

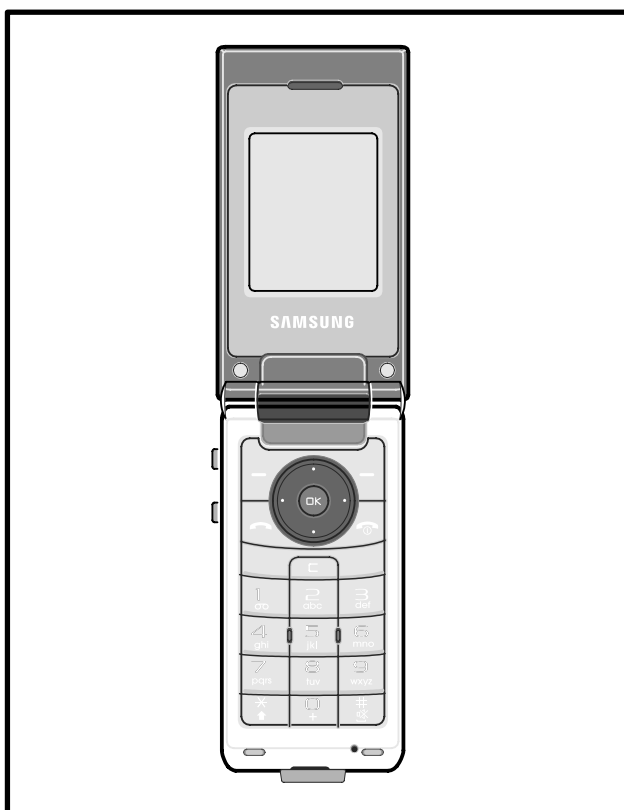
SAMSUNG

GSM TELEPHONE

SGH-X520

SERVICE *Manual*

GSM TELEPHONE



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10. Reference data

1. Safety Precautions

1-1. Repair Precaution

- Repair in Shield Box, during detailed tuning.
Take specially care of tuning or test,
because specipicty 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 manetic 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.

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.

2. Specification

2-1. GSM General Specification

	GSM900 Phase 1	EGSM 900 Phase 2	DCS1800 Phase 1	PCS1900
Freq. Band[MHz] Uplink/Downlink	890~915 935~960	880~915 925~960	1710~1785 1805~1880	1850~1910 1930~1990
ARFCN range	1~124	0~124 & 975~1023	512~885	512~810
Tx/Rx spacing	45 MHz	45 MHz	95 MHz	80 MHz
Mod. Bit rate/ Bit Period	270.833 kbps 3.692 us	270.833 kbps 3.692 us	270.833 kbps 3.692 us	270.833 kbps 3.692 us
Time Slot Period/Frame Period	576.9 us 4.615 ms	576.9 us 4.615 ms	576.9 us 4.615 ms	576.9 us 4.615 ms
Modulation	0.3GMSK	0.3 GMSK	0.3 GMSK	0.3 GMSK
MS Power	33 dBm~13 dBm	33 dBm~5 dBm	30 dBm~0 dBm	30 dBm~0 dBm
Power Class	5 pcl ~ 15 pcl	5 pcl ~ 19 pcl	0 pcl ~ 15 pcl	0 pcl ~ 15 pcl
Sensitivity	-102 dBm	-102 dBm	-100 dBm	-100 dBm
TDMA Mux	8	8	8	8
Cell Radius	35 Km	35 Km	2 Km	-

2-2. GSM Tx Power Class

TX Power control level	GSM900	TX Power control level	DCS1800	TX Power control level	PCS1900
5	33±2 dBm	0	30±3 dBm	0	30±3 dBm
6	31±2 dBm	1	28±3 dBm	1	28±3 dBm
7	29±2 dBm	2	26±3 dBm	2	26±3 dBm
8	27±2 dBm	3	24±3 dBm	3	24±3 dBm
9	25±2 dBm	4	22±3 dBm	4	22±3 dBm
10	23±2 dBm	5	20±3 dBm	5	20±3 dBm
11	21±2 dBm	6	18±3 dBm	6	18±3 dBm
12	19±2 dBm	7	16±3 dBm	7	16±3 dBm
13	17±2 dBm	8	14±3 dBm	8	14±3 dBm
14	15±2 dBm	9	12±4 dBm	9	12±4 dBm
15	13±2 dBm	10	10±4 dBm	10	10±4 dBm
16	11±3 dBm	11	8±4 dBm	11	8±4 dBm
17	9±3 dBm	12	6±4 dBm	12	6±4 dBm
18	7±3 dBm	13	4±4 dBm	13	4±4 dBm
19	5±3 dBm	14	2±5 dBm	14	2±5 dBm
		15	0±5 dBm	15	0±5 dBm

3. Product Function

Main Function

- Camera
- Web browser
- File viewer
- Java
- Multimedia Message Service(MMS)
- E-mail

4. Array course control



Test Jig (GH80-00865A)



Test Cable (GH39-00127A)



RF Test Cable (GH39-00397A)

4-1. Downloading Binary Files (1)

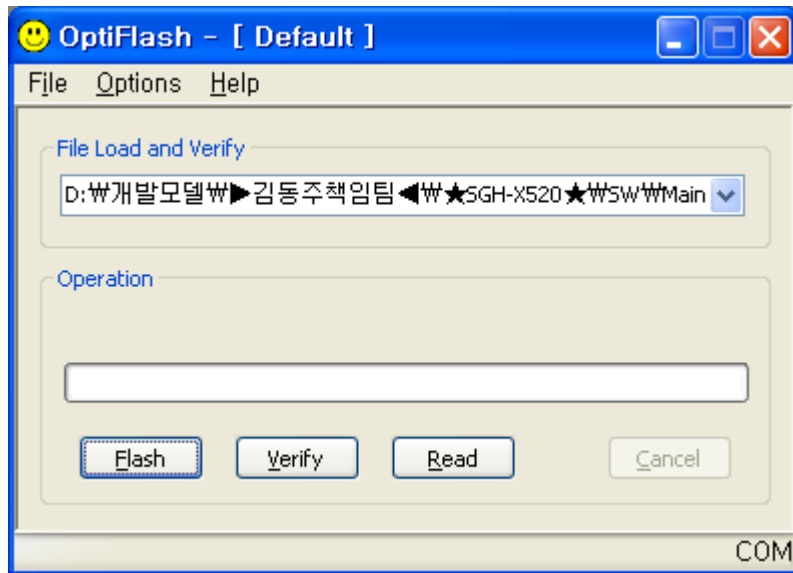
- Swift Model firmware is composed of 2 files
- *.s3 : Main source code binary.

4-2. Prerequisite

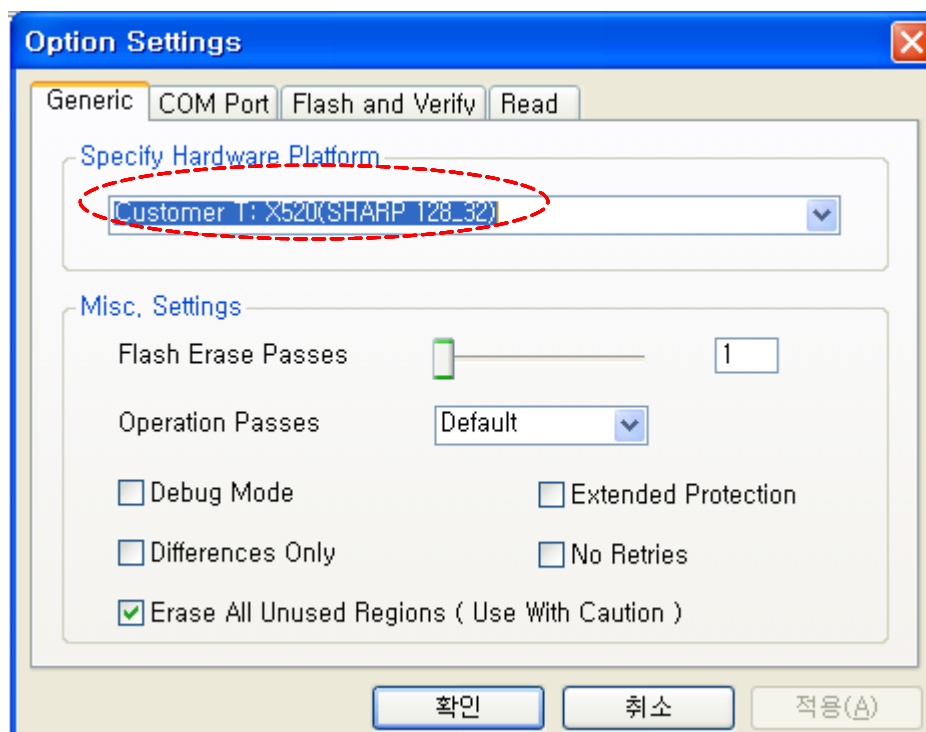
- Downloader program(Optiflash.exe)
- X520 Moblie Phone
- Data Cable
- Binary Files

4-3. S/W Downloader Program

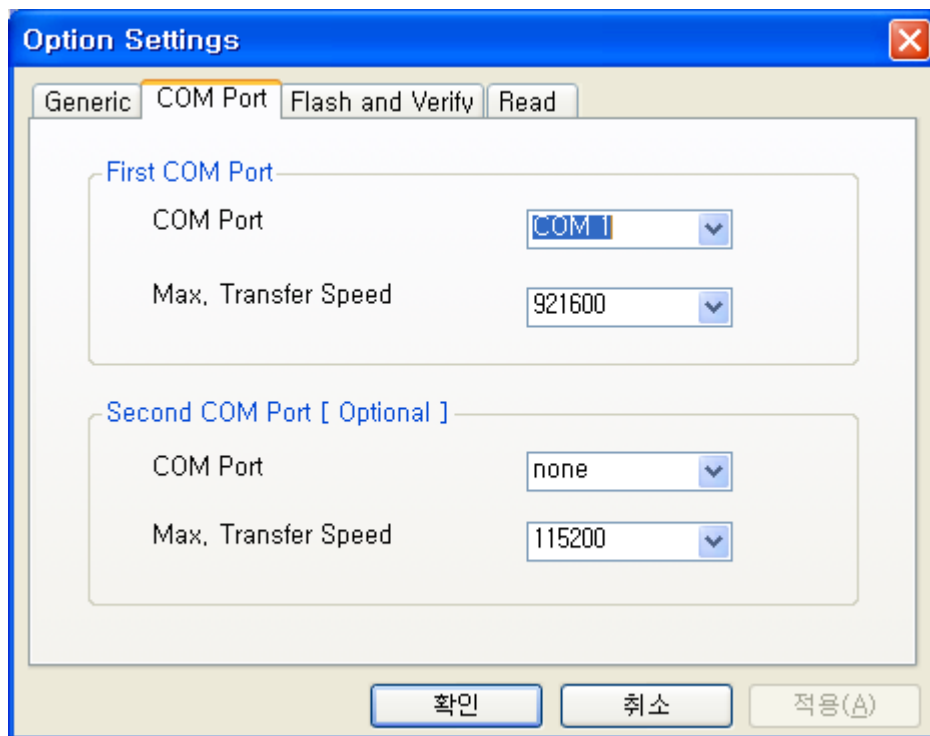
1. Load the binary download program by execution the "OptiFlash.exe"



2. Select the "Options" -> "Settings" -> "Generic" -> "Specify hardware platform".
Choose hardware platform for the downloader file setting.
Set the everything else as the default values which are shown below



3. Select the **COM port** where the download cable is connected

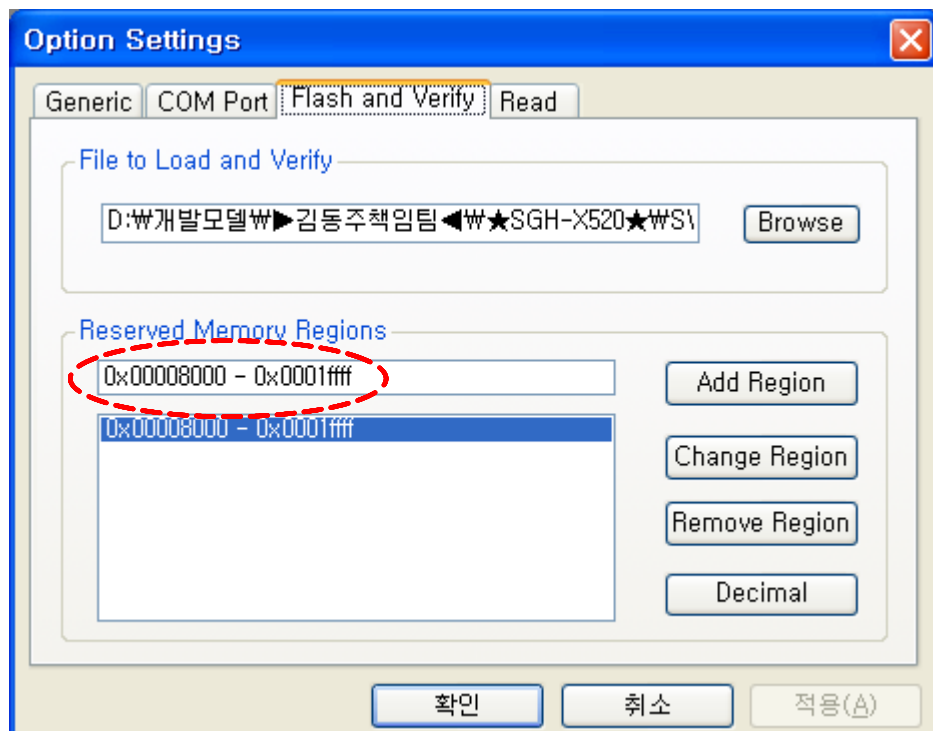


Only COM1 is supported. Additionally you can select the maximum transfer speed OptiFlash will use to communicate with the phone. However, Optiflash will use a slower speed if either the PC's or the phone's serial hardware is incapable of handling the selected speed.

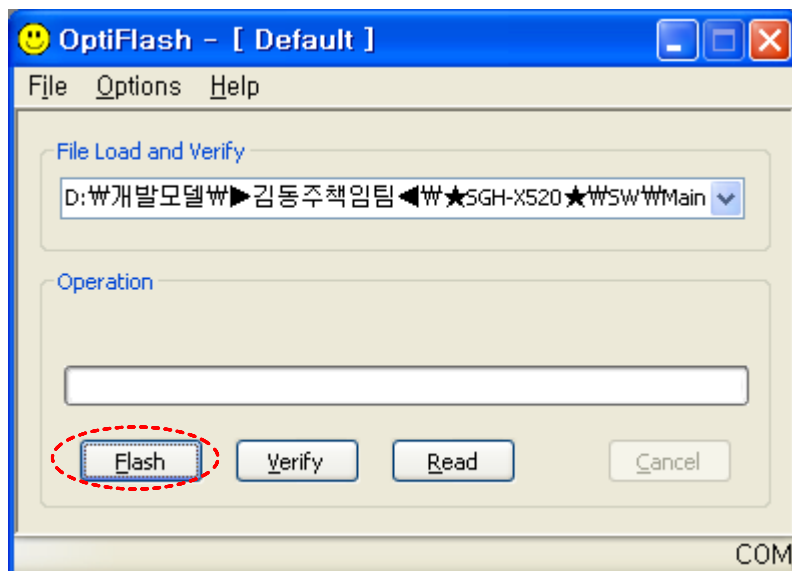
4. Select the "Flash&Verify" -> "Browse"

Set the directory path and choose the latest S/W binary, for example "gsmstack.s3", for the downloader binary setting.

