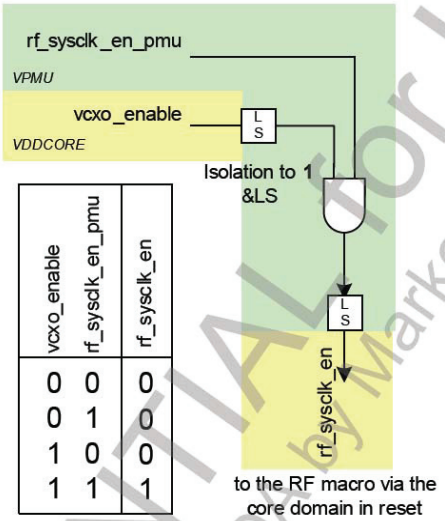


Figure 3.2.4 How sysclock Enable is Routed in the PMU

3.2.7 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.

3.2.8 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)

3.2.9 Silent Reset

WDT-reset and software-reset shall happen silently to ending customer: SIM card and interfaces have to stay powered and not reset by neither WDT-reset or C166s SRST instruction. To allow this, some LDO settings and some registers (as e.g. USIM_pad control register) are reset only by system-reset (HW-reset or power-on reset)

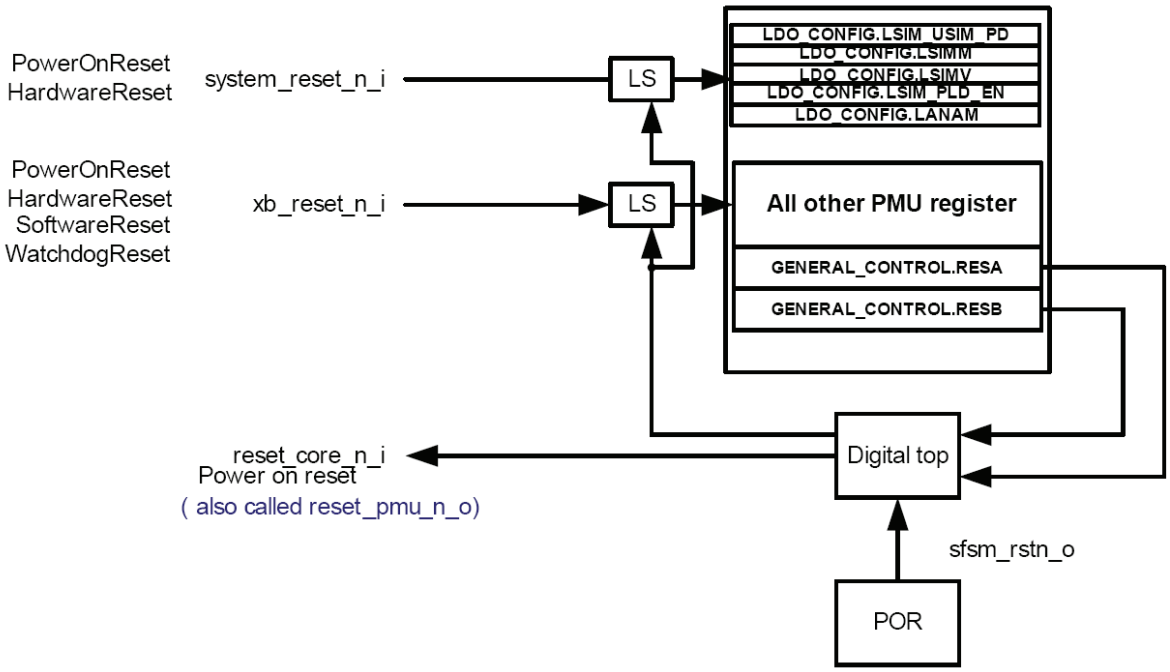


Figure 3.2.5 PMU Reset

3.2.10 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 it's 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.

3.2.11 System Sleep Mode

The sleep mode is controlled by using the VCXO_enable signal (dcxo_en_i) and gsm_sleep_i. These signals are 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.

3.2.12 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)

3.2.13 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 LCORE 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 (SKY77542/SKY77543, U301)

3.3.1 Internal Block Diagram

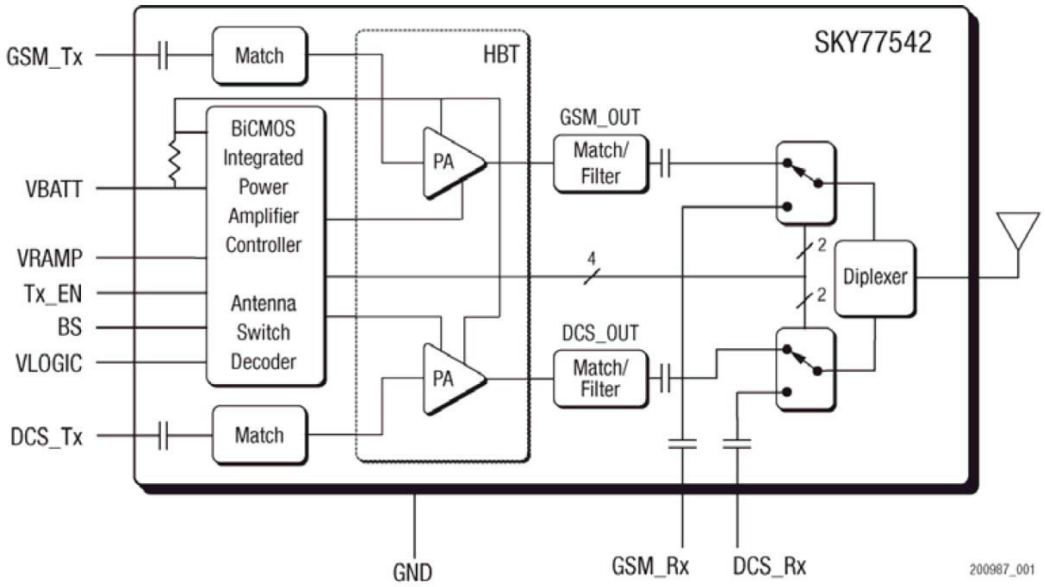


Figure. 3.3.1 SKY77542 FUNCTIONAL BLOCK DIAGRAM

3.3.2 General Description

The SKY77542 is a transmit and receive front-end module (FEM) with Integrated Power Amplifier Control (iPAC™) for dual-band cellular handsets comprising GSM900 and DCS1800 operation.Designed in a low profile, compact form factor, the SKY77542 offers a complete Transmit VCO-to-Antenna and Antenna-to-Receive SAW filter solution. The FEM also supports Class 12 General Packet Radio Service (GPRS) multi-slot operation.
The module consists of a GSM900 PA block and a DCS1800 PA block, impedance-matching circuitry for 50 Ω input and output impedances, Tx harmonics filtering, high linearity and low insertion loss PHEMT RF switches, diplexer 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 GSM900 band and the other PA block supports the DCS1800 band. Both PA blocks share common power supply pads to distribute current.

The output of each PA block and the outputs to the two receive pads are connected to the antenna pad through PHEMT RF switches and a diplexer. 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 over mold.

Mode	VLOGIC	Input Control Bits	
		Tx_EN	BS
STANDBY	0	X [1]	X [1]
GSM_Rx	1	0	0
DCS_Rx	1	0	1
GSM_Tx	1	1	0
DCS_Tx	1	1	1

[1] X = don't care

Figure 3.3.2 Band SW Logic Table

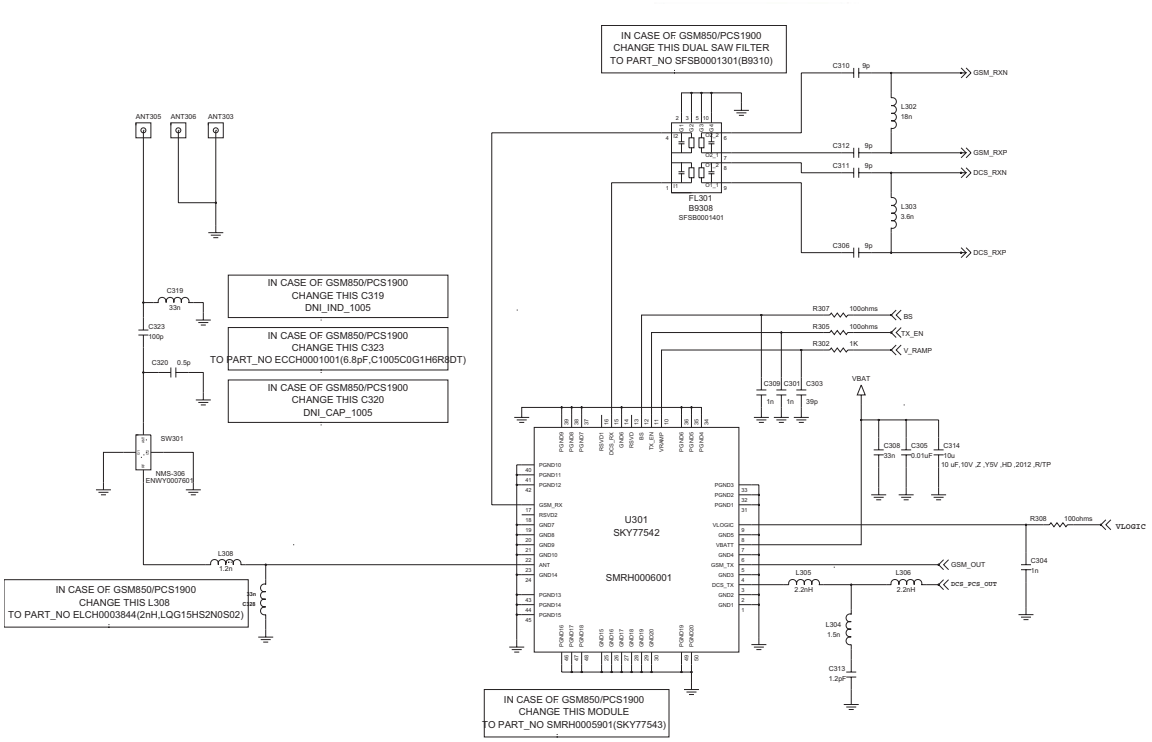


Figure 3.3.3 FEM CIRCUIT DIAGRAM

3.4 Crystal(26 MHz, X102)

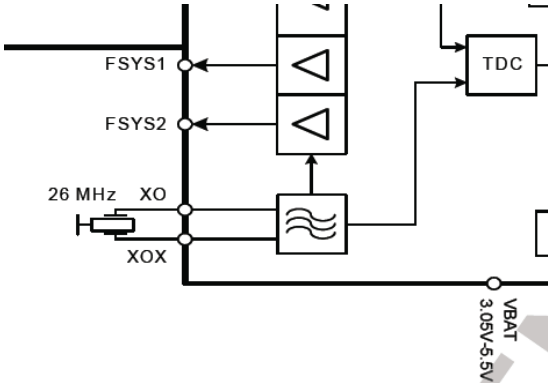


Figure. 3.4.1 Crystal Oscillator External Connection

The X-GOLDTM110 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 ±55 ppm, controllable by a 13-bit tuning word DCXO_AFC[16:4].

The 26 MHz reference clock can also be applied to external components like Bluetooth or GPS, via the buffered output signal FSYS1.

3.5 RF Subsystem of PMB8810 (U101)

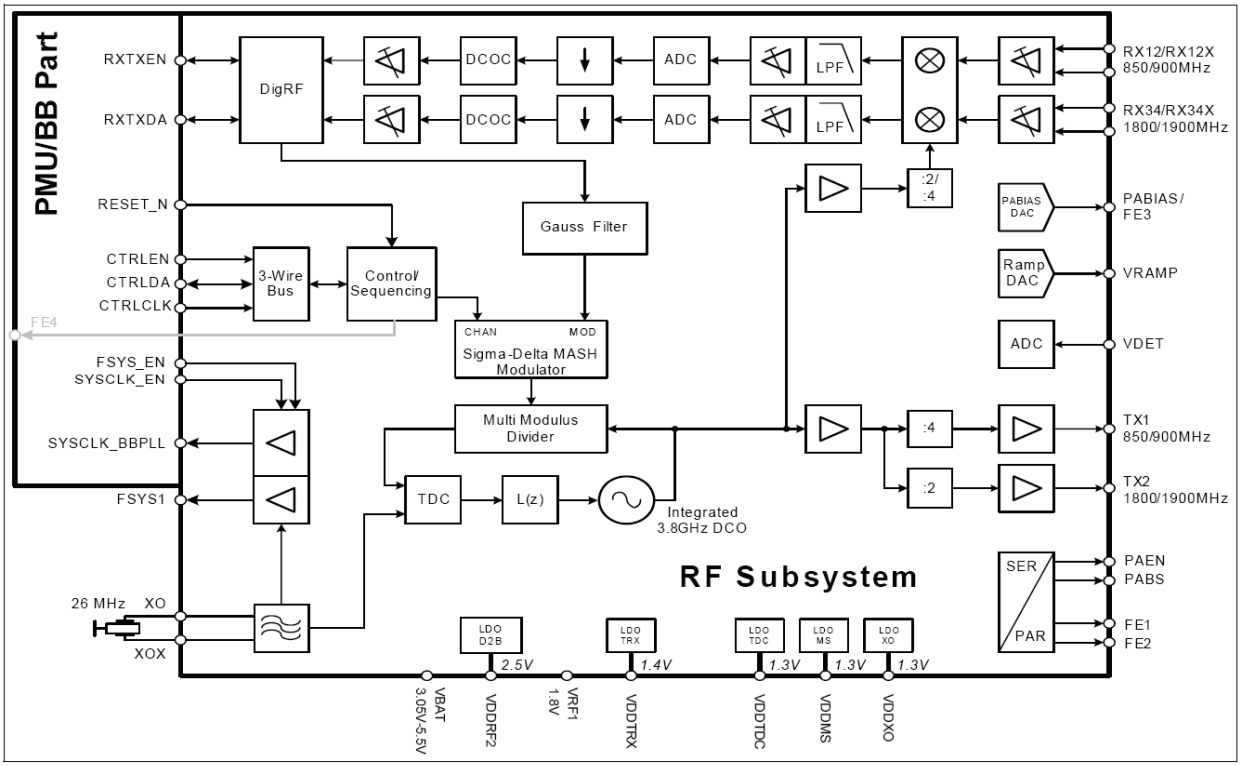


Figure. 3-5-1 Block DIAGRAM of RF Subsystem

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.

3.5.2 FUNCTIONAL DESCRIPTION

3.5.2.1 Receiver

The X-GOLDTM110 receiver is based on the Direct Conversion Receiver architecture (DCR) and can be configured to support one low band, GSM850 or EGSM900, and one high band, DCS1800 or PCS1900. A fully differential receive path is chosen to suppress on-chip interference.
The analog section of the receiver contains two LNAs, quadrature mixer, low-pass filter, and a high resolution continuous-time delta-sigma analog-to-digital converter.

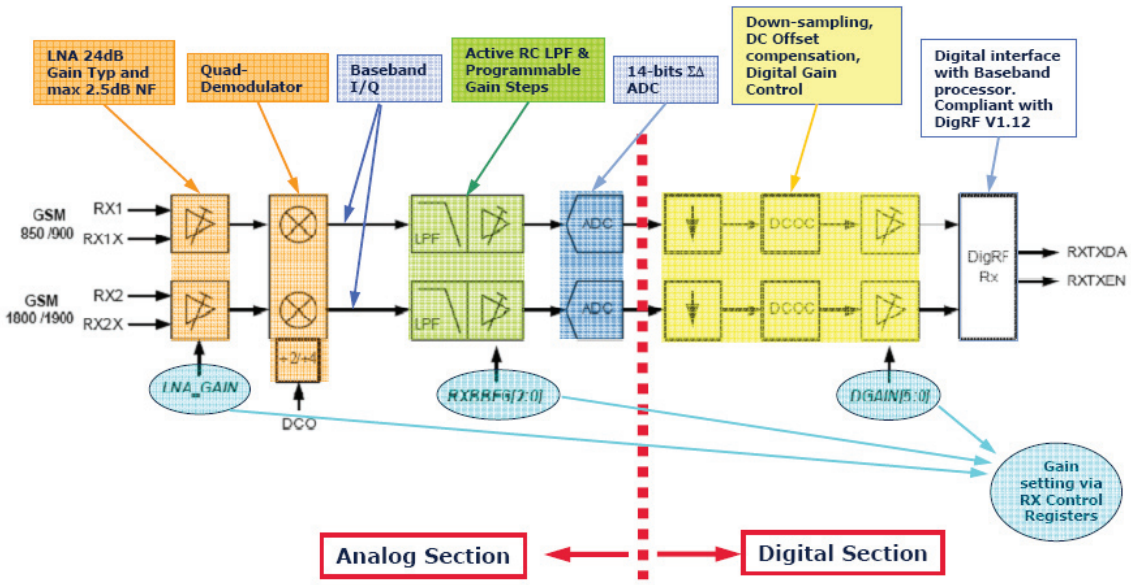


Figure. 3.5.2 RECEIVER CHAIN BLOCK DIAGRAM

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.

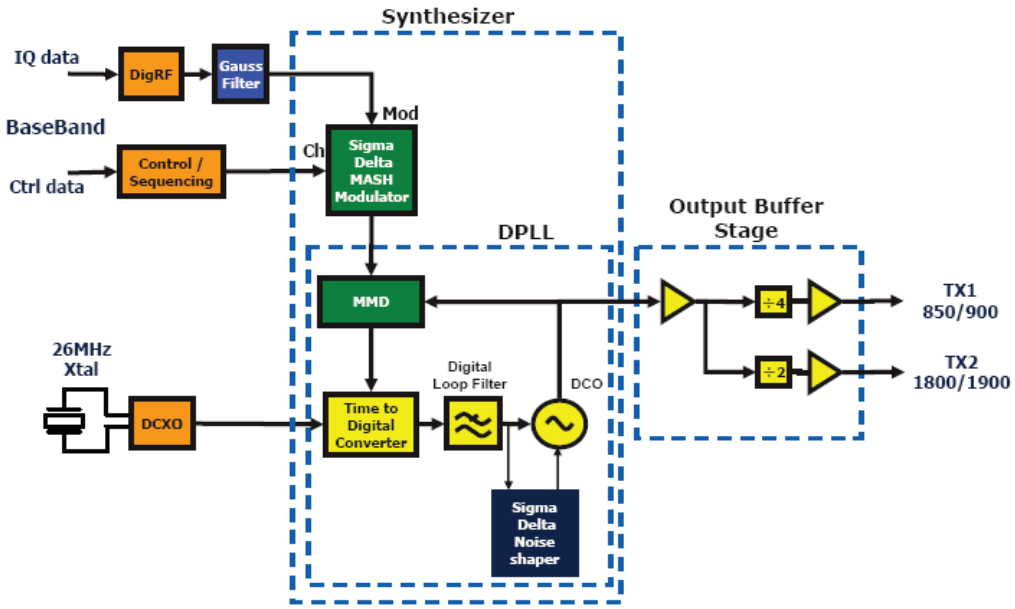


Figure. 3.5.3 TRANSMITTER CHAIN BLOCK DIAGRAM

3.5.2.3 RF synthesizer

The X-GOLDTM110 transceiver contains a fractional-N sigma-delta synthesizer for frequency synthesis in RX mode. In TX mode, the fractional-N sigma-delta synthesizer is used as a Sigma-delta modulation loop to process the phase/frequency signal. The 26 MHz reference signal is provided by the reference oscillator. This reference signal frequency serves as the comparison frequency for the phase detector and provides the digital circuitry with a clock signal.

3.5.2.4 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.

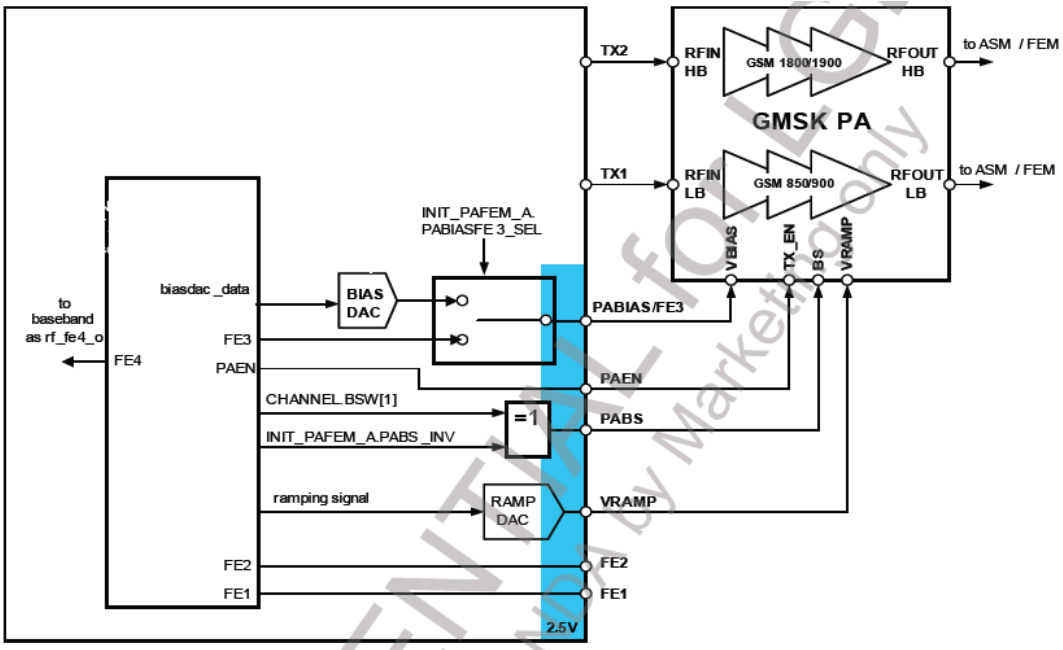


Figure. 3.5.4 PA AND FEM CONTROL BLOCK DIAGRAM

3.6 MEMORY(K5N3217ATA-AT80, U102)

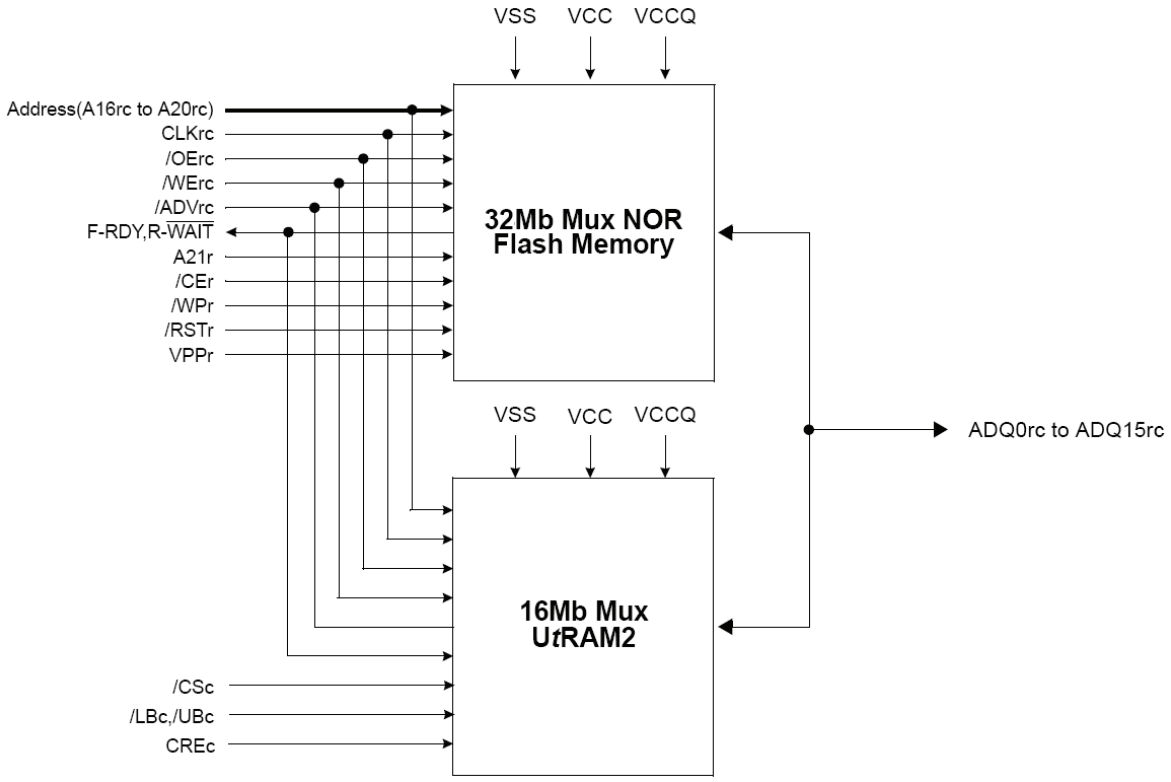


Figure. 3.6.1 MEMORY BLOCK DIAGRAM

The K5N3217ATA is a MultiChip Package Memory which combines 32Mbit MuxNOR Flash Memory and 16M bit MuxUtRAM2. The 32Mb NOR Flash featuring single 1.8V power supply is 32Mbit Synchronous Burst Multi Bank Flash Memory organized as 2Mx16. The memory architecture of the device is designed to divide its memory arrays into 71 blocks with independent hardware protection. This block architecture provides highly flexible erase and program capability. The 32Mb NOR Flash consists of sixteen banks. This device is capable of reading data from one bank while programming or erasing in the other bank. Regarding read access time, the device provides an 14.5ns burst access time and an 70ns initial access time at 54MHz. At 66MHz, the device provides an 11ns burst access time and 70ns initial access time. At 83MHz, the device provides an 9ns burst access time and 70ns initial access time.

At 108MHz, the device provides an 7ns burst access time and 70ns initial access time. The device performs a program operation in units of 16bits (Word) and an erase operation in units of a block. Single or multiple blocks can be erased. The block erase operation is completed within typically 0.7sec. The device requires 15mA as program/erase current in the extended temperature ranges.

SAMSUNG's UtRAM products are designed to meet the request from the customers who want to cope with the fast growing mobile applications that need high-speed random access memory. UtRAM is the solution for the mobile market with its low cost, high density and high performance feature. device is fabricated by SAMSUNG´s advanced CMOS technology using one transistor memory cell. The device supports the traditional SRAM like asynchronous operation (asynchronous read and asynchronous write), the NOR flash like synchronous operation (synchronous burst read and asynchronous write) and the fully synchronous operation (synchronous burst read and synchronous burst write). These operation modes are defined through the configuration register setting. It supports the special features for the standby power saving. Those are the PAR(Partial Array Refresh) mode, DPD(Deep Power Down) mode and internal TCSR(Temperature Compensated Self Refresh). It also supports variable and fixed latency, driver strength settings, Burst sequence (wrap or No-wrap) options and a device ID register (DIDR).
The K5N3217ATA is suitable for use in data memory of mobile communication system to reduce not only mount area but also power consumption.
This device is available in 52-ball FBGA Type.

3.7 SIM Card Interface

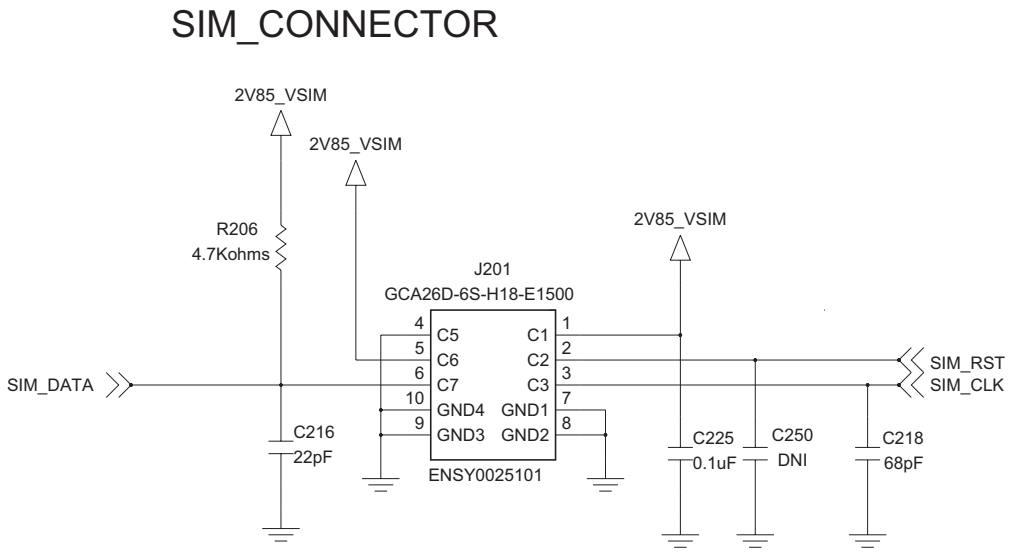


Figure 3.7.1. SIM CARD Interface

The Main Base Band Processor(XMM 110) 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 1.8/3V 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.

3.8 LCD Interface

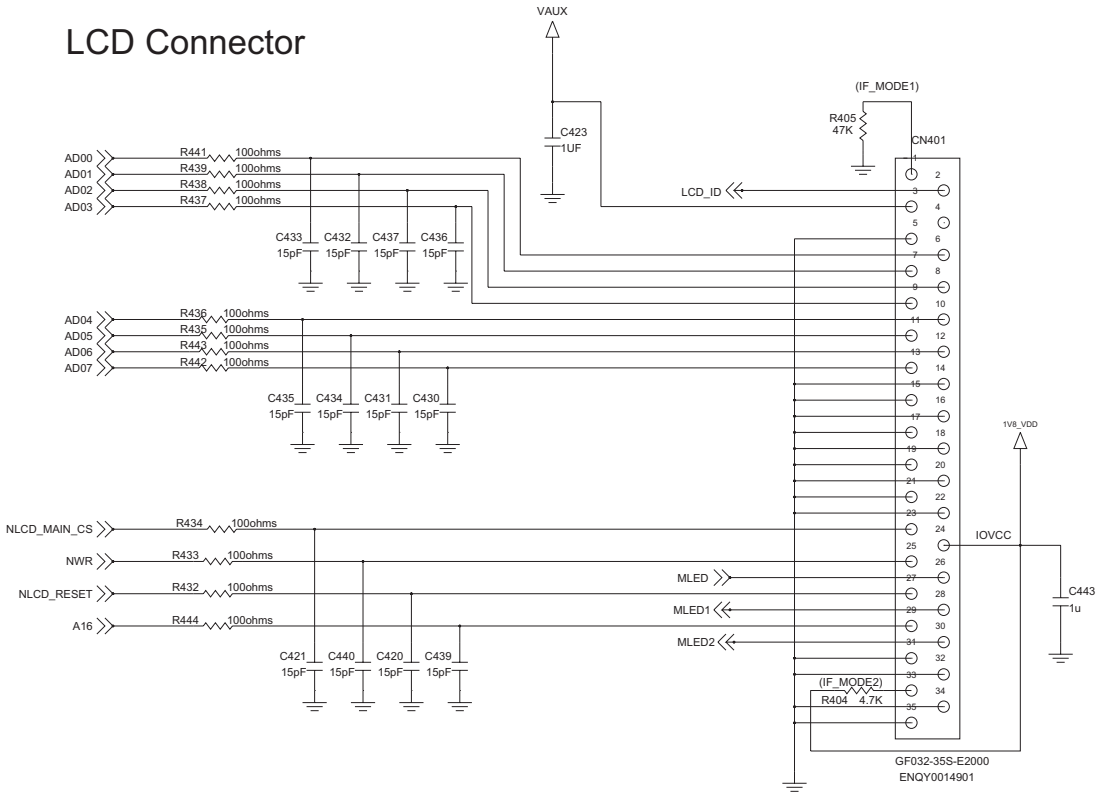


Figure 3.8.1. LCD Interface

The LG4515 is a 262,144-color one-chip controller driver LSI for a TFT liquid crystal display with resolution of 128 RGB x 160 dots, comprising a 384-channel source driver, RAM for graphics data of 128 RGB x 160 dots at maximum, a gate driver and a power supply circuit.
The LG4515 supports high-speed parallel interfaces to 8-, 9-, 16-, 18-bit ports and a function to write RAM data in high speed for transferring data efficiently and rewriting RAM graphics data in high speed.
The LG4515 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 LG4515 also supports a function to display in 8 colors and a standby mode, allowing for precise power control by software. These features make the LG4515 an ideal LCD driver for medium or small sized portable products supporting WWW browsers such as digital cellular phones or small PDAs, where long battery life is a major concern.

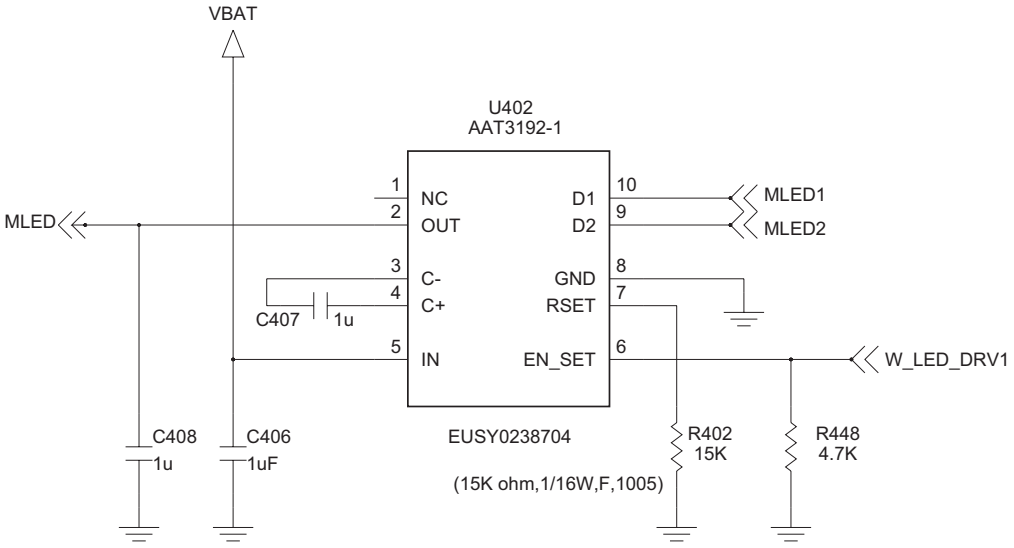


Figure 3.8.2. AAT3192 CIRCUIT DIAGRAM

The AAT3192 is a charge-pump based, current-sink white LED driver capable of driving one or two LEDs up to 30mA, each. It automatically switches between 1x mode and 2x mode to maintain the highest efficiency and optimal LED current accuracy and matching. The AAT3192 charge pump's 1x mode (bypass mode) has very low resistance allowing LED current regulation to be maintained with input supply voltage approaching the LED forward voltage. The AAT3192 is available in the 2x2mm, 10-lead SC70JW-10 package.

