KIRISUN

PROFESSIONAL
TWO-WAY RADIO

PT4200

FM PORTABLE RADIO
SERVICE MANUAL

DANGEROUS!

Do not connect the AC power or DC power over 8.6V with any connector or terminals of the radio. Otherwise it will cause fire or 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 avoid putting it in rain or snow, or any other liquid to ensure its life and performance.

STATEMENT

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Chapter 1 Introduction

1.1 Introduction

This manual applies to the service and maintenance of PT4200 series of FM mobile 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 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.

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 lightly burning on the skin.

Repairing service can only conducted by professional technicians.

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.

Any area of dynamite or exploder.

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.

Component Application

Model	Component	No .	Model/ Specifications	Material Serial No .	Quantity
PT4200-2	FET	Q11	RD07MVS1	105-RD07MV-001	1
PT4200-2	Triode	Q5	2SC5108（Y）	104-SC5108-001	1
PT4200-2	Belt Clip		KBJ-05		1

1.3 Service

All the Kirisun products are subject to the service warranty.

The main unit of the radio is guaranteed for service of 18 months. In one of the following situations, charge free service will not 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 sabotage 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.

Chapter 2 Radio Overview and Function Keys

2.1 Radio Overview
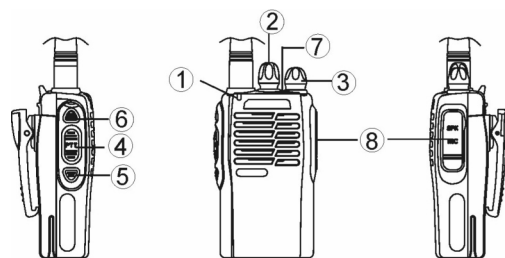
① LED Indicator

Lights red while transmitting; lights green while receiving a signal.

Flashes red while in low battery power.

② Channel Selector

Rotate to select channel 1-16.

③ Power/Volume Switch

Turn clockwise to switch on the radio.

Turn counterclockwise till a click is heard to switch off the radio.

Rotate it to adjust the volume after turning on the radio.

④ PTT (Push-to-talk)

To make a call, press and hold the PTT button, then speak into the microphone in normal voice.

Release the PTT button to receive a call.

⑤ Monitor Button

Press to disable the SQUELCH, and release to enable the SQUELCH again.

⑥ Channel Annunciation Button

Press it in standby state, and the channel number will be annunciated. If press and hold this button, and at the same time switch on the radio again, the type of voice annunciation of channel number will be changed.

⑦ Emergency Button

Press and hold this button for over 2 seconds to activate warning tone. Press it again to exit the emergency alert state.

Note: When warning tone sounds, all of the buttons are disabled.

⑧ Microphone/Speaker Jacks

For connecting external Microphone/Speaker.

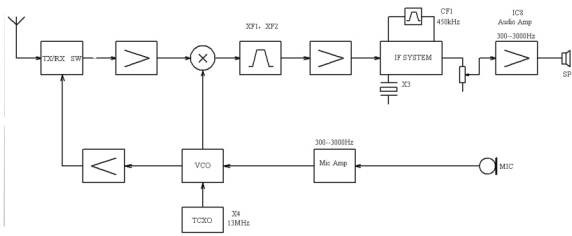## Chapter 3 Electrocircuit

3.1 Frequency Configuration

Figure3.1 Frequency Configuration

This radio adopts the 2nd Mixer, the 1st IF 49.95MHz, the 2nd IF 450kHz.

The receiver's first local oscillation is generated by the frequency synthesizer. The second local oscillation is generated by the crystal oscillator.

The transmitter signals are generated by frequency synthesizer.

The reference frequency of frequency synthesizer is generated by TCXO.
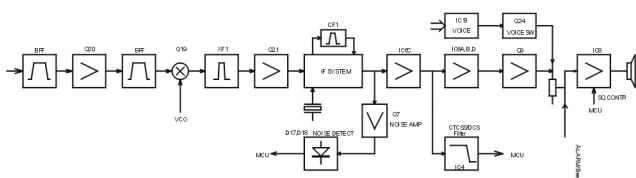
3.3 Receiver (RX)

Figure 3.2 Receiver Illustration

The Receiver Front Terminal

Signals from the antenna pass through the RX/TX switch (D1, D2, D4, D5); and then undesirable out-of-band signals will be filtered out at the band pass filter (BPF) consisting of C227, L8, L15, C70, C126, C218, L9, C217, L10, C127; then signals are amplified at the low noise amplifier (LNA) consisting of Q20 and its peripheral components.

The output from the LNA passes the BPF consisting of L5, L6, L7, C228, C124, and C132 for filtering and then is sent to the first grade frequency mixer (Q19).

MCU produces output voltages and alters the capacitance of the variable capacitor diodes D21, D22, D23, D24, D26, D30 to control the center frequency of the band-pass filter.

The First Frequency Mixer

After mixing the receiving signals and the first local oscillation signals from the frequency synthesizer, the 1st IF signals（49.95MHz）are generated. The first IF signals pass the crystal filter (XF1, XF2) , which will filter the signals of adjacent channel and those out of band.

IF Circuit

The 1st IF signals from the crystal filter are amplified at the first IF amplifier (Q21), and then are sent to the IF processing IC (IC5, MC3361). The IF IC consists of the 2nd frequency mixer, the 2nd local oscillator, IF amplifier, limiter, phase frequency detector, and noise amplifier.

IC5 inner circuit and X3 (49.5MHz) compose the 2nd local oscillator. The 2nd local oscillation (49.5MHz) and the 1st IF signal (49.95MHz) are mixed at IC5 to generate the 2nd IF（450MHz）.

After the 2nd IF signal is amplified and its amplitude is limited at IC5, and then filtered at porcelain filter (CF1,450kHz), IC5 demodulates and sends out audio signals.
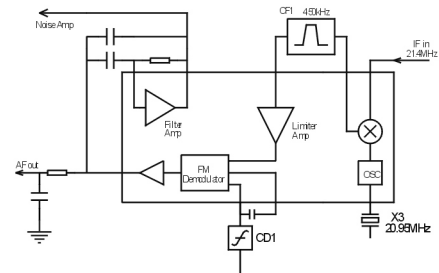
Figure 3.3IF System

Receiver Audio Signal Processing

IC6 and its peripheral circuit compose the receiver audio signal processing circuit. IC5 sends audio signals to IC6-C for amplification, and then to IC4 (CTCSS signaling filtering circuit) and IC6-D. After the signals are amplified, de-emphasized, filtered at IC6 and other cells, the HF (high frequency) and LF (low frequency) will be eliminated, and the remaining 300-3000Hz audio is sent to Q9 for amplification and then to volume potentiometer for adjustment and finally sent to the audio amplifier (Ic8).
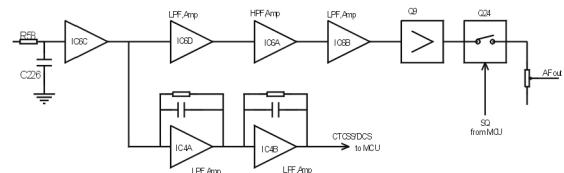
Figure 3.4 Receiver Audio Processing

Squelch Circuit

Demodulation output from IC5 is sent to the selection frequency noise amplifier, which consists of IC5 inner noise amplifier and C107, R124, R152, C33, and C35, to be filtered off the noise. After being amplified at Q7, noise is sent to D17 and D18 for wave checking and then sent to MCU, which determines the noise volume to control the squelch.

Audio Amplifier

IC8 and peripheral components construct the audio amplifier.

Receiving audio signals, voice indication signals, indication tone signals and warning tone signals are collected for audio amplification to drive the speaker. Warning tone has no volume control.

When AFCO is at the high level, Q37, Q8, Q33, and Q38 will be connected, and IC8 starts working and voice comes out from the speaker.

Q36: Receiving audio signal switch

Q35: Warning tone switch

Q25: Indication tone switch

CTCSS Signal Filtering

The IC5 demodulated output audio signals may contain CTCSS (continuous tone coded squelch system) and DCS (digital coded squelch). The frequency spectrum of CTCSS/DCS is 2-250Hz. The filtering circuit constructed by IC4 can filter out the signals out of the CTCSS/DCS frequency spectrum to ensure MCU to decode CTCSS/DCS more precisely.

3.2 Transmitter (TX)

Transmitter Amplifier

Figure 3.5 Amplifier and Antenna Switch Diagram

The modulated signals from VCO are amplified at Q2, Q3, and Q12 and then are sent to Q11 for amplification. Q11 output power: 4.5W.

The Q11 and Q12 gate offset is controlled by APC circuit. Changing gate-offset voltage can control the transmitter output power conveniently.

APC (Auto Power Control)

Figure 3.6 APC Circuit

R167, R168, and R169 are the amplifier current checker; IC3A is the sample amplifier of the amplification current; IC3B is the power comparison amplifier.
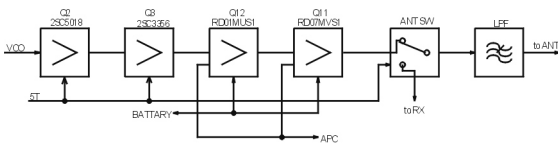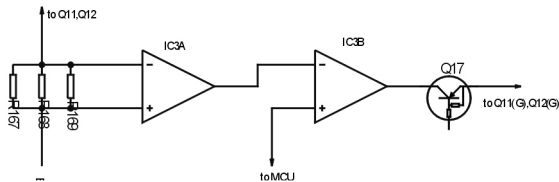
If the transmitter output power is too big, the amplifier current will increase, IC3A output will mount, IC3B output voltage decrease, the offset voltage added to Q11 and Q12 will decrease, and then the transmitter output power will decrease. Vice versa, such can ensure steady transmitter output power in different working circumstances.

MCU changes the input power to IC3B to set the power.

Transmitter Audio Signal Processing
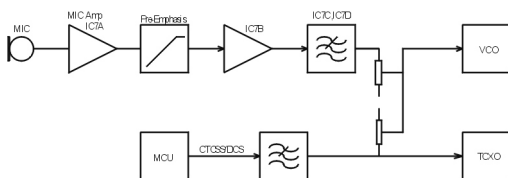
Figure 3.7 Transmitter Audio Circuit

IC7 and the peripherals components construct the transmitter audio processing circuit. After the audio signals from MIC are amplified, the amplitude of them is limited, and are filtered, they are sent to VCO together with CTCSS/DCS for modulation.

D13, D308, and Q24 constitute AGC circuit which decreases signal amplitude to avoid signal distortion when MIC signal is too big.

Q34 is the power switch of audio processing circuit. It supplies power to IC7 only when in transmitting and it is controlled by MCU.

J2 is the external MIC socket. When external MIC is used, the inner MIC will cut off automatically, but PTT will remain activated.

3.3 Frequency Synthesizer
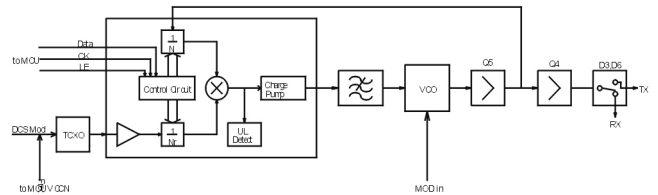
Figure 3.8 Frequency Synthesizer

The radio adopts PLL (Phase Locked Loop) frequency synthesizer.

The frequency synthesizer consists of standard oscillator, voltage controlled oscillator (VCO), programmable frequency demultiplier, phase comparator, and low pass filter.

Q14, L30, C120, C88, C142, C180, D8, and D9 constitute RX VCO. D12 is the modulation circuit of VCO.

ICI (MB15E03) is PLL integrated circuit, including programmable reference frequency demultiplier, programmable swallowing frequency demultiplier, phase comparator, and charge pump.

R244, c193, R202, R40, C207, R141, C205, R2, and C204 construct the low pass filter.

