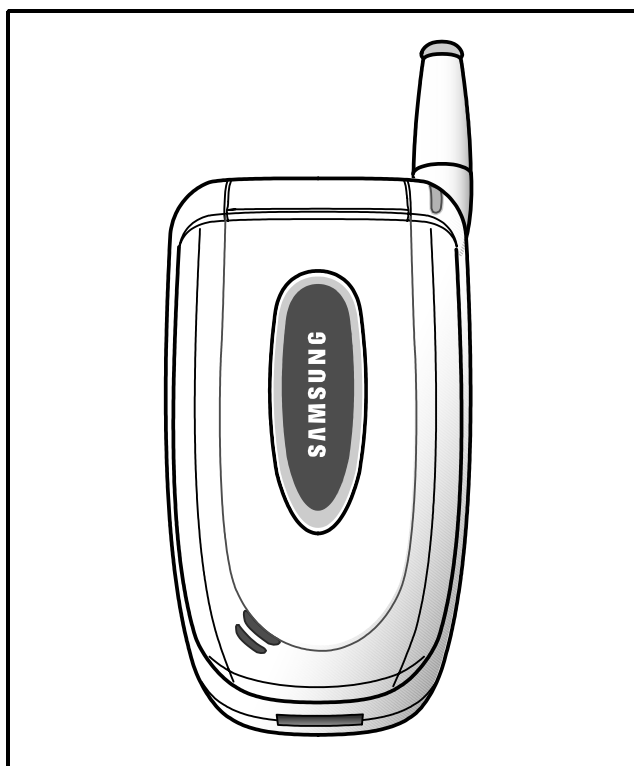


SAMSUNG

CDMA TELEPHONE SCH-A650

SERVICE *Manual*

CDMA TELEPHONE



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BASIC.

1. General Introduction

The SCH-A650 DBTM+GPS(Tri-Band Quad-Mode) phone functions as digital phone working in PCS (Personal Communication Service), CDMA(Code Division Multiple Access), AMPS modes and GPS mode. The following standards and minimum performance standards shall be met or exceeded by each subscriber unit.

Air Interface

The Subscriber Unit shall be Dual band and Tri mode in compliance with TSB-74, ANSI J-STD-008.

ANSI J-STD-008 : Personal Station-Base Station Compatibility Requirements for 1.8 to 2.0 GHz CDMA PCS.

ANSI J-STD-018 : Recommended Minimum Performance Requirements for 1.8 to 2.0 GHz CDMA
Personal Stations.

CDG Ref. Document #27 : High Rate Speech Service Option for Wideband Spread Spectrum System.

TIA/EIA IS-96A : Speech Service Option 1 Standard for Dual mode Wideband Spread Spectrum Cellular Systems.

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.

TIA/EIA IS-98C : Recommended Minimum Performance Standard for Dual-Mode Wideband Spread PCS
Cellular Systems. Both Analog and CDMA sections apply.

TIA/EIA IS-801-1 : Position Determination Service standards for Dual Mode Spread Spectrum System.

TIA/EIA/TSB-74 : Support for 14.4Kbps Data Rate and PCS interaction for wide band spread spectrum
cellular system.

CDMA Receiver/Transmitter Specifications and Requirements

The Subscriber Unit shall comply with ANSI J-STD-008 and meet TIA/EIA IS-98C. The Subscriber Unit shall comply with Personal Station Class II.

2. SCH-A650 Specification

1. General

Item	CDMA	AMPS	PCS	GPS
Tx Freq. range	824.64 ~ 848.37MHz	824.04 ~ 848.97MHz	1851.25 ~ 1908.75MHz	
Rx Freq. range	869.64 ~ 893.37MHz	869.04 ~ 893.97MHz	1931.25 ~ 1988.75MHz	1574~1576MHz
Channel Bandwidth	1.23 MHz	30 KHz	1.23MHz	
Channel Spacing	30 KHz	30 KHz	50KHz	
Number of Channel	832	832	1200	
Duplex Separation	45 MHz	45 MHz	80MHz	
Type of Emission	1M25F9W	40K0F8W, 40K0F1D	1M25F9W	
In/Output Impedance	50 Ω	50 Ω	50 Ω	
Tx IF Freq.	228.6MHz	228.6MHz	263.6MHz	
Rx IF Freq.	183.6MHz	183.6MHz	183.6MHz	
Tx Local Freq.	1st(FTx+ 228.6 MHz) 2nd(457.2 MHz)	1st(FTx+ 228.6 MHz) 2nd(457.2 MHz)	1st(FTX+ 263.6 MHz) 2nd(527.2MHz)	
Rx Local Freq	1st(FRx + 183.6 MHz) 2nd(367.2 MHz)	1st(FRx + 183.6 MHz) 2nd(367.2 MHz)	1st(FRX+ 183.6MHz) 2nd(367.2MHz)	
TCXO freq.	19.2MHz	19.2MHz	19.2MHz	
Freq. Stability	(FRx - 45MHz)± 300Hz	± 2.5ppm	(FRX-80MHz)+ /-1 50Hz	
Operating Temperature	-30 ~ + 60℃			
Supply Voltage	3.75			
Battery Cell Size and Weight	STD 06*34*50(24g) EXT 10*34*50(45g)			

2. CDMA (800MHz)

A. Transmitter

Waveform Quality : 0.944 or more

Open Loop Power Control Range @ -25dBm : -57.5dBm ~ -38.5dBm
 -65dBm : -17.5dBm ~ +1.5dBm
 -104dBm : +18.0dBm ~ +30dBm

Minimum Tx Power Control : below -50dBm

Closed Loop Power Control Range : ± 24 dB

Maximum RF Output Power : 24.5dBm

Occupied Bandwidth : 1.25MHz

Conducted Spurious Emission @ 0.9 MHz : -42dBc/30kHz
 @ 1.98 MHz : -54dBc/30kHz

B. Receiver

Rx Sensitivity and Dynamic Range : -104dBm, FER=0.5% or less
 -25dBm, FER=0.5% or less

Conducted Spurious Emission @ 869 ~ 894MHz : < -81dBm
 824 ~ 849MHz : < -61dBm
 All Other Frequencies : < -47dBm

Single Tone Desensitization : lower than 1 %

Rx Power = -101dBm

Tone Power = -30dBm

Tone Offset from Carrier = ± 0.9 MHz

Intermodulation Spurious Response Attenuation : lower than 1 %

Tone 1 offset from carrier = ± 900 KHz

Tone 2 offset from carrier = ± 1.700 MHz

- Test 1, 2

Rx power = -101dBm

Tone 1 power = -43dBm

Tone 2 power = -43dBm

- Test 3, 4

Rx power = -90dBm

Tone 1 power = -32dBm

Tone 2 power = -32dBm

- Test 5, 6
 - Rx power = -79dBm
 - Tone 1 power = -21dBm
 - Tone 2 power = -21dBm

3. AMPS

A. Transmitter

RF Output Power : 25dBm

Carrier ON/OFF Conditions

- "ON" Condition : within ± 3 dB of specification output(in 2 ms)
- "OFF" Condition : below -60dBm(in 2ms)

Compressor

- Compression Rate : 2 : 1
- Attack Time : 3 ms
- Recovery Time : 13.5 ms

Reference Input : input power level for producing a nominal ± 2.9 kHz peak frequency deviation of transmitted carrier

Preamphasis : 6dB/OCT within 0.3 ~ 3 kHz

Maximum Frequency Deviation

- F3 of G3 : ± 12 kHz

Supervisory Audio Tone : ± 2 kHz($\pm 10\%$)

Signaling Tone : ± 8 kHz($\pm 10\%$)

Wideband Data : ± 8 kHz($\pm 10\%$)

Post Deviation Limiter Filter

- 3.0 ~ 5.9 kHz : above 40 LOG(F/3000)dB
- 5.9 ~ 6.1 kHz : above 35dB
- 6.1 ~ 15 kHz : above 40 LOG(F/3000)dB
- Over 15 kHz : above 28 dB

Spectrum Noise Suppression

- For all modulation
 - $f_o + 20$ kHz ~ $f_o + 45$ kHz : above 26dB
- For modulation by voice and SAT
 - $f_o + 45$ kHz : above 63dB+ 10LOG(PY)dB

For modulation by WBD(without SAT) and ST(with SAT)

$f_o + 45 \text{ kHz} \sim f_o + 60 \text{ kHz}$: above 45 dB

$f_o + 60 \text{ kHz} \sim f_o + 90 \text{ kHz}$: above 65 dB

$f_o + 90 \text{ kHz} \sim 2 \text{ 배}$: above 63 dB + 10 LOG(PY) dB

(where f_o = carrier frequency, PY=mean output power in watts)

Harmonic and conducted Spurious Emissions : below 43 + 10 LOG(PY) dB

B. Receiver

De-emphasis : -6dB/OCT within 0.3 ~ 3 kHz

Expander

Expander Rate : 1 : 2

Attack time : within 3 ms

Recovery Time : within 13.5 ms

Reference input : output power level to a 1000Hz tone from a carrier within $\pm 2.9 \text{ kHz}$

peak frequency deviation

Sensitivity : 12 dB SINAD/-116dBm

Inter modulation Spurious Response Attenuation : above 65dB

RSSI Range : above 60dB

Protection Against Spurious Response Interference : above 60dB

In Band Conducted Spurious Emission

Transmit Band : below -60 dBm

Receive Band : below -80 dBm

Out of Band Conducted Spurious Emissions : below -47dBm

Radiated Spurious Emission

Frequency Range : Maximum Allowable EIRP

25 ~ 70MHz : -45dBm

70 ~ 130MHz : -41dBm

130 ~ 174 MHz : -41 ~ -32dBm

174 ~ 260 MHz : -32 dBm

260 ~ 470 MHz : -32 ~ -26 dBm

470 ~ 1G MHz : -21 dBm

4. US PCS (1.9GHz)

A. Transmitter

Waveform Quality : 0.944 or more

Open Loop Power Control Range @ -25dBm : -60.5dBm ~ -41.5dBm
-65dBm : -20.5dBm ~ +1.5dBm
-104dBm : +15.0dBm ~ +25.5dBm

Minimum Tx Power Control : below -50dBm

Closed Loop Power Control Range : +/-24dB

Maximum RF Output Power : 25.5dBm

Occupied Bandwidth : 1.23MHz

Conducted Spurious Emission @1.25 MHz : -42dBc/30kHz

B. Receiver

Rx Sensitivity and Dynamic Range : -104dBm, FER=0.5% or less
: -25dBm, FER=0.5% or less

Conducted Spurious Emission @ 1930~1990 MHz : <-81dBm
1850~1910 MHz : <-61dBm
All Other Frequencies : <-47dBm

Single Tone Desensitization : lower than 1 %

Rx power level = -101dBm

Tone power level = -30dBm

Tone offset from carrier = +/-1.25 MHz

Intermodulation Spurious Response Attenuation : lower than 1 %

Rx power = -101dBm

Tone 1 power = -43dBm

Tone 2 power = -43dBm

Tone 1 offset from carrier = +/-1.25 MHz

Tone 2 offset from carrier = +/-2.05 MHz

5. GPS

A. Receiver

Frequency Range : 1574~1576 MHz

3. Installation

3-1 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 latch snaps 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.

3-2 Using the Desktop Holder

1. Plug the AC cord from the travel adapter into the electrical outlet.
 2. Connect the travel adapter to the desktop holder.
 3. Remove the connector rubber plug from the bottom of your phone.
 4. Insert the phone (with the battery installed) into the slot.
- ◇ A red light on the charger lets you know the battery is charging.
 - ◇ A green light lets you know that the battery is at least 90 percent charged.
 - ◇ A orange light indicates that the battery is operating at a temperature that is too high or low, or that the charger is not plugged in correctly. Please check the charger and the battery.

Specifications using DTH (Desktop Holder)

Battery Type	Standard Battery (Li-ion, 1000mAh)	Extended Battery (Li-ion, 1700mAh)
Charging	< 5 hours	< 5 hours
SEC Code	GH43-01004A	GH43-01005A

6. Circuit Description

6-1. Phone Section

6-1-1 Power Supply

To power on the phone, Pressing the PWR key with the battery installed will short the V_BAT and ON_SW signal. The V_DC, which is connected with V_BAT, will be turned on simultaneously, The V_PD and V_RX LDOs outputs of Regulator(U201,U322) are turned on assuming V_BAT is greater than 2.85V.

Pressing the PWR key(END/①) of the keypad for a few seconds, The V_BAT voltage is applied to the ON_SW, the ON_SW signal will transition high when the PWR_HOLD signal is high.

During the phone is powered on, pressing and holding the PWR key a few second, the on_sw_sense signal is maintained to low state then the pwr_hold signal goes to low, the phone is powered off.

Once the PWR_HOLD signal is low all the LDOs output of the Regulator(U201,U322)will be powered off after typically 60ms delay.

The V_PD output voltage of Regulator(U201) is connected with V_MEM(used in memory), V_LCD(used in LCD), V_MSMD(used in the digital parts of MSM).

6-1-2 Logic Part

The logic part consists of internal CPU of MSM, Memory and EEPROM.

The MSM receives TCXO and CHIPX8 clock signals from the IFR and controls the phone during the CDMA and the FM mode. The major components are as follows:

CPU : MSM5100(U100) - ARM7TDMI μ -processor

Memory : U101(AM50DL) - 32MBIT FLASH ROM, 8MBIT SRAM

EEPROM : U102(24C256) - 256KBIT SERIAL EEPROM

CPU (U100)

ARM7TDMI μ -processor is used for the main processing.

The CPU controls all the circuitry. The 32.768KHz crystal is used for sleep mode.

MEMORY(U101)

32M FLASH ROM and 8M SRAM are used to store the terminal's program, the internal flag information, call processing data, data service, and timer data.

Using the down-loading program, the program can be changed even after the terminal is fully assembled.

EEPROM(U102)

One 256KBIT EEPROM is used to store ESN, NAM, power level, volume level, and telephone number.

6-1-3 Baseband Part

MOBILE SYSTEM MODEM (MSM)

The MSM equipped with the ARM7TDMI CPU core is an important component of the CDMA cellular phone. The MSM comes in a 208-ball FBGA package.

MICROPROCESSOR INTERFACE

The interface circuitry consists of reset circuit, address bus(DA_A(0)-DA_A(21)) data bus(DD_A(0)-DD_A(15)), and memory controls (ROM_CS1_N, RAM_CS1_N, RAM_CS2_N, WE_N, OE_N, LB_N, NS_UB, ROM_WP).

INPUT CLOCK

Sleep clock: 32.768KHz

●TCXO_CLK(pin A17): 19.2MHz.

This clock signal from the IFR is the reference clock for the MSM.

●CX8_FM_CLK(pin A14): The output clock is CHIPX8(9.8304MHz) in CDMA mode and 360KHz clock in FM mode

●SLEEP-XTAL-IN/OUT(pins T17,R17) : 32.768KHz

IFT/IFR INTERFACE

PCS, FM Data Interface

●RX_IDATA2-3(pins C17, C16) and RX_QDATA0-3(pins D13, C13, B13, A13) : RX data bus used during PCS and CDMA mode.

●FM_RX_IDATA(pin B15) and FM_RX_QDATA(pin B14) : RX data bus used during FM mode.

Clock

●CX8_FM_CLK : ADC reference clock used in PCS and CDMA RX mode.

Data Port Interface

Includes the UART and USB. Also, supports Diagnostic Monitor(DM) and HP equipment interface.**RF Interface**

TX : TX_AGC_ADJ(pin A12) port is used to control the TX power level.

