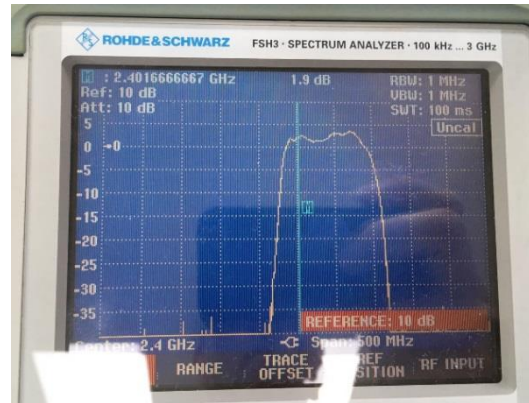


QO100 - 20W power amplifier assembly.

This document describes the assembly of the 20W amplifier kit as designed by Rens PA3AXA. The assembly of this kit requires from the builder some soldering skills, good eyesight and a stable hand. From the tool side you need a 50W Weller soldering station with small tip, thin solder wire, tweezers, magnifiers and a smd heat gun. The flow soldering of the final stage with pcb and heat spreader is already done.

This Amplifier is designed to use with an bare mixer to make SSB on QO100. Filtering inside the amplifier is good enough to use as low as 28MHz IF.

If you use a Pluto as a driver be sure the output of the Pluto is adjusted at -7dBm or use a attenuator to get it there.



Amplifier specifications:

- Output power, > 43dBm
- Gain, 50dB
- Supply voltage 12V (ptt and driver), 26V (final stage)
- Dimensions. lxbxh 110 x 36 x 30 mm
- Frequency 2400-2500 MHz

Schematic diagram and pcb layout are attached to this document.

Identify the parts

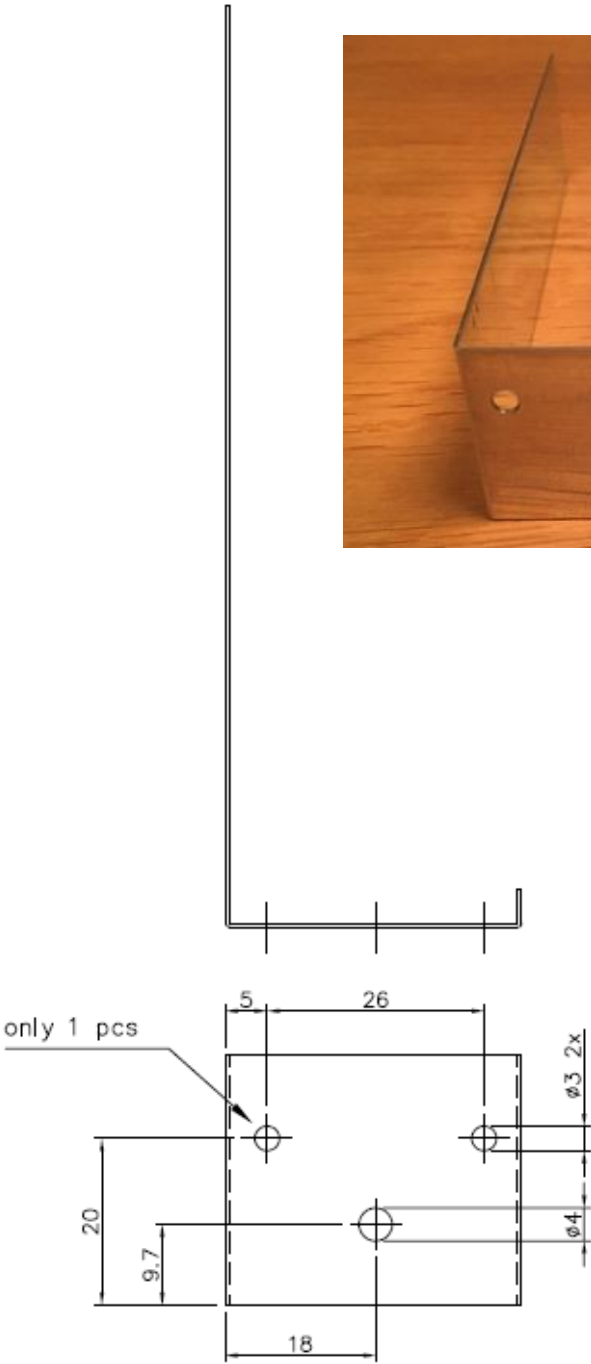
Be sure you have all parts identified using the table below.

