ICOM®

SERVICE MANUAL

PMR446 FM TRANSCEIVER

IC-4088SR

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-4088SR** PMR446 FM TRANSCEIVER at the time of publication.

MODEL	Antenna size	SYMBOL
IC-4088SR	Long	EUR
	Short	EUR-1

To upgrade quality, all electrical or mechanical parts and internal circuits are subject to change without notice or obligation.

DANGER

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 5.0 V. Such a connection could cause a fire or electric hazard.

DO NOT expose the transceiver to rain, snow or any liquids.

DO NOT reverse the polarities of the power supply when connecting the transceiver.

DO NOT apply an RF signal of more than 20 dBm (100mW) to the antenna connector. This could damage the transceiver's front end.

ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

<**SAMPLE ORDER**>

5030002520 LCD	L2-0494TAY	IC-4088SR	Main unit	5 pieces
8810009560 Screw	PH BO M2x6 ZK	IC-4088SR	Chassis	10 pieces

Addresses are provided on the inside back cover for your convenience.

REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated turning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 30 dB to 40 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

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SECTION 1 SPECIFICATIONS

■ GENERAL

• Number of channel	: 8 channels (simplex; 446.00625–446.09375 MHz)
• Type of emission	: 8K50F3E (FM)
• Frequency stability	: ±2500 Hz (±5.6 ppm)
• Frequency resolution	: 12.5 kHz
• Antenna impedance	: 50 Ω
• Power supply requirement (negative ground)	: 3 × AA (R6) dry, alkaline; or BP-202 (optional Ni-Cd battery pack)
• Current drain	: Less than 140 mA
• Operating temperature range	: –20˚C to +55˚C
• Number of CTCSS frequency	: 38 (67.0–250.3 Hz)
• Dimensions (projections not included)	: 52.5 (W) × 102.5 (H) × 26.9 (D) mm
• Weight (included 3 cells)	: 200 g (Approx.)

■ TRANSMITTER

• Output power	: Less than 500 mW ERP
• Modulation system	: Variable reactance frequency modulation
• Max. frequency deviation	: ±2.5 kHz
• Spurious emissions	: 0.25 µW
• Adjacent channel power	: More than 60 dB
• External microphone connector	: 3-conductor 2.5(d) mm/2.2 kΩ

■ RECEIVER

• Receiving system	: Double conversion superheterodyne system
• Intermediate frequency	: 1st; 21.7 MHz 2nd; 450 kHz
• Sensitivity (12 dB SINAD)	: 0.25 µV; –12 dBµ
• Adjacent channel selectivity	: More than 55 dB
• Spurious response	: More than 65 dB
• Intermodulation	: More than 60 dB
• Audio output power	: 100mW at 10% distortion with an 8 Ω load
• External SP connector	: 2-conductor 3.5(d) mm/8 Ω

All stated specifications are subject to change without notice or obligation.

■ CHANNEL FREQUENCY LIST

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	446.00625	5	446.05625
2	446.01875	6	446.06875
3	446.03125	7	446.08125
4	446.04375	8	446.09375

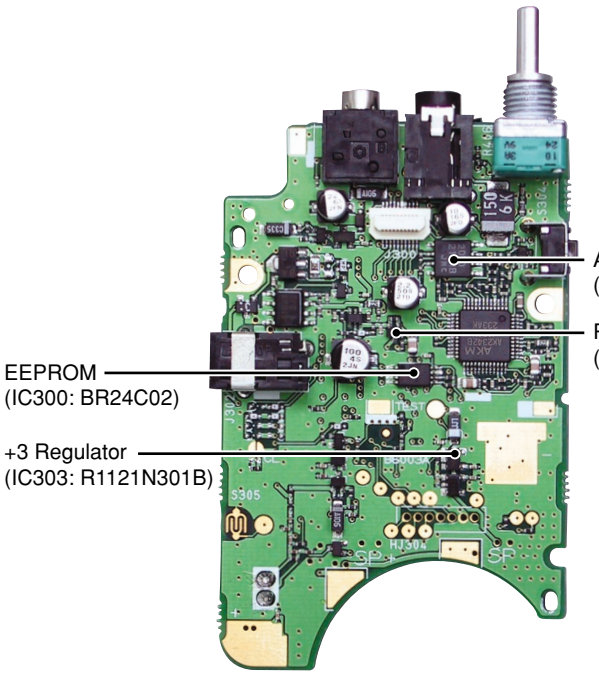
■ CTCSS FREQUENCY LIST

Channel No.	Frequency (Hz)	Channel No.	Frequency (Hz)	Channel No.	Frequency (Hz)
1	67.0	14	107.2	27	167.9
2	71.9	15	110.9	28	173.8
3	74.4	16	114.8	29	179.9
4	77.0	17	118.8	30	186.2
5	79.7	18	123.0	21	192.8
6	82.5	19	127.3	32	203.5
7	85.4	20	131.8	33	210.7
8	88.5	21	136.5	34	218.1
9	91.5	22	141.3	35	225.7
10	94.8	23	146.2	36	233.6
11	97.4	24	151.4	37	241.8
12	100.0	25	156.7	38	250.3
13	103.5	26	162.2	–	OFF

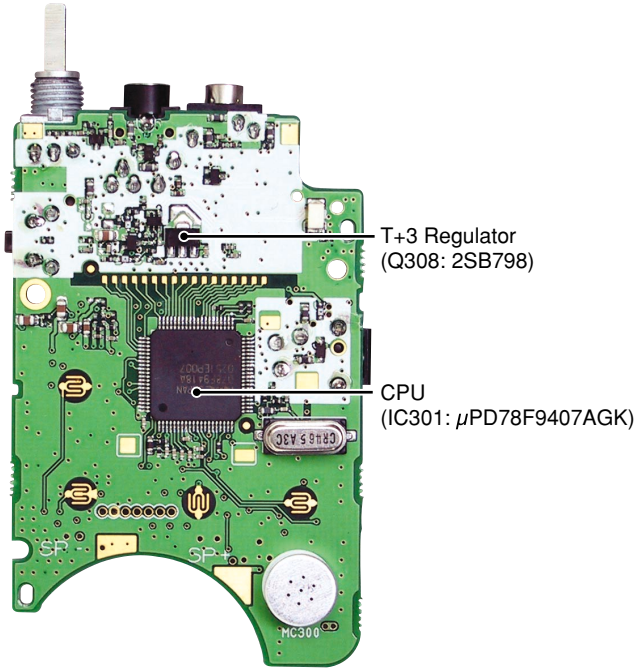
SECTION 2 INSIDE VIEWS

● MAIN UNIT

TOP VIEW

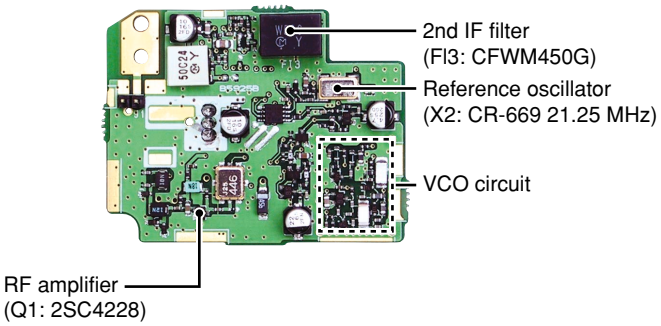


BOTTOM VIEW

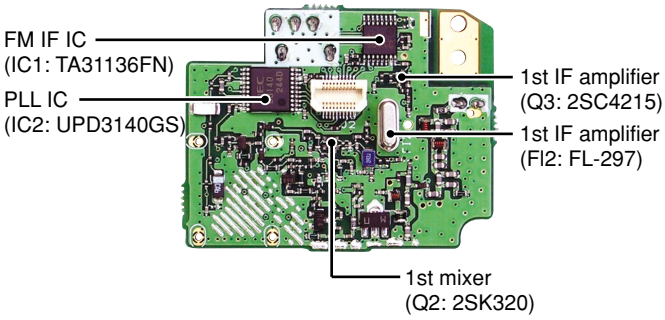


● RF UNIT

TOP VIEW



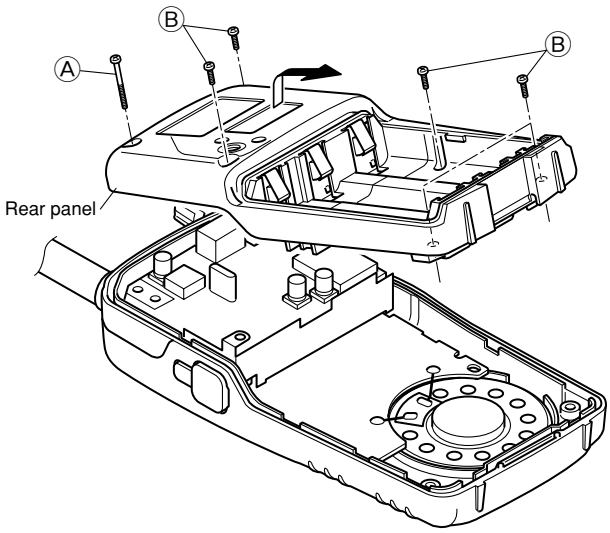
BOTTOM VIEW



SECTION 3 DISASSEMBLY INSTRUCTIONS

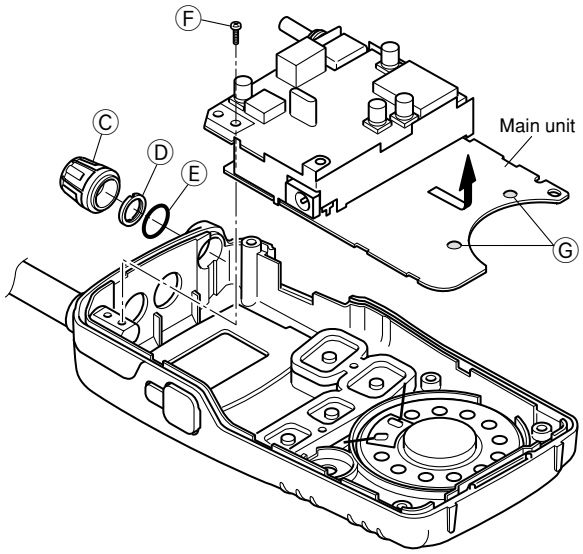
● REMOVING THE REAR PANEL

① Unscrew 1 screw Ⓐ, and 5 screws Ⓑ.
② Remove the rear panel in the direction of the arrow.



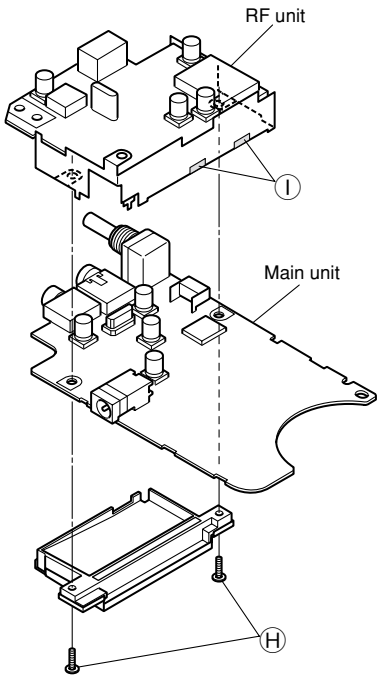
● REMOVING THE MAIN UNIT

① Remove 1 knob Ⓒ, unscrew 1 nut Ⓓ, and then remove 1 ring Ⓔ.
② Unscrew 1 screw Ⓕ.
③ Unsolder 2 points Ⓖ, and remove the MAIN unit in the direction of the arrow.



● REMOVING THE RF UNIT

① Unscrew 2 screws Ⓗ.
② Unsolder 2 points Ⓘ, and remove the RF unit.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT (RF UNIT)

Received signals from the antenna are passed through the low-pass filter (L2, L3, C1–C5, C117). The filtered signals are applied to the λ/4 type antenna switching circuit (D1–D4, L4–L6, C6–C11).

The antenna switching circuit functions as a low-pass filter while receiving. However, its impedance becomes very high while D3 and D4 are turned ON (while transmitting). Thus, transmit signals are blocked from entering the receiver circuits. The passed signals are then applied to the RF amplifier circuit.

4-1-2 RF CIRCUIT (RF UNIT)

The RF circuit amplifies signals within the range of frequency coverage and filters out-of-band signals.

The signals from the antenna switching circuit are amplified at the RF amplifier (Q1) and passed through the bandpass filter (FI4) to suppress out-of-band signals. The filtered signals are applied to the 1st mixer circuit (Q2).

4-1-3 1ST MIXER AND 1ST IF CIRCUITS (RF UNIT)

The 1st mixer circuit converts the received signals to a fixed frequency of the 1st IF signal with a PLL output frequency. By changing the PLL frequency, only desired signals will be passed through a crystal filter at the next stage of the 1st mixer.