PA_ON_PCS(C11) signal is used to control the power amplifier in the PCS mode.

PA_ON_CELL(D6) signal is used to control the power amplifier in the CDMA mode.

The PA_ON(pin L4) signal is used to control the power amplifier.

RX : AGC_REF(pin M1) port is used to control the RX gain and TRK_LO_ADJ(pin B11) is used to compensate the TCXO clock.

General Purpose I/O Register Pins

Input/output ports to control external devices.

Power Down Control

When the IDLE/ signal turns HIGH, only the TX sections will be disabled.

If the SLEEP_N (pin A8) changes to LOW, all the pins except for the TCXO is disabled.

When the SLEEP_N (pin A8) signal is high, TCXO will be disabled for a definite period.

6-1-4 Audio PartTX AUDIO PATH

The voice signal from the microphone is filtered and amplified by the internal OP-AMP and is converted to PCM data by the internal CODEC in the MSM (U100). This signal then applied to the MSM(U100)'s internal vocoder.

RX AUDIO PATH

The PCM data from the MSM is converted to audio signal by ADC of the internal CODEC in the MSM (U100), is then amplified by the internal CODEC in the MSM to be sent to the speaker unit.

6-1-5 TX WBD, ST, and SAT

These signals are generated from MSM. The modulation level of TX WBD and ST is $\pm 8\text{kHz/dev}$, and SAT is $\pm 2\text{kHz/dev}$.

6-2 RF Part

6-2-1 Transmitter(for PCS)

ANTENNA

Antenna sends signal to the base station and receives the signal from the base station. It is a tri-band Antenna and covers PCS band, CDMA band, and GPS band.

RF SWITCH

It(U406:GN04022NOL) is used to switch the PCS/CDMA path and the GPS path. The RF signal pass through PCS/CDMA path when GPS_MODE is low and nGPS_MODE_ is high. GPS_MODE and nGPS_MODE_ are digital signals from MSM5100 GPIO.

DUPLEXER

Duplexer(U404:QPMD-0422-TR1) allows to transmit only the signals within acceptable Tx frequency range (1880 ± 30 MHz) through the antenna. It also matches LNA block(U300) input in receiving part and PAM(U402:CX77107) output in transmitter part.

POWER AMP

PAM(U402:CX77107) amplifiers signal to be sent to the base station through the antenna.

DRIVER AMP

The driver amp(it is included in RFT3100 : U405) allows the signal to be inputted to the power amp(U402) as a specified level.

UP-CONVERTER

The up-converter(it is included in RFT3100:U405) converts the IF frequency(263.6 MHz) to RF frequency (1880 ± 30 MHz). The RF frequency (1880 ± 30 MHz) is generated by adding the IF frequency(263.6 MHz) to first local frequency (2143.6 ± 30 MHz)

IF AUTOMATIC GAIN CONTROL AMP

The TX IF AGC amp (in RFT3100) controls gain of AGC to deliver power level needed at driver amp. Dynamic range is 85dB, and its control voltage varies from 0.2V to 2.5V.

6-2-2 Transmitter(for CDMA)

ANTENNA

Antenna sends signal to the base station and receives the signal from the base station. It is a tri-band Antenna and covers PCS band, CDMA band, and GPS band.

RF SWITCH

It(U406:GN04022NOL) is used to switch the PCS/CDMA path and the GPS path.

The RF signal pass through PCS/CDMA path when GPS_MODE is low and nGPS_MODE_ is high. GPS_MODE and nGPS_MODE_ are digital signals from MSM5100 GPIO.

DUPLEXER

Duplexer(U407:EFSD836MC2S3) allows to transmit only the signals within acceptable Tx frequency range (835 ± 15 MHz) through the antenna. It also matches LNA block(U300) input in receiving part and PAM(U408:CX77105) output in transmitter part.

POWER AMP

PAM(U408:CX77105) amplifiers signal to be sent to the base station through the antenna.

DRIVER AMP

The driver amp(it is included in RFT3100 : U702) allows the signal to be inputted to the power amp(U708) as a specified level.

UP-CONVERTER

The up-converter(it is included in RFT3100:U405) converts the IF frequency(228.6 MHz) to RF frequency (835 ± 15 MHz). The RF frequency (835 ± 15 MHz) is generated by adding the IF frequency(228.6 MHz) to first local frequency (1063.6 ± 15 MHz)

IF AUTOMATIC GAIN CONTROL AMP

The TX IF AGC amp (in RFT3100) controls gain of AGC to deliver power level needed at driver amp. Dynamic range is 85dB, and its control voltage varies from 0.2V to 2.5V.

6-2-3 Receiver(for PCS (1900MHz))

LOW NOISE AMPLIFIER(LNA)

The low noise amplifier(It is included in MAX2538EGI : U300) 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(F301:856080) passes only a specific frequency(1960 ± 30 MHz) from the signal amplified by LNA. It is used to rejects signals such as the first image, half-IF, and local oscillator spurious resonances. The bandwidth is 60 MHz.

DOWN CONVERTER(MIXER)

The first local signal is applied to this down converter(U300 ; It is included in MAX2538EGI). This

converts the RF signal from the LNA to IF signal(183.6MHz). The IF signal is made by subtracting first local signal from RF signal(1960 ± 30 MHz).

IF BAND PASS FILTER(RX IF SAW FILTER)

This filter(F302:B4955) allows only an IF frequency(183.6 MHz) to pass to the detection circuitry(S1M8660A01:U595). The bandwidth is 1.25MHz.

IF AUTOMATIC GAIN CONTROLLER(AGC) AMP

IF signal(183.6MHz) is applied to IF AGC amplifier(in S1M8660A01) and AGC level is applied to next stage in IFR3300. The AGC amp(in S1M8660A01) keeps the signal at a constant level by controlling the gain. Dynamic range is 90 dB, up gain 45dB, and down gain -45dB.

6-2-4 Receiver(for CDMA(800MHz))

LOW NOISE AMPLIFIER(LNA)

The low noise amplifier(It is included in MAX2538EGI : U300) 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:B7730) passes only a specific frequency(880.89 ± 30 MHz) from the signal amplified by LNA. It is used to reject signals such as the first image, half-IF, and local oscillator spurious responses. The bandwidth is 60 MHz.

DOWN CONVERTER(MIXER)

The first local signal is applied to this down converter(U300 ; It is included in MAX2538EGI). This converts the RF signal from the LNA to IF signal(183.6MHz). The IF signal is made by subtracting first local signal from RF signal(880.89 ± 30 MHz).

IF BAND PASS FILTER(RX IF SAW FILTER)

This filter(F302:B4955) allows only an IF frequency(183.6 MHz) to pass to the detection circuitry(S1M8660A01:U595). The bandwidth is 1.25MHz.

IF AUTOMATIC GAIN CONTROLLER(AGC) AMP

IF signal(183.6MHz) is applied to IF AGC amplifier(in S1M8660A01) and AGC level is applied to next stage in S1M8660A01. The AGC amp(in S1M8660A01) keeps the signal at a constant level by controlling the gain. Dynamic range is 90 dB, up gain 45dB, and down gain -45dB.

6-2-5 Receiver(GPS(1575.42MHz))

ANTENNA

GPS antenna receives signal from GPS satellites. It is a tri-band Antenna and covers PCS band, CDMA band, and GPS band.

RF Switch

It(U406:GN04022NOL) is used to switch the PCS/CDMA path and the GPS path.

The RF signal pass through GPS path when GPS_MODE is high and GPS_MODE_ is low.

GPS_MODE and GPS_MODE_ are digital signals from MSM5100 GPIO.

PRE-FILTER

The RF Pre-filter(F304:B9000) passes only a specific frequency(1575.42 ± 2 MHz) from the signal received from the satellite. The bandwidth is 2MHz.

LOW NOISE AMPLIFIER(LNA)

The low noise amplifier(It is included in MAX2538EGI : U300) amplifies a weak signal received from the satellite to obtain the optimum signal level.

RF BAND PASS FILTER(RX RF SAW FILTER)

The RF BPF(F402:B9000) passes only a specific frequency(1575.42 ± 2 MHz) from the signal received from the satellite. The bandwidth is 2 MHz.

DOWN CONVERTER(MIXER)

The first local signal is applied to this down converter(U300 ; It is included in MAX2538EGI). The down converter converts the signal from LNA into 183.6MHz IF signal. 183.6MHz IF signal is made by subtracting first local signal(1391.82 MHz) from the RF signal(1575.42MHz).

IF BAND PASS FILTER(RX IF SAW FILTER)

The IF BPF(F303:SAFCC183M_6T00R12) allows only an IF frequency(183.6 MHz) to pass to the detection circuitry(S1M8660A01:U595)

IF AUTOMATIC GAIN CONTROLLER(AGC) AMP

IF signal(183.6MHz) is applied to IF AGC amplifier(in S1M8660A01) and AGC level is applied to next stage in S1M8660A01. The AGC amp(in S1M8660A01) keeps the signal at a constant level by controlling the gain. Dynamic range is 90 dB, up gain 45dB, and down gain -45dB.

6-2-6 PLL Block

FREQUENCY SYNTHESIZER CIRCUIT

The PLL(Phased Locked Loop) block consists of VC-TCXO(OSC300), PLL IC(U302) and VCO(OSC301). Input reference frequency is generated at VC-TCXO and the RF local signal is generated at VCO. PLL compares the two signals and generates the desired signal with a preprogrammed counter which controls voltage.

VC-TCXO

The VC-TCXO(OSC300) is a reference source of the frequency synthesizer. It provides 19.2MHz reference frequency to PLL-IC. It is a voltage controlled temperature compensated crystal oscillator having 19.2MHz $\pm$ 2.5ppm frequency stability over all useful temperature range. A correct frequency tuning is made by the control voltage.

VOLTAGE CONTROLLED OSCILLATOR(DUAL MODE VCO)

It(U302) generates first local signal and is dual mode VCO. One mode is the PCS and CDMA mode and the other is GPS mode. When nGPS_MODE_ is high, PCS and CDMA mode is choosed and output range is 2105.28~2173.6MHz. When nGPS_MODE_ is low, GPS mode is choosed and output is 1391.82 MHz.

PLL IC

The PLL IC includes pre-scalers, dividers and charge pump. The reference divider in the PLL IC divides the frequency of VC-TCXO into 10kHz and 30kHz . This reference frequency is supplied to one of the inputs of phase detector. The signal generated at VCO goes into another input stage of the phase detector through a pre-scaler and a programmable divider. At this point the error proportional to the phase difference of the two inputs occurs. This phase error is applied to the frequency control input stage of VCO through the loop filter which consists of resistors and capacitors.

TEMPERATURE TO VOLTAGE CONVERTER

The temperature to voltage converter(TH100) detects temperature. It is used to compensate active component characteristic due to the temperature difference.

6-3 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]

To enter the hundredth digit of command number, press * ex)134 → *134

Command No	Command SW Name	Description
01	T_SUSPEND_I	Enter to test menu
02	T_RESTART_I	escape from test menu
03	T_SAVE_VAL_I	Save values in e2prom only in auto test
04	T_GET_MODE_I	Get mode CDMA/FM AUTO TEST
05	T_SET_MODE_I	Set mode CDMA/FM AUTO TEST
06	T_WRITE_NV_I	Write the EEPROM item
07	T_CARRIERON_I	turn on the carrier
08	T_CARRIEROFF_I	turn off the carrier
09	T_LOADSYN_I	load the synthesizer for locking
10	T_PWRLEVEL_I	change RF power level
11	T_RXMUTE_I	mute rx audio
12	T_RXUNMUTE_I	unmute rx audio
13	T_TXMUTE_I	mute tx audio
14	T_TXUNMUTE_I	unmute tx audio
15	T_VOC_ESEC_I	Echo Cancellor
16	T_STON_I	turn on ST
17	T_STOFF_I	turn off ST
18	T_LCD_CONTRAST_I	LCD Contrast
19	T_CDMA_IMD_I	LNA range control
20	T_LNA_GAIN_WR_I	
21	T_TEST_SYS_I	DBDM Roam add Test System
22	T_SNDNAM_I	Send NAM Information
23	T_SNDVERSION_I	Send Software Version
24	T_SNDESN_I	Send ESN
25	T_BACKLIGHT_ON_I	Backlight on
26	T_BACKLIGHT_OFF_I	Backlight off
27	T_LAMP_ON_I	LAMP on
28	T_LAMP_OFF_I	LAMP off
29	T_REBUILD_I	Rebuilding EEPROM

30	T_PLINE_I	Product life information
31	T_MRU2_TABLE_I	MRU reset
32	T_SATON_I	turn on SAT
33	T_SATOFF_I	turn off SAT
34	T_CDATA_I	continuously send TX Control data
35	T_VOLUME_UP_I	Electric Volume Up
36	T_VOLUME_DOWN_I	Electric Volume Down
37	T_CLR_LIFETIME_I	Clear Life Time
38	T_DATASVC_ON_I	Data Service ON for Manufacturing Test
39	T_DATASVC_OFF_I	Data Service OFF for Manufacturing Test
40	T_VOC_CDMA_UNITY_GAIN_I	Vocoder CDMA unity gain
41	T_VOC_FM_HFRX_UPGAIN_I	Vocoder fm hfrx upgain
42	T_DTMFON_I	turn on DTMF
43	T_DTMFOFF_I	turn off DTMF
44	T_COMPANDORON_I	turn on compandor
45	T_COMPANDOROF_I	turn off compandor
46	T_FM_VCLINE_I	Enetr FM voice state
47	T_FM_AUD_GAIN_I	FM audio gain
48	T_VIBRATOR_ON_I	activate a vibrator
49	T_VIBRATOR_OFF_I	inactivate a vibrator
50	T_BATT_TYPE_I	Battery Type
51	T_ESN_WRITE_I	
52	T_CDMA_TEMPCOMP_I	CDMA Temp Compansation
53	T_PCS_TEMPCOMP_I	PCS Temp Compansation
54	T_CARRIER_I	Carrier selection
55	T_SET_EXT_AUDIO_I	External Audio Path On/Off
56	T_LOOPBACK_I	
57	T_PA_R0_ON_I	PA_R0 ON
58	T_PA_R0_OFF_I	PA_R0_OFF_I
59	T_ALLPATH_I	tune on the all audio path
60	T_FM_CHAN_FLAT_I	fm channel flatness
61	T_FM_AGC_MIN_ADJ_I	ADJ FM AGC MIN
62	T_FM_TEMPCOMP_I	FM Temp Compansation
63	T_TX_LIMITER_I	
64	T_FM_SAT_LEVEL_I	

