

A720T (Ex) (VHF) Service Manual

ABELL INDUSTRIES CO., LTD

CATALOG

CHAPTER 1 INTRODUCTION	4
1.1 SCOPE OF APPLICATION	4
1.2 SECURITY ISSUES	4
CHAPTER 2 STRUCTURE AND KEY FUNCTIONS	5
2.1 STRUCTURE	5
CHAPTER 3 COMPOSITE MODE	7
3.1 MODE	7
3.2 HOW TO ENTER EACH MODE	7
3.3 PC MODE	7
3.3.1 PREFACE	7
3.3.2 CONNECTION STEPS	7
CHAPTER 4 DISASSEMBLED PARTS IN MAINTENANCE PROCESS	9
4.1 DISASSEMBLE THE RADIO	9
4.2 EXPLOSIVE VIEW	10
CHAPTER 5 UNIT CIRCUIT	11
5.1 DMR DIGITAL CIRCUIT SIGNAL BLOCK DIAGRAM	11
5.2 ANALOG CIRCUIT STRUCTURE	11
5.3 RECEIVER	12
5.3.1 FRONT-END RADIO-FREQUENCY AMPLIFIER	12
5.3.2 FIRST FREQUENCY MIXER	13
5.3.3 INTERMEDIATE FREQUENCY AMPLIFIER (IF AMP)	13
5.3.4 AF AMPLIFIER	13
5.3.5 NOISE SUPPRESSION CIRCUIT	13
5.4 PHASE LOCKED FREQUENCY SYNTHESIZE	14
5.4.1 PLL CIRCUIT	14
5.4.2 UNLOCKED DETECTOR	15
5.5 TRANSMITTER	15
5.5.1 RF AUDIO	15
5.5.2 QT/DQT/4FSK CODING	15
5.5.3 WIDE/NARROW BAND SWITCH	15
5.5.4 VOLTAGE-CONTROLLED OSCILLATOR(VCO) AND RF AMPLIFIER	16
5.5.5 ANTENNA TRANSFER SWITCH AND LPF	16
5.5.6 POWER CONTROL	16
5.5.7 TEMPERATURE PROTECTION CIRCUIT	16
5.6 POWER SUPPLY	17

5.7 CPU CONTROL SYSTEM	18
CHAPTER 6 FUNCTIONS AND CONFIGURATIONS	19
6.1 FUNCTION DEFINITION AND PARAMETER CONFIGURATION	19
6.1.1 CHANNEL	19
6.1.2 SCAN	19
6.1.3 POWER/BATTERY SAVE	19
6.1.4 VOX	20
6.1.5 TOT	20
6.1.6 HIGH/LOW POWER SWITCH	20
6.1.7 SQUELCH LEVEL	20
6.1.8 RECEIVE AND MAKE CALL	20
6.1.9 RADIO CHANNEL, RADIO ID AND GROUP ID	20
6.1.10 LOW BATTERY WARNING	22
6.2 CONFIGURATIONS	23
6.2.1 SQUELCH LEVEL	23
6.2.2 HIGH/LOW POWER SWITCH	23
6.2.3 VOX	23
6.2.4 PROMPT TONE TURN ON/OFF	23
6.2.5 CHECK BATTERY CHARGING STATUS	23
6.2.6 CTCSS	24
6.2.7 CDCSS	24
CHAPTER 7 RADIO DEBUGGING	25
7.1 THE REQUIRED TEST EQUIPMENT	25
7.2 DEBUGGING INTRODUCTION	27
CHAPTER 8 PARAMETERS	32
BILL OF MATERIALS (ELECTRONICS)	34
FIG.1 A720T (EX) BIT MAP	49
TOP SIDE:	49
BOT SIDE:	50
FIG. 2 A720T (EX) SCHEMATIC DIAGRAM	51
FIG. 3 A720T (EX) BLOCK DIAGRAM	55
FIG. 4 A720T (EX) PACKING	56

Chapter 1 Introduction

1.1 Scope of application

This manual is written for technicians who well know communication profession and have maintenance experience. It includes all information and existing published data required by the equipment maintenance. The change may happen after its publication, if required, you can use repair bulletin and manual revised edition as supplement.

Before repair the equipment, please read this manual first.

1.2 Security Issues

Safe power radiation of two way radio

Two way radios can produce and emit electromagnetic energy to outside, and electromagnetic transmission safety design of ABELL two way radio completely conforms with national and international standard. In order to ensure the best communication effect of two way radio and the electromagnetic transmission safety for human, when you use two way radios for communication, please keep the two way radio perpendicular to the ground, and your mouth away from microphone 2.5-5 cm.

Electromagnetic interference

In order to avoid electromagnetic interference, please turn off two way radio when you are in the places where there is clear indication to turn off the two way radio (such as hospital, airport)

Explosive environment

You'd better turn off two way radio when in explosive environment.

Please turn off two way radio when in gas station or parking there.

Please turn it off when near electric fuse.

It is strictly prohibited to replace or recharge battery in the place where there is potentially explosive air.

Damaged antenna

When antenna is damaged, you better not to use two way radios. When the damaged antenna touches human skin, it may cause mild burn.

Parts replacement

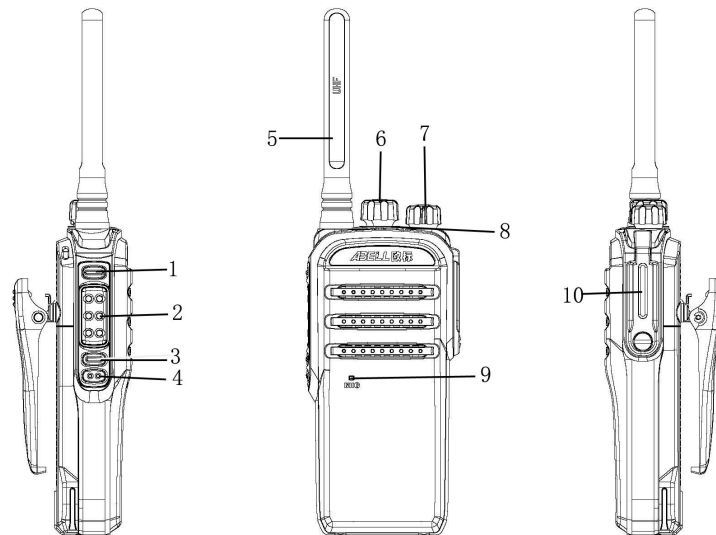
When start to replace any parts, please note the type, don't randomly use the components which differ from the information provided by the company.

Maintenance service

In order to repair the equipment, we set up a completed service system, and provide the material including schematic diagram, printed substrate as your reference.

Chapter 2 Structure and key functions

2.1 Structure



① ③ ④ **Programmable function key:** These keys are programmable function keys; Long press (key-press time should reach the time we set for long press key) and short press (normal key), which can be set for different functions. Press it to enable programmable auxiliary functions.

Your dealers can program key 1, 3 and 4 to add hotkeys and preset channel/group:

Short press: quick press and then release

Long press: Keep pressing for several seconds (preset time between 0.25s to 3.75s)

No function: If you preset this key as no function, it will warn you when pressing it.

② **PTT key:** Press this switch, and then call the opposite by microphone. Release the switch to listen.

⑤ **Antenna**

⑥ **Knob: Channel switch**

Rotate it from channel 1 to channel 32. (note: there are totally 32 channels in two areas of A720T (Ex))

⑦ **Knob: Power on/off and Volume control**

Clockwise rotate it to turn on the two way radio power, you will hear a sound of "click", then continuously rotate it to

adjust volume. When you want to turn off two way radio, counter-clockwise rotate the knob until hear a sound of "click".

Note: if you turn off the power on sound when programming, you will not hear the power on sound. Check the battery when power on failure to make sure battery installed properly. If you still cannot power on the radio, please contact the dealer. Clockwise to higher the volume

⑧ Luminous diode Indicator

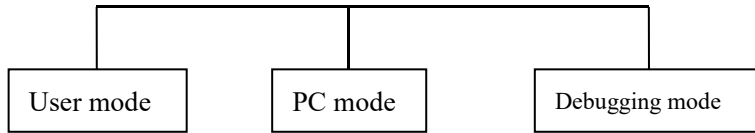
It shows red when transmitting; It shows green when power on, receiving or detecting signal; Red flashes when low battery.

⑨ Speaker

⑩ Dust cover for earpieces and programming

Chapter 3 Composite Mode

3.1 Mode



Mode type	Function
User mode	This mode is used for general operation
PC mode	By this mode, use external programming cable to make various settings
Debugging mode	Adjust parameter of machine

3.2 How to enter each mode

Mode type	Operation steps
user mode	Boot whilst automatically come into user mode
PC mode	Use programming cable to connect with PC
Debugging mode	Through programming software, come into debugging mode.

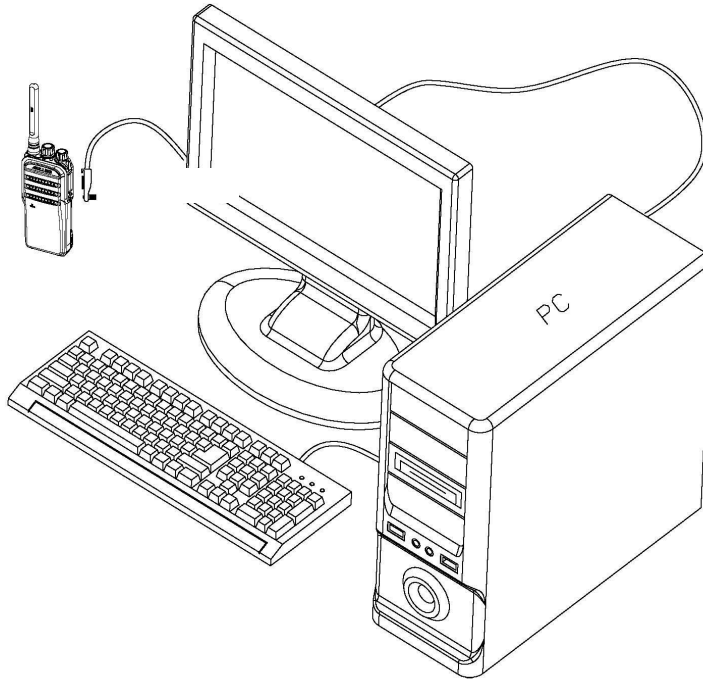
3.3 PC mode

3.3.1 Preface

Use programming cable to connect A720T (Ex) and PC, operate programming software (ABELL A720T (Ex) programming software) on PC to make programming setting for communication equipment. Figure 1 shows the process of programming setting on PC.

3.3.2 Connection Steps

1. Use programming cable to connect A720T (Ex) and PC
2. Operate programming software (ABELL A720T (Ex) programming software).
3. Set the communication port.
4. Conduct various programming operation on two way radio.
5. When the radio transmit, red light is blinking. When the radio receives, green light is blinking.

**Notice:**

- When data is written into EEPROM, the data stored in PC must conform with model of radio. Turn on power of radio only on condition that the software must run and cable must be connected.
- In the course of transmitting or receiving data, do not press [PTT] key.

Programming cable (optional):

Connect A720T (Ex) with PC using programming cable.

- **Programming S/W**

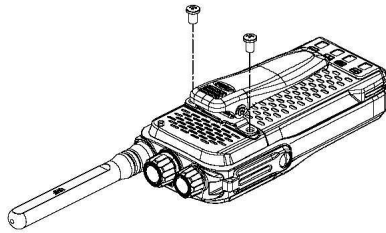
ABELL A720T (Ex) programming software (installed) allow users to conduct programming setting on A720T (Ex) through programming interface cable.

- **Program on PC**

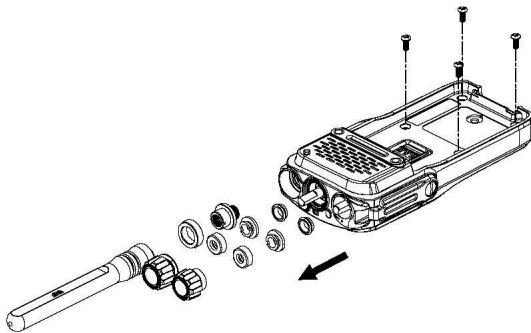
If use PC with ABELL two way radio programming for transmitting data to radio, the setting destination data (basic communication parameters) can all be modified. as the value is automatically generated in setting frequency range(frequency type), generally it is not necessary to change destination data. the value can be changed only in necessary condition. The data in form of RS-232C can be input into EEPROM, in this mode, the function of PTT line can be served for sending and receiving data.

Chapter 4 Disassembled parts in maintenance process

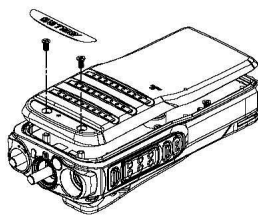
4.1 Disassemble the radio



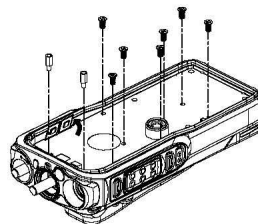
1. Remove two screws and take away the belt clip



2. Rotate to remove antenna
3. Pull out volume and channel knob
4. Remove waterproof ring
5. Remove antenna base
6. Remove waterproof screw nut
7. Remove 4 screws



8. Pull out the logo sticker
9. Remove 2 screws
10. Pull housing
11. Use the soldering iron to melt the tin on speaker wire. Then you can separate up case and aluminum housing part.



