SAMSUNG

GSM TELEPHONE

SGH-C160M

SERVICE Manual

GSM TELEPHONE

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1. Safety Precautions

1-1. Repair Precaution

- Repair in Shield Box, during detailed tuning.
  Take specially care of tuning or test, because the specification of cellular phone is sensitive for surrounding interference(RF noise).

- Be careful to use a kind of magnetic object or tool, because performance of parts is damaged by the influence of magnetic force.

- Surely use a standard screwdriver when you disassemble this product, otherwise screw will be worn away.

- Use a thicken twisted wire when you measure level.
  A thicken twisted wire has low resistance, therefore error of measurement is few.

- Repair after separate Test Pack and Set because for short danger (for example an overcurrent and furious flames of parts etc) when you repair board in condition of connecting Test Pack and tuning on.

- Take specially care of soldering, because Land of PCB is small and weak in heat.

- Surely tune on/off while using AC power plug, because a repair of battery charger is dangerous when tuning ON/OFF PBA and Connector after disassembling charger.

- Don't use as you pleases after change other material than replacement registered on SEC System. Otherwise engineer in charge isn't charged with problem that you don't keep this rules.

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1-2. ESD(Electrostatically Sensitive Devices) Precaution

Several semiconductor may be damaged easily by static electricity. Such parts are called by ESD (Electrostatically Sensitive Devices), for example IC,BGA chip etc. Read Precaution below. You can prevent from ESD damage by static electricity.

- Remove static electricity remained your body before you touch semiconductor or parts with semiconductor. There are ways that you touch an earthed place or wear static electricity prevention string on wrist.

- Use earthed soldering steel when you connect or disconnect ESD.

- Use soldering removing tool to break static electricity. , otherwise ESD will be damaged by static electricity.

- Don't unpack until you set up ESD on product. Because most of ESD are packed by box and aluminum
  plate to have conductive power,they are prevented from static electricity.

- You must maintain electric contact between ESD and place due to be set up until ESD is connected completely to the proper place or a circuit board.

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2. Specification

2-1. GSM General Specification

	EGSM 900	DCS1800
Freq. Band[MHz] Uplink/Downlink	880~915 925~960	1710~1785 1805~1880
ARFCN range	0~124 & 975~1023	512~885
Tx/Rx spacing	45MHz	95MHz
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~5dBm	30dBm~0dBm
Power Class	4 (max +33dBm)	1 (max +30dBm)
Sensitivity	-102dBm	-100dBm
TDMA Mux	8	8
Cell Radius	35Km	2Km

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2-2. 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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3. Operation Instruction and Installation

Main Function

DC-Jack TA (700mA)
No Java
MMS (30K)
WAP 2.0
10 Poly S/W MIDI
Dual band(900/1800MHz)
GPRS Class 10

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4. Array course control

4-1. Software Adjustments

1. JIG Box: Download, Trace, Calibration, etc
2. RF test cable: RF test
3. Test cable: JIG to phone
4. Serial cable: PC to JIG
5. TA (Travel Adaptor)
6. Download JIG: Download, Calibration

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4-2. Software Downloading

4-2-1. Downloading Binary Files

- 2 binary files for downloading C160M.
  - C160MXXXXX.CLA
  - C160MXXXXX.TFS

4-2-2. Pre-requsite for Downloading

- Downloader Program(**Virtuous 64X32 Downloader_PAGESIZE256_6A0000.exe**)
- SGH-C160M Mobile Phone
- JIG BOX
- Download JIG
- Test Cable
- Serial Cable
- Binary files

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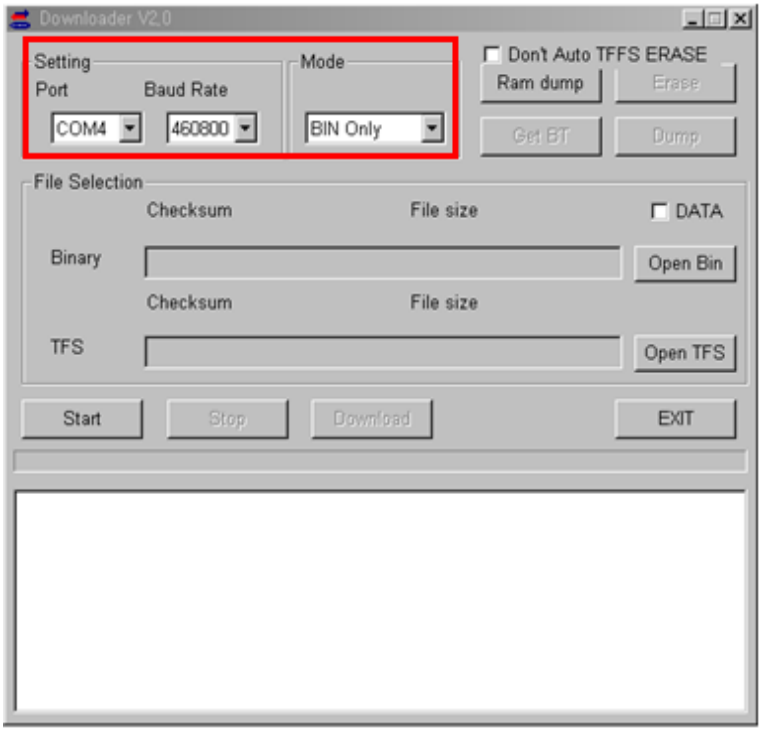
4-2-3. S/W Downloader Program

1. Load the binary download program by executing the "**Virtuous 64X32 Downloader_PAGESIZE256_6A0000.exe**".

2. Select the Port, Baud Rate and Mode.



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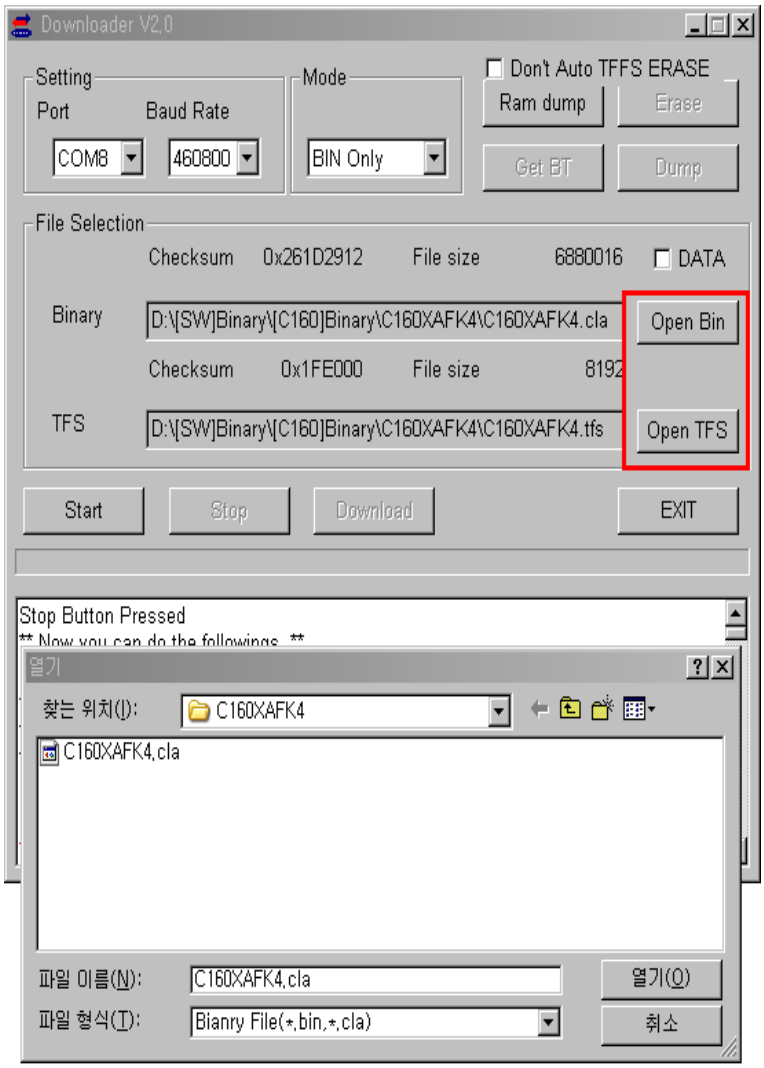
3. Select the binary files what you want to download



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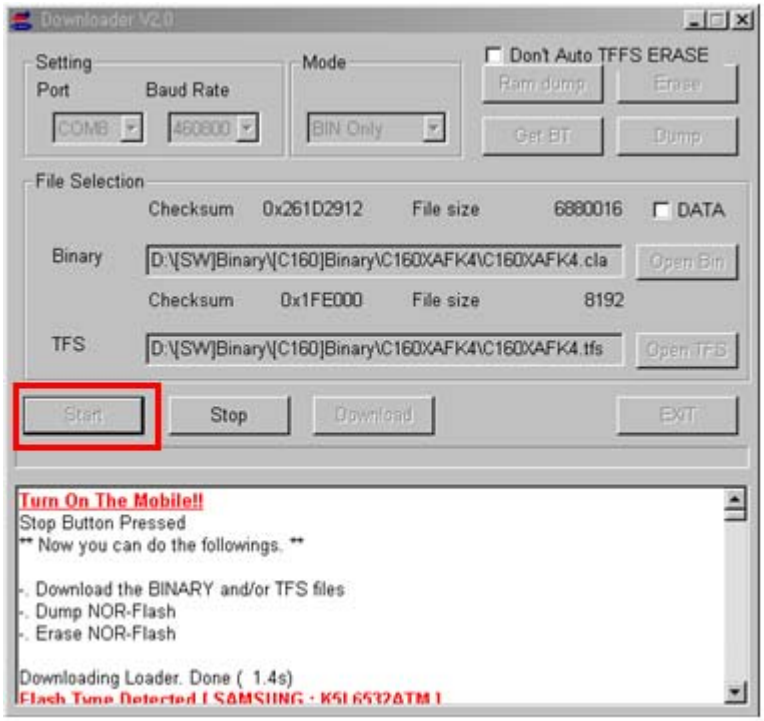
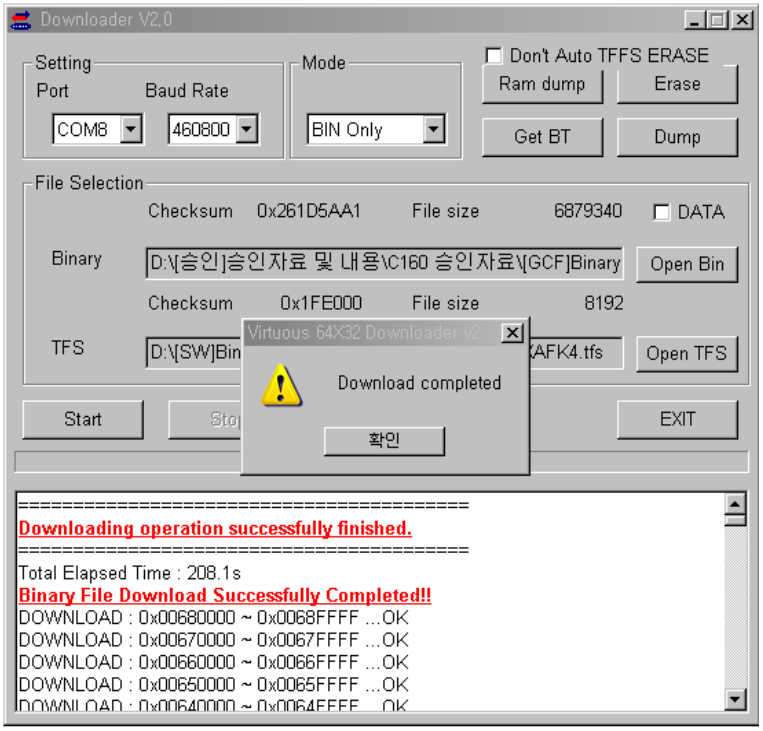
4. Press the "Start" button and connect the Handset



5. When downloading is complete, automatically the small window was showed up..



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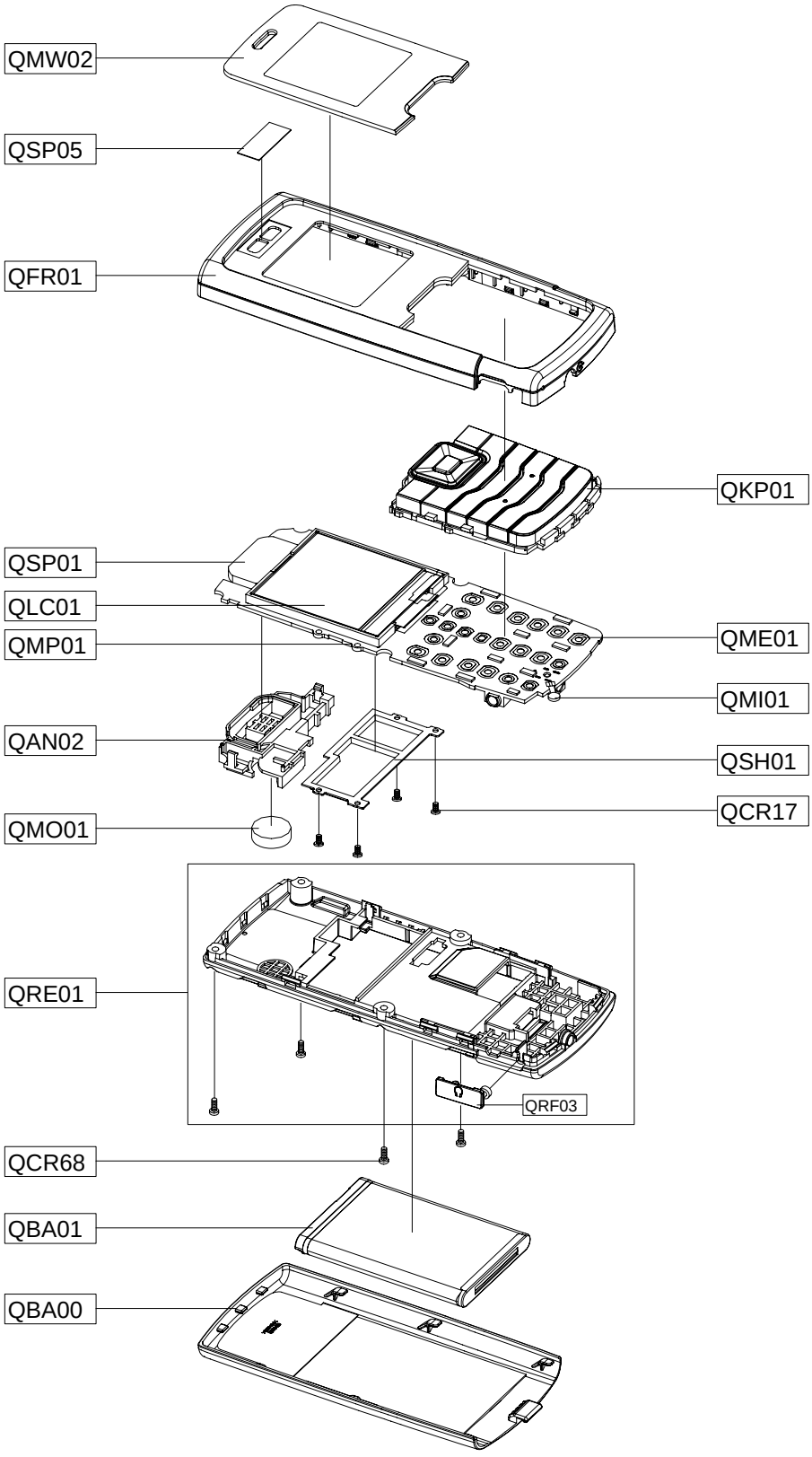
5. Exploded View/Disassembly&Assembly Instructions

5-1. Cellular phone Exploded View



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5-2. Cellular phone Parts list

Design LOC		Description	Sec Code
QAN02		INTENNA-SGHC160	GH42-01137A
QBA00		PMO-COVER BATTERY V3	GH72-37763A
QBA01		INNER BATTERY PACK-750MAH,BLK,	GH43-02483A
QCR17		SCREW-MACHINE	6001-001460
QCR68		SCREW-TAPPING	6002-001399
QFR01		ASSY CASE-FRONT	GH98-04750A
QKP01		ASSY KEYPAD-(XSG(M)//BLK)	GH98-04635A
QLC01		LCD-LCD MODULE	GH07-01056A
QME01		UNIT-METAL DOME	GH59-03976A
QMI01		MICROPHONE-ASSY-SGHC160	GH30-00177H
QMO01		MOTOR DC-SGHC160	GH31-00296A
QMP01		PBA MAIN-SGHC160M	GH92-03708A
QMW02		PCT-COVER WINDOW MAIN V4	GH72-39450A
QSH01		ASSY BRACKET-SHIELD CAN	GH98-04066A
QSP01		SPEAKER	3001-002100
QSP05		ASSY DECO-SPK GRILL	GH98-04853A
QRE01		ASSY CASE-REAR	GH98-03096A
	QRF03	PMO-COVER EAR V3	GH72-37762A

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Description	Sec Code
BAG PE	6902-000634
ADAPTOR-SGHC140 DC JACK(EU_B	GH44-01597A
LABEL(P)-IMEI	GH68-01335D
LABEL(R)-WATER SOAK	GH68-09361A
MANUAL USERS-XSG ENGLISH(C160M	GH68-14684A
LABEL(R)-MAIN(EU)	GH68-15346A
BOX-UNIT(XSG)	GH69-05620A
MPR-VINYL BOHO FRONT	GH74-31440A
MPR-VINYL BOHO WINDOW	GH74-31711A
VINYL-BOHO UPPER	GH74-33153A

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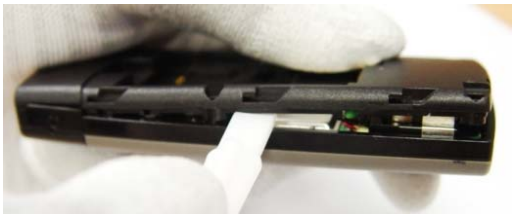
5-3. Disassembly and Assembly Instructions

5-3-1. Disassembly

1 1) Unfasten rear 4 screws. 	2 1) After disassemble both side lockers, separate the FRONT & REAR. 
Notice 1) Don't leave any scratch or spot on structure.	Notice 1) Don't leave any scratch or spot on structure.
3 Disassemble a locker on PBA. 	4 Disassemble a speaker using tweezers.
Notice 1) Don't damage any parts.	Notice 1) Don't damage speaker & wire.

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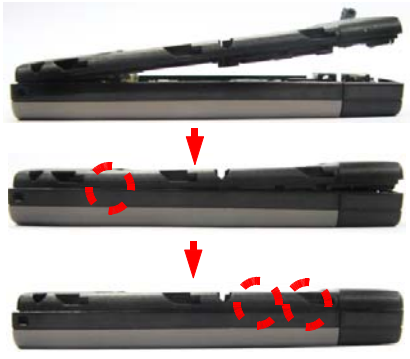
5-3-2. Assembly

1 1) Reach in good condition a KEYPAD on FRONT structure. 	2 1) Insert speaker & LCD on FRONT structure.
Notice 1) Reach in good condition holes around the 3*4 KET on FRONT structure.	Notice 1) Don't stain any bow on LCD. Notice 2) Don't be down the speaker wire.
3 1) After pull out the earjack cover, assemble first the top & after the lower locker. 	4 1) Fasten rear 4 screws.
Notice 1) Don't leave any scratch or spot on structure.	Notice 1) Don't leave any scratch or spot on structure.

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6. MAIN Electrical Parts List

Design LOC	Description	SEC Code	STATUS
BAT300	HEADER-BATTERY	3711-006228	SA
C100	C-CER,CHIP	2203-005050	SA
C102	C-CER,CHIP	2203-000425	SA
C103	C-CER,CHIP	2203-006048	SA
C104	C-CER,CHIP	2203-005444	SA
C105	C-CER,CHIP	2203-006361	SA
C106	C-CER,CHIP	2203-000812	SA
C107	C-CER,CHIP	2203-000812	SA
C108	C-CER,CHIP	2203-000812	SA
C109	C-CER,CHIP	2203-000489	SA
C110	C-CER,CHIP	2203-000278	SA
C111	C-CER,CHIP	2203-000854	SA
C112	C-CER,CHIP	2203-000278	SA
C113	C-CER,CHIP	2203-001607	SA
C114	C-CER,CHIP	2203-001259	SA
C115	C-CER,CHIP	2203-001397	SA
C116	C-CER,CHIP	2203-001259	SA
C117	C-CER,CHIP	2203-001017	SA
C118	C-CER,CHIP	2203-006048	SA
C119	C-CER,CHIP	2203-006048	SA
C120	C-CER,CHIP	2203-000233	SA
C121	C-CER,CHIP	2203-000854	SA
C122	C-CER,CHIP	2203-000278	SA
C123	C-CER,CHIP	2203-006562	SA
C125	C-CER,CHIP	2203-001153	SA
C126	C-CER,CHIP	2203-000254	SA
C127	C-CER,CHIP	2203-005234	SA
C128	C-CER,CHIP	2203-000233	SA
C129	C-CER,CHIP	2203-005446	SA
C130	C-CER,CHIP	2203-005446	SA
C131	C-CER,CHIP	2203-005446	SA
C132	C-CER,CHIP	2203-001153	SA
C133	C-CER,CHIP	2203-000254	SA
C134	C-CER,CHIP	2203-000278	SA
C135	C-CER,CHIP	2203-000854	SA
C136	C-CER,CHIP	2203-000679	SA
C137	C-CER,CHIP	2203-000278	SA
C138	C-CER,CHIP	2203-006681	SA
C139	C-CER,CHIP	2203-005234	SA
C140	C-CER,CHIP	2203-000995	SA
C143	C-CER,CHIP	2203-005234	SA
C144	C-CER,CHIP	2203-000679	SA
C145	C-CER,CHIP	2203-000995	SA
C146	C-CER,CHIP	2203-005050	SA
C201	C-CER,CHIP	2203-006562	SA
C202	C-CER,CHIP	2203-005061	SA
C203	C-CER,CHIP	2203-005061	SA
C204	C-CER,CHIP	2203-005061	SA
C205	C-CER,CHIP	2203-005061	SA
C206	C-CER,CHIP	2203-000254	SA
C207	C-CER,CHIP	2203-005061	SA
C208	C-CER,CHIP	2203-005061	SA
C209	C-CER,CHIP	2203-000254	SA