65	T_FM_FREQ_SGAIN_I	
66	T_FM_ST_GAIN_I	
67	T_READ_BATT_I	Saved Low battery value read
68	T_VBATT1_I	set the low battey position in the standby
69	T_VBATT2_I	set the low battey position in the talking
70	T_WRITE_BATT_I	write a BATT
71	T_CDMA_TXADJ_I	sets tx_agc_adj for cdma mode
72	T_FM_TXADJ_I	sets tx_agc_adj for fm mode
73	T_CLEAR_ALL_I	
74	T_SNDPINFO_I	Send Product information 8 character
75	T_READ_RSSI_I	read a RSSI
76	T_PCS_RSSI_I	adj RXRAS in PCS
77	T_THERM_READ_I	read a Thermister
78	T_RXRAS_AUTO_I	adj RXRAS from 8924C
79	T_BACKUP_CAL_DATA_I	
80	T_RESTORE_CAL_DATA_I	
81	T_VOC_PCMLPON_I	turn on to play a PCM LOOP BACK
82	T_VOC_PCMLPOFF_I	turn off to play a PCM LOOP BACK
83	T_CDMA_PWR_LIMIT_I	CDMA Tx pwr limit
84	T_PCS_PWR_LIMIT_I	PCS Tx pwr limit
85	T_YMN_DUTY_I	
86	T_YMN_MCNT_I	
87	T_YMN_NCNT_I	
88	T_TRK_ADJ_I	TRK LOCAL ADJUST
89	T_CDTRK_ADJ_I	CDMA TRK LOCAL ADJUST
90	T_PCS_TXRAS_ADJ_I	PCS TX RAS adj = TXRAS offset arry
91	T_PCS_RXRAS_ADJ_I	PCS RX RAS adj = RXRAS offset arry
92	T_TXRAS_ADJ_I	TX RAS adj = TXRAS offset arry
93	T_RXRAS_ADJ_I	RX RAS adj = RXRAS offset arry
94	T_LNARAS_ADJ_I	LNA RAS adj= LNARAS offset arry
95	T_PCS_CH_FLATNESS_I	PCS channel flatness
96	T_CH_FLATNESS_I	Tx Pwr : 23dBm
97	T_FM_TX_PWR_I	setting the volume for Power Level 2 - 7
98	T_SND_MODEL_ID_I	
99	T_SND_VOC_CAL_I	
100	T_SIO_TO_DM_I	Write NV_SIO_I

111	T_GPSONE_MODE_I	Set single/continuous mode
112	T_GPSONE_GPS_RF_DELAY_FOR_PCS_I	
113	T_GPSONE_PCS_RF_DELAY_I	
115	T_GPSONE_ANT_OFF_DB_I	
116	T_GPSONE_LO_BIAS_UPDATE_CNT_I	
117	T_GPSONE_GPS_LO_CAL_I	
118	T_GPSONE_GPS_RF_LOSS_I	Set GPS RF loss
119	T_GPSONE_GPS_RF_DELAY_I	Set GPS RF delay
120	T_GPSONE_CDMA_RF_DELAY_I	Set CDMA RF delay
121	T_LNA1_ON_I	
122	T_LNA2_ON_I	
123	T_LNA12_OFF_I	
124	T_CDMA_IMD_CODE_I	Ina range control
125	T_CDMA_TXRAS0_ADJ_I	
126	T_CDMA_TXRAS1_ADJ_I	
127	T_PCS_TXRAS0_ADJ_I	
128	T_PCS_TXRAS1_ADJ_I	
129	T_BREW_PLATFORM_ID_I	Brew Platform ID
130	T_FS_ERASE_I	FS ERASE
140	T_MAX_I	

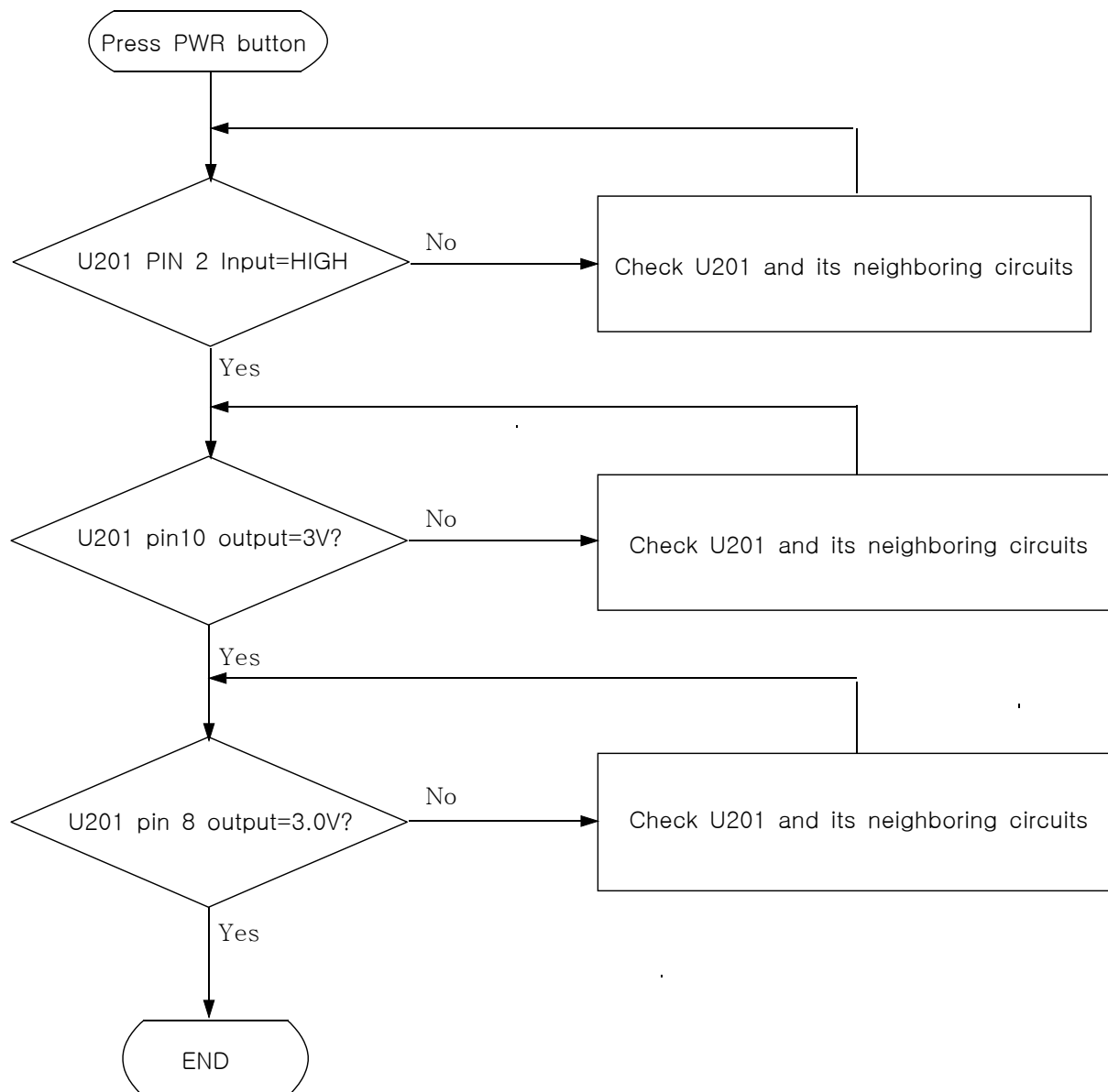
- 1) The AB (Input Argument Byte Number) values of these commands are used only in the manual test. In automatic test mode, the AB is regarded as 0.
 - 2) You can assign the value for these commands. If the AB value is assigned without argument, the test is achieved with the value stored in EEPROM.
 - 3) After you get a desired test value by performing these commands, if you want to save the value into EEPROM, use T-SAVE-VAL-I command to store the test value into the corresponding position.
- *OP: Operation Command Number / AB: Input Argument Byte Number / RB: Return Byte Number
- *SAT 32, 33 are not operating in MSM2 CHIP test
- *46 command is required in Rx, and Tx path test at AMPS mode.

8. SCH-A650 Flow Chart of Troubleshooting

1. Logic Section

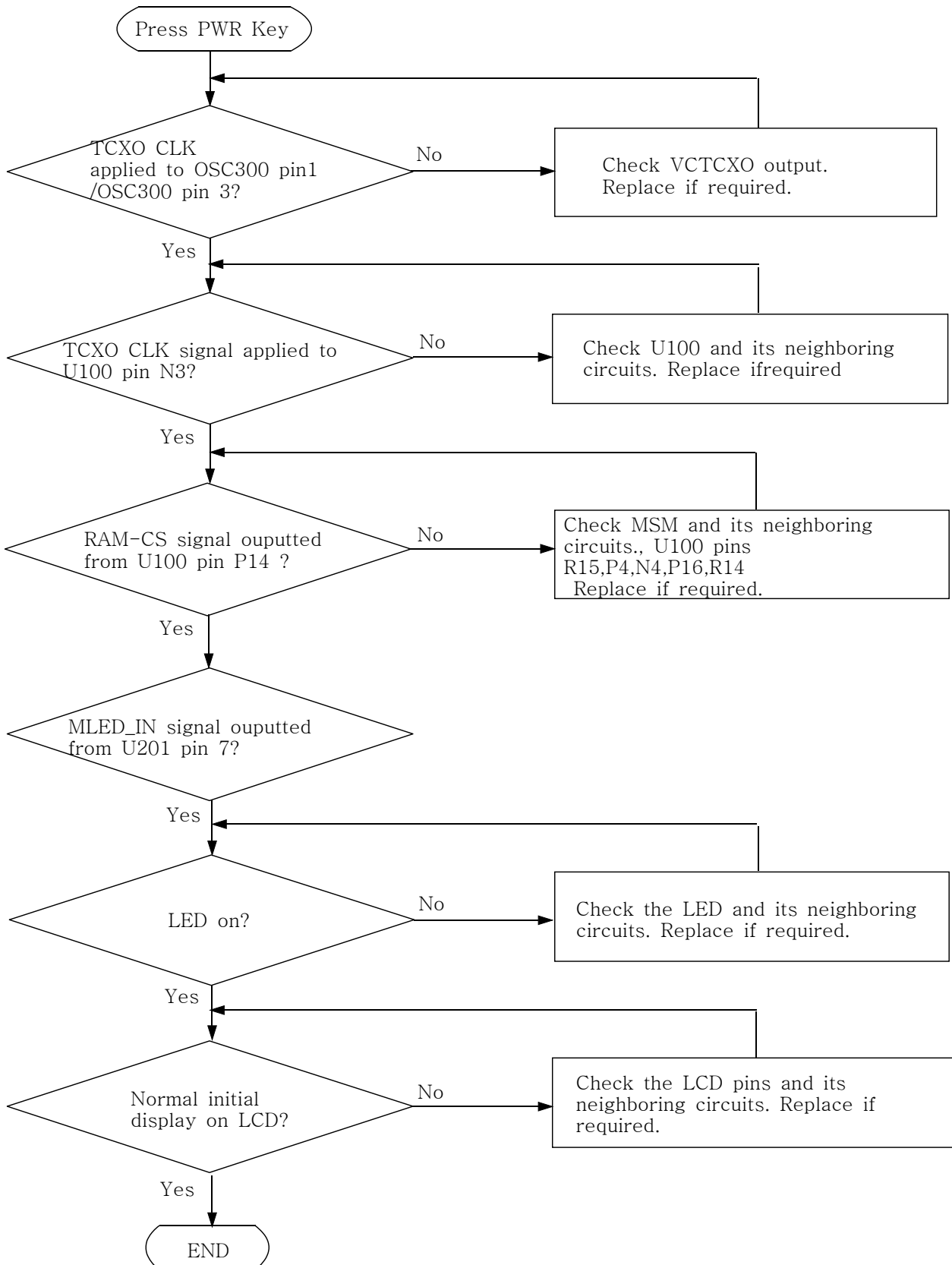
No Power

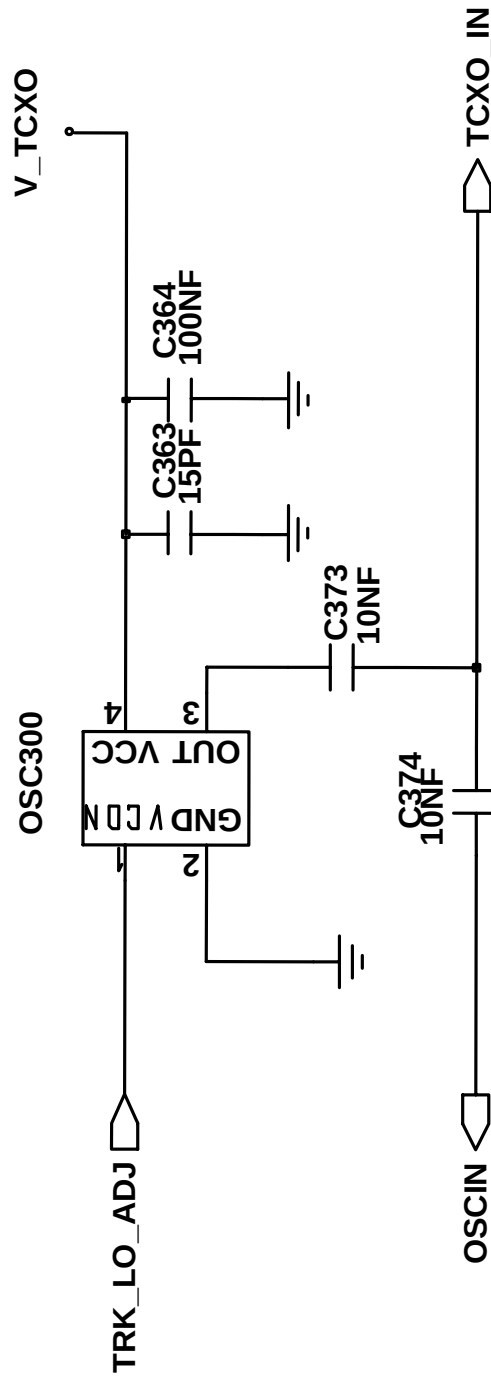
Abnormal initial operation(Normal + 3.0V voltage source)





