UHF FM TRANSCEIVER

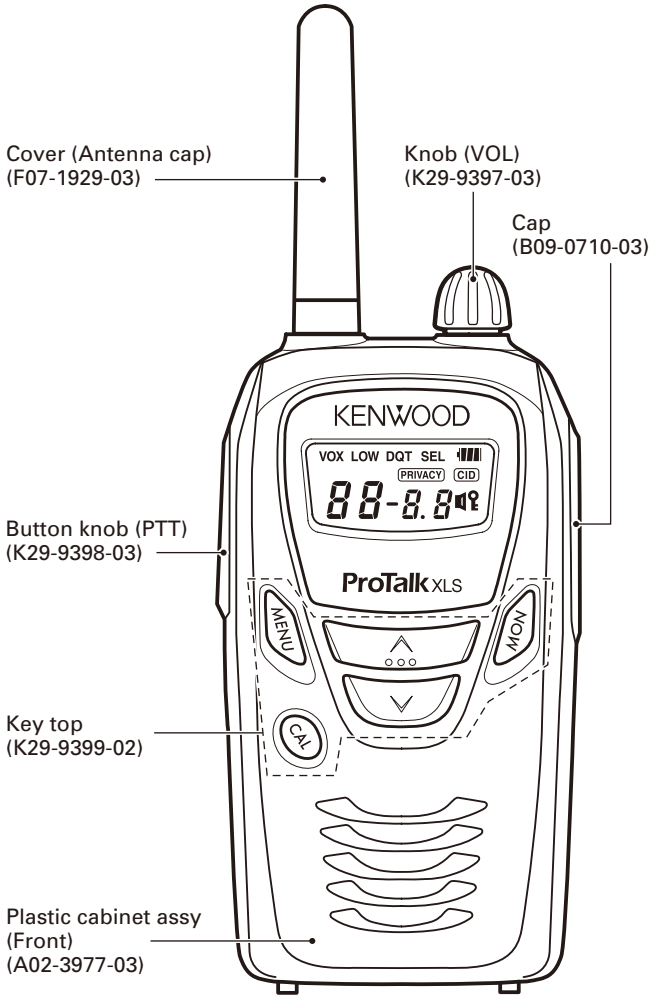
TK-3230

SERVICE MANUAL

KENWOOD

Kenwood Corporation

B51-8792-00 (N) 357



CONTENTS

This product complies with the **RoHS** directive for the European market.

LF

This product uses Lead Free solder.

Disclaimer

While every precaution has been taken in the preparation of this manual, Kenwood assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein. Kenwood reserves the right to make changes to any products herein at any time for improvement purposes.

GENERAL

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.

UHF Frequency Selection Table

Channel setup No.	Frequency (MHz)	Channel setup No.	Frequency (MHz)
01	464.50000	29	462.91250
02	464.55000	30	464.48750
03	467.76250	31	464.51250
04	467.81250	32	464.53750
05	467.85000	33	464.56250
06	467.87500	34	466.03750
07	467.90000	35	466.06250
08	467.92500	36	466.08750
09	461.03750	37	466.11250
10	461.06250	38	466.13750
11	461.08750	39	466.16250
12	461.11250	40	466.18750
13	461.13750	41	466.21250
14	461.16250	42	466.23750
15	461.18750	43	466.26250
16	461.21250	44	466.28750
17	461.23750	45	466.31250
18	461.26250	46	466.33750
19	461.28750	47	466.36250
20	461.31250	48	467.78750
21	461.33750	49	467.83750
22	461.36250	50	467.86250
23	462.76250	51	467.88750
24	462.78750	52	467.91250
25	462.81250	53	469.48750
26	462.83750	54	469.51250
27	462.86250	55	469.53750
28	462.88750	56	469.56250

User can select channel frequency from above.

GENERAL / REALIGNMENT

2 Channels (Default)

Channel No.	Receive frequency (MHz)	Transmit frequency (MHz)
1	(02) 464.55000	(02) 464.55000
2	(08) 467.92500	(08) 467.92500

All channel are Narrow bandwidth, RF power output 1.5W with QT67.0Hz encode/decode.

16 Channels (Default)

Channel No.	Receive frequency (MHz)	Transmit frequency (MHz)
1	(02) 464.55000	(02) 464.55000
2	(08) 467.92500	(08) 467.92500
3	(09) 461.03750	(09) 461.03750
4	(10) 461.06250	(10) 461.06250
5	(11) 461.08750	(11) 461.08750
6	(12) 461.11250	(12) 461.11250
7	(13) 461.13750	(13) 461.13750
8	(14) 461.16250	(14) 461.16250
9	(01) 464.50000	(01) 464.50000
10	(03) 467.76250	(03) 467.76250
11	(04) 467.81250	(04) 467.81250
12	(05) 467.85000	(05) 467.85000
13	(06) 467.87500	(06) 467.87500
14	(07) 467.90000	(07) 467.90000
15	(15) 461.18750	(15) 461.18750
16	(16) 461.21250	(16) 461.21250

All channel are Narrow bandwidth, RF power output 1.5W with QT67.0Hz encode/decode.

1. Getting Acquainted

① PTT (Push to Talk) switch
Press and hold, then speak into the speaker area to transmit.
② MENU key
Press to perform various functions. Press and hold while switching the power ON to enter Setting Mode.
③ CAL key
Press before making a call to alert the other party members, or press to select a unit ID to make a call
④ ∧/∨ keys
Press to change the operating channel, to select a menu in Setting Mode, and to perform other functions.
⑤ Power switch/Volume control
Turn clockwise to switch the power ON and counter-clockwise to switch the power OFF. Rotate to adjust the volume.
⑥ MON key
Press to monitor the current channel for activity.
⑦ LED Indicator
Indicates the transceiver status.
⑧ SP/MIC jacks
Lift the covers and insert the accessory's plugs here.

2. PC Mode

2-1. Preface

The transceiver is programmed by using a personal computer, a programming interface (KPG-22/22A, USB adapter (KCT-53U)) and programming software (KPG-108D).

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

2-2. Connection Procedure

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

REALIGNMENT

Notes:
- You must install the KCT-53U driver in the computer to used 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 receiving from the transceiver, the red LED lights.
   When data is transmitted by the transceiver, the green LED lights.

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

2-3. 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.

2-4. 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 or XP.

2-5. Programming Software Description

The KPG-108D is the programming software for the transceiver supplied on a CD-ROM. The software on this disk allows a user to program the transceiver radios via Programming interface cable (KPG-22).

2-6. Programming with IBM PC

If data is transferred to the transceiver from an IBM PC with the KPG-108D, 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.

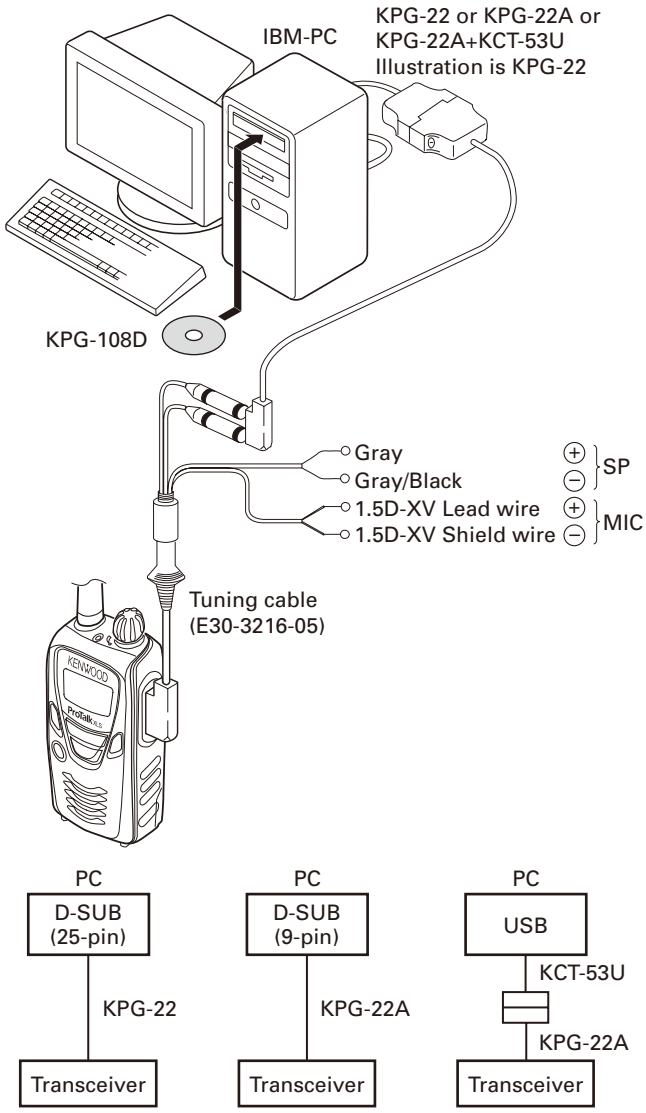


Fig. 1

3. Clone Mode

3-1. Outline

"Clone Mode" copies the transceiver data to another transceiver.

The dealer can copy the transceiver data to another transceiver even without the use of a personal computer.

3-2. Example

The transceiver can copy the programming data to one or more transceivers via RF communication.

The clone source and clone target/s must be in Clone mode.

REALIGNMENT

3-3. Operation

1. To switch the clone target/s to Clone mode, press and hold the [PTT] and [MONI] keys while turning the transceiver power ON.
2. Keep holding [PTT] and [MONI] keys for 1 second. Transceiver sound key on tone and enters Clone mode with "CL on" display.
3. Wait for 2 seconds. Transceiver displays "FG- 1".
4. Select a channel table number using [UP] (increment channel table) and [DOWN] (decrement channel table) keys.
5. To switch the clone source to Clone mode, press and hold the [PTT] and [MONI] keys while turning the transceiver power ON.
6. Keep holding [PTT] and [MONI] keys for 1 second. Transceiver sound key on tone and enters Clone mode with "CL on" display.
7. Wait for 2 seconds. Transceiver displays "FG- 1".
8. Select the same channel table number as the clone target/s.
9. Press [PTT] on the clone source to begin data transmission. When the clone target starts to receive data, the LED will light green.
   When the clone source finishes sending data, a "confirmation" tone will sound with "End " displayed.
   If data transmission fails while cloning, an "error" tone will sound from the Target unit with "Err " displayed.
10. If the cloning fails, no data will be available in the Target unit when it is returned to User mode.
11. When the cloning is successful, the Target unit's "Scan", "Key Lock" and "Super Lock" functions will return to their default values (Scan = OFF, Key Lock = OFF, Super Lock = OFF).
12. After clone has completed, it is necessary for the Target unit to set its required ID Type of ID List for FleetSync. This can be done by using unit's ID List Setting Mode.

Notes:

- The dealer can clone data to two or more transceivers by repeating the above procedures.
- If the transceiver's Clone Mode is configured as "Disabled", the transceiver cannot enter Clone mode.
- The table shown below will cover the frequencies used for wireless cloning.
- A unit cannot be a "Source Unit" if it is unprogrammed. If [PTT] is pressed, an "error" tone will sound.
- Once a unit is set to be the Source, it cannot be a target after the data has been transmitted. This protects the data in the Source unit.
- If the Target unit is cloned unsuccessfully, "error" tone will sound with "Err " display.
- After 4 seconds, Target unit returns to display "FG-XX". "xx" means the last selected channel table number.
- The Source unit and Target unit must be of the same model type and destination in order for Clone to operate.
- It is not possible to read/write setup data from the clone source/target when it is in Clone mode. But it will trigger to go to cloning mode (TX) when try to read/write.
- Electronic interface may cause a failure in data transfer during Wireless Clone, such as when waveforms or electromagnetics are being performed at the workbench.
- Clone mode can be used ONLY by the authorized service personnel.
- The Clone mode setting must be configured as "Disable" before being delivered to the end-user.
- When wireless Clone mode is used, the environment must ensure that the radio wave does not leak to outside.
- The transmit output power is automatically set to Low in Clone mode.
- Battery saver function is automatically set to off in Clone mode.

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01	464.50000	29	462.91250
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26	462.83750	54	469.51250
27	462.86250	55	469.53750
28	462.88750	56	469.56250

User can select channel frequency from above.

Table 1 Cloning frequency table

CIRCUIT DESCRIPTION

Frequency Configuration

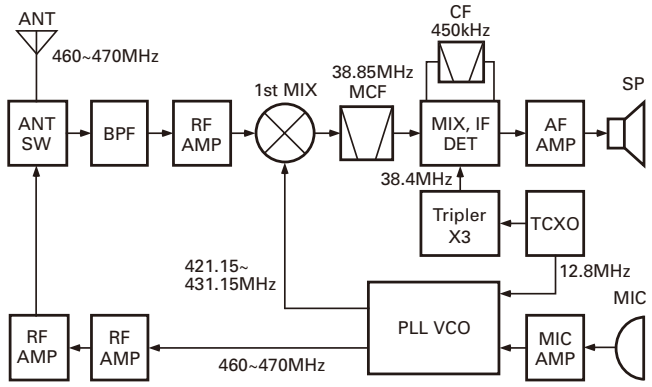


Fig. 1 Frequency configuration

Reception method	Double super heterodyne	
	1st IF frequency	38.85MHz
	2nd IF frequency	450kHz
Transmission method	VCO direct oscillation amplification	
Modulation	Variable reactance phase modulation	

Table 1 Basic configuration

Item	Rating
Nominal center frequency (fo)	38.85MHz
Pass bandwidth	±5.0kHz or more at 3dB
Attenuation bandwidth	±18.5kHz or less at 35dB
Ripple	1.0dB or less
Insertion loss	4.0dB or less
Guaranteed attenuation	70dB or more at fo–900kHz
Terminating impedance	610Ω±10% / 3.0pF±0.5pF

Table 2 MCF (L71-0586-05) : TX-RX unit (B/2) XF200

Item	Rating
Nominal center frequency (fo)	450kHz
6dB bandwidth	±6.0kHz or more
50dB bandwidth	±12.5kHz or less
Ripple (at 450kHz±4kHz)	2dB or less
Guaranteed attenuation	35dB or more
(at 450kHz±100kHz)	
Insertion loss	6dB or less
I/O matching impedance	2.0kΩ

Table 3 Ceramic filter (L72-0958-05) : TX-RX unit (B/2) CF200

Receiver System

■ Front End

The high-frequency signal from the antenna passes through a low-pass filter and a high-frequency switch (D101, D200, D201 and L220) which switches between transmission and reception, and goes to the BPF (L218) to remove unwanted signals. The resulting signal is amplified by high-frequency amplifier (Q204) and goes to the first mixer (Q203).

■ First Mixer

The signal that reaches Q203 is mixed with the first local signal from the VCO to produce a first IF signal (38.85MHz). (Receive frequency – First local frequency
= First IF frequency = 38.85MHz)

The first IF signal passes through MCF: XF200 (monolithic crystal filter) to remove unwanted signals.

The first IF signal is amplified by IF amplifier (Q201) and goes to IF IC (IC200).

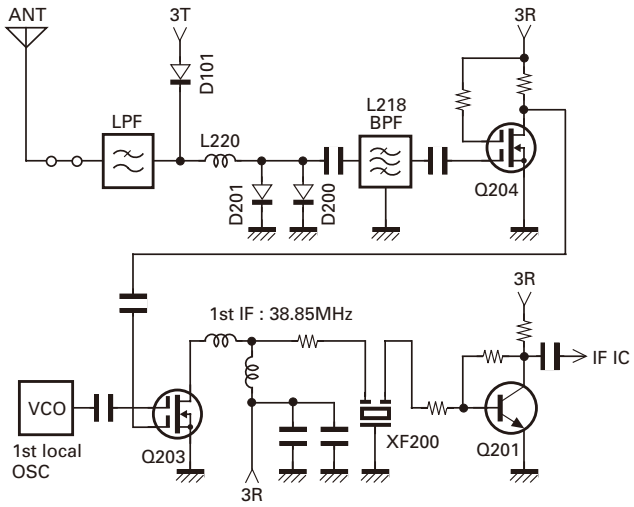


Fig. 3 Receiver circuit

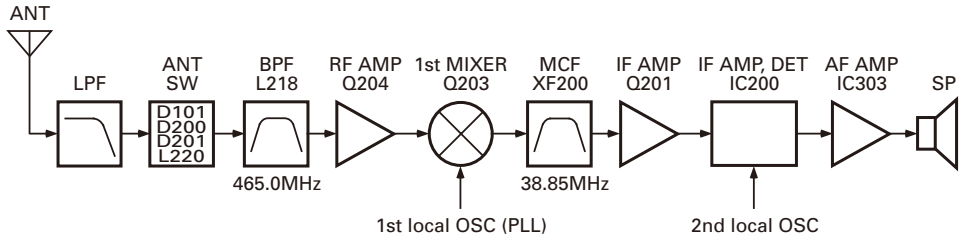


Fig. 2 Receiver section configuration

CIRCUIT DESCRIPTION

■ IF Amplifier

The IF circuit is integrated in the FM IC (IC200). The IF IC contains local input, mixer, limiter amplifier, FM DET, and low-frequency amplifier.

The IF signal coming from the IF amplifier (Q201) goes to the IF IC mixer and is mixed with the second local signal (38.4MHz) to produce a second IF signal. (38.85MHz – 38.4MHz = 450kHz)

The tripled PLL reference oscillation (12.8MHz x 3) is used for the second local signal.

The second IF signal passes through ceramic filter (CF200) to remove unwanted signals.

The second IF signal passing through the ceramic filter passes through the limiter amplifier consisting six differential amplifiers and is detected.

The amplified second IF signal is demodulated by the quadrature detector with the ceramic discriminator (CD200). The demodulated signal is routed to the audio circuit.

■ Squelch Circuit

A squelch circuit is provided to prevent no-signal noise or weak signals from outputting to a speaker during transmission.

■ AF Circuit

The FM IC output passes through the base band IC (IC300). The signal then goes through an AF volume control, and is routed to an audio power amplifier (IC303) where it is amplfied and output to speaker. This IC have BTL amplifier function. At internal speaker, BTL amplified. At external speaker, IC switch off the 1 channel amplifier by connectors information.

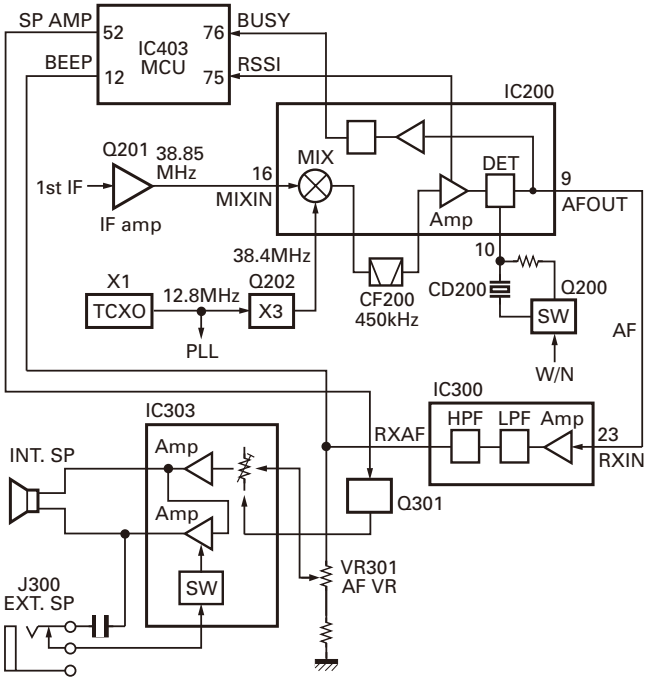


Fig. 4 IF amplifier, Squuelch and AF circuits

Narrow and wide setting can be made for each channel by switching the demodulation level. The WIDE (low level) and NARROW (high level) data is output from IC403, pin 69. When a Wide (low level) data is received, Q200 turn on. When a NARROW (high level) data is received, Q200 turn off.

Q200 turns off/on with the wide/narrow data and the IC200 detector output level is switched to maintained a constant output level during wide or narrow signals.

Transmitter System

■ Microphone Amplifier Circuit

The audio signal from the microphone passes through the MIC amplifier (IC302). Then, the signal goes through the base band IC (IC300) that has the 6dB/oct pre-emphasis circuit, band-pass filter (300 to 3kHz), amplifier, and limiter. The distortion components outside the audio band are removed by the splatter filter.

