



SERVICE MANUAL

DIGITAL VOICE REPEATER

ID-RP2000V

S-14308XZ-C1
Dec. 2006

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the **ID-RP2000V** DIGITAL VOICE REPEATER at the time of publication.

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

CAUTION

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 15 V. This will ruin the transceiver.

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>

1110003491 S.IC TA31136FNG ID-RP2000V MAIN UNIT 5 pieces
8820001210 Screw 2438 screw ID-RP2000V Top cover 10 pieces
Addresses are provided on the inside back cover for your convenience.

REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated 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 50 dB to 60 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

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SECTION 1 SPECIFICATIONS

GENERAL

• Operating frequency range	: Transmit 144–148 MHz Receive 144–148 MHz
• Type of emission	: F1D* (GMSK) *F7W for system operation
• Transfer rate	: 4.8 kbps
• Frequency resolutions	: 5, 6.25 kHz
• Frequency stability	: ± 0.3 kHz (based on 25°C)
• Usable temperature range	: -10°C to $+50^{\circ}\text{C}$; $+14^{\circ}\text{F}$ to $+122^{\circ}\text{F}$
• Antenna connectors	: Type-N ($50\ \Omega$) $\times 2$
• Power supply requirement	: 13.8 V DC $\pm 15\%$ (Negative ground)
• Current drain	: Transmit (High) Less than 7.0 A (Low) Less than 3.0 A Receive (Stand-by) Less than 0.7 A
• Dimensions (proj. not included)	: 483(W) \times 88(H) \times 428(D) mm; 19(W) \times 3 ^{15/32} (H) \times 16 ^{27/32} (D) in
• Weight (Approx.)	: 7.5 kg; 16 lb 9 oz

TRANSMITTER

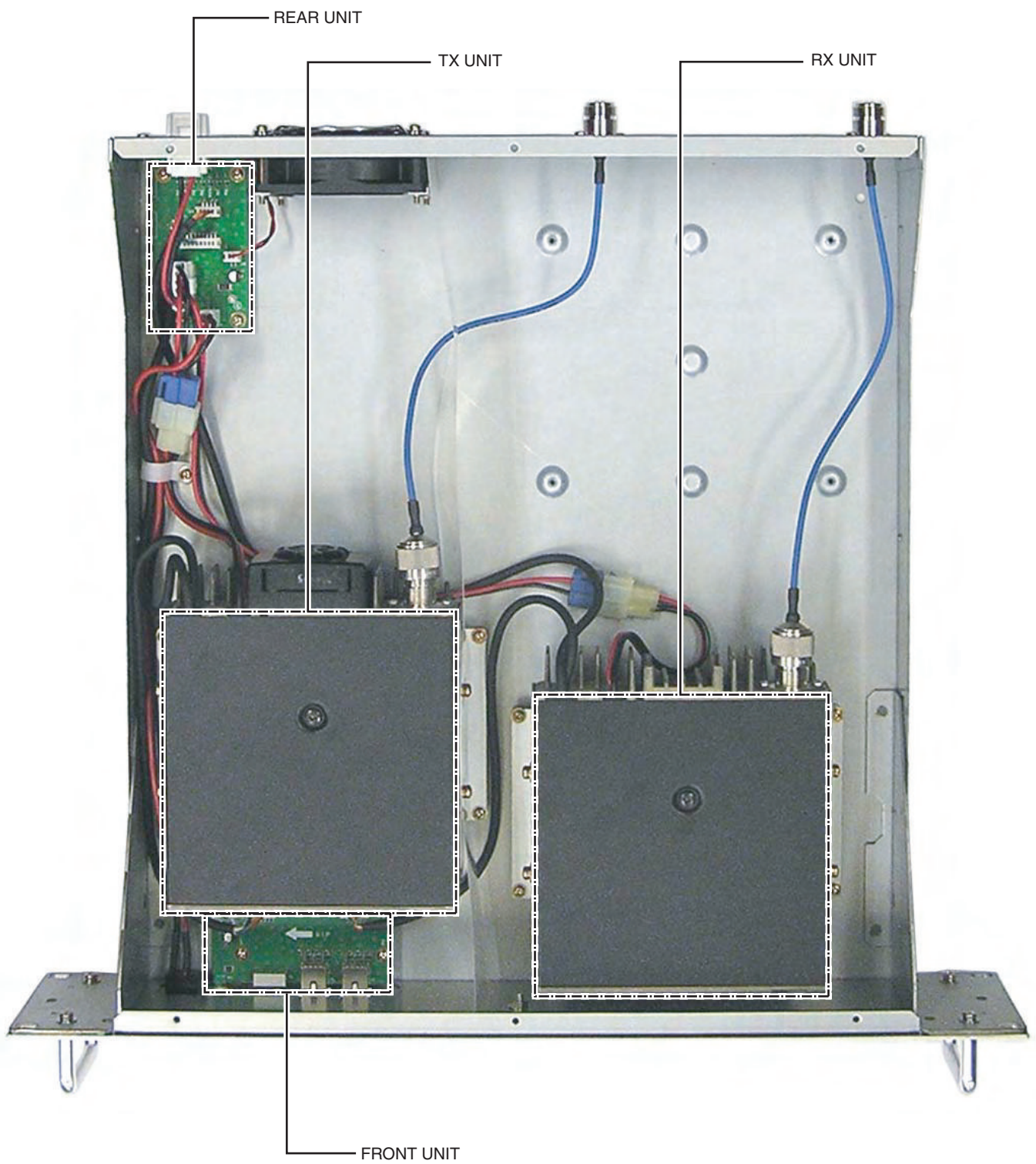
• Output power (at 13.8 V DC)	: High 23–30 W Low 2.0–3.0 W
• Modulation	: GMSK
• Modulation system	: Quadrature modulation (244.8 MHz)
• Occupied bandwidth	: Less than 5.5 kHz
• Spurious emissions	: Less than -60 dB

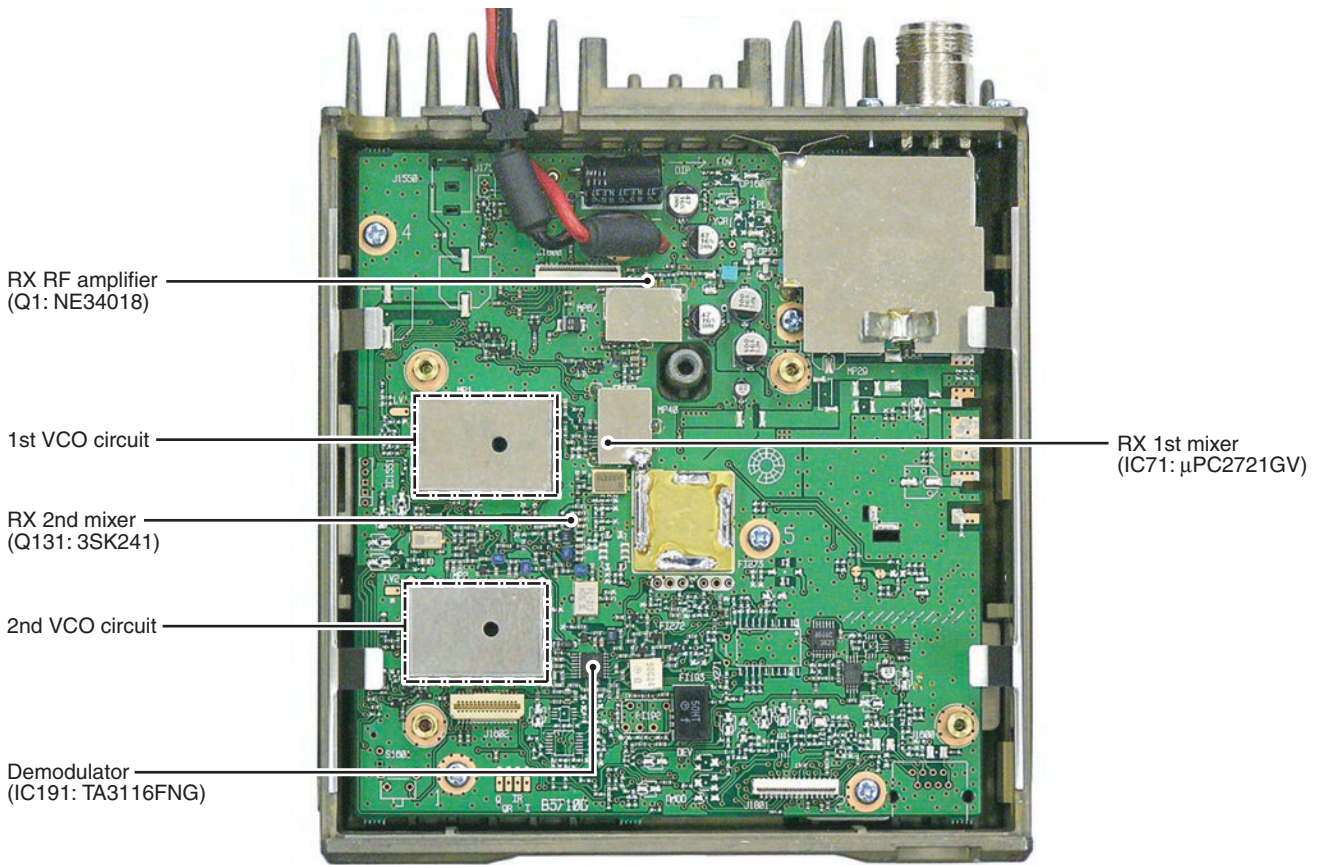
RECEIVER

• Receive system	: Double-conversion superheterodyne system
• Intermediate frequencies	: 1st 46.35 MHz 2nd 450 kHz
• Sensitivity (BER 1×10^{-2})	: Less than -7 dB μ (0.45 μV)
• Selectivity (20 kHz offset)	: More than 65 dB
• Spurious and image rejection	: More than 70 dB
• Receive spurious	: Less than 2 nW (-57 dBm)

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

SECTION 2 INSIDE VIEWS





RX RF amplifier
(Q1: NE34018)