The standard frequency is supplied by X4 (TCXO, 13MHz).

The standard frequency fromTCXO (Temperature Control Transistor Oscillator) are demultiplied by the programmable reference frequency demultiplier at IC1 to acquire 5kHz or 6.25kHz reference frequency (controlled by MCU according to the preset channel frequency).

The oscillation frequency from VCO is sent to IC1, and demultiplied by swallowing frequency demultiplier and compared with reference frequency to acquire the error signals. Then pass the low pass filter and are sent to VCO to change VCO oscillation frequency to the preset value, and then VCO is locked.

N=FVCO/FR

N：Frequency demultiplication times

FVCO：VCO oscillation frequency

FR：Reference frequency

Check Loss of Lock: When PLL is in loss of lock, IC pin14 sends out low level signals to MCU, which controls the transmitter not to transmit and initiate warning tome.

Q6: Power filter to supply more pure power to reduce the noise of the frequency synthesizer.

3.4 Voice Indication Circuit

The radio features voice indication, which is very useful at night or in the environment of dim light.

IC15 is a voice memory chip which stores the voice indication of channels, and every time you change the channel, the speaker will sound voice annunciation of the current channel number. Press voice annunciation key will repeat the voice annunciation of the current channel number.

If the voice annunciation function has been set, press " voice annunciation" key in the stand by mode and the speaker will sound voice annunciation of the current channel number. If turn on the radio again with the "voice annunciation" key pressed, the voice type will be changed. Repeat turning on the radio with the "voice annunciation" key pressed, the voice type will change in the sequence "Chinese Male--- English Male--- Chinese Female --- English Female ---- No Indication".

3.5 Power Supply

The radio is equipped with 7.4V, 1200mAh Li-Ion battery. The battery supplies power directly to the transmitter amplifier circuit (Q11, Q12) and the receiver amplifier (IC8). The power supply of other circuits is the regulated 5V power.

IC12: 5V low voltage difference, micropower regulator, together with Q10, and Q30 supply big current 5V power to the whole radio.

Q29: 5T switch, controlled by MCU.

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

Q31: 5R switch, controlled by MCU.

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

Q32: 5C switch, controlled by MCU

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

3.6 MCU
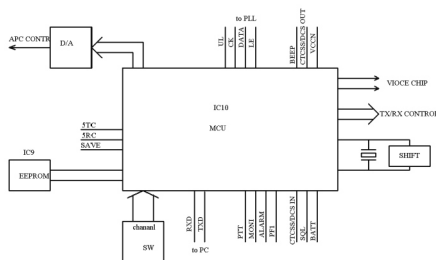
Figure 3.9 MCU Diagram

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

Connects with the PC

Accesses the radio status data

Controls PLL to generate the receiving and transmitting local oscillation frequency.

Accesses the 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

DCS decoding

Squelch check and control

Controls the content of voice indication

Memorizer （E2PROM，AT24C08）

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 pin5) are filtered at R155, R156, C242, and C243, and then 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.

Power Adjustment

MCU P56 output is sent to APC part to control the transmitter output power.

CTCSS

CTCSS (continuous tone control squelch system) is a squelch control system modulated on carrier wave with continuous subaudio 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.

39 groups of standard CTCSS frequency is available on the radio, see Table 3.1.

CTCSS signals generated by MCU pass the low pass filter consisting of RC to be filtered off the high frequency over 300Hz and then are sent to VCO for modulation.

Table 3.1   CTCSS Frequency Table

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

DCS

DCS (digital code squelch) is a kind of continuous digital code modulated with voice signals on carrier wave to control squelch.

83 groups of standard codes (positive and inverse code) are available. See table 3.2.

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	

3.7 Semiconductor Component

MCU Description

Table 3.3 Microprocessor (M38034) Port Description

Pin No.	Port Name	Pin Name	I/O	Function
1	TI	P1	I	QT/DQT signal input
2	BUSY	P2	I	Busy signal input
3	BATT	P3	I	Battery voltage check
4	ALARM	P4	I	Alarm key check
5	TO	P5	O	QT/DQT output
6	BEEP	P6	O	Beep output/warning tone output
7	PF1	P7	I	Voice indication key check
8	ENC0	P8	I	Encoding input
9	ENC2	P9	I	Encoding input
10	ENC3	P10	I	Encoding input
11	ENC1	P11	I	Encoding input
12	NC	P12	I	Not used
13	PTT	P13	I	[PTT] key input, connected with RXD
14	TXD	P14	O	RS-232C input
15	RXD	P15	I	RS-232C input
16	MONI	P16	I	[MONI] key input
17	SELF	P17	I	Self programming L: Model setting mode
18	CNVSS	P18	I	Connect 10K resistor with VSS
19	RST	P19	I	Reset　input
20	INT0	P20	I	Power　check input
21	ENC-SEL	P21	I	Encoding switch selection. Connect the pull down resistor with VSS.
22	XIN	P22	I	（7.3MHz）Oscillator
23	XOUT	P23	O	
24	VSS	P24	I	Earthing
25	SHIFT	P25	O	Clock frequency shift H：Open
26	PABC	P26	O	Final power supply　H：Open
27	OSCSI	P27	I	VCO crystal selection. Connect the pull down resistor with VSS H：13, L：16.8
28	WNTC	P28	O	Wide/Narrow band control H：Wide, L：Narrow
29	PS	P29	O	PLL power saving control H：Normal working, L：Power saving
30	SDA	P30	I/O	EEPROM data wire
31	SCL	P31	O	EEPROM clock wire
32	UL	P32	I	PLL unlock check pin　H：Locked, L：Loss of lock
33	DT	P33	O	PLL data output
34	CK	P34	O	PLL clock output
35	LE	P35	O	PLL IC enabling pin　H：Latched
36	5MC	P36	O	Power control except CPU and EEPROM L：Open
37	AFCO	P37	O	Audio amplification power H:Open
38	RX	P38	O	TX/RX VCO Selection H：Receiving
39	GLED	P39	O	Green indicator control H：Light
40	RLED	P40	O	Red indicator control　H：Light
41	SAVE	P41	O	Battery power saving control H：Power supply，L：Power saving
42	MUTE	P42	O	Squelch control H：Mic squelch L：Audio squelch
43	5RC	P43	O	Receiving power control　L：Open
44	5TC	P44	O	Transmitter power control H：Open
45	W588C	P45	O	Voice indication H：Voice annunciation of channel
46	AC	P46	O	Alert control H：Control by voice volume.It must be in low battery level when in emergency alert state .
47	DAOUT1	P47	O	D/A output 1
48	DAOUT0	P48	O	D/A output 0
49	DAOUT7	P49	O	D/A output 7 frequency regulated output VCCN
50	DAOUT6	P50	O	D/A output6
51	DAOUT5	P51	O	D/A output5
52	DAOUT4	P52	O	D/A output4
53	DAOUT3	P53	O	D/A output3
54	DAOUT2	P54	O	D/A output2
55	NC	P55	O	Not used
56	APC	P56	O	TX：Auto power control output RX：BPF tuning output
57	VCC	P57	I	CPU power 5V input
58	VREF	P58	I	Connected with VCC
59	AVSS	P59	I	Connected with VSS
60	IF_SEL	P60	I	IF selection. Connect the pull down resistor with VSS H：49.95，L：21.4

61	BUSY_V	P61	I	Voice indication of circuit busy check
62	DATA_V	P62	I/O	Voice indication data
63	SCLK_V	P63	I/O	Voice indication clock
64	NC	P64	I	Not used

3.4 Semiconductor Function Description

Posi	Type	Function Description
IC1	MB15E03	Frequency synthesizer
IC4	NJM2904	APC，Voltage comparison, drive
IC5	MC3361	Receiver's 2nd local oscillation, 2nd IF amplification, amplitude limit, demodulation, noise amplification
IC6	NJM2902	Receiver demodulation signal amplification, filtering
IC7	NJM2902	MIC amplification, amplitude limit, filtering
IC8	KIA6278F	Receiver audio amplifier
IC9	AT24C08	E2PROM, memory channel frequency data, function setting parameter, Debugging state parameters
IC10	M38034	MCU
IC11	PST9140NR	MCU reset circuit
IC12	HT7150-1	Low voltage difference, low power consumption, and regulator
IC15	W588A080	Voice storage IC
Q2	2SC5108	Transmitter 1st amplification
Q3	2SC3356	Transmitter 2nd amplification
Q4	2SC5108	VCO buffering amplifier
Q5	2SC5108	VCO buffering amplifier
Q6	2SC4617	VCO power filter
Q7	2SC4738	Noise amplifier
Q9	2SC4617	Receiver audio signals amplification
Q10	2SC1623	5V regulated output current stretcher
Q11	RD07MVS1	Transmitter final power amplifier
Q12	RD01MUS1	Transmitter power amplifier drive
Q17	DTA144EE	APC output switch
Q19	3SK318	The 1st frequency mixer
Q20	3SK318	Receiver HF amplifier
Q21	KTC4082	The 1st IF amplifier
Q22	DTC144EE	Red LED drive
Q23	DTC144EE	Green LED drive
Q24	2SK1824	Voice indication switch
Q26	DTC144EE	5C switch
Q29	KTA1298	5T switch
Q30	KTA1298	5V regulated output current stretcher
Q31	KTA1298	5R switch
Q32	KTA1298	5C switch
Q34	DTA144EE	Power switch of MIC amplification unit
Q35	2SK1824	Audio output switch of receiver. Cut off when in emergency alert state.
Q36	2SK1824	Receiver audio output switch

Table 3.5 Diode Function Description

Position	Type	Function Description
D1	MA77	Transmitter antenna switch diode
D2	MA77	Transmitter antenna switch diode
D3	HSC277	VCO output switch
D4	HSC277	Antenna switch
D5	HSC277	Antenna switch
D6	HSC277	VCO output switch
D7	HSC277	5V regulated output current stretcher
D8	HVC376B	VCO oscillation variable capacitance diode
D9	HVC376B	VCO oscillation variable capacitance diode
D12	MA360	VCO modulation diode
D14	HZU5ALL	APC output voltage-limiting diode
D15	MA2S111	Loss of lock check diode
D16	MA2S111	VCO power filtering accelerating diode
D17	1N4148	Noise detector
D18	1N4148	Noise detector
D20	LEDGreen	Receiving indication
D25	MA2S111	APC individual diode
D28	LED Red	Transmitting indication
D29	LEDGreen	Receiving Indication

Table3.6：XF1、XF2 Crystal Filter Features

Item	Specified Value
Nominal center frequency	49.95MHz
Transmission 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	---

Table 3.7 CF1 LTVPC450EB Features

Item	Specified Value
Nominal center frequency	450kHz
6Db bandwidth	±3.5kHz or bigger
50dB bandwidth	±12.5kHz or smaller
Pulse	2.0dB or smaller within f0 ±4kHz
Insertion loss	6.0dB or smaller
Guarantee attenuation	35.0dB or bigger within f0±100kHz
Terminal resistance	2.0kΩ

Figure 3.8 Semiconductor Component Packaging Illustration:
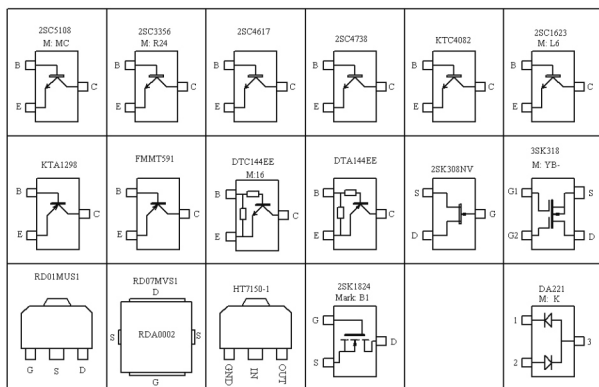
Chapter 4   Function Description and Parameter Setting

4.1 Major Functions

4.1.1 16 Channels/15 Channels +Scanning Channel

The radio stores 16 channels including one scanning channel.

