



Professional wireless communication system solution supplier



TP620

Service Manual

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1. Overview

1.1. Scope

This manual applies to the service and maintenance of TP620 digital portable radios, and it is intended for use only by engineers and professional technicians trained by Kirisun. Data changes in this manual may occur with the improvement of technology. To get the latest technology information, please contact us or your local dealer.

Please read this manual before repairing the radio.

1.2. Safety Precaution

Electromagnetic Radiation

Radios generate and radiate electromagnetic energy. The security design of TP620 radio's electromagnetic radiation on human meets national and international standards. To ensure radio's optimal performance and safe electromagnetic radiation on human, please keep the radio vertical to the ground and 2-5 cm away from your mouth.

Electromagnetic Interference

To avoid electromagnetic interference, please turn off the radio wherever there are clear warnings, e.g. hospitals, health care centers, airports, where radios must be turned off.

Explosive and Harmful Gases

The radio should be turned off in areas with explosives and harmful gases, e.g. lower deck of the hull, fuel and chemical storage facilities, area where the air contains chemicals, particles, dust or metal dust.

Please turn off the radio when close to blasting area and electric blasting detonators.

Replacing or charging batteries in potentially explosive atmosphere is prohibited.

Antenna Damage

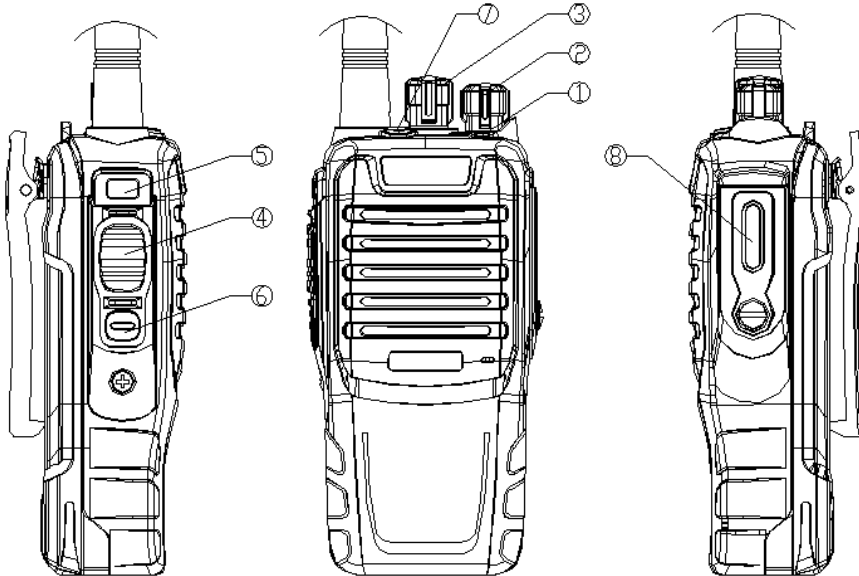
Do not use radios when the antenna is damaged. Damaged antenna may cause mild burning to human skin.

Replacing Components

When replacing components, please be aware of the model. Do not arbitrarily replace any components that do not match Kirisun's requirement.

2. Introduction

2.1. External Views and Functional Keys



No.	Part Name	No	Part Name
1	LED Indicator	2	Power/Volume Switch
3	Channel Switch	4	PTT(Push-To-Talk)
5	Side Key 1(Programmable Key)	6	Side Key 2(Programmable Key)
7	Top Key (Programmable Key)	8	Speaker/Microphone Interface

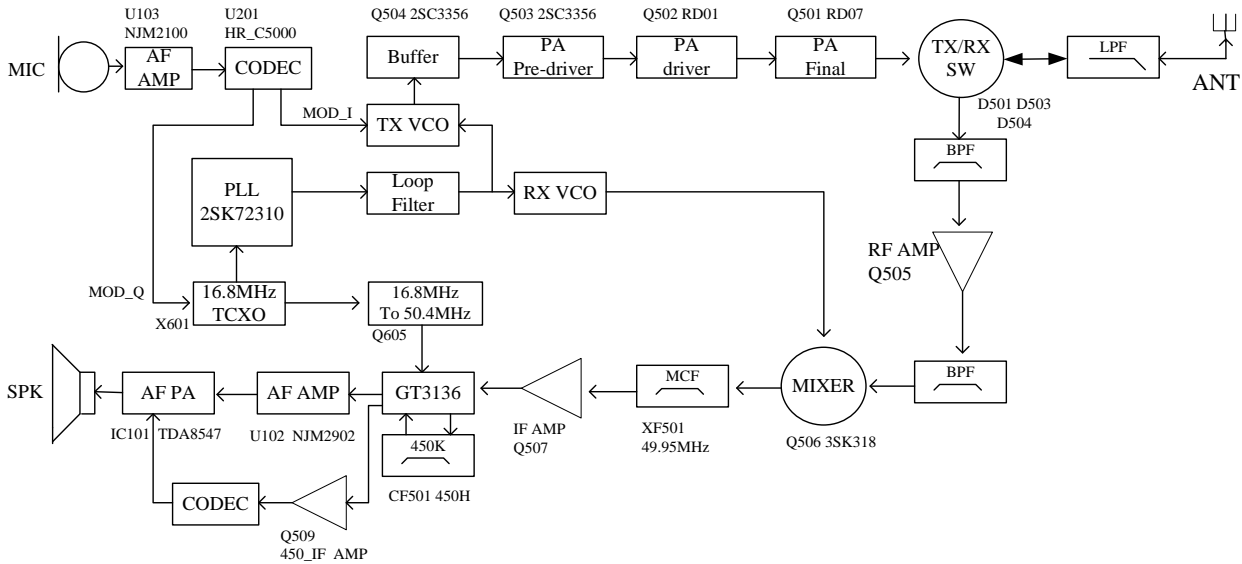
2.2. LED Indicator

- The LED glows red: The radio is transmitting.
- The LED glows green: The radio is receiving (voice mail, message, data) or activities on the channel are detected.
- The LED flashes red: Low battery.

3. Circuit Description

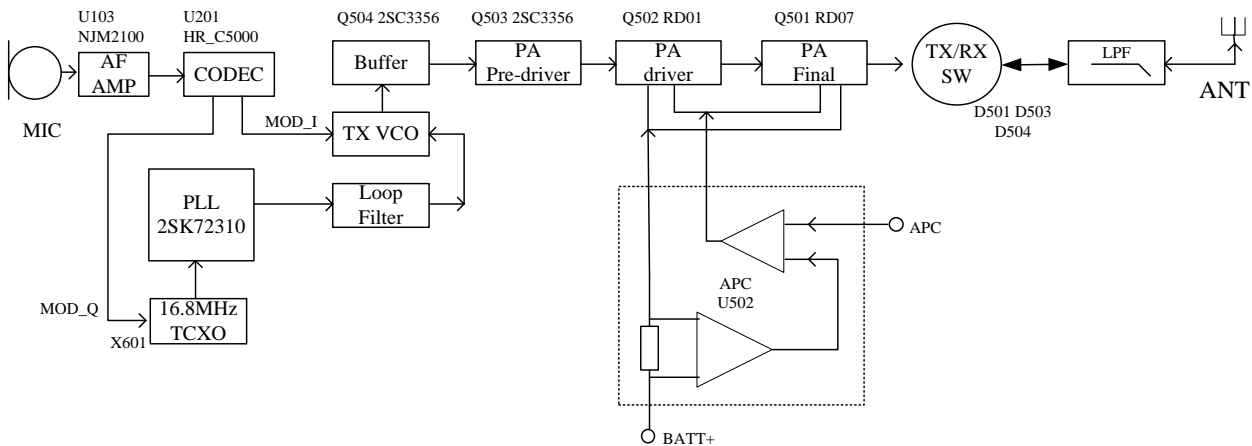
3.1. Tx/Rx Signal Procedure

Figure 3-1 RF Schematic Diagram



3.1.1. Tx Circuit

Figure 3-2 Tx Circuit Diagram



Tx circuit mainly includes four parts below:

- **RF Power Amplifier Circuit**

The carrier signal generated by VCO will be modulated and preliminarily amplified before entering Tx circuit. The signal will first pass through a Π -type pure resistance attenuator R536 R537 R538 to realize the level isolation between the power amplifier circuit and Tx VCO. Then the modulation signal enters the first pre-drive amplifier (Q504) for preliminary amplification, which generates a certain isolation between the first and second amplifier; The amplified signal will then enter the next pre- drive amplifier (Q503 and drive amplifier (Q502 RD01)) for further power amplification so as to ensure that enough drive power

signal can be offered to the last power amplifier (Q501 RD07) for final power amplification. After being processed by a set of amplifiers at several levels, the Tx signal will complete the output impedance match through a microstrip line at the output terminal of the last power amplifier, through which the output power loss caused by impedance mismatch can be avoided. The Tx signal will then pass the Rx/Tx switcher and enter the LPF.

• **Low Pass Filter Circuit for Harmonic Suppression**

Low pass filter which suppresses harmonic wave is a high level low pass filter consisting of capacitor and inductor with concentrated parameters. The out-of-band harmonic wave and spurious signal can be further suppressed on the condition that the certain in-band fluctuation is satisfied through this filter.

• **Auto Power Control Circuit (APC)**

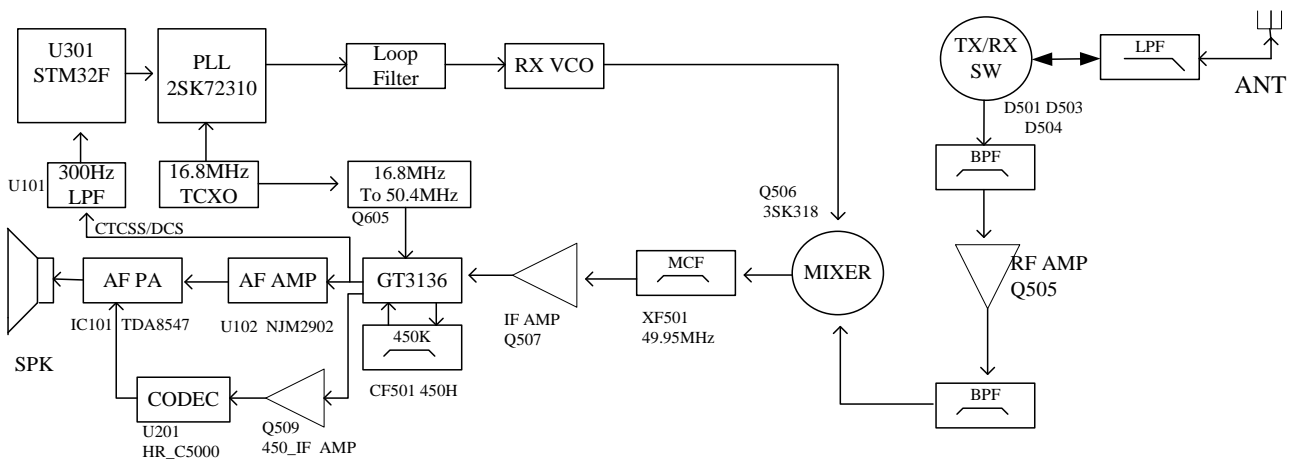
The drain current from the drive power amplifier and end-level power amplifier passes the sampling resistors (R559 R560 R561) and the subtraction circuit which consists of the first operational amplifier to realize the transformation from current to voltage. The voltage will be compared with the PAC control voltage value output from DAC (U301 pin 29) at the second operational amplifier, and the output deviation voltage will change the Tx power strength by controlling the grid bias voltage of power amplifier tube(including drive level and end level).

• **Audio Processing**

The microphone converts the speech signal to speech electric signal, and the signal will be amplified by U103 before being input into ADC of codec (U201 HR_C5000) for sampling, it will then be output into DSP after audio being digitally processed, and sent to DAC for modulation signal conversion, the modulation signal will be separated into path I and Q for modulating VCO, TCXO.

3.1.2. Rx Circuit

Figure 3-3 Rx Circuit Diagram



Rx circuit mainly includes:

RF band-pass filter, low noise amplifier, frequency mixer, IF filter, IF amplifier, IF processor and audio circuit.

- **Rx Circuit RF Part**

The high frequency signal from low-pass filter passes the front stage electrically tunable band-pass filter controlled by electric level and output by DAC (U301 PIN29) so as to filter out the out-of-band interference signal, sending effective band-pass signal into the low noise amplifier (Q505). The amplified signal passes again the band-pass filter controlled by electric level and output by DAC so as to filter out the out-of-band interference signal caused by amplification, sending effective high frequency signal into frequency mixer (Q506).

The effective signal passes RF band-pass filter and low noise amplification and enters the frequency mixer Q506, meanwhile, the first local oscillation generated by VCO passes the low-pass filter and enters Q506 for making frequency difference with effective signal so as to generate the first IF signal. The signal passes the frequency selector network which consists of LC; it further suppresses the other carrier waves other than the first IF, and increases the isolation between the frequency mixer and IF filter. The IF signal will be filtered by the XF501 crystal filter, and then sent to the first IF amplifier (Q507) for amplification before being sent to the IC for IF processing (U501, GT3136).

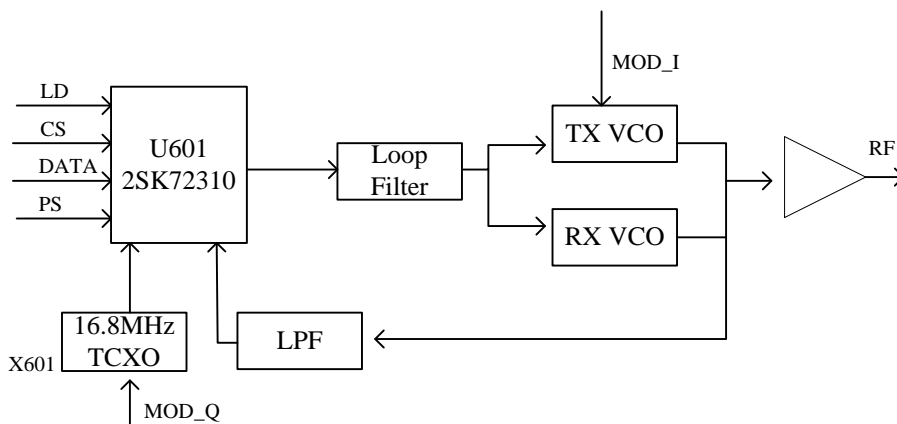
The third harmonic frequency 50.4MHz produced by TCXO(X601 16.8MHz) is amplified by frequency selector and become the second local oscillation signal source. The second local oscillation (50.4MHz) mixes with the first IF signal in U501, generating the second IF (450kHz). The second IF will be amplified, limiting amplitude inside U501, and filtered by the ceramic filter CF501 450kHz before going back to U501 for demodulating and outputting the audio signal.

- **Rx Circuit Audio Section**

- A. Digital Channel Audio Access: The second IF signal output from the eleventh pin of U501 is amplified by Q509 and sent to U201 for ADC sampling and being converted to digital signal; after the digital audio signal is compressed, decompressed and decoded by U301, U201 will complete DA conversion and output audio signal from the 10th pin, and the audio signal will be amplified by U203 and sent to the audio power amplifier IC101.
- B. Analog Channel Audio Access: The audio signal output from the 9th pin of U501 is amplified by U102 and its unit circuit. The high frequency and low frequency will be removed from the audio signal, keeping only the voice component between 300 Hz to 3000Hz. The voice component will be adjusted by volume potentiometer and sent to audio power amplifier IC101.
- C. Analog Channel CTCSS/DCS Signaling Access: The audio signal output from the 9th pin of U501 may include CTCSS/DCS signal. The 300Hz low-pass filter circuit composed of U101 filters out the signals out of the CTCSS/DCS spectrum. After CTCSS/DCS is amplified, it will be sent to the 25th pin of U301.
- D. Analog Channel Squelch Circuit: The modulated output from U501 is sent to the frequency selector noise amplifier which is composed of U501 internal noise amplifier and C555, R525, R524, C554, C553, R527; the noise will be selected from the modulation signal and detected internally before being outputting by the 14th pin and transformed as direct electric level to reach MCU U301; MCU identifies the electric level strength and controls squelch.

3.1.3. Frequency Synthesizer Circuit

Figure 3-4 Frequency Synthesizer Circuit Diagram



Frequency synthesizer circuit is composed of VCO and PLL, and it is the kernel module of the whole TRx system. When transmitting, the circuit supplies accurate carrier frequency; when receiving, it supplies stable local oscillation signal. The circuit directly influences some of the important functions in the system.

- **PLL Working Principle**

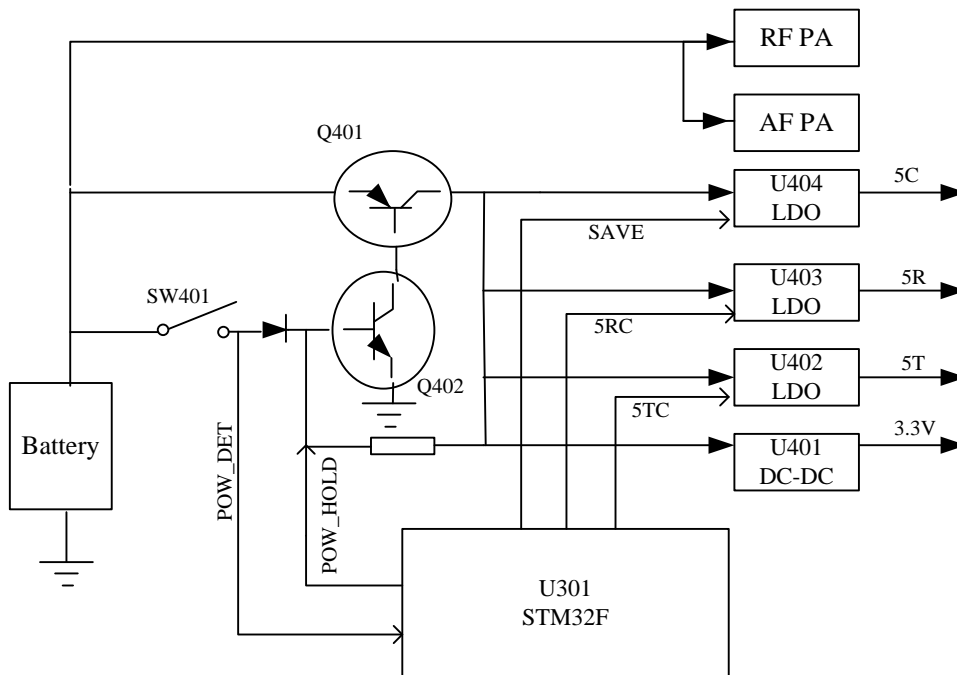
The 16.8MHz frequency generated by the reference crystal oscillator enters the frequency divider of PLL chip, and becomes reference frequency (i.e. step frequency f_1). The frequency generated by VCO passes LPF for filtering out the second harmonic wave and enters PLL chip for frequency division and gets frequency f_2 . The frequency f_2 compares with f_1 on phase difference in phase comparator, producing continuous pulse current. When the pulse current passes the loop filter, it starts to accumulate RC and converts to CV voltage. The CV voltage is sent to the VCO varactor, directly controlling and adjusting the VCO output frequency until CV becomes constant. PLL will be currently locked, and the stable frequency output from VCO passes two buffer amplifiers before entering the TRx access.

