SAMSUNG

UMTS TELEPHONE
SGH-Z107

SERVICE Manual

UMTS TELEPHONE

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ELECTRONICS

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1. SGH-Z107 Specification

1. GSM General Specification

	GSM900 Phase 1	EGSM 900 Phase 2	DCS1800 Phase 1
Freq. Band[MHz] Uplink/Downlink	890~915 935~960	880~915 925~960	1710~1785 1805~1880
ARFCN range	1~124	0~124 & 975~1023	512~885
Tx/Rx spacing	45MHz	45MHz	95MHz
Mod. Bit rate/ Bit Period	270.833kbps 3.692us	270.833kbps 3.692us	270.833kbps 3.692us
Time Slot Period/Frame Period	576.9us 4.615ms	576.9us 4.615ms	576.9us 4.615ms
Modulation	0.3GMSK	0.3GMSK	0.3GMSK
MS Power	33dBm~13dBm	33dBm~5dBm	30dBm~0dBm
Power Class	5pcl ~ 15pcl	5pcl ~ 19pcl	0pcl ~ 15pcl
Sensitivity	-102dBm	-102dBm	-100dBm
TDMA Mux	8	8	8
Cell Radius	35Km	35Km	2Km

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2. GSM TX power class

TX Power control level	GSM900
5	33±2 dBm
6	31±2 dBm
7	29±2 dBm
8	27±2 dBm
9	25±2 dBm
10	23±2 dBm
11	21±2 dBm
12	19±2 dBm
13	17±2 dBm
14	15±2 dBm
15	13±2 dBm
16	11±3 dBm
17	9±3dBm
18	7±3 dBm
19	5±3 dBm

TX Power control level	DCS1800
0	30±3 dBm
1	28±3 dBm
2	26±3 dBm
3	24±3 dBm
4	22±3 dBm
5	20±3 dBm
6	18±3 dBm
7	16±3 dBm
8	14±3 dBm
9	12±4 dBm
10	10±4 dBm
11	8±4dBm
12	6±4 dBm
13	4±4 dBm
14	2±5 dBm
15	0±5 dBm

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2. SGH-Z107 Circuit Description

1. SGH-Z107 RF Circuit Description

1. Antenna Switch Module (U100)

The antenna switch module allows multiple operating bands and modes to share the same antenna. A common antenna connects to one of five paths: 1) UMTS-2100 Rx/Tx, 2) EGSM-900 Rx, 3) EGSM-900 Tx, 4) DCS-1800 Rx, and 5) DCS-1800 Tx. UMTS operation requires simultaneous reception and transmission.

2. Filter

To convert Electromagnetic Field Wave to Acoustic Wave and then pass the specific frequency band.

- GSM Rx FILTER (F101) → For filtering the frequency band between 925 ~ 960 MHz.
- DCS Rx FILTER (F100) → For filtering the frequency band 1805 and 1880 MHz.
- WCDMA Rx FILTER (F201) → For filtering the frequency band 2110 and 2170 MHz.
- WCDMA Tx FILTER (F202) → For filtering the frequency band 1920 and 1980 MHz.

3. TCVCXO (OSC202)

To generate the 19.2MHz reference clock to drive the logic and RF.

4. Duplexer (F203)

A duplexer splits a single operating band into receive and transmit paths.

5. Isolator (MIS201)

An isolator between the Power Amplifier and the duplexer is highly recommended to provide constant load and source impedances (respectively) to those devices.

6. UMTS PAM (U202)

This is a key component in the transmitter chain and must complement the RTR6200 IC precisely; jointly they dominate the UMTS transmitter performance characteristics. Parameters such as gain, output power level, ACLR, harmonics, Rx-band noise, and power supply current are critical.

7. GSM/DCS PAM (U102)

The PAM is a key component in any transmitter chain and must complement the rest of the transmitter precisely. For GSM and DCS operation, the closed-loop transmit power control functions add even more requirements relative to the UMTS PA. In addition to gain control and switching requirements, the usual RF parameters such as gain, output power level, several output spectrum requirements, and power supply current are critical.

8. GSM/DCS Dual Tx VCO (OSC101)

The dual Tx VCO outputs, one for EGSM and one for DCS, drive a resistive network that splits the active signal into two signals: 1) the input to the active PAM – this is the low loss path, and 2) the OPLL feedback signal.

9. Dual VCO (OSC201)

The dual-band UHF VCO is a key component within its phase-locked loop; VCO performance directly impacts PLL and transceiver performance. GSM/DCS Rx/Tx LO & UMTS Rx LO signal is generated from this dual VCO's output.

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10. RFL6200 (U201)

The RFL6200 includes an LNA circuit optimized for UMTS-2100 operation. The LNA is separated from all other receive functions contained within the RFR6200 receiver IC to improve mixer LO to RF isolation – a critical parameter in the Zero-IF architecture.

11. RFR6200 (U205)

The RFR6200 provides the Zero-IF receiver signal path, from RF to analog baseband, for UMTS-2100 applications. The RFR6200 accepts its UMTS input signal from the handset RF front-end design. The UMTS input is configured differentially to optimize second-order inter-modulation and common mode rejection performance, and implements MSM-controlled gain adjustments to extend the receiver dynamic range.

12. RTR6200 (U101)

The RTR6200 supports multi-band, multi-mode phones with two receiver signal paths and three transmitter signal paths:

1) Receiver paths
- EGSM-900
- DCS-1800

2) Transmitter paths
- EGSM-900 (using OPLL technique)
- DCS-1800 (using OPLL technique)
- UMTS-2100

Numerous secondary functions are integrated on-chip as well:

3) Phase-locked loop circuits
- PLL#1 and an on-chip VCO supports UMTS Tx
- PLL#2 and an external VCO supports EGSM Rx and Tx, DCS Rx and Tx, and UMTS Rx

4) Transceiver LO generation and distribution circuits
- EGSM-900 Rx and Tx
- DCS-1800 Rx and Tx
- UMTS-2100 Tx

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2. Baseband Circuit description of SGH-Z105

1. PM6050

1.1. Power Management

Ten low-dropout regulators designed specifically for GSM applications power the terminal and help ensure optimal system performance and long battery life. It provides seven LDO support for 2.6V, 2.8V while a self-resetting, electronically fused switch supplies power to external accessories. Ancillary support functions, such as RTC module and RTC charger, Clock Buffer, aid in reducing both board area and system complexity.

SBI BUS serial interface provides access to control and configuration registers. This interface gives full control of the MSM6200 and enables system designers to maximize both standby and talk times.

Supervisory functions. including a reset generator, an input voltage monitor, and a ADC Conertte support reliable system design. These functions work together to ensure proper system behavior during start-up or in the event of a fault condition(low microprocessor voltage, insufficient battery energy, or excessive die temperature).

1.2. Keypad Backlight

The Keypad backlight driver output is at pin 17 (KEYBD_DRV) and is designed to drive parallel connected LEDs directly. Its output current level is SBI-programmable and meets the performance specified below.

Input parameters are not specified since they are internal.

1.3. TCXO Controller and Buffers

The PM6050 IC includes circuits for controlling the TCXO warm-up and buffering its signal for distribution throughout the handset. Performance specifications are presented below.

2. Connector

2-1. LCD Connector

LCD is consisted of main LCD(color 262K TFT LCD) and small LCD(OLED color 65K LCD). Chip select signals in the U302, LCD_CS1- can enable small LCD. W_LED_ON signal enables white LED of main LCD, EN_EN signal enables EL of small LCD.

"RESET-, TFT_RESET_N" signal initiates the Reset process of the LCD.

8-bit data lines(AD(0)~AD(7)) transfers data and commands to Small LCD through by pass capacitor. Data and commands use "RS" signal. If this signal is high, Inputs to LCD are commands. If it is low, Inputs to LCD are data. The signal which informs the input or output state to LCD, is required. But this system is not necessary this signal.

Power signals for LCD are "VDD_LP" and "2.8LV". "SPK+" and "SPK-" from U533 are used for audio speaker. And "Vibrator" from Q702 enables the motor.

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2-2. Key

This is consisted of key interface pins among U302, KEYSENSE_N(0:4). These signals compose the matrix. Result of matrix informs the key status to key interface in the U302. Power on/off key is seperated from the matrix. So power on/off signal is connected with U302 to enable U601. twelve key LED use the "VBAT" supply voltage. "KEY_LED" signal enables LEDs with current control. "HALL_SW" informs the status of folder (open or closed) to the. This uses the hall effect IC, A3210ELH. A magnet under main LCD enables A3210ELH.

2-3. EMI ESD Filter

This system uses the EMI ESD filter, SMF05 to protect noise from IF CONNECTOR part.

2-4. IF connetor

It is 24-pin connector. They are designed to use VBATT, CF, M_TXD0, M_RXD0, RTS, CTS, JIG_ON, HFK_DETECT, M_RXD0, M_TXD0, HFK_MIC+, HFK_MIC-, HFK_SPK+, HFK_SPK- and GND. They connected to power supply IC, microprocessor and signal processor IC.

3. Audio

EAR1OP and EAR1ON from U302 are connected to the main speaker. AUXOP and AUXON are connected to the Hands free kit. MIC_P and MIC_N are connected to the main MIC. And EAR_MIC1P and EAR_MIC1N are connected to the Earphone.

YMU765 has a built-in amplifier, and thus, is an ideal device for outputting sounds that are used by mobile phones in addition to game sounds and ringing melodies that are replayed by a synthesizer.

The synthesizer section adopts "stereophonic hybrid synthesizer system" that are given advantages of both FM synthesizers and Wave Table synthesizers to allow simultaneous generation of up to 32 FM voices and 32 Wave Table voices. Furthermore, YMU765 has a built-in hardware sequencer that helps to realize complex play without heavily loading the host CPU. And this device also has a built-in circuit for controlling vibrators and LEDs synchronizing with play of music. The consumed electric current can be stopped to the minimum by power down mode when not operating.

The hardware sequence built in this device allows playing of the complex music without giving excessive load to the CPU of the portable telephones. Moreover, the registers of the FM synthesizer can be operated directly for real time sound generation, allowing, for example, utilization of various sound effects when using the game software installed in the portable telephone.

4. Memory

The signals in the MSM6200 enable two memories. They use only one volt supply voltage, VDD_LP from the PM6050. This system uses AMD's memory, AM50DL128BG. It is consisted of 128M bits flash NOR memory and 32M bits SRAM memory. It has 16 bit data line, AD[0~15] which is connected to MSM6200. It has 22 bit address lines, A[1~22]. ROM_CS and RAM_CS signals is chip select.

In the multi-media processor, it has three type memories. One is 256Mbit Nor Flash memory another is 256Mbit NAND Flash memory and the other is 128Mbit SDRAM memory. Multi-media processor doesn't have a NAND memory interface. But we make a software algorithm use for NAND memory.

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5. Multi-media processor MA55133

MA55133 is an LSI, which is designed on 3GPP 3G-324M Standard for a video telephone system. Since protocol software is external, MA55133 can run with another protocol like H.323 by changing its software. Because of small power consumption - Typ.140mW and very small package - FPBGA, it is suitable to use 3G-324M LSI for portable apparatus.

Feature

- Based on 3GPP 3G-324M standard
- Video MPEG-4 (simple profile level1) or H263 (baseline)
- Audio AMR, G723.1, MP3 or AAC (program downloadable)
- Multiplexing H.223 (Level 0, 1, 2, processed by CPU with assistant hardware)
- Control H.245 (Processed all by CPU)
- Built-in 32bit RISC CPU(ARM7TDMI) for control, including H.245 and H.223
- Built-in 16bit DSP for audio CODEC
- Built-in SD card I/F
- Video input Rec601 YUV = 4:2:2, 8 bit I/F
- Video output Rec601 YUV = 4:2:2(8bit) / RGB 18bit

Built-in Picture-In-Picture Image Displaying Functions

Built-in On Screen Display(OSD) Functions

- Video CODEC 15fps for both encode and decode in QCIF size is possible.
- Program on SDRAM is executable without ROM (optional).
- Power supply VDDI=2.0V to 2.7V (internal), VDDO=2.7 to 3.6V (I/O)

6. Camera (HV7131GP)

The HV7131GP is a highly integrated single chip CMOS color image sensor implemented by proprietary Hynix 0.35um COMS sensor process realizing high sensitivity and wide dynamic range. Total pixel array size is 652X492, and 652X488 pixels are active. Each active pixel composed of 4 transistors has a micro-lens to enhance sensitivity, and converts photon energy to analog pixel voltage. On-chip 10bit Analog to Digital Converter(ADC) ditgitizes analog pixel voltage, and on-chip Correlated Double Sampling(CDS) scheme reduces Fixed Pattern Noise(FPN) dramatically. The integration of sensor function and image processing functions make HV7131GP especially very suitable for mobile imaging systems such as IMT-2000.

7. Irda

This system uses IRDA module, HSDL_3208, Agilent's. This has signals, "IRA_DOWN"(enagle signal), "RXD0"(Input data) and "TXD0"(output data). These signals are connected to U302(MSN6200). It uses two power signals. "VDD_LP" is used for circuit and "VBATT" is used for LED.

