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# GENERAL/REALIG

## 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 data. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions. These are issued as require.

### 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 t is a part, and a sufficient description of the required component for proper identification.

### PERSONAL SAFETY

The following precautions are recommended for personal safety:

● DO NOT transmit until all RF connectors are verified secure properly terminated.

●SHUT OFF and DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere

●This equipment should be serviced by a qualified technician only.

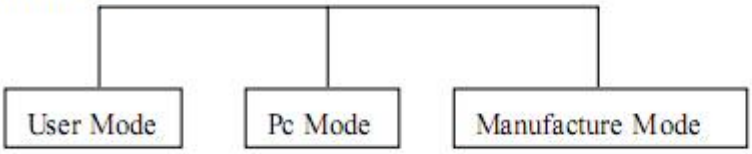
### SERVICE

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

| Detination | Number of CH | RF power output |
|---|---|---|
| LPD | 69 | 1W / 3W / 5W |
| FRS | 14 | 1W / 3W / 5W |

# ALIGNMENT PROCEDURE

## 1. Modes

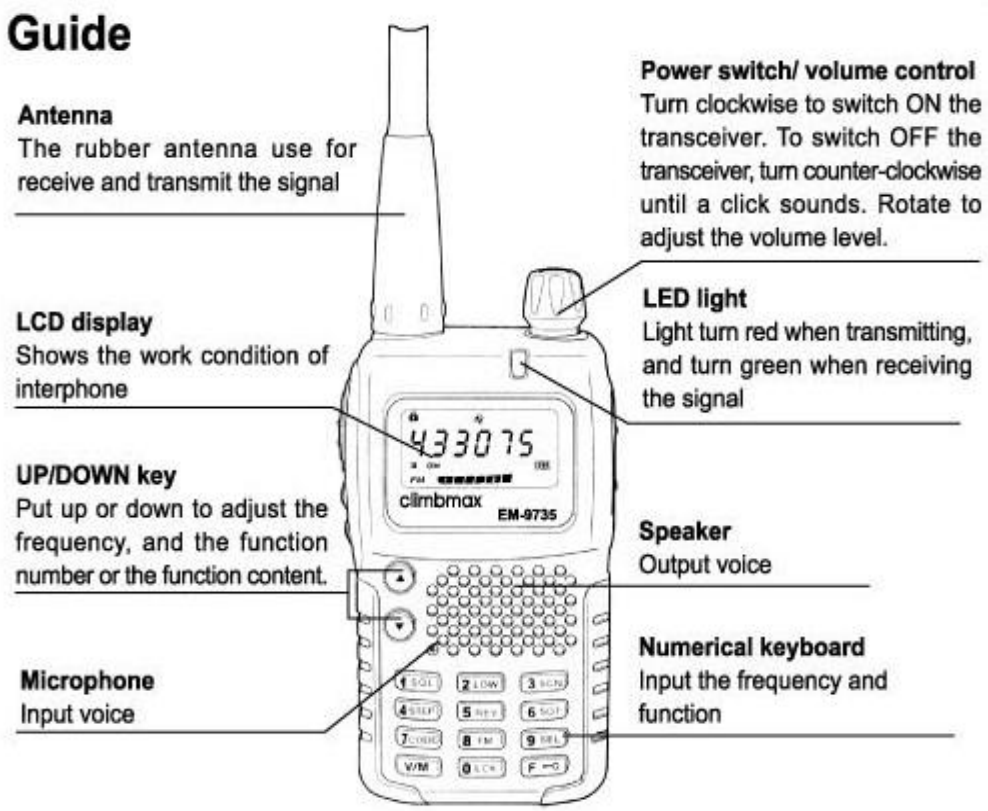


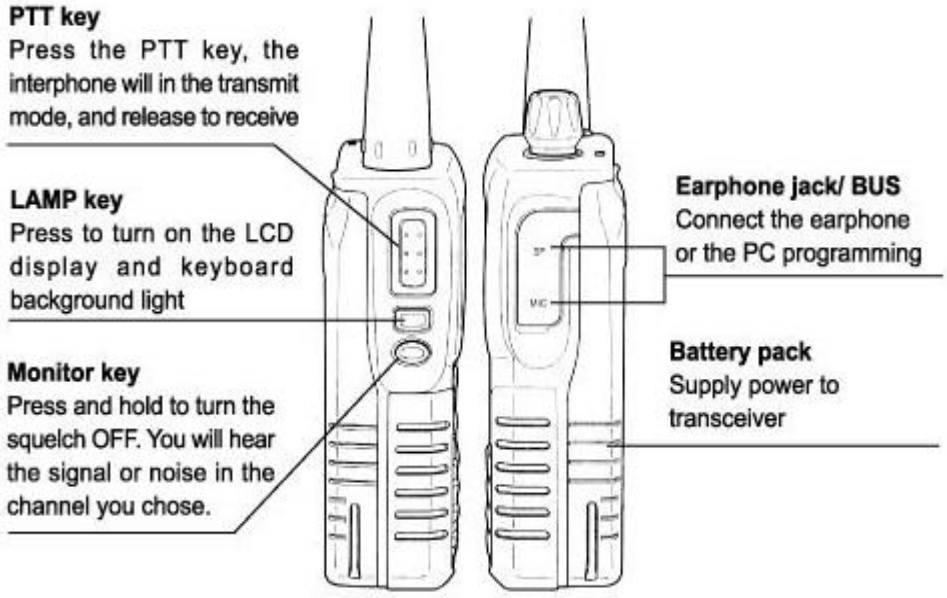

| MODE | FUNCTION |
|---|---|
| User Mode | Use this mode for normal operation. |
| PC Mode | Use this mode, to make various settings by means of the FPU through the RS-232C port. |
| Manufacture Mode | Use this mode, to realign the various settings through the RS-232C port during manufacture work. |

## 2 .How to enter each mode

| MODE | PROCEDURE |
|---|---|
| User Mode | Power ON |
| PC Mode | Connect to the IBM PC compatible machine and controlled by the FPU. |

## 3. Getting acquainted






# PC MODE

# REALIGNMENT

## Preface

The transceiver is programmed by using a personal computer,programming interface (KPG-22)and programming software(EM-9735)

The programming software can be used with an IBM PC or compatible.Figure 1 shows the setup of an IBM PC FOR programming.

## Connection procedure

1.Connect the EM-9735 to the personal computer with the interface cable.

2.When data is transmitting from the transceiver the red LED lights.
When data is receiving by the transceiver the green LED lights.

## Notes:

● The data stored in the personal computer must match the Model Name when it is written into the EEPROM.

● Do not press the 「PTT」key during data transmission or reception.

● KPG-22 description

(PC programming interface cable:Option)

The KPG-22 is required to interface the EM-9735 with the computer.It has a circuit in its D-sub connector(25-pin)case that converts the RS-232C serial port.

● Programming software description

The EM-9735 Programing Disk is supplied in 3-1/2′ ′ the disk format.The Software on this disk allows a user to program EM-9735 radios via a Programming interface cable(KPG-22)

● Programming with IBM PC

If data is transferred to the transceiver from an IBM PC with the KPG-87D,the

destination data (basic radio information)for each set can be modified.Normally, it is not necessary to modify the destination data because their values are determined automatically when the frequency range (frequency type)is set.
The values should be modified only if necessary.Data can be programmed into the Data can be programmed into the EEPROM in RS-232C format Via the SP MIC plug.
In this mode the PTT line operates as TXD and RXD data share a line.

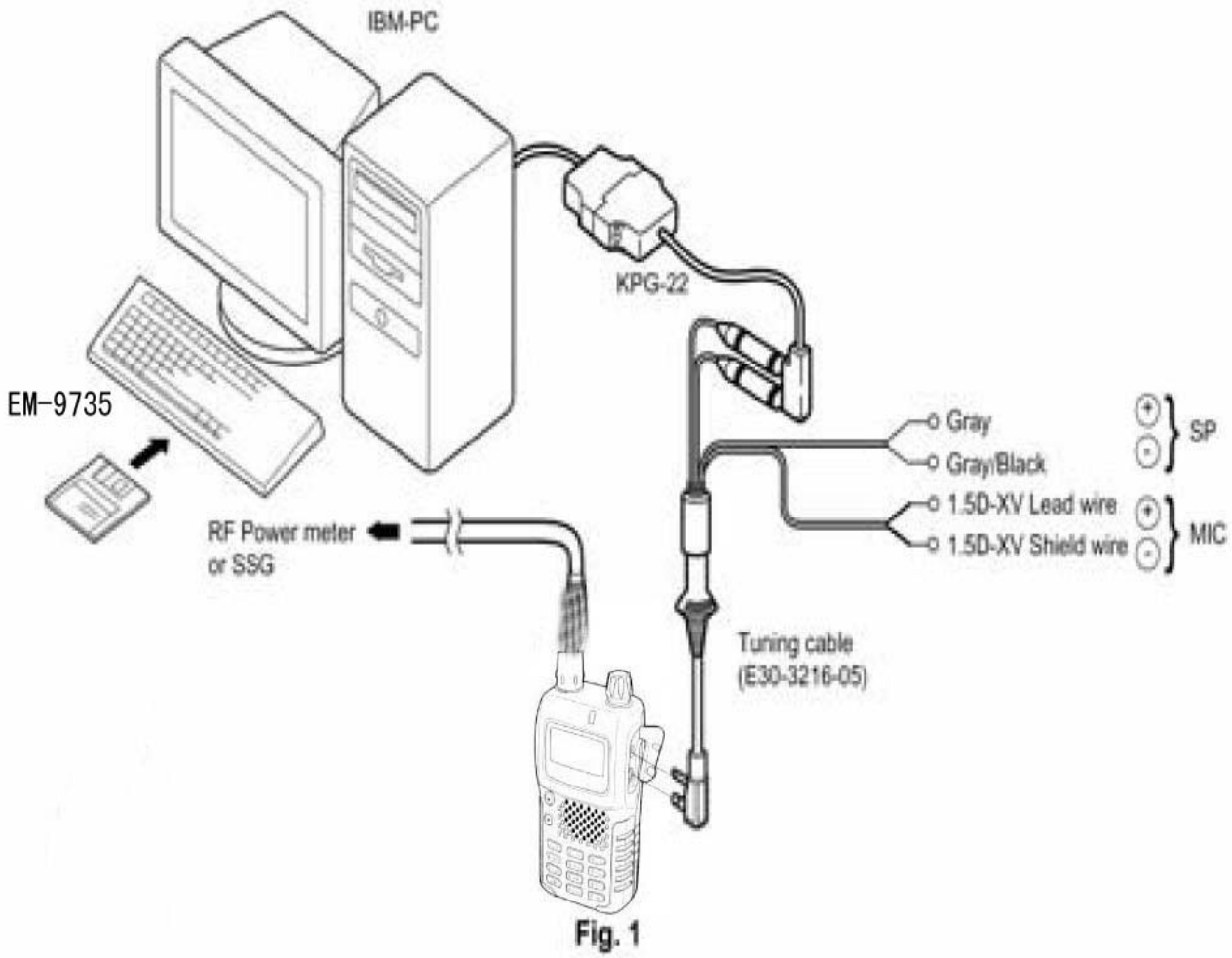


Fig. 1

## The chart of standard audio and infra-acoustic frequency

| CTCSS | | | |
|---|---|---|---|
| 1-67.0 | 14-103.5 | 27-159.8 | 40-199.5 |
| 2-69.3 | 15-103.5 | 28-162.2 | 41-203.5 |
| 3-71.9 | 16-110.9 | 29-165.5 | 42-206.5 |
| 4-74.4 | 17-114.8 | 30-167.9 | 43-210.7 |
| 5-77.0 | 18-118.8 | 31-171.3 | 44-218.1 |
| 6-79.7 | 19-123.0 | 32-173.8 | 45-225.7 |
| 7-82.5 | 20-127.3 | 33-177.3 | 46-229.1 |
| 8-85.4 | 21-131.8 | 34-179.9 | 47-233.6 |
| 9-88.5 | 22-136.5 | 35-183.5 | 48-241.8 |
| 10-91.5 | 23-141.3 | 36-186.2 | 49-250.3 |
| 11-94.8 | 24-146.2 | 37-189.9 | 50-254.1 |
| 12-97.4 | 25-151.4 | 38-192.8 | |
| 13-100.0 | 26-156.7 | 39-196.6 | |