■ Modulation Circuit

The MIC amplifier (IC302) output passes through VR300 for modulation adjustment and goes to the modulation input of the VCO circuit for variable reactance phase modulation.

■ Transmission Output Circuit

The VCO output is amplified by a high-frequency amplifier (Q101, Q103 and Q104), passes through a high-frequency antenna switch, passes through a low-pass filter and goes to the antenna.

The transmission output is about 1.5W with 3.8V DC supply at battery terminal.

■ Low-Pass Filter Circuit

A three-stage Chebyshev type low-pass filter is located between the antenna and transmit/receive switching circuit. It removes harmonic components contained in the transmission output.

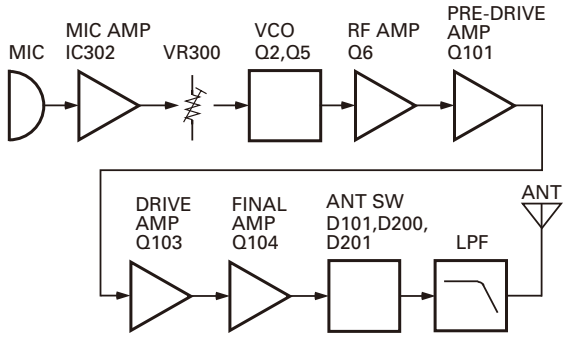


Fig. 5 Transmitter section configuration

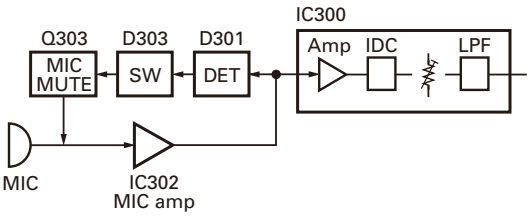


Fig. 6 Microphone amplifier circuit

CIRCUIT DESCRIPTION

PLL System

■ VCO Circuit

The VCO is housed in a shield case.

The VCO circuit consists of a transistor (Q2), a variable capacity diode (D2) for frequency control, a variable capacity diode (D4) for modulation, transmit/receive frequency shift diode (D1), control transistor (Q1), variable capacitor (TC1) for PLL lock voltage control, and oscillator buffer amplifier (Q5).

In receive mode, the shift signal T/R goes low, Q1 turns off, and the shift diode (D1) not contact. Q2 produces the first local frequency for reception. (Receive channel frequency – 38.85MHz)

In transmit mode, the shift signal T/R goes high, Q1 turns on and D1 does conducts. Q2 produces about 460~470MHz and the VCO frequency equals the transmit channel frequency.

The 3.0V circuit voltage is produced by ripple removing filter circuit Q4.

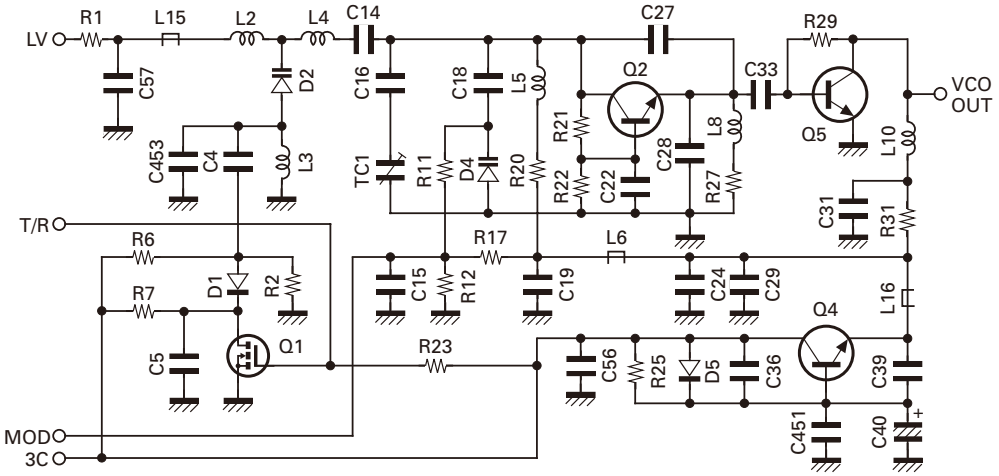


Fig. 7 VCO circuit

■ PLL Circuit

Frequency data is sent to the PLL IC (IC1) from the MCU (IC403) as serial data when the power turns on, when the channel is changed, or when transmission begins. It sets the variable divider in the PLL IC.

The TCXO (X1) produce a 12.8MHz reference frequency. It is divided to produce a 6.25kHz/5kHz PLL comparison frequency in the PLL IC.

This PLL IC can generate a channel step which is twice of the PLL comparison frequency. Hence, the PLL IC can directly generate channel step by 12.5kHz/10kHz. Beside, an external control voltage of TCXO is used to shift TCXO reference frequency by 6.25kHz/5kHz to achive channel step with 6.25kHz/5kHz generate in the PLL IC.

The VCO output is divided by the divide ratio set by the divider in the PLL IC to generate 6.25kHz/5kHz. It is compared with the reference comparison frequency by the phase comparator to detect a phase difference.

The charge pump circuit in the PLL IC converts it to a control voltage that can drive the VCO directly.

The control voltage passes through a loop filter which passes low frequency and is applied to the VCO control pin to control the oscillator frequency. The loop filter removes unwanted harmonics and noise contained in the output from the phase comparator and determines PLL response and synchronizing characteristics by the amplitude and phase characteristics (Fig. 8).

■ Unlock Detection Circuit

If the PLL cannot be synchronized for some reason or other when switching the channel or changing between transmission and reception, the PLL IC outputs a low unlock detection signal. This signal goes to the MCU to inhibit transmission when the PLL is unlocked.

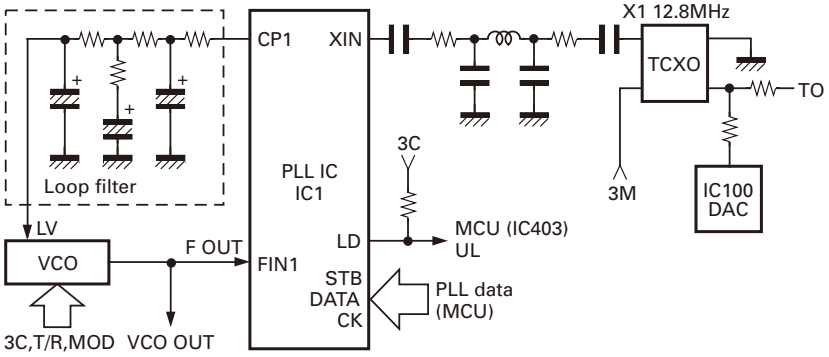


Fig. 8 PLL circuit

CIRCUIT DESCRIPTION

Control System

■ Reset Circuit

When a battery voltage is dropped, IC401 is detected low voltage, and this detected signal input to IC403 for stop the MCU function. IC400 is detected the reset voltage.

■ Battery Voltage Detection Circuit

The unit detects a low battery voltage and display the BATT indicator on the LCD. The battery voltage is divided and applied to the analog value input pin (BATT) of the MCU, and converted to a digital signal.

■ Power Supply Circuit

The power supply voltage is maintained to 3.0V by the series regulator (IC404). It is used as MCU power 3M, 3C, 3R and 3T.

The B (battery voltage) is supplied to the RF final transistor Q104.

The transmission power 3T is supplied to the transmission output circuit when the MCU turns Q404 on only in transmit mode.

The reception power 3R is provided to the receive and IF circuits when the MCU turns Q406 on only in receive mode.

The transmission/reception power 3C is supplied to the VCO and PLL circuits when the MCU turns Q405 on in transmit and receive modes.

If no signal is received for 10 seconds, the MCU enters the power save mode, and turns common power 3C and reception power 3R on for one cycle and off for three cycles according to the signals from the MCU to save the battery power.

■ QT/DQT

• Encode (Transmit)

QT/DQT signal is generated by MCU (IC403). Output signal (IC403 pin 18 (TO)) goes to TCXO modulation and VCO modulation (Through the VR300).

• Decode (Receive)

Detected AF signal go to IC300 and then IC301. Function of IC301 is LPF for sub-audible frequency. This signal goes to IC403 pin 77 (TI). IC403 is detected the QT or DQT.

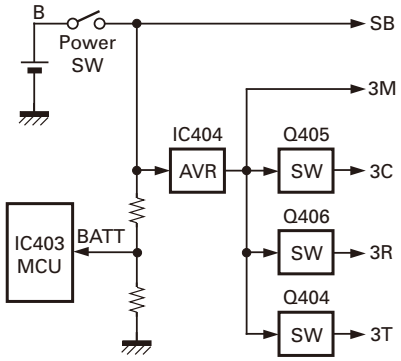


Fig. 9 Reset, Battery voltage detection and Power supply circuits

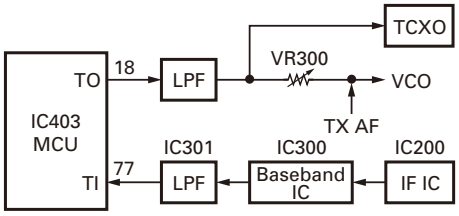


Fig. 10 QT/DQT circuit

SEMICONDUCTOR DATA

MCU: D338327A19WV (TX-RX unit IC403)

■ Terminal Function

Pin No.	Signal Name	I/O	Function
1	SP DET	I	Head set detect
2	AVSS	-	GND
3	X1	-	
4	X2	-	
5	VSS	-	GND
6	OSC2	-	X'tal (7.3728MHz)
7	OSC1	-	X'tal (7.3728MHz)
8	TEST	I	
9	RESET	-	Reset
10	SCLK	O	Serial clock
11	POW CON	O	Auto power control
12	BEEP	O	Beep output
13	DIR	O	DIR to IC300
14	SDATA	I/O	Serial data
15	TDATA	O	MSK TX data
16	TCLK	I	TCLK from IC300
17	RDF	I	RDF/FD
18	TO	O	QT/DQT output
19	PWM IN	I	PWM data input
20	BOOT	I	BOOT/USER input
21	SAVE	O	Battery save
22	3RC	O	3R control
23	3TC	O	3T control
24	GLED	O	Green LED
25	RLED	O	Red LED
26	CVCC	-	+3V (Power supply)
27	VSS	-	GND
28~31	V3~V0	-	
32	VCC	O	+3V (Power supply)
33	BACK LT	O	Back light
34~36	COM3~COM1	-	
37	PTT	I	
38	UP	I	
39	DOWN	I	
40	MONI	I	
41	MENU	I	
42	CALL	I	
43	EEPDATA	I/O	EEPROM data
44	EEPCLK	O	EEPROM clock
45	MIC MUTE	O	MIC mute
46	SHIFT	O	Beat shift
47	PDATA	O	Serial data
48	PCLK	O	Serial clock
49	PEN	O	PLL IC chip select
50	3MSC	O	IC300 power supply
51	PABC	O	Final switch
52	SP AMP	O	AF AMP on/off
53~68	SEG	-	LCD
69	WIDE	O	Wide/Narrow
70	RXD	I	RXD
71	TXD	O	TXD
72	BATT L	I	Battery low
73	AVCC	-	+3V (AD power supply)
74	THP	I	TX thermal input
75	RSSI	I	RSSI input
76	BUSY	I	Squelch input
77	TI	I	QT/DQT input
78	BATT	I	Battery voltage
79	VOX	I	VOX level
80	UL	I	PLL unlock detect

FET: 2SK3656-F (TX-RX unit Q103)

■ Absolute Maximum Rating (Ta=25°C)

Item	V_{DSS}	V_{GSS}	I_D	P_D	Tch	Tstg
Rating	7.5V	3.5V	0.5A	1W Tc=25°C	150°C	–45~+150°C

FET: RQA0002DNS (TX-RX unit Q104)

■ Absolute Maximum Rating (Ta=25°C)

Item	V_{DSS}	V_{GSS}	I_D	Pch	Tch	Tstg
Rating	16V	±5V	3.8A	15W Tc=25°C	150°C	–55~+150°C

COMPONENTS DESCRIPTION

TX-RX unit (X57-7330-10)

Ref. No.	Part Name	Description
IC1	IC	Phase Locked Loop system
IC100	IC	DAC
IC200	IC	IF System
IC300	IC	Base Band
IC301	IC	Active Filter
IC302	IC	MIC amplifier/ Limiter
IC303	IC	Audio Power Amplifier
IC400	IC	Voltage Detect
IC401	IC	Reset Switch
IC403	IC	MCU
IC404	IC	Voltage Regulator (3V)
IC405	IC	Divider
IC406	IC	EEPROM
Q1	Transistor	DC switch (T/R)
Q2	Transistor	VCO
Q3	Transistor	RF amplifier
Q4	Transistor	Ripple filter
Q5	Transistor	RF buffer amplifier
Q6	Transistor	RF amplifier
Q101	Transistor	TX pre-drive
Q103	FET	TX drive
Q104	FET	TX final
Q200	Transistor	RX W/N Switch
Q201	Transistor	IF amplifier
Q202	Transistor	Tripler
Q203	FET	Mixer
Q204	FET	RF amplifier
Q300,301	FET	Audio mute switch
Q302	FET	VOX switch

Ref. No.	Part Name	Description
Q303	Transistor	MIC mute/AGC
Q400	Transistor	DC switch (Back Light)
Q401	Transistor	DC switch (Busy)
Q402	Transistor	DC switch (TX)
Q403,408	Transistor	Beat shift switch
Q404	Transistor	DC switch (3T)
Q405	Transistor	DC switch (3C)
Q406	Transistor	DC switch (3R)
D1	Diode	Current Steering
D2	Variable capacitance Diode	Frequency control
D3	Diode	Unlock detect
D4	Variable capacitance Diode	TX modulation
D5	Diode	Current Steering
D6,7	Diode	RF switch
D101,200,201	Diode	Antenna switch
D300	Diode	Switch
D301	Diode	AGC detect
D302	Diode	AF detect
D303	Diode	MIC mute/AGC switch
D304	Diode	Reverse protection
D305	Diode	Surge absorption
D306,307	Zener Diode	Voltage protection
D308	Zener Diode	Surge absorption
D400	LED	LCD Backlight
D401	LED	TX/ BUSY

TK-3230

PARTS LIST

✻ New Parts. ⚠indicates safety critical components.
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

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

TK-3230 (Y50-6160-XX)
TX-RX UNIT (X57-7330-10)

Ref. No.	Address	New parts	Parts No.	Description	Destination
TK-3230					
1	3A	✻	A02-3975-13	PLASTIC CABINET ASSY (REAR)	
2	1A	✻	A02-3977-03	PLASTIC CABINET ASSY (FRONT)	
4	3B	✻	B09-0710-03	CAP	
5	1C	✻	B62-1976-10	INSTRUCTION MANUAL	
8	2A	✻	E37-1390-05	PARALLEL CORD	
10	2B	✻	F07-1929-03	COVER (ANTENNA CAP)	
12	2B	✻	G10-1378-04	FIBROUS SHEET	
16	3D	✻	H52-2168-02	ITEM CARTON CASE	K
18	1A	✻	J19-5508-03	HOLDER (PTT)	
19	2C	✻	J29-0736-05	HOOK ASSY ACCESSORY	
21	2B	✻	K29-9397-03	KNOB (VOLUME)	
22	1A	✻	K29-9398-03	BUTTON KNOB (PTT)	
23	2A	✻	K29-9399-02	KEY TOP	
A	2B	✻	N14-0840-05	CIRCULAR NUT	
B	2C	✻	N35-3005-43	BINDING HEAD MACHINE SCREW	BK
C	2A,3A		N80-2006-43	PAN HEAD TAPTITE SCREW	
25	2C	✻	N99-2063-05	SCREW SET ACCESSORY	K
27	2A		T07-0362-25	SPEAKER	
28	2B	✻	T90-1068-05	ANTENNA ELEMENT	
30	1D	✻	W08-0994-05	AC ADAPTER (120V) ACCESSORY	K
31	2D	✻	W08-0995-05	CHARGER ACCESSORY	K
TX-RX UNIT (X57-7330-10)					
101	2B	✻	B11-1849-03	ILLUMINATION GUIDE (LCD)	
102	1B	✻	B38-0925-05	LCD	
D400			B30-2143-05	LED (YG)	
D401			B30-2278-05	LED (RED/YELLOW)	
C1			CC73HCH1H101J	CHIP C 100PF J	
C2			CS77AA1VR33M	CHIP TNTL 0.33UF 35WV	
C3			CK73HB1H471K	CHIP C 470PF K	
C4,5			CC73HCH1H101J	CHIP C 100PF J	
C6			CS77AA1A2R2M	CHIP TNTL 2.2UF 10WV	
C7-9			CC73HCH1H101J	CHIP C 100PF J	
C10			CK73FB0J106K	CHIP C 10UF K	
C11			CS77CA1V0R1M	CHIP TNTL 0.1UF 35WV	
C12			CC73HCH1H470J	CHIP C 47PF J	
C13			CC73HCH1H101J	CHIP C 100PF J	
C14			CC73HCH1H040B	CHIP C 4.0PF B	
C15			CC73HCH1H101J	CHIP C 100PF J	
C16			CC73HCH1H130J	CHIP C 13PF J	
C17			CC73HCH1H101J	CHIP C 100PF J	
C18			CC73HCH1H1R5B	CHIP C 1.5PF B	
C19,20			CK73HB1H471K	CHIP C 470PF K	

Ref. No.	Address	New parts	Parts No.	Description	Destination
C21			CC73HCH1H470J	CHIP C 47PF J	
C22			CK73HB1H471K	CHIP C 470PF K	
C23			CK73HB1C103K	CHIP C 0.010UF K	
C25			CK73HB1H471K	CHIP C 470PF K	
C27			CC73HCH1H130G	CHIP C 13PF G	
C28			CC73HCH1H110G	CHIP C 11PF G	
C29			CC73HCH1H101J	CHIP C 100PF J	
C30			CK73GB1H103K	CHIP C 0.010UF K	
C31,32			CC73HCH1H100D	CHIP C 10PF D	
C33			CC73HCH1H0R5B	CHIP C 0.5PF B	
C34,35			CC73HCH1H100D	CHIP C 10PF D	
C36,37			CC73HCH1H101J	CHIP C 100PF J	
C38			CK73HB1H471K	CHIP C 470PF K	
C39			CC73HCH1H101J	CHIP C 100PF J	
C40			CS77AA0J220M	CHIP TNTL 22UF 6.3WV	
C41			CC73HCH1H050B	CHIP C 5.0PF B	
C43			CC73HCH1H100D	CHIP C 10PF D	
C44			CC73HCH1H050B	CHIP C 5.0PF B	
C45,46			CK73HB1H471K	CHIP C 470PF K	
C47			CK73HB1A104K	CHIP C 0.10UF K	
C48,49			CK73HB1H471K	CHIP C 470PF K	
C50,51			CC73HCH1H030B	CHIP C 3.0PF B	
C52			CC73HCH1H050B	CHIP C 5.0PF B	
C53			CC73HCH1H080B	CHIP C 8.0PF B	
C54			CC73HCH1H050B	CHIP C 5.0PF B	
C55			CC73HCH1H101J	CHIP C 100PF J	
C57,58			CC73HCH1H101J	CHIP C 100PF J	
C60			CC73HCH1H120J	CHIP C 12PF J	
C100			CK73HB1H471K	CHIP C 470PF K	
C101			CC73HCH1H1R5B	CHIP C 1.5PF B	
C103			CK73HB1A104K	CHIP C 0.10UF K	
C111			CK73HB1A104K	CHIP C 0.10UF K	
C112			CK73HB1H471K	CHIP C 470PF K	
C113			CC73HCH1H150J	CHIP C 15PF J	
C114			CC73HCH1H120J	CHIP C 12PF J	
C116			CK73HB1H471K	CHIP C 470PF K	
C117			CC73HCH1H101J	CHIP C 100PF J	
C119,120			CK73HB1H471K	CHIP C 470PF K	
C121			CC73HCH1H270J	CHIP C 27PF J	
C122			CK73HB1A104K	CHIP C 0.10UF K	
C123			CC73HCH1H270J	CHIP C 27PF J	
C124			CK73HB1H471K	CHIP C 470PF K	
C125			CC73GCH1H050B	CHIP C 5.0PF B	
C126			CK73HB1H471K	CHIP C 470PF K	
C127			CK73HB0J105K	CHIP C 1.0UF K	
C128			CC73GCH1H270J	CHIP C 27PF J	
C129			CK73HB1A104K	CHIP C 0.10UF K	
C130			CK73HB1C103K	CHIP C 0.010UF K	
C131			CK73HB1A104K	CHIP C 0.10UF	
C132			CK73HB1H471K	CHIP C 470PF K	
C133			CC73HCH1H090B	CHIP C 9.0PF B	
C134			CC73GCH1H101J	CHIP C 100PF J	
C136			CK73HB1A224K	CHIP C 0.22UF K	
C137			CK73HB1C103K	CHIP C 0.010UF K	
C138			CK73HB1A104K	CHIP C 0.10UF K	

