

SAMSUNG

CDMA TELEPHONE SCH-N500

SERVICE *Manual*

CDMA TELEPHONE



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BASIC.

1. General Introduction

The SCH-N500 (Single Mode) phone functions as digital phone working in CDMA(Code Division Multiple Access) mode.

The following standards and minimum performance standards shall be met or exceeded by each subscriber unit.

Air Interface

The Subscriber Unit shall be Single band in compliance with TSB-74.

TIA/EIA IS-125 : Recommended Minimum Performance standards for Digital Cellular Wideband Spread Spectrum Speech Service Option1.

TIA/EIA IS-126-A : Mobile Station Loop back Service Option standard.

TIA/EIA IS-95B : Mobile Station-Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular Systems;for the analog air interface.

CDMA Receiver/Transmitter Specifications and Requirements

The Subscriber Unit shall meet TIA/EIA IS-98C. The Subscriber Unit shall comply with Personal Station Class III.

2. Specification

2-1 General

ITEM	CDMA
Tx Freq. range	824.64 ~ 848.87MHz
Rx Freq. range	869.64 ~ 893.37MHz
Channel Bandwidth	1.23MHz
Channel Spacing	30KHz
Number of Channel	20FA
Duplex Separation	45MHz
Type of Emission	1M25F9W
In/Output Impedance	50 Ohm
Tx Local Freq.	1649.28~1696.74MHz
Rx Local Freq	1739.28~1786.74MHz
TCXO freq.	19.2MHz
Freq. Stability	(F _{RX} -45MHz)+/-300Hz
Operating Temperature	-30deg ~ +60deg
Supply Voltage	3.6V
Size and Weight	STD : 57.0 X 37.0 X 5.1mm 20g 800 mAh

2-2 800MHz CDMA

GENERAL

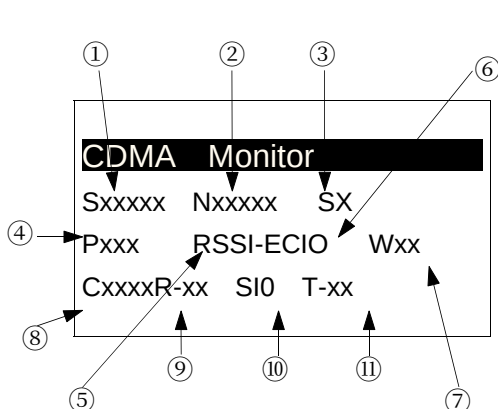
Frequency Range	
. Transmitter	: 824.64 ~ 848.87MHz
. Receiver	: 869.64 ~ 893.37MHz
Channel Bandwidth	: 1.23MHz
Channel Spacing	: 30kHz
Number of Channels	: 20FA
Duplex Separation	: 45 MHz
Type of Emission	: 1M25F9W
Input/Output Impedance	: 50 ohms
Local Frequency	
. Transmitter	: 1649.28~1696.74MHz
. Receiver	: 1739.28~1786.7MHz
TCXO Frequency	: 19.2MHz
Frequency Stability	: (F_{RX} -45MHz) $\pm$ 300Hz
Operation Temperature	: -30°C ~ +60°C
Supply Voltage	: +3.6V

TRANSMITTER

Waveform Quality	: 0.944 or more
Open Loop Power Control Range	
. -25dBm	: -57.5dBm ~ -38.5dBm
. -65dBm	: -17.5dBm ~ +1.5dBm
. -93.5dBm	: +10.5dBm ~ +29.5dBm

2-3 CDMA Debug Display Information

To select debug display mode : Select [Menu] +Press [5] +[*]+press [2] + [1] + [2] + [3] + [5] + [8] + [0] + select [Debug Screen].



① SID : SXXXX

② NID : NXXXX

③ Call Processing State : SX

- 1) S1 : Init State
- 2) S2 : Idle State
- 3) S3 : VC Init State
- 4) S4 : WFO State
- 5) S5 : WFA State
- 6) S6 : Call State
- 7) S7 : Release State
- 8) S8 : OVHD State
- 9) S9 : Originate State
- 10) SA : Page Res State
- 11) SB : ORD Res State
- 12) SC : Reg State
- 13) SD : MSG State

④ Pilot PN Code

⑤ RSSI-ECIO

⑥ -ECIO

⑦ Walsh Code

⑧ Channel Number

⑨ Protocol Revision

⑩ Slot Cycle Index

⑪ Call state : TX PDM Value

Idle, Sleep state :

Tx_Gain_ADJ Accumulator Value

3. Installation

Installing and Removing the Battery

To install, insert the battery into the opening on the back of the phone making sure the plastic tabs on the back are inserted into the matching slots in the phone. Press down until the latchsnaps into place.

To remove, make sure the power is off. Push the battery release latch up completely. Pull and lift the battery away from the phone.

4. Product Support Tools

4-1 General

IMPORTANT INFORMATION Purpose

The Product Support Tool (PST) offers you the ability to interface with the SAMSUNG telephone using a PC. With this tool you can program the phones network system requirements and functionality, data, and download software upgrades. This document supports UniPST version 2.686.

NOTE: This software supports only Windows 2000/XP.

EQUIPMENT REQUIRED

Make sure you have the following equipment setup:

1. Minimum PC configuration: 586 CPU, 64MB RAM, Windows2000/XP, 5MB of disk space free for software upgrade.
2. PST Software with appropriate cable (UART Cable for SAMSUNG phone).
3. UART Port.
4. Power Supply (3.8 V) or Battery.

INSTALLATION

Software

1. Insert the SCH-N500 CD ROM into your CD-Rom drive.
2. Run the file explorer and run the Setup.exe file.

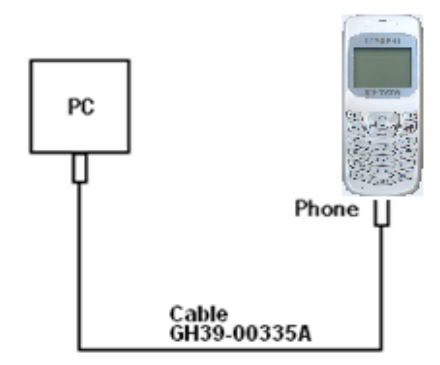
SAMSUNG Phone

Use the following procedure to connect the phone, cable, and PC .

Plug the female end of the DM Cable into the 16550 card.

Pull the black rubber connector away from the socket at the base of the phone.

Plug the special connector on the cable into the socket at the base of the phone.



4-2 PST (Product Support Tool)

4-2-1 Getting Started

MAIN MENU SCREEN

1. Double Click on your "Samsung PST for PBTL (SE)"
2. Select SCH-N500

The Main Menu Screen shows the basic tasks that are available.

CAUTION: DO NOT attempt to program phone with a low battery.

PST SETUP

UniPst supports SAMSUNG portable telephone. You can select UART port.

4-2-2 Operation Procedure

Service Programming

setting correct com port.

Read Data from File

Click "Open mmc" icon to select the name of a file whose extension is "mmc". The values will be read from the named file, and will initialize the parameter values seen on the Service programming screen

Read Data from Phone

Click Read from the Phone icon to upload the current programmable parameters of the phone. The values are read from the phone, so the phone must have the power ON and be properly connected to the PST.

NOTE: To actually view the data you need to go to the Edit Items screens.

Edit Items

Click this icon to edit Number Assignment Module (NAM) items or UI items.

1. General : Slot Cycle Index, Service Code
2. NAM1
3. NAM2

Edit UI Items

1. System, Sound, And/Phone : Sound

Save Data to File

Click this icon to save the current parameters to a file. Once you enter a filename, Click <OK> button to write all current parameters to that file. This way the same information can be downloaded into multiple phones.

Write to Phone

Click this icon to write the selected parameter values to the phone. Writing the selected values to the phone may take up to a minute. If there are dependencies in a field you can make all the changes in the proper fields and download the information all together.

If you intend to use this write to Phone feature, it is recommended that you do a "Read Data from Phone" first, and then make the changes, so that nothing gets inadvertently overwritten.

NOTE: DO NOT TOUCH THE PHONE WHILE WRITING IS IN PROGRESS.

Software Download and Upgrade Screen

1. Connect PC and SCH-N500 with UART cable
2. Run Universal PST.
3. Select DownLoad Mode tab.
4. Click Bin icon to load Image file.
5. When the downloading process is finished, the PST shows "Downloading completed!!" and the SCH-N500 reboots automatically.

NOTE: DO NOT POWER OFF WHILE THE PHONE IS BEING DOWNLOADED!

5. Circuit Description

5-1 Logic Part

CPU(U100:MSM6000-208FBGA)

5-1-1 Power Supply

Press "END/①" key to turn on the phone and then the V_BAT signal will be connected to ON_SW, which turns on the inner regulator (MSMA_2.65V, MSMP_2.85V) of U204 (RC5T623)

The V_BAT applied to ON_SW will change ON_SW_SENSE signal from HIGH to LOW. This will allow MSM6000 (U100) to send out PS_HOLD (logical HIGH) to turn on the inner regulator even after the END/①key is released.

The regulated voltage (MSMP_2.85V) is used in the digital part of MSM6000, Memory, and LCD. The regulated voltage (MSMA_2.65V) is used in analog part and MSMC_2.80V used in core part of MSM6000. The regulated voltage (RFTX_2.60V) is used in the TX RF part. The regulated voltage (RFRX_2.60V) is used in the Rx RF part. The regulated voltage (MOTOR_3.0V) is used in motor part. The regulated voltage (PAVREF_2.90V) is used in WS1101 (U447). The regulated voltage (U209) LED_3.3V is used in LED.

5-1-2 Logic

The logic part consists of the internal CPU (MSM6000) and the extra memory composed of SRAM and FlashROM. The MSM6000 receives 32.768KHz TCXO clock signal and controls the phone as a whole. The major components are as follows:

- CPU : ARM7TDMI CPU core,
- FROM:U102(K5A3281CTM) 32Mbit Flash ROM, MCP.
- SRAM:U102(K5A3281CTM) 8Mbit SRAM, MCP.

ARM 7TDMI microprocessor is used for the main processing. The CPU controls all the circuitry. The MSM6000 derives all of its internal clock sources from two clock inputs, TCXO (19.20MHz) and XTAL (32.768KHz). The clock of 32.768KHz is used for sleep. This is equipped with the ARM 7TDMI CPU core, CDMA, DFM block, vocoder, general purpose interface, and other interfaces, and is one of the most important components of the CDMA cellular phone.

FROM and SRAM (U102:K5A3281CTM,MCP)

Memories are composed of 32Mbit FROM and 8Mbit SRAM. 32Mbit Flash ROM is used to store the FONT data and terminal's program. Using the down-loading program, the program can be changed even after the terminal is fully assembled. 8Mbit SRAM is used to store the internal flag information, call processing data, and timer data.

KEYPAD

For key recognition, key matrix is setup using SCAN(0:6) and KEYSense(0:2) of input port of MSM6000. 12 backlight LEDs and back-light circuitry are included in the keypad for easy operation in the dark.

LCD MODULE

The LCD module is a 128 X 64 dots and 1 fixed icon. The LCD contains a controller which will display the information by 8-bit data from the MCU. It also contains a DC-DC converter for contrast adjustment and LCD reflector to improve the display efficiency. An internal back-light circuitry and EL back-light are used for easy operation in the dark.

5-1-3 Baseband

MOBILE SYSTEM MODEM (MSM6000)

The MCU equipped with the ARM 7TDMI CPU core is an important component of the CDMA cellular phone. The MSM6000 comes in a 208-Ball FBGA Package.

MICROPROCESSOR INTERFACE

The interface circuitry consists of reset circuit, address bus(A0-A22),data bus(D0-D15),and memory controls (LB, UB, WE, OE, CS[1S, CE[F, CS2S, RY[BY)

CODEC

The MSM6000 (U100) integrates an audio voice band CODEC into the Mobile Station Modem. The integrated CODEC contains all of the required conversion and amplification stages for the audio front end.

Clock

- Modem clock : 19.20MHz. This clock signal is used for ARM 7TDMI
- Sleep clock : 32.768KHz. This clock signal is used for sleep.

RFT6122, RFR6122 AND MSM INTERFACE

A. CDMA Data Interface

- TX_IP, TX_IM, TX_QP, TX_QM (U400 pins 29, 30 / 27, 28): Differential analog input for I and Q component used during CDMA mode.

- RX_IP, RX_IM, RX_QP, RX_QM (U300 pins 28, 27 / 25, 26): RX analog baseband output for I and Q component used during CDMA mode

B. RF Interface

- TX : TX_AGC_ADJ (U400 pin 21) port is used to control the TX power, TX_ON (U100 pin B12) signal used to control RFT6122
- RX : SBI_DT, SBI_CK_SBI_ST (U300 pins 3, 4, 5) lines are used to control the RX gain and TRK_LO_ADJ (U100 pin D15) is used to compensate the TCXO clock.