- Drives up to 2 LEDs at up to 30mA, each
- Automatic Switching Between 1x and 2x Modes
- 0.9MHz Switching Frequency
- Linear LED Output Current Control
- Single-wire, S2Cwire Interface
- AAT3192-1: 16-step
- ±10% LED Output Current Accuracy
- ±3% LED Output Current Matching
- Low-Current Shutdown Mode
- Built-in Thermal Protection

3.9 Battery Charger Interface

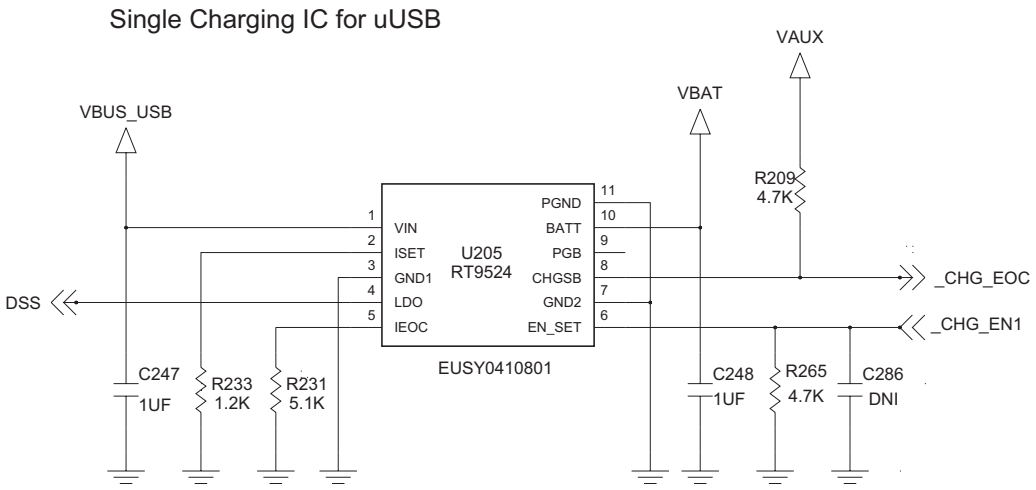


Figure 3.9.1 BATTERY CHARGER BLOCK

The RT9524 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 RT9524 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)

3.10 Keypad Interface

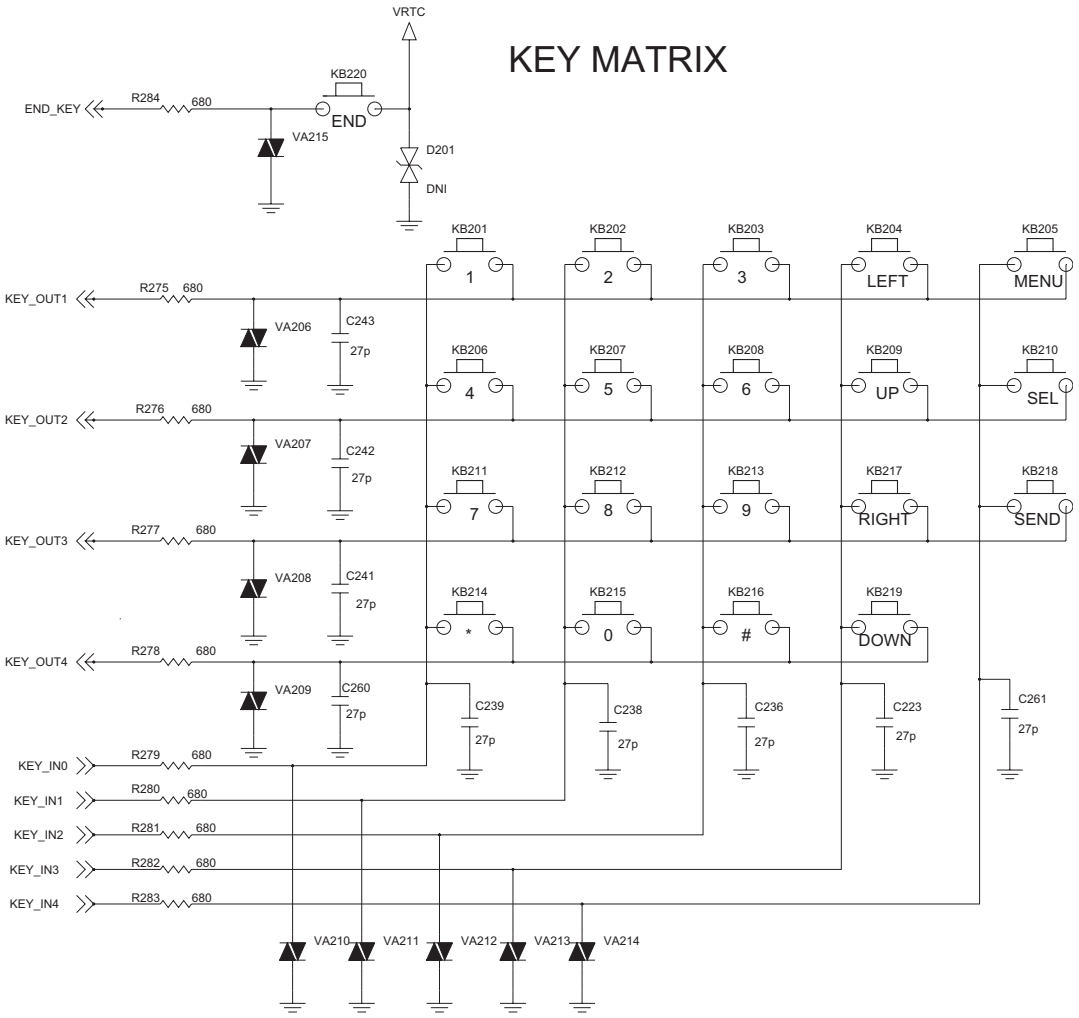


Figure 3.10.1 MAIN KEY STRUCTURE

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 by 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.

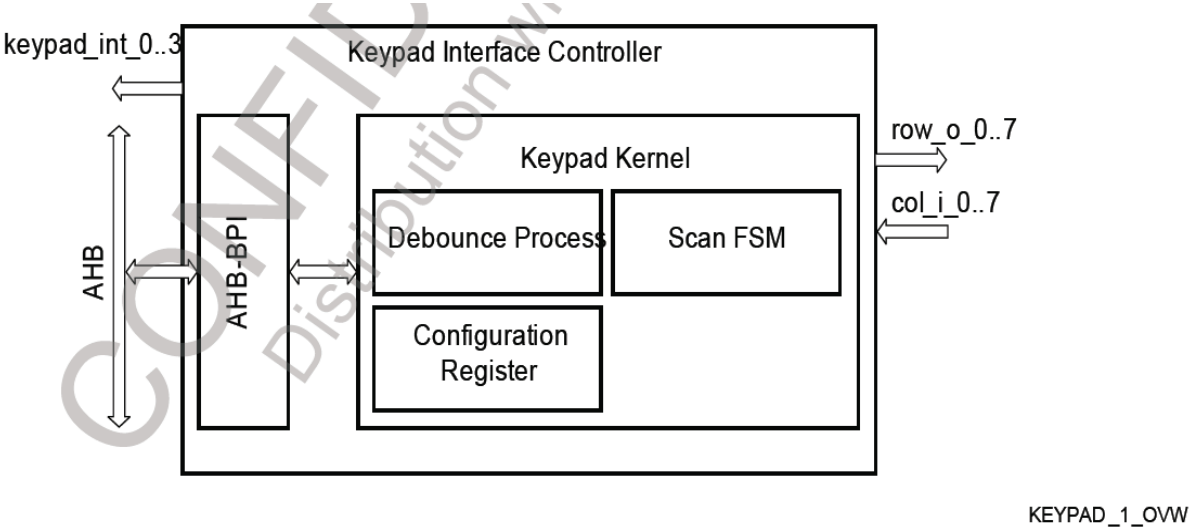


Figure 3.10.2 Block Diagram and System Integration of the KPD

3.11 Audio Front-End

3.11.1 Functional Overview

The audio front-end of X-GOLD™ 110 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™ 110. 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™ 110. 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.

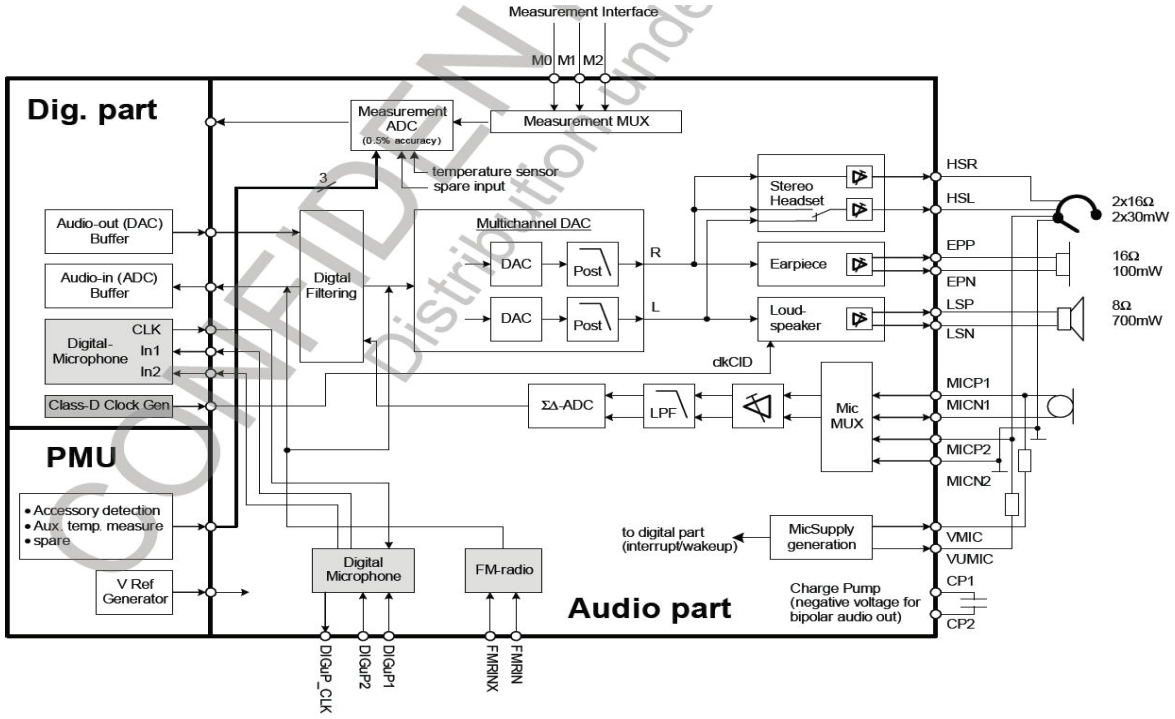


Figure 3.11.1 Audio Section Overview

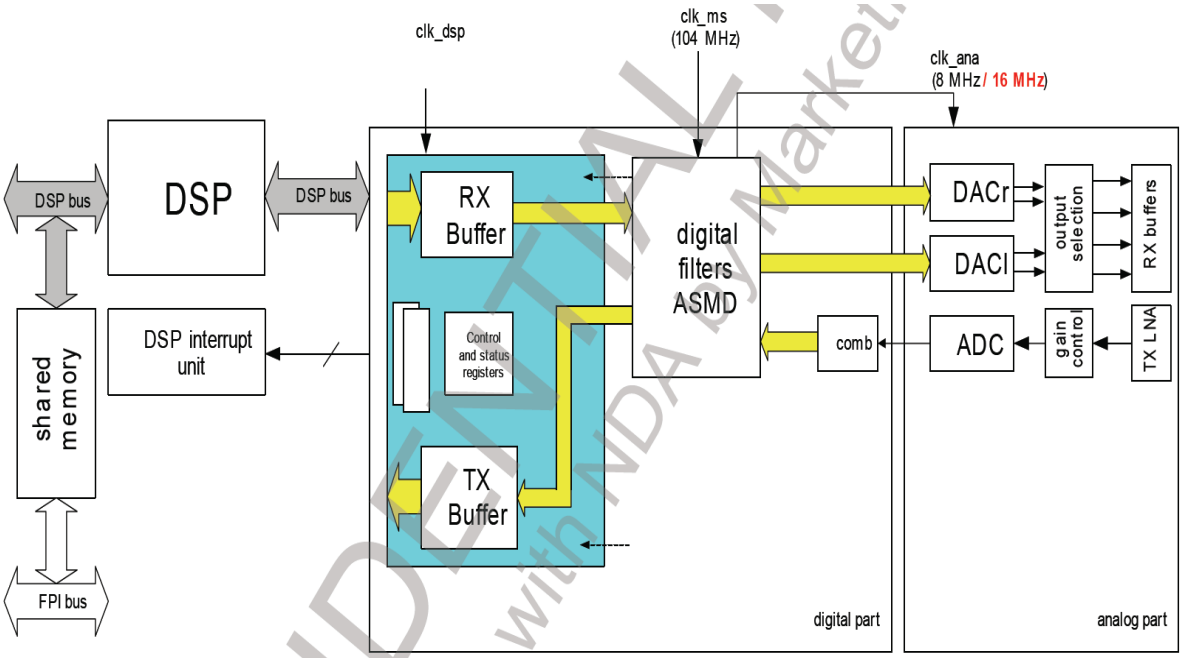


Figure 3.11.2 Overview of Clocking and Interfaces of Audio Front End

The audio front-end of X-GOLDTM110 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-GOLDTM110 .
- 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®.

3.11.2 Digital Part

The digital part of the X-GOLDTM110 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™110 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™110 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).

3.11.3 Analog Part

The analog part of the X-GOLD™110 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.

▪ **Digital-to-analog converters**

The multi-bit oversampling DACs of the X-GOLD™110 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™110 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 bipolor 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.

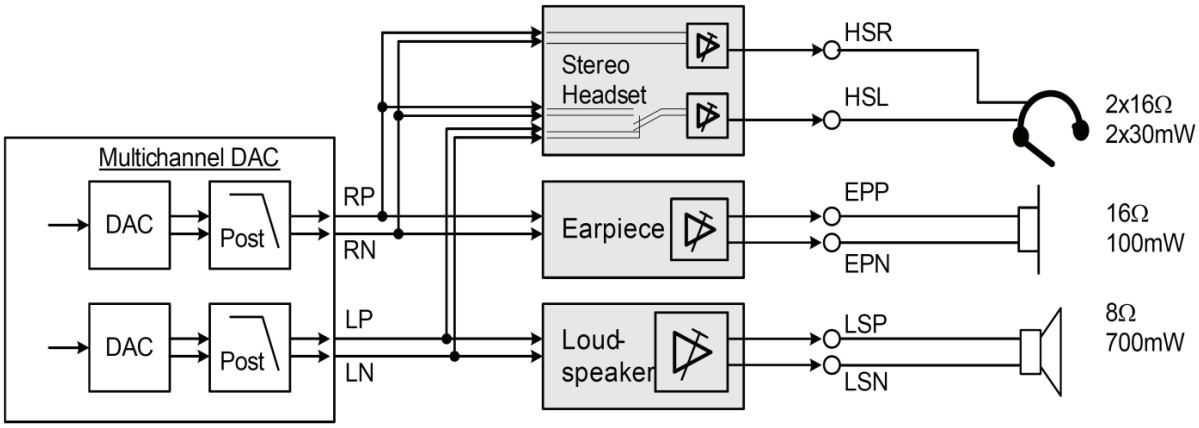


Figure 3.11.3 Switching for R/L DACs onto Buffers

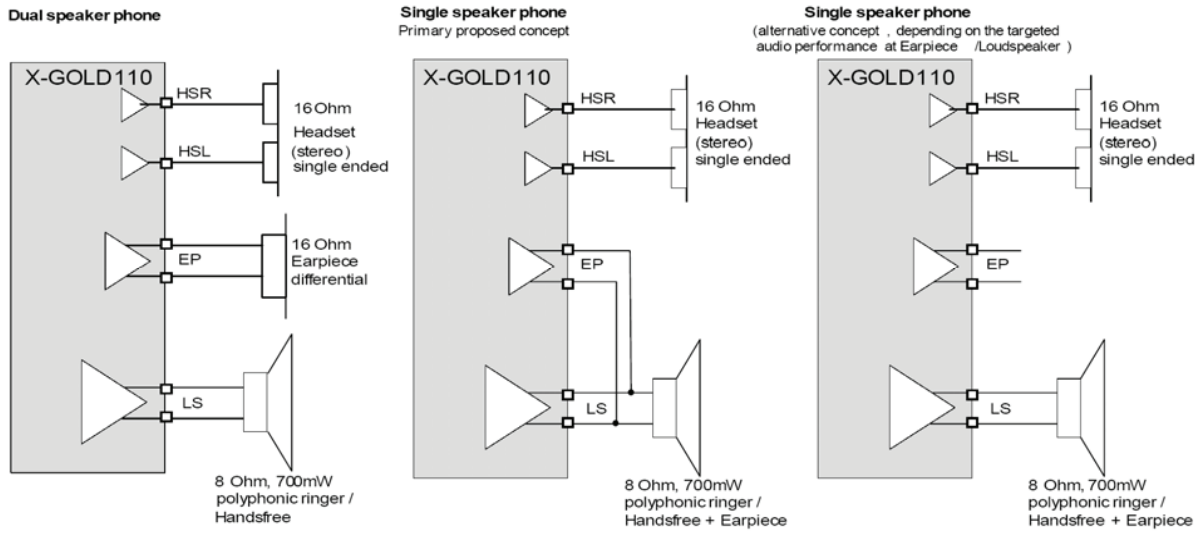


Figure 3.11.4 Different Application Scenarios

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™110 provides two differential microphone input sources, MIC1and 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 ΣΔ-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 and overall variable gain ranging from 0 dB to +39 dB . The signal is then modulated by a second order ΣΔ-converter which is clocked with the same clock rate as the digital to analog converters. The ΣΔ-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.

▪ 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.

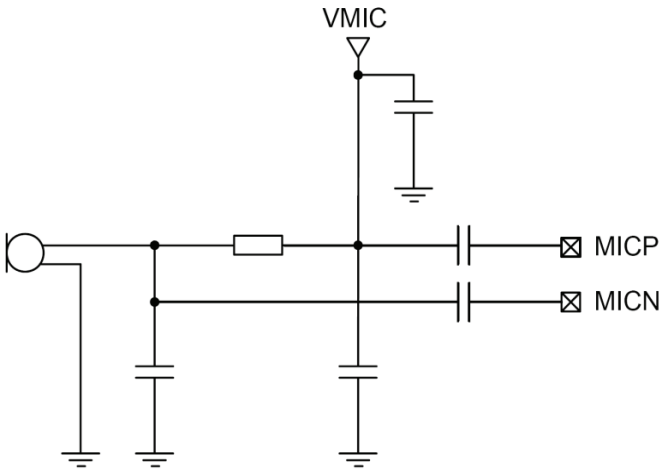


Figure 3.11.5 Typical Microphone Supply Generation (alternative)

3.12 KEY BACLKLIGHT LED Interface

Key Backlight LED is controlled by switch (Q202). If KEY_BCKLIGHT is high, Current is flowing from VBAT to LED. Then Light emitted from The LED.

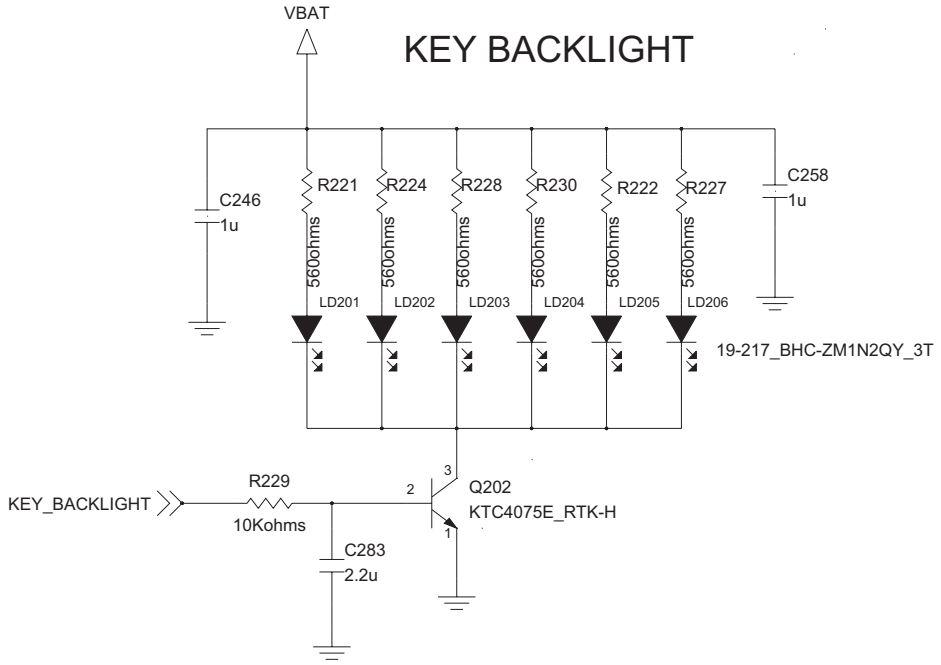


Figure 3.12.1 Key Backlight Block

3.13 Vibrator Interface

Support PWM signal which generated by hardware itself via register control
Direct connect to the VIB and VSSVIB pin from XMM110 without any external component required
It is capable to driver the vibrator motor up to 150mA

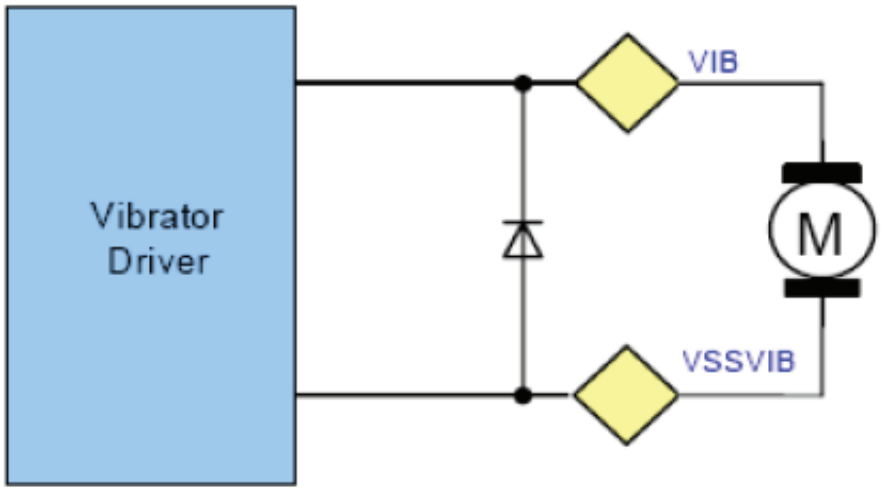


Figure 3.13.1 Vibrator Driver Block Diagram

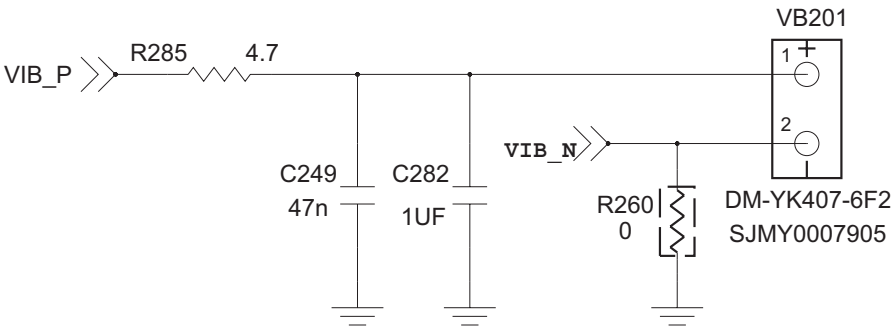


Figure 3.13.2 Vibrator Driver Block

4. TROUBLE SHOOTING

4.1 RF Component

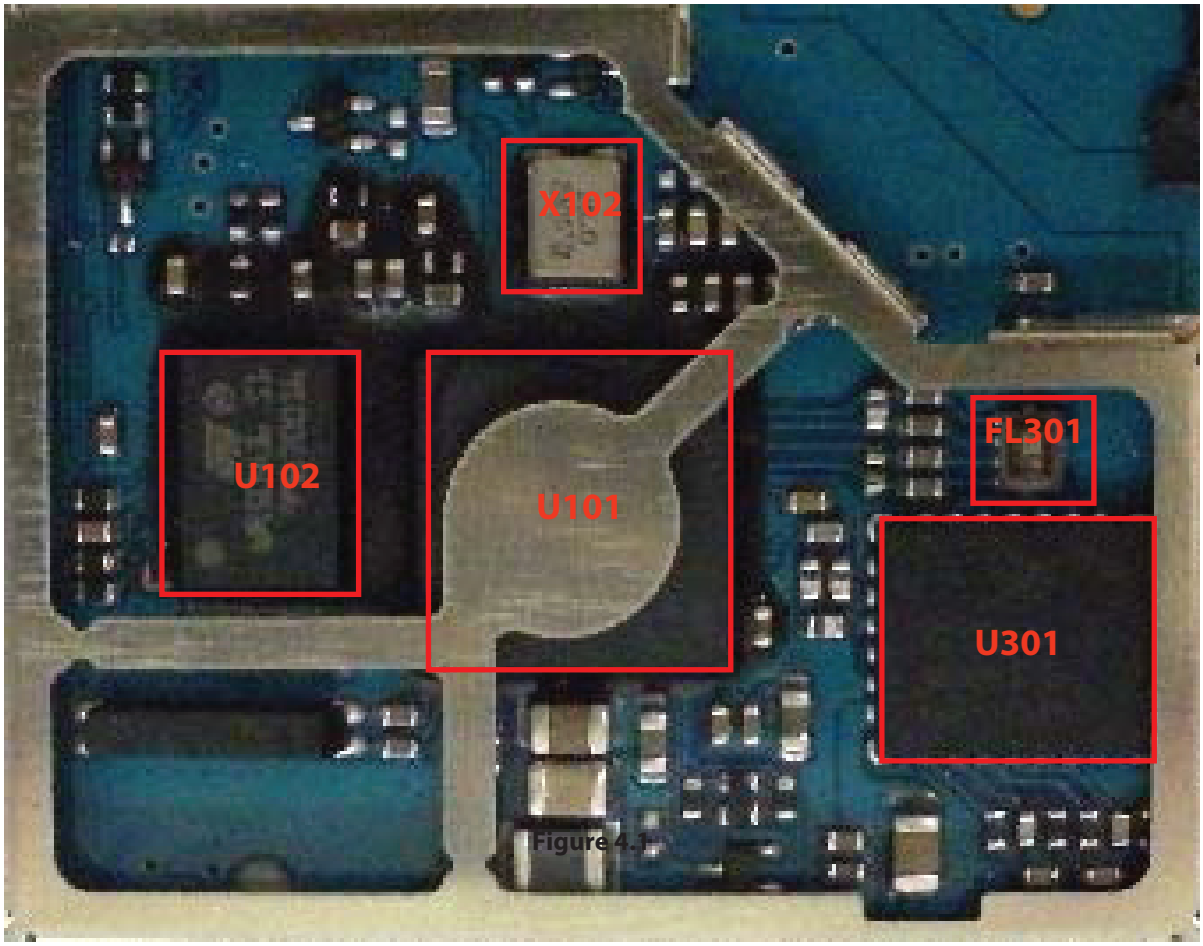
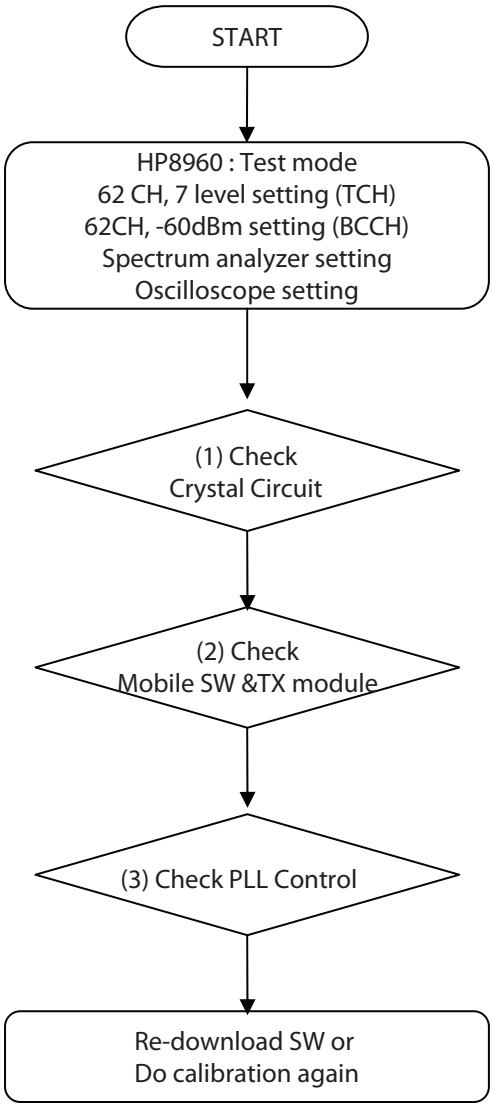


Figure 4.1

U101	Main Chip (EGV3)
U102	Memory
U301	FEM (Tx Module)
FL301	SAW Filter
X101	Crystal, 26MHz Clock

4.2 RX Trouble

CHECKING FLOW



(1) Checking Crystal Circuit

TEST POINT

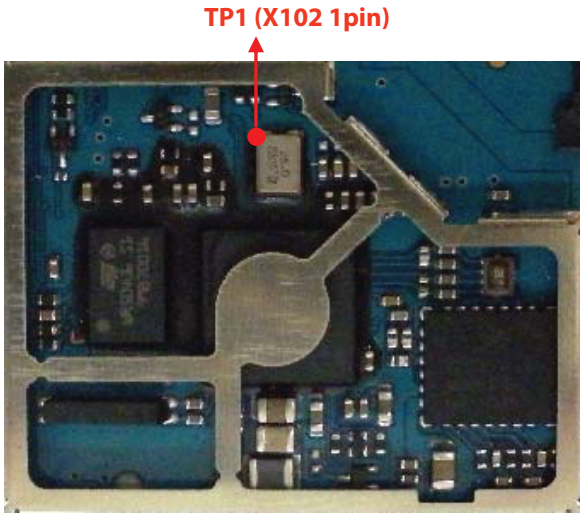
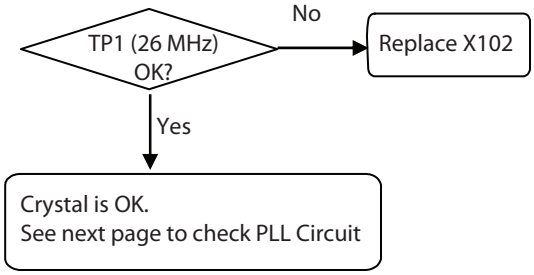


Figure 4.2.1

CHECKING FLOW



CIRCUIT

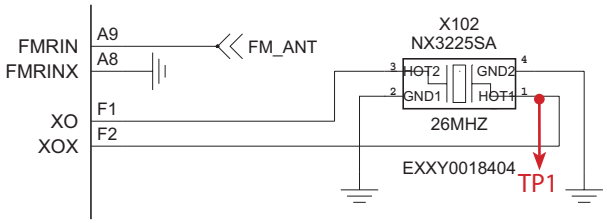


Figure 4.2.2

WAVEFORM

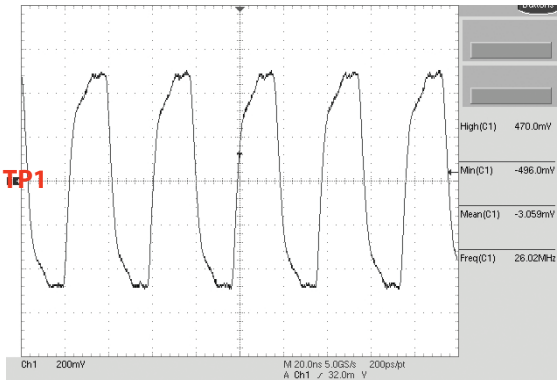


Figure 4.2.3

TEST POINT

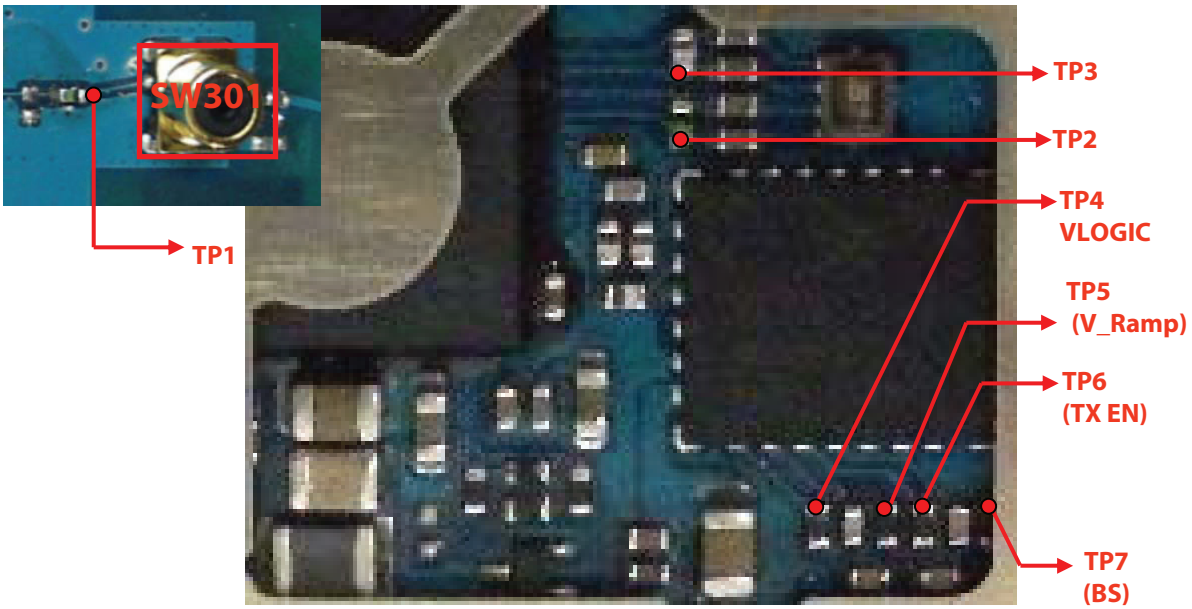
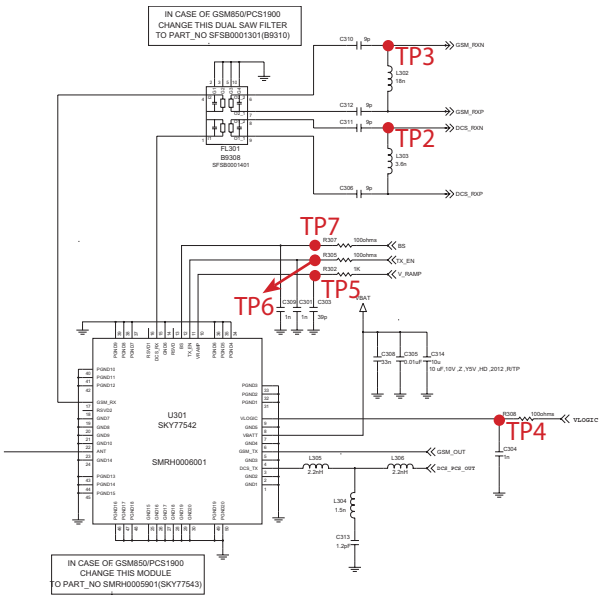