4.1.2 Scanning Function Control

If you switch the channel to channel 16, the radio is in the scanning state. After starting scanning, it will pause when receiving signals.

If you switch the channel to channel 1-15, the scanning function is inactivated.

4.1.2.1 Carrier Wave Control Scanning

If the radio scanning setting is "carrier wave control scanning", switch the channel to channel 16 to set the radio in the scanning working mode.

Each channel can be set the scanning added/deleted function solely: if the setting is scanning added, the channel will be added in the scanning list; if the setting is scanning deleted, the channel will not be in the scanning list.

The radio starts scanning from channel 1 to 16 repeatedly in the consequence of the scanning list. If signals are detected on a channel (if the channel is set with receiving signaling the carrier wave must match the signaling), the radio pauses on that channel and will restarts scanning 0.5~5 seconds (scanning delay time) after the signals disappear.

If you switch the channel to channel 1~15, scanning is inactivated.

4.1.2.2 Time Control Scanning

If the radio scanning setting is "time control scanning", switch the channel to channel 16 to set the radio in the scanning working mode.

Each channel can be set canning added/deleted function solely: if the setting is scanning added, the channel will be added in the scanning list; if the setting is scanning deleted, the channel will not be in the scanning list.

The radio starts scanning from channel 1 to 16 repeatedly in the consequence of the scanning list. If signals are detected on a channel (if the channel is set with receiving signaling the carrier wave must match the signaling), the radio pauses on that channel and will restarts scanning 0.5~5 seconds (scanning delay time) after the signals disappear.

If you switch the channel to channel 1~15, scanning is inactivated.

4.1.2.3 Priority Channel

You can set one channel in the scanning list as the priority channel, which has the highest priority during scanning. The radio scans the first non-priority channel in the canning list and then scans the priority channel, the next non-priority channel in the scanning list, and then the priority channel again. It goes on scanning in such sequence.

4.1.2.4 Revert Channel

If you press PTT button when the radio is in scanning state, the radio will transmit on the "revert channel", which has 6 types:

Selected channel: The first channel in the scanning list.

Selected channel + current channel: If the radio is in the state of scanning pause, it will transmit on the current communication channel. Otherwise it will transmit on the first channel in the scanning list.

Priority channel: The radio will always transmit on the priority channel set in the scanning list when pressing PTT.

Priority channel + current channel: If the radio is in the state of scanning pause, the radio will transmit on the current communication channel. Otherwise it will transmit on the priority channel in the scanning list.

Last called channel: The last channel that received signals.

Last called channel + current channel: If the radio is in the state of scanning pause, the radio will transmit on the current communication channel. Otherwise it will transmit on the last called channel.

The current communication channel is the channel on which the radio pauses in the 4 following situations:

1、When the radio receives signals and does not restart scanning, the radio will stay on the current channel.

2、The radio will stay on the current channel during 0.5~5 seconds (scanning delay time) after signals disappear.

3、The radio will stay on the current channel when pressing the PTT during scan.

4、After releasing the PTT to end transmitting, during the preset transmitting dwell time, the radio will stay on the current channel. After the preset transmitting dwell time 0.5~5 seconds, the radio will restart scanning again.

4.1.2.5 Retrace Period

If the priority channel has been set in the scanning list and retrace period is also set, when the radio receives signals on a non-priority channel and pauses scanning, it will retrace the priority channel in a certain period (0.3~5s). If signals are detected on the priority channel, it will stay on the priority channel; if no signal is detected on the priority channel, it returns to the original channel it stays on.

4.1.3 CTCSS/DCS

CTCSS/DCS can realize selective calls and group calls. On the same channel, only the two parties whose CTCSS/DCS are identical can communicate. CTCSS/DCS signaling code on the channel is preset.

4.1.4 TOT

The purpose of the time-out timer is to prevent any single person from overlong using a channel to transmit and affecting the whole group communication.

If the radio transmits longer than the preset TOT time limit, the radio will stop transmitting and warning tone sounds. To stop the warning tone, release the PTT button. Press the PTT again you can resume transmitting.

4.1.5 Auto Power Saving

When no signals are being received or no operations are being

conducted for over 10 seconds, the battery power saving will be activated. When it is receiving signals or in operating state, battery power saving is inactive.

4.1.6 Low Battery 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.

4.1.7 Monitor

When no signals are being received, the radio squelch circuit mutes the speaker.

Press the MONI key to cut off the squelch control circuit, and you will hear noise from speaker (no mater 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.

4.1.8 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.

4.1.9 PC Programmable

You can program the radio functions and adjust some parameters by PC programming software KSP20.

4.1.10 Wired Clone

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

4.1.11 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 form 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.

4.1.12 Beep Tone

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

4.2 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, CTCSS/DCS, auto scanning. We designed a user friendly and convenient Chinese/English programming software KSP20 for users to set parameters on the radio. The programming steps are as follows:

a.Install the programming software KSP 20 on the computer.

b.Connect the radio to the computer serial port with the specified programming line (KSPL02). See Figure 4.1

PC (RS232 Serial Port)	⟷	Programming Line (KSPL02)	⟷	Radio (Speaker/ Mic Socket)
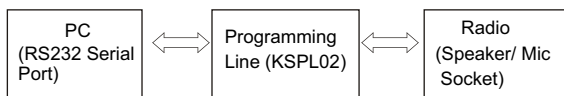
a.Turn on the computer power.

b.Turn on the radio power.

c.Click the KSP20 program to run the programming software.

d.Click the "Tools" in the KSP20 pull-down menu, and click "Read Data" to read the radio parameters into the computer; click "Write Data" to transfer the PC programming parameters into the radio.

e.You can program the following parameters with the KSP20 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) Beep tone option.

8) Monitor mode option.

9) Scan mode option.

10) Scan the revert channel option.

11) Scan the priority channel option.

For more details, please refer to the "Help" in the KSP20 software.

Notice:

1) Turn off the radio before connection.

2) When the radio is being read data, the indicator lights green and it's prohibited to press the PTT button; when the radio is being written data, the indicator lights red.

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.

6) After programming, you need to turn on the radio power again to make the radio resume the normal work.

4.3 Computer Test Mode:

Connect the radio to the radio communication port with the specified programming line (KSPL02). See Figure 4.1.

Warning: Before enter the computer test mode, connect a HF load of 50 Ω 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 KSP20 programming software:

1) Frequency tuning;

2) Transmitting power;

3) Low voltage threshold;

4) The 9th squelch level;

5) The 3rd squelch level;

6) Sub-audio wide band modulation degreed;

7) Sub-audio narrow band modulation degreed;

8) Wide band sub-audio center.

4.4 Wired Clone (It can be prohibited by programming software)

When the wired clone function is activated, the radio can enter the wired clone mode. After entering the wired clone mode, the

radio will not exit it automatically and you have to turn on the radio again to enter the user's mode. Operating steps are as follows:

1) Turn on the radio with the MONI key pressed, and 2 seconds later the red light flashes twice and two beep tones sound, and then the radio enters the wired clone mode.

2) Press the PTT button on the host radio to activate/inactivate the wired clone mode on the sub radio. But the wired clone mode of the host radio will not be changed. When pressing the PTT button, the green light flashing twice and one beep mean to activate the clone mode; the red light flashing twice and two beeps mean to inactivate the clone mode. When entering clone mode, the default setting of the sub radio receiving data is to prohibit wired clone mode.

3) Press the MONI key, red light flashes, and it starts cloning. After cloning is finished, the red light turns dim.

Note: You can activate/inactivate the wired clone mode. Short circuit the two SELF terminals, enter the model setting mode and then the manually adjustment function and wired clone function will become active automatically. If you press the MONI key at this moment, the wired clone function will be prohibited.

You can also activate/inactivate the wired clone mode by PC programming software.

If the wired clone function has been prohibited, it cannot enter the wired clone mode. The wired clone mode has been prohibited in the factory.

The cloning data includes all the data in " 4.2 Parameter Setting" but the adjustment parameters in " 4.3 Computer Test Mode".
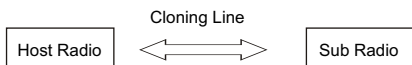
Chapter 5 Service Assemble and Disassemble

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

5.1 Removing and Installing the Battery

To remove the battery, push the latch upwards and remove the battery away from the radio. (See Figure 5.1)
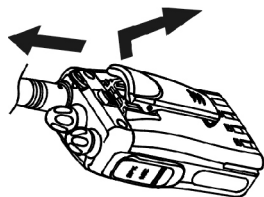
Figure 5.1

To install the battery, match the tow bulges at the bottom of the battery with the corresponding grooves at the radio aluminum alloy frame and insert it in. Then press the upper end of the battery till the latch secure.
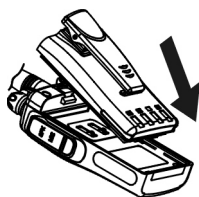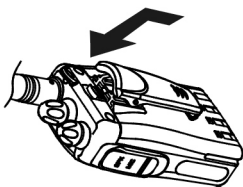
Figure 5.2   **Figure 5.3**

5.2 Removing and Installing the Belt Clip

To remove the belt clip, use your nail or a tool to lift the metal spring piece in the belt clip from the topside, and then pull the belt clip away from the radio.

To install the belt clip, match the upper head of the belt clip with the glides on the rear of the battery, and then press the belt clip downwards to lock it in place. (See Figure 5.4)
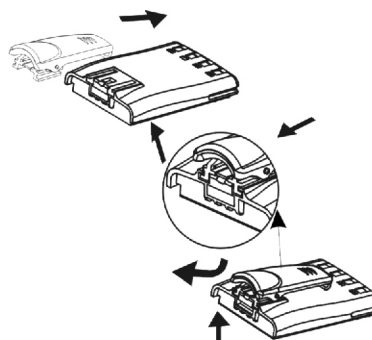
Figure 5.4

5.3 Removing the Casing from the Chassis

1) Remove the knobs;

2) Remove the two knob nuts and the antenna nut;

3) Remove the two cross head screws that fix the top cover at the top;

4) Remove the two cross head screws that fix the aluminum alloy frame at the bottom;

5) Pull the aluminum alloy frame out of the casing.

See Figure 5.5
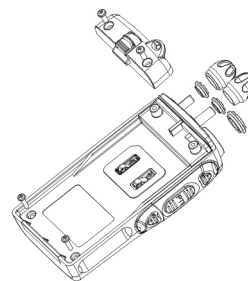
Figure 5.5

5.4 Remove the Chassis from the Main Board

1) Remove the screw of from the PCB;

2) Melt the solder at the antenna point with a electric soldering iron and take off the main board;

3) Take away the two screws and the antenna connector.