The signals from the bandpass filter are mixed at the 1st mixer circuit (Q2) with a 1st LO signal coming from the VCO circuit to produce a 21.7 MHz 1st IF signal. The 1st IF signal is applied to a crystal filter (FI2) to suppress out-of-band signals. The filtered 1st IF signal is applied to the IF amplifier (Q3), and is then applied to the 2nd mixer circuit (IC1, pin 16).

4-1-4 2ND MIXER AND DEMODULATOR CIRCUITS (RF UNIT)

The 2nd mixer circuit converts the 1st IF signal to a 2nd IF signal. A double conversion superheterodyne system (which converts receive signals twice) improves the image rejection ratio and obtains stable receiver gain.

The 1st IF signal from the IF amplifier (Q3) is applied to the 2nd mixer section in the FM IF IC (IC1, pin 16), and is mixed with the 2nd LO signal to be converted into a 450 kHz 2nd IF signal.

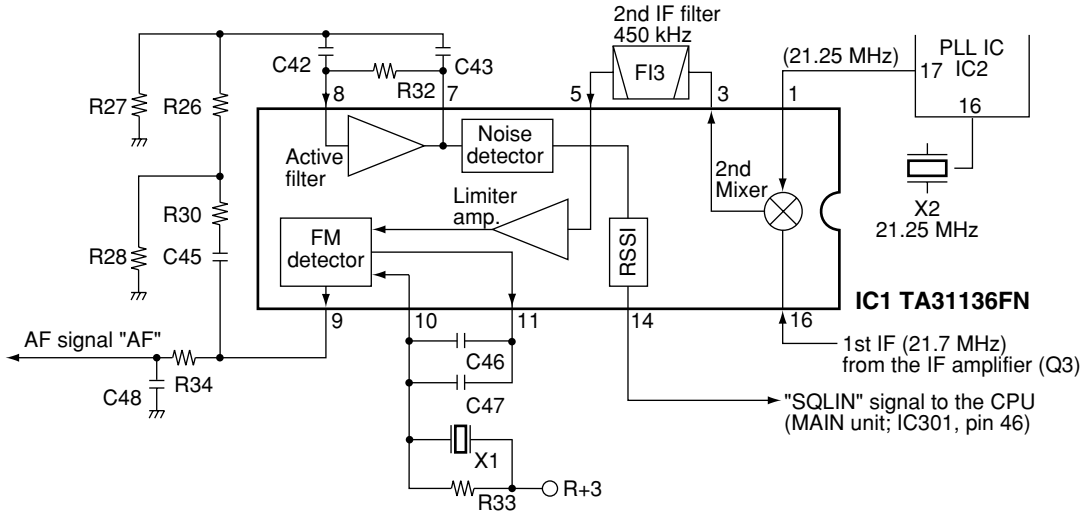
The FM IF IC contains a 2nd mixer, quadrature detector, noise amplifier and a limiter amplifier, etc. The PLL reference oscillator (X2) is used for the 2nd LO signal via the PLL IC (IC2, pins 16, 17), and is applied to pin 1 of the FM IF IC (IC1).
The mixed 2nd IF signal is output from pin 3 and passed through the ceramic bandpass filter (FI3) to remove unwanted heterodyne frequencies. It is then amplified at the limiter amplifier section (IC1, pin 5), and is applied to the quadrature detector section (IC1, pins 10, 11) to demodulate the 2nd IF signal into AF signals.

4-1-5 AF CIRCUIT (RF AND MAIN UNITS)

AF signals from the FM IF IC (RF unit; IC1, pin 9) are applied to the MAIN unit via J300 pin 14.

The AF signal applied to the [VOL] control (MAIN unit; R406) to control the audio level via the volume mute switch (MAIN unit; Q316). The level controlled AF signals are applied to the AF power amplifier (MAIN unit; IC305, pin 2) to drive an internal speaker (CHASSIS unit; SP1) via the [SP] jack (MAIN unit; J301).

• 2ND IF AND DEMODULATOR CIRCUITS



4-1-6 SQUELCH CIRCUIT (RF AND MAIN UNITS)

(1) NOISE SQUELCH

The noise squelch circuit cuts out AF signals when no RF signals are received. By detecting noise components in the AF signals, the squelch circuit switches the AF mute switch.

A portion of the AF signals from the FM IF IC (RF unit; IC1, pin 9) are applied to the active filter section (RF unit; IC1, pin 8). The active filter section amplifies and filters noise components. The filtered signals are applied to the noise detector section and output from pin 14 as the "SQLIN" signal.

The "SQLIN" signal from IC1 (pin 14) on the RF unit passes through J300, pin 12, and is then applied to the CPU (MAIN unit; IC301, pin 46). The CPU analyzes the noise condition and outputs the "RMUT" (from pin 64) and "AFON" (from pin 58) signals to toggle the AF mute (MAIN unit; Q316) and volume mute (MAIN unit; Q311) switches.

(2) TONE SQUELCH

The tone squelch circuit detects AF signals and opens the squelch only when receiving a signal containing a matching subaudible tone (CTCSS). When tone squelch is in use, and a signal with a mismatched or no subaudible tone is received, the tone squelch circuit mutes the AF signals even when noise squelch is open.

A portion of the AF signals from the FM IF IC (RF unit; IC1, pin 9) passes through the AF control (MAIN unit; IC304) to control the volume mute and AF mute switches.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER CIRCUIT (MAIN UNIT)

AF signals from the internal/external microphone are applied to the microphone amplifier circuit and low-pass filter (IC304) via the microphone switch (Q313). The filterd audio signals are applied to the modulation circuit on the RF unit via J300, pin 15 as the "MOD" signal.

4-2-2 MODULATION CIRCUIT (RF UNIT)

The filtered audio signals from J300, pin 15 (on the MAIN unit) are applied to the modulation circuit (D8, D9) to modulate transmit signals at the VCO circuit (Q8).

The modulated signal is applied to the drive amplifier circuit.

4-2-3 DRIVE/POWER AMPLIFIER CIRCUITS (RF UNIT)

The drive/power amplifier circuit amplifies the VCO oscillating signal to the output power level.

The modulated transmit signal is amplified at the drive amplifiers (Q5, Q6) after being amplified at the buffer amplifiers (Q7, Q13). The amplified signal is amplified at the power amplifier (Q4) to obtain 450 mW of RF power.

The signal is passed through the antenna switching circuit (D1) and low-pass filter, and is then applied to the antenna.

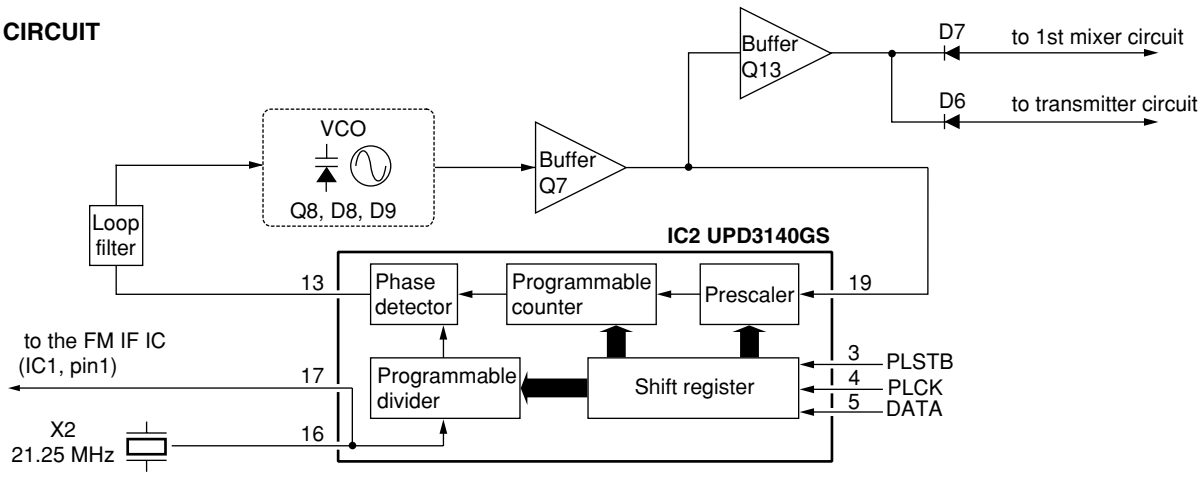
4-3 PLL CIRCUITS (RF UNIT)

A PLL circuit provides stable oscillation of the transmit frequency and receive 1st LO frequency. The PLL output compares the phase of the divided VCO frequency to the reference frequency. The PLL output frequency is controlled by the divided ratio (N-data) of a programmable divider.

The PLL circuit consists of the VCO circuit (Q8, D8, D9). An oscillated signal from the VCO passes through the buffer amplifier (Q7), and is applied to the PLL IC (IC2, pin19) to prescale in the PLL IC based on the divided ratio (N-data). The reference signal is generated at the reference oscillator (X2), and is applied to the PLL IC. The PLL IC detects the out-of-step phase using the reference frequency, and outputs detected signal from pin 14. The output signal is passed through the loop filter (R44, C67) and is then applied to the VCO circuit as lock voltage.

If the oscillated signal drifts, its phase changes from that of the reference frequency, causing a lock voltage change to compensate for the drift in the oscillated frequency.

• PLL CIRCUIT



4-4 POWER SUPPLY CIRCUITS

VOLTAGE LINE

LINE	DESCRIPTION
VCC	The voltage from the connected battery or power supply from DC IN (J302).
C3V	Common 3 V converted from the VCC line at the +3V regulator circuit (IC303). The circuit outputs the voltage regardless of the power ON/OFF condition.
+3V	Common 3 V converted from the VCC line at the +3V current amplifier (Q303, D301).
R+3	Receive 3 V controlled by the R+3 current amplifier (Q304) using the “RXC” signal from the CPU (IC301, pin 59).
T+3	Transmit 3 V converted from the VCC line at the T+3 current amplifier (Q305, Q308, Q319, D302, D303, D305) using the “TXC” signal from the CPU (IC301, pin 65).

4-5 PORT ALLOCATIONS

4-5-1 D/A CONVERTER (RF unit; IC3)

Pin number	Port name	Description
1	MODC	Outputs the deviation control signal.
2	PWRC	Outputs the TX power control signal.
3	FC	Outputs the PLL reference frequency control signal.

4-5-2 CPU (MAIN unit; IC301)

Pin number	Port name	Description
27	TEST	Input port for the test mode switch.
31	EEPCK	Outputs the clock signal to the EEPROM (MAIN unit; IC300).
32	EEPDA	Outputs the data signals to the EEPROM (MAIN unit; IC300).
33	DETOUT	Input port for the control signal of the tone detection
35	SHIFT	Outputs the shift control signal to the PLL IC (RF unit; IC2).
36	PLSTB	Outputs the strobe signals to the PLL IC (RF unit; IC2).
37	CK	Outputs the clock signal to the PLL IC (RF unit; IC2).
38	DATA	Outputs the data signals to the PLL IC (RF unit; IC2).
41	UNLK	Input port for the PLL unlock signal from the PLL IC (RF unit; IC2). Low : During unlock.
42	PTT	Input port for the PTT switch from the external mic jack (MAIN unit; J303). Low : External microphone PTT switch is pushed.
43	MICIN	Input port for the control signal from the external remote microphone.
44	TEMP	Input port for the transceiver’s internal temperature.
46	SQLIN	Input port for the squelch level signal.
47	VIN	Input port for connected battery pack voltage.
51	MODE	Input port for [MODE] switch.
52	POWSW	Input port for [POWER] switch. Low : While [POWER] switch is pushed.
53	BEEP	Outputs the beep audio signal.
54	DOWN	Input port for [DOWN] switch.
55	UP	Input port for [UP] switch.
56	PTTSW	Input port for the internal PTT switch. Low : While [PTT] switch is pushed.
57	LAMPO	Outputs the control signal of LCD back light.
58	AFON	Outputs the control signal of the AF amplifier regulator circuit (MAIN unit; Q306, Q307, Q311).
59	RXV	Outputs the control signal of the R+3 regulator circuit (MAIN unit; Q304).
61	MMUTE	Outputs the microphone mute signal for RING function. High : While RING signals are output, etc.
62	MICSW	Outputs the internal microphone control signal. High : While the internal PTT switch is pushed.
63	POWER	Outputs the control signal of the +3V regulator circuit (MAIN unit; Q303, D301).
64	RMUTE	Outputs the control signal of the volume mute switch (MAIN unit; Q316). High : While squelched.
65	TXV	Outputs the control signal of the T+3 regulator circuit (Q305, Q308, D303, D304).
66	CHGC	Outputs the control signal of the charge circuit (Q312, Q314, D305, D308).

SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

• When adjusting the IC-4088SR, *HM-75A JIG MICROPHONE (modified HM-75A OPTIONAL SPEAKER-MICROPHONE; see illustration at page5-2) is required.
• All adjustment items must be preformed at “ADJUSTMENT MODE”. (See below in detail)

■ REQUIRED TEST EQUIPMENT

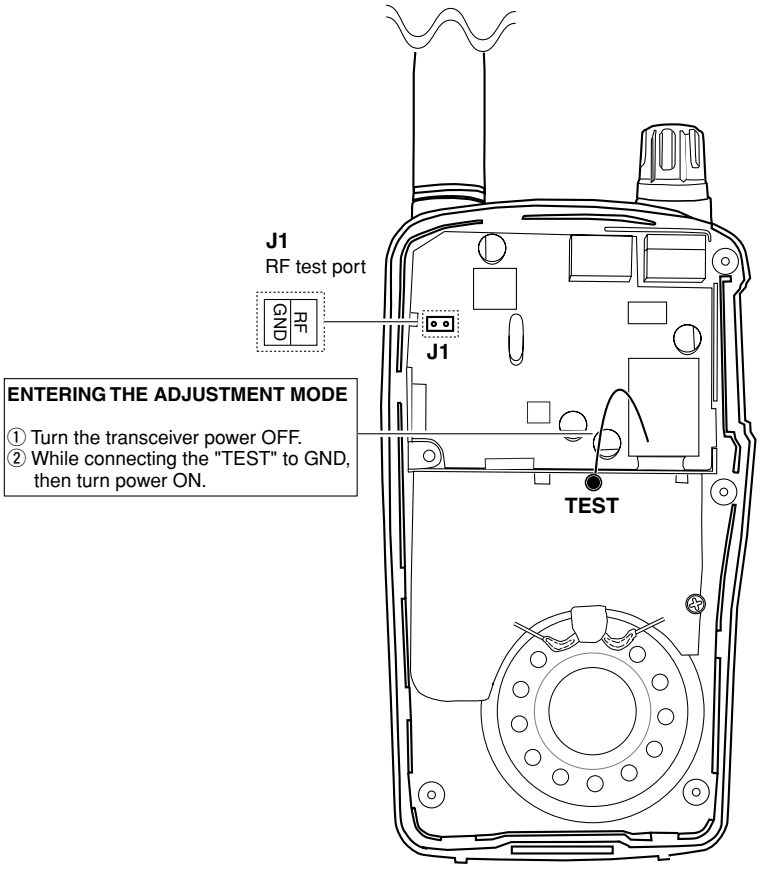
EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage : 4.5 V DC Current capacity : 1 A or more	FM deviation meter	Frequency range : 30–600 MHz Measuring range : 0 to ±10 kH
RF power meter (terminated type)	Measuring range : 1 mW–1 W Frequency range : 300–600 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–600 MHz Output level : 0.1 µV–32 mV (–127 to –17 dBm)
		AC millivoltmeter	Measuring range : 10 mV–10 V
Frequency counter	Frequency range : 0.1–600 MHz Frequency accuracy : ±1 ppm or better Sensitivity : 100 mV or better	Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV

■ ENTERING THEADJUSTMENT MODE

① Turn the transceiver’s power OFF.
② While connecting the “TEST” on the MAIN unit to “GND”, then turn power ON.

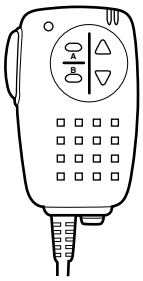
• DISPLAYED CHANNEL’S FREQUENCY LIST

CHANNEL NO.	FREQUENCY
1ch.	446.00625 MHz
2ch.	446.01875 MHz
3ch.	446.03125 MHz
4ch.	446.04375 MHz
5ch.	446.05625 MHz
6ch.	446.06875 MHz
7ch.	446.08125 MHz
8ch.	446.09375 MHz



■ OPERATION ON THE ADJUSTMENT MODE

- Change the adjustment item : HM-75A's [B] key
- Change the adjustment value : HM-75A's [▲]/[▼] keys
- Verify the adjustment value : HM-75A's [A] key
- Change the adjustment channel : IC-4088SR's [UP]/[DN] keys
- Change the adjustment group : IC-4088SR's [MODE]+ [UP]/[DN] keys

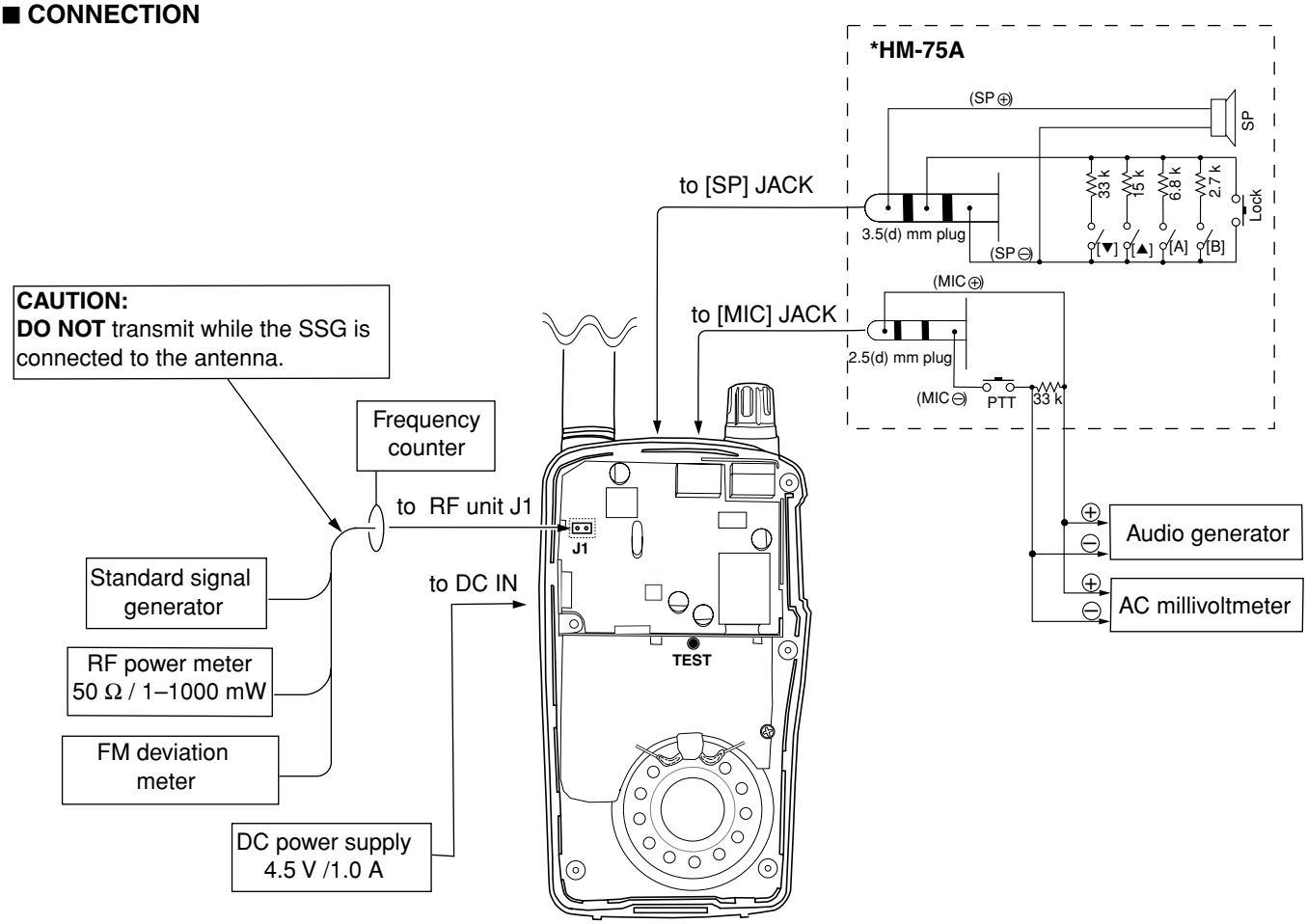


■ ADJUSTMENT ITEMS

When entering adjustment mode, displayed adjustment items indicator on LCD as follow.

- Reference frequency adjustment : Displayed Fr-88
- Output power adjustment : Displayed PL-88
- FM deviation adjustment : Displayed dL-88
- CTCSS adjustment : Displayed to-88
- Squelch adjustment : Displayed SQ-88

■ CONNECTION



5-2 ADJUSTMENT MODE ADJUSTMENTS

The following adjustment must be performed at “ADJUSTMENT MODE”.

ADJUSTMENT		ADJUSTMENT CONDITION	MEASUREMENT	VALUE	HM-75A’s KEY
REFERENCE FREQUENCY [Fr]	1	• Operating channel : Ch 8 • Transmitting	Loosely couple a frequency counter to the antenna.	446.09375 MHz	[▲]/[▼]
OUTPUT POWER [PL]	1	• Operating channel : Ch 8 • Transmitting	Connect an RF power meter to the RF test port J1.	450 mW	[▲]/[▼]
FM DEVIATION [dL]	1	• Operating channel : Ch 8 • Connect an audio generator to the [MIC] jack and set as :1 kHz/100 mV rms • Set an FM deviation meter as: HPF : OFF LPF : 20 kHz or 15 kHz De-emphasis : OFF Detector : (P–P)/2 • Set group No. : OFF (– –) • Transmitting	Connect an FM deviation meter to the RF test port J1.	± 2.05 kHz	[▲]/[▼]
CTCSS MODULATION [to]	2	• Operating channel : Ch 1 • Set group No. : 24 • Transmitting		± 0.30 kHz	[▲]/[▼]
SQUELCH SENSITIVITY [Sq]	1	• Operating channel : Ch 1 • Connect an SSG to J1 on the RF unit and set as: Level : 0.13 µV* (–125 dBm) Modulation : OFF • Receiving	speaker	• Squelch sensitivity is adjusted automatically when HM-75A’s [A] button is pushed.	
	2	• Set an SSG as: Level : OFF • Receiving		Audio signal disappears	Verify

SECTION 6 PARTS LIST

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
IC300	1130011230	S.IC	BR24C02FV-WE2	T
IC301	1140011430	S.IC	µPD789407AGK-A81-9EU (FX2624A3)	B
IC302	1110005820	S.IC	R3112N281A-TR	T
IC303	1180002430	S.REG	R1121N301B-TR	T
IC304	1130007382	S.IC	AK2342B	T
IC305	1110002810	S.IC	NJM2070M-T1	T
Q302	1590001330	S.TRANSISTOR	DTA114EUA T106	B
Q303	1590002490	S.TRANSISTOR	UMZ2N TR	T
Q304	1510000770	S.TRANSISTOR	2SA1586-GR (TE85R)	T
Q305	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)	B
Q306	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)	T
Q307	1510000580	S.TRANSISTOR	2SA1362-GR (TE85R)	T
Q308	1520000200	S.TRANSISTOR	2SB798-T2 DK	B
Q309	1590001050	S.TRANSISTOR	DTC114TUA T106	T
Q310	1590001040	S.TRANSISTOR	DTA113ZU T106	T
Q311	1530003090	S.TRANSISTOR	2SC4213-B (TE85R)	B
Q312	1590000430	S.TRANSISTOR	DTC144EUA T106	T
Q313	1560000840	S.FET	2SK1829 (TE85R)	T
Q314	1520000450	S.TRANSISTOR	2SB1132 T100 Q	T
Q315	1590002950	S.FET	HAT1023R-EL	T
Q316	1590001390	S.FET	2SJ144-Y (TE85R)	B
Q317	1590000430	S.TRANSISTOR	DTC144EUA T106	T
Q318	1590000850	S.TRANSISTOR	DTC114YUA T106	T
Q319	1590001650	S.TRANSISTOR	XP4601 (TX)	B
D301	1790001250	S.DIODE	MA2S111-(TX)	T
D302	1790001250	S.DIODE	MA2S111-(TX)	B
D303	1790001250	S.DIODE	MA2S111-(TX)	B
D305	1790000670	S.DIODE	SB07-03C-TB	T
D306	1750000880	S.DIODE	RB551V-30TE-17	B
D307	1790001240	S.DIODE	MA2S728-(TX)	B
D308	1790000860	S.DIODE	MA133 (TX)	T
D310	1790001250	S.DIODE	MA2S111-(TX)	T
D313	1790001250	S.DIODE	MA2S111-(TX)	T
D314	1790001250	S.DIODE	MA2S111-(TX)	T
D317	1790001250	S.DIODE	MA2S111-(TX)	T
D318	1750000880	S.DIODE	RB551V-30TE-17	T
X300	6050008860	S.XTAL	CR-465 (3.6864 MHz)	B
R300	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)	T
R301	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)	T
R304	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)	B
R305	7030009290	S.RESISTOR	ERJ2GEJ 562 X (5.6 kΩ)	B
R307	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	T
R308	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)	T
R327	7030005700	S.RESISTOR	ERJ2GEJ 274 X (270 kΩ)	B
R328	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R329	7030005310	S.RESISTOR	ERJ2GEJ 124 X (120 kΩ)	T
R330	7030003880	S.RESISTOR	ERJ3GEYJ 244 V (240 kΩ)	T
R331	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	T
R332	7030005110	S.RESISTOR	ERJ2GEJ 224 X (220 kΩ)	T
R333	7030009290	S.RESISTOR	ERJ2GEJ 562 X (5.6 kΩ)	B
R334	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)	B
R335	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)	B
R338	7030005100	S.RESISTOR	ERJ2GEJ 154 X (150 kΩ)	B
R340	7030008410	S.RESISTOR	ERJ2GEJ 392 X (3.9 kΩ)	B
R343	7030005590	S.RESISTOR	ERJ2GEJ 680 X (68 Ω)	B
R344	7030005720	S.RESISTOR	ERJ2GEJ 563 X (56 kΩ)	T
R345	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	T
R346	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)	T
R347	7030005000	S.RESISTOR	ERJ2GEJ 471 X (470 Ω)	T
R348	7030003880	S.RESISTOR	ERJ3GEYJ 244 V (240 kΩ)	T
R349	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)	B
R350	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)	B
R356	7030005600	S.RESISTOR	ERJ2GEJ 273 X (27 kΩ)	T
R357	7030005720	S.RESISTOR	ERJ2GEJ 563 X (56 kΩ)	T
R358	7030005720	S.RESISTOR	ERJ2GEJ 563 X (56 kΩ)	T
R359	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R360	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	T
R361	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)	T
R362	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R364	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	B
R365	7510001440	S.THERMISTOR	NTCG16 3NH 221KT	T
R366	7030009140	S.RESISTOR	ERJ2GEJ 272 X (2.7 kΩ)	T
R368	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)	T

