



# **PROFESSIONAL TWO-WAY RADIO**

## PT6500

### FM PORTABLE RADIO SERVICE MANUAL



**DANGEROUS!!**

Do not connect the AC power or DC power over 7.4V with any connector or terminals 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 bigger than 20 dBm (100mW).

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

If the antenna has been damaged, do not use the radio. Damaged antenna may cause lightly 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**


Kirisun Electronic (Shenzhen) Co., Ltd owns the copyright of KSP6500 software.

Unauthorized Duplication of KSP6500 software is strictly prohibited.

Kirisun Electronic (Shenzhen) Co., Ltd owns the copyright of the MCU software.

Kirisun Electronic (Shenzhen) Co., Ltd owns the copyright of the radio outward/structure/circuit design.

Kirisun Electronic (Shenzhen) Co., Ltd owns the copyright of this service manual. Unauthorized publication is prohibited.

Kirisun Electronic (Shenzhen) Co., Ltd owns the trademarks “KIRISUN”, “”, “科立讯” .

**CONTENTS**

Chapter 1 Introduction.....	2
Chapter 2 Radio Overview and Function Keys.....	2
Chapter 3 Electroircuit.....	3
Chapter 4 Function Description and Parameter Setting.....	7
Chapter 5 Service Assemble and Disassemble.....	12
Chapter 6 Radio Debugging.....	14
Chapter 7 Major Specifications.....	18
Chapter 8 Trouble Shooting.....	18
Appendix 1 Abbreviations.....	19
Appendix 2 Spare List.....	19
Appendix 3 Electronic Component List.....	20
Appendix 4 Framework Component List.....	20
Appendix5 Accessory List.....	31
Figure 1 PT6500 Top Main Board Position Number Diagram.....	32
Figure2 PT6500 Bottom Main Board Position Number Diagram.....	33
Figure 3 PT6500 Top Main Board Position Number Diagram.....	34
Figure4 PT6500 Bottom Main Board Position Number Diagram.....	35
Figure 5 PT6500 PTT Top Board Position Number Diagram.....	36
Figure 6 PT6500 PTT Bottom Board Position Number Diagram.....	37
Figure 7 PT6500 Top Keyboard Schematic Circuit Diagram.....	38
Figure 8 PT6500 Bottom Keyboard Schematic Circuit Diagram.....	38
Figure 9 PT6500 Schematic Circuit Diagram(136-174MHZ) .....	39
Figure 10 PT6500 Schematic Circuit Diagram(400-470MHZ) .....	40
Figure 11 PT6500 Main Board Schematic Circuit Diagram .....	41
Figure 12 PT6500 Keyboard Schematic Circuit Diagram.....	42
Figure 13 PT6500 PTT Board Schematic Circuit Diagram.....	43



**Chapter 1 Introduction**

**1.1 Introduction**

This manual applies to the service and maintenance of PT6500 series of FM portable radios, and is designed for the engineers and professional technicians that have been trained by Kirisun. In this manual you can find all the information of product service. Kirisun reserves the rights to modify the product structure and specification without notice in order to enhance product performance and quality. You can also log on our website [www.kirisun.com](http://www.kirisun.com) to download the latest service manual or contact your local dealer or us. Read this manual before repairing the product.

**1.2 Service Precautions**

**Safety**

- Avoid skin contacting with the antenna connector and PCB.
- Do not reverse the power polarities.
- If signal input at antenna connector is bigger than 20dBm(100mW), it may cause damage to the radio.
- Do not turn on the power before the antenna and load connection is completed.
- Do not use the radio if the antenna has been damaged. Contacting the damaged antenna will cause slightly burning on the skin.

**Electromagnetism Interference**

- It's prohibited to use or repair the radio in the following places:
  - Hospital, health center, air port
  - Any area with a potentially explosive atmosphere (where the air contains gas, dust and smog, etc.), such as the storage or transportation facilities of fuel or chemicals.
  - Any area of dynamite or exploder.
- It's recommended to avoid using or repairing the radio in the following places:
  - It's recommended to avoid using the radio in a car that is moving.
  - The radio wave might interfere the auto engine and cause it to stop working.

**Component Replacement**

All the components used in repair service should be supplied by Kirisun. Other components of the same models available on the market are not surely able to use in this product and we do not guarantee the quality of the product using such components. Please fill in a component application forms if you want to apply for any components from Kirisun. The following is one sample form that might be used to apply for any components from Kirisun.

Parts and Spare Parts Requisition

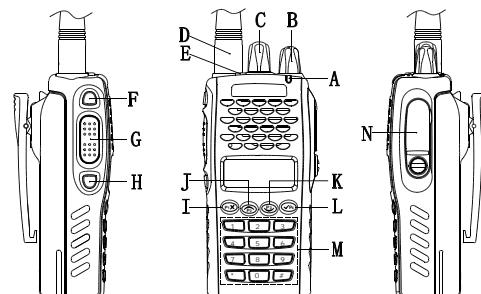
Radio Model	Component	Position Mark	Model/ Specifications	Material Serial number	Qty
PT-6500(400-470MHz)	Field effect tube	Q3	RD01MUS1	105-RD01MU-R01	1
PT-6500(400-470MHz)	Triode	Q49	2SC5108(Y)	104-SC5108-R01	1

**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 24 months. Accessories (such as battery pack, power adapter, antenna or charger) are guaranteed for free service of 6 months. Earphones are wearing parts and out of warranty. In one of the following situations, charge free service will not be available. No valid service warranty or original invoice. Malfunction caused by disassembling, repairing or reconstructing the radio by the users without permission. Wearing and tearing or any man-made damage such as mechanical damage, burning or water leaking. Product serial number has been damaged or the product trademark is difficult to identify. After the warranty expires, lifetime service is still available. And we also provide service components to service stations and service staff.

**Chapter 2 Radio Overview and Function Keys**

**2.1 Radio Overview**



The functions of the components are as follows:

- A. LED Indicator
  - Lights red while transmitting;
  - Lights green while receiving.
- B. Power/Volume Switch (Knob)
  - Turn clockwise till a click is heard to switch on the radio.
  - Turn counterclockwise till a click is heard to switch off the radio.
  - Rotate to adjust the volume after turning on the radio.
- C. Channel Selector
  - Rotate to select the channel 1-128.
- D. Antenna
- E. Top Button (programmable button)
  - It is recommended to be set as the emergency warning Button.
- F. Side button 1 (programmable button)
- G. PTT (PUSH-TO-TALK) :
  - To make a call, press and hold the PTT button, then speak into the microphone with normal voice. Release the PTT button to receive signals.
- H. Side button 2 (programmable button)
- I. Button
  - Return and delete button in the menu.
- J. Button
  - Select Button.
- K. Button
  - Select Button.
- L. Button
  - Enter and Confirm Button.
- M. Numeric keypad
- N. Microphone/speaker jacks

## Chapter 3 Electro-circuit

### 3.1 Frequency Configuration

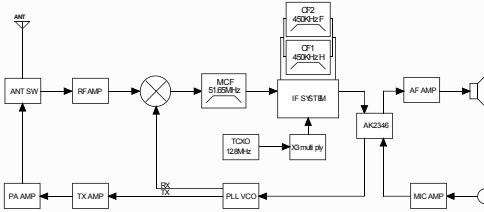


Figure 3.1 Frequency Structure

This radio adopts the 2nd Mixer, the 1st IF 51.65MHz, the 2nd IF 450kHz.

The receiver's first local oscillation is generated by the frequency synthesizer. The second local oscillation adopts the 4th harmonic 51.2MHz of TCXO.

The transmitter signals are generated by frequency synthesizer.

The reference frequency of frequency synthesizer is generated by TCXO.

### 3.2 Receiver (RX) Illustration

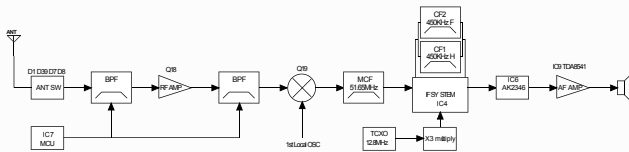


Figure 3.2 Receiver Illustration

#### The Receiver Front Terminal

Signals from the antenna pass through the RX/TX switch (D1, D39, D7, D8); and then undesirable out-of-band signals will be filtered out at the band pass filter (BPF) consisting of two-stage LC; then signals are amplified at the low noise amplifier (LNA) consisting of Q18 and its peripheral components.

The output from the LNA passes the BPF consisting of three-stage LC for filtering and then is sent to the first grade frequency mixer (Q19).

#### AGC Circuit

The AGC circuit consists of Q17 and its peripheral components. Only when the input signal is too large can the AGC functions to reduce the Q18 plus.

#### The First Frequency Mixer

After mixing the receiving signals for LNA and the first local oscillation signals from the frequency synthesizer, the 1st IF signals (51.65MHz) are generated.

#### IF Circuit

Signals of adjacent channel and those out of band of the 1st IF signals are filtered via the crystal filter (XF1).

The 1st IF signals from the crystal filter are amplified at the first IF amplifier (Q20), and then are sent to the IF processing IC (IC4, TA31136).

The IF IC consists of the 2nd frequency mixer, the 2nd local oscillator, IF amplifier, limiter, phase frequency detector, and noise amplifier.

The 2nd local oscillation is obtained after 12.8MHz signals from X1 are amplified via Q15 and external circuit. The 2nd local oscillation

(51.2 MHz) and the 1st IF signal (51.65 MHz) are mixed at IC5 to generate the 2nd IF (450 kHz). After the 2nd IF signal is amplified and its amplitude is limited at IC4, and then filtered at porcelain filter (CF1 or CF2, 450 kHz), IC5 demodulates and sends out audio signals.

The 2nd IF filter selector circuit consists of CF1, CF2, D18, D19 and peripheral circuits, when the radio is set to broad band, CF2 is open, CF1 is closed and CF2 functions; when the radio is set to narrow band, CF1 is open, CF2 is closed and CF1 functions.

#### Squelch Circuit

Demodulation output from IC4 is sent to the noise amplifier in IC4. After being amplified, noise signal is sent to D21 for further amplification and to D22 for wave checking and then sent to MCU, which determines the noise volume to control the squelch. This voltage is inversely proportional to the input signals.

### 3.3 Transmitter (TX) Illustration

#### Transmitter Power Amplifier

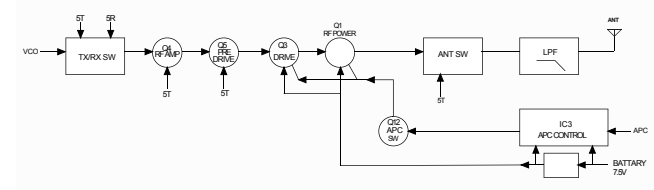


Figure 3.3 Power amplifier and antenna switch schematic diagram

The modulated signals from VCO are amplified at Q2, Q4, Q59, Q5, Q3, and then sent to Q1 for power amplification. Q1 output power: 4W.

The Q1 and Q3 gate offset is controlled by APC circuit. Transmitter output power can be controlled conveniently by changing the gate-offset.

#### APC (Auto Power Control) Circuit

R57, R65 and R66 are the amplifier current checker, IC3A is the sample amplifier of the amplification current; IC3B is the power comparison amplifier.

If the transmitter output power is too big, the amplifier current will increase, IC3A output will mount, IC3B output voltage decrease, the offset voltage added to Q1 and Q3 will decrease, and then the transmitter output power will decrease. Vice versa, such can ensure steady transmitter output power in different working circumstances. MCU changes the input power to IC3B to set the power.

### 3.4 Frequency Combiner Illustration

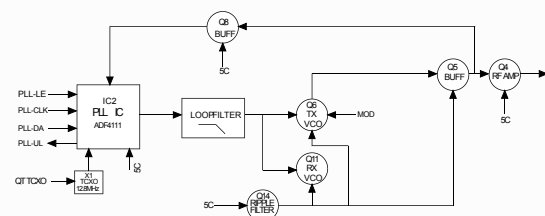


Figure 3.4 Frequency Combiner Illustrations

This radio adopts phase locked loop (PLL) type frequency combiner. The frequency combiner consists of the reference oscillator, voltage controlled oscillator (VCO), programmable frequency divider, phase

comparator, and the upper limiting filter.

Q6, D2, D4, D5 and D6 constitute the transmitting VCO unit. D9 is the modulating circuit of the transmitting VCO.

Q11, D11, D12, D13 and D14 etc. constitute the receiving VCO unit.

IIC2 (ADF4111) is the PLL integrated circuit, which can comprise the programmable reference frequency divider, programmable frequency divider, phase comparator and charge pump, etc.

The upper limiting filter consists of R43 and C96 etc.

The frequency reference is provided by X1 (TCXO, 12.8MHz).

The frequency reference from TCXO (temperature control crystal oscillator) receives frequency division by the programmable reference frequency divider in IC2 to generate the frequency reference of 5kHz or 6.25kHz (according to the frequency of the channel, controlled by MCU).

The oscillation frequency from VCO is sent to IC2, after frequency division by the programmable frequency divider, it is compared with the frequency reference to get the error signal, which is, after wave filtering by the upper limiting filter, sent to VCO to change the oscillation frequency of VCO, which allows the VCO frequency to achieve the set value and the VCO to be locked. Detection of loss of lock: if PLL loses lock, IC2 pin14 outputs low level signal to MCU, which prevents the transmitter from transmitting and generates alert.

Q13 and related circuits are used for switching the upper limiting filter.

**3.5 Audio Processing Circuit:**

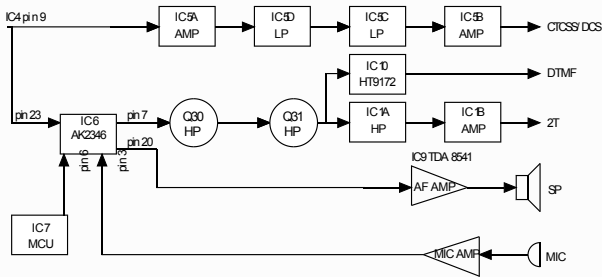


Figure 3.5 Audio Processing Diagram

C6 (AK2346) is a special voice processing chip provided with functions like amplification, wave filtering, preemphasis, deemphasis, scrambling, companding and MSK MODEM etc. Most voice processing tasks of the radio are completed by it.

**MIC Signal Processing:**

Voice signals from MIC are controlled by AGC circuit, and then reach IC24, one group of signals are amplified at IC24B (VOX circuit) and are processed into direct current by D35 and sent to MCU for processing; the other group of circuits are amplified at IC24A and then receive amplification, wave filtering, companding (optional), preemphasis, scrambling and amplitude limit at IC6 pin3, after that, they are exported from IC6 pin7 and sent along with CTCSS/DCS to VCO for modulation.

2T/5T signals are imported from IC6 pin6, and after amplitude limit and amplification, they are exported from IC6 pin7 and sent to VCO for modulation.

**Receiver Audio Signal Processing:**

Voice signals exported from IC4 are divided into two channels, one comes to the low pass circuit (voice signals filtered) consisting of IC5, etc for amplification and wave filtering to get comparatively

pure CTCSS/DCS signals, which are then sent to MCU for processing; the other comes to IC6 pin23, after amplification and wave filtering, one channel is exported from IC6 pin21 (DTMF/2T/5T signals etc.), DTMF/2T/5T signals etc. come through the high pass circuit (sub-audio signals filtered) consisting of Q30 and Q31 etc., DTMF signals come to IC10 (special chip for HT9172 DTMF decoding) for decoding and then sent to MCU for processing, 2T/5T signals are sent to MCU for processing after wave filtering and waveform modification by IC1; the other channel of signals (voice signals) are exported from IC6 pin18 after scrambling, preemphasis, deemphasis and companding and then imported from IC6 pin19 for amortizing and amplification before being exported from IC6 pin20.

IC13 is a voice storage chip, which stores voices including channel prompt etc., each time the channel is changed, the speaker will prompt the current channel number by voice. Press the “voice prompt” key to prompt the current channel number again.

Receiver audio signals, voice prompt signals, 2T/5T/DTMF signals, prompt voice signals, emergent alert signals are gathered to be amplified by the audio frequency amplifier IC9 to drive the speaker.

Speaker impedance: 16Ω.

Note: None of the terminals of the speaker can be grounded!

The volume of emergent alerts cannot be controlled.

**3.6 Power Supply:**

The radio is equipped with 7.4V battery as power supply, which directly supply power to transmitter power amplifier circuits (Q1, Q3) and receiver audio power amplifier (IC9), other circuits adopts regulated 5V power supply.

Q40, Q45: 5V low voltage difference, micro power regulator.

Q43: 5T switch, controlled by MCU.

5T: Supplies power for the front terminal of the transmitter.

Q39: 5R switch, controlled by MCU.

5R: Supplies power for the receiver RF amplification, mixing, IF processing, audio signal processing..

Q44: 5C switch, controlled by MCU.

5C: The 5V power controlled by power saving supplies power for the frequency synthesizer.

**3.7 MCU:**

MCU controls the working of each unit of the radio to realize all the radio functions.

Connects with the PC

Accesses the current channel status data

Controls the PLL to generate receiver and transmitting local oscillation frequency

Acquires current channel status

Controls the LED status indication

Controls the power supply of each location

Checks the action of each function key

Generates CTCSS signals

Generates DCS signals

Generates power control signals

CTCSS decoding

DCS decoding

Squelch check and control

Controls the content of voice indication

**Memorier (E<sup>2</sup>PROM, AT24C256)**

Memorizes the radio channel data, CTCSS/DCS data, and other data of function setting and parameter adjustment.

**CTCSS/DCS Encoding and Decoding:**

CTCSS/DCS signals generated by MCU (output form pin24 and pin28, PWM wave), are respectively sent to VCO and TCXO for modulation.

CTCSS/DCS signals from the receiver are sent to MCU (pin1) for demodulation. MCU determines whether the signals contain the same CTCSS/DCS as that set on the radio and decides whether to turn on the speaker.

**CTCSS**

CTCSS(continuous tone control squelch system, sub-audio for abbr.) is a squelch control system modulated on carrier wave with continuous sub-audio frequency as pilot frequency. If a channel is set with CTCSS, only when both the CTCSS of the receiver and that of the transmitter are identical, communication is available, which avoids interference of other signals.

This radio is equipped with 39 groups of standard sub-audio frequencies for your selection as shown in

Table 1

CTCSS signals are generated by MCU (PWM waveform) and are sent to VCO for modulation via upper limiting filter consisting of RC, which filters high-frequency components over 300Hz.

Table 3.1 CTCSS Frequencies

No.	Frq [Hz]	No.	Frq [Hz]	No.	Frq [Hz]	No.	Frq[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 signaling:**

DCS (Digital code squelch) is a kind of continuous digital code modulated with voice signals on carrier wave to control squelch. If DCS function is enabled, only in case the same DCS code is received can the speaker be turned on so as to avoid interference from useless signals.

83 groups of standard codes (positive and inverse code) are available. See table 2.

DCS signals generated by MCU (PWM wave shape) pass the low pass filter to be filtered off the high frequency over 300Hz and then are sent to VCO and TCXO for modulation. VCO modulates the high frequency of DCS signals; TCXO modulates the low frequency of DCS signals.

CTCSS/DCS signals from the receiver are sent to MCU for modulation. MCU determines whether the DCS encoding of the receiving signals is identical with that set on the radio and decides whether to turn on the speaker.

Table 3.2 DCS Encoding List

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 Components**

**MCU Description**

Table 3.3 Microprocessor (M30620) Port Description

PIN	Port Name	I/O	Function
1	VCCN	O	PLL frequency reference adjustment
2	TONEO	O	2T/5T/DTMF/BEEP signals inout
3	TONEI	I	2T/5 signals input
4	E-SDA	O	EEPROM data cable
5	E-SCL	O	EEPROM clock cable
6	C-BYTE	-	Grounding
7	C-CNVSS	-	Grounding
8	SHIFT	O	Clock offset H: Clock offset
9	E-TEST	O	EEPROM write-protection pin H: Unwriteable L: Writeable
10	RESET	I	Reset pin
11	XOUT	O	Clock output pin
12	VSS	-	Grounding
13	XIN	I	Clock input pin
14	VCC	-	Connects to 5V power supply
15	CMMI	-	Grounding
16	INTO	I	AC dump detecting pin
17	A-RDT	O	AK2346 control pin
18	A-TCLK	O	AK2346 control pin
19	A-SCLK	O	AK2346 control pin
20	A-DI/O	O	AK2346 control pin
21	A-TDATA	O	AK2346 control pin
22	A-DIR	O	AK2346 control pin
23	NC	-	Blank
24	QT VCO	O	CTCSS/DCS output pin (to VCO modulation)
25	PLL-LP	O	Phase locked loop upper limiting filter switch H: switching over medium frequency points
26	PC/TV	O	Power control or receiver band pass tuning voltage control
27	NC	-	Blank
28	QT TCXO	O	CTCSS/DCS output pin (to TCXO modulation)
29	C-TXD1	O	Serial data output, communicates with PC
30	C-RXD1	O	Serial data input, communicates with PC
31	C-CLK1	-	Grounding
32	NC	-	Blank
33	ICA	-	
34	PABC	O	Upstage power amplifier power supply control H: Transmitting
35	APC2 SW	O	power amplifier control switch H:transmission
36	APC1 SW	O	power amplifier control switch L:transmission
37	RX SW	O	Receiver VCO power switch L: Receiving
38	TX SW	O	Transmission VCO power switch L:transmitting
39	C-HOLD	-	Grounding
40	PLL-UL	I	Phase locked loop unlocked detection pin

