UHF FM TRANSCEIVER / UHF 调频手持对讲机

TK-3360

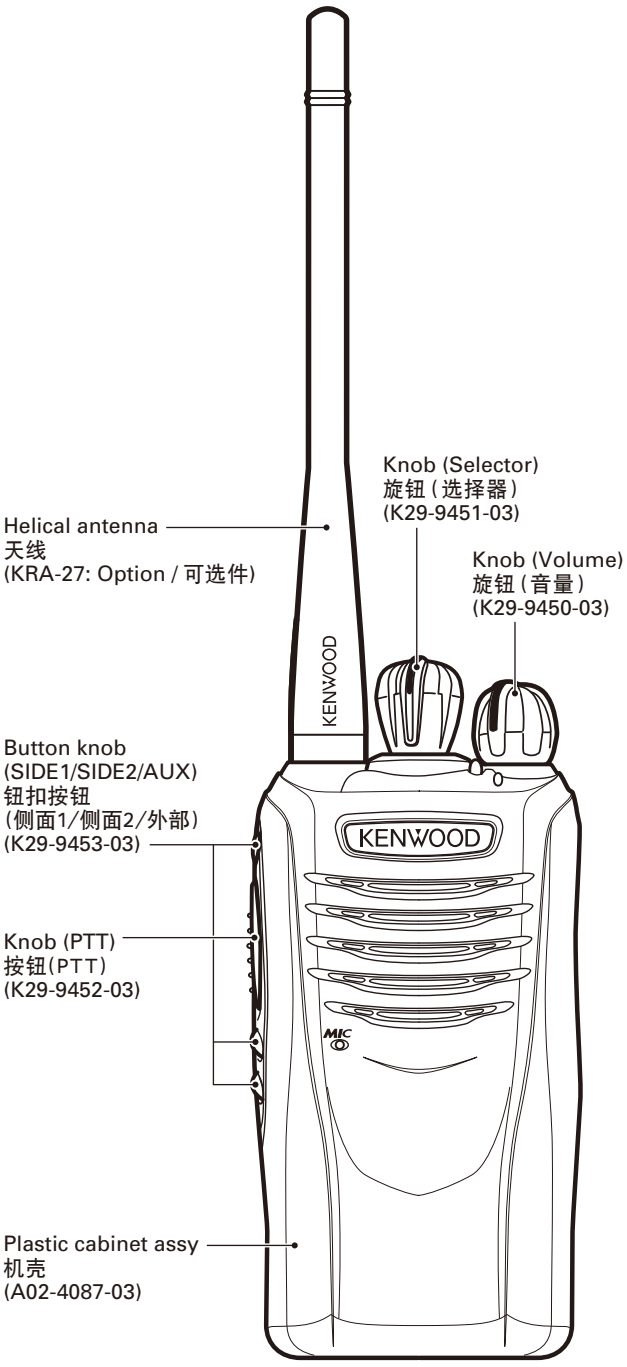
SERVICE MANUAL / 维修手册

C version / C 版本

KENWOOD

Kenwood Corporation

B51-8926-00 (N)



无铅焊接通信产品 LF
保护环境建伍领先

⚠ 注意：本产品是无铅化焊接产品
在维修时请使用无铅焊锡
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This product complies with the **RoHS** directive for the European market.

LF This product uses Lead Free solder.

CONTENTS / 目录

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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.

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.

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 atmosphere.
- This equipment should be serviced by a qualified technician only.

SERVICE

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

Model	Type	TX-RX unit	Frequency range	Remarks
TK-3360	C	X57-7790-11	400~470MHz	IF1: 49.95MHz LOC: 50.4MHz

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出版日期。在出版后可能发生变动，如果需要，可以参照《维修通报》或《手册修订本》进行补充。

替换零件的订购

当订购替换零件或设备资料时，应注意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。

个人安全

为了个人的安全，请注意下列事项：

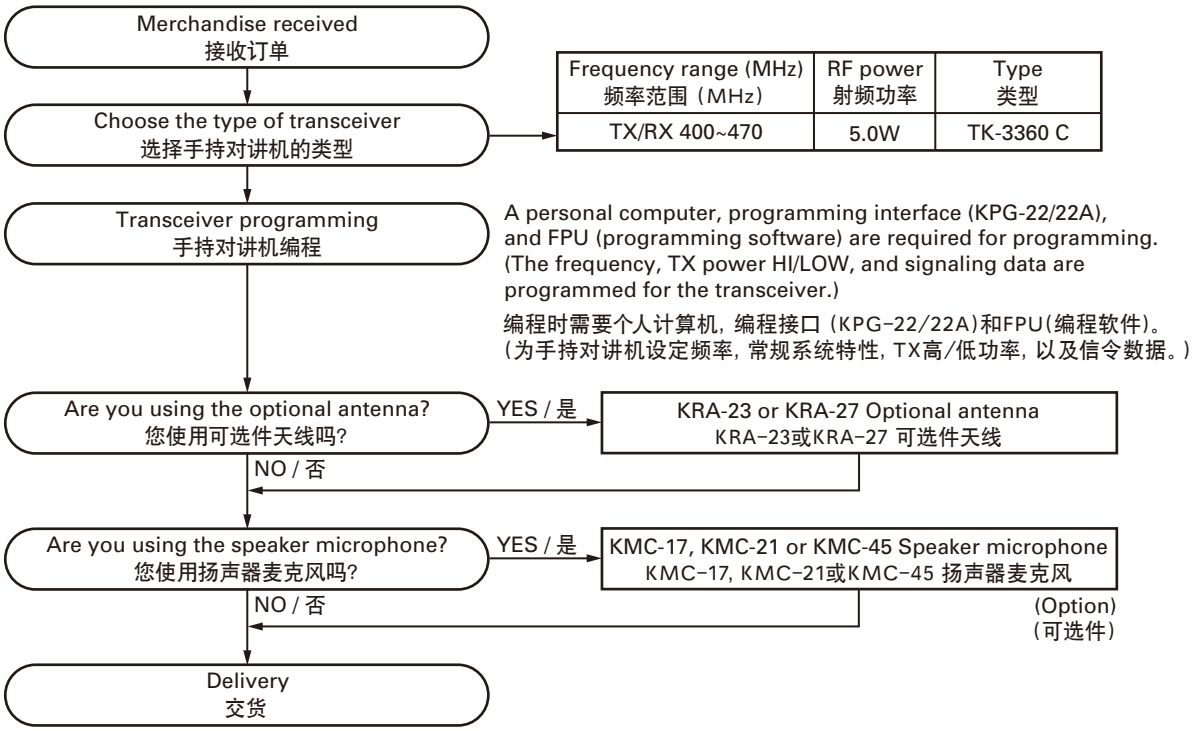
- 在没有认真核实所有射频插头之前或有任何一个脱开的插头没有连接到相应端口上的情况下均不要发射。
- 在电爆管附近或在易燃性气体环境中，必须关闭电源，不要操作本设备。
- 本设备只应该由有资格的技术人员进行维修。

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，印刷电路板图和调整步骤在内的资料供参考。

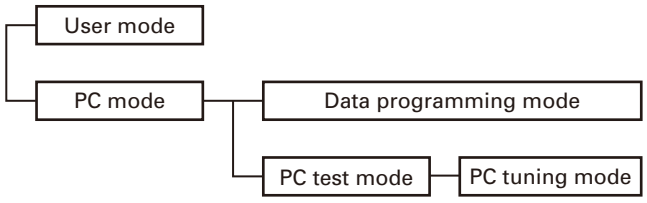
型 号	类型	收发单元	频率范围	备 注
TK-3360	C	X57-7790-11	400~470MHz	IF1:49.95MHz LOC:50.4MHz

SYSTEM SET-UP / 系统体系



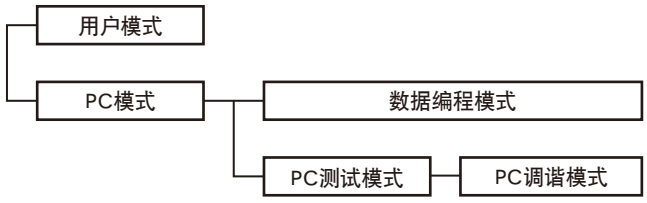
REALIGNMENT / 模式组合

1. Modes



Mode	Function
User mode	For normal use.
PC mode	Used for communication between the transceiver and PC.
Data programming mode	Used to read and write frequency data and other features to and from the transceiver.
PC test mode	Used to check the transceiver using the PC. This feature is included in the FPU.

1. 模式



模　式	功　能
用户模式	一般使用。
PC 模式	用于手持对讲机与计算机之间的通信。
数据编程模式	用于阅读和写入频率数据以及其他功能。
PC 测试模式	用于使用计算机检测。 此特性包括在 FPU 内。

REALIGNMENT / 模式组合

2. How to Enter Each Mode

Mode	Operation
User mode	Power ON
PC mode	Received commands from PC

2. 如何进入每一种模式

模　　式	操　　作
用户模式	接通电源
PC 模式	从计算机接收指令

3. PC Mode

3-1. Preface

The transceiver is programmed by using a personal computer, a programming interface (KPG-22/22A, USB adapter (KCT-53U)) and FPU (programming software).

The programming software can be used with a PC or compatible. Figure 1 shows the setup of a PC for programming.

3-2. Connection Procedure

1. Connect the transceiver to the personal computer with the interface cable and USB adapter (when the interface cable is KPG-22A, the KCT-53U can be used).

Note:

- You must install the KCT-53U driver in the computer to use the USB adapter (KCT-53U).
- When using the USB adapter (KCT-53U) for the first time, plug the KCT-53U into a USB port on the computer with the computer power ON.

2. When the POWER is switched on, user mode can be entered immediately. When the PC sends a command, the transceiver enters PC mode.
   When data is read from the transceiver, the red LED lights.
   When data is written to by the transceiver, the green LED lights.

Note:

- The data stored in the personal computer must match Model Name and Model Type when it is written into EEPROM.
- Do not press the [PTT] key during data transmission or reception.

3-3. KPG-22/KPG-22A Description (PC programming interface cable: Option)

The KPG-22/22A is required to interface the transceiver with the computer. It has a circuit in its D-sub connector (KPG-22: 25-pin, KPG-22A: 9-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-22/22A connects the SP/MIC connector of the transceiver to the RS-232C serial port of the computer.

3-4. KCT-53U Description (USB adapter: Option)

The KCT-53U is a cable which connects the KPG-22A to a USB port on a computer.

When using the KCT-53U, install the supplied CD-ROM (with driver software) in the computer. The KCT-53U driver runs under Windows 2000, XP or Vista (32-bit).

3. PC 模式

3-1. 前言

手持对讲机采用个人电脑、编程接口（KPG-22/22A，USB 适配器（KCT-53U））和 FPU（编程软件）进行编程。

编程软件可以在 PC 或兼容的 PC 上进行使用。图 1 给出了 PC 进行编程的设置。

3-2. 连接操作

1. 使用接口电缆和 USB 适配器将手持对讲机连接到个人电脑（接口电缆为 KPG-22A 时，可以使用 KCT-53U）。

注意：

- 必须在电脑上安装 KCT-53U 驱动程序才能使用 USB 适配器（KCT-53U）。
- 首次使用 USB 适配器（KCT-53U）时，请在电脑开机的情况下将 KCT-53U 插入电脑的 USB 端口。

2. 手持对讲机电源打开时，可以立即进入用户模式。PC 发送指令时，手持对讲机进入 PC 模式。
   手持对讲机发送数据时，红色的 LED 点亮。
   手持对讲机接收数据时，绿色的 LED 点亮。

注意：

- 个人电脑保存的数据写入 EEPROM 时，必须与机型和类型相符。
- 请勿在数据发送或接收期间按［PTT］键。

3-3. KPG-22/KPG-22A 说明（PC 编程接口电缆：选购件）

将手持对讲机与电脑相连需要 KPG-22/22A。该电缆的 D-sub 连接器（KPG-22：25 针，KPG-22A：9 针）盒具有将 RS-232C 逻辑电平转换为 TTL 电平的电路。

KPG-22/22A 将手持对讲机的 SP/MIC 连接器连接到电脑的 RS-232C 串行端口。

3-4. KCT-53U 说明（USB 适配器：选购件）

KCT-53U 是将 KPG-22A 连接到电脑 USB 端口的电缆。

使用 KCT-53U 时，请在电脑上安装附带的 CD-ROM（带有驱动程序软件）。KCT-53U 驱动程序在 Windows 2000, XP 或 Vista(32 位）下运行。

REALIGNMENT / 模式组合

3-5. FPU (Programming Software) Description

The FPU is the programming software for the transceiver supplied on a CD-ROM. This software runs under windows XP, Vista or 7 on a PC. The software on this disk allows a user to program the transceiver via Programming interface cable (KPG-22/22A).

3-6. Programming with PC

If data is transferred to the transceiver from a PC with the FPU, the data for each set can be modified.

Data can be programmed into the EEPROM in RS-232C format via the SP/MIC jack.

In this mode the PTT line operate as TXD and RXD data lines respectively.

3-5. FPU（编程软件）说明

FPU 是 CD-ROM 附带的用于手持对讲机的编程软件。该软件在 PC 的 Windows XP、Vista 或 7 下运行。该光盘上的软件允许用户通过编程接口电缆（KPG-22/22A）对手持对讲机进行编程。

3-6. 使用 PC 编程

如果使用 FPU 将数据从 PC 传输到手持对讲机，则每套手持对讲机的数据均可修改。

通过 SP/MIC 插孔可以将数据以 RS-232C 格式写入 EEPROM。

在该模式下，PTT 线路分别用作 TXD 和 RXD 数据线路。

List of FPU for transceiver

Model	Type	FPU
TK-3360	C	KPG-128D(C) (ver. 1.20 or later)

手持对讲机的 FPU 名单

型　号	类 型	FPU
TK-3360	C	KPG-128D(C)（ver. 1.20 或更高版本）

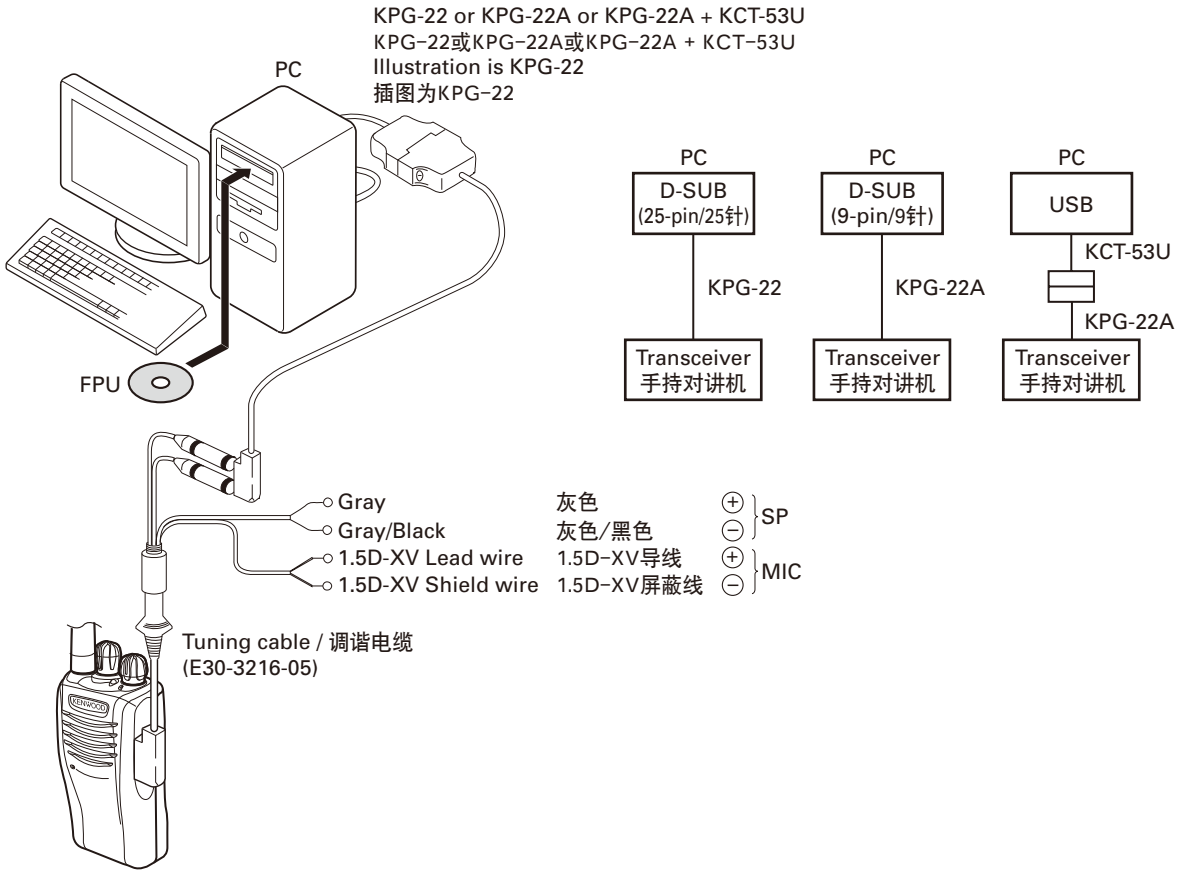


Fig. 1 / 图 1

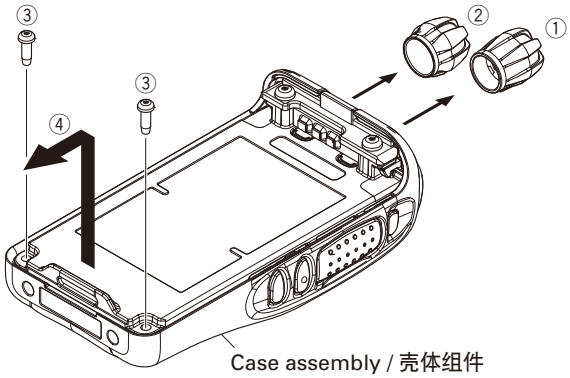
DISASSEMBLY FOR REPAIR / 维修拆卸

1. Removing the Case Assembly from the Chassis

1. Remove the selector knob ① and volume knob ②.
2. Remove the two screws ③.
3. Lift and remove the chassis from the case assembly ④.

1. 拆卸机壳

1. 拆下选择器旋钮 ① 和音量旋钮 ②。
2. 拆下两颗螺丝 ③。
3. 从壳体组件中提起并取出底座 ④。



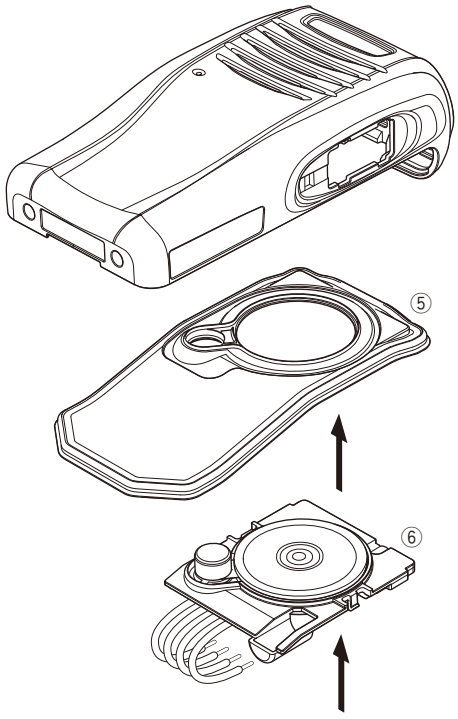
Case assembly / 壳体组件

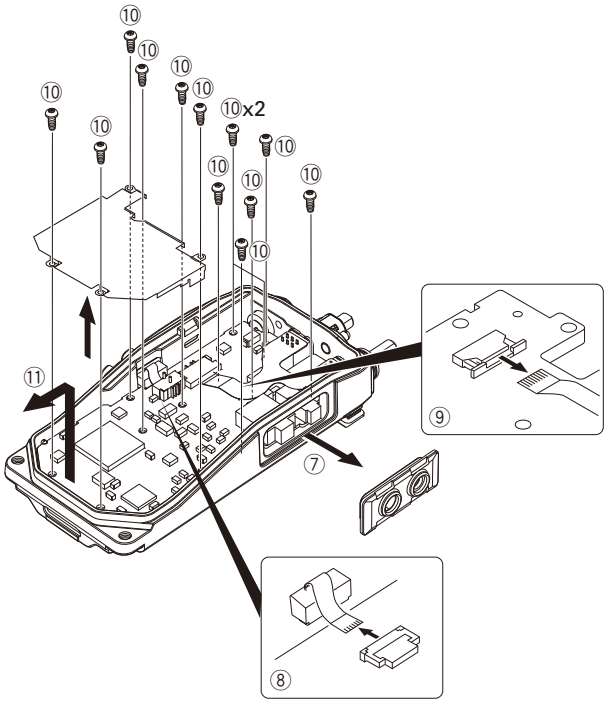
2. Removing the TX-RX unit from the Chassis

1. Remove the packing ⑤ from the chassis.
2. Remove the holder ⑥ from the chassis.
3. Detach the solder of speaker wire and mic wire from the PCB beforehand.
4. Remove the packing ⑦ from the SP/MIC jack of the TX-RX unit.
5. Remove the FPC from the flat cable connectors ⑧ ⑨.
6. Remove the 13 screws ⑩ fixing the TX-RX unit.
   Note: Take care not to put stress onto the FPC when removing the screw, as the FPC is sitting on the screw.
7. Lift and remove the TX-RX unit from the chassis ⑪.

2. 从底座取下收发单元

1. 从机架卸下橡胶垫 ⑤。
2. 从机架卸下支架 ⑥。
3. PC 板上取下卸下扬声器引线和麦克风引线上的焊锡。
4. 卸下 SP/MIC 的橡胶垫 ⑦。
5. 从扁平电缆连接器上卸下 FPC ⑧ ⑨。
6. 卸下固定收发单元的 13 个螺丝 ⑩。
   注意：拧下螺丝时，小心不要压迫到 FPC，因为 FPC 就位于螺丝之上。
7. 从机架抬起收发单元 ⑪。





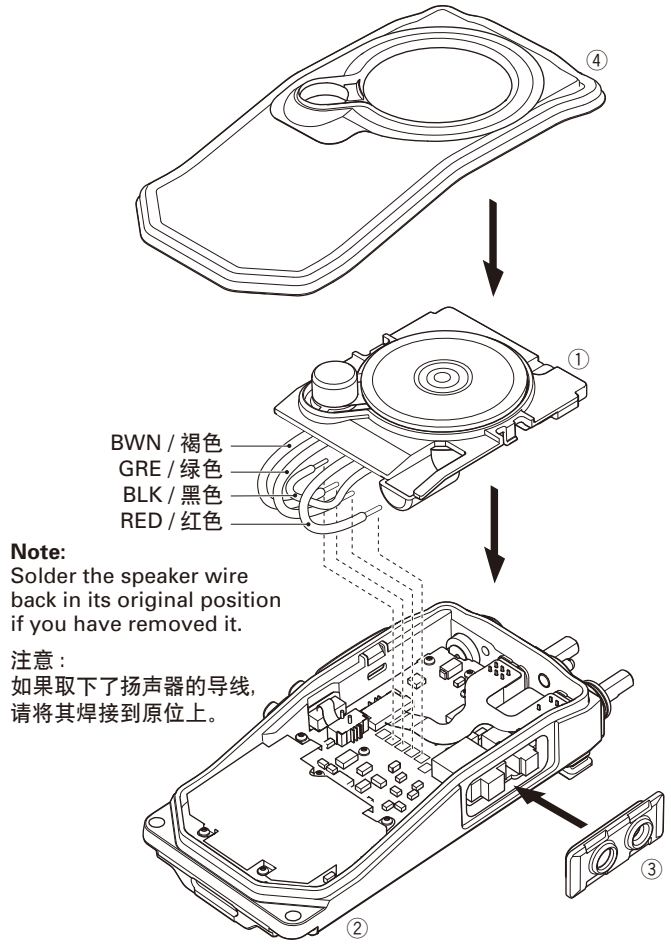
DISASSEMBLY FOR REPAIR / 维修拆卸

3. Mounting the Chassis to the Case Assembly

1. Mount the holder ① to the chassis ②.
   Confirm that the holder is securely locked to the chassis.
2. Insert the packing ③ to the phone jack side of the chassis.
   Confirm the mounting direction of packing.
3. Insert the packing ④ to the chassis.
   Confirm that the packing is securely inserted to the chassis and that it does not protrude out.
4. Insert the upper part of the chassis into the case assembly ⑤.
5. Press the chassis and the case assembly together to attach them.

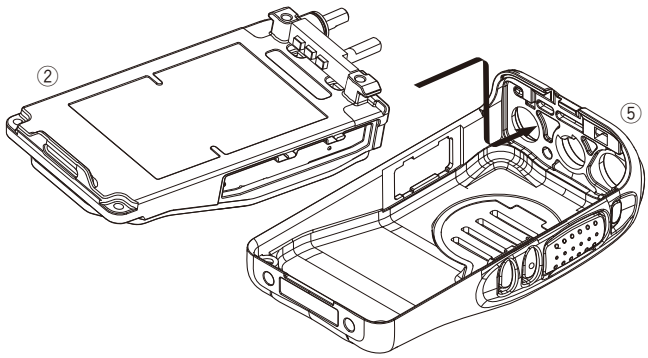
3. 将底座安装到壳体组件上

1. 把支架 ① 安装到机架 ② 上。
   确认支架是否确实锁定在机架上。
2. 把橡胶垫 ③ 插入到机架的 SP/MIC 插口里。
   确认橡胶垫的安装方向。
3 把橡胶垫 ④ 插入到机架里。
   确认橡胶垫④是否确实安装在机架上和是否突出。
4. 把机架上部插到机壳里 ⑤。
5. 按压机架，使机架和机壳成为一个整体。



Note:
Solder the speaker wire back in its original position if you have removed it.

注意 :
如果取下了扬声器的导线,
请将其焊接到原位上。



DISASSEMBLY FOR REPAIR / 维修拆卸

4. Attaching the Antenna Receptacle to the Chassis

Screw the antenna receptacle to the chassis in the order shown in the drawing so that the antenna receptacle comes to the center of the case hole.

4. 把天线座安装到机架

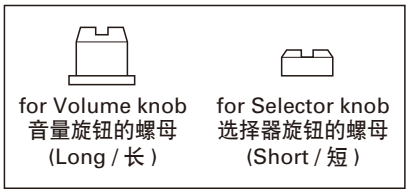
为了能把天线座安装到机芯孔的中心，在将天线座安装到机架时，请按照图示的顺序固定螺丝。

5. The Nuts of the Volume Knob and Selector Knob

Note that the shapes and heights of nuts of the volume knob and selector knob are different from one another.
Use the following jig when removing the nuts of the volume knob and selector knob.
• Jig (Part No.: W05-1012-00)

5. 关于音量旋钮和选择器旋钮的螺母

音量旋钮和选择器旋钮的螺母形状不同，颜色高度也不同，因此请注意。
另外，拆卸音量旋钮和选择器旋钮的螺母时，请使用下列夹具。
• 夹具（零件号：W05-1012-00）



CIRCUIT DESCRIPTION / 电路说明

1. Frequency Configuration

The receiver utilizes double conversion. The first IF is 49.95MHz and the second IF is 450kHz. The first Local oscillator is supplied from the PLL circuit.

The PLL circuit in the transmitter generates the necessary frequencies.

1. 频率构成

接收部采用二次变频超外差方式。第一中频为 49.95MHz，第二中频为 450kHz。第一本振频率信号由锁相环电路提供。

发射部由锁相环电路直接产生所需的频率。

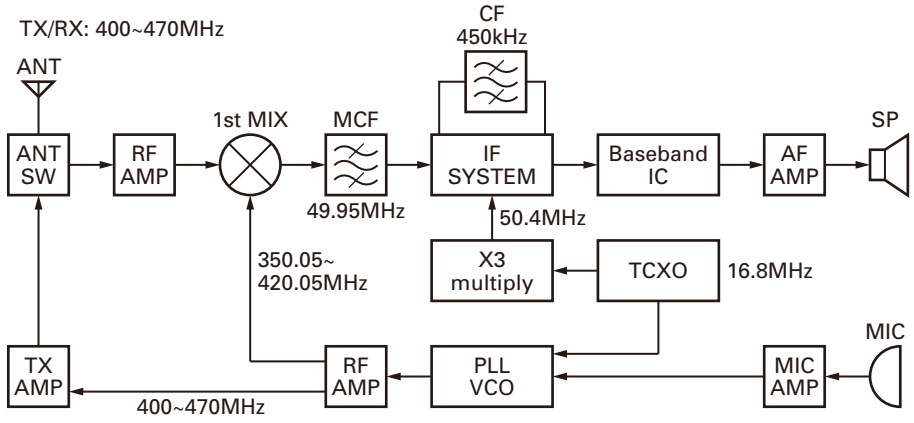


Fig. 1 Frequency configuration / 图 1 频率构成

2. Receiver System

The receiver system is shown in Figure 2.