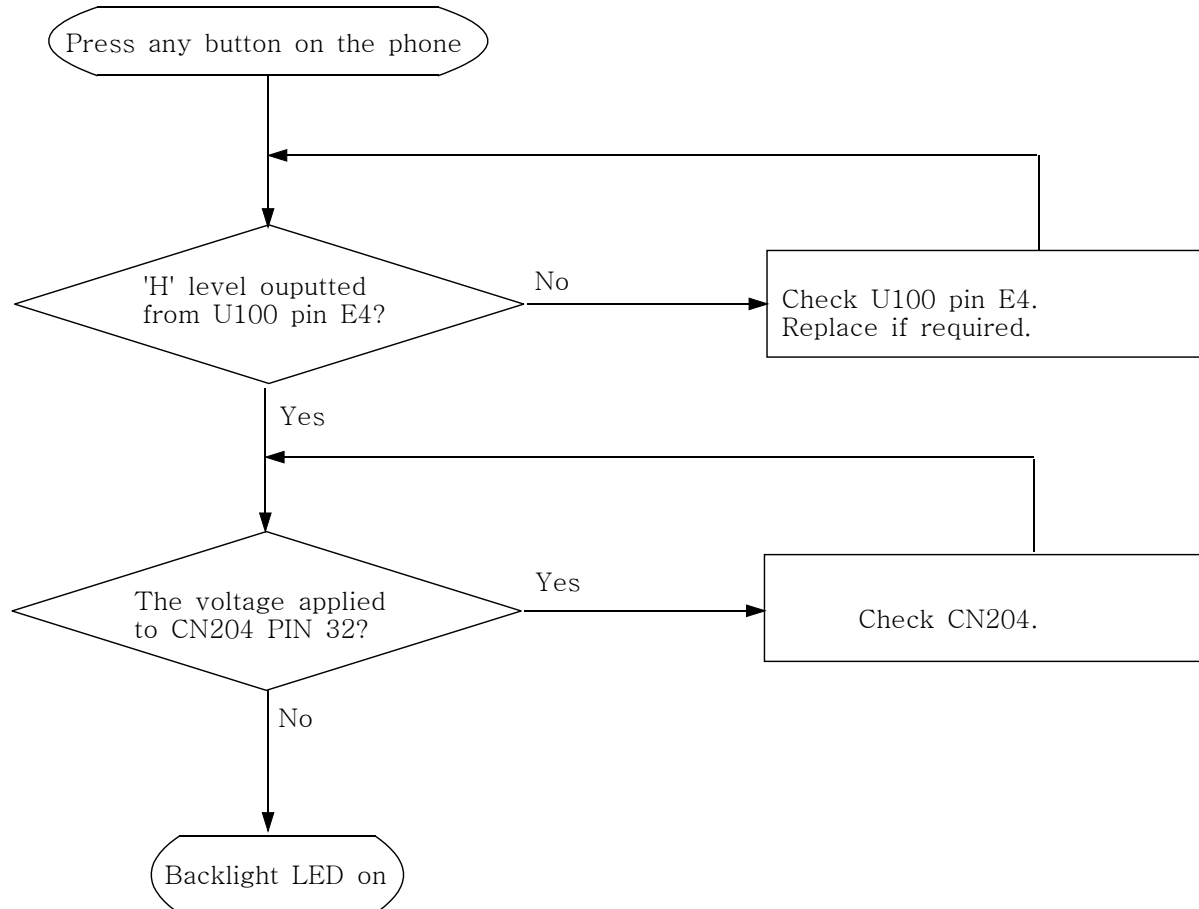
Abnormal Backlight Operation

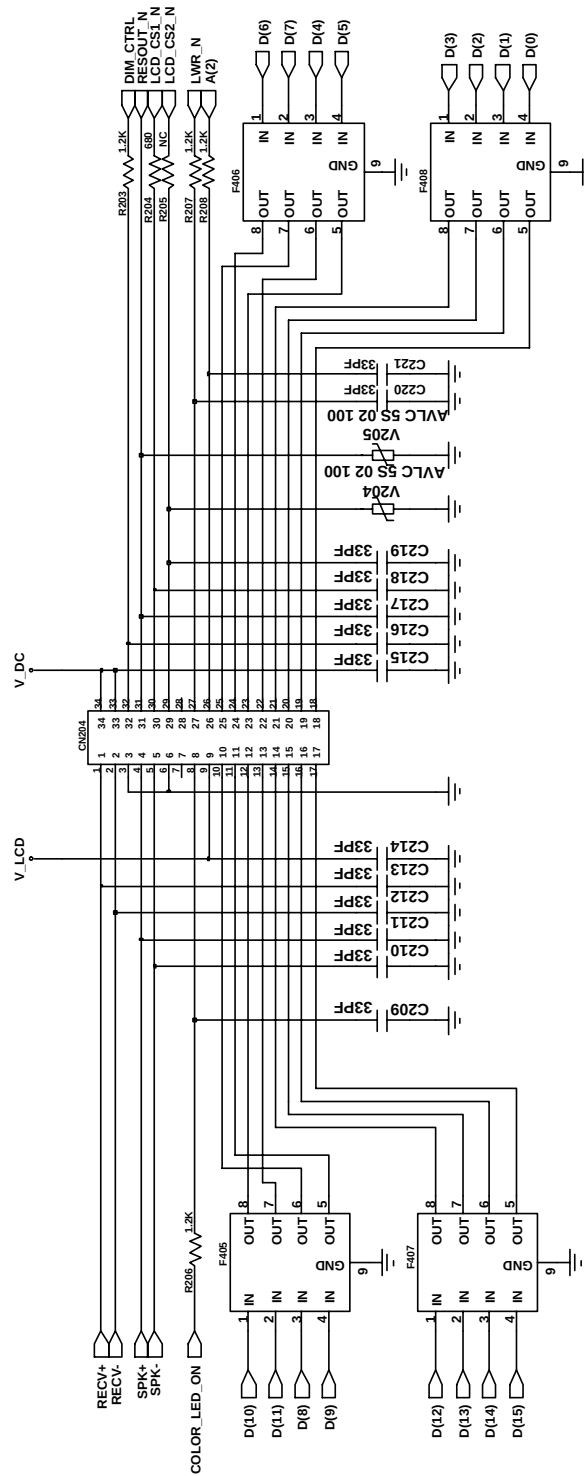




(Picture 2)

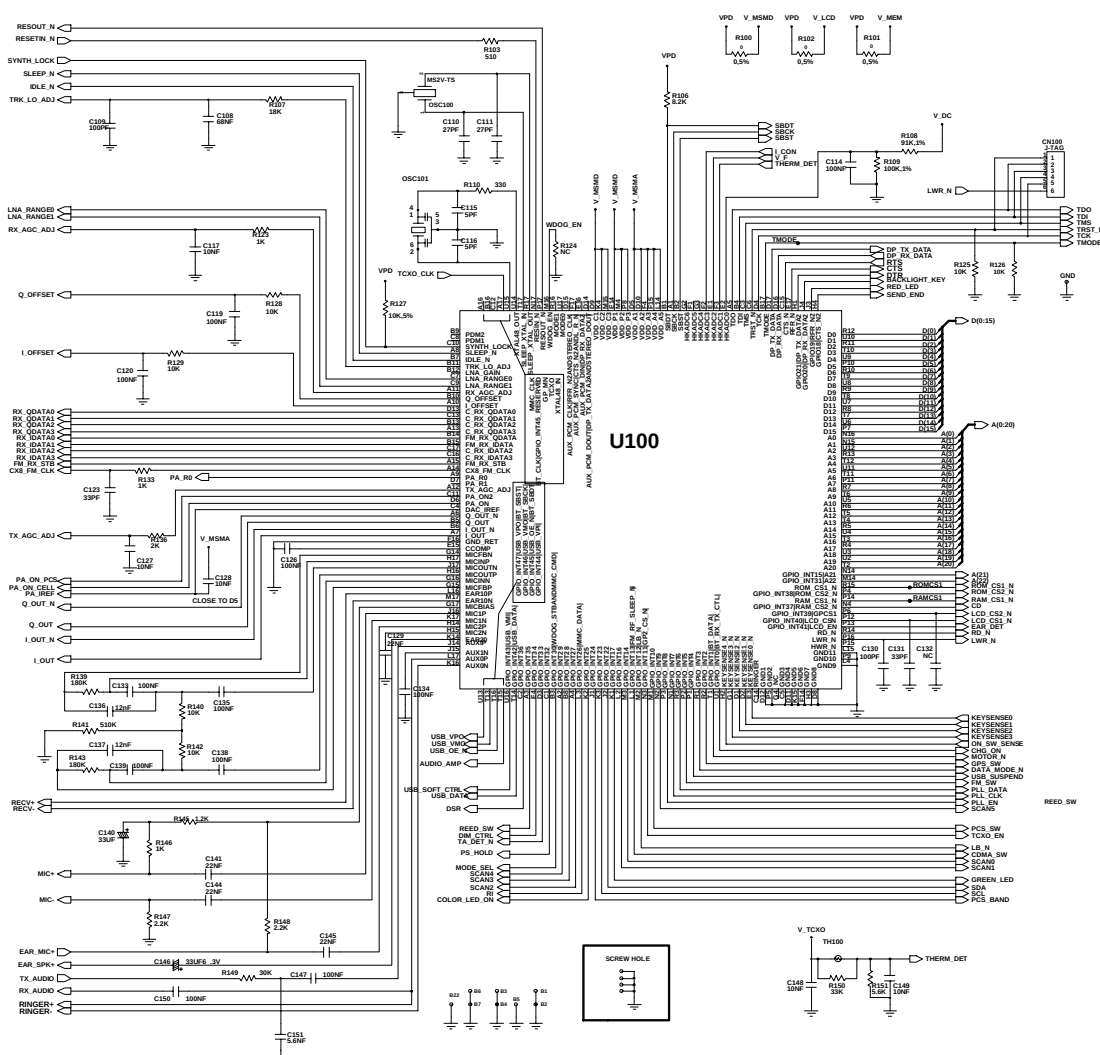
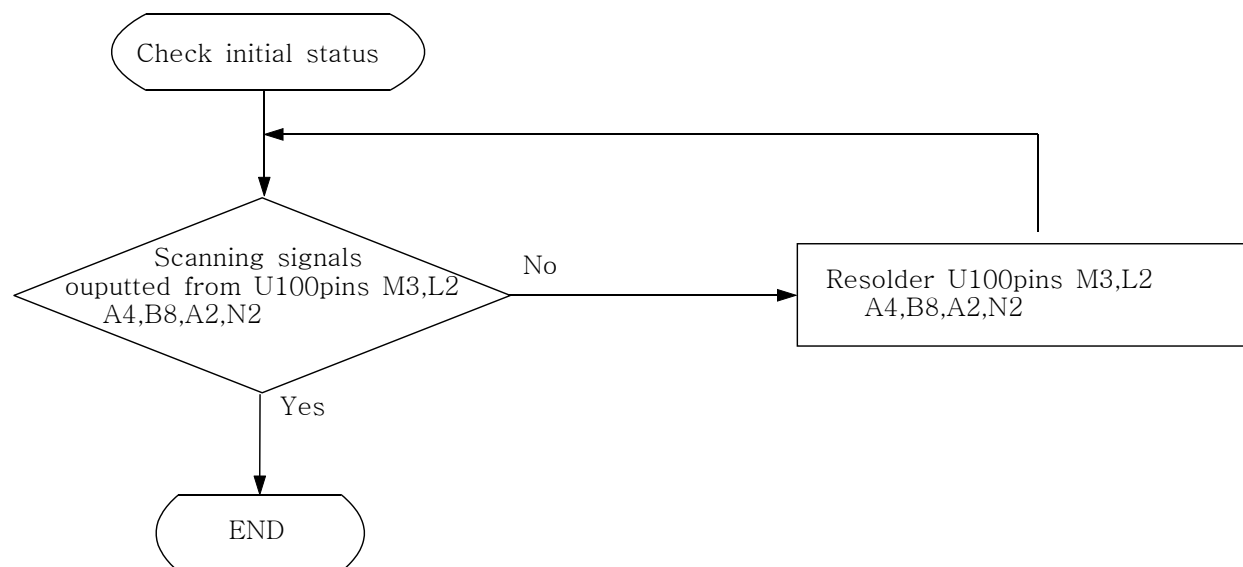
Abnormal Key Data Input



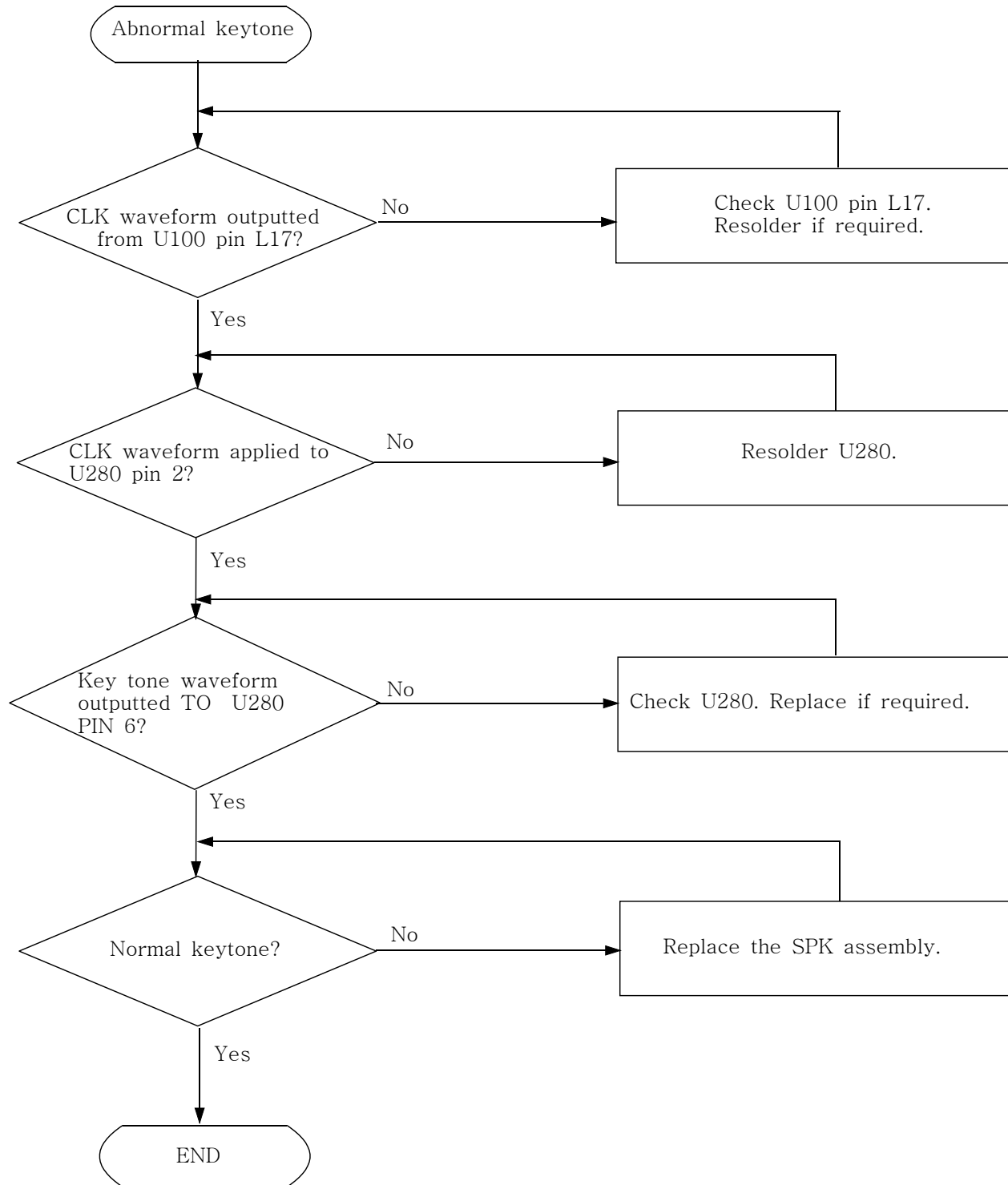


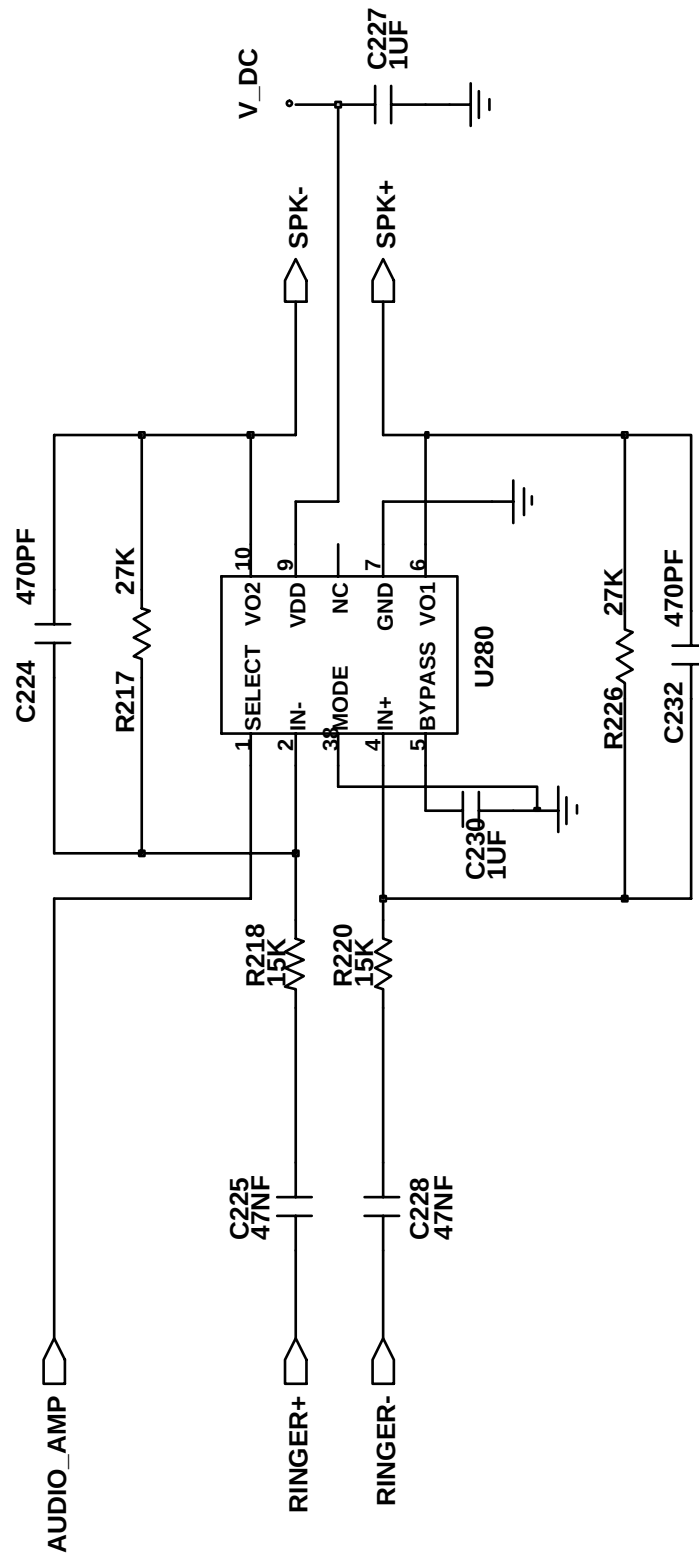
(Picture 1)