41	PLL-STB	O	Phase locked loop enabled pin
42	PLL-DATA	O	Phase locked loop data pin
43	PLL-CLK	O	Phase locked loop clock pin
44	C-VCC	-	Connects the power supply
45	MAX AF SW	O	Max volume control L: Max. volume
46	GREEN	O	Green indicator H: Lights on
47	RED	O	Red indicator H: Lights on
48	5TC	O	5T control switch L: 5V for 5T
49	5RC	O	5R control switch L: 5V for 5R
50	5CC	O	Power-saving control switch L: 5V for 5C
51	W/N N	O	Band selection-Narrow band H: narrow band
52	W/N W	O	Band selection-Wide band H: wide band
53	AFCO	O	Audio power amplifier control H: power amplifier operates
54	RX MUTE	O	Receives mute control L: mute
55	W-BUSY	I	Voice reporting chip busy, signal detection H: reporting
56	W-DATA	O	Voice reporting data signals
57	W-SCLK	O	Voice reporting clock signals
58	W-MUTE	O	Voice reporting mute control L: mute
59	S-SCK	O	-
60	ACC	-	Connects 5V power supply
61	S-SI	O	-
62	VSS	-	Grounding
63	S-SO	O	-
64	S-CS	O	-
65	-	-	-
66	PTT	I	PTT key input L: transmitting
67	H-D3	I	DTMF data input
68	H-D2	I	DTMF data input
69	H-D1	I	DTMF data input
70	H-D0	I	DTMF data input
71	H-DV	I	DTMF data input
72	DN	I	Encoding switch signals
73	UP	I	Encoding switch signals
74	L-AO	O	LCD control signals
75	L-AO	O	LCD control signals
76	L-AO	O	LCD control signals
77	L-AO	O	LCD control signals
78	L-AO	O	LCD control signals
79	K1	I/O	Keypad signals
80	K1	I/O	Keypad signals
81	K1	I/O	Keypad signals
82	K1	I/O	Keypad signals
83	K1	I/O	Keypad signals
84	K1	I/O	Keypad signals
85	K1	I/O	Keypad signals
86	K1	I/O	Keypad signals
87	LAMP	O	Backlight control signals H: lights on
88	BATT	I	Battery voltage detection
89	RSSI	I	Receives field strength indication detection
90	BUSY	I	Noise level detection
91	VOX	I	Acoustic control level detection
92	QT/DQT IN	I	CTCSS/DCS signal input
93	PF	I	Customized keypad input
94	AVSS	-	Grounding
95	MANDOWN	I	MANDOWN signal input L: valid
96	VREF	-	Connects to the power supply
97	AVCC	-	Connects to the power supply
98	VOX SW	O	VOX power control L: VOX set H: VOX not set
99	MIC MUTE	O	MIC mute switch L: Mute
100	HPF PC	O	High pass power control L: Scrambling set H: Scrambling notset

### 3.4 Semiconductor Function Description

Position	Type	Function Description
IC10	Ht9172	DTMF decoding chip
IC11	PST9140NR	MCU reset circuit
IC14	TC75W51FU	MIC amplification, amplitude limit and filtering
IC2	ADF4111	Frequency combiner
IC3	NJM2904	APC, voltage comparison, driving
IC4	Ta31136	Receiver 2 <sup>nd</sup> local oscillation, 2 <sup>nd</sup> IF amplification, Amplitude limit, demodulation, noise amplification
IC5	NJM2902	Receiver demodulation signal amplification, filtering
IC6	AK2346	Audio processing chip
IC7	M30620	MCU
IC8	AT24C256	E <sup>2</sup> PROM, storage channel frequency data, function setting parameters, debugging status parameters
IC9	TDA8541	Receiver's audio power amplifier
Q1	RQA0002	Remitter's upstage power amplifier
Q10	DTC144EUA	APC control switch
Q11	2SK508NV	Receives VCO oscillation circuit
Q12	DTA144EE	APC output switch
Q12	DTA144EE	APC control switch
Q13	2SC4116	PLL low pass switch
Q14	2SC4617	VCO power filter
Q15	2SC5108	Receiver's 2 <sup>nd</sup> local oscillation doubling circuit
Q16	DTC144EE	APC control switch
Q17	2SK1829	Receiver's HF amplification gain control switch
Q18	3SK318	Receiver's HF amplification
Q19	3SK318	1 <sup>st</sup> frequency mixer
Q2	2SC5108	VCO buffer amplifier
Q20	2SC5108	1 <sup>st</sup> IF amplifier
Q21	2SC4617	Receiver's noise amplifier
Q22	DTC144EE	Red LED drive
Q23	DTC144EE	Wide and narrow band noise switch
Q24	DTC144EE	Green LED drive
Q25	DTA144EE	Wide and narrow band frequency discrimination switch
Q26	DTA123JE	2T high pass filter control switch
Q29	2SK1824	2T high pass filter control switch
Q3	RD01MUS1	Transmitter power amplifier pushing
Q30	2SC4617	2T high pass filter circuit
Q31	2SC4617	2T high pass filter circuit
Q32	DTC144EE	Beat frequency control switch
Q33	2SK1824	Receiver's mute switch
Q34	2SK1824	Receiver's audio output switch, off upon emergent alert.
Q35	DTC144EE	Audio power amplifier control switch
Q36	DTA144EE	MIC amplification unit power switch
Q37	2SK1824	Voice prompt switch
Q38	2SA1586	External PTT detection switch
Q39	ST2301	5R switch
Q4	2SC5108	VCO buffer amplifier
Q40	XC6024B502MR	5V regulated voltage output
Q41	2SC4116	MIC AGC control switch
Q42	DTC144EE	External PTT detection switch
Q43	ST2301	5T switch
Q44	DTA123JE	5C switch
Q45	XC6024B502MR	5V regulated voltage output
Q47	2SA1586	MIC AGC control switch
Q48	ST2302	External horn control switch
Q49	2SC5108	Transmitter's 1st amplification
Q5	2SC3356	Transmitter's 2 <sup>nd</sup> amplification
Q51	2SK1824	Receiver's audio output switch, on upon emergent alert.
Q6	2SK508NV	Remitter's VCO oscillation circuit
Q7	DTA143TE	Remitter's VCO control switch
Q8	2SC5108	VCO buffer amplifier
Q9	DTA143TE	Receiver's VCO control switch



Table 3.5 Diode Function Description

Position	Type	Function Description
D1	HVC131	Transmitter antenna switch diode
D10	MA2S111	Loss of lock detection diode
D11	HVC376	Receiver's VCO oscillation variode
D12	HVC376	Receiver's VCO oscillation variode
D13	HVC376	Receiver's VCO oscillation variode
D14	HVC376	Receiver's VCO oscillation variode
D15	HZU5ALL	APC output voltage limiting diode
D16	MA2S111	VCO power filtering acceleration diode
D17	HSC277	VCO output switch
D18	DAN222	Receiver's 2 <sup>nd</sup> IF filter band switch
D19	DAN222	Receiver's 2 <sup>nd</sup> IF filter band switch
D2	HVC376	Remitter's VCO oscillation variode
D21	HVC355B	Receiver's band pass filter oscillation variode
D22	MA742	Noise demodulation
D23	HVC355B	Receiver band pass filter oscillation variode
D26	LED green	Receiving indication
D27	HVC376B	Receiver band pass filter variode
D28	LED red	Transmitting indication
D28	HVC376B	Receiver band pass filter variode
D29	HVC376B	Receiver band pass filter variode
D3	HSC277	VCO output switch
D30	HVC376B	Receiver band pass filter variode
D31	LED green	Receiving indication
D35	MA742	VOX detection diode
D36	MA742	MIC AGC detection diode
D37	MA742	MIC AGC detection diode
D39	HVC131	Transmitter's antenna switch diode
D4	HVC376	Transmitter's VCO oscillation variode
D40	HVC376B	Receiver's band pass filter variode
D5	HVC376	Transmitter's VCO oscillation variode
D6	HVC376	Transmitter's VCO oscillation variode
D7	HSC277	Antenna switch
D9	1SV278	Remitter's VCO modulation diode

Table 3.6: Features of XF1 Crystal Filter

Item	Specified Value
Nominal center frequency	51.65MHz
Transmitting bandwidth	± 7.5kHz or bigger within 3dB
40dB Barrage bandwidth	± 20.0kHz or smaller
Pulse	1.0dB or smaller
Insertion loss	3.0dB or smaller
Guarantee attenuation	80dB or bigger within fo-910kHz
Terminal resistance	330 Ω

Table 3.7 CF1 LTWC450H Features

Item	Specified Value
Nominal center frequency	450kHz
6dB bandwidth	± 3.0kHz or bigger
50dB bandwidth	± 9.5kHz or smaller
Pulse	2.0dB or smaller within f0 ± 4kHz
Insertion loss	6.0dB or smaller
Guarantee attenuation	47.0dB or bigger within f0 ± 100kHz
Terminal resistance	1.5k Ω

Table 3.8 CF1 LTWC450F Features

Item	Specified Value
Nominal center frequency	450kHz
6dB bandwidth	± 6.0kHz or bigger
50dB bandwidth	± 12.5kHz or smaller
Pulse	2.0dB or smaller within f0 ± 4kHz
Insertion loss	6.0dB or smaller
Guarantee attenuation	47.0dB or bigger within f0 ± 100kHz
Terminal resistance	1.5k Ω

## Chapter 4 Function Description and Parameter Setting

### 4.1 Major Functions

#### 4.1.1 128 channels

The radio stores 128 channels and can allocate there channels in 8 different zones ( "Zone 0" cannot be programmed and includes all channels ) .

#### 4.1.2 8 Zones

There are 8 zones numbered from "0" ~ "7" .Except "Zone0" , all other zones can be freely allocated with up to 16 channels.

"Zone0" includes all channels and cannot be programmed. Only when the previous zone is allocated with at least 1 channel can the following zone be allocated.

#### 4.1.3 Channel scanning (this feature can be disabled by programming software)

There are 16 scanning lists, each of which can be allocated with up to 16 channels, which can be from the same or different channels.

In channel setting, you can select a scanning list for the channel. If the channel is chosen by using the channel selection key, the chosen scanning list for the channel can be started by the programmable key set to "scanning" or Manu operation.

a. Activate the scanning function by pressing the key set as the " Scan" function or Manu operation to scan the specified scanning list.

When scanning, the radio will search signals of each channel till signals are found, if the time delay between the disappearance of signals and the resumption of scanning is set, if any signal is received during the time delay, the radio will still stay in this channel. Note: The current channel must be provided with a scanning list or it cannot be activated. Scanning is available only when there're at least 2 channels programmed in the scanning list and the scanning is valid.

b. Revert channel (the transmitting channel when scanning) during the scanning set by the dealer has the following options:

In the Scan mode, the radio can be set as to return to a specified channel when pressing the [PTT] key.

With this function, the radio can be customized so as to meet the requirements of the user when using the scanning function.

Revert channel has the following types: " Fixed channel" , " Selected channel" , " Selected+Current Channel" , " Priority 1+ Current Channel" , " Priority 2 + Current Channel" , " Priority 1" and " Priority channel 2" . In all cases, the user can manually select one channel for transmitting. (This will resume the revert channel to the selected channel)

Fixed channel: The channel specified for programming.

Selected channel: The channel selected by the scanning selector

knob.

Selected + current channel: The channel for holding call when receiving signals or the channel selected by the channel selection knob.

Priority 1 + current channel: The channel for Priority channel 1 or for holding call when receiving signals.

Priority 2 + current channel: The channel for Priority channel 2 or for holding call when receiving signals...

#### Priority channel 1

#### Priority channel 2

Priority channels can be set at “Fixed” or “Selected” .

#### 4.1.4 Sub-audio (QT) and Digital Sub-Audio (DQT)

The dealer may have programmed QT or DQT signals in channels of the radio, which may ignore calls from other irrelevant stations in the same channel. If a certain channel is provided with QT or DQT signals, only when the correct QT or DQT signals are received can the squelch be activated. Similarly, only when the QT/DQT signals are in accordance with your radio can the signals you transmitted be heard.

#### 4.1.5 TOT Transmitting Time Limit

a. TOT timer:

1. Time-out timer can prevent any caller from occupying one certain channel for an extended period of the time.
2. The radio is set with a continuously transmitting limit. If the radio is continuously transmitting longer than the time preset by the dealer, the radio will stop transmitting and warning

b. TOT forbidden period:

1. A period in which the radio is forbidden to transmit after its overtime activity.
2. During the period, if the PTT key is pressed, there will be a warning tone, and transmitting is forbidden.

c. TOT pre-warning:

1. The pre-warning will sound before the TOT action.
2. After the sound of the warning, the timer will take action when the transmitting time has gone beyond the limit.

d. TOT reset:

1. The time delay from releasing the PTT key to the resetting of the timer is limited.
2. The countdown will go on if the time after releasing the PTT key is shorter than the reset time.

#### 4.1.6 Auto Power Saving

The dealer can set the power-saving mode of the battery by programming.

If this function is enabled, 10 seconds after no signal is received or no operation is carried out, the radio will be in the power-saving mode. When any signal is received or any operation is carried out, the radio can automatically quit this mode.

Power-saving modes: 1: 1, 1: 2, 1: 4 and off.

Setting the power-saving function of a battery can reduce the power consumption of the battery.

#### 4.1.7 Low Power Warning

When the battery power appears low, the indicator flashes. If the battery power is lower than the preset value during transmitting, the status indicator flashes red. When the speaker sounds warning tone,

the radio will stop transmitting.

#### 4.1.8 Monitoring

When receiving a signal which doesn't matches the signaling, the mute circuit will prevent the speaker from producing any sound.

Press the MONI key to cut off the squelch control circuit, and you will hear noise from speaker (no matter whether there are signals). Such operation is very useful when you want to adjust voice volume or receive weak signals (to avoid voice intermittence when in weak signals). When you press the MONI key, the green indicator lights, and the radio is in the state of monitoring.

#### 4.1.9 Busy Channel Lockout

If busy channel lockout has been activated, transmitting signals is prohibited on the busy channel. If you press the PTT to transmit on the busy channel, the speaker will sound “busy channel lockout” tone, and you cannot transmit signals.

Options:

- ① Carrier wave: If there's carrier wave in the channel, transmitting is prohibited.
- ② Carrier wave + QT/DQT: If there's carrier wave in the channel while the QT/DQT matches, transmitting is allowed.

#### 4.1.10 2TONE Signaling

The dealer may set this function at enabled or disabled by programming.

##### 2 Tone Decoding

When the radio receives correct 2-tone signals, it will operate according to the decoding call response set by the dealer, when the orange LED will flash and sound the decoding tone you selected.

##### 2 Tone Encoding

When you press the programmable keys programmed at “Call1” , “Call2” , “Call3” or “Call4” , and the keys are provided with corresponding 2 tone signaling sequence, 2-tone signaling will be transmitted. This function should be set by the dealer by programming.

Or you can select the 2-tone signaling sequence you want to call from the call list and press PTT twice to transmit 2-tone sequences.

#### 4.1.11 DTMF Signaling

The dealer may set this function at enabled or disabled by programming.

##### DTMF Decoding

After the radio receives the correct DTMF signaling, it will operate according to the decoding call response set by the dealer. The orange LED will flash and transmit the decoding tone you selected.

##### DTMF Encoding

When you press the programmable keys programmed at “Call1” , “Call2” , “Call3” or “Call4” , and the keys are provided with corresponding DTMF signaling sequence, DTMF signaling will be transmitted. This function should be set by the dealer by programming.

Or you can select the DTMF signaling sequence you want to call from the call list and press PTT twice to transmit DTMF sequences.

#### 4.1.12 Call list

The 2-tone list and DTMF list being set will be automatically added to the call list. Enter the “Call list” menu by menu operation and select the sequence you want to call and press PTT for calling.

#### 4.1.13 PC Programming

You can program the radio functions and adjust some parameters by PC programming software KSP6500.

#### 4.1.14 Wired Clone

The radio can transfer the stored data to another radio of the same mode by a specified cable.

#### 4.1.15 Squelch Level Selection

The purpose of the squelch is to mute the speaker noise when no signals are received or the signals are weak. When the squelch is activated, you can hear noise from the speaker; when the squelch is inactivated, you will not hear noise from the speaker. Selecting the squelch level is to select which the signal strength level is strong enough to enable the squelch or weak enough to disable the squelch. Over high squelch level will make the radio unable to receive signals efficiently when signals are weak; over low squelch level will make the radio communication affected by noise or other irrelevant signals. The squelch level has 0-9 options.

#### 4.1.16 Beep Tone

This option controls power on tone, channel busy tone and TOT tone.

4.2 The operations are as follows:

Set scanning:

- As shown: in  , press  , then  is shown;
- Press  , then  is shown;
- Press  , then enter selecting  ;
- Select Scan On or Scan OFF with  /  , then press  to confirm it.

If can not enter that way, you have to set in PC communications;

##### ● Set back light:

- As shown: in  , press  ,  is shown.
- Press  to enter select mode,
- Press  /  , and  is shown,
- Press  to select On or OFF ,
- Select On or OFF with  /  , press  to confirm.

##### ● Set the squelch level:

- As shown: in  , press  ,  is shown.
- Press  to enter select mode,
- Press  /  , then  is shown,
- Press  to select squelch level, e.g.,  ,
- Change the squelch level with  /  , then press  to confirm.

##### ● Set power level (high/middle/low):

- As shown: in  , press  ,  is shown.
- Press  to enter select mode,
- Press  /  , then  is shown,
- Press  to select, e.g.,  ,
- Change the power level with  /  , then press  to confirm.

##### ● Set Companding:

- As shown: in  , press  ,  is shown.
- Press  to enter select mode,

- Press  /  , and  is shown,
- Press  to select  ,
- Select On or OFF by  /  , press  to confirm.

##### ● Set saving:

- As shown: in  , press  ,  is shown.
- Press  to enter select mode,
- Press  /  , and  is shown,
- Press  to select  ,
- Change the save percentage with  /  , press  to confirm.

##### Set scrambler:

- As shown: in  , press  ,  is shown.
- Press  to enter select mode,
- Press  /  , and  is shown,
- Press  to select, e.g.,  ,
- Select On or OFF by  /  , press  to confirm.

##### ● Set key tone:

- As shown: in  , press  ,  is shown.
- Press  to enter select mode,
- Press  /  , and  is shown,
- Press  to select  or  ,
- Select On or OFF with  /  , press  to confirm.

##### ● Set Rptr/Talkarnd:

- As shown: in  , press  to enter select mode,
- Press  /  , and  is shown,
- Press  to select the mode,
- Select Repeater Mode or Talkarnd mode with  /  , Press  to confirm.

##### ● Set speak On mode:

- As shown: in  , press  to enter select mode,
- Press  /  , and  is shown,
- Press  to select the speak on mode,
- Select with  /  , press  to confirm.

##### ● Set zone mode:

- As shown: in  , press  to enter select mode,
- Press  /  , and  is shown,
- Press  to select the zone mode,
- Select Zone No with  /  , press  to confirm.

##### ● Set call list:

- As shown: in  , press  to enter select mode,
- Press  /  , and  is shown,
- Press  to select the call list,
- Select with  /  , press PTT to transmit.

##### ● Set Rx FRQ:

- As shown: in  , press  to enter select mode,
- Press  /  , and  is shown,
- Press  to select  ,
- Press  ,  is shown, enter the set of Rx FRQ,



- Set the Rx FRQ value with the keypad,
- Press **(P<sub>2</sub>X)** to delete, and press **(P<sub>4</sub>)** to confirm.

● **Set Tx FRQ:**

- As shown: in **CH 1**, press **(P<sub>4</sub>)** to enter select mode,
- Press **(P<sub>2</sub>) / (P<sub>3</sub>)**, and **Ch Edit** is shown,
- Press to select **Ch alias CHANNEL 1**
- Press **(P<sub>3</sub>)**, **Tx FRQ 401.660000** is shown, enter the set of Tx FRQ,
- Set the Tx FRQ value with the keypad,
- Press **(P<sub>2</sub>X)** to delete, and press **(P<sub>4</sub>)** to confirm.

● **Set Rx CTCSS/DCS:**

- As shown: in **CH 1**, press **(P<sub>4</sub>)** to enter select mode,
- Press **(P<sub>2</sub>) / (P<sub>3</sub>)**, and **Ch Edit** is shown,
- Press **(P<sub>4</sub>)** to select **Ch alias CHANNEL 1**
- Press **(P<sub>3</sub>)**, **Rx CTCSS 401.660000** is shown, enter the set of Rx

CTCSS/DCS FRQ.

- Set the Rx FRQ value with the keypad,
- Press **(P<sub>2</sub>X)** to delete, and press **(P<sub>4</sub>)** to confirm.
- (\*)** Stands for the radix point, press **(#)** to convert among CTCSS、DCS and reverse DCS.

● **Set Tx CTCSS/DCS:**

- As shown: in **CH 1**, press **(P<sub>4</sub>)** to enter select mode,
- Press **(P<sub>2</sub>) / (P<sub>3</sub>)**, and **Ch Edit** is shown,
- Press **(P<sub>4</sub>)** to select **Ch alias CHANNEL 1**
- Press **(P<sub>3</sub>)**, **Tx CTCSS XXXX** is shown, enter the set of Tx

CTCSS/DCS FRQ,

- Set the Tx FRQ value with the keypad,
- Press **(P<sub>2</sub>X)** to delete, and press **(P<sub>4</sub>)** to confirm.
- (\*)** Stands for the radix point, press **(#)** to convert among CTCSS、DCS and reverse DCS.

● **Set contact list:**

- As shown: in **CH 1**, press **(P<sub>4</sub>)** to enter select mode,
- Press **(P<sub>2</sub>) / (P<sub>3</sub>)**, and **Contact List** is shown,
- Press **(P<sub>4</sub>)** to select,
- Select the address cable of the call to be made with **(P<sub>2</sub>) / (P<sub>3</sub>)**,
- Check the alias or address code by turning the knob,
- Key in the address code of the person you are calling,
- Press **(P<sub>4</sub>)** to transmit the current contact list.

● **Set status:**

- As shown: in **CH 1**, press **(P<sub>4</sub>)** to enter select mode,
- Press **(P<sub>2</sub>) / (P<sub>3</sub>)**, and **Status** is shown,
- Press **(P<sub>4</sub>)** to select,
- Select the needed status with **(P<sub>2</sub>) / (P<sub>3</sub>)**,
- Check the alias or address code of the status by turning the knob,
- Press **(P<sub>4</sub>)** to select the current status.

■ **PROGRAMMABLE BUTTON FUNCTIONS**

The dealer can program the 2 Side Buttons and 1 top Button with one of the following auxiliary functions.

- None
- OFF ( “do not set the functions” )
- Scan
- lone working
- Contact list
- Power selector
- Show or hide the channel alias
- Busy Channel Lockout (BCL)
- Key lock
- Squelch level selector
- Companding
- Scrambler
- Battery power
- Zone
- Monitoring
- Cancel Squelch
- Emergency Alert
- Back light
- Rptr/Talkarnd
- Express select channel 1
- Express select channel 2
- Call 1, 2, 3 or 4
- Channel lock
- Adjust display contrast

**Notes:**

Programmable key can be set as short press or long press. The following functions can be programmed by the dealer:

● **None**

Set of None.

● **Scan**

Press the button set as Scan to start scanning. When carrier wave scan is enabled. While in scanning, the radio checks every channel (any channel in any zone) and stops on the channel on which a signal is detected until that signal disappears. If interval between signal disappearing and continuing scanning has been preset, the radio will remain on that channel. Only when there are two channels added in the scan list and the scan function has been activated, the radio can start scanning.

It can be set as: short press: scan, long press: OFF.

- Press the programmable key once to start scanning (it should be effective in the channel scan list).
- Press once to quit.

**Notes:**

there are 8 zones from 0 (default zone) to 7; and there can be as many as 128 channels in each zone. There are totally 16 scan lists; you can select any scan list. Every scan list can scan any channels in different zones (16 channels to the most).

● **Lone working**

Press the button set as lone working to start lone working. This mode is to ensure the safety of the user while using the transceiver separately.

▲It can be set as: short press : personal working, long press: OFF.