2-1. Front End (RF Amplifier) Circuit

The signal coming from the antenna passes through the transmit/receive switching diode circuit (D201, D202, D203 and D204) and a BPF (L418 and L419), and is then amplified by the RF amplifier (Q407).

The resulting signal passes through a BPF (L413, L414 and L440) and goes to the mixer. These BPFs are adjusted by variable capacitors (D431, D410, D403, D404 and D405). The input voltage to the variable capacitor is a regulated voltage output from the DC amplifier (IC811).

2. 接收部系统

接收部系统的如图 2 所示。

2-1. 前端（高频放大器）电路

从天线接收的信号进入发送 / 接收转换开关二极管电路（D201、D202、D203 和 D204），然后通过 BPF（L418 和 L419），并且被射频放大器（Q407）放大。

此信号通过 BPF（L413、L414 和 L440）然后进入混频。这些 BPF 被可变电容器（D431、D410、D403、D404 和 D405）调整。输入可变电容器的电压被经直流放大器（IC811）的电压输出调整。

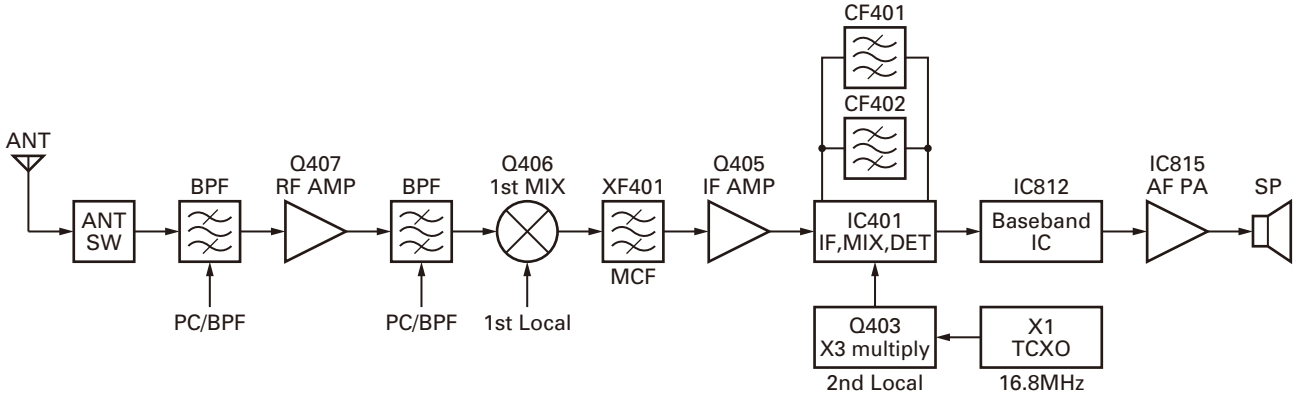


Fig. 2 Receiver system / 图 2 接收部系统

CIRCUIT DESCRIPTION / 电路说明

2-2. First Mixer

The signal from the front end is mixed with the first local oscillator signal generated in the PLL circuit by Q406 to produce a first IF frequency of 49.95 MHz.

The resulting signal passes through the XF401 MCF to cut the adjacent spurious and provide the optimum characteristics, such as adjacent frequency selectivity.

2-3. IF Amplifier Circuit

The first IF signal is passed through a four-pole monolithic crystal filter (XF401) to remove the adjacent channel signal. The filtered first IF signal is amplified by the first IF amplifier (Q405) and then applied to the IF system IC (IC401).

The IF system IC provides a second mixer, second local oscillator, limiting amplifier, quadrature detector and RSSI (Received Signal Strength Indicator). The second mixer mixes the first IF signal with the 50.4MHz of the second local oscillator output (TCXO X1) and produces the second IF signal of 450kHz.

The second IF signal is passed through the ceramic filter (Wide: CF402, Narrow: CF401) to remove the adjacent channel signal. The filtered second IF signal is amplified by the limiting amplifier and demodulated by the quadrature detector with the ceramic discriminator (CD401). The demodulated signal is routed to the audio circuit.

2-4. Wide/Narrow Switching Circuit

Wide and Narrow settings can be made for each channel by switching the ceramic filters CF402 (Wide), CF401 (Narrow). The Wide and Narrow switching data is output from IC809.

D401 and D402 are switched to ceramic filters when a Wide/Narrow level is selected.

2-2. 第一混频器

前端的信号与 PLL 电路产生的第一本振信号在 Q406 混频，生成 49.95MHz 频率的第一中频信号。

生成的信号通过 XF401 MCF。

2-3. 中频放大电路

第一中频信号通过晶体滤波器（XF401）消除相邻信道的信号。经滤波的第一中频信号被第一中频放大器（Q405）放大并进入中频系统芯片（IC401）。

中频系统芯片提供第二混频器、第二本振信号、限幅放大器、正交检测器和 RSSI（接收信号强度指示器）。第二混频器将第一中频信号与 50.4MHz 的第二本振信号输出（TCXO X1）进行混频，并生成 450kHz 的第二中频信号。

第二中频信号通过陶瓷滤波器（宽：CF402、窄：CF401）继续消除相邻信道的信号。经滤波的第二中频信号被限幅放大器放大并被带有陶瓷鉴频器（CD401）的正交检测器解调。经解调的信号进入音频电路。

2-4. 宽 / 窄切换电路

通过切换陶瓷滤波器 CF402（宽）、CF401（窄）可以对每一信道进行宽，窄设置。宽、窄控制信号从 IC809 输出。

选择宽 / 窄电平时，将 D401 和 D402 切换到陶瓷滤波器。

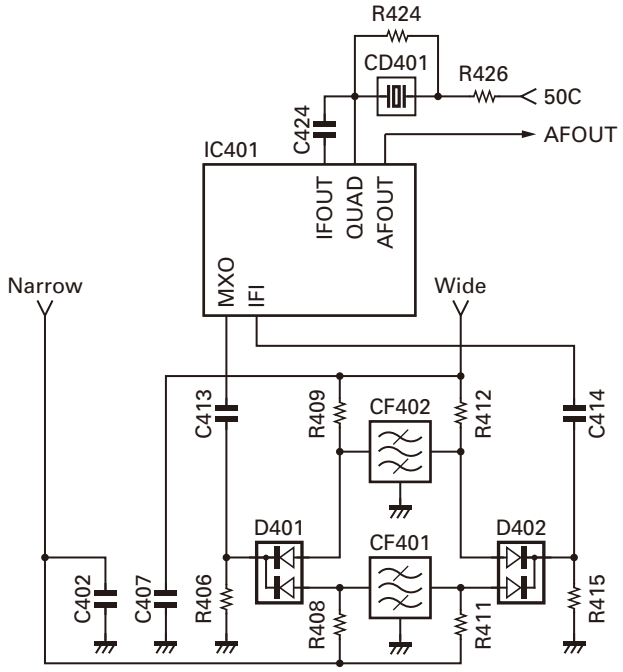


Fig. 3　Wide/Narrow switching circuit / 图 3　宽 / 窄切换电路

CIRCUIT DESCRIPTION / 电路说明

2-5. Audio Amplifier Circuit

The demodulated signal from IC401 is amplified by IC812, and goes to AF amplifier through IC815.

The signal then goes through an volume control (IC817), and is routed to an audio power amplifier (IC815) where it is amplified and output to the speaker.

2-6. Squelch Circuit

Part of the AF signal from the IC401 enters the FM IC (IC401) again, and the noise component is amplified and rectified by a filter and an amplifier to produce a DC voltage corresponding to the noise level.

The DC signal from the FM IC goes to the analog port of the MCU (IC809). IC809 determines whether or not to output sounds from the speaker by checking if the input voltage is higher or lower than the preset value.

To output sounds from the speaker, IC809 sends a high signal to the AFSW line and turns IC815 on through Q813, Q814, Q818 and Q819.

2-5. 音频放大器电路

来自于 IC401 的解调信号被 IC812 放大，并通过 IC815 送到 AF 放大器。

信号通过 AF 音量控制 (IC817)，在音频功率放大器 (IC815) 进行放大后输出到扬声器。

2-6. 静噪电路

FM IC(IC401) 输出的 AF 信号的一部分再进入 IC，噪声成份通过滤波器和放大器进行放大和修正，生成与噪声电平相应的 DC 电压。

DC 信号通过 FM IC 被送到微处理器的模拟端口 (IC809)。IC809 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。

由扬声器输出声音时，IC809 发送高电平信号给 AFSW，通过 Q813、Q814、Q818 和 Q819 打开 IC815。

3. Transmitter System

3-1. Microphone Amplifier Circuit

The signal from microphone amplified by IC812 and limited by AGC circuit composed of D807, D808, Q810 and Q811, and goes through mute switch (Q809). IC812 is composed of high-pass filter, low-pass filter and pre-emphasis/IDC circuit.

The output signal from the baseband IC (IC812) goes to the VCO modulation input. The other output signal from the baseband IC goes to the TCXO modulation input.

3. 发射机系统

3-1. 麦克风放大器电路

麦克风的信号被 IC812 放大，并受由 D807、D808、Q810 和 Q811 组成的 AGC 电路的限幅，然后通过静音开关 (Q809)。IC812 由高通滤波器、低通滤波器和预加重 /IDC 电路组成。

基带 IC(IC812) 的输出信号送入 VCO 调制输入。基带 IC 的其他输出信号送入 TCXO 调制输入。

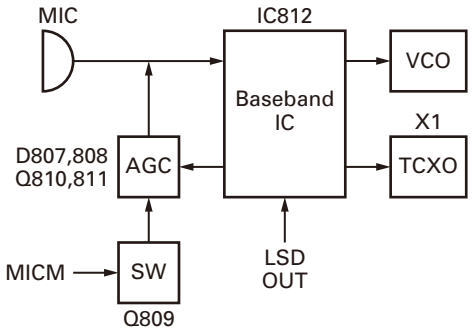


Fig. 4 Microphone amplifier circuit / 图 4 麦克风放大器电路

CIRCUIT DESCRIPTION / 电路说明

3-2. Driver and Final Amplifier Circuit

The signal from the T/R switch (D18 is on) is amplified by the RF AMP (Q201) and pre-drive amplifier (Q203) to 50mW.

The output of the pre-drive amplifier is amplified by the drive amplifier (Q204) and the RF final amplifier (Q205) to 5.0W (1W when the power is low).

The drive amplifier and the RF final amplifier consist of two MOS FET stages.

The output of the RF final amplifier is then passed through the harmonic filter (LPF) and antenna switch (D201 and D202) and is applied to the antenna terminal.

3-2. 驱动器和末级放大器电路

来自于 T/R 开关（D18 ON）的信号被射频放大器（Q201）和预驱动放大器（Q203）放大到 50mW。

预驱动放大器的输出被驱动放大器（Q204）和射频末级放大器（Q205）放大到 5.0W（当低功率时为 1W）。

驱动放大器和 RF 末级放大器由 2 个 MOS FET 构成。

射频末级放大器的输出通过谐波滤波器（LPF）和天线开关（D201 和 D202）并且送到天线终端。

3-3. APC Circuit

The APC circuit always monitors the current flowing through the drive amplifier (Q204) and the RF final amplifier (Q205) and keeps a constant current. The voltage drop at R307, R309 and R310 is caused by the current flowing through the RF final amplifier. This voltage is applied to the differential amplifier IC301 (1/2).

IC301 (2/2) compares the output voltage of IC301 (1/2) with the reference voltage from IC811. The output of IC301 (2/2) controls the VG of the RF final amplifier and the drive amplifier to make both voltages the same.

The change of power high/low is carried out by the change of the reference voltage.

3-3. 自动功率控制（APC）电路

APC 电路一直监视通过驱动放大器（Q204）和射频末级放大器（Q205）的电流并保持电流稳定。经过射频末级放大器的电流的变化会引起 R307、R309 和 R310 的电压降低，此电压送到差分放大器 IC301(1/2)。

IC301(2/2) 将 IC301(1/2) 的输出电压与来自 IC811 的参考电压进行比较。IC301(2/2) 的输出电压控制射频末级放大器、驱动放大器的 VG，使电压保持一致。

功率高 / 低的变化是通过变更参考电压来实现的。

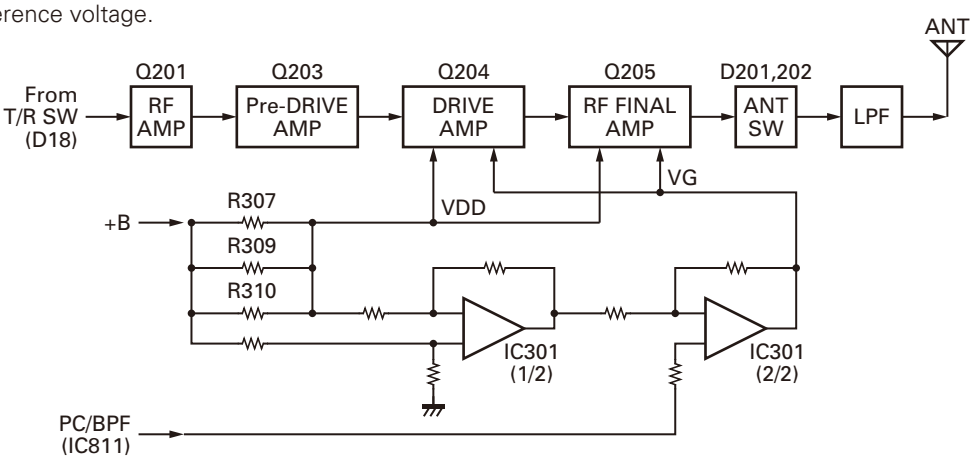


Fig. 5 Drive and final amplifier circuit and APC circuit
图 5 驱动及末级放大器电路和自动功率控制（APC）电路

4. Frequency Synthesizer Circuit

4-1. Frequency Synthesizer

The frequency synthesizer consists of the TCXO (X1), VCO, PLL IC (IC1) and buffer amplifiers.

The TCXO generates 16.8MHz. The frequency stability is 1.5ppm within the temperature range of –30 to +60°C. The frequency tuning and modulation of the TCXO are done to apply a voltage to pin 1 of the TCXO. The output of the TCXO is applied to pin 10 of the PLL IC.

The VCO consists of 2VCO and covers a dual range of the 400.00~470.00MHz and the 350.05~420.05MHz. The VCO generates 350.05~420.05MHz for providing to the first local signal in receive. The operating frequency is generated by Q5 in transmit mode and Q4 in receive mode.

4. 频率合成器电路

4-1. 频率合成器

频率合成器由 TCXO(X1)、VCO、PLL IC(IC1) 和缓冲放大器组成。

TCXO 产生 16.8MHz 的频率。在温度为 -30 ～ +60℃的范围内，频率的稳定性为 1.5ppm。进行频率调谐和 TCXO 调制，以便给 TCXO 的针脚 1 提供电压。TCXO 的输出加在 PLL IC 的针脚 10 上。

VCO 由 2VCO 组成，并且覆盖了 400.00 ～ 470.00MHz 和 350.05 ～ 420.05MHz 双波段。VCO 产生 350.05 ～ 420.05MHz 的频率，以提供接收的第一个本振信号。发射模式时，操作频率由 Q5 产生，而接收模式时，操作频率由 Q4 产生。

CIRCUIT DESCRIPTION / 电路说明

The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator (IC1) to the variable capacitor diodes (D7 and D9 in transmit mode and D3 and D5 in receive mode).

The TX pin of IC809 goes "low" in receive mode causing Q4 and Q7 turn on. The TX pin goes "high" in transmit mode causing Q5 turn on.

The outputs from Q4 and Q5 are amplified by buffer amplifier (Q8, Q2) and then sent to PLL IC.

The PLL IC consists of a prescaler, reference divider, phase comparator, charge pump (The frequency step of the PLL circuit is 5 or 6.25kHz). The input signal from the pins 10 and 17 of the PLL IC is divided down to the 5 or 6.25kHz and compared at phase comparator. The pulsed output signal of the phase comparator is applied to the charge pump and transformed into DC signal in the loop filter (LPF). The DC signal is applied to the CV of the VCO and locked to keep the VCO frequency constant.

PLL data is output from PLLDAT (pin 45), PLLCLK (pin 47) and PLLLE (pin 46) of the MCU (IC809). The data are input to the PLL IC when the channel is changed or when transmission is changed to reception and vice versa. A PLL lock condition is always monitored by the pin 48 (PLLLD) of the MCU. When the PLL is unlocked, the PLLLD goes low.

振荡频率由加在 VCO 上的控制电压控制，控制电压从可变电容二极管（在发射模式是 D7 和 D9，在接收模式是 D3 和 D5）的相位比较器（IC1）处获得。

IC809 的 TX 针脚在接收模式时为"低"电位，使 Q4 和 Q7 打开。TX 针脚在发射模式时为"高"电位，使 Q5 导通。

Q4 和 Q5 的输出由缓冲放大器（Q8, Q2）放大，然后发送到 PLL IC。

PLL IC 由预计数器、基准除法器、相位比较器、电荷泵组成（PLL 电路的频率步长为 5kHz 或 6.25kHz）。PLL IC 的针脚 10 和 17 的输入信号下分成 5kHz 或 6.25kHz，并在相位比较器处进行比较。相位比较器的脉冲输出信号加在电荷泵上，并转换成环路滤波器（LPF）的 DC 信号。DC 信号加在 VCO 的 CV 上并锁定，使 VCO 的频率恒定。

PLL 数据从 MCU（IC809）的 PLLDAT（针脚 45），PLLCLK（针脚 47）和 PLLLE（针脚 46）输出。当信道改变时，或当由发射变为接收或由接收变为发射时，数据输入 PLL IC。PLL 的锁定条件总是由 MCU 的针脚 48（PLLLD）监控。当 PLL 失锁时，PLLLD 为低电位。

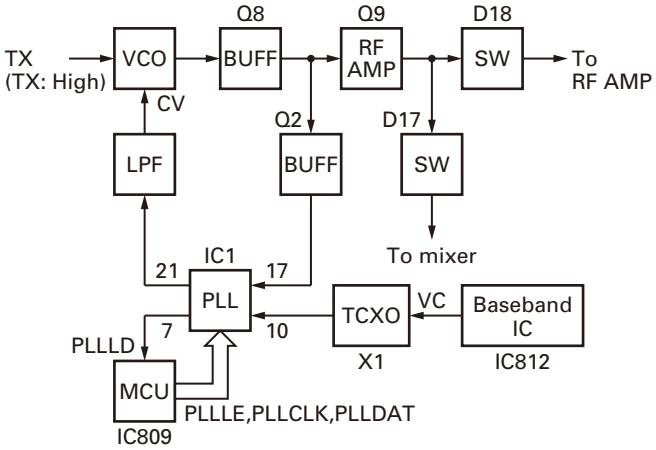


Fig. 6 PLL block diagram / 图 6 PLL 方块图

5. Control Circuit

The control consists of the MCU (IC809) and its peripheral circuits. It controls the TX-RX unit. IC809 mainly performs the following;

1) Switching between transmission and reception by PTT signal input.
2) Reading channel information, frequency, and program data from the memory circuit.
3) Sending frequency program data to the PLL.
4) Controlling squelch on/off via the DC voltage from the squelch circuit.
5) Controlling the audio mute circuit via the decode data input.
6) Transmitting tone and encode data.

5. 控制电路

控制电路是由微处理器（IC809）和外部电路构成。它控制收发单元。IC809 的主要功能如下：

1) 根据 PTT 的输入信号来转换发射和接收状态。
2) 从存储电路读出信道信息、频率以及编程数据。
3) 发送频率数据给 PLL。
4) 根据静噪电路输出的 DC 电压来控制静噪的开启和关闭。
5) 根据解码数据控制音频静音。
6) 发射 Tone 及编码数据。

CIRCUIT DESCRIPTION / 电路说明

5-1. Frequency Shift Circuit

The MCU (IC809) operates at a clock frequency of 12.0MHz. This oscillator has a circuit that shifts the frequency via Beat shift switch (Q806, Q807).

A beat sound may be able to be evaded form generation if "Beat Shift" is set to ON when it is generated in the internal spurious transmission modulated sound of the transceiver.

5-1. 频率偏移电路

微处理器（IC809）在 12.0MHz 时钟下工作。此振荡器有可以被拍频偏移开关（Q806,Q807）变换频率的电路。

如果"拍频偏移"被设定为 ON，可以避免产生拍频声音。

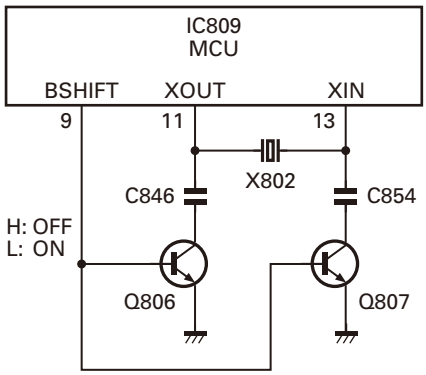


Fig. 7　Frequency shift circuit / 图 7　频率偏移电路

5-2. Memory Circuit

The Memory circuit consists of the MCU (IC809) and an EEPROM (IC810). The EEPROM has a capacity of 64k bits that contains the transceiver control program for the MCU and data such as transceiver channels and operating features.

5-2. 存储电路

存储电路由微处理器（IC809）和 EEPROM（IC810）组成。有 64kbits 的容量，包含 MCU 用的手持对讲机控制程序以及信道和操作功能这样的数据。

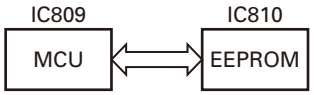


Fig. 8　Memory circuit / 图 8　存储电路

■ EEPROM

Note:

The EEPROM stores tuning data (Deviation, Squelch, etc.).

Realign the transceiver after replacing the EEPROM.

■ EEPROM

注意：

EEPROM 保存调谐数据（频偏、静噪等）。

更换 EEPROM 后，请重新校正手持对讲机。

5-3. Low Battery Warning

The battery voltage is monitored by the MCU (IC809 pin 86: BATT). When the battery voltage falls below the voltage set by the Low Battery Warning adjustment during the transmission, the red LED blinks to notify the operator that it is time to replace the battery (When the "On TX" option (default setting) under the Battery Warning /status function in the FPU is selected.). If the battery voltage falls below 5.9V, the transceiver does not transmit and the warning tone beeps while the PTT switch is pressed.

5-3. 低电池电量警告

电池电压由微处理器（IC809 针脚 86:BATT）监控。发射期间，当电池电压低于低电池电量警告调节设置的电压时，红色 LED 闪烁，通知操作者应该更换电池了（当选择了 FPU 电池告警 / 状态功能下的"On TX（发射时）"选项（默认）时）。如果电池电压低于 5.9V，按下 PTT 开关时手持对讲机不发射并响起警告音。

Low battery warning	Battery status
The red LED blinks during transmission.	The battery voltage is low but the transceiver is still usable.
The red LED blinks and the warning tone beeps while the PTT switch is pressed.	The battery voltage is low and the transceiver cannot be used to make calls.

低电池电量警告	电池状态
发射期间红色 LED 闪烁。	电池电压低，但手持对讲机仍能使用。
按下 PTT 开关时，红色 LED 闪烁并响起警告音。	电池电压低，不能使用手持对讲机进行呼叫。

CIRCUIT DESCRIPTION / 电路说明

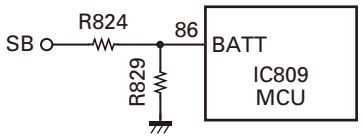


Fig. 9 Low battery warning / 图 9 低电池电量警告

5-4. Key Input

Keys and channel selector circuit.

The signal from the keys and channel selector are directly input to the MCU, as shown in Figure 10.

5-4. 键输入

键和信道选择电路。

如图 10 所示，键和信道选择器的信号被直接输入微处理器。

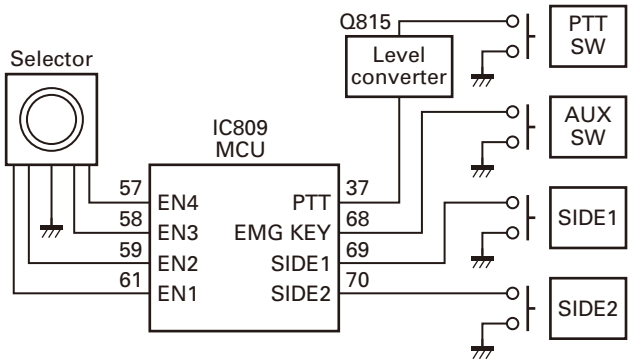


Fig. 10 Key input / 图 10 键输入

6. Signaling Circuit

6-1. Encode

■ Low-speed data (QT, DQT)

Low-speed data is output from pin 24 (LSDO) of the MCU (IC809). The signal passes through a low-pass CR filter. The signal is mixed with the audio signal and goes to the VCO and TCXO (X1) modulation input after signal processing in the baseband IC (IC812).

6. 信令电路

6-1. 编码

■低速数据 (QT, DQT)

低速数据从微处理器 (IC809) 的针脚 24(LSDO) 输出。信号通过低通 CR 滤波器。此信号与音频信号混合，在基带 IC(IC812) 中进行信号处理之后，进入 VCO 和 TCXO(X1) 调制输入。

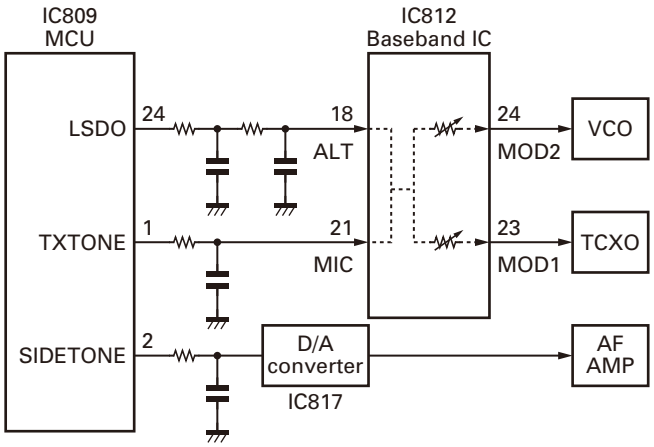


Fig. 11 Encode / 图 11 编码

CIRCUIT DESCRIPTION / 电路说明

■ High-speed data (2-tone, DTMF)

High-speed data (HSD) is output from pin 1 (TXTONE) of the MCU.

The signal passes through a low-pass CR filter. TX deviation making an adjustment by MCU is applied to the baseband IC (IC812). The signal is mixed with the audio signal and goes to the VCO and TCXO.

■ MSK

MSK signal is output from pin 24 of IC812. The signal passes through the D/A converter and is routed to the VCO. When encoding MSK, the microphone input signal is muted.

6-2. Dceode

■ QT/DQT

The output signal from IF IC (IC401) enters the MCU (IC809) through IC812. IC809 determines whether the QT or DQT matches the preset value, and controls the AFSW and the speaker output sounds according to the squelch results.

■ 2-tone

The demodulated signal from the FM IC (IC401) is amplified by the baseband IC and passes through a high-pass filter to remove frequencies of 3kHz or more. The MCU digitizes this signal and decodes the signal after receiving the signal at pin 5 (HSDI).

■ DTMF/MSK

The DTMF and MSK input signal from the IF IC (IC401) goes to IC812. The decoded information is then processed by the MCU.

7. Power Supply

There are five 5V and three 3.3V power supplies for the MCU:

50M and 33M is always output while the power is on. 33MS is always output, but turns off when the power is turned off to prevent malfunction of the MCU.

50C is a common 5V and is output when SAVE is not set to ON.

50R is 5V for reception and output during reception.

50T is 5V for transmission and output during transmission.

50V is 5V for the SP/MIC connector.

33B is 3.3V for the baseband IC (IC812).