Abnormal Keytone

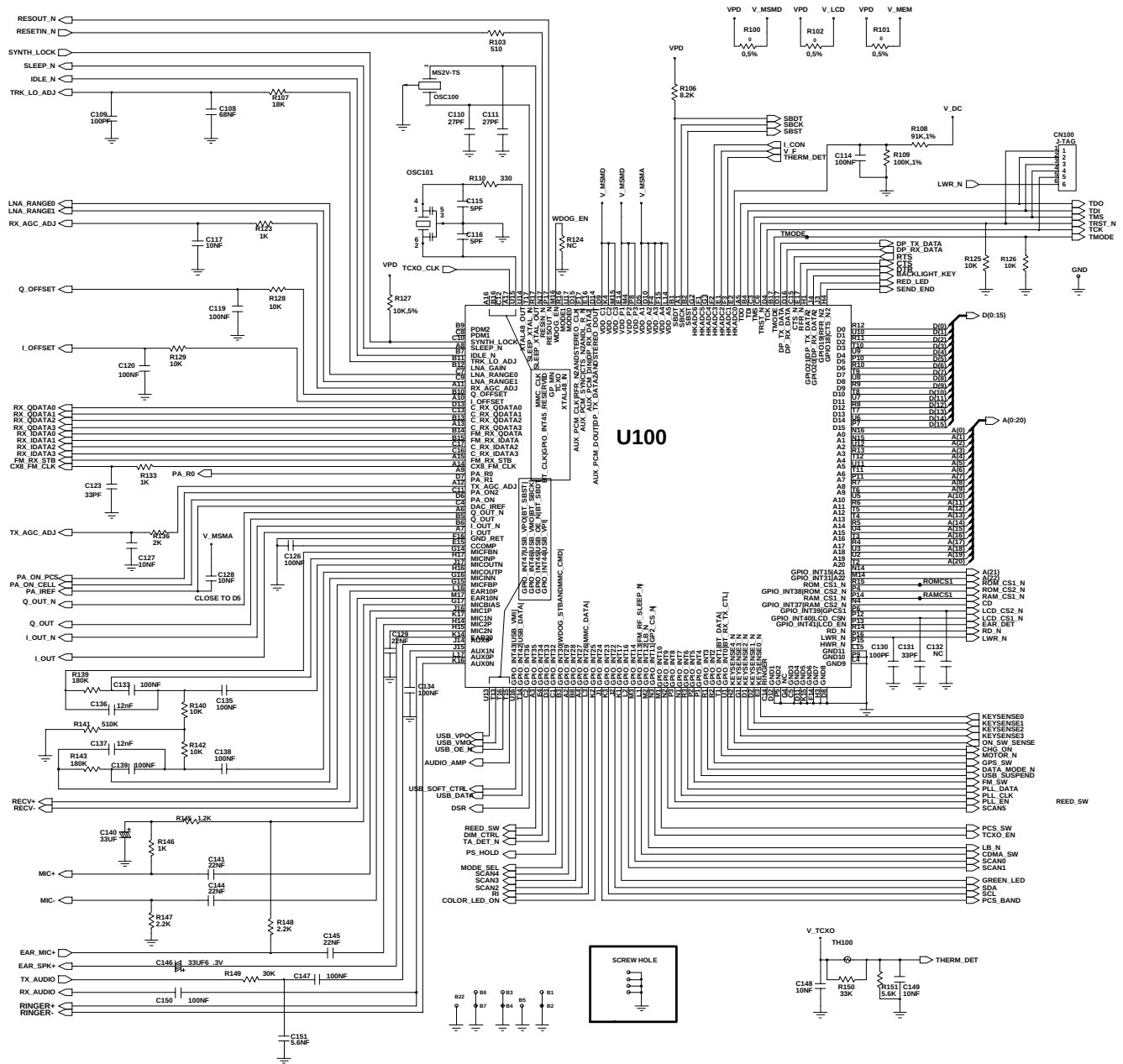


Abnormal Alert Tone



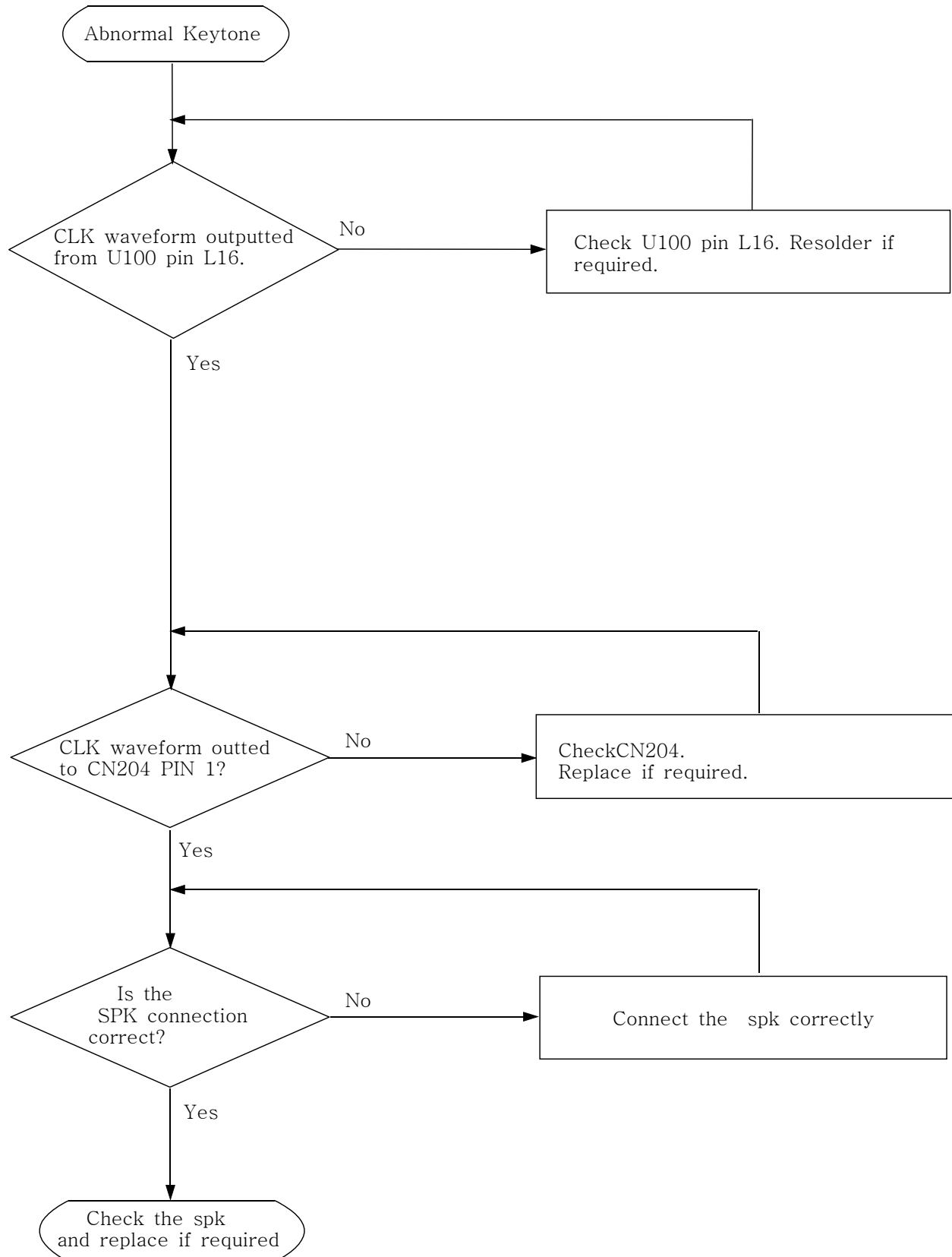


(Picture 1)

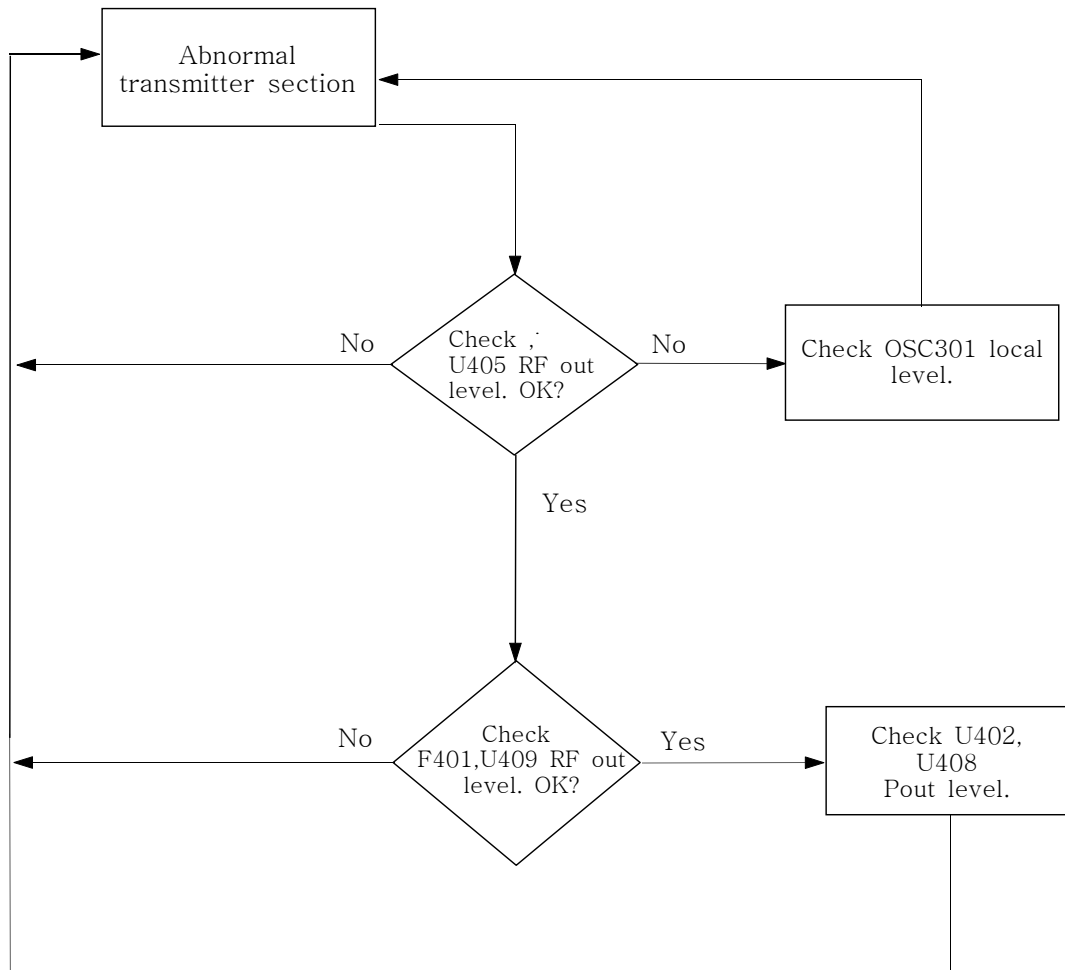


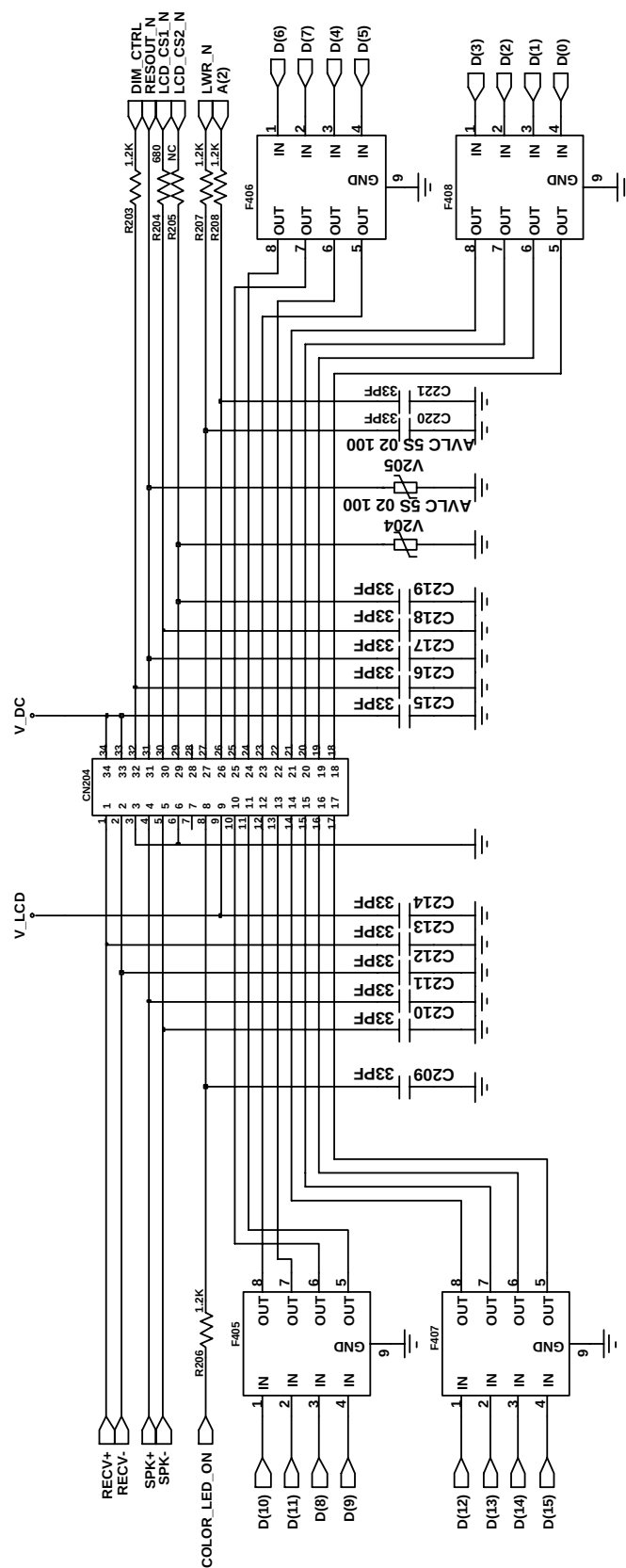
(Picture 2)

