ICOM

SERVICE MANUAL

UHF TRANSCEIVER

IC-U82

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **IC-U82** UHF TRANSCEIVER at the time of publication.

MODEL	VERSION	SYMBOL	BATTERY PACK
IC-U82	USA	[USA-1]	BP-208N
		[USA-2]	BP-222N
		[USA-3]	BP-209N
	Europe	[EUR-1]	BP-208N
		[EUR-2]	BP-222N
		[EUR-3]	BP-209N
	Korea	[KOR]	BP-222N
	EXP	[EXP-1]	BP-208N
		[EXP-2]	BP-222N
		[EXP-4]	BP-209N

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 a DC power supply that uses more than 10.3 V. This will ruin the transceiver.

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 (100 mW) 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>

1110003490	S.IC TA31136FN	IC-U82	MAIN UNIT	1 piece
8210021740	2826 front panel (A)	IC-U82	CHASSIS	5 pieces

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

REPAIR NOTES

1. Make sure the 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 tuning 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 40 dB or 50 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.

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

■ GENERAL

• Frequency range	: TX 420.000–450.000 MHz† [USA] 430.000–440.000 MHz [EUR], [KOR] 400.000–479.000 MHz* [EXP] RX 400.000–479.000 MHz* [USA], [EXP] 430.000–440.000 MHz [EUR], [KOR] *Specifications are guaranteed within 430.000 to 440.000 MHz range only. †Specifications are guaranteed within 440.000 to 450.000 MHz range only.
• Operating temperature range	: –10°C to 60°C; +14°F to +140°F
• Operating mode	: F2D, F3E, F7W* (*with optional digital unit **UT-118**)
• Frequency stability	: ±2.5 ppm (–10°C to +60°C; +14°F to +140°F)
• Antenna impedance	: 50 Ω (BNC Type)
• Power supply requirement	: Specified Icom's battery packs only (Operating voltage range; 6.0–10.3 V)
• Number of memory channels	: 207 channels (Including 6 scan edges and 1 call channel)
• Scan types	: Program/Memory/Skip/Priority/Tone scans
• Tuning steps	: 5, 10, 12.5, 15, 20, 25, 30 and 50 kHz
• Current drain (at 7.2 V DC; approx.)	: TX High 2.0 A Middle 1.4 A Low 0.9 A RX Max. audio Less than 250 mA Stand-by Less than 80 mA Power save Less than 30 mA
• Dimensions (Projections not included)	: 54.0 (W) × 139.0 (H) × 36.7 (D) mm; 2 1/8 (W) × 5 15/32 (H) × 1 5/8 (D) in.
• Weight (except antenna, battery pack)	: Approx. 200 g (7 5/32 oz)
• Data connector	: 3-conductor 2.5 (d) mm (1/10")

■ TRANSMITTER

• Output power (at 7.2 V DC)	: 5.0 W (High), 2.0 W (Middle), 0.5 W (Low)
• Modulation system	: Variable reactance frequency modulation
• Maximum deviation	: ±2.5 kHz (Narrow), ±5.0 kHz (Wide)
• Spurious emissions	: Less than –60 dBc
• Ext. microphone connector	: 3-conductor 2.5 (d) mm (1/10")/2.2 kΩ

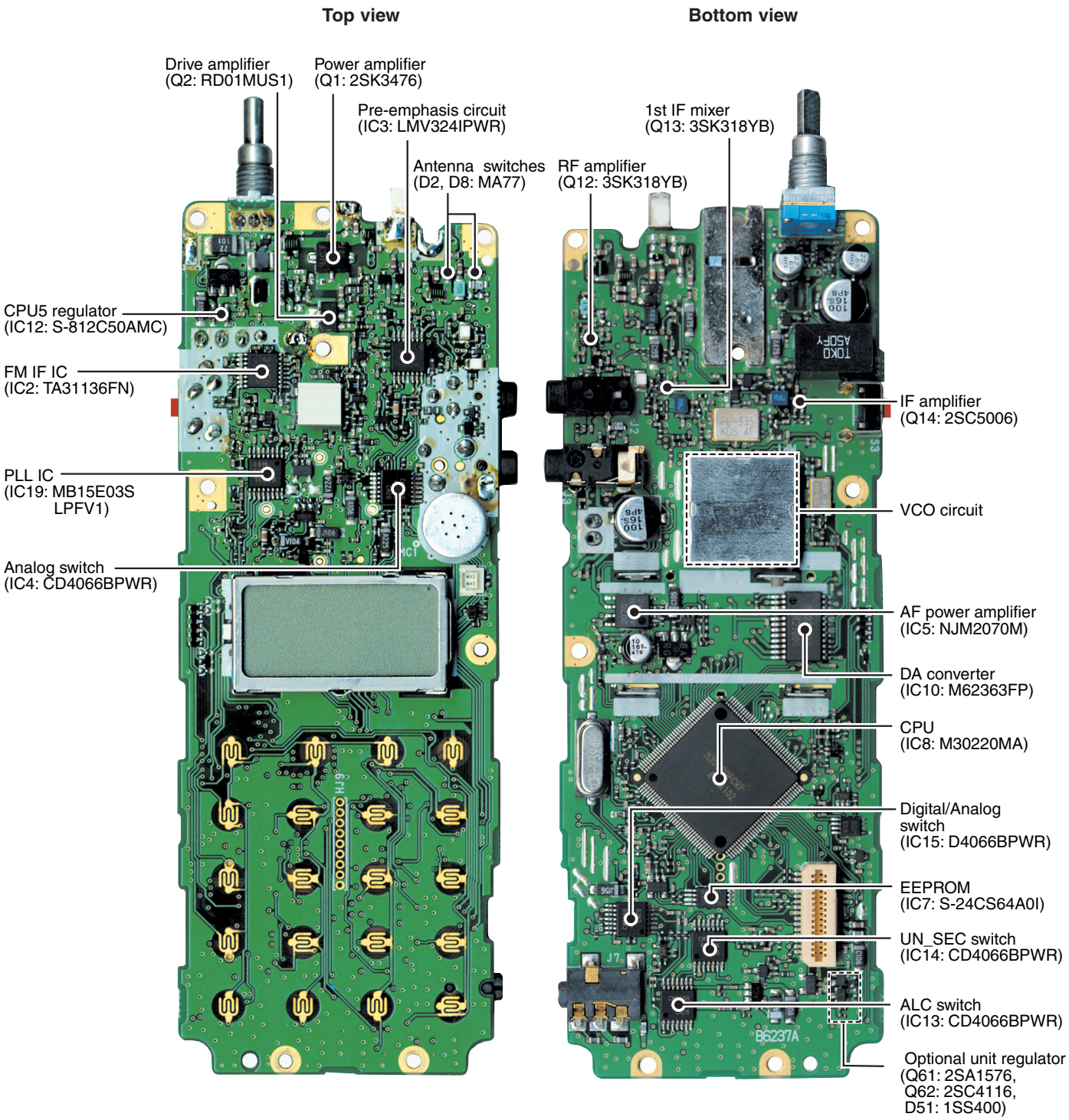
■ RECEIVER

• Receiving system	: Double conversion superheterodyne system
• Intermediate frequencies	: 1st; 46.35 MHz, 2nd; 450 kHz
• Sensitivity	: Less than –14 dBμ at 12 dB SINAD (0.16 μV typ.)
• Squelch sensitivity (at threshold)	: Less than –16 dBμ (0.11 μV typ.)
• Selectivity	: More than 55 dB (Wide; 65 dB typ.) More than 50 dB (Narrow)
• Intermodulation	: More than 55 dB (65 dB typ.)
• Spurious image rejection	: More than 60 dB (70 dB typ.)
• Audio output	: More than 300 mW at 10% distortion with an 8 Ω load
• Ext. speaker connector	: 3-conductor 3.5 (d) mm (1/8")/8 Ω

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

SECTION 2 INSIDE VIEWS

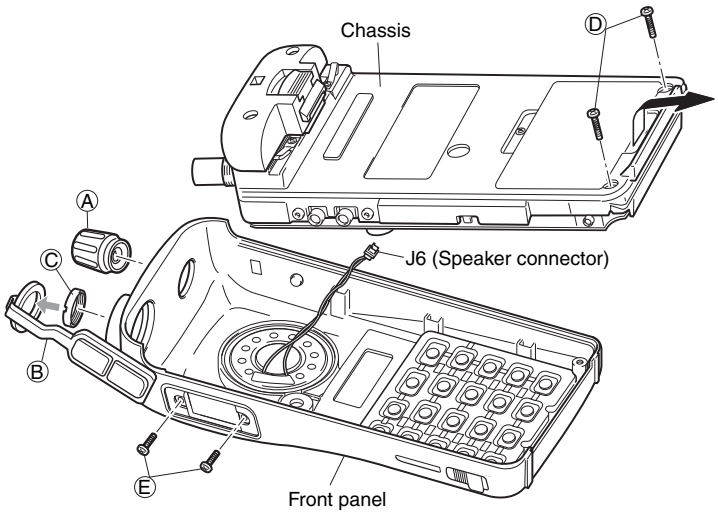
• MAIN UNIT



SECTION 3 DISASSEMBLY INSTRUCTIONS

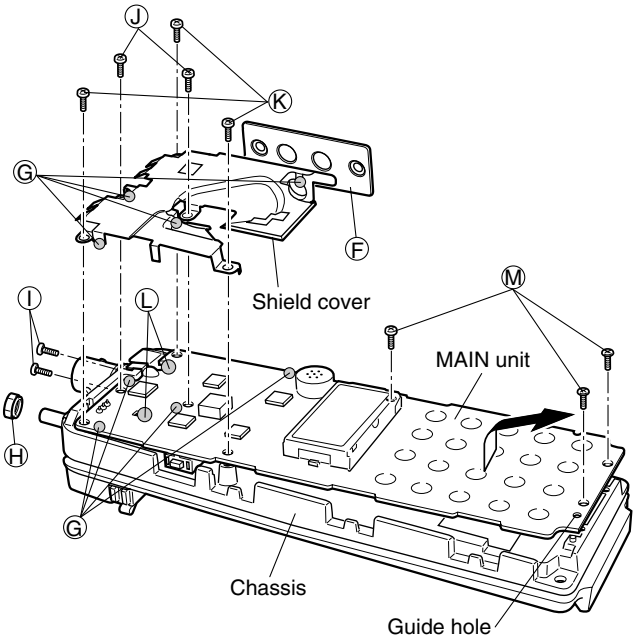
1. Removing the chassis panel

① Remove the knob Ⓐ and jack cap Ⓑ.
② Unscrew 1 nut Ⓒ.
③ Unscrew 2 screws Ⓓ (2 × 10 mm, black) and 2 screws Ⓔ (2 × 4 mm, black) from the chassis.
④ Unplug the speaker connector (J6).
⑤ Take off the chassis in the direction of the arrow.



2. Removing the MAIN unit.

① Remove the Jack seal Ⓕ.
② Unsolder 4 points Ⓖ of the shield cover.
③ Unscrew 1 nut Ⓗ and 2 screws Ⓘ (2 × 4 mm, black).
④ Unscrew 2 screws Ⓙ (2 × 4 mm, black) and 3 screws Ⓚ (2 × 4 mm, silver) and remove the shield cover.
⑤ Unsolder 2 points Ⓛ.
⑥ Unscrew 3 screws Ⓜ (2 × 4 mm, silver).
⑦ Take off the MAIN unit in the direction of the arrow.



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 ANTENNA SWITCHING CIRCUIT

The antenna switching circuit toggles receive line and transmit line. This circuit does not allow transmit signals to enter the receiver circuits.

Received signals from the antenna connector (J1: CHASSIS UNIT) are passed through the low-pass filter (LPF: L1, L2, C1–C5) and applied to the $\lambda/4$ type antenna switching circuit (D2, D8).

While receiving, no voltage is applied to D2 and D8. Thus, the receive line and the ground are disconnected and L15, L58, C52, C76 and C516 function as a two-stage LPF which leads received signals to the RF circuits via the limiter (D50).

4-1-2 RF CIRCUITS

The RF circuits amplify received signals within the range of frequency coverage and filters off out-of-band signals.

The signals from the antenna switching circuit are amplified at the RF amplifier (Q12).

The amplified signals are passed through the two-stage BPF (D11, D12, D65, L19, L57, C92, C94, C96, C97, C502–C505, C507) to suppress unwanted signals. The filtered signals are then applied to the 1st mixer circuit.

4-1-3 1st MIXER AND 1st IF AMPLIFIER CIRCUITS

The 1st mixer circuit converts received signals into the 1st intermediate frequency (IF) signal by mixing with the local oscillator (LO) signal. The converted 1st IF signal is filtered at the 1st IF filter, then amplified at the 1st IF amplifier.

The signals from the two-stage BPF are converted into the 46.35 MHz 1st IF signal at the 1st mixer (Q13) by being mixed with the 1st LO signals generated at the VCO (Q76, D59, D60).

The 1st IF signal from the 1st mixer is passed through the crystal filter (FI1) to suppress unwanted signals, and the limiter (D63) and then applied to the 1st IF amplifier (Q14).

The amplified 1st IF signal is applied to the FM IF IC (IC2, pin 16).

4-1-4 2nd IF AND DEMODULATOR CIRCUITS

The 1st IF signal is converted into the 2nd IF signal and demodulated by the FM IF IC. The FM IF IC contains 2nd mixer, limiter amplifier, quadrature detector, etc. in its package.

The 1st IF signal from the 1st IF amplifier is applied to the FM IF IC (IC2, pin 16), and mixed with the 45.9 MHz 2nd LO signal from the tripler (Q81) at the mixer section, to convert into the 450 kHz 2nd IF signal. The 2nd IF signal is output from pin 3 and is filtered by the ceramic filter (FI2) to suppress the heterodyne noise. The filtered signal is applied to IC2 (pin 5) again and amplified at the limiter amplifier section and demodulated by the quadrature detector.

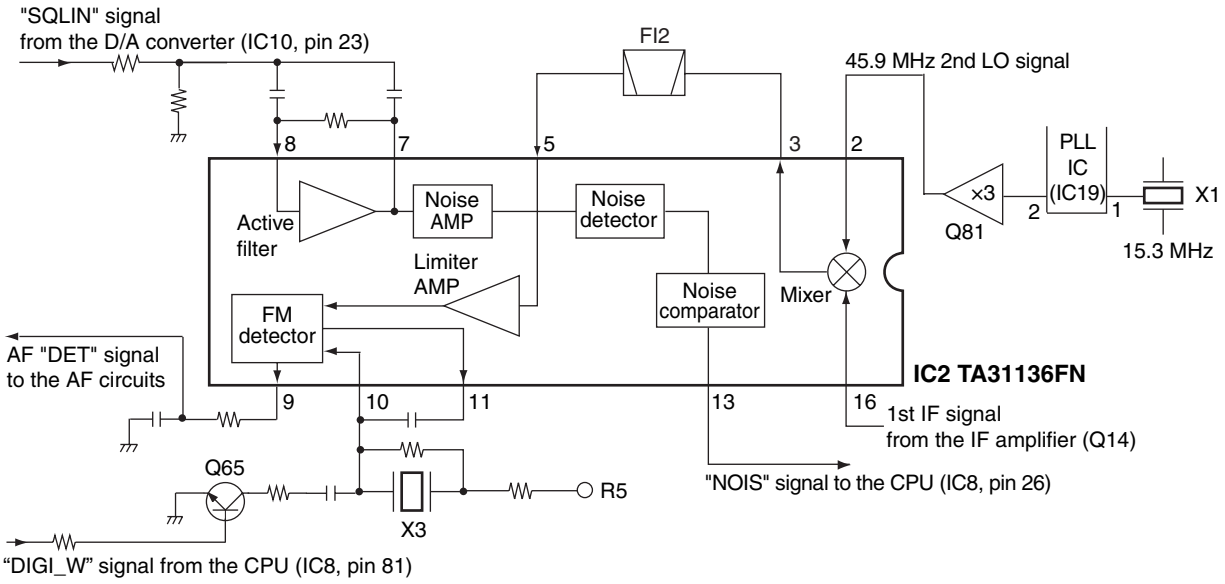
The quadrature detector is a detection method which uses a ceramic discriminator (X3). Q65 is a mode switch and toggles the detecting mode from wide and narrow, controlled by the "DIGI_W" signal from the CPU (IC8, pin 81).

The demodulated AF signals are output from pin 9.

4-1-5 AF CIRCUITS

The AF signals from FM IF IC (IC2, pin 9) are passed through the AN switch (IC14, pins 10, 11), HPF (IC3, pins 6, 7), analog switch (IC4, pins 1, 2), the LPF (IC3, pins 13, 14) and analog switch (IC4, pins 10, 11). The signals from the analog switch are applied to the D/A converter (IC10, pins 11, 12) to adjust the AF output level, and then passed through the emphasis switch (Q73) whitch toggles the AF response characteristic according to the selected operating mode (analog/FM or digital). The AF signals from the emphasis switch are applied to the AF amplifier (IC5) to obtain 300 mW of AF output power. The amplified AF signals are applied to the internal speaker (SP1) via [SP] jack (J3).

• 2ND IF AND DEMODULATOR CIRCUITS



4-1-6 SQUELCH CIRCUIT

Squelch circuit mutes AF output signal when no signals are received.

A portion of the AF signals from the FM IF IC (IC2, pin 9) are applied to the D/A converter (IC10, pin 24) to control its level. The level controlled signals are output from pin 23 and applied to the active filter (IC2, pins 7, 8; R86–R88, C121, C122). The filtered signals are applied to the noise amplifier section to amplify the noise components only.

The amplified noise components are detected at the noise detector section, and output from pin 13 as the "NOIS" signal and applied to the CPU (IC8, pin 26). Then the CPU outputs "AFON" signal from pin 71 according to the "NOIS" signal level to toggle the AF regulator (Q15, Q16) ON/OFF.

4-2 TRANSMITTER CIRCUITS

4-2-1 ALC AMPLIFIER AND PRE-EMPHASIS CIRCUIT

The ALC (Automatic Level Control) amplifier maintains the level of the audio signals from the microphone constant. The pre-emphasis circuit amplifies the audio signals within +6 dB/oct pre-emphasis characteristic.

• When ALC function is ON.

The AF signals from the microphone are passed through the ALC switch (IC13, pins 3, 4) and applied to the ALC amplifier (IC17, pin 3) to limit its level.

The level limited signals are output from pin 5 and passed through the another ALC switch (IC13, pins 8, 9) and UN_SEC switch (IC13, pins 10, 11). The signals from UN_SEC switch are then applied to the pre-emphasis circuit (IC3, pins 8, 10) to obtain frequency characteristic of +6 dB/oct.

• When ALC function is OFF.

The audio signals from the microphone are passed through the ALC switch (IC13, pins 1, 2 and pins 10, 11) and UN_SEC switch (IC13, pins 10, 11). The signals from UN_SEC switch are then applied to the pre-emphasis circuit (IC3, pins 8, 10).

The signals from the pre-emphasis circuit are passed through the analog switch (IC4, pins 3, 4) and LPF (IC3, pins 13, 14). The signals from the LPF are passed through another analog switch (IC4, pins 8, 9), digital/analog switch (IC15, pins 8, 9 and pins 3, 4) and D/A converter (IC10, pins 21, 22) to adjust its level. The level adjusted signals from the D/A converter are applied to the modulation circuit (D61).

4-2-2 MODULATION CIRCUIT

The modulation circuit modulates the VCO oscillating signal with the audio signals from the microphone.

AF signals from the D/A converter (IC10, pin 22) are applied to the modulation circuit (D61) to modulate the oscillated signal by changing the reactance of D61 at the VCO (Q76, D59, D60).

4-2-3 TRANSMIT AMPLIFIERS

The VCO output signal is amplified to transmit power level by the transmit amplifiers .

The VCO output signal is buffer-amplified by the buffer amplifiers (Q74, Q75) and passes through the TX/RX switch (D3). The signal from the TX/RX switch is applied to the buffer (Q3), the pre-driver (Q83), driver (Q2) and power (Q1) amplifiers, to be amplified to the transmit output power level.

The power amplified signal is applied to the antenna conector (J1: CHASSIS UNIT) via the antenna switching circuit (D1, D72), power detector (D32, D33), and two-stage LPFs.

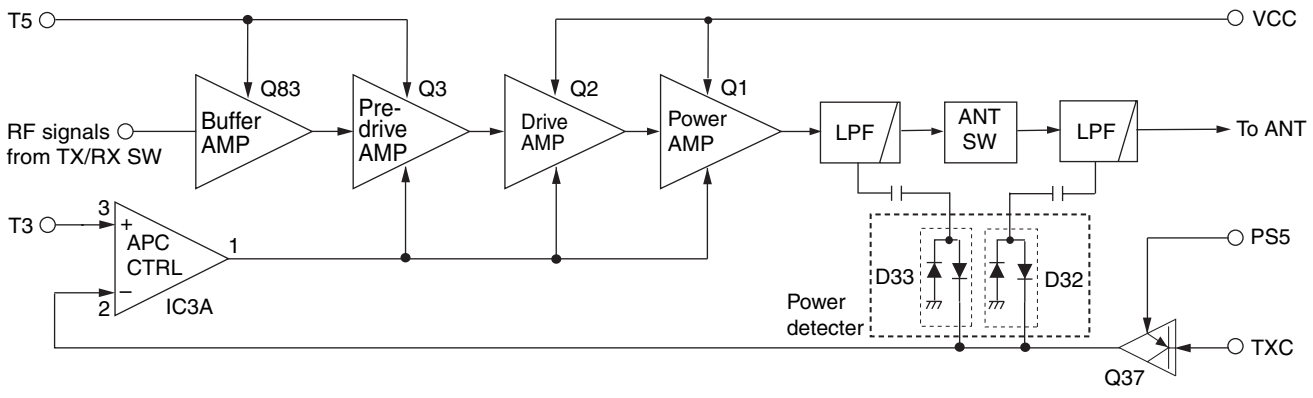
4-2-4 APC CIRCUIT

The APC (Automatic Power Control) circuit stabilizes transmit output power and controls transmit output power High, Middle and Low.

