Dangerous!

Do not connect the AC power or DC power over 8.6V with any connector or terminal of the radio. Otherwise it will cause fire, electric shock or damage to the radio.

Warning!

Do not reverse power connection.

It may cause harm to the radio if signal input on the antenna connector is higher than 20 dBm (100mW).

Do not turn on the radio before the antenna or load connection is completed.

If the antenna has been damaged, do not use the radio. Damaged antenna may cause light burning on skin.

Though the radio is waterproof, it's better to avoid putting it in rain or snow, or any other liquid to ensure its life and performance.

Statement!

Content

Chapter 1 Overview

1.1 Introduction

This manual applies to the service and maintenance of PT568 series of FM portable radios, and is intended for use by engineers and professional technicians that have been trained by Kirisun. It contains all required service information for the equipment. Kirisun reserves the right to modify the product structure and specifications without notice in order to improve product performance and quality. You can also log on our website www.kirisun.com to download the latest service manual or contact your local dealer or us.

Please read this manual carefully before repairing the product.

1.2 Service Attentions

*** Safety**

Do not touch the antenna connector or the PCB while repairing the radio.

Do not reverse the battery polarity.

It may cause harm to the radio if signal input on the antenna connector is higher than 20 dBm (100mW).

Do not turn on the radio before the antenna or load connection is completed.

If the antenna has been damaged, do not use the radio. Damaged antenna may cause light burning on skin.

*** Electromagnetic Interference**

It's prohibited to use or repair the radio in the following places:

Hospital, health center, airport

Any area with a potentially explosive atmosphere (e.g. orlop deck of the ship, storage or transportation equipment for fuel and chemical etc.)

Any place near blasting sites or area with electrical blasting cap.

It's recommended to avoid using or repairing the radio in the following place:

It's recommended to avoid using radios in a car that is moving as the radio wave might interfere the auto engine and cause it to stop working.

*** Replacement Parts**

All components used for repair should be supplied by Kirisun.

Components of the same type available on the market are not surely able to be used in this product and we do not guarantee the quality of the product using such components.

If you want to apply for any component from Kirisun, please fill in an application form as below.

e.g.

Component Application Form

Radio Model	Component	Position Mark	Model/ Specifications	Part No.	Qty
PT568-01	FET	Q11	2SK3476	105-SK3476-R01	1
PT568-02	Triode	Q57	2SC5108(Y)	104-SC5108-001	1

1.3 Service

All the Kirisun products are subject to the service warranty.

The main unit of the radio is guaranteed for free service of 12 months. Accessories (such as battery pack, antenna, charger and power adapter etc.) are guaranteed for free service of 6 months. However, in one of the following cases, charge free service will be not available.

* No valid warranty card or original invoice.

* Malfunction caused by disassembling, repairing or reconstructing the radio by the users without permission.

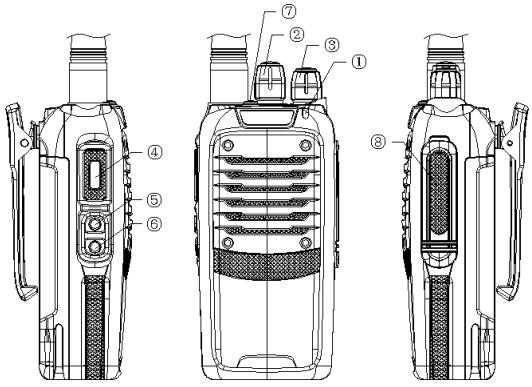
* Wear and tear or any man-made damage such as mechanical damage, burning or water leaking.

* Product's serial number has been damaged or the product trademark is difficult to identify.

After the warranty expires, lifetime service is still available. We also provide service components to service stations and staffs.

Chapter 2 External View and Functional Keys

2.1 External View



2.2 Functional Keys

① LED Indicator

Lights red while transmitting; lights green while receiving; flashes red when the radio is in low power.

② Channel Selector Knob

Rotate the knob to select channel 1-16.

③ On/Off/Volume Control Knob

Turn clockwise until you hear a click to turn the radio power on. Turn counterclockwise until you hear a click to turn it off. Rotate it to adjust the volume after turning on the radio.

④ PTT (Push-To-Talk) Button

Press and hold the PTT button and speak into the microphone, your voice can be sent to the recipient. Release the PTT button to receive.

⑤ Side Button 1 (programmable button)

⑥ Side Button 2 (programmable button)

⑦ Top Button (programmable button)

⑧ External Speaker/Microphone Jack Cover

Remove the cover; you will see the external speaker/microphone jack. External speaker/microphone can be connected to the radio through this jack.

Chapter 3 Circuit Description

3.1 Frequency Configuration

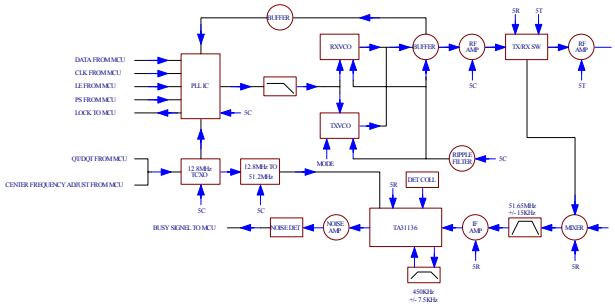


Figure 3.1 Frequency Configuration

The reference frequency of the frequency synthesizer is provided by crystal oscillator X4 (TCXO, 12.8MHz). The receiver adopts double mixing. The first IF is 51.65MHz and the second IF is 450kHz. The first local oscillator signal of the receiver is generated by the frequency synthesizer. The second local oscillator signal adopts the fourth harmonics (51.2MHz) of the crystal oscillator X4 (TCXO, 12.8MHz). Transmitter signal is directly produced by the frequency synthesizer.

3.2 Principle of Receiver (RX)

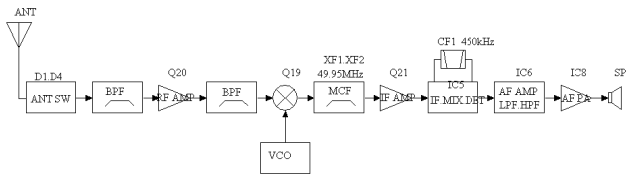


Figure 3.2 Principle of Receiver

Front end

The signal coming from the antenna passes through the RX/TX switch circuit (D1, D2, D4 and D5), and passes through a BPF comprises of C37, C227, L8, L15, C70, C126, D30, C218, L9, C230, C128, D26, C217, L10, C229, C127 and D24 to remove unwanted out-of-band signal, and is sent to the low noise amplifier (LNA) consists of Q20 and its peripheral components to be amplified.

Output signal from the LNA passes through a BPF comprises of L7, C228, C47, D23, C219, L6, C182, C124, D22, C216, L5, C132, C32 and D21 and goes to the first mixer (Q19).

PWM wave is output from pin 12 of the MCU. The wave is filtered and rectified into adjustable voltage, which can control the center frequency of the band pass filter through changing capacity of the varactor diodes (D21, D22, D23, D24, D26 and D30).

First mixer

The received signal from LNA is mixed with the first local oscillator signal from the frequency synthesizer to produce the first IF signal (51.65MHz). Then the first IF signal passes through crystal filter (XF1 and XF2) to remove the adjacent channel signal and signal outside the adjacent channel.

IF circuit

The first IF signal from the crystal filter is amplified by the first IF amplifier (Q21), and is sent to the IF processing IC (IC5, TA31136).

IF IC consists of second mixer, second local oscillator, IF amplifier, limiter, discriminator, and noise amplifier.

The 12.8MHz frequency produced by TCXO (X4) is multiple-amplified and then the fourth harmonics (51.2MHz) is adopted as the second local oscillator signal source. The second local oscillator signal (51. 2MHz) is mixed with the first IF signal (51.65MHz) in IC5 to generate the second IF (450kHz). And then the second IF signal is amplified and limited in IC5, filtered by the ceramic filter (CF1, 450kHz), and demodulated in IC5 to output audio signal.

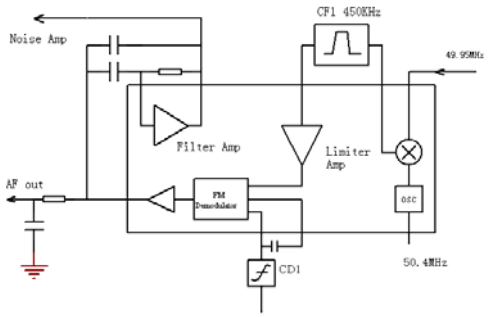


Figure 3.3 IF System

Audio signal processing

The voice signal processing circuit of the receiver consists of IC6 and its peripheral circuits. After being amplified in IC6-C, voice signal from IC5 is sent to IC4 (CTCSS signal filtering circuit) and IC6-D respectively. The signal is then amplified, deemphasized and filtered by other units of IC6 to remove HF and LF components contained in the audio frequency, with only voice components within 300~3000Hz left. The resulting signal is then sent to Q9 for amplification. The amplified signal is adjusted by the volume potentiometer and then is sent to the audio power amplifier (IC8).

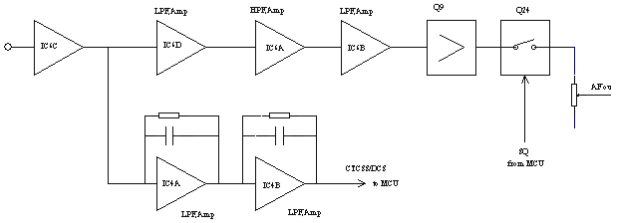


Figure 3.4 Audio Processing of Receiver

Squelch circuit

The demodulated signal from IC5 goes to the selective noise amplifier consists of internal noise amplifier of IC5, C211, R99, R100, C107 and R94 to remove the noise component. The resulting signal is then amplified by Q7 and demodulated by D17 and is sent to the MCU. MCU identifies level of the noise and controls the squelch.

Audio power amplifier

The audio power amplifier circuit consists of IC8 and its peripheral components.

The received audio signal, voice alert signal, alert tone signal and warning tone signal are collected and pass through the audio amplifier where they are amplified and output to drive the speaker. The volume of the warning tone is not controlled by the preset volume level of the radio.

When AFCO is in high level, Q35 turns on, IC8 starts to operate, and the speaker makes sound. Speaker impedance: 16Ω.

Q38: Receiving audio signal switch

Q51: Warning tone switch

Q25: Alert tone switch

CTCSS/DCS signal filtering

Audio signal demodulated by IC5 may contain CTCSS (Continuous Tone Control Squelch System) or DCS (Digital Code Squelch) signal. The spectrum components of CTCSS/DCS are within 2-250Hz. The filtering circuit consists of IC4 can remove signals outside the CTCSS/DCS spectrum, which enables the MCU to decode CTCSS/DCS more accurately.

3.3 Principle of Transmitter (TX)

TX power amplification

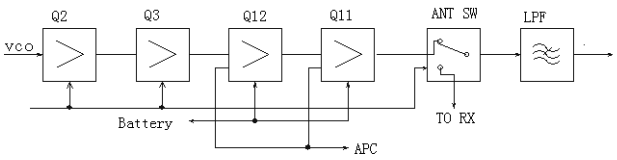


Figure 3.5 Principle of Power Amplifier and Antenna Switch

The modulated RF signal from VCO is amplified by Q2, Q3 and Q12, and is sent to Q11 for power amplification.

Grid bias of Q11 and Q12 is controlled by the APC circuit. Through changing the grid bias voltage, the Tx output power can be controlled conveniently.

APC (Automatic Power Control)

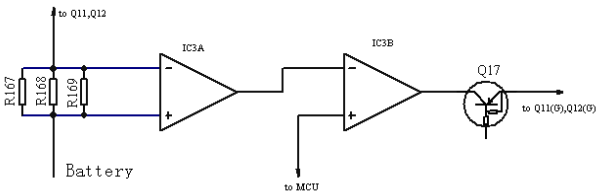


Figure 3.6 APC Circuit

R167, R168 and R169 are used to test the power amplification current. IC3A is the sampling amplifier for the power amplification current. IC3B is the power comparator amplifier.

If the Tx output power is too high, the power amplification current and IC3A output will increase; IC3B output voltage will decrease, so the bias voltage of Q11 and Q12 will also decrease, which causes the Tx output power to be lowered, and vice versa. Thus the Tx output power can keep stable under different working conditions.

MCU can set the power through changing the voltage input to IC3B.

Tx voice signal processing

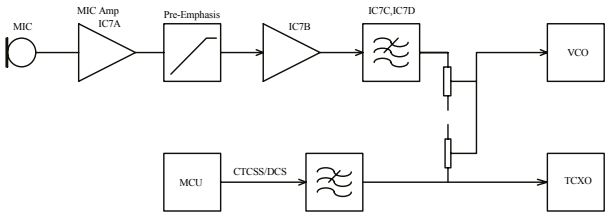


Figure 3.7 Transmitter Audio Circuit

The Tx voice signal processing circuit consists of IC7 and its peripheral components. After being amplified, limited and filtered, the voice signal from MIC is sent to VCO for modulation together with CTCSS/DCS signal.

The AGC circuit consists of D13, D308 and Q24. When signal from MIC is too large, the AGC circuit will lower the signal strength to make sure that no distortion happens to the signal.

Q34 is the power switch of the voice processing circuit. It is controlled by MCU. Power supply of IC7 will be turned on when the radio is transmitting.

J2 is the jack for external MIC. When using external MIC, the internal MIC will be turned off automatically. But the internal PTT is still effective.

3.4 Principle of Frequency Synthesizer

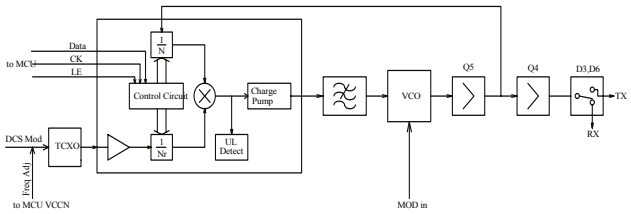


Figure 3.8 Frequency Synthesizer

The radio adopts PLL type frequency synthesizer.

The frequency synthesizer consists of reference oscillator, voltage control oscillator (VCO), programmable divider, phase comparator, and low pass filter.

Rx VCO unit consists of Q14, L30, C120, C88, C142, C180, D8 and D9. Tx VCO unit consists of Q15, L51, C121, C137, C206, C194, D10 and D11. D12 is the modulation circuit of VCO.

IC1 (MB15E03) is PLL integrated circuit, which consists of programmable reference divider, programmable swallowing divider, phase comparator, and charge pump.

The low pass filter consists of R244, C193, R202, R40, C207, R141, C205, R2 and C204. The reference frequency is provided by X4 (TCXO, 12.8MHz).

The reference frequency from TCXO (Temperature Compensated Crystal Oscillator) is divided by the programmable reference divider in IC1 to produce reference frequency of 5kHz or 6.25kHz (determined by the preset channel frequency and is controlled by MCU).