■高速数据 (2- 音 ,DTMF)

高速数据 (HSD) 从微处理器的针脚 1(TXTONE) 输出。

信号通过低通 CR 滤波器。由微处理器进行调整的 TX 频偏被施加到基带 IC(IC812)。此信号与音频信号混合，然后送入 VCO 和 TCXO。

■ MSK

MSK 信号从 IC812 的针脚 24 输出。此信号通过数模转换器，然后发送给 VCO。编码 MSK 时，麦克风输入信号被静音。

6-2. 解码

■ QT/DQT

IF IC(IC401) 的输出信号通过 IC812 送入微处理器 (IC809)。IC809 确认 QT 或 DQT 是否与预设值匹配，控制 AFSW，然后扬声器根据静噪结果输出声音。

■ 2- 音

FM IC(IC401) 的解调信号由基带 IC 放大，并通过高通滤波器以消除 3kHz 或以上的频率。在针脚 5(HSDI) 接收信号之后，微处理器将该信号数字化并对信号解码。

■ DTMF/MSK

IF IC(IC401) 的 DTMF 和 MSK 输入信号送入 IC812。然后由微处理器处理解码信息。

7. 电源

微处理器有 5 个 5V 电源和 3 个 3.3V 电源。

电源打开时，50M 和 33M 总是输出。5M 总是输出，但电源关闭时 33MS 关闭，以防止微处理器出现故障。

50C 是普通的 5V 电源，它在 SAVE 没有设为 ON 时输出。

50R 是接收用 5V 电源，它在接收期间输出。

50T 是为发射用的 5V 电源，它在发射期间保持输出。

50V 是 SP/MIC 用 5V 电源。

33B 是基带 IC(IC812) 用 3.3V 电源。

SEMICONDUCTOR DATA / 半导体数据

MCU: F3640MDFBKDPA (TX-RX unit: IC809)

Pin No.	Signal Name	I/O	Function
1	TXTONE	O	N tone/DTMF/emergency tone output
2	SIDETONE	O	N tone/DTMF/voice/beep output
3	WIDE	O	Wide switch
4	NARROW	O	Narrow switch
5	HSDI	I	HSD input
6	BYTE	I	Single chip mode
7	CNVSS	I	Single chip mode
8	NC	-	NC
9	BSFT	O	Beat shift for CPU clock
10	RESET	I	Reset signal input
11	XOUT	O	Oscillation circuit
12	VSS	-	GND
13	XIN	I	Oscillation circuit
14	VCC1	-	Power supply
15	NMI/SD	O	NC
16	INT	I	INT signal input
17	VOXM	O	VOX mute
18	BBIRQ	I	IRQ from base band IC
19	BBCS	O	Chip select for base band IC
20	BBRXD	I	RXD from base band IC
21	BBCLK	O	Clock for base band IC
22	BBTXD	O	TXD for base band IC
23	VOXSW	O	VOX switch
24	LSDO	O	Low speed data output
25	EEPRXD	I	Data input from EEPROM
26	EEPCS	O	Chip select for EEPROM
27,28	NC	-	NC
29	TXD1	O	For onboard writing/TXD for 2pin jack
30	RXD1	I	For onboard writing/RXD for 2pin jack
31	CLK1	O	For onboard writing
32	BUSY	O	For onboard writing
33,34	NC	-	NC
35	EEPTXD	O	Data output for EEPROM
36	EEPCLK	O	Clock for EEPROM
37	PTT	I	PTT key input
38	OPTDET	I	2pin option detection
39	EPM	I	For onboard writing
40	MDSW	I	External connection terminal of man down switch
41	EXTMICSW	O	External MIC compulsion ON switch
42	TX	O	Tx VCO switch/fin filter
43	DACCE	O	Chip enable for DAC IC
44	CE	I	For onboard writing
45	PLLDAT	O	Data for PLL IC & DAC IC

MCU: F3640MDFBKDPA（收发单元：IC809）

管脚号	端口名称	输入/输出	功　能
1	TXTONE	输出	高速数据输出
2	SIDETONE	输出	侧音 AF 输出
3	WIDE	输出	CF402 宽切换
4	NARROW	输出	CF401 窄切换
5	HSDI	输入	高速数据输入
6	BYTE	输入	MCU 模式选定
7	CNVSS	输入	MCU 模式选定
8	NC	-	未连接
9	BSFT	输出	拍频偏移
10	RESET	输入	MCU 复位
11	XOUT	输出	MCU 时钟输出
12	VSS	-	接地
13	XIN	输入	12.0MHz 时钟输入
14	VCC1	-	3.3V
15	NMI/SD	输出	未连接
16	INT	输入	MCU 停止
17	VOXM	输出	VOX 静音开关
18	BBIRQ	输入	基带 IC 的中断请求
19	BBCS	输出	基带 IC 的芯片选择
20	BBRXD	输入	基带 IC 的回复数据
21	BBCLK	输出	基带 IC 的串行时钟
22	BBTXD	输出	基带 IC 的命令数据
23	VOXSW	输出	VOX 开关
24	LSDO	输出	低速数据
25	EEPRXD	输入	EEPROM 数据输入
26	EEPCS	输出	EEPROM 选择
27,28	NC	-	未连接
29	TXD1	输出	仿真器的 TXD
30	RXD1	输入	仿真器的 RXD
31	CLK1	输出	仿真器的 SCLK
32	BUSY	输出	仿真器的 BUSY
33,34	NC	-	未连接
35	EEPTXD	输出	EEPROM 数据输出
36	EEPCLK	输出	EEPROM 时钟
37	PTT	输入	PTT 键输入
38	OPTDET	输入	耳机检测
39	EPM	输入	仿真器的 EPM
40	MDSW	输入	未连接
41	EXTMICSW	输出	EXT-SP/MIC 控制
42	TX	输出	TX/RX VCO 控制
43	DACCE	输出	D/A 启用
44	CE	输入	仿真器的 CE
45	PLLDAT	输出	PLL 数据

SEMICONDUCTOR DATA / 半导体数据

Pin No.	Signal Name	I/O	Function
46	PLLLE	O	Load enable for PLL IC
47	PLLCLK	O	Clock for PLL IC & DAC IC
48	PLLLD	I	Lock detect signal from PLL IC
49	33BC	O	33B control
50	33MSC	O	33MS control
51	50VC	O	50V control
52	50TC	O	50T control
53	50RC	O	50R control (SAVE)
54	50CC	O	50C control (SAVE)
55	AFSW	O	Power switch for AF amp
56	PDSW	-	NC
57	EN4	I	Encoder input 4
58	EN3	I	Encoder input 3
59	EN2	I	Encoder input 2
60	VCC2	-	Power supply
61	EN1	I	Encoder input 1
62	VSS	-	GND
63	LEDR	O	Red LED
64	LEDG	O	Green LED
65	LEDB	O	Blue LED
66	APCSW	O	APC switch
67	DCSW	O	Discharge switch
68	EMGKEY	I	AUX key input
69	SIDE1	I	Side 1 key input
70	SIDE2	I	Side 2 key input
71	MICM	O	MIC mute
72	MDINT	I	NC
73	NC	-	NC
74	MDCS	O	NC
75	MDRXD	I	NC
76	MDTXD	O	NC
77	MDCLK	O	NC
78	NC	-	NC
79	CVIN	I	NC
80	TMP	I	Temperature detection
81	VOLIN	I	AF volume level
82	VOX	I	VOX signal input
83	ASQL	I	Analog squelch input
84	RSSI	I	RSSI input
85	LSDI	I	LSD input
86	BATT	I	Battery voltage check
87~90	NC	-	NC
91	BSEL	I	Battery detection
92,93	NC	-	NC
94	AVSS	-	GND

管脚号	端口名称	输入/输出	功　　能
46	PLLLE	输出	PLL 启用
47	PLLCLK	输出	PLL 时钟
48	PLLLD	输入	PLL 失锁检测
49	33BC	输出	33B 控制
50	33MSC	输出	33MS 控制
51	50VC	输出	50V 控制
52	50TC	输出	50T 控制
53	50RC	输出	50R 控制
54	50CC	输出	50C 控制
55	AFSW	输出	AF IC 开关
56	PDSW	-	未连接
57	EN4	输入	编码器输入 4
58	EN3	输入	编码器输入 3
59	EN2	输入	编码器输入 2
60	VCC2	-	3.3V
61	EN1	输入	编码器输入 1
62	VSS	-	接地
63	LEDR	输出	红色 LED
64	LEDG	输出	绿色 LED
65	LEDB	输出	蓝色 LED
66	APCSW	输出	APC 开关
67	DCSW	输出	加速开关
68	EMGKEY	输入	AUX 键输入
69	SIDE1	输入	侧面 1 键输入
70	SIDE2	输入	侧面 2 键输入
71	MICM	输出	MIC 静音
72	MDINT	输入	未连接
73	NC	-	未连接
74	MDCS	输出	未连接
75	MDRXD	输入	未连接
76	MDTXD	输出	未连接
77	MDCLK	输出	未连接
78	NC	-	未连接
79	CVIN	输入	未连接
80	TMP	输入	温度检测
81	VOLIN	输入	AF 音量电平
82	VOX	输入	VOX
83	ASQL	输入	静噪电平
84	RSSI	输入	RSSI 电平
85	LSDI	输入	低速数据
86	BATT	输入	电池电压检测
87~90	NC	-	未连接
91	BSEL	输入	电池检测
92, 93	NC	-	未连接
94	AVSS	-	接地

SEMICONDUCTOR DATA / 半导体数据

Pin No.	Signal Name	I/O	Function
95	HSDI2	I	DTMF detect
96	VREF	I	Reference voltage input
97	AVCC	-	Power supply
98	NC	-	NC
99	SIM1	I	Destination selection 1
100	SIM2	I	Destination selection 2

管脚号	端口名称	输入/输出	功　能
95	HSDI2	输入	DTMF 输入
96	VREF	输入	基准电压
97	AVCC	–	3.3V
98	NC	–	未连接
99	SIM1	输入	类型选择 1
100	SIM2	输入	类型选择 2

TERMINAL FUNCTION / 端子功能

TX-RX unit (X57-7790-11)

Pin No.	Name	I/O	Function
CN801			
1	VOL IN	I	Audio input
2	33MS	-	33MS
3	SB	-	Switched B
4	SB	-	Switched B
5	+B	-	B (Battery Voltage)
6	+B	-	B (Battery Voltage)
7	EN2	I	Encoder pulse input
8	EN4	I	Encoder pulse input
9	GND	-	GND
10	EN3	I	Encoder pulse input
11	EN1	I	Encoder pulse input
CN802			
1	GND	O	GND
2	EMGKEY	O	EMG key output
3	PTT/RXD	O	PTT/RXD key output
4	SIDE1	O	SIDE1 key output
5	SIDE2	O	SIDE2 key output
6	GND	O	GND
CN803			
1	GND	I	GND
2	EMGKEY	I	EMG key input
3	PTT/RXD	I	PTT/RXD key input
4	SIDE1	I	SIDE1 key input
5	SIDE2	I	SIDE2 key input
6	GND	I	GND

收发单元 (X57-7790-11)

管脚号	名　称	输入/输出	功　能
CN801			
1	VOL IN	输入	音频输入
2	33MS	–	主的 3.3V 电源
3	SB	–	可关闭的 B
4	SB	–	可关闭的 B
5	+B	–	B(电池电压)
6	+B	–	B(电池电压)
7	EN2	输入	编码器脉冲输入
8	EN4	输入	编码器脉冲输入
9	GND	–	接地
10	EN3	输入	编码器脉冲输入
11	EN1	输入	编码器脉冲输入
CN802			
1	GND	输出	接地
2	EMGKEY	输出	EMG 键输出
3	PTT/RXD	输出	PTT/RXD 键输出
4	SIDE1	输出	侧面 1 键输出
5	SIDE2	输出	侧面 2 键输出
6	GND	输出	接地
CN803			
1	GND	输入	接地
2	EMGKEY	输入	EMG 键输入
3	PTT/RXD	输入	PTT/RXD 键输入
4	SIDE1	输入	侧面 1 键输入
5	SIDE2	输入	侧面 2 键输入
6	GND	输入	接地

COMPONENTS DESCRIPTION / 元件说明

TX-RX unit (X57-7790-11)

Ref. No.	Part Name	Description
IC1	IC	PLL system
IC301	IC	Comparator (APC)
IC401	IC	FM IF system
IC801~803	IC	Voltage regulator/ 5V
IC804	IC	Voltage regulator/ 3.3V
IC805	IC	Voltage detector/ INT
IC806	IC	Voltage regulator/ 3.3V
IC807	IC	Voltage detector/ RESET
IC808	IC	AF AMP
IC809	IC	MCU
IC810	IC	EEPROM
IC811	IC	DC AMP
IC812	IC	Baseband IC
IC814	IC	VOX AMP
IC815	IC	AF AMP
IC816	IC	HPF
IC817	IC	Electrical volume
Q2	Transistor	RF buffer AMP
Q3	Transistor	Ripple filter
Q4	FET	VCO/RX
Q5	FET	VCO/TX
Q6,7	FET	TX/RX switch
Q8	Transistor	RF buffer AMP
Q9	Transistor	RF AMP
Q201	Transistor	RF AMP
Q202	FET	PD 5T switch
Q203	Transistor	Pre drive AMP
Q204	FET	Drive AMP
Q205	FET	Final AMP
Q301	Transistor	DC switch
Q303	FET	DC switch
Q304	Transistor	DC switch
Q305	FET	DC switch
Q306	Transistor	DC switch
Q403	Transistor	Tripler
Q405	Transistor	IF AMP
Q406	FET	Mixer
Q407	FET	RF AMP
Q801~805	FET	DC switch
Q806,807	Transistor	Beat shift switch
Q808	FET	VOX AMP
Q809~811	Transistor	AGC
Q812	FET	VOX switch
Q813,814	Transistor	DC switch

收发单元 (X57-7790-11)

有关号码	零 件 名 称	说　　明
IC1	IC	PLL 系统
IC301	IC	比较器 (APC)
IC401	IC	FM IF 系统
IC801~803	IC	稳压器 /5V
IC804	IC	稳压器 /3.3V
IC805	IC	电压检测器 /INT 闪存
IC806	IC	稳压器 /3.3V
IC807	IC	电压检测器 / 复位
IC808	IC	AF 放大器
IC809	IC	MCU
IC810	IC	EEPROM
IC811	IC	DC 放大器
IC812	IC	基带 IC
IC814	IC	VOX 放大器
IC815	IC	AF 放大器
IC816	IC	HPF
IC817	IC	电子音量
Q2	晶体管	RF 缓冲放大器
Q3	晶体管	纹波滤波器
Q4	场效应管	VCO/RX
Q5	场效应管	VCO/TX
Q6,7	场效应管	TX/RX 直流开关
Q8	晶体管	RF 缓冲放大器
Q9	晶体管	RF 放大器
Q201	晶体管	RF 放大器
Q202	场效应管	PD 5T 开关
Q203	晶体管	预驱动放大器
Q204	场效应管	驱动放大器
Q205	场效应管	末级放大器
Q301	晶体管	DC 开关
Q303	场效应管	DC 开关
Q304	晶体管	DC 开关
Q305	场效应管	DC 开关
Q306	晶体管	DC 开关
Q403	晶体管	三倍频器
Q405	晶体管	IF 放大器
Q406	场效应管	混频器
Q407	场效应管	RF 放大器
Q801~805	场效应管	DC 开关
Q806,807	晶体管	拍频偏移开关
Q808	场效应管	VOX 放大器
Q809~811	晶体管	AGC
Q812	场效应管	VOX 开关
Q813,814	晶体管	DC 开关

COMPONENTS DESCRIPTION / 元件说明

Ref. No.	Part Name	Description
Q815,816	FET	Level converter
Q817	Transistor	DC switch
Q818,819	FET	Mute switch
Q820	Transistor	DC switch
D3,5	Variable capacitance diode	Frequency control/ RX VCO
D7,9	Variable capacitance diode	Frequency control/ TX VCO
D10	Variable capacitance diode	Frequency control/ RX VCO
D11	Variable capacitance diode	Frequency control/ TX VCO
D12	Variable capacitance diode	Modulator/ TX VCO
D13	Diode	Ripple filter
D14,15	Diode	VCO Speed up
D17,18	Diode	TX/RX RF switch
D201~204	Diode	ANT switch
D301	Zener Diode	Protect
D401,402	Diode	W/N switch
D403~405	Variable capacitance diode	BPF tuning
D410	Variable capacitance diode	BPF tuning
D431,432	Variable capacitance diode	BPF tuning
D801	LED	LED/ blue
D802,803	Diode	Protect
D804	LED	LED/ green
D805	LED	LED/ red
D806	Zener Diode	Protect
D807~810	Diode	Current steering

有关号码	零 件 名 称	说　　明
Q815,816	场效应管	电平转换器
Q817	晶体管	DC 开关
Q818,819	场效应管	静音开关
Q820	晶体管	DC 开关
D3,5	可变电容二极管	频率控制 /RX VCO
D6~9	可变电容二极管	频率控制 /TX VCO
D10	可变电容二极管	频率控制 /RX VCO
D11	可变电容二极管	频率控制 /TX VCO
D12	可变电容二极管	调制器 /TX VCO
D13	二极管	纹波滤波器
D14,15	二极管	VCO 加速
D17,18	二极管	TX/RX RF 开关
D201~204	二极管	天线开关
D301	稳压二极管	保护
D401,402	二极管	W/N 开关
D403~405	可变电容二极管	BPF 调谐
D410	可变电容二极管	BPF 调谐
D431,432	可变电容二极管	BPF 调谐
D801	LED	LED/ 蓝色
D802,803	二极管	保护
D804	LED	LED/ 绿色
D805	LED	LED/ 红色
D806	稳压二极管	保护
D807~810	二极管	整流

PARTS LIST / 零件表

✻ New Parts. ⚠indicates safety critical components.
Parts without **Parts No.** are not supplied.
✻ 新零件。⚠代表对安全至关重要的零件。
我们不会提供没有**零件号**的零件。

L : Scandinavia **K** : USA **P** : Canada
Y : PX (Far East, Hawaii) **T** : England **E** : Europe
C : China **X** : Australia **M** : Other Areas

TK-3360
TX-RX UNIT (X57-7790-11)

Ref. No.	Address	New parts	Parts No.	Description	Destination
TK-3360					
1	1A		A02-4087-03	PLASTIC CABINET ASSY	
2	3A		A10-4133-01	CHASSIS	
4	3B		B01-0694-13	ESCUTCHEON	
5	1D		B09-0686-03	CAP ACCESSORY	
6	3B		B11-1869-04	ILLUMINATION GUIDE	
-			B43-1633-04	BADGE	
8	2C		B62-2209-00	INSTRUCTION MANUAL ACCESSORY	
10	3B		E04-0467-15	RF COAXIAL RECEPTACLE (SMA)	
11	3B		E23-1345-04	TERMINAL ASSY (ANT)	
12	2B		E37-1165-15	PROCESSED LEAD WIRE (SP/RED)	
13	2B		E37-1166-15	PROCESSED LEAD WIRE (SP/BLACK)	
14	2B		E37-1511-05	PROCESSED LEAD WIRE (MIC/GR)	
15	2B		E37-1512-05	PROCESSED LEAD WIRE (MIC/BR)	
16	3B		E72-0433-03	TERMINAL BLOCK	
18	2A		F10-3128-03	SHIELDING COVER	
20	1A		G10-1324-04	FIBROUS SHEET (CABINET)	
21	2B		G11-4272-14	RUBBER CUSHION (SP)	
22	3A		G11-4315-14	SHEET (Q205/COOLING)	
23	1B		G11-4351-04	SHEET (CABI-TOP)	
24	3A		G11-4488-04	SHEET (PTT)	
25	1B		G11-4527-04	SHEET (SP)	
26	3A		G13-2038-24	CUSHION (CF401,402)	
27	3A		G13-2287-04	CUSHION (CHASS-ANT)	
28	3B		G53-1603-04	PACKING (ANT)	
29	2A		G53-1830-02	PACKING (CHASS-CABINET)	
30	3B		G53-1831-02	PACKING (CHASS-TOP)	
31	3B		G53-1832-03	PACKING (JACK)	
32	3B		G53-1833-04	PACKING (TERMINAL)	
34	1D		J19-5483-23	HOLDER ACCESSORY	
35	2B		J19-5533-02	HOLDER (SP)	
36	1C		J29-0701-15	BELT CLIP ACCESSORY	
37	3A		J87-0027-05	FPC (LEAD FREE) (PTT)	
38	2B		J87-0038-05	FPC (LEAD FREE)	
40	1B		K29-9450-03	KNOB (VOL)	
41	1B		K29-9451-03	KNOB (SELECTOR)	
42	1A		K29-9452-03	KNOB (PTT)	
43	1A		K29-9453-03	BUTTON KNOB (PTT)	
A	3B		N09-2438-05	BINDING HEAD SCREW (ANT)	
B	3A		N09-6565-05	PAN HEAD SCREW (CASE)	
C	2B		N14-0851-04	CIRCULAR NUT (SELECTOR)	
D	2B		N14-0858-04	CIRCULAR NUT (VOL)	
E	3A,3B		N30-3006-43	PAN HEAD MACHINE SCREW (ESCUTC)	
F	3B		N78-2030-48	PAN HEAD TAPTITE SCREW (TERMIN)	
G	2A,2B		N83-2005-48	PAN HEAD TAPTITE SCREW (UNIT)	
VR1	2B		R31-0665-05	VARIABLE RESISTOR (VOL)	
S805	2B		S60-0443-05	ROTARY SWITCH (SELECTOR)	
49	2B		T07-0787-05	SPEAKER	

Ref. No.	Address	New parts	Parts No.	Description	Destination
TX-RX UNIT (X57-7790-11)					
D801			B30-1790-05	LED (BLUE)	
D804			B30-2314-05	LED (GREEN)	
D805			B30-2315-05	LED (RED)	
C1			CK73HB1H471K	CHIP C 470PF K	
C2			CK73HB1H682K	CHIP C 6800PF K	
C3			CC73HCH1H100B	CHIP C 10PF B	
C4			CK73HB1H102K	CHIP C 1000PF K	
C5			CC73HCH1H100B	CHIP C 10PF B	
C7,8			CK73HB1E103K	CHIP C 0.010UF K	
C9-12			CC73HCH1H101J	CHIP C 100PF J	
C14			CK73HB1A473K	CHIP C 0.047UF K	
C15			CK73HB1A224K	CHIP C 0.22UF K	
C16,17			CC73HCH1H101J	CHIP C 100PF J	
C18			CK73HB1E103K	CHIP C 0.010UF K	
C20			CC73HCH1H101J	CHIP C 100PF J	
C21			CK73HB1E103K	CHIP C 0.010UF K	
C24			C92-0588-05	CHIP TNTL 1.5UF 16WV	
C25			CS77CA1VR22M	CHIP TNTL 0.22UF 35WV	
C27			CK73HB1A224K	CHIP C 0.22UF K	
C29,30			CK73HB1A104K	CHIP C 0.10UF K	
C31			CK73HB1H471K	CHIP C 470PF K	
C32			CS77CA1A220M	CHIP TNTL 22UF 10WV	
C33-35			CC73HCH1H101J	CHIP C 100PF J	
C36			CK73HB0J105K	CHIP C 1.0UF K	
C41			CC73HCH1H101J	CHIP C 100PF J	
C43			CC73HCH1H0R5B	CHIP C 0.5PF B	
C44,45			CC73HCH1H121J	CHIP C 120PF J	
C46			CC73HCH1H090B	CHIP C 9.0PF B	
C47			CC73HCH1H100B	CHIP C 10PF B	
C49			CC73HCH1H040B	CHIP C 4.0PF B	
C50			CC73HCH1HR75B	CHIP C 0.75PF B	
C51			CC73HCH1H010B	CHIP C 1.0PF B	
C52			CC73HCH1H060B	CHIP C 6.0PF B	
C53			CC73HCH1H050B	CHIP C 5.0PF B	
C54,55			CC73HCH1H060B	CHIP C 6.0PF B	
C56			CC73HCH1H040B	CHIP C 4.0PF B	
C57			CC73HCH1H060B	CHIP C 6.0PF B	
C58,59			CC73HCH1H101J	CHIP C 100PF J	
C60			CC73GCH1H0R5B	CHIP C 0.5PF B	
C61			CC73HCH1H0R3B	CHIP C 0.3PF B	
C70			CK73HB1H471K	CHIP C 470PF K	
C71			CC73HCH1H070B	CHIP C 7.0PF B	
C72,73			CC73HCH1H100B	CHIP C 10PF B	
C74,75			CK73HB1H471K	CHIP C 470PF K	
C76			CK73HB1A104K	CHIP C 0.10UF K	
C77			CC73HCH1H050B	CHIP C 5.0PF B	
C80			CC73HCH1H101J	CHIP C 100PF J	
C81			CK73HB1H471K	CHIP C 470PF K	
C82			CC73HCH1H100B	CHIP C 10PF B	
C83			CC73HCH1H080B	CHIP C 8.0PF B	
C84			CC73HCH1H030B	CHIP C 3.0PF B	
C85			CC73HCH1H080B	CHIP C 8.0PF B	
C86			CC73HCH1H040B	CHIP C 4.0PF B	

PARTS LIST / 零件表

TX-RX UNIT (X57-7790-11)

Ref. No.	Address	New parts	Parts No.	Description			Destination
C90			CK73HB1H471K	CHIP C	470PF	K	
C201			CC73HCH1H470J	CHIP C	47PF	J	
C202			CK73HB1A563K	CHIP C	0.056UF	K	
C203			CK73HB1H471K	CHIP C	470PF	K	
C204			CK73HB1A104K	CHIP C	0.10UF	K	
C205			CK73HB1H471K	CHIP C	470PF	K	
C206			CC73HCH1H120J	CHIP C	12PF	J	
C207,208			CK73HB1H471K	CHIP C	470PF	K	
C209			CC73HCH1H220J	CHIP C	22PF	J	
C210			CK73HB1A224K	CHIP C	0.22UF	K	
C211-213			CK73HB1H471K	CHIP C	470PF	K	
C214			CK73HB1A104K	CHIP C	0.10UF	K	
C215			CC73HCH1H060B	CHIP C	6.0PF	B	
C216,217			CK73HB1H471K	CHIP C	470PF	K	
C218			CC73HCH1H100B	CHIP C	10PF	B	
C219-221			CK73HB1H471K	CHIP C	470PF	K	
C222			CC73HCH1H221J	CHIP C	220PF	J	
C223-225			CK73HB1H471K	CHIP C	470PF	K	
C226			CC73HCH1H080B	CHIP C	8.0PF	B	
C227			CC73GCH1H430J	CHIP C	43PF	J	
C229,230			CC73HCH1H151J	CHIP C	150PF	J	
C233			CK73GB1C104K	CHIP C	0.10UF	K	
C234			CK73GB1E105K	CHIP C	1.0UF	K	
C235			CK73HB1E103K	CHIP C	0.010UF	K	
C238			CC73GCH1H020B	CHIP C	2.0PF	B	
C242			CC73GCH1H060B	CHIP C	6.0PF	B	
C243			CC73GCH1H471J	CHIP C	470PF	J	
C244			CK73HB1H471K	CHIP C	470PF	K	
C245			CC73HCH1H050B	CHIP C	5.0PF	B	
C246			CC73GCH1H040B	CHIP C	4.0PF	B	
C247			CC73GCH1H470J	CHIP C	47PF	J	
C248			CC73GCH1H030B	CHIP C	3.0PF	B	
C249			CC73GCH1H040B	CHIP C	4.0PF	B	
C250			CC73GCH1H070B	CHIP C	7.0PF	B	
C251			CC73HCH1H020B	CHIP C	2.0PF	B	
C253			CC73GCH1H010B	CHIP C	1.0PF	B	
C255			CC73GCH1H070B	CHIP C	7.0PF	B	
C256			CC73GCH1H020B	CHIP C	2.0PF	B	
C257			CC73GCH1H030B	CHIP C	3.0PF	B	
C260			CC73GCH1H240J	CHIP C	24PF	J	
C261			CC73GCH1H060B	CHIP C	6.0PF	B	
C263			CC73GCH1H070B	CHIP C	7.0PF	B	
C264			CC73HCH1H180J	CHIP C	18PF	J	
C265			CC73HCH1H080B	CHIP C	8.0PF	B	
C301			CK73HB1A104K	CHIP C	0.10UF	K	
C302			CK73HB1H471K	CHIP C	470PF	K	
C303			CK73FB1E225K	CHIP C	2.2UF	K	
C304			CK73HB1H471K	CHIP C	470PF	K	
C305,306			CC73HCH1H101J	CHIP C	100PF	J	
C307			CC73HCH1H470J	CHIP C	47PF	J	
C308			CC73HCH1H100C	CHIP C	10PF	C	
C309			CK73HB1H471K	CHIP C	470PF	K	
C311			CK73HB1H471K	CHIP C	470PF	K	
C313			CC73HCH1H101J	CHIP C	100PF	J	
C314			CK73HB1H471K	CHIP C	470PF	K	
C315			CK73HB1H102K	CHIP C	1000PF	K	
C402-407			CK73HB1A104K	CHIP C	0.10UF	K	
C408			CC73HCH1H330J	CHIP C	33PF	J	
C409			CK73HB1E103K	CHIP C	0.010UF	K	
C410			CC73HCH1H220J	CHIP C	22PF	J	

