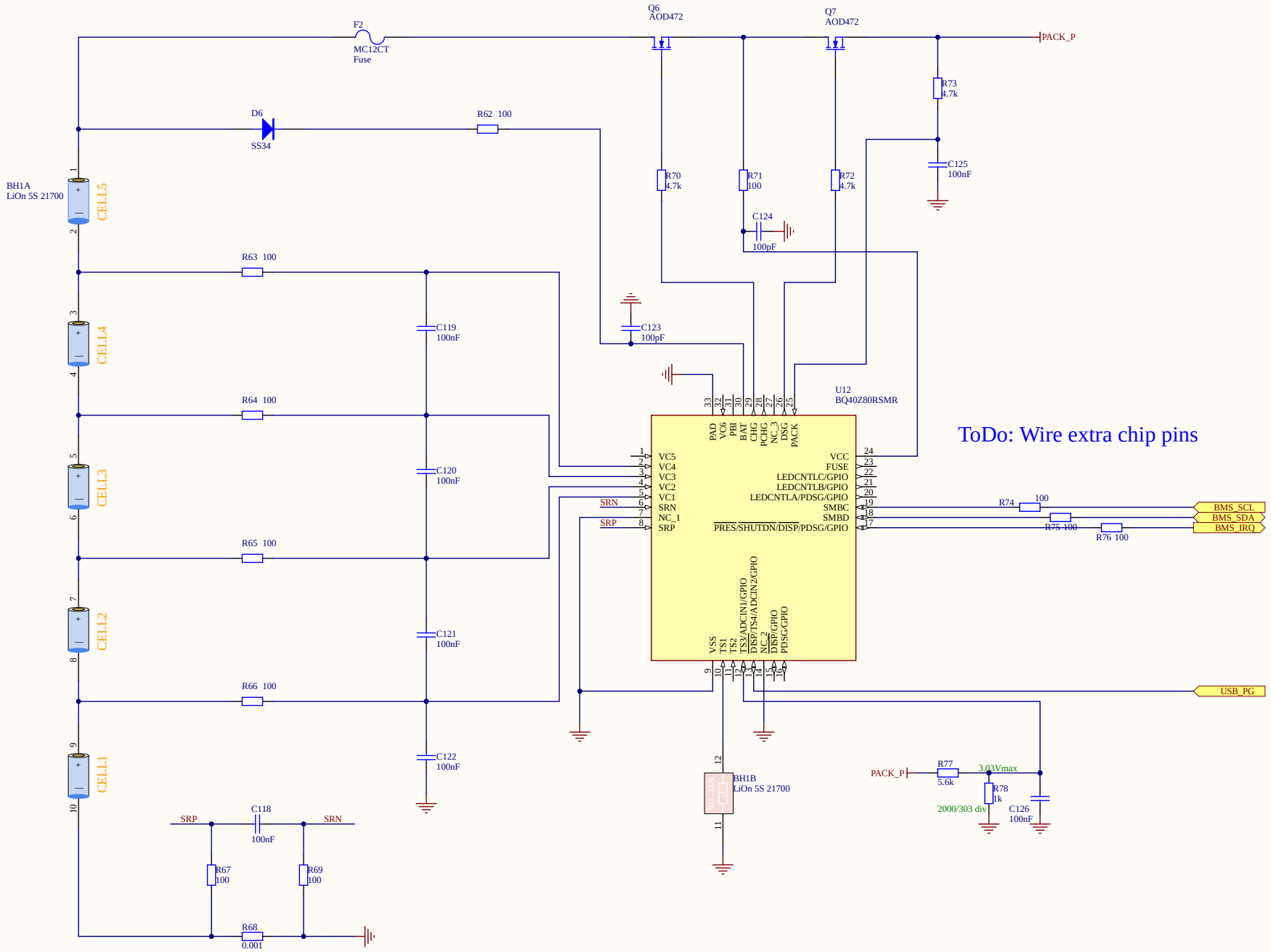

mcHF Pro Transceiver RF board	Battery Management System	*Krassi Atanassov MØNKA*
Date: 08/07/2024	Revision: 0.8.2	Sheet 14 of 14
File: C:\Projects\wip\mcHF\pcb\mchf\rf\schematics\rf_bms.SchDoc		
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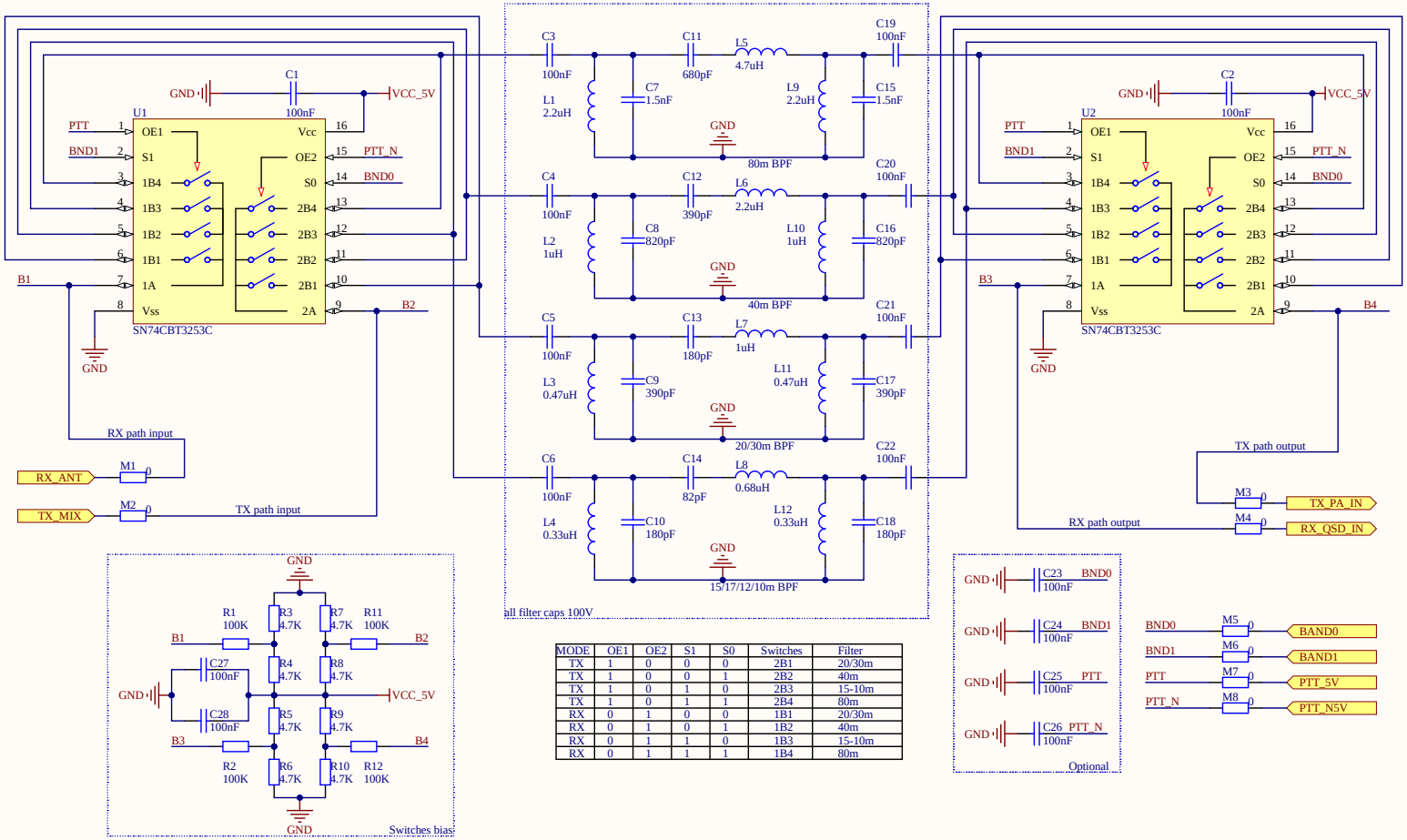