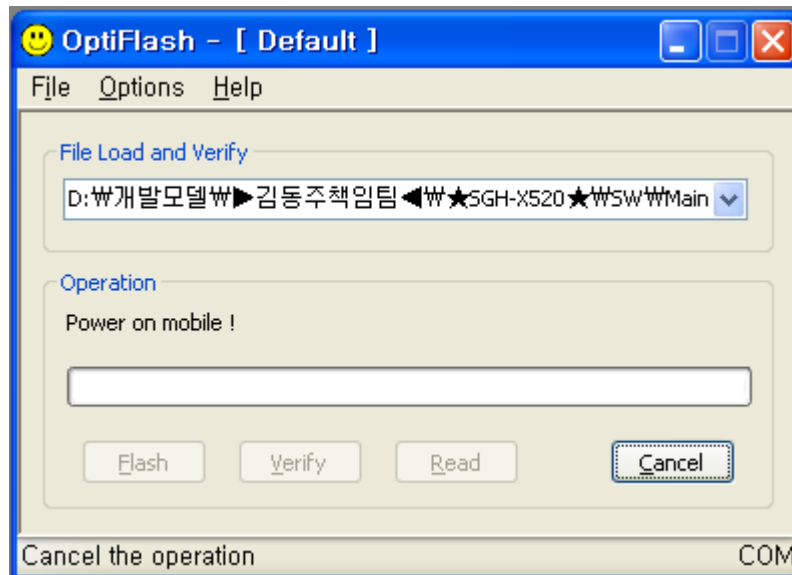
And Check "Reserved Memory Regions" - **0x00008000 - 0x0001ffff**



5. 1st. Press "Flash".



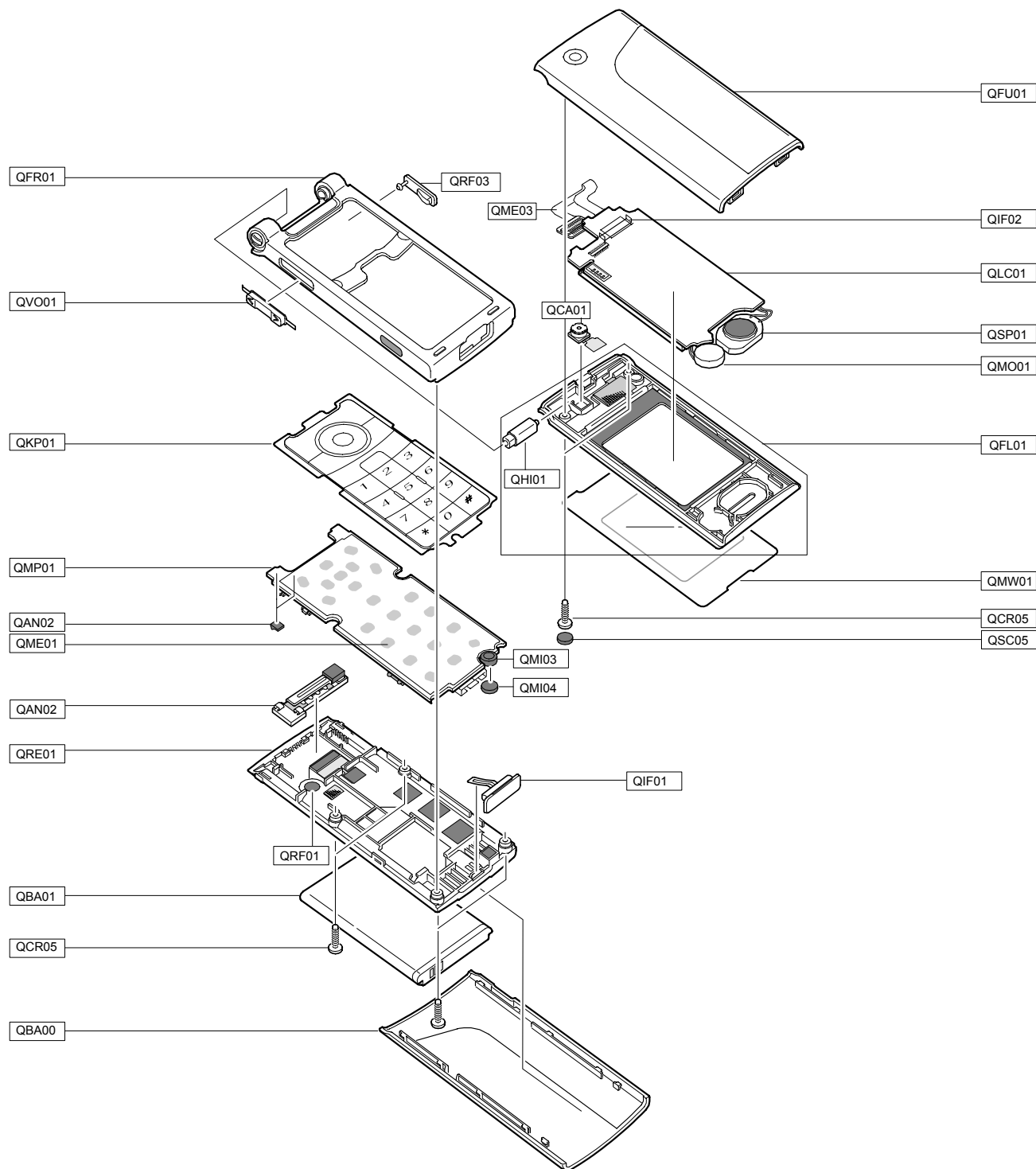
2nd. Turn on Power of mobile



6. When downloading is finished successfully, there is a “All is well” message.
7. After finishing downloading, Certain memory resets should be done to guarantee the normal performance.
8. Confirm the downloaded version name by key-string(***#1234#**)
Memory reset will be done by pressing the following key-strings.
Full Reset : “***2767*3855#**” will reboot the phone automatically.

5. Exploded View and Parts List

5-1. Cellular phone Exploded View



5-2. Cellular phone Parts list

Design LOC		Discription	SEC CODE
QAN02		ANTENNA-SGHX520	GH42-00993A
QAN11		ASSY-CUSHION-CUSHION RUBBER IN	GH98-01077A
QBA00		ASSY CASE-BATTERY	GH98-02442B
QBA01		INNER BATTERY PACK-750MAH,BLK,	GH43-02483A
QCA01		UNIT-CAMERA	GH59-03591A
QCR05		SCREW-MACHINE	6001-001478
QCR05		SCREW-MACHINE	6001-001478
QFU01		ASSY CASE-FOLDER UPPER	GH98-02437B
QIF01		PMO-COVER IF	GH72-33630A
QIF02		NPR-COVER CONNECTOR	GH71-06926A
QKP01		ASSY KEYPAD-(SER/PB)	GH98-02713A
QLC01		ELA UNIT-SGHX520 LCD MODULE	GH96-02262A
QME01		UNIT-DOME SHEET	GH59-03654A
QME03		PCB-CON-TO-CON	GH41-01412A
QMI03		RMO-HOLDER MIC	GH73-08172A
QMI04		RMO-RUBBER HOLDER MIC CAP	GH73-08395A
QMO01		MOTOR DC-SGHX520	GH31-00284A
QMP01		PBA MAIN-SGHX520 (PBA MAIN)	GH92-02983A
QMW01		PMO-COVER WINDOW LCD MAIN	GH72-33611A
QRE01		ASSY CASE-REAR	GH98-02440A
QRF01		MPR-TAPE RF SHEET	GH74-26133A
QSC05		RMO-FOLDER SCREW CAP	GH73-07837A
QSP01		SPEAKER	3001-002042
QFL01		ASSY CASE-FOLDER LOWER	GH98-02438A
	QHI01	ASSY MEC-HINGE	GH75-09605A
QFR01		ASSY CASE-FRONT	GH98-02439A
	QRF03	PMO-COVER EAR	GH72-33603A
	QVO01	PMO-KEY VOLUME	GH72-33605A

Discription	SEC CODE
BAG PE	6902-000297
ADAPTOR-EU 220V TYPE(BLK)	GH44-01334A
UNIT-EARPHONE(BLK)	GH59-02472A
LABEL(P)-WATER SOAK	GH68-02026A
LABEL(P)-WATER SOAK	GH68-02026A
MANUAL-SFC	GH68-04336A
LABEL(P)-BARCODE RUSSIA	GH68-08494A
MANUAL USERS-EU RUSSIAN	GH68-12629A
LABEL(R)-MAIN(SER)	GH68-12712B
BOX(P)-UNIT MAIN(SER)	GH69-04539B
MPR-REMOVE TAPE LCD	GH74-13804A
MPR-TAPE LED	GH74-17926A
MPR-BOHO VINYL LCD	GH74-19127A
MPR-TAPE FRONT FPCB MASKING	GH74-26099A
MPR-TAPE COVER WINDOW LCD MAIN	GH74-26134A
MPR-TAPE,24.3X3XT0.05,TESA4965	GH74-26547A
MPR-TAPE	GH74-27383A
MPR-SPONGE INTENNA	GH74-27720A
MPR-INSU TAPE	GH74-28241A
MPR-INSU TAPE	GH74-28980A

5-3. Disassembly

1



- 1) SEPERATE IF COVER WITH TWEEZERS.
- 2) SEPERATE THE IF COVER FROM THE REAR CASE.

※ **caution**

1. BE CAREFUL NOT TO MAKE SCRATCH ON CASE.

2



- 1) RELEASE SCREWS IN RED CIRCLES.

※ **caution**

1. BE CAREFUL NOT TO MAKE SCRATCH ON CASE.

3



- 1) UNLOCK THE HOOK OF REAR CASE WITH A TOOL.

※ **caution**

1. BE CAREFUL NOT TO MAKE SCRATCH ON THE CASE.

4

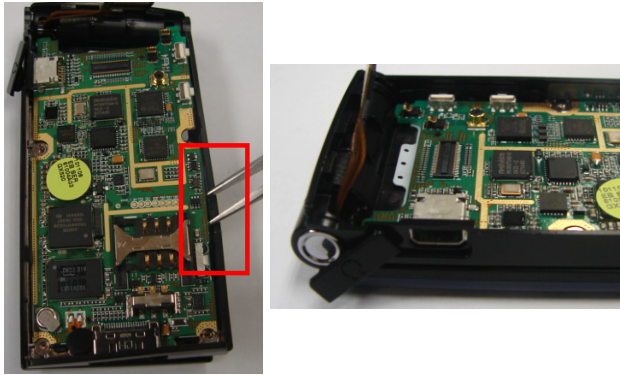


- 1) DETACH THE LCD CONNECTOR.

※ **caution**

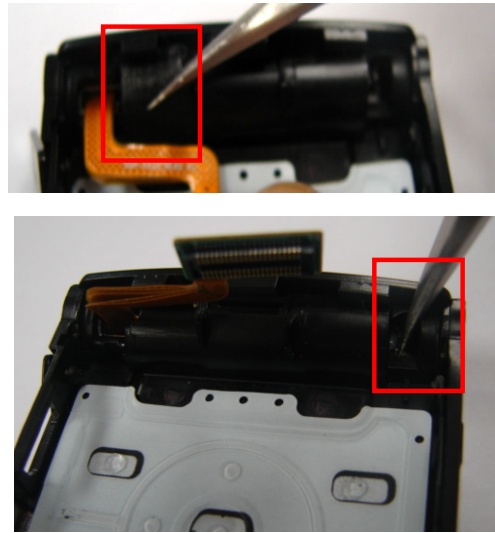
1. BE CAREFUL NOT TO DAMAGE THE LCD CONNECTOR.

5



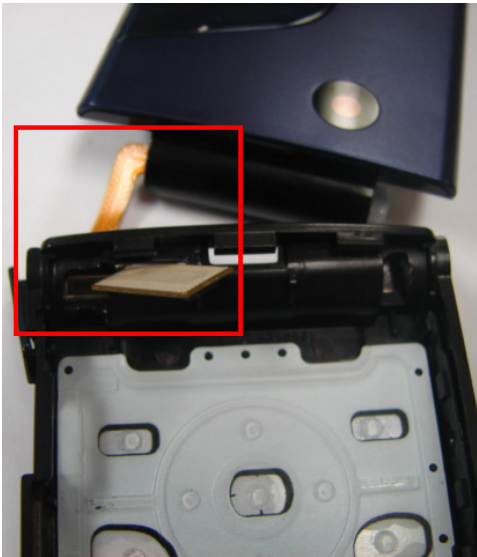
- 1) OPEN THE EARCOVER.
 - 2) SEPERATE THE PBA FROM THE FRONT CASE WITH TWEEZERS.
- ※ **caution**
1. BE CAREFUL NOT TO DAMAGE THE PARTS OF PBA.

6



- 1) REMOVE THE TAPE IN RED CIRCLE.
 - 2) PRESS THE HOOK WITH TWEEZERS.
- ※ **caution**
- 1) When you use a screwdriver, Be careful of the damage of component.

7

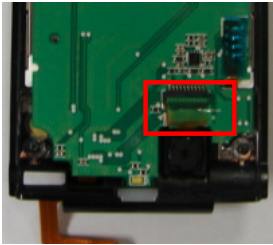
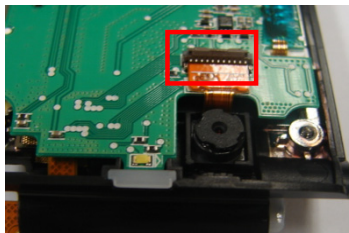
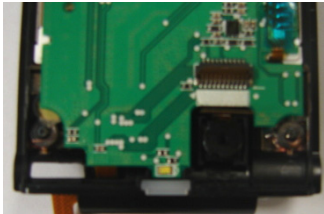
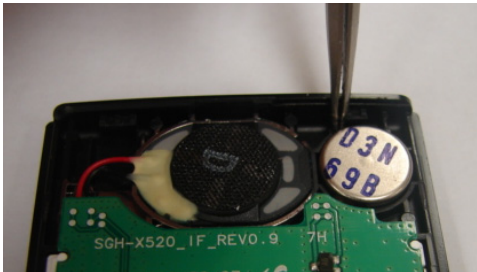
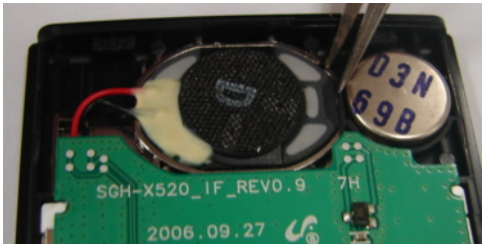
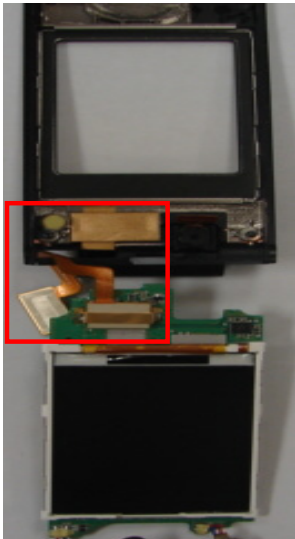


- 1) SEPERATE THE FOLDER FROM THE FRONT CASE.
 - 2) SEPERATE THE LCD FPCB FROM THE FRONT CASE.
- ※ **caution**
1. BE CAREFUL NOT TO TEAR LCD FPCB.

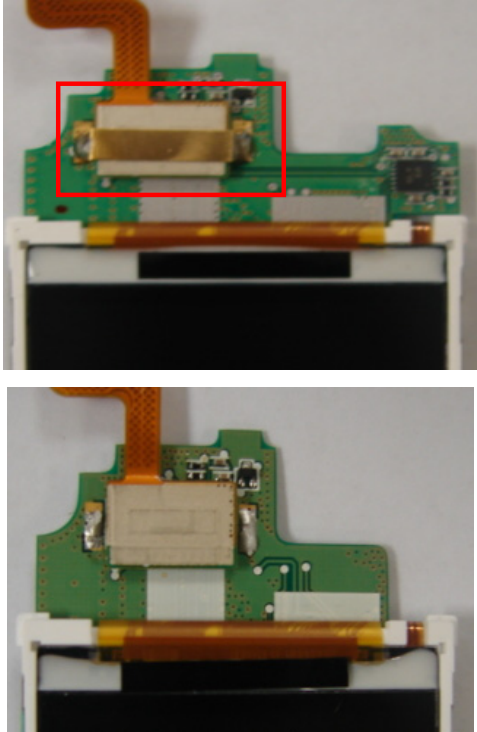
8



- 1) REMOVE SCREW CAPS IN RED CIRCLES.
 - 2) SEPERATE SCREWS IN RED CIRCLES.
- ※ **caution**
1. BE CAREFUL NOT TO MAKE SCRATCH ON CASE.

