

---

---

PORTABLE FM TRANSIVER

**АРГУТ**

**A-53**

**SERVICE MANUAL/维修手册**

---

---



# GENERAL/概述

## INTRODUCTION

### SCOPE OF THIS MANUAL

This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains all required service information for the equipment and is current as of the publication date. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions. These are issued as required.

## 引言

### 本手册的范围

本手册是提供给熟悉通信专业并且具有维修经验的技术人员使用的。它包括了维修该设备所需要的全部资料和现行公布的数据。在出版后可能发生变动，如果需要，可以使用《维修通报》或《手册修订本》进行补充。

## ORDERING REPLACEMENT PARTS

When ordering replacement parts or equipment information, the full part identification number should be included. This applies to all parts: components, kits, or chassis. If the part number is not known, include the chassis or kit number of which it is a part, and a sufficient description of the required component for proper identification.

## 替换零件的订购

当订购替换零件或设备信息时，应注明完整的零件识别号码。所有的零件均有识别号码：元件、组件或机壳。如果不知道零件的号码，为了正确地识别，必须注明此元件所属的机壳或组件的号码，并对元件进行充分的说明。

## PERSONAL SAFETY

The following precautions are recommended for personal safety:

- DO NOT transmit until all RF connectors are verified secure and any open connectors are properly terminated.
- SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive
- This equipment should be serviced by a qualified technician only.

## 个人安全

为了个人的安全，请注意下列事项：

- 在没有认真核实所有射频插头之前或有任何一个打开的插头没有连接到响应端子上的情况下，均不要发射。
- 在电爆管附近或在易燃性气体环境中，必须关掉电源，不要操作本设备
- 本设备只应该由有资格的技术人员来维修。

## SERVICE

This radio is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained within.

## 维修服务

为了便于维修本设备，建立了完整的维修服务体系，提供了包括原理图、印刷线路图和调整步骤在内的资料供参考。

Number of channels	RF Power Output
16	5W

信道数量	射频输出功率
16	5W

## MODES

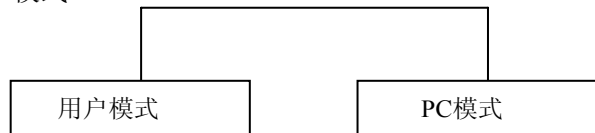


MODES	FUNCTION
User mode	For normal use.
PC mode	Used for communication between the radio and a PC

### How to enter each mode

MODES	PROCEDURE
User mode	Power ON
PC mode	Receiver commands from PC

## 模式



模式类型	功能
用户模式	用于普通操作
计算机模式	Used for communication between the radio and a PC

模式类型	操作步骤
用户模式	打开电源开关
计算机模式	从计算机接收命令

## PC MODE

### Preface

The A-53 transceiver can be programmed using a personal computer, A programming interface cable and programming software. The programming software can be used on an IBM PC or compatible. Fig-1 shows the setup of a PC for programming.

### Caution:

**When removing or installing the programming cable, first switch off the radio power.**

**Additionally, be sure to disable the VOX function, if it's enabled, as it can sometimes activate from connection noise.**

### Connection procedure

1. Connect the A-53 to the personal Computer using the interface cable.
2. When the POWER is switched ON, you can enter user mode.

### Programming software description

The software allows a user to program the A-53 radios via the programming interface cable.

#### • Programming with IBM PC

If data is transferred to the transceiver from a PC with the software, the destination data (basic radio information) for each set can be modified.

## 计算机模式

### 前言

通过个人电脑，使用编程电缆和编程软件，对对讲机 A-53 进行编程设置。图1表示一台 IBM 计算机的编程设置过程。

### 注意

当拔除或者插入编程电缆首先关闭对讲机电源。另外，确保声控功能已关闭，如果声控被激活，可能有时会开启连接噪音。

### 连接步骤

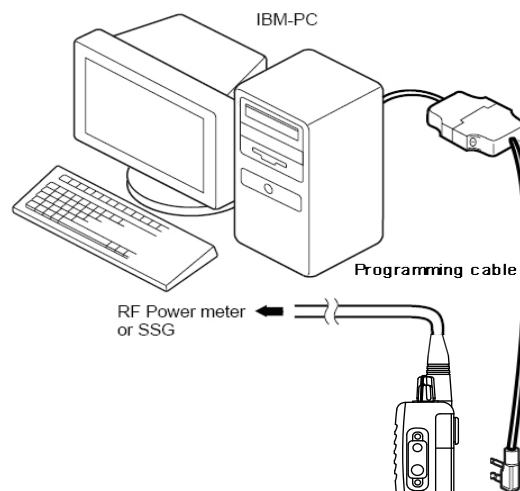
1. 使用接口电缆将 A-53 与个人电脑连接。
2. 当电源开关打开，可以进入用户模式。

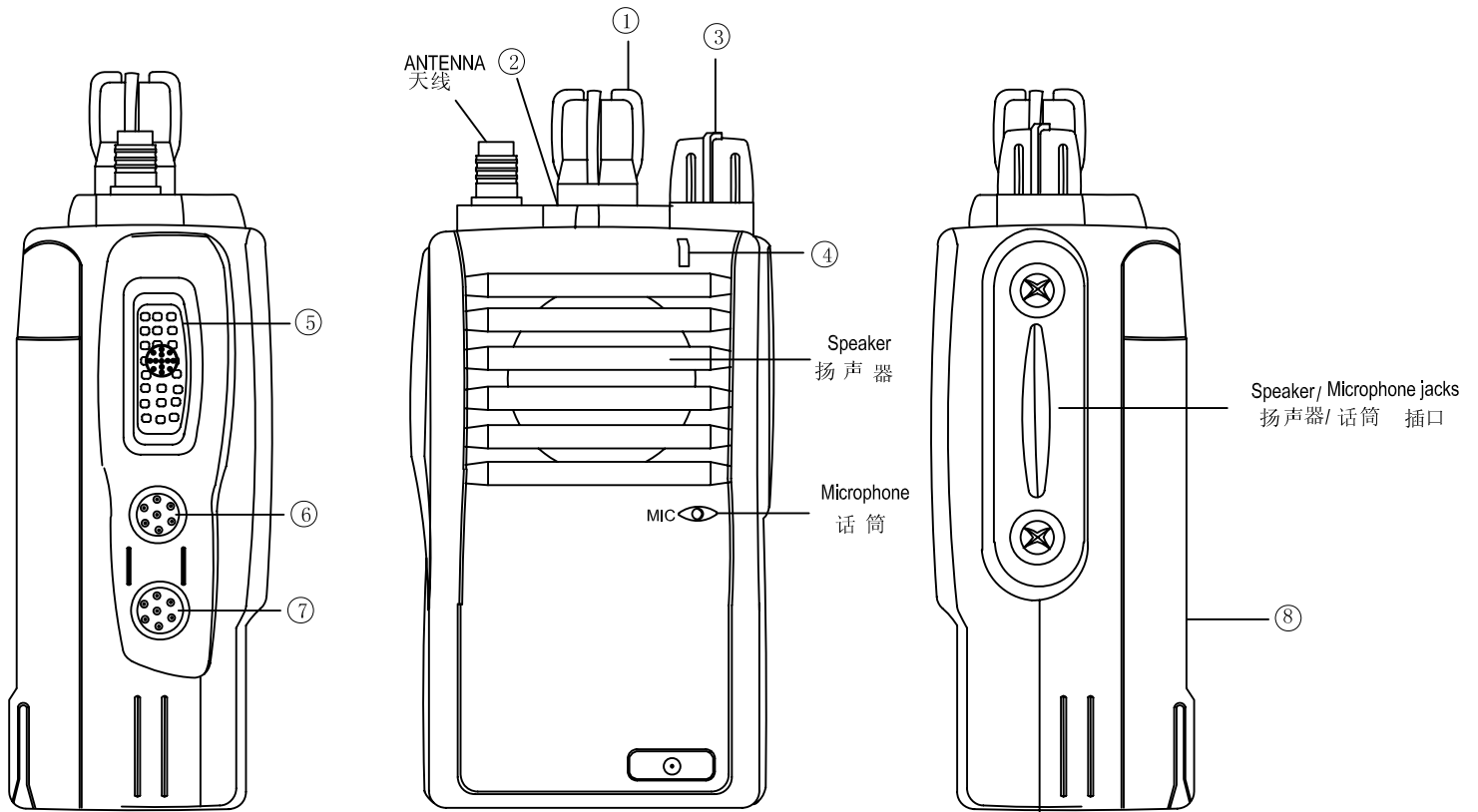
### 编程软件说明

该软件允许用户经由编程接口电缆对 A-53 进行编程设定。

### 使用 IBM 计算机编程

如果从使用软件的 IBM 计算机将数据发送到手持机，设定的目的数据（基本通信参数）均可被修改。





- |                     |             |
|---------------------|-------------|
| 1. Channel Selector | 1. 信道转换开关   |
| 2. Red alert        | 2. 紧急报警键    |
| 3. VOL Control      | 3. 音量控制     |
| 4. LED indicator    | 4. 发光二极管指示灯 |
| 5. PTT              | 5. PTT 键    |
| 6. Lamp             | 6. 灯键       |
| 7. Monitor          | 7. 监听键      |
| 8. Battery pack     | 8. 电池       |

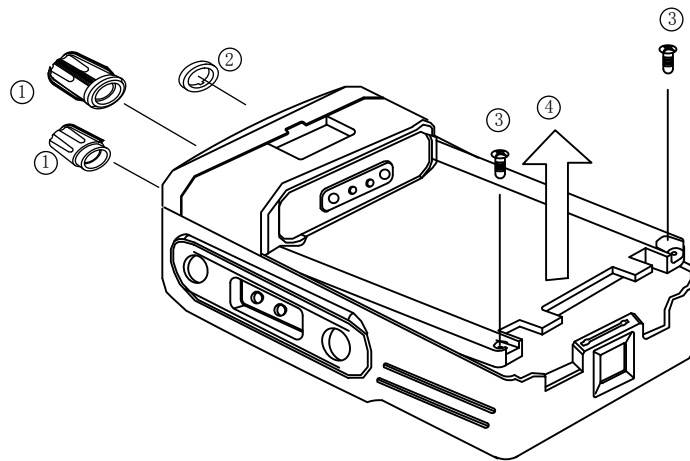
# DISASSEMBLY FOR REPAIR/维修时拆卸部分

## Separating the case assembly from the chassis

1. Remove the two knobs 1 and one round nuts 2
2. Remove the two screws 3.
3. Expand the right and left sides of the bottom of the case assembly, lift the chassis, and remove it from the case assembly 4.

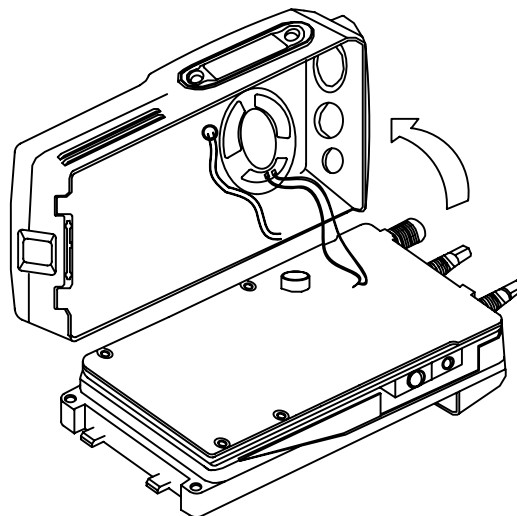
## 从底座上分离外壳

1. 取下旋钮① 和一个环形螺母②
2. 取下两颗螺钉③
3. 掀开外壳底部的左右两侧，取下底座，并外壳中取出④



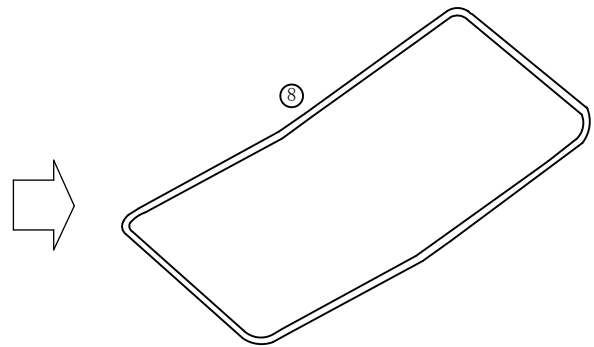
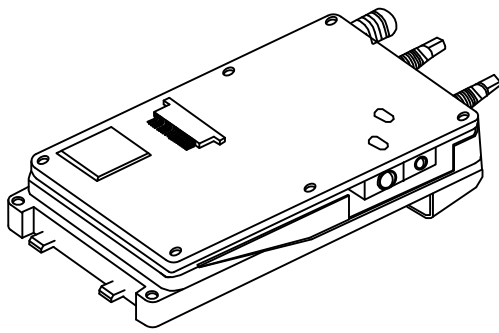
4. Remove the four screws ⑥, Taking care not to cut the speaker lead 5, open the chassis and case assembly.