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Design LOC	Description	SEC Code	STATUS
C210	C-CER,CHIP	2203-000254	SA
C211	C-CER,CHIP	2203-005482	SA
C212	C-CER,CHIP	2203-005482	SA
C213	C-CER,CHIP	2203-000854	SA
C214	C-CER,CHIP	2203-000679	SA
C216	C-CER,CHIP	2203-005483	SA
C217	R-CHIP	2007-000172	SA
C218	R-CHIP	2007-000172	SA
C219	C-CER,CHIP	2203-005482	SA
C301	C-CER,CHIP	2203-005061	SA
C302	C-CER,CHIP	2203-005061	SA
C303	C-CER,CHIP	2203-005061	SA
C306	C-CER,CHIP	2203-000679	SA
C307	C-CER,CHIP	2203-005061	SA
C308	C-CER,CHIP	2203-000425	SA
C310	C-CER,CHIP	2203-000812	SA
C311	C-CER,CHIP	2203-005061	SA
C312	C-CER,CHIP	2203-000679	SA
C316	C-CER,CHIP	2203-005482	SA
C319	C-CER,CHIP	2203-000425	SA
C320	C-CER,CHIP	2203-001153	SA
C321	C-CER,CHIP	2203-005482	SA
C324	C-CER,CHIP	2203-001153	SA
C325	C-CER,CHIP	2203-000254	SA
C326	C-CER,CHIP	2203-001405	SA
C328	C-CER,CHIP	2203-001153	SA
C401	C-CER,CHIP	2203-005482	SA
C402	C-CER,CHIP	2203-000278	SA
C403	C-CER,CHIP	2203-006257	SA
C404	C-CER,CHIP	2203-000330	SA
C406	C-TA,CHIP	2404-001381	SA
C407	C-CER,CHIP	2203-000812	SA
C408	C-CER,CHIP	2203-006348	SA
C409	C-CER,CHIP	2203-006681	SA
C410	C-CER,CHIP	2203-006348	SA
C412	C-CER,CHIP	2203-006208	SA
C413	C-CER,CHIP	2203-006562	SA
C414	C-CER,CHIP	2203-006208	SA
C415	C-CER,CHIP	2203-006257	SA
C416	C-CER,CHIP	2203-006257	SA
C418	C-CER,CHIP	2203-006825	SA
C419	C-CER,CHIP	2203-005482	SA
C422	C-CER,CHIP	2203-006257	SA
C423	C-CER,CHIP	2203-006208	SA
C424	C-CER,CHIP	2203-006257	SA
C425	C-CER,CHIP	2203-006257	SA
C426	C-CER,CHIP	2203-005482	SA
C432	C-CER,CHIP	2203-005061	SA
C434	C-CER,CHIP	2203-000812	SA
C500	C-CER,CHIP	2203-006137	SA
C503	C-CER,CHIP	2203-005480	SA
C504	C-CER,CHIP	2203-005480	SA
C505	C-CER,CHIP	2203-006260	SA

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Design LOC	Description	SEC Code	STATUS
C506	C-CER,CHIP	2203-006562	SA
C507	C-CER,CHIP	2203-006562	SA
C508	C-CER,CHIP	2203-006562	SA
C509	C-CER,CHIP	2203-006562	SA
C510	C-CER,CHIP	2203-006562	SA
C511	C-CER,CHIP	2203-006562	SA
C512	C-CER,CHIP	2203-006824	SA
C513	C-CER,CHIP	2203-006562	SA
C514	C-CER,CHIP	2203-000311	SA
C515	C-NETWORK	2503-001053	SA
C516	C-NETWORK	2503-001053	SA
C517	C-NETWORK	2503-001053	SA
C518	C-NETWORK	2503-001053	SA
C519	C-CER,CHIP	2203-006137	SA
D301	DIODE-TVS	0406-001150	SA
D400	DIODE-ARRAY	0407-001002	SA
D501	DIODE-TVS	0406-001223	SA
D502	DIODE-TVS	0406-001223	SA
DCJ301	JACK-DC POWER	3722-002433	SA
EAR300	JACK-EAR PHONE	3722-002010	SA
F101	FILTER-SAW	2904-001753	SA
F500	FILTER-EMI SMD	2901-001329	SA
L100	INDUCTOR-SMD	2703-002700	SA
L102	INDUCTOR-SMD	2703-001180	SA
L103	INDUCTOR-SMD	2703-002313	SA
L104	INDUCTOR-SMD	2703-002313	SA
L105	INDUCTOR-SMD	2703-002313	SA
L106	INDUCTOR-SMD	2703-002313	SA
L107	INDUCTOR-SMD	2703-002199	SA
L108	INDUCTOR-SMD	2703-002199	SA
L109	INDUCTOR-SMD	2703-002170	SA
L110	INDUCTOR-SMD	2703-002313	SA
L111	INDUCTOR-SMD	2703-002586	SA
L113	INDUCTOR-SMD	2703-002586	SA
L114	INDUCTOR-SMD	2703-002314	SA
L115	INDUCTOR-SMD	2703-002203	SA
L116	INDUCTOR-SMD	2703-002309	SA
L117	INDUCTOR-SMD	2703-002309	SA
L118	INDUCTOR-SMD	2703-002309	SA
L119	INDUCTOR-SMD	2703-002203	SA
L120	INDUCTOR-SMD	2703-002204	SA
L121	INDUCTOR-SMD	2703-002268	SA
L122	INDUCTOR-SMD	2703-002206	SA
L123	INDUCTOR-SMD	2703-002267	SA
L124	INDUCTOR-SMD	2703-002200	SA
L125	INDUCTOR-SMD	2703-002206	SA
L126	INDUCTOR-SMD	2703-002268	SA
L301	BEAD-SMD	3301-001729	SA
L302	BEAD-SMD	3301-001729	SA
L304	BEAD-SMD	3301-001729	SA
L305	BEAD-SMD	3301-001729	SA
L308	BEAD-SMD	3301-001729	SA
L309	BEAD-SMD	3301-001729	SA

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Design LOC	Description	SEC Code	STATUS
L310	BEAD-SMD	3301-001729	SA
L311	BEAD-SMD	3301-001729	SA
L312	BEAD-SMD	3301-001729	SA
L313	BEAD-SMD	3301-001729	SA
L401	INDUCTOR-SMD	2703-002308	SA
L402	INDUCTOR-SMD	2703-002308	SA
L500	INDUCTOR-SMD	2703-002313	SA
L501	INDUCTOR-SMD	2703-002313	SA
LED301	LED	0601-002199	SA
LED302	LED	0601-002199	SA
LED303	LED	0601-002199	SA
LED304	LED	0601-002199	SA
LED305	LED	0601-002199	SA
LED306	LED	0601-002199	SA
LED307	LED	0601-002199	SA
LED308	LED	0601-002199	SA
LED309	LED	0601-002199	SA
LED310	LED	0601-002199	SA
LED311	LED	0601-002199	SA
OSC400	CRYSTAL-SMD	2801-003856	SA
PAM101	IC-POWER AMP	1201-002490	SA
R102	R-CHIP	2007-007092	SA
R103	R-CHIP	2007-000982	SA
R104	R-CHIP	2007-007316	SA
R105	R-CHIP	2007-000171	SA
R106	R-CHIP	2007-000566	SA
R107	C-CER,CHIP	2203-000854	SA
R108	R-CHIP	2007-000148	SA
R109	INDUCTOR-SMD	2703-002281	SA
R110	R-CHIP	2007-000566	SA
R111	R-CHIP	2007-003001	SA
R112	R-CHIP	2007-000932	SA
R113	R-CHIP	2007-000932	SA
R114	R-CHIP	2007-000171	SA
R115	R-CHIP	2007-003001	SA
R116	R-CHIP	2007-000143	SA
R117	R-CHIP	2007-000143	SA
R118	R-CHIP	2007-000932	SA
R119	R-CHIP	2007-000932	SA
R120	R-CHIP	2007-000143	SA
R121	R-CHIP	2007-000143	SA
R122	R-CHIP	2007-000171	SA
R123	R-CHIP	2007-000141	SA
R124	R-CHIP	2007-000148	SA
R210	R-CHIP	2007-000174	SA
R211	R-CHIP	2007-000171	SA
R212	R-CHIP	2007-000162	SA
R214	R-CHIP	2007-007107	SA
R215	R-CHIP	2007-000159	SA
R216	R-CHIP	2007-007142	SA
R217	R-CHIP	2007-007107	SA
R218	R-CHIP	2007-000162	SA
R219	R-CHIP	2007-000162	SA

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Design LOC	Description	SEC Code	STATUS
R221	R-CHIP	2007-000162	SA
R228	R-CHIP	2007-000141	SA
R229	R-CHIP	2007-000141	SA
R233	R-CHIP	2007-000162	SA
R234	R-CHIP	2007-000143	SA
R302	R-CHIP	2007-000171	SA
R303	R-CHIP	2007-000171	SA
R315	R-CHIP	2007-000162	SA
R316	R-CHIP	2007-000162	SA
R317	R-CHIP	2007-000162	SA
R318	R-CHIP	2007-000171	SA
R319	R-CHIP	2007-000171	SA
R321	R-CHIP	2007-000148	SA
R323	R-CHIP	2007-000140	SA
R324	R-CHIP	2007-000140	SA
R325	R-CHIP	2007-002796	SA
R326	R-CHIP	2007-002796	SA
R327	R-CHIP	2007-000140	SA
R328	R-CHIP	2007-000140	SA
R332	R-CHIP	2007-003004	SA
R333	R-CHIP	2007-001288	SA
R334	R-CHIP	2007-003030	SA
R335	R-CHIP	2007-003030	SA
R336	R-CHIP	2007-000174	SA
R337	R-CHIP	2007-000174	SA
R338	R-CHIP	2007-003004	SA
R339	R-CHIP	2007-000174	SA
R340	R-CHIP	2007-003030	SA
R341	R-CHIP	2007-003030	SA
R342	R-CHIP	2007-000148	SA
R344	R-CHIP	2007-007573	SA
R345	R-CHIP	2007-007529	SA
R346	R-CHIP	2007-000162	SA
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R348	R-CHIP	2007-001317	SA
R349	R-CHIP	2007-000162	SA
R350	R-CHIP	2007-000174	SA
R401	R-CHIP	2007-007100	SA
R402	R-CHIP	2007-000170	SA
R403	R-CHIP	2007-007869	SA
R407	R-CHIP	2007-000171	SA
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R411	R-CHIP	2007-000758	SA
R412	R-CHIP	2007-002796	SA
R413	R-CHIP	2007-007573	SA
R414	R-CHIP	2007-000171	SA
R417	R-CHIP	2007-007334	SA
R426	R-CHIP	2007-000148	SA
R501	R-CHIP	2007-007101	SA
R502	R-CHIP	2007-000171	SA
R504	R-CHIP	2007-000162	SA

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Design LOC	Description	SEC Code	STATUS
R505	R-CHIP	2007-000140	SA
R507	R-CHIP	2007-007142	SA
R510	R-CHIP	2007-000162	SA
R511	R-CHIP	2007-007142	SA
R513	R-CHIP	2007-000155	SA
R517	R-CHIP	2007-000172	SA
R518	R-CHIP	2007-000172	SA
RFS101	CONNECTOR-COAXIAL	3705-001358	SA
SIM400	CONNECTOR-CARD EDGE	3709-001400	SA
TA101	C-TA,CHIP	2404-001449	SA
TA301	C-TA,CHIP	2404-001424	SA
TA401	C-TA,CHIP	2404-001381	SA
TA402	C-TA,CHIP	2404-001381	SA
TCX101	OSCILLATOR-VCTCXO	2809-001307	SA
TH200	THERMISTOR-NTC	1404-001221	SA
TR400	TR-POWER	0502-001116	SA
U100	IC-TRANSCEIVER	1205-002689	SA
U301	IC-VOLTAGE COMP.	1202-001068	SA
U400	IC-POWER SUPERVISOR	1203-004550	SA
U401	IC-POSI.FIXED REG.	1203-004338	SA
U500	IC-DC/DC CONVERTER	1203-003708	SA
U502	IC-AUDIO AMP	1201-002494	SA
U503	FET-SILICON	0505-001469	SA
U505	IC-ANALOG MULTIPLEX	1001-001349	SA
U507	R-CHIP	2007-000171	SA
U508	R-CHIP	2007-007101	SA
UCP200	IC-COMM. CONTROLLER	1205-003192	SA
UME300	IC-MCP	1108-000103	SA
VR300	VARISTOR	1405-001082	SA
VR303	DIODE-TVS	0406-001223	SA
VR304	DIODE-TVS	0406-001223	SA
VR401	VARISTOR	1405-001082	SA
VR500	VARISTOR	1405-001082	SA
VR501	VARISTOR	1405-001082	SA
VR502	VARISTOR	1405-001082	SA
VR503	VARISTOR	1405-001082	SA
VR504	VARISTOR	1405-001082	SA
VR505	VARISTOR	1405-001082	SA
VR506	VARISTOR	1405-001082	SA
VR507	VARISTOR	1405-001082	SA
VR508	VARISTOR	1405-001082	SA
ZD300	DIODE-ZENER	0403-001547	SA
ZD301	DIODE-TVS	0406-001104	SA
ZD302	DIODE-TVS	0406-001254	SA
ZD303	DIODE-TVS	0406-001254	SA
ZD400	DIODE-ZENER	0403-001340	SA

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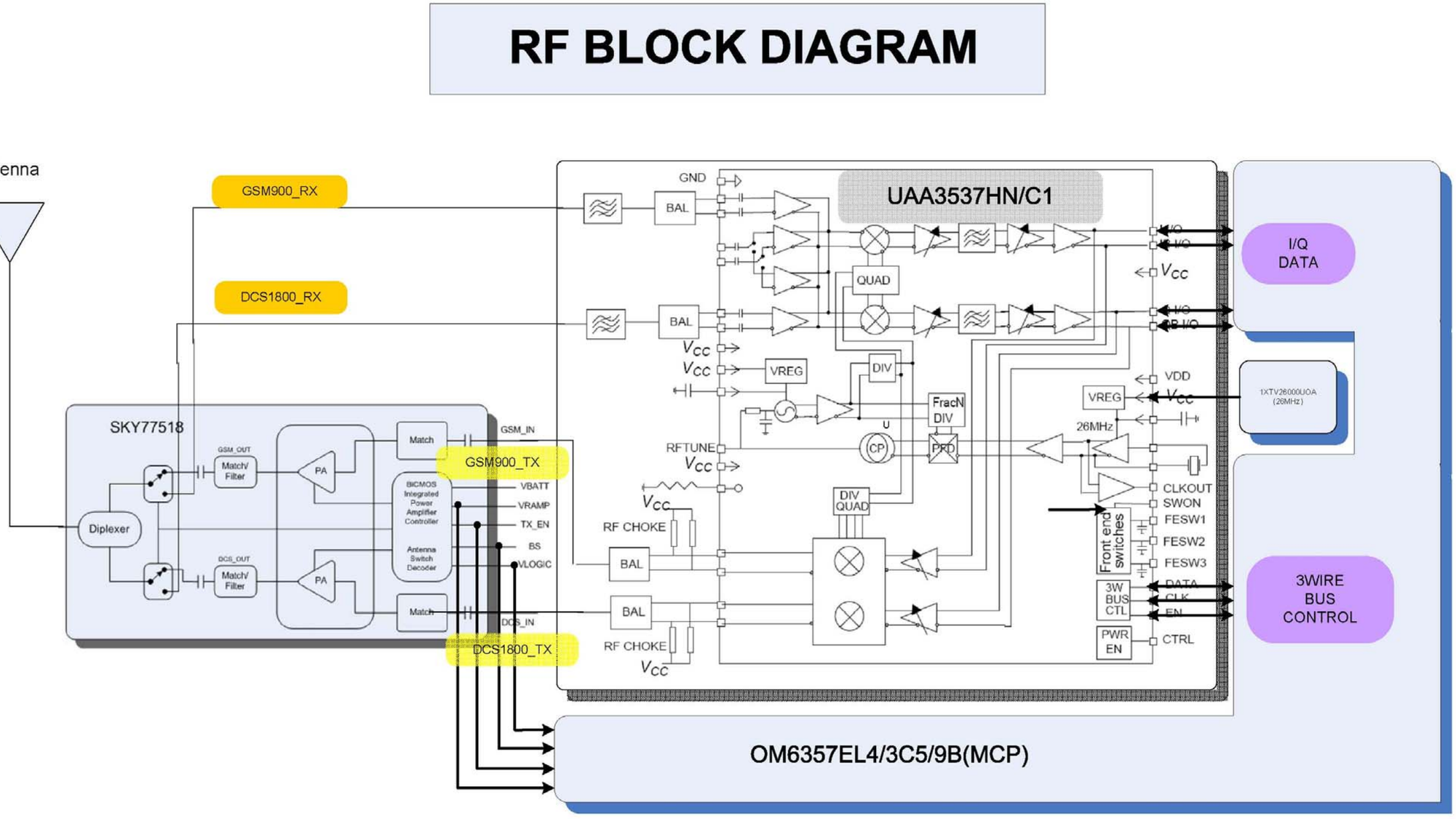
7. Block Diagrams

7-1. RF Solution Block Diagram



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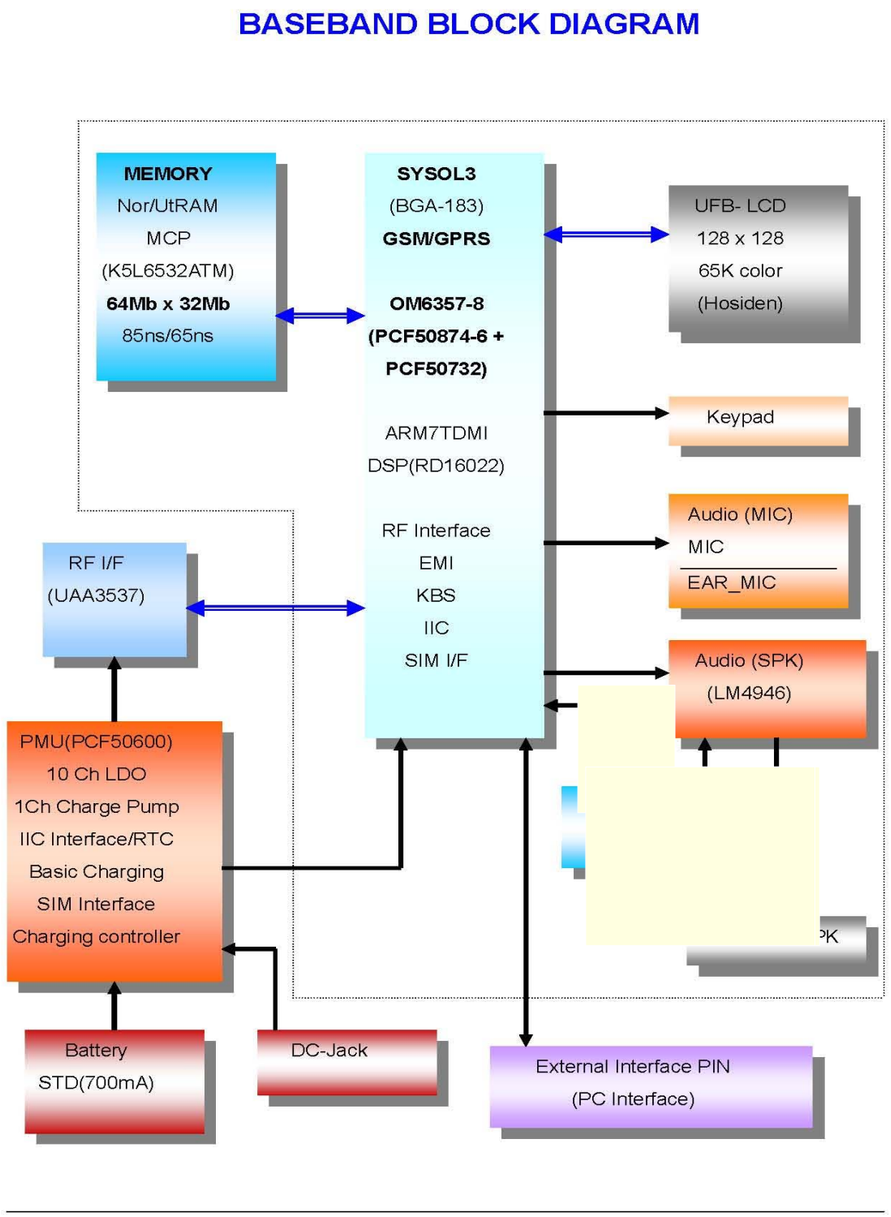
7-2. Base Band Solution Block Diagram



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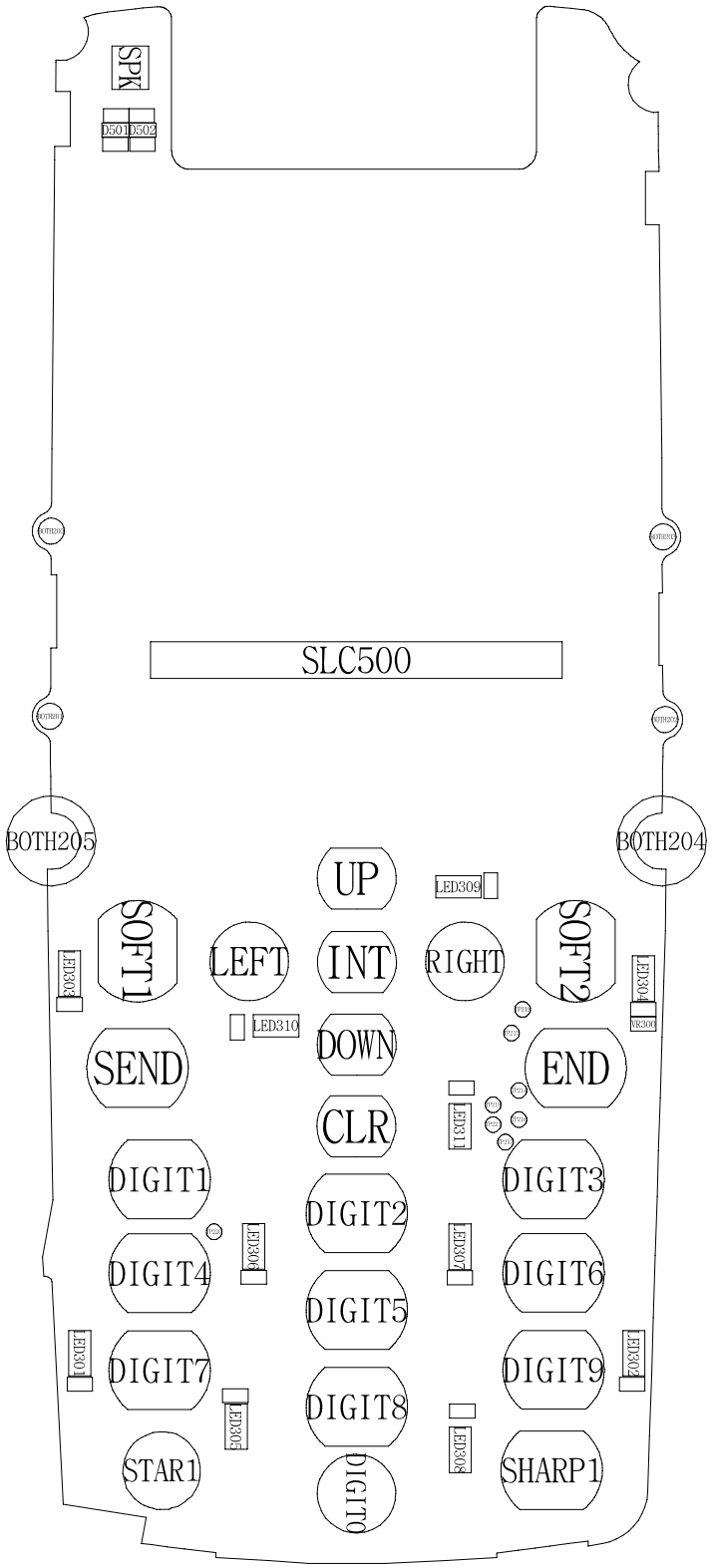
8. PCB Diagrams