Ref. No.	Address	New parts	Parts No.	Description			Destination
C411			CC73HCH1H820J	CHIP C	82PF	J	
C412			CK73HB1H391K	CHIP C	390PF	K	
C413,414			CK73HB1A104K	CHIP C	0.10UF	K	
C415			CC73HCH1H390J	CHIP C	39PF	J	
C416			CC73HCH1H820J	CHIP C	82PF	J	
C417			CK73HB1H391K	CHIP C	390PF	K	
C418			CK73HB1A104K	CHIP C	0.10UF	K	
C419			CC73HCH1H390J	CHIP C	39PF	J	
C420			CK73HB1H182K	CHIP C	1800PF	K	
C421			CK73HB1H471K	CHIP C	470PF	K	
C422,423			CK73FB0J106K	CHIP C	10UF	K	
C424			CC73HCH1H820J	CHIP C	82PF	J	
C425			CK73HB1E103K	CHIP C	0.010UF	K	
C426			CK73HB1H471K	CHIP C	470PF	K	
C427			CK73HB1A104K	CHIP C	0.10UF	K	
C428			CK73HB1A333K	CHIP C	0.033UF	K	
C429			CC73HCH1H330J	CHIP C	33PF	J	
C431			CK73HB1A104K	CHIP C	0.10UF	K	
C432,433			CK73HB1E103K	CHIP C	0.010UF	K	
C434			CK73HB1H471K	CHIP C	470PF	K	
C435			CK73HB1E103K	CHIP C	0.010UF	K	
C436			CC73HCH1H020B	CHIP C	2.0PF	B	
C437			CC73HCH1H220J	CHIP C	22PF	J	
C438			CC73HCH1H010B	CHIP C	1.0PF	B	
C439			CK73HB1E103K	CHIP C	0.010UF	K	
C440,441			CK73HB1H471K	CHIP C	470PF	K	
C442			CC73HCH1H060B	CHIP C	6.0PF	B	
C443			CK73HB1E103K	CHIP C	0.010UF	K	
C444			CC73HCH1H020B	CHIP C	2.0PF	B	
C445,446			CC73HCH1H120J	CHIP C	12PF	J	
C448			CC73HCH1H060B	CHIP C	6.0PF	B	
C449			CK73HB1E103K	CHIP C	0.010UF	K	
C450			CC73HCH1H010B	CHIP C	1.0PF	B	
C451,452			CK73HB1H471K	CHIP C	470PF	K	
C453			CC73HCH1H070B	CHIP C	7.0PF	B	
C454-456			CK73HB1H471K	CHIP C	470PF	K	
C457			CC73HCH1H060B	CHIP C	6.0PF	B	
C458			CC73HCH1H180J	CHIP C	18PF	J	
C459			CC73HCH1H020B	CHIP C	2.0PF	B	
C460			CK73HB1H471K	CHIP C	470PF	K	
C461			CC73HCH1H020B	CHIP C	2.0PF	B	
C462			CK73HB1H471K	CHIP C	470PF	K	
C463			CC73HCH1H060B	CHIP C	6.0PF	B	
C464			CC73HCH1H180J	CHIP C	18PF	J	
C465			CK73HB1H471K	CHIP C	470PF	K	
C466,467			CC73HCH1H020B	CHIP C	2.0PF	B	
C468			CC73HCH1H180J	CHIP C	18PF	J	
C469			CC73HCH1H060B	CHIP C	6.0PF	B	
C470			CK73HB1H471K	CHIP C	470PF	K	
C474,475			CK73HB1H471K	CHIP C	470PF	K	
C477			CK73HB1A104K	CHIP C	0.10UF	K	
C478			CK73HB1H471K	CHIP C	470PF	K	
C479			CC73HCH1H030B	CHIP C	3.0PF	B	
C480			CC73HCH1H150J	CHIP C	15PF	J	
C481			CK73HB1H471K	CHIP C	470PF	K	
C482			CC73HCH1H040B	CHIP C	4.0PF	B	
C483			CK73HB1H471K	CHIP C	470PF	K	
C484			CC73HCH1H040B	CHIP C	4.0PF	B	
C485			CC73HCH1H150J	CHIP C	15PF	J	
C486			CC73HCH1H030B	CHIP C	3.0PF	B	

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TX-RX UNIT (X57-7790-11)

Ref. No.	Address	New parts	Parts No.	Description			Destination
C487			CC73HCH1H330J	CHIP C	33PF	J	
C488			CC73HCH1H070B	CHIP C	7.0PF	B	
C489			CC73HCH1H100B	CHIP C	10PF	B	
C494			CC73HCH1H3R5B	CHIP C	3.5PF	B	
C495			CK73HB1H471K	CHIP C	470PF	K	
C497			CK73HB1H471K	CHIP C	470PF	K	
C801-804			CK73HB1H271K	CHIP C	270PF	K	
C806			CK73HB1H271K	CHIP C	270PF	K	
C807			CK73HB1H471K	CHIP C	470PF	K	
C808,809			CK73GB1A105K	CHIP C	1.0UF	K	
C810,811			CK73HB1H471K	CHIP C	470PF	K	
C812-816			CK73GB1A105K	CHIP C	1.0UF	K	
C818,819			CK73HB1H271K	CHIP C	270PF	K	
C821			CK73HB1H471K	CHIP C	470PF	K	
C823			CK73GB1A105K	CHIP C	1.0UF	K	
C824			CK73HB1H271K	CHIP C	270PF	K	
C825			CK73GB1A105K	CHIP C	1.0UF	K	
C826			CK73HB1H102K	CHIP C	1000PF	K	
C829			CK73HB1H102K	CHIP C	1000PF	K	
C831			CK73FB0J106K	CHIP C	10UF	K	
C834			CK73HB1A104K	CHIP C	0.10UF	K	
C835			CK73FB0J106K	CHIP C	10UF	K	
C837-839			CK73HB1H471K	CHIP C	470PF	K	
C840			CK73HB1E103K	CHIP C	0.010UF	K	
C841			CK73HB1H471K	CHIP C	470PF	K	
C842			CK73HB1A104K	CHIP C	0.10UF	K	
C843			CK73HB1A473K	CHIP C	0.047UF	K	
C844			CK73HB1A104K	CHIP C	0.10UF	K	
C846			CC73HCH1H110J	CHIP C	11PF	J	
C848			CK73HB1H681K	CHIP C	680PF	K	
C849			CK73HB1A104K	CHIP C	0.10UF	K	
C850			CK73HB1H471K	CHIP C	470PF	K	
C851,852			CK73HB1E103K	CHIP C	0.010UF	K	
C854			CC73HCH1H110J	CHIP C	11PF	J	
C855			CK73HB1A104K	CHIP C	0.10UF	K	
C856			CK73HB1H471K	CHIP C	470PF	K	
C857			CK73HB1H332K	CHIP C	3300PF	K	
C858			CK73HB1E682K	CHIP C	6800PF	K	
C859			CK73GB1A105K	CHIP C	1.0UF	K	
C860,861			CK73HB1H471K	CHIP C	470PF	K	
C863			CK73HB1H271K	CHIP C	270PF	K	
C865			CK73HB1A104K	CHIP C	0.10UF	K	
C866			CS77CA1A220M	CHIP TNTL	22UF	10WV	
C868			CK73HB1H471K	CHIP C	470PF	K	
C869			CK73FB0J106K	CHIP C	10UF	K	
C871			CK73HB1E103K	CHIP C	0.010UF	K	
C872			CK73HB1H471K	CHIP C	470PF	K	
C873			CK73HB1H102K	CHIP C	1000PF	K	
C874			CK73HB1A104K	CHIP C	0.10UF	K	
C876			CK73FB0J106K	CHIP C	10UF	K	
C877			CK73HB1H102K	CHIP C	1000PF	K	
C878			CK73HB1E103K	CHIP C	0.010UF	K	
C879			CK73FB0J106K	CHIP C	10UF	K	
C881			CK73HB1A104K	CHIP C	0.10UF	K	
C882			CK73HB1H471K	CHIP C	470PF	K	
C883			CK73HB1H102K	CHIP C	1000PF	K	
C884			CK73GB1A105K	CHIP C	1.0UF	K	
C885			CC73HCH1H101J	CHIP C	100PF	J	
C886			CC73HCH1H221J	CHIP C	220PF	J	
C887,888			CC73HCH1H101J	CHIP C	100PF	J	

Ref. No.	Address	New parts	Parts No.	Description			Destination
C890			CK73HB1H821K	CHIP C	820PF	K	
C892			CK73GB1A105K	CHIP C	1.0UF	K	
C893			CK73HB0J105K	CHIP C	1.0UF	K	
C895			CK73HB1A104K	CHIP C	0.10UF	K	
C896			CK73HB0J105K	CHIP C	1.0UF	K	
C897,898			CK73HB1A474K	CHIP C	0.47UF	K	
C899,900			CK73HB1H471K	CHIP C	470PF	K	
C901			CK73HB1A474K	CHIP C	0.47UF	K	
C902,903			CK73GB0J225K	CHIP C	2.2UF	K	
C904			CK73HB1A474K	CHIP C	0.47UF	K	
C905,906			CK73HB1H471K	CHIP C	470PF	K	
C907			CC73HCH1H470J	CHIP C	47PF	J	
C908			CK73HB1H471K	CHIP C	470PF	K	
C909			CK73HB0J105K	CHIP C	1.0UF	K	
C910			CK73HB1A683K	CHIP C	0.068UF	K	
C911			CK73FB0J106K	CHIP C	10UF	K	
C912			CK73HB1H102K	CHIP C	1000PF	K	
C913			CK73HB1E103K	CHIP C	0.010UF	K	
C914			CK73HB1H682K	CHIP C	6800PF	K	
C916-919			CK73HB1H471K	CHIP C	470PF	K	
C920			CK73GB1A105K	CHIP C	1.0UF	K	
C922			CK73HB1A104K	CHIP C	0.10UF	K	
C923			CK73FB0J106K	CHIP C	10UF	K	
C924			CC73HCH1H101J	CHIP C	100PF	J	
C925			CK73HB1A473K	CHIP C	0.047UF	K	
C926			CS77CC0J101M	CHIP TNTL	100UF	6.3WV	
C928-932			CK73HB1H271K	CHIP C	270PF	K	
C934-936			CK73HB1H271K	CHIP C	270PF	K	
C940			CK73HB1H271K	CHIP C	270PF	K	
C942			CC73HCH1H101J	CHIP C	100PF	J	
C943-945			CK73HB1H271K	CHIP C	270PF	K	
C946			CK73HB1H102K	CHIP C	1000PF	K	
C947,948			CK73HB1H182K	CHIP C	1800PF	K	
C949			CK73HB1H102K	CHIP C	1000PF	K	
C950,951			CK73HB1H272K	CHIP C	2700PF	K	
C952-954			CK73HB1A104K	CHIP C	0.10UF	K	
C956			CK73HB1A104K	CHIP C	0.10UF	K	
C957			CK73GB0J225K	CHIP C	2.2UF	K	
C958			CK73GB1A105K	CHIP C	1.0UF	K	
C959			CK73HB1H271K	CHIP C	270PF	K	
C961,962			CK73HB1H682K	CHIP C	6800PF	K	
C964			CK73FB1E475K	CHIP C	4.7UF	K	
C965			CK73HB1H392K	CHIP C	3900PF	K	
C966			CK37HB0J105K	CHIP C	1.0UF	K	
CN801			E40-6573-05	FLAT CABLE CONNECTOR			
CN802,803			E40-6568-05	FLAT CABLE CONNECTOR			
CN829			E23-1326-05	TERMINAL			
J801			E11-0484-05	3.5D PHONE JACK (EXT-MIC/PTT)			
J802			E11-0715-05	2.5D PHONE JACK (EXT-SP)			
F801			F53-0372-05	FUSE (3.15A)			
F802			F53-0319-15	FUSE (1A)			
CD401			L79-1848-05	TUNING COIL (450KHZ)			
CF401			L72-1012-05	CERAMIC FILTER (450KHZ/NAR)			
CF402			L72-1010-05	CERAMIC FILTER (450KHZ/WID)			
L1			L41-4795-39	SMALL FIXED INDUCTOR (4.7UH)			
L2			L92-0163-05	BEADS CORE			
L3			L40-2285-92	SMALL FIXED INDUCTOR (220NH)			
L4-6			L40-1001-86	SMALL FIXED INDUCTOR (10UH)			
L7,8			L40-2285-92	SMALL FIXED INDUCTOR (220NH)			

PARTS LIST / 零件表

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Ref. No.	Address	New parts	Parts No.	Description	Destination
L9			L41-2278-14	SMALL FIXED INDUCTOR (22NH)	
L10			L41-1578-14	SMALL FIXED INDUCTOR (15NH)	
L11			L40-2285-92	SMALL FIXED INDUCTOR (220NH)	
L12			L40-2785-92	SMALL FIXED INDUCTOR (270NH)	
L13,14			L40-2285-92	SMALL FIXED INDUCTOR (220NH)	
L15			L92-0163-05	BEADS CORE	
L20,21			L40-2775-57	SMALL FIXED INDUCTOR (27.0NH)	
L30			L40-2275-57	SMALL FIXED INDUCTOR (22.0NH)	
L31			L40-1575-57	SMALL FIXED INDUCTOR (15.0NH)	
L202			L40-2775-71	SMALL FIXED INDUCTOR (27NH)	
L203			L40-1575-71	SMALL FIXED INDUCTOR (15NH)	
L204			L40-1875-71	SMALL FIXED INDUCTOR (18NH)	
L205			L92-0162-05	BEADS CORE	
L206			L40-1275-71	SMALL FIXED INDUCTOR (12NH)	
L207			L34-4573-05	AIR-CORE COIL	
L208			L92-0149-05	CHIP FERRITE	
L210			L92-0149-05	CHIP FERRITE	
L211			L34-4565-05	AIR-CORE COIL	
L216			L41-2285-43	SMALL FIXED INDUCTOR (220NH)	
L217			L34-4564-05	AIR-CORE COIL	
L219			L34-4563-05	AIR-CORE COIL	
L220			L34-4565-05	AIR-CORE COIL	
L221			L34-4564-05	AIR-CORE COIL	
L222			L40-2763-92	SMALL FIXED INDUCTOR (2.7NH)	
L401			L41-1885-53	SMALL FIXED INDUCTOR (0.18UH)	
L402			L40-1085-71	SMALL FIXED INDUCTOR (100NH)	
L403			L40-1591-86	SMALL FIXED INDUCTOR (1.5UH)	
L406			L92-0138-05	CHIP FERRITE	
L407			L41-6885-39	SMALL FIXED INDUCTOR (0.68UH)	
L408			L40-1875-71	SMALL FIXED INDUCTOR (18NH)	
L409			L41-2785-53	SMALL FIXED INDUCTOR (0.27UH)	
L410			L40-1575-71	SMALL FIXED INDUCTOR (15NH)	
L411			L41-2775-53	SMALL FIXED INDUCTOR (27NH)	
L413,414			L41-6868-14	SMALL FIXED INDUCTOR (6.8NH)	
L415			L92-0138-05	CHIP FERRITE	
L416			L41-2785-45	SMALL FIXED INDUCTOR (270NH)	
L418,419			L41-6868-14	SMALL FIXED INDUCTOR (6.8NH)	
L440			L41-6868-14	SMALL FIXED INDUCTOR (6.8NH)	
L443			L41-4778-14	SMALL FIXED INDUCTOR (47NH)	
L801			L92-0472-05	CHIP FERRITE	
X1			L77-3050-05	TCXO (16.8MHZ)	
X802			L77-3049-05	CRYSTAL RESONATOR (12MHZ)	
XF401			L71-0655-05	MCF (49.95MHZ)	
CP1			RK74HB1J101J	CHIP-COM 100 J 1/16W	
CP2			RK75HA1J103J	CHIP-COM 10K J 1/16W	
CP401			RK75HA1J474J	CHIP-COM 470K J 1/16W	
CP802			RK75HA1J473J	CHIP-COM 47K J 1/16W	
CP803			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
CP804			RK75HA1J472J	CHIP-COM 4.7K J 1/16W	
CP805			RK75HA1J473J	CHIP-COM 47K J 1/16W	
CP806			RK74HB1J102J	CHIP-COM 1.0K J 1/16W	
CP807			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
CP808-811			RK75HA1J473J	CHIP-COM 47K J 1/16W	
CP816			RK75HA1J474J	CHIP-COM 470K J 1/16W	
CP817			RK75HA1J473J	CHIP-COM 47K J 1/16W	
CP818			RK75HA1J474J	CHIP-COM 470K J 1/16W	
CP819			RK75HA1J473J	CHIP-COM 47K J 1/16W	
CP820			RK75HA1J102J	CHIP-COM 1.0K J 1/16W	
R1			RK73GB2A000J	CHIP R 0.0 J 1/10W	

Ref. No.	Address	New parts	Parts No.	Description	Destination
R2			RK73HB1J474J	CHIP R 470K J 1/16W	
R6			RK73HB1J473J	CHIP R 47K J 1/16W	
R7			RK73HB1J103J	CHIP R 10K J 1/16W	
R8			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R9			RK73HB1J101J	CHIP R 100 J 1/16W	
R10			RK73HB1J122J	CHIP R 1.2K J 1/16W	
R13			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R14			RK73HB1J273J	CHIP R 27K J 1/16W	
R15,16			RK73HB1J100J	CHIP R 10 J 1/16W	
R17,18			RK73HB1J122J	CHIP R 1.2K J 1/16W	
R19			RK73HB1J681J	CHIP R 680 J 1/16W	
R20			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R21			RK73HB1J103J	CHIP R 10K J 1/16W	
R27,28			RK73HB1J106J	CHIP R 10M J 1/16W	
R29			RK73HB1J473J	CHIP R 47K J 1/16W	
R30			RK73HB1J273J	CHIP R 27K J 1/16W	
R31			RK73HB1J152J	CHIP R 1.5K J 1/16W	
R32,33			RK73HB1J104J	CHIP R 100K J 1/16W	
R41,42			RN73HH1J221D	CHIP R 220 D 1/16W	
R44,45			RN73HH1J100D	CHIP R 10 D 1/16W	
R46			RK73HB1J154J	CHIP R 150K J 1/16W	
R47			RK73HB1J101J	CHIP R 100 J 1/16W	
R48			RK73HB1J682J	CHIP R 6.8K J 1/16W	
R49			RK73HB1J103J	CHIP R 10K J 1/16W	
R50			RK73HB1J470J	CHIP R 47 J 1/16W	
R51			RK73HB1J331J	CHIP R 330 J 1/16W	
R52			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R53			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R60			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R61			RK73HB1J394J	CHIP R 390K J 1/16W	
R62			RK73HB1J220J	CHIP R 22 J 1/16W	
R70			RK73HB1J560J	CHIP R 56 J 1/16W	
R201			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R203			RK73HB1J221J	CHIP R 220 J 1/16W	
R204			RK73HB1J104J	CHIP R 100K J 1/16W	
R205			RK73HB1J101J	CHIP R 100 J 1/16W	
R206			RK73HB1J822J	CHIP R 8.2K J 1/16W	
R207			RK73HB1J101J	CHIP R 100 J 1/16W	
R208			RK73HB1J273J	CHIP R 27K J 1/16W	
R209			RK73HB1J181J	CHIP R 180 J 1/16W	
R211,212			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R213			RK73HB1J152J	CHIP R 1.5K J 1/16W	
R214			RK73HB1J220J	CHIP R 22 J 1/16W	
R215,216			RK73HB1J471J	CHIP R 470 J 1/16W	
R217			RK73HB1J120J	CHIP R 12 J 1/16W	
R218			RK73HB1J471J	CHIP R 470 J 1/16W	
R219			RK73HB1J683J	CHIP R 68K J 1/16W	
R220			RK73HB1J150J	CHIP R 15 J 1/16W	
R221			RK73HB1J473J	CHIP R 47K J 1/16W	
R223			RK73HB1J470J	CHIP R 47 J 1/16W	
R224			RK73HB1J683J	CHIP R 68K J 1/16W	
R226			RK73HB1J390J	CHIP R 39 J 1/16W	
R227			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R228			RK73HB1J473J	CHIP R 47K J 1/16W	
R231			RK73FB2B000J	CHIP R 0.0 J 1/8W	
R232,233			RK73HB1J271J	CHIP R 270 J 1/16W	
R234			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R235			RK73GB2A823J	CHIP R 82K J 1/10W	
R237			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R239,240			RK73GB2A000J	CHIP R 0.0 J 1/10W	

PARTS LIST / 零件表

TX-RX UNIT (X57-7790-11)

Ref. No.	Address	New parts	Parts No.	Description				Destination
R301			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R303			RK73HB1J561J	CHIP R	560	J	1/16W	
R304			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R305			RK73HB1J333J	CHIP R	33K	J	1/16W	
R306			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R307			RK73EB2ER39K	CHIP R	0.39	K	1/4W	
R308			RK73HB1J182J	CHIP R	1.8K	J	1/16W	
R309,310			RK73EB2ER39K	CHIP R	0.39	K	1/4W	
R311,312			RK73HH1J154D	CHIP R	150K	D	1/16W	
R313,314			RK73HH1J474D	CHIP R	470K	D	1/16W	
R315			RK73HB1J103J	CHIP R	10K	J	1/16W	
R316			RK73HB1J333J	CHIP R	33K	J	1/16W	
R317			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R318			RK73HB1J474J	CHIP R	470K	J	1/16W	
R319			RK73HB1J104J	CHIP R	100K	J	1/16W	
R320			RK73HB1J105J	CHIP R	1.0M	J	1/16W	
R406			RK73HB1J103J	CHIP R	10K	J	1/16W	
R408,409			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R410			RK73HB1J334J	CHIP R	330K	J	1/16W	
R411,412			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R414			RK73HB1J101J	CHIP R	100	J	1/16W	
R415			RK73HB1J103J	CHIP R	10K	J	1/16W	
R416			RK73HB1J122J	CHIP R	1.2K	J	1/16W	
R417			RK73HB1J334J	CHIP R	330K	J	1/16W	
R419			RK73HB1J394J	CHIP R	390K	J	1/16W	
R421,422			RK73HB1J332J	CHIP R	3.3K	J	1/16W	
R424			RK73HB1J272J	CHIP R	2.7K	J	1/16W	
R426			RK73HB1J100J	CHIP R	10	J	1/16W	
R427			RK73HB1J224J	CHIP R	220K	J	1/16W	
R429			RK73HB1J101J	CHIP R	100	J	1/16W	
R433			RK73HB1J474J	CHIP R	470K	J	1/16W	
R434			RK73HB1J271J	CHIP R	270	J	1/16W	
R435			RK73HB1J101J	CHIP R	100	J	1/16W	
R436			RK73HB1J470J	CHIP R	47	J	1/16W	
R437			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R438			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R439			RK73HB1J331J	CHIP R	330	J	1/16W	
R440			RK73HB1J104J	CHIP R	100K	J	1/16W	
R441			RK73HB1J154J	CHIP R	150K	J	1/16W	
R442			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R443			RK73HB1J104J	CHIP R	100K	J	1/16W	
R444			RK73HB1J224J	CHIP R	220K	J	1/16W	
R445			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R446			RK73HB1J474J	CHIP R	470K	J	1/16W	
R448			RK73GB2A220J	CHIP R	22	J	1/10W	
R449			RK73HB1J221J	CHIP R	220	J	1/16W	
R452			RK73HB1J104J	CHIP R	100K	J	1/16W	
R455			RK73HB1J104J	CHIP R	100K	J	1/16W	
R456			RK73HB1J683J	CHIP R	68K	J	1/16W	
R457			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R461,462			RK73HB1J474J	CHIP R	470K	J	1/16W	
R481			RK73HB1J474J	CHIP R	470K	J	1/16W	
R482,483			RK73FB2B000J	CHIP R	0.0	J	1/8W	
R801			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R802			RK73GB2A331J	CHIP R	330	J	1/10W	
R803			RK73HB1J473J	CHIP R	47K	J	1/16W	
R804,805			RK73HB1J104J	CHIP R	100K	J	1/16W	
R806-809			RK73HB1J101J	CHIP R	100	J	1/16W	
R810			RK73HB1J104J	CHIP R	100K	J	1/16W	
R811			RK73GB2A271J	CHIP R	270	J	1/10W	

Ref. No.	Address	New parts	Parts No.	Description				Destination
R812			RK73HB1J104J	CHIP R	100K	J	1/16W	
R813			RK73HB1J473J	CHIP R	47K	J	1/16W	
R814-816			RK73HB1J104J	CHIP R	100K	J	1/16W	
R817			RK73HB1J223J	CHIP R	22K	J	1/16W	
R818			RK73GB2A331J	CHIP R	330	J	1/10W	
R819,820			RK73HB1J104J	CHIP R	100K	J	1/16W	
R821			RK73HB1J473J	CHIP R	47K	J	1/16W	
R822			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R823			RK73HB1J473J	CHIP R	47K	J	1/16W	
R824			RK73HH1J914D	CHIP R	910K	D	1/16W	
R825			RK73HB1J124J	CHIP R	120K	J	1/16W	
R826,827			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R828			RK73HH1J103D	CHIP R	10K	D	1/16W	
R829			RK73HH1J474D	CHIP R	470K	D	1/16W	
R830			RK73HB1J184J	CHIP R	180K	J	1/16W	
R831			RK73HB1J473J	CHIP R	47K	J	1/16W	
R835-838			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R839			RK73HB1J223J	CHIP R	22K	J	1/16W	
R841			RK73HB1J473J	CHIP R	47K	J	1/16W	
R842			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R843			RK73HB1J104J	CHIP R	100K	J	1/16W	
R844-846			RK73HB1J103J	CHIP R	10K	J	1/16W	
R847			RK73HB1J105J	CHIP R	1.0M	J	1/16W	
R848			RK73HB1J332J	CHIP R	3.3K	J	1/16W	
R849			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R850			RK73HB1J473J	CHIP R	47K	J	1/16W	
R851			RK73HB1J223J	CHIP R	22K	J	1/16W	
R852			RK73HB1J473J	CHIP R	47K	J	1/16W	
R853			RK73HB1J103J	CHIP R	10K	J	1/16W	
R854			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R855			RK73HB1J152J	CHIP R	1.5K	J	1/16W	
R856			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R857			RK73HB1J181J	CHIP R	180	J	1/16W	
R858			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R859			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R860			RK73HB1J684J	CHIP R	680K	J	1/16W	
R861			RK73HB1J104J	CHIP R	100K	J	1/16W	
R862			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R863			RK73HB1J223J	CHIP R	22K	J	1/16W	
R864			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R865			RK73HB1J223J	CHIP R	22K	J	1/16W	
R866			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R867			RK73HB1J103J	CHIP R	10K	J	1/16W	
R868			RK73HB1J222J	CHIP R	2.2K	J	1/16W	
R869,870			RK73HB1J473J	CHIP R	47K	J	1/16W	
R871			RK73HB1J104J	CHIP R	100K	J	1/16W	
R872			RK73HB1J121J	CHIP R	120	J	1/16W	
R874			RK73GB2A100J	CHIP R	10	J	1/10W	
R875			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R876			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R883			RK73GB2A000J	CHIP R	0.0	J	1/10W	
R884			RK73HB1J564J	CHIP R	560K	J	1/16W	
R885			RK73HB1J105J	CHIP R	1.0M	J	1/16W	
R887			RK73HB1J100J	CHIP R	10	J	1/16W	
R888,889			RK73HB1J473J	CHIP R	47K	J	1/16W	
R890			RK73HB1J273J	CHIP R	27K	J	1/16W	
R892,893			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R894			RK73HB1J104J	CHIP R	100K	J	1/16W	
R895			RK73HB1J224J	CHIP R	220K	J	1/16W	
R896			RK73HB1J104J	CHIP R	100K	J	1/16W	

