

RGO ONE HF transceiver

Technical supplement
4th production run



RGO ONE schematics and boards layout

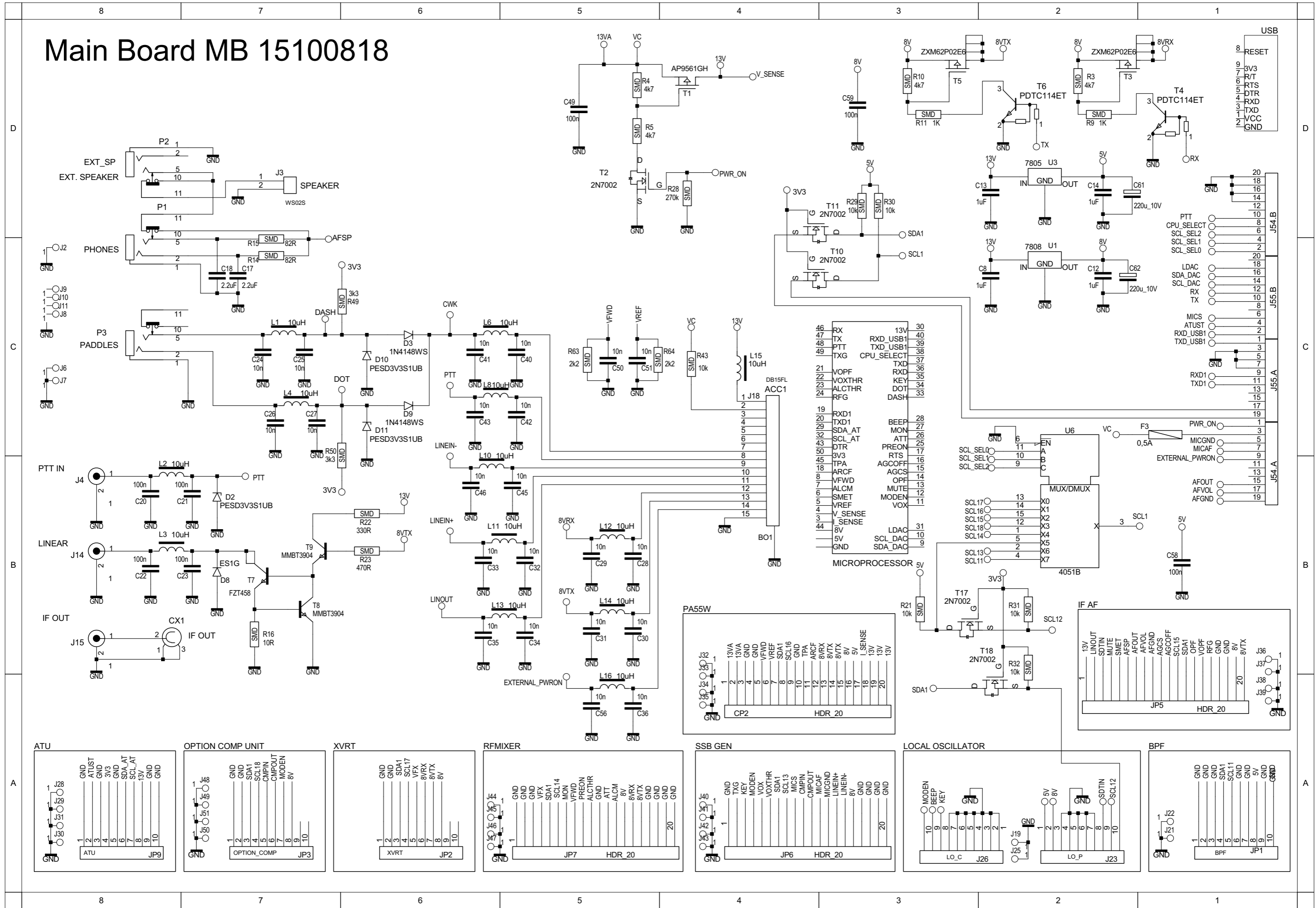
Main Board – MB

RGO ONE Main Board (MB) or so called mother board fits all connectors on the rear panel, power supply, I/O microcontroller (second CPU). MB is also intended to be a chassis for all RF boards and options, as long as “cable harness” and board interconnections.

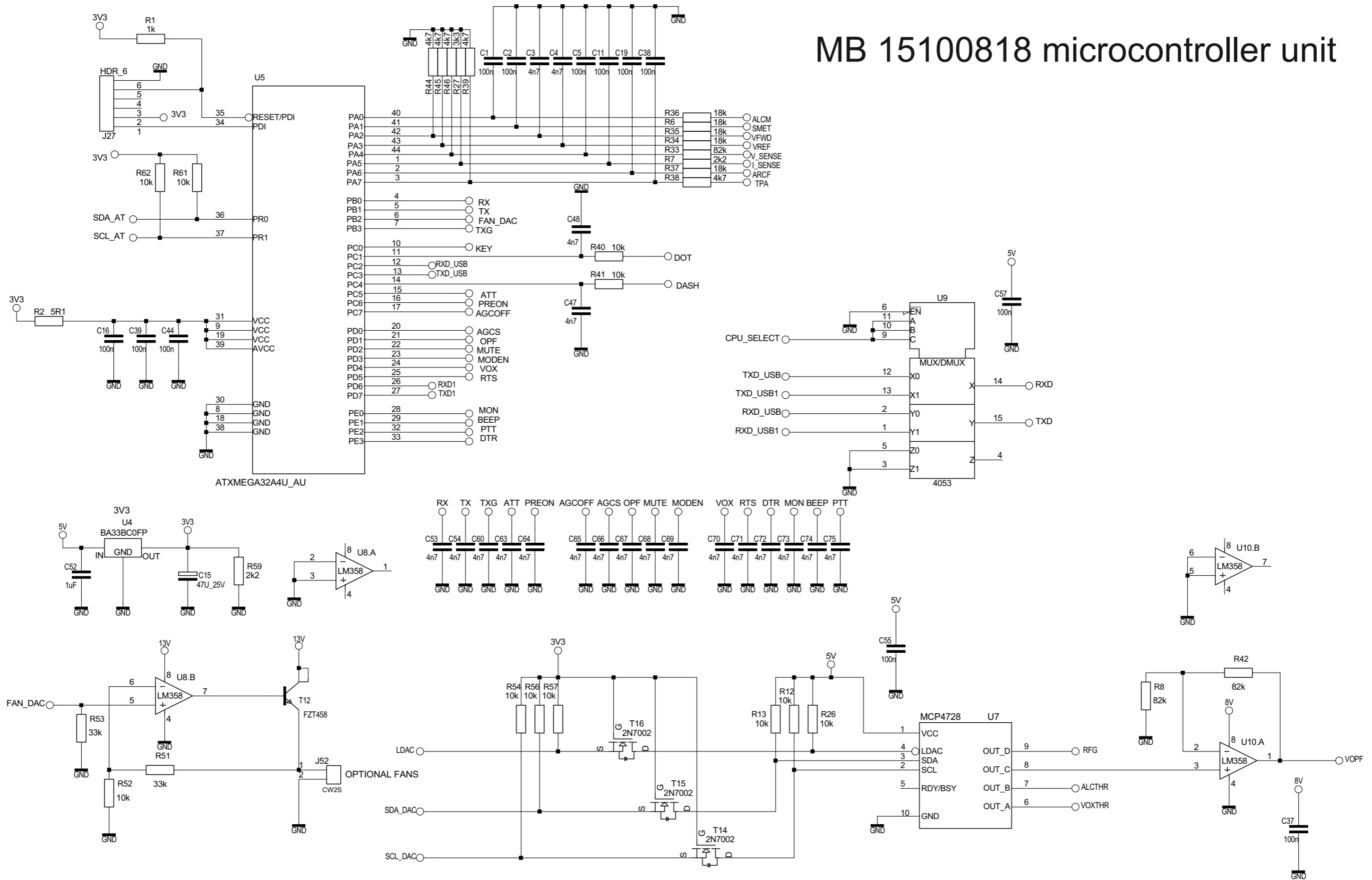
The board has the following components on it:

- I/O micro controller U5, DAC U7, external fan control – U8, T12, signal multiplexer U9, 3.3V LDO regulator chip U4.
- USB FTDI chip F1
- I/O connectors at the back side, daughter board connectors, power on/off switch, level converters, 5V,8V LDO regulators.

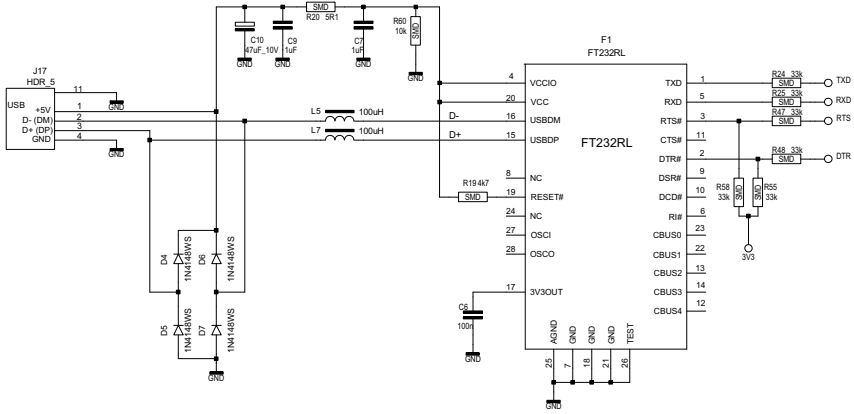
Main Board MB 15100818



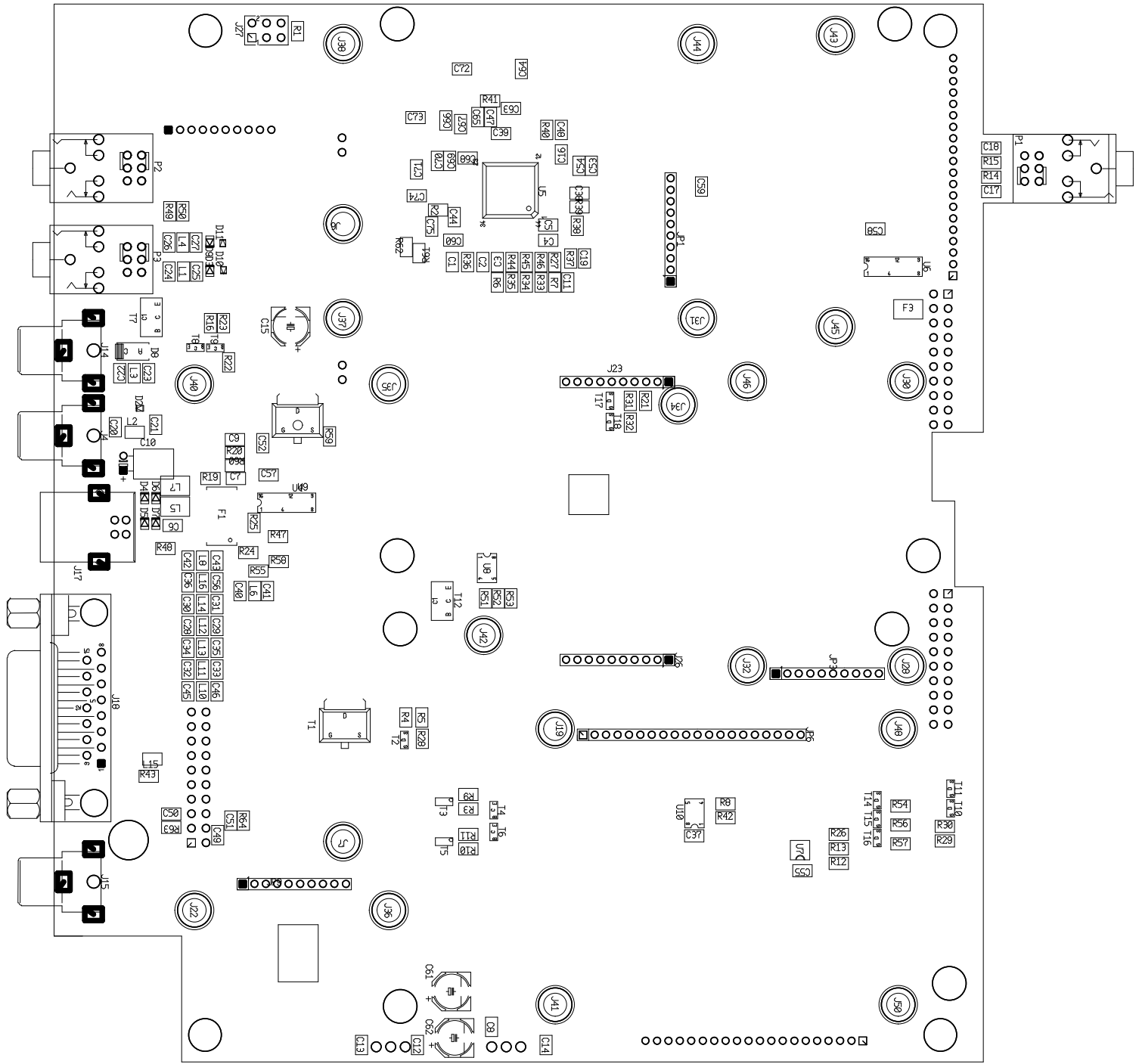
MB 15100818 microcontroller unit



MB 15100818 USB interface



Main Board (MB) BOTTOM view



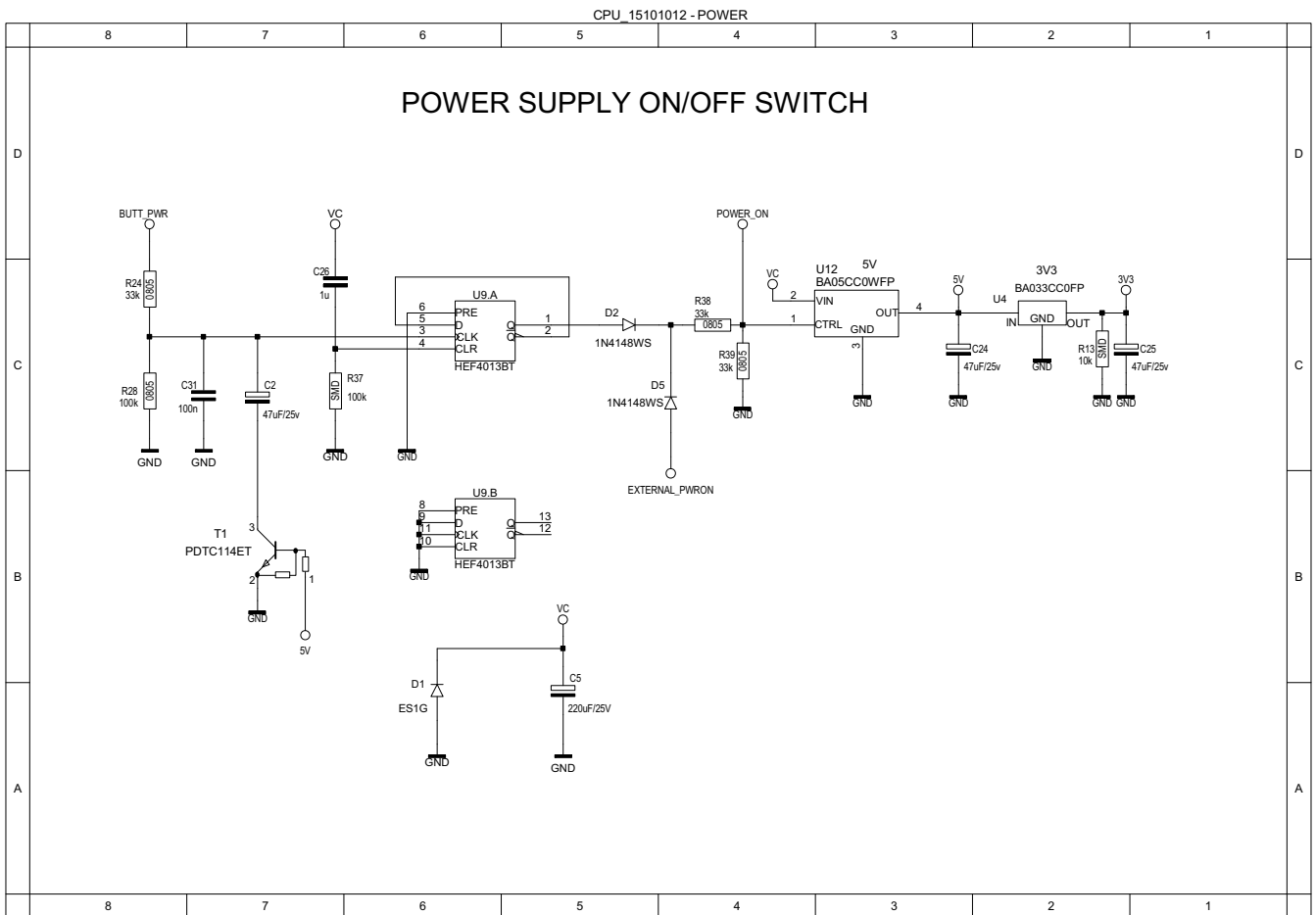
Parts specification:

Name	QTY	Alias	Shape	Order number
C1,C2,C5,C6,C11,C16,C19,C20,C21,C22,C23,C37,C38,C39,C44,C49,C55,C57,C58,C59	20	100N	\$C0805	C0805 100nF 50V X7R SAMSUNG
U3	1	7805	78XXV	7805
U1	1	7808	78XXV	7808
F3	1	0.5A	\$R1210	LQH32CN220K23L
L5,L7	2	100UH	\$R1210	LQH32CN101K23L
R12,R13,R21,R26,R29,R30,R31,R32,R40,R41,R43,R52,R54,R56,R57,R60,R61,R62	18	10K	\$R0805	R0805 10K 1%
C24,C25,C26,C27,C28,C29,C30,C31,C32,C32,C33,C34,C35,C36,C40,C41,C42,C43,C45,C46,C50,C51,C56	22	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
R16	1	10R	\$R0805	R0805 10R 1%
L1,L2,L3,L4,L6,L8,L10,L11,L12,L13,L14,L15,L16	13	10UH	\$R0805	CL0805 10uH MLT
R6,R34,R35,R36,R37	5	18K	\$R0805	R0805 18K 1%
R1,R9,R11	3	1K	\$R0805	R0805 1.0K 1% YAG/ASJ
D3,3,4,5,6,7,9	6	1N4148WS	\$SOD_323	1N4148WS
C7,C8,C9,C12,C13,C14,C52	7	1UF	\$R0805	C0805 1.0uF 50V X7R SAMSUNG
C17,C18	2	2.2UF	\$R0805	C0805 2.2uF 16V X7R SAMSUNG
C61,C62	2	220U_10V	\$P_ELKO_D	CE 220uF 10V SMD Fujicon
R28	1	270K	\$R0805	R0805 270K 1%
R7,R59,R63,R64	4	2K2	\$R0805	R0805 2.2K 1%
T2,T10,T11,T14,T15,T16,T17,T18	8	2N7002	\$FET_2N7002	2N7002K
R22	1	330R	\$R0805	R0805 330R 1%
R24	8	33K	\$R0805	R0805 33K 1%
R25,R47,R48,R51,R53,R55,R58	7	33K	\$R0805	R0805 33K 1%
R27,R49,R50	3	3K3	\$R0805	R0805 3.3K 1%
U6	1	4051B	\$SO16	HEF4051BT
U9	1	4053B	\$SO16	HEF4053BT
R23	1	470R	\$R0805	R0805 470R 1%
C15	1	47U_25V	\$P_ELKO_D	CE 47uF 25V SMD Fujicon
C10	1	47UF_10V	ELKO5R2_51	CE 47uF 10V 105C mini Fujicon
R3,R4,R5,R10,R19,R38,R39,R44,R45,R46	10	4K7	\$R0805	R0805 4.7K 1%
C3,C4,C47,C48,C53,C54,C60,C63,C64,C65,C66,C67,C68,C69,C70,C71,C72,C73,C74,C75	20	4N7	\$C0805	C0805 4.7nF 50V X7R SAMSUNG
R2,R21	2	5R1	\$R0805	R0805 5.1R 5%
R8,R33,R42	3	82K	\$R0805	R0805 82K 1%
R14,R15	2	82R	\$R0805	R0805 82R 1% YAG/ASJ
T1	1	AP9561GH	\$FET_TO252	AP9561GH
JP9	1	ATU	HDR1X10_2MM	PN1X10-2.0
U5	1	ATXMEGA32A4U_AU	\$QFP44P081	ATXMEGA32A4U-AU
U4	1	BA33BC0FP	\$REG_TO252	BA033CC0FP
JP1	1	BPF	HDR1X10_2MM	PN1X10-2.0
J52	1	CW2S	JMP8X7R2_5	CW2S
J18	1	DB15FL	DB15FL	DB15BFR
D8	1	ES1G	\$SMA	ES1G SMD TK
P2	1	EXT_SP	PHONE_JAK_PJ307B	PJ306BM
F1	1	FT232RL	SSOP28	FT232RL Rev C
T7,T12	2	FZT458	\$TRA_SOT223	FZT458

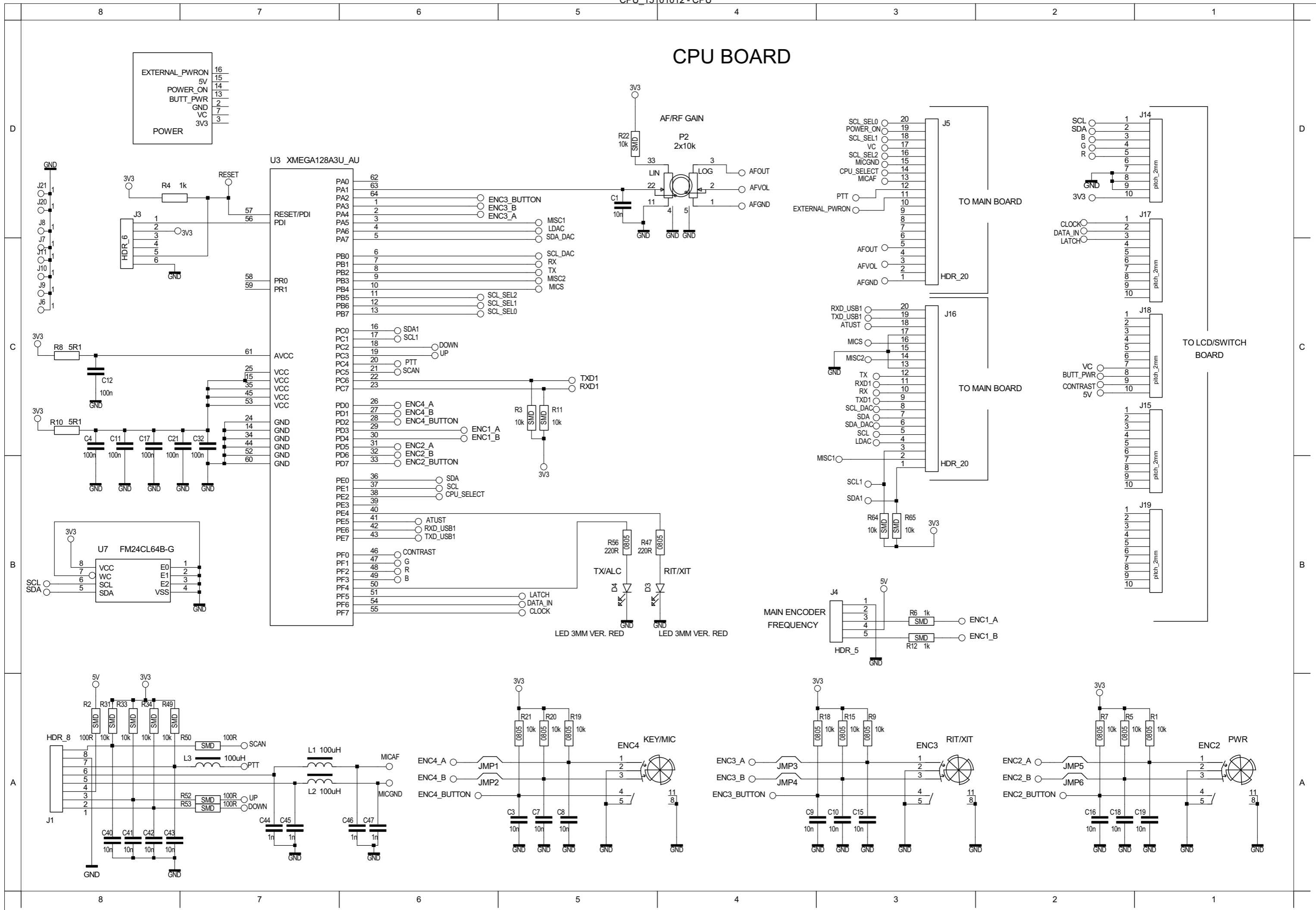
J6,J7,J19,J21,J22,J25,J28-J51	30	HDR_1	standoff M3X6	Amatom #19833B-B0350-0
J8,9,10,11	4	HDR_1	SCREW	2,9x6
J17	1	HDR_4	USB_B	USB B-PCB-R
J27	1	HDR_6	HDR2X3	HN2X20 3/20 cut
JP5	1	IF_AF	HDR1X20_2MM	PN1X20-2.0
CX1	1	IF_OUT	IPX	
J15	1	IF_OUT	RCA_JACK	yellow RC-1120YLW
J14	1	LINEAR	RCA_JACK	red RC-1120RED
U8,U10	2	LM358	\$SO8	LM358D SMD
J26	1	LO_C	HDR1X10_2MM	PN1X10-2.0
J23	1	LO_P	HDR1X10_2MM	PN1X10-2.0
U7	1	MCP4728	MSOP_10	MCP4728-E/UN
T8,T9	2	MMBT3904	\$TRA_SOT23	MMBT3904 SMD
JP3	1	OPTION_COMP	HDR1X10_2MM	PN1X10-2.0
CP2	1	PA55W	HDR2X10	HN2X20 1/2 cut
P3	1	PADDLES	PHONE_JAK_PJ307B	PJ306BM
T4,T6	2	PDTC114ET	DIGITRA	PDTC114ET
D2,D10,D11	3	PESD3V3S1UB	\$SOD523	PESD3V3S1UB
P1	1	PHONES	PHONE_JAK_PJ307B	PJ306BM
J54,J55	2	PR2X10	HDR2X10HA	PR2X10
J4	1	PTT_IN	RCA_JACK	white RC-1120WHT
JP7	1	RFMIXER	HDR1X20_2MM	PN1X20-2.0
JP6	1	SSBGEN	HDR1X20_2MM	PN1X20-2.0
J3	1	WS02S	JMP8X7R2_5	WS02S
JP2	1	XVRT	HDR1X10_2MM	PN1X10-2.0
T3,T5	2	ZXM62P02E6	\$TRA_SOT23_6	ZXM62P02E6

Front panel CPU Board

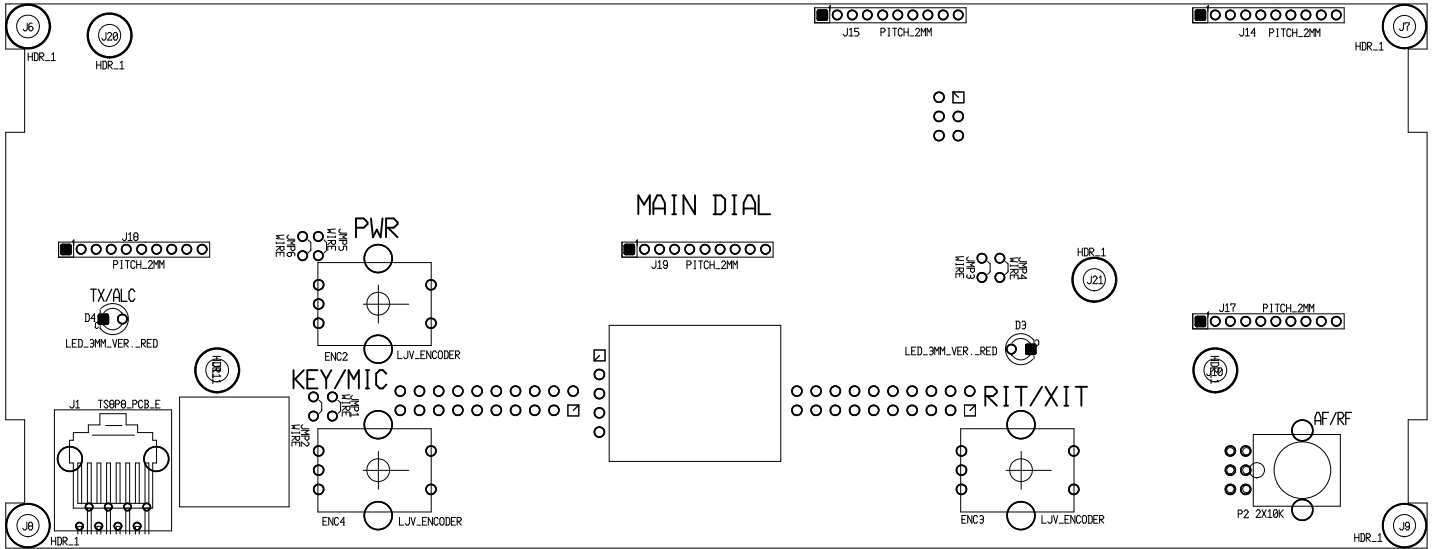
Front panel consist of two boards. One of them is CPU board with main microcontroller AtXMEGA128A3U-AU, main dial optical encoder BOURNS, mechanical encoders, dual concentric potentiometer AF/RF. This board holds LCD&switch PCB.



