Service Manual

Model : MG191

Service Manual

MG191

P/N : MMBD0048101

Date : May 2005

Table of Contents

1. Introduction

1.1. Purpose

This manual provides the information necessary to repair, calibration, description and download the features of the MG191.

1.2. Regulatory Information

1.2.1. 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 you're 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. LGE 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. LGE will not be responsible for any charges that result from such unauthorized use.

1.2.2. 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.

1.2.3. 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 MG191 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.

1.2.4. Maintenance Limitations

Maintenance limitations on the MG191 must be performed only by the LGE 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.

1.2.5. Notice of Radiated Emissions

The MG191 complies with rules regarding radiation and radio frequency emission as defined by loca regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

1.2.6. Pictures

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

1.2.7. Interference and Attenuation

An MG191 may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

1.2.8. 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 such as EEPROM to the factory, use the protective package as described.

1.3 Abbreviation

Para os propósitos do manual, a seguir as abreviações aplicadas.

APC	Automatic Power Control
BB	Baseband
BER	Bit Error Ratio
CC-CV	Constant Current ? Constant Voltage
CLA	Cigar Lighter Adapter
DAC	Digital to Analog Converter
DCS	Digital Communication System
dBm	dB relative to 1 milliwatt
DSP	Digital Signal Processing
EEPROM	Electrical Erasable Programmable Read-Only Memory

EL	Electroluminescence
ESD	Electrostatic Discharge
FPCB	Flexible Printed Circuit Board
GMSK	Gaussian Minimum Shift Keying
GPIB	General Purpose Interface Bus
GPRS	General Packet Radio Service
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
LGE	LG Electronics
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
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. General Performance

2.1 H/W Feature

A. Hardware Feature

- GSM 850 / PCS 1900 Dual Band
- Mono(120x64) Single LCD
- 830mAh Li-Ion Battery
- 3V plug-in type SIM card socket
- 40 poly MIDI sound Ring-tone
- Jack type Ear-microphone
- Dimension : 103.3 x 42.8 x 15.5mm, Weight : 68 g

B. Software Feature

- WAP Supported
- GPRS Class 10 Compatible
- FR/EFR Speech Coding
- 5-Level Volume Control (Voice, Ringtone, etc..)
- SMS
- Phone Book
  –255 entries
- Language : English & Spanish
- T9 Text

Item	Feature	Comment
Standard Battery	Li-ion, 830mAh Size:4.3(T)x34(W)x50(L)mm Weight: 17g	
AVG TCVR Current	GSM850: 250mA, PCS: 200mA	
Standby Current	< 4.0mA	
Talk time	< 4 hours (GSM TX Level 7), 3hours 30min	
Standby time	200 hours (Paging Period 2, RSSI:-85dBm)	
Charging time	2.5 hours	
RX Sensitivity	GSM850 : -108dBm, PCS : -107dBm	
TX output power	GSM850: 33dBm (Level 5) PCS190: 30dBm (Level 0)	
GPRS compatibility	Class 10	
SIM card type	1.8V/3V Small	
Display	120 x 64 dots LCD	
Status Indicator	Soft icons Key Pad 0 ~ 9, #, *, Navigation Key, Menu Key, Confirm Key, Send Key, END/PWR Key	
ANT	Internal	
EAR Phone Jack	3 pole earphone jack	
PC Synchronization	Yes	
Speech coding	EFR/FR	
Data and Fax	Yes	
Vibrator	Yes	
Buzzer	No	
Voice Recoding	Yes	
C-Mic	Yes	
Receiver	Yes	
Travel Adapter	Yes	
Options	No	

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">GSM 850 TX : 824-849Mhz
GSM 850 RX : 869-894Mhz
PCS 1900 TX : 1850-1910Mhz
PCS 1900 RX : 1930-1990Mhz</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">< 0.1ppm</td></tr>
<tr><td rowspan="21">4</td><td rowspan="21">Power Level</td><td colspan="6">GSM850</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>33 dBm</td><td>±2dB</td><td>13</td><td>17 dBm</td><td>±3dB</td></tr>
<tr><td>6</td><td>31 dBm</td><td>±3dB</td><td>14</td><td>15 dBm</td><td>±3dB</td></tr>
<tr><td>7</td><td>29 dBm</td><td>±3dB</td><td>15</td><td>13 dBm</td><td>±3dB</td></tr>
<tr><td>8</td><td>27 dBm</td><td>±3dB</td><td>16</td><td>11 dBm</td><td>±5dB</td></tr>
<tr><td>9</td><td>25 dBm</td><td>±3dB</td><td>17</td><td>9 dBm</td><td>±5dB</td></tr>
<tr><td>10</td><td>23 dBm</td><td>±3dB</td><td>18</td><td>7 dBm</td><td>±5dB</td></tr>
<tr><td>11</td><td>21 dBm</td><td>±3dB</td><td>19</td><td>5 dBm</td><td>±5dB</td></tr>
<tr><td>12</td><td>19 dBm</td><td>±3dB</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">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>30 dBm</td><td>±2dB</td><td>8</td><td>14 dBm</td><td>±3dB</td></tr>
<tr><td>1</td><td>28 dBm</td><td>±3dB</td><td>9</td><td>12 dBm</td><td>±4dB</td></tr>
<tr><td>2</td><td>26 dBm</td><td>±3dB</td><td>10</td><td>10 dBm</td><td>±4dB</td></tr>
<tr><td>3</td><td>24 dBm</td><td>±3dB</td><td>11</td><td>8 dBm</td><td>±4dB</td></tr>
<tr><td>4</td><td>22 dBm</td><td>±3dB</td><td>12</td><td>6 dBm</td><td>±4dB</td></tr>
<tr><td>5</td><td>20 dBm</td><td>±3dB</td><td>13</td><td>4 dBm</td><td>±4dB</td></tr>
<tr><td>6</td><td>18 dBm</td><td>±3dB</td><td>14</td><td>2 dBm</td><td>±5dB</td></tr>
<tr><td>7</td><td>16 dBm</td><td>±3dB</td><td>15</td><td>0 dBm</td><td>±5dB</td></tr>
</table>

Item	Description	Specification	
5	Output RF Spectrum (due to modulation)	**GSM850**	
		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
		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**	
		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="2">PCS</td><td></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 rowspan="2">7</td><td rowspan="2">Spurious Emissions</td><td colspan="3">Conduction, Emission Status</td></tr>
<tr><td colspan="3">Conduction, Emission Status</td></tr>
<tr><td>8</td><td>Bit Error Ratio</td><td colspan="3">GSM850
BER (Class II) < 2.439% @-102dBm
PCS
BER (Class II) < 2.439% @-100dBm</td></tr>
<tr><td>9</td><td>Rx Level Report accuracy</td><td colspan="3">±3 dB</td></tr>
<tr><td>10</td><td>SRL</td><td colspan="3">8±3 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>
<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>
</table>

Item	Description	Specification	
14	STMR	13 ± 5 dB	
15	Stability Margin	> 6 dB	
16	Distortion	dB to ARL (dB)	Level Ratio (dB)
		-35	17.5
		-30	22.5
		-20	30.7
		-10	33.3
		0	33.7
		7	31.7
		10	25.5
17	Side tone Distortion	Three stage distortion < 10%	
18	<Change> System frequency (26 MHz) tolerance	≤ 2.5 ppm	
19	<Change> 32.768KHz tolerance	≤ 30ppm	
20	Power consumption	Full power < 250mA (GSM850) ; < 200mA (PCS) Standby - Normal Mode ≤4.0mA(Mix. power) - Using Test mode on DSP Sleep function ≤6mA	
21	Talk Time	GSM850/Lvl 7 (Battery Capacity 830mA):230 min GSM850/Lvl 12(Battery Capacity 830mA):380 min	
22	Standby Time	Under conditions, at least 200 hours: 1. Brand new and full 740mAh battery 2. Full charge, no receive/send and keep GSM in idle mode. 3. Broadcast set off. 4. Signal strength display set at 3 level above. 5. Backlight of phone set off.	
23	Ringer Volume	At least 80 dB under below conditions: 1. Ringer set as ringer. 2. Test distance set as 50 cm	
24	Charge Voltage	Fast Charge : < 500 mA Slow Charge: < 60mA	
25	Antenna Display	Antenna Bar Number	Power
		5	-85 dBm ~
		4	-90 dBm ~ -86 dBm
		3	-95 dBm ~ -91 dBm
		2	-100 dBm ~ -96 dBm
		1	-105 dBm ~ -101 dBm
		0	~ - dBm

Item	Description	Specification	
26	Battery Indicator	Battery Bar Number	Voltage (±0.03V)
		0	3.61V~ 3.50V
		1	3.71V ~ 3.62V
		2	3.78V ~ 3.72V
		3	3.92V ~ 3.79V
		4	4.2V ~ 3.93V
27	Low Voltage Warning	3.62V±0.03V (Standby)	
28	Forced shut down Voltage	3.35±0.03 V	
29	Battery Type	1 Li-ion Battery Standard Voltage = 3.7 V Battery full charge voltage = 4.2 V Capacity: 830mAh	
30	Travel Charger	Switching-mode charger Input: 100 ~ 240 V, 50/60Hz Out put: 5.2V, 800mA	

3. H/W Circuit Description

3.1. RF Circuit

The RF parts consist of a transmitter part, a receiver part, a frequency synthesizer part and a VCTCXO part.
The TexasInstuments transceiver is composed of one RF chipset TRF6151C which is a quadruple-band GSM/GPRS wireless communications.
This device integrates a receiver based on direct conversion architecture, a transmitter based on modulation-loop architecture, frequency synthesizing including a 26-MHzVCXO, a main N-integer synthesizer, two main VCOs, a programmable main-loop filter, two TX VCOs, a TX loop filter, voltage regulators to supply on-chip and off-chip RF functions, and a power-amplifier controller.

3.1.1. Front End Part

RF front end consists of Antenna Switch(FL502), dual band LNAs integrated in transceiver The Received RF signals(GSM 869MHz ~ 894MHz, PCS 1930MHz ~ 1990MHz) are fed into the antenna or mobile switch. An antenna matching circuit is between the antenna and the mobile switch. The Antenna Switch is used for control the Rx and Tx paths. And, the input signals VC1 and VC2 of a FL502, 1 are directly connected to baseband controller to switch either Tx or Rx path on. Ant S/W module(FL502) is an antenna switch module for dual band phone. The logic and current is given below Table 1.

	VC1	VC2	Current
GSM TX	2.4 ~ 2.8V	0V	8.0mA max
PCS TX	0 V	2.4 ~ 2.8 V	8.0mA max
GSM/PCS RX	0 V	0 V	< 0.1mA

Table 3-1. The Logic and Current

RF saw filters consists of FL500, FL501. RF saw filters is Low-loss RF filter for mobile telephone GSM850 and PCS systems. Input port Unbalanced to output port balanced operation.

3.1.2. Receiver Part

- A GSM850 LNA (LNAGSM) with switchable gain
- A PCS1900 LNA (LNAPCS) with switchable gain
- Demodulators for GSM850 (MIXGSM), PCS1900 (MIXPCS) bands with programmable gain
- Two baseband amplifiers with digitally-programmable gain
- Two fully-integrated baseband channel filters
- Two dc-offset compensation systems
- A divider by 4 for LO generation in GSM850 in order to minimize dc offset generated by self- mixing and the LO reradiation
- A divider by 2 for LO generation in PCS1900 in order to minimize dc offset generated by self-mixing and LO reradiation

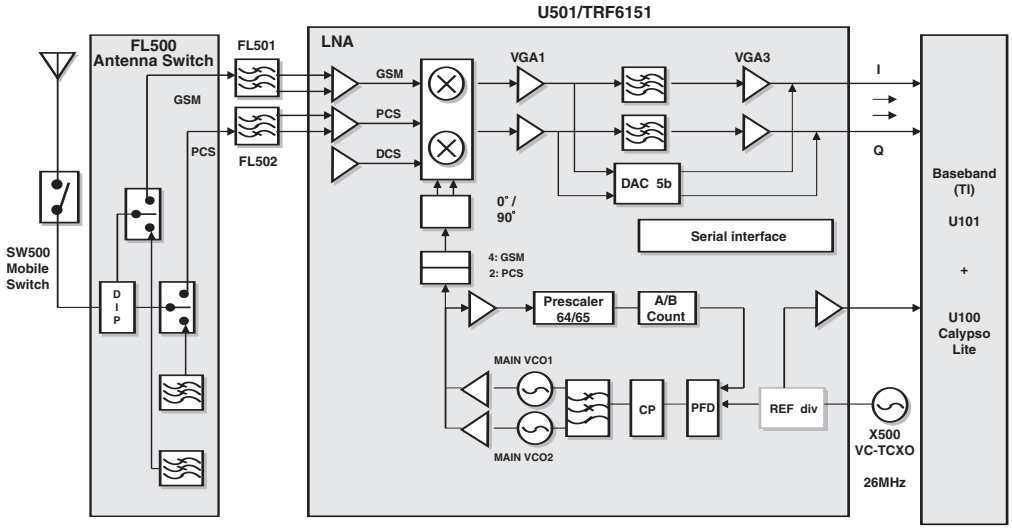


Figure 1. Receiver Part Block Diagram

3.1.3. Synthesizer Part

- A 26-MHz VCXO with external
- A 26-MHz buffer to drive the DBBs
- Two main VCOs fully integrated
- A main N-integer synthesizer
- A programmable main loop filter
- Three voltage regulators to supply
- A digital serial interface

3.1.4. Transmitter Part

- Transceiver

Transmit section:

- An offset PLL with post-IQ modulator and post-offset mixer filters fully integrated on the chip
- Two TX VCOs fully integrated on the chip
- A TX loop filter fully integrated on the chip
- A divider by 4 for local oscillator (LO) generation in GSM900 and GSM850
- A divider by 2 for LO generation in DCS1800 and PCS1900
- A programmable M divider for IF generation
- A power-amplifier controller including all the functions required to design a power-sensing control loop, except for the sensing diodes

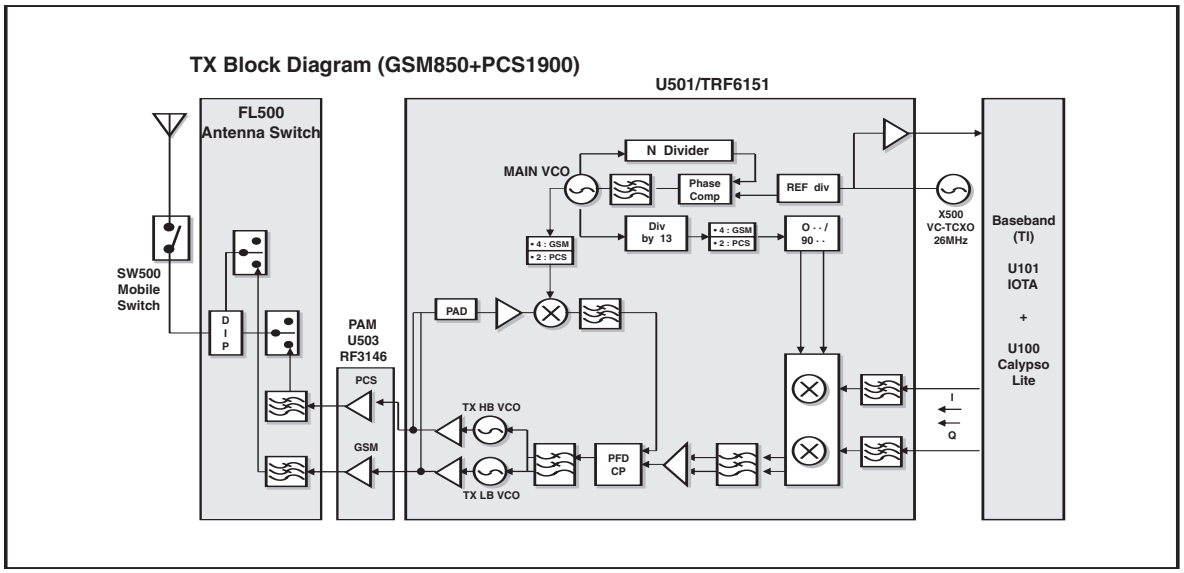


Figure 2. Transmitter Block Diagram

3.1.5. Power Amplifier

The RF3146[U501] is a high-power, high-efficiency power amplifier module with integrated power control. The device is a self-contained 7mmx7mmx0.9mm lead frame module(LFM) with 50Ω input and output terminals. The power control function is also incorporated, eliminating the need for directional couplers, detector diodes, power control ASICs and other power control circuitry; this allows the module to be driven directly from the DAC output. The device is designed for use as the final RF amplifier in GSM850, EGSM900, DCS and PCS handheld digital cellular equipment and other applications in the 824MHz to 849MHz, 880MHz to 915MHz, 1710MHz to 1785MHz and 1850MHz to 1910MHz bands.

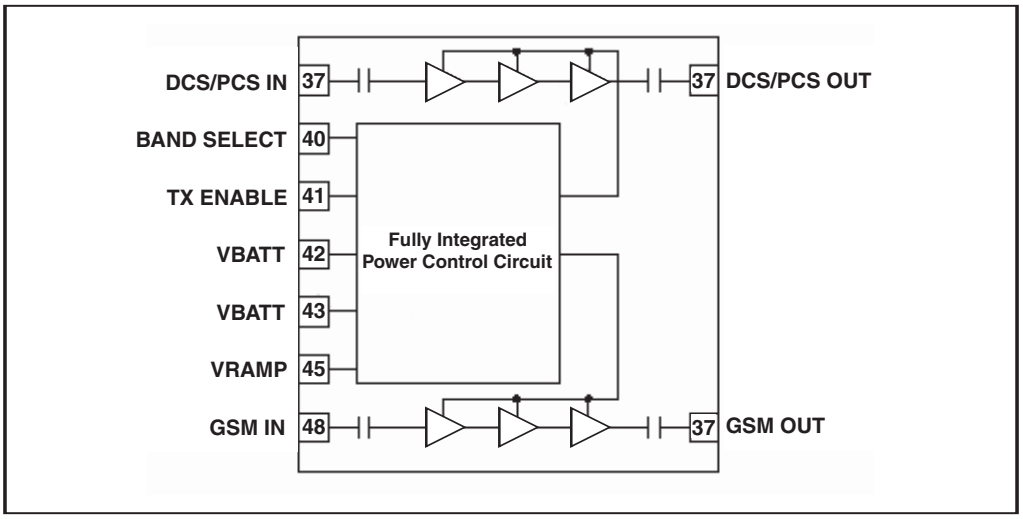


Figure 3. Power Amp Block Diagram

3.1.6. 26 MHz Clock

The 26 MHz clock(X500) consists of a TCXO(Temperature Compensated Crystal Oscillator) which oscillates at a frequency of 13 MHz. It is used within the TRF6151C RF Main Chip, BB Analog chip-set(IOTA), Digital chip-set(Calypso Lite).

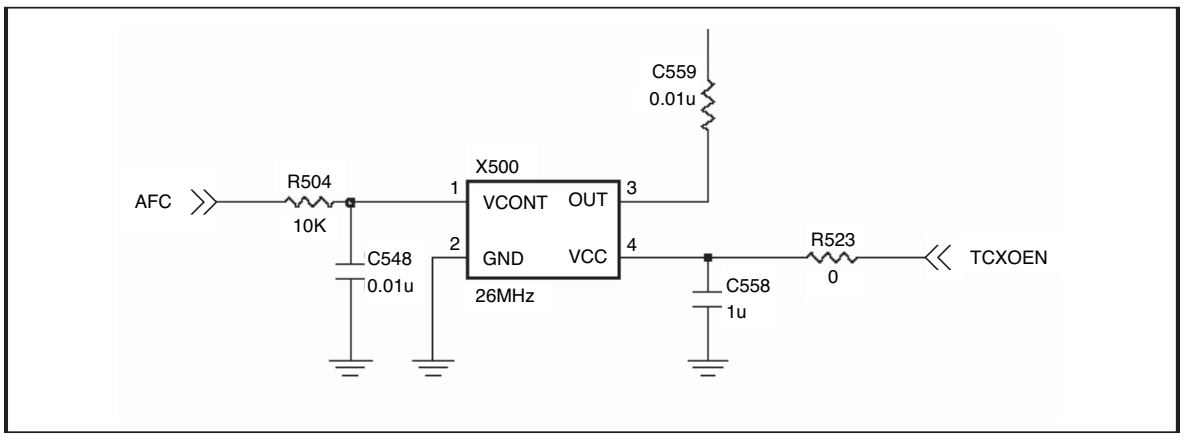


Figure 4. VC-TCXO Circuit

3.2. Digital Baseband(DBB) Processor

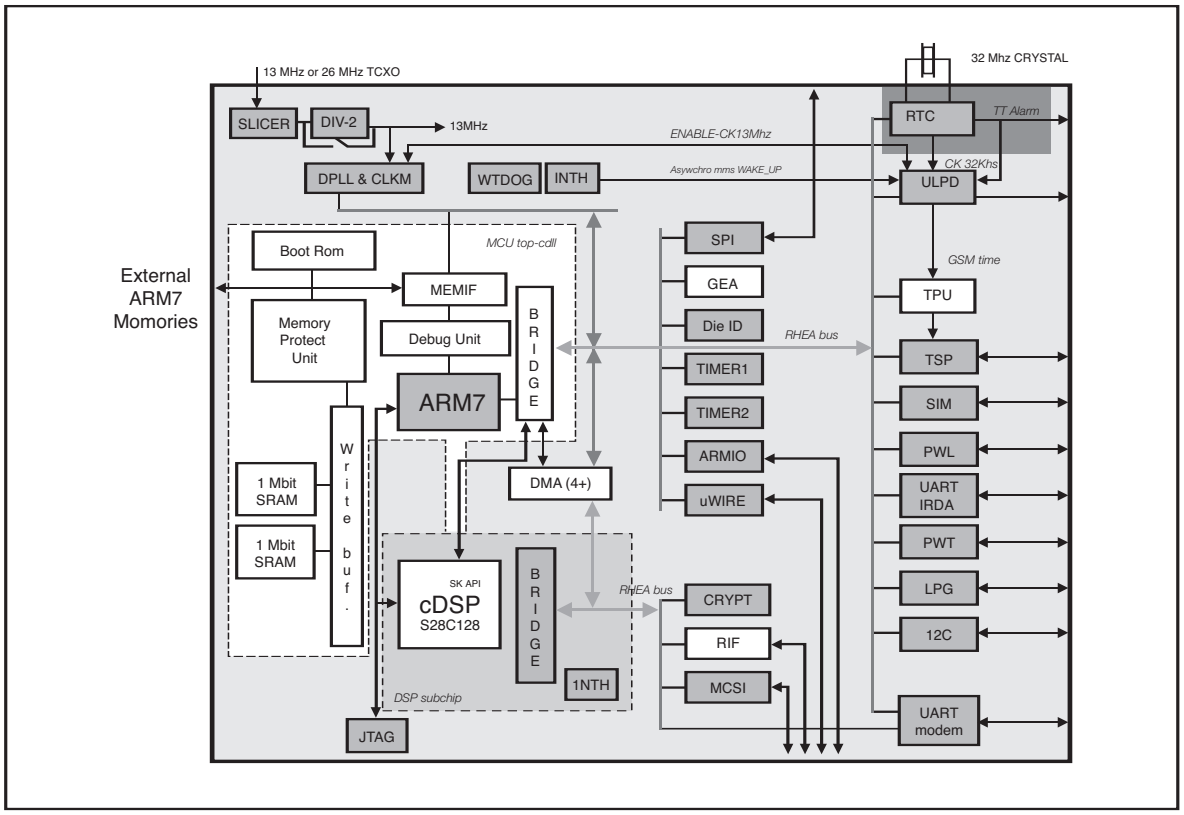


Figure 5. Top level block diagram of the Calypso lite

3.2.1. General Description

CALYPSO lite is a chip implementing the digital base-band processes of a GSM/GPRS mobile phone.

This chip combines a DSP sub-chip (LEAD2 CPU) with its program and data memories, a Micro- -Controller core with emulation facilities (ARM7TDMIE), internal 8Kb of Boot ROM memory, 2M bit SRAM memory, a clock squarer cell, several compiled single-port or 2-ports RAM and CMOS gates. The chip will fully support the Full-Rate, Enhanced Full-Rate and Half-Rate speech coding.

CALYPSO lite implements all features for the structural test of the logic (full-SCAN, BIST, PMT, 0JTAG boundary-SCAN).

3.2.2. Block Description

CALYPSO lite architecture is based on two processor cores ARM7 and DSP using the generic RHEA bus standard as interface with their associated application peripherals.
CALYPSO lite is composed from the following blocks:

- ARM7TDMIE : ARM7TDMI CPU core
- DSP subchip
- ARM peripherals:

  General purpose peripherals
  - ARM Memory Interface for external RAM, Flash or ROM
  - 2 Mbit Static RAM with write-buffer

  Application peripherals
  - ARM General purposes I/O with keyboard interface and two PWM modulation signals
  - UART 16C750 interface (UART_IRDA) with
    - IRDA control capabilities (SIR)
    - Software flow control (UART mode).
  - UART 16C750 interface (UART_MODEM) with
    - hardware flow protocol (DCD, CTS/RTS)
    - autobaud function
  - SIM Interface.
  - TPU(Time Processing Unit) : Processing for GSM time base
  - TSP(Time Serial Port) : GSM data interface with RF and ABB

* Calypso lite is internally 39MHz machine (25ns machine cycle), so it requires 3 wait-state for 80ns access(25*4 = 100 ns).

3.2.3. External Devices connected to memory interface

Interface SPEC

Device	Name	Maker	Write Access Time	Read Access Time
FLASH 1	TH50VPF5683CDSB	Toshiba	70ns	70ns
SRAM	TH50VPF5683CDSB	Toshiba	70ns	70ns
LCD	RB187Z10A	SII	50ns	50ns
Melody IC	YMU762	Yamaha	50ns	80ns

Table 3-2. Memory interface

3.2.4. RF Interface (TPU, TSP block)

Calypso lite uses this interface to control Nausica_CS(ABB Processor) and Clara(RF Processor) with GSM Time Base

TSP (Time Serial Port)		
Resource	**Interconnection**	**Description**
TSPDO	ABB & RF main Chip	Control Data
TSPEN0	ABB	ABB Control Data Enable Signal
TSPEN1	RF main Chip	RF Control Data Enable Signal
TPU (Time Processing Unit) Parallel Port		
TSPACT00	RESET_RF	RF main Chip Reset Signal
TSPACT05	PA_ON	Power Amp ON signal

Table 3-3. RF Interface Spec.

3.2.5. SIM interface

SIM interface scheme is shown in (Figure 6). SIM_IO, SIM_CLK, SIM_RST ports are used to communicate DBB with ABB and the Charge Pump in ABB enables 1.8V/3V SIM operation

SIM Interface

- ▶ SIM_CLK ---------- SIM card reference clock
- ▶ SIM_RST ---------- SIM card async/sync reset
- ▶ SIM_IO ---------- SIM card bidirectional data line
- ▶ SIM_PWCTRL ------ SIM card power activation
- ▶ SIM_RnW ---------- SIM card data line direction
- ▶ SIM_CD ---------- SIM card presence detection

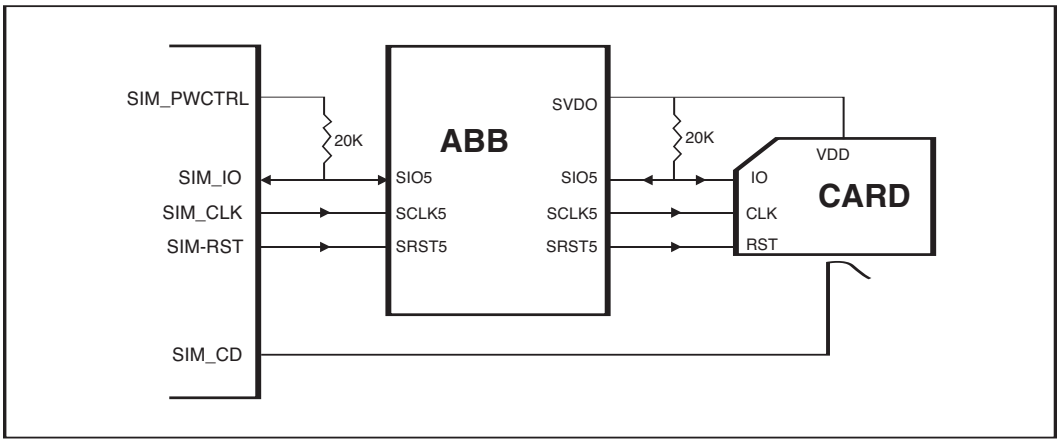


Figure 6. SIM Interface

3.2.6. UART Interface

MG191 has two UART Drivers as follow :

- UART : Hardware Flow Control / Fax&Data Modem

UART MODEM(UART)		
Resource	Name	Remark
TX_MODEM	TXD	Transmit Data
RX_MODEM	RXD	Receive Data
CTS_MODEM	CTS	ClearTo Send
RTS_MODEM	RTS	Request To Send
GPIO 3	DSR	Data Set Ready

Figure 3-4. UART Interface Spec.

3.2.7. GPIO map

In total 16 allowable resources, MG191 is using 13 resources except 3 resources dedicated to SIM and Memory. MG191 GPIO(General Purpose Input/Output) Map, describing application, I/O state, and enable level, is shown in below table.

I/O #	Application	I/O	Resource State	Inactive State	Active State
I/O (0)	LCD BACKLIGHT	I	GPIO	HIGH (Open)	LOW (Closed)
I/O (1)	MELODY IRQ	I	GPIO	HIGH	LOW
I/O (2)	LED ON	O	GPIO	LOW	HIGH
I/O (3)	DSR	I	GPIO	HIGH	LOW
I/O (4)	NC		GPIO		
I/O (5)	SIM PWCTRL	O	SIM	HIGH	HIGH
I/O (6)	NC	O	GPIO	LOW	HIGH
I/O (7)	LCD BACKLIGHT	O	GPIO	HIGH	LOW
I/O (8)	LCD RESET	O	GPIO	LOW	HIGH
I/O (9)	LCD BACKLIGHT	O	GPIO	HIGH	LOW
I/O (10)	MIDI RESET	O	GPIO	LOW	HIGH
I/O (11)	INLED R	O	GPIO	LOW	HIGH
I/O (12)	INLED G	O	GPIO	HIGH	LOW
I/O (13)	PCM SYNC	I	GPIO	HIGH	LOW
I/O (14)	BHE	O	MEMORY		
I/O (15)	BLE	O			

Table 3-5. GPIO Map Table

3.3. Analog Baseband(ABB) Processor

3.3.1. General Description

IOTA is Analog Baseband (ABB)Chip supports GSM900, DCS1800, PCS, GPRS Class 10 with Digital Basband Chip(Calypso G2).

IOTA processes GSM modulation/demodulation and power management operations.

Block Description

- Audio Signal Processing & Interface
- Baseband in-phase(I), quadrature(Q) Signal Processing
- RF interface with DBB (time serial port)
- Supply voltage regulation
- Battery charging control
- Switch ON/OFF
- 1.8V/3V SIM card Interface
- 4 internal & 4external ADC channels

3.3.2. Audio Signal Processing & Interface

Audio signal processing is divided Uplink path and downlink path.
The uplink path amplifies the audio signal from MIC and converts this analog signal to digital signal and then transmit it to DBB Chip. This transmitted signal is reformed to fit in GSM Frame format and delivered to RF Chip.
MICBIAS is 2.0V level. The downlink path amplifies the signal from DBB chip and outputs it to Receiver(or Speaker).

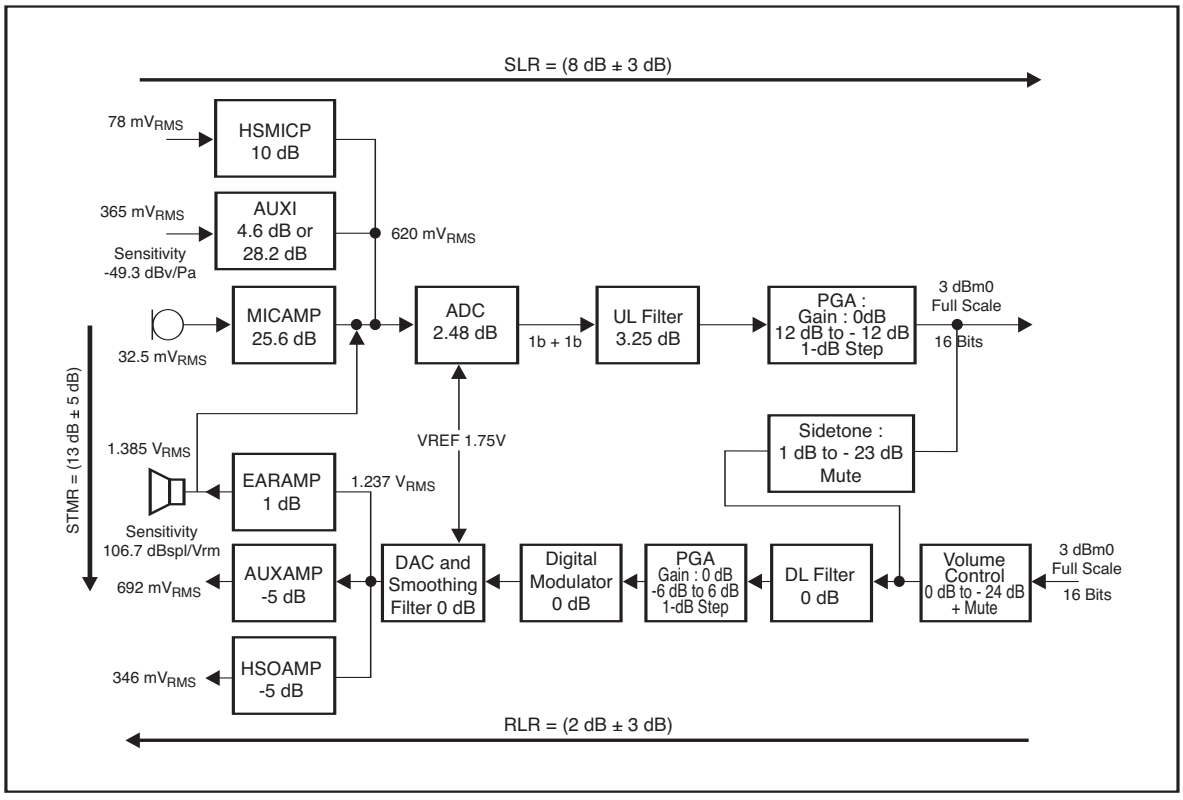


Figure 7. Audio Interace Block Diagram

3.3.3. Baseband Codec (BBC)

Baseband codec is composed of baseband uplink path(BUL) and baseband downlink path(BDL). BUL makes GMSK(Gaussian Minimum Shift Keying) modulated signal which has In-phase(I) component and quadrature(Q) component with burst data from DBB. This modulated signal is transmitted through RF section via air.

BDL process is opposite procedure of BUL. Namely, it performs GMSK demodulation with input analog I&Q signal from RF section, and then transmit it to DSP of DBB chip with 270.833kHz data rate through BSP.

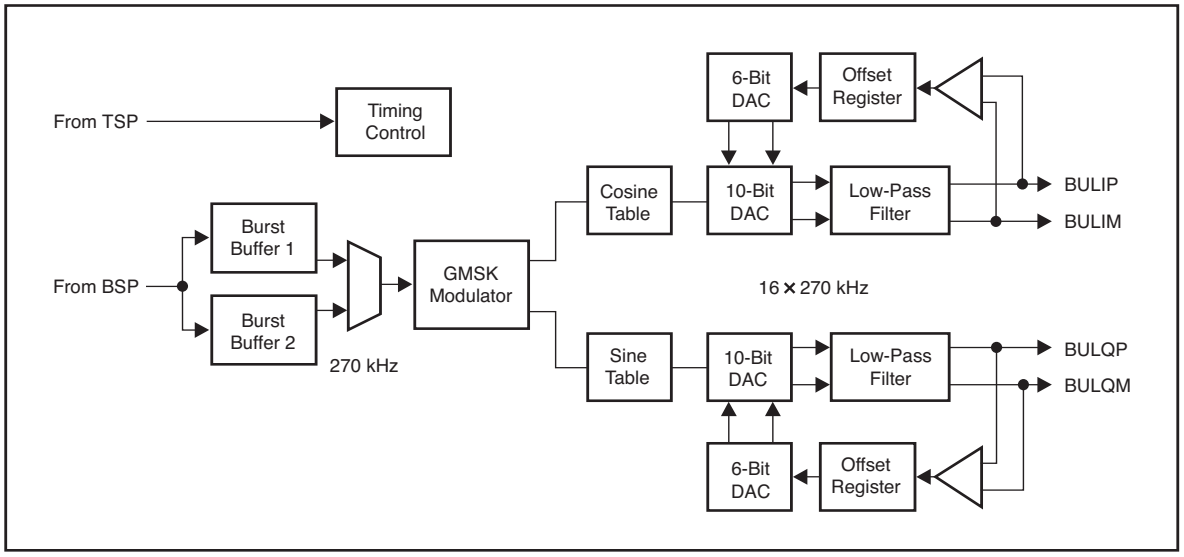


Figure 8. Baseband codec Block Diagram

	Output Voltage	Usage
VRDBB	1.5V	Digital Core of DBB
VRIO	2.8V	Peripheral devices
VRMEM	2.8V	External memory
VRRAM	2.8V	LCD & peripheral devices
VRABB	2.8V	Analog Block of ABB
VRSIM	2.85	SIM card driver
VRRTC	1.5V	RTC & 32kHz-crystal

3.3.4. Voltage Regulation (VREG)

There are 7 LDO(Low Drop Output) regulators in ABB chip.
The output of these 7 LDOs are as following table. (Figure 9) shows the power supply related locks of DBB/ABB and their interfaces in MG191.

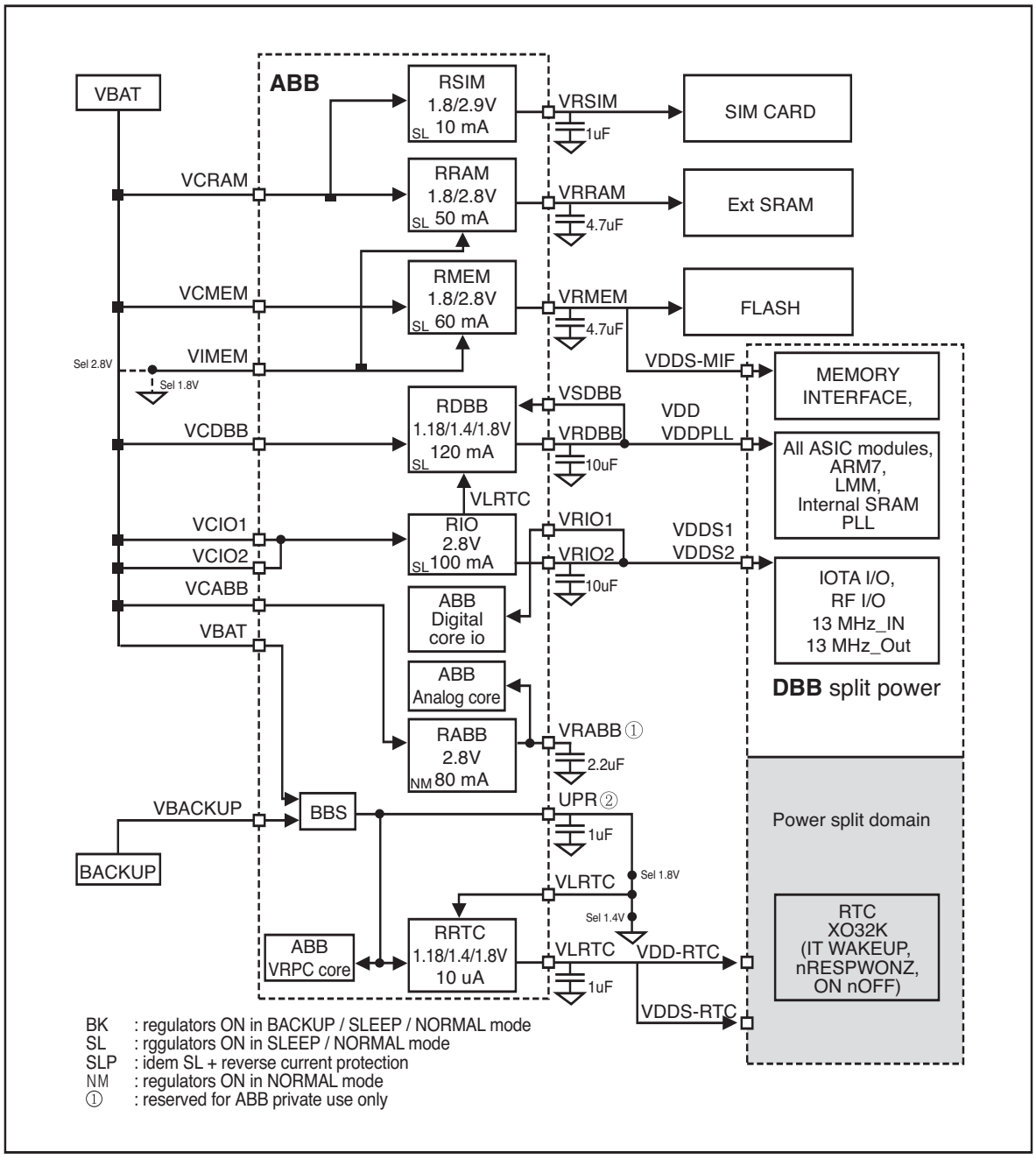


Figure 9. Power Supply Scheme

3.3.5. ADC Channels

ABB ADC block is composed of 4 internal ADC(Analog to Digital Converter) channels and 4 external ADC channel. This block operates charging process and other related process by reading battery voltage and other analog values.

ADC 8 channels		
Resource	**Name**	**Description**
VCHG	VCHG	Charging Management
VBAT	VBAT	
ICHG	ICHG	
VBACKUP	VBACKUP	Backup Battery
ADIN1	JACK_DETECT	Jack plug-in detect
ADIN2	BATT_TEMP	Battery Detect
ADIN3	TEMPSENSE	Temperature Sensing
ADIN4	HOOK_DETECT	HOOK_DETECT

Table 3-6. ADC Channel Spec.

3.3.6. Charging

Charging block in ABB processes charging operation by using VBAT, ICHG value through ADC channel. Battery Block Indication and SPEC of MG191 is as follow.