The RF output signal from the power amplifier (Q1) is detected at the power detector (D32, D33). The detector converts the RF signals into DC voltage, and the detected voltage is applied to the APC amplifier (IC3, pin 2).

The transmit output power setting voltage "T3" is applied to another input terminal of the APC amplifier (IC3, pin 3) as the reference voltage. The APC amplifier controls the bias of the pre-driver (Q83), driver (Q2) and power amplifier (Q1) by comparing the detected voltage and the reference voltage. Thus the APC circuit maintains a constant output power.

• APC CIRCUITS



4-3 PLL CIRCUITS

4-3-1 GENERAL

PLL circuits control the VCO circuit. IC19 is a PLL IC and contains prescaler, programmable counter, programmable divider, phase detector, charge pump in its package.

The VCO (Q76, D59, D60) directly generates both of the transmit frequency and the 1st LO frequency.

The PLL sets the divided ratio based on the N-data from the CPU (IC8), and compares the phase of the VCO output with the reference frequency (15.3 MHz) generated by X4.

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

4-3-2 TRANSMIT LOOP

A portion of the generated signal at the VCO (Q76, D59, D60) is applied to the PLL IC (IC19, pin 8) via buffer-amplifiers (Q5, Q75). The applied signal is divided at the prescaler section and programmable divider section, then applied to the phase detector section.

The phase detector compares the input signal with the reference frequency, and then outputs the control signal (pulse-type) from pin 5 via the charge pump section. The pulse-type signal is converted into DC voltage at the loop filter (R445–R448, C472–C474), and then applied to the VCO (Q76, D59, D60) as the lock voltage.

4-3-3 RECEIVE LOOP

The generated 1st LO signal is applied to the PLL IC (IC19, pin 8) via the buffer-amplifiers (Q5, Q75) and is divided at the prescaler section and the programmable divider section, then applied to the phase detector section.

The phase detector compares the input signal with the reference frequency, and then outputs the control signal (pulse-type) from pin 5 via the charge pump section. The pulse-type signal is converted into DC voltage at the loop filter (R445–R448, C472–C474), and then applied to the VCO (Q76, D59, D60) as the lock voltage.

4-4 OTHER CIRCUITS

4-4-1 CTCSS/DTCS CIRCUIT (DECODING)

The CTCSS/DTCS signal from FM IF IC (IC2, pin 9) is filtered at the LPF (Q53). The filtered signal is then applied to the CPU (IC8, pin 5) to control the AF amplifier according to the received CTCSS/DTCS signal.

4-4-2 CTCSS/DTCS CIRCUIT (ENCODING)

• CTCSS

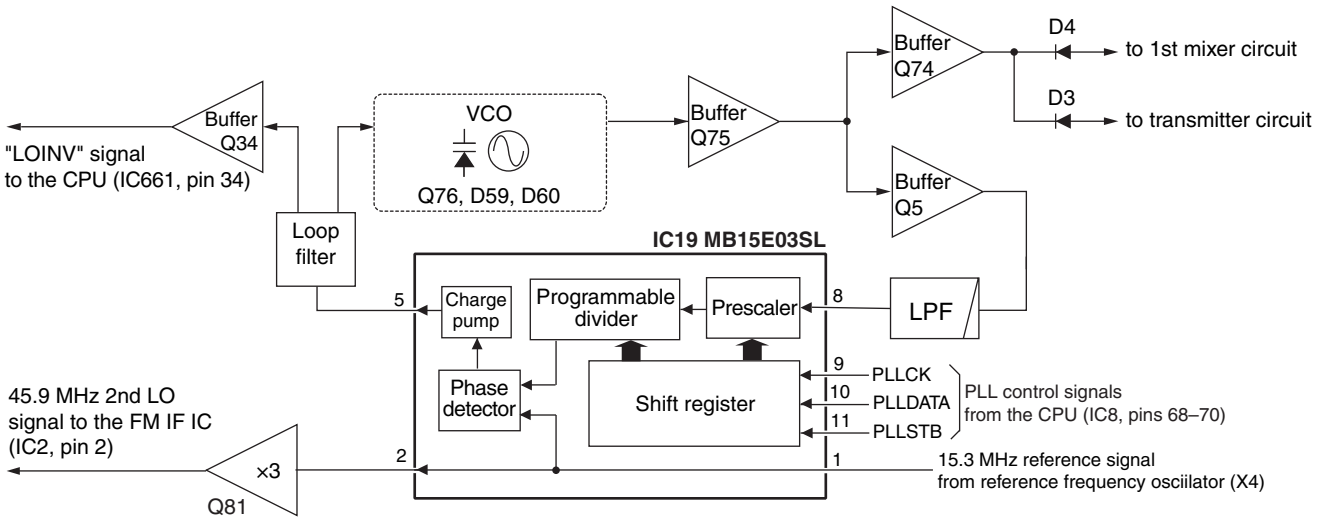
The CTCSS signal is generated by the CPU (IC8) and output from pin 139 and passed through the LPF (R224, C126, C129) and CTCSS switch (Q38). The CTCSS signal is then applied to the splatter filter (IC3, pin 13) to be mixed with the microphone audio signals. The filtered CTCSS signal is then output from pin 14 and applied to the digital/analog switch (IC15, pins 8, 9 and pins 3, 4) via the analog switch (IC4; pins 8, 9).

The CTCSS signal from the digital/analog switch (IC15, pin 3) is applied to the D/A converter (IC10, pin 21) to adjust its level. The level adjusted CTCSS signal is then applied to the modulator circuit (D61).

• DTCS

The DTCS signal is also generated by the CPU (IC8) and output from pin 139. The DTCS signal is applied to the DTCS amplifier (IC23, pin 3) via DTCS switch (IC16, pins 1, 7). The amplified DTCS signal is applied to the D/A converter (IC10, pin 13) to adjust its level. The level adjusted DTCS signal is then applied to both of the modulator circuit (D61) and the reference frequency oscillator (X4).

• PLL CIRCUITS



4-5 POWER SUPPLY CIRCUITS

4-5-1 VOLTAGE LINES

LINE	DESCRIPTION
VCC	The voltage from the attached battery pack.
CPU5	Common 5 V for the CPU (IC8) converted from the VCC line at the CPU5 regulator circuit (IC12).
SW5V	Common 5 V line converted from the VCC line at the SW5 regulator circuit (Q55–Q57, D39) controlled by the "PWRON" signal.
T5	5 V for the transmit circuits regulated from the SW5V line by the T5 regulator (Q22). The regulator is controlled by the "T5C" signal from the CPU (IC8, pin 80).
PS5	5 V for the power save line regulated from the SW5V line by the PS5 regulator (Q54). The regulator is controlled by the "PS5C" signal from the CPU (IC8, pin 92).
R5	5 V for the receive circuits regulated from the SW5V line by the R5 regulator (Q21). The regulator is controlled by the "R5C" signal from the CPU (IC8, pin 82).
VCO5	5 V for the VCO circuit regulated from the SW5V line by the VCO5 regulator (Q11). The regulator is controlled by the "PSVCO" signal from the CPU (IC8, pin 62).
+5V	5 V for the optional unit power supply regulated from the VCC line by the option power supply regulator (Q61, Q62, D51). The regulator is controlled by the "OP_PS" signal from the CPU (IC8, pin 59).

4-6 PORT ALLOCATION

4-6-1 CPU (IC8)

PIN NUMBER	PORT NAME	DESCRIPTION
1	LVIN	Input port for PLL lock voltage.
3	REMO	Input port for remote control microphone.
4	SD	Input port for receiving signal strength detect signal.
5	CTCIN	Input port for CTCSS/DTCS signals.
7	DET	Input port for weather alert tone detect signal.
8	LEDC	Outputs LCD backlight control signal. HIGH : Lights ON
9	PTT	Input port for [PTT].
10	MICS	Outputs AF filter switch (IC4) control signal. HIGH : While transmiting
11	AN	Output ports AN switch (IC14) control signal.
12	DIGITAL	Input port for UT-118 accept/refuse signal. LOW : Accept
13	UN_SEC	Output ports UN_SEC switch (IC14) control signal.
15	CSHIFT	Outputs CPU (IC8) clock control signal.
19	RESET	Input port for "RESET" signal.
25	PWRSW	Input port for [PWR]. LOW : While pushing [PWR]
26	NOIS	Input port for "NOIS" signal.
28	ESDA	I/O port for EEPROM (IC7).
29	ESCK	Outputs clock signal for EEPROM (IC7).
30	CLIN	Input port for cloning data.
31	CLOUT	Output port for cloning data.
32	OPSO	Outputs serial data for optional unit.
33	SI	Input port for DTMF decode signal.
34	SECRET	Outputs secret switch (IC14) control signal.
35	BUSY	Outputs receive detection (busy) signal to UT-118.
40–42	OPT1–OPT3	I/O ports for optional unit.
43	ALC	Outputs ALC switch (IC13) control signal. HIGH : During digital mode operation.
44	THROUGH	Outputs ALC switch (IC13) control signal. HIGH : During analog mode operation.
45	DI_SEC	Outputs moddulation/demodulation mode switching signal. HIGH : During digital mode operation
46	MMUTE	Outputs analog switch (IC4) control signal.
49	RMUTE	Outputs audio mute signal. HIGH : While muting
52–54	OPV1–OPV3	Input ports for optional unit type detect signal.
55	TX_DIGI	Outputs transmit audio frequency characteristic control signal. LOW : During digital mode operation.
56	PTTO	Input port for transmit request control signal from UT-118.
57	PTTI	Output port for transmit request control signal to UT-118.
58	D5VC	Output port for D5VC line (5 V power supply; IC22) control signal. HIGH : Power ON
59	OP_PS	Outputs option power supply (Q61, Q62, D51) control signal. HIGH : Power ON
60	OPSCK	Outputs clock signal for optional unit.
61	RX_MUTE	Input port for RX mute signal for digital mode operation.
62	PSVCO	Outputs PS5 regulator (Q22) control signal. LOW : Power ON
63	PLPS	Outputs power save control signal to the PLL IC (IC19). LOW : Power saved
64	DASTB	Outputs strobe signal to D/A convertor (IC10).
66	DADATA	Outputs serial data to D/A convertor (IC10).
67	PLLSW	Outputs PLL loop filter switch (IC20) control signal.
68	PLLCK	Outputs clock signal to PLL IC (IC19).
69	PLLDATA	Outputs serial data to the PLL IC (IC19).

PIN NUMBER	PORT NAME	DESCRIPTION
70	PLLSTB	Outputs PLL strobe signal.
71	AFON	Outputs AF regulator (Q15, Q16) control signal. HIGH : While emitting audio
72	DUSE	Outputs LPF cut-off frequency control signal to the CTCSS switch (Q38). LOW : When CTCSS or no signaling system is in use. HIGH : DTCS is in use.
73–76	KR0–KR3	Input ports for keypad.
78	UNLK	Input port for PLL unlock signal.
79	EMPHASIS	Outputs emphasis switch (Q73) control signal. HIGH : During FM mode operation.
80	T5C	Outputs T5 regurator (Q22) control signal. LOW : While transmitting
81	DEGI_W	Outputs detect circuit (Wide/Narrow) switch (Q53) control signal. HIGH : During narrow mode operation.
82	R5C	Outputs R5 regulator (Q21) control signal. LOW : During receive
83	TXC	Outputs RF output power control signal. LOW : During transmit
86–90	KS0–KS4	Output ports for keypad.
92	PS5C	Outputs PS5 regulator (Q54) control signal. LOW : Power saved
97, 98	DICK, DIUD	Input port for [VOL] control (S801).
141	TONE	Outputs DTMF, BEEP, 1750 Hz tone signals, etc.

4-6-2 D/A CONVERTER (IC10)

PIN NUMBER	PORT NAME	DESCRIPTION
2	T1	Outputs the tunable BPF tuning signal. The output signal is applied to BPF (D11).
3	T2	Outputs the tunable BPF tuning signal. The output signal is applied to BPF (D12).
10	T3	• Outputs the tunable BPF tuning signal. The output signal is applied to BPF (D65). • Output port for transmit output power setting signal. The output signal is applied to the APC amplifier (IC3, pin 3).
11	VOLOUT	Outputs AF output signals to the AF amplifier (IC5).
13	DTCS	Input port for DTCS signal from the DTCS amplifier (IC23).
15	FC	Outputs reference frequency control voltage.
22	MOD	Outputs modulating audio signal to the modulator circuit (D61).
23	SQLIN	Outputs squelch control signal to the noise active filter (IC2, pins 7, 8; R86–R88, C121, C122).

4-7 UT-118 CIRCUIT DESCRIPTION

4-7-1 RECEIVER CIRCUIT

The detected digital signals “FMDET” from the connected transceiver via the J301 (pin 22) are amplified at the buffer amplifier (IC251, pin 2). The amplified signals are applied to the GMSK modem circuit (IC252, pin 11), and are then applied to the CPU (IC204) as clock synchronizer digital signal. The digital signals from the CPU are applied to the AMBE voice CODEC IC (IC151) to press code extension, and are then applied to the linear CODEC IC (IC50) as 32 bits digital voice data. The applied digital signals are converted to the analog AF signals at the D/A converter section (IC50), and are then applied to the connected transceiver via the J301 (pin 21) as “DAFOUT” signal.

4-7-2 TRANSMITTER CIRCUIT

The analog AF signals “AMODIN” from the connected transceiver via the J301 (pin 4) are amplified at the buffer amplifier (IC251, pin 6). The amplified signals are applied to the linear CODEC IC (IC50, pin 5) to convert 32 bits digital voice data at the A/D converter section via the “ADIN” line. The digital signals are applied to the AMBE voice CODEC IC (IC151) to process code compression, and are then applied to the CPU (IC204). The digital signals from the CPU convert to the GMSK base band signal at the GMSK modem (IC252), and are then amplified at the buffer amplifier (IC253, pin 5). The amplified signals are applied to the connected transceiver via the J301 (pin 3).

4-7-3 RESET CIRCUIT

The UT-118 has the reset IC (IC203). The reset IC outputs "RES" signal to the CPU (IC204, pin 7) when more than 2.8 V of voltage is applied to the “VDD” port (pin 2).

4-7-4 RS-232C CIRCUIT

IC351 is a RS-232C compatible serial interface IC which converts data between the CPU and the external equipment (ex. Personal Computer).

4-7-5 LEVEL CONVERTER CIRCUIT

The level converter circuit (Q305 and Q306) converts communication data level between the CPU (IC204) and the connected transceiver’s CPU.
Q301, Q302 and Q303 convert control signals level between the UT-118 and the IC-V82.

4-8 UT-118 POWER SUPPLY CIRCUITS

4-8-1 VOLTAGE LINES

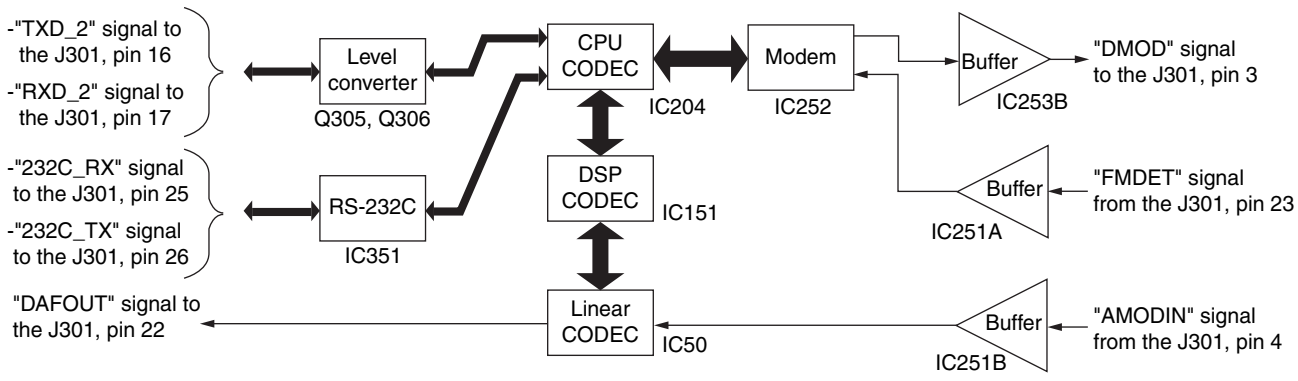
LINE	DESCRIPTION
5V	5 V from the connected transceiver via the J301 (pin 29). The 5V line is controlled by the +5 V control circuit (Q50 and Q51). The circuit is controlled by the “PSAVE” signal from the CPU (IC204, pin 58 and 59).
3.3V	Common 3.3 V converted from the 5V line by the 3.3V regulator circuit (IC1). One of the 3.3 V line is controlled by the +3V control circuit (Q400 and Q401). The circuit is controlled by the “PSAVE” signal from the CPU (IC204, pin 58 and 59).
3.2V	Common 3.2 V converted from the 4.5–8 V line by the 3.2V regulator circuit (IC2). The circuit is controlled by the “APWR” signal from the CPU (IC204, pin 16).

4-9 UT-118 PORT ALLOCATIONS

4-9-1 MODEM IC (IC252)

PIN NUMBER	PORT NAME	DESCRIPTION
2	MCLK	Outputs 2.4576 MHz clock signal to the CPU (IC151, pin 39).
7	ACQ	Outputs the PLL bandwidth control signal while receiving.
19	TXDT	Outputs transmitting data signal to the CPU (IC204, pin 54).
20	RXDT	Input port for receiving data signal from the CPU (IC204, pin 53).
21	RXCK	Input port for receive clock signal from the CPU (IC204, pin 52).
22	TXCK	Outputs transmit clock signal to the CPU (IC204, pin 51).

• UT-118 BLOCK DIAGRAM



SECTION 5 ADJUSTMENT PROCEDURES

5-1 PREPARATION

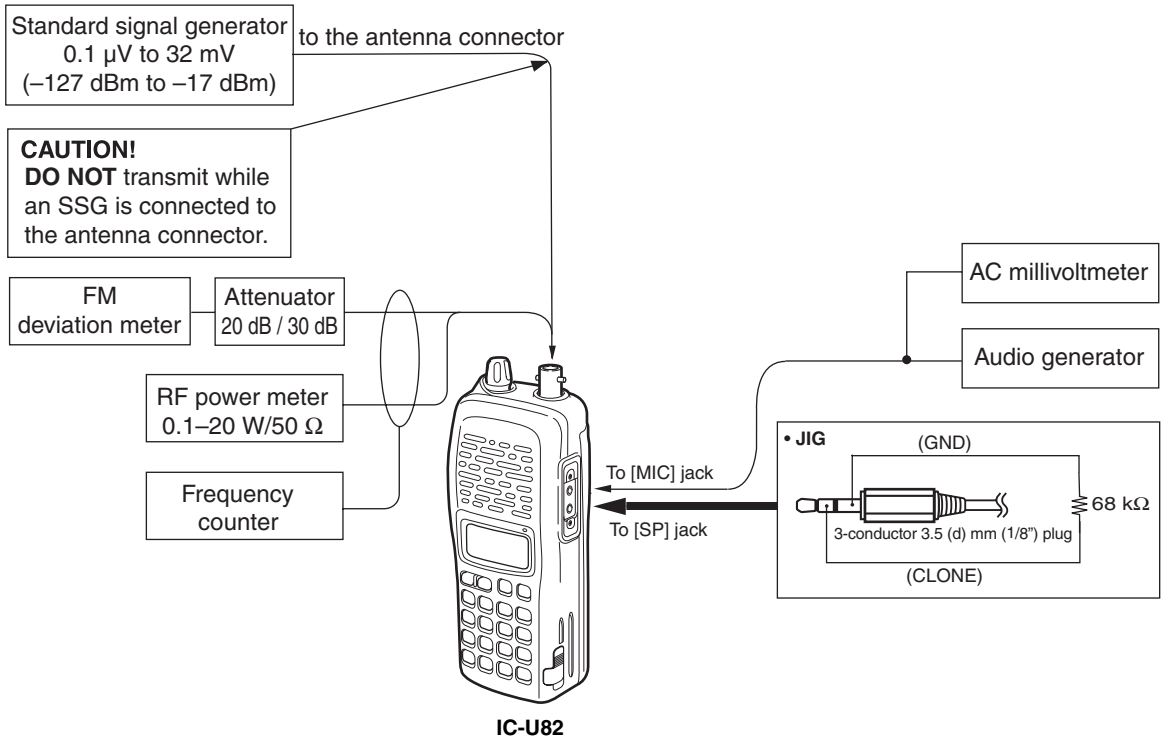
■ REQUIRED TEST EQUIPMENTS

EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supplies*	Output voltage : 5.0 V DC 8.0 V DC Current capacity : 1 A or more	FM deviation meter	Frequency range : 30–500 MHz Measuring range : 0 to ±10 kHz
RF power meter (terminated type)	Measuring range : 0.1–20 W Frequency range : 100–500 MHz Impedance : 50 Ω SWR : Less than 1.2 : 1	Standard signal generator (SSG)	Frequency range : 0.1–500 MHz Output level : 0.1 μV to 32 mV (–127 to –17 dBm)
Frequency counter	Frequency range : 0.1–500 MHz Frequency accuracy: ±1 ppm or better Sensitivity : 100 mV or better	Oscilloscope	Frequency range : DC–20 MHz Measuring range : 0.01–10 V
Audio generator	Frequency range : 300–3000 Hz Output level : 1–500 mV	AC millivoltmeter	Measuring range : 10 mV to 10 V
		Attenuator	Power attenuation : 20 or 30 dB Capacity : More than 5 W

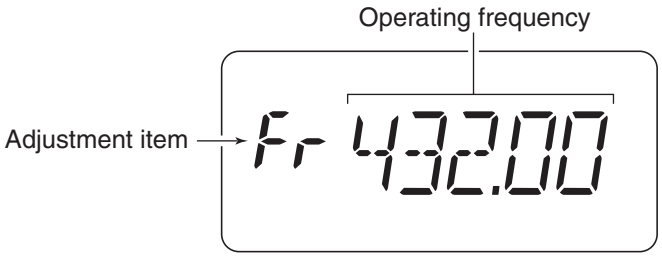
*; For UT-118 adjustment only.