## DCS standard groups

| DCS | | | | | | |
|---|---|---|---|---|---|---|
| 017 | 073 | 165 | 263 | 365 | 466 | 654 |
| 023 | 074 | 172 | 265 | 371 | 503 | 662 |
| 025 | 114 | 174 | 266 | 411 | 506 | 664 |
| 026 | 115 | 205 | 271 | 412 | 516 | 703 |
| 031 | 116 | 212 | 274 | 413 | 523 | 712 |
| 032 | 122 | 223 | 306 | 423 | 526 | 723 |
| 036 | 125 | 225 | 311 | 431 | 532 | 731 |
| 043 | 131 | 226 | 315 | 432 | 546 | 732 |
| 047 | 132 | 243 | 325 | 445 | 565 | 734 |
| 050 | 134 | 244 | 331 | 446 | 606 | 743 |
| 051 | 143 | 245 | 332 | 452 | 612 | 754 |
| 053 | 145 | 246 | 343 | 454 | 624 | |
| 054 | 152 | 251 | 346 | 455 | 627 | |
| 065 | 155 | 252 | 351 | 462 | 631 | |
| 071 | 156 | 255 | 356 | 464 | 632 | |
| 072 | 162 | 261 | 364 | 465 | 645 | |

# CIRCUIT DESCRIPTION

## Frequency configuration

The receiver utilizes double conversion. The first IF is 26.45MHz and the second IF is 450KHz. The first local oscillator signal is supplied from the PLL circuit. The PLL circuit in the transmitter genetate the necessary frequencies.
Fig. 2 shows the frequencies.

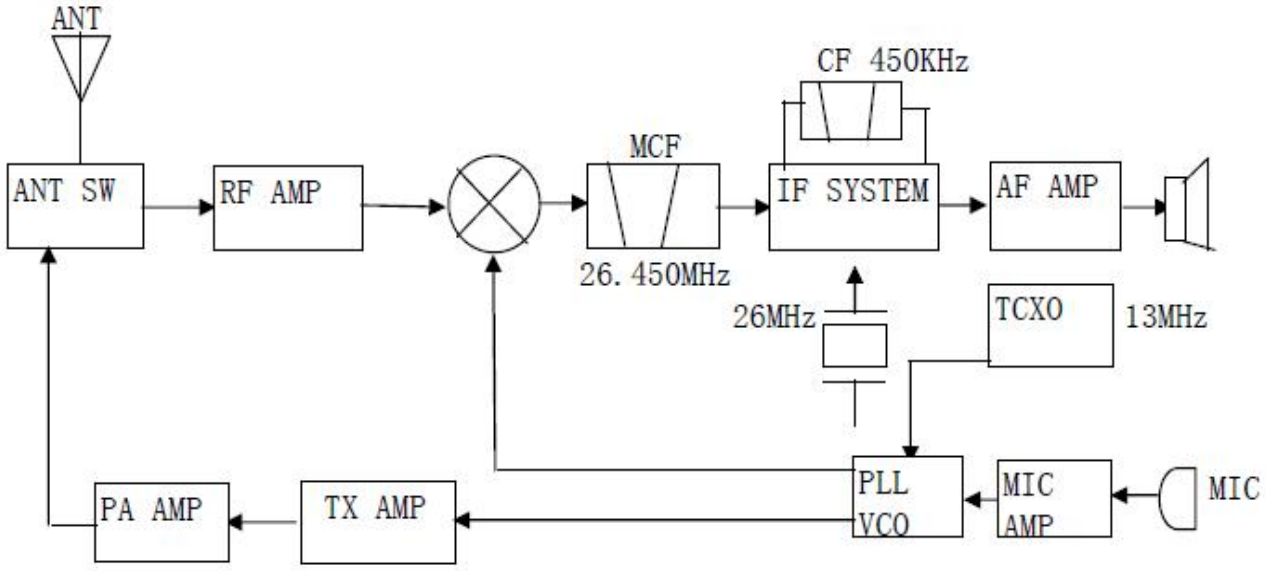



Fig.2 Frequency configuration

## Receiver

The receiver is double conversion superheterodyne, designed to operate in the frequency range. The frequency configuration is shown in the Fig. 2

### 1) Front-end RF amplifer

An incoming signal from the antenna passing through a tranmit/receive switch circuit(D3,D4,D5 are off).After the signal is ampified, passing through a band pass filter BPF and is amplified(Q30)again, the signal is filtered through a band pass filter to eliminate unwanted signals before it is passed to the first mixer. (see Fig. 3)

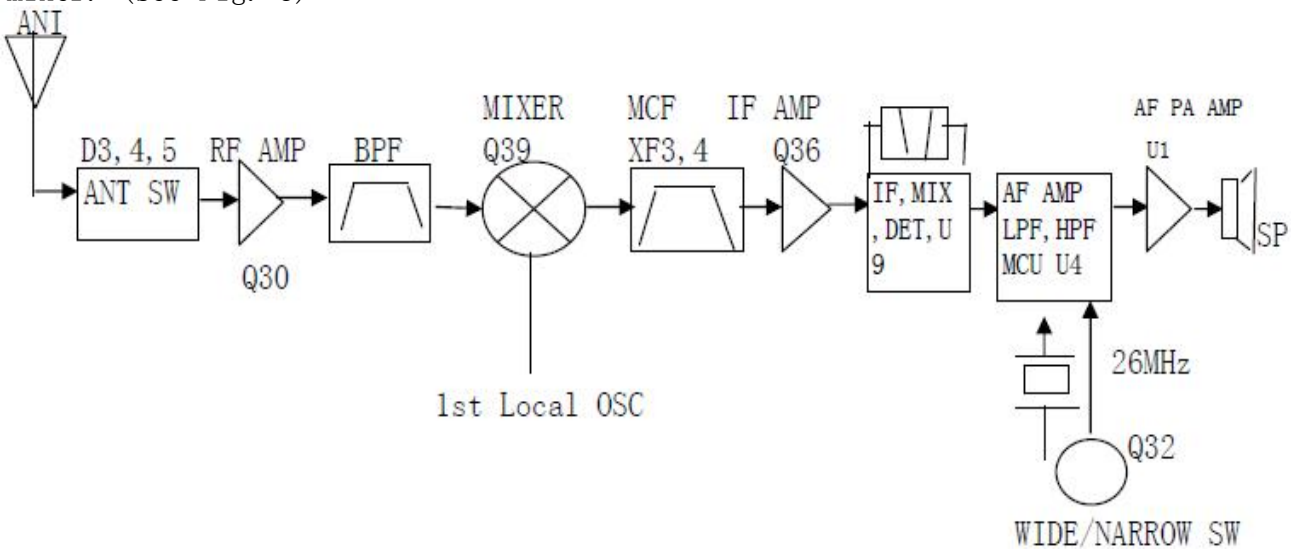



Fig.3 Receiver section configuration

### 2) First mixer

The signalfrom the RF amplifier is heterodyned with the first local oscillator signal from the PLL frequency synthesizer circuit at the first mixer(Q39)to create a 26.450MHz first intermediate frequency(1st IF)signal. The first IF signal is then fed through two monolithic crystal filters(XF3,XF4)to further remove spurious signals.

### 3) IF amplifier

The first IF signal is amplified by Q36, and then enters U9(FM processing IC). The signal is heterodyned again with a second .local oscillator signal within U9 to create a 450KHz second IF signal. The second IF signal is then fed through a 450KHz ceramic filter(CF1) to further eliminate unwanted signals before it is amplified and FM detected in U9.

### 4) AF amplifier

The recovered AF signal obtained from U9 is amplified by MCU U4 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 (U1).

### 5) Squelch

Part of the AF signal from the IC enters the FM ic again, and produce the corresponding noise level Q37 by R124 to go to the analog port of the microprocessor(U4). U4 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, U4 sends a highsignal to the MUTE and AFCO lines through LCD-Q2, Q5, Q6. (see Fig. 4)