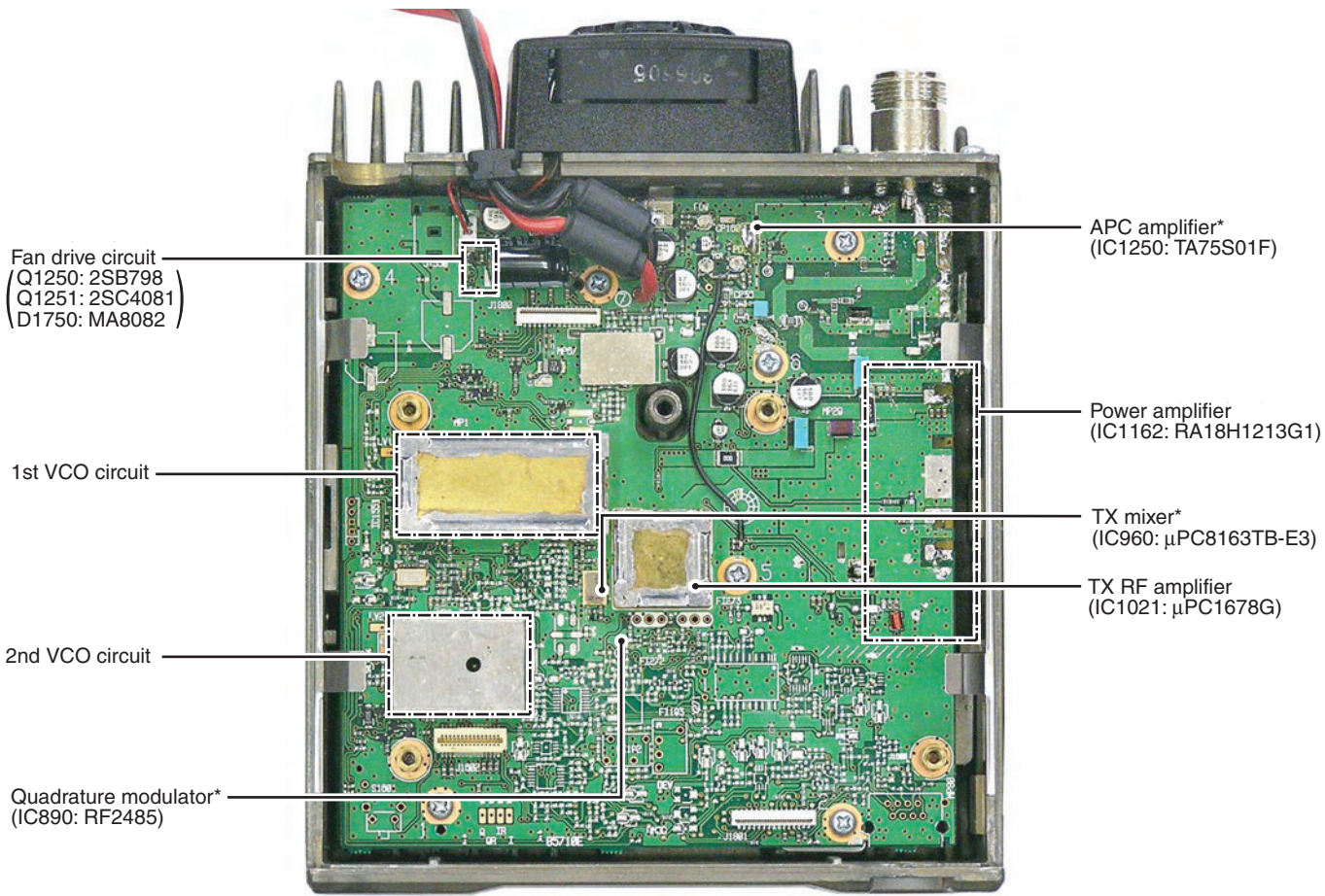
1st VCO circuit

RX 2nd mixer
(Q131: 3SK241)

2nd VCO circuit

Demodulator
(IC191: TA3116FNG)

RX 1st mixer
(IC71: μPC2721GV)



Fan drive circuit
(Q1250: 2SB798
Q1251: 2SC4081
D1750: MA8082)

1st VCO circuit

2nd VCO circuit

Quadrature modulator*
(IC890: RF2485)

APC amplifier*
(IC1250: TA75S01F)

Power amplifier
(IC1162: RA18H1213G1)

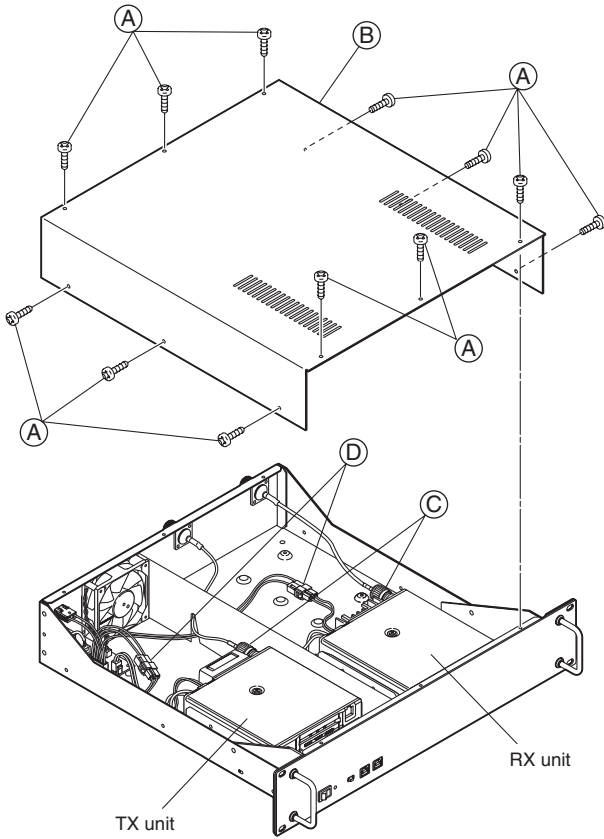
TX mixer*
(IC960: μPC8163TB-E3)

TX RF amplifier
(IC1021: μPC1678G)

SECTION 3 DISASSEMBLY INSTRUCTION

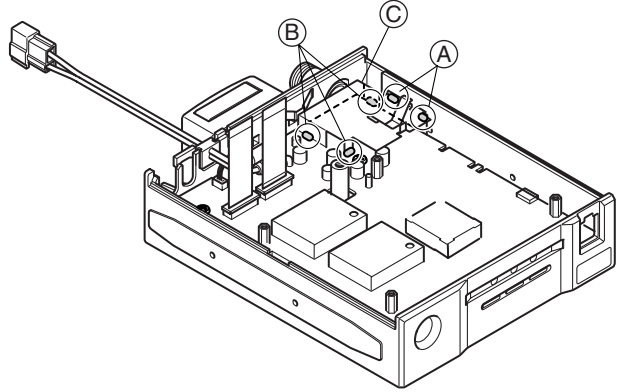
• REMOVING THE COVER

- ① Unscrew 12 screws (A), and remove the cover (B).
- ② Disconnect 2 cables (C), and disconnect 2 cables (D).

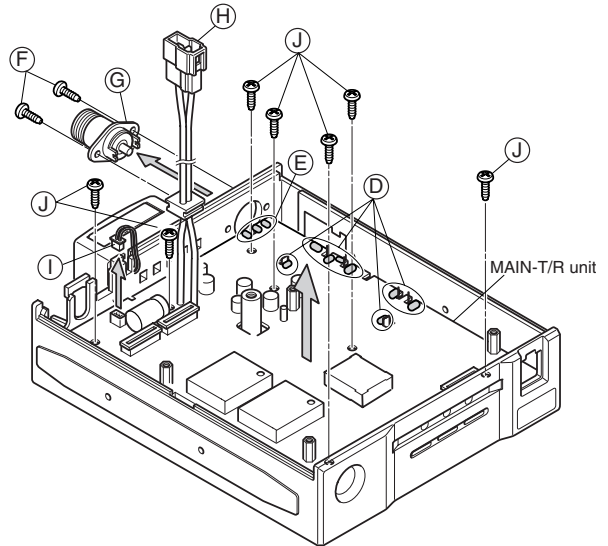


• REMOVING THE MAIN-T/R UNIT

- ① Unsolder 2 points (A). (MAIN-T unit only)
- ② Unsolder 3 points (B), and remove the ANT plate (C).

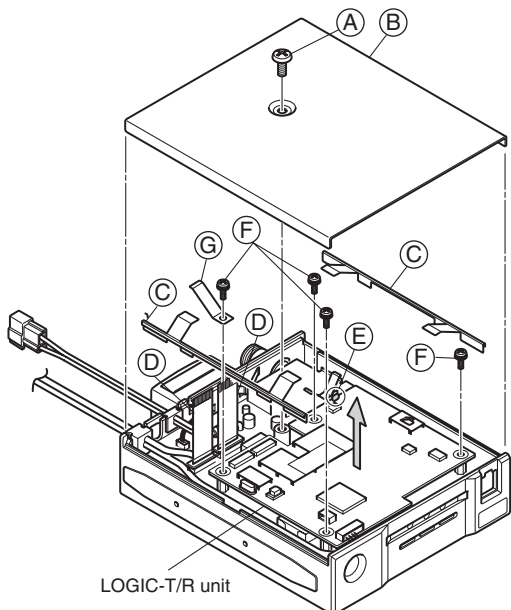


- ③ Unsolder 8 points (D). (MAIN-T unit only)
- ④ Unsolder 3 points (E).
- ⑤ Unscrew 2 screws (F), and remove the ANT connector (G).
- ⑥ Take off the cable (H) from the chassis.
- ⑦ Disconnect the cable (I). (MAIN-T unit only)
- ⑧ Unscrew 7 screws (J), and take off the MAIN-T/R unit.



• REMOVING THE LOGIC-T/R UNIT

- ① Unscrew 1 screw (A), and remove the cover (B).
- ② Remove 2 main shield plates (C).
- ③ Disconnect 2 cables (D), and unsolder 1 point (E).
- ④ Unscrew 4 screws (F), and remove the earth spring (G).
- ⑤ Take off the LOGIC-T/R unit.



[LOGIC-T UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Contains rows Q9-Q14, D2-D17, X1-X4, L1-L16, R1-R54.

[LOGIC-T UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Contains rows R55-R158.