2. Transmitter Section

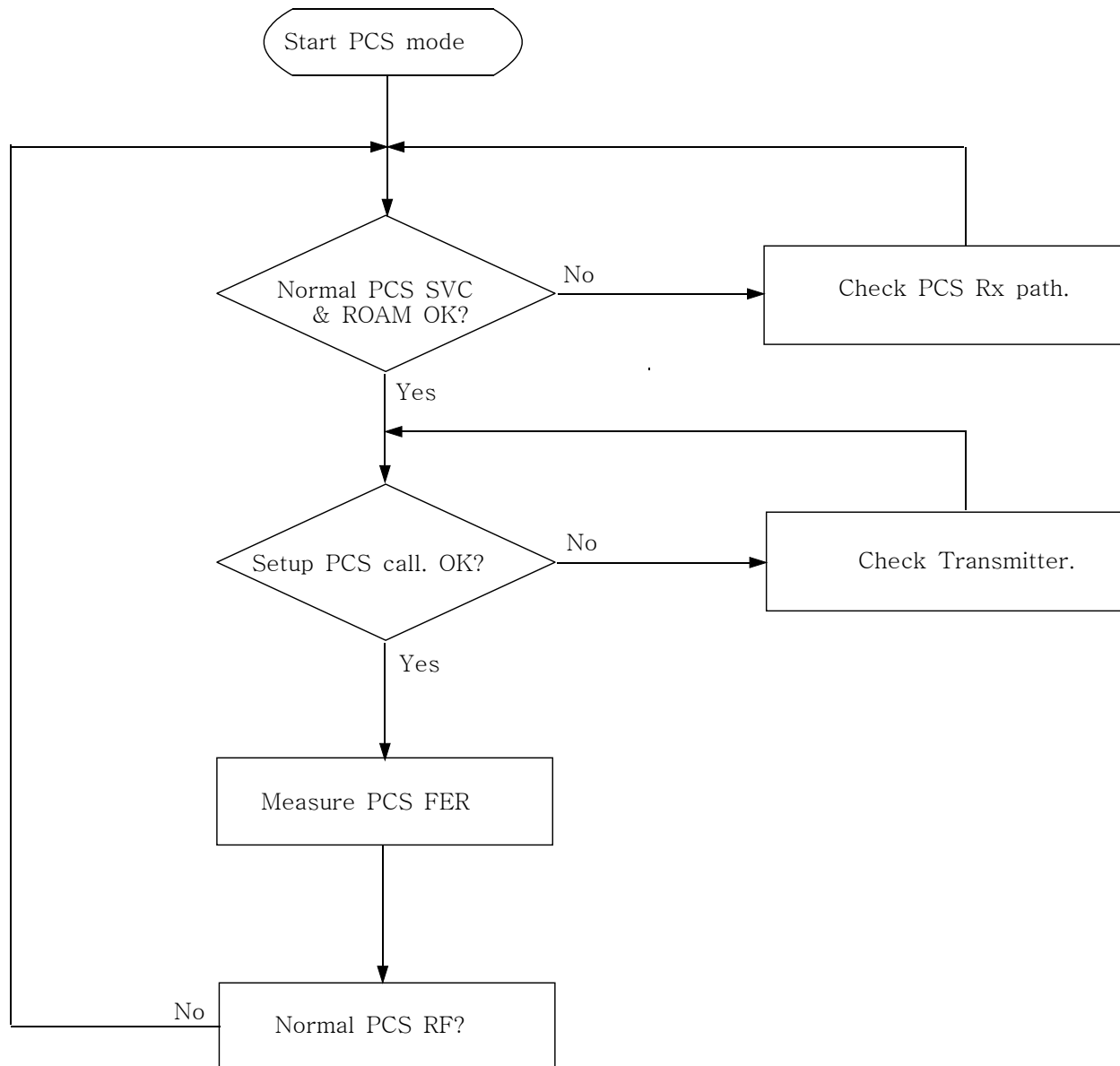






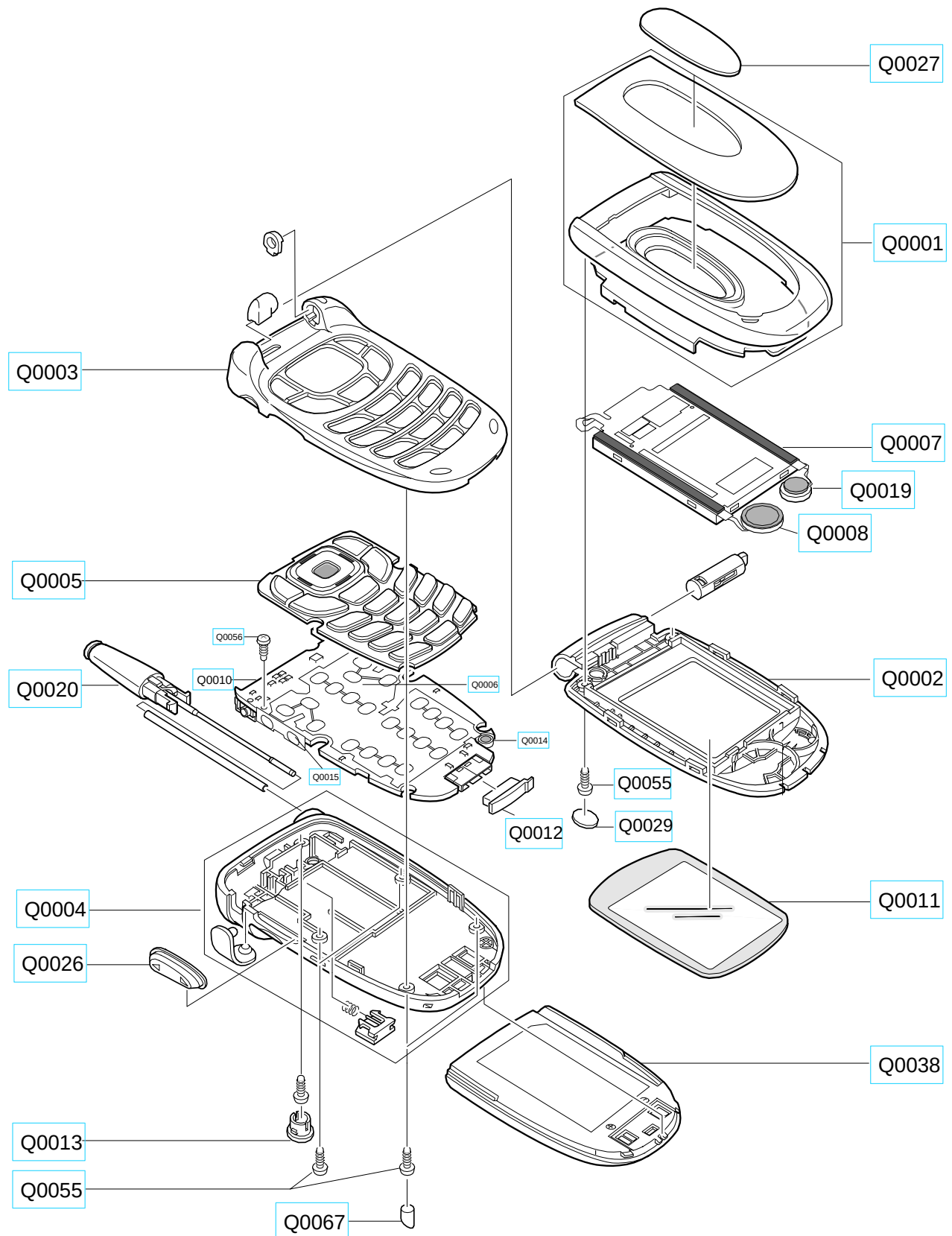


3. Receiver Section: PCS MODE



10. SCH-A650 Exploded View and its Parts list

1. Cellular phone Exploded View



2. Cellular phone Parts list

Location NO.		Description	SEC CODE	Remark
Q0027		PMO-DUMMY BADGE	GH72-08524A	
Q0001		MEC-F/UPPER	GH75-03268A	
Q0007		LCD	GH07-00414A	
Q0019		MICRO SPEAKER	3001-001462	
Q0008		AUDIO-RECEIVER	3009-001054	
Q0002		MEC-F/LOWER	GH75-03269A	
Q0011		PMO-MAIN WINDOW	GH72-08513A	
Q0055		SCREW-MACHINE:PH(12.5),+ ,M1.4	6001-001155	
Q0029		MPR-SCREW HOLE SHEET	GH74-05364A	
Q0003		MEC-FRONT COVER	GH75-03266A	
Q0005		MEC-KEYPAD	GH75-03270A	
Q0010		PBA MAIN	GH92-01506A	
Q0006		UNIT-METAL DOME	GH59-00991A	
Q0015		UNIT-VOLKEY	GH59-00992A	
Q0014		MICROPHONE-ASSY	GH30-00061A	
Q0056		SCREW-MACHINE:CH,+ ,M1.4,L2.3	6001-001460	
Q0020		ANTENNA	GH42-00324A	
Q0012		RMO-IF CONN COVER	GH73-02468A	
Q0004		MEC-REAR COVER	GH75-03267A	
Q0026		MEC-VOLUME KEY	GH75-03271A	
Q0055		SCREW-MACHINE:PH(P12.5),+ ,M1.4	6001-001155	
Q0013		RMO-RF JACK COVER	GH72-09330A	
Q0038		BATTERY	GH43-01004A	
Q0067		RMO-RF SCREW COVER	GH73-02649B	

3. Test Jig (GH80-10502C)



3-1. RF Jig Cable (GH39-00105A)



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



3-3. Download Cable



3-4. Serial Cable



3-5. Power Supply Cable



9. SCH-A650 MAIN Electrical Parts List

SEC Code	Design LOC
GH92-01506A	–
GH68-02026A	–
GH71-01810A	–
GH73-02187A	–
GH41-00462A	–
2203-000254	C100,C102,C104,C106
2203-005061	C101,C103,C105,C107
2203-005483	C108
2203-000233	C109,C130,C233,C234
2203-000679	C110,C111,C321,C328
2203-000995	C112,C113,C142,C423
2203-005061	C114,C119,C120,C121
2203-005393	C115,C116,C302,C306
2203-000254	C117,C127,C128,C148
2203-000438	C118,C124,C301,C303
2203-005061	C122,C126,C133,C134
2203-000812	C123,C125,C131,C209
2203-001405	C129,C141,C144,C145
2203-005061	C135,C138,C139,C143
2203-006091	C136,C137
2404-001151	C140,C146,C202,C366
2203-005061	C147,C150,C206,C207
2203-000254	C149,C201,C208,C241
2203-001033	C151,C468
2404-001268	C200,C229
2404-001105	C203,C205,C222,C223
2203-000812	C210,C211,C212,C213
2203-000812	C214,C215,C216,C217
2203-000812	C218,C219,C220,C221
2203-000940	C224,C232,C384,C404

SEC Code	Design LOC
2203-001432	C225,C228,C231
2203-005061	C226,C242,C257,C258
2203-006093	C227,C230,C372
2203-000233	C235,C236,C237,C239
2203-000489	C238
2203-000233	C240,C245,C246,C247
2203-005482	C243,C244,C252
2404-001101	C248,C360
2203-000233	C249,C250,C251,C253
2203-000233	C254,C255,C256,C259
2203-000233	C260,C261,C262,C263
2203-005061	C264,C265,C310,C346
2203-000233	C266,C300,C314,C316
2203-000386	C304,C363
2203-000550	C305,C338
2203-005052	C307,C323,C324,C458
2203-000438	C308,C312,C315,C318
2203-000254	C309,C311,C313,C317
2203-000254	C319,C327,C334,C336
2203-000438	C320,C325,C330,C331
2203-000885	C322
2203-000330	C326
2203-000812	C329,C356,C357,C371
2203-000233	C333,C335,C347,C379
2203-005281	C337
2203-000254	C339,C345,C353,C354
2203-001385	C340,C344
2203-005158	C342
2203-005053	C343
2203-000438	C348,C382,C383,C406

SEC Code	Design LOC
2203-001383	C349,C464
2203-001072	C350,C352,C442
2203-000254	C355,C373,C374,C377
2203-001405	C358
2203-005061	C359,C361,C362,C364
2203-005061	C365,C367,C370,C400
2203-000628	C368
2203-000278	C375,C413
2203-005496	C376
2203-005480	C378
2203-000233	C380,C381,C402,C408
2404-001105	C401,C403
2203-000940	C405,C416,C417,C472
2203-000438	C407,C412,C424,C425
2203-005061	C409,C462,C466
2203-000233	C410,C414,C418,C421
2404-001151	C411
2203-000359	C415,C447
2203-000254	C419,C434,C441,C456
2203-000714	C420
2203-000425	C422
2203-000233	C426,C427,C430
2203-000812	C429,C435,C436,C448
2203-000585	C433
2203-000233	C437,C438,C439,C444
2203-001201	C440
2203-000888	C443
2203-000438	C445,C450
2203-000233	C446,C449,C457,C467
2203-001017	C451

SEC Code	Design LOC
2203-002443	C453
2203-000643	C454,C465
2203-000812	C455,C459
2203-005050	C461
2203-000254	C463,L311,C431
2203-000233	C469,C470,C471
3711-005078	CN204
3705-001273	CN400
3722-002044	CN402
3710-002017	CN403
0601-001094	D100,D101,D102,D103
0601-001094	D104,D105,D106,D107
0601-001094	D108,D109,D110,D150
0407-000115	D200
0409-001016	D400
0405-001074	D401,D402
0405-001035	D403,D404
0407-001002	D405
2904-001430	F300
2904-001426	F301
2904-001434	F302
2904-001415	F303
2904-001414	F304,F402
2904-001422	F401
2904-001356	F404
2901-001260	F405,F406,F407,F408
3711-004862	JTAG2
3301-001342	L100,L200,L303,L304
2703-001686	L300,L301
2703-001545	L305,L306,L309

SEC Code	Design LOC
2703-001751	L307
2703-001544	L308
2703-002309	L310
2703-001949	L312
2703-002313	L313
2703-002208	L314
2703-001859	L315,L316
2703-002484	L317
2703-001851	L318
3301-001342	L319,L321,L322,L401
2703-001731	L320
3301-001105	L400
3301-001342	L402,L403,L410
02703-001984	L404,L418
NEW-CN00001	L405
2703-001190	L408,L409
2703-001786	L411,L419
2703-001748	L412
2703-001730	L415
02703-002415	L416
2703-001722	L417
0601-001402	LED101
0601-001094	LED102,LED103
0601-001094	LED106,LED107
2801-004060	OSC100
2802-001182	OSC101
2809-001277	OSC300
2806-001312	OSC301
1009-001010	Q100
0504-000168	Q101,Q102,Q205

