S-Forty-9er QRP Kit

User Manual

Revision V160604

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1. Introduction

This is a very small volume of simple 40 meter band micro-power amplitude telegraph transceiver, Despite it's small size and DC receiver limitations, it is capable of working several hundred miles when connected to a good 40 meter antenna.

The original design from the United States NoCal QRP club's famous "Forty-9er" suite. The new name is "S-Forty-9er", Designed by "**LXQQFY.com**".

The new product adds the following new features. Provide the WIFI module, with the mobile phone application communication. support automatic key. Provide automatic sending function.Display sending sequential. Provide acrylic case.

2. Specifications

Power supply: 9~13.8 Volts DC, >500mA (Recommend the use of batteries)
Antenna: 50ohm,7MHz,is not balanced
Receive: static current 50mA
Transmission power: 3W
Frequency: launch the vibration frequency,7023 KHZ
Receives the local oscillator frequency: about
7023-7023 KHZ work mode: the CW
KEY: Manual and automatic auto-detection
Automatic sending: ok
Config: the mobile phone application(WIFI)
case: acrylic

3. Circuit principle

Reference schematic diagram.Receiving part is the core of a NE602,inside it includes an oscillating circuit and a balanced mixer,antenna in the signal after a crystal filter,into the mixer,oscillation circuit at the receiving frequency oscillation,two signals through mixing,directly put the CW signal frequency conversion for audio,NE602 output again gave LM386 audio amplifier,thus complete the receiving process.Circuit consisting of Q4 audio oscillator to produce about 700 hz sine wave side tone,LM386 amplification,make the headset with "di tick" audio transmission.Launch part using the NE602 oscillation circuit,and then to Q6 do the buffer amplifier,at the end of the class is made up of class C D882 amplifier,after amplification of the high frequency signal after LPF filter ing antenna.

The WIFI module is optional. If you do not use the WIFI module, you need to short circuit the JP1, then "S-Forty-9er" == "Forty-9er" == Ordinary CW radio. If you use the WIFI module, you need to unplug the JP1,then you can use the mobile phone configuration data.

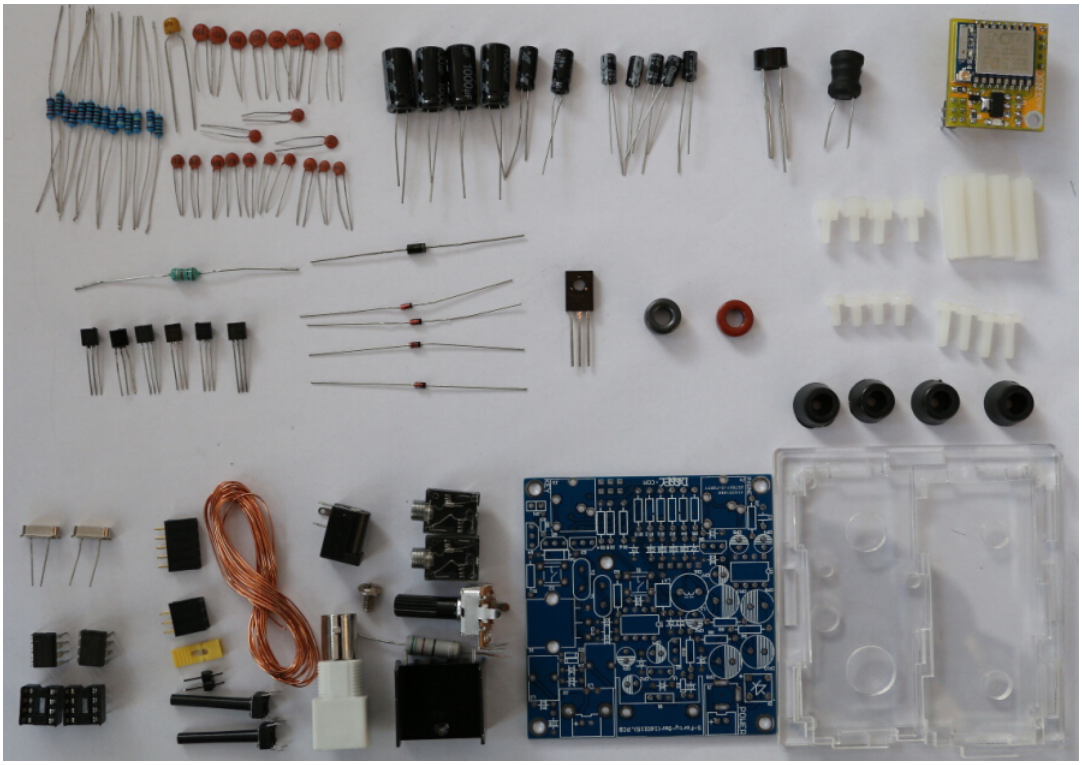
4. Component selection

8050 magnification is about 130 , D882 magnification is about 200. L3 is HFC, ferrite beads in FT37-43 (black) to use the 0.5mm enameled wire around 8 times. L2 is the high frequency filter inductance in T37-2(red) on the iron core is circular and using 16 to 0.5 mm enameled wire around.

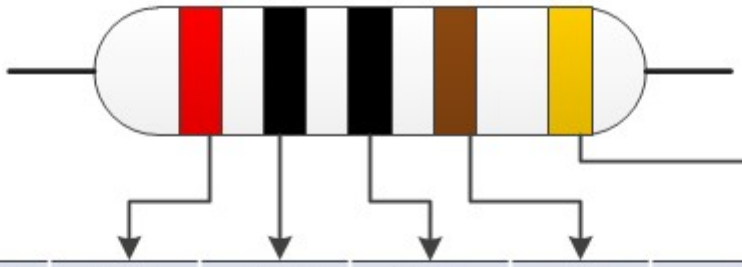
Inductance is a fixed inductance (outsourcing black heat shrinkable casing).Other devices,such as 0.47 uf formonolithic capacitors,more than 10 uf capacitance for aluminum electrolytic capacitors,all resistance is a quarter w fixed resistance.

5. Production process

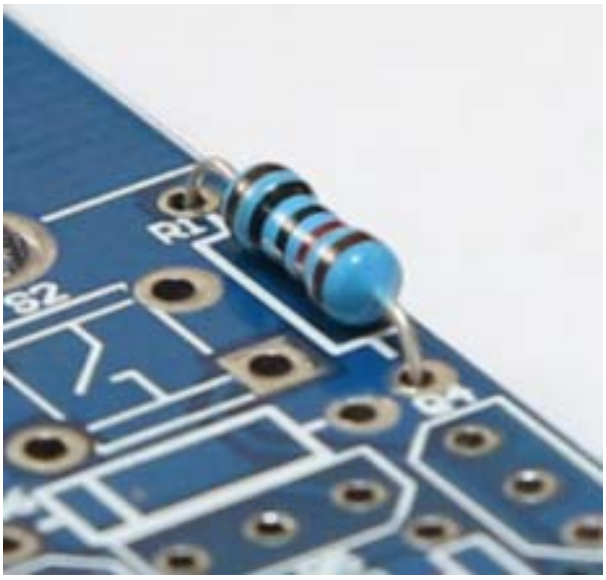
5.1 According to the list of components, check the number of components. Have tools, Electric iron, Solder wire, and A multimeter on hand. Take welding from low to high order, Recommend: Resistance -> Diode -> Capacitance -> Triode -> Crystal oscillator -> Bridge rectifier -> Electrolytic capacitor -> Ic -> Inductor -> Magnet ring -> D882 -> Other.



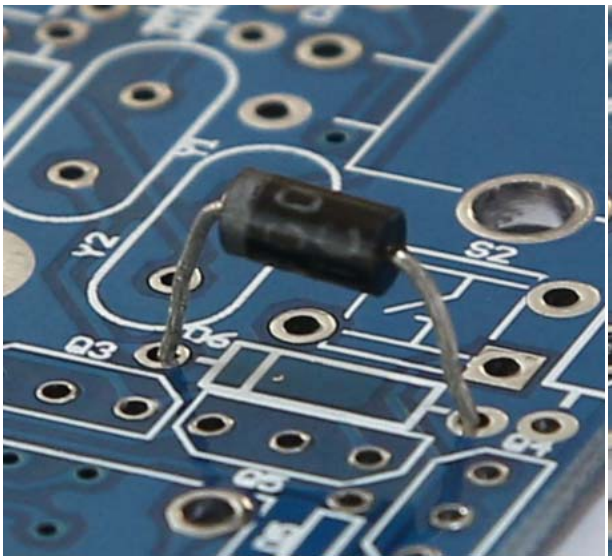
5.2 Resistance.



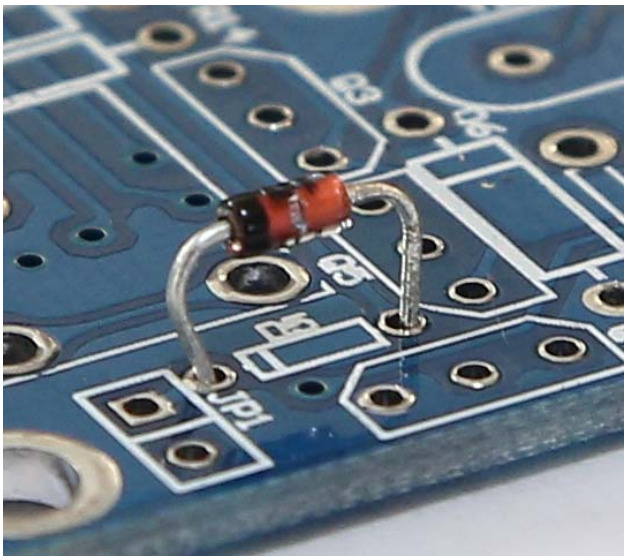
颜色	百位	十位	个位	倍数	精度
黑	0	0	0	1	
棕	1	1	1	10^1	±1%
红	2	2	2	10^2	±2%
橙	3	3	3	10^3	
黄	4	4	4	10^4	
绿	5	5	5	10^5	±0.5%
蓝	6	6	6	10^6	±0.25%
紫	7	7	7	10^7	±0.1%
灰	8	8	8	10^8	±0.05%
白	9	9	9	10^9	±50%
金				10^{-1}	±5%
银				10^{-2}	±10%
透明					±20%