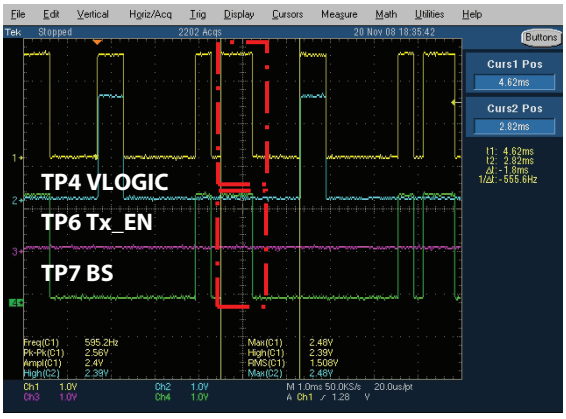
Figure 4.2.4

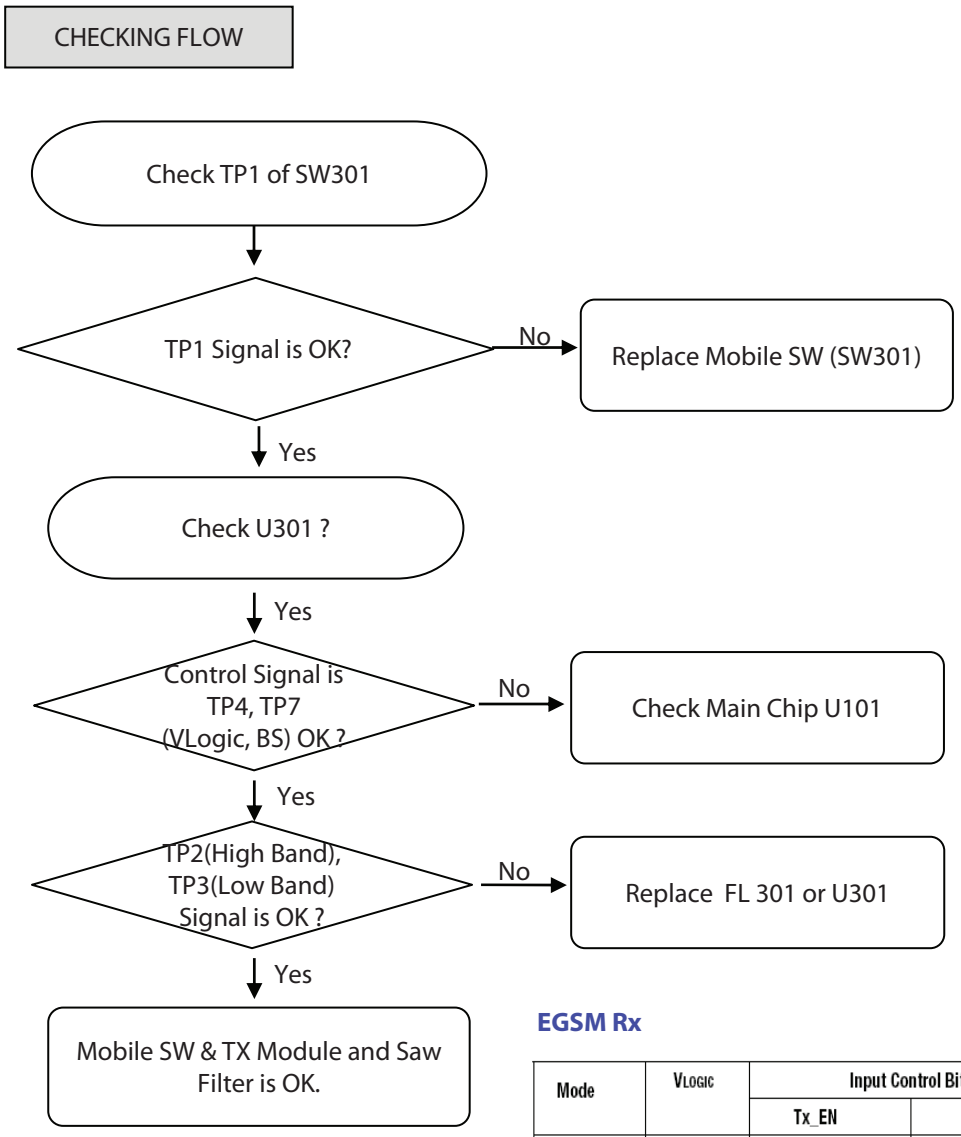
CIRCUIT



CONTROL LOGIC

EGSM Rx





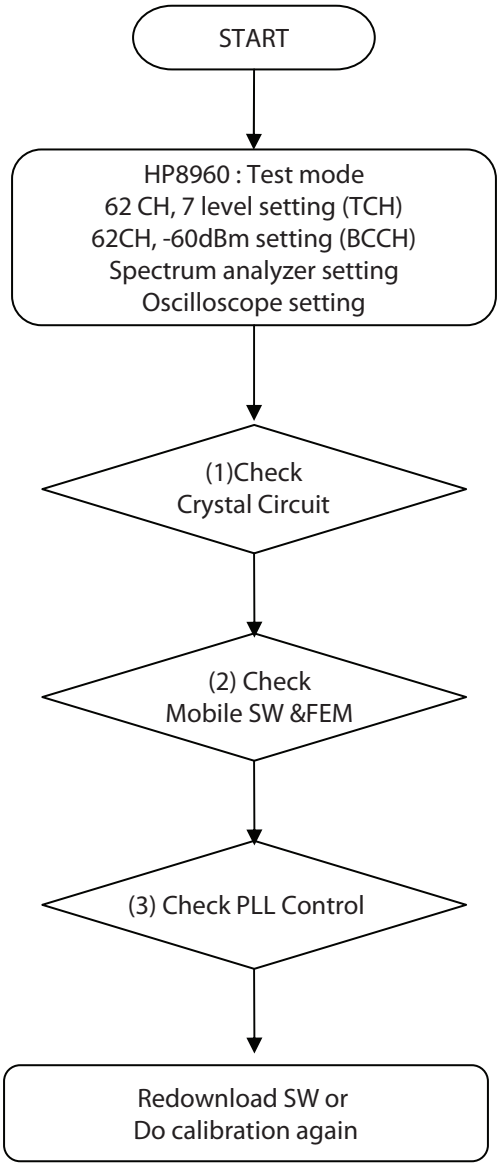
EGSM Rx

Mode	VLOGIC	Input Control Bits	
		Tx_EN	BS
STANDBY	0	X [1]	X [1]
GSM_Rx	1	0	0
DCS_Rx	1	0	1
GSM_Tx	1	1	0
DCS_Tx	1	1	1

[1] X = don't care

4.3 TX Trouble

CHECKING FLOW



(1) Checking Crystal Circuit

TEST POINT

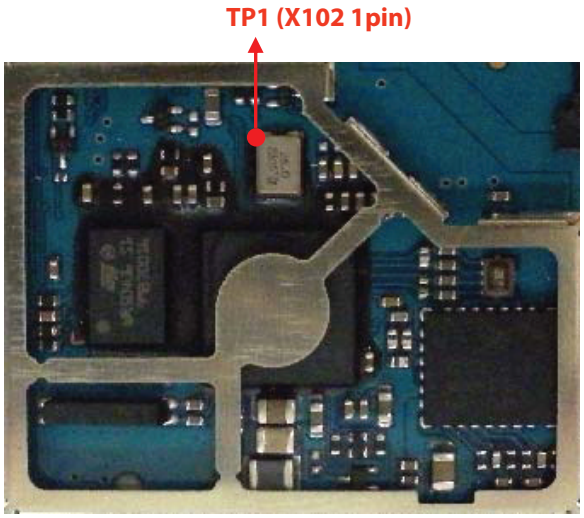
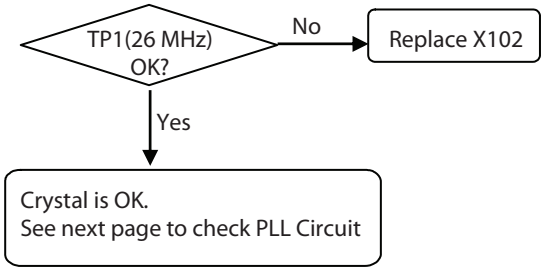


Figure 4.2.1

CHECKING FLOW



CIRCUIT

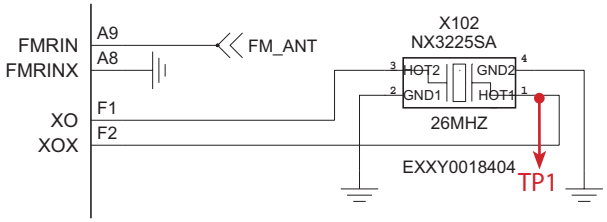


Figure 4.2.2

WAVEFORM

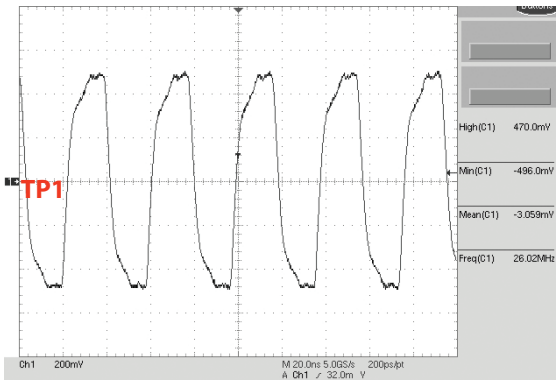


Figure 4.2.3

(2) Checking Mobile SW &FEM

TEST POINT

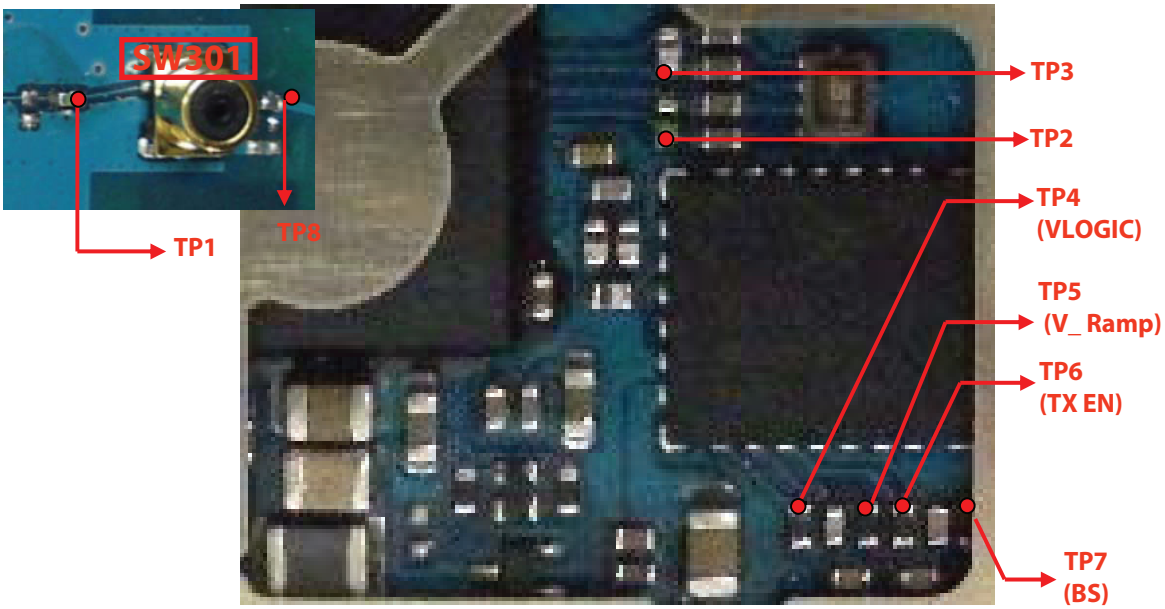
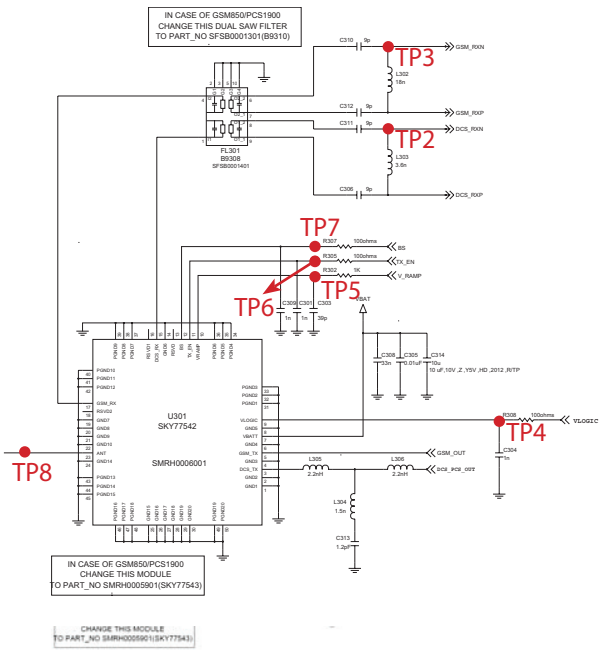
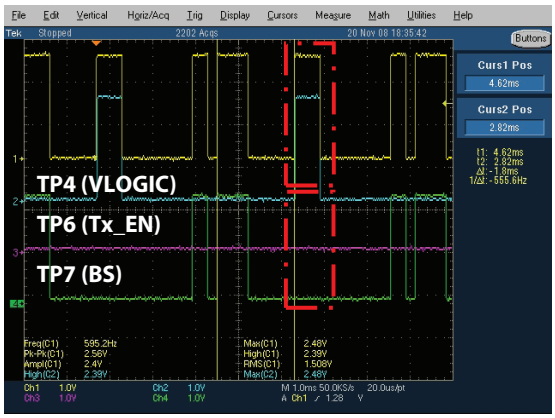


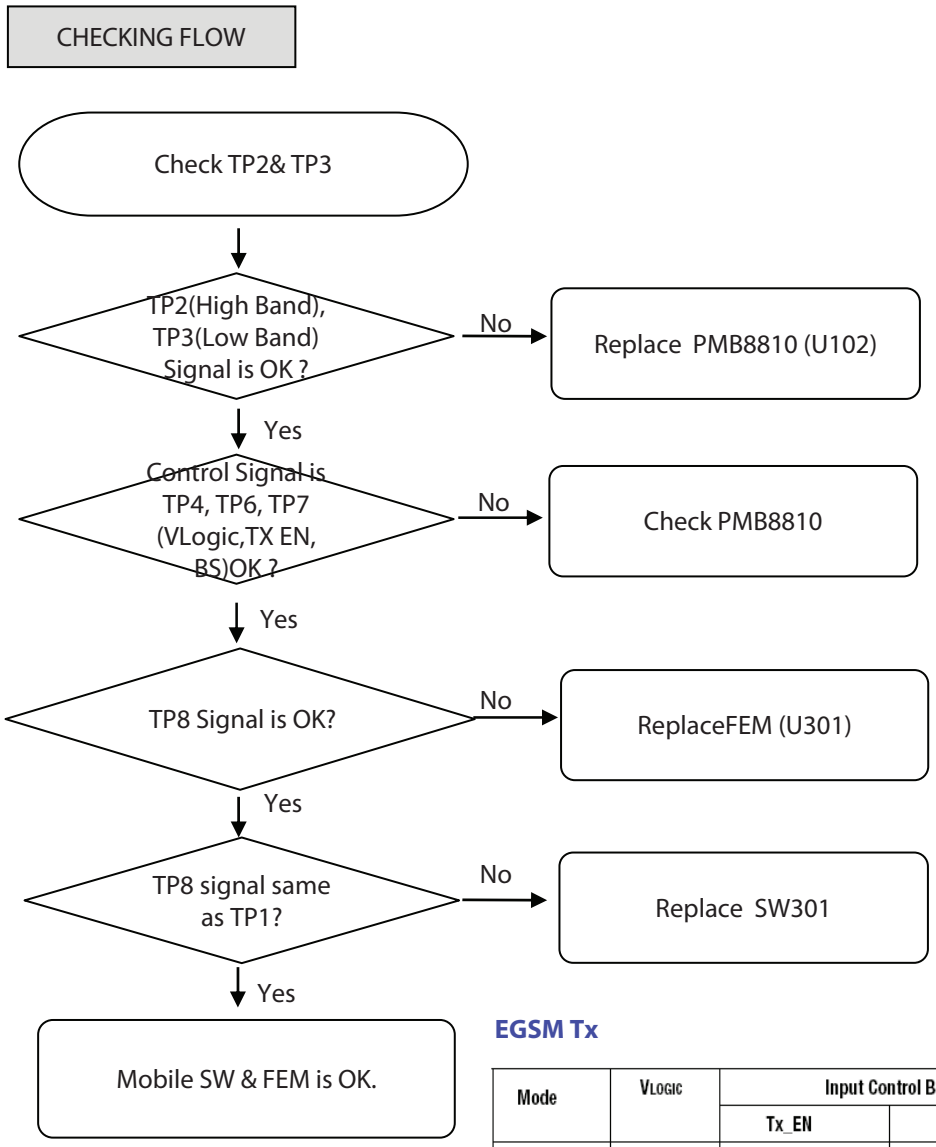
Figure 4.2.4



CONTROL LOGIC

EGSM Tx





EGSM Tx

Mode	VLOGIC	Input Control Bits	
		Tx_EN	BS
STANDBY	0	X [1]	X [1]
GSM_Rx	1	0	0
DCS_Rx	1	0	1
GSM_Tx	1	1	0
DCS_Tx	1	1	1

[1] X = don't care

4.4 Power On Trouble

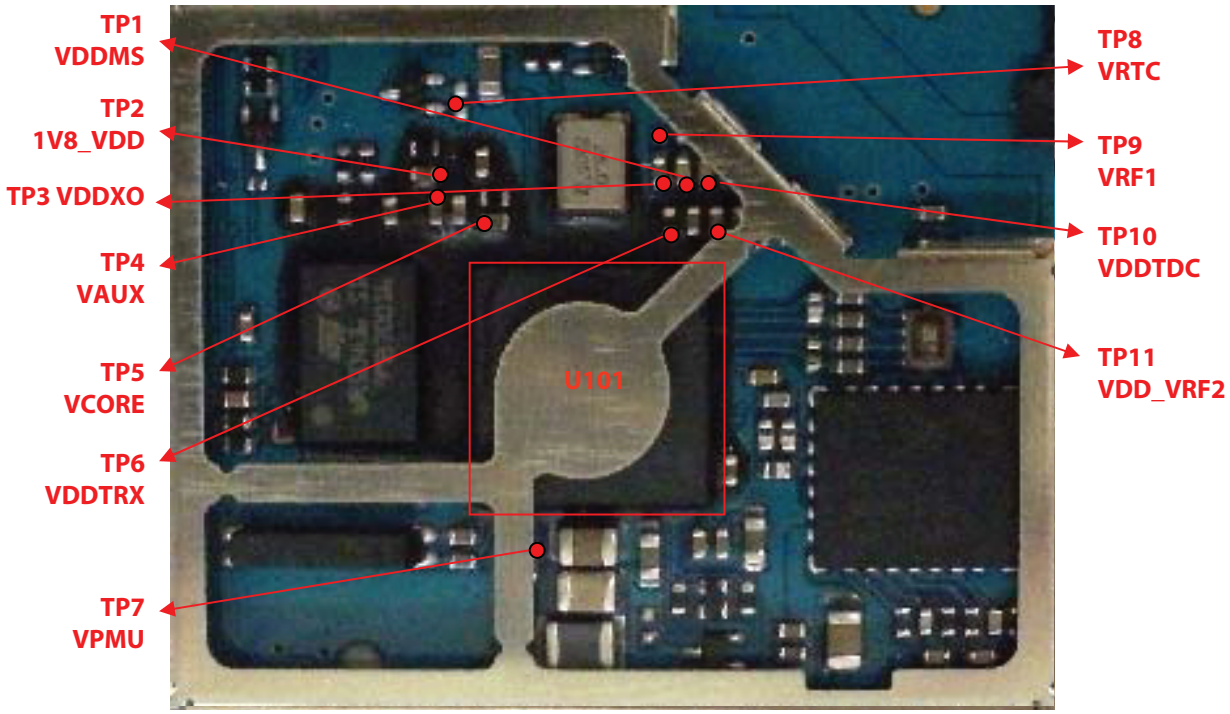


Figure 4.4.1

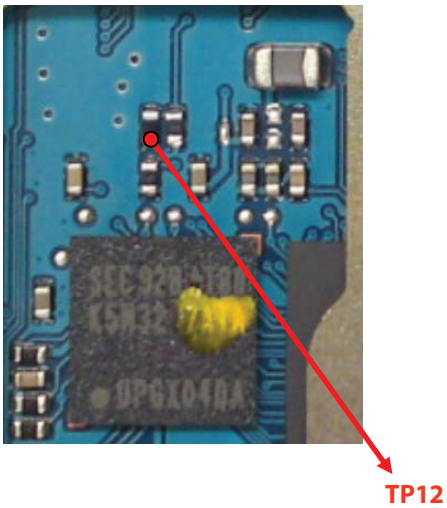


Figure 4.4.2

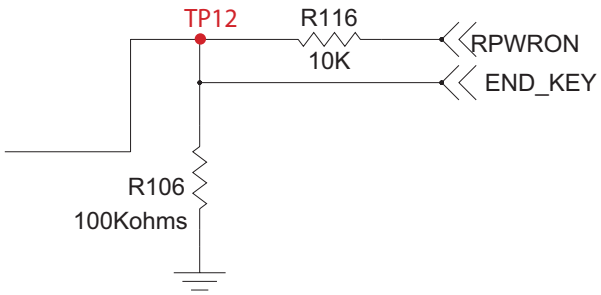


Figure 4.4.3 Remote power on

CIRCUIT

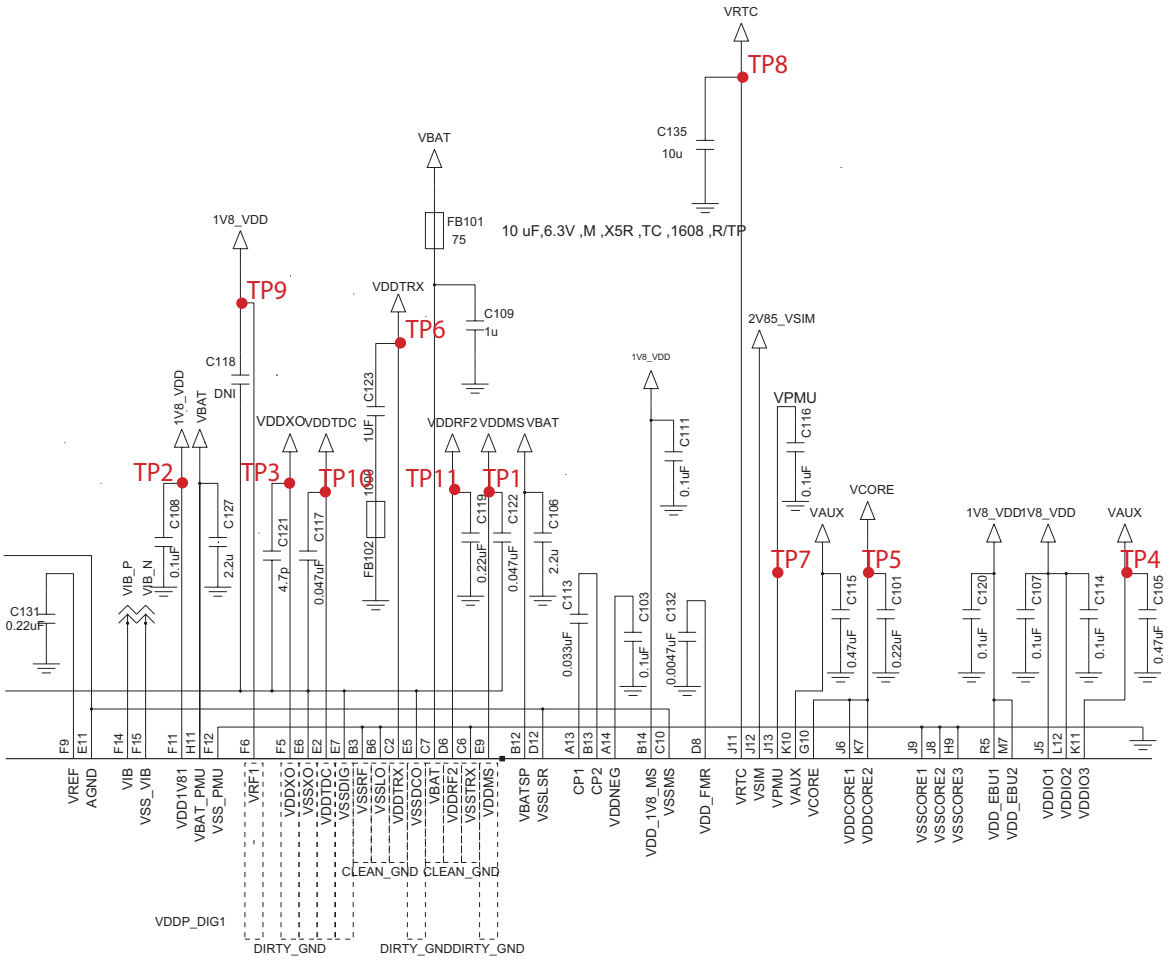
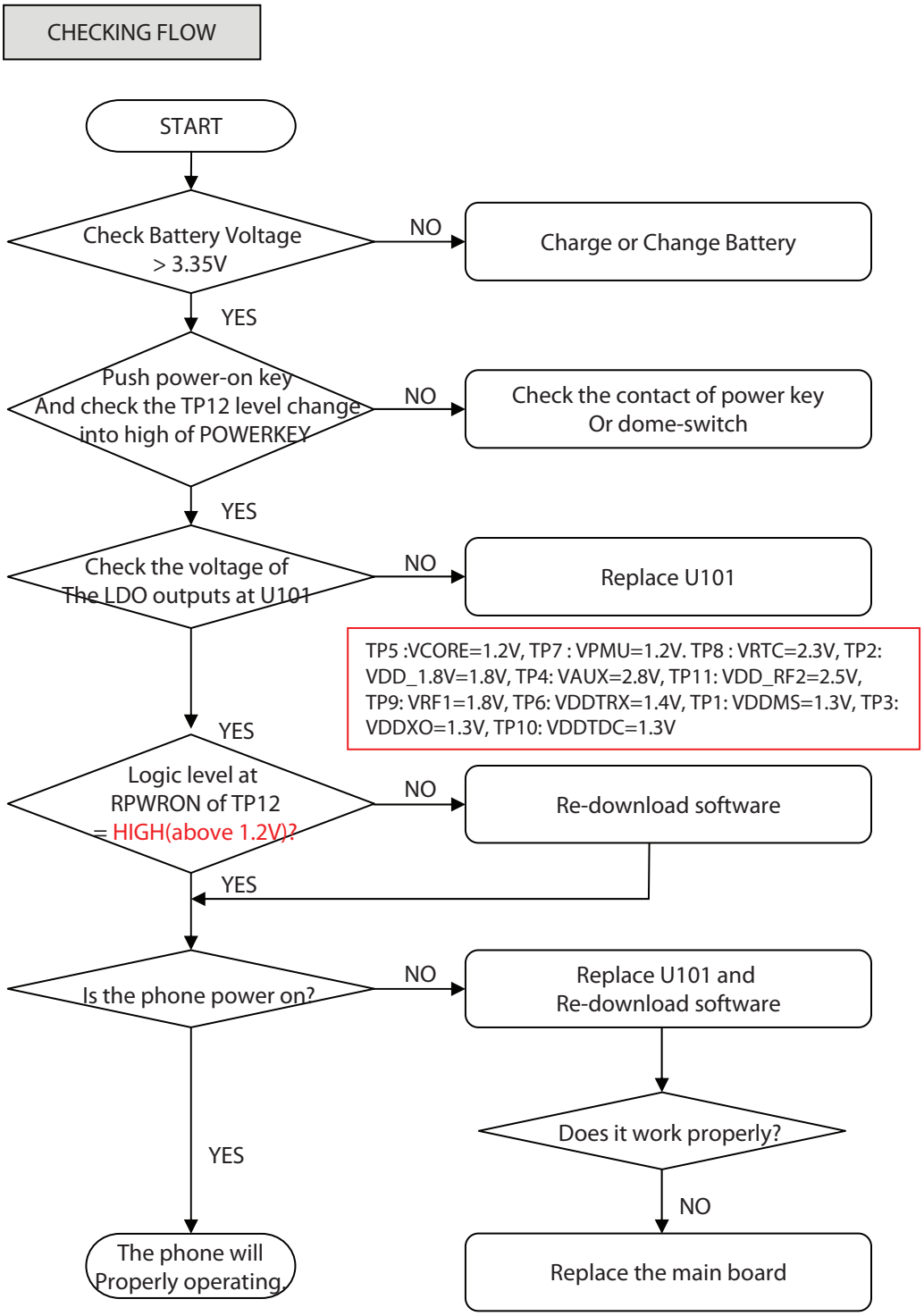


Figure 4.4.4 Power block of LG-A110



4.5 Charging Trouble

TEST POINT

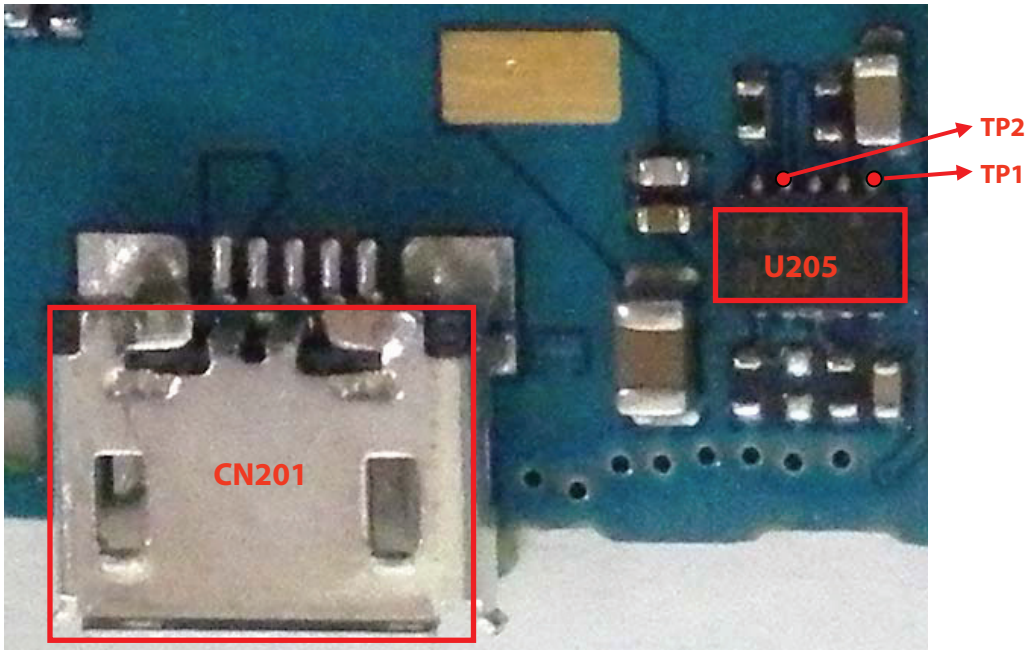


Figure 4.5.1

CIRCUIT

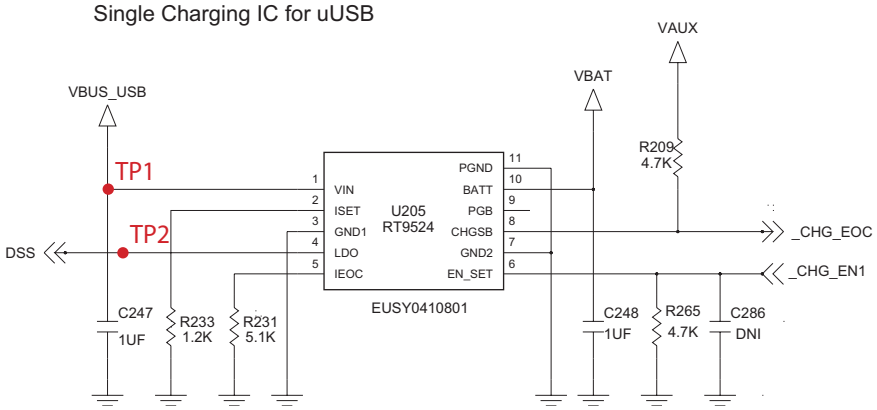
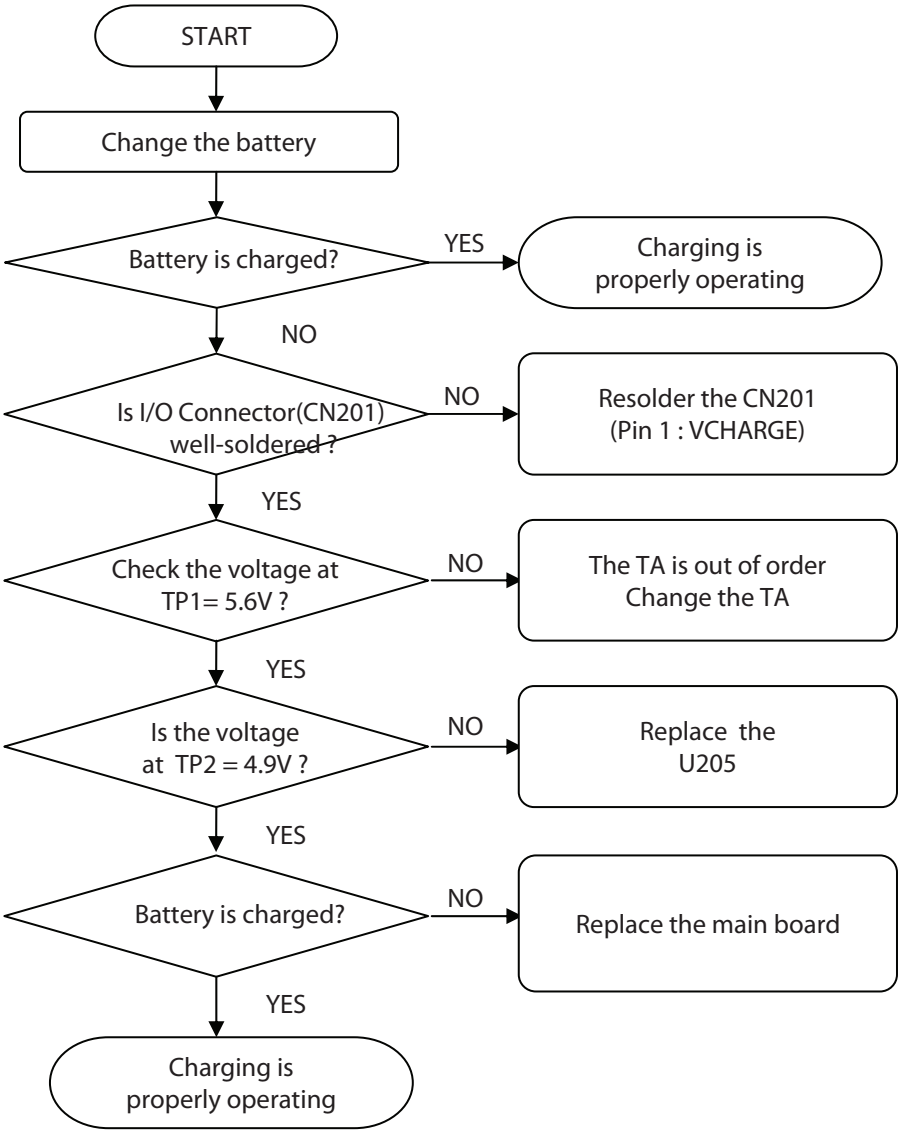


Figure 4.5.2

CHECKING FLOW



4.6 Vibrator Trouble

TEST POINT

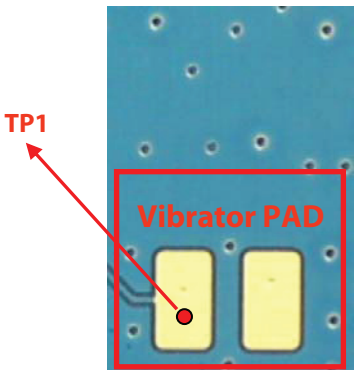


Figure 4.6.1

CIRCUIT

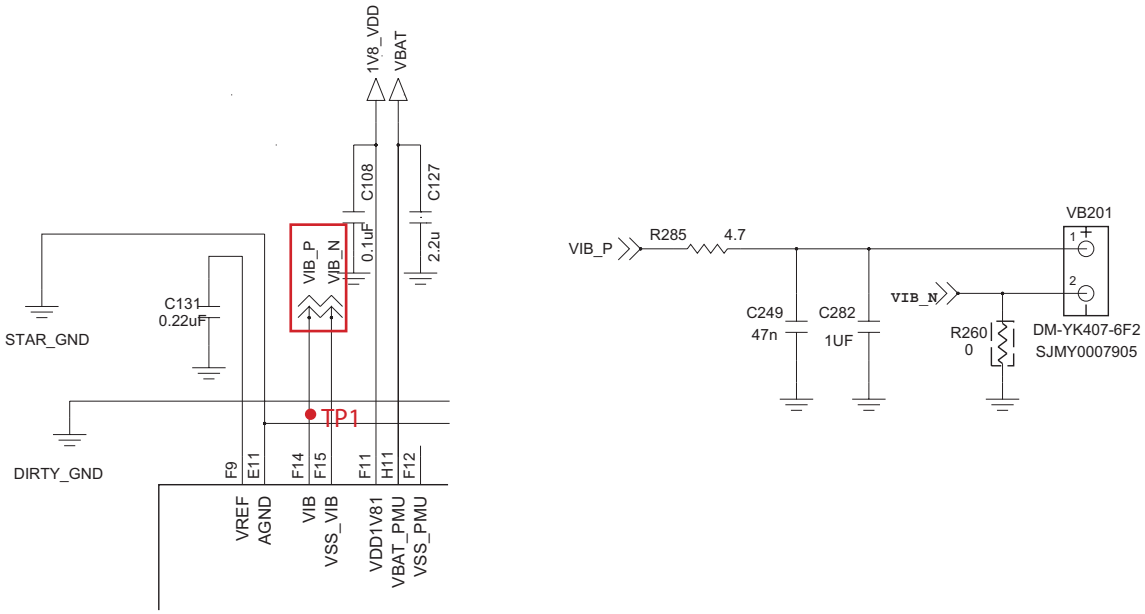
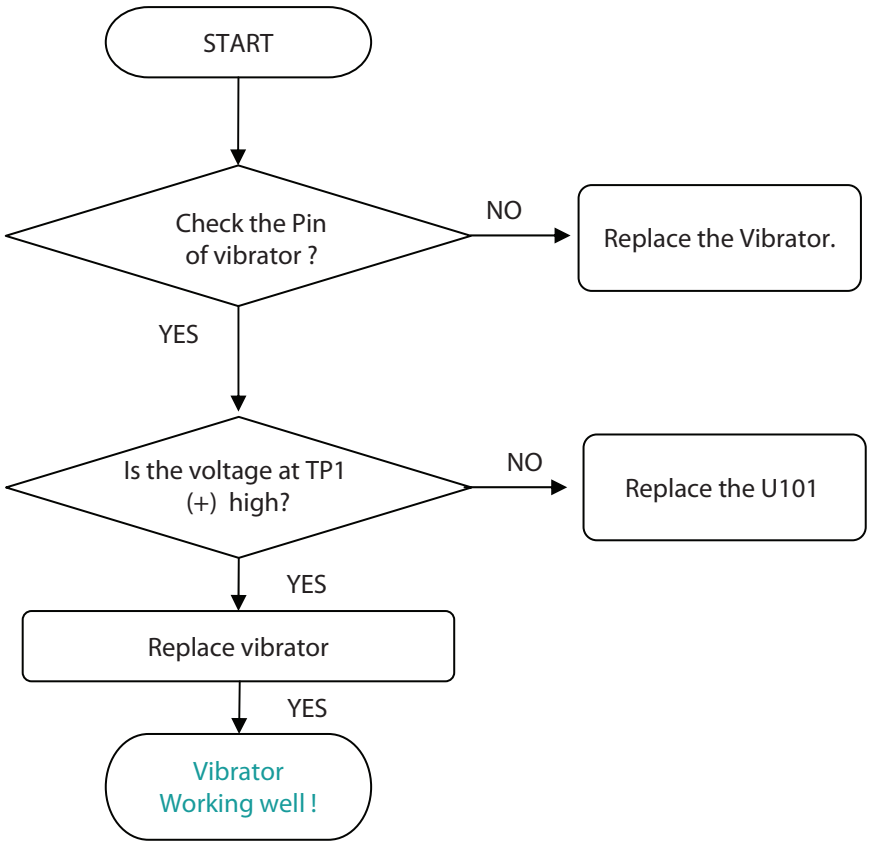


