

**SAMSUNG**

# GSM TELEPHONE SGH-E316

# **SERVICE** *Manual*

## GSM TELEPHONE



## CONTENTS

1. General Introduction
2. Specification
3. Circuit Description
4. Test Command & Test Procedure
5. Flow Chart of Troubleshooting
6. Exploded Views and Parts List
7. Electrical Parts List
8. Block Diagrams
9. PCB Diagrams



**ELECTRONICS**

This Service Manual is a property of Samsung Electronics Co.,Ltd.  
Any unauthorized use of Manual can be punished under applicable  
International and/or domestic law.

© Samsung Electronics Co.,Ltd. JUNE. 2004  
Printed in Korea.

Code No.: GH68-05425A  
BASIC.

---

# 1. SGH-E316 General Introduction

---

The SGH-E316 Dual Band phone functions as digital phone working in GSM (Global System for Mobile communications)850 and PCS(Personal Communication System)1900 modes.

## <Specification>

- Dimension : 79x42x22 mm (with Standard Batt.
- Weight : 70g (with Standard Battery)
- LCD -.Internal LCD : 65K" TFT Color LCD (128 x 128), small LCD 65K TFT Color LCD
- R/F band : GSM850MHz+ PCS1900 MHz
- Vocoder : EFR + FR +AMR
- Antenna : Fixed type
- SIM : 3 Voltage operation

## <GPRS Factor>

- MS Class : Class B
- GPRS Phase : GSM Phase II+
- Multi-slot : Class 8 (1 Up-link, 4 Down-link, supporting PBCCH)
- SMG : SMG #31
- Coding scheme : CS 1 , CS 2, CS 3, CS 4 support  
(CS 3, CS 4: network dependant)
- Power class : GSM850 - Class 4 (2W)  
PCS1900 - Class 1 (1W)
  
- WAP 2.0 Browser
- SIM AT(Application Toolkit)
- 40 Polyphonic Ringtone

## < Basic Package >

- Handset + Standard Battery + TA  
+ Ear Phone

## < Option Item >

- Battery  
. Standard : Li-Ion, 800mA
- Travel Adapter
- Ear Microphone

---

## 2. SGH-E316 Specification

---

### 1. GSM General Specification

	GSM850	PCS1900
Freq. Band[MHz] Uplink/Downlink	824~849 869~894	1850~1910 1930~1990
ARFCN range	128~251	512~810
Tx/Rx spacing	45MHz	80MHz
Mod. Bit rate/ Bit Period	270.833kbps 3.692us	270.833kbps 3.692us
Time Slot Period/Frame Period	576.9us 4.615ms	576.9us 4.615ms
Modulation	0.3GMSK	0.3GMSK
MS Power	33dBm~13dBm	30dBm~0dBm
Power Class	5pcl~15pcl	0pcl ~ 15pcl
Sensitivity	-102dBm	-100dBm
TDMA Mux	8	8
Cell Radius	35km	-

## 2. GSM TX power class

TX Power control level	GSM900
5	$33 \pm 2\text{dBm}$
6	$31 \pm 2\text{dBm}$
7	$29 \pm 2\text{dBm}$
8	$27 \pm 2\text{dBm}$
9	$25 \pm 2\text{dBm}$
10	$23 \pm 2\text{dBm}$
11	$21 \pm 2\text{dBm}$
12	$19 \pm 2\text{dBm}$
13	$17 \pm 2\text{dBm}$
14	$15 \pm 2\text{dBm}$
15	$13 \pm 2\text{dBm}$
16	$11 \pm 2\text{dBm}$
17	$9 \pm 2\text{dBm}$
18	$7 \pm 2\text{dBm}$
19	$5 \pm 2\text{dBm}$

TX Power control level	PCS1900
0	$30 \pm 3\text{dBm}$
1	$28 \pm 3\text{dBm}$
2	$26 \pm 3\text{dBm}$
3	$24 \pm 3\text{dBm}$
4	$22 \pm 3\text{dBm}$
5	$20 \pm 3\text{dBm}$
6	$18 \pm 3\text{dBm}$
7	$16 \pm 3\text{dBm}$
8	$14 \pm 3\text{dBm}$
9	$12 \pm 4\text{dBm}$
10	$10 \pm 4\text{dBm}$
11	$8 \pm 4\text{dBm}$
12	$6 \pm 4\text{dBm}$
13	$4 \pm 4\text{dBm}$
14	$2 \pm 5\text{dBm}$
15	$0 \pm 5\text{dBm}$

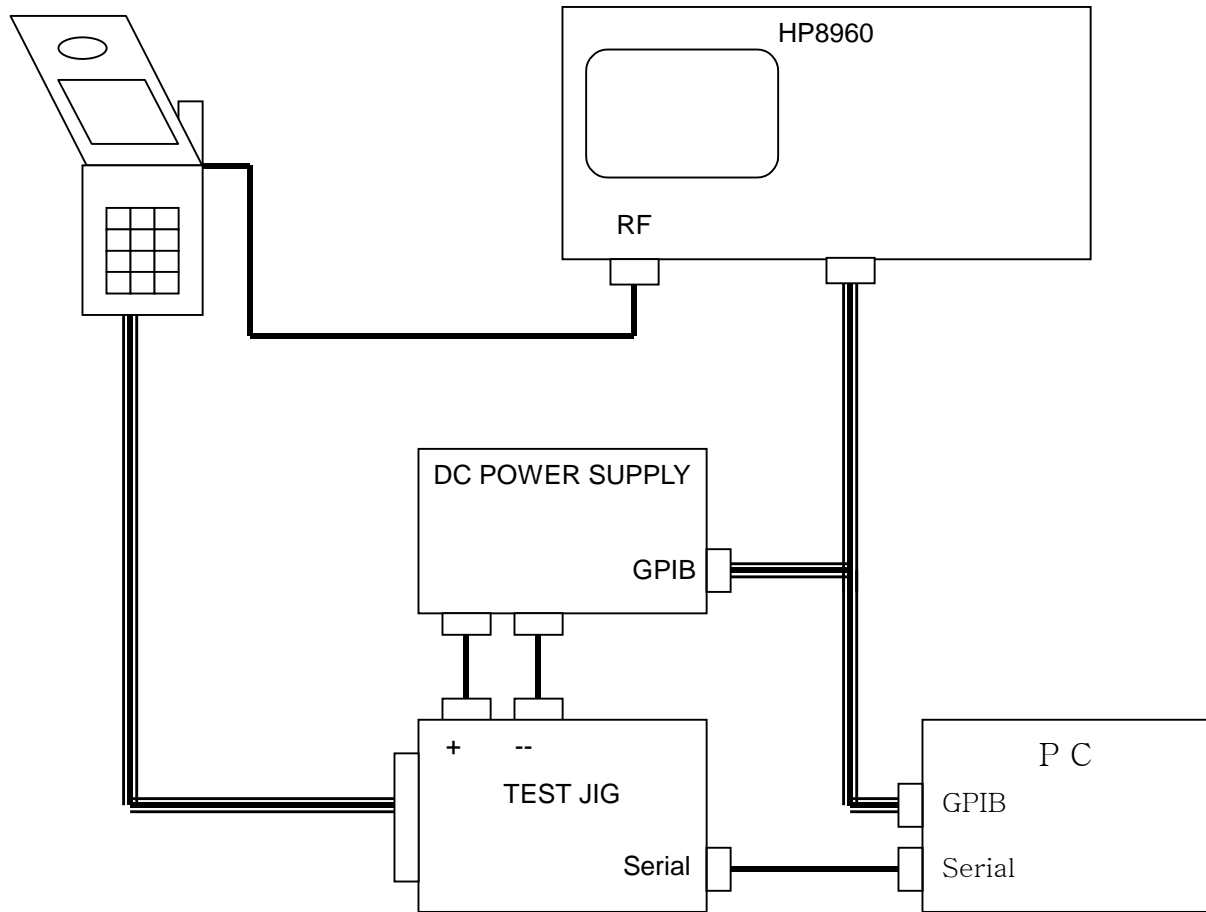
---

## 4. SGH-E316 Test Command & Test Procedure

---

### 1. Calibration Equipment

- HP 8960
- DC Power Supply
- Test Jig
- Configuration



### 2. Calibration Program

- Samsung internal software

### 3. Tx Power Tune up Procedure

1) Procedure:

- a. Calibration equipment HP8960 and the cell phone are connected through RF cable.
- b. Target power ( required power level according to the specification which should be set by calibration program) is set to equipment as power level (ex: GSM 5 level is 32.5 dBm).
- c. Activate phone in Tx\_Mode\_Only.
- d. HP8960 equipment measures transmitted power through rf test cable from the phone and reports measured level to calibration program.
- e. The program compares measured power with the target power.
- f. The calibration program decides power code which is defined in advance in the program and writes the codes to the flash memory in the phone.

2) Target value is defined according to the value of GSM specification.

See the TX power level definition table below.

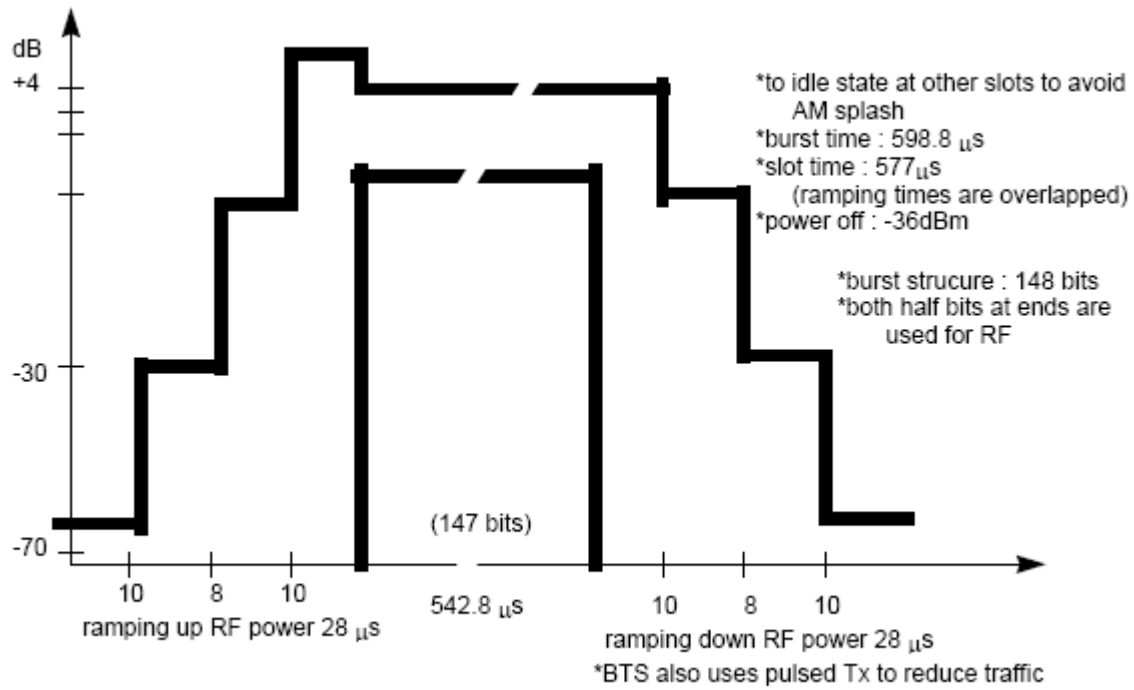
3) Target values of the peak level of the phone are set normally in conducted mode

- GSM 5 level : 32.5dBm
- PCS 0 level : 29.5dBm (Tolerance : -2dB ~ +1dB )

4) Accuracy

All the TX level from the phone after tuned-up satisfy the GSM specification

5) TX ramp mask specification applied to the calibration program:

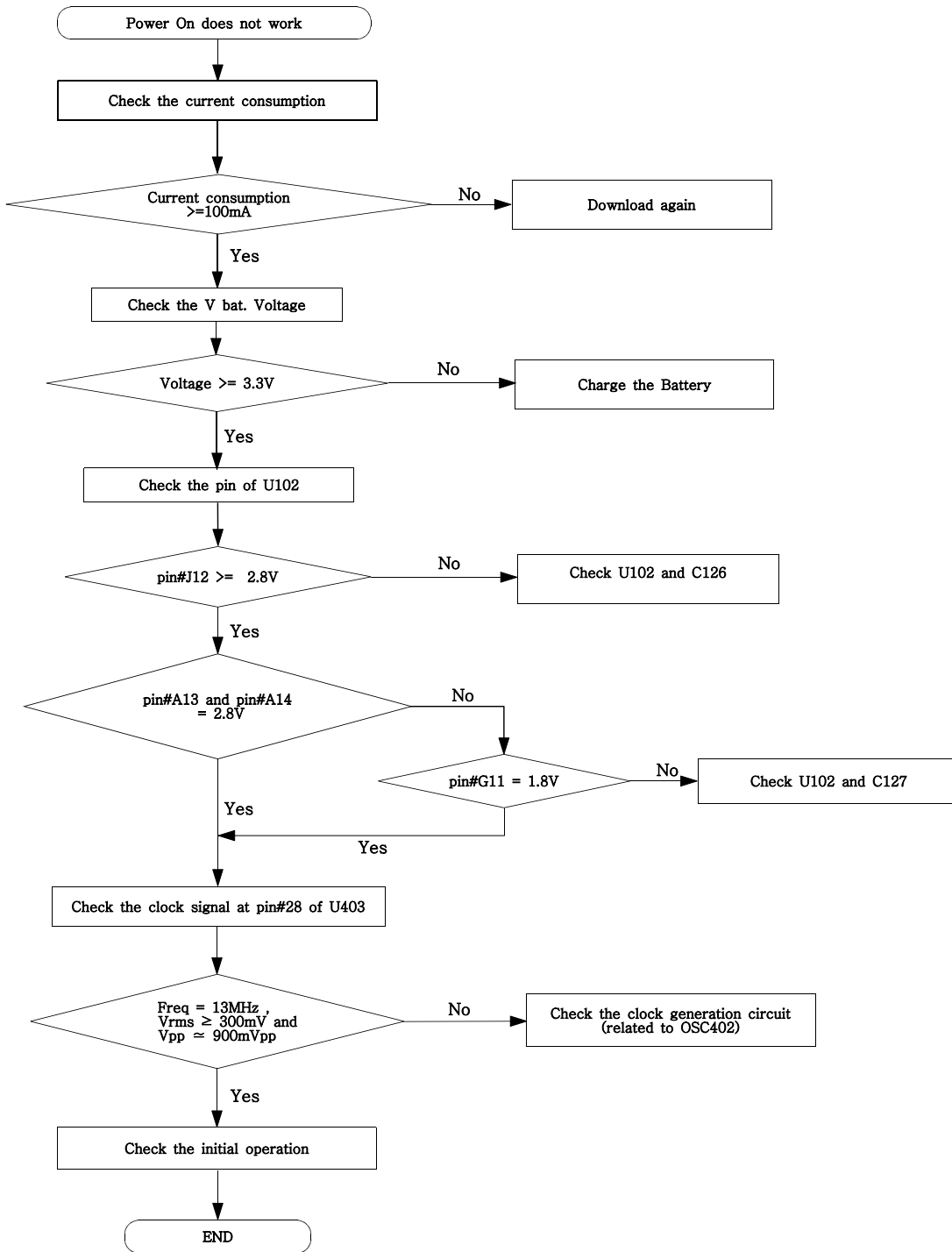




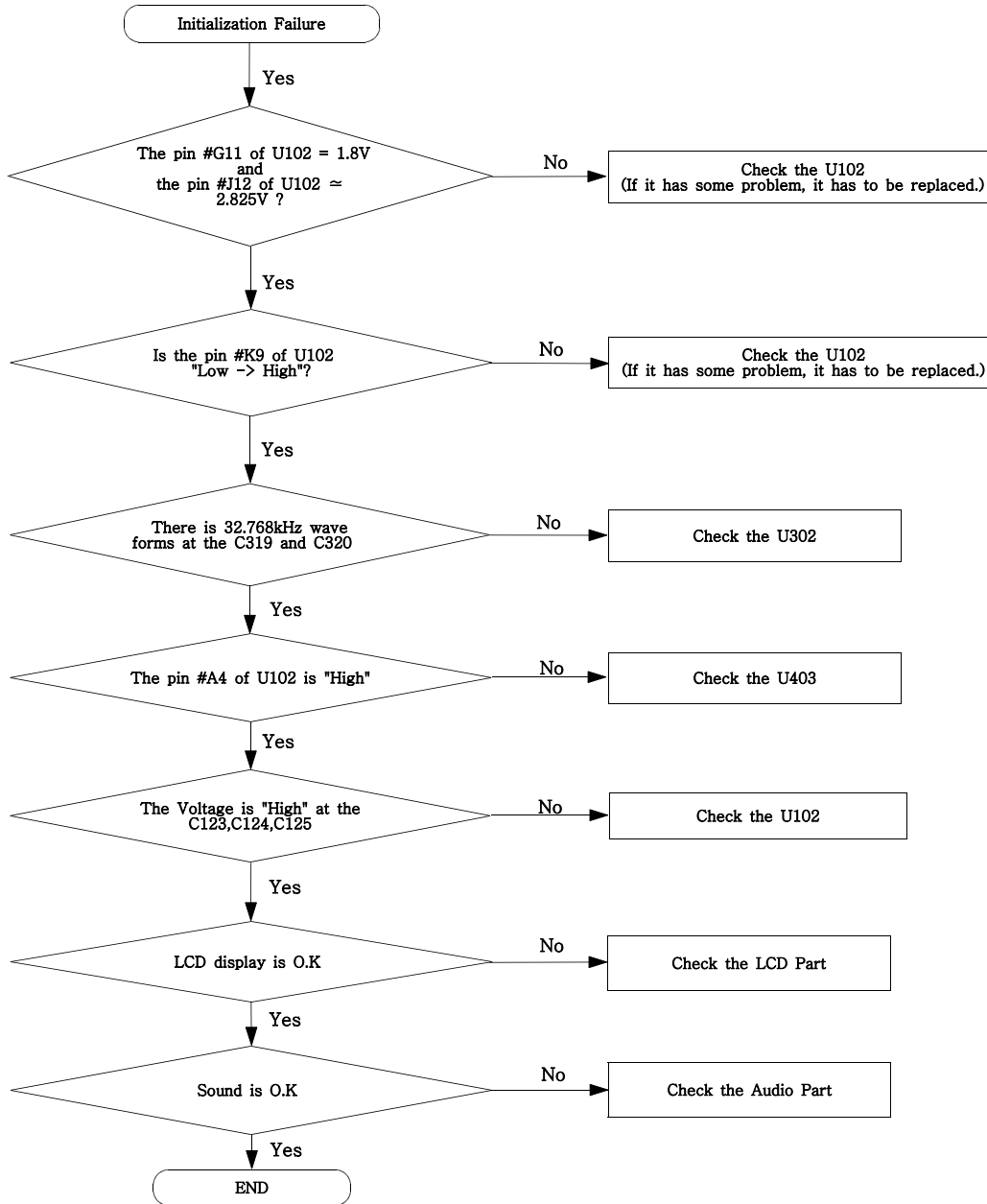
# 5. SGH-E316 Flow Chart of Troubleshooting

## 1. Baseband

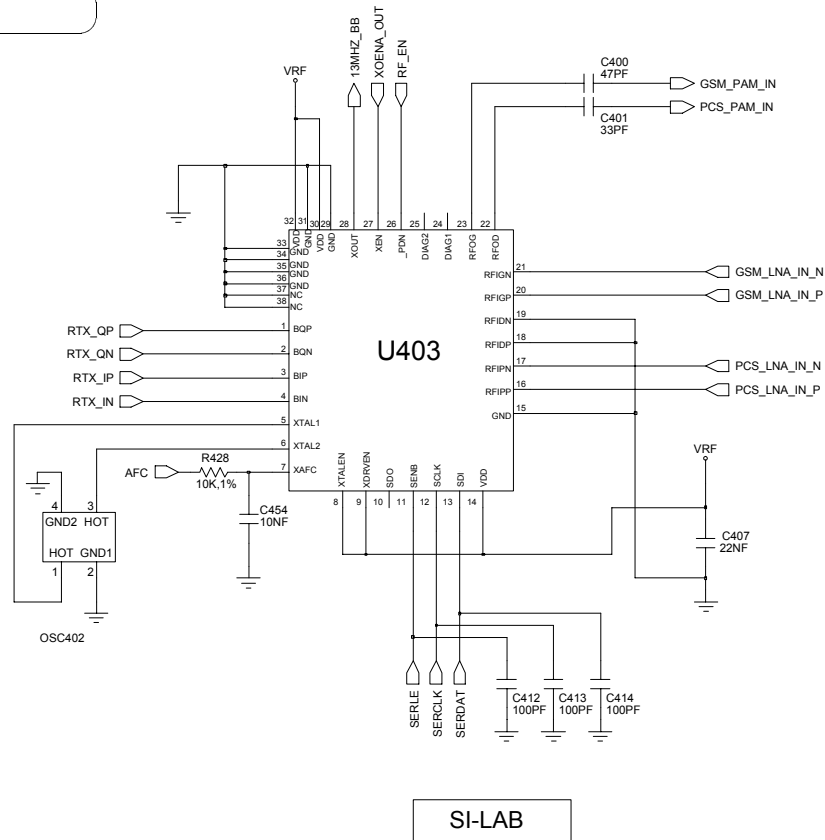
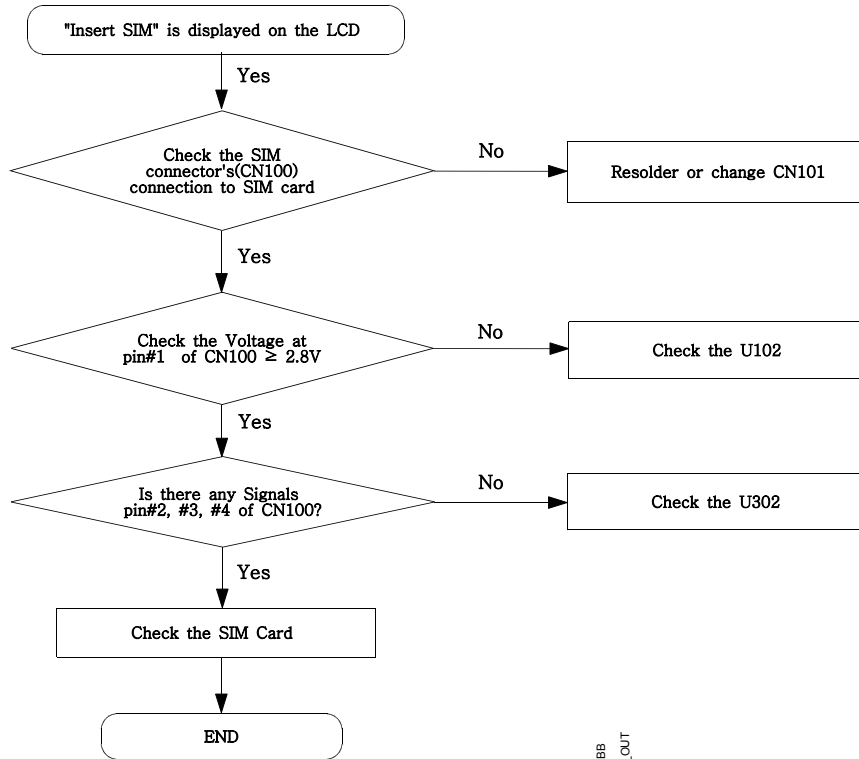
### 1. Power ON