5-1-4 Audio Part

ALERT TONE AND MELODY DRIVING CIRCUITRY

The MSM6000 integrates an audio voiceband Codec into Mobile Station Modem. The integrated Codec contains all of the required conversion and amplification stages for the audio front end. The Codec operates as a 13bit linear Codec with the

transmit (TX) and receive (RX) filters designed to meet ITU-TG.712 requirement. The CODEC contains the software controller amplifier for both the receiving and transmitting sections. Also, the vocoding schemes used will be IS-127 EVRC. The EVRC vocoder is based in the MSM internally.

A speaker generates alert tone and melody. When the MSM (U100) receives the data, it generates alert tone and melody. Ringer signal generated in MSM6000 is intended to drive a speaker.

KEY TONE GENERATOR

The CODEC data out from the MSM6000 is converted to DTMF signal by TONE generator of internal CODEC, is then amplified by the internal audio amplifier to be sent to the speaker unit.

TX AUDIO PATH

The voice signal from the microphone is inputted to the internal CODEC. The voice signal is then amplified by the internal amplifier and is converted to PCM data to be outputted to the MSM as 13bit data. This data is then processed by the MSM (U100)'s internal.

RX AUDIO PATH

The PCM data from the MSM (U100)'s internal is inputted to the internal CODEC and the data will be decoded by the internal DAC and audio levels are adjusted by the amplifier. The final audio is then sent to the audio receiver.

5-2 RF Part

5-2-1 Transmitter (For CDMA (800MHz))

ANTENNA

Antenna sends the signal to the base station and receives the signal from the base station.

DUPLEXER

The duplexer (F401) passes RF signal with the frequency of 836.49 ± 12.5 MHz through power amp output to antenna, and receives RF signal with the frequency of 881.49 ± 12.5 MHz from antenna to LNA input.

POWER AMP

The power amplifier module (PAM, U447) amplifies the power of the RF signal sent to the base station through the antenna.

RF Band Pass Filter (Tx RF SAW Filter)

The RF BPF (F400) pass only specific frequency (836.49 ± 12.5 MHz) signal. This filter eliminates the image products generated by the up-converter.

TX Automatic Gain Control Amp

The TX AGC amp within RFT6122 controls its gain by adjusting the control voltage in order to deliver the suitable power needed at the input stage of Driver amp. Dynamic range is 90dB, and its control voltage varies from 0.2V to 2.5V.

5-2-2 Receiver (For CDMA (800MHz))

LOW NOISE AMPLIFIER (LNA)

The low noise amplifier included in RFR6122 amplifies a weak signal received from the base station to obtain the optimum signal level.

RF BAND PASS FILTER (RX RF SAW FILTER)

The RF BPF (F300) passes only specific frequency (881.49 ± 12.5 MHz) signal.

RX Automatic Gain Controller (AGC) AMP

RX AGC amplifier within RFR6122 keeps its output power at a constant level by controlling the gain within the dynamic range of 90dB, maximum gain 45dB and minimum gain -45dB.

5-2-3 PLL Block

FREQUENCY SYNTHESIZER CIRCUIT

While both RX PLL block and TX PLL block are embedded in RFT6122, only the RX VCO block is embedded in RFR6122. The input reference frequency is generated from VC-TCXO (OSC301), and the RF local signal from VCO. PLL compares the reference with the VCO output divided by multiples preprogrammed in counters through SBI interface, and, if the difference is found, adjusts the DC voltage which controls the frequency of VCO output signal.

VC-TCXO

The VC-TCXO (OSC301) is used as a reference source of the frequency synthesizer. It generates 19.20MHz reference frequency. It is a voltage-controlled temperature-compensated crystal oscillator with the frequency stability of $19.20\text{MHz} \pm 2.0\text{ppm}$ over all useful temperature range. The frequency is controlled by the voltage from the MSM6000 considering the ambient temperature.

TEMPERATURE-TO-VOLTAGE CONVERTOR

The temperature-to-voltage convertor (TH101) detects the peripheral temperature. It is used to compensate the variance in characteristics of an active component due to the temperature difference.

5-3 Test Command Table

To change the phone from normal mode to test mode, you should enter the following keys. :

Press [4 7 * 6 8 # 1 3 5 8 0]

Command No	Command SW Name	Description
1	T_SUSPEND_I	/* Enter to test menu */
2	T_RESTART_I	/* Escape from test menu */
7	T_CARRIERON_I	/* Turn on the carrier */
8	T_CARRIEROFF_I	/* Turn off the carrier */
9	T_LOADSYN_I	/* Load the synthesizer for locking */
14	T_CDATA_I	/* Continuously send TX control data */
15	T_CDTRK_ADJ_I	/* CDMA TRK local adjust */
16	T_CDMA_TXADJ_I	/* Sets tx_agc_adj for cdma mode */
21	T_TEST_SYS_I	/* Set TEST_SYS */
22	T_SNDNAM_I	/* Send NAM information */
23	T_SNDVERSION_I	/* Send software version */
24	T_SNDESN_I	/* Send ESN */
39	T_BACKLIGHT_ON_I	/* Backlight on */
40	T_BACKLIGHT_OFF_I	/* Backlight off */
41	T_LAMP_ON_I	/* Lamp on */
42	T_LAMP_OFF_I	/* Lamp off */
43	T_LCD_CONTRAST_I	/* LCD contrast adjust */
45	T_VIBRATOR_ON_I	/* Activate a vibrator */
46	T_VIBRATOR_OFF_I	/* Inactivate a vibrator */
47	T_DTMFON_I	/* Turn on DTMF */
48	T_DTMFOFF_I	/* Turn off DTMF */
51	T_BATT_TYPE_I	/* Battery type */
52	T_READ_BATT_I	/* Saved low battery value read */
53	T_VBATT1_I	/* Set the low battey position in the standby */
54	T_VBATT2_I	/* Set the low battey position in the talking */
55	T_WRITE_BATT_I	/* Write a BATT */
56	T_THERM_READ_I	/* Read a Thermister */
58	T_CLR_LIFETIME_I	/* Clear Life Time */
59	T_CARRIER_I	/* Carrier selection */
60	T_CLEAR_ALL_I	/* Clear all */
72	T_HIGH_TXRAS_ADJ_I	/* High gain TX pwr RAS adjust */
73	T_TXRAS_ADJ_I	/* Low gain TX pwr RAS adjust */
74	T_CH_FLATNESS_I	/* CDMA TX pwr ch. flatness */
76	T_CDMA_PWR_LIMIT_I	/* CDMA TX pwr limit */
79	T_CDMA_TEMPComp_I	/* CDMA temp. compensation */
121	T_CDMA_VGA_OFFSET_I	/* CDMA DVGA offset */
127	T_CDMA_BTF_I	

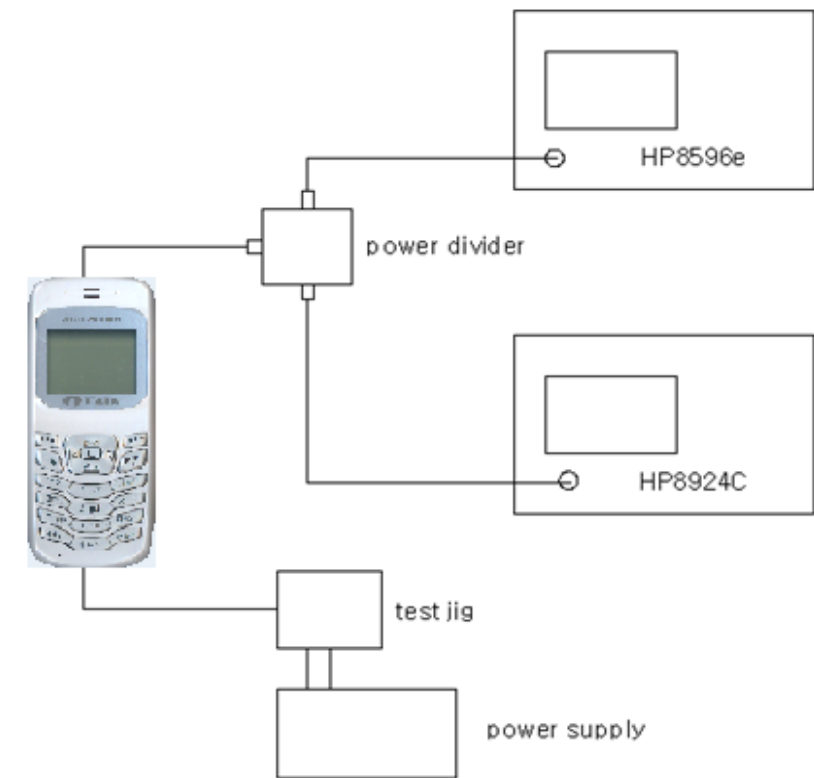
Command No	Command SW Name	Description
128	T_CDMA_SET_IM2_I	/* Set IM2 */
132	T_TEST_SET_PA_RANGE_I	/*Set PA range*/
133	T_TEST_SET_LNA_RANGE_I	/*Set LNA range*/
134	T_TEST_SET_LNA_OFFSET_I	/*Set LNA offset*/
146	T_READ_ADJUST_VAL_I	
147	T_PA_WARMUP_DELAY_I	
148	T_TX_WARMUP_DELAY_I	
150	T_CDMA_LNA_RISE_I	/*LNA rise and fall setting*/
151	T_CDMA_LNA_FALL_I	/* LNA rise and fall setting*/
152	T_CDMA_LNA_2RISE_I	/* LNA rise and fall setting*/
153	T_CDMA_LNA_2FALL_I	/* LNA rise and fall setting*/
154	T_CDMA_LNA_3RISE_I	/* LNA rise and fall setting*/
155	T_CDMA_LNA_3FALL_I	/* LNA rise and fall setting*/
156	T_VCO_COARSE_TUNE_TABLE_I	/* Set VCO table */
157	T_RFR_BB_FILTER_I	/* RFR baseband filter */
171	T_FAC_RXRAS_ADJ_I	/* Factory RX RAS */
172	T_FAC_HIGH_TXRAS_ADJ_I	/* High gain factory TX pwr RAS */
173	T_FAC_TXRAS_ADJ_I	/* Low gain factory TX pwr RAS */
174	T_FAC_CH_FLATNESS_I	/* Factory TX pwr ch. flatness */
175	T_FAC_TXRAS_ADJ_ALL_I	/* Factory TX pwr RAS */
224	T_MRU2_TABLE_I	/* MRU reset */
227	T_PLINE_I	/* Product lile information */
230	T_SNDPINFO_I	/* Send product information 8 character */
231	T_READ_RSSI_I	/* Read a RSSI */
233	T_VOC_PCMLPON_I	/* Turn on to play a PCM loop back */
234	T_VOC_PCMLPOFF_I	/* Turn off to play a PCM loop back */
236	T_GET_MODE_I	/* Get mode CDMA/FM autotest */
237	T_SET_MODE_I	/* Set mode CDMA/FM autotest */

6. Test Procedure

6-1 List of Equipment

- DC Power Supply
- Test Jig
- Test Cable
- CDMA Mobile Station Test Set HP8285A, HP8960, CMD-80, etc
- Spectrum Analyzer(include CDMA Test Mode) HP8596E

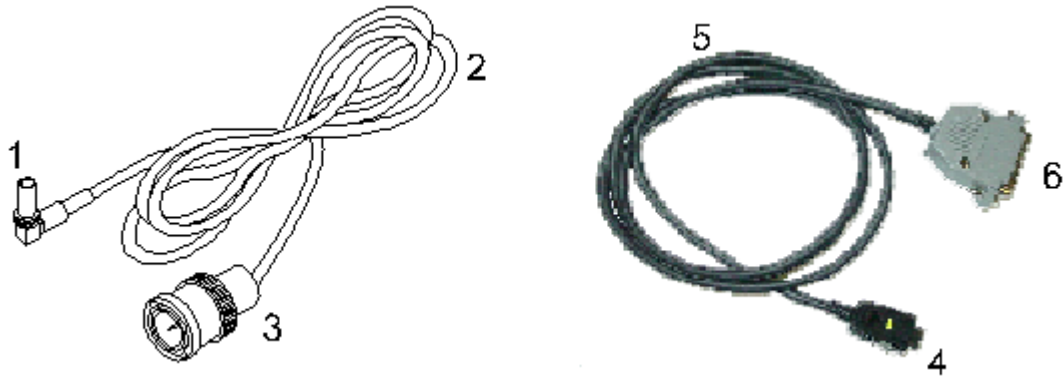
6-2 Configuration of Test



- CAUTION : The test jig and data cable has a voltage drop of 0.15V at Max power output, you'd better set the DC power supply to 4.15V for normal test condition.
(Nominal voltage of battery is 4.0V at cellular phone)

6-3 TEST CABLE CONNECTIONS

6-3-1 TEST CABLE



6-3-2 TEST CABLE CONNECTIONS

1	KMS-510-D
2	RF CABLE (1.4dB Loss for CDMA,)
3	BNC CONNECTOR (RF)
4	PLUG CONNECT TO SCH-N500
5	DATA CABLE
6	Dsub 18PIN CONNECTOR (DATA)

6-3-3 Dsub 25 PIN CONNECTOR PIN DESCRIPTION (TEST CABLE 1, BACK SIDE)

DATA DESCRIPTION	Dsub CONN. PIN NO.
V_BAT	5
DP_RX_DATA	8
DP_TX_DATA	9
HP_PWR	18
DC_VOLT	24,25
GROUND	3,23,17



6-3-4 CONVERSION TABLE OF FREQUENCY vs CHANNEL

T Y P E	CHANNEL	CONVERSION EQUATION	REMARK
TX FREQUENCY	$1 \leq N \leq 779$ $990 \leq N \leq 1023$	$F = 0.03 \times N + 825.00$ $F = 0.03 \times (N - 1023) + 825.00$	N ; CH NUMBER F ; FREQUENCY (CDMA)
RX FREQUENCY	$990 \leq N \leq 1023$ $990 \leq N \leq 1023$	$F = 0.03 \times N + 825.00$ $F = 0.03 \times (N - 1023) + 870.00$	

6-4 Main Keys Usage



Fig 1. Main Keys Mapping

UP/DOWN (): Moves on-screen highlight or list selection UP(DOWN). Faster scrolling

END (): - END call control with behavior in line with existing cell phone END buttons
- Turns the Phone ON/OFF. Press for a while (about 2 ~ 3 sec)

******* : A dynamically reassigned control with the current action always displayed onscreen.

LEFT/RIGHT(): Moves on-screen focus or list selection LEFT(RIGHT), changes spin box control selection,
toggles check box control.Faster scrolling

SEND (): Performs a call by a selected phone number.