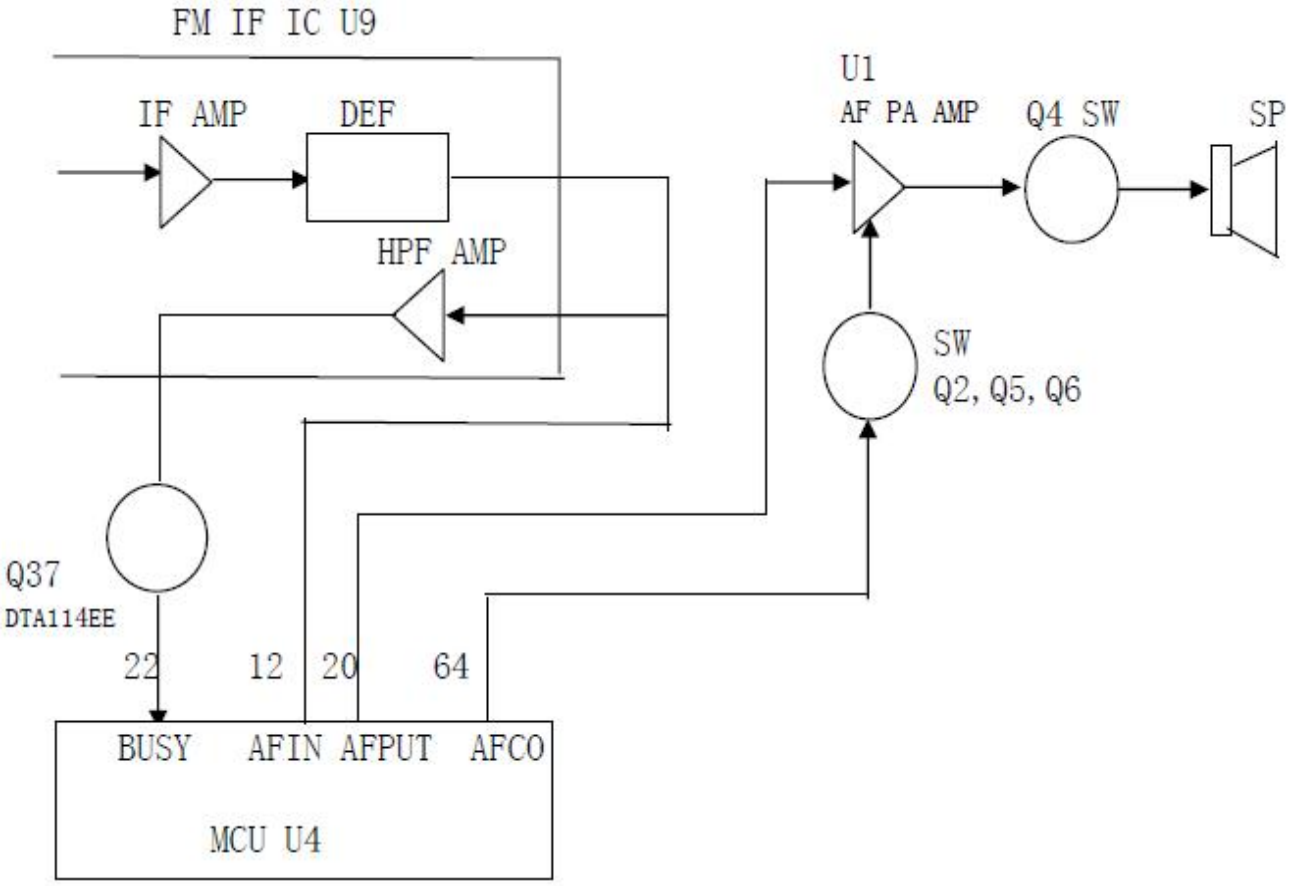



Fig.4 AF Amplifier and squelch

6) Receive signaling

QT/DQT

300Hz and higher audio frequencies of the output signal from IF IC are entered the microprocessor(MCU-U4). MCU-U4 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 13MHz reference oscillator signal is divided at U10 by a fixed counter to produce the 5 or 6.25KHz reference requency. The voltage controlled oscillator(VCO)output, The signal is buffer amplified by Q51.Then divided in U10by a dual-module programmable counter.The divied signal is compared in phase with the5 or 6.25khz reference signal in the phase comparator in U10.The output signal from the phase comparator is filtrered through a low-pass filter and passed to the VCO to control the oscillator frequency. (see Fig. 5)

2) VCO

The operating frequency is generated by Q50 in transmit mode and Q49 in receive mode. The oscillator frequency is controlled by applying the VCO control voltage. obtained from the phase comparator, to the varactor diodes(D27, D28 in transmit

mode and D22,D23 in receive mode). In transmit mode causing RX-V supplied and turn Q24 on, In transmit mode causing TX-V supplied and turn Q22 on. The outputs from Q49, Q50 are amplified by Q45 and sent to the buffer amplifiers.

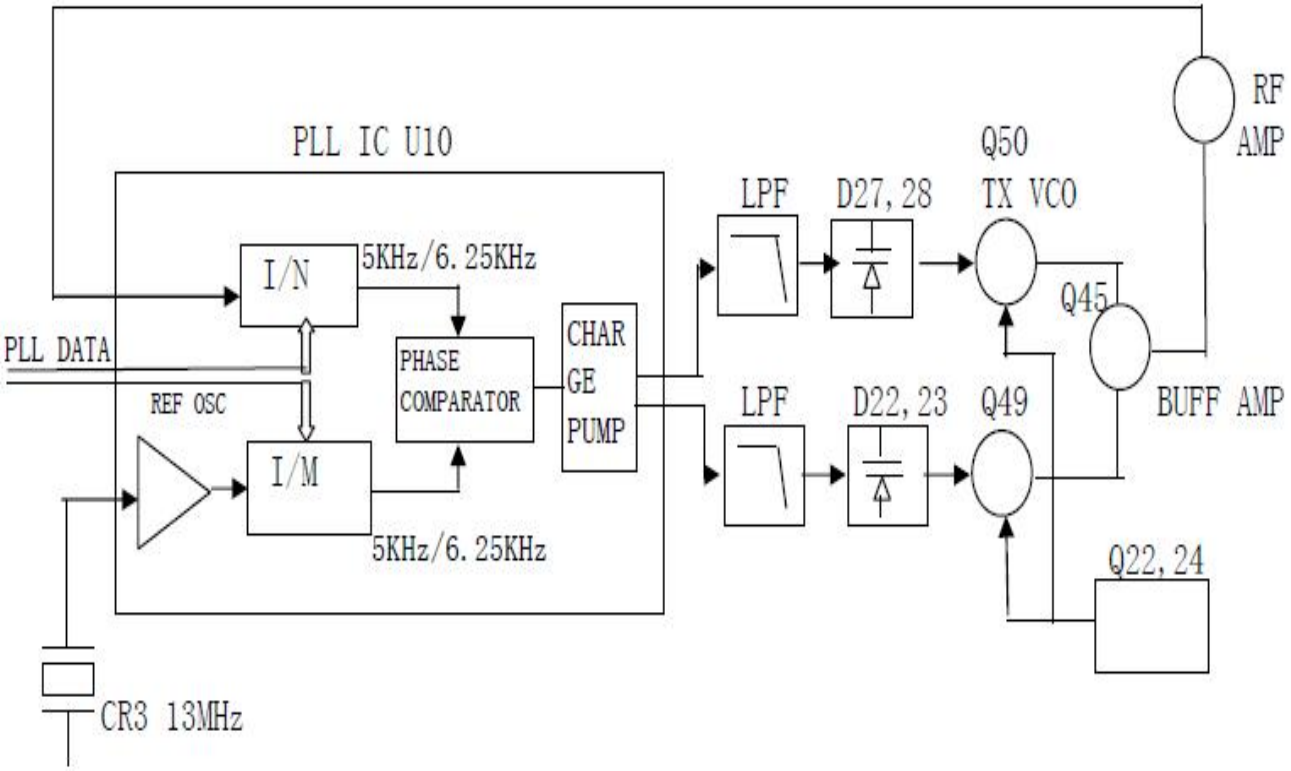



Fig.5 PLL circuit

## 4. Transmitter

### 1) Transmit audio

The modulation signal from the microphone is amplified by U7(B), passes through a preemphasis circuit, and amplified by the other U7(A)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 MCU-U4 and FM-modulated to the PLL reference signals, 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)

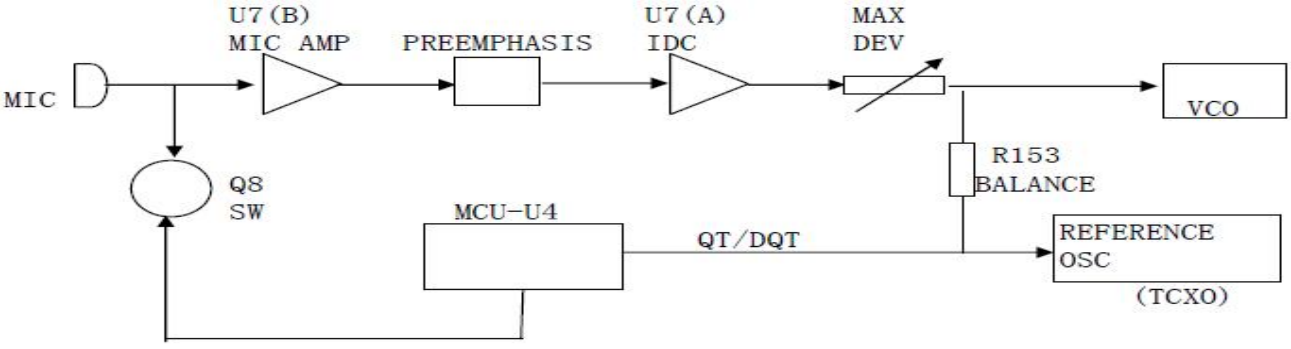


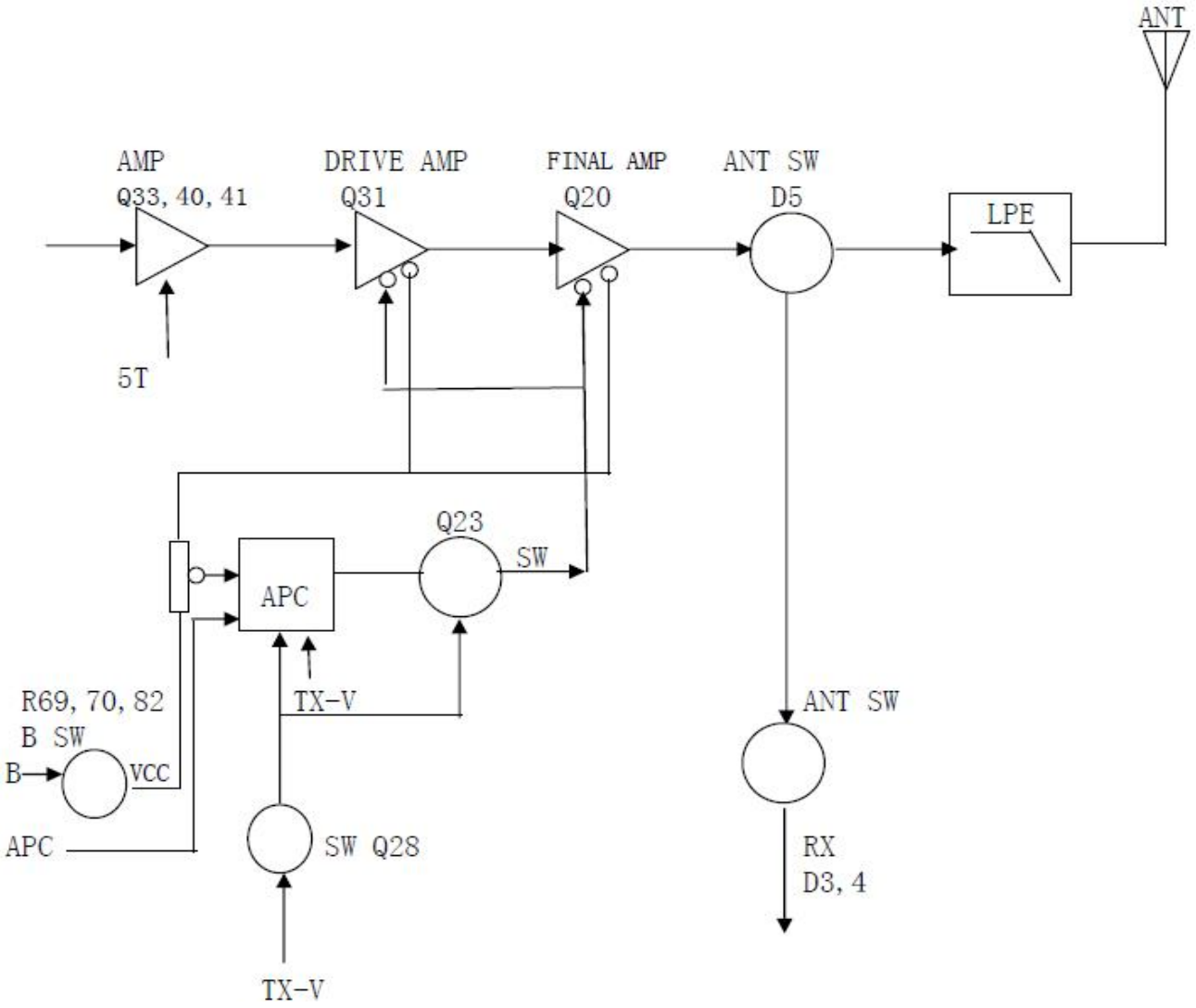

Fig.6 Transmit audio QT/DQT

### 3) VCO and RF amplifier

The transmit signal obtained from the VCO buffer amplifier Q45, is amplified by Q33,40,41. This amplified signal is passed to the power amplifier, Q20 and Q31, which consists of a 2-stage FET amplifier and is capable of producting up to 5W of RF power. (see Fig.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 D3,D4 and D5. D5 turned on(conductive) in transmit mode and off(isolated) in receive mode.