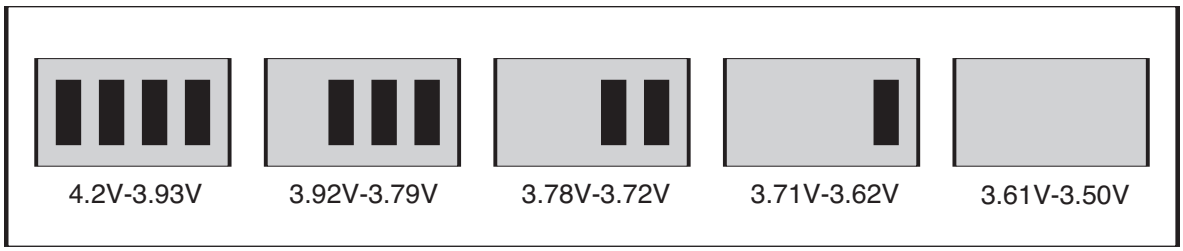


Figure 10. Battery Block Indication

1. Charging method : CC-CV
2. Charger detect voltage : 4.2V
3. Charging time : 2h30min
4. Icon stop current : 100mA
5. Charging current : 500mA
6. CV voltage : 4.2V
7. Cutoff current : 50mA
8. Full charge indication current (icon stop current) : 100mA
9. Recharge voltage : 4.05V
10. Low battery alarm
    a. Idle : 3.64V
    b. Dedicated : 3.50V
11. Low battery alarm interval :
    a. Idle : 3min
    b. Dedicated:1min
12. Switch-off voltage : 3.35V
13. Charging temperature adc range
    a. ~ -2°C : not charging operation.
    b. -2°C ~ 47°C : charging.
    c. 47°C~ : not charging operation.

3.3.7. Switch ON/OFF

MG191 Power State : Defined 4cases as follow

- ▶ Power-ON : mobile is powered by main battery or backup battery.
- ▶ Power-OFF : mobile isn't any battery.
- ▶ Switch-ON : mobileis powered and waken up from switch-off state.
- ▶ Switch-OFF : mobile is powered to maintain only the permanent function(ULPD).

To enter into Switch-ON state, one of followinf 4 condition is satisfied.

- ▶ PWR-ON pushed after a debouncing time of 30ms.
- ▶ ON_REMOTE : After debouncing, when a falling edgeis detected on RPWON pin.
- ▶ IT_WAKE_UP : When a rising edge is detected on RTC_ALARM pin.
- ▶ CHARGER_IC : When a charger voltage is above VBAT+0.4V on VCHG.

3.3.8. Memory

MG191 using 64Mbit Flash + 32Mbit SRAM with 16 bit parallel data bus thru ADD01 ~ ADD22.

3.3.9. Display & FPCB Interface

LCD module include :

Main LCD: 120*64 Mono Scale LCD

Main LCD Backlight : EL-Backlight

LCD module is connected to main board with 26 pin FPCB and connected to Speaker, Receiver, Vibrator.

No.	Pin Name	Function
1	Main_CS	LCD Chip set
2	LCD_RESET	LCD Reset
3	A(0)	Address Line
4	WR	LCD Write Control
5	RD	LCD Read Control
6	D(0)	Date input
7	D(1)	Date input
8	D(2)	Date input
9	D(3)	Date input

Table 3-7. LCD FPC Interface Spec.

Pin No.	Pin Name(WS)	Function
10	D(4)	Data input
11	D(5)	Data input
12	D(6)	Data input
13	D(7)	Data input
14	VDD	
15	GND	VSS
16	VOUT	
17	CAP3+	
18	CAP1-	
19	CAP1+	
20	CAP2+	
21	CAP2-	
22	V4	
23	V3	
24	V2	
25	V1	
26	V0	
27	GND	VSS

3.3.10. Keypad Switching & Scanning

DBB supports 25 keymap and Switch-ON Key is connected directly to ABB as (Figure 11).

	KBC0	KBC	KBC2	KBC3
KBR0	[?]	[?]	[?]	[?]
KBR1	[1]	[2]	[3]	OK
KBR2	[4]	[5]	[6]	[F1]
KBR3	[7]	[8]	[9]	[F2]
KBR4	[*]	[0]	[#]	[SEND]

Table 3-8. Keypad Map

Keypad Map

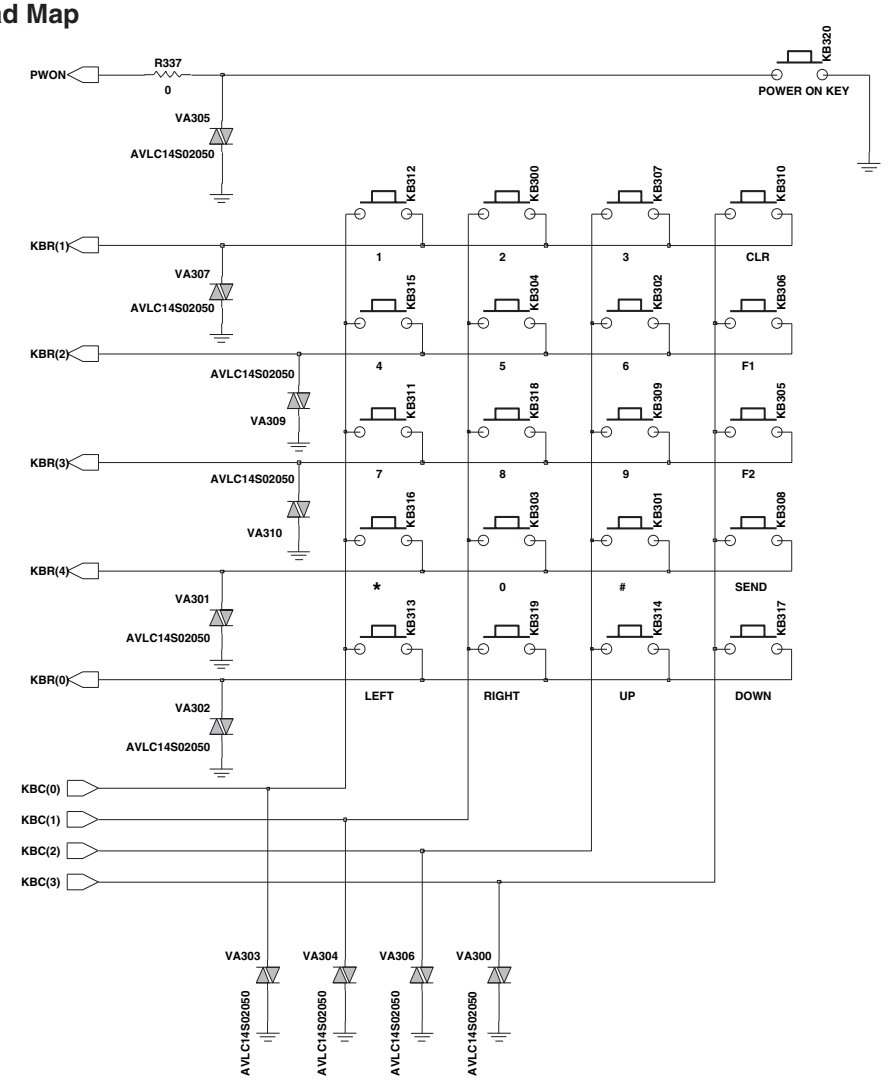


Figure 11. Keypad scanning Scheme

3.3.11. Audio

• Uplink

The microphone is soldered to the main PCB. The uplink signal is passed to MICIP and MICIN pins of IOTA.

The MICBIAS voltage is supplied from IOTA(dedicated mode only). When the headset is inserted, ADC value of HOOK_DETECT(IO6) terminal is between 20 to 150 (decimal value). On detecting this, Calypso makes IOTA switches the MIC amplifier path from main to auxiliary.

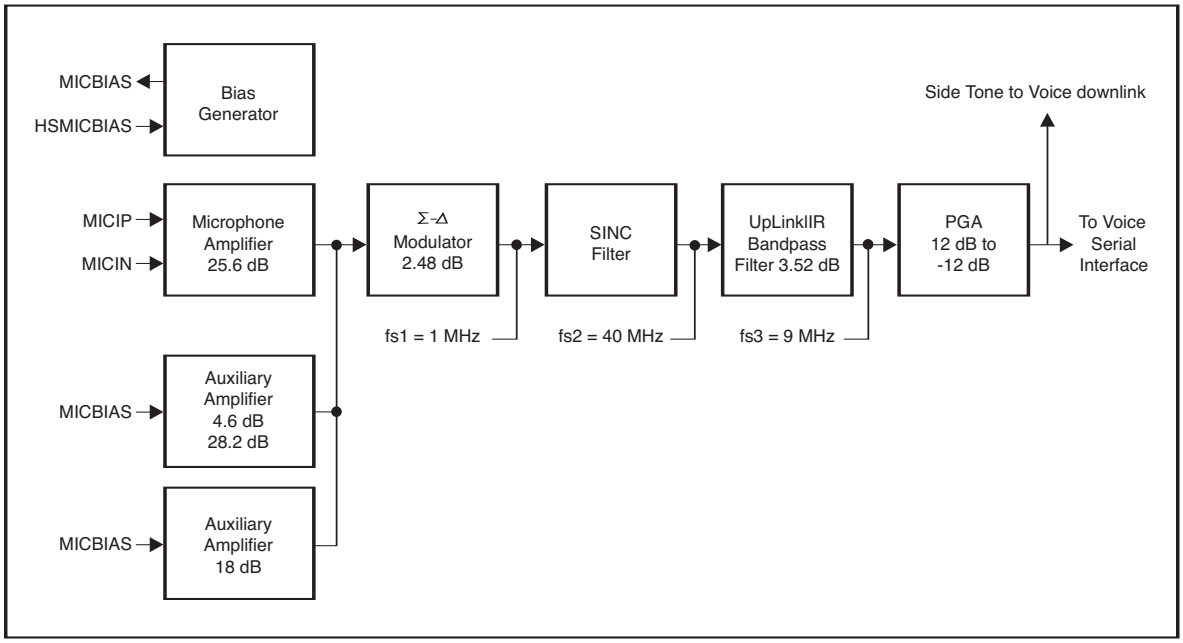
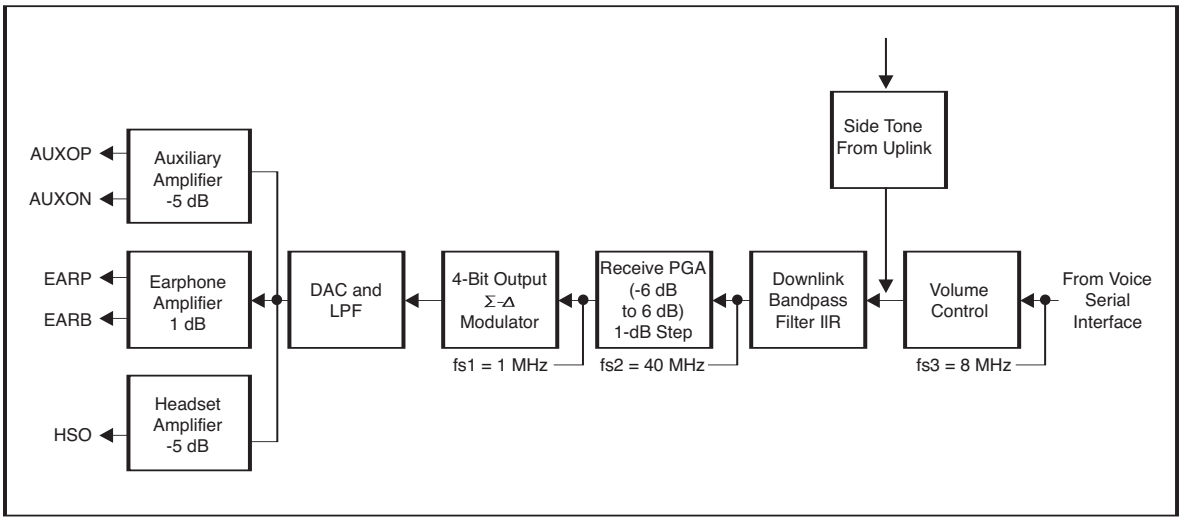


Figure 12. Uplink Path

• Downlink

The downlink signal is passed from EARP and EARN pins of IOTA. When the headset is inserted and Calypso detects 'Jack pluged state' from HOOK_DETECT terminal, Calypso makes IOTA switches the downlink path from 'EARP' and 'EARN' to auxiliary outputs('AUXOP' and 'AUXON' or 'HSO').



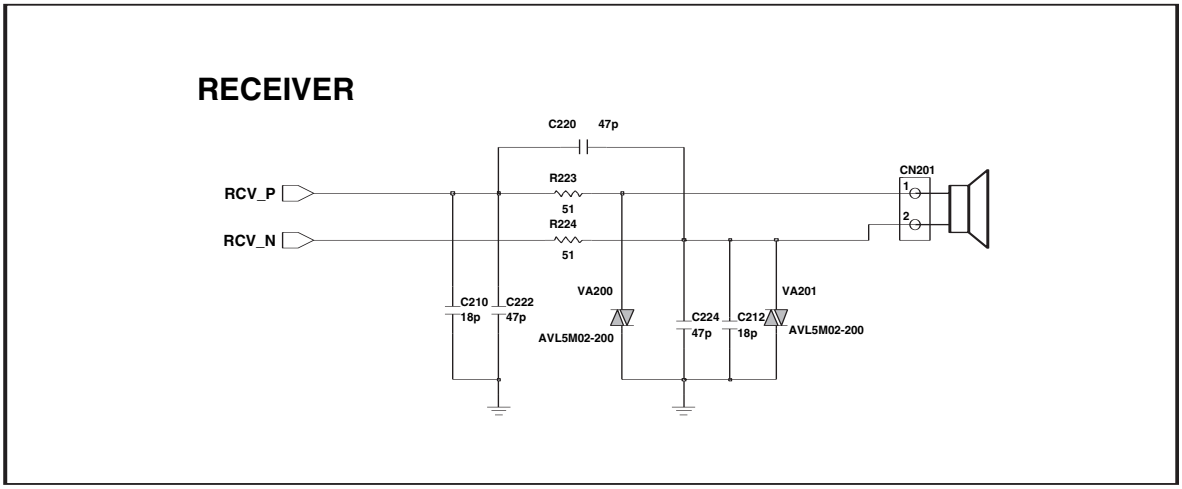
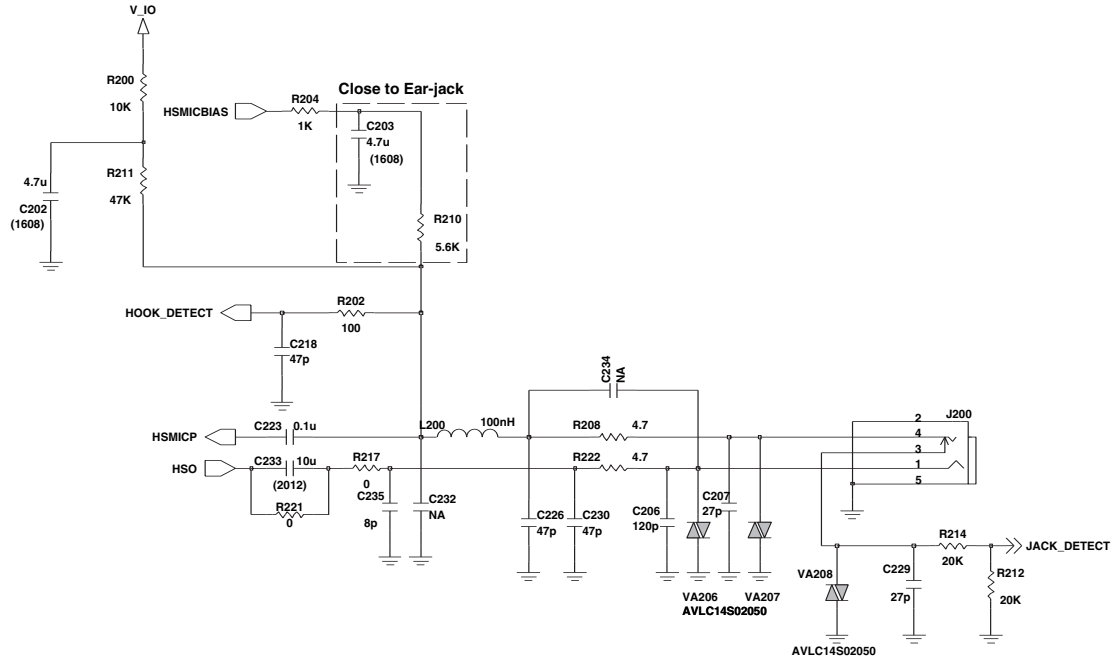
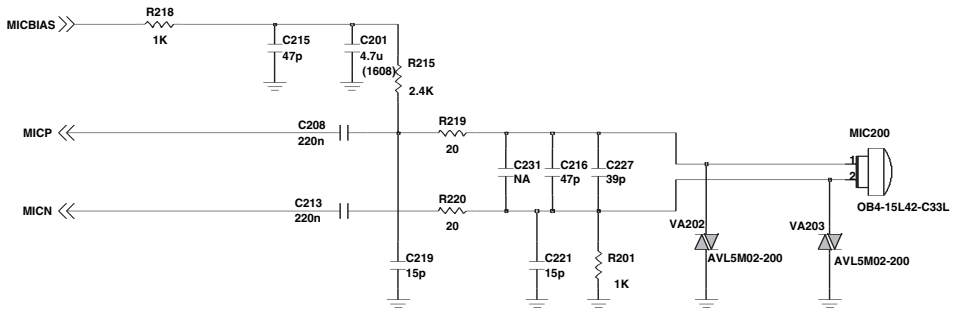


Figure 14. Audio Circuit

CIRCUIT


V_IO
R200
10K
HSMICBIAS
R204
1K
Close to Ear-jack
C203
4.7u
(1608)
4.7u
C202
(1608)
R211
47K
R210
5.6K
HOOK_DETECT
R202
100
C218
47p
C234
NA
HSMICP
C223
0.1u
L200
100nH
R208
4.7
HSO
C233
10u
(2012)
R217
0
R222
4.7
R221
0
C235
8p
C232
NA
C226
47p
C230
47p
C206
120p
C207
27p
VA206
AVLC14S02050
VA207
J200
2
4
3
1
5
R214
20K
JACK_DETECT
VA208
C229
27p
R212
20K
AVLC14S02050

MIC


MICBIAS
R218
1K
C215
47p
C201
4.7u
(1608)
R215
2.4K
MICP
C208
220n
R219
20
C231
NA
C216
47p
C227
39p
MIC200
1
2
OB4-15L42-C33L
MICN
C213
220n
R220
20
VA202
AVL5M02-200
VA203
AVL5M02-200
C219
15p
C221
15p
R201
1K

3.3.12. Keypad back-light Illumination

There are 12 Deep Blue LEDs in Main Board for Keypad Backlight.
Keypad Back-light is driven by 'D3,D4,D5' line from U300(Chargepump) .

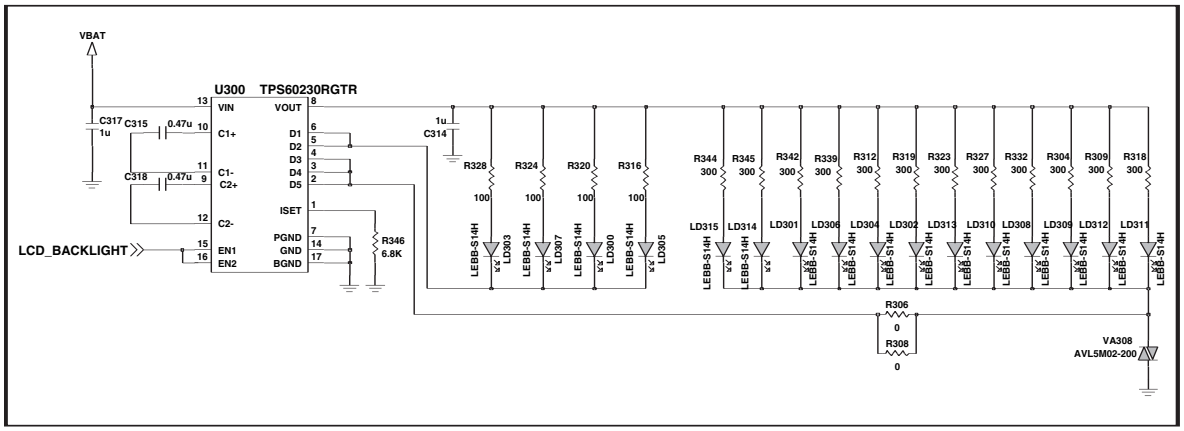


Figure 15. Keypad Back-light Scheme

3.3.13. LCD Illumination

There is EL-Backlight Sheet in the LCD module for LCD backlighting.
Keypad Back-light is driven by 'D1,D2' line from U300(Chargepump).

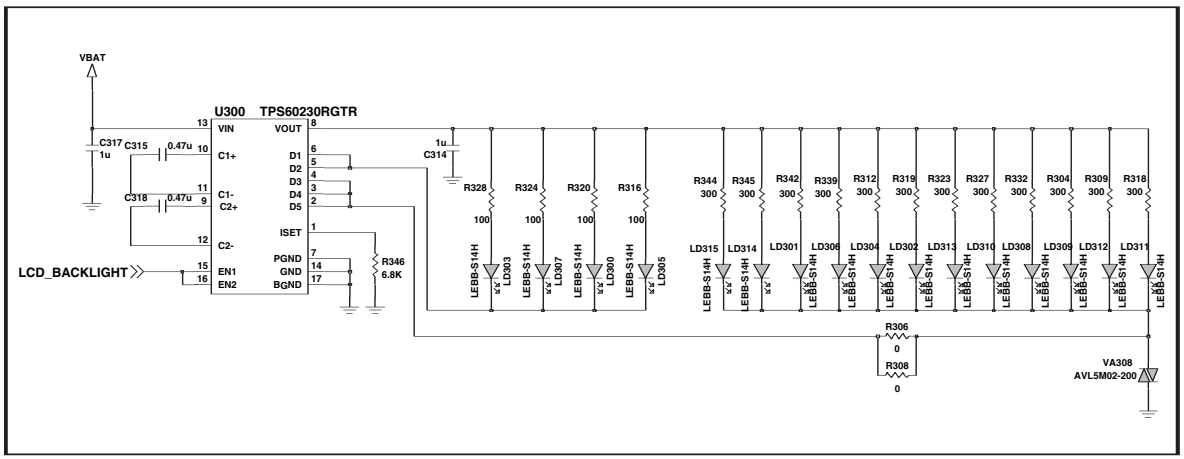
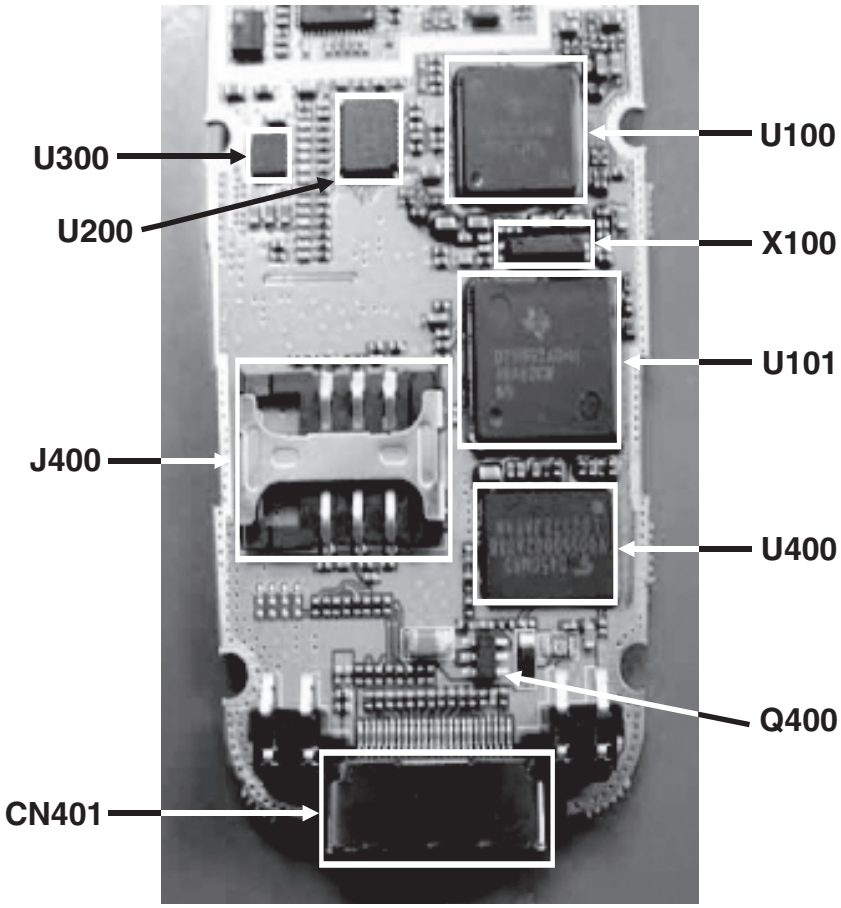


Figure 16. Keypad Back-light Scheme

3.4. Technical Brief

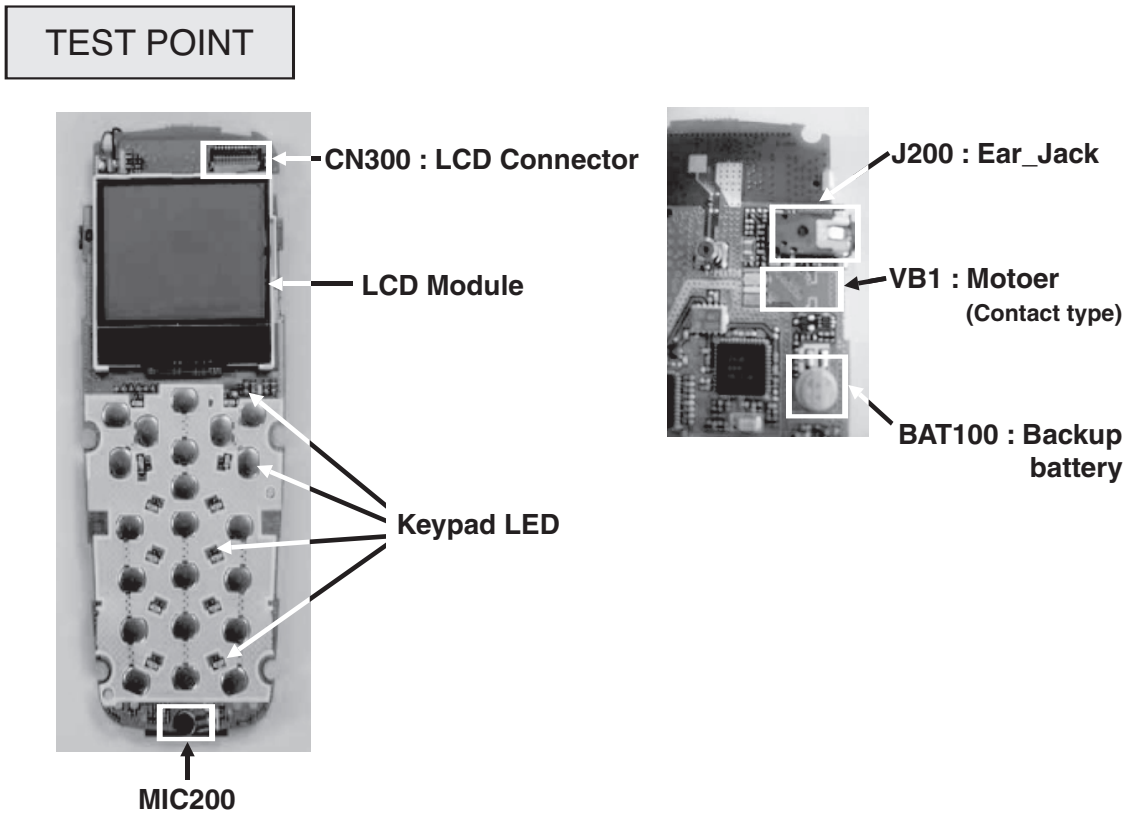
A. BaseBand Components (Component Side)

TEST POINT

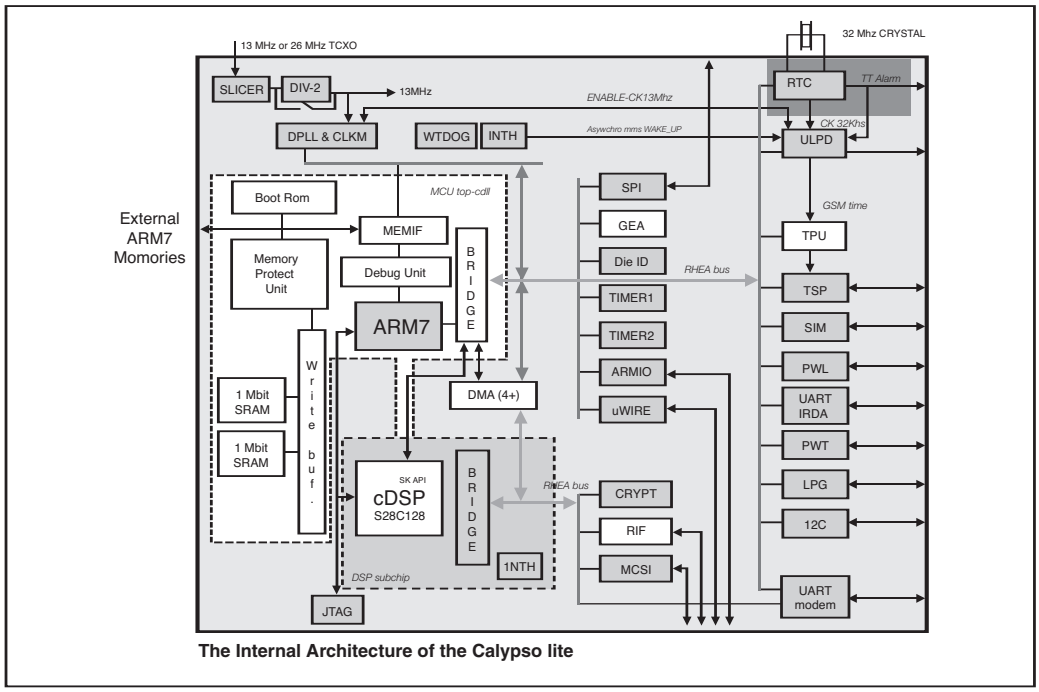


U101	Baseband Chipset (Calypso lite)
U100	Analog Baseband Chipset (IOTA)
X100	Crystal (32.768KHz Oscillator)
U200	Melody IC (40 Poly)
U400	Memory (64M Flash 32M SRAM)
Q400	FET (P-Channel)
CN401	IO Connector
J400	SIM Connector
U300	Charge Pump

B. BaseBand Components (Key Side+Botton Side)



C. Digital Baseband(DBB) Processor



The Internal Architecture of the Calypso lite

D. Analog Main Processor (ABB)

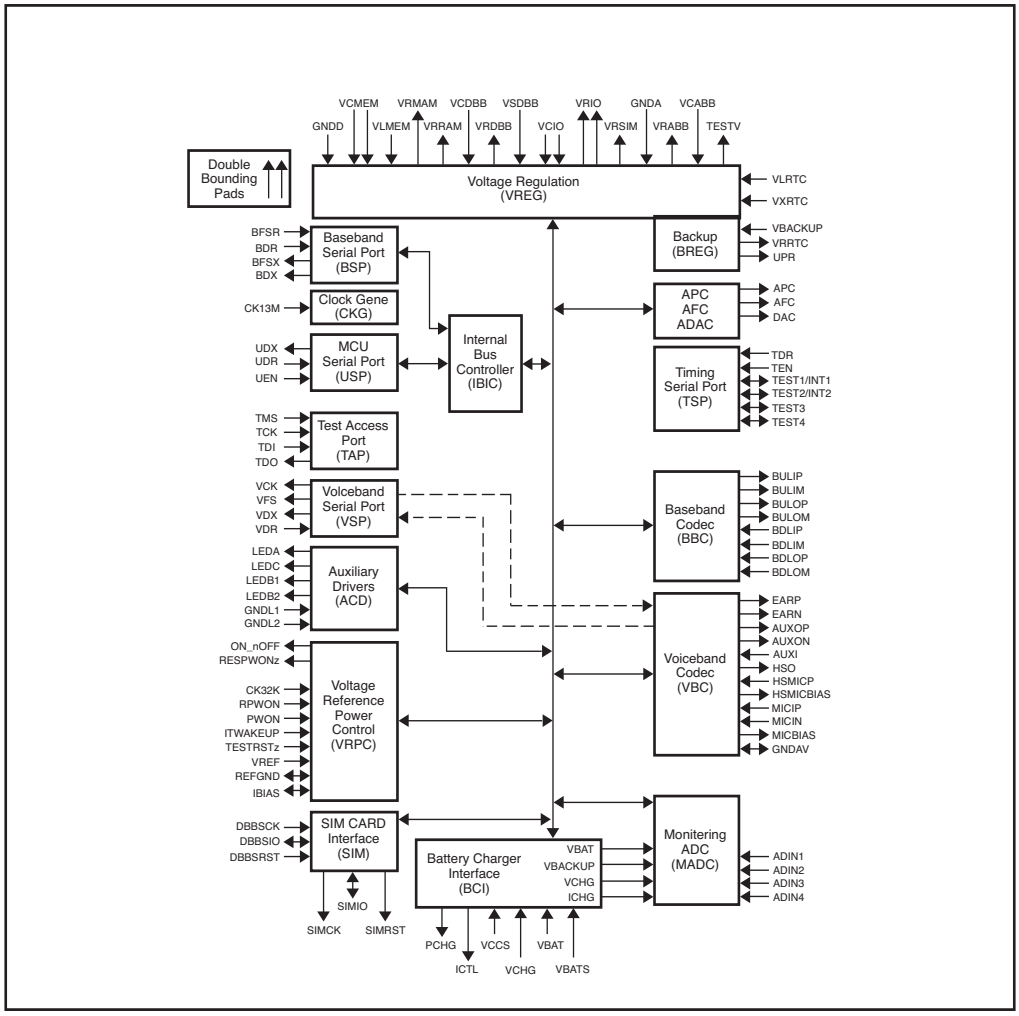


Figure 17. FTWL3014 Functional Block Diagram

- Applications include GSM 850, 900, DCS 1800, PCS 1900 Cellular Telephones
- Voice Coder/Decoder (CODEC)
- Baseband CODEC single and multislotwith I/Q RF Interface
- Auxiliary RF Converters
- SIM Card Interface
- Li-Ion or Ni-MH Battery Charging Control
- Six Low-DropOut, Low-Noise, Linear Voltage Regulators
- Dedicated Low Quiescent Current Mode on Regulators
- Voltage Detectors (with Power-Off Delays)
- Four Channel Analog-to-Digital Converters (ADC)
- Dedicated very low quiescent current domain supply

E. Memory

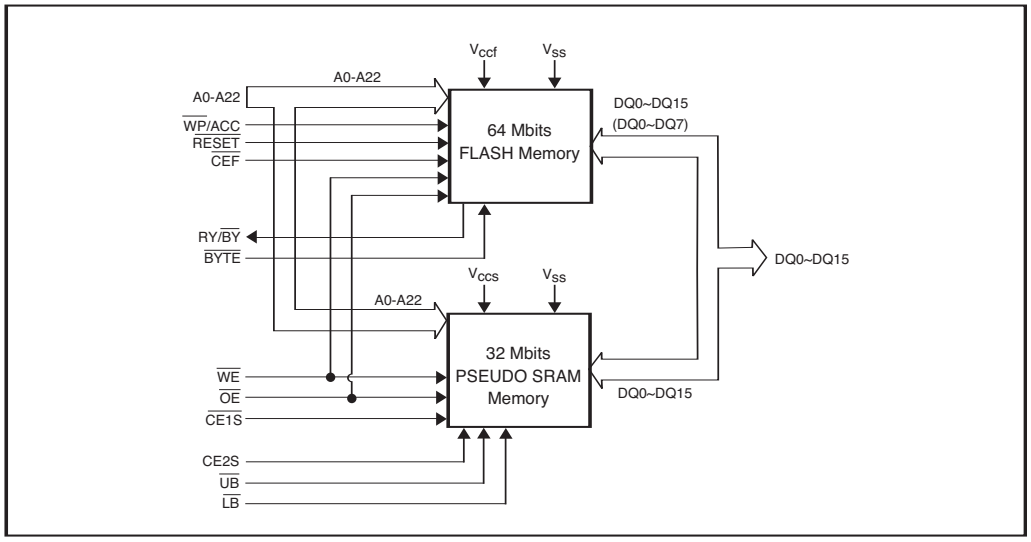


Figure 18. MCP BIOCK DIAGRAM

- Memory used MG191 is designed by TOSHIBA.
- Mixed Multi-Chip Package containing a 32M SRAM and 64M Flash Memory
- MCP(Multi-Chip Package) Features
  - Power Supply Voltage of 2.7 to 3.3V
  - Operating Temperature of -30°C to 85°C
- SRAM Features
  - Organization : 2M x 16 bits
  - Power Dissipation : 40mA max.(Operating), 70μA max.(Standby)
- Flash Memory Features
  - Organization : 4M x 16 bits
  - Power Dissipation
    - Read Operating : 55mA max.
    - Program/Erase Operating : 15mA max.
    - Standby : 10μA max.

F. Voltage Regulation (LDO)

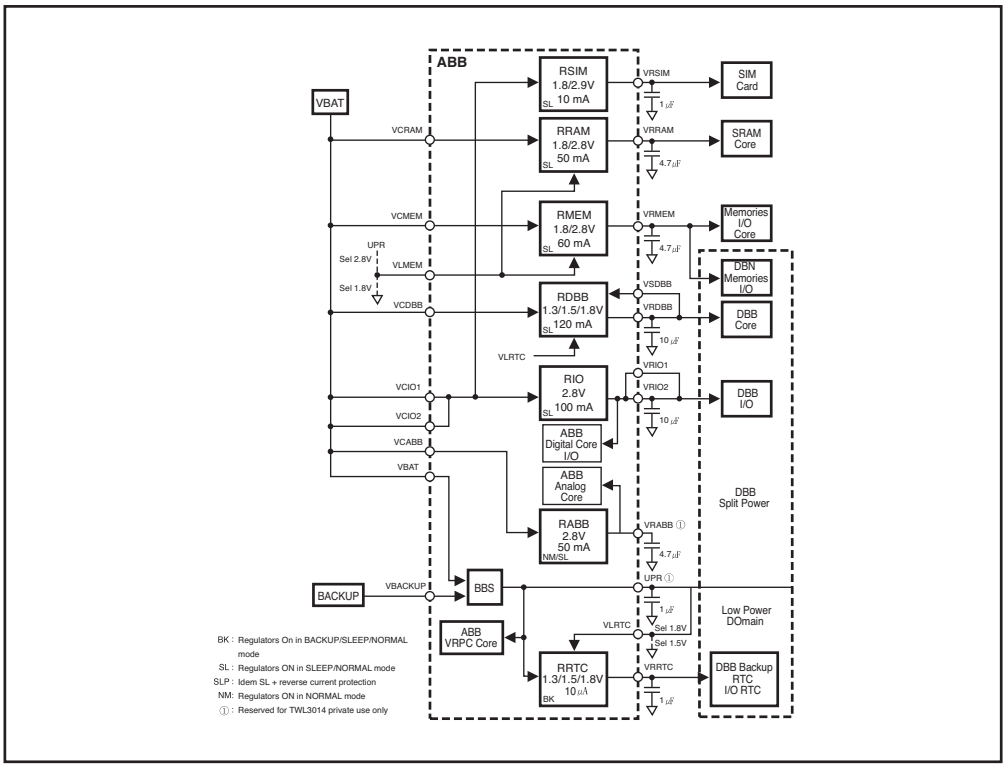
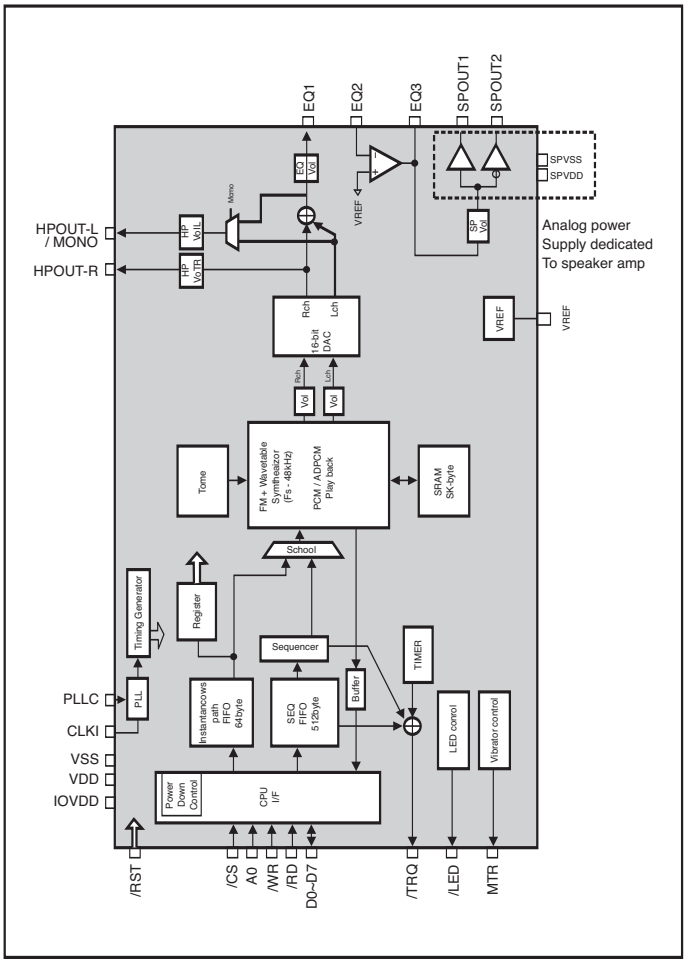


Figure 19. Voltage Supply System Block Diagram

- VRDBB
  - Provides the power to the DBB(Calypso) Core
  - 1.5V / 120mA max.
- VRRAM
  - Provides the power to the Analog S/W, IC, etc.external memory
  - 2.8V / 50mA
- VRMEM
  - Provides the power to the Flash Memory
  - 2.8V / 60mA max.
- VRABB
  - Provides the power to the ABB(IOTA) Core
  - 2.8V / 50mA max.
- VRIO
  - Provides the power to the IRDA, etc
  - 2.8V / 100mA max.
- VRRTC
  - Provides the power to the oscillator
  - 1.5V / 30uA max.
- VRSIM
  - Provides the power to the SIM card
  - •2.85V / 10mA max.

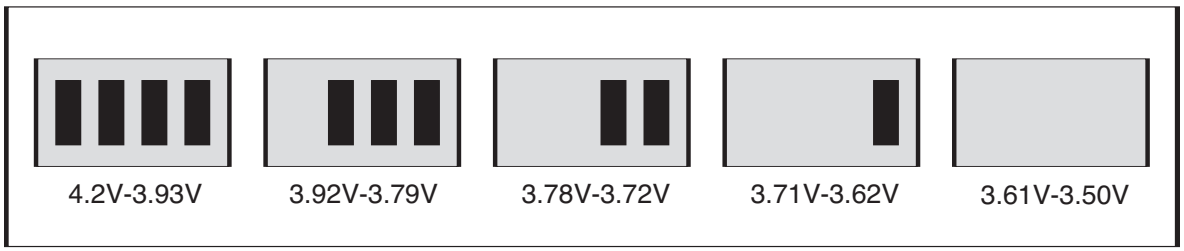
G. MIDI

- The ringing source of MG191 is the MIDI.
- The MIDI chip which is used in G4010 is YMU762 from YAMAHA.
- YMU762 generates 40-poly MIDI sound.