PARTS LIST / 零件表

TX-RX UNIT (X57-7790-11)

Ref. No.	Address	New parts	Parts No.	Description	Destination
R897			RK73HB1J103J	CHIP R 10K J 1/16W	
R898			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R899,900			RK73HB1J474J	CHIP R 470K J 1/16W	
R901			RK73HB1J564J	CHIP R 560K J 1/16W	
R902			RK73HB1J153J	CHIP R 15K J 1/16W	
R903			RK73HB1J101J	CHIP R 100 J 1/16W	
R904			RK73HB1J474J	CHIP R 470K J 1/16W	
R905			RK73HB1J272J	CHIP R 2.7K J 1/16W	
R906			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R907			RK73HB1J272J	CHIP R 2.7K J 1/16W	
R908			RK73HB1J104J	CHIP R 100K J 1/16W	
R909			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R910,911			RK73HB1J103J	CHIP R 10K J 1/16W	
R912			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R913			RK73HB1J182J	CHIP R 1.8K J 1/16W	
R914			RK73HB1J471J	CHIP R 470 J 1/16W	
R918			RK73HB1J473J	CHIP R 47K J 1/16W	
R919			RK73HB1J682J	CHIP R 6.8K J 1/16W	
R920			RK73HB1J222J	CHIP R 2.2K J 1/16W	
R921,922			RK73HB1J473J	CHIP R 47K J 1/16W	
R923			RK73HB1J151J	CHIP R 150 J 1/16W	
R924			RK73HB1J474J	CHIP R 470K J 1/16W	
R925			RK73HB1J334J	CHIP R 330K J 1/16W	
R926			RK73HB1J274J	CHIP R 270K J 1/16W	
R927			RK73HB1J473J	CHIP R 47K J 1/16W	
R928			RK73HB1J273J	CHIP R 27K J 1/16W	
R929			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R930			RK73HB1J101J	CHIP R 100 J 1/16W	
R931			RK73HB1J562J	CHIP R 5.6K J 1/16W	
R936			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R937			RK73HB1J103J	CHIP R 10K J 1/16W	
R938			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R939			RK73HB1J823J	CHIP R 82K J 1/16W	
R940			RK73HB1J105J	CHIP R 1.0M J 1/16W	
R941			RK73HB1J563J	CHIP R 56K J 1/16W	
R942			RK73HB1J221J	CHIP R 220 J 1/16W	
R943,944			RK73HB1J473J	CHIP R 47K J 1/16W	
R945,946			RK73HB1J104J	CHIP R 100K J 1/16W	
R947			RK73HB1J103J	CHIP R 10K J 1/16W	
R951			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R953,954			RK73HB1J000J	CHIP R 0.0 J 1/16W	
S801-804			S70-0516-05	TACT SWITCH	
MIC801			T91-0651-15	MIC ELEMENT	
D3			1SV325F	VARIABLE CAPACITANCE DIODE	
D5			1SV325F	VARIABLE CAPACITANCE DIODE	
D7			1SV325F	VARIABLE CAPACITANCE DIODE	
D9			1SV325F	VARIABLE CAPACITANCE DIODE	
D10,11			HVC375B-E	VARIABLE CAPACITANCE DIODE	
D12			1SV281-F	VARIABLE CAPACITANCE DIODE	
D13-15			HSC119	DIODE	
D17,18			HSC277	DIODE	
D201,202			HVC131	DIODE	
D203,204			RN142S	DIODE	
D301			UDZW5.1(B)	ZENER DIODE	
D401,402			KDS121E-P	DIODE	
D403-405			HVC350B	VARIABLE CAPACITANCE DIODE	
D410			HVC350B	VARIABLE CAPACITANCE DIODE	
D431,432			HVC350B	VARIABLE CAPACITANCE DIODE	

Ref. No.	Address	New parts	Parts No.	Description	Destination
D802			HSC119	DIODE	
D803			GN1G	DIODE	
D806			RKZ5.1B2KG	ZENER DIODE	
D807-809			KDR731	DIODE	
D810			MC2850	DIODE	
IC1			AK1541	MOS-IC	
IC301			NJM2904RB1-ZB	BI-POLAR IC	
IC401			TA31136FNG	MOS-IC	
IC801			XC6209B502PR	MOS-IC	
IC802			XC6209B502MR	MOS-IC	
IC803			XC6209B502PR	MOS-IC	
IC804			XC6209B332MR	MOS-IC	
IC805			XC61CN4502MR	MOS-IC	
IC806			XC6209B332MR	MOS-IC	
IC807			XC6120N302N1	MOS-IC	
IC808			HA1630D03MM	MOS-IC	
IC809			F3640MDFBKDPA	MCU	
IC810			EX25064ASA00A	ROM IC	
IC811			TC75S51FE(F)	MOS-IC	
IC812			CD686Q3	MOS-IC	
IC814			TC75S51FE(F)	MOS-IC	
IC815			TA7368FG	MOS-IC	
IC816			HA1630D03MM	MOS-IC	
IC817			AK2331	MOS-IC	
Q2			2SC5636	TRANSISTOR	
Q3			KTC4075E(Y,GR)	TRANSISTOR	
Q4,5			MCH3914(8)-H	FET	
Q6			SSM6L05FU-F	FET	
Q7			SSM3J05FU-F	FET	
Q8,9			2SC5636	TRANSISTOR	
Q201			2SC5636	TRANSISTOR	
Q202			SSM6L05FU-F	FET	
Q203			2SC4926YD	TRANSISTOR	
Q204			RFM01U7P	FET	
Q205			RD07MUS2BT112	FET	
Q301			RT1N140U-T111	TRANSISTOR	
Q303			2SK1830F	FET	
Q304			RT1N141U-T111	TRANSISTOR	
Q305			2SK1824-A	FET	
Q306			RT1P441U-T111	TRANSISTOR	
Q403			KTC4080E-P	TRANSISTOR	
Q405			KTC4080E-P	TRANSISTOR	
Q406			3SK318	FET	
Q407			3SK293-F	FET	
Q801			SSM6N17FU	FET	
Q802,803			SSM6L05FU-F	FET	
Q804			SSM3J05FU-F	FET	
Q805			2SK1830F	FET	
Q806,807			2SC4919-S	TRANSISTOR	
Q808			2SK1830F	FET	
Q809			KTC4075E(Y,GR)	TRANSISTOR	
Q810			2SC4116(GR)F	TRANSISTOR	
Q811			2SA1586(Y,GR)F	TRANSISTOR	
Q812			2SK1830F	FET	
Q813			RT1N141U-T111	TRANSISTOR	
Q814			2SA1362-F(GR)	TRANSISTOR	
Q815,816			UPA672T-A	FET	
Q817			RT1N441U-T111	TRANSISTOR	
Q818,819			2SK3577-A	FET	
Q820			RT1N141U-T111	TRANSISTOR	

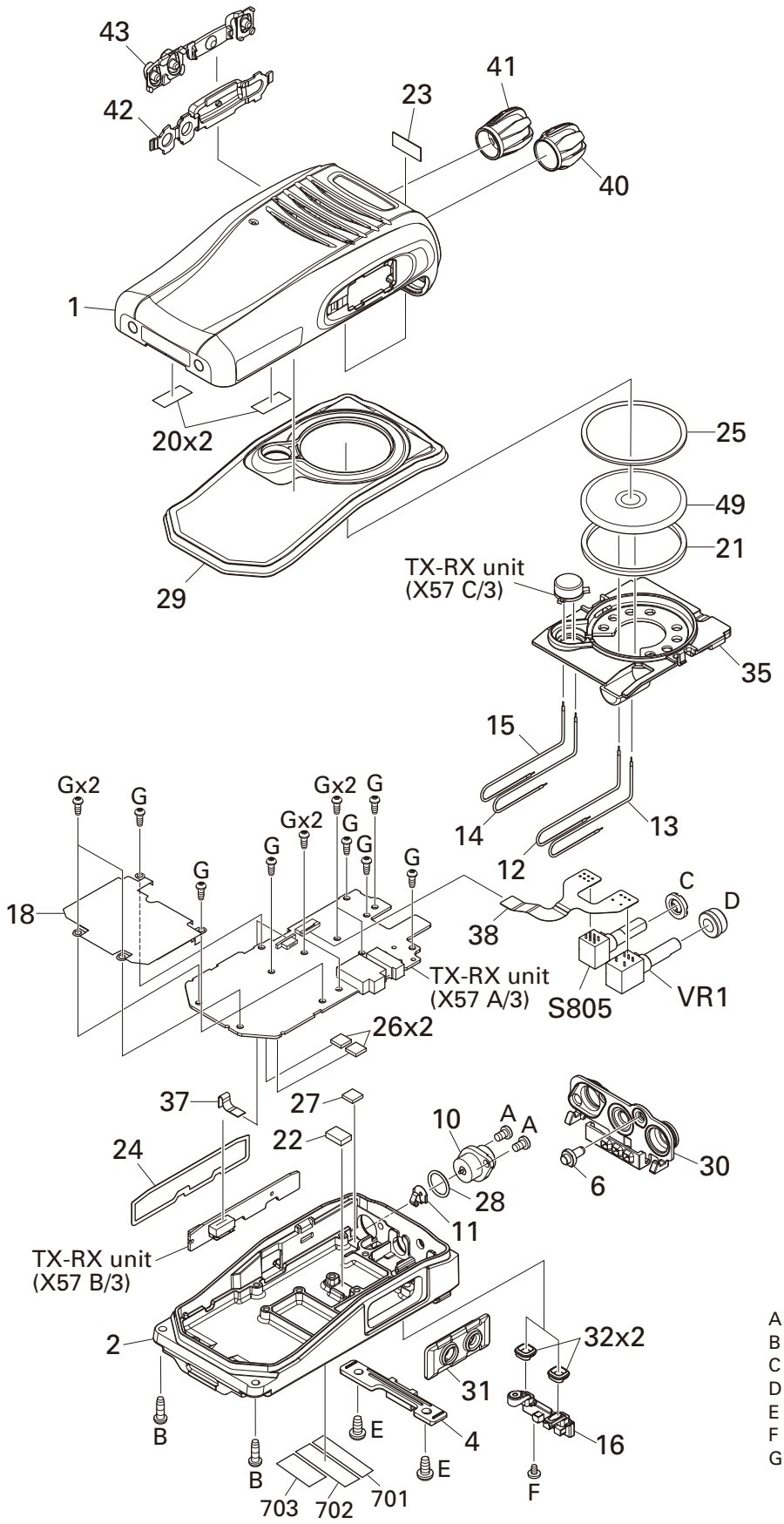
PARTS LIST / 零件表

TX-RX UNIT (X57-7790-11)

Ref. No.	Address	New parts	Parts No.	Description	Destination
TH201			ERTJ0EV104J	THERMISTOR	
TH401			B57331V2104J	THERMISTOR	

Ref. No.	Address	New parts	Parts No.	Description	Destination

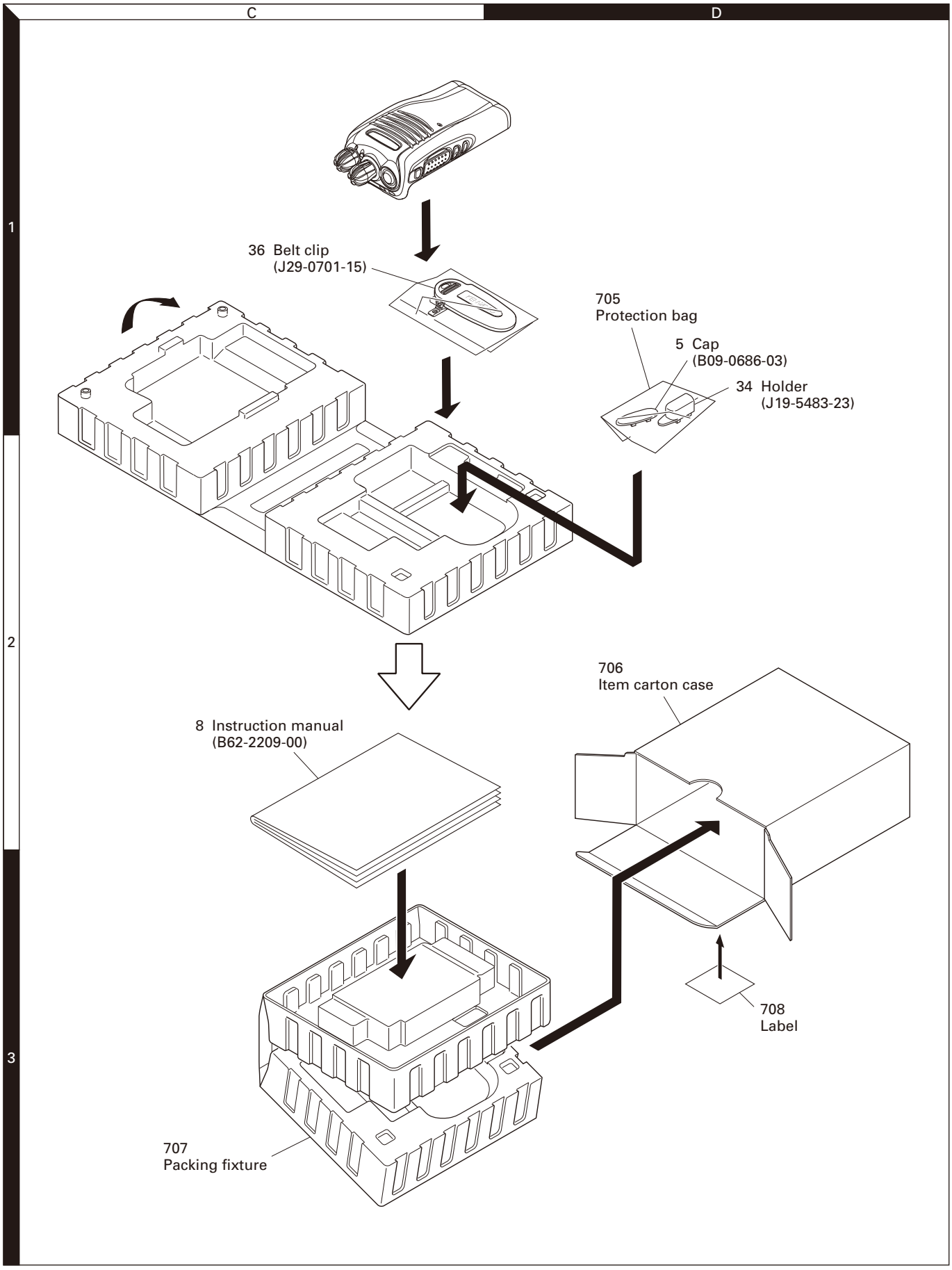
EXPLODED VIEW / 部件分解图



A : N09-2438-05
B : N09-6565-05
C : N14-0851-04
D : N14-0858-04
E : N30-3006-43
F : N78-2030-48
G : N83-2005-48

Parts with the exploded numbers larger than 700 are not supplied. / 编号大于 700 的零件未提供分解图。

PACKING / 包装



Parts with the exploded numbers larger than 700 are not supplied. / 编号大于 700 的零件未提供分解图。

ADJUSTMENT

Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	400 to 470MHz Frequency modulation and external modulation –127dBm/0.1μV to greater than –47dBm/1mV
2. RF Power Meter	Input Impedance Operation Frequency Measurement Range	50Ω 400 to 470MHz Vicinity of 10W
3. Deviation Meter	Frequency Range	400 to 470MHz
4. Digital Volt Meter (DVM)	Measuring Range Input Impedance	10mV to 10V DC High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 1000MHz 0.2ppm or less
7. DC Ammeter		5A
8. AF Volt Meter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz 1mV to 10V
9. Audio Generator (AG)	Frequency Range Output	50Hz to 5kHz or more 0 to 1V
10. Distortion Meter	Capability Input Level	3% or less at 1kHz 50mV to 10Vrms
11. Spectrum Analyzer	Measuring Range	DC to 1GHz or more
12. Tracking Generator	Center frequency Output Voltage	50kHz to 600MHz 100mV or more
13. 8Ω Dummy Load		Approx. 8Ω, 3W
14. Regulated Power Supply		5V to 10V, approx. 3A Useful if ammeter equipped

■ Antenna connector adapter

The antenna connector of this transceiver uses an SMA terminal.

Use an antenna connector adapter [SMA(f) – BNC(f) or SMA(f) – N(f)] for adjustment. (The adapter is not provided as an option, so buy a commercially-available one.)

■ Repair Jig (Chassis)

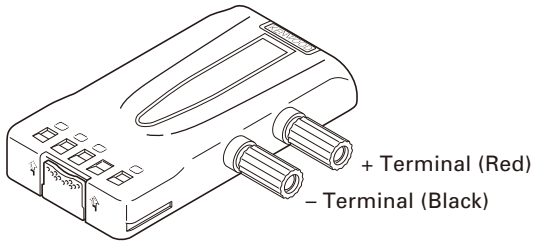
Use jig (part No.: A10-4134-03) for repairing the transceiver. Place the TX-RX unit on the jig and fit it with screws.

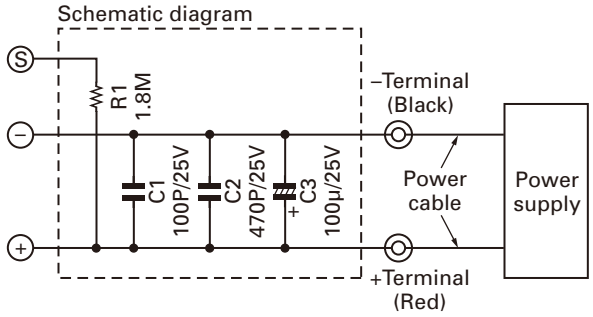
The jig facilitates the voltage check and protects the final amplifier FET when the voltage on the flow side of the TX-RX unit is checked during repairs.

■ Battery Jig (W05-0909-00)

Connect the power cable properly between the battery jig installed in the transceiver and the power supply, and be sure output voltage and the power supply polarity prior to switching the power supply ON, otherwise over voltage and reverse connection may damage the transceiver, or the power supply or both.

Note: When using the battery jig, you must measure the voltage at the terminals of the battery jig. Otherwise, a slight voltage drop may occur within the power cable, between the power supply and the battery jig, especially while the transceiver transmits.





调　整

调整所需的测试设备

测　试　设　备	主　要　规　格	
1. 标准信号发生器 (SSG)	频率范围 调制 输出	400 到 470MHz 调频和外部调制 -127dBm/0.1μV 到大于 -47dBm/1mV
2. 功率计	输入阻抗 操作频率 测量范围	50Ω 400 到 470MHz 10W 左右
3. 频偏仪	频率范围	400 到 470MHz
4. 数字电压表 (DVM)	测量范围 输入阻抗	直流 10mV 到 10V 为最小电路负载高输入阻抗
5. 示波器		直流到 30MHz
6. 高灵敏度频率计数器	频率范围 频率稳定性	10Hz 到 1000MHz 0.2ppm 或更低
7. 直流电流表		5A
8. 音频电压表 (AF VTVM)	频率范围 电压范围	50Hz 到 10kHz 1mV 到 10V
9. 音频发生器 (AG)	频率范围 输出	50Hz 到 5kHz 或更高 0V 到 1V
10. 失真测试仪	能力 输入电平	在 1kHz 时 3%或更低 50mV 到 10Vrms
11. 频谱分析仪	测量范围	直流到 1GHz 或更高
12. 轨迹发生器	中心频率 输出电压	50kHz 到 600MHz 100mV 或更高
13. 8Ω 假负载		大约 8Ω，3W
14. 可调电源		5V 到 10V，大约 3A 配备了电流表时更好

■天线接口转换头

此手持对讲机的天线接口使用 SMA 终端。

使用天线接口转换头 [SMA(f)-BNC(f) 或 SMA(f)-N(f)] 进行调整。(转换头不作为可选件提供,因此请购买商用转换头。)

■维修机架 (机壳)

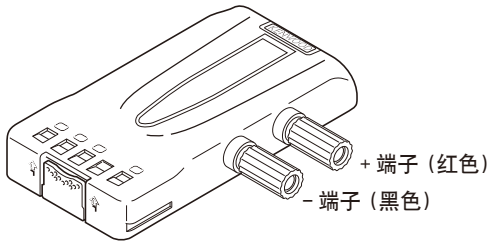
使用机壳 (A10-4134-03) 维修 TK-2360。将收发单元放置在机壳上，并且拧上螺钉。

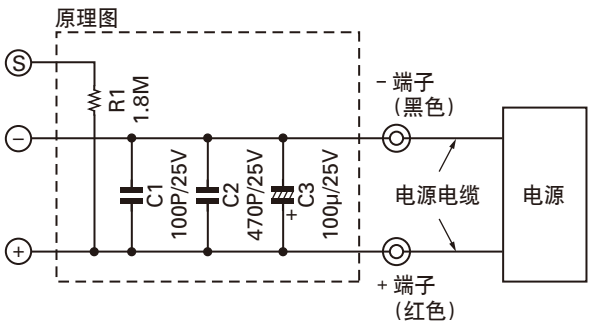
在维修过程中，当需要在收发单元的电路板上检测到电压时，机壳可以方便地进行电压检测，并且保护模块。

■电池夹具 (W05-0909-00)

在通手持对讲机电池夹具和电源之间连接适当的电源电缆，确认了输出电压之后接通电源开关，电压超过或极性颠倒都有可能损坏手持对讲机。

注意：当使用电池夹具时，你必须测定电池夹具的终端电压。因为，电源和电池夹具之间会有一些的电压下降，尤其在手持对讲机发射的时候。





ADJUSTMENT

Frequency and Signaling

The transceiver has been adjusted for the frequencies shown in the following table. When required, re-adjust them following the adjustment procedure to obtain the frequencies you want in actual operation.

■ Test Frequency (MHz)

CH	RX Frequency	TX Frequency
1	435.05000	435.10000
2	400.05000	400.10000
3	469.95000	469.90000
4	435.00000	435.00000
5	435.20000	435.20000
6	435.40000	435.40000
7~16	-	-

■ Test Signaling

No.	RX	TX
1	None	None
2	None	100Hz Square Wave
3	-	-
4	QT 67.0Hz	QT 67.0Hz
5	QT 151.4Hz	QT 151.4Hz
6	QT 210.7Hz	QT 210.7Hz
7	QT 254.1Hz	QT 254.1Hz
8	DQT D023N	DQT D023N
9	DQT D754I	DQT D754I
10	DTMF Decode (Code: 159D)	DTMF Encode (Code: 159D)
11	None	DTMF Encode (Code: 9)
12	2-tone Decode (A: 304.7Hz, B: 3106.0Hz)	2-tone Encode (A: 304.7Hz, B: 3106.0Hz)
13	Single Tone Decode (979.9Hz)	Single Tone Encode (979.9Hz)
14	None	Single Tone Encode (1000Hz)
15	-	-
16	None	MSK
17	MSK Decode	MSK Encode

Preparations for Tuning the Transceiver

Before attempting to tune the transceiver, connect the unit to a suitable power supply.

Whenever the transmitter is tuned, the unit must be connected to a suitable dummy load (i.e. power meter).

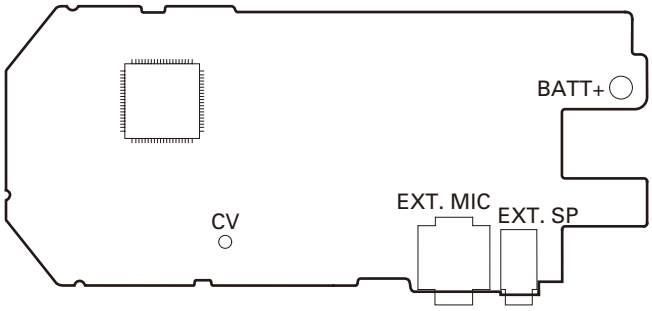
The speaker output connector must be terminated with a 8Ω dummy load and connected to an AC voltmeter and an audio distortion meter or a SINAD measurement meter at all times during tuning.

■ Adjustment frequency (MHz)

Tuning point	RX	TX
Low	400.05000	400.10000
Low'	417.55000	417.60000
Center	435.05000	435.10000
High'	452.55000	452.60000
High	469.95000	469.90000

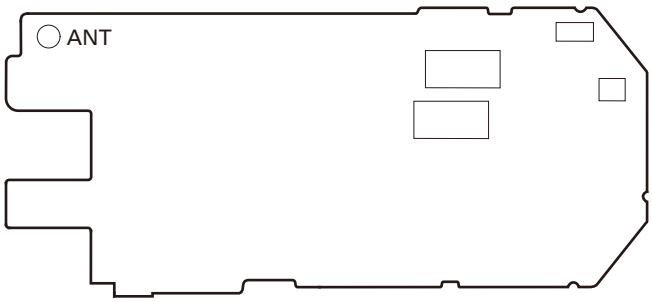
Adjustment Points

TX-RX UNIT (A/3)
Component side view



CV (LV): VCO Lock voltage
BATT+: Battery warning level

Foil side view



调　整

频率和信令

已经根据下表所示的频率调整了设置。需要时，按调整步骤重新调整，以获得实际操作时想要的频率。

■测试频率（MHz）

信　道	接 收 频 率	发 射 频 率
1	435.05000	435.10000
2	400.05000	400.10000
3	469.95000	469.90000
4	435.00000	435.00000
5	435.20000	435.20000
6	435.40000	435.40000
7 ～ 16	–	–

■测试信令

编　号	接　收	发　射
1	无	无
2	无	100Hz 方波
3	–	–
4	QT 67.0Hz	QT 67.0Hz
5	QT 151.4Hz	QT 151.4Hz
6	QT 210.7Hz	QT 210.7Hz
7	QT 254.1Hz	QT 254.1Hz
8	DQT D023N	DQT D023N
9	DQT D754I	DQT D754I
10	DTMF 解码 （码 :159D）	DTMF 编码 （码 :159D）
11	无	DTMF 编码 （码 :9）
12	2- 音解码 (A:304.7Hz,B:3106.0Hz)	2- 音编码 (A:304.7Hz,B:3106.0Hz)
13	单音解码 (979.9Hz)	单音编码 (979.9Hz)
14	无	单音编码 (1000Hz)
15	–	–
16	无	MSK
17	MSK 解码	MSK 编码

调谐手持对讲机的准备

在尝试调谐手持对讲机前，请将手持对讲机连接到合适的电源上。

发射打开时，手持对讲机必须连接到合适的等效负载上（如功率表）。

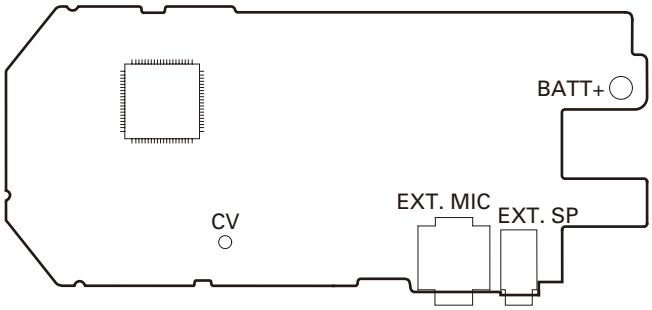
扬声器输出连接器必须端接 8Ω 的等效负载，调谐期间，必须始终连接到交流电压表和音频失真仪或 SINAD 测量仪表上。

■调整频率（MHz）

调 谐 点	接　收	发　射
低	400.05000	400.10000
低’	417.55000	417.60000
中	435.05000	435.10000
高’	452.55000	452.60000
高	469.95000	469.90000

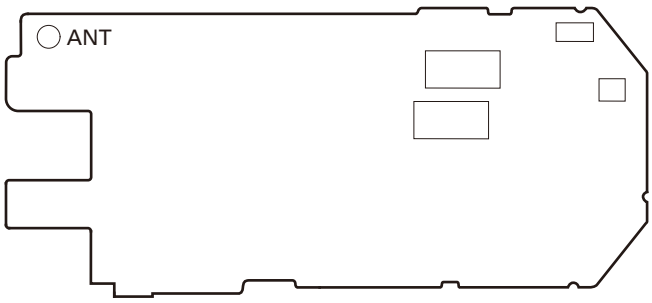
调整点

收发单元(A/3)
元件面视图



CV（LV）: VCO锁定电压
BATT+: 电池警告电平

箔面视图



ADJUSTMENT

Common Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) BATT terminal voltage: 7.5V 2) SSG standard modulation [Wide] MOD: 1kHz, DEV: 3kHz [Narrow] MOD: 1kHz, DEV: 1.5kHz							
2. Receive VCO Lock Voltage	1) TEST CH: 3	Power meter	TX-RX (A/3)	ANT		FPU	4.4V	±0.1V
	2) TEST CH: 2	DVM		CV			Check	0.6V or more
3. Transmit VCO Lock Voltage	1) TEST CH: 3 Press [Transmit] button.						4.2V	±0.1V
	2) TEST CH: 2 Press [Transmit] button.						Check	0.6V or more

Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Frequency	1) TEST CH: 3 Press [Transmit] button.	f. counter	TX-RX (A/3)	ANT		FPU	469.900MHz	±50Hz
2. High Transmit Power	1) Adj item: Low, Low', Center, High', High (5 points) BATT terminal voltage: 7.5V Press [Transmit] button.	Power meter Ammeter				FPU	4.8W	±0.1W 1.9A or less
3. Low Transmit Power	1) Adj item: Low, Low', Center, High', High (5 points) BATT terminal voltage: 7.5V Press [Transmit] button.						1.0W	±0.1W 0.9A or less
4. DQT Balance [Narrow]	1) Adj item: Low, Center, High (3 points) Deviation meter filter LPF: 3kHz HPF: OFF Press [Transmit] button.	Power meter Deviation meter Oscilloscope AG AF VTVM	TX-RX (A/3)	ANT SP/MIC connector		FPU	Adjust 2kHz deviation to be the same as 20Hz.	±0.5dB
5. Maximum Deviation [Narrow]	1) Adj item: Center, Low, High (3 points) AG: 1kHz/150mV Deviation meter filter LPF: 15kHz HPF: OFF Press [Transmit] button.						2.1kHz (According to the lager +, –)	±100Hz
[Wide]	2) TEST CH: 1 Press [Transmit] button.						4.2kHz (According to the lager +, –)	±100Hz

调　整

共通部分

项　目	条　件	测　量			调　整			规　格 / 备　注
		测量装置	单元	端子	单元	部件	方　法	
1. 设定	1)BATT 端子电压 :7.5V 2)标准信号发生器调制 ［宽］ 调制 :1kHz, 频偏 :3kHz ［窄］ 调制 :1kHz, 频偏 :1.5kHz							
2. 接收 VCO 锁定电压	1)测试信道 :3	功率计 DVM	收发 (A/3)	天线 CV		FPU	4.4V	±0.1V
	2)测试信道 :2						检查	0.6V 或更高
3. 发射 VCO 锁定电压	1)测试信道 :3 按［发射］按钮。						4.2V	±0.1V
	2)测试信道 : 2 按［发射］按钮。						检查	0.6V 或更高

发射部分

项　目	条　件	测　量			调　整			规　格 / 备　注
		测量装置	单元	端子	单元	部件	方　法	
1. 频率	1)测试信道 :3 按［发射］按钮。	频率计数器	收发 (A/3)	天线		FPU	469.900MHz	±50Hz
2. 高发射功率	1)调整项目 : 低 , 低', 中 , 高', 高 (5 点) BATT 端子电压 :7.5V 按［发射］按钮。	功率计 电流表				FPU	4.8W	±0.1W 1.9A 或更低
3. 低发射功率	1)调整项目 : 低 , 低', 中 , 高', 高 (5 点) BATT 端子电压 :7.5V 按［发射］按钮。						1.0W	±0.1W 0.9A 或更低
4. DQT 平衡 ［窄带］	1)调整项目 : 低 , 中 , 高 (3 点) 频偏仪滤波器 LPF:3kHz HPF:OFF 按［发射］按钮。	功率计 频偏仪 示波器 AG AF VTVM	收发 (A/3)	天线 SP/MIC 连接器		FPU	对 2 kHz 调制频偏的调整同 20Hz 时相同。	±0.5dB
5. 最大频偏 ［窄带］	1)调整项目 : 中 , 低 , 高 (3 点) AG:1kHz/150mV 频偏仪滤波器 LPF:15kHz HPF:OFF 按［发射］按钮。						2.1kHz (按照较大＋ , －)	±100Hz
［宽带］	2)测试信道 :1 按［发射］按钮。						4.2kHz (按照较大＋ , －)	±100Hz

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
6. DTMF Deviation [Narrow]	1) TEST CH: 1 Deviation meter filter LPF: 15kHz HPF: OFF Press [Transmit] button.	Power meter Deviation meter Oscilloscope AG AF VTVM	TX-RX (A/3)	ANT SP/MIC connector		FPU	1.5kHz	±100Hz
[Wide]	2) TEST CH: 1 Press [Transmit] button.						3.0kHz	±100Hz
7. MSK Deviation [Narrow]	1) TEST CH: 1 Deviation meter filter LPF: 15kHz HPF: OFF Press [Transmit] button.						1.5kHz	±100Hz
[Wide]	2) TEST CH: 1 Press [Transmit] button.						3.0kHz	±100Hz
8. Single Tone Deviation [Narrow]	1) TEST CH: 1 Deviation meter filter LPF: 15kHz HPF: OFF Press [Transmit] button.						1.5kHz	±100Hz
[Wide]	2) TEST CH: 1 Press [Transmit] button.						3.0kHz	±100Hz
9. QT Deviation [Narrow]	1) Adj item: Center, Low, High (3 points) Deviation meter filter LPF: 3kHz HPF: OFF Press [Transmit] button.						0.37kHz	±40Hz
[Wide]	2) TEST CH: 1 Press [Transmit] button.						0.75kHz	±40Hz
10. DQT Deviation [Narrow]	1) TEST CH: 1 Deviation meter filter LPF: 3kHz HPF: OFF Press [Transmit] button.						0.37kHz	±40Hz
[Wide]	2) TEST CH: 1 Press [Transmit] button.						0.75kHz	±40Hz
11. Battery Warning Level	1) BATT terminal voltage: 5.9V	DVM	TX-RX (A/3)	BATT terminal		FPU	Write	BATT terminal voltage: 5.9V
12. Battery Detection Check	1) BATT terminal voltage: 5.5V PTT: ON	Power meter DVM		ANT BATT terminal			Check	LED blinks No transmit power
	2) BATT terminal voltage: 7.5V PTT: ON							LED does not blink

调　整

项　目	条　件	测　量			调　整			规　格 / 备　注
		测量装置	单元	端子	单元	部件	方　法	
6. DTMF 频偏 ［窄带］	1)测试信道 :1 频偏仪滤波器 LPF:15kHz HPF:OFF 按［发射］按钮。	功率计 频偏仪 示波器 AG AF VTVM	收发 (A/3)	天线 SP/MIC 连接器		FPU	1.5kHz	±100Hz
［宽带］	2)测试信道 :1 按［发射］按钮。						3.0kHz	±100Hz
7. MSK 频偏 ［窄带］	1)测试信道 :1 频偏仪滤波器 LPF:15kHz HPF:OFF 按［发射］按钮。						1.5kHz	±100Hz
［宽带］	2)测试信道 :1 按［发射］按钮。						3.0kHz	±100Hz
8. 单音频偏 ［窄带］	1)测试信道 :1 频偏仪滤波器 LPF:15kHz HPF:OFF 按［发射］按钮。						1.5kHz	±100Hz
［宽带］	2)测试信道 :1 按［发射］按钮。						3.0kHz	±100Hz
9. QT 频偏 ［窄带］	1)调整项目 : 中, 低, 高 (3 点) 频偏仪滤波器 LPF:3kHz HPF:OFF 按［发射］按钮。						0.37kHz	±40Hz
［宽带］	2)测试信道 :1 按［发射］按钮。						0.75kHz	±40Hz
10. DQT 频偏 ［窄带］	1)测试信道 :1 频偏仪滤波器 LPF:3kHz HPF:OFF 按［发射］按钮。						0.37kHz	±40Hz
［宽带］	2)测试信道 :1 按［发射］按钮。						0.75kHz	±40Hz
11. 电池警告电平	1)BATT 端子电压 :5.9V	DVM	收发 (A/3)	BATT 端子		FPU	写入	BATT 端子电压 :5.9V
12. 电池指示检查	1)BATT 端子电压 :5.5V PTT: 开启	功率计 DVM		天线 BATT 端子			检查	手持对讲机不能发射，LED 闪烁
	2)BATT 端子电压 :7.5V PTT: 开启							手持对讲机可以发射，不会引起 LED 闪烁

ADJUSTMENT

Receiver Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Sensitivity	1) Adj item: Low, Low', Center, High', High (5 points) SSG output: –70dBm (70.8µV) SSG MOD: 1.5kHz	SSG DVM Oscilloscope AF VTVM	TX-RX (A/3)	ANT SP/MIC connector		FPU	Write	
2. Sensitivity Check [Narrow]	1) Adj item: Low, High (2 points) SSG output: –115dBm (0.4µV) SSG MOD: 1.5kHz						Check	13dB SINAD or more
[Wide]	2) TEST CH: 1 SSG output: –117dBm (0.32µV) SSG MOD: 3.0kHz							
3. High RSSI [Narrow]	1) Adj item: Center, Low, High (3 points) SSG output: –70dBm (70.8µV) SSG MOD: 1.5kHz					FPU	Write	
[Wide]	2) TEST CH: 1 SSG output: –70dBm (70.8µV) SSG MOD: 3.0kHz							
4. Low RSSI [Narrow]	1) Adj item: Center, Low, High (3 points) SSG output: –118dBm (0.28µV) SSG MOD: 1.5kHz							
[Wide]	2) TEST CH: 1 SSG output: –118dBm (0.28µV) SSG MOD: 3.0kHz							
5. Open Squelch [Narrow]	1) Adj item: Center, Low, High (3 points) SSG output: –119dBm (0.25µV) SSG MOD: 1.5kHz							
[Wide]	2) TEST CH: 1 SSG output: –120dBm (0.22µV) SSG MOD: 3.0kHz							
6. Tight Squelch [Narrow]	1) Adj item: Center, Low, High (3 points) SSG output: –115dBm (0.40µV) SSG MOD: 1.5kHz							
[Wide]	2) TEST CH: 1 SSG output: –116dBm (0.35µV) SSG MOD: 3.0kHz							

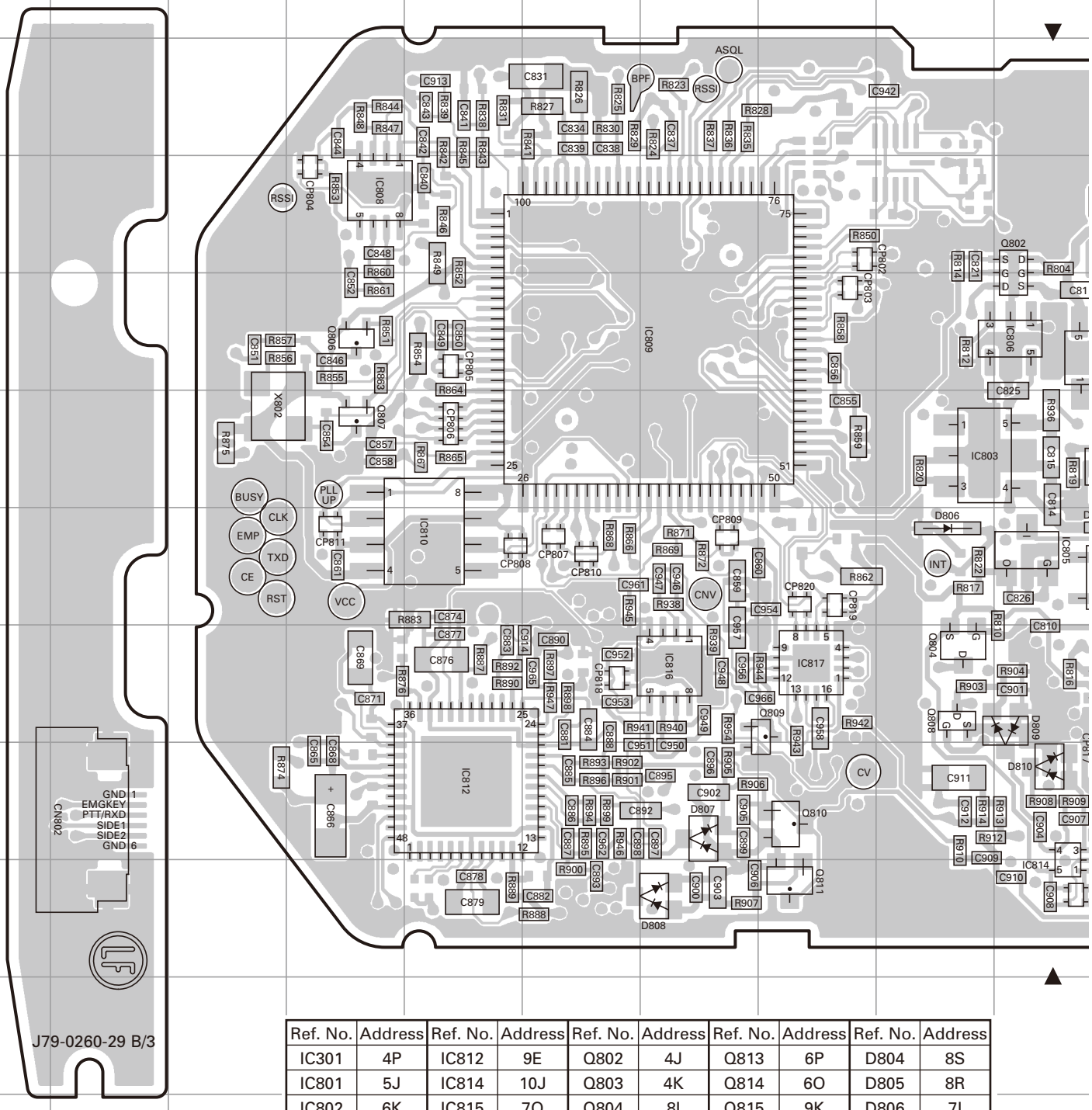
调　整

接收部分

项　目	条　件	测　量			调　整			规　格 / 备　注
		测量装置	单元	端子	单元	部件	方　法	
1. 灵敏度	1) 调整项目：低，低’，中，高’，高 (5 点) SSG 输出 :-70dBm(70.8μV) SSG 调制 :1.5kHz	SSG DVM 示波器 AF VTVM	收发 (A/3)	天线 SP/MIC 连接器		FPU	写入	
2. 灵敏度检查 [窄带]	1) 调整项目：低，高 (2 点) SSG 输出 :-115dBm(0.4μV) SSG 调制 :1.5kHz						检查	13dB SINAD 或更高
[宽带]	2) 测试信道 :1 SSG 输出 :-117dBm(0.32μV) SSG 调制 :3.0kHz							
3. 高 RSSI [窄带]	1) 调整项目：中，低，高 (3 点) SSG 输出 :-70dBm(70.8μV) SSG 调制 :1.5kHz					FPU	写入	
[宽带]	2) 测试信道 :1 SSG 输出 :-70dBm(70.8μV) SSG 调制 :3.0kHz							
4. 低 RSSI [窄带]	1) 调整项目：中，低，高 (3 点) SSG 输出 :-118dBm(0.28μV) SSG 调制 :1.5kHz							
[宽带]	2) 测试信道 :1 SSG 输出 :-118dBm(0.28μV) SSG 调制 :3.0kHz							
5. 静噪 (浅) [窄带]	1) 调整项目：中，低，高 (3 点) SSG 输出 :-119dBm(0.25μV) SSG 调制 :1.5kHz							
[宽带]	2) 测试信道 :1 SSG 输出 :-120dBm(0.22μV) SSG 调制 :3.0kHz							
6. 静噪 (深) [窄带]	1) 调整项目：中，低，高 (3 点) SSG 输出 :-115dBm(0.40μV) SSG 调制 :1.5kHz							
[宽带]	2) 测试信道 :1 SSG 输出 :-116dBm(0.35μV) SSG 调制 :3.0kHz							

TK-3360 PC BOARD / 印刷电路板

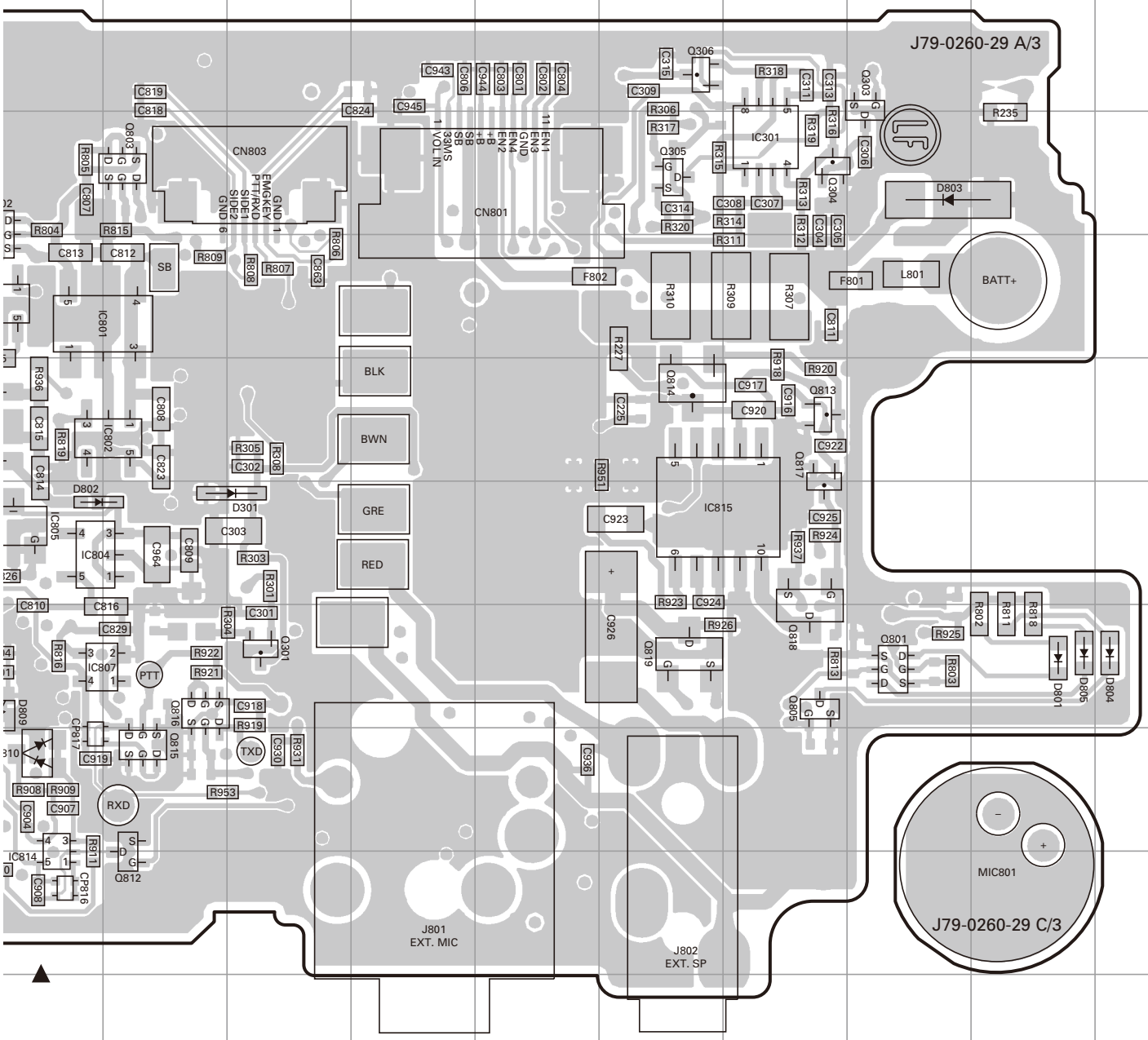
TX-RX UNIT (X57-7790-11)
Component side view (J79-0260-29)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC301	4P	IC812	9E	Q802	4J	Q813	6P	D804	8S
IC801	5J	IC814	10J	Q803	4K	Q814	6O	D805	8R
IC802	6K	IC815	7O	Q804	8I	Q815	9K	D806	7I
IC803	6I	IC816	8G	Q805	8P	Q816	8K	D807	9G
IC804	7J	IC817	8H	Q806	5D	Q817	6P	D808	10G
IC805	7J	Q301	8L	Q807	6D	Q818	8P	D809	8J
IC806	5J	Q303	3Q	Q808	8I	Q819	8O	D810	9J
IC807	8J	Q304	4P	Q809	8H	D301	7L		
IC808	4D	Q305	4O	Q810	9H	D801	8R		
IC809	5G	Q306	3O	Q811	10H	D802	7J		
IC810	7E	Q801	8Q	Q812	10K	D803	4Q		

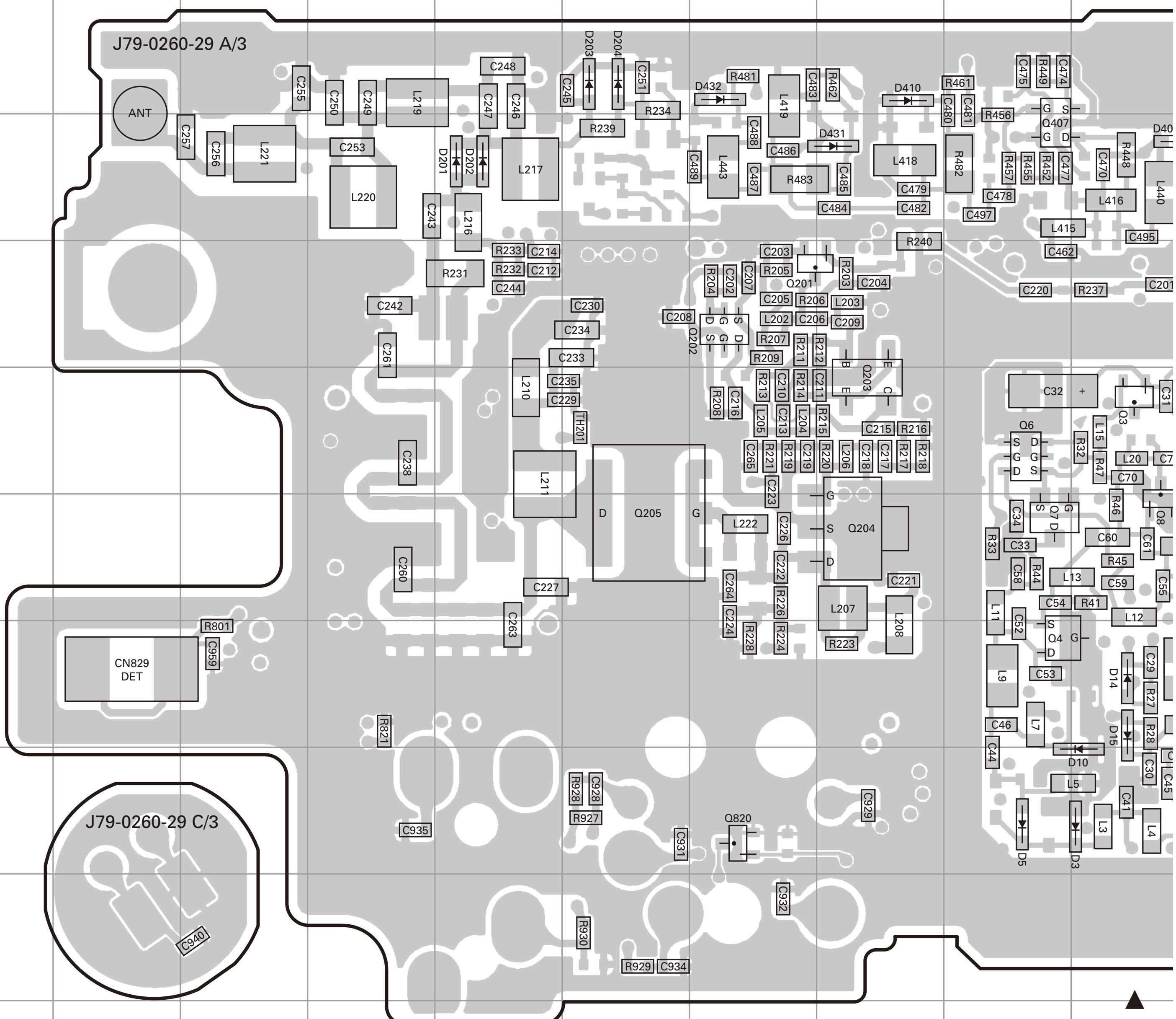
PC BOARD / 印刷电路板 TK-3360

TX-RX UNIT (X57-7790-11)
Component side view (J79-0260-29)



TK-3360 PC BOARD / 印刷电路板

TX-RX UNIT (X57-7790-11)
Foil side view (J79-0260-29)



Component side

Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Layer 6

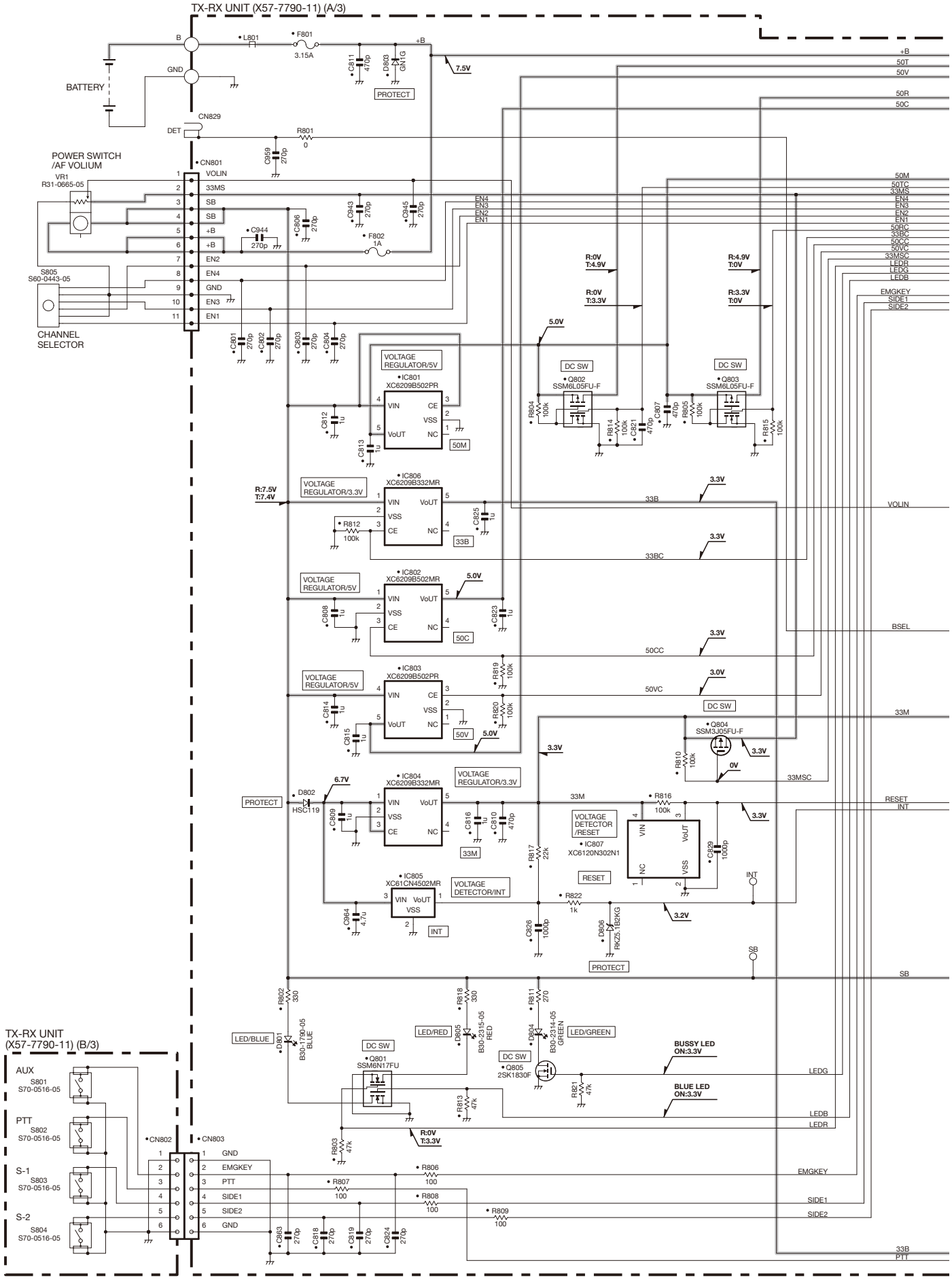
Foil side

PC BOARD / 印刷电路板 TK-3360

TX-RX UNIT (X57-7790-11)
Foil side view (J79-0260-29)