MODE	OE1	OE2	S1	S0	Switches	Filter
TX	1	0	0	0	2B1	20/30m
TX	1	0	0	1	2B2	40m
TX	1	0	1	0	2B3	15-10m
TX	1	0	1	1	2B4	80m
RX	0	1	0	0	1B1	20/30m
RX	0	1	0	1	1B2	40m
RX	0	1	1	0	1B3	15-10m
RX	0	1	1	1	1B4	80m

mcHF Pro Transceiver RF board		Bandpass filters	*Krassi Atanassov MØNKA*
Date: 08/07/2024	Revision: 0.8.2	Sheet 2 of 14	
File: C:\Projects\wip\mcHF\pcb\mchf\rf\schematics\rf_bpf.SchDoc			
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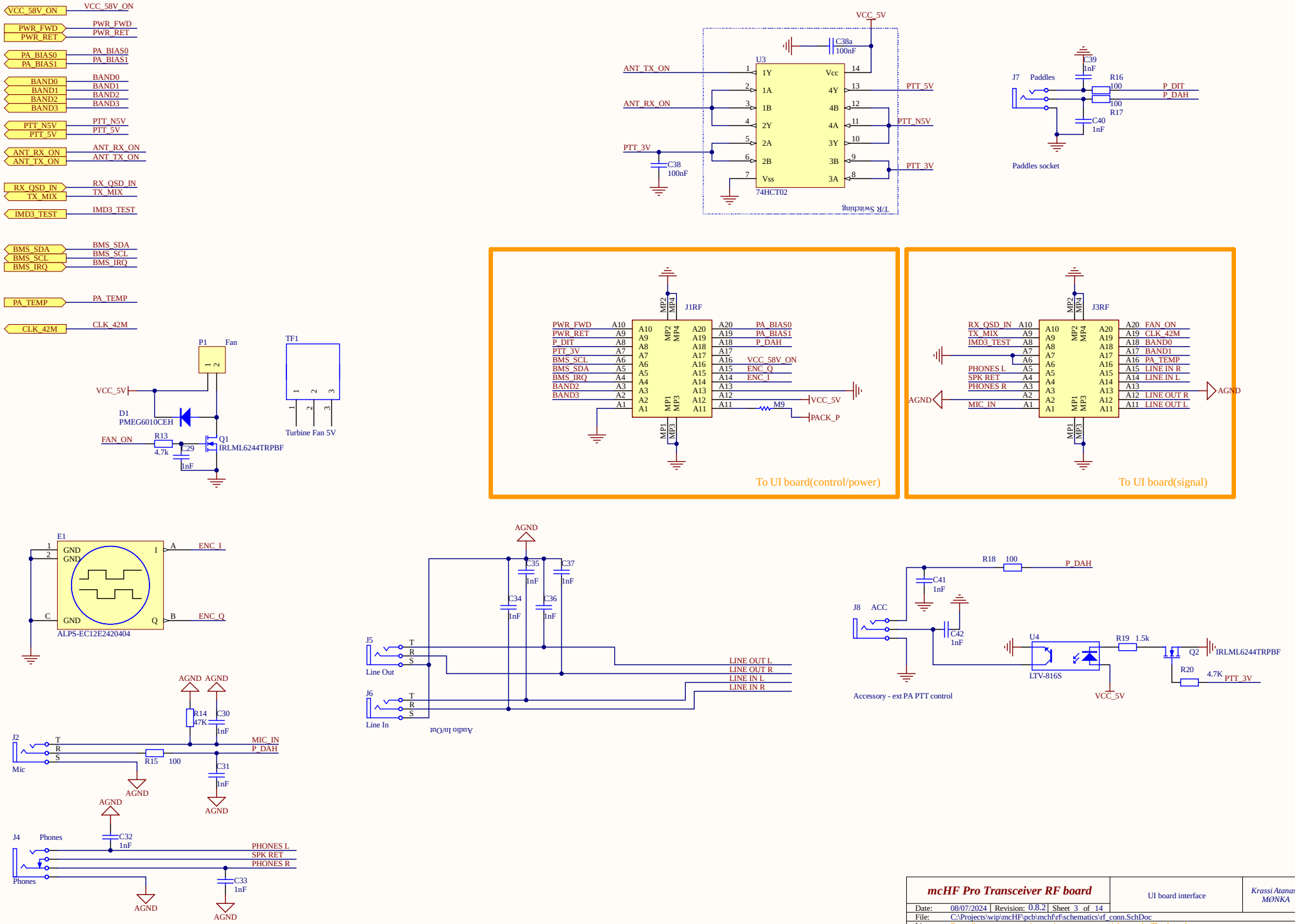