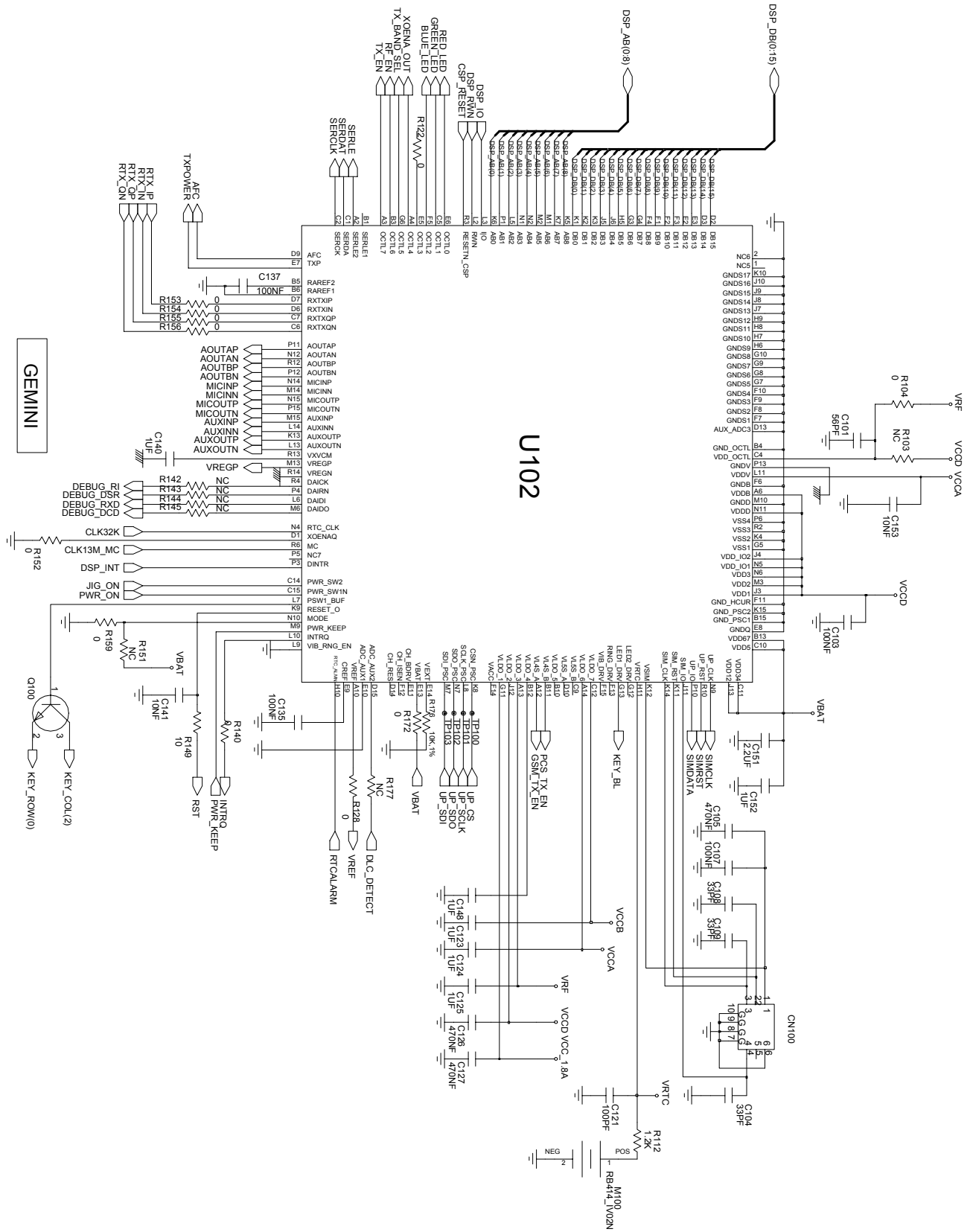
2. Initial



### 3. Sim Part

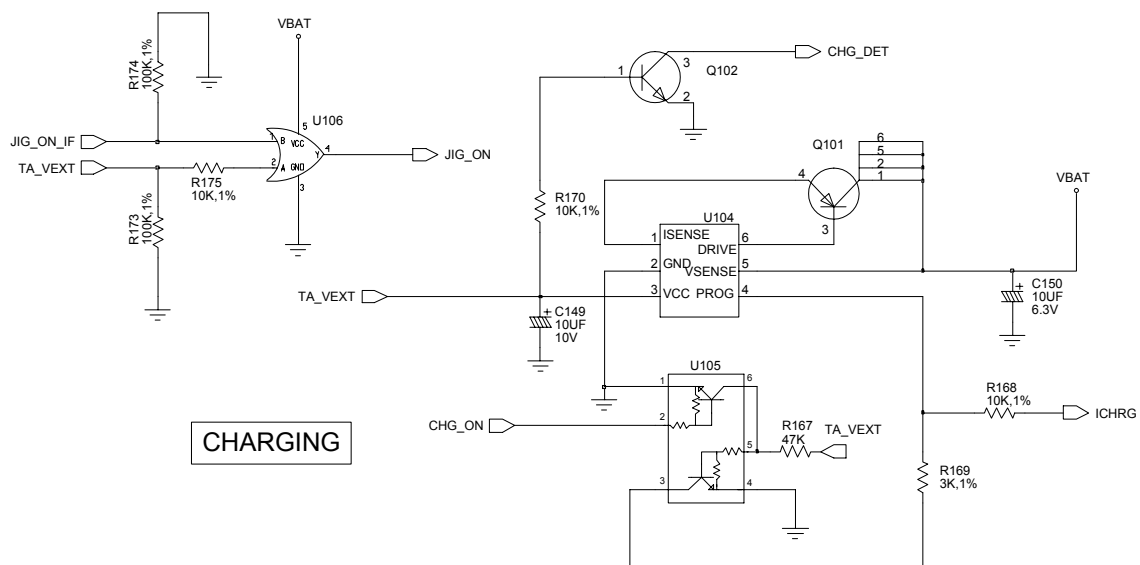
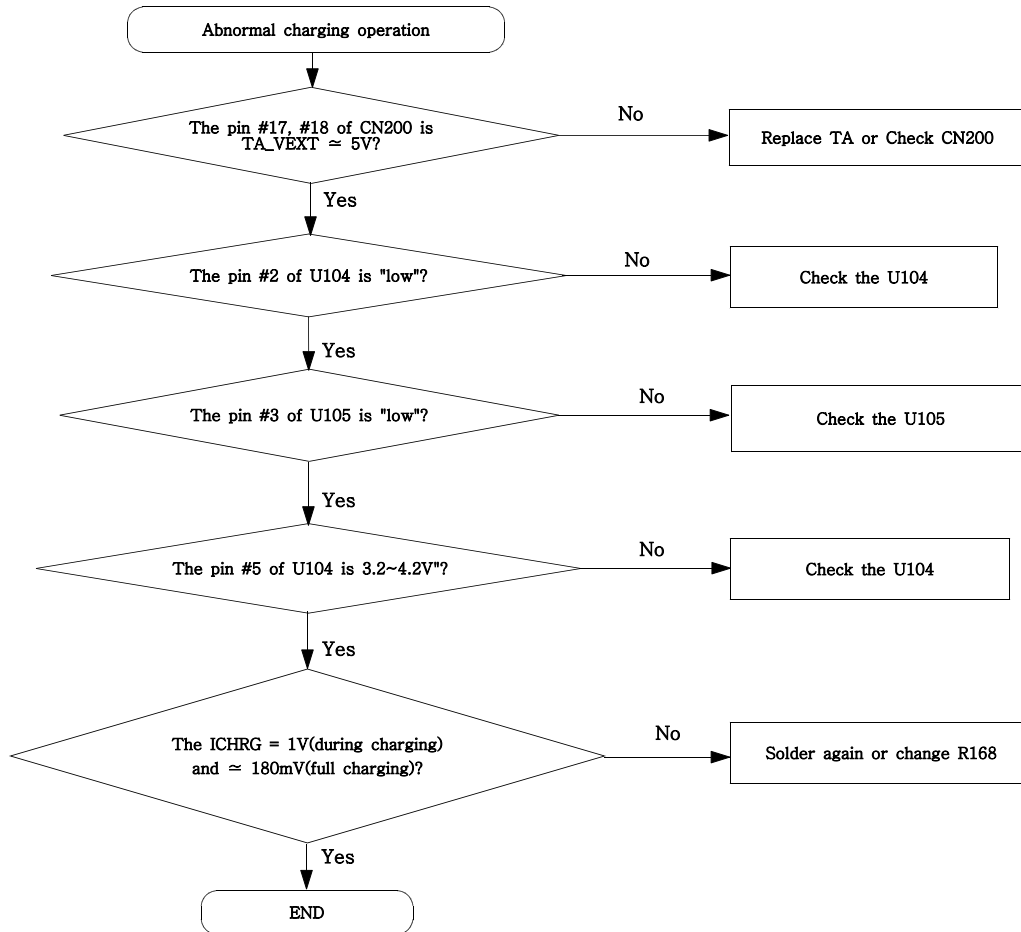


(Picture 1)

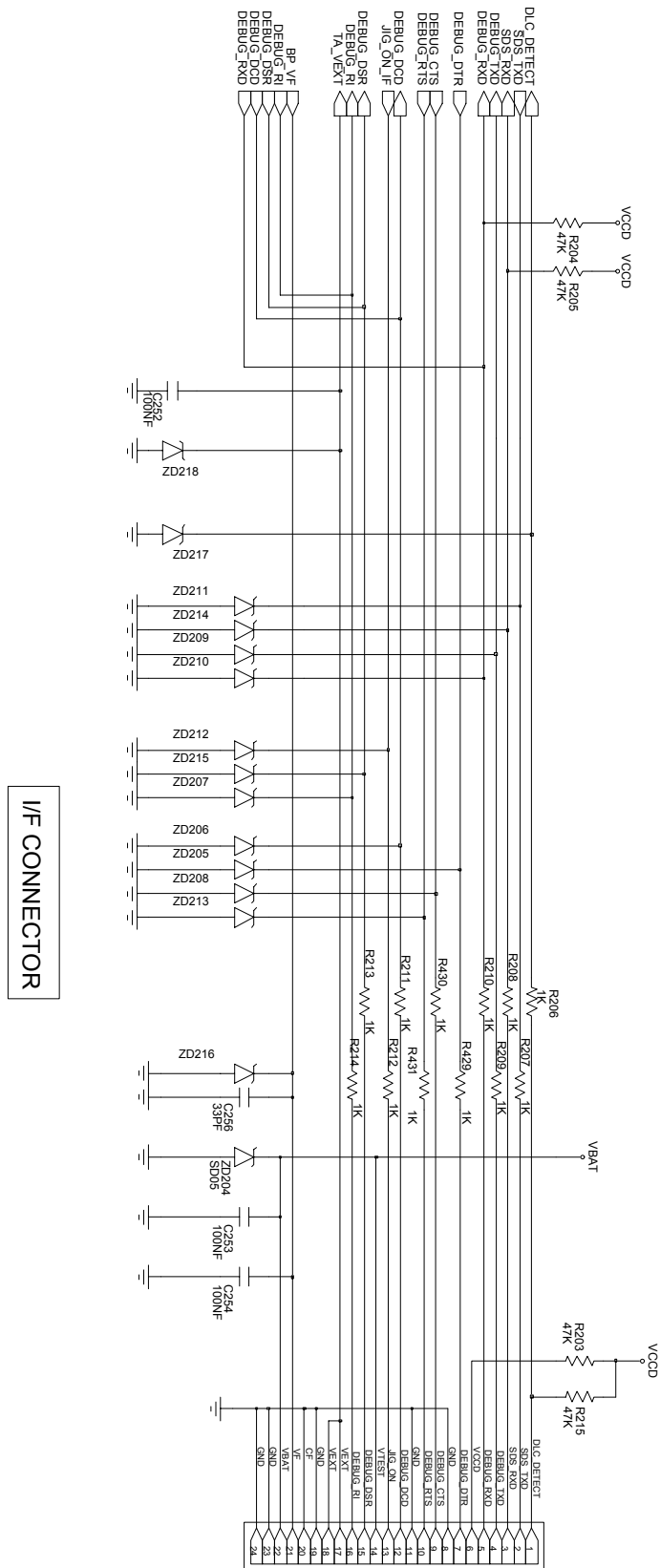


(Picture 2)

### 4. Charging Part

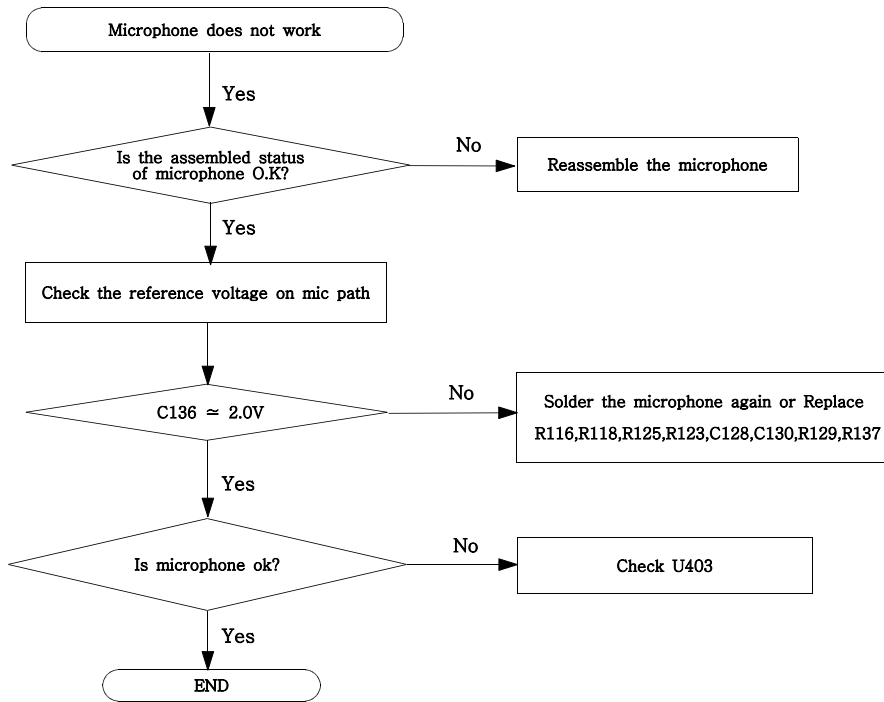


(Picture 1)

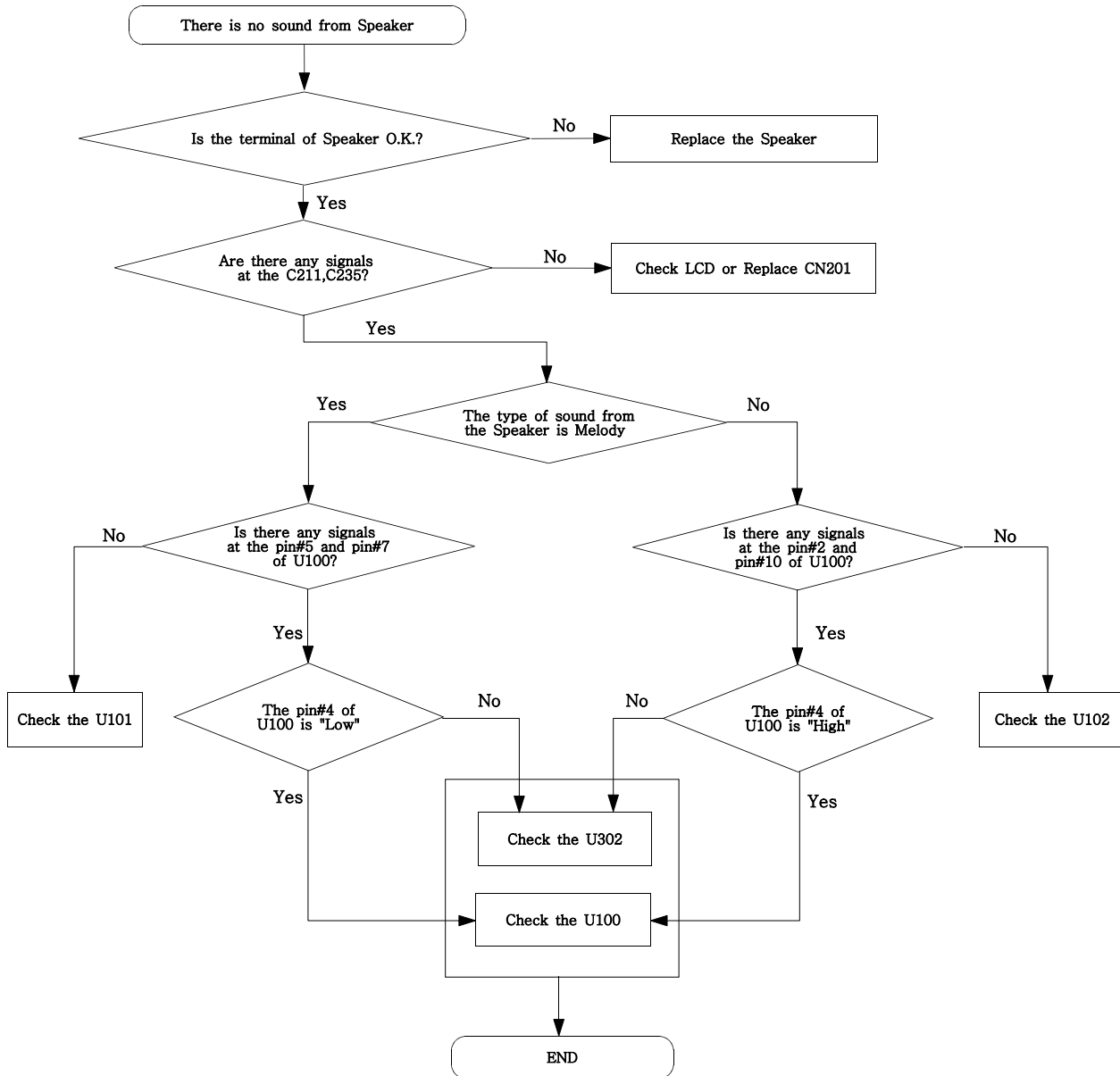


(Picture 2)