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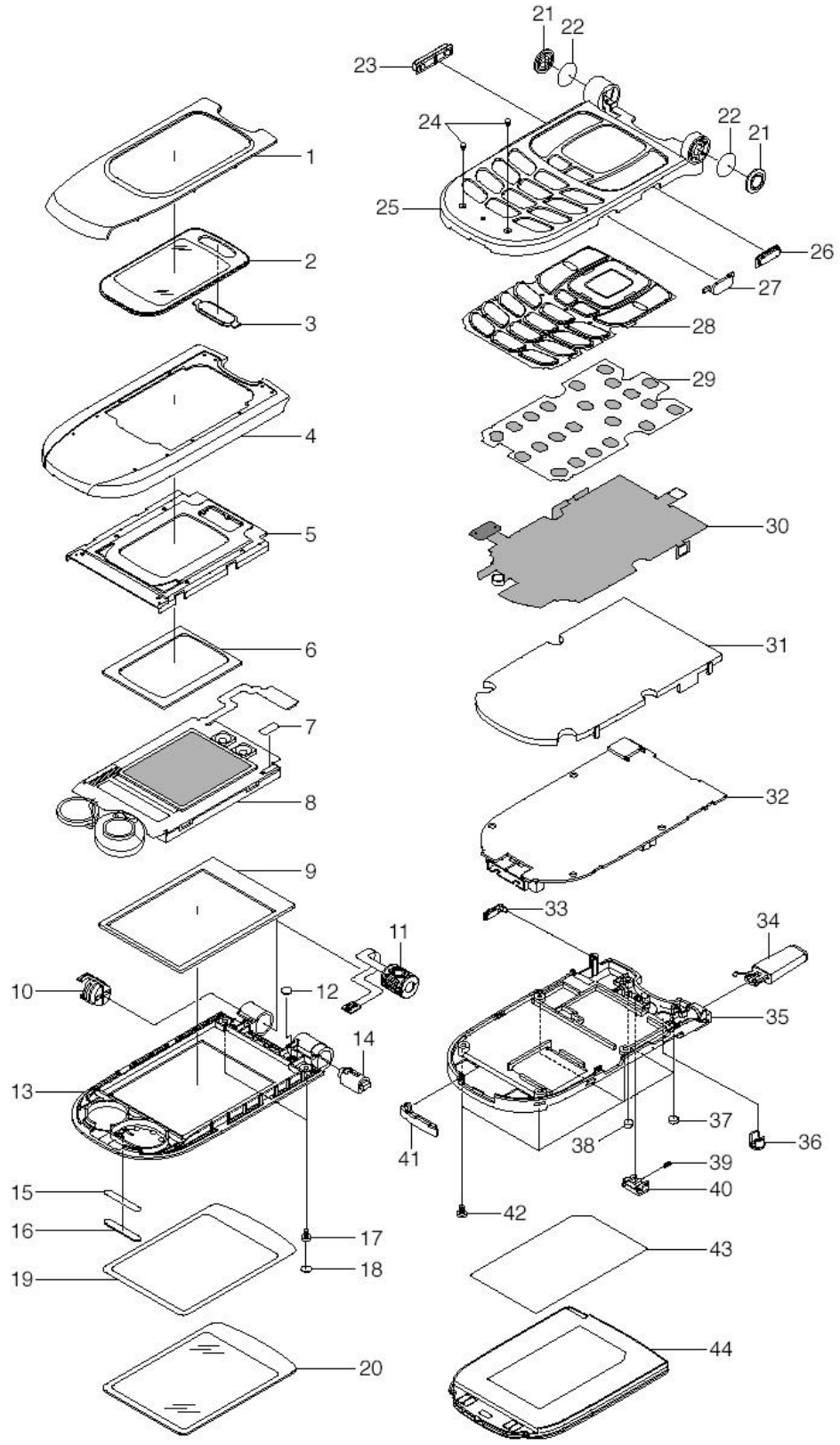
3. SGH-Z107U Exploded View and its Parts list

1. Cellular phone Exploded View



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2. Cellular phone Parts list

NO	SEC CODE	DESCRIPTION	COLOR	Q'TY	REMARKS
1	GH72-15052	PMO-FOLDER SIDE DECO	DEEP GRAY	1	
2	GH75-05133A	MEC-FOLDER DECO	SILVER	1	
3	GH72-15062A	PMO-FLASH LENS	-	1	
4	GH72-15051A	PMO-FOLDER UPPER	SILVER	1	
5	GH71-03694A	NDC-FOLDER BRACKET	-	1	
6	GH74-09373A	MPR-SPONGE DUAL LCD	-	1	
7		TAPE-LCD	-	1	
8		LCD	-	1	
9	GH74-09372A	MPR-SPONGE MAIN LCD	-	1	
10	GH75-03947A	MEC-CAMERA HINGE DUMMY	-	1	
11		CAMERA	-	1	
12		MAGNET	-	1	
13	GH72-15050A	PMO-FOLDER LOWER	SILVER	1	
14	GH75-04156A	MEC-HINGE	-	1	
15	GH74-06516A	MPR-TAPE SPK DECO	-	1	
16	GH71-02421A	NPR-SPEAKER DECO	-	1	
17	6001-001155	MACHINE SCREW	-	2	
18	GH74-06525A	MPR-FOLDER SCREW CAP	SILVER	1	
19	GH74-09369A	MPR-TAPE MAIN WINDOW DECO	-	1	
20	GH75-05132A	MEC-MAIN WINDOW DECO	SILVER	1	
21	GH71-02421A	NPR-SPEAKER DECO	SILVER	1	
22	GH74-06516A	MPR-TAPE SPK DECO	-	1	
23	GH75-03950A	MEC-VOLUME KEY	SILVER	1	
24-1	GH75-05129A	RMO-FOLDER DAMPER R	SILVER	1	
24-2	GH74-06516A	RMO-FOLDER DAMPER L	SILVER	1	
25	GH72-15048A	PMO-FRONT COVER	SILVER	1	
26	GH75-15061A	MEC-CALL REJECT KEY	SILVER	1	
27	GH72-15055A	PMO-WINDOW IRDA	VIOLET	1	
28	GH75-05134A	MEC-KEY PAD	-	1	
29		DOME-SHEET	-	1	
30		KEYPAD FPCB	-	1	
31	GH72-15060A	PMO-SHIELD CAN	-	1	
32		PBA	-	1	
33	GH72-10996A	PMO-EARPHONE COVER	SILVER	1	
34		ANTENNA	SILVER	1	
35	GH72-15053A	PMO-REAR COVER	SILVER	1	
36	GH72-15059A	PMO-RF COVER	SILVER	1	
37	GH72-15057A	PMO-SCREW CAP L	SILVER	1	
38	GH72-15058A	PMO-SCREW CAP R	SILVER	1	
39	GH70-10633A	BATT LOCKER SPRING	-	1	
40	GH72-15054A	PMO-BATT LOCKER	SILVER	1	
41	GH72-15056A	PMO-IF COVER	SILVER	1	
42	6001-001155	MACHINE SCREW	-	6	
43		MAIN-LABEL	-	1	
44		BATTERY	SILVER	1	

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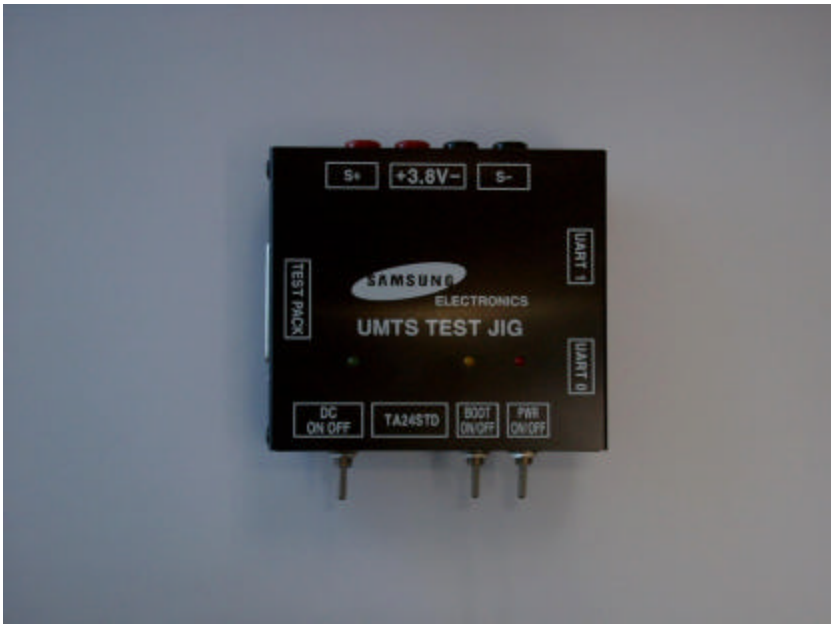
3. Test Jig (GH80-03305A)



3-1. RF Test Cable
(GH39-00105A)

3-2. Test Cable
(GH39-00210A)

3-3. Serial Cable

3-4. Power Supply Cable

3-5. DATA CABLE
(GH39-00208A)

3-6. TC
(GH44-00482A)

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4. SGH-Z107 MAIN Electrical Parts List

0403-001427	ZD806
0403-001427	ZD807
0404-001110	D500
0406-001084	D502
0406-001084	U513
0406-001084	ZD808
0406-001084	ZD809
0406-001084	ZD810
0406-001178	ZD801
0406-001178	ZD805
0406-001201	ZD811
0407-001002	D601
0407-001002	D602
0407-001002	D603
0407-001038	U704
0501-000218	Q801
0504-000168	Q601
0504-000168	Q705
0504-001113	Q202
0504-001151	U203
0505-001131	Q201
0505-001423	U304
0505-001423	U604
0505-001423	U708
0505-001423	U710
0505-001454	Q704
0604-001261	IRD200
1001-001248	U949
1001-001253	U501
1001-001253	U547
1105-001489	U403
1109-001234	U401
1109-001243	U303
1201-001954	U102
1201-001984	U201
1201-001990	U202
1202-001036	U503
1203-001285	U711
1203-002965	U707
1203-003007	U786
1203-003137	U603
1203-003137	U607
1203-003137	U608
1203-003326	U204
1204-002018	U402
1204-002138	U510
1205-002293	U509
1205-002295	U302
1205-002297	U205
1205-002300	U101

1205-002514	U705
1404-001224	TH301
1405-001018	V801
1405-001082	V802
1405-001119	CA400
1405-001119	CA403
1405-001119	CA404
2007-000138	R105
2007-000138	R111
2007-000138	R117
2007-000138	R125
2007-000138	R131
2007-000138	R203
2007-000138	R220
2007-000138	R226
2007-000138	R332
2007-000138	R405
2007-000138	R805
2007-000138	R806
2007-000138	R808
2007-000139	R115
2007-000139	R116
2007-000139	R122
2007-000139	R123
2007-000140	R103

2007-000140	R134
2007-000140	R229
2007-000140	R334
2007-000141	R102
2007-000143	R411
2007-000143	R827
2007-000144	R137
2007-000147	R133
2007-000148	R124
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2007-000148	R210
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2007-000148	R301
2007-000148	R304
2007-000148	R311
2007-000148	R3111
2007-000148	R312
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2007-000148	R327
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2007-000148	R826
2007-000148	R837

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2007-000148	U706
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2007-000148	U799
2007-000148	U800
2007-000148	U802
2007-000149	R335
2007-000152	R828
2007-000152	U807
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2007-000159	R338
2007-000159	R611

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2007-000159	R848
2007-000162	R407
2007-000162	R409
2007-000162	R410
2007-000162	R704
2007-000162	U804
2007-000163	R517
2007-000164	U806
2007-000166	R1106
2007-000166	R3115
2007-000166	R502
2007-000166	R503
2007-000166	R838
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2007-000171	R106
2007-000171	R108
2007-000171	R109
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2007-000171	R1099
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2007-000636	U808
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2007-000932	R331
2007-001119	R305

2007-001119	R308
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2007-001217	R104
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2007-001298	R233
2007-001298	R234
2007-001298	U943
2007-001301	R121
2007-001305	R232
2007-001306	C147
2007-001306	R120
2007-001313	R309
2007-001325	R140
2007-001325	R141
2007-001325	R142
2007-001325	R513
2007-001339	R313
2007-001339	R316
2007-002796	R135
2007-002796	R422
2007-002796	R608

2007-002965	R221
2007-003010	U940
2007-003022	R223
2007-007001	R225
2007-007014	R511
2007-007135	R321
2007-007138	R217
2007-007138	R219
2007-007142	R607
2007-007314	R201
2007-007314	R207
2007-007314	R209
2007-007314	R214
2007-007314	R323
2007-007318	R337
2007-007318	R506
2007-007318	R507
2007-007489	R1105
2007-007489	R3114
2007-007491	R136
2007-007491	R208
2007-007528	R306
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2007-007698	R228
2007-007981	R614

2007-008117	R227
2007-008401	R613
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2203-000233	C148
2203-000233	C151
2203-000233	C201
2203-000233	C202
2203-000233	C210
2203-000233	C221
2203-000233	C223
2203-000233	C226
2203-000233	C231
2203-000233	C236
2203-000233	C240
2203-000233	C242
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2203-000233	C517