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
R369	7030007570	S.RESISTOR	ERJ2GEJ 122X (1.2 kΩ)	B
R373	7030005080	S.RESISTOR	ERJ2GEJ 823 X (82 kΩ)	T
R374	7030009140	S.RESISTOR	ERJ2GEJ 272 X (2.7 kΩ)	T
R375	7030007310	S.RESISTOR	ERJ2GEJ 155 X (1.5 MΩ)	T
R376	7030007570	S.RESISTOR	ERJ2GEJ 122X (1.2 kΩ)	T
R377	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)	B
R378	7030005230	S.RESISTOR	ERJ2GEJ 334 X (330 kΩ)	T
R379	7030004990	S.RESISTOR	ERJ2GEJ 221 X (220 Ω)	B
R381	7030005600	S.RESISTOR	ERJ2GEJ 273 X (27 kΩ)	T
R382	7030008010	S.RESISTOR	ERJ2GEJ 123 X (12 kΩ)	T
R383	7030005710	S.RESISTOR	ERJ2GEJ 121 X (120 Ω)	T
R384	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R385	7030004050	S.RESISTOR	ERJ3GEYJ 1R0 V (1 Ω)	T
R386	7030004980	S.RESISTOR	ERJ2GEJ 101 X (100 Ω)	T
R387	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)	T
R388	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)	T
R389	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)	T
R390	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	B
R391	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	B
R392	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)	T
R393	7030005570	S.RESISTOR	ERJ2GEJ 820 X (82 Ω)	T
R394	7030009290	S.RESISTOR	ERJ2GEJ 562 X (5.6 kΩ)	T
R395	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R396	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)	T
R397	7030000130	S.RESISTOR	MCR10EZHJ 8.2 Ω (8R2)	T
R399	7030005530	S.RESISTOR	ERJ2GEJ 100 X (10 Ω)	T
R400	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)	T
R401	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	B
R402	7030007300	S.RESISTOR	ERJ2GEJ 332 X (3.3 kΩ)	T
R403	7030004980	S.RESISTOR	ERJ2GEJ 101 X (100 Ω)	B
R404	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)	B
R405	7030004980	S.RESISTOR	ERJ2GEJ 101 X (100 Ω)	B
R406	7210001970	VARIABLE	RV-244 (RK0971110) 10KA	T
R409	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R410	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	B
R411	7030008280	S.RESISTOR	ERJ2GEJ 271 X (270 Ω)	B
R412	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	B
R413	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	B
R414	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	B
R415	7510001660	S.THRMISTOR	NTCG16 4LH 473KT	B
R416	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	B
R417	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)	T
R418	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)	T
R419	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R420	7030007320	S.RESISTOR	ERJ2GEJ 225 X (2.2 MΩ)	T
R421	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	B
R422	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)	B
R423	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)	T
R424	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)	B
R426	7030007290	S.RESISTOR	ERJ2GEJ 222 X (2.2 kΩ)	T
R427	7030007320	S.RESISTOR	ERJ2GEJ 225 X (2.2 MΩ)	B
R428	7030007060	S.RESISTOR	ERJ2GEJ 684X (680 kΩ)	T
R430	7030005100	S.RESISTOR	ERJ2GEJ 154 X (150 kΩ)	T
R431	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)	T
R432	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)	T
R433	7030005600	S.RESISTOR	ERJ2GEJ 273 X (27 kΩ)	T
C300	4030017410	S.CERAMIC	ECJ0EC1H240J	B
C301	4030017410	S.CERAMIC	ECJ0EC1H240J	B
C303	4030016790	S.CERAMIC	ECJ0EB1C103K	B
C304	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C311	4030016930	S.CERAMIC	ECJ0EB1A104K	B
C312	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C313	4030017430	S.CERAMIC	ECJ0EC1H101J	B
C314	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C315	4550006620	S.TANTALUM	ECST0JY226R	T
C316	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T	B
C317	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C319	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C320	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T	T
C321	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T	B
C323	4030017040	S.CERAMIC	ECJ0EB1A333K	T
C324	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C325	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T	B
C326	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T	B
C327	4030017720	S.CERAMIC	ECJ0EB1H331K	T
C328	4510005900	S.ELECTROLYTIC	ECEV0GA101SR	T
C329	4030017420	S.CERAMIC	ECJ0EC1H470J	T
C330	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C331	4030016930	S.CERAMIC	ECJ0EB1A104K	T

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
C332	4030017460	S.CERAMIC	ECJ0EB1E102K	T
C333	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C334	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C335	4030017440	S.CERAMIC	ECJ0EC1H221J	T
C336	4030017450	S.CERAMIC	ECJ0EB1E271K	T
C337	4030011810	S.CERAMIC	C1608 JB 1A 224K-T	T
C338	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C339	4030017720	S.CERAMIC	ECJ0EB1H331K	T
C340	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T	T
C341	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T	B
C343	4550006390	S.TANTALUM	TEESVA 1C 335M8L	T
C344	4030016950	S.CERAMIC	ECJ0EB1A473K	T
C345	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C346	4030017430	S.CERAMIC	ECJ0EC1H101J	T
C347	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C348	4510005860	S.ELECTROLYTIC	ECEV1HA2R2SR	T
C349	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C350	4030016930	S.CERAMIC	ECJ0EB1A104K	B
C351	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C352	4030016930	S.CERAMIC	ECJ0EB1A104K	B
C354	4510005430	S.ELECTROLYTIC	ECEV0JA220SR	T
C355	4030017780	S.CERAMIC	ECJ0EB1E472K	T
C356	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C357	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C358	4550006880	S.TANTALUM	TEESVD2 0J 157M12R	T
C359	4030017720	S.CERAMIC	ECJ0EB1H331K	T
C360	4030017460	S.CERAMIC	ECJ0EB1E102K	T
C361	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C362	4030016930	S.CERAMIC	ECJ0EB1A104K	B
C363	4030017460	S.CERAMIC	ECJ0EB1E102K	T
C364	4550006250	S.TANTALUM	TEESVA 1A 106M8L	T
C365	4030016930	S.CERAMIC	ECJ0EB1A104K	B
C366	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C367	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C368	4030017720	S.CERAMIC	ECJ0EB1H331K	B
C369	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C371	4030017720	S.CERAMIC	ECJ0EB1H331K	B
C372	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C373	4030017460	S.CERAMIC	ECJ0EB1E102K	T
C374	4030017420	S.CERAMIC	ECJ0EC1H470J	B
C375	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C376	4550006250	S.TANTALUM	TEESVA 1A 106M8L	T
C377	4030017720	S.CERAMIC	ECJ0EB1H331K	T
C378	4030016930	S.CERAMIC	ECJ0EB1A104K	B
C379	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C380	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C381	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C382	4030016790	S.CERAMIC	ECJ0EB1C103K	B
C383	4030016930	S.CERAMIC	ECJ0EB1A104K	B
C384	4030016790	S.CERAMIC	ECJ0EB1C103K	T
C385	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C386	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C387	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C388	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C389	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C390	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T	T
C392	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C393	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C394	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C395	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C396	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C397	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C398	4030017720	S.CERAMIC	ECJ0EB1H331K	T
C399	4030017790	S.CERAMIC	ECJ0EB1E682K	T
C400	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C401	4030017780	S.CERAMIC	ECJ0EB1E472K	T
C402	4030016780	S.CERAMIC	ECJ0EB1C153K	B
J300	6510023500	S.CONNECTOR	AXK6S20545P	T
J301	6450001060	CONNECTOR	HSJ1493-01-010	T
J302	6450002130	CONNECTOR	04-730A2-02BKA	T
J303	6450000130	CONNECTOR	HSJ1102-01-540	T
DS300	5030002520	LCD	L2-0494TAY	B
DS301	5040002230	S.LED	CL-200YG-C-TS	B
MC300	7700002160	MICROPHON	KUC3523-040245	B
S304	2260001900	SWITCH	SW-149 (SKHLLD)	T
W300	7030010040	S.RESISTOR	ERJ2GE-JPW	T
W301	7030010040	S.RESISTOR	ERJ2GE-JPW	B
W302	7120000470	JUMPER	ERDS2T0	T

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
W305	7030010040	S.RESISTOR	ERJ2GE-JPW	T
W307	7030010040	S.RESISTOR	ERJ2GE-JPW	B
EP1	0910056431	PCB	B 6003A	
EP300	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP301	6910014690	S.BEAD	MPZ1608S221A-T	B
EP302	6910014690	S.BEAD	MPZ1608S221A-T	B
EP303	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP304	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP305	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP306	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP307	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP308	6910012350	S.BEAD	MMZ1608Y 102BT	B
EP309	8930059580	LCD CONTACT	SRCN-2628-SP-N-W	B

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
IC1	1110003490	S.IC	TA31136FN (D,EL)	B
IC2	1130007610	S.IC	µPD3140GS-E1 (DS8)	B
IC3	1190001830	S.IC	BH2220FVM-TR	T
Q1	1530002930	S.TRANSISTOR	2SC4228 (M) -T1 R45	T
Q2	1580000740	S.FET	3SK320 (TE85L)	B
Q3	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)	B
Q4	1560001270	S.FET	2SK3078A (TE12L)	B
Q5	1530000370	S.TRANSISTOR	2SC3356-T1B	B
Q6	1530002940	S.TRANSISTOR	2SC4228-T1 R44	B
Q7	1530003320	S.TRANSISTOR	2SC5108-Y (TE85R)	T
Q8	1530003320	S.TRANSISTOR	2SC5108-Y (TE85R)	T
Q9	1530003010	S.TRANSISTOR	2SC4117-GR (TE85R)	T
Q10	1510000770	S.TRANSISTOR	2SA1586-GR (TE85R)	T
Q11	1530002690	S.TRANSISTOR	2SC4116-GR (TE85R)	T
Q12	1590001450	S.FET	2SJ144-GR (TE85R)	T
Q13	1530002920	S.TRANSISTOR	2SC4226-T1 R25	B
Q14	1530003090	S.TRANSISTOR	2SC4213-B (TE85R)	T
D1	1790001620	S.DIODE	1SV308 (TPL3)	B
D2	1790001620	S.DIODE	1SV308 (TPL3)	T
D3	1790001620	S.DIODE	1SV308 (TPL3)	T
D4	1790001620	S.DIODE	1SV308 (TPL3)	T
D5	1790001240	S.DIODE	MA2S728-(TX)	B
D6	1790001260	S.DIODE	MA2S077-(TX)	B
D7	1790001260	S.DIODE	MA2S077-(TX)	B
D8	1720000640	S.VARICAP	1SV284 (TPH3)	T
D9	1720000640	S.VARICAP	1SV284 (TPH3)	T
D10	1790001250	S.DIODE	MA2S111-(TX)	T
D11	1790001250	S.DIODE	MA2S111-(TX)	T
D12	1750000770	S.VARICAP	HVC376BTRF	T
FI2	2010002320	MONOLITH	FL-297 (21.700 MHz)	B
FI3	2020001410	CERAMIC	CFWLB450KGFA-B0	T
FI4	2040001580	S.SAW	NSVS647	T
X1	6070000190	S.DISCRIMINATOR	CDBCB450KCAY24-R0	T
X2	6050010900	S.XTAL	CR-669 (21.2500 MHz)	T
L2	6200008270	S.COIL	0.26-1.0-5TL 17N	B
L3	6200008270	S.COIL	0.26-1.0-5TL 17N	B
L4	6200005710	S.COIL	ELJRE 27NG-F	B
L5	6200001650	S.COIL	ELJNC 18NK-F	T
L6	6200002470	S.COIL	ELJNC 12NK-F	T
L7	6200009980	S.COIL	C2012C-18NG	T
L8	6200005710	S.COIL	ELJRE 27NG-F	B
L9	6200003280	S.COIL	NL 252018T-2R2J	B
L10	6200004480	S.COIL	MLF1608D R82K-T	B
L11	6200010500	S.COIL	0.3-1.1-3TR 9.5N	B
L12	6200008680	S.COIL	0.26-0.8-3TR 6.8N	B
L13	6200005720	S.COIL	ELJRE 33NG-F	B
L14	6200005700	S.COIL	ELJRE 22NG-F	B
L15	6200005700	S.COIL	ELJRE 22NG-F	B
L18	6200003640	S.COIL	MLF1608E 100K-T	T
L19	6200007000	S.COIL	ELJRE 82NG-F	T
L20	6200005720	S.COIL	ELJRE 33NG-F	T
L21	6200002350	S.COIL	LQW31HN27NJ01L	T