4. 取下4颗螺钉⑥，小心不要折断扬声器引线⑤，拆下底座和外壳。



5. Remove the waterproof loop ⑧

5.取下防水圈 ⑧



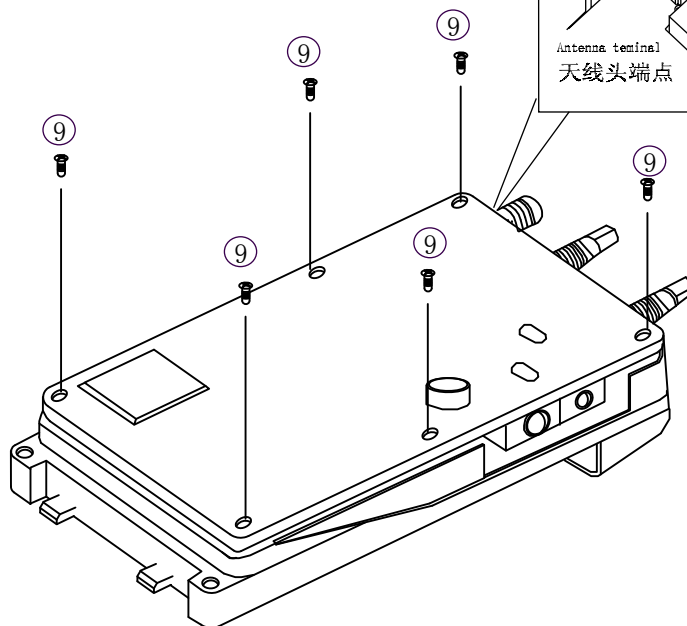
6. Remove the six screws ⑨

Remove the solder from the antenna terminal using a soldering iron then lift the second unit off ⑩

Note: When reassembling the unit in the chassis, be sure to solder the antenna terminal.

6.取下6颗螺钉 ⑨

用电烙铁将天线端点焊开，然后取下第二块主板 ⑩。  
注意：当重新将主板安装到底座上时，确保将天线端点焊接好。



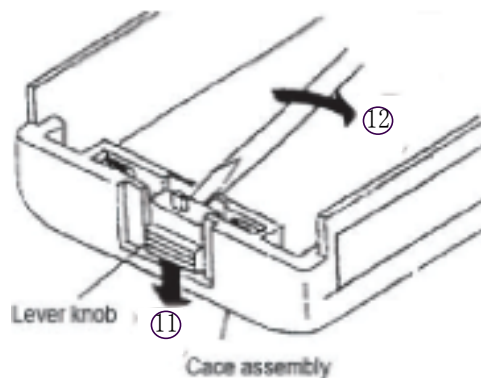
7. Remove the lever ⑪

Raise the lever on the lower case ⑫, insert a small flat screwdriver into the space between the case and lever, open the case carefully ⑬ and lift the lever off.

Note.: Do not force to separate the case from the lever.

7.取下夹扭

提起在外壳下部 ⑪ 上的锁扣，在外壳和锁扣之间插入一个小型平头改锥，小心地打开外壳 ⑫ 并卸下锁扣。  
注意：不要用力拆卸锁扣和外壳。



# CIRCUIT DESCRIPTION/电路说明

## Frequency configuration

The receiver utilizes double conversion. The first IF is 38.850MHz and the second IF is 450kHz. The first local oscillator signal is supplied from the PLL circuit. The PLL circuit in the transmitter generates the necessary frequencies. Fig. 1 shows the frequencies.

## 频率构成

接收部采用二次变频超外差方式，第一中频为38.85MHz，第二中频为450kHz。第一本振频率信号由锁相环电路（PLL）提供，发射部由锁相环电路直接产生所需要的频率。图1显示各种频率。

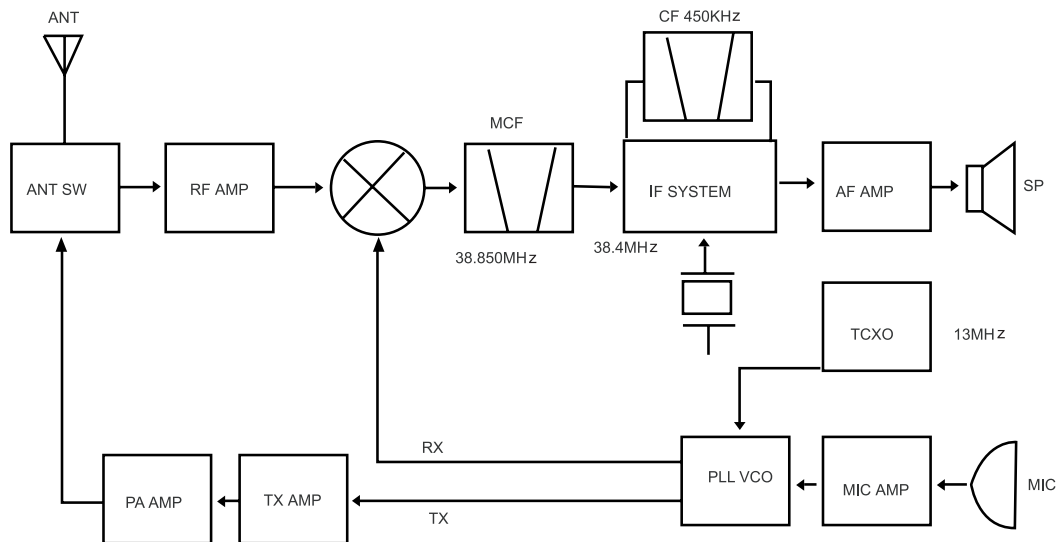


Fig. 1 Frequency configuration/频率构成

## Receiver

The receiver is double conversion super heterodyne, designed to operate in the frequency range of 400 to 480MHz. The frequency configuration is shown in Fig. 1.

### 1) Front - end RF amplifier

An incoming signal from the (Q113) after passing through a transmit/receive switch circuit (D100, D101, D105, D113 are off) After the signal is amplified (Q113) passing through a band pass filter BPF and is amplified (Q117) again, the signal is filtered through a band pass filter to eliminate unwanted signals before it is passed to the first mixer. (See Fig. 2)

## 接收部

接收部为二次变频超外差方式，设计操作的频率范围是400-480MHz。

图1显示频率构成

### 1) 前端射频放大器

从天线输入的信号经过收发转换电路D100, D101, D105, D113断开)。在射频放大器 (Q113) 处放大，信号被放大后。经过带通滤波器 (BPF) 和再次在射频放大器 (Q117) 处放大，在通过第一混频器之前，经过带通滤波器滤波来消除不要的信号。(参见图2)

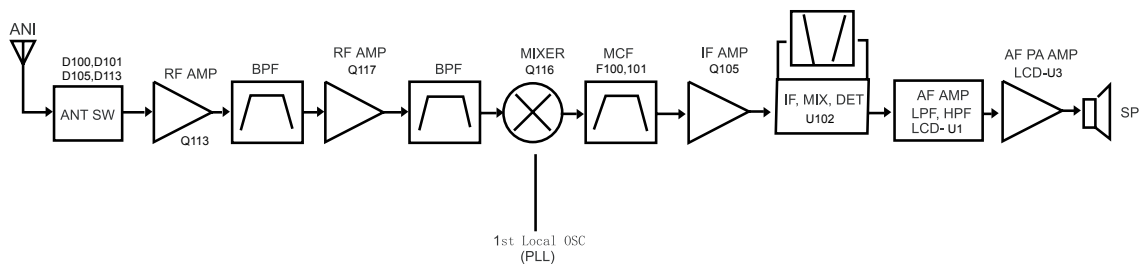


Fig. 2 Receiver section configuration/接收部构成

## 2) First Mixer

The signal from the RF amplifier is heterodyned with the first local oscillator signal from the PLL frequency synthesizer circuit at the first mixer (Q116) to create a 38.550MHz first intermediate frequency (1st IF) signal. The first IF signal is then fed through two monolithic crystal filters (F100.101) to further remove spurious signals.

## 3) IF amplifier

The first IF signal is amplified by Q105, and then enters U102 (FM processing IC). The signal is heterodyned again with a second local oscillator signal within U102 to create a 450kHz second IF signal. The second IF signal is then fed through a 450F ceramic filter (F102) to further eliminate unwanted signals before it is amplified and FM detected in U7.

## 4) AF amplifier

The recovered AF signal obtained from U102 is amplified by (LCDU3) handle, 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 (LCDU1).

## 5) Squelch

Part of the AF signal from the IC enters the FM IC again, and produce the corresponding noise level Q14 by R156 to go to the analog port of the microprocessor (U3). U3 determines whether to output sounds from the speaker by checking whether the input voltage is higher or lower than the preset value. To output sounds from the speaker, U3 sends a high signal to the MUTE and AFCO lines through Q14.10.11 (See Fig. 3)

## 2) 第一混频器

来自射频放大器的信号与来自锁相环频率合成器电路的第一本振信号在第一混频器(Q116)处混频并生成38.550MHz的第一中频(1st IF)信号。第一中频信号通过两个单片晶体滤波器(F100.101)进一步消除邻道的杂波信号。

## 3) 中频放大器

第一中频信号通过Q105放大,然后进入芯片U102(调频处理芯片),信号在U102中与第二本振信号再次混频生成一个450F陶瓷滤波器(F102)滤除无用杂散信号。

## 4) 音频放大器

在U102中鉴频解调出的音频信号通过(LCDU3)处理放大,经处理的音频信号通过音量控制电路再经过音频功率放大器(LCDU1)放大后、驱动扬声器。

## 5) 噪音抑制电路

从IC输出的音频信号的一部分再进入IC, Q14生成一个对应于噪音电平的直流电压通过R156,进入到微处理器的模拟端口(U3)。U3通过检测输入的电压是高于还是低于预设值来决定是否从扬声器输出声音。要通过扬声器输出声音, U3向静音和自动频率控制振荡器连线发送一个高电平信号,通过Q14.10.11。(见图3)。

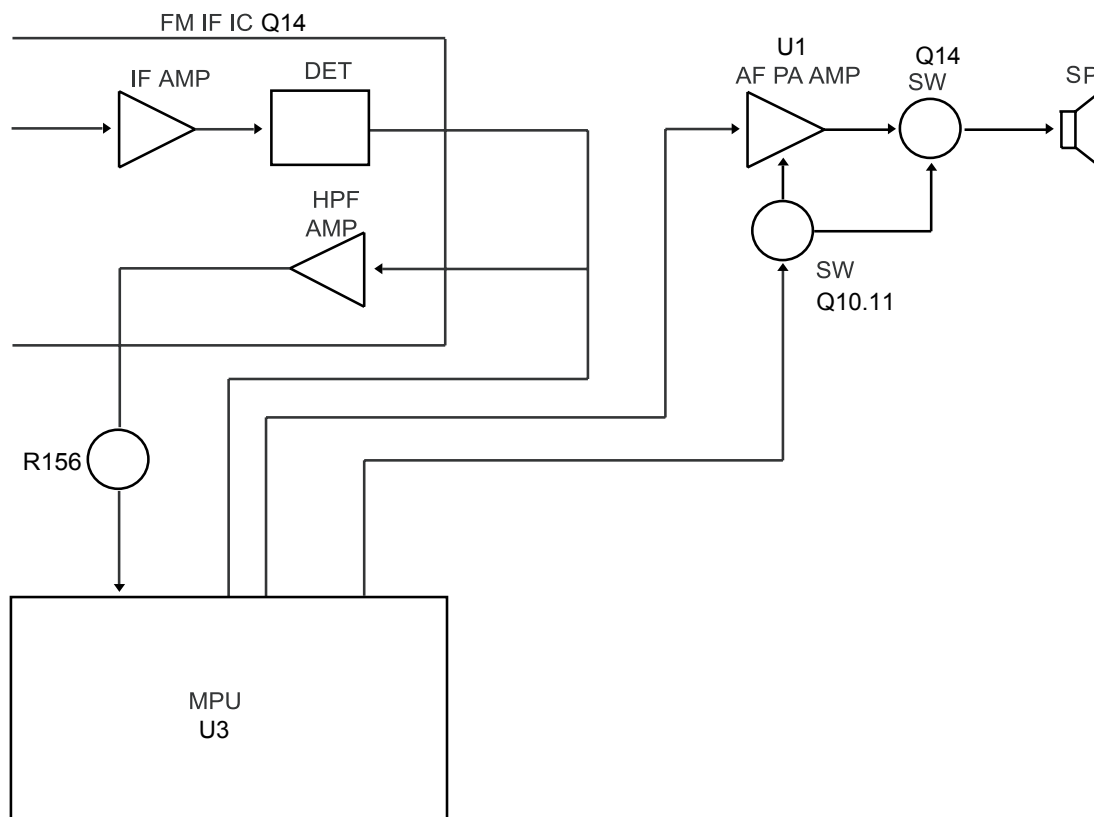


Fig.3 AF Amplifier and squelch/图3 音频放大器和噪音抑制电路



## 6) Receive signaling

QT/DQT  
300 Hz and higher audio frequencies of the output signal from IF IC are entered the microprocessor (LCD-U3). LCD-U3 determines whether the QT or DQT matches the preset value, and controls the MUTE and AFCO and the speaker output sounds according to the squelch results.