Top



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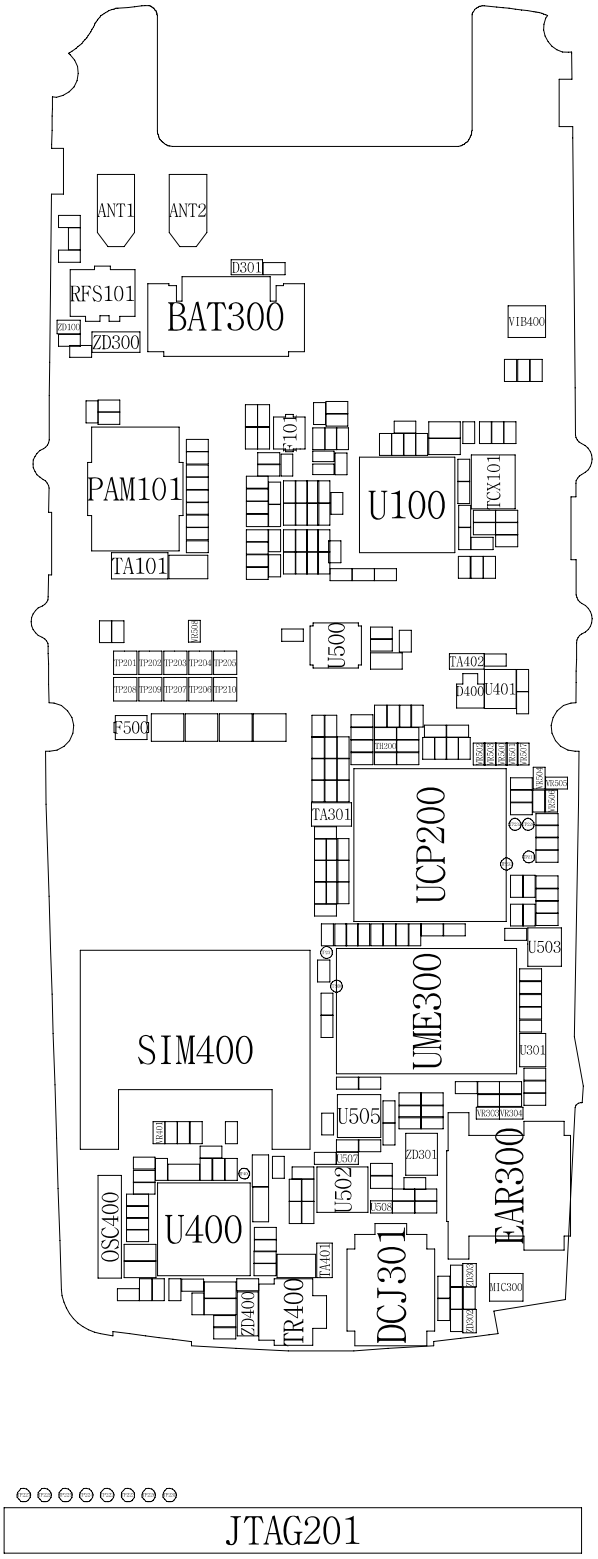
Bottom



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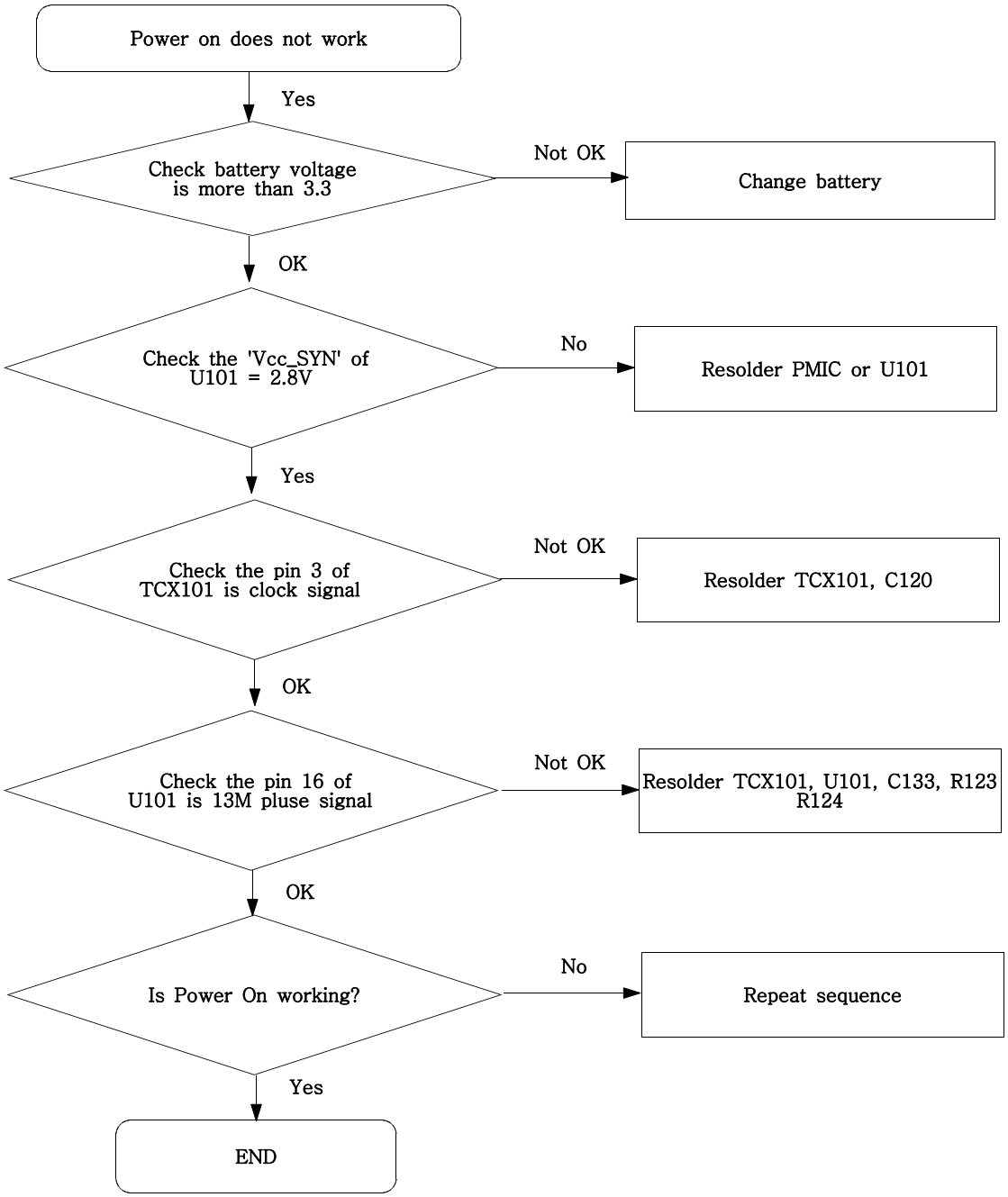
9. Flow Chart of Troubleshooting

9-1. Power On



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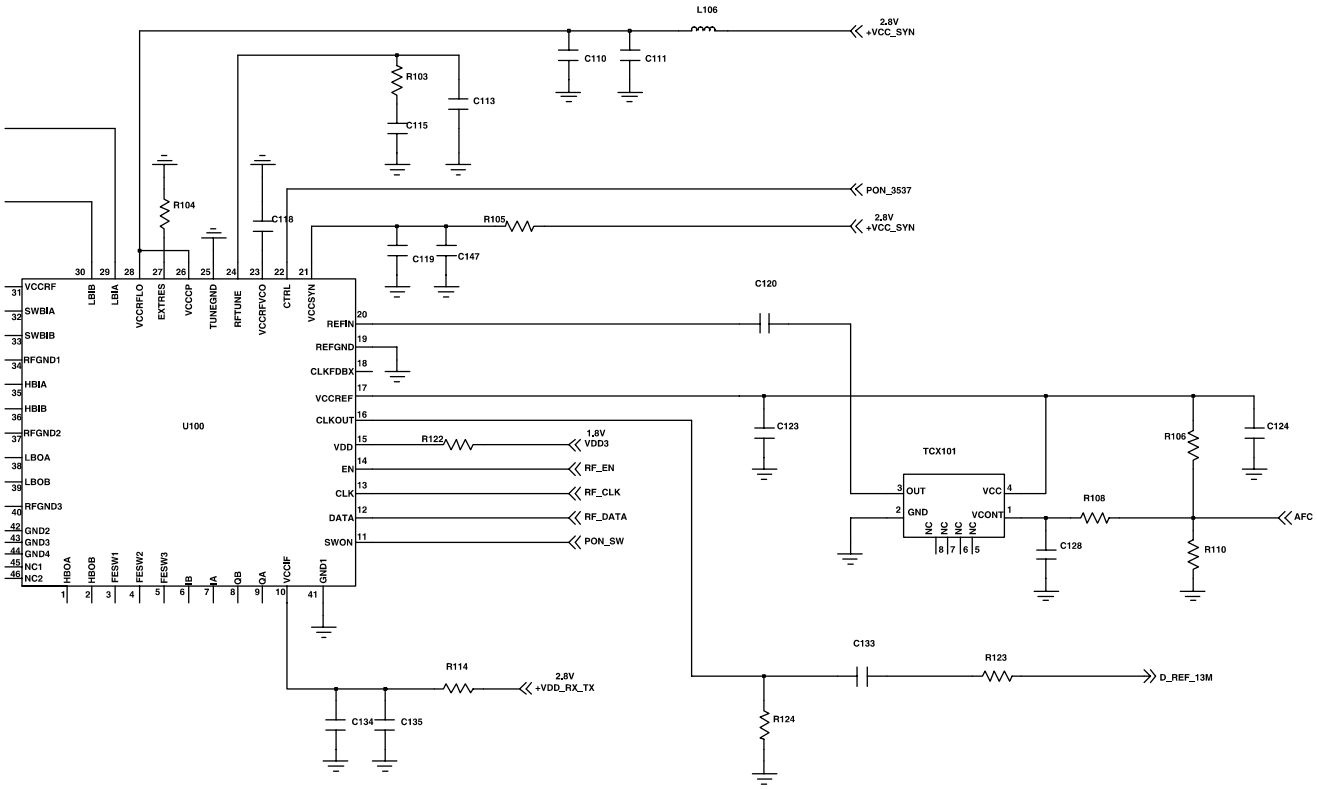
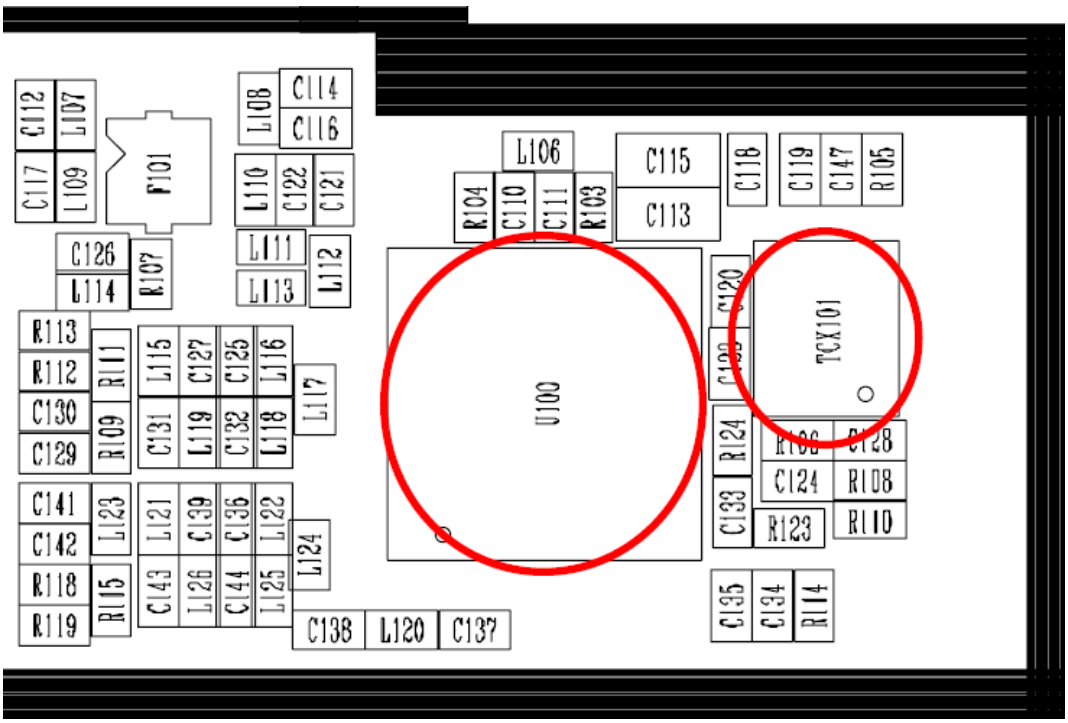
Power On





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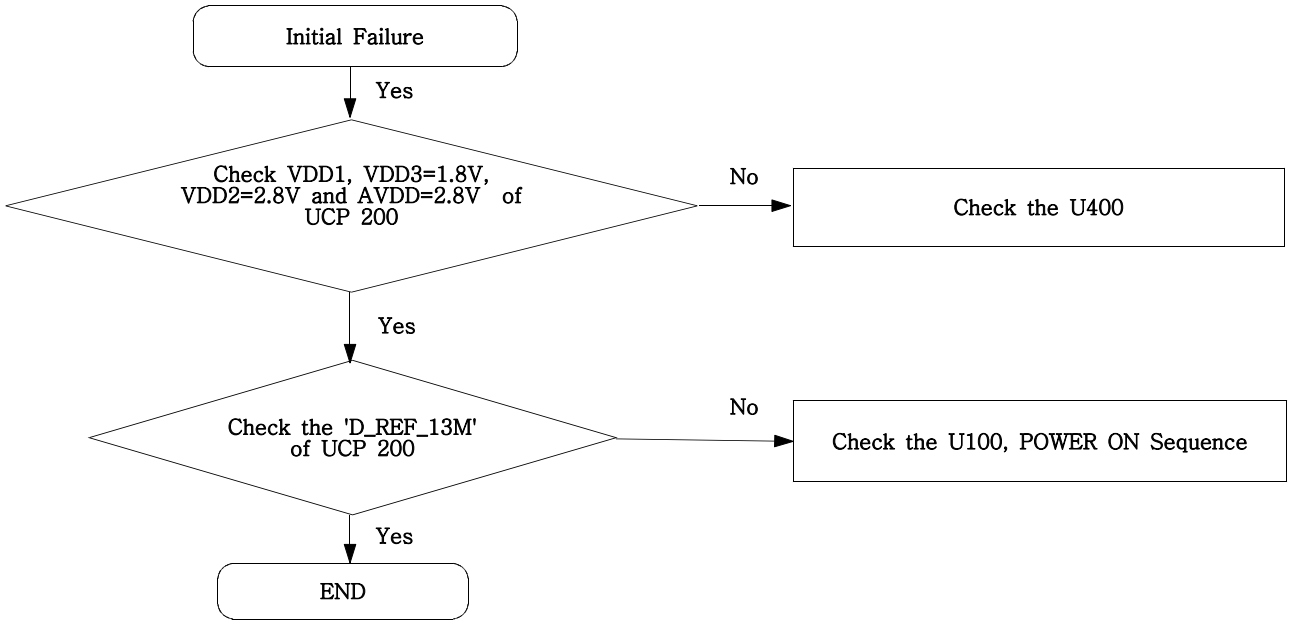
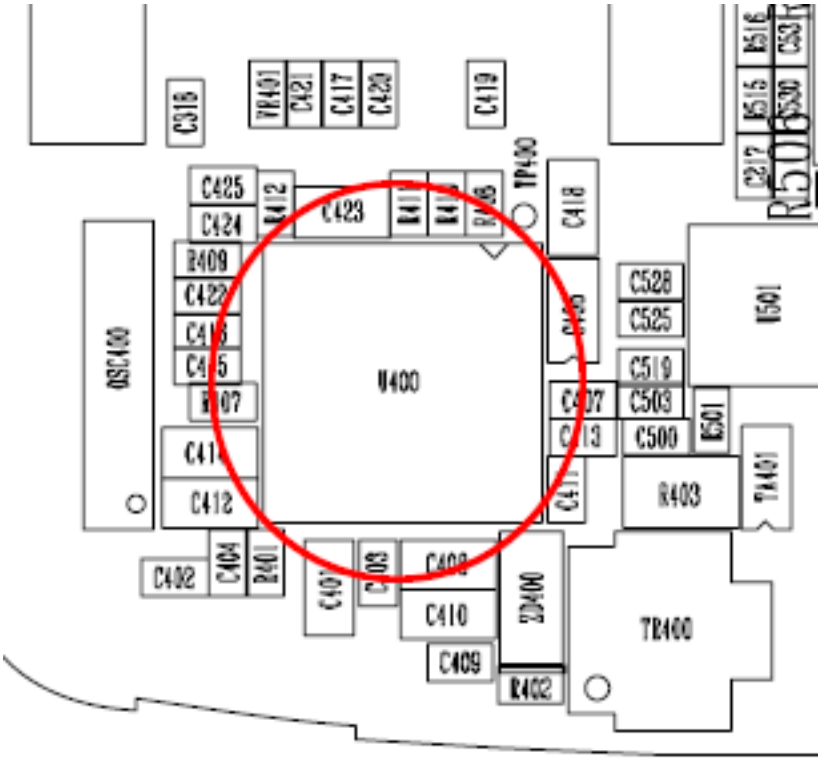
9-2. Initial





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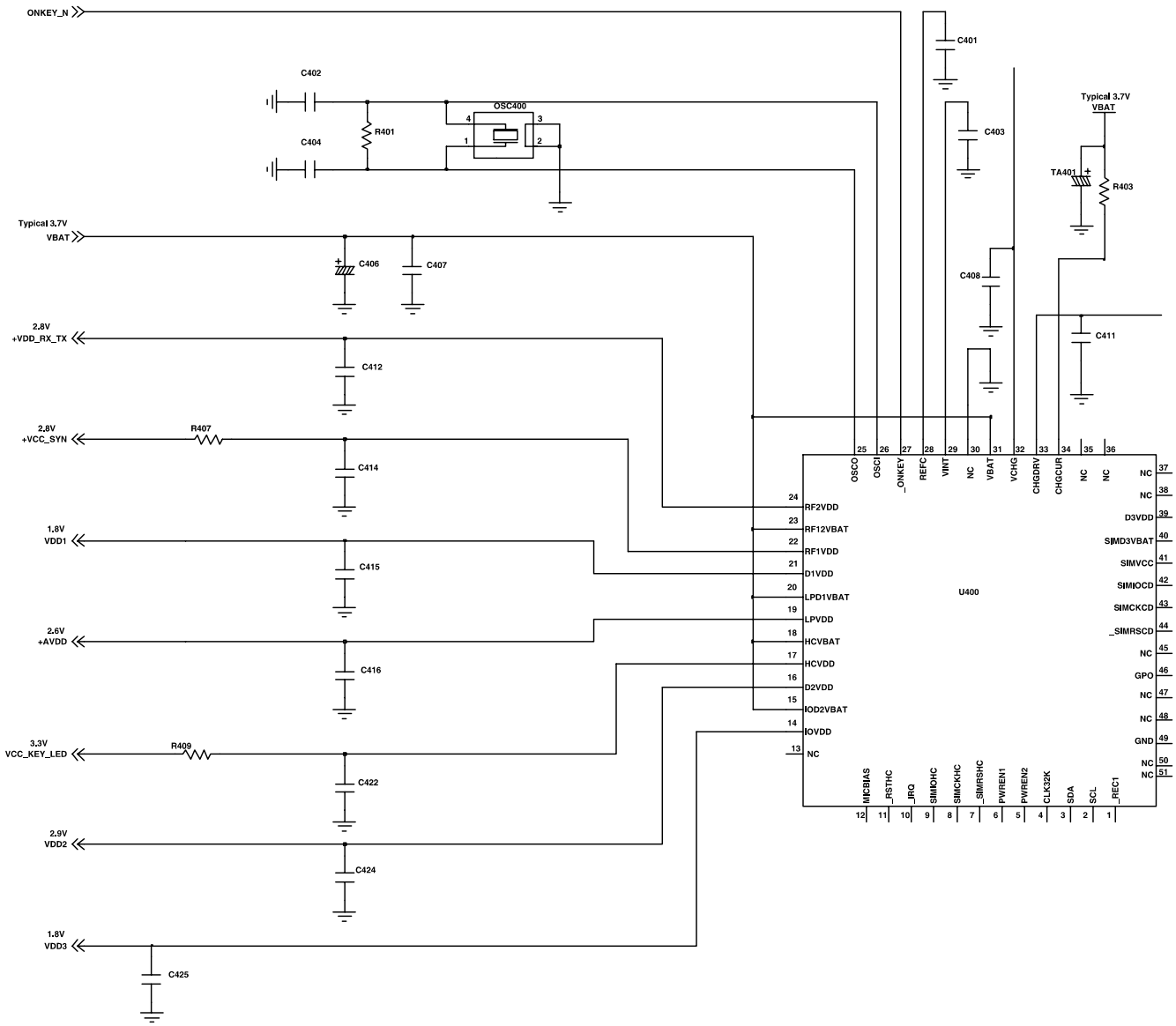

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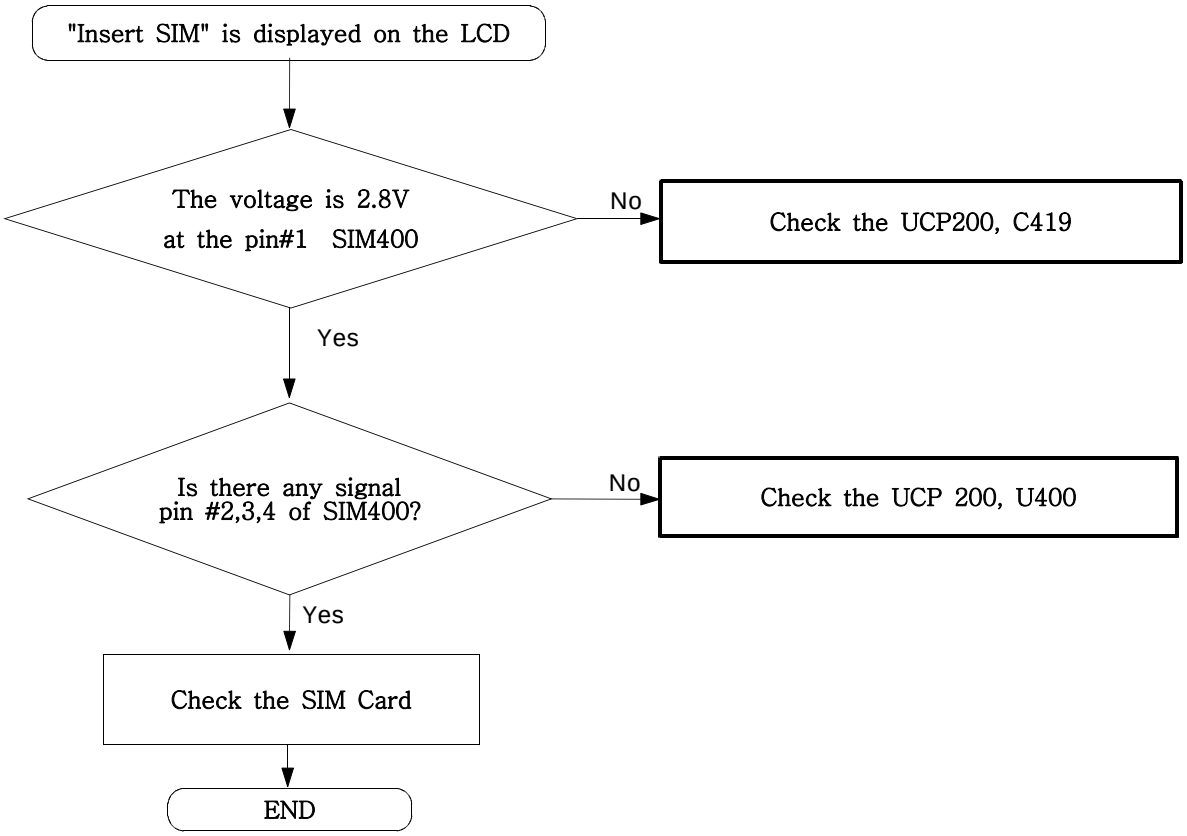
9-3. Sim Part