Figure 4.6.2

CHECKING FLOW

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



4.7 LCD Trouble

TEST POINT

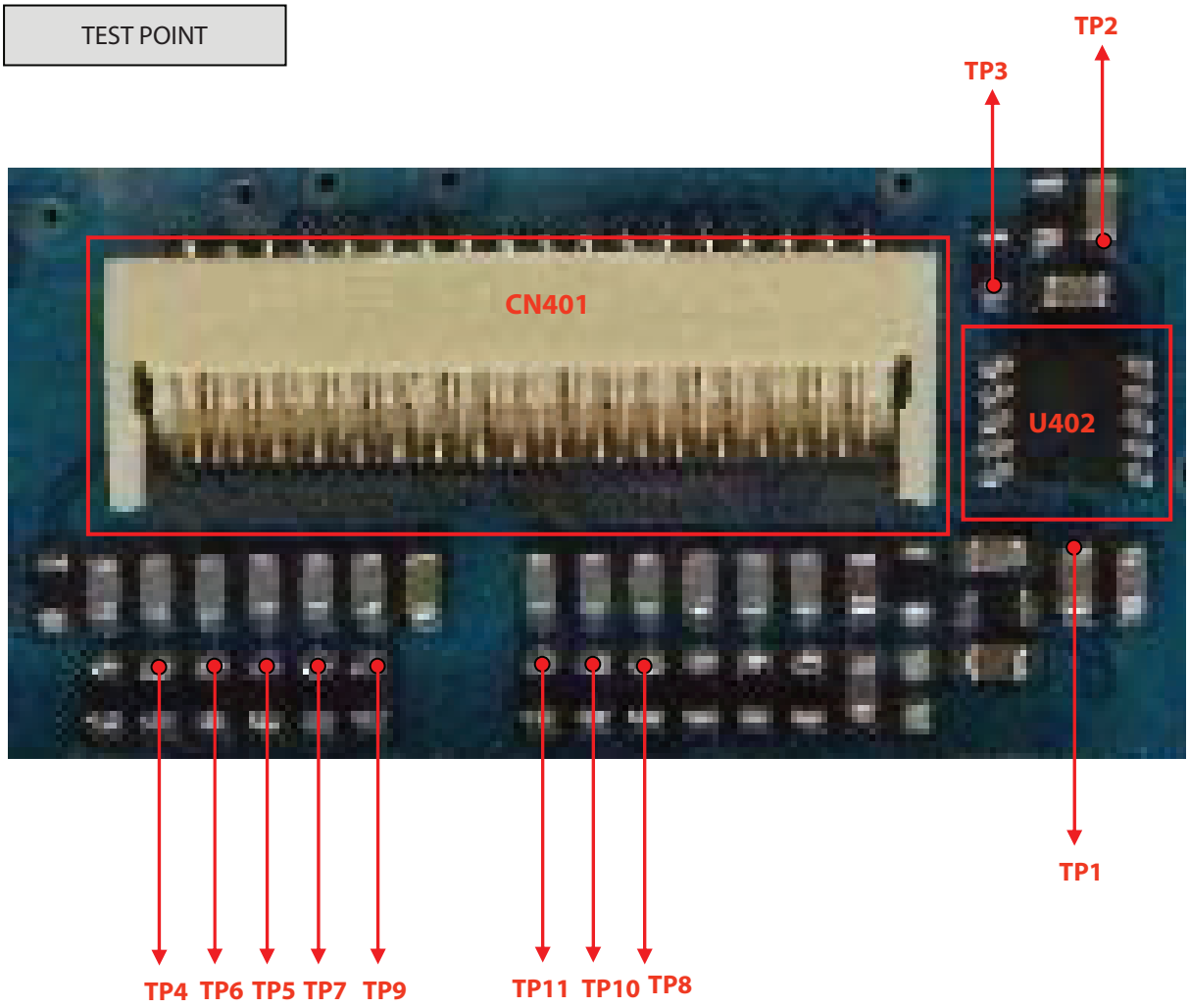


Figure 4.7.1

CIRCUIT

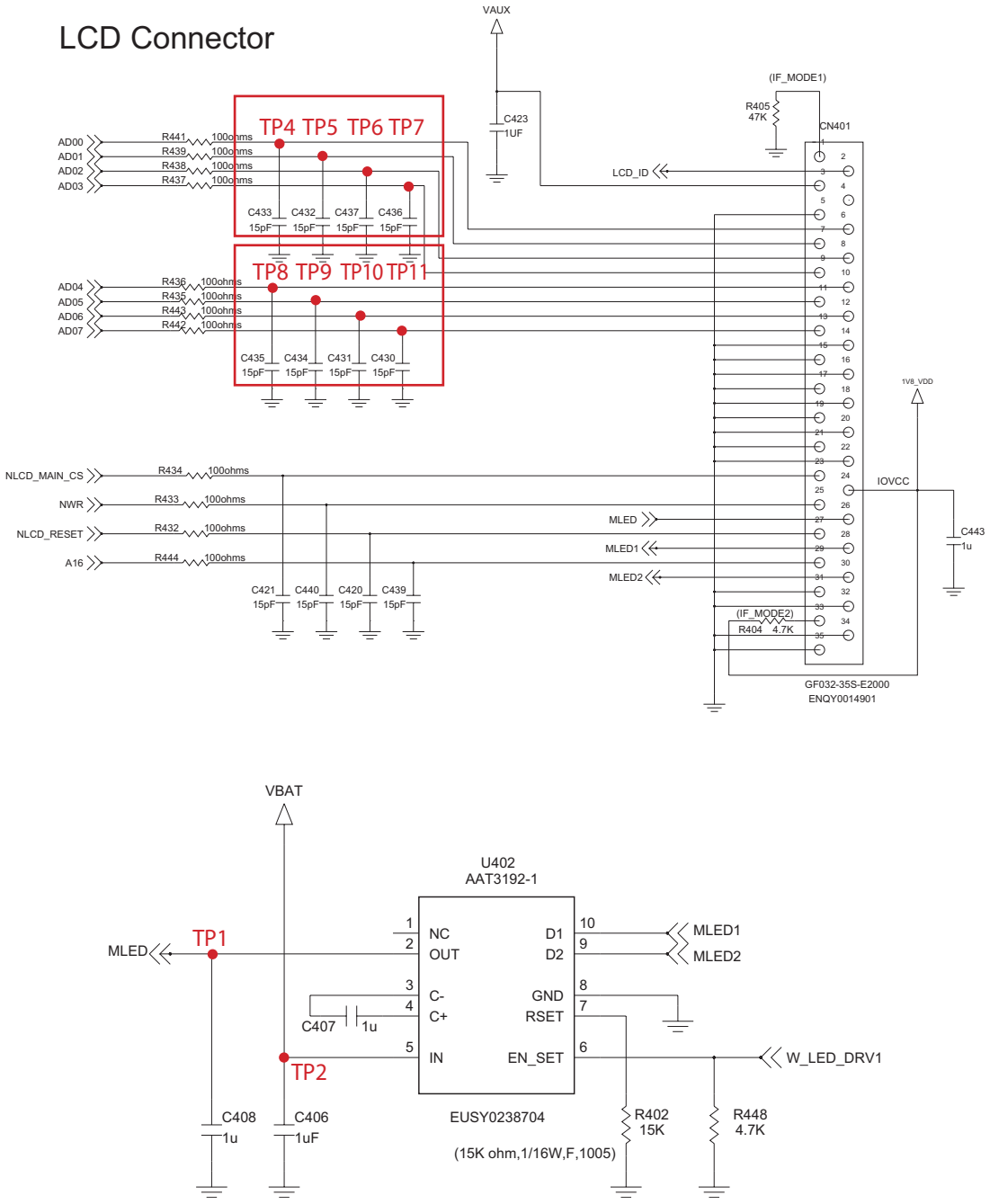
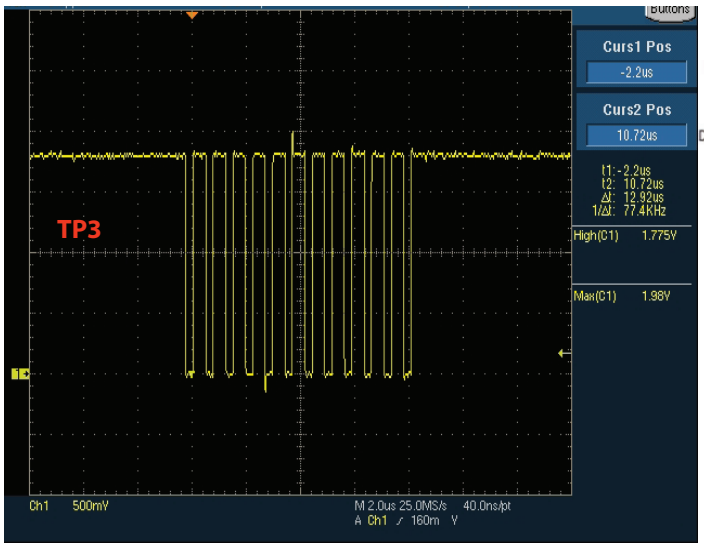
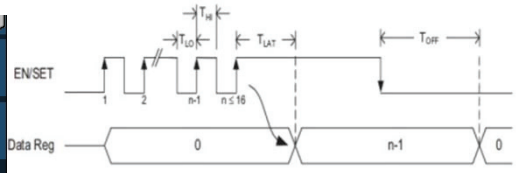


Figure 4.7.2

Waveform

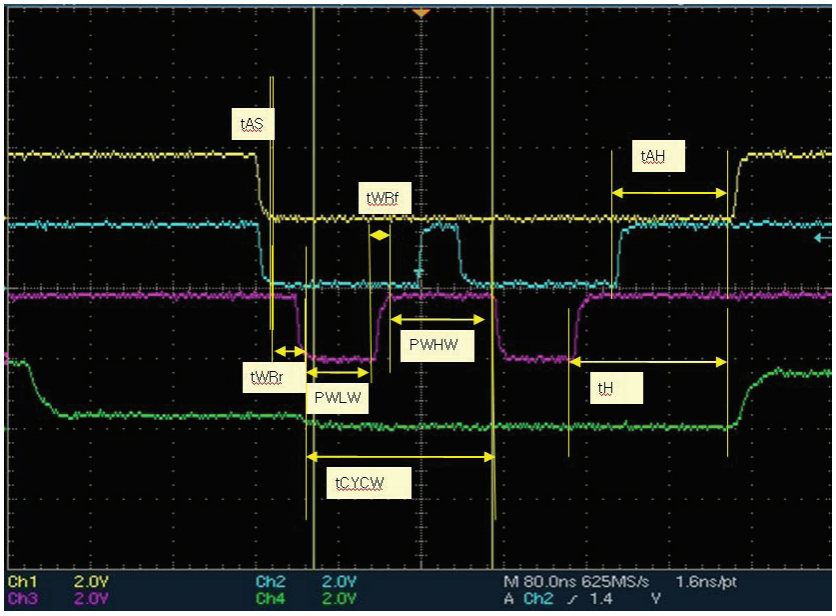




Data	EN Rising Edges	D1-D2 Current (mA)
1	1	20
2	2	18.7
3	3	17.3
4	4	16
5	5	14.7
6	6	13.3
7	7	12
8	8	10.7
9	9	9.3
10	10	8
11	11	6.7
12	12	5.3
13	13	4
14	14	2.7
15	15	1.3
16	16	0.63

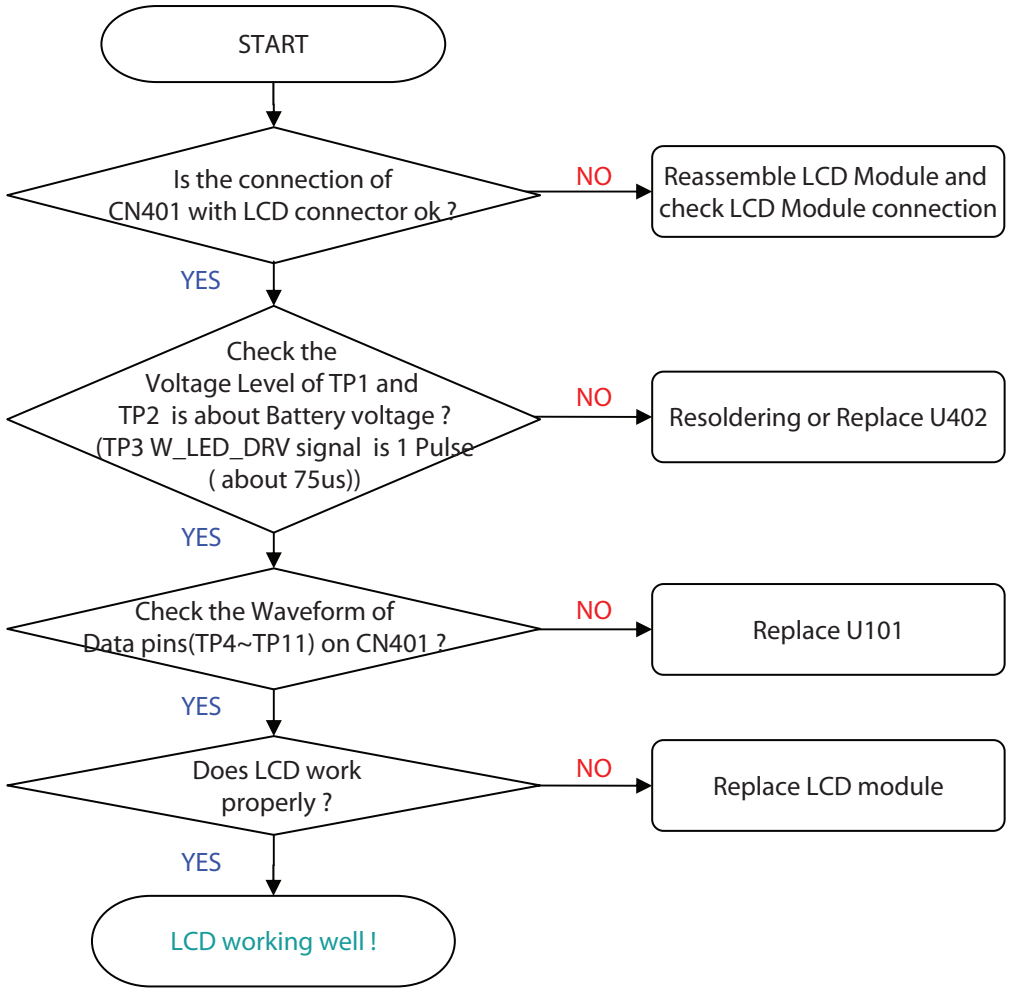
Graph 4.7.1. LCD Backlight Dimming Control Signal Waveform

TP 4~TP11



Graph 4.7.2. LCD Data Waveform

CHECKING FLOW



4.8 Speaker Trouble

TEST POINT

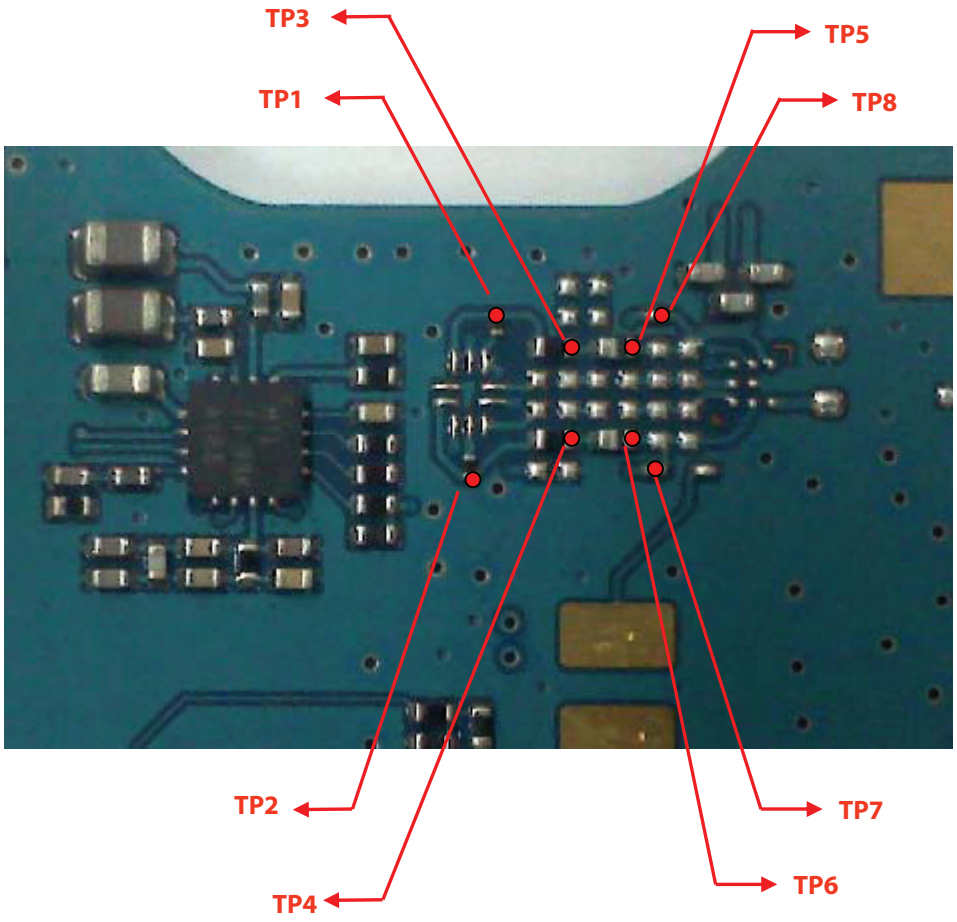
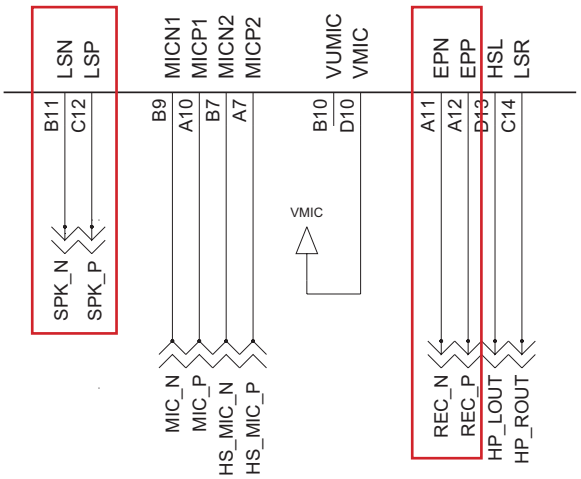
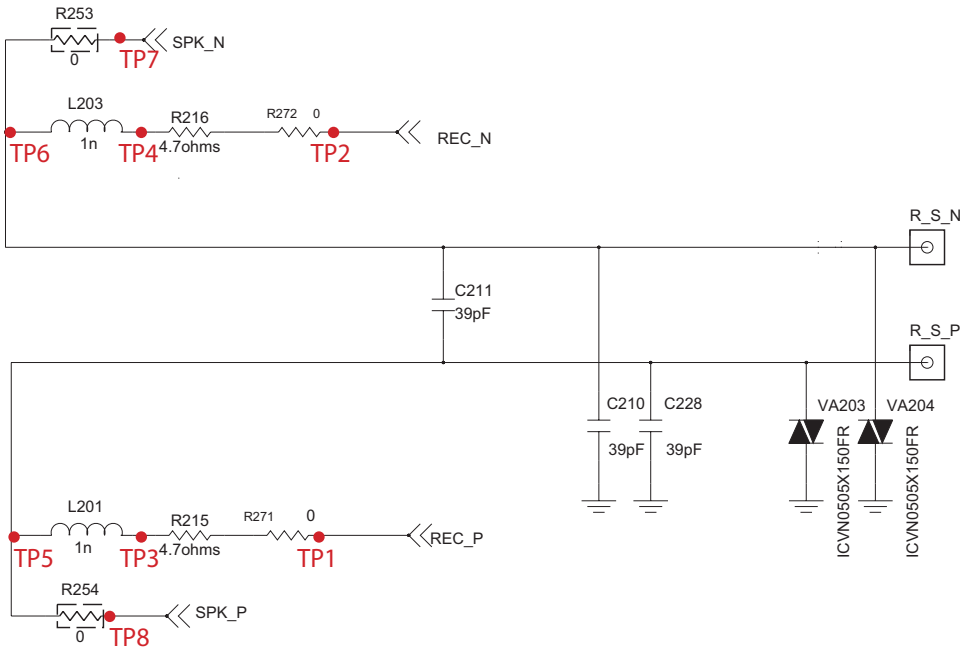


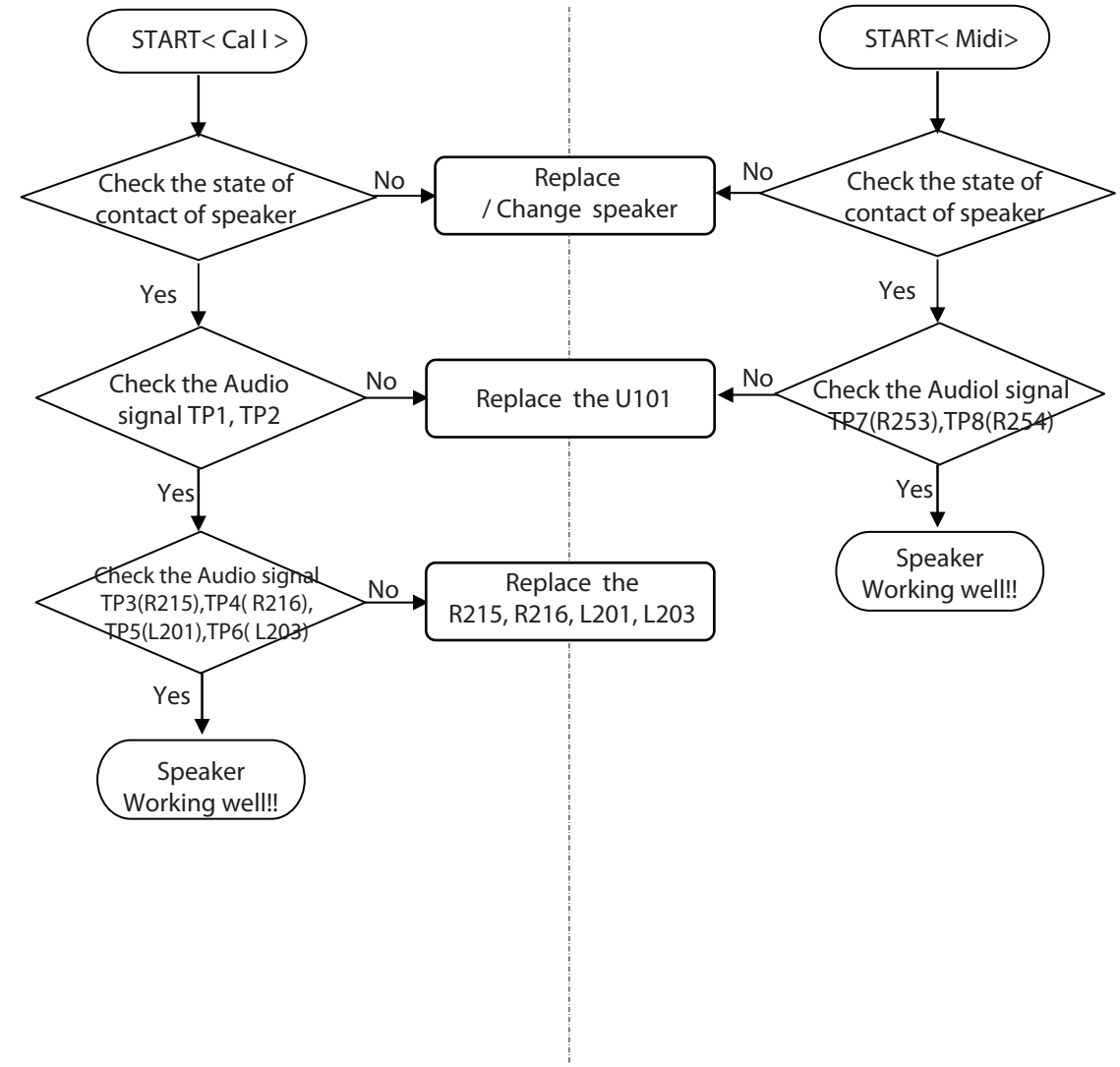
Figure 4.8.1

CIRCUIT





CHECKING FLOW



4.9 Earphone Trouble

TEST POINT

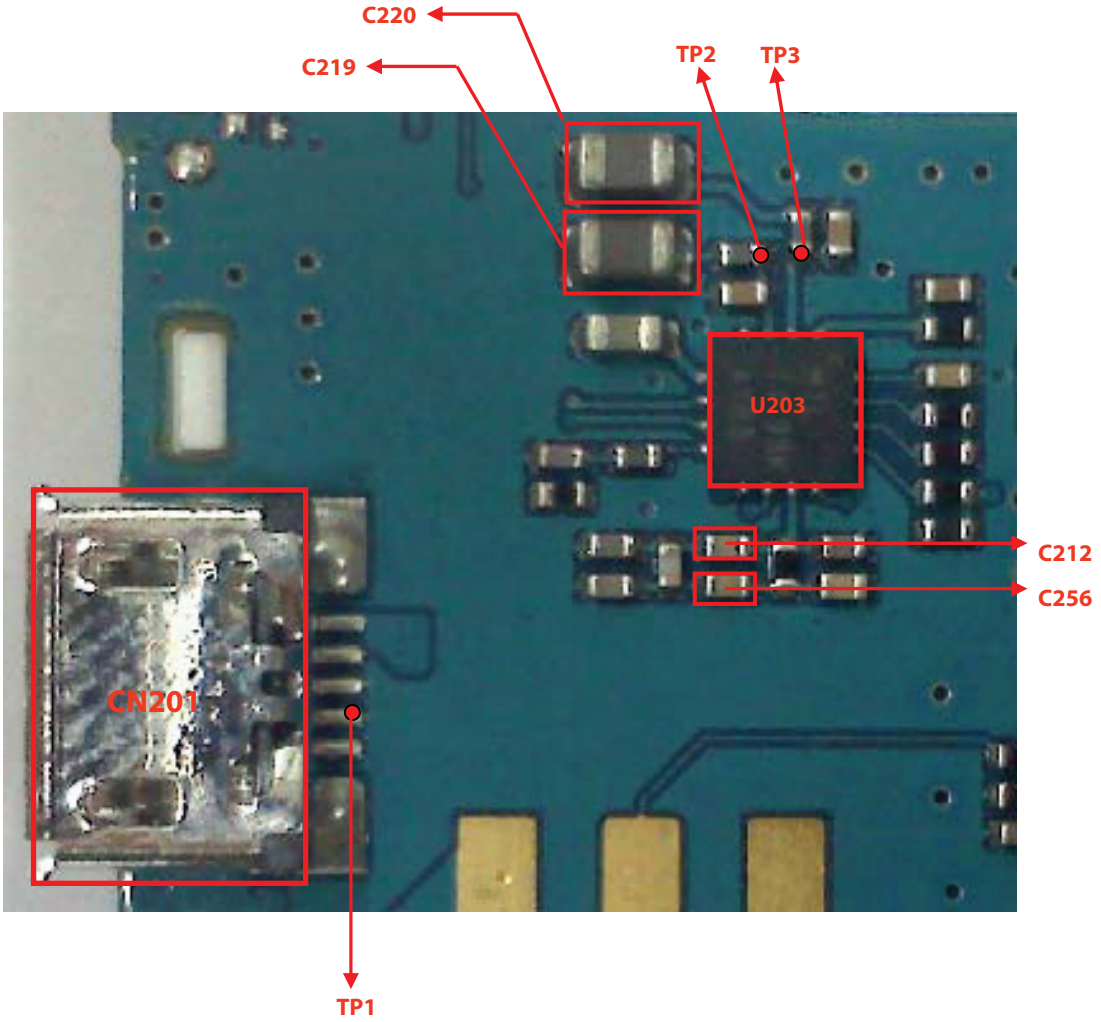
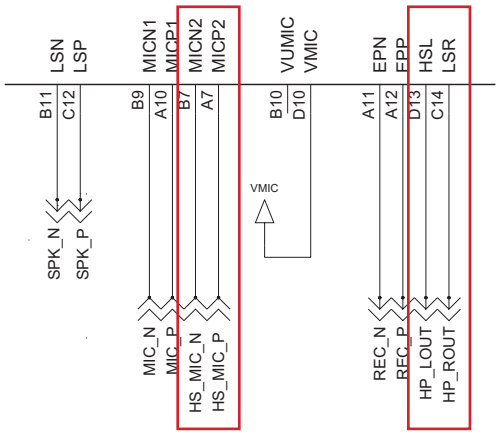
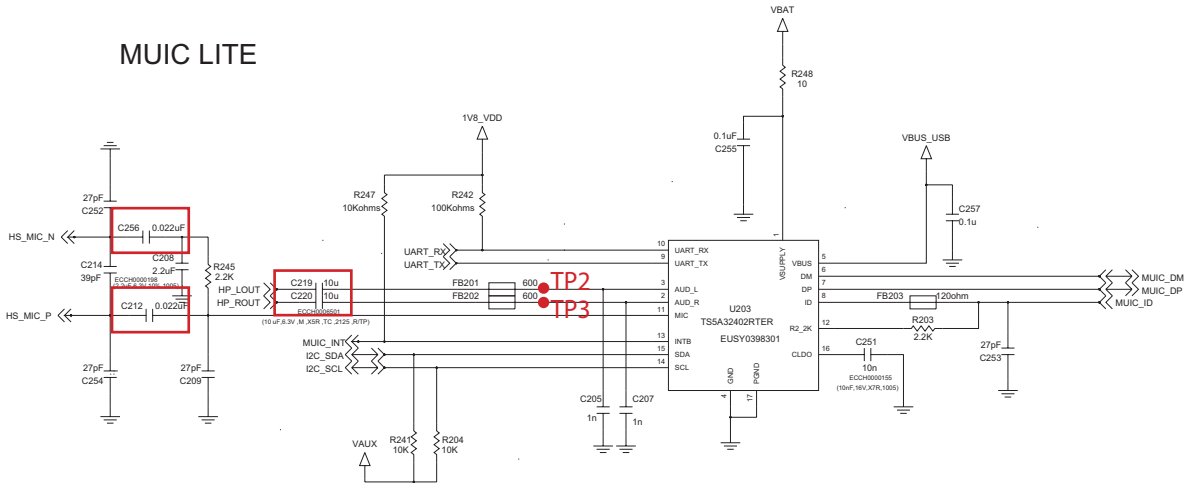
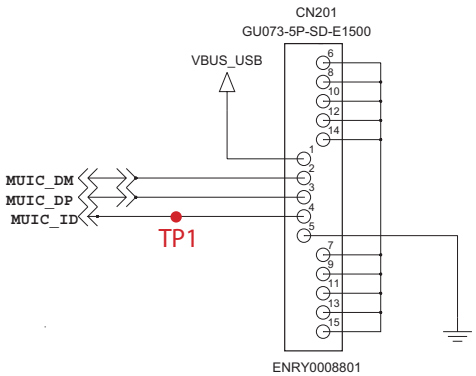


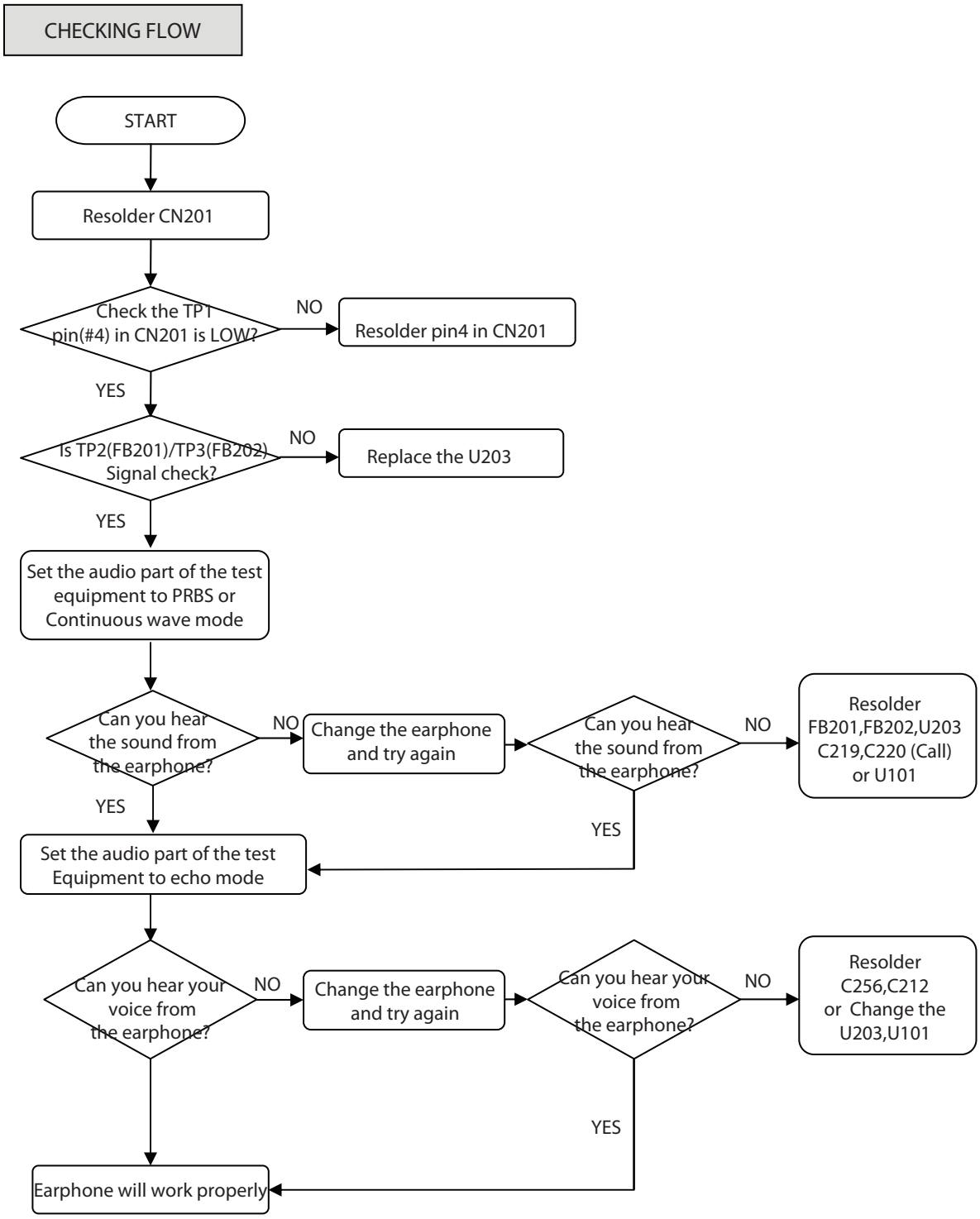
Figure 4.9.1

CIRCUIT









4.10 Microphone Trouble

TEST POINT

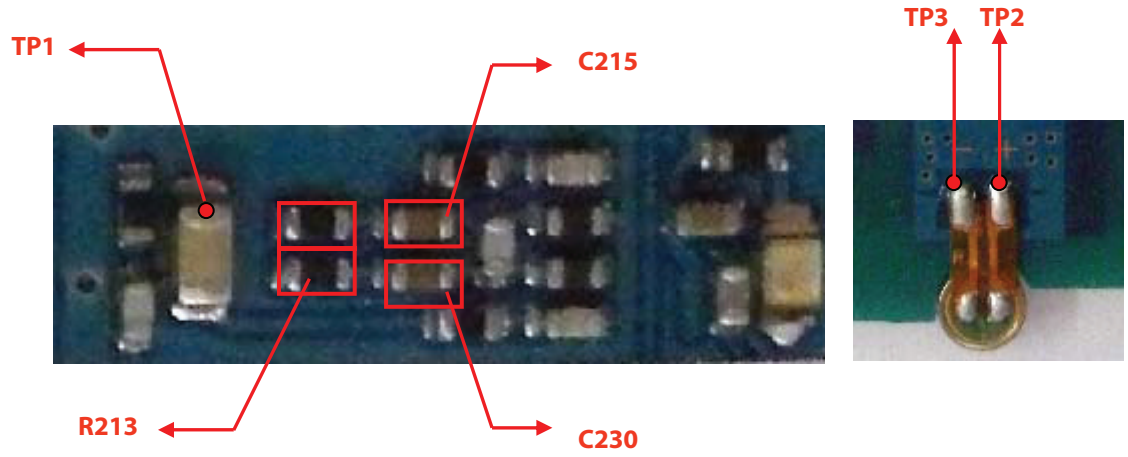
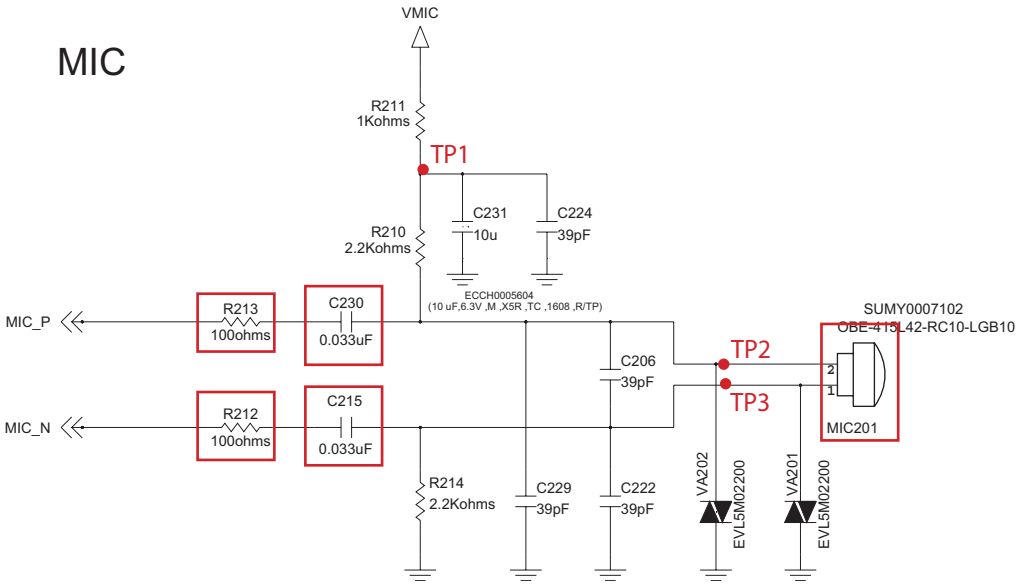