- Press the programmable key once to start personal working;

start scanning.

It can be set as: short press: scan, long press: OFF.

1. Press the programmable key once to start scanning (it should be effective in the channel scan list).
2. Press once to quit.

**Notes:**

there are 8 zones from 0 (default zone) to 7; and there can be as many as 128 channels in each zone. There are totally 16 scan lists; you can select any scan list. Every scan list can scan any channels in different zones (16 channels to the most).

● **Lone working**

Press the button set as lone working to start lone working. This mode is to ensure the safety of the user while using the transceiver separately.

▲It can be set as: short press : personal working, long press: OFF.

1. Press the programmable key once to start personal working;
2. Press once again to quit.

**Notes:**

The lone working is connected with the automotive checking in the programming software, and will be effective when both are set.

● **Contact list**

Enter the Contact list quickly:

▲ It can be set as: short press: contact list, long press: OFF.

1. Press the programmable key once to enter the contact list  

Call
2. Press again to enter the content interface of the contact list,
3. Select the options in the contact list with /
4. Press PTT to transmit
5. Press to quit.

▲ It can be set as: short press: instantly select channel 1, long press: OFF.

1. Press the key once to instantaneously select the channel, e.g.:  

CHANNEL 15
2. Press again to return.

● **Call 1, 2, 3, or 4**

Press the side button programmed as Call 1, 2, 3, or 4 to transmit the specified code stored in the contact list. Release “ Call ” button, and speak to the microphone to call with the PTT button still pressed.

▲It can be set as: short press: Call 1, long press: OFF.

1. Press the key once to make a call (within the current channel), and will quit automatically after the call.

● **Channel Annunciation**

Select or delete the voice annunciation function.

● **Adjust display contrast**

You can adjust the display contrast as per your need.

▲It can be set as: short press: display contrast, long press: OFF.

1. Press the key once, 

Contrast

 will be shown,
2. Press / to select the character you need,
3. Press to confirm.

● **Manual programming**

The dealer can open the manual programming rights of channel frequency set, CTCSS, DCS.

Basic operations of programmable keys:

You can set the programmable keys with the “ key set ” in PC software, as follows:

▲It can be set as: short press: display channel frequency, channel alias and channel No., long press: OFF.

1. Press the key once, display the channel alias, e.g.: 

CHANNEL 1

,
2. Press it again, the channel frequency will be shown, e.g.:  

401.66500
3. Press it a third time, the channel alias will be shown, e.g.:  

CH 1

▲It can be set as: short press: Zone, long press: OFF.

1. Press the key once, 

Zone No

 will be shown,
2. Select zone No. with / ,
3. Press to confirm.

▲It can be set as: short press: channel lock, long press: OFF.

1. Press the key once to perform channel lock, then you can not

- choose the channel, 

CHANNEL 1

 will be shown.
2. Press it again to cancel channel lock, 

CHANNEL 1

 will be shown.

**4.3 Parameter Setting (PC Mode)**

The radio parameters have been programmed in the factory. The user can program the radio parameters such as working frequency, channels, QT/ DQT, auto scanning. We designed a user-friendly and convenient Chinese/English programming software KSP6500 for users to set parameters on the radio. The programming steps are as follows:

- a. Install the programming software KSP6500.
- b. Connect the radio to the computer serial port with the specified programming cable (KSPL-09), See Figure 4.1.

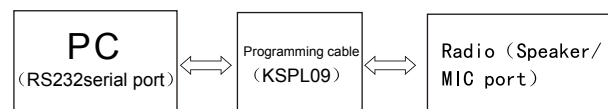


Figure4-1

- c. Turn on the computer power.
- d. Turn on the radio power.
- e. Click the KSP65000 program to run the programming software.
- f. Click on Read in the KSP65000 main menu to read the radio parameters into the computer; click on Write to transfer the PC programming parameters into the radio.
- g. You can program the following parameters with the KSP6500 software:
  - 1) The RX and TX frequency of each channel;
  - 2) The receiving and transmitting signaling of each channel;
  - 3) Busy channel lockout option;
  - 4) TOT;
  - 5) Squelch level option;
  - 6) Power saving option;
  - 7) 2-tone setting;
  - 8) DTMF setting;
  - 9) Beep tone option;

- 10) Monitor mode option;
- 11) Scan mode option;
- 12) Scan the reverting channel option;
- 13) Scan the priority channel selection;
- 14) Call list setting;
- 15) Customized tones;

For more details, please refer to the “ Help ” document of KSP6500 software.

- Note:
1. Turn off the radio before connection.
  2. When the radio is being read data, the indicator lights orange and it's prohibited to press the PTT button; when the radio is being written data, the indicator lights orange.
  3. Before the first time editing, you should read data form the radio and backup the data.
  4. If the radio cannot work normally after being written in with the editing data, open the data backup and rewrite the backup into the radio.
  5. Model information is important radio data and is prohibited to modify.

**4.4 Computer Test Mode:**

Connect the radio to the radio communication port with the specified programming cable (KSPL-09). See Figure 4.1.

Warning: Before enter the computer test mode, connect a HF load of 50Ω to the radio antenna connector or connect the radio to a comprehensive test device.

Under the computer test mode, you can modify the following parameters with KSP6500 programming

software:

- 1) Frequency stability
- 2) Transmitting H/I/L power;
- 3) Max audio frequency deviation;
- 4) DTMF frequency deviation;
- 5) MSK frequency deviation;
- 6) QT frequency deviation;
- 7) DQT balancing;
- 8) DQT frequency deviation;
- 9) TX low voltage;
- 10) Receiving sensitivity;
- 11) SQL 1/9(OPEN/SQUELCH);
- 12) Max RX volume
- 13) VOX plus
- 14) RX low voltage

**Chapter 5 Service Assemble and Disassemble**

The radio is precision communication equipment. Please be careful when assemble or disassemble the radio during service.

**5.1 Installing/Removing the battery pack**

**To install the battery pack:**

Match the 3 bulges of the battery pack with the corresponding slots at the rear bottom of the transceiver.

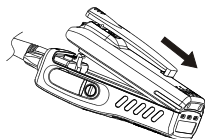


Figure 5.1-1

**Removing the Battery Pack**

To remove the battery pack, use your thumb to press the belt clip, one side of your index finger to press the release button and then pull the battery away from the radio.

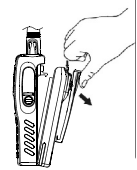


Figure 5.1-2

**5.2 INSTALLING THE ANTENNA**

Screw the antenna into the connector at the top of the transceiver by holding the Button of the antenna and turn it clockwise until secure.



Figure 5.2-1

**5.3 INSTALLING THE BELT CLIP**

Match the grooves of the belt clip with those on the rear of the battery. Then press belt clip downwards to lock it in place. Push the card by inserting your nail or tool into the groove at the upper part of the clip to remove the belt clip.

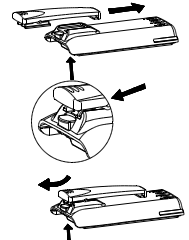


Figure 5.3-1

**5.4 Removing the Casing from the Chassis**

1. Remove the antenna and two knobs;
2. Remove the two knob screws and a antenna head screw;
3. Remove the two inner hexangular aluminum alloy socket head screw fixed at the bottom;
4. Insert the slotted screwdriver into the groove at the bottom of the chassis and apply force upwards to release the aluminum alloy frame; and then hold the aluminum alloy frame and draw it out properly to remove it out of the casing;
5. Plug the PCB winding displacement connecting the main PCB and the keyboard from the main PCB.

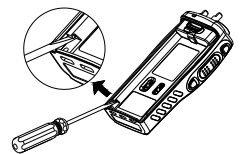
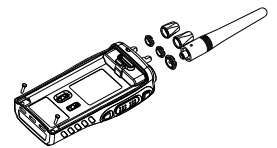


Figure 5.4-1

As shown in Figure 5.4-1

**5.5 Removing the main board from the aluminum alloy frame**

1. Remove the waterproof washer at the top;
2. Remove the screws of the PTT keypad and then remove the PTT keypad;
3. Remove the screws on the PCB;
4. Melt the solder at the antenna point with an electric soldering iron and take off the main board.

As shown in Figure 5.4-1

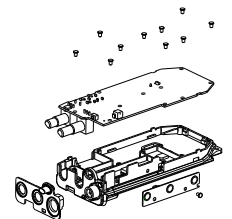


Figure 5.5-1

**5.6 Removing the keypad from the surface casing**

Remove the screws of the keypad to detach the keypad from the surface casing. As shown in Figure 5.6-1

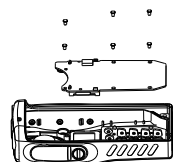
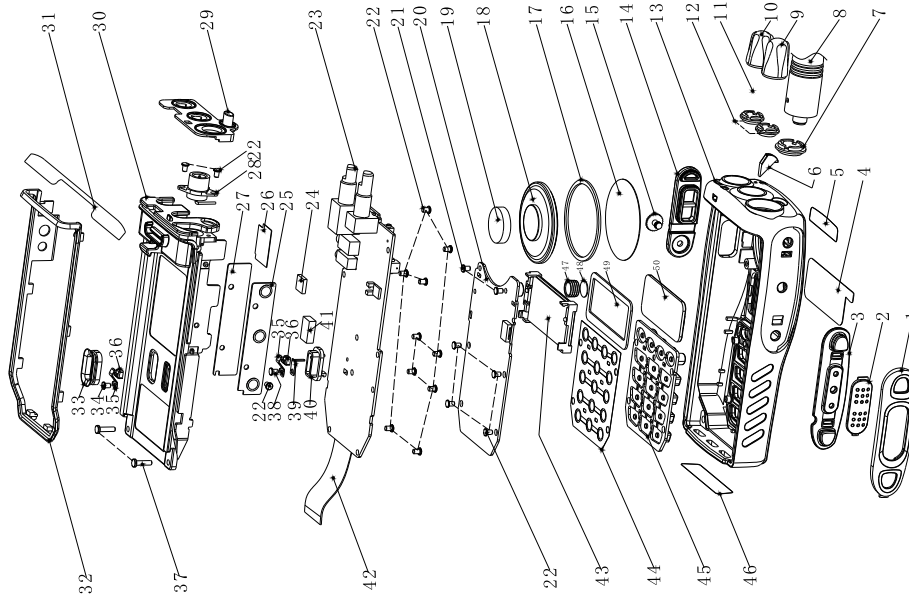


Figure 5.6-1

## 5.7 Exploded View



ITEM	PART NUMBER	DESCRIPTION	QTY.
1	201-006500-R02	COVER PTT KEY	1
2	201-006500-R05	KEY PTT	1
3	202-006500-R01	RUBBER KEY PTT	1
4	204-006800-R01	LABEL LCD LENS	1
5		LABEL LOGO	1
6	201-006500-R09	LENS LED	1
7	203-000558-R11	NUT ANTENNA	1
8		ANTENNA	1
9	201-006500-R04	KNOB CHANNEL	1
10	201-006500-R03	KNOB VOLUME	1
11	203-006800-R26	SPRING PLATE KNOB	2
12	305-108020-R01	NUT KNOB	2
13	201-006500-R01	CASE FRONT	1
14	201-006500-R07	COVER EARPHONE	1
15	304-30040G-R01	SCREW EARPHONE COVER	1
16	204-003208-R02	WATERPROOF NET SPEAKER	1
17	204-003208-R07	CUSHION SPEAKER	1
18	121-100000-R17	SPEAKER	1
19	204-006200-R09	CUSHION SPACE SPEAKER	1
20		PCB ASSEMBLED FUNCTION KEY	1
21	302-20060G-R01	SCREW M2 0X6 0	2
22	301-20040G-R01	SCREW, M2X4	17
23		PCB ASSEMBLED FUNCTION KEY	1
24	202-003208-R07	SPACE TRASCALENT	1
25	203-006500-R06	METAL DOME PTT KEY	1

ITEM	PART NUMBER	DESCRIPTION	QTY.
26	204-006500-R02	SPACE EARPHONE	1
27		PCB ASSEMBLED PTT	1
28	203-000558-R07	BASE ANTENNA	1
29	202-006500-R03	WATERPROOF PART TOP	1
30	203-006500-R01	CASE AL	1
31	204-006800-R11	LABEL	1
32	202-006500-R02	WATERPROOF LOOP MAIN	1
33	202-006500-R05	WATERPROOF PART POSITIVE BKT	1
34	301-20030G-R01	SCREW M2X3.0	1
35	203-006500-R04	SPRING PLATE POSIT.AND NEGAT.	2
36	202-000558-R08	RUBBER CUSHION	2
37	301-20080G-R02	SCREW, M2X8	2
38	302-17040G-R01	SCREW, $\phi$ 1.7x4.0	1
39	203-006500-R02	PLATE POSITIVE	1
40	201-006500-R06	BKT POSITIVE	1
41	204-006200-R04	CUSHION	1
42	120-400000-R13	LINE	1
43	102-6800CN-R01	LCM	1
44	203-006500-R03	METAL DOME FUNCTION KEY	1
45	202-006500-R04	RUBBER KEY FUNCTION	1
46	204-006800-R12	LABEL CASE FRONT BOTTOM	1
47	202-000558-R09	COVER MIC	1
48	204-006800-R06	CUSHION MIC	1
49	204-006500-R01	CUSHION LCD LENS	1
50	201-006500-R08	LENS LCD	1

**Chapter 6 Radio Debugging**

Before test/debugging, make sure all the equipments have been well connected to the ground!

Before test/debugging, make sure the antenna output terminal has been connected properly to the corresponding devices and load!

The transmitter output must pass RF power attenuator before being connected to the standard signal source/ frequency deviator/frequency spectrum!

When testing the receiver, make sure not to conduct transmitting operation!

When in debugging/testing/service, make sure static free measures for human body and equipments.

**6.1 Service Equipment and Software**

The following equipments and software in Table 6.1 are necessary for the service and test of the radio.

NO	Name	Specifications
1	Computer	Above P2, compatible with IBM PC, WINDOWS 98/ME/2000/XP
2	Programming software	KSP6500
3	Programming Cable	KSPL-09
4	Cloning cable	KCL01
5	DC regulated power	Output voltage: 7.5V, output current: > 5A
6	Therefore Power meter	Measuring rang: 0.5--10W Frequency range: 100MHz500MHz Impedance: 50Ω SWR < 1.2
7	Frequency meter	Frequency range: 0.1600MHz Frequency precision: higher than $\pm 1 \times 10^{-6}$ Sensitivity: higher than 100mV
8	Frequency Deviator	Frequency range: DC600MHz Measuring range: 0-- $\pm 5$ kHz
9	Digital Multimeter	Input impedance: higher than 10MΩ/V DC, with the ability of testing voltage, current, impedance
10	Audio Signal Generator	Frequency range: 2--3000Hz output level: 1---500mV
11	RF Power attenuator	Attenuation: 40dB or 50dB Supporting power: Bigger than 10W
12	Standard signal source	Frequency range: 10MHz---1000MHz Output level: 0.1uV~32mV (-127dBm~-17dBm)
13	Oscillograph	Frequency range: DC~20MHz Test range: 10mV~20V
14	Audio voltmeter	Test range: 10mV~10V

Recommendation: Equipment in item 6, 7, 8, 10, 11, and 12 can be replaced by a comprehensive test instrument.

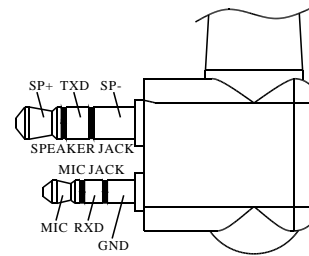


Figure 6.1 External Speaker/Mic. Connector Definition

**6.2 Debugging Items**

During the course of maintenance, the radio needs to be tested and debugged after replacing components. Brief description of circuits is as follows.

Some certain radio parameters can be modified (computer mode) with our KSP6500 programming software. The modifiable parameters are as follows:

- 1) Receiving and transmitting frequencies of different channels;
- 2) Receiving and transmitting signaling of different channels;
- 3) Busy-lock selection of channels;
- 4) TOT transmitting time limit;
- 5) Squelch level;
- 6) Power-saving function selection;
- 7) 2-tone settings;
- 8) DTMF settings;
- 9) Voice alert function selection;
- 10) Monitoring mode selection;
- 11) Scanning mode selection;
- 12) Scanning reply channel selection;
- 13) Scanning channel priority selection;
- 14) Call list settings;
- 15) Customized alert;

**Debugging Procedures:**

- A, Enter the computer test mode. Access method refers to the instruction in 4.2.1 for entering the computer mode.
- b, Select the Test Mode option in KPS6500 programming software to enter the computer test mode.
- c, Select the options that you want to adjust and adjust the parameters on the computer.
- d, After adjustment, exit the computer test mode.

**6.3 Debugging**

**6.3.1 VCO Modification**

Turn off the power saving mode. Set the frequency at the low frequency (see Table 6.2). In receiving status, test the PD power with the digital multimeter. Adjust the trimming capacitor C117 to make the PD power at  $4.2V \pm 0.1V$

In the transmitting status, test the PD power with the digital multimeter and adjust the micro capacity C52 to make the voltage at PD point at  $4.2V \pm 0.1V$

Table 6.2 Radio H/I/L Frequency

Low Frequency	Center frequency	High Frequency
400.125MHz	435.125MHz	469.975MHz



### 6.3.2 PLL Frequency Adjustment (HP8920 set at the TX status)

Under the computer test mode, select “frequency stability” to enter, Adjust the TX frequency among 0~255 to the specified value. (Frequency error less than 200Hz.).

### 6.3.3 TX Frequency Adjustment (HP8920 set at the TX status)

**A.** Under the computer test mode, select “high power” to enter and Adjust the TX power among 0~255 to 4W. And watch the working current and make sure it not higher than 1.7A.

And adjust the max, high, low, min. frequencies in the method above to make the TX power at 4W for all.

**B.** Under the computer test mode, select “medium power” to enter and Adjust the TX power among 0~255 to 2W. And watch the working current and make sure it not higher than 1.2A. And adjust the max, high, low, min. frequencies in the method above to make the TX power at 2W for all.

**C.** Under the computer test mode, select “low power” to enter and Adjust the TX power among 0~255 to 0.5W. And watch the working current and make sure it not higher than 1A. And adjust the max, high, low, min frequencies in the method above to make the TX power at 0.5W for all.

### 6.3.4 DCS Transmitted Signal Waveform

(HP8920 set at the TX status, filter set at 20Hz~300Hz)

Under the computer test mode, select “DCS balancing” to enter, select “broadband” and adjust the digits within the range of 0~255, and watch the signals to make sure the waveforms are smooth (near square wave) .

### 6.3.5 Frequency Deviation Adjustment

**A.** Max frequency deviation (HP8920 set at the TX status, filter set at 50Hz~15kHz): input the audio signal of 160mV,1000Hz at the MIC port of the radio. Under the computer test mode, select “Max frequency deviation” to and adjust the digits within 0~64 at the max, high, medium, low and min frequencies to make the RF frequency deviation at  $\pm 4.5$ kHz.

Adjust the frequency deviation of “narrow band” in the method above to make the transmitting frequency deviation at  $\pm 2.2$ kHz.

**B.** 5\_Tone frequency deviation (HP8920 set at the TX status, filter set at 50Hz~15kHz): Under the computer test mode, select “5\_Tone frequency deviation” to enter, select “broadband” and adjust the digits within 0~255 range to set the frequency deviation at  $\pm 4.0$ kHz.

Adjust the frequency deviation of “narrow band” in the method above to make the transmitting frequency deviation at  $\pm 2.0$ kHz.

**C.** DTMF frequency deviation (HP8920 set at the TX status, filter set at 50Hz~15kHz): Under the computer test mode, select “DTMF frequency deviation” to enter, select “broadband” and adjust the digits within 0~64 range to set the frequency deviation at  $\pm 4.0$ kHz.

Adjust the frequency deviation of “narrow band” in the method above to make the transmitting frequency deviation at  $\pm 2.0$ kHz.

**D.** CTCSS (67Hz) frequency deviation (HP892 set at the TX status, filter set at 20Hz~300Hz): Under the computer test mode, select “CTCSS(67Hz) frequency deviation” to enter, select “broadband” and adjust the digits within 0~255 range to set the frequency deviation at  $\pm 0.75$ kHz.

Adjust the frequency deviation of “narrow band” in the method above to make the transmitting frequency deviation at  $\pm 0.35$ kHz.

**E.** CTCSS (150Hz) frequency deviation (HP8920 set at the TX status, filter set at 20Hz~300Hz): Under the computer test mode, select “CTCSS(150Hz) frequency deviation” to enter, select “broadband” and adjust the digits within 0~255 range to set the frequency deviation at  $\pm 0.75$ kHz.

Adjust the frequency deviation of “narrow band” in the method above to make the transmitting frequency deviation at  $\pm 0.35$ kHz

**F.** CTCSS (254.1Hz) frequency deviation (HP8920 set at the TX status, filter set at 20Hz~300Hz): Under the computer test mode, select “CTCSS(254.1Hz) frequency deviation” to enter, select “roadband” and adjust the digits within 0~255 range to set the frequency deviation at  $\pm 0.75$ kHz.

Adjust the frequency deviation of “narrow band” in the method above to make the transmitting frequency deviatio5

### 6.3.6 Transmitting Low Voltage Alert (HP8920 set at the TX status)

Set the voltage of the power supply at 5.8V.

Under the computer test mode, select “transmitting low voltage” and press adjustment to enter, when the digits are stable, press Confirm.

### 6.3.7 Receiver Sensitivity (HP8920 set at the RX status)

Under the computer test mode, select “Receiver Sensitivity” to enter and respectively adjust 5 frequencies of max. high, medium, low and min, adjust within 0~255 range to make the frequencies at the highest sensitivity.

### 6.3.8 Receiver Squelch Setting

**A.** Level 9 broadband squelch (HP8920 set at the RX status): input the RF signal with adjusted frequency and the amplitude at -116dBm at the antenna port of the radio. Under the computer test mode, select “Level 9 broadband squelch” to enter and respectively adjust f frequencies of max, high, medium, low and min and make the green LED on when adjusting within the range of 0~255 range.

**B.** Level 9 narrowband squelch level (HP8920 set at the RX status): input the RF signal with adjusted frequency and the amplitude at -116dBm at the antenna port of the radio. Under the computer test mode, select “Level 9 narrowband squelch” to enter and respectively adjust f frequencies of max, high, medium, low and min and make the green LED on when adjusting within the range of 0~255 range.

**C.** Level 1 broadband squelch (HP8920 set at the RX status): input the RF signal with adjusted frequency and the amplitude at -123dBm at the antenna port of the radio. Under the computer test mode, select “Level 1 broadband squelch” to enter and respectively adjust f frequencies of max, high, medium, low and min and make the green LED on when adjusting within the range of 0~255 range.