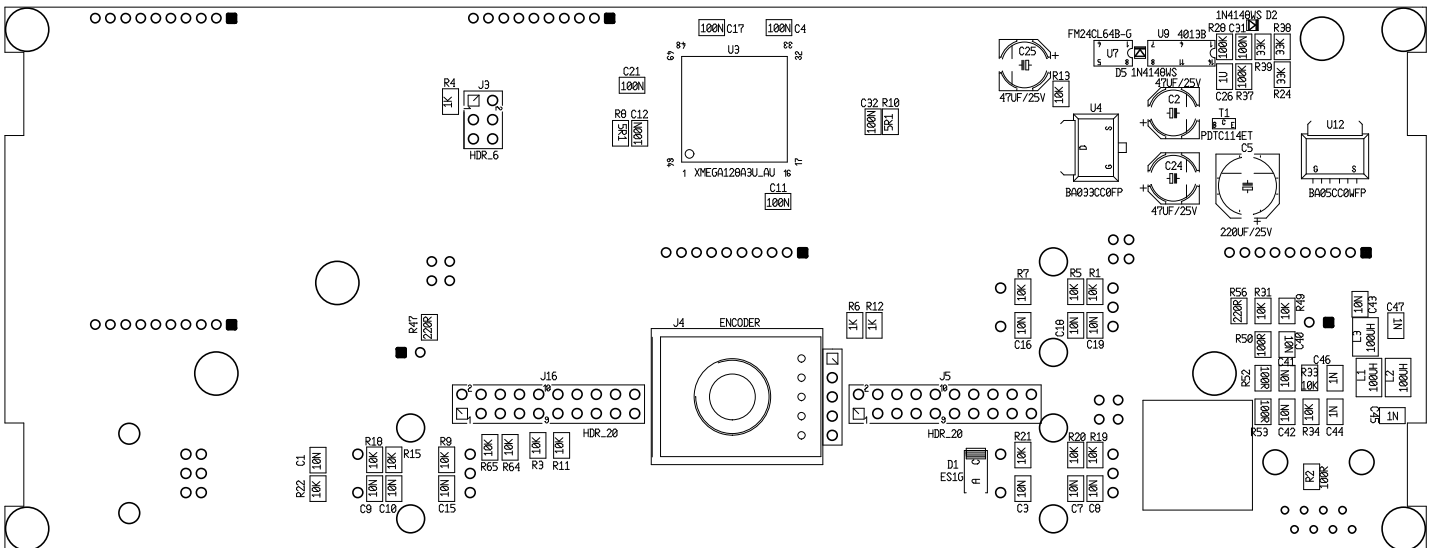
CPU BOARD



CPU board TOP view



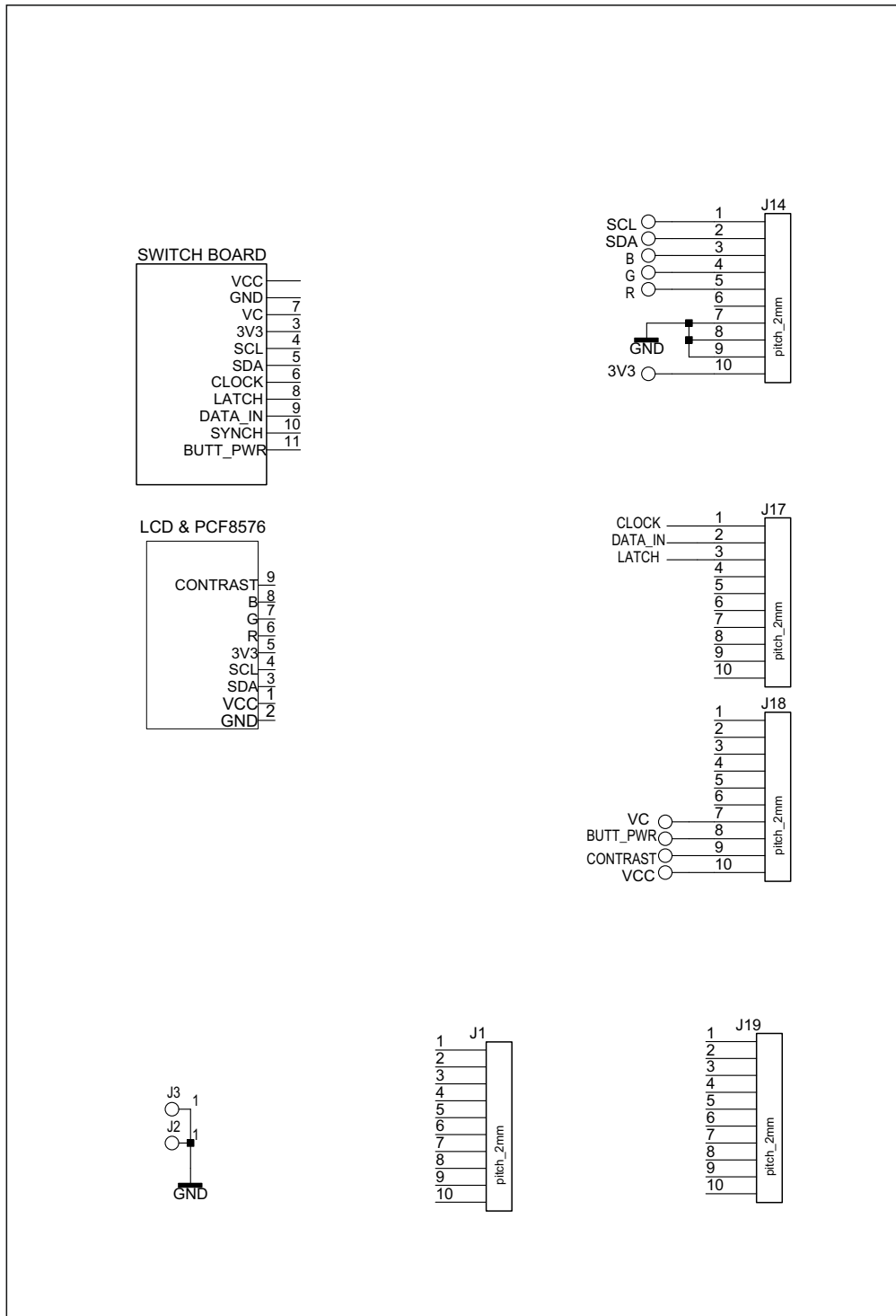
CPU board BOTTOM view



Parts specification:

Name	QTY	Alias	Shape	order number
R28,R37	2	100K	\$R0805	R0805 100K 1%
C4,C11,C12,C17,C21,C31,C32	7	100N	\$C0805	C0805 100nF 50V X7R SAMSUNG
R2,50,52,53	4	100R	\$R0805	R0805 100R 1% YAG/ASJ
L1,L2,L3	3	100UH	\$R1210	LQH32CN101K23L
R1,R3,R5,R7,R9,R11,R13,R15,R18,R19,R20,R21,R22,R31,R33,R34,R49,R64,R65	19	10K	\$R0805	R0805 10K 1% YAG/ASJ
C1,C3,C7,C8,C9,C10,C15,C16,C18,C19,C40,C41,C42,C43	14	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
R4,R6,R12	3	1K	\$R0805	R0805 1.0K 1% YAG/ASJ
C44,C45,C46,C47	4	1N	\$R0805	C0805 1.0nF 50V C0G SAMSUNG
D2,D5	2	1N4148WS	\$SOD_323	1N4148WS
C26	1	1U	\$R0805	C0805 1.0uF 50V X7R SAMSUNG
R47,R56	2	220R	\$R0805	R0805 220R 1%
C5	1	220UF/25V	\$P_ELKO_E	CE 220uF 25V SMD 105C Fujicon
P2	1	2X10K	Dual potentiometer	RP09211GOXX-H03
R24,R38,R39	3	33K	\$R0805	R0805 33K 1%
U9	1	4013B	\$SO14	HEF4013BT
C2,C24,C25	3	47UF/25V	\$P_ELKO_D	CE 47uF 25V SMD Fujicon
R8,R10	2	5R1	\$R0805	R0805 5.1R 5%
U4	1	BA033CC0FP	\$FET_TO252	BA033CC0FP
U12	1	BA05CC0WFP	\$FET_TO252_5	BA05CC0WFP ROHM
J4	1	ENCODER	KK	ENA1J-B28L00128L
D1	1	ES1G	\$SMA	ES1G SMD TK
U7	1	FM24CL64B-G	\$SO8	2768016
J6,J7,J8,J9,J10,J11	6	HDR_1	SCREW	2,9x6MM
J20,J21	2	HDR_1	standoff M3x6	19833B-B0350-0
J5,J16	2	HDR_20	HDR2X10	HN2X40 1/2cut
J3	1	HDR_6	HDR2X3	HN2X40 cut
D3,D4	2	LED_3MM_VER	LED3R2_5V	OSR6NU3134E
ENC2,ENC3,ENC4	3	BOURNS	ENC_5_2	PEC11R-4220F-S0024
T1	1	PDTC114ET	DIGITRA	PDTC114ET
J14,J15,J17,J18,J19	5	PITCH_2MM	HDR1X10_2MM	PN1X10-2.0
J1	1	TS8P8_PCB_E	RJ45!0	TS8P8C-PCB-S
U3		XMEGA128A3U	\$QFP64S0_8	ATXMEGA128A3U-AU

LCD&SWITCH BOARD 15100401



LCD & PCF8576

D

D

C

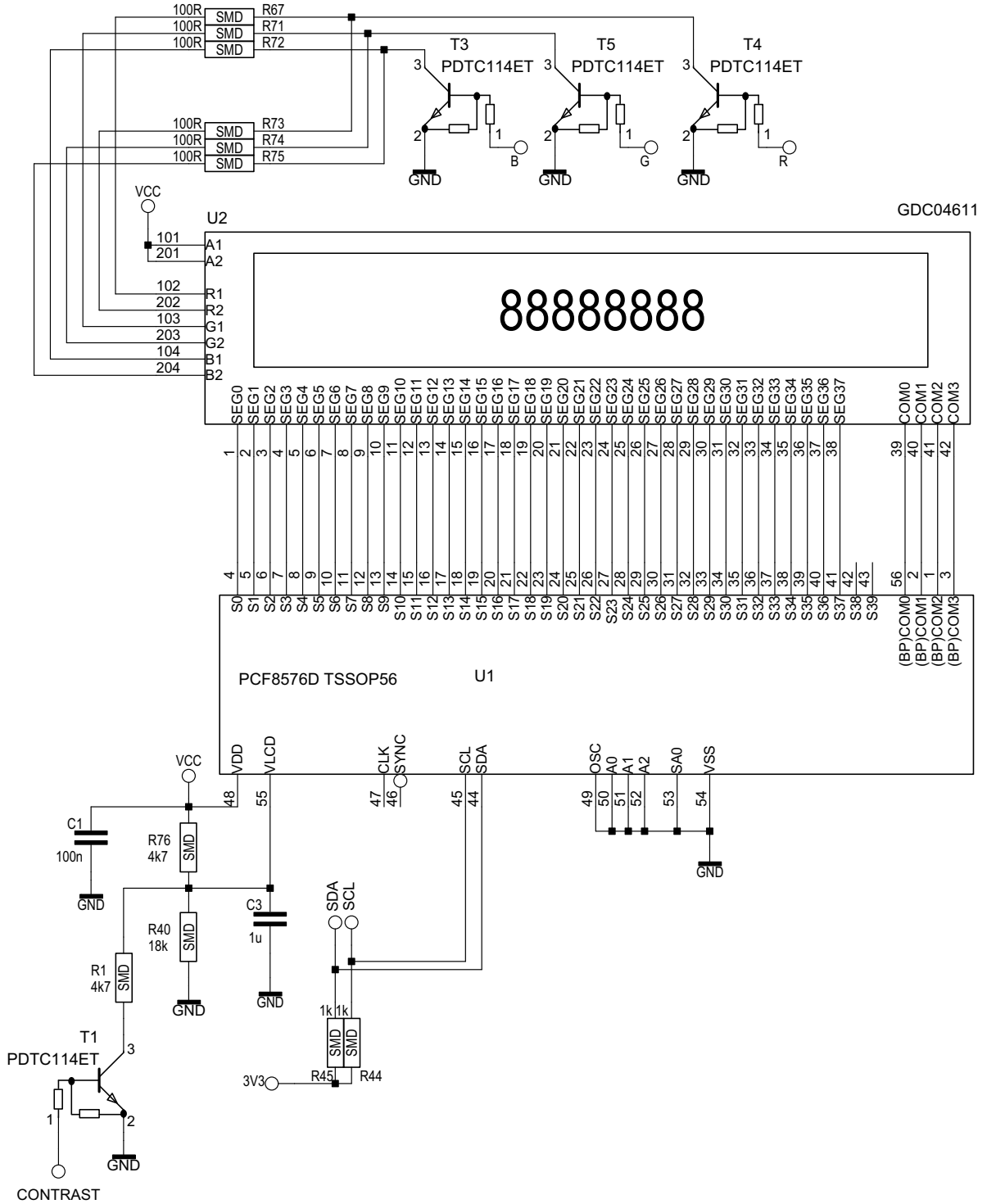
C

B

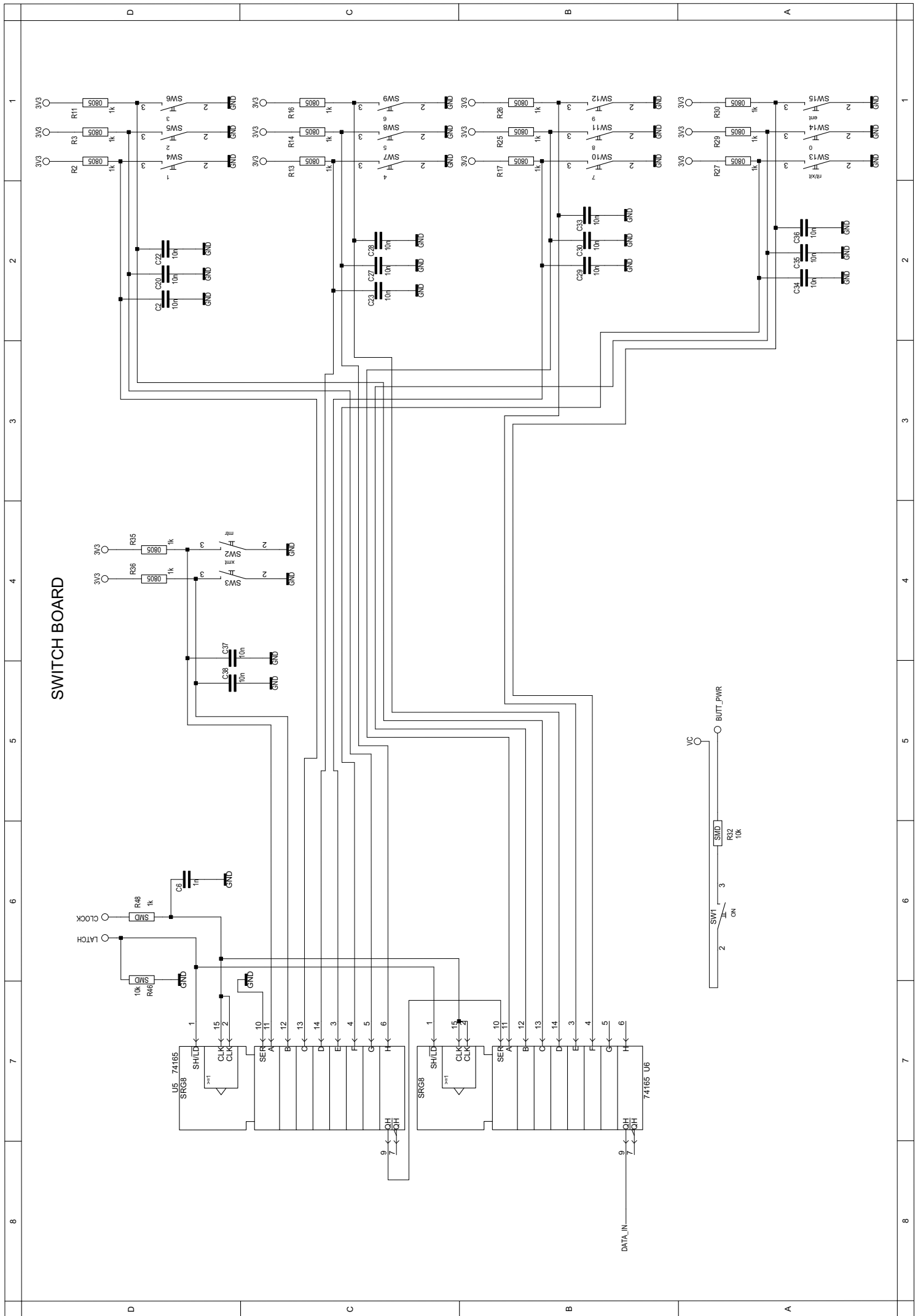
B

A

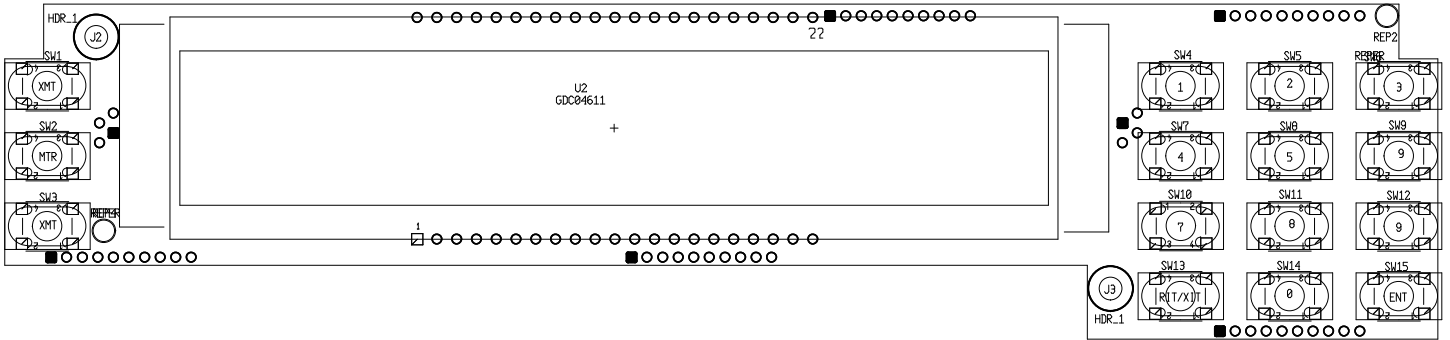
A



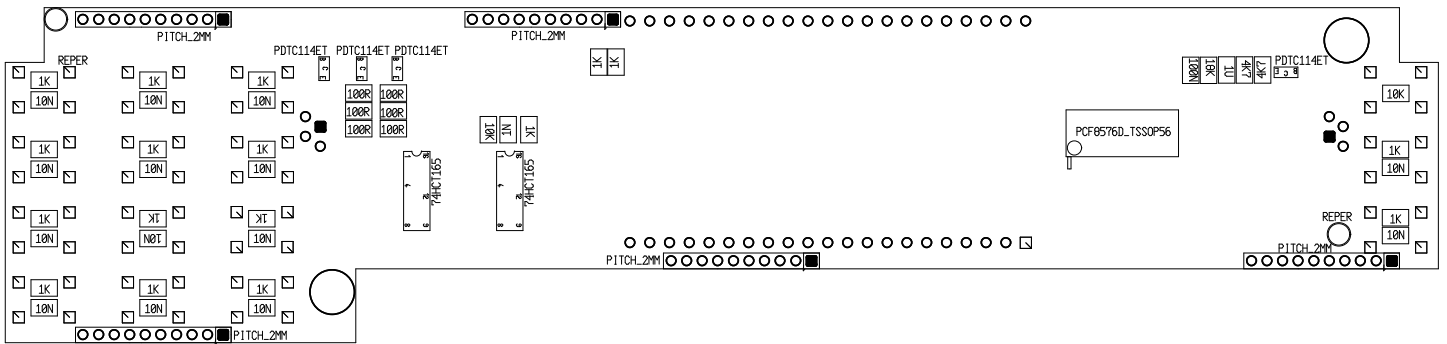
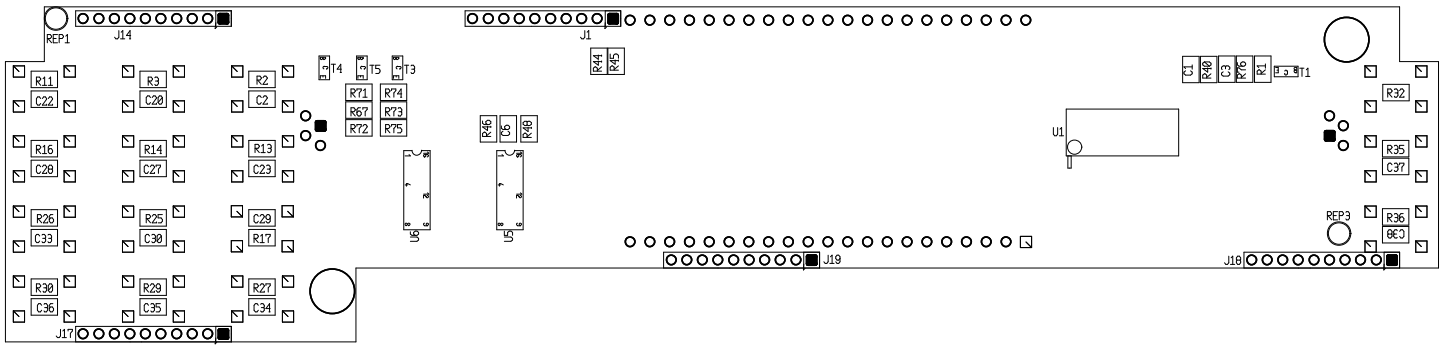
SWITCH BOARD



LCD TOP view



LCD BOTTOM view



Parts specification:

Name	QTY	Alias	Shape	Order number
C1	1	100N	\$R0805	C0805 100nF 50V X7R SAMSUNG
C2		10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
C3	1	1U	\$R0805	C0805 1.0uF 16V X7R SAMSUNG
C6	1	1N	\$C0805	C0805 1.0nF 50V C0G SAMSUNG
C1,C20,C22,C23,C27,C28,C29,C30,C33,C34,C35,C36,C37,C38	14	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
J1,14,17,18,19	5	PITCH 2MM	HDR1X10 2MM	2289781
J2,J3	2	HDR_1	SCREW	M3x6, lockwasher 3mm
R1	1	4K7	\$R0805	R0805 4.7K 1%
R2,3,11,13,14,16,17,25,26,27,29,30,35,36,44,45,48	17	1K	\$R0805	R0805 1.0K 1% YAG/ASJ
R32,R46	2	10K	\$R0805	R0805 10K 1%
R40	1	18K	\$R0805	R0805 18K 1%
R67,R71,R72,R73,R74,R75	6	100R	\$R0805	R0805 100R 1%
R76	1	4K7	\$R0805	R0805 4.7K 1%
SW1-SW15	15	TL1105	SKHH 1	TL1105SPF100Q
T1,T3,T4,T5	4	PDTC114ET	DIGITRA	PDTC114ET
U1	1	PCF8576D_TSSOP56	\$TSSOP56	771-PCF8576DT/2-T
U2	1	GDC04611	DA 42	GDC04611 + BACKLIGHT
U5,U6	2	74HCT165	\$SO16	74HCT165D

MOSFET LINEAR POWER AMPLIFIER 50 WATTS

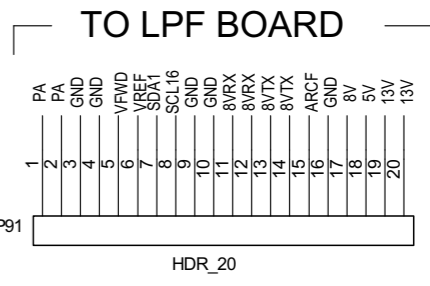
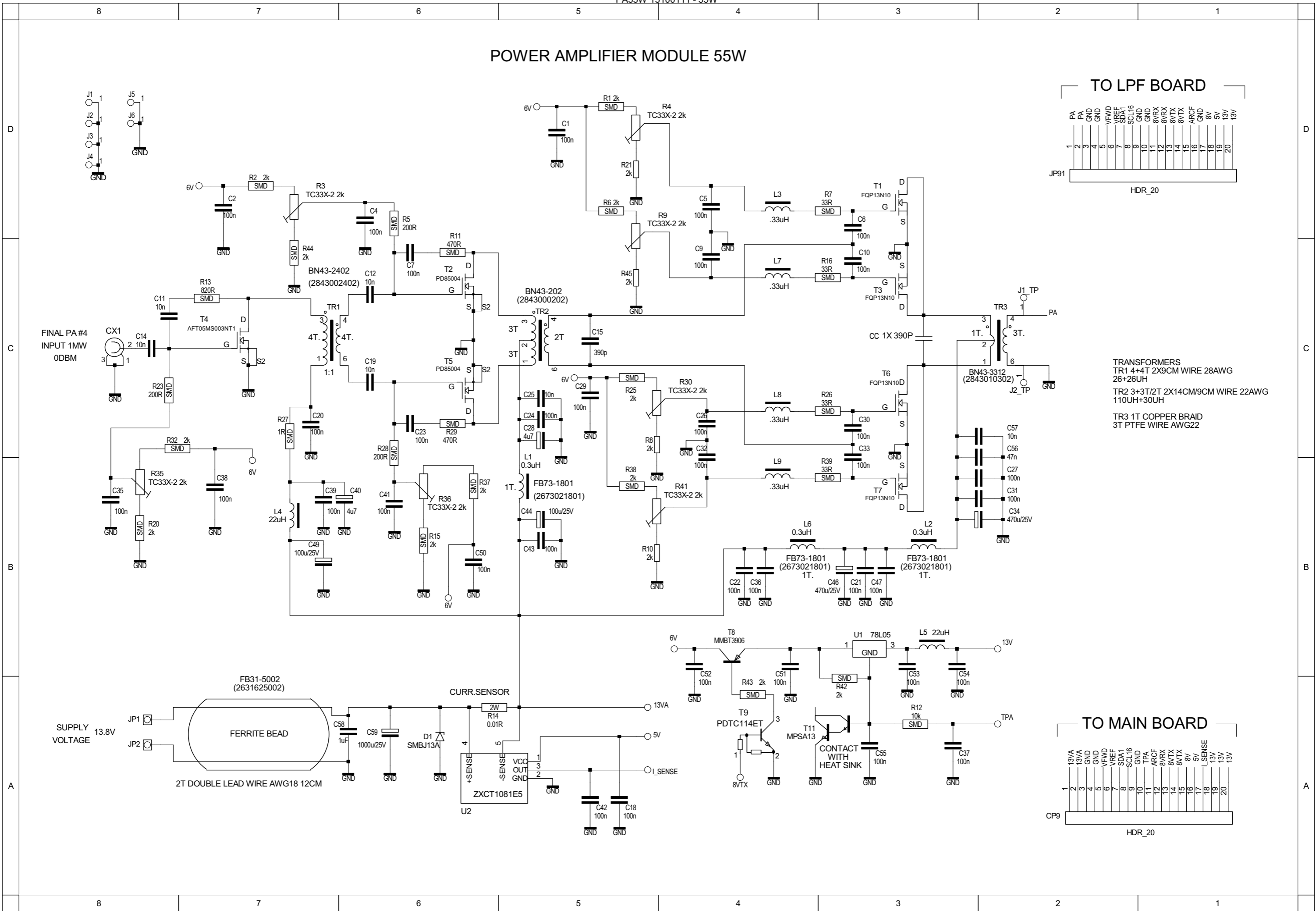
Final 50W amplifier is designed using 4pcs. QFET N-MOS [FAIRCHILD FQP13N10](#) transistor. The module consist of three stages: predriver AFT05MS003NT1, driver in push-pull configuration (2xPD85004) and final unit utilizing 4pcs. (2 by 2 push-pull in parallel) FQP13N10 transistors in easy to mount TO-220 case.

Input matching and especially Ciss (~400pF) compensation is performed by input transformer Tr2 and swamp resistors R7, R16, R26, R39. This group of components increases input drive level but helps to compensate input capacitance on higher frequencies.

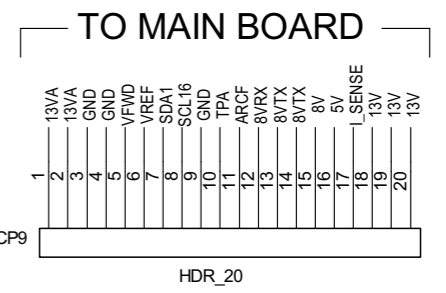
Each stage uses broadband ferrite transformer (Tr1, Tr2, Tr3).

Device input voltage 13.8V supplies directly power amplifier module via input balun transformer and current sensor U2 (ZXCT1081E5)

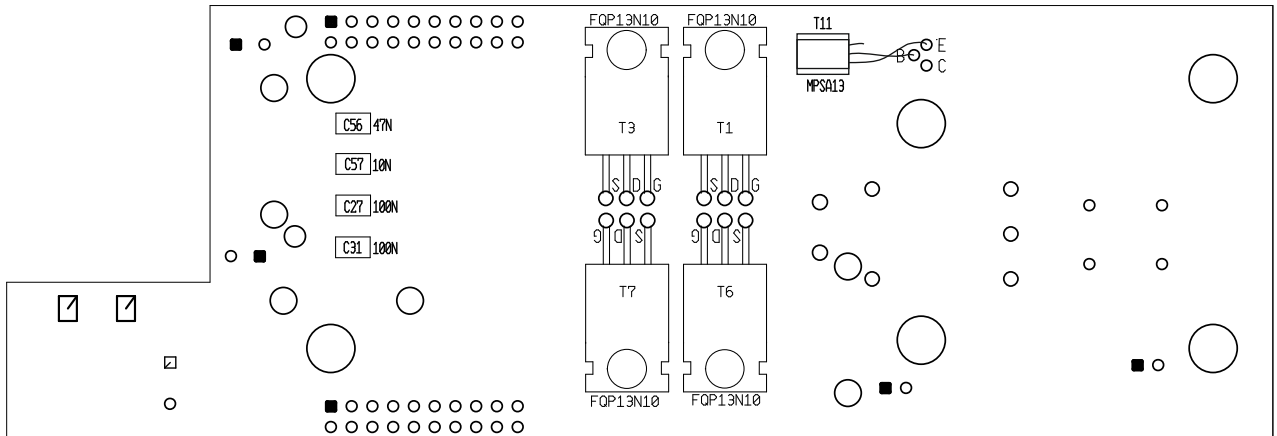
POWER AMPLIFIER MODULE 55W



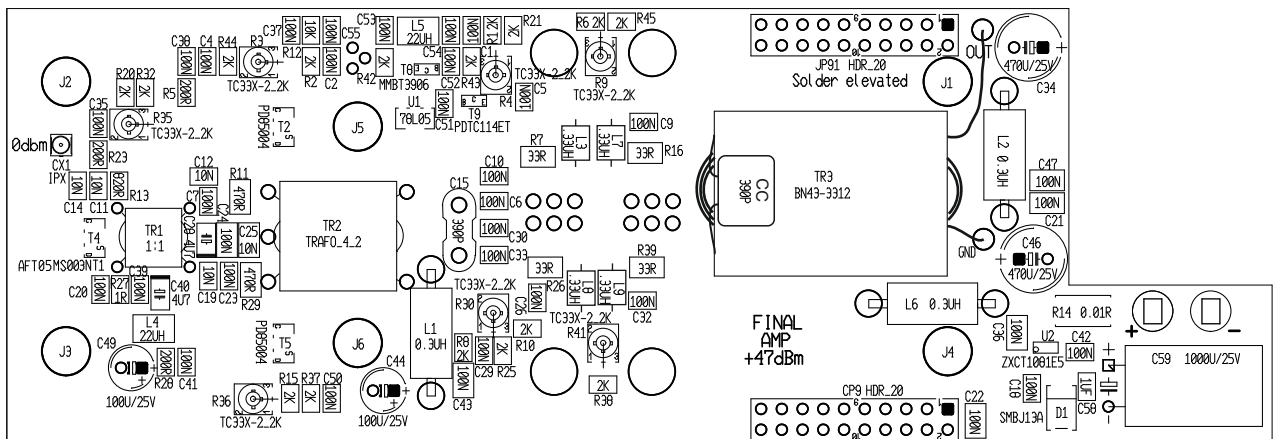
TRANSFORMERS
 TR1 4+4T 2X9CM WIRE 28AWG
 26+26UH
 TR2 3+3T/2T 2X14CM/9CM WIRE 22AWG
 110UH+30UH
 TR3 1T COPPER BRAID
 3T PTFE WIRE AWG22



PA55W BOTTOM view



PA55W TOP view



Parts specification:

Name	QTY	Alias	Shape	Order number
L3,L7,L8,L9	4	.33UH		ferrite bead onto short wire lead
R14	1	0.01R	\$R_WSC1	R2512 0.01R 1% 2W
L1,L2,L6	3	0.3UH	FB43-1801	2673021801 1t. Fair-rite
C59	1	1000U/25V	ELKO10R5H	CE 1000uF 25V 105C Fujicon
C1,C2,C4,C5,C6,C7,C9,C10,C18,C20,C23,C26,C29,C30,C32,C33,C35,C37,C38,C39,C41,C42,C50-C55	28	100N	\$R0805	C0805 100nF 50V X7R SAMSUNG
C21,C22,C24,C27,C31,C36,C43,C47	8	100N	\$R1206	C1206 100nF 200V X7R
C44,C49	1	100U/25V	ELKO5R2_5	CE 100uF 25V 105C Fujicon
R12	1	10K	\$R0805	R0805 10K 1%
C11,12,1	4	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
C25,C57	2	10N	\$R1206	C1206 10nF 200V X7R
R27	1	1R	\$R0805	R0805 1.1R 5%
C58	1	1UF	\$R0805	C0805 1.0uF 50V X7R SAMSUNG
R5,R23,R28	3	200R	\$R0805	R0805 200R 1%
L4,L5	2	22UH	\$R1210	LQH32CN220K23L
R1,R2,R6,R8,R10,R15,R20,R21,R25,R32,R37,R38,R42-R45	16	2K	\$R0805	R0805 2.0K 1%
R7,16,26,39	4	33R	\$R1206	R1206 33R 1%
C15,CC	2	390P/500V	SM_CAP2	cornell dubilier Silver Mica
R11,R29	2	470R	\$R1206	R1206 470R 1% YAG/ASJ
C34,C46	2	470U/25V	ELKO8R3_5	CE 470uF 16V 105C Fujicon
C56	1	47N	\$R1206	C1206 47nF 100V X7R SAMSUNG
C28,C40	2	4U7	\$TANT1206	C1206 4.7uF 25V X7R SAMSUNG
U1	1	78L05	\$78L05_SOT89	78L05 SMD SOT89
R13	1	820R	\$R0805	R0805 820R 1%
T1,T3,T6,T7	4	FQP13N10	FET_TO220H2	
CP9	1	HDR_20	HDR2X10	PN2X10
JP91	1	HDR_20	HDR2X10	ELEVATED
CX1	1	IPX	IPX	
JP1	1	13.8V	2MM	ANDERSON PP RED
JP2	1	GND	2MM	ANDERSON PP BLACK
13,8V	1	INPUT	BALUN	2631625002 Ferite bead
T8	1	MMBT3906	\$TRA_SOT23	MMBT3906 SMD
T11	1	MPSA13	TRA_TO92B	MPSA13
T2,T5	2	PD85004	SOT89	PD85004
T4	1	AFT05MS03NT1	SOT89	AFT05MS03NT1
T9	1	PDTC114ET	DIGITRA	PDTC114ET
D1	1	SMBJ13A	\$SMB	SMBJ13A
R3,R4,R9,R30,R35,R36,R41	7	TC33X-2 2K	\$POTTC33X	TC33X-2 2K
TR3	1	BN43-3312		2843010302
TR2	1	TRAFO_4_2	BN43-202	2843000202
TR1	1	transformer 1:1	BN43-2402	2843002402
U2	1	ZXCT1081E5	\$TRA_SOT23_5	ZXCT1081E5

LOW PASS FILTER BLOCK 1.8 - 30MHz

This board consist of the following modules:

High voltage (210V) scheme (voltage tripler)

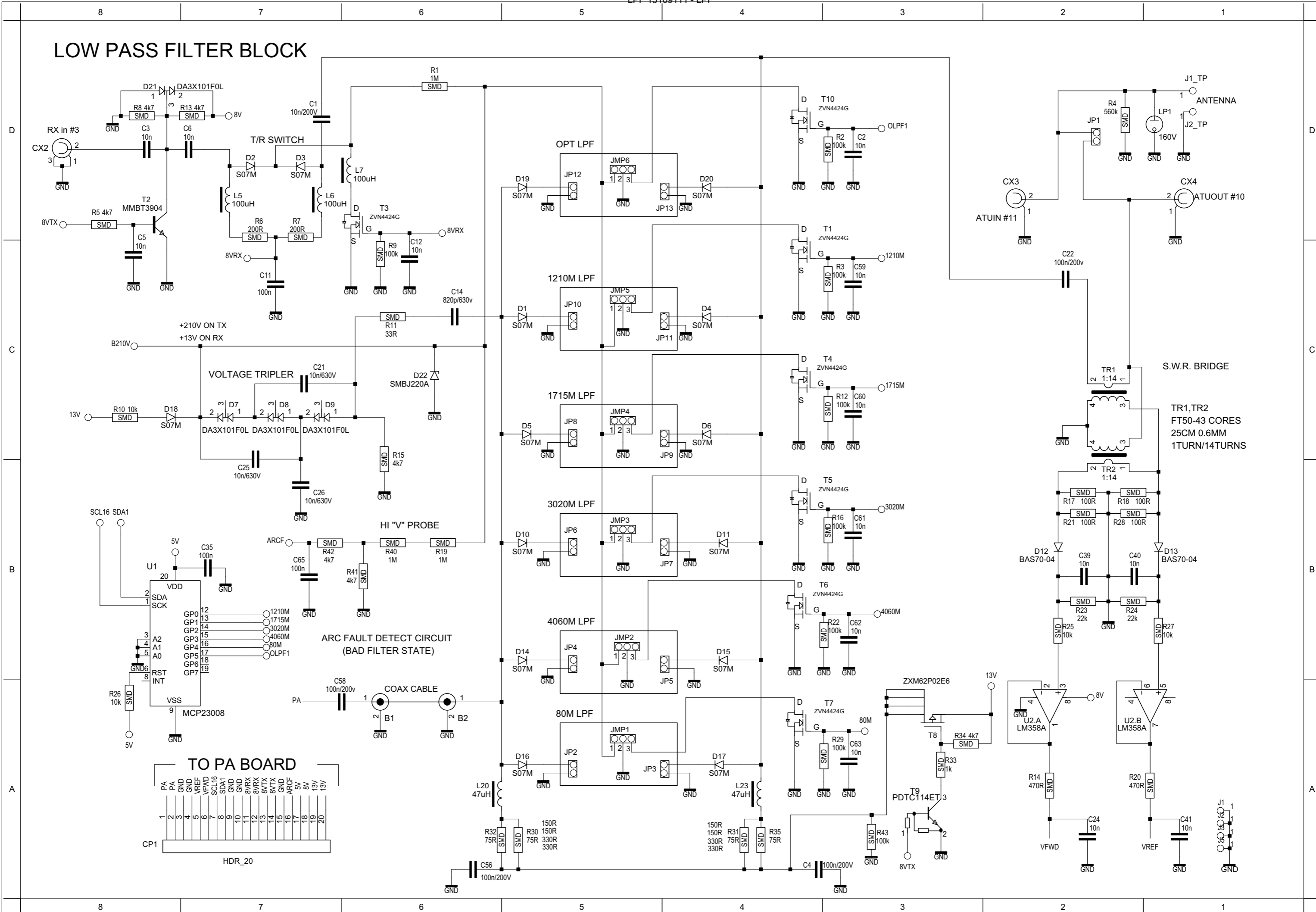
Antenna RX/TX switching

SWR directional coupler and measurement of V_{fwd}/V_{ref}

Optional LPF (160m) connector

This module ensures clear harmonic output of the linear amplifier, also fits the components for antenna RX/TX switching. Following the “click-less” concept, there are no mechanical relays in the circuit. After long searching for suitable power switching component a VISHAY high voltage rectifier diode [S07J](#) (S07M) that met all the requirements for reverse voltage capacity, reverse recovery time, forward current and reverse voltage was found. So S07J were used in the project to ensure good switching of TX power to the antenna via proper LPF and also reliable isolation between each other low pass filters not selected for this band portion.

LOW PASS FILTER BLOCK



Parts specification:

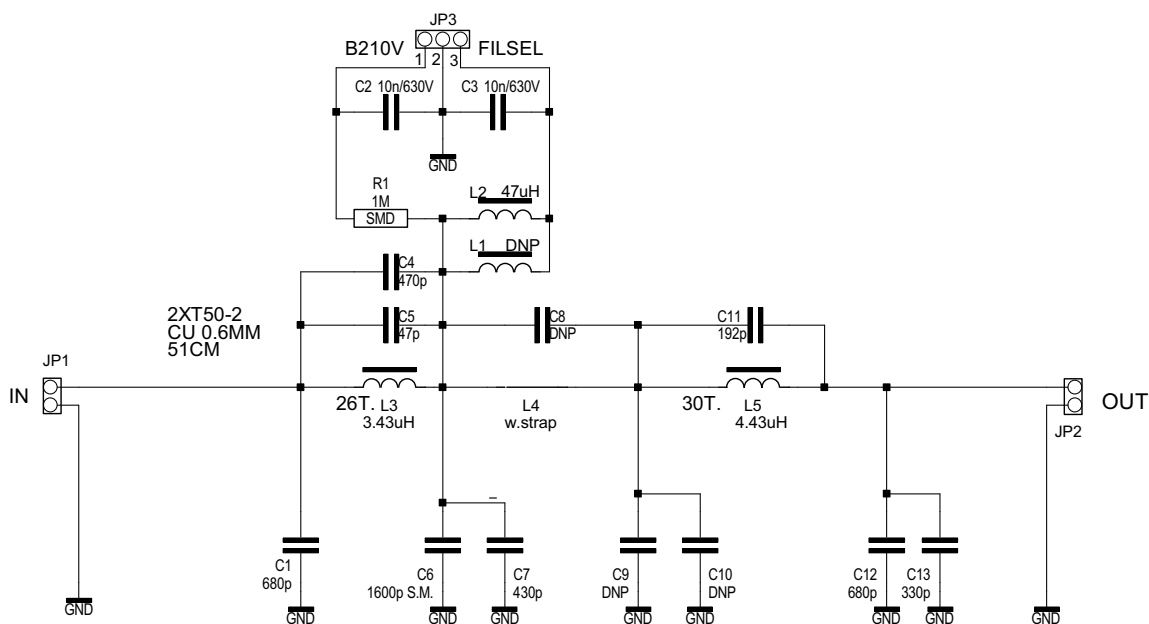
Name	QTY	Alias	Shape	Order number
B1	1	CP	COAX_JUMPER	5cm rg-404
R2,R3,R9,R12,R16,R22,R29	7	100K	\$R0805	R0805 100K 1%
C11,C35,C65	3	100N	\$R0805	C0805 100nF 50V X7R SAMSUNG
C4,C22,C56,C58	4	100N/200V	\$R1206	C1206 100nF 200V X7R
R17,R18,R21,R28	4	100R	\$R1206	R1206 100R 1% YAG/ASJ
R30,R31,R32,R35	4	100R	\$R_WSC1	R2512 150R 1% YAG/ASJ X2PCS.
L5,7	2	100UH	\$R1210	CL100uH FDA32
L6	1	100UH	DA54	CL100uH FPI0504 (DA54)
R10,25,26,27	4	10K	\$R0805	R0805 10K 1%
C2,C3,C5,C6,C12,C24,C39,C40,C41,C59,C60-C63	14	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
C1	1	10N/200V	\$R1206	C1206 10nF 200V X7R
C21,C25,C26	3	10N/630V	\$R1206	C1206 10nF 630V X7R
R33	1	1K	\$R0805	R0805 1.0K 1% YAG/ASJ
R1,R19,R40	3	1M	\$R1206	R1206 1.0M 1% YAG/ASJ
R6,R7	2	200R	\$R0805	R0805 200R 1%
R23,R24	2	22K	\$R0805	R0805 22K 1%
R11	1	33R	\$R1206	R1206 33R 1%
R14,R20	2	470R	\$R0805	R0805 470R 1%
L20,L23	2	47UH	DA54	CL47uH FPI0504 (DA54)
R5,R8,R13,R15,R34,R41,R42	7	4K7	\$R0805	R0805 4.7K 1%
R4	1	560K	\$R1206	R1206 560K 1% YAG/ASJ
C14	1	820P/630V	\$R1206	GRM31B5C2J821FW01L
CX3	1	ATUIN_#11	HDR2ATU	CW2S
CX4	1	ATUOUT_#10	HDR2ATU	CW2S
D12,13	2	BAS70-04	\$SOT23BAS	1797835
D7,D8,D9,D21	4	DA3X101F0L	\$SOT23DA3	2284127
J1,J2,J3,J5	4	HDR_1	SCREW	M3x6, lockwasher 3mm
CP1	1	HDR_20	HDR2X10	HN2X20 1/2 cut
U2	1	LM358A	\$SO8	LM358D SMD
U1	1	MCP23008	\$SSOP20	MCP23008/ESS
T2	1	MMBT3904	\$TRA_SOT23	MMBT3904 SMD
T9	1	PDTC114ET	DIGITRA	PDTC114ET
CX2	1	RX_IN_#3	IPX	
D1-D6,D10,D11,D14-D20	15	S07M	\$SMF	S07M-GS18
D22	1	SMBJ220A	\$SMB	2749199
TR1,TR2	2	SWR Trafo 1:14	14T/AWG22	FT50-43 Fair-Rite
T1,T3-T7,T10	7	ZVN4424G	\$FET_SOT223	ZVN4424G
T8	1	ZXM62P02E6	\$TRA_SOT23_6	ZXM62P02E6

LOW PASS FILTER subboards 160 - 10m

LPF subboards are situated on small PCB that should be soldered directly on main LPF board. There are 6 sub PCBs with low pass filters chebyshev type for all HF bands. There is place where to be nested optional LPF subboard (for 160m). Bands and frequencies are as following:

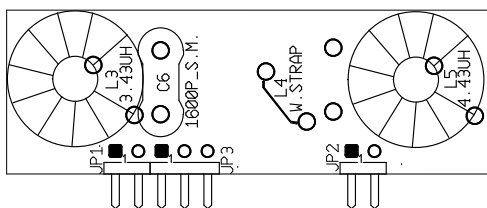
160m (optional)	1.8 - 2.0MHz
80m	3.5 - 4.0MHz
40/60m	5.2 - 7,3MHz
30/20m	10 - 14.3MHz
17/15m	18 - 21.5MHz
12/10m	24.5 - 29.7MHz