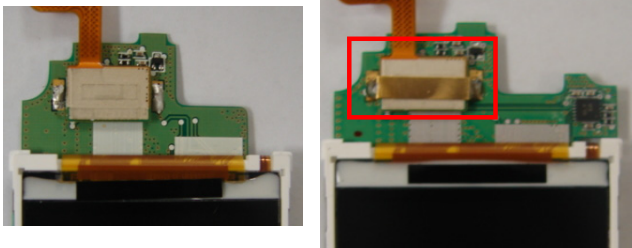
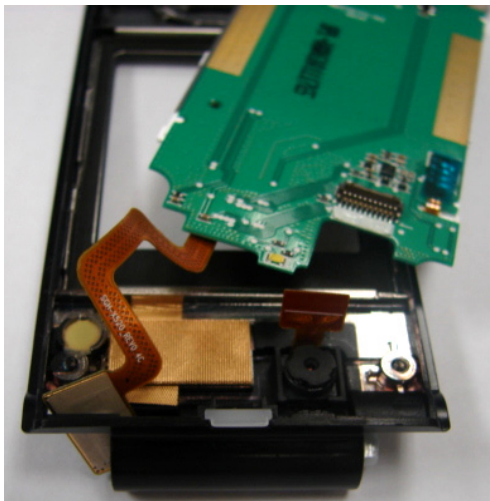
9 1  2  3 	10   
1) SEPERATE THE FOLDER UPPER WITH TWEEZERS ACCORDING TO THE ORDER OF PICTURES ABOVE. ※ caution 1. BE CAREFUL NOT TO MAKE SCRATCH ON CASE.	1) REMOVE THE TAPE IN THE RED SQUARE. 2) OPEN THE CONNECTOR. 3) SEPERATE THE FPCB WITH TWEEZERS. ※ caution 1. BE CAREFUL NOT TO DAMAGE THE CONNECTOR. 2. BE CAREFUL NOT TO TEAR THE FPCB.
11  	12 
1) SEPERATE THE MOTOR WITH TWEEZERS. 2) SEPERATE THE SPEAKER WITH WEEZWERS. ※ caution 1. BE CAREFUL NOT TO DAMAGE THE SPEAKER.	1) SEPERATE THE LCD FPCB FROM FOLDER LOWER. ※ caution 1. BE CAREFUL NOT TO TEAR THE LCD FPCB.

13



- 1) REMOVE LEAD OF FIXED METAL OF THE LCD CONNECTOR.
 - 2) SEPERATE THE LCD CONNECTOR.
- ※ **caution**
1. BE CAREFUL NOT TO DAMAGE THE PARTS OF LCD.
 2. BE CAREFUL NOT TO DAMAGE LCD CONNECTOR.

5-4. Assembly

1 	2 
1) FIX THE LCD CONNECTOR. 1) SOLDER THE METAL TO FIX LCD CONNECTOR. ※ caution 1. BE CAREFUL NOT TO DAMAGE THE PARTS OF LCD. 2. BE CAREFUL NOT TO DAMAGE THE LCD CONNECTOR.	1) ASSEMBLE THE LCD FPCB INTO THE GROOVE OF THE FOLDER LOWER. ※ caution 1. BE CAREFUL NOT TO TEAR THE LCD FPCB.
3 	4 1)  2) 
1) INSERT LCD,SPEAKER,MOTOR INTO THE FOLDER LOWER. 2) AFTER ASSEMBLING THE CAMERA INTO THE CONNECTOR, ATTACH THE TAPE ON THE CONNECTOR. ※ caution 1. BE CAREFUL NOT TO BE STAINED THE LCD WITH THE ALIEN SUBSTANCE OR DUST.. 2. BE CAREFUL NOT TO TEAR THE CAMERA FPCB.	1) ASSEMBLE THE FOLDER UPPER STARTING AT THE UPPER HOOK. 2) LOCK THE HOOK BY PRESSING THE SECTIONS POINTED BY RED ARROWS WITH SUITABLE FORCE. ※ caution 1. BE CAREFUL NOT TO MAKE SCRATCH ON CASE.

5



- 1) TIGHTEN SCREWS IN RED CIRCLES.
- 2) INSERT SCREW CAPS IN RED CIRCLES.

※ **caution**

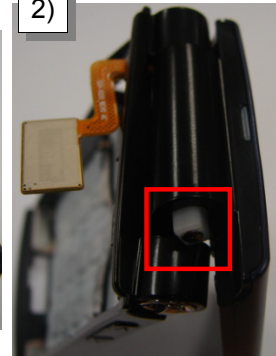
1. BE CAREFUL NOT TO MAKE SCRATCH ON THE CASE.
2. INSERT SCREW CAPS SURELY.

6

1)



2)



- 1) INSERT LCD FPCB INTO THE GROOVE OF FRONT CASE.
- 2) TO ASSEMBLE FOLDER INTO FRONT CASE, PUT THE FOLDER CASE ON THE FRONT CASE AND THEN PRESS THE HINGE.

※ **caution**

1. BE CAREFUL NOT TO TEAR THE LCD FPCB.
2. BE CAREFUL NOT TO MAKE SCRATCH ON THE CASE.

7

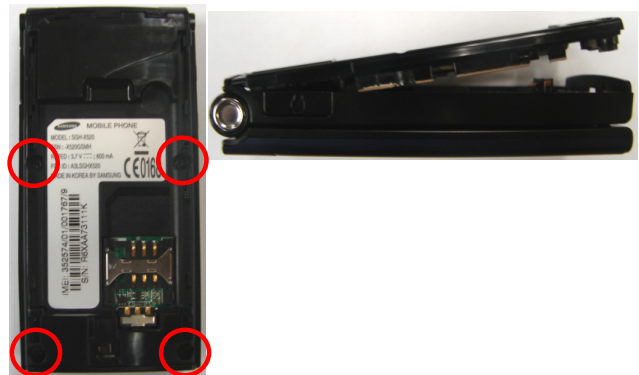


- 1) ASSEMBLE THE PBA STARTING AT THE EARJACK SECTION
- 2) FIXED THE LCD CONNECTOR.

※ **caution**

1. BE CAREFUL NOT TO DAMAGE THE PARTS OF PBA.
2. BE CAREFUL NOT TO MAKE SCRATCH ON THE CASE.

8

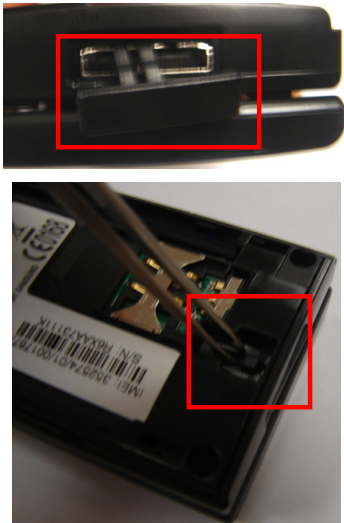


- 1) ASSEMBLE THE REAR CASE STARTING AT THE UPPER HOOK.
- 2) CLOSE THE REAR CASE AND TIGHTEN THE SCREWS IN THE RED CIRCLES.

※ **caution**

1. BE CAREFUL NOT TO MAKE SCRATCH ON THE CASE.

9



1) ASSEMBLE THE IF COVER INTO
THE REAR CASE WITH TWEEZERS.

※ **caution**

1. BE CAREFUL NOT TO MAKE SCRATCH ON
THE CASE.

6. MAIN Electrical Parts List

SEC CODE	Design LOC	Discription	STATUS
0403-001547	ZD300	DIODE-ZENER	SA
0406-001083	ZD301	DIODE-TVS	SA
0406-001083	ZD307	DIODE-TVS	SA
0406-001083	ZD308	DIODE-TVS	SA
0406-001104	ZD303	DIODE-TVS	SA
0406-001104	ZD306	DIODE-TVS	SA
0406-001150	ZD309	DIODE-TVS	SA
0406-001210	ZD305	DIODE-TVS	SA
0504-000168	TR100	TR-DIGITAL	SA
0601-002048	LED301	LED	SA
0601-002048	LED302	LED	SA
0601-002048	LED303	LED	SA
0604-001306	IRD300	PHOTO-IRDA	SA
0801-002529	U101	IC-CMOS LOGIC	SA
1001-001358	U300	IC-ANALOG MULTIPLEX	SA
1009-001020	U203	IC-HALL EFFECT S/W	SA
1108-000010	UME200	IC-MCP	SA
1201-002278	U401	IC-POWER AMP	SA
1201-002356	U403	IC-AUDIO AMP	SA
1203-003304	U100	IC-POWER SUPERVISOR	SA
1203-003663	U105	IC-BATTERY	SA
1204-002161	U104	IC-MELODY	SA
1204-002688	U402	IC-DEMODULATOR	SA
1205-002683	U400	IC-TRANSCEIVER	SA
1209-001219	U201	IC-SENSOR	SA
1405-001082	VR300	VARISTOR	SA
1405-001082	VR301	VARISTOR	SA
1405-001082	VR302	VARISTOR	SA
1405-001082	VR313	VARISTOR	SA
1405-001082	VR314	VARISTOR	SA
1405-001082	VR315	VARISTOR	SA
1405-001082	VR316	VARISTOR	SA
1405-001082	VR317	VARISTOR	SA
2007-000140	R305	R-CHIP	SA
2007-000140	R306	R-CHIP	SA
2007-000140	R307	R-CHIP	SA
2007-000140	R308	R-CHIP	SA

SEC CODE	Design LOC	Discription	STATUS
2007-000140	R309	R-CHIP	SA
2007-000140	R310	R-CHIP	SA
2007-000140	R311	R-CHIP	SA
2007-000140	R312	R-CHIP	SA
2007-000140	R332	R-CHIP	SA
2007-000140	R363	R-CHIP	SA
2007-000144	R112	R-CHIP	SA
2007-000145	R113	R-CHIP	SA
2007-000148	R325	R-CHIP	SA
2007-000148	R328	R-CHIP	SA
2007-000148	R338	R-CHIP	SA
2007-000148	R340	R-CHIP	SA
2007-000149	R114	R-CHIP	SA
2007-000157	R125	R-CHIP	SA
2007-000157	R202	R-CHIP	SA
2007-000157	R320	R-CHIP	SA
2007-000161	R327	R-CHIP	SA
2007-000161	R329	R-CHIP	SA
2007-000161	R339	R-CHIP	SA
2007-000161	R341	R-CHIP	SA
2007-000162	R115	R-CHIP	SA
2007-000162	R120	R-CHIP	SA
2007-000162	R204	R-CHIP	SA
2007-000162	R368	R-CHIP	SA
2007-000164	R116	R-CHIP	SA
2007-000170	R111	R-CHIP	SA
2007-000170	R205	R-CHIP	SA
2007-000171	R209	R-CHIP	SA
2007-000171	R366	R-CHIP	SA
2007-000171	R367	R-CHIP	SA
2007-000171	R403	R-CHIP	SA
2007-000171	R405	R-CHIP	SA
2007-000172	R200	R-CHIP	SA
2007-000172	R201	R-CHIP	SA
2007-000242	R330	R-CHIP	SA
2007-000242	R336	R-CHIP	SA
2007-000242	R337	R-CHIP	SA

SEC CODE	Design LOC	Discription	STATUS
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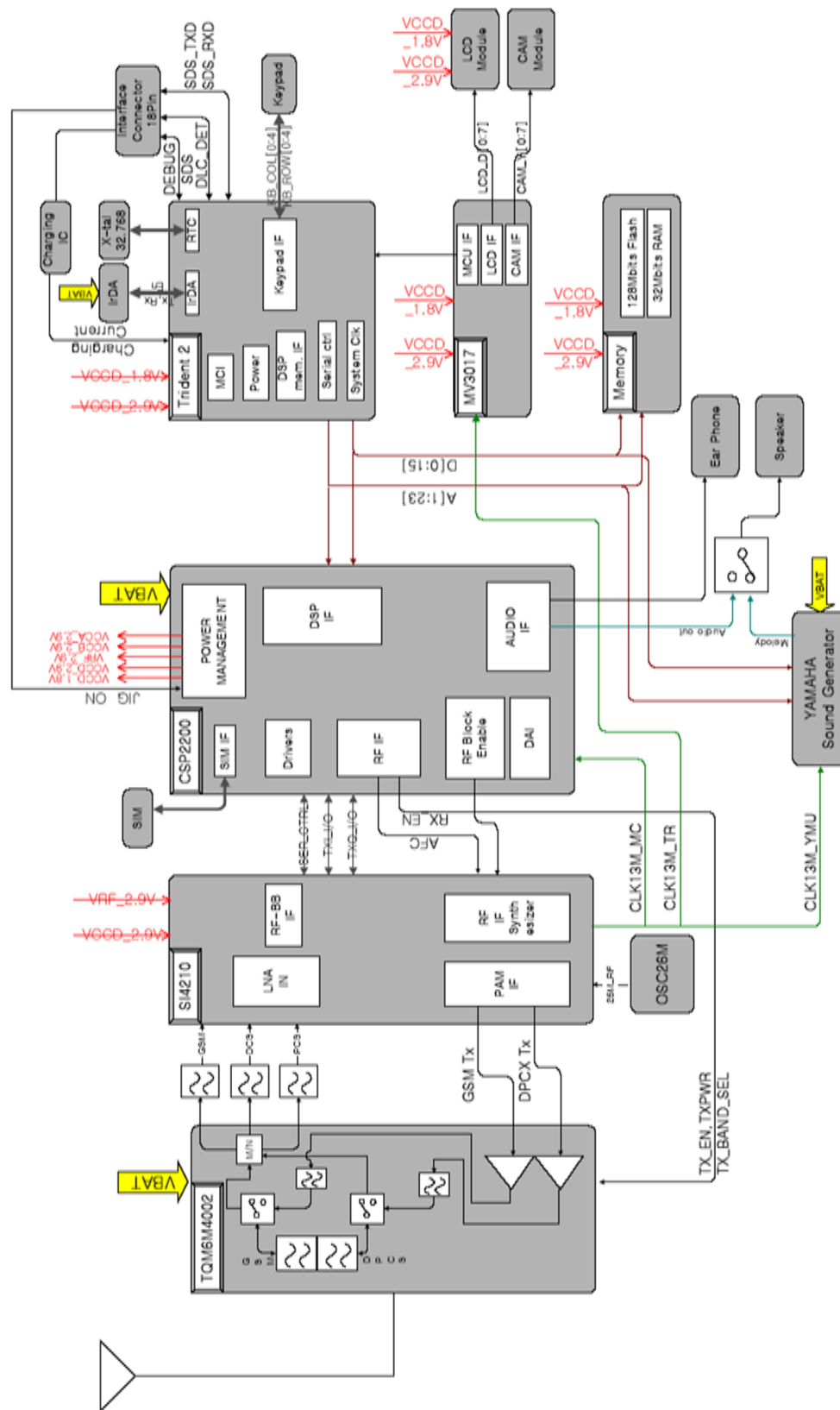
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2203-006648	C427	C-CER,CHIP	SA
2203-006681	C138	C-CER,CHIP	SA
2203-006681	C140	C-CER,CHIP	SA
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2203-006708	C148	C-CER,CHIP	SA