## 3. PLL frequency synthesizer

The PLL circuit generates the first local oscillator signal for reception and the RF signal for transmission.

### 1) PLL

The frequency step of the PLL circuit is 5 or 6.25kHz. A 19.2MHz reference oscillator signal is divided at U103 by a fixed counter to produce the 5 or 6.25kHz reference frequency. The voltage controlled oscillator (VCO) output signal is buffer amplified by Q107, then divided in U103 by a dual-module programmable counter. The divided signal is compared in phase with the 5 or 6.25kHz reference signal in the phase comparator in U103. The output signal from the phase comparator is filtered through a low-pass filter and passed to the VCO to control the oscillator frequency. (See Fig.4)

### 2) VCO

The operating frequency is generated by Q120 in transmit mode and Q119 in receive mode. The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator, to the varactor diodes (D108, D109 in transmit mode and D106, D107 in receive mode). In receive mode causing RX-V supplied and turn Q121 on. In transmit mode causing TX-V supplied and turn Q124 on. The outputs from Q119, Q120 are amplified by Q108, Q109 and sent to the buffer amplifiers.

## 6) 接收信令

QT/DQT  
来自于中频芯片输出信号的300Hz和更高的音频，所得到的信号微处理器LCD-U3 处理。LCD-U3确定QT或DQT是否匹配预设值、并且根据噪声抑制电路的结果控制MUTE和AFCO以及扬声器输出声音。

## 3. 锁相环频率合成器

锁相环电路生成用于接收的第一本振信号和用于发送的射频载波信号。

### 1) 锁相环电路

锁相环电路的步进频率5或6.25kHz。19.2MHz的参考振荡器信号通过一个混合计数器在U103中被分频并生成5或6.25kHz的参考频率。压空振荡器(VCO)输出的信号通过Q107缓冲放大器，然后U103中被可编程脉冲清除计算器分频。被分频的信号在带有5或6.25kHz参考信号的相位比较器的U103中被比较。从相位比较器输出的信号进入一个低通滤波器后，并通过压空振荡器来控制振荡频率。(参见图4)

### 2) 压控振荡器

在发射模式中通过Q120产生操作频率，在接收模式中通过Q119产生操作频率。通过相位比较器到变容二极管(在发射模式中为D108和D109，在接收模式中为D106和D107)采用压空振荡器控制电压来控制振荡频率。在接收模式中，由于RX-V供电，导通Q121。在发射模式中，由于TX-V供电，导通Q124。Q119和Q120的输出通过Q108和Q109被放大并被发送到缓冲放大器。

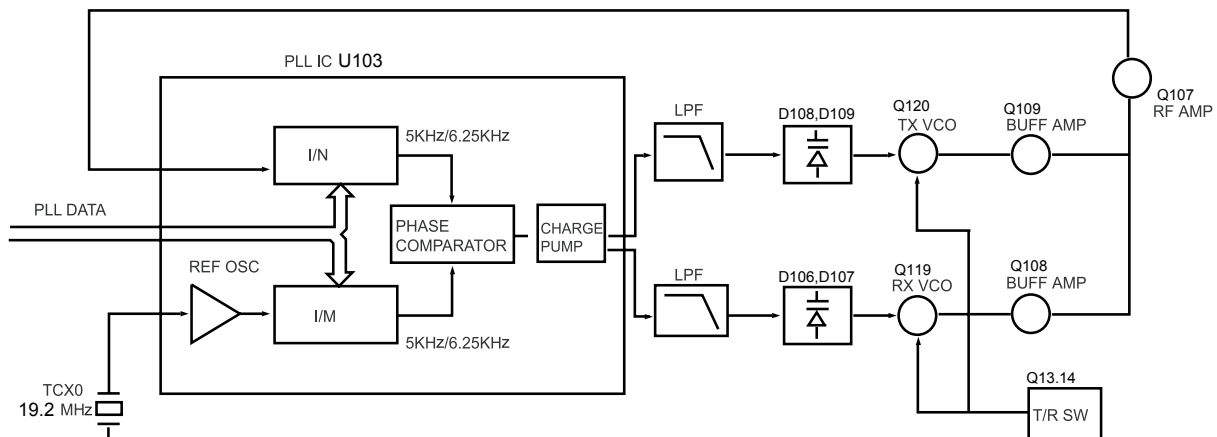


Fig. 4 PLL circuit/图4 锁相环电路

### 3) UNLOCK DETECTOR

If a pulse signal appears at the LD pin of U103, an unlock condition occurs, and the DC voltage obtained from D111, R185, R164 and R165 causes the voltage applied to the UL pin of the microprocessor to go low. When the microprocessor detects this condition, the transmitter is disabled, ignoring the push-talk switch input signal. (See Fig.5)

### 3) 失锁检测器

如果U103的LD管脚上出现高电平，则产生失锁状态。并从D111, R185, R164获得直流电压，且R165产生的提供给微处理器UL管脚的电压降低。当微处理器检测到此种情况时，不能进行发射，无视通话转换开关输入信号。(参见图5)

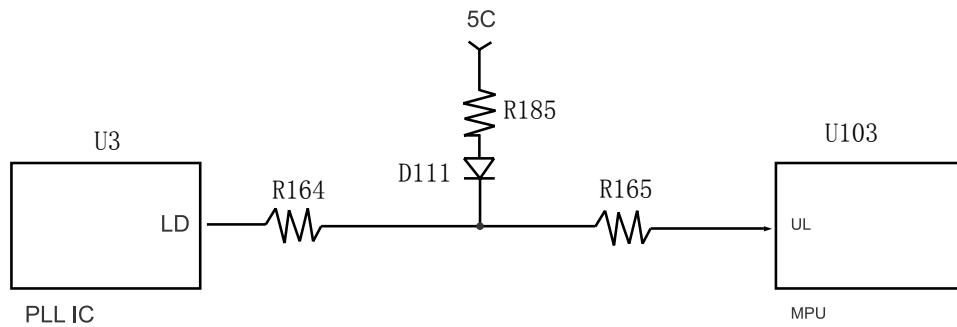


Fig.5 Unlock detector circuit /图5 失锁检测器电路

## 4. Transmitter

### 1) Transmit audio

The modulation signal from the microphone is amplified by U104 (A/2), passes through a preemphasis circuit, and amplified by the other U104 (B/2) to perform IDC operation. The signal then passes through a low-pass filter (splatter filter) and cuts 3kHz and higher frequencies. The resulting signal goes to the VCO through the VCO modulation terminal for direct FM modulation. (See Fig. 6)

### 2) QT/DQT encoder

A necessary signal for QT/DQT encoding is generated by U3 and FM-modulated to the PLL reference signal. Since the reference OSC does not modulate the loop characteristic frequency or higher, modulation is performed at the VCO side by adjusting the balance. (See Fig. 6)

## 4. 发射部

### 1) 发射音频

来自于话筒的调制信号通过U104 (A/2) 放大，经过一个预加重电路，并通过另一个U104 (B/2) 放大后进入IDC处理。然后信号通过一个低通滤波器（分离滤波器）并滤除比3kHz频率更高的部分。得到的信号进入压控振荡器直接进行调频调制。

### 2) QT/DQT编码器

QT/DQT编码所需的信号通过U3产生，被锁相环电路的基准率调整。由于基准振荡器不能对频率环路特性外的频率进行调制，因此通过分配器在压控振荡器一侧进行调制。（参见图6）

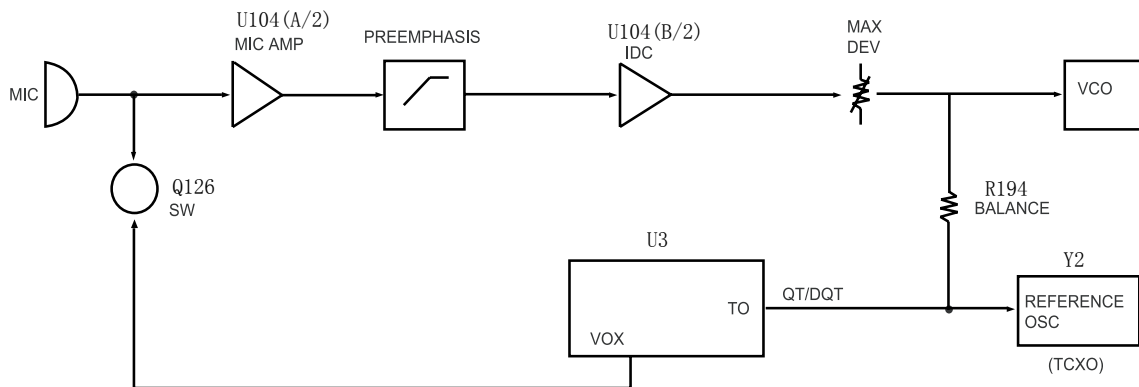


Fig.6 Transmit audio QT/DQT/图6 发射音频QT/DQT

### 3) VCO and RF amplifier

The transmit signal obtained from the VCO buffer amplifier Q107, is amplified by Q108, 109. This amplified signal is passed to the power amplifier, Q119 and Q120, which consists of a 2-stage FET amplifier and is capable of producing up to 5W of RF power. (See Fig.7)

### 3) 压控振荡器和射频放大器

从压控振荡缓冲放大器Q107, 接收到的发送信号通过Q108, 109被放大. 这个放大信号通过功率放大器, Q119和Q120 (包括一个二级场效应管放大器), 并能产生5W射频功率. (参见图7)

#### 4) ANT switch and LPF

The RF amplifier output signal is passed through a low pass filter network and a transmit/receive switching circuit before it is passed to the antenna terminal. The transmit/receive switching circuit is comprised of D100, 101 and D110, 106. D100, 101 turned on (conducting) in transmit mode and off (isolated) in receive mode.

#### 4) 天线转换开关和LPF

在其到达天线终端之前，射频放大器输出信号通过一个低通滤波器网络和发射/接收转换电路。发射/接收转换电路由D100, 101和D110, 106构成。D100, 101在发射模式下开启（导通），在接收模式下关闭（隔离）。

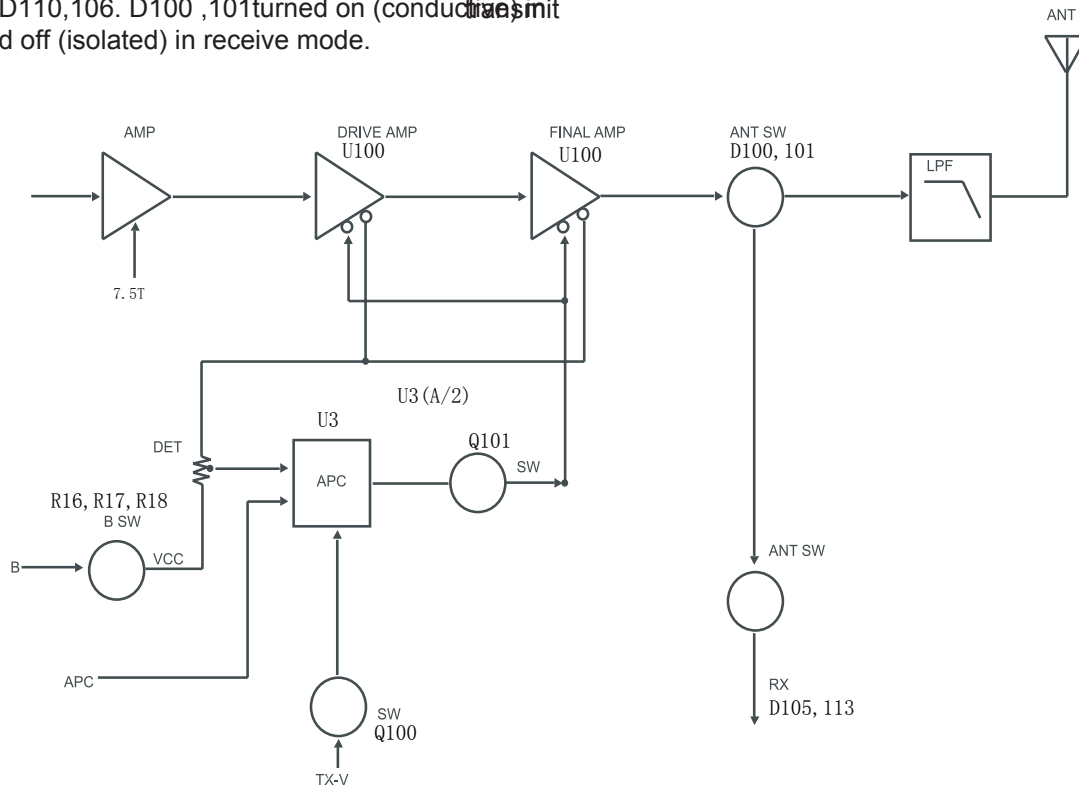


Fig. 7 APC system /图7 自动功率控制系统

#### 5) APC

The automatic power control (APC) circuit stabilizes the transmitter output power at a predetermined level by sensing the drain current of the final amplifier Field Effect Transistor (FET). The voltage comparator, U100 (B/2), compares the voltage obtained from the above drain current with a reference voltage which is set using the microprocessor. An APC voltage proportional to the difference between the sensed voltage and the reference voltage appears at the output of U100 (A/2). This output voltage controls the gate of the FET power amplifier, which keeps the transmitter output power constant. The transmitter output power can be varied by the microprocessor which in turn changes the reference voltage and hence, the output power.