12. Remove 6 screws and 2 copper screw nuts.
13. Up warp two BTB
14. Against battery connector from back then lift PCB part

4.2 Explosive View

41	BATTERY FRONT CASE	1
40	BATTERY O-RING	1
39	BATTERY SPRING	1
38	BATTERY LOCK	1
37	BATTERY LOCK AXLE	1
36	BATTERY LOCK HOLDER	1
35	SCREW PA2*85	2
34	LITHIUM BATTERY	1
33	BATTERY REAR CASE	1
32	BREATHABLE FILM	1
31	BATTERY LABEL	1
30	BACK CLIP ASM	1
29	SCREW PM2*88	4
28	EAR MIC COVER	1
27	BREATHABLE FILM	1
26	AL CASE	1
25	RUBBER PVD	1
24	PCB ASM	1
23	SCREW PM2.0*6	2
22	REAR COVER	1
21	SPRNG O-RING	1
20	WATERPROOF NUT	2
19	VOL KNOB	1
18	CHANNEL KNOB	1
17	ANT	1
16	ANT O-RING	1
15	ANT HOLDER	1
14	LHD LENS	1
13	WORKING KEY	1
12	SILICONE KEY	1
11	PTT BRACKET	1
10	PTT KEY	1
9	COPPER STUD	2
8	SCREW PHRUZ.0*4	7
7	MATTINGS	1
6	UNIT O-RING	1
5	SPEAKER	1
4	MIC COVER	1
3	UNIT FRONT CASE	1
2	SCREW PM2*4	2
1	LOGO LABEL	1
NO	DESCRIPTION	QTY

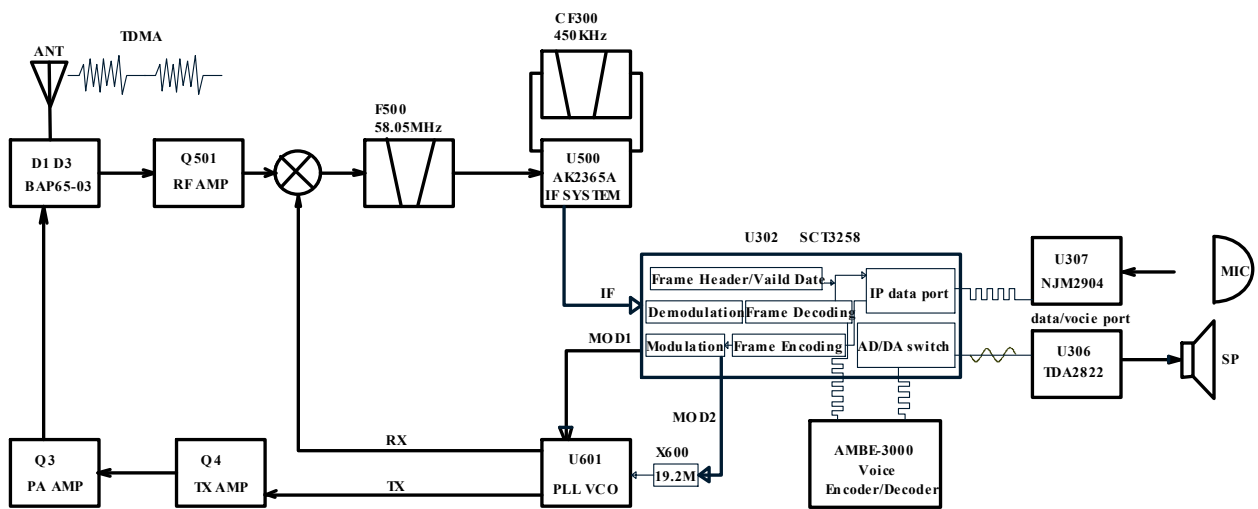
ABELL INDUSTRIES CO., LTD			
Name	explode	Date	2017-08-23
Model	A720T	Design	
Material		Check	
Part No		Approve	
		Ver	00

Chapter 5 unit circuit

5.1 DMR digital circuit Signal block diagram

4FSK digital signal channel process of Block diagram of DMR digital circuit:

- Via MIC, voice comes into NJM2904V, being amplified; After that DSP digital signal is processed to 4FSK digital modulating signal, which are sent to VCO and crystal modulator by two ways as MDO1/MOD2, then sent out by transition circuit.
- The 4FSK digital modulation signal received by receiving circuit is sent to SCT3258TD DSP digital signal processing; and it was demodulated by AMBE3000 to be 4FSK digital audio signal; then TDA2822 power amplifier will magnify and drive SP speaker.



DMR Circuit Structure

5.2 Analog Circuit Structure

Receiver is working on double conversion superheterodyne mode, first intermediate frequency is 58.05MHz, second Intermediate Frequency is 450KHz. The first vibration signal is provided by the phase-locked loop (PLL).

Required frequency by transmitter is come directly from PLL.

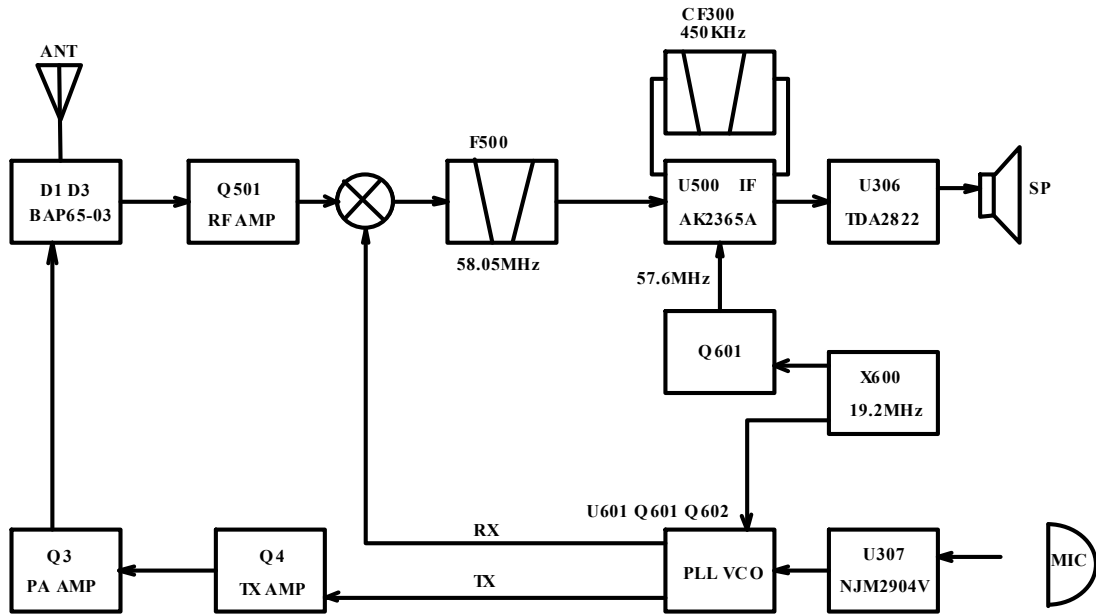


Chart 1 Analog Circuit Structure

5.3 Receiver

Receiver is working on double conversion superheterodyne mode, its rated operation frequency range is 136-174MHz.

5.3.1 Front-end radio-frequency amplifier

Signal received by antenna comes into low pass filter and receiving/transmission switching diode (D1, D3 and D501, D502 are disconnected), the unwanted signal is filtered out by secondary LC band-pass filter, go through RF overload protection diode(D505), go into RF amplifier(Q501) and amplified by it, after which the signal will go through third level LC band-pass filter and unwanted signal will be filtered out, wanted signal will be allowed to go into first mixed frequency(Q502).

Due to the limited working bandwidth of LC band-pass filter, the required bandwidth is achieved by AFC automatic frequency control voltage adjusting varactor diode (D503-D507) capacitor value. AFC voltage is controlled by U300 microprocessor center frequency (see Figure 2).

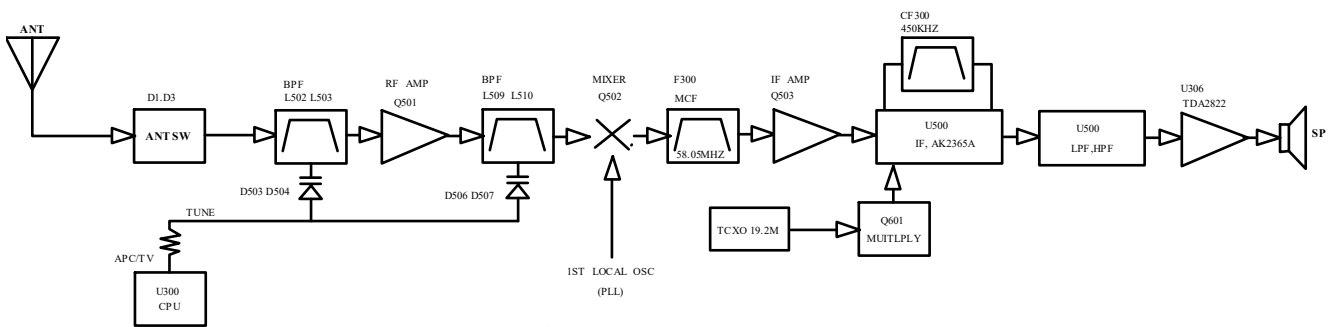


Chart 2 Receiving Circuit

5.3.2 First frequency mixer

The signal from the RF amplifier is mixed with the first oscillator signal from the PLL frequency synthesizer circuit at the first mixer (Q502) and generates the 1st IF signal of 58.05MHz. The first if signal is further eliminated by a two-stage single-crystal filter (F500).

5.3.3 Intermediate Frequency Amplifier (IF AMP)

First intermediate frequency amplified through Q503, then go into chip U500(FM process chip). Signal will mix with second local referenced signal and generates a 450KHz second IF signal, which will go through a 450KHz filter to filter out unwanted spurious signal before it is amplified and discriminated.

5.3.4 AF Amplifier

In the U500, the audio signal demodulated by frequency discrimination is de-emphasised by IC501(A,B) high-pass filter and then IC501(C, D) low-pass filter. The processed AF signal passes through an AF volume control and is amplified to a sufficient level to drive a loud speaker by an AF power amplifier (U306).

5.3.5 Noise Suppression Circuit

Part of the audio signal from 13 pin of U500 will go through U500 again, use filter and amplifier to amplify noise and then Rectify to generate a DCV with corresponding noise level. The DCV goes through A/D port of micro processor. U300 will detect the input voltage value to see if whether it exceeds or is lower than the preset value, then decide the output voice through speaker.

To output voice through speaker, micro processor(U300) will send a high level signal to AF_MODE control line: open Q302 through Q303 to supply power, open the Audio Power Amplifier (U306).

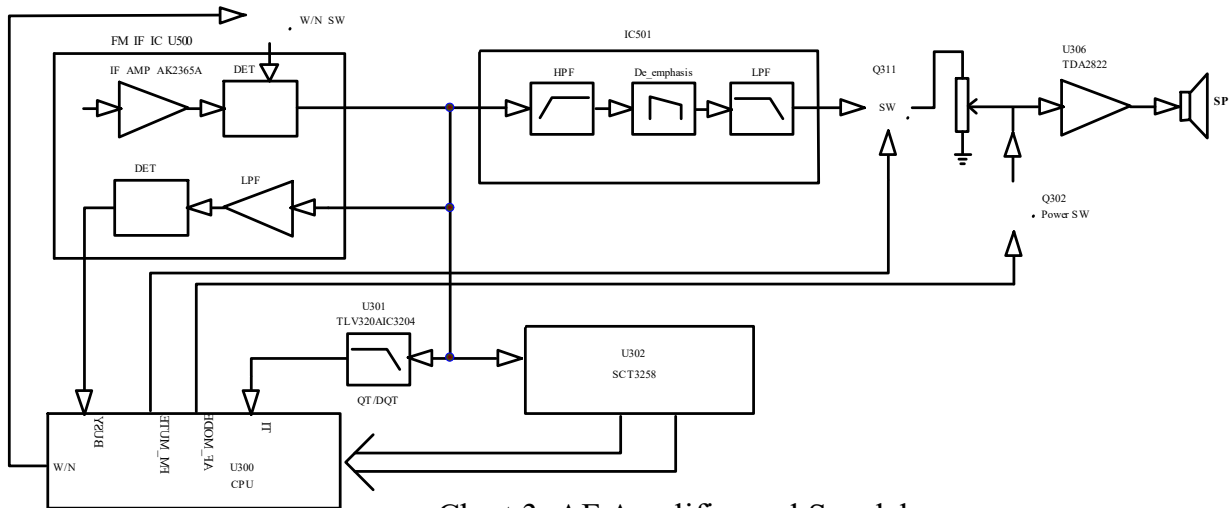


Chart 3 AF Amplifier and Squelch

5.4 Phase Locked Frequency Synthesize

The PLL circuit generates the first vibration signal for reception and the RF carrier signal for transmission.

5.4.1 PLL Circuit

Step frequency of PLL is 5 or 6.25KHz. The 19.2MHz reference oscillator signal is divided in a phase-locked loop (U601) by a hybrid counter and generates a reference frequency of 5 or 6.25KHz. The voltage controlled oscillator (VCO) outputs signal is buffer amplified by Q605 then divided in PLL(U601) by a dual-module programmable counter. The divided signal is compared in (U601) with a phase comparator with a 5 or 6.25 KHz reference signal. The output signal from the phase comparator is filtered through a low-pass filter and passed to the VCO to control the oscillation frequency. (See Fig.4)

5.4.1 Voltage-Controlled

Oscillator(VCO)

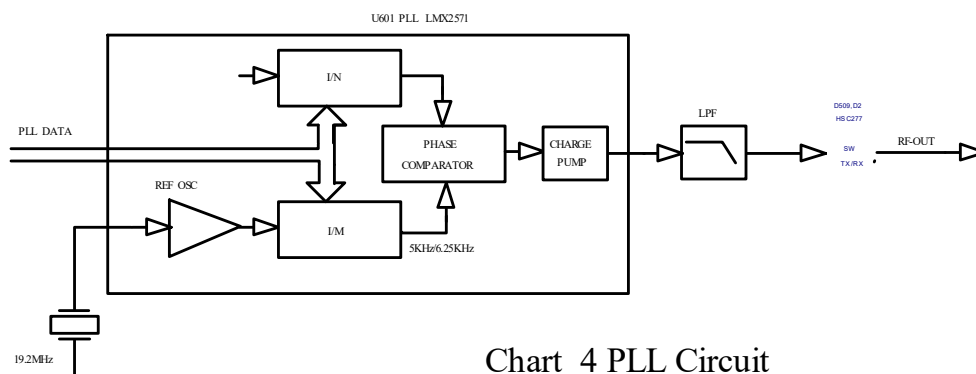


Chart 4 PLL Circuit

Q601 generate operation frequency during transmitting mode, Q602 generate operation frequency during receiving mode. From phase comparator to Varactor Diodes(D603 and D609 in transmitting mode, D606 and D607 in receiving mode).

mode), adopt voltage-controlled oscillator to control oscillation frequency. In receiving mode, Q607 conduct to provide Q601 power supply. In transmitting mode, Q607 cut off Q611 to conduct and provide Q602 power supply. (Q607 cut off or conduct is determined by output high/low level of micro processor. Micro processor(U300 and 56th pin) output high level in receiving mode, output low level in transmitting mode)output of Q601 and Q602 will be amplified by Q605 and sent to buffer amplifier.

5.4.2 Unlocked Detector

Lose lock if there is low level on LLP(10th pin of U601). Then get DC voltage from R634, if the low level detected by micro processor(53rd pin of U300), transmitting will be unable regardless of communication switch.

5.5 Transmitter

5.5.1 RF Audio

FM signal from microphone will be amplified when through U307(A), and will be processed by IDC pre-emphasised circuit when through another U301 and amplified. Then part(higher than 3KHz) of the signal will be filtered out when going through inner low-pass filter of U301. Then start FM after going trough amplifier and VCO. Audio deviation is controlled by the inner output electric level of audio filer U301. Check Chart 6 followed

5.5.2 QT/DQT/4FSK Coding

Required signal for MOD/QT/DQT/4FSK coding is produced by U301 and U300, which is being adjusted according to reference frequency of PLL all the way. Since reference oscillator cannot adjust any frequencies out of loop frequency, FM will be at another side of VCO in another path. Check Charter 6 followed.

5.5.3 Wide/Narrow Band Switch

We can use programming software to enable wide/narrow band to set that of various channels. Wide/narrow band data will be realized by inner output of U300. Check Charter 6 followed.

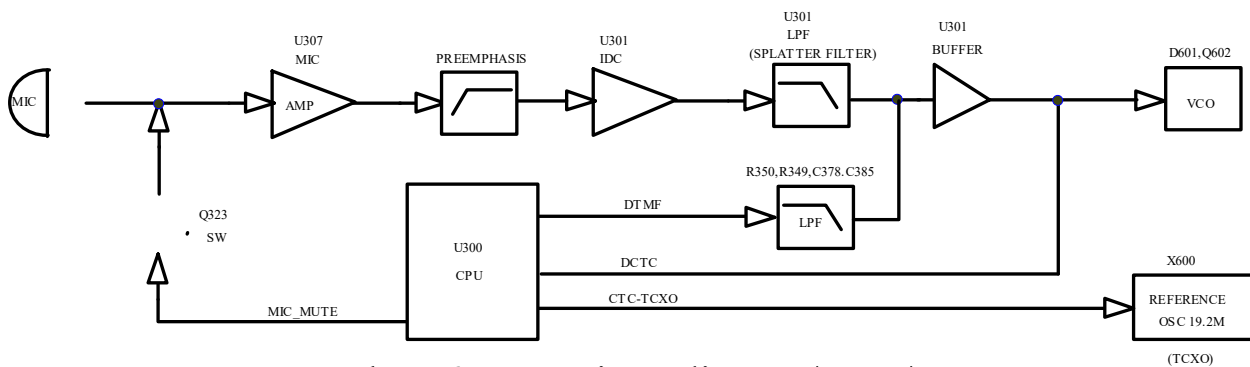


Chart 6 Transmit Audio QT /DQT/DTMF

5.5.4 Voltage-Controlled Oscillator(VCO) and RF Amplifier

Signal comes from VCO buffer amplifier(Q605) will be amplified when through Q606, Q8, and Q10. This amplified signal go through amplifier and Q3(RF MOSFET DOLULE), the RF power will be 5W if you set radio as high power, will be 1.5w if your set radio as low power. Check chart 7.