**D.** Level 1 narrowband squelch level (HP8920 set at the RX Status): input the RF signal with adjusted frequency and the amplitude at -123dBm at the antenna port of the radio. Under the computer test mode, select “Level 1 narrowband Squelch” to enter and respectively adjust f frequencies of max, high, medium, low and min and make the green LED on when Adjusting within the

range of 0~255 range.

**6.3.9 Receiver volume** (HP8920 set at the RX status, filter set at 50Hz~15kHz)

**A.** Max broadband receiver volume: input the RF signal with adjusted frequency and the amplitude at -47dBm and the modulation frequency deviation at 3kHz at the antenna port of the radio. Under

the computer test mode, select “ Max broadband receiver volume” to enter and adjust the audio power at 1.8W within the range of 0~64 range.

**B.** Max narrowband receiver volume: input the RF signal with adjusted frequency and the amplitude at -47dBm and the modulation frequency deviation at 1.5 kHz at the antenna port of the radio. Under the computer test mode, select “ Max narrowband receiver volume” to enter and adjust the audio power at 1.8W within the range of 0~64 range..

**6.4 Debugging**

The above debugging refers to Table3, Table4, and Table 5.

**Table 6.3 Voltage Controlled Oscillator**

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Requirement	Note
Setting	Battery capacity: 7.5V	Digital Multimeter	PD			
Locked voltage	CH: RX High Frequency			C117	4.2V±0.1V	Adjustment
	CH: RX Low Frequency				>0.6V	Watching
	CH: TX High Frequency			C52	4.2V±0.1V	Adjustment
	CH:TX Low Frequency				>0.6V	Watching

**Table 6.4 Receiver**

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Requirement	Note
Band pass filter		Frequency spectrum Analyzer / comprehensive test Device	Before mixing	Computer test	Smooth wave	No adjustment is recommended!
Audiopower	Test frequency: intermediate frequency Antenna port input: RF OUT: -47dBm(11 V) MOD: 1kHz DEV: ±3.0kHz/±1.5kHz Audio load: 16Ω	RF Signal generator Oscillator Audio Voltmeter Distortion test device /Comprehensive test device	Speaker connector	Computer test	(Turn the volume knob clockwise) audio power >1.5W SINAD: 12dB or higher	Inner speaker power > 1.2W
Sensitivity	CH: center frequency CH:low frequency CH:high frequency RF OUT: -119dBm(0.25 V) MOD: 1kHz DEV: ±3.0kHz/±1.5kHz			Computer test	After adjustment, squelch activation is normal	
Squelch activation	CH: RX center frequency				Computer test	After adjustment squelch activation is normal
	9 <sup>th</sup> RF OUT:-117dBm					
	3 <sup>rd</sup> RF OUT:-124dBm					

**Table 6.5 Transmitter**

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Requirement	Note
Tx Frequency		Frequency counter/comprehensive test device	Antenn a	Computer test mode	Within $\pm 200\text{Hz}$	
DCS wave (smooth)		Oscillator/comprehensive test device		Computer test mode	Waveform is close to smooth square wave	
Power		Wattmeter/comprehensive test device ammeter		Computer test mode	Adjust to 4W/2W/0.5W	Within $\pm 0.2\text{W} \pm 200\text{Hz}$
Max modulation frequency deviation	Ch: TXcenter frequency AG: 1kHz/320mV	Frequency deviation meter/comprehensive test device		Computer test mode	Adjust to $\pm 4.5\text{kHz}/2.2\text{kHz}$	$\pm 50\text{Hz}$
5-Tone DEV		Frequency deviation meter/comprehensive test device		Computer test mode	Adjust to $\pm 4\text{kHz}/2\text{kHz}$	
DTMF DEV		Frequency deviation meter/comprehensive test device		Computer test mode	Adjust to $\pm 4\text{kHz}/2\text{kHz}$	
CTCSS DEV	CTCSS: 67Hz	Frequency deviation meter/comprehensive test device		Computer test mode	Adjust to $\pm 0.75\text{kHz}/0.35\text{kHz}$	
CTCSS DEV	CTCSS: 150Hz	Frequency deviation meter/comprehensive test device		Computer test mode	Adjust to $\pm 0.75\text{kHz}/0.35\text{kHz}$	
CTCSS DEV	CTCSS: 254.1Hz	Frequency deviation meter/comprehensive test device		Computer test mode	Adjust to $\pm 0.75\text{kHz}/0.35\text{kHz}$	
DCS DEV	DCS: 023N	Frequency deviation meter/comprehensive test device		Computer test mode	Adjust to $\pm 0.9\text{kHz}/0.45\text{kHz}$	
Battery power warning	Battery terminal: 5.8V			Computer test mode	After adjustment, the indicator flashes	

## Chapter 7 Major Specifications

### 7.1 General Specification

	PT6500
Frequency range(mhz)	(1) 136~174MHz (2) 400~470 MHz (3) 450~520MHz (4) 350~400 Mhz
Channel capacity	128
Channel spacing(khz)	12.5KHz/20KHz/25KHz
Frequency stability(ppm)	2.5ppm
operating temperature( $^{\circ}\text{C}$ )	$-25^{\circ}\text{C} \sim +55^{\circ}\text{C}$
operating voltage(v)	7.5V DC $\pm 20\%$
power supply requirement	0.5~4W/5W
dimension (h*w*d)(mm) (with battery, without antenna)	56 mm $\times$ 120 mm $\times$ 35 mm
weight(g)(with antenna& battery)	310g
battery (mah)	1700mAh

### 7.2 Transmitter

RF Power (w)	4W/2W/0.5W(UHF) 5W/2W/0.5W(VHF)
Frequency modulation	16K $\phi$ F3E/ 11K $\phi$ F3E/8K $\phi$ F3E
Antenna Impedance( $\Omega$ )	50 $\Omega$
Modulation Limiting(KHz)	$\pm 2.5\text{KHz}@12.5\text{KHz}$ , $\pm 4\text{KHz}@20\text{KHz}$ , $\pm 5\text{KHz}@25\text{KHz}$
Modulation Distortion(%)	5%
Radiated Spurious Emission	-36dBm < 1GHz, -30dBm > 1GHz
FM Noise(dB)	-40dB@25KHz, -35dB@12.5KHz
Adjacent Channel Power(dB)	-60dB @ 12.5KHz, -70dB @ 20/25KHz,

### 7.3 Receiver

Reference Sensitivity( $\mu\text{V}$ ) .	35 $\mu\text{V}$
Operating Bandwidth(KHz)	$\geq \pm 7/\pm 3.5$
First IF of Receiver (MHz)	51.65
second IF of Receiver(khz)	450
Adjacent channel Selectivity(dB)	60 dB@12.5KHz, 70 dB@20/25KHz
intermodulation Rejection(dB)	65 dB
Spurious Response Rejection(dB)	70 dB
Rated Audio Power(w)	0.5W
rated Audio Distortion(%)	10%
FM Hum&Noise(dB)	40/35

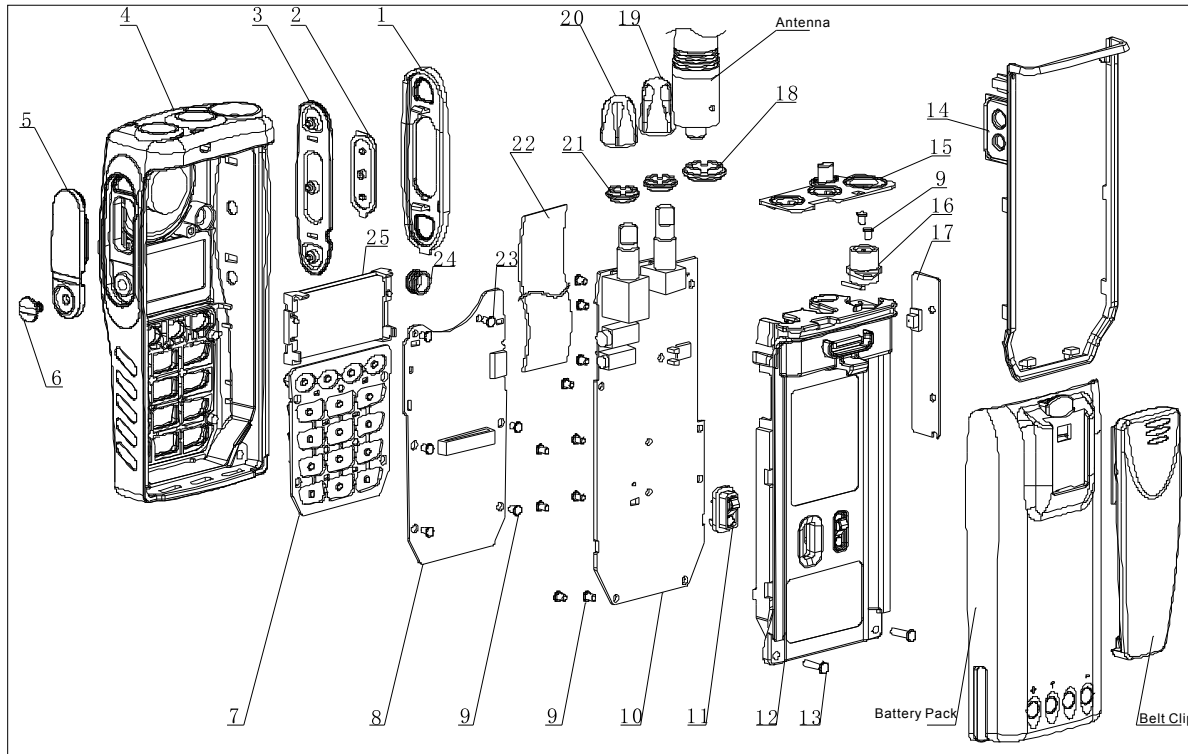


## Chapter 8 Trouble Shooting

No.	Problems	Solution
1	No display after switched on.	A. Battery power may be insufficient. Recharge or replace the battery pack. B. The power switch may be broken, replace the switch. C. CPU may be broken, replace the IC. D. Regulator tube Q45 may be broken, replace the IC.
2	Phase locked loop unlocked	A. Phase locked loop Crystal Oscillator X1 may be broken, replace it. B. Oscillator tube may be broken, replace it. C. Phase locked loop IC2 may be broken, replace the IC.
3	Cannot transmit.	A. The frequencies of both users are not the same, select the same frequency channel again. B. The CTCSS/DCS signaling of both users are not the same, set it with PC. C. Beyond the efficient communication range.
4	No signal	A. Make sure the antenna is well connected. B. Low sensibility, trimming "computer test mode" . C. HF amplifier may be broken, replace it. D. The squelch level is too high, which makes the squelch unable to switch on, reset it by PC. E. Mixer tube Q19 may be broken, replace the tube. F. Frequency Modulation IC4 may be broken, replace the IC.
5	The transmitting red light is on, but no voice is heard	A. Power-amplifier tube no power output, replace the tube. B. Replace the microphone if it is broken. C. Operational Amplifier IC14 may be broken, replace it.
6	Receiving green light is on, but no voice is heard	A. Replace the speaker if it is broken. B. Audio power amplifier IC9 may be broken, replace it. C. Switch Tube Q48 may be broken, replace it. D. Operational Amplifier IC6 may be broken, replace it.
7	Abnormal programming	A. Make sure the wires are well connected. B. Abnormal output of the RS-232 serial port of the computer, check the computer . C. Abnormal connection of MIC and SPK jack, check the jack.

## 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
DEMODO	demodulation
EEPROM	EEPROM
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: Spare List**

ITEM	PARTNUMBER	DESCRIPTION	QTY
1	201-006500-R02	COVER PTT KEY	1
2	201-006500-R05	KEY PTT	1
3	202-006500-R01	RUBBER KEY PTT	1
4	604-065000-R01	CASE FRONT SUBASSEMBLY	1
5	201-006500-R07	COVER EARPHONE	1
6	304-30040G-R01	SCREW EARPHONE COVER	1
7	202-006500-R04	RUBBER KEY FUNCTION	1
8	604-065000-R06	PCB FUNCTION KEY SUBASSEMBLY	1
9	301-20040G-R01	SCREW M2.0*4.0	17
10		PCB MAIN SUBASSEMBLY	1
11	604-065000-R02	BKT POSITIVER SUBASSEMBLY	1
12	604-065000-R03	CASE AL SUBASSEMB	1
13	301-20080G-R02	SCREW M2.0*8.0	2
14	202-006500-R02	WATERPROOF LOOP MAIN	1
15	202-006500-R03	WATERPROOF PLATE TOP	1
16	203-000558-R07	BASE ANTENNA	1
17	604-06500-R07	PCB PTT KEY SUBASSEMBLY	1
18	203-000558-R11	NUT ANTENNA	1
19	604-06500-R04	KNOB CHANNEL SUBASSEMBLY	1
20	604-06500-R05	KNOB VOLUME SUBASSEMB	1
21	305-108020-R01	NUT KONB	2
22	120-400000-R13	LINE	1
23	302-20060G-R01	SCREW M2.0*6.0	2
24	202-000558-R09	COVER MIC	1
25	102-6800CN-R01	LCM	1
26	201-006500-R01	CASE FRONT	1
27	204-003208-R02	WATERPROOF NUT SPEAKER	1
28	204-003208-R07	CUSHION SPEAKER	1
29	121-100000-R17	SPEAKER	1
30	204-006200-R09	SPACE CUSHION SPEAKER	1

ITEM	PARTNUMBER	DESCRIPTION	QTY
31	204-006800-R01	LABEL LCD	1
32	204-006800-R06	CUSHION MIC	1
33	201-006500-R09	LENS LED	1
34	201-006500-R08	LENS LCD	1
35	204-006500-R01	CUSHION LCD	1
36	204-006800-R12	LABEL CASE FRONT BOTTOM	1
37		LABEL LOGO	1
38	201-006500-R06	BKT POSITIVE	1
39	203-006500-R02	PLATE POSITIVE	1
40	203-006500-R04	SPRING PLATE	1
41	202-000558-R08	RUBBER CUSHION SPRING PLATE	1
42	302-17040G-R01	SCREW M1.7*4.0	1
43	203-006500-R01	CASE AL	1
44	204-006500-R02	SPACE EARPHON	1
45	202-006500-R05	WATERPROOF PART POSITIVE BKT	1
46	204-006200-R04	SPACE	1
47	204-006800-R11	LABEL	1
48	203-006500-R04	SPRING PLATE	1
49	202-000558-R08	RUBBER CUSHION SPRING PLATE	1
50	301-20030G-R03	SCREW M2.0*3.0	1
51	202-003208-R07	SPACE TRANSCALENT	1
52	201-006500-R04	KNOB CHANNEL	1
53	203-006800-R26	SPRING PLATE KNOB	1
54	201-006500-R03	KNOB VOLUME	1
55	203-006800-R26	SPRING PLATE KNOB	1
56		PCB FUNCTION KEY SUBASSEMBLY	1
57	203-006500-R03	METAL DOME FUNCTION KEY	1
58		PCB PTT KEY SUBASSEMBLY	1
59	203-006500-R06	METAL DOME PTT KEY	1

**Appendix 3: STRUCTURE PART LIST**

ITEM	PARTNUMBER	DESCRIBER	QUTY
1	102-6800CN-R01	LCD	1
2	120-100000-R07	LINE (COLOR RED)	1
3	120-100000-R08	LINE (COLOR BLACK)	1
4	120-400000-R13	CABLE 38PIN	1
5	121-100000-R17	SPEAKER	1
6	201-006500-R01C	CASE FRONT	1
7	201-006500-R02B	COVER PTT KEY	1
8	201-006500-R03	KNOB VOLUME	1
9	201-006500-R04	KNOB CHANNEL	1
10	201-006500-R05	KEY PTT	1
11	201-006500-R06B	BKT POSITIVE	1
12	201-006500-R07	COVER EARPHONE	1
13	201-006500-R08	LENS LCD WINDOW	1
14	201-006500-R09	LENS LED	1
15	202-000558-R08	CUSHION RUBBER POSITAND NEGAT	2
16	202-000558-R09	COVER MIC RUBBER	1
17	202-003208-R07	SPACE TRASCALANT	1
18	202-006500-R01	RUBBER KEY PTT	1
19	202-006500-R02	WATERPROOF LOOP MAIN	1
20	202-006500-R03	WATERPROOF TOP	1
21	202-006500-R04	RUBBER KEY FUNCTION	1
22	202-006500-R05	WATERPROOF POSITIVE BKT	1
23	203-000558-R07B	BASE ANTENNA	1
24	203-000558-R11	NUT ANTENNA	1
25	203-006500-R01B	CASE AL	1
26	203-006500-R02	PLATE POSITIVE	1
27	203-006500-R03	METALDOME FUNCTION KEY	1
28	203-006500-R04	SPRING PLATEPOSIT ANDNEGAT	2
29	203-006500-R06	METALDOME PTT KEY	1
30	203-006500-R07A	SPRRING PLATEFUNCTION KEY PCB	2
31	203-006800-R26	SPRINT PLATE KNOB	2
32	203-007200-R08	NUT KNOB	2
33	204-006500-R01	CUSHION LCD LENS	1
34	204-006500-R02	SPACE MIC	1
35	204-006800-R01	LABEL LCDLENS	1
36	204-006800-R05	WATERPROOF NET SPEAKER	1
37	204-006800-R06	WATERPROOF NET MIC	1
38	204-0KB36L-R03	CUSHION KB36L	1
39	301-20020G-R01	SCREW M2.0*2.0	4
40	301-20030G-R03	SCREW M2.0*3.0	1
41	301-20040G-R01	SCREW M2.0*4.0	13
42	301-20080G-R02	SCREW M2.0*8.0	2
43	302-17040G-R01	SCREW M1.7*4.0	1
44	302-20060G-R01	SCREW M2.0*6.0	2
45	304-30040G-R02B	SCREW M3.0*4.0	1

**Appendix 4: Electronic Component List(136-174MHz)**

No	Material Serial No	Component Name/Specification		QTY.
1	101-06500V-R04	PT6500PCB / VHF PCB,6 LAYER,FR4,1.2mm,PT6500V-071115.PCB,Rohs		1
2	102-1509GV-R01	DIVIDER / UPB1509GV,Rohs	IC1	1
3	102-24C256-R02	EEPROM / 24LC256I/SN,Rohs	IC8	1
4	102-9140NR-R01	Reset IC / PST9140NR,Rohs	IC11	1
5	102-A31136-R01	FM DETECTOR IC / TA31136FN,SSOP,Rohs	IC4	1
6	102-AK2346-R01	Audio Processor IC / AK2346. Rohs	IC6	1
7	102-B502MR-R01	LDO / XC6204B502MR, Rohs	Q40, Q45	2

No	Material Serial No	Component Name/Specification		QTY.
8	102-C75W51-R01	Operational Amplifier / TC75W51FU,SSOP8-P-0.65,Rohs	IC14, IC18	2
9	102-DA8541-R01	POWER AMPLIFIER / TDA8541,SO8,Rohs	IC9	1
10	102-DF4111-R01	RF PLL Frequency Synthesizers / ADF4111,TSSOP, Rohs	IC2	1
11	102-FP3502-R01	Positive Voltage Regulator / XC62FP3502PR,SOT-89,Rohs	IC16	1
12	102-HT9172-R01	DTMF Receiver / HT9172,SOP,Rohs	IC10	1
13	102-M2902V-R01	Operational Amplifier / NJM2902V,OP-AMP,Rohs	IC5	1
14	102-M2904V-R01	Operational Amplifier / NJM2904V,OP-AMP,Rohs	IC3	1
15	102-M30620-R01	MCU / CPU,M16C-M30620FCPGP,FLASH,Rohs	IC7	1
16	103-0MA742-R01	Chip switch diode / MA742(PANASONIC),Rohs	D22, D35, D36, D37	4
17	103-1SR154-R01	Chip diode / 1SR154-400(ROHM),Rohs	D33	1
18	103-1SV278-R01	Chip variable capacitor diode / 1SV278,Rohs	D9	1
19	103-1SV305-R01	Chip variable capacitor diode / 1SV305,Rohs	D27, D28, D29, D30	4
20	103-1SV325-R01	Chip variable capacitor diode / 1SV325,Rohs	D2, D6, D11, D14	4
21	103-A2S111-R01	Chip switch diode / 0603,MA2S111(PANASONIC),Rohs	D10, D16, D20, D38	4
22	103-DAN222-R01	Chip switch diode / DAN222,(ROHM),Rohs	D18, D19	2
23	103-HSC277-R01	Chip diode / Waveband switch,HSC277(HITACHI),Rohs	D3, D17	2
24	103-HVC131-R01	Chip HF switch diode / 0603,HVC131(HITACHI),Rohs	D1, D7, D8, D39	4
25	103-HZU5AL-R01	Chip regulator diode / HZU5ALL(HITACHI),Rohs	D15	1
26	103-L190YG-R01	Chip LED / 0603,green,H19-213SYGC,Rohs	D26, D31	2
27	103-MHC190-R02	Chip LED / 0603,red,19-21SURC/S530-A2/TR8,Rohs	D25	1
28	104-A123JE-R01	Chip triode / DTA123JE(ROHM),Rohs	Q26, Q44	2
29	104-A143TE-R01	Chip triode / DTA143TE,Rohs	Q7, Q9	2
30	104-A144EE-R01	Chip triode / DTA144EE(ROHM),Rohs	Q12, Q25, Q36	3
31	104-C144EE-R01	Chip triode / DTC144EE(ROHM),Rohs	Q13, Q16, Q22, Q24, Q32, Q35, Q42, Q23, Q52	9
32	104-C144EU-R01	Chip triode / DTC144EUA(ROHM),Rohs	Q10	1
33	104-SA1586-R01	Chip triode / 2SA1586,Rohs	Q38, Q47	2
34	104-SC3356-R01	Chip triode / 2SC3356,R24,Rohs	Q5	1
35	104-SC4116-R01	Chip triode / 2SC4116-GR, Rohs	Q41	1
36	104-SC4617-R01	Chip triode / 2SC4617(S)(ROHM),Rohs	Q21, Q30, Q31, Q53, Q14	5
37	104-SC5108-R01	Chip triode / 2SC5108Y(TOSHIBA),Rohs	Q2, Q8, Q20, Q4	4
38	104-TC4082-R01	Chip triode / KTC4082,(KEC),Rohs	Q15	1
39	105-2SK508-R01	Chip FET / 2SK508NV(K52),Rohs	Q6, Q11	2
40	105-3SK318-R01	Chip FET / 3SK318,Rohs	Q18, Q19	2
41	105-RD01MU-R01	Chip FET / RD01MUS2,Rohs	Q3	1
42	105-RD07MV-R01	Chip FET / RD07MVS1,Rohs	Q1	1
43	105-SK1824-R01	Chip FET / 2SK1824,Rohs	Q27, Q29, Q34, Q50, Q51, Q54, Q33, Q46	8
44	105-ST2301-R01	Chip FET / ST2301,Rohs	Q39, Q43	2
45	106-LBE010-R01	Switch / SKRTLBE010,Rohs	SW3	1
46	106-RY6472-R01	Carbon encoder switch / RY-6472,Rohs	SW2	1
47	108-450C24-R02	Plug-in phase frequency detector / JTBM450CX24,Rohs	CD1	1
48	108-CF450F-R02	Plug-in porcelain filter / LTWC450F,450kHz $\pm$ 7kHz,Rohs	CF2	1
49	108-CF450G-R02	Plug-in porcelain filter / LTWC450G,450kHz $\pm$ 3kHz,Rohs	Cf1	1
50	108-XF5165-R01	chip IF filter / DSF753SBF,51.65MHz $\pm$ 4kHz/3dB, (7.0x5.0x1.3)mm,Rohs	Xf1	1
51	109-040000-R01	Chip resistor / 0402,0R $\pm$ 5%,Rohs	C255, C271, R31, R54, R152, R178, R187, R227, R240, R245, R258, R262, R264, R269, R291, R298, R304, R307, R308, R310, R319	21
52	109-040100-R01	Chip resistor / 0402,10R $\pm$ 5%,Rohs	R2, R47, R49, R69	4
53	109-040101-R01	Chip resistor / 0402,100R $\pm$ 5%,Rohs	R20, R108	2
54	109-040102-R01	Chip resistor / 0402,1K $\pm$ 5%,Rohs	R7, R11, R40, R76, R118, R132, R148, R154, R160, R167, R168, R192, R198, R202, R205, R208, R217, R221, R225, R226, R241, R251, R253, R277, R294, R297, R299, R301, R316, R320, R321, R322, R323, R324, R325, R326, R327, R328, R329, R330, R331, R332, R333, R334, R335, R336, R337, R338, R339, R340, R341, R342, R343, R344, R345, R346, R347, R348, R349, R350, R351	61
55	109-040103-R01	Chip resistor / 0402,10K $\pm$ 5%,Rohs	R59, R73, R79, R80, R126, R144, R172, R199, R211,	15