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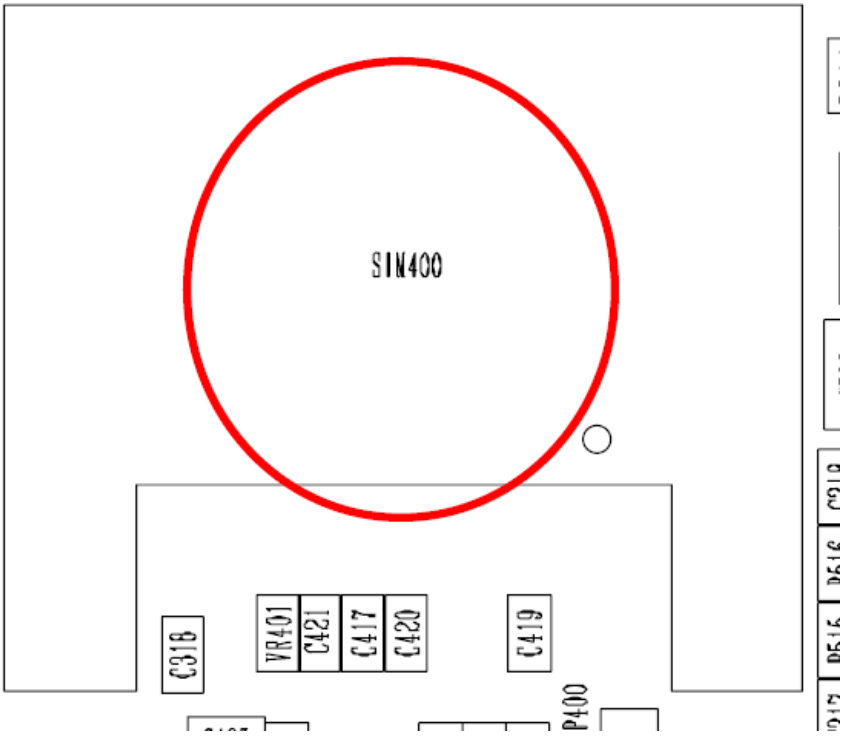

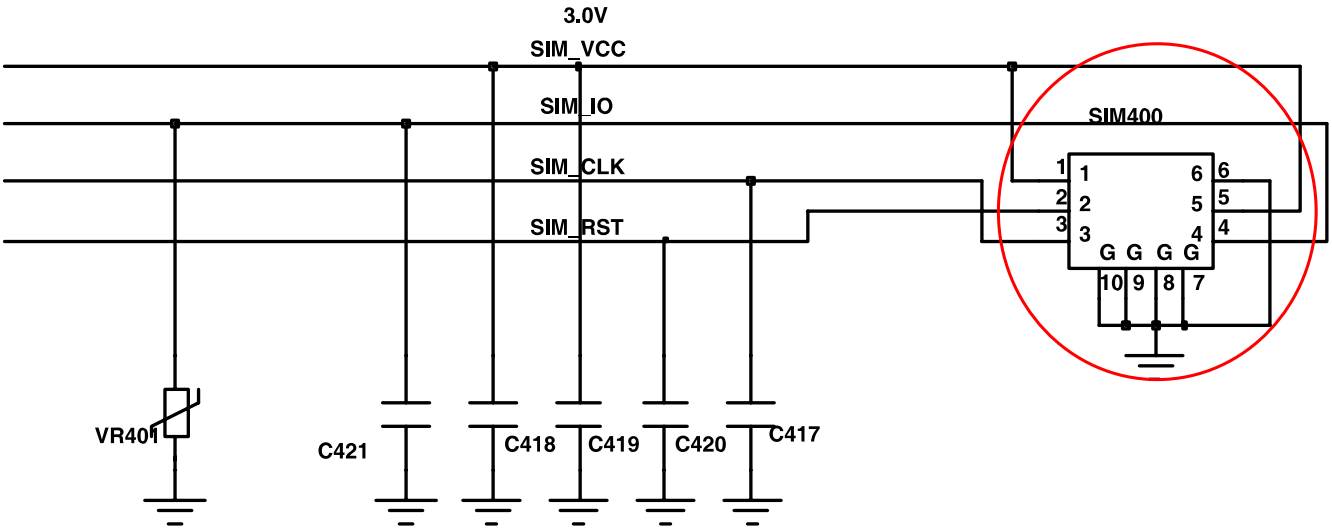

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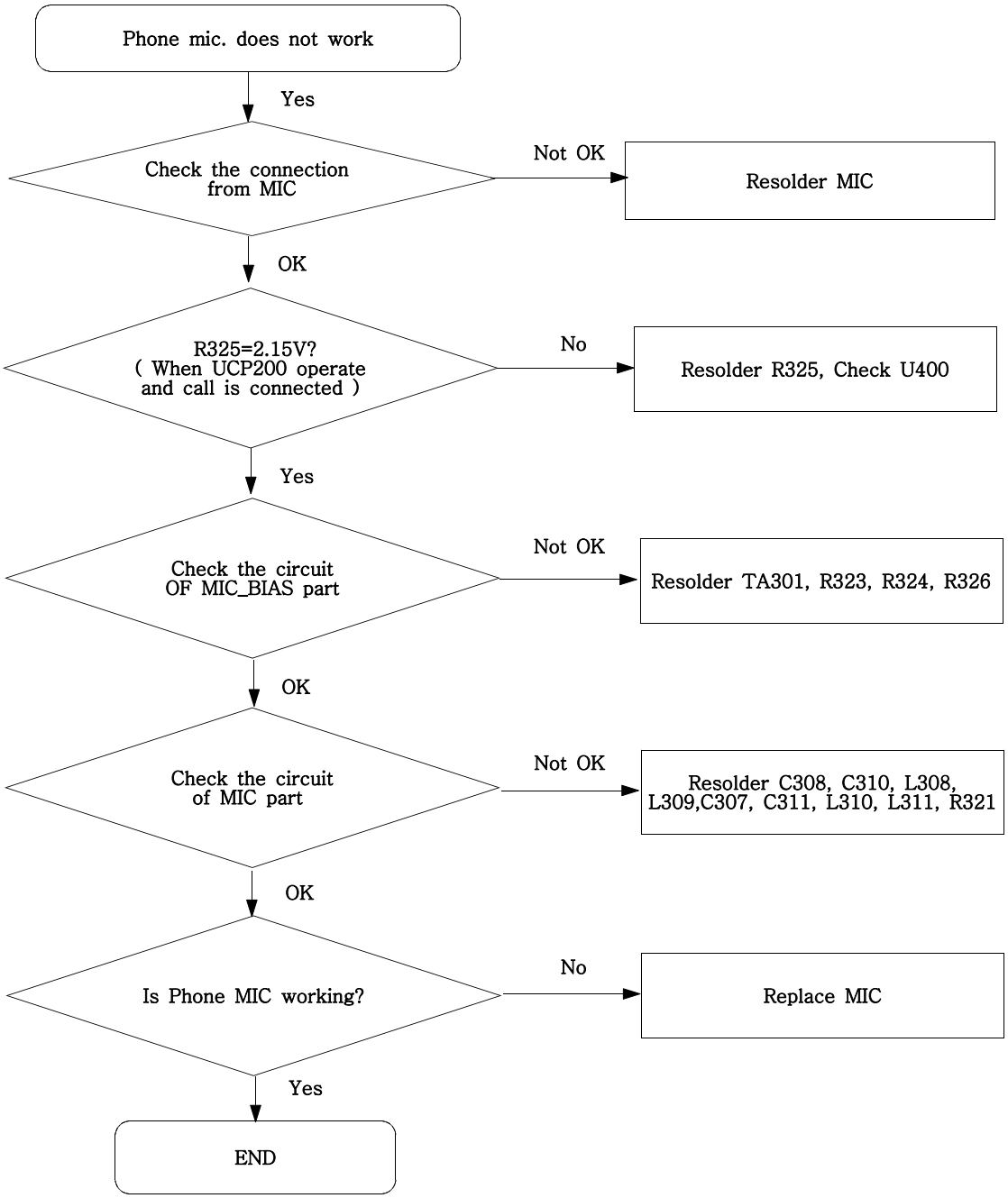
9-4. Microphone Part - Phone MIC



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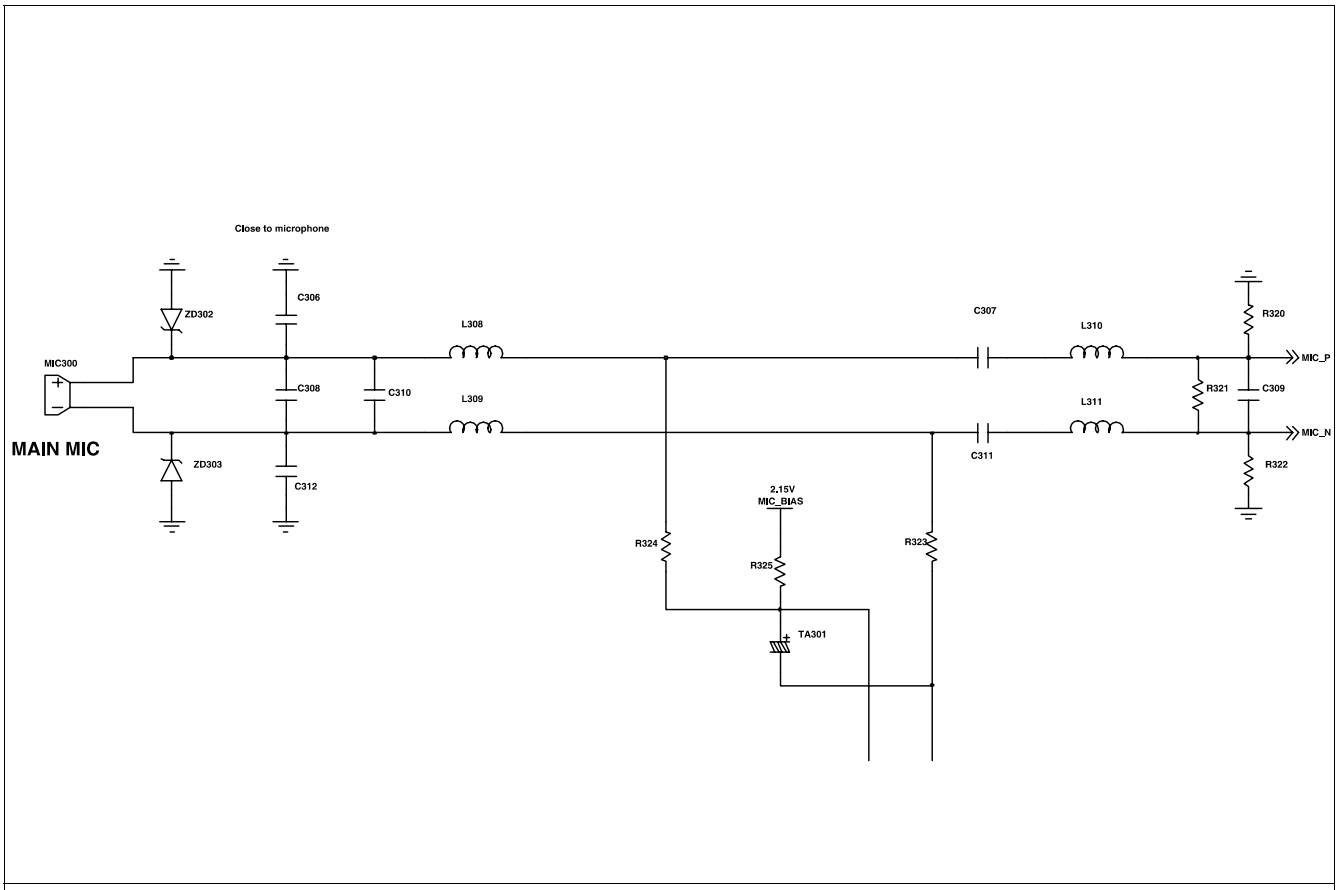

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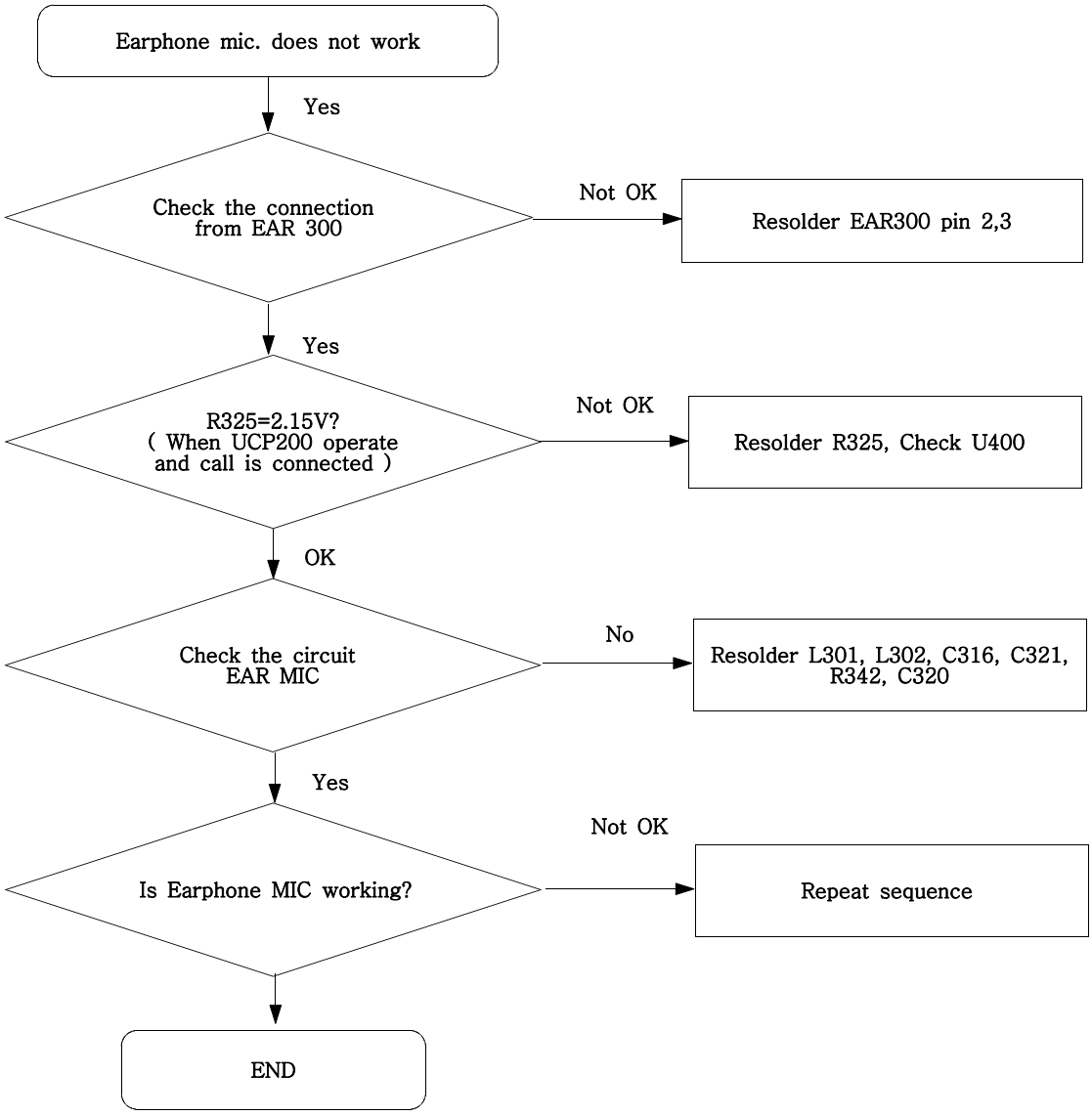
9-5. Microphone Part - Earphone MIC



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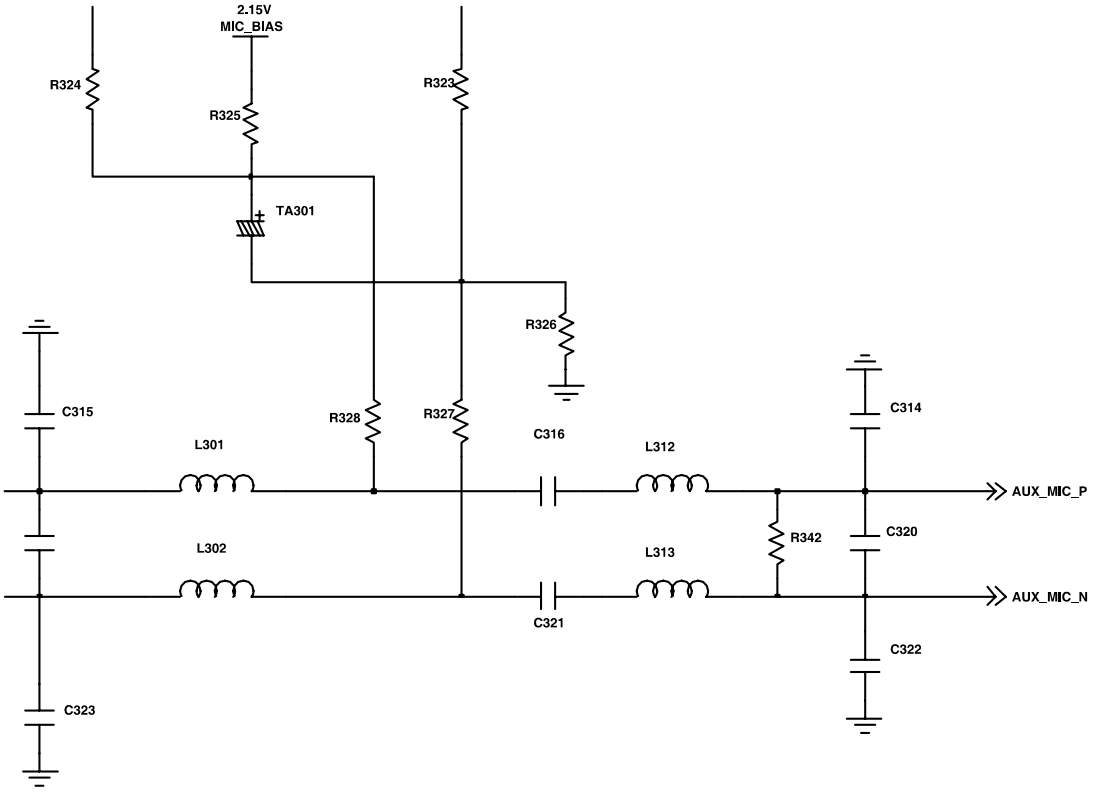

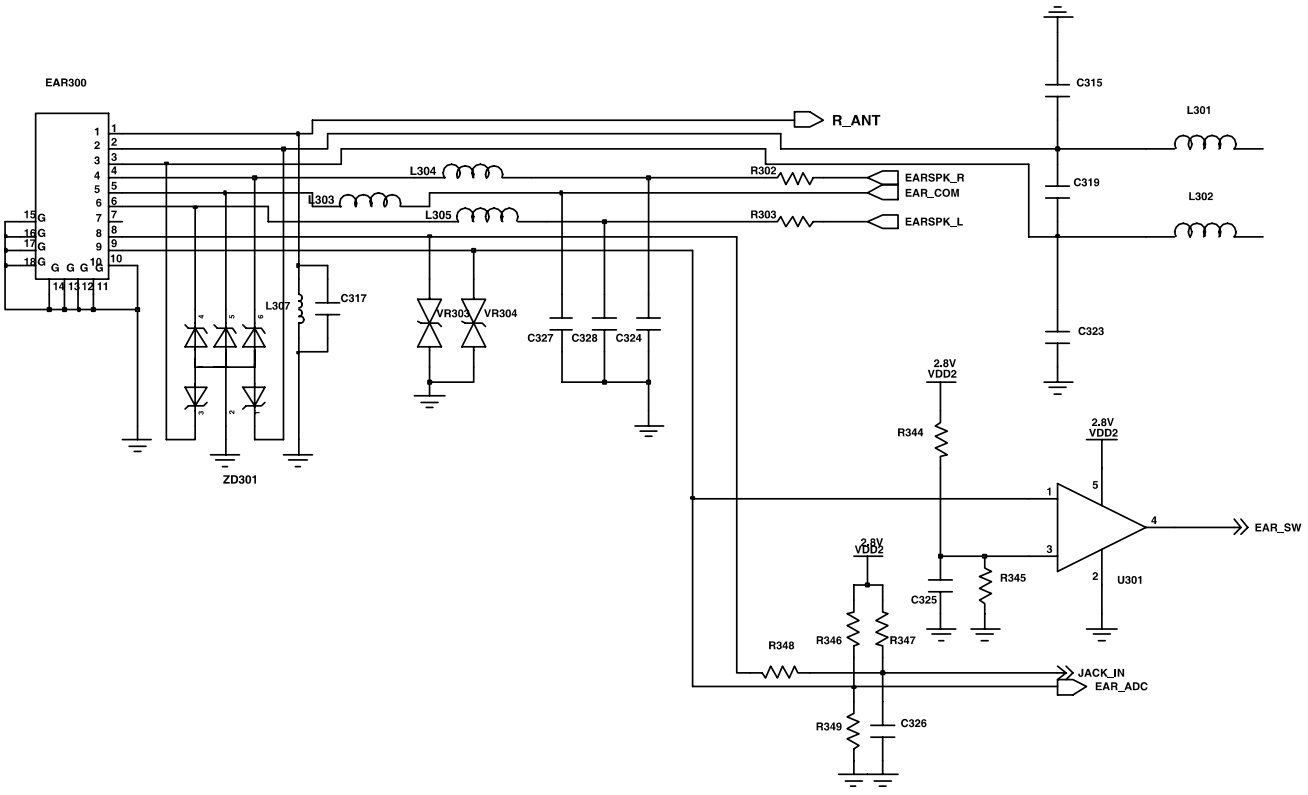

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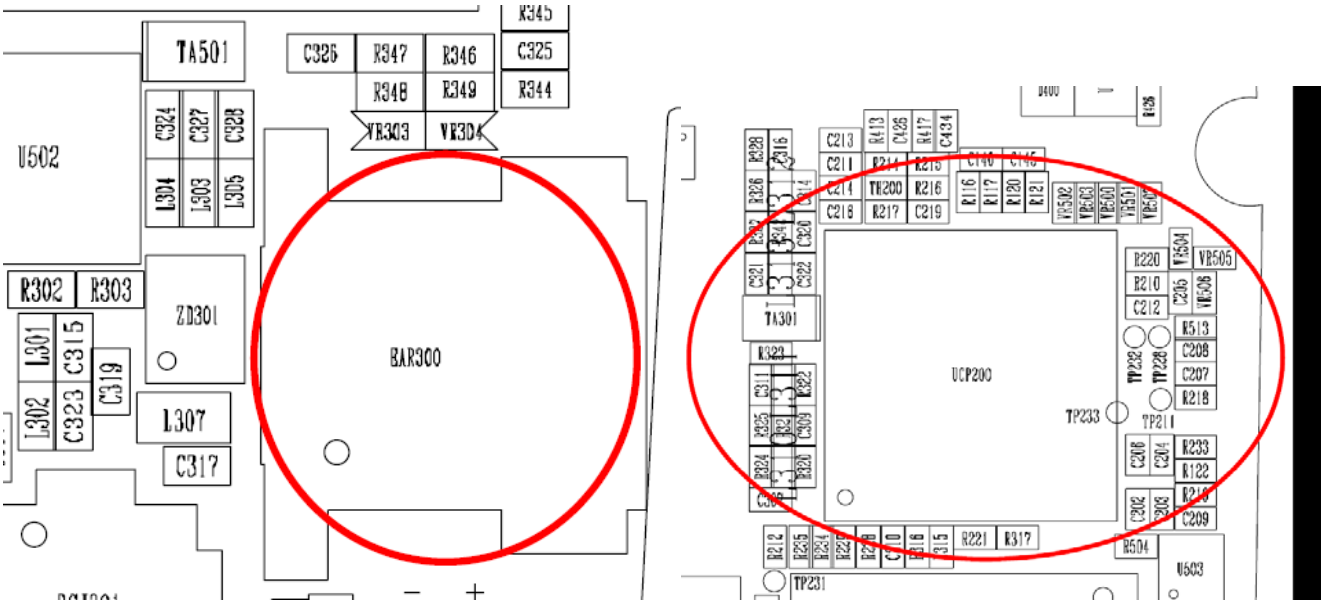