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

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
DS1	5040003070	LED MPG4371F		
S1	2220000631	SW MFS201N-16-Z		

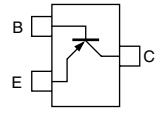
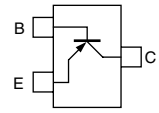
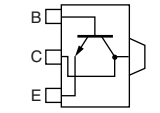
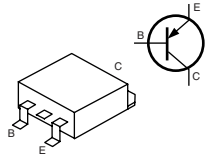
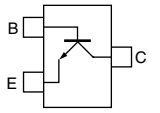
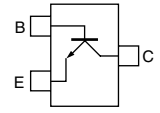
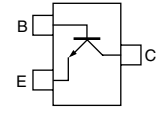
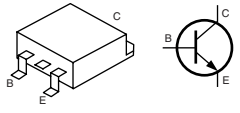
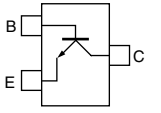
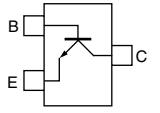
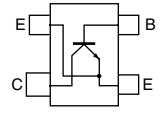
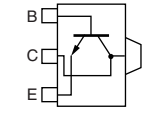
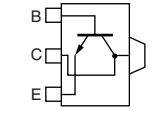
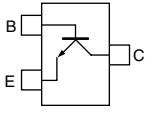
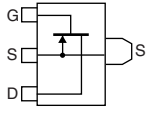
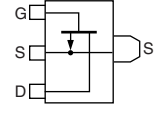
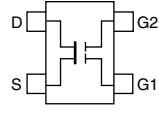
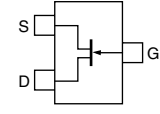
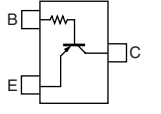
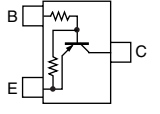
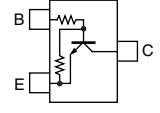
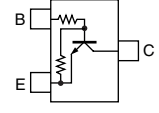
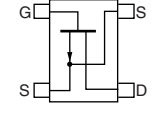
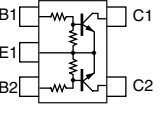
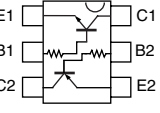
[REAR UNIT]

REF NO.	ORDER NO.	DESCRIPTION	M.	H/V LOCATION
D1	1790001711	S.DIO NNCD5.6C-T1-A	T	36.9/71.8
D2	1790001711	S.DIO NNCD5.6C-T1-A	T	32.9/71.8
D3	1790001711	S.DIO NNCD5.6C-T1-A	T	24.9/71.8
D4	1790001711	S.DIO NNCD5.6C-T1-A	T	20.9/71.8
D5	1790001711	S.DIO NNCD5.6C-T1-A	T	16.9/71.7
D6	1790001711	S.DIO NNCD5.6C-T1-A	T	12.9/71.8
D7	1790000700	DIO DSA3A1		
D8	1790001711	S.DIO NNCD5.6C-T1-A	T	28.9/71.8
R1	7030003300	S.RES ERJ3GEYJ 680 V (68)	T	36/76.4
R2	7030003300	S.RES ERJ3GEYJ 680 V (68)	T	32/76.4
R3	7030003300	S.RES ERJ3GEYJ 680 V (68)	T	24/76.4
R4	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	20/76.4
R5	7030003320	S.RES ERJ3GEYJ 101 V (100)	T	16/76.4
R6	7030003300	S.RES ERJ3GEYJ 680 V (68)	T	12/76.4
R7	7030011030	S.RES ERJ1TYJ 270U (27)	T	35.3/21.3
R8	7030003340	S.RES ERJ3GEYJ 151 V (150)	T	28/76.4
C7	4510008800	S.ELE EEE1EA100SR	T	40.8/26.6
J1	6510018921	S.CNR B8B-PH-SM4-TB (LF) (SN)	T	23.9/43
J2	6510016171	CNR 52018-8836		
J3	6510023261	S.CNR B6B-PH-SM4-TB (LF) (SN)	T	25.9/58.5
J4	6510011591	CNR B2P-VH (LF) (SN)		
J5	6510011461	CNR B6P-VH (LF) (SN)		
J6	6510018961	S.CNR B2B-PH-SM4-TB (LF) (SN)	T	39.8/36.3

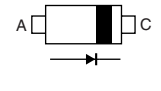
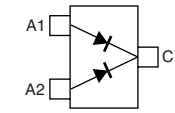
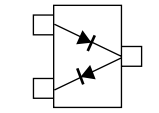
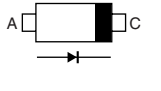
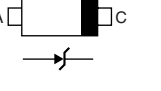
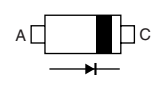
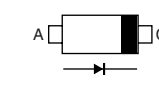
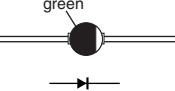
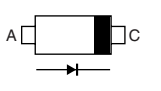
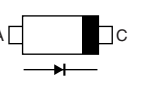
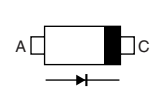
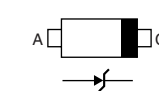
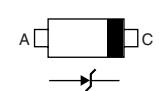
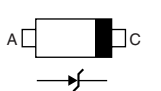
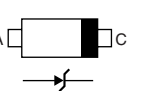
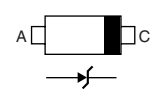
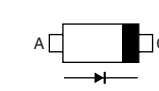
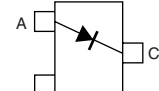
M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

SECTION 5 SEMICONDUCTOR INFORMATION

• TRANSISTORS AND FET'S

2SA1362 GR (Symbol: AEG) 	2SA1586 GR (Symbol: SG) 	2SB798 T2 DK (Symbol: DK) 	2SB934 P (Symbol: None) 	2SC4081 T106 S (Symbol: BS) 
2SC4215 O (Symbol: QO) 	2SC4226 T1 R25 (Symbol: R25) 	2SC4684 (Symbol: 2SC4684) 	2SC5107 O (Symbol: MFO) 	2SC5195 (Symbol: 88) 
2SC5454 R54 (Symbol: R54) 	2SD1619 T TD (Symbol: DB) 	2SD1801 S TL (Symbol: CE) 	2SD2216J (Symbol: Y) 	2SK2854 (Symbol: UP) 
2SK2855 (Symbol: UT) 	3SK241 (Symbol: DU) 	DTA114EUA T106 (Symbol: 14) 	DTA143TUA (Symbol: 93) 	DTA144EUA T106 (Symbol: 16) 
DTC143ZUA (Symbol: 123) 	DTC144EUA T106 (Symbol: 26) 	NE34018-T1 64 (Symbol: V64) 	XP1214 (Symbol: 9H) 	XP4315 (Symbol: CB) 

• DIODES

1SS355 (Symbol: A) 	1SS364 (Symbol: BF) 	1SS372 (Symbol: N9) 	1SV239 (Symbol: TC) 	1SV282 (Symbol: TD) 
1SV307 (Symbol: TX) 	1SV308 (Symbol: TX) 	DSA3A1 (Color: Green) 	HSU88TRF (Symbol: 9) 	MA2S077 (Symbol: S) 
MA2S728 (Symbol: B) 	MA8030 H (Symbol: 3^0) 	MA8033 L (Symbol: 3_3) 	MA8062 M (Symbol: 6-2) 	MA8082 M (Symbol: 8-2) 
MA8091 M (Symbol: 9-1) 	NNCD5.6C-T1 (Symbol: NNCD5.6) 	SB07-03C (Symbol: J) 		

SECTION 6 MECHANICAL PARTS

[CASE]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
MF1	2710000750	FBA08A12LZ (RIB)	1
W1	8900013140	OPC-1323 (2731 POWER-SW CABLE)	1
W2	8900013210	OPC-1307 (2731 DC CABLE)	1
W3	8900013240	OPC-1373 (2731 FAN CABLE)	1
W4	8900013170	OPC-1306 (2731 TRX-ANT CABLE)	1
W5	8900013170	OPC-1306 (2731 TRX-ANT CABLE)	1
EP1	6910008330	G80-18	1
MP1	8010019581	2732 CHASSIS-1	1
MP2	8930062871	2731 R-PLATE-1	1
MP3	8930062861	2731 L-PLATE-1	1
MP4	8110008171	2731 COVER-1	1
MP5	8210023000	2732 PANEL (B)	1
MP6	8930062851	2731 M-PLATE-1	2
MP7	8930062851	2731 M-PLATE-1	2
MP8	8930062841	2731 FAN HOLDER-1	2
MP9	8930063090	BH-60S	1
MP10	8850002040	Z-8S	4
MP12	8930048350	2146 LENS	1
MP13	8950003170	Nylon clip SL-8N	1
MP14	8810006470	setscrew (C) 4x12 SUS	4
MP15	8810003361	setscrew (C) 3x6 ZC3	4
MP16	8810003361	setscrew (C) 3x6 ZC3	4
MP17	8810003361	setscrew (C) 3x6 ZC3	4
MP18	8810003361	setscrew (C) 3x6 ZC3	4
MP20	8810003361	setscrew (C) 3x6 ZC3	1
MP21	8810002950	binding screw M3x6 SUS	12
MP22	8810002950	binding screw M3x6 SUS	2
MP23	8810002950	binding screw M3x6 SUS	1
MP24	8810010131	setscrew (C) 3x35 ZC3	4
MP25	8810003391	setscrew (C) 4x8 ZC3	4
MP26	8810003391	setscrew (C) 4x8 ZC3	4
MP27	8830000111	Nut M4 ZC3	1
MP28	8850000140	flat washer M4 BS NI	1
MP29	8850000130	flat washer M3 BS NI 3x8x0.5	1
MP30	8810002950	binding screw M3x6 SUS	2

[FRONT UNIT]

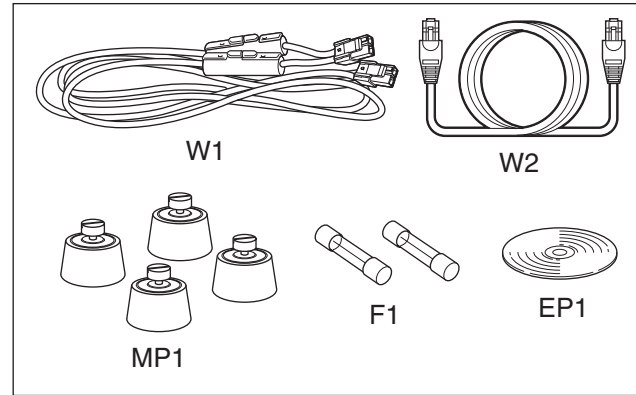
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6450002101	CMS1410-016010	1
J2	6450002101	CMS1410-016010	1
J3	6510020251	B9B-PH-SM4-TB (LF) (SN)	1
J4	6510022311	B5B-PH-SM4-TB (LF) (SN)	1
DS1	5040003070	MPG4371F	1
S1	2220000631	MFS201N-16-Z	1