No	Material Serial No	Component Name/Specification		QTY.
			R252, R255, R266, R284, R287, R288	
56	109-040104-R01	Chip resistor / 0402,100K $\pm$ 5%,RoHS	R186, R213, R279, R300	4
57	109-040105-R01	Chip resistor / 0402,1M $\pm$ 5%,RoHS	R60, R114, R115, R116, R120, R127, R234, R237, R243, R270	10
58	109-040123-R01	Chip resistor / 0402,12K $\pm$ 5%,RoHS	R16, R140, R191, R209, R231	5
59	109-040124-R01	Chip resistor / 0402,120K $\pm$ 5%,RoHS	R15, R88, R193, R204	4
60	109-040152-R01	Chip resistor / 0402,1.5K $\pm$ 5%,RoHS	R10, R45, R180, R238	4
61	109-040153-R01	Chip resistor / 0402,15K $\pm$ 5%,RoHS	R50, R233, R281	3
62	109-040154-R01	Chip resistor / 0402,150K $\pm$ 5%,RoHS	R6, R25, R42, R121, R157, R159, R179, R182	8
63	109-040180-R01	Chip resistor / 0402,18R $\pm$ 5%,RoHS	R5	1
64	109-040181-R01	Chip resistor / 0402,180R $\pm$ 5%,RoHS	R52	1
65	109-040182-R01	Chip resistor / 0402,1.8K $\pm$ 5%,RoHS	R22, R87	2
66	109-040183-R01	Chip resistor / 0402,18K $\pm$ 5%,RoHS	R184, R185, R278	3
67	109-040184-R01	Chip resistor / 0402,180K $\pm$ 1%,RoHS	R81, R110, R139, R147, R174, R194, R196, R210	8
68	109-040202-R01	Chip resistor / 0402,2K $\pm$ 5%,RoHS	R257	1
69	109-040220-R01	Chip resistor / 0402,22R $\pm$ 5%,RoHS	R36, R92, R230	3
70	109-040221-R01	Chip resistor / 0402,220R $\pm$ 5%,RoHS	R43, R100	2
71	109-040222-R01	Chip resistor / 0402,2.2K $\pm$ 5%,RoHS	R1, R51, R77, R93, R135, R189	6
72	109-040223-R01	Chip resistor / 0402,22K $\pm$ 5%,RoHS	R74, R75, R82, R83, R102, R103, R166, R244, R273	9
73	109-040224-R01	Chip resistor / 0402,220K $\pm$ 5%,RoHS	R161, R203	2
74	109-040271-R01	Chip resistor / 0402,270R $\pm$ 5%,RoHS	R19	1
75	109-040272-R01	Chip resistor / 0402,2.7K $\pm$ 5%,RoHS	R24, R133, R181, R200, R212, R254, R295	7
76	109-040273-R01	Chip resistor / 0402,27K $\pm$ 5%,RoHS	R101, R153, R195, R280, R283	5
77	109-040274-R01	Chip resistor / 0402,270K $\pm$ 5%,RoHS	R34, R38	2
78	109-040331-R01	Chip resistor / 0402,330R $\pm$ 5%,RoHS	R14, R17, R23, R90, R107, R119, R150	7
79	109-040332-R01	Chip resistor / 0402,3.3K $\pm$ 5%,RoHS	R12, R21, R112, R123, R128, R177	6
80	109-040333-R01	Chip resistor / 0402,33K $\pm$ 5%,RoHS	R171, R215, R247, R248, R311	5
81	109-040334-R01	Chip resistor / 0402,330K $\pm$ 5%,RoHS	R61, R97, R232, R239	4
82	109-040361-R01	Chip resistor / 0402,360R $\pm$ 5%,RoHS	R33	1
83	109-040393-R01	Chip resistor / 0402,39K $\pm$ 5%,RoHS	R35, R86	2
84	109-040470-R01	Chip resistor / 0402,47R $\pm$ 5%,RoHS	R8, R13, R28, R68	4
85	109-040471-R01	Chip resistor / 0402,470R $\pm$ 5%,RoHS	R263	1
86	109-040472-R01	Chip resistor / 0402,4.7K $\pm$ 5%,RoHS	R4, R37, R48, R62, R98, R99, R125, R134, R136, R137, R145, R173, R197, R207, R216	15
87	109-040473-R01	Chip resistor / 0402,47K $\pm$ 5%,RoHS	R30, R32, R183, R206, R214, R224, R228, R229, R235, R242, R274, R275, R276, R286, R292, R317, R318	17
88	109-040474-R01	Chip resistor / 0402,470K $\pm$ 5%,RoHS	R29, R85, R156, R265, R271	5
89	109-040512-R01	Chip resistor / 0402,5.1K $\pm$ 5%,RoHS	R176	1
90	109-040513-R01	Chip resistor / 0402,51K $\pm$ 5%,RoHS	R151	1
91	109-040560-R01	Chip resistor / 0402,56R $\pm$ 5%,RoHS	R117	1
92	109-040561-R01	Chip resistor / 0402,560R $\pm$ 5%,RoHS	R26, R44	2
93	109-040562-R01	Chip resistor / 0402,5.6K $\pm$ 5%,RoHS	R303	1
94	109-040563-R01	Chip resistor / 0402,56K $\pm$ 5%,RoHS	R71, R142, R220	3
95	109-040564-R01	Chip resistor / 0402,560K $\pm$ 5%,RoHS	R146, R218, R219	3
96	109-040681-R01	Chip resistor / 0402,680R $\pm$ 5%,RoHS	R41	1
97	109-040683-R01	Chip resistor / 0402,68K $\pm$ 5%,RoHS	C162, R141, R246	3
98	109-040823-R01	Chip resistor / 0402,82K $\pm$ 5%,RoHS	R169	1
99	109-040824-R01	Chip resistor / 0402,820K $\pm$ 5%,RoHS	R285	1
100	109-040913-R01	Chip resistor / 0402,91K $\pm$ 5%,RoHS	R175	1
101	109-060000-R01	Chip resistor / 0603,0R $\pm$ 5%,RoHS	C12, R94, R95, R170, R201, R222, R282	7
102	109-060101-R01	Chip resistor / 0603,100R $\pm$ 5%,RoHS	R9, R39	2
103	109-060104-R01	Chip resistor / 0603,100K $\pm$ 5%,RoHS	R106, R124, R250	3
104	109-060124-R01	Chip resistor / 0603,120K $\pm$ 5%,RoHS	R78, R105	2
105	109-060150-R01	Chip resistor / 0603,15R $\pm$ 5%,RoHS	R27	1
106	109-060153-R01	Chip resistor / 0603,15K $\pm$ 5%,RoHS	R305	1
107	109-060154-R02	Chip resistor / 0603,150K $\pm$ 1%,RoHS	R53, R55, R58, R63, R67, R72	6
108	109-060182-R01	Chip resistor / 0603,1.8K $\pm$ 5%,RoHS	L48	1
109	109-060221-R01	Chip resistor / 0603,220R $\pm$ 5%,RoHS	R104	1
110	109-060273-R01	Chip resistor / 0603,27K $\pm$ 5%,RoHS	R70	1

No	Material Serial No	Component Name/Specification		QTY.
111	109-060331-R01	Chip resistor / 0603,330R±5%,Rohs	R3, R18, R91	3
112	109-060470-R01	Chip resistor / 0603,47R±5%,Rohs	L52	1
113	109-060472-R01	Chip resistor / 0603,4.7K±5%,Rohs	R138	1
114	109-060823-R01	Chip resistor / 0603,82K±5%,Rohs	R84, R111	2
115	109-070000-R01	Chip resistor / 0805,0R±5%,Rohs	L54	1
116	109-100000-R01	Chip resistor / 1206,0R±5%,Rohs	C294	1
117	109-100R47-R01	Chip resistor / 1206,0.47R±5%,Rohs	R57, R65, R66	3
118	110-220103-R01	Volume switch / 10K,RY-6473,Rohs	SW1	1
119	111-030000-R01	Chip FUSE / 433003,3A/32V,1206, Rohs	F1	1
120	112-042214-R01	Chip capacitor / 220P*4,0402,Rohs	C288, C345, C346	3
121	112-043100-R01	Chip capacitor / 0402,10P±0.5P,50V,C0G,Rohs	C11, C70, C142, C143	4
122	112-043101-R01	Chip capacitor / 0402,100P±5%,50V,C0G,Rohs	C144, C153, C84, C104, C105, C106, C121	7
123	112-043102-R01	Chip capacitor / 0402,1000P±10%,50V,X7R,Rohs	C6, C7, C21, C23, C31, C34, C37, C43, C46, C49, C56, C57, C62, C63, C65, C67, C73, C77, C78, C79, C80, C81, C82, C85, C88, C92, C94, C97, C98, C100, C109, C110, C113, C119, C126, C131, C133, C136, C146, C150, C154, C175, C179, C180, C192, C193, C202, C203, C205, C210, C211, C212, C235, C247, C253, C270, C272, C279, C282, C283, C290, C301, C306, C311, C314, C318, C323, C329, C332, C333, C334, C335, C347, C348, C350, C352, C360, C363, C365, C366, C367, C368, C369, C370, C376, C377, C134	87
124	112-043103-R01	Chip capacitor / 0402,0.01uF±10%,50V,X7R,Rohs	C44, C54, C91, C95, C115, C152, C158, C164, C181, C196, C207, C219, C232, C234, C256, C268, C275, C362, C374, C220	20
125	112-043104-R02	Chip capacitor / 0402,0.1uF±10%,10V,X5R,Rohs	C33, C83, C99, C114, C151, C159, C166, C167, C177, C178, C199, C209, C216, C231, C233, C248, C251, C257, C274, C276, C280, C285, C293, C303, C310, C319, C359, C532	28
126	112-043105-R01	Chip capacitor / 0402,1uF±10%,6.3V,X5R,Rohs	C45, C87, C217, C263, C289, C299, C304, C315, C330, C339, C353, C354, C371, C372, C373, C375	16
127	112-043110-R01	Chip capacitor / 0402,11P±5%,50V,C0G,Rohs	C174	1
128	112-043120-R01	Chip capacitor / 0402,12P±5%,50V,C0G,Rohs	C145	1
129	112-043121-R01	Chip capacitor / 0402,120P±5%,50V,C0G,Rohs	C101	1
130	112-043123-R01	Chip capacitor / 0402,0.012uF±10%,50V,X7R,Rohs	C249	1
131	112-043130-R01	Chip capacitor / 0402,13P±5%,50V,C0G,Rohs	C176	1
132	112-043150-R01	Chip capacitor / 0402,15P±5%,50V,C0G,Rohs	C22, C59	2
133	112-043153-R01	Chip capacitor / 0402,0.015uF±10%,50V,X7R,Rohs	C239	1
134	112-043180-R01	Chip capacitor / 0402,18P±5%,50V,C0G,Rohs	C155	1
135	112-043182-R01	Chip capacitor / 0402,1800P±10%,50V,X7R,Rohs	C218, C267, C201	3
136	112-0431R5-R01	Chip capacitor / 0402,1.5P±0.25P,50V,C0G,Rohs	C68, C69	2
137	112-043200-R01	Chip capacitor / 0402,20P±5%,50V,C0G,Rohs	C250	1
138	112-043220-R01	Chip capacitor / 0402,22P±5%,50V,C0G,Rohs	C64, C242	2
139	112-043221-R01	Chip capacitor / 0402,220P±5%,50V,C0G,Rohs	C230, C364	2
140	112-043222-R01	Chip capacitor / 0402,2200P±10%,50V,X7R,Rohs	C241, C246	2
141	112-043223-R01	Chip capacitor / 0402,0.022uF±10%,50V,X7R,Rohs	C140, C161, C214, C226, C325	5
142	112-043224-R02	Chip capacitor / 0402,0.22uF±10%,16V,X7R,Rohs	C313	1
143	112-043270-R01	Chip capacitor / 0402,27P±5%,50V,C0G,Rohs	C260	1
144	112-043271-R01	Chip capacitor / 0402,270P±10%,50V,X7R,Rohs	C258	1
145	112-043330-R01	Chip capacitor / 0402,33P±5%,50V,C0G,Rohs	C10, C50, C188, C190, C191, C194, C297, C298	8
146	112-043332-R01	Chip capacitor / 0402,3300P±10%,50V,X7R,Rohs	C286	1
147	112-043333-R01	Chip capacitor / 0402,0.033uF±10%,16V,X7R,Rohs	C157, C240, C265, C328, C331	5
148	112-043390-R01	Chip capacitor / 0402,39P±5%,50V,C0G,Rohs	C38	1
149	112-043392-R01	Chip capacitor / 0402,3900P±10%,50V,X7R,Rohs	C320, C337	2
150	112-043393-R01	Chip capacitor / 0402,0.039uF±10%,50V,X7R,Rohs	C243, C277	2
151	112-0433R0-R01	Chip capacitor / 0402,3P±0.25P,50V,C0G,Rohs	C124, C170	2
152	112-0433R5-R01	Chip capacitor / 0402,3.5P±0.25P,50V,C0G,Rohs	C123	1
153	112-043470-R01	Chip capacitor / 0402,47P±5%,50V,C0G,Rohs	C128, C252, C309	3
154	112-043471-R01	Chip capacitor / 0402,470P±10%,50V,X7R,Rohs	C58, C71, C76, C86, C127, C137, C198, C204, C223, C224, C244, C266, C281, C312, C316, C321, C324, C327, C338, C356, C125, C168, C342	23



No	Material Serial No	Component Name/Specification		QTY.
155	112-043473-R01	Chip capacitor / 0402,0.047uF ± 10%,16V,X7R,Rohs	C238	1
156	112-043474-R01	Chip capacitor / 0402,0.47uF ± 10%,10V,X5R,Rohs	C237	1
157	112-0434R0-R01	Chip capacitor / 0402,4P ± 0.25P,50V,C0G,Rohs	C48, C187, C189, C195, C349	5
158	112-0434R7-R01	Chip capacitor / 0402,4.5P/4.7P ± 0.25P,50V,C0G,Rohs	C186	1
159	112-043560-R01	Chip capacitor / 0402,56P ± 5%,50V,C0G,Rohs	C4	1
160	112-043561-R01	Chip capacitor / 0402,560P ± 10%,16V,X7R,Rohs	C245	1
161	112-0435R0-R01	Chip capacitor / 0402,5P ± 0.25P,50V,C0G,Rohs	C103, C254	2
162	112-043680-R01	Chip capacitor / 0402,68P ± 5%,50V,C0G,Rohs	C55	1
163	112-043682-R01	Chip capacitor / 0402,6800P ± 10%,16V,X7R,Rohs	C264	1
164	112-043683-R01	Chip capacitor / 0402,0.068uF ± 10%,16V,X7R,Rohs	C269	1
165	112-0436R0-R01	Chip capacitor / 0402,6P ± 0.5P,50V,C0G,Rohs	C74, C75, C108, C135, C169	5
166	112-043820-R01	Chip capacitor / 0402,82P ± 5%,50V,C0G,Rohs	C215	1
167	112-0439R0-R01	Chip capacitor / 0402,9P ± 0.5P,50V,C0G,Rohs	C129	1
168	112-063100-R01	Chip capacitor / 0603,10P ± 5%,50V,C0G,Rohs	C16, C27, C29, C47, C156	5
169	112-063101-R01	Chip capacitor / 0603,100P ± 5%,50V,C0G,Rohs	C30, C111	2
170	112-063102-R01	Chip capacitor / 0603,1000P ± 10%,50V,X7R,Rohs	C5, C13, C32, C72, C132, C160, C183, C184, C200, C206, C213	11
171	112-063103-R01	Chip capacitor / 0603,0.01uF ± 10%,50V,X7R,Rohs	C165	1
172	112-063110-R01	Chip capacitor / 0603,11P ± 5%,50V,C0G,Rohs	C2	1
173	112-063120-R01	Chip capacitor / 0603,12P ± 5%,50V,C0G,Rohs	C1	1
174	112-063150-R01	Chip capacitor / 0603,15P ± 5%,50V,C0G,Rohs	C18, C28	2
175	112-063180-R01	Chip capacitor / 0603,18P ± 5%,50V,C0G,Rohs	C17, C182	2
176	112-063181-R01	Chip capacitor / 0603,180P ± 10%,50V,X7R,Rohs	C8	1
177	112-0631R0-R01	Chip capacitor / 0603,1P ± 0.25P,50V,C0G,Rohs	C9, C90	2
178	112-063220-R01	Chip capacitor / 0603,22P ± 5%,50V,C0G,Rohs	C19	1
179	112-063270-R01	Chip capacitor / 0603,27P ± 5%,50V,C0G,Rohs	C25, C36	2
180	112-063334-R01	Chip capacitor / 0603,0.33uF ± 10%,50V,X7R,Rohs	C163	1
181	112-063390-R01	Chip capacitor / 0603,39P ± 5%,50V,C0G,Rohs	C291, C295	2
182	112-0633R0-R01	Chip capacitor / 0603,3P ± 0.25P,50V,C0G,Rohs	C139	1
183	112-063471-R01	Chip capacitor / 0603,470P ± 10%,50V,X7R,Rohs	C171	1
184	112-0634R0-R01	Chip capacitor / 0603,4P ± 0.25P,50V,C0G,Rohs	C24, C41, C138	3
185	112-0635R0-R01	Chip capacitor / 0603,5P ± 0.25P,50V,C0G,Rohs	C14, C42	2
186	112-063680-R01	Chip capacitor / 0603,68P ± 5%,50V,C0G,Rohs	C26	1
187	112-0636R0-R01	Chip capacitor / 0603,6P ± 0.5P,50V,C0G,Rohs	C148	1
188	112-0637R0-R01	Chip capacitor / 0603,7P ± 0.5P,50V,C0G,Rohs	C3	1
189	112-0638R0-R01	Chip capacitor / 0603,8P ± 0.5P,50V,C0G,Rohs	C149	1
190	112-0639R0-R01	Chip capacitor / 0603,9P ± 0.5P,50V,C0G,Rohs	C39, C147	2
191	112-063R50-R01	Chip capacitor / 0603,0.5P ± 0.1P,50V,C0G,Rohs	C107	1
192	112-072105-R01	Chip Ta capacitor / TP Model,SIZE P,1uF ± 20%,10V,Rohs	C229, C236, C322, C355	4
193	112-072475-R01	Chip Ta capacitor / TPModel,SIZE P,4.7uF ± 20%,10V,Rohs	C20, C89, C93, C120, C122, C130, C173, C197, C208, C225, C261, C262, C273, C278, C284, C305, C307, C308, C317, C336, C344, C361	22
194	112-073474-R01	Chip capacitor / 0805,0.47uF +80%--20%,16V,Y5V,Rohs	C172	1
195	112-102104-R01	Chip Ta capacitor / TSMModel,SIZE A,0.1uF ± 20%,35V,Rohs	C102	1
196	112-102105-R02	Chip Ta capacitor / TSMModel,SIZE A,1uF ± 20%,10V,Rohs	C118	1
197	112-102106-R02	Chip Ta capacitor / TSMModel,SIZE A,10uF ± 20%,10V,Rohs	C227	1
198	112-102156-R01	Chip Ta capacitor / TSMModel,SIZE A,15uF ± 20%,6.3V,Rohs	C141	1
199	112-102334-R01	Chip Ta capacitor / TSMModel,SIZE A,0.33uF ± 20%,35V,Rohs	C96	1
200	112-102335-R02	Chip Ta capacitor / TSMModel,SIZE A,3.3uF ± 20%,10V,Rohs	C112	1
201	113-010100-R01	Chip trimming capacitor / TZV2Z100A110,3~10p+100,Rohs	C52, C117	2
202	114-06E180-R01	Chip wire inductor / C1608CB-18NJ,ceramic core18NH ± 5%,0603,Rohs	L24	1
203	114-06G101-R03	Chip inductor / MLG1608BR10J,100nH ± 5%,0603,Rohs	L23, L35, L44, L45	4
204	114-06G181-R01	Chip inductor / LGHK1608R18J-T,180nH ± 5%,0603,Rohs	L7	1
205	114-06G221-R02	Chip inductor / LGHK1608R22J-T,220nH ± 5%,0603,Rohs	L20, L25, L31, L38	4
206	114-06G270-R01	Chip inductor / MLG1608B27NJ,27nH ± 5%,0603,Rohs	L11, L16	2
207	114-06G330-R01	Chip inductor / MLG1608B33NJT,33nH ± 5%,0603,Rohs	L21, L39	2
208	114-06G332-R01	Chip inductor / MLF1608A3R3K,3.3uH ± 5%,0603,Rohs	L10, L37	2