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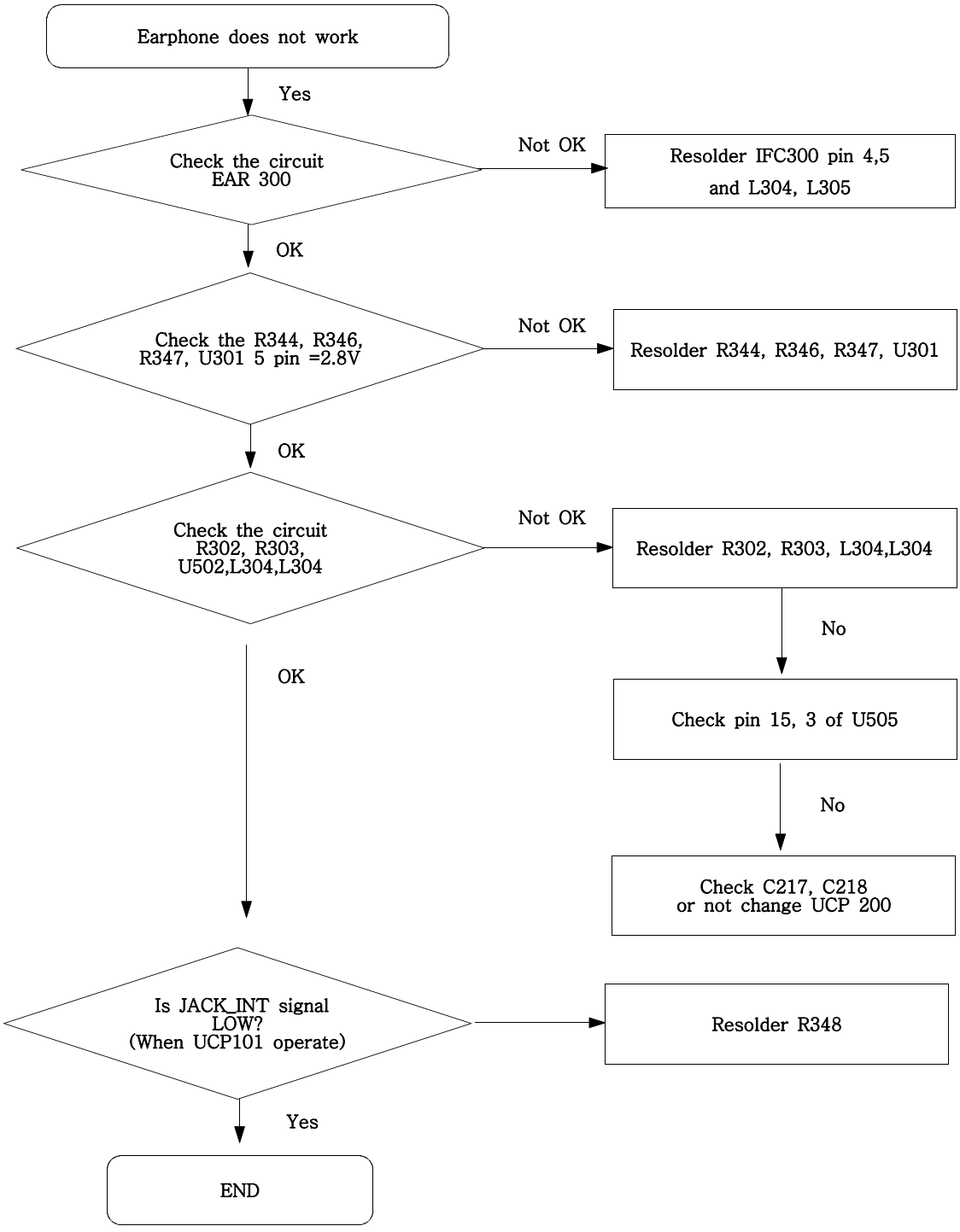
9-6. Earphone Part



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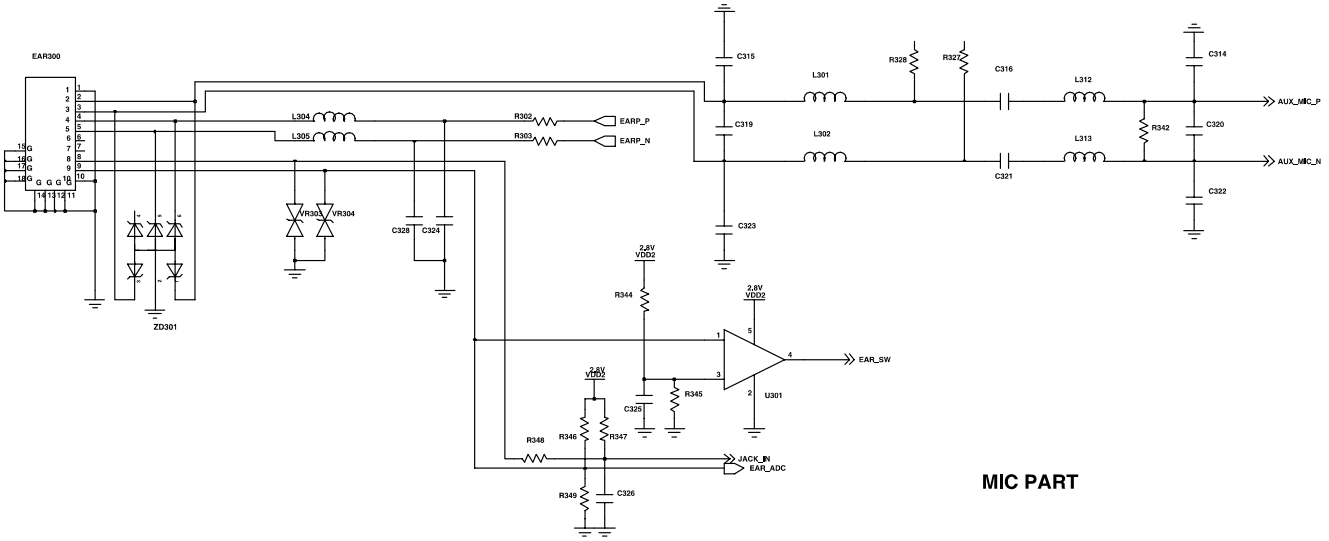
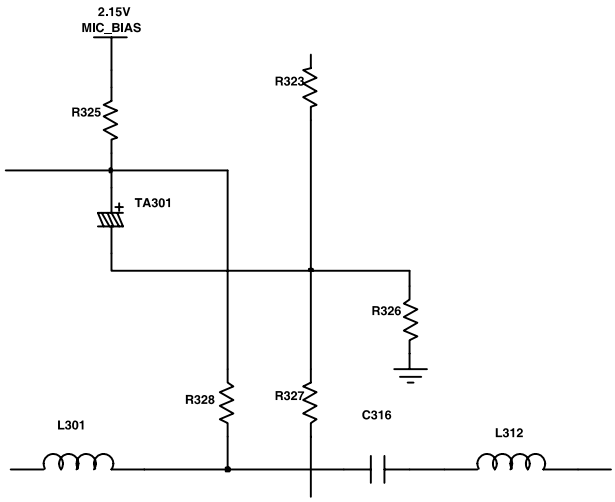
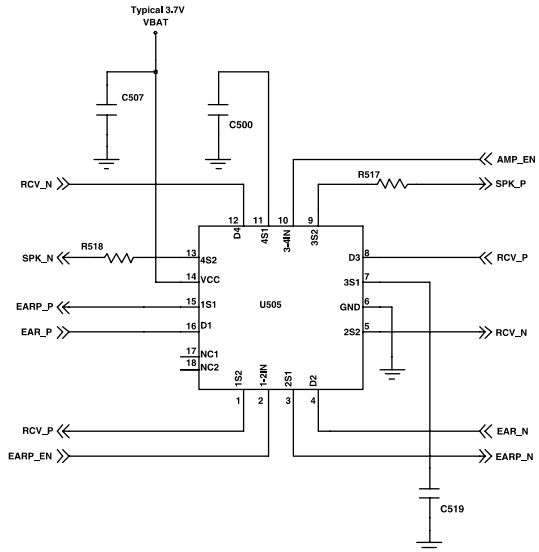


MIC PART





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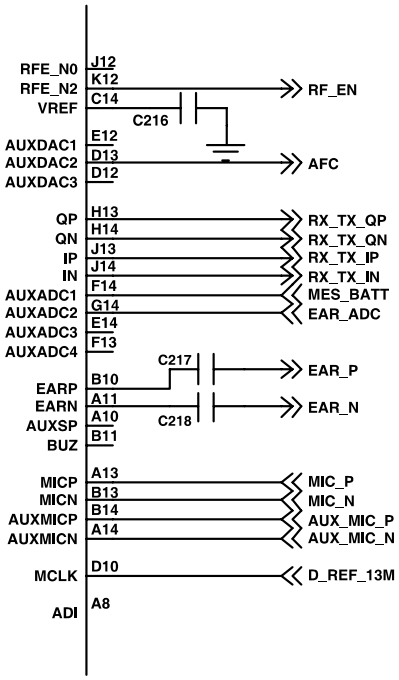
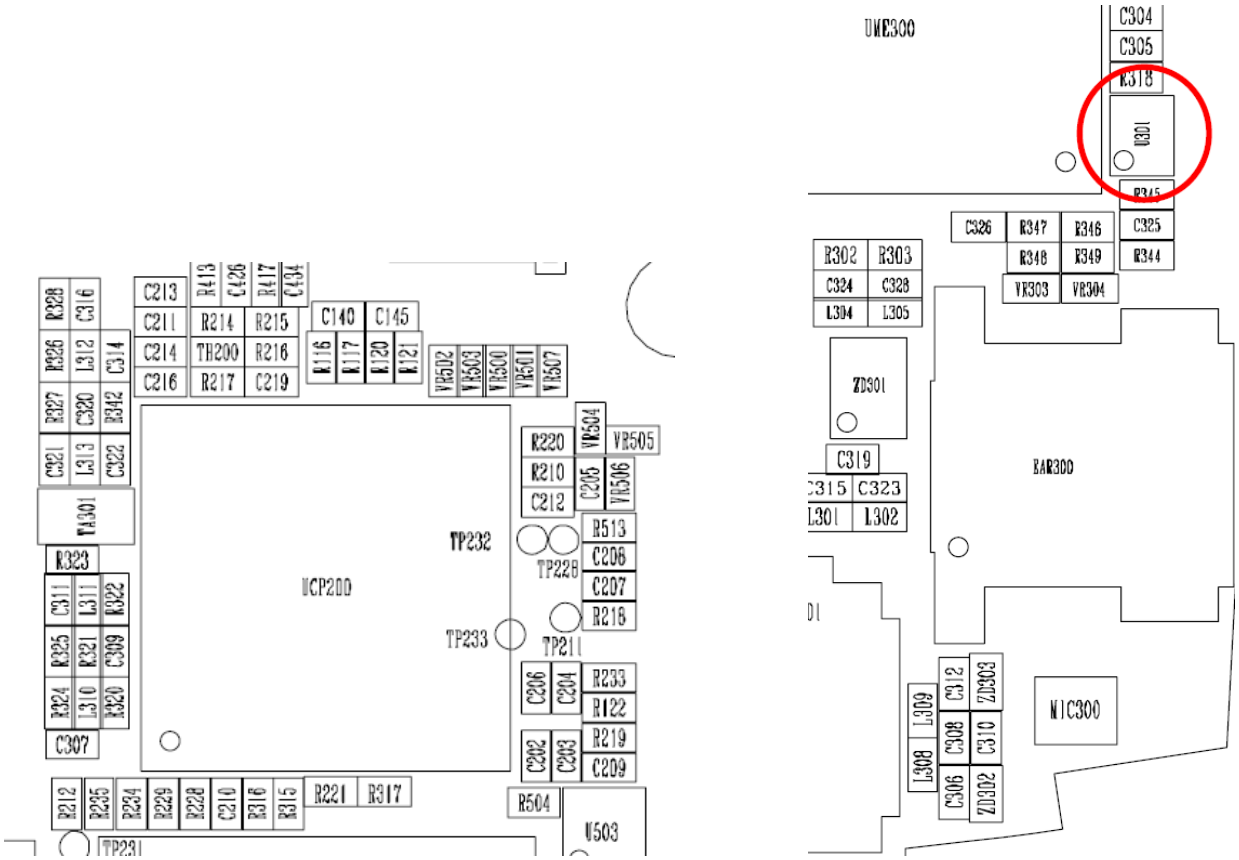
UCP200





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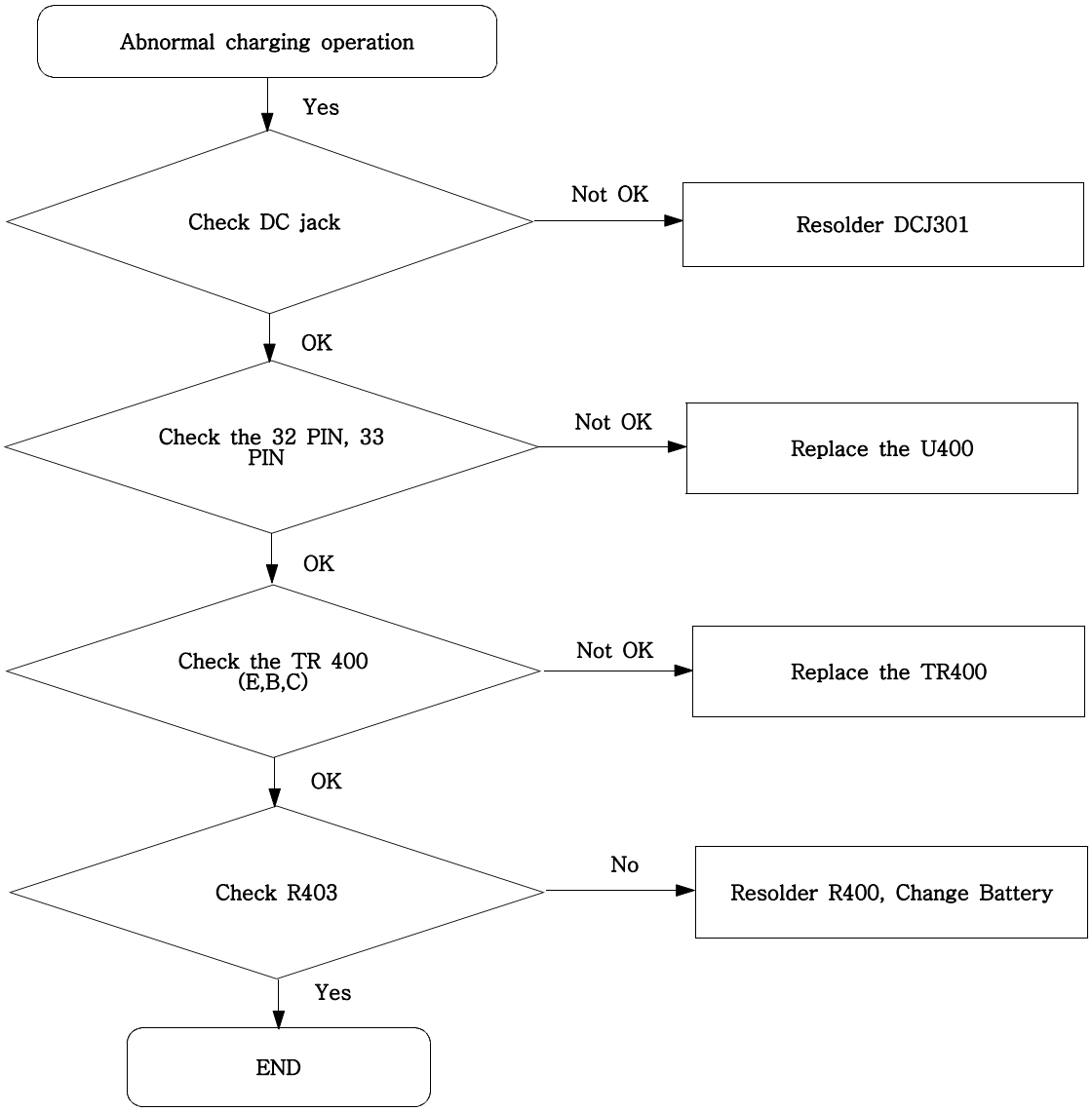
9-7. Charging Part



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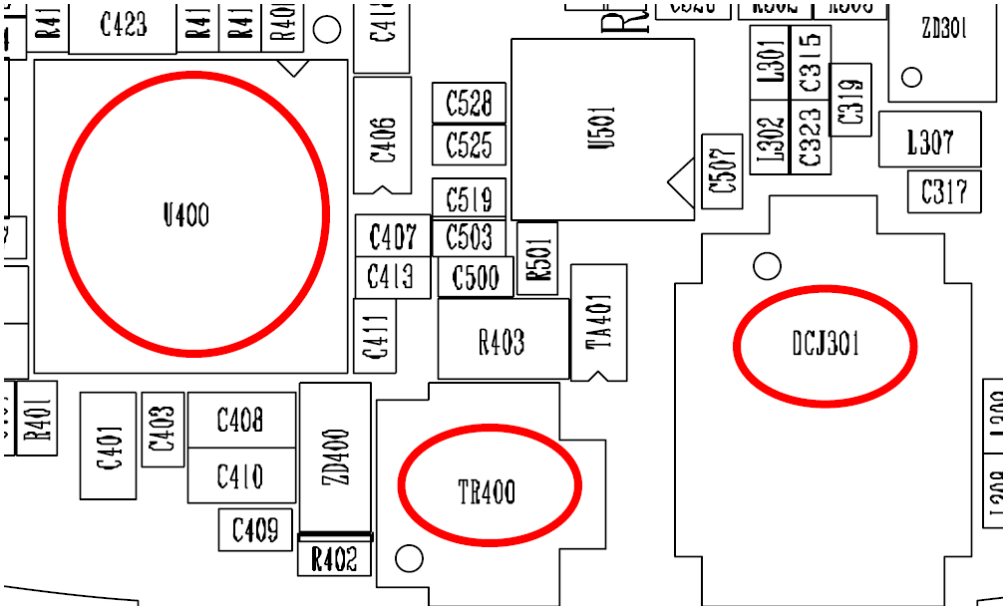

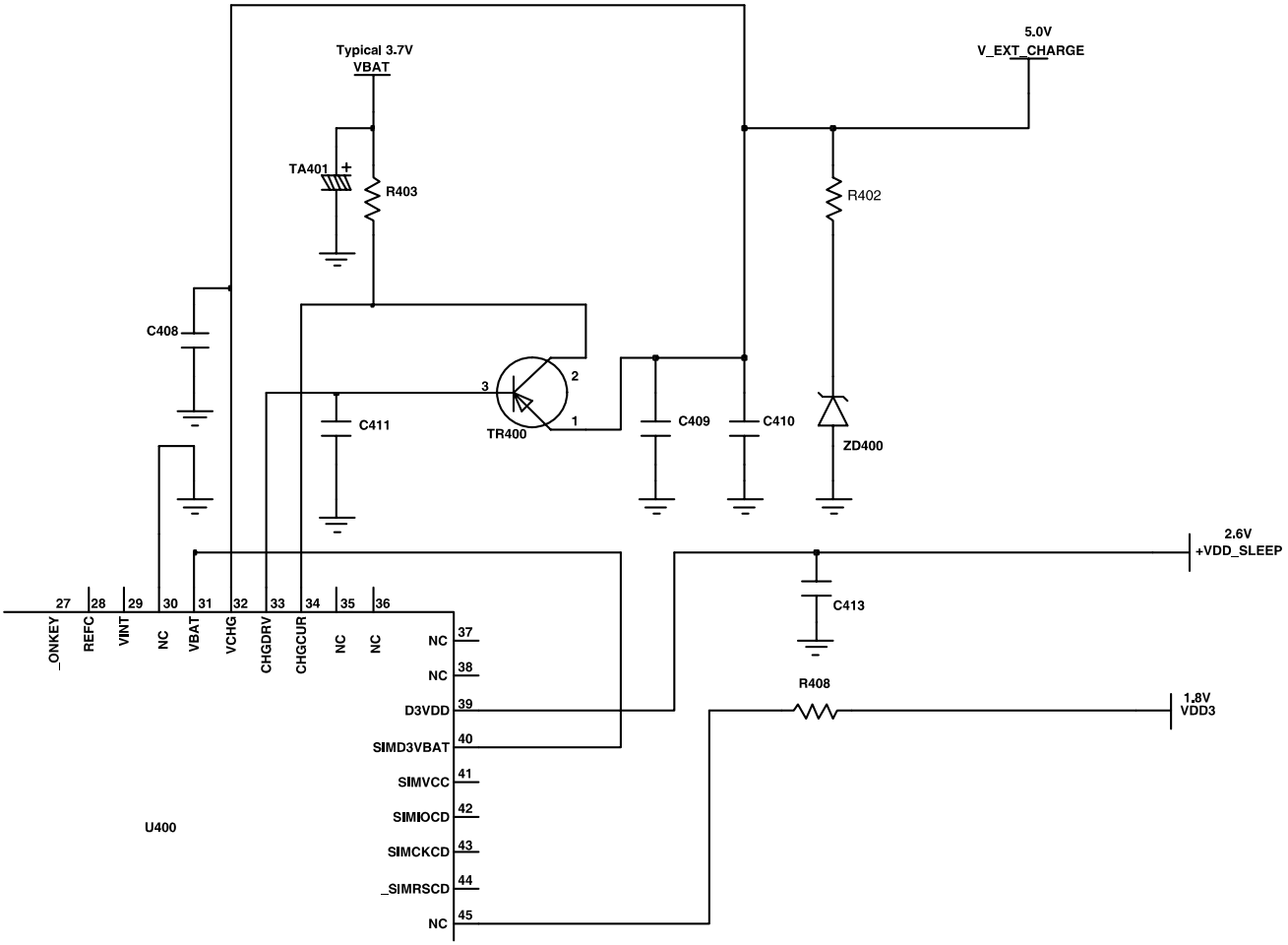

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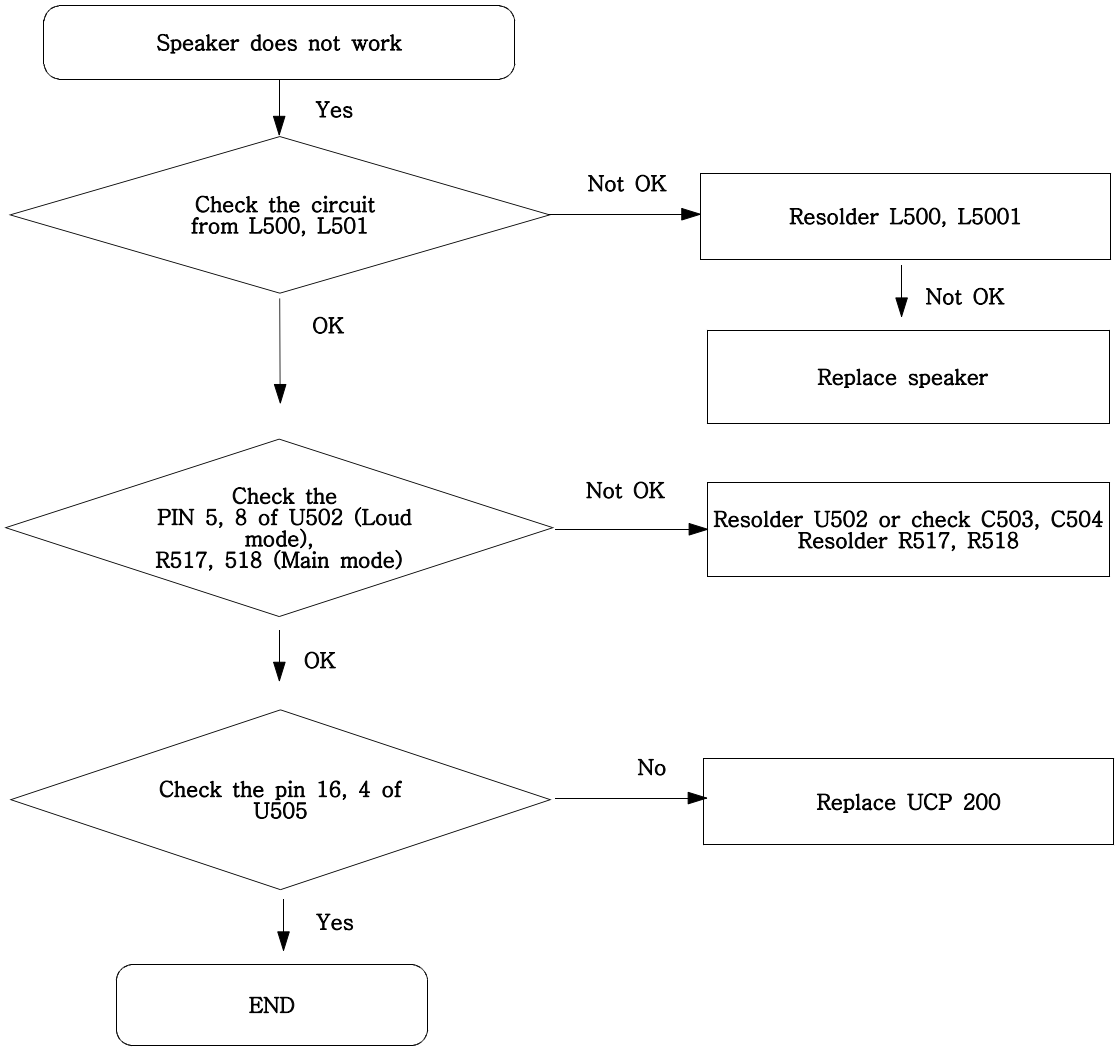
9-8. Speaker Part