K : TK-3230
BK : TK-3230B

PARTS LIST

TX-RX UNIT (X57-7330-10)

Ref. No.	Address	New parts	Parts No.	Description			Destination
C200			CK73HB1H182K	CHIP C	1800PF	K	
C202			CK73HB1H271K	CHIP C	270PF	K	
C203,204			CK73HB1H102K	CHIP C	1000PF	K	
C205			CK73HB1A104K	CHIP C	0.10UF	K	
C206			CK73HB1H271K	CHIP C	270PF	K	
C207			CK73HB1A104K	CHIP C	0.10UF	K	
C208			CC73HCH1H680J	CHIP C	68PF	J	
C209			CK73HB1H471K	CHIP C	470PF	K	
C210			CK73FB0J106K	CHIP C	10UF	K	
C211			CK73HB1A224K	CHIP C	0.22UF	K	
C212,213			CK73HB1H471K	CHIP C	470PF	K	
C215-217			CK73HB1C103K	CHIP C	0.010UF	K	
C218			CK73HB1H471K	CHIP C	470PF	K	
C219			CK73HB1C103K	CHIP C	0.010UF	K	
C220			CC73HCH1H010B	CHIP C	1.0PF	B	
C221			CK73GB1H183K	CHIP C	0.018UF	K	
C222			CK73HB1H331K	CHIP C	330PF	K	
C223			CK73HB1C103K	CHIP C	0.010UF	K	
C224			CC73HCH1H100D	CHIP C	10PF	D	
C225			CC73HCH1H150J	CHIP C	15PF	J	
C226			CC73HCH1H010B	CHIP C	1.0PF	B	
C228			CK73HB1C103K	CHIP C	0.010UF	K	
C229			CC73HCH1H680J	CHIP C	68PF	J	
C230,231			CK73HB1C103K	CHIP C	0.010UF	K	
C232			CC73HCH1H330J	CHIP C	33PF	J	
C233			CC73HCH1H121J	CHIP C	120PF	J	
C234			CK73HB1H471K	CHIP C	470PF	K	
C235			CC73HCH1H330J	CHIP C	33PF	J	
C236			CC73HCH1H240J	CHIP C	24PF	J	
C237			CC73HCH1H680J	CHIP C	68PF	J	
C239			CC73HCH1H030B	CHIP C	3.0PF	B	
C240			CK73HB1C103K	CHIP C	0.010UF	K	
C241,242			CK73HB1H471K	CHIP C	470PF	K	
C243			CC73HCH1H470J	CHIP C	47PF	J	
C244-246			CK73HB1H471K	CHIP C	470PF	K	
C247			CC73HCH1H040B	CHIP C	4.0PF	B	
C248			CK73HB1C103K	CHIP C	0.010UF	K	
C250,251			CK73HB1H471K	CHIP C	470PF	K	
C252,253			CC73HCH1H470J	CHIP C	47PF	J	
C254			CK73HB1H471K	CHIP C	470PF	K	
C255			CC73HCH1H060B	CHIP C	6.0PF	B	
C257			CC73HCH1H1R5B	CHIP C	1.5PF	B	
C258			CC73HCH1H100D	CHIP C	10PF	D	
C259			CK73HB1H471K	CHIP C	470PF	K	
C261			CC73HCH1H100D	CHIP C	10PF	D	
C262			CC73HCH1H010C	CHIP C	1.0PF	C	
C264			CC73HCH1H010B	CHIP C	1.0PF	B	
C267,268			CK73HB1A104K	CHIP C	0.10UF	K	
C301			CK73HB1E682K	CHIP C	6800PF	K	
C303			CC73HCH1H090B	CHIP C	9.0PF	B	
C304			CK73GB1C563K	CHIP C	0.056UF	K	
C306			CK73HB1H681K	CHIP C	680PF	K	
C307,308			CK73HB0J105K	CHIP C	1.0UF	K	
C309			CC73HCH1H101J	CHIP C	100PF	J	
C310			CK73HB1C473K	CHIP C	0.047UF	K	
C311			CK73FB0J106K	CHIP C	10UF	K	
C312			CK73HB1A473K	CHIP C	0.047UF	K	
C313			CK73FB0J106K	CHIP C	10UF	K	
C314			CK73HB1H392K	CHIP C	3900PF	K	
C315			CK73HB1H471K	CHIP C	470PF	K	

Ref. No.	Address	New parts	Parts No.	Description			Destination
C316			CC73HCH1H221J	CHIP C	220PF	J	
C317			CK73HB1A473K	CHIP C	0.047UF	K	
C318			CK73HB0J105K	CHIP C	1.0UF	K	
C319			CK73HB1H272K	CHIP C	2700PF	K	
C320			CK73FB0J106K	CHIP C	10UF	K	
C321			CK73HB1H471K	CHIP C	470PF	K	
C322,323			CK73HB1A104K	CHIP C	0.10UF	K	
C324			CC73HCH1H180J	CHIP C	18PF	J	
C325			CK73GB0J475K	CHIP C	4.7UF	K	
C326			CK73HB1A104K	CHIP C	0.10UF	K	
C327			CK73HB1A683K	CHIP C	0.068UF	K	
C328			CK73GB0J475K	CHIP C	4.7UF	K	
C329			CC73HCH1H181J	CHIP C	180PF	J	
C330,331			CK73HB1A473K	CHIP C	0.047UF	K	
C332,333			CK73HB1A104K	CHIP C	0.10UF	K	
C336			CK73HB1A104K	CHIP C	0.10UF	K	
C337			CK73FB1A225K	CHIP C	2.2UF	K	
C338			CK73HB1C103K	CHIP C	0.010UF	K	
C339			C92-0864-05	CHIP TNTL	10UF	10WV	
C340			CK73HB0J105K	CHIP C	1.0UF	K	
C341			CK73HB1H471K	CHIP C	470PF	K	
C342			CK73HB0J105K	CHIP C	1.0UF	K	
C343			CK73HB1A333K	CHIP C	0.033UF	K	
C345			CK73HB1H471K	CHIP C	470PF	K	
C346			CK73HB1A104K	CHIP C	0.10UF	K	
C348			CK73HB1A104K	CHIP C	0.10UF	K	
C349			CK73HB1H102K	CHIP C	1000PF	K	
C350			CS77CP0J100M	CHIP TNTL	10UF	6.3WV	
C351			CK73HB1A154K	CHIP C	0.15UF	K	
C353			CK73HB1H102K	CHIP C	1000PF	K	
C354			CS77AB20J101M	CHIP TNTL	100UF	6.3WV	
C358			CC73HCH1H470J	CHIP C	47PF	J	
C359-361			CC73HCH1H101J	CHIP C	100PF	J	
C363			CK73HB0J105K	CHIP C	1.0UF	K	
C364		✻	CC73HCH1H0R3B	CHIP C	0.3PF	B	
C400			CK73HB1H471K	CHIP C	470PF	K	
C401			CK73HB0J105K	CHIP C	1.0UF	K	
C402			CK73HB1H471K	CHIP C	470PF	K	
C404			CK73HB1H471K	CHIP C	470PF	K	
C405			CK73FB1A105K	CHIP C	1.0UF	K	
C408			CK73HB1H471K	CHIP C	470PF	K	
C411			CK73HB1H471K	CHIP C	470PF	K	
C412			CS77AA1A100M	CHIP TNTL	10UF	10WV	
C413-415			CK73HB1A104K	CHIP C	0.10UF	K	
C417			CK73HB1H471K	CHIP C	470PF	K	
C418			CK73HB1A104K	CHIP C	0.10UF	K	
C419			CK73FB0J106K	CHIP C	10UF	K	
C420			CC73HCH1H080B	CHIP C	8.0PF	B	
C421			CK73HB1H471K	CHIP C	470PF	K	
C422			CC73HCH1H330J	CHIP C	33PF	J	
C423			CC73HCH1H080B	CHIP C	8.0PF	B	
C426			CK73HB1H102K	CHIP C	1000PF	K	
C427			CC73HCH1H330J	CHIP C	33PF	J	
C428			CC73HCH1H101J	CHIP C	100PF	J	
C430			CK73GB1A105K	CHIP C	1.0UF	K	
C431			CK73HB1C103K	CHIP C	0.010UF	K	
C432			CK73HB1C223K	CHIP C	0.022UF	K	
C433			CK73HB1A104K	CHIP C	0.10UF	K	
C434			CK73HB1A683K	CHIP C	0.068UF	K	
C437			CK73HB1C103K	CHIP C	0.010UF	K	

PARTS LIST

TX-RX UNIT (X57-7330-10)

Ref. No.	Address	New parts	Parts No.	Description	Destination
C440			CC73HCH1H101J	CHIP C 100PF J	
C442,443			CC73HCH1H101J	CHIP C 100PF J	
C444			CK73HB1A104K	CHIP C 0.10UF K	
C445			CK73HB1H471K	CHIP C 470PF K	
C446			CK73HB0J105K	CHIP C 1.0UF K	
C448			CC73GCH1H101J	CHIP C 100PF J	
C449			CC73HCH1H101J	CHIP C 100PF J	
C451			CC73HCH1H101J	CHIP C 100PF J	
C454			CC73HCH1H101J	CHIP C 100PF J	
C453			CC73HCH1H020B	CHIP C 2.0PF B	
C455			CK73HB0J105K	CHIP C 1.0UF K	
C456			CK73HB1A104K	CHIP C 0.10UF K	
C459			CC73HCH1H050B	CHIP C 5.0PF B	
C460			CK73HB1A104K	CHIP C 0.10UF K	
C461			CK73HB1H471K	CHIP C 470PF K	
C464			CK73HB1C103K	CHIP C 0.010UF K	
C468			CK73HB1A104K	CHIP C 0.10UF K	
C470			CK73HB1C183K	CHIP C 0.018UF K	
TC1			C05-0245-05	CERAMIC TRIMMER (10PF)	
103	1B	✻	E29-1217-05	INTER CONNECTOR (LCD)	
J300			E11-0703-05	PHONE JACK (2.5/3.5)	
-		✻	F10-3083-04	SHIELDING CASE	
F300			F53-0324-05	FUSE	
104	1B	✻	J21-8570-04	MOUNTING HARDWARE (LCD)	
-			J30-1282-14	SPACER	
CD200			L79-1866-05	TUNING COIL	
CF200			L72-0958-05	CERAMIC FILTER	
L1			L92-0140-05	CHIP FERRITE	
L2			L41-2285-06	SMALL FIXED INDUCTOR (220NH)	
L3			L41-6868-14	SMALL FIXED INDUCTOR (6.8NH)	
L4		✻	L41-3372-43	SMALL FIXED INDUCTOR (33NH)	
L5,6			L41-1091-06	SMALL FIXED INDUCTOR (1.0UH)	
L7			L41-1005-08	SMALL FIXED INDUCTOR (10UH)	
L8			L41-1091-06	SMALL FIXED INDUCTOR (1.0UH)	
L10			L40-2775-57	SMALL FIXED INDUCTOR (27.0NH)	
L12			L40-2775-57	SMALL FIXED INDUCTOR (27.0NH)	
L13,14			L40-1275-57	SMALL FIXED INDUCTOR (12.0NH)	
L15,16			L92-0161-05	BEADS CORE	
L17			L40-1075-57	SMALL FIXED INDUCTOR (10.0NH)	
L101			L40-1575-57	SMALL FIXED INDUCTOR (15.0NH)	
L102			L40-1575-92	SMALL FIXED INDUCTOR (15NH)	
L103			L40-1875-92	SMALL FIXED INDUCTOR (18NH)	
L104			L92-0149-05	CHIP FERRITE	
L105			L40-2763-92	SMALL FIXED INDUCTOR (2.7NH)	
L106			L41-2263-14	SMALL FIXED INDUCTOR (2.2NH)	
L107			L92-0149-05	CHIP FERRITE	
L108			L41-2285-43	SMALL FIXED INDUCTOR (220NH)	
L109			L92-0138-05	CHIP FERRITE	
L111			L34-4568-05	AIR-CORE COIL	
L112			L92-0161-05	BEADS CORE	
L201			L40-1091-37	SMALL FIXED INDUCTOR (1.0UH)	
L205			L40-5681-86	SMALL FIXED INDUCTOR (0.56UH)	
L206		✻	L41-4781-06	SMALL FIXED INDUCTOR (470NH)	
L208			L40-2285-92	SMALL FIXED INDUCTOR (220NH)	
L209		✻	L41-3385-39	SMALL FIXED INDUCTOR (0.33UH)	
L210			L40-2285-92	SMALL FIXED INDUCTOR (220NH)	
L211			L40-2785-92	SMALL FIXED INDUCTOR (270NH)	
L212			L40-1875-57	SMALL FIXED INDUCTOR (18.0NH)	

Ref. No.	Address	New parts	Parts No.	Description	Destination
L214			L40-2775-57	SMALL FIXED INDUCTOR (27.0NH)	
L215			L40-3975-57	SMALL FIXED INDUCTOR (39.0NH)	
L217			L41-1092-44	SMALL FIXED INDUCTOR (1UH)	
L218			L79-1807-05	FILTER	
L219-222			L34-4563-05	AIR-CORE COIL	
L300,301			L92-0138-05	CHIP FERRITE	
L400			L92-0140-05	CHIP FERRITE	
L401,402			L92-0138-05	CHIP FERRITE	
L403			L92-0140-05	CHIP FERRITE	
L404-407			L92-0161-05	BEADS CORE	
L408			L40-2781-86	SMALL FIXED INDUCTOR (0.27UH)	
L409			L40-3363-57	SMALL FIXED INDUCTOR (3.3NH)	
L410			L92-0149-05	CHIP FERRITE	
L411			L40-3363-57	SMALL FIXED INDUCTOR (3.3NH)	
L412			L40-2775-57	SMALL FIXED INDUCTOR (27.0NH)	
X1		✻	L77-3019-05	TCXO	
X400		✻	L77-3026-05	CRYSTAL RESONATOR (7.3728MHZ)	
XF200			L71-0586-05	MCF (38.85MHZ)	
CP400-402			RK74HB1J103J	CHIP-COM 10K J 1/16W	
R1			RK73HB1J103J	CHIP R 10K J 1/16W	
R2			RK73HB1J152J	CHIP R 1.5K J 1/16W	
R3			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R4			RK73HB1J100J	CHIP R 10 J 1/16W	
R5			RK73HB1J392J	CHIP R 3.9K J 1/16W	
R6			RK73HB1J102J	CHIP R 1.0K J 1/16W	
R7			RK73HB1J473J	CHIP R 47K J 1/16W	
R8			RK73HB1J101J	CHIP R 100 J 1/16W	
R9			RK73HB1J563J	CHIP R 56K J 1/16W	
R10			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R11			RK73HB1J473J	CHIP R 47K J 1/16W	
R12			RK73HB1J183J	CHIP R 18K J 1/16W	
R13			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R14-16			RK73HB1J101J	CHIP R 100 J 1/16W	
R17			RK73HB1J563J	CHIP R 56K J 1/16W	
R20			RK73HB1J470J	CHIP R 47 J 1/16W	
R21			RK73HB1J152J	CHIP R 1.5K J 1/16W	
R22			RK73HB1J562J	CHIP R 5.6K J 1/16W	
R23			RK73HB1J103J	CHIP R 10K J 1/16W	
R24			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R25			RK73HB1J472J	CHIP R 4.7K J 1/16W	
R26			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R27			RK73GB2A330J	CHIP R 33 J 1/10W	
R29			RK73HB1J333J	CHIP R 33K J 1/16W	
R30			RK73HB1J104J	CHIP R 100K J 1/16W	
R31			RK73HB1J101J	CHIP R 100 J 1/16W	
R32			RK73HB1J104J	CHIP R 100K J 1/16W	
R34			RK73HB1J221J	CHIP R 220 J 1/16W	
R39			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R40			RK73HB1J103J	CHIP R 10K J 1/16W	
R42,43			RK73HB1J103J	CHIP R 10K J 1/16W	
R44			RK73HB1J471J	CHIP R 470 J 1/16W	
R100			RK73HB1J332J	CHIP R 3.3K J 1/16W	
R107			RK73GB2A393J	CHIP R 39K J 1/10W	
R112			RK73HB1J153J	CHIP R 15K J 1/16W	
R115			RK73HB1J100J	CHIP R 10 J 1/16W	
R119			RK73HB1J220J	CHIP R 22 J 1/16W	
R120			RK73HB1J333J	CHIP R 33K J 1/16W	
R122			RK73HB1J683J	CHIP R 68K J 1/16W	
R124			RK73GB2A470J	CHIP R 47 J 1/10W	

PARTS LIST

TX-RX UNIT (X57-7330-10)

Ref. No.	Address	New parts	Parts No.	Description				Destination
R125,126			RK73HB1J184J	CHIP R	180K	J	1/16W	
R128			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R129,130			RK73HB1J221J	CHIP R	220	J	1/16W	
R131			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R133			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R200			RK73HB1J122J	CHIP R	1.2K	J	1/16W	
R201			RK73HB1J272J	CHIP R	2.7K	J	1/16W	
R202			RK73HB1J332J	CHIP R	3.3K	J	1/16W	
R204			RK73HB1J124J	CHIP R	120K	J	1/16W	
R205			RK73HB1J332J	CHIP R	3.3K	J	1/16W	
R206			RK73HB1J394J	CHIP R	390K	J	1/16W	
R207			RK73HB1J332J	CHIP R	3.3K	J	1/16W	
R208			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R209			RK73HB1J122J	CHIP R	1.2K	J	1/16W	
R211			RK73HB1J222J	CHIP R	2.2K	J	1/16W	
R212			RK73HB1J101J	CHIP R	100	J	1/16W	
R213			RK73HB1J564J	CHIP R	560K	J	1/16W	
R214			RK73HB1J334J	CHIP R	330K	J	1/16W	
R215			RK73HB1J561J	CHIP R	560	J	1/16W	
R216			RK73HB1J101J	CHIP R	100	J	1/16W	
R217			RK73HB1J561J	CHIP R	560	J	1/16W	
R218			RK73HB1J331J	CHIP R	330	J	1/16W	
R219			RK73HB1J224J	CHIP R	220K	J	1/16W	
R220			RK73HB1J683J	CHIP R	68K	J	1/16W	
R221			RK73HB1J473J	CHIP R	47K	J	1/16W	
R222			RK73HB1J224J	CHIP R	220K	J	1/16W	
R223			RK73HB1J271J	CHIP R	270	J	1/16W	
R224			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R226			RK73HB1J560J	CHIP R	56	J	1/16W	
R227			RK73HB1J124J	CHIP R	120K	J	1/16W	
R228			RK73HB1J104J	CHIP R	100K	J	1/16W	
R230			RK73HB1J273J	CHIP R	27K	J	1/16W	
R231			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R232,233			RK73HB1J564J	CHIP R	560K	J	1/16W	
R234			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R300			RK73HB1J153J	CHIP R	15K	J	1/16W	
R302			RK73HB1J562J	CHIP R	5.6K	J	1/16W	
R303			RK73HB1J104J	CHIP R	100K	J	1/16W	
R304			RK73HB1J273J	CHIP R	27K	J	1/16W	
R305			RK73HB1J274J	CHIP R	270K	J	1/16W	
R306			RK73HB1J154J	CHIP R	150K	J	1/16W	
R307			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R308			RK73HB1J101J	CHIP R	100	J	1/16W	
R309,310			RK73HB1J104J	CHIP R	100K	J	1/16W	
R311			RK73HB1J101J	CHIP R	100	J	1/16W	
R313			RK73HB1J473J	CHIP R	47K	J	1/16W	
R314			RK73HB1J563J	CHIP R	56K	J	1/16W	
R315,316			RK73HB1J153J	CHIP R	15K	J	1/16W	
R317			RK73HB1J333J	CHIP R	33K	J	1/16W	
R318			RK73HB1J104J	CHIP R	100K	J	1/16W	
R319			RK73HB1J823J	CHIP R	82K	J	1/16W	
R321			RK73HB1J223J	CHIP R	22K	J	1/16W	
R322			RK73HB1J183J	CHIP R	18K	J	1/16W	
R323			RK73HB1J474J	CHIP R	470K	J	1/16W	
R324			RK73HB1J153J	CHIP R	15K	J	1/16W	
R325			RK73HB1J331J	CHIP R	330	J	1/16W	
R327			RK73HB1J683J	CHIP R	68K	J	1/16W	
R328			RK73HB1J105J	CHIP R	1.0M	J	1/16W	
R329,330			RK73HB1J104J	CHIP R	100K	J	1/16W	
R332			RK73HB1J683J	CHIP R	68K	J	1/16W	