### 5) APC

The automatic power control(APC) circuit stablilizes the transmitter output power at a predetermined level by sensing the drain current of the final amplifier Field Effect Transistor(FET). The voltage comparator, U8(B), compares the voltage which is set using the microprocessor. An APC voltage and the reference voltage appears at the output of U8(A). 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 microprcessor which

in turn changes the reference voltage and hence, the output power.

5. Power supply

The battery power source is internally regulated by the circuit(Q7-5)and output 5Wdc. This 5V DC is also supplied to the microprocessor(Q7-5A) and reset circuit (MCU-Q16). 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 VCD).

6. Control system

The microprocessor(MCU-U4)is operating at a clock of 32.768KHz. This microprocessor controls the EEPROM data transfer, PLL data and other various functions.

| BOM chart | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| Model | EM-9735 | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| NO. | Part NO. | | Specificat | Semicond | Ref.NO. | Bottom partNO. | | pins |
| 1 | 0P5 | 0P5 | 0402A | CAP | C109, C132, C206, C207, C208 | | | 5 |
| 2 | 0P75 | 0P75 | 0402A | CAP | C223 | | | 1 |
| 3 | 1P | 1P | 0402A | CAP | C91, C110, C117, C129, C131, C179 | | | 6 |
| 4 | 1P5 | 1P5 | 0402A | CAP | C75, | | | 2 |
| 5 | 2P | 2P | 0402A | CAP | C133, | | | 2 |
| 6 | 3P | 3P | 0402A | CAP | C116, C218 | | | 2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7 | 5P | 5P | 0402A | CAP | C148, C163, C164, C177, C178, C216, C227, C232 | | | 8 |
| 8 | 8P | 8P | 0402A | CAP | C93, C169 | | | 2 |
| 9 | 10P | 10P | 0402A | CAP | C67, C147, C189 | C73 | C73 | 4 |
| 10 | 12P | 12P | 0402A | CAP | C120 | | | 1 |
| 11 | 15P | 15P | 0402A | CAP | C162 | C46, C61 | C46, C61 | 3 |
| 12 | 24P | 24P | 0402A | CAP | C85 | | | 1 |
| 14 | 27P | 27P | 0402A | CAP | C124 | C137 | C137 | 2 |
| 15 | 47P | 47P | 0402A | CAP | C42, C96 | | | 2 |
| 16 | 68P | 68P | 0402A | CAP | C39 | | | 1 |
| 17 | 82P | 82P | 0402A | CAP | C82, C122, C142 | | | 3 |
| 18 | 100P | 100P | 0402A | CAP | C3, C92, C200, C211, C212, C221, C228, C230 | | | 8 |
| 19 | 220P | 220P | 0402A | CAP | C143, C191 | C5, C17, C28, C125, C126 | C5, C17, C28, C125, C126 | 7 |
| 20 | 330P | 330P | 0402A | CAP | C78, C128 | C23, C44 | C23, C44 | 4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21 | 470P | 470P | 0402A | CAP | C16, C38, C47, C50, C103, C111, C121, C134, C146, C151, C153, C156, C168, C176, C180, C181, C188, C202, C209, C210, C237 | C27, C52, C83, C101, C135, C167 | C27, C52, C83, C101, C135, C167 | 27 |
| 22 | 680P | 680P | 0402A | CAP | C173 | | | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 23 | 102P | 102P | 0402A | CAP | C20, C88, C99, C105, C106, C107, C114, C130, C149, C150, C154, C165, C190, C193, C194, C196, C197, C198, C199, C222, C225, C229, C231, C235, C236 | C34, C72, C76, C86, C98, C113, C139, C233, C234 | C34, C72, C76, C86, C98, C113, C139, C233, C234 | 34 |
| 24 | 332P | 332P | 0402A | CAP | C171, C174 | | | 2 |
| 25 | 103P | 103P | 0402A | CAP | C11, C49, C66, C95, C112, C140, C141, C144, C152, C161, C175, C182, C187, C242 | C21, C32, C79, C108 | C21, C32, C79, C108 | 18 |
| 26 | 223P | 223P | 0402A | CAP | C90, C172, C224 | C70, C80, R1 | C70, C80, R1 | 6 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 27 | 273P | 273P | 0402A | CAP | C205, C213, C244 | | | 3 |
| 28 | 473P | 473P | 0402A | CAP | C2 | C123 | C123 | 2 |
| 29 | 104P | 104P | 0402A | CAP | C10, C48, C55, C57, C58, C89, C100, C102, C115, C127, C136, C138, C155, C166, C185, C192, C247 | C29, C36, C37, C43, C53, C54, C60, C71, C81, C87, C104, C158, R5 | C29, C36, C37, C43, C53, C54, C60, C71, C81, C87, C104, C158, R5 | 30 |
| 30 | 224P | 224P | 0402A | CAP | | C19 | C19 | 1 |
| 31 | 474P | 474P | 0402A | CAP | | C6 | C6 | 1 |
| 32 | 105P | 105P | 0402A | CAP | C203, C204, C239, C245 | | | 4 |
| 33 | 1P | 1P | 0603A | CAP | C9, C12, C14 | | | 3 |
| 34 | 2P | 2P | 0603A | CAP | C31, C33 | | | 2 |
| 35 | 2P5 | 2P5 | 0603A | CAP | C8 | | | 1 |
| 36 | 3P | 3P | 0603A | CAP | C215 | | | 1 |
| 37 | 4P | 4P | 0603A | CAP | C7, C15, C63 | | | 3 |
| 38 | 5P | 5P | 0603A | CAP | C64, C217 | | | 2 |
| 39 | 5P6 | 5P6 | 0603A | CAP | C13 | | | 1 |
| 40 | 7P | 7P | 0603A | CAP | C26, C41 | | | 2 |
| 41 | 18P | 18P | 0603A | CAP | C40 | | | 1 |
| 42 | 22P | 22P | 0603A | CAP | C45 | | | 1 |
| 43 | 33P | 33P | 0603A | CAP | C62 | | | 1 |
| 44 | 47P | 47P | 0603A | CAP | C220 | | | 1 |
| 45 | 51P | 51P | 0603A | CAP | C30, C69 | | | 2 |
| 46 | 470P | 470P | 0603A | CAP | C22, C35 | | | 2 |
| 47 | 102P | 102P | 0603A | CAP | C94 | | | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 48 | 333P | 333P | 0603A | CAP | | C65 | C65 | 1 |
| 49 | 0P5 | 0P5 | 0805A | CAP | L54 | | | 1 |
| 50 | 22P | 22P | 0805A | CAP | C51 | | | 1 |
| 51 | 0U22F | 0U22F | 0805A | TAIYOU CAI | E21 | | | 1 |
| 52 | 1UF | 1UF | 0805A | TAIYOU CAI | E18 | | | 1 |
| 53 | 2U2F | 2U2F | 0805A | TAIYOU CAI | E11, E16, E22 | E10 | E10 | 4 |
| 54 | 4U7F | 4U7F | 0805A | TAIYOU CAI | E19, E20 | | | 2 |
| 55 | 10UF | 10UF | 0805A | TAIYOU CAI | E23, E25 | E6, E13, E15 | E6, E13, E15 | 5 |
| 56 | 0U1F | 0U1F | A | KEMET | E24, E26 | | | 2 |
| 57 | 2U2F | 2U2F | A | KEMET | E27 | | | 1 |
| 58 | 4U7F | 4U7F | A | KEMET | | E9 | E9 | 1 |
| 59 | 10UF | 10UF | A | KEMET | E3, E5, E8, E14 | E7, E17 | E7, E17 | 6 |
| 60 | 22UF | 22UF | B | KEMET | E2, E4 | | | 2 |
| 61 | 0R | 0R | 0402A | Resister | C241, R101, R183, R213, R214, R229 | R6, R13, R29, R39, R234 | R6, R13, R29, R39, R234 | 11 |
| 62 | 10R | 10R | 0402A | Resister | R4, R108, R147, R173, R195, R196 | | | 6 |
| 63 | 22R | 22R | 0402A | Resister | R111, R139, R182, R188 | | | 4 |
| 64 | 47R | 47R | 0402A | Resister | R10, R75, | | | 4 |
| 65 | 100R | 100R | 0402A | Resister | R206, R211 | R44, R60, R134, R142 | R44, R60, R134, R142 | 6 |
| 66 | 220R | 220R | 0402A | Resister | R102, R138 | R2, R34 | R2, R34 | 4 |
| 67 | 270R | 270R | 0402A | Resister | R17, R18, R150 | | | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 68 | 330R | 330R | 0402A | Resister | R54, R55, R110, R120, R132 | | | 5 |
| 69 | 470R | 470R | 0402A | Resister | R45, R48, R144 | R11, R24, R119, R143 | R11, R24, R119, R143 | 7 |
| 70 | 560R | 560R | 0402A | Resister | R197, R216 | R42, R43 | R42, R43 | 4 |
| 71 | 680R | 680R | 0402A | Resister | R100, R122 | | | 2 |
| 72 | 1K | 1K | 0402A | Resister | R14, R20, R88, R151, R152, R154, R166, R177, R198, R199, R200, R208, R221 | R12, R23, R26, R27, R124 | R12, R23, R26, R27, R124 | 18 |
| 73 | 1K2 | 1K2 | 0402A | Resister | | C4, R59 | C4, R59 | 2 |
| 74 | 1K5 | 1K5 | 0402A | Resister | R121 | R64 | R64 | 2 |
| 75 | 1K8 | 1K8 | 0402A | Resister | R212 | | | 1 |
| 76 | 2K | 2K | 0402A | Resister | R112 | R135 | R135 | 1 |
| 77 | 2K2 | 2K2 | 0402A | Resister | | R52 | R52 | 1 |
| 78 | 2K7 | 2K7 | 0402A | Resister | R89, R215 | R7, R106 | R7, R106 | 4 |
| 79 | 3K3 | 3K3 | 0402A | Resister | R78, R141, R145, R148, R149, R155, R164, R179 | R113, R115 | R113, R115 | 10 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 80 | 4K7 | 4K7 | 0402A | Resister | R162, R174, R207 | R16, R63, R85, R114 | R16, R63, R85, R114 | 7 |