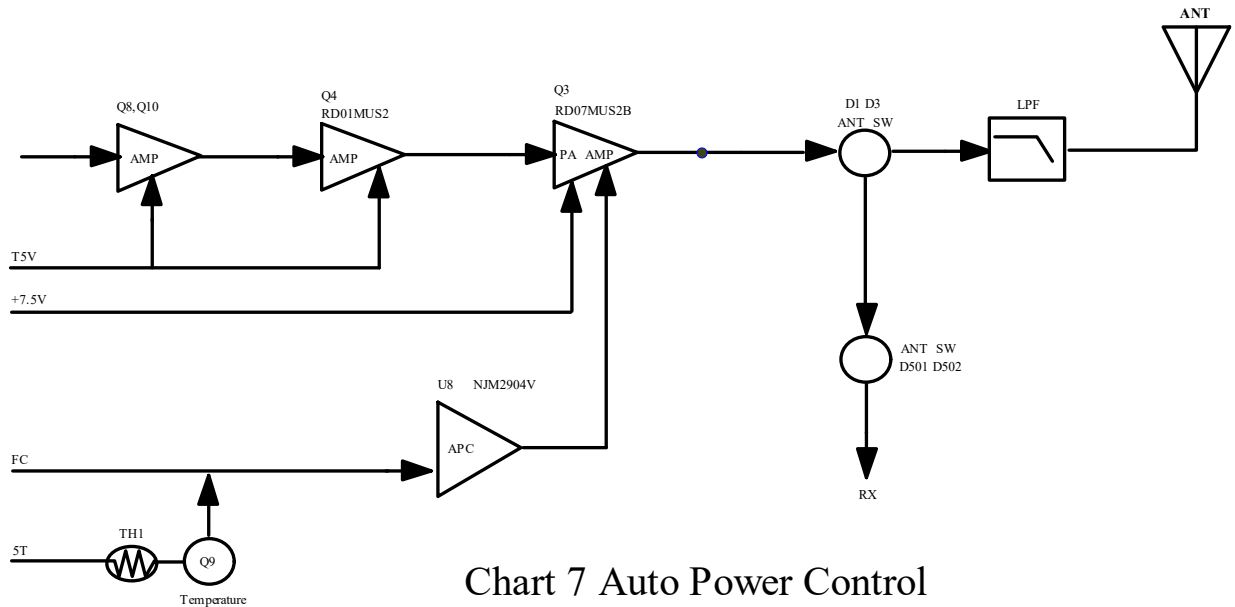


Chart 7 Auto Power Control

5.5.5 Antenna transfer switch and LPF

Before RF signal reach antenna terminal, RF amplifier output signal , harmonic will be filtered when it going through low-pass filter then this signal go through transmit/receive switch circuit(made of D1 and D3). D1 and D3 keep open(conductive) in transmitting mode, keep closed(isolation) in receiving mode.

5.5.6 Power Control

Power control circuit can stabilize the transmission output power through detecting drain current of final amplifier field-effect tube. Voltage comparing circuit, U8 use the reference voltage configured by microprocessor to compare with the voltage obtained from the last current. The different value of power control voltage and U8output automatic detection voltage and reference voltage is in direct proportion. The output voltage can control the power amplifier of field-effect tube, and maintain the constant of output power of transmission part. The output power of transmission part can be changed by microprocessor, and the reference voltage can be changed by microprocessor to control output power.

5.5.7 Temperature Protection Circuit

When the thermistor(TH1)reaches about 80°C, the protection circuit turns on to protect transmitting final amplifier(Q3) from the overheating.

5.6 Power Supply

J404 input +7.5V to U313 LM2734X to born +3.3V voltage to power U300 micro processor. J404 input+7.5V to U308 XC6204B502MR +5.0V(5C) voltage to power VCO and PLL circuit 从 J404. J404 input +7.5V to U314 XC6204B502MR +5.0V(5R)voltage to power receiving circuit and audio circuit. J404 input +7.5V to U315 XC6204B502MR +5.0V(5T)voltage to power transmitting control circuit.

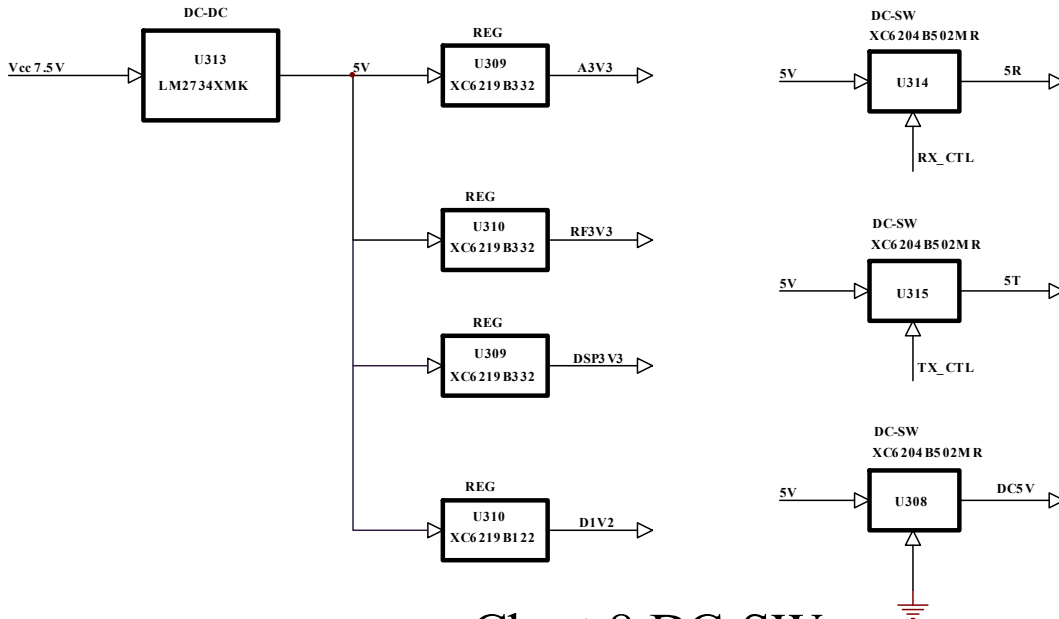
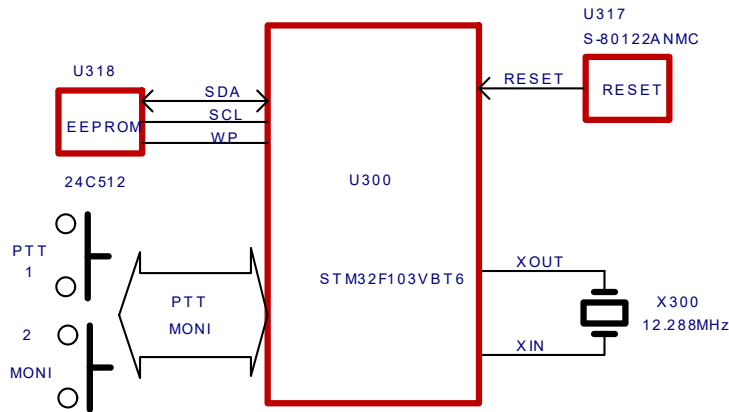


Chart 8 DC-SW

5.7 CPU Control System

U300 micro processor clock running on 12.228MHz.



Low voltage warning of battery:

The battery voltage is monitored by U300 microprocessor. When it is below the low voltage of warning, the warning tone will alarm.

On standby status:

- When battery voltage is lower than preset warning value, system enter into low voltage warning status, radio will give a “Beep” sound at preset intervals

On transmitting status:

- When battery voltage is lower than preset warning value, press PTT key, the indicator LED will keep showing flash red, radio is on transmitting status; When you release PTT key, radio will give a “Beep” sound at preset intervals.
- When battery voltage is lower than preset warning value but still withing the required transmitting voltage, red long bright, you can press PTT key to transmit, radio will give a “Beep” sound at preset intervals.
- If voltage lower than required transmitting voltage, when release PTT key, radio will give a “Beep” sound at preset intervals. When you press PTT key again, red keeping flashing, radio will give a “Beep” sound and stop transmitting; The transmitting will recover again till voltage higher than required transmitting voltage, red flash and “Beep” sound will disappear.
- When battery voltage lower than standard, red keep flashing, if you press PTT key, radio will give “Beep” sound at preset intervals.
- Radio will power off when battery voltage lower than power voltage. You need to charge the battery till higher than power voltage to power on again.
- When battery voltage higher than high voltage protection circuit, transmitting will be stopped, radio will give “Beep” sound. Radio can only be allow to transmit till voltage turn normal.

Charter 6 Functions and Configurations

6.1 Function Definition and Parameter Configuration

6.1.1 Channel

This machine can store up 32 channels in 2 areas. 16 channels in each area.

6.1.2 Scan

Press preset scan key to active scan function, radio indicator LED will flash yellow. Once signal detected in any of the channels, indicator LED will long bright green, speaker will open. There will be a delay after channel disappear, then go to scan next channel.

Press preset scan key to quit scan status.

Two Scan Ways

Main channel scan(manually): radio will scan all channels/groups in your preset scan list. When enter scan mode, according to different settings, your radio can start scan from the last scanned active channel/group or start scan from current channel.

Auto scan(automatically): After you choose an active preset scan channel/group, radio will start scan automatically.

Start and Stop Scan

Steps:

Press pre-programmed scan key. Or switch the channel knob to select a scan channel(pre-programmed).

After scan function activated, indicator LED will flash yellow, you will hear a prompt “Di” tone. After scan stopped, indicator LED no stop bright, you will hear a prompt “Di Di” tone.

During scan, response to scan

When your radio scan detect stop at an active channel/group, radio will keep staying at this channel, which is called pre-programmed time limit of free time.

Steps:

1Hold radio and place it 1 to 2 inch away from your mouth at vertical position. If you turn on “Channel Free” function, you will hear a short sound after the caller released PTT key, which means this channel is unoccupied and wait for your speaking.

- Within the free time, press PTT key, indicator LCD will bright red.
- Wait till the “call tone” is finished(if you turned on “call tone” during programming), then start to speak.
- Release PTT key to listen.
- If you don't have any response during free time, radio will leave and scan other channels.

6.1.3 Power/Battery Save

You can turn this function via customer programming software.

If there is no any operation or call 8 seconds after power on, your radio will active power/battery save mode.

Select Open: Turn on power/battery save mode

Select Close: Turn of power/battery save mode

Default: Turn on

6.1.4 VOX

With voice instead of pressing the PTT key, use voice to control transmission by microphone.

6.1.5 TOT

To forbid long time channel occupation and to protect radio from being operated for long time transmitting.

6.1.6 High/Low Power Switch

Select High or Low power by programming.

6.1.7 Squelch Level

Squelch level from 0-9 can be chosen, level 1 is the shallowest which is easy to receive weak signal, level 9 is the deepest which can receive stronger signal, and whose background noise is relatively less, interval of each grade is about 1dbm, level 0 is out of control with squelch hysteresis.

6.1.8 Receive and Make Call

Select Area

Area is a channel group. This radio support 2 areas, there are max. 16 channels in each area

Steps:

Press pre-programmed area key.

You will hear a prompt “Di” tone, which means your radio has switched from area 1 to area 2; you will hear a prompt “Di Di”tone, which means your radio has switched from area 2 to area 1.

6.1.9 Radio Channel, Radio ID and Group ID

Steps:

After the desired zone is set (if there are more than one zone),switch channel knob to choose channel, radio ID and group ID.

Receive and Reply Call

Steps:

In channel,after you set the radio ID and group ID , you can receive call or call back.

Indicator LED bright red when radio is transmitting, bright green when radio is receiving signal.

Receive and Reply Group Call

Your radio must be set to belong to the group if you want to receive the group call.

- Indicator LED bright green.
- Hold radio and place it 1 to 2 inch away from your mouth at vertical position. If you turned on “Channel Free” function when programming, after the caller released PTT key, you will hear a short prompt tone, which means this channel is free for you to call back.
- Press PTT key to speak. Indicator LED bright red.

- Wait till the “call tone” is finished(if you turned on “call tone” during programming), then start to speak.
- Release PTT key to listen/receive signal.
- If there is no speaking withing preset time, your speaking/call is over.

Receive and Call Back to Individual Call

Definition of Individual Call: one radio call another radio; there are two types of individual call: start radio check/detect before call; start to call immediately.

Dealer can only program one of the two types individual call call into radio.

Steps:

When you received a individual call

- Indicator LED bright green
- Hold radio and place it 1 to 2 inch away from your month at vertical position. If you turned on “Channel Free” function when programming, after the caller released PTT key, you will hear a short prompt tone, which means this channel is free for you to call back.
- Press PTT key to speak. Indicator LED bright red.
- Wait till the “call tone” is finished(if you turned on “call tone” during programming), then start to speak.
- Release PTT key to receive signal/ listen.
- If there is no voice activities within preset time, this calling is over.
- You will hear a short tone.

Receive a ALL Call

Definition of ALL Call: one radio call all radio on the same channels.

Steps:

When you are receiving a ALL Call:

You'll hear a prompt tone, indicator LED bright green.

If there is no voice activity within preset time, the ALL Call is over. If you turned on “Channel Free” function when programming, after the caller released PTT key, you will hear a short prompt tone, which means this channel is free for you to use, but you cannot call back to a ALL call.

Note: When receiving ALL call, radio will stop receiving all call if you switch to other channel. No pre-programmed function key can be used during the all call

Speak/Call

Your can use following methods to select a channel, radio ID or group ID:

- Channel Knob
- Pre-programmed making call key

Make Call by Channel Knob

Make Group Call

Your radios must be pre-programmed belong to this group if you want to make call to this group.

Steps:

- Switch channel knob, use activated group ID to select channel.
- Hold radio and place it 1 to 2 inch away from your month at vertical position.
- Press PTT key to make call/speak, indicator LED bright red.
- Wait till the “call tone” is finished(if you turned on “call tone” during programming), then start to speak.

- Release PTT key to receive. When other radio is speaking, indicator LED bright green.
- If you turned on “Channel Free” function when programming, after the caller released PTT key, you will hear a short prompt tone, which means this channel is free for you to call back/speak. You can press PTT key to speak.
- If there is no voice activity within preset time, the call is over.
-

Make Individual Call

Steps:

- Switch channel knob, use activated Individual ID to select channel.
- Hold radio and place it 1 to 2 inch away from your mouth at vertical position.
- Press PTT key to make call/speak, indicator LED bright red.
- Wait till the “call tone” is finished(if you turned on “call tone” during programming), then start to speak.
- Release PTT key to receive. When other radio is speaking, indicator LED bright green.
- If you turned on “Channel Free” function when programming, after the caller released PTT key, you will hear a short prompt tone, which means this channel is free for you to call back/speak. You can press PTT key to speak.
- You will hear a short tone

Make All Call

You can speaking to all radios at the same channel if your radios pre-programmed to use this function.