H. Charging

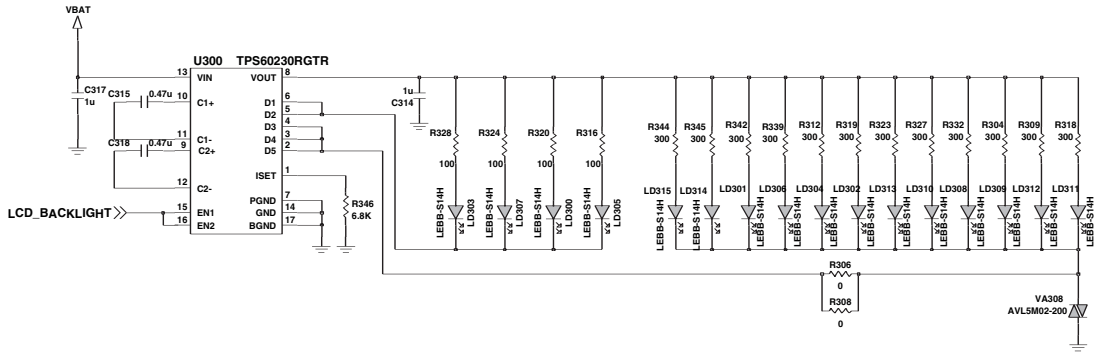
- Charging method : CC-CV
- Charger detect voltage : 4.0V
- Charging time : 2h 30min.
- Icon stop current : 100mA
- Charging current : 500mA
- CV voltage : 4.2V
- Cutoff current : 50mA
- Low battery alarm
  - Idle : 3.64V
  - Dedicated : 3.50V
- Switch-off voltage : 3.35V
- Charging temperature adc range
  - ~ -9°C : not charging operation.
  - -9°C ~ 50°C : charging.
  - 50°C ~ : not charging operation.



I. KEY Back-light Illumination

• KEYPAD Back-light Scheme.
  • There are 12 Deep Blue LEDs in Main Board for Keypad Backlight.
  • Keypad Back-light is driven by 'D3,D4,D5' line from U300(Chargepump)

KEY Backlight



J. SIM

• SIM Interface

The SimCard digital interface in ABB insures the translation of logic levels between DBB and SimCard, for the transmission of 3 different signals:

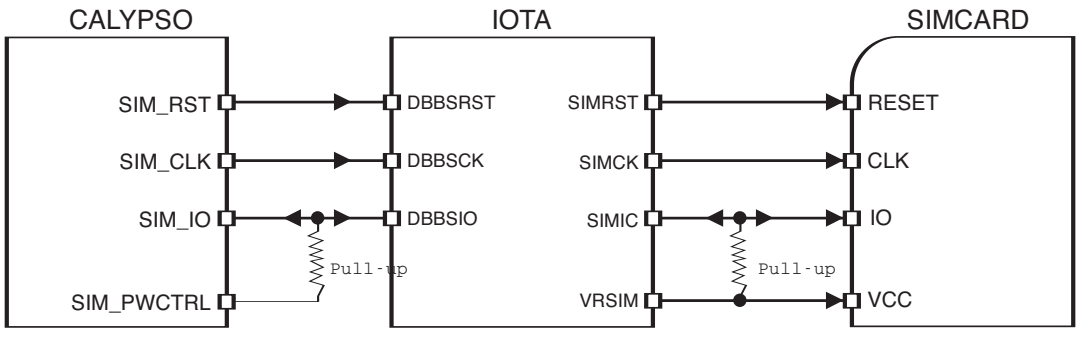
·A clock derived from a clock elaborated in DBB, to the Sim-Card (DBBSCK → SIM_CK)

·A reset signal from DBB to the SimCard (DBBSRST → SIM_RST),

·A serial data from DBB to the SimCard (DBBSIO → SIM_IO) and vice-versa.

The SIM card interface can be programmed to drive a 1.8V or 3V SimCard.

SIM Card connection scheme



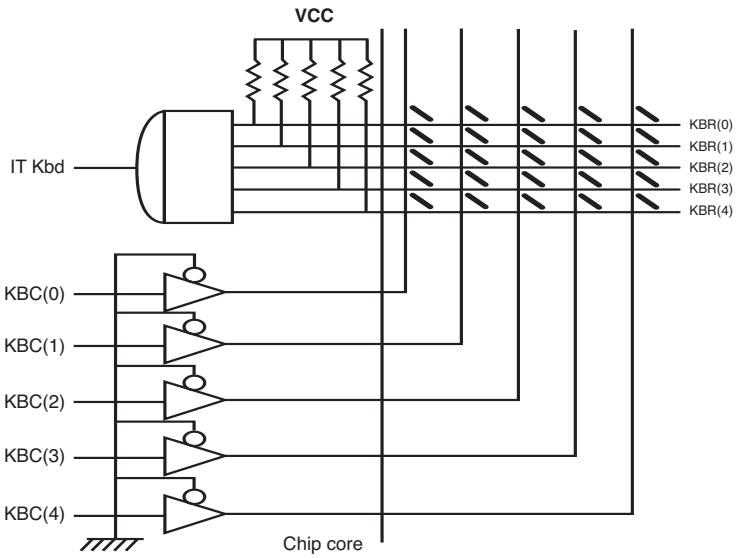
K. KEYPAD

• KEYPAD Back-light Scheme.

The keyboard is connected to the chip using:

- KBR (4:0) input pins for row lines
- KBC (4:0) output pins for column lines

Keypad Scanning Scheme

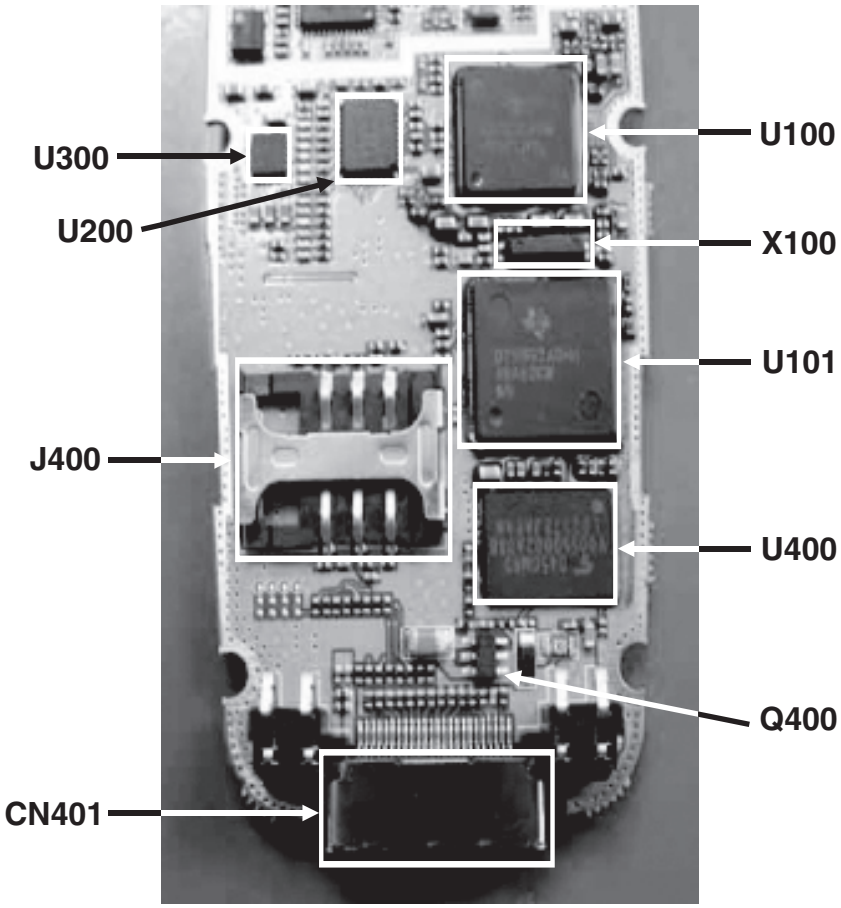


4. TROUBLE SHOOTING

BaseBand Part Troubleshooting

4.1. Baseband Components (Component Side)

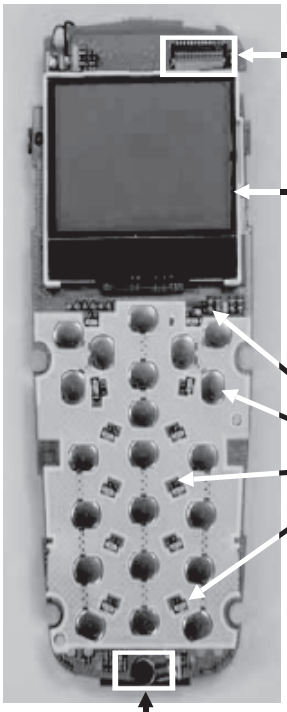
TEST POINT

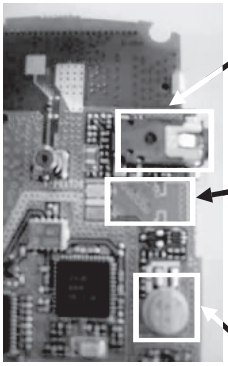


U101	Baseband Chipset (Calypso lite)
U100	Analog Baseband Chipset (IOTA)
X100	Crystal (32.768KHz Oscillator)
U200	Melody IC (40 Poly)
U400	Memory (64M Flash 32M SRAM)
Q400	FET (P-Channel)
CN401	IO Connector
J400	SIM Connector
U300	Charge Pump

4.2. Baseband Components (Keypad Side + Botton Side)

TEST POINT

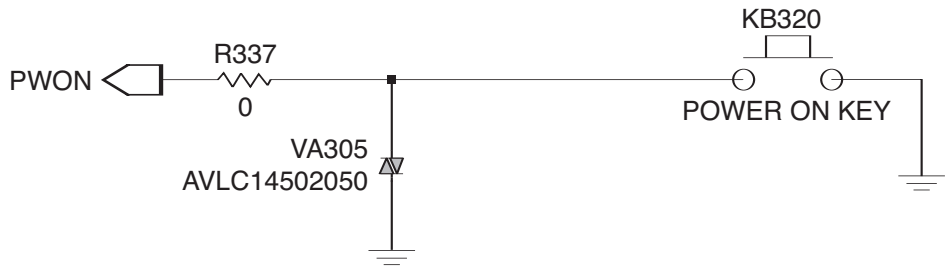




4.3 Power On Trouble

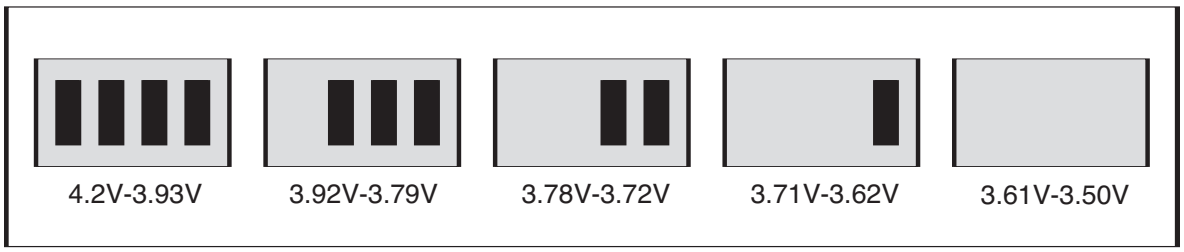
- Power On Sequence
  - Connecting Battery
  - Power-On Key Detection–END_ON_OFF signal goes to ABB and then ABB reset DBB by ON_OFF signal
  - ON_OFF turn low(0V) to HIGH(2.8V) and it resets Calypso lite.
  - All LDOs are turned on.
- Check Points
  - Battery Voltage
  - Power-On Key Detection(END_ON_OFF signal)
  - Outputs of LDOs
- Trouble Shooting Setup
  - Connect PIF-UNION to the phone.
  - Set the TI-remote switch at PIF-UNION off.
- Trouble Shooting Procedure
  - Check Battery Voltage
  - END_KEY Dome Switch condition
  - Check the output voltages of all LDOs.

CIRCUIT

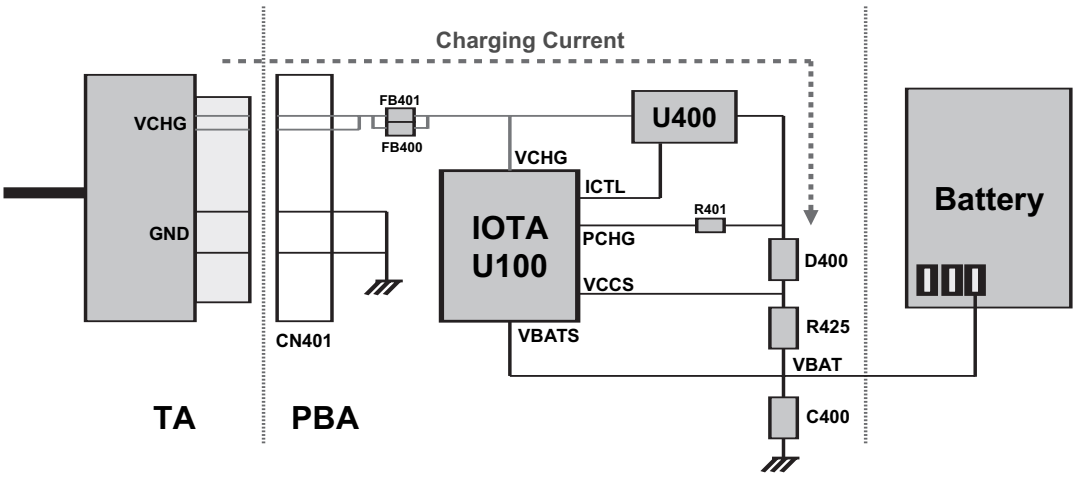


4.4. Charging Trouble

- Charging method : CC-CV
- Charger detect voltage : Over 4.0V
- Charging time : About 3hours
- Charging current : 500mA
- Cutoff current : 50mA
- Low battery alarm
  - Idle : 3.62V
  - Dedicated : 3.50V
- Switch-off voltage : 3.35V
- Charging temperature adcrange
  - ~ -9°C : not charging operation.
  - -9°C ~ 50°C : charging.
  - 50°C ~ : not charging operation.

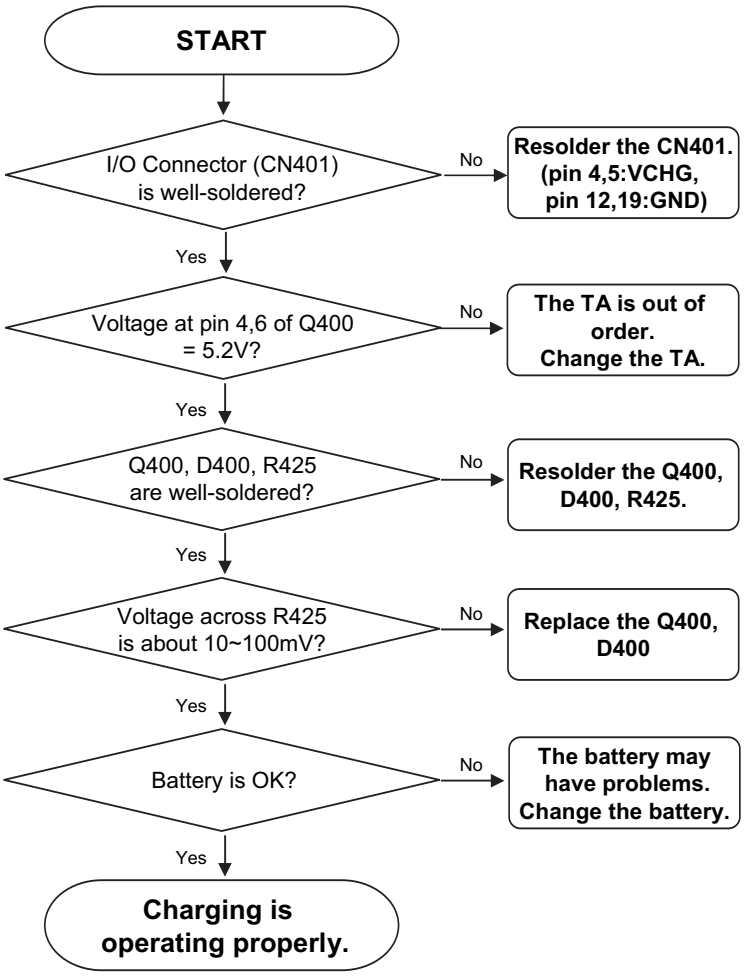


CIRCUIT Diagram



- Charging Procedure
  - Connecting TA & Charger Detection
  - Control the charging Current by ABB
  - Charging Current flows into the Battery.
- Check Points–Connection of TA
  - Charging Current Path
  - Battery
- Trouble Shooting Setup
  - Connect Battery & TA to the handset.
- Trouble Shooting Procedure
  - Check the charger connector.
  - Check the charging current path.
  - Check the batteryVCHGGND

Checking Flow

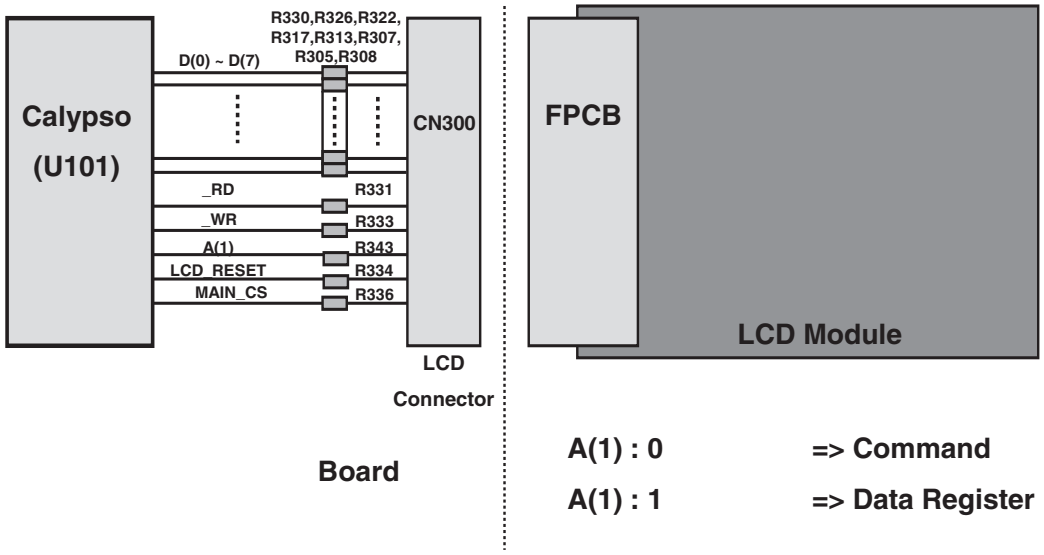


4.5. LCD Display Trouble

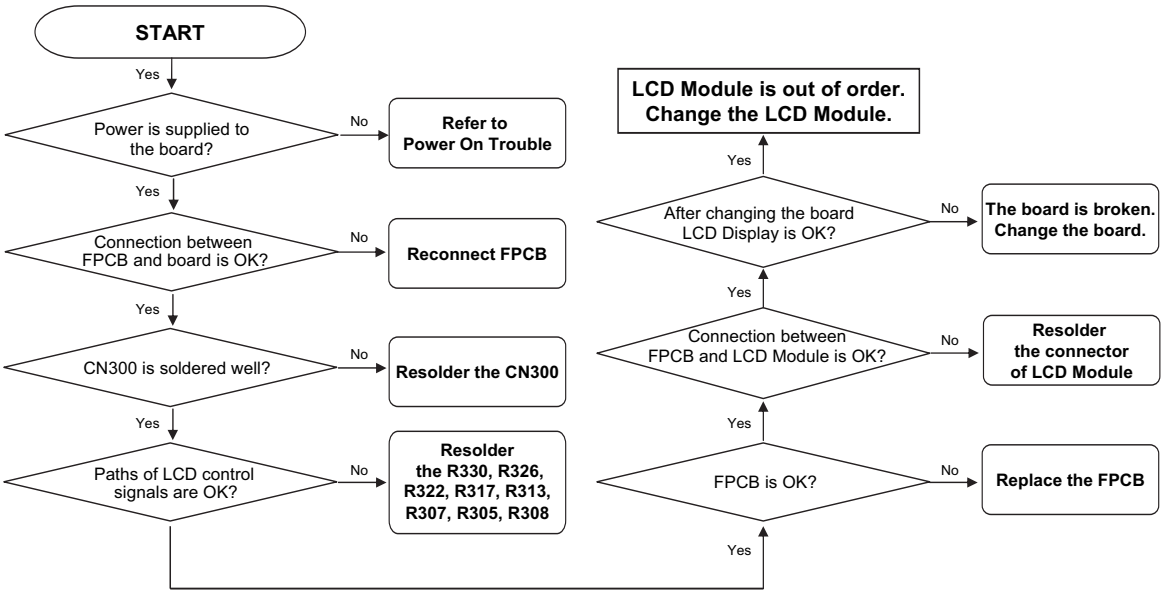
• LCD Control Signals From Main Board
  – LCD_MAIN_CS, LCD_SUB_CS, _WR, LCD_RESET, A(1), CAM_HOLD, D(0)~(15), A(1) ~A(6)
• Check Points
  – The Assembly status of the LCD Module.
  – The Soldering of connectors
  – The FPCB which connects the LCD module with the main board.
• Trouble Shooting Setup
  – Connect PIF, and power on.

If the FPCB has a problem, the control signals for LCD cannot be transmitted properly.
Check soldering and connection around connector.

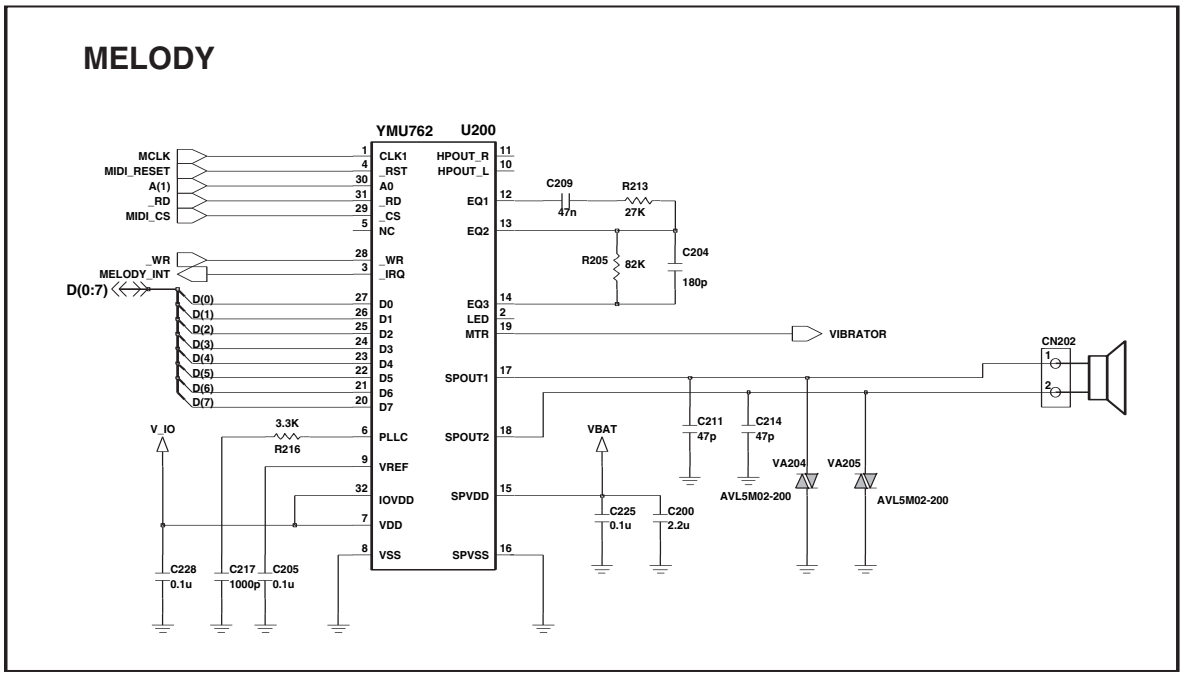
Checking Flow

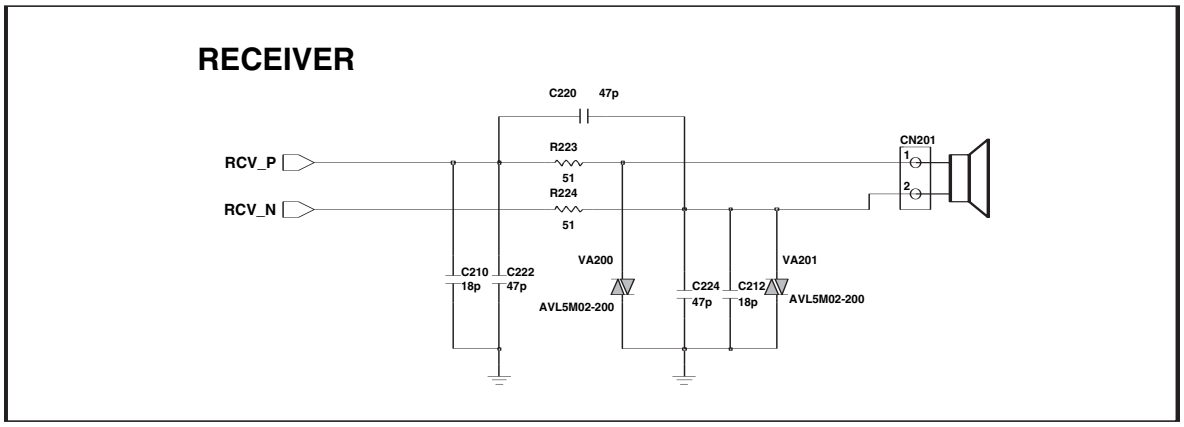


CIRCUIT DIAGRAM



4.6. Speaker/Receiver Trouble





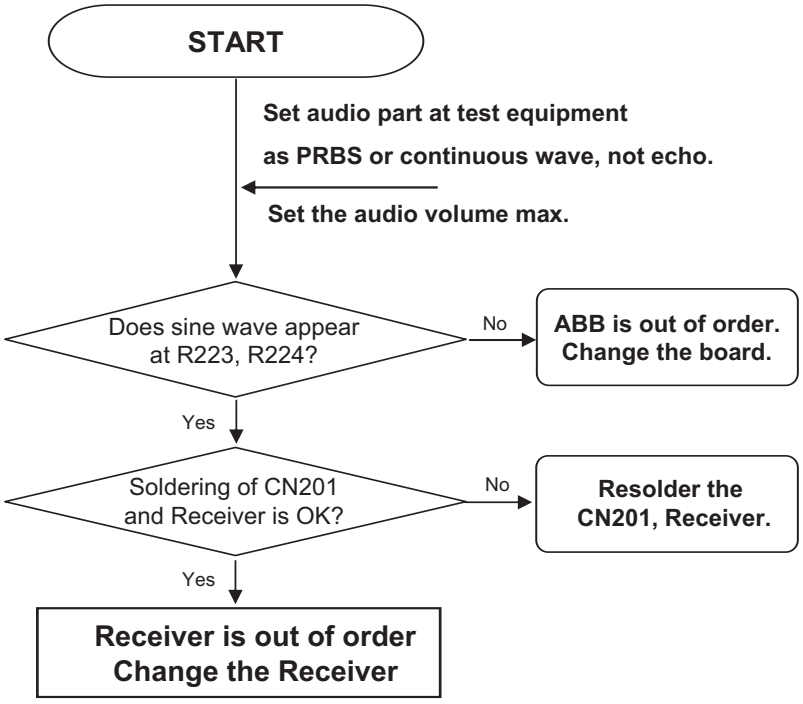
- Melody Generation
  - U200(YMU762,MIDI) is controlled by DBB.
  - U200 generates 40poly MIDI sound and it is delivered to the speaker
- Signals to the receiver
  - RCV_P,RCV_N From ABB
- Check Points
  - Audio signals from ABB
  - Audio signals to the receiver
  - Audio signal path
  - Check the sound level to the speaker.
  - Soldering of connector & speaker/receiver
  - Speaker/Receiver

• Receiver Trouble shooting setup
  - Initialize GSM MS test equipment.
  - Connect PIF-UNION and power on.
  - Make a test call.
  - Set audio part at test equipment as PRBS or continuous wave, not echo.
  - Set the audio volume max.
• Trouble shooting Procedure
  - Check the audio signal levels at each point.
  - Check the soldering of the connector.
  - Check the soldering of the receiver.
  - Check the receiver.
• Speaker Trouble Shooting Setup
  - Connect PIF to the phone, and power on.
  - Enter the engineering mode, and go to menu “Baseband → Alert → Ring”
• Trouble Shooting Procedure
  - Check the voltage levels of power supplies.
  - Check all sound path.
  - Check the sound level to the speaker.
  - Check the speaker and the soldering.

Check soldering these points!
R208,R250
Check Audio signal here !
RCV_N and RCV_P of U101 chip

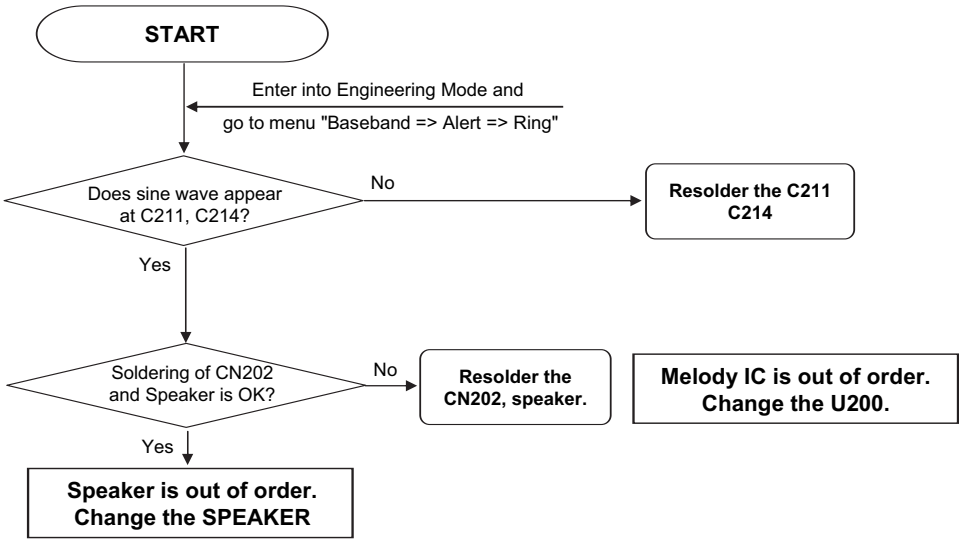
A. Receiver Trouble

Checking Flow



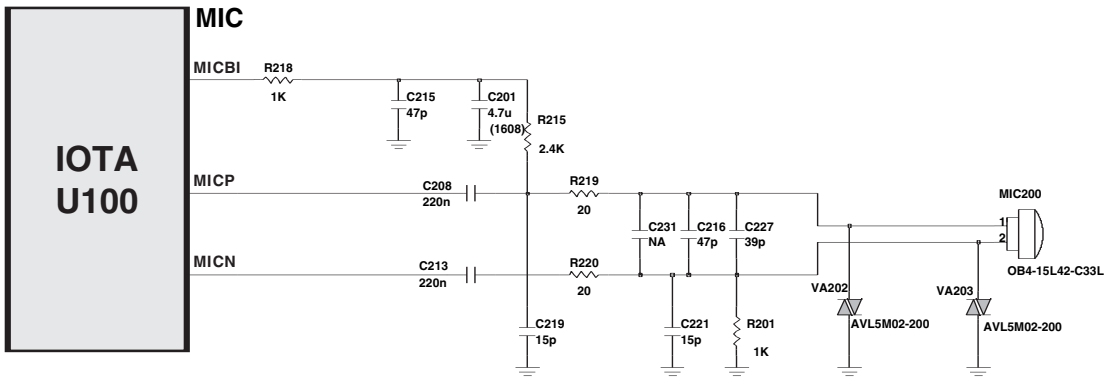
B. Speaker Trouble

Checking Flow



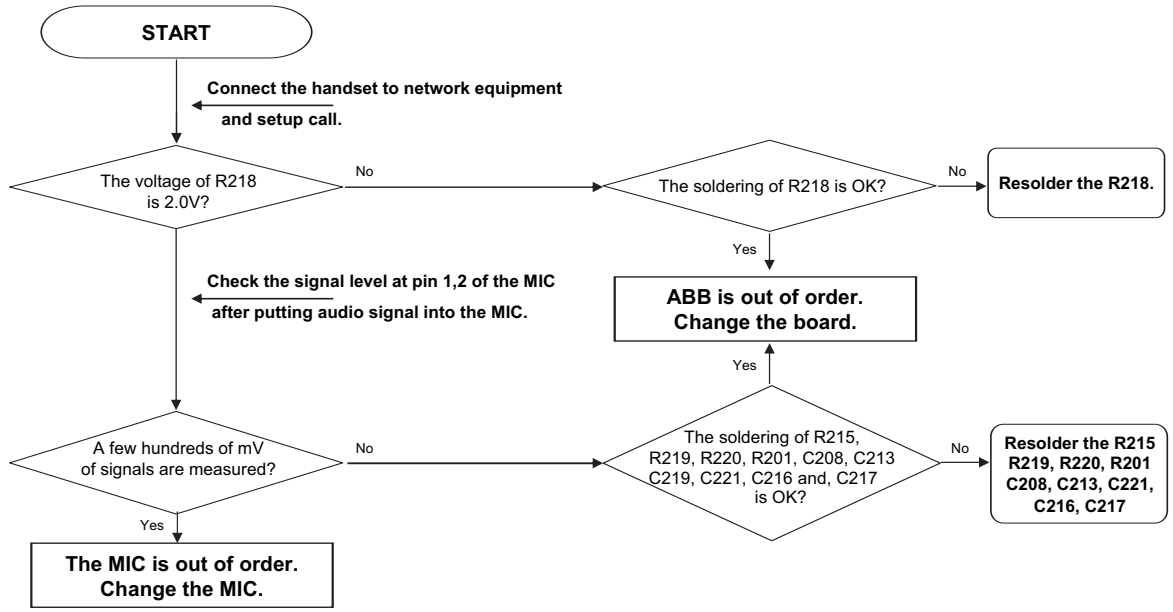
4.7. Microphone Trouble

CIRCUIT DIAGRAM



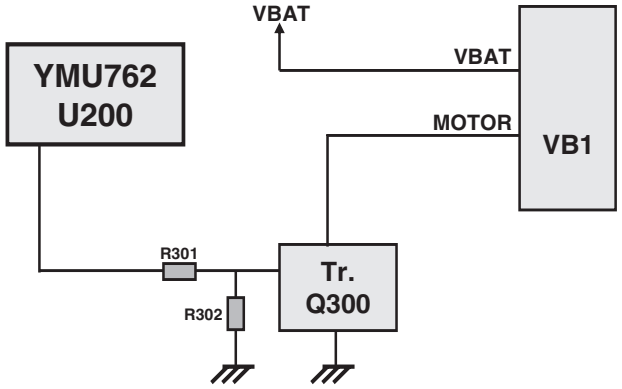
- Microphone Signal Flow
  - MIC is enable by MICBIAS
  - MICBIAS, MICP, MICN signals from ABB
- Check Points
  - Microphone bias
  - Audio signal level of the microphone
  - Soldering of components

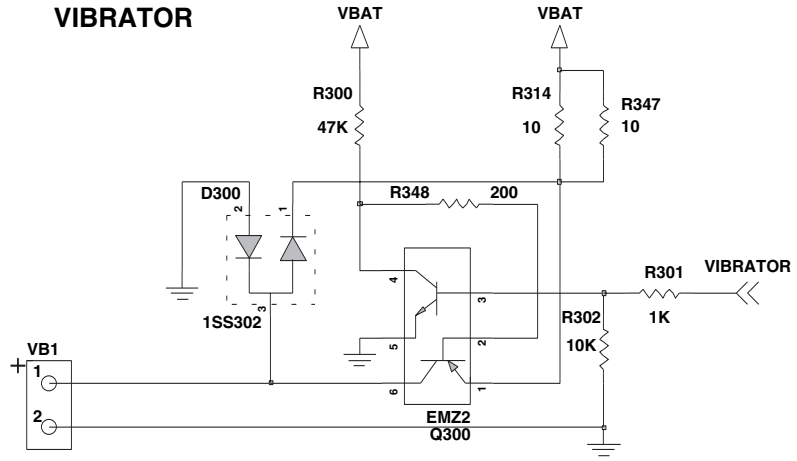
Checking Flow



4.8. Vibrator Trouble

CIRCUIT DIAGRAM

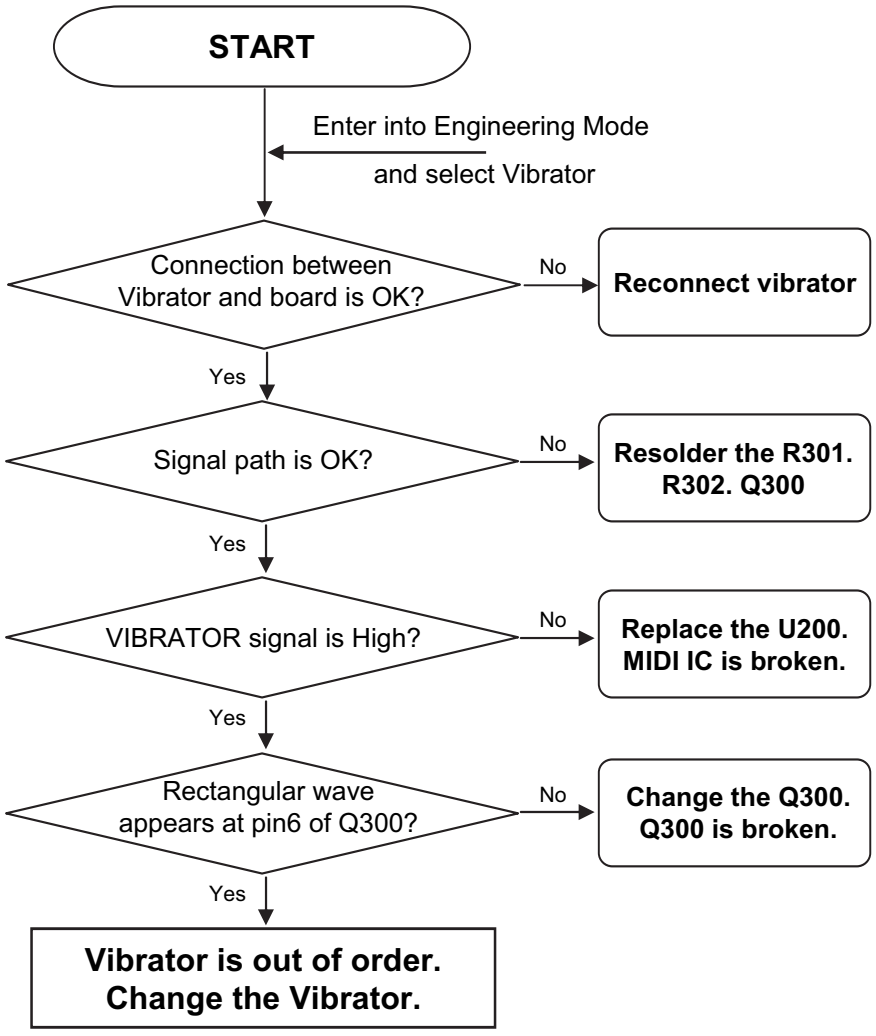




• Vibrator Operation
  – Vibrator is controlled by MIDI chip
  – When vibrator signal is high, vibrator is enabled

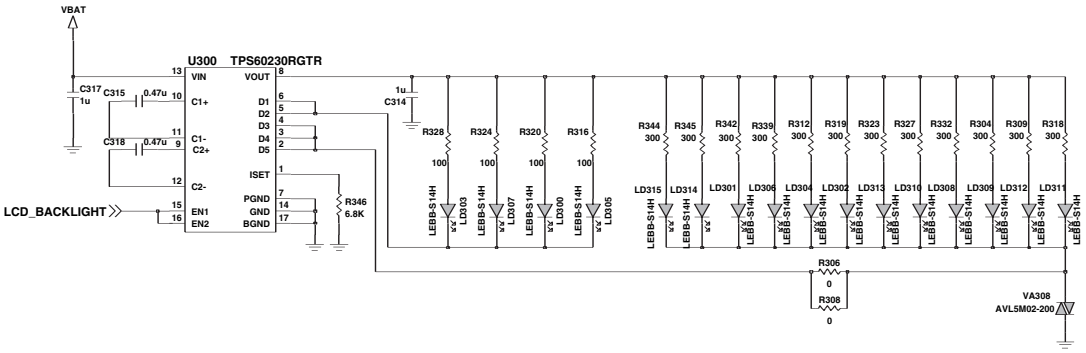
• Check Points
  – VCC lines of MIDI chip
  – Vibrator signal path
  – The connection between the main board and Vibrator
  – The soldering of components
  – The Vibrator

Checking Flow



4.9. Keypad Backlight Trouble

CIRCUIT DIAGRAM

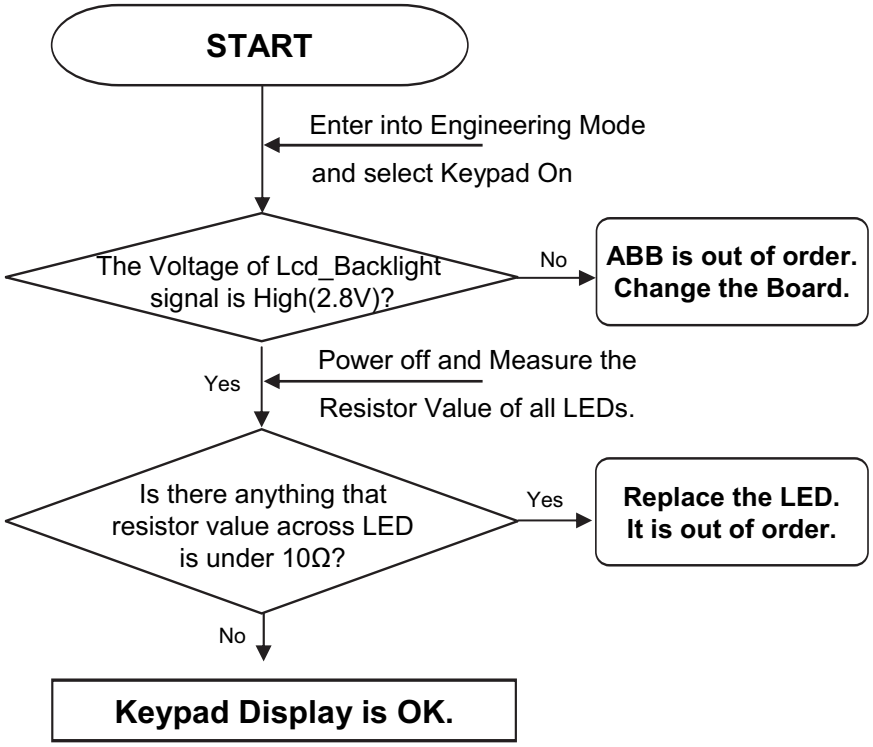


• Backlight Operation
  – The keypad LED backlight is controlled with LCD_BACKLIGHT.
  – LCD_BACKLIGHT signal from DBB.
  – The LEDs are forward biased and turned on.