CLEAR (): Cancel or end the function and cancel a number or character in the phone test mode or NAM mode.

6-5 Test Procedure

6-5-1 Change the test mode

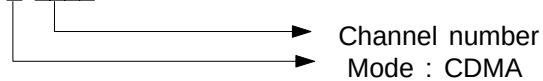
A. To change the phone's state from Normal Mode to Test Mode, You should press following keys.

" 4 7 * 6 8 # 1 3 5 8 0 "

B. To Enter suspend mode press "001"

C. Press "021" then You can set channel " 2xxxx "

Example : "2 0363"



and press **the right soft key(Soft2 key)** to save mode/channel value..

D. To finish the Test Mode, You should enter the command "002".

6-5-2 Channel selection and Tx power output level control

A. Enter to Test Mode [4 7 * 6 8 # 1 3 5 8 0]

B. "001" : Suspend.

C. "009" "0363" [Push the right soft key] : Set to '0363' channel.

D. "007" : Carrier On.(TX On)

E. "014" : Spread spectrum to 1.23MHz band width.

F. "016" " xxx " : Adjust RF power level. "xxx" means AGC level (000~ 511)

G. To finish the Test Mode, You should enter the command "002".

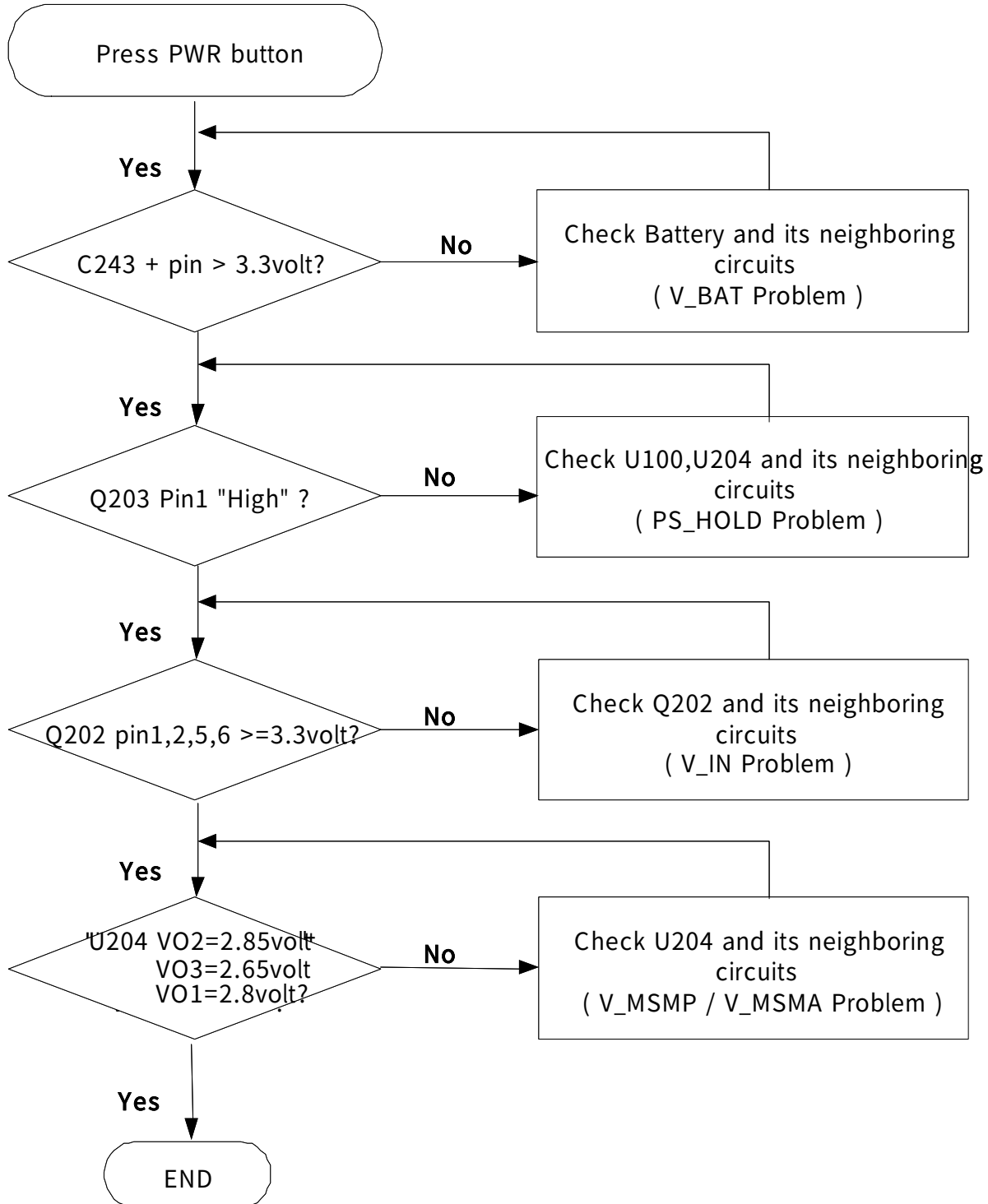
6-6 CDMA

TEST ITEMS	PROCEDURE
1. PREPARATION	Set test equipments up. [4 7 * 6 8 # 1 3 5 8 0]: Enter the Test Mode "001" : Suspend If you select a wrong key, press " # ", then enter new command. To exit the Test Mode at any time, just press [0 0 2].
2. FREQUENCY ACCURACY	"001" : Suspend. "009" "0363" 'right soft key(Soft2)' : Set channel to 363. "007" : Carrier On. "014" : Spread spectrum. "016" ""280" ' right soft key(Soft2)' : Set AGC Code(xxx) to adjust RF Output Power .Measure the TX frequency : 836.49MHz±300Hz.
3. OCCUPIED CDMA BANDWIDTH	"001" : Suspend. "009" "0363" 'right soft key(Soft2)' : Set channel to 363. "007" : Carrier On. "014" : Spread spectrum. "016" ""280" ' right soft key(Soft2)' : Set AGC level. Measure the bandwidth (spec: 1.23MHz).
4. LIMITATIONS ON EMISSIONS	"001" : Suspend. "009" "0363" 'right soft key(Soft2)' : Set channel to 363. "007" : Carrier On. "014" : Spread spectrum. "016" ""280" ' right soft key(Soft2)' : Set AGC level. Measure the spurious at $F_c \pm 885\text{kHz}$, $F_c \pm 1.98\text{MHz}$, $2F_c$, $3F_c$, $1/2F_c$. spec: $F_c \pm 885\text{kHz}$ below 42dBc/30kHz $F_c \pm 1.98\text{MHz}$ below 54dBc/30kHz Outside Receive Band $43+10\log(\text{PY})$ PY: Mean Output Power in watts
5. GATED POWER & TIME	Set the service option 2. Set the data rate Eighth (1200bps). Registering: HHP → HP8924C. Call : HP8924C → HHP. Measure the Gated Power & Time. spec : Gated Power - at least 20dB Gated Time - Rising Time : below 6μs Falling Time : below 6μs Burst Time : below 1.25ms