### 5. Microphone Part

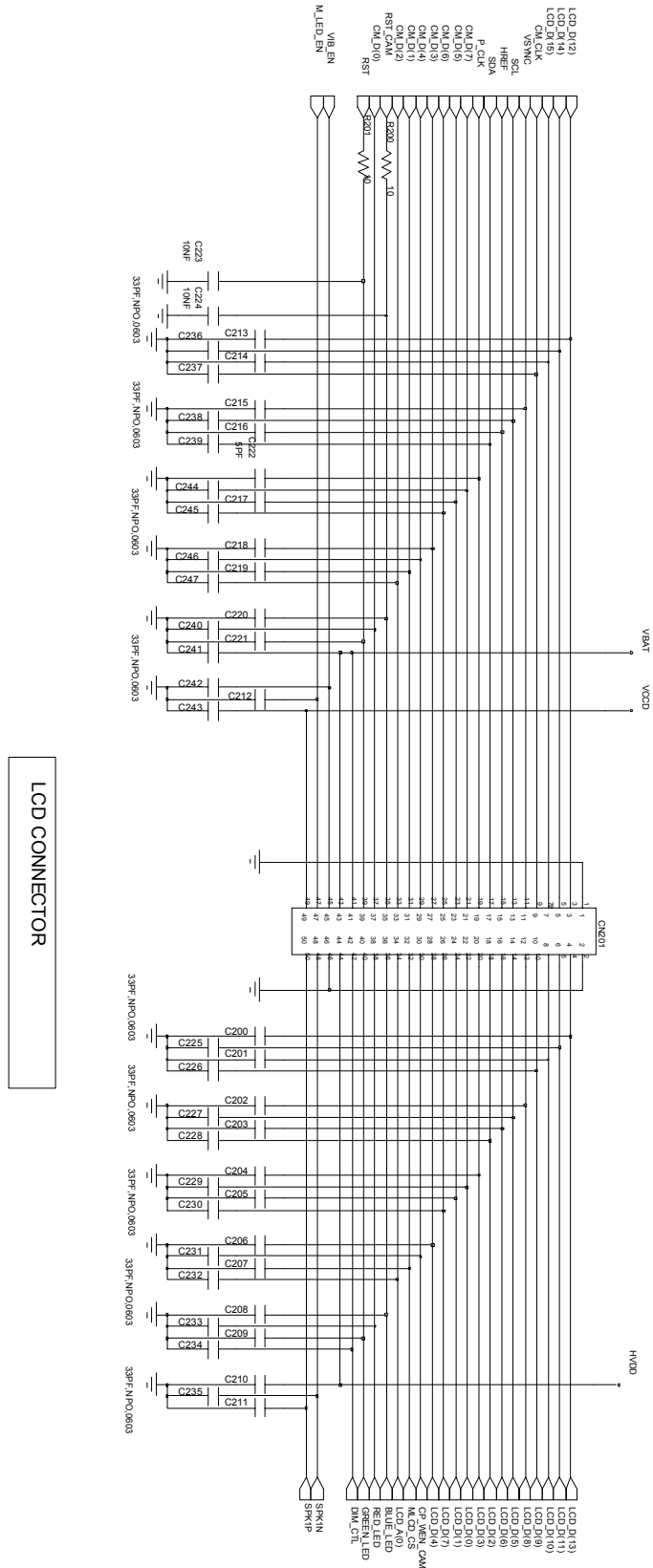


## 6. Speaker Part



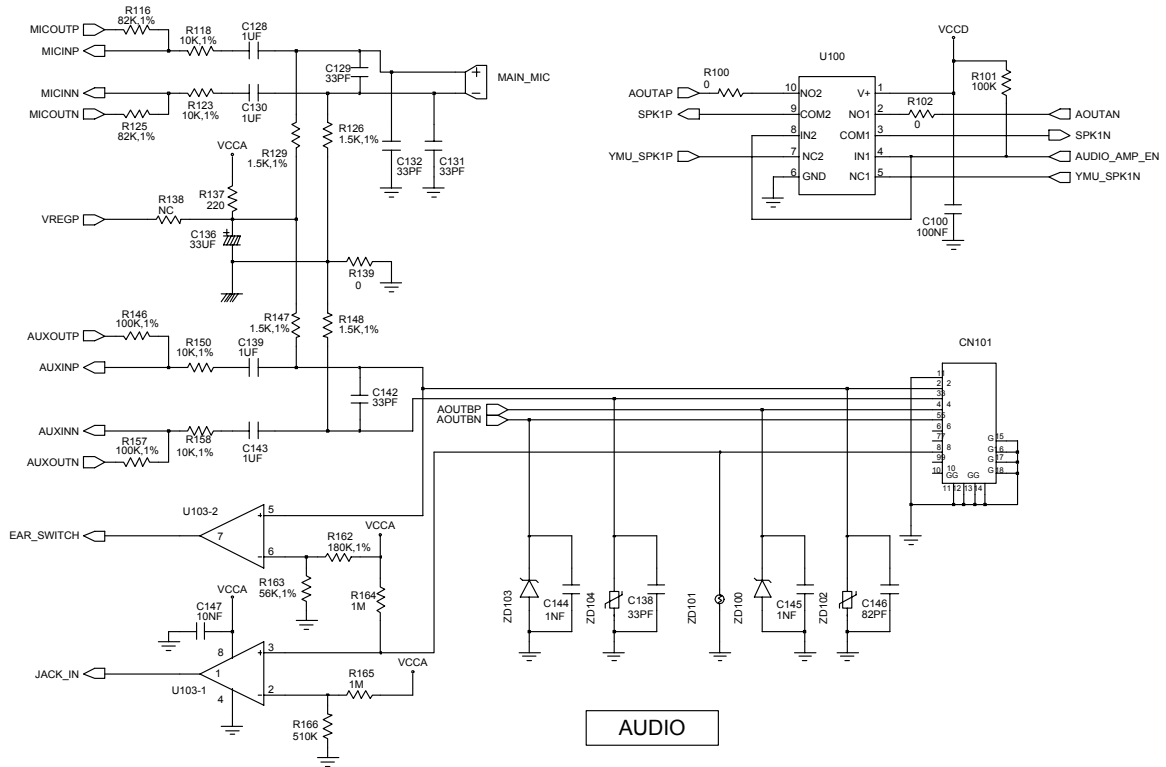


# SGH-E316 Flow Chart of Troubleshooting and Circuit Diagrams

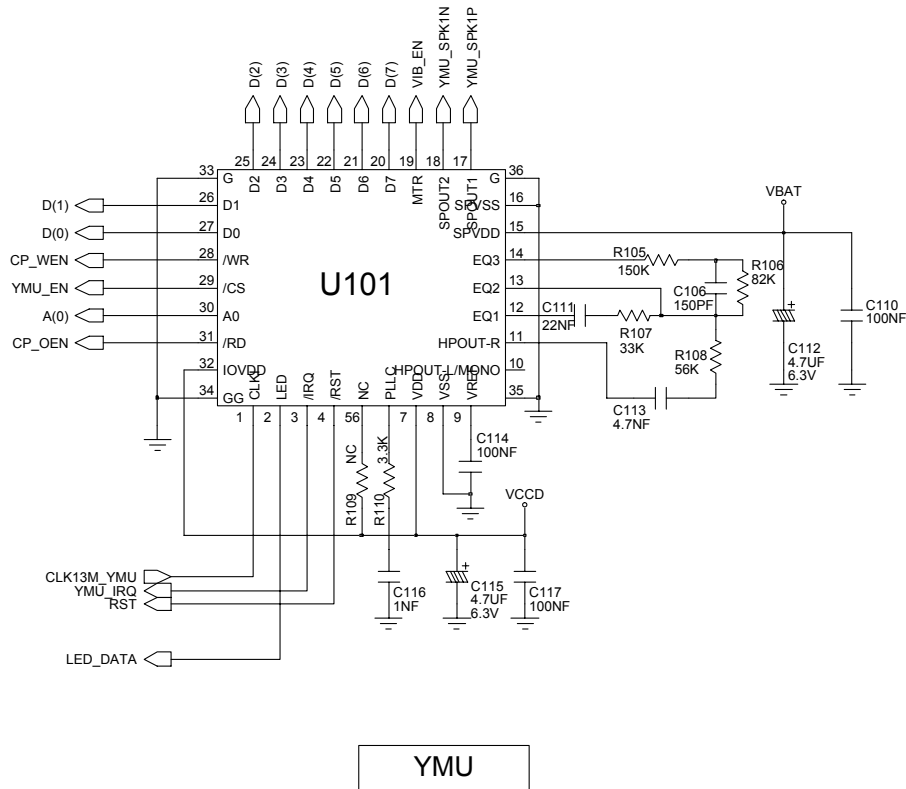


(Picture 1)

# SGH-E316 Flow Chart of Troubleshooting and Circuit Diagrams

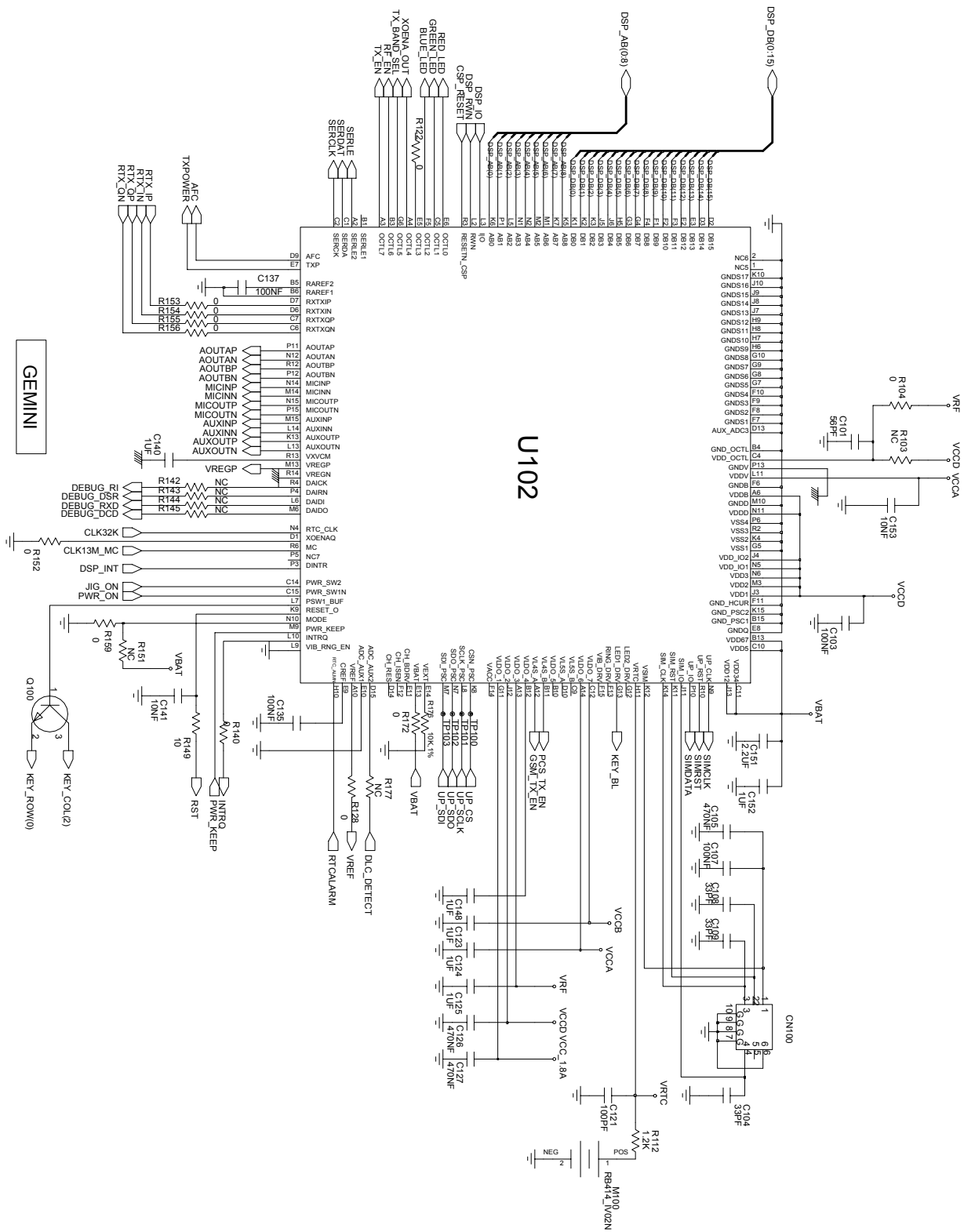


(Picture 2)