mcHF Pro Transceiver RF board	UI board interface	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 3 of 14		
File: C:\Projects\wip\mcHF\pcb\mchf\rf\schematics\rf_conn.SchDoc		
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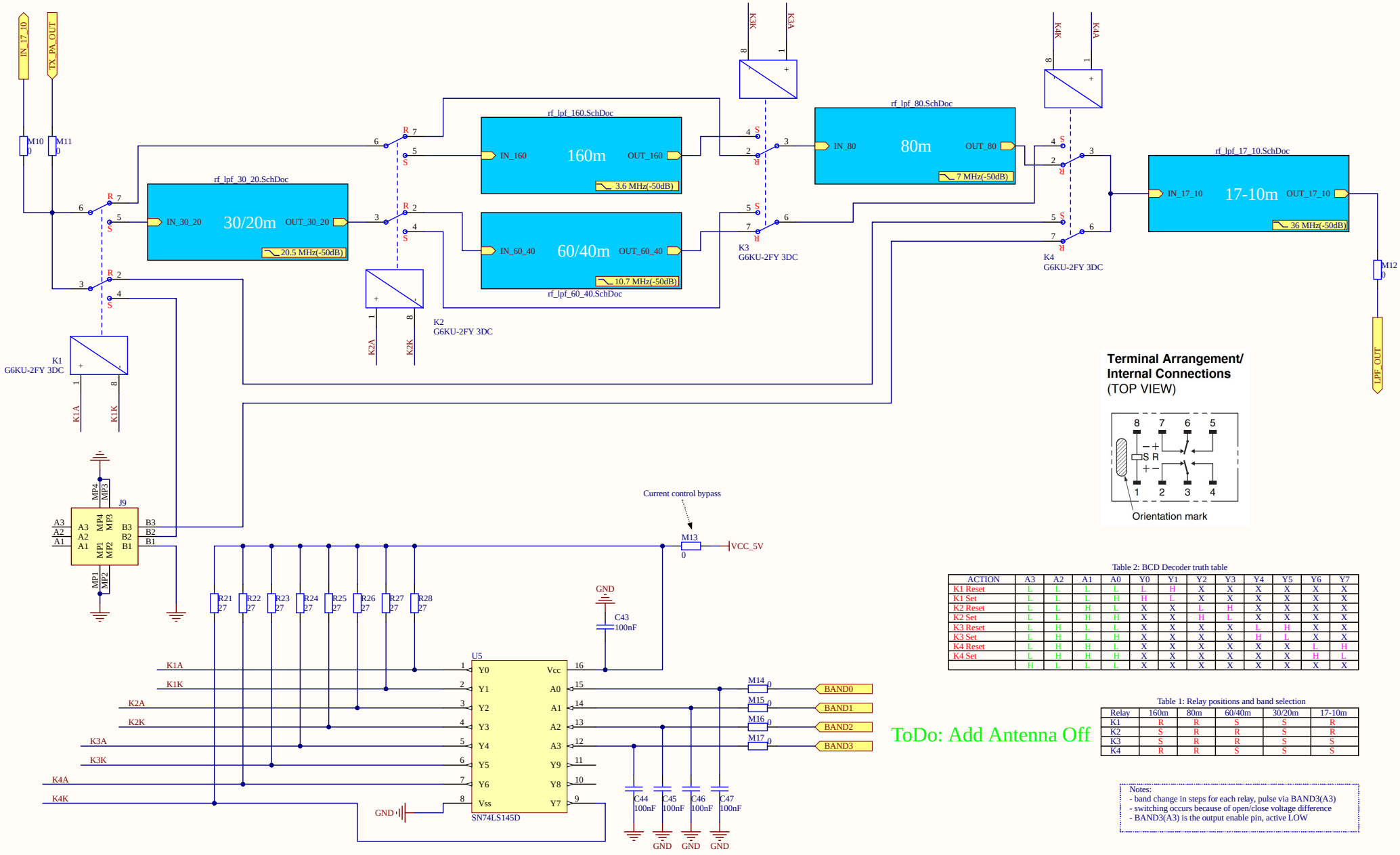

ToDo: Add Antenna Off

Table 2: BCD Decoder truth table

ACTION	A3	A2	A1	A0	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
K1 Reset	L	L	L	L	L	H	X	X	X	X	X	X
K1 Set	L	L	L	H	H	L	X	X	X	X	X	X
K2 Reset	L	L	H	L	X	X	L	H	X	X	X	X
K2 Set	L	L	H	H	X	X	H	L	X	X	X	X
K3 Reset	L	H	L	L	X	X	X	X	L	H	X	X
K3 Set	L	H	L	H	X	X	X	X	H	L	X	X
K4 Reset	L	H	H	L	X	X	X	X	X	X	L	H
K4 Set	L	H	H	H	X	X	X	X	X	X	H	L
	H	L	L	L	X	X	X	X	X	X	X	X

Table 1: Relay positions and band selection

Relay	160m	80m	60/40m	30/20m	17-10m
K1	R	R	S	S	R
K2	S	R	R	S	R
K3	S	R	R	S	S
K4	R	R	S	S	S

Notes:
- band change in steps for each relay, pulse via BAND3(A3)
- switching occurs because of open/close voltage difference
- BAND3(A3) is the output enable pin, active LOW

mcHF Pro Transceiver RF board		Lowpass filters	*Krassi Atanassov MØNKA*
Date: 08/07/2024	Revision: 0.8.2	Sheet 4 of 14	
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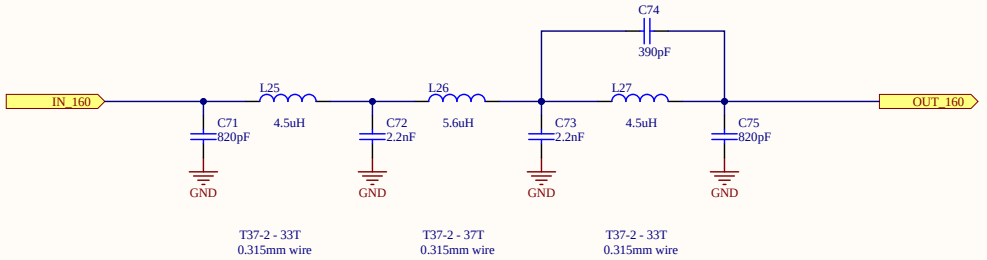
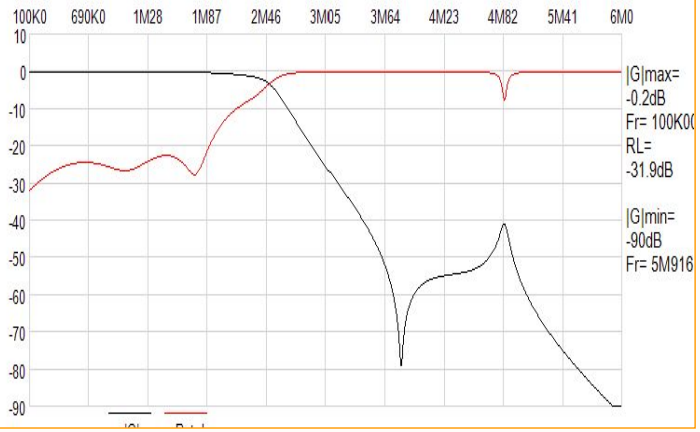
NOTE: Real Life Performance dips are bit off in Graphic2 due to tolerances of caps installed at the factory and turns spacing of inductors not achieving ideal inductance. If you need to meet strict regulation requirements, like second harmonic -50 dB below fundamental, then care should be taken when winding inductors and maybe caps replaced with very high tolerance ones.



Graphic1: Cascaded with 80 and 17/10 filters (design)



Graphic2: IRL performance (R26,R27, C104 removed)

Graphic3: Filter standalone (design)