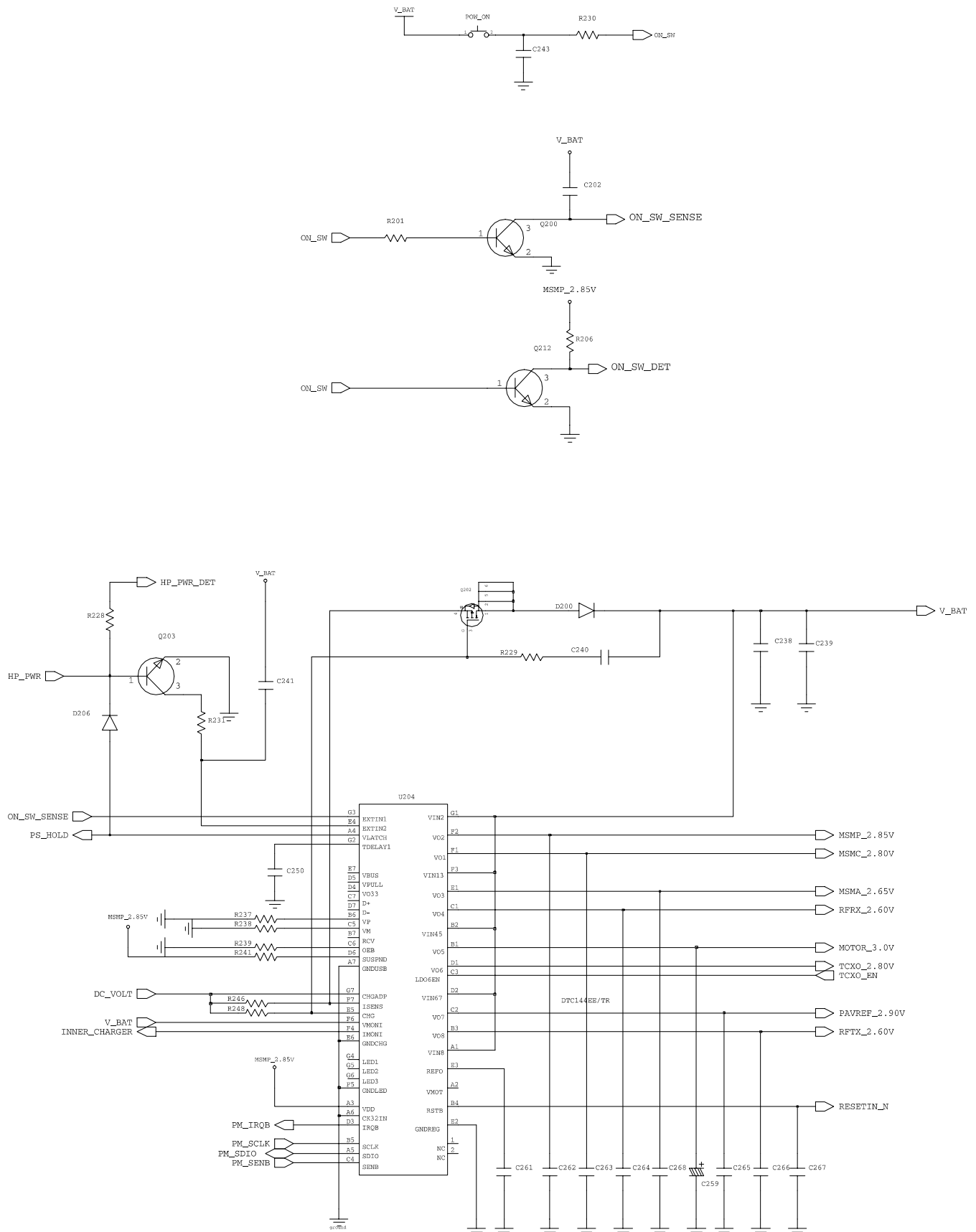
7. Flow Chart of Troubleshooting

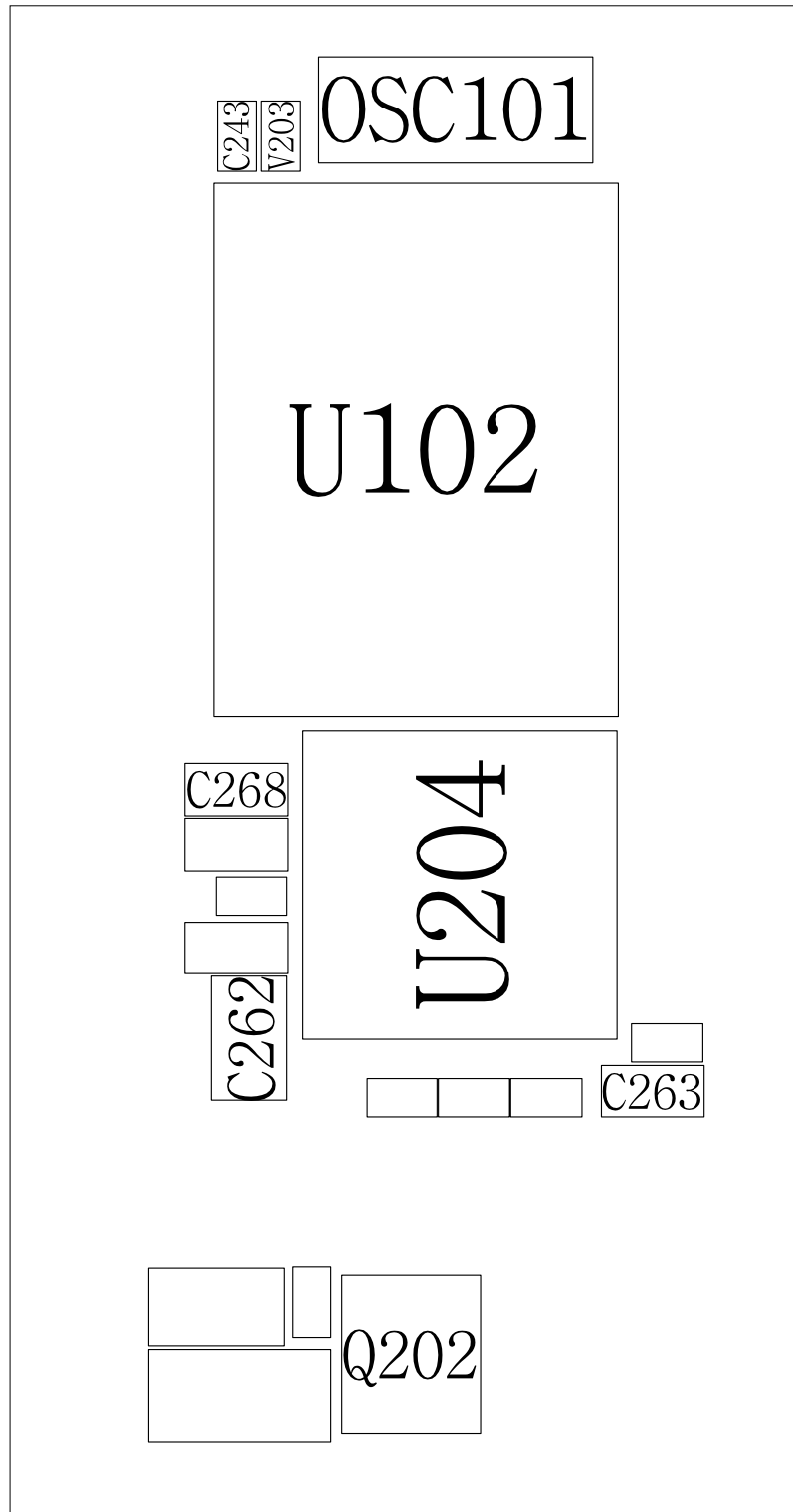
7-1 Logic Section

7-1-1 No Power

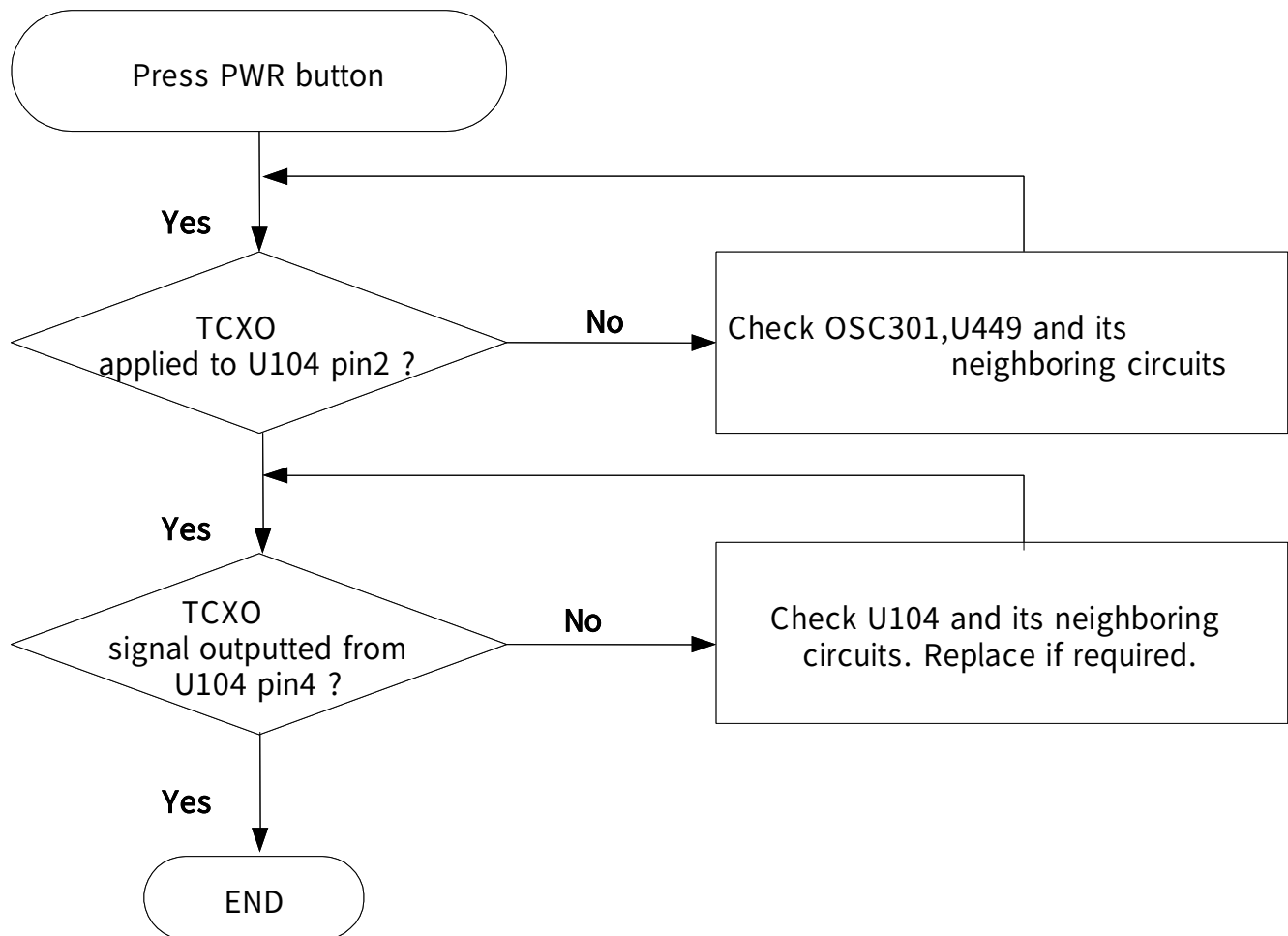


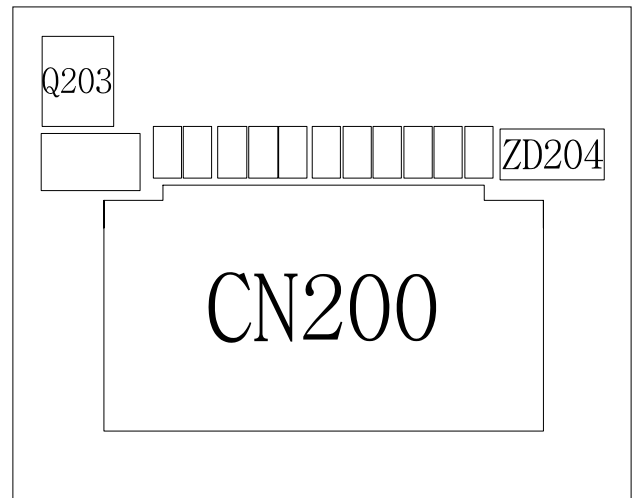
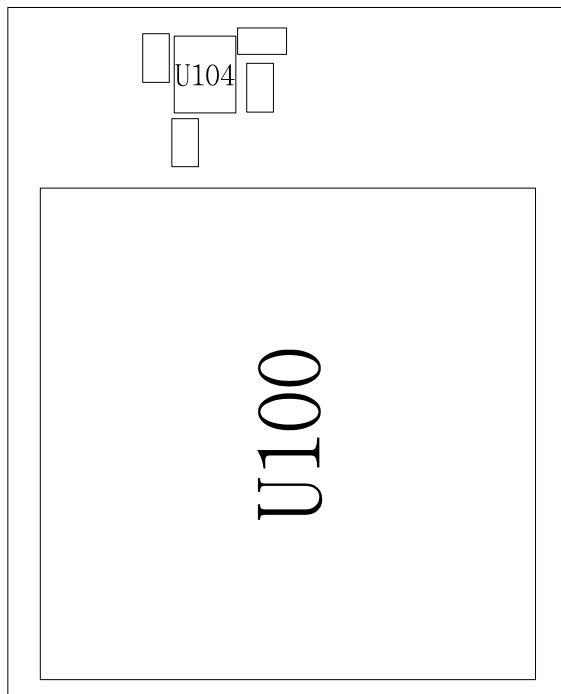
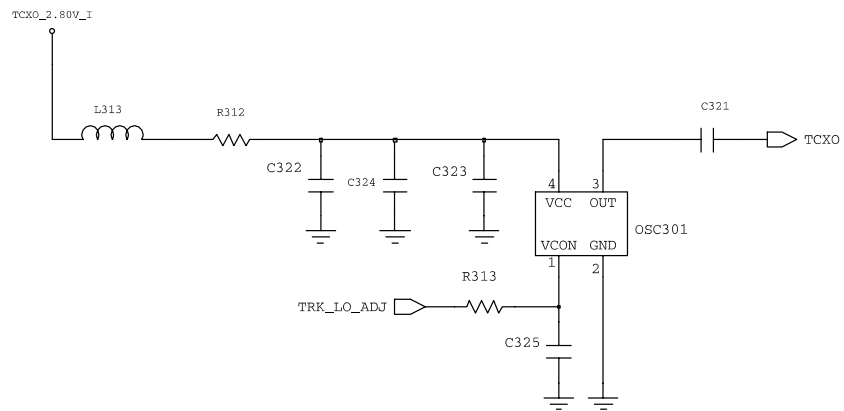
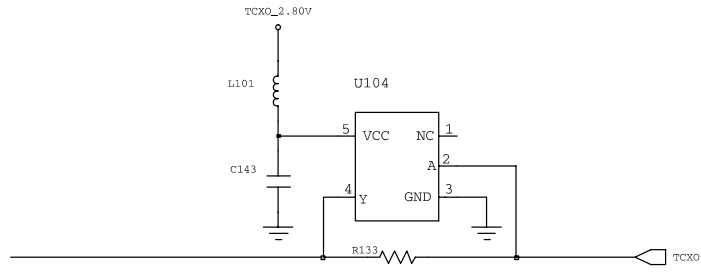
Flow Chart of Troubleshooting