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3301-001341	L604

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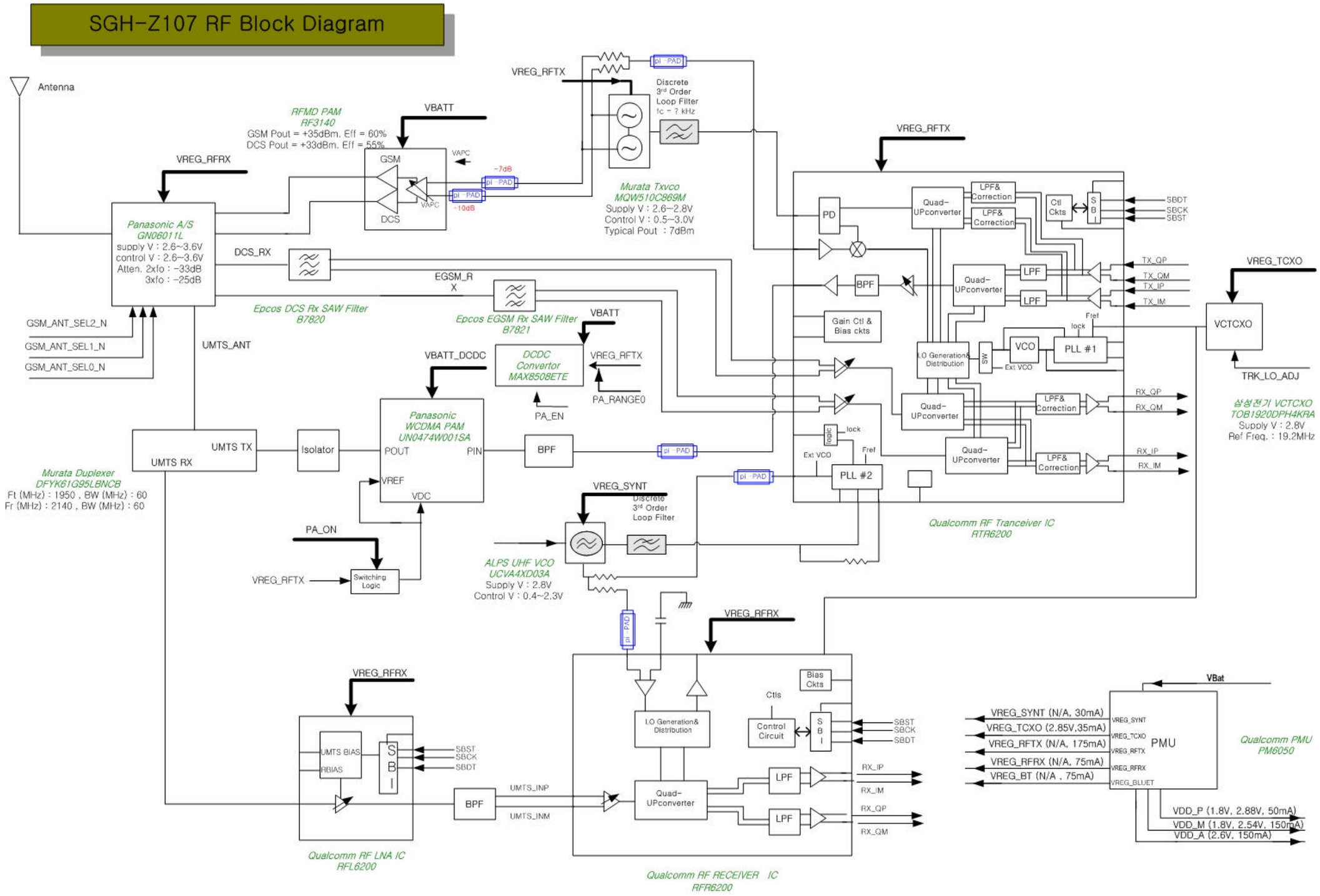
3705-001255	RFSW100
3709-001298	CN701
3710-002037	CN402
3711-005200	CN804
3711-005407	HEA1
3711-005423	CN805
3722-002181	EAR500
4302-001119	BAT601
4709-001303	MIS201
GH41-00615A	
GH71-02324A	ANTC101

5. SGH-Z107 Block Diagrams

1. RF Solution Block Diagram



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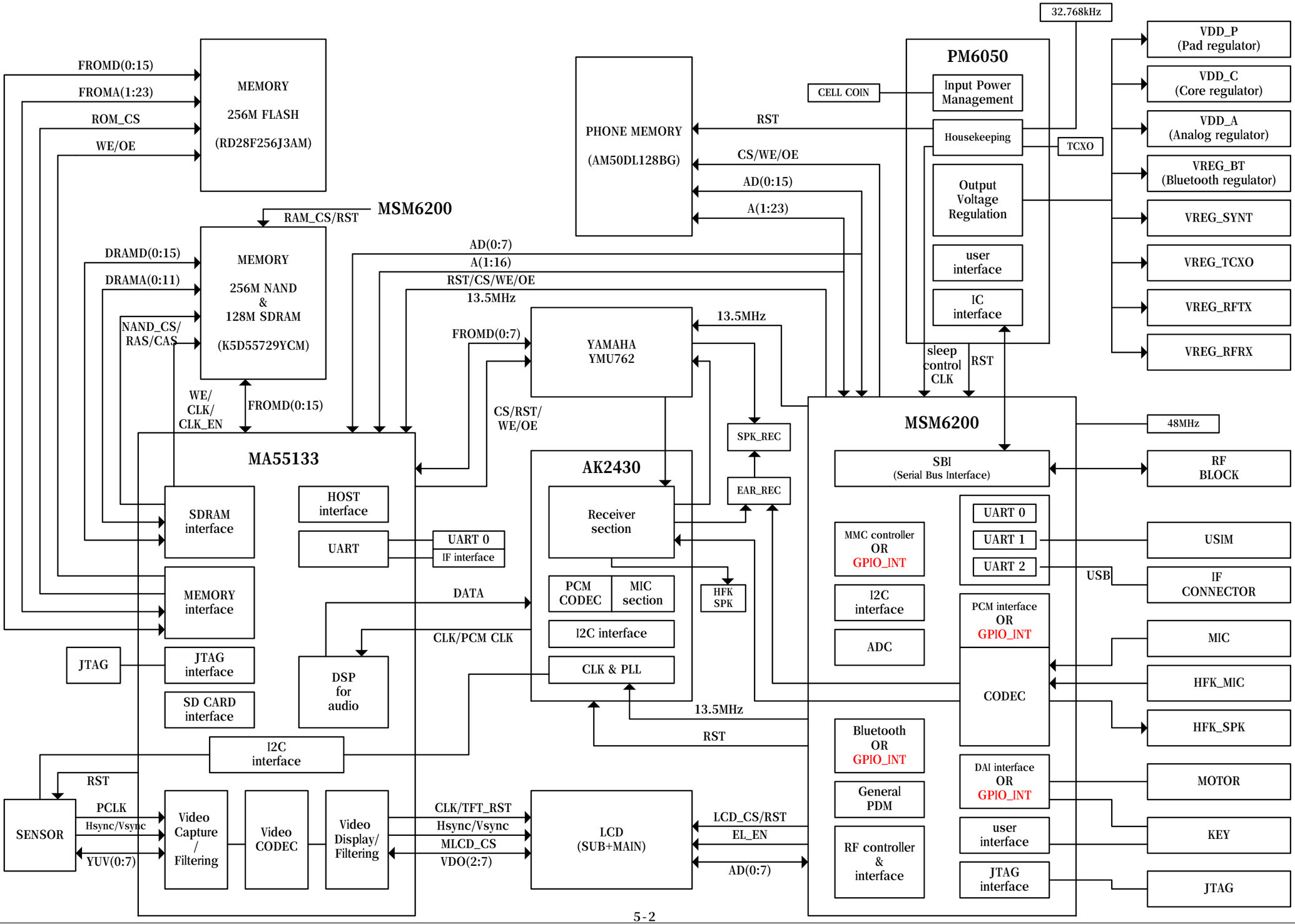
2. Base Band Solution Block Diagram



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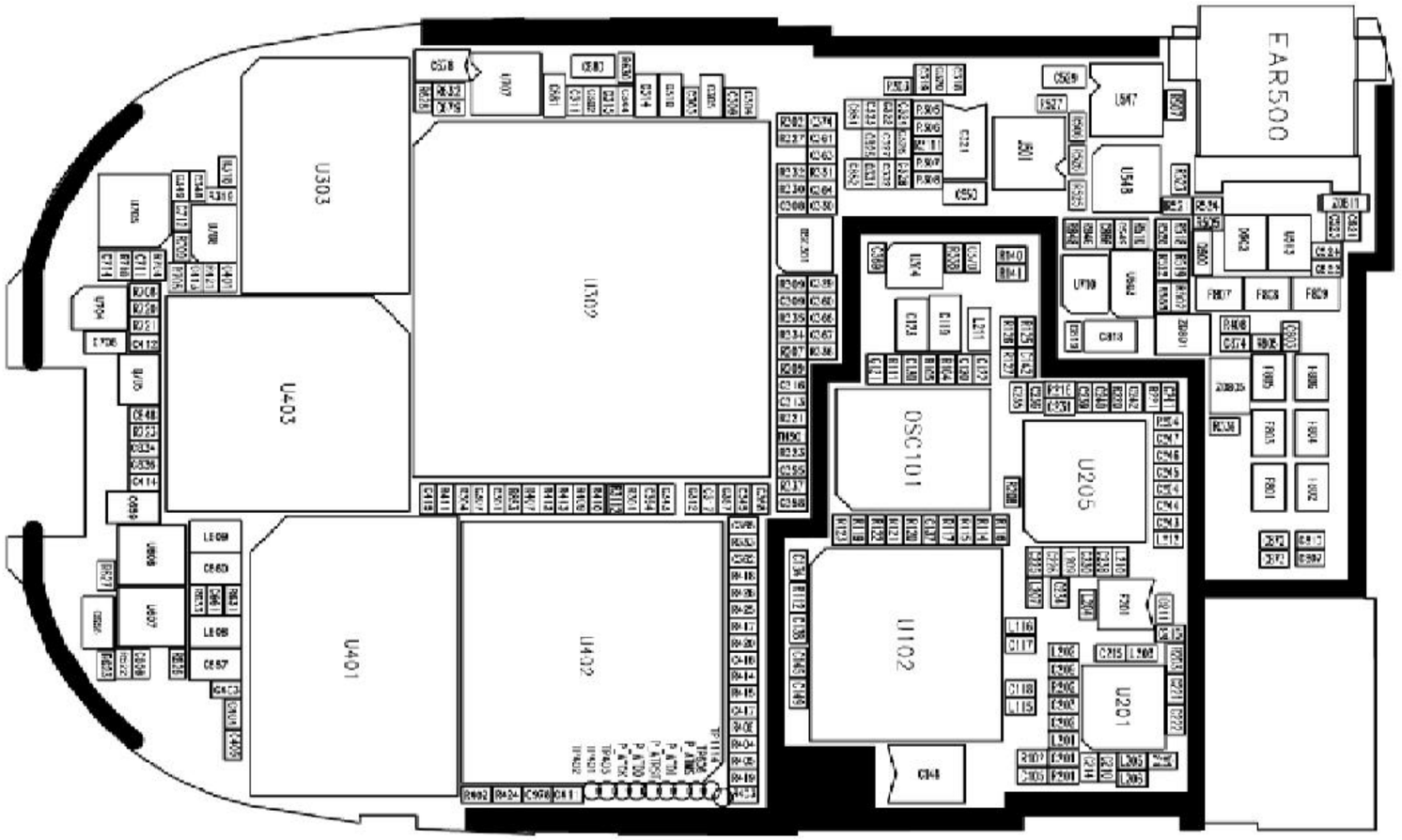
6. SGH-Z107 PCB Diagrams

1. Main PCB Top Diagram



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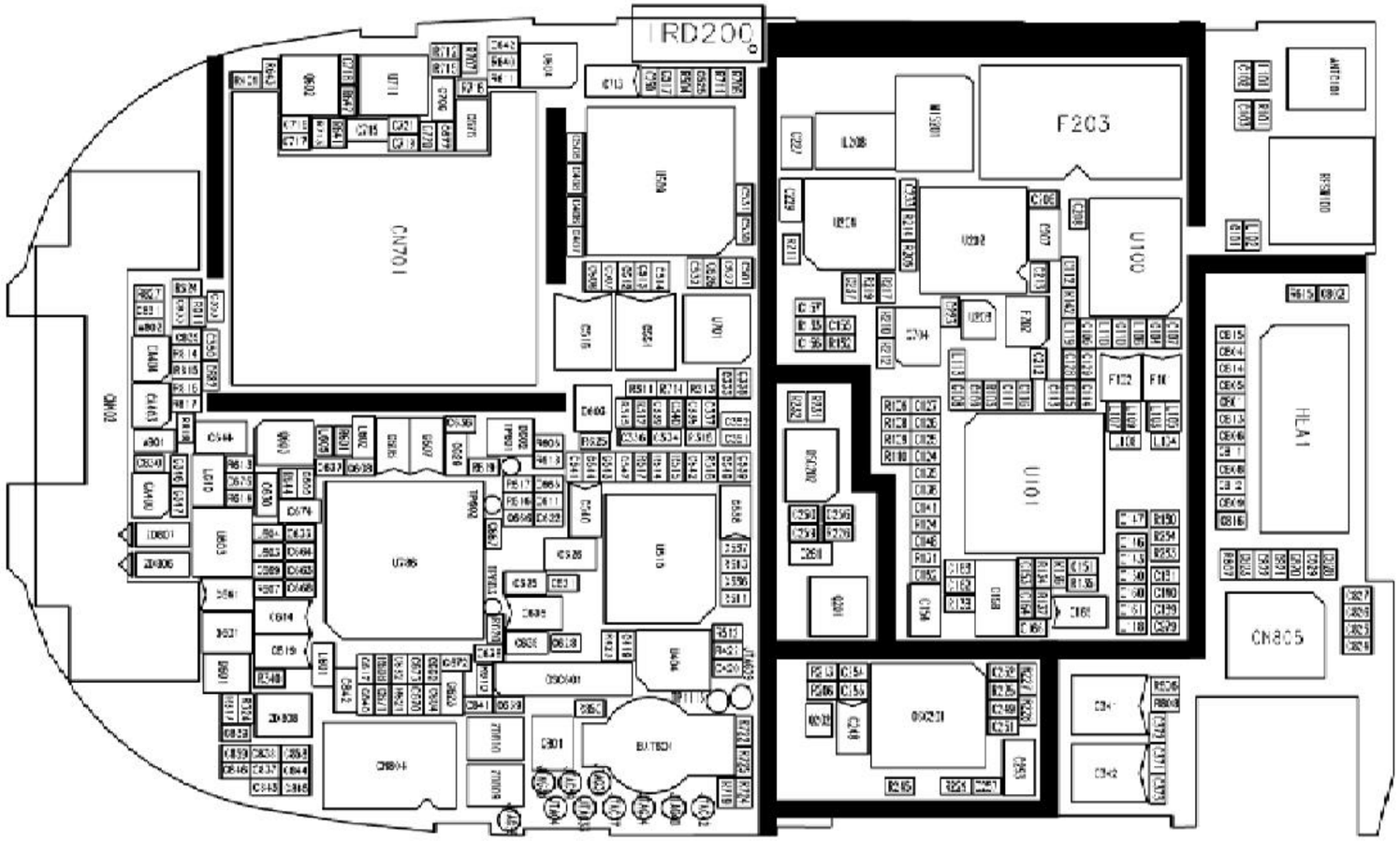
2. Main PCB Bottom Diagram