See Figure 5.6.
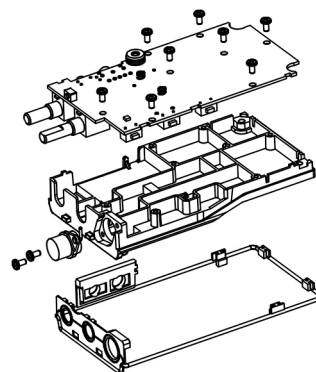
Figure 5.6

5.7 Exploded View
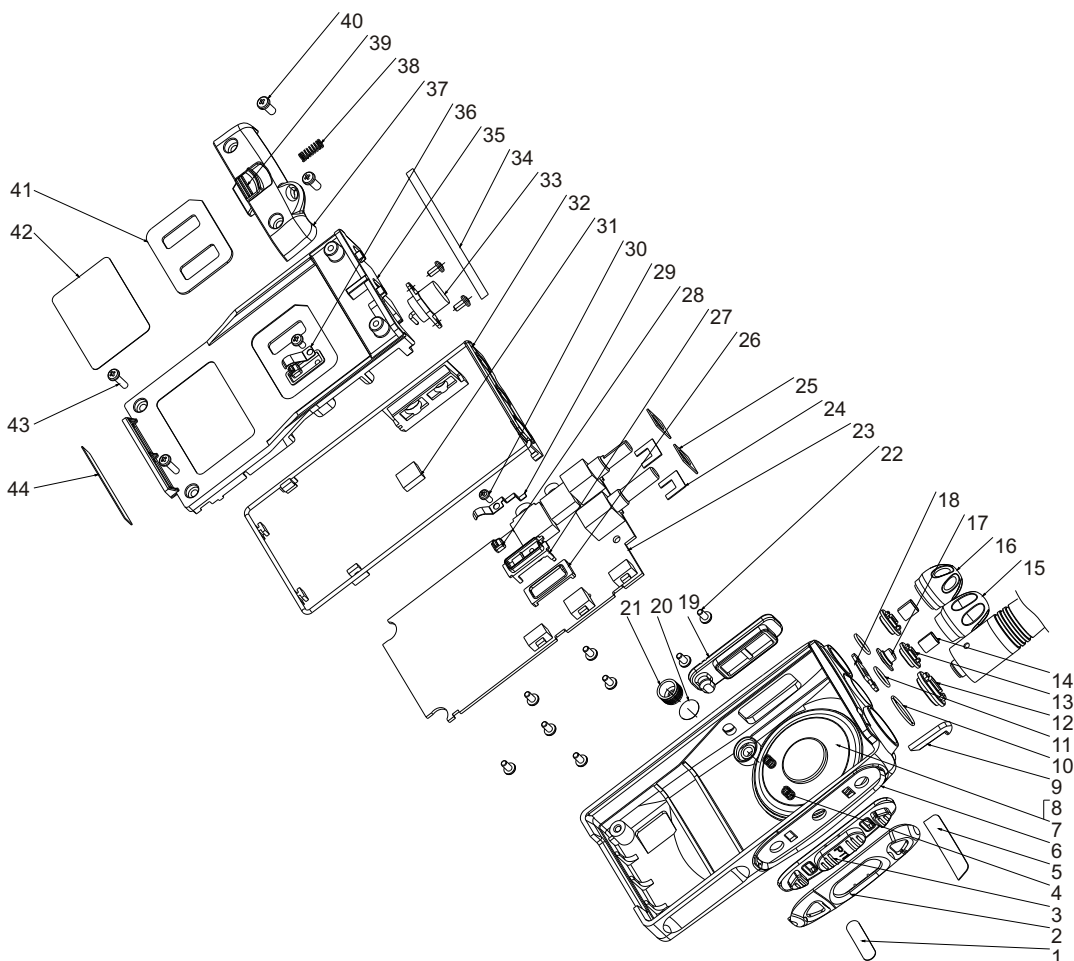
NO.	MATERIAL NO.	DECRIPTION	QTY
21	202-000558-009	MIC CAP	1
20	204-006800-006	MIC WASHER	1
19	202-000558-001	MIC COVER	1
18	201-000558-008	EMERGENCY BUTTON COVER	1
17	202-000558-003	EMERGENCY BUTTON	1
16	201-000558-002	VOLUME KNOB	1
15	201-000558-003	CHANNEL KNOB	1
14	203-003208-009	KNOB CIRCLIP	2
13	203-000558-002	SWITCH NUT	2
12	203-000558-001	ANTENNA NUT	1
11	202-000558-004	arial	2
10	202-000558-005	arial	1
9	201-000558-009	LIGHT PIPE	1
8	204-000558-001	SPEAKER WATERPROOF NET	2
7	121-100000-007	SPEAKER	1
6	201-000558-001	FRONT COVER	1
5	401-0101E1-057	LOGO LABLE	1
4	203-000558-004	SPEAKER SPRING	2
3	202-000558-002	PTT BUTTON	1
2	201-000558-004	PTT BUTTON FRAME	1
1	401-0101E1-058	MODEL LABLE	1

44	204-000558-003	AL LABLE	1
43	301-20080G-001	M2 SCREW	2
42	401-0201C1-006	AL LABLE	1
41	204-000558-002	WATERPROOF LABLE	1
40	301-25060J-001	M2.5 SCREW	2
39	201-000558-014	PUSH FASTENER	1
38	203-000558-005	PUSH FASTENER SPRING	1
37	201-000558-005	TOP COVER	1
36	203-003208-004	arial	1
35	203-004200-001	Aluminum bracket	1
34	204-000558-005	AL ALLOY LABLE	1
33	203-000558-007	ANTENNA HEAD	1
32	202-000558-007	WATERPROOF WASHER	1
31	202-003208-007	INSULATING WASHER	1
30	302-17040G-001	M1.7 SCREW	1
29	203-003208-002	arial	1
28	202-000558-008	POSITIVE TERMINAL WASHER	2
27	201-000558-007	POSITIVE TERMINAL FRAME	1
26	202-000558-006	WASHER	1
25	204-003208-005	WASHER	2
24	204-000558-004	WASHER	2
23		PCB BOARD	1
22	301-20040G-001	M2 SCREW	11

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.

Table 6.1 For Test and Service： Equipment and Software

No.	Item	Specifications
1	Computer	Higher than P2, compatible with IBM PC，WINDOWS 98/ME/2000/XP
2	Programming Software	KSP-20
3	Programming Line	KSPL02
4	Cloning Line	KCL01
5	DC Regulated Power	Output voltage：7.5V， Output current：≥ 5A
6	RF power meter	Test range：0.5---10W Frequency range：100MHz—500MHz Impedance：50Ω SWR≤1.2
7	Frequency Meter	Frequency range： 0.1—600MHz Frequency precision: Higher than ±1×10⁻⁶ Sensitivity： Higher than 100mV
8	Frequency Deviator	Frequency range：DC—600MHz Test range：0--±5kHz
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

The equipments in item 6, 7, 8, 10, 11, and 12 can be replaced by a comprehensive test instrument.
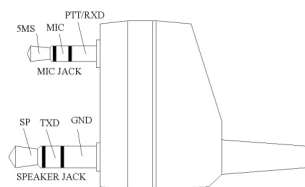
Figure 6.1 External Speaker/Mic Connector Definition

6.2 Debugging Items

During the course of maintenance, the radio needs to be tested and debugged after replacing components. Some certain radio parameters can be modified (computer mode) with our KSP 20 programming software. The modifiable parameters are as follows:

1) Frequency difference

2) TX power

3) Low battery power warning threshold

4) Squelch level

5) CTCSS frequency deviation

6) DCS frequency deviation

Debugging Procedures

a.Enter the computer test mode. Access method refers to the instruction in 4.2 parameter setting.

b.Select the "Test Mode" option 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 C180 to make the PD power at 1V±0.1V.

Set the TX frequency at high frequency (see Table 6.2), press the PTT button, test the PD power with the digital multimeter. The power should lower than 3.5V.

Table 6.2 Radio H/I/L Frequency

	Low Frequency	Medium Frequency	High Frequency
PT4200(1)	420.125MHz	445.125MHz	469.975MHz
PT4200(2)	400.125MHz	425.125MHz	449.975MHz

6.3.2 PLL Frequency Adjustment

Under the computer test mode, select " frequency tune" option and click "adjustment" to enter. Adjust the TX frequency among 0~255 to the specified value. (Frequency error should less than 200Hz.)

6.3.3 TX Frequency Adjustment

Under the computer test mode, select "high power, low frequency" and click "adjustment" to enter. Adjust the TX power among 0~255 to 4W. And watch the working current and make sure it not higher than 1.5A.

Adjust "high power, medium frequency"，"high power, high frequency" to set the TX power at 4W.

6.3.4 TX Low Power Warning

Adjust the power to 6.8V.

Under the computer test mode, select "the low power threshold"，and click "adjustment" to enter. Adjust the figure among 0~255 to make the red light flash.

6.3.5 Frequency Deviation Adjustment

Input 100mV, 1000Hz audio signals from the radio MIC, and adjust the potentiometer VR2 to set the TX frequency deviation at ±2.2kHz.

6.3.6 DCS TX Signal Wave Shape and Frequency Adjustment

Under the computer test mode, select " DCS wide band modulation", and click "adjustment" to enter。Adjust the potentiometer VR1, and watch the demodulation signals. The wave shape should be smooth (close to square wave) and then adjust the figure to set the frequency deviation at 0.35kHz.

6.3.7 CTCSS Frequency Deviation Adjustment

Under the computer test mode, select " CTCSS wide band modulation", and click "adjustment" to enter. Adjust the figure to set the frequency deviation at 0.35kHz.

6.3.8 Receiver Sensitivity

Repeat adjusting L9, L10, L6, and L5 to make the frequencies at highest sensitivity.

6.3.9 Receiver Squelch Setting

Under the computer test mode, select "the 9th squelch" and click "adjustment" to enter. Input the receiver with the signals of 1kHz modulation frequency, 3kHz frequency deviation, and -117dBm level. Adjust the figure to make the green light flash.

Under the computer test mode, select "the 1st squelch" and click "adjustment" to enter. Input the receiver with the signals of 1kHz modulation frequency, 3kHz frequency deviation, and 124dBm level. Adjust the figure to make the green light flash.

6.4 Debugging

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

Table 6.3 Voltage Controlled Oscillator (VCO)

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Require-ment	Note
Setting	Battery Power: 7.5V	Digital Multimeter	PD			
Locked Power	CH:RX Low Frequency		C180		1.0V±0.1V	Adjust-ment
	CH:RX High Frequency				Lower than 3.5V	Watch
	CH:TX Low Frequency		C181		1.0V±0.1V	Adjust-ment
	CH:TX High Frequency				Lower than 3.5V	Watch

Table 6.4 Receiver

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Require-ment	Note
Band Pass Filter		Spectroan-alizer/ Compreh-ensive Test Device	Before Mixing	Computer Test	ModePass Band 25MHz, smooth wave Shape	Not recom-mend the user to adjust it!
Audio Level	Ch: RX center frequency RF OUT：-53dBm (501μV) MOD:1kHz DEV:±3.0 (kHz) Audio Load:16Ω	RF Audio Signal Generator Oscillator Audio Voltmeter Distortion Test Device /Comprehensive Test Device	Speaker Connector		(Turn the volume knob clockwise) Audio power > 0.3 W	Inner speaker power >1.2W

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Require-ment	Note
Sensitivity	CH: MF CH:LF CH: HF RF OUT：-116dBm (0.35μV) MOD:1kHz DEV: ±1.5kHz (W/N)	RF Audio Signal Generator Oscillator Audio Voltmeter Distortion Test Device /Comprehensive Test Device	Speaker Connector	Computer Test Mode	SINAD：12dB or higher	
Squelch Activation Sensitivity	Ch: RX Center Frequency			Computer Test Mode	Computer Test Mode After adjustment, squelch activation is normal.	
	9th RF OUT: -117dBm					
	1st RF OUT: -124dBm				After adjustment, squelch activation is normal.	

Table 6.5 Transmitter

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Require-ment	Note
TX Frequency		Frequency Meter/ Comprehensive Test Device	Antenna	Computer Test Mode	Within ±200Hz	
DCS Wave Shape (Balance)		Oscillator / Comprehensive Test Device		Vr1	Wave shape is close to smooth square wave.	
Power		Power Meter/ Comprehensive Test Device/ Ammeter		Computer Test Mode	Adjust to 4W	Within ±200Hz
Maximum Modulation Frequency Deviation	CH: TX Center Frequency AG:1kHz/ 70mV	Frequency Deviation Meter/ Comprehensive Test Device			Adjust to ±4.5kHz	±200 Hz
Modulation Sensitivity	AG:1kHz/ 7mV				Checking frequency deviation: 2.2kHz~3.6kHz	

Item	Test Condition	Test Equipment	Test Point	Adjustment Part	Require-ment	Note
CTCSS DEV	CTCSS: 67Hz	Frequency Deviation Meter/ Comprehensive Test Device	Antenna	Computer Test Mode	Adjust to±0.75kHz	±50Hz
DCS DEV	DCS：023N				Adjust to±0.35kHz	±50Hz
Battery Power Warning	Battery Terminal: 6.8V				After adjustment, the indicator flashes.	