| 81 | 5K1 | 5K1 | 0402A | Resister | | R66 | R66 | 1 |
| 82 | 5K6 | 5K6 | 0402A | Resister | R163 | R25 | R25 | 1 |
| 83 | 6K8 | 6K8 | 0402A | Resister | R217 | R62, R109 | R62, R109 | 3 |
| 84 | 10K | 10K | 0402A | Resister | C201, L52, R21, R126, R128, R136, R140, R156, R165, R171, R178, R231, R232 | R19, R32, R73 | R19, R32, R73 | 16 |
| 85 | 15K | 15K | 0402A | Resister | R230 | R47 | R47 | 2 |
| 86 | 18K | 18K | 0402A | Resister | | R57 | R57 | 1 |
| 87 | 22K | 22K | 0402A | Resister | R99, R185, R191, R201, R202, R203 | R65 | R65 | 7 |
| 88 | 27K | 27K | 0402A | Resister | R190 | | | 1 |
| 89 | 30K | 30K | 0402A | Resister | | R53, R95 | R53, R95 | 2 |
| 90 | 33K | 33K | 0402A | Resister | R40, R158, R159, R160, R161, R204, R210 | R58 | R58 | 8 |
| 91 | 39K | 39K | 0402A | Resister | R76, R233 | | | 2 |
| 92 | 47K | 47K | 0402A | Resister | R15, R30, | R77, R86, | R77, | 17 |
| 93 | 56K | 56K | 0402A | Resister | R209 | R103 | R103 | 2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 94 | 68K | 68K | 0402A | Resister | R92 | R223 | R223 | 1 |
| 95 | 82K | 82K | 0402A | Resister | | R56 | R56 | 1 |
| 96 | 100K | 100K | 0402A | Resister | R90, R94, R157, R184, R187, R189, R224, R225 | R36, R125 | R36, R125 | 10 |
| 97 | 120K | 120K | 0402A | Resister | | R49 | R49 | 1 |
| 98 | 150K | 150K | 0402A | Resister | R104, R222 | R31, R33 | R31, R33 | 4 |
| 99 | 180K | 180K | 0402A | Resister | | R83, R123 | R83, R123 | 2 |
| 100 | 220K | 220K | 0402A | Resister | R127, R153 | R22, R116, R133 | R22, R116, R133 | 5 |
| 101 | 270K | 270K | 0402A | Resister | | R28 | R28 | 1 |
| 102 | 330K | 330K | 0402A | Resister | R131 | | | 1 |
| 103 | 470K | 470K | 0402A | Resister | R118 | R3 | R3 | 2 |
| 104 | 680K | 680K | 0402A | Resister | | R61 | R61 | 1 |
| 105 | 1M | 1M | 0402A | Resister | | R46, R72 | R46, R72 | 2 |
| 106 | 1M8 | 1M8 | 0402A | Resister | R170, R172 | | | 2 |
| 107 | 0R | 0R | 0603A | Resister | | L9 | L9 | 1 |
| 108 | 47R | 47R | 0603A | Resister | L35 | | | 1 |
| 109 | 150K | 150K | 0603A | Resister | | R67, R68, R79, R80, | R67, R68, | 6 |
| 110 | 220K | 220K | 0603A | Resister | | R97 | R97 | 1 |
| 111 | 0R | 0R | 0805A | Resister | L38, R41 | | | 2 |
| 112 | 0R39 | 0R39 | R1206 | Resister | R69, R70, R82 | | | 3 |
| 113 | 50K | 50K | RV1 | varistor | RV2 | RV1 | RV1 | 2 |
| 114 | 2N2H | 2N2H | 0603A | HF lamina | L25 | | | 1 |
| 115 | 15NH | 15NH | 0603A | HF lamina | L31, L36 | | | 2 |
| 116 | 18NH | 18NH | 0603A | HF lamina | L33, L39 | | | 2 |
| 117 | 22NH | 22NH | 0603A | HF lamina | L41, L56 | | | 2 |
| 118 | 47NH | 47NH | 0603A | HF lamina | L7 | | | 1 |
| 119 | 82NH | 82NH | 0603A | coil | L23 | | | 1 |
| 120 | 100NH | 100NH | 0603A | HF lamina | L8, L18, L46, L47, L55 | L10 | L10 | 6 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 121 | 101T | 101T | 0603A | bead | | L15, L16, L57 | L15, L16, L57 | 3 |
| 122 | 120NH | 120NH | 0603A | coil | L20 | | | 1 |
| 123 | 120NH | 120NH | 0603A | laminate | L45 | | | 1 |
| 124 | 220NH | 220NH | 0603A | F laminat | L29, L32 | | | 2 |
| 125 | 1UH | 1UH | 0603A | laminate | L50 | | | 1 |
| 126 | 6U8H | 6U8H | 0603A | INDUCTOR | L40, L42, L49, L53 | | | 4 |
| 127 | 10UH | 10UH | 0603A | INDUCTOR | L12 | | | 1 |
| 128 | 12UH | 12UH | 0603A | INDUCTOR | L11, L21, L24 | | | 3 |
| 129 | 2N2H | 2N2H | 0805A | INDUCTOR | R71 | | | 1 |
| 130 | 15NH | 15NH | 0805A | INDUCTOR | L17 | | | 1 |
| 131 | 22NH | 22NH | 0805A | INDUCTOR | L22, L28, L30, L34 | | | 4 |
| 132 | 33NH | 33NH | 0805A | INDUCTOR | L44 | | | 1 |
| 133 | 39NH | 39NH | 0805A | INDUCTOR | L51 | | | 1 |
| 134 | 100NH | 100NH | 0805A | INDUCTOR | L43 | | | 1 |
| 135 | 101T | 101T | 0805A | bead | L14, L26 | | | 2 |
| 136 | R22 | R22 | 0805A | coil | L5 | | | 1 |
| 137 | 1R0 | 1R0 | 0805A | coil | L27 | | | 1 |
| 138 | 2R2J | 2R2J | 0805A | coil | L37 | | | 1 |
| 139 | 1UH | 1UH | 1210 | INDUCTOR | | L1 | L1 | 1 |
| 140 | 0.4*1.5*3T | 0.4*1.5*3T | 4T | Loops | L4 | | | 1 |
| 141 | 0.4*1.5*4T | 0.4*1.5*4T | 4T | Loops | L2, L3, | | | 3 |
| 142 | 0.4*1.5*8T | 0.4*1.5*8T | 10T | Loops | L19 | | | 1 |
| 143 | 4148 | 4148 | ESC | DIODE | D13, D14 | | | 2 |
| 144 | HSC277 | HSC277 | ESC | DIODE | D3, D4, D11, D12, D15, D16 | D6 | D6 | 7 |
| 145 | GRE | GRE | LED | ED-GREEN | | D1 | D1 | 1 |
| 146 | LED | LED | LED | LED-ORANGE | | D10, D17, D18, D24, D25 | D10, D17, D18, D24, D25 | 5 |
| 147 | RED | RED | LED | LED-RED | | D2 | D2 | 1 |
| 148 | BA592 | BA592 | USC | DIODE | D5 | | | 1 |
| 149 | B0 | B0 | USCV | DIODE | D19, D22, D23, D27, D28 | | | 5 |
| 150 | BB639 | BB639 | USCV | DIODE | D7, D8 | | | 2 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 151 | 2SC4617 | 2SC4617 | ESM | Dynatron | Q42, Q43, Q44, Q46 | Q10, Q18 | | 6 |
| 152 | 2SK1824 | 2SK1824 | ESM | Dynatron | Q47, Q52 | | | 2 |
| 153 | DTC114EE | DTC114EE | ESM | Dynatron | Q6, Q26, Q27 | Q1, Q2, Q3, Q14, Q23, Q28 | Q1, Q2, Q3, Q14, Q23, Q28 | 9 |
| 154 | DTA114EE | DTA114EE | ESM | Dynatron | | Q8, Q32, Q37 | Q8, Q32, Q37 | 3 |
| 155 | RQA0009 | RQA0009 | HWSON-2 | Power tub | Q20 | | | 1 |
| 156 | BF1212 | BF1212 | SOT343 | Dual-grid | Q30, Q39 | | | 2 |
| 157 | 2SK3078 | 2SK3078 | SOT89 | Dynatron | Q31 | | | 1 |
| 158 | 5A | 5A | SOT89 | stabilivol | Q7 | | | 1 |
| 159 | 3A | 3A | SOT89 | stabilivolt | Q9 | | | 1 |
| 160 | 2SK1588 | 2SK1588 | SOT89 | Dynatron | | Q4 | Q4 | 1 |
| 161 | 2SB624 | 2SB624 | TSM | Dynatron | Q25 | Q16, Q22, Q24 | | 4 |
| 162 | R25 | R25 | TSM | Dynatron | Q33 | | | 1 |
| 163 | 2SK508 | 2SK508 | TSM | Dynatron | Q49, Q50 | | | 2 |
| 164 | 2SA1362 | 2SA1362 | TSM | Dynatron | Q5 | | | 1 |
| 165 | 2SC4226 | 2SC4226 | USM | Dynatron | Q11, Q13, Q17, Q40, Q41, Q45, Q48, Q51 | | | 8 |
| 166 | 1SS372 | 1SS372 | USM | Dynatron | | Q12, Q15, Q21 | Q12, Q15, Q21 | 3 |
| 167 | 2SC4215 | 2SC4215 | USM | Dynatron | Q35 | Q36 | Q36 | 2 |
| 168 | MCU | MCU | QFP80 | chip | | U4 | U4 | 1 |
| 169 | 24C16 | 24C16 | SO8 | IC | | U3 | U3 | 1 |
| 170 | 4558 | 4558 | SO8 | IC | | U7 | U7 | 1 |
| 171 | 7368F | 7368F | SSOP10 | IC | U1 | | | 1 |
| 172 | 4116 | 4116 | SSOP16 | IC | U9 | | | 1 |
| 173 | LMX2331 | | SSOP20 | IC | U10 | | | 1 |
| 174 | TA2104 | | SSOP24 | IC | U6 | | | 1 |
| 175 | NJM2904 | | SSOP8 | IC | | U8 | | 1 |
| 177 | 5A/A | | F6100A5A | FLITER | U5 | | | 1 |
| 178 | 450K | | CF5 | CERAMIC FI | CF1 | | | 1 |
| 179 | J10.7 | | F6100J107 | ransistor | CR1 | | | 1 |
| 180 | 32.768KHZ | | MC-146 | ransistor | | CR4 | | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 181 | 13M | X3225 | TCXO | CR3 | | 1 |



# ADJUSTMENT

## Required Test Equipment

### 1.Stablilized 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 7.5 V.

### 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 Countnter)

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:50Ω, 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.

### 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: 1MΩ 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 to
3)Output impedance: 50Ω

## 12. Tracking Generator

1) Center frequency: 50Khz to 500MHz.
2) Frequency deviation: ±35MHz
3) Output voltage: 100mV or more

## 13. Dummy load

1) 8Ω,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.

Squelch Level, S meter Level, Lo Power, Hi Power, CTCSS Deviation, Deviation,and Battery warning.