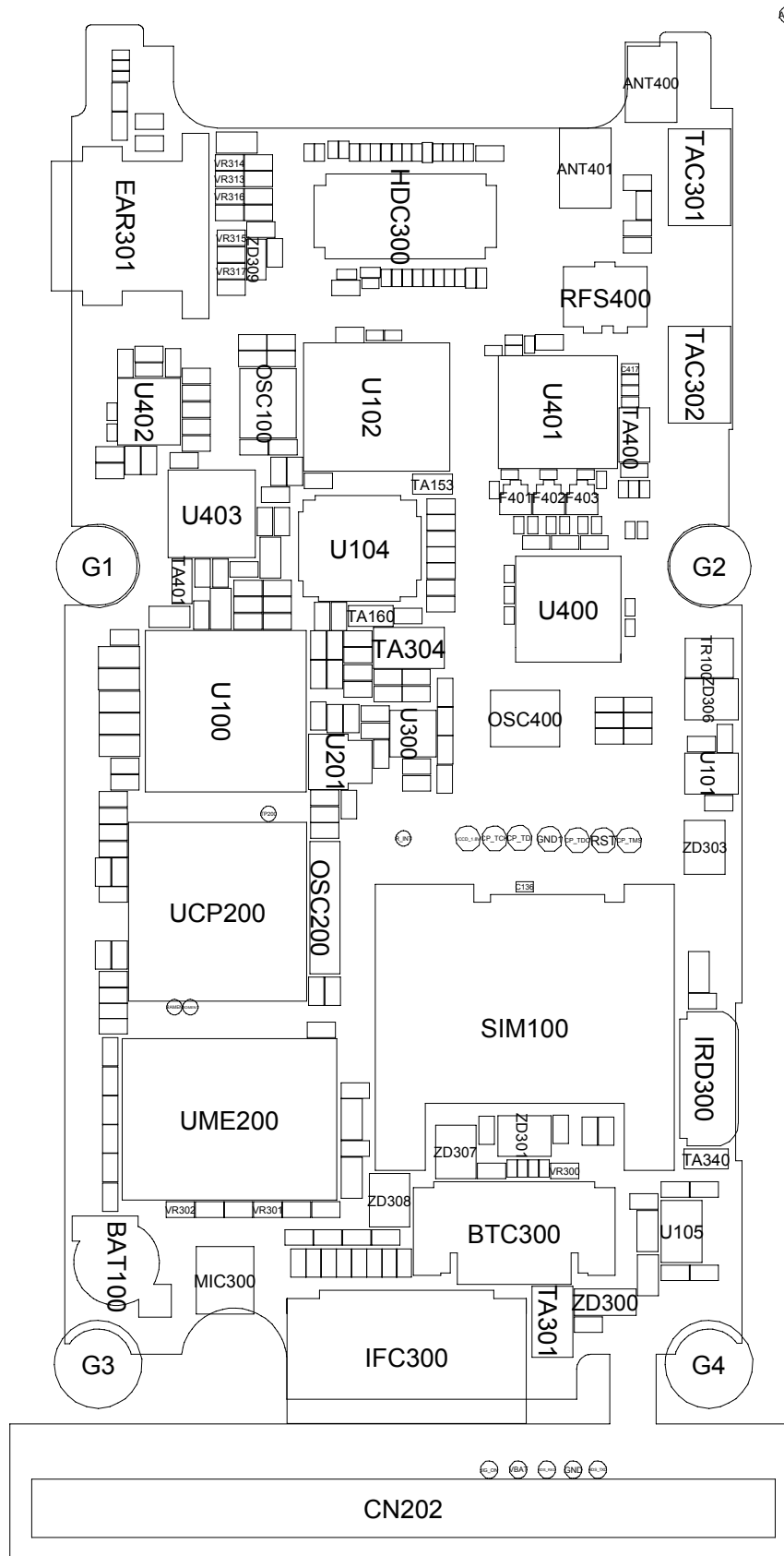
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2404-001374	TA400	C-TA,CHIP	SA
2404-001381	TA340	C-TA,CHIP	SA
2404-001381	TA401	C-TA,CHIP	SA
2404-001406	TA301	C-TA,CHIP	SA
2404-001406	TA304	C-TA,CHIP	SA
2703-001178	R406	INDUCTOR-SMD	SA
2703-001231	L310	INDUCTOR-SMD	SNA
2703-002170	C403	INDUCTOR-SMD	SA
2703-002313	L405	INDUCTOR-SMD	SA
2703-002484	L409	INDUCTOR-SMD	SA
2703-002485	L407	INDUCTOR-SMD	SA
2703-002558	L401	INDUCTOR-SMD	SA
2703-002603	L408	INDUCTOR-SMD	SA
2703-002842	L402	INDUCTOR-SMD	SA
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2703-002910	L410	INDUCTOR-SMD	SA
2703-002989	L411	INDUCTOR-SMD	SA
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2801-004573	OSC100	CRYSTAL-SMD	SA
2801-004587	OSC400	CRYSTAL-SMD	SA
2904-001592	F401	FILTER-SAW	SA
2904-001599	F402	FILTER-SAW	SA
2904-001600	F403	FILTER-SAW	SA
3301-001342	L200	BEAD-SMD	SA
3301-001729	L300	BEAD-SMD	SA
3301-001729	L302	BEAD-SMD	SA
3301-001729	L303	BEAD-SMD	SA
3301-001756	L301	BEAD-SMD	SA
3301-001762	L100	BEAD-SMD	SA
3404-001152	TAC301	SWITCH-TACT	SA
3404-001152	TAC302	SWITCH-TACT	SA
3705-001358	RFS400	CONNECTOR-COAXIAL	SA
3709-001451	SIM100	CONNECTOR-CARD EDGE	SA

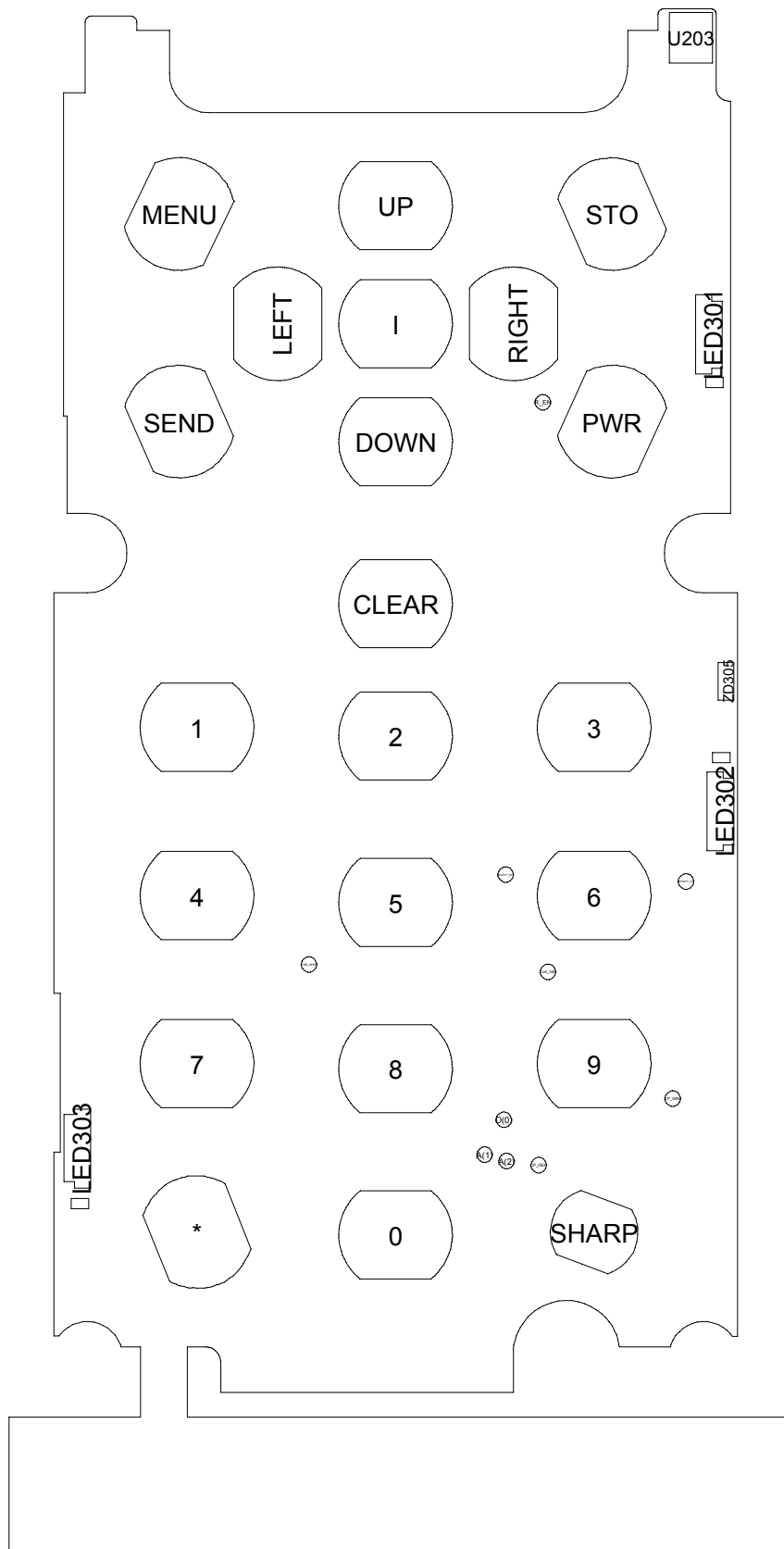
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3711-006228	BTC300	HEADER-BATTERY	SA
3722-002257	EAR301	JACK-PHONE	SA
4302-001130	BAT100	BATTERY-LI(2ND)	SA
GH09-00036A	UCP200	IC MICOM-SGHX480	SA
GH13-00036A	U102	IC ASIC-SGHX670	SA
GH30-00296A	MIC300	MICROPHONE-ASSY	SA
GH71-05666A	ANT400	NPR-ANTENNA CONTACT	SA
GH71-05666A	ANT401	NPR-ANTENNA CONTACT	SA

7. Block Diagrams



8. PCB Diagrams

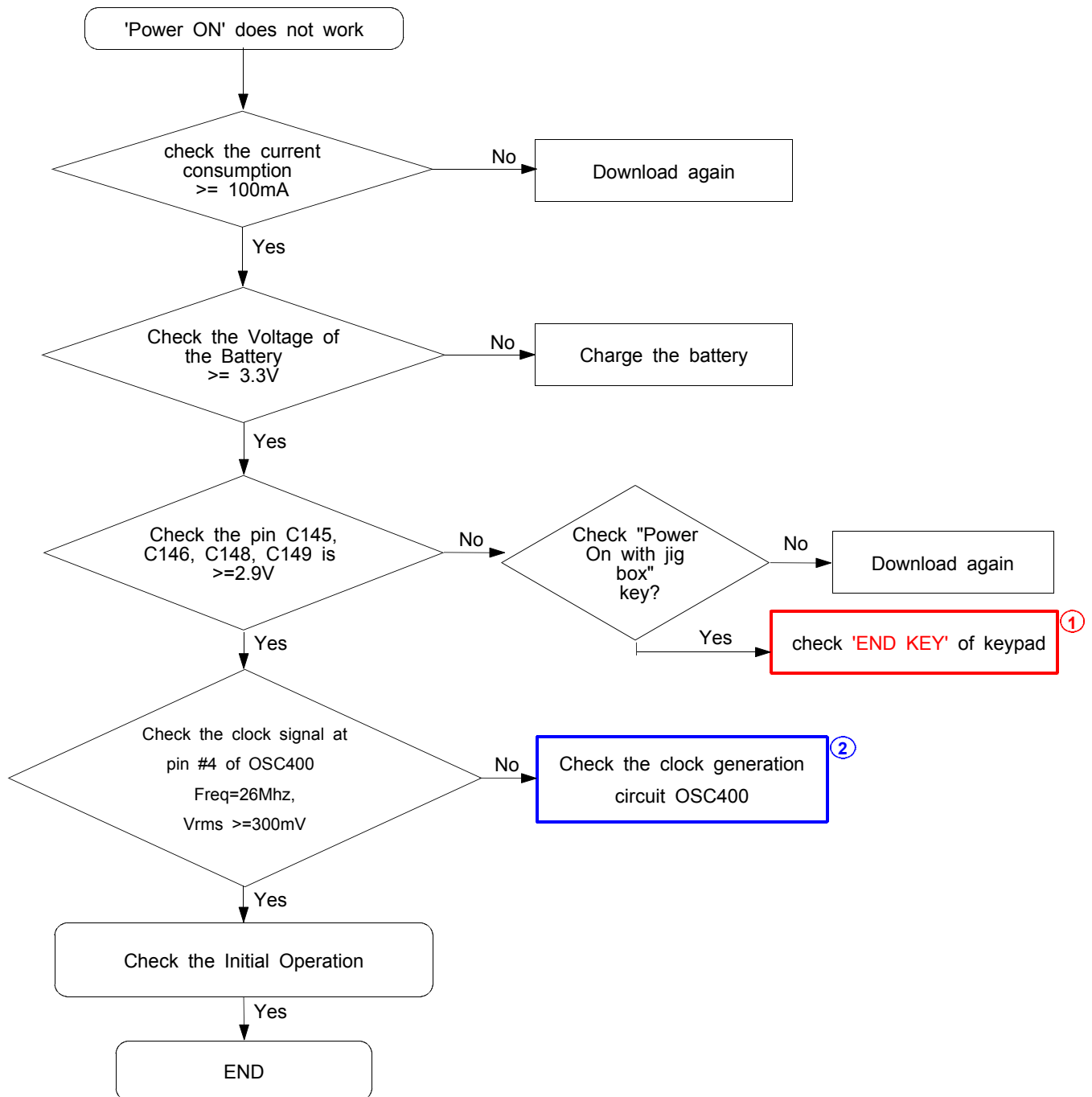


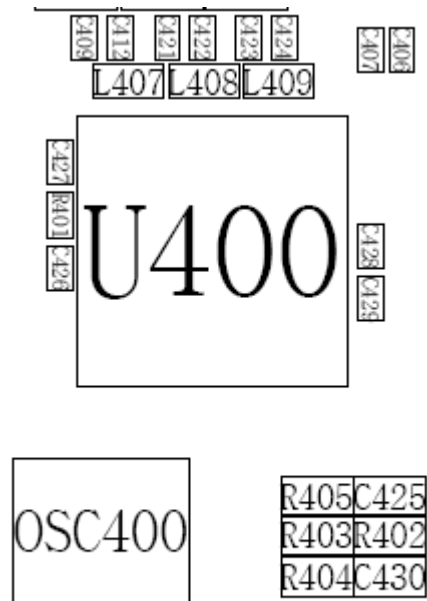
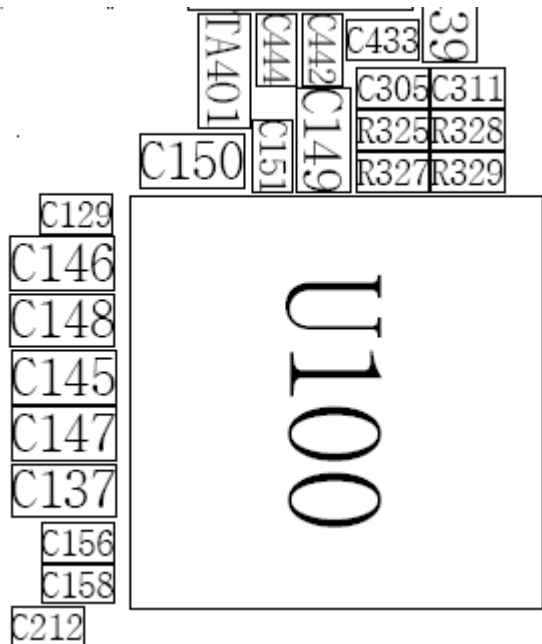
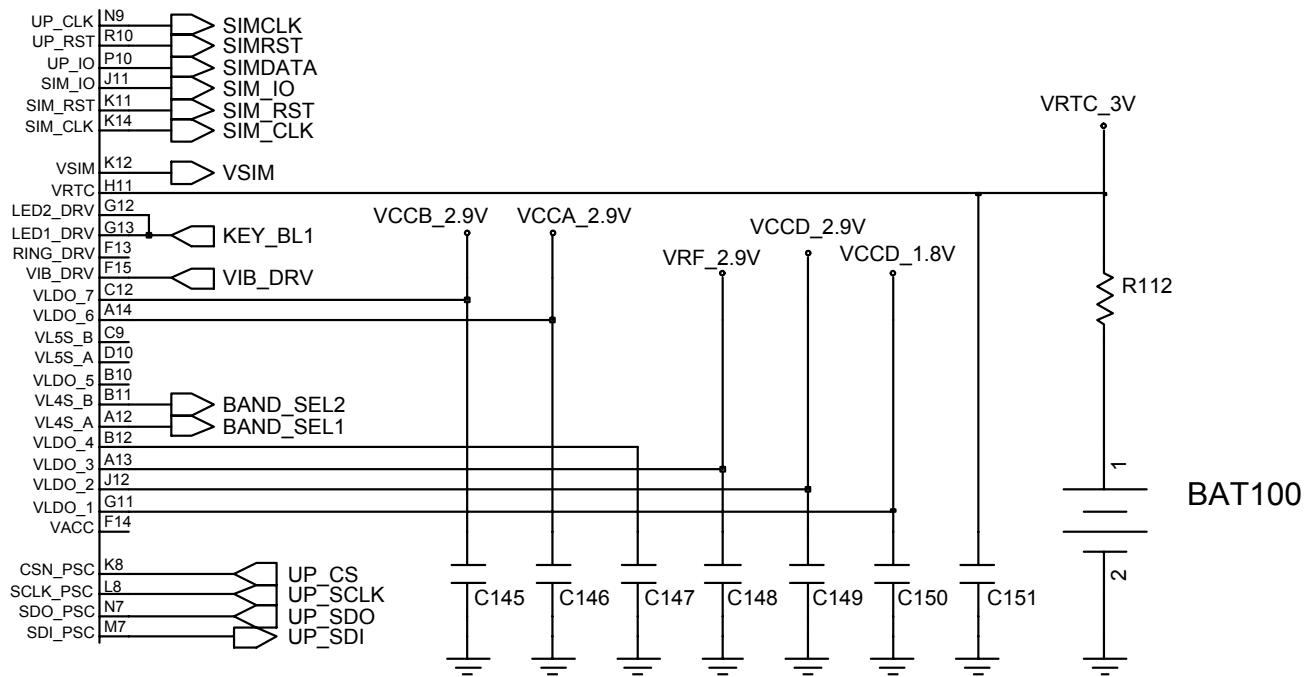