Chapter 7 Major Specifications

7.1 General Specification

Model	PT4200
Frequency	(1)420~470MHz (2)400~450MHz
Modulation	11KΦF3E
Number of Channels	16(15+S)
Channel Spacing	12.5 kHz
MF	1st MF：49.95 MHz 2nd MF：450kHz
Working Voltage	7.5V
Working Temperature	-25℃～ +55℃
Antenna Impetance	50Ω
Mic Impedance	2kΩ
Battery (Standard)	Model：KB-58A，Li-Ion Battery DC 7.2V，1000mAh
Dimension (WXHXD)	56 mmx120 mmx29 mm
Weight	235（With battery and Antenna）

7.2 Receiver

Available Sensitivity (12dBSINAD)	±0.35μV
Squelch Activation Sensitivity	≤0.20μV @level 3 squelch
Receiver Surplus Output	≤-40dB
Modulation Receiving Bandwidth	≤3.5kHz
Adjacent Channel Selectivity	≥60dB
Intermediation Reject Ratio	≥60dB
Spurious Response Reject Ratio	≥70dB
Audio Output Power	500mW， @distortion≤5%，4Ω
Receiving Current Sinking	≤250mA
Standby Current (Average)	≤25mA

RF Power	4.0W @7.5V DC
Frequency Stability	≤ ±2.5x10^{-6}
Maximum Modulation Frequency Deviation	±2.5kHz
Modulation Sensitivity	16mV
Modulation （300~3000Hz）	≤ 3%
Adjacent Channel RF Power	≤-60dB
Spurious and Harmonics	≤-70 dB
Residential Frequency Modulation	≤ -40 dB
Transmitting Current Sinking	≤1.8A @ 7.5V DC

Chapter 8 Trouble Shooting

No.	PROBLEM	SOLUTION
1	No display after switching on the radio.	A. Battery power may be insufficient. Recharge or change the battery pack. B. The power switch is broken, and please change it. C. The CPU is broken, and please change it. D.The regulator IC12 is broken, and please change it.
2	PLL is unlocked. (Beep sounds)	A. The PLL crystal oscillator C4 is broken, and please change it. B. The oscillatingtube is broken, and please change it. C. The oscillatingtube is broken, and please change it.
3	Cannot talk to or hear other group members.	A. Make sure the two communication radios are using the channel of the same frequency. B. Make sure the CTCSS/DCS tone is the same as that of your group members. C. Out of the effective communication range.
4	Cannot receive signals.	A. The antenna is not well connected, and please screw the antenna again until secure. B. The sensitivity is too low and minitrim L9, L10, L7, L6, and L5. C.HF amplifier Q20 is broken, and please change it. D. The squelch level is too high and the squelch cannot be activated. Reset the squelch level with a computer. E. Mixer tube Q19 is broken, and please change it. F. MF processing chip IC5 is broken, and please change it.

No.	PROBLEM	SOLUTION
5	The indicator lights red when in transmitting but no voice can be heard.	A. The power amplifier tube Q11 is broken and there is no power output and please change it with a new tube. B. The microphone is broken, and please change it with a new one. C. The operational amplifier IC3 is broken, and please change it with a new one.
6	The indicator lights green when in receiving but no voice can be heard.	A. The speaker is broken, and please change it with a new one. B. The audio amplifier IC8 is broken and please change it with a new one. C. The switch tube Q36 and Q35 is broken, and pleas change it with a new one. D. The operational amplifier IC6 is broken, and please change it with a new one.
7	Cannot program the radio parameters normally.	A. Make sure the programming cable is well connected. B. The computer RS-232 serial port output is unmoral, and please fix the computer. C. The MIC is not well connected with the SPK socket. Check the socket and if it is unable to work normally please change it with a new one.
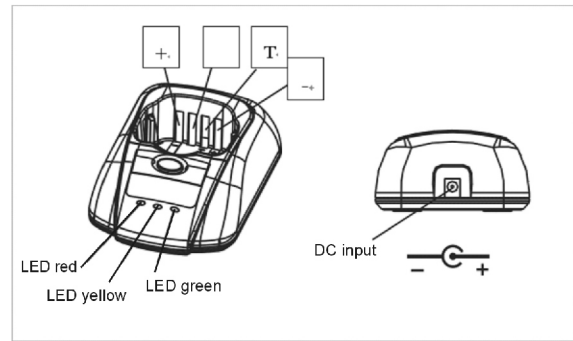
LED red: Charging indication

LED yellow: Power indication

LED green: Charging completion

Note: After putting the battery pack that has been discharged completely into the charger, its red indicator needs about 1~2 minutes to turn light.

Chapter 9 KBC-58L Charger

9.1 Charger Specifications

A) Idling Input Current: ≤30mA

B) Charging Terminal Maximum Idling Voltage: ≤8.8V

C) Constant current charging: 200～270mA

D) Maximum Charging Time: 7 hours

E) Maximum Charging Voltage Limit: 8.45±0.1V

9.2 Charging and Charging Indicator

A) When DC inputs power voltage 14~20V, the indicator lights yellow.

B) When the battery is inserted into the charger, the red and yellow indicator lights. (The battery power is lower than 8.1±0.1 V.) (When the voltage is lower than 6.0V, the red indicator become light slowly after about 20 seconds.)

C) When the battery voltage is lower than 8.1± 0.1 V, the charger charge the battery with constant current. (Charging current is 200～270mA. It needs 3~4 hours to charge a battery that has been discharged completely.)

D) When the battery voltage is higher than 8.1± 0.1 V, the charging current will decrease gradually; when the battery voltage is 8.2～8.4V, the charging current will decrease quickly; when the battery voltage is 8.4～8.5V, the charging current will close to zero (then the charger begins constant voltage output) and charging stops. This course takes about 2~3 hours.

E) When the battery voltage is 8.2～8.4V, the red, yellow and green indicator lights. When the battery voltage is 8.3～8.5V, the red indicator becomes dime and the green and yellow indicator light.

Appendix 1 Abbreviations

AMP	amplify, amplifier
ANT	antenna
APC	automatic power control
BPF	band pass filter
CTCSS	continuous tone control squelch system
DCS	digital code squelch
DEMOD	demodulation
E^2PROM	electrically erasable programmable read-only memory
HPF	high pass filter
IDC	instantaneous deviation control
IF	intermediate frequency
LED	Light-Emitting Diode
LNA	low noise amplifier
LPF	low pass filter
MCU	micro control unit
MIC	microphone
MOD	modulation
MONI	monitor
PLL	phase lock loop
PTT	push-to-talk
RX	receiver
SPK	speaker
TCXO	temperature compensated crystal oscillators
TX	transmitter
UL	un-lock
VCO	voltage control oscillator

Appendix 2 Spare List

No.	Material Serial No.	Name/Specification	Position	Quantity
1	201-000558-002	PT558 volume knob / PC+ABS,black		1
2	201-000558-003	PT558 encoder knob / PC+ABS,blak		1
3	201-000558-005	PT558 upper cover / PC+ABS,black		1
4	201-000558-006	PT558 latch / PC+ABS,black		1
5	202-000558-001	PT558 Earpiece-Mic jack panel cover / black silica gel(enhanced elasticity)hardness70		1
6	203-000558-001	PT558 antenna nut brass black passivation		1
7	203-000558-002	PT558 witch nut brass black passivation		2
8	203-000558-005	PT558 latch spring, carbon spring steel wire 0.35 nickle plating		1
9	203-003208-002	PT3208 positive terminal phosphorus copper gold plating		1
10	203-003208-004	PT3208 negative terminal phosphorus copper gold plating		1
11	301-20040G-001	Woven belly-tooth screw,M2.0x4.0 flat round cross head, nickle plating	PCB, antenna head, negative terminal screw	11
12	301-20080G-001	Woven belly-tooth screw,M2.0x8.0 flat round cross head, nickle plating	Aluminium alloy bracket fixing	2
13	301-25060J-001	Woven belly-tooth screw,M2.5x6.0 flat round cross head,black zinc plating	Upper cover fixing	2
14	302-17040G-001	Self-tapping screw, 1.7x4.0 flat round cross head nickle plating	Positive terminal screw	1
15	102-MC3361-R01	IF(MF) modulation IC/MC3361BP,lead-free	IC5	1
16	103-L190YG-R01	Chip LBD/ 0603,green,CL-190YG-CD, lead-free	D20, D29	2
17	103-MHC190-R02	Chip LBD/ 0603,red,HSMH-C190,lead-free	D28	1
18	104-MT717T-001	Chip triode / FMMT717TA	Q8, Q30	2
19	104-TA1298-R01	Chip triode / KTA1298(Y),lead-free	Q29, Q31, Q32	3
20	105-RD01MU-R01	Chip FET(field-effect transistor)/ RD01MUS1,lead-free	Q12	1
21	105-RD07MV-R01	Chip FET(field-effect transistor)/ RD07MVS1,lead-free	Q11	1
22	106-RD835E-001	Carbon-film encoder switch / RD835E-GA1-16C-0F01 18mm BAND HONGHUA	SW2	1
23	108-455C24-R01	Plug-in phase frequency detector/ JTBM455C24,lead-free	L57	1
24	108-CF450H-R01	Plug-in porcelain filter/ LTM450HT,450kHz 3kHz,lead-free	CF1	1
25	108-XF4995-R01	Plug-in IF filter / 49.95MHz$\pm$7.5KHz,U-5*2,lead-free	XF1, XF2	1
26	110-110473-R01	Chip trimming resistor/ MVR22HXBRN473,47K$\pm$25%,B Linear,lead-free	VR2	1
27	110-110683-R01	Chip trimming resistor/ MVR22HXBRN683,68K$\pm$25%,B Linear,lead-free	VR1	1
28	110-220103-008	Volume switch / RD810S-JA1-A103-0C61	SW1	1
29	121-200000-001	MIC / B6027AP402-65	MIC1	1
30	122-113M00-001	Chip transistor / 13MHz$\pm$2.5PPm	X4	1
31	122-17M300-R01	Chip crystal resonator/ CSTCR7M30G53-R0,7.3M,lead-free	X2	1
32	122-249M50-001	Plug-in crystal oscillator/ 49.5MHz$\pm$10PPM,UM-1	X3	1
33	124-050000-005	2.5mm Eearphone socket/ SP/MIC,EJ-2507-CCPA	J1	1
34	124-050000-R04	3.5mm MIC socket / SP/MIC,ST-212,lead-free	J2	1
35	603-0W558A-001	Voice recording IC IC / W588A080,binding	Ic15	1

Appendix 3 Framework Component List

No.	Material Serial No.	Description	Position	Quantity	Note
Plastic					
1	201-000558-001	Casing,PC+ABS,black		1	2 nuts inlaid
2	201-000558-002	Volume switch, PC+ABS,black		1	
3	201-000558-003	Channel knob, PC+ABS,black		1	
4	201-000558-004	PTT button frame, PC+ABS,black		1	
5	201-000558-005	Upper cover, PC+ABS,black		1	
6	201-000558-014	Latch, PC+ABS,black		1	
7	201-000558-007	Positive terminal chassis, PC+ABS,black		1	
8	201-000558-008	Alert button frame, PC+ABS,black		1	
9	201-000558-009	Light guide, PMMA, transparent		1	
Metal					
10	203-000558-007	Antenna holder,brass nickle plating		1	
11	203-000558-001	Antenna nut，brass，black passivation		1	
12	203-000558-002	Switch nut，brass，black passivation		2	