Steps:

- Switch channel knob, use activated Individual ID to select channel.
 - Hold radio and place it 1 to 2 inch away from your mouth at vertical position.
 - Press PTT key to make call/speak, indicator LED bright red.
 - Wait till the “call tone” is finished(if you turned on “call tone” during programming), then start to speak.
- Radios on the same channel cannot answer your all call.

Make Group Call and Individual Call by Pre-programmed Call Key

You can pre-program a function key with an ID to make group call or individual call. You can pre-program long press or short press function key to active this function. You can pre-program only one group/individual call ID to a function key or pre-program this function to several function key.

Steps:

- Press the pre-programmed function key to make a call to predefined individual or group.
- Hold radio and place it 1 to 2 inch away from your mouth at vertical position.
- Press PTT key to make call/speak, indicator LED bright red.
- Wait till the “call tone” is finished(if you turned on “call tone” during programming), then start to speak.
- Release PTT key to receive. When someone is speaking, your indicator LED bright green.
- If you turned on “Channel Free” function when programming, after the caller released PTT key, you will hear a short prompt tone, which means this channel is free for you to call back/speak. You can press PTT key to speak. If there is no voice activity within preset time, the call is over. For individual call, you will hear a short tone after call over.

6.1.10 Low Battery Warning

You can know exactly the battery capacity in time.

Warning tone in first stage: When battery voltage is lower than $6.3V \pm 0.1$ during transmitting, your radio will give

low battery warning tone every 3 seconds.

Warning tone in second stage: When battery voltage is lower than $5.8V \pm 0.1$, transmitting will be prohibited and radio give low battery warning tone. When you release PTT key, radio will turn to receive mode, indicator LED flash red.

6.2 Configurations

6.2.1 Squelch Level

You can adjust radio squelch level to filter unwanted call with low RSSI or any channel who's background noise is too high.

Steps:

- Press pre-programmed function key to active Squelch function.
- You'll hear a prompt "Di" tone, which means that radio is under high level squelch; Radio is under normal squelch when you hear a prompt "Di Di" tone.

6.2.2 High/Low Power Switch

You can set high/low power for each channel.

You'd better set high power for long distance communication and low power for short distance communication.

- Press pre-programmed Power Switch function key to switch between high and low power.
- You will hear a prompt "Di" tone, which means that radio is under low power status; Radio is under high power status when you hear a prompt "Di Di" tone.

6.2.3 VOX

This function allows you to hands free call in pre-programmed channels. When you are wearing VOX earpieces, radio can detect your voice and start to transmit your voice automatically.

You can quit VOX by pressing PTT key. You need to do following steps if you need to active VOX function again:

Reboot the radio, or change channel by channel knob or do following steps:

Note: Please contact your dealer for any information of VOX.

Steps:

Press pre-programmed VOX function key to active/prohibit this function.

6.2.4 Prompt Tone Turn On/Off

If necessary, you can turn on/off radio prompt tone, except incoming call urgent prompt.

Steps:

- Press pre-programmed function key.
- You will hear a "Di" tone, which means prompt tone function turned on; radio prompt tone turned off when you hear a "Di Di" tone.

6.2.5 Check Battery Charging Status

When desk charger indicator LED shows yellow, battery is charging, green for fully charged.

6.2.6 CTCSS

- Program receive(Rx) and transmit(TX) CTCSS code at channel setting.
- You radio(Rx CTCSS pre-programmed) can only receive the signal which carries the same CTCSS code, can receive any signal(no CTCSS code programmed) with the same TX and Rx frequency.
- After TX CTCSS code pre-programmed, your radio will transmit pre-programmed CTCSS code with your signal.

6.2.7 CDCSS

- Programm receive(Rx) and transmit(Tx) CDCSS code at channel setting.
- You radio(Rx CDCSS pre-programmed) can only receive the signal which carries the same CDCSS code, can receive any signal(no CDCSS code programmed) with the same TX and Rx frequency.
- After TX CDCSS code pre-programmed, your radio will transmit pre-programmed CDCSS code with your signal.

Tail Tone Elimination: To avoid tail tone for receiver after carrier disappear in the channel. Carrier will disappear after speaker finish speaking, so the noisy tail tone will born when receiver radio cannot detect carrier. When transmitting of signal with CTCSS/CDCSS finished, the signal will send a prompt tone to receiver radio, so receiver radio can open squelch before carrier disappear to avoid noisy tail tone.

Chapter 7 Radio Debugging

7.1 The required test equipment

1. Stabilized power supply

- 1)The out power can be adjusted from 5V to 15V, and its current is 3A or even bigger.
- 2)standard voltage is 7.5V.

2. Ampere meter

- 1)Advanced ampere meter(17 gears and other functions)
- 2)Full scale can be set as 300mA or 3A.
- 3)It must use low loss cable.

3. Digital voltmeter

- 1)Voltage range: approximate FS=18V.
- 2)Input impedance: 1M Ω or even bigger.

4. Oscilloscope

- 1)Measuring range: DC to 30MHZ.
- 2)High accuracy measurement can be provided from 5 to 25MHz

5. Spectrum analyzer

Measurement range: DC to 1GHz or even bigger

6. Dummy load

16 Ω , 3W or even bigger

7. General-purpose tester

8920A/8921A/8920B/3920

Chart 1 Adjustment Frequency List

Frequency	VHF 136-174 MHz	
Channel	Tx(MHz)	Rx(MHz)
CH:0	136. 000	136. 000
CH:1	147. 500	147. 500
CH:2	156. 000	156. 000
CH:3	166. 500	166. 500
CH:4	174. 000	174. 000

Chart 2 Adjustment QT List

Frequency	VHF 136-174 MHz	
Signaling number	QT(wide band)	QT(narrow band)
0	67 Hz	67 Hz
1	127.3Hz	114.8Hz
2	136.5 Hz	136.5 Hz
3	206.5Hz	206.5Hz
4	241.8Hz	241.8Hz

Note:

- Connect radio with PC.
- Send channel data to radio, and then back up the data.
- Input the adjustment frequency program to radio.

Note: After adjustment, reform the loaded backup channel data.

7.2 Debugging Introduction

Chart 3 TX Part

Item	Condition	measurement		Regulation		Specificati on
		Test equipme nt	Termi nal	Component	Method	
1. low power modulation	BAT1 terminal low power banning transmission 5.8V	digital voltage meter	antenna terminal BAT1 port	A720T (Ex) programming software low power adjustment	enter low power adjustment enable to automatically adjust data after debugging, click confirmation to save the debugging data	banning transmission in low power 5.8V±0.1V
2. frequency difference adjustment	debugging channel CH:1	frequency counter	antenna terminal	frequency difference adjustment optional	enable PPT, adjust data change frequency	frequency difference:wit hin ±100Hz
3. high power adjustment	debugging channel CH:1(low port) CH:2(middle port) CH:3(high port) BATT port: 7.5V	power meter	antenna	A720T (Ex) programming software high power, high, middle, low frequency points adjustment	Enter power adjustment enable PTT, adjust data	high power: 5W±0.2W current: below 1.7A
4. low power adjustment		ampere meter	terminal	A720T (Ex) programming software low power, high, middle, low frequency points adjustment	change power/current after debugging, click confirmation to save debugging data	Low power: 1.5W±0.2W Current: below 1A
5. VOX adjustment level 1/level 9	Test channel CH:2 AG:1KHz 1 level: 3mv 9 level: 12mv	audio generator	JK101 Mic socket	A720T (Ex) programming software VOX adjustment	Enter voice control adjustment Boot whilst	

				(level 1 frequency point 2 adjustment) (level 9 frequency point 2 adjustment)	automatically detect data After debugging, click the confirmation to save detection data	
6.audio frequency broadband adjustment	Adjust channel CH:2(middle port) AG:1KHz/120 mv	power meter frequency deviation meter	Antenna Terminal	A720T (Ex) programming software frequency deviation wide band middle port adjustment	Enter audio frequency deviation adjustment	Wide band frequency deviation: 4.2KHz±0.2 KHz
7.audio frequency deviation narrow band adjustment	frequency deviation filter LPF:15KHz HPF:50KHz	oscilloscope Audio generator	JK101 Mic socket	A720T (Ex) programming software frequency deviation narrow band RF:middle port adjustment	After Changing sub audio deviation adjustment, click confirmation to save debugging data	narrow band frequency deviation: 2.2KHz±0.2 KHz
1. transmit digital 4FSK bit error rate adjustment	Test channels: CH1 CH2 CH3 CH4 CH5	3920 measuring equipment	Antenna terminal JK101 JK102 Connect computer A720T (Ex) programming software	Digital send path I amplitude path Q adjustment:this adjustment needs AEROFLEX3920. click digital adjustment item to adjust path Q digital frequency deviation, via +/- to adjust digital frequency deviation within 1.9KHZ~2KHZ, then via path I to adjust bit error rate , use path I to adjust digital bit error rate mainly and adjust frequency deviation slightly. Use path Q to adjust digital bit error rate and also adjust frequency deviation slightly. When you adjust path Q to a higher value, path I needs to be adjust higher or lower according to current situation. In a word, you need to adjust both path I and path Q. Adjust channel 1 to standard range, then click confirm, then adjust next channel one by one.(CH 1.2.3.4.5)		Digital frequency difference 1.9KHZ~2.0 KHZ Bib error rate: < 5%

<p>2.Receive digital 4FSK bit error rate adjustment</p>	<p>Testing channels: CH1 CH2 CH3 CH4 CH5</p>	<p>3920 measuring equipment</p>	<p>Antenna terminal JK101 JK102 Connect computer programming software</p>	<p>3920 send 4FSK signal to radio,then radio send demodulated signal back to 3920. Adjust dBmw of 3920, check receive bit error rate of 3920. Adjust sensitivity till worst bit error rate within radio's decoding ability.</p>	<p>Bit error rate: < 5% 0.35uV</p>
---	--	---------------------------------	---	---	---

8. QT wide band frequency deviation adjustment	debug channel CH:2 frequency deviation	power meter	Antenna	A720T (Ex) programming software QT: high, middle, low port RF:wide band high, middle, low frequencies adjustment	enter QT adjustment enable PTT, adjust data change sub-audio	QT frequency deviation 750Hz±100Hz
9. QT narrow band frequency deviation adjustment	detector filter LPF:3KHz HPF:20Hz	frequency deviation meter	terminal	A720T (Ex) programming software QT: high, middle, low port RF:narrow band high, middle, low frequencies adjustment	frequency deviation after debugging, click confirmation to save debugging data	QT frequency deviation 350Hz±50Hz
10.DQT wide band frequency deviation adjustment(023N)	debug channel CH:1(low port) CH:2(middle port) CH:3(high port)	power meter	Antenna	A720T (Ex) programming software DQT: 023N RF: wide band high, middle, low port frequencies adjustment	enter QT adjustment enable PTT, adjust data change DQT	DQT frequency deviation 750Hz±100Hz
11.DQT narrow band frequency deviation adjustment(023N)	frequency deviation detector filter LPF:300Hz HPF:20Hz	frequency deviation meter	terminal	A720T (Ex) programming software DQT: 023N RF: narrow band high, middle, low port frequencies adjustment	frequency deviation after debugging, click confirmation to save debugging data	DQT frequency deviation 350Hz±50Hz

Chart 4 Receiver

Item	Condition	Measurement		Adjustment		Specification
		Test Equipment	Terminal	Part	Methods	

<p>SQ wide band open speaker adjustment</p>	<p>test channel CH:2(middle port) level 5(SSG:-121dBm) MOD:1KHz DEV:3KHz</p>	<p>signal generator audio voltage meter distortion tester SINAD meter LPF: 15KHz HPF: 50Hz</p>	<p>Antenna Terminal J1A,J1B external socket</p>	<p>A720T (Ex) programming software level 5 SQ open RF:middle point frequency wide band adjustment</p>	<p>enter SQ open speaker adjustment adjust squelch to open speaker after debugging, click the confirmation to save debugging data</p>	<p>Level 5 squelch open speaker SSG:-121dBm±1dBm</p>
<p>SQ narrow band open speaker adjustment</p>	<p>test channel CH:2 level 5(SSG:-121dBm) MOD:1KHz DEV:1.5KHz</p>			<p>A720T (Ex) programming software level 5 SQ open RF:middle point frequency narrow band adjustment</p>	<p>enter SQ open speaker adjustment adjust squelch to open speaker after debugging, click the confirmation to save debugging data</p>	<p>Level 5 squelch open speaker SSG:-121dBm±1dBm</p>

Chapter 8 Parameters

General	
Model	A720T (Ex)
Frequency range	VHF: 136-174MHz
Channel capacity	32
Channel spacing	25 kHz/12.5 kHz
Working temperature	-25°C~+60 °C
Frequency stability	±2.5ppm
Working voltage	7.4VDC
Antenna impedance	50Ω
Microphone impedance	2.2KΩ
Battery	Li-ion DC7.4V 1800mAh(standard)
	DC 7.4V 2200mAh (optional)
Dimension	126mm×53 mm×26.5 mm
Weight	173.2g(transceiver) / 270.7g(with battery and antenna)
Receiver	
Analog sensitivity (12dB SINAD)	25K ≅ 0.22uV(12dB SINAD) 12.5K ≅ 0.25uV(12dB SINAD)
Digital sensitivity (BER 5%)	0.22uV (BER 5%)
SNR	25K ≅ 45 dB 12.5K ≅ 40 dB
Adjacent channel selectivity	25K ≅ 70 dB 12.5K ≅ 65 dB
Intermodulation	25K ≅ 65 dB 12.5K ≅ 65 dB
Spurious response rejection	≅ 70dB
Audio output power	≅ 1000 mW
Rated audio distortion	≅ 5%
Battery standby	36 hours(1800mAh); 45 hours(2200mAh)
Battery life(5-5-90) analog/digital	14/18 hours (1800mAh); 17/21 hours (2200mAh);
Transmitter	
RF power	H: 5.0W L: 1.5 W
FM modulation	25K/16KΦF3E 12.5K/8KΦF3E
4FSK digital modulation	12.5KHZ data 7K60FXD 12.5KHZ data+voice 7K60FXE
Digital vocoder type	AMBE+2TM
Digital protocol	ETSI-TS102 361-1,-2
Harmonic	≅ 70 dB
Residual FM	25K ≅ -45 dB 12.5K ≅ -40 dB

Audio distortion	$\cong 5\%$
Frequency stability	± 2.5 ppm
Max. frequency deviation	25K \cong 5 kHz 12.5K \cong 2.5 kHz

Bill of Materials (electronics)