[REAR UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J2	6510016171	52018-8836	1

[ACCESSORIES]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
F1	5210000071	FGB 10A PBF	2
W1	8900013190	OPC-1309 (2731 DC-IN CABLE)	1
W2	8900010551	OPC-1069A	1
EP1	7800000330	Utility CD	1
MP1	8930057680	Rubber leg (O)	4



Screw abbreviations BiH: Binding head
SUS: Stainless NI: Nickel
BS: Brass

[CHASSIS-T PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
IC204	1150002042	RA30H1317M-121	1
J1	6510004910	NR-DSE-01	1
P1	5610000380	TMP-K01X-A1	1
P2	5610000380	TMP-K01X-A1	1
MF1	2710000590	MF40D-12H-001 *	1
W1	8900010890	OPC-1115	1
W2	8900010890	OPC-1115	1
W3	9025900540	62/99/270/C31/C31	1
W4	9086700300	08	1
MP1	8010019621	2506 CHASSIS (A)-2	1
MP2	8810008661	Screw BT B0 3x8 NI-ZC3 (BT)	2
MP3	8810008661	Screw BT B0 3x8 NI-ZC3 (BT)	2
MP4	8810008661	Screw BT B0 3x8 NI-ZC3 (BT)	7
MP5	8110006640	2047 COVER	1
MP6	8810008451	binding screw M4x8 ZK3	1
MP7	8810008661	Screw BT B0 3x8 NI-ZC3 (BT)	1
MP9	8110005751	1729 FAN COVER-1	1
MP10	8810009111	Screw M2.6x16 ZK3	4
MP11	8510012210	2047 MAIN SHIELD	2
MP12	8810007131	setscrew (H) 3x6 ZC3	4
MP13	8930001170	earth spring (A) (FX-294)	1

[MAIN-T UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510009351	B2B-ZR (LF) (SN)	1
J2	6510021721	30FLT-SM2-TB (LF) (SN)	1
J3	6510021721	30FLT-SM2-TB (LF) (SN)	1
J4	6510018450	TMP-S01X-B1	1
W1	8900004880	OPC-465	1
MP1	8510011111	1922 VCO CASE-1	1
MP2	8510011111	1922 VCO CASE-1	1
MP3	8510014760	2493 PLL CASE	1
MP4	8510017220	2850 VCO COVER	1
MP5	8510017220	2850 VCO COVER	1
MP6	8510014750	2493 PLL COVER	1
MP7	8930056580	Spacer (AD)	4
MP8	8810007131	setscrew (H) 3x6 ZC3	4
MP9	8930059770	2633 M-HOLDER	1
MP10	8930014140	earth spring (D)	1

[LOGIC-T UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510022711	30FLZ-SM2-TB (LF) (SN)	1
J2	6510022711	30FLZ-SM2-TB (LF) (SN)	1
J4	6510019271	52365-0671	1
J5	6510021431	S8B-ZR-SM4A-TF (LF) (SN)	1
J6	6510023861	S9B-ZR-SM4A-TF (LF) (SN)	1
W1	8900013180	OPC-1312 (2732 TX-CTRL CABLE)	1
MP1	8510014481	2506 CPU SHIELD-1	1
MP3	8510002280	VCO shield plate (A) (FX-15)	1

[CHASSIS-R PARTS]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510004910	NR-DSE-01	1
W1	8900010890	OPC-1115	1
W2	8900010890	OPC-1115	1
MP1	8010019621	2506 CHASSIS (A)-2	1
MP2	8810008661	screw BT B0 3x8 NI-ZC3 (BT)	2
MP3	8810008661	screw BT B0 3x8 NI-ZC3 (BT)	1
MP4	8810008661	screw BT B0 3x8 NI-ZC3 (BT)	7
MP5	8110006640	2047 COVER	1
MP6	8810008451	binding screw M4x8 ZK3	1
MP7	8510012210	2047 MAIN SHIELD	2
MP8	8810007131	setscrew (H) 3x6 ZC3	4

[MAIN-R UNIT]

REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510021721	30FLT-SM2-TB (LF) (SN)	1
J2	6510021721	30FLT-SM2-TB (LF) (SN)	1
J3	6510018450	TMP-S01X-B1	1
W1	8900004880	OPC-465	1
EP2	6910013310	MMZ1608D121B	1
MP1	8510011111	1922 VCO CASE-1	1
MP2	8510017220	2850 VCO COVER	1
MP3	8930056580	Spacer (AD)	4
MP4	8810007131	setscrew (H) 3x6 ZC3	4
MP5	8510002280	VCO shield plate (A) (FX-15)	1
MP6	8930014140	earth spring (D)	1
MP7	8510016420	2506 VCO CASE	1
MP8	8510016430	2506 VCO COVER	1

[LOGIC-R UNIT]

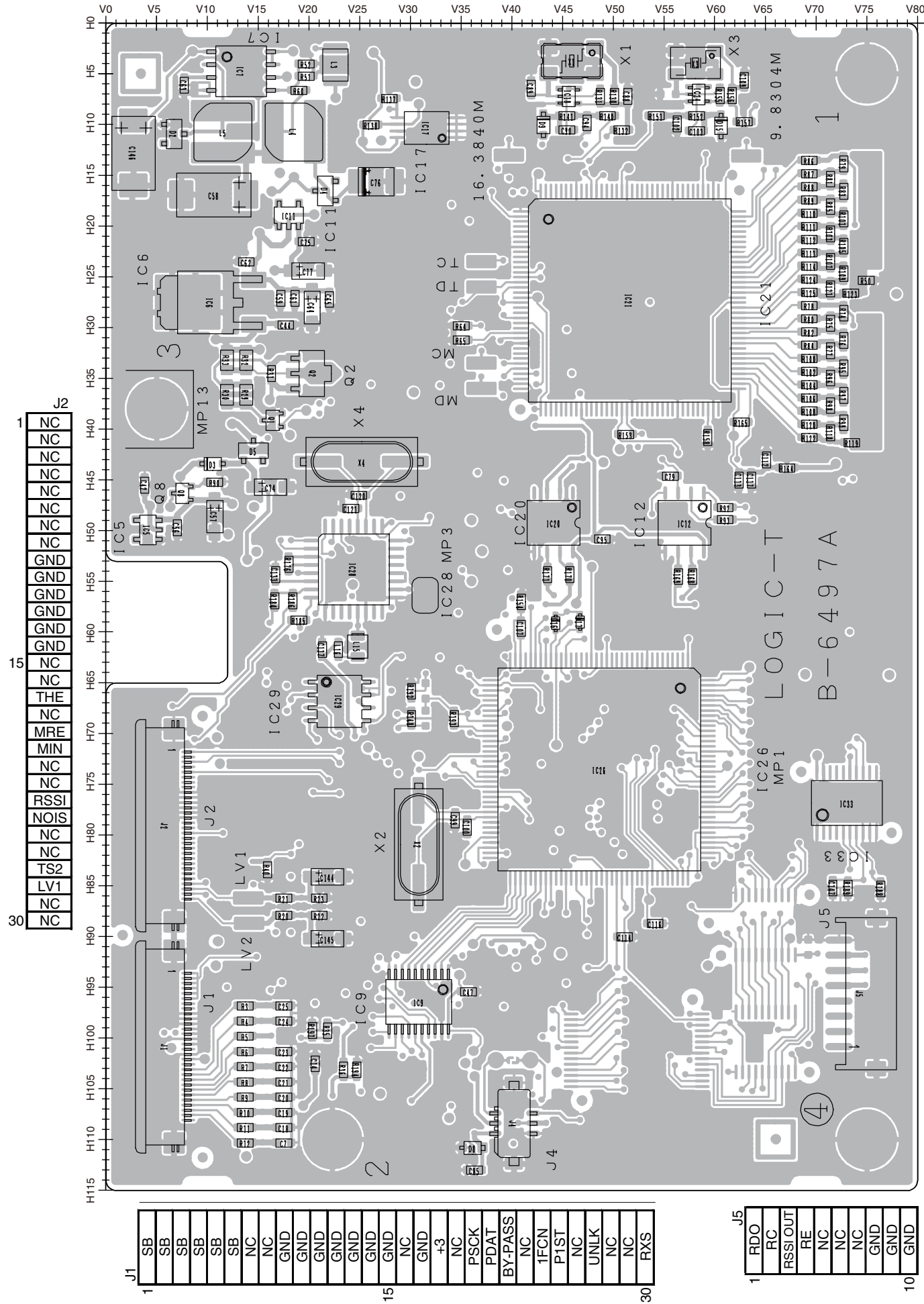
REF. NO.	ORDER NO.	DESCRIPTION	QTY.
J1	6510022711	30FLZ-SM2-TB (LF) (SN)	1
J2	6510022711	30FLZ-SM2-TB (LF) (SN)	1
J4	6510019271	52365-0671	1
J5	6510021431	S8B-ZR-SM4A-TF (LF) (SN)	1
J6	6510023861	S9B-ZR-SM4A-TF (LF) (SN)	1
W1	8900013161	OPC-1313A (2732 RX-CTRL CABLE)	1
MP1	8510014481	2506 CPU SHIELD-1	1
MP3	8510002280	VCO shield plate (A) (FX-15)	1
MP4	8510010460	1691 MAIN SHIELD PLATE	1
MP5	8510010460	1691 MAIN SHIELD PLATE	1

*Note: Refer to SECTION 9 BOARD LAYOUTS.