5.3 Diode.



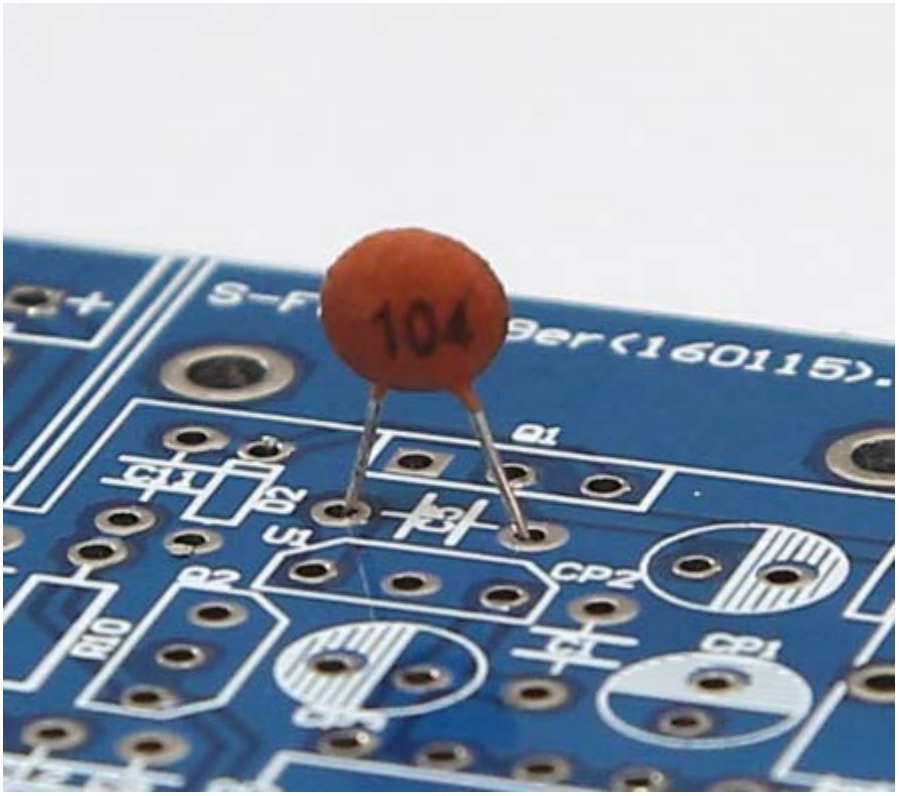
1N4001



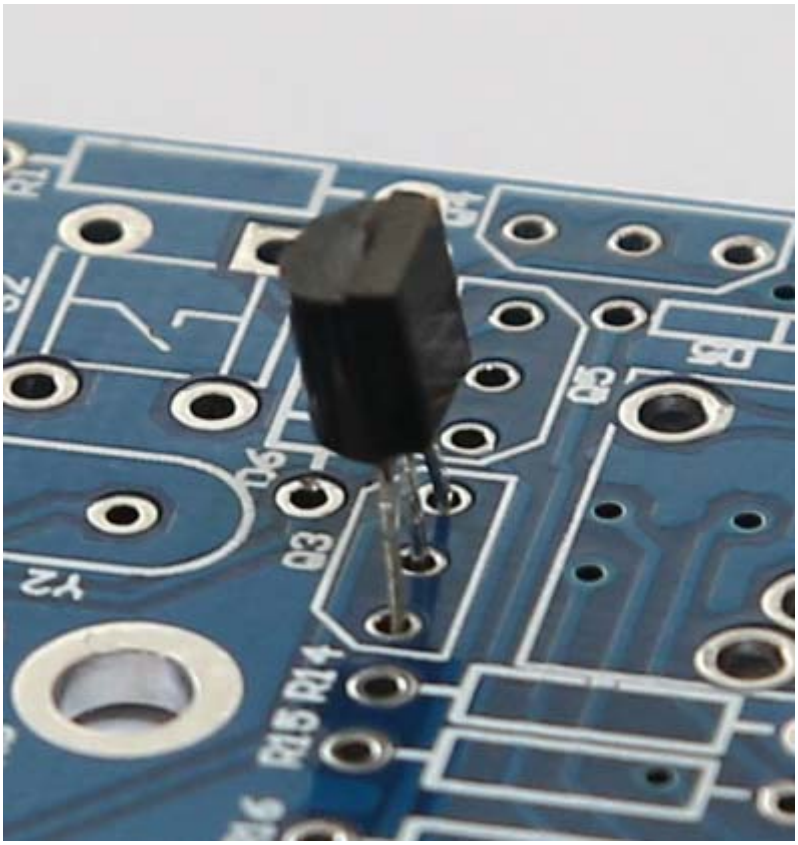
1N4148

5.4 Capacitance.

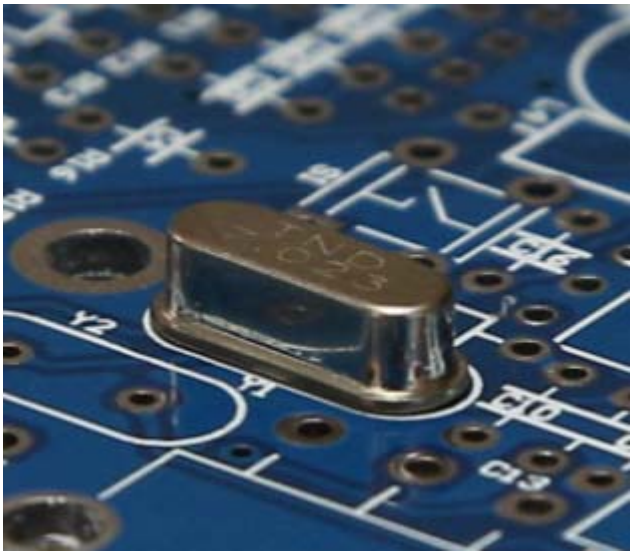
104: 0.1uF 103: 0.01uF 33: 33pF 82: 82pF 474: 0.47uF 471: 470pF 473: 0.047uF



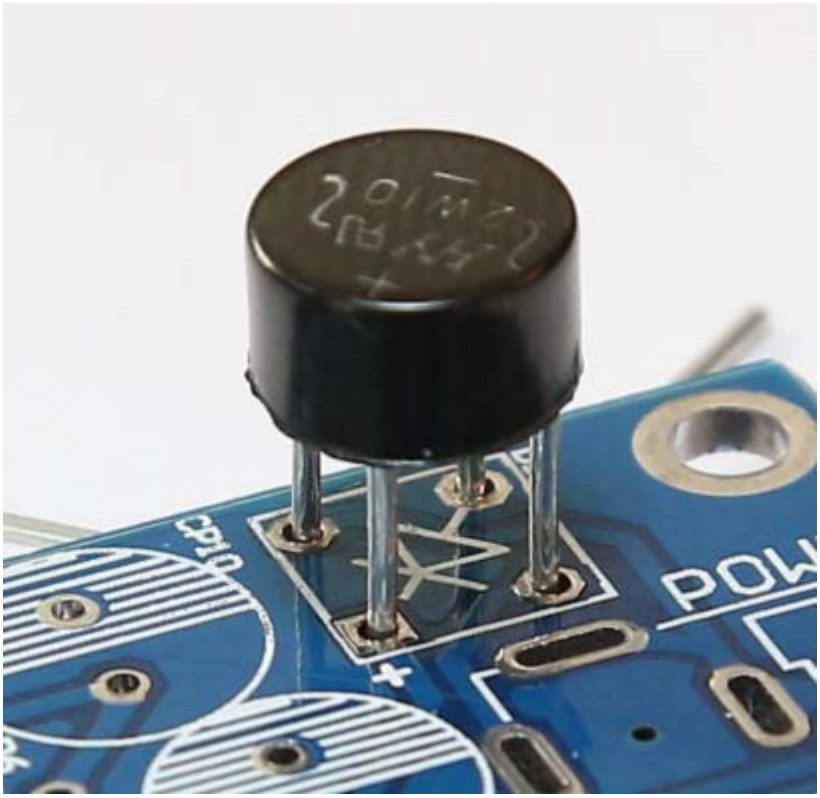
5.5 Triode and FET.



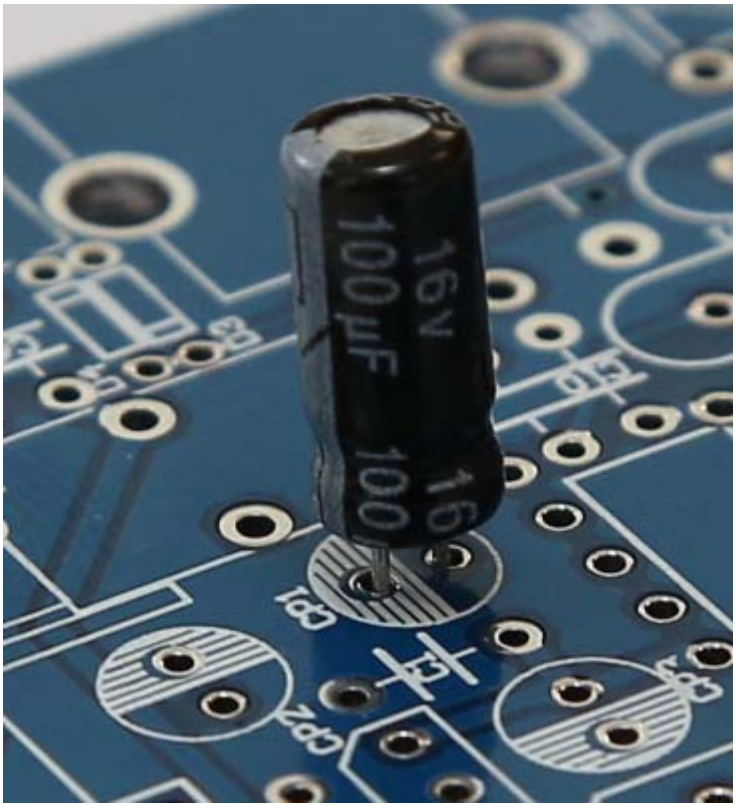
5.6 Crystal oscillator.