Model+ Frequency: A720T (Ex)(VHF)
Date:2017-8-18

NO.	Materials Cold	Description (specification + package + Color/ Tolerance, etc.)	Amount	Bit No. / application mode
	SMD			
1	151-147321Y1-010	SMD carbon resistor 47K +/-5% 0201 1/20W YAGEO RC0201JR-0747K	1	R538
2	151-10002211-010	SMD carbon resistor 0R +/-5% 0402 YAGEO RC0402JR-070R	26	C479 R301 R311 R324 R330 R368 R369 R370 R383 R384 R385 R386 R388 R421 R423 R447 R461 R462 R478 R507 R567 R568 R651 RD07 R641 R420
3	151-147A2211-010	SMD carbon resistor 4R7 +/-5% 0402 YAGEO RC0402JR-074R7	5	R404 R405 R458 R459 R633
4	151-11002211-010	SMD carbon resistor 10R +/-5% 0402 YAGEO RC0402JR-0710R	3	R43 R430 R637
	151-11802211-010	SMD carbon resistor 18R +/-5% 0402 YAGEO RC0402JR-0718R	1	R413
5	151-12202211-010	SMD carbon resistor 22R +/-5% 0402 YAGEO RC0402JR-0722R	9	R41 R327 R338 R624 R630 R631 R634 R635 R636
6	151-14702211-010	SMD carbon resistor 47R +/-5% 0402 YAGEO RC0402JR-0747R	3	R21 R22 R519
7	151-16802211-010	SMD carbon resistor 68R +/-5% 0402 YAGEO RC0402JR-0768R	1	R510
8	151-11012211-010	SMD carbon resistor 100R +/-5% 0402 YAGEO RC0402JR-07100R	6	R60 R356 R357 R393 R416 R417
9	151-11812211-010	SMD carbon resistor 180R +/-5% 0402 YAGEO RC0402JR-07180R	1	R517
10	151-12712211-010	SMD carbon resistor 270R +/-5% 0402 YAGEO RC0402JR-07270R	3	R10 R71 R72
11	151-13312211-010	SMD carbon resistor 330R +/-5% 0402 YAGEO RC0402JR-07330R	6	R38 R81 R83 R342 R445 R446
12	151-13912211-010	SMD carbon resistor 390R +/-5% 0402 YAGEO RC0402JR-07390R	1	R36
13	151-14712211-010	SMD carbon resistor 470R +/-5% 0402 YAGEO RC0402JR-07470R	8	R59 R402 R411 R412 R525 R560 R653 R640
14	151-16812211-010	SMD carbon resistor 680R +/-5% 0402 YAGEO RC0402JR-07680R	3	R39 R509 R632
15	151-17512211-010	SMD carbon resistor 750R +/-5% 0402 YAGEO RC0402JR-07750R	1	R526
16	151-18212211-010	SMD carbon resistor 820R +/-5% 0402 YAGEO RC0402JR-07820R	1	R343

17	151-11022211-010	SMD carbon resistor 1K +/-5% 0402 YAGEO RC0402JR-071K	14	R300 R335 R339 R351 R354 R358 R367 R387 R392 R394 R460 R564 R600 R657
18	151-11522211-010	SMD carbon resistor 1K5 +/-5% 0402 YAGEO RC0402JR-071K5	2	R90 R379
19	151-11822211-010	SMD carbon resistor 1K8 +/-5% 0402 YAGEO RC0402JR-071K8	1	R331
20	151-12222211-010	SMD carbon resistor 2K2 +/-5% 0402 YAGEO RC0402JR-072K2	10	R73 R302 R305 R395 R505 R518 R418 R419 R349 R350
21	151-13322211-010	SMD carbon resistor 3K3 +/-5% 0402 YAGEO RC0402JR-073K3	5	R32 R91 R333 R534 R548
22	151-14722211-010	SMD carbon resistor 4K7 +/-5% 0402 YAGEO RC0402JR-074K7	7	R92 R97 R374 R415 R426 R520 R309
23	151-15122211-010	SMD carbon resistor 5K1 +/-5% 0402 YAGEO RC0402JR-075K1	1	R403
24	151-15622211-010	SMD carbon resistor 5K6 +/-5% 0402 YAGEO RC0402JR-075K6	6	R537 R544 R545 R555 R558 R561
25	151-16822211-010	SMD carbon resistor 6K8 +/-5% 0402 YAGEO RC0402JR-076K8	1	R566
26	151-18222211-010	SMD carbon resistor 8K2 +/-5% 0402 YAGEO RC0402JR-078K2	1	R506
27	151-11032211-010	SMD carbon resistor 10K +/-5% 0402 YAGEO RC0402JR-0710K	13	C28 R303 R308 R326 R336 R337 R347 R381 R396 R397 R425 R541 R391
28	151-11232211-010	SMD carbon resistor 12K +/-5% 0402 YAGEO RC0402JR-0712K	2	R504 R549
29	151-11532211-010	SMD carbon resistor 15K +/-5% 0402 YAGEO RC0402JR-0715K	1	R638
30	151-11832211-010	SMD carbon resistor 18K +/-5% 0402 YAGEO RC0402JR-0718K	1	R547
31	151-12232211-010	SMD carbon resistor 22K +/-5% 0402 YAGEO RC0402JR-0722K	6	R365 R371 R372 R380 R470 R554
32	151-13332211-010	SMD carbon resistor 33K +/-5% 0402 YAGEO RC0402JR-0733K	3	R44 R45 R307
33	151-14732211-010	SMD carbon resistor 47K +/-5% 0402 YAGEO RC0402JR-0747K	13	R28 R29 R306 R352 R360 R361 R363 R364 R399 R406 R407 R408 R409
34	151-15132211-010	SMD carbon resistor 51K +/-5% 0402 YAGEO RC0402JR-0751K	2	R471 R535
35	151-16832211-010	SMD carbon resistor 68K +/-5% 0402 YAGEO RC0402JR-0768K	1	R389
36	151-18232211-010	SMD carbon resistor 82K +/-5% 0402 YAGEO RC0402JR-0782K	1	R378
37	151-19132211-010	SMD carbon resistor 91K +/-5% 0402 YAGEO RC0402JR-0791K	1	R557
38	151-11041211-010	SMD carbon resistor 100K +/-1% 0402	1	R353

		YAGEO RC0402FR-07100K		
39	151-11042211-010	SMD carbon resistor 100K +/-5% 0402 YAGEO RC0402JR-07100K	13	R93 R95 R328 R325 R329 R373 R376 R469 R501 R513 R514 R542 R645
40	151-11242211-010	SMD carbon resistor 120K +/-5% 0402 YAGEO RC0402JR-07120K	4	R523 R543 R556 R563
41	151-11541211-010	SMD carbon resistor 150K +/-1% 0402 YAGEO RC0402FR-07150K	4	R51 R53 R54 R55
42	151-11542211-010	SMD carbon resistor 150K +/-5% 0402 YAGEO RC0402JR-07150K	5	R390 R515 R516 R536 R652
43	151-12041211-010	SMD carbon resistor 200K +/-1% 0402 YAGEO RC0402FR-07200K	1	R355
44	151-12242211-010	SMD carbon resistor 220K +/-5% 0402 YAGEO RC0402JR-07220K	2	R532 R553
45	151-12641211-010	SMD carbon resistor 261K +/-1% 0402 YAGEO RC0402FR-07261K	1	R382
46	151-12742211-010	SMD carbon resistor 270K +/-5% 0402 YAGEO RC0402JR-07270K	1	R550
47	151-13942211-010	SMD carbon resistor 390K +/-5% 0402 YAGEO RC0402JR-07390K	1	R552
48	151-14742211-010	SMD carbon resistor 470K +/-5% 0402 YAGEO RC0402JR-07470K	7	R31 R502 R503 R511 R512 R540 R551
49	151-11052211-010	SMD carbon resistor 1M +/-5% 0402 YAGEO RC0402JR-071M	5	R52 R56 R96 R533 R546
50	151-10002321-010	SMD carbon resistor 0R +/-5% 0603 YAGEO RC0603JR-070R	3	C394 L305 L520
51	151-11012321-010	SMD carbon resistor 100R +/-5% 0603 YAGEO RC0603JR-07100R	1	C672
52	151-15612321-010	SMD carbon resistor 560R +/-5% 0603 YAGEO RC0603JR-07560R	2	R521 R522
53	151-18222321-010	SMD carbon resistor 8K2 +/-5% 0603 YAGEO RC0603JR-078K2	1	L518
54	151-11042321-010	SMD carbon resistor 100K +/-5% 0603 YAGEO RC0603JR -07100K	1	R2
55	151-13901541-011	SMD carbon resistor 0.390R +/-1% 1206 YAGEO RL1206FR-070R39L	3	R87 R88 R89
56	173-47343K61-010	Thermistor NTC SMD 47K +/-5% 4050K 0603 mu Rata NCP18WB473J03RB	1	TH1
57	081-14716141-040	SMD ceramic capacitor COG 470pF +/-5% 0201 25V mu Rata GRM0335C1E471J	1	C427
	081-91037141-040	SMD ceramic capacitor X5R 10nF ±10% 0201 25V mu Rata GRM033R61E103K	3	C416 C550 C560
59	081-91047141-040	SMD ceramic capacitor X5R 100nF ±10% 0201 25V mu Rata GRM033R61E104K	3	C420 C423 C442
60	081-133A1251-040	SMD ceramic capacitor COG 3P3 +/-0.1pF 0402 50V mu Rata GRM1555C1H3R3B	1	C587

61	081-10501251-040	SMD ceramic capacitor COG 5P +/-0.1pF 0402 50V mu Rata GRM1555C1H5R0B	2	C520 C504
62	081-10601251-040	SMD ceramic capacitor COG 6P +/-0.1pF 0402 50V mu Rata GRM1555C1H6R0B	2	C531 C600
63	081-10801251-040	SMD ceramic capacitor COG 8P +/-0.1pF 0402 50V mu Rata GRM1555C1H8R0B	3	C540 C545 C592
64	081-10901251-040	SMD ceramic capacitor COG 9P +/-0.1pF 0402 50V mu Rata GRM1555C1H9R0B	1	C572
65	081-11006251-040	SMD ceramic capacitor COG 10P +/-5% 0402 50V mu Rata GRM1555C1H100J	3	C508 C518 R562
66	081-11306251-040	SMD ceramic capacitor COG 13P +/-5% 0402 50V mu Rata GRM1555C1H130J	2	C501 C658
67	081-12006251-040	SMD ceramic capacitor COG 20P +/-5% 0402 50V mu Rata GRM1555C1H200J	2	C99 C586
68	081-13006251-040	SMD ceramic capacitor COG 30P +/-5% 0402 50V mu Rata GRM1555C1H300J	1	C553
69	081-13306251-040	SMD ceramic capacitor COG 33P +/-5% 0402 50V mu Rata GRM1555C1H330J	1	C664
70	081-14706251-040	SMD ceramic capacitor COG 47P +/-5% 0402 50V mu Rata GRM1555C1H470J	1	C26
71	081-15606251-040	SMD ceramic capacitor COG 56P +/-5% 0402 50V mu Rata GRM1555C1H560J	1	C83
72	081-16806251-040	SMD ceramic capacitor COG 68P +/-5% 0402 50V mu Rata GRM1555C1H680J	2	C584 C585
73	081-11016251-040	SMD ceramic capacitor COG 100P +/-5% 0402 50V mu Rata GRM1555C1H101J	8	C327 C434 C465 C469 C512 C557 C673 C699
74	081-11516251-040	SMD ceramic capacitor COG 150P +/-5% 0402 50V mu Rata GRM1555C1H151J	1	C663
75	081-12216251-040	SMD ceramic capacitor COG 220P +/-5% 0402 50V mu Rata GRM1555C1H221J	8	C381 C388 C426 C461 C551 C552 C661 C662
76	081-13916251-040	SMD ceramic capacitor COG 390P +/-5% 0402 50V mu Rata GRM1555C1H391J	1	C641
77	081-14716251-040	SMD ceramic capacitor COG 470P +/-5% 0402 50V mu Rata GRM1555C1H471J	28	C18 C44 C93 C101 C320 C352 C355 C359 C382 C383 C395 C415 C419 C449 C459 C460 C463 C464 C470 C471 C510 C513 C517 C525 C527 C529 C532 C588
78	081-41027251-040	SMD ceramic capacitor X7R 1000pF +/-10% 0402 50V mu Rata GRM155R71H102K	35	C13 C15 C16 C17 C19 C94 C114 C116 C143 C151 C153 C154 C363 C364 C367 C389 C393 C406 C409 C410 C458 C448 C511 C524 C534 C538 C554 C562 C659 C660 C667 C697 R431 C555 C556
	081-42227251-040	SMD ceramic capacitor X7R 2200pF +/-10%	1	C20

		0402 50V mu Rata GRM155R71H222K		
79	081-43327251-040	SMD ceramic capacitor X7R 3300pF +/-10% 0402 50V mu Rata GRM155R71H332K	1	C671
80	081-44727251-040	SMD ceramic capacitor X7R 4700pF +/-10% 0402 50V mu Rata GRM155R71H472K	2	C401 C647
81	081-45627251-040	SMD ceramic capacitor X7R 5600pF +/-10% 0402 50V mu Rata GRM155R71H562K	1	C571
82	081-48227241-040	SMD ceramic capacitor X7R 8200pF +/-10% 0402 25V mu Rata GRM155R71E822K	5	C569 C573 C574 C575 C576
83	081-41037241-040	SMD ceramic capacitor X7R 10nF +/-10% 0402 25V mu Rata GRM155R71E103K	36	C98 C312 C325 C332 C339 C340 C342 C366 C368 C370 C375 C405 C424 C432 C447 C450 C451 C452 C453 C462 C475 C476 C477 C489 C528 C530 C533 C539 C542 C543 C546 C591 C651 C657 C666 C681
84	081-41537241-040	SMD ceramic capacitor X7R 15nF +/-10% 0402 25V mu Rata GRM155R71E153K	2	C323 C348
85	081-41837241-040	SMD ceramic capacitor X7R 18nF +/-10% 0402 25V mu Rata GRM155R71E183K	2	C570 C670
86	081-42237241-040	SMD ceramic capacitor X7R 22nF +/-10% 0402 25V mu Rata GRM155R71E223K	5	C331 C378 C385 C481 C488
87	081-43337241-040	SMD ceramic capacitor X7R 33nF +/-10% 0402 25V mu Rata GRM155R71E333K	2	C577 C578
88	081-44737241-040	SMD ceramic capacitor X7R 47nF +/-10% 0402 25V mu Rata GRM155R71E473K	2	C25 C446
89	081-46837231-040	SMD ceramic capacitor X7R 68nF +/-10% 0402 16V mu Rata GRM155R71C683K	2	C404 C435
90	081-41047231-040	SMD ceramic capacitor X7R 100nF +/-10% 0402 16V mu Rata GRM155R71C104K	63	C29 C49 C50 C313 C317 C318 C319 C322 C329 C334 C337 C345 C346 C361 C365 C369 C371 C384 C386 C390 C392 C396 C408 C411 C412 C414 C421 C428 C430 C437 C438 C439 C440 C444 C455 C456 C457 C468 C472 C473 C480 C485 C486 C487 C507 C515 C544 C549 C566 C579 C580 C638 C639 C640 C642 C643 C645 C649 C652 C656 C668 C694 C696
	081-41047231-070	SMD ceramic capacitor X7R 100nF +/-10% 0402 16V YAGEO CC0402KRX7R7BB104		
91	081-42247231-040	SMD ceramic capacitor X7R 220nF +/-10% 0402 16V mu Rata GRM155R71C224K	3	C443 C547 C563
92	081-91057221-040	SMD ceramic capacitor X5R 1uF ±10% 0402 10V mu Rata GRM155R61A105K	23	C301 C341 C347 C350 C351 C413 C417 C418 C422 C431