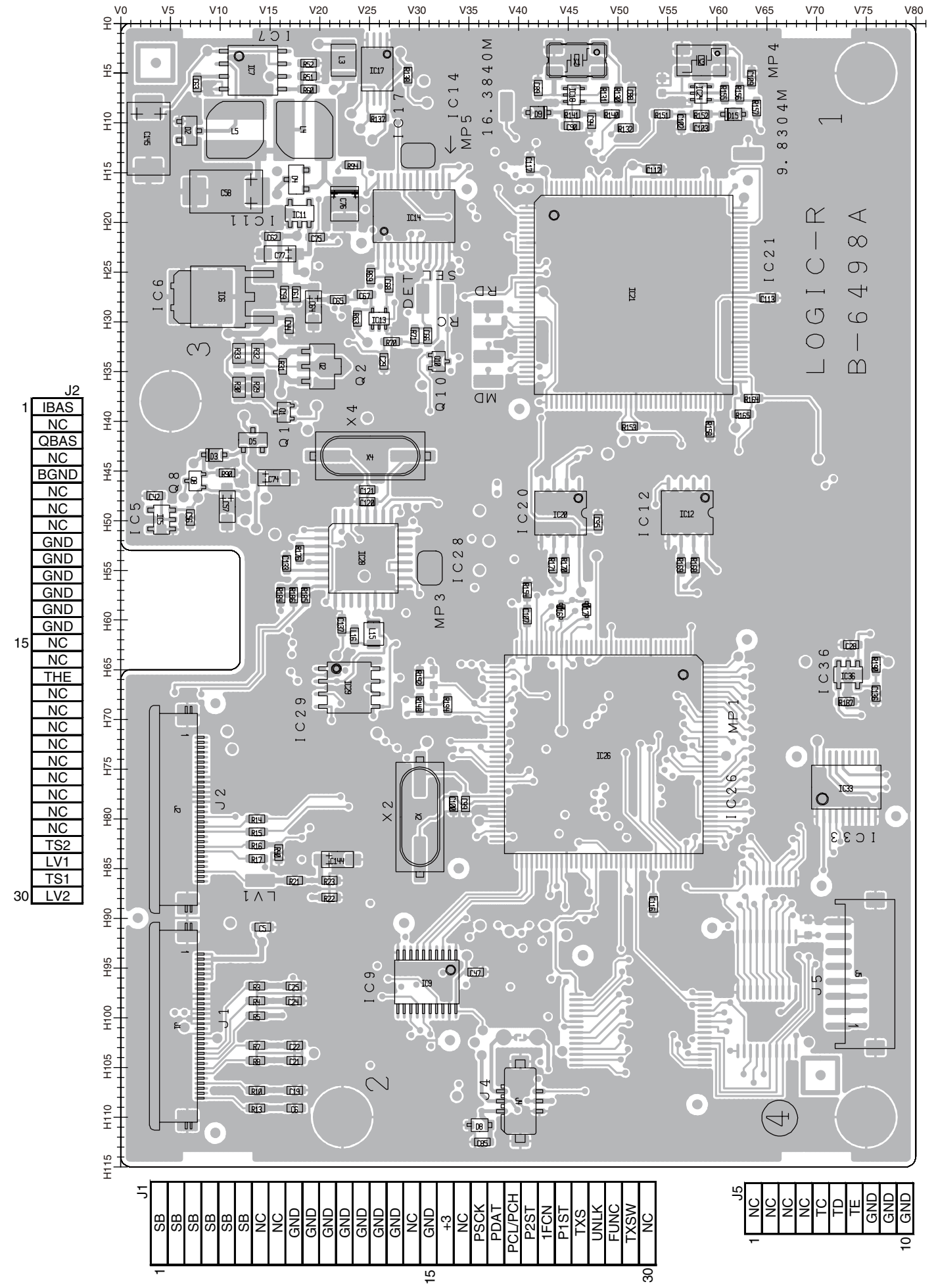
Screw abbreviations BT: Self-tapping PH: Pan head
BiH: Binding head
ZK, ZK3: Black ZC, ZC3: Black
NI-ZU: Nickel-Zinc

SECTION 7 BOARD LAYOUTS

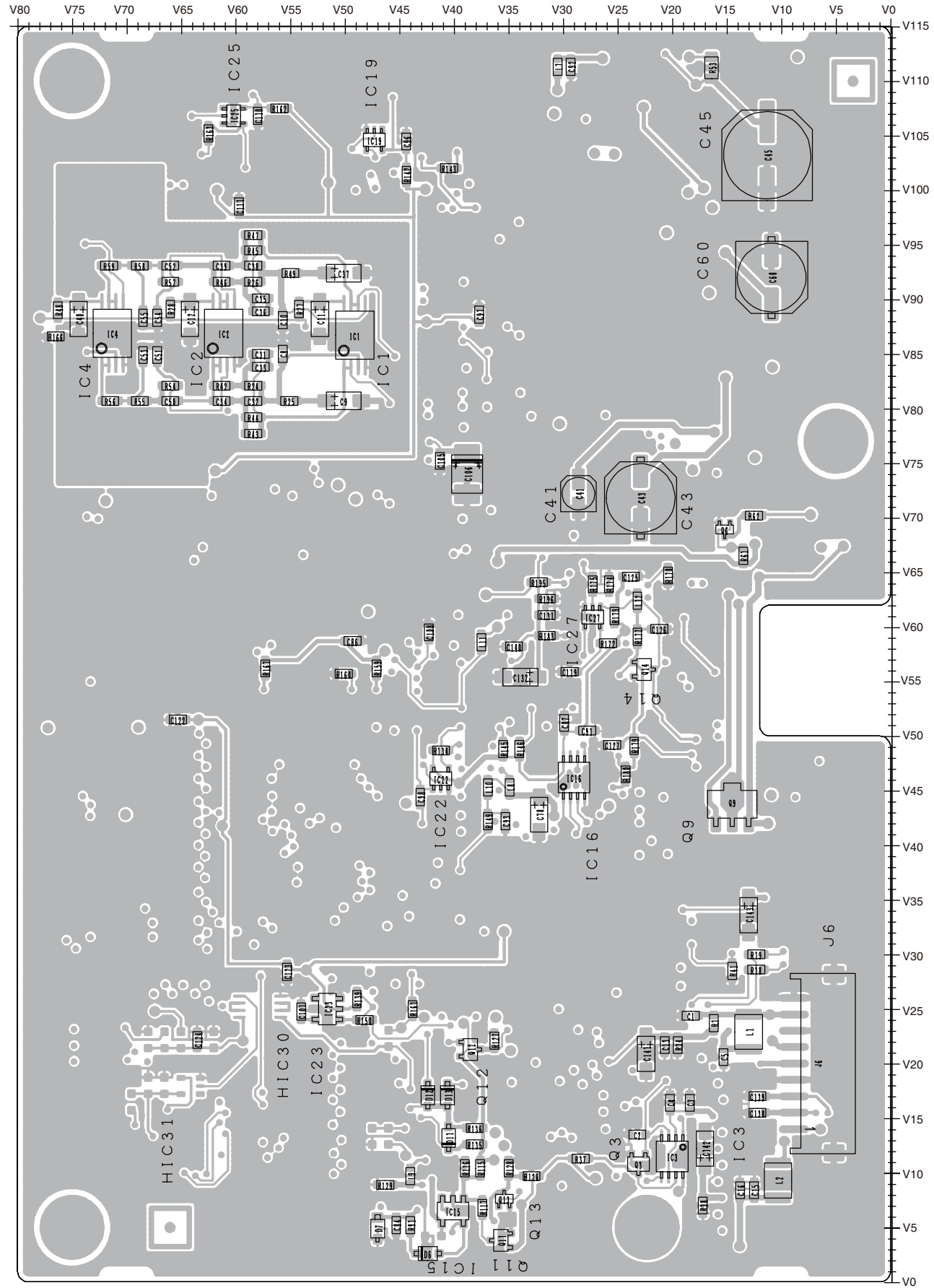
• LOGIC-R BOARD (TOP VIEW)



• LOGIC-T BOARD (TOP VIEW)

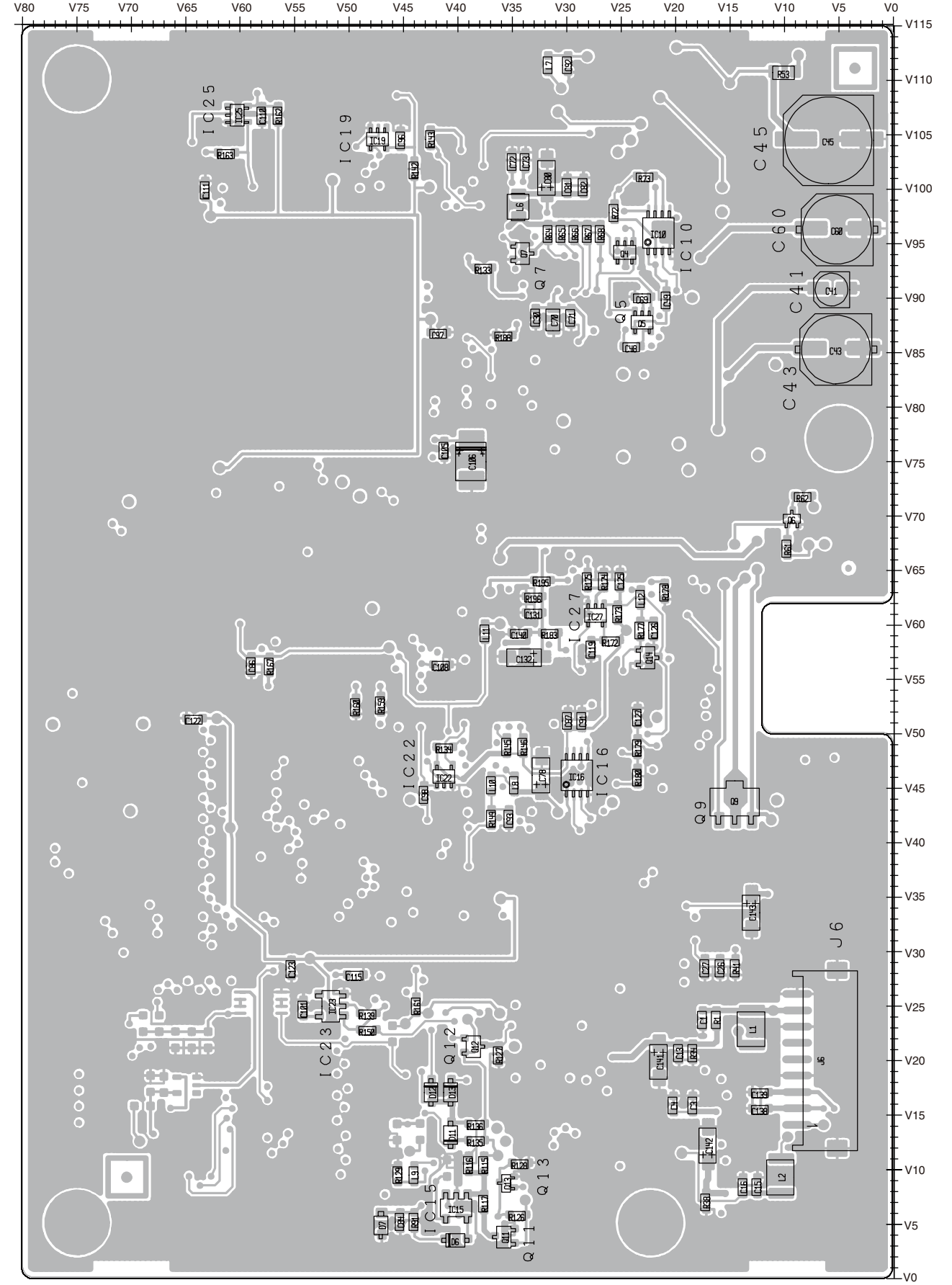


• LOGIC-T BOARD (BOTTOM VIEW)