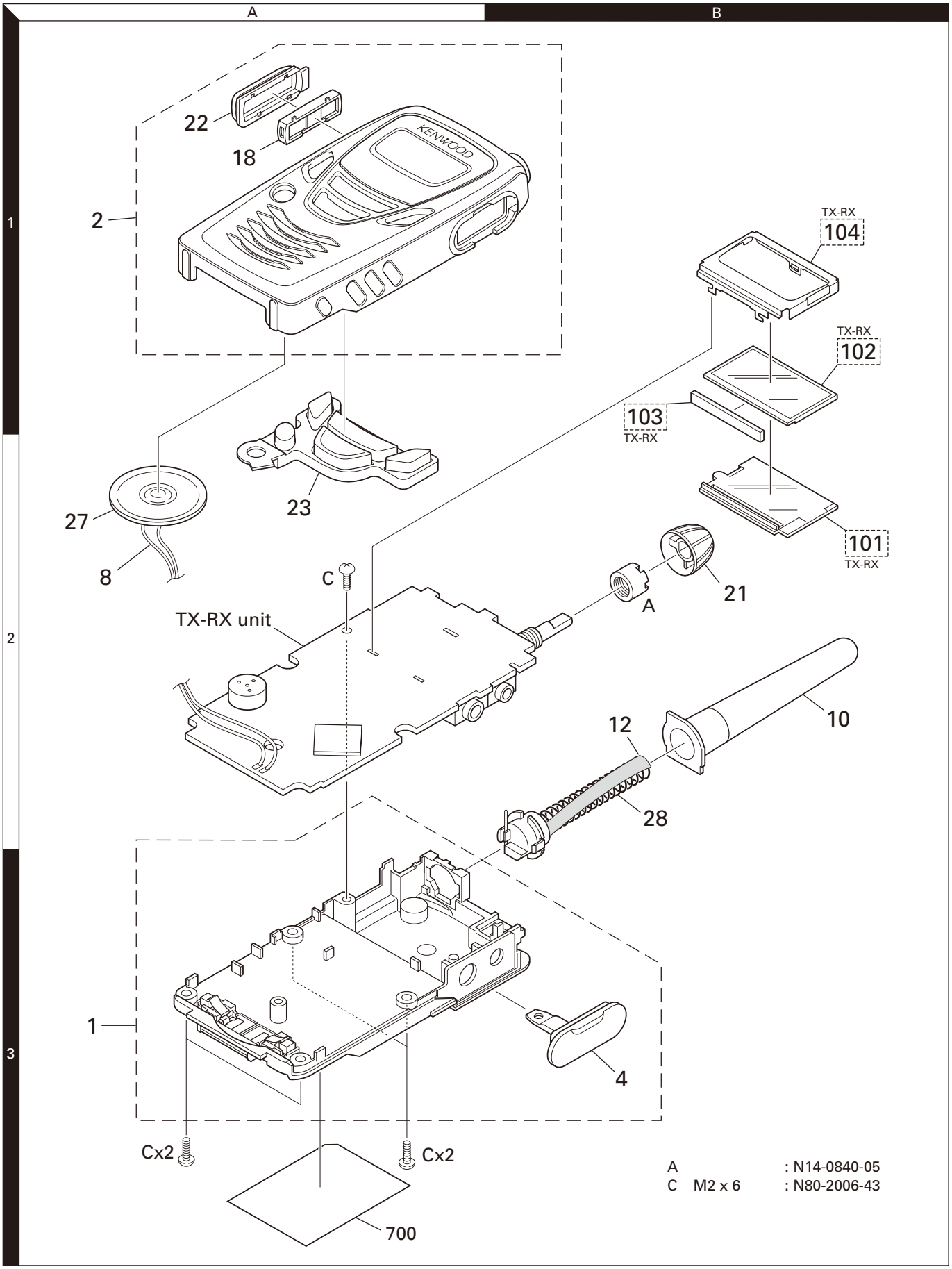
Ref. No.	Address	New parts	Parts No.	Description				Destination
R333			RK73HB1J682J	CHIP R	6.8K	J	1/16W	
R334			RK73HB1J473J	CHIP R	47K	J	1/16W	
R335			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R336			RK73HB1J223J	CHIP R	22K	J	1/16W	
R338			RK73HB1J153J	CHIP R	15K	J	1/16W	
R339			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R340			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R342,343			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R344,345			RK73HB1J104J	CHIP R	100K	J	1/16W	
R346			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R347			RK73HB1J560J	CHIP R	56	J	1/16W	
R348			RK73HB1J104J	CHIP R	100K	J	1/16W	
R349			RK73HB1J105J	CHIP R	1.0M	J	1/16W	
R350			RK73HB1J182J	CHIP R	1.8K	J	1/16W	
R351			RK73HB1J472J	CHIP R	4.7K	J	1/16W	
R352			RK73HB1J471J	CHIP R	470	J	1/16W	
R354			RK73HB1J101J	CHIP R	100	J	1/16W	
R355			RK73HB1J151J	CHIP R	150	J	1/16W	
R356,357			RK73HB1J331J	CHIP R	330	J	1/16W	
R358			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R359			RK73HB1J104J	CHIP R	100K	J	1/16W	
R360,361			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R363			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R365			RK73HB1J560J	CHIP R	56	J	1/16W	
R400			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R401			RK73HB1J181J	CHIP R	180	J	1/16W	
R402,403			RK73HB1J473J	CHIP R	47K	J	1/16W	
R404			RK73HB1J101J	CHIP R	100	J	1/16W	
R405			RK73HB1J473J	CHIP R	47K	J	1/16W	
R406-408			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R409			RK73HB1J473J	CHIP R	47K	J	1/16W	
R410,411			RK73HB1J101J	CHIP R	100	J	1/16W	
R412			RK73HB1J473J	CHIP R	47K	J	1/16W	
R413,414			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R416			RK73HH1J104D	CHIP R	100K	D	1/16W	
R417			RK73HH1J154D	CHIP R	150K	D	1/16W	
R418			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R419-421			RK73HB1J473J	CHIP R	47K	J	1/16W	
R422,423			RK73HB1J393J	CHIP R	39K	J	1/16W	
R424			RK73HB1J101J	CHIP R	100	J	1/16W	
R425			RK73HB1J393J	CHIP R	39K	J	1/16W	
R428			RK73HB1J101J	CHIP R	100	J	1/16W	
R429,430			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R431			RK73HB1J103J	CHIP R	10K	J	1/16W	
R433			RK73HB1J473J	CHIP R	47K	J	1/16W	
R434			RK73HB1J103J	CHIP R	10K	J	1/16W	
R435			RK73HB1J473J	CHIP R	47K	J	1/16W	
R437			RK73HB1J473J	CHIP R	47K	J	1/16W	
R441			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R442			RK73HB1J680J	CHIP R	68	J	1/16W	
R443			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R444			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R445			RK73HB1J152J	CHIP R	1.5K	J	1/16W	
R446-450			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R453			RK73HB1J473J	CHIP R	47K	J	1/16W	
R460			RK73HB1J473J	CHIP R	47K	J	1/16W	
R464			RK73HB1J102J	CHIP R	1.0K	J	1/16W	
R466			RK73HB1J104J	CHIP R	100K	J	1/16W	
R468-471			RK73HB1J000J	CHIP R	0.0	J	1/16W	
R472			RK73HB1J105J	CHIP R	1.0M	J	1/16W	

PARTS LIST

TX-RX UNIT (X57-7330-10)

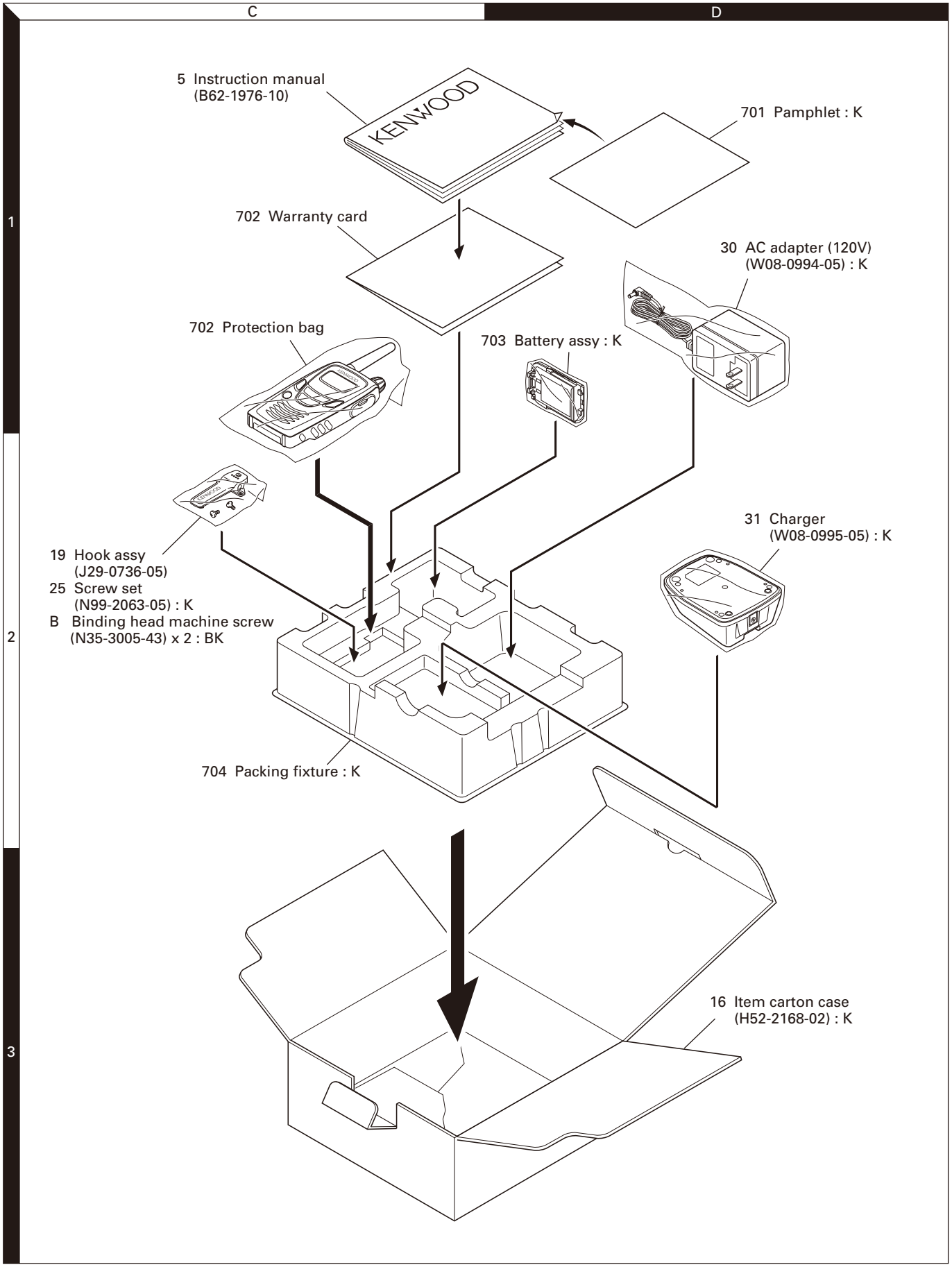
Ref. No.	Address	New parts	Parts No.	Description	Destination
R473			RK73HB1J184J	CHIP R 180K J 1/16W	
R474			RK73GB2A000J	CHIP R 0.0 J 1/10W	
R475			RK73HB1J104J	CHIP R 100K J 1/16W	
R476			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R479			RK73HB1J182J	CHIP R 1.8K J 1/16W	
R482			RK73HB1J273J	CHIP R 27K J 1/16W	
R483			RK73HB1J121J	CHIP R 120 J 1/16W	
R484			RK73HB1J000J	CHIP R 0.0 J 1/16W	
R486			RK73HB1J823J	CHIP R 82K J 1/16W	
R487			RK73HB1J154J	CHIP R 150K J 1/16W	
R490			RK73HB1J473J	CHIP R 47K J 1/16W	
R491			RK73HB1J104J	CHIP R 100K J 1/16W	
R492			RK73HB1J223J	CHIP R 22K J 1/16W	
VR300			R32-0735-05	SEMI FIXED VARIABLE RESISTOR	
VR301		✻	R31-0667-05	VARIABLE RESISTOR	
S1			S70-0414-05	TACT SWITCH	
MIC300			T91-0651-15	MIC ELEMENT	
D1			RSK151KJ	DIODE	
D2			1SV214-F	VARIABLE CAPACITANCE DIODE	
D3			MA2S111-F	DIODE	
D4			1SV214-F	VARIABLE CAPACITANCE DIODE	
D5			MA2S111-F	DIODE	
D6,7			HSC277	DIODE	
D101			HVC131	DIODE	
D200,201			HSC277	DIODE	
D300			DA221	DIODE	
D301,302			RB706F-40	DIODE	
D303			DAN222	DIODE	
D304		✻	GN1G	DIODE	
D305-308			KDZ3.3V	ZENER DIODE	
IC1			TB31202FNG	MOS-IC	
IC100		✻	BH2219FVM	ANALOGUE IC	
IC200			TA31136FNG	MOS-IC	
IC300			AK2346	MOS-IC	
IC301			NJM2100V-ZB	MOS-IC	
IC302			TK62012F	MOS-IC	
IC303		✻	LM4865M-N	BI-POLAR IC	
IC400		✻	XC61CN2802N	MOS-IC	
IC401			XC61CN2702N	MOS-IC	
IC403		✻	D338327A19WV	MICROCONTROLLER IC	
IC404			BH30FB1WG	MOS-IC	
IC405			TC7W74FU-F	MOS-IC	
IC406		✻	BR24L08FJ-W	ROM IC	
Q1			2SK1824-A	FET	
Q2,3			2SC5488	TRANSISTOR	
Q4			2SC4617(S)	TRANSISTOR	
Q5,6			2SC5066-F(O)	TRANSISTOR	
Q101			2SC5092-F	TRANSISTOR	
Q103			2SK3656-F	FET	
Q104		✻	RQA0002DNS	FET	
Q200		✻	KRA304E	DIGITAL TRANSISTOR	
Q201,202			2SC4082	TRANSISTOR	
Q203			3SK318	FET	
Q204			3SK294-FP	FET	
Q300			2SK1824-A	FET	
Q301,302			2SK1824-A	FET	
Q303			2SC4919	TRANSISTOR	
Q400-402			DTC114EE	DIGITAL TRANSISTOR	
Q403			2SC4919	TRANSISTOR	
Q404-406		✻	KRA305E	DIGITAL TRANSISTOR	
Q408			2SC4919	TRANSISTOR	
TH100,101			B57331V2104J	THERMISTOR	
TH302			ERTJ0EV104H	THERMICTOR	

EXPLODED VIEW



Parts with the exploded numbers larger than 700 are not supplied.

PACKING



Parts with the exploded numbers larger than 700 are not supplied.

ADJUSTMENT

Required Test Equipment

1. Stabilized Power Supply
1) The supply voltage can be changed between 0V and 10V, and the current is 3A or more
2) The standard voltage is 3.8V

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

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

4. Power Meter
1) Measurable frequency : Up to 600MHz
2) Impedance : 50Ω, unbalanced
3) Measuring range : Full scale of 3W or so
4) A standard cable (5D2W 1m) must be used.

5. RF Voltmeter (RF V.M)
1) Measurable frequency : Up to 600MHz or so

6. Linear Detector
1) Measurable frequency : Up to 600MHz or so
2) Characteristics are flat, and CN is 60dB or more

7. Digital Voltmeter
1) Voltage range : FS=10V or so
2) Input resistance : 1MΩ or more

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

9. AF Voltmeter (AF V.M)
1) Measurable frequency : 50Hz to 1MHz
2) Maximum sensitivity : 1mV or more

10. Standard Signal Generator (SSG)
1) Maximum frequency : 600MHz or more
2) Output : –133dBm/0.05μV to 7dBm/501mV
3) Output impedance : 50Ω

11. Dummy Load
1) 8Ω, 1W or more

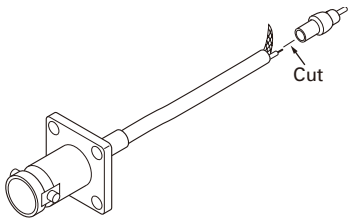
12. AF Generator (AG)
1) Frequency range : 100Hz to 100kHz
2) Output : 0.5mV to 1V

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

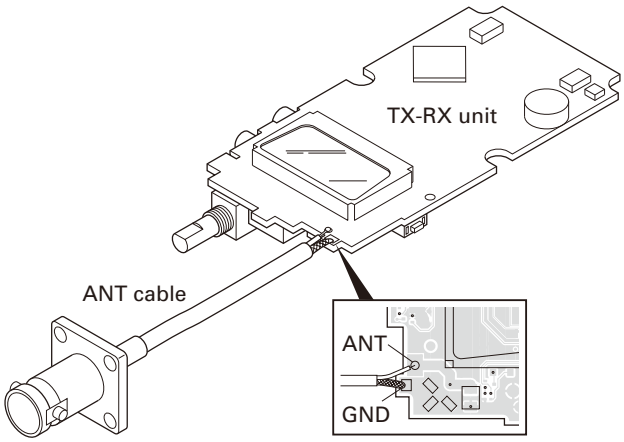
Service Jig

■ ANT cable (E30-3418-08)

Modify the cable as shown below.



Solder the ANT cable to the ANT terminal on the TX-RX unit.



■ Battery jig (W05-1365-00)

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.

ADJUSTMENT

Common Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting	1) Set unit jig Battery terminal: 3.8V							
2. VCO lock voltage	1) CH: TX high PTT: ON	Digital voltmeter	TX-RX	LV	TX-RX	TC1	1.85V	±0.05V
	2) CH: RX high						Check	2.4V or less
	3) CH: RX low							0.4V or more
	4) CH: TX low PTT: ON							

Transmitter Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Transmit frequency (PC mode)	1) CH: TX center PTT: ON	f. counter		ANT Jig cable SP/MIC jack		PC key	Adjust to the center frequency.	Within ±100Hz
2. Transmit frequency shift 6.25kHz (PC mode)	1) CH: TX 460.00625MHz PTT: ON						Adjust to the desired frequency.	Within ±100Hz
3. Transmit frequency shift 5kHz (PC mode)	1) CH: TX 460.005MHz PTT: ON							
4. Power (High) (PC mode)	1) CH: TX center	Power meter Ammeter					Adjust it to 1.5W	±0.1W Less than 1.6A
	2) CH: TX low, high PTT: ON						Check	1.15~1.85W Less than 1.6A
5. Power (Low) (PC mode)	1) CH: TX center PTT: ON					PC key	Adjust it to 0.55W	±0.1W Less than 0.9A
	2) CH: TX low, high PTT: ON						Check	300~800mW Less than 0.9A
6. DQT balance (PC mode)	1) CH: TX 100Hz square wave Modulation analyzer filter LPF: 3kHz PTT: ON	Linear detector Oscilloscope			TX-RX	VR300	Adjust the wave-form to square wave.	