CAUTION!: BACK UP the originally programmed contents (Memory channels, Call signs, Common settings, etc.) in the transceiver using CS-V82 CLONING SOFTWARE before starting adjustment.
When all adjustments are completed, these contents in the transceiver will be cleared.

• CONNECTION



• ADJUSTMENT MODE DISPLAY

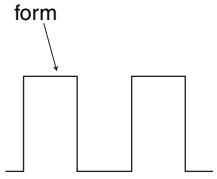


5-2 IC-U82 ADJUSTMENT

5-2-1 KEY OPERATION FOR THE ADJUSTMENT

- Rotate [VOL] to adjust the value.
- Push [D•CLR] key to store the adjustment value and move to next adjustment item.
- Push [▲]/[▼] key to move to next adjustment item without changing the value.

5-2-2 ADJUSTMENT

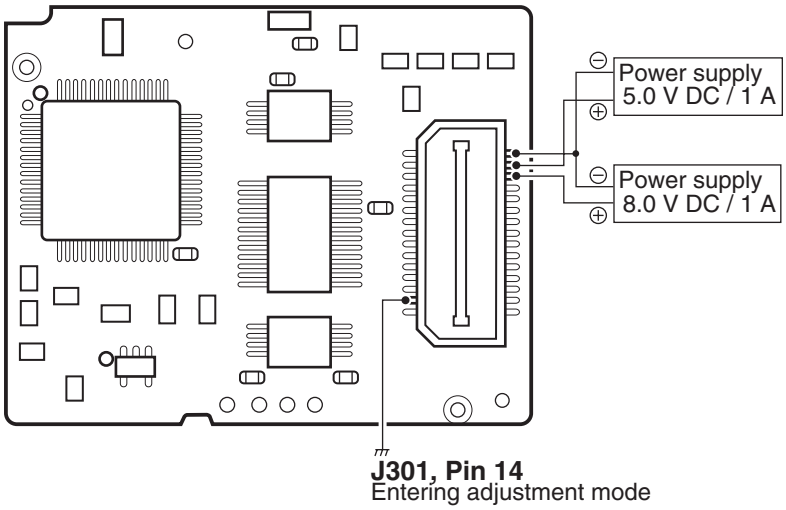
ADJUSTMENT		ADJUSTMENT CONDITION	OPERATION
ENTERING ADJUSTMENT MODE	1	• Connect the JIG to the [SP] jack (see page 5-1).	
	2	• While pushing [▲], [▼] and [D•CLR] keys, turn power ON.	
REFERENCE FREQUENCY (other than USA) Fr 432.00	1	• Connect an RF power meter or dummy load to the antenna connector, and loosely couple the frequency counter to the antenna connector. • Transmitting	• Rotate [VOL] to set to 432.000 MHz ±100Hz. • Push [D•CLR] key.
(USA version) Fr 445.00			• Rotate [VOL] to set to 445.000 MHz ±100Hz. • Push [D•CLR] key.
TRANSMIT LOCK VOLTAGE (other than USA) LU 445.00	1	• Transmitting	• Push [D•CLR] key, then push [▼] key. (Do not release [PTT] button when pushing [D•CLR] key.)
(USA version) LU 432.00			
OUTPUT POWER (High) (other than USA) Po 432.00	1	• Connect an RF power meter to the antenna connector. • Transmitting	• Rotate [VOL] to set the transmit power to 5.0 W. • Push [D•CLR] key.
(USA version) Po 445.00			
(Middle) (other than USA) Po 432.00 M	2	• Transmitting	• Rotate [VOL] to set the transmit power to 2.0 W. • Push [D•CLR] key.
(USA version) Po 445.00 M			
(Low) (other than USA) Po 432.00 L	3	• Transmitting	• Rotate [VOL] to set the transmit power to 0.5 W. • Push [D•CLR] key.
(USA version) Po 445.00 L			
FREQUENCY DEVIATION (other than USA) dE 432.00	1	• Mode : Wide • Connect an FM deviation meter to the antenna connector through an attenuator and set as : HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • Connect an audio generator to [MIC] jack and set as; Frequency : 1 kHz Level : 150 mV rms • Transmitting	• Rotate [VOL] to set to ±4.2 kHz deviation. • Push [D•CLR] key. Set to square wave form 
(USA version) dE 445.00			
DIGITAL VCO FREQUENCY DEVIATION (other than USA) dE 432.00 DV	1	• Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to ±1.20 kHz deviation. • Push [D•CLR] key.
(USA version) dE 445.00 DV			

ADJUSTMENT		ADJUSTMENT CONDITION	OPERATION
DTCS WAVE FORM (other than USA) dt 432.00 (USA version) dt 445.00		• Mode : Wide • Connect an oscilloscope and the FM deviation meter to the antenna connector. • Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • No audio input Transmitting	• Rotate [VOL] to set to square wave form as shown below. • Push [D•CLR] key.
DIGITAL REFERENCE FREQUENCY DEVIATION (other than USA) dt 432.00 DV (USA version) dt 445.00 DV	1	• Set the FM deviation meter as; HPF : OFF LPF : 20 kHz De-emphasis : OFF Detector : (P–P)/2 • No audio input • Transmitting	• Rotate [VOL] to set to ±1.20 kHz deviation. • Push [D•CLR] key.
SENSITIVITY tr 400.02	1	• Connect an SSG to the antenna connector and set as; Frequency : 400.020 MHz Level : 0 dBμ* Modulation : 1 kHz Deviation : ± 3.5 kHz • Receiving	• Push [D•CLR] key.
tr 449.98	2	• Set the SSG as; Frequency : 449.980 MHz Level : 0 dBμ* Modulation : 1 kHz Deviation : ± 3.5 kHz • Receiving	• Push [D•CLR] key.
tr 478.98	3	• Set the SSG as; Frequency : 478.980 MHz Level : 0 dBμ* Modulation : 1 kHz Deviation : ± 3.5 kHz • Receiving	• Push [D•CLR] key.
SQUELCH (other than USA) SQ 435.02 (USA version) SQ 445.02	1	• Set the SSG as; Frequency : 435.020 MHz : 445.020 MHz (USA version) Level : –19 dBμ* Modulation : 1 kHz Deviation : ± 3.5 kHz • Receiving	• Close the squelch once, then set the squelch level at the point where the audio signals just appears.
S-METER (other than USA) Sr 435.02 (USA version) Sr 445.02	1	• Set the SSG as; Frequency : 435.020 MHz : 445.020 MHz (USA version) Level : –6 dBμ* Modulation : 1 kHz Deviation : ± 3.5 kHz • Receiving	• Push [D•CLR] key.
QUITING ADJUSTMENT MODE	1	• Turn power OFF.	
	2	• Disconnect the JIG from [SP] jack.	
	3	• While pushing [MONI] and [D•CLR] keys, turn power ON.	

*; This output level of the standard signal generator (SSG) is indicated as SSG's terminated circuit.

5-3 UT-118 ADJUSTMENT

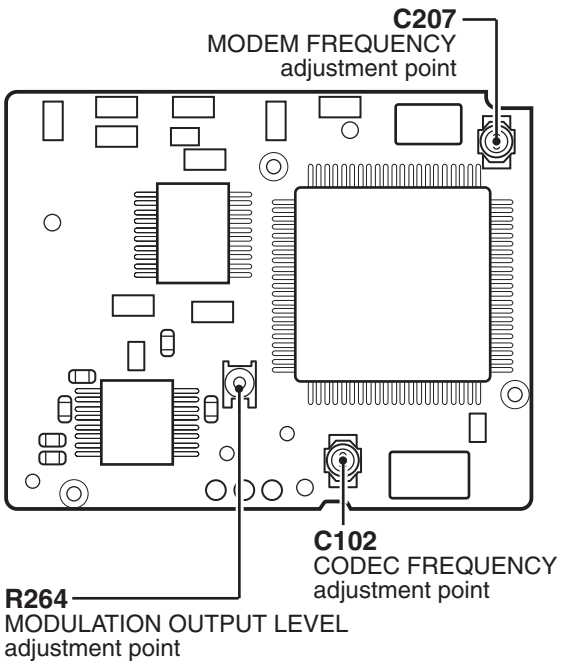
• CONNECTION (BOTTOM VIEW)



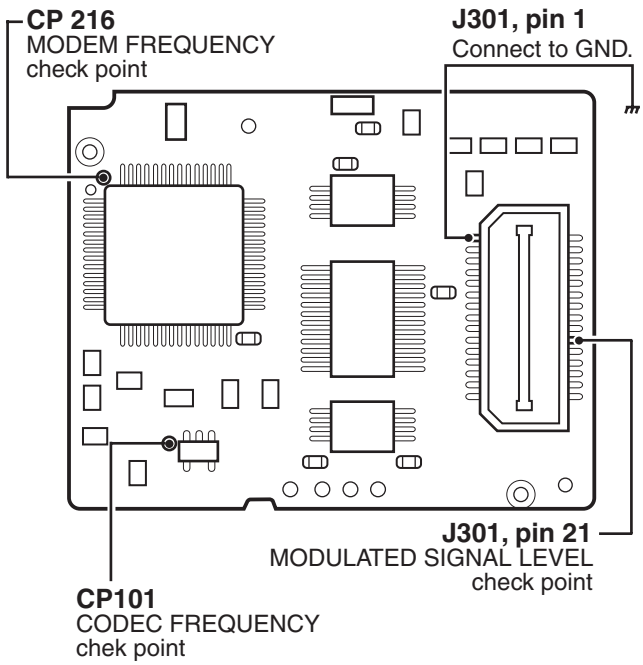
• ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITION	OPERATION
ENTERING ADJUSTMENT MODE		• Connect the pin 14 of J301 to GND to enter the adjustment mode.	
CODEC FREQUENCY	1	• Connect the frequency counter to CP101 through a capacitor (1000 pF).	• Adjust C102 to set to 16.38400 MHz ±10 Hz.
MODEM FREQUENCY	1	• Connect the frequency counter to CP216 through a capacitor (1000 pF).	• Adjust C207 to set to 2.457600 MHz ±3 Hz.
MODURATION OUTPUT LEVEL	1	• Connect the pin 1 of J301 to GND to enter the transmit mode. • Connect the oscilloscope to pin 21 of J301.	• Adjust R264 to set to 350 mVp-p ±10 mV.
	2	• Disconnect the pin 1 of J301 from GND after the adjustment to quit the transmit mode.	
QUITING ADJUSTMENT MODE		• Disconnect the pin 14 of J301 from GND to quit the adjustment mode.	

• UT-118 TOP VIEW



• UT-118 BOTTOM VIEW



SECTION 6 PARTS LIST

6-1 IC-U82

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
IC2	1110003490	S.IC TA31136FN (D)	T	101.7/33.7
IC3	1110006470	S.IC LMV324IPWR	T	103.7/13.2
IC4	1130011770	S.IC CD4066BPWR	T	84.9/14.9
IC5	1110002810	S.IC NJM2070M-TE1	B	67.3/10.2
IC7	1130012430	S.IC S-24CS64A0I-T8T1G	B	26.1/21.5
IC8	1140012480	S.IC M30220MA-135RP [EX2] only	B	43.3/22.9
	1140012490	S.IC M30220MA-136RP Except [EX2]	B	43.3/22.9
IC10	1190000350	S.IC M62363FP-650C	B	65/34.4
IC12	1180002250	S.IC S-812C50AMC-C3E-T2	T	109.8/39.8
IC13	1130011770	S.IC CD4066BPWR	B	10.8/16.8
IC14	1130011770	S.IC CD4066BPWR	B	19.1/21.2
IC15	1130011770	S.IC CD4066BPWR	B	23/10.2
IC16	1130011780	S.IC SN74AHC2G53HDCTR	B	36.3/41.1
IC17	1110005310	S.IC AN6123MS	B	12.3/27.9
IC19	1130011670	S.IC MB15E03SLPFV1-G-BND-ER	T	86.9/33.3
IC20	1130011800	S.IC SN74AHC1G66HDBVR	T	80.9/28
IC21	1110006260	S.IC BD5242G-TR	B	27.6/13.9
IC22	1180002680	S.REG S-812C50BMC-C5E-T2G	B	13.5/35.6
IC23	1110006490	S.IC LMV321IDCKR	B	40.5/40.2
IC24	1180002690	S.REG S-812C36AMC-C2Q-T2G	T	87.3/28.1
IC25	1110006490	S.IC LMV321IDCKR	B	18.4/14.6
Q1	1560001150	S.FET 2SK3476 (TE12L)	T	118/24
Q2	1560001240	S.FET RD01MUS1	T	109.5/24.5
Q3	1530003310	S.TR 2SC5107-O (TE85R)	T	97.6/20.1
Q5	1530003260	S.TR 2SC5006-T1	B	87.3/30.2
Q11	1590001650	S.TR XP4601 (TX)	T	86.5/22.1
Q12	1580000790	S.FET 3SK318YB-TL-E	B	106.7/4.1
Q13	1580000790	S.FET 3SK318YB-TL-E	B	99.7/14.8
Q14	1530003260	S.TR 2SC5006-T1	B	97.5/33.9
Q15	1520000460	S.TR 2SB1132 T100 R	B	61.8/16.3
Q16	1590001190	S.TR XP6501-(TX) AB	B	65.9/18.2
Q17	1590003420	S.TR UNR911FJ-(TX)	B	28/10.6
Q21	1510000510	S.TR 2SA1576A T106R	B	113.3/31.2
Q22	1510000510	S.TR 2SA1576A T106R	B	109.8/32.1
Q25	1530002850	S.TR 2SC4116-BL (TE85R)	T	66.9/4.1
Q31	1590003270	S.TR UNR9210J-(TX)	T	95.7/4.2
Q34	1560000810	S.FET 2SK1069-4-TL	T	74.8/28.1
Q37	1590003230	S.TR UNR9113J-(TX)	T	109.9/15.9
Q38	1590003290	S.TR UNR9213J-(TX)	B	41.1/36.6
Q53	1590001650	S.TR XP4601 (TX)	B	47.4/38.9
Q54	1510000510	S.TR 2SA1576A T106R	B	100.7/26.5
Q55	1520000460	S.TR 2SB1132 T100 R	T	115/39.4
Q56	1590003290	S.TR UNR9213J-(TX)	T	120.3/33.3
Q57	1590001170	S.TR XP1501-(TX) AB	B	119.6/37
Q61	1510000620	S.TR 2SA1576 T106 S	B	14.4/39.9
Q62	1530002850	S.TR 2SC4116-BL (TE85R)	B	11.9/39.8
Q63	1510000510	S.TR 2SA1576A T106R	B	15.5/28.9
Q64	1510000510	S.TR 2SA1576A T106R	B	31.8/42.5
Q65	1530002850	S.TR 2SC4116-BL (TE85R)	B	98.9/24.7
Q67	1590002230	S.TR UMG2N TL	T	94.6/16.9
Q68	1590003290	S.TR UNR9213J-(TX)	T	93.6/13.5
Q73	1530003630	S.TR 2SC4617 TLS	B	61.4/6.3
Q74	1530003580	S.TR 2SC5231C8-TL	B	87.5/23
Q75	1530003580	S.TR 2SC5231C8-TL	B	83.4/22.2
Q76	1530003580	S.TR 2SC5231C8-TL	B	77.4/21.2
Q81	1530002850	S.TR 2SC4116-BL (TE85R)	T	94.9/32.9
Q82	1530002850	S.TR 2SC4116-BL (TE85R)	B	20.4/29.4
Q83	1530002920	S.TR 2SC4226-T1 R25	T	103.8/20
D1	1750000580	S.DIO 1SV307 (TPH3)	B	112.5/12.7
D2	1790000620	S.DIO MA77 (TX)	T	115.9/7.6
D3	1790001620	S.DIO 1SV308 (TPL3)	T	92.6/22.2
D4	1790001260	S.DIO MA2S077-(TX)	T	91.4/19.2
D8	1790000620	S.DIO MA77 (TX)	T	115.9/3.7
D11	1750000710	S.VCP HVC350BTRF	T	104.4/3.2
D12	1750000710	S.VCP HVC350BTRF	B	101.5/4.7
D27	1790000980	S.DIO MA742 (TX)	T	93.4/4.7
D32	1790000980	S.DIO MA742 (TX)	T	114.9/14.1
D33	1790000980	S.DIO MA742 (TX)	T	114.8/16.6
D34	1790000950	S.ZEN MA8056-M (TX)	B	94/8.1
D39	1750000940	S.DIO 1SS400 TE61	B	117.2/38.7
D40	1750000940	S.DIO 1SS400 TE61	B	60.8/43.2
D41	1750000940	S.DIO 1SS400 TE61	B	63.6/43.1
D42	1750000940	S.DIO 1SS400 TE61	B	64.9/43.1
D43	1750000940	S.DIO 1SS400 TE61	B	66.2/43.1
D44	1750000940	S.DIO 1SS400 TE61	B	67.5/43.1
D45	1750000940	S.DIO 1SS400 TE61 Except [EX1], [EX2]	T	58.4/41.8
D46	1750000940	S.DIO 1SS400 TE61 [EX1], [EX2], [EX4] only	T	59.7/41.8
D47	1750000940	S.DIO 1SS400 TE61		

[EU1]=[EUR-1], [EX1]=[EXP-1], [US1]=[USA-1], [EU2]=[EUR-2], [EX2]=[EXP-2]
[US2]=[USA-2], [EU3]=[EUR-3], [EX4]=[EXP-4], [US3]=[USA-3]