(Picture 3)

# SGH-E316 Flow Chart of Troubleshooting and Circuit Diagrams

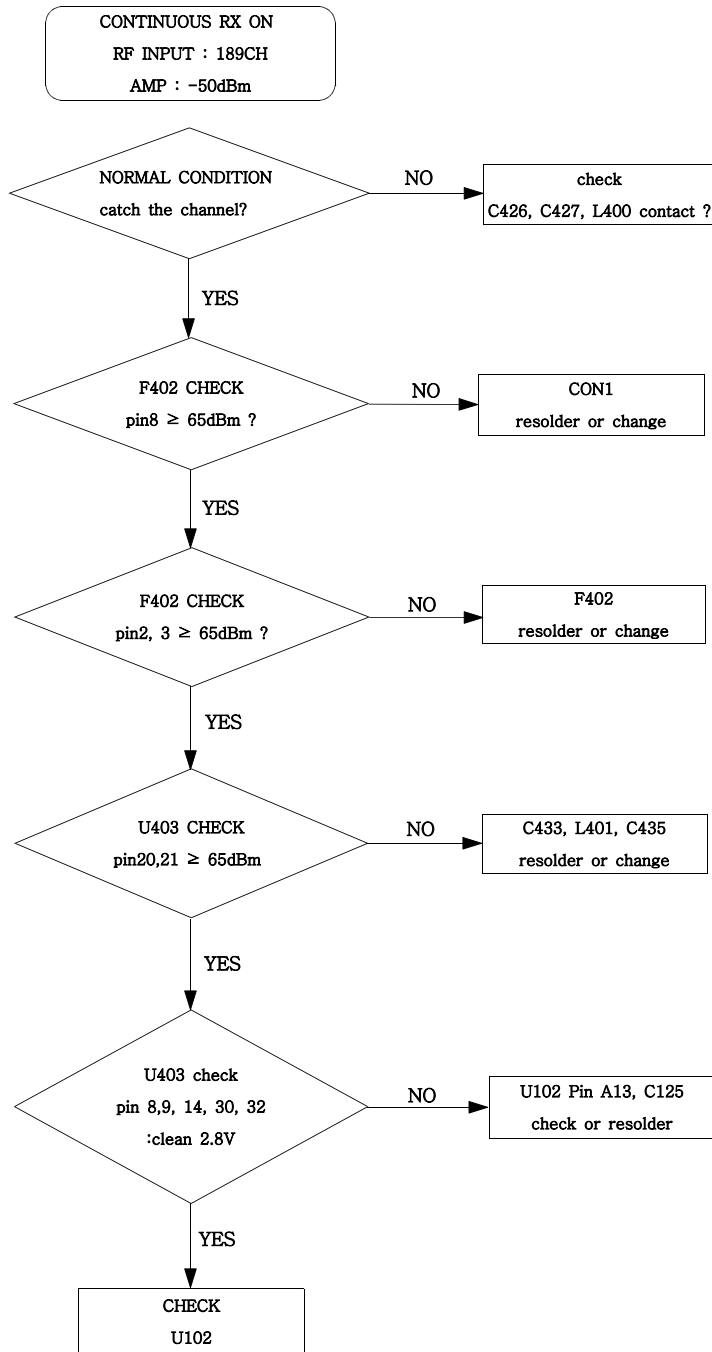


(Picture 4)