	081-91057221-070	SMD ceramic capacitor X5R 1uF ±10% 0402 10V YAGEO CC0402KRX5R6BB105		C466 C483 C514 C558 C559 C568 C583 C675 C695 C433 C436 C380 R422
93	081-10901351-040	SMD ceramic capacitor COG 9P +/-0.1pF 0603 50V mu Rata GRM1885C1H9R0B	1	C140
	081-20901351-070	SMD ceramic capacitor NPO 9pF +/-0.1pF 0603 50V YAGEO CC0603BRNPO9BN9R0		
94	081-11006351-040	SMD ceramic capacitor COG 10P +/-5% 0603 50V mu Rata GRM1885C1H100J	3	C132 C133 C142
95	081-11206351-040	SMD ceramic capacitor COG 12P +/-5% 0603 50V mu Rata GRM1885C1H120J	1	C129
96	081-11506351-040	SMD ceramic capacitor COG 15P +/-5% 0603 50V mu Rata GRM1885C1H150J	1	C134
97	081-11606351-040	SMD ceramic capacitor COG 16P +/-5% 0603 50V mu Rata GRM1885C1H160J	2	C121 C138
98	081-12206351-040	SMD ceramic capacitor COG 22P +/-5% 0603 50V mu Rata GRM1885C1H220J	1	C135
99	081-12706351-040	SMD ceramic capacitor COG 27P +/-5% 0603 50V mu Rata GRM1885C1H270J	2	C122 C131
100	081-15606351-040	SMD ceramic capacitor COG 56P +/-5% 0603 50V mu Rata GRM1885C1H560J	1	C128
101	081-12216351-040	SMD ceramic capacitor COG 220P +/-5% 0603 50V mu Rata GRM1885C1H221J	1	C84
102	081-41027351-040	SMD ceramic capacitor X7R 1nF +/-10% 0603 50V mu Rata GRM188R71H102K	2	C21 C115
	081-41027351-070	SMD ceramic capacitor X7R 1nF +/-10% 0603 50V YAGEO CC0603KRX7R9BB102		
103	081-41047351-040	SMD ceramic capacitor X7R 100nF +/-10% 0603 50V mu Rata GRM188R71H104K	1	C333
104	081-41057331-040	SMD ceramic capacitor X7R 1uF +/-10% 0603 16V mu Rata GRM188R71C105K	1	C391
	081-41057331-070	SMD ceramic capacitor X7R 1uF +/-10% 0603 16V YAGEO CC0603KRX7R7BB105		
105	081-41057441-040	SMD ceramic capacitor X7R 1uF +/-10% 0805 25V mu Rata GRM21BR71E105K	3	C41 C344 C402
	081-41057441-070	SMD ceramic capacitor X7R 1uF +/-10% 0805 25V YAGEO CC0805KKX7R8BB105		
106	081-91067421-040	SMD ceramic capacitor X5R 10uF +/-10% 0805 10V mu Rata GRM21BR61A106K	23	C42 C324 C338 C356 C357 C360 C362 C377 C379 C397 C398 C403 C407 C425 C429 C441 C445 C526 C561 C567 C581 C644 C680
107	081-92267521-040	SMD ceramic capacitor X5R 22uF +/-10% 1206 10V mu Rata GRM31CR61A226K	2	C314 C335
	081-92267531-040	SMD ceramic capacitor X5R 22uF +/-10% 1206 16V mu Rata GRM31CR61C226K		

108	081-94768521-040	SMD ceramic capacitor X5R 47uF +/-20% 1206 10V mu Rata GRM31CR61A476ME15L	1	C330
109	213-27031101-010	Non-wound chip inductor 27nH +/-5% 0402 mu Rata LQG15HS27NJ02	3	L14 L514 L516
110	213-56031101-050	Non-wound chip inductor 56nH +/-5% 0402 TDK MLK1005S56NJ	1	L517
111	213-68031101-010	Non-wound chip inductor 68nH +/-5% 0402 mu Rata LQG15HS68NJ02	1	L17
112	213-10132101-060	Non-wound chip inductor 100nH +/-5% 0603 Sunlord SDCL1608CR10J	1	L506
113	213-33132101-060	Non-wound chip inductor 330nH +/-5% 0603 Sunlord SDCL1608CR33J	2	L519 L621
114	213-47142101-050	Non-wound chip inductor 470nH +/-10% 0603 TDK MLF1608DR47KT	4	L313 L515 L619 L620
115	213-56142101-050	Non-wound chip inductor 560nH +/-10% 0603 TDK MLF1608DR56KT	1	L618
116	213-68142101-050	Non-wound chip inductor 680nH +/-10% 0603 TDK MLF1608DR68KT	2	L511 L512
117	213-10242101-050	Non-wound chip inductor 1uH +/-10% 0603 TDK MLF1608A1R0KT	1	L317
118	211-22032101-010	Wound chip inductor 22nH +/-5% 0603 mu Rata LQW18AN22NJ00	1	L505
	211-22022101-010	Wound chip inductor 22nH +/-2% 0603 mu Rata LQW18AN22NG00		
119	211-1025C201-050	Wound chip inductor 1.0uH +/-20% 2012 TDK MLZ2012M1R0HT000	1	L20
120	211-22239101-050	Wound chip inductor 2.2uH +/-5% 2520 TDK NLV25T-2R2J-PF	1	L22
121	211-4726A101-06 0	Wound chip inductor 4.7uH +/-30% 4012 Sunlord SWPA4012S4R7NT	2	L304 L319
122	211-39032101-010	Wound chip inductor 39nH +/-5% 0603 mu Rata LQW18AN39NJ00	1	R50
123	211-47022101-010	Wound chip inductor 47nH +/-2% 0603 mu Rata LQW18AN47NG00	1	L18
124	211-56032101-010	Wound chip inductor 56nH +/-5% 0603 mu Rata LQW18AN56NJ00	5	L502 L503 L508 L509 L510
125	221-45160421-010	SMD Air Coil E2R0.40*1.6*4.5T	2	L102 L501
126	221-65160421-010	SMD Air Coil E2R0.40*1.6*6.5T	4	L21 L28 L29 L30
127	221-25160621-010	SMD Air Coil E2R0.60*1.6*2.5T	1	L101
128	231-05A36011-01 0	Chip Bead 500mA 0603 600R mu Rata BLM18AG601SN1	15	L11 L37 L303 L306 L307 L308 L309 L311 L312 L315 L316 L507 L513 L622 R508
129	231-06042201-010	Chip Bead 6A 0805 22R mu Rata BLM21PG220SN1D	2	L7 L8
130	394-10301501-010	SMD Fuse fast fusing 3A 1206 little fuse	1	FU400

		0466003		
131	481-3SURC211-010	Light emitting diode SMD red high light 0603 19-213SURC/S530-A2/TR8 EVERLIGHT	1	LED1
132	481-19217221-010	Light emitting diode SMD green high light0603 19-217/G7C-AN1P2/3T EVERLIGHT	1	LED2
133	024-B5819103-240	Diode SMD RSB5819WS SOD-323 RS	2	D301 D307
134	024-SS372108-090	Diode 1SS372 SOT-323 TOSHIBA	2	D303 D304
135	027-SV305104-090	Varactor Diode SMD 1SV305 SOD-523 TOSHIBA	4	D503 D504 D506 D507
136	022-P6503103-050	Diode pin switch BAP65-03 SOD-323/URP NXP	1	D1
137	021-SS390104-070	Diode switch 1SS390 SOD-523/SC-79 ROHM	4	D2 D501 D502 D509
138	021-L4148121-120	Diode switch LL4148 LL-34 ST	1	D302
139	021-SS362105-090	Diode switch 1SS362 SOT-523 TOSHIBA	2	D505 D508
140	025-6151B103-070	Zener diode EDZTE615.1B SC-79/SOD523/EMD2 ROHM	3	D404 D405 D408
	025-5V1D5204-250	Zener diode WZ5C5V1D5E SOD-523 CYG		
141	031-550AR123-150	Audion NPN SMD BFU550AR SOT23 NXP	3	Q8 Q503 Q505
142	031-C4617222-050	Audion NPN SMD 2SC4617TLR SOT-416/SC-75A ROHM	2	Q325 Q406
143	031-C5108122-080	Audion NPN SMD 2SC5108 SOT-523/SC-75 TOSHIBA	1	Q610
144	031-U550X116-150	Audion NPN SMD BFU550X SOT143B NXP	1	Q501
145	031-114EE222-050	Audion NPN SMD DTC114EEBMGTL SOT-416FL/SC-89/EMT3F ROHM	6	Q9 Q303 Q305 Q306 Q307 Q319
	031-114EE122-050	Audion NPN SMD DTC114EETL SOT-416/EMT3 ROHM		
	031-114EE122-150	Audion NPN SMD PDTC114EE SOT416/SC-75 NXP		
146	032-114YE122-050	Audion NPN SMD DTA114YETL SOT-416/EMT3 ROHM	1	Q304
147	032-123JE122-050	Audion NPN SMD DTA123JETL SOT-416/EMT3 ROHM	1	Q310
148	032-8550S112-100	Audion NPN SMD MPS8550S-D-RTK/P SOT-23 KEC	1	Q302
149	032-A1586117-080	Audion NPN SMD 2SA1586SU-GR SC-70 TOSHIBA	1	Q326
150	035-UMC4N119-050	Audion Complex SMD UMC4NTR SC-88A/UMT5 ROHM	2	Q7 Q317
151	041-A7002122-07	Tube field N channel SMD NTA7002NT1G	8	Q309 Q311 Q312 Q313 Q315

	0	SC-75/SOT-416 ON		Q316 Q323 Q324
152	041-3400A112-01 0	Tube field N channel SMD AO3400A SOT-23 ALPHA	2	Q404 Q405
153	041-RFM01115-08 0	Tube field N channel SMD RFM01U7P SC-62 TOSHIBA	1	Q4
154	041-RFM07141-08 0	Tube field N channel RFM07U7X 2-5N1A TOSHIBA	1	Q3
155	041-B506C118-04 0	Tube field N channel BB506CFS-TL-H SOT-343 RENESAS	1	Q502
156	012-2902V113-07 0	IC Operational amplifier NJM2902V SSOP14 JRC	1	IC501
157	012-M2904111-07 0	IC Operational amplifier NJM2904V SSOP8 JRC	2	U8 U307
158	012-2365A199-35 0	Intermediate Frequency IC AK2365A QFNJ32 AKM	1	U500
159	012-B332M191-19 0	stabilizer IC XC6219B332MR SOT-25 TOREX	3	U320 U321 U323
160	012-M2734195-38 0	stabilizer IC 5.0V LM2734XMK SOT-23-6	2	U313 U322
161	012-B502M291-19 0	stabilizer IC 5V XC6204B502MR SOT-25	1	U315
	012-P170N191-14 0	stabilizer IC 5V RP170N501D-TR-FE SOT-23-5		
162	012-2822G101-23 0	Audio Amplifier IC TDA2822G SOP-8 UTC	1	U306
163	012-S8012291-330	voltage detection IC S-80128ANMC-JCNT2U SOT-23-5 SII	1	U317
164	012-X2571199-54 0	PLL IC LMX2571NJKR WQFN36	1	U601
165	014-15050115-250	Speech IC WTV080-20SS WTC150507-41.ROM SSOP20	1	U316
166	011-103VE148-27 0	CPU STM32F103VET6 LQFP100 ST	1	U300
	011-3VET6148-99 0	CPU APM32F103VET6 LQFP-100		
	011-3VET6248-99 0	CPU APM32E103VET6 LQFP-100		
167	013-C512C194-02 0	EEPROM Storage IC AT24C512C-SSHM-T 8-lead	1	U318
	013-C512D101-52 0	IC Storage IC FM24C512D-SO-T-G SOP8		
	013-G512F101-15 0	EEPROM Storage IC BR24G512F-3AGTE SOP-8		
168	01Y-C1G04193-54 0	LOGICAL IC SN74LVC1G04DBVR SOT-23	1	U304
169	014-C3204177-540	Audio IC TLV320AIC3204IRHBR QFN32	1	U301

170	012-SCT32188-160	IC DMR Base band chip SCT3258TD QFN64	1	U302
	980-010220105021	Base band software CT3258TD V2.01.0502		
171	312-58051001-030	Crystal filter SMD 58.050MHz DSF753SDF +/-5KHz	1	F500
172	321-12284442-010	Crystal SMD 12.288M 2.5*2.0 +/-20PPM KDS 7FE01228AON	1	X300
173	321-19204A11-010	Crystal SMD 19.2M 3.2*2.5 +/-2.0PPM KDS DSA321SDN 2.8V	1	X600
174	371-90200801-151	FPC Female socket 20PIN 8*1.5mm AXK5F20347YG Panasonic	1	J402-F
	371-90200801-152	FPC Female socket 20PIN 8*5.8*1.5mm AXK5F20347YG Panasonic		
175	371-90120502-150	FPC Male socket 12PIN 6*1.5mm AXK6F12347YG Panasonic	1	J401
176	431-03AE0101-010	Mic switch 4.5*3.4*3.3mm SKRTLAE010 ALPS 1.6N	1	K4
177	50C-A720T (Ex)001-011	battery connector A720T (Ex) PA+phosphor copper+BeCu black	1	J404
178	67Y-A780T001-011	antenna contact clip A780T 0.2t BeCu Gold-Plated	1	CN201
179	466-720T1211-V02	PCB Main Board Six layer blind hole A720T (Ex) VHF V2 MP60LI107919A0 112.9*45.2*1.2T	1	
Production tools				
Software				
CPU Program	Part Number	Version	check code	Machine Burn file name
	955-A720T (Ex)1020113	A37 V1.02.01	2C40EE ECH	A720T (Ex)_A37_V1_02_01_013WN .hex
Code data	Part Number	Version	check code	Machine Burn file name
	975-A720T (Ex)1020113	A37 V1.02.01WN	3D14H	A720T (Ex)_A37_E_V1_02_01WN.t op
Programming software	Part Number	Version	CRC32 check code	Programming software file name
	963-0A720T (Ex)101722	V1.01.72P	1C35D8 7EH	A720T (Ex)_CN_P V1.01.72.exe
	963-0A720T (Ex)104023	V1.04.02C	DD8850 CBH	A720T (Ex)_CN_C V1.04.02.exe
	963-0A720T (Ex)104024	V1.04.02C	B03E76 7FH	A720T (Ex)_EN_C V1.04.02.exe

	Welding afterward components			
1	801-A720T (Ex)A37-001	Main board PCBA A720T (Ex)(A37)	1	
2	391-29745442-010	Microphone with feet COF9745P-1544-00-AB D9.7*4.5mm -44dB 1.5V	1	M1
3	163-10SNAX16-0 40	potentiometer 10K RP08110SNAX-V02-0657	1	VR400
4	451-53645051-020	Speaker waterproof circle ND03650M.16P-C 16R 05W D36*4.5	1	SP1
5	380-128800Y1-00 0	PVC flat cable AWG#28 L=80mm red+black	1	
6	442-0HXV0221-04 0	Encoder with 16 channels RE08120HX-V02-0374 waterproof	1	S400
	Assembly parts			
1	81E-0A780T00-00 2	Expansion connector A780T	1	
1.1	462-780TYY21-V 01	FUN-FPC soft PVC double layer A780T VHF V1 2S00653A0 25.7*24.0*0.15mm	1	
1.2	371-90200802-151	FPC male socket 20PIN 8*1.5mm AXK6F20347YG	1	J402-M
	371-90200802-152	FPC male socket 20PIN 8*1.5mm AXK6F20347YG		
2	815-0A720T (Ex)00-001	PTT connector A720T (Ex)	1	
2.1	462-780TYY22-V 01	PTT-FPC Soft PVC double layer A780T VHF V1 2S00450A0 77.8*51*0.15mm	1	
2.2	371-90120501-151	PC female socket 12PIN 6*1.5mm AXK5F12347YG	1	J902
		Plastic Parts::		
1	501-A720T (Ex)001-014	Housing A720T (Ex) PC1414 black 4PCS Copper nut	1	
2	502-A720T (Ex)001-012	VOL Knob A720T (Ex) PC black	1	
3	503-A720T (Ex)001-013	Channel Knob A720T (Ex) PC black	1	
4	50Y-A720T (Ex)001-011	Small back cover A720T (Ex) PC1414 black 2PCS Copper nut	1	61C-A720T (Ex)002-011
5	50B-A720T (Ex)001-011	Ear mic cover A720T (Ex) PC black	1	
6	507-A720T (Ex)001-011	PTT Button A720T (Ex) PC orange border+ middle black	1	
7	50Y-A720T	PTT support A720T (Ex) PC black	1	