#### 5) 自动功率控制

自动功率控制（APC）电路，通过测检末级放大器场效应管的漏极电流来稳定发射的输出功率。电压比较电路，U100（B/2）用微处理器设定的参考电压来比较从末级电流所获得的电压。自动功率控制电压与U100（A/2）输出的自动检测电压和参考电压之间的差值成正比。此输出电压控制场效应管功率放大器，保持发射部输出功率常数。发射部输出功率可以通过微处理器进行改变，在微处理器中改变参考电压来控制输出功率。

#### 5. Power supply

The battery power source is internally regulated by the circuit (Q5) and outputs 5V DC. This 5V DC is also supplied to the microprocessor (U3) and reset circuit (Q1 current). This reference voltage is used for the following DC power sources: 5V DC (RX-V for the receiver, TX-V for the transmitter, and VCO-V for part of VCO).

#### 5. 电源

电池电源通过电路（Q5）内部调整并输出直流电压5V。同时直流输出电压5V也供应给微处理器（U3）和复位电路（Q1电流），参考电压用于以下直流电源：5V直流（RX-V用于接收，TX-V用于发射，VCO-V用于压控振荡器的一部分）。

#### 6. Control system

The microprocessor (U3) is operating at a clock of 32.768KHz. This microprocessor controls the EEPROM data transfer, PLL data and other various functions.

#### 6. 控制系统

微处理器（U3）在32.768MHz的情况下运行。微处理器控制EEPROM的数据转移，锁相环数据和其它各种功能。

# SEMICONDUCTOR DATA

SOR: TMP78CPU(LCD-U3)

Pin No.	I/O	Port Name	Function
1	O	PLL-DAT	PLL data output
2	O	PLL-CLK	PLL CLOCK OUTPUT
3	I/O	EEPDAT	EEPROM data input/output
4	I	BEEP	BEEP key input
5	O	MONI	MONI key input
6		NC	NC
7	O	TX-C	TX OUTPUT CONTROL
8	O	MIC-C	MIC OUTPUT CONTROL
9	I	W/N RXD	Wide/Narrow Switch Serial date (FPU/FLASH)
10	O	AF-CONT	SPEAKER MUTE
11	O	QT/DQT-OUT	QT/DQT OUTPUT
12	I	AV-DD	+5V
13	I	RX0	AUDIO INPUT
14	I	RX1	AUDIO INPUT
15		NC	NC
16		NC	NC
17	O		BEEP OUTPUT
18		ACC	GND
19		AVSS	GND
20	O	PO/LO	POWER OUTPUT CONTROL
21	O	LE	PLL OUTPUT SELECT
22	O	AF-OUT	AUDIO OUTPUT
23	I	VOX	VOX LEVER INPUT
24	I	BUSY	BUSY LEVEL INPUT
25	I	BATT	BATTERY LEVEL INPUT
26	I	XIN	CONNECT TO 32.768KHZ
27	O	XOUT	CONNECT TO 32.768KHZ
28		VSS	GND
29	O	RX-C	RX CIRCUIT POWER SUPPLY
30	I	PLL-UL	UNLOCK DETECT INPUT
31	O	VCO-C	VCO CIRCUIT POWER SUPPLY
32	I	RESET	CPU RESET
33	I	VDSD	5V
34	O	LED RX	GREEN LED OUPUT CONTROL
35			CONNECT TO POWER
36	I	SPA1	Channel Selector Input
37	I	SPA2	Channel Selector Input
38	I	SPA3	Channel Selector Input
39	I	SPA4	Channel Selector Input
40			CONNECT TO POWER
41	I	PTT	PTT SWITCH INPUT
42		LED-TX	EEPROM IC DATA
43	I/O	VOICE ANNUNCIATION DATA	Voice annunciation data input
44	I	EEPCLK	EEPROM clock output

## FET : 2SK3078 (Q10)

Absolute Maximum Ratings (Ta=25°C)						
Item	VDSS	VGSS	ID	Pch*	Tch	Tstg
Rating	20V	±5V	1.0A	3W	150°C	-45~+150°C
			*Tc=25°C			

## FET : 2SK3476(Q11)

Absolute Maximum Ratings (Ta=25°C)						
Item	VDS	VGSS	ID	Pch*	Tch	Tstg
Rating	20V	±5V	3.0A	20W	150°C	-45~+150°C
			*Tc=25°C			

# 半导体数据

微处理器TMP78CPU(LCD-U3)

Pin No.	I/O	端口名称	功能
1	O	PLL-DAT	PLL 数据输出
2	O	PLL-CLK	PLL 时钟输出
3	I/O	EEPDAT	EEPROM数据输入/输出
4	I	BEEP	BEEP 键输入
5	O	MONI	监听键输入
6		NC	NC
7	O	TX-C	发射输出控制
8	O	MIC-C	麦克风输出控制
9	I	W/N RXD	宽窄带开关串行数据 (FPU/FLASH)
10	O	AF-CONT	喇叭静音
11	O	QT/DQT-OUT	音频/亚音频输出
12	I	AV-DD	+5V
13	I	RX0	音频输入
14	I	RX1	音频输入
15		NC	NC
16		NC	NC
17	O	VOICE ANNUNCIATION	极数声输出
18		ACC	接地
19		AVSS	接地
20	O	PO/LO	输出功率控制
21	O	LE	PLL 输出选择
22	O	AF-OUT	音频输出
23	I	VOX	声控级别输入
24	I	BUSY	繁忙信号级别输入
25	I	BATT	电池级别输入
26	I	XIN	连接 32.768KHZ
27	O	XOUT	连接32.768KHZ
28		VSS	GND
29	O	RX-C	接收回路供电
30	I	PLL-UL	失锁检测输入
31	O	VCO-C	压控振荡器回路供电
32	I	RESET	CPU复位
33	I	VDSD	5V
34	O	LED RX	绿灯输出控制
35			连接电源
36	I	SPA1	信道选择输入
37	I	SPA2	信道选择输入
38	I	SPA3	信道选择输入
39	I	SPA4	信道选择输入
40			连接电源
41	I	PTT	PTT开关输入
42		LED-TX	EEPROM 芯片数据
43	I/O	VOICE ANNUNCIATION DAT	语音数据输入
44	I	EEPCLK	EEPROM时钟输出

## FET : 2SK3078 (Q10)

绝对最大定额 (Ta=25°C)						
Item	VDSS	VGSS	ID	Pch*	Tch	Tstg
Rating	20V	±5V	1.0A	3W	150°C	-45~+150°C
			*Tc=25°C			

## FET : 2SK3476(Q11)

绝对最大定额 (Ta=25°C)						
Item	VDS	VGSS	ID	Pch*	Tch	Tstg
Rating	20V	±5V	3.0A	20W	150°C	-45~+150°C
			*Tc=25°C			

# DESCRIPTION OF COMPONENTS/元件说明

## TX-RX UNIT

Ref No.	Semiconductor	Description
U100	IC	AUTOMATIC POWER CONTROL
U102	IC	IF SYSTE
U103	IC	PHASE LOCKED LOOP SYSTEM
U1	IC	AUDIO AMP
Q1	TRANSISTOR	DC SWITCH
Q2	TRANSISTOR	DC SWITCH
Q3	TRANSISTOR	DC SWITCH
Q4	TRANSISTOR	DC SWITCH
Q6	TRANSISTOR	RF AMP
Q7	TRANSISTOR	RF AMP
Q8	TRANSISTOR	RF AMP
Q10	FET	TX DRIVE
Q11	FET	TX FAINAL
Q12		IF AMP
Q13	TRANSISTOR	BUSY LEVEL INPUT
Q14	TRANSISTOR	TX AMP
Q15	TRANSISTOR	IF AMP
Q16	FET	IF AMP
Q17	PET	MIXER
Q18	TRANSISTOR	PLL LC-IN AMP
Q20	FET	VCO/RX
Q21	TRANSISTOR	RF BUFFER AMP
Q22	TRANSISTOR	DC SWITCH/RX
Q23	TRANSISTOR	IF AMP
Q24	TRANSISTOR	IF AMP
Q25	FET	VCO /TX
Q26	TRANSISTOR	RF BUFFER AMP
Q27	TRANSISTOR	DC SWITCH /TX
Q28	DIODE	AGC DETECT
Q29	TRANSISTOR	AGC DETECT
D1	DIODE	ANT SWITCH

Ref No.	Semiconductor	Description
D2	DIODE	ANT SWITCH
D3	DIODE	ANT SWITCH
D4	VARIABLE CAPACITANCE DIODE	FREQUENCY CONTROL/ RX/VCO
D5	VARIABLE CAPACITANCE DIODE	FREQUENCY CONTROL/ RX/VCO
D6	DIODE	CURRENT STEERING
D7	DIODE	RIPPLE FILTER
D8	VARIABLE CAPACITANCE DIODE	FREQUENCY CONTROL/ VCO
D9,10	VARIABLE CAPACITANCE DIODE	FREQUENCY CONTROL/ TX/VCO
D11	VARIABLE CAPACITANCE DIODE	MODULATOR
D12, D10E	VARIABLE CAPACITANCE DIODE	CURRENT STEERING

## DISPLAY CONTROL UNIT

Ref No.	Semiconductor	Description
U1	IC	AF AMP
U2	IC	VOTLAGE REGULATER
U3	IC	DISPLAY DRIVE
U4	IC	VOICE ANNUNCIATION
U5	IC	EEPROM
Q1	TRANSISTOR	DC SWITCH
Q2	TRANSISTOR	DC SWITCH
Q3	TRANSISTOR	DC SWITCH
Q4	TRANSISTOR	DC SWITCH
Q5	TRANSISTOR	DC SWITCH
Q6	TRANSISTOR	DC SWITCH
Q7	FET	AUDIO MUTE CONTROL SWITCH
Q8	TRANSISTOR	DC SWITCH
Q9	TRANSISTOR	SPEAKER TEST
Q10,11	TRANSISTOR	DC SWITCH
D1	LED	LED/RED
D2	LED	LED/GREEN
Q12	TRANSISTOR	LED SWITCH/RED
Q13	TRANSISTOR	LED SWITCH/GREEN
Q14	Diode	DETETOR

## DESCRIPTION OF COMPONENTS/元件说明

### TX-RX UNIT

Ref No.	半导体	说明
U100	IC	自动功率控制
U102	IC	中频系统
U103	IC	锁项环路系统
U1	IC	音频放大器
Q1	晶体管	直流开关
Q2	晶体管	直流开关
Q3	晶体管	直流开关
Q4	晶体管	直流开关
Q6	晶体管	射频放大器
Q7	晶体管	射频放大器
Q8	晶体管	射频放大器
Q10	场效应管	驱动放大器
Q11	场效应管	末级射频功率放大器
Q12	晶体管	中频放大器
Q13	晶体管	繁忙信号级别输入
Q14	晶体管	驱动放大器
Q15	晶体管	中频放大器
Q16	场效应管	中频放大器
Q17	场效应管	混频器
Q18	晶体管	射频放大器
Q20	场效应管	压控振荡器发射
Q21	晶体管	压控振荡器发射
Q22	晶体管	直流开关
Q23	晶体管	中频放大器
Q24	晶体管	中频放大器
Q25	场效应管	压控振荡器发射
Q26	晶体管	射频缓冲放大器
Q27	晶体管	直流开关 /发射
Q28	二极管	自动发电控制
Q29	晶体管	自动发电控制
D1	二极管	天线开关

Ref No.	半导体	说明
D2	二极管	天线开关
D3	二极管	天线开关
D4	变容二极管	频率控制/接收/压控振荡器
D5	变容二极管	频率控制/接收/压控振荡器
D6	二极管	电流导引
D7	二极管	脉动滤波器
D8	变容二极管	频率控制/压控振荡器
D9,10	变容二极管	频率控制/发射/压控振荡器
D11	变容二极管	调制器
D12, D10E	变容二极管	电流导引

### DISPLAY CONTROL UNIT

Ref No.	半导体	说明
U1	IC	视频放大器
U2	IC	电压管理器
U3	IC	驱动显示
U4	IC	语音报数
U5	IC	EEPROM
Q1	晶体管	直流开关
Q2	晶体管	直流开关
Q3	晶体管	直流开关
Q4	晶体管	直流开关
Q5	晶体管	直流开关
Q6	晶体管	直流开关
Q7	场效应管	音频静音控制
Q8	晶体管	扬声器测试
Q9	晶体管	直流开关
Q10,11	晶体管	直流开关
D1	发光二极管	发光二极管/红灯
D2	发光二极管	发光二极管/绿灯
Q12	晶体管	发光二极管开关/红
Q13	晶体管	发光二极管开关/绿
Q14	二极管	检测器