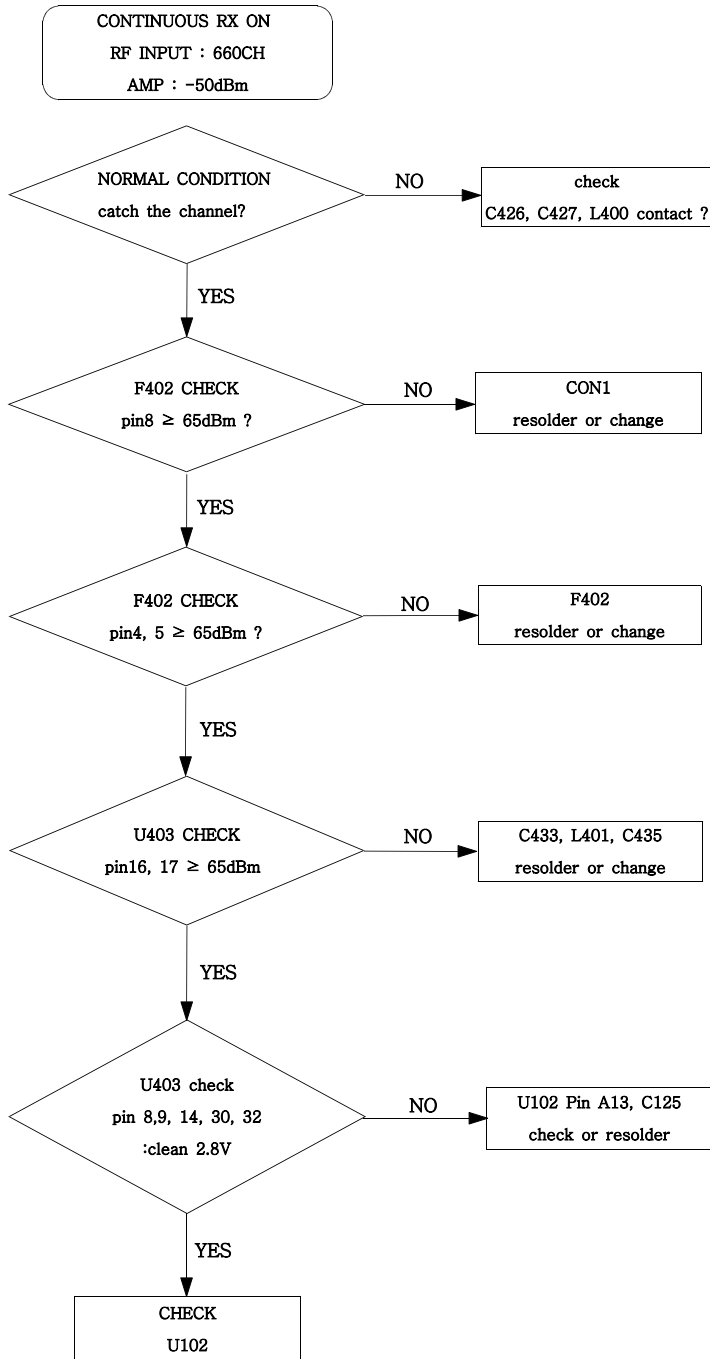


## 2.RF

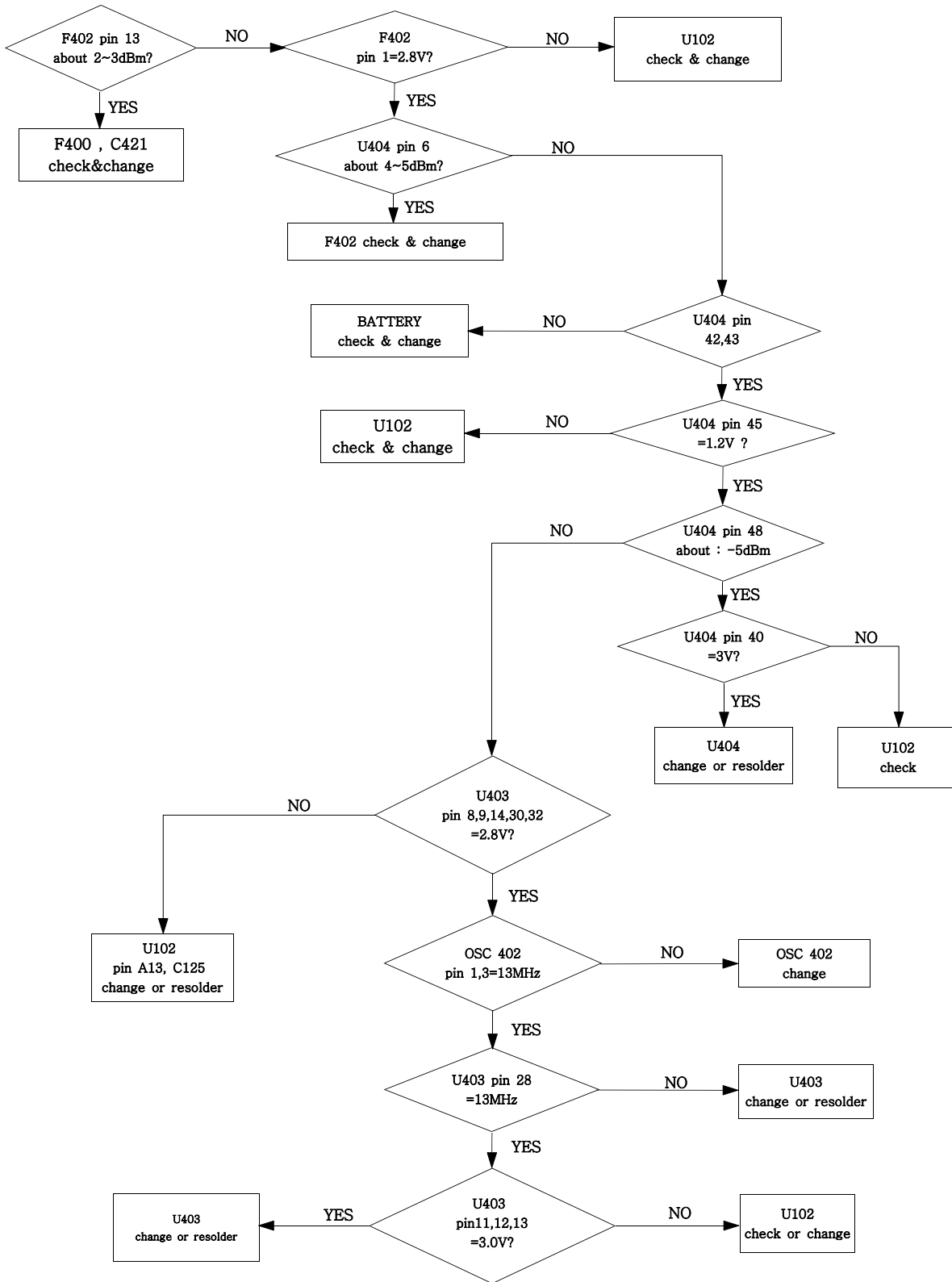
### 1. GSM RX



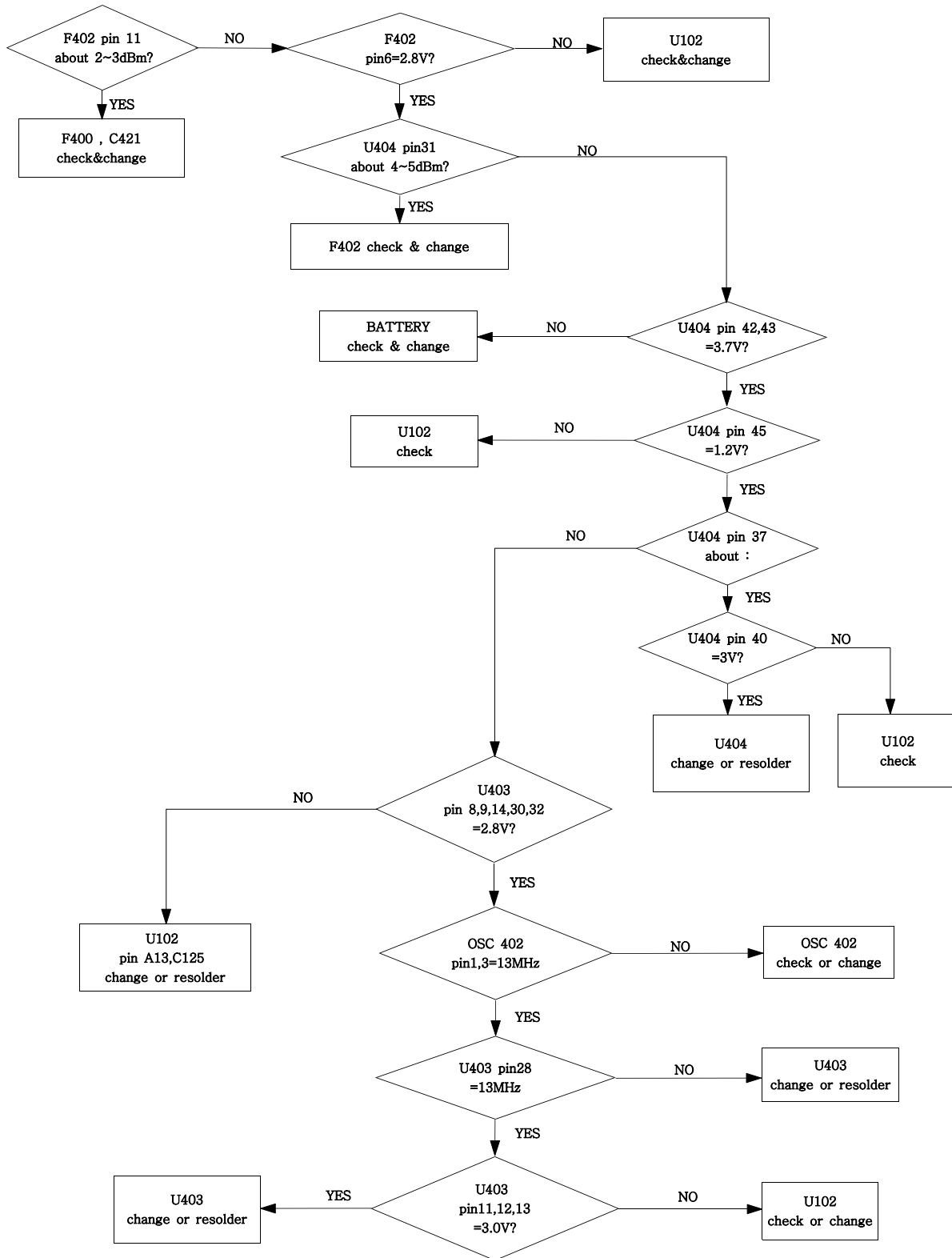
2. PCS RX



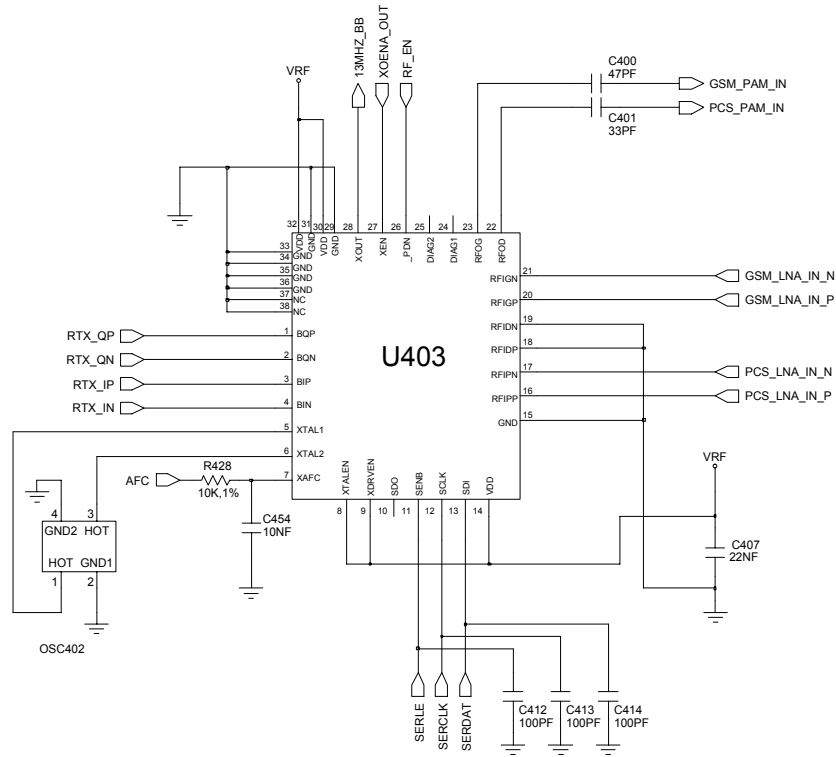
### 3. GSM TX



4. PCS TX

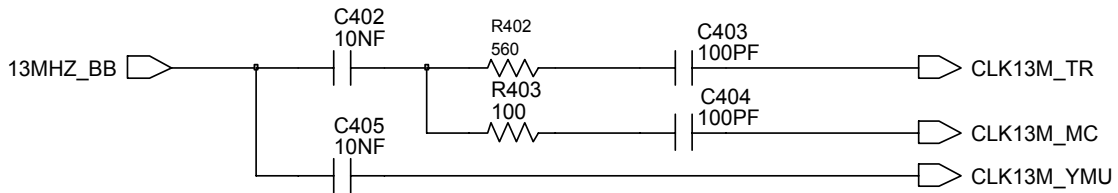






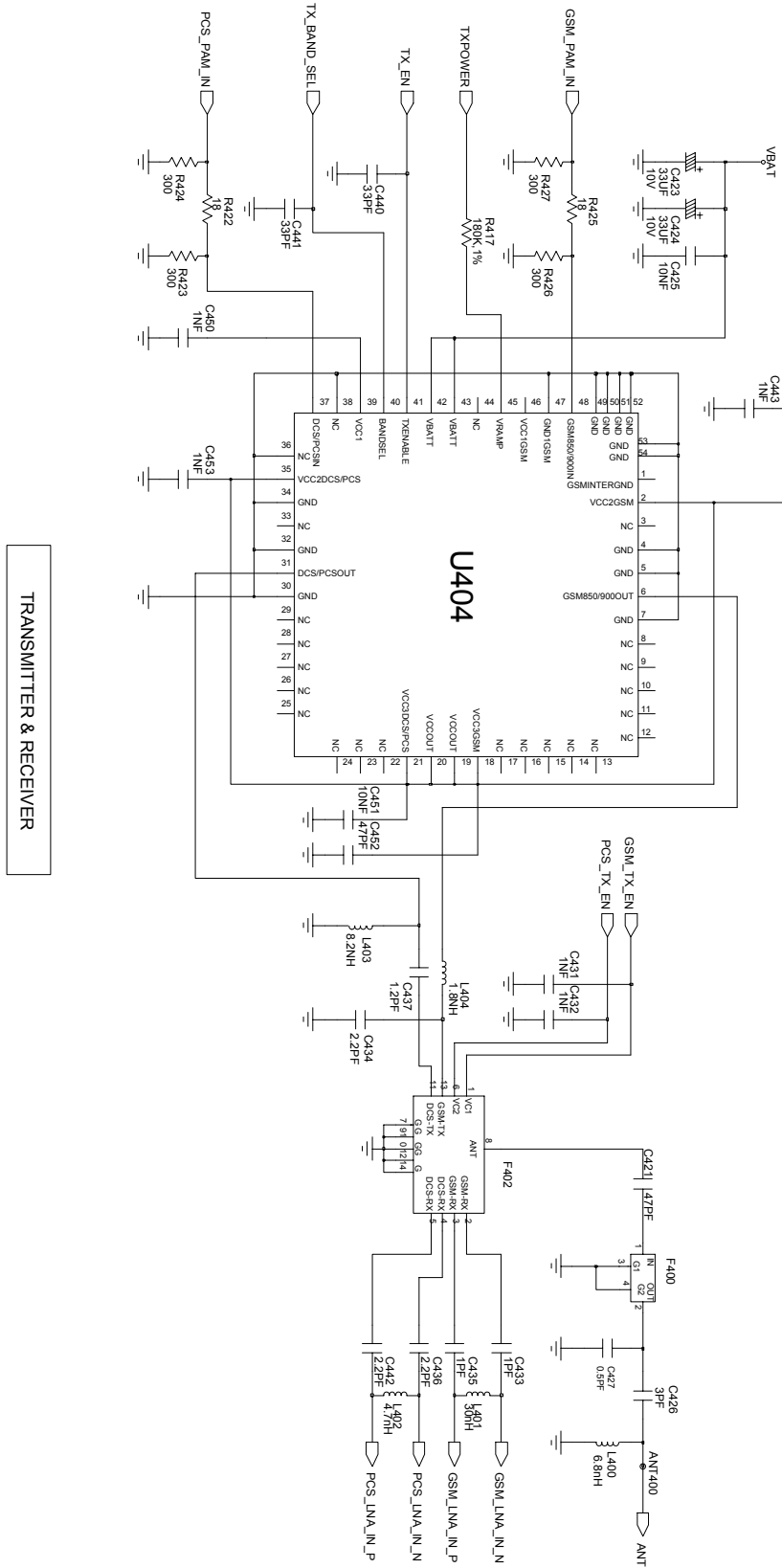
SI-LAB

(Picture 1)



X-TAL(13MHz)

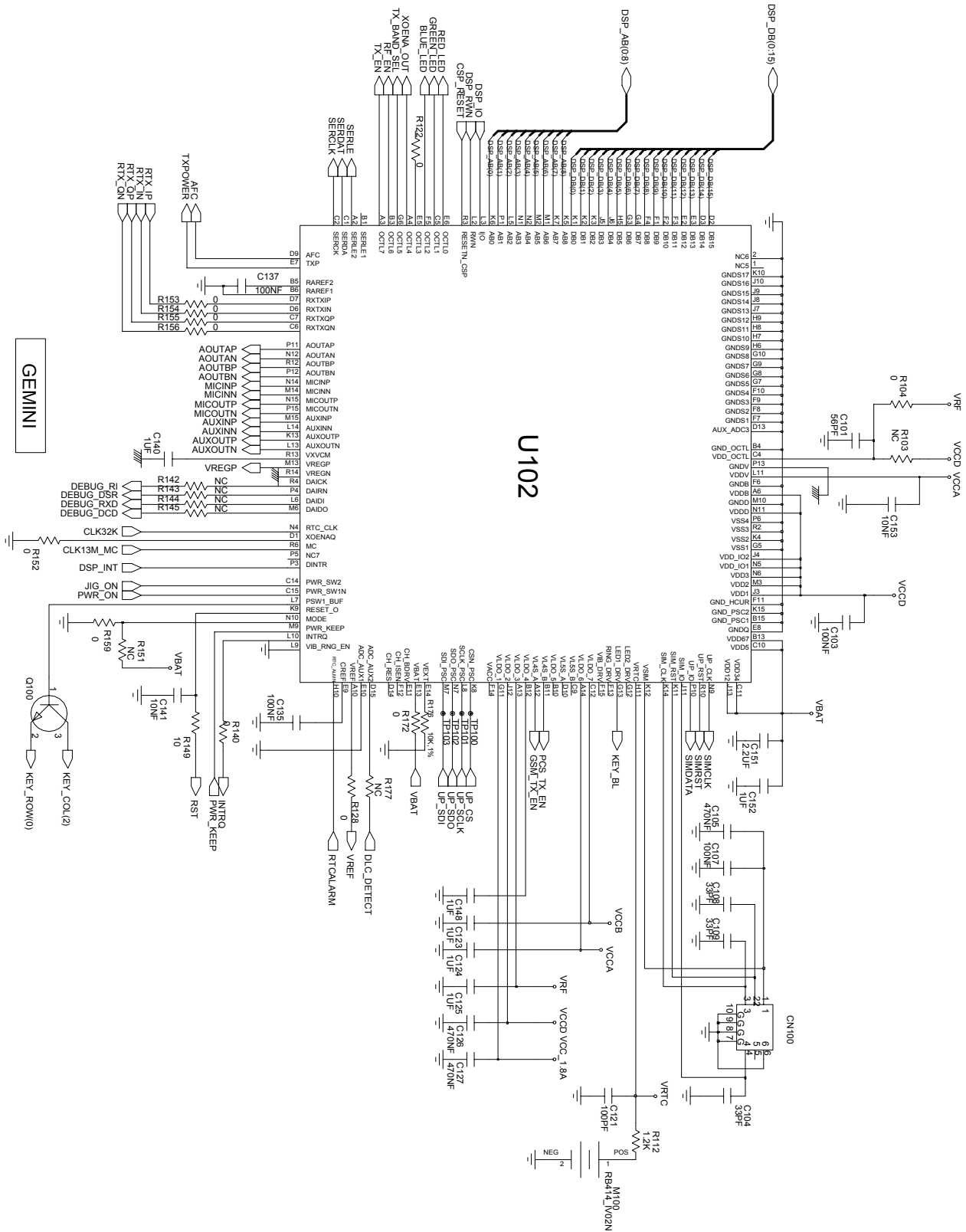
(Picture 2)



TRANSMITTER & RECEIVER

(Picture 3)

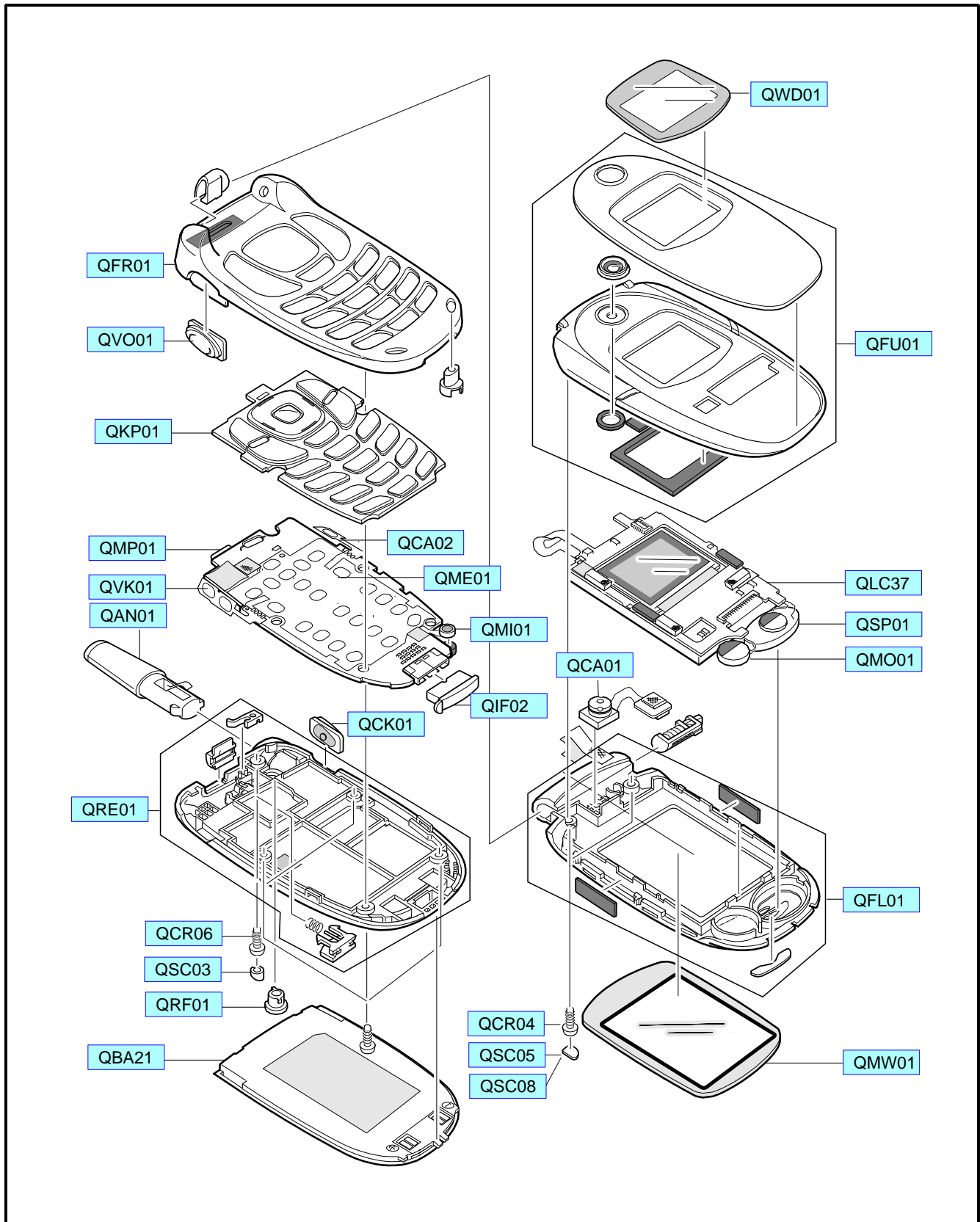
# SGH-E316 Flow Chart of Troubleshooting and Circuit Diagrams