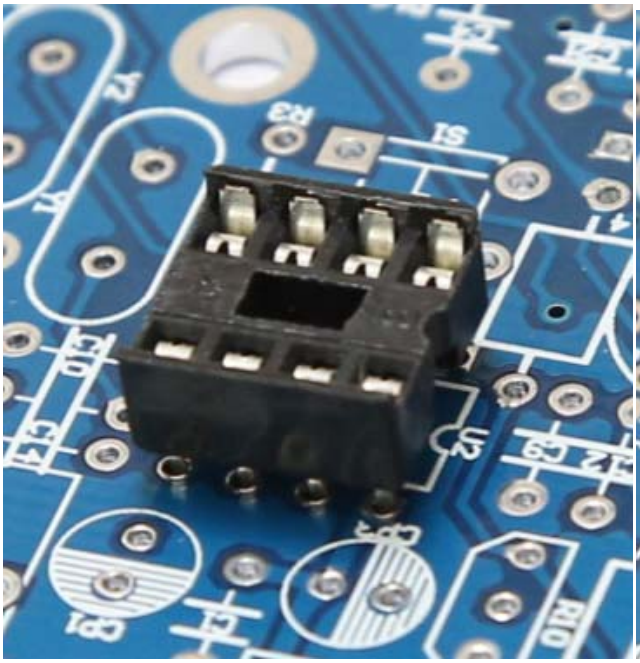
5.7 Bridge rectifier.

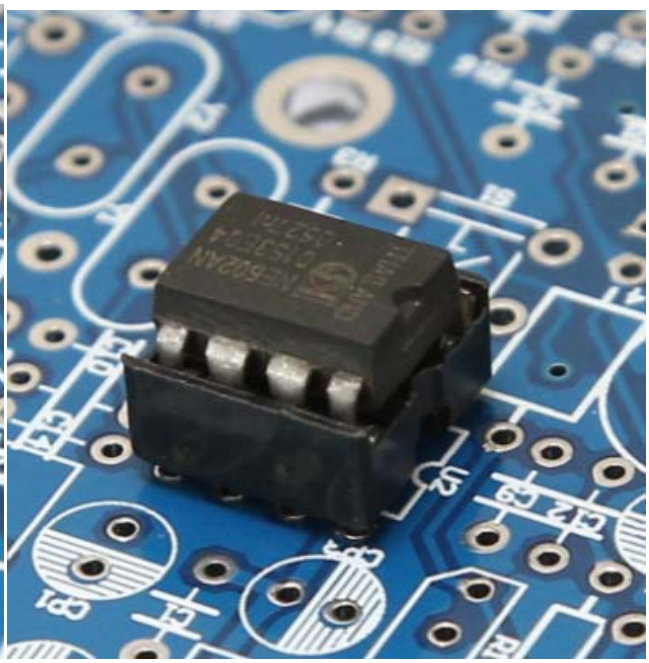


5.8 Electrolytic capacitor.



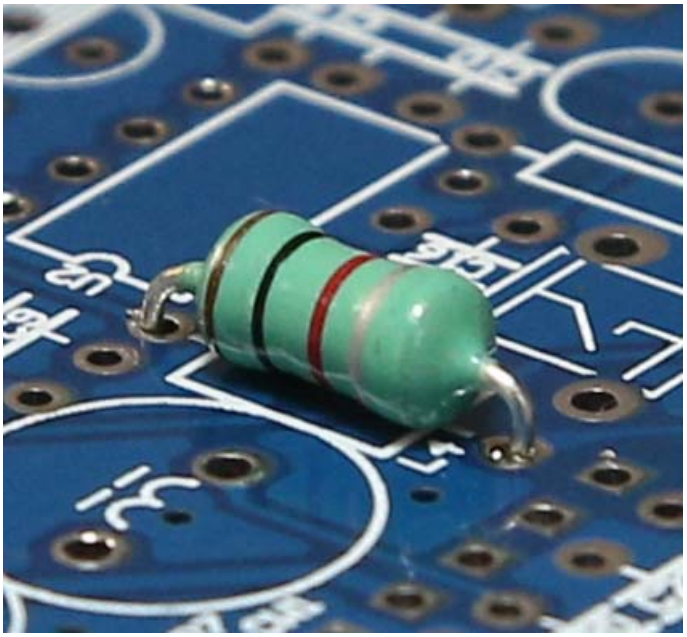
5.9 Ic.





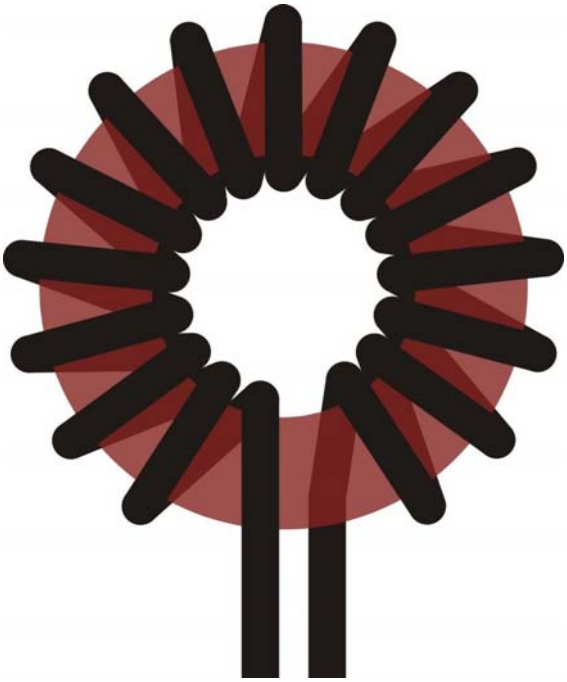
5.10 Inductance.