J6
1 USBV
USBDM
USBDF
GND
HLS
5V
GND
SB
GND
GND
10

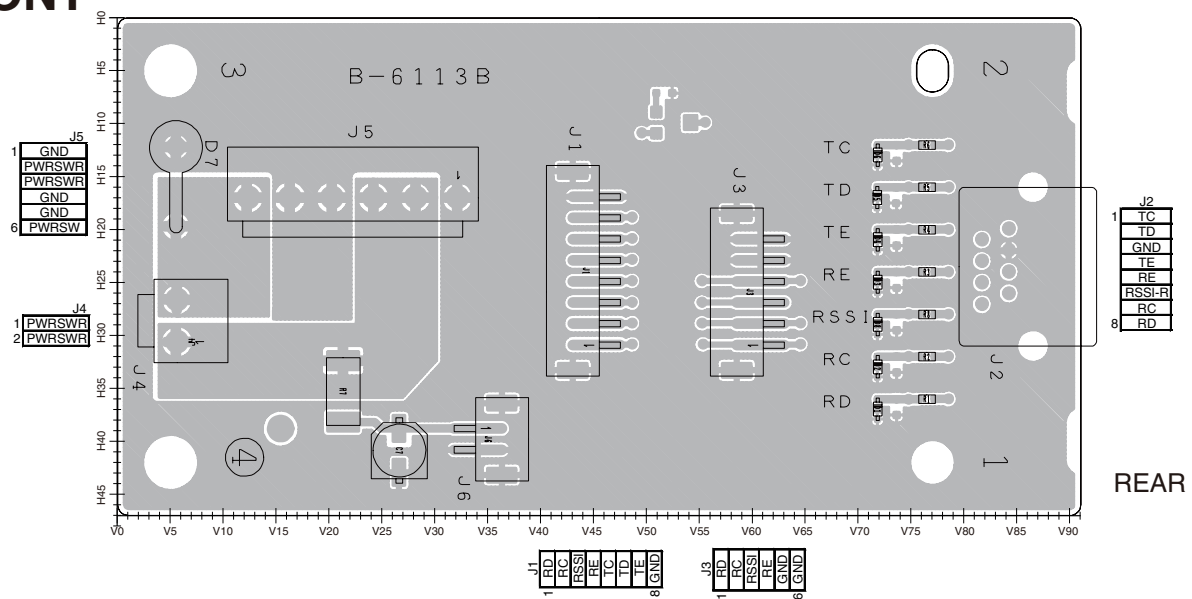
• LOGIC-R BOARD (BOTTOM VIEW)



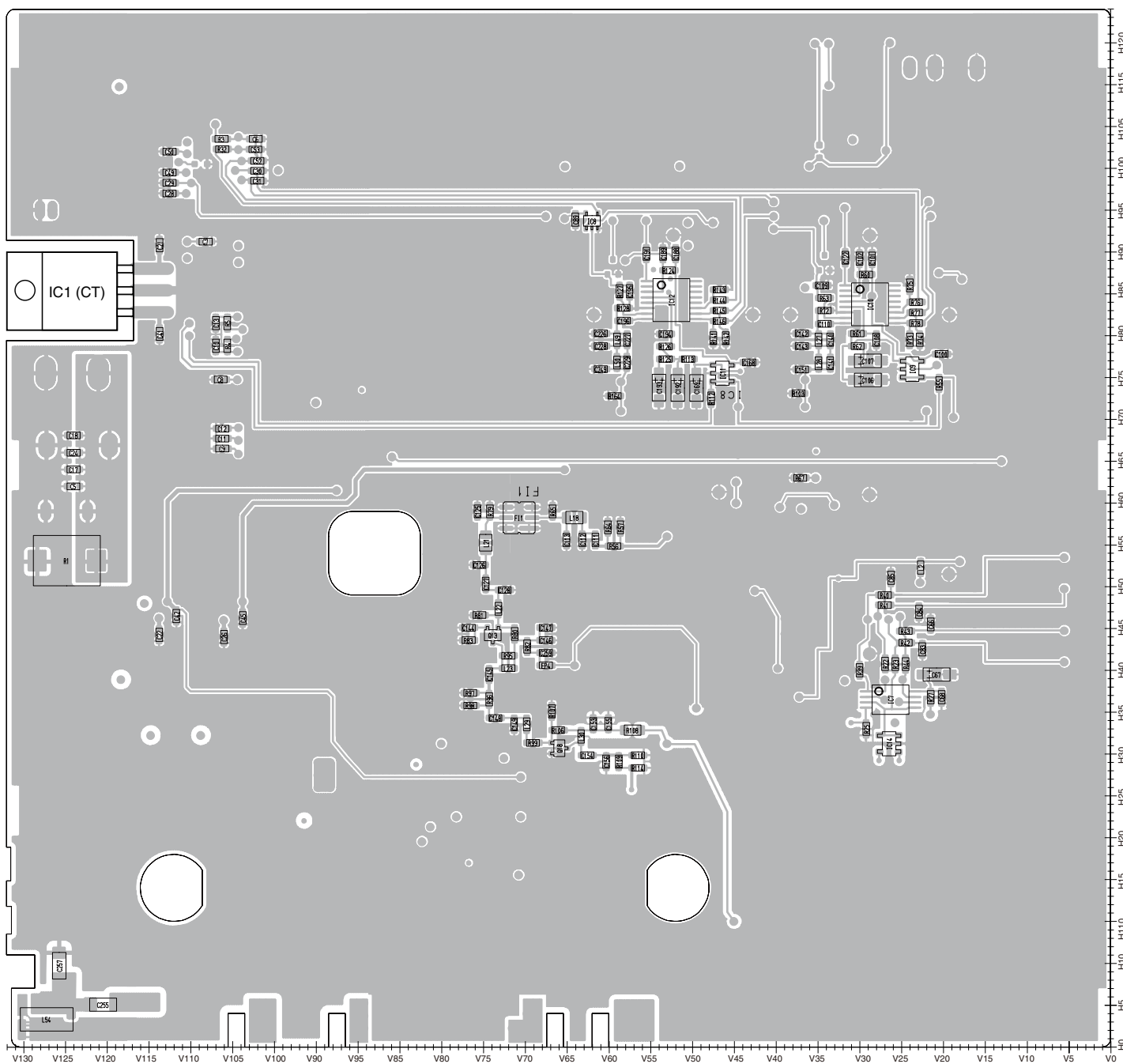
J6
1 USBV
USBDM
USBDF
GND
NC
NC
GND
SB
GND
GND
10