ADJUSTMENT

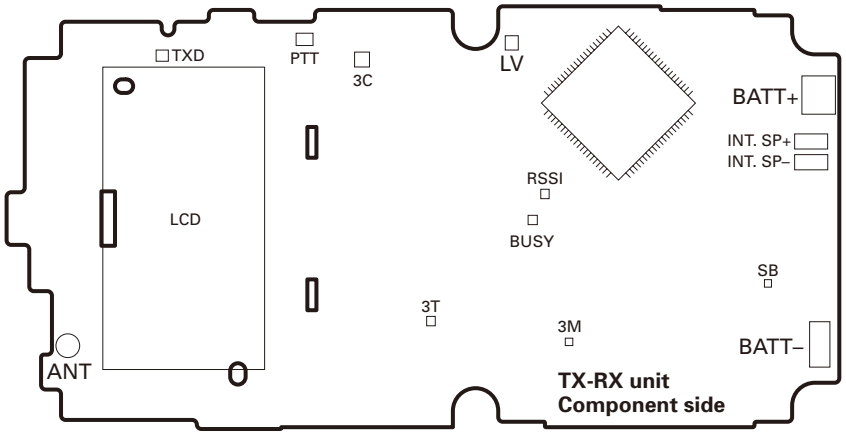
Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
7. MAX deviation (Wide) (PC mode)	1) CH: TX center Modulation analyzer filter LPF: 15kHz AG: 1kHz/150mV PTT: ON	Linear detector AG AF V.M		ANT Jig cable SP/MIC jack		PC key	Adjust it to 4.2kHz. ± peak whichever higher	±0.1kHz
(Narrow)							Adjust it to 2.1kHz. ± peak whichever higher	±0.1kHz
8. MIC sensitivity (Wide)	1) CH: TX center Modulation analyzer filter LPF: 15kHz AG: 1kHz/12mV PTT: ON						Check	±2.5~3.8kHz
(Narrow)								±1.1~0.9kHz
9. QT deviation (PC mode)	1) CH: TX center (Wide) QT: 151.4Hz Modulation analyzer filter LPF: 3kHz PTT: ON	Linear detector				PC key	Adjust it to 0.75kHz.	±0.05kHz
	2) CH: TX center (Narrow) QT: 151.4Hz Modulation analyzer filter LPF: 3kHz PTT: ON						Adjust it to 0.35kHz.	±0.05kHz
10. DQT deviation (PC mode)	1) CH: TX center (Wide) DQT: 023N Modulation analyzer filter LPF: 3kHz PTT: ON						Adjust it to 0.75kHz.	±0.05kHz
	2) CH: TX center (Narrow) DQT: 023N Modulation analyzer filter LPF: 3kHz PTT: ON						Adjust it to 0.35kHz.	±0.05kHz
11. Battery warning (PC mode)	1) Battery terminal: 3.1V	Digital voltmeter						

ADJUSTMENT

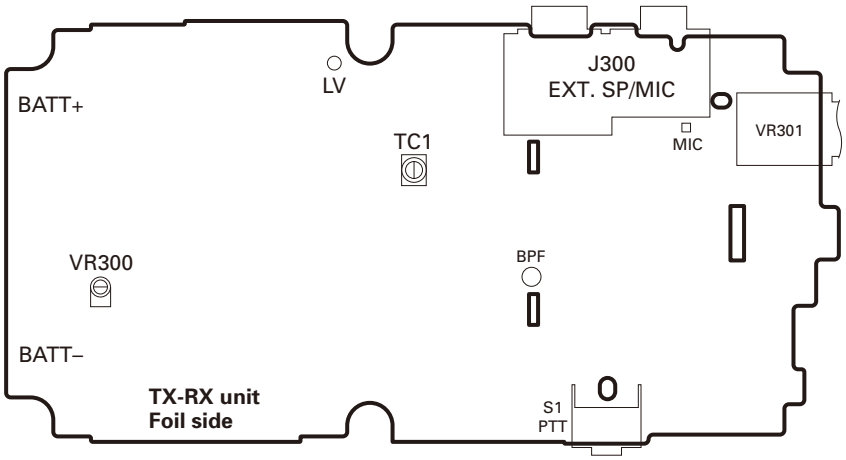
Receiver Section

Item	Condition	Measurement			Adjustment			Specifications / Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Sensitiviry (Wide)	1) CH: RX low, center, high SSG output: –117dBm (0.32µV) SSG MOD: 1kHz SSG DEV: ±3kHz	SSG Oscilloscope AF V.M Distortion meter		ANT Jig cable SP/MIC jack			Check	SINAD: 12dB or more
(Narrow)	2) CH: RX low, center, high SSG output: –116dBm (0.35µV) SSG MOD: 1kHz SSG DEV: ±1.5kHz							
2. Squelch level (PC mode)	1) CH: RX center (Wide) SSG output: –121dBm SSH MOD: 1kHz SSG DEV: ±3.0kHz					PC key	Adjust to open the squelch.	
	2) CH: RX center (Narrow) SSG output: –120dBm SSH MOD: 1kHz SSG DEV: ±1.5kHz							

Adjustment Points

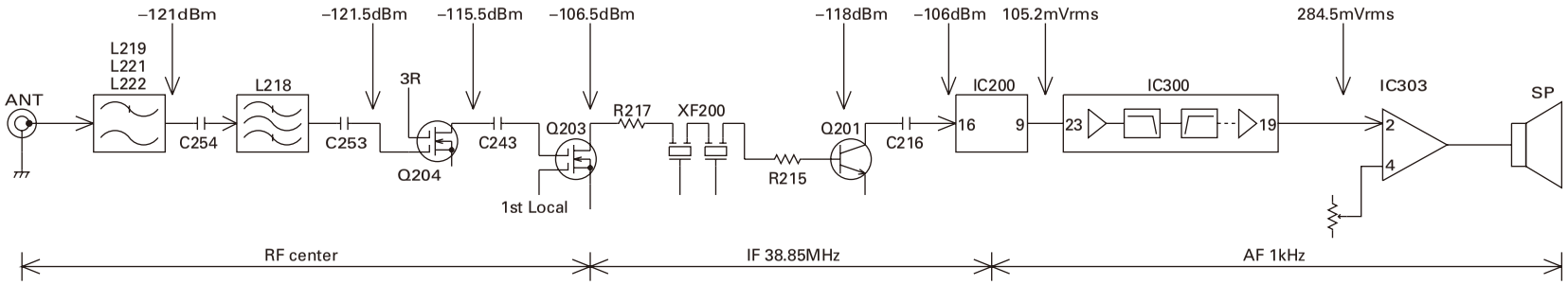


BATT+/–: External power supply terminal (Fasten it with an alligator clip)



TC1: VCO lock voltage adjustment
LV: VCO lock voltage measurement
VR300: DQT balance adjustment

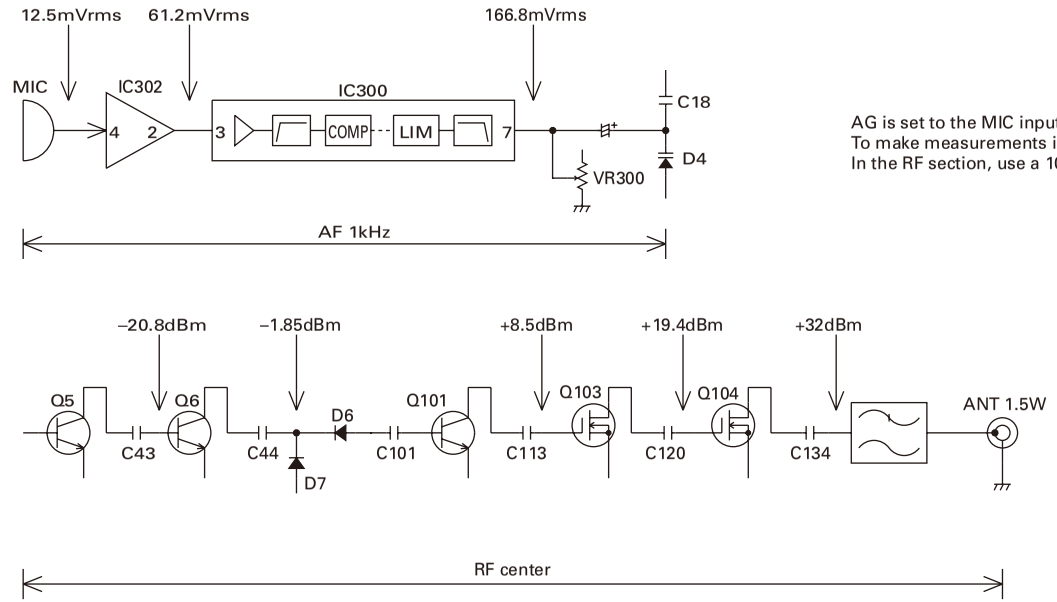
Receiver Section



SG output level for obtaining 12dB/SINAD when injected to each point through a 470pF coupling capacitor.

Modulate the AF level with a frequency of 1kHz and deviation of 1.5kHz (Narrow), 3kHz (Wide). Then take the signal from the signal generator output when set to –53dBm and obtain the level shown on an AF VTVM when the AF output has been adjusted to 0.63Vrms with the AF vol.

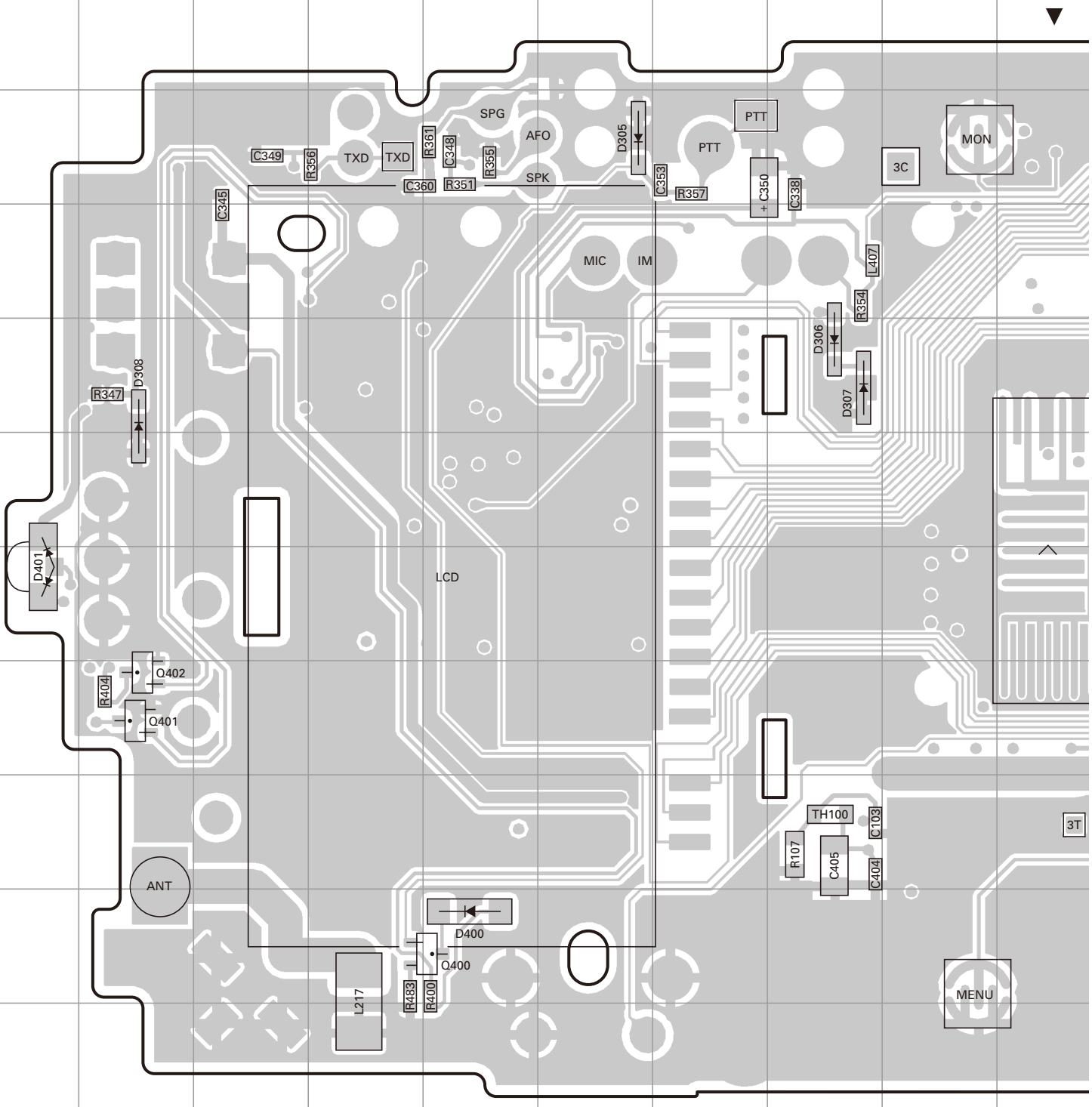
Transmitter Section



AG is set to the MIC input becomes 3.0kHz DEV. at 1kHz.
To make measurements in the AF section,connect the AC level meter.
In the RF section, use a 1000pF coupling capacitor.

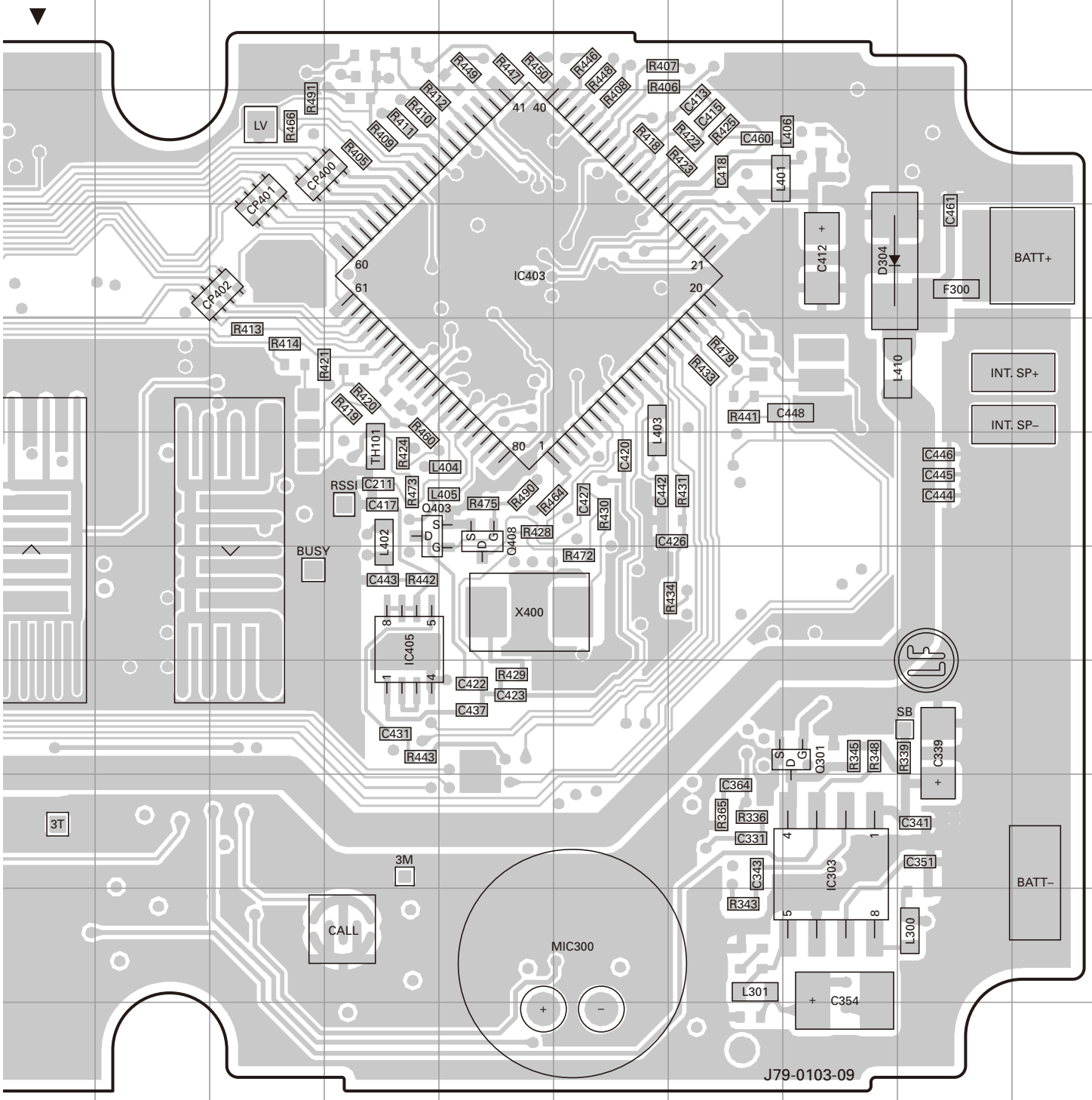
TK-3230 PC BOARD

TX-RX UNIT (X57-7330-10) Component side view (J79-0103-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC303	9Q	Q402	8B	D307	5H
IC403	4N	Q403	6M	D308	5B
IC405	7M	Q408	6N	D400	10E
Q301	8Q	D304	4Q	D401	7A
Q400	10E	D305	3F		
Q401	8B	D306	5H		

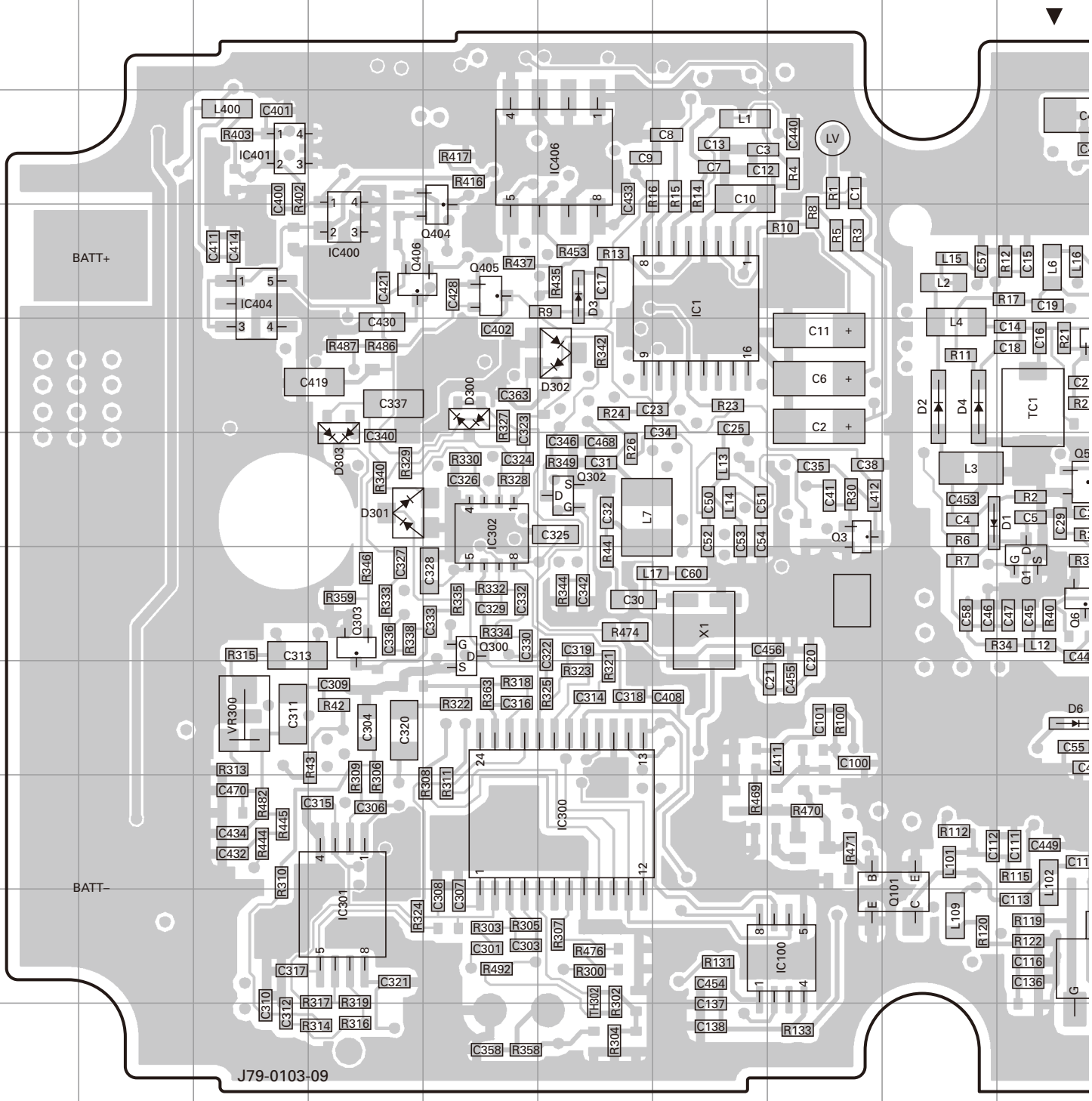
TX-RX UNIT (X57-7330-10) Component side view (J79-0103-09)