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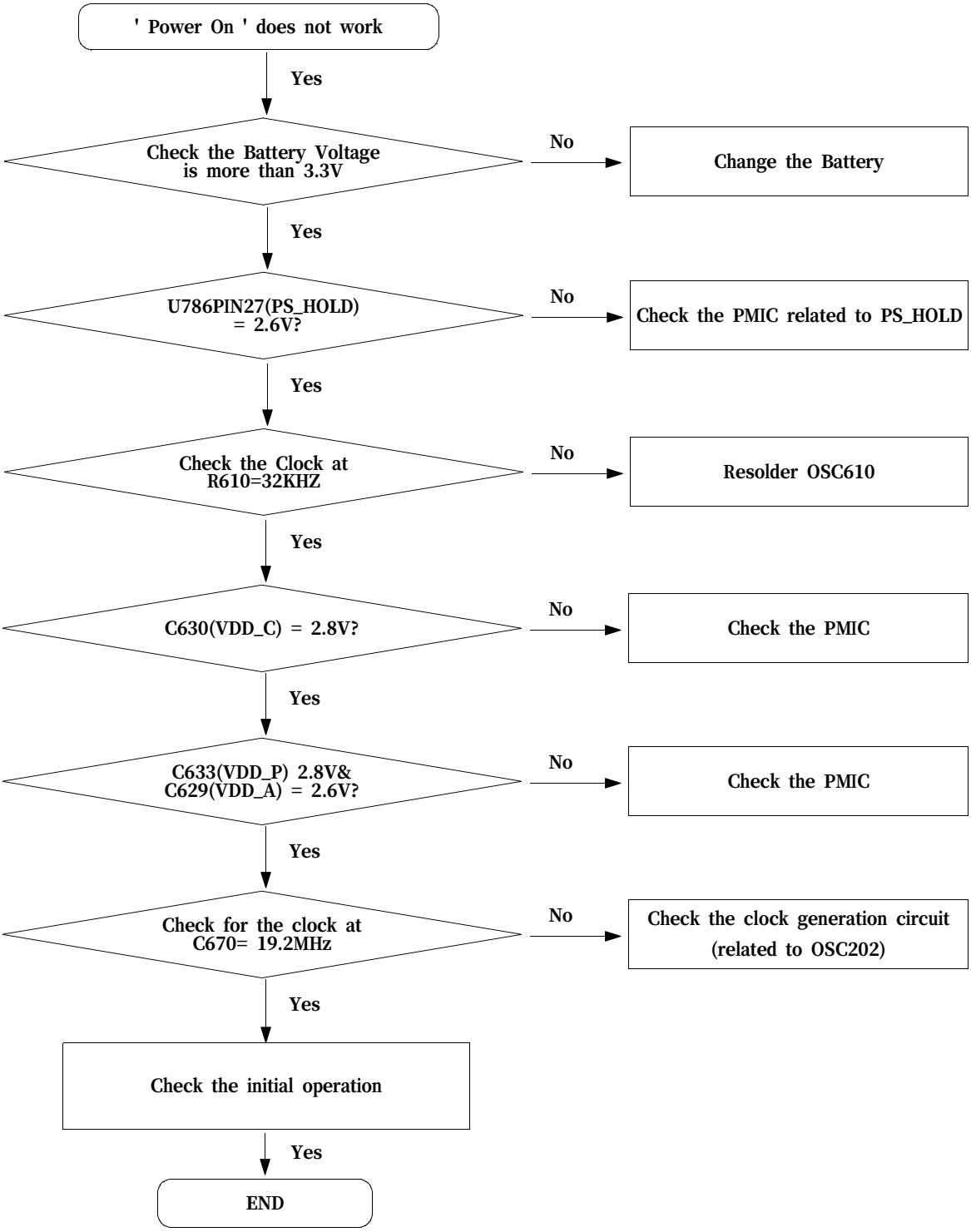
7. SGH-Z107Flow Chart of Troubleshooting

1. Power On



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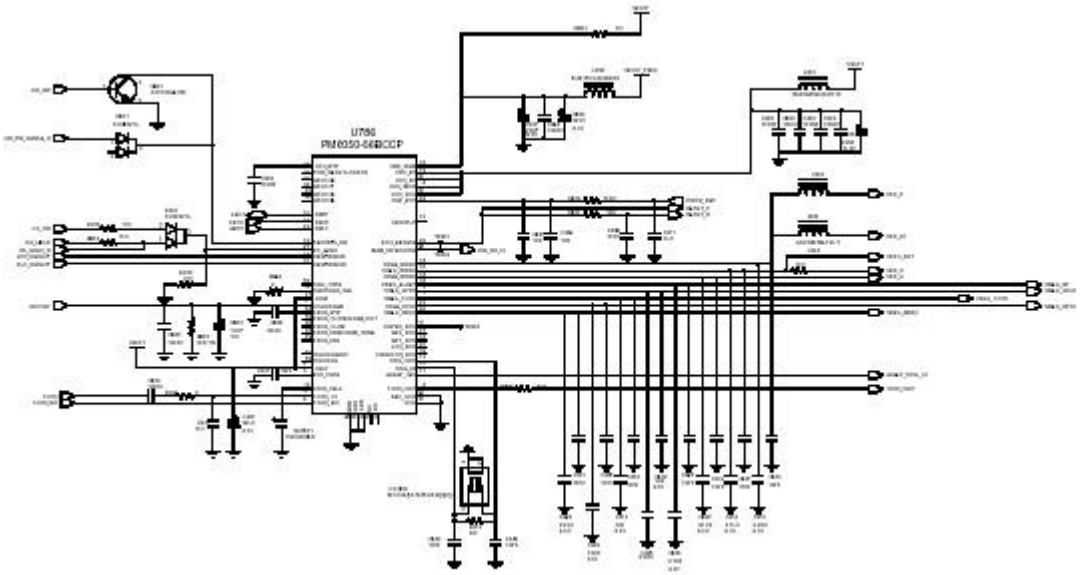
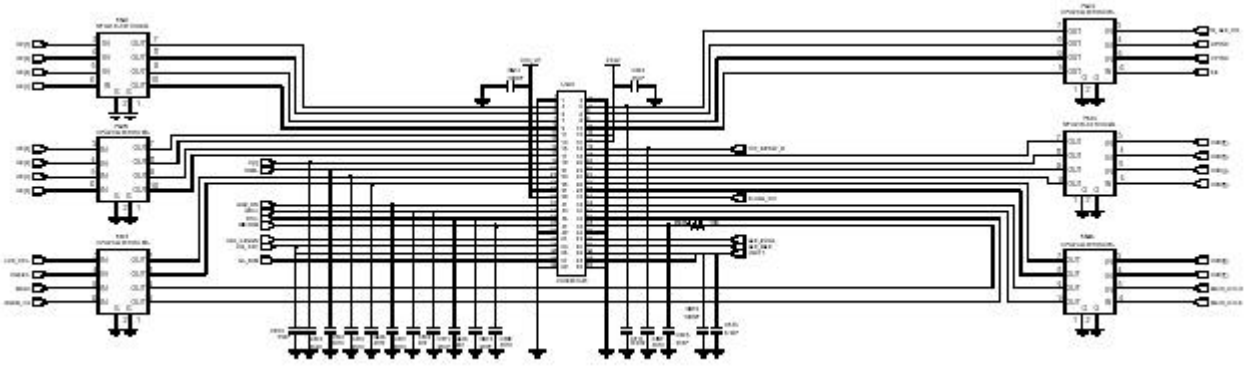
Power On





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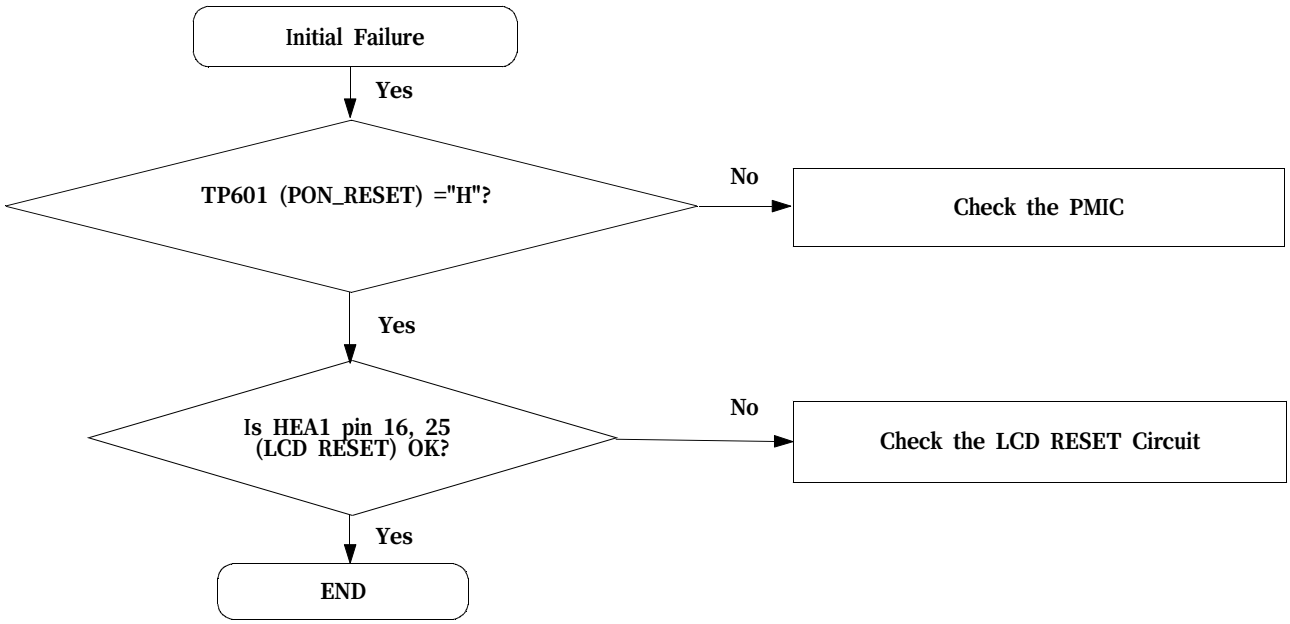
2. Initial



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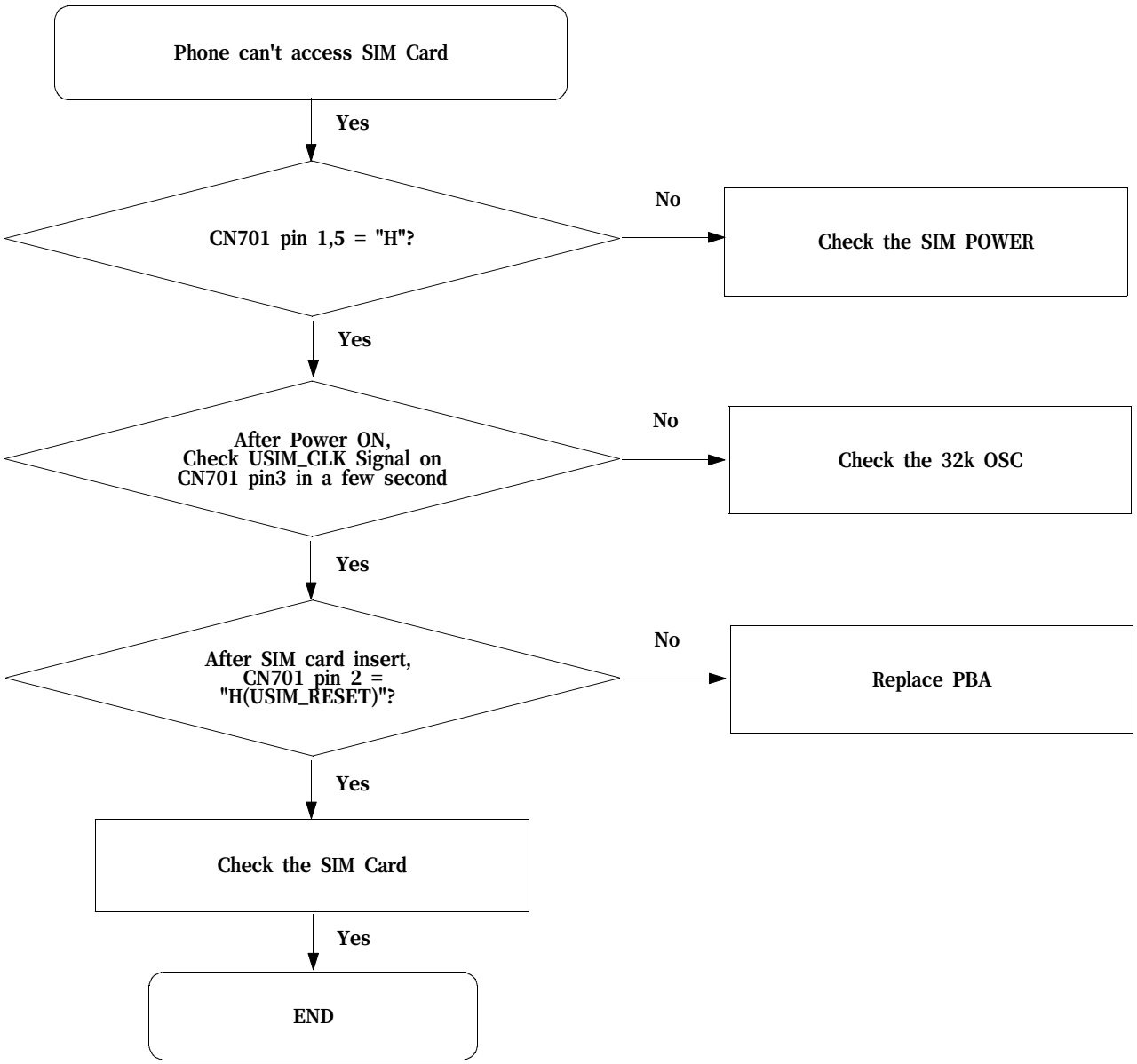
3. Sim Part