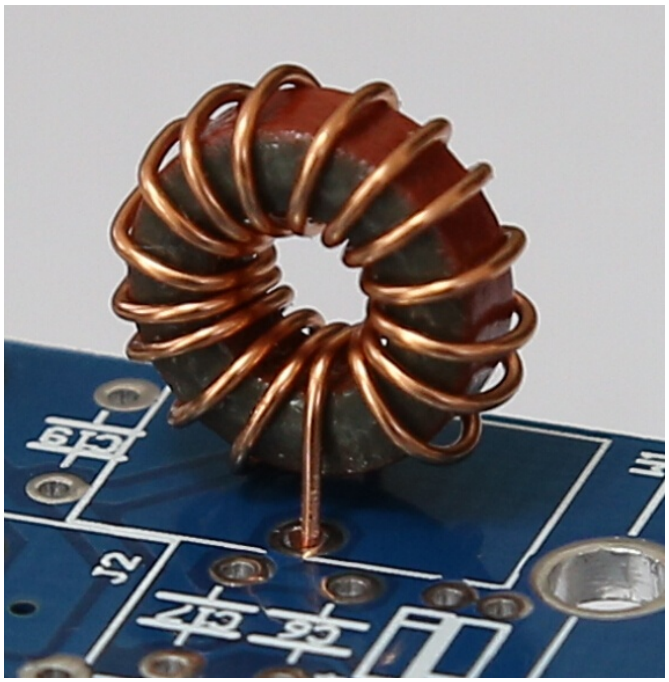
I-inductor

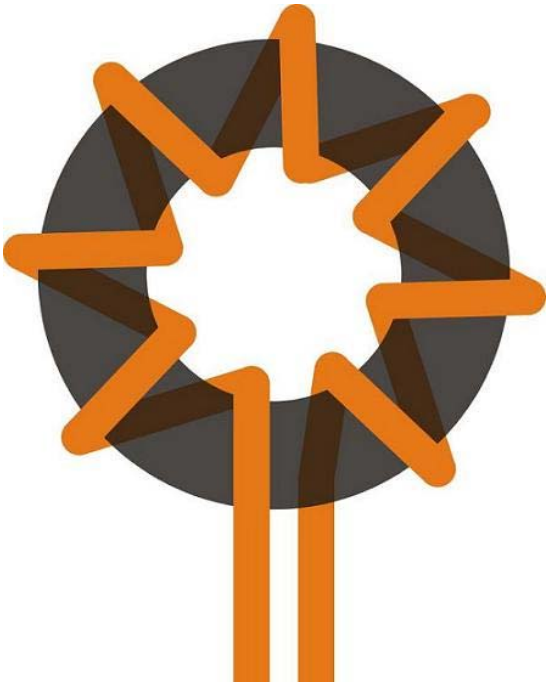


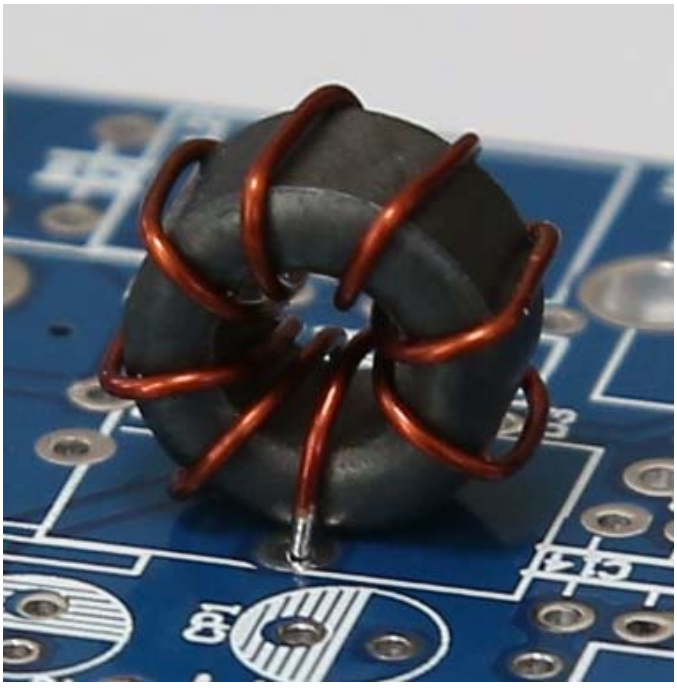
Color ring inductance

5.11 Magnet ring.

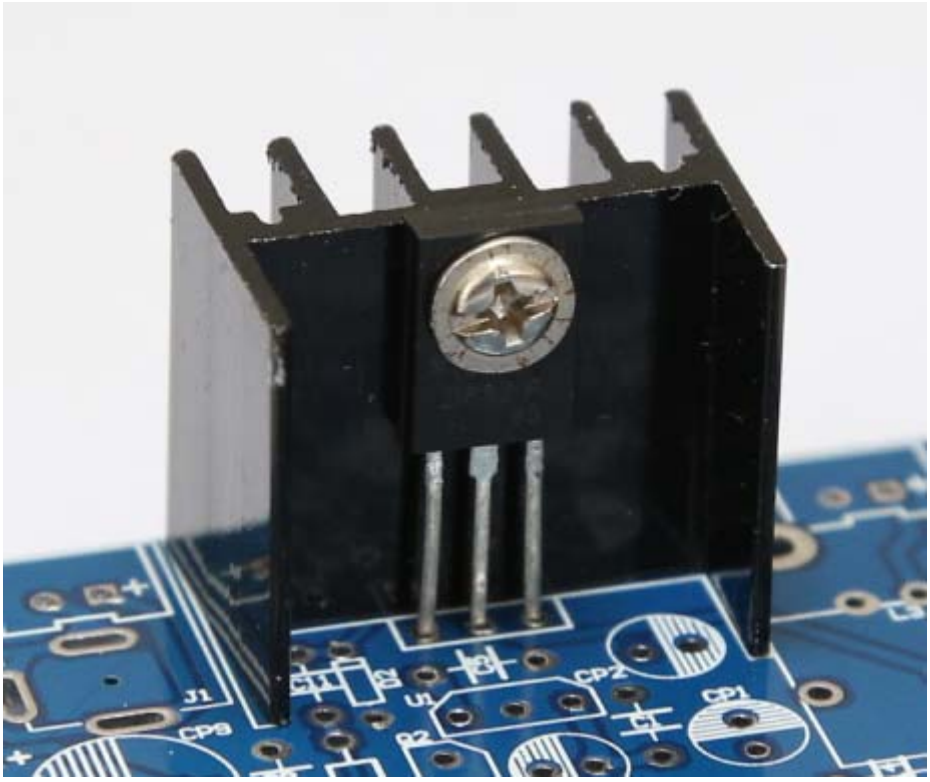




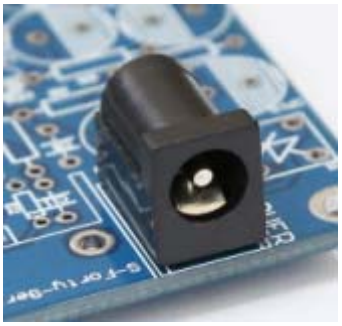




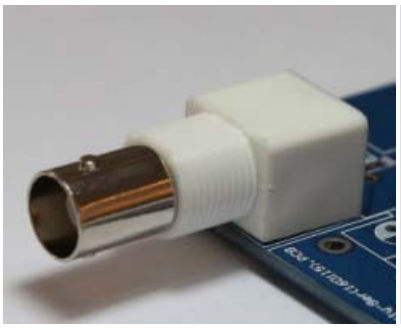
5.12 D882.



5.13 Other.

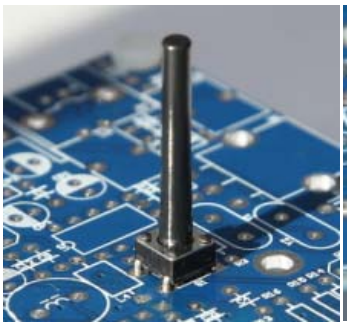


DC Jack

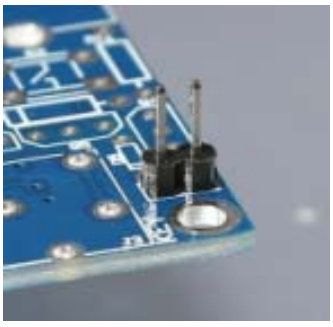


Q9(BNC)

3.5mm Socket(Key and Phone)



Key

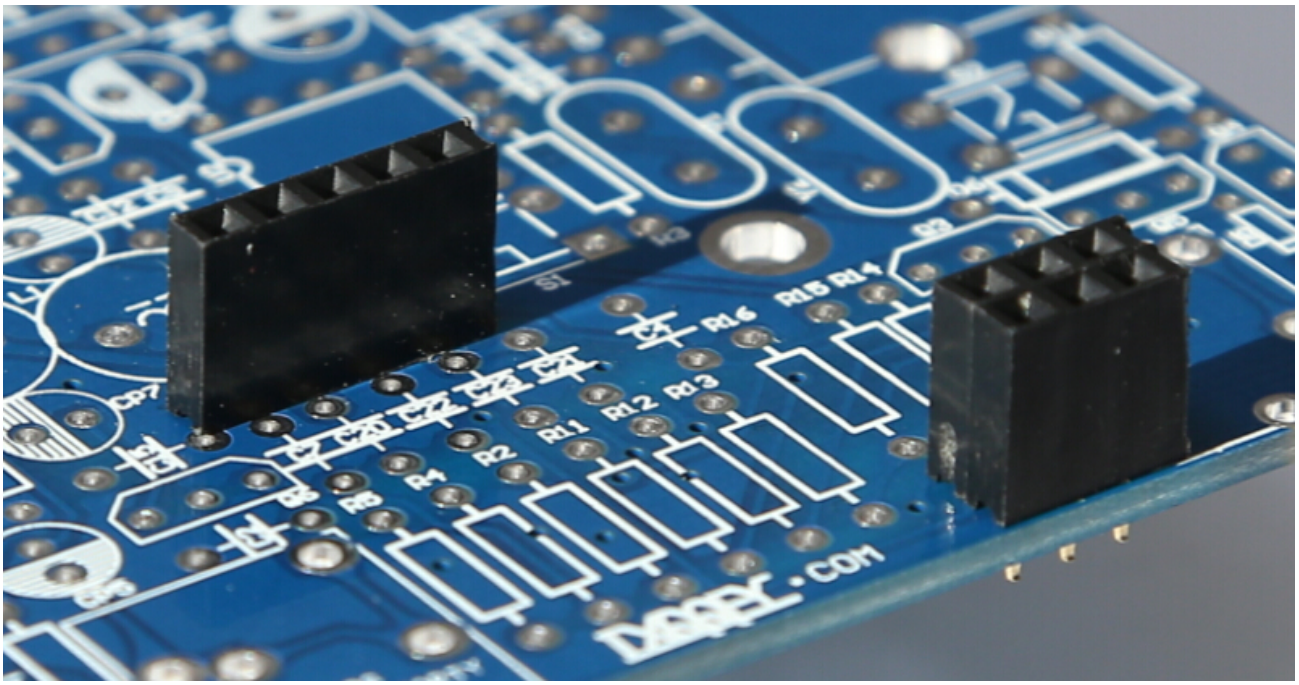


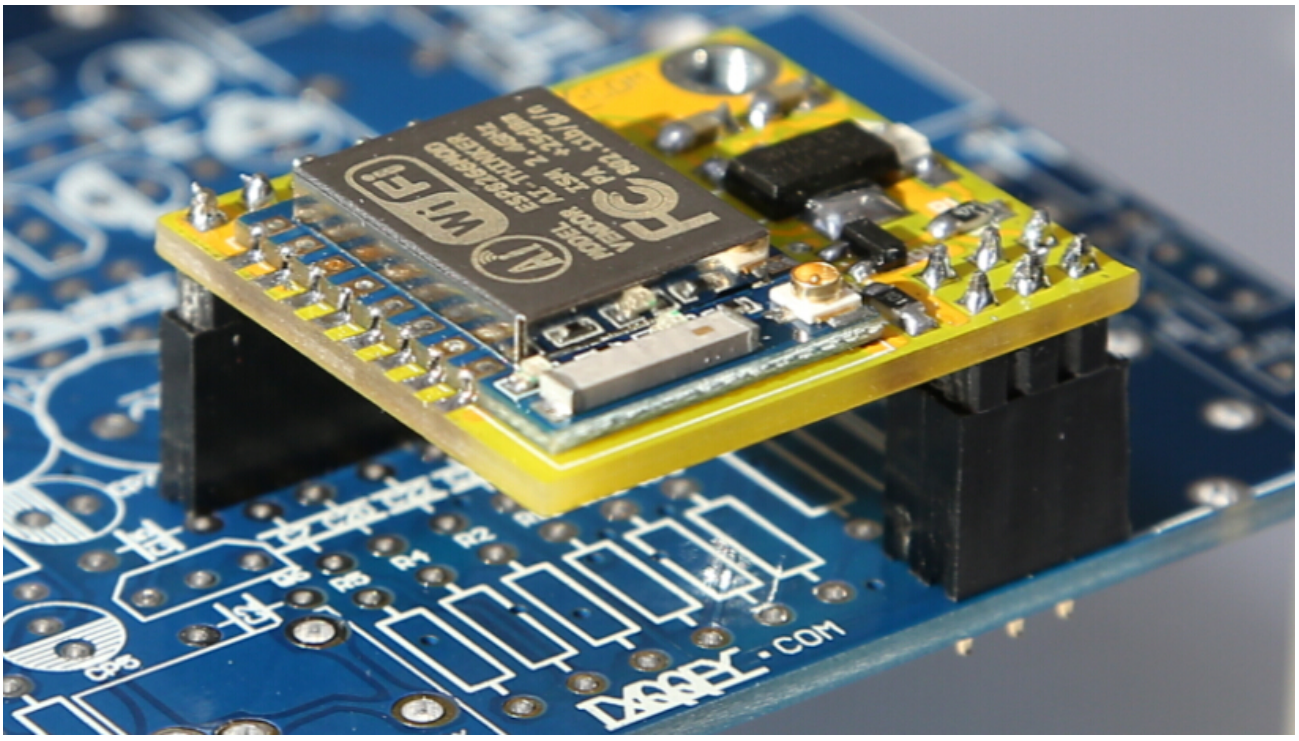
Pin

Jumper Cap

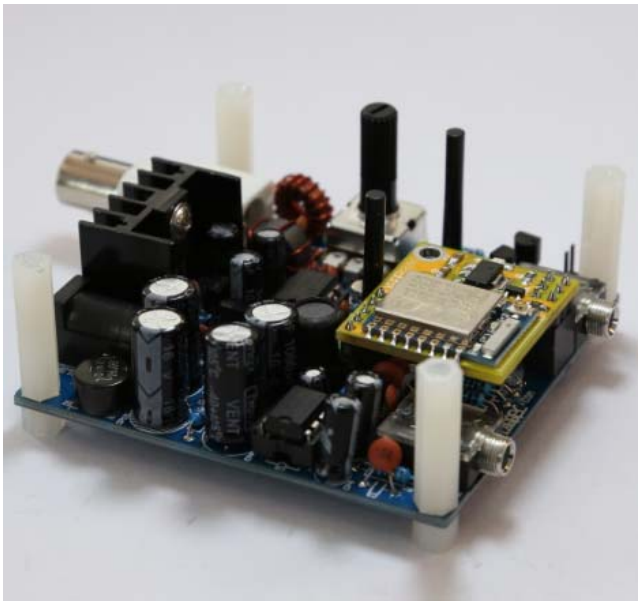
Variable resistor

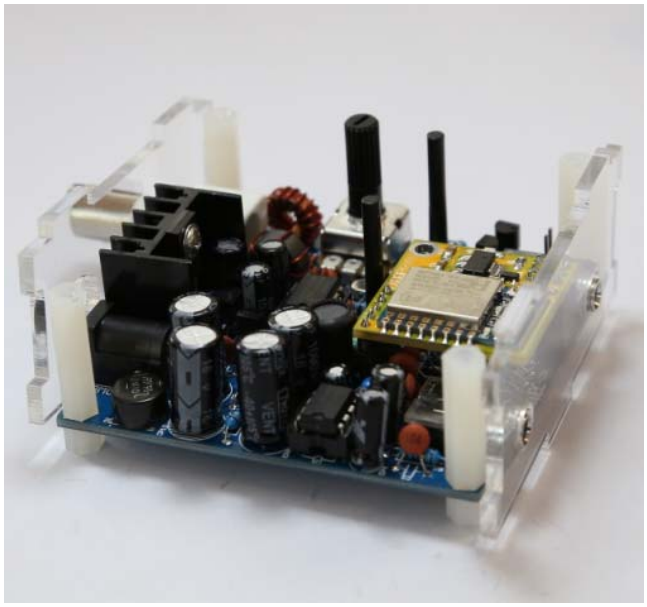
5.14 WIFI Module.