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

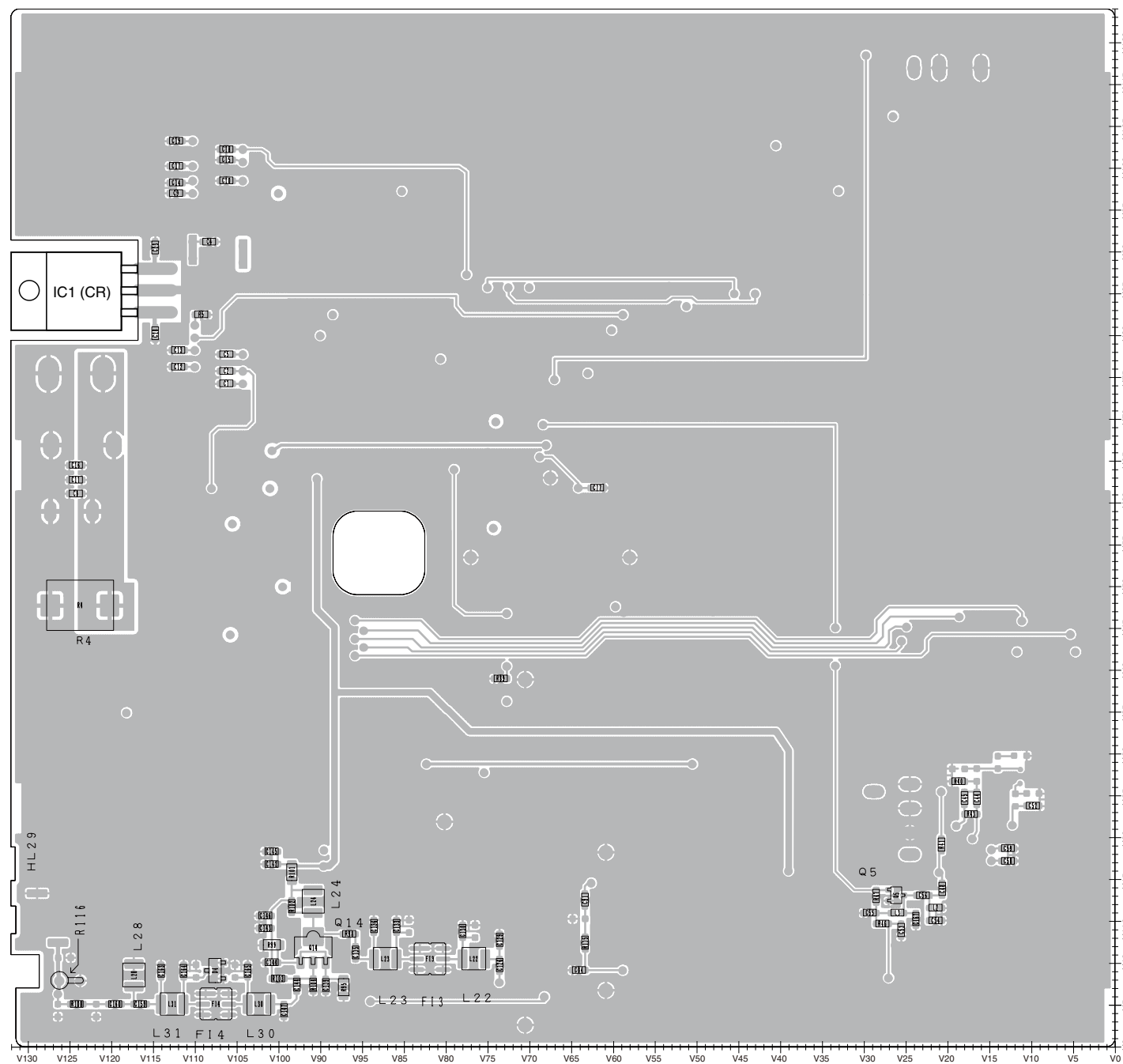
FRONT



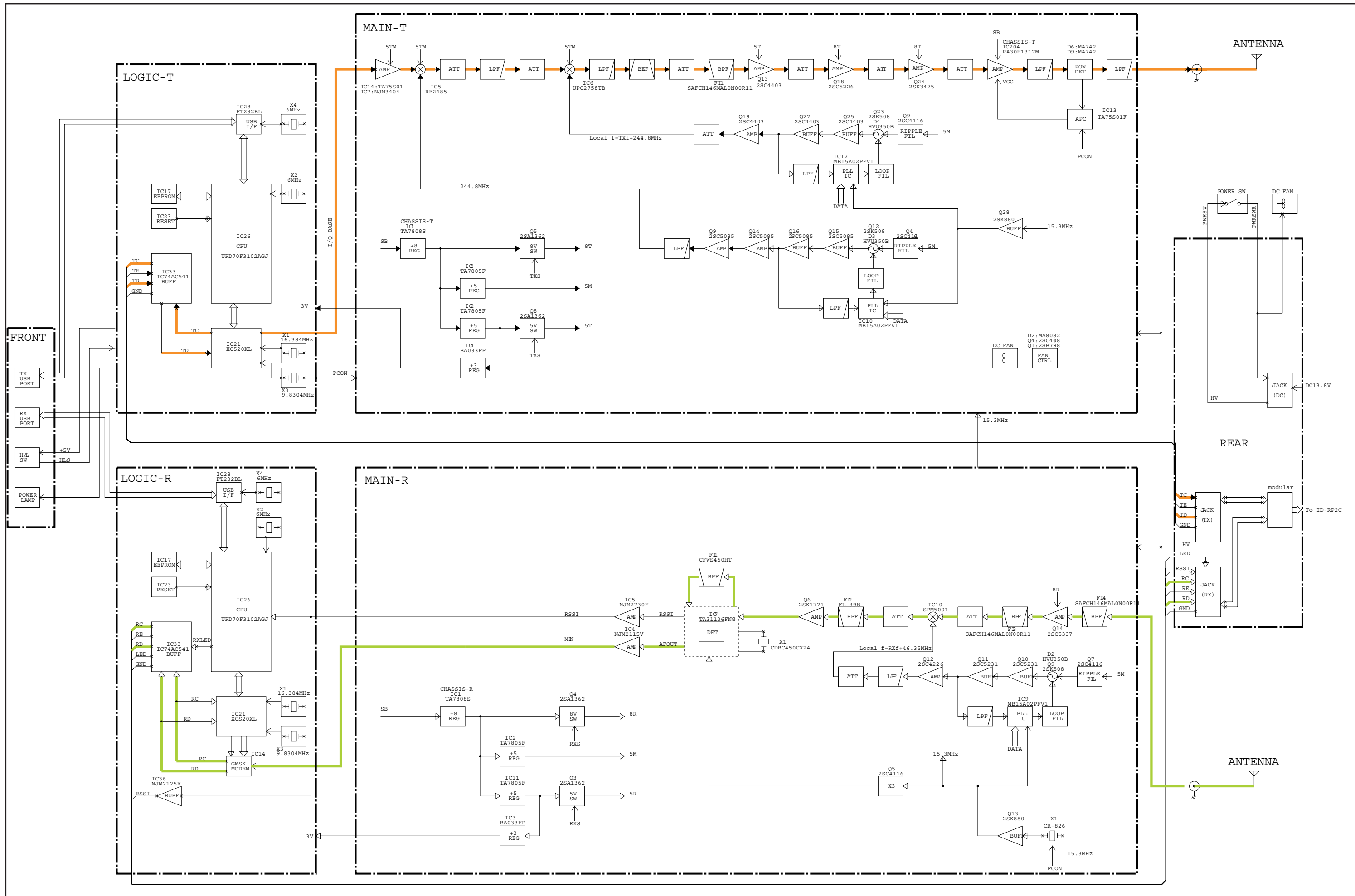
MAIN-R



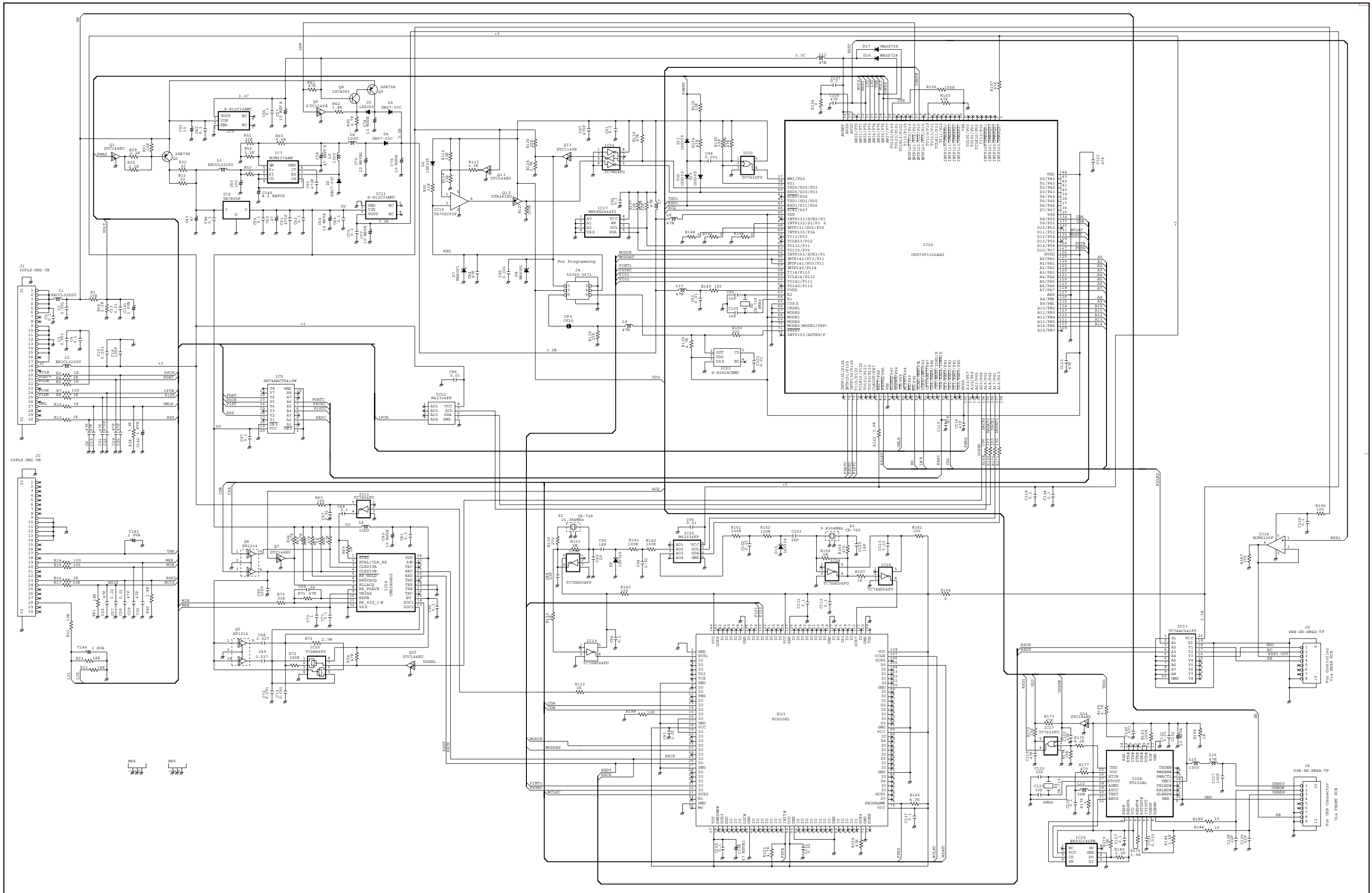
MAIN-T