9. Flow Chart of Troubleshooting

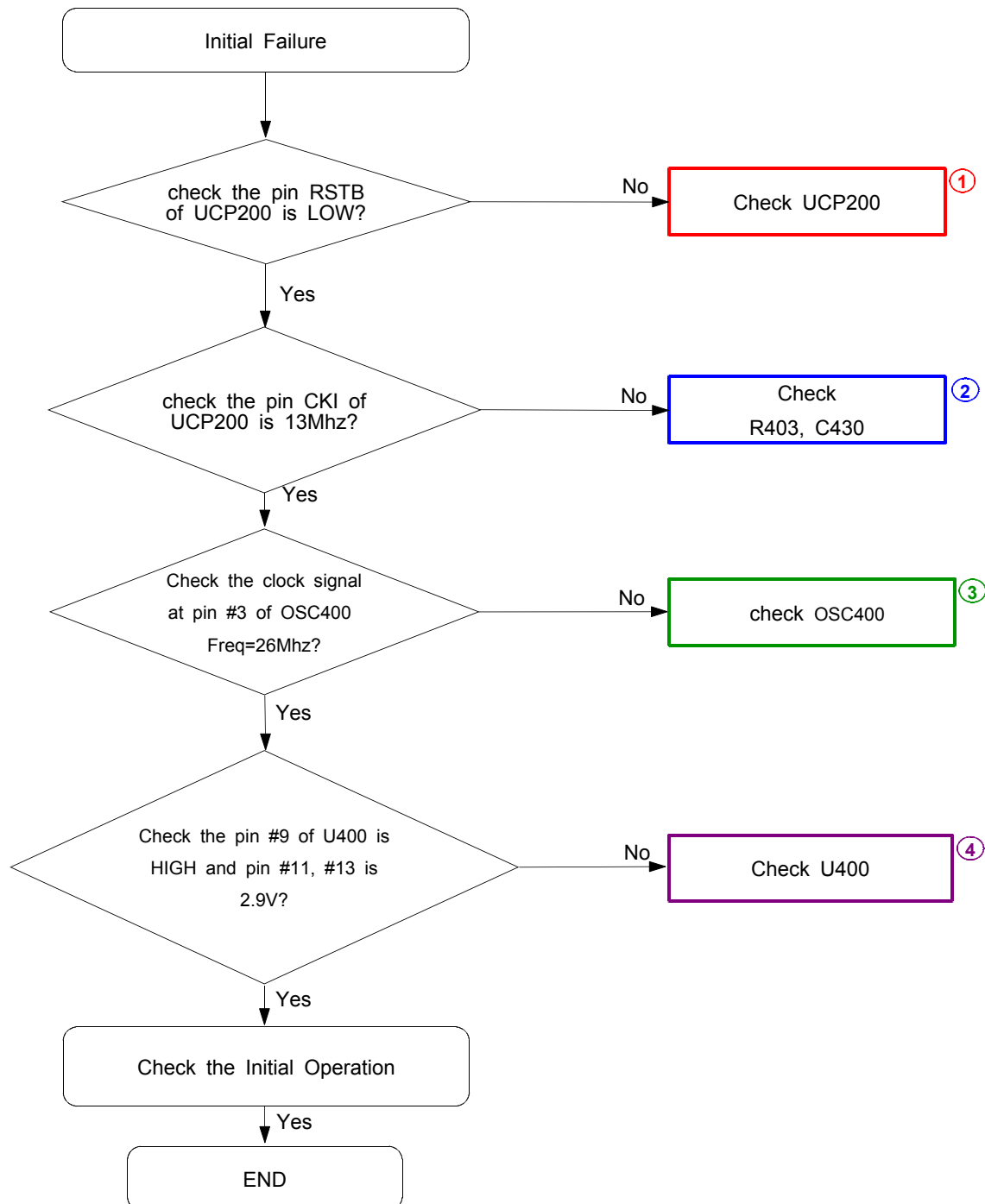
9-1. Baseband

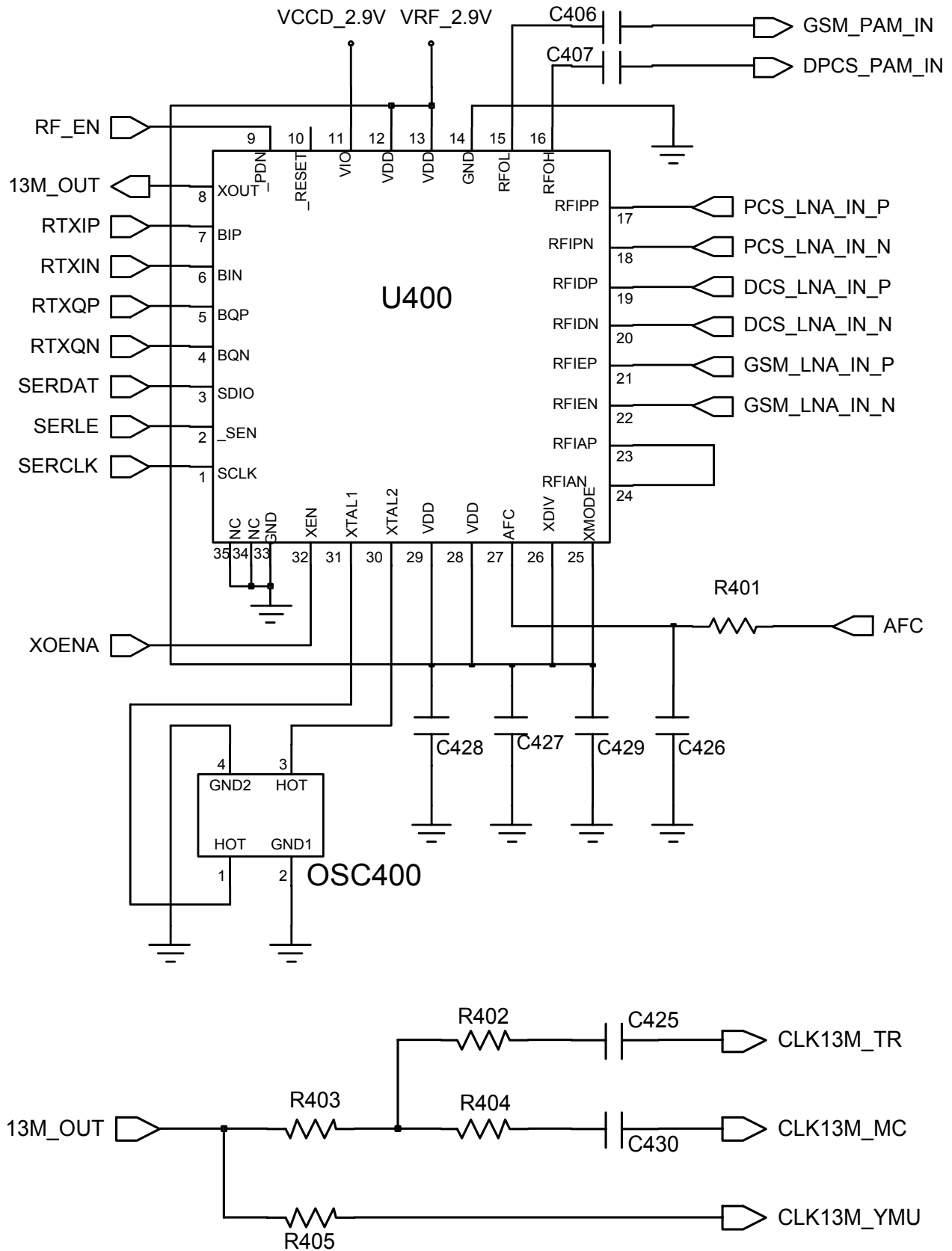
9-1-1. Power ON

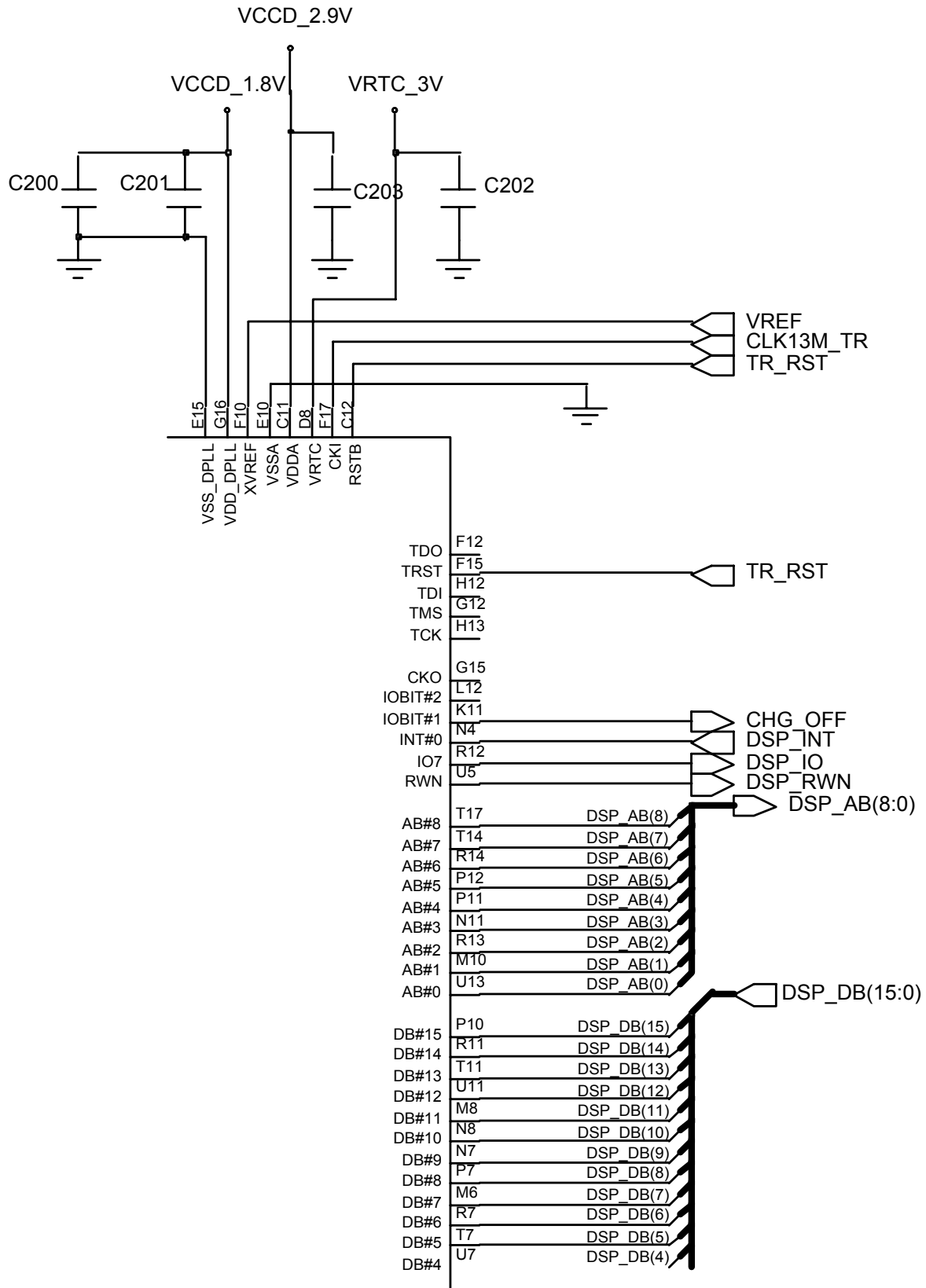




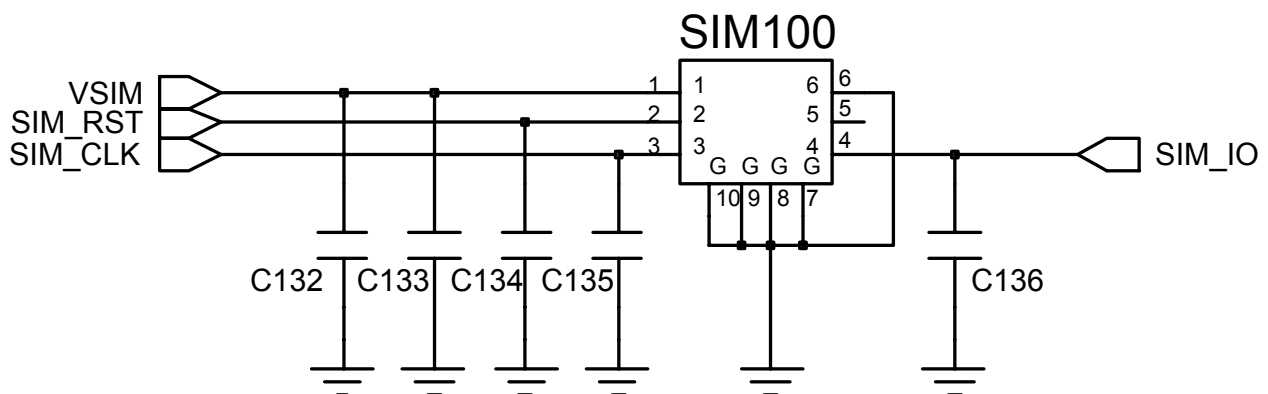
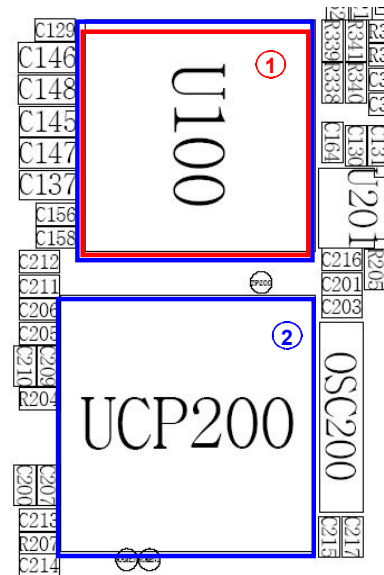
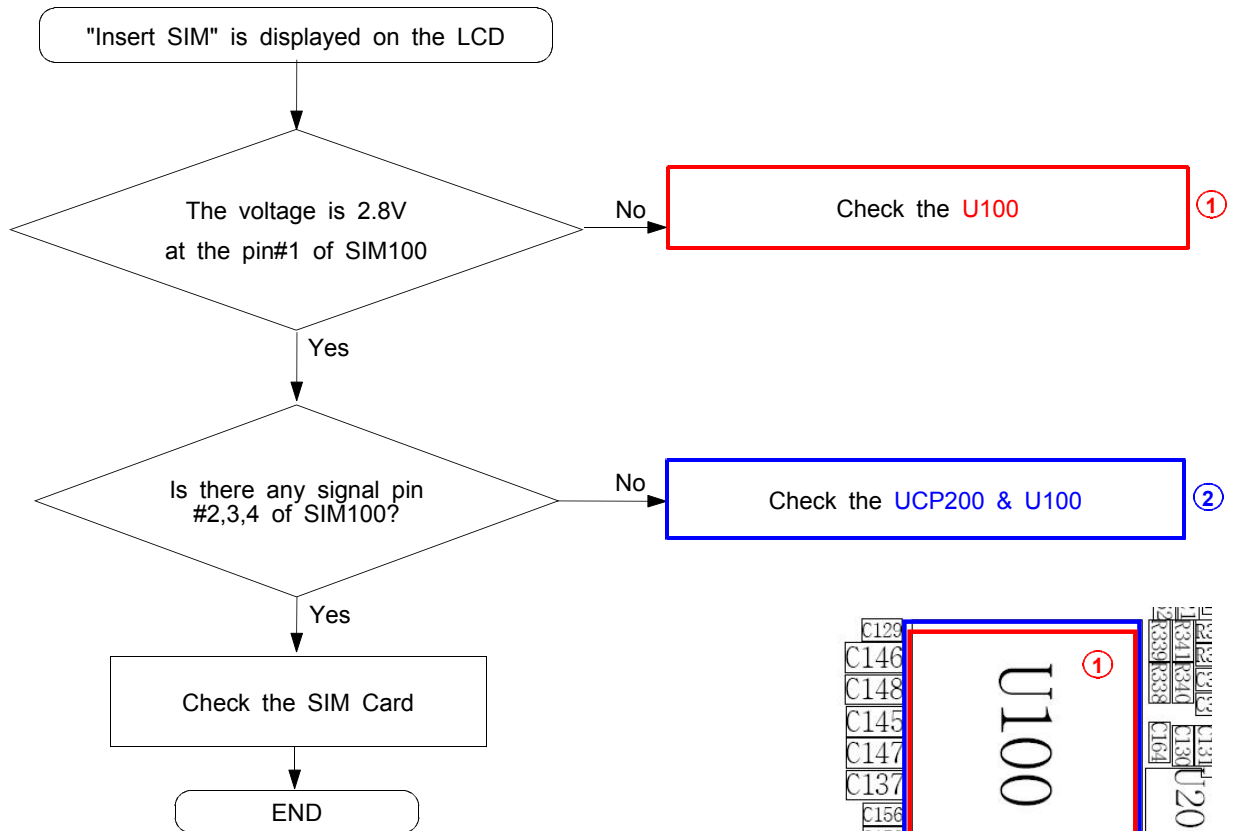
9-1-2. Initial