	(Ex)002-012			
8	50Y-A720T (Ex)003-011	alarm button A720T (Ex) PC orange 1PCS Steel Bar	1	67Y-A720T (Ex)001-011
9	532-A720T (Ex)001-111	Light A720T (Ex) PC transparent	1	
		knife mould components:		
1	70C-0A720T (Ex)01-011	Speaker dust proof net A720T (Ex) D33.4mm 250 black	1	
2	70B-000A8101-01 1	radiating silica gel A-81 7.5*7.0*2.0T silica gel gray	1	
	70B-000A8101-11 1	radiating silica gel A-81 7.5*7.0*2.0T silica gel gray		
3	70D-000A8201-01 1	Dust/water proof mic net A-82 D11*ID3.8 white single side of gum	1	
4	708-00A60101-01 1	Conductive sponge pad A-601 26*25*1.0t sponge black single side gum	1	
5	70G-0A720T (Ex)01-011	Channel SMD A720T (Ex) D14.4*ID10.6*0.3t PVC black bottom white words back gum	1	
6	709-0A720T (Ex)01-111	metal dome A720T (Ex) D5*3P D6*1P PVC white single side of gum	1	
7	704-0A720T (Ex)02-011	Double Sided Adhesive Tape A720T (Ex) 25*11.1*0.1mm 3Mv	1	for Mic water proof pad
8	704-0A720T (Ex)03-012	Double Sided Adhesive Tape A720T (Ex) 50.6*12.2*0.1mm 3M	1	For PTT PCB board
9	70Y-0A720T (Ex)01-011	Mic PCB cover A720T (Ex) 24*9.5*0.3t black back gum	1	for Mic PCB
10	708-0A720T (Ex)01-012	sponge pad A720T (Ex) 13.0*3*3mm hard sponge black	2	bilateral holes of the aluminum case
11	708-000A8103-01 1	Encoder sponge pad A-81 9.5*9.5*1.0mm sponge black single side gum	1	FUN FPC cover
12	708-000A8102-01 1	Potentiometer sponge pad A-81 9.5*8.5*2.0mm sponge black single side gum	1	PTT FPC cover
13	70F-0A720T (Ex)01-011	Water/dust proof breathable film A720T (Ex) D7.8*ID4.0 black single side gum	1	For aluminum water proof testing hole
		rubber articles:		
1	546-00A82001-01 1	Mic cover A-82 silica gel 30 degrees black	1	
2	548-0A510001-12 2	antenna water proof ring A-510 silica gel 40degrees black	1	for antenna base
3	54D-0A510001-01 2	screw water proof ring A-510 NBR 70 degrees black	6	to fasten housing and aluminum
4	541-A720T (Ex)001-011	silica gel PTT button A720T (Ex) silica gel 60 degrees black	1	
5	545-A720T (Ex)001-011	negative and positive rubber pad A720T (Ex) silica gel 40 degrees orange	1	

6	547-A720T (Ex)001-012	transceiver water proof ring A720T (Ex) silica gel 40 degrees orange	1	
7	548-A720T (Ex)001-011	antenna water proof pad A720T (Ex) silica gel 60 degrees orange	1	for antenna base
8	54C-A720T (Ex)001-011	Mic water proof pad A720T (Ex) silica gel 40 degrees black	1	
9	54Y-A720T (Ex)001-011	potentiometer water proof ring A720T (Ex) silica gel 40 degrees orange	2	for encoder and potentiometer
10	54D-A720T (Ex)001-011	water proof ring A720T (Ex) 1.0*0.6 NBR 70 degrees black	2	FOR SOS button
12	54Y-A720T (Ex)002-012	speaker water proof ring A720T (Ex) silica gel 40 degrees black	1	
		Metal Parts:		
1	621-A780T001-01 4	aluminum case A780T ADC12 Polishing sandblasting electricity motor fixing hole	1	
	621-A780T002-01 2	aluminum case A780T ADC12 Polishing sandblasting electrophoresis black		
2	60C-A720T (Ex)001-011	Shielding Case A720T (Ex) SUS304 40.2*30.2*0.5t natural color	1	small back cover
3	61C-A720T (Ex)001-011	copper stud with inlet and outlet Thread A720T (Ex) M2*5+4 copper	2	hooding and MPCB
4	61C-A720T (Ex)002-011	copper stud A720T (Ex) M5*9.9 copper	2	small back cover
5	67Y-A720T (Ex)001-011	steel bar A720T (Ex) D1.8*8.2mm 45# steel	1	FOR SOS button
6	63Y-A720T (Ex)003-011	pressure spring D3.1* \varnothing 0.3*3.8N piano wire nickel plating	1	FOR SOS button
7	63Y-A720T (Ex)001-111	E snap spring D3.0*ID1.2*0.3mm SUS304	1	FOR SOS button
8	662-P0020060-102	machine screw PM2*6 cross recess stainless steel	2	small back cover and aluminum case
9	662-P0020040-301	machine screw PM2*4 Trox stainless steel	2	housing and aluminum case
10	611-A720T (Ex)001-013	antenna base A720T (Ex) brass+teflon Gold Plating+nickel	1	
11	662-P0025070-301	machine Half thread screw PM2.5*7 T8 Torx and TX tamper resistant stainless steel nickel plating	4	fasten screws in housing and aluminum case
12	662-K0020040-10 1	machine screw KM2.0*4 cross recess nickel plating	2	lock PTT button board 2PCS
13	662-P0440040-201	machine Half thread screw PM#4-40*4 straight slot big head stainless steel	1	earpiece cover
14	661-P0020035-302	Triangle Screw PBH2.0*3.5 T6 Torx and TX tamper resistant White nickel plating	10	7PCS FOR MPCB;3PCS FOR back shield cover
15	644-00600641-011	knob water proof nut A-510 copper+ silica gel	2	encoder, potentiometer
16	662-P0040050-102	machine screw PM2*4 Trox stainless steel	2	fasten the belt clip

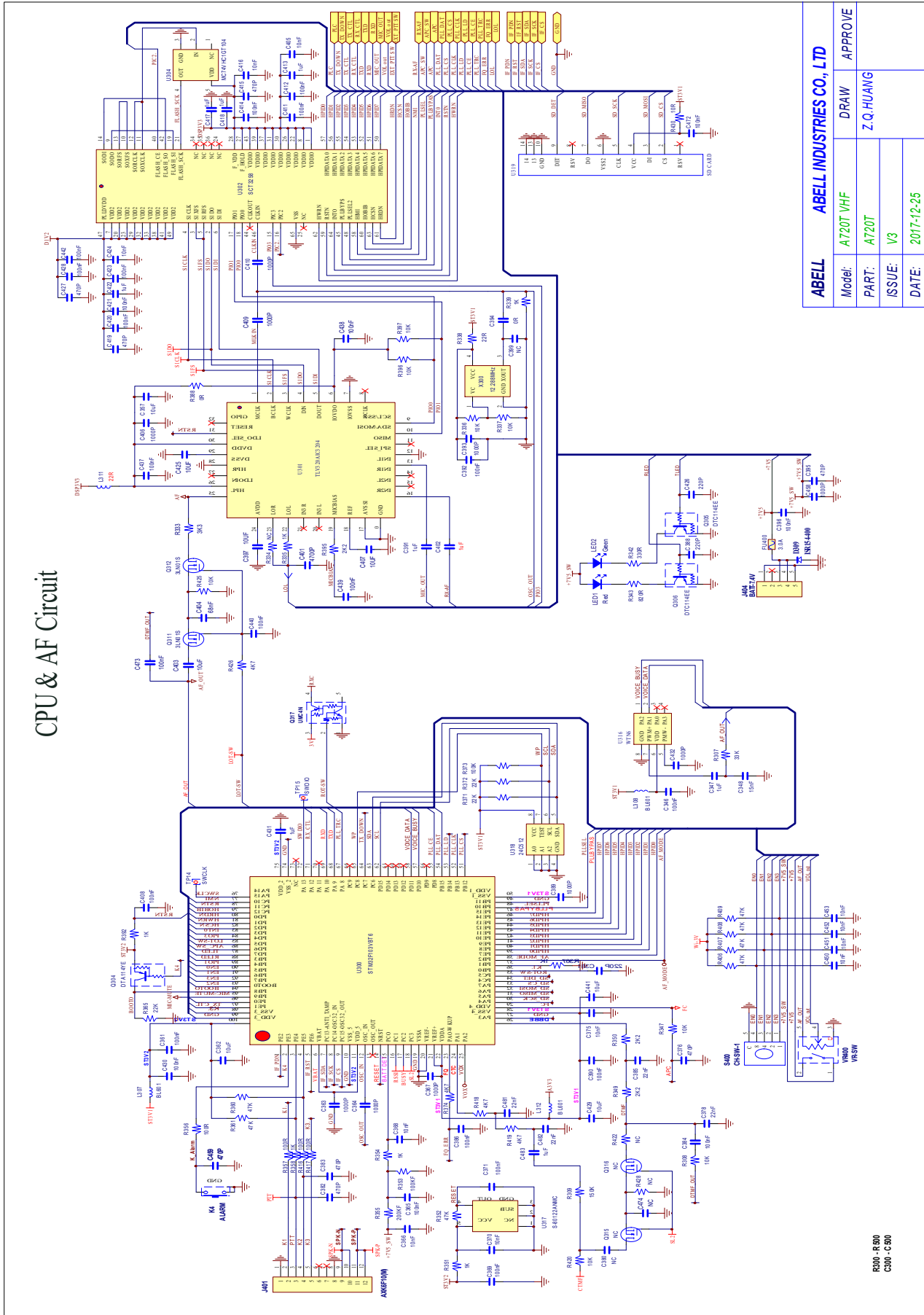
		labels:		
1	591-A720T (Ex)201-011	Logo A720T (Ex) "ABELL"stainless steel SUS304 0.3t black gum in reverse side	1	
2	741-0A720T (Ex)01-011	model label A720T (Ex) silver polyester 34.4*29.6mm	1	
3	749-000ALL01-01 1	S/N label silver polyester 22*5mm(round)	1	
		Auxiliary Materials:		
1	FL2-A002	white 703 sealant, Spot Light, for Mic	0.24mL	
2	FL2-A002	white 703 sealant, for PTT and function keys	0.34mL	
3	FL2-A003	8008 sealant, for inner Mic PCB	0.94mL	
4	FL3-Y001	TB-001 gum treating agent	0.1mL	for Mic water proof pad
5	FL2-B002	Thread glue CY3021	0.03ml	
		package		
1	803-A720T (Ex)A37-001	transceiver A720T (Ex)(A37) Chinese wide band	1	
	803-A720T (Ex)A37-002	transceiver A720T (Ex)(A37) English narrow band		
2	823-0BC78000-00 1	charger+power switch BC-780A 12V 600mA	1	
3	821-BL187800-00 4	Li-ion battery AB-L2478 7.4V 1800mAH Chinese	1	
	821-BL187800-00 5	Li-ion battery AB-L2478 7.4V 1800mAH English		
	821-L1878N00-00 2	Li-ion battery AB-L2478 7.4V 1800mAH Chinese not waterproof		
4	812-X2136174-00 1	Antenna assembly(long&thin) 168mm rubber+SMA-Krubber+SMA-K 136~174MHz X-2-136-174M-3108-B gum cover	1	
5	761-25500001-111	hand strap TH-308GB 255mm black English	1	
6	751-08516007-011	PE bag 85*160*0.07mm	1	for battery
7	751-11026007-011	CPE bag 110*260*0.07mm	1	for transceiver
8	751-13015007-111	PE bag 130*150*0.07mm	1	for users manual
9	771-0A720T (Ex)04-001	users manual A720T (Ex) 157chrome paper 66.5*17mm	1	
10	773-00A60001-00 1	warranty card A-600 carbon-free paper 140*105mm	1	
11	774-00A60001-00 1	certification A-600 230g single copper 50*50mm	1	
12	70F-0A720T (Ex)01-011	Waterproof and dust-proof breathable membrane A720T (Ex) D7.8*ID4.0 black single side of gum	1	for aluminum case waterproof testing
13	732-0A720T (Ex)01-001	Blister box A720T (Ex) PP 195*195*52mm	1	

14	721-0A720T (Ex)01-011	Gift box A720T (Ex) 300g 197*195*55mm	1	
15	711-0A720T (Ex)D3-001	Package box	1/20	
	711-0A720T (Ex)D2-001	Package box	1/10	
	711-0A720T (Ex)D4-001	Package box	1/20	
16	811-0A720T (Ex)00-001	plastic belt clip component A720T (Ex)	1	
16.1	504-A720T (Ex)001-012	Belt clip A720T (Ex) PC2805	1	
		Metal Parts:		
16.2	60A-A720T (Ex)001-111	belt clip A720T (Ex) zinc alloy electrophoresis black	1	
16.3	632-A720T (Ex)001-011	belt clip Torsion Spring A720T (Ex) nickel plating	1	
16.4	614-00A82001-01 1	belt clip Hinge A-82 1.9*23.6 SUS301 nickel plating	1	
		optional parts:		
1	821-BL227800-00 1	Li-ion battery AB-L2278 7.4V 2200mAH Chinese	1	
	821-BL227800-00 2	Li-ion battery AB-L2278 7.4V 2200mAH English		
2	814-AEHH8T02-0 01	"D"type ear hook AE-HH8-TD HRE-1016H8(AB2)(Digital) H8	1	
	814-AEHH8T03-0 01	"G"type ear hook AE-HH8-TG02 HRE-1013H8(AB2)(Digital) H8		
	816-AMHH8T02-0 01	Shoulder Mic AM-HH8-T02 HRM-160H8(AB2) (Digital)with ABELL LOGO		
3	815-0ADUH800-0 01	programming cable AD-UH8 H8ABELL	1	