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
L22	6200003640	S.COIL	MLF1608E 100K-T	T
L23	6200003640	S.COIL	MLF1608E 100K-T	T
L24	6200005720	S.COIL	ELJRE 33NG-F	B
L25	6200006980	S.COIL	ELJRE R10G-F	B
L26	6200005710	S.COIL	ELJRE 27NG-F	B
L28	6200005670	S.COIL	ELJRE 12NG-F	B
R1	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)	T
R2	7030009200	S.RESISTOR	ERJ2GEJ 390 X (39 Ω)	T
R3	7030004970	S.RESISTOR	ERJ2GEJ 470 X (47 Ω)	T
R4	7030005230	S.RESISTOR	ERJ2GEJ 334 X (330 kΩ)	B
R5	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)	B
R6	7030008370	S.RESISTOR	ERJ2GEJ 561 X (560 Ω)	B
R7	7030007280	S.RESISTOR	ERJ2GEJ 331 X (330 Ω)	B
R8	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)	B
R9	7030005080	S.RESISTOR	ERJ2GEJ 823 X (82 kΩ)	B
R10	7030009270	S.RESISTOR	ERJ2GEJ 821 X (820 Ω)	B
R11	7030004990	S.RESISTOR	ERJ2GEJ 221 X (220 Ω)	B
R12	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)	B
R14	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)	B
R17	7030005290	S.RESISTOR	ERJ2GEJ 682 X (6.8 kΩ)	B
R18	7030004990	S.RESISTOR	ERJ2GEJ 221 X (220 Ω)	B
R19	7030005590	S.RESISTOR	ERJ2GEJ 680 X (68 Ω)	B
R20	7030005220	S.RESISTOR	ERJ2GEJ 223 X (22 kΩ)	B
R21	7030005010	S.RESISTOR	ERJ2GEJ 681 X (680 Ω)	B
R22	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)	B
R26	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R27	7030008370	S.RESISTOR	ERJ2GEJ 561 X (560 Ω)	T
R28	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	T
R30	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)	T
R32	7030008310	S.RESISTOR	ERJ2GEJ 564 X (560 kΩ)	T
R33	7030007290	S.RESISTOR	ERJ2GEJ 222 X (2.2 kΩ)	T
R34	7030005030	S.RESISTOR	ERJ2GEJ 152 X (1.5 kΩ)	B
R35	7030004990	S.RESISTOR	ERJ2GEJ 221 X (220 Ω)	T
R36	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)	T
R37	7030005010	S.RESISTOR	ERJ2GEJ 681 X (680 Ω)	T
R38	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)	T
R39	7030005210	S.RESISTOR	ERJ2GEJ 822 X (8.2 kΩ)	T
R40	7030005570	S.RESISTOR	ERJ2GEJ 820 X (82 Ω)	T
R41	7030007340	S.RESISTOR	ERJ2GEJ 153 X (15 kΩ)	T
R43	7030005210	S.RESISTOR	ERJ2GEJ 822 X (8.2 kΩ)	B
R44	7030005210	S.RESISTOR	ERJ2GEJ 822 X (8.2 kΩ)	B
R46	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)	B
R48	7030010090	S.RESISTOR	ERJ2GEJ 180 X (18 Ω)	T
R49	7030005720	S.RESISTOR	ERJ2GEJ 563 X (56 kΩ)	T
R50	7030007300	S.RESISTOR	ERJ2GEJ 332 X (3.3 kΩ)	T
R51	7030005530	S.RESISTOR	ERJ2GEJ 100 X (10 Ω)	T
R64	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	B
R65	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	T
R66	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R67	7030007300	S.RESISTOR	ERJ2GEJ 332 X (3.3 kΩ)	T
R68	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	T
R69	7030005160	S.RESISTOR	ERJ2GEJ 105 X (1 MΩ)	T
R70	7510001490	S.THERMISTOR	NTCG16 3NH 681KT	T
R71	7030005000	S.RESISTOR	ERJ2GEJ 471 X (470 Ω)	B
R72	7030005080	S.RESISTOR	ERJ2GEJ 823 X (82 kΩ)	B
R73	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)	B
R74	7030005040	S.RESISTOR	ERJ2GEJ 472 X (4.7 kΩ)	T
R75	7030008280	S.RESISTOR	ERJ2GEJ 271 X (270 Ω)	B
R76	7030008410	S.RESISTOR	ERJ2GEJ 392 X (3.9 kΩ)	B
R77	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	B
R78	7030005240	S.RESISTOR	ERJ2GEJ 473 X (47 kΩ)	T
R79	7030005090	S.RESISTOR	ERJ2GEJ 104 X (100 kΩ)	T
R80	7030005120	S.RESISTOR	ERJ2GEJ 102 X (1 kΩ)	T
R81	7030007250	S.RESISTOR	ERJ2GEJ 220 X (22 Ω)	B
R82	7030005060	S.RESISTOR	ERJ2GEJ 333 X (33 kΩ)	T
R83	7030005050	S.RESISTOR	ERJ2GEJ 103 X (10 kΩ)	T
C1	4030006980	S.CERAMIC	C1608 CH 1H 070D-T	B
C2	4030006970	S.CERAMIC	C1608 CH 1H 060D-T	B
C3	4030009510	S.CERAMIC	C1608 CH 1H 010B-T	B
C4	4030007020	S.CERAMIC	C1608 CH 1H 120J-T	B
C5	4030009560	S.CERAMIC	C1608 CH 1H R75B-T	B
C6	4030006980	S.CERAMIC	C1608 CH 1H 070D-T	B
C7	4030006980	S.CERAMIC	C1608 CH 1H 070D-T	B
C8	4030007050	S.CERAMIC	C1608 CH 1H 220J-T	B
C9	4030017580	S.CERAMIC	ECJ0EC1H060C	T
C10	4030017590	S.CERAMIC	ECJ0EC1H070C	T
C11	4030017400	S.CERAMIC	ECJ0EC1H220J	T
C12	4030006850	S.CERAMIC	C1608 JB 1H 471K-T	T
C13	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C14	4030017570	S.CERAMIC	ECJ0EC1H040B	T
C15	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C16	4030017640	S.CERAMIC	ECJ0EC1H150J	B
C18	4030016950	S.CERAMIC	ECJ0EB1A473K	B
C19	4030017730	S.CERAMIC	ECJ0EB1E471K	B

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
C20	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C21	4030017630	S.CERAMIC	ECJ0EC1H120J	B
C22	4030017600	S.CERAMIC	ECJ0EC1H080C	B
C23	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C24	4030016950	S.CERAMIC	ECJ0EB1A473K	B
C25	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C26	4030006970	S.CERAMIC	C1608 CH 1H 060D-T	B
C27	4030006980	S.CERAMIC	C1608 CH 1H 070D-T	B
C28	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C29	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C30	4030017660	S.CERAMIC	ECJ0EC1H330J	B
C31	4030017660	S.CERAMIC	ECJ0EC1H330J	B
C32	4030017590	S.CERAMIC	ECJ0EC1H070C	B
C33	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C34	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C35	4030017380	S.CERAMIC	ECJ0EC1H050B	B
C36	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C37	4030017350	S.CERAMIC	ECJ0EC1H020B	B
C38	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C39	4550006300	S.TANTALUM	ECST1AY475R	T
C42	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C43	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C44	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C45	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C46	4030017400	S.CERAMIC	ECJ0EC1H220J	T
C47	4030017510	S.CERAMIC	ECJ0EC1H680J	T
C48	4030016950	S.CERAMIC	ECJ0EB1A473K	B
C49	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C50	4030017350	S.CERAMIC	ECJ0EC1H020B	T
C51	4030017530	S.CERAMIC	ECJ0EC1H0R5B	T
C52	4030017350	S.CERAMIC	ECJ0EC1H020B	T
C53	4030017350	S.CERAMIC	ECJ0EC1H020B	T
C54	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C55	4030017550	S.CERAMIC	ECJ0EC1H1R5B	T
C56	4030017620	S.CERAMIC	ECJ0EC1H100C	T
C57	4030017630	S.CERAMIC	ECJ0EC1H120J	T
C58	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C59	4510004650	S.ELECTROLYTIC	ECEV1EA4R7SR	T
C60	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T	T
C61	4030017380	S.CERAMIC	ECJ0EC1H050B	B
C62	4030016950	S.CERAMIC	ECJ0EB1A473K	B
C63	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C64	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C66	4340000180	S.MYLAR	ECHU 1C 333JB5	B
C67	4550006150	S.TANTALUM	ECST1CY105R	B
C70	4030017390	S.CERAMIC	ECJ0EC1H180J	T
C71	4030008190	S.CERAMIC	C1608 UJ 1H 040C-T	T
C72	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C73	4030016790	S.CERAMIC	ECJ0EB1C103K	B
C74	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C75	4510005430	S.ELECTROLYTIC	ECEV0JA220SR	T
C76	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C77	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T	T
C85	4030009660	S.CERAMIC	C1608 JF 1C 224Z-T	T
C86	4030016950	S.CERAMIC	ECJ0EB1A473K	B
C87	4030016930	S.CERAMIC	ECJ0EB1A104K	B
C88	4030008680	S.CERAMIC	C2012 JF 1C 105Z-T	T
C89	4030017400	S.CERAMIC	ECJ0EC1H220J	B
C90	4030017340	S.CERAMIC	ECJ0EC1H010B	B
C91	4030017610	S.CERAMIC	ECJ0EC1H090C	T
C92	4030017460	S.CERAMIC	ECJ0EB1E102K	T
C98	4030017460	S.CERAMIC	ECJ0EB1E102K	T
C99	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C101	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C102	4030016930	S.CERAMIC	ECJ0EB1A104K	T
C103	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C104	4030017730	S.CERAMIC	ECJ0EB1E471K	T
C106	4340000180	S.MYLAR	ECHU 1C 333JB5	T
C108	4030017550	S.CERAMIC	ECJ0EC1H1R5B	B
C109	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C110	4030017580	S.CERAMIC	ECJ0EC1H060C	B
C111	4030017620	S.CERAMIC	ECJ0EC1H100C	B
C112	4030017570	S.CERAMIC	ECJ0EC1H040B	B
C113	4030017460	S.CERAMIC	ECJ0EB1E102K	B
C114	4030017730	S.CERAMIC	ECJ0EB1E471K	B
C117	4030009560	S.CERAMIC	C1608 CH 1H R75B-T	B
C118	4030017540	S.CERAMIC	ECJ0EC1HR75B	T
C119	4030017360	S.CERAMIC	ECJ0EC1H030B	T
C120	4030017580	S.CERAMIC	ECJ0EC1H060C	T
C121	4510004630	S.ELECTROLYTIC	ECEV1CA100SR	T
C122	4030017360	S.CERAMIC	ECJ0EC1H030B	B
J1	6510016890	CONNECTOR	IMSA-9210B-1-02R-T	T
J2	6510023490	S.CONNECTOR	AXK5S20340P	B
W4	7030010040	S.RESISTOR	ERJ2GE-JPW	T

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)

S.=Surface mount

[RF UNIT]

REF NO.	ORDER NO.	DESCRIPTION		M.
W5	7030010040	S.RESISTOR	ERJ2GE-JPW	B
W6	7030010040	S.RESISTOR	ERJ2GE-JPW	B
W7	7030003860	S.RESISTOR	ERJ3GE JPW V	B
W8	7030010040	S.RESISTOR	ERJ2GE-JPW	B
EP1	0910056422	PCB	B 5925B	
EP2	6910013310	S.BEAD	MMZ1608D121B	B