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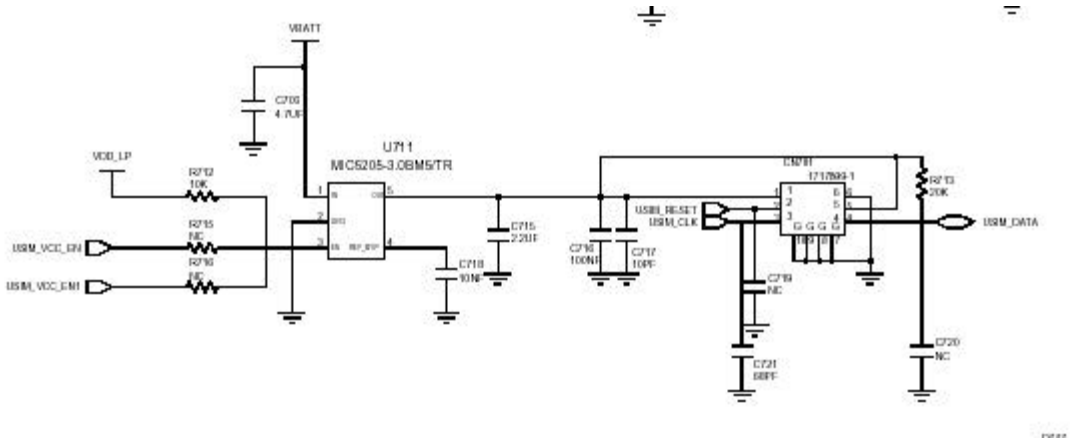
SIM



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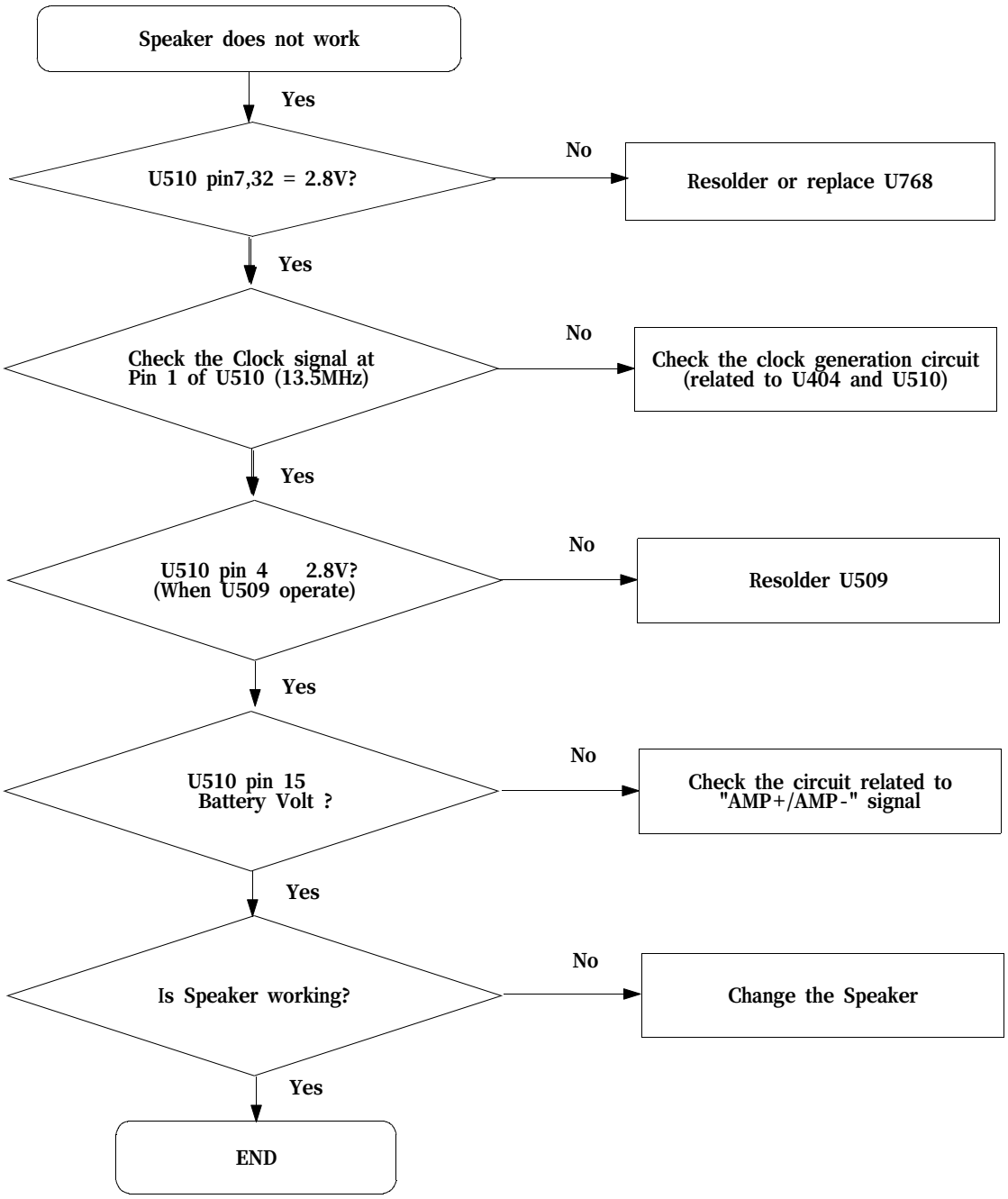
4. Microphone Part



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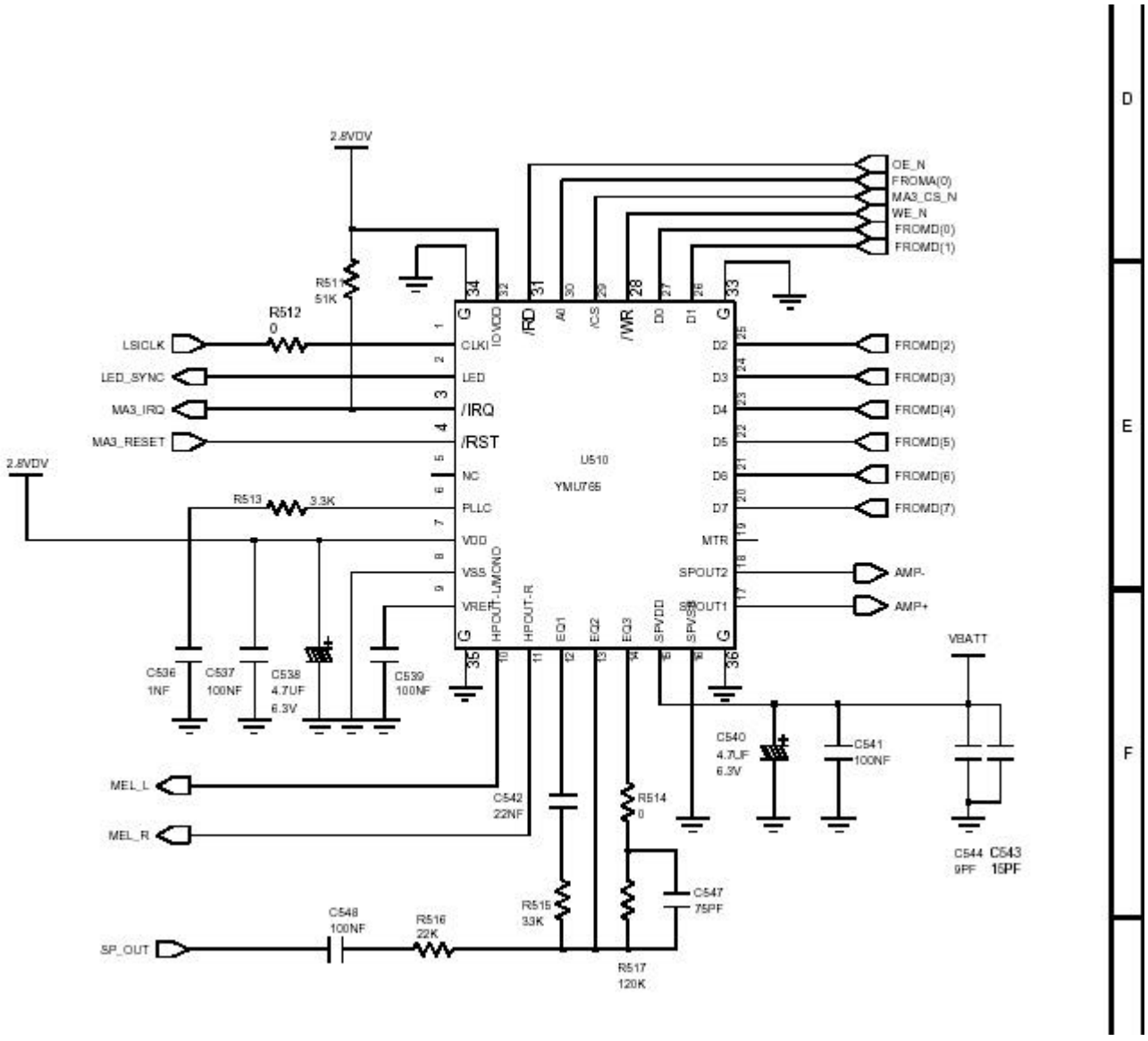
Microphone



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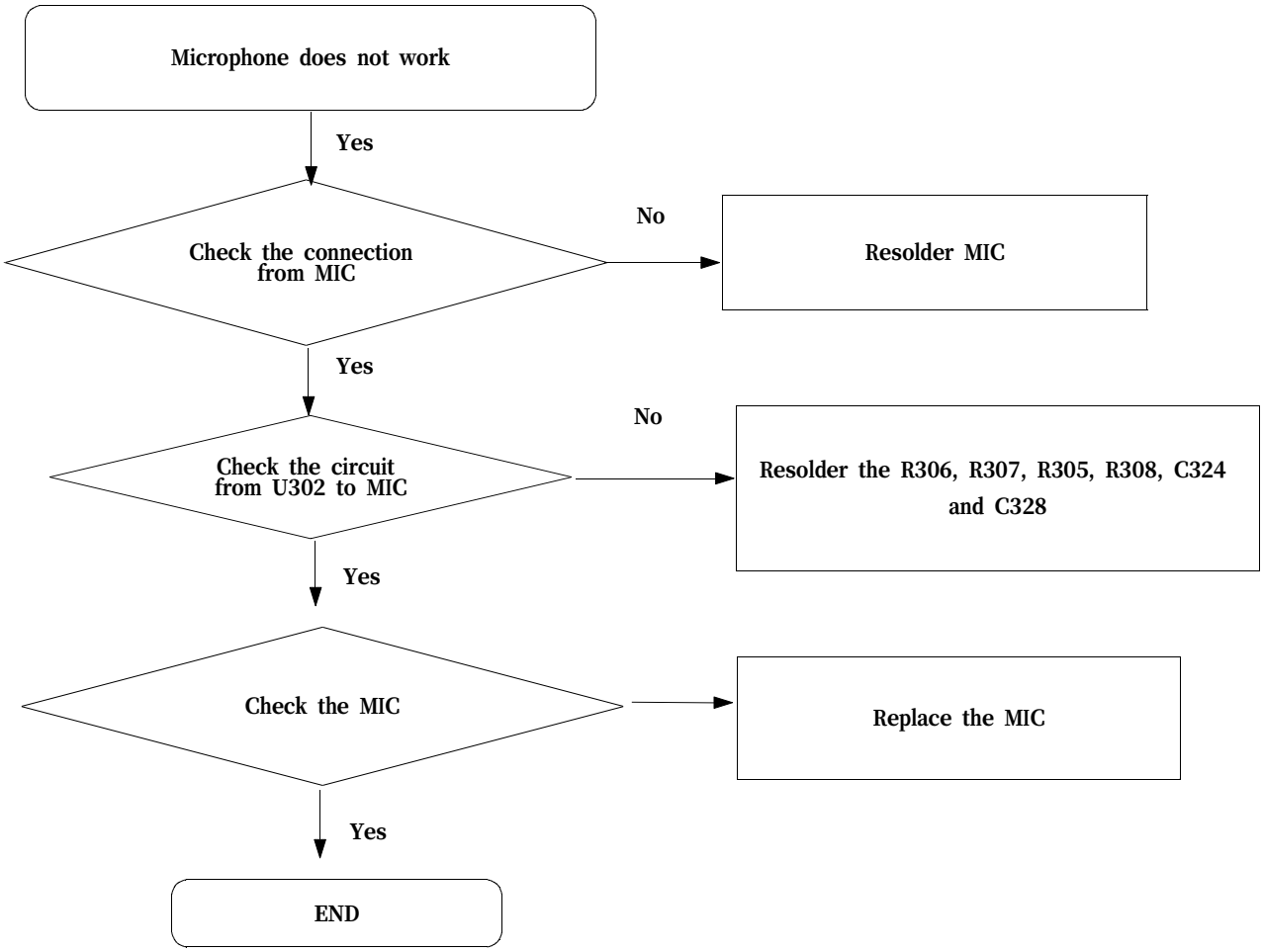
5. Speaker Part (Melody)



