SAMSUNG

GSM TELEPHONE
SGH-E630

SERVICE Manual

GSM TELEPHONE

CONTENTS

ELECTRONICS

Code No.: GH68-05360A
BASIC.

1. SGH-E630 Specification

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	45MHz	45MHz	95MHz	80MHz
Mod. Bit rate/ Bit Period	270.833kbps 3.692us	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	576.9us 4.615ms
Modulation	0.3GMSK	0.3GMSK	0.3GMSK	0.3GMSK
MS Power	33dBm~13dBm	33dBm~5dBm	30dBm~0dBm	30dBm~0dBm
Power Class	5pcl ~ 15pcl	5pcl ~ 19pcl	0pcl ~ 15pcl	0pcl ~ 15pcl
Sensitivity	-102dBm	-102dBm	-100dBm	-100dBm
TDMA Mux	8	8	8	8
Cell Radius	35Km	35Km	2Km	-

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±2 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

TX Power control level	PCS1900
0	30±2 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

2. SGH-E630 Circuit Description

1. SGH-E630 RF Circuit Description

1) RX PART

1. FEM(U205) → Switching Tx, Rx path for GSM900, DCS1800 and PCS1900 by logic controlling.
2. ASM Control Logic (U100, U207) → Truth Table

	VC_1	VC_2	VC_3
GSM/DCS Rx Mode	L	L	L
PCS Rx Mode	L	L	H
GSM Tx Mode	H	L	L
DCS/PCS Tx Mode	L	H	L

3. FILTER

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

- GSM FILTER (L100,L101,L102) → For filtering the frequency band between 925 ~ 960 MHz.
- DCS FILTER (L104,L105,L107) → For filtering the frequency band 1805 and 1880 MHz.
- PCS FILTER (L108, C151, C152) → For filtering the frequency band 1930 and 1990 MHz.

4. TC-VCXO (U101)

To generate the 26MHz reference clock to drive the logic and RF.

After additional process, the reference clock applies to the U100 Rx IQ demodulator and Tx IQ modulator.

The oscillator for RX IQ demodulator and Tx modulator are controlled by serial data to select channel and use fast lock mode for GPRS high class operation.

5. UAA3536HN (U100)

This chip integrates two differential-input LNAs.

The GSM input supports the E-GSM, DCS input supports the DCS1800. The LNA inputs are matched to the 200 ohm differential output SAW filters through eternal LC matching network.

Image-reject mixer downconverts the RF signal to a 100 KHz intermediate frequency (IF) with the RFLO from VOL1861 frequency synthesizer. The RFLO frequency is between 1801 ~ 1921 MHz.

The Mixer output is amplified with an analog programmable gain amplifier (PGA), which is controlled by AGAIN.

The quadrature IF signal is digitized with high resolution A/D converts (ADC).

2) TX PART

Baseband IQ signal fed into offset PLL, this function is included inside of U100 chip.

UAA3536HN chip generates modulator signal which power level is about 1.5dBm and fed into Power Amplifier(U201).

The PA output power and power ramping are well controlled by Auto Power Control circuit.

We use offset PLL below table.

Modulation Spectrum	200kHz offset 30 kHz bandwidth	GSM	-35dBc
		DCS	-35dBc
		PCS	-35dBc
	400kHz offset 30 kHz bandwidth	GSM	-66dBc
		DCS	-65dBc
		PCS	-66dBc
	600kHz ~ 1.8MHz offset 30 kHz bandwidth	GSM	-75dBc
		DCS	-68dBc
		PCS	-75dBc

2. Baseband Circuit description of SGH-E630

1. PCF50601

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. A programmable boost converter provides support for 1.8V, 3.0V, and 5.0V SIMs, while a self-resetting, electronically fused switch supplies power to external accessories. Ancillary support functions, such as RTC module and High Voltage Charge pump, Clock generator, aid in reducing both board area and system complexity. I2C BUS serial interface provides access to control and configuration registers. This interface gives a microprocessor full control of the PCF50601 and enables system designers to maximize both standby and talk times.

Supervisory functions. including a reset generator, an input voltage monitor, and a temperature sensor, 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. LCD Backlight Brightness Controler (MAX1574)

The Backlight Brightness is controled by Main chip(OM6357_7) through the MAX1574 charge pump.

The MAX1574 charge pump drives three white LED's with regulated constant current for uniform intensity. The MAX1574 uses an external resistor to set the full scale 100% LED current. An enable input (EN-"BACKLIGHT") is used for simple on/off control or can be pulsed repeatedly to set lower LED current in multiple steps down to 5%. Once the desired brightness is set, the MAX1574 maintains constant LED current as long as EN is kept high. If EN is kept low for more than 2ms, the MAX1574 enters shutdown.

When the LEDs are enabled by driving EN high, the MAX1574 goes through soft-start, bringing the LED current up to ILED_. Dimming is then done by pulsing EN low (500ns to 500µs pulse width). Each pulse reduces the LED current by 10%, so after one pulse the LED current is 0.9 x ILED. The tenth pulse reduces the current by 5%, so the ILED_ current reduces from 0.1 x ILED_ to 0.05x ILED. The eleventh pulse sets the LED current back to ILED_.

1.3. Clock Generator

The Clock Generator (CG) generates all clocks for internal and external usage. The 32768 Hz crystal oscillator provides an accurate low clock frequency for the PCF50601 and other circuitry.

2. Connector

2-1. LCD Connector

LCD is consisted of main LCD(color 65K TFT LCD).

Chip select signals in the **U400**, LCD_MAIN_CS, can enable LCD. BACKLIGHT signal enables white LED of main LCD. This signal is from IO part of the DSP in the U300(Main Chip). "LCD_RESET" signal initiates the Reset process of the LCD.

16-bit data lines(LD(0)~LD(15)) transfers data and commands to 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. So "L_WR" signal is used to write data or commands to LCD. Power signals for LCD are "VBAT and "VDD2".

"SPK_P" and "SPK_N" from OM6357 are used for audio speaker. And "VDD_VIB" from PCF50601 enables the motor.

2-3. IrDA

This system uses IrDA module, HSDL_3208, Agilent's. This has signals, "IrDA_DOWN" (enable signal), "RXD0" (input data) and "TXD0" (output data). These signals are connected to OM6357. A power signals, "VDD2" is used for circuit and LED.

2-4. Key

This is consisted of key interface pins among OM6357, KBIO[0~7]. These signals compose the matrix. Result of matrix informs the key status to key interface in the OM6357. Power on/off key is seperated from the matrix. So power on/off signal is connected with PCF50601 to enable PCF50601.

Key LED is consisted of four white LED for sub key and six white LED for main key. Key LED use the "BLVDD" supply voltage. Main key LED is controlled by the "VDD_KEY" supply voltage.

"FLIP" informs the status of folder (open or closed) to the OM6357. This uses the hall effect IC, EM-1681-FT.

A magnet under main LCD enables EM-1681-FT.

2-5. EMI ESD Filter

This system uses the EMI ESD filter, EMIF09 to protect noise from IF CONNECTOR part.

2-6. IF connector

It is 18-pin connector. They are designed to use VBAT, +DCVOLT, TXD0, RXD0, RTS0, CTS0, JIG_REC, CHARGER_OK, RXD1, TXD1 and GND. They connected to power supply IC, microprocessor and signal processor IC.

3. Battery Charge Management

A complete constant-current/constant-voltage linear charger for single cell lithium-ion batteries.

If TA connected to phone, "+DCVOLT" enable charger IC and supply current to battery.

when fault condition caused, "CHG_ON" signal level change low to high and charger IC stop charging process.

4. Audio

EARP_P and EARP_N from OM6357 are connected to the main speaker. AUXSP is connected to the Hands free kit. MIC_P and MIC_N are connected to the main MIC. And AUX_MIC_P and AUX_MIC_N are connected to the Hands free kit.

YMU765MA5 is a LSI for portable telephone that is capable of playing high quality music by utilizing FM synthesizer and ADPCM decorder that are included in this device. As a synthesis, YMU765MA5 is equipped 32 FM voices and 32 Wave Table voices. Since the device is capable of simultaneously generating up to synchronous with the play of the FM synthesizer, various sampled voices can be used as sound effects.

Since the play data of YMU765MA5 are interpreted at anytime through FIFO, the length of the data(playing period) is not limited, so the device can flexiblysupport application such as incoming call melody music distribution service.

The hardware sequencer 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.

YMU765MA5 includes a speaker amplifier with high ripple removal rate whose maximum output is 580mW (SPVDD=3.6V). The device is also equipped with conventional function including a vibartor and a circuit for controlling LEDs synchornous with music.

For the headphone, it is provided with a stereophonic output terminal.

For the purpose of enabling YMU765MA5 to demonstarte its full capablities, Yamaha purpose to use "SMAF:Synthetic music Mobile Application Format" as a data distribution format that is compatible wiht multimedia. Since the SMAF takes a structure that sets importance on the synchronization between sound and images, various contents can be written into it including incoming call melody with words that can be used for traning karaoke, and commercial channel that combines texts, images and sounds, and others. The hardware sequencer of YMU765MA5 directly interprets and plays blocks relevant to systhesis (playing music and reproducing ADPCM with FM synthesizer) that are included in data distributed in SMAF.

5. Memory

signals in the OM6357_7 enable two memories. They use only one volt supply voltage, VDD3 in the PCF50601. This system uses Samsung's memory, KBB06B400M-F402. It is consisted of 128M bits flash NOR memory and 256M bits flash NAND memory and 64M bits SCRAM. It has 16 bit data line, HD[0~15] which is connected to OM6357_7 and MV317S. It has 26 bit address lines, HA[1~26]. CS_NAND and NCSRAM signals is chip select. Wrting process, HWR_N is low and it enables writing process to flash memory and SRAM. During reading process, HRD_N is low and it enables reading process to flash memory and SRAM. Each chip select signals in the OM6357_7 select memory among 2 flash memory and SCRAM. Reading or writing procedure is processed after HWR_N or HRD_N is enabled. Memories use reset, which is VDD3 delay from PCF50601. HA[25] signal enables lower byte of SRAM and HA[26] signal enables higher byte of SRAM.

6. OM6357_7

OM6357_7 is consisted of ARM core and DSP core. It has **8x1Kword on-chip program/data RAM, 55 Kwords on-chip program ROM** in the DSP. It has 4K*32bits ROM and 2K*32bits RAM in the ARM core. DSP is consisted of KBS, JTAG, EMI and UART. ARM core is consisted of EMI, PIC(Programmable Interrupt Controller), reset/power/clock unit, DMA controller, TIC(Test Interface Controller), eripheral bridge, PPI, SSI(Synchronous Serial Interface), ACC(Asynchronous communications controllers), timer, ADC, RTC(Real-Time Clock) and keyboard interface. KBIO(0:7), address lines of DSP core and HD[0~15]. HA[1~26], address lines of ARM core and HD[0~15], data lines of ARM core are connected to memory, YMU765. MV317S(Camera DSP Chip) controls the communication between ARM core and DSP core.

CS_NAND, NCSRAM, NCSFLASH in the ARM core are connected to each memory. HWR_N and HRD_N control the process of memory. External IRQ(Interrupt ReQuest) signals from each units, such as, PMU need the compatible process. KBIO[0~7] receive the status from key and RXD0/TXD0/irDA_DOWN are used for the communicatios using IRDA and data link cable(DEBUG_DTR/RTS/TXD/RXD/CTS/DSR).

It has JTAG control pins(TDI/TDO/TCK) for ARM core and DSP core. It recieves 13MHz clock in CKI pin from external TCXO. ADC(Analog to Digital Convertor) part receives the status of temperature, battery type and battery voltage.

7. Camera DSP (MV317SAQ)

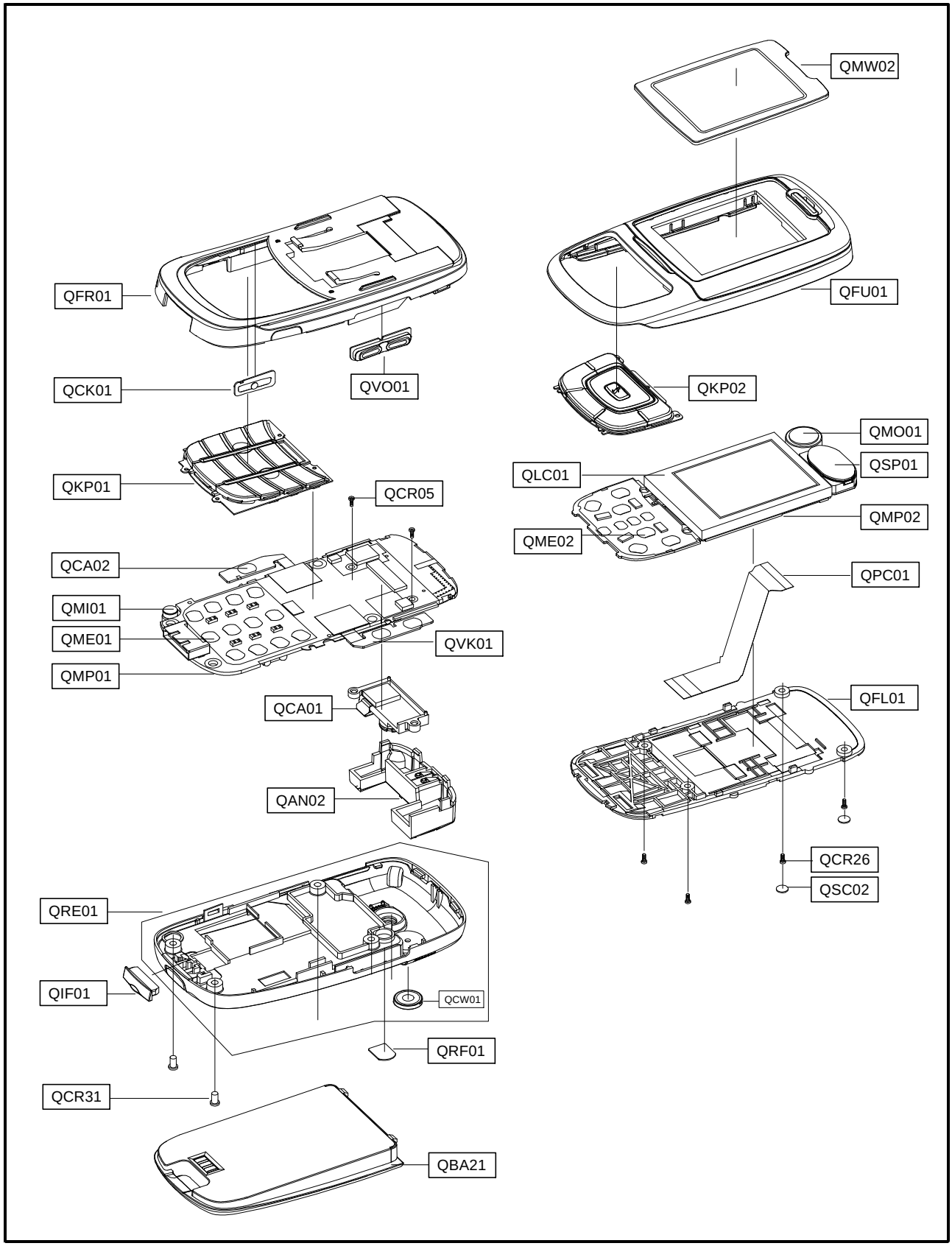
Tiger is an Integrated circuit for mobile phone camera. This structure will allow effectiveness for large data management and significantly reduces main processor will get burden.