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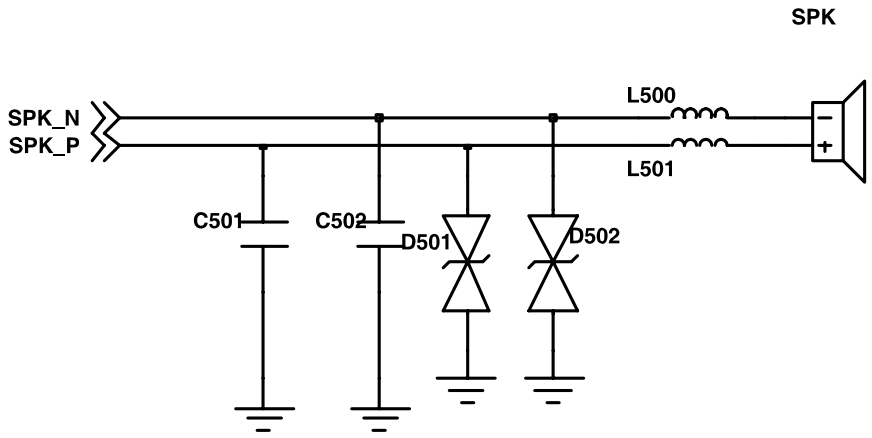

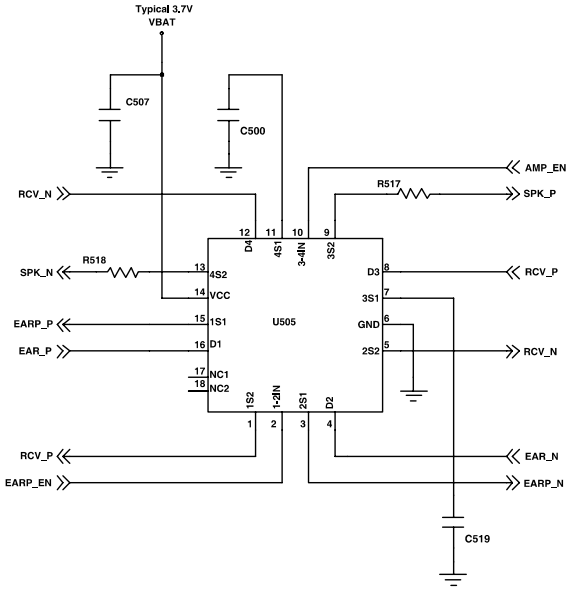

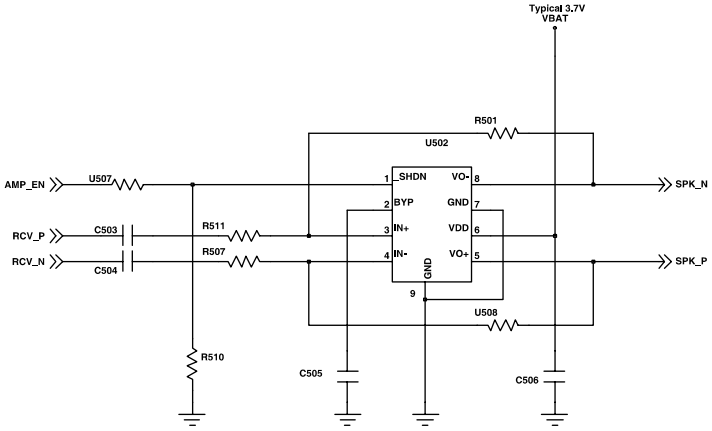

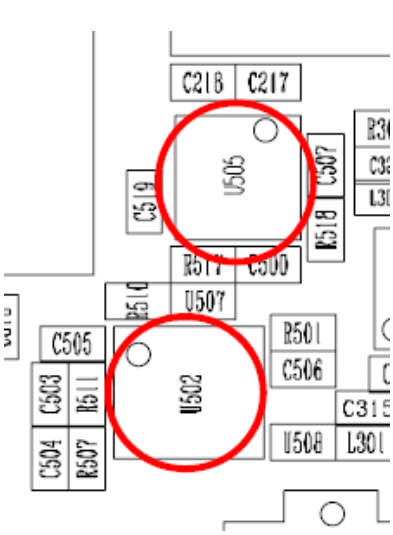

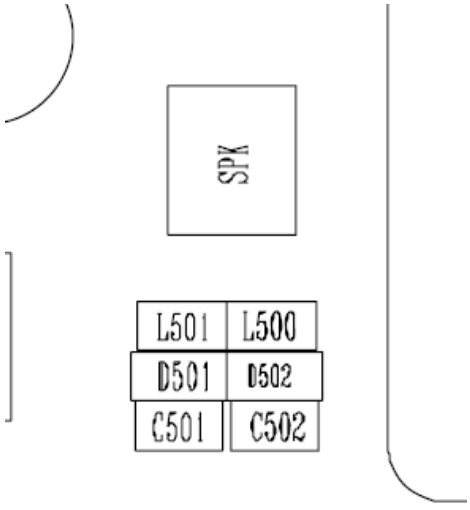

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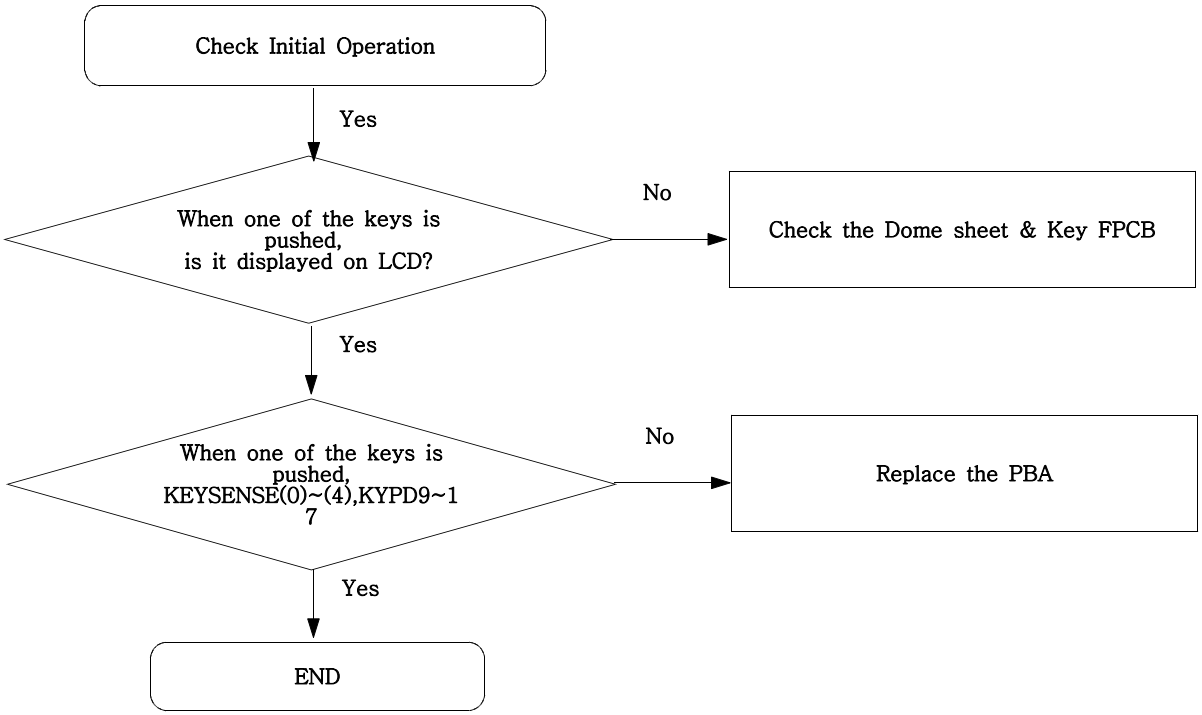
9-9. Key Data Input



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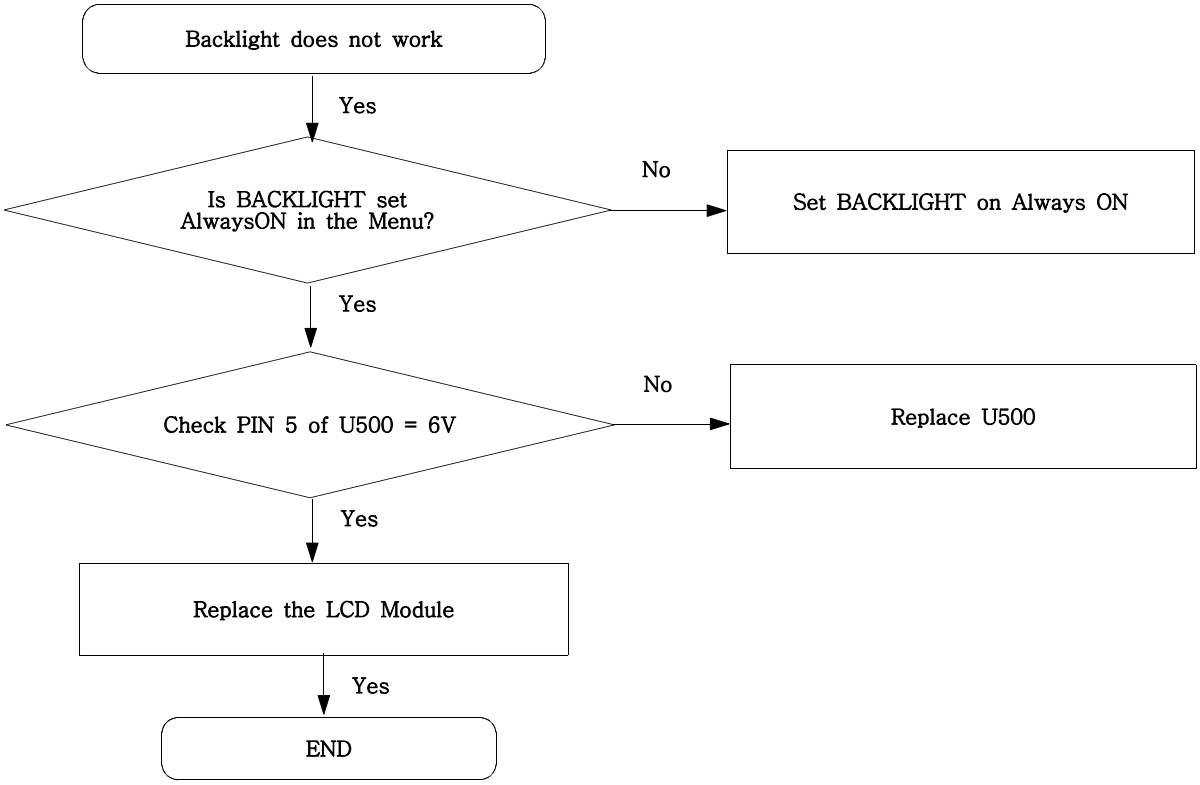
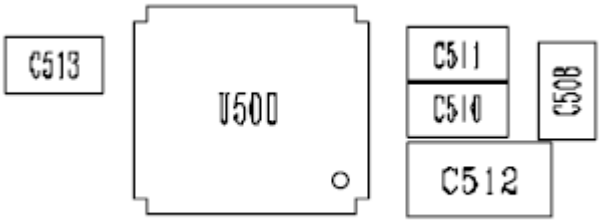
9-10. Back Light (for Color Main LCD)





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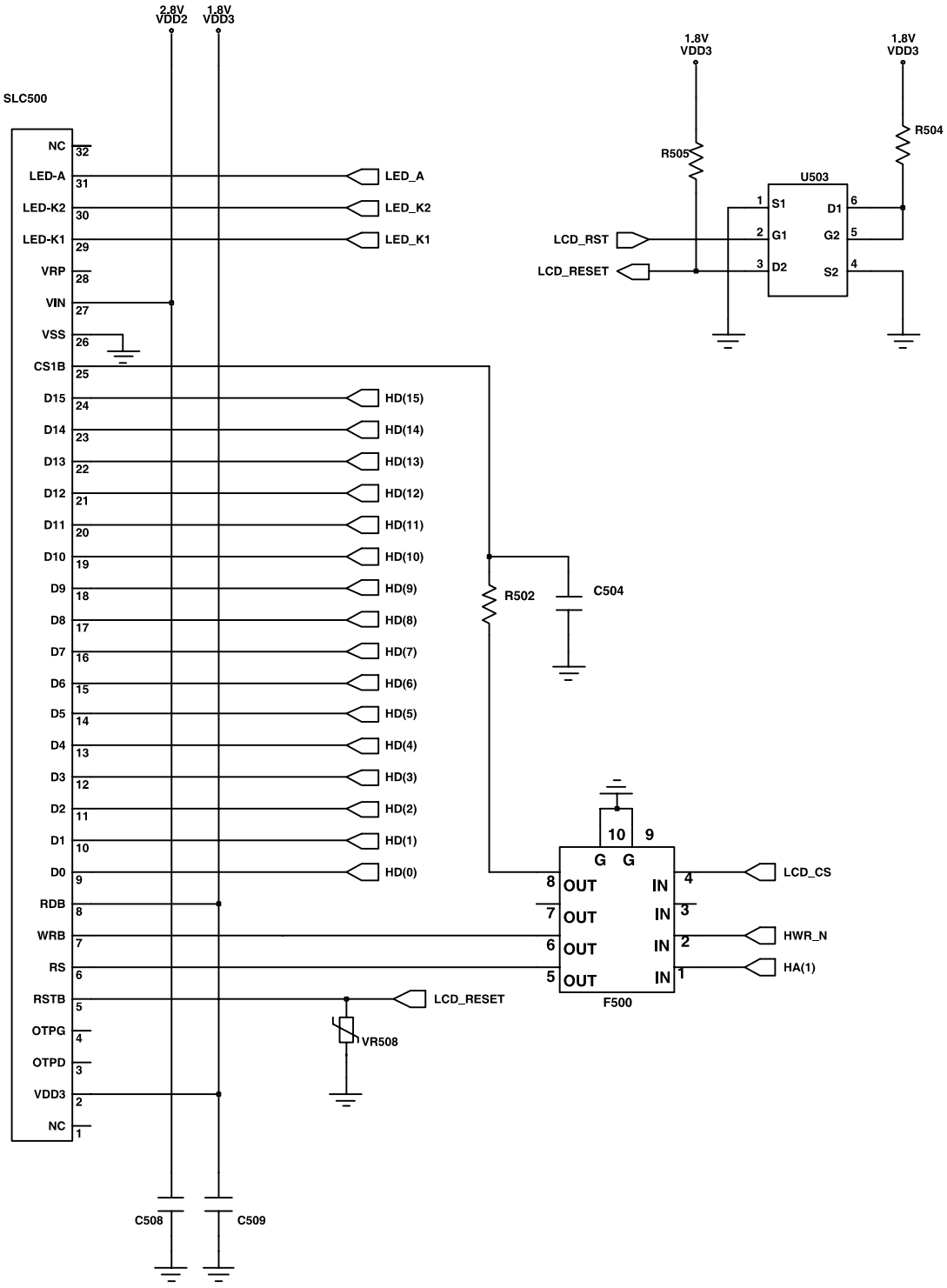

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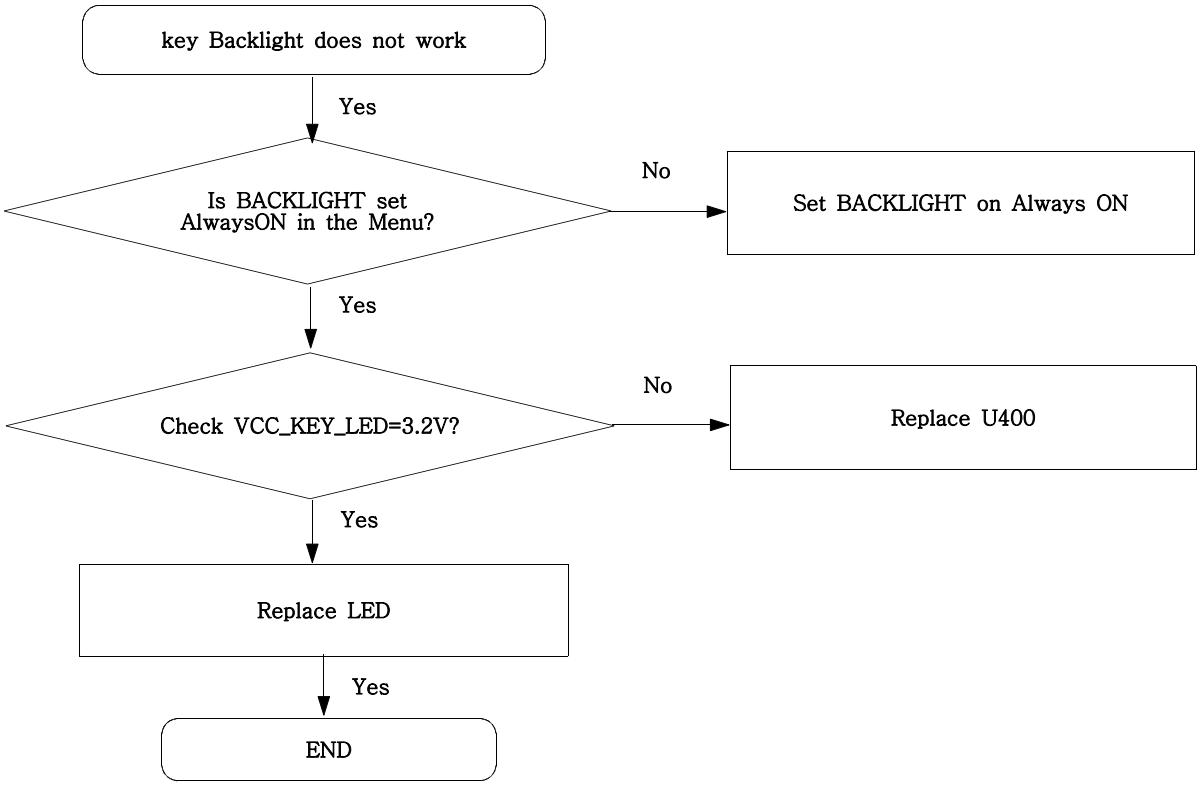
9-11. Key Back Light



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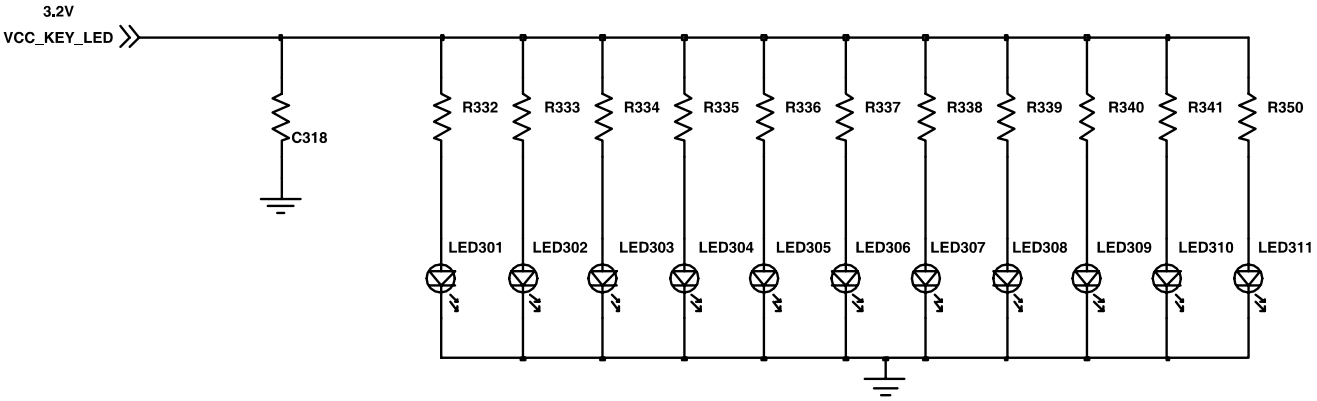