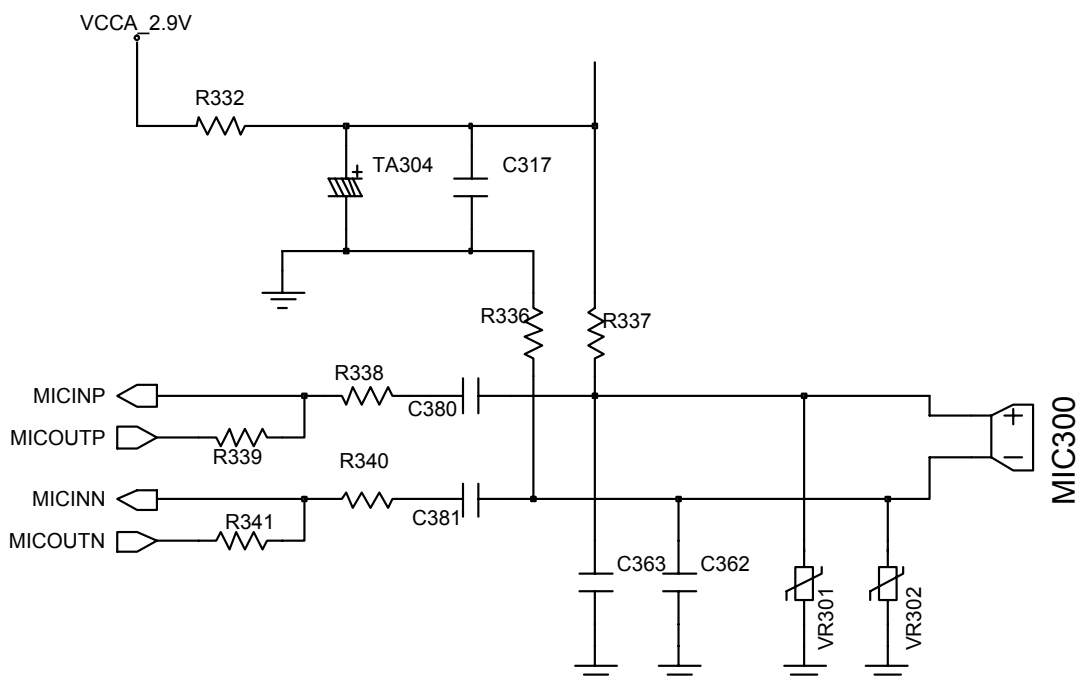
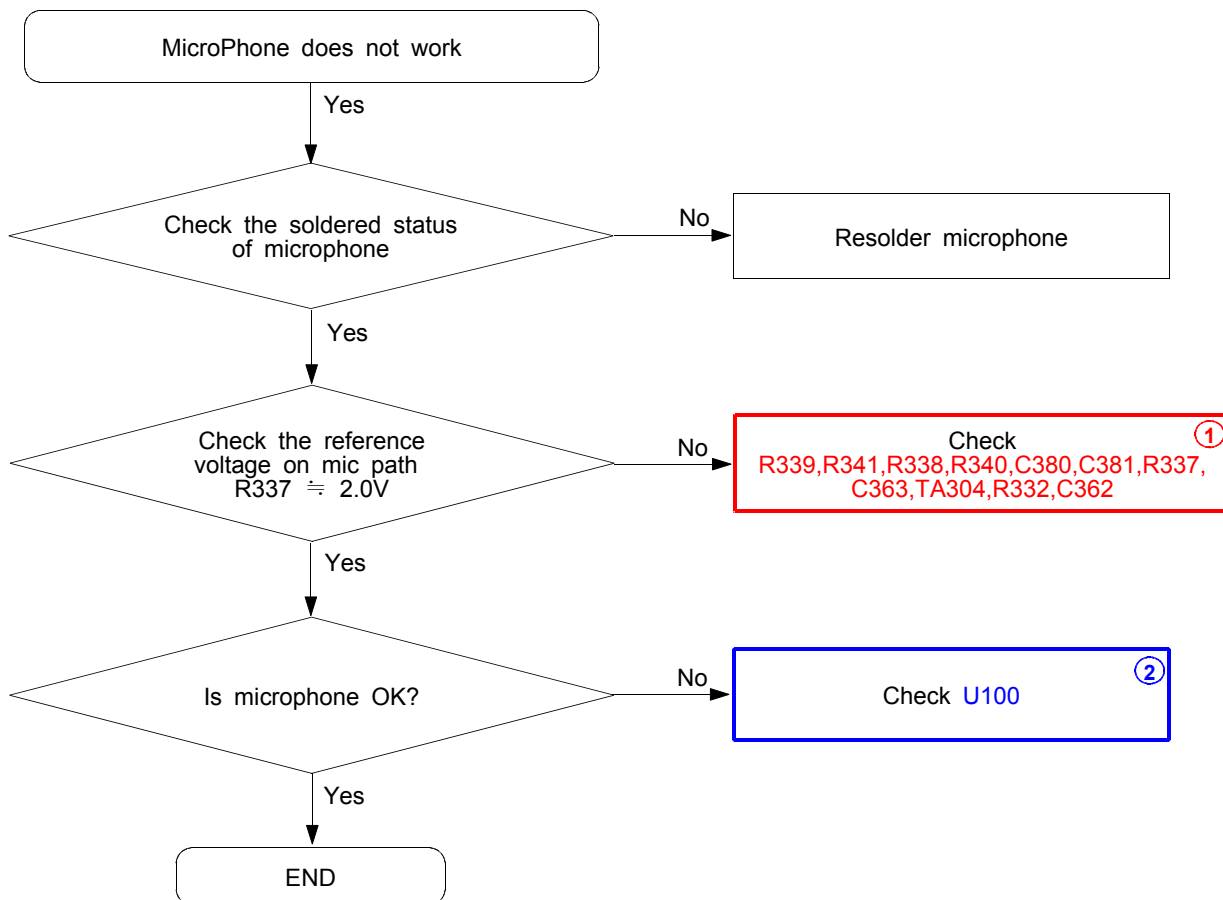


9-1-3. Sim Part

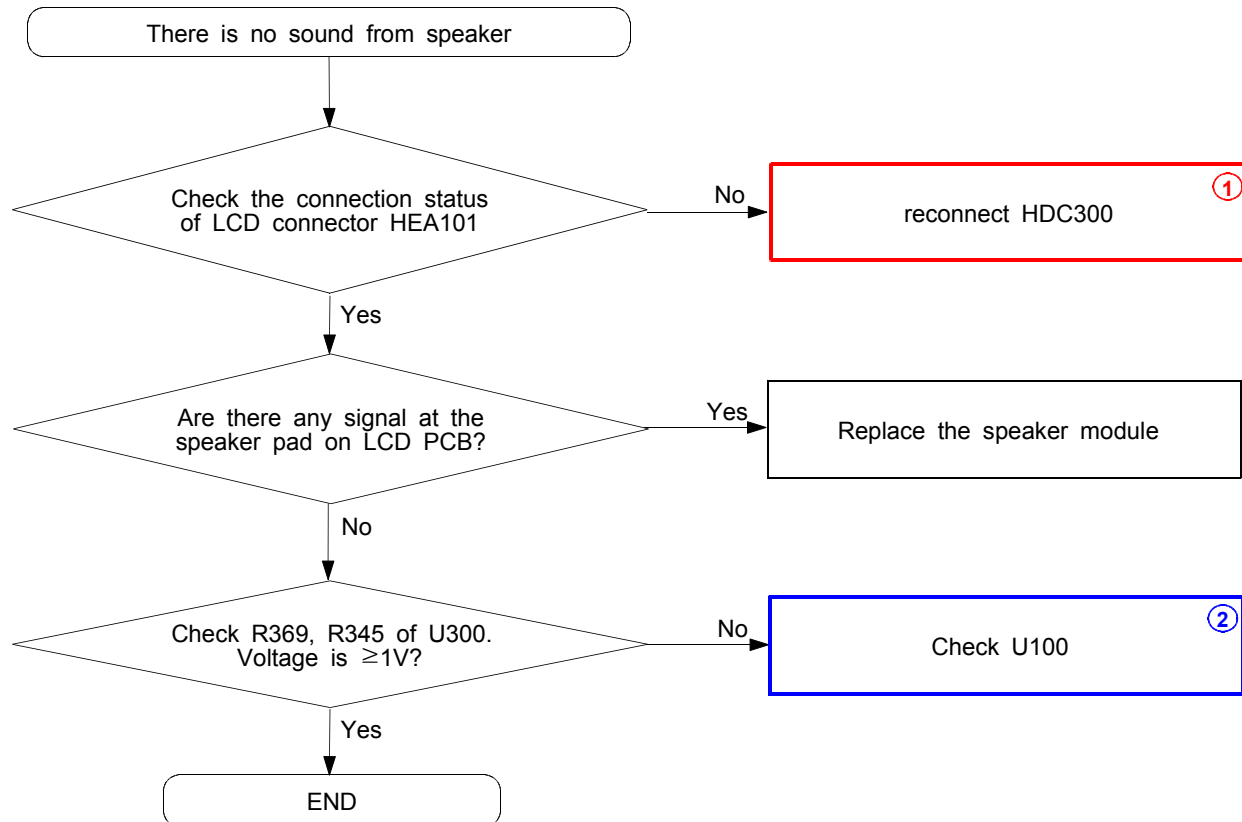


9-1-4. Microphone Part

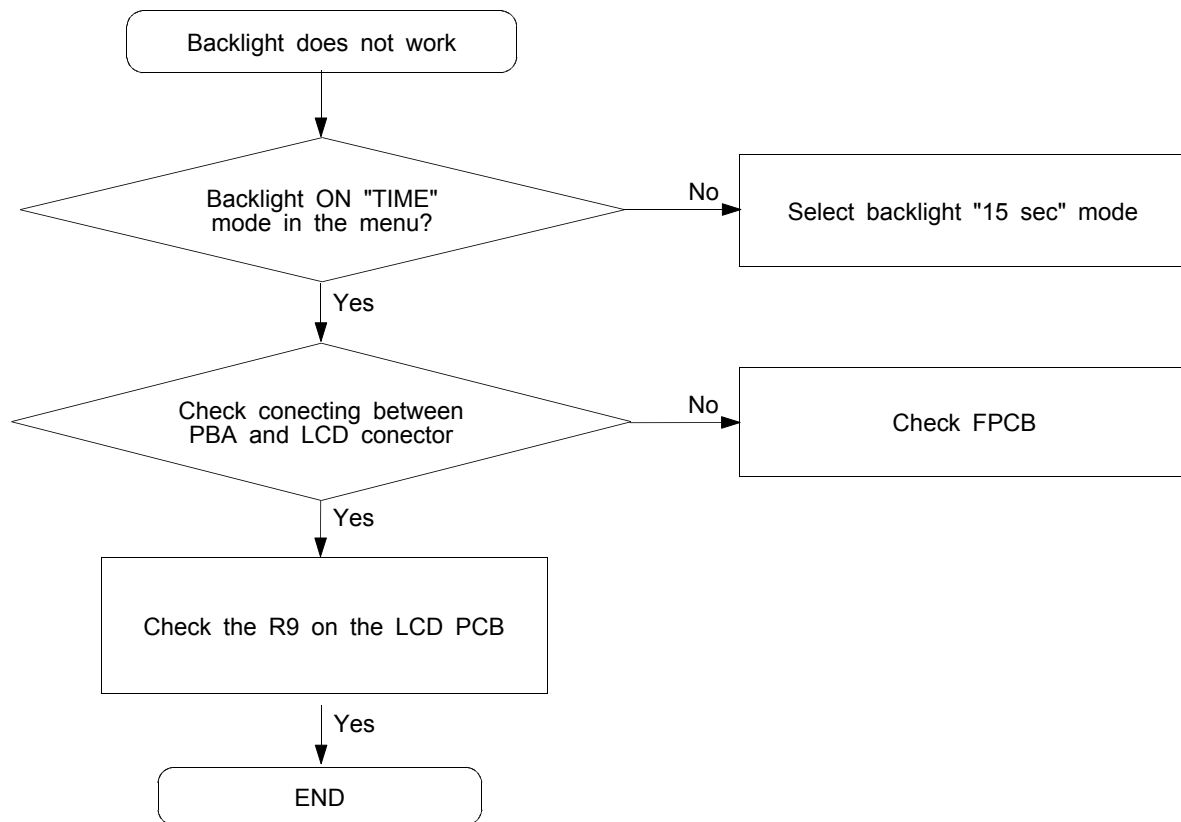
* Call with Sim before testing.