- **The Working Principle of Voltage Controlled Oscillator**

The voltage controlled oscillator applies oscillation mode of three point capacitor. It changes the control voltage of varactor to get different output frequency. Rx VCO is composed of oscillator circuit and Q603. Tx VCO is composed of oscillator circuit and Q601, supplying carrier wave of TX signal.

3.2. Power Section

Figure 3-5 Power Structure Diagram



This radio applies 7.4V, 2000mAh lithium battery, RF power amplification (Q501, Q502), AF power amplification (IC101), and direct battery power supply.

The power circuit is composed of power-on/off circuit, 5C, 5R, 5T, and 3.3V DC-DC voltage stabilizing circuit.

Power-on Circuit: When SW401 is closed, the B level of Q402 becomes high electrical level, and the switch tube Q401 becomes conductive. The power supplies electricity for every power module through Q401, when MCU is powered on, POW_HOLD will output high electric level to keep Q401 constantly conductive so as to turn on the radio.

Power-off Circuit: When SW401 is cut off, POW_DET test pin becomes low electric level, and POW_HOLD pin of MCU will first stays on high electric level for a while before outputting low electric level. The Q402 B level thus becomes low electric level, cutting off the switch tube Q401 and the power to turn off the radio.

5C voltage stabilizing circuit: U404 applies 5V LDO voltage stabilizer and supply 5v power for PLL circuit. Meanwhile, the 67th pin of U301 outputs high and low electric level to control the enable pin of U404, making the voltage stabilizer switches between 5V and 0V so as to realize the functions such as energy saving and Tx/Rx switch.

5R voltage stabilizing circuit: U403 applies 5V LDO voltage stabilizer, and supplies 5V power for Rx circuit. Meanwhile, the 66th pin of U301 outputs high and low electric level to control the enable pin of U403, making the voltage stabilizer switches between 5V and 0V so as to realize the functions such as energy saving and Tx/Rx switch.

5T voltage stabilizing circuit: U402 applies 5V LDO voltage stabilizer, and supplies 5V power for Tx circuit. Meanwhile, the 34th pin of U301 outputs high and low electric level to control the enable pin of U402,

making the voltage stabilizer switches between 5V and 0V so as to realize the functions such as energy saving and Tx/Rx switch.

voltage stabilizing circuit:U401 applies 3.3V DC-DC voltage stabilizer, and supplies 3.3V power for U201,U301,U302,U307.

4. Function Description and Parameter Settings

4.1. Conventional Functions

- Supports private call, group call, all call on digital mode.
- Supports end-to-end voice encryption, data encryption.
- Supports short message.
- Supports Stun, Activate, and Digital Signaling Monitor in DMR standard.
- Supports CTCSS/CDCSS on analog mode
- Supports DTMF system on analog mode
- Supports emergency alarm feature
- Supports digital channel scanning, analog channel scanning.
- Supports a maximum of 32 channels
- Supports a maximum of two zones, and each zone contains 16 channels.
- Supports a maximum of 1000 contacts.
- Supports LED, and alert tone which indicates option
- Supports programmable selection between 12.5 kHz and 25 kHz channel spacing.
- Battery power indication and low power alert feature.

4.2. Function Parameter Settings

The radios are set with default value when they are out of the factory. But due to the different requirements by the users, the radio may be reset with operational frequency, channel parameter, scanning, encryption, etc. Therefore, Kirisun specially designs a user programmable software which is interface-friendly, operation-easily and display-visually to complete the parameter settings for the radio.

- **Steps for parameter settings are as below:**

Step 1. Confirm that the right version of TP620 user programmable software is installed on the computer.

Step 2. Confirm that the right version of TP620 USB driver software is installed on the computer.

Step 3. Use TP620 programmable lead supplied by Kirisun to connect the radio with computer USB port.

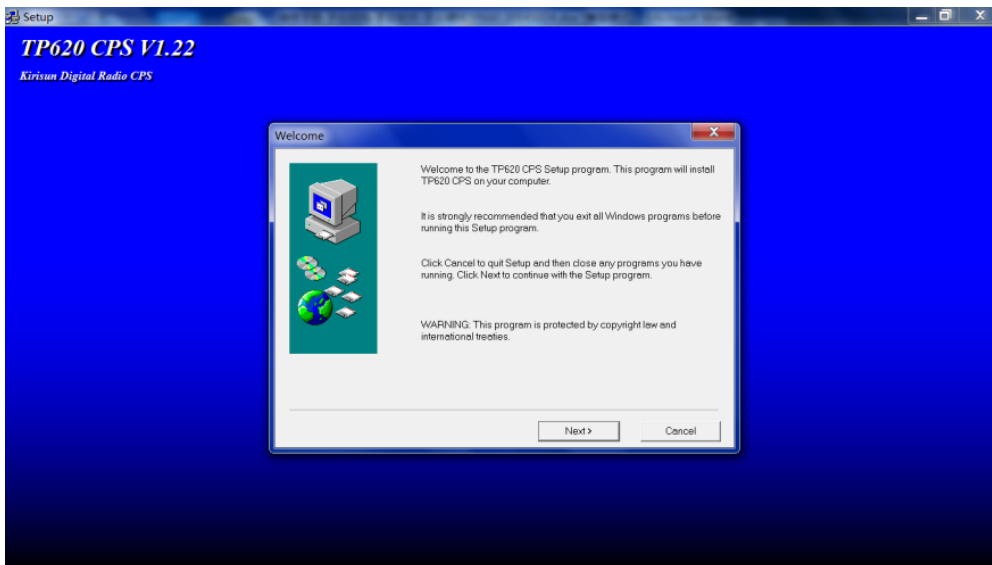
Step 4. Confirm that the radio is powered on.

Step 5. Operate TP620 user programming software.

- **Steps for installing TP620 user programmable software are as below:**

Step 1. Double click the installation file, and the interface in Figure 4-1 will pop up.

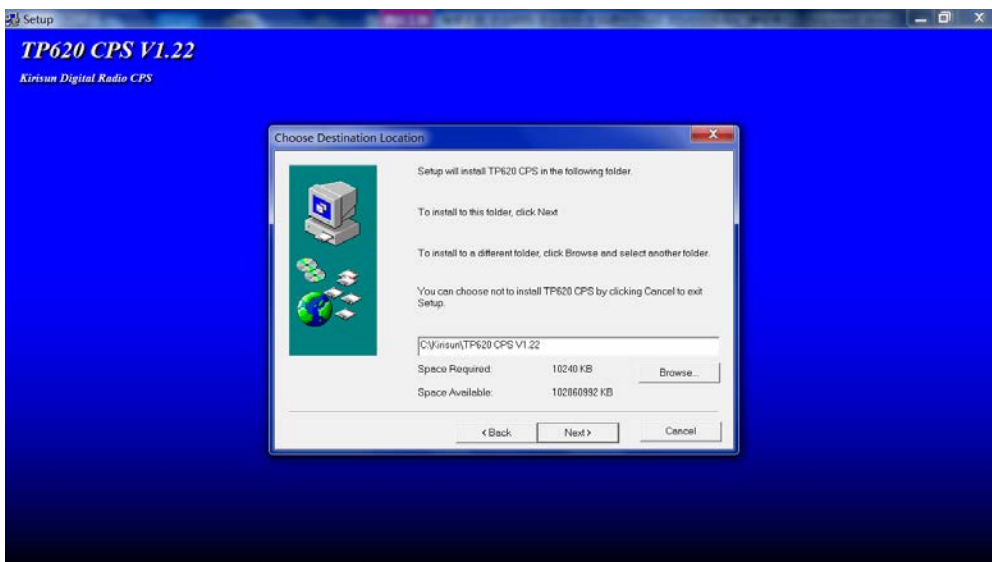
Figure 4-1



Step 2. Click “Next” to enter the next interface for selecting software installation path.

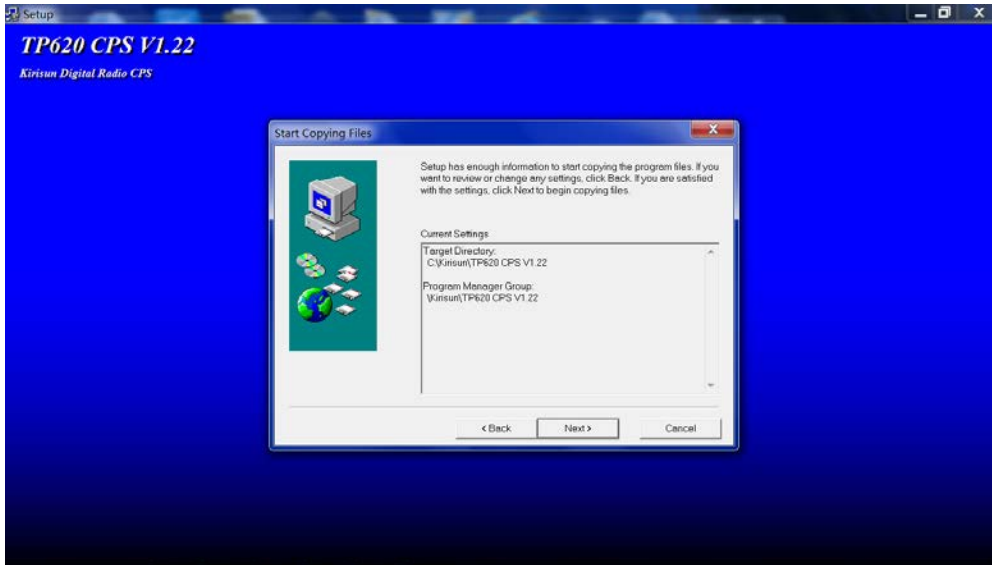
Step 3. As shown in figure 4-2, the user can click “Browse” to select the software installation path or the default installation path. Click “Next” to enter the installation confirmation interface.

Figure 4-2



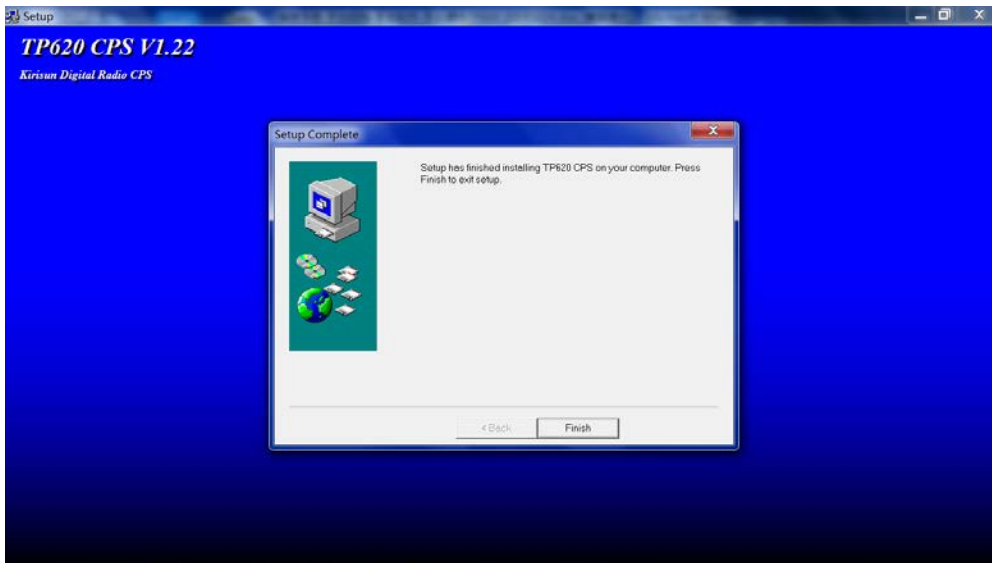
Step 4. Click “Next” to enter the installation completion interface.

Figure 4-3



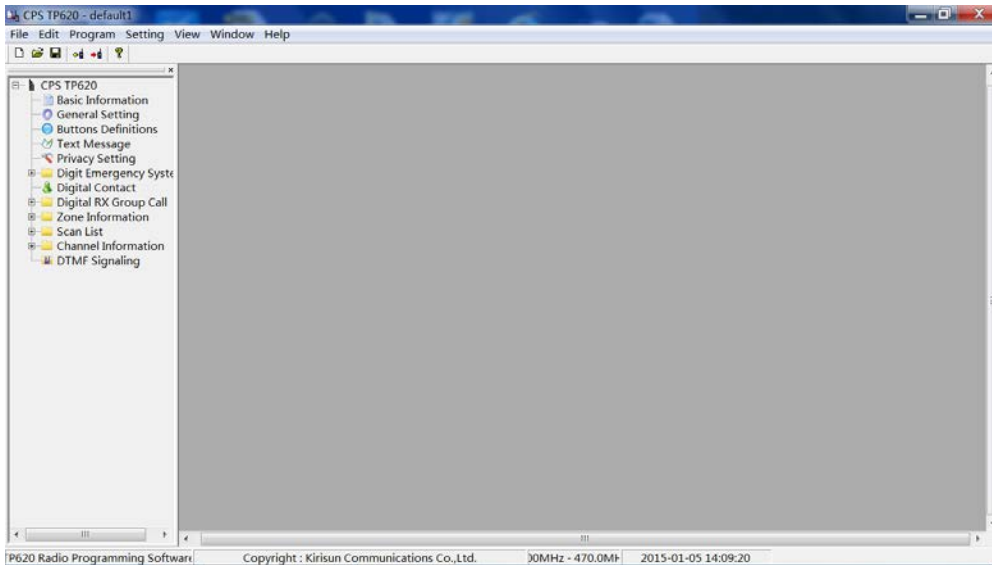
Step 5. Click “Finish” to complete the software installation.

Figure 4-4



Step 6. After the installation, double click TP620 user programmable software. (See figure 4-5)

Figure 4-5



The user can read the current parameter settings from the radio through TP620 user programmable software, and the parameter configuration can also be modified before writing the parameters into the radio.

Please refer to the help file attached along with the software for detailed operation instructions of TP620 user programmable software.

Note:

1. Wrong parameter settings may cause malfunction. Normally, rewriting the correct parameter settings can solve the problem.
2. Before rewriting the parameter settings, reading the parameter settings out of the radio for back-up is strongly recommended in case that the recovery is needed once the radio becomes faulty.

5. Assemble and Disassemble Instructions

This radio is sophisticated communication equipment with compact, precise mechanism. Please be careful during attaching and detaching.

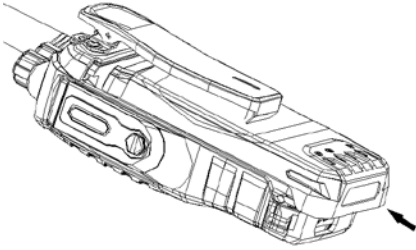
The attaching and detaching instructions are as below:

5.1. Attaching and Detaching the Battery

Attaching the battery

Press the belt clip and push the battery pack forwards in the arrow direction until a click is heard, which indicates that the battery pack is properly fixed. (see figure 5-1)

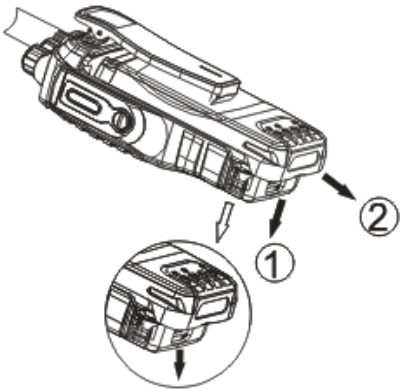
Figure 5-1



Detaching the battery

When detaching the battery, press the latch downwards in the direction ①, and use other hand to push the battery in the direction ② until it is removed from the radio.

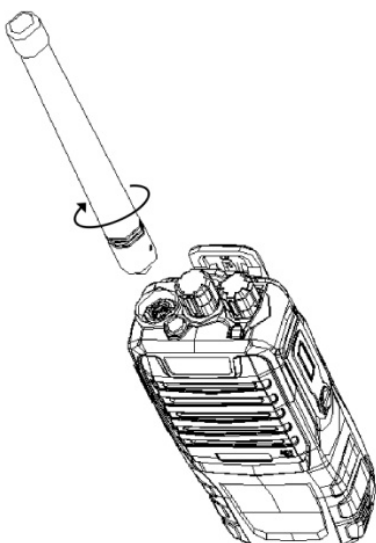
Figure 5-2



5.2. Attaching the antenna

Hold the antenna base, turn the antenna clockwise into the interface on the radio top until it is fastened. (see figure 5-3)

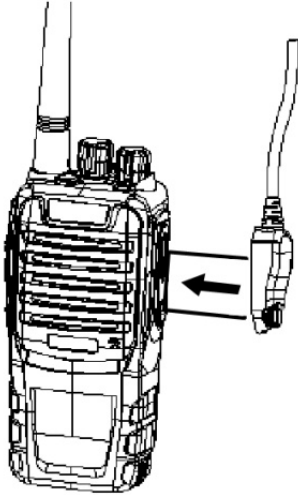
Figure 5-3



5.3. Attaching the Speaker /Microphone

Open the microphone cover board and plug the speaker or microphone into the corresponding interface.
 (See figure 5-4)

Figure 5-4

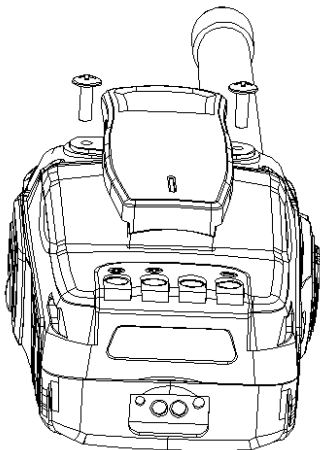


5.4. Attaching the Belt Clip

Step 1. Press the belt clip and align the two screw holes with those on the back aluminum shell. (See figure 5-5)

Step 2. Fasten the two screws.

Figure 5-5



5.5. Separating the Shell from the Chassis

Step 1. Detach the antenna. (See figure5-6 and 5-7)

Step 2. Remove the two knobs.

Step 3. Remove the three nuts which fix the antenna connector and switch.

Step 4. Rotate loose the screws on both sides of the shell and the two screws which fix the aluminum shell.

Step 5. Use a tool to pry up the aluminum shell and push it backwards to separate the shell from the chassis.