(Picture 4)

# 6. SGH-E316 Exploded View and its Parts list

## 1. Cellular phone Exploded View



2. Cellular phone Parts list

Location NO.	Description	SEC CODE	Remark
QWD01	MEC-DUAL WINDOWS	GH75-03873A	
QFU01	MEC-F/UPPER ASS'Y	GH75-04024A	
QLC37	LCD	GH07-00465A	
QSP01	SPEAKER	3001-001484	
QMO01	MOTOR	3101-001366	
QCA01	CAMERA	GH59-01102A	
CFL01	MEC-FOLDER LOWER ASSY	GH75-03870A	
QCR04	SCREW	6001-001479	
QSC05	MPR-SCREW SHEET-L	GH74-06866A	
QSC08	MPR-SCREW SHEET-R	GH74-06867A	
QMW01	MEC-LCD WINDOW ASS'Y	GH75-03874C	
QRE01	MEC-REAR ASS'Y	GH75-04025A	
QFR01	MEC-FRONT ASS'Y	GH75-04023A	
QVO01	MEC-VOL KEY	GH75-04736A	
QKP01	MEC-KEYPAD ASS'Y	GH75-04026A	
QMP01	MAIN PBA	GH92-01633A	
QVK01	UNIT-VOL KEY	GH59-01016A	
QCA02	UNIT-CAMERA KEY	GH59-01015A	
QAN01	ANTENNA	GH42-00394A	
QMI01	MIC	GH30-00062A	
QME01	METAL DOME	GH59-01324A	
QIF02	RMO-I/F COVER	GH73-01394A	
QRE01	MEC-REAR ASSY	GH75-04025A	
QCK01	MEC-CAMERA KEY ASS'Y	GH75-04735A	
QCR06	SCREW	6001-001155	
QSC03	PMO-SCREW COVER	GH72-10978A	
QRF01	PMO-RF COVER	GH72-10977A	
QBA21	BATTERY	GH43-01267A	

3. Test Jig (GH80-00865A)



3-1. RF Test Cable  
(GH39-00182A)



3-2. Test Cable  
(GH39-00127A)



3-3. Serial Cable



3-4. Power Supply Cable



3-5. DATA CABLE  
(GH39-00159A)



3-6. TA  
(GH44-00482A)



## 7. SGH-E316 MAIN Electrical Parts List

### 1.Main Parts List

SEC Code	Design LOC	SEC Code	Design LOC	SEC Code	Design LOC
2203-005061	C100	2203-000812	C142	2203-000254	C224
2203-001072	C101	2203-006093	C143	2203-005682	C225
2203-005482	C103	2203-000438	C144	2203-005682	C226
2203-000812	C104	2203-000438	C145	2203-005682	C227
2203-001652	C105	2203-001239	C146	2203-000812	C228
2203-000359	C106	2203-000254	C147	2203-005682	C229
2203-005061	C107	2203-006053	C148	2203-005682	C230
2203-000812	C108	2404-001268	C149	2203-000812	C231
2203-000812	C109	2404-001105	C150	2203-005682	C232
2203-005061	C110	2203-006324	C151	2203-005682	C233
2203-001405	C111	2203-006053	C152	2203-005682	C234
2404-001086	C112	2203-000254	C153	2203-005682	C235
2203-000885	C113	2203-000812	C200	2203-005682	C236
2203-005061	C114	2203-005682	C201	2203-000812	C237
2404-001086	C115	2203-005682	C202	2203-000812	C238
2203-000438	C116	2203-005682	C203	2203-000812	C239
2203-005061	C117	2203-000812	C204	2203-005682	C240
2203-000233	C121	2203-005682	C205	2203-005682	C241
2203-006053	C123	2203-005682	C206	2203-005682	C242
2203-006053	C124	2203-000812	C207	2203-005682	C243
2203-006053	C125	2203-005682	C208	2203-005682	C244
2203-001652	C126	2203-005682	C209	2203-005682	C245
2203-001652	C127	2203-005682	C210	2203-005682	C246
2203-006093	C128	2203-005682	C211	2203-005682	C247
2203-000812	C129	2203-005682	C212	2203-005061	C248
2203-006093	C130	2203-005682	C213	2203-005061	C249
2203-000812	C131	2203-005682	C214	2203-005061	C252
2203-000812	C132	2203-000812	C215	2203-005061	C253
2203-005482	C135	2203-000812	C216	2203-005061	C254
2404-001100	C136	2203-005682	C217	2203-000812	C256
2203-005482	C137	2203-005682	C218	2203-005496	C300
2203-000812	C138	2203-000812	C219	2203-005496	C301
2203-006093	C139	2203-005682	C220	2203-000254	C302
2203-006053	C140	2203-005682	C221	2203-000254	C303
2203-000254	C141	2203-005740	C222	2203-000254	C304
		2203-000254	C223	2203-000254	C305

SEC Code	Design LOC
2203-005480	C306
2203-000254	C307
2203-005061	C308
2203-001405	C309
2203-000679	C310
2203-000254	C311
2203-005509	C312
2203-005509	C313
2203-005061	C314
2203-005509	C315
2203-005509	C316
2203-000628	C319
2203-000628	C320
2203-000233	C321
2203-000254	C322
2203-000995	C400
2203-000812	C401
2203-000254	C402
2203-000233	C403
2203-000233	C404
2203-000254	C405
2203-000254	C406
2203-001405	C407
2203-000233	C412
2203-000233	C413
2203-000233	C414
2203-005482	C415
2203-000254	C416
2203-000233	C417
2203-006053	C418
2203-000233	C419
2203-005482	C420
2203-000995	C421
2203-005482	C422
2404-001151	C423
2404-001151	C424

SEC Code	Design LOC
2203-000254	C425
2203-000872	C426
2203-002668	C427
2203-005482	C430
2203-000438	C431
2203-000438	C432
2203-005288	C433
2203-005552	C434
2203-005288	C435
2203-005552	C436
2203-005234	C437
2203-006053	C438
2203-006257	C439
2203-000812	C440
2203-000812	C441
2203-005552	C442
2203-000438	C443
2203-000438	C450
2203-000254	C451
2203-000995	C452
2203-000438	C453
2203-000254	C454
3709-001229	CN100
3722-002010	CN101
3710-001673	CN200
3711-005649	CN201
3711-004621	CN203
3705-001287	F400
2909-001236	F402
2703-001952	L400
2703-002602	L401
2703-002700	L402
2703-002544	L403
2703-001729	L404
0601-001790	LED200
0601-001790	LED201

SEC Code	Design LOC
0601-001790	LED202
0601-001790	LED203
0601-001790	LED204
0601-001790	LED205
0601-001790	LED206
0601-001790	LED207
0601-001790	LED208
0601-001790	LED209
0601-001790	LED210
0601-001790	LED211
0601-001790	LED212
0601-001790	LED213
0601-001790	LED214
0601-001790	LED215
0601-001790	LED216
0601-001790	LED217
0601-001790	LED218
4302-001130	M100
2801-003747	OSC300
2804-001577	OSC401
2801-004359	OSC402
0504-000168	Q100
0502-001201	Q101
0504-000168	Q102
2007-000171	R100
2007-000162	R101
2007-000171	R102
2007-000171	R104
2007-000164	R105
2007-000161	R106
2007-000775	R107
2007-000159	R108
2007-001325	R110
2007-001319	R112
2007-007590	R116
2007-007142	R118



**SGH-E316 Electrical Parts List**

SEC Code	Design LOC
2007-000171	R122
2007-007142	R123
2007-007590	R125
2007-007528	R126
2007-000171	R128
2007-007528	R129
2007-000139	R137
2007-000171	R139
2007-000171	R140
2007-007489	R146
2007-007528	R147
2007-007528	R148
2007-000172	R149
2007-007142	R150
2007-000171	R152
2007-000171	R153
2007-000171	R154
2007-000171	R155
2007-000171	R156
2007-007489	R157
2007-007142	R158
2007-000171	R159
2007-007981	R162
2007-007468	R163
2007-000170	R164
2007-000170	R165
2007-000169	R166
2007-000157	R167
2007-007142	R168
2007-008263	R169
2007-007142	R170
2007-000171	R172
2007-007107	R173
2007-007107	R174
2007-007142	R175
2007-007142	R176

SEC Code	Design LOC
2007-000172	R200
2007-000172	R201
2007-000157	R203
2007-000157	R204
2007-000157	R205
2007-000140	R206
2007-000140	R207
2007-000140	R208
2007-000140	R209
2007-000140	R210
2007-000140	R211
2007-000140	R212
2007-000140	R213
2007-000140	R214
2007-000566	R215
2007-000172	R300
2007-000157	R301
2007-000157	R302
2007-000171	R303
2007-000157	R304
2007-000170	R305
2007-000157	R306
2007-007142	R307
2007-000171	R308
2007-007308	R309
2007-007308	R310
2007-000172	R311
2007-007107	R317
2007-000148	R400
2007-000148	R401
2007-002797	R402
2007-000138	R403
2007-000171	R408
2007-000171	R409
2007-000172	R410
2007-000171	R413

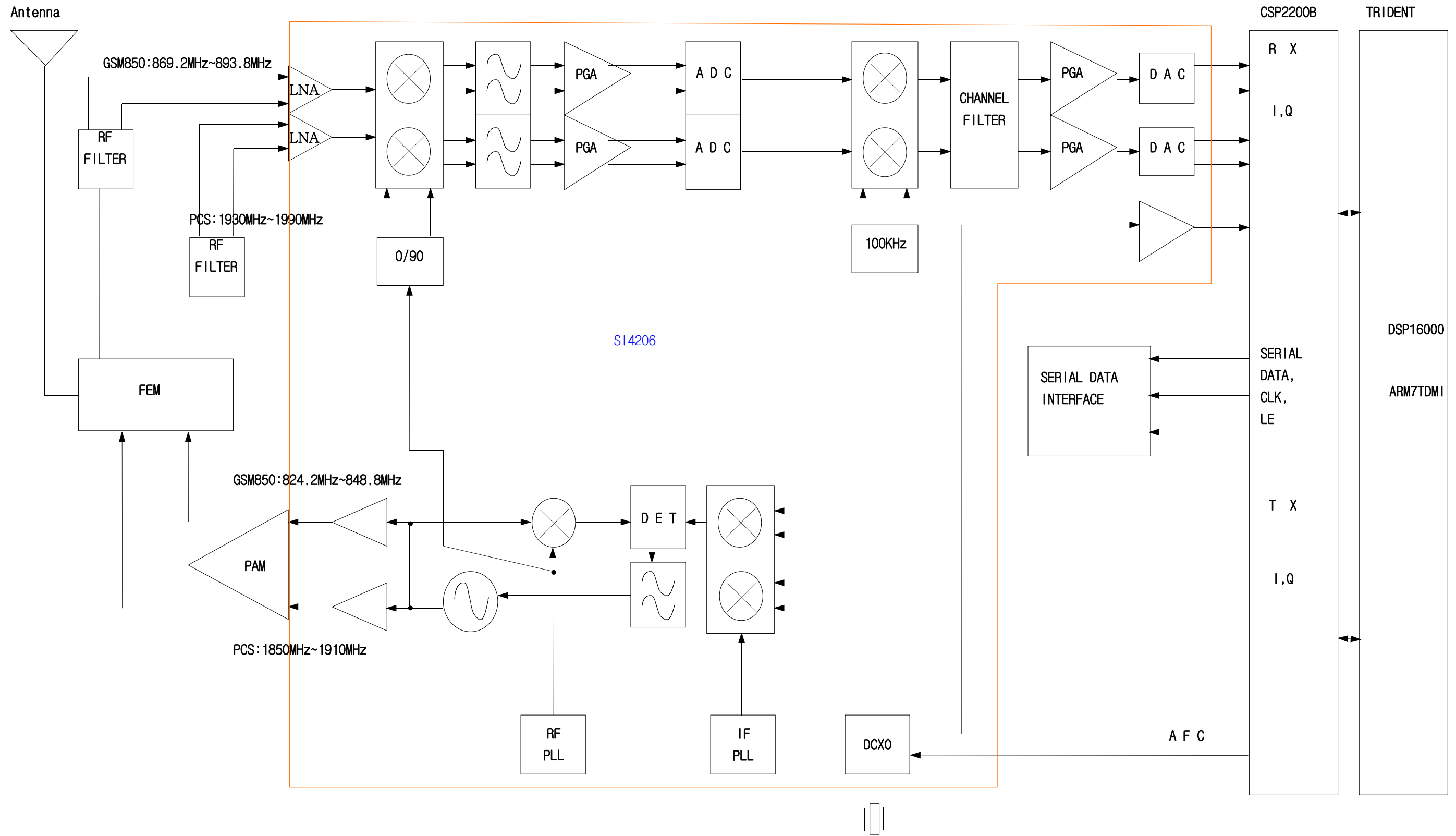
SEC Code	Design LOC
2007-000162	R414
2007-007981	R417
2007-000171	R420
2007-000171	R421
2007-001288	R422
2007-007008	R423
2007-007008	R424
2007-001288	R425
2007-007008	R426
2007-007008	R427
2007-007142	R428
2007-000140	R429
2007-000140	R430
2007-000140	R431
1001-001183	U100
1204-002161	U101
1203-003304	U102
1201-001729	U103
1203-002127	U104
0506-001052	U105
0801-000796	U106
1009-001010	U200
1109-001281	U300
1209-001219	U301
GH09-00020A	U302
GH13-00020A	U401
1203-002236	U402
1205-002485	U403
1201-002075	U404
0406-001152	ZD100
1405-001121	ZD101
1405-001082	ZD102
0406-001152	ZD103
1405-001082	ZD104
0406-001152	ZD204
0406-001150	ZD205