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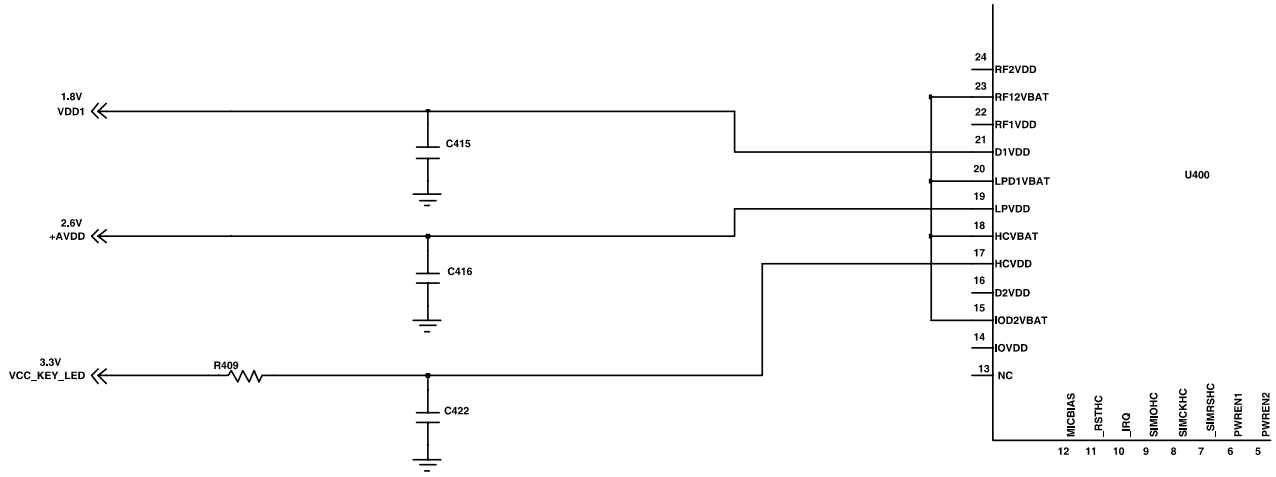

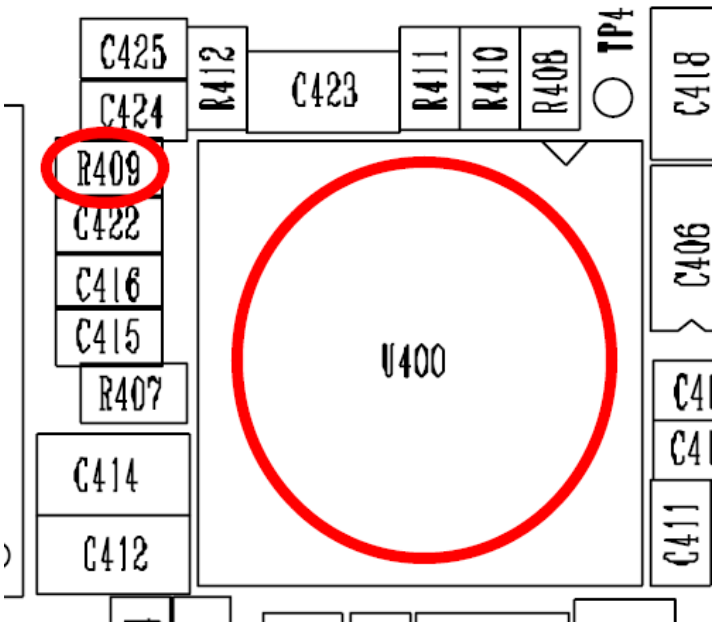

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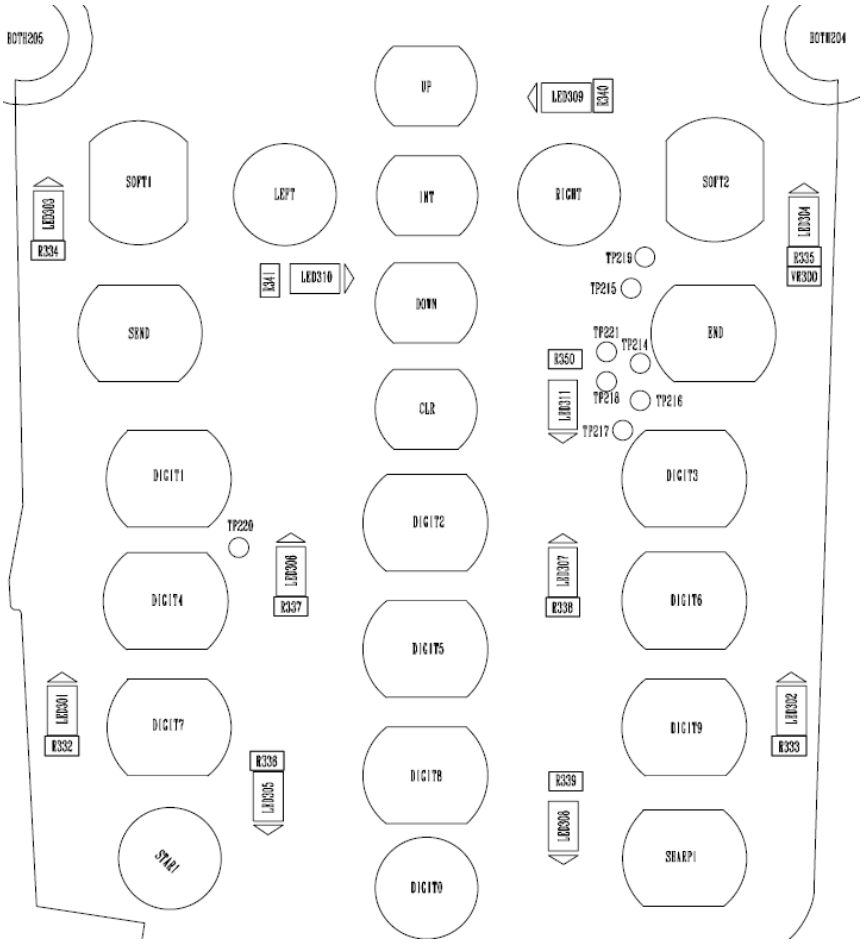

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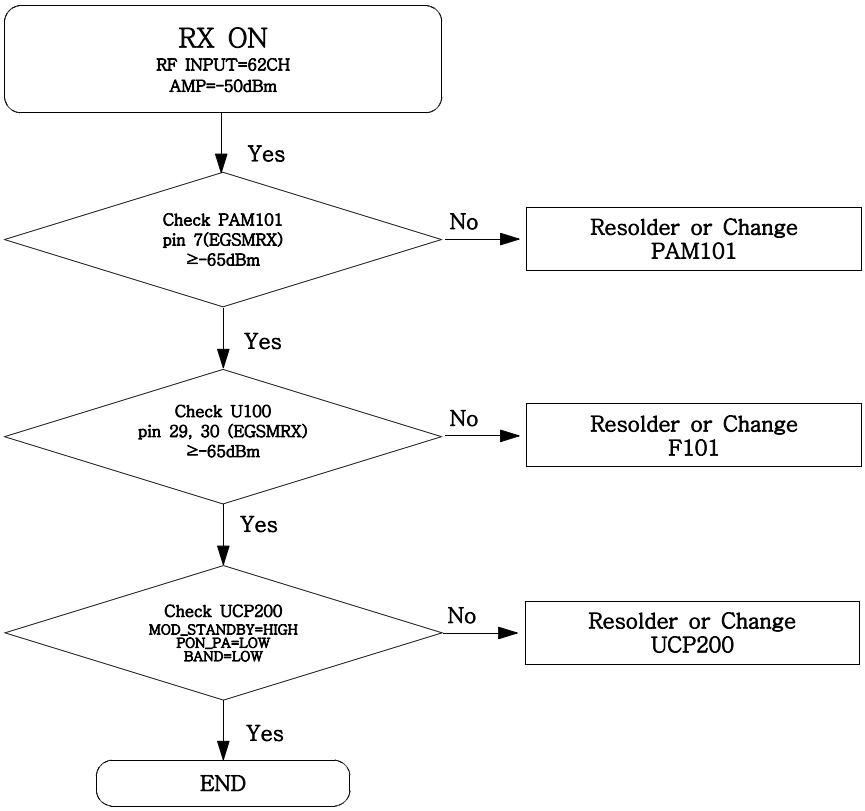
9-12. GSM Receiver



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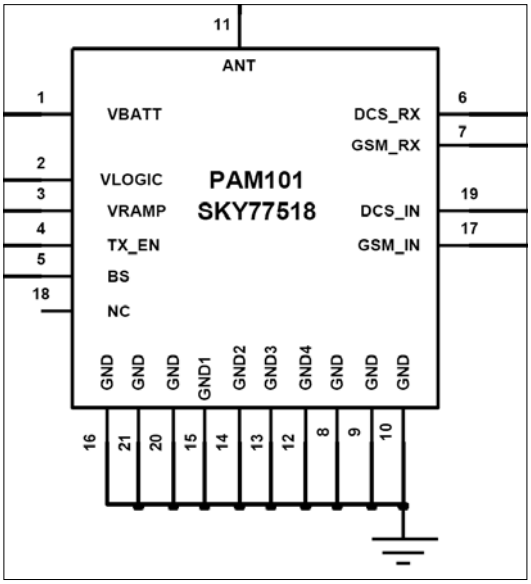

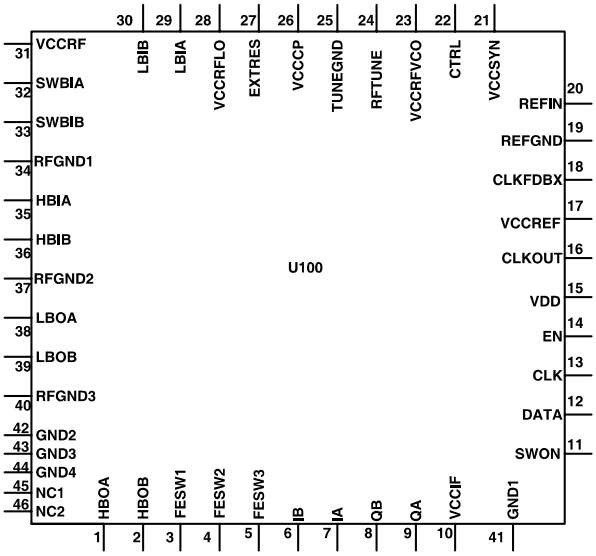

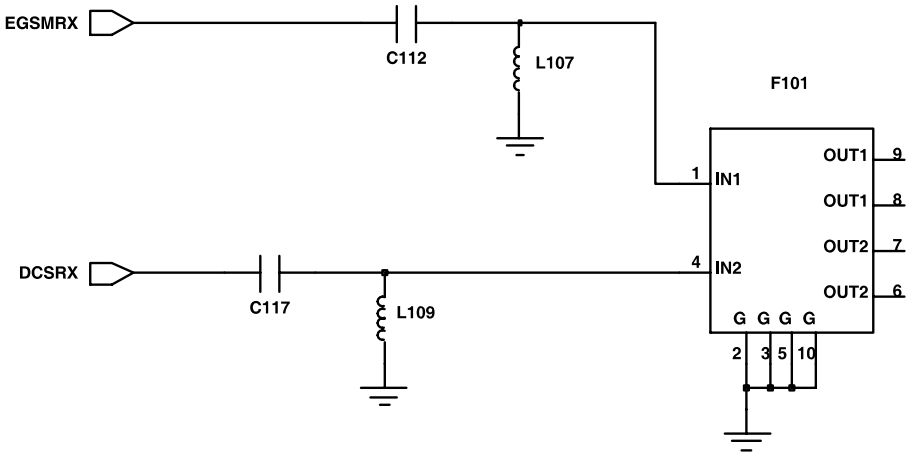

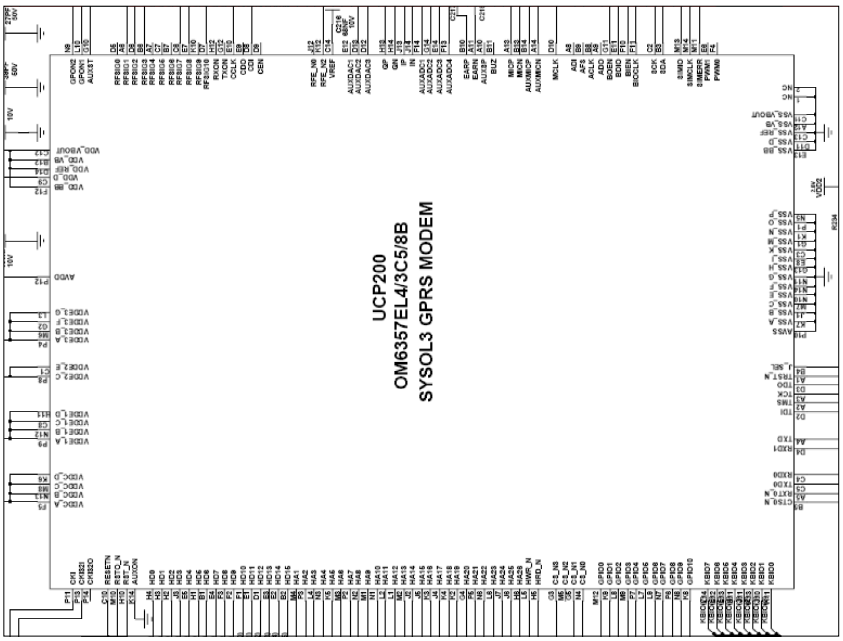

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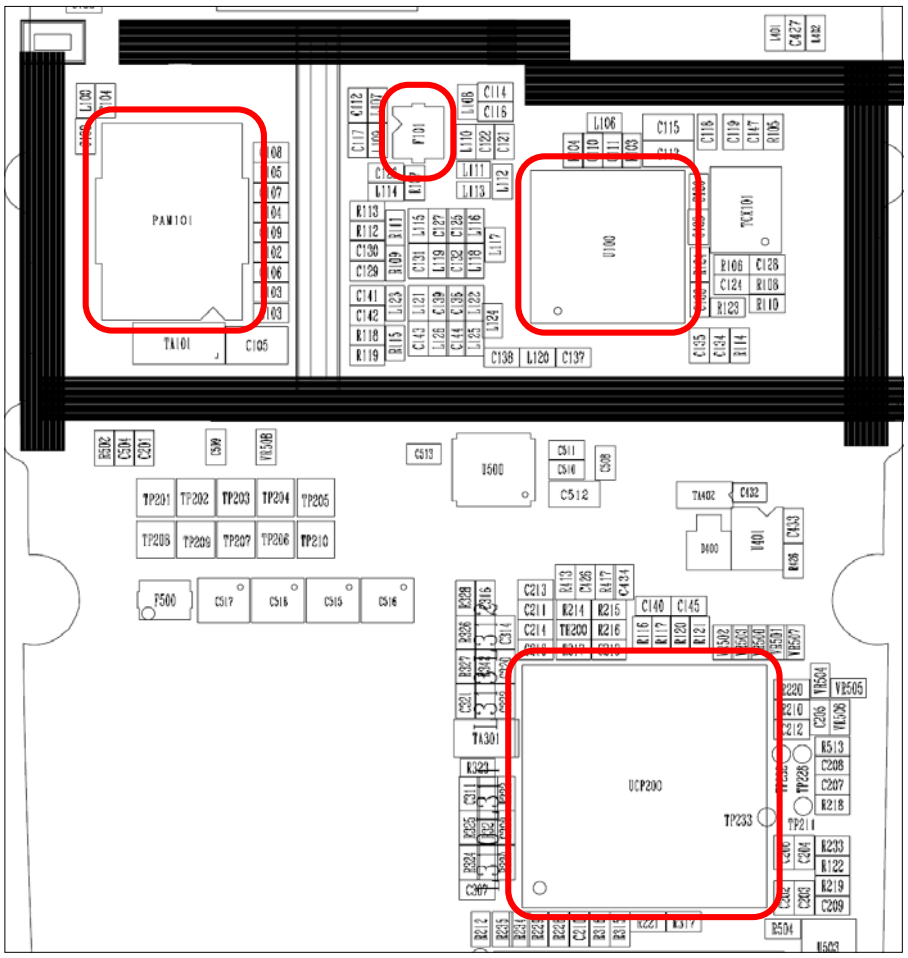

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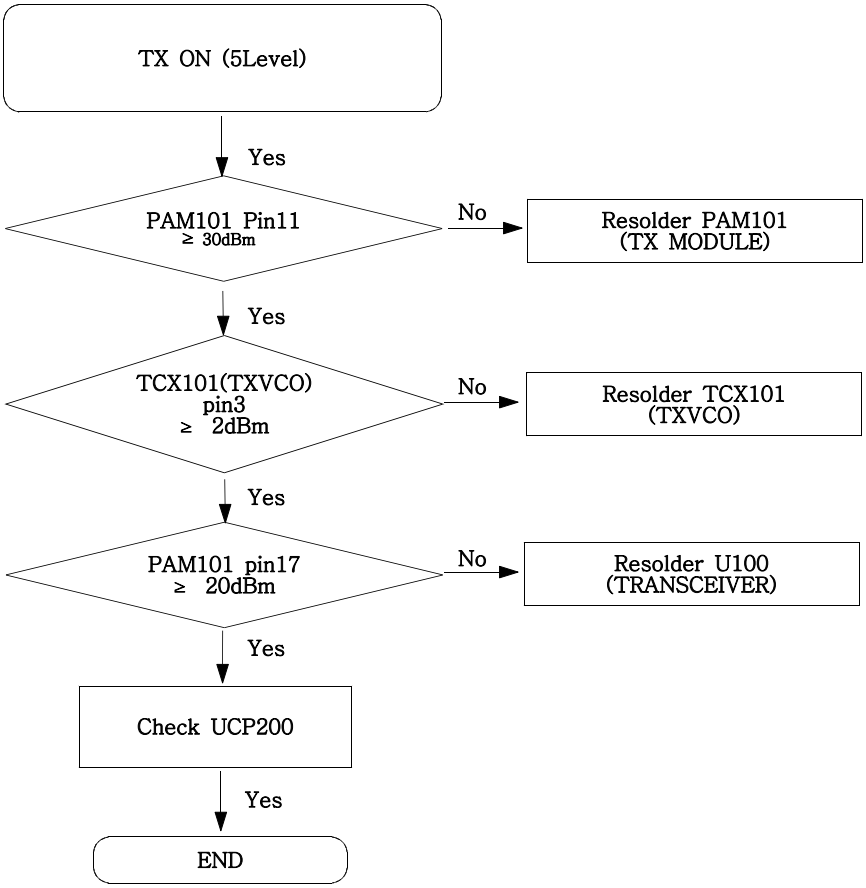
9-13. GSM Transmitter



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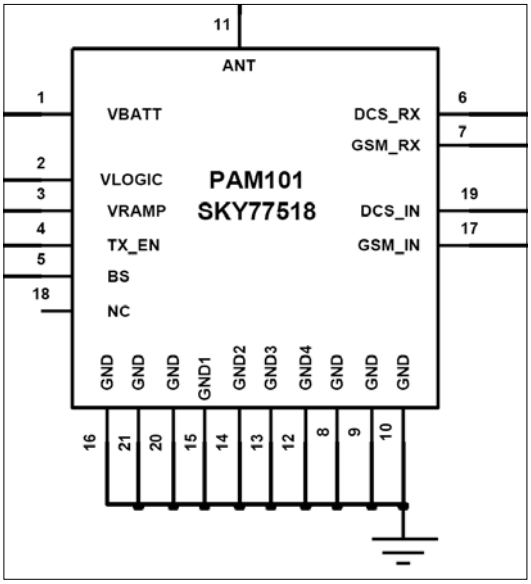
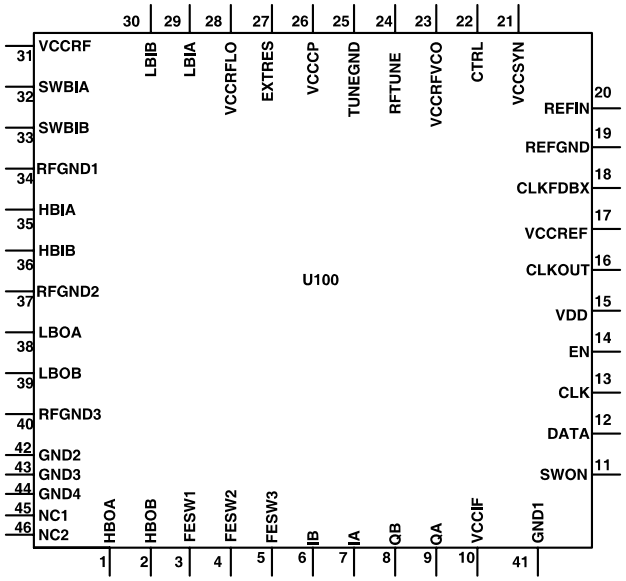
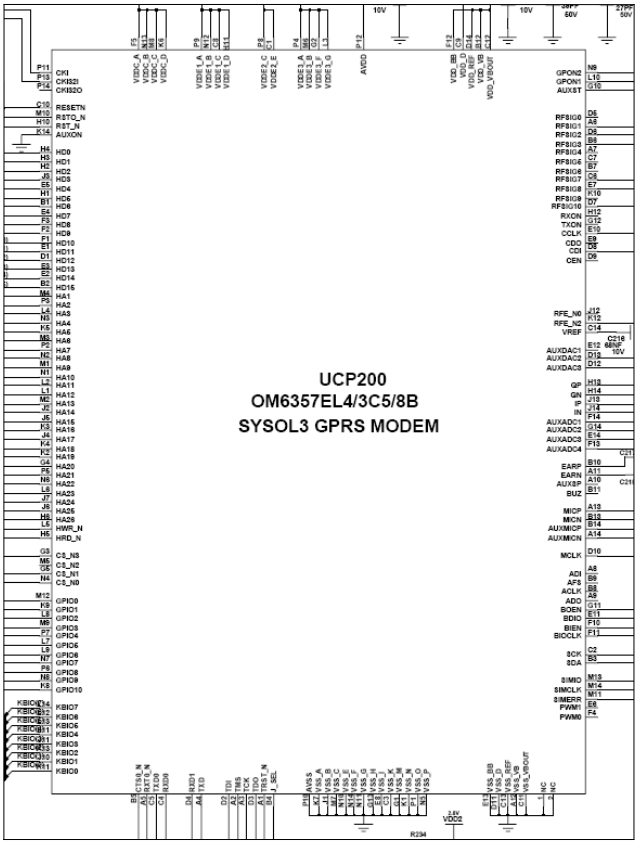
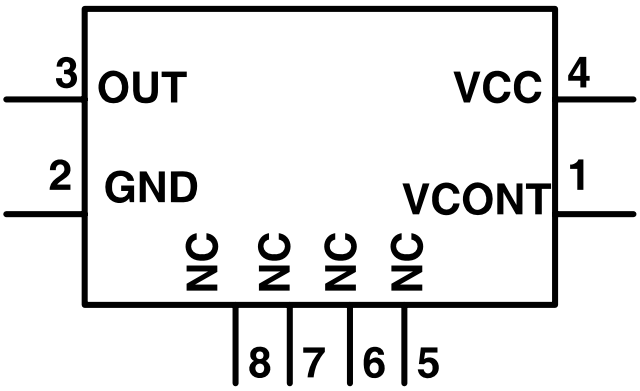