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
		[KOR], [EU3], [EX4], [US3] only	T	61/41.8
D48	1750000940	S.DIO 1SS400 TE61 Except [EX1], [EX2]	T	67.1/40.8
D49	1750000940	S.DIO 1SS400 TE61 [EU1], [EU2], [KOR], [EU3] only	T	68.4/40.8
D50	1790000660	S.DIO MA728 (TX)	T	114.2/3.3
D51	1750000940	S.DIO 1SS400 TE61	B	13.6/41.9
D56	1750000770	S.VCP HVC376BTRF	B	33.5/9.8
D59	1750000720	S.VCP HVC375BTRF	B	77.3/27.6
D60	1750000720	S.VCP HVC375BTRF	B	79.8/27.6
D61	1720000650	S.VCP 1SV286 (TPH3)	B	78.2/28.9
D63	1750000370	S.DIO DA221 TL	B	93.4/30.7
D64	1750000940	S.DIO 1SS400 TE61	T	84/37.9
D65	1750000710	S.VCP HVC350BTRF	T	102.3/9.8
D66	1750000940	S.DIO 1SS400 TE61 [EX1], [EX2], [EX4] only	T	67.5/43.3
D67	1750000940	S.DIO 1SS400 TE61 Except [US1], [US2], [US3]	T	66.2/43.3
D68	1750000940	S.DIO 1SS400 TE61 Except [US1], [US2], [US3]	T	64.9/43.3
D69	1750000940	S.DIO 1SS400 TE61 [EX1], [EX2], [KOR], [EX4] only	T	63.6/43.3
D70	1750000940	S.DIO 1SS400 TE61	T	62.3/43.3
D71	1750000940	S.DIO 1SS400 TE61	T	79.6/37.9
D72	1750000580	S.DIO 1SV307 (TPH3)	B	114.3/13
FI1	2030000150	S.MLH FL-335 (46.350 MHz)	B	94.4/25
FI2	2020001590	CER ALFY450F=K		
X2	6050011500	S.XTL CR-739 (9.8304 MHz)	B	46/4.6
X3	6070000190	S.DCR CDBCB450KCAY24-R0	T	96.8/26
X4	6050011940	S.XTL CR-783 (15.3 MHz)	B	84.1/36.9
L1	6200008700	S.COL 0.30-0.9-6TR 17.5N	B	116.9/5.9
L2	6200008240	S.COL 0.30-0.9-5TL 14N	B	115.8/9.2
L4	6200009470	S.COL 0.40-0.9-2TL	B	118.7/13.7
L5	6200008230	S.COL 0.30-1.3-5TL 22N	T	119.8/29.9
L6	6200010410	S.COL ELJRE 1N0Z-F2	T	113.5/28
L7	6200005650	S.COL ELJRE 8N2Z-F	T	99.6/21
L15	6200008700	S.COL 0.30-0.9-6TR 17.5N	T	112.7/9.1
L18	6200007670	S.COL LQW2BHN10NJ01L	T	107.2/5.2
L19	6200007670	S.COL LQW2BHN10NJ01L	T	102.7/3.5
L20	6200003270	S.COL NL 252018T-R56J	B	97.1/17.1
L24	6200007370	S.COL ELJFC R82K-F	B	110/12.9
L26	6200003590	S.COL EXCCL3225U1	T	117.5/33.8
L29	6200005730	S.COL ELJRE 39NG-F	B	95.5/14.4
L32	6200009470	S.COL 0.40-0.9-2TL	T	121/19
L40	6200007900	S.COL ELJRF 22NJF2 (22)	B	86.7/20.3
L41	6200007870	S.COL ELJRF 39NJF2 (39)	B	82.9/20.6
L42	6200011000	S.COL ELJRF 56NJF2 (56)	B	85.7/30
L43	6200005690	S.COL ELJRE 18NG-F	T	88.4/36.8
L44	6200002330	S.COL LQW31HN15NJ01L	B	78.4/25.9
L46	6200002610	S.COL NL 252018T-R47J	B	79.2/31
L47	6200009470	S.COL 0.40-0.9-2TL	B	119.7/17.9
L50	6200003270	S.COL NL 252018T-R56J	B	98.2/31.1
L51	6200004480	S.COL MLF1608D R82K-T	T	96.1/35.7
L55	6200003540	S.COL MLF1608D R22K-T	T	94.2/34.9
L56	6200010540	S.COL C2012C-47NG	B	111.4/3.7
L57	6200007670	S.COL LQW2BHN10NJ01L	B	100.8/11.4
L58	6200010030	S.COL C2012C-15NG	T	113.4/5.9
L59	6200005650	S.COL ELJRE 8N2Z-F	T	106.9/20.1
R1	7030003670	S.RES ERJ3GEYJ 823 V (82 kΩ)	T	118.4/6.8
R2	7030003860	S.RES ERJ3GE JPW V	T	116.9/13.4
R5	7030003200	S.RES ERJ3GEYJ 100 V (10 Ω)	T	114.6/20.8
R7	7030004990	S.RES ERJ2GEJ 221 X (220 Ω)	T	109.1/20.1
R11	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	T	101.9/19.8
R12	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	T	96.6/21.9
R13	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	100.8/24.9
R14	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	94.4/20.9
R15	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	94.4/19.9
R16	7030010040	S.RES ERJ2GE-JPW	T	94.6/21.9
R20	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	B	87.3/28.6
R21	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	B	84.7/28.7
R30	7030008400	S.RES ERJ2GEJ 182 X (1.8 kΩ)	T	86.5/20.2
R44	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	74.9/17.9
R48	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ)	B	77.2/37.5
R49	7030010040	S.RES ERJ2GE-JPW	B	80.7/37.3
R50	7030005700	S.RES ERJ2GEJ 274 X (270 kΩ)	B	79.7/37.3
R52	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ)	T	108.3/11.7
R53	7030005290	S.RES ERJ2GEJ 682 X (6.8 kΩ)	T	109.1/13
R54	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	T	104/16.5

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.	H/V LOCATION
R59	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	106.2/6
R61	7030004970	S.RES ERJ2GEJ 470 X (47 Ω)	T	106.8/7.9
R64	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	T	103.6/6
R66	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	T	101.1/4.1
R68	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	92.6/16.4
R69	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	92.7/18
R70	7030005310	S.RES ERJ2GEJ 124 X (120 kΩ)	B	101.5/14.4
R71	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	B	96.2/19.8
R72	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	B	98.7/12.7
R75	7030004990	S.RES ERJ2GEJ 221 X (220 Ω)	B	100.1/16.6
R77	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	93/20.1
R79	7030009160	S.RES ERJ2GEJ 181 X (180 Ω)	B	95/30.2
R80	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	95.9/32
R81	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	B	102.5/30.9
R82	7030008410	S.RES ERJ2GEJ 392 X (3.9 kΩ)	T	97.9/30.2
R83	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	T	98.4/31.8
R84	7030009280	S.RES ERJ2GEJ 391 X (390 Ω)	T	105/32.8
R85	7030005030	S.RES ERJ2GEJ 152 X (1.5 kΩ)	T	102.9/38
R86	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	98.2/38.4
R87	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	T	97.2/40.4
R88	7030005060	S.RES ERJ2GEJ 333 X (33 kΩ)	T	96.2/38.4
R93	7030005600	S.RES ERJ2GEJ 273 X (27 kΩ)	B	104.6/18
R94	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	107.9/12.4
R95	7030007310	S.RES ERJ2GEJ 155 X (1.5 MΩ)	B	108.5/15
R97	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	T	89.1/15.6
R98	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ)	T	80.7/16.8
R99	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	B	105.1/16
R100	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	105/10.9
R101	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	34.7/12.6
R102	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	B	35.9/13.1
R103	7030008010	S.RES ERJ2GEJ 123 X (12 kΩ)	B	31.5/13.7
R104	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	104.9/15
R105	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	T	98.3/16.9
R107	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ)	T	81.1/15.8
R108	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	T	99.4/14.4
R112	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	T	88.5/13.8
R113	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	T	81.1/14.7
R114	7030008290	S.RES ERJ2GEJ 183 X (18 kΩ)	T	97.5/13.7
R115	7030005310	S.RES ERJ2GEJ 124 X (120 kΩ)	T	96.8/12.7
R117	7030005030	S.RES ERJ2GEJ 152 X (1.5 kΩ)	T	96.8/11.7
R120	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	62.6/20.4
R121	7030005030	S.RES ERJ2GEJ 152 X (1.5 kΩ)	B	65.9/20.4
R122	7030009140	S.RES ERJ2GEJ 272 X (2.7 kΩ)	B	65.3/16.2
R123	7030005290	S.RES ERJ2GEJ 682 X (6.8 kΩ)	B	66.9/20.4
R126	7030005310	S.RES ERJ2GEJ 124 X (120 kΩ)	B	63.5/6.6
R127	7030007260	S.RES ERJ2GEJ 330 X (33 Ω)	B	67.4/14.6
R128	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	B	73.8/4.4
R130	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	29.6/10.6
R131	7030008400	S.RES ERJ2GEJ 182 X (1.8 kΩ)	B	26.5/10.5
R132	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	B	93.7/2.5
R136	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	23.5/40.9
R137	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	20.6/16.9
R139	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	110.5/35
R141	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	B	107.2/32.1
R144	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	B	82.4/3.2
R148	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	29.9/14.1
R150	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	B	69.1/27.9
R155	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	68.1/2.3
R159	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	105/11.9
R160	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	109.2/9.5
R161	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	111.8/14
R162	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	111.8/15
R163	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	T	111.3/12.6
R164	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	26.9/28.9
R169	7030007350	S.RES ERJ2GEJ 393 X (39 kΩ)	T	76.3/18.2
R170	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	79.6/13.5
R174	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	T	93.4/2.8
R176	7030008410	S.RES ERJ2GEJ 392 X (3.9 kΩ)	B	103.3/17.5
R177	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	99.7/16.7
R178	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	107.1/15.5
R181	7030010080	S.RES ERJ2RHD 104 X (100 kΩ)	B	45.4/8.2
R182	7510001660	S.TMR NTCG16 4LH 473KT	B	49.8/8.8
R184	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	T	75.3/29.9
R185	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	76/25.9
R186	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	74.7/22.4
R187	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	104.9/7.4
R193	7030005720	S.RES ERJ2GEJ 563 X (56 kΩ)	B	50.2/12
R194	7030005720	S.RES ERJ2GEJ 563 X (56 kΩ)	B	48.6/12.4
R195	7030005720	S.RES ERJ2GEJ 563 X (56 kΩ)	B	48.8/13.4
R196	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	49.3/10.9
R204	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	65.1/3.7
R205	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	T	66.5/2.3
R210	7030008410	S.RES ERJ2GEJ 392 X (3.9 kΩ)	T	108.7/14.3
R222	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	106.4/2.6
R224	7030007350	S.RES ERJ2GEJ 393 X (39 kΩ)	B	47.7/9.2
R225	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	25.8/17.2
R227	7030008410	S.RES ERJ2GEJ 392 X (3.9 kΩ)	B	47.8/10.4
R228	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	25.8/16.2
R240	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	29.9/15.8
R244	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	102.5/31.9
R245	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	32.5/17.7
R246	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	36.1/14.3
R251	7030005230	S.RES ERJ2GEJ 334 X (330 kΩ)	T	105.5/18.6

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R252	7030005310	S.RES ERJ2GEJ 124 X (120 kΩ)	B	108.8/2.6
R257	7030010040	S.RES ERJ2GE-JPW	T	88.1/16.5
R258	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	T	107.7/3.2
R259	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	103.7/3
R260	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	B	109.7/34
R261	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	115.5/35.2
R262	7030005530	S.RES ERJ2GEJ 100 X (10 Ω)	B	98.6/20.3
R266	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	B	23.9/17.4
R318	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	B	51.4/37.2
R319	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	B	47.4/36.1
R320	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	B	47.4/37.1
R321	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	50.2/38.3
R323	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	45.4/37.9
R324	7030007570	S.RES ERJ2GEJ 122 X (1.2 kΩ)	B	45.7/39.6
R325	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	B	49.3/40.6
R326	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	B	51.4/39.2
R327	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	45.1/36.6
R328	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	101/28.4
R329	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	100.5/30
R330	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	117.6/37.5
R331	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	119.4/38.8
R332	7030005290	S.RES ERJ2GEJ 682 X (6.8 kΩ)	B	119.2/35
R333	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	122.8/30.4
R334	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	120.8/34.2
R335	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	117.9/35.7
R336	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	49.2/38.3
R337	7030007310	S.RES ERJ2GEJ 155 X (1.5 MΩ)	T	87.6/18.4
R340	7030005600	S.RES ERJ2GEJ 273 X (27 kΩ)	T	113.9/18.4
R341	7030005600	S.RES ERJ2GEJ 273 X (27 kΩ)	T	115.2/18.7
R346	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	30.9/15.8
R357	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	T	112.1/18.4
R358	7030005600	S.RES ERJ2GEJ 273 X (27 kΩ)	T	110.6/20
R362	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	29.8/32.3
R363	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	B	11.4/41.9
R364	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	10.1/40.1
R367	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	15.5/30.7
R368	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	15/32
R369	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	31.8/40.6
R370	7030005170	S.RES ERJ2GEJ 474 X (470 kΩ)	B	33.1/40.1
R371	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	10.1/24.8
R372	7030009290	S.RES ERJ2GEJ 562 X (5.6 kΩ)	B	9.1/26.5
R373	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	13.2/23
R374	7030005010	S.RES ERJ2GEJ 681 X (680 Ω)	B	12.2/23
R375	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	10.1/28.3
R376	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	17.2/30
R377	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	B	38.7/38.8
R378	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	38.7/40.4
R379	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	38.7/41.9
R380	7030005170	S.RES ERJ2GEJ 474 X (470 kΩ)	B	40.3/41.9
R381	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	27.1/42.3
R382	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	26.9/27.9
R384	7030005060	S.RES ERJ2GEJ 333 X (33 kΩ)	B	22.6/5.9
R385	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	20.9/5.2
R386	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	17.4/32.7
R387	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	B	98.2/28.9
R388	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	92/25.3
R389	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	99.3/22.8
R397	7030008400	S.RES ERJ2GEJ 182 X (1.8 kΩ)	T	96.9/16.1
R398	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	35.8/8.6
R402	7030010040	S.RES ERJ2GE-JPW	T	89.9/29.1
R405	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	60.1/7.7
R406	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	57.2/5.7
R413	7030010040	S.RES ERJ2GE-JPW	T	106/16.6
R417	7030010040	S.RES ERJ2GE-JPW	B	91.6/16.6
R418	7030010040	S.RES ERJ2GE-JPW	B	93.1/14.3
R419	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	90.3/15.8
R420	7030007290	S.RES ERJ2GEJ 222 X (2.2 kΩ)	T	90.2/19.5
R422	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	85.7/22.3
R423	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	84.9/23.6
R424	7030008410	S.RES ERJ2GEJ 392 X (3.9 kΩ)	B	86.3/24.9
R426	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	79.5/20.7
R427	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	81.6/20.1
R428	7030008410	S.RES ERJ2GEJ 392 X (3.9 kΩ)	B	80.8/21.7
R430	7030007250	S.RES ERJ2GEJ 220 X (22 Ω)	B	86.3/25.9
R431	7030005600	S.RES ERJ2GEJ 273 X (27 kΩ)	B	87.3/27.6
R432	7030007310	S.RES ERJ2GEJ 155 X (1.5 MΩ)	T	90.9/37.9
R433	7030004970	S.RES ERJ2GEJ 470 X (47 Ω)	B	77.9/19.6
R434	7030007300	S.RES ERJ2GEJ 332 X (3.3 kΩ)	B	75.9/21.5
R435	7030008280	S.RES ERJ2GEJ 271 X (270 Ω)	B	80.9/23.3
R436	7030009290	S.RES ERJ2GEJ 562 X (5.6 kΩ)	B	77.8/24.1
R440	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	76.5/30.3
R441	7030007320	S.RES ERJ2GEJ 225 X (2.2 MΩ)	T	80/30.2
R442	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	78.8/31
R443	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	75.6/32.7
R444	7030005310	S.RES ERJ2GEJ 124 X (120 kΩ)	T	75.6/33.7
R445	7030008400	S.RES ERJ2GEJ 182 X (1.8 kΩ)	T	78.8/32.4
R446	7030005000	S.RES ERJ2GEJ 471 X (470 Ω)	T	75.2/31.2
R447	7030007570	S.RES ERJ2GEJ 122 X (1.2 kΩ)	T	81.7/25.8
R448	7030005010	S.RES ERJ2GEJ 681 X (680 Ω)	T	83/26.7
R449	7030007250	S.RES ERJ2GEJ 220 X (22 Ω)	T	83/28.4
R455	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	95.3/33.3
R456	7030010040	S.RES ERJ2GE-JPW	B	95.3/34.3
R457	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	74.8/37.6

[EU1]=[EUR-1], [EX1]=[EXP-1], [US1]=[USA-1], [EU2]=[EUR-2], [EX2]=[EXP-2]
[US2]=[USA-2], [EU3]=[EUR-3], [EX4]=[EXP-4], [US3]=[USA-3]

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.	H/V LOCATION
R458	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	77.3/36.9
R459	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	74.7/36.5
R460	7030008290	S.RES ERJ2GEJ 183 X (18 kΩ)	T	81/36.7
R463	7030007060	S.RES ERJ2GEJ 684X (680 kΩ)	T	93.2/32.2
R465	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	91.9/32.7
R467	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	T	102.2/8.6
R469	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	89.5/35.4
R473	7030010040	S.RES ERJ2GE-JPW		
		[EX1], [EX2], [EX4] only	B	54.2/29.3
R474	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	31.9/15.4
R475	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	36.1/15.3
R476	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	28.8/32.3
R477	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	B	27.8/32.3
R478	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	26.9/29.9
R479	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	26.9/30.9
R480	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	20.6/17.9
R482	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	25.1/32.4
R483	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	25.1/31.4
R484	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	25.1/30.4
R485	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	9.1/40.1
R486	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	T	94.4/11.2
R487	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	76/36
R488	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	79.3/35.5
R489	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	76.1/38.1
R491	7030005110	S.RES ERJ2GEJ 224 X (220 kΩ)	B	45/10.4
R492	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	44.3/9.4
R493	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	44.2/8.4
R494	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	40.1/11.2
R495	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	40.8/8.1
R496	7030007340	S.RES ERJ2GEJ 153 X (15 kΩ)	B	19.2/31.2
R497	7030007320	S.RES ERJ2GEJ 225 X (2.2 MΩ)	B	20.2/27.7
R498	7030005080	S.RES ERJ2GEJ 823 X (82 kΩ)	B	19/27.3
R499	7030005080	S.RES ERJ2GEJ 823 X (82 kΩ)	B	19/25.7
R500	7030010010	S.RES ERJ2RKF 334 X (330 kΩ)	B	37.4/10.4
R501	7030005471	S.RES ERA3YKD 244V (240 kΩ)	B	38/8.5
R502	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	37.6/12.4
R503	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	108.8/9.6
R504	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	79.4/39.4
R506	7030007250	S.RES ERJ2GEJ 220 X (22 Ω)	T	102.1/23
R507	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	37.8/36.3
R508	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	20.6/15.9
R509	7030005170	S.RES ERJ2GEJ 474 X (470 kΩ)	B	20.2/14.6
R510	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	18.1/16.4
R511	7030008300	S.RES ERJ2GEJ 184 X (180 kΩ)	B	16.6/14.6
R512	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	38.3/37.6
R513	7030005070	S.RES ERJ2GEJ 683 X (68 kΩ)	B	65.8/14.6
R514	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	78.4/37.2
R515	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	91.8/27.8
R516	7030009320	S.RES ERJ2GEJ 4R7 X (4.7 Ω)	T	108/20.2
R517	7030005230	S.RES ERJ2GEJ 334 X (330 kΩ)	B	80.3/35.9
R518	7030005100	S.RES ERJ2GEJ 154 X (150 kΩ)	B	79.1/35.4
R519	7030005290	S.RES ERJ2GEJ 682 X (6.8 kΩ)	T	101.1/23
R520	7030003860	S.RES ERJ3GE JPW V	T	90.7/21
R521	7030010040	S.RES ERJ2GE-JPW	B	25.3/41.7
R522	7030005310	S.RES ERJ2GEJ 124 X (120 kΩ)	B	97.6/14.8
R523	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	97.5/12.5
R524	7030003860	S.RES ERJ3GE JPW V	T	113.3/20.8
R525	7030010040	S.RES ERJ2GE-JPW	B	96.6/14.8
R527	7030003860	S.RES ERJ3GE JPW V	B	109.9/6.1
R528	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	78.1/39
C1	4030009910	S.CER C1608 CH 1H 040B-T	B	119.4/6
C2	4030009500	S.CER C1608 CH 1H 0R5B-T	B	116.8/4.3
C3	4030006990	S.CER C1608 CH 1H 080D-T	B	118.1/8.5
C4	4030009520	S.CER C1608 CH 1H 020B-T	B	114.1/8.7
C5	4030009350	S.CER C1608 CH 1H 3R5B-T	B	118.1/10.5
C8	4030006860	S.CER C1608 JB 1H 102K-T	B	113.5/10.5
C10	4030017460	S.CER ECJ0EB1E102K	T	110.3/12.6
C13	4030017460	S.CER ECJ0EB1E102K	T	116.1/20
C14	4030016790	S.CER ECJ0EB1C103K	T	118/30.4
C15	4030007080	S.CER C1608 CH 1H 390J-T	T	113.1/22.7
C17	4030017460	S.CER ECJ0EB1E102K	T	110.1/18.7
C18	4030017460	S.CER ECJ0EB1E102K	B	113.3/18.4
C19	4030017730	S.CER ECJ0EB1E471K	T	114.9/28.9
C20	4030017460	S.CER ECJ0EB1E102K	T	119.8/35.9
C21	4550006480	S.TAN TEESVA 1C 475M8L	T	113.6/31.3
C22	4030017640	S.CER ECJ0EC1H150J	T	100.8/19.8
C23	4030017590	S.CER ECJ0EC1H070C	T	100.8/21.4
C24	4030017460	S.CER ECJ0EB1E102K	T	98.2/21.9
C25	4030017620	S.CER ECJ0EC1H100C	T	95.7/20.6
C26	4030017460	S.CER ECJ0EB1E102K	T	92.8/21
C32	4030017460	S.CER ECJ0EB1E102K	B	86/28.3
C50	4550006250	S.TAN TEESVA 1A 106M8L	T	82/21.3
C52	4030006950	S.CER C1608 CH 1H 040C-T	T	115.4/9.2
C54	4030017460	S.CER ECJ0EB1E102K	T	91.9/33.7
C70	4030017460	S.CER ECJ0EB1E102K	B	77.2/35.9
C73	4030016930	S.CER ECJ0EB1A104K	T	109.3/11.7
C75	4030016930	S.CER ECJ0EB1A104K	T	104/17.5
C76	4030009920	S.CER C1608 CH 1H 050B-T	T	115.4/10.7
C79	4030017460	S.CER ECJ0EB1E102K	B	113.4/3.8
C82	4030017460	S.CER ECJ0EB1E102K	T	110.3/5.6
C87	4030016790	S.CER ECJ0EB1C103K	B	107.1/7
C88	4030017460	S.CER ECJ0EB1E102K	B	107.8/6

[EU1]=[EUR-1], [EX1]=[EXP-1], [US1]=[USA-1], [EU2]=[EUR-2], [EX2]=[EXP-2]
[US2]=[USA-2], [EU3]=[EUR-3], [EX4]=[EXP-4], [US3]=[USA-3]