Figure 5-6

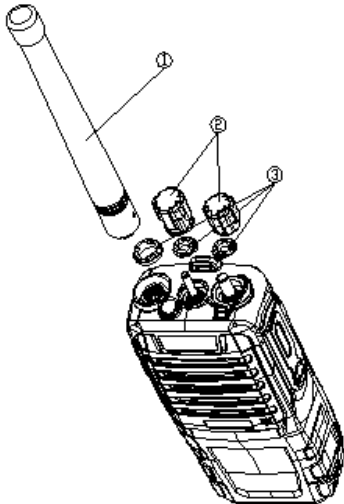
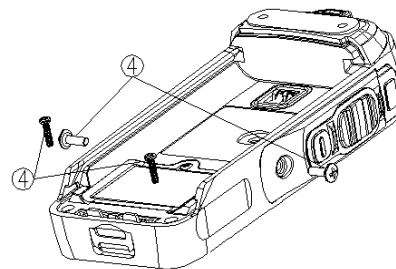


Figure 5-7

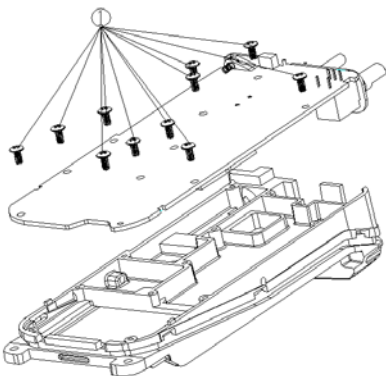


5.6. Separating the Aluminum Shell from the Main Board

Step 1. Remove 11 screws. (See figure 5-8)

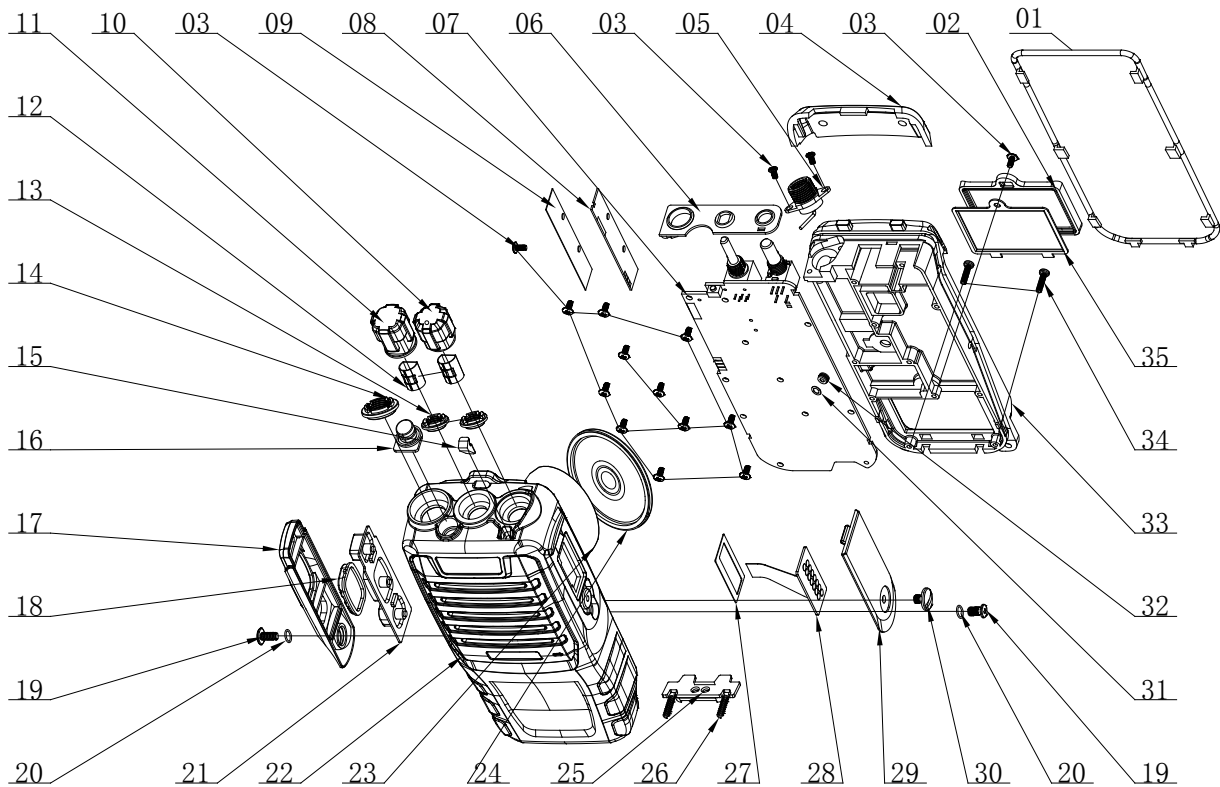
Step 2. Use an electrical soldering iron to solder off the antenna and remove the main board.

Figure 5-8



After the detachment above, the maintenance and modulation can be done accordingly.

5.7.Exploded View



No.	Part No.	Part Name	Specification	Quantity
1	7MHR-7069-04A-W0	PT7800 major waterproof ring	Silicone gel (highly-elastic), black, hardness 40 degrees,pb-free	1
2	7MHR-7069-05A-W3	PT7800 roof waterproof ring	Silicone gel, orange, hardness 60 degrees,pb-free	1
3	7SMF-020040M-SZYB-N	Machine screw /M2.0*4.0	Hardened iron,Φ2mm*4mm,cross flat nickel plated threading machine,Nylok Processing	15
4	7MHP-7069-02A-W0	PT7800 top cover	PC+ABS, black,red texture 2008B ,pb-free	1
5	3CR7-SMA-50JFB-4	RF coaxial connector	SMA-J, flange plate installation (558, hole distance 14mm, chip length:10.5mm)	1
6	7MHR-7210-02A-W0	PT567 top waterproof pad	Silicone gel, black, hardness 60 degrees,pb-free	1
7		TP620 mainboard		1
8		TP660 PTT board		1
9	7MHS-7069-04A-W	PT7800 PTT button	METAL DOME, pb-free,3 D6 square dome	1
10	7MHP-7210-04A-W0	PT567volume knob	ABS, black,pb-free,texture	1

11	7MHP-7210-03A-W0	PT567 channel knob	ABS, black,pb-free,texture	1
12	7MHS-1140-01A-W	3208 knob calorific	Spring steel	2
13	7NRC-060100035-B1 A	Switch nut	Brass,internal diameter M6mm, external diameterφ10mm, thickness 3.5mm, black passivation	2
14	7NRC-090110025-W1	Antenna nut	internal diameter M9mm, external diameterφ11mm, thickness 2.5mm, no surface processing	1
15	7MHP-7069-10A-WC	PT7800 guide beam	PC, transparent,pb-free	1
16	7MHR-7210-01A-W3	PT567alarm button	Silica gel, orange, hardness 60 degrees,pb-free	1
17	7MHP-7069-03A-W0	PT7800 PTT side cover	PC+ABS, black, 2008B/2010B,pb-free	1
18	7MHP-7069-04A-W0	PT7800 PTT cover board	PC+ABS, black, 2010B,pb-free	1
19	7SMF-025080M-SZYB -Z1	M2.5X8 cross flat head thread machine screw	Hardened iron,Φ2.5mm*8mm, metric coarse thread	2
20	7MHR-7069-08A-W0	O ring	D2.4X1.0MM pb-free	2
21	7MHR-7069-02C-W0	PT7800 PTT button	Silica gel,black, hardness 60 degrees,1409 modified, pb-free	1
22	7MHP-7210-01A-W0	PT567 front shell	PC+ABS, black,pb-free,texture	1
23	7GCJ-S7210-01-J	PT567double-sided adhesive speaker net	Non-woven cloth, gum nitto57120B, with 2 notches	1
24	4SS7-4005-016-100C	40 speaker	11.3.25 modified technique,Φ40, impedance 16Ω,1W,pb-free	1
25	7MHP-7069-06A-W0	PT7800 battery latch	PC+ABS,embedded latch baffle,black,2008B,pb-free	1
26	7MHS-1010-02A-N	PT3208S spring	Spring steel, nickel-plated, wire diameter 0.2, diameter 2, height 9.5,11 circles	2
27	7GCJ-S1867-01	PT7200 head set, PCB sticker	Double-sided tape	1
28	6SS2-7210-HLA	PT567rail radio earphone set		1
29	7MHP-7210-02A-W0	PT567earphone cover board	PC+ABS, black,texturing,pb-free	1
30	7SSF-030040M-YXHP -BA	M3*4 screw	Earphone cover board screw, SUS303, US made # 4-40 thread, IP black vacuum plating, pb-free	1
31	7GCB-070045005-J	PT567Φ7	Diameter φ7*φ4.5* thickness	1

		microphone cloth	0.1mm, one side glue	
32	7MHR-1727-09A-W3	558 microphone case	Silicone gel, hardness 40 degrees, orange, no surface process	1
33	7MHL-7069-01A-W	PT7800 aluminum bracket	Aluminum alloy (ADC12), ground, polish, pb-free	1
34	7SMF-020080M-MHH T-N1	M2*8 club size thick-headed machine screw	Hardened iron, $\Phi 2\text{mm} \times 8\text{mm}$, metric coarse thread, Nylok processing	2
35	7MHF-7069-02A-W	PT7800 roof cover board	0.5MM, SUS304, pb-free	1

6. Adjustment and Test

During the maintenance, it is necessary to test and adjust the radio's technical parameters after changing components.

6.1. Components for Adjustment

- (1) Antenna connector converter
- (2) Universal connector

6.2. Adjustment Test Method

6.2.1. Frequency Description

Model	TP620(400-470)				
Channel	Low frequency	Intermediate/low frequency	Intermediate frequency	Intermediate/high frequency	high frequency
Tx frequency (MHz)	400.025	417.025	435.025	452.025	469.975
Rx frequency (MHz)	400.25	417.25	435.25	452.25	469.95

Model	TP620(134-176)				
Channel	Low frequency	Intermediate/low frequency	Intermediate frequency1	Intermediate/high frequency	high frequency
Tx frequency (MHz)	136.025	145.025	155.025	162.025	173.975
Rx frequency (MHz)	136.25	145.25	155.25	162.25	173.95

6.2.2. Test Tools

- Integrated tester
- Programming lead
- AEROFLEX 3920
- Spectrum analyzer FSU

6.2.3. Tx Test and Modulation

Item	Steps	Specification Requirement
Frequency stability	<ol style="list-style-type: none"> 1. Enter computer tuning mode. 2. Enter "RF stability adjustment". 3. Adjust PC software value, and observe integrated tester frequency value. 4. Adjust to nominal frequency $\pm 100\text{Hz}$. 	$\leq 0.5\text{ppm}$
Tx high power	<ol style="list-style-type: none"> 1. Enter computer tuning mode. 2. Enter tuning mode "Tx high power". 3. Adjust PC software value, observe integrated tester frequency value. 4. Adjust to the nominal test power. UHF: $4.2 \pm 0.2\text{W}$, VHF: $5\text{W} \pm 0.2\text{W}$ 5. Adjust the frequencies by turns. 	UHF: 3.8-4.5W current: less than 1.8A VHF: 4.5-5.2W current: less than 1.8A.8A
Tx low power	<ol style="list-style-type: none"> 1. Enter computer tuning mode. 2. Enter tuning mode "Tx low power". 3. Adjust PC software value, observe integrated tester power value. 4. Adjust to nominal test power $1 \pm 0.2\text{W}$. 5. Adjust the frequencies by turns. 	0.8-1.2W current: less than 1A
I path and Q path amplitude adjustment for analog transmit	<ol style="list-style-type: none"> 1. Enter computer tuning mode, 2. Enter "analog Tx I path amplitude and Q path amplitude" to adjust I oath value. 3. Observe FM Deviation as $1.95 \pm 0.05\text{kHz}$. 4. Click "OK" to save. 	1.9KHZ~2.0KHZ

I path and Q path amplitude adjustment for digital transmit	<ol style="list-style-type: none"> 1. Enter computer tuning mode. 2. Enter "digital Tx I path amplitude and Q path amplitude". 3. Click digital adjustment item, and adjust Q path (see figure 6) to adjust the digital frequency deviation in the range between 1.9KHZ and 2KHZ; adjust the bit error rate through the I path adjustment, and the I path which adjusts the bit error rate also adjusts frequency deviation; the Q path which adjusts digital frequency deviation also adjusts bit error rate. When the Q path is turned up, the I path also needs to be turned up or turned down. Adjust the channel 1 within the specified range and click ok before clicking the next channel for adjustment. (Channel 3, 5, 7, 9 can be adjusted in turn based on the methods above). 	1.9KHZ~2KHZ FSK EER≤5%Hz
CTCSS frequency deviation and wave	<ol style="list-style-type: none"> 1. Enter computer tuning mode. 2. Enter the tuning mode one by one "CTCSS (67Hz)", "CTCSS (51.4Hz)" "CTCSS (254.1Hz)". 3. Adjust PC software value and observe integrated tester frequency deviation value. 4. Adjust to the nominal frequency deviation: 350±50Hz. 5. Adjust the frequencies in turn. 6. Check the frequencies in turn. 	200±200Hz. <15mV
DCS frequency deviation and wave	<ol style="list-style-type: none"> 1. Enter computer tuning mode. 2. Enter the tuning mode "DCS frequency deviation". 3. Adjust PC software value and observe integrated tester frequency deviation value. 4. Adjust to nominal frequency deviation: 350±50Hz. 5. Adjust the frequencies in turn. 6. Check the frequencies in turn. 	350±150Hz
Modulation distortion	Observe distortion form value.	<3%
Tx SNR	Observe SNR form value.	N:>40dB
4FSK Tx error	<ol style="list-style-type: none"> 1. Select 3920 and put it on the DMR test interface; set the receiver frequency as the low frequency of the radio Tx frequency, Press PTT button to transmit and read the FSK Error on the apparatus. (select the test average value) 2. Test the intermediate frequency and high frequency channel with the same method. 	<5%
Analog & digital ACP	Observe adjacent channel power display value.	N:<-60dB.narrow band)
Spurious emission	Observe spectrum analyzer display value.	<1GHz: <-36dBm, >1GHz: <-30dBm

6.2.4. Rx Test and Modulation

Item	Steps	Specification Requirement
RF Rx Sensitivity	<ol style="list-style-type: none"> 1. Enter the computer tuning mode. 2. Enter the tuning mode "Rx sensitivity", click frequency 1,3,5,7,9 one by one. 3. Observe the integrated tester spectrum analyzer property, adjust PC software value, Rx SINAD>12d. 4. Setting: Rx frequency -24.975MHz (*1,*2,*3,*4) , set the signal ass -40dBm, SINAD<7dB. 	SINAD>=12dB N: -118dBm
Squelch level9 on	<ol style="list-style-type: none"> 1. Enter the computer tuning mode. 2. Set the channel as current test frequency. 3. Enter the tuning mode "SQL9 on", click start and switch to the next frequency when the number is stable. 4. Adjust frequency 1, 3, 5, 7, 9, one by turns. 	Input -115dBm to turn it on,-120dm to turn it off
Squelch level9 off	<ol style="list-style-type: none"> 1. Enter the computer tuning mode. 2. Set the channel as current test frequency. 3. Enter the tuning mode " SQL9 off ", click start and switch to the next frequency when the number is stable. 4. Adjust frequency 1, 3, 5, 7, 9, one by turns. 	
Squelch level1 on	<ol style="list-style-type: none"> 1. Enter the computer tuning mode. 2. Set the channel as current test frequency. 3. Enter the tuning mode "SQL1 on ", click start and switch to the next frequency when the number is stable. 4. Adjust frequency 1, 3, 5, 7, 9, one by turns. 	Input -115dBm and turn on,-120dm and turn off
Squelch level1 off	<ol style="list-style-type: none"> 1. Enter the computer tuning mode. 2. Set the channel as current test frequency. 3. Enter the tuning mode " SQL1 off ", click start and switch to the next frequency when the number is stable. 4. Adjust frequency 1, 3, 5, 7, 9, one by turns. 	
Rx Distortion	Observe SNR form value.	<3% (4 bars)

Rx SNR	Observe SNR form value.	
CTCSS/CDC SS Decoding		Decoded successfully and no interrupter
BER Test	1. Set the output of 3920 as -118dBm. 2. Enter bit error rate test item; click start and observe bit error rate.	EER≤5%

7. Technical Functions and Specifications

General Specification	
Frequency Range	UHF: 400-470MHz VHF: 136-174MHz
Channel Capacity	32
Channel Spacing	12.5kHz/25kHz
Weight	270 kg (with battery and antenna)
Measurement (H*W*T)	113mm*54mm*34mm (with battery but without antenna)
Battery Capacity	7.4V 2000mAH lithium-ion battery
Working hour (5-5-90)	analog: 13.5 hours digital: 15 hours
Environment Specification	
Working Temperature	-30°C~ +60°C
Storage Temperature	-40°C~ +85°C
Waterproof and Dust-proof	IP67
Statics Prevention	IEC 61000-4-2 ±4kV±8kV(air)
American Military Standard	MIL-STD-810 C/D/E/F/G

Damp proof	MIL-STD-810 C/D/E/F/G
Shock and Oscillation	MIL-STD-810 C/D/E/F/G
Receiver Specification	
Frequency Stability	±2.5ppm
Analog Rx Sensitivity	0.35μV /-116dBm(12 dB SINAD)
Digital Rx Sensitivity	0.22μV /-120dBm
Intermodulation	ETSI: 65dB TIA603: 70dB
Adjacent Channel Selectivity	ETSI/TIA603: 60dB@12.5kHz,70dB@25kHz
Spurious Response Suppression	ETSI/TIA603: 70dB
Conductive Spurious Radiation	-57dBm
Block	TIA603C: 75dB ETSI: 70dB
Rated Audio Power	1.5W±0.1W
Rated Audio Distortion	<3% (typical)
Hum and Noise	-40dB@12.5kHz/-45dB@25kHz
Audio Response	+1dB ~ -3dB
Transmitting Specification	
Frequency Stability	±2.5ppm
Tx Power	Low:1W,High:4W(UHF) Low:1W,High :5W(VHF)
Hum and Noise	-40dB@12.5kHz/-45dB@25kHz
Conductive Radiation Spurious	-36dBm@<1GHz,-30dBm@>1GHz
Adjacent Channel Power	60dB@12.5kHz,70dB@25kHz
FM Modulation	11K0F3E@12.5kHz,16K0F3E@25kHz

4FSK Modulation	12.5kHz (only data) : 7K60FXD 12.5kHz (data + voice) : 7K60FXE
Modulation Limit	2.5kHz@12.5KHz, 5kHz@25kHz
Audio Response	+1dB~-3dB
Audio Distortion	3% (typical)
Vocoder Type	AMBE++
Digital Communication Protocol	ETSI TS 102 361-1, -2, -3

8. Maintenance and Test Equipment

During maintenance and adjustment, the major equipment and apparatus below will be used.