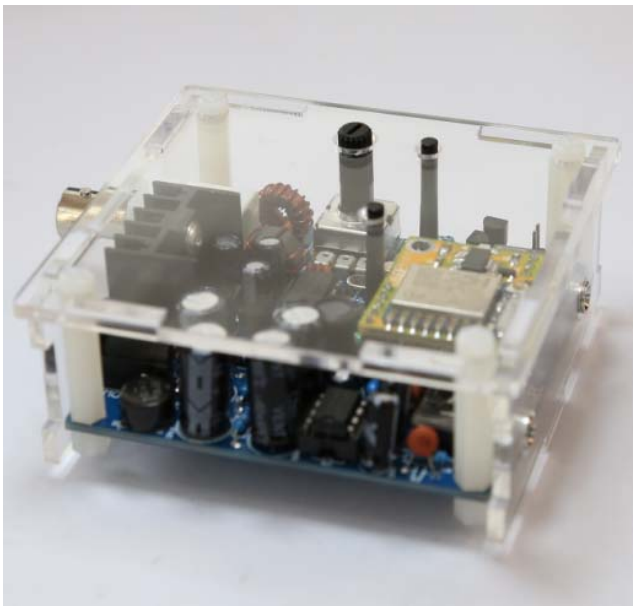


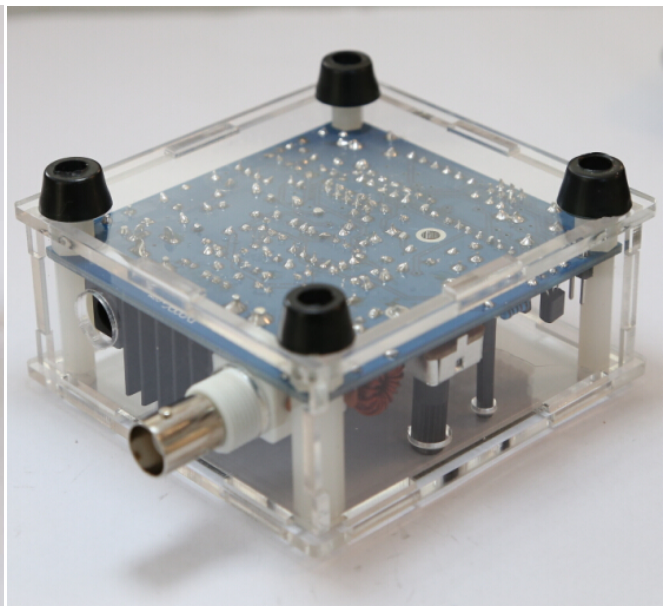


5.15 Install the acrylic case.





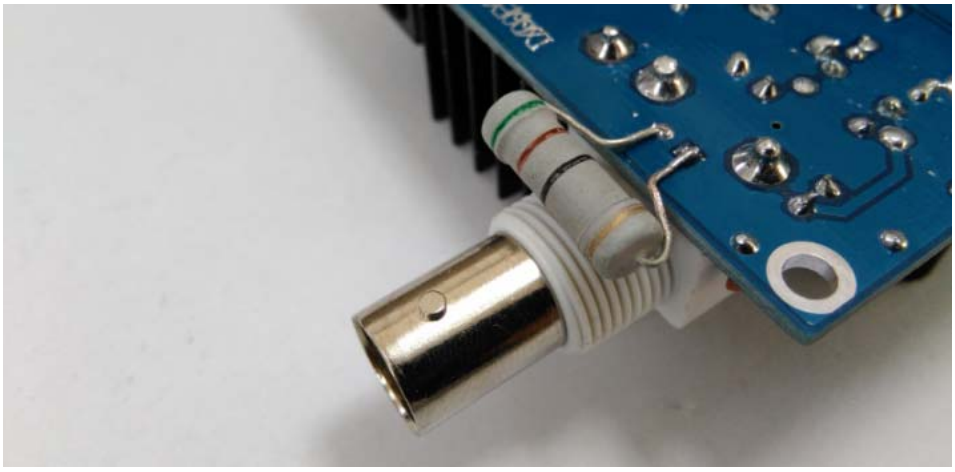




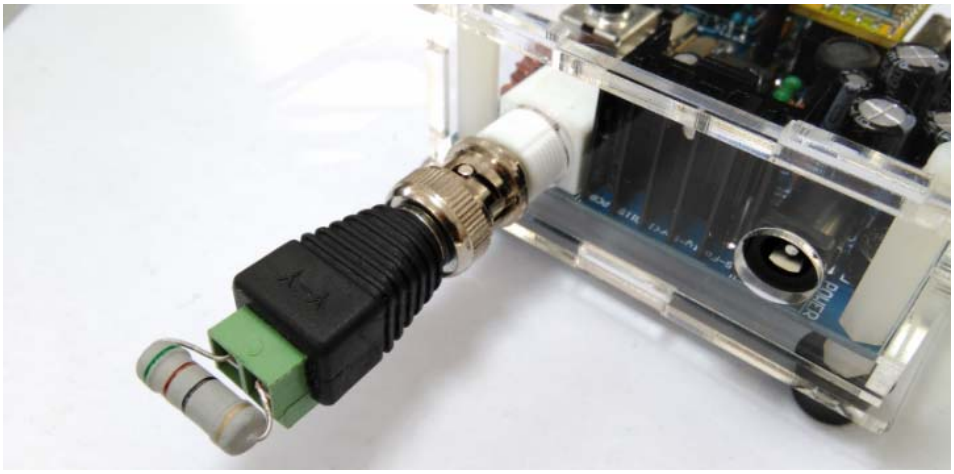
6. Debug

6.1 The power before installation of dummy load.

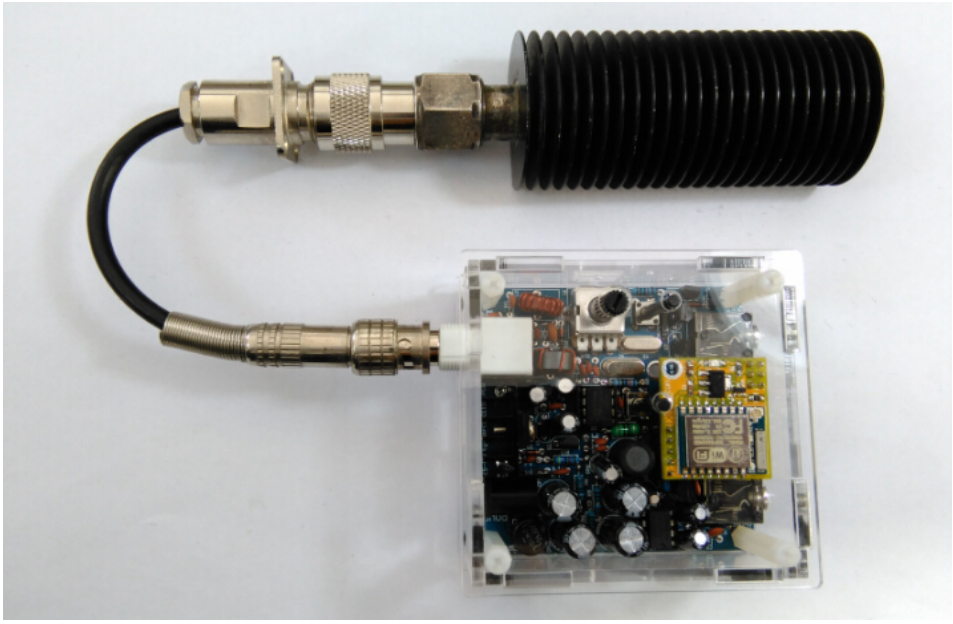
Method 1:



Method 2:



Method 3:



6.2 Power on: Do not distinguish between positive electrode and negative electrode(Internal rectification), Recommend the use of battery, Can also use the DC linear voltage stabilized power supply. If power on after tens of seconds without abnormal heating,then it's normal.