In hence, Tiger will allow the user to be able to display to LCD direct without burdening the main processor. It also allows to have various kinds of display size on the LCD and snapshot for Jpeg. Digital effect will also be executed on real time base resulting Tiger as being a video co-processor in the mobile platform.

Also,an i80 type processor' s 16bit parallel interface of Tiger makes it available for the CPU to interchange the data with Tiger. As the additional 8Mbit is usable except 2Mbit buffer embedded in Tiger, the diverse UI data processing which is not a burden to the CPU is available. JPEG encoder and decoder are baseline ISO/IEC 10918-1 JPEG compliance (DCT-based). JPEG decoder supports YUV444, YUV422, YUV420 and YUV411 format standard JPEG image.

3. SGH-E630 Exploded View and its Parts list

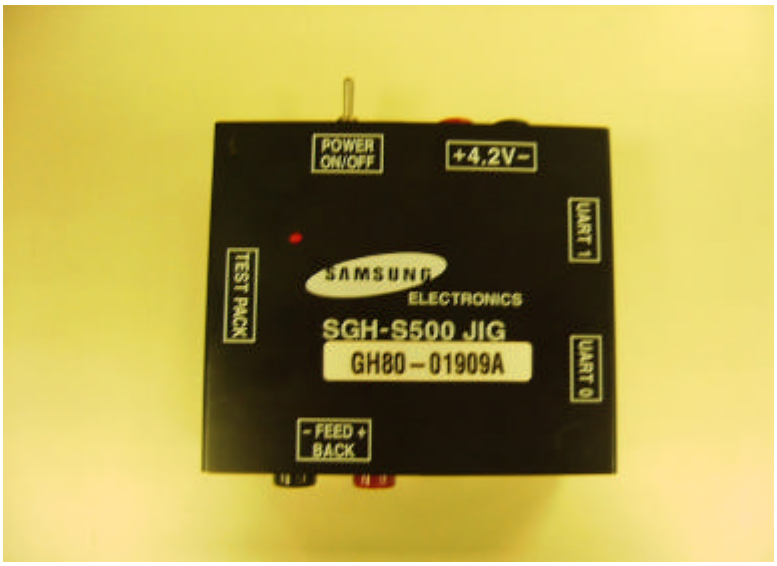
1. Cellular phone Exploded View



2. Cellular phone Parts list

Location NO.		Description	SEC CODE	Remark
QMW02		WINDOW LCD	GH72-15021A	
QFU01		MEC-SLIDE UPPER	GH75-04606A	
QKP02		KEYPAD SUB	GH75-04612A	
QMP02		LCD PBA	GH92-01846A	
QME02		LCD METAL DOME	GH59-01438A	
QFL01		MEC-SLIDE LOWER	GH75-04607A	
QSP01		SPEAKER	3001-001575	
QMO01		MOTOR	GH31-00098A	
QLC01		LCD	GH07-00561A	
QCR26		SCREW MACHINE	6001-001850	
QFR01		FRONT COVER	GH75-04605A	
QKP01		KEYPAD MAIN	GH75-04611A	
QIF01		IF CONN COVER	GH72-15017A	
QMP01		MAIN PBA	GH92-01889A	
QVK01		UNIT VOLUME KEY	GH59-01436A	
QME01		UNIT METAL DOME	GH59-01437A	
QCA02		UNIT CAM KEY	GH59-01435A	
QCR05		SCREW	6001-001478	
QMI01		MICROPHONE ASSY	GH30-00134A	
QCK01		MEC CAM KEY	GH75-04610A	
QCR31		SCREW	6001-001795	
QVO01		MEC SIDE KEY	GH75-04609A	
QRE01		MEC REAR COVER	GH75-04608A	
QRF01		RF COVER	GH74-09508A	
QBA21		BATTERY	GH43-01447A	
QPC01		PCB-FPCB	GH41-00637A	
QCA01		UNIT CAMERA	GH59-01464A	
QSC02		SCREW CAP	GH74-11226A	
QAN02		INTENNA	GH42-00457A	
QCW01		WINDOW CAMERA	GH75-05299A	

3. Test Jig (GH80-01909A)



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

3-2. Test Cable
(GH39-00217A)

3-3. Serial Cable

3-4. Power Supply Cable

3-5. DATA CABLE
(GH39-00219A)

3-6. TA
(GH44-00483A)

4. SGH-E630 MAIN Electrical Parts List

M A I N	
SEC CODE	Design LOC
0403-001387	ZD600
0504-000168	Q801
0504-001151	U206
0504-001151	U207
0506-000107	U801
0601-001790	LED700
0601-001790	LED701
0601-001790	LED702
0601-001790	LED703
0601-001790	LED706
0601-001790	LED709
0604-001261	U601
0801-002237	U409
0801-002882	U301
0801-002882	U403
0801-002882	U405
1001-001253	U702
1203-003109	U602
1204-002138	U402
1205-002327	U100
1205-002350	U500
1404-001221	V600
1405-001082	V201
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1405-001082	V204
1405-001082	V205
1405-001082	V501
1405-001082	V502

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1405-001082	V706
1405-001082	V707
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1405-001082	V802
1405-001082	V803
1405-001082	V804
1405-001082	V805
1405-001082	V812
1405-001082	V814
1405-001093	V503
1405-001093	V504
1405-001138	V808
1405-001138	V809
1405-001138	V810
2007-000138	R616
2007-000140	R125
2007-000140	R416
2007-000140	R700
2007-000141	R126
2007-000141	R303
2007-000141	R304
2007-000141	R412
2007-000141	R415

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2007-000141	R421
2007-000141	R708
2007-000143	R406
2007-000144	R736
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2007-000148	R108
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2007-000148	R210
2007-000148	R301
2007-000148	R312
2007-000148	R500
2007-000148	R706
2007-000148	R731
2007-000157	R604
2007-000162	R300
2007-000162	R305
2007-000162	R306
2007-000162	R315
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2007-000162	R602
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2007-000162	R722
2007-000162	R728
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2007-000171	R204
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2007-000171	R806
2007-000172	R727
2007-000172	R730
2007-000174	R122
2007-000566	R106
2007-000566	R107
2007-000566	R606
2007-000758	R605
2007-000982	R116
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2007-003030	R110
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2007-007014	R400
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2007-007015	R404
2007-007096	R104
2007-007100	R501
2007-007148	R121
2007-007148	R405
2007-007311	R105
2007-007470	R505
2007-007697	R610
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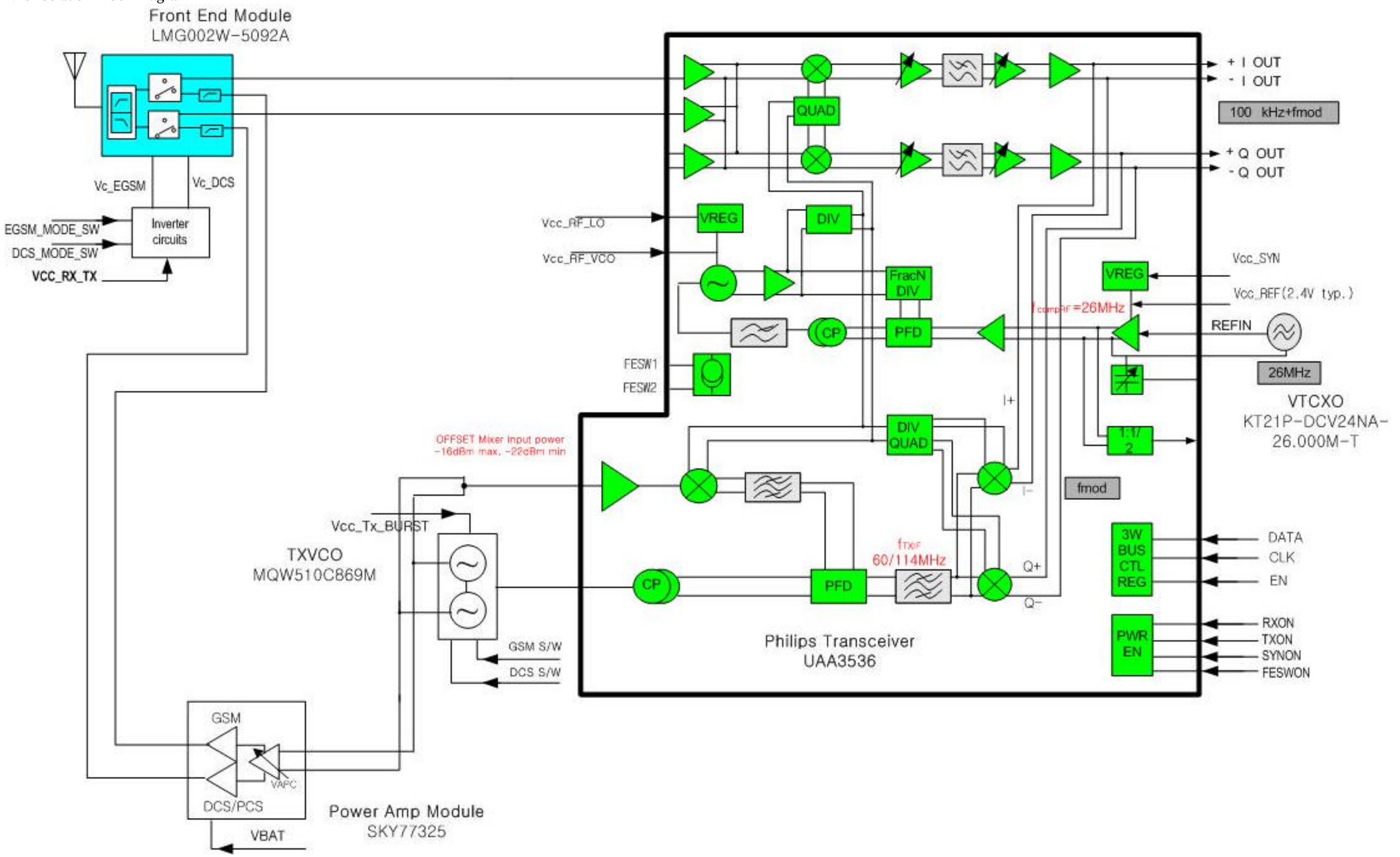
2203-006208	C528
2203-006208	C529
2203-006257	C606
2203-006257	C608
2301-001197	C119
2301-001213	C121
2404-001105	C720
2404-001134	C211
2404-001164	C605
2404-001268	C522
2404-001268	C523
2404-001268	C527
2404-001268	C601
2404-001305	C700
2404-001339	C425
2703-002200	L101
2703-002201	L807

SEC CODE	Design LOC
2703-002201	L808
2703-002208	L100
2703-002208	L102
2703-002267	L201
2703-002314	L200
2703-002636	L105
2801-003747	OSC500
2806-001329	OSC401
2901-001246	U600
2901-001286	F800
2901-001286	F801
2901-001286	F802
2901-001286	F803
3301-001105	L500
3301-001362	L301
3301-001362	L400
3301-001438	L700
3301-001438	L701
3301-001438	R741
3301-001438	R742
3705-001287	CN201
3711-005558	CN603
4302-001130	M500
GH13-00020A	U400