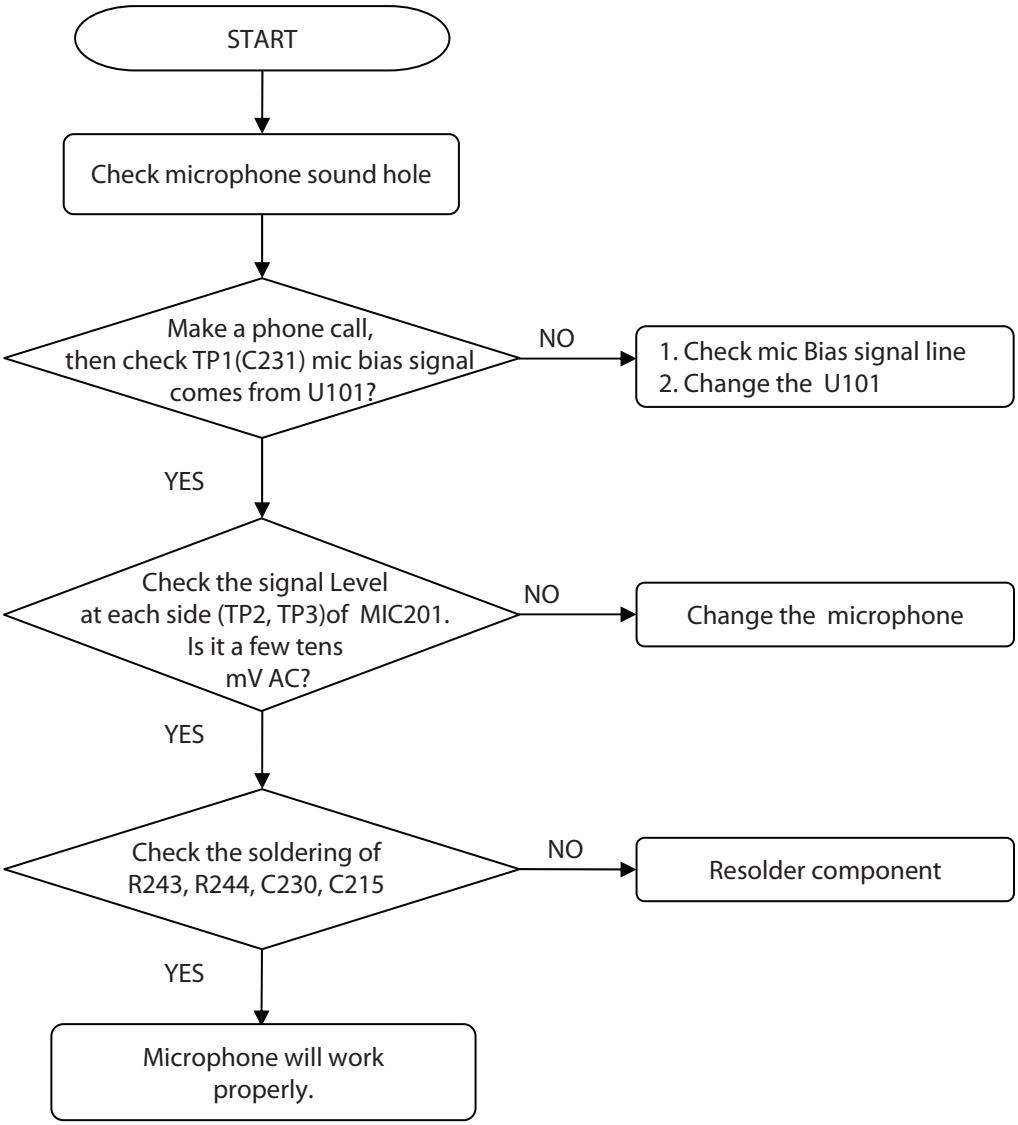
Figure 4.10.1

CIRCUIT



CHECKING FLOW

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



4.11 SIM Card Interface Trouble

TEST POINT

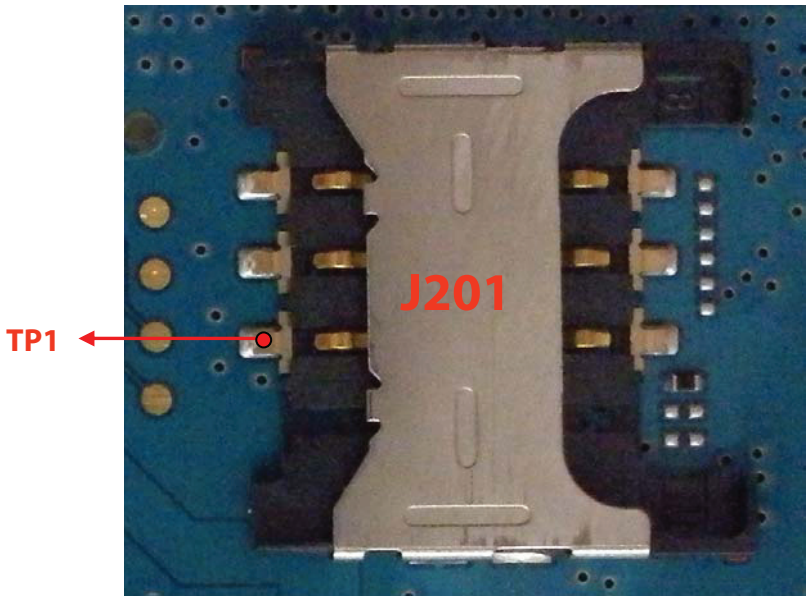
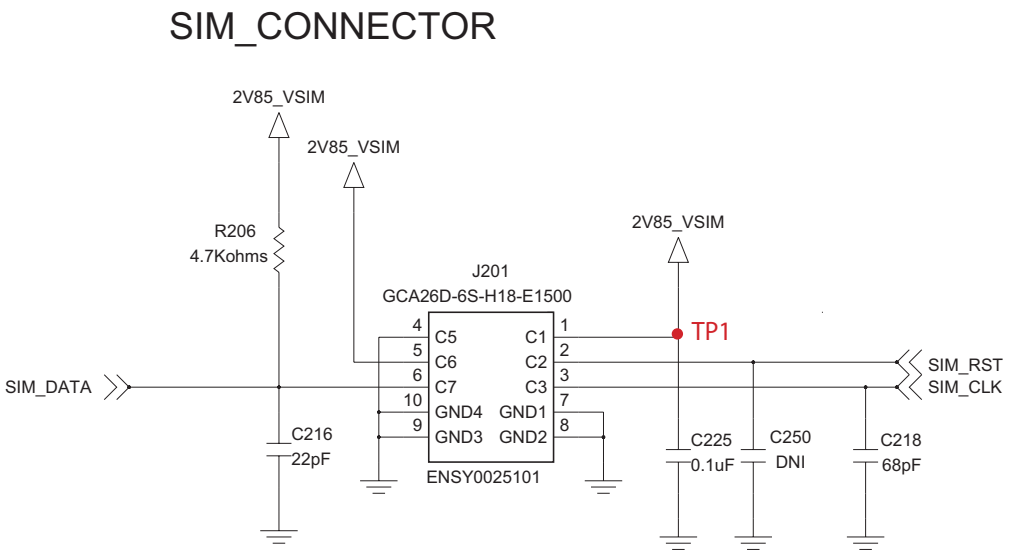
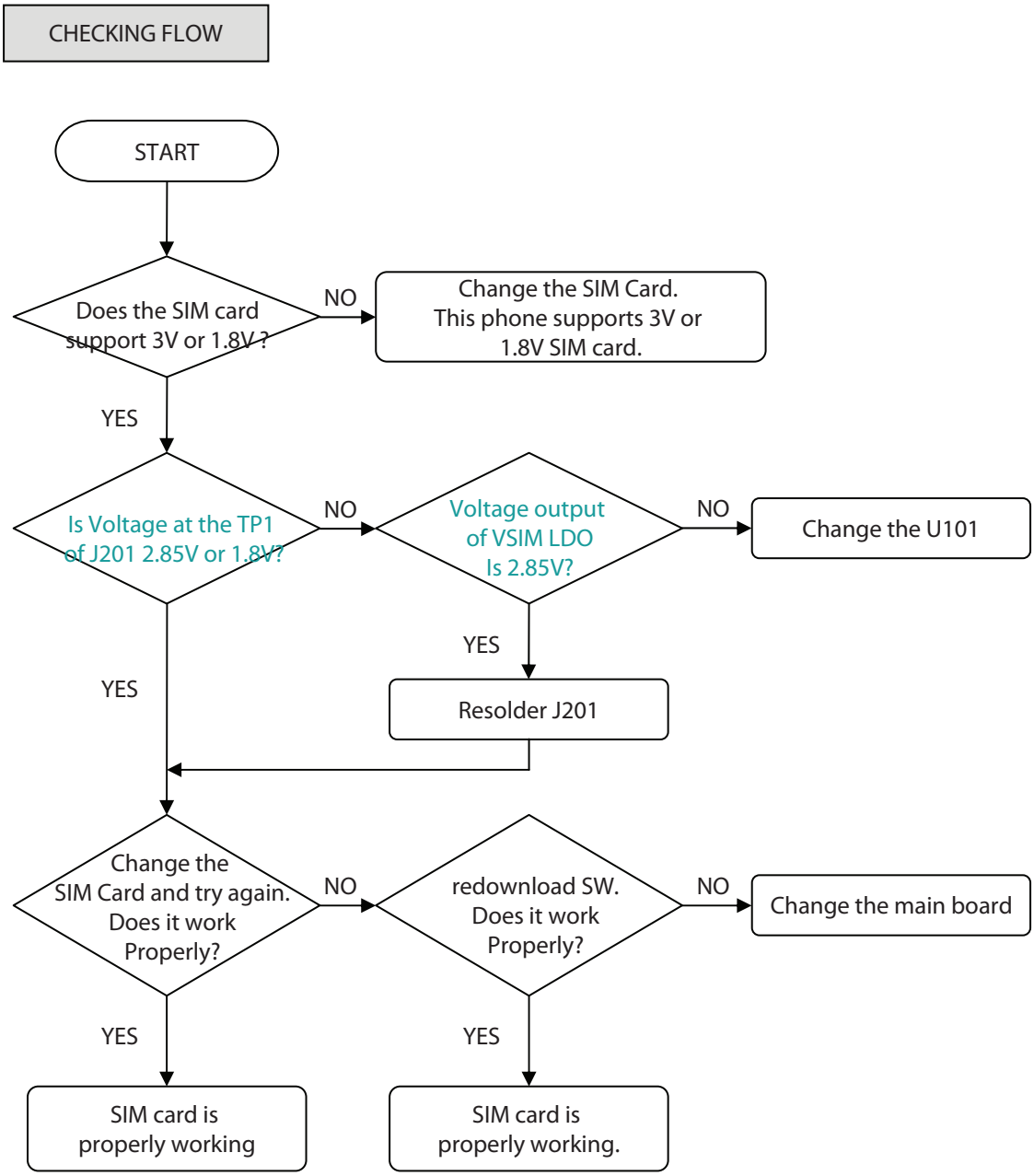


Figure 4.11.1

CIRCUIT





4.12 KEY backlight Trouble

TEST POINT

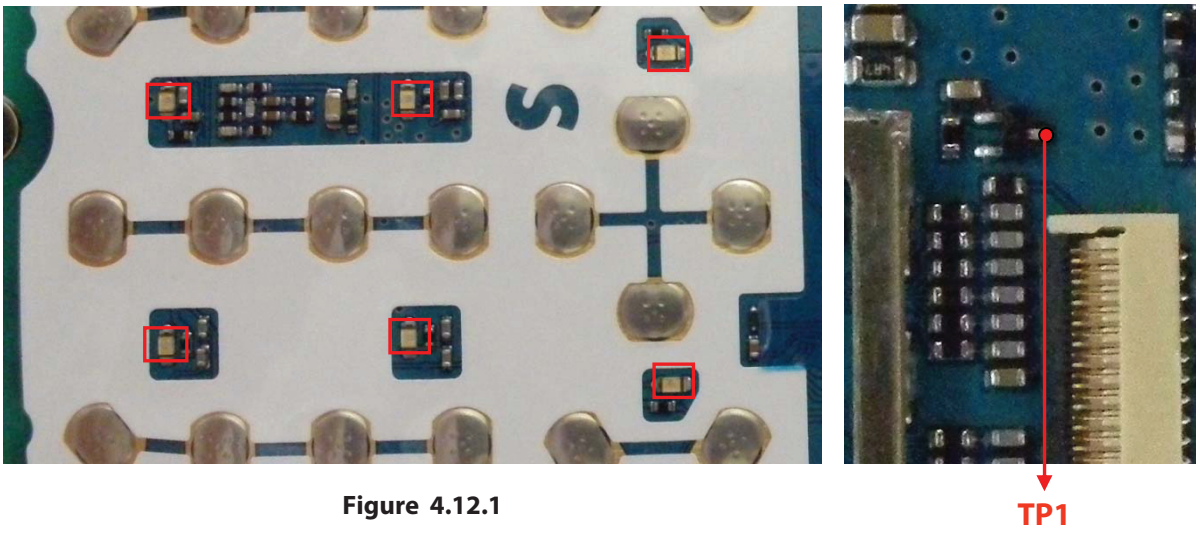
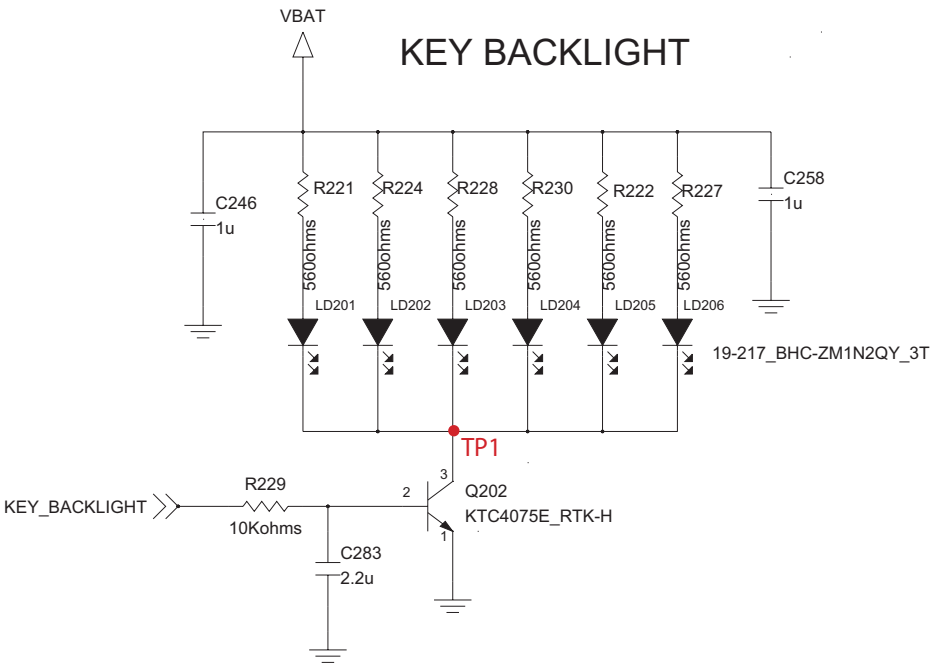
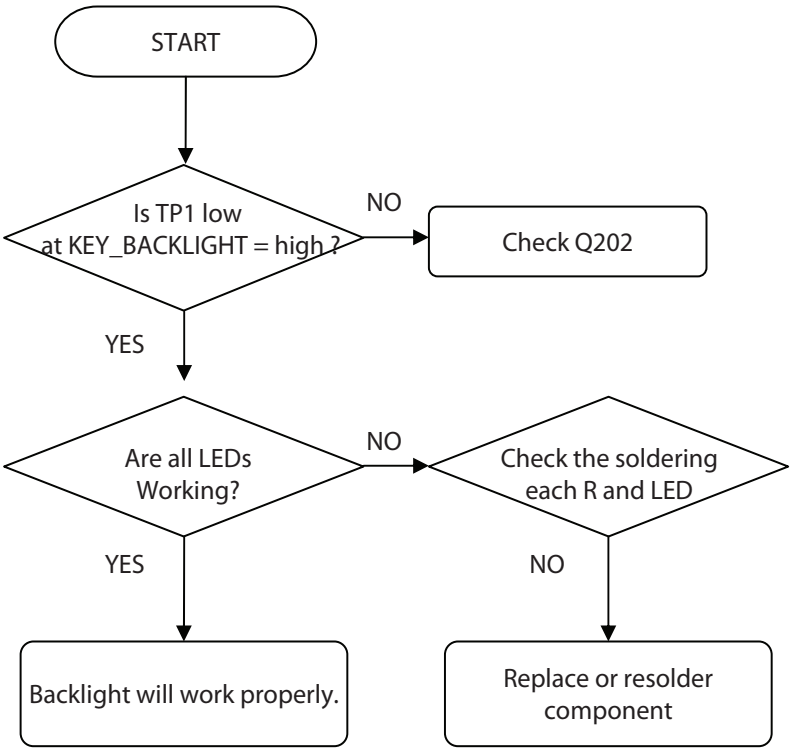


Figure 4.12.1

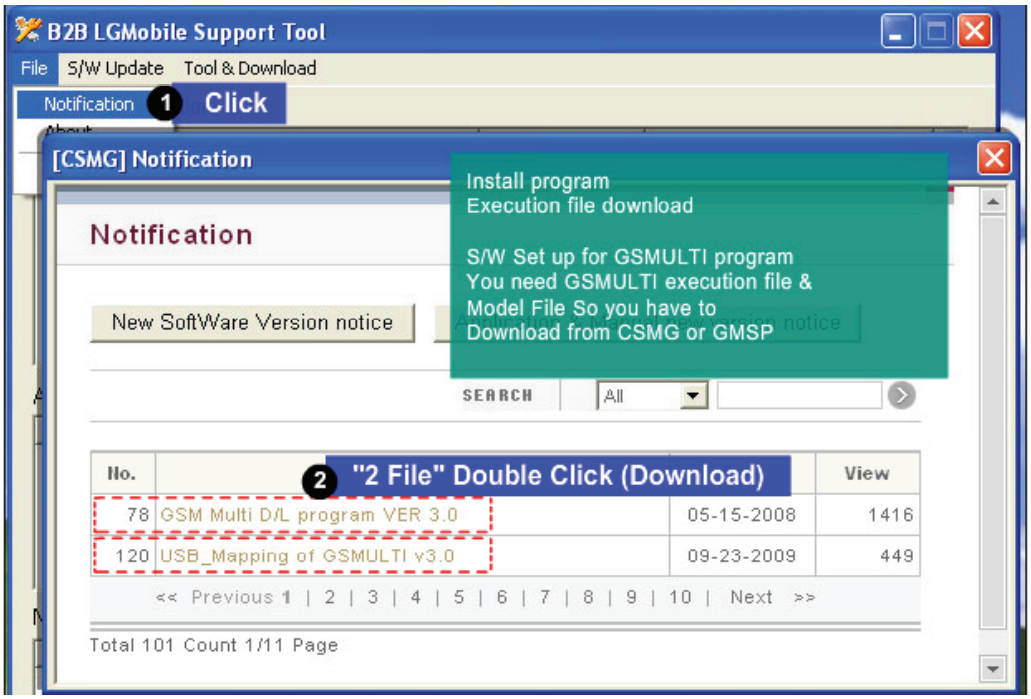
CIRCUIT

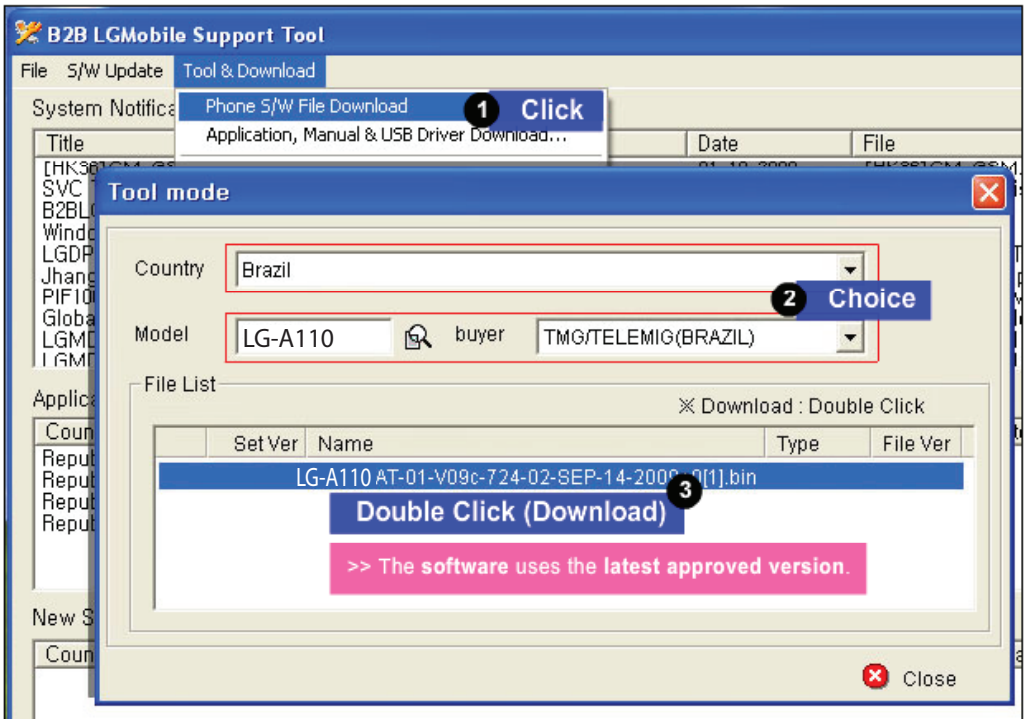


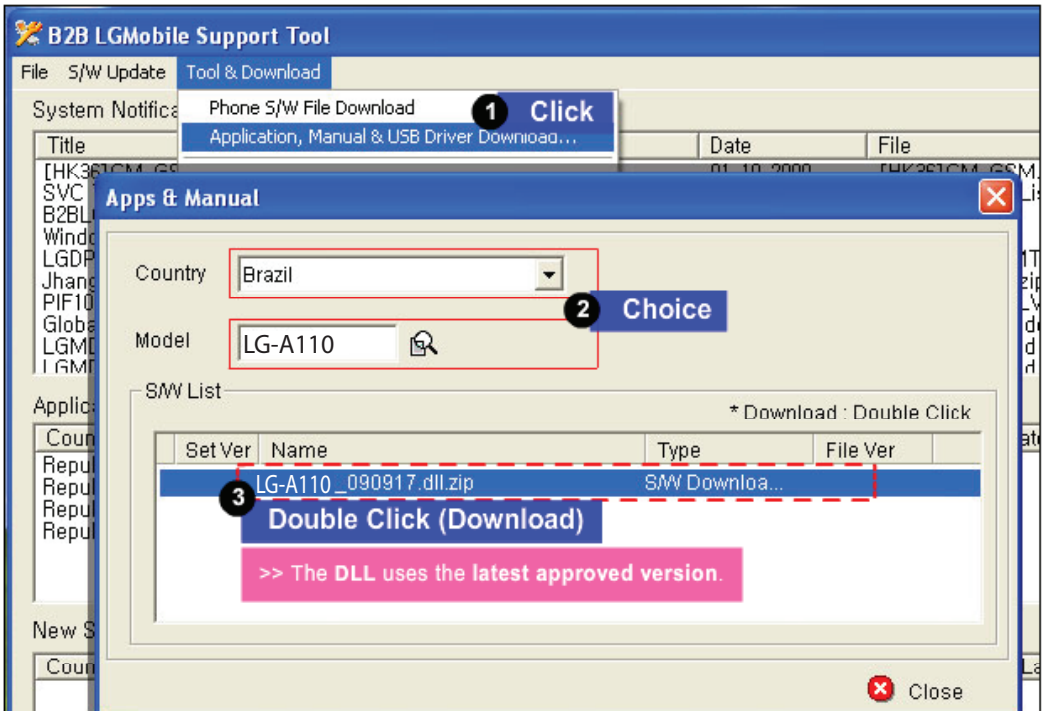
CHECKING FLOW

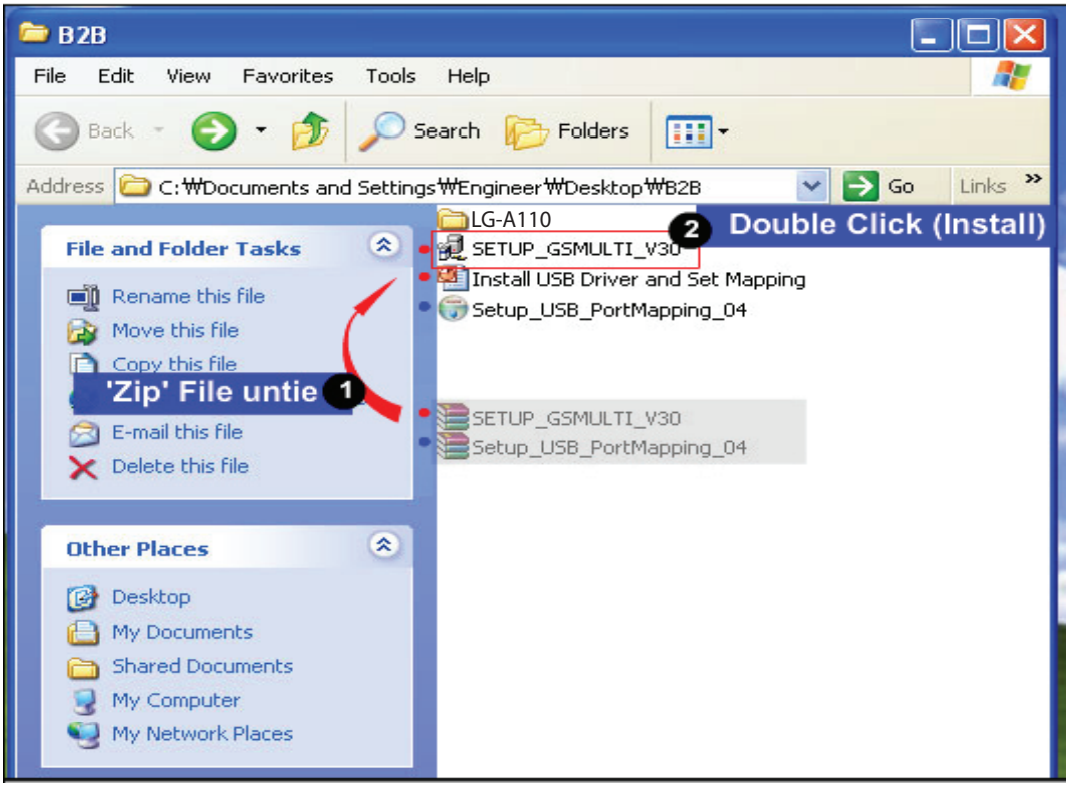


5. DOWNLOAD

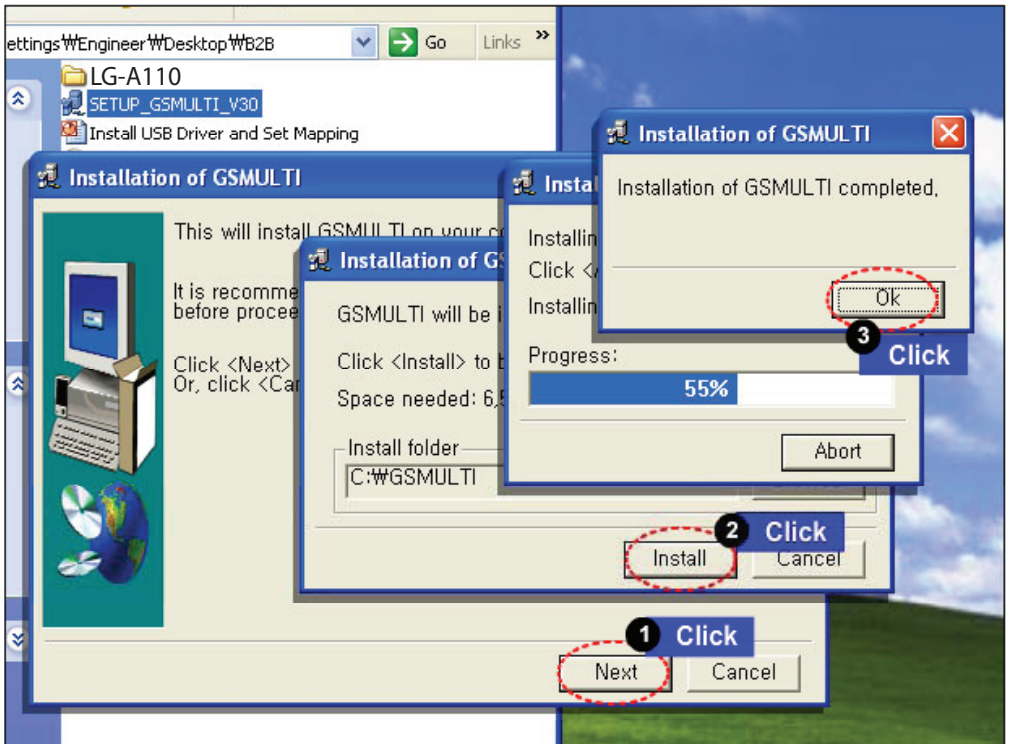


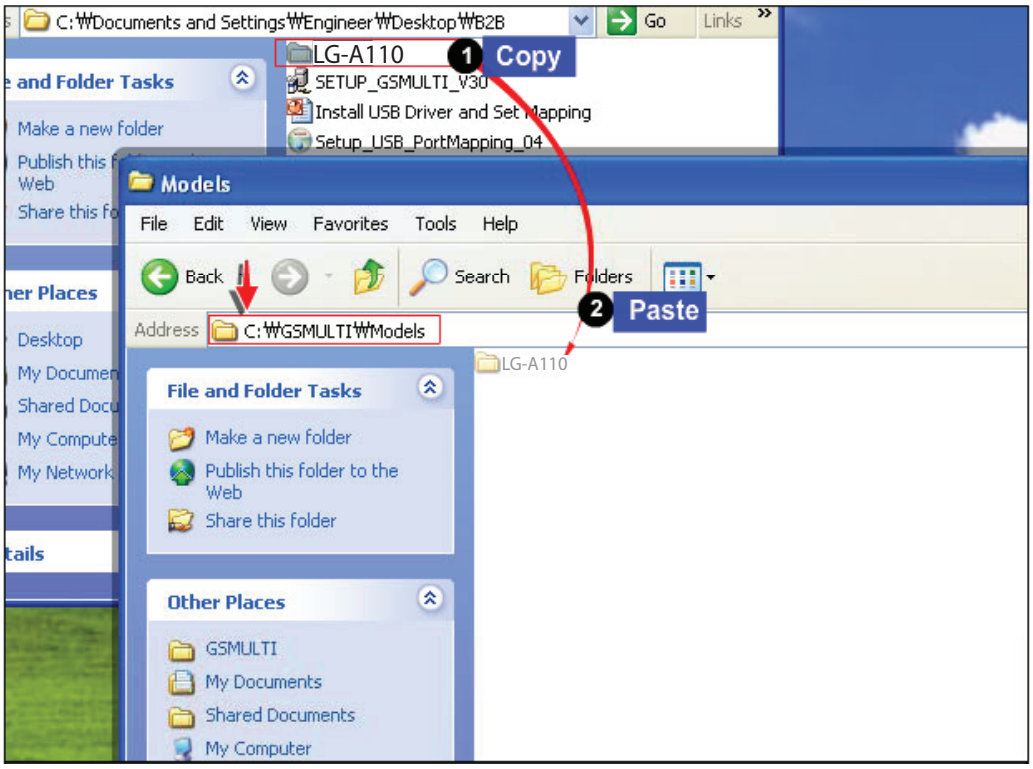


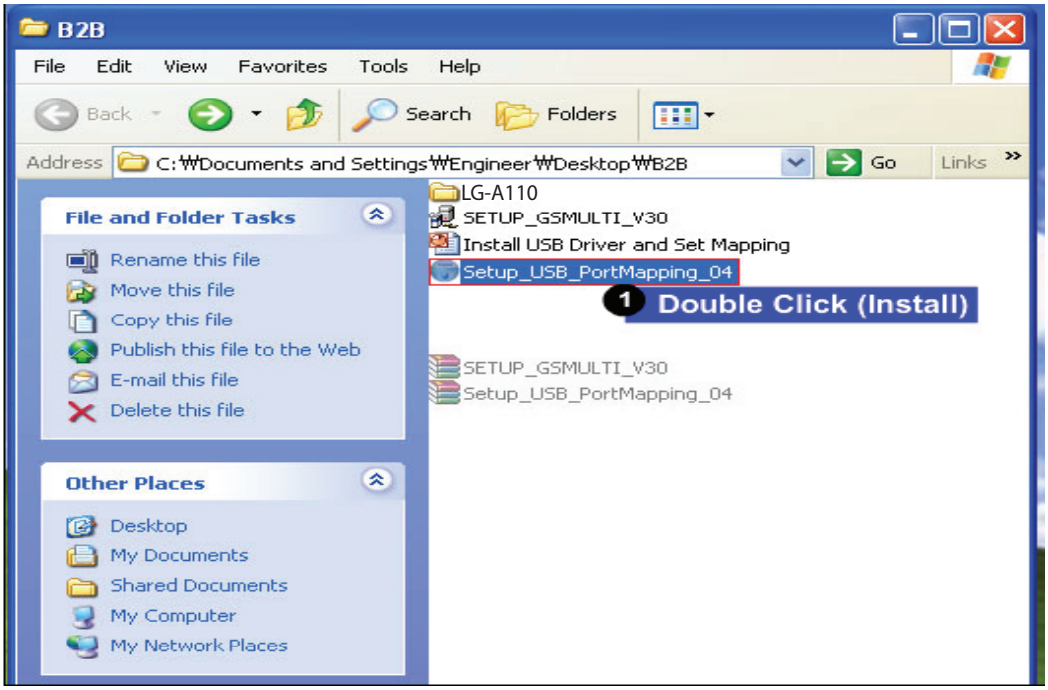


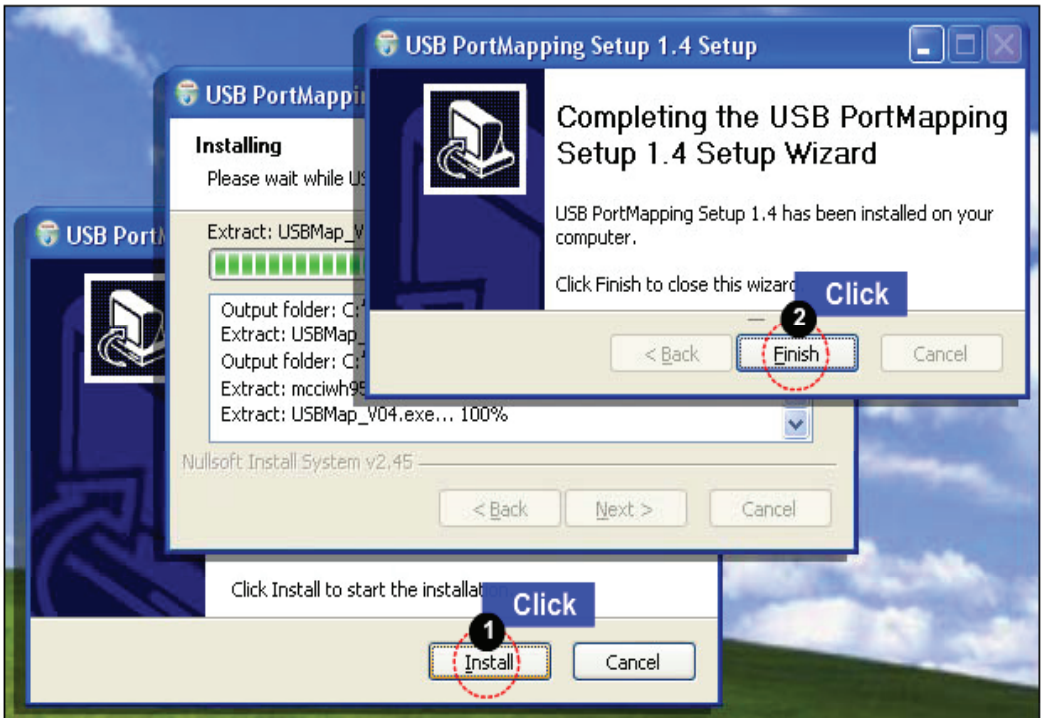


5. DOWNLOAD









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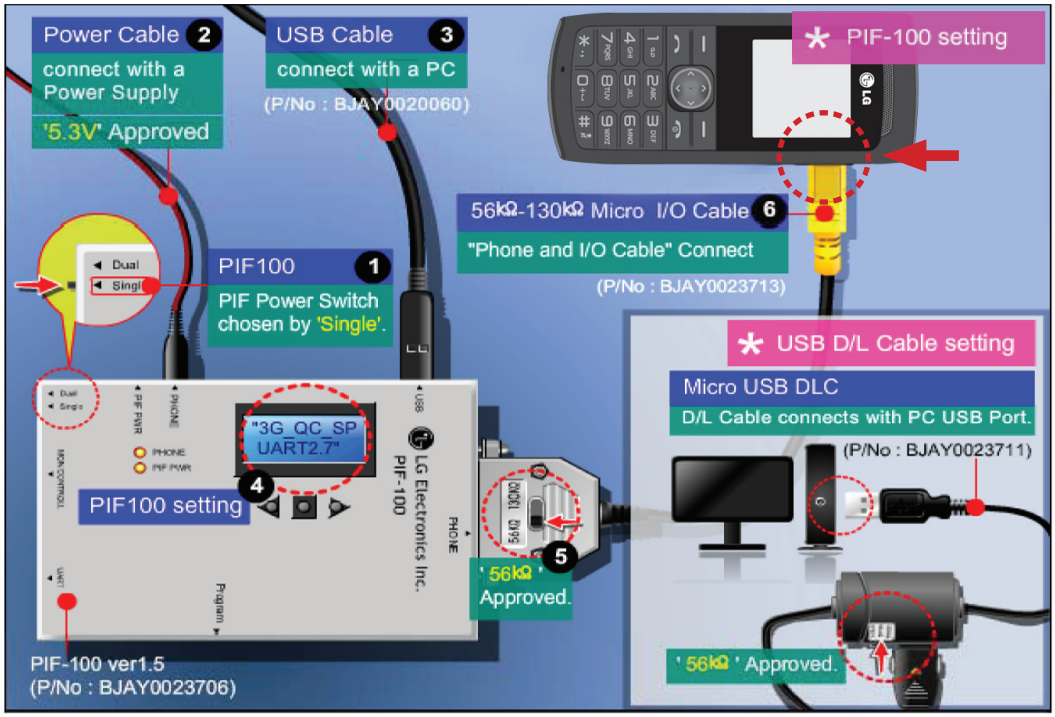