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

TK-3230 PC BOARD

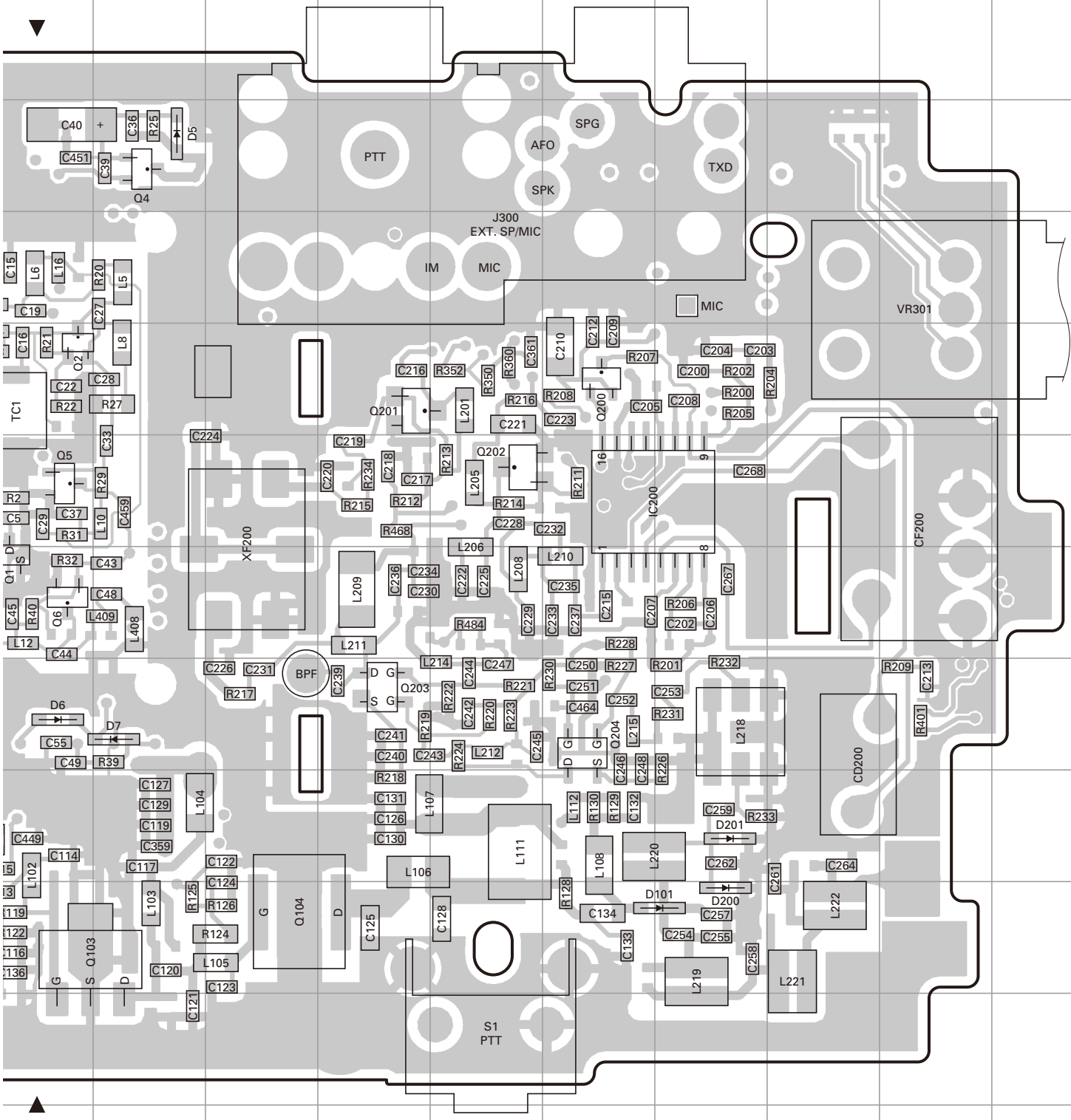
TX-RX UNIT (X57-7330-10) Foil side view (J79-0103-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	4G	IC404	4C	Q101	10J	Q300	7E	D3	4F	D300	5E
IC100	10H	IC406	3F	Q103	10J	Q302	6F	D4	5I	D301	6D
IC200	6O	Q1	7J	Q104	10L	Q303	7D	D5	3K	D302	5F
IC300	9F	Q2	5J	Q200	5O	Q404	4E	D6	8J	D303	6D
IC301	10D	Q3	6H	Q201	5M	Q405	4E	D7	8K		
IC302	6E	Q4	3K	Q202	6N	Q406	4D	D101	10P		
IC400	4D	Q5	6J	Q203	8M	D1	6I	D200	10P		
IC401	3C	Q6	7J	Q204	8O	D2	5I	D201	9P		

PC BOARD TK-3230

TX-RX UNIT (X57-7330-10) Foil side view (J79-0103-09)



Component side

Layer 1

Layer 2

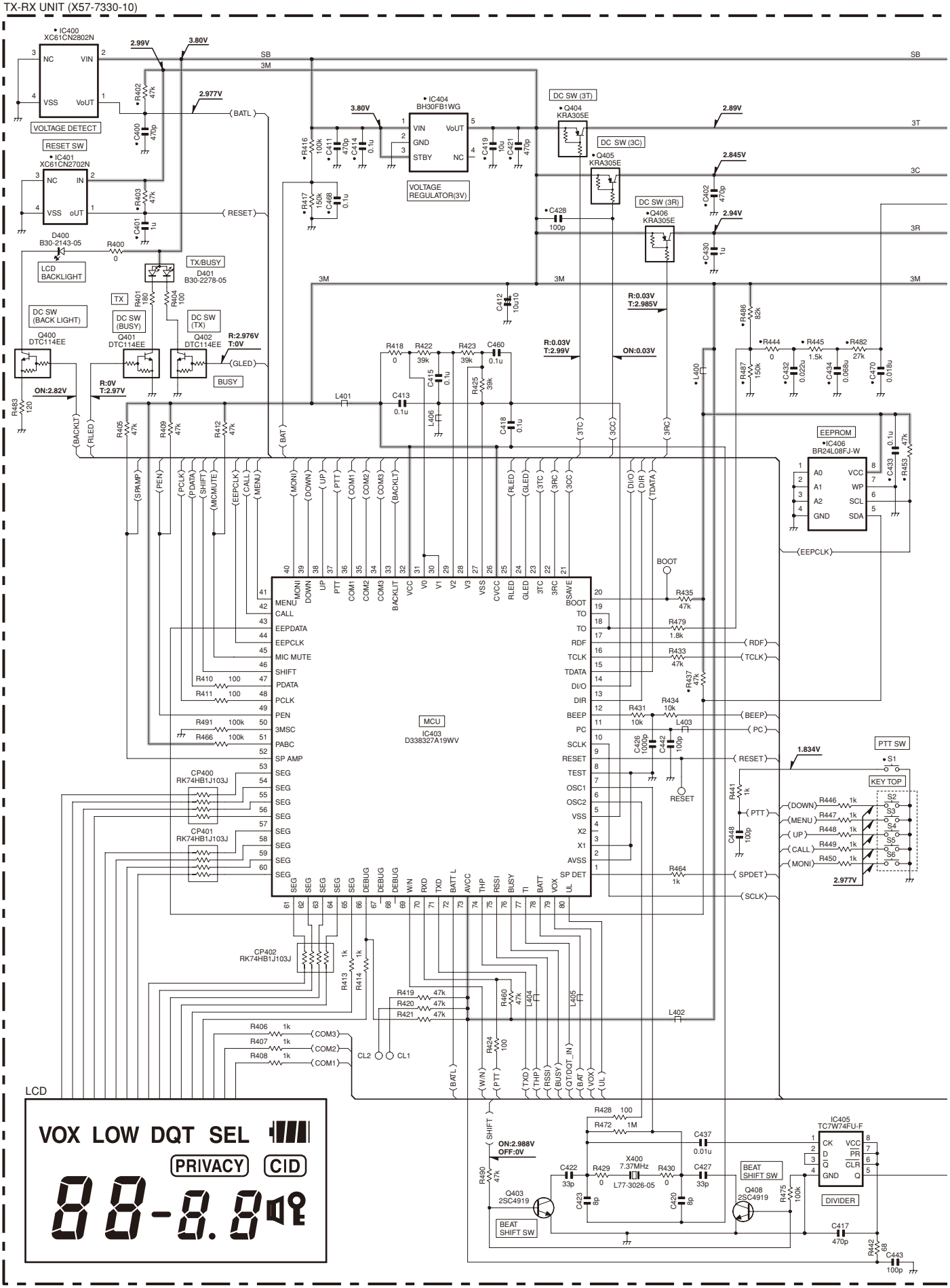
Layer 3

Layer 4

Foil side

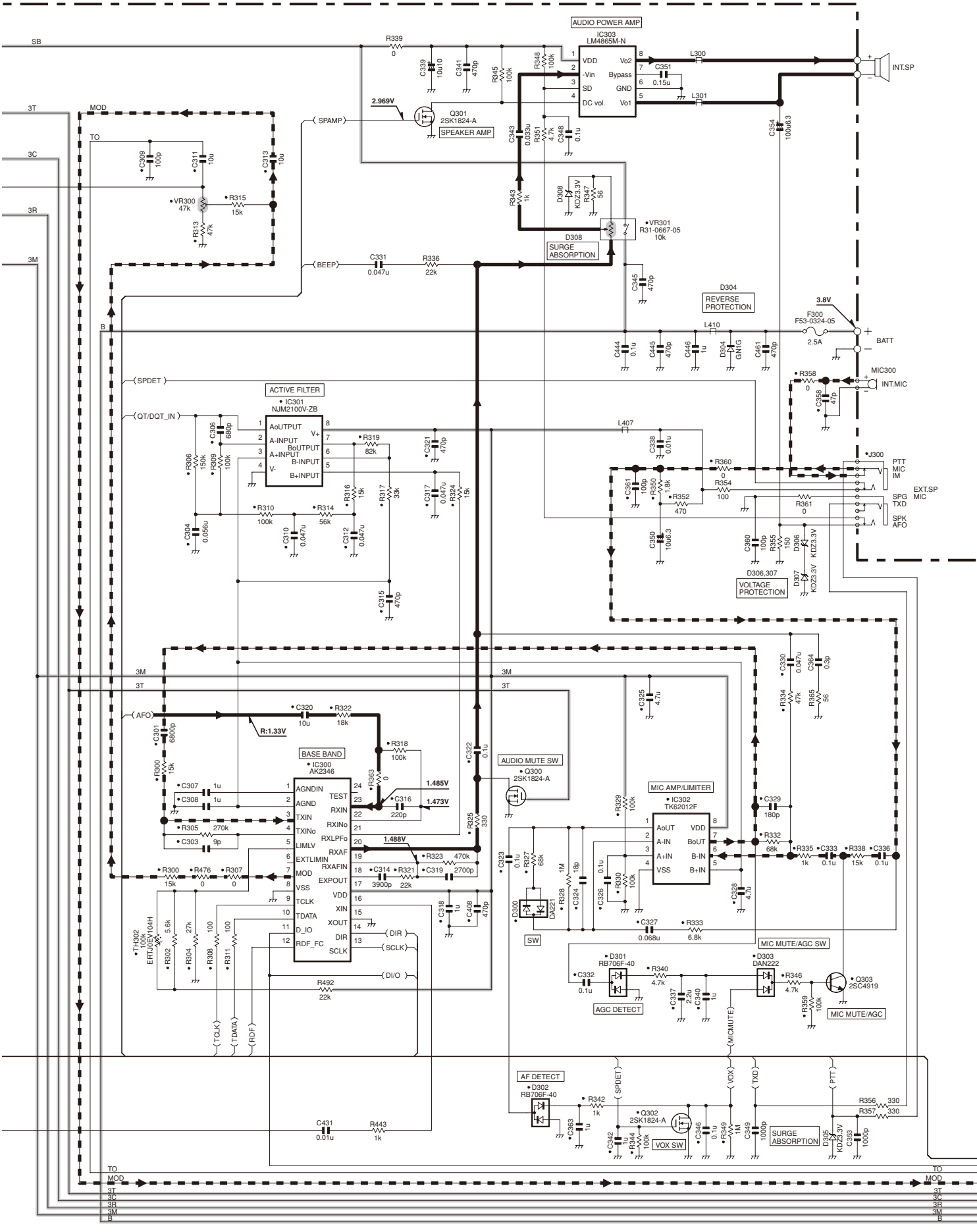
TK-3230 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-7330-10)



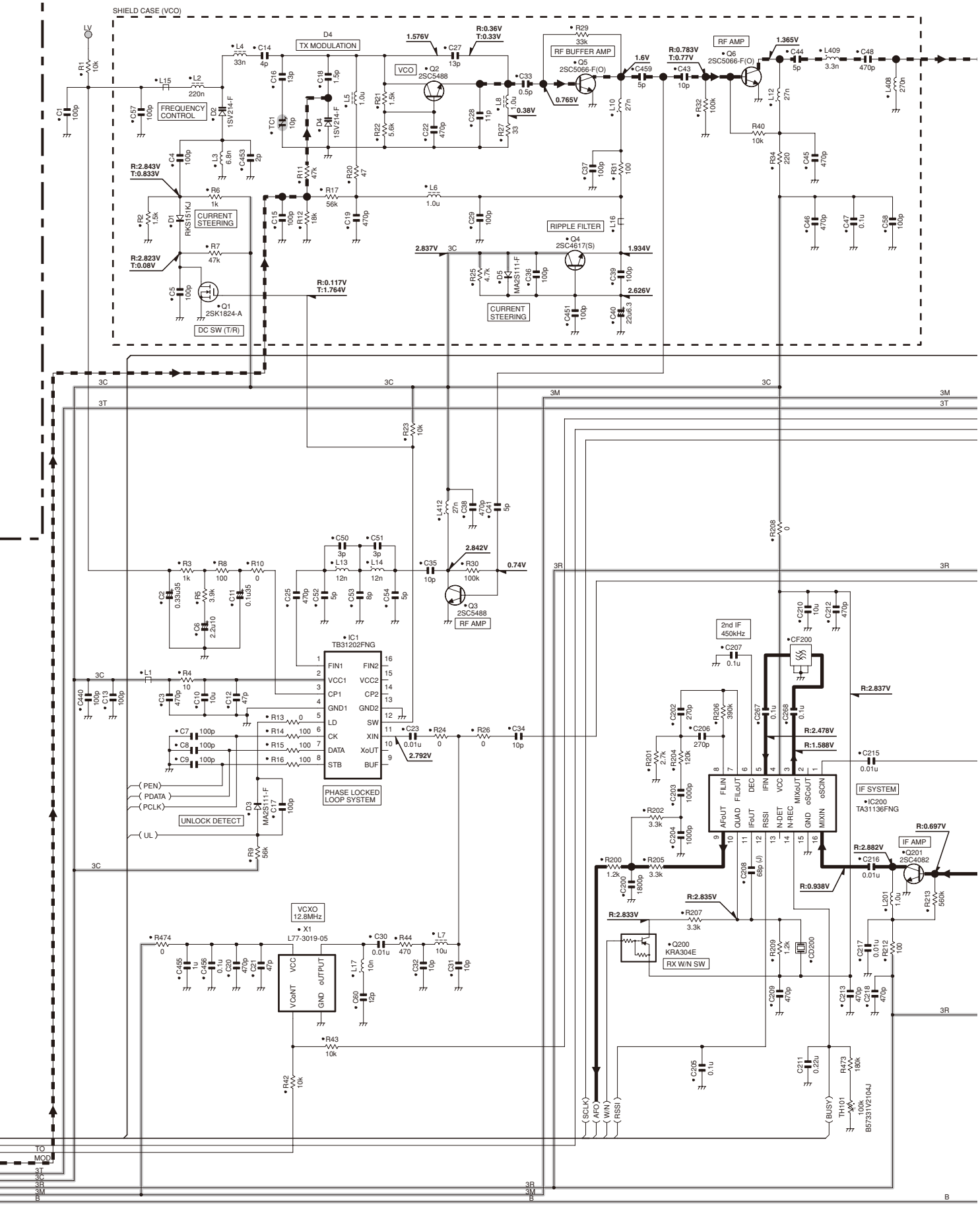
SCHEMATIC DIAGRAM TK-3230

TX-RX UNIT (X57-7330-10)



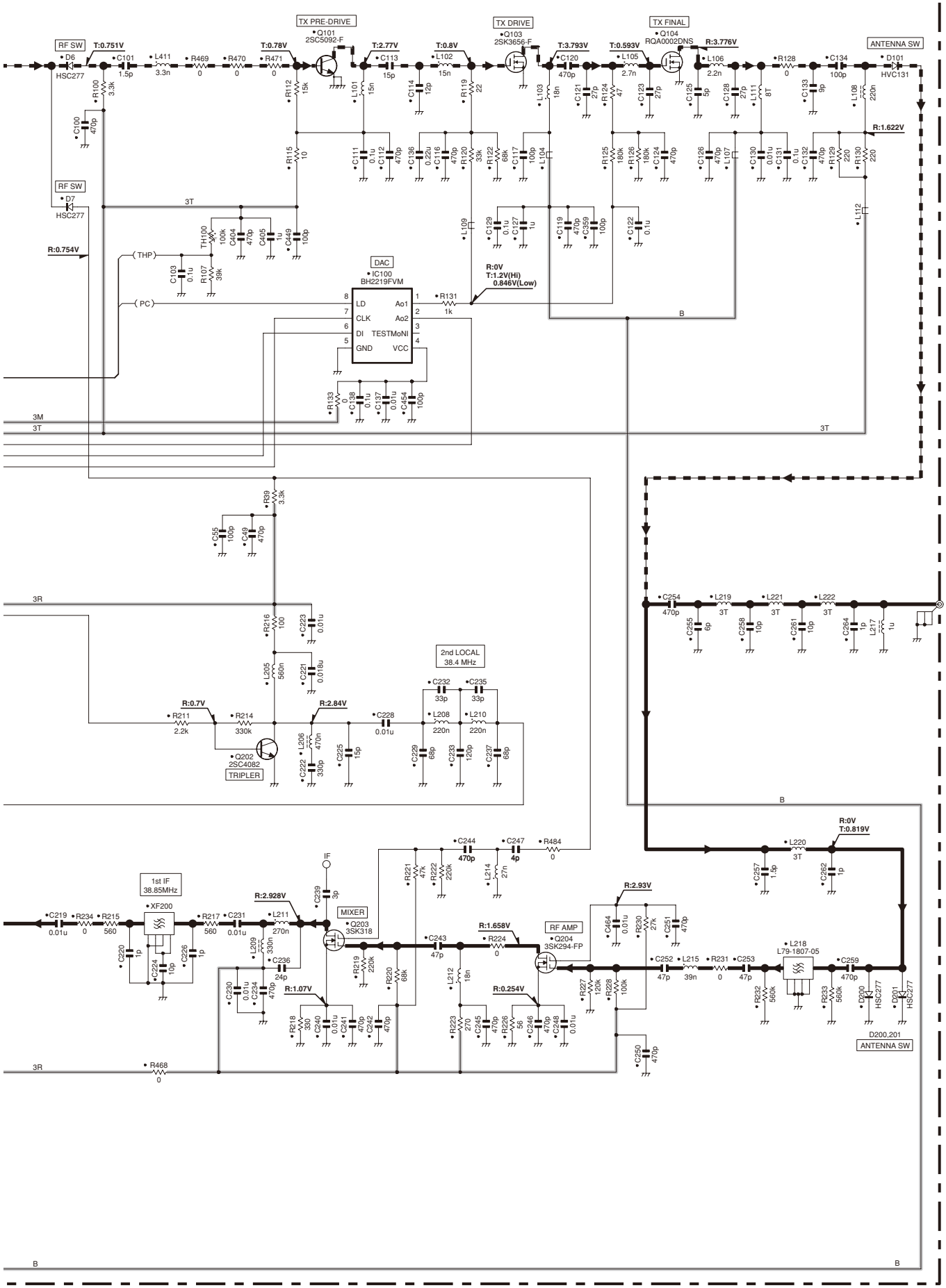
TK-3230 SCHEMATIC DIAGRAM

TX-RX UNIT (X57-7330-10)