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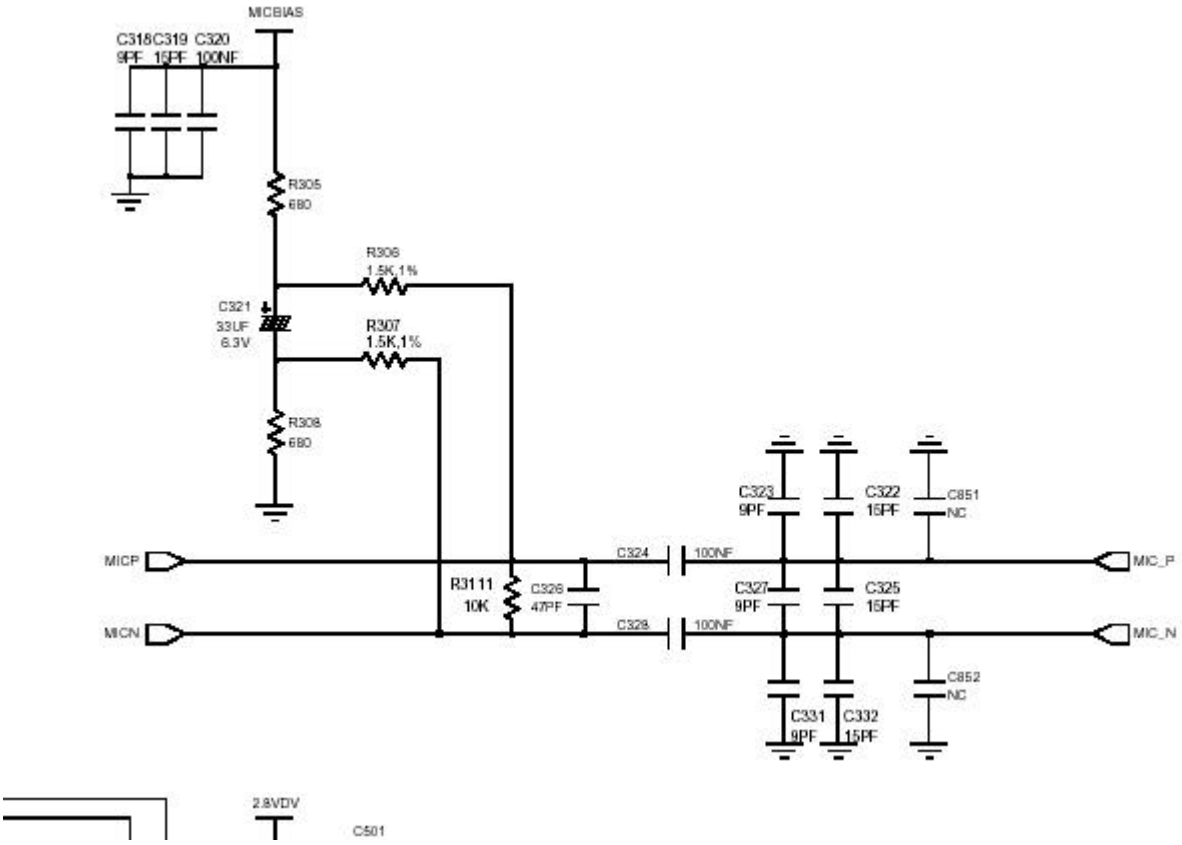
Speaker



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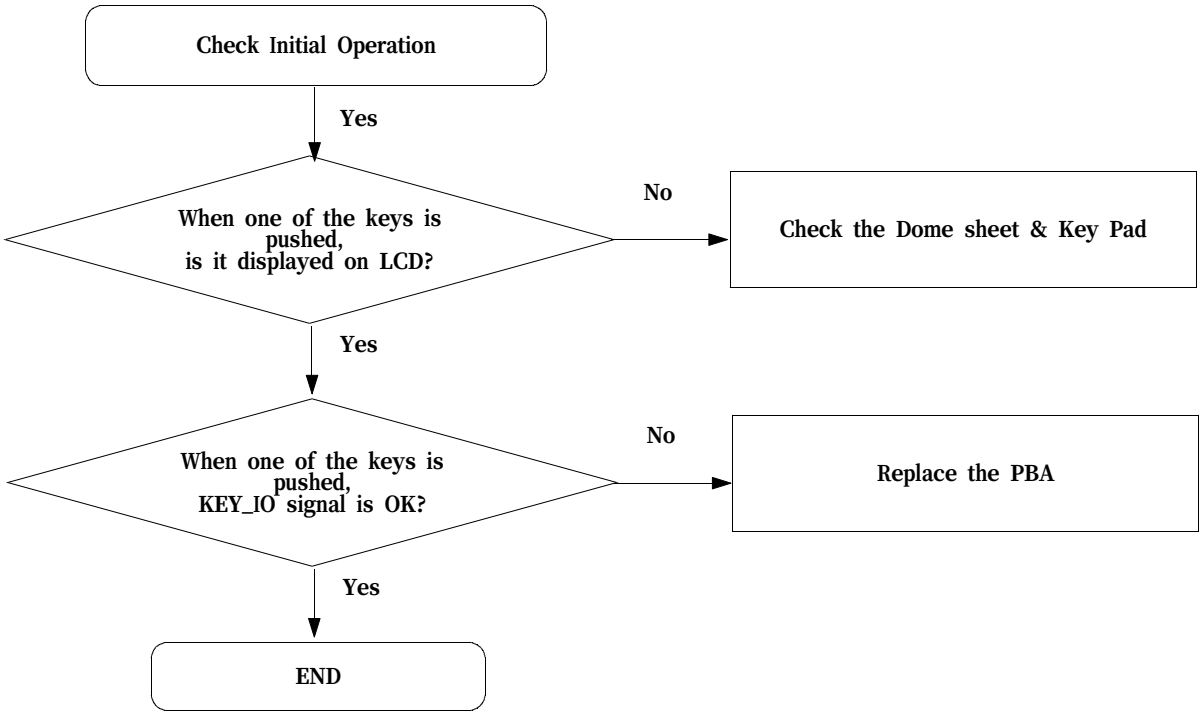
6. Key Data Input



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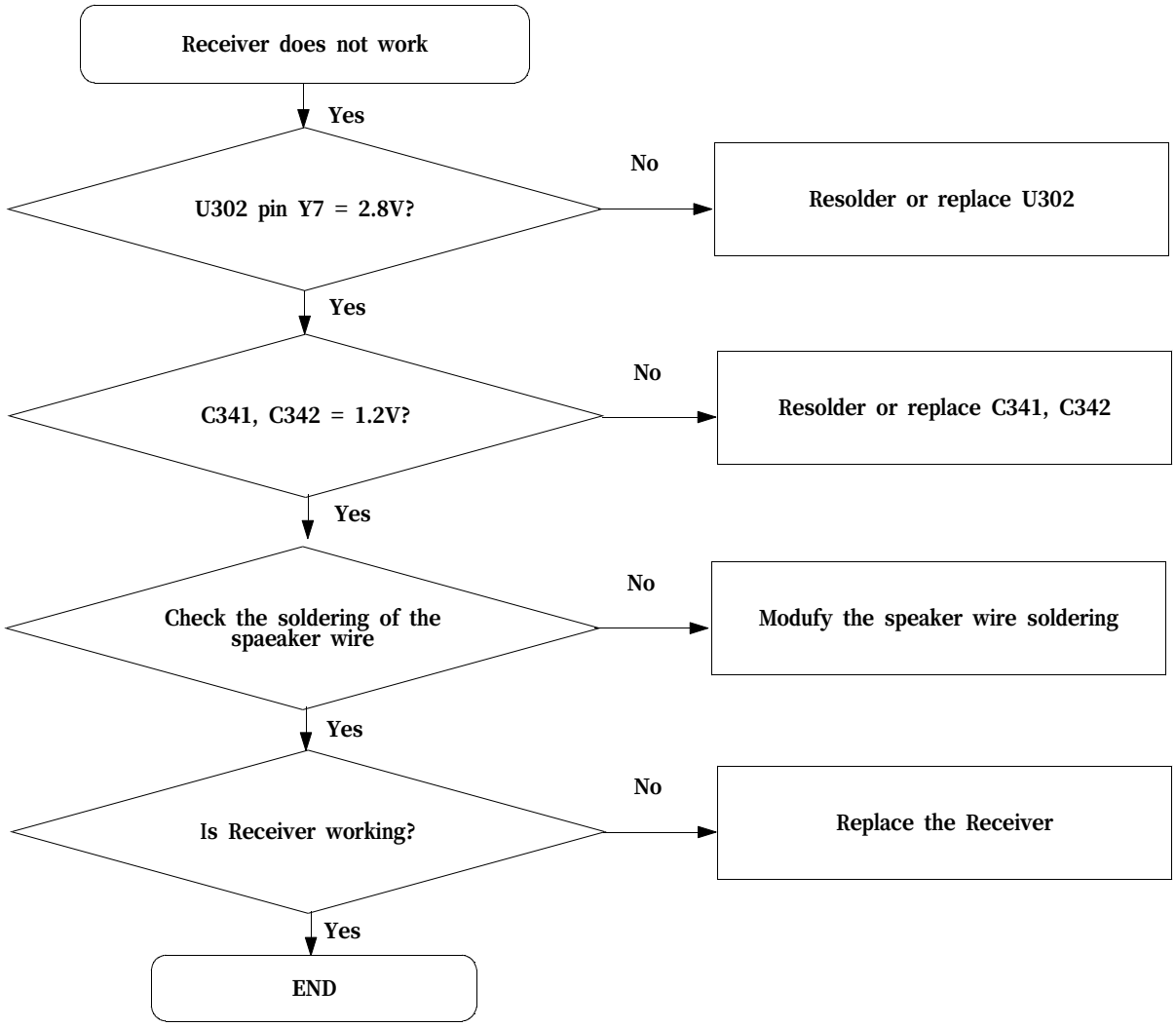
7. Receiver Part



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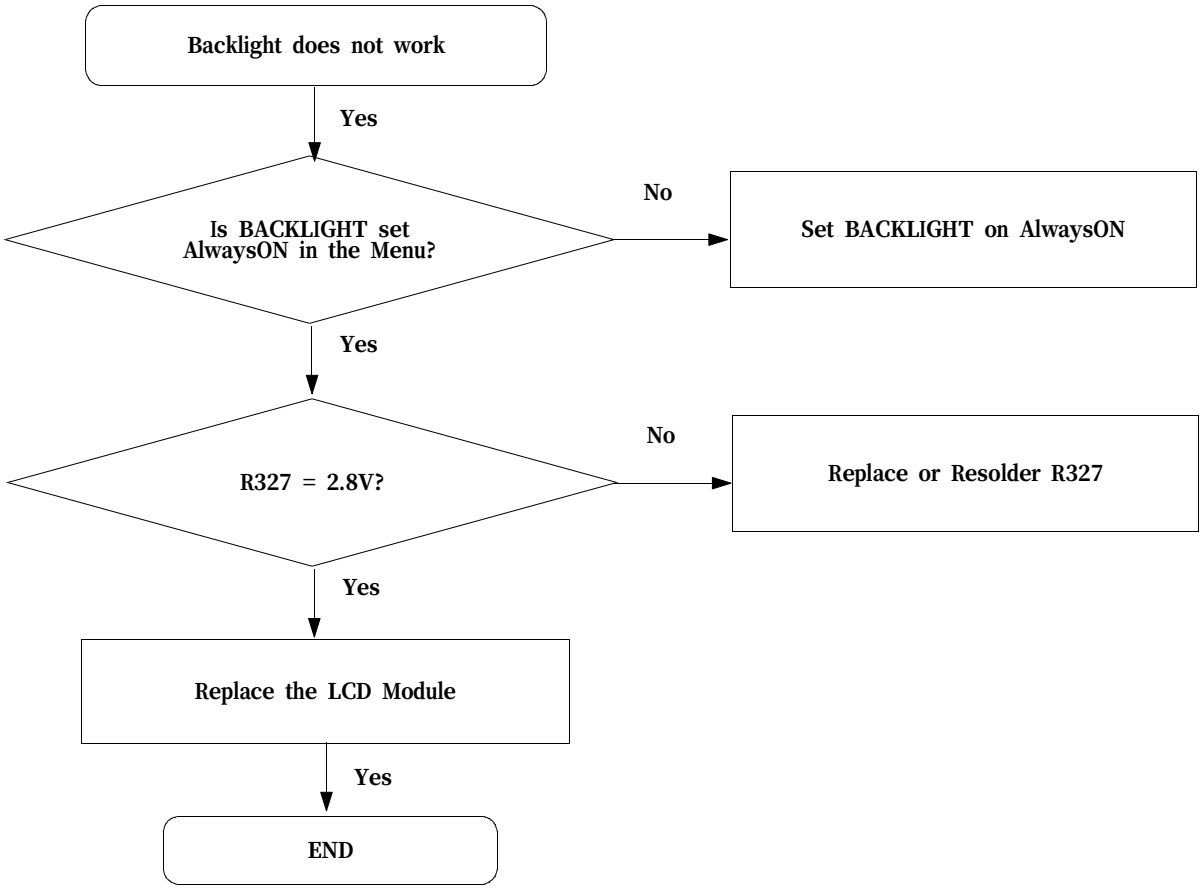
8. Back Light (for Color Main LCD)



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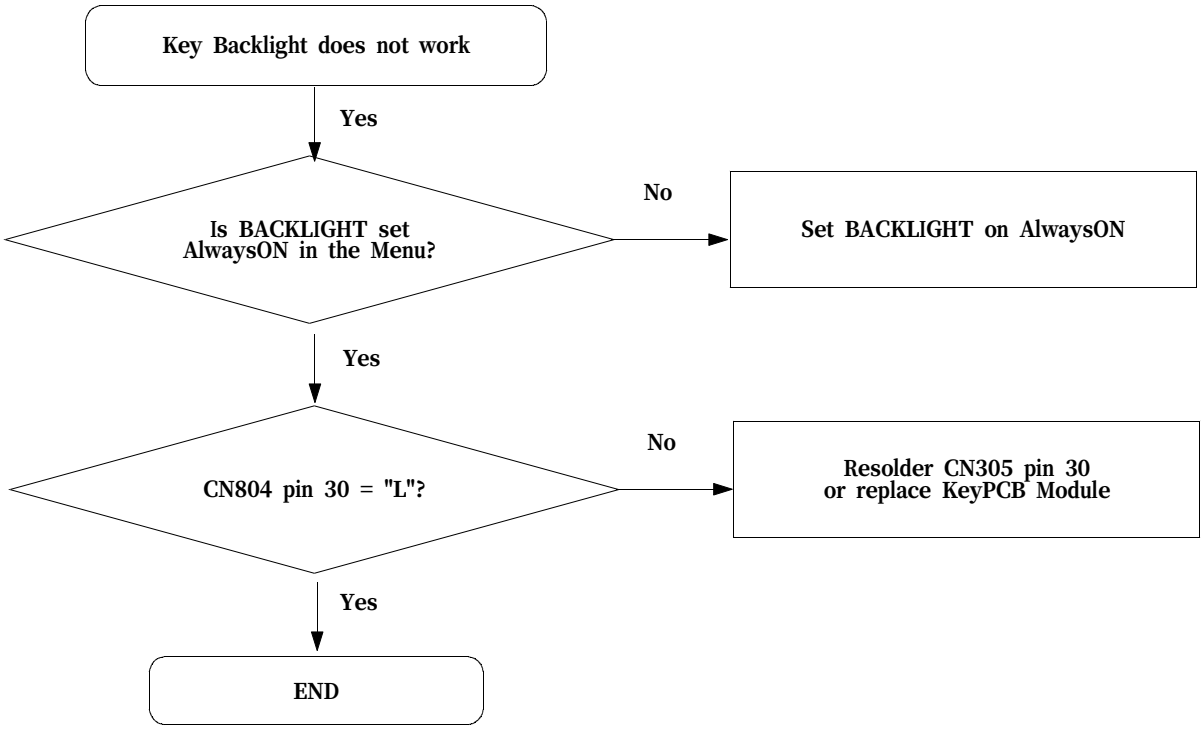
9. Key Back Light