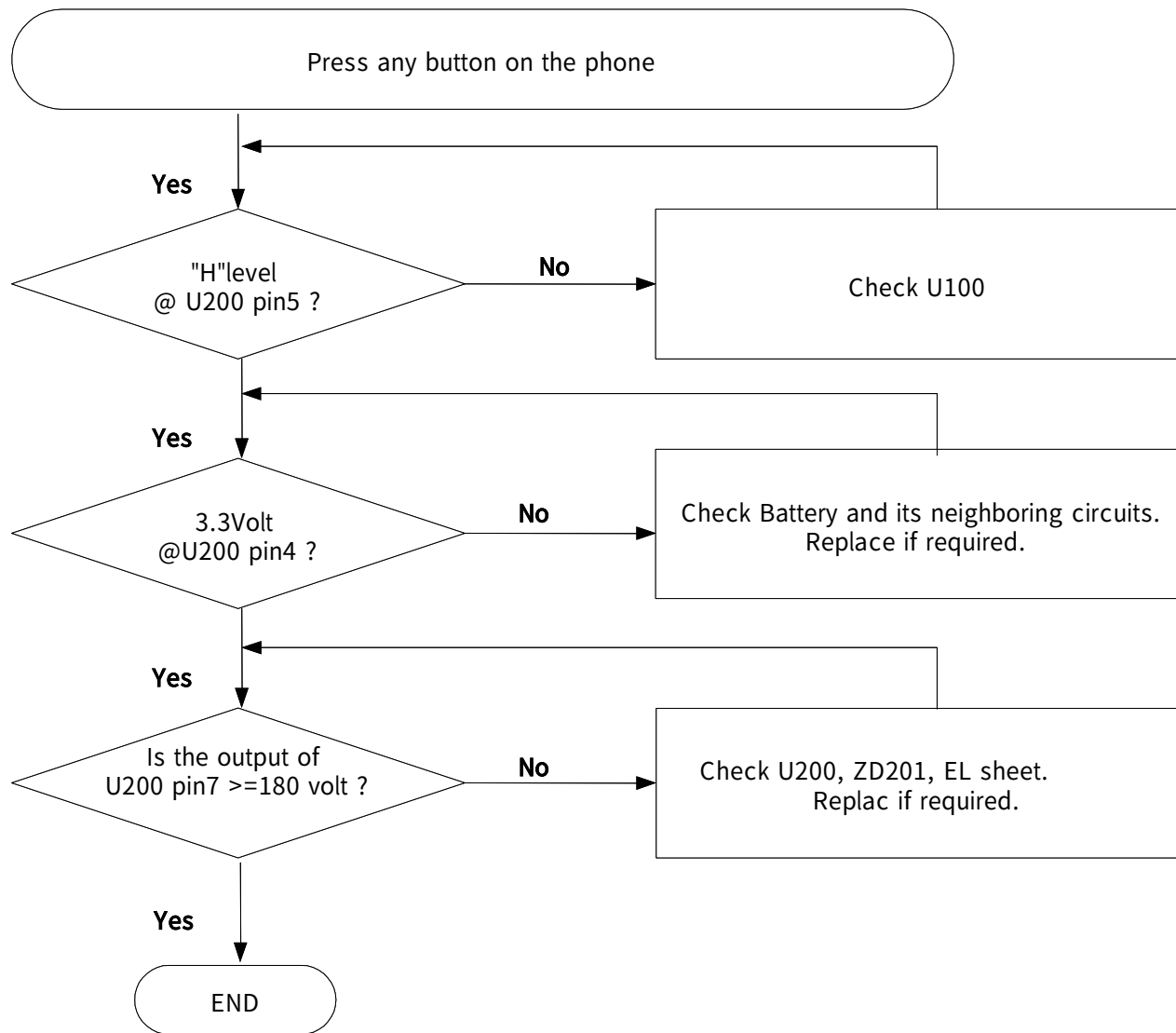


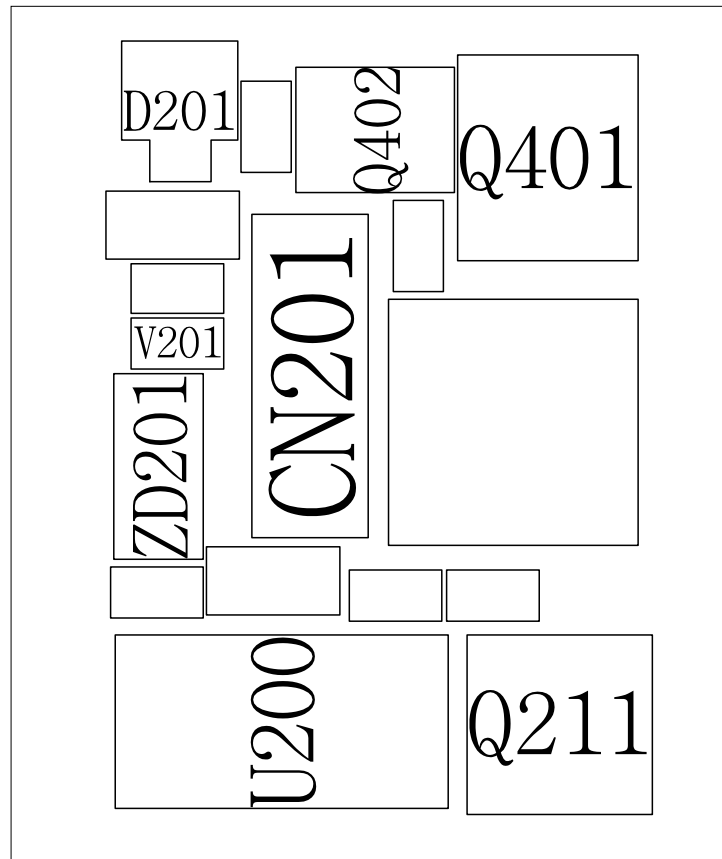
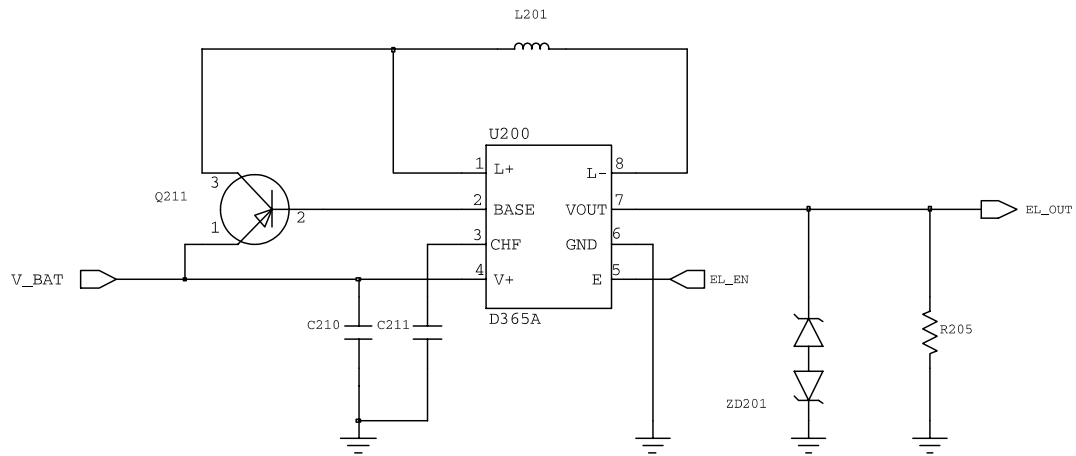
7-1-2 Abnormal initial operation



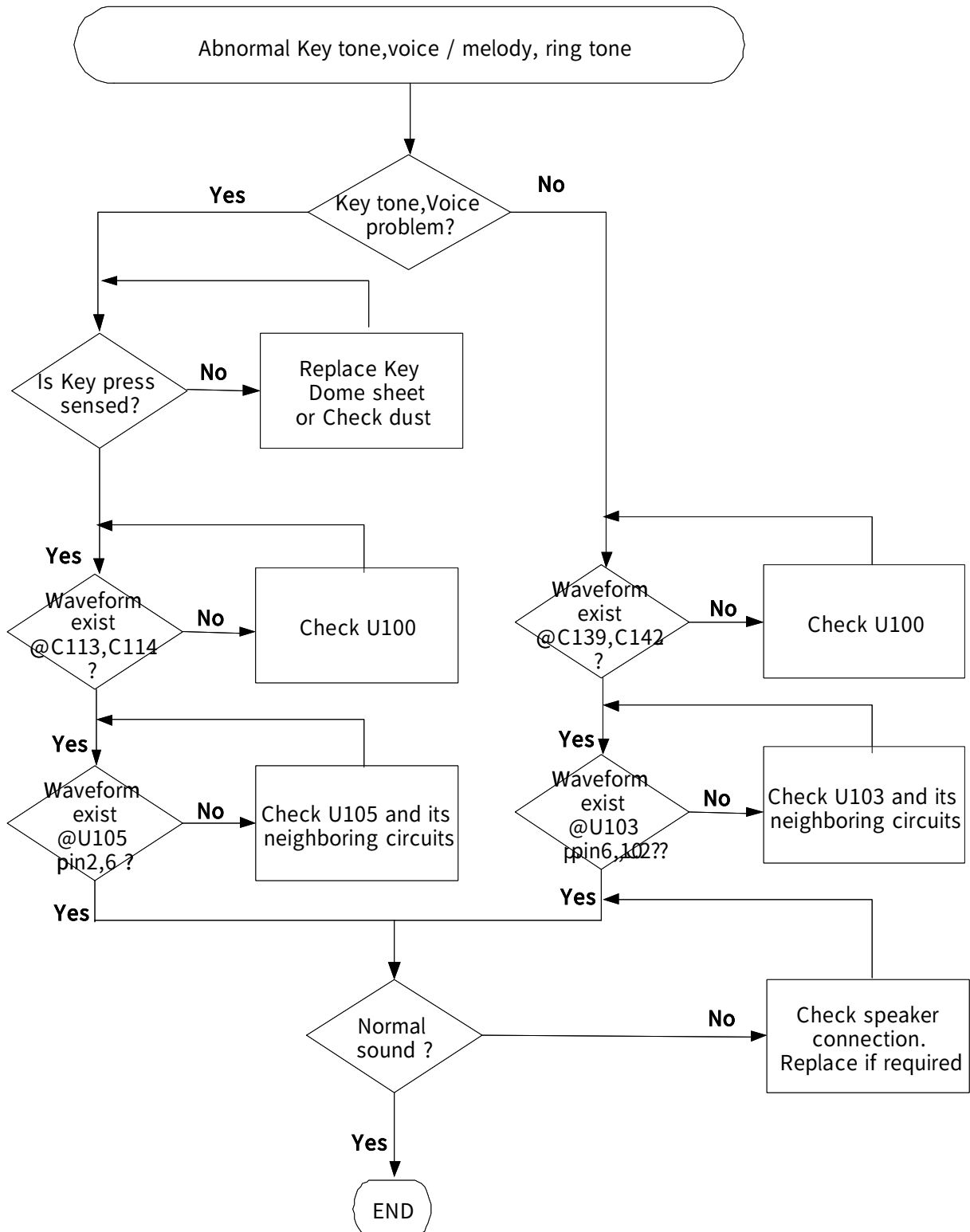


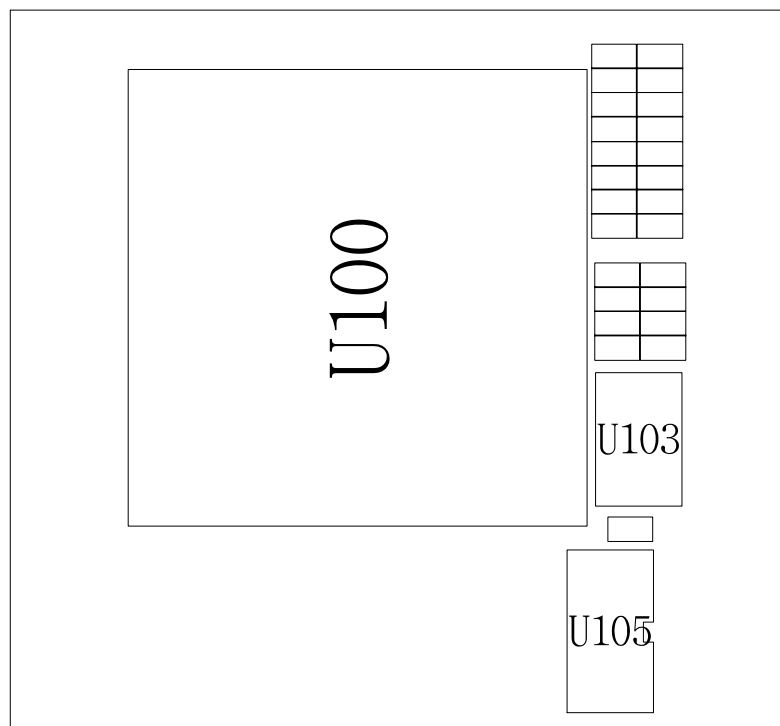
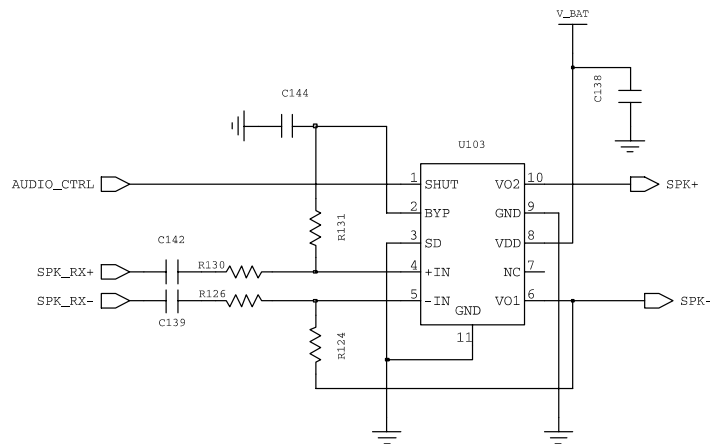
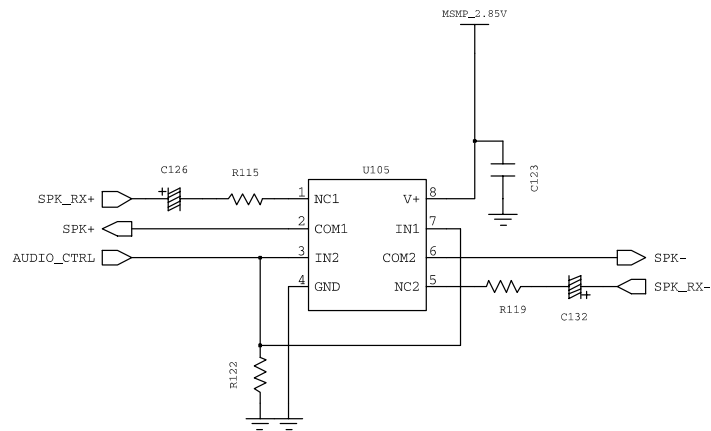
7-1-3 Abnormal Backlight Operation