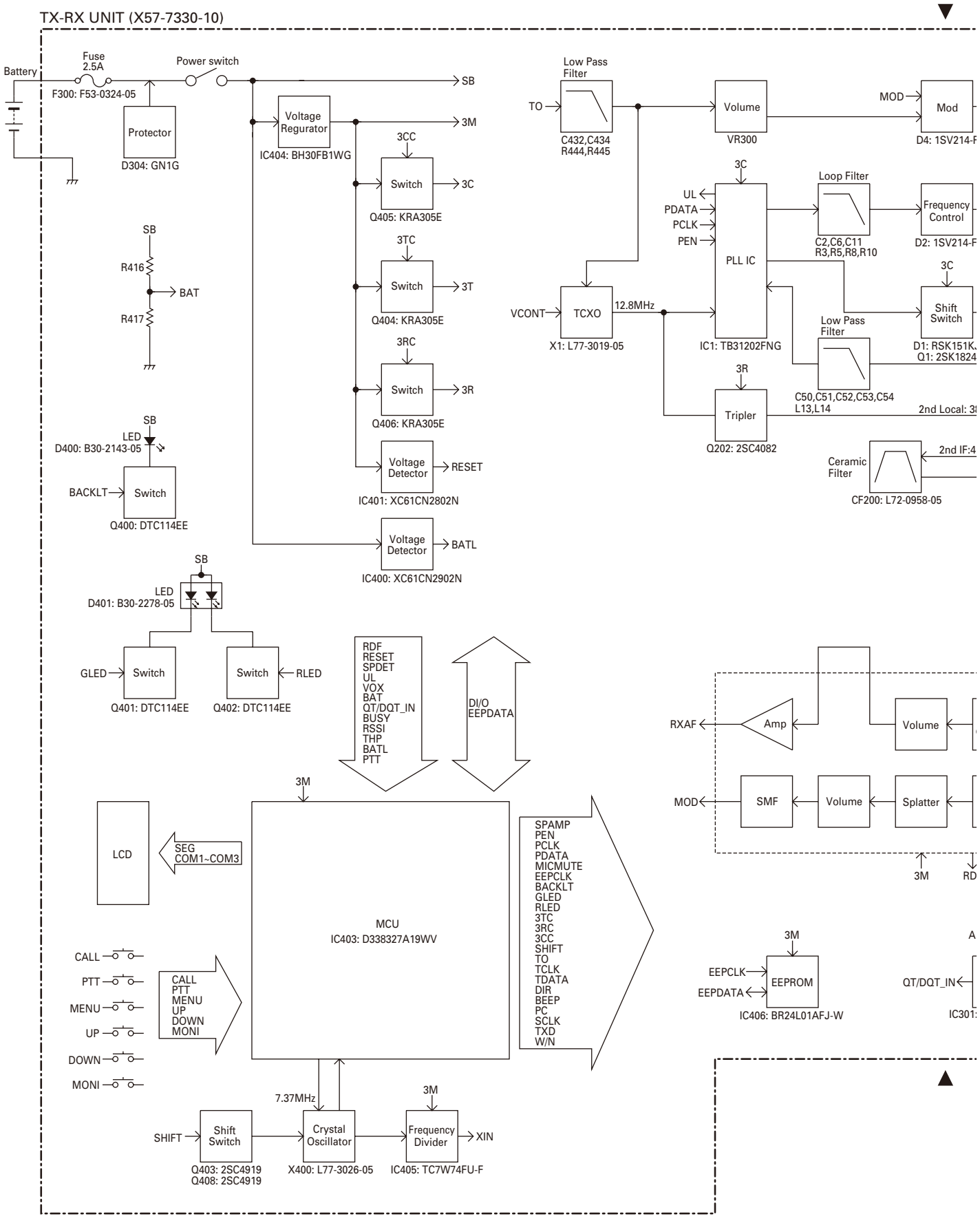
SCHEMATIC DIAGRAM TK-3230

TX-RX UNIT (X57-7330-10)

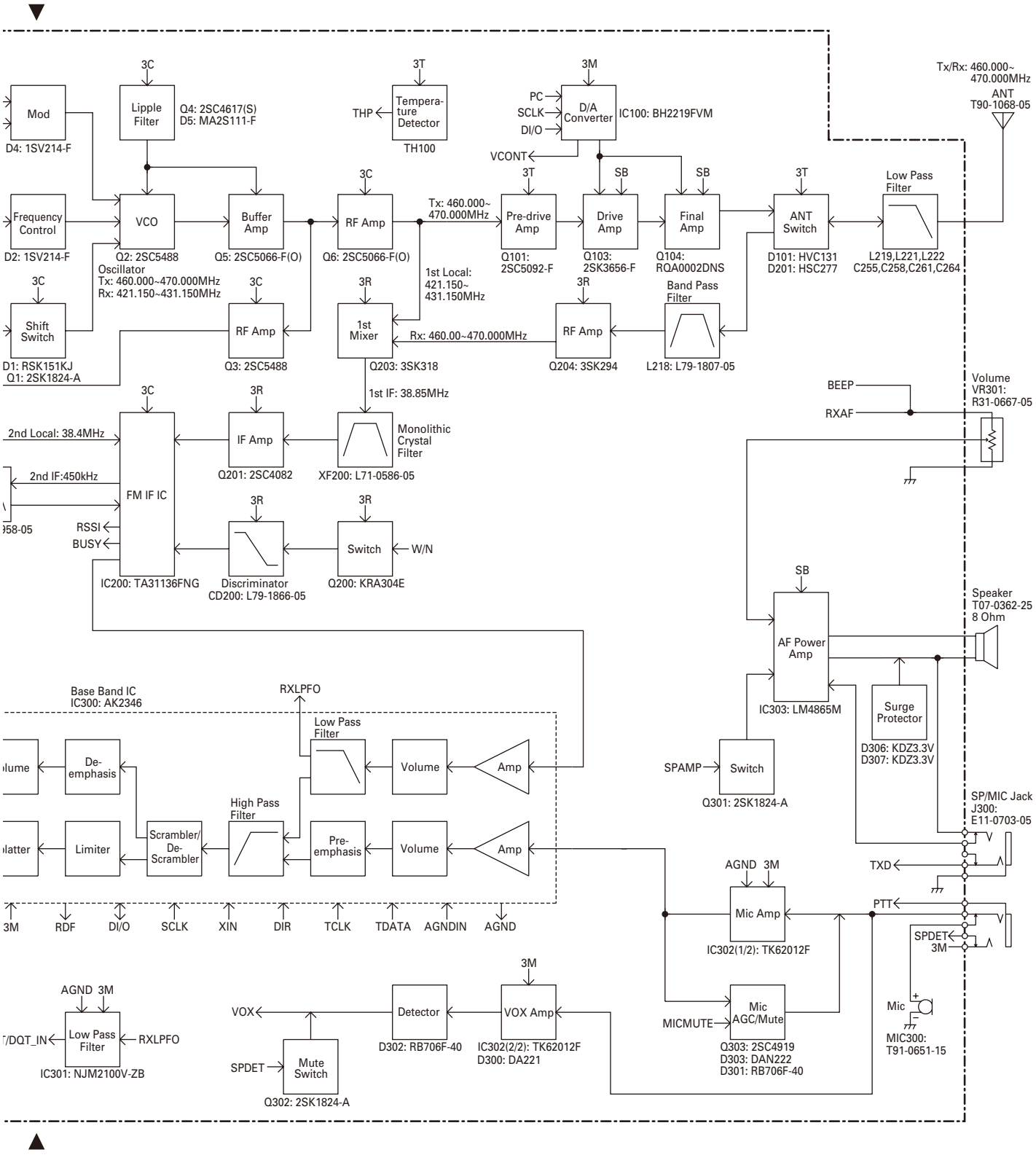


Note : The components marked with a dot (•) are parts of layer 1.

BLOCK DIAGRAM



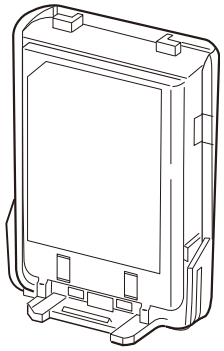
BLOCK DIAGRAM



OPTIONAL ACCESSORIES

KNB-46L (Li-ion battery pack)

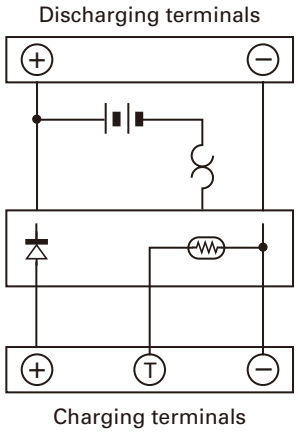
■ External View



■ Specifications

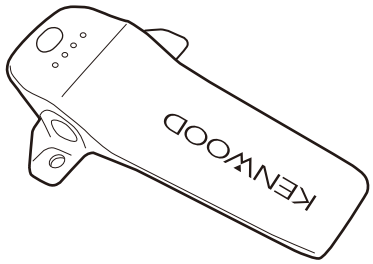
Voltage.....3.7V
Charging current..... 2000mAh

■ Circuit Diagram



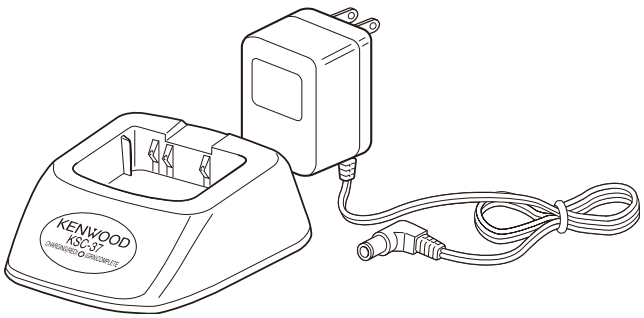
KBH-14 (Belt clip)

■ External View



KSC-37 (Rapid charger)

■ External View

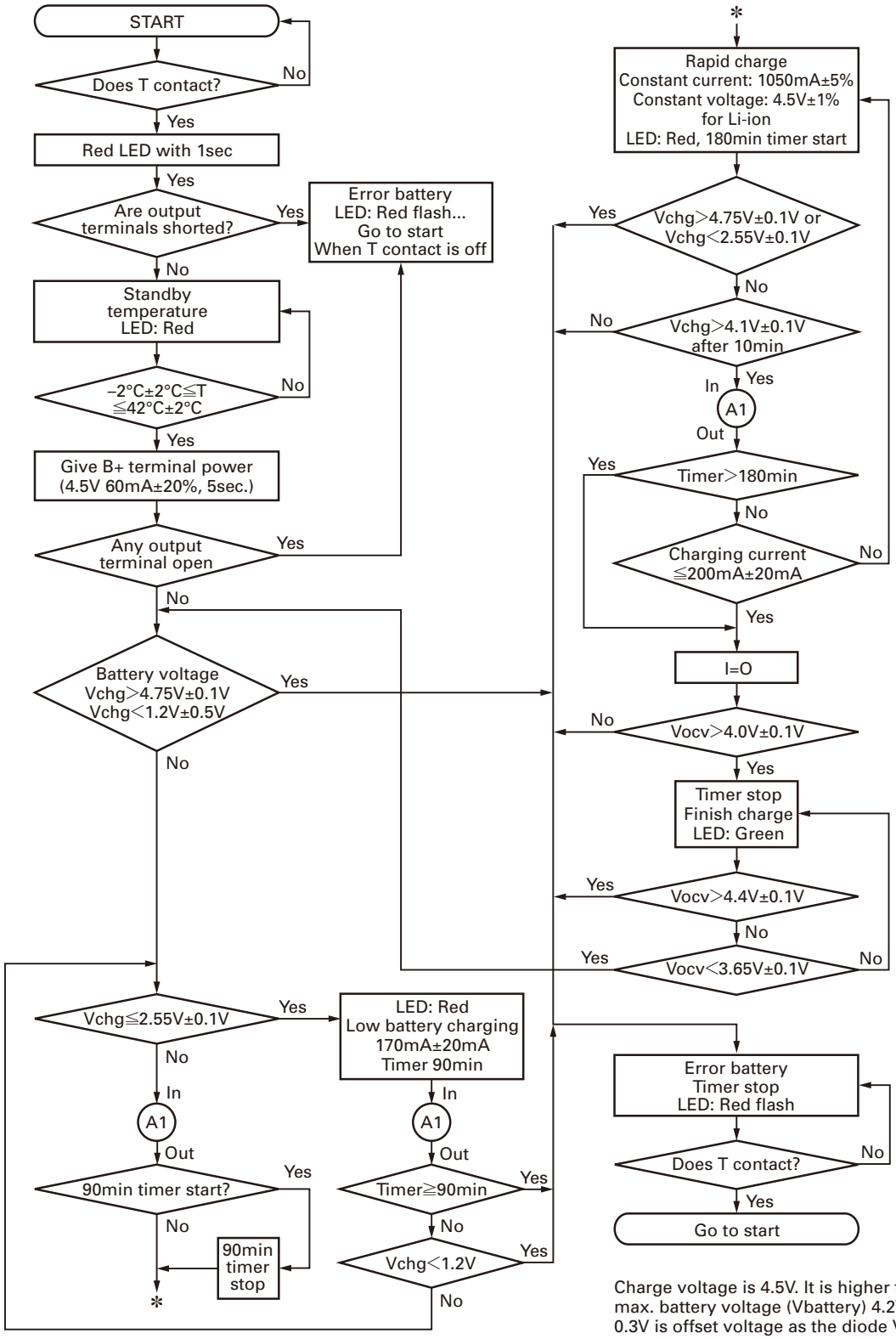


■ Specifications

Charge current ..... 1050mA ± 5%
Charge voltage (at battery charging terminals) .....4.5V ± 1%
End of charge (current) ..... 200mA ± 20mA
Rapid charge time ..... Less than 150min
Low voltage battery charge timer.....90min
Rapid charge timer 150min
Starting charge temperature range .....0°C < T < 40°C
On charge temperature range .....0°C < T < 57°C

OPTIONAL ACCESSORY (KSC-37: RAPID CHARGER)

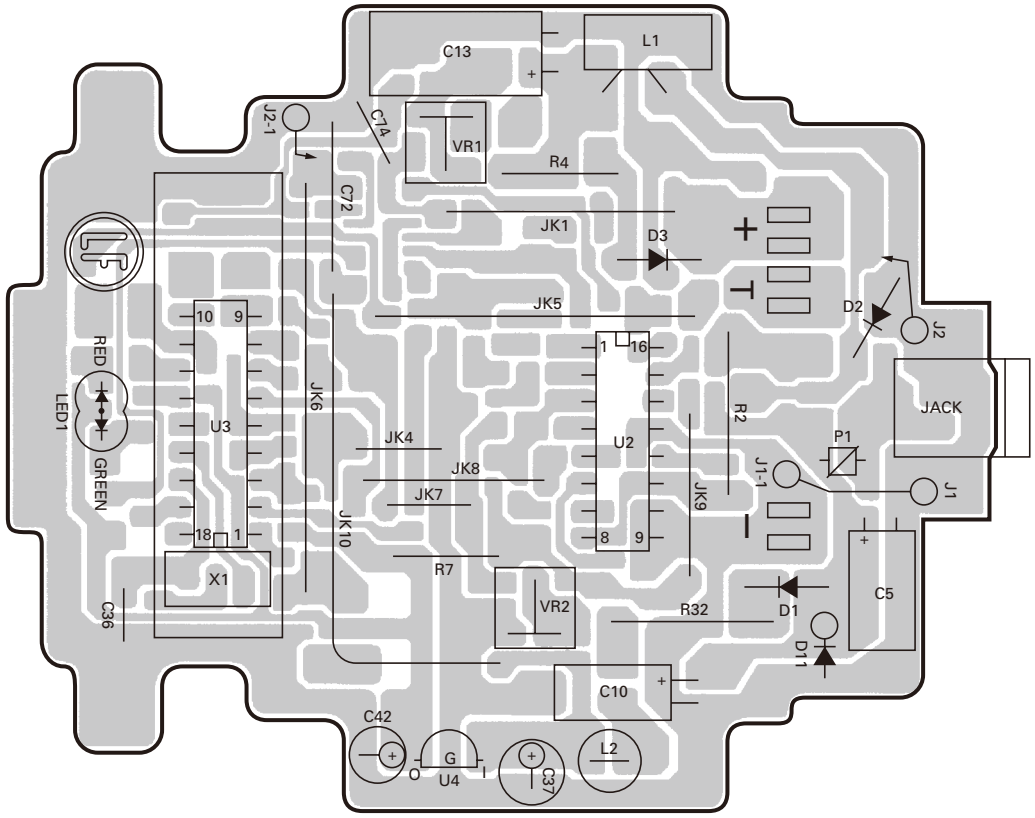
■ Flow Chart



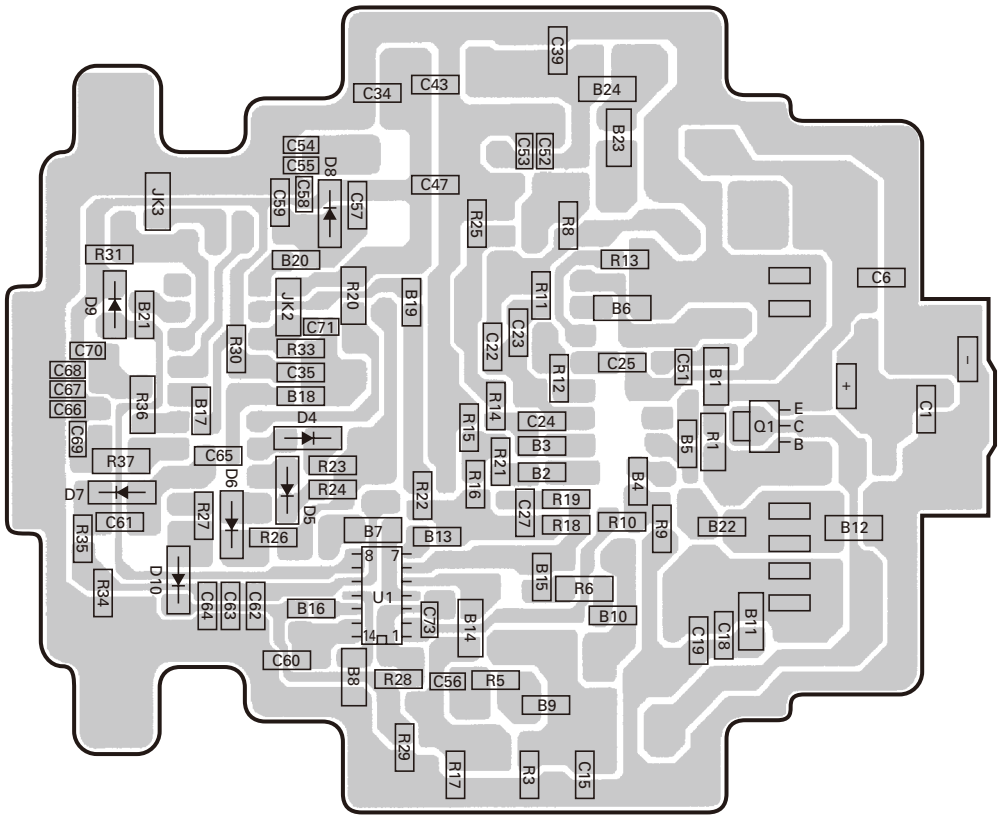
Charge voltage is 4.5V. It is higher than normally max. battery voltage (Vbattery) 4.2V.
0.3V is offset voltage as the diode Vf which is in the battery pack.
Vchg: Charge voltage at charging (Vbattery+Vf)
Vocv: Battery voltage at non-chargeing