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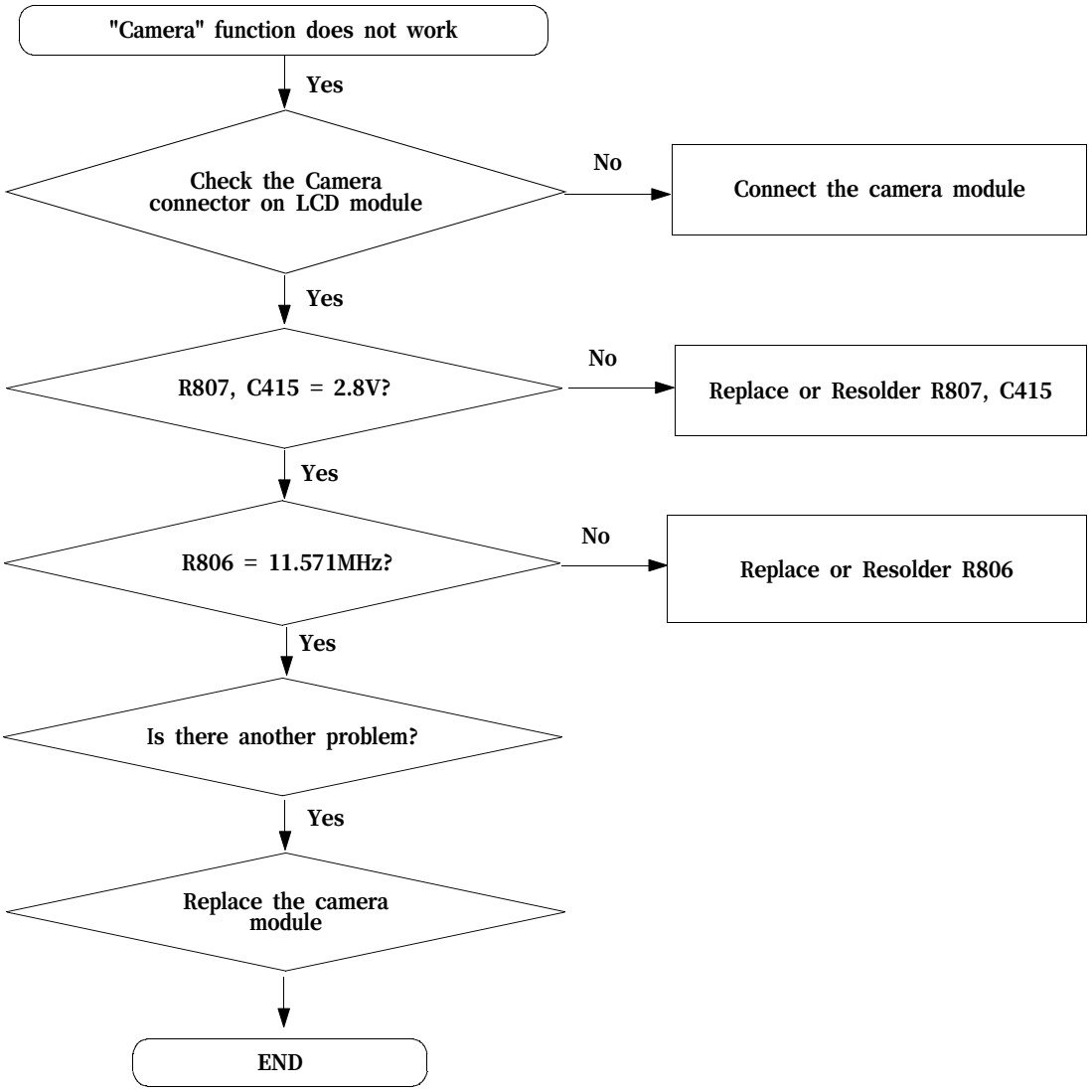
10. Camera part



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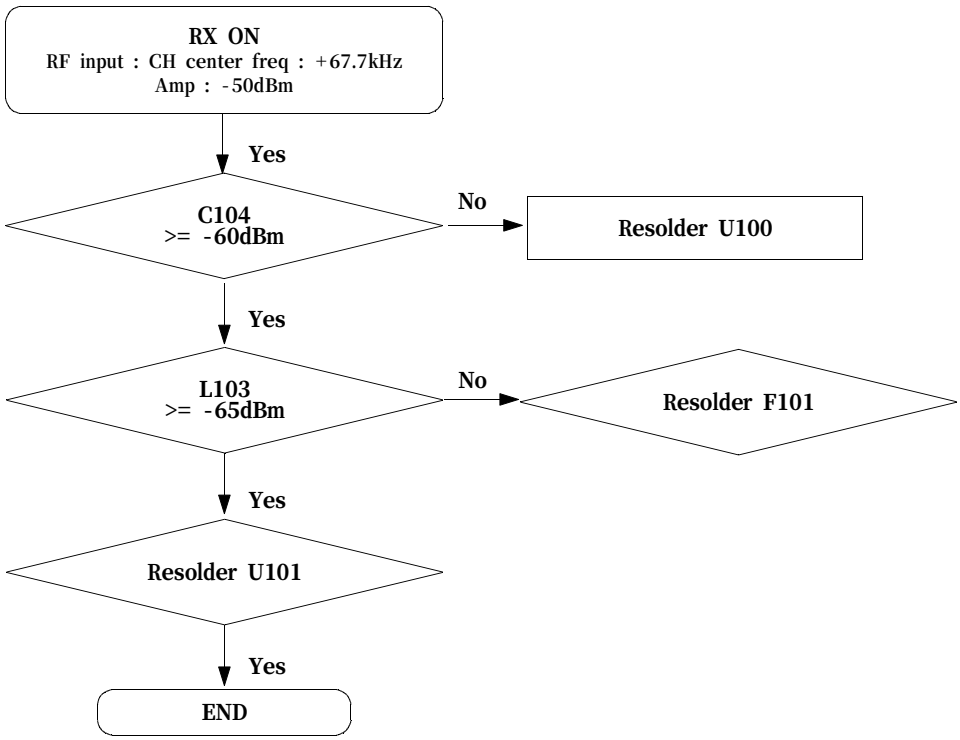
11. GSM Receiver



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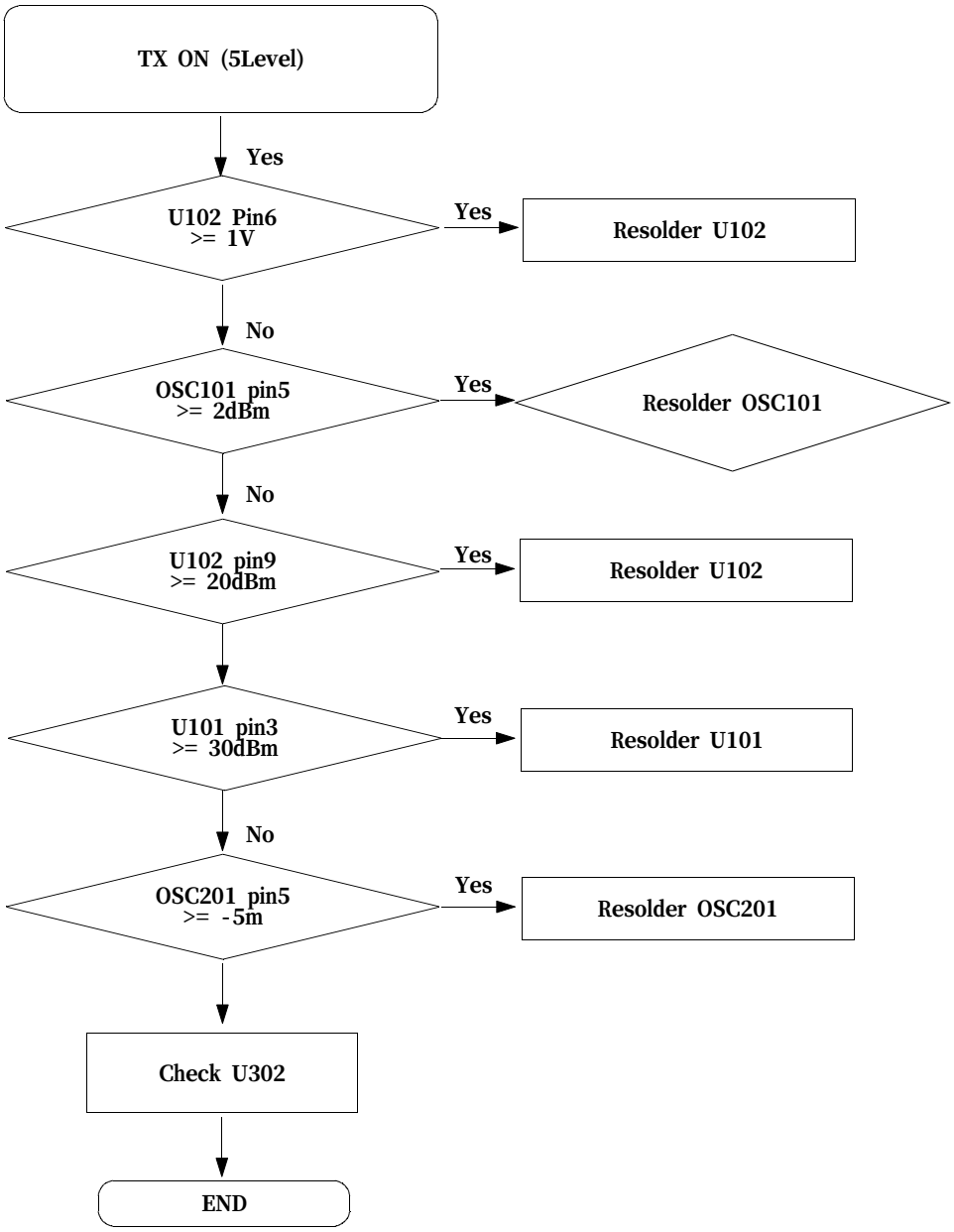
12. GSM Transmitter



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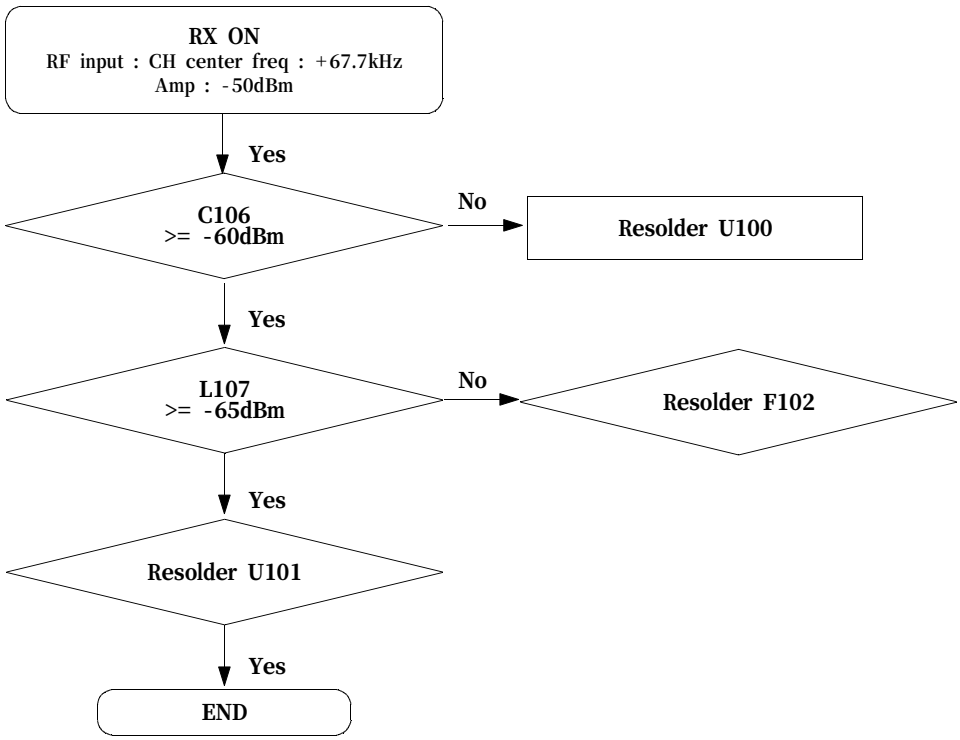
13. DCS Receiver