No	Material Serial No	Component Name/Specification		QTY.
209	114-06G390-R01	Chip inductor / MLG1608B39NJ,39nH±5%,0603,Rohs	L17	1
210	114-06G470-R01	Chip inductor / MLG1608B47NJ,47nH±5%,0603,Rohs	L40, L43	2
211	114-06G472-R01	Chip inductor / MLF1608A4R7K,4.7uH±5%,0603,Rohs	L42	1
212	114-06G820-R01	Chip inductor / MLG1608B82N,82nH±5%,0603,Rohs	L15	1
213	114-06GR15-R01	Chip inductor / MLG1608BR15J,150nH±5%,0603,Rohs	L19, L47	2
214	114-07E220-R01	Chip wire inductor / C2012C-22NJ,22nH±5%,0805,Rohs	L36	1
215	114-07E221-R01	Chip wire inductor / LQW2BHNR22NJ03L / LQN21AR22J, 220nH±5%,0805,Rohs	L14	1
216	114-07E390-R01	Chip wire inductor / C2012C-39NJ,39nH±5%,0805,Rohs	L8	1
217	114-07E470-R01	Chip wire inductor / C2012C-47NJ,47nH±5%,0805,Rohs	L22, L57	2
218	114-07E560-R02	Chip wire inductor / C2012C-56NJ,56nH±5%,0805,Rohs	L53, L55, L58	3
219	114-08E331-R01	Chip inductor / FSLM2520-R33K,330nH±10%,1008,Rohs	L50	1
220	114-08E821-R01	Chip inductor / FSLM2520-R82K,820nH±10%,1008,Rohs	L51	1
221	115-1R04R0-R02	Chip air-cored coil / 0.3*1.0*4TR,positive, high pin,Rohs	L2	1
222	115-1R07R0-R01	Chip air-cored coil / 0.3*1.0*7TR,positive, high pin,Rohs	L4	1
223	115-1R08R0-R01	Chip air-cored coil / 0.3*1.0*8TR,positive, high pin,Rohs	L12	1
224	115-1R23R0-R01	Chip air-cored coil / 0.4*1.2*3TR,positive, high pin,Rohs	L1	1
225	115-1R25R0-R01	Chip air-cored coil / 0.3*1.2*5TR,positive, high pin,Rohs	L3	1
226	115-1R57R0-R01	Chip air-cored coil / 0.4*1.5*7TR,positive, high pin,Rohs	L5, L6	2
227	115-1R58R0-R03	Chip air-cored coil / 0.4*1.5*8TR,positive, high pin,Rohs	L18	1
228	117-000000-R05	Chip bead / EMI,FILTER, SMT,BLM21P300S,0805,Rohs	L27, L28, L32, L65, R143	5
229	117-000000-R08	Chip bead / EMI,FILTER, SMT,BLM11A601S,0603,Rohs	L9, L26, L29, L30, L33, L34, L41, L49, L59, L60, L61, L62, L63, L64, L66, L68, L69, L70, L71, L72, L73, L74, L75, L76, L79, L67	26
230	119-060104-R01	Thermistor / NTH5G16P42B104K07TH,100K,0603,Rohs	TH188	1
231	122-112M80-R01	Chip transistor / NT5032SC,12.8±2.5PPM,5.0*3.2*1.6mm,Rohs	X1	1
232	122-13M580-R01	Chip crystal resonator/ ZTACC3.58MG,Rohs	X4	1
233	122-13M686-R01	Chip crystal resonator/ 3.6864MHZ,Rohs	X3	1
234	122-19M830-R01	Chip crystal resonator / 9.8304MHZ-NX5032GA,Rohs	X2	1
235	124-020000-R15	Chip connector / BL112-38RU,38PIN, Rohs	CN3	1
236	124-030000-R01	Chip connector / 532680670,6PIN,Rohs	CN2	1
237	124-050000-R13	2.5mm Earphone connector / MOTOROLA Model,Rohs	J1	1
238	124-050000-R14	3.5mm mic connector / MOTOROLA Model,Rohs	J2	1
239	204-006500-R04A	PT6500 Volume switch cushion / PVC,white,thickness 0.3mm,Rohs		1

**Appendix 4: Electronic Component List(400-470MHz)**

No	Material Serial No	Component Name/Specification	位号	QTY.
1				1
2	101-06500U-R04	PT6500PCB / PT6500U-070928.PCB		1
3	102-24C256-R02	Memory IC / 24LC256I/SN	IC8	1
4	102-9140NR-R01	Reset IC / PST9140NR	IC11	1
5	102-A31136-R01	IF (MF) modulation IC / TA31136FN,SSOP	IC4	1
6	102-AK2346-R01	IC / AK2346	IC6	1
7	102-B502MR-R01	Voltage regulator IC / XC6204B502MR	Q40, Q45	2
8	102-C75W51-R01	Operational amplifier / TC75W51FU,SSOP8-P-0.65	IC1, IC14	2
9	102-DA8541-R01	AUDIO,AMP / TDA8541,S08	IC9	1
10	102-DF4111-R01	PLL IC / ADF4111,TSSOP	IC2	1
11	102-FP3502-R01	Voltage regulator IC / XC62FP3502PR,SOT-89	IC16	1
12	102-HT9172-R01	DTMF decode IC / HT9172,SOP	IC10	1
13	102-M2902V-R01	Operational amplifier / NJM2902V,OP-AMP	IC5	1
14	102-M2904V-R01	Operational amplifier / NJM2904V,OP-AMP	IC3	1
15	102-M3062L-R01	CPU / M16C-M3062LFGPGP,FLASH,100P6Q-A	IC7	1
16	103-0MA742-R01	Chip variable capacitor diode / MA742(PANASONIC)	D22, D35, D36, D37	4
17	103-1SR154-R01	Chip diode / 1SR154-400(ROHM)	D33	1
18	103-1SV278-R01	Chip variable capacitor diode / 1SV278	D9	1



No	Material Serial No	Component Name/Specification	位号	QTY.
19	103-A2S111-R01	Chip switch diode / 0603,MA2S111(PANASONIC)	D10, D16, D20, D38	4
20	103-DAN222-R01	Chip switch diode / DAN222,(ROHM)	D18, D19	2
21	103-HSC277-R01	Chip diode / Waveband switch,HSC277(HITACHI)	D3, D7, D17	3
22	103-HVC131-R01	Chip HF switch diode / 0603,HVC131(HITACHI)	D1, D39	2
23	103-HVC355-R02	Chip variable capacitor diode/0603,HVC355B(HITACHI)	D21, D23	2
24	103-HVC376-R01	Chip variable capacitor diode / HVC376B	D2, D4, D5, D6, D11, D12, D13, D14, D27, D28, D29, D30, D40	13
25	103-HZU5AL-R01	Chip regulator diode / HZU5ALL(HITACHI)	D15	1
26	103-L190YG-R01	Chip LBD / 0603,green,H19-213SYGC	D26, D31	2
27	103-MHC190-R02	Chip LBD / 0603,red,19-21SURC/S530-A2/TR8	D25	1
28	104-A123JE-R01	Chip triode / DTA123JE(ROHM)	Q26, Q44	2
29	104-A143TE-R01	Chip triode / DTA143TE	Q7, Q9	2
30	104-A144EE-R01	Chip triode / DTA144EE(ROHM)	Q12, Q25, Q36, Q50	4
31	104-C144EE-R01	Chip triode / DTC144EE(ROHM)	Q13, Q16, Q22, Q23, Q24, Q32, Q35, Q42, Q52	9
32	104-C144EU-R01	Chip triode / DTC144EUA(ROHM)	Q10	1
33	104-SA1586-R01	Chip triode / 2SA1586	Q38, Q47	2
34	104-SC3356-R01	Chip triode / 2SC3356	Q5	1
35	104-SC4116-R01	Chip triode / 2SC4116-GR	Q41	1
36	104-SC4617-R01	Chip triode / 2SC4617(S)(ROHM)	Q14, Q21, Q30, Q31, Q53	5
37	104-SC5108-R01	Chip triode / 2SC5108Y(TOSHIBA)	Q2, Q4, Q8, Q15, Q20, Q49	6
38	105-2SK508-R01	Chip FET (field-effect transistor) / 2SK508NV(K52)	Q6, Q11	2
39	105-3SK318-R01	Chip FET (field-effect transistor) / 3SK318	Q18, Q19	2
40	105-RD01MU-R01	Chip FET (field-effect transistor) / RD01MUS2	Q3	1
41	105-RD07MV-R01	Chip FET (field-effect transistor) / RD07MVS1	Q1	1
42	105-SK1824-R01	Chip FET (field-effect transistor) / 2SK1824	Q29, Q33, Q34, Q37, Q46, Q51, Q54	7
43	105-SK1829-R01	Chip FET (field-effect transistor) / 2SK1829	Q17	1
44	105-ST2301-R01	Chip FET (field-effect transistor) / ST2301	Q39, Q43	2
45	106-LBE010-R01	Chip touch switch / SKRTLBE010	SW3	1
46	106-RY6472-R01	encoder switch / RY-6472	SW2	1
47	108-450C24-R02	Plug-in phase frequency detector / JTBM450CX24	CD1	1
48	108-CF450F-R02	Plug-in porcelain filter/ LTWC450F,450kHz ± 7kHz	CF2	1
49	108-CF450H-R02	Plug-in porcelain filter / LTWC450H,450kHz ± 3kHz	CF1	1
50	108-XF5165-R01	chip IF filter / DSF753SBF,51.65MHz ± 4kHz/3dB,(7.0x5.0x1.3)mm	Xf1	1
51	109-040000-R01	Chip Resistor / 0402,0R ± 5%	C135, C136, C255, C330, R54, R94, R152, R175, R178, R187, R227, R240, R258, R264, R269, R272, R291, R298, R307, R308, R317	21
52	109-040100-R01	Chip Resistor / 0402,10R ± 5%	R2, R47, R49, R69, R77, R267, R290	7
53	109-040101-R01	Chip Resistor / 0402,100R ± 5%	R20, R22, R108, R268	4
54	109-040102-R01	Chip Resistor / 0402,1K ± 5%	R11, R12, R40, R51, R68, R76, R118, R129, R130, R131, R148, R154, R160, R162, R163, R164, R165, R167, R192, R198, R217, R221, R225, R226, R238, R241, R245, R277, R289, R294, R297, R299, R301, R310, R316, R318, R320, R321, R322, R323, R324, R325, R326, R327, R328, R329, R330, R331, R332, R333	50
55	109-040103-R01	Chip Resistor / 0402,10K ± 5%	R21, R59, R126, R139, R144, R172, R199, R211, R266, R284, R287, R288	12
56	109-040104-R01	Chip Resistor / 0402,100K ± 5%	R186, R213, R279, R300, R304	5
57	109-040105-R01	Chip Resistor / 0402,1M ± 5%	R8, R60, R109, R113, R114, R115, R116, R120, R127, R234, R237, R243, R270	13
58	109-040123-R01	Chip Resistor / 0402,12K ± 5%	R140, R191, R209, R231	4
59	109-040124-R01	Chip Resistor / 0402,120K ± 5%	R193, R204	2
60	109-040151-R01	Chip Resistor / 0402,150R ± 5%	R100	1
61	109-040152-R01	Chip Resistor / 0402,1.5K ± 5%	R13, R28, R180	3
62	109-040153-R01	Chip Resistor / 0402,15K ± 5%	R50, R233, R281	3
63	109-040154-R01	Chip Resistor / 0402,150K ± 5%	R6, R25, R42, R121, R157, R159, R179, R182, R293	9
64	109-040162-R01	Chip Resistor / 0402,1.6K ± 5%	R135	1
65	109-040181-R01	Chip Resistor / 0402,180R ± 5%	R52	1
66	109-040183-R01	Chip Resistor / 0402,18K ± 5%	R184, R185, R278	3
67	109-040184-R01	Chip Resistor / 0402,180K ± 1%	R174, R194, R196, R210	4

No	Material Serial No	Component Name/Specification	位号	QTY.
68	109-040184-R02	Chip Resitor / 0402,180K ± 5%	R81	1
69	109-040204-R01	Chip Resitor / 0402,200K ± 5%	R61	1
70	109-040220-R01	Chip Resitor / 0402,22R ± 5%	R31, R36, R92, R230	4
71	109-040222-R01	Chip Resitor / 0402,2.2K ± 5%	R189	1
72	109-040223-R01	Chip Resitor / 0402,22K ± 5%	R79, R80, R82, R83, R86, R102, R103, R141, R166, R244, R273, R313	12
73	109-040224-R01	Chip Resitor / 0402,220K ± 5%	R146, R161, R203	3
74	109-040271-R01	Chip Resitor / 0402,270R ± 5%	R19	1
75	109-040272-R01	Chip Resitor / 0402,2.7K ± 5%	R24, R45, R46, R181, R295	5
76	109-040273-R01	Chip Resitor / 0402,27K ± 5%	R101, R125, R147, R153, R195, R275, R280	7
77	109-040274-R01	Chip Resitor / 0402,270K ± 5%	R34, R38	2
78	109-040302-R01	Chip Resitor / 0402,3K ± 5%	R133	1
79	109-040331-R01	Chip Resitor / 0402,330R ± 5%	R14, R107, R119	3
80	109-040332-R01	Chip Resitor / 0402,3.3K ± 5%	R112, R123, R128, R177	4
81	109-040333-R01	Chip Resitor / 0402,33K ± 5%	R171, R215, R247, R248, R311	5
82	109-040334-R01	Chip Resitor / 0402,330K ± 5%	R97, R232, R239	3
83	109-040363-R01	Chip Resitor / 0402,36K ± 5%	R87	1
84	109-040393-R01	Chip Resitor / 0402,39K ± 5%	R35	1
85	109-040471-R01	Chip Resitor / 0402,470R ± 5%	C164, R263	2
86	109-040472-R01	Chip Resitor / 0402,4.7K ± 5%	R4, R16, R37, R48, R62, R73, R74, R75, R89, R134, R136, R137, R145, R173, R176, R197, R207, R216	18
87	109-040473-R01	Chip Resitor / 0402,47K ± 5%	R7, R30, R32, R183, R206, R214, R224, R228, R229, R235, R242, R274, R276, R286, R292	15
88	109-040474-R01	Chip Resitor / 0402,470K ± 5%	R29, R85, R156, R265, R271, R342, R343	7
89	109-040513-R01	Chip Resitor / 0402,51K ± 5%	R151	1
90	109-040560-R01	Chip Resitor / 0402,56R ± 5%	R117	1
91	109-040561-R01	Chip Resitor / 0402,560R ± 5%	R41, R43, R44	3
92	109-040562-R01	Chip Resitor / 0402,5.6K ± 5%	R10, R303	2
93	109-040563-R01	Chip Resitor / 0402,56K ± 5%	R71, R220	2
94	109-040564-R01	Chip Resitor / 0402,560K ± 5%	R88, R218, R219	3
95	109-040682-R01	Chip Resitor / 0402,6.8K ± 5%	R98, R99	2
96	109-040683-R01	Chip Resitor / 0402,68K ± 5%	R246	1
97	109-040753-R01	Chip Resitor / 0402,75K ± 5%	R283	1
98	109-040823-R01	Chip Resitor / 0402,82K ± 5%	R15, R142, R169	3
99	109-040824-R01	Chip Resitor / 0402,820K ± 5%	R285	1
100	109-060000-R01	Chip Resitor / 0603,0R ± 5%	C139, L52, R95, R170, R201, R222, R282, R305, R314	9
101	109-060100-R01	Chip Resitor / 0603,10R ± 5%	L61	1
102	109-060101-R01	Chip Resitor / 0603,100R ± 5%	R39	1
103	109-060102-R01	Chip Resitor / 0603,1K ± 5%	R18	1
104	109-060104-R01	Chip Resitor / 0603,100K ± 5%	R78, R105, R110, R250	4
105	109-060151-R01	Chip Resitor / 0603,150R ± 5%	R9	1
106	109-060154-R02	Chip Resitor / 0603,150K ± 1%	R53, R55, R58, R63, R67, R72	6
107	109-060184-R01	Chip Resitor / 0603,180K ± 5%	R124	1
108	109-060220-R01	Chip Resitor / 0603,22R ± 5%	R27	1
109	109-060221-R01	Chip Resitor / 0603,220R ± 5%	R104	1
110	109-060222-R01	Chip Resitor / 0603,2.2K ± 5%	R1	1
111	109-060273-R01	Chip Resitor / 0603,27K ± 5%	R70	1
112	109-060274-R01	Chip Resitor / 0603,270K ± 5%	R122	1
113	109-060330-R01	Chip Resitor / 0603,33R ± 5%	R33	1
114	109-060471-R01	Chip Resitor / 0603,470R ± 5%	C165	1
115	109-060472-R01	Chip Resitor / 0603,4.7K ± 5%	R138	1
116	109-060560-R01	Chip Resitor / 0603,56R ± 5%	L59	1
117	109-060563-R01	Chip Resitor / 0603,56K ± 5%	R84, R111	2
118	109-060683-R01	Chip Resitor / 0603,68K ± 5%	R106	1
119	109-070000-R01	Chip Resitor / 0805,0R ± 5%	L22, L54	2
120	109-100000-R01	Chip Resitor / 1206,0R ± 5%	C294	1
121	109-100R47-R01	Chip Resitor / 1206,0.47R ± 5%	R57, R65, R66	3
122	110-220103-R01	Volume switch / 10K,RY-6473	SW1	1
123	111-030000-R01	Chip FUSE / 433003,3A/32V,1206	F1	1

No	Material Serial No	Component Name/Specification	位号	QTY.
124	112-043100-R01	Chip Capacitor / 0402,10P ± 0.5P,50V,C0G	C11, C59, C70, C142, C143	5
125	112-043101-R01	Chip Capacitor / 0402,100P ± 5%,50V,C0G	C84, C104, C105, C106, C121, C296	6
126	112-043102-R01	Chip Capacitor / 0402,1000P ± 10%,50V,X7R	C179, C180, C192, C198, C204, C211, C212, C283, C363	9
127	112-043103-R01	Chip Capacitor / 0402,0.01uF ± 10%,50V,X7R	C44, C54, C91, C95, C115, C134, C152, C181, C196, C207, C232, C234, C256, C268, C275, C352, C362, R90	18
128	112-043104-R02	Chip Capacitor / 0402,0.1uF ± 10%,10V,X5R	C33, C167, C83, C99, C114, C151, C166, C177, C178, C199, C209, C216, C231, C233, C248, C251, C257, C274, C276, C280, C285, C293, C303, C310, C319, C326, C328, C331, C351, C359	30
129	112-043105-R01	Chip Capacitor / 0402,1uF ± 10%,6.3V,X5R	C45, C87, C217, C218, C227, C237, C263, C271, C289, C299, C302, C304, C315, C339, C353, C354, C358, C371, C372	19
130	112-043120-R01	Chip Capacitor / 0402,12P ± 5%,50V,C0G	C190, C194, C347	3
131	112-043123-R01	Chip Capacitor/0402,0.012uF ± 10%,50V,X7R	C249	1
132	112-043150-R01	Chip Capacitor / 0402,15P ± 5%,50V,C0G	C22, C108	2
133	112-043151-R01	Chip Capacitor / 0402,150P ± 5%,50V,C0G	C264	1
134	112-043180-R01	Chip Capacitor / 0402,18P ± 5%,50V,C0G	C38, C176	2
135	112-043181-R01	Chip Capacitor / 0402,180P ± 10%,50V,X7R	C215	1
136	112-043182-R01	Chip Capacitor / 0402,1800P ± 10%,50V,X7R	C201, C267	2
137	112-0431R0-R01	Chip Capacitor / 0402,1P ± 0.25P,50V,C0G	C68, C69, C169	3
138	112-0431R5-R01	Chip Capacitor / 0402,1.5P ± 0.25P,50V,C0G	C170	1
139	112-043200-R01	Chip Capacitor / 0402,20P ± 5%,50V,C0G	C250	1
140	112-043220-R01	Chip Capacitor / 0402,22P ± 5%,50V,C0G	C242, C297, C298	3
141	112-043221-R01	Chip Capacitor / 0402,220P ± 5%,50V,C0G	C66, C162, C230, C288, C340, C345, C346, C364, C375, C377, C378, C379	12
142	112-043222-R01	Chip Capacitor / 0402,2200P ± 10%,50V,X7R	C241, C246	2
143	112-043223-R01	Chip Capacitor /0402,0.022uF ± 10%,50V,X7R	C140, C161, C214, C226, C325	5
144	112-043224-R02	Chip Capacitor / 0402,0.22uF ± 10%,16V,X7R	C313	1
145	112-043270-R01	Chip Capacitor / 0402,27P ± 5%,50V,C0G	C260, C342	2
146	112-0432R0-R01	Chip Capacitor / 0402,2P ± 0.25P,50V,C0G	C123	1
147	112-0432R5-R01	Chip Capacitor / 0402,2.5P ± 0.1P,50V,C0G	C334	1
148	112-043300-R01	Chip Capacitor / 0402,30P ± 5%,50V,C0G	C101	1
149	112-043330-R01	Chip Capacitor / 0402,33P ± 5%,50V,C0G	C10, C129, C154, C258	4
150	112-043331-R01	Chip Capacitor / 0402,330P ± 10%,50V,X7R	C144	1
151	112-043332-R01	Chip Capacitor / 0402,3300P ± 10%,50V,X7R	C286	1
152	112-043333-R01	Chip Capacitor /0402,0.033uF ± 10%,16V,X7R	C157, C159, C219, C240, C265	5
153	112-043392-R01	Chip Capacitor / 0402,3900P ± 10%,50V,X7R	C320, C337	2
154	112-043393-R01	Chip Capacitor /0402,0.039uF ± 10%,50V,X7R	C239, C243, C277	3
155	112-0433R0-R01	Chip Capacitor / 0402,3P ± 0.25P,50V,C0G	C48	1
156	112-043470-R01	Chip Capacitor / 0402,47P ± 5%,50V,C0G	C128, C252, C309	3
157	112-043471-R01	Chip Capacitor / 0402,470P ± 10%,50V,X7R	C6, C7, C21, C23, C31, C34, C43, C46, C49, C56, C57, C58, C62, C63, C65, C67, C71, C73, C76, C77, C78, C79, C80, C81, C82, C85, C86, C92, C94, C97, C98, C100, C109, C110, C113, C119, C125, C126, C127, C131, C133, C137, C146, C150, C173, C175, C193, C202, C203, C205, C210, C223, C235, C244, C247, C253, C266, C270, C272, C279, C281, C282, C290, C301, C306, C311, C312, C316, C318, C321, C323, C324, C327, C329, C332, C333, C335, C338, C341, C356, C360, C365, C366, C367, C368, C369, C370, C376	88
158	112-043473-R01	Chip Capacitor/ 0402,0.047uF ± 10%,16V,X7R	C238	1
159	112-0434R0-R01	Chip Capacitor / 0402,4P ± 0.25P,50V,C0G	C186	1
160	112-043561-R01	Chip Capacitor / 0402,560P ± 10%,16V,X7R	C245	1
161	112-0435R0-R01	Chip Capacitor / 0402,5P ± 0.25P,50V,C0G	C74, C75, C254	3
162	112-043682-R01	Chip Capacitor / 0402,6800P ± 10%,16V,X7R	C287	1
163	112-043683-R01	Chip Capacitor / 0402,0.068uF ± 10%,16V,X7R	C158, C220, C269	3
164	112-0437R0-R01	Chip Capacitor / 0402,7P ± 0.5P,50V,C0G	C103, C124	2
165	112-043R50-R01	Chip Capacitor / 0402,0.5P ± 0.1P,50V,C0G	C88	1
166	112-063100-R01	Chip Capacitor / 0603,10P ± 5%,50V,C0G	C191	1
167	112-063101-R01	Chip Capacitor / 0603,100P ± 5%,50V,C0G	C30, C111, C374	3
168	112-063102-R01	Chip Capacitor / 0603,1000P ± 10%,50V,X7R	C12, C13, C132, C160, C183, C184, C200	7
169	112-063103-R01	Chip Capacitor / 0603,0.01uF ± 10%,50V,X7R	R91	1
170	112-063110-R01	Chip Capacitor / 0603,11P ± 5%,50V,C0G	C25, C188	2