OPTIONAL ACCESSORY (KSC-37: RAPID CHARGER)

■ **PC Board (Component side view)**

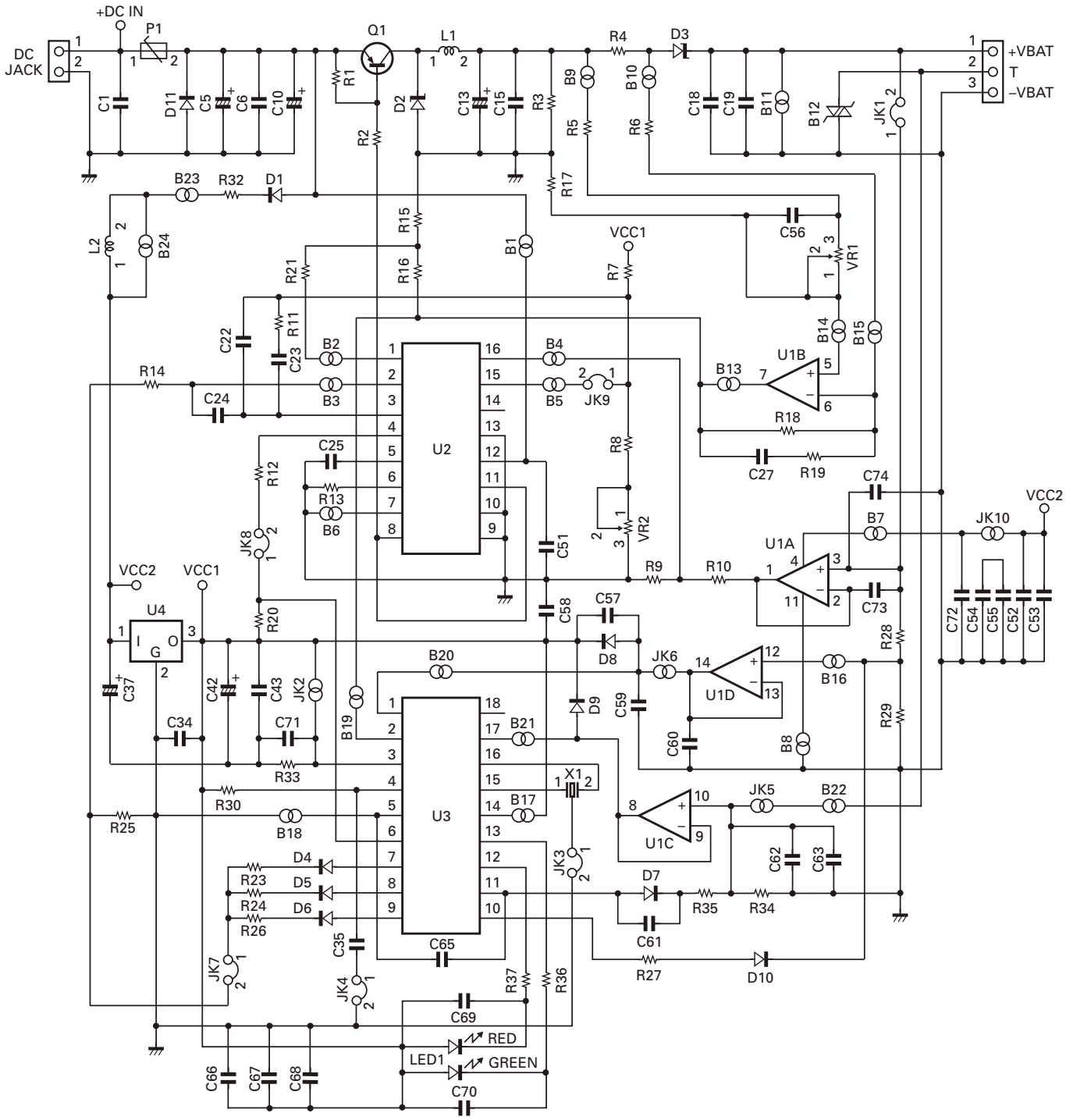


■ **PC Board (Foil side view)**



OPTIONAL ACCESSORY (KSC-37: RAPID CHARGER)

■ Schematic Diagram



TK-3230

SPECIFICATIONS

General

Frequency Range	
BRS	Preset 56CH
LMR	460 to 470MHz
Number of Channels	2CH (FPU: 16CH)
PLL Channel Stepping	6.25kHz, 5kHz
Modulation (Wide/Narrow)	16K0F3E/11K00F3E
RF Output Power (High/Low)	1.5W / 500mW
Operating Voltage	3.7V DC (3.4~4.2V)
Battery Life (5-5-90 Duty Cycle)	Up to 14 hours (at KNB-46L high power)
Operating Temperature Range	–10°C to +60°C (+14°F to +140°F)
Frequency Stability	±2.5ppm
Dimensions	52 (W) x 103.5 (H) x 28.7 (D) mm (155.5mm (H) included antenna) (Projections not included)
Weight	Approx. 155g with KNB-46L battery
Standard Load	
Antenna Impedance	50Ω
MIC Input	2kΩ
AF Output	8Ω

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

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

Kenwood Electronics Canada Inc.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

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

Kenwood Electronics Belgium N.V.
Leuvensesteenweg 248 J, 1800 Vilvoorde, Belgium

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

Kenwood Electronics UK Limited
KENWOOD House, Dwight Road, Watford, Herts., WD18 9EB United Kingdom

Kenwood Electronics Europe B.V.
Amsterdamseweg 37, 1422 AC Uithoorn, The Netherlands

Kenwood Electronics Italia S.p.A.
Via G. Sirtori, 7/9 20129 Milano, Italy

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

Kenwood Electronics Australia Pty. Ltd.
(A.C.N. 001 499 074)
16 Giffnock Avenue, Centrecourt Estate, North Ryde, N.S.W. 2113 Australia

Kenwood Electronics (Hong Kong) Ltd.
Unit 3712-3724, Level 37, Tower one Metroplaza, 223 Hing Fong Road, Kwai Fong, N.T., Hong Kong

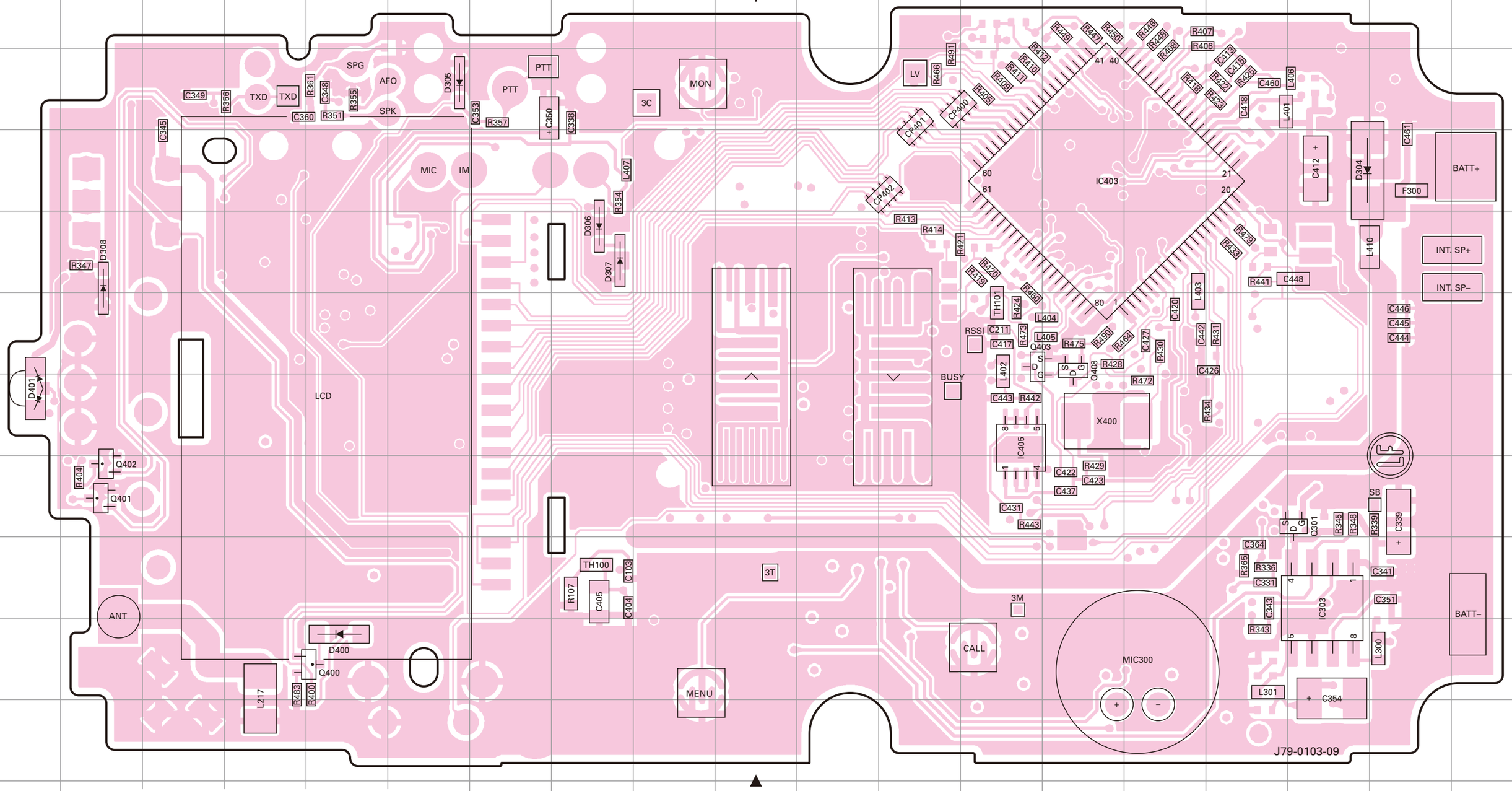
Kenwood Electronics Singapore Pte Ltd
1 Ang Mo Kio Street 63, Singapore 569110

TK-3230 PC BOARD

PC BOARD TK-3230

TX-RX UNIT (X57-7330-10) Component side view (J79-0103-09)

TX-RX UNIT (X57-7330-10) Component side view (J79-0103-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC303	9Q	Q402	8B	D307	5H
IC403	4N	Q403	6M	D308	5B
IC405	7M	Q408	6N	D400	10E
Q301	8Q	D304	4Q	D401	7A
Q400	10E	D305	3F		
Q401	8B	D306	5H		

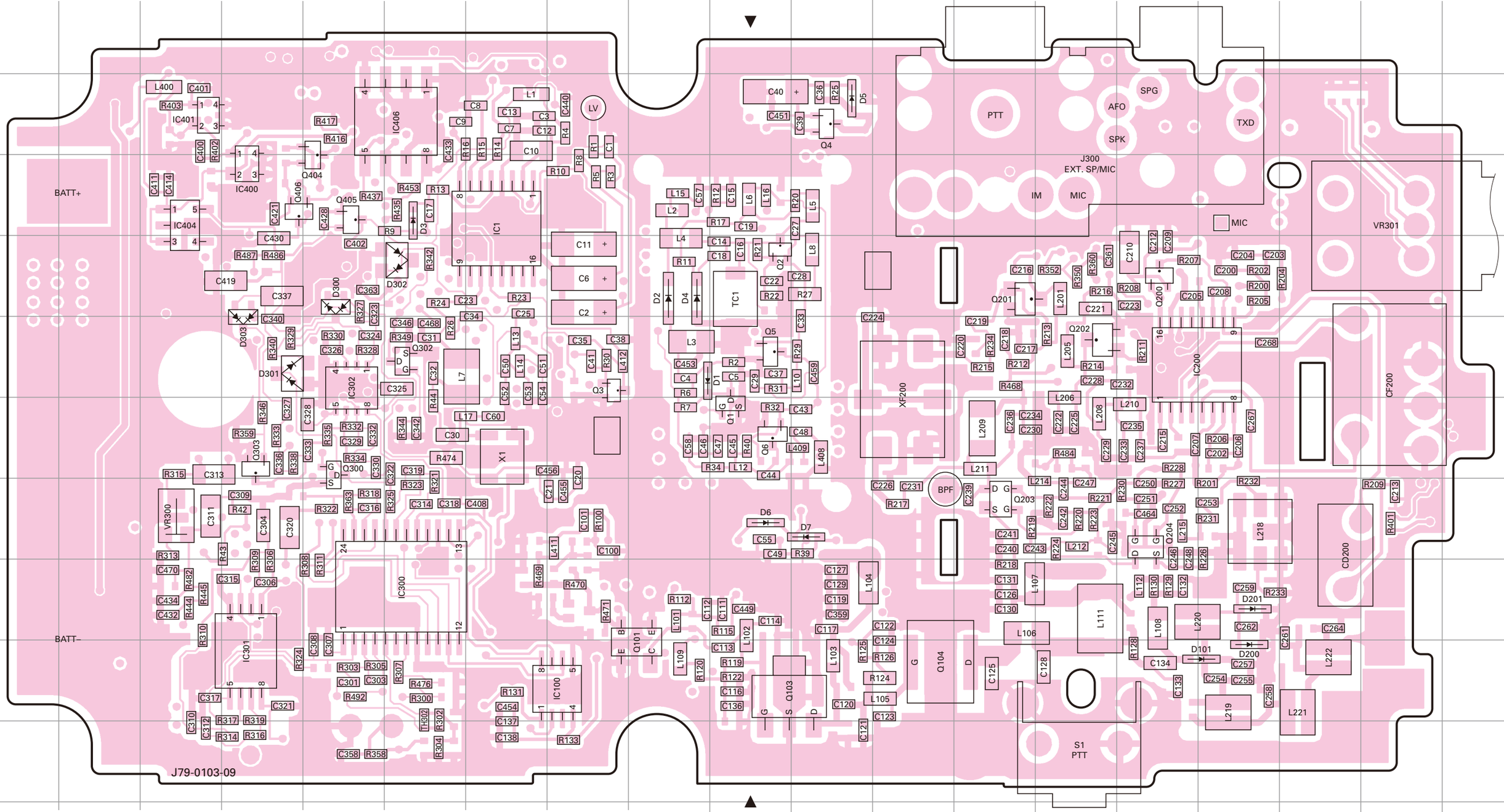
Component side
Layer 1
Layer 2
Layer 3
Layer 4
Foil side

TK-3230 PC BOARD

PC BOARD TK-3230

TX-RX UNIT (X57-7330-10) Foil side view (J79-0103-09)

TX-RX UNIT (X57-7330-10) Foil side view (J79-0103-09)



Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address	Ref. No.	Address
IC1	4G	IC404	4C	Q101	10J	Q300	7E	D3	4F	D300	5E
IC100	10H	IC406	3F	Q103	10J	Q302	6F	D4	5I	D301	6D
IC200	6O	Q1	7J	Q104	10L	Q303	7D	D5	3K	D302	5F
IC300	9F	Q2	5J	Q200	5O	Q404	4E	D6	8J	D303	6D
IC301	10D	Q3	6H	Q201	5M	Q405	4E	D7	8K		
IC302	6E	Q4	3K	Q202	6N	Q406	4D	D101	10P		
IC400	4D	Q5	6J	Q203	8M	D1	6I	D200	10P		
IC401	3C	Q6	7J	Q204	8O	D2	5I	D201	9P		

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

TX-RX UNIT (X57-7330-10)

TX-RX UNIT (X57-7330-10)

Battery
Fuse 2.5A
F300: F53-0324-05
Power switch
Protector
D304: GN1G
Voltage Regurator
IC404: BH30FB1WG
SB
3M
3CC
Switch
3C
Q405: KRA305E
3TC
Switch
3T
Q404: KRA305E
3RC
Switch
3R
Q406: KRA305E
Voltage Detector
RESET
IC401: XC61CN2802N
Voltage Detector
BATL
IC400: XC61CN2902N
R416
BAT
R417
LED
D400: B30-2143-05
BACKLT
Switch
Q400: DTC114EE
LED
D401: B30-2278-05
GLED
Switch
Q401: DTC114EE
Switch
RLED
Q402: DTC114EE
RDF
RESET
SPDET
UL
VOX
BAT
QT/DQT_IN
BUSY
RSSI
THP
BATL
PTT
DI/O
EEPDATA
LCD
SEG
COM1~COM3
MCU
IC403: D338327A19WV
CALL
PTT
MENU
UP
DOWN
MONI
SPAMP
PEN
PCLK
PDATA
MICMUTE
EEPCLK
BACKLT
GLED
RLED
3TC
3RC
3CC
SHIFT
TO
TCLK
TDATA
DIR
BEEP
PC
SCLK
TXD
W/N
7.37MHz
SHIFT
Shift Switch
Q403: 2SC4919
Q408: 2SC4919
Crystal Oscillator
X400: L77-3026-05
Frequency Divider
XIN
IC405: TC7W74FU-F
Low Pass Filter
TO
C432,C434
R444,R445
Volume
VR300
MOD
Mod
D4: 1SV214-F
Lipple Filter
Q4: 2SC4617(S)
D5: MA2S111-F
THP
Tempera-ture Detector
TH100
PC
SCLK
DI/O
D/A Converter
IC100: BH2219FVM
VCONT
Tx/Rx: 460.000~ 470.000MHz
ANT
T90-1068-05
UL
PDATA
PCLK
PEN
PLL IC
IC1: TB31202FNG
Loop Filter
C2,C6,C11
R3,R5,R8,R10
Frequency Control
D2: 1SV214-F
VCO
Q2: 2SC5488
Oscillator
Tx: 460.000~470.000MHz
Rx: 421.150~431.150MHz
Buffer Amp
Q5: 2SC5066-F(O)
RF Amp
Q6: 2SC5066-F(O)
Tx: 460.000~ 470.000MHz
Pre-drive Amp
Q101: 2SC5092-F
Drive Amp
Q103: 2SK3656-F
Final Amp
Q104: RQA0002DNS
ANT Switch
D101: HVC131
D201: HSC277
Low Pass Filter
L219,L221,L222
C255,C258,C261,C264
VCONT
TCXO
12.8MHz
X1: L77-3019-05
Shift Switch
D1: RSK151KJ
Q1: 2SK1824-A
RF Amp
Q3: 2SC5488
1st Local: 421.150~ 431.150MHz
1st Mixer
Q203: 3SK318
Rx: 460.00~470.000MHz
RF Amp
Q204: 3SK294
Band Pass Filter
L218: L79-1807-05
Low Pass Filter
C50,C51,C52,C53,C54
L13,L14
Tripler
Q202: 2SC4082
2nd Local: 38.4MHz
1st IF: 38.85MHz
IF Amp
Q201: 2SC4082
Monolithic Crystal Filter
XF200: L71-0586-05
Ceramic Filter
CF200: L72-0958-05
2nd IF:450kHz
FM IF IC
IC200: TA31136FNG
RSSI
BUSY
Discriminator
CD200: L79-1866-05
Switch
W/N
Q200: KRA304E
BEEP
RXAF
Volume
VR301:
R31-0667-05
Base Band IC
IC300: AK2346
RXLPFO
Low Pass Filter
RXAF
Amp
Volume
De-emphasis
Volume
Amp
MOD
SMF
Volume
Splatter
Limiter
Scrambler/ De-Scrambler
High Pass Filter
Pre-emphasis
Volume
Amp
3M
RDF
DI/O
SCLK
XIN
DIR
TCLK
TDATA
AGNDIN
AGND
EEPCLK
EEPDATA
EEPROM
IC406: BR24L01AFJ-W
AGND
3M
QT/DQT_IN
Low Pass Filter
RXLPFO
IC301: NJM2100V-ZB
VOX
SPDET
Mute Switch
Q302: 2SK1824-A
Detector
D302: RB706F-40
VOX Amp
IC302(2/2): TK62012F
D300: DA221
AF Power Amp
IC303: LM4865M
Speaker
T07-0362-25
8 Ohm
Surge Protector
D306: KDZ3.3V
D307: KDZ3.3V
SPAMP
Switch
Q301: 2SK1824-A
SP/MIC Jack
J300:
E11-0703-05
AGND
3M
Mic Amp
IC302(1/2): TK62012F
TXD
PTT
SPDET
MICMUTE
Mic AGC/Mute
Q303: 2SC4919
D303: DAN222
D301: RB706F-40
Mic
MIC300:
T91-0651-15