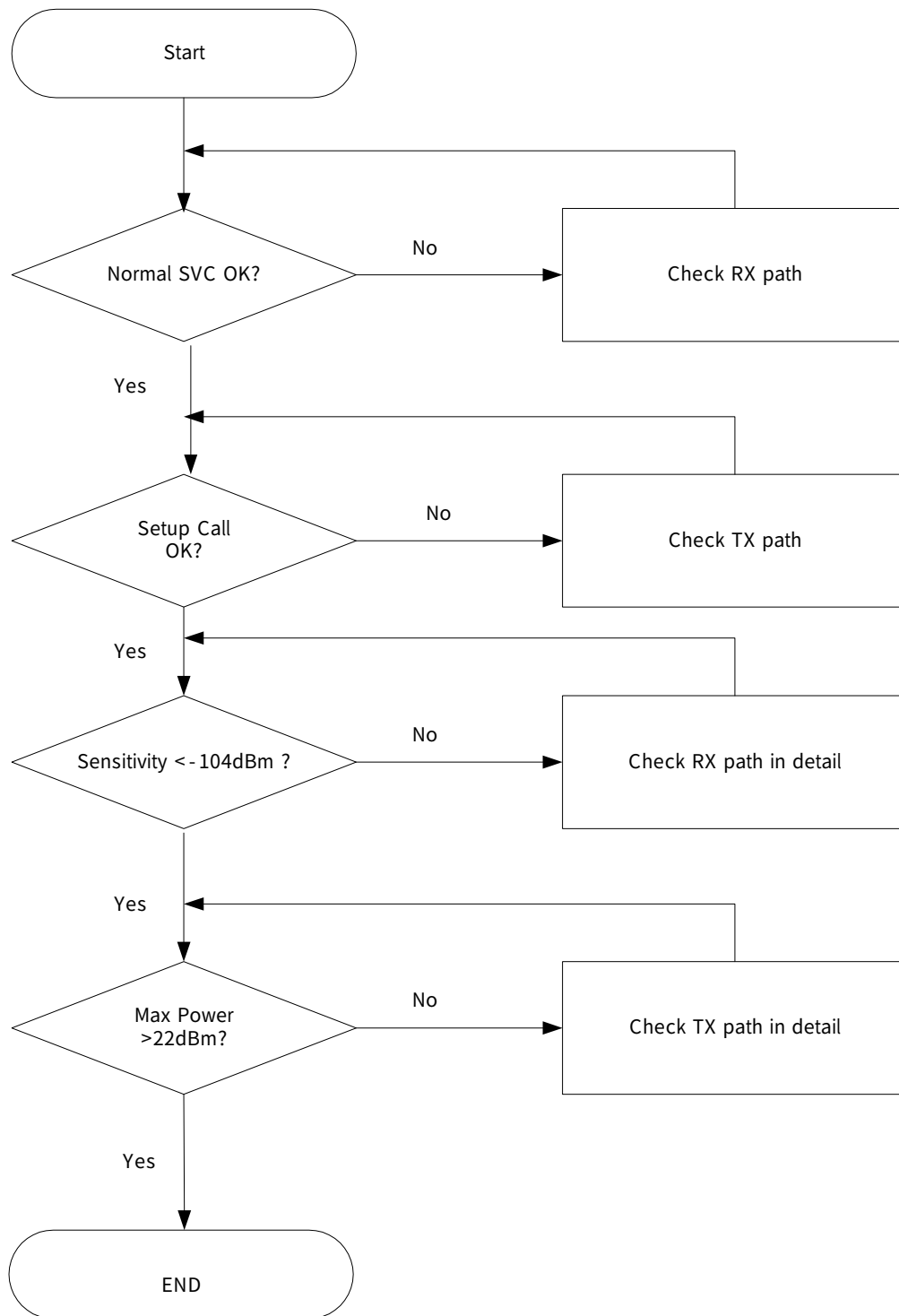


7-1-4 Abnormal Key tone,voice / melody

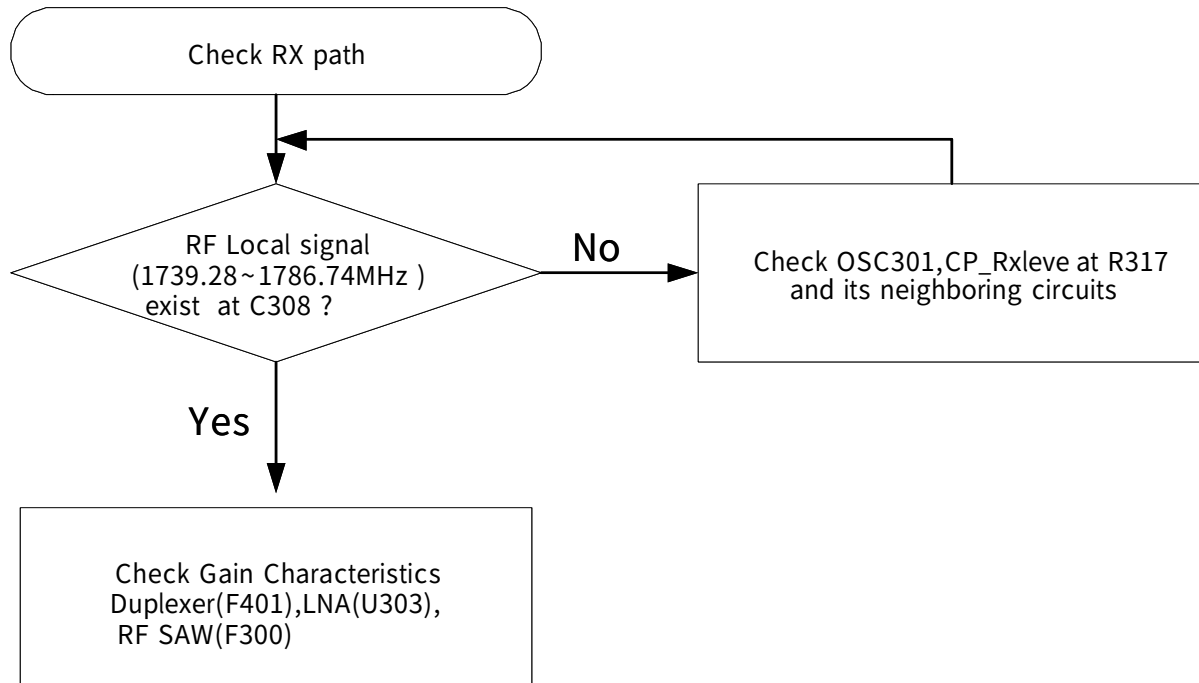


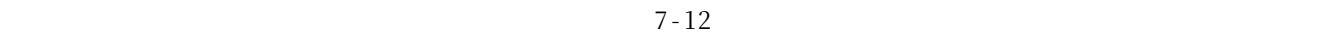


7-2 Receiver & Transmitter Section

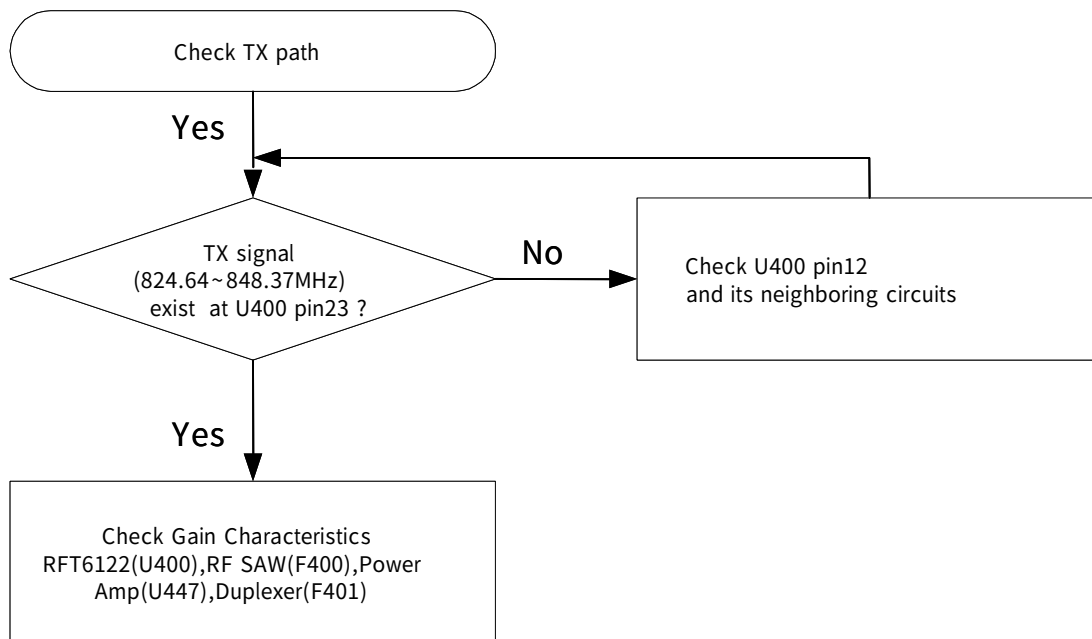


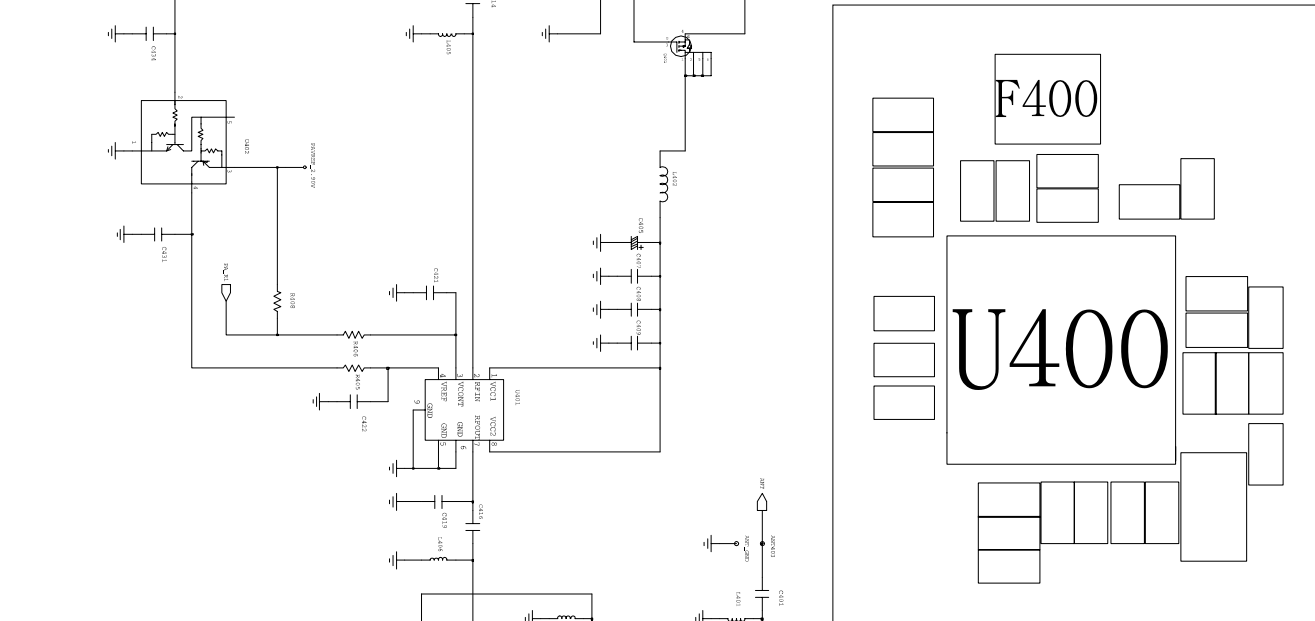
7-2-1 Check RX path





7-2-2 Check TX path





8. Electrical Parts List

DESIGN LOC	PART NAME	SEC CODE
C101	C - CER,CHIP	2203 - 005061
C102	C - CER,CHIP	2203 - 005061
C103	C - CER,CHIP	2203 - 005061
C104	C - CER,CHIP	2203 - 005061
C105	C - CER,CHIP	2203 - 005061
C106	C - CER,CHIP	2203 - 005061
C107	C - CER,CHIP	2203 - 005061
C108	C - CER,CHIP	2203 - 005061
C109	C - CER,CHIP	2203 - 005061
C110	C - CER,CHIP	2203 - 005061
C111	C - CER,CHIP	2203 - 005061
C112	C - CER,CHIP	2203 - 005061
C113	C - CER,CHIP	2203 - 000233
C114	C - CER,CHIP	2203 - 000233
C115	C - CER,CHIP	2203 - 000233
C116	C - CER,CHIP	2203 - 005061
C117	C - CER,CHIP	2203 - 005061
C118	C - CER,CHIP	2203 - 001405
C119	C - CER,CHIP	2203 - 001405
C120	C - CER,CHIP	2203 - 001405
C121	C - CER,CHIP	2203 - 001405
C122	C - TA,CHIP	2404 - 001352
C123	C - CER,CHIP	2203 - 005482
C124	C - CER,CHIP	2203 - 006399
C125	C - CER,CHIP	2203 - 005061
C126	C - TA,CHIP	2404 - 001105
C127	C - CER,CHIP	2203 - 005061
C128	C - CER,CHIP	2203 - 005061
C129	C - CER,CHIP	2203 - 005061
C130	C - CER,CHIP	2203 - 005061
C131	C - CER,CHIP	2203 - 006091
C132	C - TA,CHIP	2404 - 001105
C133	C - CER,CHIP	2203 - 000425
C134	C - CER,CHIP	2203 - 006091
C135	C - CER,CHIP	2203 - 000425
C136	C - CER,CHIP	2203 - 005061
C137	C - CER,CHIP	2203 - 005061
C138	C - CER,CHIP	2203 - 006399
C139	C - CER,CHIP	2203 - 006190
C140	C - CER,CHIP	2203 - 000233
C141	C - CER,CHIP	2203 - 000254
C142	C - CER,CHIP	2203 - 006190
C143	C - CER,CHIP	2203 - 005061
C144	C - CER,CHIP	2203 - 006399
C145	C - CER,CHIP	2203 - 000254