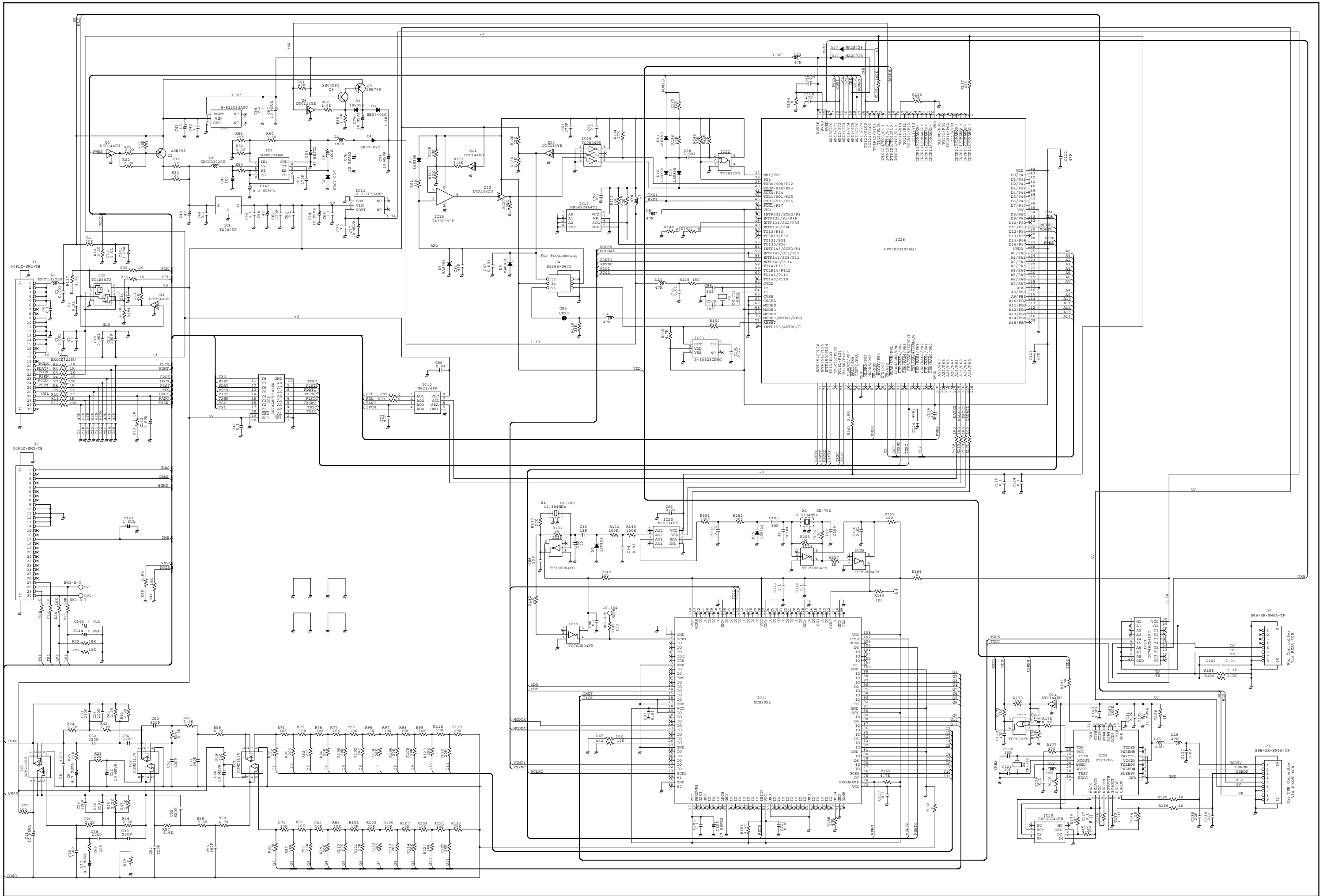


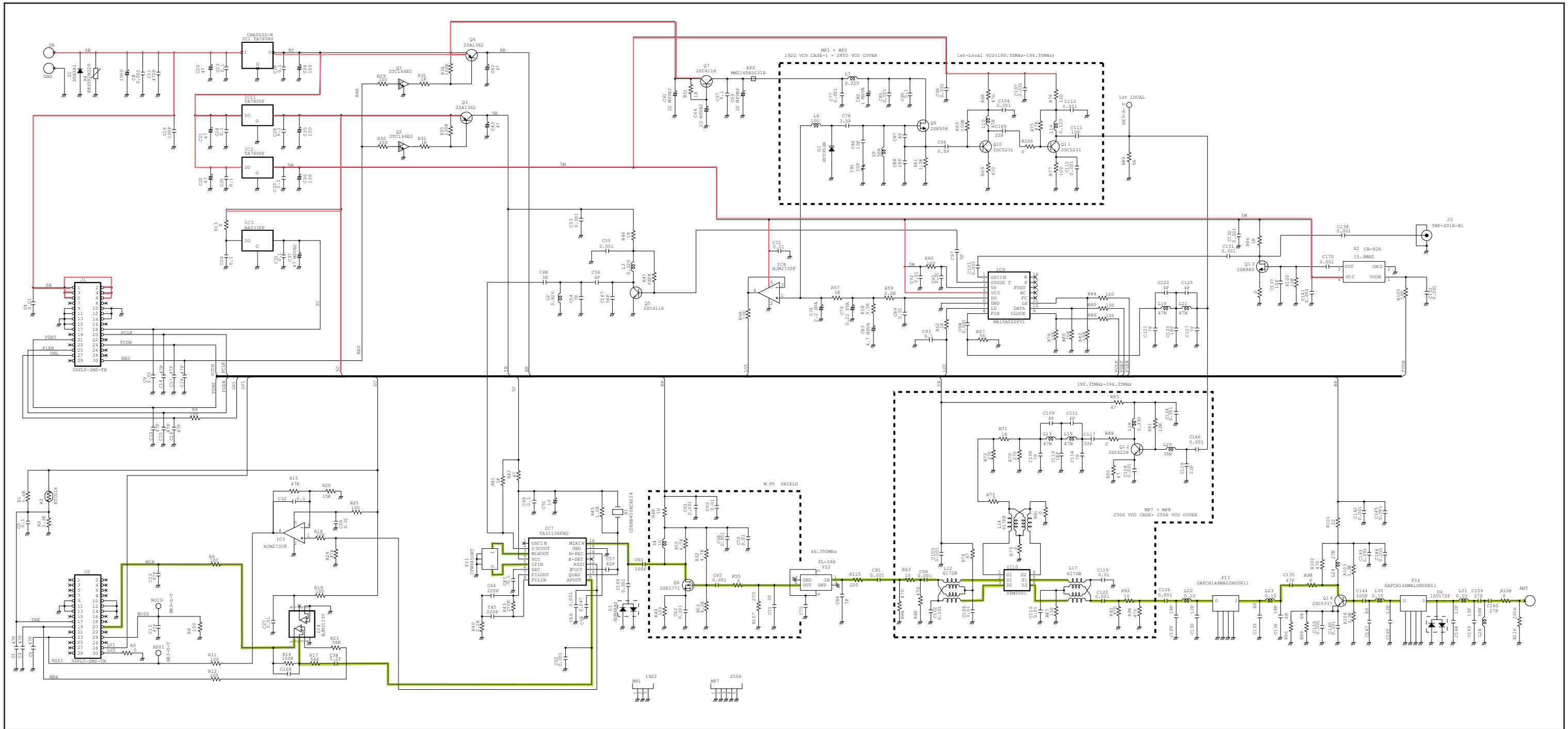
SECTION 8 BLOCK DIAGRAM

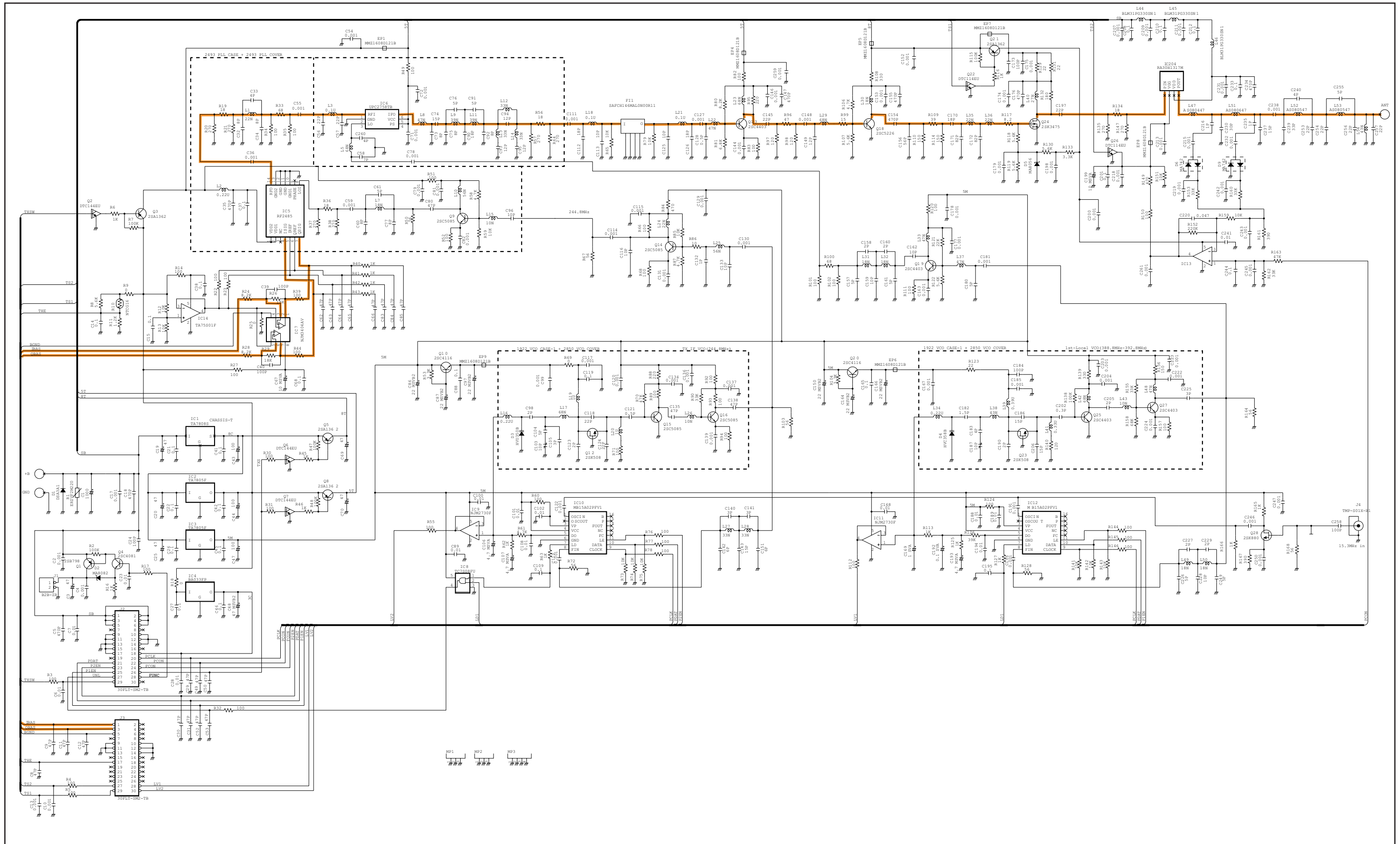


SECTION 9 VOLTAGE DIAGRAM









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