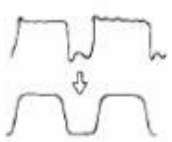
**Section common to the transmitter and receiver (VCO)**

| Item | Condition | Measurement | | Adjustment | | Specifications/ Remarks |
|---|---|---|---|---|---|---|
| | | Test equipment | Terminal | Parts | Method | |
| 1. Setting | Power supply voltage Battery terminal:6.5V | | | | | |
| 2.VCO lock Voltage | CH: TX low | Digital voltmeter | TC2 | CV3000 | 2.8V | ±0.1V |
| | CH: RX low | | | | 2.8V | ±0.1V |
| | CH: TX high | | | | check | More than 0.6V |
| | CH: RX high | | | | | |

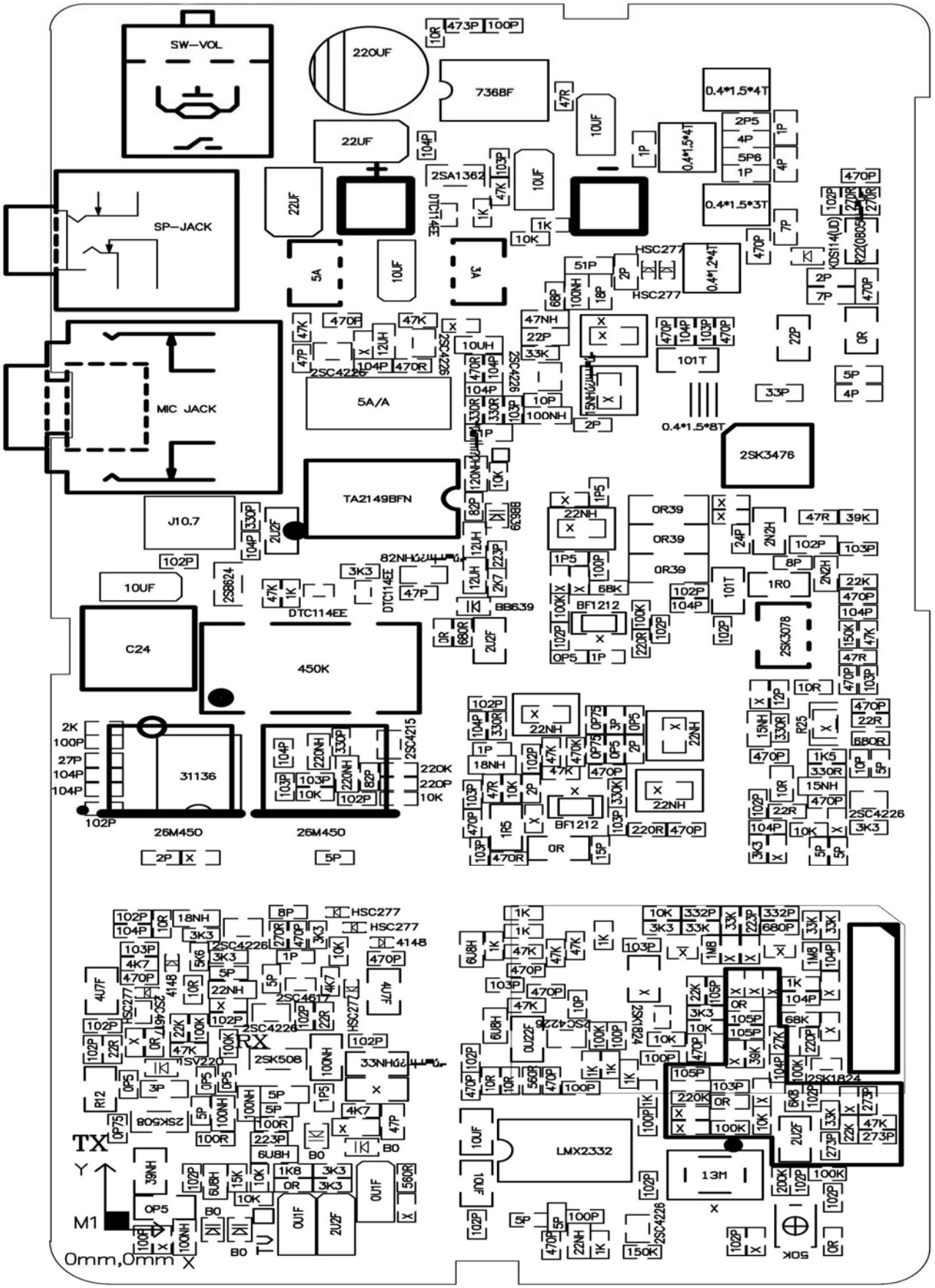
## Receiver Section

| Item | Condition | Measurement | | Adjustment | | Specifications/ Remarks |
|---|---|---|---|---|---|---|
| | | Test equipment | Terminal | Parts | Method | |
| 1.Band-pass filter | 1) CH: RX center<br>2) Tra generator output –40dB<br>Connect the spectrum analyzer to TP2 terminal | Tar generator<br>Spectrum analyzer | ANT<br>TP | L3013<br>L3014<br>L3015<br>L2016 | Adjust to the spectrum waveform shown Fig1 | |
| 2. AF level | 1) CH: RX center<br>SSG output: -53dBm(501uV)<br>MOD: 1KHz<br>DEV: ±3.0KHz (Wide)<br>±1.5KHz (Narrow) | SSG<br>Oscilloscope<br>AF. V. M<br>Distortion meter | ANT<br>SP | | Adjust to the MAX AF level | |
| 3. Sensitivity | 1)CH: RX center<br>CH: RX LO CH: RX Hi<br>SSG:<br>output :-125dBm(0.15uV)<br>MOD: 1KHz<br>DEV: ±3.0KHz(Wide)<br>±1.5KHz (Narrow) | | | | Check | SINAD: 12dB or higher |
| 4. Squelch Level (PC Mode) | 1)CH: RX center<br>MONI:ON | | | PC key | Level 9<br>Adjust to close the squelch | The squelch must be closed. |
| | 2)Level 9<br>SSG output:<br>-122dBm(0.16uV) | | | | Level 3<br>Adjust to close the squelch | |

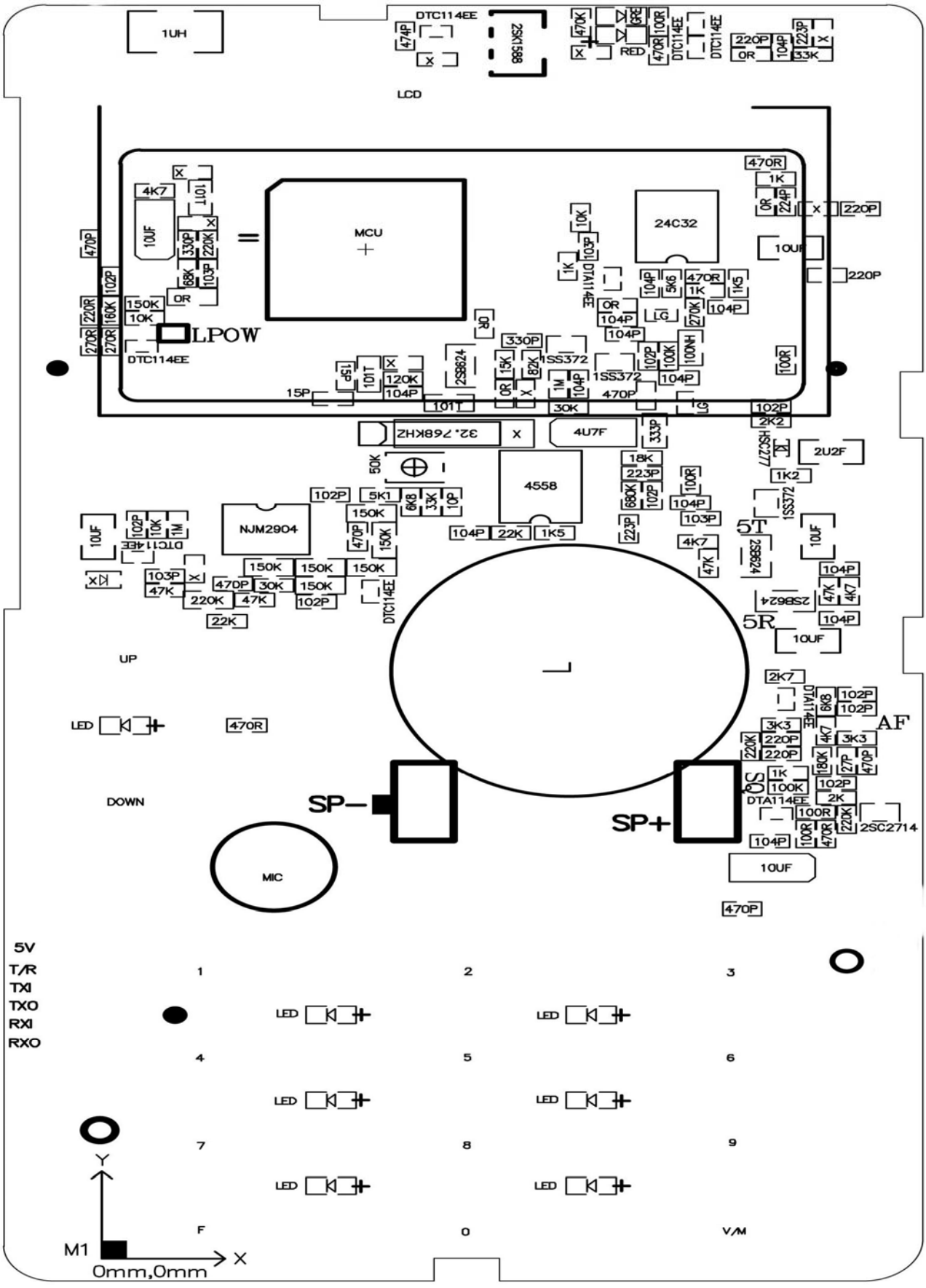
## Transmitter section

| Item | Condition | Measurement | | Adjustment | | Specifications/ Remarks |
|---|---|---|---|---|---|---|
| | | Test equipment | Terminal | Parts | Method | |
| 1.Transmit Frequency (PC Mode) | 1) CH: TX center PTT: ON | Frequency counter | | PC key | Adjust to center frequency | within ±300Hz |
| 2. CTCSS balance | 1) CH: TX center | Modulation Analyzer or linear detector(LPF:3KHz) Oscilloscope | ANT | VR1000 | Rectify the waveform to square wave |  |
| 3. Power (PC Mode) | 1) CH:TX center Battery terminal: 6.5V PTT: ON | Power meter Ammeter | | | Adjust it to 3.0W | ±0.5W |
| 4.MAX DEV | 1) CH: TX center AG: 1kHz/120mV PTT: ON | Modulation analyzer or linear detector (LPF:15kHz) Oscilloscope AG AF. V. M | ANT MIC | VR1000 | Adjust it to ± 2.2kHz | ±50Hz ±1.8kHz~2.2kHz |
| 5. MIC SENS | 1) CH: TX center AG: 1kHz/12mV | | | | Check (+, - Peak whichever is Maximum) | ±1.1kHz~1.8kHz |
| 6. CTCSS DEV (PC MODE) | 1) CH: TX center | Modulation analyzer or linear detector (LPF:3kHz) Oscilloscope AG AF. V. M | ANT | PC key | Adjust it to ± 0.35kHz | ±50Hz |