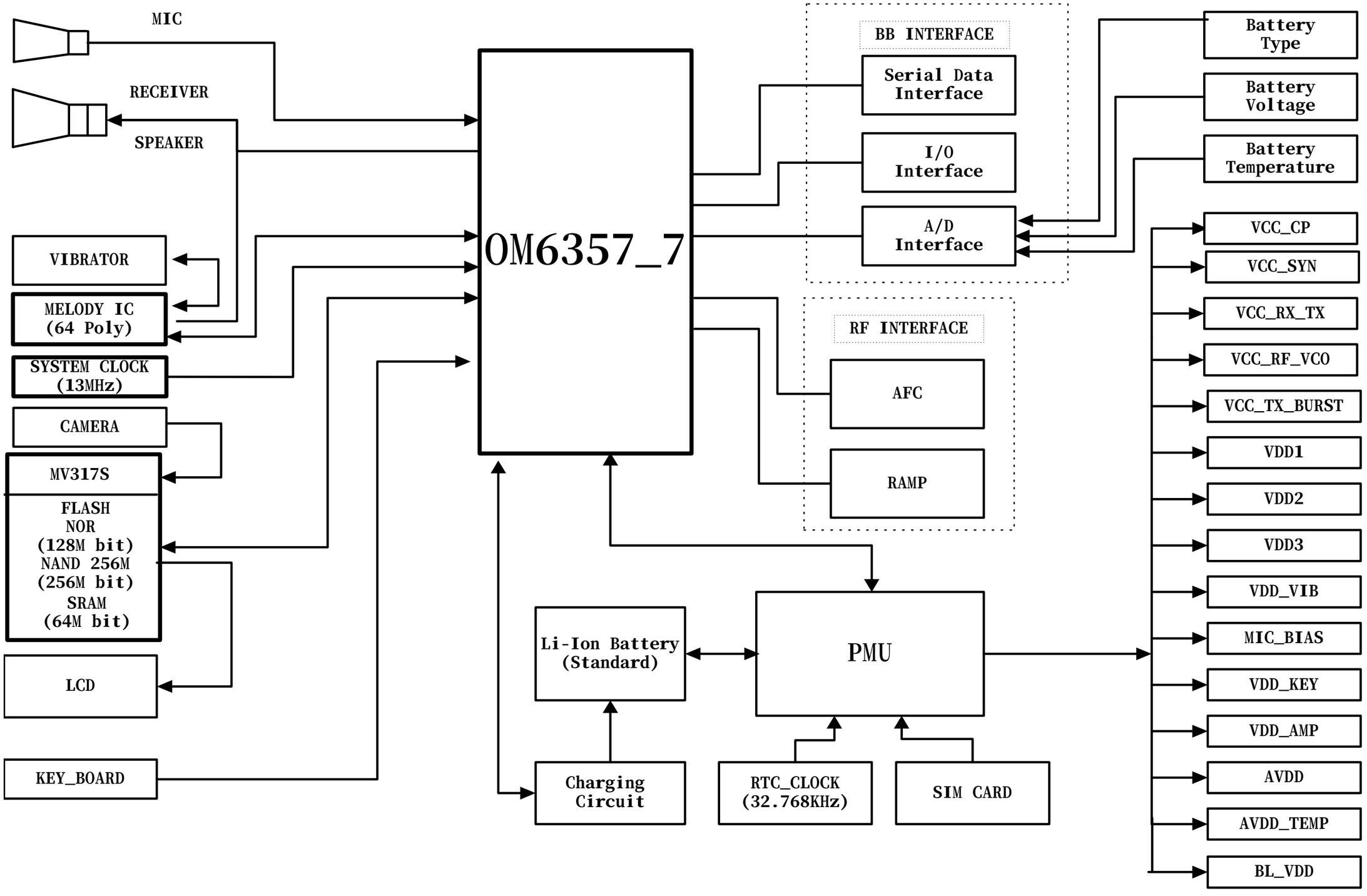
S U B	
SEC CODE	Design LOC
0403-001427	ZD1
0407-001002	D1
0601-001819	D2
0601-001819	D3
0601-001819	D4
0601-001819	D5
1405-001082	V1
1405-001082	V2
1405-001082	V3
1405-001082	V4
1405-001082	V5
1405-001082	V6
1405-001082	V7
1405-001082	V8
1405-001082	V9
2007-000162	R6
2007-001301	R2
2007-001301	R3
2007-001301	R4
2007-001301	R5
2007-008137	R1
2203-005061	C5
2203-005061	C6
2203-005061	C7
2203-005065	C9
2203-005482	C10
2203-005496	C4
2203-006093	C1