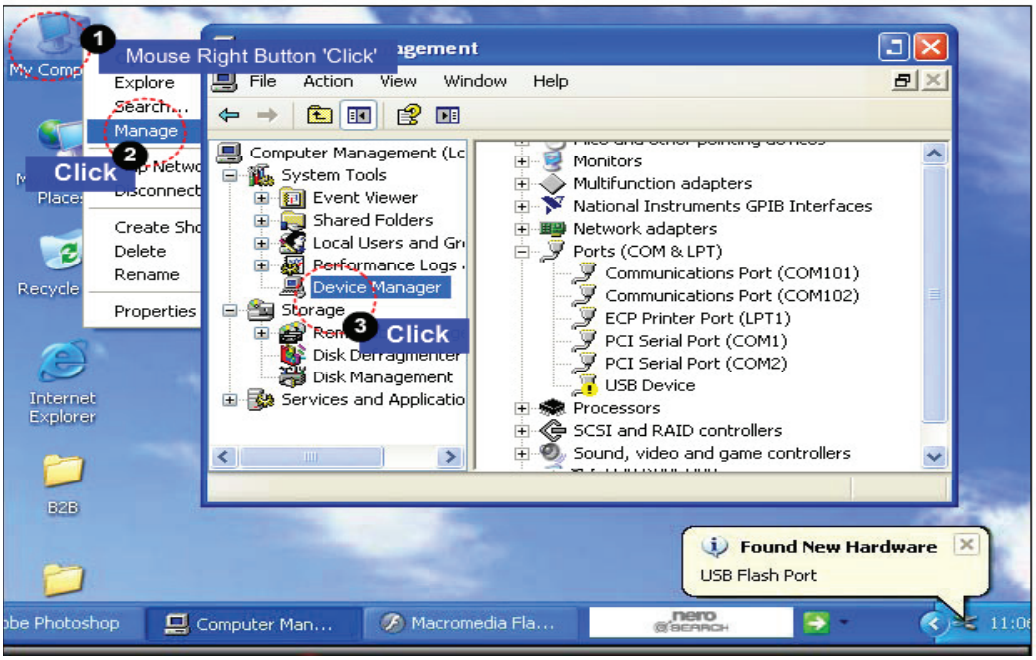

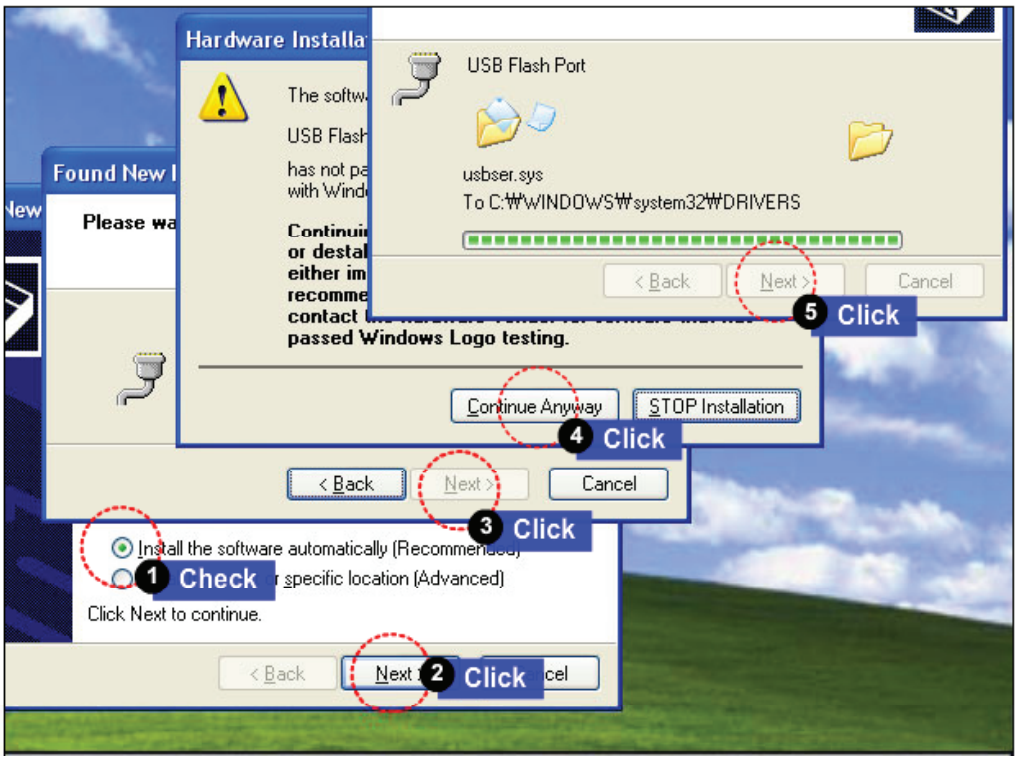

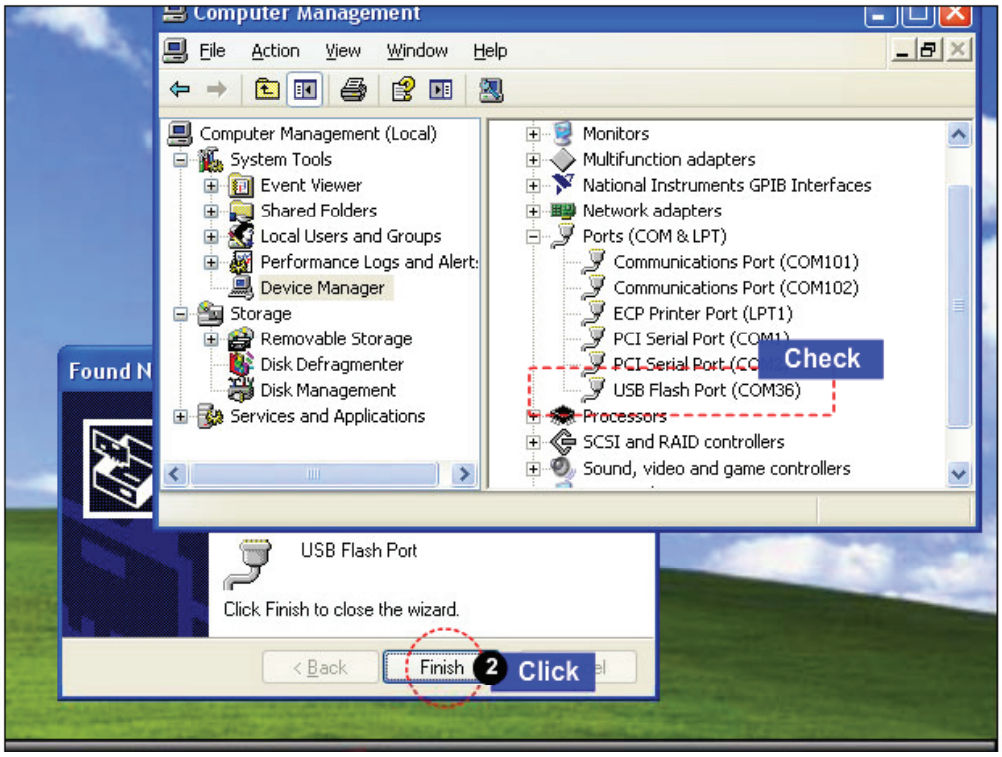

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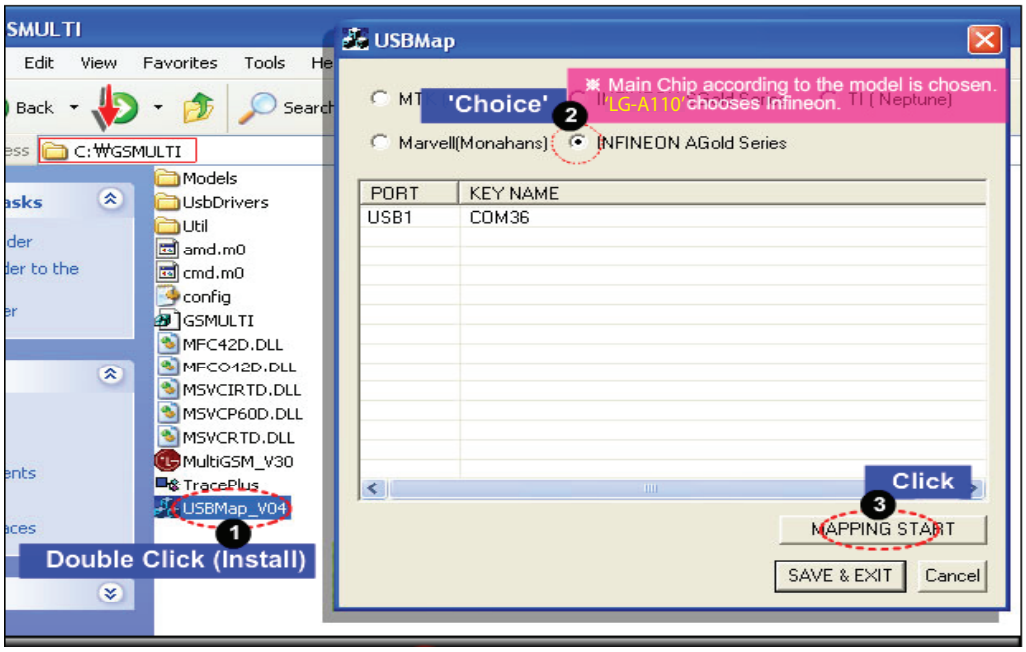

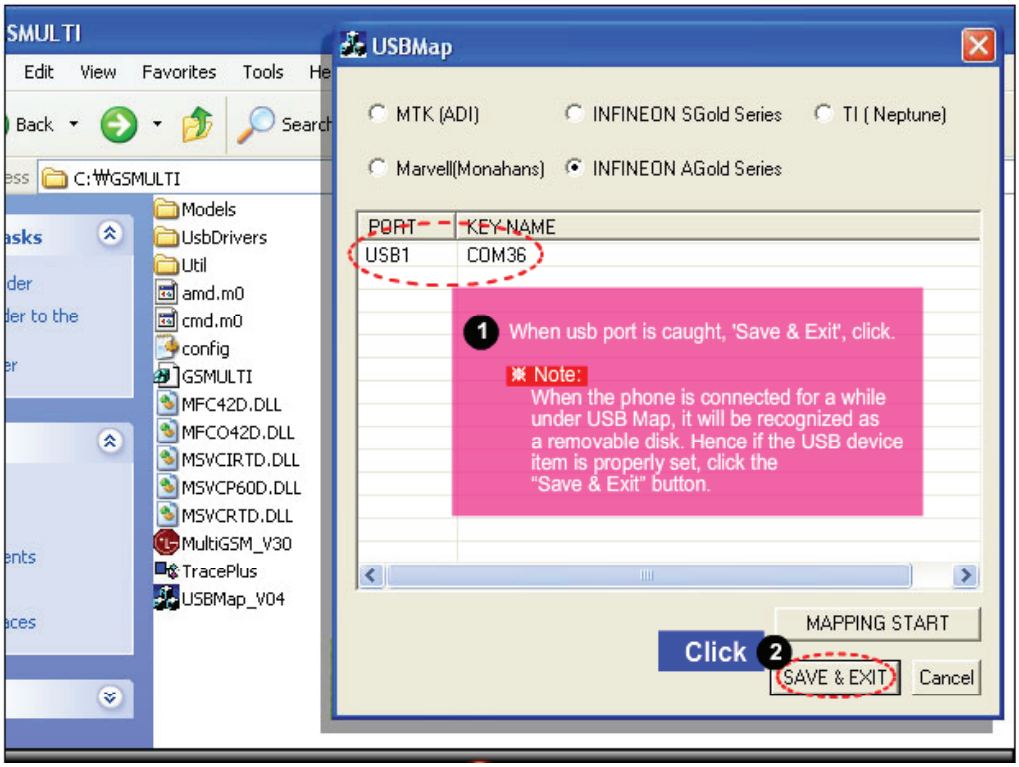

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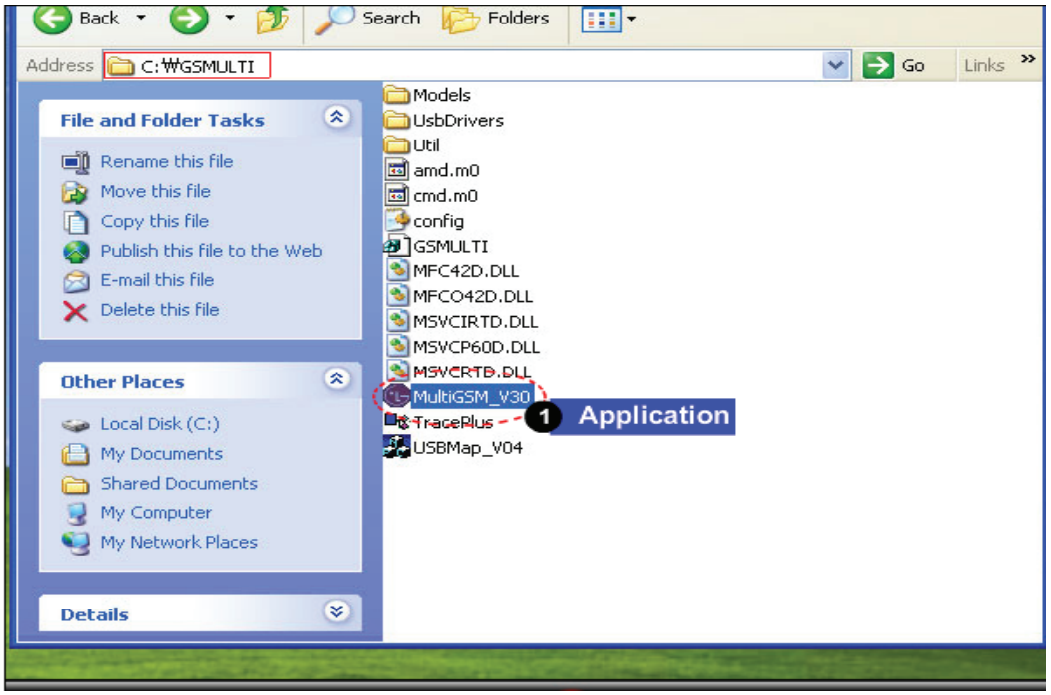
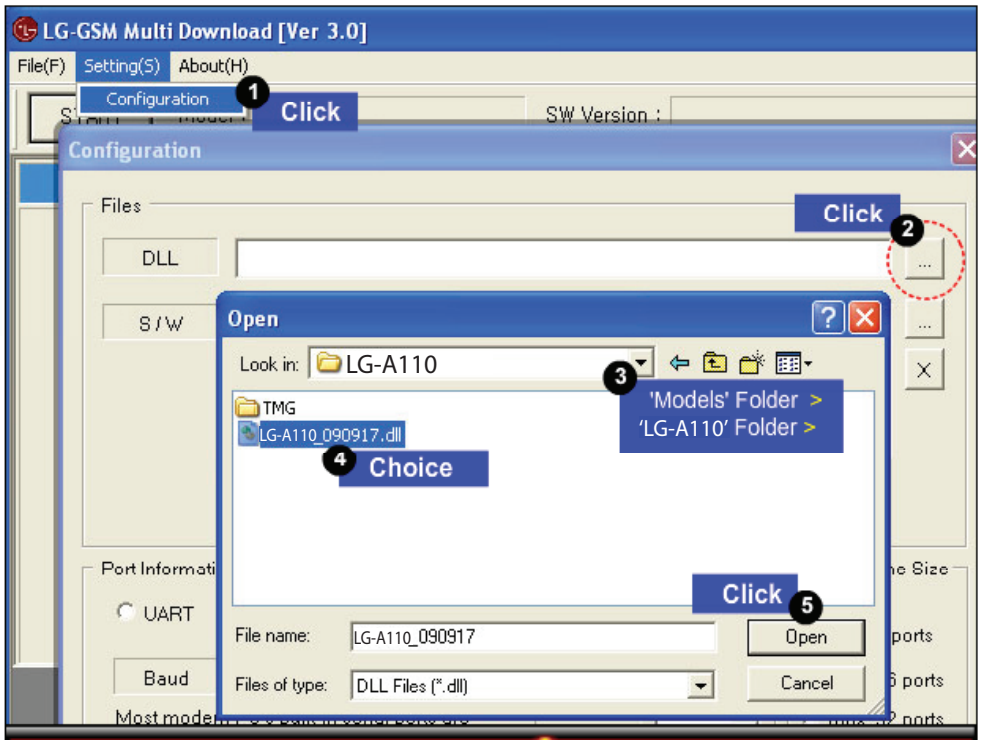
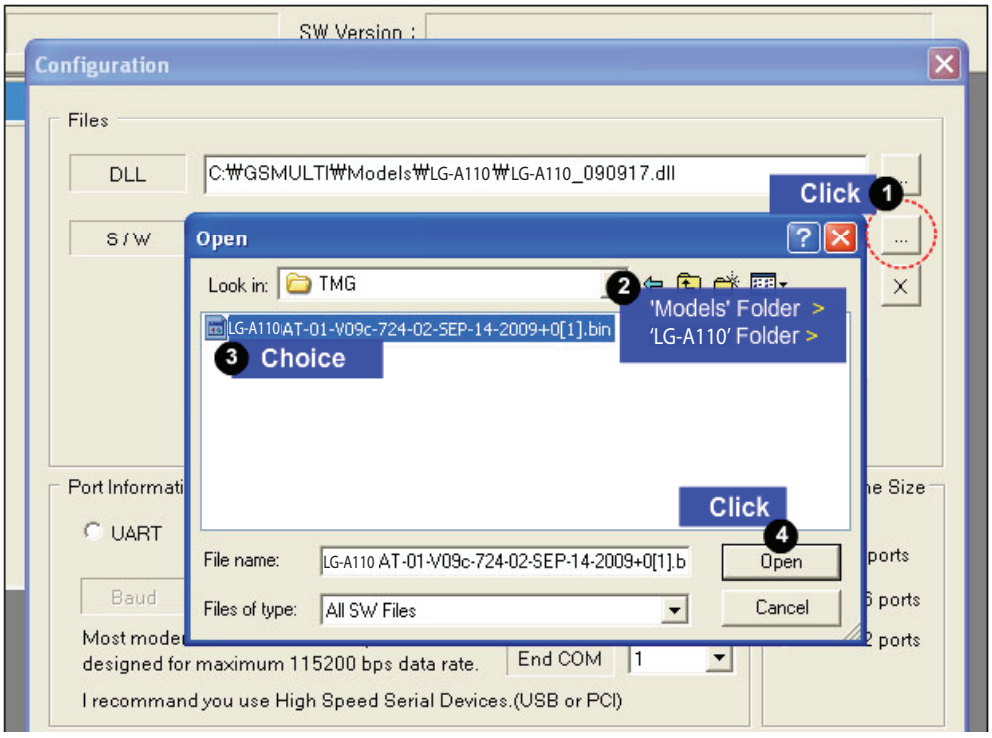
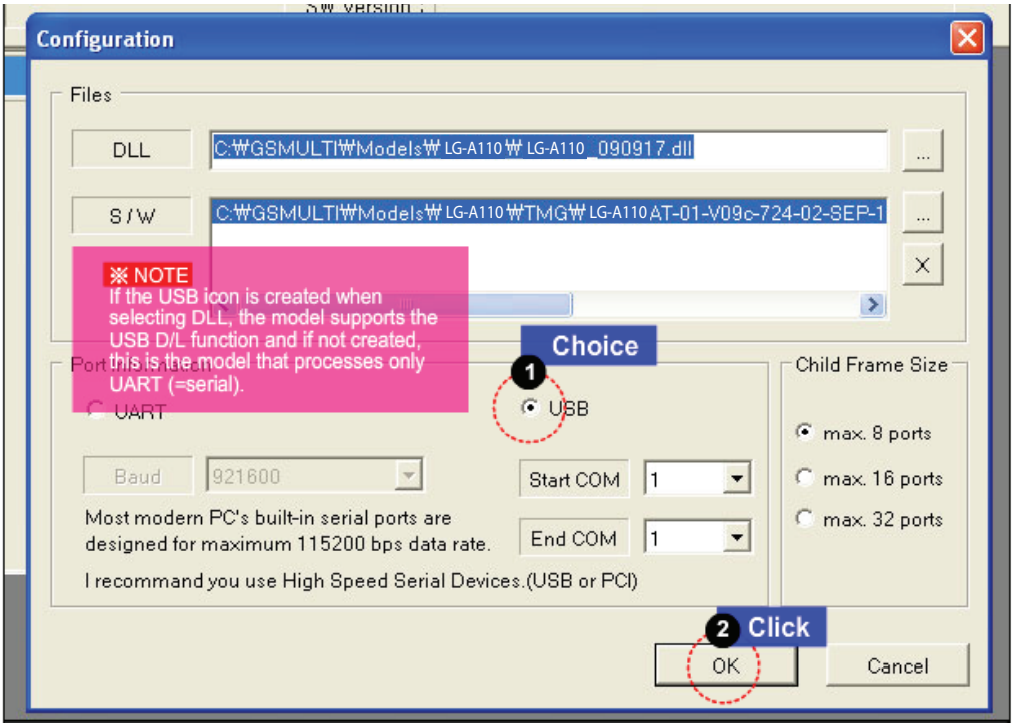
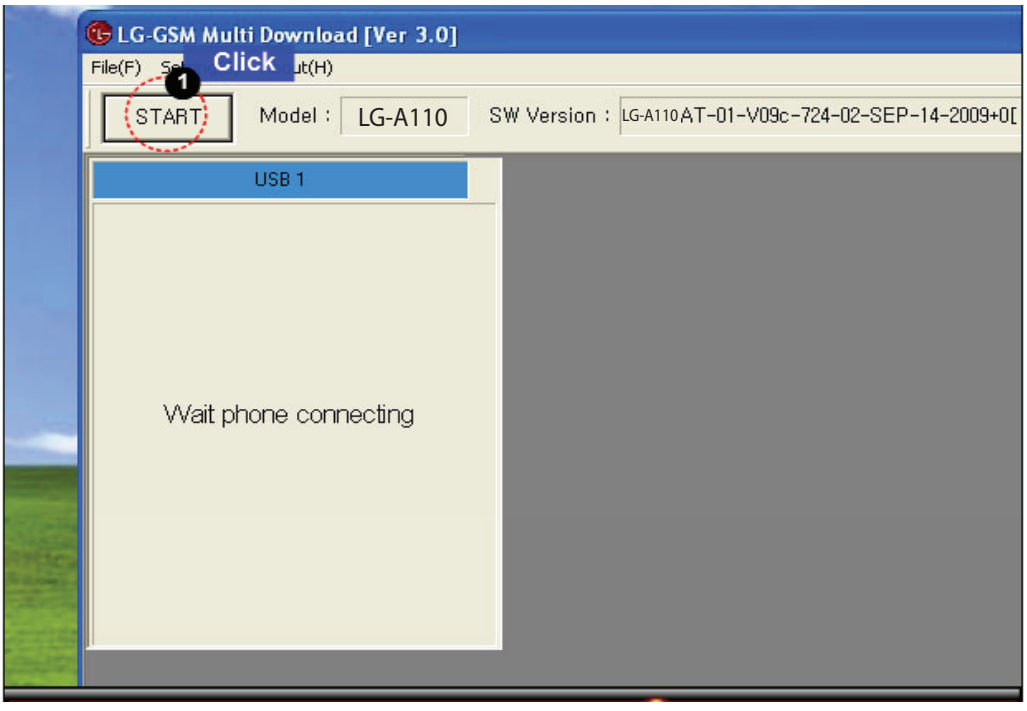