No	Material Serial No	Component Name/Specification	位号	QTY.
171	112-063130-R01	Chip Capacitor / 0603,13P±5%,50V,C0G	C29	1
172	112-063150-R01	Chip Capacitor / 0603,15P±5%,50V,C0G	C24, C26	2
173	112-063180-R01	Chip Capacitor / 0603,18P±5%,50V,C0G	C37	1
174	112-0631R0-R01	Chip Capacitor / 0603,1P±0.25P,50V,C0G	C9, C55, C90	3
175	112-0631R5-R01	Chip Capacitor / 0603,1.5P±0.25P,50V,C0G	C2	1
176	112-063220-R01	Chip Capacitor / 0603,22P±5%,50V,C0G	C291, C295	2
177	112-063270-R01	Chip Capacitor / 0603,27P±5%,50V,C0G	C4	1
178	112-0632R0-R01	Chip Capacitor / 0603,2P±0.25P,50V,C0G	C1, C16, C41, C138	4
179	112-063300-R01	Chip Capacitor / 0603,30P±5%,50V,C0G	C8	1
180	112-063330-R01	Chip Capacitor / 0603,33P±5%,50V,C0G	C213	1
181	112-063390-R01	Chip Capacitor / 0603,39P±5%,50V,C0G	C36	1
182	112-0633R0-R01	Chip Capacitor / 0603,3P±0.25P,50V,C0G	C189	1
183	112-0633R5-R01	Chip Capacitor / 0603,3.5P±0.25P,50V,C0G	C3	1
184	112-063471-R01	Chip Capacitor / 0603,470P±10%,50V,X7R	C5, C72, C168, C171, C206	5
185	112-0634R0-R01	Chip Capacitor / 0603,4P±0.25P,50V,C0G	C18, C60	2
186	112-0635R0-R01	Chip Capacitor / 0603,5P±0.25P,50V,C0G	C14, C17, C19, C42, C156, C174	6
187	112-0636R0-R01	Chip Capacitor / 0603,6P±0.5P,50V,C0G	C28, C50	2
188	112-0638R0-R01	Chip Capacitor / 0603,8P±0.5P,50V,C0G	C182	1
189	112-063R50-R01	Chip Capacitor / 0603,0.5P±0.1P,50V,C0G	C40, C107	2
190	112-072105-R01	Chip Ta capacitor / TP model,SIZE P,1uF±20%,10V	C229, C236, C322, C355	4
191	112-072475-R01	Chip Ta capacitor / TP model,SIZE P,4.7uF±20%,10V	C20, C89, C93, C120, C122, C130, C163, C197, C208, C225, C261, C262, C273, C278, C284, C305, C307, C308, C317, C336, C344, C350, C361	23
192	112-073334-R01	Chip Capacitor / 0805,0.33uF+80%--20%,10V,Y5V	C172	1
193	112-102104-R01	Chip Ta capacitor / TS model,SIZE A,0.1uF±20%,35V	C96, C102	2
194	112-102105-R01	Chip Ta capacitor / TS model,SIZE A,1uF±20%,16V	C112, C118	2
195	112-102156-R01	Chip Ta capacitor / TS model,SIZE A,15uF±20%,6.3V	C141	1
196	113-010100-R01	Chip trimming capacitor / TZV2Z100A110,3~10p+100	C52, C117	2
197	114-06E102-R02	Chip inductor / LQG11N1R0K00,1uH,0603(0141-05)	L48	1
198	114-06E180-R01	Chip wire inductor / C1608CB-18NJ,ceramic core 18NH±5%,0603	L24, L39	2
199	114-06E331-R02	Chip inductor / MLF1608R33K,330nH±10%,0603	L50	1
200	114-06E560-R01	Chip wire inductor / C1608CB-56NJ,ceramic core 56nH±5%,0603	L78	1
201	114-06E680-R01	Chip wire inductor / C1608CB-68NJ,ceramic core 68nH±5%,0603	L47, L53	2
202	114-06G101-R03	Chip inductor / MLG1608BR10J,100nH±5%,0603	L35	1
203	114-06G120-R01	Chip inductor / MLG1608B12NJ,12nH±5%,0603	L23	1
204	114-06G180-R01	Chip inductor / MLG1608B18NJ,18nH±5%,0603	L21	1
205	114-06G181-R01	Chip stacked inductor / LGHK1608R18J-T,180nH±5%,0603	L7	1
206	114-06G220-R01	Chip inductor / MLG1608B22NJ,22nH±5%,0603	L15, L17	2
207	114-06G221-R02	Chip stacked inductor / LGHK1608R22J-T,220nH±5%,0603	L20, L25, L31, L38, L46	5
208	114-06G270-R01	Chip inductor / MLG1608B27NJ,27nH±5%,0603	L26	1
209	114-06G332-R01	Chip inductor / MLF1608A3R3K,3.3uH±5%,0603	L10, L37	2
210	114-06G471-R01	Chip inductor / MLF1608DR47K,470nH±10%,0603	L43	1
211	114-06G561-R01	Chip inductor / MLF1608DR56K,560nH±10%,0603	L44	1
212	114-07E220-R01	Chip wire inductor / C2012C-22NJ,22nH±5%,0805	L8	1
213	114-07E221-R01	Chip wire inductor / LQW2BHNR22NJ03L / LQN21AR22J,220nH±5%,0805	L14	1
214	114-07E270-R01	Chip wire inductor / C2012C-27NJ,27nH±5%,0805	L36	1
215	114-08E103-R01	Chip inductor / FSLM2520-100J,10uH±5%,1008	L42	1
216	114-08E821-R01	Chip inductor / FSLM2520-R82K,820nH±10%,1008	L51	1
217	115-1R53R0-R04	Chip air-cored coil / 0.4*1.5*3TL,negative,high pin	L1, L2, L3, L4, L6, L12, L55, L57, L58	9
218	115-1R54R0-R04	Chip air-cored coil / 0.4*1.5*4TL,negative,high pin	L5	1
219	115-1R55R0-R01	Chip air-cored coil / 0.5*1.5*5T,positive,high pin	L19	1
220	115-1R58R0-R02	Chip air-cored coil / 0.4*1.5*8TL,negative,high pin	L18	1
221	117-000000-R04	Chip bead / EMI,FILTER, SMT,BLM11A221S,0603	L9, L29, L30, L33, L34, L41, L49, L60, L62, L63, L64, L66, L68, L69, L70, L71, L72, L73, L74, L75, L76, L79	22
222	117-000000-R05	Chip bead / EMI,FILTER, SMT,BLM21P300S,0805	L27, L28, L32, L65, L67, R143	6
223	119-060104-R01	thermistor / NTH5G16P42B104K07TH,100K,0603	R188	1
224	122-112M80-R01	Chip transistor / NT5032SC,12.8±2.5PPM,5.0*3.2*1.6mm	X1	1

No	Material Serial No	Component Name/Specification	位号	QTY.
225	122-13M580-R01	Chip crystal resonator / ZTACC3.58MG	X4	1
226	122-13M686-R01	Chip crystal resonator / 3.6864MHz	X3	1
227	122-19M830-R01	Chip crystal resonator / 9.8304MHZ-NX5032GA	X2	1
228	124-020000-R15	Chip connector / BL112-38RU,38PIN	CN3	1
229	124-030000-R01	Chip connector / 532680670,6PIN	CN2	1
230	124-050000-R13	2.5mm Earphone socket / MOTOROLA port	J2	1
231	124-050000-R14	3.5mm Mic socket / MOTOROLA port	J1	1
232	203-006500-R05	PT6500Speaker contact spring, / SUS301,wire 0.3mm,gilt	1, 2	2
233	603-0W558A-R01	Voice recorder IC / W588A080,binding	IC13	1
234	101-005582-R03	W588PCB / PT558 Voice recorder IC, binding,W588-051108.PCB,1.0mm		1
235	102-0W558A-R01	Voice recorder IC / W588A080-5750H,unbinding,ROHS		1
236	602-06500K-H01	PT6500KEY BOM / PT6500KEY BOM, ROHS		1
237	101-06500K-R03	PT6500PCB / PT6500KEY-070928.PCB,ROHS		1
238	103-Y2CANQ-R01	Chip LED / 0603,green,19-213/Y2C-ANQB/3T	D2, D3, D4, D5, D6, D7	6
239	104-C144EE-R01	Chip Triode / DTC144EE(ROHM)	Q2	1
240	104-T591TA-R01	Chip FET / FMMT591TA,SOT-23,PNP( ZETEX)	Q1	1
241	109-040000-R01	Chip Resistor / 0402,0R $\pm$ 5%	C41, C42, R4, R27, R29	5
242	109-040101-R01	Chip Resistor / 0402,100R $\pm$ 5%	R17, R18, R19	3
243	109-040102-R01	Chip Resistor / 0402,1K $\pm$ 5%	R9, R10, R11, R12, R13, R14, R15, R16	8
244	109-040182-R01	Chip Resistor / 0402,1.8K $\pm$ 5%	R22	1
245	109-040272-R01	Chip Resistor / 0402,2.7K $\pm$ 5%	R1, R2, R3, R5, R6, R7	6
246	109-040471-R01	Chip Resistor / 0402,470R $\pm$ 5%	R20	1
247	109-060000-R01	Chip Resistor / 0603,0R $\pm$ 5%	R24	1
248	112-042214-R01	Chip Network Capacitor / 220P*4,0402	C6, C7, C11	3
249	112-043102-R01	Chip Capacitor / 0402,1000P $\pm$ 10%,50V,X7R	C12, C14, C18, C19, C21, C22	6
250	112-043103-R01	Chip Capacitor / 0402,0.01uF $\pm$ 10%,50V,X7R	C13, C15	2
251	112-043104-R02	Chip Capacitor / 0402,0.1uF $\pm$ 10%,10V,X5R	C17	1
252	112-043105-R01	Chip Capacitor / 0402,1uF $\pm$ 10%,6.3V,X5R	C20	1
253	112-043221-R01	Chip Capacitor / 0402,220P $\pm$ 5%,50V,C0G	C1, C2, C8, C9, C23, C24, C25, C26, C27, C28, C36, C37	12
254	112-072475-R01	Chip Ta Capacitor / TP,SIZE P4.7uF $\pm$ 20%,10V	C16	1
255	117-000000-R04	Chip bead / EMI,FILTER, SMT,BLM11A221S,0603	L1, L2, L3, L4	4
256	121-200000-R01	Microphone/ B6027AP402-88(:B6027AP402-65),ROHS	MIC1	1
257	124-020000-R11	Chip connector / 10PIN,P1.25-10PIN,ROHS	CN2	1
258	124-020000-R15	Chip connector / BL112-38RU,38PIN,ROHS	CN3	1
259	602-06500P-H01	PT6500PTT BOM / PT6500PTT BOM,ROHS		1
260	101-065002-R02	PT6500PCB / PT6500-PTT-070226.PCB		1
261	109-040203-R01	Chip Resistor / 0402,20K $\pm$ 5%,ROHS	R1	1
262	109-040472-R01	Chip Resistor / 0402,4.7K $\pm$ 5%,ROHS	R2	1
263	124-030000-R02	Chip PTT Connector/ 523650671,6PIN,ROHS	CN1	1

**Appendix 5: Accessory List**










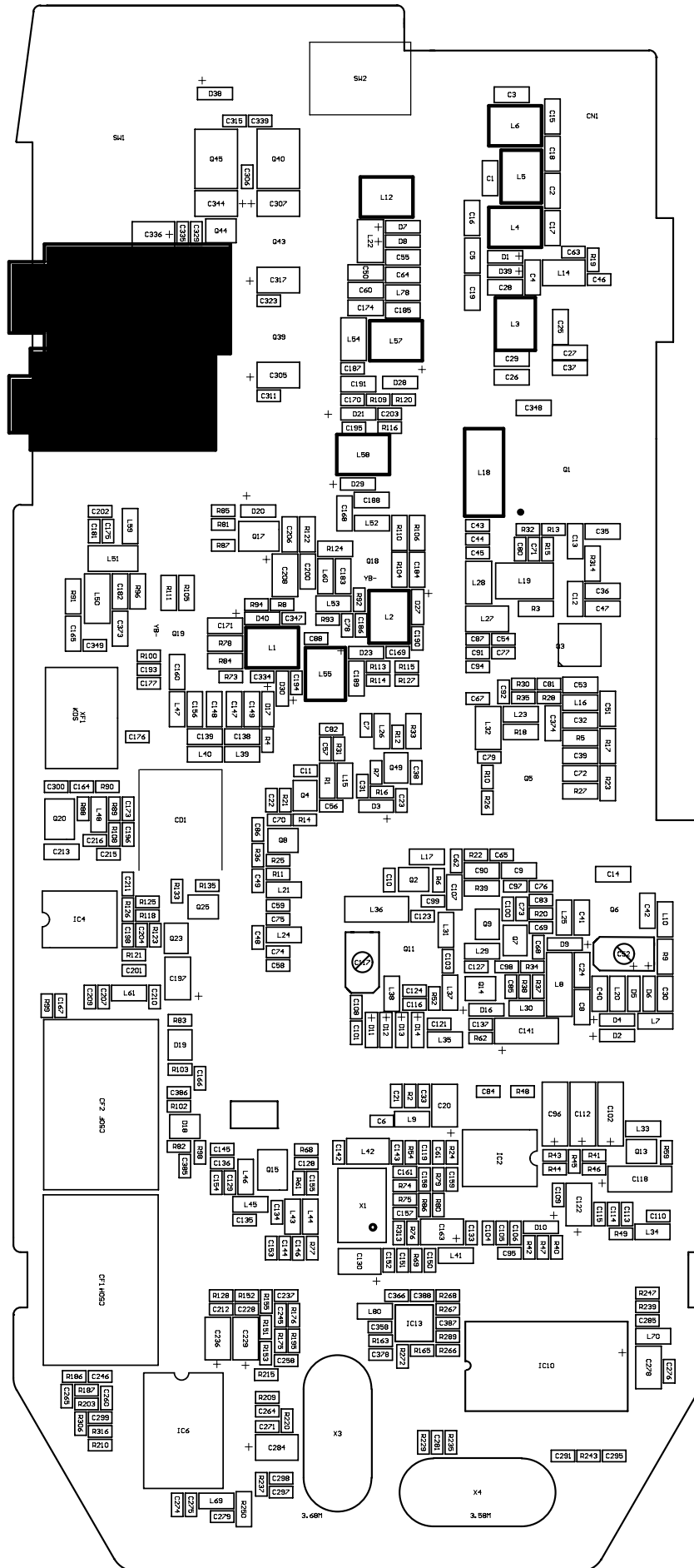
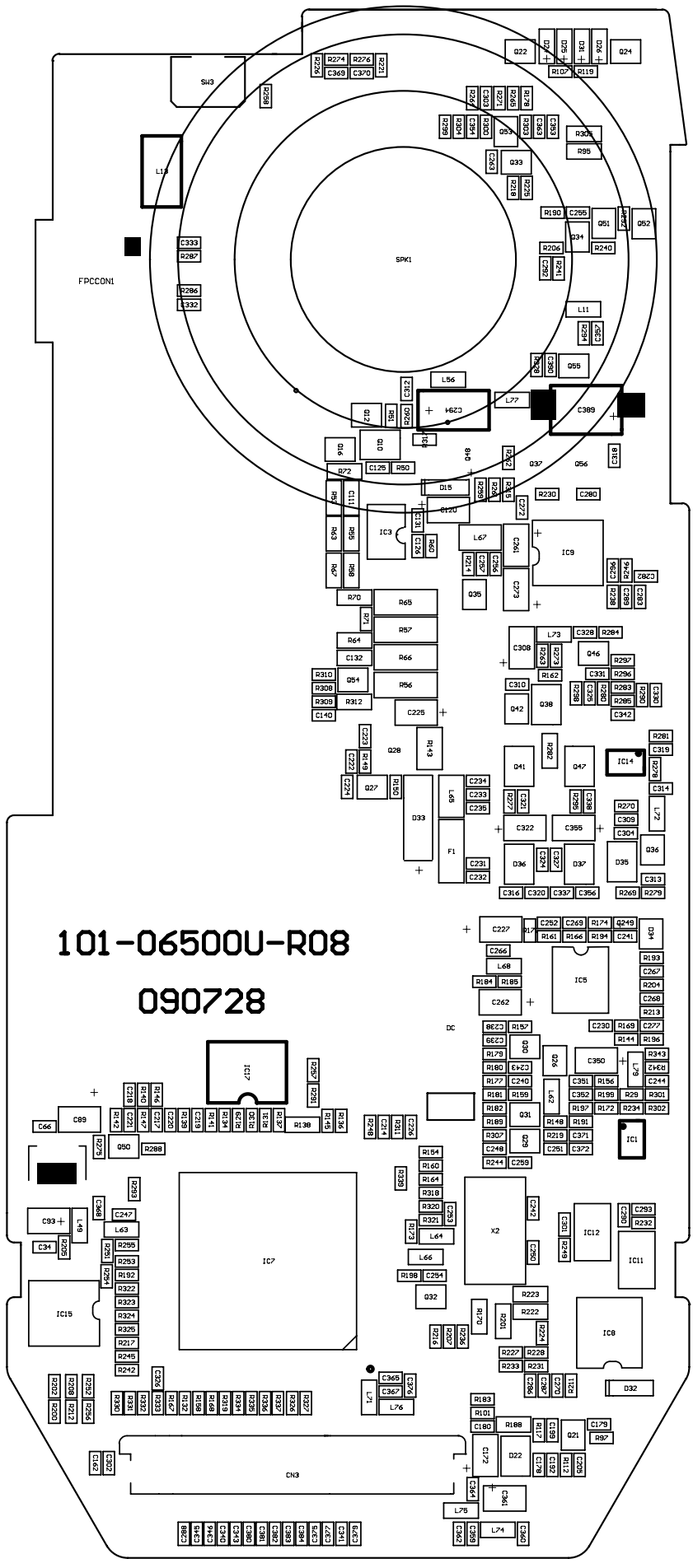
Name	Type	Specification	Accessories
Battery	KB-36C	7.4V 1750mAH Li-Poly battery	
Hanging loop	KGS-03		
Earphone	KME-014		
	KME-015		
	KME-016		
Charger	KBC-36C	7-hour standard charger	
Antenna	long antenna		
	Short antenna		
Belt Clip	KBJ-04		

Figure2 PT6500 Bottom Main Board Position Number Diagram(400-470MHz)