LPF 0.8 re-design, special thanks to:
Paolo IZ6MAF & Wayne NB6M & MM0GYX

mcHF Pro Transceiver RF board	LPF 160m	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 6 of 14		
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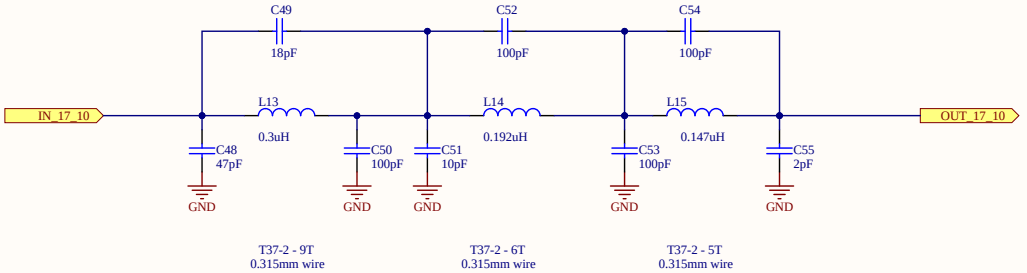
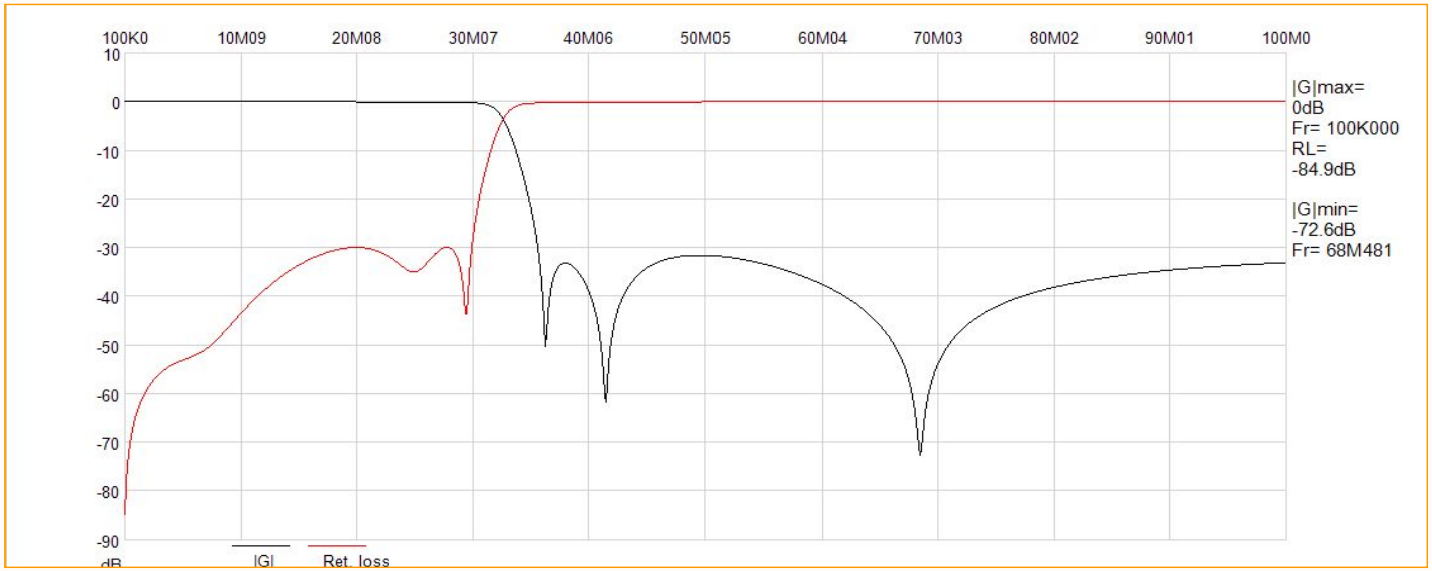
Graphic1: IRL performance (R26,R27, C104 removed)



NOTE: Real Life Performance dips are bit off in Graphic1 due to tolerances of caps installed at the factory and turns spacing of inductors not achieving ideal inductance. If you need to meet strict regulation requirements, like second harmonic -50 dB below fundamental, then care should be taken when winding inductors and maybe caps replaced with very high tolerance ones.

Graphic2: Filter standalone (design)



LPF 0.8 re-design, special thanks to:
Paolo IZ6MAF & Wayne NB6M & MM0GYX

mcHF Pro Transceiver RF board	LPF 17-10m	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 5 of 14		
File: C:\Projects\wip\mcHF\pcb\mchf\rf\schematics\rf_lpf_17_10.SchDoc		
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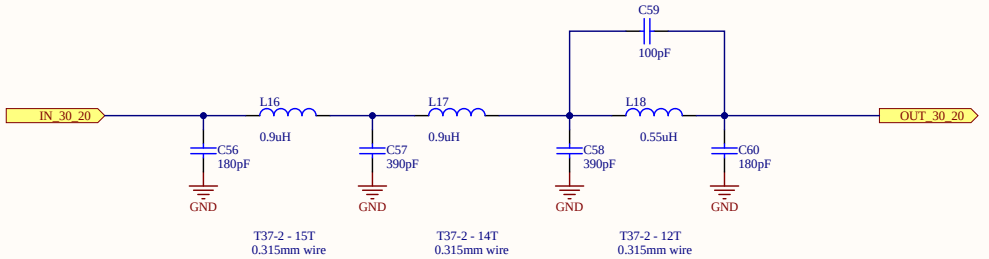
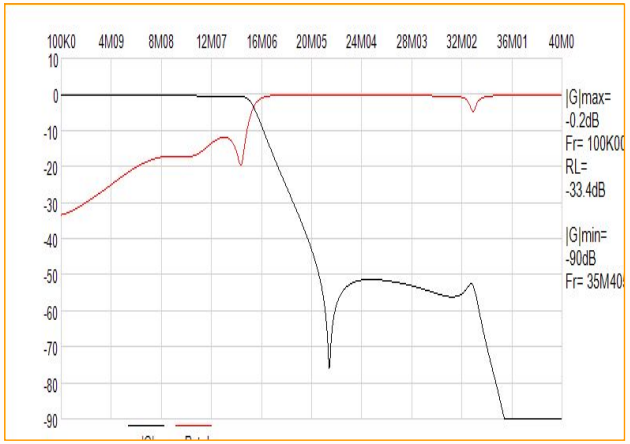
NOTE: Real Life Performance dips are bit off in Graphic2 due to tolerances of caps installed at the factory and turns spacing of inductors not achieving ideal inductance. If you need to meet strict regulation requirements, like second harmonic -50 dB below fundamental, then care should be taken when winding inductors and maybe caps replaced with very high tolerance ones.

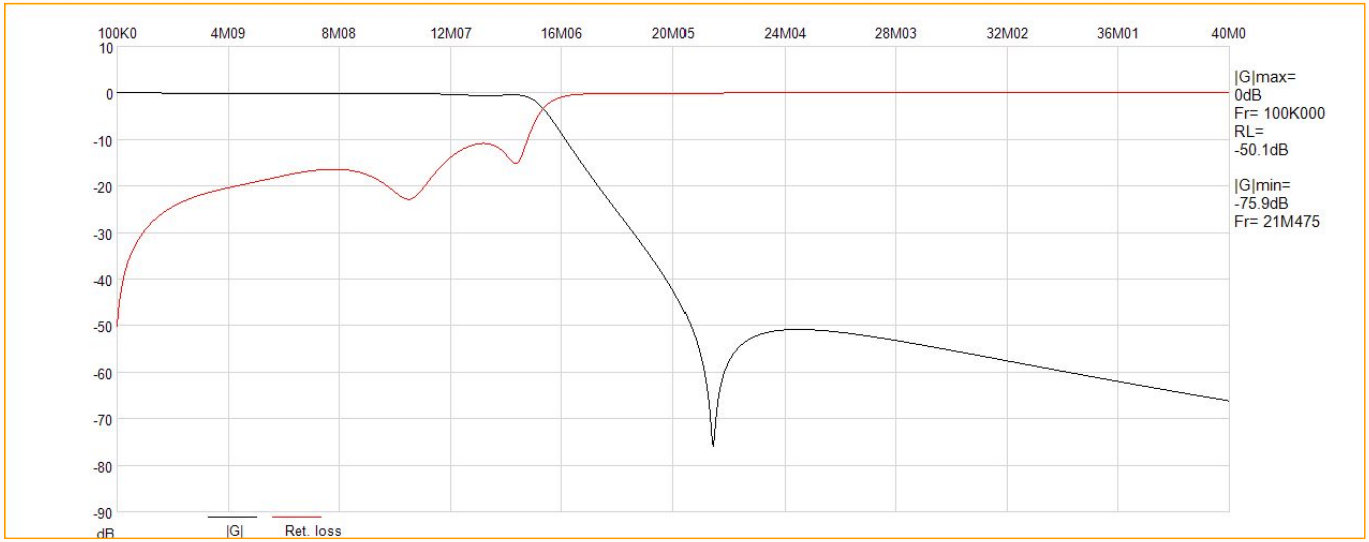


Graphic1: Cascaded with 17/10 filter (design)