The oscillation frequency from VCO goes to IC1 where it is divided by the programmable swallowing divider and is then compared with the reference frequency to obtain error signal. The signal is then filtered by a low pass filter and is sent to VCO to change the oscillation frequency of the VCO, enabling the frequency to reach the set value. Then the VCO is locked.

$N=F_{VCO}/F_R$

N: Times of frequency division

F_{VCO}: Oscillation frequency of VCO

F_R: Reference frequency

Unlock detection: When PLL is unlocked, Pin 14 of IC will output low level signal to MCU. Then MCU prohibits the transmitter from transmitting and makes an alert tone.

Q6: Power filter, which provides more purified power for PLL to reduce noise of the frequency synthesizer.

3.5 Voice Alert Circuit

The radio is provided with voice alert function, which is especially useful at night or in dark environment.

IC15 is a voice memory chip, which is stored with voices of channel indication etc. Once the channel selector knob is switched, the speaker will announce the current channel number. You can press the preprogrammed “Voice Alert” key to repeat the current channel number.

If voice alert function is enabled, the speaker will announce the current channel number once the “Voice Alert” key is pressed under standby mode. You can switch the voice type by pressing and holding the “Voice Alert” key while restarting the radio. Do it repeatedly to switch the voice type in the order of “Chinese Male-English Male-Chinese Female-English Female-No Alert”.

3.6 Power Supply

The radio uses 7.4V, 1700mAh Li battery. The Tx power amplification circuit (Q11 and Q12) and the Rx audio power amplifier (IC8) directly adopt the battery for power supply. Power of other circuits is supplied by 5V regulated voltage.

IC12: 5V low dropout, micro-power regulator, which supplies 5V power with large current for the radio together with Q10 and Q30.

Q29: 5T switch, which is controlled by MCU.

5T: Supplies power for front end of Tx.

Q31: 5R switch, which is controlled by MCU.

5R: Supplies power for RF amplifier, mixer, IF processing unit, and audio signal processing unit etc. of the receiver.

Q32: 5C switch, which is controlled by MCU.

5C: 5V power supply under SAVE control. Supplies power for frequency synthesizer.

3.7 MCU Unit

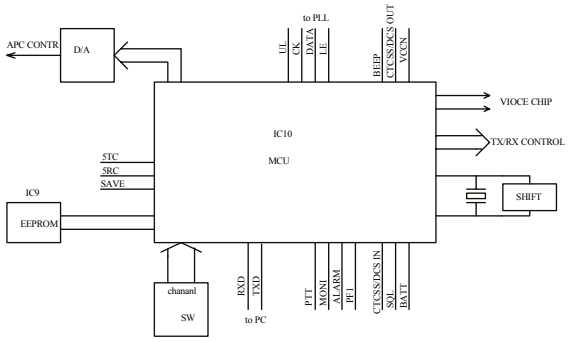


Figure 3.9 Principle of MCU Unit

MCU unit controls the operation of each unit of the radio so that all functions can be realized.

Communicate with external PC.

Access the status data of the radio.

Control the PLL to generate Rx and Tx local oscillator frequencies.

Obtain status parameters of current channel.

Control status of LED indicator.

Control power supply for each unit.

Check the actions of each functional key.

Generate CTCSS signal.

Generate DCS signal.

Generate power control signal.

Perform CTCSS decoding.

Perform DCS decoding.

Test and control the squelch.

Control content of voice alert.

Memory (E^2PROM, AT24C08):

The memory is stored with channel data, CTCSS/DCS data, other function setting data, and parameter adjusting data.

CTCSS/DCS signal encoding and decoding:

The CTCSS/DCS signal (output from pin 12) generated by MCU is filtered by R155, R156, C242 and C243. Then the resulting signal is divided into two parts and sent to VCO and TCXO respectively for modulation.

The CTCSS/DCS signal from the receiver is sent to MCU (pin 49) for decoding. MCU checks if the CTCSS/DCS signal in the received signal matches the preset value of the radio, and determines whether to open the speaker or not.

Power adjustment:

Output from pin 42 of the MCU passes through integrating filter (R161, C317, R206, and C318), and is sent to the APC unit to control the output power of the transmitter.

CTCSS

CTCSS (Continuous Tone Control Squelch System) is a squelch control system which is modulated on carrier and is guided by a continuous sub-audio signal. If CTCSS is set, the communication between the transmitting and receiving radios can be realized only when the two radios have set the same CTCSS frequency. In doing this, disturbance from other signals can be avoided.

PT568 has 39 groups of standard CTCSS frequencies for your selection. See table 3.1.

The CTCSS signal is generated by MCU, and is passed through low pass filter consists of RC to remove high frequency components (above 300Hz). Then the resulting signal is sent to VCO for modulation.

Table 3.1 CTCSS Frequencies

No.	Frequency [Hz]	No.	Frequency [Hz]	No.	Frequency [Hz]	No.	Frequency [Hz]
1	67.0	11	94.8	21	131.8	31	186.2
2	69.3	12	97.4	22	136.5	32	192.8
3	71.9	13	100.0	23	141.3	33	203.5
4	74.4	14	103.5	24	146.2	34	210.7
5	77.0	15	107.2	25	151.4	35	218.1
6	79.7	16	110.9	26	156.7	36	225.7
7	82.5	17	114.8	27	162.2	37	233.6
8	85.4	18	118.8	28	167.9	38	241.8
9	88.5	19	123.0	29	173.8	39	250.3
10	91.5	20	127.3	30	179.9		

DCS

DCS (Digital Code Squelch), which is used to control squelch, is a series of continuous digital codes modulated on carrier together with voice signal. If DCS is set, the speaker can be opened only when the radio receives signal with the same DCS to avoid disturbance of unwanted signals.

PT568 has 83 standard codes (inverted and non-inverted) for your selection. See table 3.2.

DCS signal is produced by MCU (in waveform of PWM). It passes through the low pass filter consists of RC to remove the high frequency components (above 300Hz). Then the resulting signal is sent to VCO and TCXO for modulation, with HF components of the DCS signal being modulated by VCO, and the LF components of the DCS signal being modulated by TCXO.

The DCS signal coming from the receiver is sent to MCU for decoding. MCU checks if the DCS code in the received signal matches the preset DCS of the radio, and determines whether to open the speaker or not.

Table 3.2 DCS Codes

023	114	174	315	445	631
025	115	205	331	464	632
026	116	223	343	465	654
031	125	226	346	466	662
032	131	243	351	503	664
043	132	244	364	506	703
047	134	245	365	516	712
051	143	251	371	532	723
054	152	261	411	546	731
065	155	263	412	565	732
071	156	265	413	606	734
072	162	271	423	612	743
073	165	306	431	624	754
074	172	311	432	627	

3.8 Semiconductor Data

Refer to table 3.3 for descriptions of each pin.

Table 3.3 Definition of CPU Pins

No.	Port name	Pin Name	I/O	Function
1	NC			NC
2	AFCO2	P35	O	Audio frequency switch 2
3	GLED	P33	O	Green LED switch
4	PTT	P34	I	[PTT] input
5	MODE		I	Connect the 4.7K resistor with VCC, programming test point
6	VDEVC2	P43	O	VHF deviation switch 2
7	VDEVC1	P44	O	VHF deviation switch 1
8	RST		I	Reset input, programming test point
9	XOUT		O	
10	VSS		I	GND, programming test point
11	XIN		I	Oscillator (7.3MHz)
12	VCC		I	5V CPU power input, programming test point
13	SHIFT	P27	O	Clock beat shift. H: On
14	VCCN	P26	O(PWM)	Frequency stability output
15	TO	P25	O(PWM)	QT/DQT output
16	WNTC	P24	O	Wideband/Narrowband control H: Wideband, L: Narrowband
17	APC	P23	O(PWM)	TX: Automatic power control output, RX: 0
18	TUNE	P22	O(PWM)	TX: 0 RX: BPF tuning output
19	BEEP	P21	O(PWM)	BEEP/DTMF output
20	SDA	P20	I/O	EEPROM data line
21	ENC0	P17	I	Encoder input
22	ENC2	P16	I	Encoder input
23	ENC3	P15	I	Encoder input
24	ENC1	P14	I	Encoder input
25	SCL	P13	O	EEPROM clock line
26	NC			NC
27	UL	P45	I	PLL circuit unlock detect pin H: locked, L: unlocked
28	TXD	P66	O	RS-232C output, programming test point
29	RXD	P67	I	RS-232C input, programming test point
30	CK	P12	O	PLL clock output
31	DT	P11	O	PLL data output
32	LE	P10	O	PLL IC enable pin, H: locked
33	RX	P31	O	Receiving enable
34	BUSY_V	P30	O	Busy signal of voice annunciation IC
35	DATA_V	P65	O	Data of voice annunciation IC
36	SCLK_V	P64	O	Clock of voice annunciation IC
37	RLED	P63	O	Red LED control, H: On
38	NC	P07	I(A/D0)	Connect the pull-up resistor with VCC, and connect the pull-down resistor with VSS
39	NC			NC
40	NC			NC
41	TI	P06	I(A/D1)	QT/DQT signal input
42	BUSY	P05	I(A/D2)	Busy signal input
43	BATT	P04	I(A/D3)	Battery voltage detect
44	VREF		I	Connect with VCC
45	SAVE	P60	O	Battery saving control, H: supply power, L: power saving
46	MUTE	P62	O	Mute control H: Mic mute L: audio mute
47	5RC	P61	O	Receiving power control L: On
48	KEYIN	P03	I(A/D4)	Programmable key P1, P2, P3 detect
49	5TC	P02	O	Transmitting power control, H: On
50	RLED	P01	O	Red LED switch
51	AC	P00	O	Alarm switch control, H: controlled by volume switch Radio should be in low level in emergency alarm
52	AFCO1	P37	I	Audio control switch 1

Table 3.4 Function Description of Semiconductor Components

Position Mark	Model	Function Description
IC1	MB15E03	Frequency synthesizer
IC4	NJM2904	APC, voltage comparison, driving
IC5	TA31136	Rx second local oscillation, second IF amplification, limitation, demodulation, and noise amplification
IC6	NJM2902	Amplification and filtering of demodulation signal of receiver.
IC7	NJM2902	MIC amplification, limitation and filtering
IC8	TDA8541	Audio frequency power amplification of receiver
IC9	AT24C08	E^2PROM, memorizes channel frequency data, function setting parameters and adjusting status parameters
IC10	R5F212A8	MCU
IC11	PST9140NR	MCU reset circuit
IC12	HT7150-1	LDO, low-power voltage regulator
IC15	W588A080	Voice storage IC
Q2	2SC5108	First amplification of transmitter
Q3	2SC3356	Second amplification of transmitter
Q4	2SC5108	VCO buffer amplifier
Q5	2SC5108	VCO buffer amplifier
Q6	2SC4617	VCO power supply filter
Q7	2SC4738	Noise amplifier
Q9	2SC4617	Audio frequency signal amplification of receiver
Q10	2SC1623	5V voltage regulation output current stretching
Q11	2SK3476	Transmitter final power amplification
Q12	RD01MUS1	Transmitter power amplification driving
Q17	DTA144EE	APC output switch
Q19	3SK318	First mixer
Q20	3SK318	Receiver high power amplifier

Q21	KTC4082	1st IF Amplifier
Q22	DTC144EE	Red LED Driving
Q23	DTC144EE	Green LED Driving
Q24	2SK1824	Voice alert switch
Q26	DTC144EE	5C switch
Q29	KTA1298	5T switch
Q30	KTA1298	5V voltage regulation output current stretching
Q31	KTA1298	5R switch
Q32	KTA1298	5C switch
Q34	DTA144EE	Power switch of MIC amplification unit
Q35	2SK1824	Receiver audio output switch. Disconnect on Emergency
Q36	2SK1824	Receiver audio output switch

Table 3.5 Function Description of Diodes

Position Mark	Model	Function Description
D1	MA77	Transmitter antenna switch diode
D2	HVC131	Transmitter antenna switch diode
D3	HSC277	VCO output switch
D4	HVC131	Antenna toggle switch
D5	HVC131	Antenna toggle switch
D6	HSC277	VCO output switch
D7	HSC277	5V voltage regulation output current stretching
D8	HVC376B	VCO oscillation varactor diode
D9	HVC376B	VCO oscillation varactor diode
D12	MA360	VCO modulation diode
D14	HZU5ALL	APC output voltage-limiting diode
D15	MA2S111	Unlock detection diode
D16	MA2S111	VCO power filtering acceleration diode
D17	1N4148	Noise demodulation
D18	1N4148	Noise demodulation
D20	Green LED	Receiving indicator
D25	MA2S111	APC single diode
D28	Red LED	Transmitting indicator
D29	Green LED	Receiving indicator

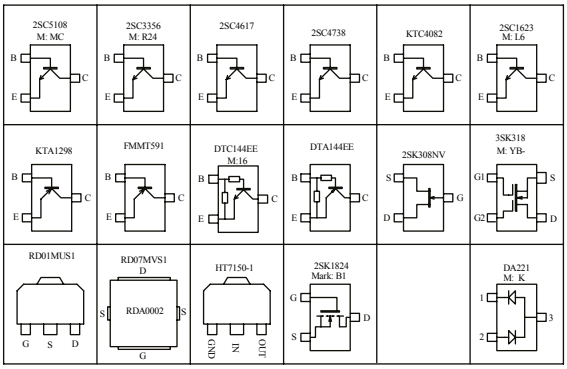
Table 3.6 Features of Crystal Filter XF1, XF2

Item	Rated Value
Nominal center frequency	51.65MHz
Pass band width	±7.5kHz or higher
40dB stop band width	±20.0kHz or lower
Pulse within band	1.0dB or lower
Insertion loss	3.0dB or lower
Guarantee attenuation	80dB or higher
Terminal impedance	1.2kΩ

Table 3.7 Features of CF1 LTVPC450EB

Item	Rated Value
Nominal center frequency	450kHz
6dB band width	±6kHz or higher
50dB band width	±12.5kHz or lower
Pulse	2.0dB or lower
Insertion loss	6.0dB or lower
Guarantee attenuation	35.0db or higher
Terminal impedance	2.0kΩ

Table 3.8 Schematic Diagram for Packaging of Semiconductor Devices



Chapter 4 Mode Introduction

Mode Introduction

Mode		Function	How to enter
User Mode		For normal use	Power ON
PC Mode	Data Programming Mode	Used to read and write frequency data and other features to and from the radio	Received commands from PC.
	PC Test Mode	Tune the radio parameters by PC	Received commands from PC.
	Firmware Programming Mode	Upgrade the radio when new features are released	Press and hold the top key for over 2 seconds while turning the radio power ON, and received commands from PC
Wired Clone Mode		Used to transfer programming data from one radio to another	Press and hold side key 1 for over 2 seconds while turning the radio power ON

4.1 User Mode

You can enter User Mode (conventional communication mode) by turning the radio power ON. Under this mode, users can use the defined functions of the radio.