Equipment	Major Specification
RF Signal Generator	Frequency Range: 10MHz-3GHz Modulation: Frequency modulation and external modulation Output: -127dBm/0.1uV-> 47dBm/1mV
Power Meter	Input Impedance: 50Ω Operation Frequency: 100MHz-1000MHz Measurement Range: About 10W
Frequency Deviation Meter	Frequency Range: 100MHz -1000MHz
Digital Voltmeter	Test Range: DC 10mV-10V Input Impedance: The minimum circuit load high input impedance
Oscilloscope	30-100MHz
High Sensitivity Frequency Counter	Frequency Range: 100-1000MHz Frequency Stability: ±0.2ppm or lower
Ammeter	5A
Audio Voltmeter	Frequency Range: 50Hz-10kHz Voltage Range: 1mV-10V
Audio Signal Generator	Frequency Range: 50Hz-5kHz or higher Output: 0V-1V
Distortion Tester	capacity: 3% or lower at 1kHz Input Electric Level: 50mV-0Vms
Spectrum Analyzer	Test Range: 100-3GHz or higher
16Ω Dummy Load	About 16Ω, 3W

Voltage Stabilizing Power	Output Voltage 5V-30V, Current: 5A
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9. Troubleshooting

No.	Problem	Cause and Solution
1	Failed to turn on the radio	<p>A. Check if the battery is in low power. If the battery is low, please charge it or change it.</p> <p>B. Check if there is poor contact in the power-on knob. Please change the knob and try again.</p> <p>C. The power connecting wire is in poor contact with the battery. Please reinstall it and try again.</p> <p>D. The reverse power connection leads to the power protective tube F401 being turned on. Please change the protective tube and try again.</p>
2	Failed to communicate with each other	<p>A. The frequencies between the two radios differ. Please select the same channel with frequency.</p> <p>B. The CTCSS/CDCSS signaling of the two radios differ. Please reset with your computer.</p> <p>C. Beyond the communication scope.</p>
3	Failed to receive the signal	<p>A. Poor contact of the antenna. Please fasten the antenna.</p> <p>B. The Tx frequency and Rx frequency differ. Please select the same Tx/Rx frequency again.</p> <p>C. Beyond the communication scope.</p>
4	The Rx green indicator lights up without any voice	<p>A. Check if the volume is at its lowest level. If so, turn on the volume.</p> <p>B. Check if the speaker is broken. If so, please change the speaker.</p>
5	The programming is abnormal	<p>A. Wrong wire connection. Please check if the connection is right.</p> <p>B. Check if the computer USB drive is installed. If not, please install it properly.</p> <p>C. Poor contact in earphone interface board. If so, please change the interface board.</p>

Appendix

List 1 Material List (Electronic Section 400-470MHz)

No.	Part No.	Specification	Quantity	Location
1	2RW3-TP76 N97N15FB1 03	TP76N97N15FB103/RY-10 005,TOCOS,pb-free	1	SW100
2	3SE3-RE08 140AX-V01	RE08140AX-V01-0015A :IP 67,	1	SW200
3	4SM7-6027- A40B	Φ6.0mm, height 2.7mm,-40dB±2dB,,2.2KΩ, 2V(B6027AP402-65)	1	MIC600
4	2LG1-VLS3 012ET-100 M	VLS3012ET-100M,10uH+2 0% 3*3*1.2MM	1	L404
5	2LW1-33UF -1R0M	3225,1μH±20%,(LQH32MN 1R0M23L/LQH3N1R0M04)	1	L501
6	5XC1-16R8- 6800CFA	1XTV16800CFA 16.8MHz 3225 VC-TCXO KDS	1	X601
7	1DR1-1SR1 54-400	1SR154-400,4532	1	D402
8	1DS1-1SS3 72	1SS372	3	D101,D114,D115
9	5XC1-29R5- 29491CAA	1XTW29491CAA 29.4912MHz 3225 TCXO KDS	1	X201
10	1TT1-2SA15 86	2SA1586	1	Q105
11	1TT1-2SC3 356-R24	2SC3356-R24,SOT23,NPN	6	Q503,Q504,Q507,Q509,Q601,Q603
12	1TT1-2SC4 116-GR	2SC4116-GR	1	Q103
13	1TF1-2SJ24 3	2SJ243-SMD	2	Q101, Q607
14	1TF1-2SK18 24	2SK1824(B1)	1	Q104
15	5FT1-LTWC 450H	LTWC450H	1	CF501

16	2LG1-VLS3 012ET-470 M	VLS3012ET-470M 470uH+20% 3*3*1.2MM	1	L203
17	5XC1-8R0- MML08-253 0	DSX321G-8MHZ,8MHZ±30 PPm,8PF,-40°C~+85 °C,2.5mm*3mm,4PIN	1	X301
18	1IS1-LN825 9	DC-DC IC,SMD,SOP8,DC23V1.8A, ,LN8259,pb-free	1	U401
19	1IS1-SKY72 310	SKY72310,24 pin QFN 4mmX4mm (QFN-N24_B4x4-P0_5) , pb-free	1	U601
20	3ST1-SKRT LBE010	SKRTLBE010,4.5*3.55*3.3 mm(ALPS)	1	SW301
21	1IP1-HRV30 00S	HR_V3000S,	1	U307
22	1TT1-AT415 11	SOT143-EEBC-B3X1_4-P1 _9	1	Q505
23	7MHP-7042- 12A-W	3600 568 567 7800	1	J401
24	5FE1-BLM2 1PG221SN1	2012,220Ω	4	L103,L201,L522,L525
25	1DP1-BV08 C	BV08C	6	D110,D116,D117,D118,D119,D121
26	2CC1-10-C0 G500-R50C	1005,0.5P±0.25P,50V,C0G	1	C609
27	2CC1-10-C0 G500-101J	1005,100P±5%,50V,C0G	16	C153,C154,C157,C159,C525,C529, C580,C656,C657,C658,C659,C678, C681,C108,C158,C403
28	2CC1-10-X7 R500-102K	1005,1000P±10%,50V,X7R	16	C105,C125,C233,C248,C256,C287, C314,C315,C410,C523,C555,C584, C639,C649,C711,C512
29	2CC1-10-X7 R500-103K	1005,10nF±10%,50V,X7R	60	C102,C126,C131,C141,C142,C144, C145,C177,C178,C191,C201,C202, C227,C237,C257,C270,C272,C276, C278,C282,C284,C312,C313,C316, C317,C318,C319,C339,C341,C345, C585,C706,C422,C424,C427,C430, C433,C436,C439,C440,C534,C535, C536,C537,C540,C544,C546,C557,

				C597,C644,C646,C654,C655,C672,C675,C691,C695,C713,C718,C724
30	2CC1-10-X7 R160-104K	1005,100nF±10%,16V,X7R	71	C115,C117,C130,C133,C135,C160,C225,C226,C230,C232,C235,C239,C240,C252,C264,C267,C273,C274,C285,C290,C305,C306,C307,C310,C311,C320,C338,C346,C350,C360,C361,C362,C405,C406,C577,C734,C258,C260,C170,C171,C407,C413,C416,C428,C432,C435,C438,C520,C532,C547,C548,C551,C552,C559,C571,C583,C595,C596,C610,C613,C615,C627,C630,C637,C638,C663,C665,C676,C682,C690,C709
31	2CC1-10-X5 R6R3-105K	1005,1uF±10%,6.3V,X5R	45	C114,C118,C119,C120,C121,C129,C132,C134,C136,C137,C138,C146,C149,C163,C190,C224,C238,C249,C250,C269,C271,C279,C281,C283,C308,C337,C340,C343,C344,C352,C412,C415,C419,C445,C666,C674,C680,C683,C685,C692,C710,C712,C205,C417,C722
32	2CC1-10-C0 G500-100D	1005,10P±0.5P,50V,C0G	5	C231,C635,C636,C716,C404
33	2CC1-10-C0 G500-121J	1005,120P±5%,50V,C0G	1	C550
34	2CC1-10-X7 R250-123K	1005,12nF±10%,25V,X7R	1	C124
35	2CC1-10-C0 G500-120J	1005,12P±5%,50V,C0G	3	C542,C574,C543
36	2CC1-10-X7 R500-153K	1005,15nF±10%,50V,X7R	2	C332,C686
37	2CC1-10-X7 R500-183K	1005,18nF±10%,50V,X7R	4	C139,C333,C336,C677
38	2CC1-10-C0 G500-1R5C	1005,1.5P±0.25P,50V,C0G	3	C614,C617,C631
39	2CC1-10-C0 G500-200J	1005,20P±5%,50V,C0G	1	C531
40	2CC1-10-C0 G500-221J	1005,220P±5%,50V,C0G	6	C128,C241,C244,C259,C261,C653
41	2CC1-10-X7 R500-222K	1005,2200P±10%,50V,X7R	1	C123
42	2CC1-10-X7 R250-223K	1005,22nF±10%,25V,X7R	6	C107,C112,C150,C408,C549,C556

43	2CC1-10-X7 R500-271K	1005,270P±10%,50V,X7R	5	C263,C265,C266,C268,C704
44	2CC1-10-C0 G500-2R0C	1005,2P±0.25P,50V,C0G	3	C524,C527,C689
45	2CC1-10-C0 G500-181J	1005,180P±5%,50V,C0G	1	C645
46	2CC1-10-X7 R500-332K	1005,3300P±10%,50V,X7R	4	C295,C296,C640,C687
47	2CC1-10-C0 G500-330J	1005,33P±5%,50V,C0G	4	C518,C545,C579,C647
48	2CC1-10-X7 R500-392K	1005,3900P±10%,50V,X7R	1	C335
49	2CC1-10-X7 R100-393K	1005,39nF±10%,10V,X7R	1	C127
50	2CC1-10-C0 G500-3R0C	1005,3P±0.25P,50V,C0G	3	C515,C528,C699
51	2CC1-10-C0 G500-471J	1005,470P±5%,50V,C0G	44	C106,C554,C553,C101,C113,C164, C165,C166,C172,C253,C442,C521, C533,C538,C560,C561,C562,C563, C566,C570,C572,C573,C578,C582, C598,C611,C612,C616,C619,C628, C629,C634,C662,C667,C669,C670, C673,C684,C693,C719,C152,C594, C707,C723
52	2CC1-10-X7 R160-473K	1005,47nF±10%,16V,X7R	1	C705
53	2CC1-10-C0 G500-470J	1005,47P±5%,50V,C0G	5	C147,C519,C643,C401,C720
54	2CC1-10-C0 G500-4R0C	1005,4P±0.25P,50V,C0G	3	C514,C516,C618
55	2CC1-10-C0 G500-560J	1005,56P±5%,50V,C0G	1	C708
56	2CC1-10-X7 R160-683K	1005,68nF±10%,16V,X7R	1	C122
57	2CC1-10-C0 G500-6R0C	1005,6P±0.25P,50V,C0G	5	C510,C568,C632,C660,C661
58	2CC1-10-C0 G500-7R0C	1005,7P±0.25P,50V,C0G	4	C517,C539,C700,C526
59	2CC1-10-X7 R160-822K	1005,8200P±10%,16V,X7R	2	C140,C143
60	2CC1-10-C0 G500-8R0C	1005,8P±0.25P,50V,C0G	4	C513,C633,C302,C303
61	2CC1-10-C0 G500-9R0C	1005,9P±0.25P,50V,C0G	2	C564,C698
62	2CC1-20-X7 R160-224K	2012,220nF±10%,16V,X7R	2	C650,C652

63	2CC1-20-Y5 V160-106Z	2012,10uF+80%/-20%,16V, Y5V	5	C104,C148,C228,C236,C291
64	2CC1-20-Y5 V160-225Z	2012,2.2uF+80%/-20% ,16 V,Y5V	1	C437
65	2CC1-16-C0 G500-100D	1608,10P±0.5P,50V,C0G	3	C606,C623, C604
66	2CC1-16-C0 G500-121J	1608,120P±5%,50V,C0G	1	C507
67	2CC1-16-C0 G500-120J	1608,12P±5%,50V,C0G	3	C592,C601,C620
68	2CC1-16-C0 G500-150J	1608,15P±5%,50V,C0G	4	C587,C588,C590,C625
69	2CC1-16-C0 G500-180J	1608,18P±5%,50V,C0G	2	C605,C624
70	2CC1-16-C0 G500-1R5B	1608,1.5P±0.1P,50V,C0G	1	C503
71	2CC1-16-C0 G500-300J	1608,30P±5%,50V,C0G	1	C589
72	2CC1-16-C0 G500-2R0C	1608,2P±0.25P,50V,C0G	2	C505,C506
73	2CC1-16-C0 G500-390J	1608,39P±5%,50V,C0G	1	C607
74	2CC1-16-C0 G500-3R0C	1608,3P±0.25P,50V,C0G	1	C501
75	2CC1-16-C0 G500-470J	1608,47P±5%,50V,C0G	2	C586,C626
76	2CC1-16-C0 G500-4R0C	1608,4P±0.25P,50V,C0G	1	C502
77	2CC1-16-C0 G500-680J	1608,68P±5%,50V,C0G	1	C593
78	2CC1-16-C0 G500-6R0C	1608,6P±0.25P ,50V,C0G	2	C504,C591
79	2CT1-TP20- 100-100M	2012,10μF±20%,10V,TP	5	EC431,EC434,EC558,EC668,EC671
80	2CT1-TP20- 100-1R0M	2012,1μF±20%,10V,TP	2	EC167,EC168
81	2CT1-TP20- 100-2R2M	2012,2.2μF±20%,10V,TP	2	EC151,EC651
82	2CC1-20-X7 R160-475K	2012,4.7μF±10%,16V,X7R, GRM21BR61C475KA88L	1	C664
83	2CT1-TP20- 100-4R7M	2012,4.7μF±20%,10V,TP	1	EC103
84	2CT1-TS32- 160-100M	3216,10μF±20%,16V,TS	1	EC403
85	2CC1-32-Y5	3216,22μF+80%/-20%,10V,	5	C409,C425,C441,C599,C286

	V100-226Z	Y5V(C3216Y5V1A226ZT)		
86	3CF1-BL112-14RL	0.5mm,14PIN,BL112-14RL	1	CN101
87	5XC1-50R0-49910GQ9	1D49910GQ9 49.95MHz 7*5 KDS	1	XF501
88	1DS1-HSC277	HSC277,1608	4	D503,D504,D510,D511
89	1DS1-DA2S10100L	DA2S10100L	3	D403,D404,D601
90	1DV1-1SV278	1SV278(T1)	1	D610
91	1DV1-1SV305	1SV305	8	D602,D603,D604,D605,D606,D607, D608,D609
92	1DV1-HVC350B	HVC350B(B0),SOD523	5	D505,D506,D507,D508,D513
93	1TT1-DTC144EE	DTC144EE(26),SOT323	9	Q102,Q202,Q203,Q206,Q301,Q302, Q402,Q201,Q510
94	3FW1-42932-302320	429003/433003/466003,32 16,3A/32V	1	F401
95	2LL1-16-3R3K	1608,3.3 μ H \pm 10%(MLF1608 A3R3K TA00)	1	L601
96	2LL1-16-R47K	1608,0.47 μ H \pm 10%(MLF160 8DR47K)	2	L608,L514
97	2LL1-16-R56K	1608,560nH \pm 10%(MLF160 8DR56K)	2	L513,L607
98	5XT1-JTBM450CX24	JTBM450CX24	1	FD501
99	1IS1-HRC5000	HR_C5000 80Pin LQFP	1	U201
100	1DS1-HVU131	HVU131(P1),2012	1	D501
101	2RS1-16-0000	1608,0 Ω	1	L520
102	2LW1-16UC-120J	1608,12nH \pm 5%,(C1608CB- 12NJ)	1	L626
103	2LW1-16UC-180J	1608,18nH \pm 5%,(C1608CB- 18NJ)	1	L602
104	2LL1-16-2N7S	1608,2.7nH \pm 2%(MLG1608 B2N7S)	1	L523
105	2LW1-16UC-331J	1608,330nH \pm 5%,	1	L609
106	2LL1-16-22NJ	1608,22nH \pm 5%(MLG1608B 22NJ)	3	L508,L518,L519
107	2LW1-16UC-220GB	1608,22nH \pm 2%,(LQW18AN 22NG)	1	L515

108	2LW1-16UC-330J	1608,33nH±5%,(C1608CB-33NJ)	2	L612,L620
109	2LL1-16-33NJ	1608,33nH±5%(MLG1608B33NJ)	2	L617,L625
110	2LI1-1608-R39G	0603,390nH±2% murata LQW18ANR39G00	8	L611,L614,L615,L616,L619,L622,L623,L624
111	2LL1-16-82NJ	1608,82nH±5%(MLG1608B82NJ)	1	L509
112	5FE1-BLM11A601S	1608,BLM11A601S/BLM18AG601S(0138-05)	15	L101,L102,L202,L208,L401,L528,L531,L603,L610,L630,L631,L632,L104,L402,L600
113	2LI1-2012-10NJ	0805,10nH±5% murata LQW2BHN10NJ032	1	L613
114	2LI1-2012-15NJ	0805,15nH±5%,murata,LQW2BHN15NJ032	1	L621
115	2LW1-20UC-102J	2012,1μH±5%(C2012C-1R0J)	1	L521
116	2LW1-20UC-221JA	2012,220nH±5%,(C2012C-R22J)	1	L527
117	2LH1-R401R5-R02-05	φ0.40*φ1.5,2T	1	L526
118	2LH1-R401R5-R03-05	φ0.40*φ1.5,3T	3	L502,L504,L505
119	2LH1-R401R5-R04-05	φ0.40*φ1.5,4T	6	L503,L506,L507,L511,L512,L530
120	2LH1-R401R5-R08-05	φ0.40*φ1.5,8T	1	L524
121	4PE1-16-F5	1608,GREEN,,H19-213SYGC	2	LED301,LED302
122	4PE1-16-F2-A	1608,RED,19-213/R6C-AP1Q2B/3T,	1	LED303
123	1TF1-RD01MUS2	RD01MUS2	1	Q502
124	1TF1-RD07MUS2B	RD07MUS2B	1	Q501
125	1TF1-3SK318	3SK318(YB-)	1	Q506
126	1IL1-NJM2100V	NJM2100V,TSSOP-8	1	U103
127	1IL1-NJM2904V	NJM2904V,TSSOP-8	2	U502,U603
128	1TT1-2SC4617-R	2SC4617-R(BR),EMT3	1	Q606
129	1TT1-2SC5066-Y	2SC5066-Y(M2),NPN,SOT323	4	Q602,Q604,Q605,Q608