# TERMINAL FUNCTION

## RX-TX UNIT

CN NO.	LOCATION	PIN NO.	NAME	I/O	FUNCTION
	TXRX UNIT	1	AF	I/O	RF AF LINE
		2	PO/LO		HIGH LOW POWER CONTROL
		3	LE		PHASE LOCKED LOOP LOCKOUT
		4	BUSY	I	RX SQUELCH
		5	PS	I	UNLOCK
		6	BEEP	I	BEEP OUT
		7	5V	O	5V POWER
		8	5C	O	VCO 5V
		9	5R	O	RX 5V
		10	5T	O	TX 5V
		12	DATA	O	PLL IC DATA
		11	CLK	O	PLL IC CLOCK
		13	CT	O	TX QT/DQT
		14	E		GND
		15	NC		
		16	E		GND
		17	MOD	O	TX MODULATION
		18	B	I	7.2 POWER SUPPLY
		19, 20	B		7.2 POWER SUPPLY

## 端子功能

## RX-TX UNIT

CN NO.	LOCATION	管脚号码	名称	输入/输出	功能
	TXRX UNIT	1	AF	输入/输出	射频 视频线
		2	PO/LO		高低功率控制
		3	LE		锁相环路锁定
		4	BUSY	输入	接收静噪
		5	PS	输入	开锁
		6	BEEP	输入	BEEP 输出
		7	5V	输出	5V 功率
		8	5C	输出	压控振荡 5V
		9	5R	输出	接收 5V
		10	5T	输出	发射 5V
		12	DATA	输出	锁相环芯片数据
		11	CLK	输出	锁相环芯片时钟
		13	CT	输出	发射 音频/亚音频
		14	E		接地
		15	NC		
		16	E		接地
		17	MOD	输出	发射调制
		18	B	输入	7.2 电源供应
		19, 20	B		7.2 电源供应



# PARTS LIST/零件表

## CAPACITORS

CC 45 TH 1H 220 J

1 2 3 4 5 6

1=Type...ceramic,electrolytic,etc.

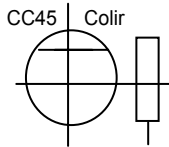
4=Voltage rating

2=Shap...round,square,ect.

5=Value

3=Temp.coefficient

6=Tolerance



## .Caocitor value

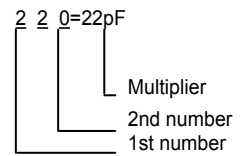
010=1pF

100=10pF

101=100pF

102=1000pf=0.001uF

103=0.01uF



## .Temperature coeffictolytict

1st Word	C	L	P	R	S	T	U
Color	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	-80	-150	-220	-330	-470	-750

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

Example:CC45TH=-470 ±60ppm/°C

## .Tolerance (More than 10pF)

Code	C	D	G	J	K	M	X	Z	P	No code
(%)	±0.25	±0.5	±2	±5	±10	±20	±40	+80 -20	100	More than 10uF-10~+50 Less than 4.7uF-10~+75

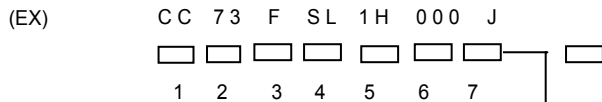
## Less than 10pF)

Gode	B	C	D	F	G
(pF)	±0.1	±0.25	±0.5	±1	±2

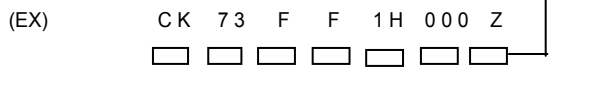
## .Voltage rating

1st word \ 2nd word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2	2.5	3.15	4	5	6.3	8	-
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	-
3	1000	1250	1600	2000	2500	3150	400	5000	6300	8000	-

## .Chip capacitors



(Chip)(CH,RH,UJ,SL)



(Chip)(B,F)

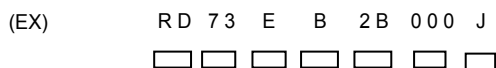
- 1=Type
- 2=Shap
- 3=Dimension
- 4=Temp.coefficient
- 5=Voltage rating
- 6=Value
- 7=Tolerance

## Dimension(capacitors)

Dimension code	L	W	T
Empty	5.6±0.5	5.0±0.5	Less than2.0
A	4.5±0.5	3.2±0.4	Less than2.0
B	4.5±0.5	2.0±0.3	Less than2.0
C	4.5±0.5	1.25±0.2	Less than1.25
D	3.2±0.4	2.5±0.3	Less than1.5
E	3.0±0.2	1.6±0.2	Less than1.25
F	2.0±0.3	1.25±0.2	Less than1.25
G	1.6±0.2	0.8±0.2	Less than2.0
H	1.0±0.05	0.5±0.05	0.5±0.05

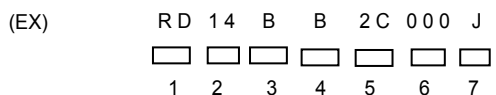
## RESISTORS

### .Chip resistor(Carbon)



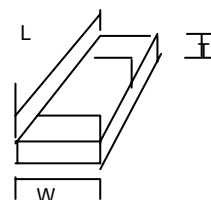
(Chip)(B,F)

### .Carbon resistor(Normal type)



- 1=Type
- 2=Shap
- 3=Dimension
- 4=Temp.coefficient
- 5=Rating wattage
- 6=Value
- 7=Tolerance

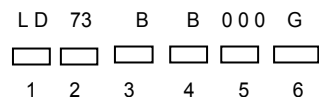
## Dimension



## Dimension(Chip resistor)

Dimension code	L	W	T
E	3.2±0.2	1.6±0.2	1.0
F	2.0±0.3	1.25±0.2	1.0
G	1.6±0.2	0.8±0.2	0.5±0.1
H	1.0±0.05	0.5±0.05	0.35±0.05

## INDUCTANCE



- 1=Type
- 2=Shap
- 3=Dimension
- 4=Temp.coefficient
- 5=Value
- 6=Tolerance

## Rating wattage

Code	wattage	code	wattage	code	wattage
1J	1/16W	2C	1/6W	3A	1W
2A	1/10W	2E	1/4W	3D	2W
2B	1/89W	2H	1/2W		

Ref.No	Parts No.	Description		
RF				
C1-C2	CK73GHH1H102J	CHIPF C 0402	102PF	J
C 4 -C9	CK73GHH1H102J	CHIPF C 0402	102PF	J
C10-C14	CK73GHH1H104K	CHIPF C 0402	104PF	K
C16-C17	CK73GHH1H104K	CHIPF C 0402	104PF	K
C18	CK73GHH1H221C	CHIPF C 0402	220PF	C
C20	CK73GHH1H221C	CHIPF C 0402	220PF	C
C21-C22	CC73GHH1H470C	CHIPF C 0402	22PF	C
C23-C28	CK73GH1H103K	CHIPF C 0402	103PF	K
C29	CK73GHH1H471C	CHIPF C 0402	470PF	C
C30-C32	CK73GH1H103K	CHIPF C 0402	103PF	K
C33	CK73GHH1H471C	CHIPF C 0402	470PF	C
C34	CK73GHH1H102J	CHIPF C 0402	102PF	J
C35-C36	CK73GH1H103K	CHIPF C 0402	103PF	K
C37	CK73GH1H473K	CHIPF C 0402	473PF	K
C38	CK73GHH1H273K	CHIPF C 0402	273PF	K
C39-C40	CK73GH1H473K	CHIPF C 0402	473PF	K
C41	CK73GHH1H102J	CHIPF C 0402	822PF	J
C42	CK73GHH1H273K	CHIPF C 0402	273PF	K
C43	CK73GHH1H102J	CHIPF C 0402	102PF	J
C44	CK73GHH1H221C	CHIPF C 0402	220PF	C
C45-C46	CK73GHH1H101C	CHIPF C 0402	100PF	C
C47	CK73GHH1H104K	CHIPF C 0402	474PF	K
C48-C49	CK73GHH1H221C	CHIPF C 0402	220PF	C
C53-C57	CK73GHH1H471C	CHIPF C 0402	470PF	C
C59-C61	CK73GHH1H101C	CHIPF C 0402	100PF	C
C100-C101	CK73GHH1H471C	CHIPF C 0402	470PF	C
C102	CK73GHH1H101C	CHIPF C 0402	100PF	C
C103	CC73GHH1H005B	CHIPF C 0402	0.5PF	B
C104	CC73GHH1H030B	CHIPF C 0402	3PF	B
C106-108	CK73GHH1H102J	CHIPF C 0402	102PF	J
C109	CK73GHH1H104K	CHIPF C 0402	104PF	K
C111	CK73GHH1H102J	CHIPF C 0603	102PF	J
C112-C127	CK73GHH1H102J	CHIPF C 0402	102PF	J
C128	RK73HB1J333J	CHIP R 0402	33K	J 1/16W
C129-C130	CK73GHH1H102J	CHIPF C 0402	102PF	J
C132-C137	CK73GHH1H102J	CHIPF C 0402	102PF	J
C139-C140	CC73GHH1H030B	CHIPF C 0402	3PF	B
C141	CC73GCH1H070B	CHIPF C 0603	7PF	B
C143	CC73GCH1H070B	CHIPF C 0603	7PF	B
C144	CC73GHH1H100B	CHIPF C 0402	10PF	B
C146-C147	CK73GHH1H471C	CHIPF C 0402	470PF	C
C148	CK73GHH1H471C	CHIPF C 0603	470PF	C
C149-C155	CK73GHH1H471C	CHIPF C 0402	470PF	C
C156	CK73GH1H103K	CHIPF C 0603	103PF	K
C157-C165	CK73GH1H103K	CHIPF C 0402	103PF	K
C167-C171	CK73GHH1H104K	CHIPF C 0402	104PF	K
C172-C173	CC73GHH1H010B	CHIPF C 0402	1PF	B
C174	CK73GB1H104K	CHIPF C 0603	24PF	K
C175	CK73GH1H103K	CHIPF C 0603	3PF	K
C176	CK73GHH1H104K	CHIPF C 0603	4PF	K

C177	CC73GCH1H050B	CHIPF C 0402	5. 6PF	B
C178	CC73GCH1H080B	CHIPF C 0402	8PF	B
C179-C180	CC73GHH1H060B	CHIPF C 0402	6PF	B
C181	CC73GCH1H070B	CHIPF C 0402	7PF	B
C182	CK73GHH1H330K	CHIPF C 0402	33PF	K
C183	CK73GHH1H104K	CHIPF C 0603	4PF	K
C184	CC73GHH1H120C	CHIPF C 0402	12PF	C
C185	CC73GCH1H070B	CHIPF C 0402	7PF	B
C186-C187	CK73GHH1H101C	CHIPF C 0402	100PF	C
C188	CK73GHH1H820J	CHIPF C 0402	82PF	J
C189	CC73GHH1H020B	CHIPF C 0603	2PF	B
C190	CC73GHH1H030B	CHIPF C 0402	3PF	B
C191	CC73GCH1H050B	CHIPF C 0603	1. 5PF	B
C192	CC73GHH1H020B	CHIPF C 0603	2PF	B
C193	CK73GHH1H104K	CHIPF C 0402	4PF	K
C194	CK73GHH1H104K	CHIPF C 0603	4PF	K
C195-C196	CK73GHH1H224K	CHIPF C 0402	224PF	K
C197-C199	CC73GHH1H470C	CHIPF C 0402	47PF	C
C200	CK73GHH1H104K	CHIPF C 0402	104PF	K
C201-C204	CK73GHH1H102J	CHIPF C 0402	102PF	J
C205	CK73GHH1H820J	CHIPF C 0402	82PF	J
C206	CK73GHH1H102J	CHIPF C 0402	102PF	J
C207	CC73GHH1H200C	CHIPF C 0402	20PF	C
C208	CC73GCH1H050B	CHIPF C 0603	5PF	B
C209	CC73GCH1H180C	CHIPF C 0603	18PF	C
C210	CC73GCH1H070B	CHIPF C 0402	7PF	B
C211	CC73GHH1H030B	CHIPF C 0603	3PF	B
C212-C213	CC73GCH1H070B	CHIPF C 0402	7PF	B
C214-C217	CK73GHH1H471C	CHIPF C 0402	470PF	C
C218	CC73GHH1H010B	CHIPF C 0402	1PF	B
C219	CC73GHH1H020B	CHIPF C 0402	2PF	B
C220	CC73GHH1H025B	CHIPF C 0402	2. 5PF	B
C221	CC73GHH1H005B	CHIPF C 0402	0. 5PF	B
C222	CC73GHH1H018B	CHIPF C 0402	1. 8PF	B
C223	CC73GHH1H060B	CHIPF C 0402	6PF	B
C224	CC73GHH1H470C	CHIPF C 0402	47PF	C
C225-C226	CK73GHH1H101C	CHIPF C 0402	100PF	C
C227	CC73GHH1H560C	CHIPF C 0402	56PF	C
C228-C229	CC73GHH1H005B	CHIPF C 0402	0. 5PF	B
C230	CC73GHH1H010B	CHIPF C 0402	1PF	B
C231	CK73GHH1H332J	CHIPF C 0402	332PF	J
C232-C233	CK73GHH1H681C	CHIPF C 0402	680PF	C
C234-C235	CK73GH1H473K	CHIPF C 0402	473PF	K
C272	CK73GHH1H272J	CHIPF C 0402	2722PF	J
C237-C238	CK73GHH1H223K	CHIPF C 0402	223PF	K
C239	CC73GHH1H010B	CHIPF C 0402	1PF	B
C240	CC73GHH1H005B	CHIPF C 0402	0. 5PF	B
C242-C243	CK73GHH1H471C	CHIPF C 0402	470PF	C
C245	CK73GHH1H471C	CHIPF C 0402	470PF	C
C246	CK73GHH1H104K	CHIPF C 0402	104PF	K
C247-C248	CK73GHH1H102J	CHIPF C 0402	102PF	J
C249	RK73HB1J000J	CHIP R 0402	0R	J 1/16W