Graphic2: IRL performance (R26,R27, C104 removed)

Graphic3: Filter standalone (design)



LPF 0.8 re-design, special thanks to:
Paolo IZ6MAF & Wayne NB6M & MM0GYX

mcHF Pro Transceiver RF board	LPF 30/20m	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 9 of 14		
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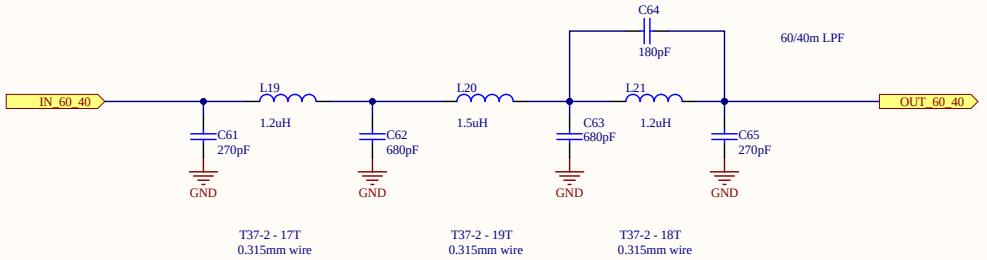
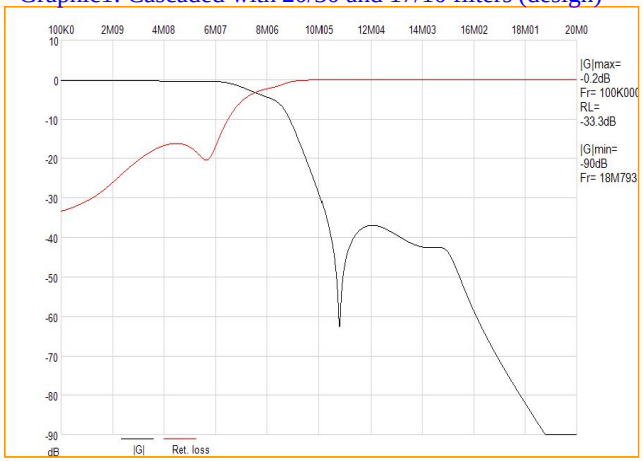
NOTE: Real Life Performance dips are bit off in Graphic2 due to tolerances of caps installed at the factory and turns spacing of inductors not achieving ideal inductance. If you need to meet strict regulation requirements, like second harmonic -50 dB below fundamental, then care should be taken when winding inductors and maybe caps replaced with very high tolerance ones.

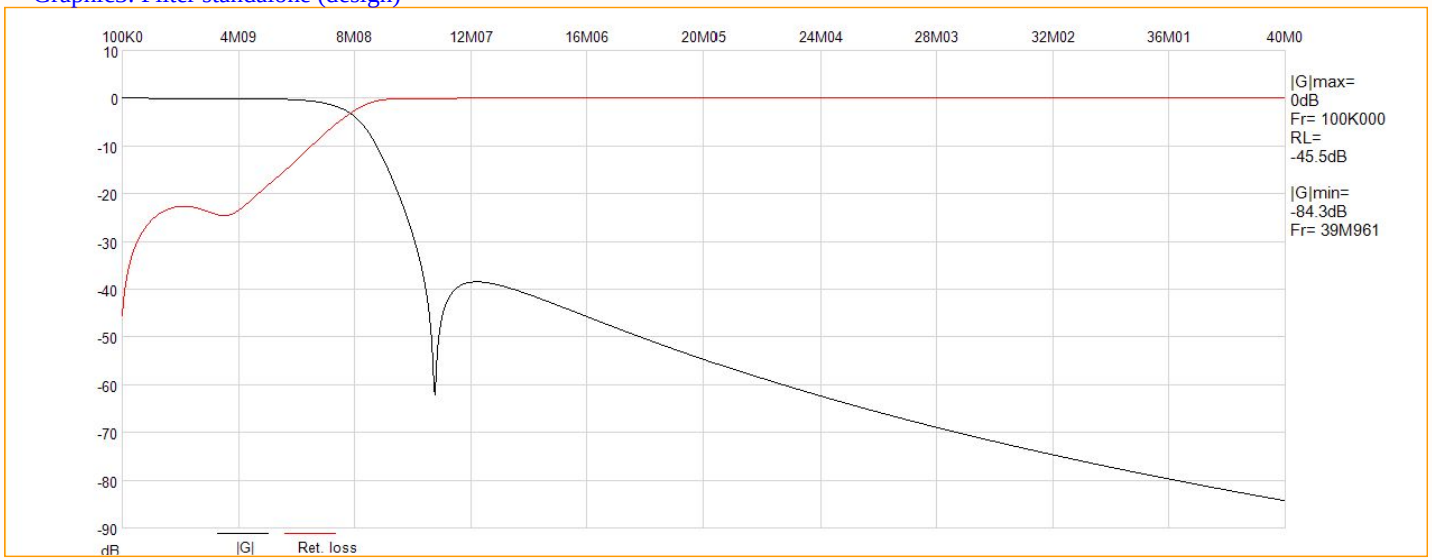


Graphic1: Cascaded with 20/30 and 17/10 filters (design)



Graphic2: IRL performance (R26,R27, C104 removed)

Graphic3: Filter standalone (design)



LPF 0.8 re-design, special thanks to:
Paolo IZ6MAF & Wayne NB6M & MM0GYX

mcHF Pro Transceiver RF board	LPF 60/40m	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 7 of 14		
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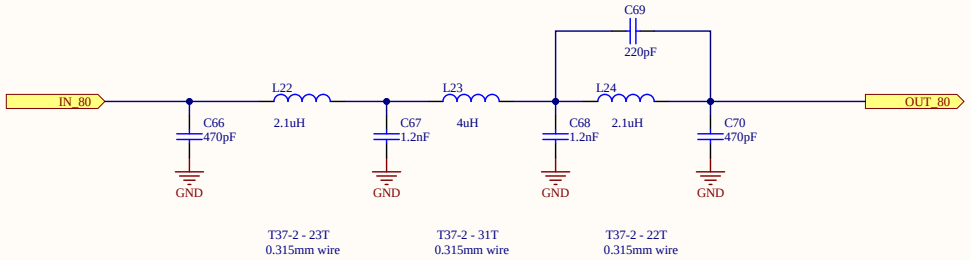
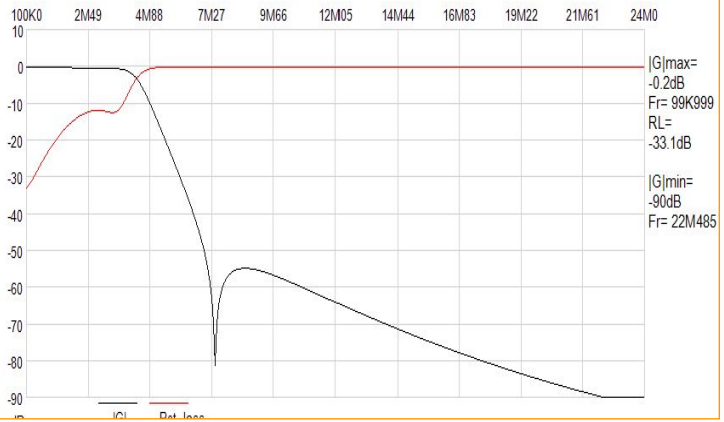
NOTE: Real Life Performance dips are bit off in Graphic2 due to tolerances of caps installed at the factory and turns spacing of inductors not achieving ideal inductance. If you need to meet strict regulation requirements, like second harmonic -50 dB below fundamental, then care should be taken when winding inductors and maybe caps replaced with very high tolerance ones.