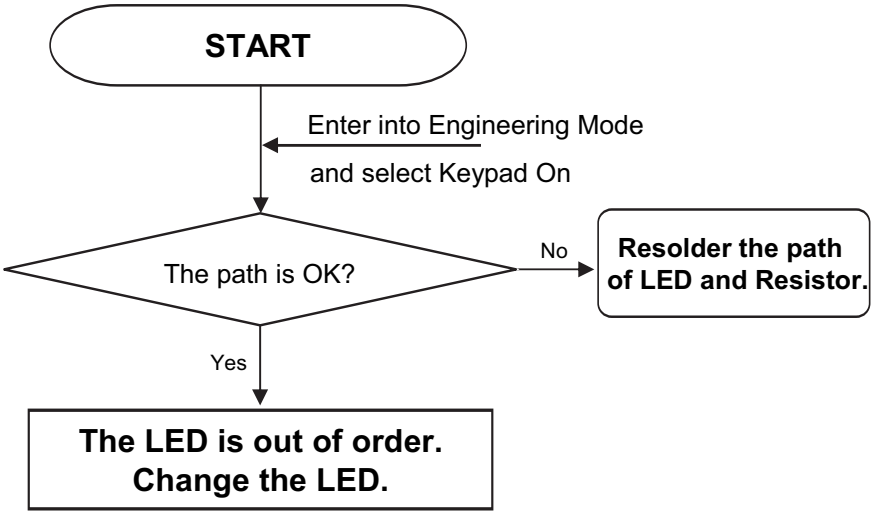
• Check Point
  – LCD_BACKLIGHT signal
  – LEDs

Checking Flow

All LEDs are not working

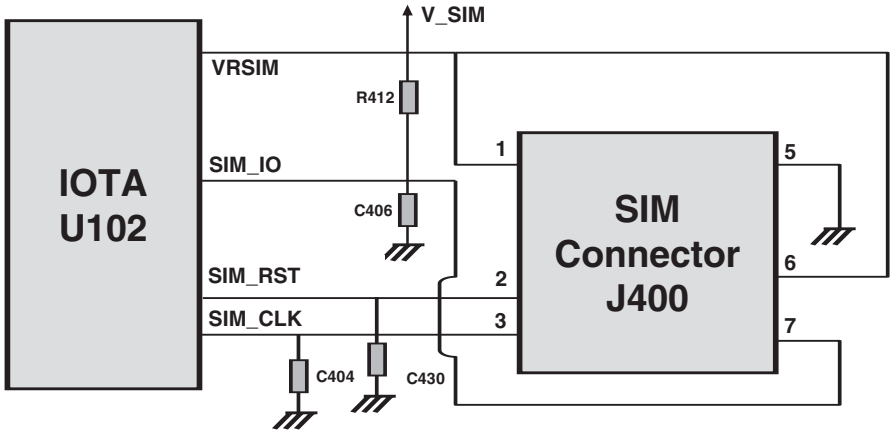


Any LED is not working



4.10. SIM Detect Trouble

CIRCUIT DIAGRAM



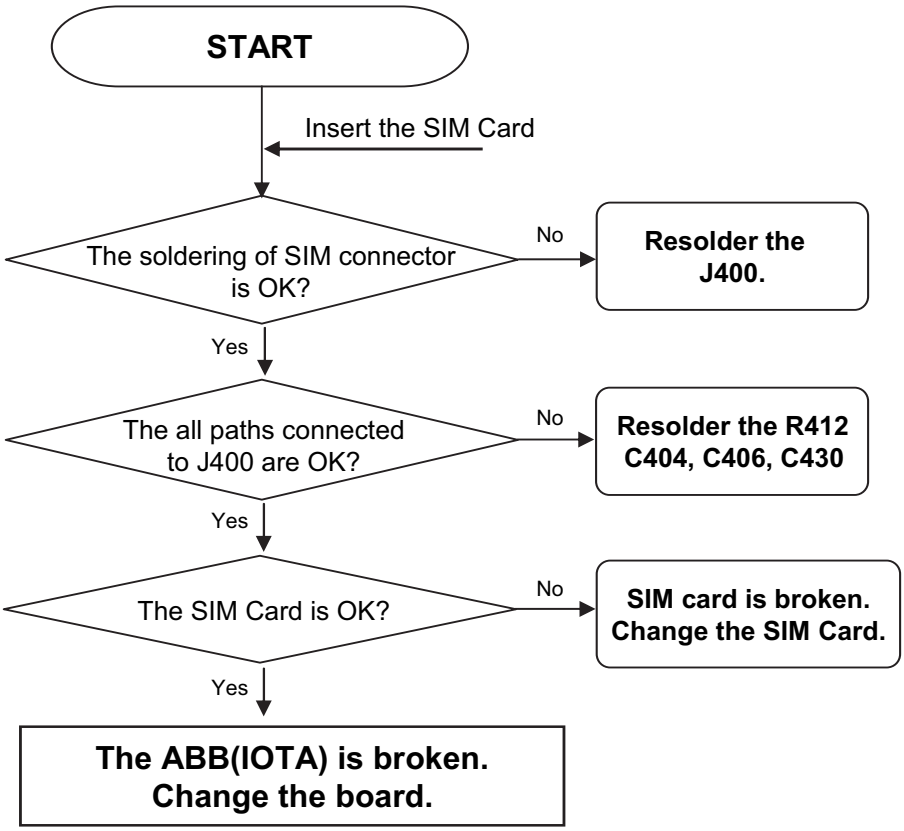
• Connection between SIM and DBB
  – SIM_CLK, SIM_IO, SIM_RST

• Check Point
  – Contact between SIM and socket
  – Soldering of SIM socket

• Trouble Shooting Setup
  – Insert the SIM into socket
  – Connect PIF to the phone, and power on.

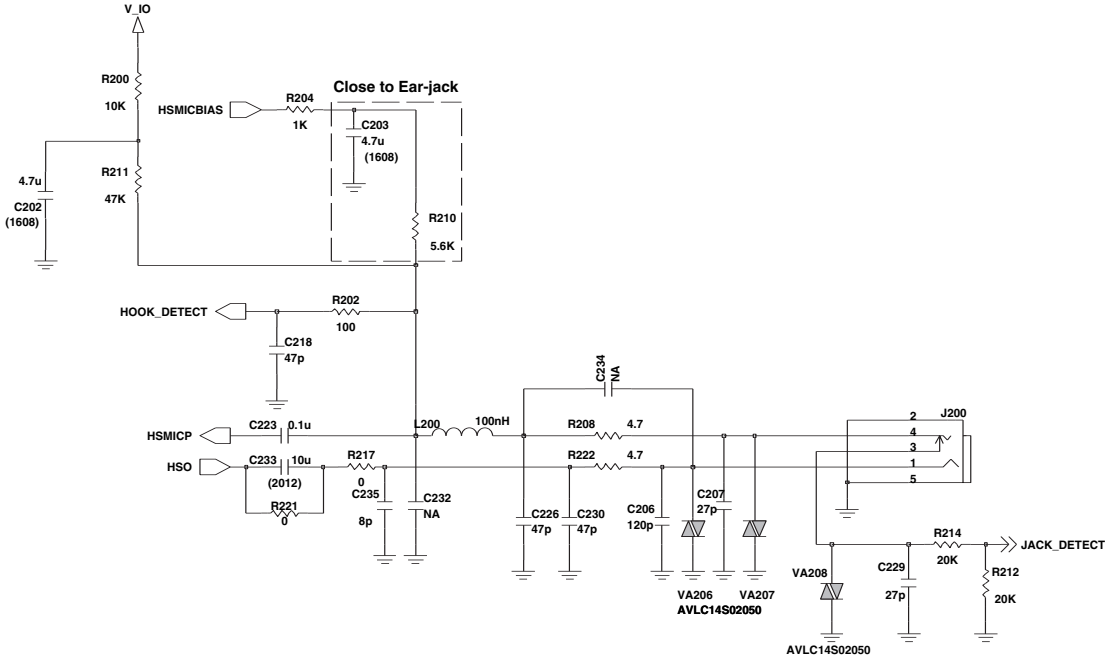
• Trouble Shooting Procedure
  – Check the power supply.
  – Check the soldering of SIM socket.
  – Check the SIM.

Checking Flow



4.11. Earphone Trouble

CIRCUIT

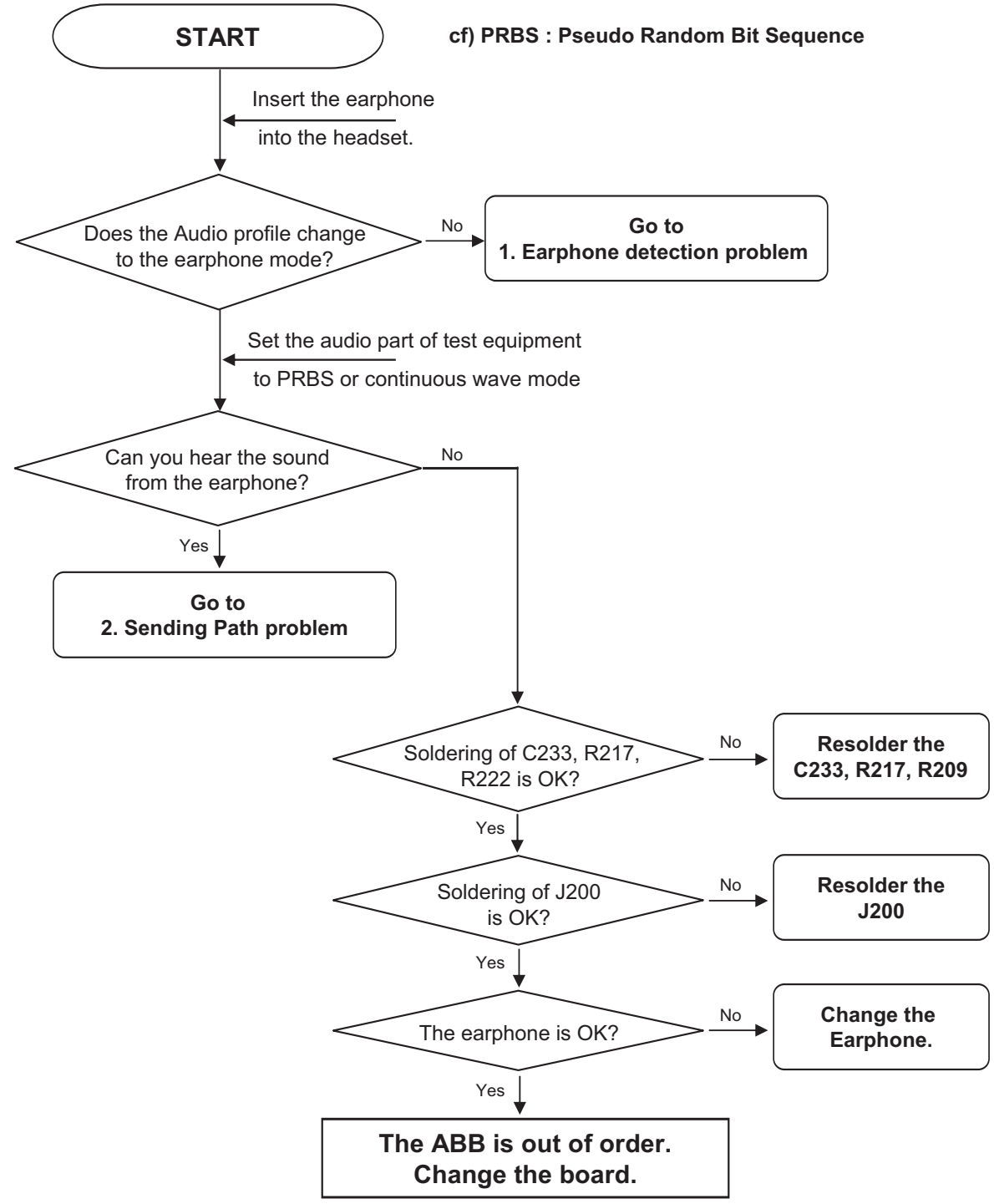


• Earphone Detecting Operation
  – The ABB operates A/D conversion continuously and if the voltage of “ADIN1”node goes to 0V and the voltage at “HOOK_DETECT”0.05V to 0.25V, it detects ear-jack inserted.
  – The ABB operates A/D conversion continuously and if the voltage of “HOOK_DETECT”node goes to 0V, it detects hook switch is pushed.

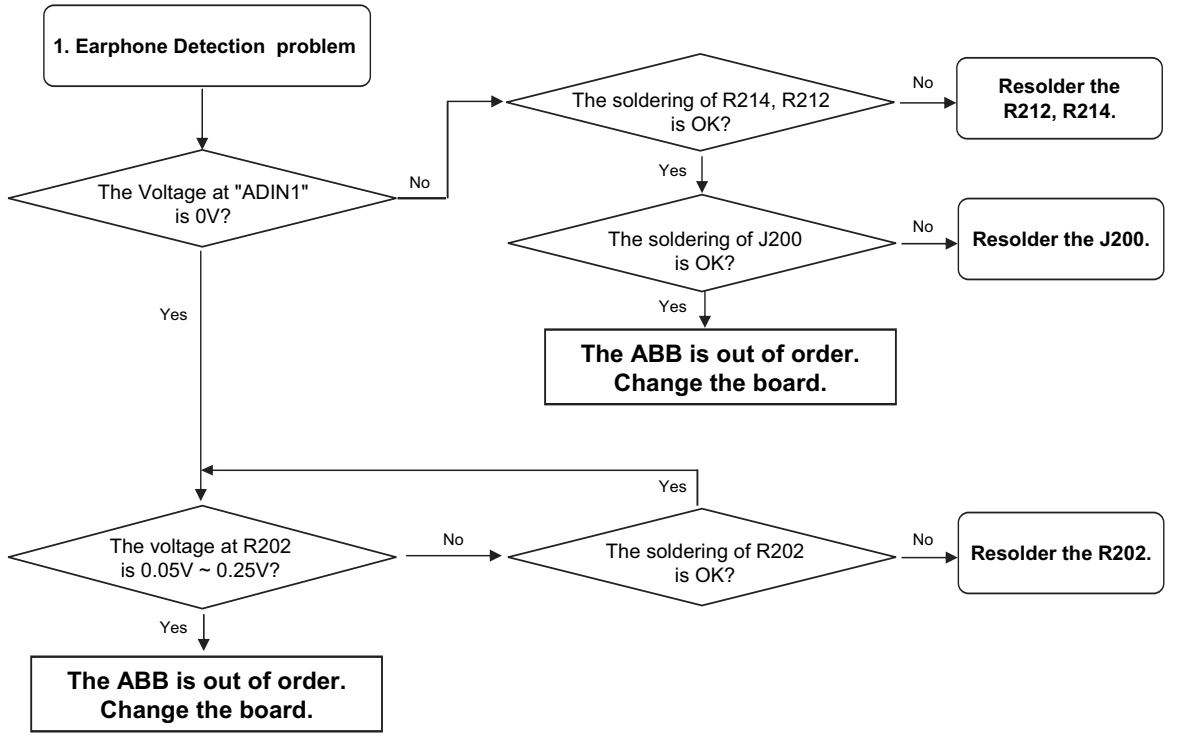
• Earphone Sending Path
  – HSMICP is the audio signal from the microphone of the earphone.
  – L200 and C223 make the path of the audio signal from the microphone of the earphone.
  – This audio signal is delivered to ABB(IOTA).

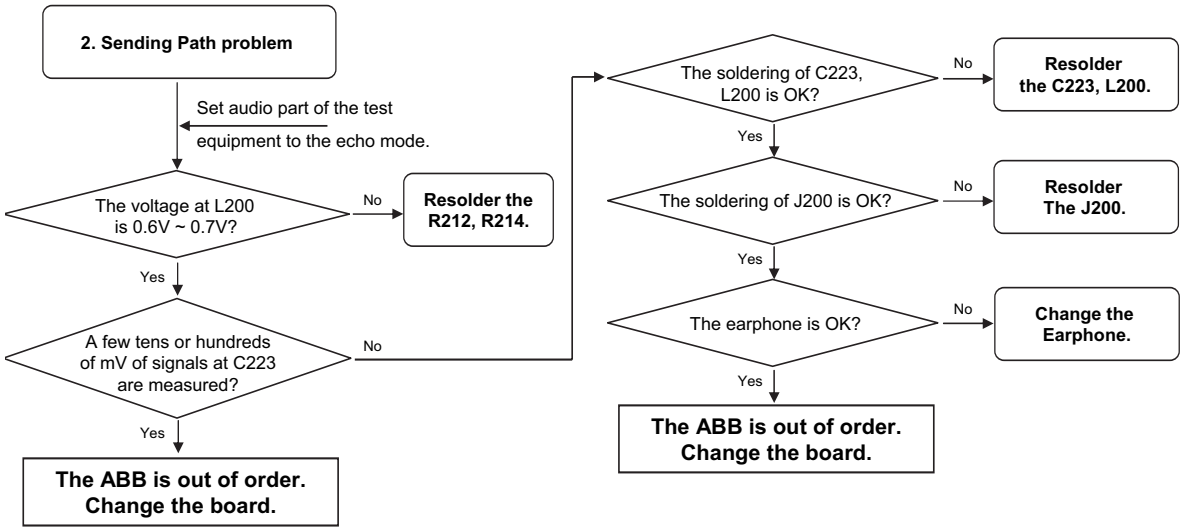
• Earphone Receiving Path
  – HSO is the audio signal from ABB(IOTA).

Checking Flow



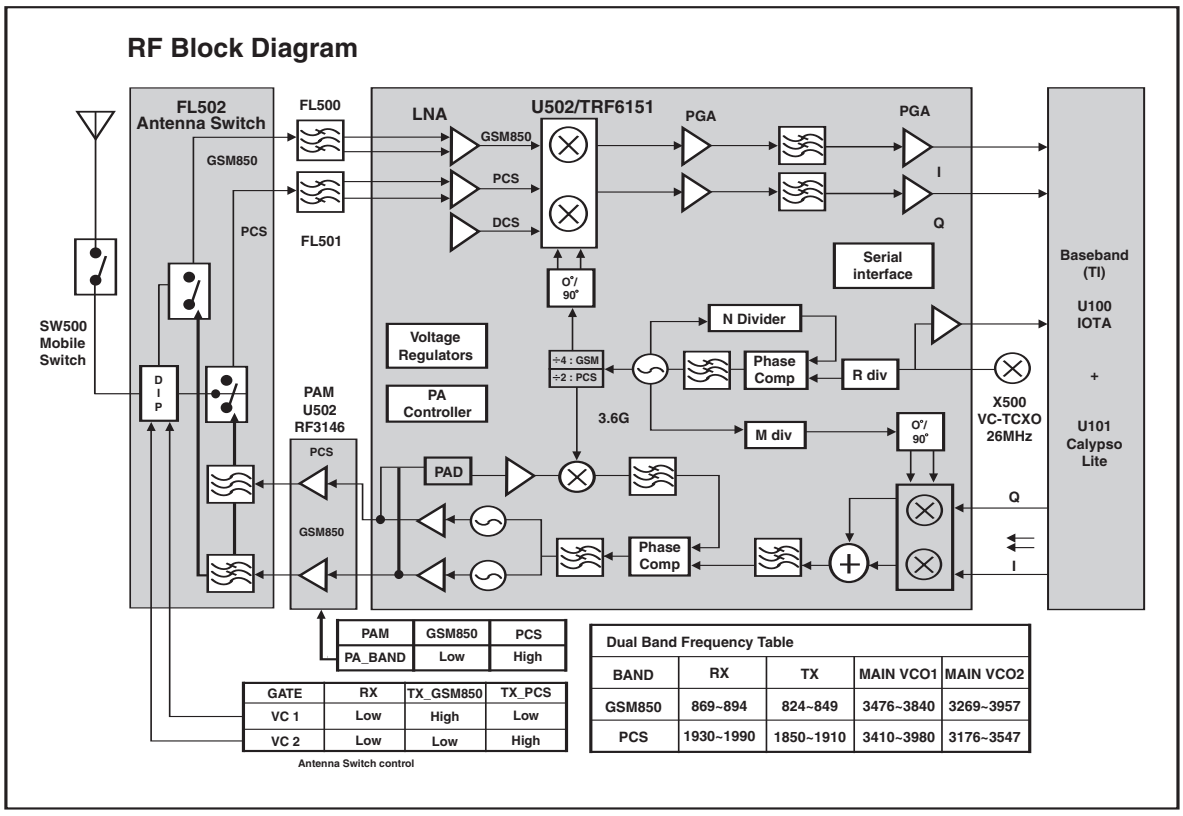
Checking Flow





RF Part Technical Brief

4.12. The Block Diagram of the RF Part



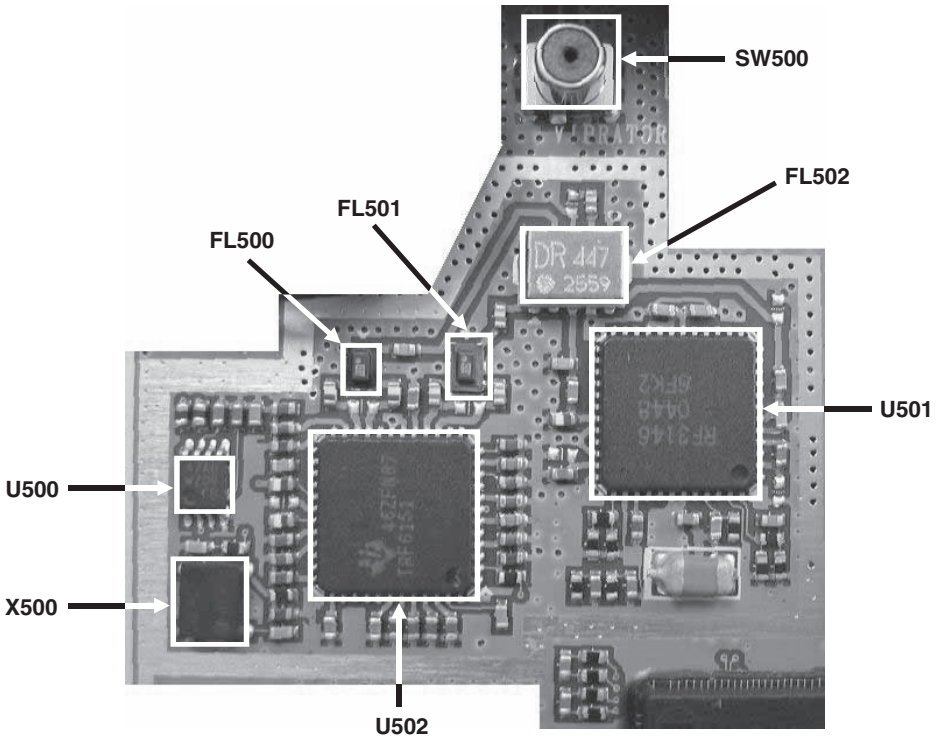
PAM	GSM850	PCS
PA_BAND	Low	High

GATE	RX	TX_GSM850	TX_PCS
VC 1	Low	High	Low
VC 2	Low	Low	High

Dual Band Frequency Table

BAND	RX	TX	MAIN VCO1	MAIN VCO2
GSM850	869~894	824~849	3476~3840	3269~3957
PCS	1930~1990	1850~1910	3410~3980	3176~3547

TEST POINT

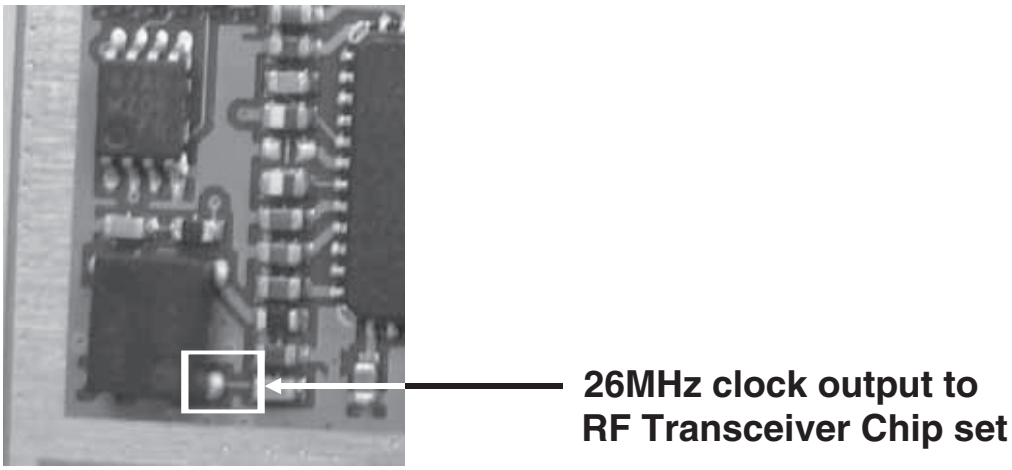


- SW500 : Mobile Switch
- U500 : Dual And Gate
- U502
  - TRF6151
  - RF Transceiver
- U501
  - RF3146
  - Power Amp Module
- X500
  - VCTCXO
  - 26MHz Clock
- FL502 : Antenna Switch
- FL500 : GSM850 SAW Filter
- FL501 : PCS1900 SAW Filter

4.13. Tx / Rx Part Description

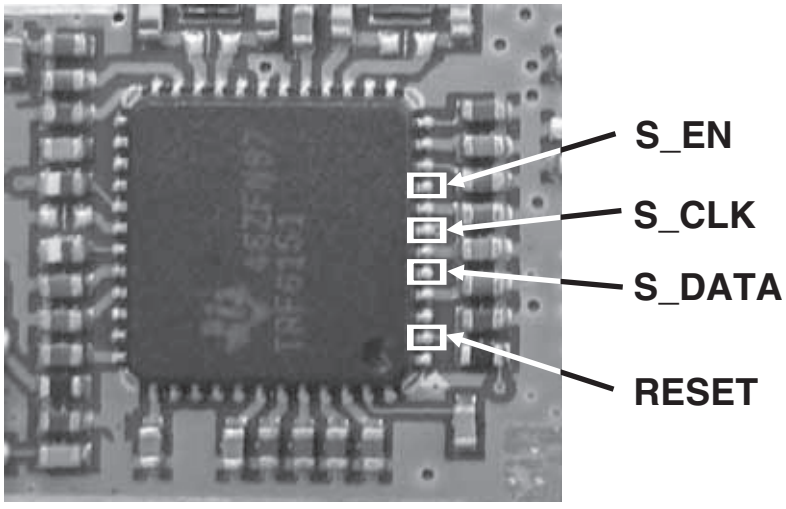
• VCTCXO
  • Produce RF reference clock → 26MHz frequency

TEST POINT



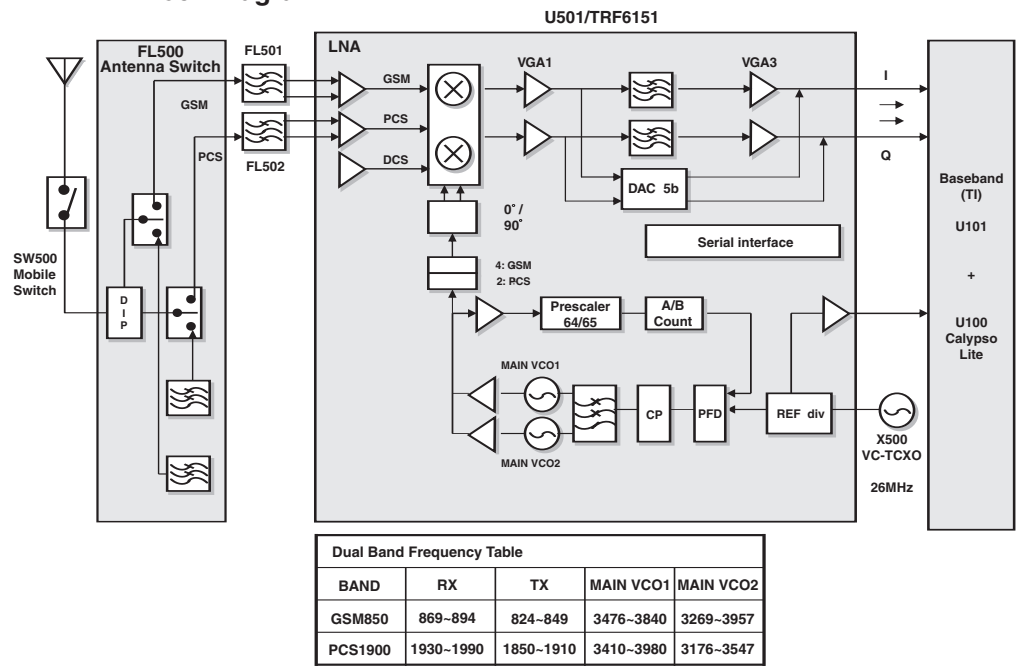
• RF Transceiver Chip (TRF6151)
  • PDNB, S_EN, S_CLK, S_DATA
    - From DBB Main Chip Set
    - Contains information all about ARFCN, voice data, user information etc.
    - RF Chips operate according to these signals

TEST POINT



4.14. Receiver Part Description

Rx Block Diagram

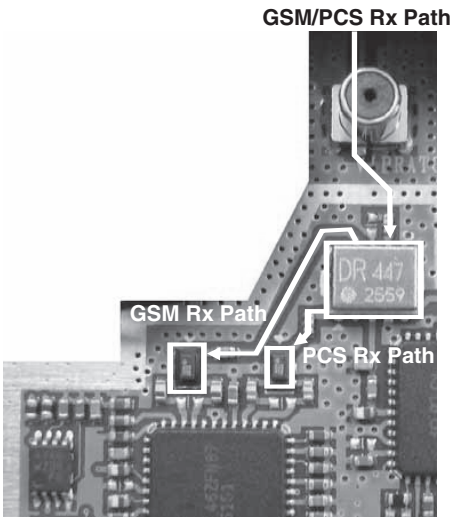


Dual Band Frequency Table				
BAND	RX	TX	MAIN VCO1	MAIN VCO2
GSM850	869~894	824~849	3476~3840	3269~3957
PCS1900	1930~1990	1850~1910	3410~3980	3176~3547

Mobile Switch & Ant Switch

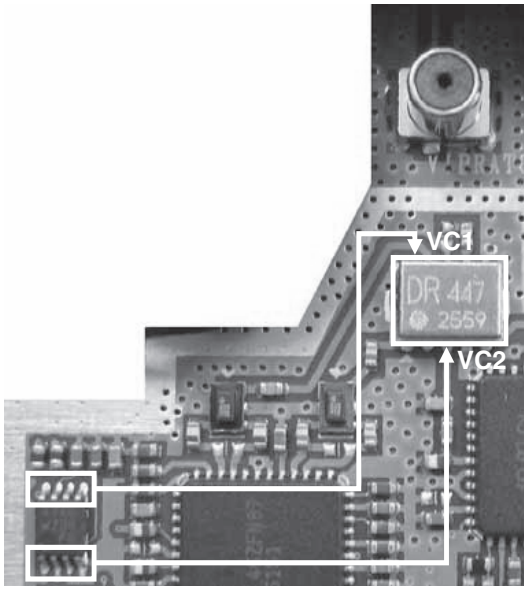
- Antenna Switch
  - Select the Path – GSM / PCS Tx, GSM / PCS Rx
  - From DBB, three control signals (ANT_SW, ANTSW_TXRX, ANTSW_BAND) are fed into the Dual AND Gate
  - Dual AND Gate Controls the Ant SW with VC1 & VC2

TEST POINT



• Antenna SW control Signals
  • VC1, VC2 control Antenna SW

TEST POINT



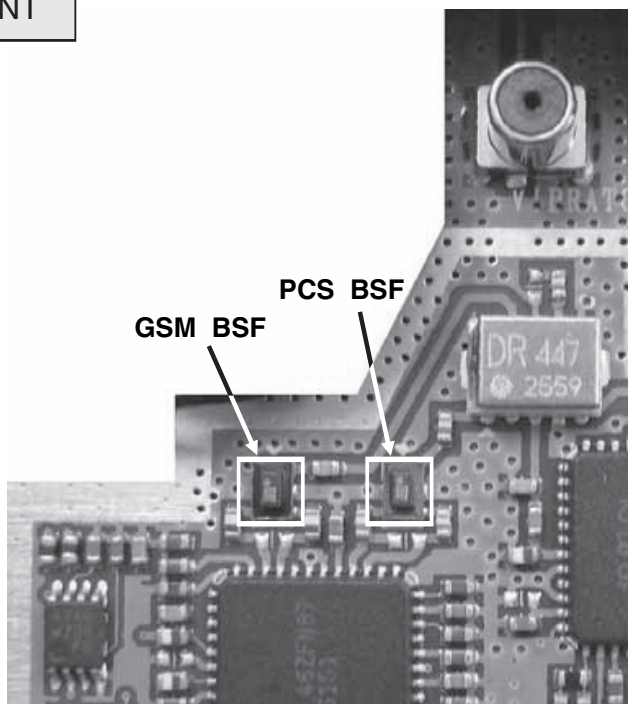
Control Signal Logic

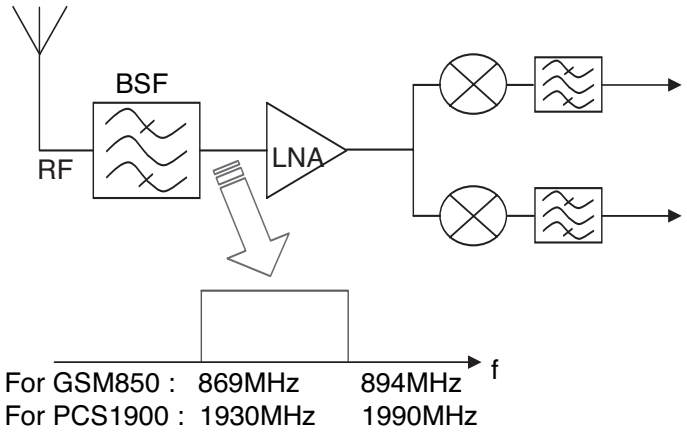
	GSM Tx	PCS Tx	GSM / PCS Rx
VC1	High	Low	Low
VC2	Low	High	Low

Band Selection Filter

- Band Selection Filter
  - Cuts the out of band frequency
  - Insertion Loss
  - For GSM850 : ~2.5dB
  - For PCS1900 : ~3dB

TEST POINT

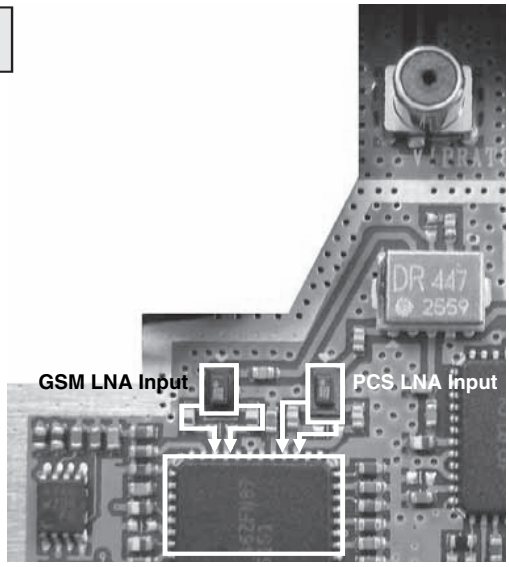


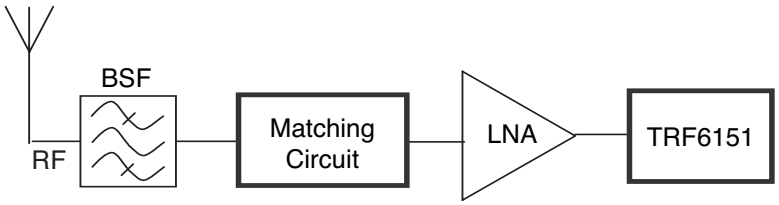


RF Transceiver Chip (LNA Input)

- LNA input port of RF Transceiver (TRF6151)
  - Balanced-type LNA Input

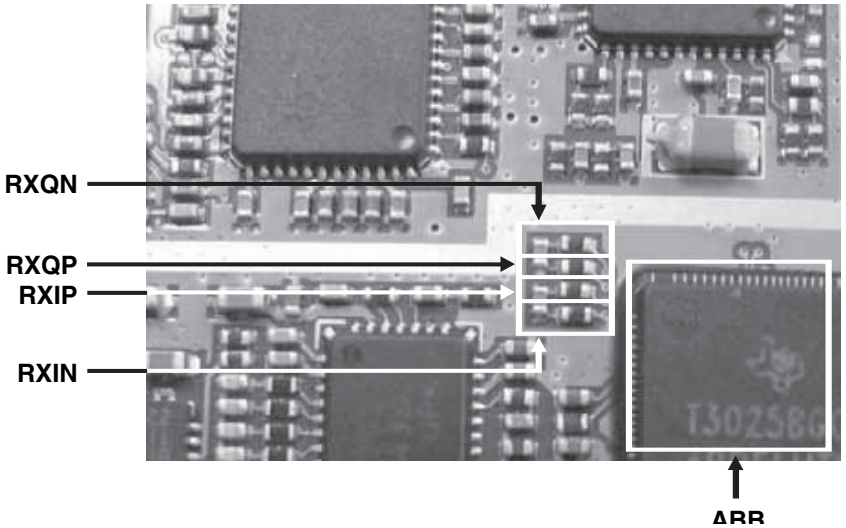
TEST POINT



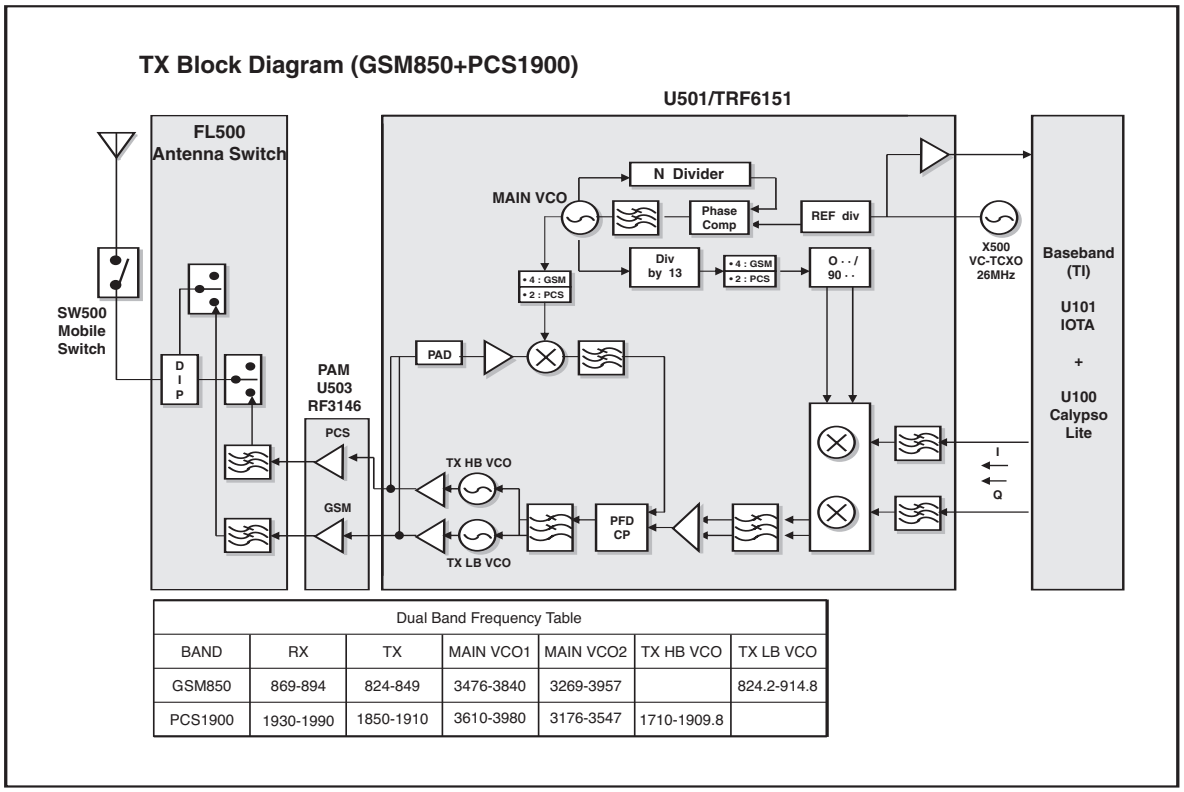


RX I/Q signal (TRF6151)

TEST POINT



4.15. Transmitter Part Description

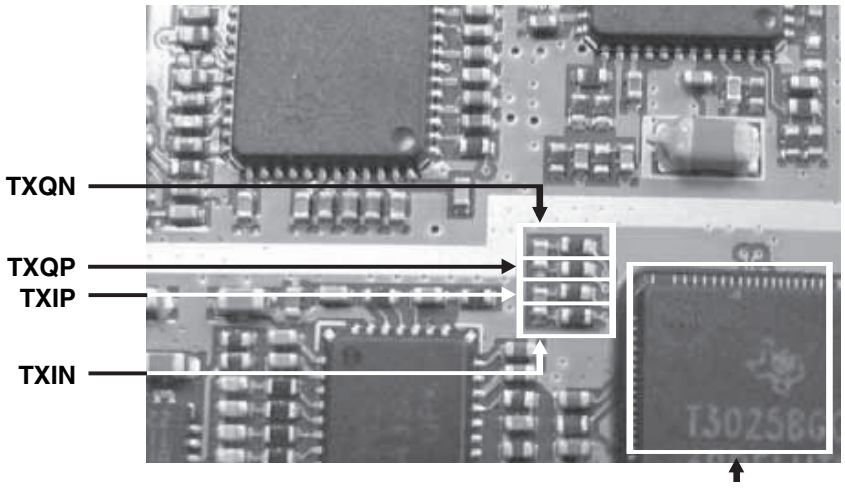


Dual Band Frequency Table						
BAND	RX	TX	MAIN VCO1	MAIN VCO2	TX HB VCO	TX LB VCO
GSM850	869-894	824-849	3476-3840	3269-3957		824.2-914.8
PCS1900	1930-1990	1850-1910	3610-3980	3176-3547	1710-1909.8	