130	1TT1-FMMT 717TA	FMMT717A,PNP,SOT23	1	Q401
131	1IS1-PST91 24NR	RESET IC,PST9124NR	1	U303
132	2RS1-10-00 00	1005,0Ω	5	R160,R320,R334,R263,R647
133	2RS1-10-10 4J	1005,100K±5%	28	R107,R113,R114,R118,R121,R128, R129,R133,R154,R244,R310,R402, R418,R501,R502,R503,R504,R510, R513,R581,R599,R644,R645,R650, R651,R659,R161,R162
134	2RS1-10-10 1J	1005,100Ω±5%	9	R517,R518,R604,R614,R627,R629, R642,R643,R571
135	2RS1-10-10 3J	1005,10K±5%	31	R638,R115,R117,R132,R135,R150, R151,R231,R232,R233,R234,R240, R259,R262,R266,R267,R268,R306, R311,R313,R321,R342,R360,R361, R419,R422,R549,R631,R632,R637, R652
136	2RS1-10-10 0J	1005,10Ω±5%	7	R229,R269,R270,R528,R609,R630, R634
137	2RS1-10-12 1J	1005,120Ω±5%	2	R603,R613
138	2RS1-10-12 3J	1005,12K±5%	1	R143
139	2RS1-10-15 4J	1005,150K±5%	5	R124,R138,R621,R261,R265
140	2RS1-10-15 3J	1005,15K±5%	3	R241,R335,R605
141	2RS1-10-15 0J	1005,15Ω±5%	1	R537
142	2RS1-10-18 4J	1005,180K±5%	4	R126,R127,R525,R527
143	2RS1-10-18 1J	1005,180Ω±5%	2	R314,R512
144	2RS1-10-18 3J	1005,18K±5%	2	R134,R648
145	2RS1-10-10 2J	1005,1K±5%	27	R102,R149,R153,R180,R225,R236, R238,R253,R301,R332,R351,R352, R353,R357,R358,R391,R520,R530, R533,R535,R542,R545,R608,R628, R680,R282,R370
146	2RS1-10-15 2J	1005,1.5K±5%	2	R411,R551
147	2RS1-10-18 2J	1005,1.8K±5%	3	R108,R522,R555

148	2RS1-10-10 5J	1005,1M±5%	1	R141
149	2RS1-10-20 4J	1005,200K±5%	1	R401
150	2RS1-10-22 4J	1005,220K±5%	4	R131,R147,R243,R606
151	2RS1-10-22 1J	1005,220Ω±5%	1	R315
152	2RS1-10-22 3J	1005,22K±5%	9	R111,R125,R148,R336,R340,R425, R539,R574,R615
153	2RS1-10-22 0J	1005,22Ω±5%	4	R106,R120,R543,R548
154	2RS1-10-27 4J	1005,270K±5%	1	R145
155	2RS1-10-27 1J	1005,270Ω±5%	3	R568,R556,R595
156	2RS1-10-27 3J	1005,27K±5%	3	R524,R569,R701
157	2RS1-10-22 2J	1005,2.2K±5%	7	R258,R341,R406,R515,R570,R540, R541
158	2RS1-10-27 2J	1005,2.7K±5%	1	R156
159	2RS1-10-33 4J	1005,330K±5%	2	R639,R112
160	2RS1-10-33 1J	1005,330Ω±5%	2	R508,R658
161	2RS1-10-33 3J	1005,33K±5%	2	R123,R552
162	2RS1-10-39 4J	1005,390K±5%	1	R146
163	2RS1-10-33 2J	1005,3.3K±5%	2	R142,R526
164	2RS1-10-39 2J	1005,3.9K±5%	1	R617
165	2RS1-10-47 4J	1005,470K±5%	3	R136,R144,R155
166	2RS1-10-47 1J	1005,470Ω±5%	5	R104,R521,R531,R619,R640
167	2RS1-10-47 3J	1005,47K±5%	10	R122,R312,R316,R317,R318,R319, R354,R405,R408,R550
168	2RS1-10-47 0J	1005,47Ω±5%	3	R516,R554,R635
169	2RS1-10-47 2J	1005,4.7K±5%	13	R338,R339,R362,R363,R412,R523, R547,R588,R602,R612,R620,R623, R646

170	2RS1-10-56 4J	1005,560K±5%	2	R519,R641
171	2RS1-10-56 3J	1005,56K±5%	2	R511,R514
172	2RS1-10-56 0J	1005,56Ω±5%	1	R636
173	2RS1-10-56 2J	1005,5.6K±5%	7	R139,R140,R505,R575,R601,R611, R616
174	2RS1-10-68 3J	1005,68K±5%	3	R137,R410,R622
175	2RS1-10-68 2J	1005,6.8K±5%	2	R506,R546
176	2RS1-10-75 4J	1005,750K±5%	1	R529
177	2RS1-10-82 4J	1005,820K±5%	1	R116
178	2RS1-10-82 1J	1005,820Ω±5%	1	R152
179	2RS1-10-82 3J	1005,82K±5%	2	R130,R553
180	2RS1-10-82 2J	1005,8.2K±5%	2	R536,R538
181	2RS1-10-91 2J	1005,9.1K±5%	1	R649
182	2RS1-32-R3 9J	3216,0.39Ω±5%	3	R559,R560,R561
183	1IS1-GT313 6	GT3136,SSOP16	1	U501
184	1IS1-TC75S 51F	TC75S51F,SSOP5-P-0.95	1	U203
185	1IL1-TDA85 47TS	TDA8547TS,SSOP20,pb-fr ee	1	U204
186	1IL1-NJM29 02V	NJM2902V-SMD	2	U101,U102
187	1TC1-UMC4	UMC4,NPN/PNP	4	U104,U503,U505,U604
188	1IM1-W25Q 80DVSIG	W25Q80DVSIG,SOIC,8M	1	U302
189	1DR1-NSR1 020MW2T1 G	NSR1020MW2T1G	1	D405
190	1IS1-XC620 4B332MR	3.3V,SOT-23-5,150mA	1	U602
191	1IS1-XC620 4B502MR	5V,SOT-23-5	4	U105,U402,U403,U404
192	6PM7-4082-	8layers,FR-4,1.2mm,TP620	1	

	HMB	-UHF-V2.0-20140610,108.6 6X46.8mm		
193	2RS1-10-15 5J	1005,1.5M±5%	2	R567,R566
194	2RS1-10-4R 7J	1005,4.7Ω±5%	2	R507,R598
195	2LL1-16-18 NJ	1608,18nH±5%(MLG1608B 18NJ)	1	L533
196	2CC1-10-C0 G500-6R0D	1005,6P±0.5P,50V,C0G	1	C530
197	2CC1-10-C0 G500-1R0C	1005,1P±0.25P,50V,C0G	1	C608
198	2CC1-10-C0 G500-680J	1005,68P±5%,50V,C0G	1	C648
199	1TT1-DTA1 43ZE	DTA143ZE-SMD	1	Q511
200	2CC1-10-C0 G500-3R0B	1005,3P±0.1P,50V,C0G	1	C508
201	2RS1-10-56 1J	1005,560Ω±5%	1	R157
202	2RE1-10-15 03	1005,150KΩ±1%	4	R562 R564 R702 R700
203	1DS1-RB70 6F-40	RB706F-40,SOT-323	1	D512
204	1IP1-STM32 F405VGT6	STM32F405VG T6 LQFP100,MCU,14*14MM	1	

List 2 Material List (Electronic Section 136-174MHz)

No.	Part No.	Specification	Quantity	Location
1	2RW3-RP08 110SNBX-V 02	RP08110SNBX-V02-0854, IP67	1	SW100
2	3SE3-RE08 140AX-V01	,RE08140AX-V01-0015A	1	SW200
3	4SM7-6027- A40B	Φ 6.0mm,Hight 2.7mm,-40dB±2dB,2.2K Ω ,2V(B6027AP402-65)	1	MIC600
4	2LG1-VLS3 012ET-100 M	VLS3012ET-100M , 10uH+20% 3*3*1.2MM	1	L404
5	2LW1-33UF -1R0M	3225,1 μ H±20%,(LQH32MN1R0M23	1	L501

		L/LQH3N1R0M04)		
6	5XC1-16R8-6800CFA	1XTV16800CFA 16.8MHz 3225 VC-TCXO KDS	1	X601
7	1DR1-1SR154-400	1SR154-400,4532	1	D402
8	1DS1-1SS372	Dual diode	3	D101,D114,D115
9	5XC1-29R5-29491CAA	1XTW29491CAA 29.4912MHz 3225 TCXO KDS	1	X201
10	1TT1-2SA1586	2SA1586	1	Q105
11	1TT1-2SC3356-R24	2SC3356-R24,SOT23,NPN	6	Q503,Q504,Q507,Q509,Q601,Q603
12	1TT1-2SC4116-GR	2SC4116-GR	1	Q103
13	1TF1-2SJ243	2SJ243-SMD	2	Q101,Q607
14	1TF1-SSM3K15AFS	SSM3K15AFS (D1)	1	Q104
15	5FT1-LTWC450G	LTWC450G,	1	CF501
16	2LG1-VLS3012ET-470M	VLS3012ET-470M 470uH+20% 3*3*1.2MM	1	L203
17	5XC1-8R0-MML08-2530	DSX321G-8MHZ,8MHZ±30 PPm,8PF,-40°C~+85 °C,2.5mm*3mm,4PIN	1	X301
18	1IS1-LN8259	DC-DCIC,SMD,SOP8,DC2 3V1.8A,	1	U401
19	1IS1-SKY72310	SKY72310,24 pin QFN 4mmX4mm (QFN-N24_B4x4-P0_5)	1	U601
20	3ST1-SKRTLBE010	SKRTLBE010,4.5*3.55*3.3 mm(ALPS)	1	SW301
21	1IP1-HRV3000S)HR_V3000S,	1	U307
22	1TT1-AT41511	SOT143-EEBC-B3X1_4-P1 _9,无铅	1	Q505
23	7MHP-7042-12A-W	3600 568 567 7800	1	J401
24	5FE1-BLM21PG221SN1	2012,220 Ω	4	L103,L201,L522,L525

25	1DP1-BV08 C	BV08C	6	D110,D116,D117,D118,D119,D121
26	2CC1-10-C0 G500-R50C	1005,0.5P±0.25P,50V,C0G	1	C609
27	2CC1-10-C0 G500-1R0C	1005,1P±0.25P,50V,C0G	1	C608
28	2CC1-10-C0 G500-101J	1005,100P±5%,50V,C0G	16	C152,C153,C154,C157,C158,C159, C524,C529,C653,C656,C657,C658, C659,C678,C681,C519
29	2CC1-10-X7 R500-102K	1005,1000P±10%,50V,X7R	24	C105,C125,C233,C248,C256,C287, C314,C315,C404, C410,C517,C523,C555,C580,C584, C594,C639, C649,C684,C690,C711,C720,C805, C806
30	2CC1-10-X7 R500-103K	1005,10nF±10%,50V,X7R	62	C102,C126,C131,C141,C142,C144, C145,C177,C178,C191, C201,C202,C227,C237,C257,C270, C272,C276,C278,C282, C284,C312,C313,C316,C317,C318, C319,C339,C341,C345,
31	2CC1-10-X7 R160-104K	1005,100nF±10%,16V,X7R	67	C115,C117,C130,C133,C135,C160, C225,C226,C230,C232, C235,C239,C240,C252,C264,C267, C273,C274,C285,C290,C422,C424, C427,C430,C433,C436,C439,C440, C534,C535,C536,C537,C540,C544, C546,C557,C597,C644,C646,C654, C655,C672,C675,C691,C695,C706, C713,C718,C722,C724,C143,C585, C305,C306,C307,C310,C311,C320, C338,C346,C350,C360,C361,C362, C405,C406,C407,C413,C416,C428, C432,C435, C438,C520,C532,C547,C548,C551, C552,C559,C571,C583, C595,C596,C610,C613,C615,C627, C630,C637,C638,C663, C665,C676,C682,C709,C577,C258, C260
32	2CC1-10-X5 R6R3-105K	1005,1uF±10%,6.3V,X5R	42	C114,C118,C119,C120,C121,C129, C132,C134,C136,C137,C138,C146, C149,C163,C190,C224,C238,C249, C250,C269,C271,C279,C281,C283, C308,C337,C340,C343,C344,C352, C412,C415,C419,C445,C666,C674,

				C680,C683, C685,C692,C710,C712
33	2CC1-10-C0 G500-100D	1005,10P±0.5P,50V,C0G	9	C231,C635,C636,C700,C807,C528, C527,C728,C515
34	2CC1-10-C0 G500-121J	1005,120P±5%,50V,C0G	1	C550
35	2CC1-10-X7 R250-123K	1005,12nF±10%,25V,X7R	1	C124
36	2CC1-10-C0 G500-120J	1005,12P±5%,50V,C0G	6	C660,C661,C542,C574,C633,C725
37	2CC1-10-X7 R500-153K	1005,15nF±10%,50V,X7R	2	C332,C686
38	2CC1-10-C0 G500-150J	1005,15P±5%,50V,C0G	5	C564,C618,C731,C513,C516
39	2CC1-10-C0 G500-181J	1005,180P±5%,50V,C0G	1	C645
40	2CC1-10-X7 R500-183K	1005,18nF±10%,50V,X7R	4	C139,C333,C336,C677
41	2CC1-10-C0 G500-180J	1005,18P±5%,50V,C0G	3	C568,C716,C531
42	2CC1-10-C0 G500-1R5C	1005,1.5P±0.25P,50V,C0G	3	C614,C631,C804
43	2CC1-10-C0 G500-221J	1005,220P±5%,50V,C0G	6	C128,C241,C244,C259,C261,C525
44	2CC1-10-X7 R500-222K	1005,2200P±10%,50V,X7R	1	C123
45	2CC1-10-X7 R250-223K	1005,22nF±10%,25V,X7R	5	C107,C112,C408,C549,C556
46	2CC1-10-C0 G500-220J	1005,22P±5%,50V,C0G	5	C509,C510,C723,C721,C715
47	2CC1-10-X7 R500-271K	1005,270P±10%,50V,X7R	5	C263,C265,C266,C268,C704
48	2CC1-10-X7 R500-332K	1005,3300P±10%,50V,X7R	4	C295,C296,C640,C687
49	2CC1-10-C0 G500-330J	1005,33P±5%,50V,C0G	2	C545,C647
50	2CC1-10-X7 R500-392K	1005,3900P±10%,50V,X7R	1	C335
51	2CC1-10-X7 R100-393K	1005,39nF±10%,10V,X7R	2	C127, C150
52	2CC1-10-C0 G500-2R0C	1005,2P±0.25P,50V,C0G	1	C717
53	2CC1-10-C0 G500-3R0C	1005,3P±0.25P,50V,C0G	4	C541,C689,C530,C617
54	2CC1-10-C0 G500-471J	1005,470P±5%,50V,C0G	41	C101,C113,C164,C165,C166,C172, C253,C401,C442,C521,

				C533,C538,C560,C561,C562,C563, C566,C570,C572,C573, C578,C582,C598,C611,C612,C616, C619,C628,C629,C634, C662,C667,C669,C670,C673,C693, C707,C719,C554,C553,C106
55	2CC1-10-X7 R160-473K	1005,47nF±10%,16V,X7R	1	C705
56	2CC1-10-C0 G500-470J	1005,47P±5%,50V,C0G	4	C147,C518,C581,C643
57	2CC1-10-C0 G500-4R0C	1005,4P±0.25P,50V,C0G	1	C801
58	2CC1-10-C0 G500-560J	1005,56P±5%,50V,C0G	4	C708,C727,C729,C730
59	2CC1-10-C0 G500-5R0C	1005,5P±0.25P,50V,C0G	2	C575,C698
60	2CC1-10-X7 R160-682K	1005,6800P±10%,16V,X7R	2	C170,C171
61	2CC1-10-X7 R160-683K	1005,68nF±10%,16V,X7R	1	C122
62	2CC1-10-C0 G500-680J	1005,68P±5%,50V,C0G	1	C648
63	2CC1-10-C0 G500-6R0C	1005,6P±0.25P,50V,C0G	3	C632,C802,C803
64	2CC1-10-C0 G500-7R0C	1005,7P±0.25P,50V,C0G	3	C514,C539,C699
65	2CC1-10-X7 R160-822K	1005,8200P±10%,16V,X7R	1	C140
66	2CC1-10-C0 G500-8R0C	1005,8P±0.25P,50V,C0G	3	C302,C303,C526
67	2CC1-20-X7 R500-224K	2012,220nF±10%,50V,X7R	2	C650,C652
68	2CC1-20-Y5 V160-106Z	2012,10uF+80%/-20%,16V, Y5V	5	C104,C148,C228,C236,C291
69	2CC1-20-Y5 V160-225Z	2012,2.2uF+80%/-20% ,16 V,Y5V	1	C437
70	2CC1-16-C0 G500-151J	1608,150P±5%,50V,C0G	1	C593
71	2CC1-16-C0 G500-102J	1608,1000P±5%,50V,C0G	1	C507
72	2CC1-16-C0 G500-100D	1608,10P±0.5P,50V,C0G	6	C591, C505,C601,C625,C623,C500
73	2CC1-16-C0 G500-120J	1608,12P±5%,50V,C0G	3	C604,C501,C506
74	2CC1-16-C0	1608,15P±5%,50V,C0G	1	C606

	G500-150J			
75	2CC1-16-C0 G500-180J	1608,18P±5%,50V,C0G	2	C605,C624
76	2CC1-16-C0 G500-8R0C	1608,8P±0.25P,50V,C0G	2	C620, C508
77	2CC1-16-C0 G500-330J	1608,33P±5%,50V,C0G	1	C626
78	2CC1-16-C0 G500-200J	1608,20P±5%,50V,C0G	1	C502
79	2CC1-16-C0 G500-300J	1608,30P±5%,50V,C0G	1	C592
80	2CC1-16-C0 G500-560J	1608,56P±5%,50V,C0G	1	C587
81	2CC1-16-C0 G500-3R0C	1608,3P±0.25P,50V,C0G	1	C590
82	2CC1-16-C0 G500-390J	1608,39P±5%,50V,C0G	2	C607,C588
83	2CC1-16-C0 G500-270J	1608,27P±5%,50V,C0G	1	C504
84	2CC1-16-C0 G500-7R0D	1608,7P±0.5P,50V,C0G	2	C503, C586
85	2CT1-TP20- 100-100M	2012,10 μ F±20%,10V,TP	5	EC431,EC434,EC558,EC668,EC671
86	2CT1-TP20- 100-1R0M	2012,1 μ F±20%,10V,TP	2	EC167,EC168
87	2CT1-TP20- 100-2R2M	2012,2.2 μ F±20%,10V,TP	2	EC151,EC651
88	2CC1-20-X7 R160-475K	2012,4.7μF±10%,16V,X7R, GRM21BR61C475KA88L	1	C664
89	2CT1-TP20- 100-4R7M	2012,4.7 μ F±20%,10V,TP	1	EC103
90	2CT1-TS32- 160-100M	3216,10 μ F±20%,16V,TS	1	EC403
91	2CC1-32-Y5 V100-226Z	3216,22μF+80%/-20%,10V, Y5V(C3216Y5V1A226ZT)	5	C286,C425,C441,C409,C599
92	2CT1-TS32- 100-1R0M	3216,1 μ F±20%,10V,TS	1	EC262
93	3CF1-BL112 -14RL	0.5mm,14 芯,BL112-14RL	1	CN101
94	5XC1-50R0- 49910GQ9	1D49910GQ9 49.95MHz 7*5 KDS	1	XF501
95	1DS1-HSC2 77	HSC277,1608	6	D503,D504,D510,D511,D611,D612
96	1DS1-DA2S 10100L	DA2S10100L	3	D403,D404,D601