C271	CC73GHH1H470C	CHIPF C 0402	47PF	C
CF1	CERAMIC FILTER		450E	
CHSW2			16 CHANLE	
D1	TX LED		G_LED	
D2	RX LED		R_LED	
D100-D101		DIODE	TY	
D102-D105		DIODE	UD	
D106-D109	VARIABLELE CAPCITANCE DIODE	DIODE	B0	
D110	VARIABLELE CAPCITANCE DIODE	DIODE	1SV220	
D111		DIODE	HVC132	
D112		DIODE	5. 1V	
D113		DIODE	UD	
D114		DIODE	HVU131	
E1	CS77EP1A100M	CHIP-TAN A TYPE	10UF	10V
E4-E8	CS77EP1A100M	CHIP-TAN A TYPE	10UF	10V
E10	CS77EP1A100M	CHIP-TAN A TYPE	10UF	10V
E11	CS77EP1A0R1M	CHIP-TAN A TYPE	0. 1UF	10V
E12	CS77EP1A047M	CHIP-TAN A TYPE	4U7F	10V
E13	CS77EP1A100M	CHIP-TAN A TYPE	10UF	16V
E14	CS77AP1A101M	CHIP-TAN C TYPE	100UF	10V
E15	CS77EP1A220M	CHIP-TAN B TYPE	22UF	16V
E16	CS77EP1A100M	CHIP-TAN A TYPE	10UF	10V
E100-E101	CS77EP1A010M	CHIP-TAN A TYPE	1UF	10V
E102	CS77EP1A220M	CHIP-TAN B TYPE	22UF	10V
E103	CS77EP1A100M	CHIP-TAN A TYPE	10UF	10V
E105	CS77EP1A100M	CHIP-TAN A TYPE	10UF	10V
E107	CS77EP1AR22M	CHIP-TAN A TYPE	0. 22UF	10V
E108	CS77EP1A0R1M	CHIP-TAN A TYPE	0. 1UF	10V
E109	CS77EP1A010M	CHIP-TAN A TYPE	1UF	10V
E110-E111	CS77EP1A100M	CHIP-TAN A TYPE	10UF	10V
E112-E113	CS77EP1A047M	CHIP-TAN A TYPE	4U7F	10V
E114	CS77EP1A010M	CHIP-TAN A TYPE	1UF	10V
F100-F101			38. 85M	
F102			450F	
J1	PHONE JACK (2. 5)		SP_JACK	
J2	PHONE JACK (3. 5)		MIC_JACK	
J10			18PIN	
L1-L4	LX73FB222G	SMALL FIDXEDINDUCTOR	3. 3UH	
L100-L103	LD73GB220J	SMALL FIDXEDINDUCTOR	22NH	
L104	LD73GB100J	SMALL FIDXEDINDUCTOR	10NH	
L105	LD73GB270J	SMALL FIDXEDINDUCTOR	27NH	
L106	LD73GB220J	SMALL FIDXEDINDUCTOR	22NH	
L107	LX73GB102G	SMALL FIDXEDINDUCTOR	1UH	
L108-L109	LX73FB102G	SMALL FIDXEDINDUCTOR	1ROL	
L110	LD73GB022J	SMALL FIDXEDINDUCTOR	2. 2NH	
L111		CUOKE COLL	0. 35*1. 5*7T	
L112	LX73FB102G	SMALL FIDXEDINDUCTOR	R22L	
L113		CUOKE COLL	0. 4*1. 5*4T	
L114		CUOKE COLL	0. 4*1. 5*3T	
L115-L120		CUOKE COLL	0. 35*1. 5*3T	
L121-L122		CUOKE COLL	0. 4*1. 5*4T	
L123		SMALL FIDXEDINDUCTOR	450C24	

L124	LX73FB102G	SMALL FIDXEDINDUCTOR	R33L	
L125	LX73FB102G	SMALL FIDXEDINDUCTOR	R56L	
L126	LD73GB180J	SMALL FIDXEDINDUCTOR	18NH	
L127-L128	LD73GB221J	SMALL FIDXEDINDUCTOR	220NH	
L129	LD73FB682G	SMALL FIDXEDINDUCTOR	6U8H	
L130	LD73GB101J	SMALL FIDXEDINDUCTOR	100NH	
L131	LD73FB682G	SMALL FIDXEDINDUCTOR	6U8H	
L132	LD73GB221J	SMALL FIDXEDINDUCTOR	220NH	
L133	LD73GB390J	SMALL FIDXEDINDUCTOR	39NH	
L134-L136	LD73GB121J	SMALL FIDXEDINDUCTOR	120NH	
L137	LD73GB390J	SMALL FIDXEDINDUCTOR	39NH	
L150	LD73FB682G	SMALL FIDXEDINDUCTOR	6U8H	
M1	MIC			
Q1	SOT-23	DIODE	1SS372	
Q2	SOT-23	TRANSISTOR	2SB1819	
Q3-Q8	SOT-23	TRANSISTOR	2SB624	
Q9-Q13	SOT-416/SC-75	DIGITAL TRANSISOR	DTC114EE	
Q14	SOT-23	FET	2SK1588	
Q100-Q101	SOT-416/SC-75	DIGITAL TRANSISOR	DTC114EE	
Q102	SOT-23	TRANSISTOR	2SC4226	
Q105-Q106	SOT-23	TRANSISTOR	2SC4649	
Q107-Q109	SOT-23	TRANSISTOR	2SC4226	
Q110	SOT-23	TRANSISTOR	2SC3356	
Q111	SOT-23	FET	2SK3078	
Q112		FET	RQA0009	
Q113	SOT-23	TRANSISTOR	2SC4226	
Q114	SOT-416/SC-75	DIGITAL TRANSISOR	DTC114EE	
Q115	SOT-416/SC-75	DIGITAL TRANSISOR	DTA114YE	
Q116-Q117	CMPAK-4(T)	FET	3SK318	
Q118	SOT-416/SC-75	DIGITAL TRANSISOR	DTC144EE	
Q119-Q120	SOT-23	FET	2SK508	
Q121-Q124	SOT-23	TRANSISTOR	2SB1819	
Q125	SOT-23	DIODE	1SS372	
Q126	SOT-23	TRANSISTOR	2SC4919	
R1	RK73HB1J102J	CHIP R 0402	1K	J 1/16W
R2	RK73FB2B000J	CHIP R 0805	0R	J 1/8W
R3-R17	RK73HB1J102J	CHIP R 0402	1K	J 1/16W
R18-R19	RK73HB1J153J	CHIP R 0402	15K	J 1/16W
R20	RK73HB1J274J	CHIP R 0402	270K	J 1/16W
R21-R22	RK73GB1J101J	CHIP R 0603	100R	J 1/16W
R23-R24	RK73HB1J473J	CHIP R 0402	47K	J 1/16W
R25	RK73HB1J224J	CHIP R 0402	220K	J 1/16W
R26-R37	RK73HB1J473J	CHIP R 0402	47K	J 1/16W
R38-R39	RK73GB1J332J	CHIP R 0603	3.3K	J 1/16W
R40-R41	RK73HB1J103J	CHIP R 0402	10K	J 1/16W
R42	RK73GB1J472J	CHIP R 0603	4.7K	J 1/16W
R43	RK73HB1J102J	CHIP R 0402	1K	J 1/16W
R44-R48	RK73HB1J103J	CHIP R 0402	10K	J 1/16W
R49	RK73HB1J224J	CHIP R 0402	220K	J 1/16W
R50-R55	RK73GB1J472J	CHIP R 0603	4.7K	J 1/16W
R56	RK73HB1J823J	CHIP R 0402	82K	J 1/16W
R57	CK73GH1H473K	CHIPF C 0402	473PF	K

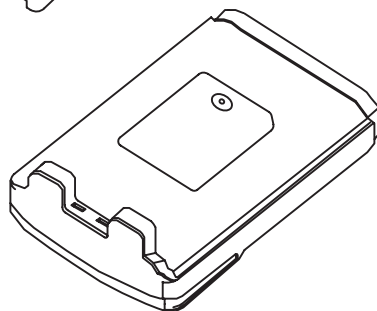
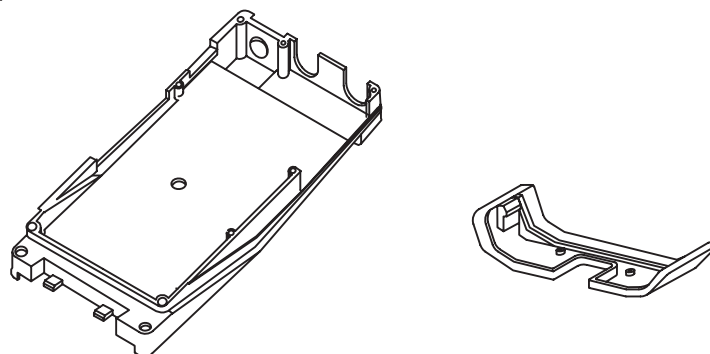
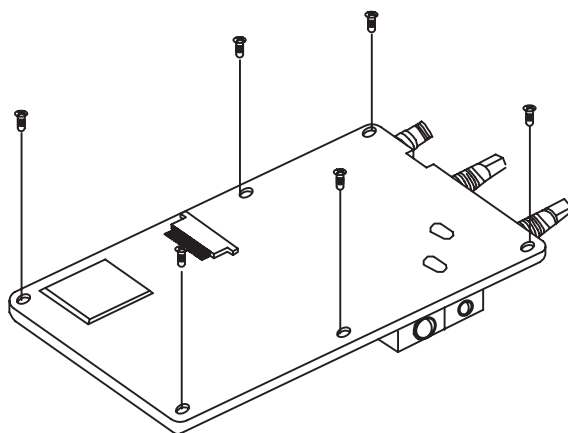
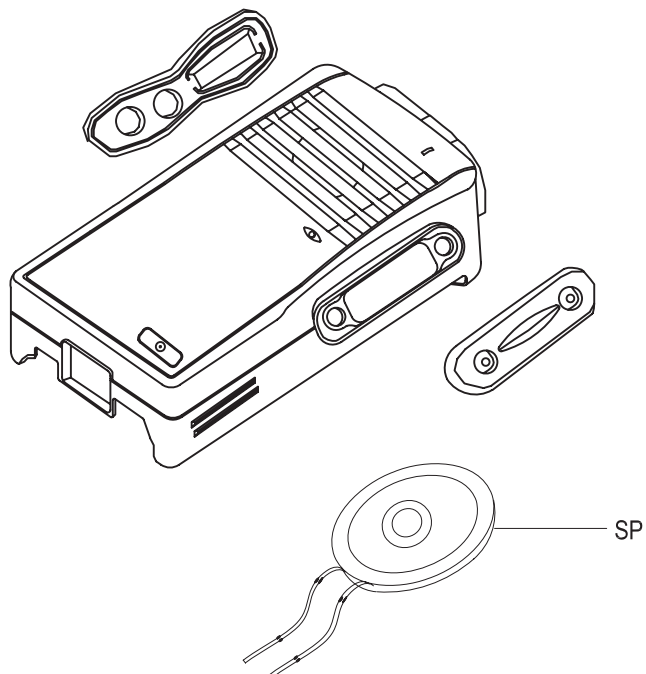
R58-R59	RK73HB1J333J	CHIP R 0402	33K	J 1/16W
R60-R63	RK73HB1J823J	CHIP R 0402	82K	J 1/16W
R64	RK73HB1J563J	CHIP R 0402	56K	J 1/16W
R65	CK73GHH1H105C	CHIPF C 0402	105PF	C
R66	RK73HB1J333J	CHIP R 0402	33K	J 1/16W
R67	RK73HB1J392J	CHIP R 0402	3.9K	J 1/16W
R68	RK73HB1J222J	CHIP R 0402	2.2K	J 1/16W
R71	RK73HB1J331J	CHIP R 0402	330R	J 1/16W
R72	RK73HB1J100J	CHIP R 0402	10R	J 1/16W
R73	RK73HB1J104J	CHIP R 0402	100K	J 1/16W
R74	RK73HB1J474J	CHIP R 0402	470K	J 1/16W
R75	RK73HB1J334J	CHIP R 0402	330K	J 1/16W
R76	RK73HB1J681J	CHIP R 0402	680R	J 1/16W
R77	RK73HB1J075J	CHIP R 0402	75R	J 1/16W
R78-R79	RK73HB1J102J	CHIP R 0402	1K	J 1/16W
R80	RK73HB1J473J	CHIP R 0402	47K	J 1/16W
R100-R105	RK73GB1J154J	CHIP R 0603	150K	J 1/16W
R106-R108	RK73HB1J390J	CHIP R 1206	R39	J 1/16W
R111	RK73HB1J473J	CHIP R 0402	47K	J 1/16W
R112	RK73HB1J222J	CHIP R 0402	2.2K	J 1/16W
R113	RK73HB1J473J	CHIP R 0402	47K	J 1/16W
R114	RK73HB1J224J	CHIP R 0402	220K	J 1/16W
R115	RK73HB1J105J	CHIP R 0402	1M	J 1/16W
R116	RK73HB1J222J	CHIP R 0402	2.2K	J 1/16W
R120-R121	RK73HB1J103J	CHIP R 0402	10K	J 1/16W
R122	RK73HB1J562J	CHIP R 0402	5.6K	J 1/16W
R123	RK73HB1J153J	CHIP R 0402	15K	J 1/16W
R124	RK73HB1J563J	CHIP R 0402	56K	J 1/16W
R125	RK73HB1J823J	CHIP R 0402	82K	J 1/16W
R127-R128	RK73HB1J333J	CHIP R 0402	33K	J 1/16W
R129	RK73FB2B000J	CHIP R 0805	0R	J 1/8W
R130-R139	RK73GB1J101J	CHIP R 0402	100R	J 1/16W
R140	RK73HB1J332J	CHIP R 0402	3.3K	J 1/16W
R143-R146	RK73HB1J332J	CHIP R 0402	3.3K	J 1/16W
R147	RK73HB1J562J	CHIP R 0402	5.6K	J 1/16W
R148	RK73HB1J332J	CHIP R 0402	3.3K	J 1/16W
R150-R153	RK73HB1J470J	CHIP R 0402	47R	J 1/16W
R154	RK73GB1J101J	CHIP R 0402	100R	J 1/16W
R156-R159	RK73HB1J102J	CHIP R 0402	1K	J 1/16W
R160	LD73GB390J	SMALL FIDXEDINDUCTOR	39NH	
R161-R166	RK73HB1J102J	CHIP R 0402	1K	J 1/16W
R167	RK73HB1J222J	CHIP R 0402	2.2K	J 1/16W
R168	RK73HB1J332J	CHIP R 0402	3.3K	J 1/16W
R169-R170	RK73HB1J222J	CHIP R 0402	2.2K	J 1/16W
R171	RK73HB1J681J	CHIP R 0402	680R	J 1/16W
R172	RK73HB1J102J	CHIP R 0402	1K	J 1/16W
R173	RK73HB1J220J	CHIP R 0402	22R	J 1/16W
R175	RK73FB2B000J	CHIP R 0805	0R	J 1/8W
R176	RK73HB1J821J	CHIP R 0402	820R	J 1/16W
R177-R178	RK73FB2B000J	CHIP R 0805	0R	J 1/8W
R179-R180	RK73HB1J561J	CHIP R 0402	560R	J 1/16W
R181	RK73HB1J100J	CHIP R 0402	10R	J 1/16W