4.2 Data Programming Mode

The radio has been set before leaving the factory. However, due to different requirements of users, the radio's operating frequencies, channels, CTCSS/DCS, scan, and other functional parameters should be reprogrammed. Therefore, Kirisun has specially designed a set of Chinese/English programming software KSP568 with friendly interface, convenient operation and visualized display for setting functional parameters of the radio.

Steps for setting the functional parameters of the radio by PC are as follows:

A. Install KSP568 on the computer.

B. Connect the radio to the serial port of the PC with the special programming cable (KSPL-09). Refer to the figure below.

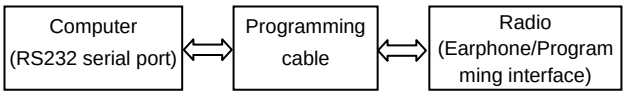


Figure 4.1

C. Turn the computer power ON.

D. Turn the radio power ON.

E. Run the KSP568 programming software by double clicking on its executive program.

F. Click "Program" in the main menu of KSP568, and click "Read from radio" in the pull-down menu to read parameters of the radio to the computer; click "Write to radio" in the pull-down menu to write parameters in the computer to the radio.

G. The following parameters can be set by using KSP568 according to requirements of the user:

Radio Information:

Radio Model (model/frequency range), Serial Number, Embedded Information, MCU Version, Hardware Version, etc.

Radio Parameters:

1) Key Assignment: P1, P2, P3 can be set as long/short key and the hold time can be defined.

No.	Function	Description
0	None	No function is assigned.
1	Voice Annunciation	Press the preprogrammed "Voice Annunciation" button to change the language and mode of voice annunciation. Meanwhile, the current channel number can be heard.
2	Talk Around	When the preprogrammed "Talk Around" button is pressed, the next transmission will be at the same frequency as at which it is received.
3	Lone Worker	Press the preprogrammed "Lone Worker" button to start/stop lone working.
4	Emergency Alarm	Press the preprogrammed "Emergency Alarm" button to make warning tone according to the setting of the programming software or send your ID or background sound to your partner or the system. (This function can only be assigned to the TOP KEY)
5	Emergency Alarm Off	Press the preprogrammed "Emergency Alarm Off" button to quit the Emergency Alarm Mode. (This function can only be assigned to the TOP KEY, and should be used together with Emergency Alarm function)
6	Scan	Press the preprogrammed "Scan" button to start/stop scanning.
7	Nuisance Delete(temporary)	If the radio stays at a noise channel while scanning, press the preprogrammed "Nuisance Delete" button to delete the nuisance channel temporarily.
8	High/Low Power Switch	Press the preprogrammed "High/Low Power Switch" button to switch between high and low transmitting power of the radio.
9	Momentary Monitor	Press and hold the preprogrammed "Momentary Monitor" button to disable CTCSS, DCS signalling, and release the button to resume normal operation.
10	Monitor	Press the preprogrammed "Monitor" button to disable CTCSS, DCS signalling, and you can receive signals that cannot be heard under normal operation. Press it again to resume normal operation.
11	Momentary Squelch Off	Press and hold the preprogrammed "Momentary Squelch Off" button to open squelch; release it to resume normal operation
12	Squelch Off	Press the preprogrammed "Squelch Off" button to open squelch. Press it again to resume normal operation.
13	Lone Worker Reset	Press the preprogrammed "Lone Worker Reset" button while the radio is in Lone Worker Mode to reset the lone worker timer, and the timer starts again.
14	FCS	Press to start free channel scanning (FCS).

2) Optional Functions

1. Wired Clone enable
2. All Low Power Switch
3. Firmware Programming Mode enable
4. Beep Tone
5. All Low Power
6. Voice Annunciation Setting
7. Battery Save
8. TOT
9. TOT Reset Time
10. TOT Pre-alert
11. TOT Rekey Time
12. Squelch Level Selection

3) Embedded Information

1. Password of Read Radio
2. Password of Write Radio
3. Embedded Information Setting

4) Scan

Scan function setting: Priority Channel selection, Revert Channel selection, Tx Dwell Time, Dropout Delay Time, Lookback Time.

FCS function setting: Automatic Tx Time, Automatic Rx Time, FCS Resume Time, Scanning Times.

5) Emergency Setting

Press the preprogrammed "Emergency Alarm" button (the hold time should be longer than the debounce time of the emergency alarm switch) to enter Emergency Alarm Mode. The radio can make warning tone according to the setting of the programming software, or send the background sound to your partner or the system.

Press the preprogrammed "Emergency Alarm Off" button to

quit Emergency Alarm Mode, the radio stops making alert, or stops sending background sound and resumes normal operation.

Channel Information

1) Receiving and transmitting frequencies of each channel (frequency step: 2.5kHz/5kHz/6.25kHz).

2) Receiving and transmitting signalling of each channel.

a) None

b) CTCSS (67~254.1Hz@0.1Hz step)

c) DCS (-777~777@octal number)

3) Busy Channel Lockout (BCL)

4) Clock Beat Shift

5) Channel Spacing Selection: 25kHz/12.5kHz (W/N)

6) Scan Add/Delete

7) FCS Channel Add/Delete

8) Tx Power Selection: High/Low

9) QT Reverse

Please refer to the "Help" document of KSP568 for details.

Note:

1. Firstly, please read data of the radio and back up the data before editing the parameters on KSP568.

2. If the radio cannot function normally after being written in with the edited data, please rewrite the backup data into the radio.

3. "Model Information" is important for the radio; users should not modify it.

4.3 PC Test Mode

Connect the radio to the serial port of the computer with the special programming cable. Please refer to Figure 4.1.

Warning: Non-professionals should not enter PC Test Mode; otherwise, the radio may be damaged. Before entering the PC Test Mode, please firstly connect a 50Ω high frequency load to the antenna connector of the radio or connect the radio to a general test set.

In the programming software, enter the Tuning Mode under the PC Test Mode to tune the following parameters of the radio:

1) Frequency Stability (6250Hz and 2500Hz)

2) Five frequency points of Tx High Power

3) Five frequency points of Tx Low Power

4) Five frequency points for SQL9 On (Wideband)

5) Five frequency points for SQL9 Off (Wideband)

6) Five frequency points for SQL9 On (Narrowband)

7) Five frequency points for SQL9 Off (Narrowband)

8) Five frequency points for SQL1 On (Wideband)

9) Five frequency points for SQL1 Off (Wideband)

10) Five frequency points for SQL1 On (Narrowband)

11) Five frequency points for SQL1 Off (Narrowband)

12) Five frequency points for QT (67.0Hz) Deviation (Wideband)

13) Center frequency point for QT (67.0Hz) Deviation (Narrowband)

14) Five frequency points for QT (151.4Hz) Deviation (Wideband)

15) Center frequency point for QT (151.4Hz) Deviation (Narrowband)

16) Five frequency points for QT (254.1Hz) Deviation (Wideband)

17) Center frequency point for QT (254.1Hz) Deviation (Narrowband)

18) Five frequency points for DQT Deviation (Wideband)

19) Center frequency point for DQT Deviation (Narrowband)

20) Five frequency points for Rx Sensitivity

21) Tx Low Voltage

4.4 Firmware Programming Mode

The radio is in possession with an internal Flash ROM which can be upgraded when new features are released.

Procedure:

1. Press and hold the Top Key for over 2 seconds while turning the radio power ON. The LED will light orange and the radio enters the Firmware Programming Mode.

2. Run the firmware programming software KMU on PC.

3. Connect the radio to the computer by the programming cable.

4. Select a COM port and load the firmware upgrading file. Then click on "E.P" to start downloading.

5. If the communication ends successfully, turn the radio power OFF to exit.

6. If you want to continue programming other radios, repeat steps 1 to 5.

4.5 Wired Clone Mode

If the wired clone function is enabled, the radio can enter the Wired Clone Mode. After entering this mode, the radio will not exit automatically. The user needs to restart the radio if he wants the radio to return to the User Mode.

The operation procedure is as follows:

1. Press and hold Side Key 1 while turning the radio power ON to enter the Wired Clone Mode. If the wired clone function is disabled, the radio will enter User Mode.

2. Connect the slave radio to the master radio by the cloning cable (KCL-01) and turn on the power of the slave radio.

3. Press Side Key 2 of the master radio to start cloning. The LED

on the master radio will light red, and the data of the master is sent to the slave. While the slave is receiving the data, the LED lights green. When cloning of data is completed, the LED of the master will go out, and the slave will restart automatically.

4. Carry out the operation in step 3 to clone other slave radios.

Note: The user can enable or disable the wired clone function through PC programming software. Once the wired clone function is disabled, the radio cannot enter the Wired Clone Mode.

Chapter 5 Disassembly for Repair

The radio is a piece of precision communication equipment. Please be careful when disassemble the radio during service. The instructions for the disassembly are as follows.

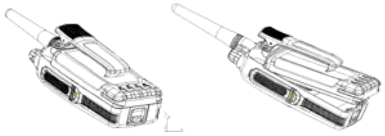
5.1 Attaching and Removing the Battery

1) Attaching the Battery

Fit the two extensions at the top of the battery into the slots at the top of the radio's body.

Press the bottom part of the battery towards the radio until a click is heard and the battery is hooked.

2) Removing the Battery



Push the battery latch at the bottom of the radio forward, the bottom part of the battery will bounce up automatically. Then release the belt clip and remove the battery from the radio's body.

Note:

* Do not short-circuit the battery terminals or dispose battery in fire.

* Do not disassemble the battery casing by yourself.

5.2 Installing/Removing the belt clip

Match the two holes of the belt clip with those on the rear of the radio, and then fix the belt clip to the radio using the two supplied 2.5*8 .0 screws. Loose the fixing screws to remove the belt clip.

5.3 Removing the chassis from the front cabinet

1. Pull out the volume knob and the channel selector knob, and remove the antenna;

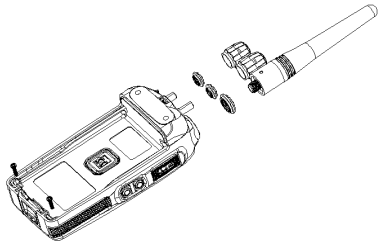
2. Remove the two nuts for knobs and the nut for the antenna connector by the special tool;

3. Remove the two fixing screws at the lower part of the Al chassis by a hexagonal screwdriver;

4. Insert a flat-blade screwdriver into the slot at the bottom of the Al chassis, and prize it up. Then pull the Al chassis backwards to remove it from the front cabinet. Be careful not to break the speaker wire.

5. Remove the solder of the speaker wire with a soldering iron. Then you can remove the chassis from the front cabinet.

See figure below:



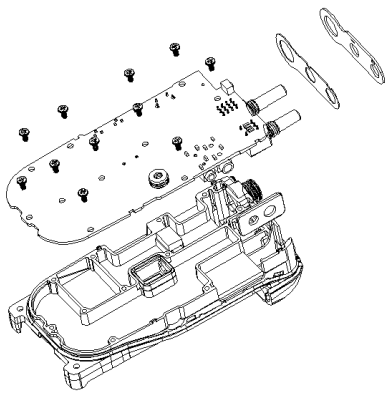
5.4 Removing the mainboard from the Al chassis

1. Remove the top waterproof gasket and the top gasket;

2. Remove the screws on the PCB by a cross screwdriver;

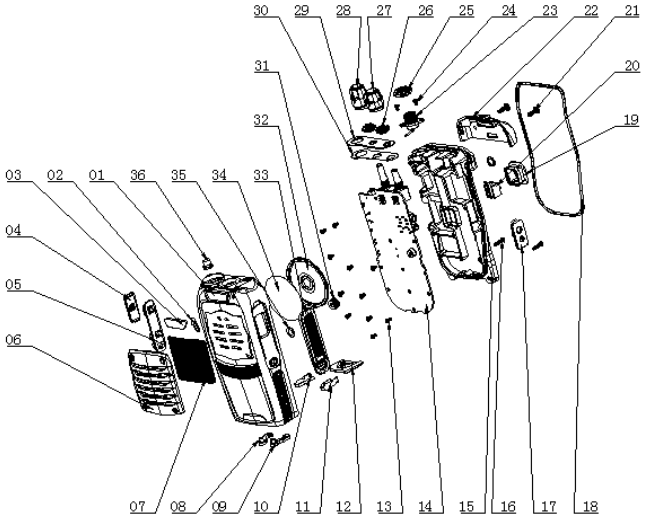
3. Remove the solder of the antenna connector with a soldering iron, and remove the mainboard.

See figure below:



After the aforesaid disassembly, you can repair and adjust the radio according to its actual malfunction.

5.5 Exploded View



No.	Name	Part No.	PCS
1	PT568 Front Casing	201-000568-R02C	1
2	PT568 Light Guide	201-000568-R09A	1
3	PT568 Logo	401-0201E1-R97B	1
4	PT568 PTT Cover	201-000568-R05C	1
5	PT568 PTT Key	202-000568-R02A	1
6	PT568 Speaker Cover	201-000568-R03B	1
7	PT568 Metal Speaker Net	203-000568-R09C	1
8	PT568 Battery Hook 2	203-000568-R05C	1
9	PT568 Battery Hook 1	203-000568-R04C	1
10	PT568 Spring Sheet 2 for Battery Latch	203-000568-R07A	1
11	PT568 Spring Sheet 1 for Battery Latch	203-000568-R06A	1
12	PT568 Battery Latch	201-000568-R14A	1
13	M2.0*4.0 Screws	301-20040G-R01B	11
14	PT568 Mainboard	602-005682-R01	1
15	PT568 Al Alloy Chassis	203-000568-R02B	1
16	M2.0*8.0 Screws	301-20080G-R02B	2
17	PT568 Earphone Jack Bracket	201-000568-R11A	1
18	PT568 Main Waterproof Loop	202-000568-R01A	1
19	PT568 Bracket Waterproof Washer	202-000568-R05A	1
20	PT568 Battery Connector	201-000568-R13A	1
21	M2.5*8.0 Screws	301-25080J-R01	2
22	PT568 Top Cover	201-000568-R04B	1
23	PT558 Antenna Connector	203-000558-R07B	1
24	M2.0*4.0 Screws	301-20040G-R01B	2
25	PT558 Nut for Antenna	203-000558-R14A	1
26	PT558 Nut for Knob	203-000558-R13A	2
27	PT568 Volume Knob	201-000568-R06A	1
28	PT568 Channel Selector Knob	201-000568-R07A	1
29	PT568 Top Waterproof Gasket	202-000568-R04A	1
30	PT568 Top Gasket	203-000568-R08A	1
31	PT558 MIC Seal	202-000558-R09	1
32	Speaker	121-100000-R20	1
33	PT568 Earphone Jack Cover	201-000568-R10B	1
34	PT558 Waterproof Net for Speaker	204-000558-R01	1
35	PT568 Waterproof Gasket for MIC Head	204-000568-R01A	2
36	PT568 Emergency Button	202-000568-R03A	1

Chapter 6 Adjustment

Before test/adjustment, make sure all equipment has been well connected to the ground!