6.3 Listen to the base noise: Connect the 8ohm headset, after power will hear a slight voice, then it's normal.

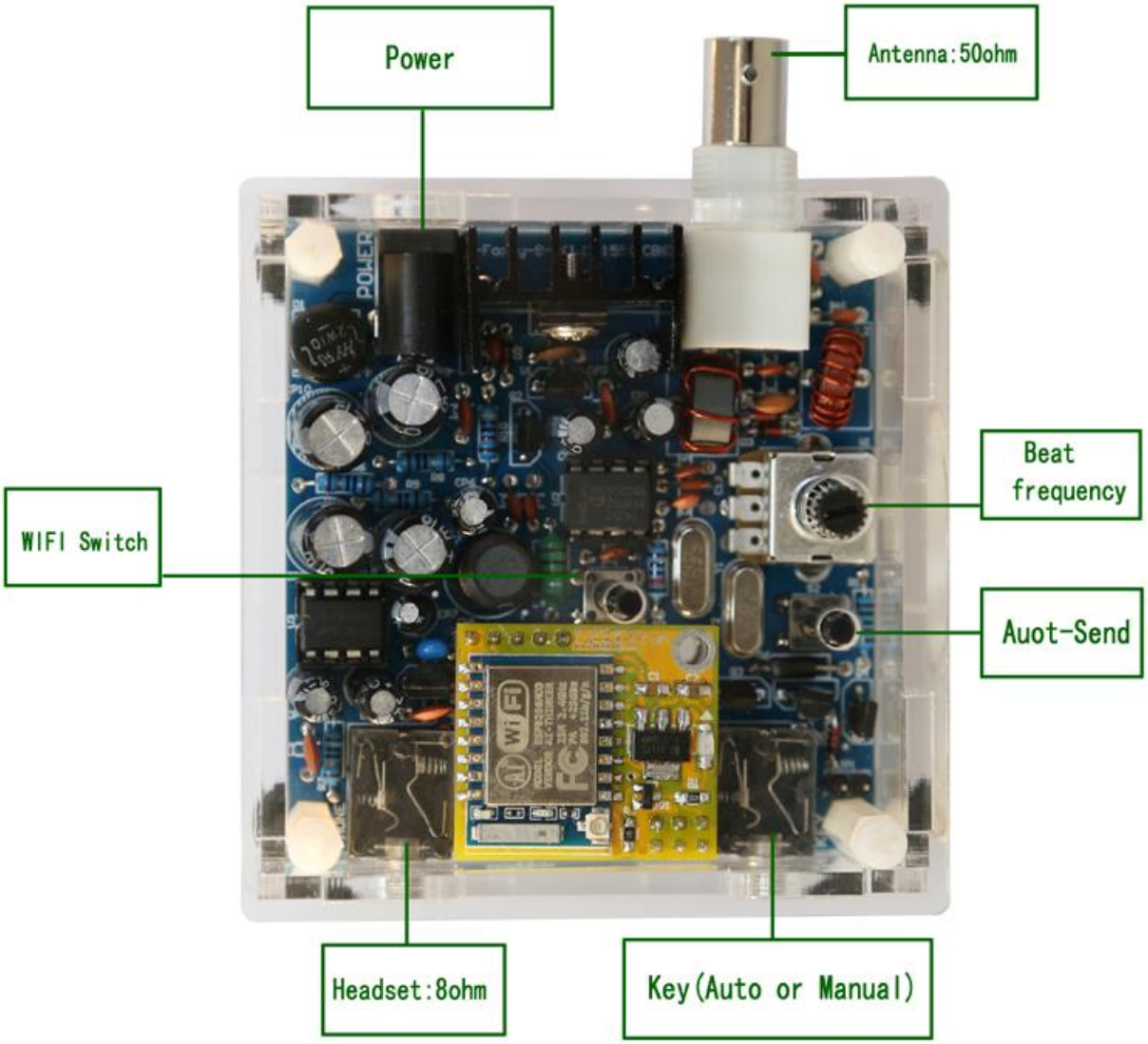
6.4 The receiving circuit test: If connect the antenna to hear the voice and do not connect the antenna to hear the voice of a great difference,then it's normal.

6.5 The sending circuit test: Connect dummy load, don‘t install WIFI module, short circuit JP1, connect the key, and power on. Now you can use the key control to send, Static current:40~100mA,Sending current:400mA, In the sending state under the virtual load will be fever. Note: it is not a long time to send.

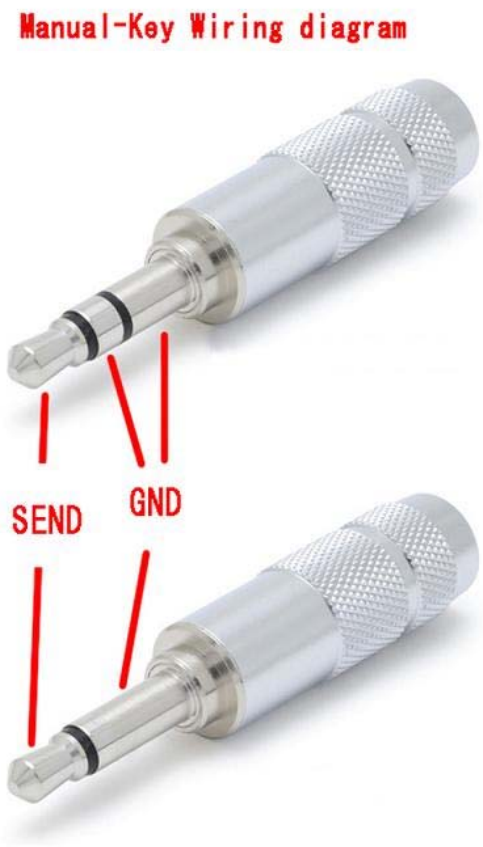
6.6 The WIFI module test: Connect dummy load, install WIFI module, circuit breaker JP1, connect the 8ohm headset, connect the key, and power on. Click “WIFI button” to open a WIFI connection, would you hear "ka ka" sound, then WIFI is opened. Download the APP from the www.lxqqfy, using APP to connect the WiFi module to communicate.

7. Usage method

7.1 Function diagram



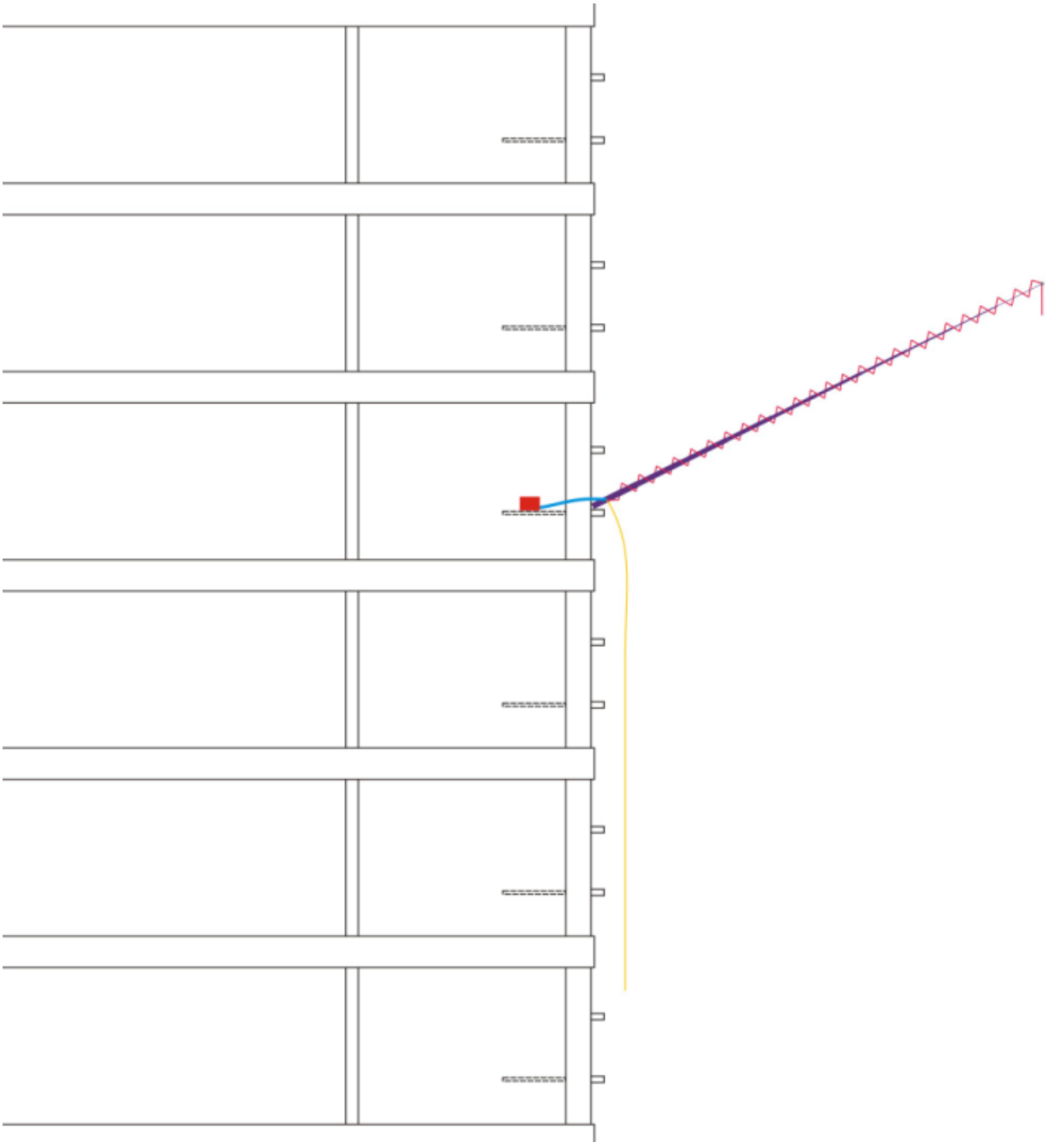
7.2 Key.



7.3 Using the most common 8ohm headset.

7.4 The antenna is the key of the shortwave station, Requirements: frequency 7MHz, impedance 50ohm, SWR <1.5. Recommend the following:

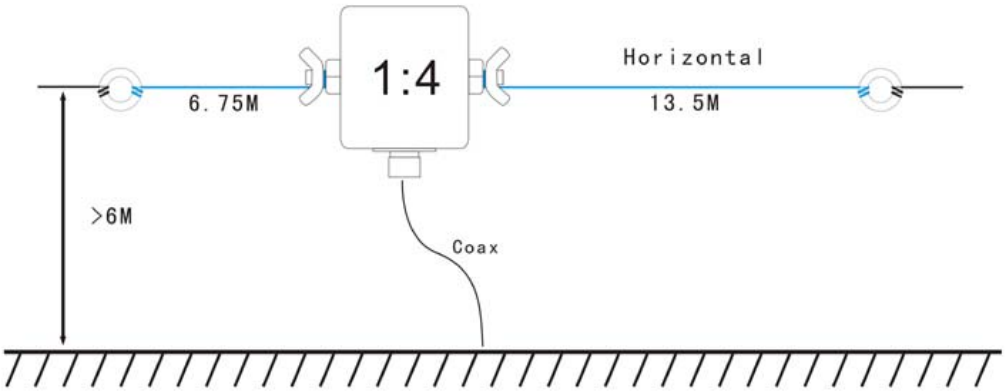
7.3.1 GP Antenna.