Graphic1: Cascaded with 17/10 filter (design)



Graphic2: IRL performance (R26,R27, C104 removed)

Graphic3: Filter standalone (design)

LPF 0.8 re-design, special thanks to:
Paolo IZ6MAF & Wayne NB6M & MM0GYX

mcHF Pro Transceiver RF board	LPF 80m	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 8 of 14		
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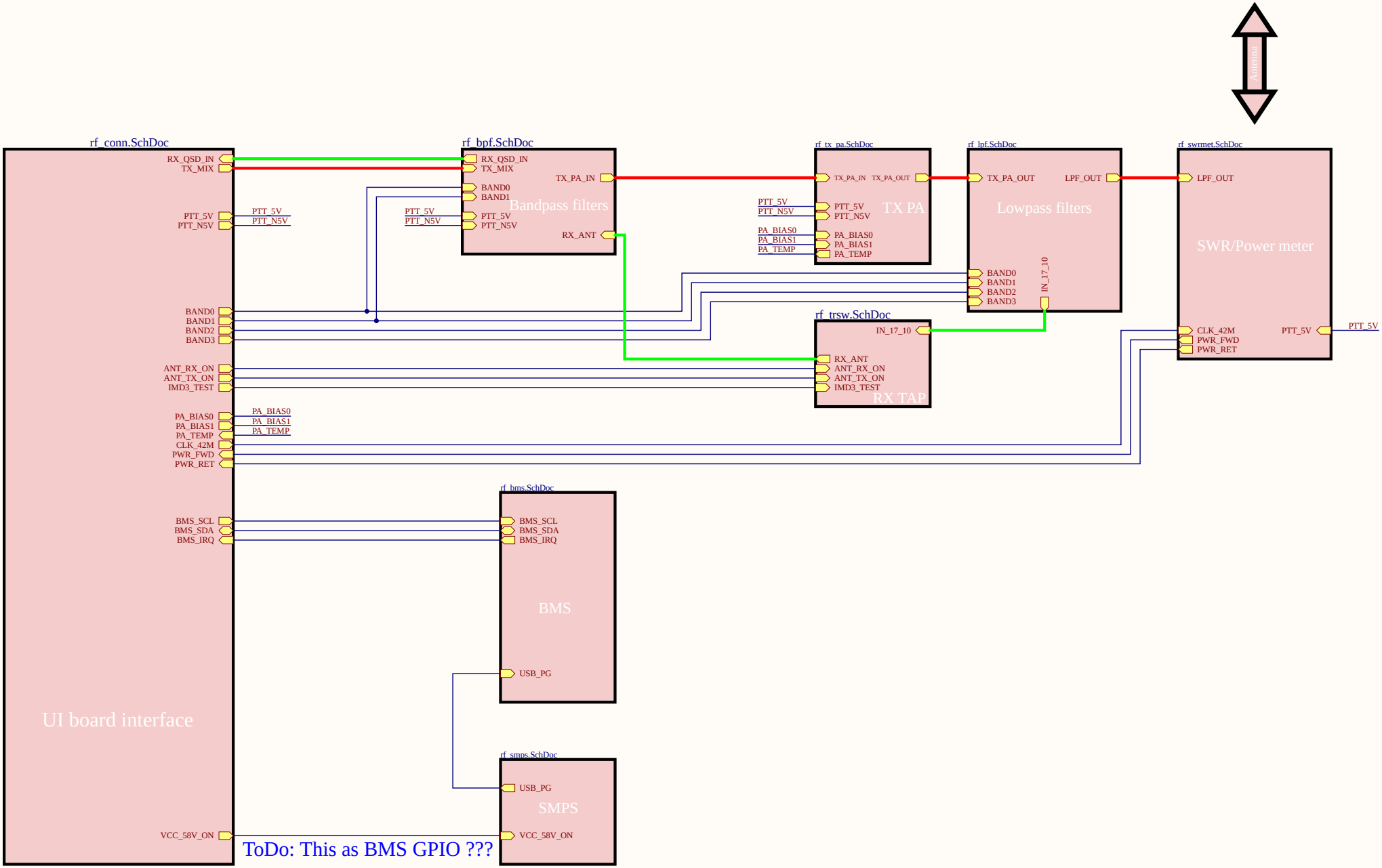

mcHF Pro Transceiver RF board	Block diagram	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 1 of 14		
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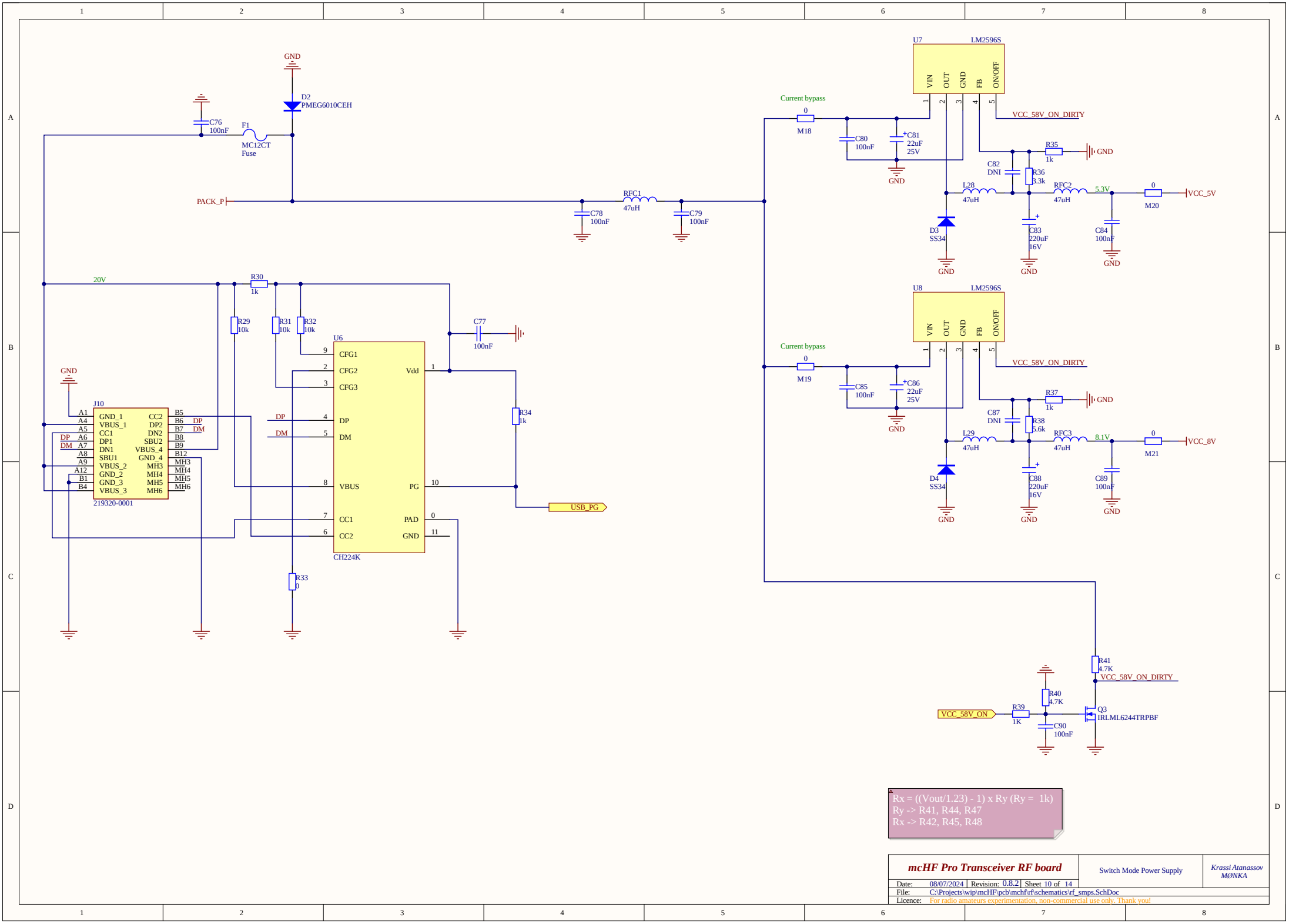