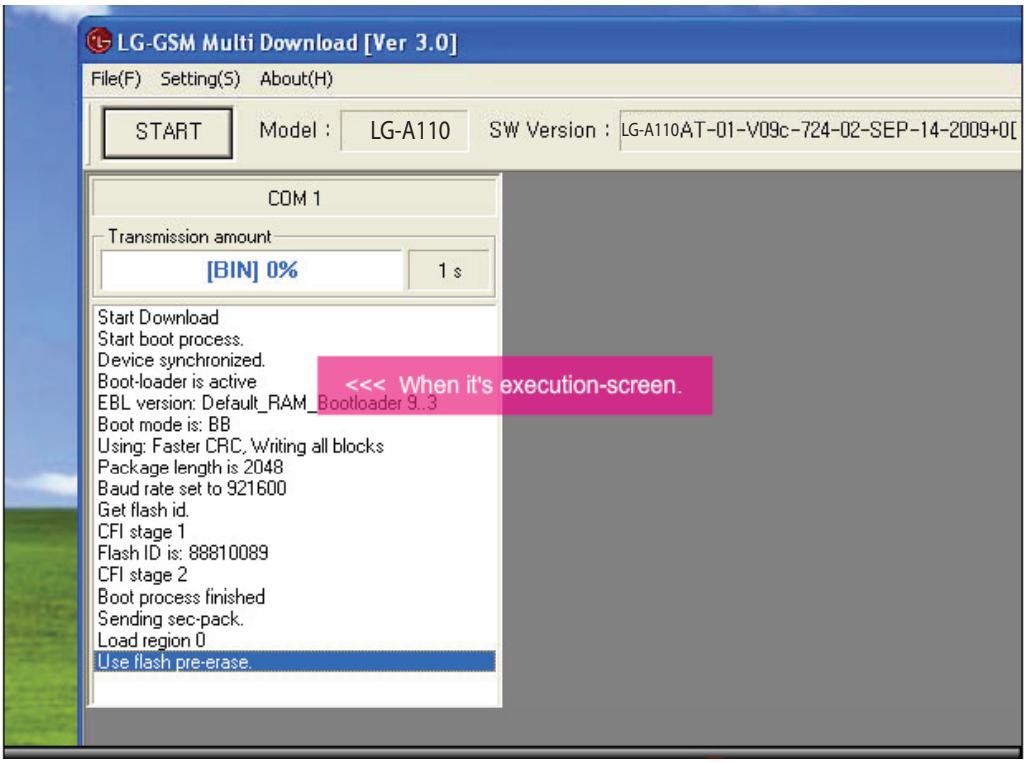




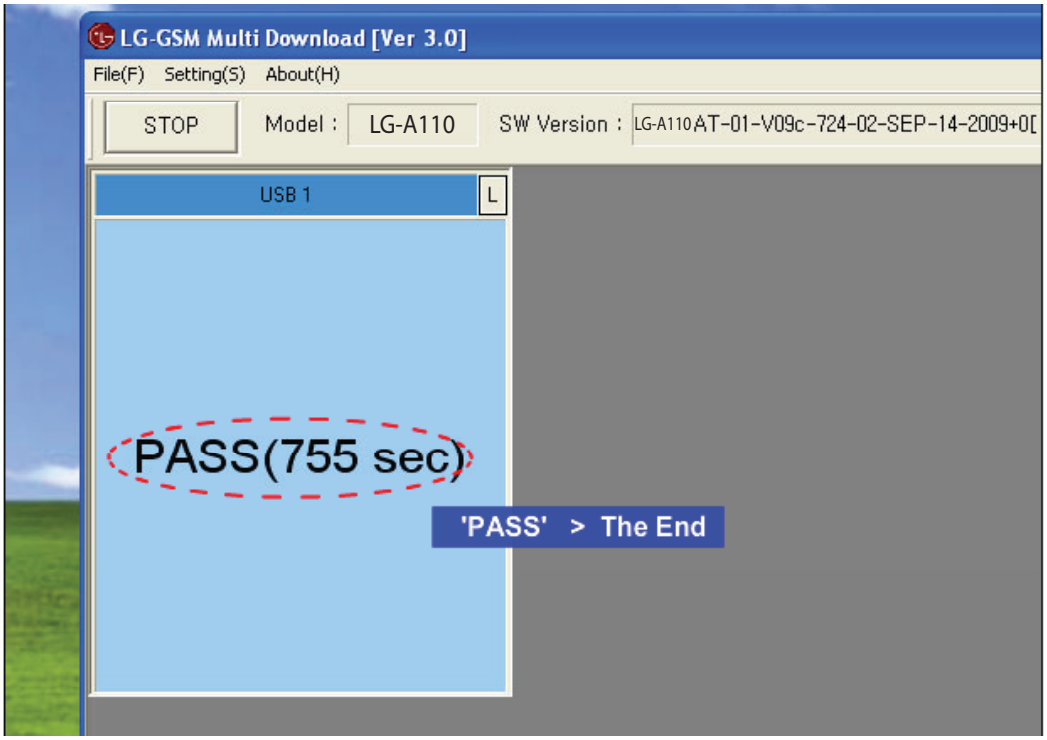
5. DOWNLOAD



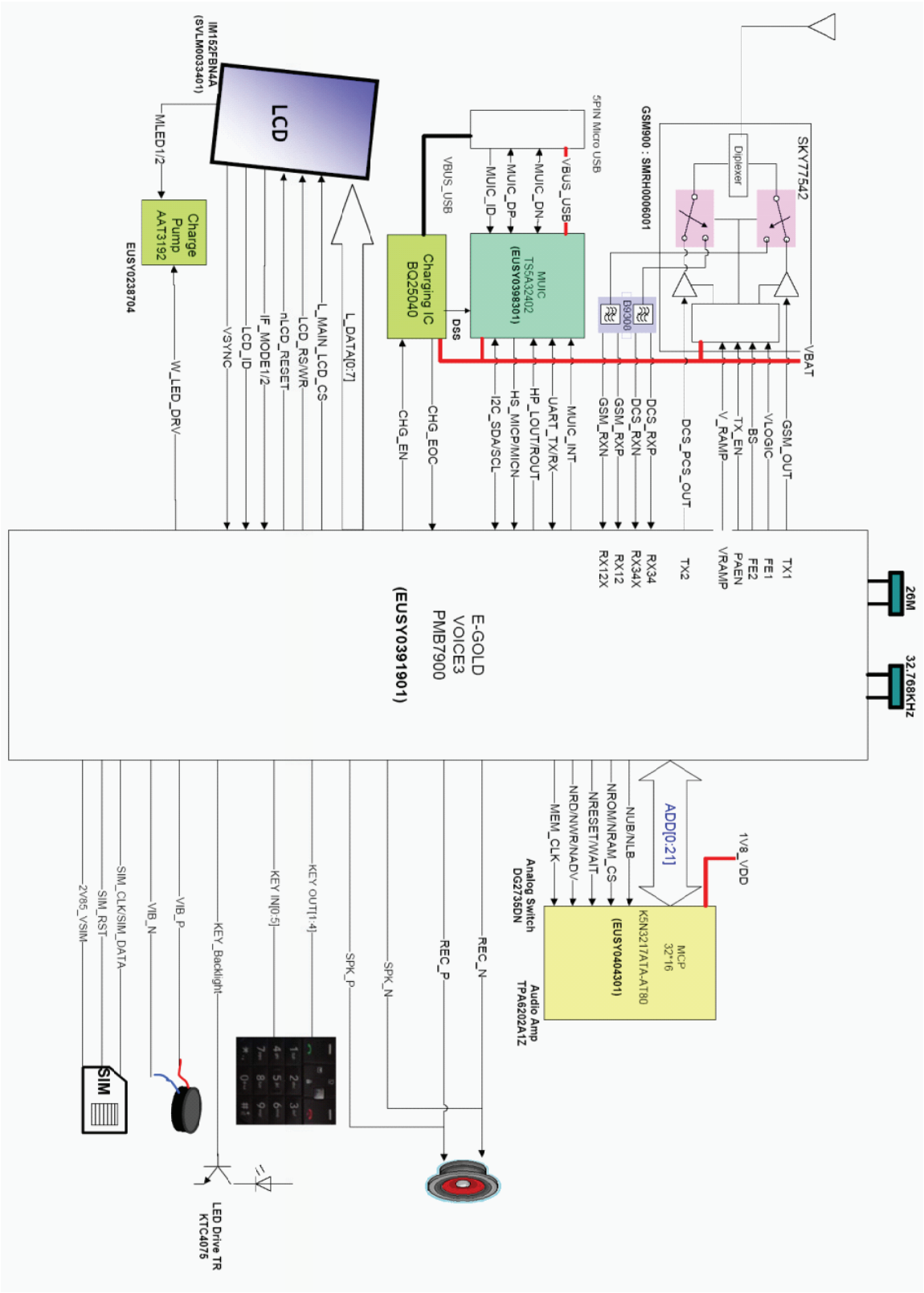




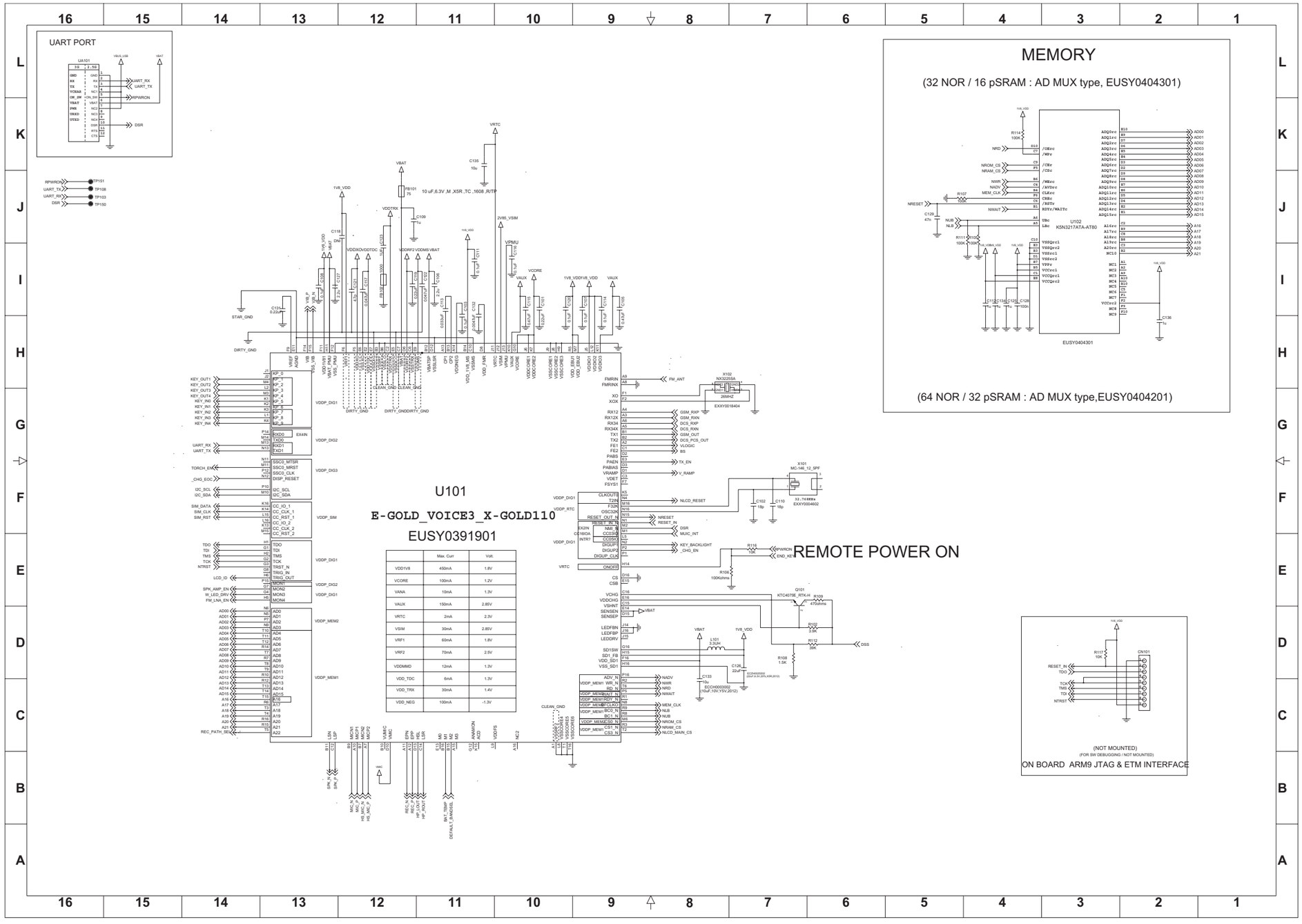
5. DOWNLOAD



6. BLOCK DIAGRAM

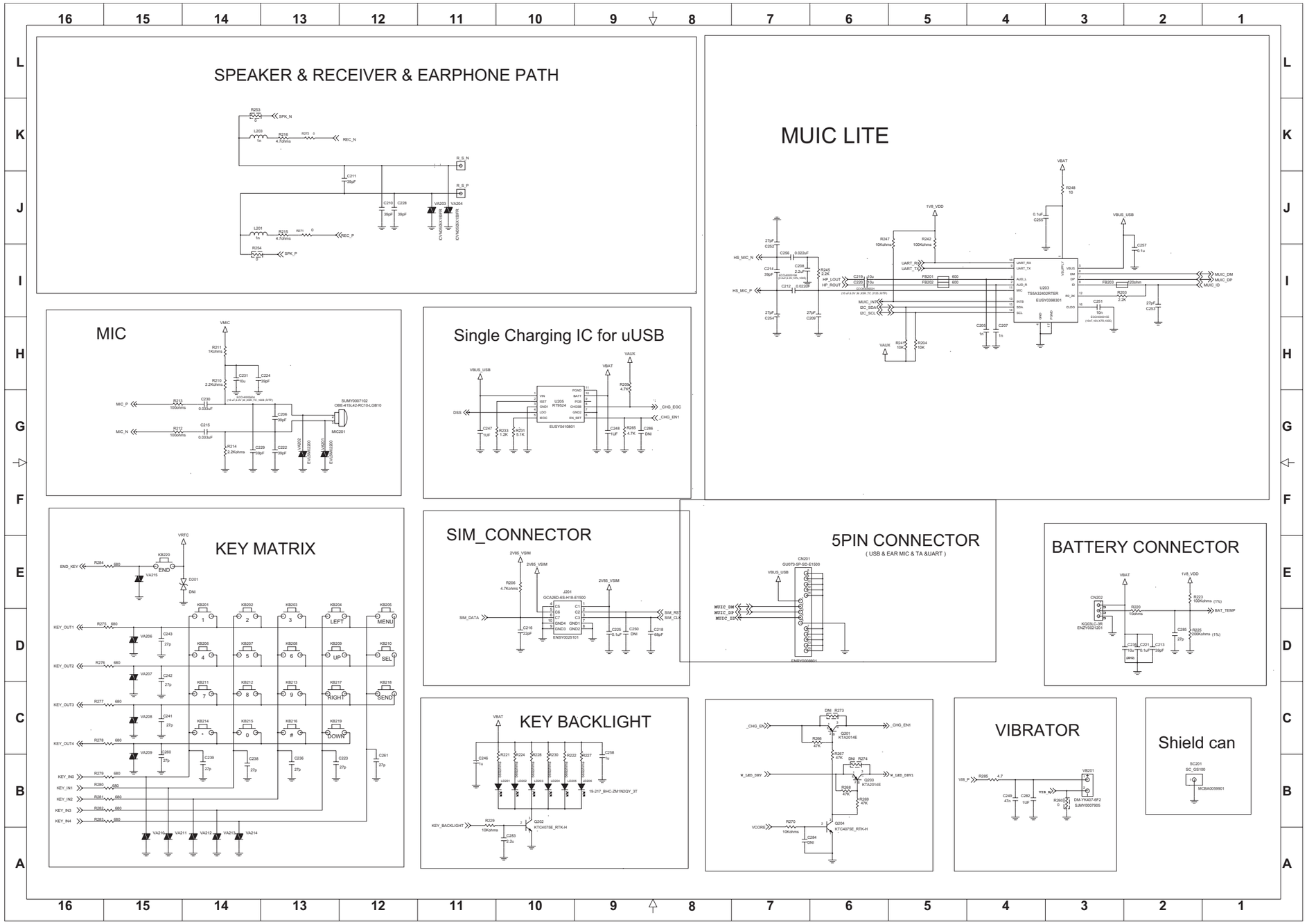


7. CIRCUIT DIAGRAM

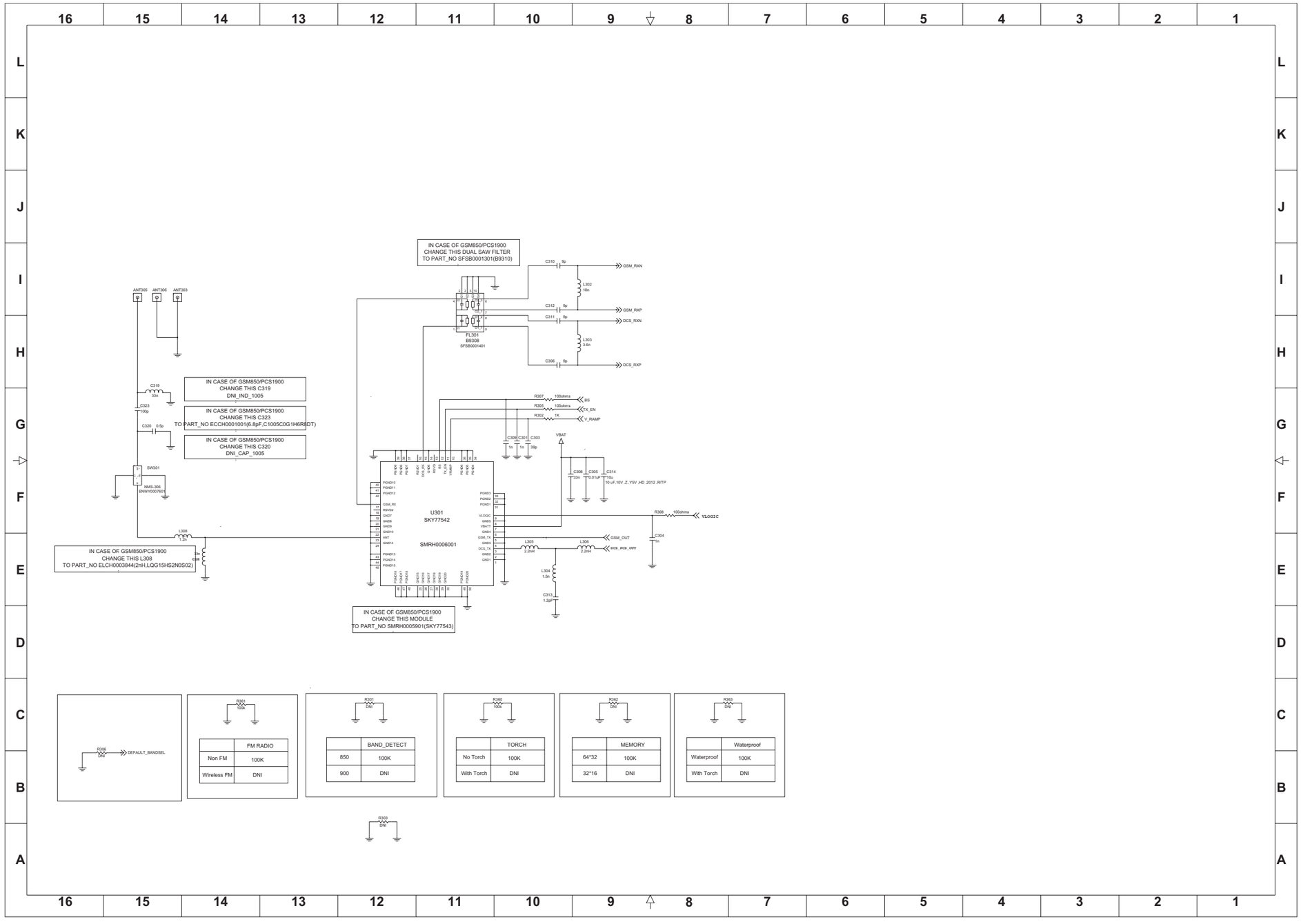


	Max. Curr	Volt.
VDDTV8	450mA	1.8V
VCORE	100mA	1.2V
VANA	10mA	1.3V
VAUX	150mA	2.85V
VRTC	2mA	2.3V
VSIM	30mA	2.85V
VRF1	60mA	1.8V
VRF2	70mA	2.5V
VDDMMD	12mA	1.3V
VDD_TDC	6mA	1.3V
VDD_TRX	30mA	1.4V
VDD_NEG	100mA	-1.3V

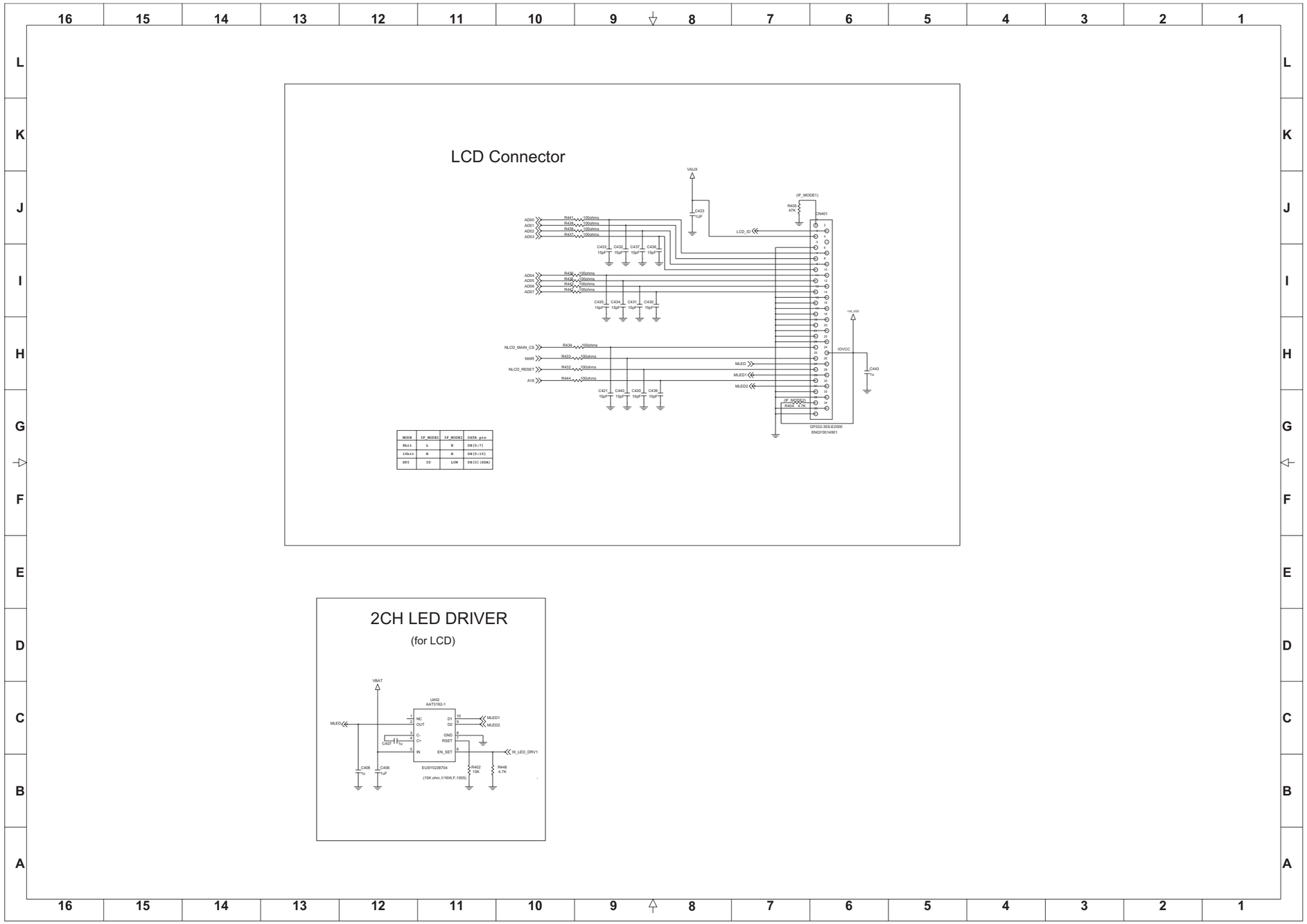
7. CIRCUIT DIAGRAM



7. CIRCUIT DIAGRAM



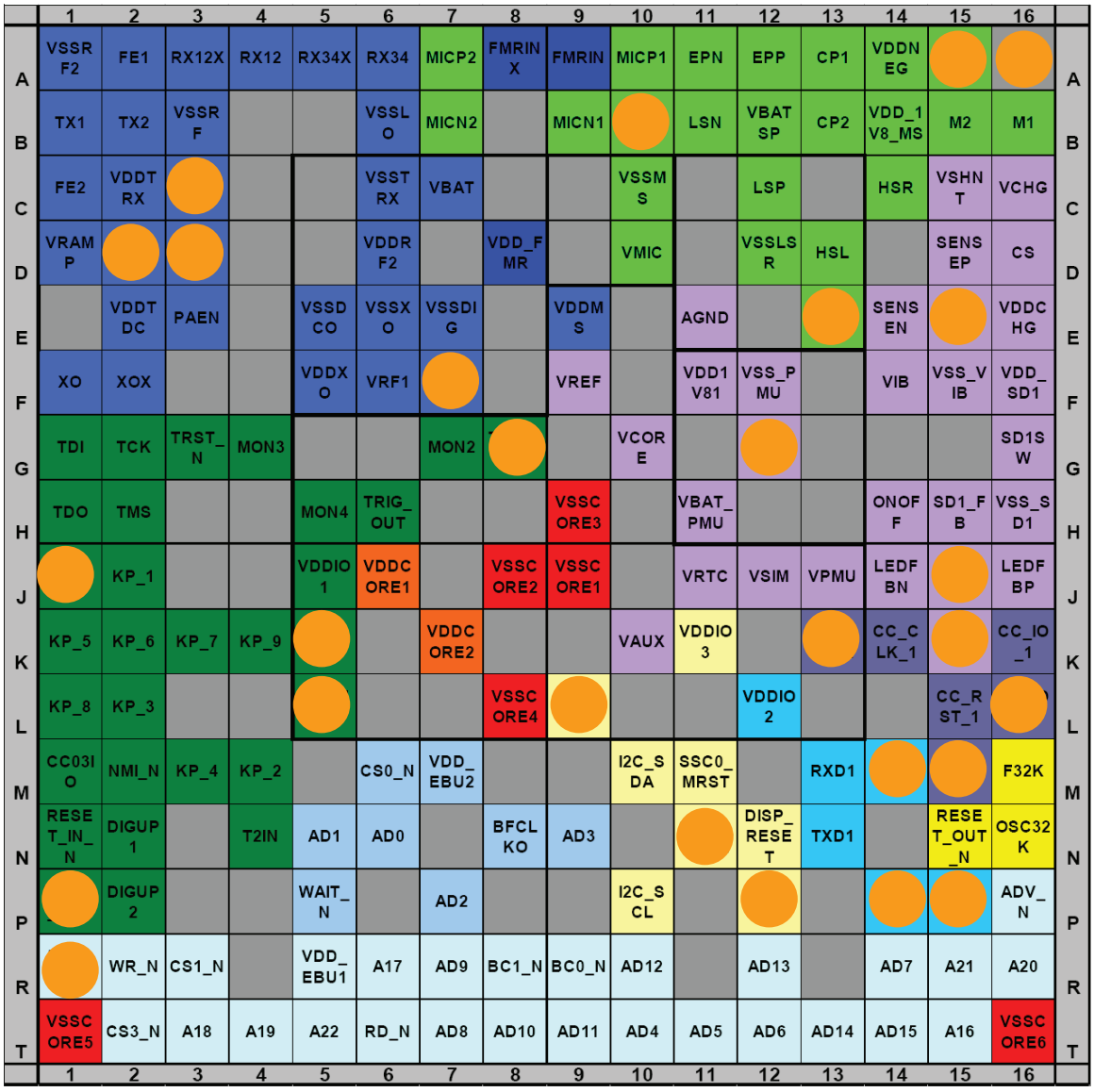
7. CIRCUIT DIAGRAM



8. BGA PIN MAP

8.1 BGA IC pin check (U101)

▪ **Ball Diagram (Top View), PMB7900(E-GOLDVoice 3)**

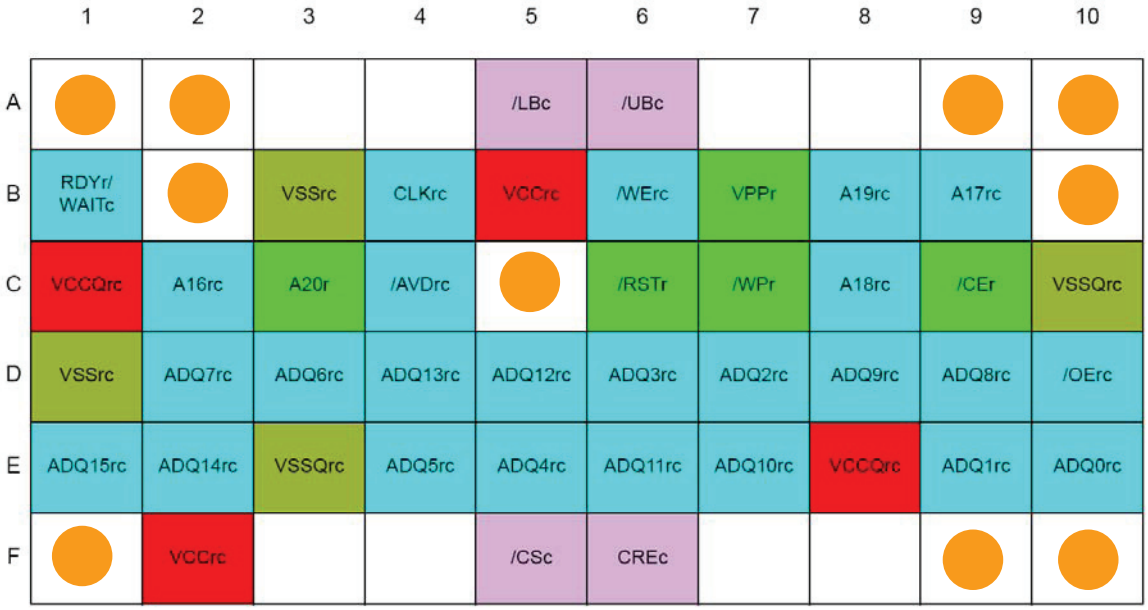


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A	VSSRF2	FE1	RX12X	RX12	RX34X	RX34	MICP2	FMRINX	FMRIN	MICP1	EPN	EPP	CP1	VDDNEG	●	●
B	TX1	TX2	VSSRF			VSSLO	MICN2		MICN1	●	LSN	VBATSP	CP2	VDD_1V8_MS	M2	M1
C	FE2	VDDTRX	●			VSSTRX	VBAT			VSSMS		LSP		HSR	VSHNT	VCHG
D	VRAMP	●	●			VDDRF2		VDD_FMR		VMIC		VSSLSR	HSL		SENSEP	CS
E		VDDTDC	PAEN		VSSDCO	VSSXO	VSSDIG		VDDMS		AGND		●	SENSEN	●	VDDCHG
F	XO	XOX			VDDXO	VRF1	●		VREF		VDD1V81	VSS_PMU		VIB	VSS_VIB	VDD_SD1
G	TDI	TCK	TRST_N	MON3			MON2	●		VCORE		●				SD1SW
H	TDO	TMS			MON4	TRIG_OUT			VSSCORE3		VBAT_PMU			ONOFF	SD1_FB	VSS_SD1
J	●	KP_1			VDDIO1	VDDCORE1		VSSCORE2	VSSCORE1		VRTC	VSIM	VPMU	LEDFBN	●	LEDFBP
K	KP_5	KP_6	KP_7	KP_9	●		VDDCORE2			VAUX	VDDIO3		●	CC_CLK_1	●	CC_IO_1
L	KP_8	KP_3			●			VSSCORE4	●			VDDIO2			CC_RST_1	●
M	CC03IO	NMI_N	KP_4	KP_2		CS0_N	VDD_EBU2			I2C_SDA	SSC0_MRST		RXD1	●	●	F32K
N	RESET_IN_N	DIGUP1		T2IN	AD1	AD0		BFCLKO	AD3		●	DISP_RESET	TXD1		RESET_OUT_N	OSC32K
P	●	DIGUP2			WAIT_N		AD2			I2C_SCL		●		●	●	ADV_N
R	●	WR_N	CS1_N		VDD_EBU1	A17	AD9	BC1_N	BC0_N	AD12		AD13		AD7	A21	A20
T	VSSCORE5	CS3_N	A18	A19	A22	RD_N	AD8	AD10	AD11	AD4	AD5	AD6	AD14	AD15	A16	VSSCORE6

● : Not use

8.2 BGA IC pin check (U102)

▪ **Ball Diagram (Top View), K5N3217ATA**

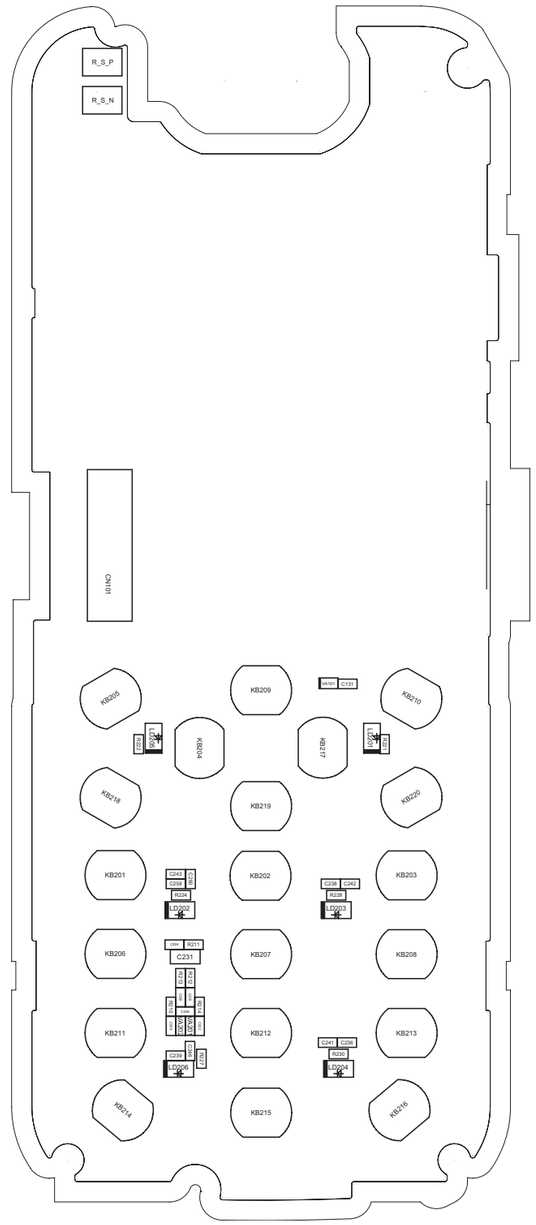


	1	2	3	4	5	6	7	8	9	10
A	●	●			/LBc	/UBc			●	●
B	RDYr/ WAITc	●	VSSrc	CLKrc	VCCrc	/WErc	VPPr	A19rc	A17rc	●
C	VCCQrc	A16rc	A20r	/AVDrc	●	/RSTr	/WPr	A18rc	/CEr	VSSQrc
D	VSSrc	ADQ7rc	ADQ6rc	ADQ13rc	ADQ12rc	ADQ3rc	ADQ2rc	ADQ9rc	ADQ8rc	/OErc
E	ADQ15rc	ADQ14rc	VSSQrc	ADQ5rc	ADQ4rc	ADQ11rc	ADQ10rc	VCCQrc	ADQ1rc	ADQ0rc
F	●	VCCrc			/CSc	CREc			●	●

52 FBGA: Top View (Ball Down)

● : Not use

9. PCB LAYOUT



LG-A110-MAIN-SPFY0229601-1.3-TOP

9. PCB LAYOUT

U203 : MUIC
- no Booting
- no USB/Serial Connection

CN201 : I/O conn.
- no USB Connection.
- no Serial Connection.

CN202 : Battery Conn.
- no power On

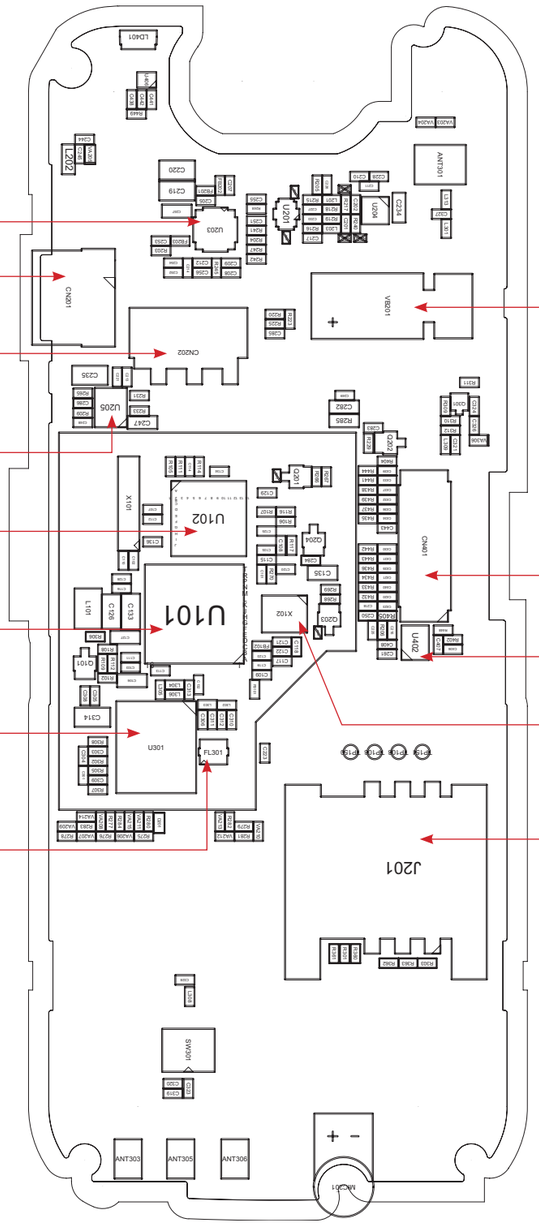
U205 : Charging IC
- no Battery Charge

U102 : Memory
- no Booting

U101 : DBB
- no Power On
- no Servive

U301 : PAM
- no Service
- RF Sensitivity & TX Power

FL301 : FEM
- no Service
- RF Sensitivity & TX Power



VB201 : Vibrator
- no Vibration

CN401 : LCD Conn.
- no Display

U402 : ChargePump
- no LCD backlight

X102 : 26Mhz X-tal
- no Power On
- no Service

J201 : SIM Conn.
- No SIM

LG-A110-MAIN-SPFY0229601-1.3-BOT

10.ENGINEERING MODE

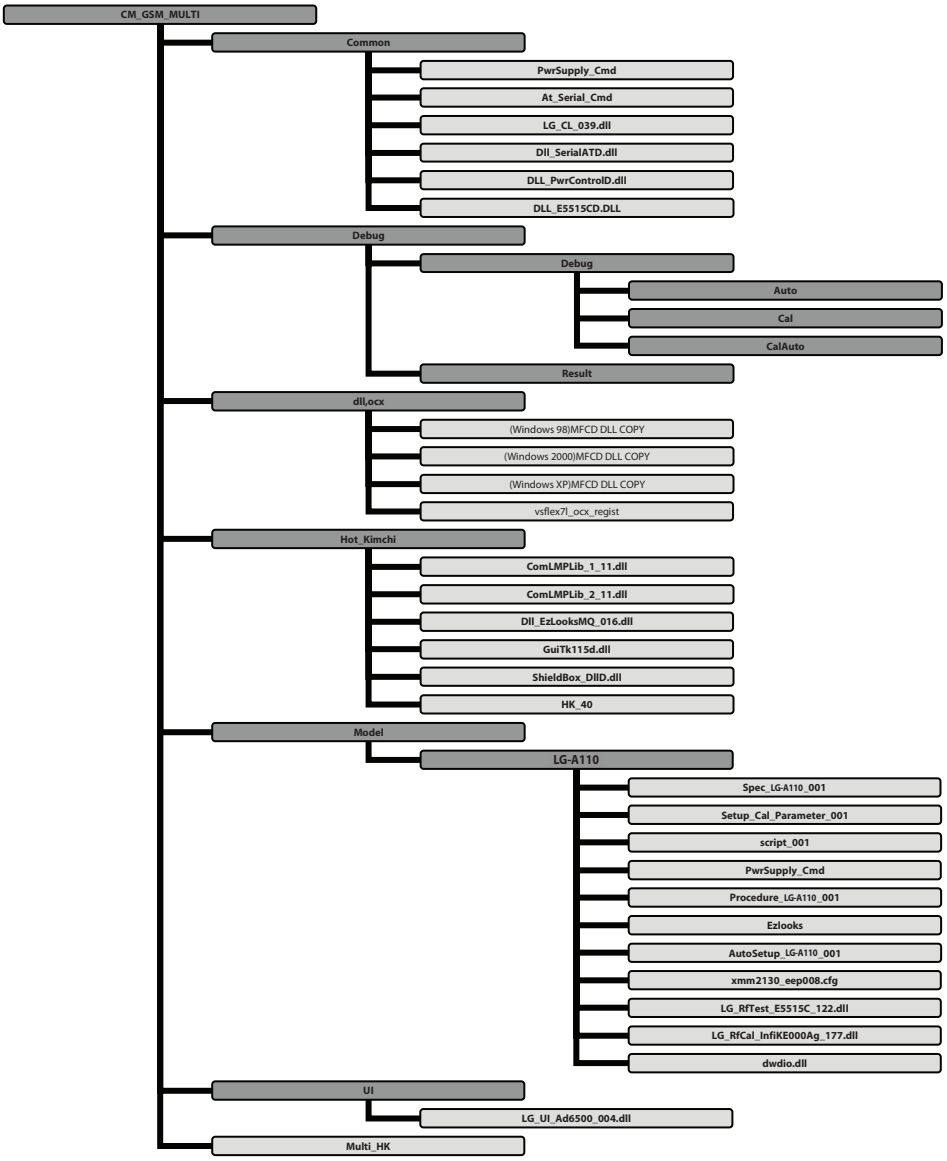
Engineering mode is designed to allow a service man/engineer to view and test the basic functions provided by a handset. The key sequence for switching the engineering mode on is “1809#*108# “Select. Pressing END will switch back to non-engineering mode operation. Use Up and Down key to select a menu and press ‘select’ key to progress the test. Pressing ‘back key will switch back to the original test menu.

11. AUTO CALIBRATION

11.1 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.

11.2 Configuration of HotKimchi



11.3 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_PwrControlD.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_DllD.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_LG-A110_100.xml** : RF TEST Setup Module.
-. **Ezlooks.xml** : Calibration ezLooks Item & Cal Spec Definition Module.
-. **Procedure_LG-A110_001.xml** : RF TEST Procedure Definition Module.
-. **Script_001.xml** : RF TEST Setup & calibration Setup Module.
-. **Spec_LG-A110_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.