97	1DV1-1SV2 78	1SV278(T1)	1	D610
98	1DV1-HVC3 50B	HVC350B(B0),SOD523	4	D602,D603,D608,D609
99	1DV1-HVC3 62	HVC362	5	D505,D506,D507,D508,D513
100	1DV1-HVC3 76B	HVC376B(B9)	4	D604,D605,D606,D607
101	1TT1-DTC1 44EE	DTC144EE(26),SOT323	8	Q102,Q201,Q202,Q206,Q301,Q302, Q402,Q510
102	3FW1-4293 2-302320	429003/433003/466003,32 16,3A/32V	1	F401
103	2LL1-16-3R 3K	1608,3.3 μ H \pm 10%(MLF1608 A3R3K TA00)	1	L601
104	2LL1-16-R4 7K	1608,0.47 μ H \pm 10%(MLF160 8DR47K)	2	L514,L608
105	2LL1-16-R5 6K	1608,560nH \pm 10%(MLF160 8DR56K)	2	L513,L607
106	5XT1-JTBM 450CX24	Frequency detector	1	FD501
107	1IS1-HRC50 00	HR_C5000 80Pin LQFP	1	U201
108	1DS1-HVU1 31	HVU131(P1),2012	1	D501
109	2LW1-16UC -R12J	1608,120nH \pm 5%	1	L532
110	2LL1-16-R1 0JB	1608,100nH \pm 5%(LQG11AR 10J)	1	L515
111	2LW1-16UC -150J	1608,15nH \pm 5%(C1608CB-1 5NJ)	1	L602
112	2LW1-16UC -180J	1608,18nH \pm 5%(C1608CB-1 8NJ)	1	L633
113	2LL1-16-27 NJ	1608,27nH \pm 5%(MLG1608B 27NJ)	2	L523,L536
114	2LL1-16-R3 3K	1608,0.33 μ H \pm 10%(MLF160 8DR33K)	1	L609
115	2LW1-16UC -270J	1608,27nH \pm 5%(C1608CB-2 7NJ)	1	L620
116	2LI1-1608-R 39G	0603,390nH \pm 2% murata LQW18ANR39G00	9	L509,L611,L614,L615,L616,L619,L6 22,L623,L624
117	2LL1-16-39 NJ	1608,39nH \pm 5%(MLG1608B 39NJ)	2	L520,L533
118	2LW1-16UC -390J	1608,39nH \pm 5%(C1608CB-3 9NJ)	1	L626
119	2LL1-16-4N	1608,4.7nH \pm 0.3nH(MLG16	1	L548

	7S	08B4N7S)		
120	2LW1-16UC-270G	1608,27nH±2%,(C1608CB-27NG)	1	L612
121	2LL1-16-56NJ	1608,56nH±5%(MLG1608B56NJ)	1	L508
122	2LL1-16-68NJ	1608,68nH±5%(MLG1608B68NJ)	2	L518,L519
123	2LL1-16-82NJ	1608,82nH±5%(MLG1608B82NJ)	2	L617,L625
124	5FE1-BLM11A601S	1608,BLM11A601S/BLM18AG601S(0138-05)	13	L101,L102,L202,L208,L401,L528,L531,L603,L610,L629,L630,L631,L632
125	2LW1-20UC-150J	2012,15nH±5%,(C2012C-15NJ)	1	L621
126	2LW1-20UC-270GA	2012,27nH±2%,(HWI0805UC27NG)	1	L613
127	2LW1-25UC-102JA	2520,1 μH±5%,(FHW1008UC1R0J)	1	L521
128	2LW1-25UC-222J	2520,2.2 μH±5%,(NL252018T-2R2J/NLV25T-2R2J)	1	L527
129	2LW1-20UC-270J	2012,27nH±5%,(C2012C-27NJ)	5	L506,L507,L511,L512,L530
130	2LH1-R401R5-R03-05	φ 0.40,* φ 1.5,3T,	2	L534,L526
131	2LH1-R301R5-L05-05	φ 0.30 * φ 1.5 5T	1	L535
132	2LH1-R401R5-R06-05	φ 0.40,* φ 1.5,6T	2	L502,L504
133	2LH1-R401R5-R07-05	φ 0.40* φ 1.5,7T	1	L503
134	2LH1-R401R5-R08-05	φ 0.40* φ 1.5,8T	2	L505,L524
135	4PE1-16-F5	1608,green light,H19-213SYGC	2	LED301,LED302
136	4PE1-16-F2-A	1608,red light,19-213/R6C-AP1Q2B/3T,Hight 0.6mm,	1	LED303
137	1TF1-RD01MUS2		1	Q502
138	1TF1-RD07MUS2B	RD07MUS2B,	1	Q501
139	1TF1-3SK318	3SK318(YB-)	1	Q506
140	1IL1-NJM2100V	NJM2100V,TSSOP-8	1	U103

141	1IL1-NJM2904V	NJM2904V,TSSOP-8	2	U502,U603
142	1TT1-2SC4617-R	2SC4617-R(BR),EMT3	1	Q606
143	1TT1-2SC5066-Y	2SC5066-Y(M2),NPN,SOT323	2	Q604,Q605
144	1TT1-DTA143ZE	DTA143ZE-SMD	1	Q511
145	1TT1-FMMT717TA	FMMT717A,PNP,SOT23	1	Q401
146	1IS1-PST9124NR	Reset IC,PST9124NR	1	U303
147	2RS1-10-0000	1005,0Ω	7	R249,R160,R320,R334,R263,R280,R281
148	2RS1-10-104J	1005,100K±5%	23	R107,R113,R114,R118,R121,R128,R129,R133,R154,R244,R310,R402,R418,R501,R502,R503,R504,R510,R513,R581,R599,R645,R650
149	2RS1-10-101J	1005,100Ω±5%	10	R517,R518,R554,R604,R614,R627,R629,R642,R643,R635
150	2RS1-10-103J	1005,10K±5%	30	R115,R117,R132,R135,R150,R151,R231,R232,R233,R234,R240,R259,R262,R266,R267,R306,R311,R313,R549,R321,R342,R360,R361,R419,R422,R631,R632,R637,R638,R652
151	2RS1-10-100J	1005,10Ω±5%	8	R229,R269,R270,R528,R609,R610,R630,R634
152	2RS1-10-121J	1005,120Ω±5%	2	R603,R613
153	2RS1-10-151J	1005,150Ω±5%	1	R551
154	2RS1-10-123J	1005,12K±5%	1	R143
155	2RS1-10-154J	1005,150K±5%	10	R124,R138,R562,R564,R566,R702,R621,R651,R261,R265
156	2RS1-10-153J	1005,15K±5%	2	R335,R605
157	2RS1-10-150J	1005,15Ω±5%	1	R537
158	2RS1-10-184J	1005,180K±5%	5	R126,R127,R525,R527,R644
159	2RS1-10-181J	1005,180Ω±5%	2	R314,R512

160	2RS1-10-18 3J	1005,18K±5%	2	R134,R648
161	2RS1-10-10 2J	1005,1K±5%	29	R108, R102,R149,R153,R180,R225,R236, R238,R253,R282,R301, R332,R351,R352,R353,R357,R358, R370,R391,R520,R530, R533,R535,R542,R545,R571,R606, R628,R680
162	2RS1-10-15 2J	1005,1.5K±5%	1	R411
163	2RS1-10-15 5J	1005,1.5M±5%	2	R567,R700
164	2RS1-10-10 5J	1005,1M±5%	1	R141
165	2RS1-10-24 2J	1005,2.4K±5%	1	R555
166	2RS1-10-20 4J	1005,200K±5%	1	R401
167	2RS1-10-22 4J	1005,220K±5%	4	R131,R147,R243,R112
168	2RS1-10-22 1J	1005,220Ω±5%	1	R315
169	2RS1-10-22 3J	1005,22K±5%	9	R111,R125,R148,R336,R340,R425, R539,R574,R615
170	2RS1-10-22 0J	1005,22Ω±5%	3	R106,R120,R543
171	2RS1-10-27 4J	1005,270K±5%	1	R145
172	2RS1-10-27 1J	1005,270Ω±5%	1	R568
173	2RS1-10-27 3J	1005,27K±5%	3	R524,R569,R701
174	2RS1-10-22 2J	1005,2.2K±5%	5	R258,R341,R406,R515,R570
175	2RS1-10-56 1J	1005,560Ω±5%	1	R157
176	2RS1-10-27 2J	1005,2.7K±5%	1	R156
177	2RE1-10-2R 70	0402 2.7Ω±1%,1005.	1	R507
178	2RS1-10-33 4J	1005,330K±5%	1	R639
179	2RS1-10-33 3J	1005,33K±5%	3	R123,R552, R241

180	2RS1-10-33 1J	1005,330Ω±5%	1	R508
181	2RS1-10-39 4J	1005,390K±5%	1	R146
182	2RS1-10-39 1J	1005,390Ω±5%	2	R556,R595
183	2RS1-10-33 2J	1005,3.3K±5%	2	R142,R526
184	2RS1-10-39 2J	1005,3.9K±5%	2	R522,R617
185	2RS1-10-47 4J	1005,470K±5%	3	R136,R144,R155
186	2RS1-10-47 1J	1005,470Ω±5%	5	R104,R521,R531,R619,R640
187	2RS1-10-47 3J	1005,47K±5%	10	R122,R312,R316,R317,R318,R319, R354,R405,R408,R550
188	2RS1-10-47 0J	1005,47Ω±5%	2	R516,R548
189	2RS1-10-47 2J	1005,4.7K±5%	19	R338,R339,R362,R363,R412,R505, R523,R541,R547,R575, R588,R602,R608,R612,R620,R623, R646,R658,R659
190	2RS1-10-56 4J	1005,560K±5%	2	R519,R641
191	2RS1-10-56 3J	1005,56K±5%	2	R511,R514
192	2RS1-10-56 0J	1005,56Ω±5%	1	R636
193	2RS1-10-56 2J	1005,5.6K±5%	5	R139,R140,R601,R611,R616
194	2RS1-10-68 3J	1005,68K±5%	3	R137,R410,R622
195	2RS1-10-68 2J	1005,6.8K±5%	2	R506,R546
196	2RS1-10-75 4J	1005,750K±5%	1	R529
197	2RS1-10-82 4J	1005,820K±5%	1	R116
198	2RS1-10-82 1J	1005,820Ω±5%	1	R152
199	2RS1-10-82 3J	1005,82K±5%	2	R130,R553
200	2RS1-10-82 2J	1005,8.2K±5%	2	R536,R538
201	2RS1-10-91	1005,9.1K±5%	1	R649

	2J			
202	2RS1-32-R3 9J	3216,0.39Ω±5%	3	R559,R560,R561
203	1IS1-GT313 6	GT3136,SSOP16	1	U501
204	1IS1-TC75S 51F	TC75S51F,SSOP5-P-0.95	1	U203
205	1IL1-TDA85 47TS	,TDA8547TS,SSOP20,	1	U204
206	1IL1-NJM29 02V	NJM2902V-SMD	2	U101,U102
207	1TC1-UMC4	UMC4,NPN/PNP	4	U104,U503,U505,U604
208	1IS1-UPB15 09GV	UPB1509GV,SSOP	1	U605
209	1IM1-W25Q 80DVSIG	W25Q80DVSIG, SOIC,8M	1	U302
210	1DR1-NSR1 020MW2T1 G	NSR1020MW2T1G	1	D405
211	1IS1-XC620 4B332MR	3.3V,SOT-23-5,150mA	1	U602
212	1IS1-XC620 4B502MR	5V,SOT-23-5	4	U105,U402,U403,U404
213	6PM7-4112- HMA	8 layer FR-4, 1.2,TP620-140113,108.66X 46.8mm	1	
214	2CC1-10-X7 R500-331K	1005,330P±10%,50V,X7R	1	C108
215	1IP1-00TP6 20-R01	STM32F405VG T6 LQFP100, MCU,14*14MM	1	U301

List 3 Material List (structure material)

No	Part No.	Description	Quantity
1	7MHP-7069-02A-W0	PT7800 top cover (cover die)	1
2	7MHP-7210-03A-W0	PT567channel knob (cover die 1)	1
3	7MHP-7210-04A-W0	PT567volume knob (cover die 1)	1
4	7MHR-7069-04A-W0	PT7800major waterproof ring	1
5	7MHR-7069-05A-W3	PT7800roof waterproof ring	1
6	7MHR-7210-02A-W0	PT567top waterproof pad	1
7	7MHR-7069-07A-W0	PT7800pedestal waterproof pad	1
8	7MHR-1727-09A-W3	R 558 microphone case	1

9	7MHR-7042-06B-W0	R thermally conductive silica gel pad	1
10	3CR7-SMA-50JFB-4	R RF coaxial connector for analog radio	1
11	7NRC-060100035-B1A	Switch nut 558 3600 7200 568 578 5200 7800 567 7200EX	2
12	7MHL-7069-01A-W	PT7800 aluminum alloy bracket	1
13	7MHF-7069-02A-W	PT7800 roof cover board	1
14	7MHS-7069-04A-W	PT7800 PTT button	1
15	7MHS-1140-01A-W	R 3118/3208 knob circlip	2
16	7SMF-020040M-SZYB-N	R M2*4 cross round flat head machine screw (558/PT4200/PT558S/5200/PT	15
17	7SMF-020080M-MHHT-N1	R M2*8torx thick-headed machine screw (558/E66/PT558/4200/PT4200/5200/PT65	2
18	7SMF-025080M-SZYB-Z1	R M2.5*8 cross round flat head machine screw (4208/PT4208/AP570/DP570/S660/PT56	2
19	7MHR-7069-08A-W0	O ring	2
20	7SMF-026060M-SZHT-B1	M2.6*6 cross machine screw (PT617A/6808/PT6808	2
21	7MHP-7210-01A-W0	PT567 front shell	1
22	7MHP-7069-03A-W0	PT7800 PTT side cover	1
23	7MHP-7069-04A-W0	PT7800 PTT cover board (cover die)	1
24	7MHP-7069-06A-W0	PT7800battery latch (cover die)	1
25	7MHF-7069-01A-N	PT7800 latch baffle outsourcing part (DP770/780/7800/TP660)	1
26	7MHP-7069-10A-WC	PT7800 guide beam	1
27	7MHR-7069-02C-W0	PT7800PTT button	1
28	7MHR-7210-01A-W3	PT567 emergency button	1
29	7MHS-1010-02A-N	PT3208 spring	2
30	7GCJ-S7210-01-J	PT567double-sided adhesive speaker net	2
31	4SS7-4005-016-100C	Speaker 7200,6500,S780,S785,S760,S765,567	1
32	7GCJ-S1867-01	R PT7200earphone PCB sticker	1
33	7GCB-070045005-J	DP770,PT567Φ7 microphone cloth	1
34	6SS2-7210-HLA	PT567 rail radio earphone set	1
35	6SS1-7210-HLA	PT567 rail radio earphone SMD suite	1
36	7NRC-090110025-W1	Antenna screw can be replaced with 7NRC-090110025-W1	1
37	7GCB-070045005-J	DP770,PT567Φ7 microphone cloth	1
38	6PD7-4078-HPB	TP660 PTT board	1
39	6SS3-BJ4026-A	KBJ-15 belt clip (560,567,770 FP series,STP)	1
40	6SS1-1867-HLA	R PT7200 microphone board SMD suite	1
41	7MHP-7210-02A-W0	PT567 microphone cover board	1
42	7SSF-030040M-YXHP-BA	R M3*4 screw(earphone cover board screw)(6500/PT6500/7200/PT7200/AP570/D	1

Figure 1 TP620 Main Board Top Side PCB View(400-470MHz)

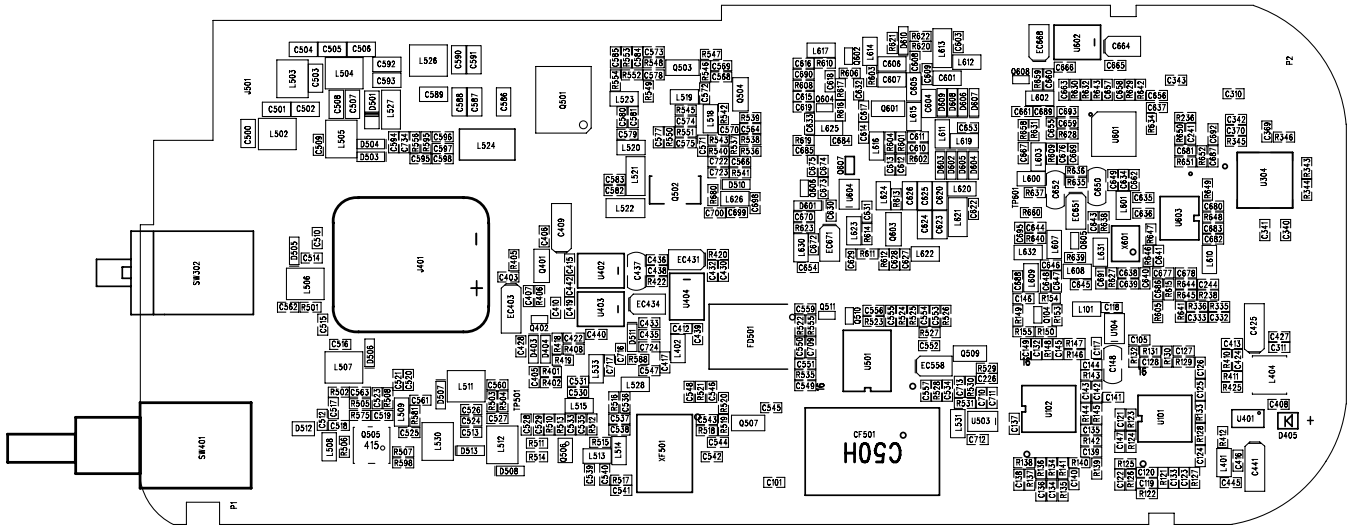


Figure 2 TP620 Main Board Bottom Side PCB View(400-470MHz)