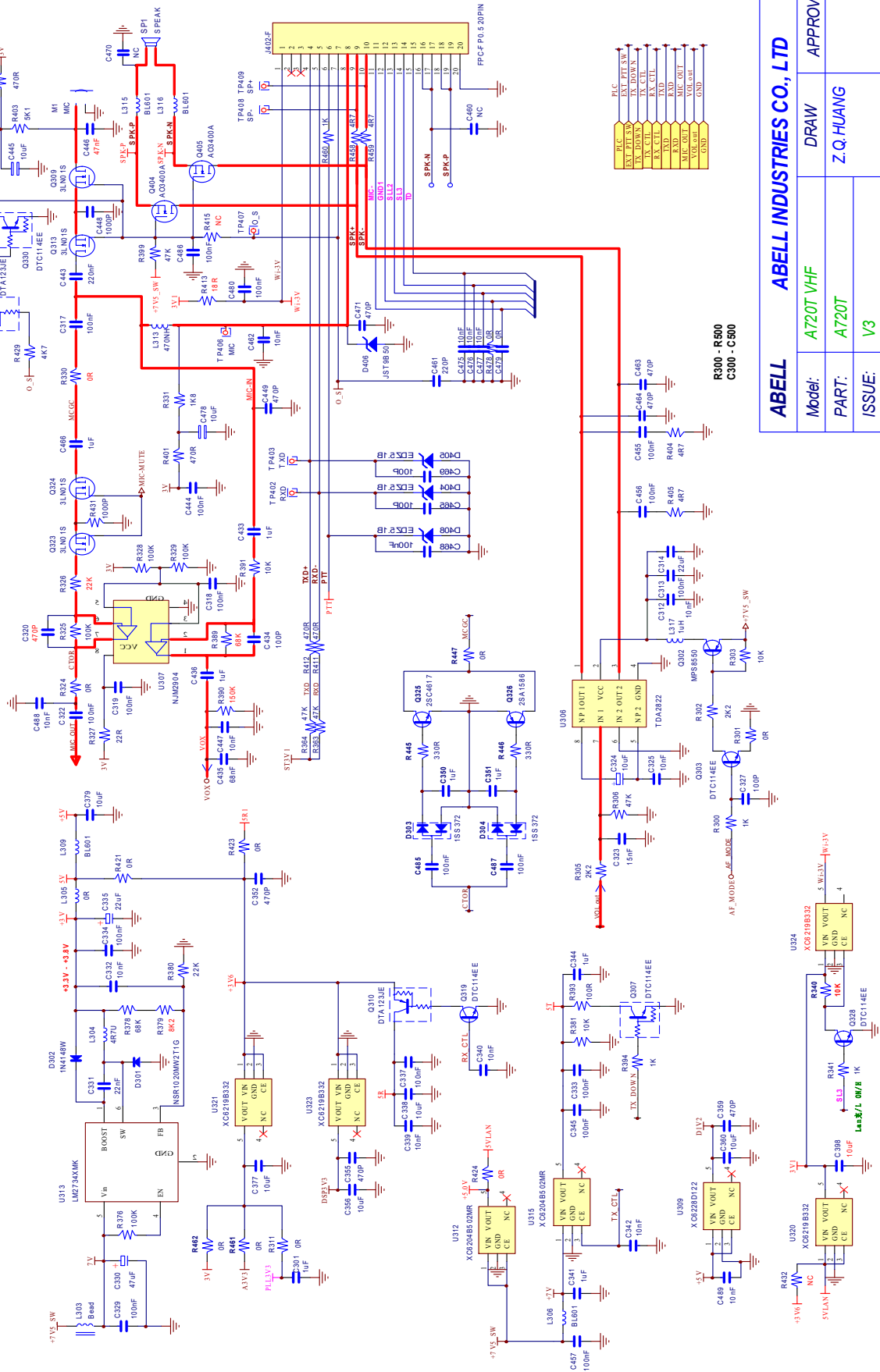
Fig.1 A720T (Ex) BIT Map**TOP Side:**

BOT Side:

Fig. 2 A720T (Ex) Schematic Diagram

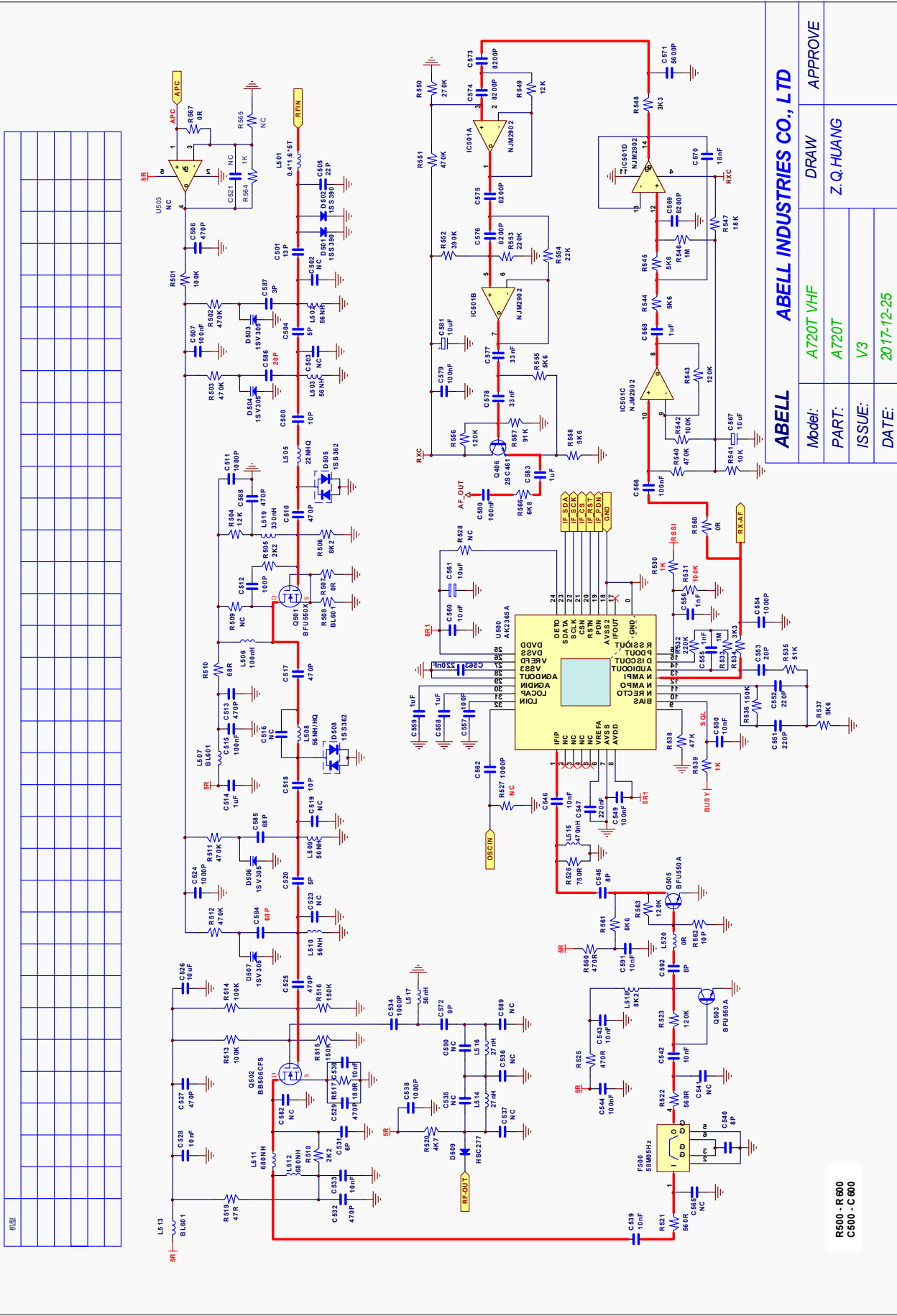


DC & AUDIO



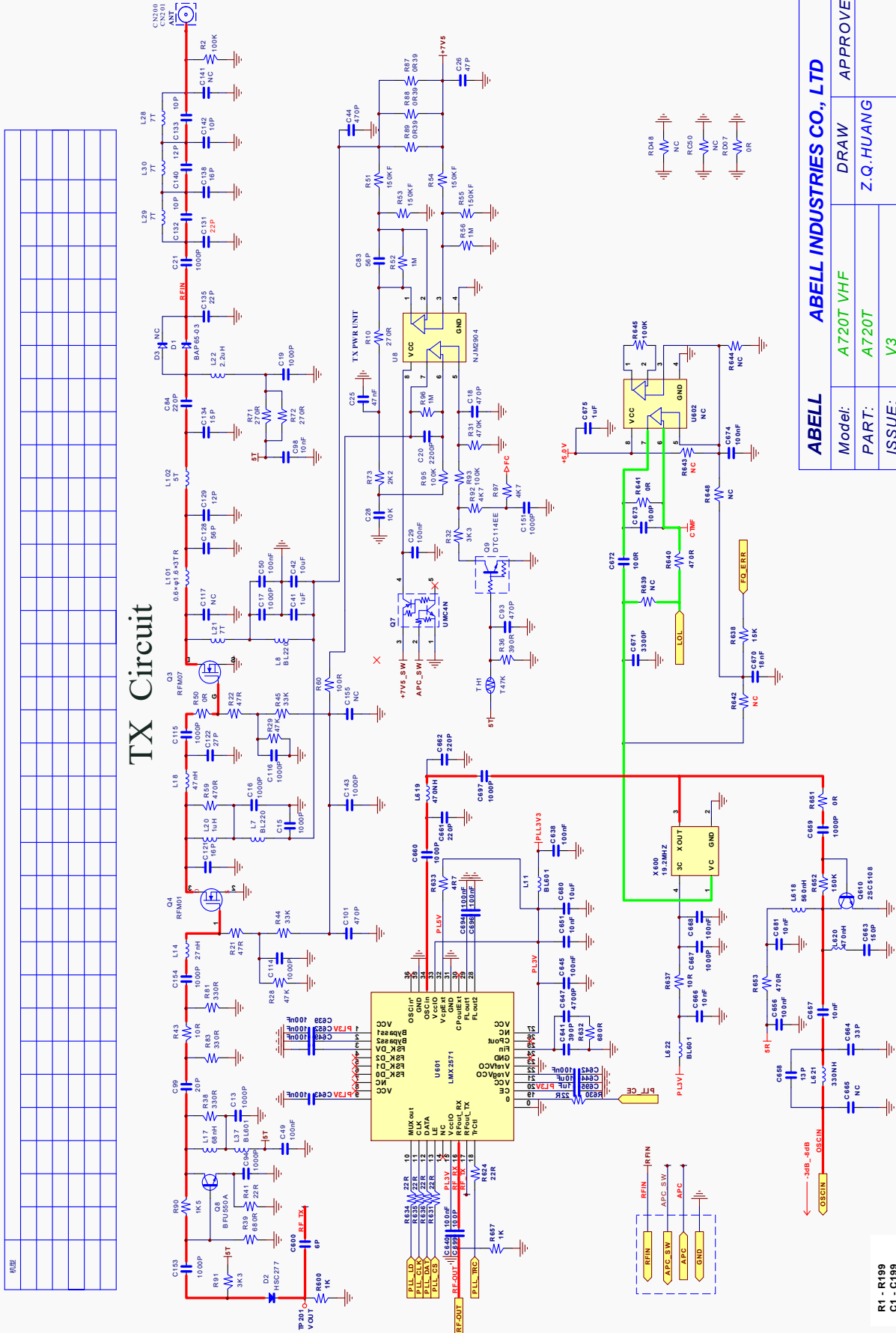
ABELL		ABELL INDUSTRIES CO., LTD	
Model:	A720T VHF	DRAW	APPROVE
PART:	A720T	Z.Q.HUANG	
ISSUE:	V3		
DATE:	2017-12-25		

RX Circuit



ABELL		ABELL INDUSTRIES CO., LTD	
Model:	A720T VHF	DRAW	APPROVE
PART:	A720T	Z.Q.HUANG	
ISSUE:	V3		
DATE:	2017-12-25		

TX Circuit



ABELL		ABELL INDUSTRIES CO., LTD	
Model:	A720T VHF	DRAW	APPROVE
PART:	A720T	Z.Q.HUANG	
ISSUE:	V3		
DATE:	2017-12-25		

R1 - R199
C1 - C199

Fig. 3 A720T (Ex) Block Diagram

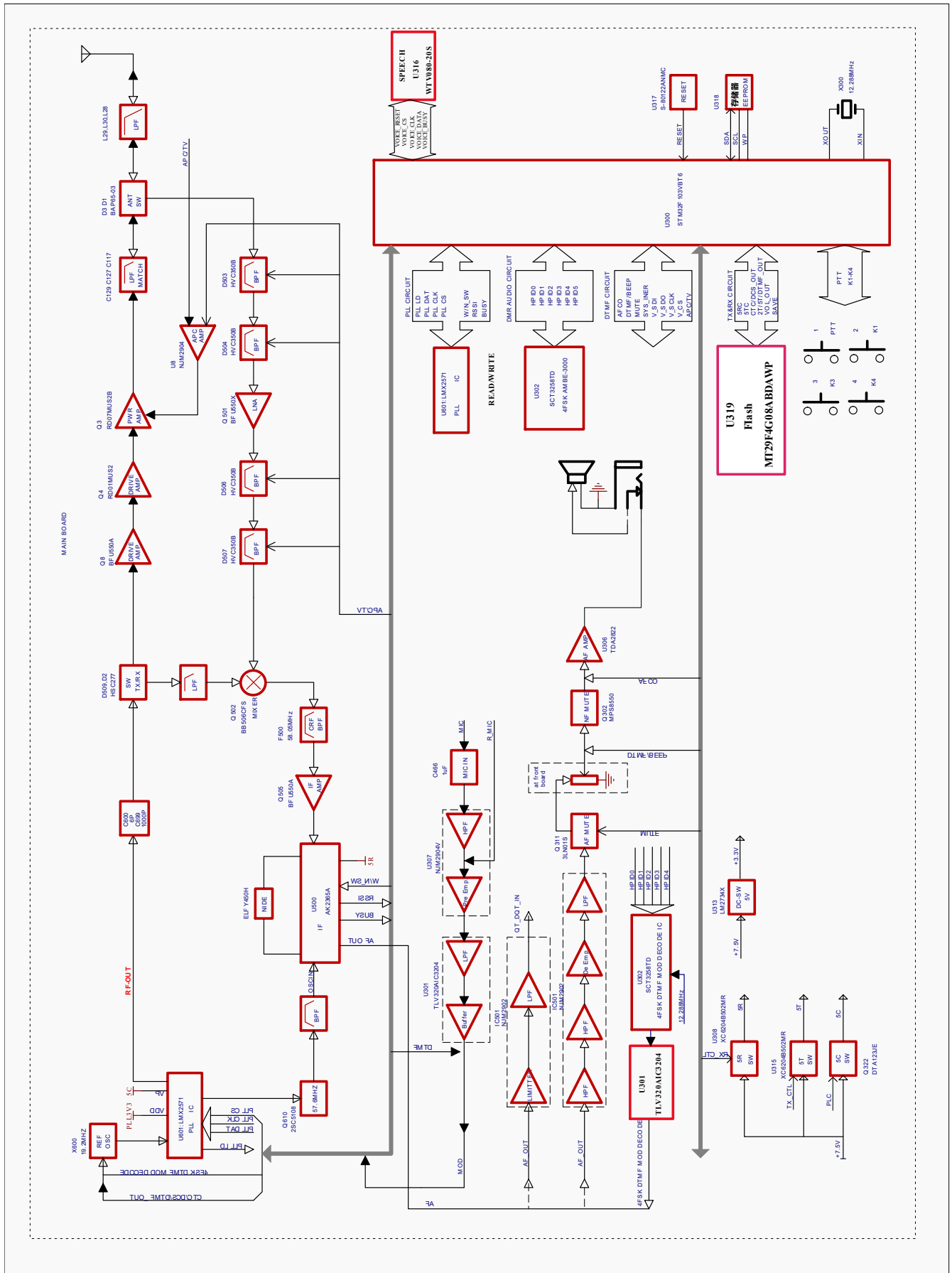


Fig. 4 A720T (Ex) Packing