5. SGH-E630 Block Diagrams

1. RF Solution Block Diagram

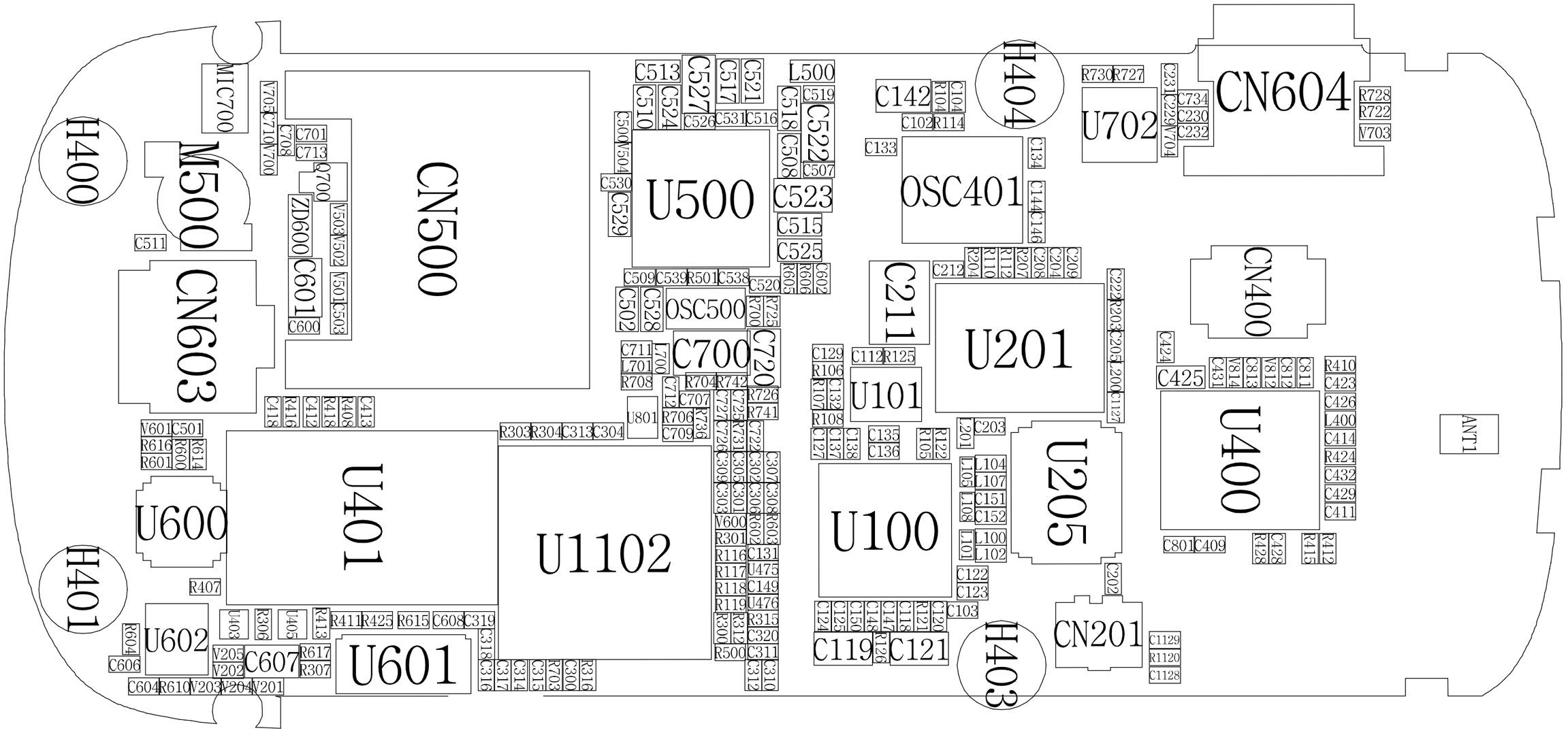


2. Base Band Solution Block Diagram

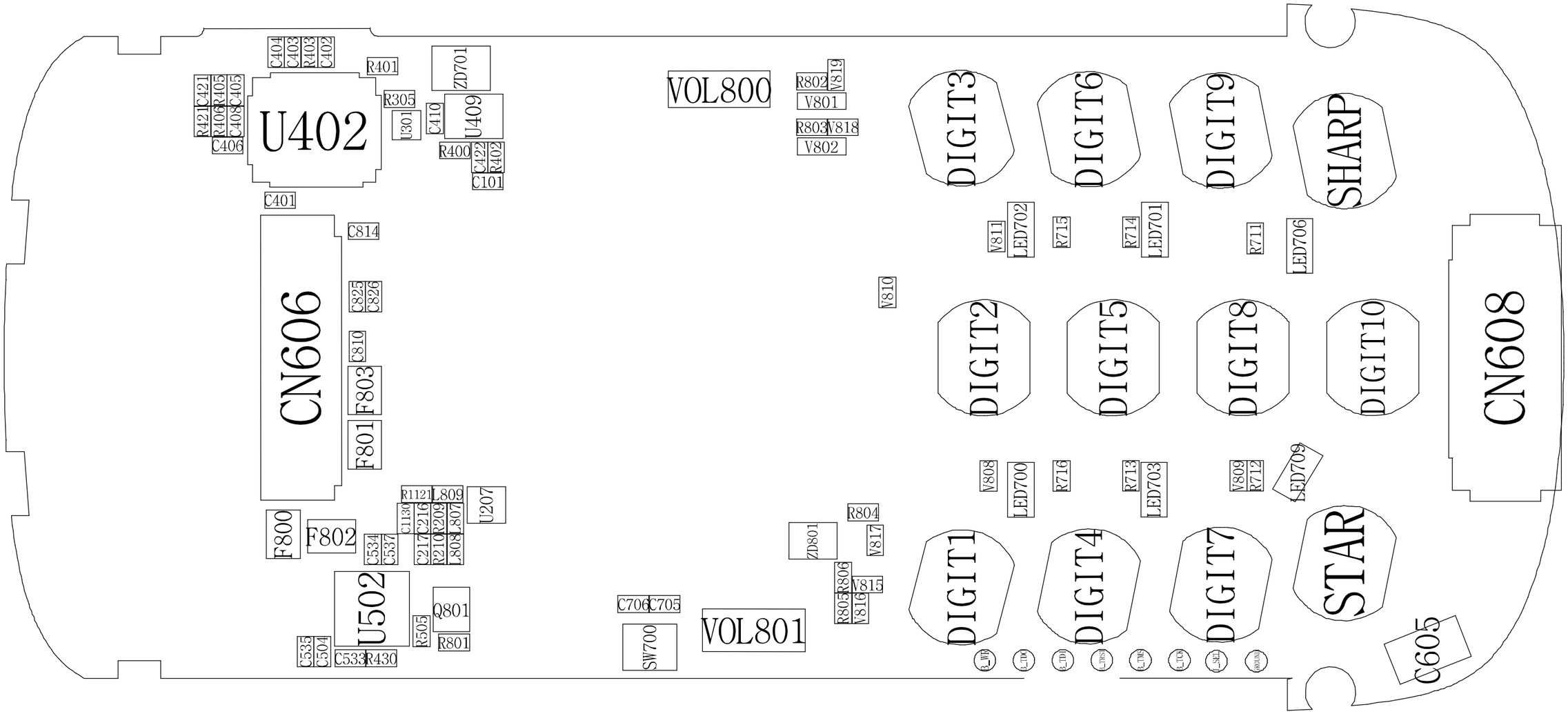


6. SGH-E630 PCB Diagrams

1. Main PCB Top Diagram

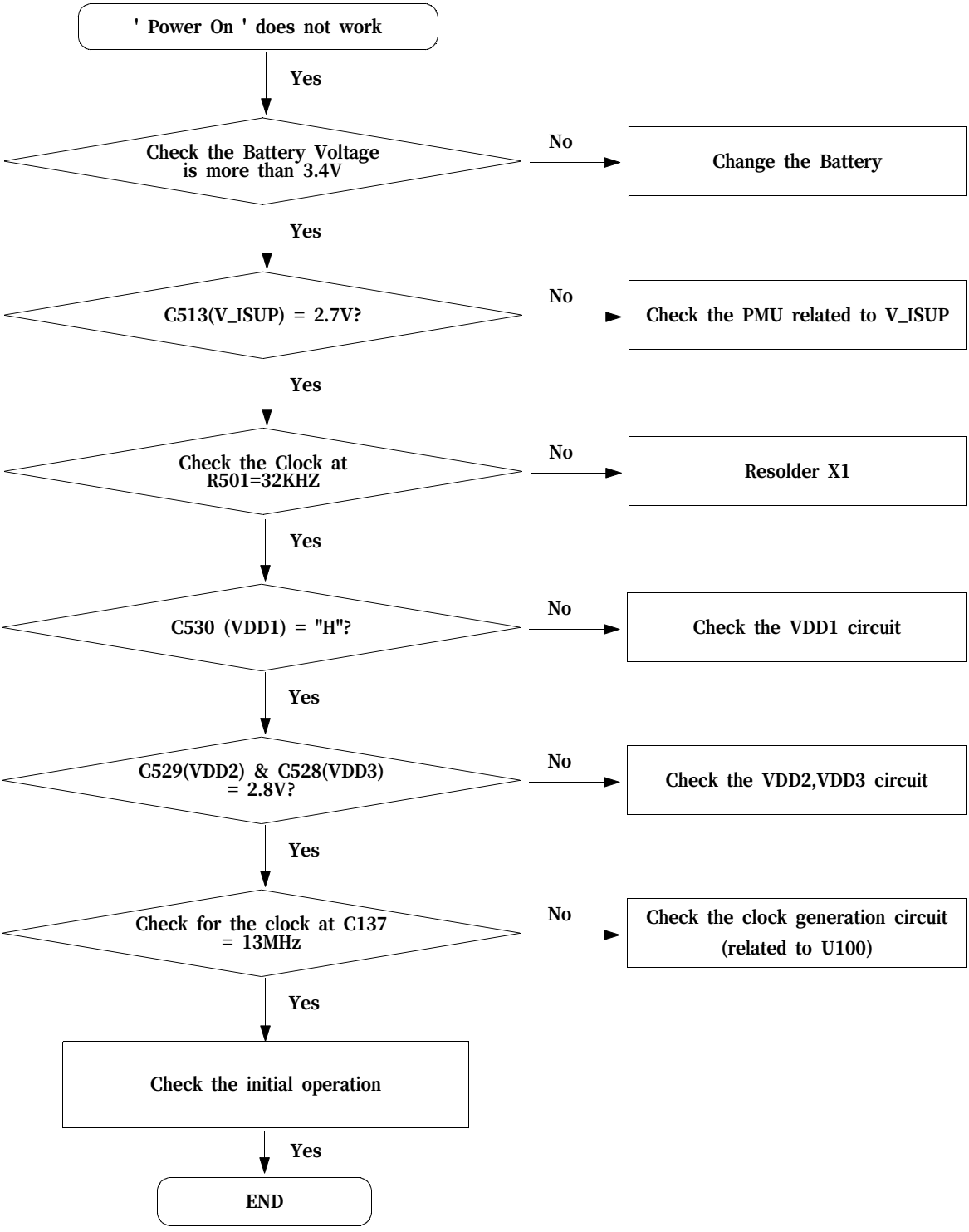


2. Main PCB Bottom Diagram