Tx Part component Description

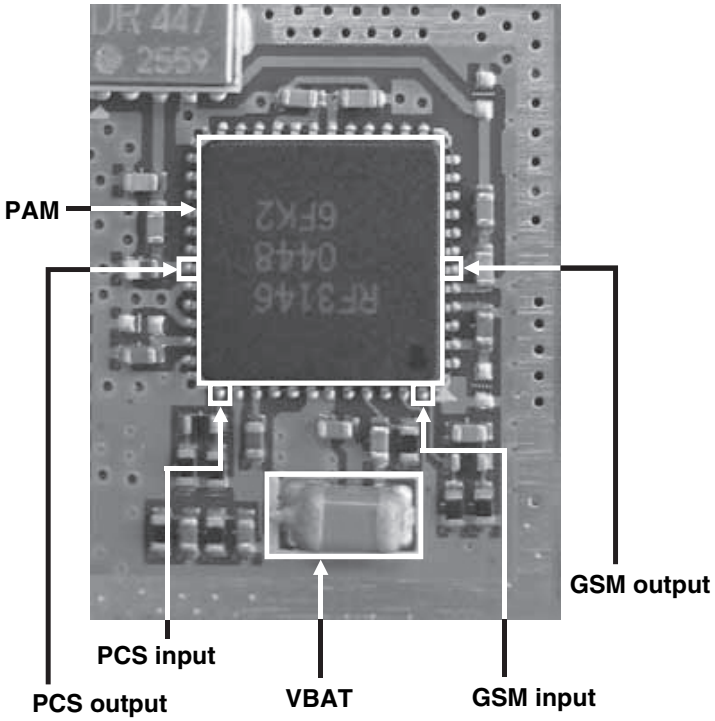
• Tx I/Q signal from ABB signal

TEST POINT



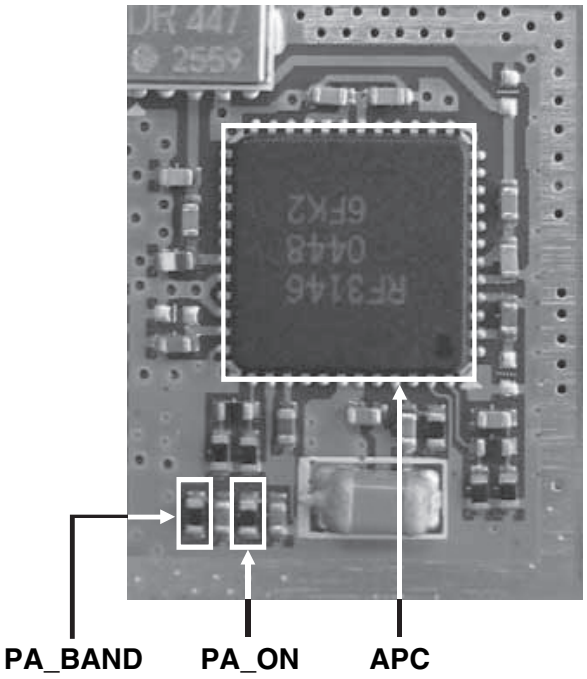
- PAM – input and output signals
  - Power Amp Module
    - Amplifies Tx Signal from TRF6151
  - Tx Carrier Frequency
    - GSM : 824 ~ 849MHz
    - PCS : 1850 ~ 1910MHz

TEST POINT



- PAM – control signals
  - PA_ON
    - From DBB Chip Set
    - Enables Tx Path
  - PA_Band
    - From DBB Chip Set
    - Select PAM operating band
    - Low : GSM selected
    - High : PCS selected
  - APC
    - From ABB Chip Set
    - Controls Tx rising and falling shape
    - APC voltage Controls Tx Output Power

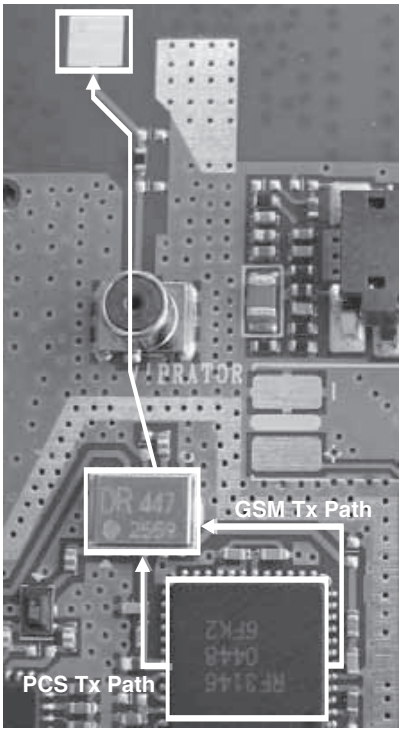
TEST POINT



• Moblie Switch & Ant Switch
  • Antenna Switch
    - Select the Path – GSM / PCS Tx, GSM / PCS Rx
    - From DBB, three control signals (ANT_SW, ANTSW_TXRX, ANTSW_BAND) are fed into the Dual AND Gate
    - Dual AND Gate Controls the Ant SW with VC1 & VC2

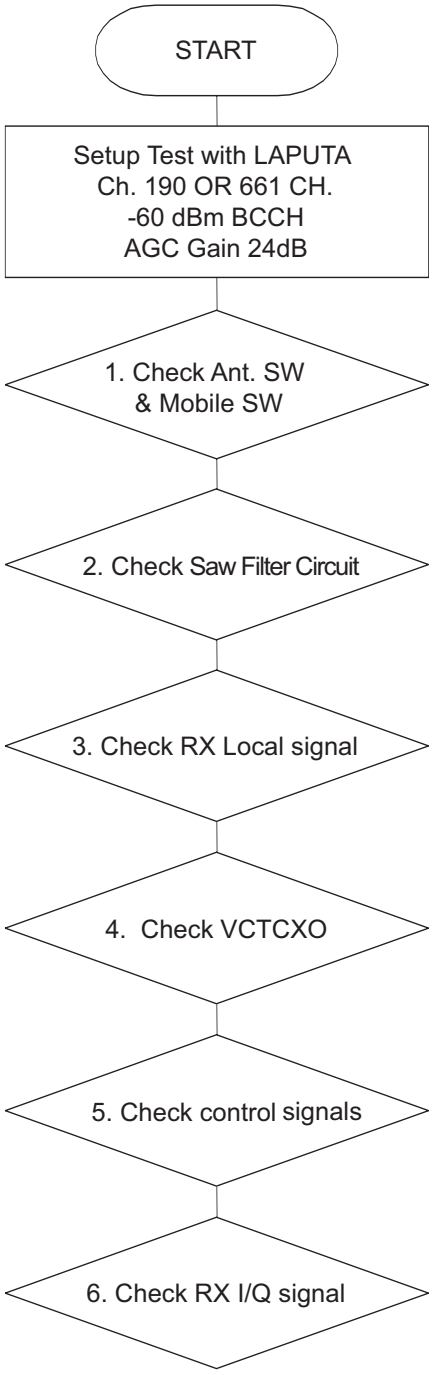
TEST POINT

GSM/PCS Tx Path



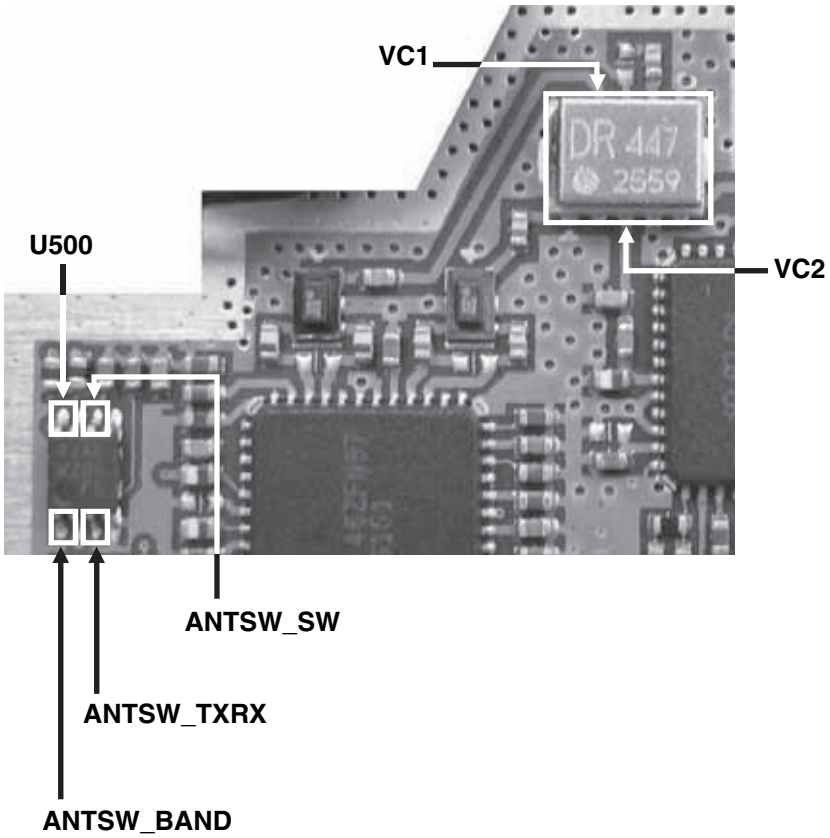
4.16. RX Part Trouble Shooting

Checking Flow



Check Ant. SW and Mobile SW

TEST POINT

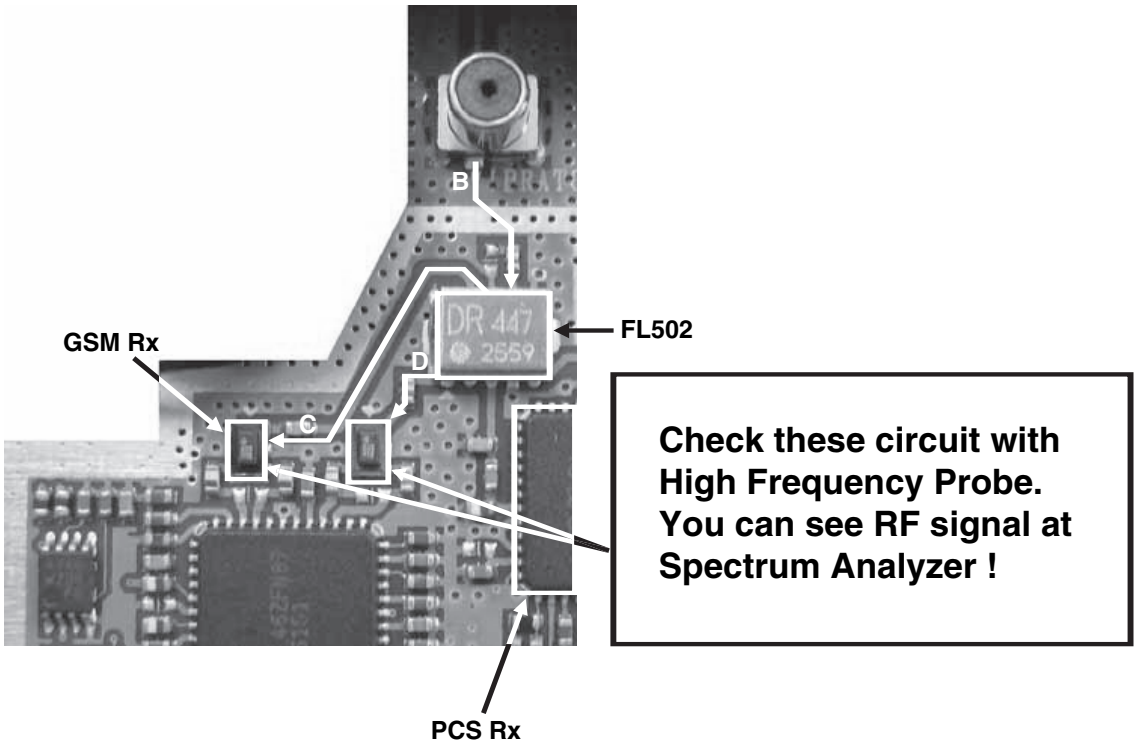


• Check Dual And gate input signals.
• Check Ant. SW control signals (Outputs of And gate).

	VC1	VC2
GSM TX	1	0
PCS TX	0	1
RX	0	0

• If VC1 and VC2 are differ to above logic table, change U500(dual and gate).

TEST POINT

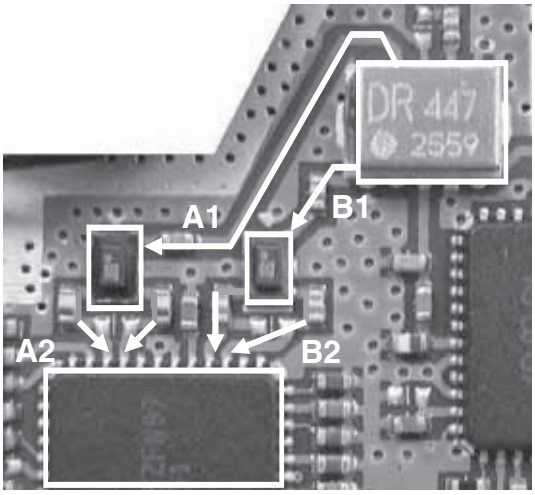


- Check RF Power at each point (A, B, C, D).
- Can you observe good RF signal at proper frequency?
  - GSM 190Ch. : 881.6MHz
  - PCS 661Ch. : 1960MHz
  - RF Power is almost same with input power set to equipment.
- If not, change FL502(Ant. SW)

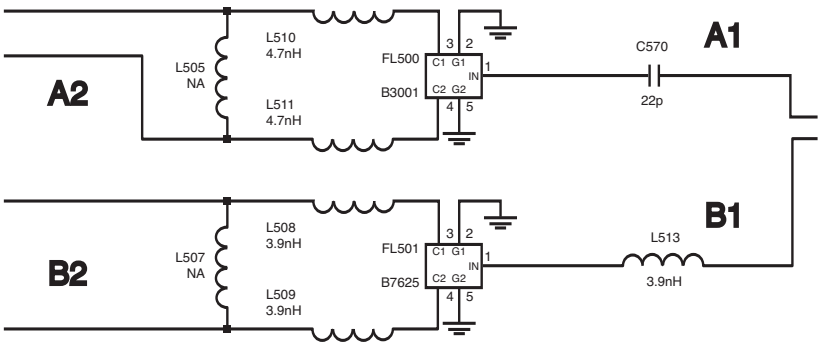
Check SAW Filter circuit

- Check SAW Filter Input power(A1, B1)
- Check SAW Filter Output power(A2, B2)
  - GSM Insertion loss ~2.5dB
  - DCS Insertion loss ~3dB
- If checked insertion loss is too big, check matching circuit or change SAW Filter.

TEST POINT



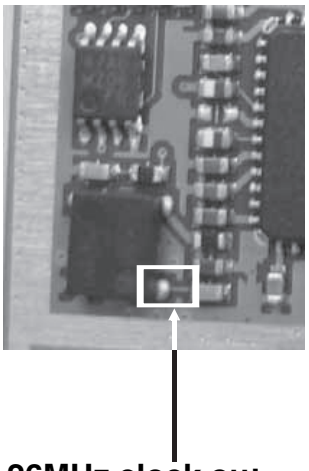
CIRCUIT



Check VCTCXO and Transceiver XOUT

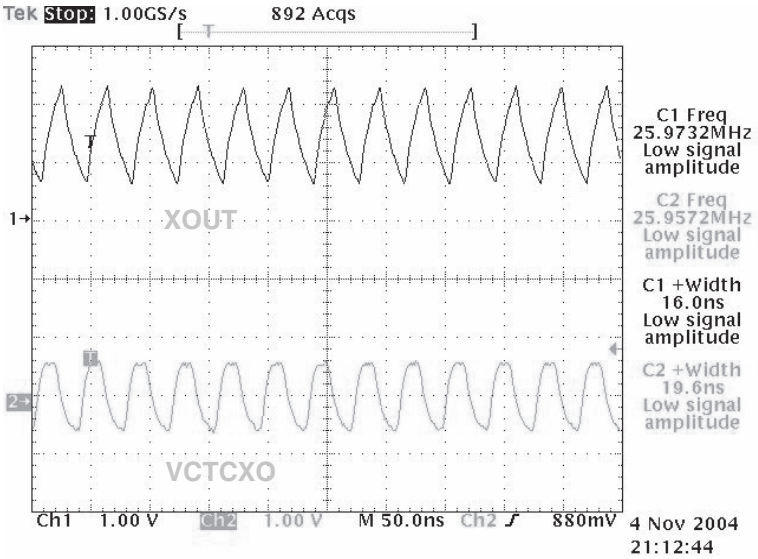
- VCTCXO : 26MHz Clock Output
- Transceiver XOUT : 26MHz Clock to DBB

TEST POINT



26MHz clock output to RF Transceiver Chip set

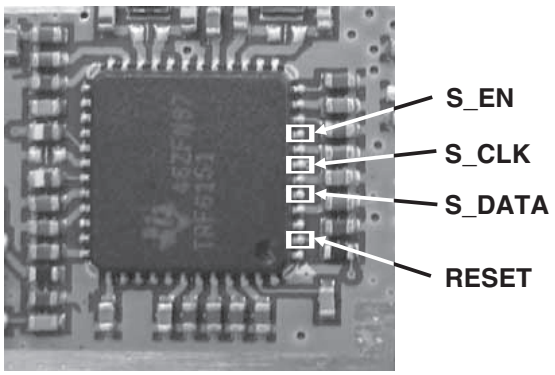
Waveform



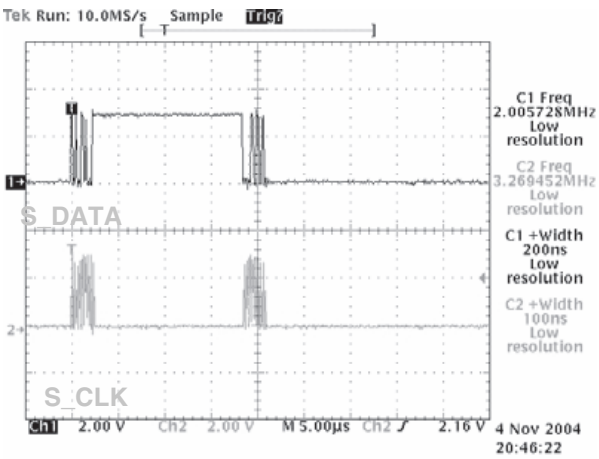
Check control signals

RESET, S_DATA, S_CLK, S_EN

TEST POINT

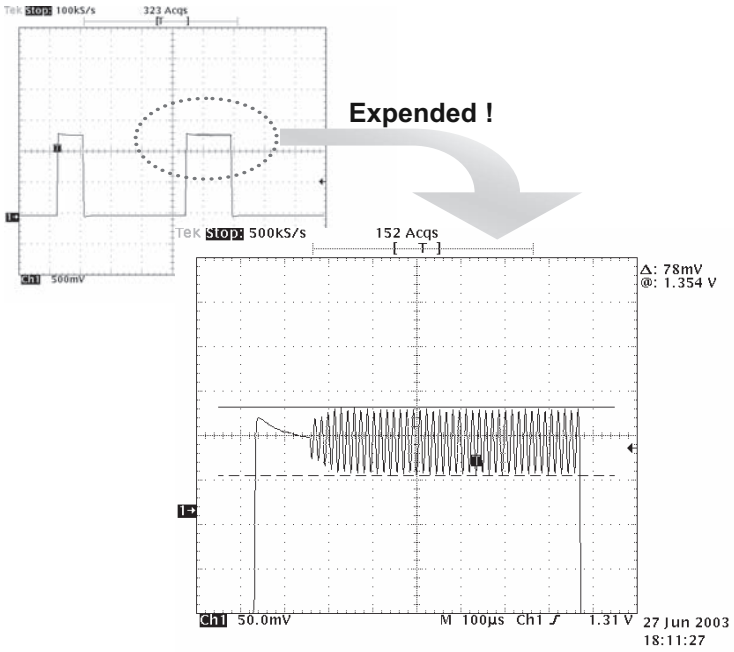


Waveform



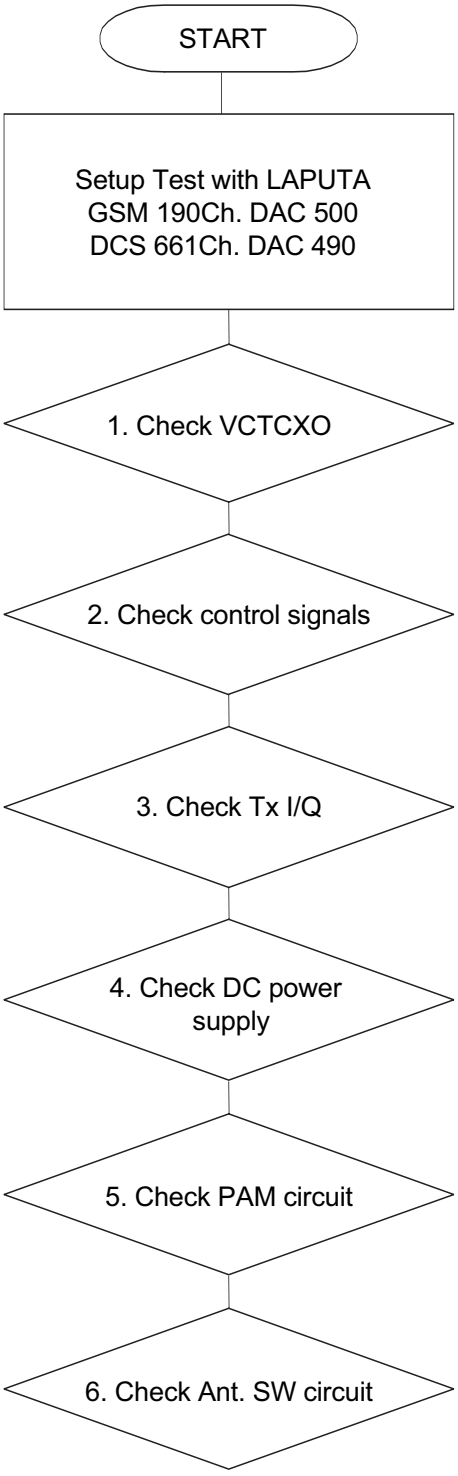
Check RX I/Q signal

Waveform



4.17. TX Part Trouble Shooting

Checking Flow



1. Check VCTCXO and Regulator

- VCTCXO
  - 26MHz Clock Output

2. Check Control Signals

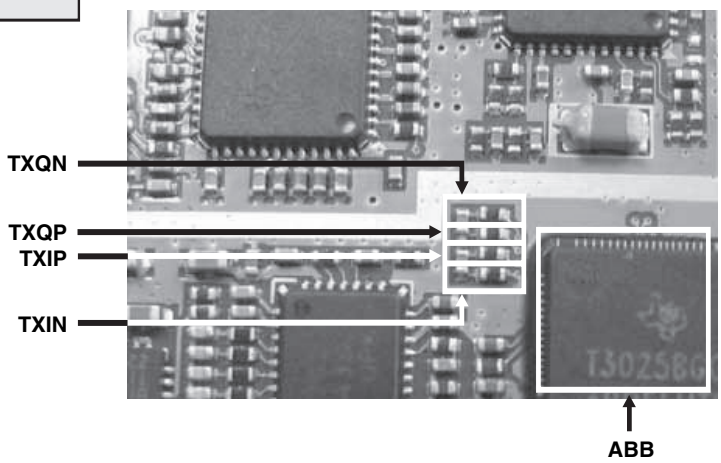
- RESET, S_EN, S_CLK, S_DATA

Same as RX Trouble Shooting Procedure No.4 and 5.

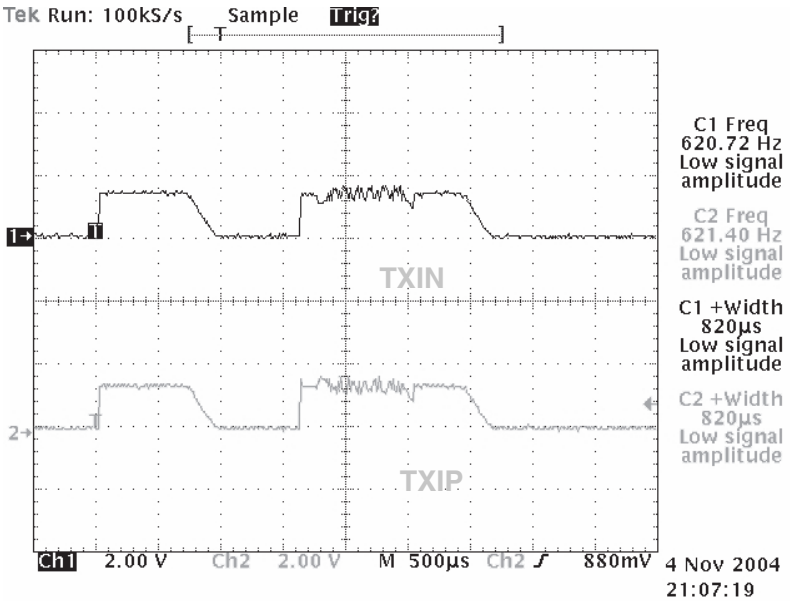
3. Check Tx I/Q

- Tx I/Q

TEST POINT



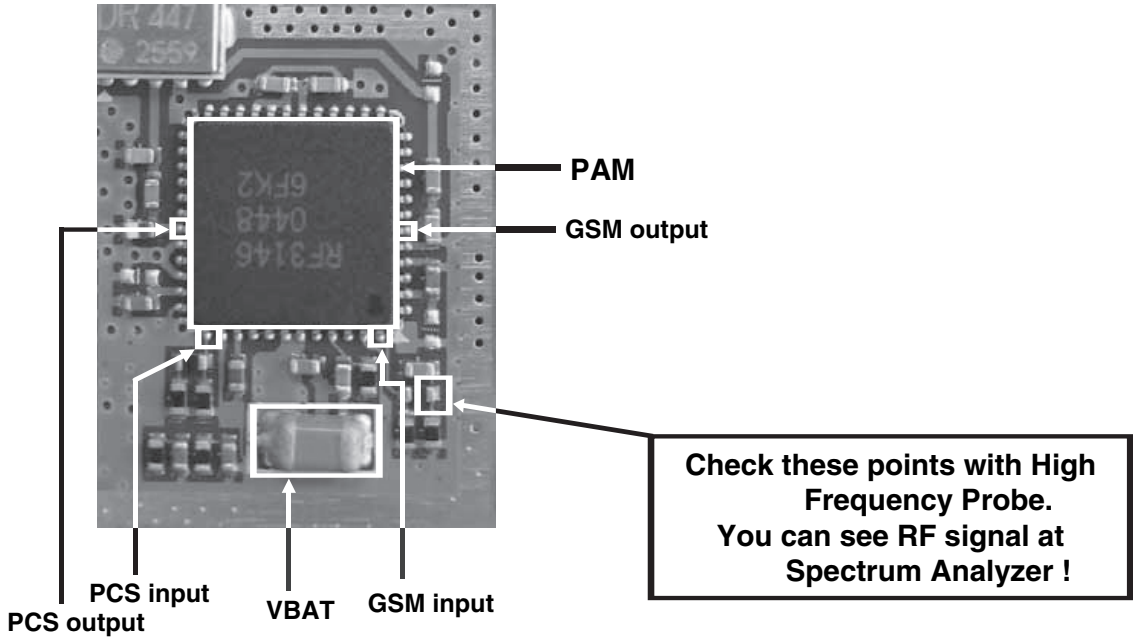
Waveform



4. Check PAM Circuit

• PAM input and output

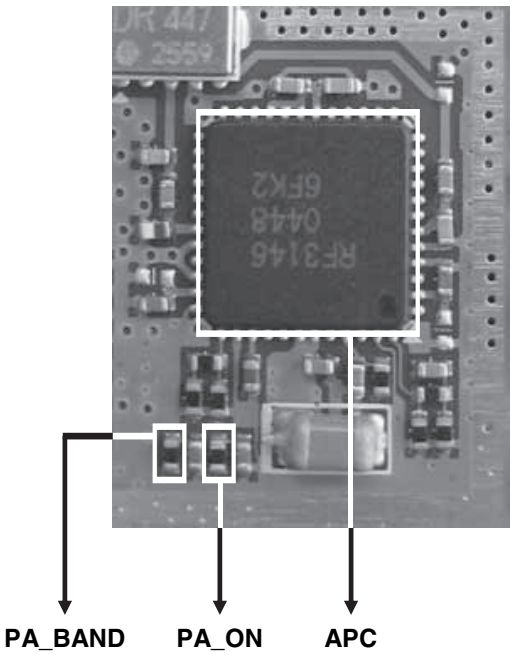
TEST POINT



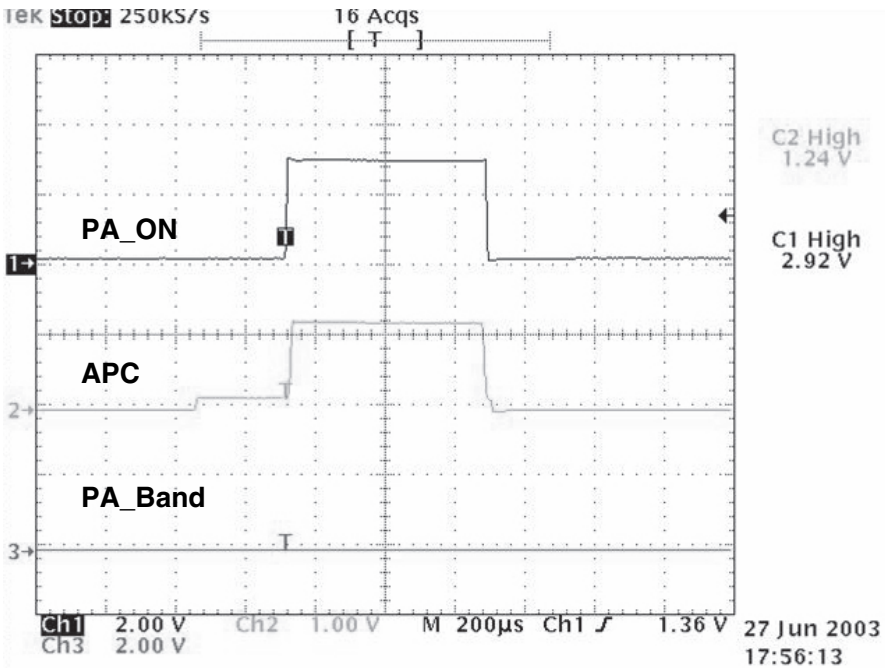
• Tx Carrier Frequency
  – GSM 190Ch. : 836.6MHz
  – PCS 661Ch. : 1880.0MHz
• PAM output power
  – GSM : about 33dBm
  – PCS : about 30dBm

• PAM control signals

TEST POINT



Waveform



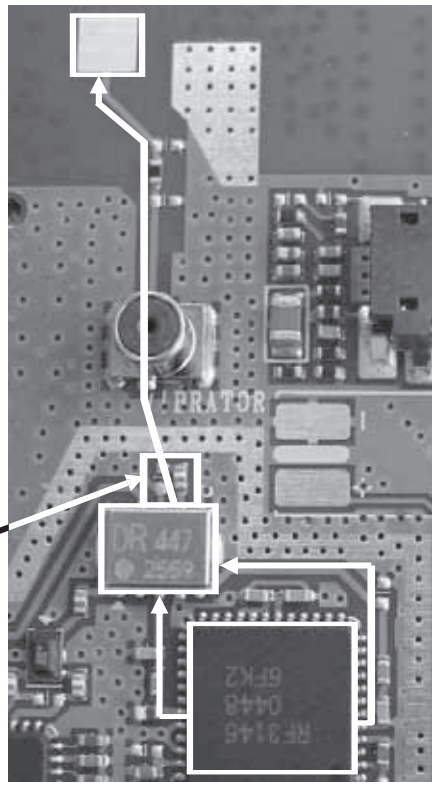
5. Check Ant. SW circuit

- Control signal VC1, VC2

Same as RX Trouble Shooting Procedure No.1

- Tx OUT Power
  - GSM : about 33dBm
  - PCS : about 30dBm

TEST POINT



Check these points with High Frequency Probe.
You can see RF signal at Spectrum Analyzer !

5. DOWNLOAD AND CALIBRATION

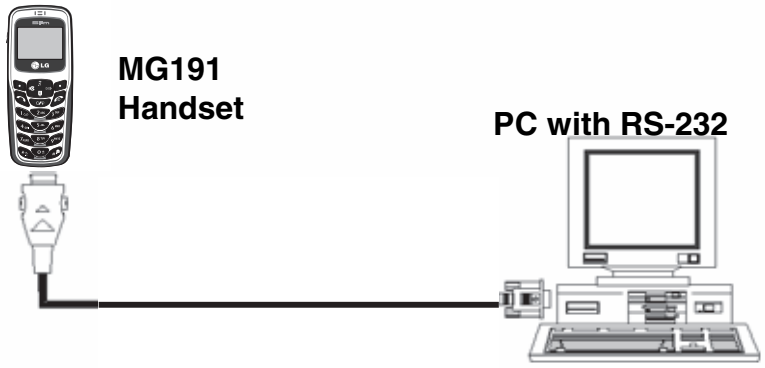
A. The Purpose of Downloading Software

- To make a phone operate at the first manufacturing
  - A phone = Hardware + Software
  - A phone cannot operate with hardware alone.
  - The hardware with the suitable software can operate properly.
- To upgrade the software of the phone
  - The software of the phone may be changed to enhance the performance of the phone.
  - The older version software of the phone can be replaced to the newer version.

B. The Environment of Downloading Software

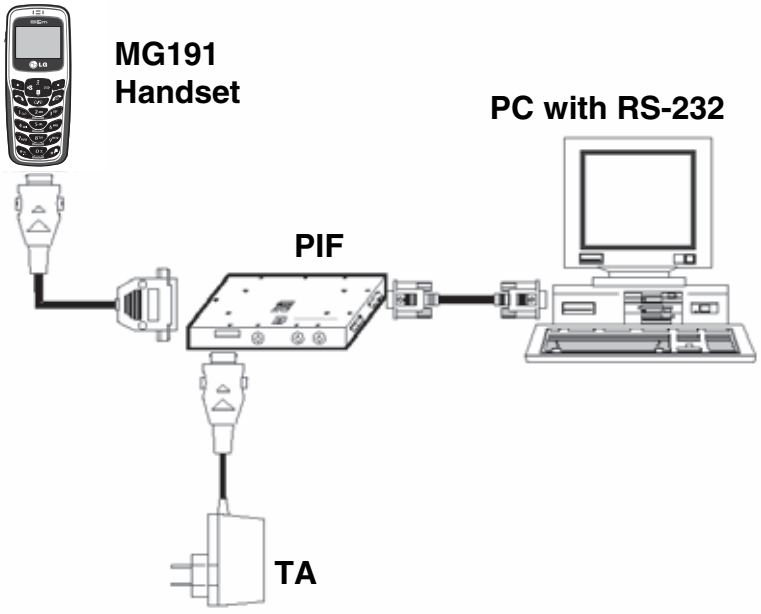
1. In case of using the Data Kit

- Preparation
  - Target Handset (MG191)
  - Data kit
  - Battery
  - IBM compatible PC supporting RS-232 with Windows 98 or newer
- If you use data kit, you should have a battery with the voltage above 3.7V.



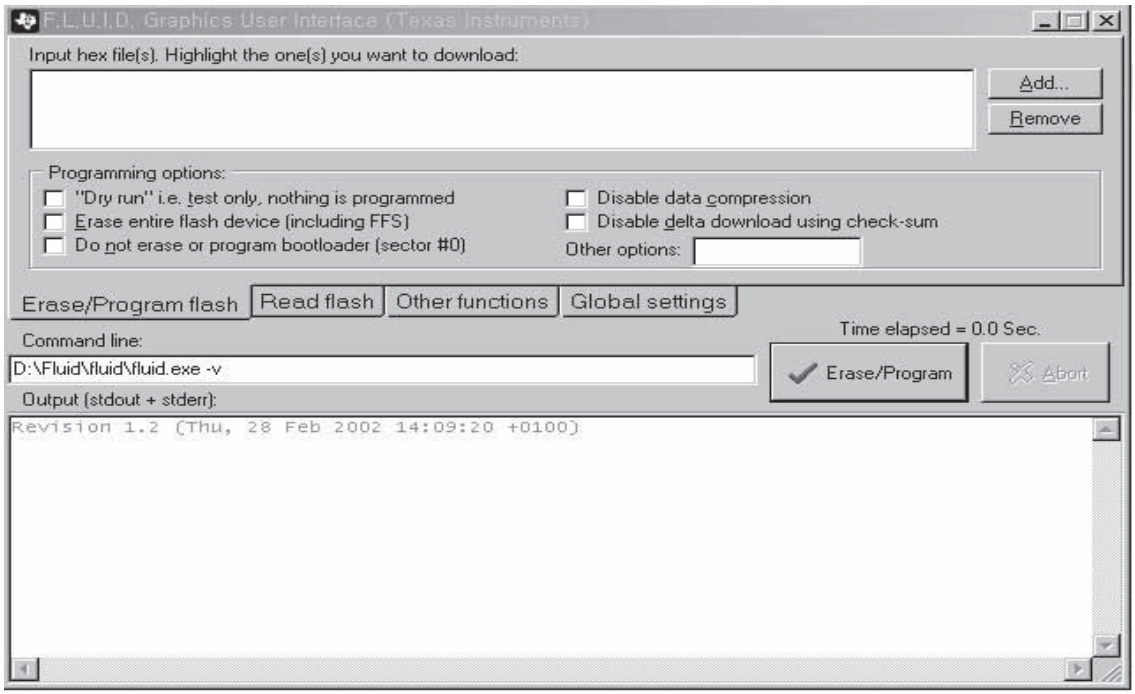
2. In case of using the PIF

• Preparation
  – Target Handset (MG191)
  – PIF
  – RS-232 Cable and PIF-to-Phone interface Cable
  – TA/Power Supply or Battery
  – IBM compatible PC supporting RS-232 with Windows 98 or newer
• If you use battery, you should have a battery with the voltage above 3.7V

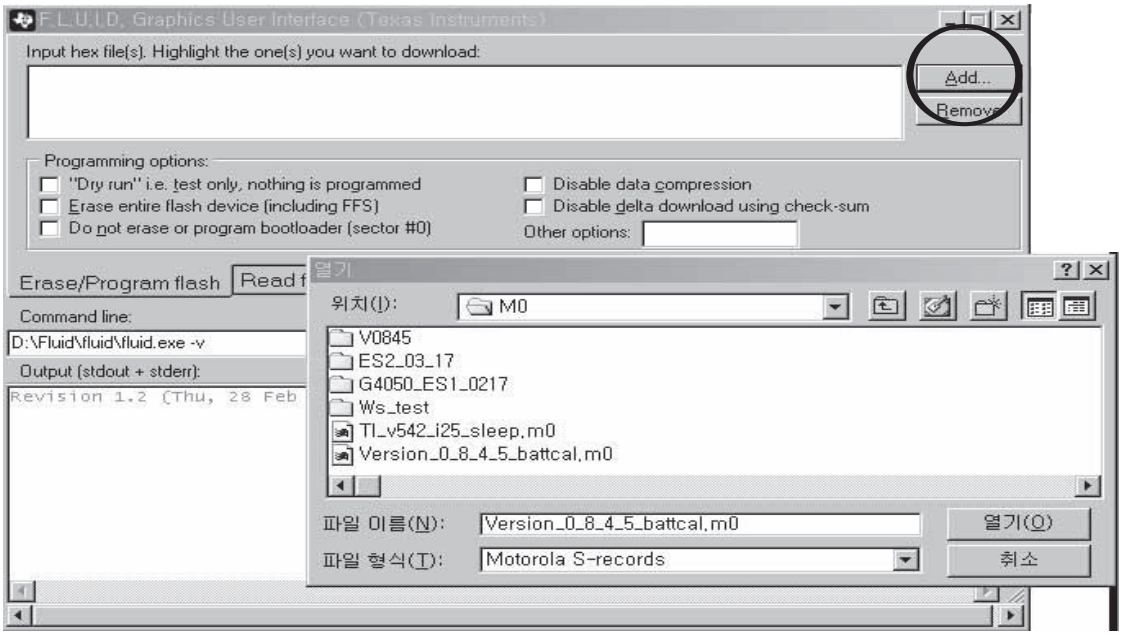


C. The Procedure of Downloading Software

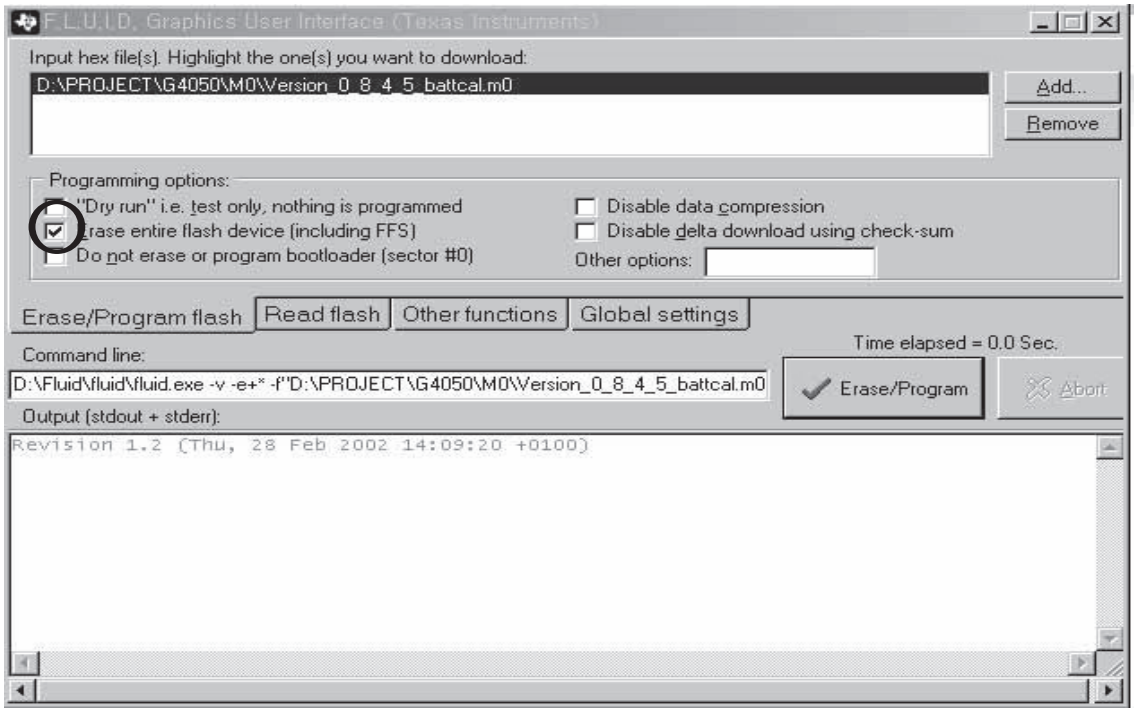
1. Execute FLUID.EXE. And then a window will be shown as below.