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C89	4030017460	S.CER ECJ0EB1E102K	B	104.7/5.2
C90	4030017460	S.CER ECJ0EB1E102K	T	109.5/6.6
C92	4030017630	S.CER ECJ0EC1H120J	T	104.6/5.3
C93	4030017460	S.CER ECJ0EB1E102K	T	102.3/6.5
C94	4030017340	S.CER ECJ0EC1H010B	B	103.3/5.8
C95	4030017460	S.CER ECJ0EB1E102K	T	99.8/4.3
C96	4030017630	S.CER ECJ0EC1H120J	B	102/3
C97	4030017570	S.CER ECJ0EC1H040B	B	102.6/4.3
C99	4030017460	S.CER ECJ0EB1E102K	B	91.7/18.8
C102	4030017600	S.CER ECJ0EC1H080C	B	94.3/13.9
C104	4030017460	S.CER ECJ0EB1E102K	B	101.7/16.4
C105	4030016790	S.CER ECJ0EB1C103K	B	100.1/17.6
C106	4030017390	S.CER ECJ0EC1H180J	B	96.2/18.8
C107	4030017460	S.CER ECJ0EB1E102K	B	94.6/17.5
C108	4030016790	S.CER ECJ0EB1C103K	B	94.3/20.3
C111	4030016790	S.CER ECJ0EB1C103K	B	93.1/32.3
C112	4030017460	S.CER ECJ0EB1E102K	T	97.4/32.8
C113	4030017460	S.CER ECJ0EB1E102K	T	97.1/31.2
C114	4030017040	S.CER ECJ0EB1A333K	T	102.1/29
C115	4030017460	S.CER ECJ0EB1E102K	B	99.8/33.6
C116	4030017680	S.CER ECJ0EC1H820J	T	101.1/28.9
C117	4030017460	S.CER ECJ0EB1E102K	T	95.8/30.6
C118	4030016790	S.CER ECJ0EB1C103K	T	102.9/39
C119	4030018860	S.CER ECJ0EB0J105K	T	93.6/29.9
C120	4030016930	S.CER ECJ0EB1A104K	T	100.4/38.2
C121	4030017440	S.CER ECJ0EC1H221J	T	97.2/39.4
C122	4030017440	S.CER ECJ0EC1H221J	T	97.2/37.4
C123	4030017460	S.CER ECJ0EB1E102K	B	70.8/38.6
C124	4030016790	S.CER ECJ0EB1C103K	B	104.6/17
C125	4030017760	S.CER ECJ0EB1H222K	B	109.5/16
C126	4030018110	S.CER ECJ0EB1H272K	B	110.5/16
C128	4030016930	S.CER ECJ0EB1A104K	T	81.6/13.5
C129	4550002960	S.TAN TEESVA 1C 155M8L	B	104.9/13.4
C131	4030016790	S.CER ECJ0EB1C103K	T	88.1/11.7
C132	4030018240	S.CER ECJ0EB1E562K	B	23.9/15.8
C133	4030016930	S.CER ECJ0EB1A104K	T	96.9/17.3
C134	4030017440	S.CER ECJ0EC1H221J	T	99/15.7
C135	4030017450	S.CER ECJ0EB1E271K	T	98/12.2
C136	4030018240	S.CER ECJ0EB1E562K	T	95.7/13.7
C137	4030017040	S.CER ECJ0EB1A333K	T	95.5/12.2
C138	4030017460	S.CER ECJ0EB1E102K	B	104.7/3
C139	4030018860	S.CER ECJ0EB0J105K	B	63.8/20.4
C144	4030017460	S.CER ECJ0EB1E102K	B	30.2/17.4
C145	4510008540	S.ELE EEE1CA100SR	B	61.8/11
C147	4030016950	S.CER ECJ0EB1A473K	B	30.6/10.6
C149	4030016790	S.CER ECJ0EB1C103K	B	63.5/5.6
C150	4550000460	S.TAN TEESVA 1C 105M8L	B	68.9/16.1
C152	4030016950	S.CER ECJ0EB1A473K	B	72.5/3.9
C153	4510008500	S.ELE EEE1CA101WP	B	80.8/11.1
C154	4550006220	S.TAN TEESVA 0J 156M8L	B	27.2/6.8
C161	4030016790	S.CER ECJ0EB1C103K	B	111.6/31.5
C162	4030016790	S.CER ECJ0EB1C103K	B	109.2/35.3
C163	4030017460	S.CER ECJ0EB1E102K	B	83.4/3.2
C164	4030017460	S.CER ECJ0EB1E102K	B	72.5/2.9
C165	4030017460	S.CER ECJ0EB1E102K	B	92.6/7.4
C166	4030017460	S.CER ECJ0EB1E102K	B	93.7/4.5
C167	4030017420	S.CER ECJ0EC1H470J	B	92.8/5.7
C168	4030017460	S.CER ECJ0EB1E102K	B	92.1/9.4
C169	4030017460	S.CER ECJ0EB1E102K	B	84.2/6.8
C171	4030016930	S.CER ECJ0EB1A104K	B	65.5/5.9
C173	4510008500	S.ELE EEE1CA101WP	B	111.8/39.9
C174	4510008660	S.ELE EEE0JA220SR	B	117.5/32
C179	4030016790	S.CER ECJ0EB1C103K	T	106/17.6
C193	4030017530	S.CER ECJ0EC1H0R5B	B	33.5/13.6
C194	4030017600	S.CER ECJ0EC1H080C	B	35.5/11.6
C195	4030017500	S.CER ECJ0EC1H560J	B	33/12.6
C197	4030016930	S.CER ECJ0EB1A104K	B	33.1/14.8
C199	4030016930	S.CER ECJ0EB1A104K	B	46.5/11
C204	4030017460	S.CER ECJ0EB1E102K	B	109/11.2
C205	4030006860	S.CER C1608 JB 1H 102K-T	B	116.3/13.2
C209	4030016930	S.CER ECJ0EB1A104K	B	29/8.8
C212	4030016790	S.CER ECJ0EB1C103K	T	79.8/17.9
C213	4550002890	S.TAN TEESVA 1A 225M8L	T	77.3/16.4
C214	4030017040	S.CER ECJ0EB1A333K	T	80.6/13.5
C216	4030018920	S.CER ECJ0EB1H392K	B	39.6/37.2
C217	4030016930	S.CER ECJ0EB1A104K	T	101.2/17.5
C219	4030017040	S.CER ECJ0EB1A333K	B	46.4/8.7
C230	4030017030	S.CER ECJ0EB1A273K	B	27.4/16.1
C232	4030016930	S.CER ECJ0EB1A104K	B	49.9/9.9
C233	4030017460	S.CER ECJ0EB1E102K	T	74.7/21.4
C234	4030017460	S.CER ECJ0EB1E102K	T	75.7/24.6
C236	4030016790	S.CER ECJ0EB1C103K	B	67.5/27.9
C243	4030017460	S.CER ECJ0EB1E102K	B	112.2/16.4
C244	4030016790	S.CER ECJ0EB1C103K	B	65.7/29.4
C245	4030016790	S.CER ECJ0EB1C103K	B	59.5/38.7
C249	4030016790	S.CER ECJ0EB1C103K	B	50.9/41.1
C251	4030017460	S.CER ECJ0EB1E102K	T	111.8/16
C252	4030017460	S.CER ECJ0EB1E102K	T	113.1/13.5
C277	4030017400	S.CER ECJ0EC1H220J	B	108.8/4.7
C278	4030009910	S.CER C1608 CH 1H 040B-T	B	116.3/14.5
C281	4030006860	S.CER C1608 JB 1H 102K-T	B	118.1/16.1
C282	4030017460	S.CER ECJ0EB1E102K	T	109.4/34.2
C283	4030017760	S.CER ECJ0EB1H222K	T	119.8/34.9

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.	H/V LOCATION
C284	4030007080	S.CER C1608 CH 1H 390J-T	T	122.2/20.6
C287	4030009910	S.CER C1608 CH 1H 040B-T	B	121.1/14.7
C288	4030017460	S.CER ECJ0EB1E102K	B	110.8/9.4
C289	4030017460	S.CER ECJ0EB1E102K	T	121.5/30.1
C293	4030016930	S.CER ECJ0EB1A104K	T	82.3/37.2
C296	4030017730	S.CER ECJ0EB1E471K	B	35.8/10.6
C297	4030016790	S.CER ECJ0EB1C103K	B	35.8/9.6
C298	4550005980	S.TAN TEESVA 1A 475M8L	B	109.8/18.4
C299	4030017730	S.CER ECJ0EB1E471K	B	93.7/3.5
C300	4030017460	S.CER ECJ0EB1E102K	B	84.7/29.9
C301	4030017460	S.CER ECJ0EB1E102K	T	89.3/23
C303	4030017460	S.CER ECJ0EB1E102K	T	103.1/29
C304	4030016950	S.CER ECJ0EB1A473K	B	22.6/16.9
C305	4030017730	S.CER ECJ0EB1E471K	T	111.2/36.4
C351	4030017570	S.CER ECJ0EC1H040B	B	97.6/21.4
C369	4030017040	S.CER ECJ0EB1A333K	B	49.2/36.7
C370	4030018080	S.CER ECJ0EB1H182K	B	46.2/36.6
C372	4030016970	S.CER ECJ0EB1C223K	B	44.2/38.4
C373	4030017790	S.CER ECJ0EB1E682K	B	52.7/38.9
C374	4030017760	S.CER ECJ0EB1H222K	B	43.8/36.6
C375	4030017460	S.CER ECJ0EB1E102K	B	102.1/29.7
C376	4030017460	S.CER ECJ0EB1E102K	T	109.4/36.7
C377	4550006350	S.TAN TEESVB2 1A 226M8L	T	119.7/39.2
C378	4030016930	S.CER ECJ0EB1A104K	B	121.3/39.2
C379	4030017460	S.CER ECJ0EB1E102K	T	117.2/41.8
C380	4510008660	S.ELE EEE0JA220SR	B	118.3/41.7
C381	4550006250	S.TAN TEESVA 1A 106M8L	T	110.6/42.5
C385	4030016930	S.CER ECJ0EB1A104K	B	120.8/33.2
C386	4030017590	S.CER ECJ0EC1H070C	T	97.3/36
C387	4030017360	S.CER ECJ0EC1H030B	T	97.7/34.8
C398	4550005980	S.TAN TEESVA 1A 475M8L	B	105.9/30.6
C399	4030017770	S.CER ECJ0EB1E332K	B	62.9/7.6
C400	4030017760	S.CER ECJ0EB1H222K	T	111.4/37.7
C401	4030016790	S.CER ECJ0EB1C103K	B	18.5/40.6
C402	4030016930	S.CER ECJ0EB1A104K	B	16.4/40.9
C404	4550007080	S.TAN TEESVA 1C 106M8R	B	17.6/42.5
C405	4030017460	S.CER ECJ0EB1E102K	B	13/37.8
C406	4550006700	S.TAN ECST1AY106R	B	10.4/30.6
C407	4550006250	S.TAN TEESVA 1A 106M8L	B	10.3/32.7
C408	4030017460	S.CER ECJ0EB1E102K	B	15.5/26.6
C409	4030018860	S.CER ECJ0EB0J105K	B	10.1/23
C410	4030016930	S.CER ECJ0EB1A104K	B	13.2/24.8
C411	4030016930	S.CER ECJ0EB1A104K	B	10.1/26.5
C412	4030016790	S.CER ECJ0EB1C103K	B	34.1/40.1
C413	4030017460	S.CER ECJ0EB1E102K	B	29.7/42.4
C414	4030017460	S.CER ECJ0EB1E102K	B	14.5/13.3
C415	4030017460	S.CER ECJ0EB1E102K	B	22.6/17.9
C416	4030017460	S.CER ECJ0EB1E102K	B	19.7/8.2
C417	4030016930	S.CER ECJ0EB1A104K	B	98.2/27.9
C418	4030016930	S.CER ECJ0EB1A104K	B	99.4/21.8
C421	4030016930	S.CER ECJ0EB1A104K	T	105/34.6
C422	4030016930	S.CER ECJ0EB1A104K	T	101.7/38.6
C423	4030017490	S.CER C1608 JB 1A 105K-T	T	96.2/14.9
C424	4030016790	S.CER ECJ0EB1C103K	B	34/11.2
C425	4030016790	S.CER ECJ0EB1C103K	B	52.8/30.9
C429	4030018860	S.CER ECJ0EB0J105K	B	92/35.2
C430	4030016790	S.CER ECJ0EB1C103K	T	89.5/27.8
C431	4030017460	S.CER ECJ0EB1E102K	B	59.9/6.1
C432	4030018860	S.CER ECJ0EB0J105K	B	58.9/6.1
C438	4030017460	S.CER ECJ0EB1E102K	B	88.7/15.7
C439	4030016790	S.CER ECJ0EB1C103K	T	114.9/27.9
C440	4030017600	S.CER ECJ0EC1H080C	B	87.9/21
C441	4030017460	S.CER ECJ0EB1E102K	B	85.1/20.8
C442	4030017460	S.CER ECJ0EB1E102K	B	85.9/23.6
C443	4030017420	S.CER ECJ0EC1H470J	T	77.3/20.7
C444	4030017570	S.CER ECJ0EC1H040B	B	85/25.2
C445	4030017360	S.CER ECJ0EC1H030B	B	86.7/21.3
C446	4030017570	S.CER ECJ0EC1H040B	B	83.9/24
C447	4030017360	S.CER ECJ0EC1H030B	B	82.9/19.6
C448	4030017530	S.CER ECJ0EC1H0R5B	B	79.5/21.8
C449	4030017460	S.CER ECJ0EB1E102K	T	88.2/23
C450	4030017460	S.CER ECJ0EB1E102K	B	80.3/19.7
C451	4030017360	S.CER ECJ0EC1H030B	B	87.8/26.3
C452	4030017570	S.CER ECJ0EC1H040B	B	87.3/31.7
C453	4030017420	S.CER ECJ0EC1H470J	B	85.6/31.2
C454	4030017360	S.CER ECJ0EC1H030B	T	88.4/37.9
C455	4030017380	S.CER ECJ0EC1H050B	T	90.9/36.9
C456	4030007020	S.CER C1608 CH 1H 120J-T	B	79.7/23.6
C457	4030007020	S.CER C1608 CH 1H 120J-T	B	77.8/22.9
C458	4030017460	S.CER ECJ0EB1E102K	B	76.3/19.7
C459	4030017460	S.CER ECJ0EB1E102K	T	79.9/19.6
C460	4030009920	S.CER C1608 CH 1H 050B-T	B	76/23.6
C461	4030017520	S.CER ECJ0EC1H0R3B	B	76.5/29
C463	4030017460	S.CER ECJ0EB1E102K	B	91.4/20.1
C465	4030017460	S.CER ECJ0EB1E102K	B	77/31.6
C466	4030007010	S.CER C1608 CH 1H 100D-T	B	115.5/18.5
C469	4030009520	S.CER C1608 CH 1H 020B-T	T	112/20.7
C471	4030011600	S.CER C1608 JB 1E 104K-T	T	77.8/33.5
C472	4550006050	S.TAN TEESVA 0J 106M8L	T	78.4/24.6
C473	4550000550	S.TAN TEESVA 1V 224M8L	T	85/24.5
C474	4550000530	S.TAN TEESVA 1V 104M8L	T	77.1/29.7
C475	4030017460	S.CER ECJ0EB1E102K	T	76.8/24.6
C476	4030017460	S.CER ECJ0EB1E102K	T	79.9/25.5

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
C477	4030017460	S.CER ECJ0EB1E102K	T	91.9/30.2
C478	4030017460	S.CER ECJ0EB1E102K	B	97.6/19.1
C479	4030016790	S.CER ECJ0EB1C103K	B	94.9/32
C482	4030017460	S.CER ECJ0EB1E102K	B	101/31.3
C486	4030016930	S.CER ECJ0EB1A104K	T	91.6/28.8
C487	4030017420	S.CER ECJ0EC1H470J	T	83.6/36.7
C488	4030017730	S.CER ECJ0EB1E471K	T	85.4/36.7
C489	4030017460	S.CER ECJ0EB1E102K	T	90.6/26.9
C491	4030017500	S.CER ECJ0EC1H560J	T	94.6/37.1
C492	4030017570	S.CER ECJ0EC1H040B	T	94.6/36.1
C493	4030017460	S.CER ECJ0EB1E102K	T	92/24.2
C496	4030016790	S.CER ECJ0EB1C103K	T	93.3/36.4
C497	4030017380	S.CER ECJ0EC1H050B	T	91.9/31.2
C499	4030017570	S.CER ECJ0EC1H040B	T	106.5/3.6
C500	4030018860	S.CER ECJ0EB0J105K	T	108.1/7.4
C502	4030017340	S.CER ECJ0EC1H010B	B	103.6/6.8
C503	4030017340	S.CER ECJ0EC1H010B	B	102.4/7
C504	4030017540	S.CER ECJ0EC1HR75B	B	102.7/8.6
C505	4030017630	S.CER ECJ0EC1H120J	T	100.3/10.3
C506	4030017460	S.CER ECJ0EB1E102K	T	102.5/7.6
C507	4030017570	S.CER ECJ0EC1H040B	B	101.6/9.5
C509	4030017460	S.CER ECJ0EB1E102K	B	89/36.8
C510	4030007010	S.CER C1608 CH 1H 100D-T	T	119.2/17.7
C511	4030017460	S.CER ECJ0EB1E102K	B	101.5/22.2
C512	4030017460	S.CER ECJ0EB1E102K	T	108.3/16.7
C514	4030018520	S.CER C1608 JB 0J 225M-T	B	30.6/12.6
C515	4030016930	S.CER ECJ0EB1A104K	B	34.1/14.8
C516	4030006940	S.CER C1608 CH 1H 030C-T	T	116.4/5.9
C517	4030018860	S.CER ECJ0EB0J105K	B	13.5/13.3
C518	4030017460	S.CER ECJ0EB1E102K	T	81.1/31.2
C519	4550000560	S.TAN TEESVA 1V 334M-8L	B	81.8/29.7
C521	4030017460	S.CER ECJ0EB1E102K	T	91.7/34.9
C522	4030018860	S.CER ECJ0EB0J105K	B	77.2/39.1
C523	4030018860	S.CER ECJ0EB0J105K	B	78.2/39.1
C524	4030017460	S.CER ECJ0EB1E102K	B	42.6/9.2
C525	4030017460	S.CER ECJ0EB1E102K	B	41.6/9.3
C526	4030017460	S.CER ECJ0EB1E102K	B	40.6/9.9
C527	4030017460	S.CER ECJ0EB1E102K	B	39.4/9.4
C528	4030017460	S.CER ECJ0EB1E102K	B	18.6/29.5
C529	4030017720	S.CER ECJ0EB1H331K	B	20.2/26.7
C530	4030018860	S.CER ECJ0EB0J105K	B	20/24.8
C531	4030016790	S.CER ECJ0EB1C103K	B	38.9/11.8
C532	4030017460	S.CER ECJ0EB1E102K	B	21.5/27.3
C533	4030017400	S.CER ECJ0EC1H220J	B	97.6/26.6
C534	4030017460	S.CER ECJ0EB1E102K	T	105.5/20.9
C535	4030017730	S.CER ECJ0EB1E471K	T	100.8/26.5
C536	4030017650	S.CER ECJ0EC1H270J	T	108/18.6
C538	4030017400	S.CER ECJ0EC1H220J	B	100.4/13
C540	4030017420	S.CER ECJ0EC1H470J	B	81.8/21.7
C541	4030016930	S.CER ECJ0EB1A104K	B	15.6/13.8
C543	4030009500	S.CER C1608 CH 1H 0R5B-T	T	117.2/15.3
C544	4030009500	S.CER C1608 CH 1H 0R5B-T	B	112.8/8.7
C545	4030017460	S.CER ECJ0EB1E102K	B	97/13.5
C546	4030017460	S.CER ECJ0EB1E102K	B	96.2/12.1
C547	4030017780	S.CER ECJ0EB1E472K	B	64.1/4.4
J2	6450001680	CNR HSJ1122-010010		
J3	6450002250	CNR HSJ1456-010320		
J5	6510021970	S.CNR AXN330C130P	B	23.8/36.6
J6	6510021900	S.CNR BM02B-ASRS-TF	T	71.5/3.9
J7	6510024580	S.CNR HSJ1621-019011	B	12.6/1.9
DS2	5010000160	S.LED LNJ310M6URA	T	64.1/38.8
DS3	5010000160	S.LED LNJ310M6URA	T	64.1/7
DS4	5030002800	LCD LCD A01B001X		
MC1	7700002160	MIC KUC3523-040245		
S3	2260002840	SW SKHLLFA010		
S801	7600000210	ECR TP70N00E20-15F-1903		
EP2	8930064900	LCT SRCN-2826-SP-N-W		
EP5	6910012350	S.BEA MMZ1608Y 102BT	T	96/9.7
EP6	6910012350	S.BEA MMZ1608Y 102BT	B	20.8/42.3
EP7	6910012350	S.BEA MMZ1608Y 102BT	B	22.1/42.3
EP9	6910012350	S.BEA MMZ1608Y 102BT	B	7.5/12
EP10	6910012350	S.BEA MMZ1608Y 102BT	B	5.8/9
EP11	6910012350	S.BEA MMZ1608Y 102BT	B	5.8/5
EP12	6910015370	S.BEA ACZ1005Y-102-T	T	113.6/29.8

[CHASSIS UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
J1	6510022460	CNR BNC-R162		
SP1	2510001280	SP SDRS-3650P-008A		
W1	8900009640	CBL OPC-963		

[EU1]=[EUR-1], [EX1]=[EXP-1], [US1]=[USA-1], [EU2]=[EUR-2], [EX2]=[EXP-2]
[US2]=[USA-2], [EU3]=[EUR-3], [EX4]=[EXP-4], [US3]=[USA-3]