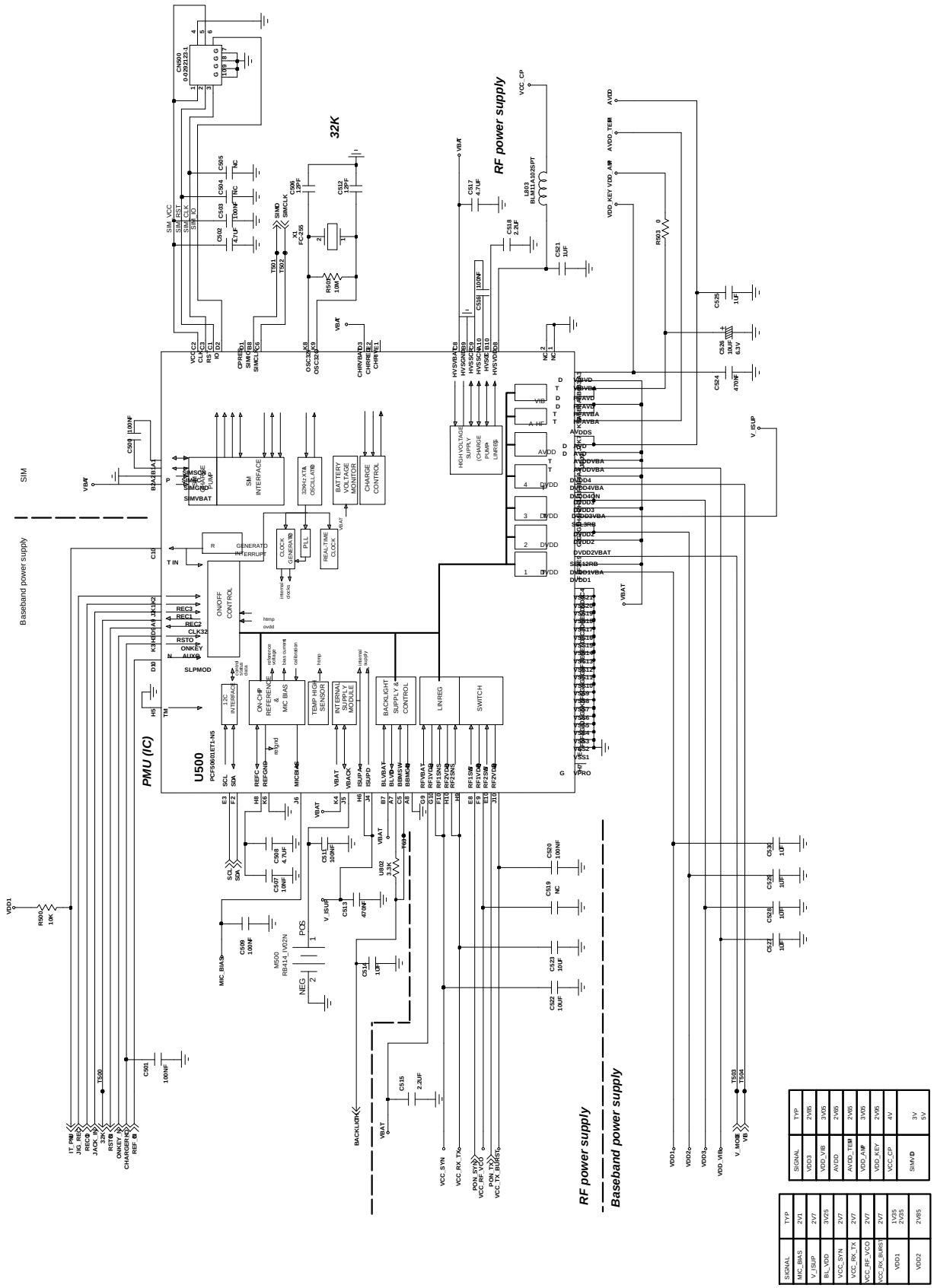


7. SGH-E630 Flow Chart of Troubleshooting

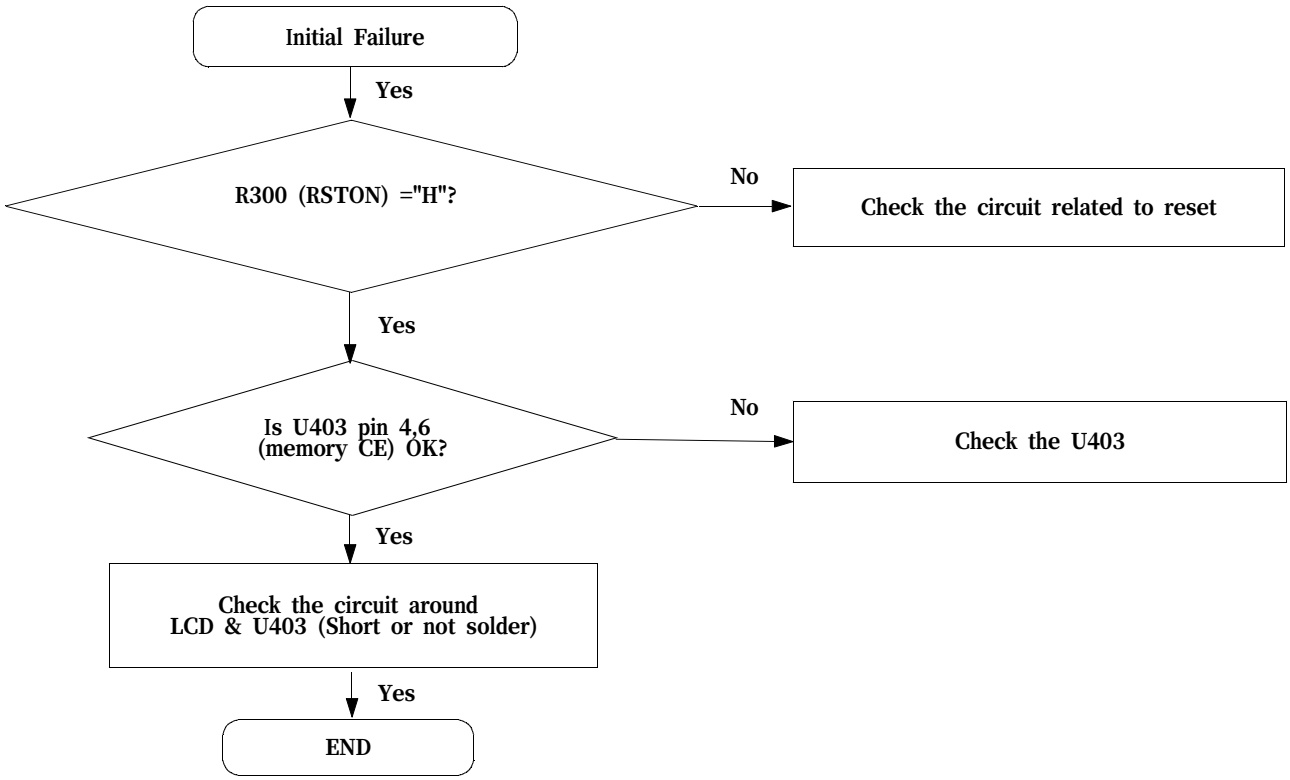
1. Power On



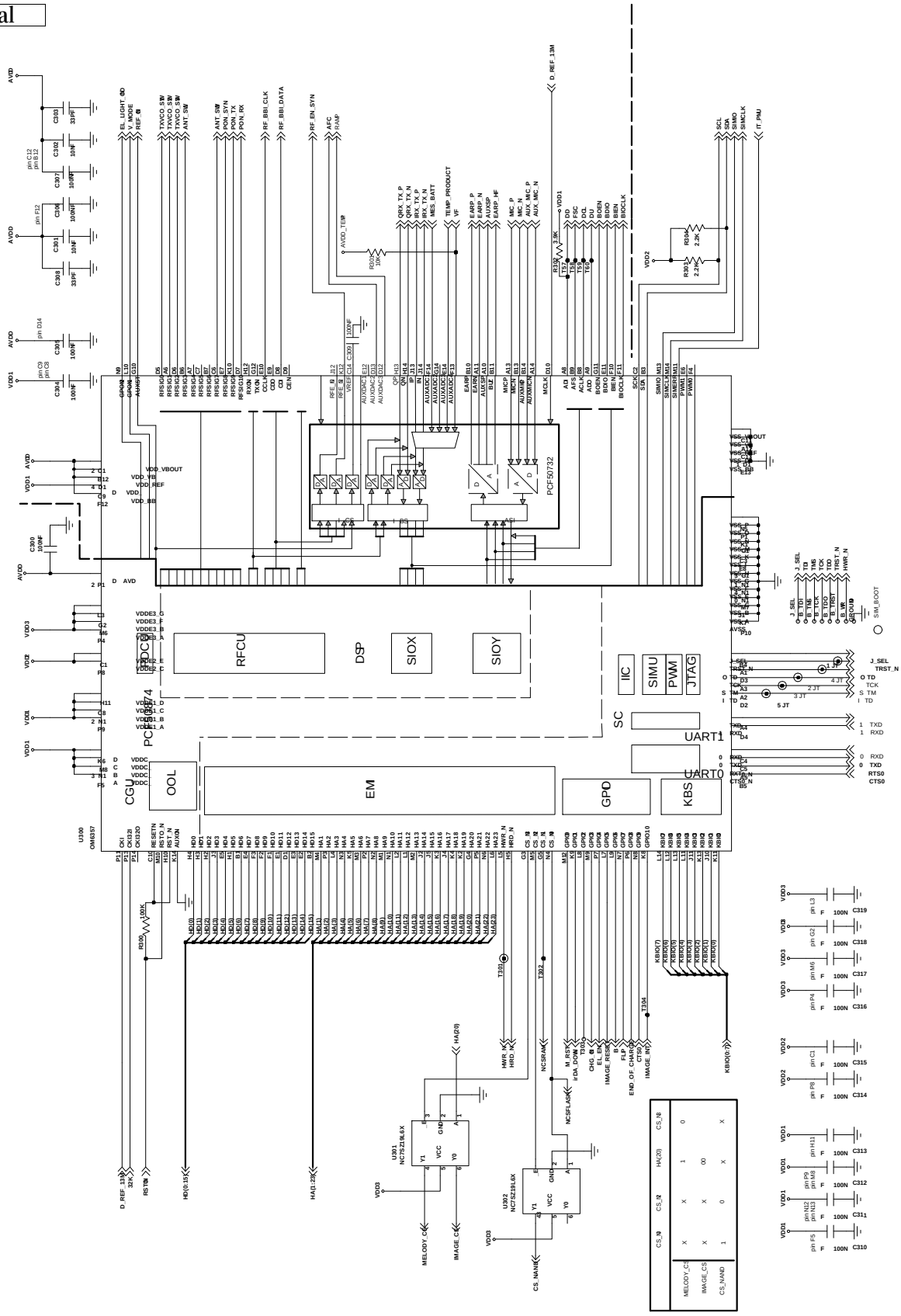
Power On



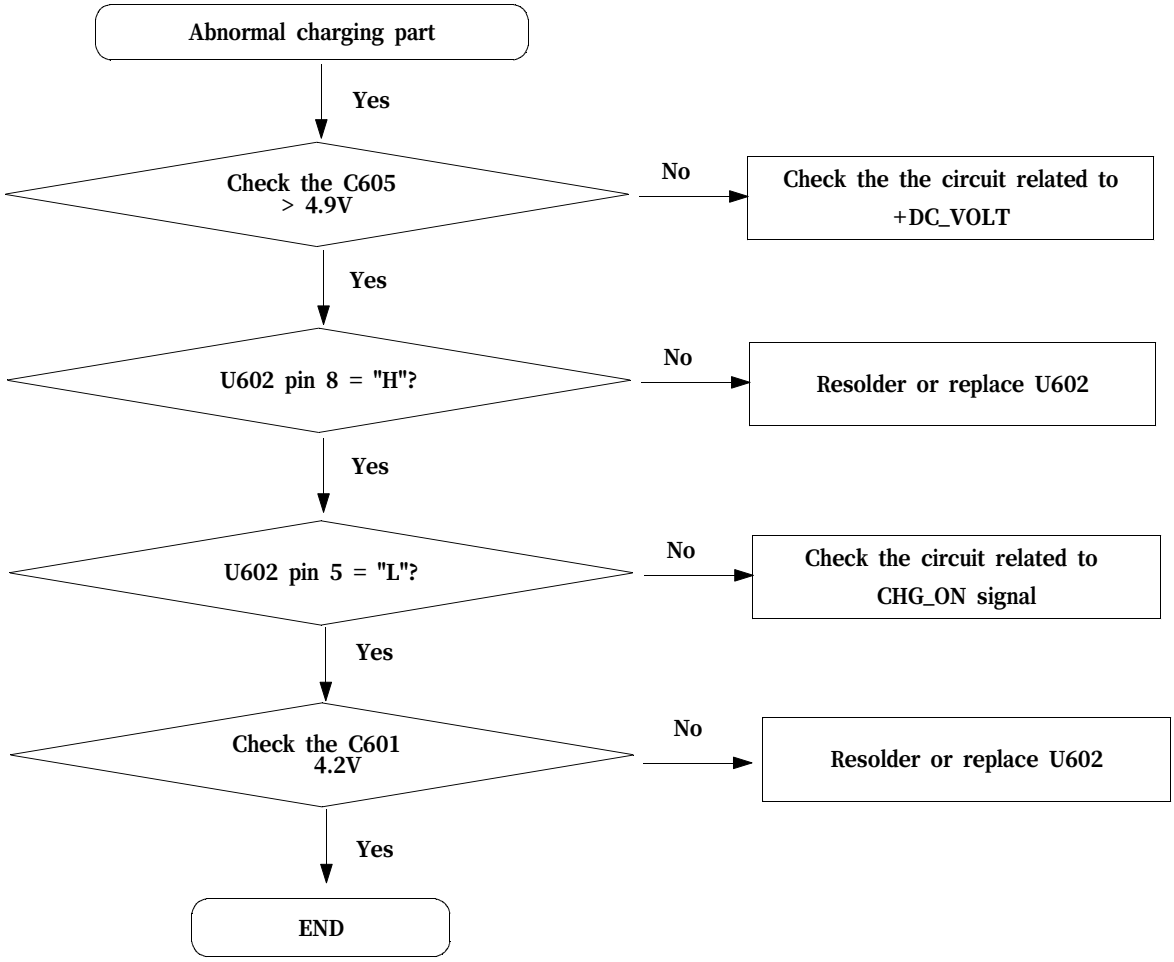
2. Initial



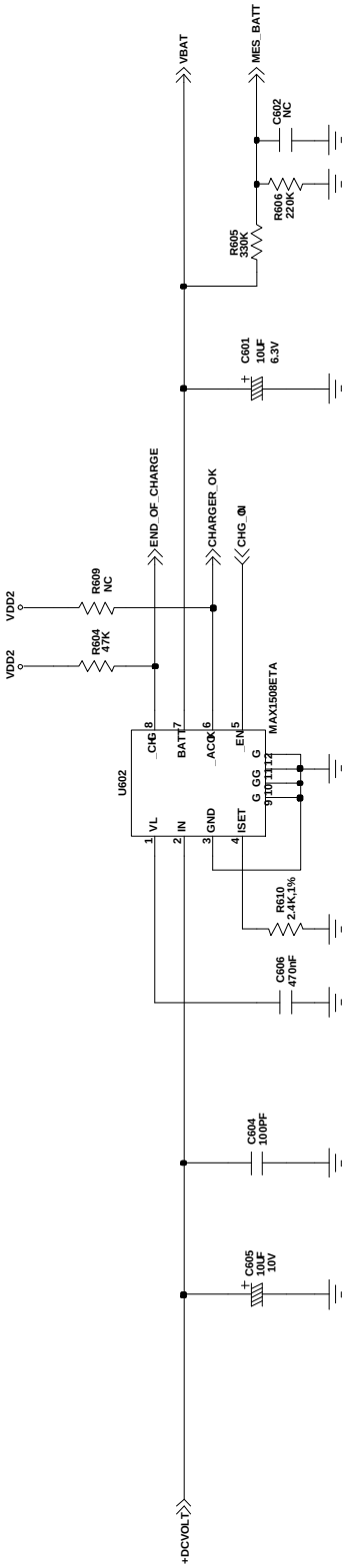
Initial



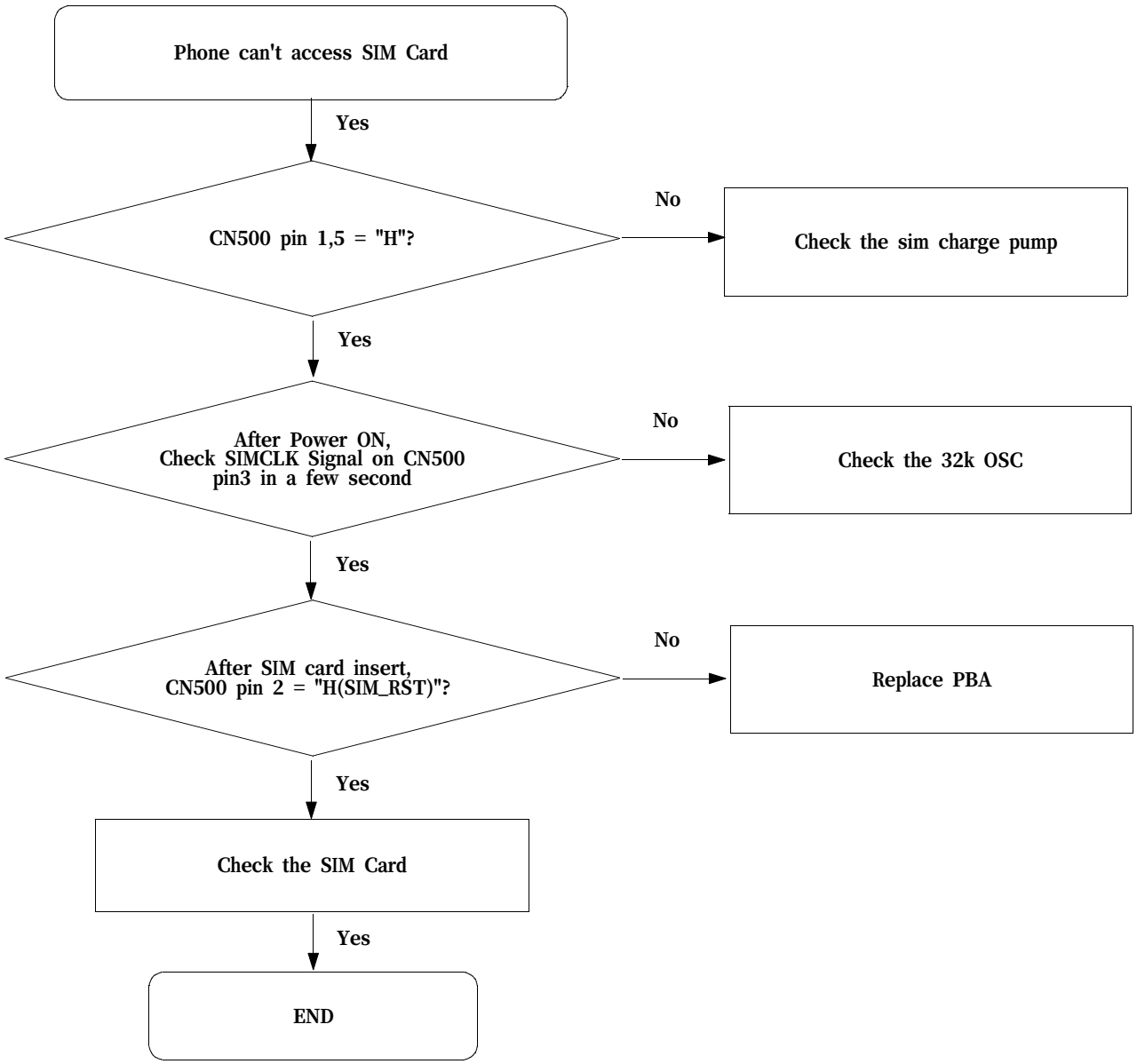