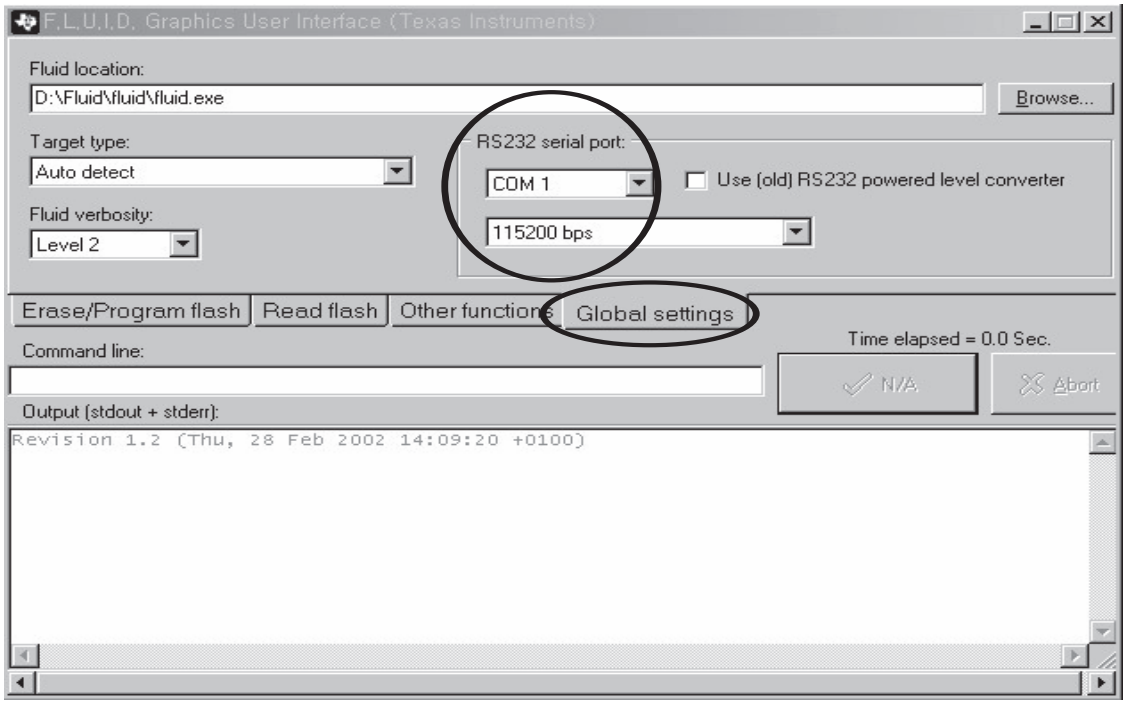
2. Press “Add” button and select a software to wnload in browser.



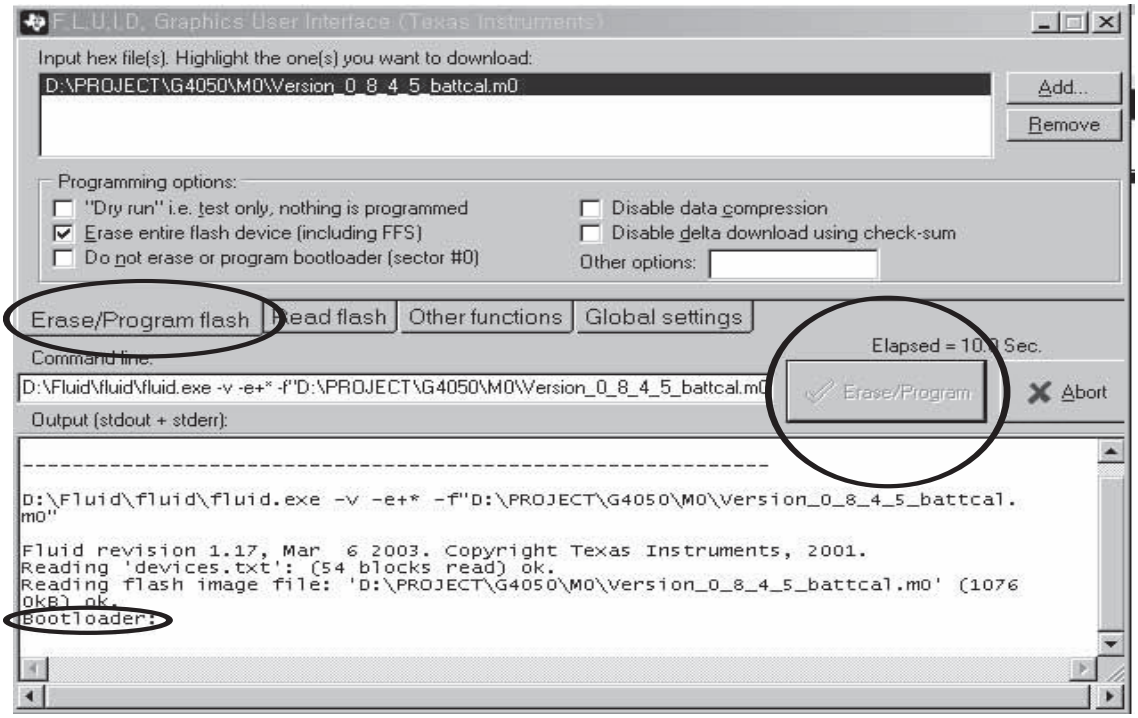
3. And then the window will be shown as below. Check the “Erase entire flash device” item.



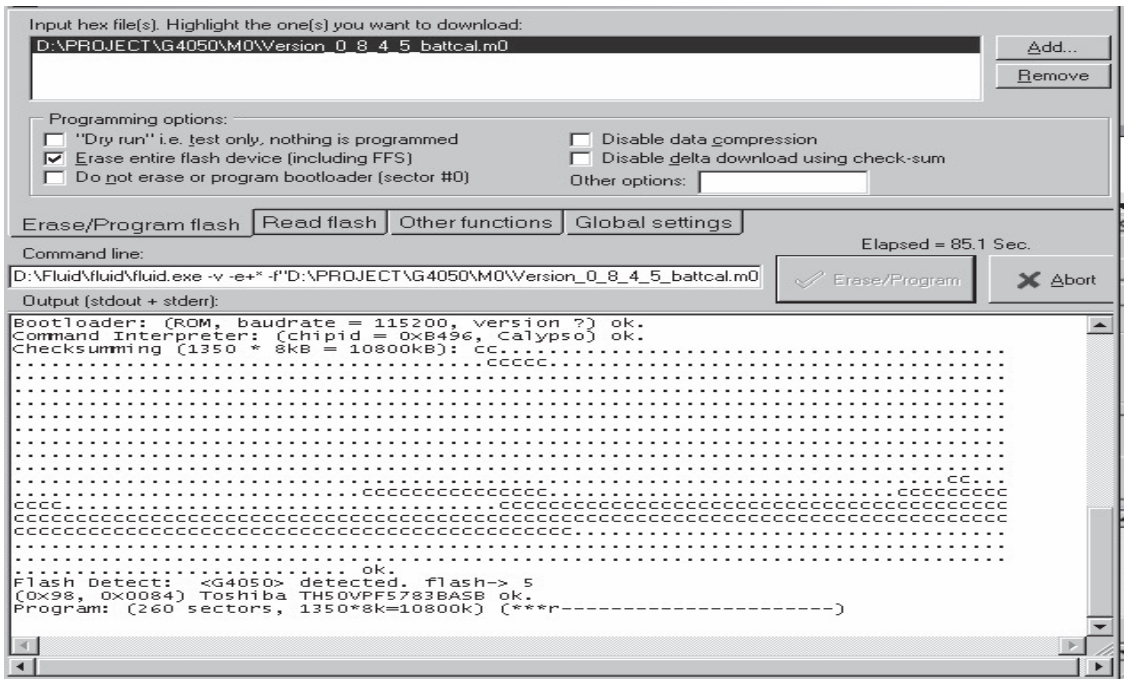
4. Press “Global Settings” menu. Choose a correct serial port and set the configuration as below.



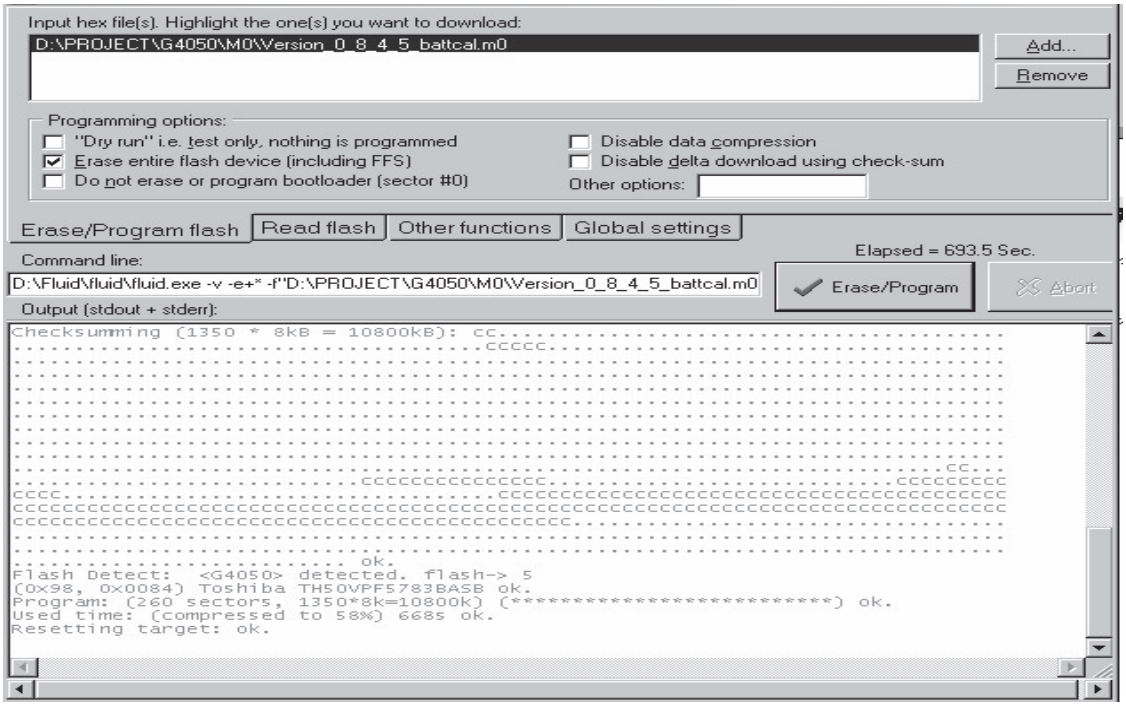
5. Press “Erase/Program flash” menu. Click the “Erase/Program” item and you will see the window as below.



6. After you watched the “Bootloader: ” message, press the Power key of handset (in case of Data kit) or turn the POWER on (PIF) and switch on the TI-REMOTE (PIF). The window will be shown as below.

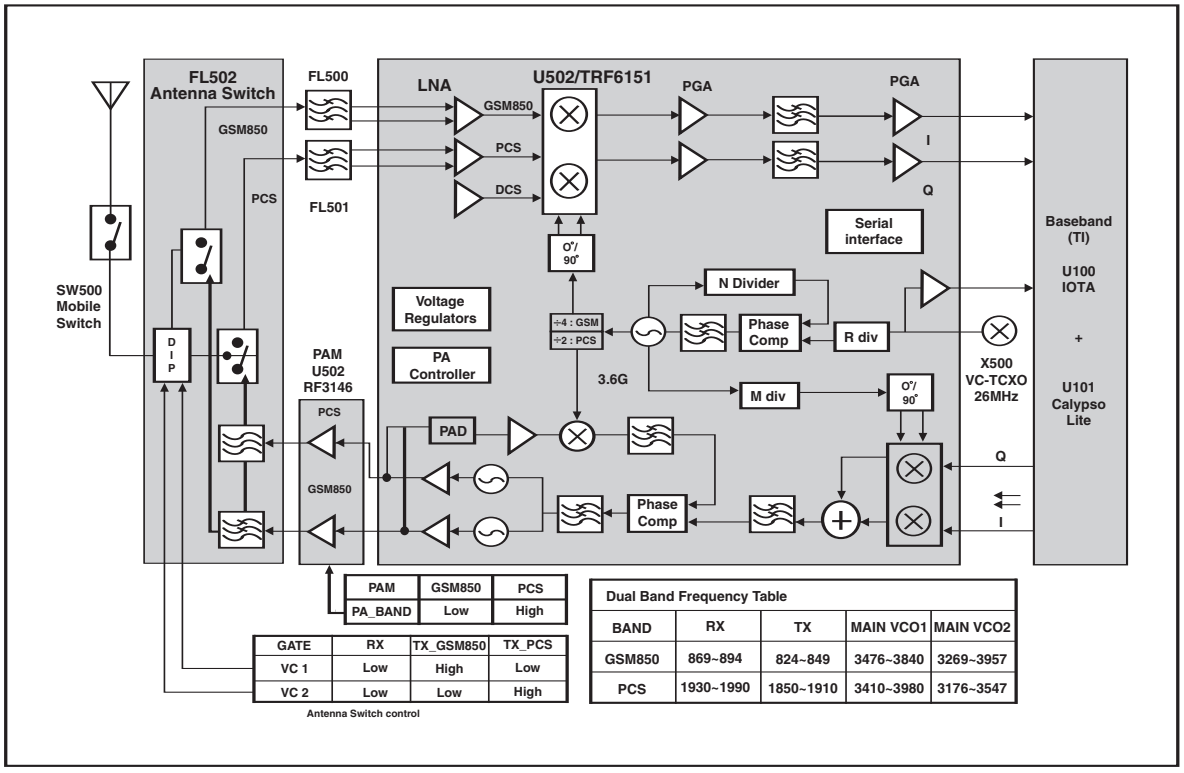


7. If downloading is completed, you will see the window as below.
   And then turn the Power On after removing and inserting battery again. (in using of battery)



6. BLOCK DIAGRAM

A. The Block Diagram of the RF Part



PAM	GSM850	PCS
PA_BAND	Low	High

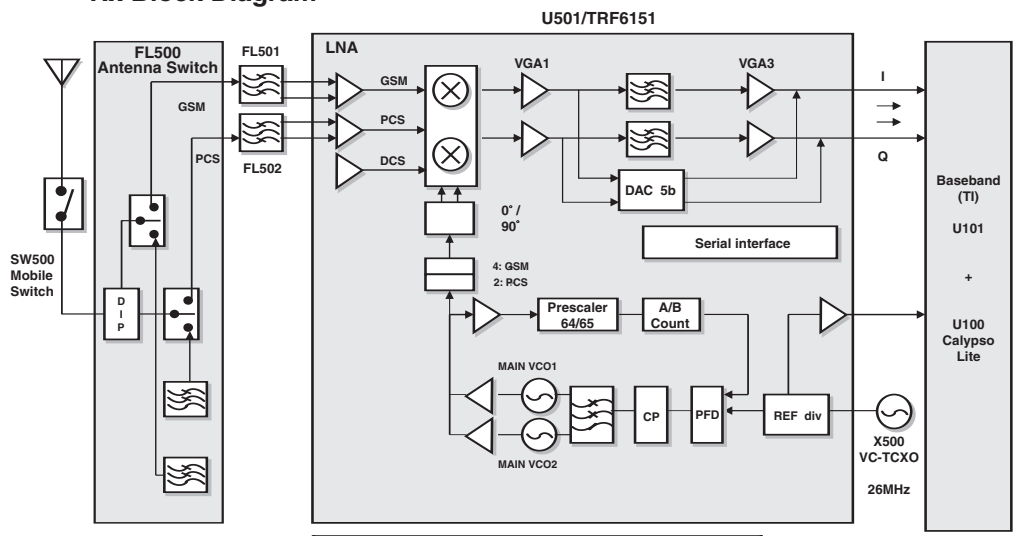
GATE	RX	TX_GSM850	TX_PCS
VC 1	Low	High	Low
VC 2	Low	Low	High

Dual Band Frequency Table

BAND	RX	TX	MAIN VCO1	MAIN VCO2
GSM850	869~894	824~849	3476~3840	3269~3957
PCS	1930~1990	1850~1910	3410~3980	3176~3547

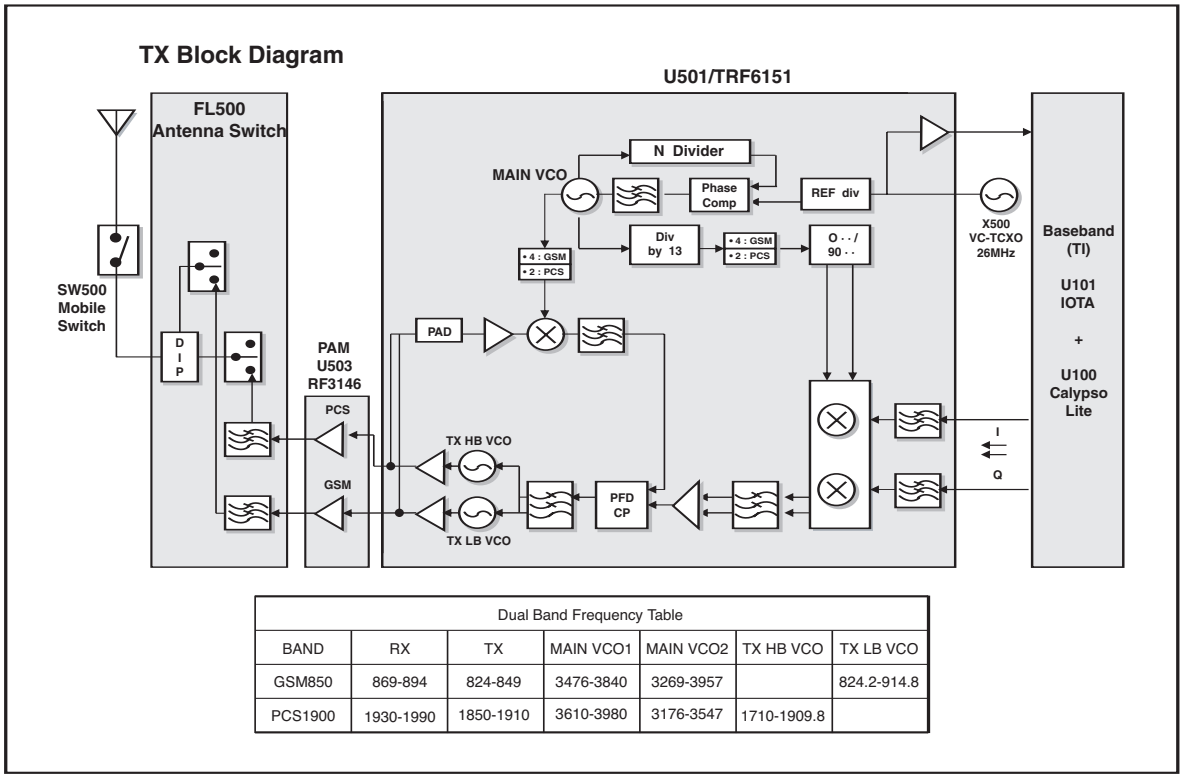
B. Receiver Part Description

Rx Block Diagram

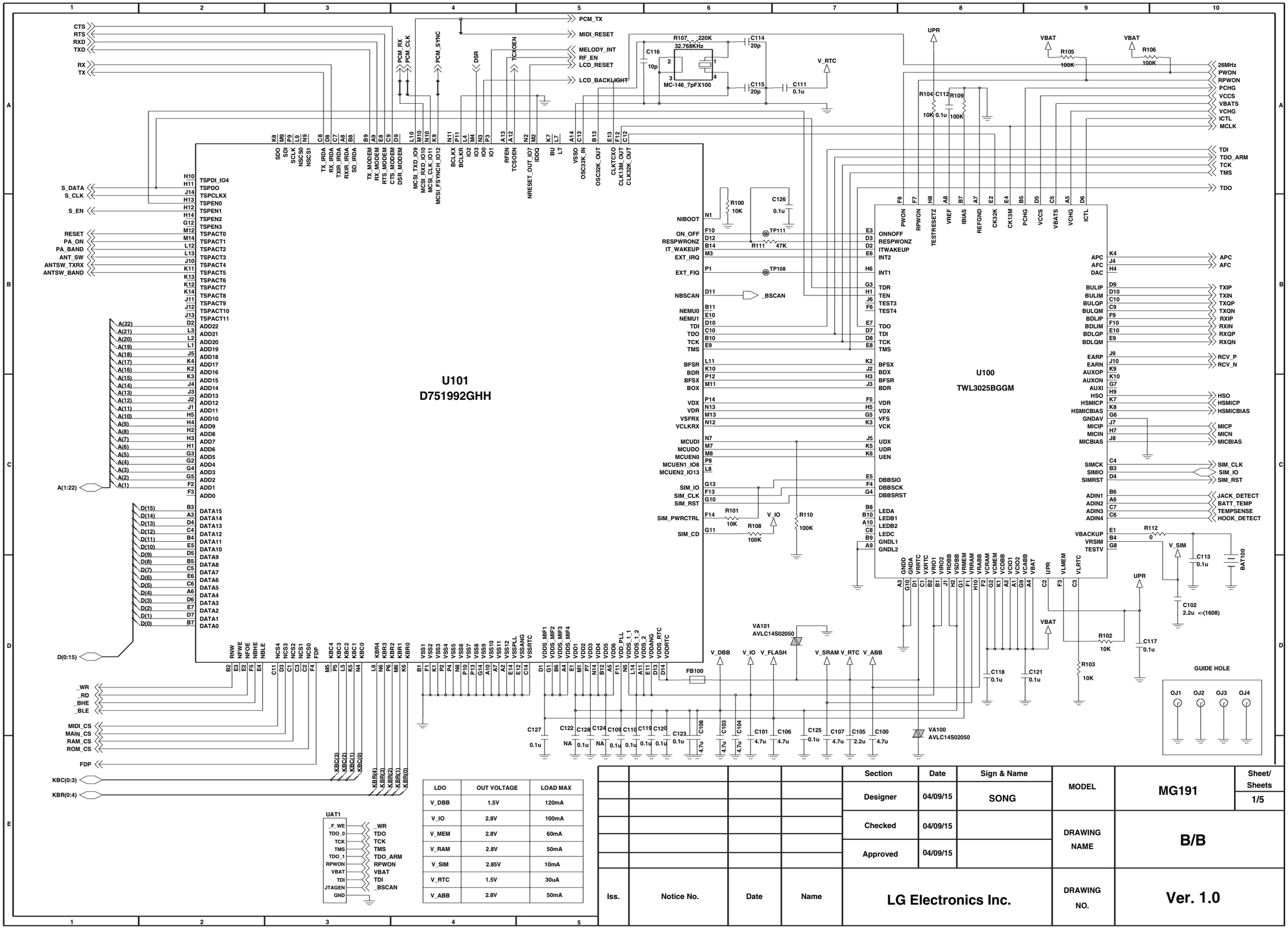


Dual Band Frequency Table				
BAND	RX	TX	MAIN VCO1	MAIN VCO2
GSM850	869~894	824~849	3476~3840	3269~3957
PCS1900	1930~1990	1850~1910	3410~3980	3176~3547

C. Transmitter Part Description



Dual Band Frequency Table						
BAND	RX	TX	MAIN VCO1	MAIN VCO2	TX HB VCO	TX LB VCO
GSM850	869-894	824-849	3476-3840	3269-3957		824.2-914.8
PCS1900	1930-1990	1850-1910	3610-3980	3176-3547	1710-1909.8	



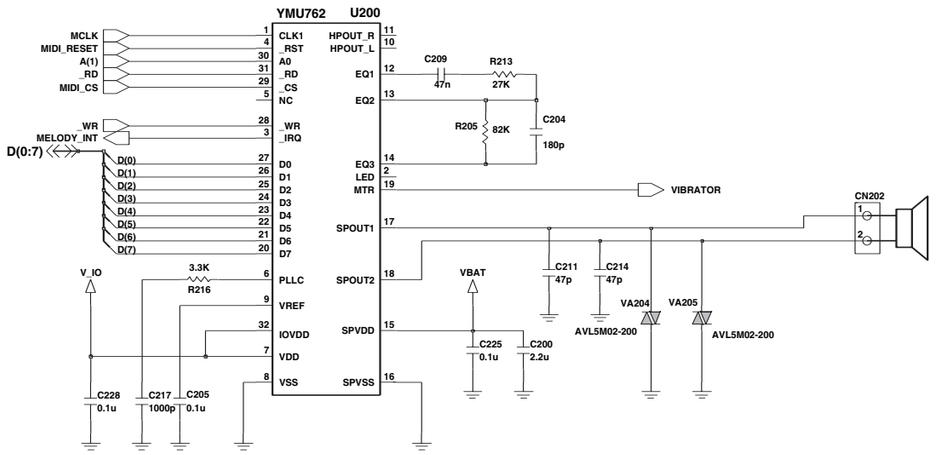
LDO	OUT VOLTAGE	LOAD MAX
V_DBB	1.5V	120mA
V_IO	2.8V	100mA
V_MEM	2.8V	60mA
V_RAM	2.8V	50mA
V_SIM	2.85V	10mA
V_RTC	1.5V	30uA
V_ABB	2.8V	50mA

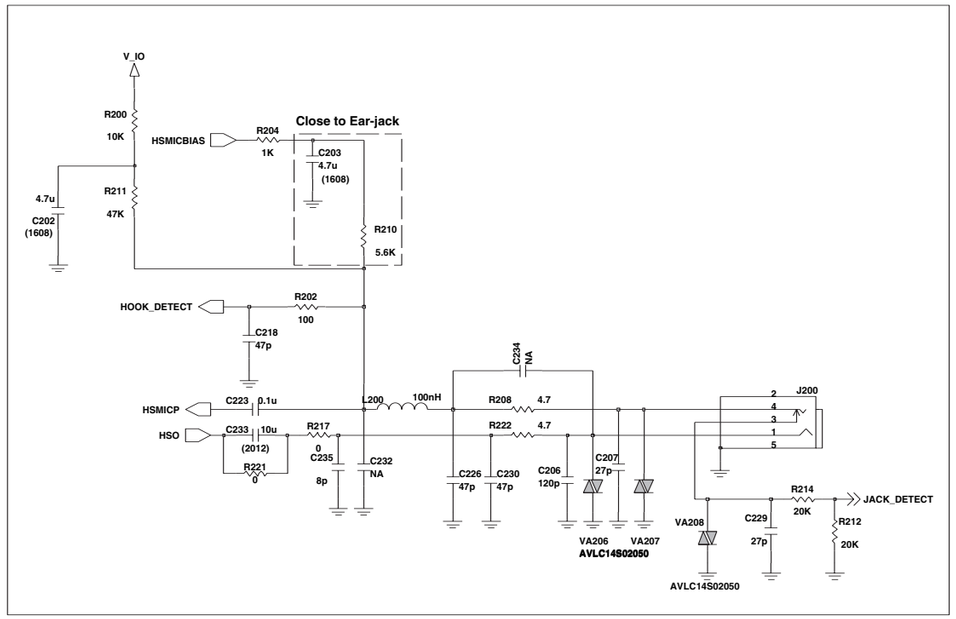
				Section	Date	Sign & Name	MODEL	MG191	Sheet/ Sheets
				Designer	04/09/15	SONG			1/5
				Checked	04/09/15		DRAWING NAME	B/B	
				Approved	04/09/15				
Iss.	Notice No.	Date	Name	LG Electronics Inc.			DRAWING NO.	Ver. 1.0	

LGIC(42)-A-5505-10:01

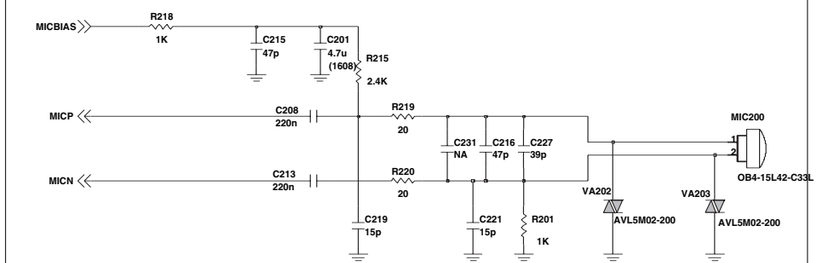
LG Electronics Inc.

MELODY

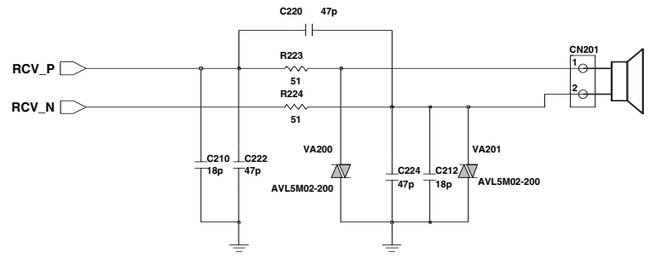




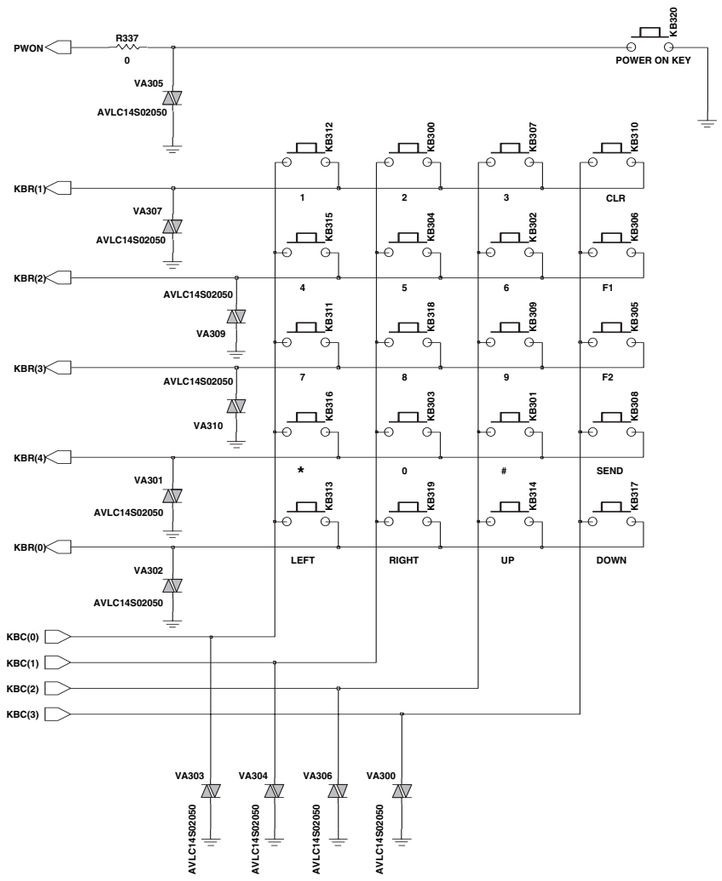
MIC

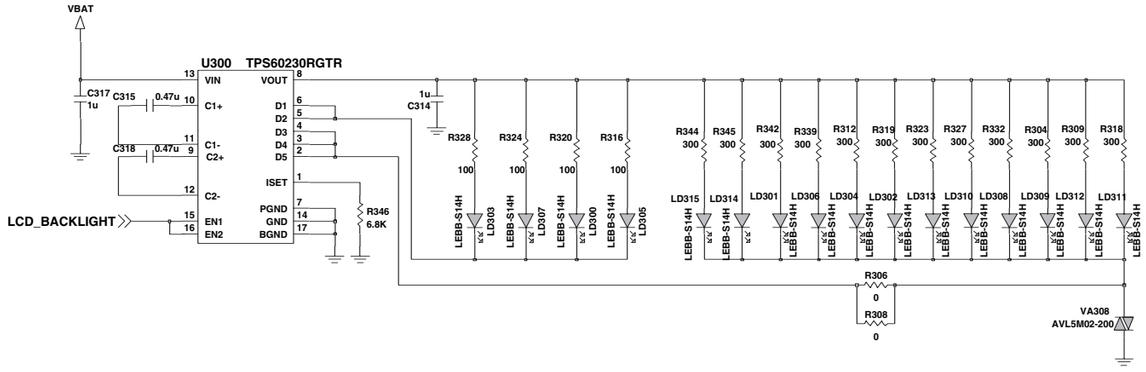


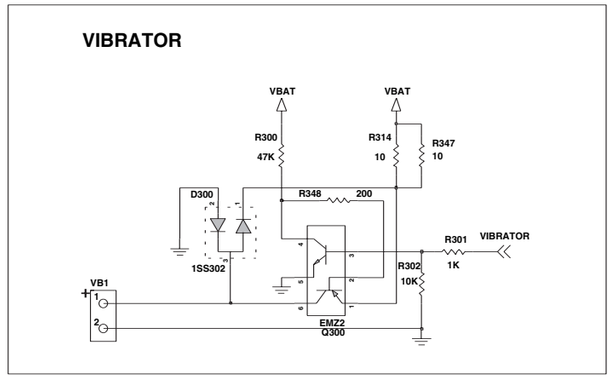
RECEIVER

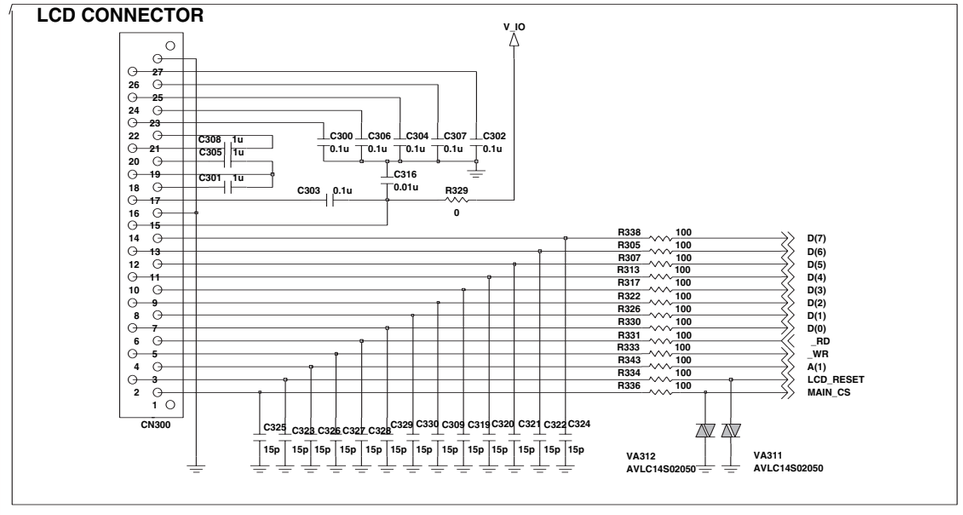


				Section	Date	Sign & Name	MODEL	MG191	Sheet/ Sheets
				Designer	04/09/15	SONG			2/5
				Checked	04/09/15		DRAWING NAME	AUDIO	
				Approved	04/04/06				
Iss.	Notice No.	Date	Name	LG Electronics Inc.			DRAWING NO.	Ver. 1.0	







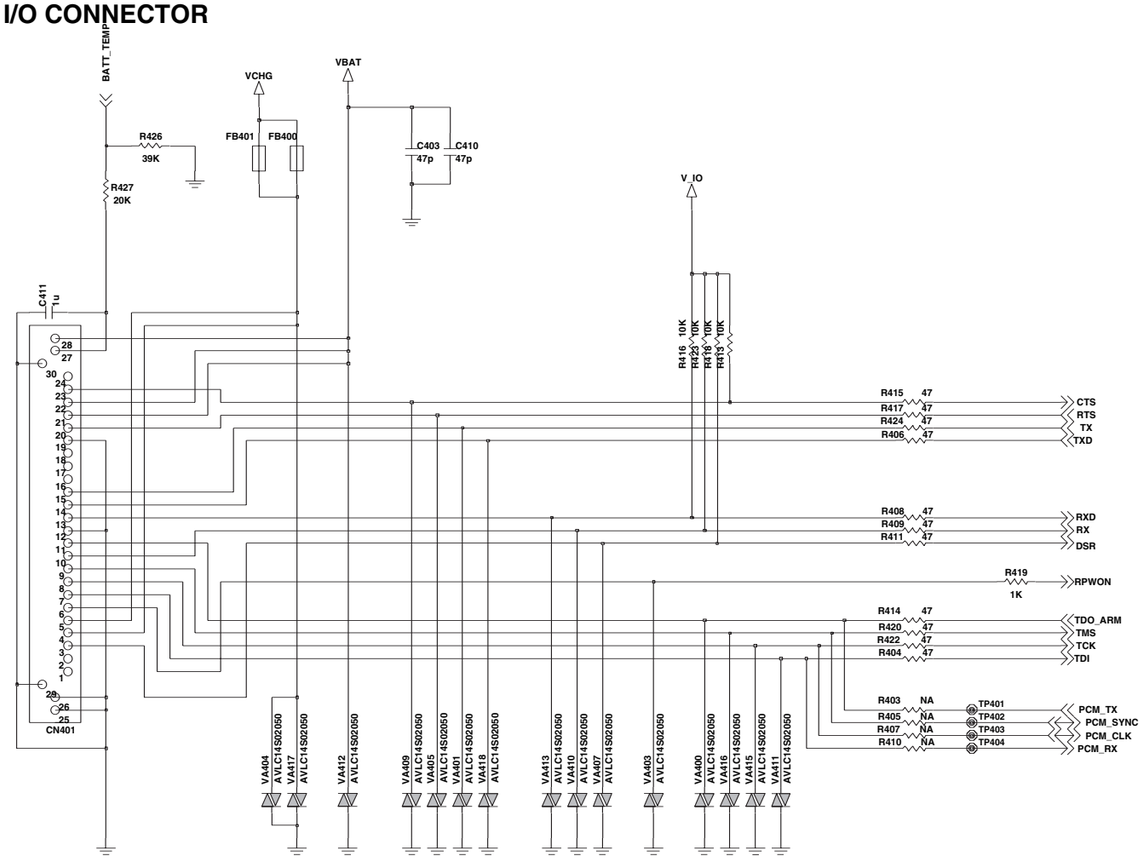


				Section	Date	Sign & Name	MODEL	MG191	Sheet/ Sheets
				Designer	04/09/15	SONG			3/5
				Checked	04/09/15		DRAWING NAME	KEY	
				Approved	04/09/15				
Iss.	Notice No.	Date	Name	LG Electronics Inc.			DRAWING NO.	Ver. 1.0	

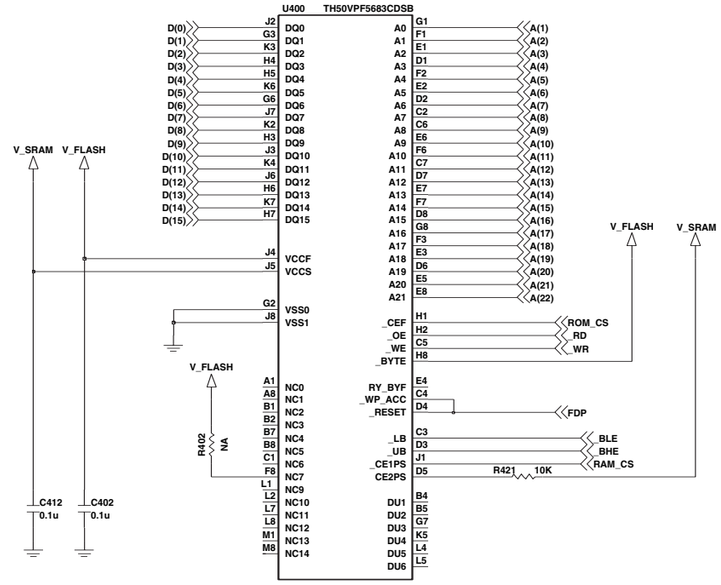
LGIC(42)-A-5505-10:01

LG Electronics Inc.