LOW PASS FILTER SUB BOARD 160M/15109201

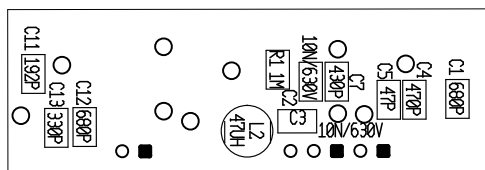


ALL CAPACITORS IF NOT OTHER SPECIFIED ARE 1000V COG RADIO FREQUENCY CERAMICS OR SILVER MICA 500V

160m TOP view



160m BOTTOM view



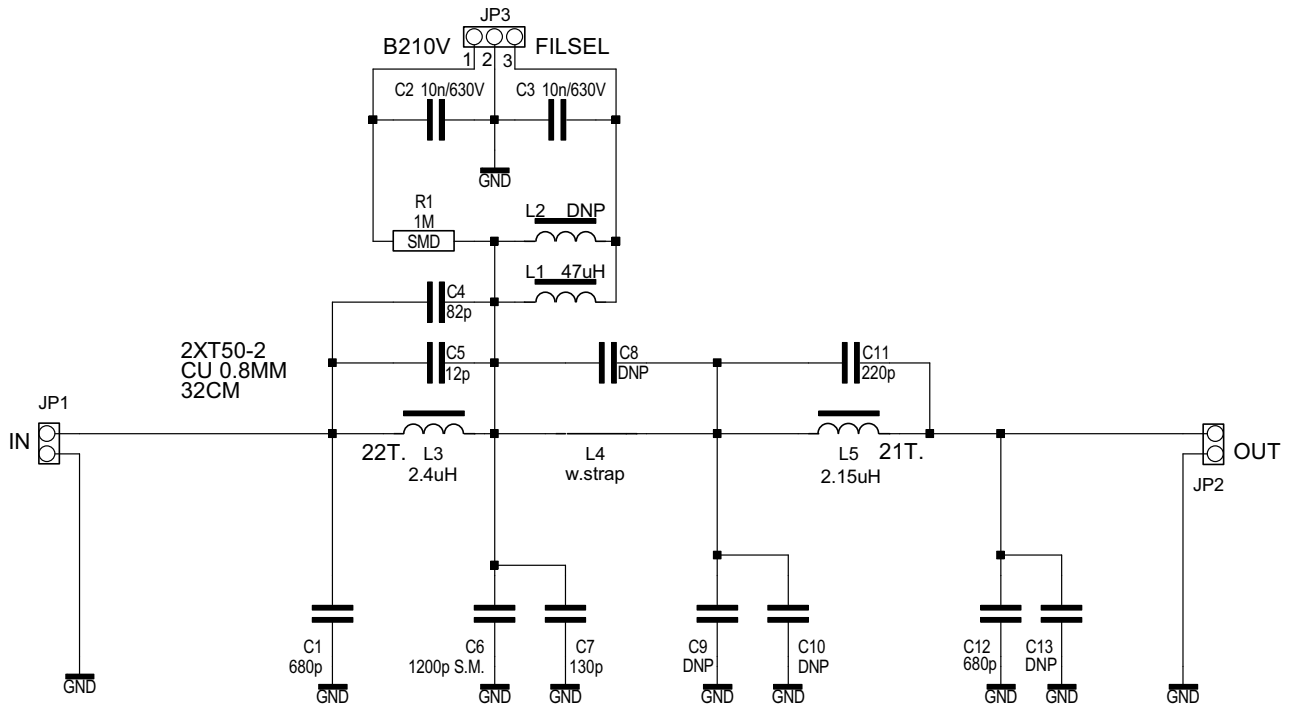
Parts specification:

Name	Alias	Shape	Part
C1	680P	SR1206	630-1000V COG
C2	10N/630V	SR1206	C1206 10nF 630V X7R
C3	10N/630V	SR1206	C1206 10nF 630V X7R
C4	470P	SR1206	630-1000V COG
C5	47P	SR1206	630-1000V COG
C6	1600P/500V	SM_CAP	Cornell Dubilier
C7	430P	SR1206	630-1000V COG
C8	DNP		
C9	DNP		
C10	DNP		
C11	192P	SR1206	630-1000V COG

Name	Alias	Shape	Part
C12	680P	SR1206	630-1000V COG
C13	330P	SR1206	630-1000V COG
JP1	.	HDR1X2HA	HR1X20 1/10cut
JP2	.	HDR1X2HA	HR1X20 1/10cut
JP3	.	HDR1X3HA	HR1X20 3/20cut
L1	DNP		
L2	47UH	DA54	CL47uH FPI0504 (DA54)
L3	3.43UH	T50-2	26t./51cm Cu 0.6mm
L4	0UH	wire strap	wire strap
L5	4.43UH	T50-2	30t./51cm Cu 0.6mm
R1	1M	SR1206	R1206 1.0M 1% YAG/ASJ

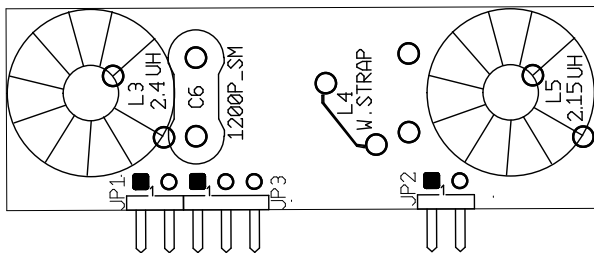
LOW PASS FILTER SUB BOARD

80M/15109206

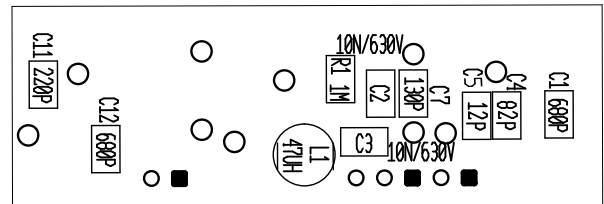


ALL CAPACITORS IF NOT OTHER SPECIFIED ARE 1000V COG RADIO FREQUENCY CERAMICS OR SILVER MICA 500V

80m TOP VIEW



80m BOTTOM VIEW



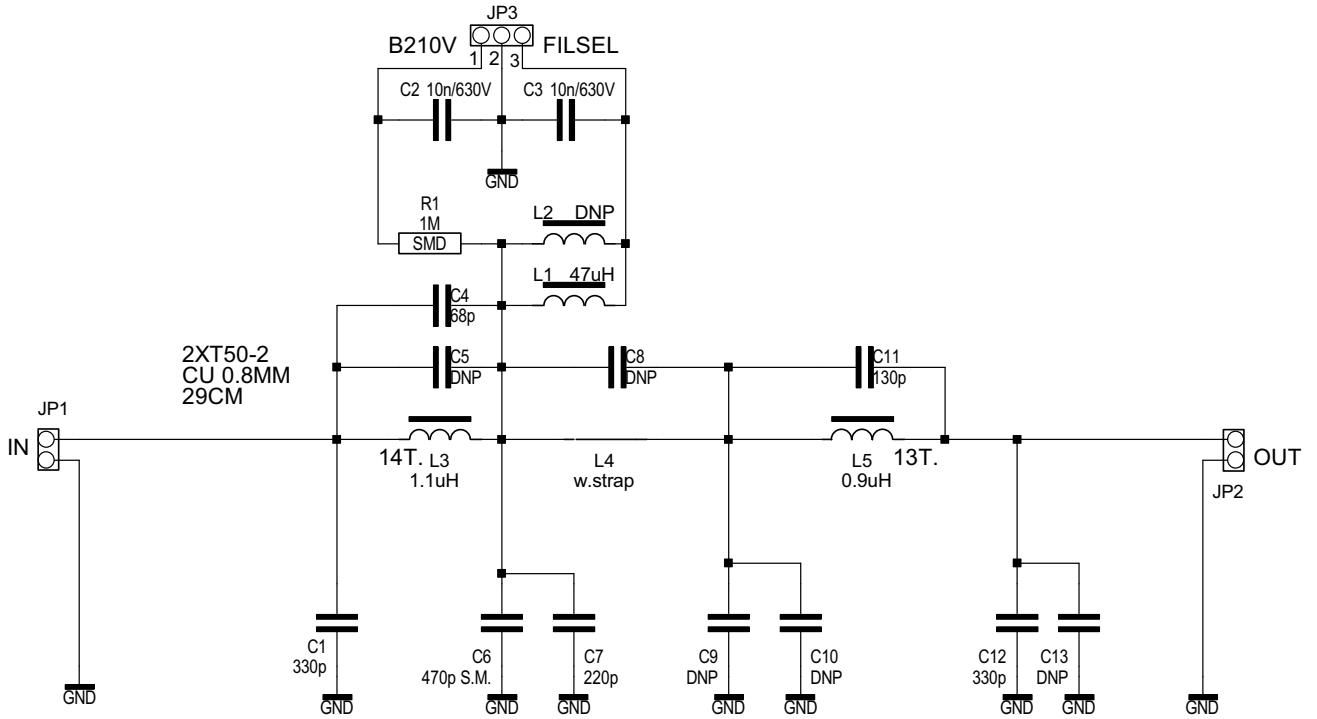
Parts specification:

Name	Alias	Shape	part
C1	680P	SR1206	630-1000V COG
C2	10N/630V	SR1206	C1206 10nF 630V X7R
C3	10N/630V	SR1206	C1206 10nF 630V X7R
C4	82P	SR1206	630-1000V COG
C5	12P	SR1206	630-1000V COG
C6	1200P_S.M.	SM_CAP	Cornell Dubilier
C7	130P	SR1206	630-1000V COG
C8	DNP		
C9	DNP		
C10	DNP		
C11	220P	SR1206	630-1000V COG

Name	Alias	Shape	part
C12	680P	SR1206	630-1000V COG
C13	DNP		
JP1	.	HDR1X2HA	HR1X20 1/10cut
JP2	.	HDR1X2HA	HR1X20 1/10cut
JP3	.	HDR1X3HA	HR1X20 3/20cut
L1	47UH	DA54	CL47uH FPI0504 (DA54)
L2	DNP		
L3	2.4UH	T50-2	22t./Cu 0.8mm/32cm
L4	0UH		wire strap 20mm
L5	2.15UH	T50-2	21t./Cu 0.8mm/32cm
R1	1M	SR1206	R1206 1.0M 1% YAG/ASJ

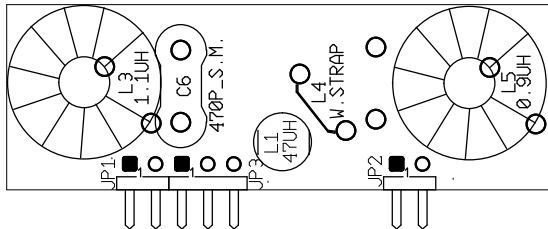
LOW PASS FILTER SUB BOARD

4060M/15109205

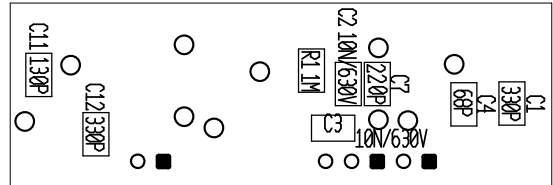


ALL CAPACITORS IF NOT OTHER SPECIFIED ARE 1000V COG RADIO FREQUENCY CERAMICS OR SILVER MICA 500V

40/60m TOP VIEW



40/60m BOTTOM VIEW



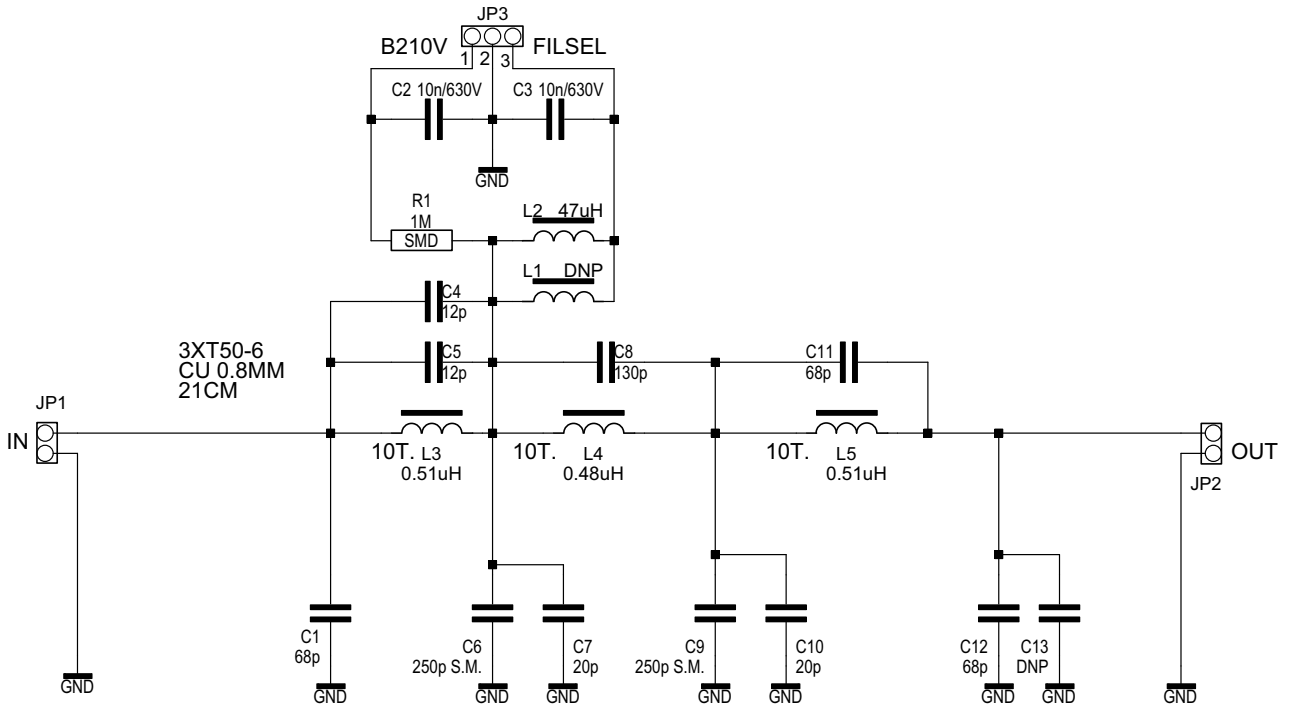
Parts specification:

Name	Alias	Shape	Order number
C1	330P	SR1206	630-1000V COG
C2	10N/630V	SR1206	C1206 10nF 630V X7R
C3	10N/630V	SR1206	C1206 10nF 630V X7R
C4	68P	SR1206	630-1000V COG
C5	DNP		
C6	470P_S.M.	SM_CAP	Cornell Dubilier
C7	220P	SR1206	630-1000V COG
C8	DNP		
C9	DNP		
C10	DNP		
C11	130P	SR1206	630-1000V COG

Name	Alias	Shape	Order number
C12	330P	SR1206	630-1000V COG
C13	DNP		
JP1	.	HDR1X2HA	HR1X20 1/10cut
JP2	.	HDR1X2HA	HR1X20 1/10cut
JP3	.	HDR1X3HA	HR1X20 3/20cut
L1	47UH	DA54	CL47uH FPI0504 (DA54)
L2	DNP		
L3	1.1UH	T50-2	14t./29cm Cu 0.8mm
L4	0UH		wire strap
L5	0.9UH	T50-2	13t./29cm Cu 0.8mm
R1	1M	SR1206	R1206 1.0M 1% YAG/ASJ

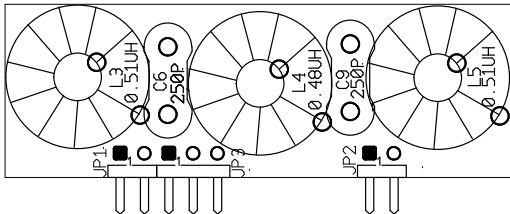
LOW PASS FILTER SUB BOARD

3020M/15109202

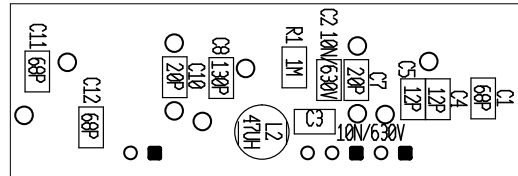


ALL CAPACITORS IF NOT OTHER SPECIFIED ARE 1000V C0G RADIO FREQUENCY CERAMICS OR SILVER MICA 500V

30/20m TOP VIEW



30/20m BOTTOM VIEW



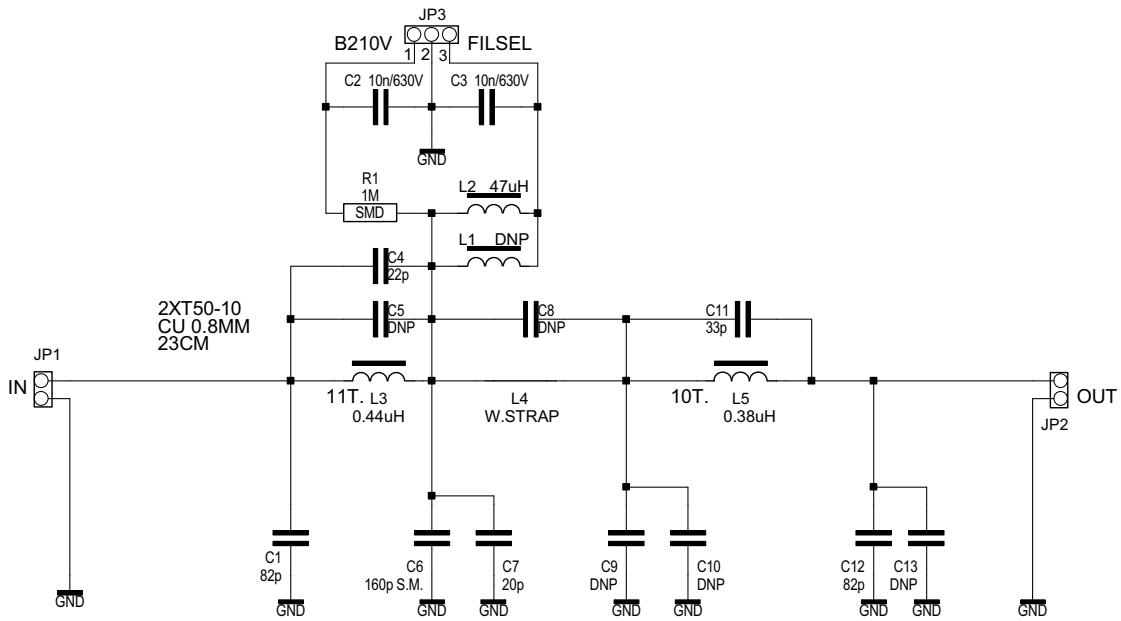
Parts specification:

Name	Alias	Shape	Part
C1	68P	SR1206	630-1000V C0G
C2	10N/630V	SR1206	C1206 10nF 630V X7R
C3	10N/630V	SR1206	C1206 10nF 630V X7R
C4	12P	SR1206	630-1000V C0G
C5	12P	SR1206	630-1000V C0G
C6	250P/500V	SM_CAP	Cornell Dubilier
C7	20P	SR1206	630-1000V C0G
C8	130P	SR1206	630-1000V C0G
C9	250P/500V	SM_CAP	Cornell Dubilier
C10	20P	SR1206	630-1000V C0G
C11	68P	SR1206	630-1000V C0G

Name	Alias	Shape	Part
C12	68P	SR1206	630-1000V C0G
C13	DNP		
JP1	.	HDR1X2H/A	HR1X20 1/10cut
JP2	.	HDR1X2H/A	HR1X20 1/10cut
JP3	.	HDR1X3H/A	HR1X20 3/20cut
L1	DNP		
L2	47UH	DA54	CL47uH FPI0504 (DA54)
L3	0.51UH	T50-6	10t./21cm Cu 0.8mm
L4	0.48UH	T50-6	10t./21cm Cu 0.8mm
L5	0.51UH	T50-6	10t./21cm Cu 0.8mm
R1	1M	SR1206	R1206 1.0M 1% YAG/ASJ

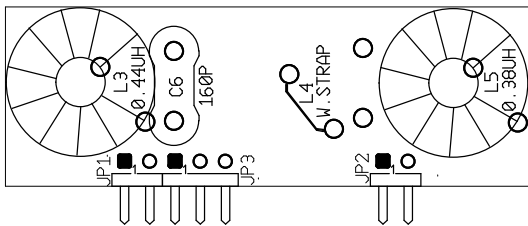
LOW PASS FILTER SUB BOARD

1715M/15109203

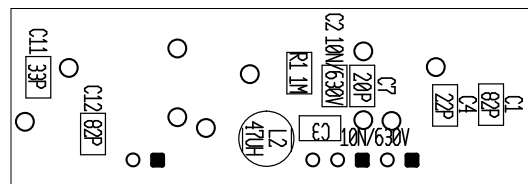


ALL CAPACITORS IF NOT OTHER
SPECIFIED ARE 1000V C0G
RADIO FREQUENCY CERAMICS
OR SILVER MICA 500V

17/15m TOP VIEW



17/15m TOP VIEW



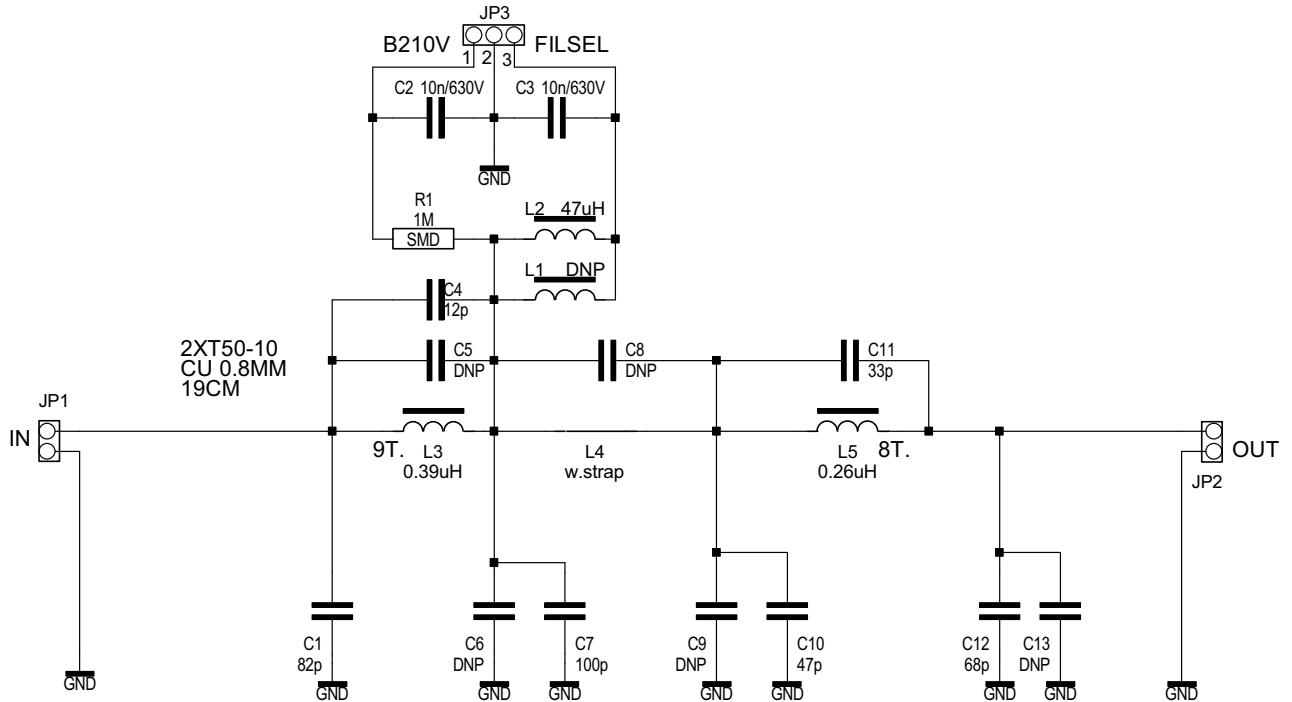
Parts specification:

Name	Alias	Shape	Order number
C1	82P	\$R1206	630-1000V COG
C2	10N/630V	\$R1206	C1206 10nF 630V X7R
C3	10N/630V	\$R1206	C1206 10nF 630V X7R
C4	22P	\$R1206	630-1000V COG
C5	DNP		
C6	160P/500V	SM_CAP	Cornell Dubilier
C7	20P	\$R1206	630-1000V COG
C8	DNP		
C9	DNP		
C10	DNP		
C11	33P	\$R1206	630-1000V COG

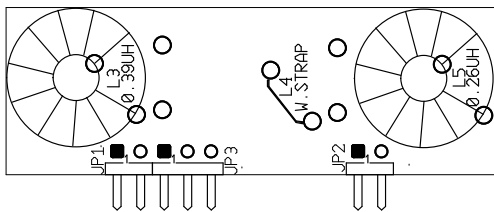
Name	Alias	Shape	Order number
C12	82P	\$R1206	630-1000V COG
C13	DNP		
JP1	.	HDR1X2HA	HR1X20 1/10cut
JP2	.	HDR1X2HA	HR1X20 1/10cut
JP3	.	HDR1X3HA	HR1X20 3/20cut
L1	DNP		
L2	47UH	DA54	CL47uH FPI0504 (DA54)
L3	0.44UH	T50-10	11t./23cm Cu 0.8mm
L4	0UH	wire strap	wire strap
L5	0.38UH	T50-10	10t./23cm Cu 0.8mm
R1	1M	\$R1206	R1206 1.0M 1% YAG/ASJ

LOW PASS FILTER SUB BOARD

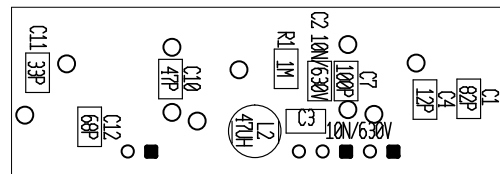
1210M/15109204



12/10m TOP VIEW



12/10m BOTTOM VIEW



Parts specification:

Name	Alias	Shape	part
C1	82P	\$R1206	630-1000V COG
C2	10N/630V	\$R1206	C1206 10nF 630V X7R
C3	10N/630V	\$R1206	C1206 10nF 630V X7R
C4	12P	\$R1206	630-1000V COG
C5	DNP		
C6	DNP		
C7	100P	\$R1206	630-1000V COG
C8	DNP		
C9	DNP		
C10	47P	\$R1206	630-1000V COG
C11	33P	\$R1206	630-1000V COG

Name	Alias	Shape	part
C12	68P	\$R1206	630-1000V COG
C13	DNP		
JP1	.	HDR1X2HA	HR1X20 1/10cut
JP2	.	HDR1X2HA	HR1X20 1/10cut
JP3	.	HDR1X3HA	HR1X20 3/20cut
L1	DNP		
L2	47UH	DA54	CL47uH FPI0504 (DA54)
L3	0.39UH	T50-10	9t./19cm Cu 0.8mm
L4	0UH		wire strap
L5	0.26UH	T50-10	8t./19cm Cu 0.8mm
R1	1M	\$R1206	R1206 1.0M 1% YAG/ASJ

SSBGEN - mic amplifier, DSB, CW modulator unit

SSBGEN board forms DSB/CW modulation on TX.