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

6-2 OPTIONAL UNIT UT-118

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
IC1	1180002390	S.REG S-812C33AMC-C2N-T2	T	3.4/27.9
IC2	1180002370	S.REG R1111N321B-TR	T	19.5/27.8
IC50	1130011630	S.IC AD73311ARS	T	13.7/19.6
IC101	1130008360	S.IC TC7SHU04FU (TE85L)	B	32.5/2.5
IC103	1130006890	S.IC TC7S04FU (TE85R)	T	34/5.9
IC151	1130010920	S.IC AMBE-2020	T	27.9/16.1
IC202	1130010460	S.IC TC7SH08FU (TE85L)	B	29.6/7.9
IC203	1110005730	S.IC S-80928CNMC-G8Y-T2	B	30/27.5
IC204	1140010770	S.IC HD64F3687FP (EMPTY)	B	29.9/18.1
IC251	1110005290	S.IC NJM2115V-TE1	B	16.7/21.9
IC252	1110005430	S.IC CMX589AD5	B	16.7/13.6
IC253	1110006200	S.IC NJM13404V-TE1	B	16.6/6.1
IC254	1130004200	S.IC TC4S66F (TE85R)	B	28/4.1
IC351	1120002980	S.IC MAX3226EAE-T	T	9.7/6.1
Q50	1510000770	S.TR 2SA1586-GR (TE85R)	T	9.6/11
Q51	1590000430	S.TR DTC144EUA T106	B	8.7/23.2
Q201	1590000430	S.TR DTC144EUA T106	B	33.1/9.1
Q202	1590000430	S.TR DTC144EUA T106	B	35.8/10.3
Q251	1590000430	S.TR DTC144EUA T106	B	35.6/5.1
Q252	1590000430	S.TR DTC144EUA T106	B	35.8/7.8
Q301	1590000430	S.TR DTC144EUA T106	B	7.3/25.9
Q302	1590000430	S.TR DTC144EUA T106	B	2.3/25.5
Q303	1590000430	S.TR DTC144EUA T106	B	4.8/25.9
Q305	1590001660	S.TR XP4312 (TX)	B	23/8.1
Q306	1590001660	S.TR XP4312 (TX)	B	26/8.1
Q400	1510000770	S.TR 2SA1586-GR (TE85R)	B	13.2/27.5
Q401	1590000430	S.TR DTC144EUA T106	B	9.8/25.9
D151	1790001240	S.DIO MA2S728-(TX)	T	29.2/6.9
D152	1790001250	S.DIO MA2S111-(TX)	B	22.7/23.7
X101	6050011240	S.XTL CR-708 (16.384 MHz)	T	30.5/2.5
X201	6050011700	S.XTL CR-760 (9.8304 MHz)	T	30.5/27.7
L50	6200003960	S.COL MLF1608A 1R0K-T	T	11.8/11.9
L151	6200003960	S.COL MLF1608A 1R0K-T	B	16.1/27.2
L201	6200003960	S.COL MLF1608A 1R0K-T	B	24.6/12.1
L351	6200003960	S.COL MLF1608A 1R0K-T	T	14.2/9.4
R1	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	17.1/26.7
R2	7030000180	S.RES MCR10EZHJ 22 Ω (220)	T	12.9/26.8
R50	7030005010	S.RES ERJ2GEJ 681 X (680 Ω)	T	8.2/19.7
R51	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	8.2/23.3
R52	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	11.1/21.6
R53	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	13.7/18.9
R54	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	6.6/22.9
R55	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	12.5/22.4
R56	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	12.5/24.2
R57	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	17.3/23.5
R58	7030010040	S.RES ERJ2GE-JPW	B	11.1/22.6
R59	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	T	7.7/11.2
R60	7030005050	S.RES ERJ2GEJ 103 X (10 kΩ)	T	7.2/12.5
R100	7030010040	S.RES ERJ2GE-JPW	T	13.5/12.1
R101	7030005160	S.RES ERJ2GEJ 105 X (1 MΩ)	B	32.6/4.4
R102	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	35.1/2.8
R103	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	35.8/5.4
R151	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	T	29.6/5.5
R152	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	T	31.4/6.9
R201	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	30.3/10.4
R202	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	29.3/10.4
R203	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	28.3/10.4
R204	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	27.1/10.4
R205	7030005040	S.RES ERJ2GEJ 472 X (4.7 kΩ)	B	31.3/7.5
R206	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	32.3/11
R209	7030005120	S.RES ERJ2GEJ 102 X (1 kΩ)	B	27.8/27
R211	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	25.5/25.1
R212	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	22.4/22.3
R216	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	22.3/20
R217	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	22.3/21
R218	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	24.3/11
R219	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	26.1/10.4
R221	7030010040	S.RES ERJ2GE-JPW	B	24.5/25.1
R251	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	20.1/24.7
R252	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	20.1/23.7
R253	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	11.3/13.9
R254	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	11.3/12.9
R255	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	10.9/10.9
R256	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	15.8/18.9
R257	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	13.1/9.3
R258	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	17.8/18.9
R260	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	16.8/18.9
R261	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	11.3/9.6
R262	7030005220	S.RES ERJ2GEJ 223 X (22 kΩ)	T	17.1/11.8
R264	7310004610	S.TRI EVM-2WSX80 B15 (104)	T	16.9/9
R267	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	17.7/8.7
R268	7030006610	S.RES ERJ2GEJ 394 X (390 kΩ)	B	25.3/4.8

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

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
R269	7030005060	S.RES ERJ2GEJ 333 X (33 kΩ)	B	15.9/8.7
R270	7030005240	S.RES ERJ2GEJ 473 X (47 kΩ)	B	28.5/1.6
R308	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	1.8/16.9
R309	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	2.8/16.9
R315	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	6.2/16
R316	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	2.8/11.3
R317	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	B	10/17
R318	7030004980	S.RES ERJ2GEJ 101 X (100 Ω)	T	2.3/18.2
R400	7030005090	S.RES ERJ2GEJ 104 X (100 kΩ)	B	10.2/28.7
R401	7030009290	S.RES ERJ2GEJ 562 X (5.6 kΩ)	B	10.2/27.7
C1	4550006250	S.TAN TEESVA 1A 106M8L	T	8/26.7
C2	4550006250	S.TAN TEESVA 1A 106M8L	T	8/28.9
C5	4030017460	S.CER ECJ0EB1E102K	B	5.7/28.2
C7	4550005980	S.TAN TEESVA 1A 475M8L	T	13.6/28.9
C8	4030016930	S.CER ECJ0EB1A104K	T	17.1/28.7
C9	4550006250	S.TAN TEESVA 1A 106M8L	T	24.1/28.9
C10	4030016930	S.CER ECJ0EB1A104K	T	22/26.8
C11	4550006480	S.TAN TEESVA 1C 475M8L	T	14.5/24.8
C50	4030016930	S.CER ECJ0EB1A104K	T	7.2/18.7
C51	4030016970	S.CER ECJ0EB1C223K	T	7.7/22
C53	4030016930	S.CER ECJ0EB1A104K	T	6.6/21.1
C54	4550006250	S.TAN TEESVA 1A 106M8L	T	9.4/14.5
C55	4030016930	S.CER ECJ0EB1A104K	T	8.7/21
C56	4030016950	S.CER ECJ0EB1A473K	B	11.1/20.6
C57	4030016930	S.CER ECJ0EB1A104K	T	8.7/18.4
C58	4030016930	S.CER ECJ0EB1A104K	T	17.3/15.7
C102	4540000070	S.TRI TZY2Z100A001	T	24.4/3.4
C103	4030017590	S.CER ECJ0EC1H070C	T	34.3/2
C104	4030016930	S.CER ECJ0EB1A104K	B	34.4/1.2
C106	4030016930	S.CER ECJ0EB1A104K	T	35.1/3.8
C150	4550000460	S.TAN TEESVA 1C 105M8L	T	15.3/14.1
C151	4030016930	S.CER ECJ0EB1A104K	T	22.4/25.1
C152	4030016930	S.CER ECJ0EB1A104K	T	29/25.1
C153	4030016930	S.CER ECJ0EB1A104K	T	18.9/15.5
C154	4030016930	S.CER ECJ0EB1A104K	T	18.8/10
C155	4030016930	S.CER ECJ0EB1A104K	T	22.9/7
C156	4030016930	S.CER ECJ0EB1A104K	T	27.6/6.4
C157	4030016930	S.CER ECJ0EB1A104K	T	37.1/10.6
C159	4030016930	S.CER ECJ0EB1A104K	T	37.1/16.6
C201	4030016930	S.CER ECJ0EB1A104K	B	27.8/7.6
C202	4030017590	S.CER ECJ0EC1H070C	B	33.1/28.1
C203	4030016930	S.CER ECJ0EB1A104K	B	32.5/25.8
C204	4030017390	S.CER ECJ0EC1H180J	T	27.2/26.7
C205	4030016930	S.CER ECJ0EB1A104K	B	29.2/25.2
C206	4030016790	S.CER ECJ0EB1C103K	B	32.1/27.6
C207	4540000080	S.TRI TZY2R200A001	T	35.4/26.4
C250	4030016930	S.CER ECJ0EB1A104K	B	13.5/24.2
C252	4030017490	S.CER C1608 JB 1A 105K-T	B	17.8/24.6
C253	4030017400	S.CER ECJ0EC1H220J	B	14.8/18.9
C255	4030017490	S.CER C1608 JB 1A 105K-T	B	10.8/15.5
C256	4030016930	S.CER ECJ0EB1A104K	B	20/8.7
C257	4030017030	S.CER ECJ0EB1A273K	B	20.3/18.3
C258	4030017030	S.CER ECJ0EB1A273K	B	20.3/19.3
C259	4030017760	S.CER ECJ0EB1H222K	T	16/11.8
C260	4030017490	S.CER C1608 JB 1A 105K-T	B	13.2/3.6
C261	4030016930	S.CER ECJ0EB1A104K	B	21.4/4.9
C262	4030017490	S.CER C1608 JB 1A 105K-T	B	19.9/3.5
C263	4030016930	S.CER ECJ0EB1A104K	B	24.9/2.8
C333	4030017460	S.CER ECJ0EB1E102K	T	9.1/12.9
C351	4030011810	S.CER C1608 JB 1A 224K-T	T	4.5/7.1
C352	4030011810	S.CER C1608 JB 1A 224K-T	T	5.7/9.4
C353	4030011810	S.CER C1608 JB 1A 224K-T	T	3.5/4.9
C354	4030011810	S.CER C1608 JB 1A 224K-T	T	3.5/3.6
C355	4030011600	S.CER C1608 JB 1E 104K-T	T	15/7.3
C401	4550006250	S.TAN TEESVA 1A 106M8L	B	17.4/28.9
J301	6510018440	S.CNR AXN430C330P	B	5.3/13.8

S.=Surface mount

SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

[CHASSIS PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510022460	Connector BNC-R162	1
SP1	2510001280	Speaker SDRS-3650P-008A	1
W1	8900009640	Cable OPC-963	1
MP1	8210021740	2826 front panel (A)	1
MP2	8930064470	2826 keyboard	1
MP3	8010019850	2826 chassis	1
MP4	8930064420	2826 D-cap	1
MP5	8930064440	2826 jack cap	1
MP6	8930064910	2826 S-jack seal	1
MP7	8930050870	2251 release button	1
MP12	8210021271	2826 rear panel-1	1
MP13	8210017091	2337 terminal holder-1	1
MP14	8310062510	2826 window plate	1
MP15	8930042350	1922 microphone sheet	1
MP16	8930051300	2251 microphone sponge	1
MP18	8610012170	Knob N-326	1
MP19	8810008640	Screw No.0-1 FH B0 2 × 4 NI-ZU (BT)	3
MP20	8930054881	2458 plus terminal-1	1
MP21	8930050840	2251 minus terminal	1
MP23	8830001340	1903 hex. Nut	1
MP24	8830001250	Nut ANT connector-101	1
MP25	8930036751	Spring (Y)-1	1
MP27	8810009510	Screw PH B0 2 × 4 NI-ZU (BT)	6
MP28	8810009560	Screw PH B0 2 × 6 ZK (BT)	4
MP29	8810000100	Screw PH M2 × 4 ZK	2
MP30	8810008990	Screw PH B0 2 × 10 ZK (BT)	2
MP31	8860001210	2251 antenna lug plate	1
MP32	8510016800	2826 shield cover	1
MP33	8510016790	2826 option plate	1
MP34	8930064880	2826 window sheet	1
MP35	8810005700	Screw No.0-1 PH M2 × 4 ZK	4
MP36	8930065490	Rubber sheet (BO)	1
MP37	8510016890	2826 U-shield cover	2

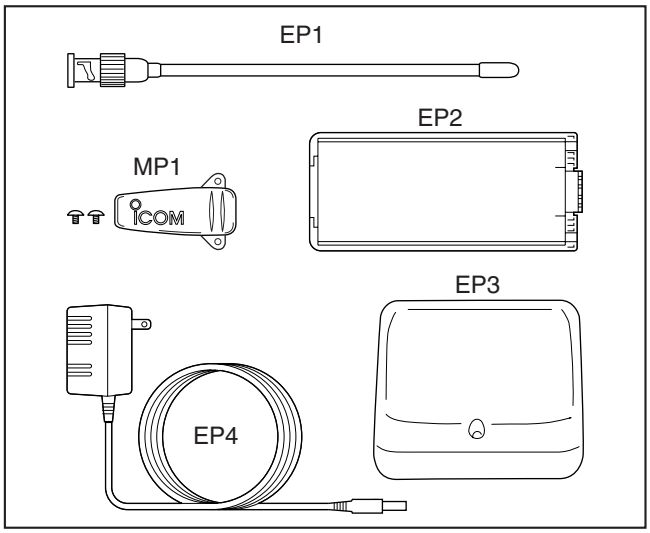
[MAIN UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
DS4	5030002800	LCD A01B001X	1
MP1	8510016470	2775 VCO case	1
MP2	8510016460	2775 VCO cover	1
MP3	8210021280	2826 reflector	1
MP4	8930064560	2826 LCD holder	1
MP6	8930058840	Shield sponge	1

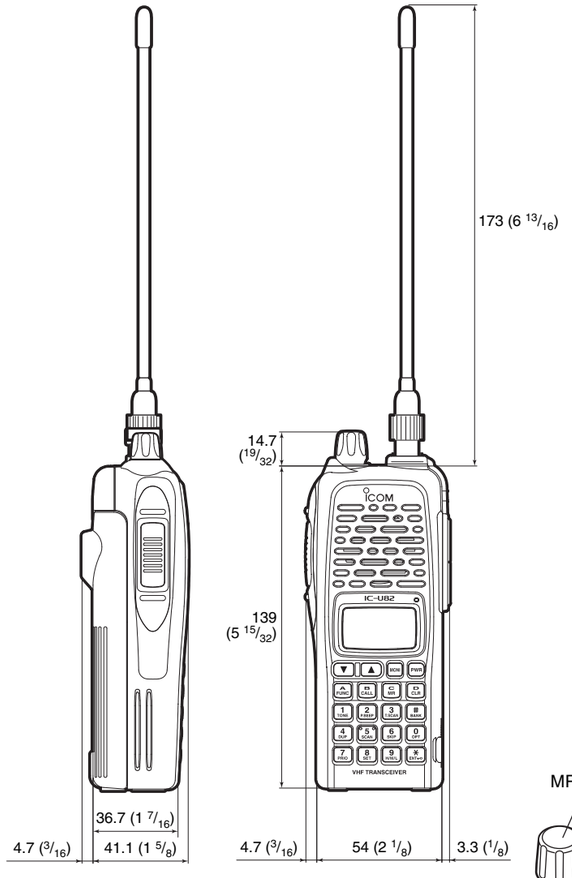
Screw abbreviations
B0, BT: Self-tapping PH: Pan head
NI-ZU: Nickel-Zinc ZK: Black

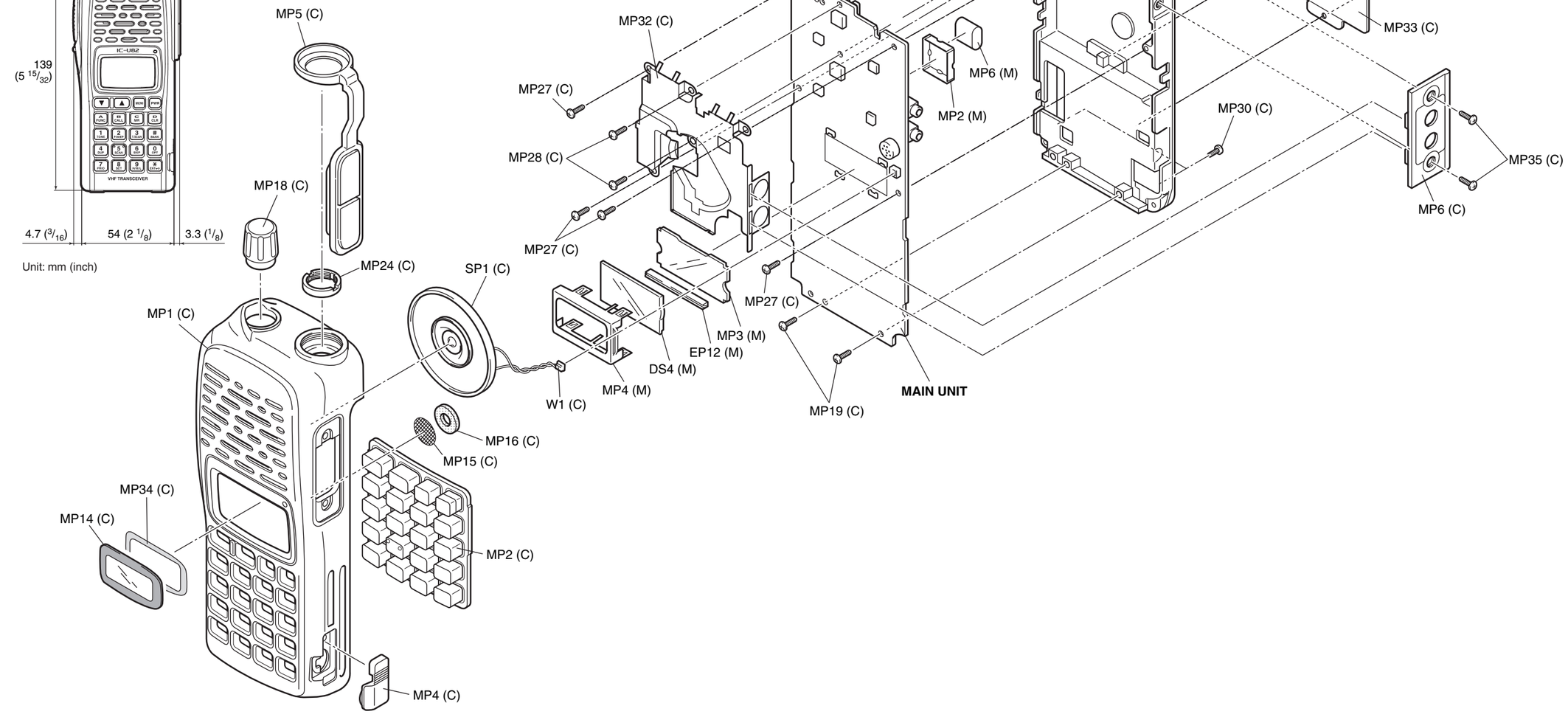
[ACCESSORIES]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
EP1	Optional product	Antenna FA-B70C	1
EP2	Optional product	Battery case BP-208N [USA-1], [EUR-1], [EXP-1]	1
	Optional product	Battery pack BP-222N [USA-2], [EUR-2], [KOR], [EXP-2]	1
	Optional product	Battery pack BP-209N [USA-3], [EUR-3], [EXP-4]	1
EP3	Optional product	AC charger BC-146	1
EP4	Optional product	AC adapter BC-147E [EUR-2], [EXP-2], [EUR-3], [EXP-4]	1
	Optional product	AC adapter BC-147A [USA-2], [USA-3]	1
MP1	Optional product	MB-103	1



* Design is depended on versions.