DESIGN LOC	PART NAME	SEC CODE
C146	C - CER,CHIP	2203 - 000254
C147	C - CER,CHIP	2203 - 000254
C148	C - CER,CHIP	2203 - 000254
C149	C - CER,CHIP	2203 - 000254
C150	C - CER,CHIP	2203 - 006626
C201	C - CER,CHIP	2203 - 005061
C202	C - CER,CHIP	2203 - 000138
C203	C - CER,CHIP	2203 - 005061
C204	C - CER,CHIP	2203 - 005061
C205	C - CER,CHIP	2203 - 005061
C206	C - CER,CHIP	2203 - 005061
C207	C - CER,CHIP	2203 - 000995
C208	C - CER,CHIP	2203 - 000995
C209	C - CER,CHIP	2203 - 006399
C210	C - CER,CHIP	2203 - 005482
C211	C - CER,CHIP	2203 - 000885
C212	C - CER,CHIP	2203 - 006399
C213	C - CER,CHIP	2203 - 006399
C214	C - CER,CHIP	2203 - 006399
C229	C - CER,CHIP	2203 - 005061
C231	C - CER,CHIP	2203 - 005061
C232	C - CER,CHIP	2203 - 000233
C233	C - CER,CHIP	2203 - 000995
C234	C - CER,CHIP	2203 - 005061
C235	C - CER,CHIP	2203 - 000438
C236	C - CER,CHIP	2203 - 000438
C237	C - CER,CHIP	2203 - 000438
C238	C - CER,CHIP	2203 - 006201
C239	C - CER,CHIP	2203 - 000254
C240	C - CER,CHIP	2203 - 006201
C241	C - CER,CHIP	2203 - 000138
C242	C - CER,CHIP	2203 - 005061
C243	C - CER,CHIP	2203 - 000438
C244	C - TA,CHIP	2404 - 001268
C245	C - CER,CHIP	2203 - 005061
C246	C - CER,CHIP	2203 - 000254
C247	C - CER,CHIP	2203 - 006324
C248	C - CER,CHIP	2203 - 000438
C249	C - CER,CHIP	2203 - 000940
C250	C - CER,CHIP	2203 - 006399
C257	C - TA,CHIP	2404 - 001268
C258	C - CER,CHIP	2203 - 005061
C259	C - TA,CHIP	2404 - 001105
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C261	C - CER,CHIP	2203 - 006201

DESIGN LOC	PART NAME	SEC CODE
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C263	C - CER,CHIP	2203 -006201
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C303	C - CER,CHIP	2203 -005482
C304	C - CER,CHIP	2203 -000233
C305	C - CER,CHIP	2203 -005057
C306	C - CER,CHIP	2203 -000438
C307	C - CER,CHIP	2203 -000438
C308	C - CER,CHIP	2203 -000233
C309	C - CER,CHIP	2203 -000233
C310	C - CER,CHIP	2203 -005482
C311	C - CER,CHIP	2203 -006399
C312	C - CER,CHIP	2203 -000550
C313	C - CER,CHIP	2203 -005482
C314	C - CER,CHIP	2203 -006105
C315	C - CER,CHIP	2203 -000233
C317	C - CER,CHIP	2203 -000233
C318	C - CER,CHIP	2203 -000233
C319	C - CER,CHIP	2203 -005057
C320	C - CER,CHIP	2203 -005057
C321	C - CER,CHIP	2203 -000438
C322	C - CER,CHIP	2203 -006105
C323	C - CER,CHIP	2203 -000233
C324	C - CER,CHIP	2203 -005482
C325	C - CER,CHIP	2203 -000254
C401	C - CER,CHIP	2203 -000359
C402	C - CER,CHIP	2203 -000278
C404	C - CER,CHIP	2203 -000359
C405	C - TA,CHIP	2404 -001381
C406	C - CER,CHIP	2203 -000233
C407	C - CER,CHIP	2203 -006201
C408	C - CER,CHIP	2203 -000438
C409	C - CER,CHIP	2203 -002443
C410	C - CER,CHIP	2203 -000359
C411	C - CER,CHIP	2203 -000233
C412	C - CER,CHIP	2203 -005482
C413	C - CER,CHIP	2203 -000233
C414	C - CER,CHIP	2203 -001017
C415	C - CER,CHIP	2203 -000550
C416	C - CER,CHIP	2203 -000278

DESIGN LOC	PART NAME	SEC CODE
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C420	C - CER,CHIP	2203 - 005052
C421	C - CER,CHIP	2203 - 002687
C422	C - CER,CHIP	2203 - 002443
C423	C - CER,CHIP	2203 - 000254
C424	C - CER,CHIP	2203 - 000550
C425	C - CER,CHIP	2203 - 000885
C426	C - CER,CHIP	2203 - 005482
C427	C - CER,CHIP	2203 - 005482
C428	C - CER,CHIP	2203 - 005480
C429	C - CER,CHIP	2203 - 000489
C430	C - CER,CHIP	2203 - 000254
C431	C - CER,CHIP	2203 - 005481
C432	C - CER,CHIP	2203 - 000233
C433	C - CER,CHIP	2203 - 006105
C434	C - CER,CHIP	2203 - 006257
C435	C - CER,CHIP	2203 - 001033
C436	C - CER,CHIP	2203 - 000940
C437	C - CER,CHIP	2203 - 005061
C438	C - CER,CHIP	2203 - 000233
CN200	CONNECTOR - INTERFACE	3710 - 001611
CN201	CONNECTOR - SOCKET	3710 - 001105
CN202	CONNECTOR - BATTERY	3711 - 005781
CN204	JACK - EAR PHONE	3722 - 002104
D100	DIODE - TVS	0406 - 001203
D101	DIODE - TVS	0406 - 001203
D200	DIODE - SCHOTTKY	0404 - 001157
D201	DIODE - ARRAY	0407 - 001002
D202	DIODE - TVS	0406 - 001203
D203	DIODE - TVS	0406 - 001203
D204	DIODE - TVS	0406 - 001203
D205	DIODE - TVS	0406 - 001203
D206	DIODE - SWITCHING	0401 - 001110
F300	FILTER - SAW	2904 - 001521
F400	FILTER - SAW	2904 - 001502
F401	DUPLEXER - SAW	2909 - 001244
L101	INDUCTOR - SMD	2703 - 001868
L201	INDUCTOR - SMD	2703 - 002850
L202	INDUCTOR - SMD	2703 - 001868
L203	BEAD - SMD	3301 - 001170
L204	BEAD - SMD	3301 - 001342
L205	BEAD - SMD	3301 - 001170
L301	BEAD - SMD	3301 - 001729
L302	BEAD - SMD	3301 - 001729
L303	INDUCTOR - SMD	2703 - 001409

DESIGN LOC	PART NAME	SEC CODE
L304	INDUCTOR - SMD	2703-002313
L306	INDUCTOR - SMD	2703-001786
L307	BEAD - SMD	3301-001729
L308	INDUCTOR - SMD	2703-001737
L309	INDUCTOR - SMD	2703-001868
L310	INDUCTOR - SMD	2703-001990
L311	INDUCTOR - SMD	2703-001868
L312	INDUCTOR - SMD	2703-001737
L313	BEAD - SMD	3301-001729
L401	INDUCTOR - SMD	2703-002204
L402	BEAD - SMD	3301-001120
L403	INDUCTOR - SMD	2703-002155
L404	INDUCTOR - SMD	2703-001938
L407	INDUCTOR - SMD	2703-002155
LED201	LED	0601-001094
LED202	LED	0601-001094
LED203	LED	0601-001094
LED204	LED	0601-001094
LED205	LED	0601-001094
LED206	LED	0601-001094
LED207	LED	0601-001094
LED208	LED	0601-001094
LED209	LED	0601-001094
LED210	LED	0601-001094
LED211	LED	0601-001094
LED212	LED	0601-001094
OSC101	CRYSTAL - SMD	2801-003747
OSC301	OSCILLATOR - VCTCXO	2809-001280
Q200	TR - DIGITAL	0504-000168
Q201	TR - DIGITAL	0504-000168
Q202	FET - SILICON	0505-001165
Q203	TR - DIGITAL	0504-000168
Q211	TR - SMALL SIGNAL	0501-002039
Q212	TR - DIGITAL	0504-000168
Q401	FET - SILICON	0505-001165
Q402	TR - DIGITAL	0504-000168
R101	R - CHIP	2007-000171
R104	R - CHIP	2007-000148
R106	R - CHIP	2007-007309
R107	R - CHIP	2007-007137
R108	R - CHIP	2007-007139
R109	R - CHIP	2007-000162
R110	R - CHIP	2007-000141
R112	R - CHIP	2007-000141
R113	R - CHIP	2007-000162

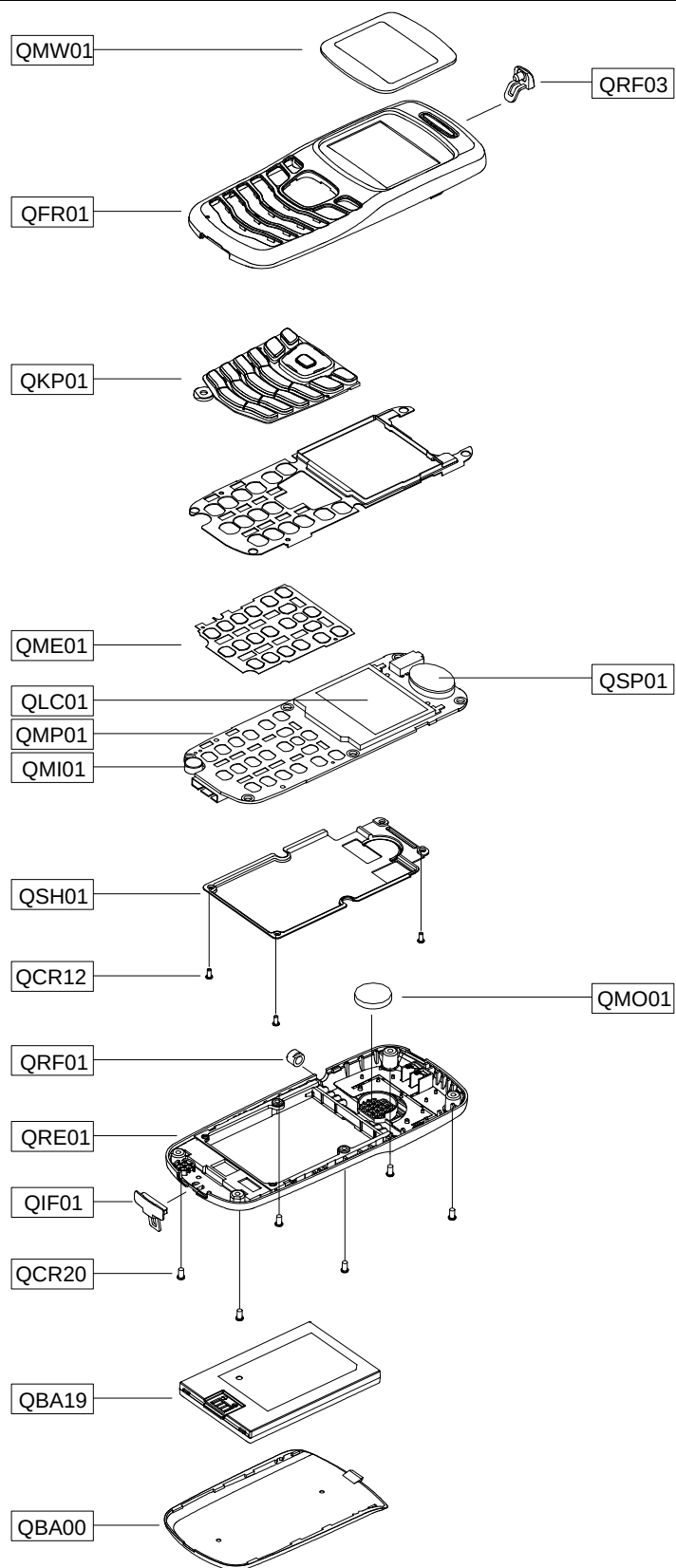
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R116	R-CHIP	2007-001339
R117	R-CHIP	2007-000171
R118	R-CHIP	2007-000148
R119	R-CHIP	2007-000172
R120	R-CHIP	2007-000169
R121	R-CHIP	2007-000148
R122	R-CHIP	2007-000141
R123	R-CHIP	2007-001339
R124	R-CHIP	2007-007312
R125	R-CHIP	2007-007529
R126	R-CHIP	2007-007312
R127	R-CHIP	2007-000140
R128	R-CHIP	2007-007107
R130	R-CHIP	2007-007312
R131	R-CHIP	2007-007312
R132	R-CHIP	2007-000138
R133	R-CHIP	2007-000162
R134	R-CHIP	2007-000775
R135	R-CHIP	2007-000775
R136	R-CHIP	2007-007313
R137	R-CHIP	2007-007313
R138	R-CHIP	2007-001308
R201	R-CHIP	2007-000171
R202	R-CHIP	2007-000171
R204	R-CHIP	2007-000157
R205	R-CHIP	2007-000690
R206	R-CHIP	2007-000162
R207	R-CHIP	2007-000163
R208	R-CHIP	2007-000138
R209	R-CHIP	2007-003004
R210	R-CHIP	2007-007009
R211	R-CHIP	2007-007009
R212	R-CHIP	2007-007009
R213	R-CHIP	2007-007009
R214	R-CHIP	2007-003004
R215	R-CHIP	2007-000138
R216	R-CHIP	2007-003004
R217	R-CHIP	2007-000138
R218	R-CHIP	2007-007310
R221	R-CHIP	2007-007697
R222	R-CHIP	2007-000165
R223	R-CHIP	2007-000141
R224	R-CHIP	2007-000162