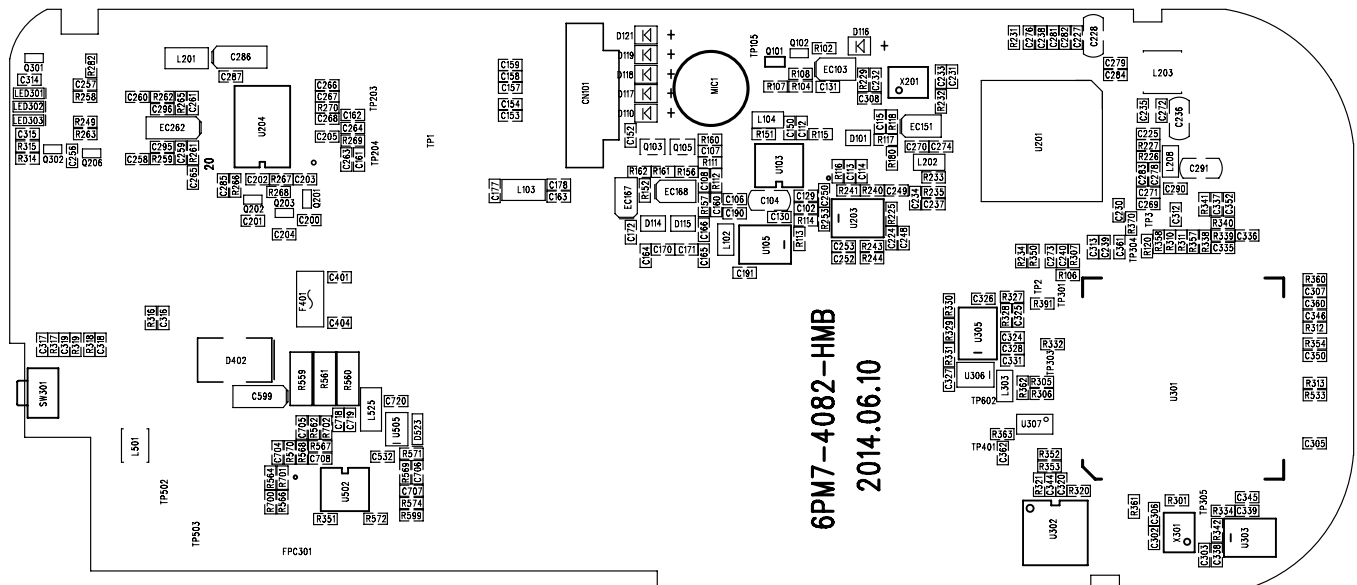


Figure 3 TP620 Main Board Top Side PCB View(136-174MHz)

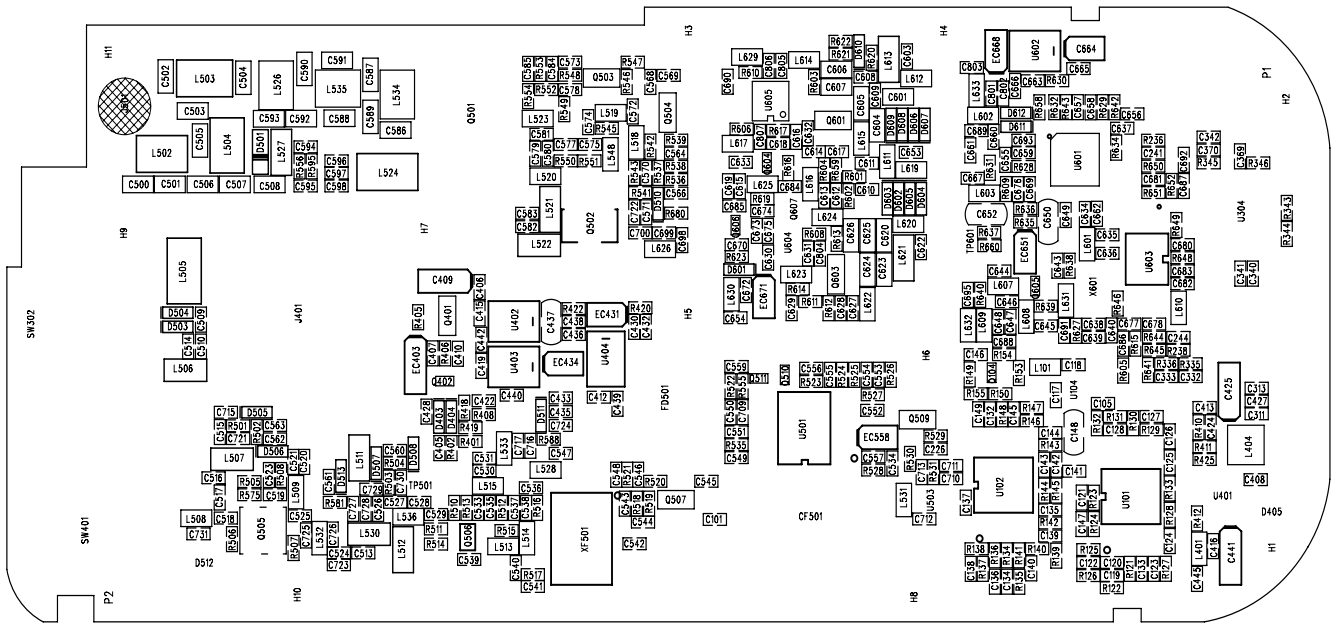


Figure 4 TP620 Main Board Bottom Side PCB View(136-174MHz)

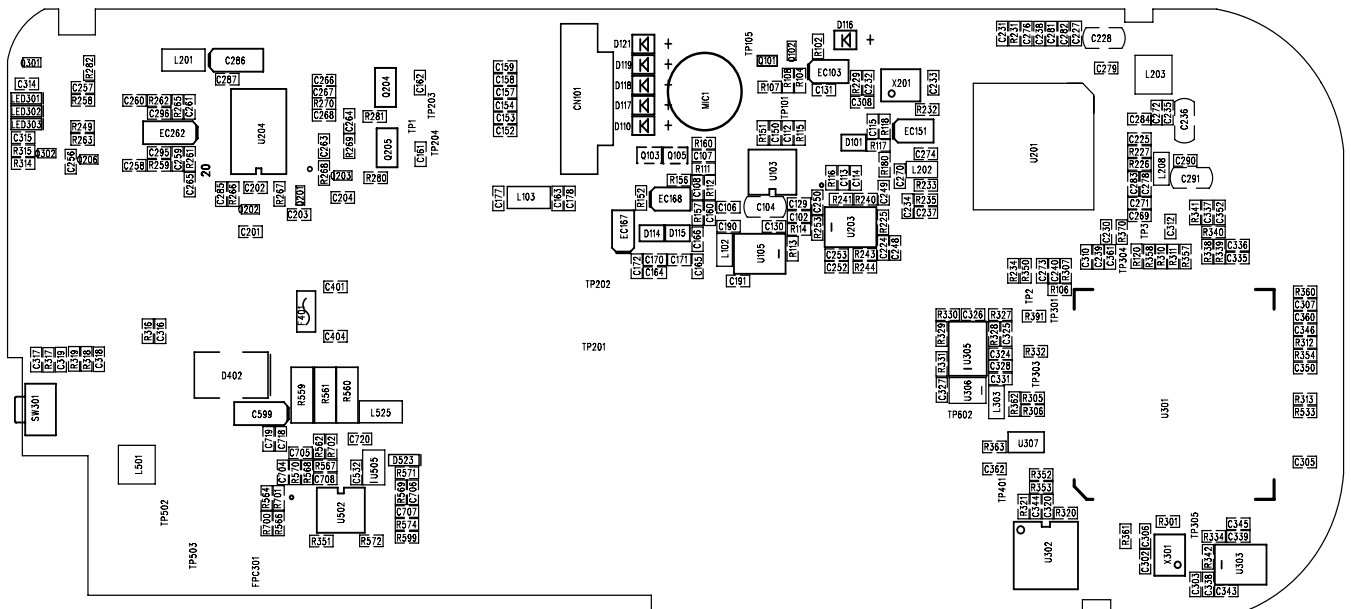
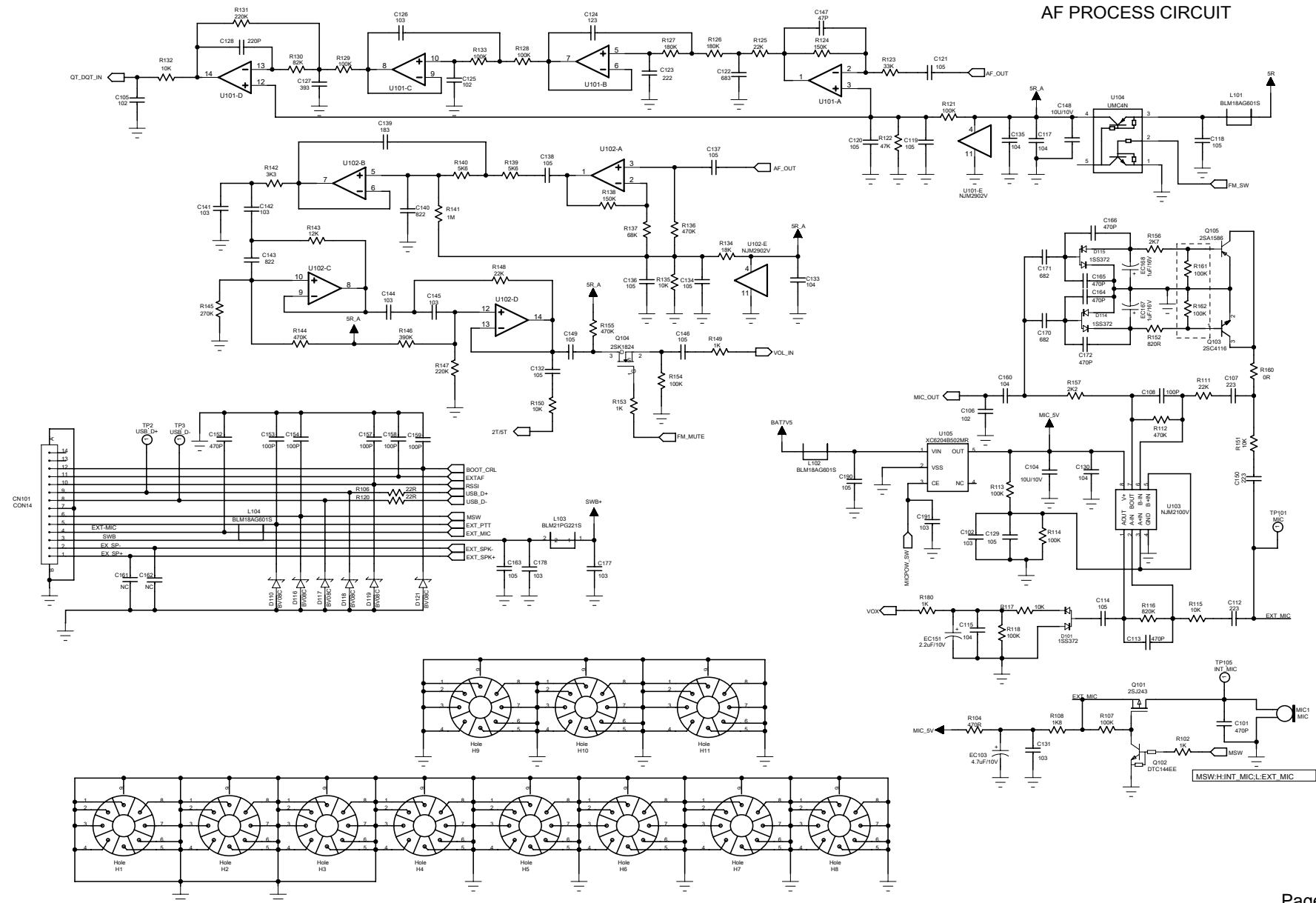
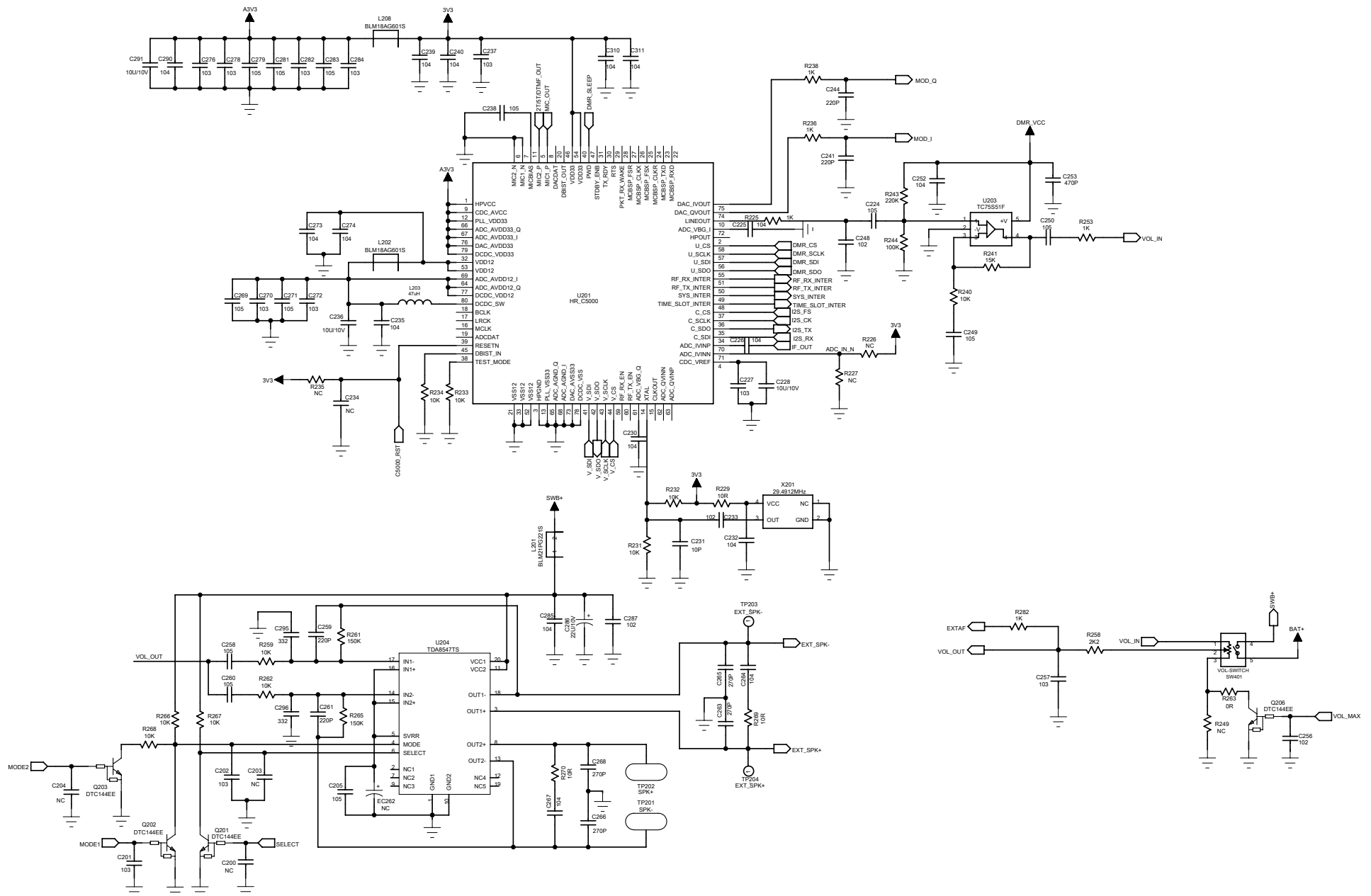
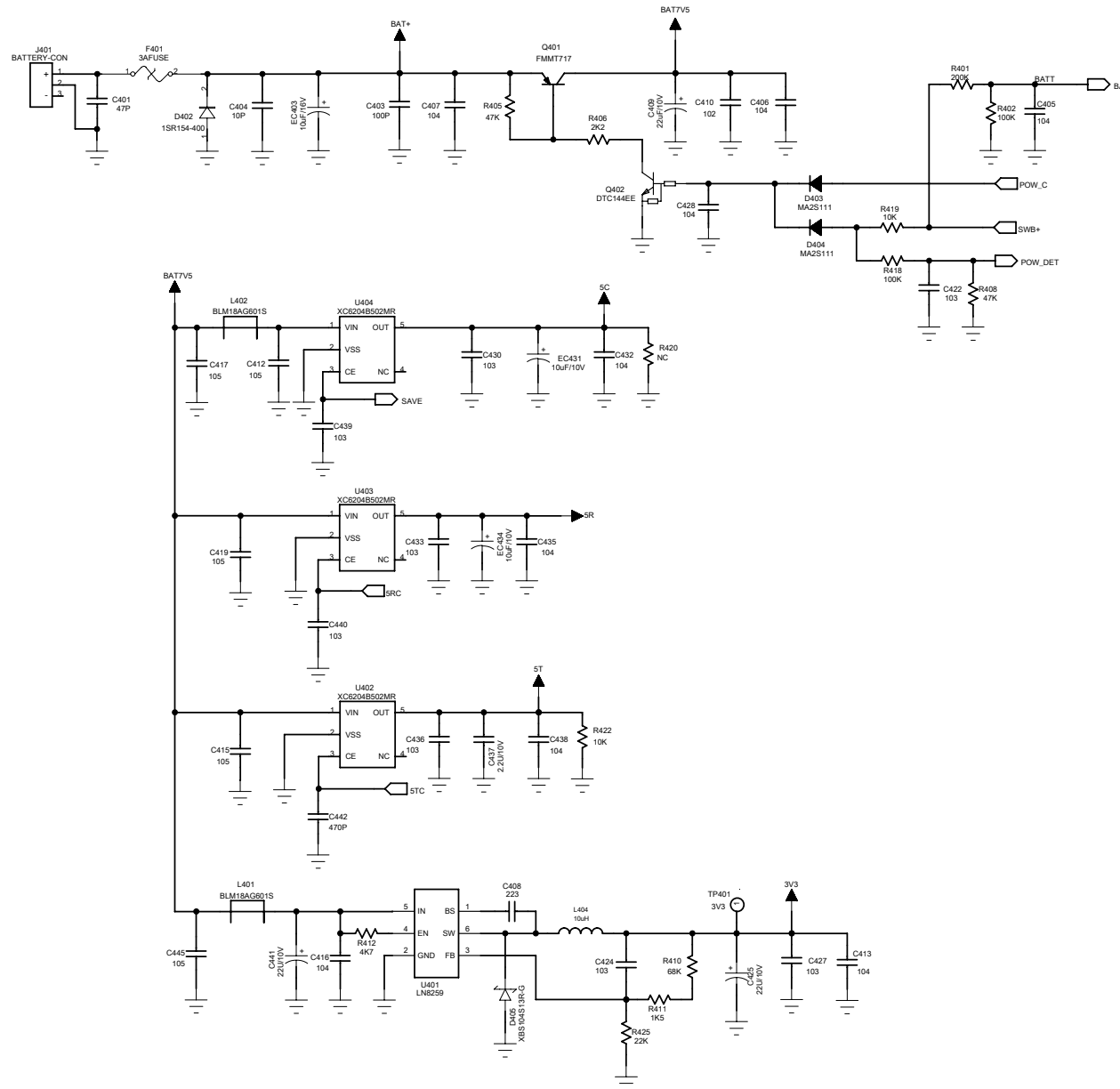