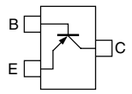
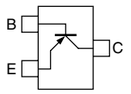
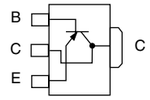
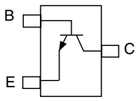
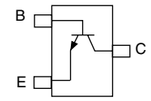
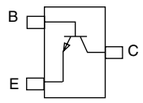
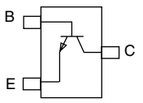
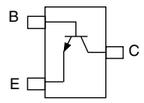
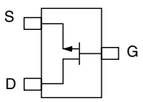
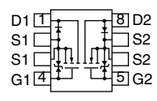
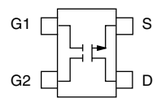
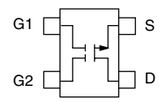
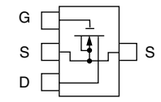
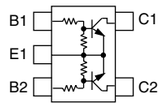
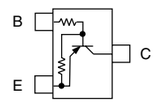
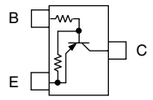
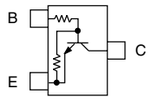
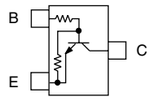
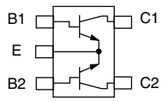
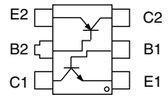
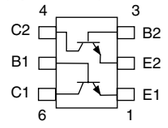




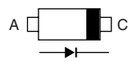
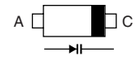
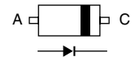
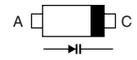
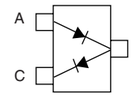
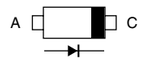
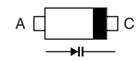
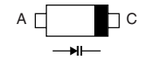
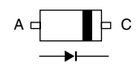
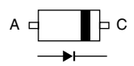
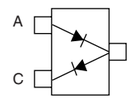
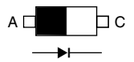
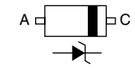
UNIT abbreviations (C): CHASSIS PARTS, (M): MAIN UNIT

SECTION 8 SEMICONDUCTOR INFORMATION

•TRANSISTORS AND FET'S

2SA1576S (Symbol: FS) 	2SA1576A (Symbol: FA) 	2SB1132R (Symbol: BAR) 	2SC4116BL 2SC4226 (Symbol: LL) 	2SC4617 TLS (Symbol: BS) 
2SC5006-T1 (Symbol: 24) 	2SC5107-O (Symbol: MFO) 	2SC5231 C8 (Symbol: C8) 	2SK1069-4 (Symbol: FJ) 	2SK3476 (Symbol: TUCF) 
3SK299-U73 (Symbol: U73) 	3SK318YB-TL-E (Symbol: YB) 	RD01MUS1 (Symbol: K2) 	UMG2N TL (Symbol: G2) 	UNR911FJ (Symbol: 6O) 
UNR9113J (Symbol: 6C) 	UNR9210J (Symbol: 8L) 	UNR9213J (Symbol: 8C) 	XP1501 AB (Symbol: 5R) 	XP4601 (Symbol: 5C) 
XP6501-AB (Symbol: 5N) 				

•DIODES

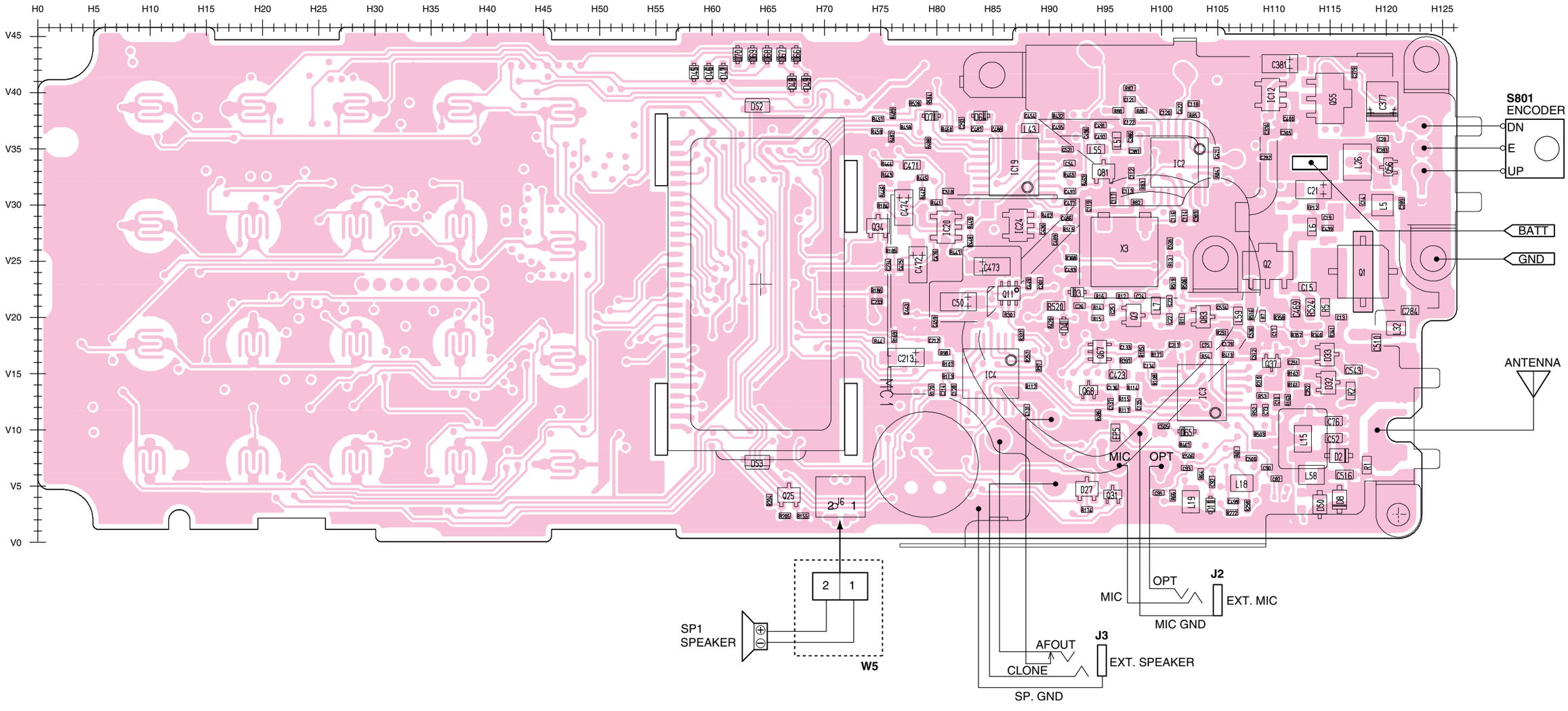
1SS400 (Symbol: A) 	1SV286 (Symbol: T7) 	1SV307 (Symbol: TX) 	1SV308 (Symbol: K) 	DA221 TL (Symbol: K) 
HVC350BTRF (Symbol: B0) 	HVC375BTRF (Symbol: B8) 	HVC376BTRF (Symbol: B9) 	MA2S077 (Symbol: S) 	MA728 (Symbol: 2A) 
MA742 (Symbol: M1U) 	MA77 (Symbol: 4B) 	MA8056-M (Symbol: 5-6) 		

SECTION 9 BOARD LAYOUTS

MAIN UNIT

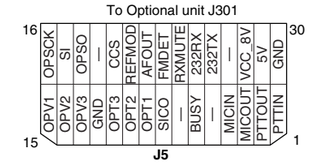
• TOP VIEW

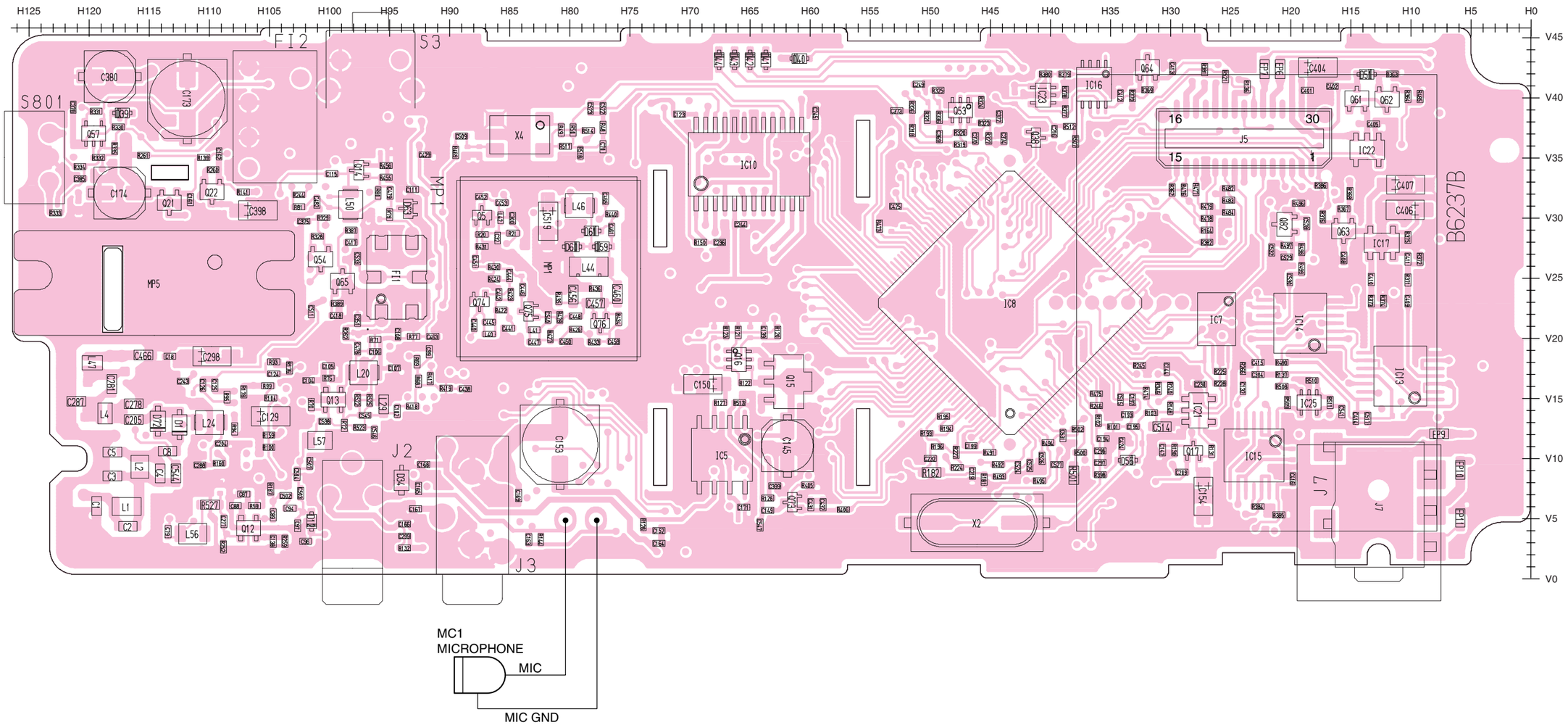
The combination of this page and next page shows the unit layout in the same configuration as the actual P.C. Board.



• **BOTTOM VIEW**

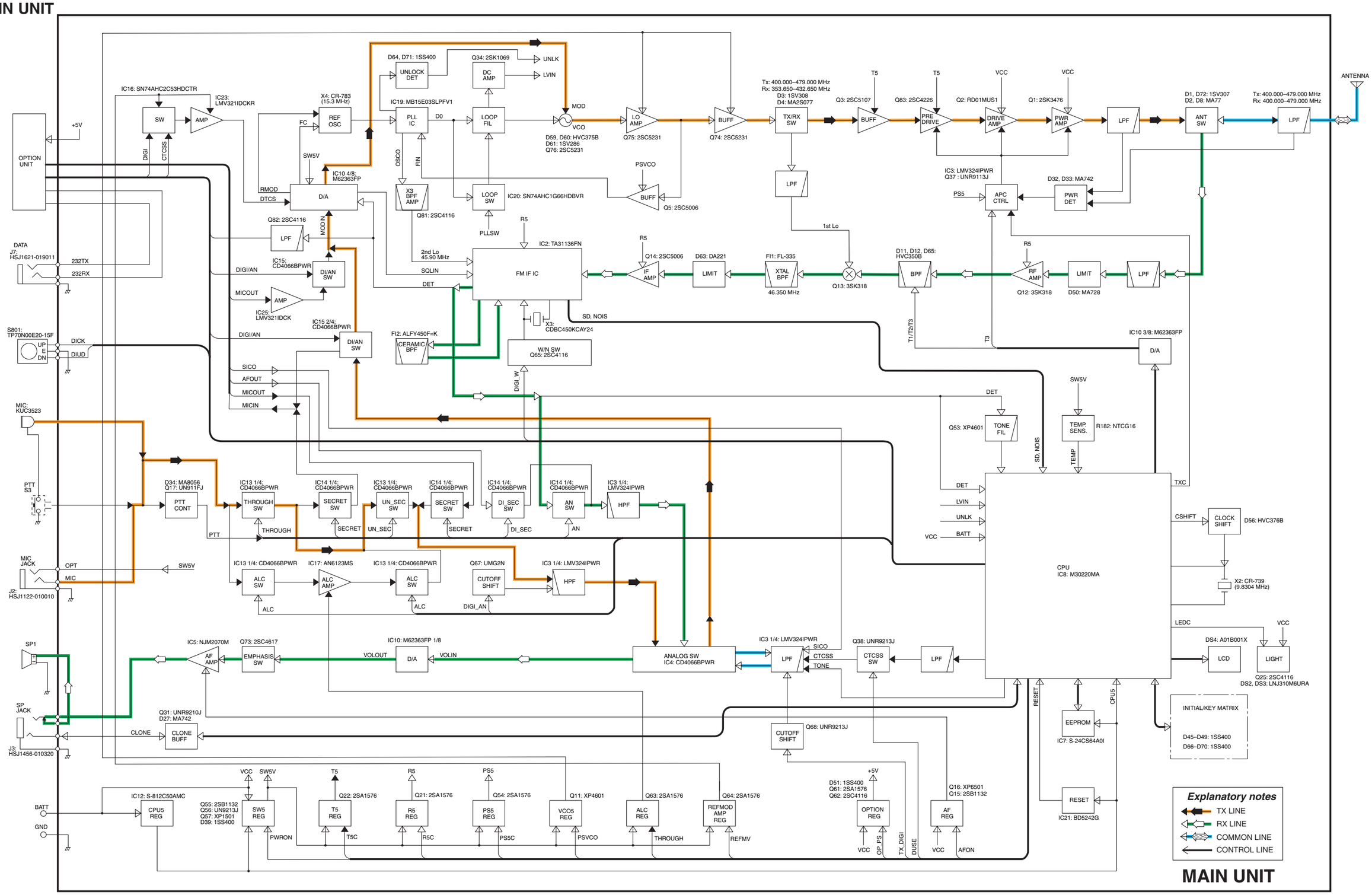
The combination of this page and previous page shows the unit layout in the same configuration as the actual P.C. Board.





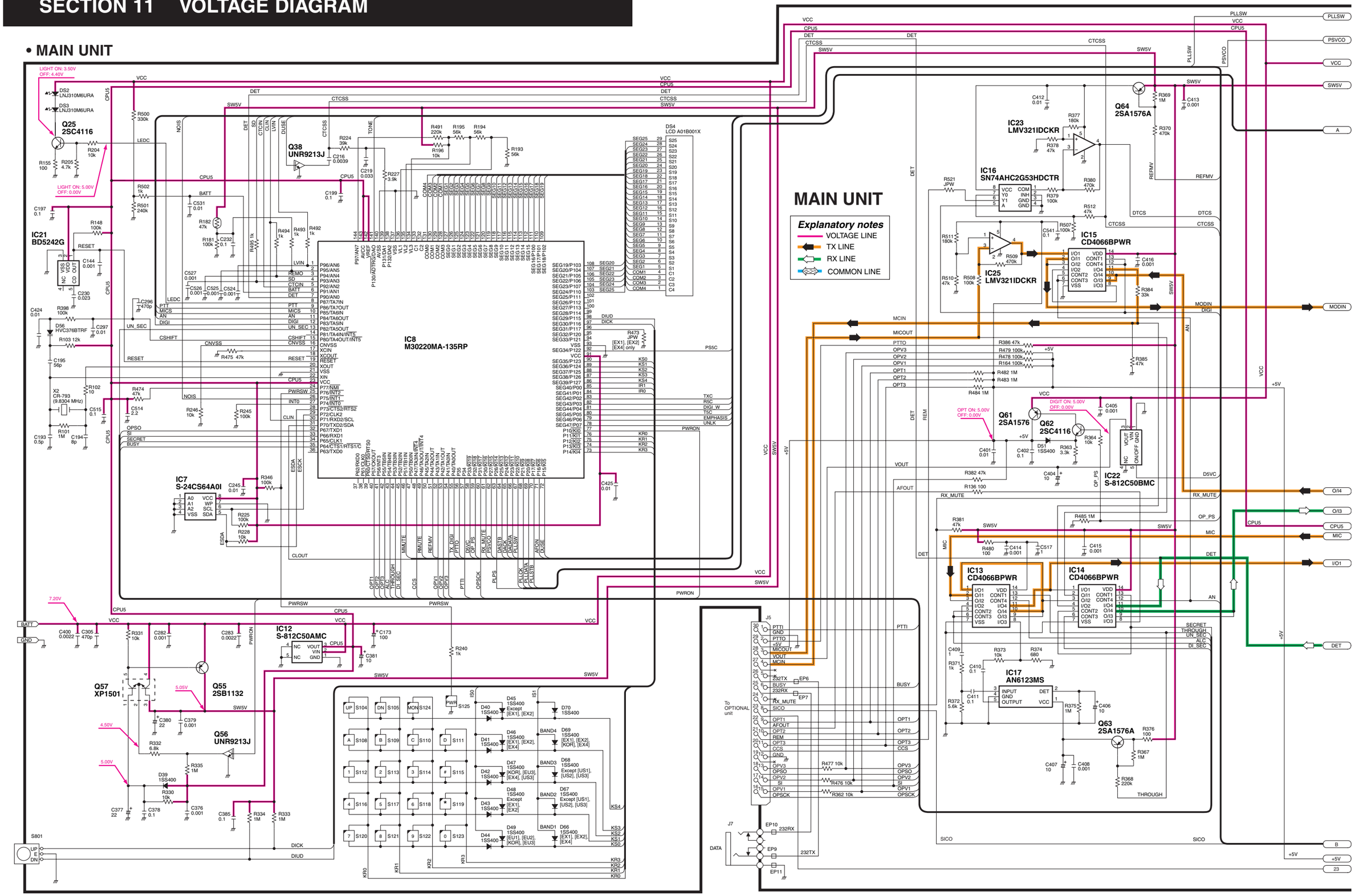
SECTION 10 BLOCK DIAGRAM

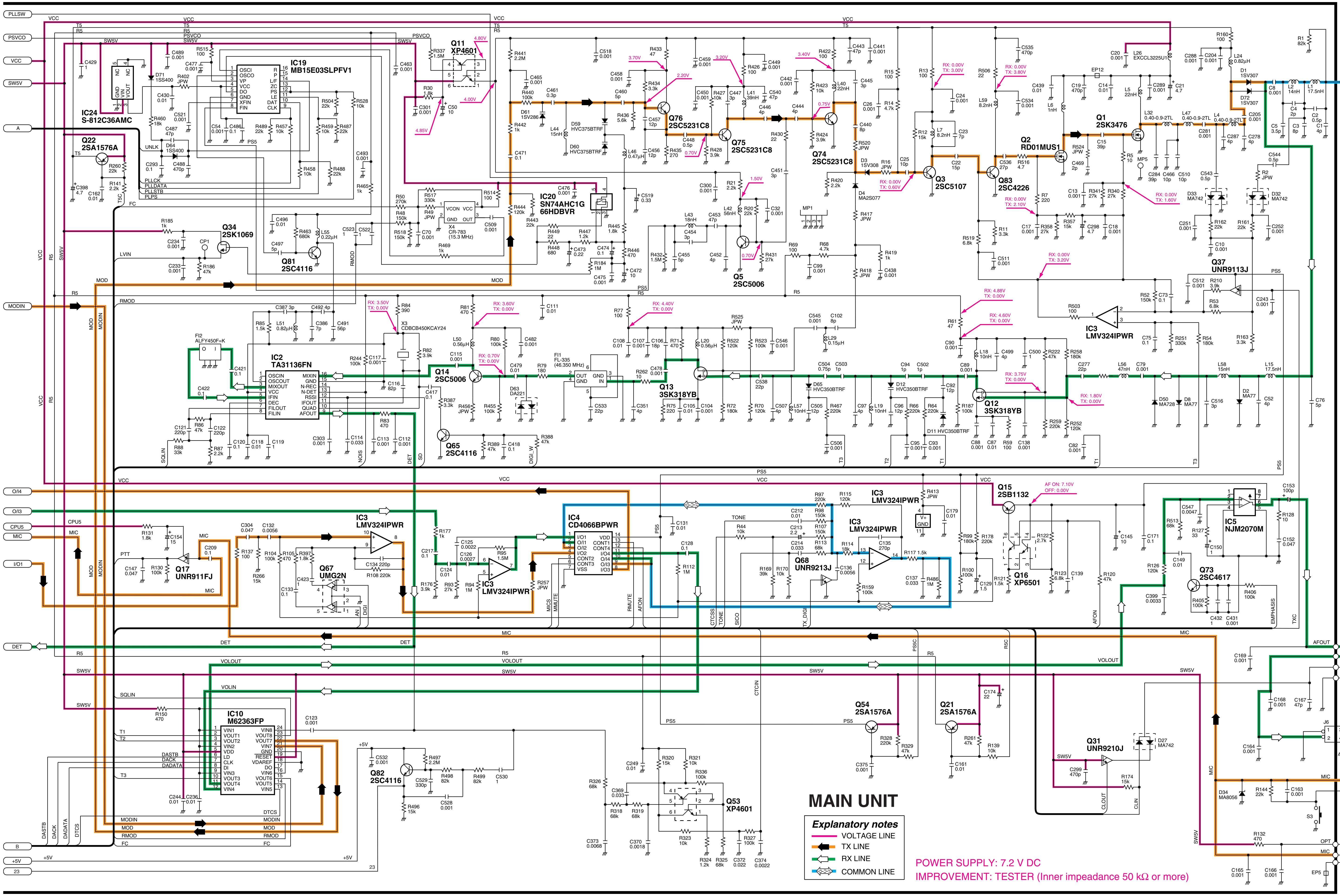
• MAIN UNIT



SECTION 11 VOLTAGE DIAGRAM

• MAIN UNIT




MAIN UNIT
Explanatory notes
VOLTAGE LINE
TX LINE
RX LINE
COMMON LINE
POWER SUPPLY: 7.2 V DC
IMPROVEMENT: TESTER (Inner impeadance 50 kΩ or more)
IC19 MB15E03SLPFV1
IC24 S-812C36AMC
Q22 2SA1576A
Q11 XP4601
IC20 SN74AHC1G 66HDBVR
Q34 2SK1069
Q81 2SC4116
Q76 2SC5231C8
Q75 2SC5231C8
Q74 2SC5231C8
Q5 2SC5006
Q3 2SC5107
Q83 2SC4226
Q2 RD01MUS1
Q1 2SK3476
Q37 UNR9113J
IC3 LMV324IPWR
IC2 TA31136FN
Q14 2SC5006
Q13 3SK318YB
Q12 3SK318YB
Q65 2SC4116
Q15 2SB1132
IC5 NJM2070M
IC4 CD4066BPWR
Q17 UNR911FJ
Q67 UMG2N
Q68 UNR9213J
Q16 XP6501
Q73 2SC4617
IC10 M62363FP
Q82 2SC4116
Q53 XP4601
Q54 2SA1576A
Q21 2SA1576A
Q31 UNR9210J
PLLSW
PSVCO
VCC
SW5V
A
MODIN
O/I4
O/I3
CPU5
MIC
I/O1
DET
B
+5V
23
ANT
J3 EXT SP
SP1
MC1 KUC3523-040245
J2 EXT MIC