13	203-003208-009	Knob retaining ring，stainless steel，0.18THK		2	Refer to PT3208
14	203-003208-002	Positive terminal，phosphorus copper gold plating		1	Refer to PT3208
15	203-003208-004	Negative terminal，phosphorus copper gold plating		1	Refer to PT3208
16	203-004200-001	Aluminum bracket		1	
17	203-000558-004	Speaker contact spring,carbon spring steel wire ∮0.25，gilt		2	
18	203-000558-005	Latch spring,carbon spring steel wire ∮0.35，nickle plating		1	

Rubber

19	202-000558-001	Earpiece-Mic jack panel cover black silica gel(enhanced elasticity) hardness70		1	
20	202-000558-002	PTT button black silica gel hardness50		1	
21	202-000558-003	Alert button orange silica gel (enhanced elasticity) hardness60		1	
22	202-000558-004	Switch water-proof gasket black silica gel hardness60		2	
23	202-000558-005	Antenna water-proof gasket black silica gel hardness60		1	
24	202-000558-006	Waterproof gasket black silica gel hardness60		1	
25	202-000558-007	Waterproof gasket black silica gel(enhanced elasticity) hardness40		1	
26	202-000558-008	Negative & positive terminal cushion black silica gel hardness40		2	
27	202-000558-009	Mic case orange silica gel hardness40		1	

Mechanical Parts

28	204-000558-001	Speaker waterproof net,black waterproof cloth		1	
29	204-006800-006	Mic cushion,dustproof net black		1	Refer to PT6800
30	204-000558-002	Waterproof spacer PORON black self-adhesice 0.8THK		1	
31	204-000558-003	Aluminium alloy sticker 1 PVC black self-adhesive 0.3THK		1	
32	204-000558-004	Potentionmeter cushion PVC transparent self-adhesive 0.35THK		2	
33	202-003208-007	Thermally conductive insulator, thermally conductive rubber,2*6*9 blue	Under FET	1	Refer to PT3208

Screws & Nuts

34	302-17040G-001	Self-tapping screw, 1.7x4.0 flat round cross head nickle plating	Positive terminal screw	1	Refer to PT3208
35	301-20040G-001	Woven belly-tooth screw,M2.0x4flat round cross head, nickle plating	PCB antenna head negative terminal screw	11	Refer to PT3208
36	301-20080G-001	Woven belly-tooth screw,M2.0x8flat round cross head, nickle plating		2	
37	301-25060J-001	Woven belly-tooth screw,M2.5x6 flat round cross head, black zinc plating	Aluminium alloy bracket fixing Upper cover fixing	2	

Appendix 4 Electrical Component List

No.	Material Serial No.	Component Name/Specification	Quantity	
1	101-005583-004	PT558PCB / Mainboard,PT558N-060228	1	
2	102-9140NR-001	Reset IC / PST9140NR	1	IC11
3	102-A6278F-001	KIA6278F,AUDIO,AMP	1	IC8
4	102-AT2408-001	Memory IC / AT24C08N-10SI2.7	1	IC9
5	102-B15E03-001	PLL IC / MB15E03SL,PLL,16-PIN,SSOP	1	IC1
6	102-HT7130-001	Regulator IC / HT7130-1,SOT-89	1	IC14
7	102-HT7150-001	Regulator IC / HT7150-1	1	IC12
8	102-M2902V-001	Operational amplifier / NJM2902V,OP-AMP	3	IC4，IC6，IC7
9	102-M2904V-001	Operational amplifier/ NJM2904V,OP-AMP	1	IC3
10	102-M38034-001	MCU / M38034M4H-284HP	1	IC10
11	102-MC3361-001	IF(MF) modulation IC / MC3361BP	1	IC5
12	103-00MA77-001	Chip HF switch diode / MA77,0805	1	D1
13	103-0MA360-001	Chip variable capacitor diode / 0805,MA360(PANASONIC)	1	D12
14	103-1SS372-001	Chip switch diode / 1SS372(TOSHIBA)	1	D13
15	103-A2S111-001	Chip switch diode / 0603,MA2S111(PANASONIC)	3	D15，D16，D25
16	103-DAN222-001	Chip switch diode / DAN222,(ROHM)	1	D308
17	103-HSC277-001	Chip diode / Waveband switch,HSC277(HITACHI)	4	D3，D4，D6，D7
18	103-HVC350-001	Chip varialble capacitor diode / 0603,HVC350B(HITACHI)	6	D21，D22，D23，D24，D26，D30
19	103-HVC376-001	Chip varialble capacitor diode / HVC376B	4	D8，D9，D10，D11
20	103-HZU5AL-001	Chip regulator diode / HZU5ALL(HITACHI)	1	D14
21	103-IN4148-001	Chip diode / IN4148	2	D17，D18
22	103-L190YG-001	Chip LBD / 0603,green,H19-21SYGC	2	D20，D29
23	103-MHC190-002	Chip LBD/ 0603,red,19-21SURC/S530-A2/TR8	1	D28
24	104-A144EE-001	Chip triode / DTA144EE(ROHM)	2	Q17，Q34
25	104-C144EE-001	Chip triode / DTC144EE(ROHM)	6	Q22，Q23，Q26，Q27，Q33，Q37
26	104-KRX102-001	Chip triode / KRX102U,with,bias,resistor,	1	IC2

27	104-MT717T-001	Chip triode / FMMT717TA	2	Q8, Q30
28	104-SC1623-001	Chip triode / 2SC1623	1	Q10
29	104-SC3356-001	Chip triode / 2SC3356	1	Q3
30	104-SC4617-001	Chip triode / 2SC4617(S)(ROHM)	2	Q6, Q9
31	104-SC4738-001	Chip triode / 2SC4738(GR),AF,AMPLIFIER(TOSHIBA)	1	Q7
32	104-SC4919-001	Chip triode / 2SC4919,MUTING,CIRCUIT(SANYO)	1	Q24
33	104-SC5108-001	Chip triode / 2SC5108Y(TOSHIBA)	3	Q2, Q4, Q5
34	104-TA1298-001	Chip triode / KTA1298(Y)	3	Q29, Q31, Q32
35	104-TC4082-001	Chip triode / KTC4082,(KEC)	1	Q21
36	105-2SJ243-001	Chip FET(field-effect transistor) / 2SJ243	1	Q16
37	105-2SK508-001	Chip FET(field-effect transistor) / 2SK508NV(K52)	2	Q14, Q15
38	105-3SK318-001	Chip FET(field-effect transistor) / 3SK318	2	Q19, Q20
39	105-RD01MU-001	Chip FET(field-effect transistor) / RD01MUS2	1	Q12
40	105-RD07MV-001	Chip FET(field-effect transistor) / RD07MVS1	1	Q11
41	105-SK1588-001	Chip FET(field-effect transistor) / 2SK1588(NEC)	1	Q38
42	105-SK1824-001	Chip FET(field-effect transistor) / 2SK1824	4	Q13, Q25, Q35, Q36
43	106-0BA010-001	Knob switch / SKHLLBA010,exported	1	K1
44	106-454548-001	Chip switch/ 4.5*4.5*4.8	2	K2, K4
45	106-LBE010-001	Chip touch switch / SKRTLBE010	1	K3
46	106-RD835E-001	Carbon encoder switch / RD835E-GA1-16C-0F01 18mm BAND	1	SW2
47	108-455C24-001	Plug-in phase frequency detector/ JTBM455C24	1	L57
48	108-CF450H-001	Plug-in porcelain filter/ LTM450HT,450kHz 3kHz	1	CF1
49	108-XF4995-001	Plug-in IF filter / 49.95MHz 7.5KHz,U-5*2	1	XF1, XF2
50	109-040000-001	Chip resistor / 0402,0R 5%	15	C67, C166, C247, C276, C277, R4, R24, R30, R99, R154, R174, R217, R255, R260, R261
51	109-040100-001	Chip resistor / 0402,10R 5%	4	R98, R127, R200, R238
52	109-040101-001	Chip resistor / 0402,100R 5%	4	R12, R94, R128, R237
53	109-040102-001	Chip resistor / 0402,1K 5%	16	R29, R39, R41, R42, R48, R49, R50, R111, R129, R130, R131, R157, R184, R195, R199, R273
54	109-040103-001	Chip resistor / 0402,10K 5%	18	R109, R120, R121, R122, R123, R126, R133, R140, R194, R205, R206, R212, R228, R254, R264, R266, R268, R295
55	109-040104-001	Chip resistor / 0402,100K 5%	6	R105, R108, R113, R114, R115, R116
56	109-040105-001	Chip resistor / 0402,1M 5%	2	R160, R162
57	109-040122-001	Chip resistor / 0402,1.2K 5%	1	R188
58	109-040123-001	Chip resistor / 0402,12K 5%	1	R208
59	109-040124-001	Chip resistor / 0402,120K 5%	4	R6, R7, R8, R9
60	109-040153-001	Chip resistor / 0402,15K 5%	8	C187, C188, C189, C265, R64, R76, R142, R192
61	109-040154-001	Chip resistor / 0402,150K 5%	1	R201
62	109-040182-001	Chip resistor / 0402,1.8K 5%	1	R224
63	109-040183-001	Chip resistor / 0402,18K 5%	2	R218, R219
64	109-040184-002	Chip resistor / 0402,180K 5%	1	R67
65	109-040203-001	Chip resistor / 0402,20K 5%	10	R27, R207, R225, R226, R227, R240, R263, R265, R267, R269
66	109-040221-001	Chip resistor / 0402,220R 5%	3	R214, R215, R216
67	109-040222-001	Chip resistor / 0402,2.2K 5%	1	R294
68	109-040223-001	Chip resistor / 0402,22K 5%	3	R209, R210, R211
69	109-040224-001	Chip resistor / 0402,220K 5%	3	R86, R87, R164
70	109-040272-001	Chip resistor / 0402,2.7K 5%	1	R223
71	109-040273-001	Chip resistor / 0402,27K 5%	4	R46, R171, R172, R257
72	109-040274-001	Chip resistor / 0402,270K 5%	1	R231
73	109-040332-001	Chip resistor / 0402,3.3K 5%	2	R59, R60
74	109-040333-001	Chip resistor / 0402,33K 5%	3	R196, R258, R290
75	109-040334-001	Chip resistor / 0402,330K 5%	1	R82
76	109-040392-001	Chip resistor / 0402,3.9K 5%	2	R221, R222
77	109-040393-001	Chip resistor / 0402,39K 5%	3	R53, R149, R153
78	109-040394-001	Chip resistor / 0402,390K 5%	1	R165
79	109-040471-001	Chip resistor / 0402,470R 5%	1	R3
80	109-040472-001	Chip resistor / 0402,4.7K 5%	6	R118, R125, R155, R156, R204, R248