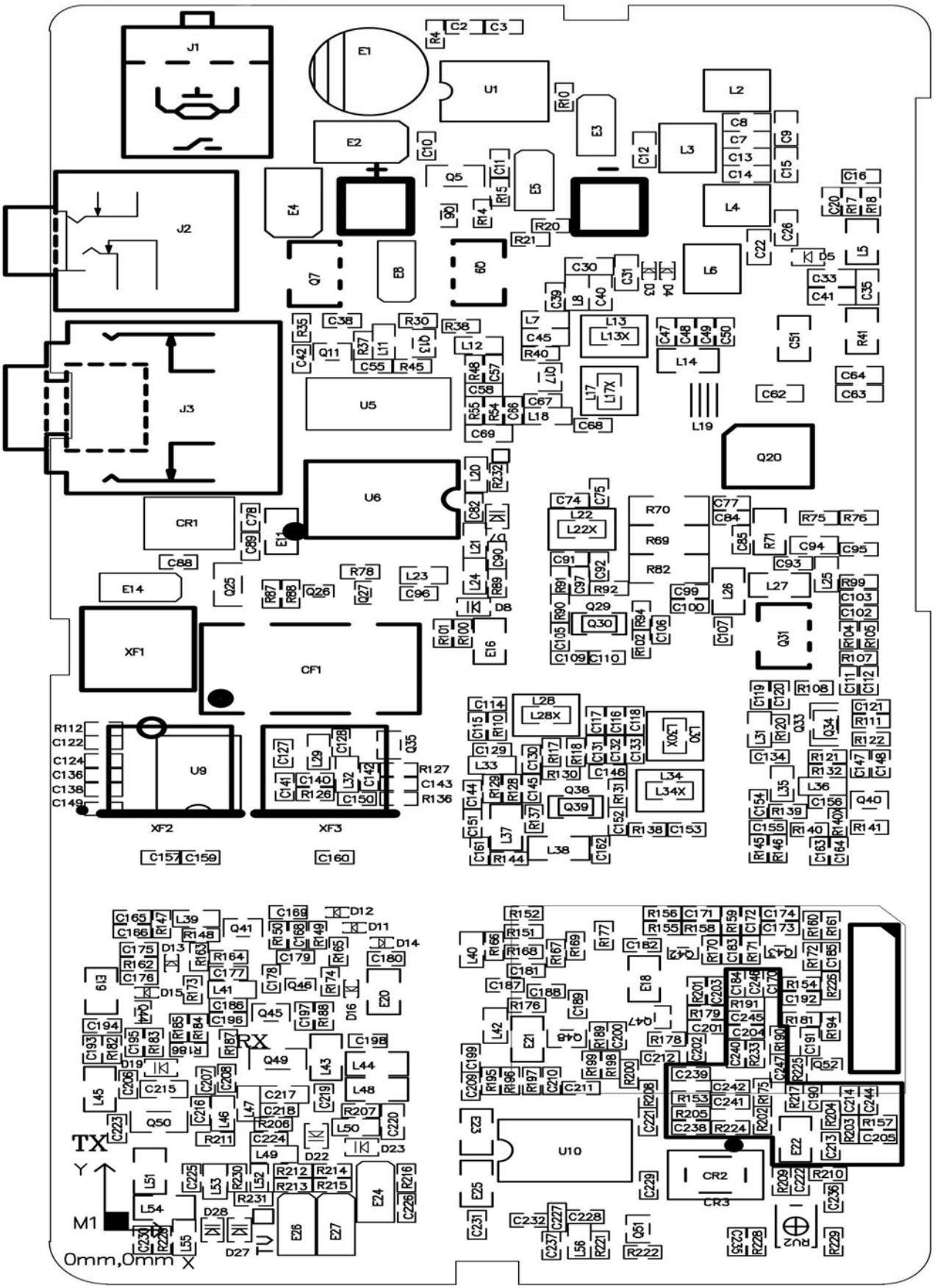
EM-9735 TOP


SW-VOL
SP-JACK
MIC JACK
220UF
22UF
7368F
TA2149BFN
J10.7
C24
450K
31136
26M450
26M450
2SK3476
2SK3078
2SK1824
2SK508
2SC4226
2SC4215
BF1212
LMX2332
13M
TX
RX
TV
M1
0mm,0mm

EM-9735 BOT


1UH
DTC114EE
2SK1588
LCD
MCU
24C32
LPOW
DTC114EE
2SB624
1SS372
4U7F
32.768KHZ
4558
NJM2904
UP
DOWN
LED
470R
SP-
SP+
MIC
AF
5T
5R
2SC2714
5V
T/R
TXI
TXO
RXI
RXO
Y
M1
X
0mm,0mm

# EM-9735 TOP


J1
J2
J3
E1
E2
E3
E4
E5
E6
E7
E8
U1
U5
U6
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L2
L3
L4
L5
L6
L7
L8
L10
L11
L12
L13
L13X
L14
L17
L17X
L18
L19
L20
L21
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L22X
L23
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L26
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L28
L28X
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Q33
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Q35
Q38
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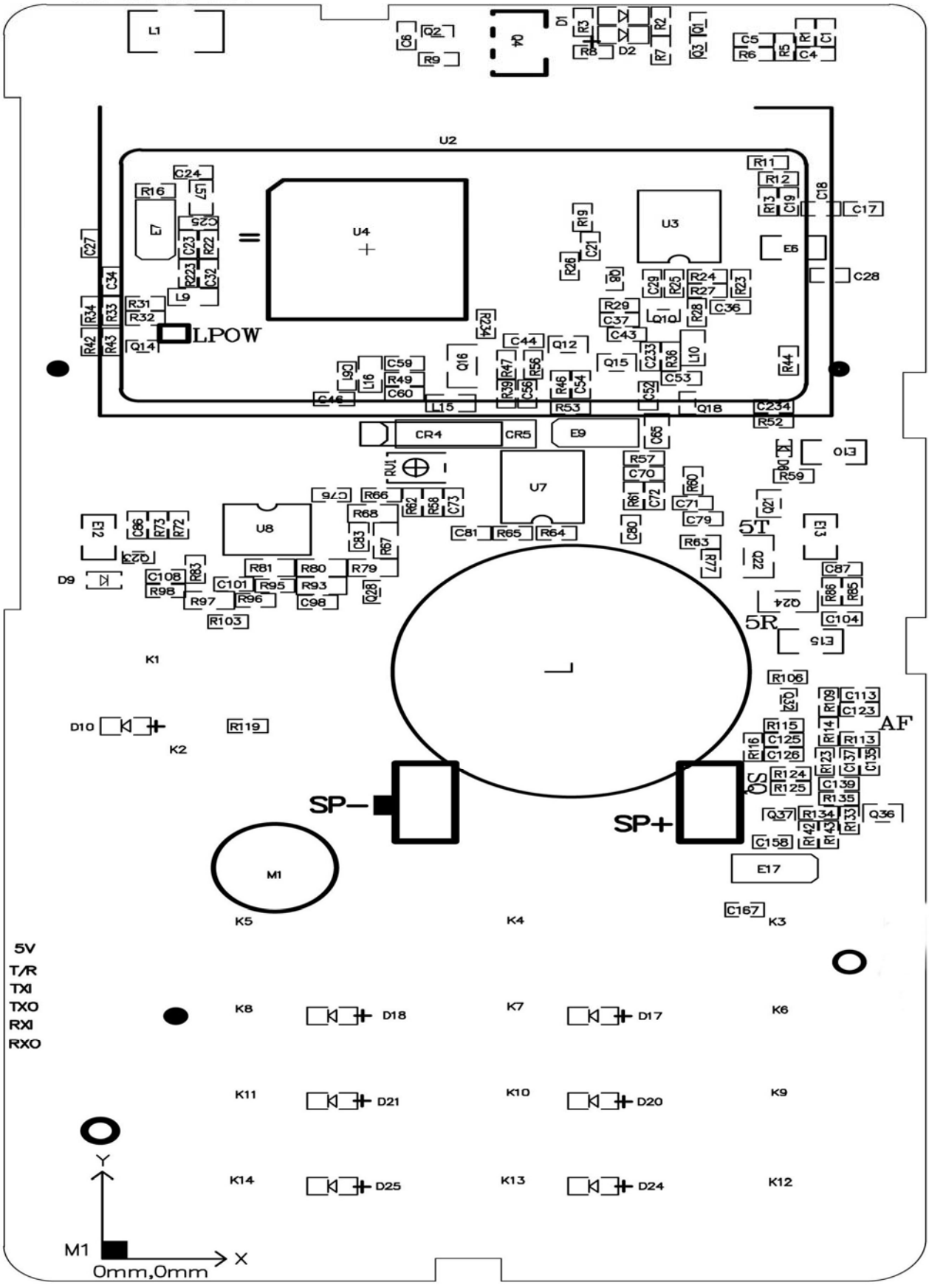
Q40
Q41
Q44
Q45
Q46
Q47
Q48
Q49
Q50
Q51
Q52
D3
D4
D5
D8
D11
D12
D13
D14
D15
D16
D19
D22
D23
D27
D28
CR1
CR2
CR3
XF1
XF2
XF3
CF1
RX
TX
TV
M1
0mm,0mm
Y
X