SECTION 12 BC-146 BATTERY CHARGER

12-1 PARTS LIST

[CHARGE UNIT]

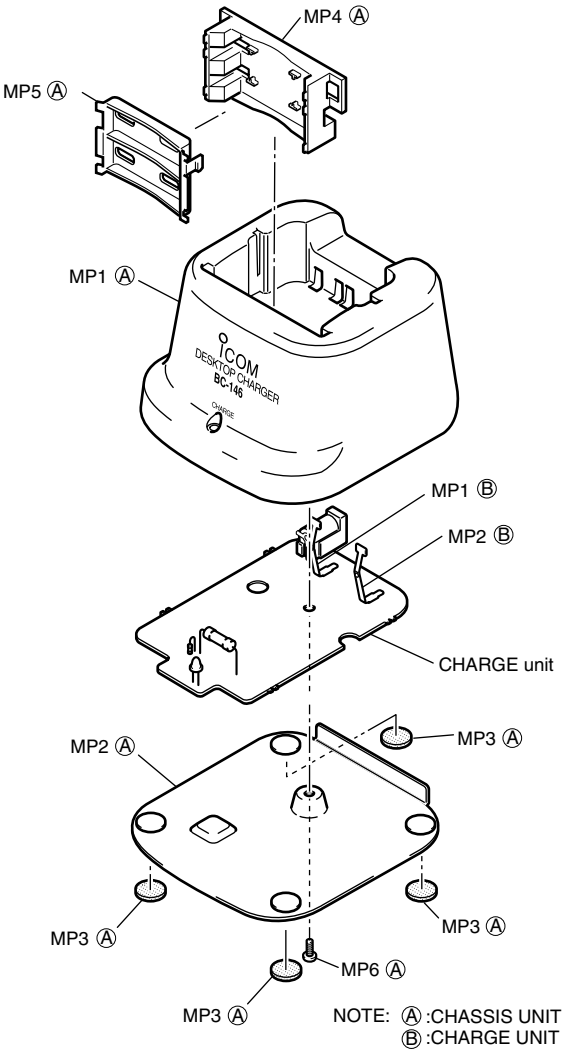
REF. NO.	ODER NO.	DESCRIPTION		QTY.
R1	7010007550	RESISTOR	ERG3SJ680H	1
R2	7010007100	RESISTOR	PSD1/4V 1 kΩ	1
J1	6510021470	CONNECTOR	HEC0470-01-230	1
DS1	5040001390	LED	TLG124A	1
EP1	0910053820	PCB	B 5650	1
MP1	8930051340	2338 TERMINAL		1
MP2	8930051340	2338 TERMINAL		1

[CHASSIS UNIT]

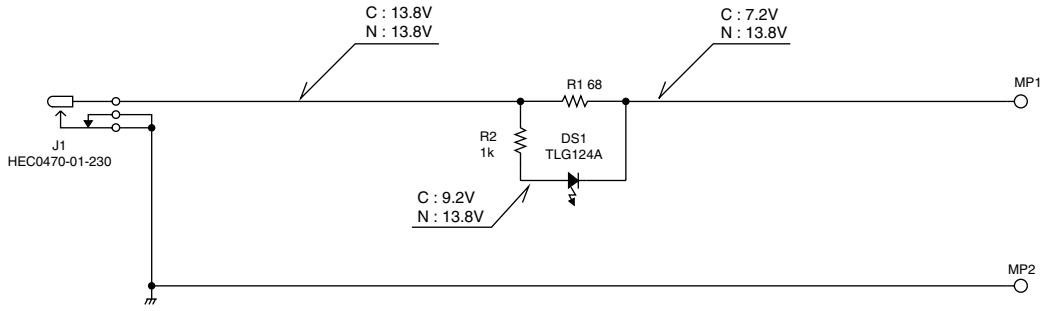
REF. NO.	ODER NO.	DESCRIPTION	QTY.
MP1	8010018620	2447 case (A)	1
MP2	8110007450	2447 cover	1
MP3	8930039620	Leg cushion (A)	4
MP4	8930055020	2480 spacer	1
MP5	8930055030	2480 BC-spacer	1
MP6	8810008660	Screw B0 M 3 x 8 NI-ZU (BT)	1

Screw abbreviations B0, BT:Self-tapping
NI-ZU :Nickel-Zinc

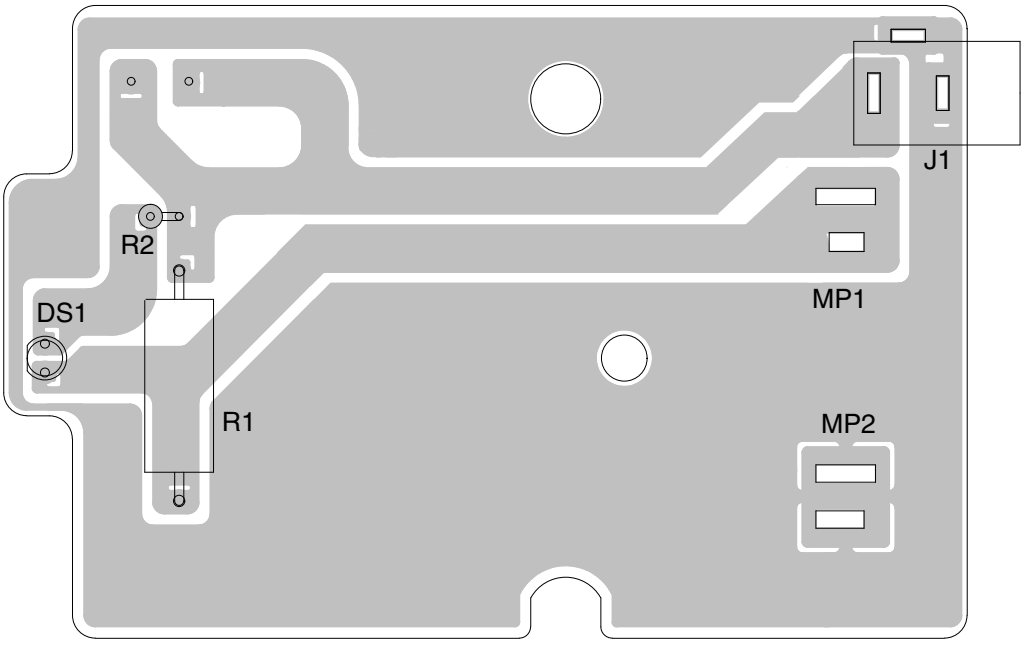
12-2 DISASSEMBLY INFORMATION



12-3 VOLTAGE DIAGRAM



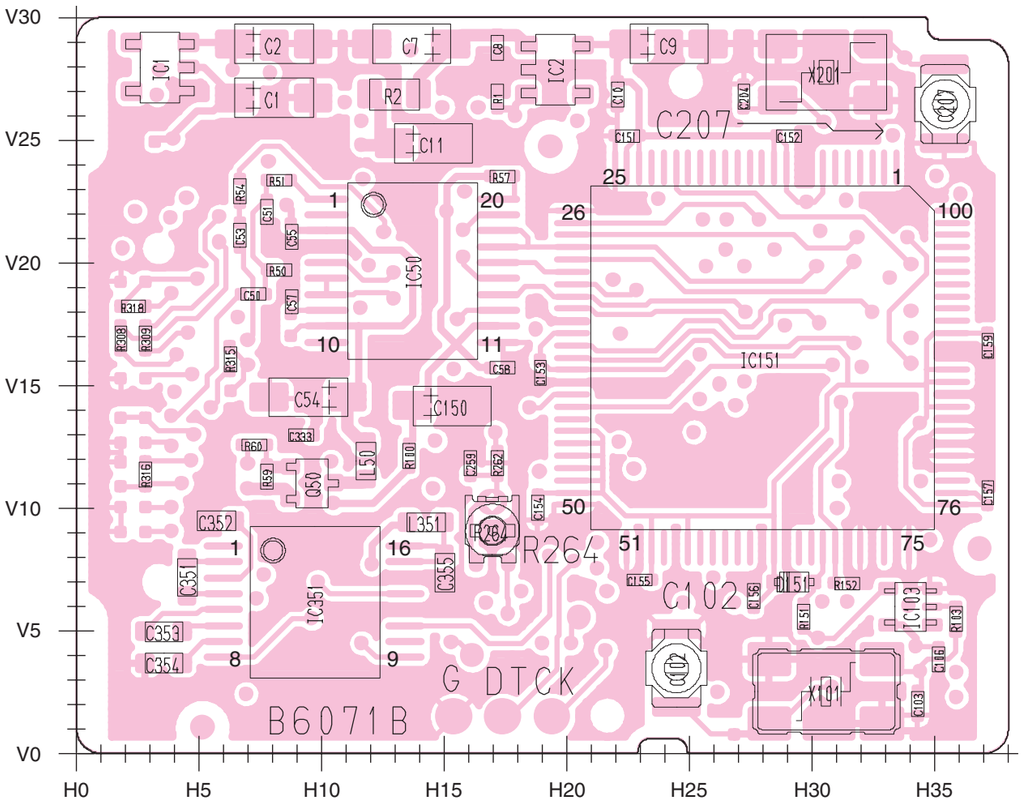
12-4 BOARD LAYOUT



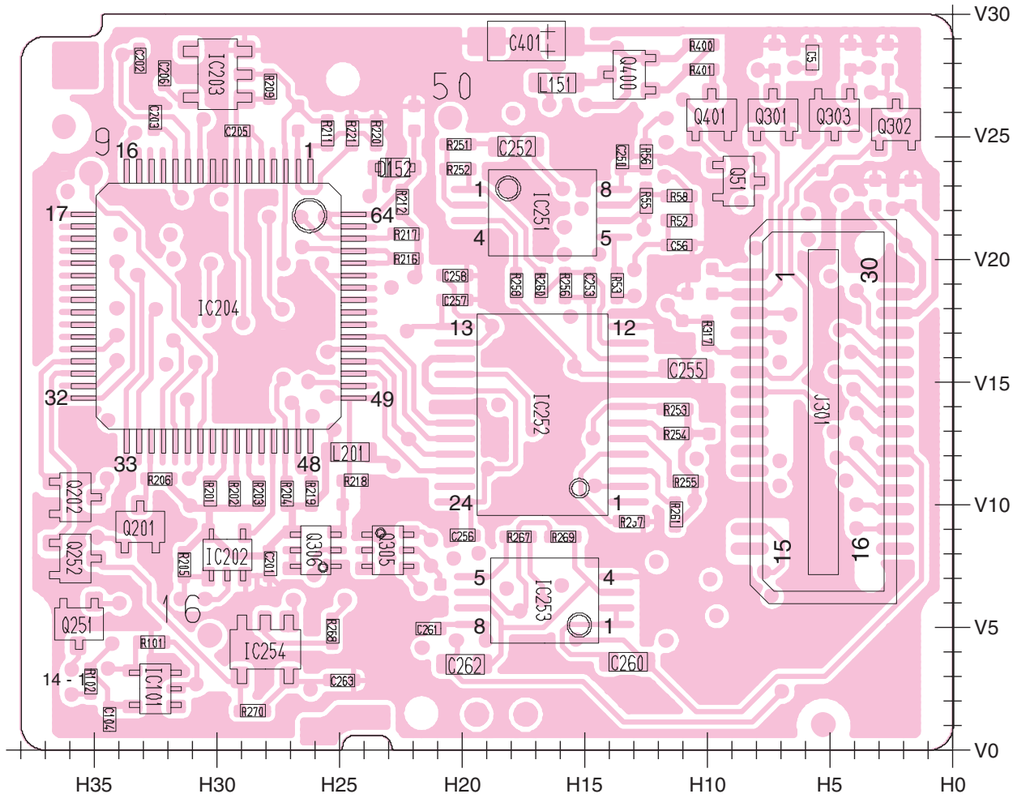
SECTION 13 UT-118 DIGITAL UNIT (OPTIONAL UNIT)

13-1 UT-118 BOARD LAYOUT

• TOP VIEW



• BOTTOM VIEW



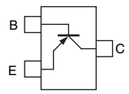
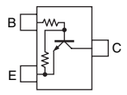
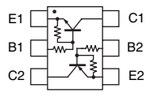
J301

1		30
PTTIN	GND	
PTTOUT	5V	
MICOUT	VCC_8V	
MICIN	—	
—	232TX	
BUSY	232RX	
—	RXMUTE	
SICO	FMDET	
OPT1	AFOUT	
OPT2	REFMOD	
OPT3	CSS	
GND	—	
OPV3	OPSO	
OPV2	SI	
OPV1	OPSCK	16
15		

To Main unit J5

13-2 UT-118 SEMICONDUCTOR INFORMATION

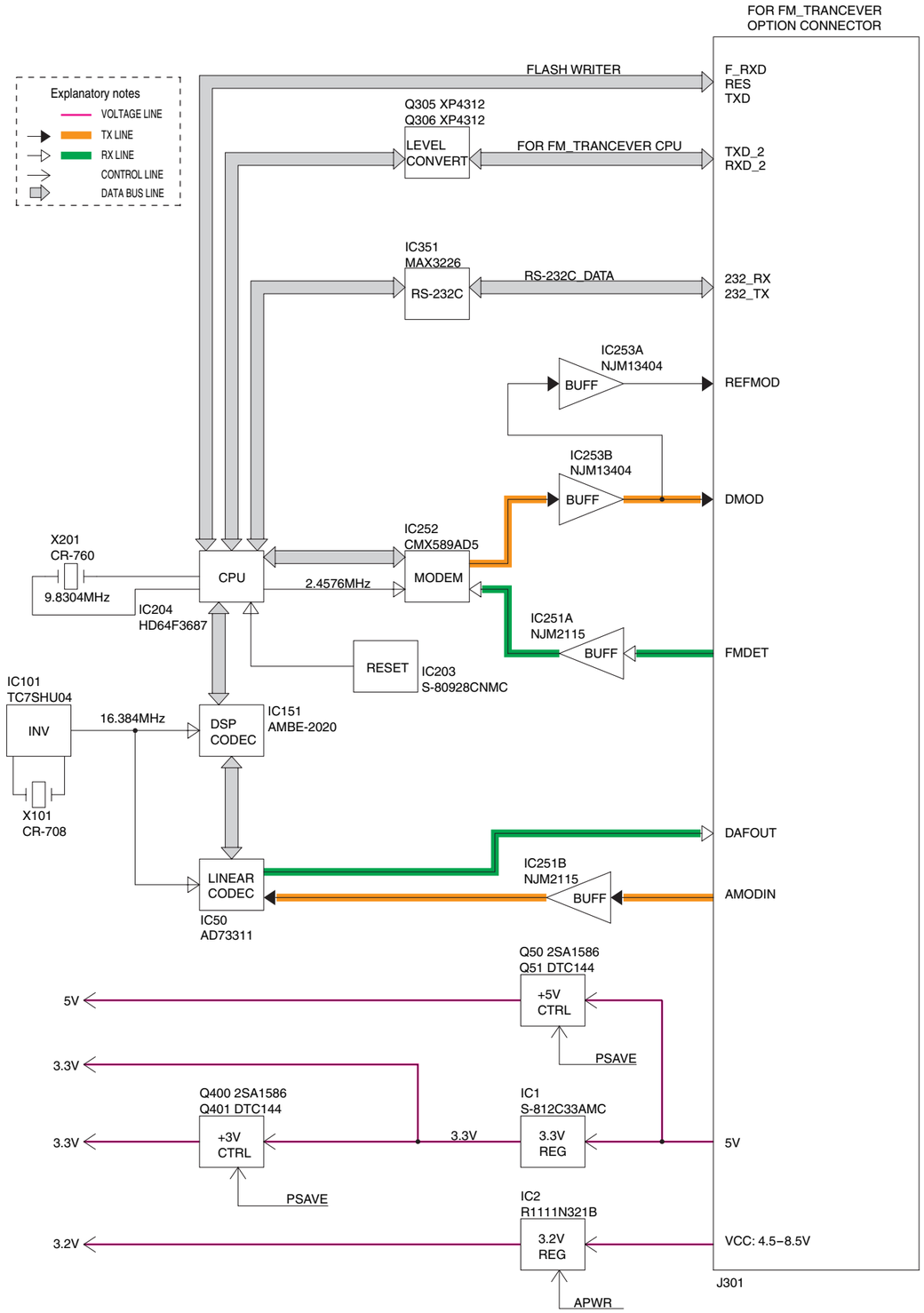
• TRANSISTORS AND FET'S

2SA1586 GR (Symbol: SG)	DTC144EUA T106 (Symbol: 26_)	XP4312 (Symbol: 7T)
		

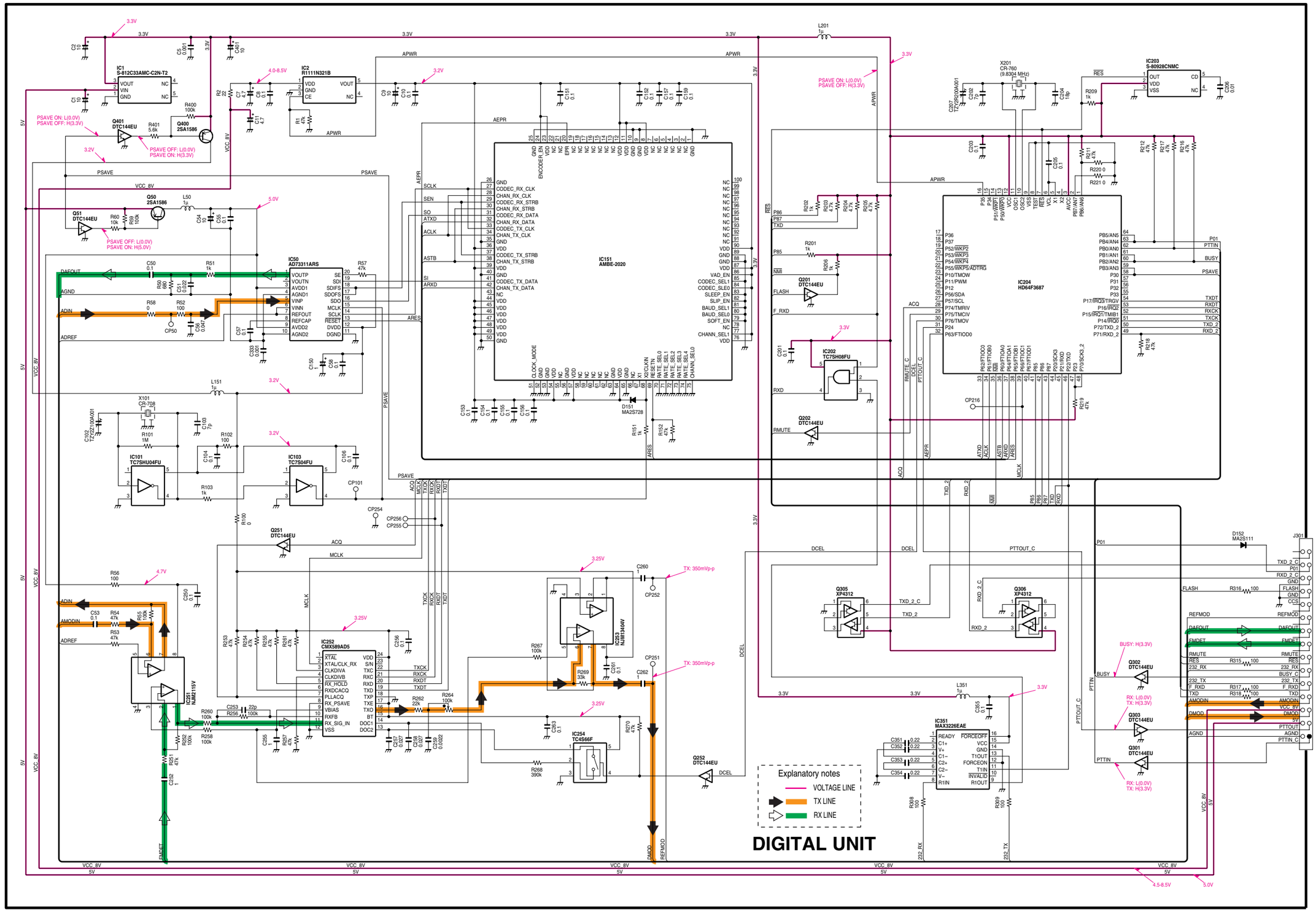
• DIODES

MA2S111 (Symbol: A)	MA2S728 (Symbol: B)

13-3 UT-118 BLOCK DIAGRAM



13-4 UT-118 VOLTAGE DIAGRAM



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