mcHF Pro Transceiver RF board		Switch Mode Power Supply	*Krassi Atanassov MØNKA*
Date: 08/07/2024	Revision: 0.8.2	Sheet 10 of 14	
File: C:\Projects\wip\mcHF\pcb\mchf\rf\schematics\rf_smps.SchDoc			
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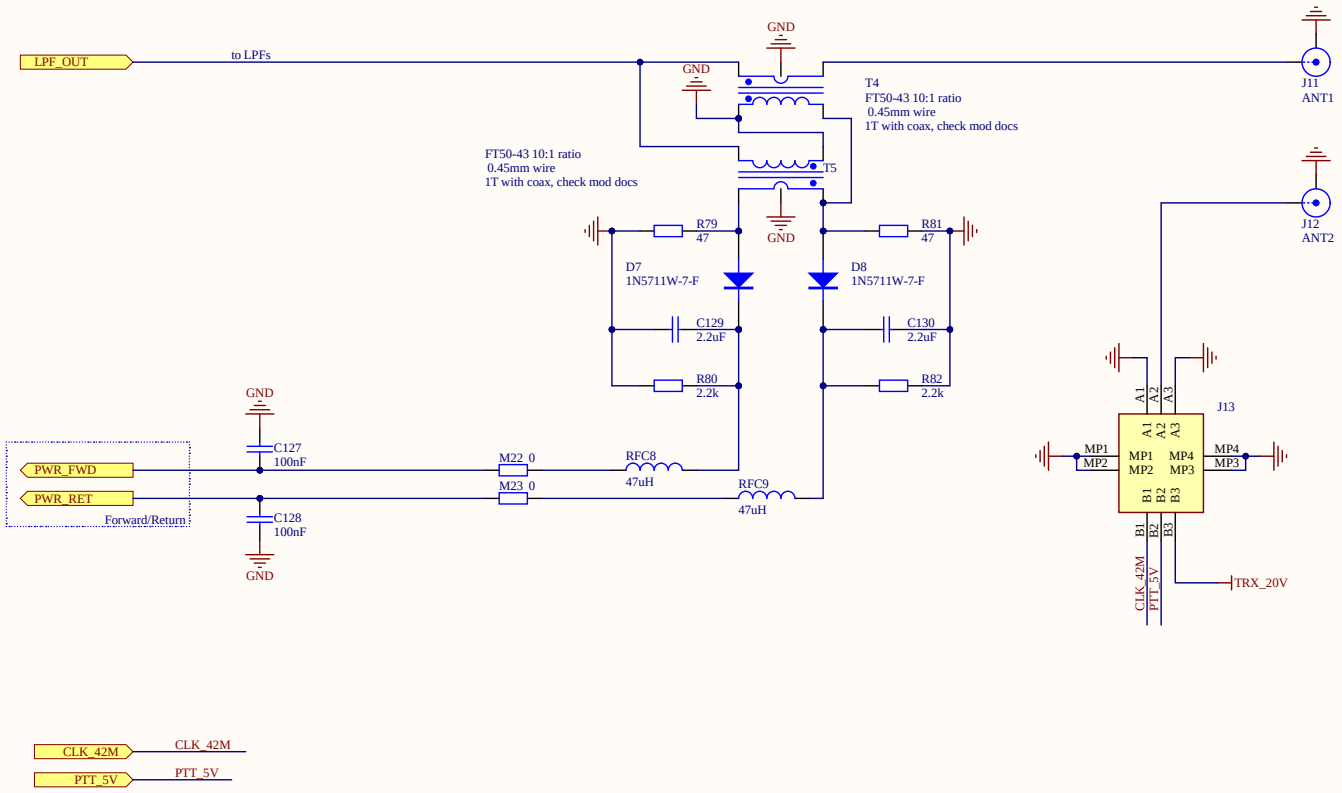

mcHF Pro Transceiver RF board	SWR/PWR Meter	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 11 of 14		
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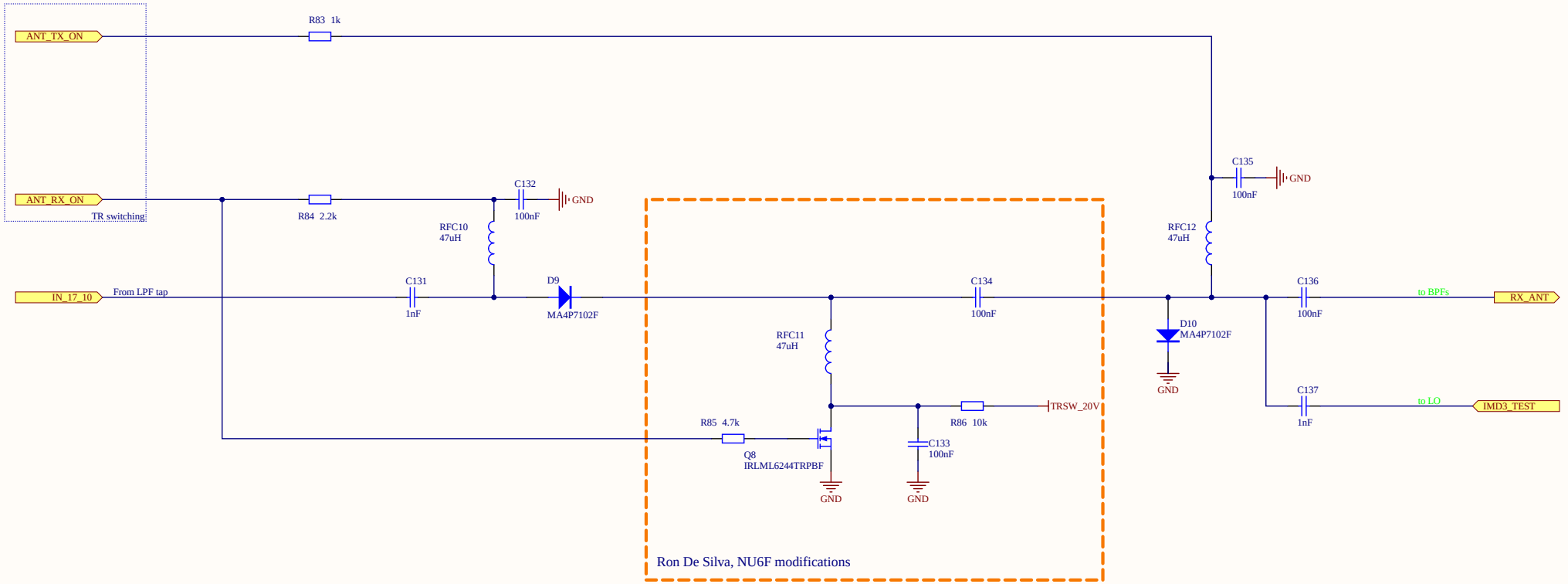