3. Charging Part



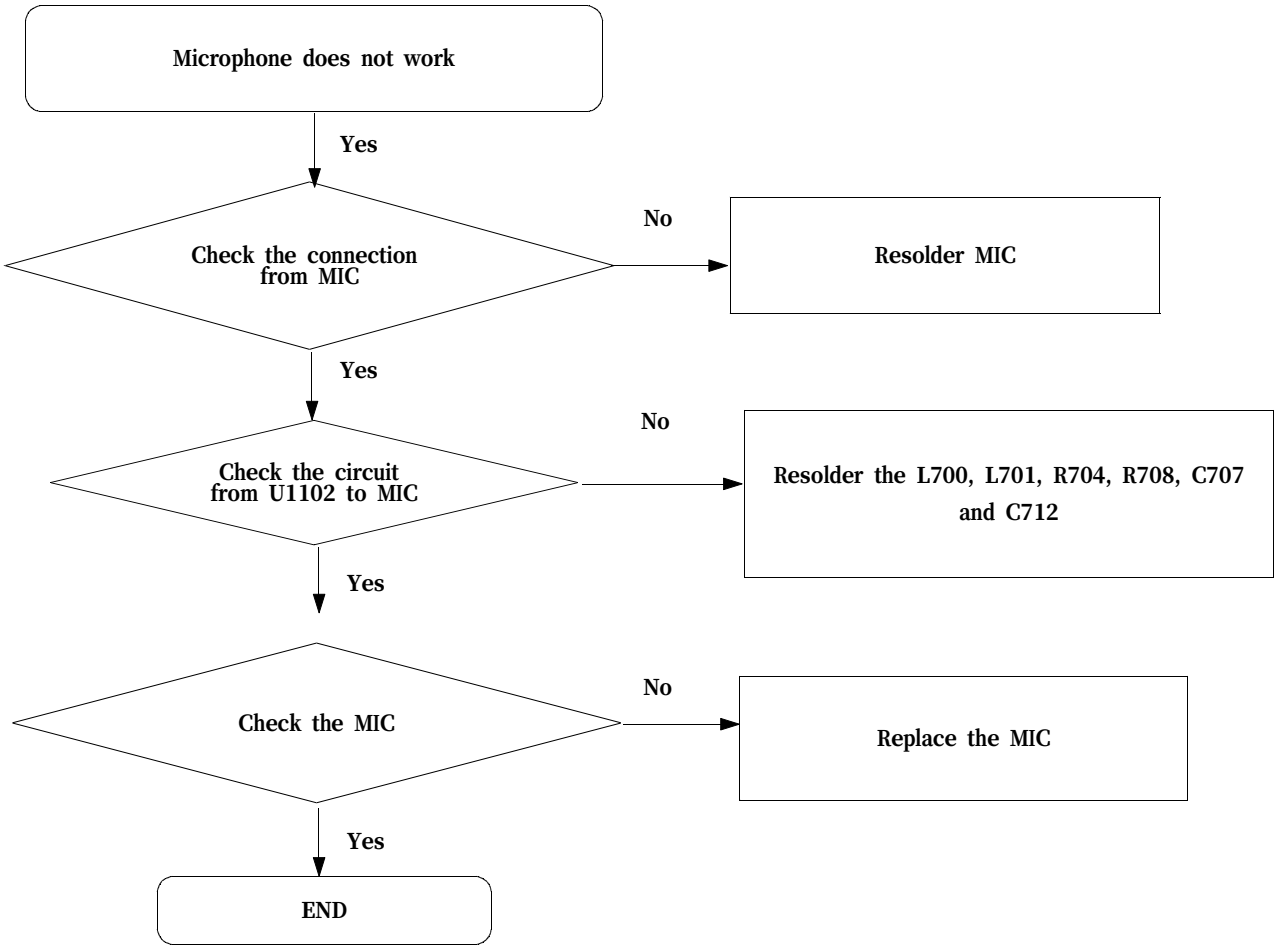
Charging



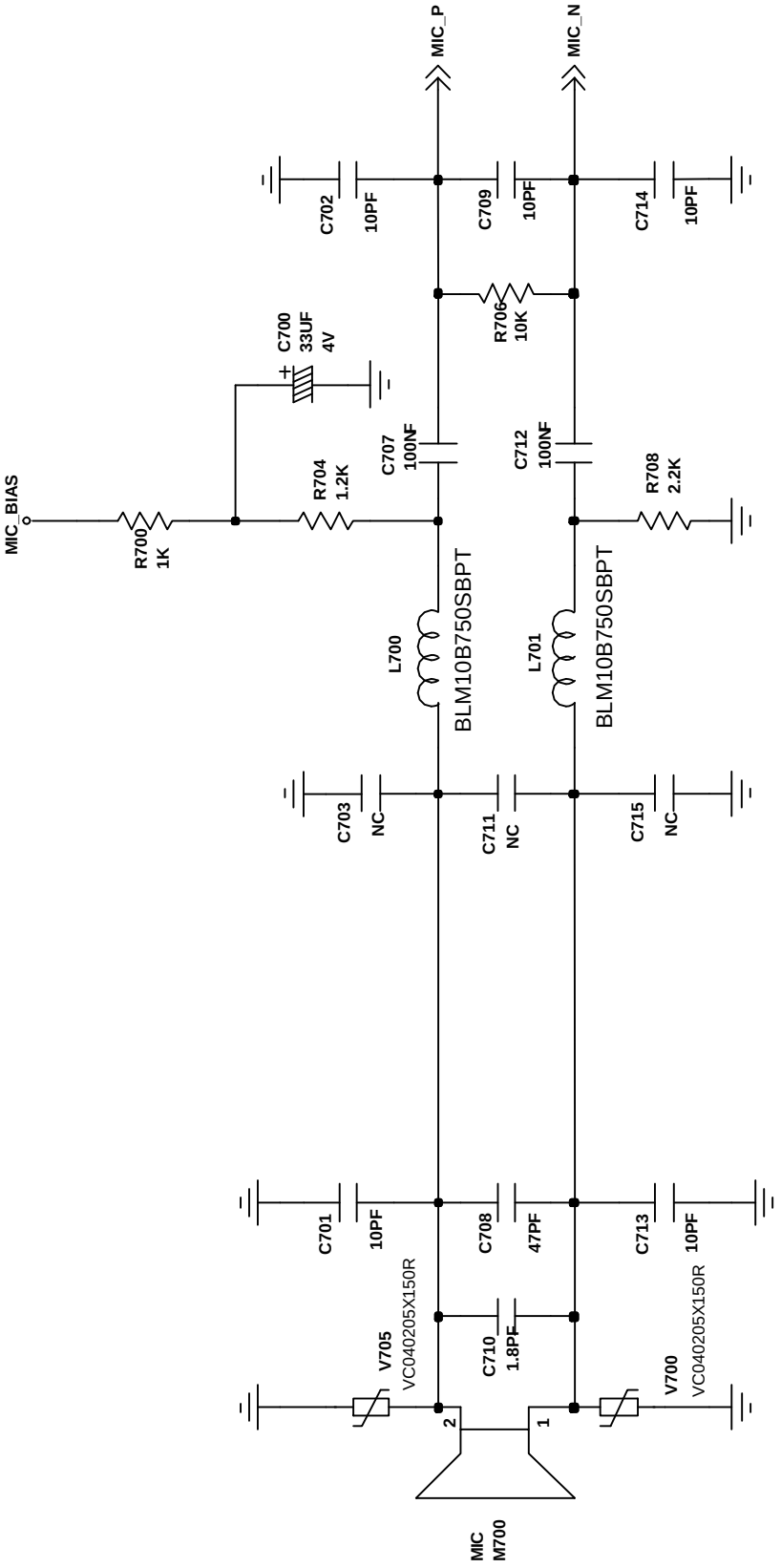
4. SIM Part



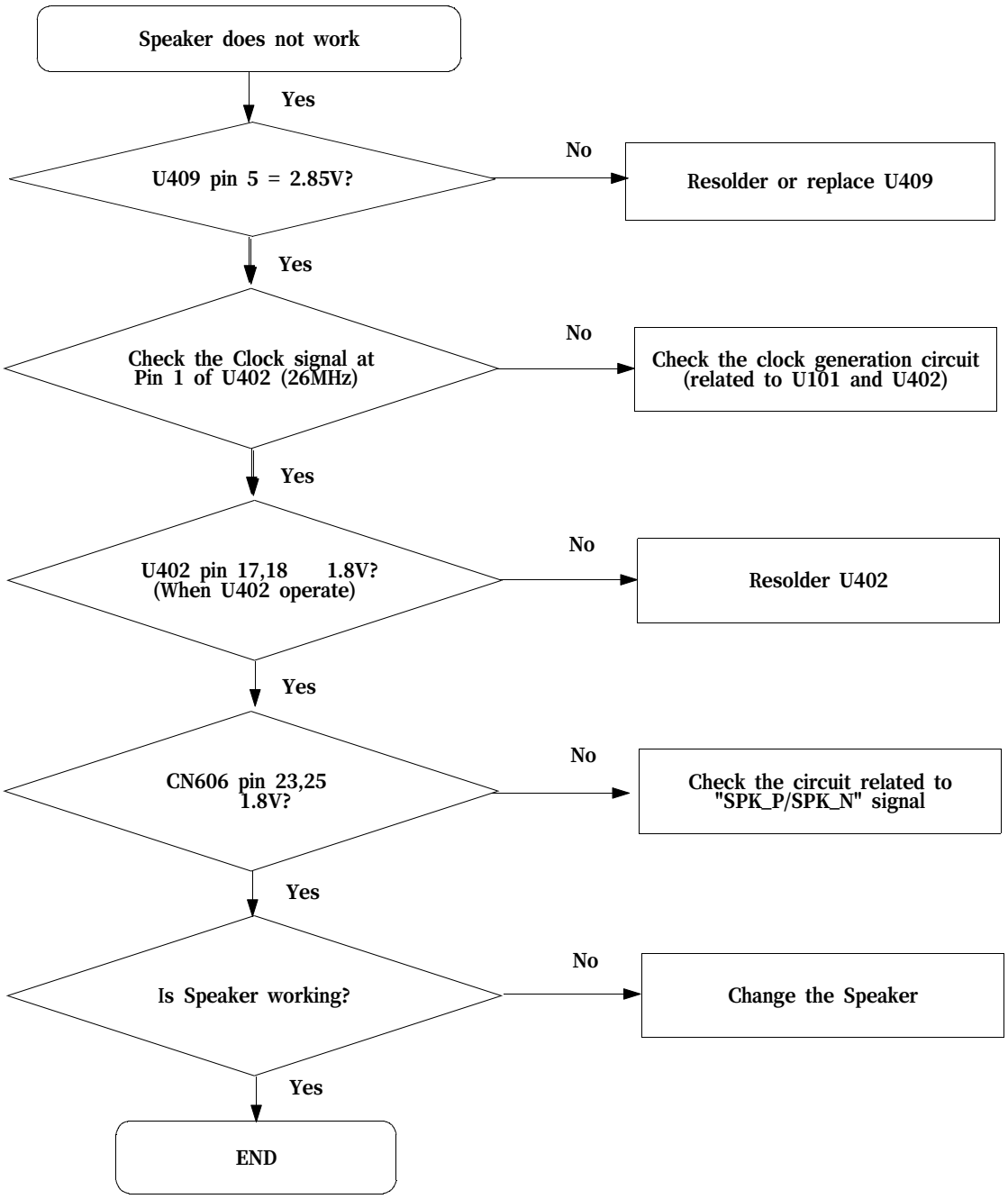
5. Microphone Part



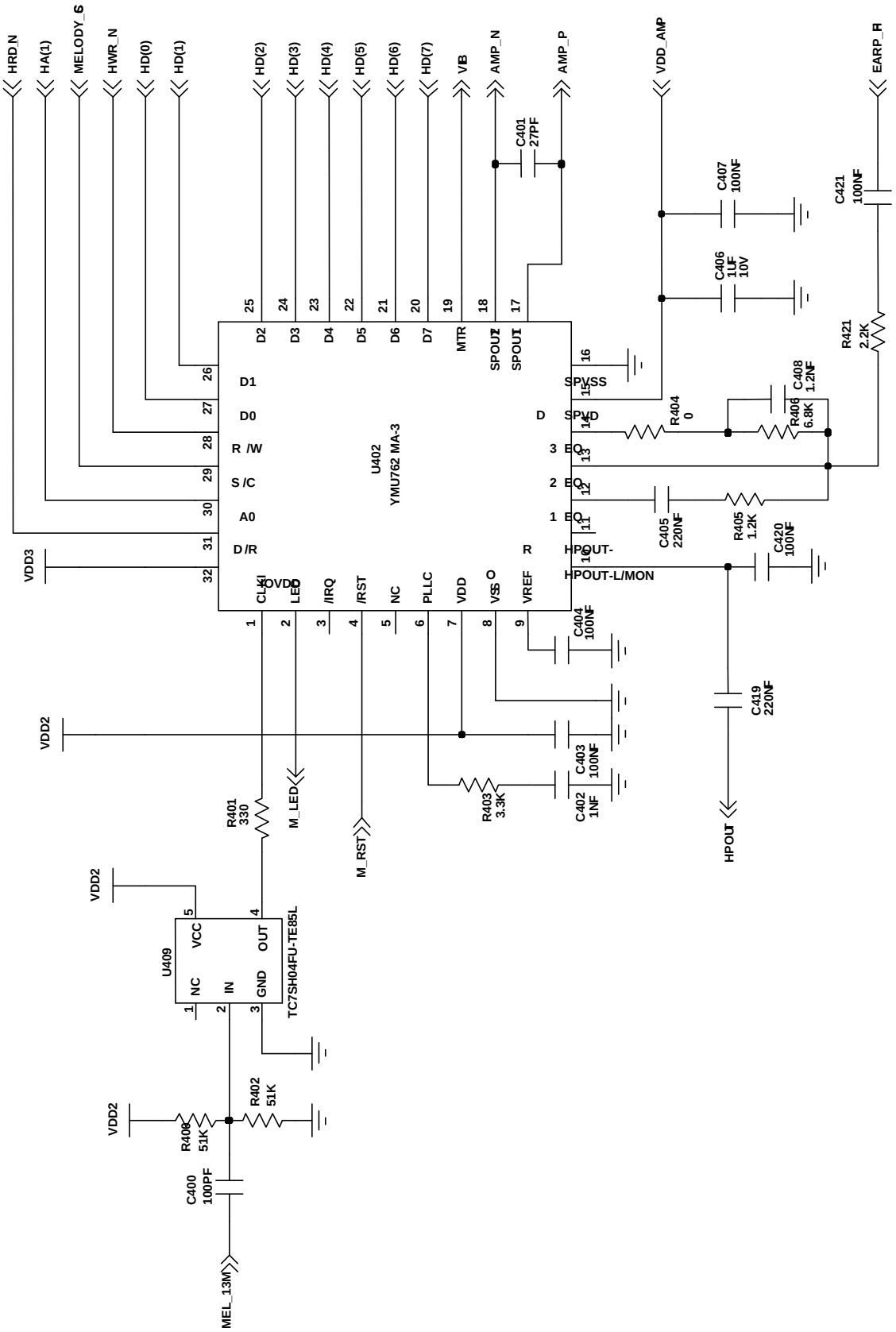
Microphone



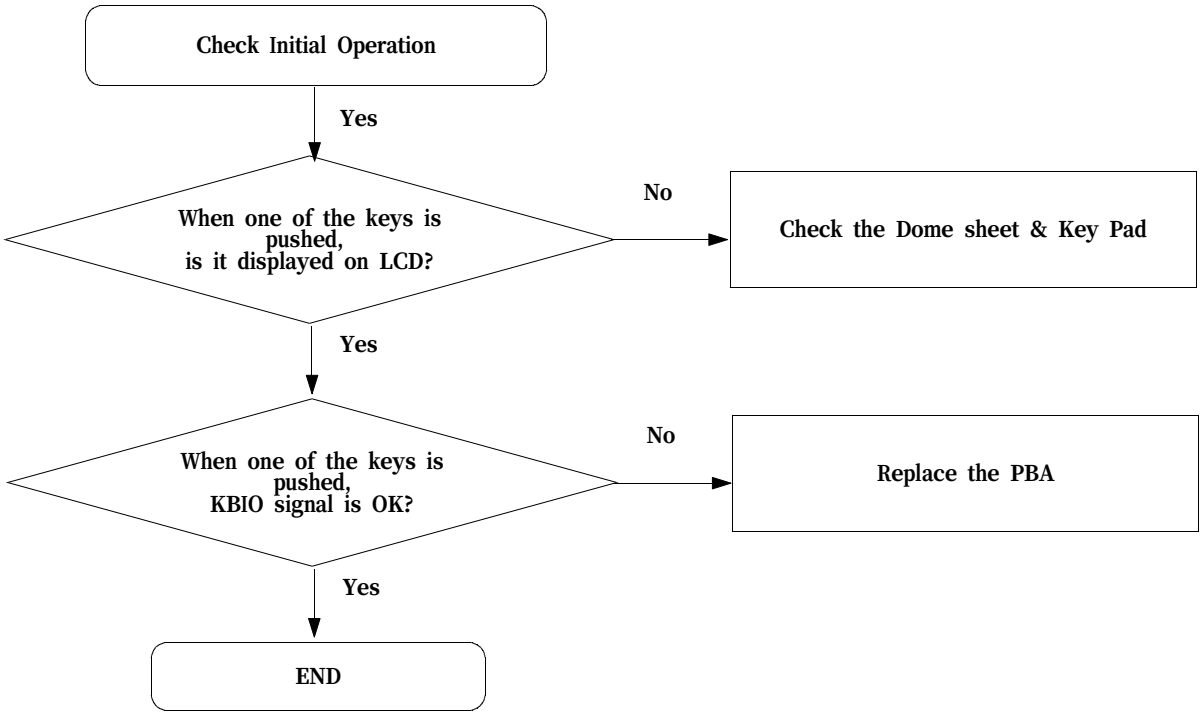
6. Speaker Part(Melody)