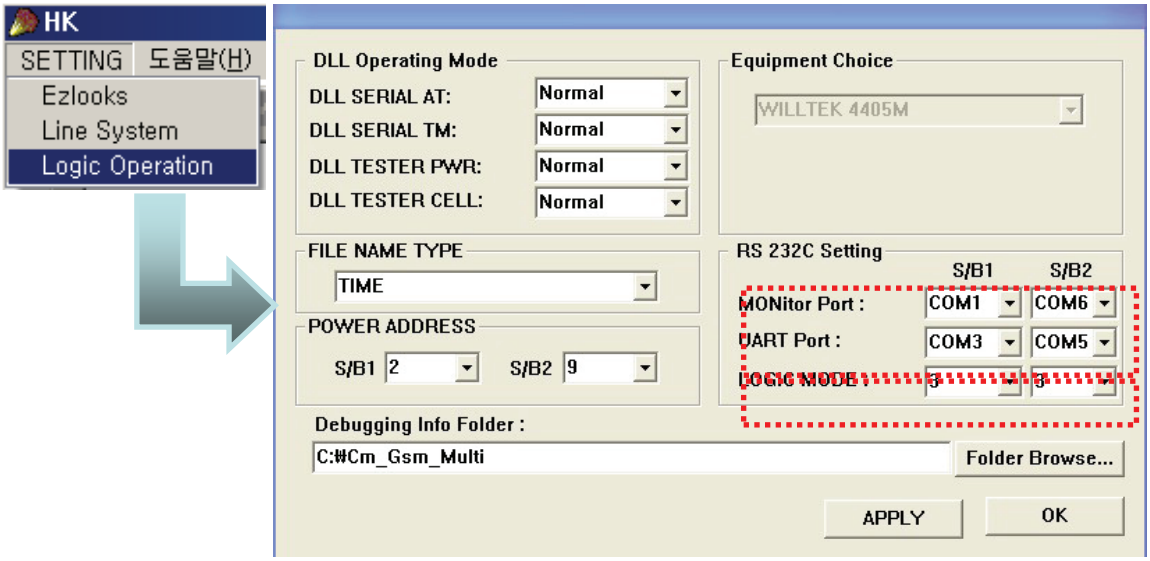
7. Multi_HK

-. 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 3rd, 4th of DIP SW ON state always
4. Press the Phone power key, if the Remote ON is used, 1st ON state

11.4 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\dll,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



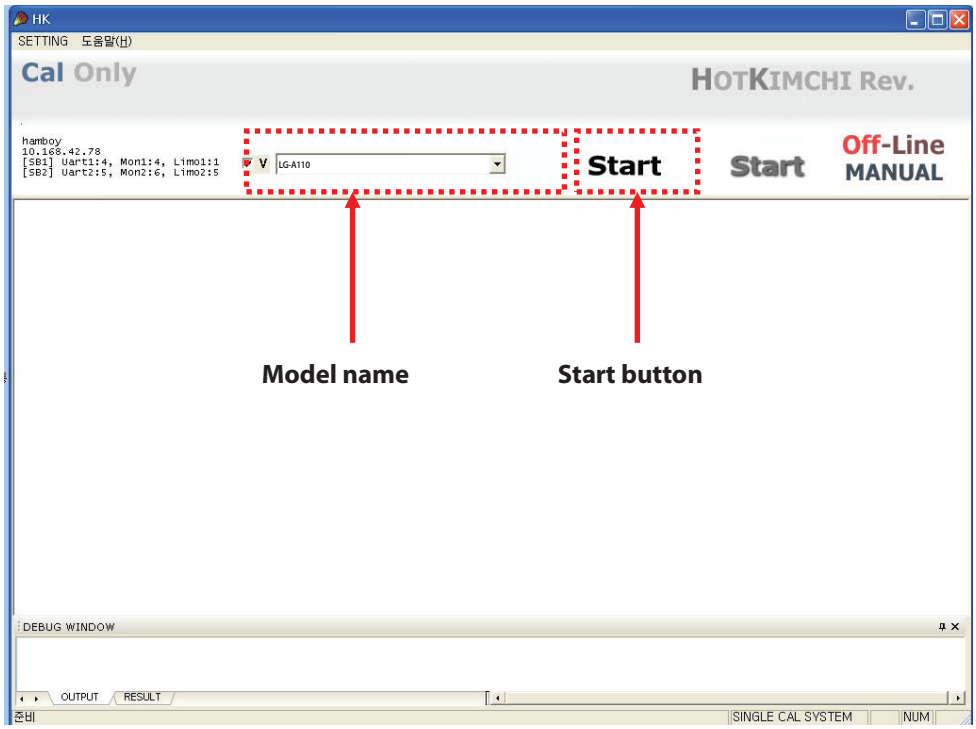
9. Set PORT (using RS232 cable) that PC can communicate with the phone

10. Select " LOGIC MODE" that you want

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

11. AUTO CALIBRATION

11. Select the model name “LG-A110”



12. Click “start” button

11.5 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.

11.6 APC

This procedure is for Tx calibration.
In this procedure you can get proper scale factor value and measured power level.

11.7 ADC

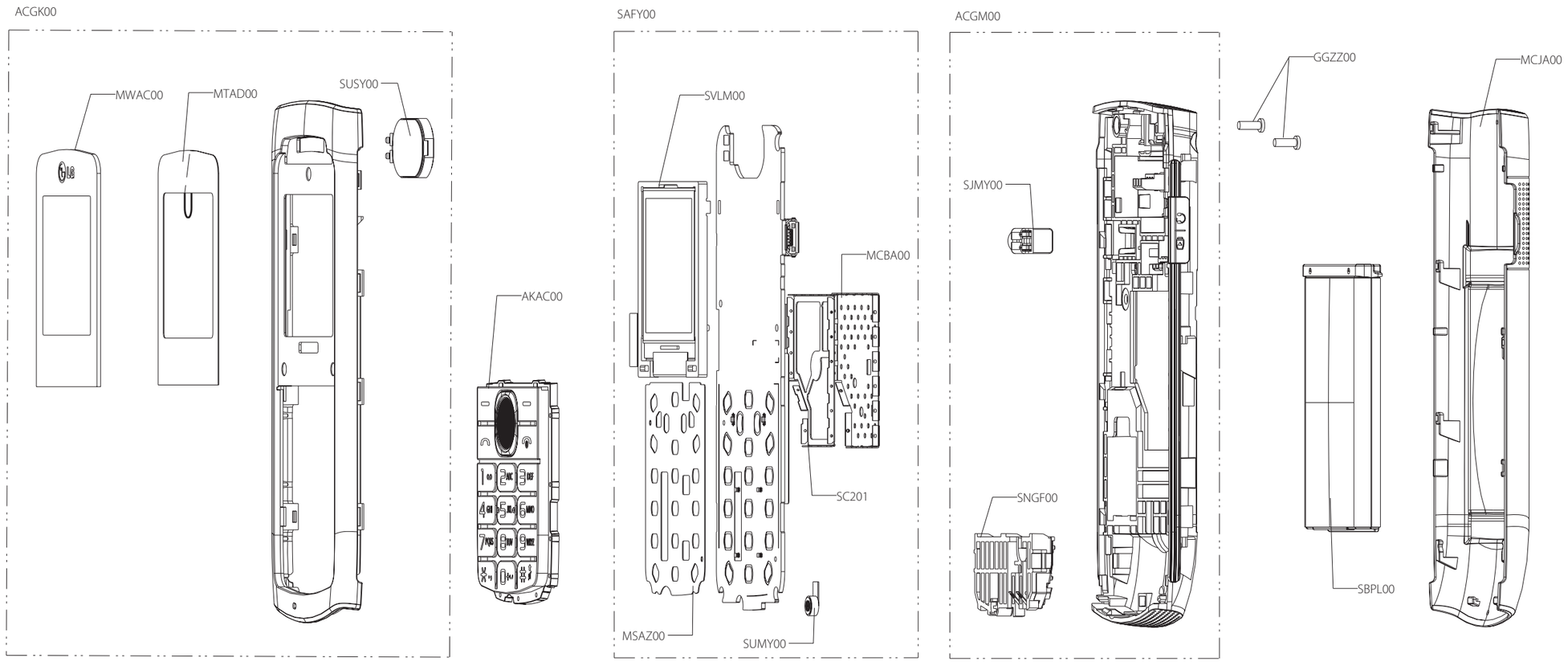
This procedure is for battery calibration.
You can get main Battery Config Table and temperature Config Table will be reset.

11.8 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

12. EXPLODED VIEW & REPLACEMENT PART LIST

12.1 EXPLODED VIEW



Location No	Part Description
MCJA00	COVER,BATTERY
SBPL00	BATTERY PACK,LI-ION
ACGK00	COVER ASSY,FRONT
MTAD00	TAPE,PROTECTION
MWAC00	WINDOW,LCD
SUSY00	SPEAKER
ACGM00	COVER ASSY,REAR
SJMY00	MOTOR, DC
SNGF00	ANTENNA,GSM,FIXED
AKAC00	KEYPAD ASSY,MAIN
GGZZ00	SCREW TAPPING
SAFY00	PCB ASSY,MAIN
MSAZ00	DOME ASSY,METAL
MCBA00	CAN,SHIELD
SUMY00	MICROPHONE
SVLM00	LCD MODULE
SC201	CAN, SHIELD

12.2 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	Remark
1	AAAY00	AdditionAssembly	AAAY0439706☞7	LG-A110CZETSTS:TitanSilver-	
2	MCJA	Cover,Battery	MCJA0122101	COMPLEXLG-A110GBRBAGR:GrayMOLD,PCLUPOYHP-5004,,,,,	
1	APAY00	PackageAssembly	APAY0151302☞7	LG-A110CZEBTZZ:WithoutColorLG-A110CZE(EU1/STDUB/EnvironmentLB/1200ea)	
2	APLY00	PalletAssembly	APLY0003901☞3	GD510BALBKZZ:WithoutColorEU1TYPE_Body(SW)+Cap(EU)+AL_1200EA	
3	MBEC00	Box,Carton	MBEC0003601	COMPLEXGD510CZESVZZ:WithoutColor-	
3	MCCL00	Cap,Box	MCCL0002501	COMPLEXGD510CZESVZZ:WithoutColor-	
3	MPCY00	Pallet	MPCY0012403	COMPLEXKG800FRABKDB:DARKBLUE-	
2	MBAD00	Bag,Vinyl	MBAD0005204	COMPLEXLG-LX260SPRAGZZ:WithoutColor-	
2	MBEE00	Box,Master	MBEE0061001	COMPLEXGD510CZESVZZ:WithoutColor-	
2	MBEF00	Box,Unit	MBEF0150102	COMPLEXLG-A110CZEBTZZ:WithoutColorBOXTW,LG-A110STDUnitBox(EU1)	
2	MLAJ00	Label,MasterBox	MLAJ0004402	COMPLEXCG300CGRZZ:WithoutColorLABEL,MASTERBOX(forCGRTDR2VER.mbox_label)	
2	MLAQ00	Label,UnitBox	MLAQ0018009	COMPLEXKE970CZEPKZZ:WithoutColorPRINTING,CZE,ORS,TMC,VDZ_Environment+UboxBarLabel	
2	MLAZ00	Label	MLAZ0050901	COMPLEXKU990GBRBKZZ:WithoutColor-	
1	APEY	PhoneAssembly	APEY0996201☞2	LG-A110CZETSTS:TitanSilver-	
2	ACGY	CoverAssembly,EMS	ACGY0078902☞5	LG-A110CZETSTS:TitanSilver-	
3	ACGK00	CoverAssembly,Front	ACGK0173601☞12	LG-A110GBRBABA:BLUEGRAY-	
4	MCJK	Cover,Front	MCJK0136501	COMPLEXLG-A110GBRBAGR:GrayMOLD,PCLUPOYSC-1004A,,,,,	
4	MDAY00	Decor	MDAY0090301	COMPLEXLG-A110GBRBABL:BluePRESS,STS,0.3mm,,,,	
4	MFBZ	Filter	MFBZ0008001	COMPLEXGS100CHNBKZZ:WithoutColor-	
4	MPBG00	Damper,LCD	MPBG0116401	COMPLEXLG-A110GBRBABK:BlackCOMPLEX,(empty),,,,,	
4	MPBN	Damper,Speaker	MPBN0079901	COMPLEXGS100CHNBKZZ:WithoutColor-	
4	MPBU	Damper,Connector	MPBU0090001	COMPLEXGS100CHNBKZZ:WithoutColor-	
4	MTAA00	Tape,Decor	MTAA0230101	COMPLEXLG-A110GBRBAZZ:WithoutColorCOMPLEX,(empty),,,,,	
4	MTAB00	Tape,Protect	MTAB0430501	COMPLEXLG-A110GBRBAZZ:WithoutColorCOMPLEX,(empty),,,,,	
4	MTAD00	Tape,Window	MTAD0135301	COMPLEXLG-A110GBRBAZZ:WithoutColorCOMPLEX,(empty),,,,,	
4	MWAC00	Window,LCD	MWAC0154001	COMPLEXLG-A110GBRBABK:BlackCUTTING,PMMAMR200,0.8,,,,	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	Part Number	Spec	Remark
3	ACGM00	CoverAssembly,Rear	ACGM0171501☞9	LG-A110GBRBABA:BLUEGRAY-	
4	MCCE	Cap,Receptacle	MCCE0062401	COMPLEXLG-A110GBRBABL:BlueMOLD,UrethaneRubberS190A,,,,,	
4	MCJN	Cover,Rear	MCJN0128901	COMPLEXLG-A110GBRBABL:BlueMOLD,PCLUPOYHP-5004,,,,,	
4	MLAB	Label,AfterService	MLAB0001102	COMPLEXC2000CGRSVWA:WhiteC2000USASVDIA4.0PRINTING,	
4	MPBN	Damper,Speaker	MPBN0080001	COMPLEXGS100CHNBKZZ:WithoutColor-	
4	MPBN00	Damper,Speaker	MPBN0082301	COMPLEXGS100CHNBKZZ:WithoutColor-	
4	MPBZ	Damper	MPBZ0256701	COMPLEXGS100CHNBKZZ:WithoutColor-	
3	AKAC	KeypadAssembly,Main	AKAC0020001	LG-A110GBRBABA:BLUEGRAY-	
3	GGZZ00	Screw,Tapping	GGZZ0005101	GGZZ0005101CH+-1.6mM4.5mMMSWRFZBSERVEONECO.,LTD.	
5	ADCA00	DomeAssembly,Metal	ADCA0104401	GS100CHNBKZZ:WithoutColor-	
5	MCBA00	Can,Shield	MCBA0060001	COMPLEXGS100CHNBKZZ:WithoutColor-	
5	MIDZ00	Insulator	MIDZ0235101	COMPLEXGS100CHNBKZZ:WithoutColor-	
5	MIDZ01	Insulator	MIDZ0250101	COMPLEXGS108SEARDZZ:WithoutColor-	
5	MSAZ00	Sheet	MSAZ0068701	COMPLEXGS117INDKVZZ:WithoutColor-	
5	MTAZ00	Tape	MTAZ0268101	COMPLEXGS100CHNBKZZ:WithoutColor-	
5	MLAZ00	Label	MLAZ0038301	COMPLEXLG-VX6000ZZ:WithoutColorPIDLabel4ArrayPRINTING,	
6	SC201	Can,Shield	MCBA0059901	COMPLEXGS100CHNBKZZ:WithoutColor-	
2	MLAA00	Label,Approval	MLAA0062303	COMPLEXKB770DEUBKZZ:WithoutColor-	

12.2 Replacement Parts <Main component>

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

Level	Location No.	Description	Part Number	Spec	Remark
4	SUSY	Speaker,DualMode	SUSY0028904	EMS1812TPB4PNd-Fe-B700mW8OHM91DB710HZ1812*3.0TPINEM-TECH	
4	SUSY	Speaker,DualMode	*S*SUSY0028903	BRS-181216P08-PNd-Fe-B700mW8OHM91DB710HZ1812*3.0TPINBUJEONELECTRONICSCO.,LTD	
4	ENZY	Connector,TerminalBlock	ENZY0021201	KQ03LC-3R3P3.00MMANGLESMDR/TP-HIROSEKOREACO.,LTD	
4	SJMY	Motor,DC	SJMY0007905	DM-YK407-6F23V80mA0A11KRPM0RPM0SEC0GF.CM0OHMDONGYANGCHENGJICO.	
4	SNGF	Antenna,Helical	SNGF0065102	LS01-I-100313,-2dBd,GSM850/PCS,DUAL,-2,50,3LSMtronLtd.	
3	SAFY00	PCBAssembly,Main	SAFY0393702☞2	LG-A110CZEBTMAIN,1.0	
4	SAFB00	PCBAssembly,Main,Insert	SAFB0118901☞10	GS105SEAKVMAIN,1.1	
5	BRAH00	Resin,PC	BRAH0001301	UF-1060	
5	SUMY00	Microphone,Condenser	SUMY0003815	B4010AL443-49-44DB2.2KOHMOMNI1.1TO10V4x1.0tFPCBGoerTekInc.	
5	SVLM00	LCD,Module-TFT	SVLM0033401	IM152FBN4AMain,1.52,128*128,35.78*39.7*1.9,262K,TFT,TM,LGDP4515,LGDisplayCo.Ltd.	
5	SVLM00	LCD,Module-TFT	*S*SVLM0038301	Main,1.52",128x128,35.8x39.7x1.9t,262K,TFT,TM,NT39123H,	
4	SAFF00	PCBAssembly,Main,SMT	SAFF0293002☞4	LG-A110CZEBTMAIN1.0	
5	SAFC00	PCBAssembly,Main,SMTBottom	SAFC0151901☞91	GS101PRTKVMAIN,1.4	
6	C420,C421,C430,C431,C432,C433,C434,C435,C436,C437,C439,C440	Capacitor,Ceramic,Chip	ECCH0000112	MCH155C150J15pF5%50VNP0-55TO+125C1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	C102,C110	Capacitor,Ceramic,Chip	ECCH0000113	MCH155A180J18pF5%50VNP0-55TO+125C1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	C216	Capacitor,Ceramic,Chip	ECCH0000115	MCH155A220JK22pF5%50VNP0-55TO+125C1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	C209,C223,C252,C253,C254,C261,C285	Capacitor,Ceramic,Chip	ECCH0000117	CL05C270JB5NNNC27pF5%50VNP0-55TO+125C1005R/TP0.5SAMSUNGELECTRO-MECHANICSCO.,LTD.	
6	C210,C211,C213,C214,C228,C303	Capacitor,Ceramic,Chip	ECCH0000120	MCH155A390J39pF5%50VNP0-55TO+125C1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	C205,C207,C301,C304,C309	Capacitor,Ceramic,Chip	ECCH0000143	MCH155CN102KK1nF10%50VX7R-55TO+125C1005R/TP-ROHMSemiconductorKOREACORPORATION	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	Part Number	Spec	Remark
6	C132	Capacitor,Ceramic,Chip	ECCH0000151	CL05B472KB5NNNC4.7nF10%25VX7R-55TO+125C1005R/TP-SAMSUNGELECTRO-MECHANICSCO.,LTD.	
6	C251,C305	Capacitor,Ceramic,Chip	ECCH0000155	MCH153CN103KK10nF10%16VX7R-55TO+125C1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	C113,C308	Capacitor,Ceramic,Chip	ECCH0000161	MCH153CN333KK33nF10%16VX7R-55TO+125C1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	C129	Capacitor,Ceramic,Chip	ECCH0000163	C1005X5R473KDT47nF10%10VX5R-55TO+85C1005R/TP-NEOTECHCO.,LTD	
6	C212,C256	Capacitor,Ceramic,Chip	ECCH0000179	GRM155R71C223K22nF10%16VX5R-55TO+85C1005R/TP-MURATAMANUFACTURINGCO.,LTD.	
6	C208,C283	Capacitor,Ceramic,Chip	ECCH0000198	CL05A225MQ5NSNC2.2uF20%6.3VX5R-55TO+85C1005R/TP.SAMSUNGELECTRO-MECHANICSCO.,LTD.	
6	C313	Capacitor,Ceramic,Chip	ECCH0000701	C1005C0G1H1R2CT000F1.2pF0.25PF50VNP0-55TO+125C1005R/TP-TDKCORPORATION	
6	C117,C122, C249	Capacitor,Ceramic,Chip	ECCH0002002	C1005X7R1A473KT000F47000pF10%10VY5P-30TO+85C1005R/TP-TDKCORPORATION	
6	C133,C235, C314	Capacitor,Ceramic,Chip	ECCH0003002	C2012Y5V1A106ZT000N10uF-20TO+80%10VY5V-30TO+85C2012R/TP-TDKCORPORATION	
6	C112,C123, C125,C134, C136,C423	Capacitor,Ceramic,Chip	ECCH0004904	GRM155R60J105K1uF10%6.3VX5R-55TO+85C1005R/TP-MURATAMANUFACTURINGCO.,LTD.	
6	C106,C127	Capacitor,Ceramic,Chip	ECCH0005603	GRM188R61A225K2.2uF10%10VX5R-55TO+85C1608R/TP-MURATAMANUFACTURINGCO.,LTD.	
6	C135	Capacitor,Ceramic,Chip	ECCH0005604	GRM188R60J106M10000000pF,6.3V,M,X5R,TC,1608,R/TP,0.8mm MURATAMANUFACTURINGCO.,LTD.	
6	C219,C220	Capacitor,Ceramic,Chip	ECCH0006501	GRM21BR60J106K10uF10%6.3VX5R-55TO+85C2012R/TP-MURATAMANUFACTURINGCO.,LTD.	
6	C306,C310, C311,C312	Capacitor,Ceramic,Chip	ECZH0000810	C1005C0G1H090DT000F9pF0.5PF50VNP0-55TO+125C1005R/TP-TDKKOREACOOPERATION	
6	C323	Capacitor,Ceramic,Chip	ECZH0000813	C1005C0G1H101JT100pF5%50VNP0-55TO+125C1005R/TP-TDKKOREACOOPERATION	
6	C121	Capacitor,Ceramic,Chip	ECZH0000839	C1005C0G1H4R7CT000F4.7pF0.25PF50VNP0-55TO+125C1005R/TP-TDKKOREACOOPERATION	
6	C218	Capacitor,Ceramic,Chip	ECZH0000844	C1005C0G1H680JT000F68pF5%50VNP0-55TO+125C1005R/TP-TDKKOREACOOPERATION	
6	C320	Capacitor,Ceramic,Chip	ECZH0001002	C1005CH1H0R5BT000F0.5pF0.1PF50VNP0-55TO+125C1005R/TP-TDKKOREACOOPERATION	
6	C109,C248, C406,C407, C408,C443	Capacitor,Ceramic,Chip	ECZH0001215	C1005X5R1A105KT000F1uF10%10VX5R-55TO+85C1005R/TP-TDKKOREACOOPERATION	
6	C101,C119	Capacitor,Ceramic,Chip	ECZH0001216	C1005X5R1A224KT000E220nF10%10VX5R-55TO+85C1005R/TP-TDKKOREACOOPERATION	
6	C105,C115	Capacitor,Ceramic,Chip	ECZH0001217	GRM155R60J474K470nF10%6.3VX5R-25TO+70C1005BK-DUP-MURATAMANUFACTURINGCO.,LTD.	

Level	Location No.	Description	Part Number	Spec	Remark
6	C103,C107, C108,C111, C114,C116, C120,C128, C221,C225, C255	Capacitor,Ceramic,Chip	ECZH0003103	GRM36X7R104K10PT100nF10%10VX7R-55TO+125C1005R/TP-MURATAMANUFACTURINGCO.,LTD.	
6	C247,C282	Capacitor,Ceramic,Chip	ECZH0003503	GRM188R61E105K1uF10%25VX5R-55TO+85C1608R/TP-MURATAMANUFACTURINGCO.,LTD.	
6	C257	Capacitor,Ceramic,Chip	ECZH0003504	GRM188R71E104K100nF10%25VX7R-55TO+125C1608R/TP-MURATAMANUFACTURINGCO.,LTD.	
6	C126	Capacitor,Ceramic,Chip	ECZH0025502	GRM219R60J226M0.000022F20%6.3VX5R-55TO+85C2012R/TP0.85MMMURATAMANUFACTURINGCO.,LTD.	
6	L302	Inductor,Multilayer,Chip	ELCH0001052	1005GC2T18NJLF18NH5%0V200mA0.65OHM1.6GHZ8NONSHIELD11.0X0.5X0.5MMR/TPPILKORELECTRONICSLTD.	
6	L201,L203	Inductor,Multilayer,Chip	ELCH0001403	LL1005-FHL1N0S1NH0.3NH0V500mA0.1OHM20GHZ8NONSHIELD11.0X0.5X0.5MMR/TPTOKO,INC.	
6	C319	Inductor,Multilayer,Chip	ELCH0001417	LL1005-FHL33NJ33NH5%0V200mA1OHM1.7GHZ10NONSHIELD11.0X0.5X0.5MMR/TPTOKO,INC.	
6	L303	Inductor,Multilayer,Chip	ELCH0003816	LQG15HS3N6S02D3.6NH0.3NH0V300mA0.18OHM6GHZ8NONSHIELD11.0X0.5X0.5MMR/TPMURATAMANUFACTURINGCO.,LTD.	
6	L304	Inductor,Multilayer,Chip	ELCH0004707	1005GC2T1N5S001.5NH0.3NH0V300mA0.13OHM7GHZ8NONSHIELD11.0X0.5X0.5MMR/TPPILKORELECTRONICSLTD.	
6	L308	Inductor,Multilayer,Chip	ELCH0004720	1005GC2T1N2S001.2NH0.3NH0V300mA0.12OHM9GHZ8NONSHIELD11.0X0.5X0.5MMR/TPPILKORELECTRONICSLTD.	
6	L305,L306	Inductor,Multilayer,Chip	ELCH0004721	1005GC2T2N2S002.2NH5%0V300mA0.13OHM7GHZ8NONSHIELD11.0X0.5X0.5MMR/TPPILKORELECTRONICSLTD.	
6	L101	Inductor,WireWound,Chip	ELCP0008003	MIP2520D3R3M3.3UH30%0V1.2A0.1OHM0HZ0SHIELD2.5X2X1MMNONER/TPFDKCORPORATION.	
6	CN401	Connector,FFC/FPC/PIC	ENQY0014901	GF032-35S-E200035P0.30MMFPCSTRAIGHTBOTHSMDR/TPLOCKING-LSMtronLtd.	
6	CN401	Connector,FFC/FPC/PIC	*S*ENQY0013901	04-6293-635-005-829+35P0.30MMFPCANGLEBOTHSMDR/TPLOCKINGFLIPTYPEKYOCERAELCOKOREASALESCO.,LTD.	
6	CN201	connector,I/O	ENRY0008801	GU073-5P-SD-E1500GU073-5P-SD-E1500,5,mm,ANGLELSMtronLtd.	
6	J201	CardSocket	ENSY0025101	GCA26D-6S-H18-E1500SIM6PANGLESMDR/TP-LSMtronLtd.	
6	J201	Socket,Card	*S*ENSY0018701	5000-6P-1.8SLUSIM6PSTRAIGHTSMDR/TP-HYUPJINI&CCO.,LTD.	
6	SW301	connector,RF	ENWY0007601	NMS-306NMS-306,SMD,dBNAMAEELECTRONICSINC	
6	Q101,Q202, Q204	TR,Bipolar	EQBN0020501	KTC4075ENPN5V60V50V150mA100NA700100mWESMR/TP3PKECCORPORAITION	
6	Q201,Q203	TR,Bipolar	EQBP0006301	KTA2014EKTA2014E,,W,R/TP,KECCORPORAITION	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	Part Number	Spec	Remark
6	R402	Resistor,Chip	ERHY0000128	MCR01MZP5F150215KOHM1%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R225	Resistor,Chip	ERHY0000161	MCR01MZP5F2003200KOHM1%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R209	Resistor,Chip	ERHY0000254	MCR01MZP5J4724.7KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R432,R433, R434,R435, R436,R437, R438,R439, R441,R442, R443,R444	Resistor,Chip	ERHY0003301	MCR01MZP5J101100OHM5%1/16W1005R/TP-ROHM.	
6	R271,R272	Resistor,Chip	ERHY0009501	MCR006YZPJ0000OHM5%1/20W0603R/TP-ROHMSemiconductorKOREACORPORATION	
6	R305,R307, R308	Resistor,Chip	ERHZ0000201	MCR01MZP5F1000100OHM1%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R223,R242	Resistor,Chip	ERHZ0000204	MCR01MZP5F1003100KOHM1%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R233	Resistor,Chip	ERHZ0000211	MCR01MZP5F12011.2KOHM1%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R231	Resistor,Chip	ERHZ0000294	MCR01MZP5F51015.1KOHM1%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R220,R248	Resistor,Chip	ERHZ0000402	MCR01MZP5J10010OHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R302	Resistor,Chip	ERHZ0000404	MCR01MZP5J1021KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R116,R117, R204,R229, R241,R247, R270	Resistor,Chip	ERHZ0000405	MCR01MZP5J10310KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R105,R106, R107,R111, R114,R360, R361	Resistor,Chip	ERHZ0000406	MCR01MZP5J104100KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R203,R245	Resistor,Chip	ERHZ0000443	MCR01MZP5J2222.2KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R102	Resistor,Chip	ERHZ0000475	MCR01MZP5J3923.9KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R112	Resistor,Chip	ERHZ0000476	MCR01MZP5J39339KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R109	Resistor,Chip	ERHZ0000484	MCR01MZP5J471470OHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R206,R265, R404,R448	Resistor,Chip	ERHZ0000485	MCR01MZP5J4724.7KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R266,R267, R268,R269, R405	Resistor,Chip	ERHZ0000486	MCR01MZP5J47347KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	

Level	Location No.	Description	Part Number	Spec	Remark
6	R215,R216	Resistor,Chip	ERHZ0000488	MCR01MZP5J4R74.7OHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R275,R276, R277,R278, R279,R280, R281,R282, R283,R284	Resistor,Chip	ERHZ0000505	MCR01MZP5J681680OHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R108	Resistor,Chip	ERHZ0000529	MCR01MZP5J1521.5KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R285	Resistor,Chip	ERHZ0000749	MCR03MZSJ4R74.7OHM5%1/16W1608R/TP-ROHMSemiconductorKOREACORPORATION	
6	U402	IC,ChargePump	EUSY0238704	AAT3192IJQ-1-T1SC70JW,10,R/TP,2chchargepump,IC,ChargePumpIC,ChargePumpAdvancedAnalogicTechnologiesHKLimited	
6	U101	IC,DigitalBasebandProcessor,GSM	EUSY0391901	PMB79000VTO0V0WBGAR/TP183P-INFINEONTECHNOLOGIES(ASIAPACIFIC)PTELTD.	
6	U101	IC,DigitalBasebandProcessor,GSM	*S*EUSY0419301	PMB79000VTO0V0WBGAR/TP183P-INFINEONTECHNOLOGIES(ASIAPACIFIC)PTELTD.	
6	U203	IC,AnalogMultiplexer	EUSY0398301	EUSY0398301QFN,18,R/TP,MUIC-Lite,IC,AnalogSwitchIC,AnalogSwitchTEXASINSTRUMENTSKOREALTD,HONGKONGBRANCH.	
6	U102	IC,MCP,NOR	EUSY0404301	K5N3217ATA-AT80NOR32M+UTRAM/16M1.7VTO1.9V6 6 1TR52P---SAMSUNGELECTRONICCO.,LTD	
6	U102	IC,MCP,NOR	*S*EUSY0393701	M36W0R5040U6ZSNOR/32MBIT+PSRAM/16MBIT1.7VTO1.9V6 4 1.2TR56P---NumonyxAsiaPacificPteLtd.	
6	U205	IC,VoltageReference	EUSY0410801	RT9524DFN,10,R/TP,DFNCalTestModeSingleChargerICforMicroUSB,IC,ChargerIC,ChargerRICHTEKTECHNOLOGYCORP.	
6	X101	Crystal	EXXY0004602	MC-146(12.5PF,+/-20PPM)32.768KHZ20PPM12.5PF69*14SMDR/TPSEIKOEPSONCORP	
6	X102	Crystal	EXXY0018404	NX3225SA26MHZ10PPM8PF32*25SMDR/TPNIHONDEMPAKOGYOCO.,LTD.	
6	X102	Crystal	*S*EXXY0027001	DSX321G-26M(8PF)26MHZ10PPM0FNONESMDR/TPDAISHINKUCORPORATION.	
6	R273,R274	WirePad,Open	SAFO0000401	AX3100ATLSV_SHIPBACK,MAIN,A,0OHMDNI	
6	R253,R254	WirePad,Short	SAFP0000401	AX3100ATLSV_SHIPBACK,MAIN,A	
6	VA206, VA207, VA208, VA209, VA210, VA211, VA212, VA213, VA214, VA215	Varistor	SEVY0003901	EVL5M022005.5V0%480F1.0*0.5*0.6NONESMDR/TPAMOTECHCO.,LTD.	
6	VA203, VA204	Varistor	SEVY0004101	ICVN0505X150FR5.6V0%360F1.0*0.5*0.55NONESMDR/TPINNOCHIPSTECHNOLOGY	

12. EXPLODED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	Part Number	Spec	Remark
6	FB203	Filter,Bead	SFBH0007101	BLM15AG121PN1120ohm1.0x0.5x0.55SMDR/TP2PMURATAMANUFACTURINGCO.,LTD.	
6	FB101	Filter,Bead	SFBH0007103	BLM15BB750SN1J75ohm1.0x0.5x0.55SMDR/TP2PMURATAMANUFACTURINGCO.,LTD.	
6	FB201,FB202	Filter,Bead	SFBH0008101	BLM15AG601SN1600ohm1.0x0.5x0.55SMDR/TP2PMURATAMANUFACTURINGCO.,LTD.	
6	FB102	Filter,Bead	SFBH0008106	BLM15HG102SN1600at100MHz,1000at1GHz1.0x0.5x0.5SMDR/TP2PMURATAMANUFACTURINGCO.,LTD.	
6	FL301	Filter,Saw,Dual	SFSB0001401	B9308942.5,1842.52.0X1.6X0.68SMDR/TP10PEPCOSPTELTD.	
6	U301	RFModule	SMRH0006001	SKY77542MHz,MHz,GSMDualBandTxModuleforEU.6x7,SKYWORKSSOLUTIONSINC.	
5	SAFD00	PCBAssembly,Main,SMTTop	SAFD0149701☞14	GS105SEAKVMAIN,1.0	
6	C236,C238,C239,C241,C242,C243,C260	Capacitor,Ceramic,Chip	ECCH0000117	CL05C270JB5NNNC27pF5%50VNP0-55TO+125C1005R/TP0.5SAMSUNGELECTRO-MECHANICSCO.,LTD.	
6	C206,C222,C224,C229	Capacitor,Ceramic,Chip	ECCH0000120	MCH155A390J39pF5%50VNP0-55TO+125C1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	C215,C230	Capacitor,Ceramic,Chip	ECCH0000161	MCH153CN333KK33nF10%16VX7R-55TO+125C1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	C231	Capacitor,Ceramic,Chip	ECCH0005604	GRM188R60J106M10000000pF,6.3V,M,X5R,TC,1608,R/TP,0.8mmMURATAMANUFACTURINGCO.,LTD.	
6	C246,C258	Capacitor,Ceramic,Chip	ECZH0001215	C1005X5R1A105KT000F1uF10%10VX5R-55TO+85C1005R/TP-TDKKOREACOOPERATION	
6	C131	Capacitor,Ceramic,Chip	ECZH0001216	C1005X5R1A224KT000E220nF10%10VX5R-55TO+85C1005R/TP-TDKKOREACOOPERATION	
6	LD201,LD202,LD203,LD204,LD205,LD206	LED,Chip	EDLH0015101	19-217/BHC-ZM1N2QY/3TBLUE2.7~3.225mA18~45mcd465~475nm95mW1608R/TP2P-EVERLIGHTELECTRONICSCO.,LTD.	
6	VA101	Diode,TVS	EDTY0009401	VMNZ6.8CST2R5.5V010V0A200mWSC70R/TP6P5ROHM.	
6	R212,R213	Resistor,Chip	ERHY0003301	MCR01MZP5J101100OHM5%1/16W1005R/TP-ROHM.	
6	R211	Resistor,Chip	ERHZ0000404	MCR01MZP5J1021KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R210,R214	Resistor,Chip	ERHZ0000443	MCR01MZP5J2222.2KOHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	R221,R222,R224,R227,R228,R230	Resistor,Chip	ERHZ0000496	MCR01MZP5J561560OHM5%1/16W1005R/TP-ROHMSemiconductorKOREACORPORATION	
6	VA201,VA202	Varistor	SEVY0003901	EVL5M022005.5V0%480F1.0*0.5*0.6NONESMDR/TPAMOTECHCO.,LTD.	
6	SPFY	PCB,Main	SPFY0229601	KR015131FR-4Build-UpBUILD-UP40.8GS105GOO2DWA,MAIN,1.3,FR-4,0.8mm,BUILD-UP4LGInnotek.com	

12.3 Accessory

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

Level	Location No.	Description	Part Number	Spec	Remark
2	SBPL00	RechargeableBattery,Lithiumion	SBPL0091401	KU250-553450-SAN-EUPRISMATIC3.7V950AH950AH5.5X34X505.7*34.15*53.55BLACKINNERPACK-TOCADDONGHWA	
2	SSAD00	Adapters	SSAD0034501	STA-U35ER90Vac~264Vac4.8V400mA5060CENONENONE-SUNLINELECTRONICSCO.,LTD	
2	SSAD00	Adapters	*S*SSAD0034502	90Vac~264Vac4.8V400mA5060CENONENONE-	
2	SSAD00	Adapters	*S*SSAD0034504	STA-U35ES90Vac~264Vac4.8V400mA5060CENONENONE-SALCOMPOY	
2	SSAD00	Adapters	*S*SSAD0034503	STA-U35ED90Vac~264Vac4.8V400mA5060CENONENONE-DONGDOELECTRONICSCO.,LTD	