DESIGN LOC	PART NAME	SEC CODE
R225	R-CHIP	2007-000162
R226	R-CHIP	2007-001320
R227	R-CHIP	2007-000142
R228	R-CHIP	2007-000148
R229	R-CHIP	2007-003019
R230	R-CHIP	2007-000157
R231	R-CHIP	2007-000171
R232	R-CHIP	2007-000164
R233	R-CHIP	2007-000140
R234	R-CHIP	2007-000140
R235	R-CHIP	2007-000140
R236	R-CHIP	2007-000140
R237	R-CHIP	2007-000148
R238	R-CHIP	2007-000148
R239	R-CHIP	2007-000148
R240	R-CHIP	2007-000140
R241	R-CHIP	2007-000148
R246	R-CHIP	2007-008404
R248	R-CHIP	2007-007315
R249	R-CHIP	2007-003004
R250	R-CHIP	2007-003004
R301	R-CHIP	2007-001156
R302	R-CHIP	2007-000138
R303	R-CHIP	2007-001156
R304	R-CHIP	2007-001156
R305	R-CHIP	2007-001156
R306	R-CHIP	2007-002796
R307	R-CHIP	2007-000171
R309	R-CHIP	2007-008964
R310	R-CHIP	2007-003010
R311	R-CHIP	2007-000171
R312	R-CHIP	2007-000172
R313	R-CHIP	2007-000138
R401	R-CHIP	2007-000171
R402	R-CHIP	2007-000168
R403	R-CHIP	2007-007491
R404	R-CHIP	2007-000138
R405	R-CHIP	2007-000171
R406	R-CHIP	2007-000171
R407	R-CHIP	2007-000140
R408	R-CHIP	2007-000148
R409	R-CHIP	2007-000172
R410	R-CHIP	2007-001329
R411	R-CHIP	2007-007142
RFSW401	CONNECTOR-COAXIAL	3705-001351

DESIGN LOC	PART NAME	SEC CODE
TH101	THERMISTOR-NTC	1404-001165
TH102	THERMISTOR-NTC	1404-001165
U100	IC-MODEM	1205-002672
U102	IC-MCP	1109-001267
U103	IC-AUDIO AMP	1201-002204
U104	IC-CMOS LOGIC	0801-000306
U105	IC-ANALOG MULTIPLEX	1001-001161
U200	IC-EL DRIVER	1003-001395
U203	IC-VOLTAGE COMP.	1202-001036
U204	IC-POWER SUPERVISOR	1203-003040
U206	DIODE-TVS	0406-001187
U208	DIODE-TVS	0406-001187
U209	IC-POS.FIXED REG.	1203-003650
U300	IC-RECEIVER	1205-002549
U400	IC-TRANSMITTER	1205-002548
U401	IC-POWER AMP	1201-002228
U402	TR-ARRAY	0506-001004
V201	VARISTOR	1405-001082
V202	VARISTOR	1405-001082
V203	VARISTOR	1405-001082
ZD201	DIODE-ZENER	0403-001511
ZD204	DIODE-ZENER	0403-001427
ZD205	DIODE-ZENER	0403-001547

9. Exploded View and Parts list

9-1 Exploded Views



9-2 Parts List

Location No		Description	Sec Code
QBA00		PMO-BATT COVER;SCH-N500,PC,SIL,-,-,-	GH72-24170A
QBA19		BATTERY-800MAH,L/GRAY,ENG,M;BST3178L	GH43-01325A
QCR12		SCREW-MACHINE;PH,+,M1.4,L2.5,ZPC(BLK	6001-001530
QCR20		SCREW-MACHINE;BH,+,M1.7,L3.5,NYLOCK,	6001-001429
QIF01		PMO-IF COVER;SCH-N500,PC+URETHAN,WHT	GH72-24174A
QLC01		LCD-SCHN500 MODULE;WD-G1206W7-6WEOi,	GH07-00739A
QME01		UNIT-METAL DOME;SCH-N500,SSM5017P083	GH59-02239A
QMI01		MICROPHONE-ASSY-SCHN380;2,130~500uA,	GH30-00174A
QMO01		MOTOR DC-SCHN380 MOTOR;DMJBRK12BQ,SC	GH31-00150A
QMP01		PBA MAIN-SCHN500;SCH-N500,EU,INDA,PB	GH92-02271A
QMW01		PCT-MAIN WINDOW;SCH-N500,ACRYL,TRP,-	GH72-24175A
QRE01		MEC-REAR CASE;SCH-N500,TATA,-,-,-,-,	GH75-07755A
QRF01		RMO-RF COVER;SCH-N500,ELASTOMA,PI4.7	GH73-05218A
QSH01		MEC-SHIELD REAR;SCH-N500,TATA,-,-,-,-,	GH75-07757A
QSP01		SPEAKER;0.5W,8ohm,87dB,750Hz±15%	3001-001705
QFR01		MEC-FRONT CASE;SCH-N500,TATA,-,-,-,-,	GH75-07754A
	QRF03	PMO-EAR COVER;SCH-N500,PC+URETHAN,WH	GH72-24171A
QKP01		MEC-KEYPAD;SCH-N500,TATA,-,-,-,-,SIL	GH75-07756A

Description	Sec Code
CARD-WARRANTY;INDA,TATA,ENGLISH,MOJO	6801-001471
BAG PE;LDPE,T0.05,W80,L180,TRP,-,-	6902-000634
CHARGER-SCHN380 TA;TAD137IBE,SCH-N38	GH44-00902A
LABEL(P)-WATER SOAK;COMM,NORGE,100G,	GH68-02026A
LABEL(R)-WARRANTY STICKER;COMM,-,-,-	GH68-03459A
MANUAL-QUICK GUIDE;SCH-N500,RELIANCE	GH68-07504A
MANUAL-QUICK GUIDE;SCH-N500,RELIANCE	GH68-07765A
LABEL(R)-MRP(TAT);SCH-N500,TAT,POLYE	GH68-08148A
LABEL(R)-MAIN(TAT);SCH-N500,TAT,POLY	GH68-08157A
CUSHION-CASE MAIN;SCH-N380,HIPS,T0.6	GH69-02737A
BOX(P)-SCHN500(TATA);SCH-N500,SC300+	GH69-03260A
ICT-SHIELD FRONT;SCH-N500,STS,-,0.3,	GH70-00723A
MPR-WINDOW BOHO VINYL(B);SCH-N356,ST	GH74-08753B
MPR-TAPE INSULATION;SCH-N380,3M,7X10	GH74-13584A
MPR-BOHO VINYL WIN (B);SCH-N345,STA	GH74-15116A
MPR-TAPE FPCB INSULATION;SCH-N500,3M	GH74-16900A
MPR-SPONGE SPK;SCH-N500,SRS,PI 11XT0	GH74-16901A

9-3 Test Jig (GH80-10502C)



9-3-1 RF Test Cable
(GH39-00261A)



9-3-2 Test Cable
(GH39-00122A)



9-3-3 Serial Cable



9-3-4 Power Supply
Cable



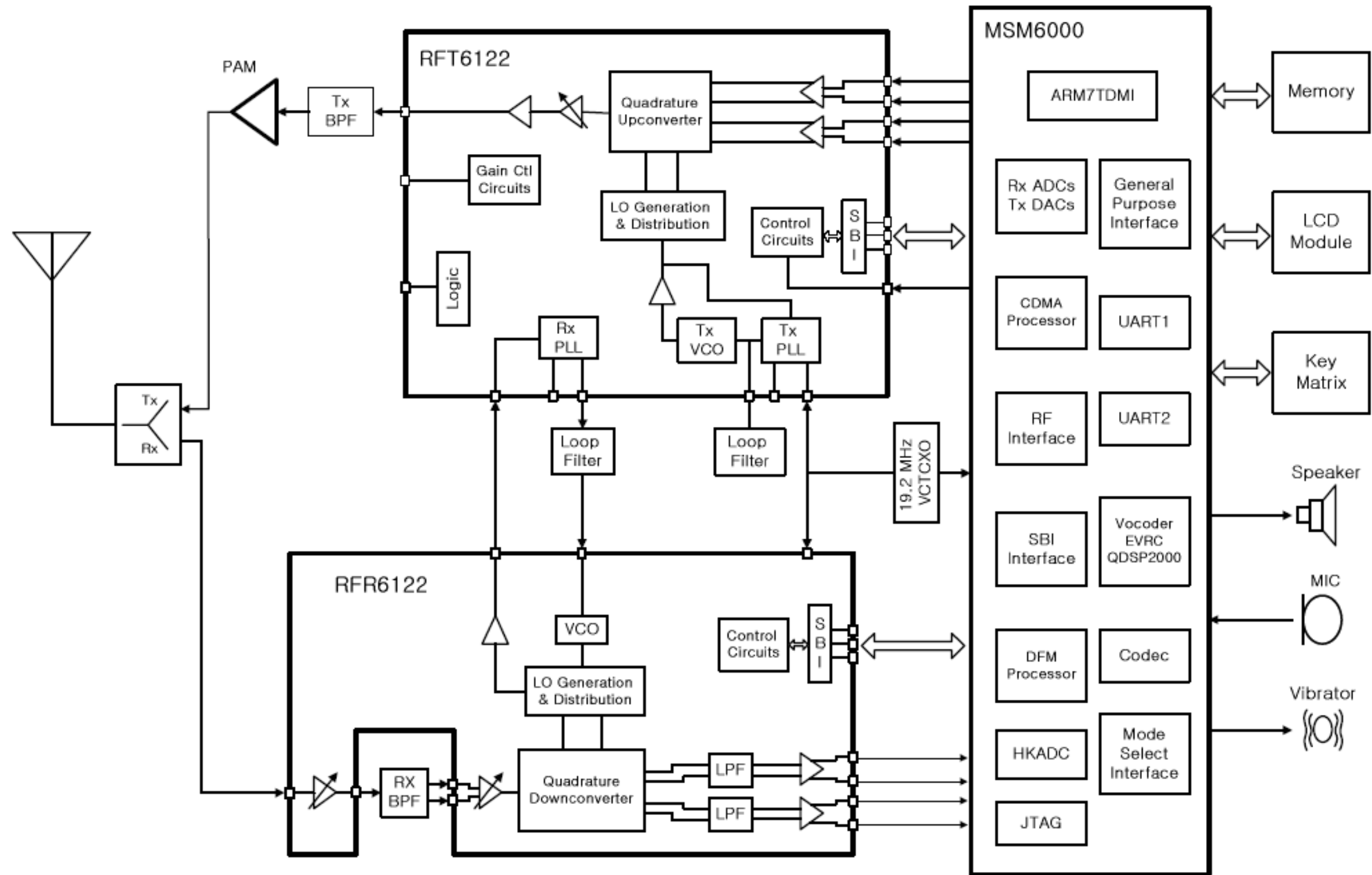
9-3-5 DATA CABLE
(GH39-00221A)



9-3-6 TA
(GH44-00902A)



10. Block Diagrams



11. PCB Diagrams

11-1. Main PCB Top Diagram



11-2. Main PCB Bottom Diagram