Before test/adjustment, make sure the antenna output terminal has been correctly connected to corresponding equipment or load!

The transmitter output terminal must be terminated with an RF power attenuator and connected to a standard signal generator (SSG)/frequency counter/deviation meter/spectrum analyzer!

Make sure no transmission operation is being conducted while measuring the receiver!

During the adjustment/test/maintenance, make sure reliable anti-static measures are taken for human body and equipment.

6.1 Equipment and Software Required for Test and Adjustment

Equipment and software listed in Table 6.1 are required for test and adjustment of PT568.

Table 6.1 Equipment and Software Required for Test and Adjustment

No.	Item	Specifications
1	Computer	P2 or above, IBM compatible PC, WINDOWS 98/ME/2000/XP Operating System
2	Programming software	KSP568
3	Programming cable	
4	Clone cable	KCL01
5	DC regulated power supply	Output voltage: 7.5V Output current: ≥ 5A
6	RF power meter	Measurement range: 0.5-10W Frequency range: 100MHz-500MHz Impedance: 50Ω SWR ≤ 1.2
7	Frequency counter	Frequency range: 0.1 - 600MHz Frequency accuracy: better than $\pm 1\times10^{-6}$ Sensitivity: better than 100mV
8	Deviation meter	Frequency range: DC - 600MHz Measurement range: 0 - ±5kHz
9	DMM	Input impedance: above 10MΩ/V DC, capable of measuring voltage, current and resistance.
10	Audio signal generator	Frequency range:2-3000Hz Output level: 1-500mV
11	RF power attenuator	Attenuation: 40dB or 50dB Supporting power : higher than 10W
12	Standard signal generator	Frequency range: 10MHz-1000MHz Output level: 0.1uV-32mV (-127dBm~-17dBm)
13	Oscilloscope	Frequency range: DC~20MHz Test range: 10mV-20V
14	Audio frequency voltmeter	Test range: 10mV-10V

Recommendation: Item 6, 7, 8, 10, 11, and 12 listed in the table can be replaced by HP8920 general test set.

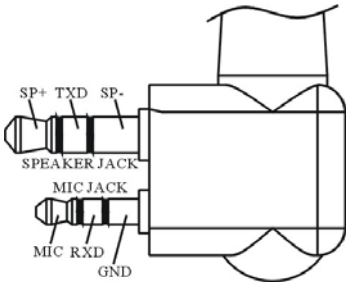


Figure 6.1 External Speaker/Microphone Interface Definition

6.2 Adjustment

After changing components during the maintenance, it is necessary to test the radio and adjust its technical parameters. The following part is going to introduce the adjustment items.

Some parameters can be adjusted by use of KSP568 programming software (in the Tuning Mode). The adjustable parameters are as follows:

1) 6250Hz Precision
2) 2500Hz Precision
3) Tx Power
4) Tx Low Voltage
5) Squelch Level
6) QT Deviation
7) DCS Deviation
8) Rx Sensitivity

Steps for adjustment:

a. Enter PC Test Mode. Refer to Section 4.2.1.

b. Click "Edit" in the main menu of KSP568 programming software, and then click "Entry Tuning" in the pull-down menu to enter the Tuning Mode.

c. Then the "Tuning Item List" screen will pop up. Double click the item you want to adjust, and then you can adjust the parameters.

d. Exit the PC Test Mode after adjustment.

6.3 Adjustment

6.3.1 VCO

Disable the "Battery Save" function, and set the Rx frequency at the high frequency point (see Table 6.2). Under the receiving status, measure the voltage of PD by DMM. Then adjust the PD voltage to be 4.0V±0.2V by tuning the trimming capacitor C180.

Set the Tx frequency at the low frequency point (see Table 6.2), and press the PTT button. Then measure the voltage of PD by DMM. The resulting voltage should be higher than 0.5V.

Table 6.2 High/Center/Low Frequency Point for PT568

	Low Freq Point	Center Freq Point	High Freq Point
PT568(1)	136.125 MHz	145.125 MHz	173.975 MHz
PT568(2)	400.125MHz	425.125MHz	449.975MHz
PT568(3)	420.125MHz	445.125MHz	469.975MHz

6.3.2 PLL frequency

1. In the Tuning Mode, double click "6250Hz precision" to enter. Adjust the parameter among 0-255 to make the Tx frequency at the rated value (error within ±200Hz).

2. In the Tuning Mode, double click "2500Hz precision" to enter. Adjust the parameter among 0-255 to make the Tx frequency at the rated value (error within ±200Hz).

6.3.3 Tx Power

In the Tuning Mode, double click Tx "High power" to enter. Adjust the five frequency points of "Lowest", "Low", "Mid", "High" and "Highest" among 0-255 to make the Tx power at 4W. Meanwhile, observe the operating current, and make sure that the current ≤1.8A.

In the Tuning Mode, double click Tx "Low power" to enter. Adjust the five frequency points of "Lowest", "Low", "Mid", "High" and "Highest" among 0-255 to make the Tx power higher than 0.5W.

6.3.4 Tx Low Voltage

Firstly, adjust the power voltage to be 6.8V. Double click "Tx low voltage" in the Tuning Mode to enter. The software will test automatically. When the value changes no more or only changes a little, click SAVE to exit.

6.3.5 Deviation

Input audio signal (120mV, 1000Hz) to the MIC jack of the radio. Adjust the potentiometer VR2 to make the Tx deviation at ± 4.2kHz.

6.3.6 DCS Tx Signal Waveform and Deviation

In the Tuning Mode, double click "DCS DEV" to enter. Adjust the potentiometer VR1 and observe the demodulation signal (the waveform should be smooth and similar to square wave). Click wideband, and adjust the five frequency points of "Lowest", "Low", "Mid", "High", and "Highest" to make the deviation at 0.75kHz. Then click narrowband, and adjust the value to make the deviation at 0.35kHz.

6.3.7 CTCSS Deviation

In the Tuning Mode, double click "QT (67.0) DEV" to enter. Click wideband, and adjust the five frequency points of "Lowest", "Low", "Mid", "High", and "Highest" to make the deviation at

0.75kHz. Then click narrowband, and adjust the value to make the deviation at 0.35kHz.

In the Tuning Mode, double click “QT(151.4) DEV” to enter. The tuning method is the same as that of “QT(67.0) DEV”.

In the Tuning Mode, double click “QT(254.1) DEV” to enter. The tuning method is the same as that of “QT(67.0) DEV”.

6.3.8 Receiver Sensitivity

In the Tuning Mode, double click “Sensitivity” to enter. Adjust the five frequency points of “Lowest”, “Low”, “Mid”, “High”, and “Highest” among 0-255 to make the sensitivity be the highest.

6.3.9 Receiver Squelch

In the Tuning Mode, double click “SQL9 On” to enter. Click wideband and use the following method to adjust the five frequency points of “Lowest”, “Low”, “Mid”, “High”, and “Highest” respectively. Firstly, click one of the frequency points, and adjust the RF signal frequency of the test equipment to be the same with the receiving frequency of that frequency point, and adjust the signal level to be -116dBm. Then adjust the frequency of the modulation signal to be 1kHz and the deviation to be 3kHz. The programming software will adjust the value automatically. When the value keeps stable, the adjustment of that frequency point is completed. Then click the next frequency point to do the adjustment. After all of the five frequency points are adjusted, use the same method to adjust the five frequency points for narrowband. The only difference is that the frequency of the modulation signal should be 1kHz, and the deviation should be 1.5kHz.

In the Tuning Mode, double click “SQL9 Off” to enter. Click wideband and use the following method to adjust the five frequency points of “Lowest”, “Low”, “Mid”, “High”, and “Highest” respectively. Firstly, click one of the frequency points, and adjust the RF signal frequency of the test equipment to be the same with the receiving frequency of that frequency point, and adjust the signal level to be -118dBm. Then adjust the frequency of the modulation signal to be 1kHz and the deviation to be 3kHz. The programming software will adjust the value automatically. When the value keeps stable, the adjustment of that frequency point is completed. Then click the next frequency point to do the adjustment. After all of the five frequency points are adjusted, use the same method to adjust the five frequency points for narrowband. The only difference is that the frequency of the modulation signal should be 1kHz, and the deviation should be 1.5kHz.

In the Tuning Mode, double click “SQL1 On” and “SQL1 Off” to enter respectively. Use the same method stated above to do the adjustment. The only difference is that the RF signal level for “SQL1 On” should be 123dBm, and the RF signal level for “SQL1 Off” should be 125dBm.

6.4 Adjustment Description

See Table 6.3, 6.4, and 6.5.

Table 6.3 VCO

Item	Test Condition	Test Equipment	Measurement Terminal	Adjustment Parts	Requirement	Remark
Setting	BATT terminal voltage: 7.5V	DMM	CV			
VCO lock voltage	CH: Rx high freq point			C180	4.0V±0.2V	Adjustment
	CH: Tx high freq point				4.0V±0.2V	Adjustment

Table 6.4 Receiver Section

Item	Test Condition	Test Equipment	Measurement Terminal	Adjustment Parts	Requirement	Remark
Audio level	Test freq: Mid freq point Antenna input: RF OUT: -53dBm (501μV) MOD: 1kHz DEV: ±3.0kHz Audio load: 16Ω	RF signal generator Oscilloscope Audio frequency voltmeter Distortion meter /General test set	Speaker connector		(Turn the volume knob clockwise to the end) Audio power ＞ 1.2W	
Sensitivity	CH: Mid freq point CH: Low freq point CH: High freq point RF OUT: -119dBm (0.25μV) MOD: 1kHz DEV: ±3.0kHz			PC Tuning Mode	SINAD: 12dB or higher	
SQL On sensitivity	CH: Rx center freq point			PC Tuning Mode	Normal squelch on after	
	Level 9 RF OUT: -116dBm					

	Level 1 RF OUT: -123dBm				adjustment	

Table 6.5 Transmitter Section

Item	Test condition	Test equipment	Measuring terminal	Adjustment parts	Requirement	Remark
Tx frequency		Frequency counter / General test set	Antenna	PC Tuning Mode	Within ±200Hz	
DCS waveform (balance)		Oscilloscope / General test set		VR1	Smooth and similar to square wave	
Power	Power: 7.5V	Power meter/ General test set Ammeter		PC Tuning Mode	Adjust to 4W	Within ±0.2W
Max. modulation deviation	CH：Tx center freq point AG：1kHz/220mV	Deviation meter/ General test set		VR2	Adjust to ±4.2kHz	±200Hz
Modulation sensitivity	CH：Tx center freq point AG：1kHz/22mV				Deviation checked should be 2.2kHz~3.6kHz	
CTCSS DEV	CTCSS：67Hz	Deviation meter/ General test set		PC Tuning Mode	Adjust to ±0.75kHz	±50Hz
DCS DEV	DCS：023N	Deviation meter/ General test set		PC Tuning Mode	Adjust to ±0.75kHz	±50Hz
Low battery warning	Battery terminal: 6.8V			PC Tuning Mode	Indicator flashes after adjustment	

Chapter 7 Specifications

7.1 General Specifications

Product Model	PT568
Frequency	136 ~ 174 MHz
	400 ~ 450MHz
	420 ~ 470 MHz
Number of Channels	16
Channel Spacing	W: 25 kHz /N:12.5kHz
Operating Temperature	-25℃~ +55℃
Antenna Impedance	50Ω
Frequency Stability	±2.5ppm
Battery (Standard Configuration)	Li-Poly Battery: 1500mAH 7.4V
Dimension (W×H×D)	52.5mm × 111mm × 33.5mm
Weight	≤ 270g: with antenna and 1500mAh Li-Poly Battery

7.2 Receiver Section

Sensitivity (12dB SINAD)	0.25μV(W) / 0.28μV(N)
Adjacent Channel Selectivity	W: ≥ 70dB / N:≥ 60dB
Intermodulation Interference	≥ 65dB
Audio Output Power	1W (16Ω)
Audio Distortion	≤ 5%

7.3 Transmitter Section

Tx Power	4W(UHF) / 5W(VHF)
Modulation Type	W:16KφF3E / N:11KφF3E
Clutter and Harmonic	≤-36 dBm
Residual FM（300~3000Hz）	W:≤-45 dB / N:≤-40dB
Audio Distortion（300~3000Hz）	≤ 5%
Adjacent Channel Power	W:≥ 70dB / N:≥ 60dB
Max. Deviation	W: <±5kHz / N: <±2.5kHz

Chapter 8 Troubleshooting

No.	Problem	Causes and Solutions
1	No display after switching on the radio	A. Battery power may be insufficient, please recharge or change the battery pack. B. The power switch is broken, please change it. C. The CPU is broken, please change the IC. D. The regulator tube IC12 is broken, please change the IC.
2	PLL unlocked (Beeping)	A. The PLL crystal oscillator X4 is broken. Please change it. B. The oscillator transistor Q14 and Q15 are broken. Please change them. C. The PLL IC1 is broken. Please change it.
3	Cannot talk to or hear other	A. The frequencies of both users are not the same, select the same frequency channel.

	group members	B. The CTCSS/DCS of both users are not the same. Please reset it with PC. C. The radio is out of the effective communication range.
4	Cannot receive signals	A. The antenna is in poor contact. Please fasten the antenna until secure. B. The sensitivity is too low, please adjust it with PC. C. The HF amplifier Q20 is broken. Please change it. D. The squelch level is too high and the squelch cannot be opened. Please reset the squelch level with PC. E. The mixing tube Q19 is broken. Please change it. F. The FM processing chip IC5 is broken. Please change it. G. The crystal filter XF1, XF2 are broken, please change them. H. The ceramic filter CF1 is broken, please change it.
5	The transmitting red light is on, but no voice is heard by the recipient.	A. The amplifier tube Q11 is broken, so there is no power output, please change it. B. The microphone is broken, please change it. C. The operational amplifier IC3 is broken, please change it.
6	The receiving green light is on, but no voice is heard.	A. The speaker is broken. Please change it. B. The audio power amplifier IC8 is broken. Please change it. C. The switch tube Q36, Q35 are broken, please change them. D. The operational amplifier IC6 is broken, please change it.
7	Cannot program the radio parameters normally	A. The cable connection is wrong, please check the cable connection. B. The computer RS232 serial port output is abnormal, please check the computer. C. The external MIC/Speaker jack is in poor contact, please change the jack.