EM-9735 BOT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U3
U7
U8
LPOW
SP-
SP+
M1
5T
5R
AF
K1
K2
K3
K4
K5
K6
K7
K8
K9
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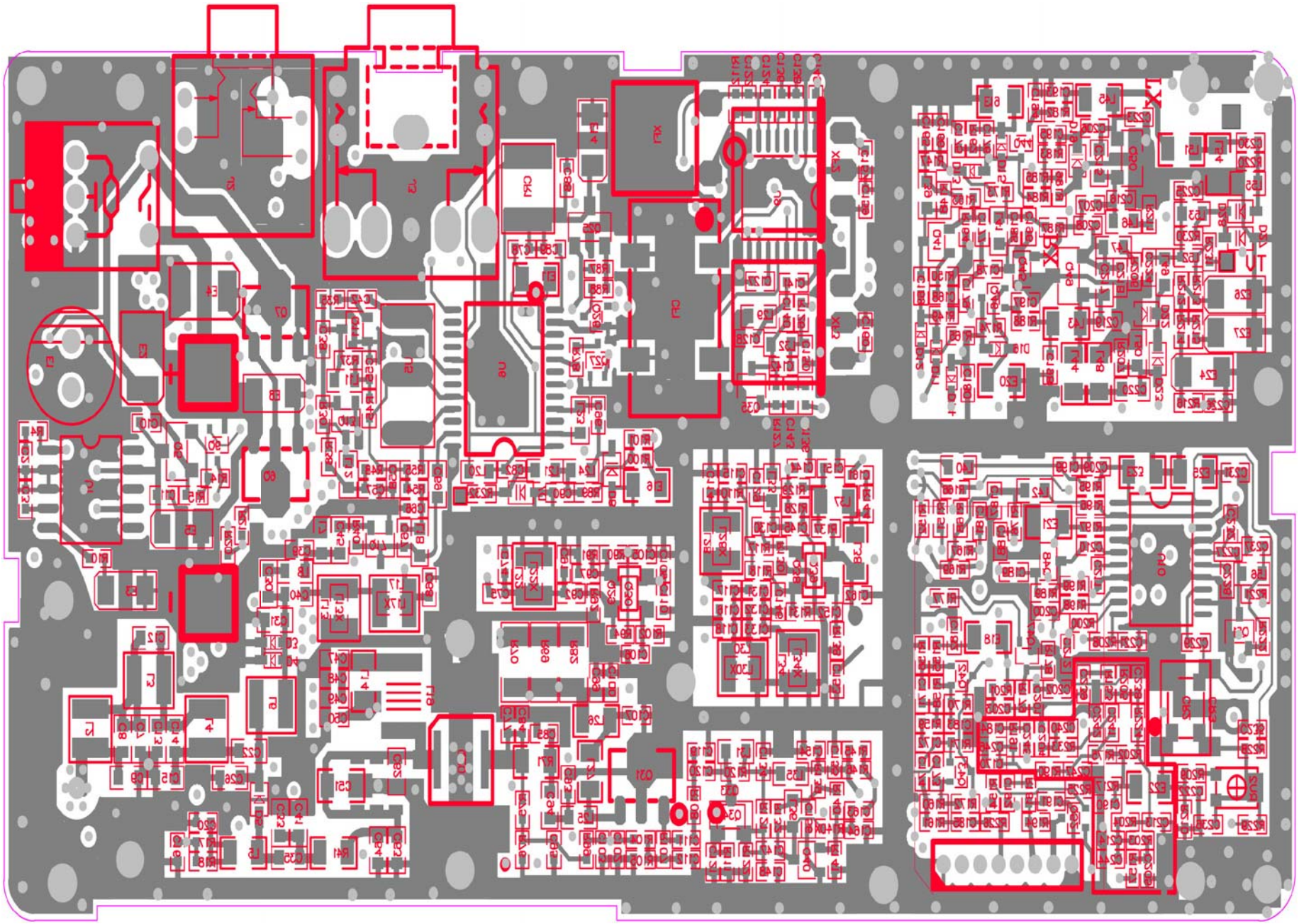
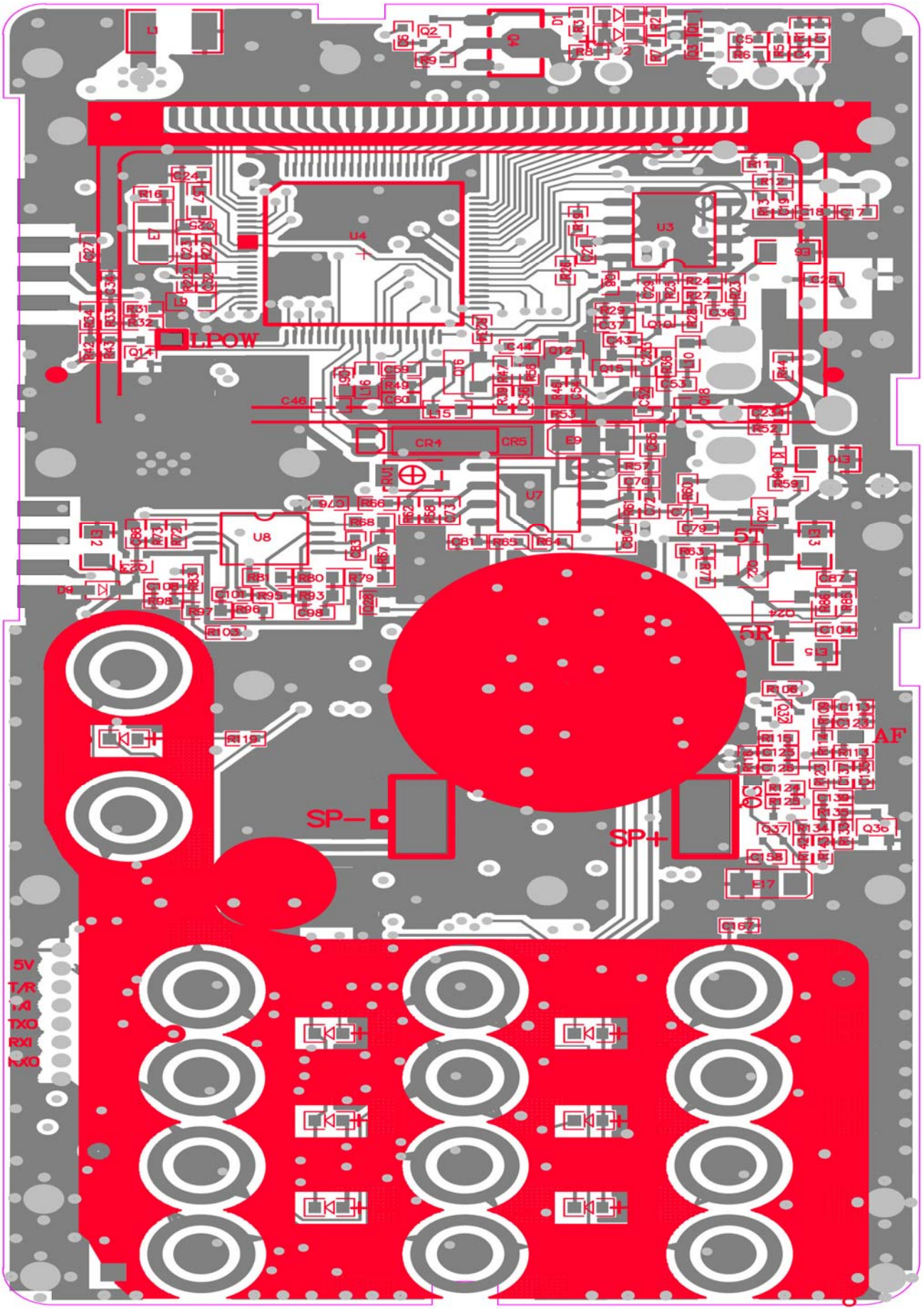
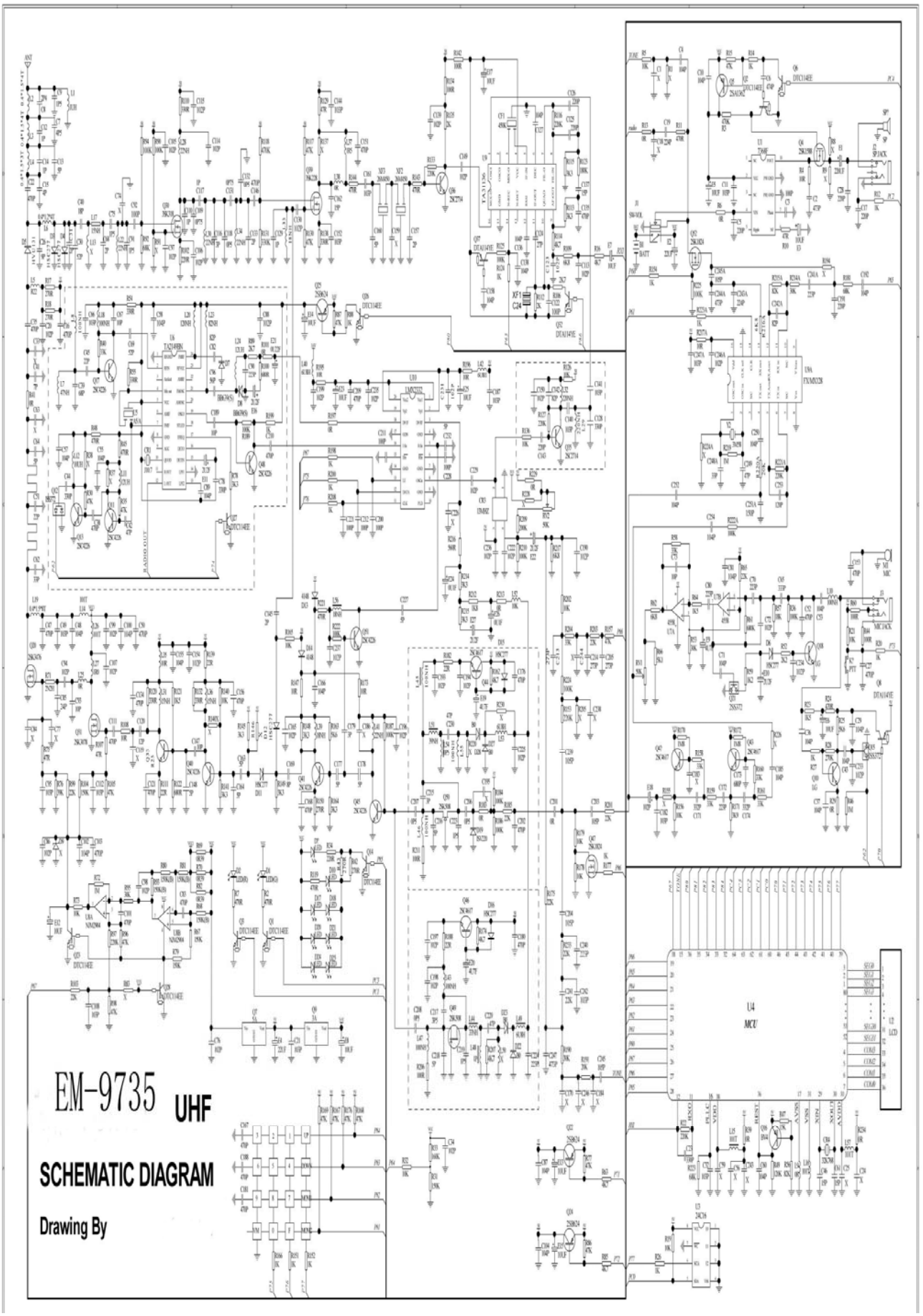
TXO
RXI
RXO
Y
X
M1
0mm,0mm




LPOW
SP-
SP+
AF
5V
T/R
TXO
RXI
NXO


EM-9735 UHF
SCHEMATIC DIAGRAM
Drawing By

# Specification

| | |
|---|---|
| **General** | |
| Frequency range | 433.075-434.775 MHz.<br>462.5625-467.7125MHz |
| Operation temperature | -20℃~+50℃ |
| DV Voltage | DC 7.4V |
| Form | With the frequently single worker or the different single worker frequently |
| Dimensions | 100(L)*55(W)*32(D)MM (no including antenna) |
| Weight | 220g (including battery) |
| Antenna Impedance | 50Ω |
| **Transmitter** | |
| Frequency offset | ± 5ppm |
| Output power | ⩽5W |
| Max. Freq. Deviation | ⩽5KHz |
| Audio distortion | ⩽5% |
| modulating characteristic | +3dB~ -3dB |
| adjacent-channel power | ⩾65dB |
| Spurious RF | ⩽7.5μW |
| Bandwidth | ⩽16KHz |
| **Receiver** | |
| Reference sensitivity | ＜0.2μV |
| Audio distortion | ⩽5% |
| Audio response | +2dB~ -10dB |
| Channel rejection | ⩾-8dB |
| Adjacent channel selecting | ⩾55dB |
| Intermodulation immunity | ⩾55dB |
| Spurious response immunity | ⩾55dB |
| Obstruction | ⩾85dB |

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