81	109-040473-001	Chip resistor / 0402,47K 5%	7	R17, R18, R19, R20, R21, R22, R292
82	109-040474-001	Chip resistor / 0402,470K 5%	3	R166, R232, R293
83	109-040562-001	Chip resistor / 0402,5.6K 5%	3	R63, R65, R132
84	109-040563-001	Chip resistor / 0402,56K 5%	6	R173, R175, R176, R177, R178, R291
85	109-040564-001	Chip resistor / 0402,560K 5%	1	R163
86	109-040682-001	Chip resistor / 0402,6.8K 5%	1	R220
87	109-040683-001	Chip resistor / 0402,68K 5%	2	R78, R245
88	109-040821-001	Chip resistor / 0402,820R 5%	1	R33
89	109-040822-001	Chip resistor / 0402,8.2K 5%	2	R229, R230
90	109-040823-001	Chip resistor / 0402,82K 5%	1	R52
91	109-040913-001	Chip resistor / 0402,91K 5%	2	R77, R213
92	109-060000-001	Chip resistor / 0603,0R 5%	15	C1, C86, C266, C273, L16, L34, L42, L62, R23, R28, R81, R141, R182, R241, R262
93	109-060100-001	Chip resistor / 0603,10R 5%	4	R95, R96, R97, R101
94	109-060101-001	Chip resistor / 0603,100R 5%	5	R74, R88, R89, R90, R180
95	109-060102-001	Chip resistor / 0603,1K 5%	6	R37, R38, R47, R150, R234, R256
96	109-060103-001	Chip resistor / 0603,10K 5%	9	R92, R117, R119, R124, R136, R137, R138, R139, R203
97	109-060104-001	Chip resistor / 0603,100K 5%	15	R43, R79, R80, R84, R102, R103, R104, R107, R158, R197, R235, R243, R247, R249, R297
98	109-060122-001	Chip resistor / 0603,1.2K 5%	1	R69
99	109-060124-001	Chip resistor / 0603,120K 5%	2	R5, R66
100	109-060150-001	Chip resistor / 0603,15R 5%	1	R31
101	109-060151-001	Chip resistor / 0603,150R 5%	1	R179
102	109-060152-001	Chip resistor / 0603,1.5K 5%	1	R54
103	109-060153-001	Chip resistor / 0603,15K 5%	1	R75
104	109-060154-002	Chip resistor / 0603,150K 1%	6	R143, R144, R145, R146, R147, R170
105	109-060181-001	Chip resistor / 0603,180R 5%	4	R70, R71, R91, R189
106	109-060220-001	Chip resistor / 0603,22R 5%	2	L54, R93
107	109-060222-001	Chip resistor / 0603,2.2K 5%	4	R2, R185, R186, R187
108	109-060224-001	Chip resistor / 0603,220K 5%	1	R233
109	109-060271-001	Chip resistor / 0603,270R 5%	2	R34, R35
110	109-060272-001	Chip resistor / 0603,2.7K 5%	1	R40
111	109-060274-001	Chip resistor / 0603,270K 5%	1	R85
112	109-060330-001	Chip resistor / 0603,33R 5%	1	R72
113	109-060332-001	Chip resistor / 0603,3.3K 5%	4	R55, R56, R57, R58
114	109-060393-001	Chip resistor / 0603,39K 5%	2	R68, R193
115	109-060470-001	Chip resistor / 0603,47R 5%	2	R15, R32
116	109-060471-001	Chip resistor / 0603,470R 5%	1	R25
117	109-060472-001	Chip resistor / 0603,4.7K 5%	4	R151, R152, R159, R183
118	109-060473-001	Chip resistor / 0603,47K 5%	4	R10, R11, R13, R14
119	109-060561-001	Chip resistor / 0603,560R 5%	2	R202, R244
120	109-060562-001	Chip resistor / 0603,5.6K 5%	4	R44, R61, R62, R191
121	109-060563-001	Chip resistor / 0603,56K 5%	2	R16, R239
122	109-060564-001	Chip resistor / 0603,560K 5%	1	R148
123	109-060680-001	Chip resistor / 0603,68R 5%	1	R73
124	109-060683-001	Chip resistor / 0603,68K 5%	1	R190
125	109-060822-001	Chip resistor / 0603,8.2K 5%	1	R36
126	109-060823-001	Chip resistor / 0603,82K 5%	1	R51
127	109-070000-001	Chip resistor / 0805,0R 5%	1	L63
128	109-100R47-001	Chip resistor / 1206,0.47R 5%	3	R167, R168, R169
129	110-110473-001	Chip trimming resistor/ MVR22HXBRN473,47K 25%,B Linear	1	VR2
130	110-110683-001	Chip trimming resistor/ MVR22HXBRN683,68K 25%,B Linear	1	VR1
131	110-220103-008	Volume switch / RD810S-JA1-A103-0C61	1	SW1
132	112-043100-001	Chip capacitor / 0402,10P 0.5P,50V,C0G	1	C257
133	112-043101-001	Chip capacitor / 0402,100P 5%,50V,C0G	2	C171, C196
134	112-043102-001	Chip capacitor / 0402,1000P 10%,50V,X7R	8	C75, C105, C106, C110, C111, C263, C278, C310

135	112-043103-001	Chip capacitor / 0402,0.01uF 10%,50V,X7R	8	C50, C149, C155, C159, C160, C161, C162, C279
136	112-043104-001	Chip capacitor / 0402,0.1uF,+80%--20%,16V,Y5V	10	C85, C101, C167, C168, C173, C176, C177, C178, C271, C286
137	112-043104-002	Chip capacitor / 0402,0.1uF 10%,16V,X7R	1	C307
138	112-043105-001	Chip capacitor / 0402,1uF 10%,50V,X7R	4	C170, C235, C252, C303
139	112-043152-001	Chip capacitor / 0402,1500P 10%,50V,X7R	1	C289
140	112-043183-001	Chip capacitor / 0402,0.018uF 10%,50V,X7R	1	C156
141	112-043222-001	Chip capacitor / 0402,2200P 10%,50V,X7R	1	C215
142	112-043223-001	Chip capacitor / 0402,0.022uF 10%,50V,X7R	3	C242, C243, C245
143	112-043273-001	Chip capacitor / 0402,0.027uF 10%,50V,X7R	2	C179, C185
144	112-043332-001	Chip capacitor / 0402,3300P 10%,50V,X7R	1	C113
145	112-043333-001	Chip capacitor / 0402,0.033uF 10%,16V,X7R	2	C224, C244
146	112-043392-001	Chip capacitor / 0402,3900P 10%,50V,X7R	4	C82, C222, C238, C284
147	112-043393-001	Chip capacitor / 0402,0.039uF 10%,50V,X7R	1	C223
148	112-043471-001	Chip capacitor / 0402,470P 10%,50V,X7R	33	C4, C9, C22, C29, C48, C51, C52, C53, C54, C57, C58, C59, C60, C61, C71, C83, C84, C125, C152, C163, C248, C258, C269, C270, C274, C275, C290, C291, C305, C308, R161, R270, R271
149	112-043472-001	Chip capacitor / 0402,4700P 10%,25V,C0G	1	C285
150	112-043473-001	Chip capacitor / 0402,0.047uF 10%,16V,X7R	4	C212, C213, C253, C283
151	112-043474-001	Chip capacitor / 0402,0.47uF 10%,16V,X7R	2	C169, C302
152	112-043560-001	Chip capacitor / 0402,56P 5%,50V,C0G	1	C184
153	112-043562-001	Chip capacitor / 0402,5600P 10%,16V,X7R	1	C251
154	112-043681-001	Chip capacitor / 0402,680P 10%,16V,X7R	1	C260
155	112-043683-001	Chip capacitor / 0402,0.068uF 10%,16V,X7R	1	C259
156	112-043822-001	Chip capacitor / 0402,8200P 10%,16V,X7R	4	C157, C158, C239, C249
157	112-063100-001	Chip capacitor / 0603,10P 0.5P,50V,C0G	4	C124, C135, C142, C195
158	112-063101-001	Chip capacitor / 0603,100P 5%,50V,C0G	1	C93
159	112-063102-001	Chip capacitor / 0603,1000P 10%,50V,X7R	18	C95, C96, C97, C98, C99, C100, C103, C104, C107, C108, C109, C112, C114, C150, C151, C172, C264, C272
160	112-063103-001	Chip capacitor / 0603,0.01uF 10%,50V,X7R	4	C79, C153, C190, C280
161	112-063104-001	Chip capacitor / 0603,0.1uF 10%,50V,X7R	8	C74, C165, C174, C175, C193, C204, C231, C232
162	112-063105-001	Chip capacitor / 0603,1uF 10%,50V,X7R	4	C25, C30, C207, C233
163	112-063120-001	Chip capacitor / 0603,12P 5%,50V,C0G	2	C92, C133
164	112-063150-001	Chip capacitor / 0603,15P 5%,50V,C0G	3	C72, C73, C91
165	112-063152-001	Chip capacitor / 0603,1500P 10%,50V,X7R	2	C33, C35
166	112-063180-001	Chip capacitor / 0603,18P 5%,50V,C0G	2	C69, C94
167	112-063182-001	Chip capacitor / 0603,1800P 10%,50V,X7R	1	C226
168	112-0631R0-001	Chip capacitor / 0603,1P 0.25P,50V,C0G	3	C148, C229, C236
169	112-0631R5-001	Chip capacitor / 0603,1.5P 0.25P,50V,C0G	1	C62
170	112-063200-001	Chip capacitor / 0603,20P 5%,50V,C0G	1	C134
171	112-063220-001	Chip capacitor / 0603,22P 5%,50V,C0G	3	C143, C255, C256
172	112-063221-001	Chip capacitor / 0603,220P 5%,50V,C0G	1	C309
173	112-0632R0-001	Chip capacitor / 0603,2P 0.25P,50V,C0G	5	C2, C3, C88, C121, C182
174	112-063300-001	Chip capacitor / 0603,30P 5%,50V,C0G	2	C144, C194
175	112-063330-001	Chip capacitor / 0603,33P 5%,50V,C0G	1	C227
176	112-063333-001	Chip capacitor / 0603,0.033uF 10%,16V,X7R	1	C221
177	112-063390-001	Chip capacitor / 0603,39P 5%,50V,C0G	1	C139
178	112-0633R0-001	Chip capacitor / 0603,3P 0.25P,50V,C0G	6	C70, C78, C87, C90, C131, C230
179	112-0633R5-001	Chip capacitor / 0603,3.5P/3.6P 0.25P,50V,C0G	1	C63
180	112-063471-001	Chip capacitor / 0603,470P 10%,50V,X7R	42	C5, C6, C7, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C24, C26, C27, C28, C31, C34, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C49, C55, C56, C102, C154, C183, C186, C220, C261, C268, C287
181	112-063472-001	Chip capacitor / 0603,4700P 10%,50V,X7R	1	C214
182	112-063473-001	Chip capacitor / 0603,0.047uF 10%,16V,X7R	1	C211
183	112-063474-001	Chip capacitor / 0603,0.47uF+80%--20%,16V,Y5V	3	C8, C80, C192
184	112-0634R0-001	Chip capacitor / 0603,4P 0.25P,50V,C0G	2	C129, C228