101-06500U-R08  
090728







Figure 5 PT6500 PTT Top Board Position Number Diagram

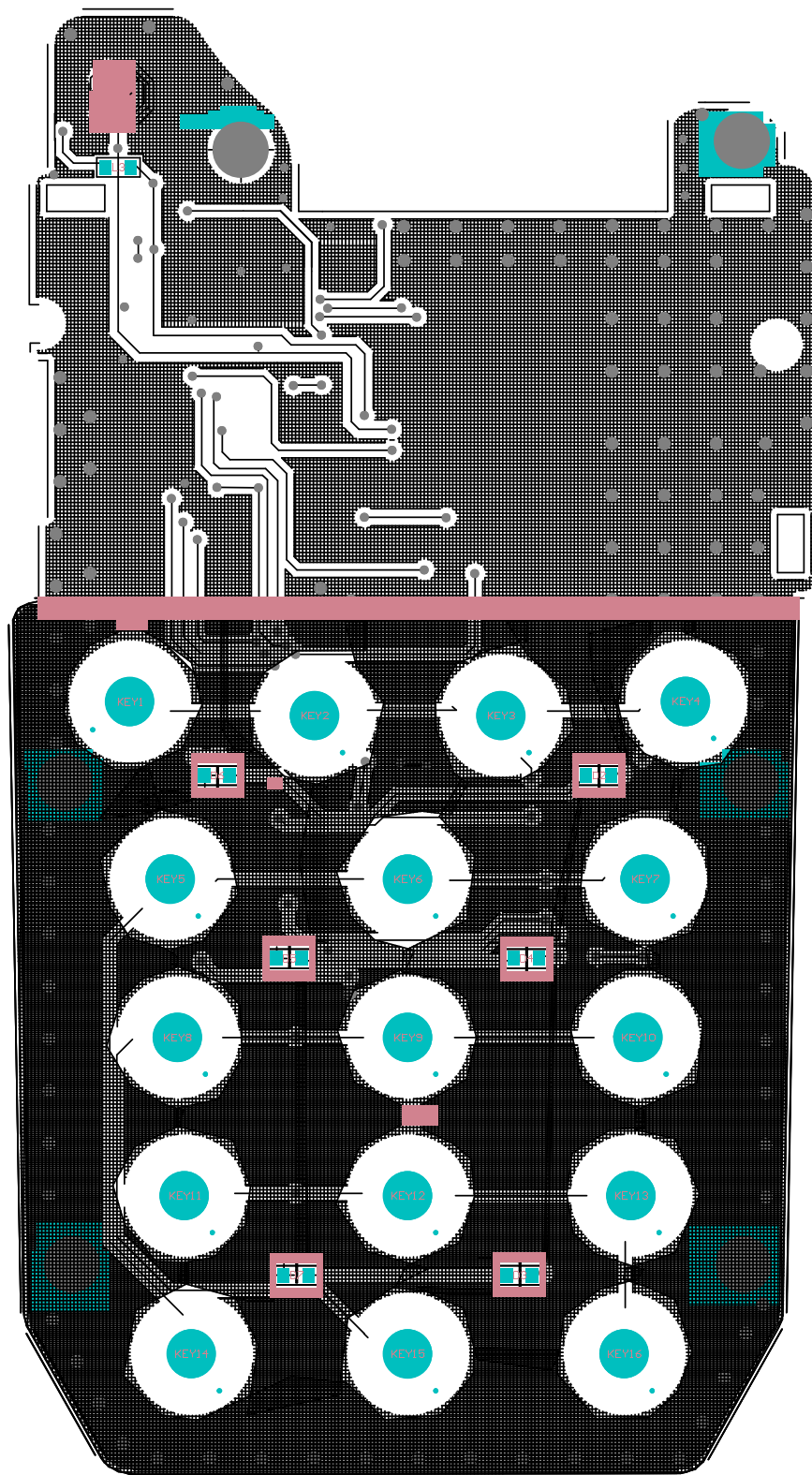


Figure 6 PT6500 PTT BOTTOM Board Position Number Diagram

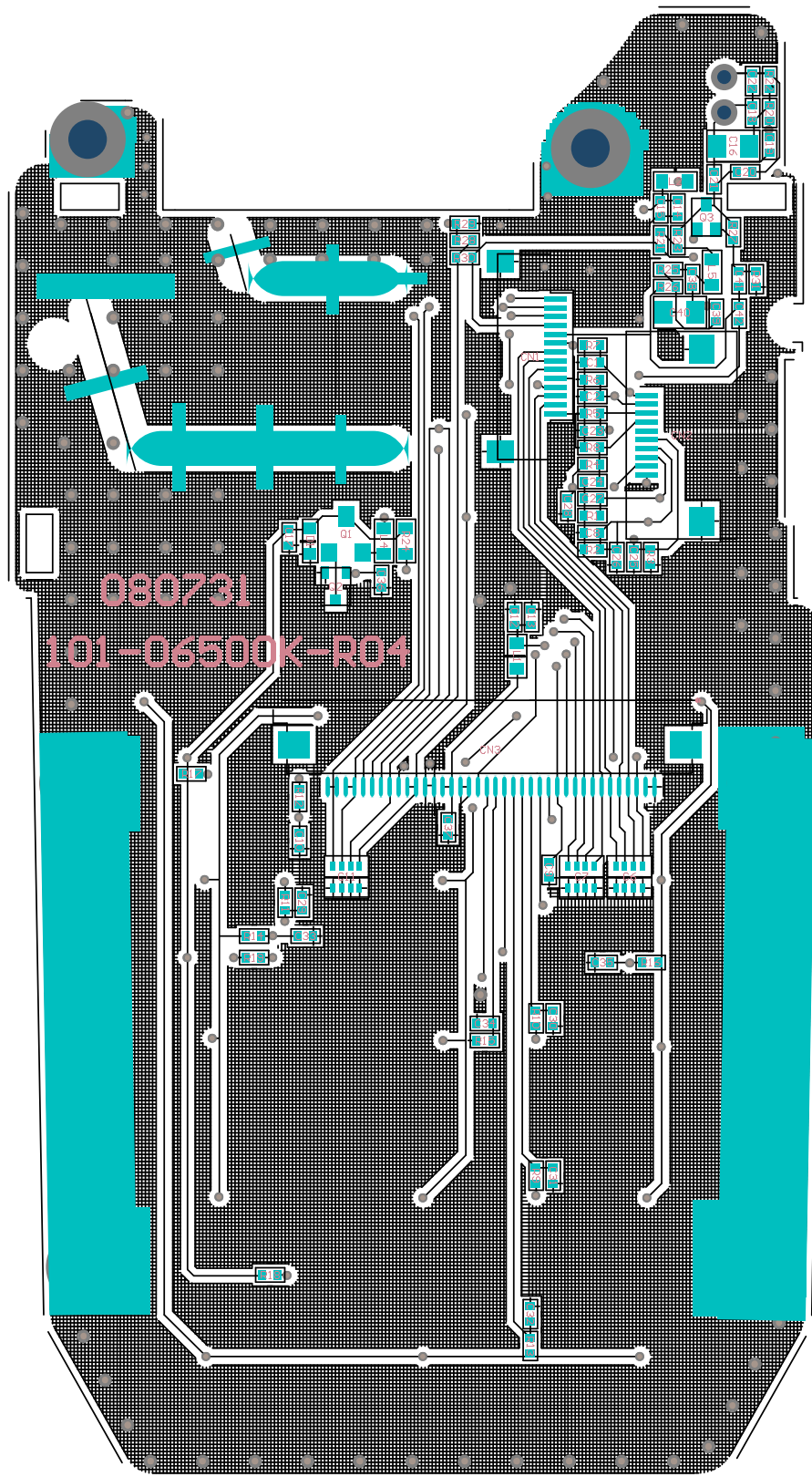


Figure 7 PT6500 Top Keyboard Schematic Circuit Diagram

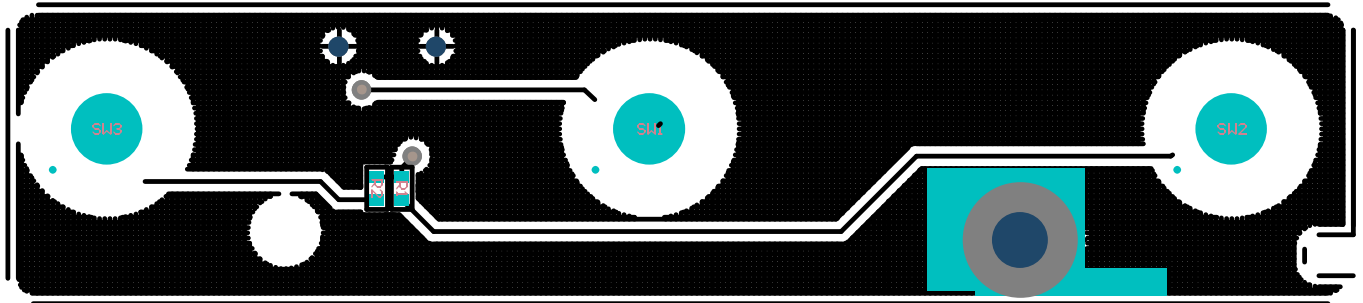


Figure 8 PT6500 Bottom Keyboard Schematic Circuit Diagram

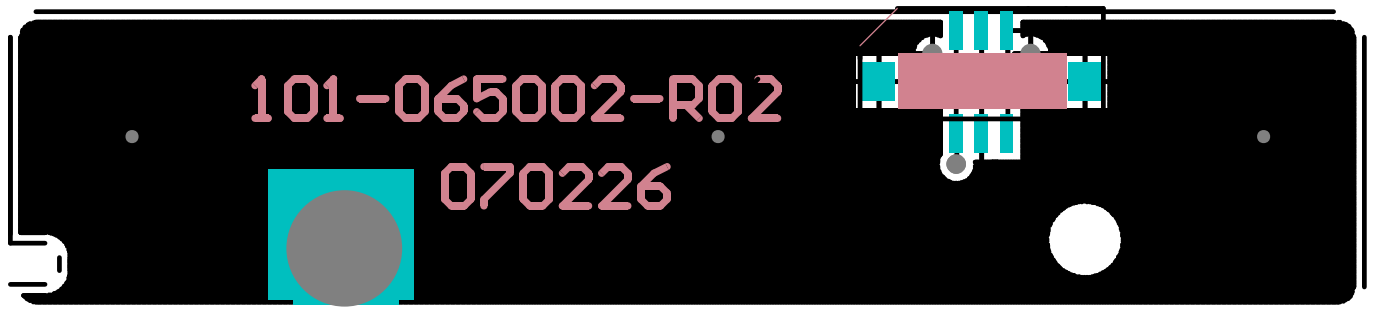


Figure 9 PT6500 Schematic Circuit Pane Diagram(136-174MHz)

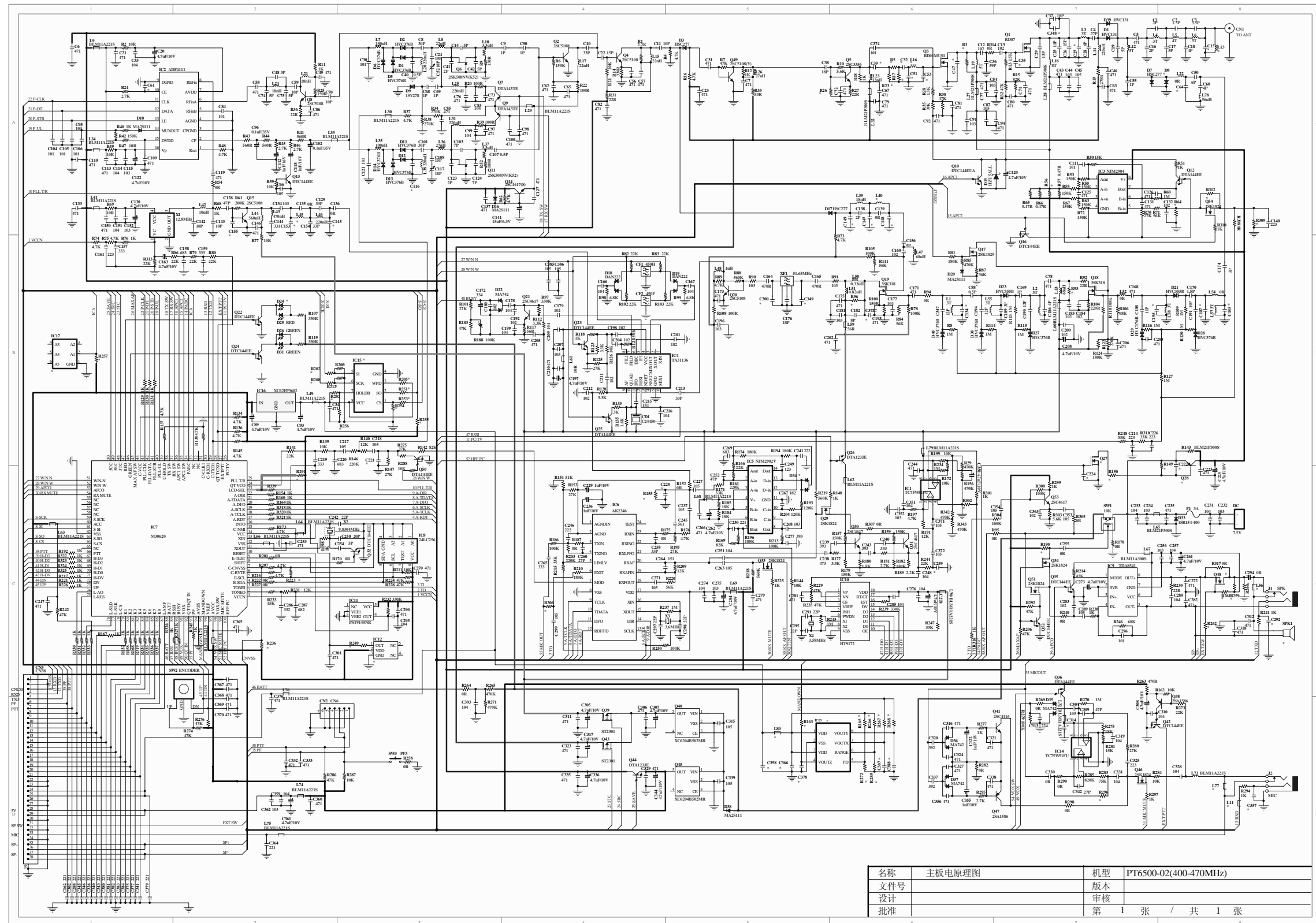




Figure 10 PT6500 Schematic Circuit Pane Diagram(400-470MHz)

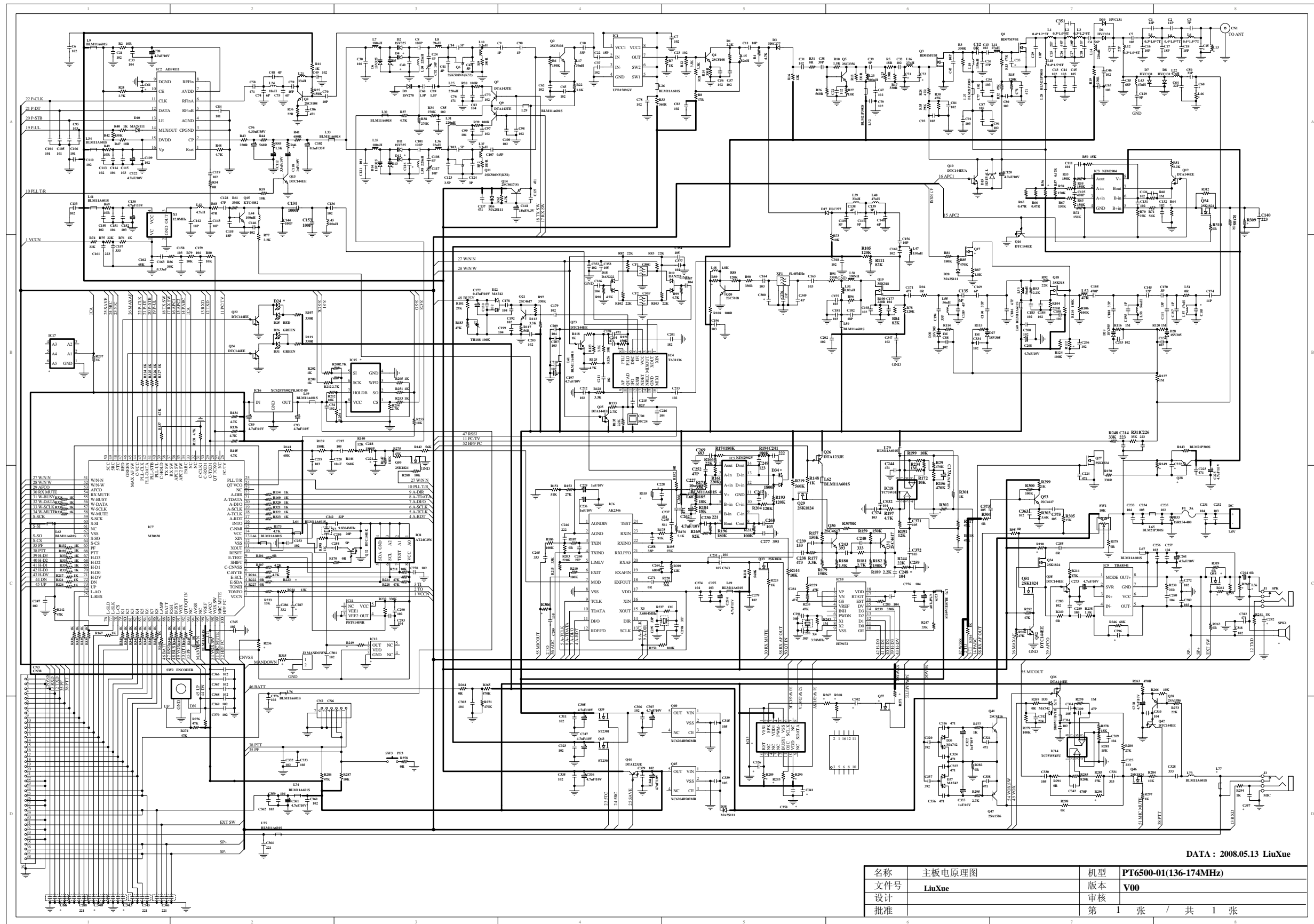
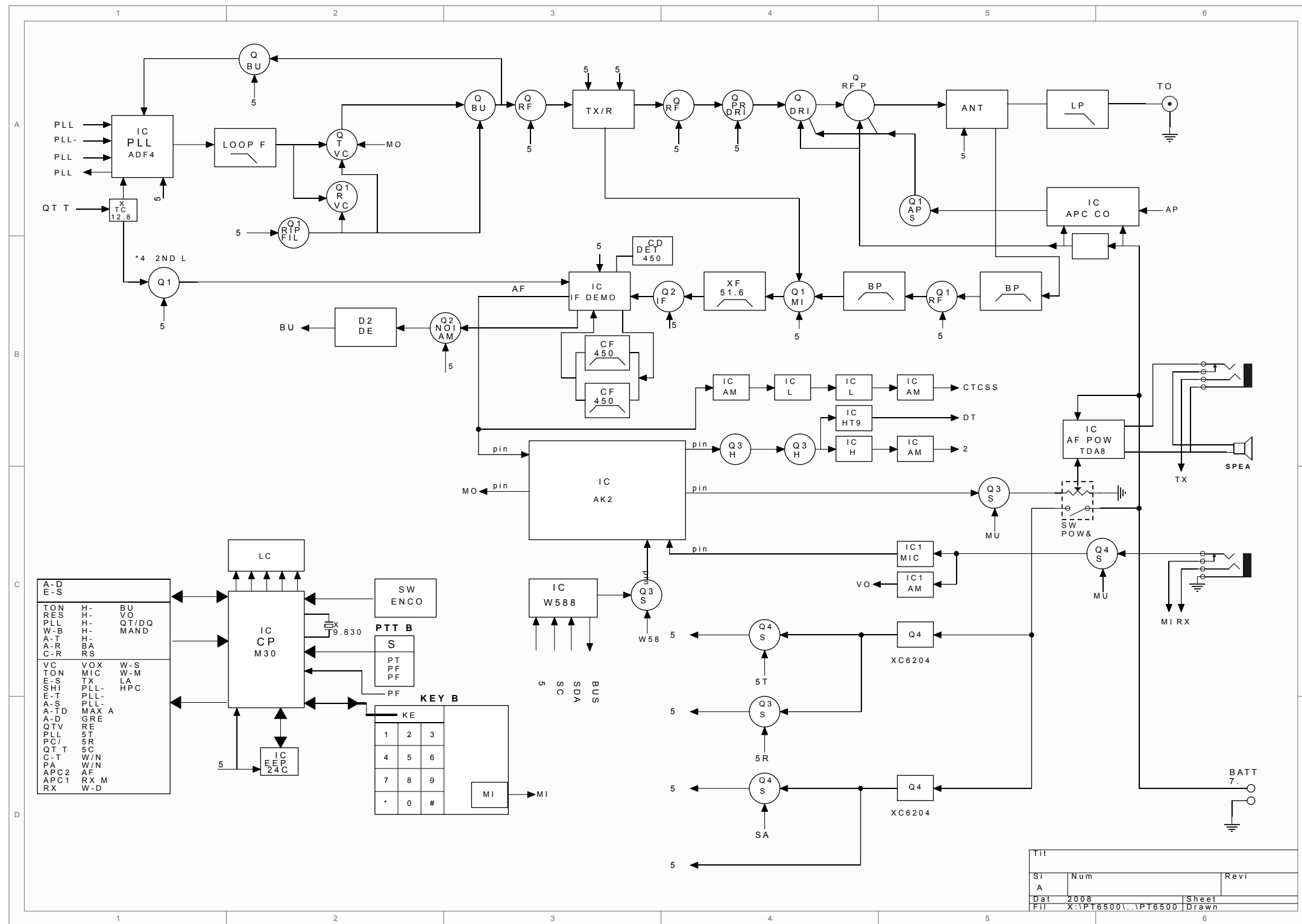


Figure 11 PT6500 Main Board Schematic Circuit Diagram



Tit		
Si	Num	Revi
A		
Dat	2008	Sheet
File	X:\PT6500\...\PT6500	Drawn

Figure 12 PT6500 Keyboard Schematic Circuit Diagram

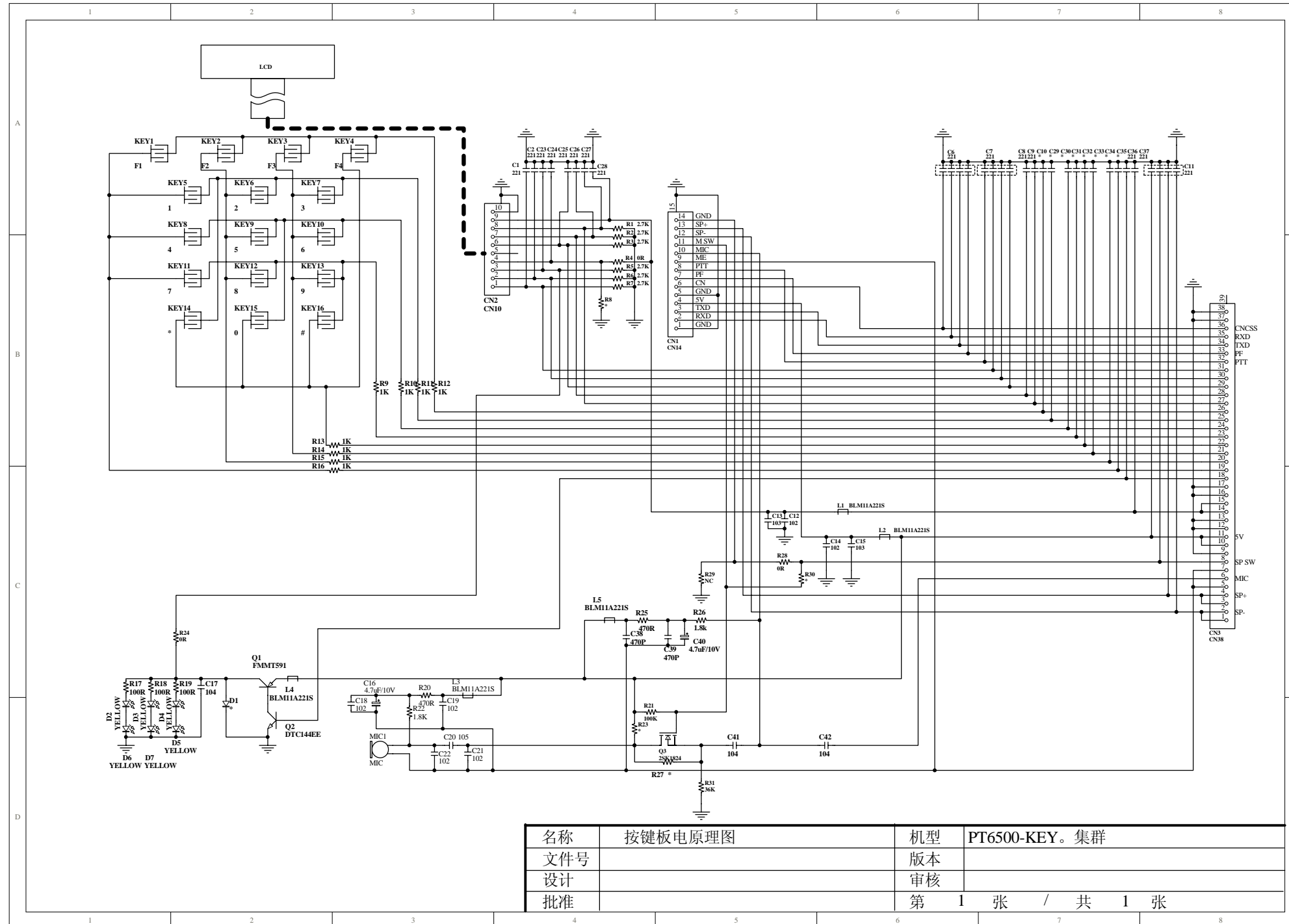


Figure 13 PT6500 PTT Board Schematic Circuit Diagram