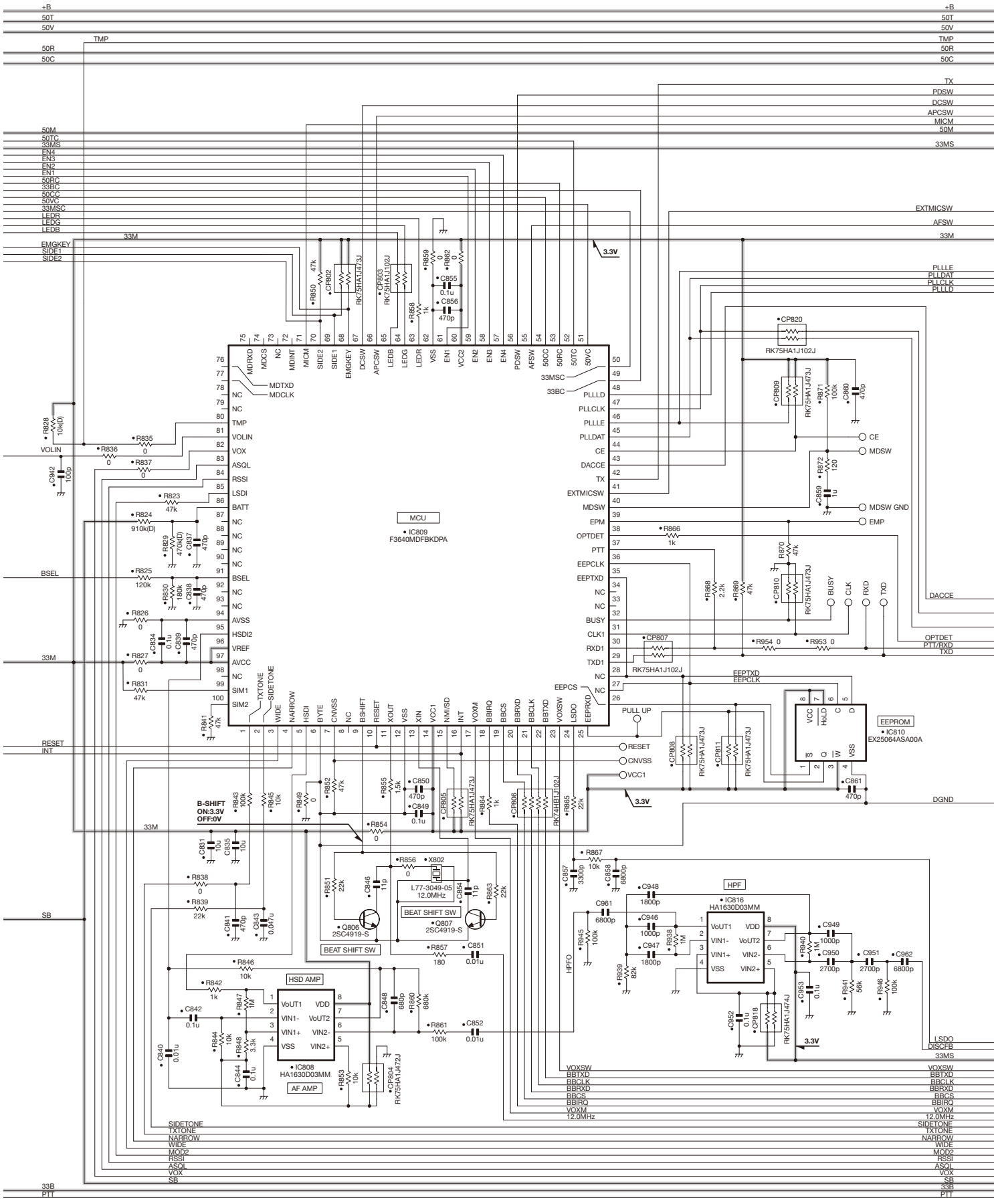
Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9N	Q9	6K	Q820	9G	D15	8J	D404	3K
IC401	6O	Q201	5G	D3	9J	D17	5K	D405	4J
IC811	9L	Q202	5G	D5	9I	D18	5K	D410	3H
Q2	8L	Q203	6H	D7	9K	D201	4E	D431	4H
Q3	6J	Q204	7H	D9	9J	D202	4E	D432	3G
Q4	8I	Q205	7F	D10	9J	D203	3F		
Q5	7K	Q403	8N	D11	8K	D204	3F		
Q6	6I	Q405	4O	D12	8K	D401	6N		
Q7	7I	Q406	4M	D13	6K	D402	5N		
Q8	7J	Q407	4I	D14	8J	D403	3L		

TK-3360 SCHEMATIC DIAGRAM / 原理图



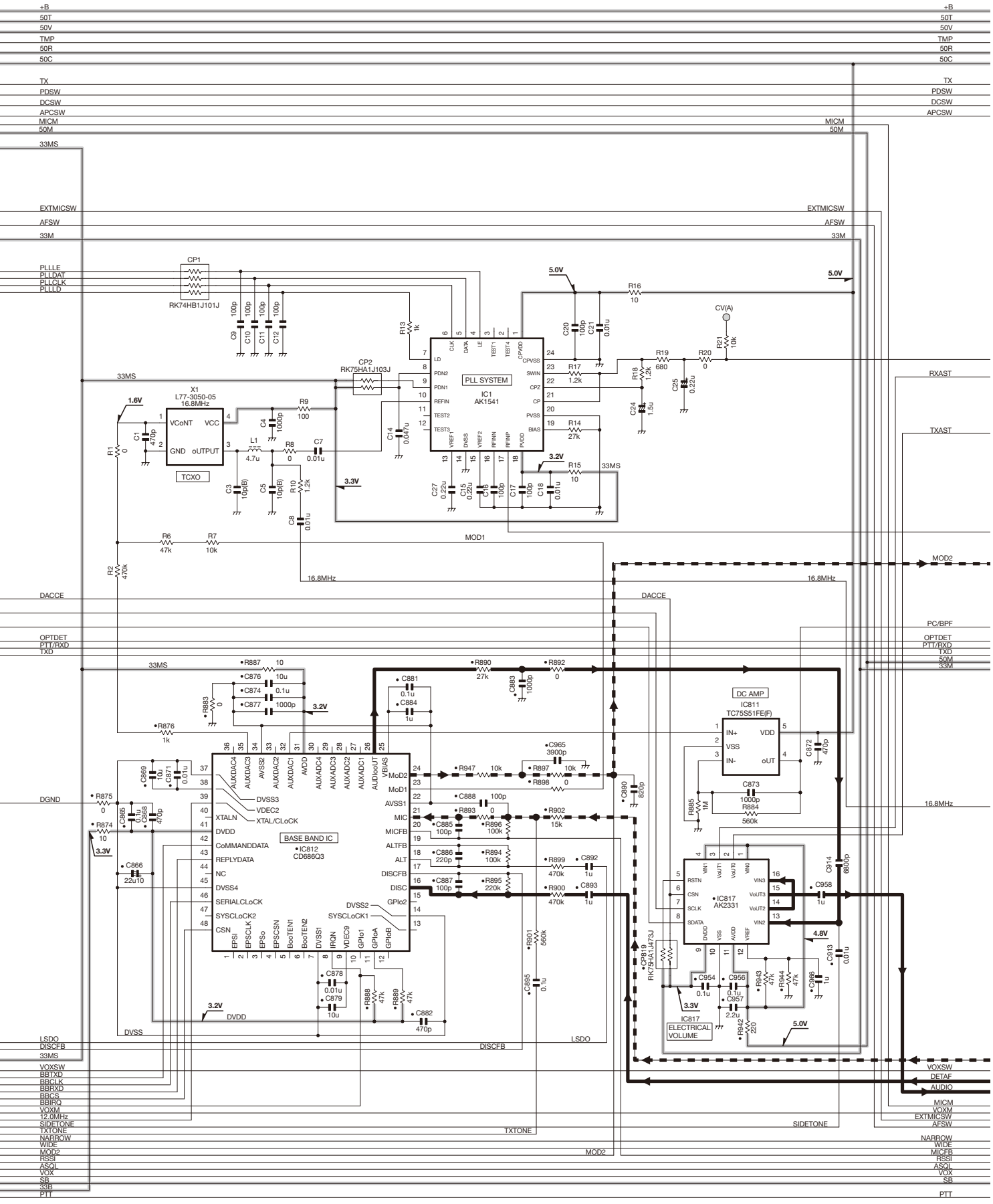
SCHEMATIC DIAGRAM / 原理图 TK-3360

TX-RX UNIT (X57-7790-11) (A/3)



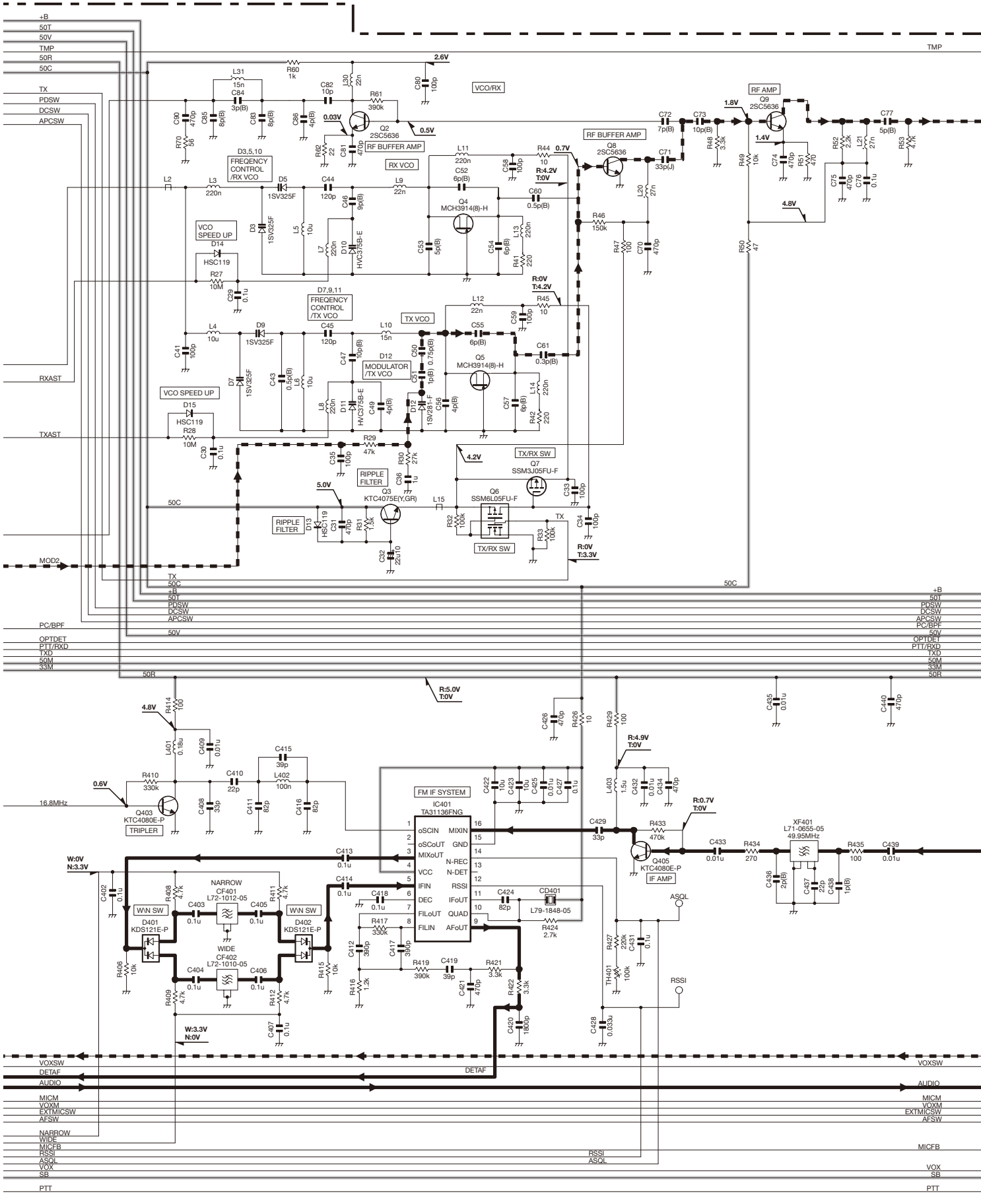
TK-3360 SCHEMATIC DIAGRAM / 原理图

TX-RX UNIT (X57-7790-11) (A/3)



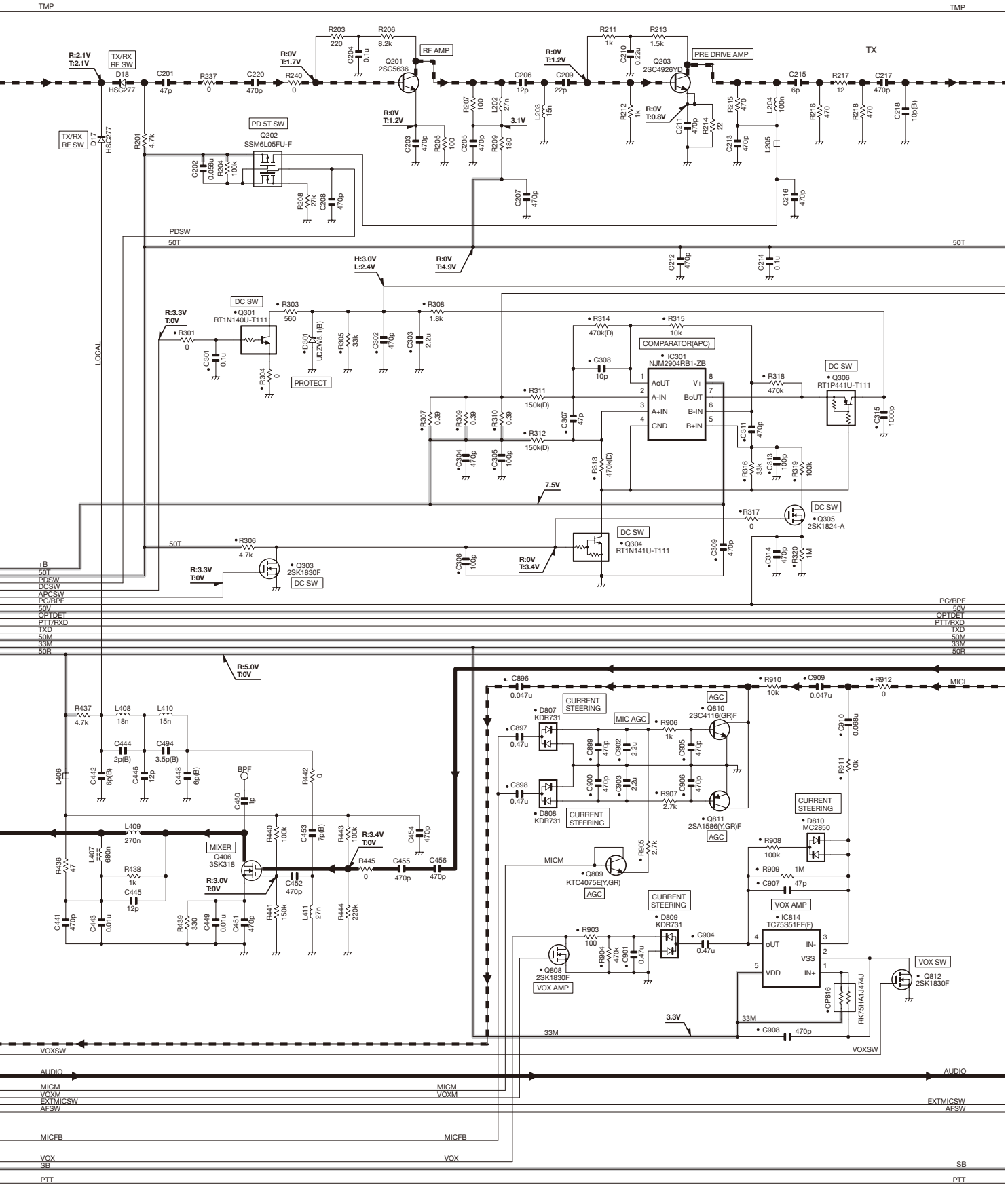
SCHEMATIC DIAGRAM / 原理图 TK-3360

TX-RX UNIT (X57-7790-11) (A/3)



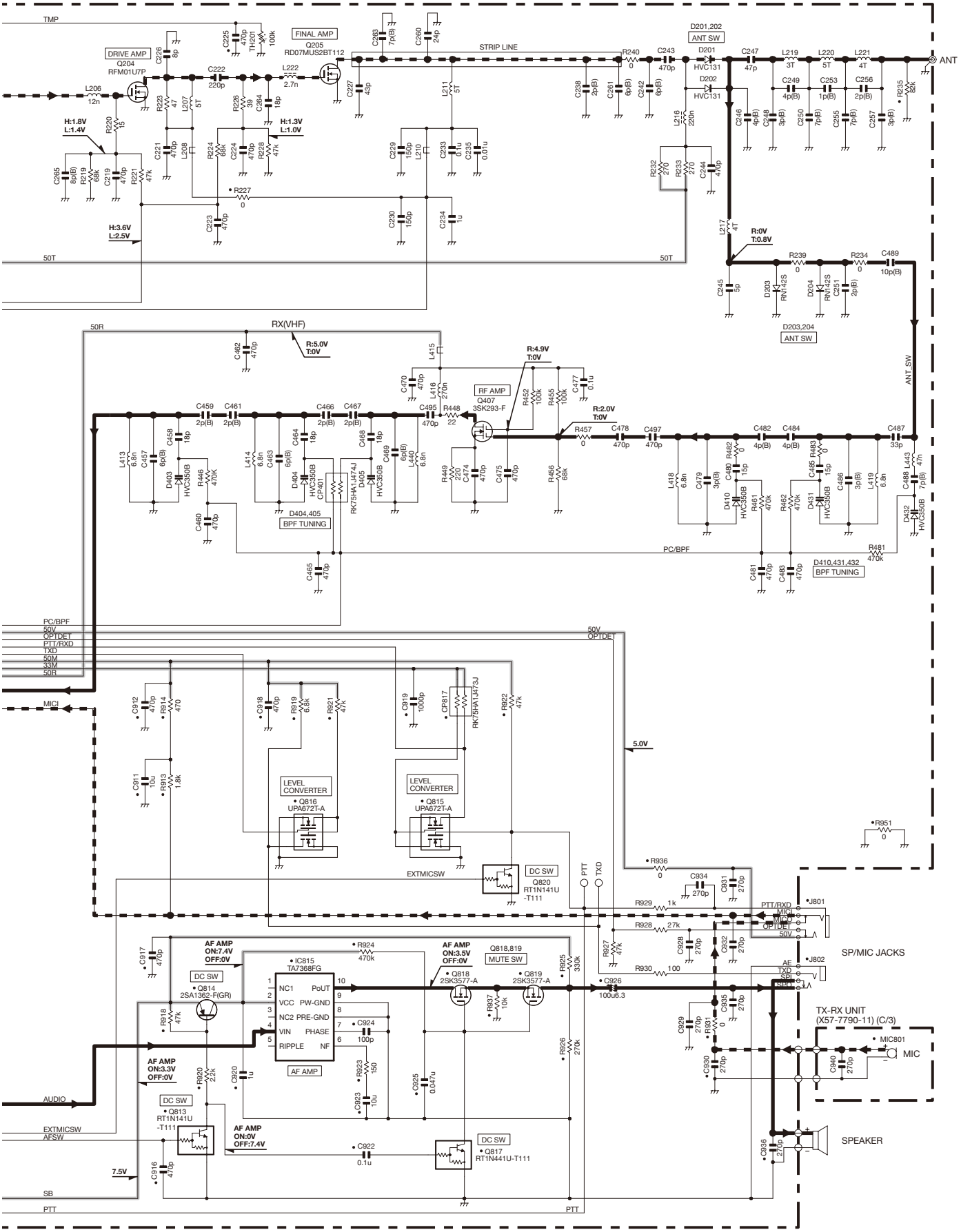
TK-3360 SCHEMATIC DIAGRAM / 原理图

TX-RX UNIT (X57-7790-11) (A/3)



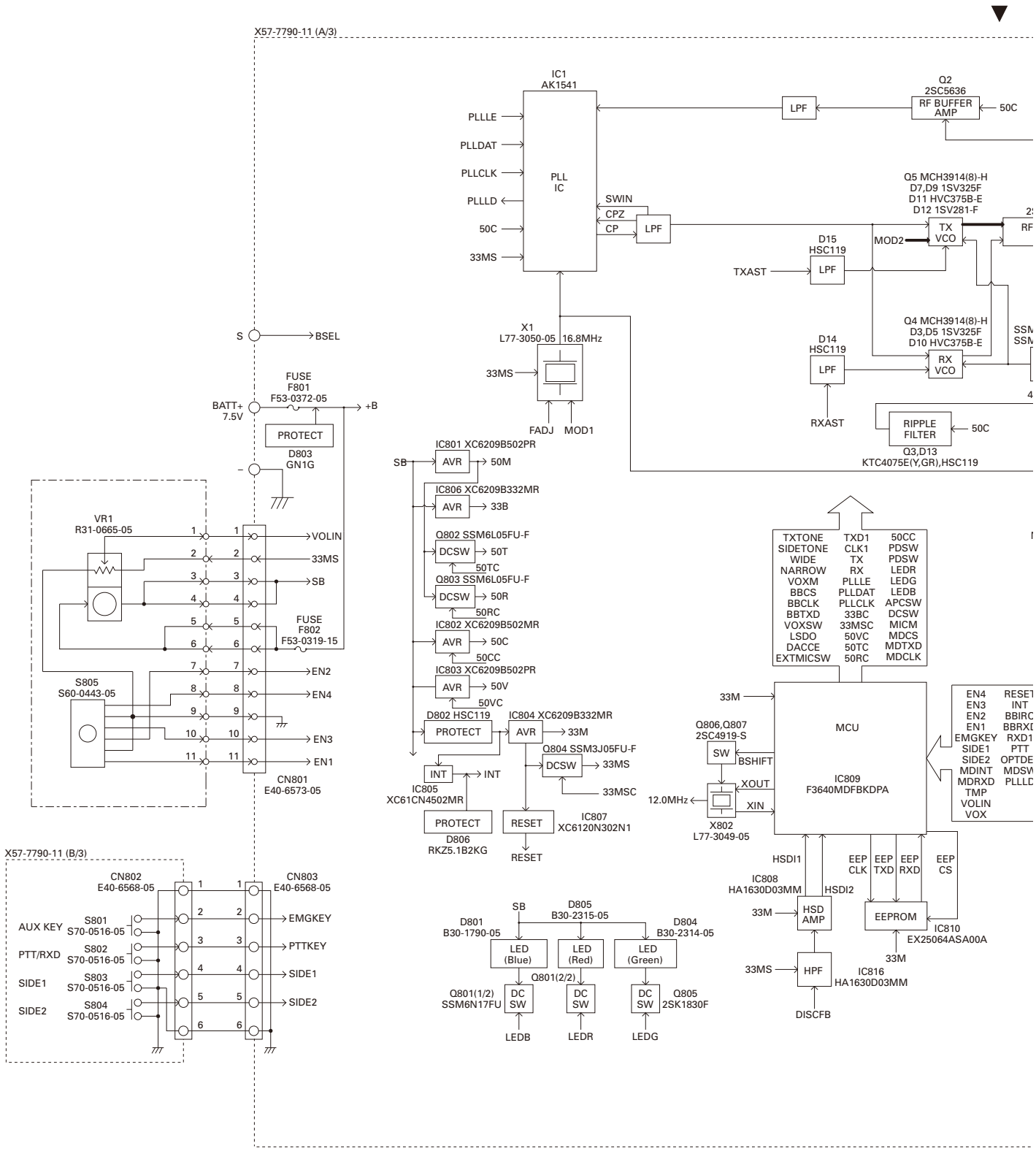
SCHEMATIC DIAGRAM / 原理图 TK-3360

TX-RX UNIT (X57-7790-11) (A/3)

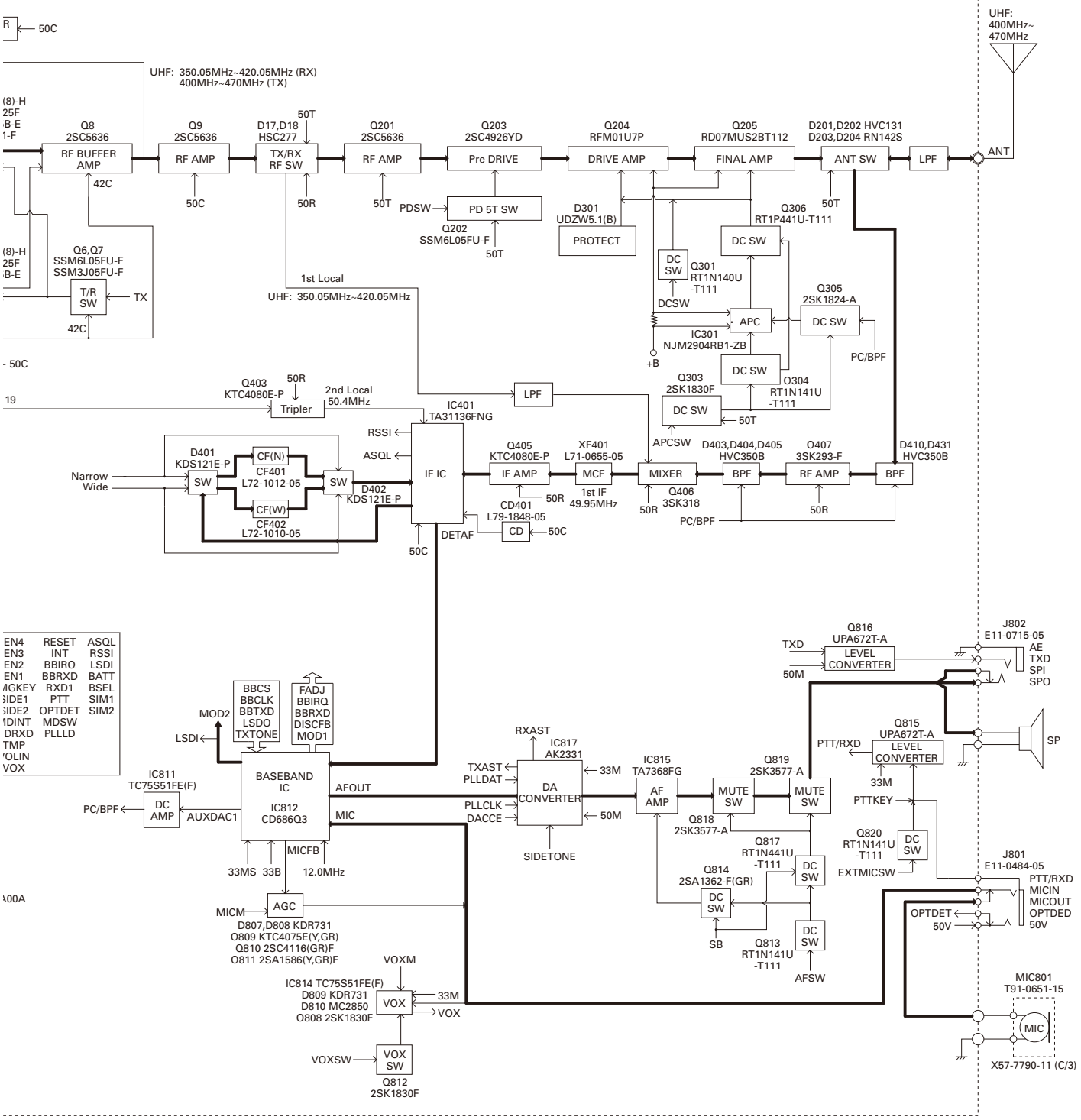


Note : The components marked with a dot (•) are parts of layer 1. / 注意: 标有点号 (•) 的零件为第一层的零件。 **51**

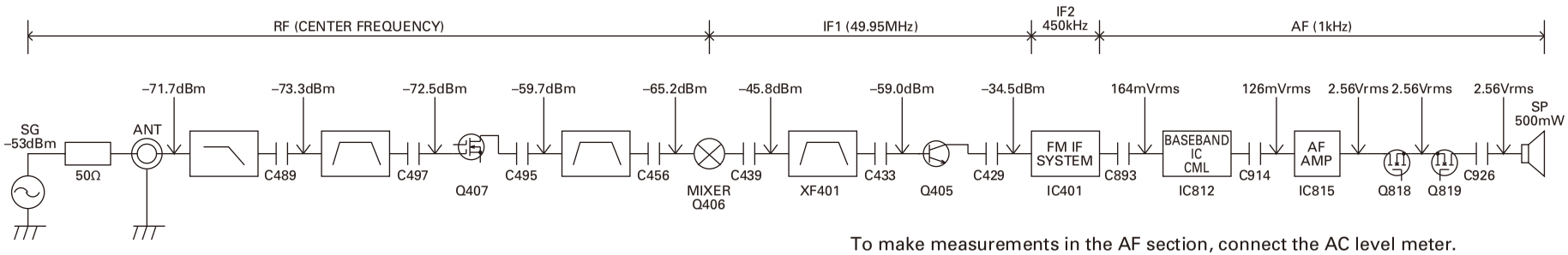
BLOCK DIAGRAM / 方块图



BLOCK DIAGRAM / 方块图



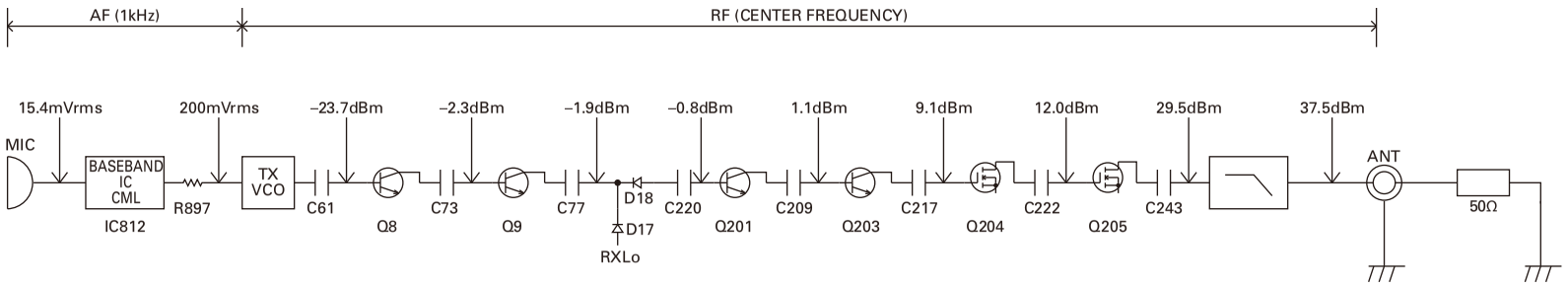
Receiver Section / 接收部分



To make measurements in the AF section, connect the AC level meter.
(ANT input : –53dBm, 1kHz FM, 1.5kHz DEV (Narrow).)
In the RF section, use a high impedance probe. (ANT input : –53dBm, MOD off.)