TCX101



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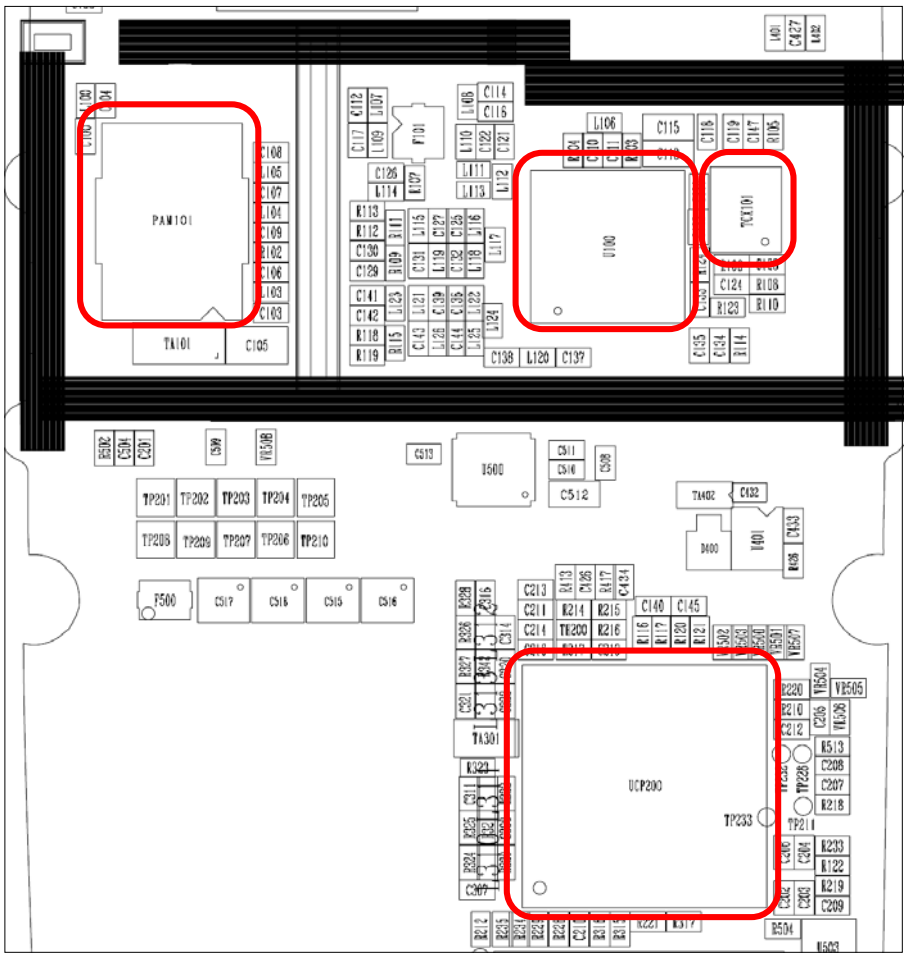

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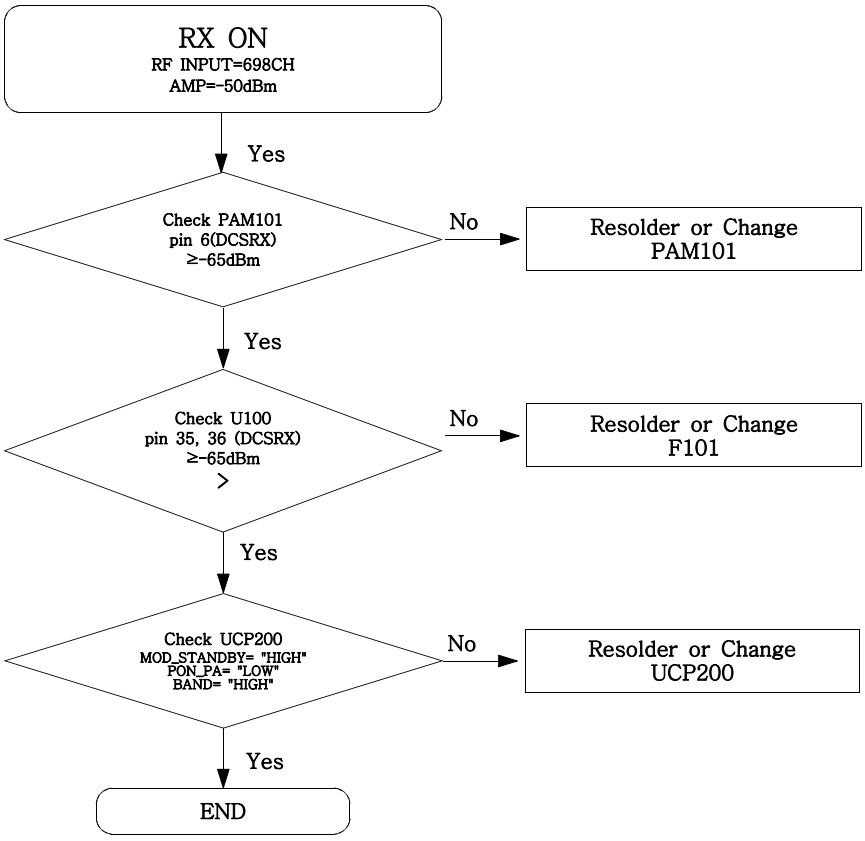
9-14. DCS Receiver



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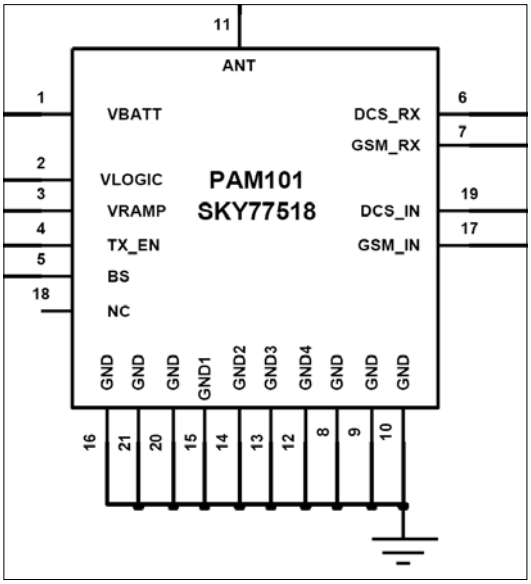

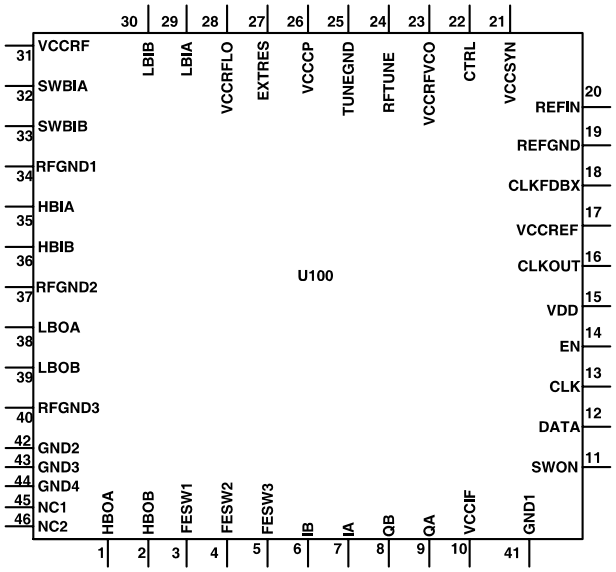

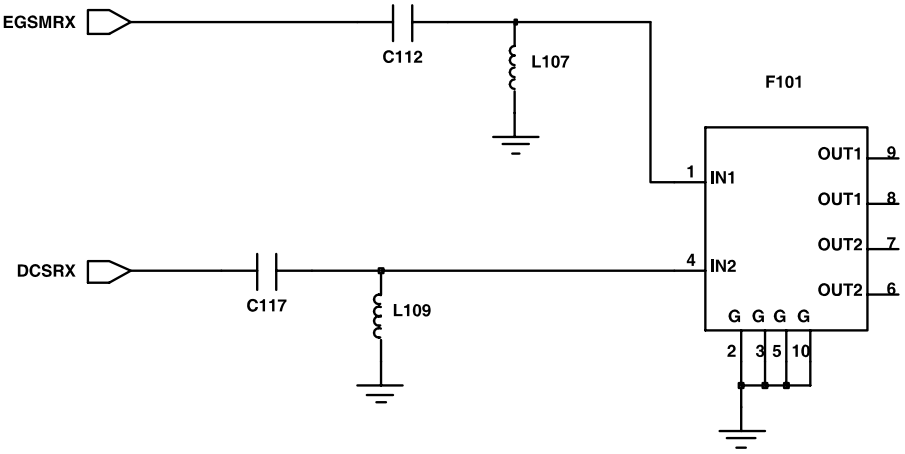

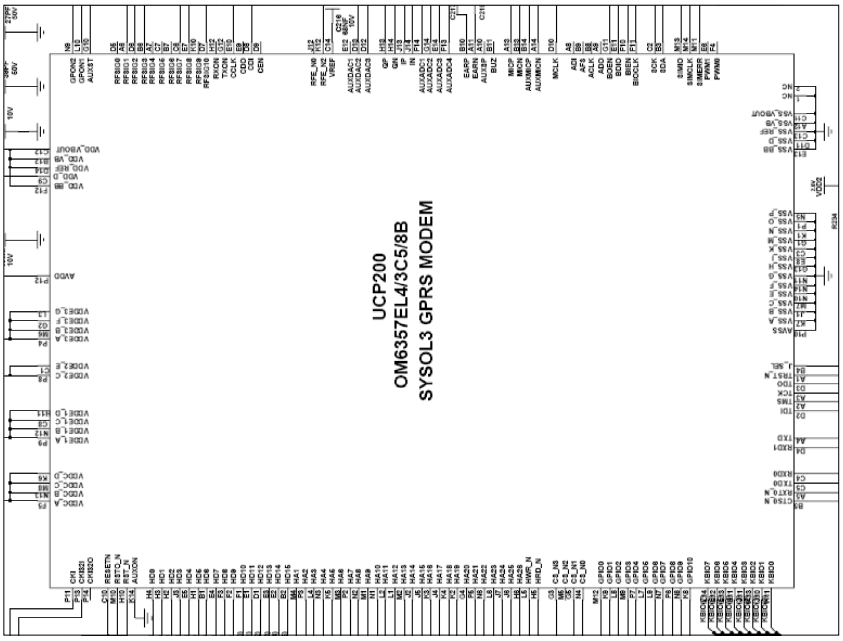

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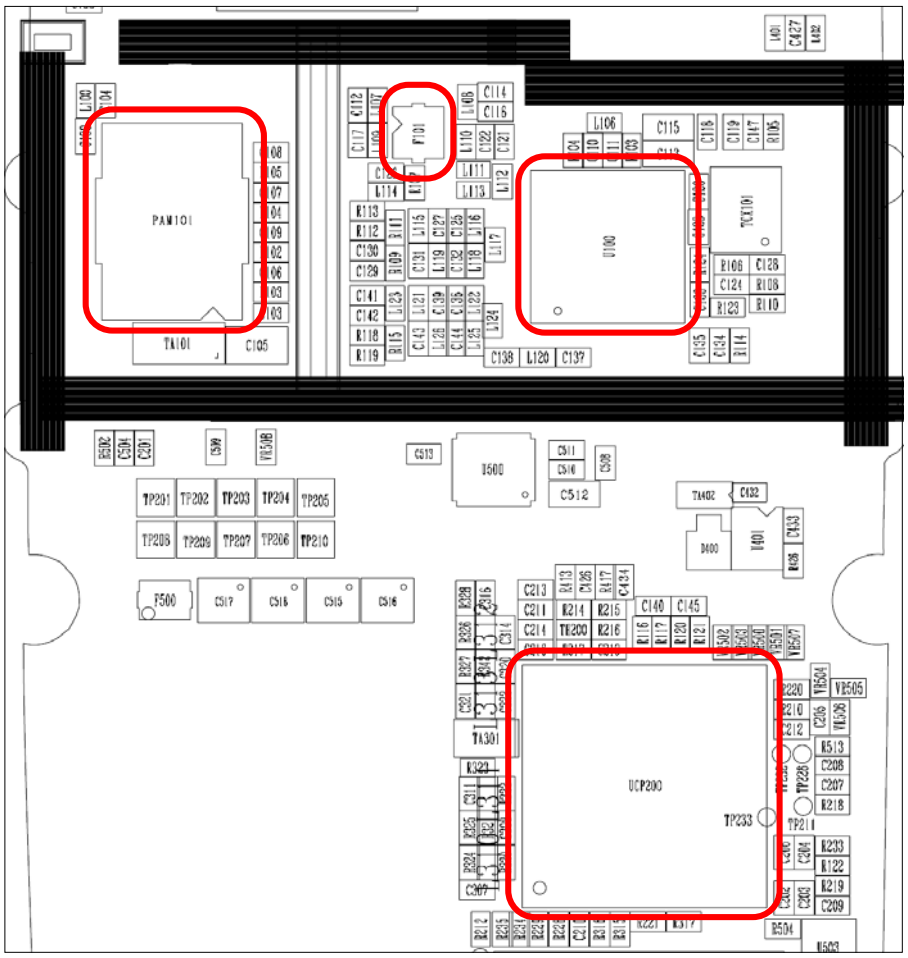

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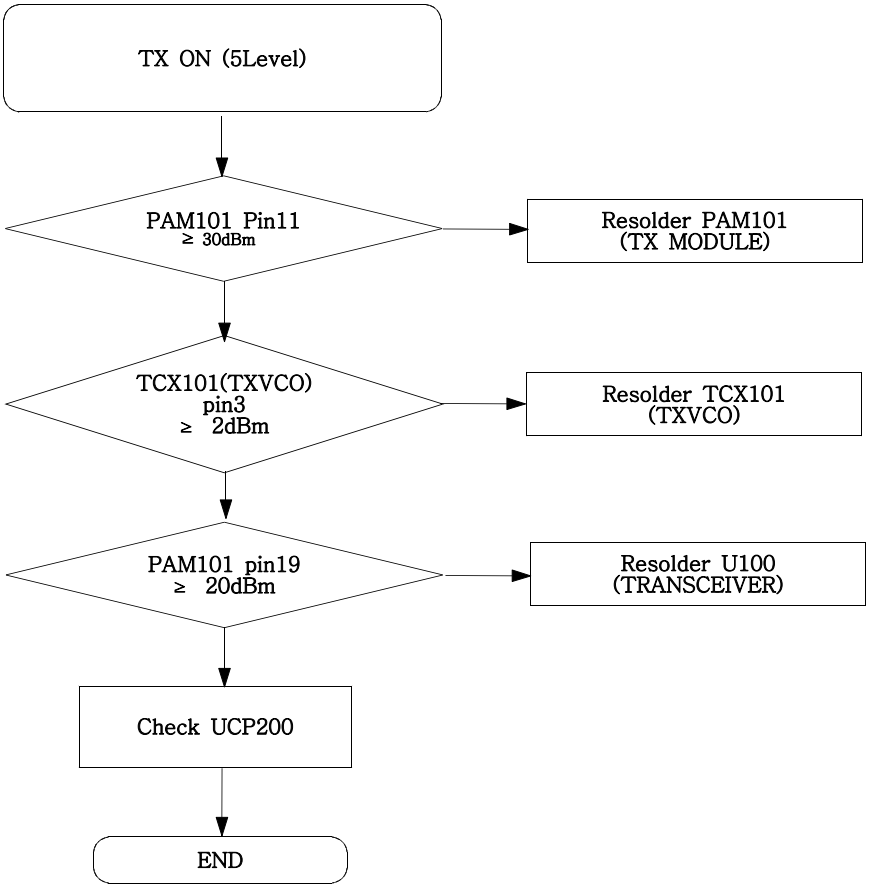
9-15. DCS Transmitter



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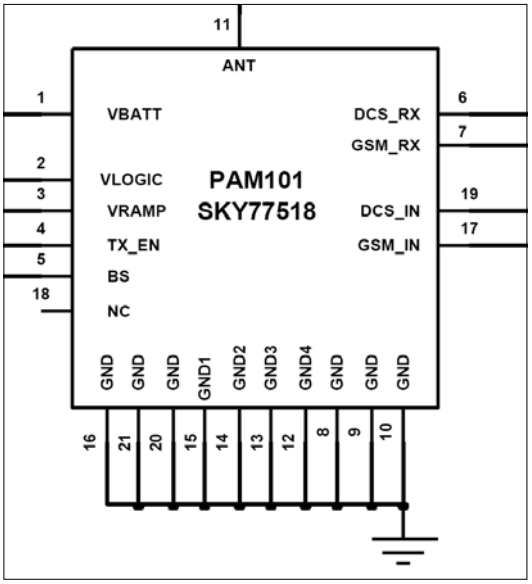

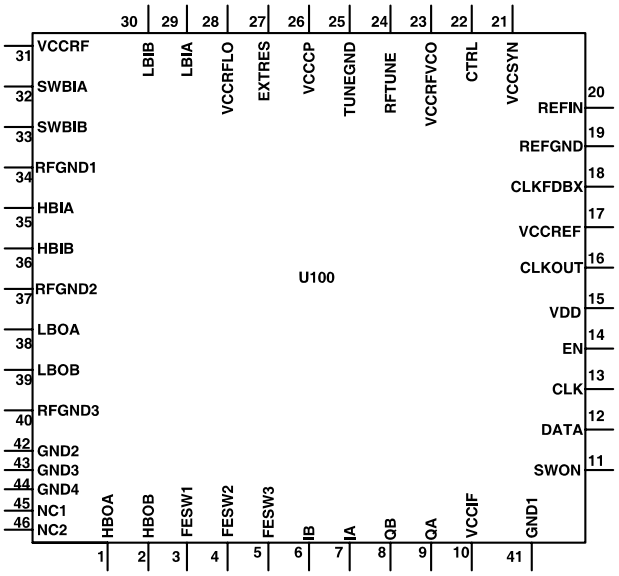

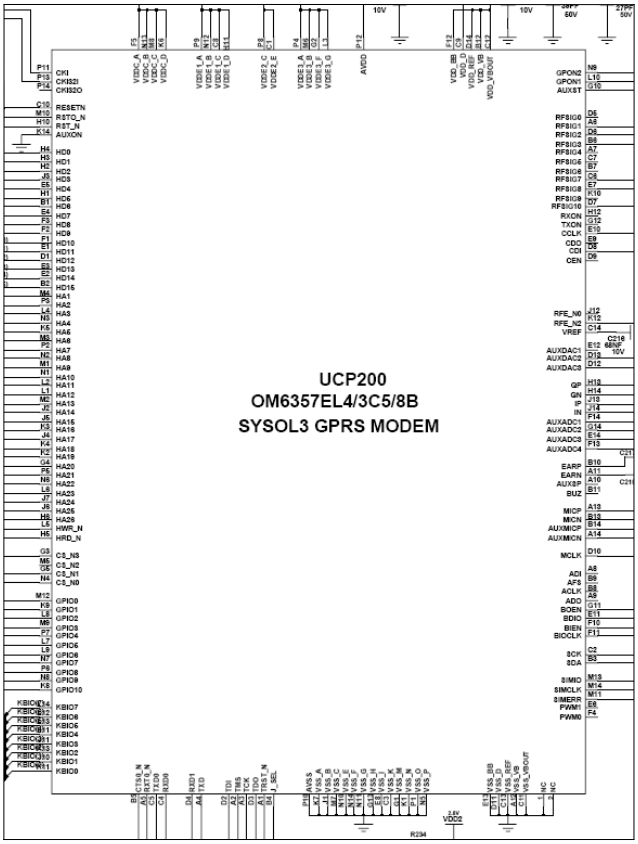

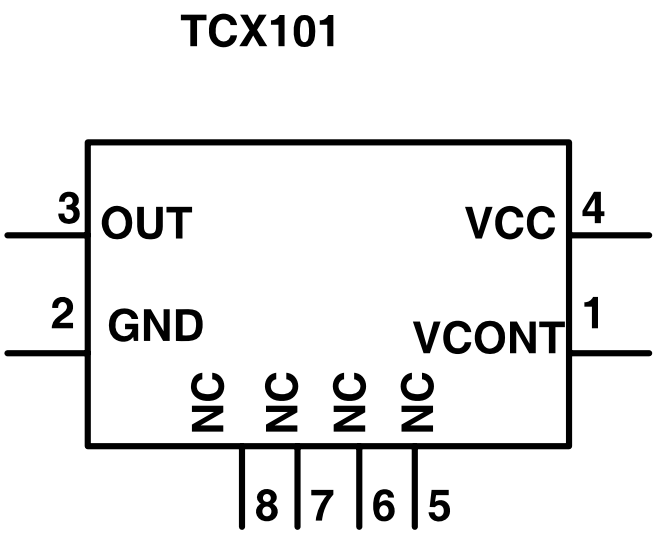

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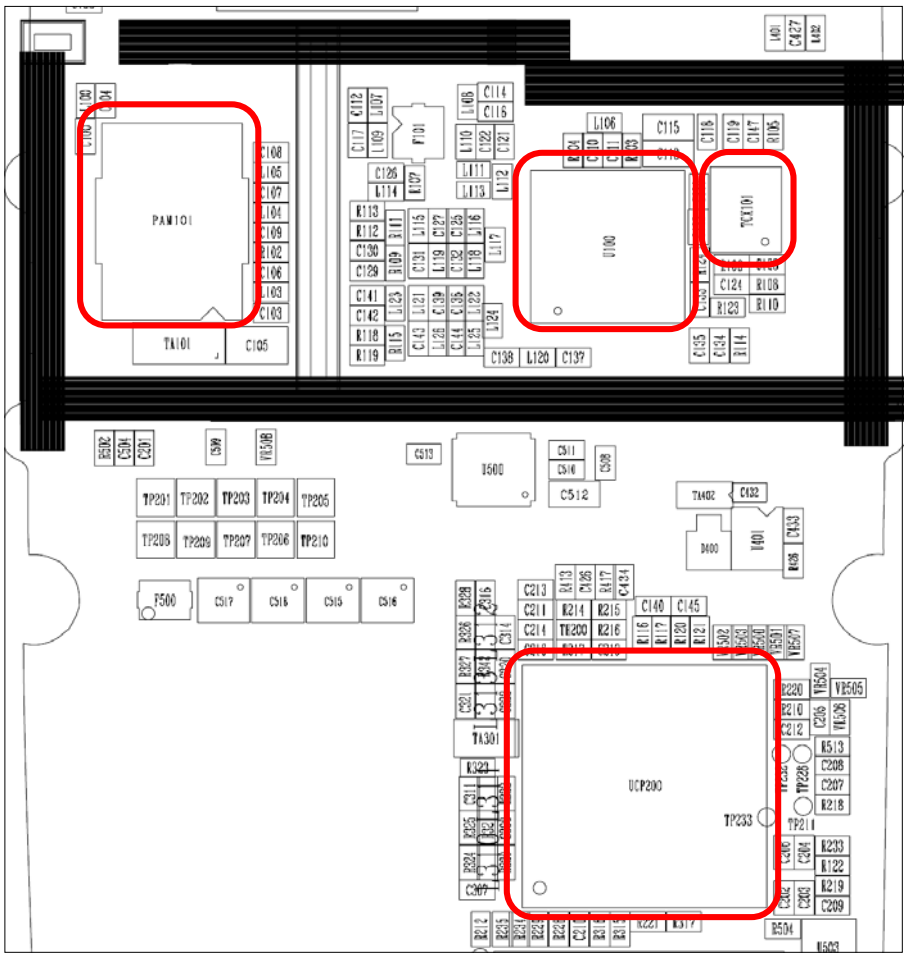

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10. Reference data

Reference Abbreviate

- **ARFCN** : Absolute Radio Frequency Channel Number
- **BER** : Bit Error Rate
- **BPSK**: Binary Phase Shift Keying
- **ESD :** Electrostatically Sensitive Devices
- **ETSI**: European Telecommunications Standards Institute
- **MS**: Mobile Station
- **QPSK**: Quadrature Phase Shift Keying
- **RF** : Radio Frequency
- **TDMA** : Time Division Multiple Access

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