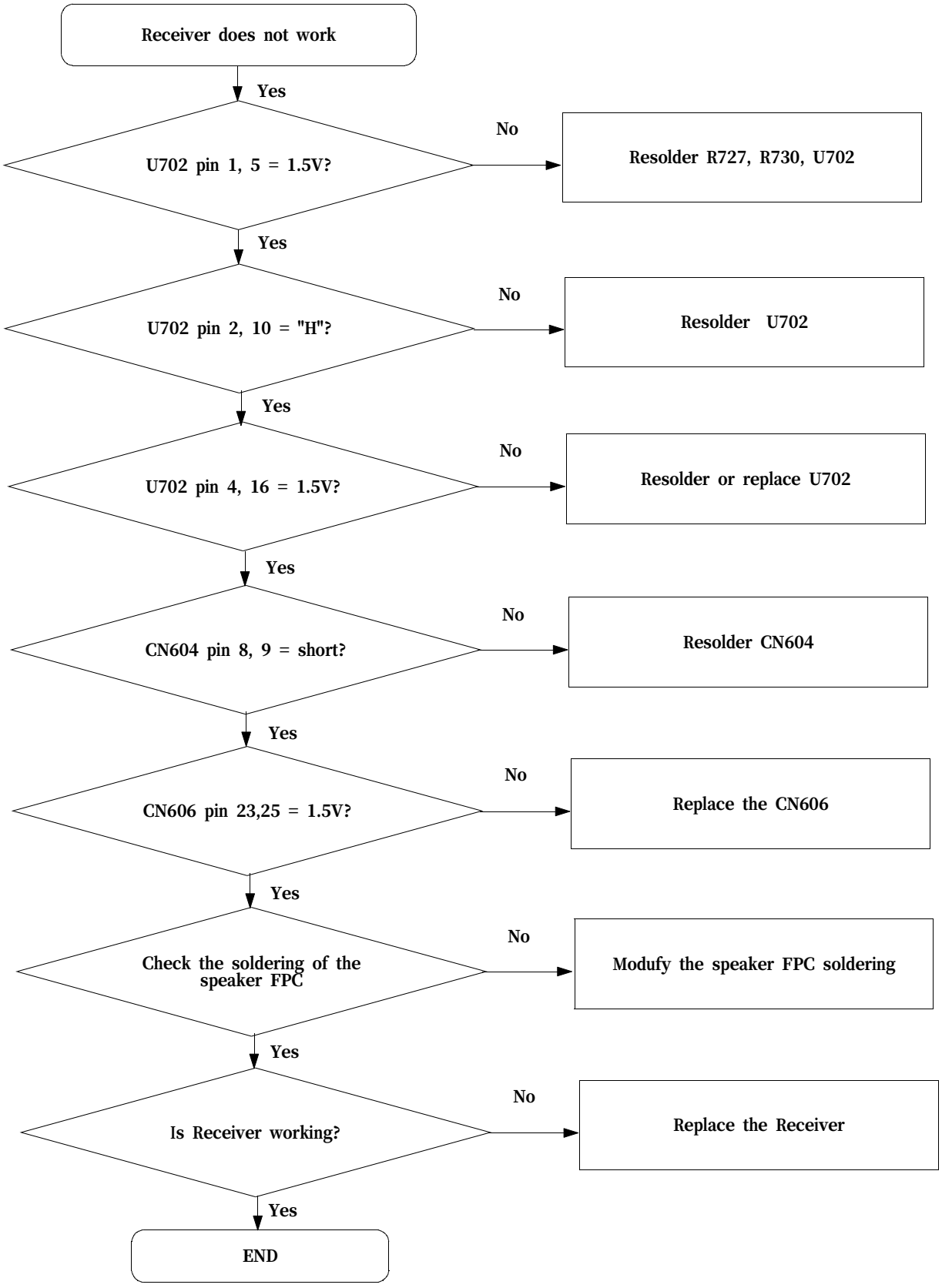
Speaker



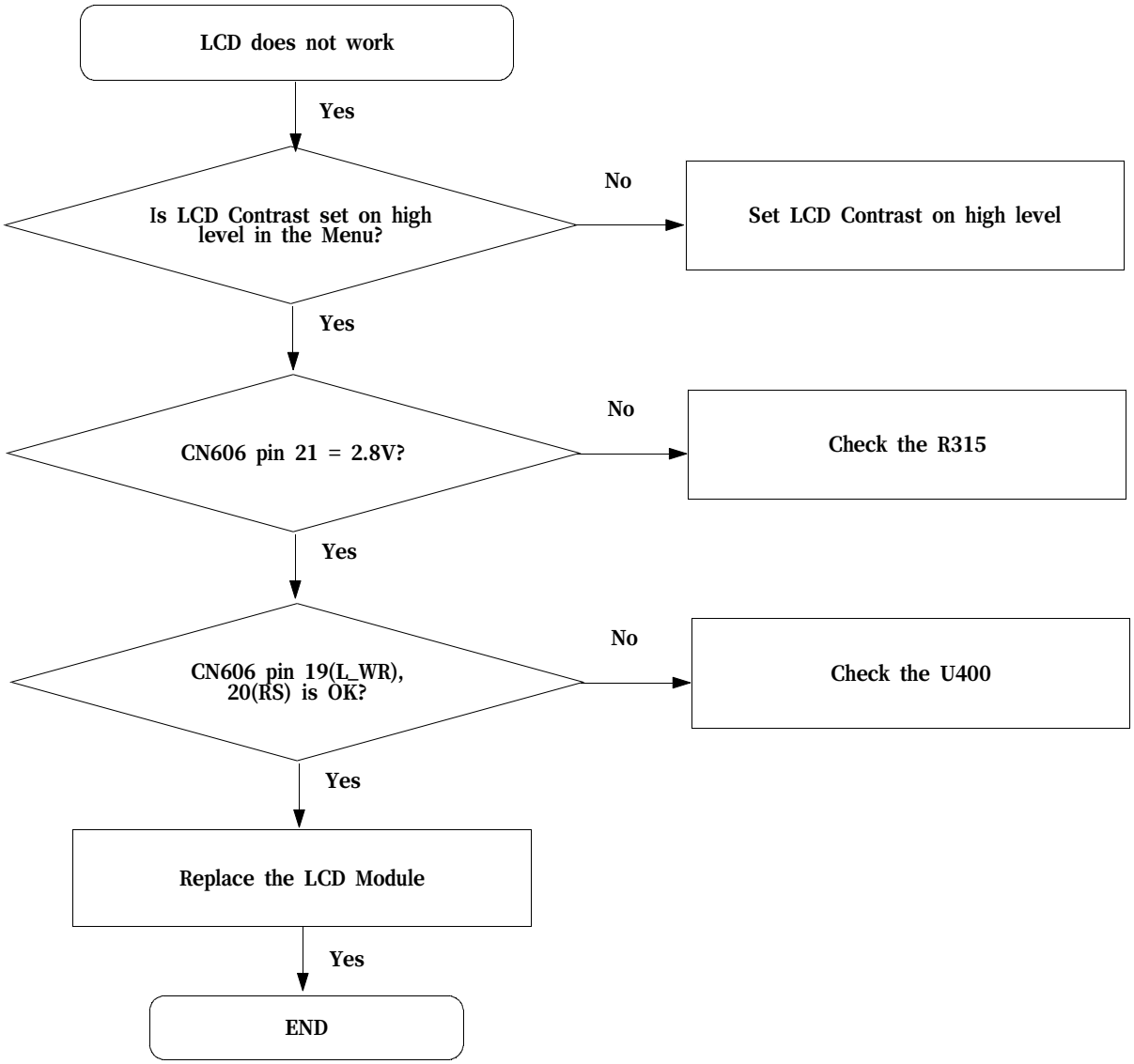
7. Key Data Input



8. Receiver Part

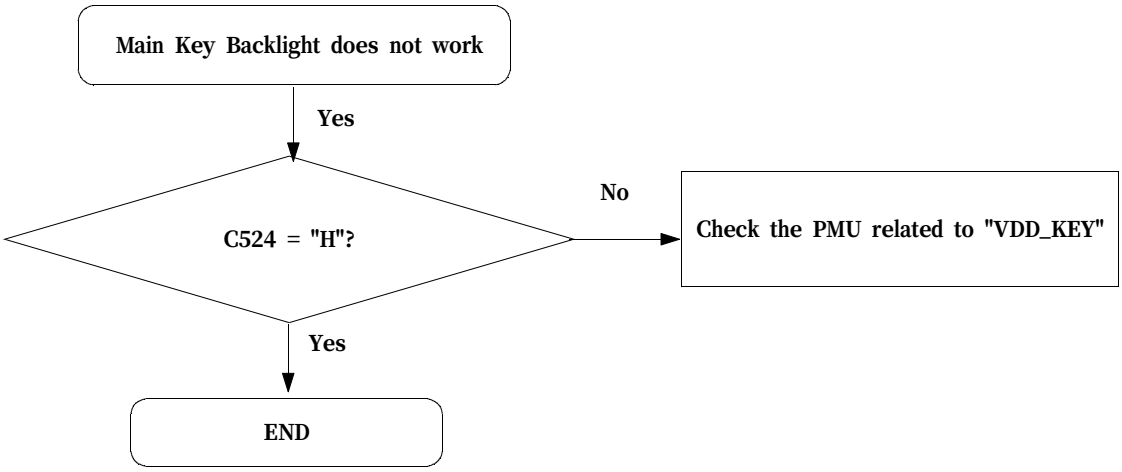


9. LCD Part

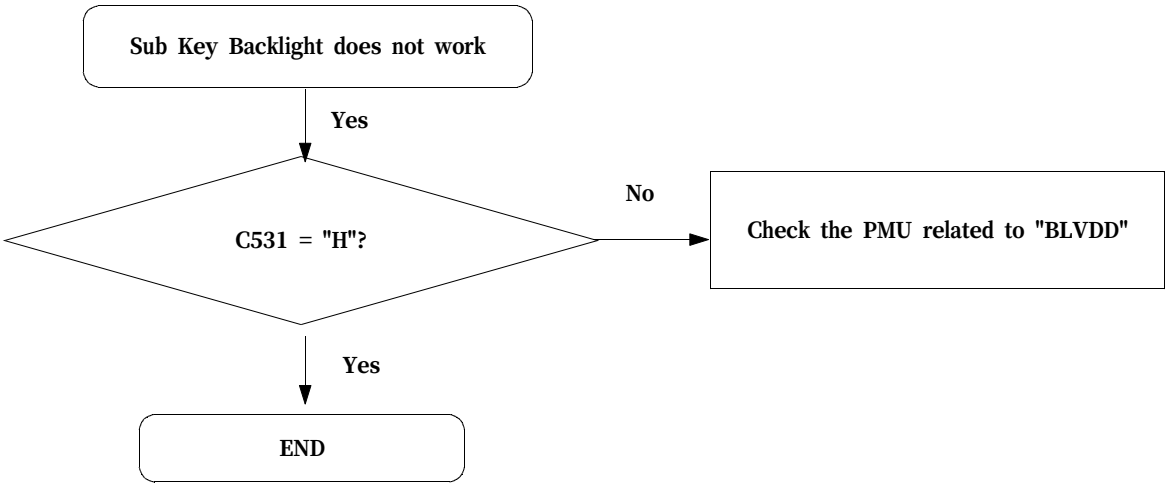


10. Key Back Light

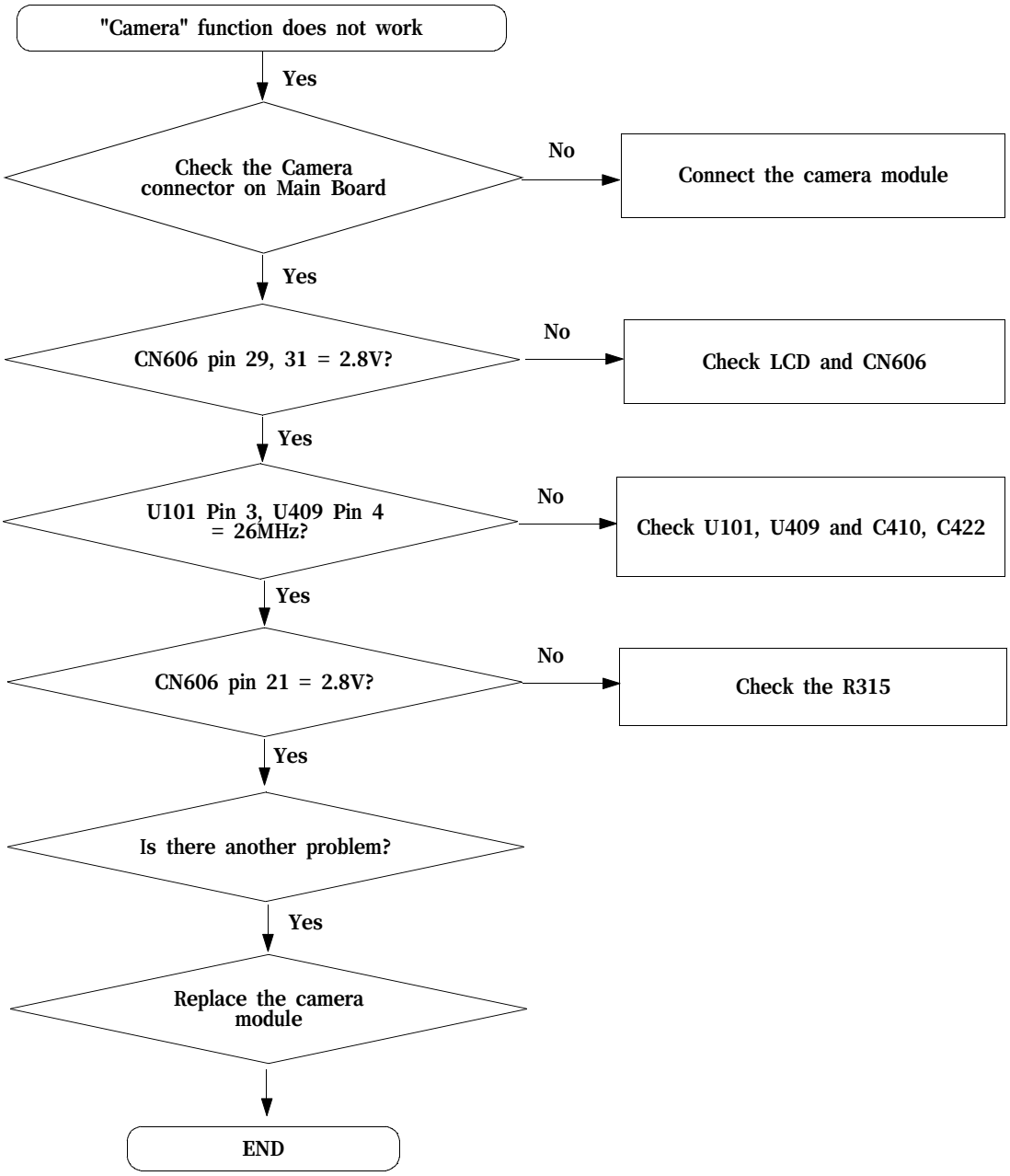
1. Main Key Part



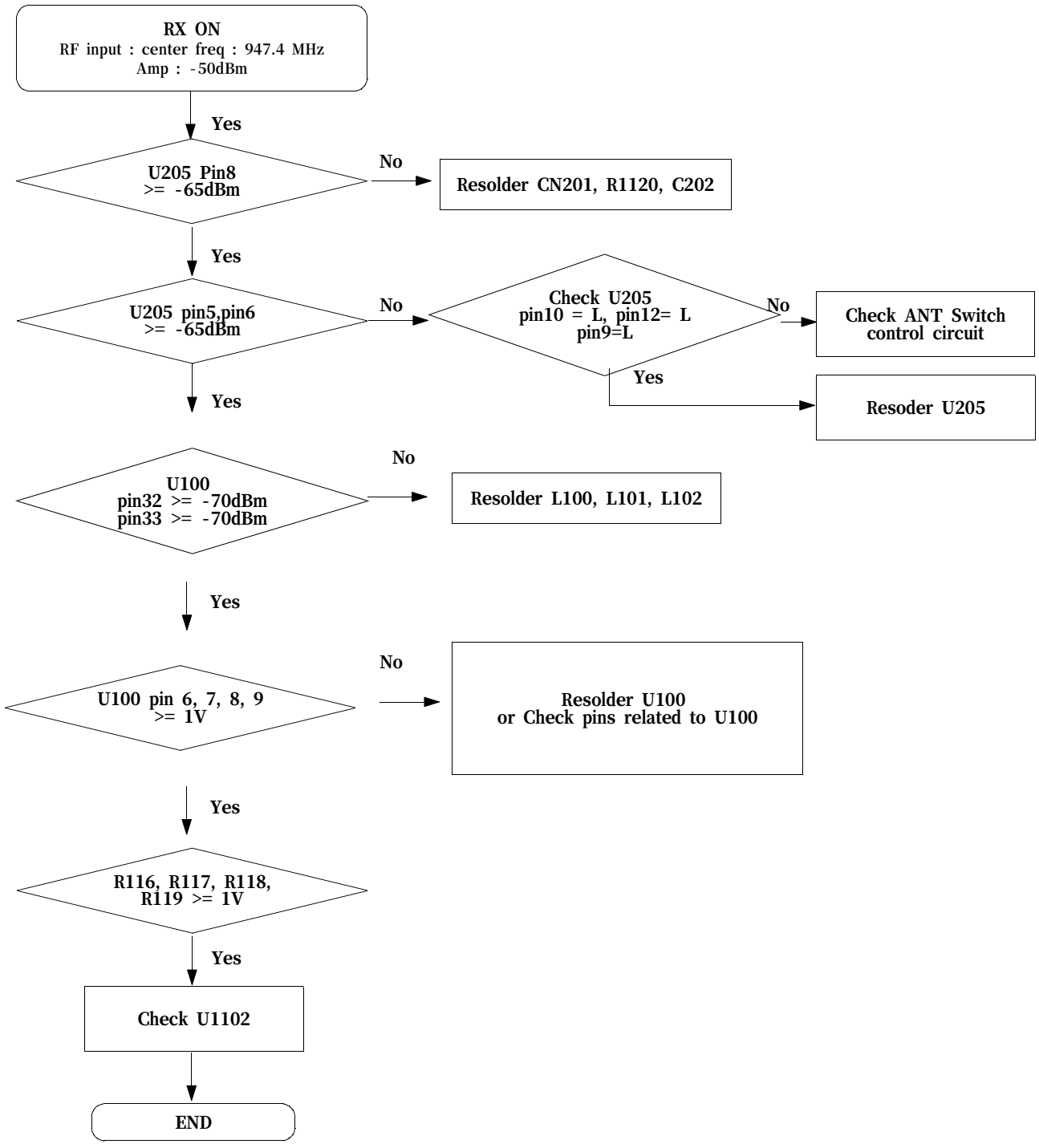