Chapter 9 KBC-70Q Charger

9.1 Working Conditions and General Specifications

a) Applicable battery: Li-poly (2*3.7v) and Ni-MH (6*1.2) battery (battery capacity: 1 – 2.4AH).

b) Applicable power adapter: DC 11V-16V, 1000mA. Voltage of standard power adapter: 12V.

c) Idling input current: ≤ 15mA.

d) Pre-charge current: 75mA ± 10mA.

e) Pre-charge time limit: 15Min.

f) Constant charging current: 800mA ± 40mA.

g) Max. charging voltage for Li-poly battery: 8.32 – 8.42V;
Max. charging voltage for Ni-MH battery: 9.6 ± 0.1V.

9.2 Function Description

1. KBC-70Q is an intelligent charger which is safe and reliable, and has fast charging speed and high charging saturation.

2. Status indication function: In the pre-charge process, the red LED will flash; in the charging process, the red LED will light; if the radio is fully charged, or no battery is inserted to the charger slot, or the battery is in the protection status, the green LED will light; if the battery output is in short circuit, the yellow LED will flash.

3. External port of KBC-70Q can identify Li-poly battery and Ni-MH battery.

4. Short circuit protection: If the positive and negative terminals of the charger are in short circuit, the yellow LED will flash, and the charging current will be cut off. After the fault is removed, the charger will resume normal operation.

5. Fully charged battery identification: If the user recharges a Ni-MH battery that has been fully charged, the charger will still charge the battery, and will judge if the battery is fully charged according to normal –ΔV; if the user recharges a Li-poly battery that has been fully charged, the charger will detect the voltage of the battery. If the voltage is higher than 8.25V, the charger will not charge; if the voltage is lower than 8.25V, the charger will charge the battery again.

6. Temperature protection: For Li-poly battery, when the temperature is higher than 55℃, the charger will stop charging, and the yellow LED will light; when the temperature comes back to 45℃, the charger will start charging again. For Ni-MH battery, when the temperature is higher than 60℃, the charger will stop charging, and the yellow LED will light; when the temperature comes back to 50℃, the charger will start charging again.

7. When the radio is in the standby mode, if it is inserted into the charger slot, the charger will charge it automatically if the battery voltage is lower than 8.2V.

8. LED status:

Charger Status	LED Status		
	Charging Indicator (red)	Power Indicator (green)	Indicator for abnormal battery temperature (yellow)
Standby/No battery inserted	/	Light	/
Pre-charge	Flash	/	/
Rapid charge	Light	/	/
Charging completed	/	Light	/
Abnormal charging status	/	/	Light

Interface Description

Red LED: Charging indication

Green LED: Power indication/charging completion indication

Yellow LED: Abnormal charging indication

Face the charger, from left to right:

B-: Charging output negative terminal

TYPE: Battery type detection

Suspended: Ni-MH battery

Grounded: Li-poly battery

TEMP: Battery temperature detection.

B+: Charging output positive terminal

Appendix 1 Abbreviations

AMP: Amplify, amplifier

ANT: Antenna

APC: Automatic Power Control

BPF: Band Pass Filter

CTCSS: Continuous Tone Control Squelch System

DCS: Digital Code Squelch

DEMOD: Demodulation

E^2PROM: Electrical Erasable Programmable Read Only Memory

HPF: High Pass Filter

IDC: Instantaneous Deviation Control

IF: Intermediate Frequency

LED: Light-Emitting Diode

LNA: Low Noise Amplifier

LPF: Low Pass Filter

MCU: Micro Control Unit

MIC: Microphone

MOD: Modulation

MONI: Monitor

PLL: Phase Lock Loop

PTT: Push-to-talk

RX: Receiver

SPK: Speaker

TCXO: Temperature Compensated Crystal Oscillators

TX: Transmitter

UL: Un-lock

VCO: Voltage Control Oscillator

Appendix 2 Electronic Parts List

No.	Part No.	Description	Unit	PCS	Position Mark
1	101-00568U-R02	PT568PCB / UHF, four layers, FR4, 1.2mm, PT568U-090409, ROHS	pcs	1	
2	102-9140NR-R01	Reset IC / PST9140NR, ROHS	pcs	1	IC11
3	102-A31136-R01	IF (FM) demodulation IC / TA31136FN,SSOP, ROHS	pcs	1	IC5
4	102-AT2408-R02	Memory IC / AT24C08BN-SH, ROHS	pcs	1	IC9
5	102-B15E03-R01	PLL IC / MB15E03SL,PLL,16-PIN,SSOP, ROHS	pcs	1	IC1
6	102-DA8541-R01	Audio power amplifier / TDA8541,SO8, ROHS	pcs	1	IC8
7	102-HT7130-R01	Voltage regulator IC / HT7130-1,SOT-89, ROHS	pcs	1	IC14
8	102-HT7150-R01	Voltage regulator IC / HT7150-1, ROHS	pcs	1	IC12
9	102-M2902V-R01	Operational amplifier / NJM2902V,OP-AMP, ROHS	pcs	3	IC4, IC6, IC7
10	102-M2904V-R01	Operational amplifier / NJM2904V,OP-AMP, ROHS	pcs	1	IC3
11	103-00MA77-R01	Chip HF switch diode / MA77,0805, ROHS	pcs	1	D1
12	103-1SR154-R01	Chip rectifying diode / 1SR154-400(ROHM), ROHS	pcs	1	D33
13	103-1SS372-R01	Chip switch diode / 1SS372(TOSHIBA), ROHS	pcs	1	D13
14	103-1SV278-R01	Chip variable capacitor diode / 1SV278, ROHS	pcs	2	D9, D10
15	103-1SV325-R01	Chip variable capacitor diode / 1SV325, ROHS	pcs	2	D8, D11
16	103-A2S111-R01	Chip switch diode / 0603,MA2S111(PANASONIC), ROHS	pcs	3	D15, D16, D25
17	103-DAN222-R01	Chip switch diode / DAN222,(ROHM), ROHS	pcs	1	D308
18	103-HSC277-R01	Chip diode / waveband switch,HSC277(HITACHI), ROHS	pcs	3	D3, D6, D7
19	103-HVC131-R01	Chip HF switch diode / 0603,HVC131(HITACHI), ROHS	pcs	2	D4, D5
20	103-HVC350-R01	Chip variable capacitor diode / 0603,HVC350B(HITACHI), ROHS	pcs	6	D21, D22, D23, D24, D26, D30
21	103-HZU5AL-R01	Chip voltage regulator diode / HZU5ALL(HITACHI), ROHS	pcs	1	D14
22	103-L190YG-R01	Chip LED / 0603, green, H19-213SYGC, ROHS	pcs	2	D20, D29
23	103-MHC190-R02	Chip LED / 0603, red, 19-21SURC/S530-A2/TR8, ROHS	pcs	1	D28
24	103-RB706F-R01	Chip switch diode / RB706F-40,SOT-323, ROHS	pcs	1	D17
25	103-RKV500-R01	Chip variable capacitor diode / 0805,RKV500KG, ROHS	pcs	1	D12
26	104-A144EE-R01	Chip triode / DTA144EE(ROHM), ROHS	pcs	4	Q17, Q33, Q34, Q40

27	104-C144EE-R01	Chip triode / DTC144EE(ROHM), ROHS	pcs	13	Q8, Q22, Q23, Q26, Q27, Q28, Q35, Q39, Q42, Q44, Q45, Q46, Q52
28	104-C144EU-R01	Chip triode / DTC144EUA(ROHM), ROHS	pcs	1	Q18
29	104-KRX102-R01	Chip triode / KRX102U,with,bias,resistor, ROHS	pcs	1	IC2
30	104-MT717T-R01	Chip triode / FMMT717TA, ROHS	pcs	1	Q30
31	104-SA1586-R01	Chip triode / 2SA1586, ROHS	pcs	1	Q43
32	104-SC1623-R01	Chip triode / 2SC1623, ROHS	pcs	1	Q10
33	104-SC3356-R01	Chip triode / 2SC3356,R24, ROHS	pcs	1	Q3
34	104-SC4617-R02	Chip triode / 2SC4617(R)(ROHM), ROHS	pcs	4	Q6, Q7, Q9, Q37
35	104-SC4919-R01	Chip triode / 2SC4919,MUTING,CIRCUIT(SANYO), ROHS	pcs	1	Q24
36	104-SC5108-R01	Chip triode / 2SC5108Y(TOSHIBA), ROHS	pcs	3	Q2, Q4, Q5
37	104-TA1298-R01	Chip triode / KTA1298(Y), ROHS	pcs	3	Q29, Q31, Q32
38	104-TC4082-R01	Chip triode / KTC4082,(KEC), ROHS	pcs	2	Q1, Q21
39	105-2SJ243-R01	Chip FET / 2SJ243, ROHS	pcs	1	Q16
40	105-2SK508-R01	Chip FET / 2SK508NV(K52), ROHS	pcs	2	Q14, Q15
41	105-3SK318-R01	Chip FET / 3SK318, ROHS	pcs	2	Q19, Q20
42	105-RD01MU-R01	Chip FET / RD01MUS2, ROHS	pcs	1	Q12
43	105-SK1824-R01	Chip FET / 2SK1824, ROHS	pcs	6	Q13, Q25, Q36, Q38, Q41, Q51
44	105-SK3476-R01	Chip FET / 2SK3476, ROHS	pcs	1	Q11
45	105-ST2302-R01	Chip FET / ST2302, ROHS	pcs	2	Q47, Q48
46	106-0BA010-R01	Button switch / SKHLLBA010, ROHS	pcs	1	K1
47	106-454548-R01	Touch switch / 4.5*4.5*4.8, ROHS	pcs	2	K2, K4
48	106-LBE010-R01	Chip touch switch / SKRTLBE010, ROHS	pcs	1	K3
49	106-RE0814-R02	Encoder switch / RE08140AX-V01-0000,16P16 , ROHS	pcs	1	SW2
50	108-450C24-R02	Chip discriminator / JTBM450CX24, ROHS	pcs	1	CD1
51	108-CF450G-R02	Chip ceramic filter / LTWC450G,450kHz±5kHz, ROHS	pcs	1	CF1
52	108-XF5165-R01	Chip crystal filter / DSF753SBF， 51.65MHz ± 4kHz/3dB，(7.0x5.0x1.3)mm， ROHS	pcs	1	XF1
53	109-040000-R01	Chip resistor / 0402,0R±5%, ROHS	pcs	20	C67, C166, C250, R7, R18, R24, R27, R30, R141, R182, R183, R203, R217, R241, R260, R261, R262, R268, R278, R283
54	109-040100-R01	Chip resistor / 0402,10R±5%, ROHS	pcs	6	R95, R96, R98, R101, R127, R200
55	109-040101-R01	Chip resistor / 0402,100R±5%, ROHS	pcs	6	R4, R12, R89, R90, R128, R240
56	109-040102-R01	Chip resistor / 0402,1K±5%, ROHS	pcs	20	R37, R38, R41, R42, R47, R48, R49, R50, R69, R129, R130, R131, R150, R152, R157, R191, R199, R234, R238, R256
57	109-040103-R01	Chip resistor / 0402,10K±5%, ROHS	pcs	23	R29, R80, R92, R100, R109, R110, R116, R117, R119, R120, R121, R122, R123, R133, R136, R137, R138, R139, R140, R194, R205, R275, R280
58	109-040104-R01	Chip resistor / 0402,100K±5%, ROHS	pcs	18	R6, R102, R104, R115, R154, R158, R174, R197, R212, R226, R228, R235, R236, R243, R247, R257, R272, R300
59	109-040105-R01	Chip resistor / 0402,1M±5%, ROHS	pcs	9	R43, R79, R84, R103, R107, R160, R162, R266, R297
60	109-040111-R01	Chip resistor / 0402,110R±5%, ROHS	pcs	1	R91
61	109-040122-R01	Chip resistor / 0402,1.2K±5%, ROHS	pcs	1	R188
62	109-040123-R01	Chip resistor / 0402,12K±5%, ROHS	pcs	2	R211, R301
63	109-040124-R01	Chip resistor / 0402,120K±5%, ROHS	pcs	5	R5, R8, R9, R17, R248
64	109-040152-R01	Chip resistor / 0402,1.5K±5%, ROHS	pcs	1	R54
65	109-040153-R01	Chip resistor / 0402,15K±5%, ROHS	pcs	9	C187, C188, C189, R52, R76, R142, R155, R156, R192
66	109-040154-R01	Chip resistor / 0402,150K±5%, ROHS	pcs	4	R94, R113, R190, R201
67	109-040181-R01	Chip resistor / 0402,180R±5%, ROHS	pcs	3	R70, R71, R189
68	109-040182-R01	Chip resistor / 0402,1.8K±5%, ROHS	pcs	2	R44, R224
69	109-040183-R01	Chip resistor / 0402,18K±5%, ROHS	pcs	4	R149, R210, R218, R219
70	109-040184-R01	Chip resistor / 0402,180K±1%, ROHS	pcs	3	R66, R67, R86
71	109-040203-R01	Chip resistor / 0402,20K±5%, ROHS	pcs	1	R249