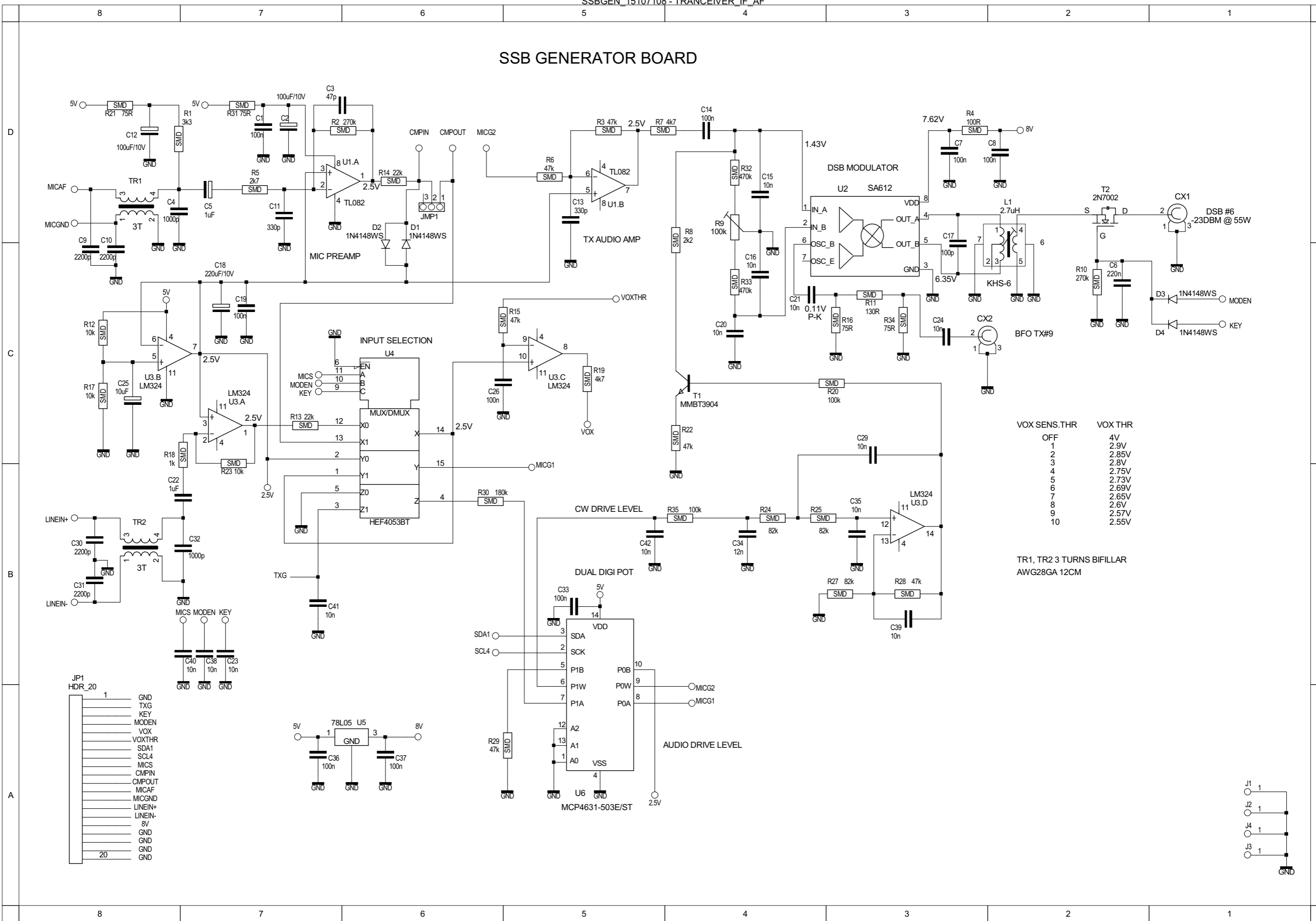
It consists of the following parts:

- Microphone preamplifier and TX audio amplifier – T1082
- Switched input: LINE IN or MIC (MUX 4053)
- DSB modulator – Sa612
- CW drive level and form circuit – $\frac{1}{2}$ of MCP4631 dual digi pot
- SSB drive level (mic level) – $\frac{1}{2}$ of MCP4631 dual digi pot

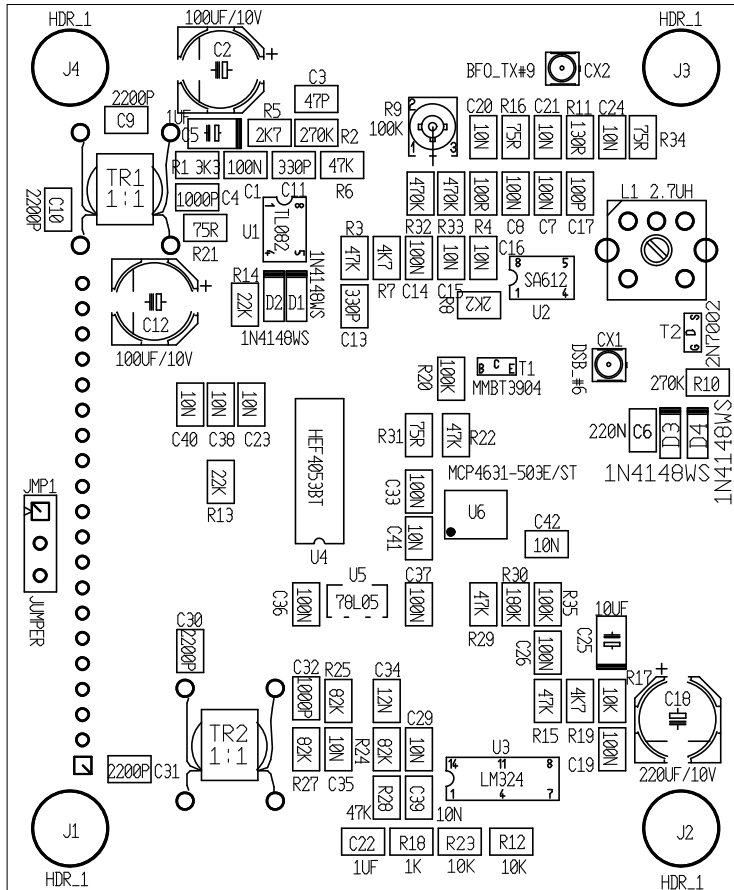
Input audio frequency signal comes either from mic input from RJ-45 front panel connector or line input (DB15 ACC1 connector on rear panel). Tr1 and Tr2 eliminates any existing stray RF currents caused by mismatched and/or not balanced antenna load. TX gain line controls the signal level on CW so it could be near assigned power levels and ALC level is within proper range.

Pseudo-gaussian CW pulses are formed by LP filter U3.D and R35,R24,R25, R27, R28, C42, C34, C35, C29 and C39. Then the signal comes on T1 which leads to de-balance of DSB modulator U2.

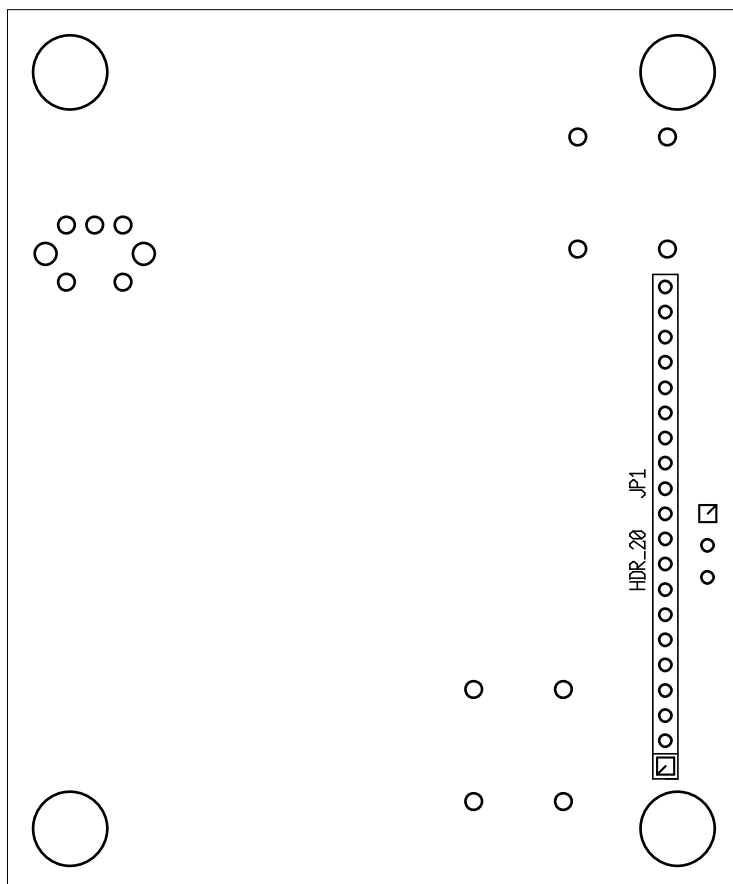
SSB GENERATOR BOARD



SSB GEN TOP view



SSB GEN BOTTOM view



Parts specification:

Name	QTY	Alias	Shape	Order number
C4,32	2	1000P	\$R0805	C0805 1.0nF 50V C0G SAMSUNG
R9,20,35	3	100K	\$POTTC33X	TC33X-2 100K
C1,7,8,14,19,26,33,36,37	9	100N	\$R0805	C0805 100nF 50V X7R SAMSUNG
C17	1	100P	\$R0805	C0805 100pF 50V C0G SAMSUNG
R4	1	100R	\$R0805	R0805 100R 1%
C2,12	2	100UF/10V	\$P_ELKO_D	CE 100uF 25V SMD Fujicon
R12,17,23	3	10K	\$R0805	R0805 10K 1%
C15,16,20,21,23,24,29,35,38,39,40,41,42	13	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
C25	1	10UF	\$TANT1206	TANT A SMD 10uF 16V
C34	1	12N	\$R0805	C0805 12nF 50V X7R SAMSUNG
R11	1	130R	\$R0805	R0805 130R 1% YAG/ASJ
R30	1	180K	\$R0805	R0805 180K 5% YAG/ASJ
R18	1	1K	\$R0805	R0805 1K 1% YAG/ASJ
D1-D4	4	1N4148WS	\$SOD123	1N4148WS
C5	1	1UF	\$TANT1206	C1206 1.0uF 50V X7R SAMSUNG
C22	1	1UF	\$R0805	C0805 1.0uF 50V X7R SAMSUNG
L1	1	2.7UH	KHS-6	KHS-6 2.7uH A71108006 T3
C9,10,30,31	4	2200P	\$R0805	C0805 2.2nF 50V C0G SAMSUNG
C6	1	220N	\$R0805	C0805 220nF 50V X7R SAMSUNG
C18	1	220UF/10V	\$P_ELKO_D	CE 220uF 16V SMD Fujicon
R13,14	2	22K	\$R0805	R0805 22K 1%
R2,10	2	270K	\$R0805	R0805 270K 1%
R8	1	2K2	\$R0805	R0805 2.2K 5% YAG/ASJ
R5	1	2K7	\$R0805	R0805 2.7K 1%
T2	1	2N7002	\$FET_2N7002	2N7002K
C11,13	2	330P	\$R0805	C0805 330pF 50V C0G SAMSUNG
R1	1	3K3	\$R0805	R0805 3.3K 1%
R32,33	2	470K	\$R0805	R0805 470K 1%
R3,6,15,22,28,29	6	47K	\$R0805	R0805 47K 1% YAG/ASJ
C3	1	47P	\$R0805	C0805 47pF 50V C0G SAMSUNG
R7,19	2	4K7	\$R0805	R0805 4.7K 1%
R16,21,31,34	4	75R	\$R0805	R0805 75R 1%
U5	1	78L05	\$78L05_SOT89	78L05 SMD SOT89 DIV
R24,25,27	3	82K	\$R0805	R0805 82K 1%
CX2	1	BFO_TX#9	IPX	
CX1	1	DSB_#6	IPX	
J1,2,3,4	4	HDR_1	SCREW	M3x6; lock washer 3mm
JP1	1	HDR_20	HDR1X20_2MM	2289781
U4	1	HEF4053BT	SO16	HEF4053BT
JMP1	1	JUMPER	JMP	wire strap
U3	1	LM324	\$SO14-1	LM324D SMD
U6	1	MCP4631-503E/ST	\$TSSOP14	mouser MCP4631-503E/ST
T1	1	MMBT3904	\$TRA_SOT23	MMBT3904 SMD
TR1,2	2	ratio 1:1	MIC_BALUN	mouser 5943000201
U2	1	SA612	\$SO8	farnel 2212081
U1	1	TL082	\$SO8	TL082CD SMD

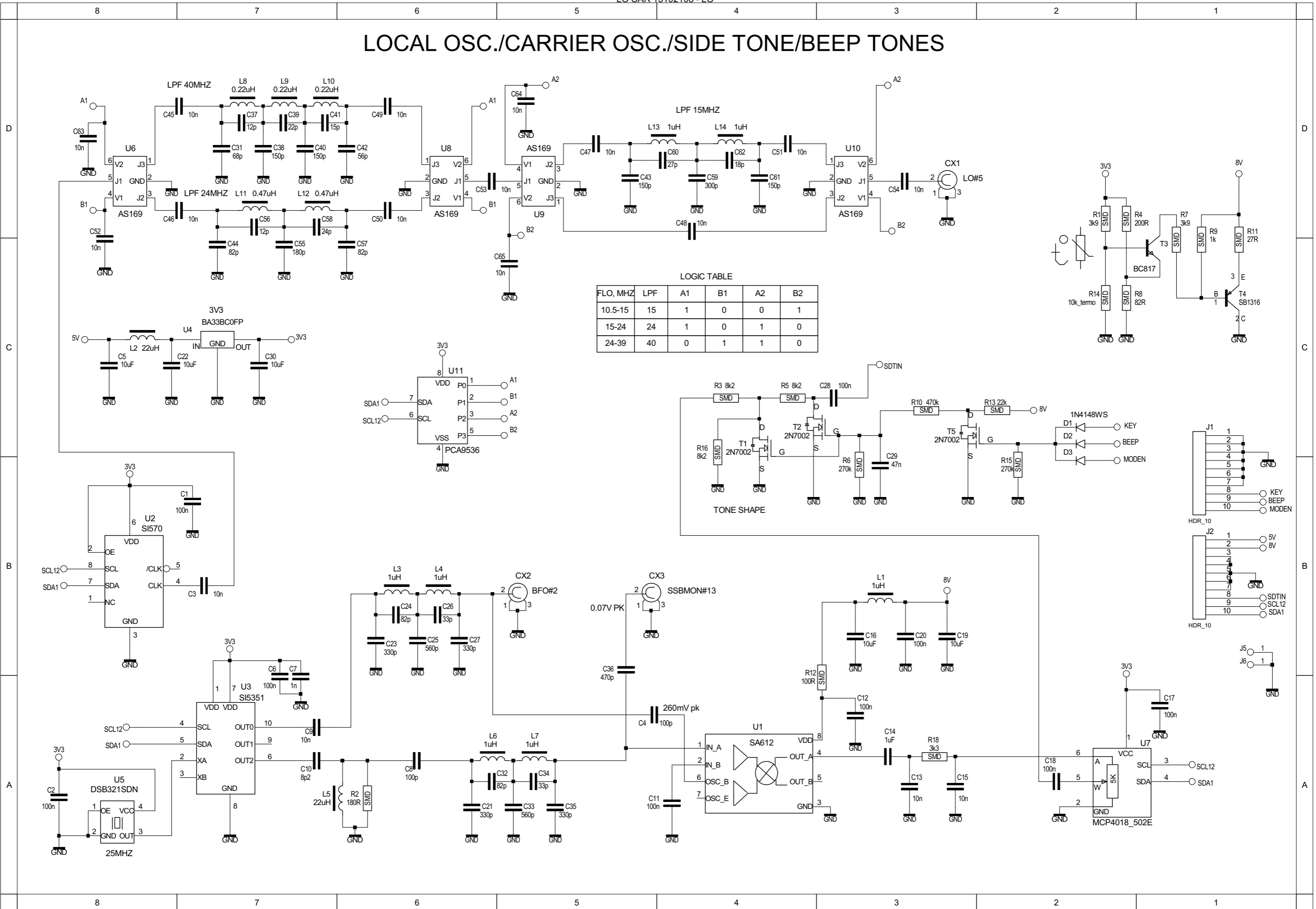
LO (Local oscillator)/BFO/BEEP/SIDETONES/SSB monitor

LO board provides all oscillator signals needed for signal conversion and mixing. The board consists of the following components:

- LO first oscillator realized by U2 – SI570 (570CAC000141DG), 3 switchable low pass filters: 10.8-15MHz; 15-24MHz; 24-39MHz. Filter switching is performed by I2C chip PCA9536
- 9MHz generators – U3 (SI5351) BFO, CW sidetone, beeps, U1 (SA-612) balanced mixer which acts as CW/SSB monitor product detector, digital potentiometer – U7 (MCP4018-502E)
- Tone shaping, (tones on/off) circuitry – T1,T2,T5
- Temperature compensation oven made by thermo resistor R14 and T3,T4

LO pure sine form is of essential importance for further signal mixing/processing and lack of spurs and higher harmonic content in output signal.

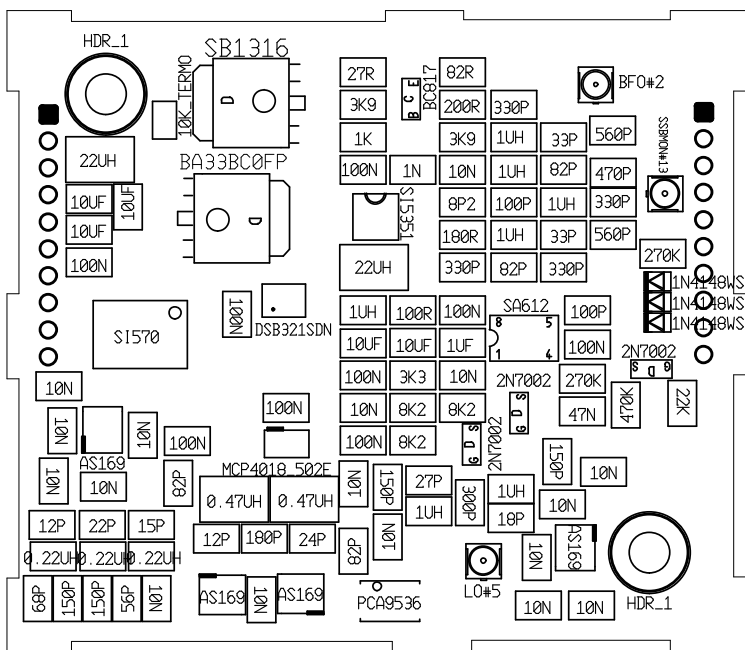
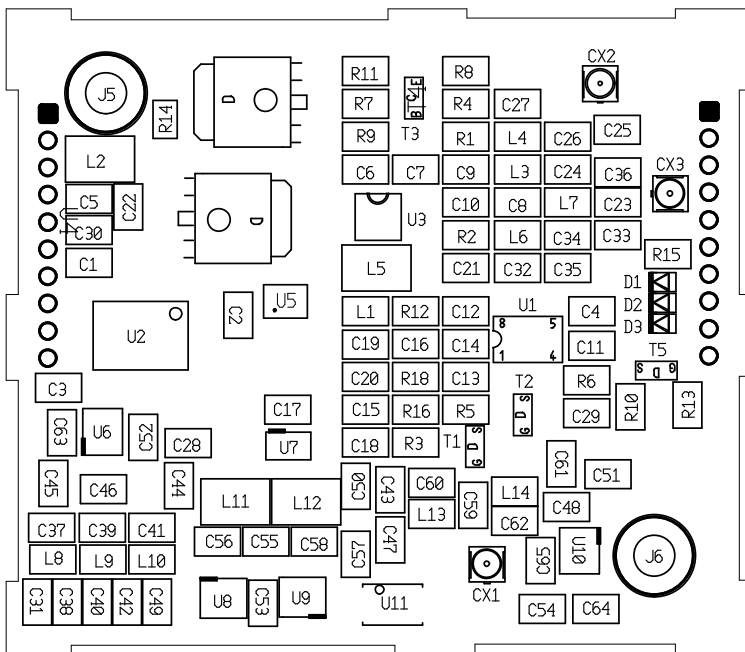
LOCAL OSC./CARRIER OSC./SIDE TONE/BEEP TONES



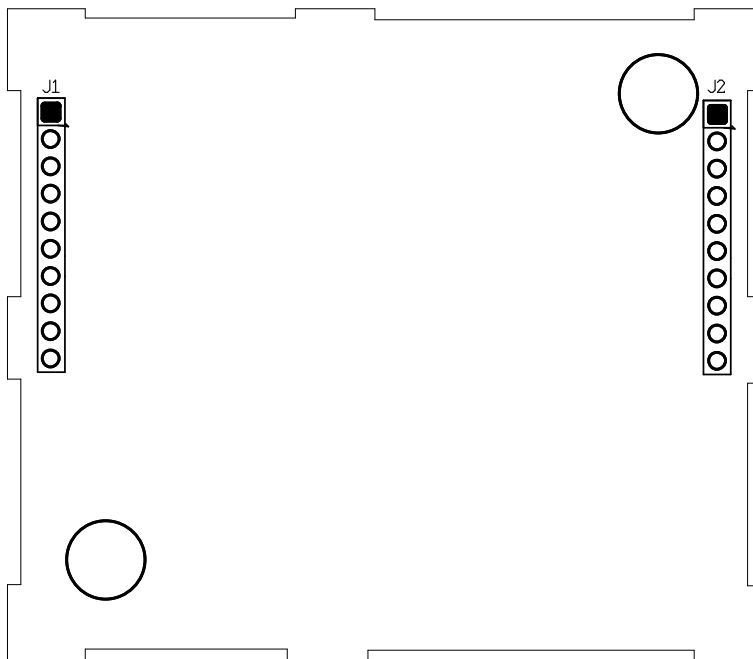
LOGIC TABLE

FLO, MHZ	LPF	A1	B1	A2	B2
10.5-15	15	1	0	0	1
15-24	24	1	0	1	0
24-39	40	0	1	1	0

LO board TOP view



LO board BOTTOM view



Parts specification:

Name	QTY	Alias	Shape	Order number
C1,C2,C6,C11,C12,C17,C18,C20,C28	9	100N	\$C0805	C0805 100nF 50V X7R SAMSUNG
L8-L10	3	0.22UH	\$R0805	2309226
L11,L12	2	0.47UH	\$R1210	CL1210 470nH WWT
C4,C8	2	100P	\$C0805	C0805 100pF 50V C0G SAMSUNG
R12	1	100R	\$R0805	R0805 100R 1%
R14	1	10K_TERM0	\$R0603	NCP21XV103J03RA
C3,C9,C13,C15,C45-C54,C63,C64,C65	17	10N	\$C0805	C0805 10nF 50V X7R SAMSUNG
C5,C16,C19,C22,C30	5	10UF	\$C0805	C0805 10uF 16V X5R SAMSUNG
C37,C56	2	12P	\$C0805	C0805 12pF 50V C0G
C38,C40,C43,C61	4	150P	\$C0805	C0805 150pF 50V C0G
C41	1	15P	\$C0805	C0805 15pF 50V C0G SAMSUNG
C55	1	180P	\$C0805	C0805 180pF 50V C0G SAMSUNG
R2	1	180R	\$R0805	R0805 180R 5% YAG/ASJ
C62	1	18P	\$C0805	C0805 18pF 50V C0G SAMSUNG
R9	1	1K	\$R0805	R0805 1.0K 1% YAG/ASJ
C7	1	1N	\$C0805	C0805 1.0nF 50V C0G SAMSUNG
D1-D3	3	1N4148WS	\$SOD_323	1N4148WS
C14	1	1UF	\$C0805	C0805 1.0uF 50V X7R SAMSUNG
L1,L3,L4,L6,L7,L13,L14	7	1UH	\$R0805	CL0805 1.0uH CCFH
R4	1	200R	\$R0805	R0805 200R 1%
R13	1	22K	\$R0805	R0805 22K 1%
C39	1	22P	\$C0805	C0805 22pF 50V C0G
L2,L5	2	22UH	\$R1210	LQH32CN220K23L
C58	1	24P	\$C0805	C0805 24pF 50V C0G SAMSUNG
R6,R15	2	270K	\$R0805	R0805 270K 1%
C60	1	27P	\$C0805	C0805 27pF 50V C0G
R11	1	27R	\$R0805	R0805 27R 1% YAG/ASJ
T1,T2,T5	3	2N7002	\$FET_2N7002	2N7002K
C59	1	300P	\$C0805	81-GRM215C1H301JA01D
C21,C23,C27,C35	4	330P	\$C0805	C0805 330pF 50V C0G SAMSUNG
C26,C34	2	33P	\$C0805	C0805 33pF 50V C0G SAMSUNG
R18	1	3K3	\$R0805	R0805 3.3K 1%
R1,R7	1	3K9	\$R0805	R0805 3.9K 1%
R10	1	470K	\$R0805	R0805 470K 1%
C36	1	470P	\$C0805	C0805 470pF 50V C0G SAMSUNG
C29	1	47N	\$C0805	C0805 47nF 50V X7R SAMSUNG
C25,C33	2	560P	\$C0805	C0805 560pF 50V C0G SAMSUNG
C42	1	56P	\$C0805	C0805 56pF 50V C0G SAMSUNG
C31	1	68P	\$C0805	C0805 68pF 50V C0G SAMSUNG
C24,C32,C44,C57	4	82P	\$C0805	C0805 82pF 50V C0G SAMSUNG
R8	1	82R	\$R0805	R0805 82R 1% YAG/ASJ
R3,R5,R16	3	8K2	\$R0805	R0805 8.2K 1%
C10	1	8P2	\$C0805	C0805 8.2pF 50V C0G SAMSUNG
U6,U8,U9,U10	4	AS169	\$SOT6	863-1002-1-ND
U4	1	BA33BC0FP	\$FET_TO252	BA033CC0FP
T3	1	BC817	\$TRA_SOT23	BC817-40 SMD
CX2	1	BFO#2	IPX	
U5	1	DSB321SDN	OSC3225	DSB321SDN KDS Daishinko
J5,J6	2	HDR_1	SCREW	M3x6, lockwasher 3mm
J1,J2	2	HDR1X10	2MM	~PL2015G023.5/2.3-120
CX1	1	LO#5	IPX	
U7	1	MCP4018_502E	\$SC70	MCP4018T-502E/LT
U11	1	PCA9536	TSSOP8	2212093
U1	1	SA612	\$SO8	~SA612AD
T4	1	SB1316	\$FET_TO252	2SB1316TL ROHM SMD
U3	1	SI5351	MSOP_10	SI5351A-B-GT
U2	1	SI570	SI570	336-2518-ND
CX3	1	SSBMON#13	IPX	