---

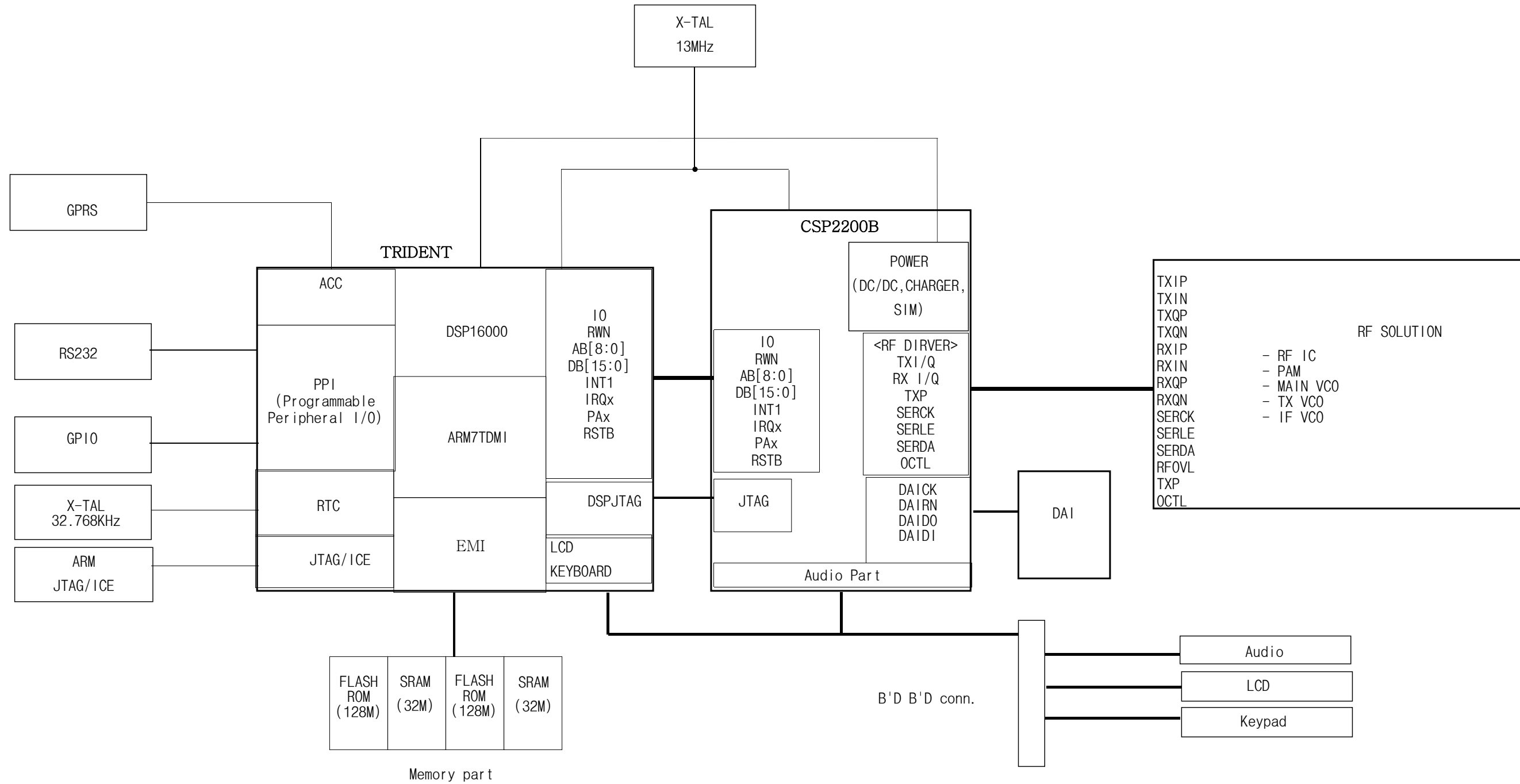
SEC Code	Design LOC
0406-001150	ZD206
0406-001150	ZD207
0406-001150	ZD208
0406-001150	ZD209
0406-001150	ZD210
0406-001150	ZD211
0406-001150	ZD212
0406-001150	ZD213
0406-001150	ZD214
0406-001150	ZD215
0406-001150	ZD216
0406-001150	ZD217
0403-001427	ZD218
0406-001150	ZD219
0406-001150	ZD220
0406-001150	ZD221
0406-001169	ZD222
0406-001169	ZD223
GH92-01633A	

# 8. SGH-E316 Block Diagrams

## 1. RF Solution Block Diagram

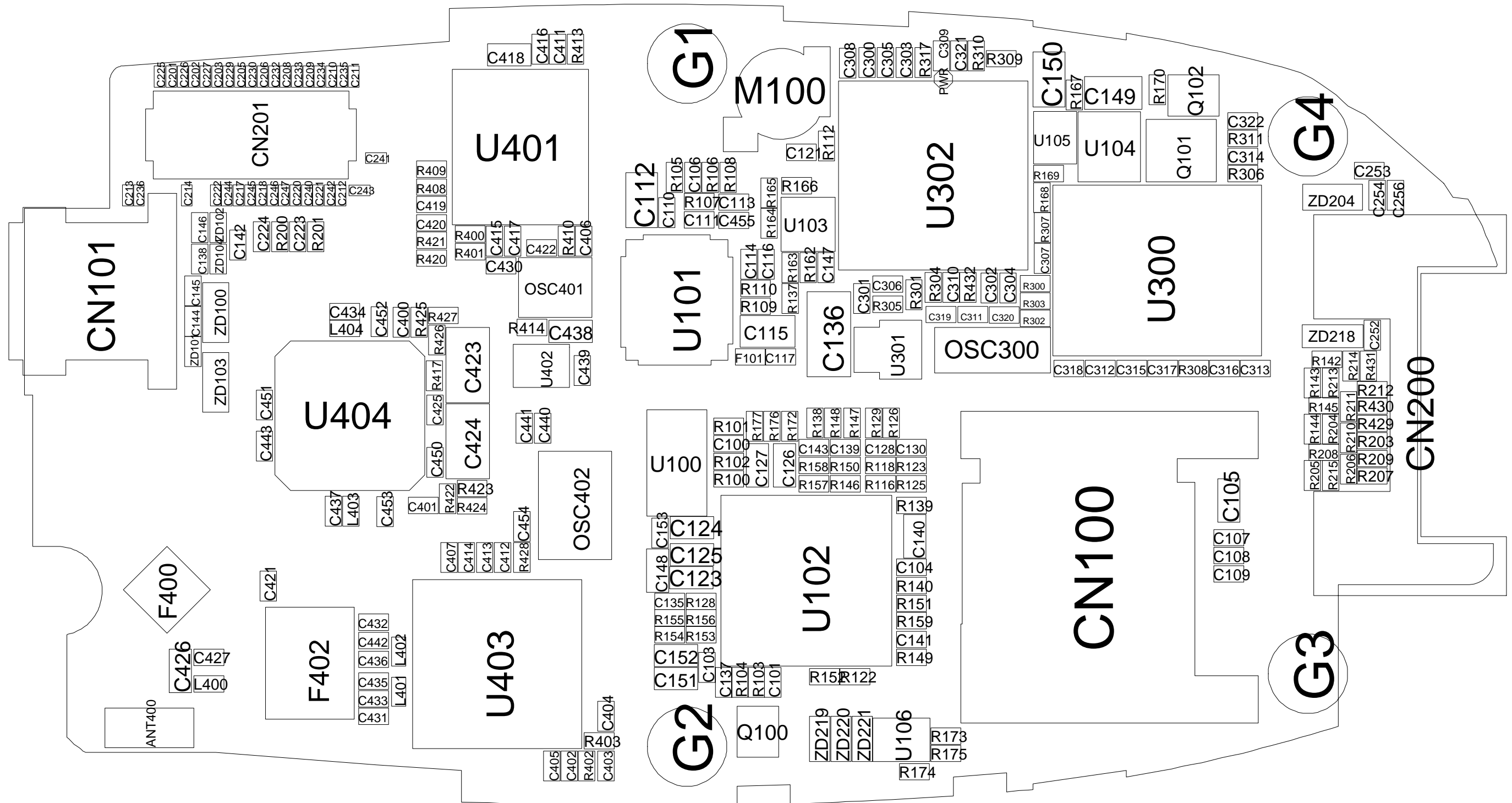


2. Base Band Solution Block Diagram

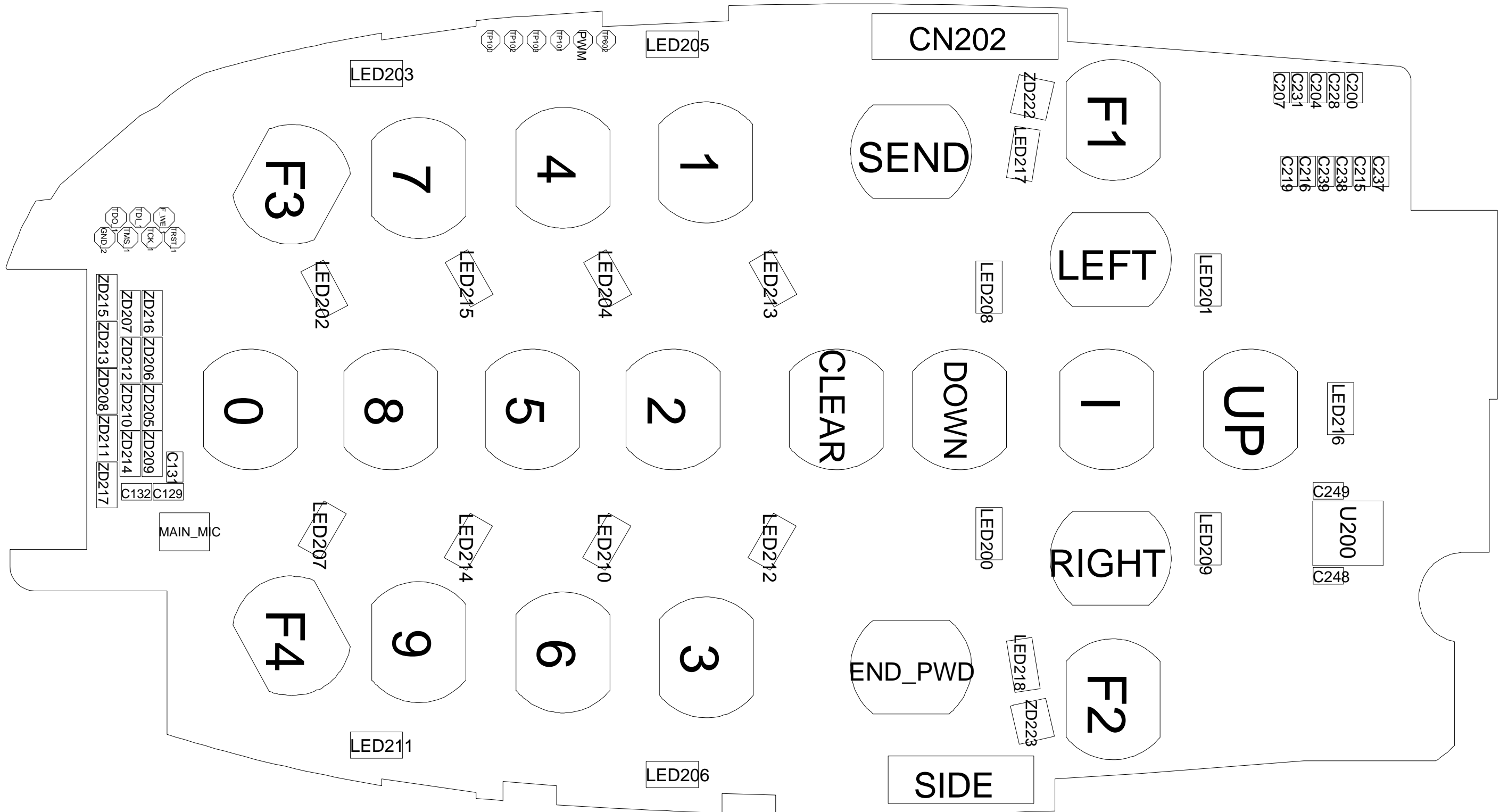


# 9. SGH-E316 PCB Diagrams

## 1.Main TOP Diagram



2. Main Bottom Diagram



[www.s-manuals.com](http://www.s-manuals.com)