72	109-040220-R01	Chip resistor / 0402,22R±5%, ROHS	pcs	3	R73, R93, R274
73	109-040221-R01	Chip resistor / 0402,220R±5%, ROHS	pcs	6	R179, R180, R214, R215, R216, R244
74	109-040222-R01	Chip resistor / 0402,2.2K±5%, ROHS	pcs	5	R2, R39, R185, R186, R187
75	109-040223-R01	Chip resistor / 0402,22K±5%, ROHS	pcs	3	R106, R198, R209
76	109-040224-R01	Chip resistor / 0402,220K±5%, ROHS	pcs	12	R87, R126, R164, R207, R227, R233, R246, R251, R252, R269, R279, R281
77	109-040271-R01	Chip resistor / 0402,270R±5%, ROHS	pcs	1	R35
78	109-040272-R01	Chip resistor / 0402,2.7K±5%, ROHS	pcs	4	R40, R148, R223, R363
79	109-040273-R01	Chip resistor / 0402,27K±5%, ROHS	pcs	6	R46, R99, R171, R172, R193, R271
80	109-040274-R01	Chip resistor / 0402,270K±5%, ROHS	pcs	1	R231
81	109-040330-R01	Chip resistor / 0402,33R±5%, ROHS	pcs	1	R72
82	109-040332-R01	Chip resistor / 0402,3.3K±5%, ROHS	pcs	8	R26, R55, R56, R57, R59, R60, R97, R111
83	109-040333-R01	Chip resistor / 0402,33K±5%, ROHS	pcs	8	R25, R114, R161, R196, R206, R258, R263, R265
84	109-040334-R01	Chip resistor / 0402,330K±5%, ROHS	pcs	3	R15, R82, R105
85	109-040392-R01	Chip resistor / 0402,3.9K±5%, ROHS	pcs	2	R221, R222
86	109-040393-R01	Chip resistor / 0402,39K±5%, ROHS	pcs	2	R53, R68
87	109-040394-R01	Chip resistor / 0402,390K±5%, ROHS	pcs	1	R165
88	109-040470-R01	Chip resistor / 0402,47R±5%, ROHS	pcs	2	R31, R32
89	109-040471-R01	Chip resistor / 0402,470R±5%, ROHS	pcs	2	R3, R81
90	109-040472-R01	Chip resistor / 0402,4.7K±5%, ROHS	pcs	4	R151, R159, R204, R282
91	109-040473-R01	Chip resistor / 0402,47K±5%, ROHS	pcs	16	R10, R11, R13, R14, R19, R20, R21, R22, R28, R75, R118, R125, R153, R273, R277, R292
92	109-040474-R01	Chip resistor / 0402,470K±5%, ROHS	pcs	3	R166, R232, R264
93	109-040560-R01	Chip resistor / 0402,56R±5%, ROHS	pcs	1	R58
94	109-040561-R01	Chip resistor / 0402,560R±5%, ROHS	pcs	1	R202
95	109-040562-R01	Chip resistor / 0402,5.6K±5%, ROHS	pcs	9	R61, R62, R63, R64, R65, R132, R184, R195, R302
96	109-040563-R01	Chip resistor / 0402,56K±5%, ROHS	pcs	12	R16, R173, R175, R176, R177, R178, R225, R239, R254, R267, R270, R284
97	109-040564-R01	Chip resistor / 0402,560K±5%, ROHS	pcs	1	R163
98	109-040682-R01	Chip resistor / 0402,6.8K±5%, ROHS	pcs	2	C276, R220
99	109-040683-R01	Chip resistor / 0402,68K±5%, ROHS	pcs	1	R245
100	109-040684-R01	Chip resistor / 0402,680K±5%, ROHS	pcs	1	R77
101	109-040821-R01	Chip resistor / 0402,820R±5%, ROHS	pcs	1	R33
102	109-040822-R01	Chip resistor / 0402,8.2K±5%, ROHS	pcs	3	R36, R229, R230
103	109-040823-R01	Chip resistor / 0402,82K±5%, ROHS	pcs	2	R51, R255
104	109-040913-R01	Chip resistor / 0402,91K±5%, ROHS	pcs	1	R213
105	109-060000-R01	Chip resistor / 0603,0R±5%, ROHS	pcs	5	L23, L34, L62, L66, R23
106	109-060100-R01	Chip resistor / 0603,10R±5%, ROHS	pcs	1	L21
107	109-060101-R01	Chip resistor / 0603,100R±5%, ROHS	pcs	2	R74, R88
108	109-060154-R02	Chip resistor / 0603,150K±1%, ROHS	pcs	6	R143, R144, R145, R146, R147, R170
109	109-060220-R01	Chip resistor / 0603,22R±5%, ROHS	pcs	1	L54
110	109-060271-R01	Chip resistor / 0603,270R±5%, ROHS	pcs	1	R34
111	109-100R47-R01	Chip resistor / 1206,0.47R±5%, ROHS	pcs	3	R167, R168, R169
112	110-110503-R01	Chip trimming resistor / EVM2NSX80B54，50K±25%，B Linear, ROHS	pcs	1	VR2
113	110-110683-R02	Chip trimming resistor / EVM2NSX80BS4，68K±25%，B Linear，PANASONIC, ROHS	pcs	1	VR1
114	110-220103-R03	Volume switch / RY-6932， ROHS	pcs	1	SW1
115	111-030000-R01	Chip self-resume fuse / 433003,3A/32V,1206(original 429003)，ROHS	pcs	1	F1
116	112-043100-R01	Chip capacitor / 0402,10P±0.5P,50V,C0G, ROHS	pcs	6	C47, C124, C142, C257, C282, C288
117	112-043101-R01	Chip capacitor / 0402,100P±5%,50V,C0G, ROHS	pcs	2	C119, C196
118	112-043102-R01	Chip capacitor / 0402,1000P±10%,50V,X7R, ROHS	pcs	29	C38, C72, C73, C75, C96, C97, C98, C99, C100, C103, C104, C105, C106, C109, C111, C112, C114, C150, C151, C169, C172, C184, C241, C263, C264, C272, C278, C279, C294
119	112-043103-R01	Chip capacitor / 0402,0.01uF±10%,50V,X7R, ROHS	pcs	17	C23, C50, C79, C138, C149, C153, C155, C159,

					C160, C161, C162, C190, C226, C232, C253, C296, C313
120	112-043104-R01	Chip capacitor / 0402,0.1uF,+80%--20%,16V,Y5V, ROHS	pcs	6	C179, C185, C317, C318, C357, C358
121	112-043104-R02	Chip capacitor / 0402,0.1uF±10%,16V,X7R, ROHS	pcs	20	C35, C82, C83, C85, C101, C167, C168, C173, C174, C175, C176, C177, C178, C221, C231, C233, C254, C271, C307, C310
122	112-043105-R01	Chip capacitor / 0402,1uF±10%,6.3V,X5R, ROHS	pcs	15	C25, C30, C123, C170, C225, C235, C248, C251, C300, C303, C315, C321, C326, C331, C400
123	112-043121-R01	Chip capacitor / 0402,120P±5%,50V,C0G, ROHS	pcs	1	C214
124	112-043122-R01	Chip capacitor / 0402,1200P±10%,50V,X7R, ROHS	pcs	1	C211
125	112-043123-R01	Chip capacitor / 0402,0.012uF±10%,25V,X7R, ROHS	pcs	5	C157, C158, C239, C249, C275
126	112-043130-R01	Chip capacitor / 0402,13P±5%,50V,C0G, ROHS	pcs	1	C69
127	112-043150-R01	Chip capacitor / 0402,15P±5%,50V,C0G, ROHS	pcs	2	C86, C195
128	112-043152-R01	Chip capacitor / 0402,1500P±10%,50V,X7R, ROHS	pcs	1	C289
129	112-043180-R01	Chip capacitor / 0402,18P±5%,50V,C0G, ROHS	pcs	1	C212
130	112-043182-R01	Chip capacitor / 0402,1800P±10%,50V,X7R, ROHS	pcs	2	C51, C113
131	112-0431R0-R01	Chip capacitor / 0402,1P±0.25P,50V,C0G, ROHS	pcs	1	C229
132	112-043200-R01	Chip capacitor / 0402,20P±5%,50V,C0G, ROHS	pcs	1	C141
133	112-043220-R01	Chip capacitor / 0402,22P±5%,50V,C0G, ROHS	pcs	3	C143, C255, C256
134	112-043221-R01	Chip capacitor / 0402,220P±5%,50V,C0G, ROHS	pcs	1	C295
135	112-043222-R01	Chip capacitor / 0402,2200P±10%,50V,X7R, ROHS	pcs	1	C262
136	112-043223-R01	Chip capacitor / 0402,0.022uF±10%,25V,X7R, ROHS	pcs	1	C245
137	112-043224-R02	Chip capacitor / 0402,0.22uF±10%,10V,X7R, ROHS	pcs	1	C280
138	112-043270-R01	Chip capacitor / 0402,27P±5%,50V,C0G, ROHS	pcs	1	C227
139	112-043271-R01	Chip capacitor / 0402,270P±10%,50V,X7R, ROHS	pcs	1	C1
140	112-043273-R01	Chip capacitor / 0402,0.027uF±10%,50V,X7R, ROHS	pcs	2	C244, C323
141	112-0432R0-R01	Chip capacitor / 0402,2P±0.25P,50V,C0G, ROHS	pcs	2	C218, C301
142	112-043300-R01	Chip capacitor / 0402,30P±5%,50V,C0G, ROHS	pcs	2	C200, C319
143	112-043330-R01	Chip capacitor / 0402,33P±5%,50V,C0G, ROHS	pcs	1	C171
144	112-043333-R01	Chip capacitor / 0402,0.033uF±10%,16V,X7R, ROHS	pcs	3	C213, C223, C283
145	112-043360-R01	Chip capacitor / 0402,36P±5%,50V,C0G, ROHS	pcs	1	C90
146	112-043392-R01	Chip capacitor / 0402,3900P±10%,50V,X7R, ROHS	pcs	3	C222, C238, C284
147	112-043393-R01	Chip capacitor / 0402,0.039uF±10%,10V,X7R, ROHS	pcs	1	C299
148	112-0433R0-R01	Chip capacitor / 0402,3P±0.25P,50V,C0G, ROHS	pcs	4	C70, C182, C230, C302
149	112-043470-R01	Chip capacitor / 0402,47P±5%,50V,C0G, ROHS	pcs	2	C4, C293
150	112-043471-R01	Chip capacitor / 0402,470P±10%,50V,X7R, ROHS	pcs	79	C6, C286, C74, C107, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C24, C26, C28, C29, C31, C34, C36, C37, C39, C40, C41, C42, C43, C44, C45, C48, C49, C52, C53, C54, C55, C56, C58, C59, C60, C61, C71, C84, C102, C108, C110, C125, C146, C152, C154, C163, C183, C186, C220, C237, C261, C267, C268, C269, C270, C274, C277, C287, C290, C291, C297, C305, C316, C320, C327, C328, C329, C502, R78
151	112-043472-R01	Chip capacitor / 0402,4700P±10%,25V,X7R, ROHS	pcs	6	C156, C215, C285, C322, C324, C325
152	112-043474-R01	Chip capacitor / 0402,0.47uF±10%,10V,X5R, ROHS	pcs	2	C80, C192
153	112-0434R0-R01	Chip capacitor / 0402,4P±0.25P,50V,C0G, ROHS	pcs	3	C228, C309, C312
154	112-0435R0-R01	Chip capacitor / 0402,5P±0.25P,50V,C0G, ROHS	pcs	2	C87, C118
155	112-043680-R01	Chip capacitor / 0402,68P±5%,50V,C0G, ROHS	pcs	1	C314
156	112-043681-R01	Chip capacitor / 0402,680P±10%,16V,X7R, ROHS	pcs	3	C57, C258, C260
157	112-043683-R01	Chip capacitor / 0402,0.068uF±10%,16V,X7R, ROHS	pcs	4	C242, C243, C247, C259
158	112-0436R0-R01	Chip capacitor / 0402,6P±0.5P,50V,C0G, ROHS	pcs	1	C131
159	112-0437R0-R01	Chip capacitor / 0402,7P±0.5P,50V,C0G, ROHS	pcs	1	C122
160	112-0438R0-R01	Chip capacitor / 0402,8P±0.5P,50V,C0G, ROHS	pcs	4	C32, C126, C145, C311
161	112-0439R0-R01	Chip capacitor / 0402,9P±0.5P,50V,C0G, ROHS	pcs	2	C127, C128
162	112-043R50-R01	Chip capacitor / 0402,0.5P±0.1P,50V,C0G, ROHS	pcs	2	C147, C219

163	112-043R75-R01	Chip capacitor / 0402,0.75P±0.1P,50V,C0G, ROHS	pcs	2	C216, C217
164	112-063101-R01	Chip capacitor / 0603,100P±5%,50V,C0G, ROHS	pcs	1	C144
165	112-063102-R01	Chip capacitor / 0603,1000P±10%,50V,X7R, ROHS	pcs	1	L16
166	112-063150-R01	Chip capacitor / 0603,15P±5%,50V,C0G, ROHS	pcs	1	C133
167	112-0631R0-R01	Chip capacitor / 0603,1P±0.25P,50V,C0G, ROHS	pcs	2	C148, C236
168	112-0631R5-R01	Chip capacitor / 0603,1.5P±0.25P,50V,C0G, ROHS	pcs	1	C62
169	112-063270-R01	Chip capacitor / 0603,27P±5%,50V,C0G, ROHS	pcs	1	C94
170	112-0632R0-R01	Chip capacitor / 0603,2P±0.25P,50V,C0G, ROHS	pcs	2	C2, C3
171	112-063390-R01	Chip capacitor / 0603,39P±5%,50V,C0G, ROHS	pcs	1	C194
172	112-0633R0-R01	Chip capacitor / 0603,3P±0.25P,50V,C0G, ROHS	pcs	2	C121, C137
173	112-0633R5-R01	Chip capacitor / 0603,3.5P±0.25P,50V,C0G, ROHS	pcs	3	C63, C117, C120
174	112-063471-R01	Chip capacitor / 0603,470P±10%,50V,X7R, ROHS	pcs	2	C5, C27
175	112-0634R0-R01	Chip capacitor / 0603,4P±0.25P,50V,C0G, ROHS	pcs	2	C88, C129
176	112-063560-R01	Chip capacitor / 0603,56P±5%,50V,C0G, ROHS	pcs	1	C139
177	112-0635R0-R01	Chip capacitor / 0603,5P±0.25P,50V,C0G, ROHS	pcs	1	C116
178	112-063680-R01	Chip capacitor / 0603,68P±5%,50V,C0G, ROHS	pcs	1	C93
179	112-0636R0-R01	Chip capacitor / 0603,6P±0.5P,50V,C0G, ROHS	pcs	2	C136, C206
180	112-0638R0-R01	Chip capacitor / 0603,8P±0.5P,50V,C0G, ROHS	pcs	1	C135
181	112-0639R0-R01	Chip capacitor / 0603,9P±0.5P,50V,C0G, ROHS	pcs	2	C78, C91
182	112-063R50-R01	Chip capacitor / 0603,0.5P±0.1P,50V,C0G, ROHS	pcs	1	C115
183	112-072106-R01	Chip Ta capacitor / TP model, SIZE P,10uF±20%,6.3V, ROHS	pcs	3	C191, C198, C199
184	112-072225-R01	Chip Ta capacitor / TP model, SIZE P,2.2uF±20%,10V, ROHS	pcs	2	C140, C246
185	112-072475-R01	Chip Ta capacitor / TP model, SIZE P,4.7uF±20%,10V, ROHS	pcs	7	C165, C201, C202, C273, C292, C298, C308
186	112-073105-R01	Chip capacitor / 0805,1uF+80%--20%,16V,Y5V, ROHS	pcs	1	C306
187	112-073225-R01	Chip capacitor / 0805,2.2uF+80%--20%,10V,Y5V, ROHS	pcs	1	C234
188	112-073334-R02	Chip capacitor / 0805,330nF±10%,16V,X7R, ROHS	pcs	2	C33, C209
189	112-102104-R01	Chip Ta capacitor / TS model, SIZE A,0.1uF±20%,35V, ROHS	pcs	2	C193, C204
190	112-102106-R02	Chip Ta capacitor / TS model, SIZE A,10uF±20%,10V, ROHS	pcs	3	C197, C203, C210
191	112-102156-R01	Chip Ta capacitor / TS model, SIZE A,15uF±20%,6.3V, ROHS	pcs	1	C208
192	112-102225-R01	Chip Ta capacitor / TS model, SIZE A,2.2uF±20%,10V, ROHS	pcs	1	C207
193	112-102475-R02	Chip Ta capacitor / TS model, SIZE A,4.7uF±20%,16V, ROHS	pcs	4	C46, C224, C240, C266
194	112-112476-R02	Chip Ta capacitor / TS model, SIZE B,47uF±20%,10V, ROHS	pcs	1	C330
195	113-010100-R01	Chip trimming capacitor / TZV2Z100A110,3~10p+100, ROHS	pcs	2	C180, C181
196	114-06E180-R01	Chip wire inductor / C1608CB-18NJ,ceramic chip 18NH±5%, 0603, ROHS	pcs	2	L57, L63
197	114-06E331-R02	Chip inductor / MLF1608R33K,330nH±10%,0603, ROHS	pcs	2	L59, L69
198	114-06E560-R01	Chip wire inductor / C1608CB-56NJ,ceramic chip 56nH±5%, 0603, ROHS	pcs	1	L13
199	114-06E680-R01	Chip wire inductor / C1608CB-68NJ,ceramic chip 68nH±5%, 0603, ROHS	pcs	1	L53
200	114-06G102-R01	Chip inductor / MLF1608A1R0K,1uH±5%,0603, ROHS	pcs	1	L68
201	114-06G120-R01	Chip inductor / MLG1608B12NJT,12nH±5%,0603, ROHS	pcs	1	L31
202	114-06G181-R01	Chip stacked inductor / LGHK1608R18J-T,180nH ± 5%,0603, ROHS	pcs	2	L27, L50
203	114-06G221-R02	Chip stacked inductor / LGHK1608R22J-T,220nH ± 5%,0603, ROHS	pcs	4	L18, L36, L49, L52
204	114-06G270-R01	Chip inductor / MLG1608B27NJ,27nH±5%,0603, ROHS	pcs	3	L12, L32, L33
205	114-06G332-R01	Chip inductor / MLF1608A3R3K,3.3uH±5%,0603, ROHS	pcs	2	L28, L29
206	114-06G470-R01	Chip inductor / MLG1608B47NJ,47nH±5%,0603, ROHS	pcs	1	L35
207	114-06G561-R01	Chip inductor / MLF1608DR56K,560nH±10%,0603, ROHS	pcs	2	L11, L64
208	114-06G6R8-R01	Chip inductor / MLG1608B6N8DT,6.8nH±0.5nH,0603, ROHS	pcs	1	C95
209	114-07E220-R02	Chip wire inductor / C2012CB-22NG,22nH±2%,0805, ROHS	pcs	1	L51
210	114-07E221-R01	Chip wire inductor / LQW2BHNR22NJ03L / LQN21AR22J, 220nH±5%, 0805, ROHS	pcs	1	L26
211	114-07E270-R03	Chip wire inductor / C2012C-27NG,27nH±2%,0805, ROHS	pcs	1	L30
212	114-08E103-R01	Chip inductor / FSLM2520-100J,10uH±5%,1008, ROHS	pcs	1	L45
213	114-08E331-R01	Chip inductor / FSLM2520-R33K,330nH±10%,1008, ROHS	pcs	1	L55