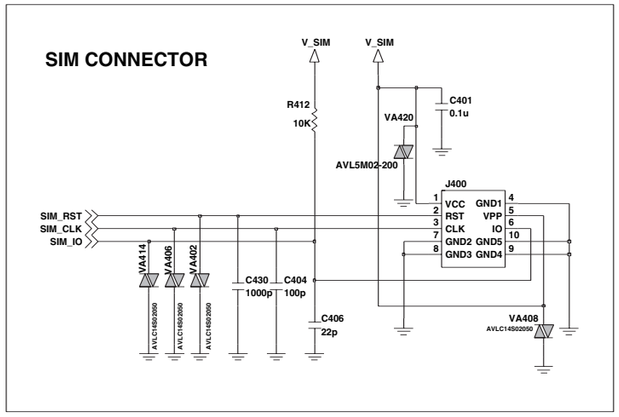
I/O CONNECTOR



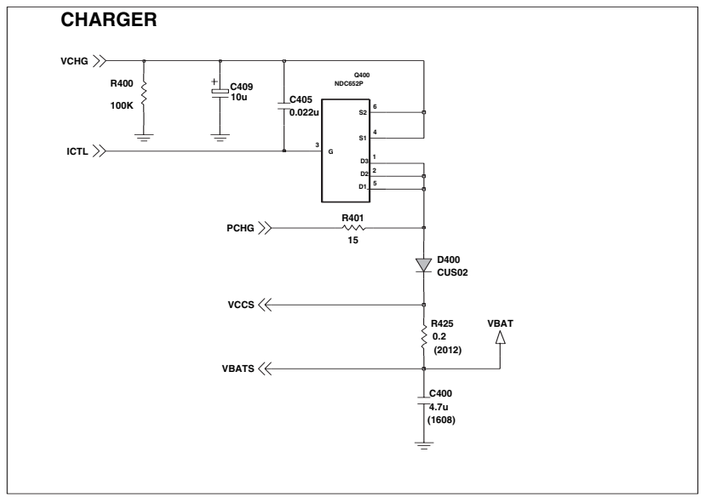
MEMORY



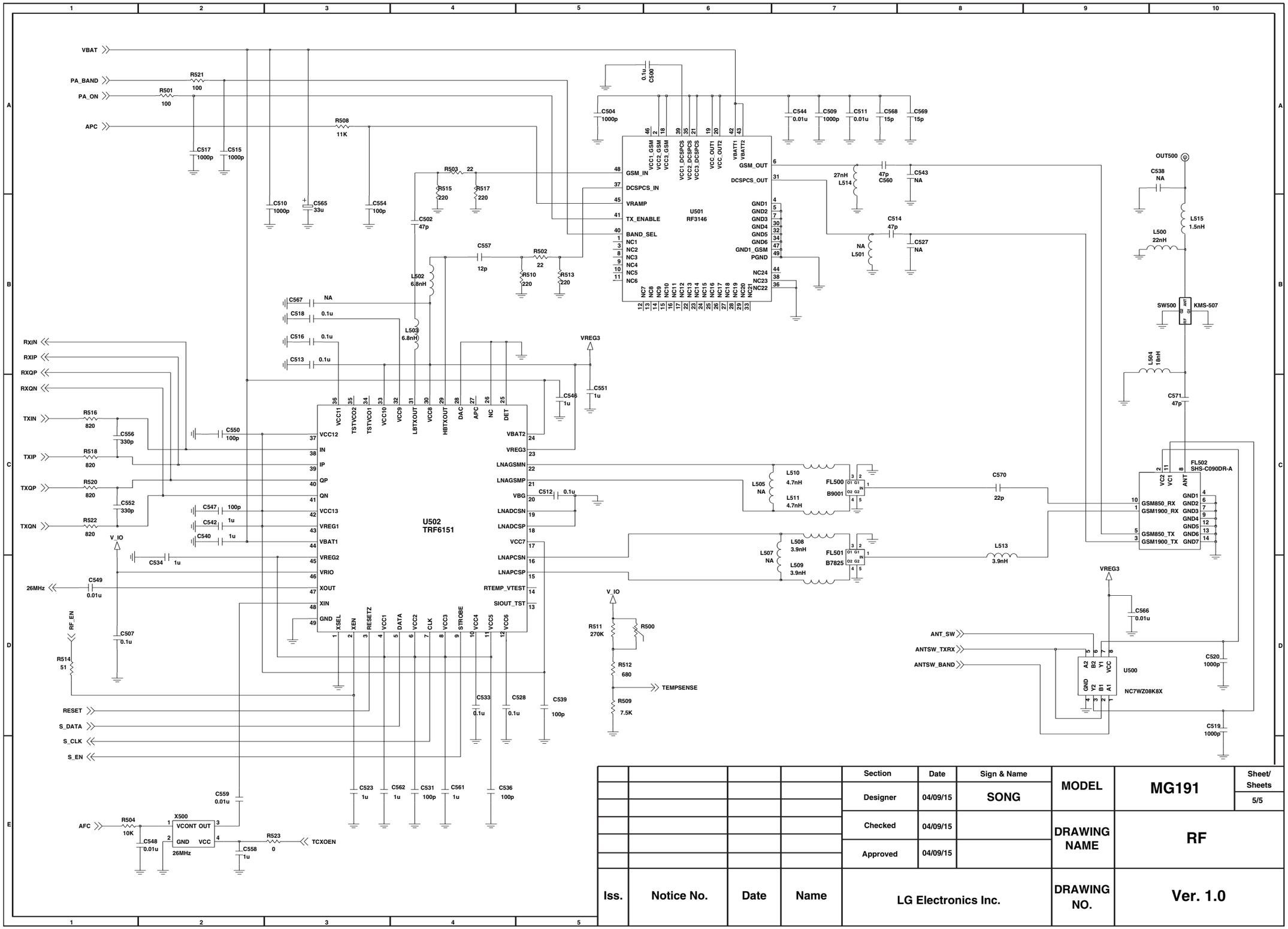
SIM CONNECTOR



CHARGER



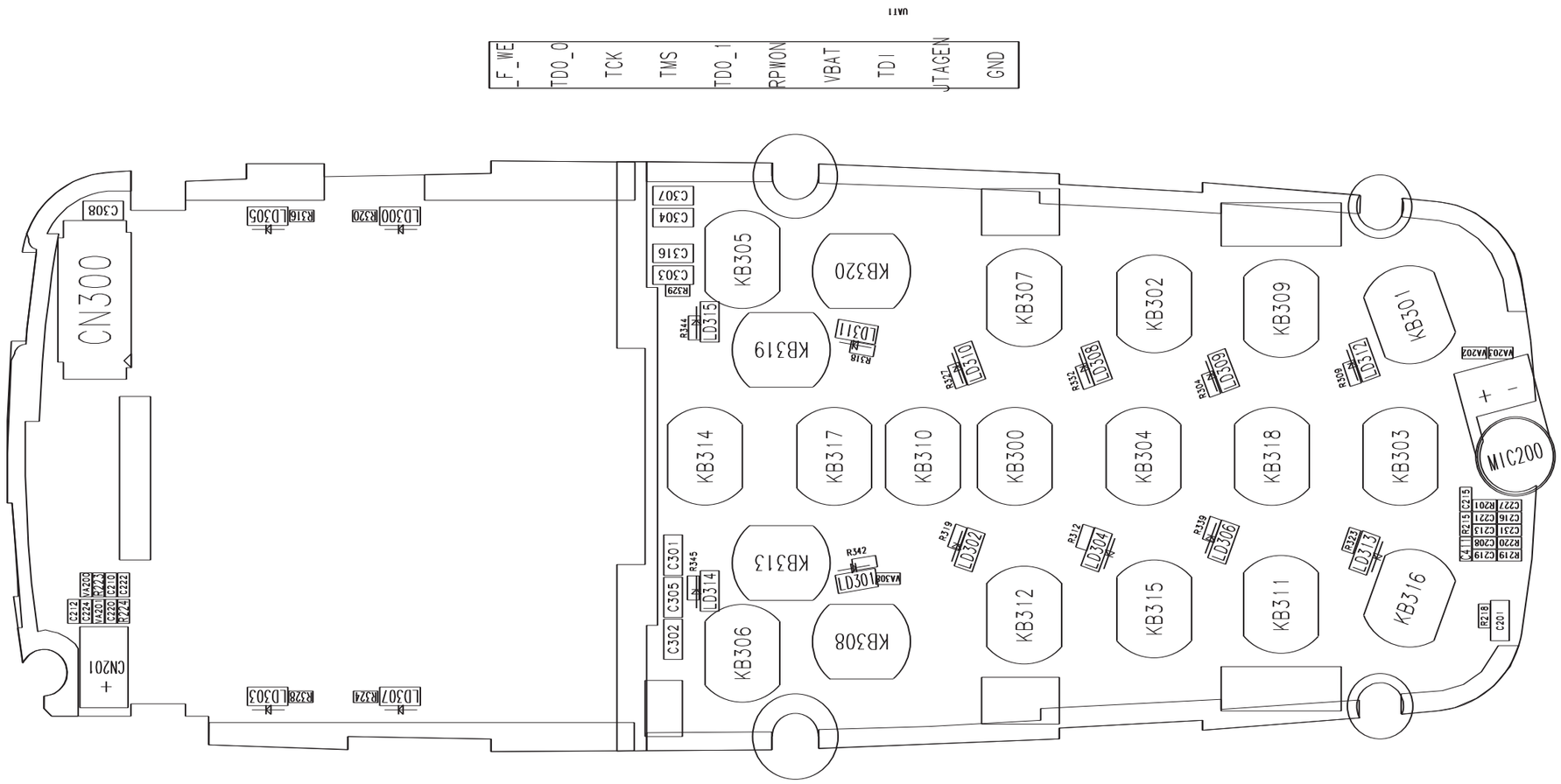
				Section	Date	Sign & Name	MODEL	MG191	Sheet/ Sheets
				Designer	04/04/06	SONG			4/5
				Checked	04/04/06		DRAWING NAME	IO/SIM	
				Approved	04/04/06				
Iss.	Notice No.	Date	Name	LG Electronics Inc.			DRAWING NO.	Ver. 1.0	

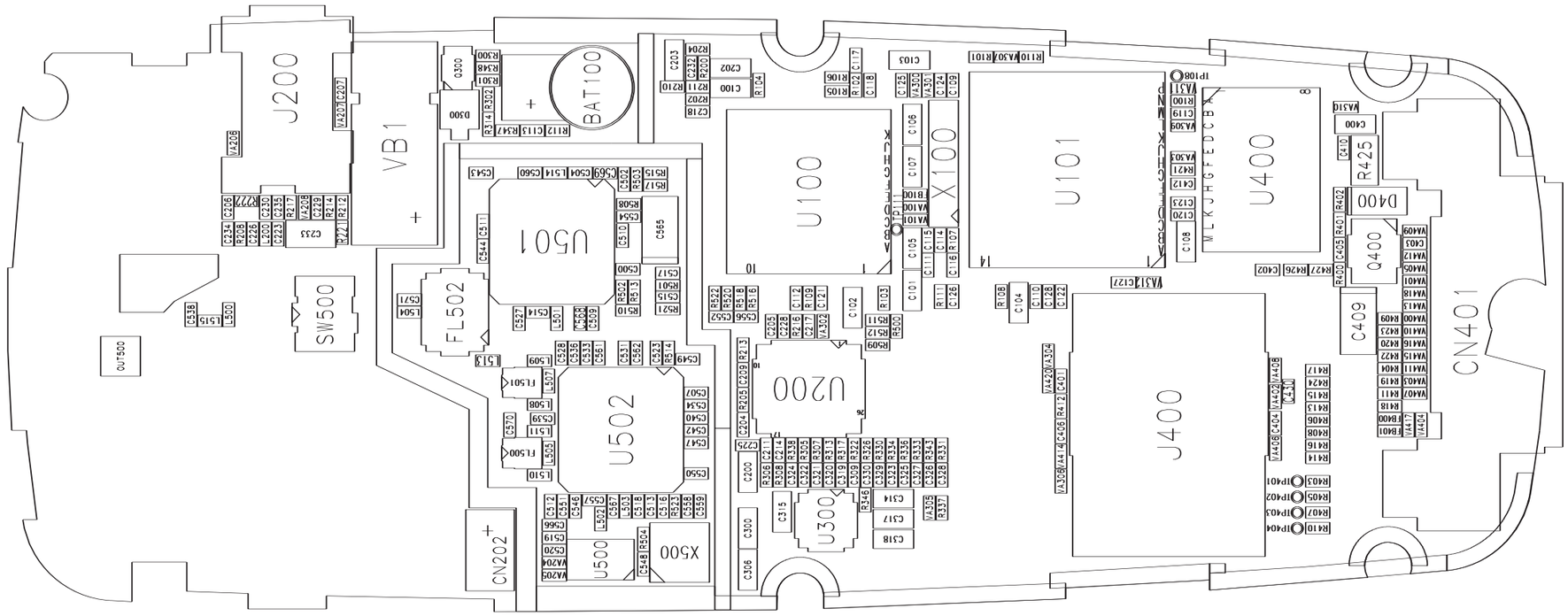


				Section	Date	Sign & Name	MODEL	MG191	Sheet/ Sheets
				Designer	04/09/15	SONG			5/5
				Checked	04/09/15		DRAWING NAME	RF	
				Approved	04/09/15				
Iss.	Notice No.	Date	Name	LG Electronics Inc.			DRAWING NO.	Ver. 1.0	

LGIC(42)-A-5505-10:01

LG Electronics Inc.


MG191-SPFY00969001-1.0-TOP
UA11
F_WE
TDO_0
TCK
TMS
TDO_1
RPWON
VBAT
TDI
JTAGEN
GND
CN300
CN201
MIC200
KB305
KB320
KB319
KB307
KB302
KB309
KB301
KB314
KB317
KB310
KB300
KB304
KB318
KB303
KB313
KB308
KB312
KB315
KB311
KB316
KB306
LD308
LD309
LD312
LD313
LD314
LD315
LD317
LD318
LD319
LD320
LD321
LD322
LD323
LD324
LD325
LD326
LD327
LD328
LD329
LD330
LD331
LD332
LD333
LD334
LD335
LD336
LD337
LD338
LD339
LD340
LD341
LD342
LD343
LD344
LD345
LD346
LD347
LD348
LD349
LD350
LD351
LD352
LD353
LD354
LD355
LD356
LD357
LD358
LD359
LD360
LD361
LD362
LD363
LD364
LD365
LD366
LD367
LD368
LD369
LD370
LD371
LD372
LD373
LD374
LD375
LD376
LD377
LD378
LD379
LD380
LD381
LD382
LD383
LD384
LD385
LD386
LD387
LD388
LD389
LD390
LD391
LD392
LD393
LD394
LD395
LD396
LD397
LD398
LD399
LD400
LD401
LD402
LD403
LD404
LD405
LD406
LD407
LD408
LD409
LD410
LD411
LD412
LD413
LD414
LD415
LD416
LD417
LD418
LD419
LD420
LD421
LD422
LD423
LD424
LD425
LD426
LD427
LD428
LD429
LD430
LD431
LD432
LD433
LD434
LD435
LD436
LD437
LD438
LD439
LD440
LD441
LD442
LD443
LD444
LD445
LD446
LD447
LD448
LD449
LD450
LD451
LD452
LD453
LD454
LD455
LD456
LD457
LD458
LD459
LD460
LD461
LD462
LD463
LD464
LD465
LD466
LD467
LD468
LD469
LD470
LD471
LD472
LD473
LD474
LD475
LD476
LD477
LD478
LD479
LD480
LD481
LD482
LD483
LD484
LD485
LD486
LD487
LD488
LD489
LD490
LD491
LD492
LD493
LD494
LD495
LD496
LD497
LD498
LD499
LD500
LD501
LD502
LD503
LD504
LD505
LD506
LD507
LD508
LD509
LD510
LD511
LD512
LD513
LD514
LD515
LD516
LD517
LD518
LD519
LD520
LD521
LD522
LD523
LD524
LD525
LD526
LD527
LD528
LD529
LD530
LD531
LD532
LD533
LD534
LD535
LD536
LD537
LD538
LD539
LD540
LD541
LD542
LD543
LD544
LD545
LD546
LD547
LD548
LD549
LD550
LD551
LD552
LD553
LD554
LD555
LD556
LD557
LD558
LD559
LD560
LD561
LD562
LD563
LD564
LD565
LD566
LD567
LD568
LD569
LD570
LD571
LD572
LD573
LD574
LD575
LD576
LD577
LD578
LD579
LD580
LD581
LD582
LD583
LD584
LD585
LD586
LD587
LD588
LD589
LD590
LD591
LD592
LD593
LD594
LD595
LD596
LD597
LD598
LD599
LD600
LD601
LD602
LD603
LD604
LD605
LD606
LD607
LD608
LD609
LD610
LD611
LD612
LD613
LD614
LD615
LD616
LD617
LD618
LD619
LD620
LD621
LD622
LD623
LD624
LD625
LD626
LD627
LD628
LD629
LD630
LD631
LD632
LD633
LD634
LD635
LD636
LD637
LD638
LD639
LD640
LD641
LD642
LD643
LD644
LD645
LD646
LD647
LD648
LD649
LD650
LD651
LD652
LD653
LD654
LD655
LD656
LD657
LD658
LD659
LD660
LD661
LD662
LD663
LD664
LD665
LD666
LD667
LD668
LD669
LD670
LD671
LD672
LD673
LD674
LD675
LD676
LD677
LD678
LD679
LD680
LD681
LD682
LD683
LD684
LD685
LD686
LD687
LD688
LD689
LD690
LD691
LD692
LD693
LD694
LD695
LD696
LD697
LD698
LD699
LD700
LD701
LD702
LD703
LD704
LD705
LD706
LD707
LD708
LD709
LD710
LD711
LD712
LD713
LD714
LD715
LD716
LD717
LD718
LD719
LD720
LD721
LD722
LD723
LD724
LD725
LD726
LD727
LD728
LD729
LD730
LD731
LD732
LD733
LD734
LD735
LD736
LD737
LD738
LD739
LD740
LD741
LD742
LD743
LD744
LD745
LD746
LD747
LD748
LD749
LD750
LD751
LD752
LD753
LD754
LD755
LD756
LD757
LD758
LD759
LD760
LD761
LD762
LD763
LD764
LD765
LD766
LD767
LD768
LD769
LD770
LD771
LD772
LD773
LD774
LD775
LD776
LD777
LD778
LD779
LD780
LD781
LD782
LD783
LD784
LD785
LD786
LD787
LD788
LD789
LD790
LD791
LD792
LD793
LD794
LD795
LD796
LD797
LD798
LD799
LD800
LD801
LD802
LD803
LD804
LD805
LD806
LD807
LD808
LD809
LD810
LD811
LD812
LD813
LD814
LD815
LD816
LD817
LD818
LD819
LD820
LD821
LD822
LD823
LD824
LD825
LD826
LD827
LD828
LD829
LD830
LD831
LD832
LD833
LD834
LD835
LD836
LD837
LD838
LD839
LD840
LD841
LD842
LD843
LD844
LD845
LD846
LD847
LD848
LD849
LD850
LD851
LD852
LD853
LD854
LD855
LD856
LD857
LD858
LD859
LD860
LD861
LD862
LD863
LD864
LD865
LD866
LD867
LD868
LD869
LD870
LD871
LD872
LD873
LD874
LD875
LD876
LD877
LD878
LD879
LD880
LD881
LD882
LD883
LD884
LD885
LD886
LD887
LD888
LD889
LD890
LD891
LD892
LD893
LD894
LD895
LD896
LD897
LD898
LD899
LD900
LD901
LD902
LD903
LD904
LD905
LD906
LD907
LD908
LD909
LD910
LD911
LD912
LD913
LD914
LD915
LD916
LD917
LD918
LD919
LD920
LD921
LD922
LD923
LD924
LD925
LD926
LD927
LD928
LD929
LD930
LD931
LD932
LD933
LD934
LD935
LD936
LD937
LD938
LD939
LD940
LD941
LD942
LD943
LD944
LD945
LD946
LD947
LD948
LD949
LD950
LD951
LD952
LD953
LD954
LD955
LD956
LD957
LD958
LD959
LD960
LD961
LD962
LD963
LD964
LD965
LD966
LD967
LD968
LD969
LD970
LD971
LD972
LD973
LD974
LD975
LD976
LD977
LD978
LD979
LD980
LD981
LD982
LD983
LD984
LD985
LD986
LD987
LD988
LD989
LD990
LD991
LD992
LD993
LD994
LD995
LD996
LD997
LD998
LD999
LD1000



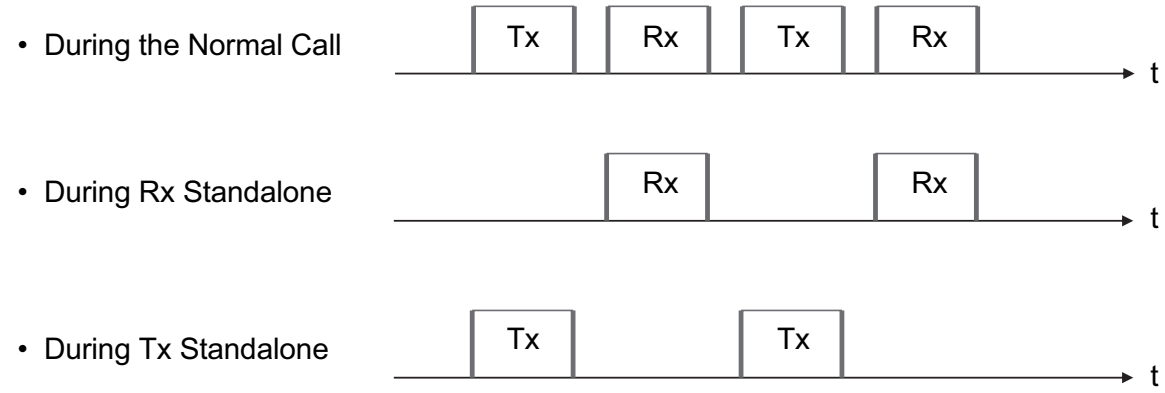
MG191-SPFY00690-1.0-BTM

9. STAND ALONE TEST & CALIBRATION

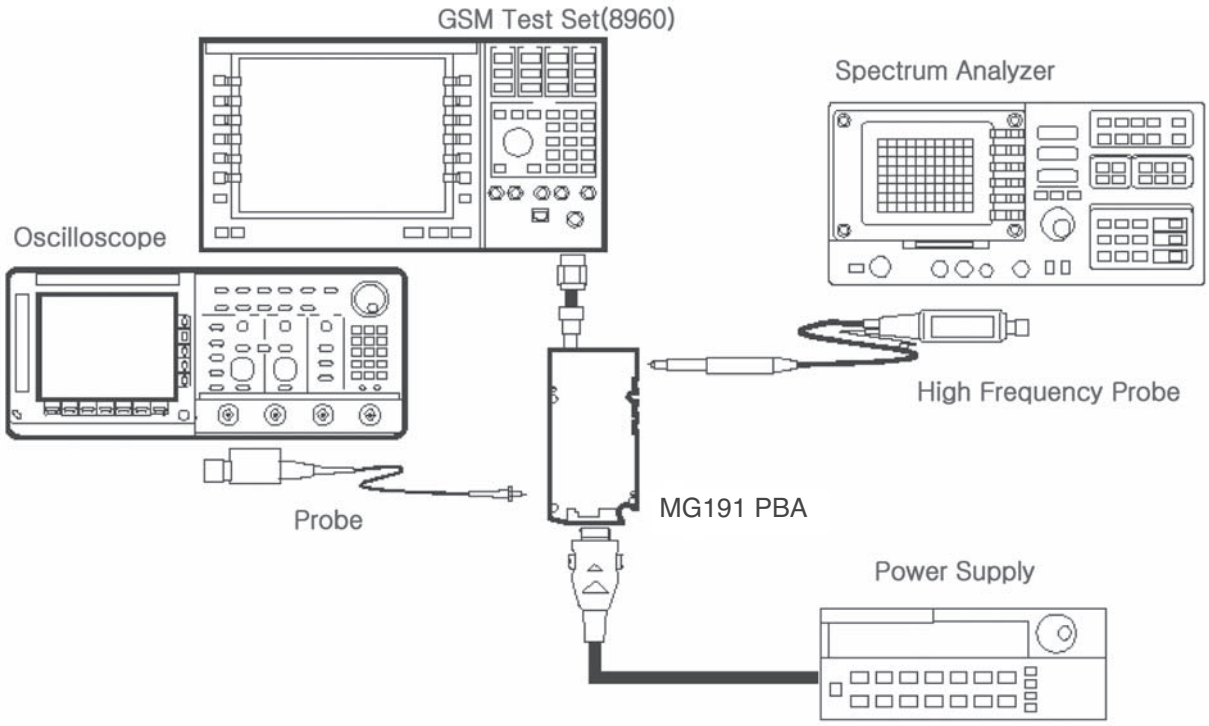
A. What is Standalone Test?

• What's the Standalone Test?

• Set the Phone to Perform only Tx or Rx mode



B. Standalone Test Equipment Setup



C. Rx Standalone Test

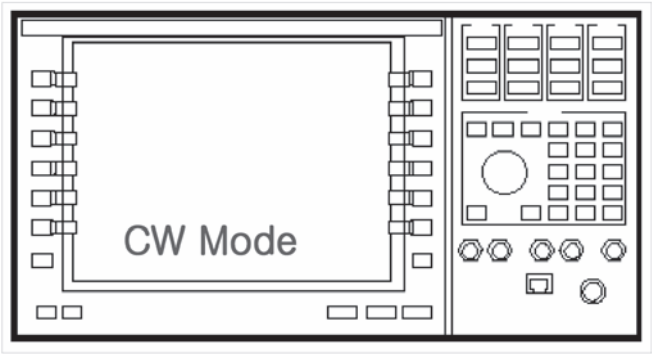
1. Test Equipment Setting

① Set Test equip. to “CW Generator”

② Set RF Frequency

- RX Frequency + 67.7 kHz
- Ex.) GSM 190Ch : 881.6MHz + 67.7KHz = 881.6677MHz

③ Set RF Power –60dBm



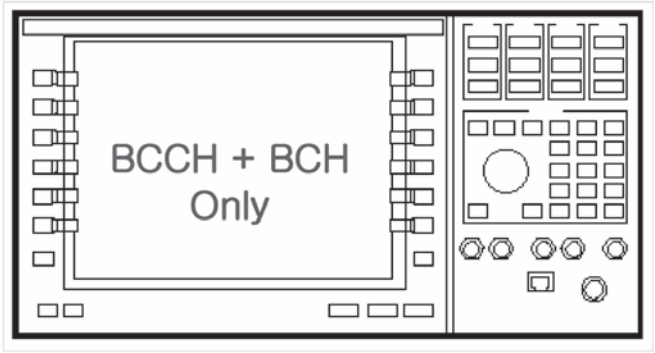
D. Tx Standalone Test

1. Test Equipment Setting

① Set Test equip. to “BCCH + BCH Only”

② Set TCH CH and PWR Level

- You can set any CH and power level that you want to test

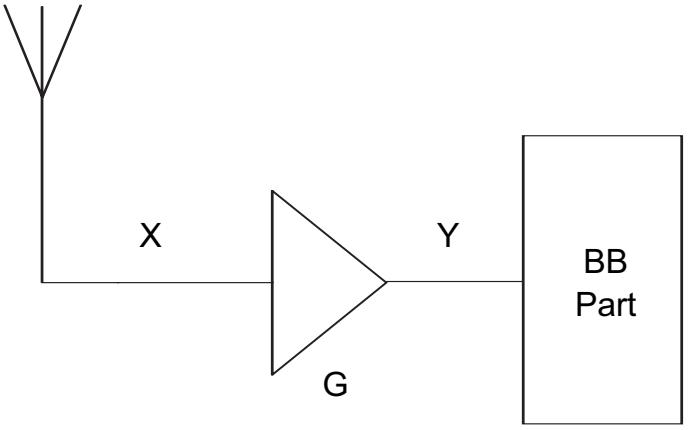


E. What is Calibration?

1. What's the Rx Calibration

① Find proper AGC Gain to make the same Rx Power fed into the Base Band Part regardless of Antenna Input Level

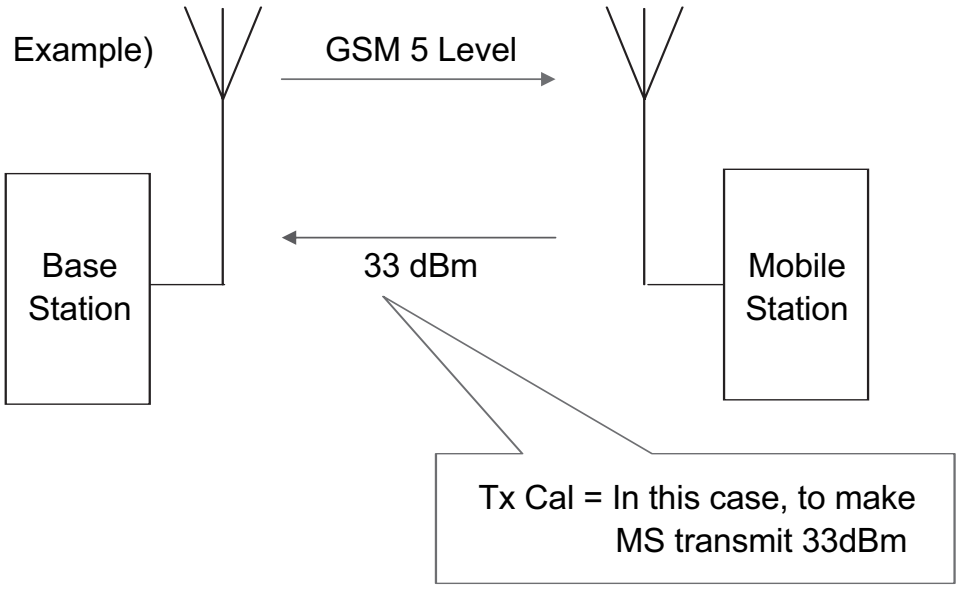
② Can make report correct RSSI level



X(Input Level)+G(Gain)=Y

2. What's the Tx Calibration

① To make Tx Power Level transmitted properly following the information of Base Station



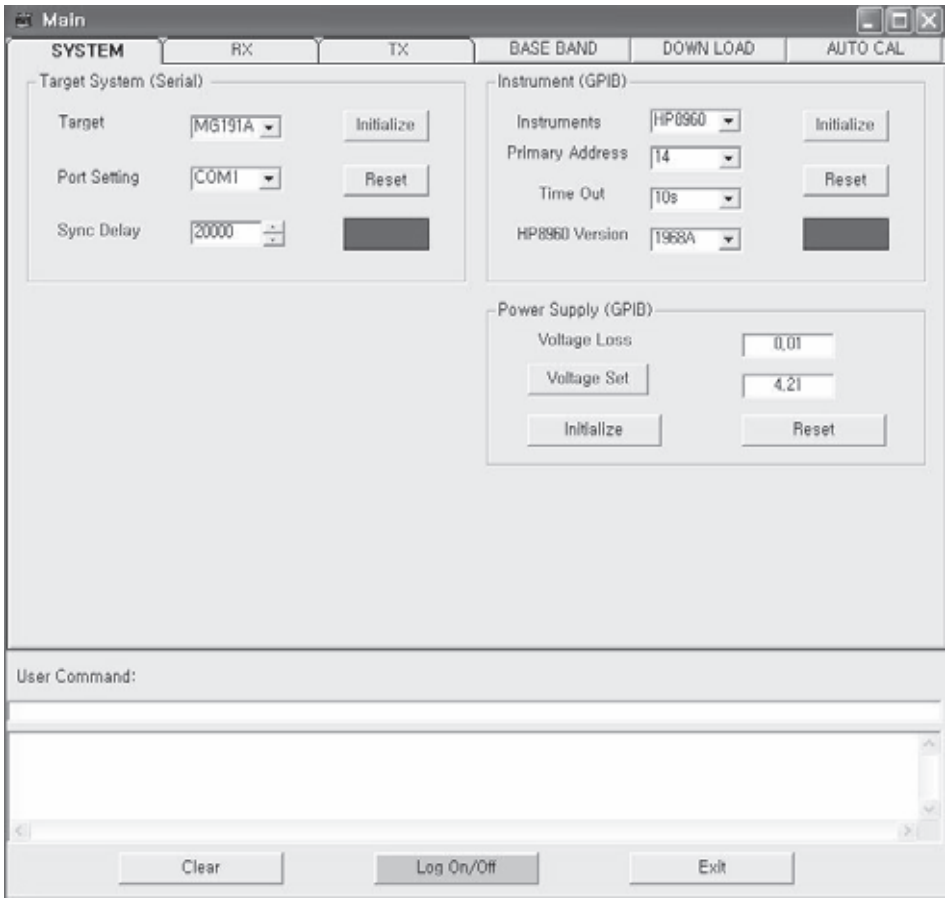
F. Calibration program

1.Calibration program(LAPUTA)

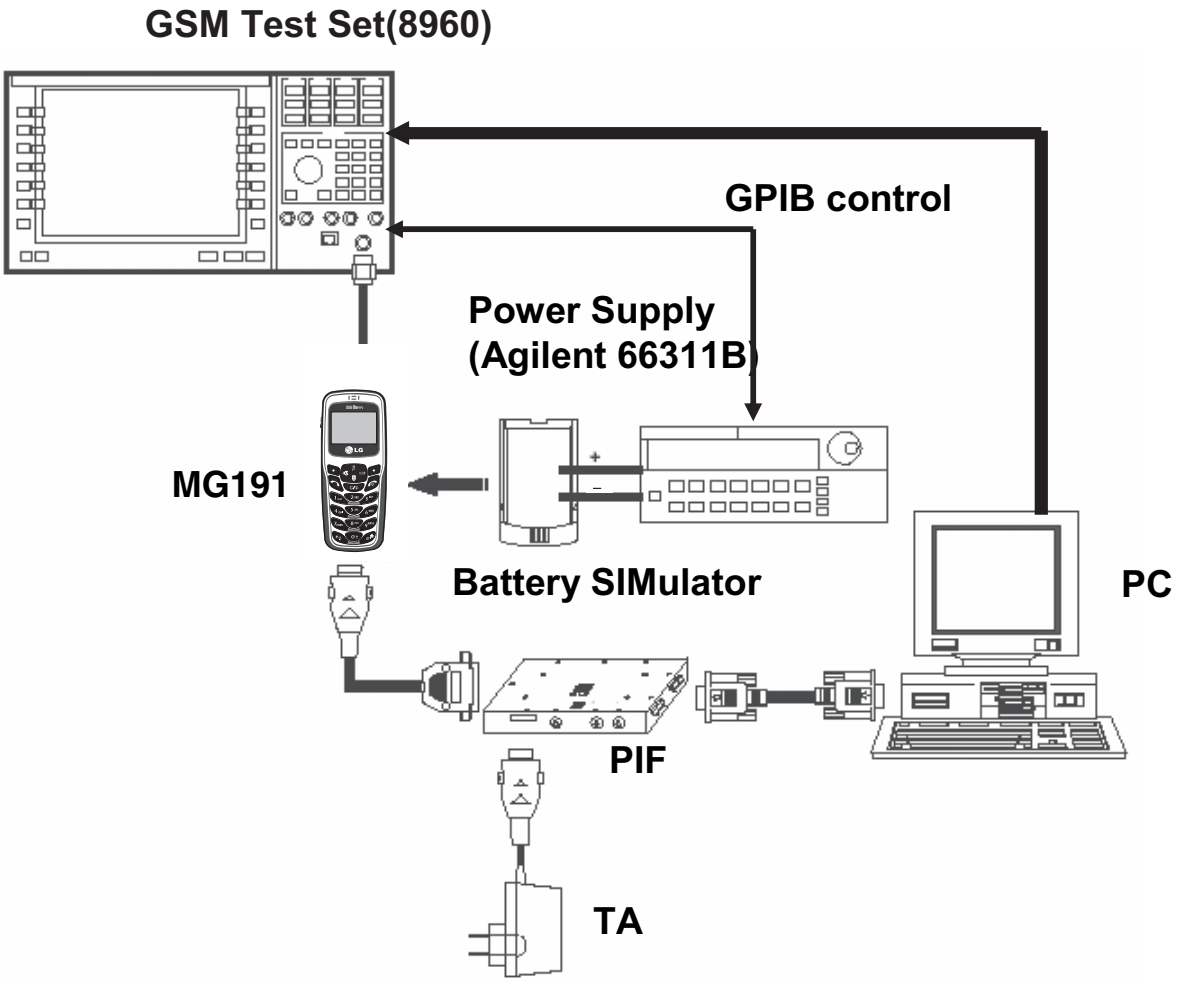
- Under windows 98 or 2k
- Not support win xp

2.Required Equipments

- Test PC with PCMCIA slot
- GPIB card and cable
- PIF JIG
- E5515C(Agilent 8960 series)
- Power supply



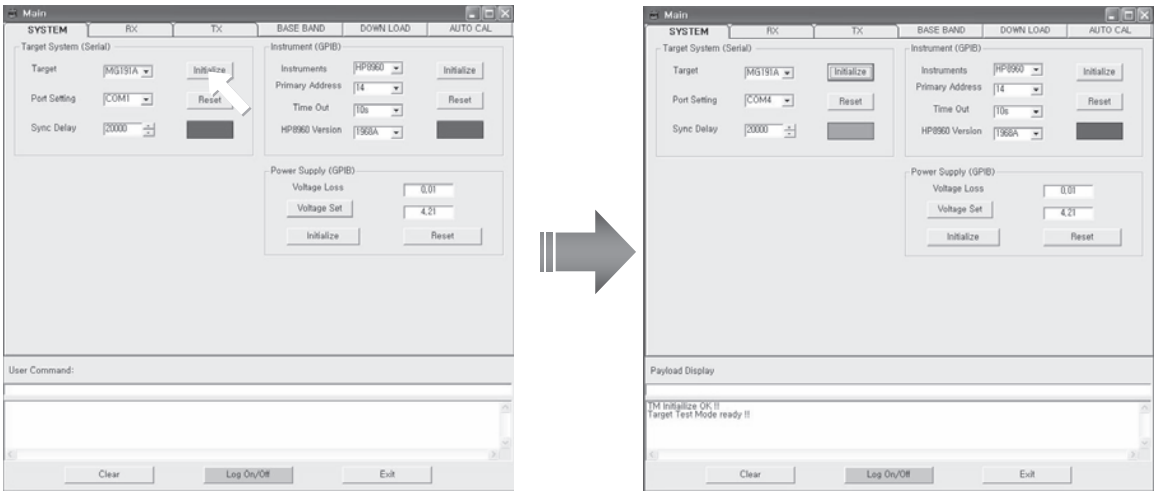
G. Calibration Equipment Setup



H. Calibrate MG191 with LAPUTA

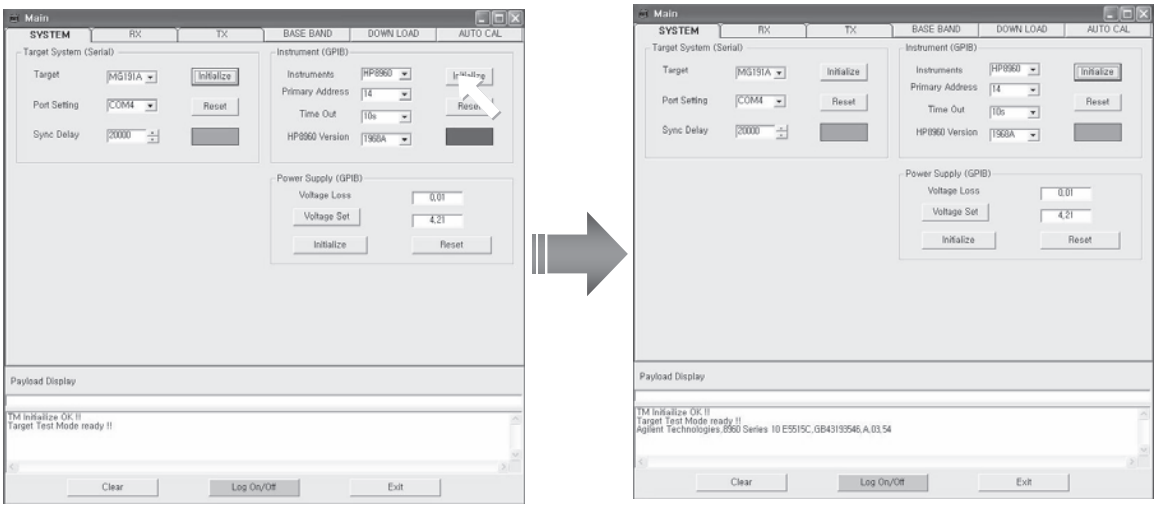
1. Initialize Target

- After connect phone and equipments, click Initialize button
- You can see the green signal after successful initialize



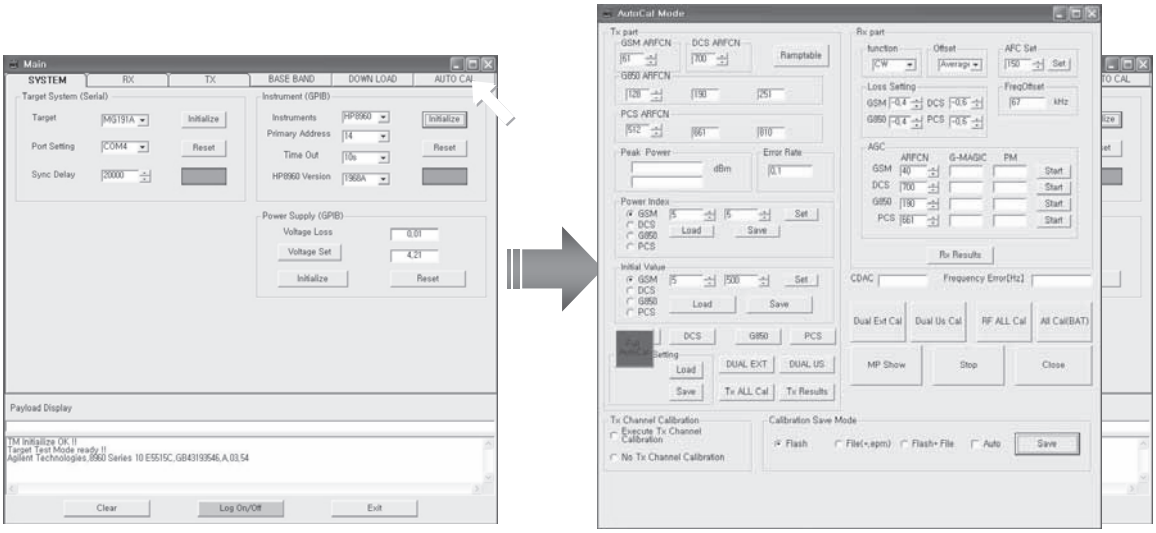
2.Initialize E5515C

- After connect phone and equipments, click Initialize button
- You can see the green signal after successful initialize

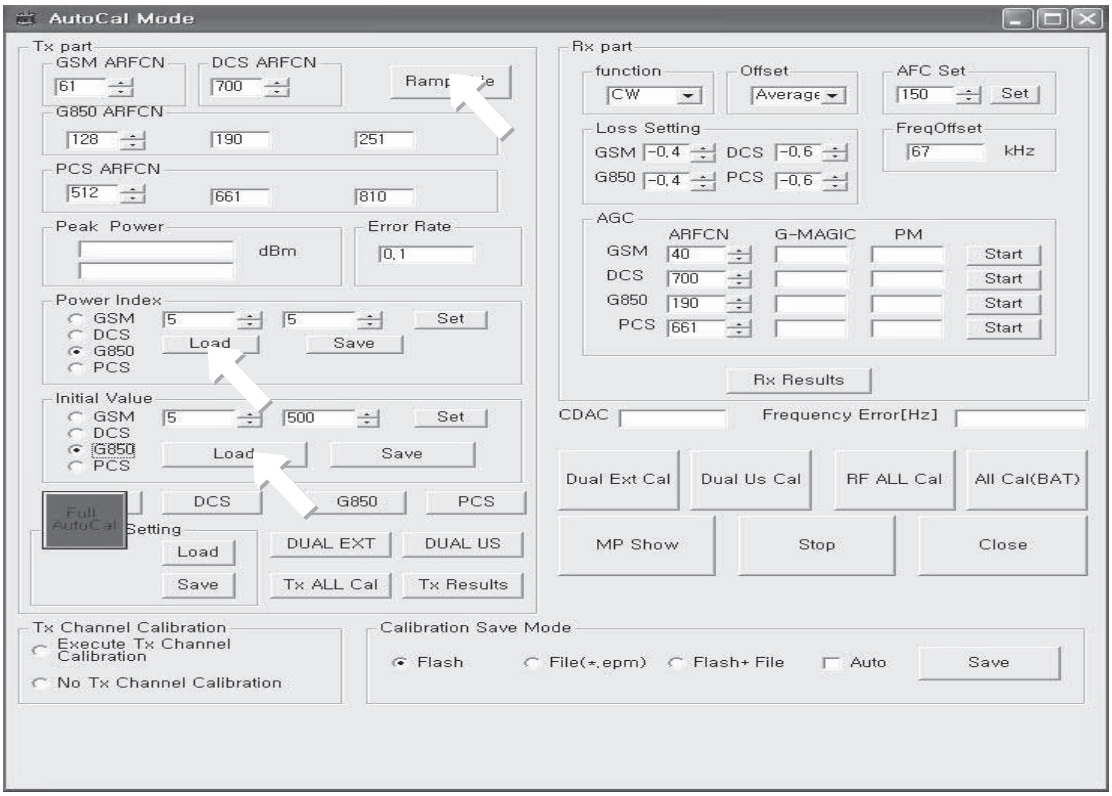


3.AUTO CAL

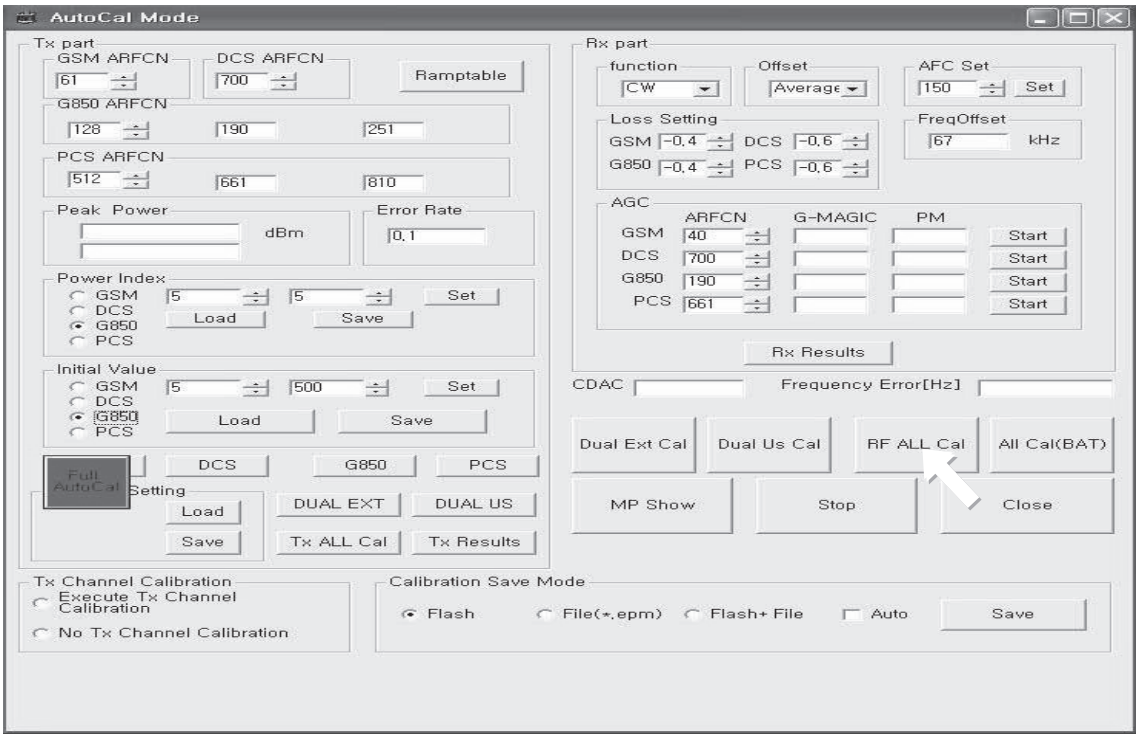
- Click AUTO CAL tab
- Another auto cal window will appeared