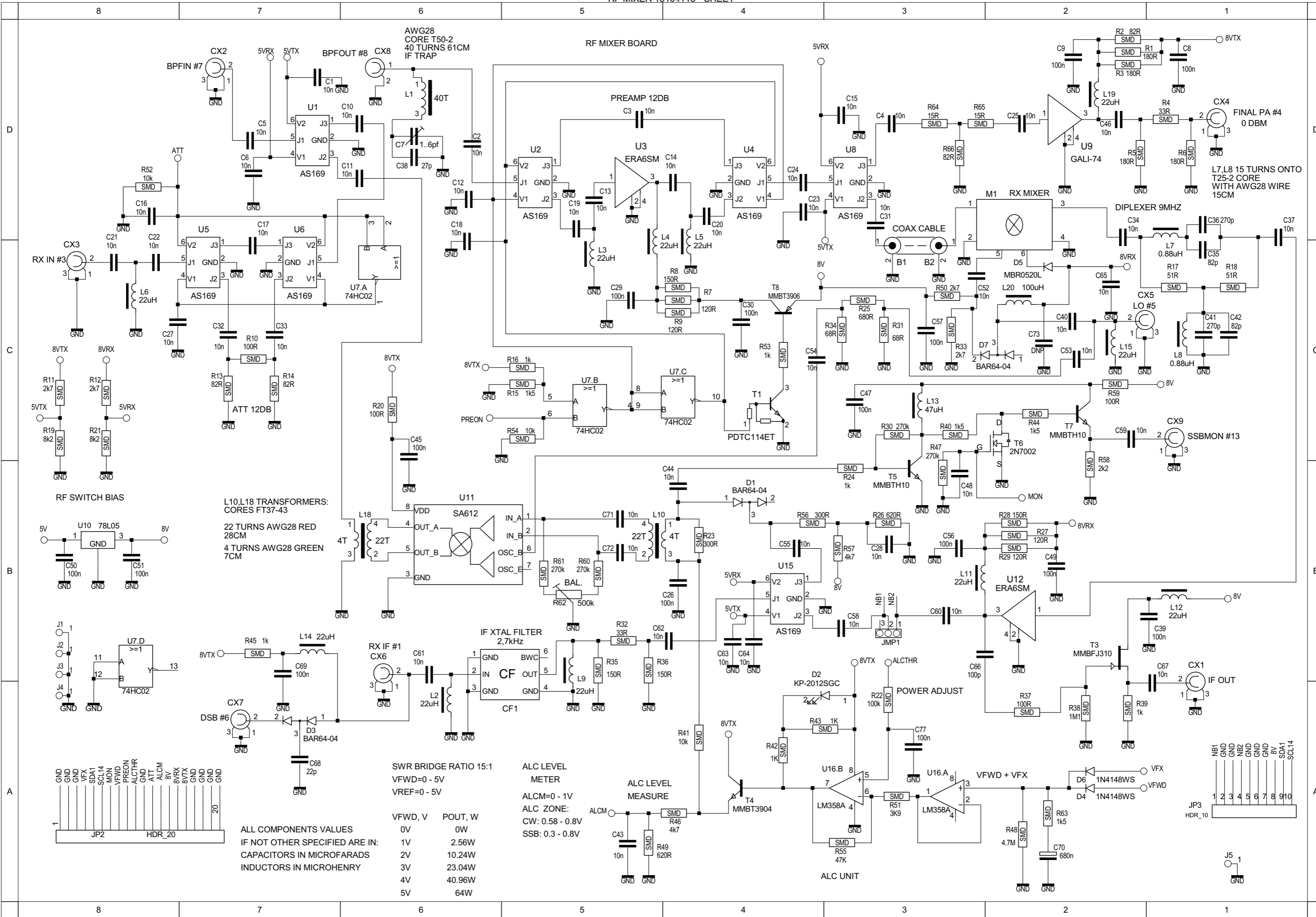
RF MIXER

RF MIXER board does all RX/TX signals on IF and operation frequencies. On receive the signal comes on CX3 coaxial connector, then passes (or not) through input attenuator R10,R13,R14, then via switches come to BPF board. IF TRAP circuitry consists of L1, C7, C38. Then signal passes through U3 (ERA6SM) RX preamplifier (operator switchable). RX MIXER is on additional subboard and sits over RF MIXER board. 9MHz diplexer follows and then IF amplifier – U12 (ERA6SM). After some switching and attenuation signal comes to the first crystal filter – 2.7kHz then to CX6 coaxial connector and IF/AF board.

On transmit the signal from SSB GEN board through CX7 connector passes through crystal filter and after TX/RX switch to a pin diode D1 attenuator. It is driven by ALC circuitry performed by U16 and T4.

U11 is TX mixer which is fine balanced by R62 and impedance matched by L10,L18 wide band transformers. Output mixed signals are further filtered by BPF board and amplified by U3 and U9. Output attenuator R4,R5,R6 is following then via CX4 signal goes to linear amplifier PA55W board.

ALC circuitry consist of U16 and T4. ALC can be controlled either from Vfwd signal from PA or from XVRTR output signal - VFX. T4 directly controls D1 pin diode bias voltage which affects IF 9MHz signal level. ALCTHR line sets power level for both CW and side band modes.



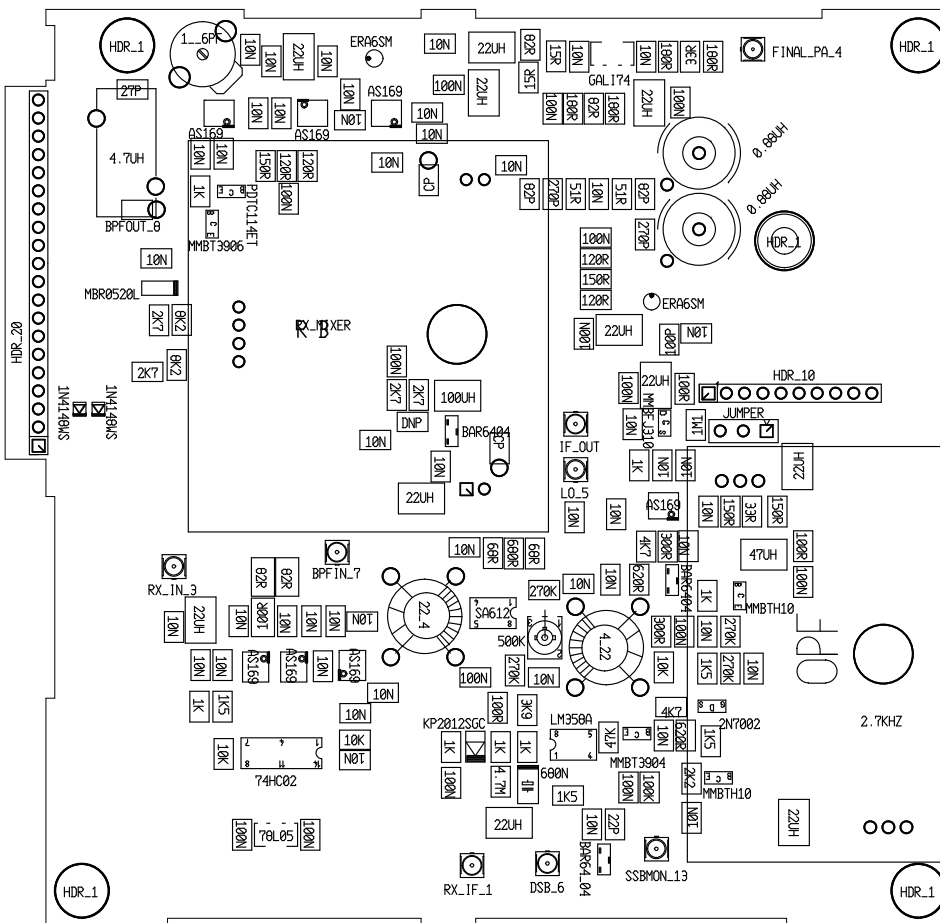
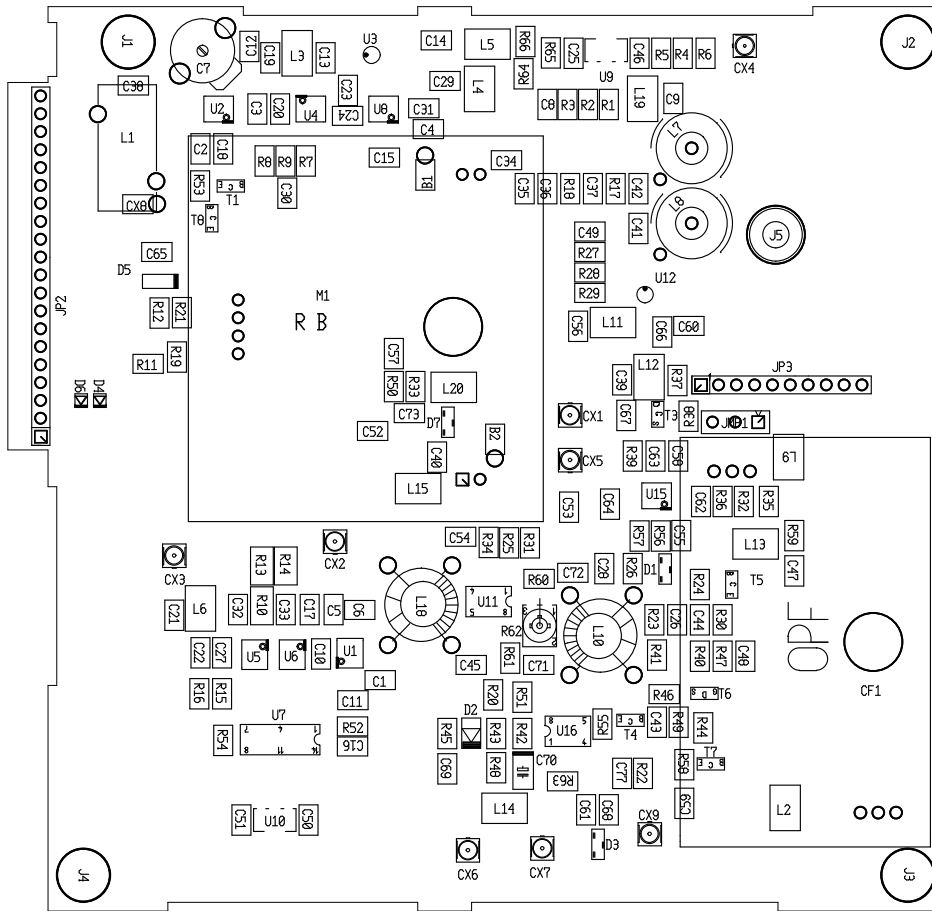
ALL COMPONENTS VALUES
IF NOT OTHER SPECIFIED ARE IN:
CAPACITORS IN MICROFARADS
INDUCTORS IN MICROHENRY

SWR BRIDGE RATIO 15:1

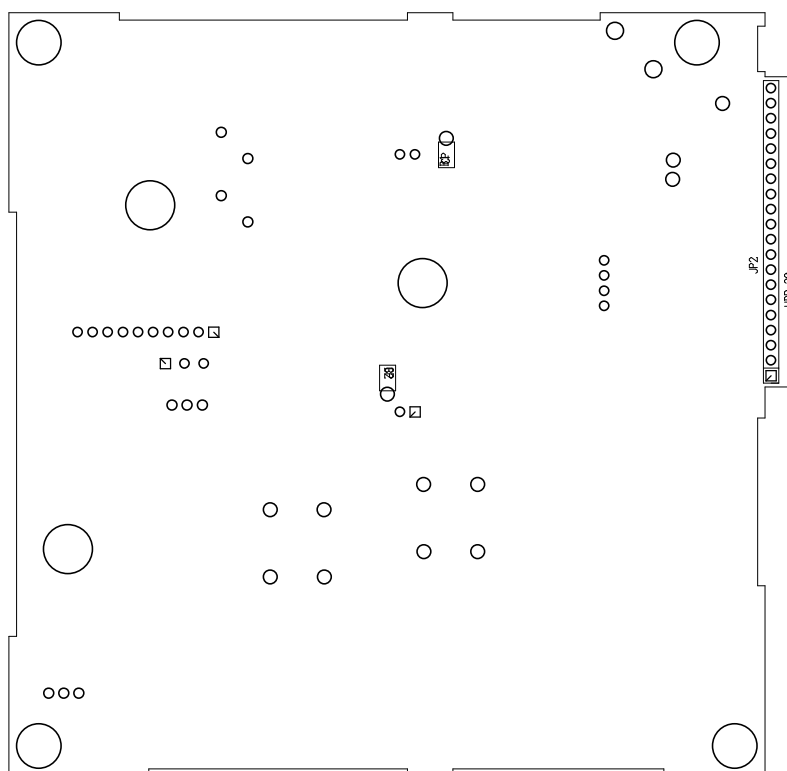
VFWWD, V	POUT, W
0V	0W
1V	2.56W
2V	10.24W
3V	23.04W
4V	40.96W
5V	64W

ALC LEVEL
METER
ALCM=0 - 1V
ALC ZONE:
CW: 0.58 - 0.8V
SSB: 0.3 - 0.8V

RF MIXER TOP view



RF MIXER BOTTOM view



Parts specification:

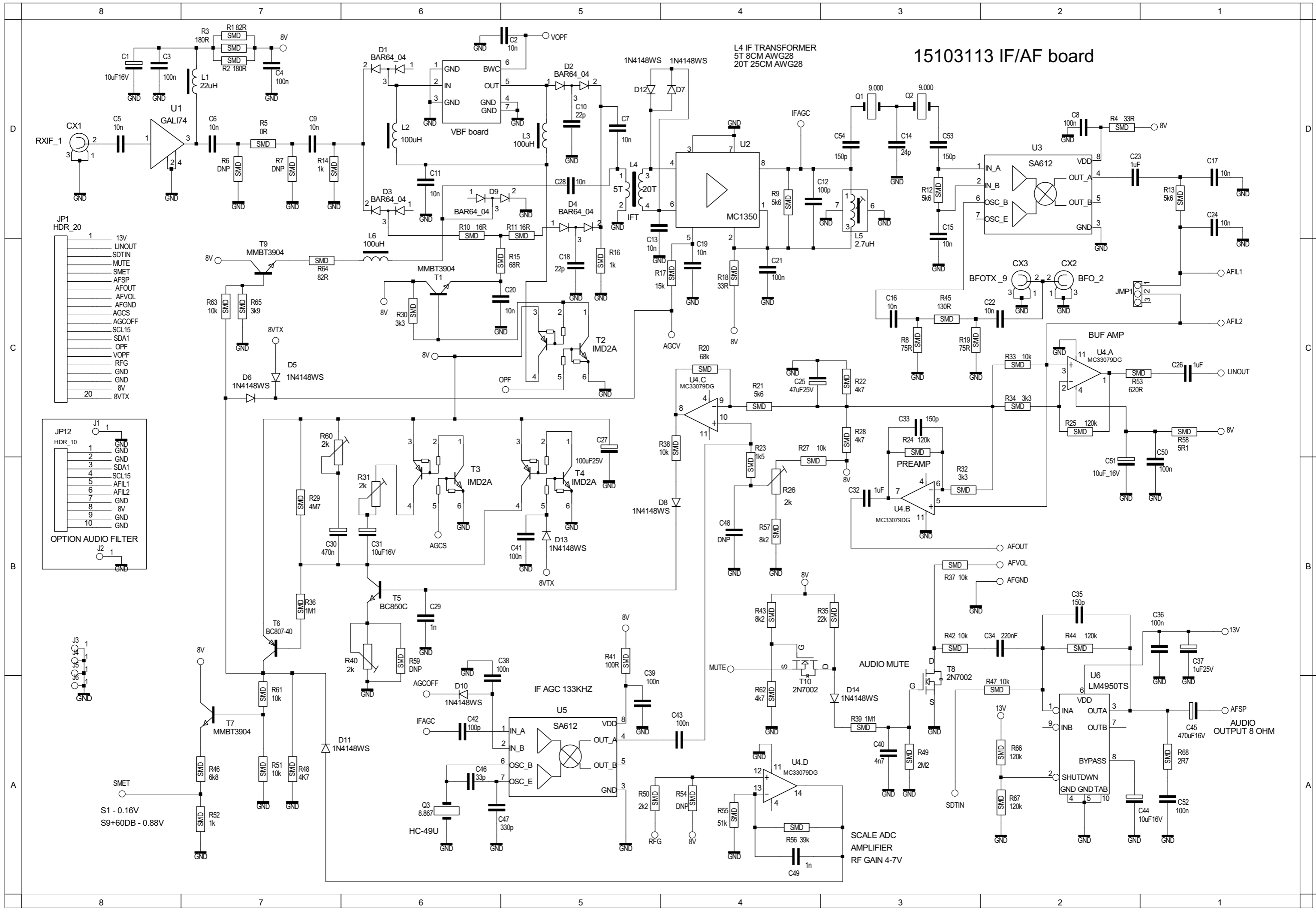
Name	QTY	Alias	Shape	Order number
L7,L8	2	0.88UH	T25-2	T25-2 15t. AWG28
C7	1	1-6PF	TRIM-CON7.5	CVN610 1-6pF blue
R22	1	100K	\$R0805	R0805 100K 1%
C8,C9,C26,C29,C30,C39,C45,C47,C49,C50,C51,C56,C57,C69,C77	15	100N	\$R0805	C0805 100nF 50V X7R SAMSUNG
C66	1	100P	\$R0805	C0805 100pF 50V C0G SAMSUNG
R10,R20,R37,R59	4	100R	\$R1206	R1206 100R 1% YAG/ASJ
L20	1	100UH	\$R1210	LQH32CN101K23L
R41,R52,R54	3	10K	\$R0805	R0805 10K 1%
C1-C6,C10 - C25,C27, C28,C31 - C34,C37,C40,C43, C44,C46,C48,C52-C55,C58-C65,C67,C71,C72	49	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
R7,R9,R27,R29	4	120R	\$R0805	R0805 120R 1% YAG/ASJ
R8,R28,R35,R36	4	150R	\$R0805	R0805 150R 1% YAG/ASJ
R64,R65	2	15R	\$R0805	R0805 15R 1%
R1,R3,R5,R6	4	180R	\$R0805	R0805 180R 5% YAG/ASJ
R16,R24,R39,R42,R43,R45, R53	7	1K	\$R0805	R0805 1.0K 1% YAG/ASJ
R15,R20,R40,R44	4	1K5	\$R0805	R0805 1.5K 1%
R38	1	1M1	\$R0805	R0805 1.1M 5%
D4,D6	2	1N4148WS	\$SOD_323	1N4148WS
CF1	2	2.7KHZ	XTALFIL 15106104	PN1X3-2.0 X2PCS.
L18	1	22_4	TRANSF22_4	FT43-37 22/4t AWG28
C68	1	22P	\$R0805	C0805 22pF 50V C0G
L2-L6,L9,L11,L12,L14,L15,L19	11	22UH	\$R1210	LQH32CN220K23L
R30	4	270K	\$R0805	R0805 270K 1%
C36,C41	2	270P	\$R0805	C0805 270pF 50V C0G SAMSUNG
C38	1	27P	\$R0805	C0805 27pF 50V C0G SAMSUNG
R58	1	2K2	\$R0805	R0805 2.2K 5% YAG/ASJ
R11,R12,R33,R50	4	2K7	\$R0805	R0805 2.7K 1%

Name	QTY	Alias	Shape	Order number
T6	1	2N7002	\$FET_2N7002	2N7002K
R23,R56	2	300R	\$R0805	R0805 300R 1% YAG/ASJ
R4,R32	2	33R	\$R0805	R0805 33R 1%
R51	1	3K9	\$R0805	R0805 3.9K 1%
R48	1	4.7M	\$R0805	R0805 4.7M 5%
L1	1	4.7UH	IFTRAP2	T50-2 40t. AWG28
L10	1	4 22	TRANSF22_4	FT43-37 22/4t AWG28
R55	1	47K	\$R0805	R0805 47K 1% YAG/ASJ
L13	1	47UH	\$R1210	LQH32CN470K23L
R46,R57	2	4K7	\$R0805	R0805 4.7K 1%
R62	1	500K	\$POTTC33X	TC33X-2 500K
R17,R18	2	51R	\$R0805	R0805 51R 1% YAG/ASJ
R26,R49	2	620R	\$R0805	R0805 620R 1% YAG/ASJ
C70	1	680N	\$TANT1206	C1206 680nF 50V X7R SAMSUNG
R25	1	680R	\$R0805	R0805 680R 1%
R31,R34	2	68R	\$R0805	R0805 68R 1%
U7	1	74HC02	\$SO14	74HC02 SMD
U10	1	78L05	\$78L05_SOT89	78L05 SMD SOT89 DIV
C35,C42	2	82P	\$R0805	C0805 82pF 50V C0G SAMSUNG
R2,R13,R14,R66	4	82R	\$R0805	R0805 82R 1% YAG/ASJ
R19,R21	2	8K2	\$R0805	R0805 8.2K 1%
R21	1	8K2	\$R0805	R0805 8.2K 1%
U1,U2,U4-U6,U8,U15	7	AS169	\$SOT6	digkey as169
D3,D1,D7	3	BAR64_04	\$SOT23	farnel 2480900
CX2,CX1,CX5,CX3,CX6,CX9, CX4,CX7	8	BPFIN,OUT,MON	IPX	IPX.UFL coaxial mini plug
CX8	1	BPFOUT_8	COAX_PADS	
B1,B2	2	CP	COAX_PADS	5CM COAX JUMPER RG-404
U3,12	2	ERA6SM	WW107	era6sm
U9	1	GALI74	DF782	gali-74
J1-J4	4	HDR_1	SCREW	M3x6; lock washer 3mm
J5	3	HDR_1	PCB standoff	Amatom #19833B-B0350-0
JP3	1	HDR_10	HDR1X10_2MM	PN1X10-2.0
JP2	1	HDR_20	HDR1X20_2MM	~PL2015G023.5/2.3-120
D2	1	KP2012SGC	\$D0805	KP-2012SGC
U16	1	LM358A	\$SO8	LM358D SMD
D5	1	MBR0520L	\$SOD123	MBR0520L
T3	1	MMBFJ310	\$FET_SOT23	Farnell 1095137
T4	1	MMBT3904	\$TRA_SOT23	MMBT3904 SMD
T8	1	MMBT3906	\$TRA_SOT23	MMBT3906 SMD
T5,T7	2	MMBTH10	\$TRA_SOT23	MMBTH10
T1	1	PDTC114ET	DIGITRA	PDTC114ET
M1	1	RX_MIXER	RX_MIXER	PN1X5-2mm; PN1X3-2mm 2br
U11	1	SA612	\$SO8	farnel 2212081

IF/AF board

This unit includes the following:

- intermediate frequency IF amplification – MC1350
- optional crystal filter (4 pole variable crystal Johnson type filter)
- RX product detector – SA612
- AF preamplifier – MC33079DG
- RX MUTE and sidetone input circuitry
- AF final amplifier – LM4950
- Fast IF 134kHz Automatic Gain Control scheme – SA612,MC33079DG
- Optional AF filter board