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 CABINET PARTS

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
SP1	2510001120	Speaker SDRS-3650P-008	1
EP1	3310003060	Antenna 2628 ANT [EUR]	1
	3310003120	Antenna 2628 SHORT ANT M [EUR-1]	1
MP1	8210019370	2628 Front panel	1
MP2	8110007900	2628 Rear cover	1
MP3	8210019380	2628 Rear panel	1
MP4	8310054740	2628 Window plate	1
MP5	8930059220	2628 Window sheet	1
MP6	8930059210	2628 SP JACK CAP	1
MP7	8610011270	Knob N-296	1
MP8	8930059240	2628 4-key	1
MP9	8930059250	2628 PTT rubber	1
MP10	8930059260	2628 A-terminal	1
MP11	8930059270	2628 B-terminal	1
MP12	8930059280	2628 Detect button	1
MP13	8930059550	2628 PTT sheet	1
MP14	8110007910	2628 Lock cover	1
MP15	8930059290	O-ring (AU)	1
MP16	8930059590	O-ring (AV)	1
MP17	8930045220	2045 BATT seal	1
MP19	8930045370	2045 C-terminal	2
MP20	8810008750	Screw PH B0 2x15 ZK (BT)	1
MP22	8930058310	2605 DC cap	1
MP25	8830000550	Nut (E)	1
MP32	8810009560	Screw PH B0 2x6 ZK (BT)	5
MP33	8810008620	Screw PH B0 2x20 ZK (BT)	1
MP35	8930059600	2628 Mic rubber	1
MP36	8930059610	Sponge (HC)	1

[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
R406	7210001970	RV-244	1
J301	6450001060	HSJ1493-01-01	1
J302	6450002130	04-730A-02BKA	1
J303	6450000130	HSJ1102-01-540	1
DS300	5030002520	LCD L2-0494TAY	1
MC300	7700002160	KUC3523-040245	1
S304	2260001900	SW-149	1
EP303	6910012350	LCD contact SRCN-2045-SP-N-W	1
MP301	8210019390	2628 Reflector	1
MP302	8930060120	2628 LCD holder	1
MP303	8810004890	Screw PH 2x6 ZK	2
MP304	8010019180	2628 CHASSIS	1

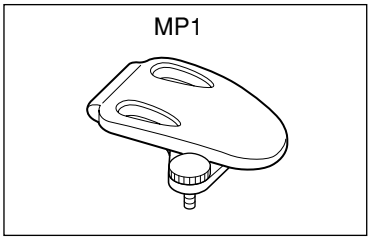
[RF UNIT]

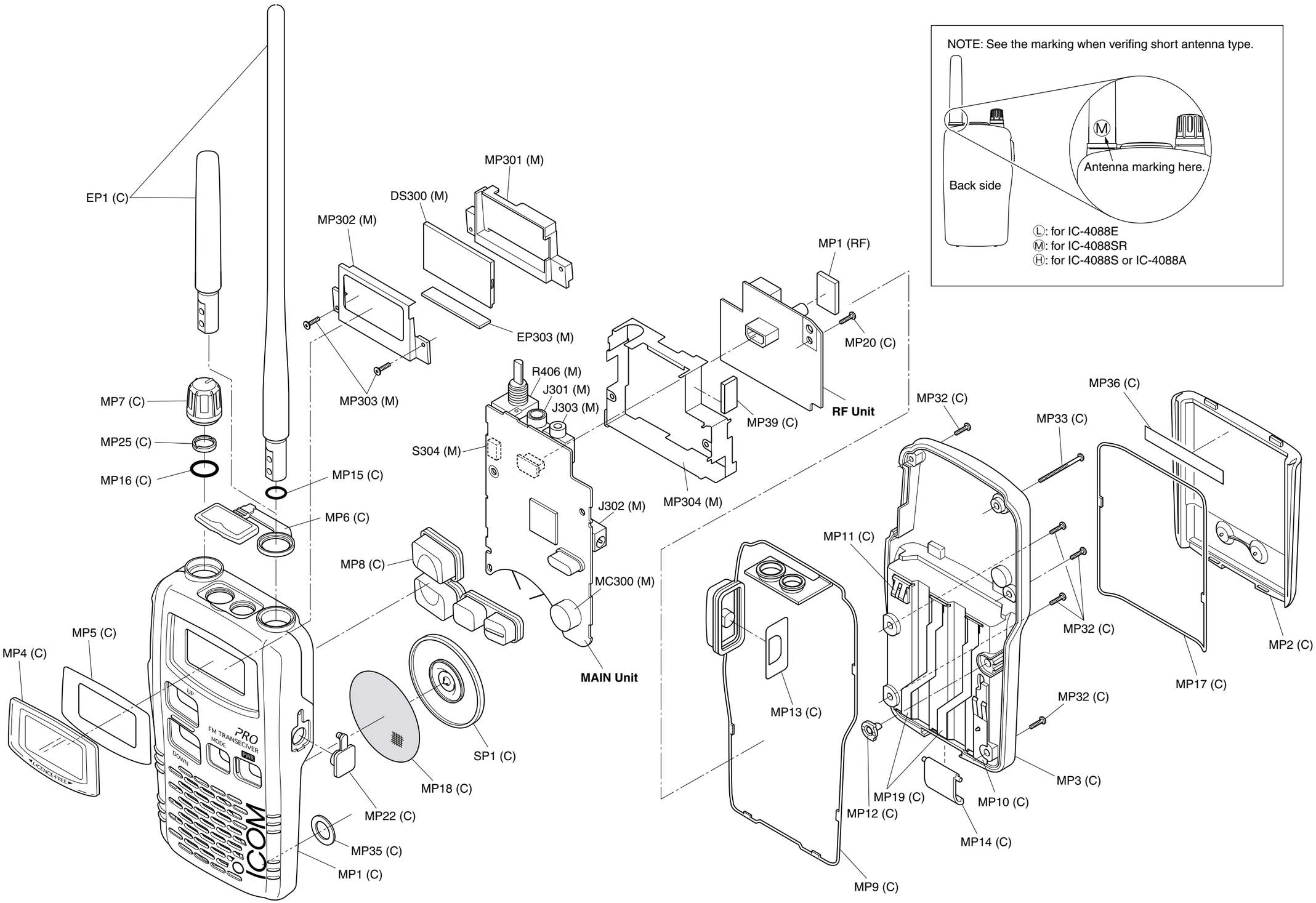
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8510011570	2405 VCO case	1

Screw abbreviations B0, BT: Self-tapping
PH: Pan head
ZK: Black

7-2 ACCESSORIES

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MP1	8930045332	2045 Belt clip-2	1

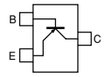
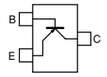
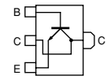
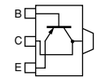
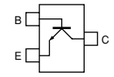
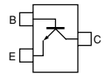
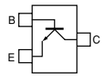
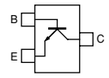
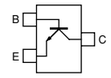
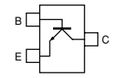
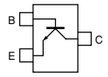
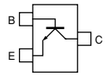
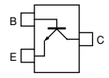
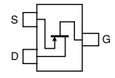
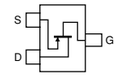
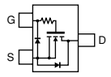
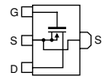
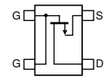
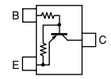
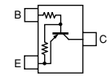
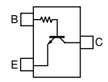
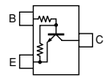
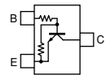
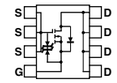
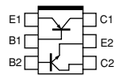
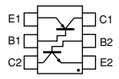




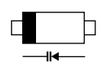
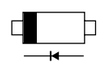
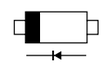
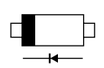
UNIT abbreviation (C): CHASSIS PARTS, (RF): RF UNIT, (M): MAIN UNIT

SECTION 8 SEMI-CONDUCTOR INFORMATION

• TRANSISTOR AND FET'S

2SA1362 GR (Symbol: AEG) 	**2SA1586 GR** (Symbol: SG) 	**2SB798 DK** (Symbol: DK) 	**2SB1132Q** (Symbol: BA) 	**2SC3356** (Symbol: R22) 
2SC4116GR (Symbol: LG) 	**2SC4117GR** (Symbol: DG) 	**2SC4213 B** (Symbol: AB) 	**2SC4215 O** (Symbol: QO) 	**2SC4226 R25** (Symbol: R25) 
2SC4228 R44 (Symbol: R44) 	**2SC4228 R45** (Symbol: R45) 	**2SC5108 Y** (Symbol: MC) 	**2SJ144GR** (Symbol: VG) 	**2SJ144 Y** (Symbol: VY) 
2SK1829 (Symbol: K1) 	**2SK3078A** (Symbol: UW) 	**3SK320** (Symbol: U7) 	**DTA113ZU** (Symbol: 111) 	**DTA114 EU** (Symbol: 16) 
DTC114TU (Symbol: 04) 	**DTC114YU** (Symbol: 64) 	**DTC144EU** (Symbol: 26) 	**HAT1023R** (Symbol: 1023) 	**UMZ2N** (Symbol: Z2) 
XP4601 (Symbol: 5C) 				

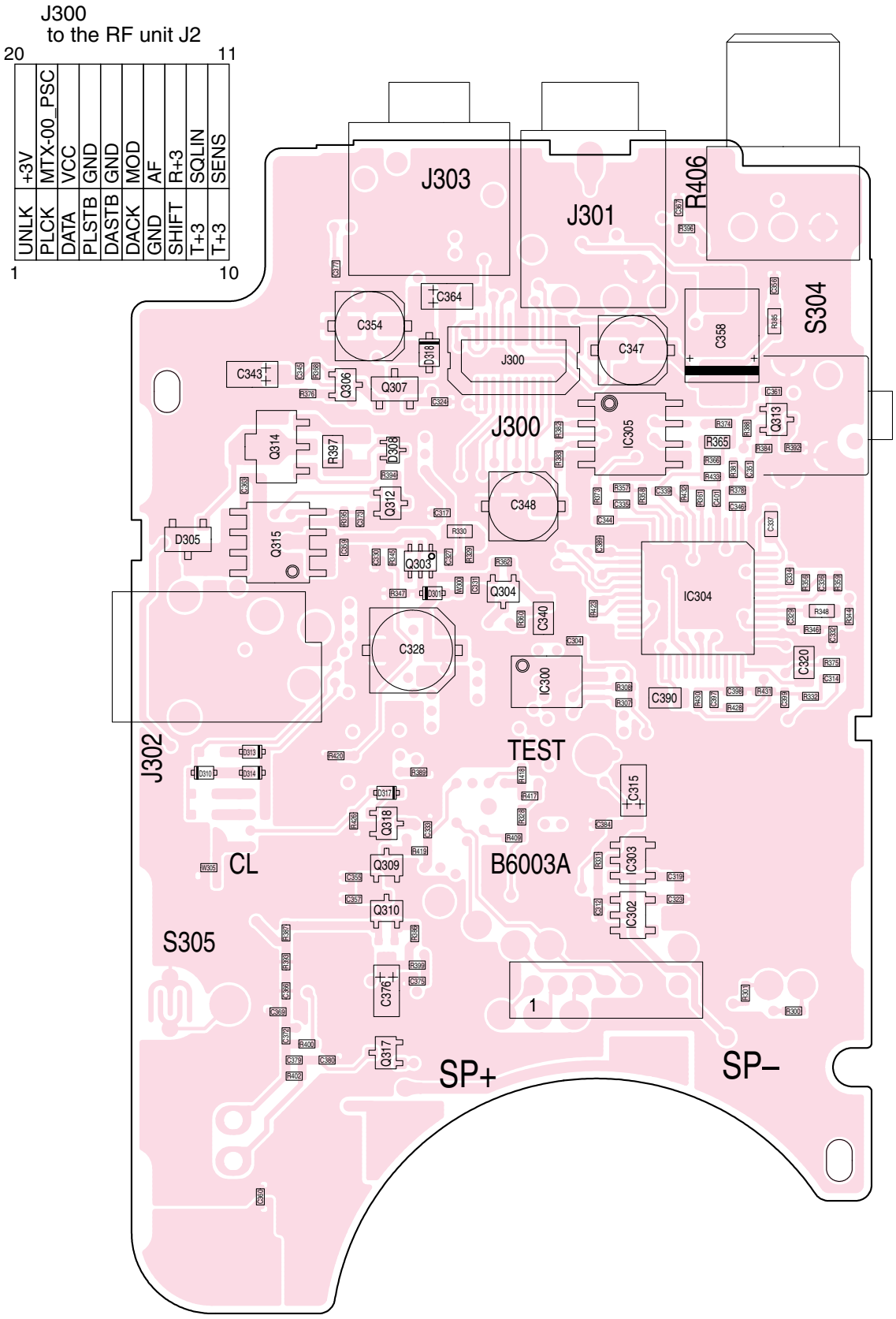
• DIODES

1SV284 (Symbol: TL) 	**1SV308** (Symbol: TX) 	**HVC376B** (Symbol: B9) 	**MA2S077** (Symbol: S) 	**MA2S111** (Symbol: A) 
MA2S728 (Symbol: B) 	**MA133** (Symbol: MP) 	**SB07-03C** (Symbol: J) 	**RB551V-30** (Symbol: D) 	