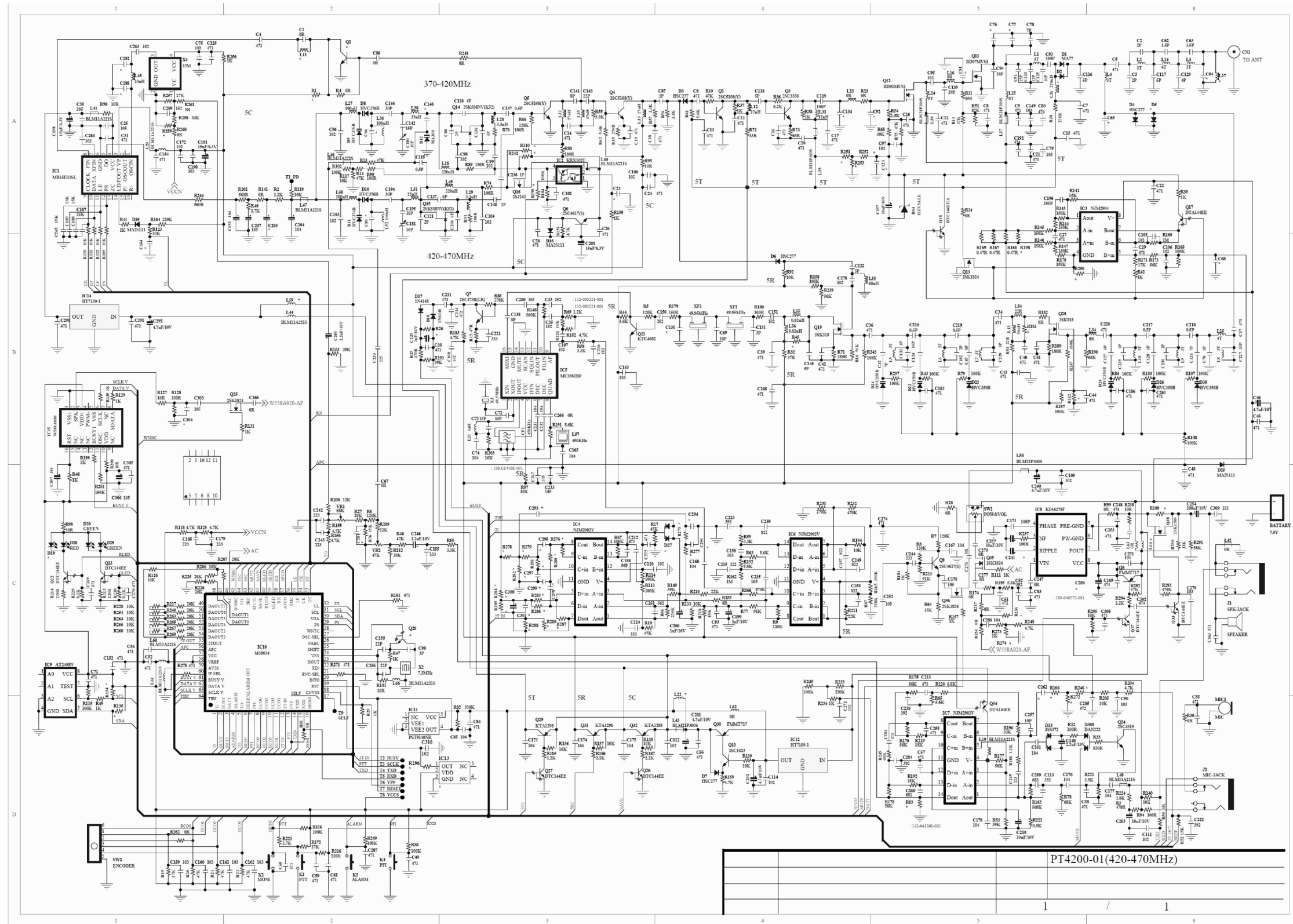| 185	112-0635R0-001	Chip capacitor / 0603,5P 0.25P,50V,C0G	6	C116, C117, C118, C119, C122, C145
186	112-0636R0-001	Chip capacitor / 0603,6P 0.5P,50V,C0G	4	C127, C128, C137, C206
187	112-0637R0-001	Chip capacitor / 0603,7P 0.5P,50V,C0G,	3	C32, C47, C126
188	112-0638R0-001	Chip capacitor / 0603,8P 0.5P,50V,C0G	4	C120, C136, C138, C141
189	112-063R50-001	Chip capacitor / 0603,0.5P 0.1P,50V,C0G	6	C115, C147, C216, C217, C218, C219
190	112-072225-001	Chip Ta capacitor/ TP Model,SIZE P,2.2uF 20%,10V	3	C140, C209, C246
191	112-072475-001	Chip Ta capacitor/ TP model,SIZE P,4.7uF 20%,10V	5	C46, C201, C202, C240, C292
192	112-073105-001	Chip capacitor / 0805,1uF+80%--20%,16V,Y5V	2	C267, C306
193	112-073225-001	Chip capacitor / 0805,2.2uF+80%--20%,10V,Y5V	1	C234
194	112-102105-001	Chip Ta capacitor /TS Model,SIZE A,1uF 20%,16V	3	C199, C200, C225
195	112-102106-002	Chip Ta capacitor /TS Model,SIZE A,10uF 20%,10V	4	C197, C203, C210, C237
196	112-102156-001	Chip Ta capacitor /TS Model,SIZE A,15uF 20%,6.3V	3	C191, C198, C208
197	112-172107-002	Chip Ta capacitor /TS Model,SIZE C,100uF 20%,10V	1	C254
198	113-010100-001	Chip trimming capacitor / TZV2Z100A110,3~10p+100/-%,Np0 300ppm/	2	C180, C181
199	114-06E220-001	Chip wire inductor / C1608CB-22NJ,ceramic core22NH 5%,0603	1	L51
200	114-06E270-001	Chip wire inductor / C1608CB-27NJ,green,ceramic core27NH 5%,0603	1	L30
201	114-06E560-001	Chip wire inductor / C1608CB-56NJ,ceramic core56nH 5%,0603	1	L13
202	114-06E680-001	Chip wire inductor / C1608CB-68NJ,ceramic core68nH 5%,0603	1	L53
203	114-06G101-003	Chip inductor / MLG1608BR10J,100nH 5%,0603	4	L27, L36, L50, L52
204	114-06G102-001	Chip inductor / MLF1608A1R0K,1uH 5%,0603	1	L21
205	114-06G120-001	Chip inductor / MLG1608B12NJT,12nH 5%,0603	1	L31
206	114-06G221-002	Chip stacked inductor/ LGHK1608R22J-T,220nH 5%,0603	2	L18, L49
207	114-06G270-001	Chip inductor / MLG1608B27NJ,27nH 5%,0603	3	L12, L32, L33
208	114-06G332-001	Chip inductor / MLF1608A3R3K,3.3uH 5%,0603	2	L28, L29
209	114-06G470-001	Chip inductor / MLG1608B47NJ,47nH 5%,0603	1	L35
210	114-06G6R8-001	Chip inductor / MLG1608B6N8DT,6.8nH 0.5nH,0603	1	L23
211	114-08E103-001	Chip inductor / FSLM2520-100J,10uH 5%,1008	1	L45
212	114-08E821-001	Chip inductor / FSLM2520-R82K,820nH 10%,1008	2	L55, L56
213	114-10E221-001	Chip wire inductor / LQN21AR22J,220nH 5%,1206	1	L26
214	115-1R53R0-004	Chip air-cored coil / 0.4*1.5*3TL,negative,high pin	10	L1, L2, L3, L4, L5, L6, L7, L8, L9, L10
215	115-1R54R0-004	Chip air-cored coil / 0.4*1.5*4TL,negative,high pin	2	L14, L15
216	115-1R55R0-001	Chip air-cored coil / 0.5*1.5*5T,positive,high pin	1	L24
217	115-1R58R0-002	Chip air-cored coil / 0.4*1.5*8TL,negative,high pin	1	L25
218	117-000000-004	Chip bead / EMI,FILTER,SMT, BLM11A221S,0603	11	L19, L20, L40, L41, L44, L46, L47, L48, L60, L61, L66
219	117-000000-005	Chip bead / EMI,FILTER,SMT, BLM21P300S,0805	5	L37, L38, L39, L43, L58
220	121-200000-001	Microphone / B6027AP402-65	1	MIC1
221	122-113M00-001	Chip transistor/ 13MHz 2.5PPm	1	X4
222	122-17M300-001	Chip crystal resonator / CSTCR7M30G53-R0,7.3M	1	X2
223	122-249M50-001	Plug-in crystal oscillator/ 49.5MHz 10PPM,UM-1	1	X3
224	124-050000-004	3.5mm Mic socket / SP/MIC,ST-212	1	J2
225	124-050000-005	2.5mm Eearphone socket / SP/MIC,EJ-2507-CCPA	1	J1
226	603-0W558A-001	Voice recorder IC / W588A080,binding	1	Ic15

Appendix 5 Accessory List

Item	Model	Specification	Accessory Figure
Battery	KB-42A	7.4V 1200mAh Li-Poly	
Hand Strap	8AJD-20K		
Earphone	KME-201		
	KME-202		
Charger	KBC-58L	7-hour standard charger	
Adapter	KTC-58C1	DC OUT 15V 400mA	
Antenna	KA-3U064		
	Short Antenna		

Figure 1 PT4200 Top Board Position Mark Diagram

Figure 2 PT4200 Bottom Board Position Mark Diagram
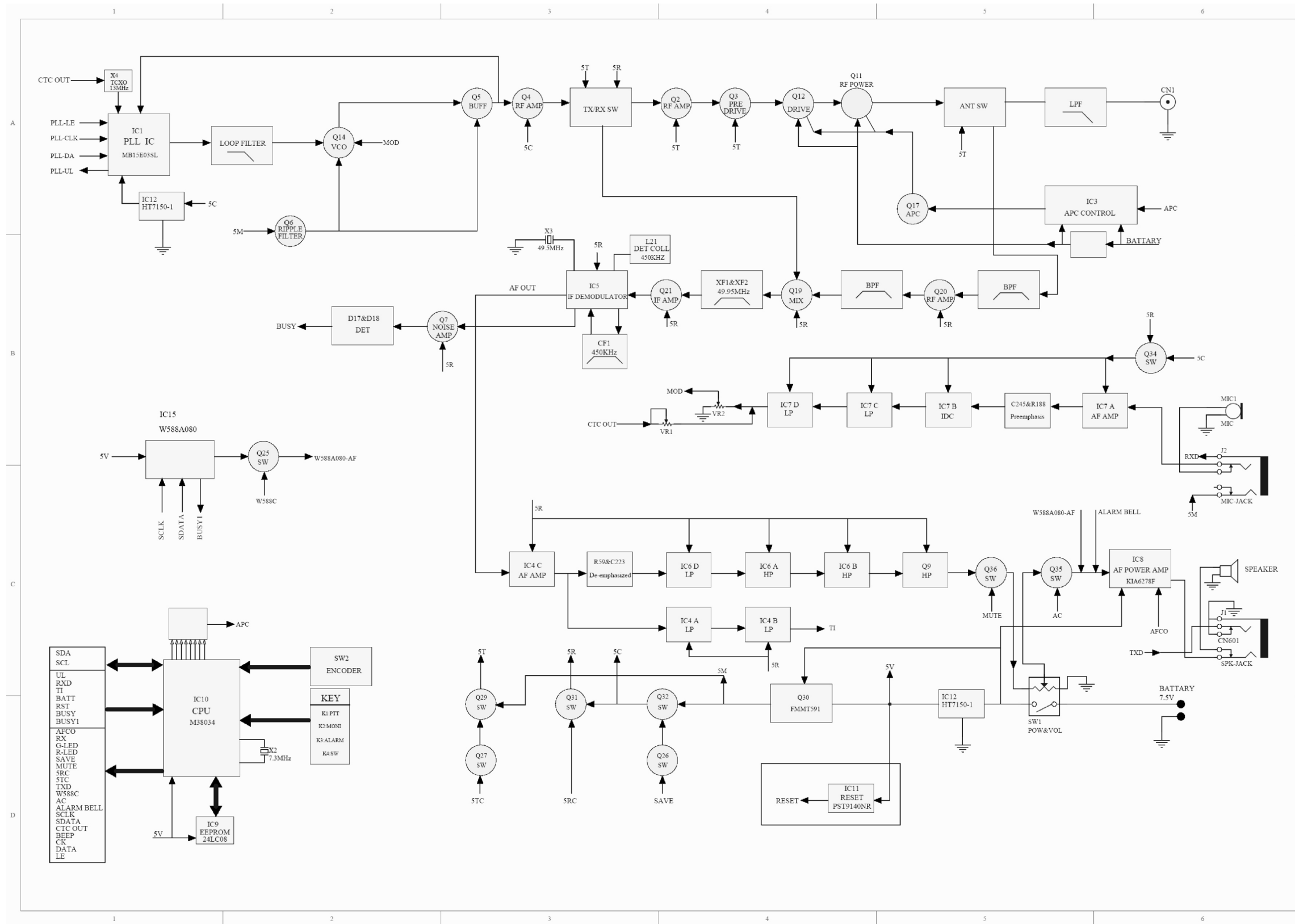
PT4200-01(420-470MHz)

Figur4 PT4200 Schematic Circuit Pane Diagram

Figure 5 KBC-58L Schematic Circuit Diagram

KBC-58L Schematic Circuit Diagram — 1/1

KIRISUN ELECTRONICS (SHENZHEN) CO.,LTD