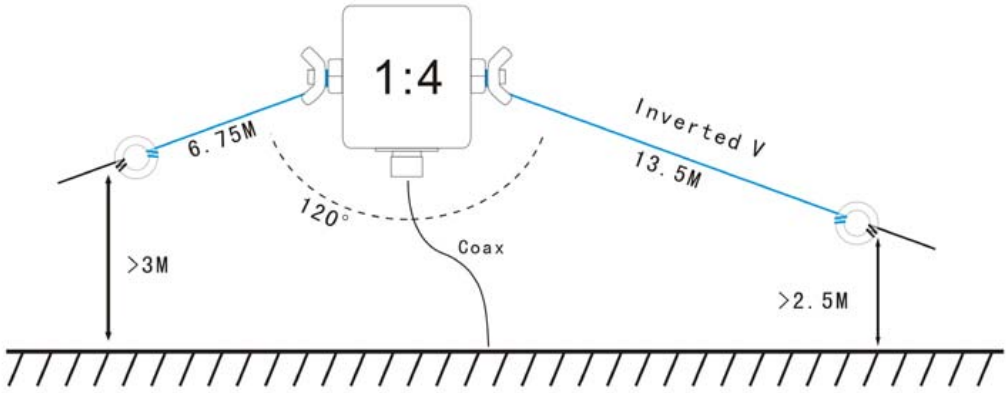


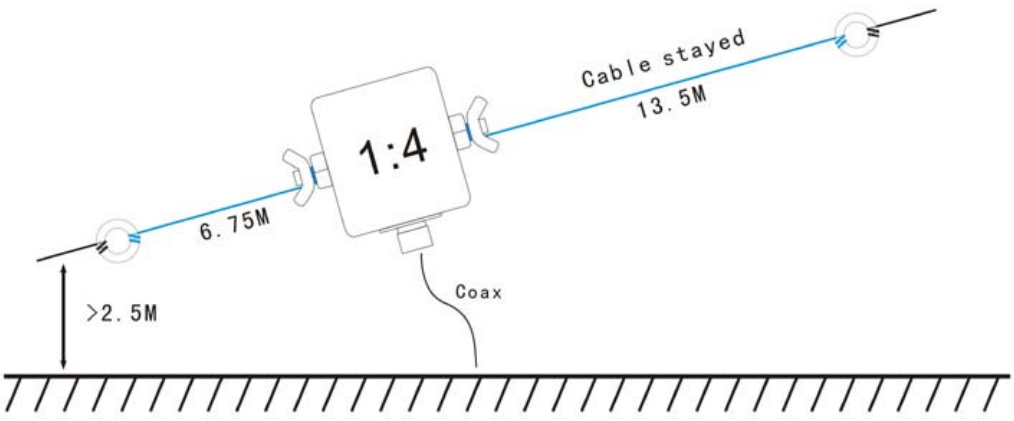
Red: Radio; Bule:: Feeder(50ohm); Violet: Fishing rod(9 meters); Yellow: Dummy grounds(9 meters); Pink:: Oscillator(10.1 meters);

7.3.1 Windom Antenna.

Winton antenna can be good to work in the three 40m/20m/10m band, the use of 1:4 Balun, according to the actual environment can have a variety of different installation methods.

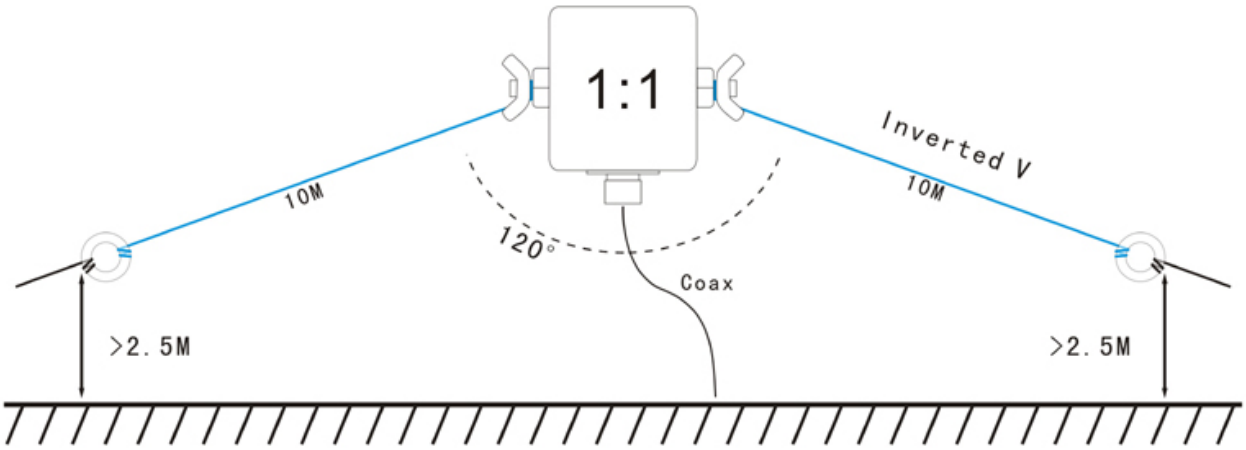






7.3.1 DP Antenna.

The DP antenna is adopted skywave communication,long distance communication effect is very good,the use to 1:1 balun, usually V installation.



7.4 The use of WIFI Module and Mobile phone APP

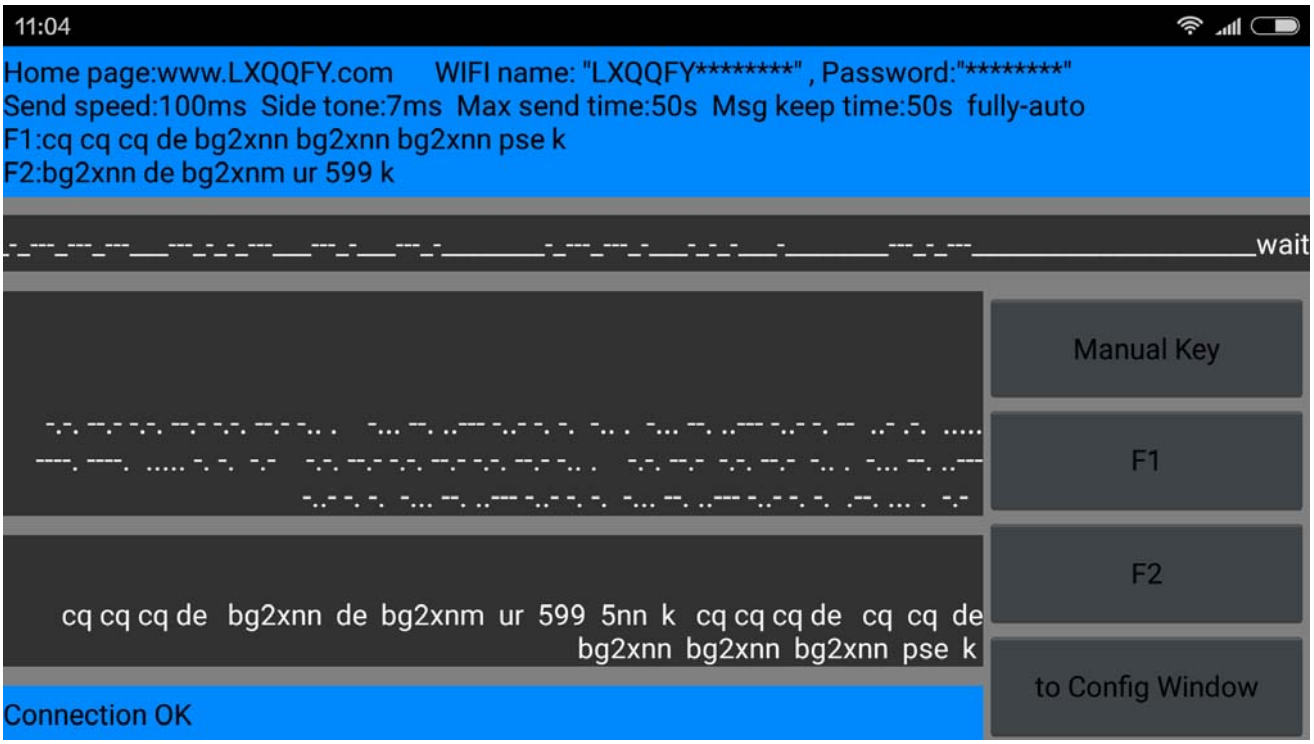
7.4.1 Download Mobile phone APP from http://www.lxqqfy.com/.

7.4.2 Install WIFI module, circuit breaker JP1,power on.

7.4.3 Open Mobile phone, connect WIFI,The name is "LXQQFY********",the password is "********","********" is 8 bit random number.

7.4.4 Open the APP,will be prompted to connect successfully. The status bar at the bottom of the screen will display the current state of the connection.

7.4.5 Run windows.

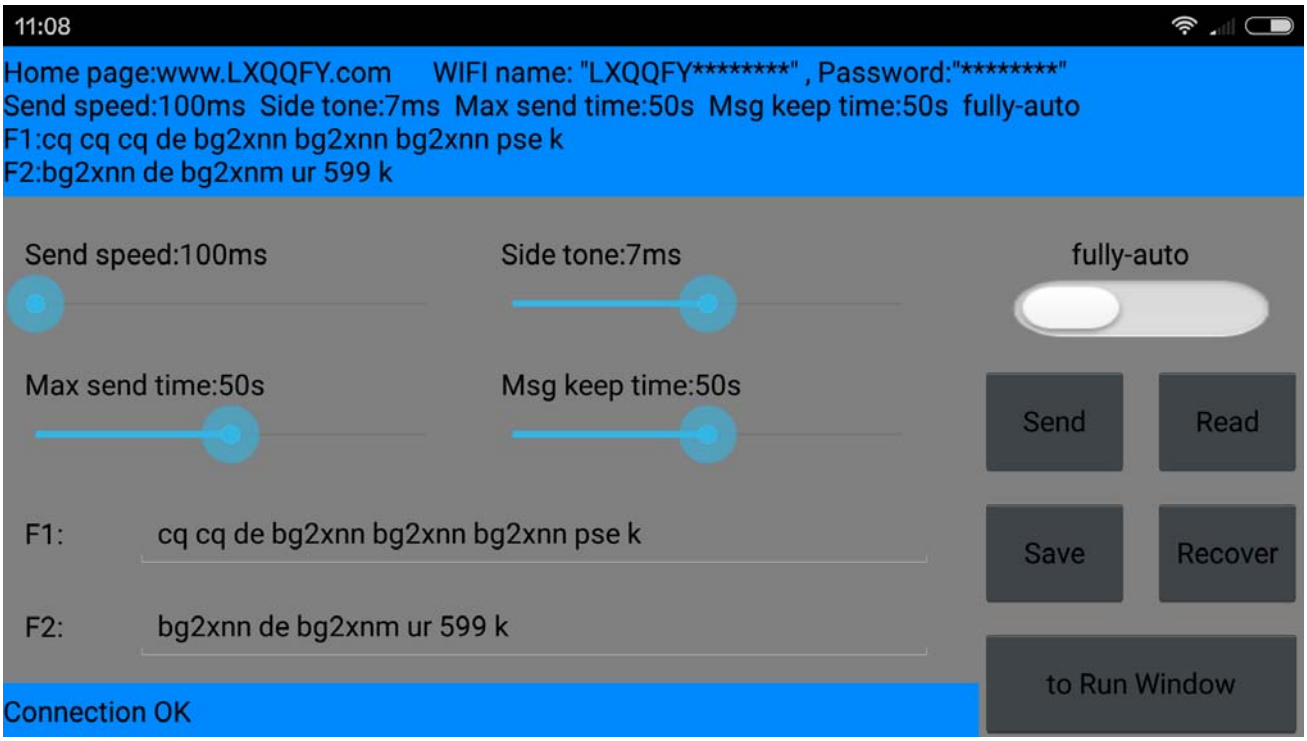


7.4.5.1 The information is displayed on the top of the blue bar, connection status is displayed in the bottom of the blue bar.