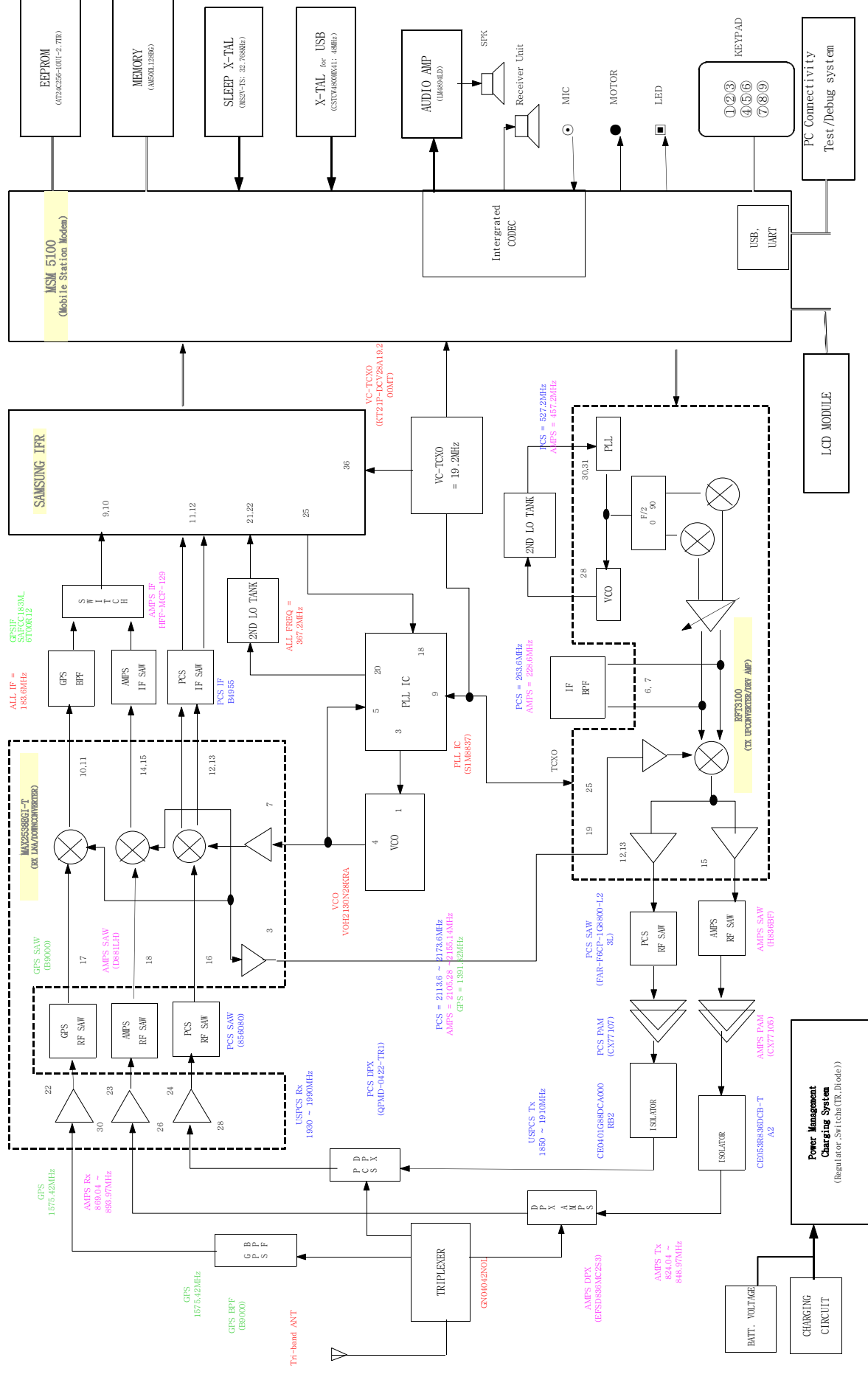
SEC Code	Design LOC
0505-001165	Q200
0506-001004	Q201,Q320,Q400,Q401
0506-000146	Q202
0502-001201	Q204
0501-000225	Q206
0501-000462	Q210
0504-000172	Q402
2007-000171	R100,R101,R102,R216
2007-002796	R103,R223
2007-001301	R104
2007-001305	R105
2007-000147	R106,R310
2007-001333	R107
2007-007529	R108
2007-007107	R109,R239
2007-001313	R110,R316,R317
2007-000174	R111,R112,R113,R114
2007-000174	R115,R116,R117,R118
2007-000174	R119,R120,R121,R122
2007-000140	R123,R133,R146,R201
2007-000148	R125,R126,R127,R128
2007-000148	R129,R132,R137,R140
2007-000162	R130,R131,R135,R144
2007-001308	R134
2007-000137	R136
2007-001339	R139,R143
2007-000169	R141
2007-000148	R142,R311,R314,R401
2007-001319	R145,R203,R206,R207
2007-000141	R147,R148,R236

SEC Code	Design LOC
2007-000156	R149
2007-000775	R150
2007-000982	R151
2007-000168	R200,R202,R227
2007-001119	R204
2007-001319	R208
2007-000157	R209,R212,R313
2007-000831	R210
2007-000162	R213,R214,R215,R219
2007-000155	R217,R226
2007-000151	R218,R220
2007-008117	R221
2007-000162	R222,R235
2007-000140	R225,R302,R400,R403
2007-000138	R228,R230,R232,R233
2007-007142	R229,R406
2007-007014	R231
2007-000138	R234,R309
2007-007309	R237,R405
2007-007137	R238
2007-000171	R240,R242,R243,R301
2007-000242	R241
2007-007148	R303
2007-000171	R304,R307,R318,R320
2007-003013	R305,R306
2007-007008	R308
2007-000152	R312
2007-002965	R315
2007-000172	R319,R323,R325
2007-007528	R321

SEC Code	Design LOC
2007-000139	R322
2007-007319	R324
2007-000171	R402
2007-000153	R407
2007-007310	R408
2007-000140	R409
2007-007588	R410
2007-001298	R411
2007-008213	R412
2007-000148	R413,R414
2007-000174	R415,R416,R419,R420
1404-001165	TH100
1205-002099	U100
1109-001243	U101
1103-001184	U102
0801-002345	U103
0407-001007	U200
1203-002803	U201
1203-002557	U203
1203-002127	U204
0407-001038	U210
1001-001221	U212
1205-002272	U213
1202-001036	U270
1201-001900	U280
1205-002259	U300
1209-001441	U302
1203-001285	U322,U493
1201-001957	U402
4709-001283	U403

SEC Code	Design LOC
2909-001170	U404
1204-001682	U405
1001-001220	U406
2909-001161	U407
1201-001894	U408
2904-001319	U409
4709-001202	U410
0801-000796	U411
1201-001348	U412
1209-001427	U595
1405-001108	V204,V205
0406-001104	ZD200,ZD201,ZD202
0406-001104	ZD204,ZD205
0406-001113	ZD206
0403-001387	ZD289
0403-001427	ZD299

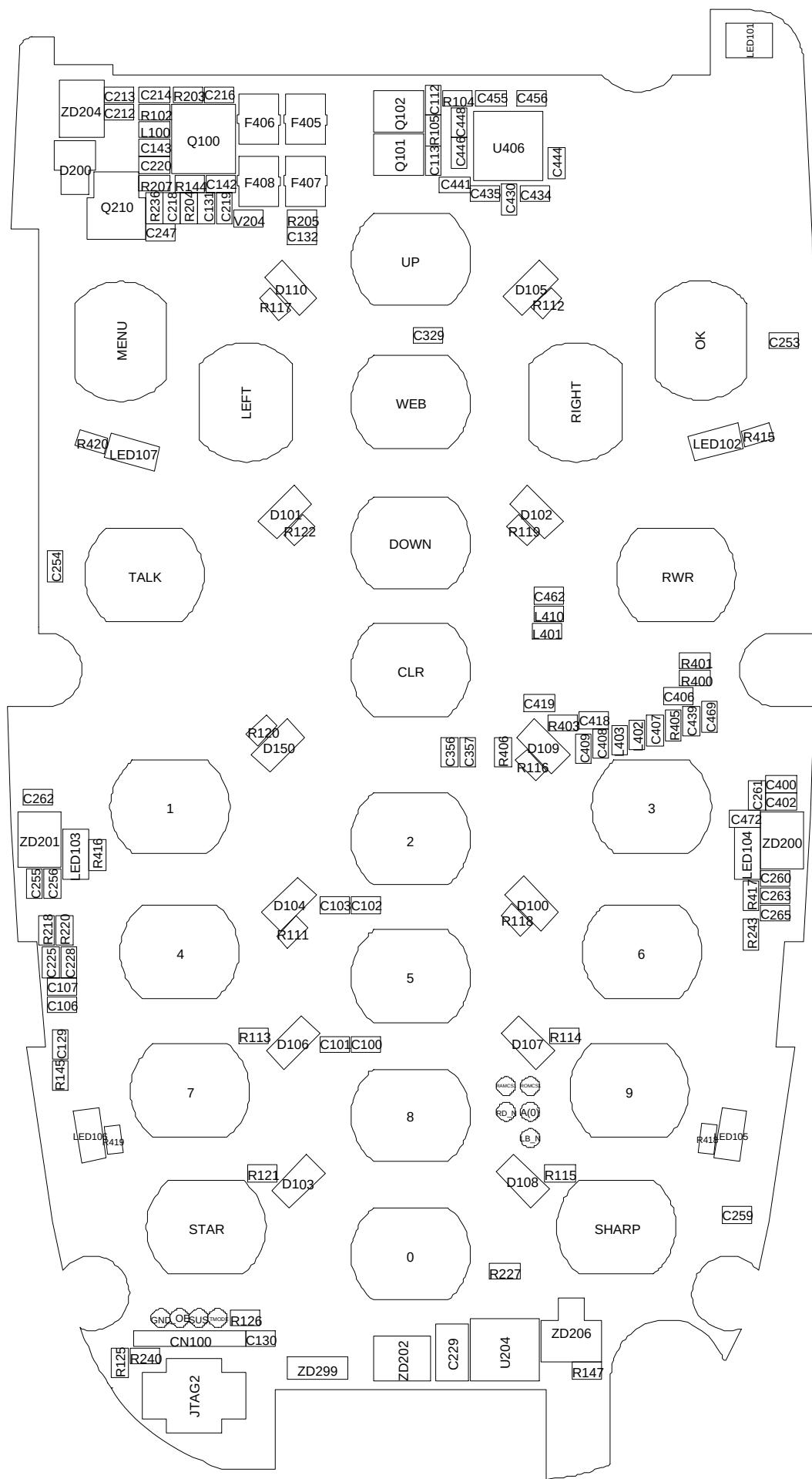
11. SCH-A650 Block Diagrams



1.Main TOP Diagram



2. Main Bottom Diagram



4. NAM Programming

NAM features can be programmed as follows:

Notes:

- 1)**spc, then press (xxxxxx) (the X's indicate your 6 digit SPC lock code).
For example, press **spc , then press 000000 (000000: SPC code), you can see Service Mode.
If you want to use these menu easily, toggle [123] key black.
- 2) If you want to select items for programming, press OK. OK key save the value and proceed to next item but → does not save the value and just proceed to next item. You can back to the previous item to press VOL UP key.
- 3) When you want to exit the service menu, press END key.
- 4) In some menu, you can use numeric key pad to input value.
For example, In “Phone Number”, you can input the number with numeric key pad.
- 5) You can select other items when “BASIC NAM1 PROGRAMMING IS COMPLETE” is displayed.
And press MENU if you want to program more items.
- 6) To change Home SID/NID, when “NAM1 CDMA Home SID/NID” is displayed, press MENU key and modify the value.

4-1 NAM SETTING FLOW:

4-1-1 Basic items

LCD Display	Key in	Function
	**spc, then press xxxxxx (6 digit spc)	-Start NAM programming -by Entering ** with 6-digit code(MSL)
Service Mode ESN 176 00000000 B0000000	OK	-Electronic Serial Number of the phone is displayed
Service Mode NAM 1 CDMA MDN 0000000016	number OK	CDMA Directory #, current directory # is displayed. - to change, enter new one. - stores it.
Service Mode NAM 1 Phone Number 0000000016	number OK	Current phone number of NAM1 is displayed. - phone number setup - To change phone number, enter phone number - Stores it
Service Mode NAM 1 Home SID 2004	number OK	SID written in the list, current status is displayed. - To change, enter new one - Stores it.
Service Mode BASIC NAM 1 PROGRAMMING IS COMPLETE		

4-1-2 More Items

LCD Display	Key in	Function
Service Mode SVC Sec. Code 000000	number OK	Current service security code is displayed. - To change service security code, enter SVC Sec. Code. - Stores it.
Service Mode NAM1 CDMA MCC 310	number OK	Mobile Country Code, current code is displayed. - to change, enter new one. - stores it.
Service Mode NAM1 CDMA NMSID 0000000016	number OK	National Mobile Station id, current id is displayed. - to change, enter new one. - stores it.
Service Mode NAM1 True IMSI MCC 000	number OK	IMSI Mobile Country Code, current code is displayed. - to change, enter new one. - stores it.
Service Mode NAM1 True IMSI NMSID 0000000016	number OK	IMSI National Mobile Station Id, current id is displayed. - to change, enter new one. - stores it.
Service Mode NAM 1 CDMA Home SID/NID 01=2004/6...	MENU number OK	NAM1 CDMA Home SID/NID, current status is displayed.(index=SID/NID) - to change, press MENU - enter new SID - press OK - enter new NID - press OK - repeat (index will be increase.)
	OK	- not change
Service Mode NAM 1 CDMA Primary CH A 283	number OK	Primary channel system A, current channel is displayed. - to change, enter new one. - stores it.
Service Mode NAM 1 CDMA Second CH A 691	number OK	Secondary channel system A, current channel is displayed. - to change, enter new one. - stores it.
Service Mode NAM 1 CDMA Primary CH B 384	number OK	Primary channel system B, current channel is displayed. - to change, enter new one. - stores it.

Service Mode NAM 1 CDMA Second CH B 777	number OK	Secondary channel system B, current channel is displayed. - to change, enter new one. - stores it.
Service Mode NAM 1 CDMA Home Sys Reg Yes	VOL up or down OK	CDMA Home system ID. current status is displayed. - changes the status. - stores it.
Service Mode NAM 1 CDMA Forn SID Reg Yes	VOL up or down OK	CDMA foreign SID, current status is displayed. - changes the status. - stores it.
Service Mode NAM 1 CDMA Forn NID Reg Yes	VOL up or down OK	CDMA foreign NID, current status is displayed. - changes the status. - stores it.
Service Mode NAM 1 AMPS Phone Number 0000000016	number OK	Current phone number of NAM1 is displayed. - phone number setup - To change phone number, enter phone number - Stores it
Service Mode NAM 1 AMPS Home SID 2004	number OK	SID written in the list, current status is displayed. - To change, enter new one - Stores it.
Service Mode NAM 1 AMPS 1st Page CH 334	number OK	
Service Mode NAM 1 AMPS Auto-Reg YES	VOL up or down OK	
Service Mode NAM 1 ORIG SVC OPT 13K CALL	VOL up or down OK	
Service Mode NAM 1 Access Overld Class 6	OK	CDMA Home system ID, current status is displayed.
Service Mode NAM 2 Settings	MENU OK	- To set up NAM 2 - NAM 2 setting is the same as NAM 1 setting.
	OK	- To enter the end items.

4-1-3 End Items

LCD Display	Key in	Function
Service Mode PHONE MODEL 163	Enter	Phone Model number is displayed.
Service Mode SLOT CYCLE INDEX 1	number Enter	Slot mode index. The higher, the longer sleeping time - to change, enter new one (0~7) - stores it.

5. Product Support Tools

5-1. General

IMPORTANT INFORMATION

Purpose

The Product Support Tool (PST) offers you the ability to interface with the SAMSUNG DBTM 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 2.445.