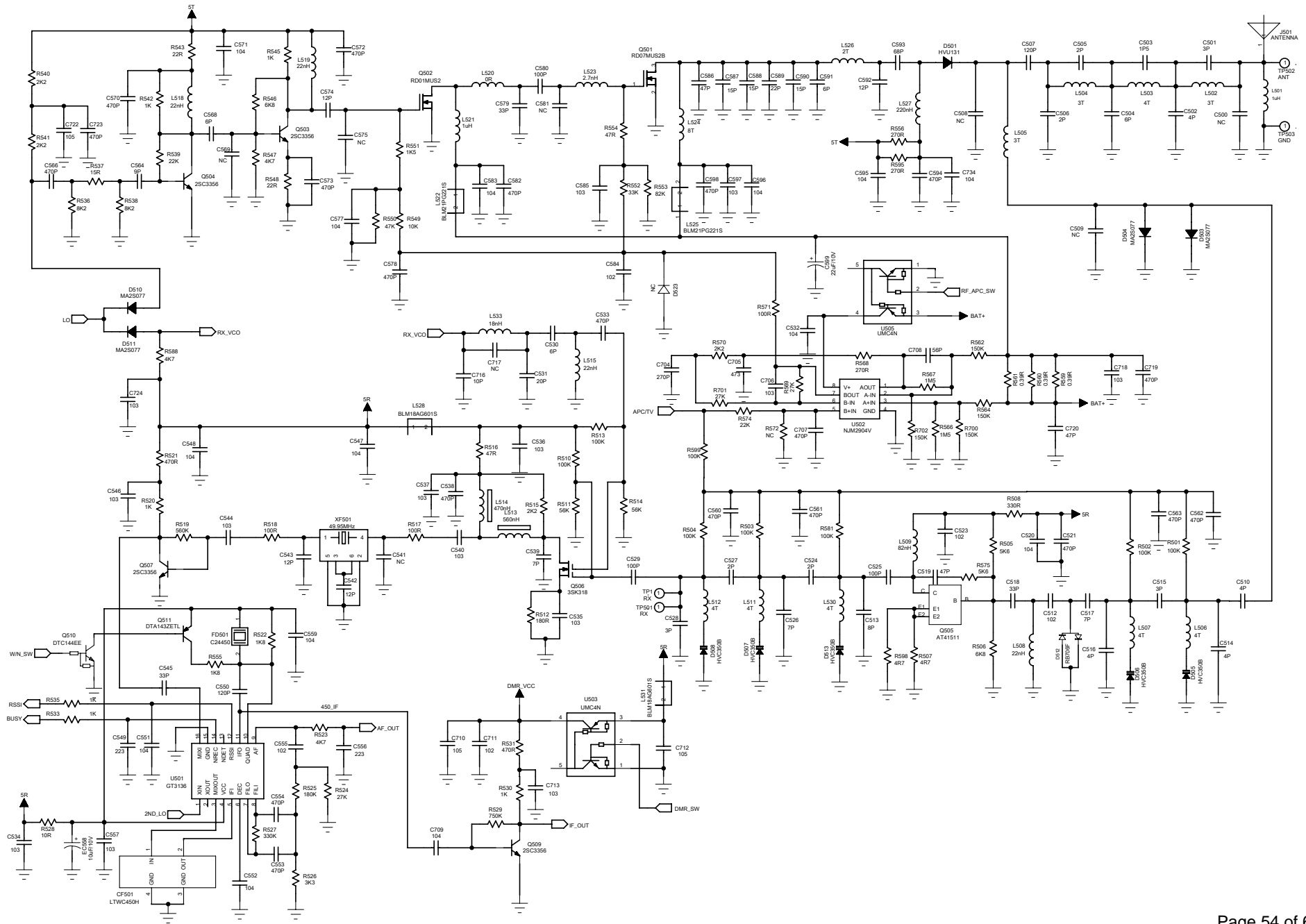
Figure 5 TP620 Mainboard Schematic Diagram(400-470MHz)





POWER CIRCUIT





PLL&VCO Circuit

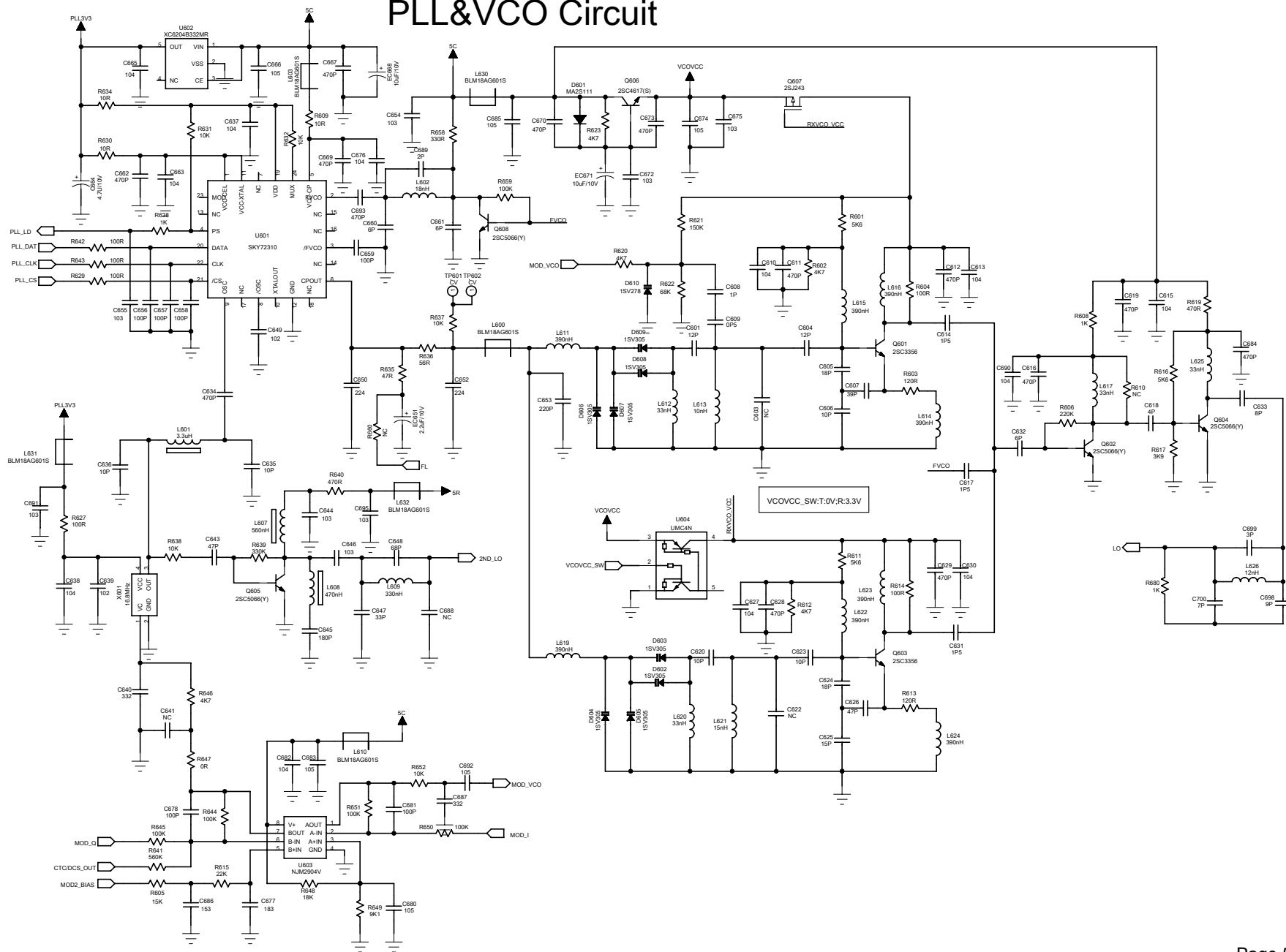
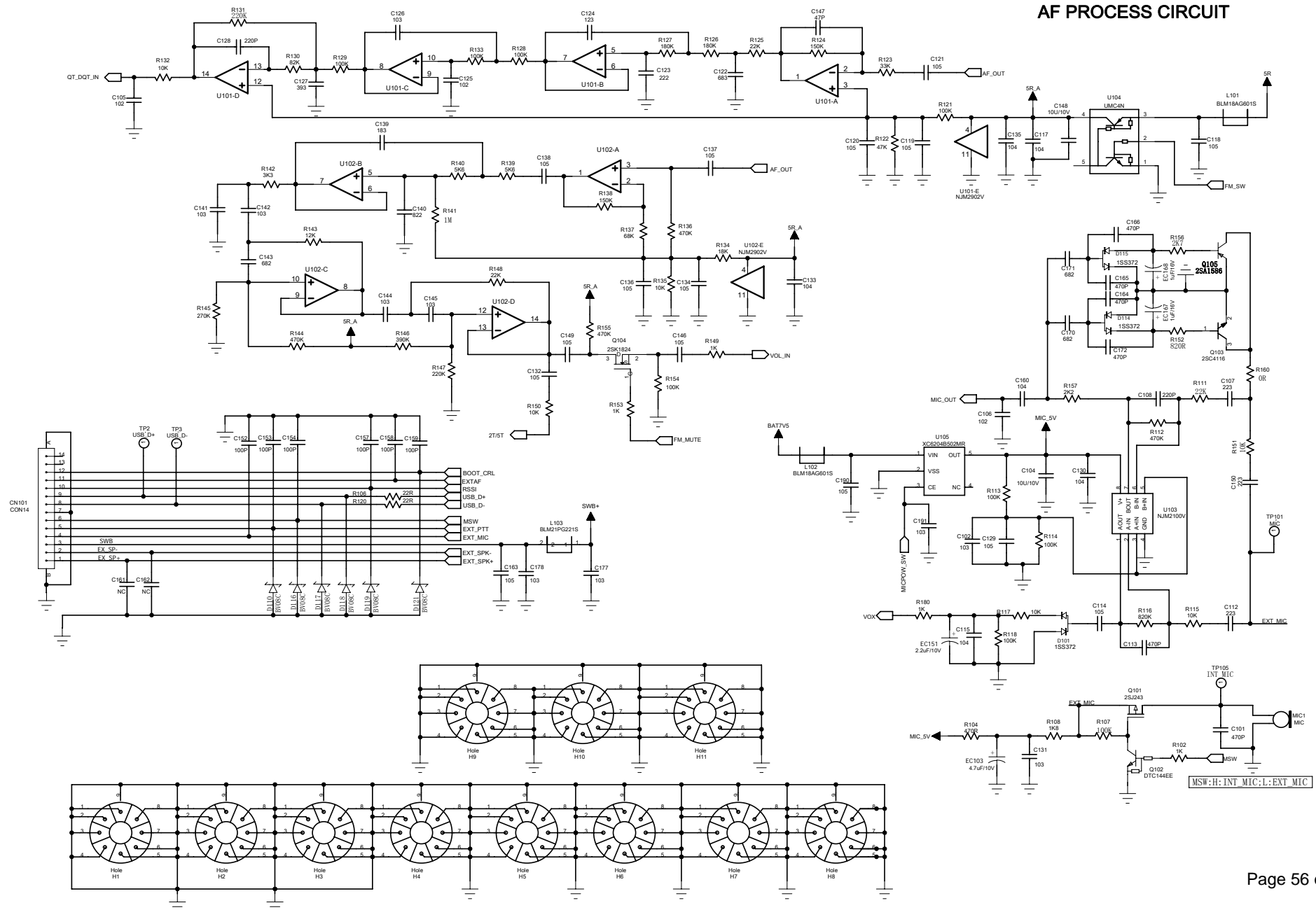
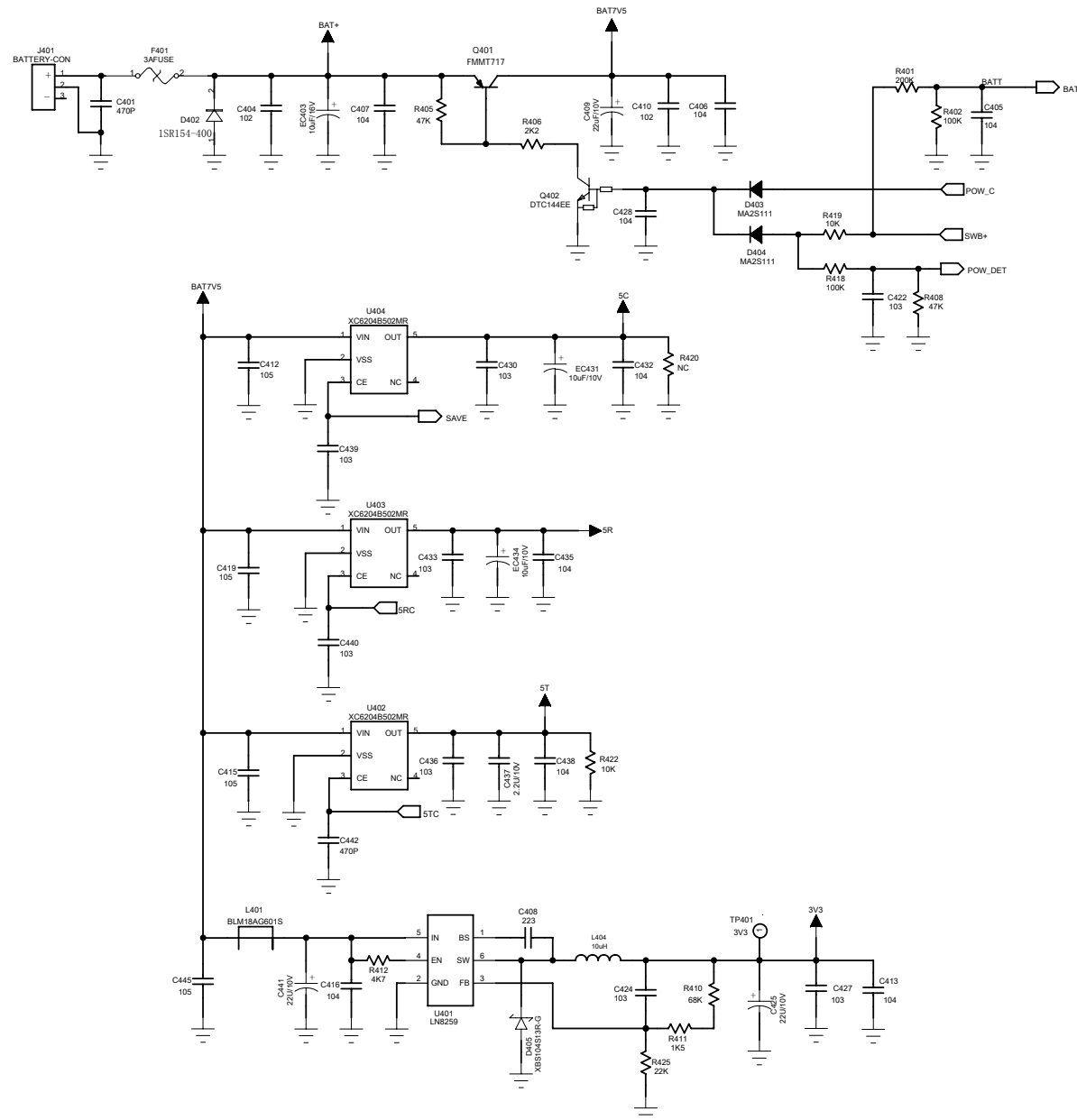
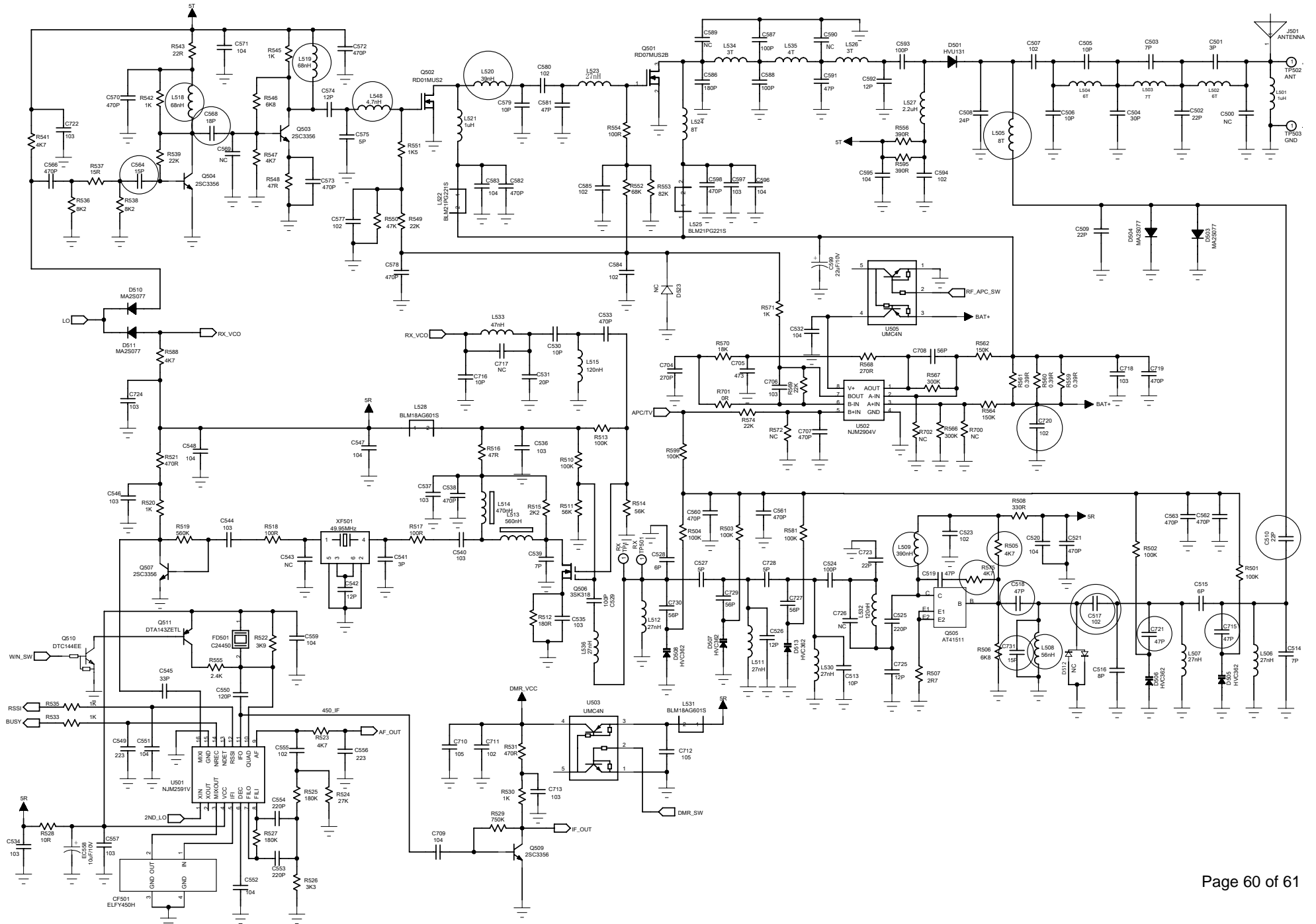


Figure 6 TP620 Mainboard Schematic Diagram(134-174MHz)



POWER CIRCUIT





PLL&VCO Circuit