R182-R186	RK73HB1J473J	CHIP R 0402	47K	J 1/16W
R187	LD73GB022J	SMALL FIDXEDINDUCTOR	2. 2NH	
R188-R189	RK73FB2B000J	CHIP R 0805	0R	J 1/8W
R191-R192	RK73HB1J221J	CHIP R 0402	220R	J 1/16W
R193-R198	RK73HB1J104J	CHIP R 0402	100K	J 1/16W
R199	RK73GB1J154J	CHIP R 0402	150K	J 1/16W
R200	CK73GHH1H102J	CHIPF C 0402	102PF	J
R201	RK73HB1J104J	CHIP R 0402	100K	J 1/16W
R202	RK73HB1J224J	CHIP R 0402	220K	J 1/16W
R203	RK73HB1J184J	CHIP R 0402	180K	J 1/16W
R204-R205	RK73GB1J154J	CHIP R 0402	150K	J 1/16W
R206	RK73HB1J120J	CHIP R 0402	12K	J 1/16W
R207-R209	RK73GB1J472J	CHIP R 0603	4. 7K	J 1/16W
R210	LD73GB221J	SMALL FIDXEDINDUCTOR	220NH	
R211	RK73GB1J472J	CHIP R 0603	4. 7K	J 1/16W
R212	RK73HB1J563J	CHIP R 0402	56K	J 1/16W
R213	RK73HB1J224J	CHIP R 0402	220K	J 1/16W
R214	RK73HB1J204J	CHIP R 0402	200K	J 1/16W
R215	RK73HB1J334J	CHIP R 0402	330K	J 1/16W
R216-R217	RK73HB1J471J	CHIP R 0402	470R	J 1/16W
R218	RK73HB1J331J	CHIP R 0402	330R	J 1/16W
R219	RK73HB1J102J	CHIP R 0402	1K	J 1/16W
R220-R221	RK73HB1J104J	CHIP R 0402	100K	J 1/16W
R222	RK73HB1J823J	CHIP R 0402	82K	J 1/16W
R223	RK73HB1J124J	CHIP R 0402	120K	J 1/16W
R224	RK73HB1J473J	CHIP R 0402	47K	J 1/16W
R225	RK73HB1J683J	CHIP R 0402	68K	J 1/16W
R226	RK73HB1J184J	CHIP R 0402	180K	J 1/16W
R227	RK73HB1J102J	CHIP R 0402	1. 2K	J 1/16W
R228	LD73GB221J	SMALL FIDXEDINDUCTOR	220NH	
R229-R230	RK73HB1J205J	CHIP R 0402	2M	J 1/16W
R231-R232	RK73HB1J393J	CHIP R 0402	39K	J 1/16W
R233	RK73HB1J202J	CHIP R 0402	2K	J 1/16W
R234	RK73HB1J152J	CHIP R 0402	1. 5K	J 1/16W
R235	RK73HB1J684J	CHIP R 0402	680K	J 1/16W
R236	RK73GB1J901J	CHIP R 0603	9. 1K	J 1/16W
R237	RK73HB1J120J	CHIP R 0402	12K	J 1/16W
R238	RK73HB1J153J	CHIP R 0402	15K	J 1/16W
R239	RK73HB1J562J	CHIP R 0402	5. 6K	J 1/16W
R240	RK73GB1J273J	CHIP R 0402	27K	J 1/16W
R241	RK73HB1J224J	CHIP R 0402	220K	J 1/16W
R242	RK73HB1J684J	CHIP R 0402	680K	J 1/16W
R248	RK73HB1J103J	CHIP R 0402	10K	J 1/16W
RV100	TRIMMING POT		50K	
RV101	TRIMMING POT		10K	
SW1			POW-SW	
SW2-SW5			PPT	
U1			TA7368F	
U2	SOT89	VOLTAGE REGULATOOR	5V	
U3			TMP87P805	
U4	S0-8	EEPROM	24C08	
U5	S0-8	EEPROM	CH	

U100	TSSOP-8	IC APC	NJM2904	
U102	SSOP16-225	IC FM IF DETECTOR	TA31136	
U103			E03	
U104	S0-8	IC OP AMP X2	MC4558	
U105	SOT89	VOLTAGE REGULATOOR	3V	
X1	CRYSTAL RESONATOR		32.768K	
X100	CRYSTAL RESONATOR		19.2M	



# EXPLODED VIEW/部件分解图





# ADJUSTMENT/调整

## Required Test Equipment

### 1. Stabilized Power supply

1. The supply voltage can be changed between 5V and 9V, and the current is 3A or more.
2. The standard voltage is 7.5V.

### 2. DC Ammeter

1. Class 1 ammeter (17 ranges and other features).
2. The full scale can be set to either 300mA or 3A.
3. A cable of less internal loss must be used.

### 3. Frequency Counter (f. counter)

1. Frequencies of up to 1GHz or so can be measured.
2. The sensitivity can be changed to 500MHz or below, and measurements are highly stable and accurate (0.2ppm or so).

### 4. Power Meter

1. Measurable frequency : Up to 500MHz
2. Impedance : 50 $\Omega$ , unbalanced
3. Measuring range : Full scale of 10W or so
4. A standard cable (5D2W 1m) must be used.

### 5. RF Voltmeter(RF V.M)

1. Measurable frequency : Up to 500MHz or so.

### 6. Linear Detector

1. Measurable frequency : Up to 500MHz or so
2. Characteristics are flat, and CN is 60dB or more.

### 7. Digital Voltmeter

1. Voltage range : FS-18V or so
2. Input resistance : 1M $\Omega$  or more

### 8. Oscilloscope

1. Measuring range : DC to 30MHz
2. Provides highly accurate measurements for 5 to 25MHz.

### 9. AF Voltmeter (AF V.M)

1. Measurable frequency : 50Hz to 1MHz
2. Maximum sensitivity : 1mV or more

### 10. Spectrum Analyzer

1. Measuring range : DC to 1GHz or more

### 11. Standard Signal Generator (SSG)

1. Maximum frequency : 500MHz or more
2. Output : -133dBm/0.05 $\mu$ V to 7dBm/501mV
3. Output impedance : 50

### 12. Tracking Generator

1. Center frequency : 50kHz to 500MHz
2. Frequency deviation :  $\pm$ 35MHz
3. Output voltage : 100mV or more

### 13. Dummy Load

1. 8 $\Omega$ , 3W or more

### 14. AF Generator(AG)

1. Frequency range : 100Hz to 100kHz
2. Output : 0.5mV to 1V

### 15. Distortion Meter

1. Measurable frequency : 30Hz to 100kHz
2. Input level : 50mV to 10Vrms

## 所需的测试设备

### 1. 稳定电源

1. 输出电源在5V和9V之间可调，并且电流为3A或更大。
2. 标准电压为7.5V。

### 2. 电流表

1. 高级电流表（17档和其它功能）
2. 满刻度可设定为300mA也可设定为3A。
3. 必须使用低消耗电缆。

### 3. 频率计数器（f. counter）

1. 可以测量到最大量程大约为1GHz的频率。
2. 灵敏度可调到500MHz或更低，测量为高稳定性和高准确度（大约为0.2ppm）。

### 4. 功率仪

1. 可测量的频率：最高到500MHz
2. 阻抗：50 $\Omega$ ，不稳定
3. 测量范围：满刻度大约为10W
4. 必须使用标准电缆（5D2W 1m）

### 5. 射频电压表(RF V. M)

1. 频率范围：最高大约到500MHz

### 6. 线性检测器

1. 频率范围：最高大约到500MHz
2. 特征函数是平展的，CN为60dB或更大

### 7. 数字电压表

1. 电压范围：大约FS-18V
2. 输入阻抗值：1M $\Omega$ 或更大

### 8. 示波器

1. 测量范围：直流到30MHz
2. 5到25MHz间提供高准确度测量

### 9. 音频电压表(AF V. M)

1. 测量范围：50Hz到1MHz
2. 最高灵敏度：1mV或更高

### 10. 频谱分析仪

1. 测量范围：直流到1GHz

### 11. 标准信号发射器（SSG）

1. 测量范围：直流到1GHz
2. 输出：-133dBm/0.05 $\mu$ V to 7dBm/501mV
2. 输出阻抗：50 $\Omega$

### 12. 轨迹发生器

1. 中心频率：500MHz或更高
2. 频偏： $\pm$ 35MHz
3. 输出电压：100mV或更高

### 13. 假负载

1. 8 $\Omega$ , 3W或更高

### 14. 音频发生器

1. 测量范围：100Hz到100kHz
2. 输出：0.5mV到1V

### 15. 失真测试仪

1. 测量范围：30Hz到100kHz
2. 输入电平：50mV到10Vrms

## ADJUSTMENT FREQUENCY LIST

Description	C	
CH	TX f(MHz)	R X f(MHz)
Center	440.025MHz	440.025MHz
Low	400.025MHz	430.025MHz
Hi	479.975MHz	479.975MHz

### 调整频率清单

描述	C	
信道	发射频率 (MHz)	接收频率 (MHz)
中心	440.025MHz	440.025MHz
底	430.025MHz	430.025MHz
高	479.975MHz	479.975MHz

### 1. Jig (chassis) for adjustment

#### 2. Use the jig as follows:

1. Insert the coaxial antenna connector into the jig.
2. Place the power board on the jig and fix it with 1 screws①.
3. Solder the power board to the power terminal of the unit.
4. Place the unit on the jig and fix it with 6 screws②.
5. Solder the antenna terminal to the terminal of the unit.