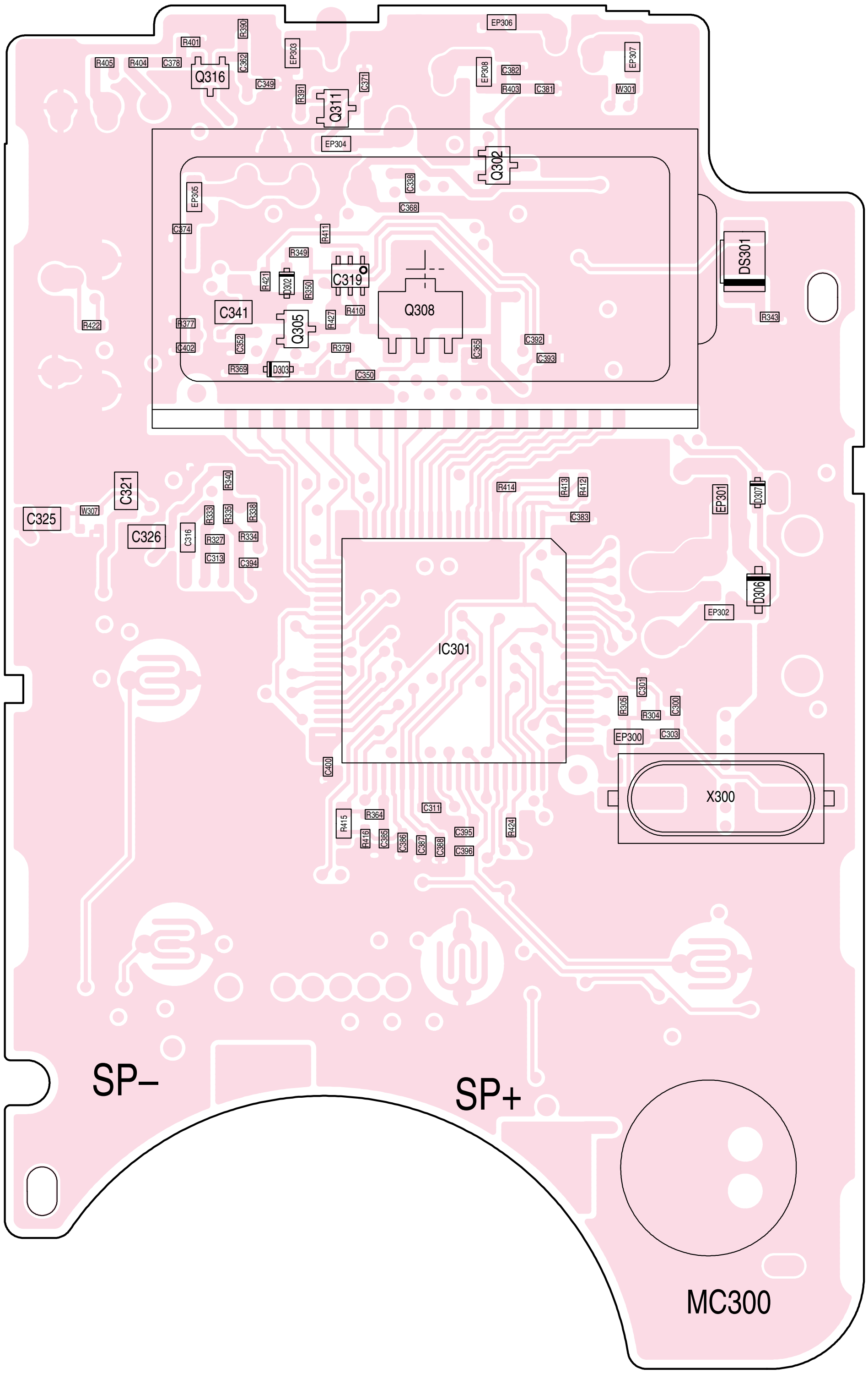
SECTION 9 BOARD LAYOUTS

9-1 MAIN UNIT

- **TOP VIEW**



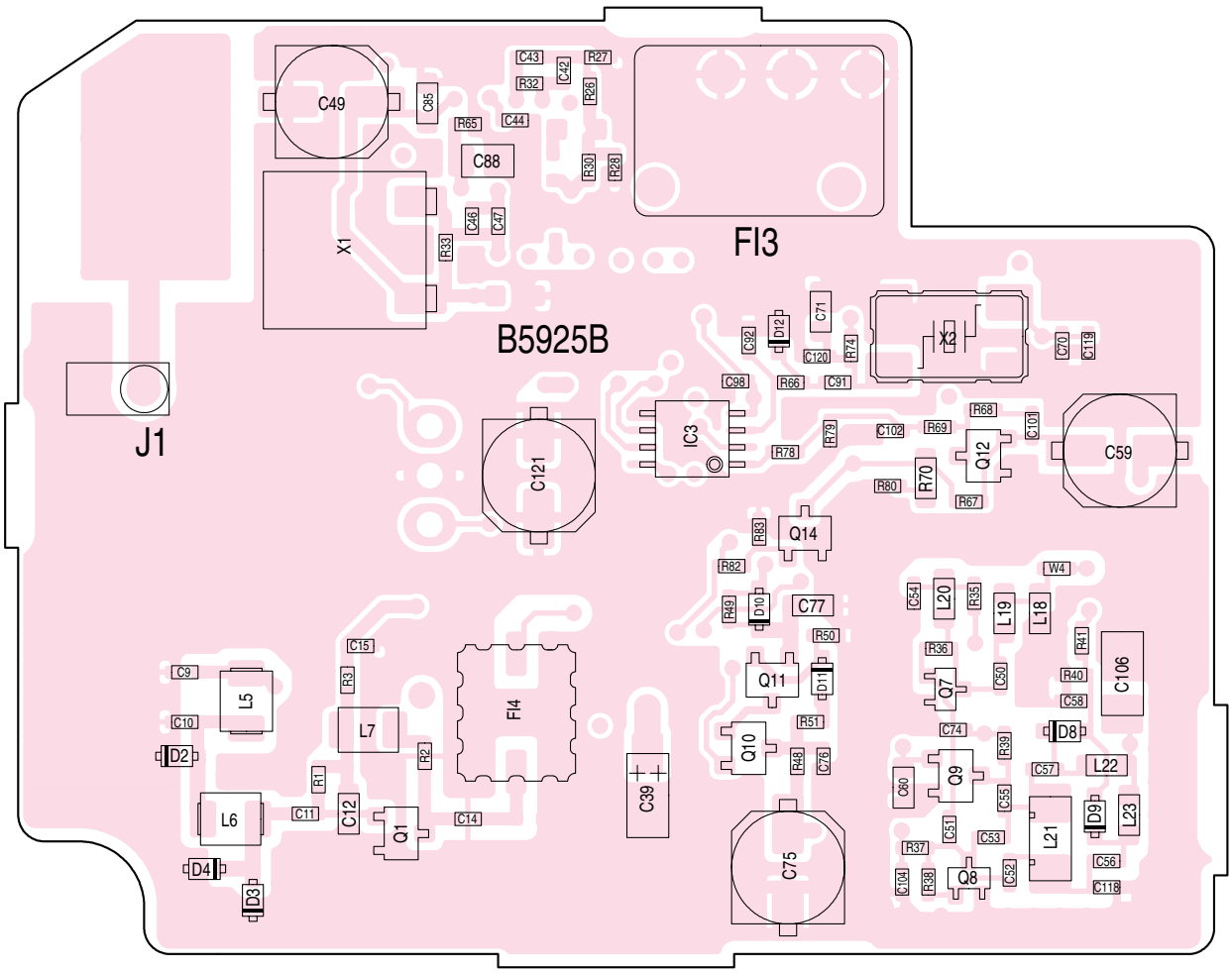
● **BOTTOM VIEW**



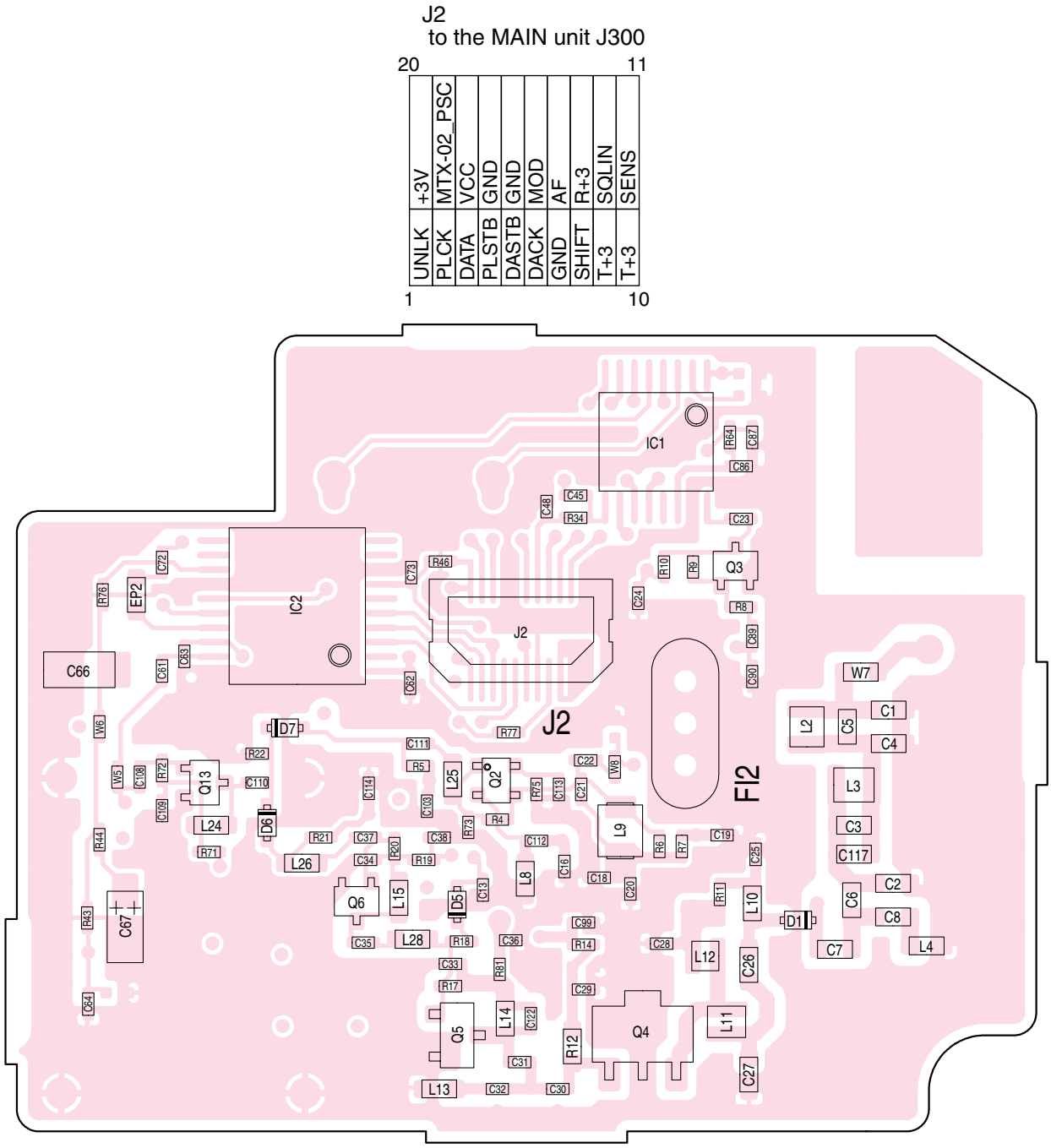
Q316
Q311
Q302
DS301
C319
C341
Q305
Q308
C321
C325
C326
IC301
X300
SP–
SP+
MC300