9-1-5. Speaker Part

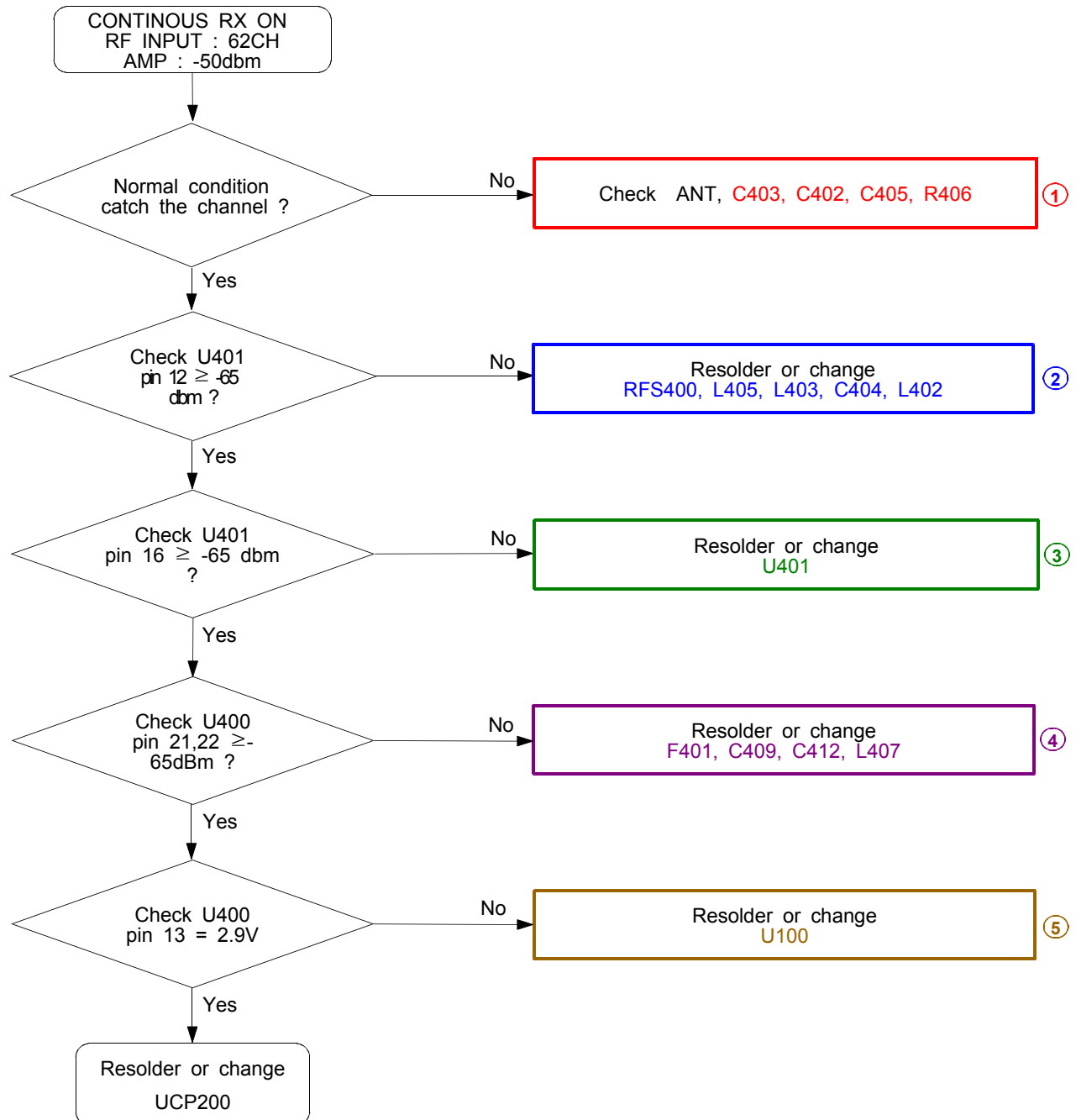


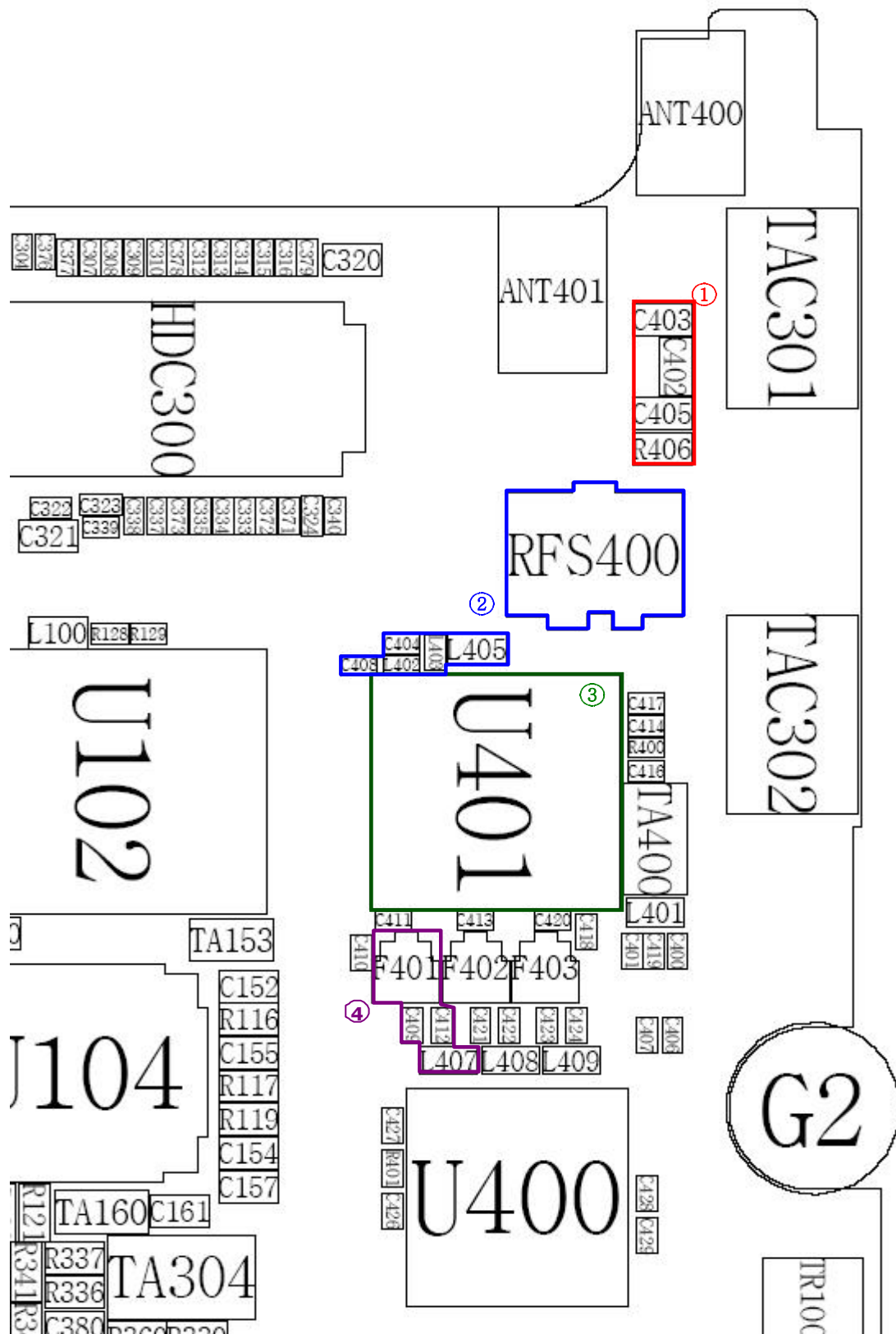
9-1-6. LCD backlight



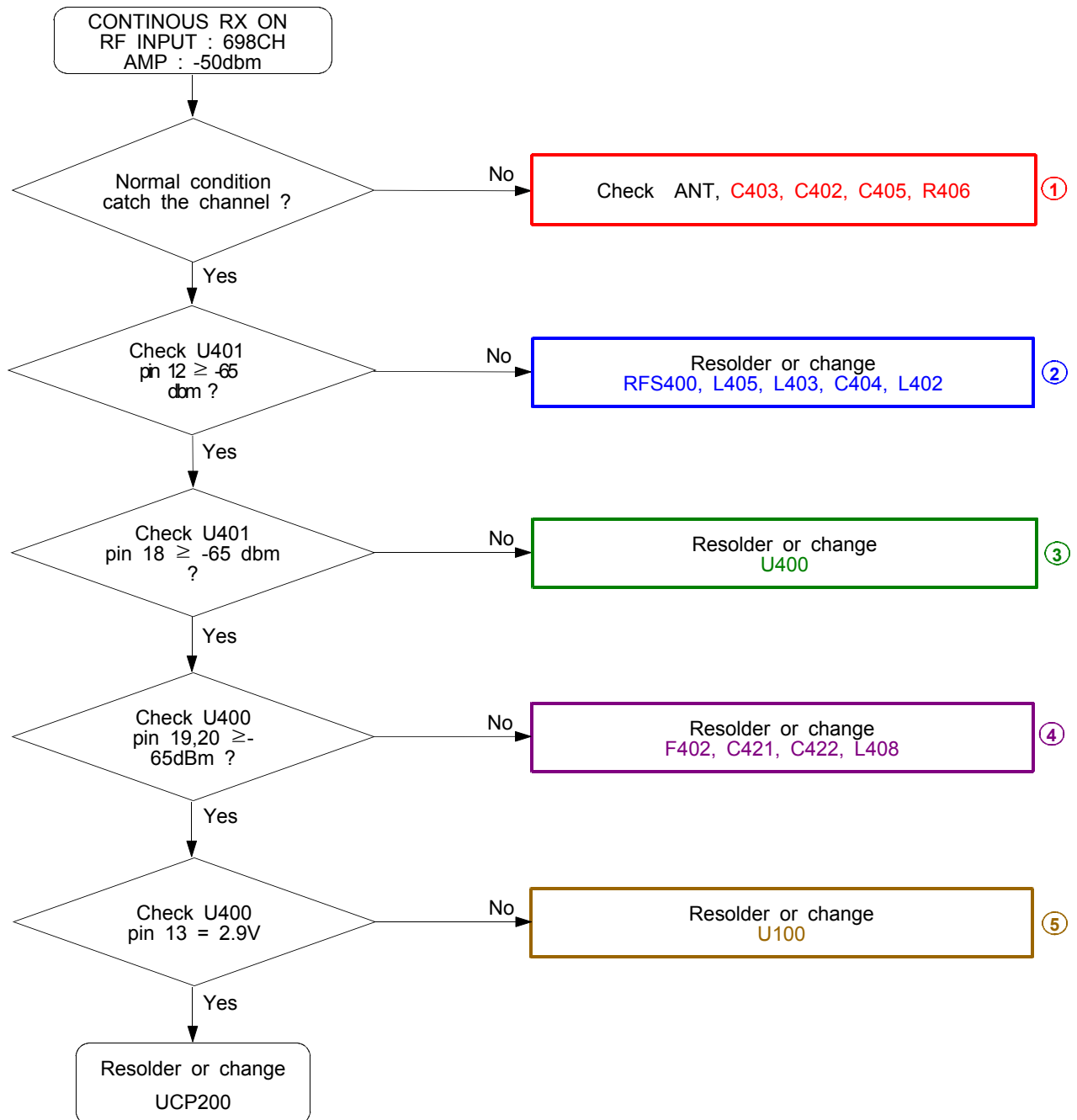
9-2. RF

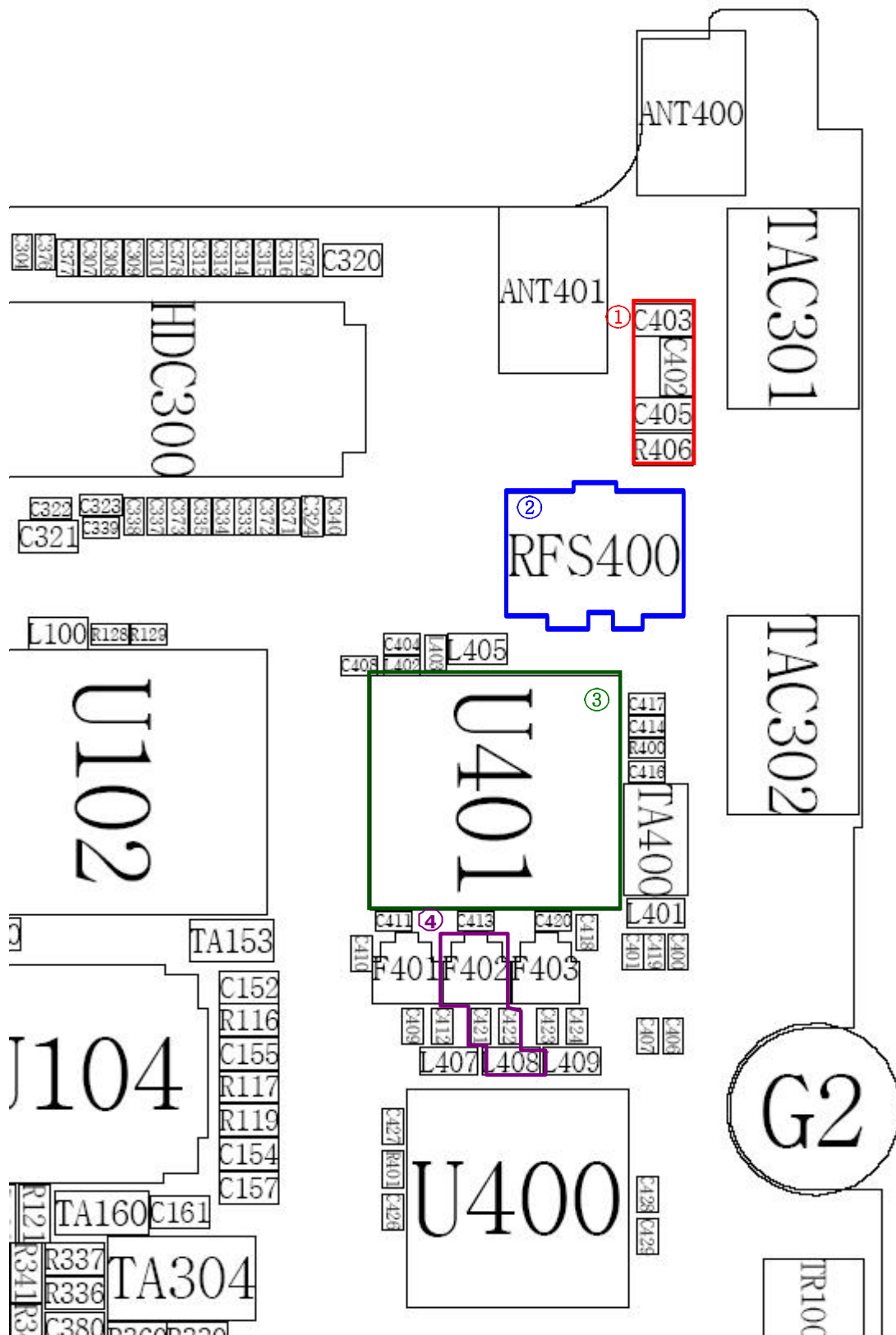
9-2-1. GSM Rx



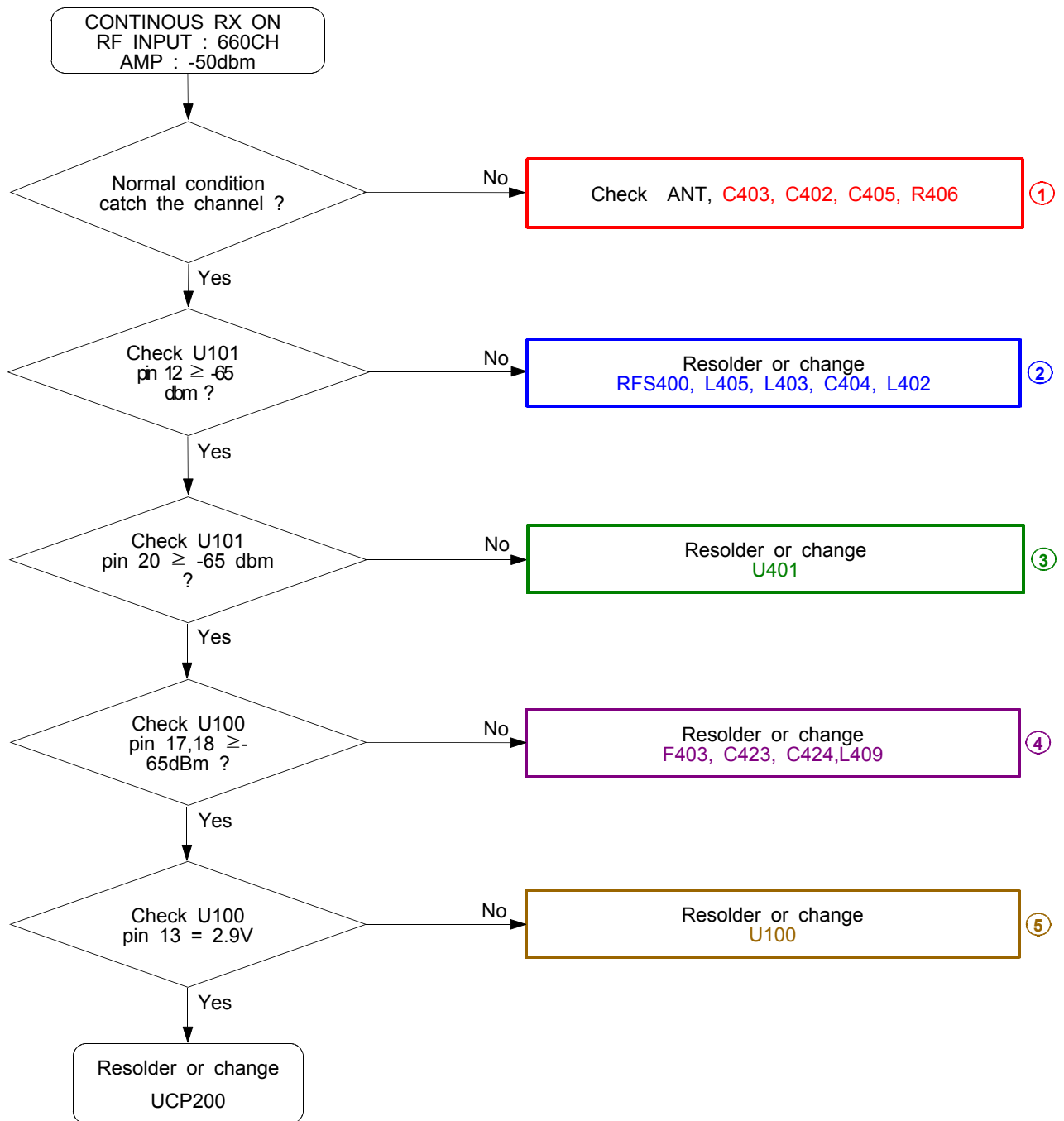


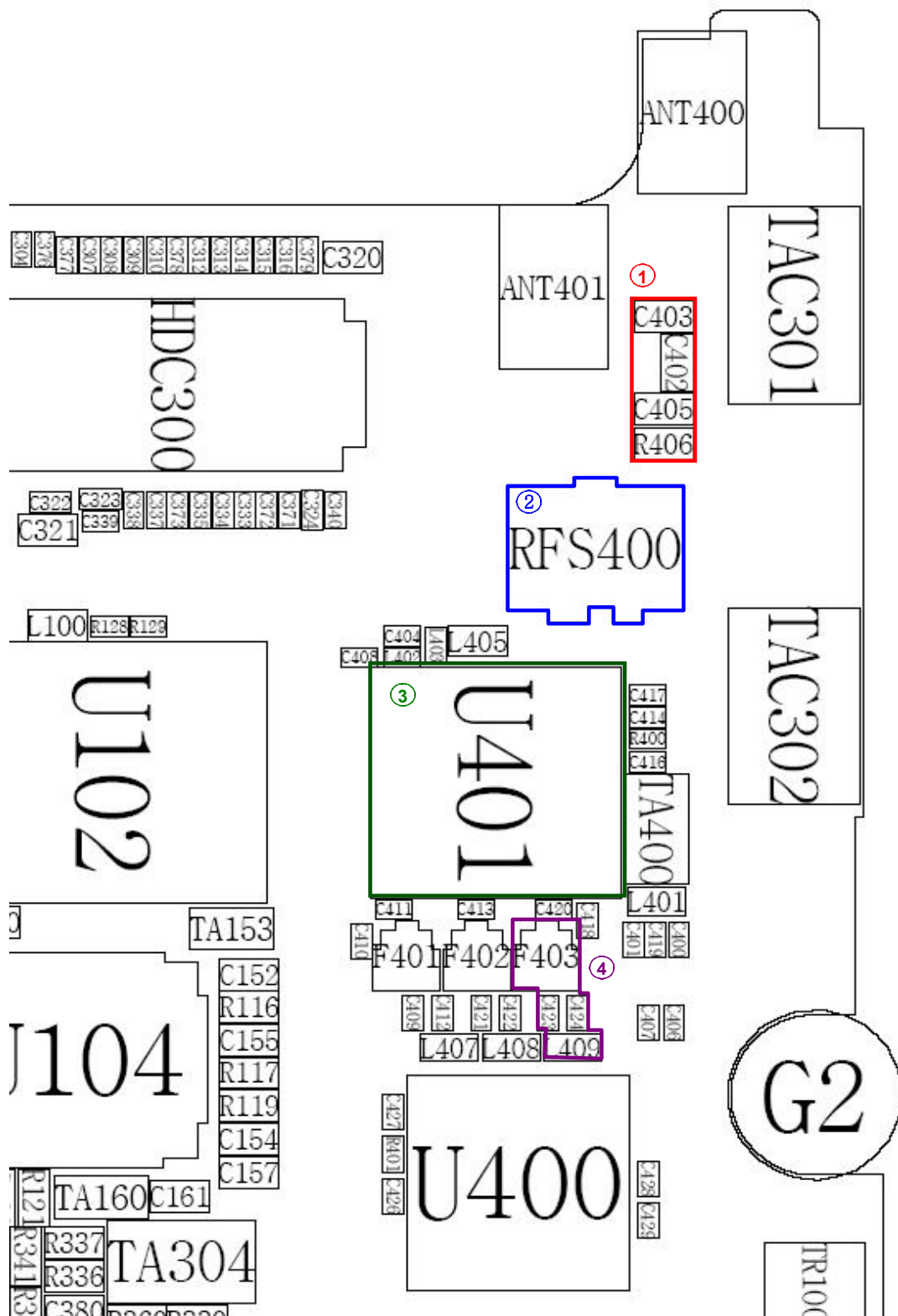
9-2-2. DCS Rx

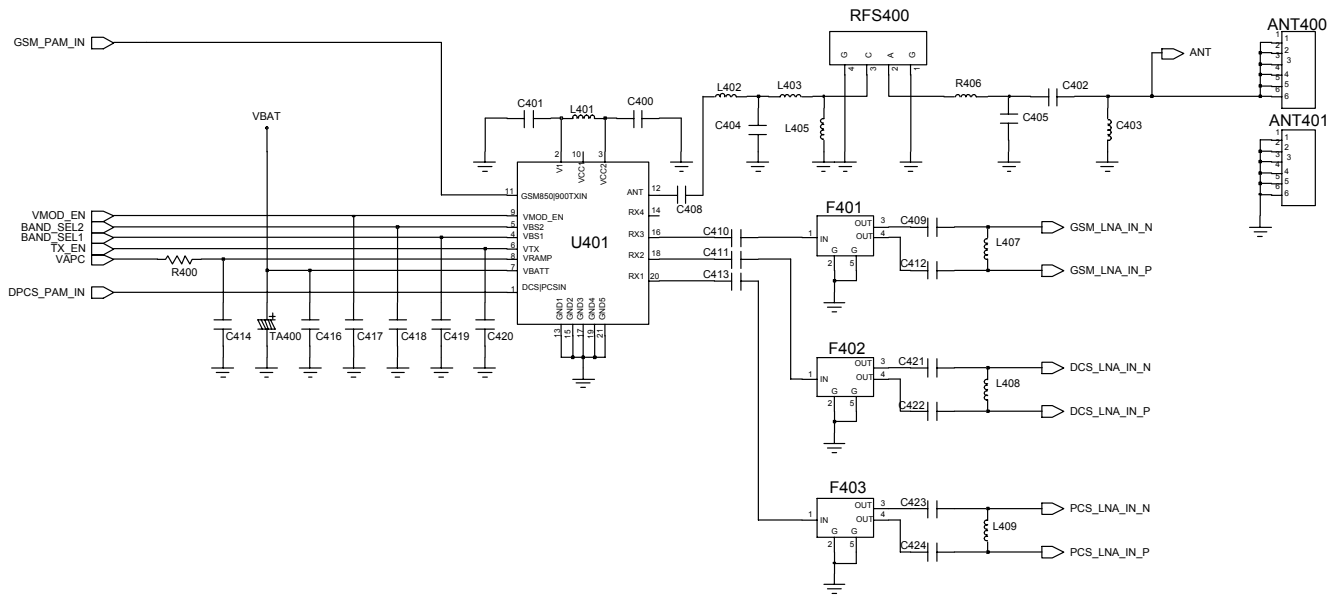




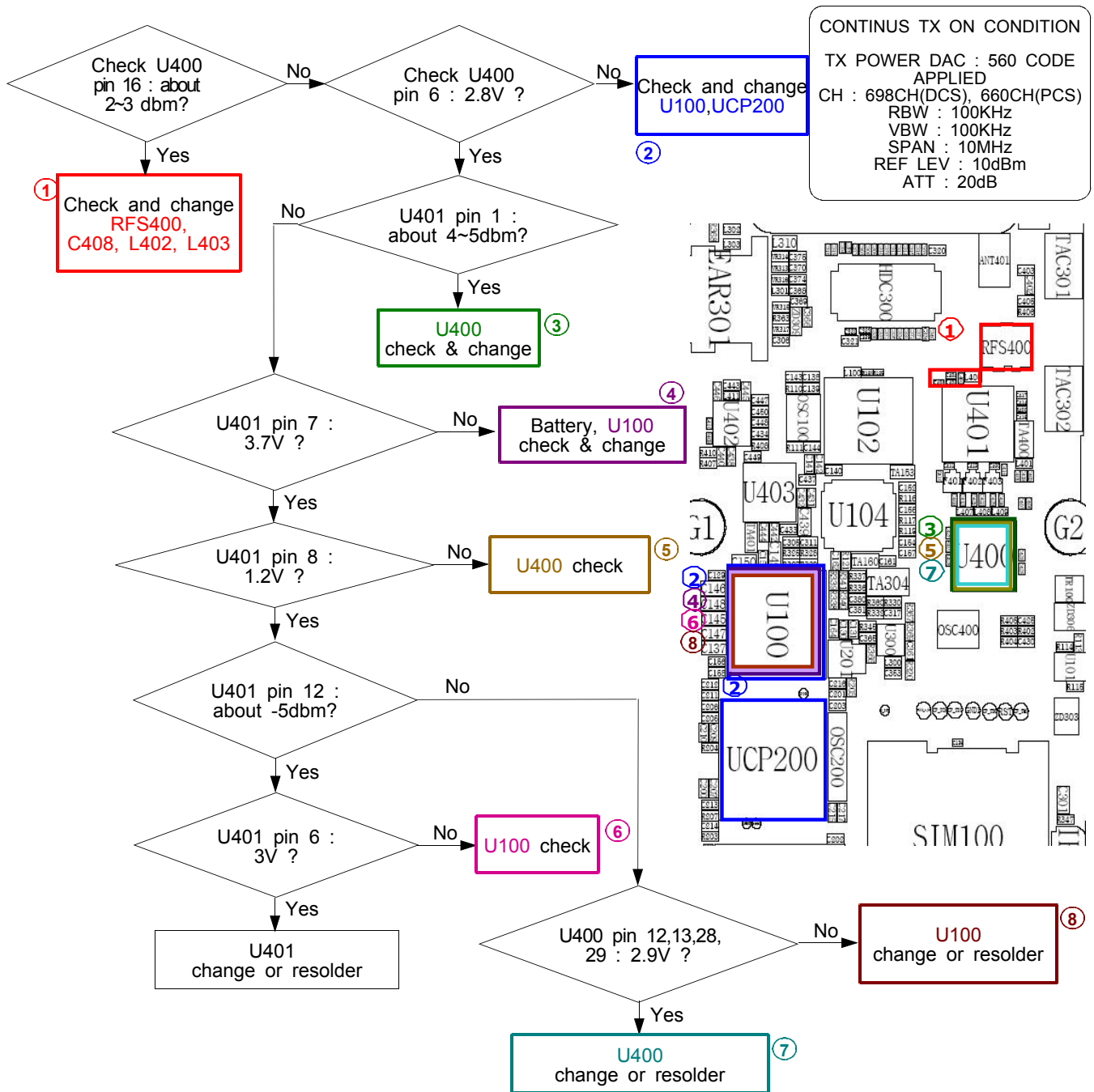
9-2-3. PCS Rx



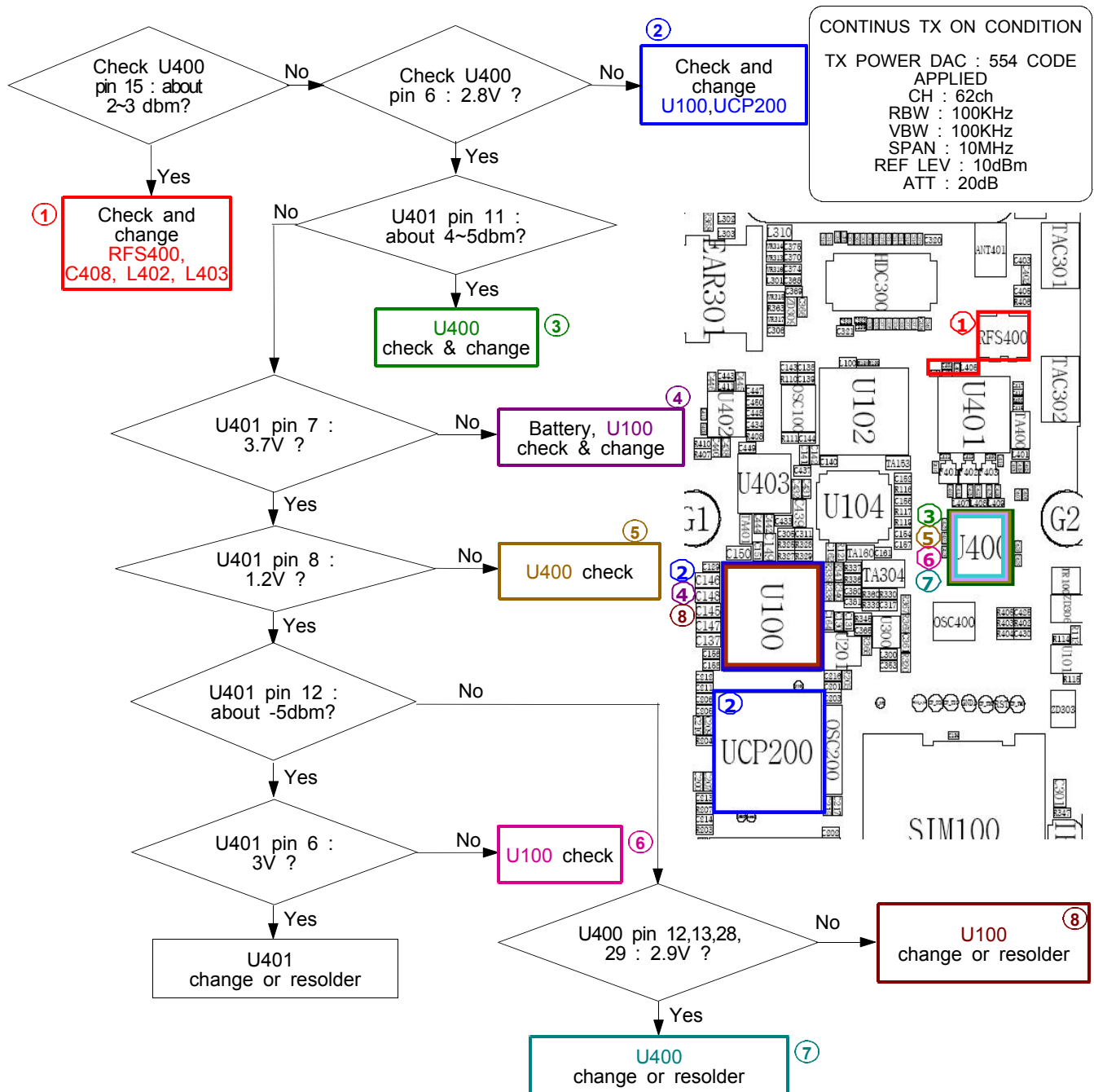




9-2-4. DCS/PCS Tx



9-2-5. GSM Tx



10. Reference data

10-1. Reference Abbreviate

AAC: Advanced Audio Coding.

AVC : Advanced Video Coding.

BER : Bit Error Rate

BPSK: Binary Phase Shift Keying

CA : Conditional Access

CDM : Code Division Multiplexing

C/I : Carrier to Interference

DMB : Digital Multimedia Broadcasting

EN : European Standard

ES : Elementary Stream

ETSI: European Telecommunications Standards Institute

MPEG: Moving Picture Experts Group

PN : Pseudo-random Noise

PS : Pilot Symbol

QPSK: Quadrature Phase Shift Keying

RS : Reed-Solomon

SI : Service Information

TDM : Time Division Multiplexing

TS : Transport Stream

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