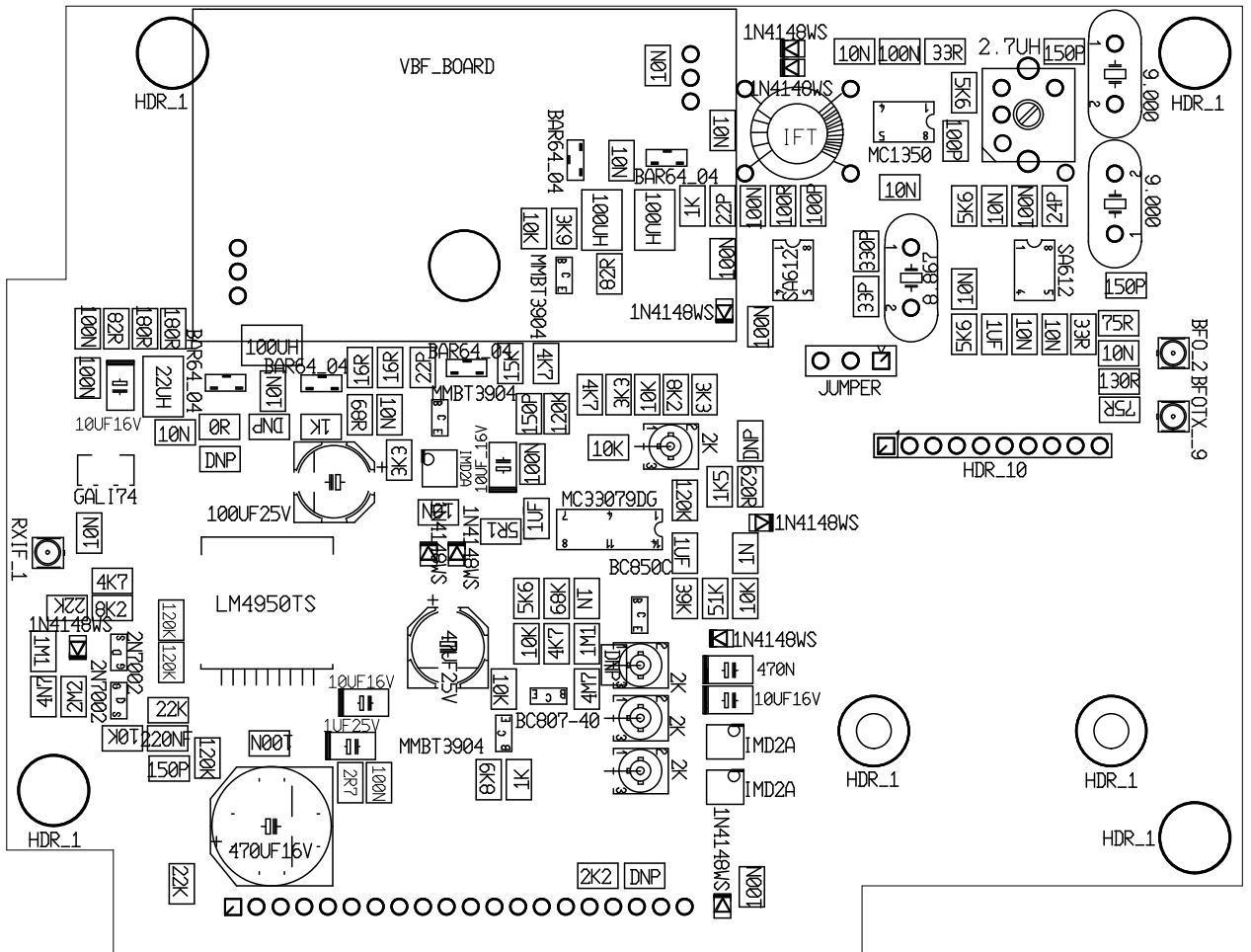
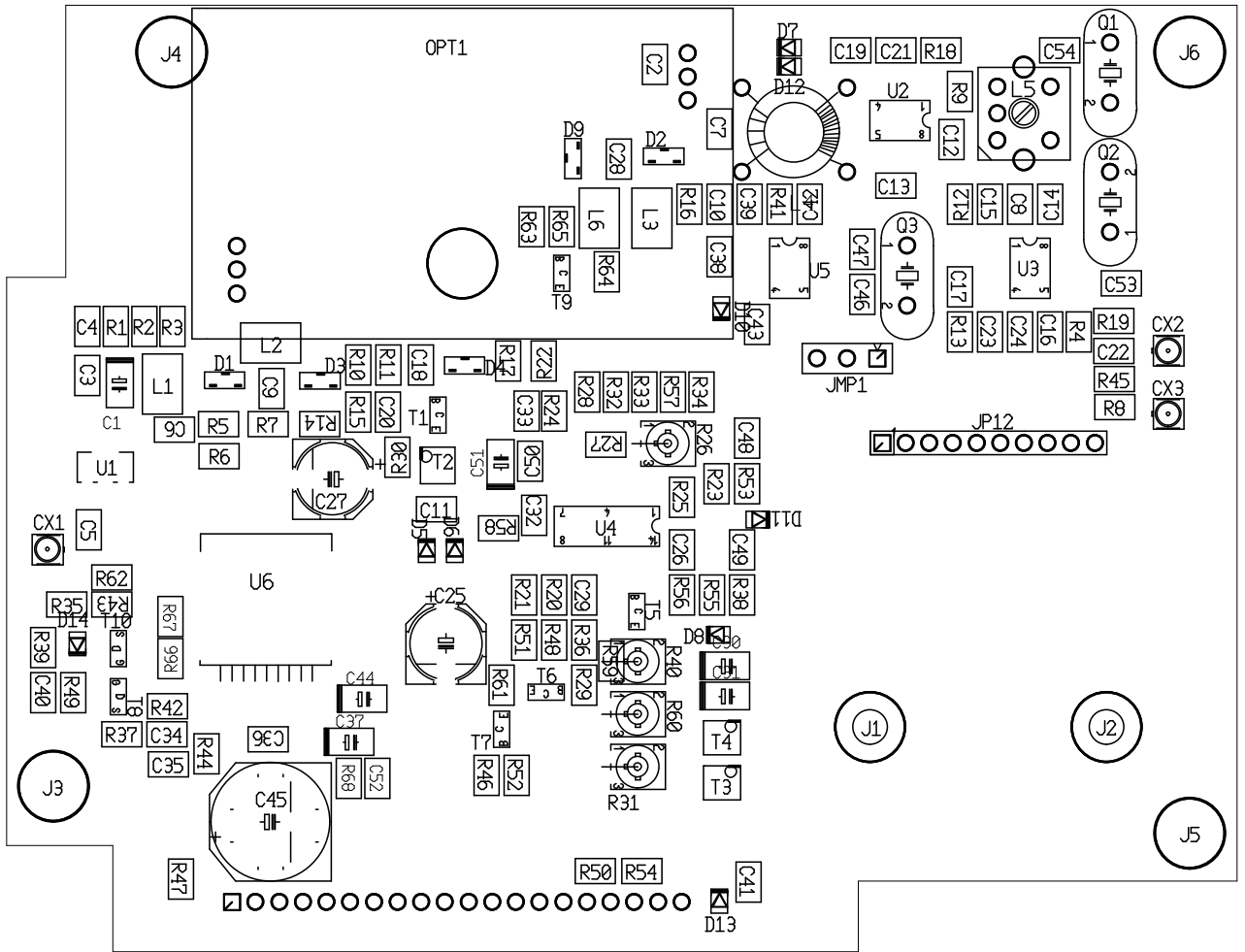
15103113 IF/AF board

L4 IF TRANSFORMER
5T 8CM AWG28
20T 25CM AWG28

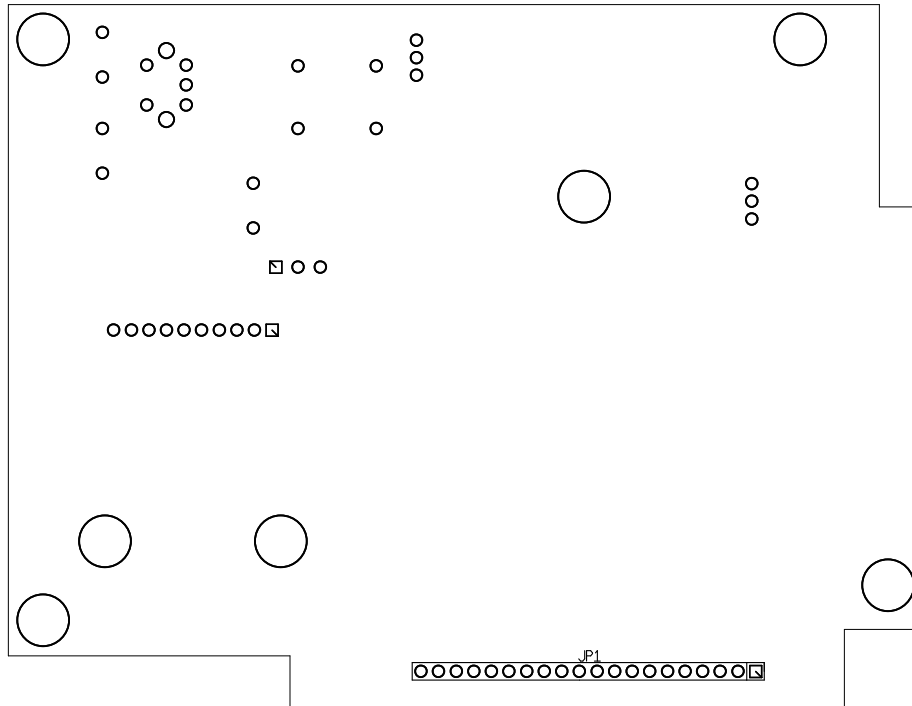
- JP1 HDR_20
- 1 13V
 - 2 LINOUT
 - 3 SDTIN
 - 4 MUTE
 - 5 SMET
 - 6 AFSP
 - 7 AFOUT
 - 8 AFVOL
 - 9 AFGND
 - 10 AGCS
 - 11 AGCOFF
 - 12 SCL15
 - 13 SDA1
 - 14 OPF
 - 15 VOPF
 - 16 RFG
 - 17 GND
 - 18 GND
 - 19 8V
 - 20 8VTX

- JP12 HDR_10
- 1 GND
 - 2 GND
 - 3 SDA1
 - 4 SCL15
 - 5 AFIL1
 - 6 AFIL2
 - 7 GND
 - 8 8V
 - 9 GND
 - 10 GND
- OPTION AUDIO FILTER

IF/AF board TOP view



IF/AF board BOTTOM view



Parts specification:

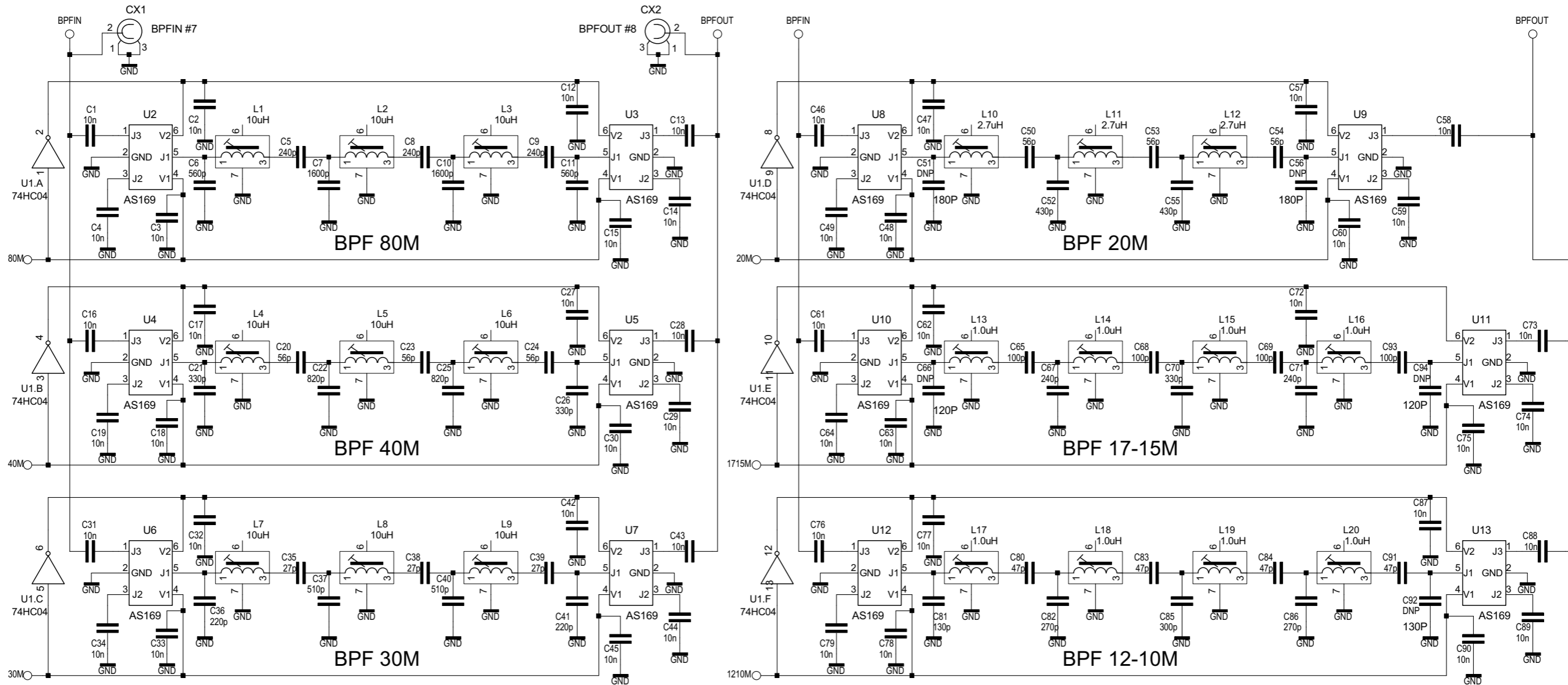
Name	QTY	Alias	Shape	Order number
C1	1	10UF16V	\$TANT1206	TANT A SMD 10uF 16V
R5	1	0R	\$R0805	R0805 0R 5%
C3,C4,C8,C21,C36,C38,C39,C41,C43,C50,C52	11	100N	\$R0805	C0805 100nF 50V X7R SAMSUNG
C12,C42	2	100P	\$R0805	C0805 100pF 50V C0G SAMSUNG
R41	1	100R	\$R0805	R0805 100R 1%
C27	1	100UF25V	\$P_ELKO_D	CE 100uF 25V SMD Fujicon
L2,L3,L6	3	100UH	\$R1210	LQH32CN101K23L
R27,R33,R37,R38,R51,R61,R63	7	10K	\$R0805	R0805 10K 1%
C2,C5,C6,C7,C9,C11	15	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
C51,C31,C44	3	10UF/16V	\$TANT1206	TANT A SMD 10uF 16V
R24,R25,R44,R66,R67	5	120K	\$R0805	R0805 120K 5%
R45	1	130R	\$R0805	R0805 130R 1%
C33,C35,C53,C54	4	150P	\$R0805	C0805 150pF 50V C0G
R17	1	15K	\$R0805	R0805 15K 1%
R10,R11	2	16R	\$R0805	R0805 16R 1%
R2,R3	2	180R	\$R0805	R0805 180R 5% YAG/ASJ
R14,R16,R52	3	1K	\$R0805	R0805 1.0K 1% YAG/ASJ
R23	1	1K5	\$R0805	R0805 1.5K 1%
R36,R39	2	1M1	\$R0805	R0805 1.1M 5%
C29,C49	2	1N	\$R0805	C0805 1.0nF 50V C0G SAMSUNG
D5,D6,D7,D8,D10,D11,D12,D13,D14	9	1N4148WS	\$SOD_323	1N4148WS
C23,C26,C32	3	1UF	\$R0805	C0805 1.0uF 50V X7R SAMSUNG
C37	1	1UF/25V	\$TANT1206	TANT A SMD 1uF 25V
L5	1	2.7UH	KHS6	KHS-6 2.7uH A71108006
C34	1	220NF	\$R0805	C0805 220nF 50V X7R
R35,R42,R47	3	22K	\$R0805	R0805 22K 1%
R54			DNP	

Name	QTY	Alias	Shape	Order number
C10,C18	2	22P	\$R0805	C0805 22pF 50V C0G
L1	1	22UH	\$R1210	LQH32CN220K23L
C14	1	24P	\$R0805	C0805 24pF 50V C0G SAMSUNG
R26,R31,R40,R60	4	2K	\$POTTC33X	TC33X-2 2K
R50	1	2K2	\$R0805	R0805 2.2K 1%
R49	1	2M2	\$R0805	R0805 2.2M 1%
T8,T10	2	2N7002	\$FET_2N7002	2N7002K
R68	1	2R7	\$R0805	R0805 2.7R 5%
C47	1	330P	\$R0805	C0805 330pF 50V C0G SAMSUNG
C46	1	33P	\$R0805	C0805 33pF 50V C0G SAMSUNG
R4,R18	2	33R	\$R0805	R0805 33R 1%
R56	1	39K	\$R0805	R0805 39K 1% YAG/ASJ
R30,R32,R34	3	3K3	\$R0805	R0805 3.3K 1%
R65	1	3K9	\$R0805	R0805 3.9K 1%
C30	1	470N	\$TANT1206	TANT A SMD 470nF 25V
C45	1	470UF16V	\$P_ELKO_E	CE 470uF 16V SMD Fujicon
C25	1	47UF25V	\$P_ELKO_D	CE 47uF 25V SMD Fujicon
R22,R28,R48,R62	4	4K7	\$R0805	R0805 4.7K 1%
R29	1	4M7	\$R0805	R0805 4.7M 5%
C40	1	4N7	\$R0805	C0805 4.7nF 50V X7R SAMSUNG
R55	1	51K	\$R0805	R0805 51K 1%
R9,R12,R13,R21	4	5K6	\$R0805	R0805 5.6K 1%
R58	1	5R1	\$R0805	R0805 5.1R 5%
R53	1	620R	\$R0805	R0805 620R 1% YAG/ASJ
R20	1	68K	\$R0805	R0805 68K 1%
R15	1	68R	\$R0805	R0805 68R 1%
R46	1	6K8	\$R0805	R0805 6.8K 1%
R8,R19	2	75R	\$R0805	R0805 75R 1%
Q3	1	8.867	HC-49S	8,867238 MHz
R1,R64	2	82R	\$R0805	R0805 82R 1% YAG/ASJ
R43,R57		8K2	\$R0805	R0805 8.2K 1%
Q1,Q2		9.000	HC-49S	MATCHED crystals
D1,D2,D3,D4,D9	5	BAR64_04	\$SOT23BAR	2480900
T6	1	BC807-40	\$TRA_SOT23	BC807-40 SMD
T5	1	BC850C	\$TRA_SOT23	BC850C SMD
CX1,CX2,CX3	2	BFO#2,BFOT	IPX	IPX/U.FL coaxial mini connector
C48,R6,R7,R59		DNP		
U1	1	GALI74	DF782	
J1,J2	2	HDR_1	STANDOFF	19833B-B0350-0
J3,J4,J5,J6	4	HDR_1	SCREW	M3x6, lockwasher 3mm
JP12	1	HDR_10	HDR1X10_2M	PN1X10-2.0
JP1	1	HDR_20	HDR1X20_2M	~PL2015G023.5/2.3-120
L4	1	IFT	TRANSF520	ferrite core FT43-37
T2,T3,T4	3	IMD2A	\$SOT457	IMD2AT108 SMD
JMP1	1	JUMPER	JMP	wire strap
U6	1	LM4950TS	DDPAK	
U2	1	MC1350	\$SO8	
U4	1	MC33079DG	\$SO14	863-MC33079DR2G
T1,T7,T9	3	MMBT3904	\$TRA_SOT23	MMBT3904 SMD
U3,U5	2	SA612	\$SO8	
OPT1	3	VBF_BOARD	XTALFIL	VBF board PN1X3 2PCS.

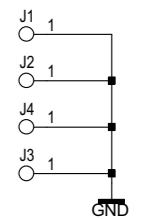
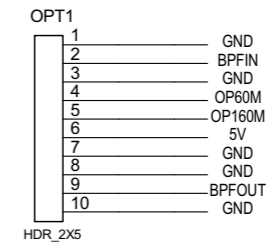
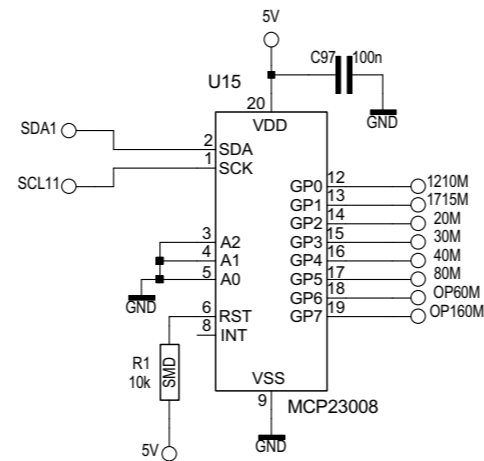
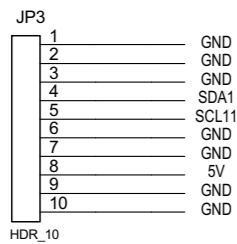
Receiver BAND PASS FILTERS (BPF) board

Six band pass filters were built to cover 10-80m bands on RX. Schematic utilizes Skywork solutions AS169 PHEMT GaAs SPDT switches, used in modern wireless equipments. In order to perform individually “fine tune” a variable coil inductors are used. The module fully meets project CLICKLESS concept as there aren't any mechanical switching components. MCP23008 serial controlled I/O expander is used to engage needed filter. The board has a provision for two optional filters (Optional filter 160/60m).

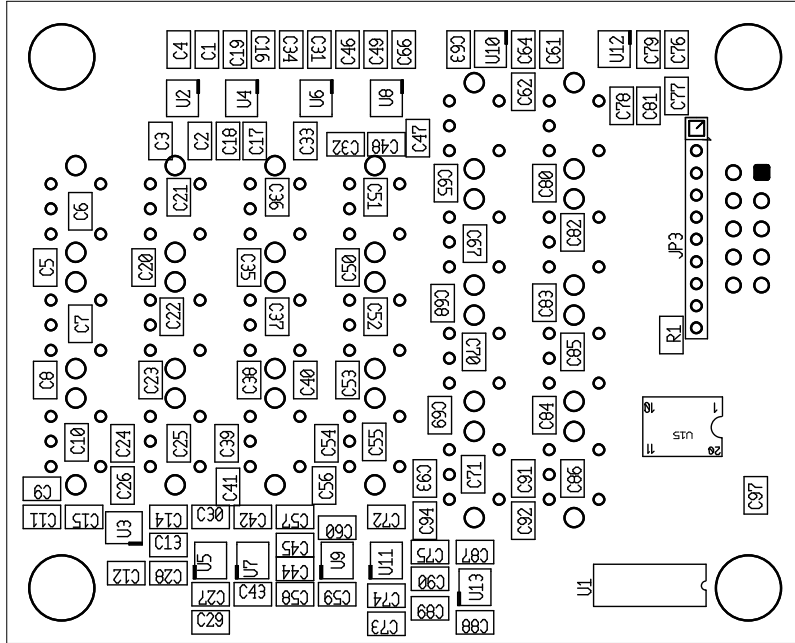
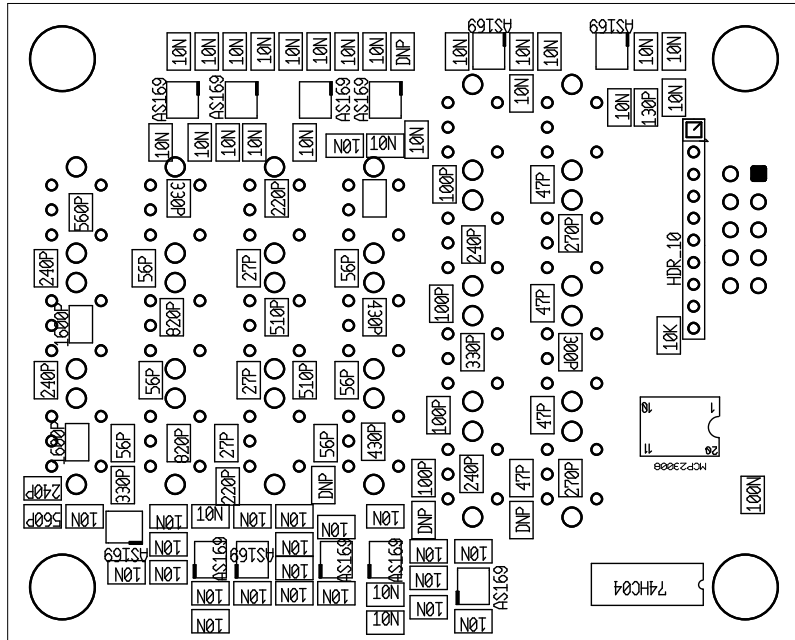
BAND PASS FILTER BOARD



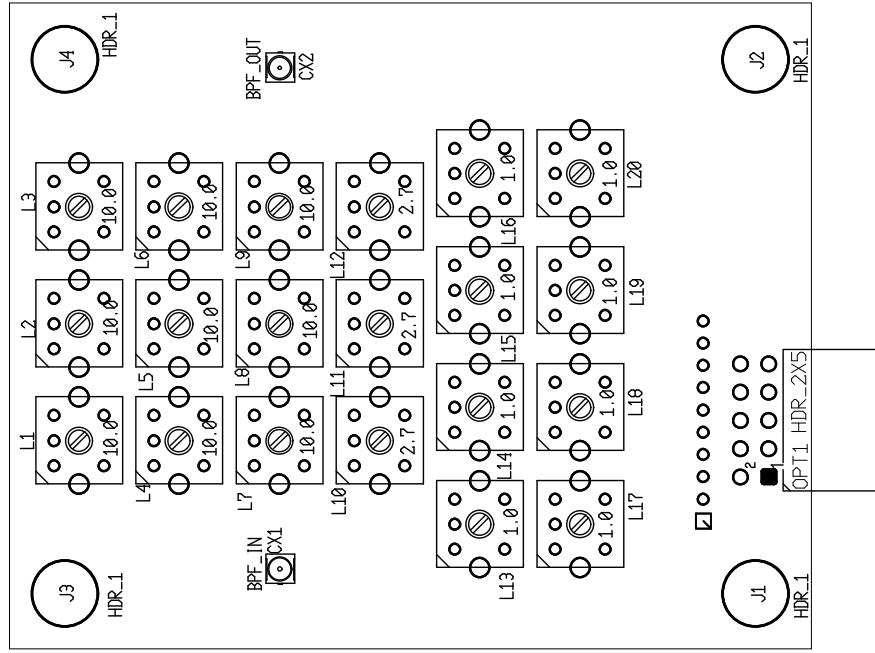
L1-L20 VARIABLE INDUCTOR COILS TYPE KHS-6
ALL CAPACITORS RATED AT 50V NPO/C0G



BPF board BOTTOM view



BPF board TOP view



Parts specification:

Name	QTY	Alias	Shape	order number
L13,L14,L15,L17,L18,L19,L20	7	1.0	KHS-6	KHS-6 1.0 uH 2593
L1-L9,L16	10	10.0	KHS-6	KHS-6 10 uH A71108002
C97	1	100N	\$R0805	C0805 100nF 50V X7R SAMSUNG
C65,C68,C69,C93	4	100P	\$R0805	C0805 100pF 50V C0G SAMSUNG
R1	1	10K	\$R0805	R0805 10K 1%
C1,C2,C3,C4,C12-C19,C27-C34,C42-C49,C57-C64,C72-C79,C87-C90	47	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
C81	1	130P	\$R0805	C0805 130pF 50V C0G SAMSUNG
C7,C10	2	1600P	\$R0805	1865488
L10-L12		2.7uH	KHS-6	KHS-6 2.7uH A71108006
C36,C41	2	220P	\$R0805	C0805 220pF 50V C0G SAMSUNG
C5,C8,C9,C67,C71	5	240P	\$R0805	C0805 240pF 50V C0G SAMSUNG
C82,C86	2	270P	\$R0805	C0805 270pF 50V C0G SAMSUNG
C35,C38,C39	3	27P	\$R0805	C0805 27pF 50V C0G SAMSUNG
C85	1	300P	\$R0805	CL21C301JBANNNC
C21,C26,C70	3	330P	\$R0805	C0805 330pF 50V C0G SAMSUNG
C52,C55	2	430P	\$R0805	CL21C431JBANNNC
C80,C83,C84,C91	4	47P	\$R0805	C0805 47pF 50V C0G SAMSUNG
C37,C40	2	510P	\$R0805	NMC0805NPO511J50TRPF
C6,C11	2	560P	\$R0805	C0805 560pF 50V C0G SAMSUNG
C20,C23,C24,C50,C53,C54	6	56P	\$R0805	C0805 56pF 50V C0G SAMSUNG
U1	1	74HC04	SO14	74HC04D
C22,C25	2	820P	\$R0805	C0805 820pF 50V C0G SAMSUNG
U2-U13	12	AS169	\$SOT6	863-1002-1-ND
CX1,CX2	2	BPFIN,BPF	IPX	
C51,C56,C66,C92,C94	5	DNP	\$R0805	
J1-J4	4	HDR_1	SCREW	M3x6, lockwasher 3mm
JP3	1	HDR_10	HDR1X10	2289781
OPT1	1	HDR_2X5	HDR2X5H	PR2X5
U15	1	MCP23008	\$SSOP20	1605564

RX MIXER

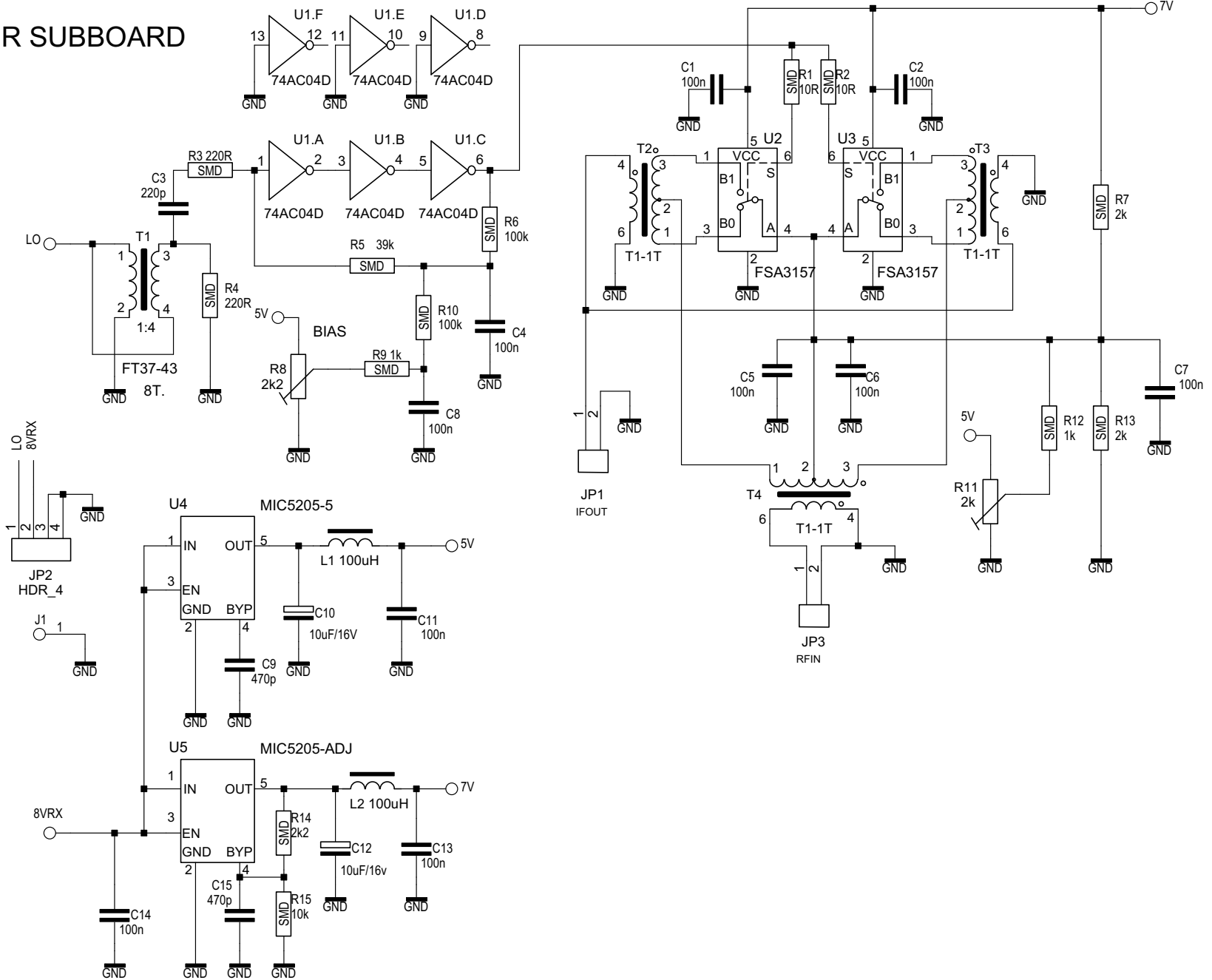
High dynamic range H-MODE receiver mixer (Option)

Parts specification:

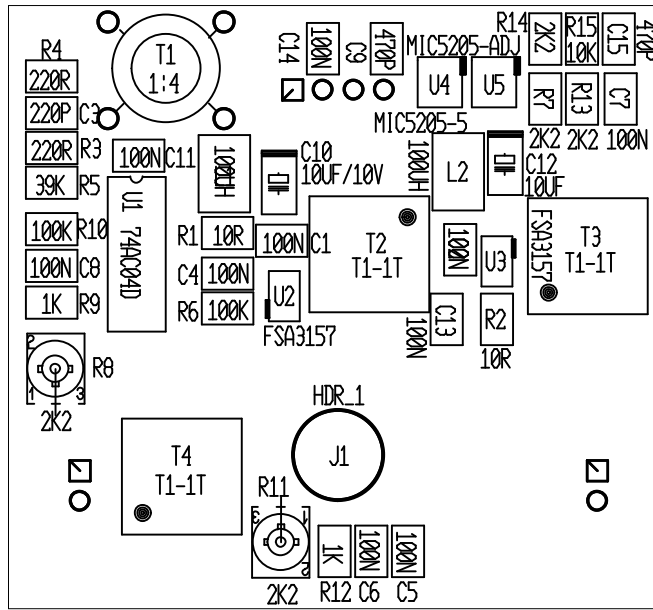
Name	QTY	Alias	Shape	Order number
T1	1	TRANSF 1:4	TRANSF_1:4	FT37-43 bifillar 8t
R6,R10	2	100K	\$R0805	R0805 100K 1%
C1,2,4,5,6,7,8,11, 13,14	10	100N	\$R0805	C0805 100nF 50V X7R SAMSUNG
L1,L2	2	100UH	\$R1210	LQH32CN101K23L
R15	1	10K	\$R0805	R0805 10K 1%
R1,R2	2	10R	\$R0805	R0805 10R 1%
C12,C10	2	10UF/10V	\$TANT1206	TANT A SMD 10uF 16V
R9,R12	2	1K	\$R0805	R0805 1K 1%
C3	1	220P	\$R0805	C0805 220pF 50V C0G SAMSUNG
R3,R4	2	220R	\$R0805	R0805 220R 1%
R7,R13,R14	3	2K2	\$R0805	R0805 2.2K 1%
R8,R11	2	2K2	\$POTTC33X	TC33X-2 2K
R5	1	39K	\$R0805	R0805 39K 1%
C9,C15	2	470P	\$R0805	C0805 470pF 50V C0G SAMSUNG
U1	1	74AC04D	SO14	74AC04D
U2,U3	2	FSA3157	\$SC70	FSA3157
J1	1	HDR_1	SCREW	M3x6 lock washer 3mm
JP2	1	HDR_4	HDR1X4_2MM	
JP1	1	IFOUT	HDR1X2_2MM	
U4	1	MIC5205-5	\$SOT23-5	MIC5205-5
U5	1	MIC5205-AD	\$SOT23-5	MIC5205-ADJ
JP3	1	RFIN	HDR1X2_2MM	
T2,T3,T4	3	T1-1T	\$KK81	Minicircuits T1-1T

RX MIXER 15105104 - RX MIXER

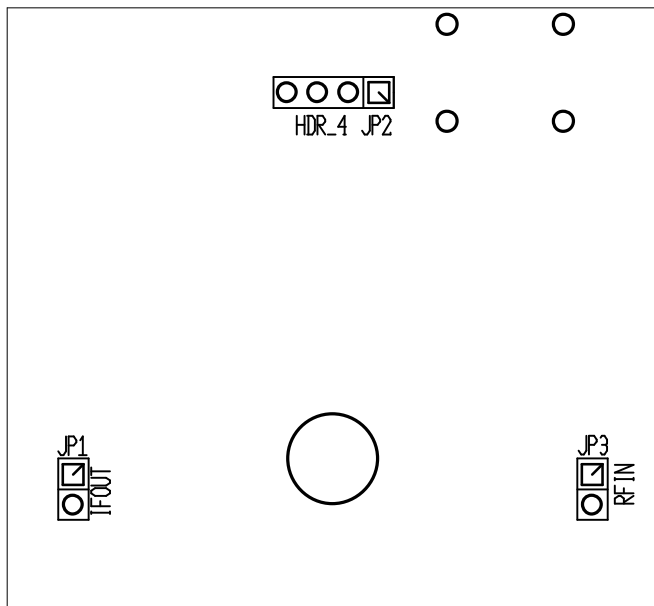
RX MIXER SUBBOARD



RX MIXER TOP view



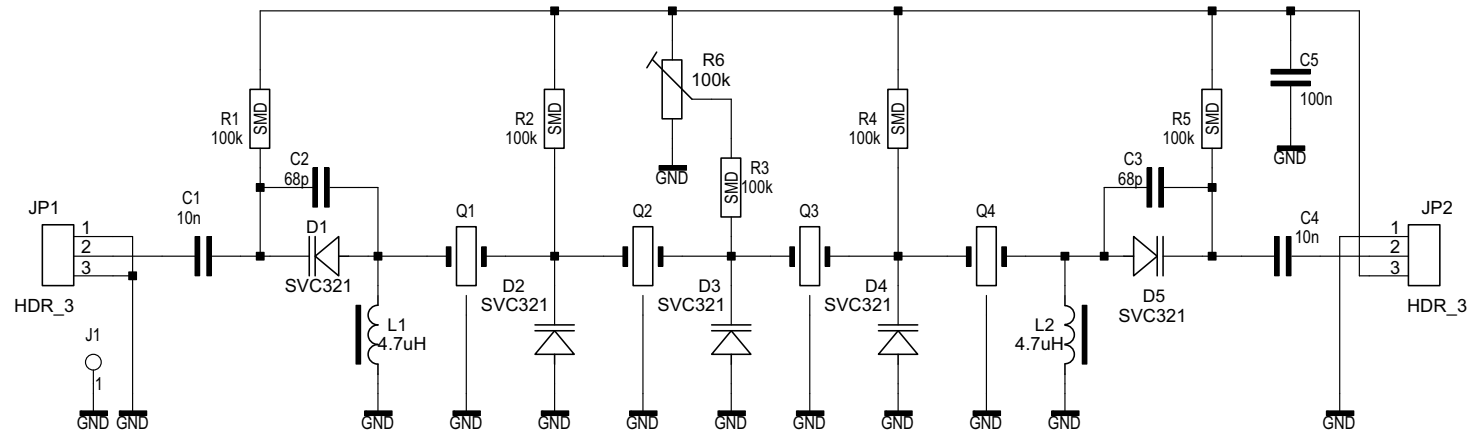
RX MIXER BOTTOM view



VBF part list

Name	Alias	Shape	part
C1	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
C2	68P	\$R0805	C0805 68pF 50V COG SAMSUNG
C3	68P	\$R0805	C0805 68pF 50V COG SAMSUNG
C4	10N	\$R0805	C0805 10nF 50V X7R SAMSUNG
C5	100N	\$R0805	C0805 100nF 50V X7R SAMSUNG
D1	SVC321	TO92	SVC321 VARACTOR DIODE
D2	SVC321	TO92	SVC321 VARACTOR DIODE
D3	SVC321	TO92	SVC321 VARACTOR DIODE
D4	SVC321	TO92	SVC321 VARACTOR DIODE
D5	SVC321	TO92	SVC321 VARACTOR DIODE
J1	HDR_1	HOLE	M3x6; lockwasher 3mm
JP1	HDR_3	HDR1X4_2MM	2289781 3/20 cut
JP2	HDR_3	HDR1X4_2MM	2289781 3/20 cut
L1	4.7UH	\$R1210	LQH32CN4R7M23L
L2	4.7UH	\$R1210	LQH32CN4R7M23L
Q1	9.000	RESO10X5R5	CRYSTAL RESONATOR HC-49S
Q2	9.000	RESO10X5R5	CRYSTAL RESONATOR HC-49S
Q3	9.000	RESO10X5R5	CRYSTAL RESONATOR HC-49S
Q4	9.000	RESO10X5R5	CRYSTAL RESONATOR HC-49S
R1	100K	\$R0805	R0805 100K 1%
R2	100K	\$R0805	R0805 100K 1%
R3	100K	\$R0805	R0805 100K 1%
R4	100K	\$R0805	R0805 100K 1%
R5	100K	\$R0805	R0805 100K 1%
R6	100K	\$POTTC33X	TC33X-2 100K

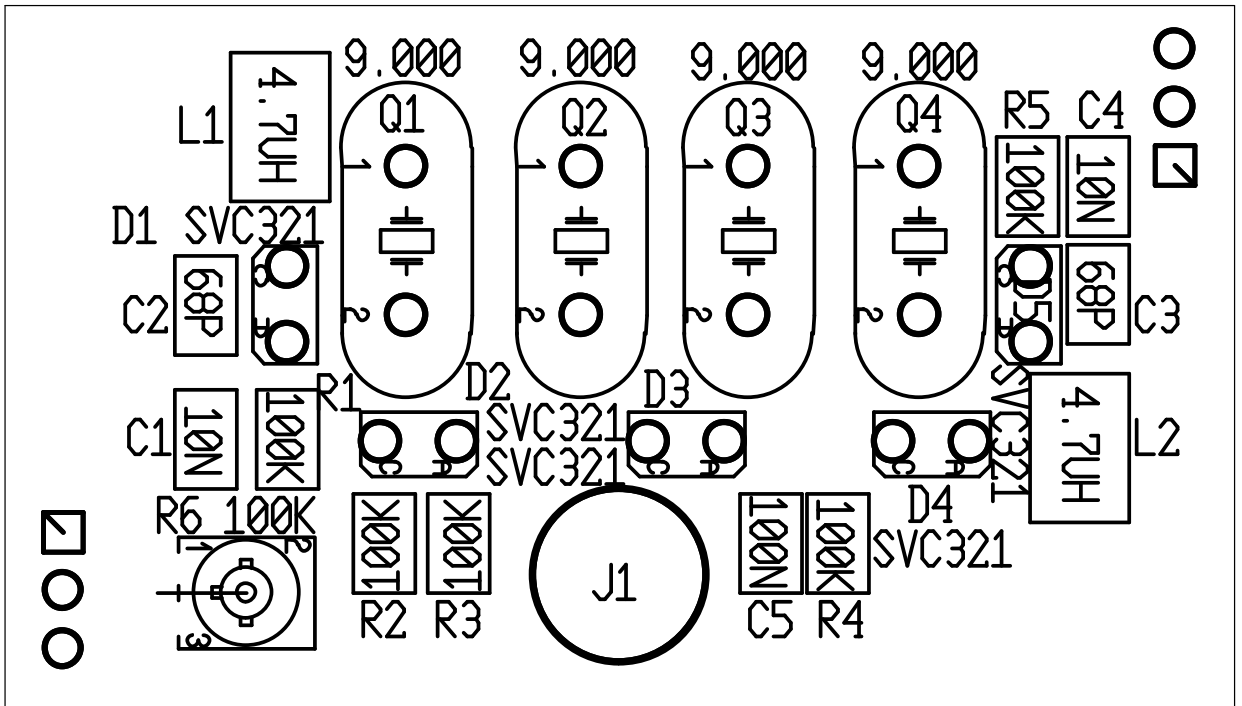
4 POLE VARIABLE BANDWIDTH FILTER 9MHZ



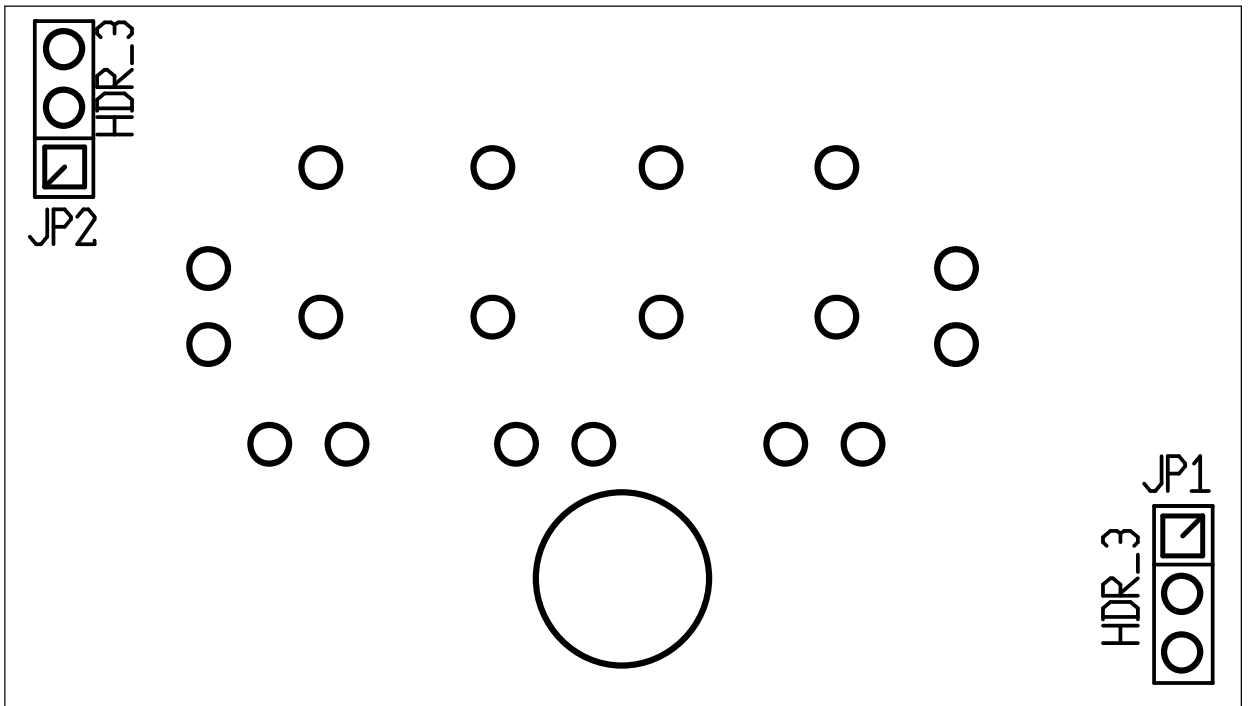
INDIVIDUAL XTAL MOTIONAL PARAMETERS:
 FS=8998.620KHZ
 Q=116000
 LM=35.3MH
 CM=8.85FF
 R=17.5
 CO=2.75PF

ALL CAPACITORS ARE NPO, C0G 50V
 CRYSTAL TYPE HC-49S
 ALL CRYSTAL ARE MATCHED TO 100HZ
 ZIN/OUT = 50 OHM
 CRYSTAL CASES MUST BE SOLDERED
 TO GROUND

VBF TOP view



VBF BOTTOM view



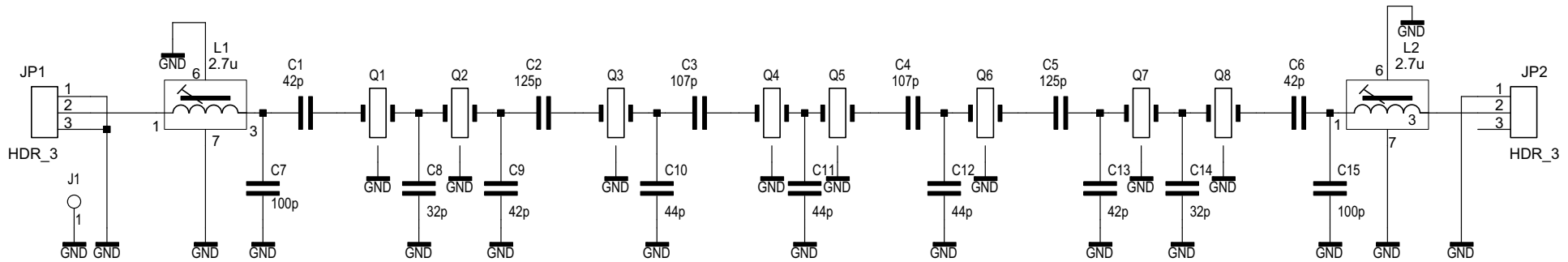
Crystal filter 9MHz 2.7kHz

Crystal filter is made of individual quartz crystals with matched parameters – Fser. (+/- 15Hz), Lm and Q factor > 100 000. A large quantity of 9MHz oscillator crystals were purchased to extract only few to fit those requirements. Three type of quartz filters are used in RGO ONE – main (roofing) filter, VBF 4 pole Johnson type filter for SSB and CW modes and noise filter. All the filters are internally impedance matched to 50 ohm input/output circuitry and individually aligned.

Roofing first (standard) wide 2.7kHz SSB filter:

Filter type	Chebyshev 8-pole
Center frequency	9MHz
Bandwidth at -3db	2.7kHz
Shape factor -6/-60db	1.75
IN/OUT impedance	50ohm
Band pass ripple	<1db
Stop band attenuation	>80db

8 POLE CHEBISHEV CRYSTAL LADDER FILTER 9MHZ BW 2.7KHZ



C.FREQ. 9.000 MHZ
 OFFSET 0HZ
 BW@-6 2.7KHZ
 PASSBAND RIPPLE 0.2DB
 STOPBAND ATTN >100DB
 SHAPE FACTOR 1.66

INDIVIDUAL XTAL MOTIONAL PARAMETERS:
 FS=8998.240KHZ
 Q=116000
 LM=35.3MH
 CM=8.85FF
 R=17.5
 CO=2.75PF

ALL CAPACITORS ARE NPO, COG 50V
 CRYSTAL TYPE HC-49S
 ALL CRYSTAL ARE MATCHED TO 30HZ
 ZIN/OUT = 50 OHM
 CRYSTAL CASES MUST BE SOLDERED
 TO GROUND

D

D

C

C

B

B

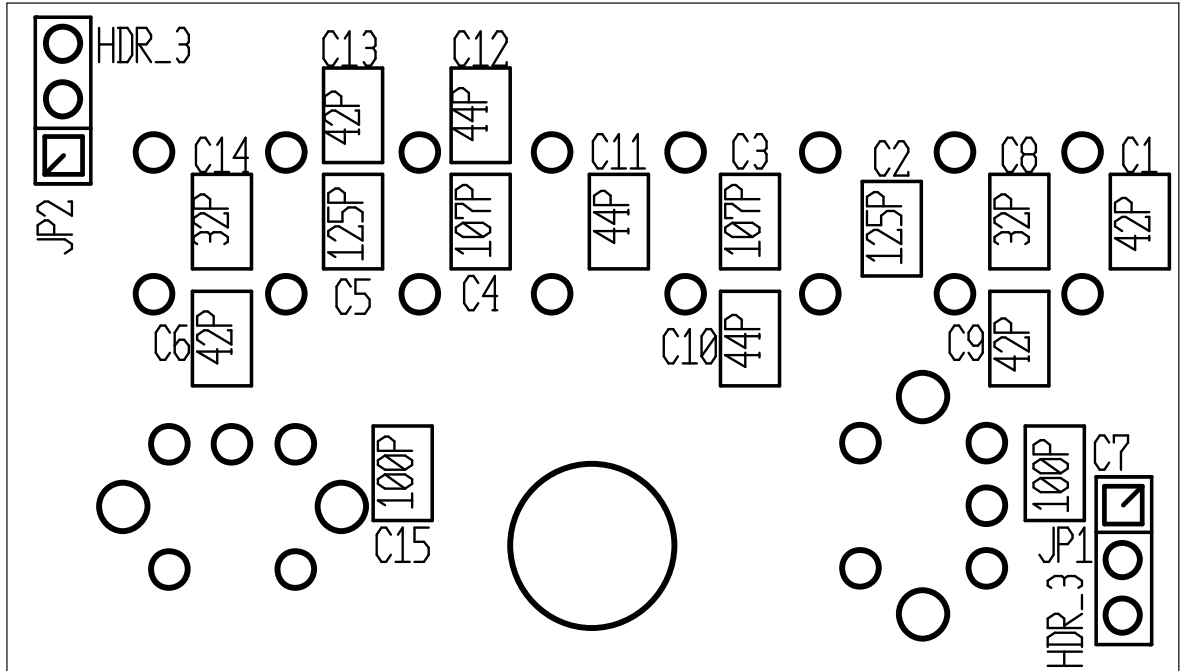
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8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

XTAL Filter BOTTOM view



XTAL Filter TOP view