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 (USB Cable for SAMSUNG DBTM phone).
3. USB Port.
4. Power Supply (3.8 V) or Battery.

INSTALLATION

Software

1. Insert the SCH-A650 CDROM into your CD-Rom drive.
2. Run the file explorer and run the Setup.exe file.

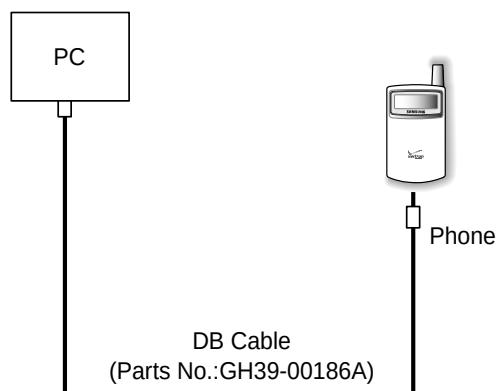
SAMSUNG DBTM Phone

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.



5-2. PST (Product Support Tool)

5-2-1 Getting Started

MAIN MENU SCREEN

1. Double Click on your "Samsung PST for Verizon (SE)"
2. Select SCH-A650

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 DBTM portable telephone. You can select virtual USB port.

5-2-2 Operation Procedure

Service Programming

Before start service programming, you must change usb port of SCH-A650 to phone (Menu -> Set up -> OK -> * -> Field Serv -> '000000' -> Port Map -> OK -> USB/UART DS -> OK)

The Service Programming screens enable you to set and change the service activation parameters of the phones. These items can be changed individually or as a group via the "Edit Items" Property Sheet of the PST.

There are several pages on the Service Programming Property Sheet (See below Figure)

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/Data/GPS/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 A650 with usb cable
2. Change your A650 usb to phone.(Start Setting System USB/UART)
3. Check com port of SAMSUNG CDMA Modem. To check on Com port, first you go to my computer->property->Hardware->Device Manager ->Modem->Samsung USB Modem. Then go to property of Samsung USB Modem, and then click on Modem tab. You may see the port number, which is assigned for Samsung USB Modem.
4. Run Universal PST.
5. Change PST's comport setting (Setup COM Setting) same as com port of 'SAMSUNG cdma modem'
6. Select DownLoad Mode tab.
7. Click Bin icon to load Img file.
8. Click IMG icon and wait for "Press reset hole in the back" in PST, Reset A650 in back side of the set.
9. When the downloading process is finished, the PST shows "Downloading completed!!" and the A650 reboots automatically.

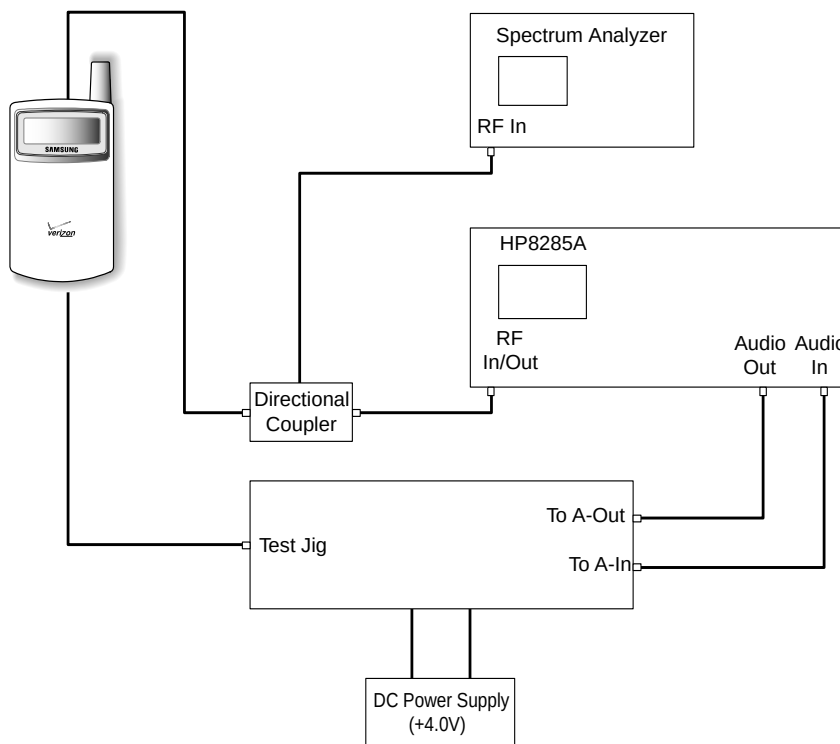
NOTE: DO NOT POWER OFF WHILE THE PHONE IS BEING DOWNLOADED!

7. Test Procedure

7-1 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

7-2 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)

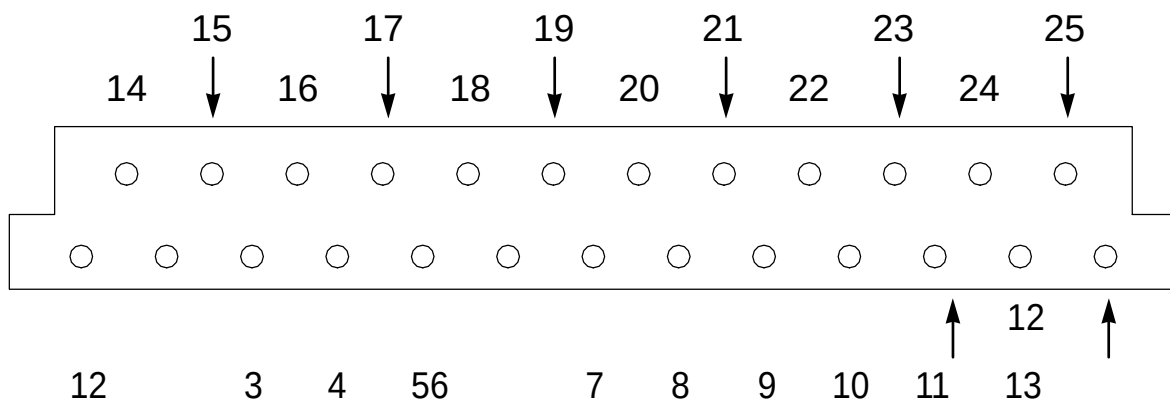
7-2 TEST CABLE CONNECTIONS

7-2-1 TEST CABLE CONNECTIONS

1	MHC 172
2	RF CABLE (1.4dB Loss for CDMA, 2.1dB Loss for PCS, 1.8dB Loss for GPS)
3	BNC CONNECTOR (RF)
4	PLUG CONNECT TO SCH-A650
5	DATA CABLE
6	Dsub 25PIN CONNECTOR (DATA)

7-2-2 Dsub 25 PIN CONNECTOR PIN DESCRIPTION (TEST CABLE 1, BACK SIDE)

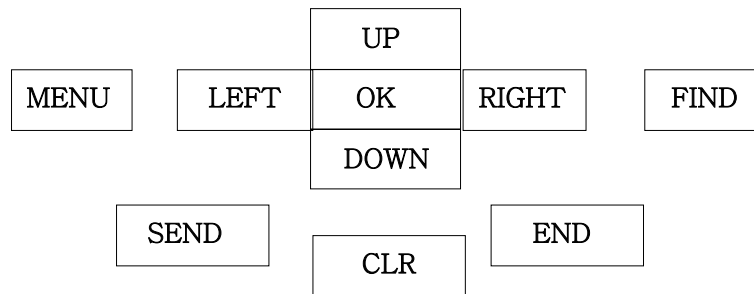
DATA DESCRIPTION	Dsub CONN. PIN NO.	DATA DESCRIPTION	Dsub CONN. PIN NO.
V_F	12,21	DP_RX_DATA	8
DGND	2,4,6,13,19	HP_PWR	9
BATT	15,16,22	RI	10
C_F	3,20	CD	11
TX_AUDIO	5	RTS	14
DP_TX_DATA	7	CTS	17
RX_AUDIO	1	DTR	18



7-2-3 CONVERSION TABLE OF FREQUENCY vs CHANNEL

T Y P E	CHANNEL	CONVERSION EQUATION	REMARK
TX FREQUENCY	$990 \leq N \leq 1023$	$F = 0.03 \times (N - 1023) + 825.00$	N ; CH NUMBER F ; FREQUENCY (CDMA)
RX FREQUENCY	$990 \leq N \leq 1023$	$F = 0.03 \times (N - 1023) + 870.00$	
TX FREQUENCY	$0 \leq N \leq 1199$	$F = 0.05 \times N + 1850.00$	N ; CH NUMBER F ; FREQUENCY (PCS)
RX FREQUENCY	$0 \leq N \leq 1199$	$F = 0.05 \times N + 1930.00$	

7-3 Main Keys Usage



OK : Performs an action on the selected item.

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

(also tagged as "CANCEL" or "NO" on some brands).Key lock.

- Turns SMART Phone ON/OFF. Press for a while (about 2 ~ 3 sec)

- Cancel or end the function in the phone test mode or NAM mode.

Press for a while (about 2 ~ 3 sec)

V_UP/V_DN : Increase/decrease the earpiece volume while in a call, increases volume while not in a call.

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

MENU : Displays the device Menu screen.

CLR: Edit view: back space.

FIND : Can search the stored phone number by using name, group or partial number.

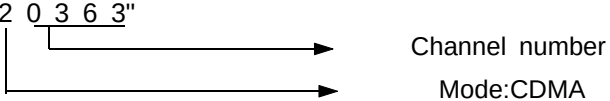
7-4 Test Procedure

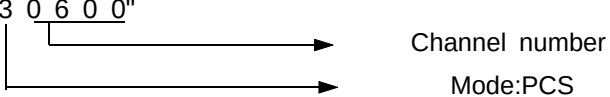
7-4-1 Change the test mode

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

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

B. The command "21" is mode and channel change.

"2 0 3 6 3"

 Channel number
 Mode:CDMA

"3 0 6 0 0"

 Channel number
 Mode:PCS

and press enter key from the soft key board to save mode/channel value..

C. The command "0 1" is Suspend.

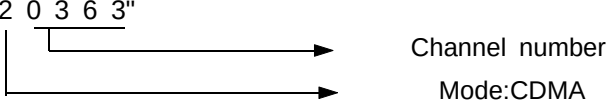
D. To finish the Test Mode, You should enter the command " 0 2".

7-4-2 Channel selection and Tx power output level control

CDMA

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

B. The command "21" is mode and channel change

"2 0 3 6 3"

 Channel number
 Mode:CDMA

Push the [OK] key to save.

C. "0 1" : Suspend.

D. To finish the Test Mode, You should enter the command "0 2".

E. "0 9 0 3 8 3 '[Push and Hold]'" : Set to '0383' channel.

Test Procedure

F. "0 7" : Carrier On.

G. "3 4" : Spread spectrum to 1.23MHz band width.

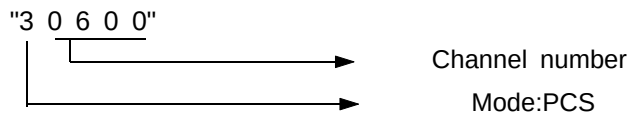
H. "9 2 * * * " : Adjust RF power level.

"* * *" means AGC level and AGC level range is from 000 to 511.

PCS

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

B. The command "021" is mode and channel change



Push the [enter] key to save.

C. "0 1" : Suspend.

D. To finish the Test Mode, You should enter the command "0 2".

E. "0 9 0 6 0 0 '[Push and Hold]' " : Set to '0600' channel.

F. "0 7" : Carrier On.

G. "3 4" : Spread spectrum to 1.23MHz band width.

H. "9 0 * * * " : Adjust RF power level.

"* * *" means AGC level and AGC level range is from 000 to 511.

7-5 CDMA

TEST ITEMS	PROCEDURE
1. PREPARANCE	Set test equipments up. [4 7 * 6 8 # 1 3 5 8 0] : Enter the Test Mode "0 1" : Suspend Confirm that the phone is in the "CDMA Mode". (If not CDMA Mode, Use Test Command "21""2XXXX" and Push the "↵" Key to "OK", and enter "0 2" to restart) If you select a wrong key, press " # ", then enter new command. To exit the Test Mode at any time, just press [0 2].
2. FREQUENCY ACCURACY	"0 1" : Suspend. "0 9 0 3 8 3 ' # [Push and Hold] ' " : Set channel to 363. "0 7" : Carrier On. "3 4" : Spread spectrum. "9 2 3 6 0 ' # [Push and Hold] ' " : Set AGC level. Measure the TX frequency : $836.49\text{MHz} \pm 300\text{Hz}$.
3. OCCUPIED CDMA BANDWIDTH	"0 1" : Suspend. "0 9 0 3 8 3 ' # [Push and Hold] ' " : Set channel to 383. "0 7" : Carrier On. "3 4" : Spread spectrum. "9 2 X X X ' # [Push and Hold] ' " : Enter AGC Code(XXX) to adjust RF Output Power. Measure the bandwidth (spec: 1.23MHz).
4. LIMITATIONS ON EMISSIONS	"0 1" : Suspend. "0 9 0 3 8 3 ' _ ' " : Set channel to 363. "0 7" : Carrier On. "3 4" : Spread spectrum. "9 2 X X X ' # [Push and Hold] ' " : Enter AGC Code(XXX) to adjust RF Output Power. Measure the spurious at $F_c \pm 900\text{kHz}$, $F_c \pm 1.98\text{MHz}$, $2F_c$, $3F_c$, $1/2F_c$. spec: $F_c \pm 900\text{kHz}$ below 42dBc/30kHz $F_c \pm 1.98\text{MHz}$ below 54dBc/30kHz Outside Receive Band $43+10\log(PY)$ 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 $6\mu\text{s}$ Falling Time : below $6\mu\text{s}$ Burst Time : below 1.25ms

7-6 PCS

TEST ITEMS	PROCEDURE
1. PREPARANCE	Set test equipments up. [4 7 * 6 8 # 1 3 5 8 0] : Enter the Test Mode "0 1" : Suspend Confirm that the phone is in the "PCS Mode". (If not PCS Mode, Use Test Command "021""3XXXX" and Push the [OK] Key, and enter "0 2" to restart) If you select a wrong key, push and hold the " # " botton for a while(about 2~3 sec), then enter new command. To exit the Test Mode at any time, just press [0 2].
2. FREQUENCY ACCURACY	"0 1" : Suspend. "0 9 0 6 0 0 ' # [Push and Hold] ' " : Set channel to 600. "0 7" : Carrier On. "3 4" : Spread spectrum. "9 0 3 6 0 ' # [Push and Hold] ' " : Set AGC level. Measure the TX frequency : 1880.00MHz±300Hz.
3. OCCUPIED CDMA BANDWIDTH	"0 1" : Suspend. "0 9 0 6 0 0 ' # [Push and Hold] ' " : Set channel to 600. "0 7" : Carrier On. "3 4" : Spread spectrum. "9 0 X X X ' # [Push and Hold] ' " : Enter AGC Code(XXX) to adjust RF Output Power. Measure the bandwidth (spec: 1.23MHz).
4. LIMITATIONS ON EMISSIONS	"0 1" : Suspend. "0 9 0 6 0 0 ' # [Push and Hold] ' " : Set channel to 600. "0 7" : Carrier On. "3 4" : Spread spectrum. "9 0 X X X ' # [Push and Hold] ' " : Enter AGC Code(XXX) to adjust RF Output Power. Measure the spurious at $F_c \pm 1.25\text{MHz}$ spec: $F_c \pm 1.25\text{MHz}$ below 42dBc/30kHz
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 1.247ms