214	114-08E821-R01	Chip inductor / FSLM2520-R82K,820nH±10%,1008, ROHS	pcs	1	L56
215	115-1R53R0-R04	Chip air-cored coil / 0.4*1.5*3TL, negative, high pin, ROHS	pcs	10	L1, L2, L3, L4, L5, L6, L7, L8, L9, L10
216	115-1R54R0-R04	Chip air-cored coil / 0.4*1.5*4TL, negative, high pin, ROHS	pcs	2	L14, L15
217	115-1R55R0-R01	Chip air-cored coil / 0.5*1.5*5T, positive, high pin, ROHS	pcs	1	L24
218	115-1R58R0-R02	Chip air-cored coil / 0.4*1.5*8TL, negative, high pin, ROHS	pcs	1	L25
219	117-000000-R04	Chip bead / EMI,FILTER, SMT,BLM11A221S,0603, ROHS	pcs	11	L19, L20, L40, L41, L42, L44, L46, L47, L48, L60, L65
220	117-000000-R05	Chip bead / EMI,FILTER, SMT,BLM21P300S,0805, ROHS	pcs	7	L22, L37, L38, L39, L43, L58, L67
221	119-060104-R01	Thermal resistor / NTH5G16P42B104K07TH,100K,0603, ROHS	pcs	1	R85
222	121-200000-R01	MIC / B6027AP402-88(old model: B6027AP402-65), ROHS	pcs	1	MIC1
223	122-112M80-R01	Chip temperature compensated crystal / NT5032SC,12.8 ± 2.5PPM, 5.0*3.2*1.6mm, ROHS	pcs	1	X4
224	122-17M300-R01	Chip crystal resonator / CSTCR7M30G53-R0,7.3M, ROHS	pcs	1	X2
225	124-050000-R15	2.5mm earphone jack / MOTOROLA interface, PJ-D2008B, DC30V0.5A, ROHS	pcs	1	J2
226	124-050000-R16	3.5mm MIC socket / MOTOROLA interface, PJ-D3027, DC30V0.5A, ROHS	pcs	1	J1
227	201-000568-R13A	PT568 battery connector / LCP, black, 2P-4.0PH-9.3H, ROHS	pcs	1	DC
228	603-000568-R01	PT568 programming chip/ CPU, R8C/24, M30C026FPGP#U0, 52PIN, 8 bit MCU, FLASH, ROHS	pcs	1	IC10
229	603-0W558A-R01	Record IC / W588A080, ROHS	pcs	1	IC15

Appendix 3 Structural Parts List

No.	Part No.	Description	Unit	PCS	
1	121-100000-R20	Speaker / 16±15% OHM 1W, diameter: 40±0.3MM, height: 5.1±0.3MM (Max. audio power: 2W), ROHS	pcs	1	
2	201-000568-R02C	PT568 Front Casing / PC+ABS, black, ROHS	pcs	1	
3	201-000568-R03B	PT568 Speaker Cover / PC+ABS, ROHS	pcs	1	
4	201-000568-R04B	PT568 Top Cover / PC+ABS, black, ROHS	pcs	1	
5	201-000568-R05C	PT568 PTT Cover / PC+ABS, black, ROHS	pcs	1	
6	201-000568-R06A	PT568 Volume Knob / ABS, black, ROHS	pcs	1	
7	201-000568-R07A	PT568 Channel Selector Knob / ABS, black, ROHS	pcs	1	
8	201-000568-R09A	PT568 Light Guide / PC, transparent, ROHS	pcs	1	
9	201-000568-R10B	PT568 Earphone Jack Cover / TPU, black, hardness: 90, ROHS	pcs	1	
10	201-000568-R11A	PT568 Earphone Jack Bracket / TPU, Black, Hardness: 90, ROHS	pcs	1	
11	201-000568-R12A	PT568 Rubber Plug for Earphone Jack Cover / PC+ABS, black, ROHS	pcs	1	
12	201-000568-R14A	PT568 Battery Latch / POM, black, ROHS	pcs	1	
13	202-000558-R09	PT558 MIC Seal / orange silica gel, hardness: 40, ROHS	pcs	1	
14	202-000568-R01A	PT568 Main Waterproof Loop / silica gel (enhanced elasticity), black, hardness: 40, ROHS	pcs	1	
15	202-000568-R02A	PT568 PTT Button / silica gel (enhanced elasticity), black, hardness: 60, ROHS	pcs	1	
16	202-000568-R03A	PT568 Emergency Button / silica gel (enhanced elasticity), orange, hardness: 60, ROHS	pcs	1	
17	202-000568-R04A	PT568 Top Waterproof Gasket / silica gel, black, hardness: 60, ROHS	pcs	1	
18	202-000568-R05A	PT568 Bracket Waterproof Gasket / silica gel, black, hardness: 60, ROHS	pcs	1	
19	202-000568-R06B	PT568 Thermal-conductive Silica Gel Gasket / silica gel, black, 3*6*9mm, softer than A type, ROHS	pcs	1	Under FET
20	203-000558-R07B	PT558 Antenna Connector / Ni-plated brass, ROHS	pcs	1	
21	203-000558-R13A	PT558 Nut for Knob / brass, black, ROHS	pcs	2	
22	203-000558-R14A	PT558 Nut for Antenna / brass, black, ROHS	pcs	1	
23	203-000568-R02B	PT568 Al Chassis / Al alloy (ADC12), abrasive, polished, ROHS	pcs	1	
24	203-000568-R04C	PT568 Battery Hook 1 / Zn alloy (Zn3#), black Zn-plated, ROHS	pcs	1	
25	203-000568-R05C	PT568 Battery Hook 2 / Zn alloy (Zn3#), black Zn-plated, ROHS	pcs	1	
26	203-000568-R06A	PT568 Spring Sheet 1 for Battery Latch / stainless steel (SUS301), 0.25THK, ROHS	pcs	1	
27	203-000568-R07A	PT568 Spring Sheet 2 for Battery Latch / stainless steel (SUS301), 0.25THK, ROHS	pcs	1	

28	203-000568-R08A	PT568 Top Gasket / stainless steel (SUS304), 0.30THK, ROHS	pcs	1	
29	203-000568-R09C	PT568 Metal Speaker Net / stainless steel, Φ0.8 holes for sound penetration, 0.10THK, ROHS	pcs	1	
30	204-000558-R01	PT558 Waterproof Net for Speaker / black waterproof cloth, ROHS	pcs	1	
31	204-000568-R01A	PT568 Waterproof Gasket for MIC Head / white, ventilative film, ϕ7.0* ϕ4.5, with PVC, ROHS	pcs	1	
32	204-000568-R02B	PT568 Double-sided Adhesive Tape for Front Casing / 3M" double-sided adhesive tape, white, 18*2mm, ROHS"	pcs	2	
33	301-20040G-R01B	Screw / M2.0*4.0 pan plus Ni-plated, ROHS	pcs	13	For fixing PCB board and antenna connector
34	301-20080G-R02B	Screw / M2.0*8.0 pan torx Ni-plated, ROHS	pcs	2	For fixing Al alloy chassis
35	301-25080J-R01	Screw / M2.5*8.0 pan plus black Zn-plated, ROHS	pcs	2	For fixing top cover or belt clip

Appendix 4 Accessories

Name	Model	Specifications	External View
Battery	KB-56B	7.4V 1500mAh Li-poly battery	
Hand Strap	KGS-01		
Earphone	KME-014		
	KME-015		
	KME-016		
Charger	KBC-70Q	3 hours standard charger	
Power Adaptor	KTC-50D1	DC OUT 12V 1000mA	
Antenna	KA		
	KA		