要在AF段进行测量，请连接交流电平表。
（ANT输入：–53dBm，1kHz FM，1.5kHz频偏(窄带)。）
在RF段，请使用高阻抗探针。（ANT输入：–53dBm，MOD关。）

Transmitter Section / 发射部分



AG is set to the MIC input becomes 1.5kHz DEV, At 1kHz MOD. (Narrow)
To make measurements in the AF section, connect the AC level meter.
In the RF section, use a 1000pF coupling capacitor

AG被设为麦克风输入，为1.5kHz频偏在1kHz调制。（窄带）
要在AF段进行测量，请连接交流电平表。
在RF段，请使用1000pF耦合电容。

OPTIONAL ACCESSORIES / 可选附件

KNB-55L (Li-ion Battery Pack / 锂离子电池)

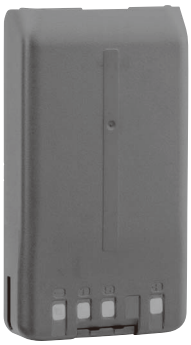
■ **External View / 外视图**

■ **Specifications / 规格**

Voltage / 电压.....7.4V (3.7V x 2)
Capacity / 充电电流..... 1480mAh

KNB-57L (Li-ion Battery Pack / 锂离子电池)

■ **External View / 外视图**



■ **Specifications / 规格**

Voltage / 电压.....7.4V (3.7V x 2)
Capacity / 充电电流..... 2000mAh

KMC-48GPS (GPS Speaker Microphone / GPS 扬声器麦克风)

■ **External View / 外视图**

■ **Specifications / 规格**

Operating temperature range / 工作温度范围....–30°C~+60°C
Microphone impedance / 麦克风阻抗..... 2.2kΩ (max / 最大)
Speaker impedance / 扬声器阻抗..... 1.2kHz 下为 16Ω±15%

TK-3360

SPECIFICATIONS / 规格

GENERAL

Frequency Range.....400~470MHz
Number of Channels.....MAX. 16
Channel Spacing.....25kHz (Wide), 12.5kHz (Narrow)
Operating Voltage.....7.5V DC±20%
Battery Life (5-5-90 duty cycle, save off)
With KNB-55L (1480mAh).....More than 9 hours at 5 W
Operating Temperature Range .....–30°C to +60°C
Frequency Stability ..... ±2.5ppm (–30°C to +60°C)
Channel Frequency Spread..... 70MHz
Dimensions and Weight (Dimensions not included)
Radio only .....56 W x 103.7 H x 14.0 D mm, 163g
With KNB-55L .....56 W x 103.7 H x 29.1 D mm, 260g

RECEIVER

(Measurements mode per EN Standards)

Sensitivity
EIA 12dB SINAD ..... 0.25µV (Wide), 0.28µV (Narrow)
EN 20dB SINAD
..... –3dBµV (0.35µV) (Wide), –2dBµV (0.40µV) (Narrow)
Adjasent Channel Selectivity .....70dB (Wide), 63dB (Narrow)
Intermodulation 68dB
Spurious Response Rejection..... 70dB
Audio Distortion.....Less than 5%
Audio Output 500mW/8Ω

TRANSMITTER

(Measurements mode per EN Standards)

RF Output Power.....5W/1W
Spurious Emission .....–36dBm ≤ 1GHz, –30dBm > 1GHz
FM Noise (EIA) .....45dB (Wide), 43dB (Narrow)
Microphone Impedance..... 1.8kΩ
Modulation Distortion.....Less than 5%
Modulation.....16K0F3E, 11K0F3E

概　述

频率范围..... 400 ～ 470MHz
信道数量.....最大 16
信道间隔..... 25kHz（宽带），12.5kHz（窄带）
工作电源电压..... 7.5V DC±20%
电池寿命（5-5-90 工作循环，电池省电 off 状态）
带有 KNB-55L(1480mAh) ..... 在 5W 时高于 9 时间
工作温度范围.....-30℃～ +60℃
频率稳定度..... ±2.5ppm(-30℃～ +60℃）
信道频率扩展..... 70MHz
尺寸及重量（未包括凸起部分）
仅对讲机时.....56 宽 ×103.7 高 ×14.0 长 mm, 163g
带有 KNB-55L.....56 宽 ×103.7 高 ×29.1 长 mm, 260g

接收部

（依据 EN 标准获得的模拟测量值）

灵敏度
EIA 12dB SINAD..... 0.25µV（宽带），0.28µV（窄带）
EN 20dB SINAD
..... -3dBµV(0.35µV)（宽带），-2dBµV(0.40µV)（窄带）
邻道选择性..... 70dB（宽带），63dB（窄带）
互调抑制..... 68dB
杂散响应..... 70dB
音频失真.....低于 5%
音频输出功率..... 500mW/8Ω

发射部

（依据 EN 标准获得的模拟测量值）

射频功率输出..... 5W/1W
杂散抑制..... -36dBm ≦ 1GHz, -30dBm ＞ 1GHz
调频噪声 (EIA) ..... 45dB（宽带），43dB（窄带）
麦克风阻抗..... 1.8kΩ
调制失真.....低于 5%
调　　制 16K0F3E, 11K0F3E

Kenwood Corporation
2967-3, Ishikawa-machi, Hachioji-shi, Tokyo, 192-8525 Japan

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P.O. BOX 22745, 2201 East Dominguez Street, Long Beach, CA 90801-5745, U.S.A.

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6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

Kenwood Electronics Deutschland GmbH
Rembrücker Str. 15, 63150 Heusenstamm, Germany

Kenwood Electronics Belgium N.V.
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Kenwood Electronics France S.A.
L'Etoile Paris Nord 2, 50 Allée des Impressionnistes, Bp 58416 Villepinte, 95944 Roissy Ch De Gaulle Cedex

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Kenwood Ibérica, S.A.
Bolivia, 239-08020 Barcelona, Spain

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Talavera Business Park Building A, 4 Talavera Road, North Ryde NSW 2113 Australia

Kenwood Electronics (Hong Kong) Ltd.
Suite 2504, 25/F, Tower 2, Nina Tower, No. 8 Yeung Uk Road, Tsuen Wan, New Territories, Hong Kong

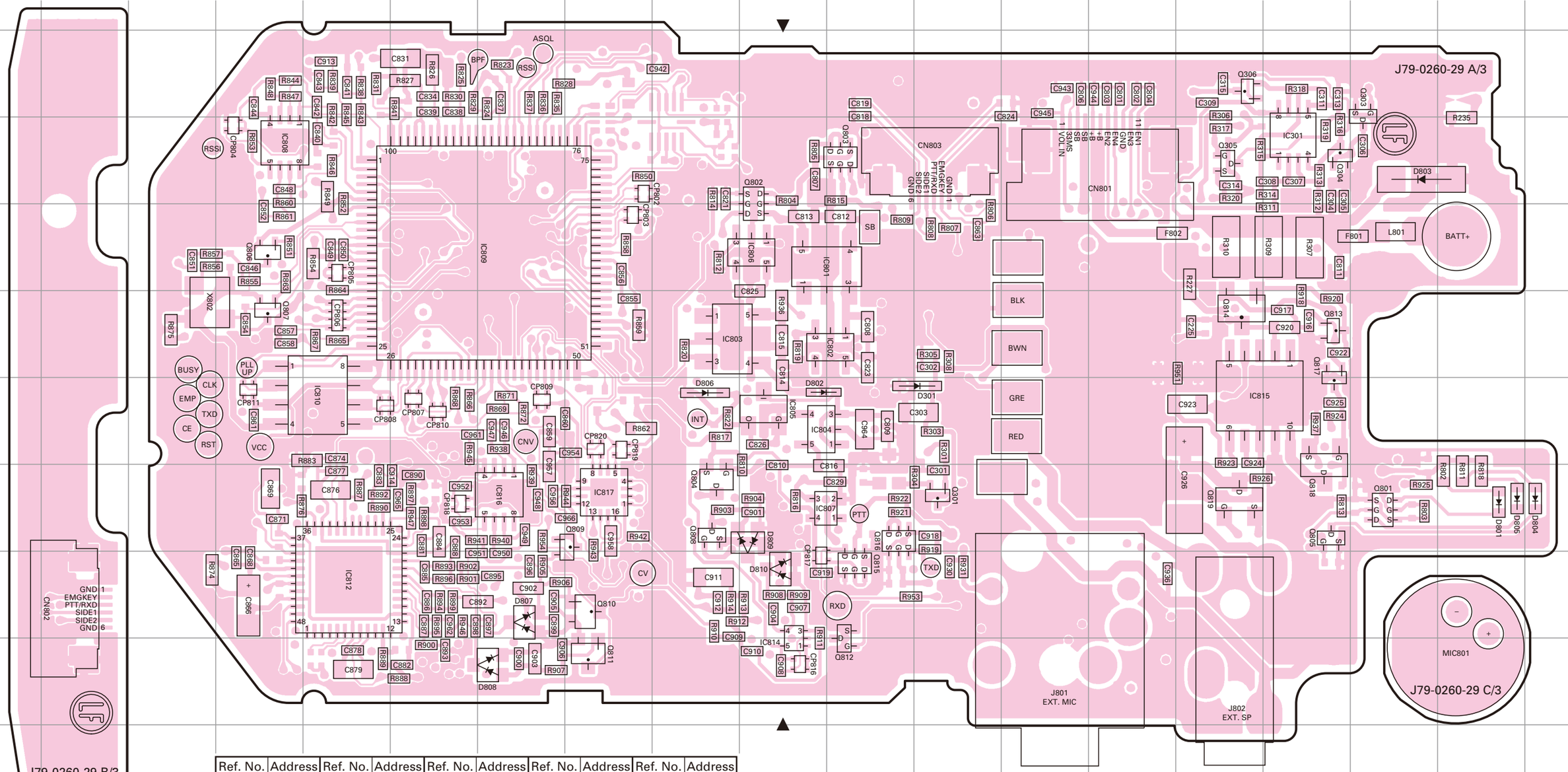
Kenwood Electronics Singapore Pte Ltd
1 Ang Mo Kio Street 63, Singapore 569110

TK-3360 PC BOARD / 印刷电路板

PC BOARD / 印刷电路板 TK-3360

TX-RX UNIT (X57-7790-11)
Component side view (J79-0260-29)

TX-RX UNIT (X57-7790-11)
Component side view (J79-0260-29)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC301	4P	IC812	9E	Q802	4J	Q813	6P	D804	8S
IC801	5J	IC814	10J	Q803	4K	Q814	6O	D805	8R
IC802	6K	IC815	7O	Q804	8I	Q815	9K	D806	7I
IC803	6I	IC816	8G	Q805	8P	Q816	8K	D807	9G
IC804	7J	IC817	8H	Q806	5D	Q817	6P	D808	10G
IC805	7J	Q301	8L	Q807	6D	Q818	8P	D809	8J
IC806	5J	Q303	3Q	Q808	8I	Q819	8O	D810	9J
IC807	8J	Q304	4P	Q809	8H	D301	7L		
IC808	4D	Q305	4O	Q810	9H	D801	8R		
IC809	5G	Q306	3O	Q811	10H	D802	7J		
IC810	7E	Q801	8Q	Q812	10K	D803	4Q		

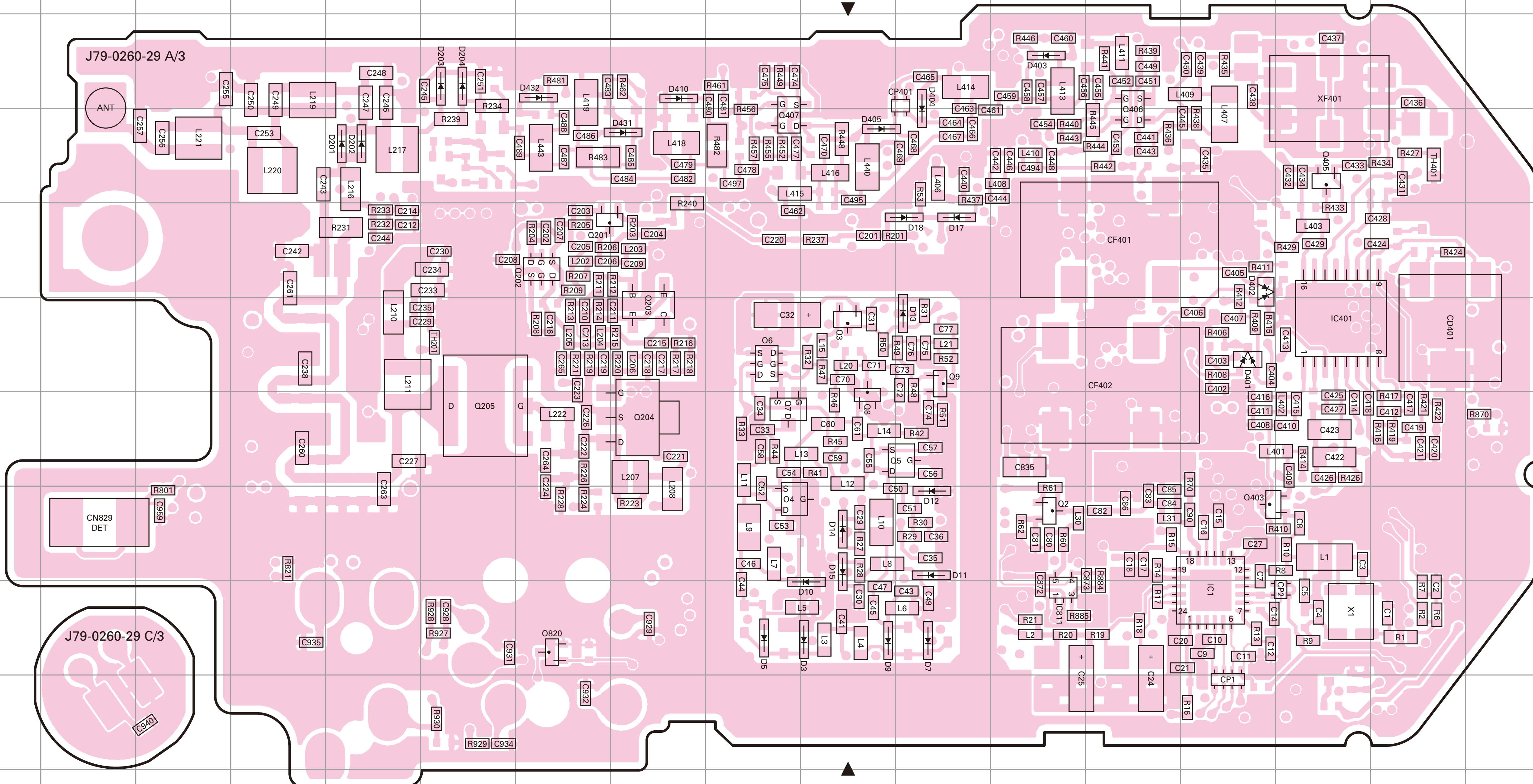
Component side
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5
Layer 6
Foil side

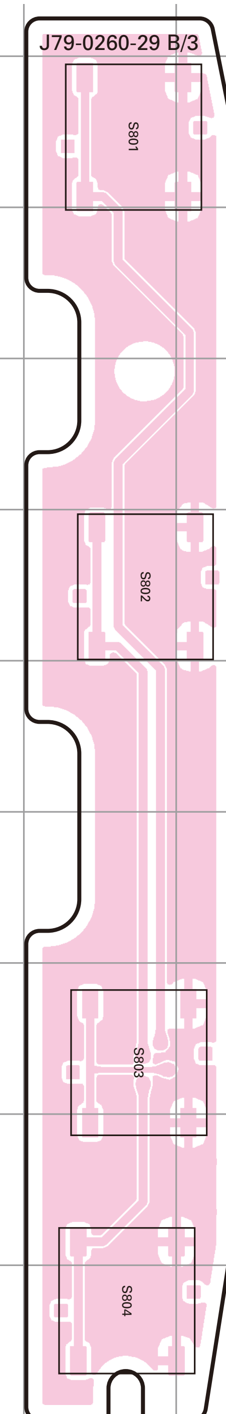
TK-3360 PC BOARD / 印刷电路板

PC BOARD / 印刷电路板 TK-3360

TX-RX UNIT (X57-7790-11)
Foil side view (J79-0260-29)

TX-RX UNIT (X57-7790-11)
Foil side view (J79-0260-29)





Component side

Layer	
Layer 1	
Layer 2	
Layer 3	
Layer 4	
Layer 5	
Layer 6	(pink)

Foil side

Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	9N	Q9	6K	Q820	9G	D15	8J	D404	3K
IC401	6O	Q201	5G	D3	9J	D17	5K	D405	4J
IC811	9L	Q202	5G	D5	9I	D18	5K	D410	3H
Q2	8L	Q203	6H	D7	9K	D201	4E	D431	4H
Q3	6J	Q204	7H	D9	9J	D202	4E	D432	3G
Q4	8I	Q205	7F	D10	9J	D203	3F		
Q5	7K	Q403	8N	D11	8K	D204	3F		
Q6	6I	Q405	4O	D12	8K	D401	6N		
Q7	7I	Q406	4M	D13	6K	D402	5N		
Q8	7J	Q407	4I	D14	8J	D403	3L		


TX-RX UNIT (X57-7790-11) (A/3)
BATTERY
POWER SWITCH /AF VOLIUM
VR1 R31-0665-05
S805 S60-0443-05
CHANNEL SELECTOR
CN829
CN801
F801 3.15A
F802 1A
PROTECT
7.5V
VOLTAGE REGULATOR/5V
IC801 XC6209B502PR
DC SW
Q802 SSM6L05FU-F
Q803 SSM6L05FU-F
R:0V T:4.9V
R:0V T:3.3V
R:4.9V T:0V
R:3.3V T:0V
5.0V
TX-RX UNIT (X57-7790-11) (B/3)
AUX S801 S70-0516-05
PTT S802 S70-0516-05
S-1 S803 S70-0516-05
S-2 S804 S70-0516-05
CN802
CN803
GND
EMGKEY
PTT
SIDE1
SIDE2
LED/BLUE
LED/RED
D801 B30-1790-05 BLUE
D805 B30-2315-05 RED
Q801 SSM6N17FU
Q805 2SK1830F
AF AMP ON:3.5V OFF:0V
Q818,819 MUTE SW
Q818 2SK3577-A
Q819 2SK3577-A
Q817 RT1N441U-T111
Q820 RT1N141U -T111
J801
PTT/RXD
MICI
MICO
OPTDET
50V
J802
AE
TXD
SPI
SPO
SP/MIC JACKS
TX-RX UNIT (X57-7790-11) (C/3)
MIC801
MIC
SPEAKER

X57-7790-11 (A/3)

IC1 AK1541
PLLLE
PLLDAT
PLLCLK
PLLLD
50C
33MS
PLL IC
SWIN
CPZ
CP
LPF
Q2 2SC5636 RF BUFFER AMP
50C
UHF: 350.05MHz~420.05MHz (RX) 400MHz~470MHz (TX)
UHF: 400MHz~ 470MHz
ANT
Q5 MCH3914(8)-H D7,D9 1SV325F D11 HVC375B-E D12 1SV281-F
TX VCO
MOD2
D15 HSC119
LPF
TXAST
Q8 2SC5636 RF BUFFER AMP
42C
Q9 2SC5636 RF AMP
50C
D17,D18 HSC277 TX/RX RF SW
50R
50T
Q201 2SC5636 RF AMP
50T
Q203 2SC4926YD Pre DRIVE
PDSW
PD 5T SW
Q202 SSM6L05FU-F
50T
Q204 RFM01U7P DRIVE AMP
D301 UDZW5.1(B) PROTECT
Q205 RD07MUS2BT112 FINAL AMP
D201,D202 HVC131 D203,D204 RN142S ANT SW
LPF
Q306 RT1P441U-T111
50T
DC SW
Q301 RT1N140U -T111
DCSW
APC
IC301 NJM2904RB1-ZB
+B
Q305 2SK1824-A
DC SW
PC/BPF
Q303 2SK1830F
DC SW
Q304 RT1N141U -T111
50T
APCSW
Q4 MCH3914(8)-H D3,D5 1SV325F D10 HVC375B-E
RX VCO
Q6,Q7 SSM6L05FU-F SSM3J05FU-F
T/R SW
TX
42C
D14 HSC119
LPF
RXAST
RIPPLE FILTER
50C
Q3,D13 KTC4075E(Y,GR),HSC119
X1 L77-3050-05 16.8MHz
33MS
FADJ
MOD1
1st Local UHF: 350.05MHz~420.05MHz
Q403 KTC4080E-P
50R
Tripler
2nd Local 50.4MHz
LPF
IC401 TA31136FNG
RSSI
ASQL
IF IC
Q405 KTC4080E-P IF AMP
50R
CD401 L79-1848-05
CD
50C
XF401 L71-0655-05 MCF
1st IF 49.95MHz
MIXER
Q406 3SK318
50R
D403,D404,D405 HVC350B BPF
RF AMP
50R
Q407 3SK293-F
BPF
D410,D431 HVC350B
PC/BPF
DETAF
50C
Narrow
Wide
D401 KDS121E-P SW
CF(N)
CF401 L72-1012-05
CF(W)
CF402 L72-1010-05
SW
D402 KDS121E-P
S
BSEL
FUSE F801 F53-0372-05
BATT+ 7.5V
+B
PROTECT
D803 GN1G
–
VR1 R31-0665-05
VOLIN
33MS
SB
FUSE F802 F53-0319-15
EN2
EN4
EN3
EN1
S805 S60-0443-05
CN801 E40-6573-05
IC801 XC6209B502PR
SB
AVR
50M
IC806 XC6209B332MR
AVR
33B
Q802 SSM6L05FU-F
DCSW
50T
50TC
Q803 SSM6L05FU-F
DCSW
50R
50RC
IC802 XC6209B502MR
AVR
50C
50CC
IC803 XC6209B502PR
AVR
50V
50VC
D802 HSC119
PROTECT
IC804 XC6209B332MR
AVR
33M
Q804 SSM3J05FU-F
DCSW
33MS
33MSC
INT
INT
IC805 XC61CN4502MR
PROTECT
RESET
IC807 XC6120N302N1
RESET
D806 RKZ5.1B2KG
TXTONE
SIDETONE
WIDE
NARROW
VOXM
BBCS
BBCLK
BBTXD
VOXSW
LSDO
DACCE
EXTMICSW
TXD1
CLK1
TX
RX
PLLLE
PLLDAT
PLLCLK
33BC
33MSC
50VC
50TC
50RC
50CC
LEDG
LEDB
LEDR
APCSW
DCSW
MICM
MDCS
MDTXD
MDCLK
PDSW
LEDR
33M
Q806,Q807 2SC4919-S
SW
BSHIFT
XOUT
12.0MHz
XIN
X802 L77-3049-05
MCU
IC809 F3640MDFBKDPA
EN4
EN3
EN2
EN1
EMGKEY
SIDE1
SIDE2
MDINT
MDRXD
TMP
VOLIN
VOX
RESET
INT
BBIRQ
RXD1
PTT
OPTDET
MDSW
PLLLD
ASQL
RSSI
LSDI
BATT
BSEL
SIM1
SIM2
HSDI1
HSDI2
IC808 HA1630D03MM
HSD AMP
33M
HPF
33MS
DISCFB
EEP CLK
EEP TXD
EEP RXD
EEP CS
EEPROM
IC816 HA1630D03MM
IC810 EX25064ASA00A
SB
D805 B30-2315-05
D801 B30-1790-05
D804 B30-2314-05
LED (Blue)
LED (Red)
LED (Green)
Q801(2/2)
Q801(1/2) SSM6N17FU
DC SW
Q805 2SK1830F
LEDB
LEDR
LEDG
BBCS
BBCLK
LSDO
TXTONE
FADJ
BBIRQ
BBRXD
DISCFB
MOD1
MOD2
LSDI
IC811 TC75S51FE(F)
DC AMP
PC/BPF
AUXDAC1
BASEBAND IC
IC812 CD686Q3
AFOUT
MIC
33MS
33B
MICFB
12.0MHz
AGC
MICM
D807,D808 KDR731
Q809 KTC4075E(Y,GR)
Q810 2SC4116(GR)F
Q811 2SA1586(Y,GR)F
VOXM
IC814 TC75S51FE(F)
D809 KDR731
D810 MC2850
Q808 2SK1830F
VOX
33M
VOX
VOXSW
VOX SW
Q812 2SK1830F
RXAST
IC817 AK2331
TXAST
PLLDAT
DACCE
DA CONVERTER
33M
50M
SIDETONE
IC815 TA7368FG
AF AMP
Q819 2SK3577-A
MUTE SW
MUTE SW
Q818 2SK3577-A
Q814 2SA1362-F(GR)
DC SW
Q817 RT1N441U -T111
DC SW
SB
Q813 RT1N141U -T111
DC SW
AFSW
Q816 UPA672T-A LEVEL CONVERTER
TXD
50M
J802 E11-0715-05
AE
TXD
SPI
SPO
Q815 UPA672T-A LEVEL CONVERTER
PTT/RXD
33M
SP
PTTKEY
Q820 RT1N141U -T111
DC SW
EXTMICSW
J801 E11-0484-05
PTT/RXD
MICIN
MICOUT
OPTDED
50V
OPTDET
50V
MIC801 T91-0651-15
MIC
X57-7790-11 (C/3)
X57-7790-11 (B/3)
CN802 E40-6568-05
CN803 E40-6568-05
AUX KEY
S801 S70-0516-05
PTT/RXD
S802 S70-0516-05
SIDE1
S803 S70-0516-05
SIDE2
S804 S70-0516-05
EMGKEY
PTTKEY
SIDE1
SIDE2