9-2 RF UNIT

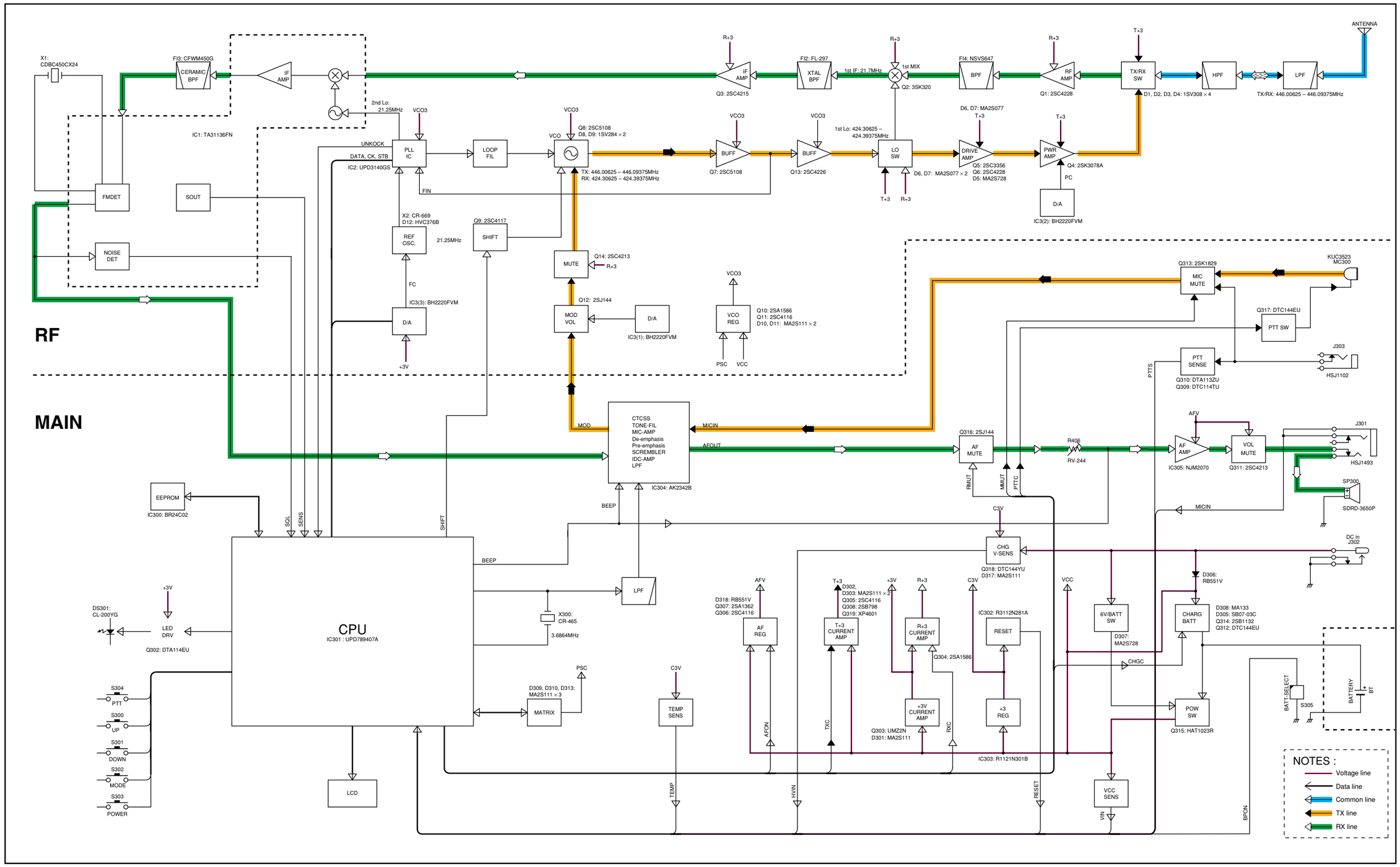
- **TOP VIEW**



● BOTTOM VIEW


J2
to the MAIN unit J300
20
11
UNLK
PLCK
DATA
PLSTB
DASTB
DACK
GND
SHIFT
T+3
T+3
+3V
MTX-02_PSC
VCC
GND
GND
MOD
AF
R+3
SQLIN
SENS
1
10
IC1
IC2
J2
J2
FI2
Q2
Q3
Q4
Q5
Q6
Q13
D1
D5
D6
D7
L2
L3
L4
L8
L9
L10
L11
L12
L13
L14
L15
L24
L25
L26
L28
W5
W6
W7
W8
EP2
C1
C2
C3
C4
C5
C6
C7
C8
C26
C27
C66
C67
C117
R12

SECTION 10 BLOCK DIAGRAM



SECTION 11 VOLTAGE DIAGRAM

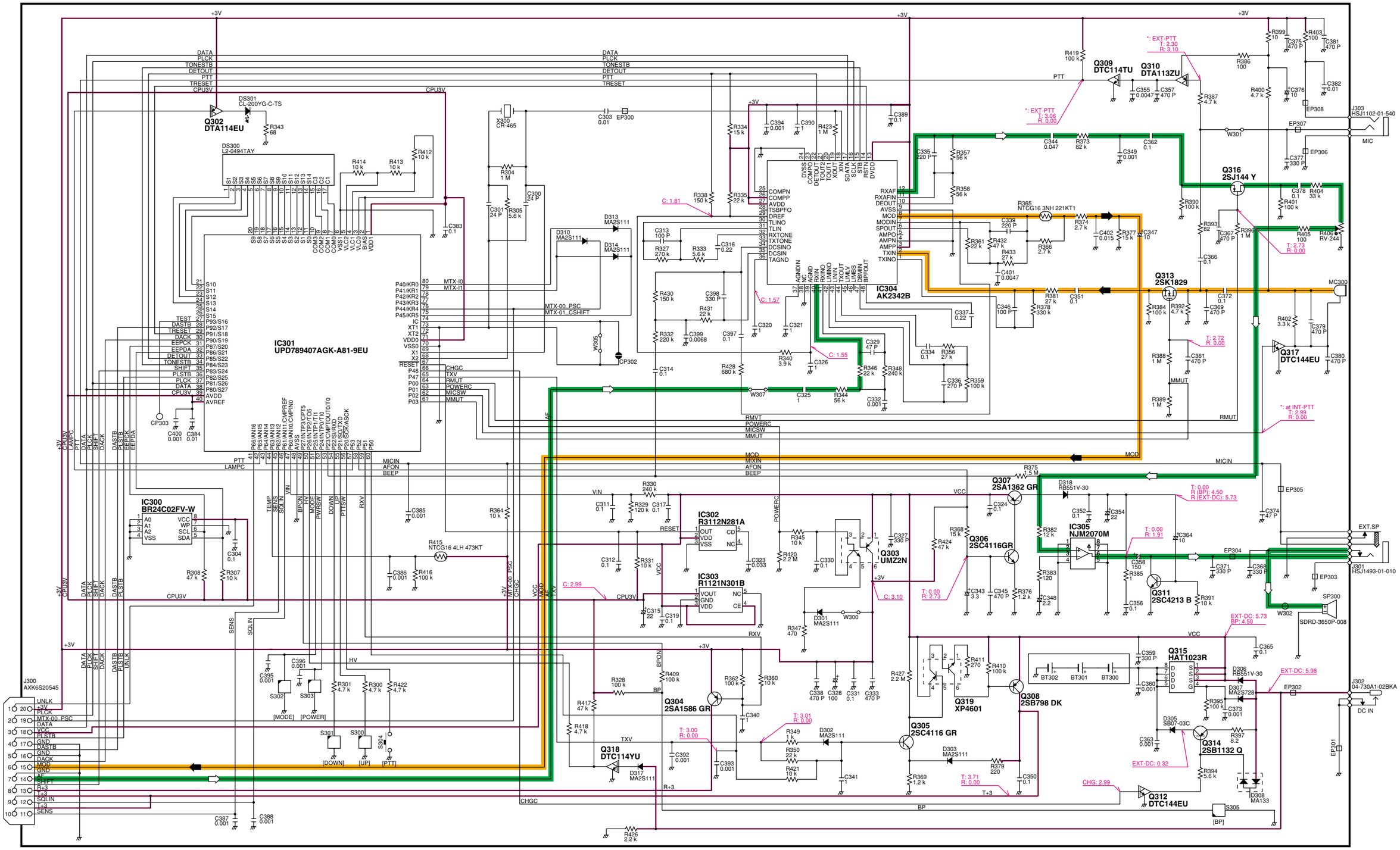
11-1 MAIN UNIT

NOTES :

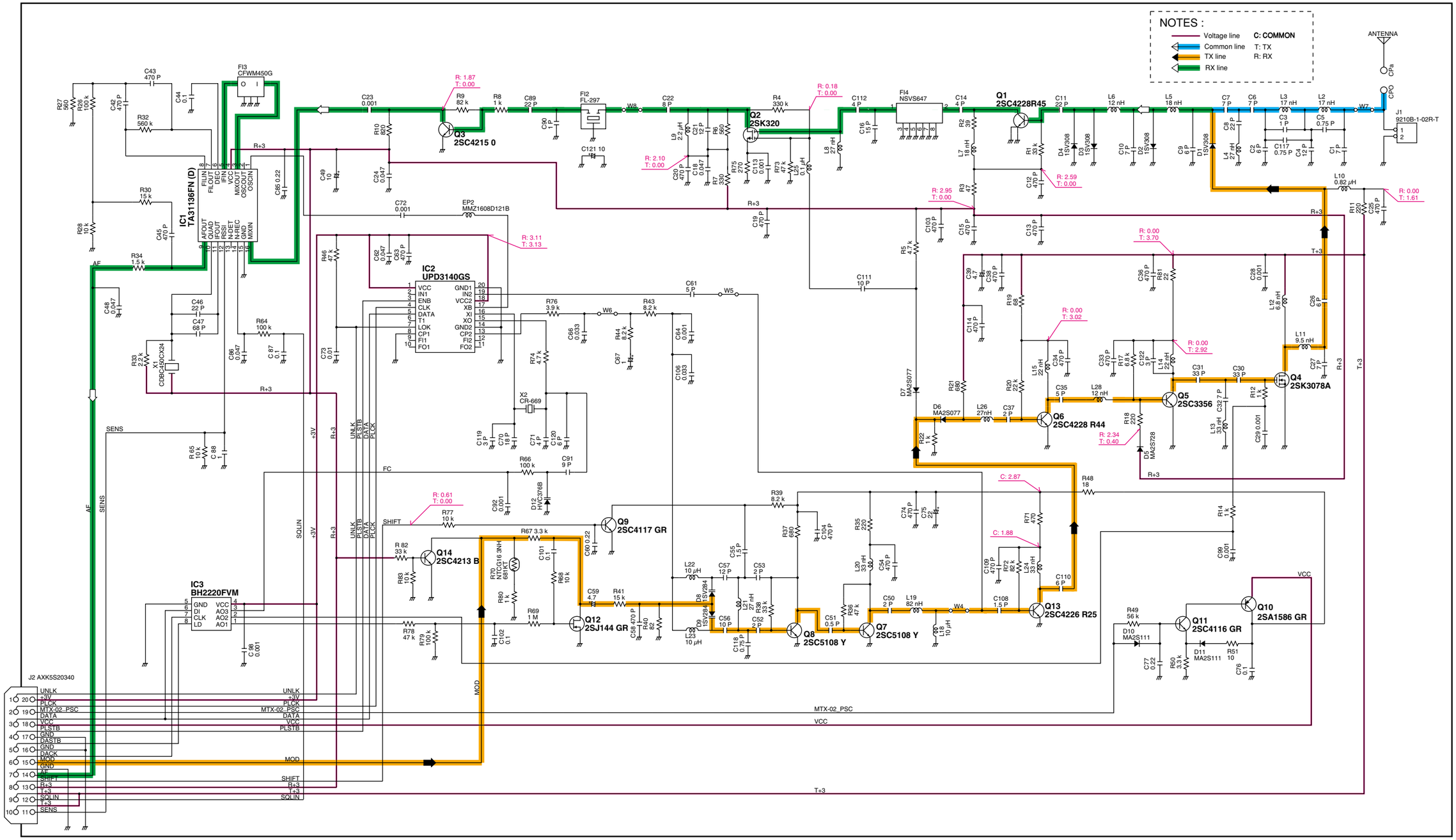
- Voltage line
- Common line
- TX line
- RX line

C: COMMON
T: TX
R: RX

EXT DC: Using external power supply
BP: Using the battery
CHG: While charging the battery



11-2 RF UNIT


NOTES :
Voltage line
Common line
TX line
RX line
C: COMMON
T: TX
R: RX
ANTENNA
IC1 TA31136FN (D)
IC2 UPD3140GS
IC3 BH2220FVM
Q1 2SC4228R45
Q2 2SK320
Q3 2SC4215 0
Q4 2SK3078A
Q5 2SC3356
Q6 2SC4228 R44
Q7 2SC5108 Y
Q8 2SC5108 Y
Q9 2SC4117 GR
Q10 2SA1586 GR
Q11 2SC4116 GR
Q12 2SJ144 GR
Q13 2SC4226 R25
Q14 2SC4213 B
J1 9210B-1-02R-T
J2 AXK5S20340
UNLK
+3V
PLCK
MTX-02_PSC
DATA
VCC
PLSTB
GND
DASTB
DACK
MOD
AF
SHIFT
R+3
T+3
SQLIN
SENS
FC

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