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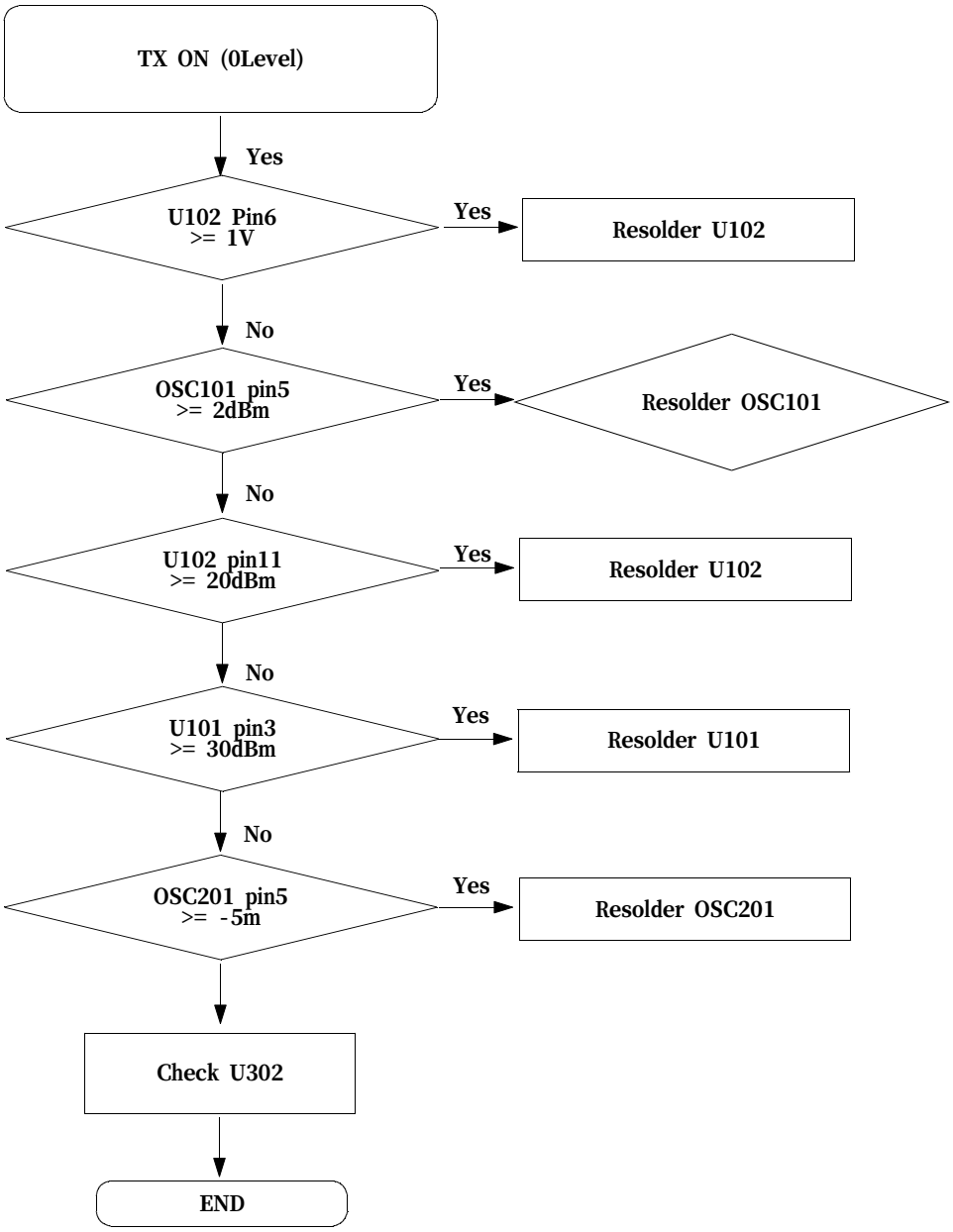
14. DCS Transmitter



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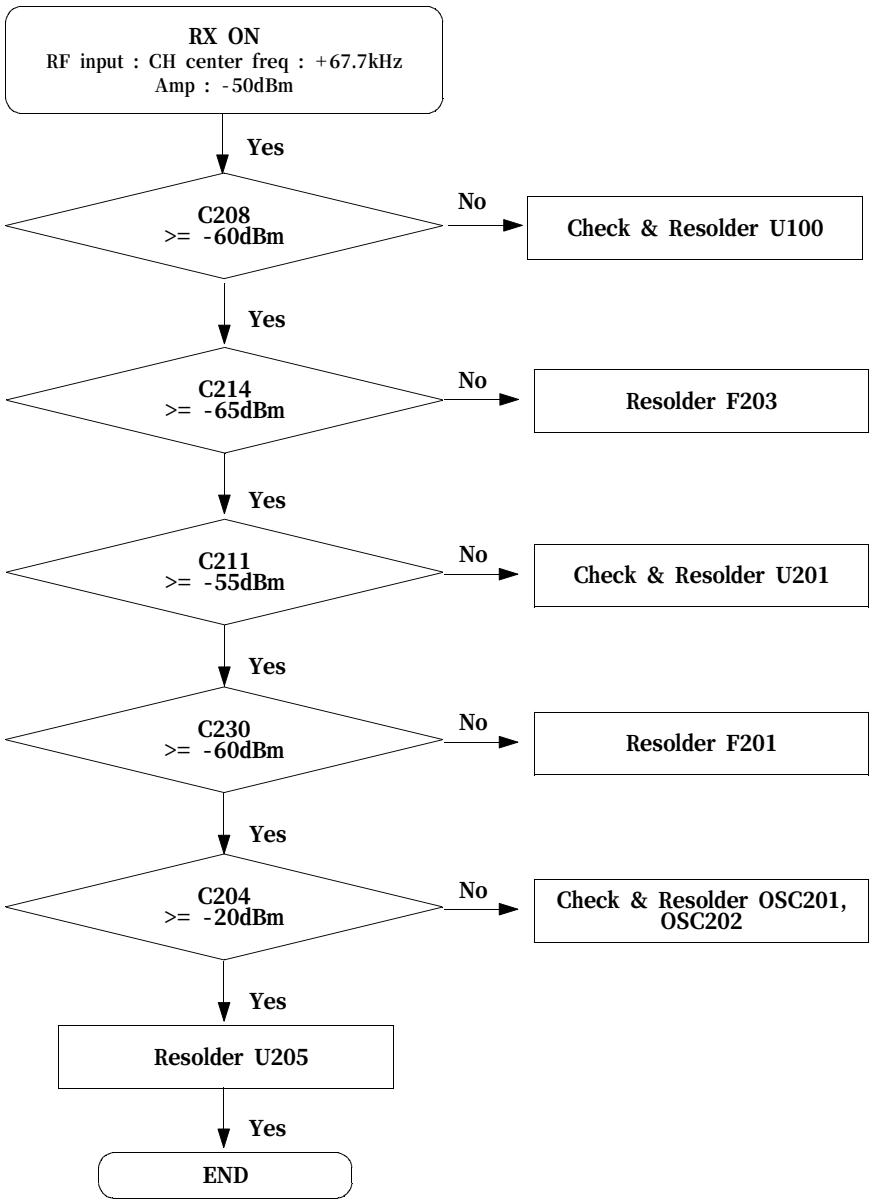
15. WCDMA Receiver



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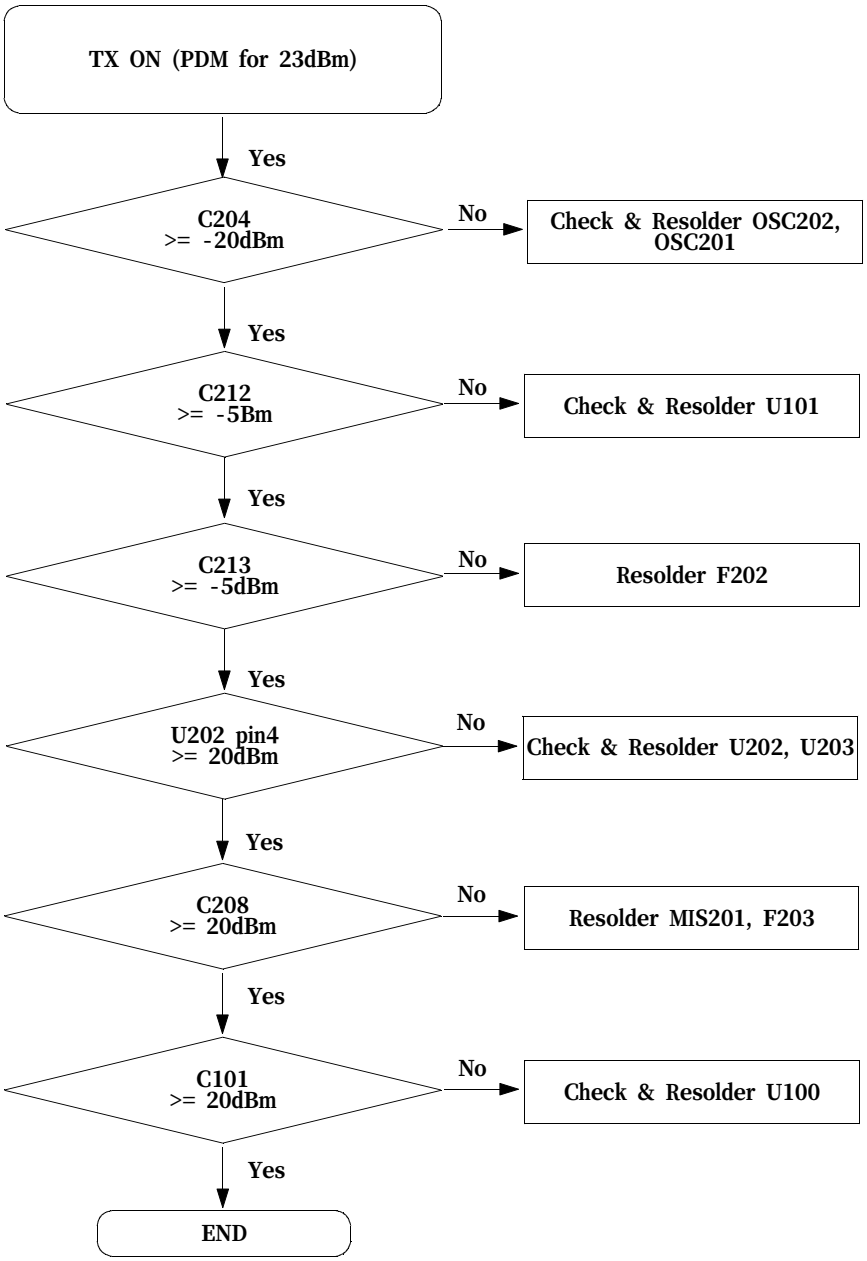
16. WCDMA Transmitter



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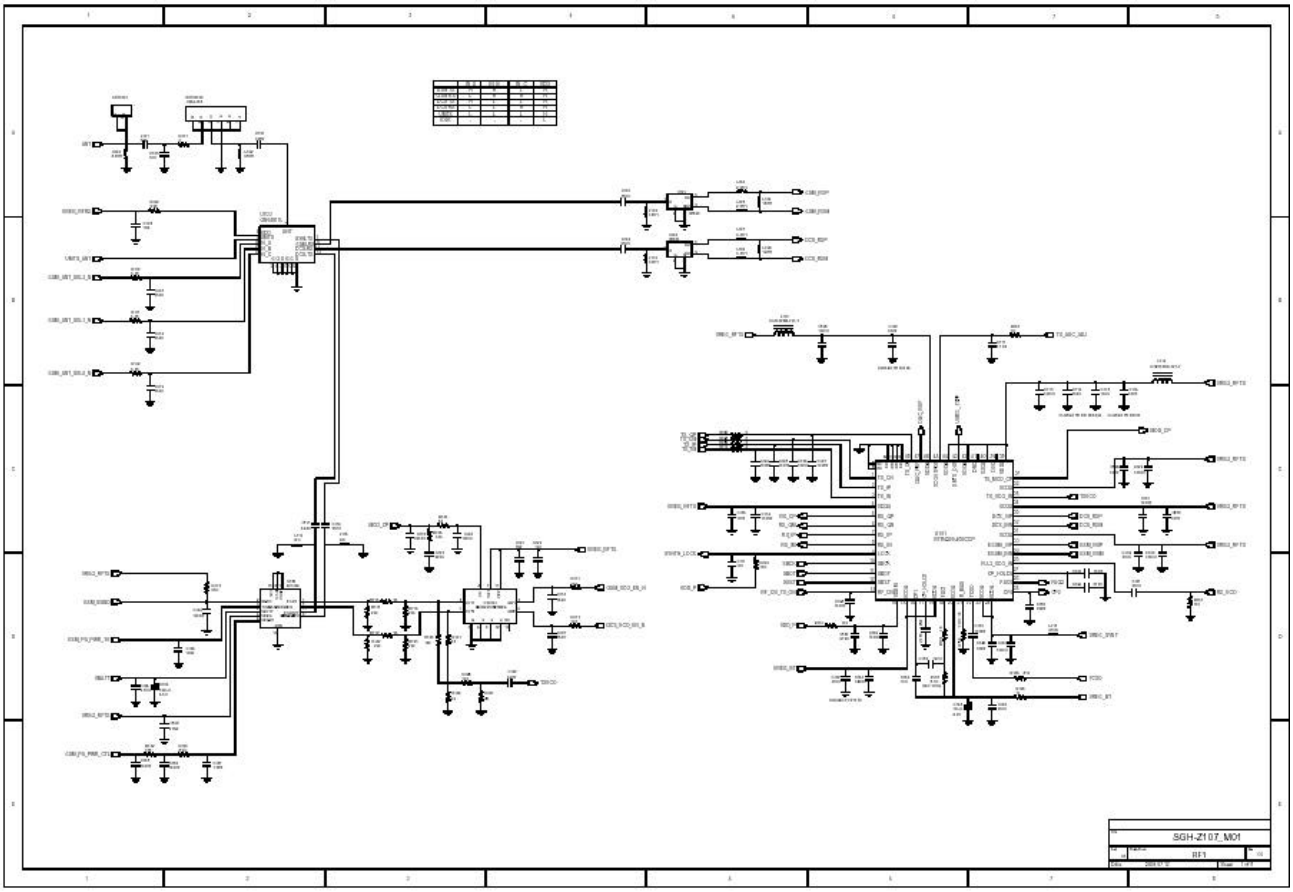
Transmitter



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