**Notes:** Supply power from an external power supply.

( Relay terminal: +  
Jig(chassis) :- )

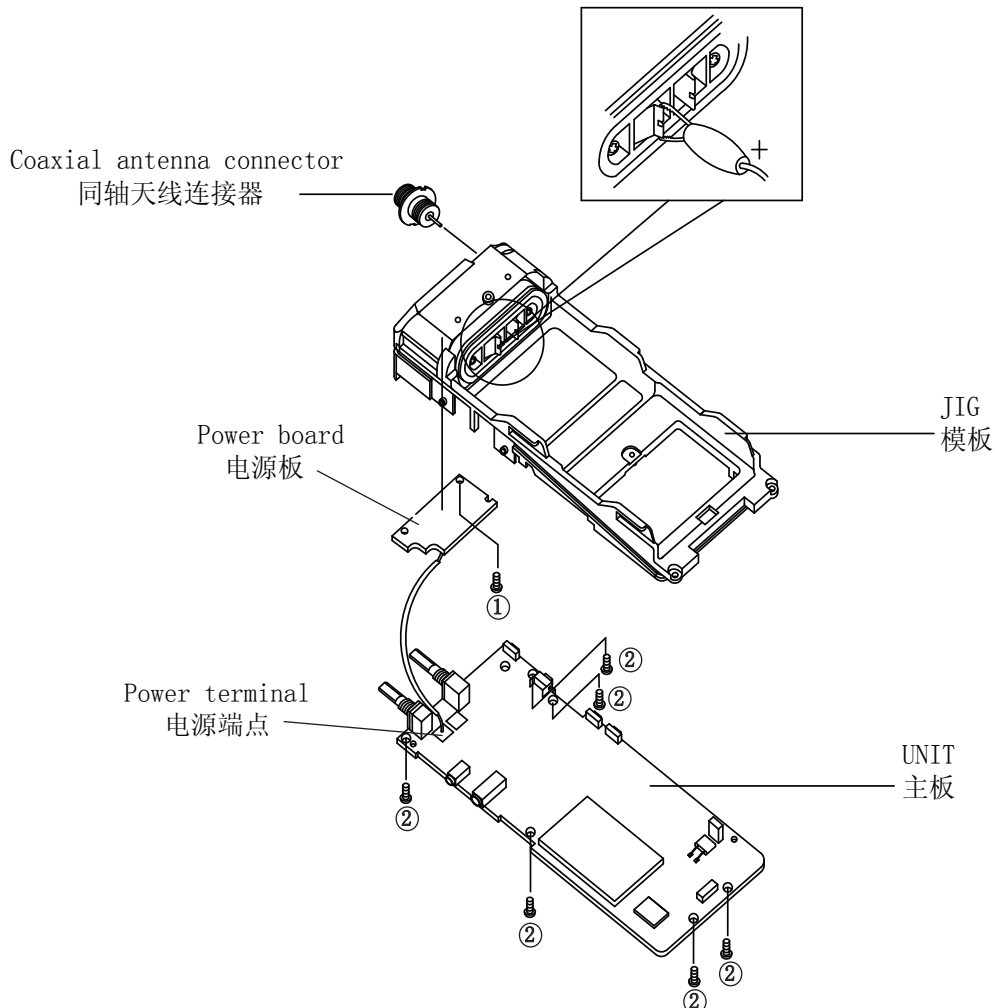
### 1. 用于调整的模板(机架)

#### 2. 按照下述方法使用模板:

1. 将同轴天线连接器插入模板。
2. 将电源板放置在模板上、然后用1颗螺钉拧紧①。
3. 将电源板与主板的电源端点焊接。
4. 将主板放置在模板上、然后用6颗螺钉拧紧②。
5. 将天线的端点与主板的焊点焊接。

**注意:** 供电来自于外部电源。

( 继电器端点 : +  
模板(机架) : - )



Squelch Level, S meter Level, Lo Power, QT Deviation, DQT Deviation, and battery warning.

**Section common to the transmitter and receiver (VCO)**

Item	Condition	Measurement		Adjustment		Specifications /Remarks
		Test equipment	Terminal	parts	Method	
Setting	Power supply voltage battery terminal: 7.4V					
VCO lock Voltage	CH: TX low	Digital voltmeter			0.8V	±0.1V
	CH: RX low				0.8V	±0.1V
	CH: TX high				4V	Less than 4.5V
	CH: RX high					

**Receiver Section**

Item	Condition	Measurement		Adjustment		Specifications /Remarks
		Test equipment	Terminal	parts	Method	
Band-pass filter	CH: RX center	Tra generator Spectrum analyzer			Adjust to the spectrum waveform	3V
AF level	CH: RX center SSG output: -53dBm (50 μV) MOD:1KHz DEV :±3.0KHz	SSG Oscilloscope AF.V.M Distortion meter	ANT SP		Adjust to the MAX AF level Vo..knob position at 12 o'clock	
Sensitivity	CH: RX center CH: low CH: high SSG:output: -116dBm (0.35 μV) MOD:1KHz DEV :±3.0KHz				check	SINAD: 12dB or higher
Squelch Level	CH: RX center Level 9 SSG output: -116dBm (0.35 μV)				Adjust to open the squelch	
	Level 2 SSG output: -123dBm (0.16 μV)				Adjust to open the squelch	

**Transmitter section**

Item	Condition	Measurement		Adjustment		Specifications /Remarks	
		Test equipment	Terminal	parts	Method		
Transmit Frequency	CH: TX center PTT: ON	Frequency counter	ANT	CV1	Adjust to center frequency	Within±500Hz	
QT/DQT balance	CH: RX center	Modulation analyzer		R151	Recify the waveform to square wave		
Lo Power	CH: TX center CH: TX low CH: TX high	Power meter Current meter				Adjust it to 5W	Within±0.2W
HI Power	CH: RX center CH: TX low CH: TX high	Power meter Current meter				Adjust it to 5W	Within±0.2W
MAX DEV	CH: TX center AG:1KHz/50mV	Modulation Analyzer 15KHz LPF AG AF V.M		RV1	Adjust it to ±4.2KHz		±100Hz
					Check		±1.9KHz~2.2KHz
MIC Sensitivity	CH: TX center AG:1KHz/5mV				Check		±2.2KHz~3.8KHz
QT Deviation	CH: TX center CH: TX low CH: TX high QT:151.4Hz	Modulation Analyzer 3KHz LPF		Adjust it to 0.75KHz		±0.05Hz	
				CH:TX center			
DQT Deviation	CH: TX center CH: TX low CH: TX high DQT:023N	Modulation Analyzer 15KHz LPF		Adjust it to 0.75KHz		±0.05Hz	
				CH:TX center			
VOX Level					Adjust it to [4]		
Battery Warning	Battery terminal:6.0V						

静噪级别, S计电平, 低功率, QT偏差, DQT偏差和电池警告  
发射部和接收部共用部分 (压控振荡器)

项目	条件	测量		调整		规格备注
		测试设备	终端	部件	方法	
设定	电源电压电池终端: 7.4V					
压控振荡器	CH: 发射低端频点	数字电压表			0.8V	±0.1V
	CH: 接收低端频点				0.8V	±0.1V
	CH: 发射高端频点				4V	少于 4.5V
	CH: 接收低端频点					

接收部分

项目	条件	测量		调整		规格备注
		测试设备	终端	部件	方法	
带通滤波器	CH: 接收中心频点	Tra发生器 频谱分析仪			调整频谱波形	3V
音频电平	CH: 接收中心频点 SSG输出: -53dBm (50 μV) MOD:1KHz DEV :±3.0KHz	标准信号发射器 示波器 音频电压表 失真测试仪	天线 扬声器		调整到最大音频电平 Vo旋钮的位置在12点钟	
灵敏度	CH: 接收中心频点 CH:低 CH: 高 SSG输出: -116dBm (0.35 μV) MOD:1KHz DEV :±3.0KHz				检查	SINAD: 12dB or 更高
静噪抑制电路 电平	CH: 接收中心频点 第9级 SSG 输出: -116dBm (0.35 μV)				经调整打开静噪	
	第2级 SSG 输出: -123dBm (0.16 μV)				经调整打开静噪	

发射部

项目	条件	测量		调整		规格备注
		测试设备	终端	部件	方法	
发射频率	CH: 接收中心频点 PTT: 开启	频率计数器	天线	CV1	调整到中心	±500Hz以内
QT/DQT 平衡	CH:接收中心频点	频谱分析仪		R151	将波形整流为方形图	
低功率	CH:发射中心频点 CH: TX low CH: TX high	功率表 电流表			调整到 5W	±0.2W以内
高功率	CH: 接收中心频点 CH: TX low CH: TX high	功率表 电流表			调整到 5W	±0.2W 以内
最大偏差	CH: 发射中心频点 AG:1KHz/50mV	Modulation Analyzer 15KHz LPF AG AF V.M		RV1	调整到±4.2KHz	±100Hz
					检查	±1.9KHz~2.2KHz
MIC灵敏度	CH: 发射中心频点 AG:1KHz/5mV				检查	±2.2KHz~3.8KHz
QT偏差	CH:发射中心频点 CH: 发射低端频点 CH: 发射高端频点 QT:151.4Hz	频谱分析仪 3KHz LPF			调整到 0.75KHz	±0.05Hz
					CH:发射中心频点	
DQT偏差	CH: 发射中心频点 CH: 发射低端频点 CH: 发射高端频点 DQT:023N	频谱分析仪 15KHz LPF			调整到 0.75KHz	±0.05Hz
					CH:发射中心频点	
声控级别					调整到 [4]	
电池电平	电池终端: 6.0V					

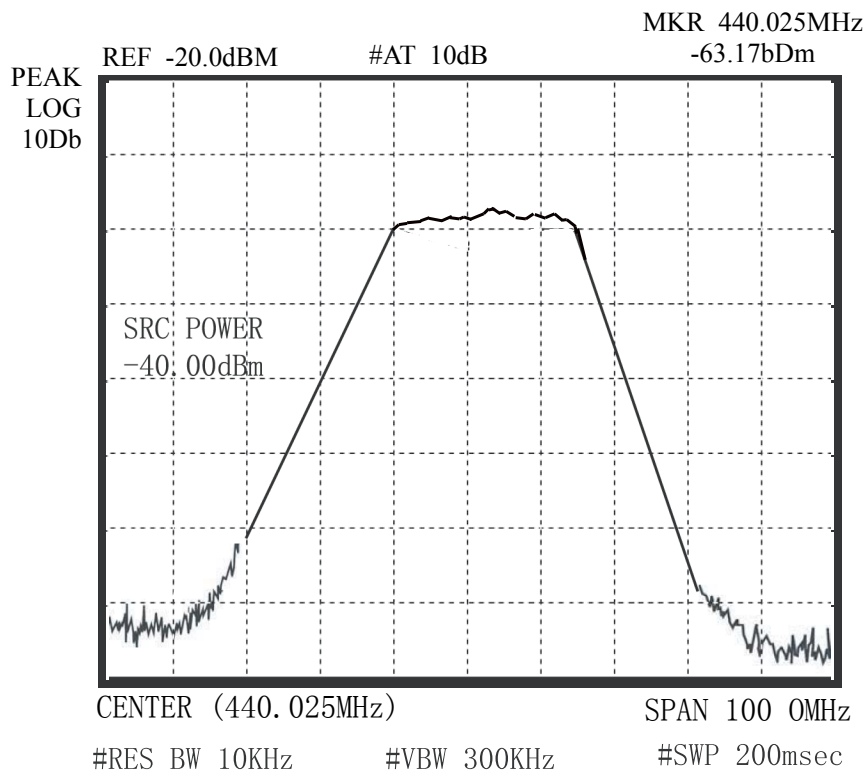
## ADJUSTMENT FREQUENCY LIST

Description	C	
CH	TX f(MHz)	R X f(MHz)
Center	440.025MHz	440.025MHz
Low	400.025MHz	400.025MHz
Hi	479.975MHz	479.975MHz

调整频率清单

描述	C	
信道	发射频率 (MHz)	接收频率 (MHz)
中心	440.025MHz	440.025MHz
底	400.025MHz	400.025MHz
高	479.975MHz	479.975MHz

## BPF-wave/波段



### Notes:

- Adjust the TX VCO trimmer within a short period of time (Appros. 10 seconds). When the transceiver is in TX mode and the final amplifier transistor is detached from the chassis for a long time, it may cause thermal damage to the transistor (No heatsink).

### 注释:

在短时间内调整发射压控微调电容器(大约10秒). 当收发机处于发射模式, 并且末级放大器晶体管长时间从机架拔出, 则可能会对晶体管产生热损伤(无散热器).

# BLOCK DIAGRAM

## MODEL:A-53