- calibration setting files may be loaded
- Power Index file, Initial Value file and Ramp Table



- Click RF CAL button
- Auto cal is started with Rx calibration



- Fig A : Rx calibration is started
- Fig B : Rx calibration is ended

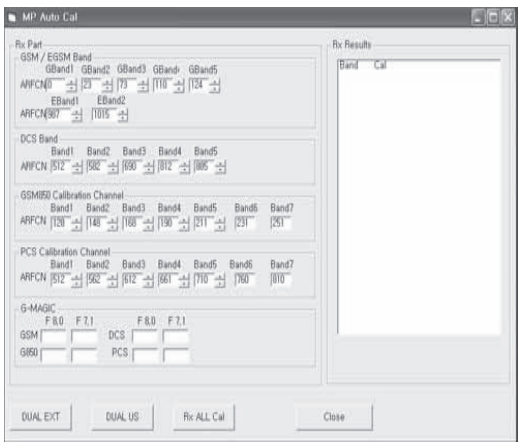


Fig A

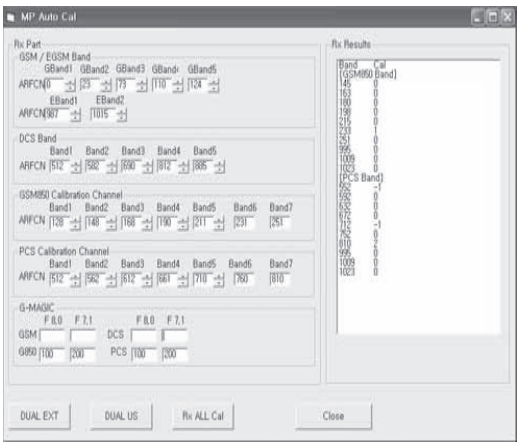


Fig B

• Fig A : Tx calibration is started
• Fig B : Tx calibration is ended

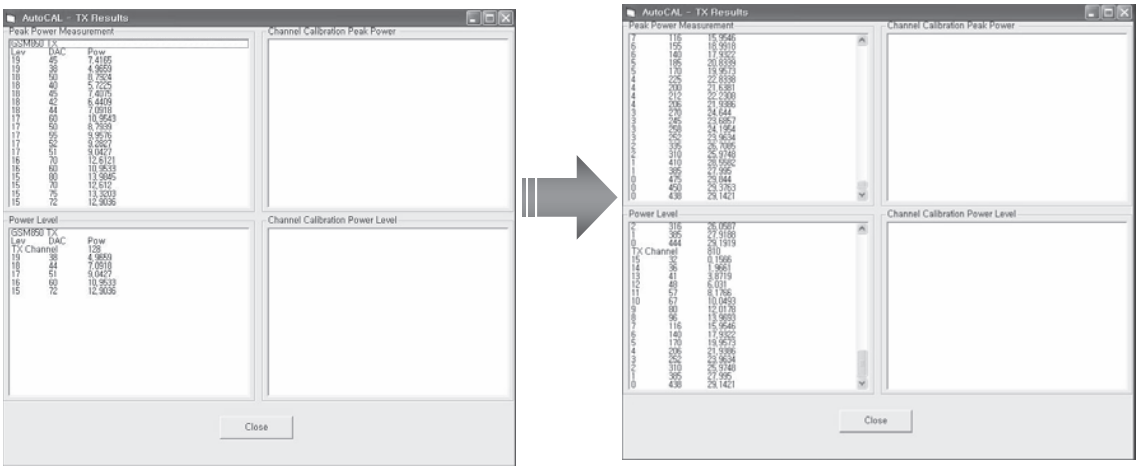


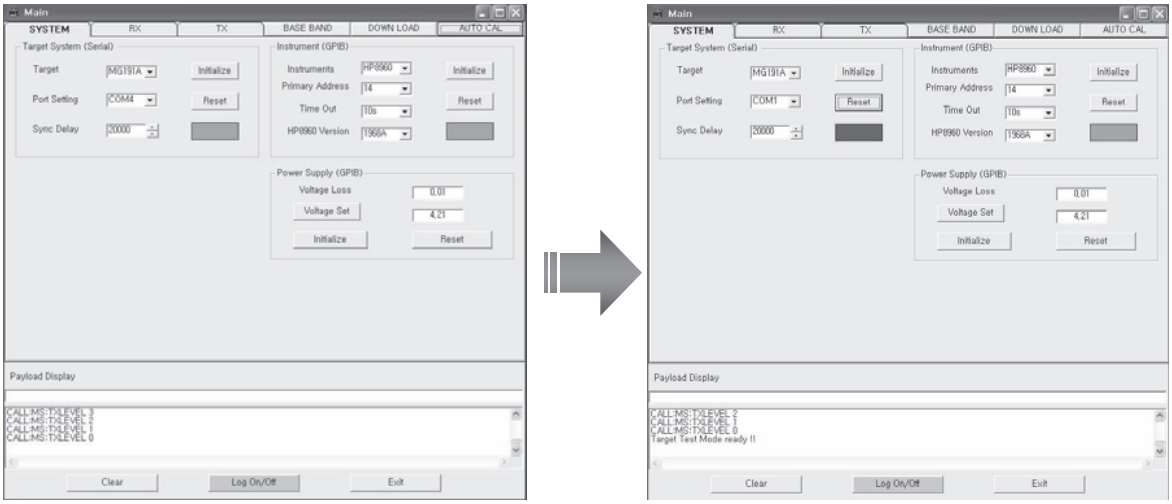
Fig A **Fig B**

4. Saving Cal data to phone

• Click Save button on Auto calibration window

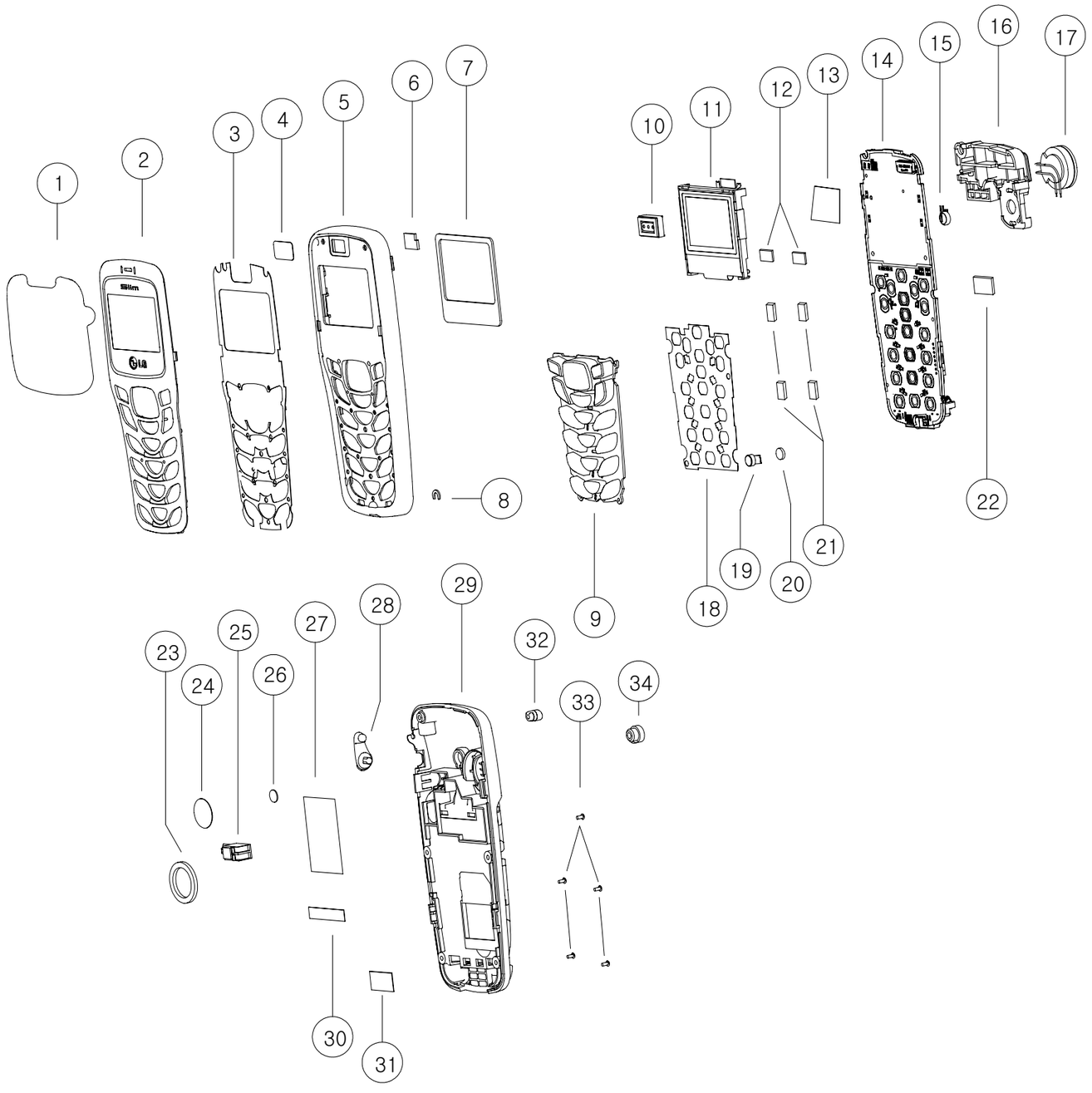
5. Reset Target

- Click reset button on Laputa main window
- The green signal turn to red after reset



10. EXPLODED VIEW REPLACEMENT PART LIST

10.1 EXPLODED VIEW



ITEM	PART NAME	PART NO.	Q"TY	TYPE
34	CAP, MOBILE SWITCH	MCCF0021201	1	PART
33	SCREW, MACHINE BINDER	GMEY0005902	5	PART
35	CAP, SCREW	MCCH0041001	1	PART
31	EMI, TAPE	MTAC0022801	1	PART
30	TAPE, SHIELD	MTAC0020201	1	PART
29	COVER, REAR	MCJN0030601	1	PART
28	CAP, EARPHONE JACK	MCCC0020501	1	PART
27	INSULATOR	MIDZ0055201	1	PART
26	PAD(REAR)	MPBZ0082301	1	PART
25	VIBRATOR	SJMY0007001	1	PART
24	FILTER, SPEAKER	MFBC0012701	1	PART
23	PAD, SPEAKER	MPBN0015701	1	PART
22	PAD(INTENNA)	MPBZ0076001	1	PART
21	GASKET, SHIELD FORM	MGAD0074501	4	PART
20	PAD, MIC	MPBH0012201	1	PART
19	MIC	SUMY0003802	1	PART
18	DOME, ASSY METAL	ADCA0028001	1	ASSMBLY
17	SPEAKER	SUSY0006201	1	PART
16	INTENNA	SNGF0006501	1	ASSMBLY
15	BACK-UP, BATTERY	SBCL0001001	1	PART
14	PCB, MAIN ASSY	SAFY0122501	1	ASSMBLY
13	TAPE(PCB)	MTAZ0066201	1	PART
12	TAPE(LCD)	MTAZ0052101	2	PART
11	LCD, MODULE	SVLY0025601	1	ASSMBLY
10	RECEIVER	SURY0005603	1	PART
9	BUTTON, DIAL	MBJA0016102	1	PART
8	FILTER, MIC	MFBD0007801	1	PART
7	PAD, LCD	MPBG0029101	1	PART
6	PAD	MPBZ0070601	1	PART
5	COVER, FRONT	MCJK0034301	1	PART
4	FILTER, RECEIVER	MFBB0008401	1	PART
3	TAPE, WINDOW LCD	MTAD0031401	1	PART
2	WINDOW, LCD	MWAC0047301	1	PART
1	TAPE, PROTECTION	MTAB0056801	1	PART

10.2. Replacement Parts

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

<Machanic Component>

Level	Location No.	Description	Part Number	Specification	Color	Remark
1		GSM,BAR/FILP	TGSM0030602		White	
2	AAAY00	ADDITION	AAAY0064101		White	
3	MCJA00	COVER,BATTERY	MCJA0014501		White	
2	APEY	PHONE	APEY0179318		White	
3	ACGK	COVER ASSY,FRONT	ACGK0045401		White	
4	AWAB	WINDOW ASSY,LCD	AWAB0016401		White	
5	BFAA	FILM,INMOLD	BFAA0028301	MG191a W/A	White	
5	MWAC00	WINDOW,LCD	MWAC0047301		White	2
4	MCJK00	COVER,FRONT	MCJK0034301		White	5
5	MICZ00	INSERT	MICZ0016101		Orange	
4	MFBB00	FILTER,RECEIVER	MFBB0008401			4
4	MFBD00	FILTER,MIKE	MFBD0007801			8
4	MGAD00	GASKET,SHIELD FORM	MGAD0074501			21
4	MPBG00	PAD,LCD	MPBG0029101			7
4	MPBZ00	PAD	MPBZ0070601			6
4	MTAB	TAPE,PROTECTION	MTAB0056801			1
4	MTAD00	TAPE,WINDOW	MTAD0031401			3
3	ACGM	COVER ASSY,RREAR	ACGM0045001		White	
4	MCCC00	CAP,EARPHONE JACK	MCCC0020501		White	28
4	MCJN00	COVER,REAR	MCJN0030601		White	29
4	MFBC00	FILTR,SPEAKER	MFBC0012701			24
4	MIDZ00	INSULATOR	MIDZ0055201			27
4	MPBN00	PAD,SPEAKER	MPBN0015701			23
4	MPBZ00	PAD	MPBZ0082301			
4	MTAC00	TAPE,SHIELD	MTAC0020201			30
4	MTAC01	TAPE,SHIELD	MTAC0022801			31
4	SJMY00	VIBRATOR,MOTOR	SJMY0007001	3 V,0.085 A,4*12.5 ,6.6T ,L3100,SILINDER		25
3	GMEY00	SCREW MACHINE,BIND	GMEY0005902	M1.4, 3.5mm,Black,+,HEAD D=2.7mm,epoxy coated		33
3	MBJA	BUTTON,DIAL	MBJA0016102		silver	9
3	MCCF	CAP,MOBILE SWITCH	MCCF0021201		White	34
3	MCCH	CAP,SCREW	MCCH0041001		White	32
3	MLAK00	LABEL,MODEL	MLAK0010801	G1500S MODEL LABEL		
5	MPBH00	PAD,MIKE	MPBH0012201			20

Level	Location No.	Description	Part Number	Specification	Color	Remark
5	MPBZ00	PAD	MPBZ0076001			22
5	MTAZ00	TAPE	MTAZ0057501			
5	MTAZ01	TAPE	MTAZ0066201			13

10.2. Replacement Parts

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

<Main component>

Level	Location No.	Description	Part Number	Specification	Color	Remark
3	SAFY	PCB ASSY,MAIN	SAFY0122503			14
4	SAFB	PCB ASSY,MAIN,INSERT	SAFB0038901	120x64 MONO LCD, 64x32 Memory, 40 Poly MIDI		
5	ADCA00	DOME ASSY,METAL	ADCA0028001			18
5	BAT100	BATTERY,CELL,LITHIUM	SBCL0001001	3 V,1.2 mAh,COIN ,MATUESHITA Backup BATTERY (ML414NB/F9D)		15
5	CN202	RECEIVER	SURY0005603	ASSY ,106 dB,32 ohm,1107*4.0 ,		10
5	MIC200	MICROPHONE	SUMY0003802	FPCB ,-42 dB,4*1.5 ,		
5	SNGF00	ANTENNA,GSM,FIXED	SNGF0006501	3.0 ,-2.0 dBd, ,GSM850+PCS, Intenna		16
5	SUSY00	SPEAKER	SUSY0006201	ASSY ,8 ohm,86 dB,15 mm,G5200 SPEAKER		17
5	SVLY00	LCD	SVLY0025601	MAIN ,120*64 ,33.61*31.58*3.0(t) ,NONE ,4-Gray ,TF ,ST7565P ,Bar Type		11
4	SAFF	PCB ASSY,MAIN,SMT	SAFF0050104			
5	SAFC	PCB ASSY,MAIN,SMT BOTTOM	SAFC0045901	120x62 MONO LCD, 64x32 Memory, 40Poli MIDI		
6	C100	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C101	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C102	CAP,CERAMIC,CHIP	ECCH0005801	2.2 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C103	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C104	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C105	CAP,CERAMIC,CHIP	ECCH0005801	2.2 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C106	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C107	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C108	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C109	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C110	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C111	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C112	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C113	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C114	CAP,CERAMIC,CHIP	ECCH0000114	20 pF,50V,J,NP0,TC,1005,R/TP		
6	C115	CAP,CERAMIC,CHIP	ECCH0000114	20 pF,50V,J,NP0,TC,1005,R/TP		
6	C116	CAP,CERAMIC,CHIP	ECCH0000110	10 pF,50V,D,NP0,TC,1005,R/TP		
6	C117	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C118	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C119	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C120	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		

10. EXPLOED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	C121	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C123	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C125	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C126	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C127	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C128	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C200	CAP,CERAMIC,CHIP	ECCH0005801	2.2 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C202	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C203	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C204	CAP,CERAMIC,CHIP	ECCH0000131	180 pF,50V,J,SL,TC,1005,R/TP		
6	C205	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C206	CAP,CERAMIC,CHIP	ECCH0000129	120 pF,50V,J,NP0,TC,1005,R/TP		
6	C207	CAP,CERAMIC,CHIP	ECCH0000117	27 pF,50V,J,NP0,TC,1005,R/TP		
6	C209	CAP,CERAMIC,CHIP	ECCH0000163	47 nF,10V,K,X5R,HD,1005,R/TP		
6	C211	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C214	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C217	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
6	C218	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C223	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C225	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C226	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C228	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C229	CAP,CERAMIC,CHIP	ECCH0000117	27 pF,50V,J,NP0,TC,1005,R/TP		
6	C230	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C235	CAP,CERAMIC,CHIP	ECCH0000109	8 pF,50V,D,NP0,TC,1005,R/TP		
6	C300	CAP,CERAMIC,CHIP	ECCH0000272	0.1 uF,25V,Z,Y5V,HD,1608,R/TP		
6	C306	CAP,CERAMIC,CHIP	ECCH0000272	0.1 uF,25V,Z,Y5V,HD,1608,R/TP		
6	C309	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C314	CAP,CERAMIC,CHIP	ECCH0007701	1 uF,10V ,K ,X5R ,TC ,1608 ,R/TP		
6	C315	CAP,CERAMIC,CHIP	ECCH0000279	0.47 uF,10V ,Z ,Y5V ,HD ,1608 ,R/TP		
6	C317	CAP,CERAMIC,CHIP	ECCH0007701	1 uF,10V ,K ,X5R ,TC ,1608 ,R/TP		
6	C318	CAP,CERAMIC,CHIP	ECCH0000279	0.47 uF,10V ,Z ,Y5V ,HD ,1608 ,R/TP		
6	C319	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C320	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C321	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C322	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C323	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	C324	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C325	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C326	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C327	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C328	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C329	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C330	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C400	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C401	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C402	CAP,CERAMIC,CHIP	ECCH0000182	0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP		
6	C403	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C404	CAP,CERAMIC,CHIP	ECCH0000128	100 pF,50V,J,NP0,TC,1005,R/TP		
6	C405	CAP,CERAMIC,CHIP	ECCH0000159	22 nF,16V,K,X7R,HD,1005,R/TP		
6	C406	CAP,CERAMIC,CHIP	ECCH0000115	22 pF,50V,J,NP0,TC,1005,R/TP		
6	C409	CAP,TANTAL,CHIP,MAKER	ECTZ0003901	10 uF,16V ,M ,STD ,ETC ,R/TP		
6	C410	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C412	CAP,CERAMIC,CHIP	ECCH0000182	0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP		
6	C430	CAP,CERAMIC,CHIP	ECCH0000135	270 pF,50V ,K ,X7R ,HD ,1005 ,R/TP		
6	C500	CAP,CERAMIC,CHIP	ECCH0000182	0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP		
6	C502	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C504	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
6	C507	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C509	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
6	C510	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
6	C511	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V,K,X7R,HD,1005,R/TP		
6	C512	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C513	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C514	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C515	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
6	C516	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C517	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
6	C518	CAP,CERAMIC,CHIP	ECCH0000167	0.1 uF,6.3V,K,X5R,HD,1005,R/TP		
6	C519	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
6	C520	CAP,CERAMIC,CHIP	ECCH0000143	1 nF,50V,K,X7R,HD,1005,R/TP		
6	C523	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
6	C528	CAP,CERAMIC,CHIP	ECCH0000182	0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP		
6	C531	CAP,CERAMIC,CHIP	ECCH0000128	100 pF,50V,J,NP0,TC,1005,R/TP		

10. EXPLOED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	C533	CAP,CERAMIC,CHIP	ECCH0000182	0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP		
6	C534	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
6	C536	CAP,CERAMIC,CHIP	ECCH0000128	100 pF,50V,J,NP0,TC,1005,R/TP		
6	C539	CAP,CERAMIC,CHIP	ECCH0000128	100 pF,50V,J,NP0,TC,1005,R/TP		
6	C540	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
6	C542	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
6	C544	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V,K,X7R,HD,1005,R/TP		
6	C546	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
6	C547	CAP,CERAMIC,CHIP	ECCH0000128	100 pF,50V,J,NP0,TC,1005,R/TP		
6	C548	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V,K,X7R,HD,1005,R/TP		
6	C549	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V,K,X7R,HD,1005,R/TP		
6	C550	CAP,CERAMIC,CHIP	ECCH0000128	100 pF,50V,J,NP0,TC,1005,R/TP		
6	C551	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
6	C552	CAP,CERAMIC,CHIP	ECCH0000137	330 pF,50V ,K ,X7R ,HD ,1005 ,R/TP		
6	C554	CAP,CERAMIC,CHIP	ECCH0000128	100 pF,50V,J,NP0,TC,1005,R/TP		
6	C556	CAP,CERAMIC,CHIP	ECCH0000137	330 pF,50V ,K ,X7R ,HD ,1005 ,R/TP		
6	C557	CAP,CERAMIC,CHIP	ECCH0000111	12 pF,50V,J,NP0,TC,1005,R/TP		
6	C558	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
6	C559	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V,K,X7R,HD,1005,R/TP		
6	C560	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C561	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
6	C562	CAP,CERAMIC,CHIP	ECCH0004904	1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP		
6	C565	CAP,TANTAL,CHIP,MAKER	ECTZ0000318	33 uF,10V ,M ,STD ,3216 ,R/TP		
6	C566	CAP,CERAMIC,CHIP	ECCH0000155	10 nF,16V,K,X7R,HD,1005,R/TP		
6	C568	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C569	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C570	CAP,CERAMIC,CHIP	ECCH0000115	22 pF,50V,J,NP0,TC,1005,R/TP		
6	C571	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	CN401	CONNECTOR,I/O	ENRY0003501	24 PIN,0.5 mm,ANGLE , ,		
6	D300	DIODE,SWITCHING	EDSY0005301	SC-70 ,80 V,0.1 A,R/TP ,		
6	D400	DIODE,SWITCHING	EDSY0012101	US-FLAT ,30 V,1 A,R/TP ,2.5*1.25*0.6(t)		
6	FB100	FILTER,BEAD,CHIP	SFBH0007102	10 ohm,1005 ,Ferrite Bead		
6	FB400	FILTER,BEAD,CHIP	SFBH0007102	10 ohm,1005 ,Ferrite Bead		
6	FB401	FILTER,BEAD,CHIP	SFBH0007102	10 ohm,1005 ,Ferrite Bead		
6	FL500	FILTER,SAW	SFSY0020601	850 MHz,2.0*1.4*0.68 ,SMD ,		
6	FL501	FILTER,SAW	SFSY0017203	1960 MHz,2.0*1.4*0.68 ,SMD ,		
6	FL502	FILTER,SEPERATOR	SFAY0003701	850 ,1900 ,1.4 dB,1.4 dB,30 dB,25 dB,4532 ,		

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	J200	CONN,JACK/PLUG, EARPHONE	ENJE0002301	3,5 PIN,G7000 EAR JACK 3 pole, 5 pin KSD		
6	J400	CONN,SOCKET	ENSY0007609	6 PIN,ETC ,BRIDGE NON PROTECTOR ,2.54 mm,HEIGHT 2.5T		
6	L200	INDUCTOR,CHIP	ELCH0005009	100 nH,J ,1005 ,R/TP ,		
6	L500	INDUCTOR,CHIP	ELCH0001413	22 nH,J ,1005 ,R/TP ,		
6	L502	INDUCTOR,CHIP	ELCH0001408	6.8 nH,J ,1005 ,R/TP ,		
6	L503	INDUCTOR,CHIP	ELCH0001408	6.8 nH,J ,1005 ,R/TP ,		
6	L504	INDUCTOR,CHIP	ELCH0001402	18 nH,J,1005,R/TP		
6	L508	INDUCTOR,CHIP	ELCH0001420	3.9 nH,S ,1005 ,R/TP ,		
6	L509	INDUCTOR,CHIP	ELCH0001420	3.9 nH,S ,1005 ,R/TP ,		
6	L510	INDUCTOR,CHIP	ELCH0001406	4.7 nH,S ,1005 ,R/TP ,		
6	L511	INDUCTOR,CHIP	ELCH0001406	4.7 nH,S ,1005 ,R/TP ,		
6	L513	INDUCTOR,CHIP	ELCH0001420	3.9 nH,S ,1005 ,R/TP ,		
6	L515	RES,CHIP	ERHY0000201	0 ohm,1/16W,J,1005,R/TP		
6	Q300	TR,BJT,ARRAY	EQBA0002701	EMT6 ,150 mW,R/TP ,NPN, PNP, 150 mA		
6	Q400	TR,FET,P-CHANNEL	EQFP0003301	SOT-6 ,1.6 W,30 V,2.4 A,R/TP ,use for charge P-CHANNEL FET		
6	R100	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R101	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R102	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R103	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R104	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R105	RES,CHIP	ERHY0000280	100K ohm,1/16W,J,1005,R/TP		
6	R106	RES,CHIP	ERHY0000280	100K ohm,1/16W,J,1005,R/TP		
6	R107	RES,CHIP	ERHY0000287	220K ohm,1/16W,J,1005,R/TP		
6	R108	RES,CHIP	ERHY0000280	100K ohm,1/16W,J,1005,R/TP		
6	R109	RES,CHIP	ERHY0000153	100K ohm,1/16W,F,1005,R/TP		
6	R110	RES,CHIP	ERHY0000153	100K ohm,1/16W,F,1005,R/TP		
6	R111	RES,CHIP	ERHY0000273	47K ohm,1/16W,J,1005,R/TP		
6	R112	RES,CHIP	ERHY0000201	0 ohm,1/16W,J,1005,R/TP		
6	R200	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R202	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R204	RES,CHIP	ERHY0000241	1K ohm,1/16W,J,1005,R/TP		
6	R205	RES,CHIP	ERHY0000278	82K ohm,1/16W,J,1005,R/TP		
6	R208	RES,CHIP	ERHY0000202	4.7 ohm,1/16W,J,1005,R/TP		
6	R210	RES,CHIP	ERHY0000255	5.6K ohm,1/16W,J,1005,R/TP		
6	R211	RES,CHIP	ERHY0000273	47K ohm,1/16W,J,1005,R/TP		

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	R212	RES,CHIP	ERHY0000265	20K ohm,1/16W,J,1005,R/TP		
6	R213	RES,CHIP	ERHY0000268	27K ohm,1/16W,J,1005,R/TP		
6	R214	RES,CHIP	ERHY0000265	20K ohm,1/16W,J,1005,R/TP		
6	R216	RES,CHIP	ERHY0000250	3.3K ohm,1/16W,J,1005,R/TP		
6	R217	RES,CHIP	ERHY0000203	10 ohm,1/16W,J,1005,R/TP		
6	R221	RES,CHIP	ERHY0000201	0 ohm,1/16W,J,1005,R/TP		
6	R222	RES,CHIP	ERHY0000207	20 ohm,1/16W,J,1005,R/TP		
6	R300	RES,CHIP	ERHY0000273	47K ohm,1/16W,J,1005,R/TP		
6	R301	RES,CHIP	ERHY0000241	1K ohm,1/16W,J,1005,R/TP		
6	R302	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R305	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R306	RES,CHIP	ERHY0008202	62 ohm,1/16W ,J ,1005 ,R/TP		
6	R307	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R308	RES,CHIP	ERHY0008202	62 ohm,1/16W ,J ,1005 ,R/TP		
6	R313	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R314	RES,CHIP	ERHY0000203	10 ohm,1/16W,J,1005,R/TP		
6	R317	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R322	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R326	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R330	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R331	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R333	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R334	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R336	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R337	RES,CHIP	ERHY0000201	0 ohm,1/16W,J,1005,R/TP		
6	R338	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R343	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R346	RES,CHIP	ERHY0000187	6.8 Kohm,1/16W ,F ,1005 ,R/TP		
6	R347	RES,CHIP	ERHY0000203	10 ohm,1/16W,J,1005,R/TP		
6	R348	RES,CHIP	ERHY0000225	200 ohm,1/16W,J,1005,R/TP		
6	R400	RES,CHIP	ERHY0000280	100K ohm,1/16W,J,1005,R/TP		
6	R401	RES,CHIP	ERHY0000205	15 ohm,1/16W,J,1005,R/TP		
6	R404	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R406	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R408	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R409	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R411	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	R412	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R413	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R414	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R415	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R416	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R417	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R418	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R419	RES,CHIP	ERHY0000241	1K ohm,1/16W,J,1005,R/TP		
6	R420	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R421	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R422	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R423	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R424	RES,CHIP	ERHY0000213	47 ohm,1/16W,J,1005,R/TP		
6	R425	RES,CHIP	ERHY0001102	0.2 ohm,1/4W ,F ,2012 ,R/TP		
6	R426	RES,CHIP	ERHY0000271	39K ohm,1/16W,J,1005,R/TP		
6	R427	RES,CHIP	ERHY0000265	20K ohm,1/16W,J,1005,R/TP		
6	R500	THERMISTOR	SETY0001201	NTC ,22000 ohm,SMD ,1005, ECTH 1005 Series		
6	R501	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R502	RES,CHIP	ERHY0000208	22 ohm,1/16W,J,1005,R/TP		
6	R503	RES,CHIP	ERHY0000208	22 ohm,1/16W,J,1005,R/TP		
6	R504	RES,CHIP	ERHY0000261	10K ohm,1/16W,J,1005,R/TP		
6	R508	RES,CHIP	ERHY0011601	11 Kohm,1/16W ,F ,1005 ,R/TP		
6	R509	RES,CHIP	ERHY0000258	7.5K ohm,1/16W,J,1005,R/TP		
6	R510	RES,CHIP	ERHY0000107	220 ohm,1/16W,F,1005,R/TP		
6	R511	RES,CHIP	ERHY0000289	270K ohm,1/16W,J,1005,R/TP		
6	R512	RES,CHIP	ERHY0000237	680 ohm,1/16W,J,1005,R/TP		
6	R513	RES,CHIP	ERHY0000107	220 ohm,1/16W,F,1005,R/TP		
6	R514	RES,CHIP	ERHY0000105	51 ohm,1/16W,F,1005,R/TP		
6	R515	RES,CHIP	ERHY0000107	220 ohm,1/16W,F,1005,R/TP		
6	R516	RES,CHIP	ERHY0000185	820 ohm,1/16W ,F ,1005 ,R/TP		
6	R517	RES,CHIP	ERHY0000107	220 ohm,1/16W,F,1005,R/TP		
6	R518	RES,CHIP	ERHY0000185	820 ohm,1/16W ,F ,1005 ,R/TP		
6	R520	RES,CHIP	ERHY0000185	820 ohm,1/16W ,F ,1005 ,R/TP		
6	R521	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R522	RES,CHIP	ERHY0000185	820 ohm,1/16W ,F ,1005 ,R/TP		
6	R523	RES,CHIP	ERHY0000201	0 ohm,1/16W,J,1005,R/TP		
6	SW500	CONN,RF SWITCH	ENWY0003001	STRAIGHT ,SMD ,0.6 dB,3.8X3.0X3.6T		

10. EXPLOED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	U100	IC	EUSY0243001	BGA ,100 PIN,R/TP ,ABB(IOTA Shrink)		
6	U101	IC	EUSY0251801	BGA ,179 PIN,R/TP ,Calypso Lite DBB		
6	U200	IC	EUSY0111601	32-PIN QFN ,32 PIN,R/TP ,MA-3 / 40 TONES / FM + WAVEFORM TABLE		
6	U300	IC	EUSY0224601	QFN ,16 PIN,R/TP ,WHITE LED CHARGE PUMP		
6	U400	IC	EUSY0256101	BGA ,73 PIN,R/TP ,64NOR+32PS(tweh=6ns) ,73 BGA		
6	U500	IC	EUSY0100502	8-LEAD US8 ,8 PIN,R/TP ,UHS DUAL 2-INPUT AND GATE		
6	U501	PAM	SMPY0006401	35 dBm,55 %,0.8 A,-50 dBc,50 dB,7*7*0.9 ,SMD ,		
6	U502	IC	EUSY0173001	QFN ,48 PIN,R/TP ,RF CHIP		
6	VA100	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA101	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA204	RES,VARIABLE,ETC	ERVZ0000101	ohm, PIN, ,SMD ,R/TP ,1005 SIZE CHIP VARISTOR		
6	VA205	RES,VARIABLE,ETC	ERVZ0000101	ohm, PIN, ,SMD ,R/TP ,1005 SIZE CHIP VARISTOR		
6	VA206	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA207	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA208	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA300	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA301	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA302	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA303	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA304	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA305	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA306	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA307	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA309	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA310	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA311	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA312	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA400	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA401	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA402	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA403	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA404	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA405	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA406	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA407	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA408	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	VA409	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA410	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA411	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA412	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA413	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA414	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA415	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA416	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA417	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA418	VARISTOR	SEVY0001001	14 V, ,SMD ,50pF, 1005		
6	VA420	RES,VARIABLE,ETC	ERVZ0000101	ohm, PIN, ,SMD ,R/TP ,1005 SIZE CHIP VARISTOR		
6	X100	X-TAL	EXXY0015601	.032768 MHz,20 PPM,7 pF,65000 ohm,SMD , 6.9*1.4*1.3		
6	X500	VCTCXO	EXSK0005002	26 MHz,1 PPM,10 pF,SMD ,3.2*2.5*1.1 ,		
5	SAFD	PCPCB ASSY,MAIN,SMT TOP	SAFD0044501	120x62 MONO LCD, 64x32 Memory, 40Poli MIDI		
6	C201	CAP,CERAMIC,CHIP	ECCH0006201	4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP		
6	C208	CAP,CERAMIC,CHIP	ECCH0001811	220000 pF,10V ,Z ,Y5V ,HD ,1005 ,R/TP		
6	C210	CAP,CERAMIC,CHIP	ECCH0000113	18 pF,50V,J,NP0,TC,1005,R/TP		
6	C212	CAP,CERAMIC,CHIP	ECCH0000113	18 pF,50V,J,NP0,TC,1005,R/TP		
6	C213	CAP,CERAMIC,CHIP	ECCH0001811	220000 pF,10V ,Z ,Y5V ,HD ,1005 ,R/TP		
6	C215	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C216	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C219	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C220	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C221	CAP,CERAMIC,CHIP	ECCH0000112	15 pF,50V,J,NP0,TC,1005,R/TP		
6	C222	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C224	CAP,CERAMIC,CHIP	ECCH0000122	47 pF,50V,J,NP0,TC,1005,R/TP		
6	C227	CAP,CERAMIC,CHIP	ECCH0000120	39 pF,50V,J,NP0,TC,1005,R/TP		
6	C301	CAP,CERAMIC,CHIP	ECCH0000276	1 uF,10V,Z,Y5V,HD,1608,R/TP		
6	C302	CAP,CERAMIC,CHIP	ECCH0000272	0.1 uF,25V,Z,Y5V,HD,1608,R/TP		
6	C303	CAP,CERAMIC,CHIP	ECCH0000272	0.1 uF,25V,Z,Y5V,HD,1608,R/TP		
6	C304	CAP,CERAMIC,CHIP	ECCH0000272	0.1 uF,25V,Z,Y5V,HD,1608,R/TP		
6	C305	CAP,CERAMIC,CHIP	ECCH0000276	1 uF,10V,Z,Y5V,HD,1608,R/TP		
6	C307	CAP,CERAMIC,CHIP	ECCH0000272	0.1 uF,25V,Z,Y5V,HD,1608,R/TP		
6	C308	CAP,CERAMIC,CHIP	ECCH0000276	1 uF,10V,Z,Y5V,HD,1608,R/TP		
6	C316	CAP,CERAMIC,CHIP	ECCH0000259	10 nF,50V,K,X7R,HD,1608,R/TP		
6	C411	CAP,CERAMIC,CHIP	ECCH0004903	1 uF,6.3V ,Z ,Y5V ,TC ,1005 ,R/TP		

10. EXPLOED VIEW & REPLACEMENT PART LIST

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	CN300	CONNECTOR,FFC/FPC	ENQY0009001	27 PIN,.3 mm,ETC , ,H=0.9		
6	LD300	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD301	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD302	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD303	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD304	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD305	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD306	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD307	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD308	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD309	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD310	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD311	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD312	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD313	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD314	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	LD315	DIODE,LED,CHIP	EDLH0004502	BLUE ,1608 ,R/TP ,0.35T		
6	R201	RES,CHIP	ERHY0000241	1K ohm,1/16W,J,1005,R/TP		
6	R215	RES,CHIP	ERHY0000248	2.4K ohm,1/16W,J,1005,R/TP		
6	R218	RES,CHIP	ERHY0000241	1K ohm,1/16W,J,1005,R/TP		
6	R219	RES,CHIP	ERHY0000207	20 ohm,1/16W,J,1005,R/TP		
6	R220	RES,CHIP	ERHY0000207	20 ohm,1/16W,J,1005,R/TP		
6	R223	RES,CHIP	ERHY0000214	51 ohm,1/16W,J,1005,R/TP		
6	R224	RES,CHIP	ERHY0000214	51 ohm,1/16W,J,1005,R/TP		
6	R304	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R309	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R312	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R316	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R318	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R319	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R320	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R323	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R324	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R327	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R328	RES,CHIP	ERHY0000220	100 ohm,1/16W,J,1005,R/TP		
6	R329	RES,CHIP	ERHY0000201	0 ohm,1/16W,J,1005,R/TP		
6	R332	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		

Level	Location No.	Description	Part Number	Specification	Color	Remark
6	R339	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R342	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R344	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	R345	RES,CHIP	ERHY0000229	300 ohm,1/16W,J,1005,R/TP		
6	VA200	RES,VARIABLE,ETC	ERVZ0000101	ohm, PIN, ,SMD ,R/TP ,1005 SIZE CHIP VARISTOR		
6	VA201	RES,VARIABLE,ETC	ERVZ0000101	ohm, PIN, ,SMD ,R/TP ,1005 SIZE CHIP VARISTOR		
6	VA202	RES,VARIABLE,ETC	ERVZ0000101	ohm, PIN, ,SMD ,R/TP ,1005 SIZE CHIP VARISTOR		
6	VA203	RES,VARIABLE,ETC	ERVZ0000101	ohm, PIN, ,SMD ,R/TP ,1005 SIZE CHIP VARISTOR		
6	VA308	RES,VARIABLE,ETC	ERVZ0000101	ohm, PIN, ,SMD ,R/TP ,1005 SIZE CHIP VARISTOR		
5	SPFY	PCB,MAIN	SPFY0096901	FR-4 ,1mm,BUILD-UP 6 ,MG191a MAIN PCB		
5	WSYY	SOFTWARE	WSYY0242401	MG191aP40FL-52-V100-334-020 Mar 20 2005+6		
2	MSFC00	STICKER,COLOR	MSFC0000904	STICKER,COLOR(for MG191a TCL_WA)	White	

10.3. Accessory

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

Level	Location No.	Description	Part Number	Specification	Color	Remark
3	SBPL00	BATTERY PACK,LI-ION	SBPL0077901	3.7V,830mAh,1 CELL,PRISMATIC ,FG101 RUSSV423450, Innerpack		
3	SSAD00	ADAPTOR,AC-DC	SSAD0007843	FREE ,50Hz,5.2 V,800 mA,NOM ,		