2. Sub Key Part



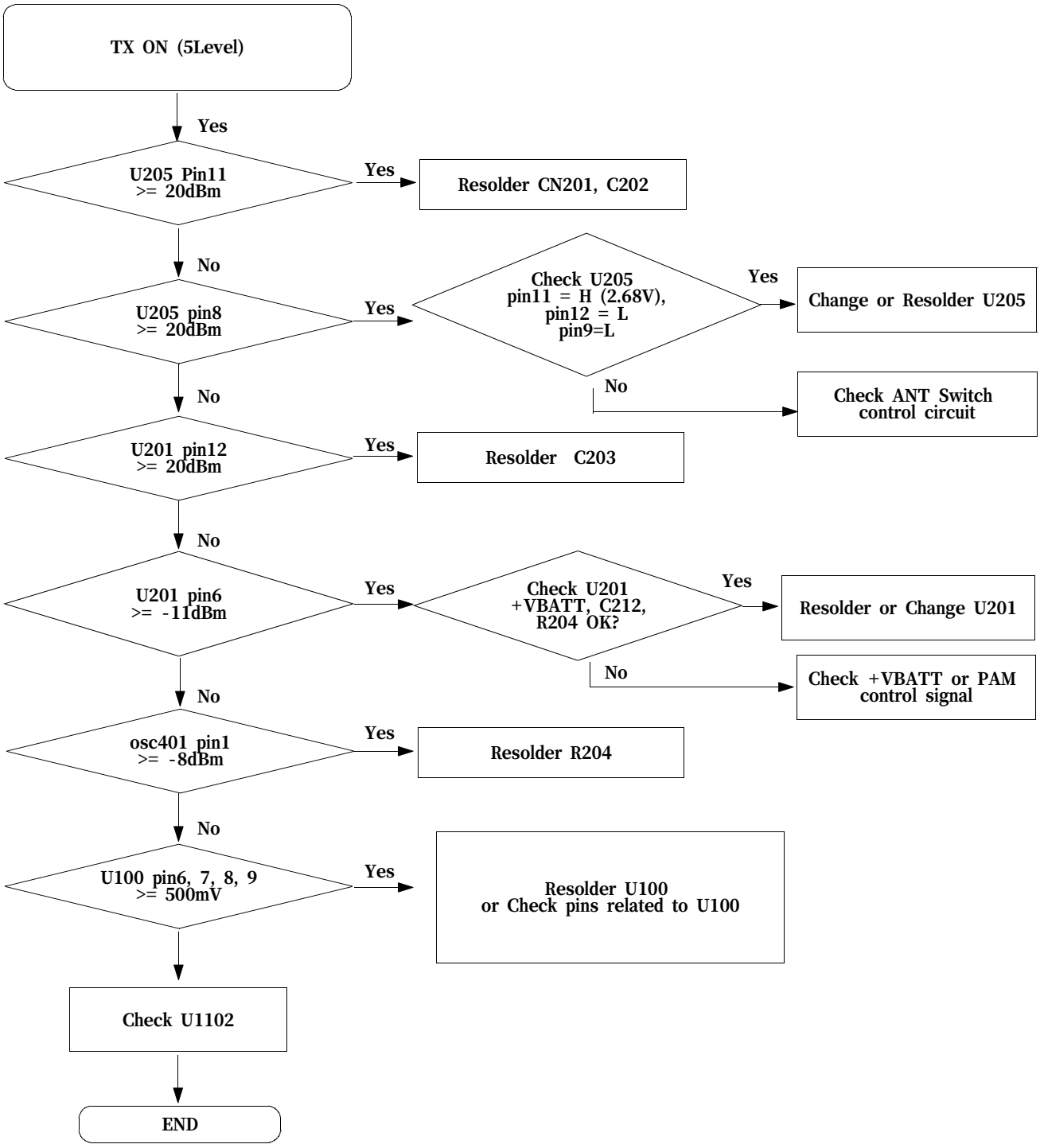
11. Camera part



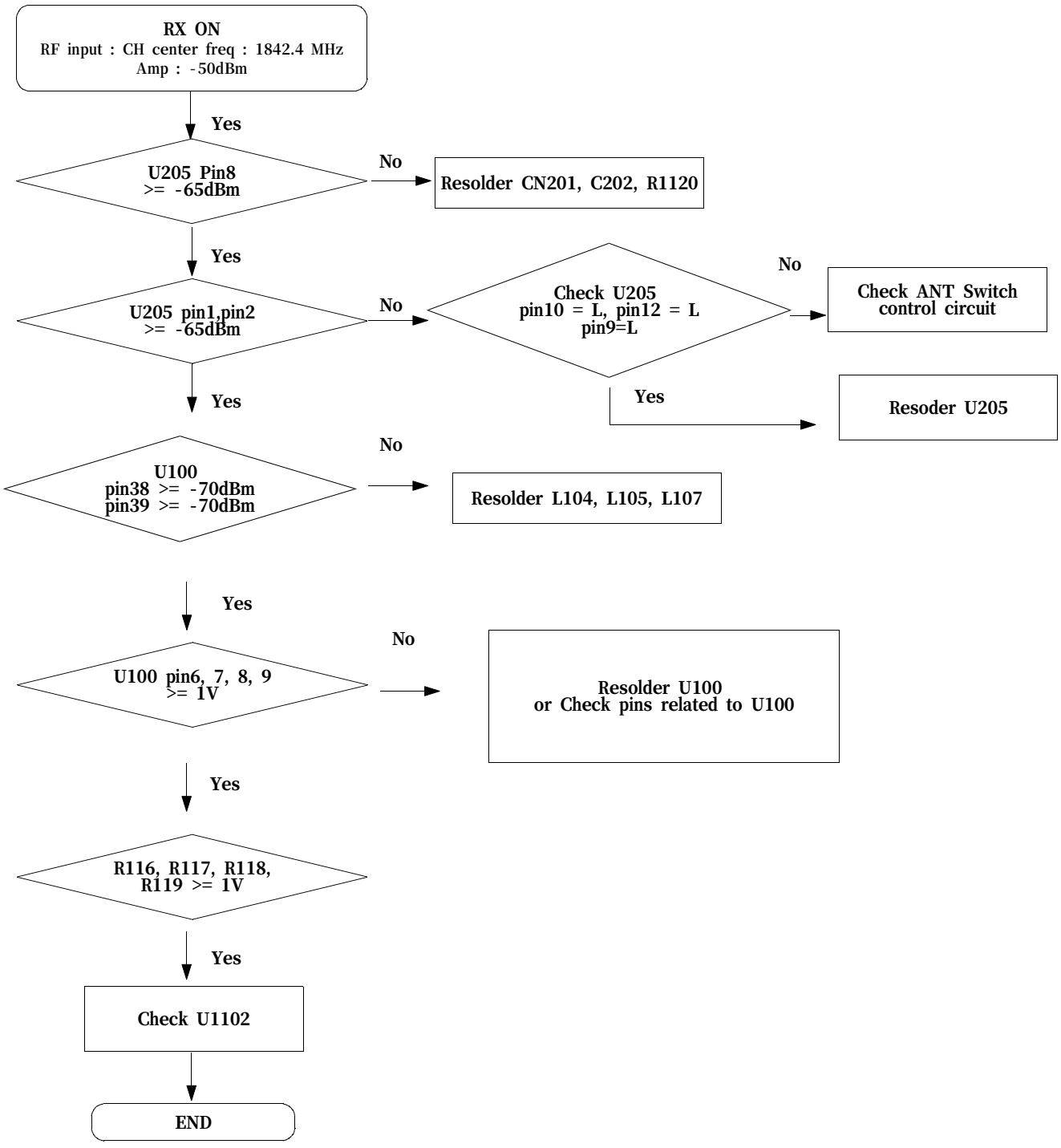
12. GSM Receiver



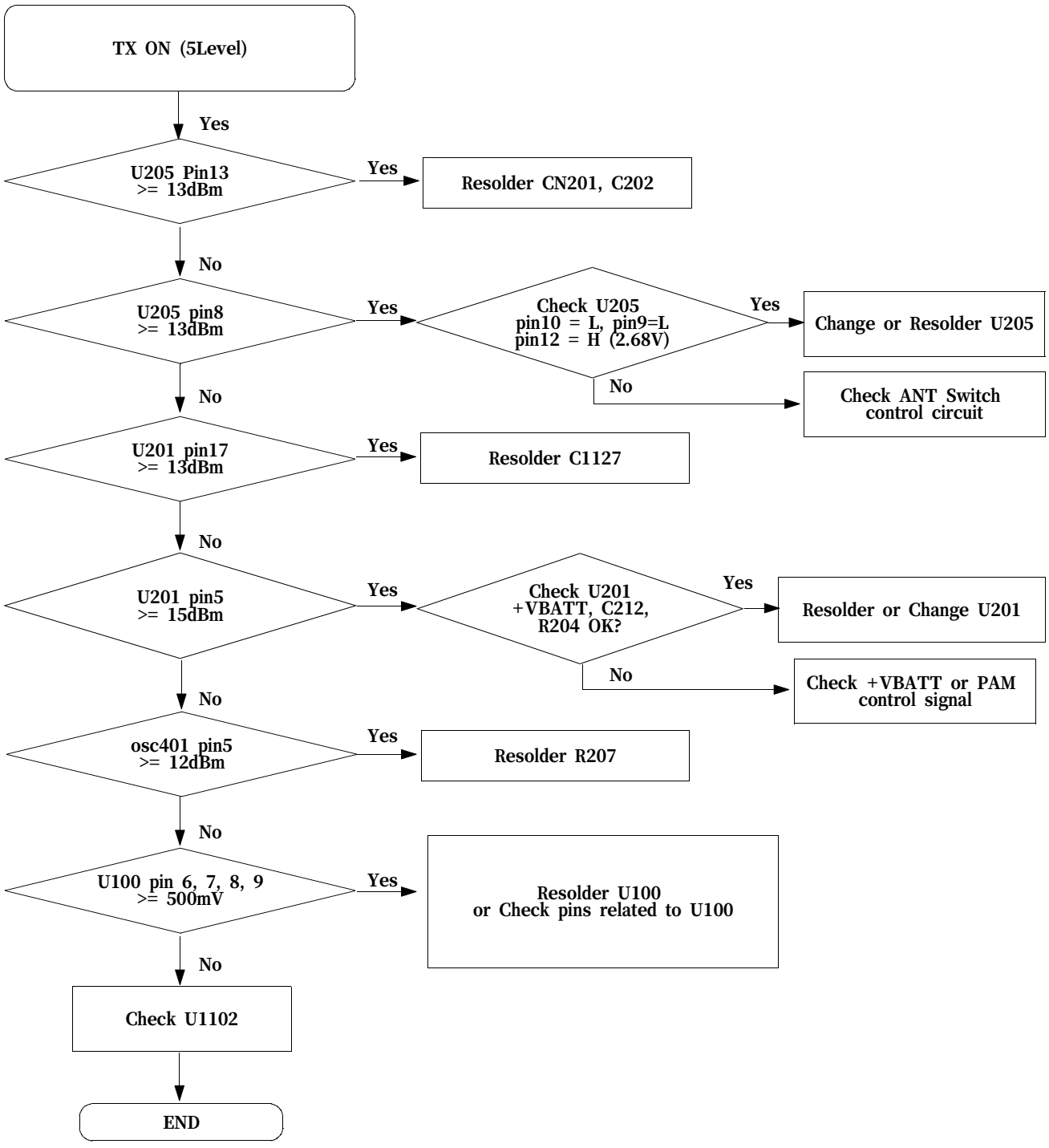
13. GSM Transmitter



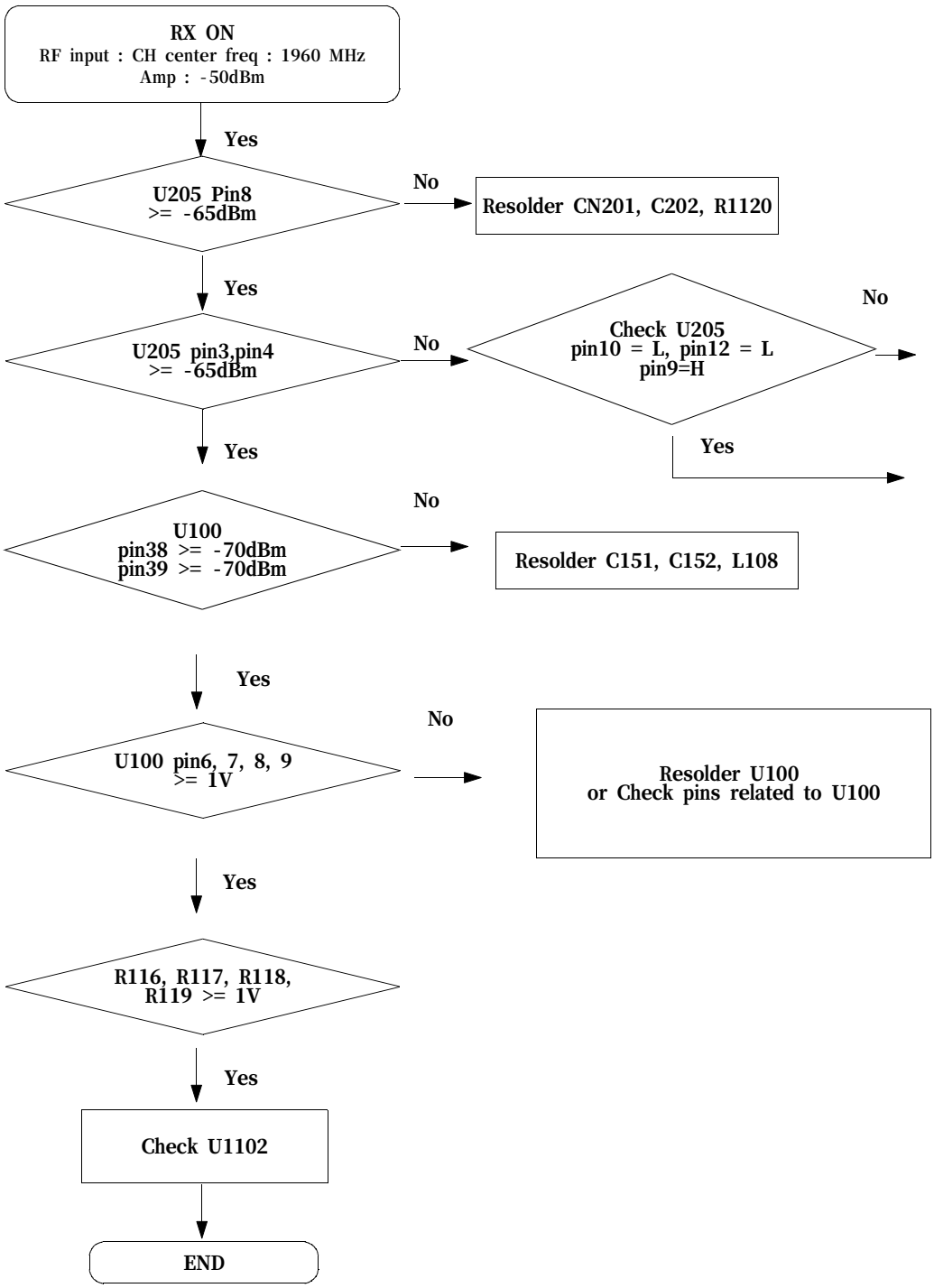
14. DCS Receiver



15. DCS Transmitter



16. PCS Receiver



17. PCS Transmitter