Minor changes in the original PIN diode ANT switching scheme can give very clean results for both transmit and recieve.
Step one is to remove the DC connection between D3 cathode and D4 anode and instal the 100 nf cap(C79a).
This greatly simplifies biasing each device independently.

RX mode:

Now we can set forward bias of D3 to 2 milliamps with a value of 2200 ohms .This puts D3 at less than 3 ohms resistance to our receive signal.

At the same time,now D4, the receiver shunt protection diode is totally unbiased and you will see no receive signal loss .

TX mode:

D4 is now forward biased at over 3 milliamps and is shorting out any leaked transmitter signal with 2.0 ohms to ground,protecting the bandpass filter and receiver input. And D3 still has its anode at dc ground through RFC2 and ANT RX ON being in its low state.

But at the cathode of D3,we now have 12 -14 volts of reverse bias from the 2n3904 DC switch.The only current that will flow here is the tiny leakage current of the PIN diode in the order of microamps.

Tests showed that anything over 7 volts was enough to keep D3 from occasionally conducting and noising up the rf signal at power of 7 watts or more.

By keeping D3 well into its RF OPEN condition in transmit,we were able to increase the value of C78 to 100nf ,which greatly reduced series loss of the receive signal at 7mhz and below.

If continued operation at over 10 watts is being done...replacing D3 and D4 with the MAP7104-1072 diodes is suggested.

Ron De Silva, NU6F

mcHF Pro Transceiver RF board	RX Antenna Switching	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 12 of 14		
File: C:\Projects\wip\mcHF\pcb\mchf\rf\schematics\rf_trsw.SchDoc		
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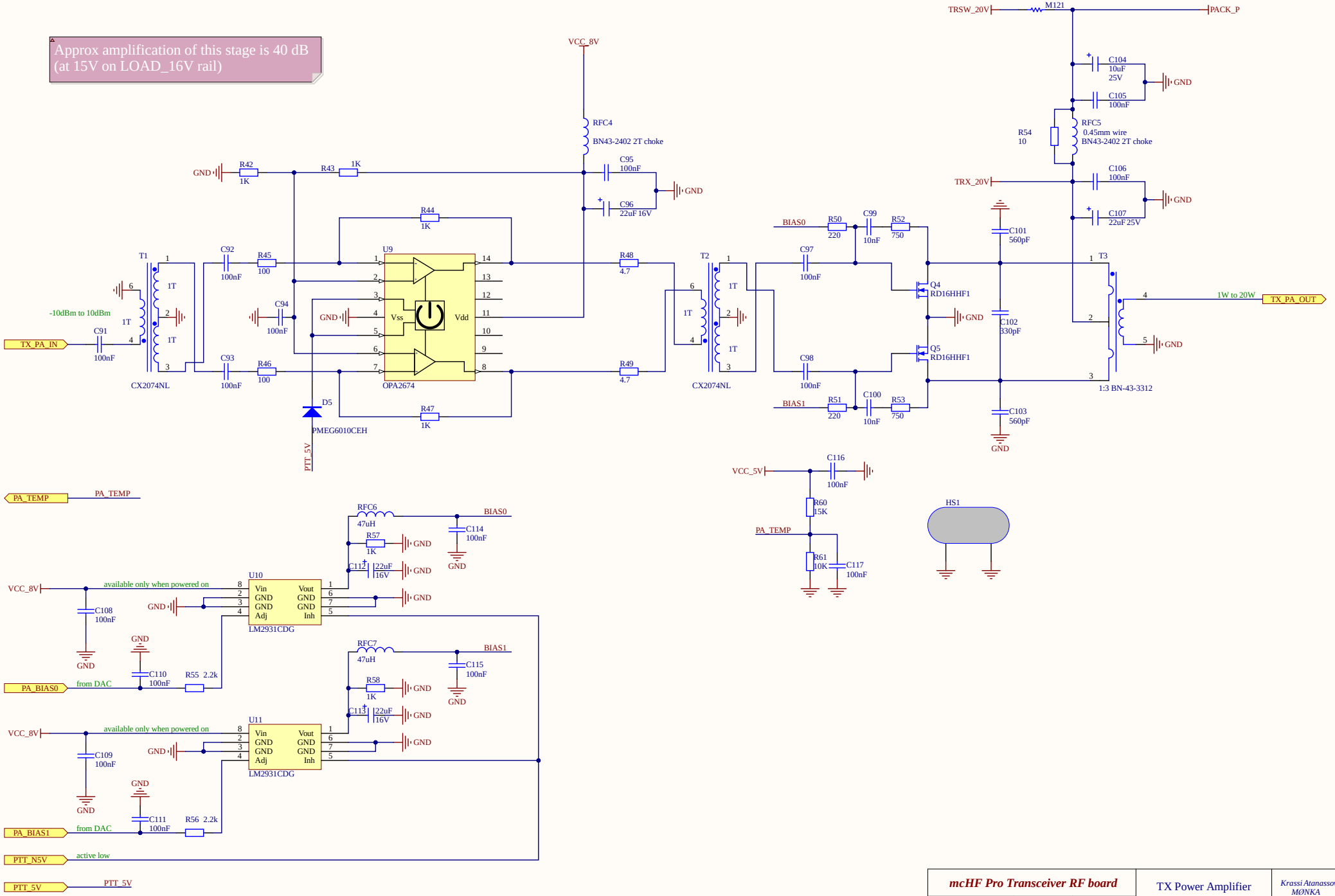
Approx amplification of this stage is 40 dB
(at 15V on LOAD_16V rail)



mcHF Pro Transceiver RF board	TX Power Amplifier	*Krassi Atanassov MØNKA*
Date: 08/07/2024 | Revision: 0.8.2 | Sheet 13 of 14		
File: C:\Projects\wip\mcHF\pcb\mchf\rf\schematics\rf_tx_pa.SchDoc		
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