Figure 1 PT568 Block Diagram

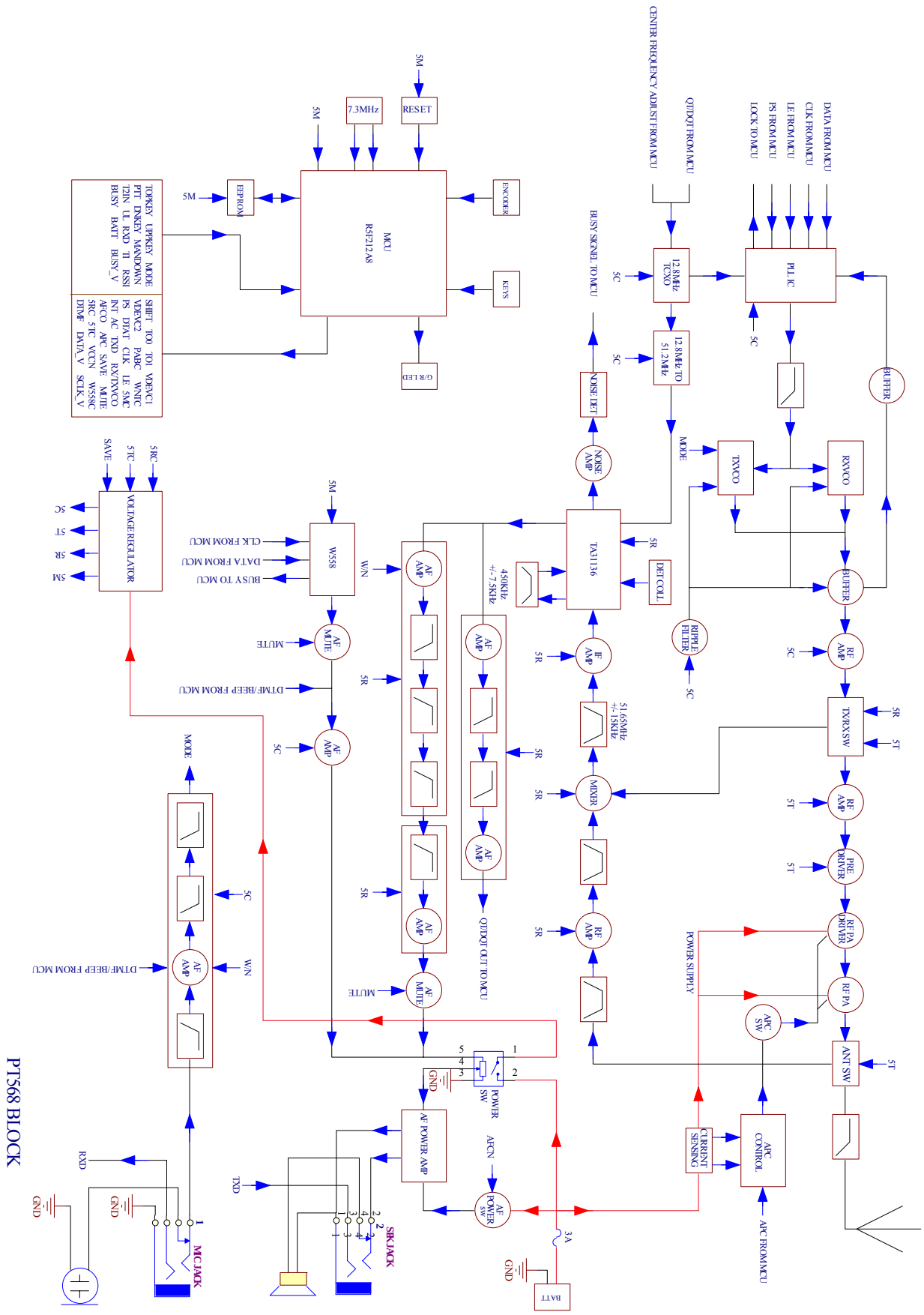
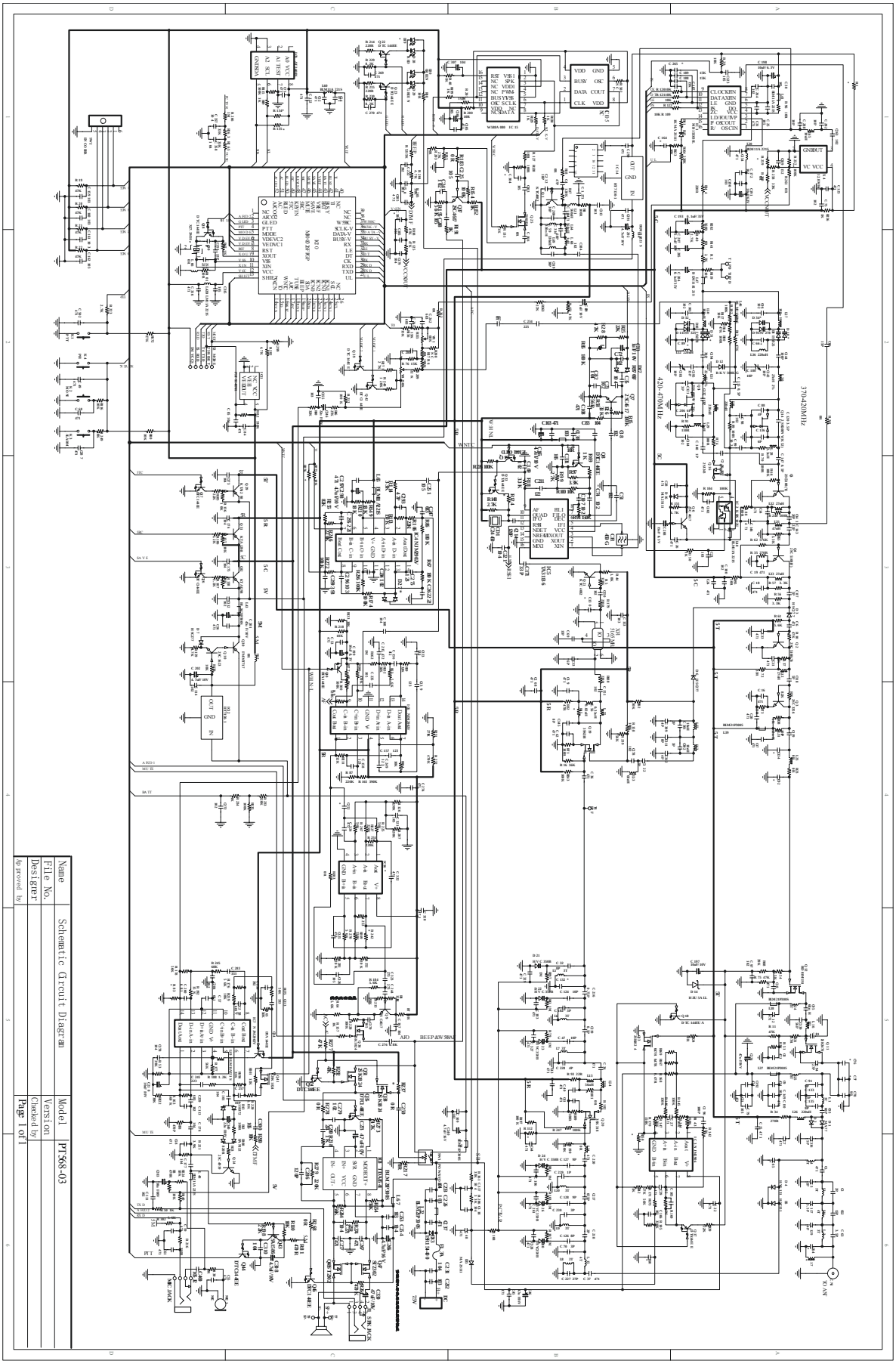
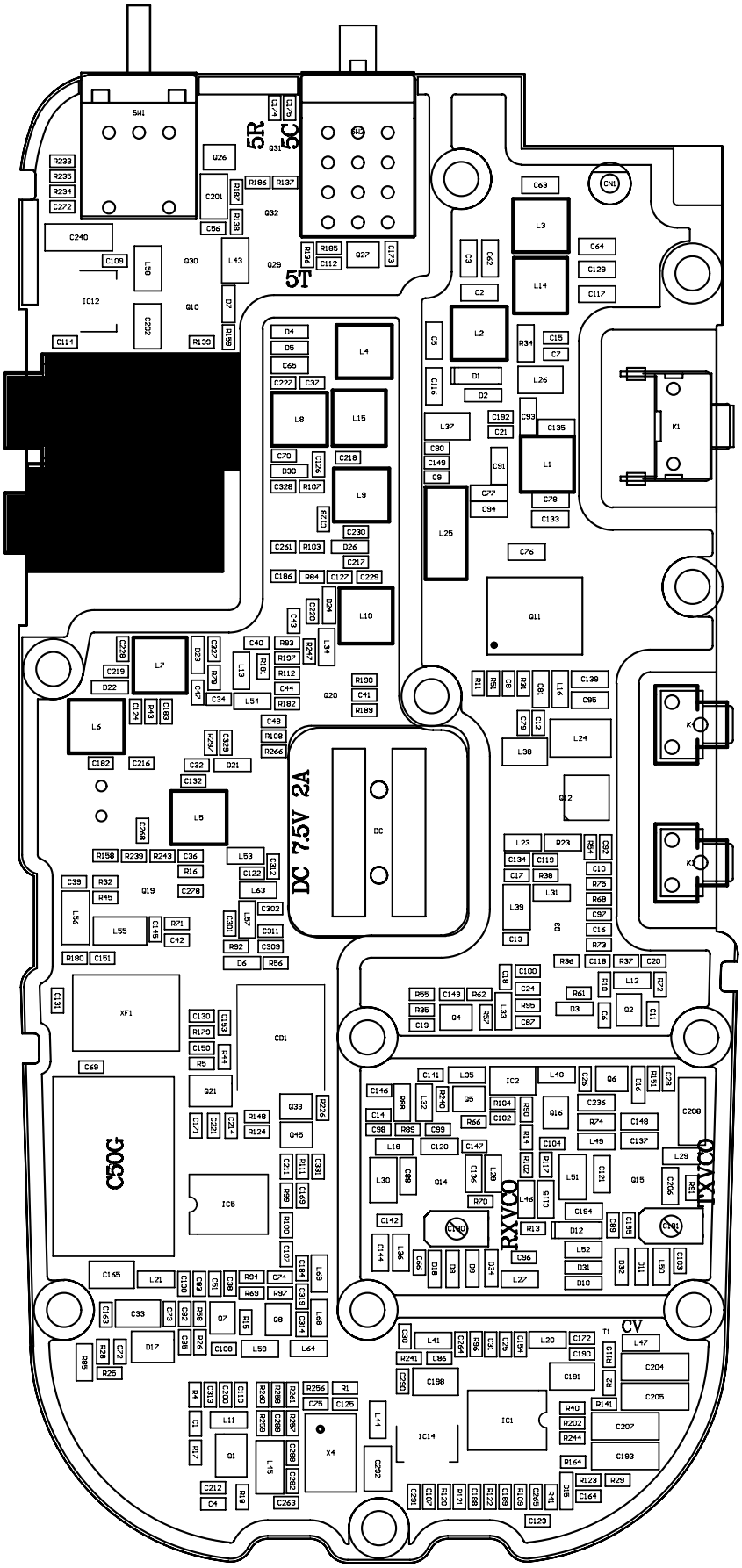


Figure 2 PT568 Schematic Circuit Diagram

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5T
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C50G
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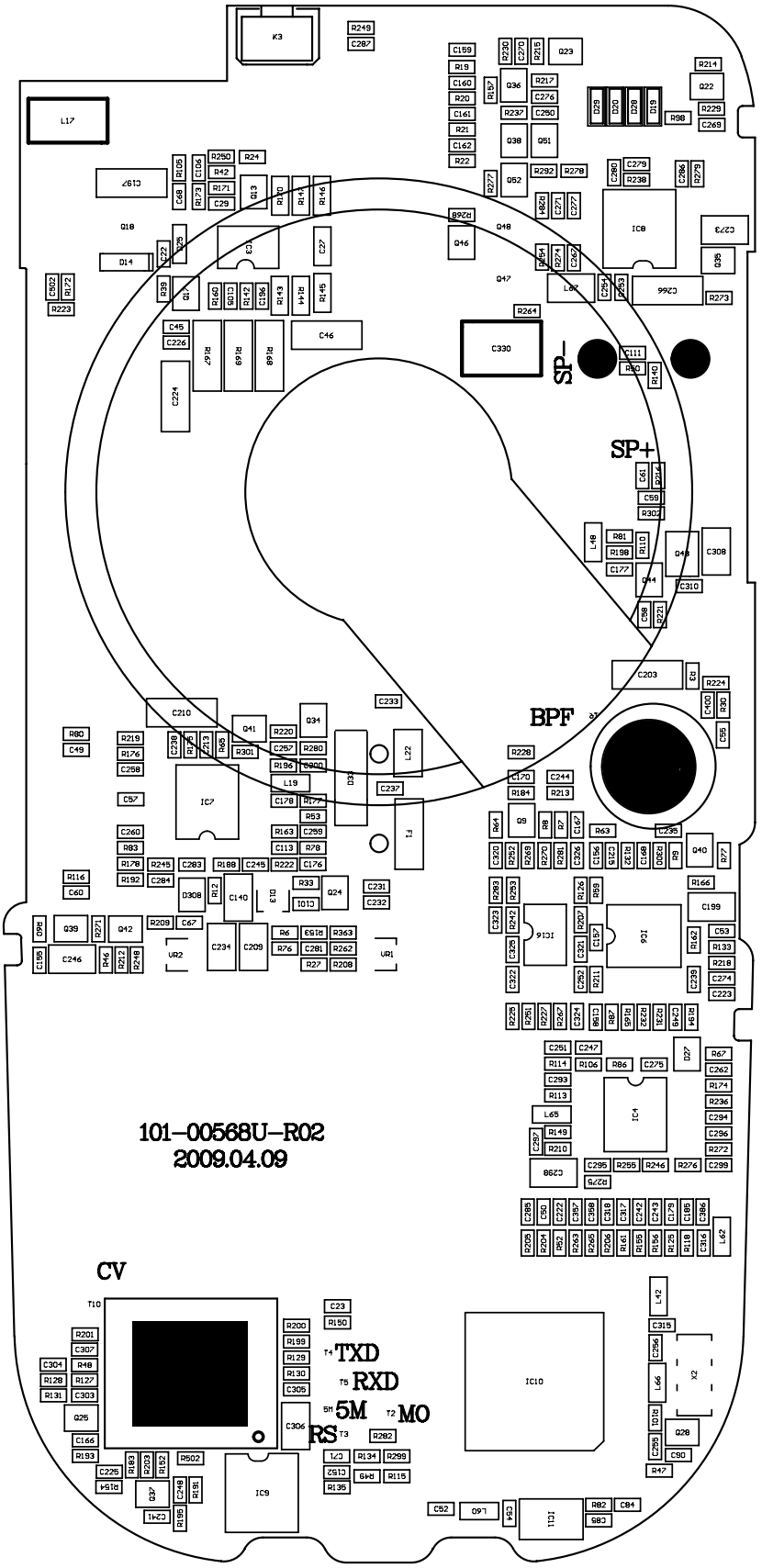
TXVCO
CV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SP+
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CV
TXD
RXD
5M
MO
RS
101-00568U-R02
2009.04.09

Figure 5 PT568 Top Layer Position Value Diagram

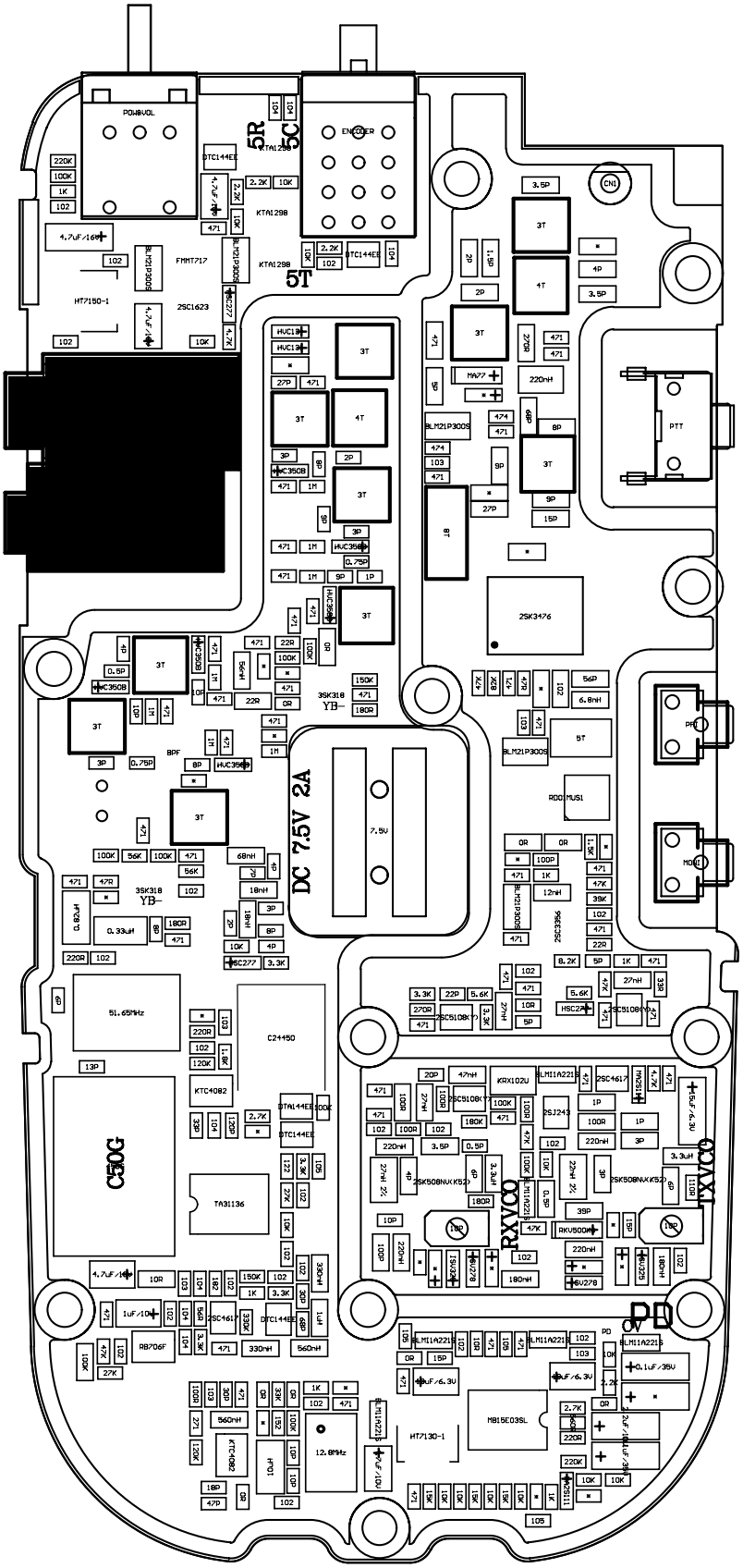

Figure 6 PT568 Bottom Layer Position Value Diagram