7.4.5.2 The second row: the Sending timming; The third row: the Morse code; The fourth row: Identified words;

7.4.5.3 "Manual Key":Send control; "F1" and "F2":Automatically send F1 and F2 code; "to Config Window":Switch to Config Window;

7.4.6 Config Window.

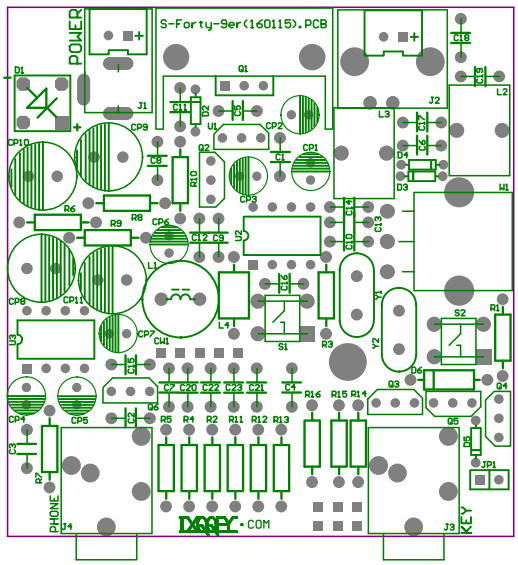


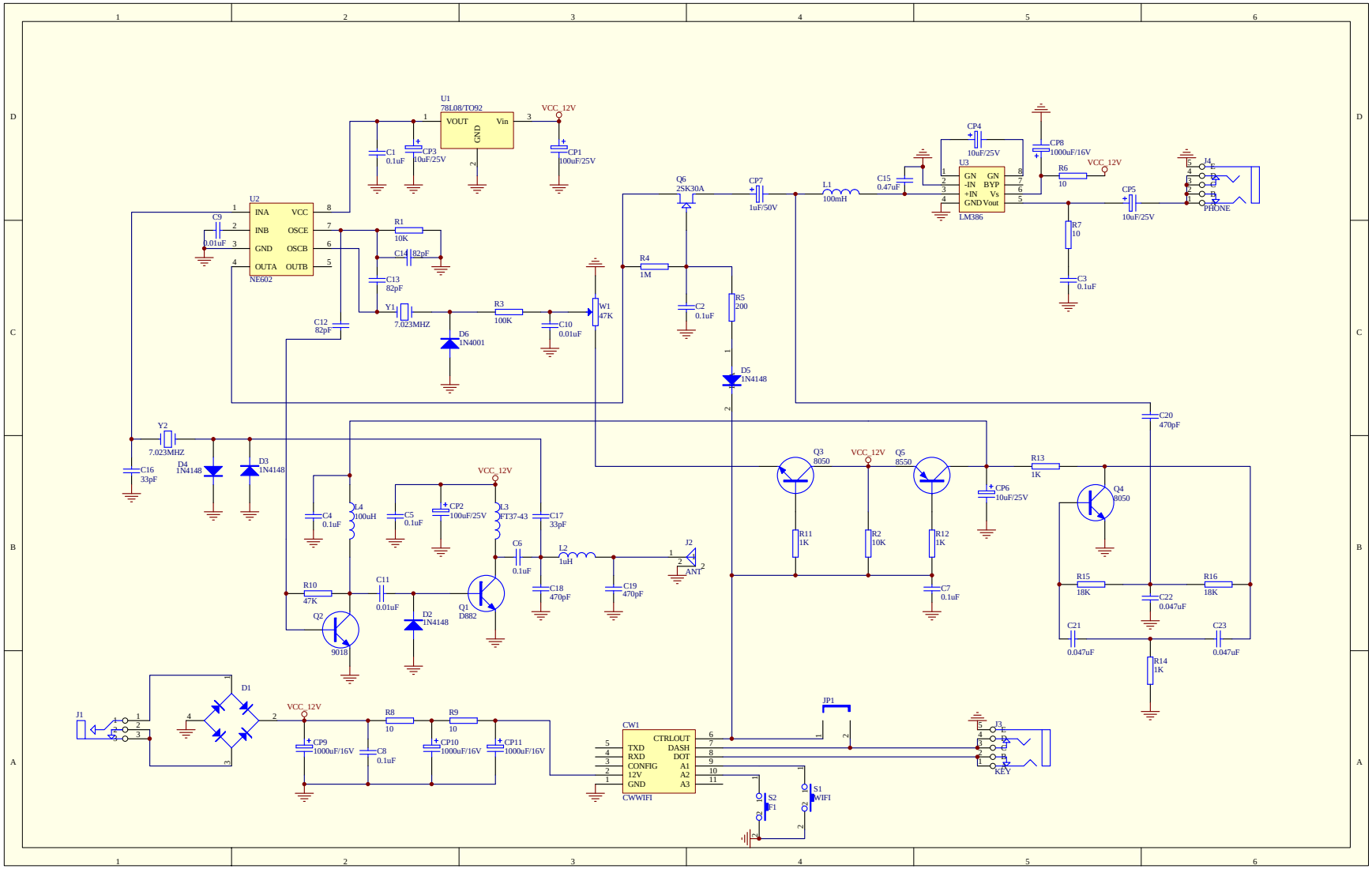
7.4.6.1 "Send speed ":The time unit of send, the time unit is also identified.

7.4.6.2 "Update": The current information send to the radio; "Read": The current information read from the radio; "Save": The current information save to Mobile phone; "Recover": The current information recover from Mobile phone;

8 List of components

1/4W Resistor		**Capacitor**	
R6 R7 R8 R9	10ohm	C1 C2 C3 C4 C5 C6 C7 C8	0.1uF(104)
R5	200ohm	C9 C10 C11	0.01uF(103)
R11 R12 R13 R14	1K	C16 C17	33pF(33)
R1 R2	10K	C12 C13 C14	82pF(82)
R15 R16	18K	C15	0.47uF(474)
R10	47K	C18 C19 C20	470pF(471)
R3	100K	C21 C22 C23	0.047uF(473)
R4	1M	**Inductance**	
Electrolytic capacitor		L1	100mH(I-inductor)
CP8 CP9 CP10 CP11	1000uF/16V	L4	100uH(Color ring inductance)
CP1 CP2	100uF /25V	L3	22uH(Black Ring;8 Turn;)
CP3 CP4 CP5 CP6	10uF /25V	L2	1uH(Red Ring;16 Turn;)
CP7	1uF /50V	**IC**	
Transistor		U1	78L08
D1	2W10(Bridge rectifier)	U2	NE602
D2 D3 D4 D5	1N4148(Diode)	U3	LM386
D6	1N4001(Diode)	**Crystal oscillator**	
Q6	2SK30A(FET)	Y1 Y2	7.023MHz
Q2	9018(Triode)	**Variable resistor**	
Q3 Q4	8050(Triode)	W1	47K(473)
Q5	8550(Triode)	**Other**	
Q1	D882(Triode)	JP1	Pin and Jumper Cap
PCB * 1		J1	DC Jack
0.5mm Enameled wire		J2	Q9(BNC)
The heat sink and screw (for D882)		J3 J4	3.5mm Socket(Key and Phone)
51ohm 2W Resistor(for dummy load)		S1 S2	Key
Acrylic case			
SIP5 DIP6(for WIFI Module)		**WIFI Module(Optional)**	


S-Forty-9er(160115).PCB
POWER
PHONE
KEY
J1
J2
J3
J4
D1
D2
D3
D4
Q1
Q2
Q3
Q4
Q5
U1
U2
U3
L1
L2
L3
L4
S1
S2
Y1
Y2
H1
JP1
CP1
CP2
CP3
CP4
CP5
CP6
CP7
CP8
CP9
CP10
CP11
CW1
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
C22
C23
D5
D6
.COM


U1
78L08/TO92
VOUT
Vin
GND
VCC_12V
C1
0.1uF
CP3
10uF/25V
CP1
100uF/25V
U2
INA
VCC
INB
OSCE
GND
OSCB
OUTA
OUTB
NE602
C9
0.01uF
R1
10K
C14
82pF
C13
82pF
C12
82pF
Y1
7.023MHZ
R3
100K
C10
0.01uF
W1
47K
D6
1N4001
Q6
2SK30A
R4
1M
C2
0.1uF
R5
200
D5
1N4148
CP7
1uF/50V
L1
100mH
C15
0.47uF
U3
GN
GN
-IN
BYP
+IN
Vs
GND
Vout
LM386
CP4
10uF/25V
CP8
1000uF/16V
R6
10
R7
10
C3
0.1uF
CP5
10uF/25V
J4
PHONE
Y2
7.023MHZ
C16
33pF
D4
1N4148
D3
1N4148
C4
0.1uF
L4
100uH
C5
0.1uF
CP2
100uF/25V
L3
FT37-43
C17
33pF
C6
0.1uF
L2
1uH
C18
470pF
C19
470pF
J2
ANT
R10
47K
C11
0.01uF
Q2
9018
D2
1N4148
Q1
D882
Q3
8050
Q5
8550
R11
1K
R2
10K
R12
1K
C7
0.1uF
CP6
10uF/25V
R13
1K
Q4
8050
C20
470pF
R15
18K
R16
18K
C22
0.047uF
C21
0.047uF
C23
0.047uF
R14
1K
J1
D1
R8
10
R9
10
CP9
1000uF/16V
C8
0.1uF
CP10
1000uF/16V
CP11
1000uF/16V
CW1
CTRLOUT
TXD
DASH
RXD
DOT
CONFIG
A1
12V
A2
GND
A3
CWWIFI
JP1
J3
KEY
S2
F1
S1
WIFI