Item	In Diagram	Value	QTY	How to identify
1	C10,5,6,7,8	56p	5	Orange 5pcs
2	C1,3,28,22,9,15,12	15N	7	Blue 7pcs
3	C29	100N	1	Orange 1pcs
4	C2,4,21,19,16,13,24,17	1N	8	Orange 8pcs (7 + 1)
5	C11	3p3 atc	1	In clear tape 1pcs
6	C25,26,27	1N	3	Feed trough capacitor
7	R7	50R	1	Green 1pcs
8	R1,8,2,9	20R	4	Green 4pcs
9	R4,3	1K	2	Green 2pcs
10	R5,6	5K	2	Trimmer
11	U1,2	SBB3089Z	2	Unpacked in zipper bag
12	U4	78M05	1	In clear tape 1pcs Regulator
13	FL1,2	SF2124E	2	In clear tape 2pcs
14	D1	BAT15	1	In clear tape 1pcs
15	SMA female		2	
16	Enclosure	110x35x30	1	
17	PCB assy		1	pcb with module and heat spreader

Mechanical work upfront

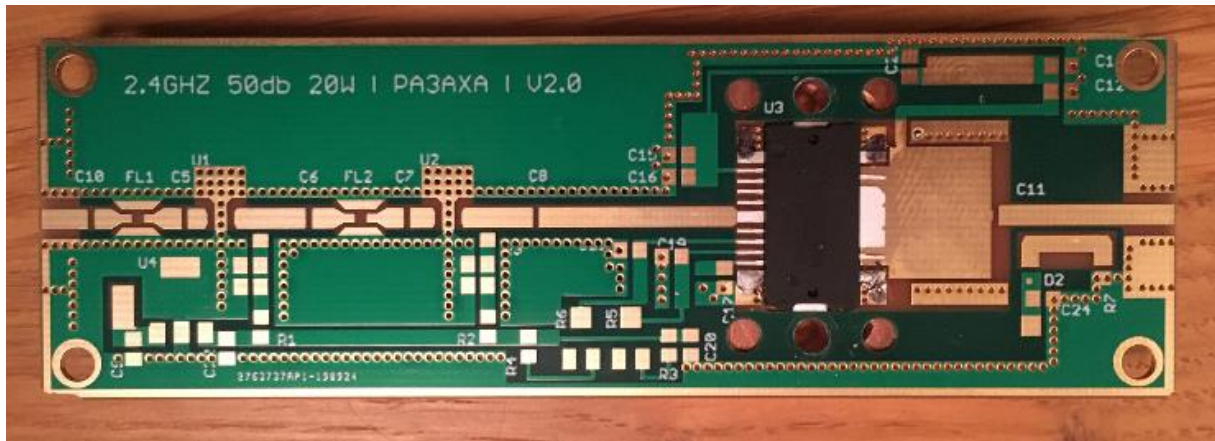
- Drill the enclosure sides following the drawing left:

One side wall has two 3mm holes.



- Mating the pcb to the enclosure side with a file.

Note the right upper and left lower corner of the pcb. All 4 corners have a 0.5mm chamfer to fit the corners of the enclosure sides.

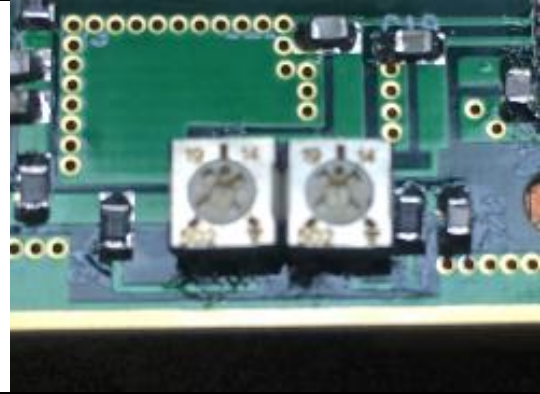


- Drill the tapped M3 holes to 3mm.
- Cutting the Teflon of the SMA connectors to have them flush with the enclosure inside.

The soldering starts

<p>First parts we solder are the 2 filters, FL1 and FL2. These are the most difficult parts to solder. Apply some solder on the pcb traces as on the photo. Use a fine tip and thin solder wire. If you apply to much remove it with suck wick.</p>	
<p>Solder the filters using a smd heat gun. Keep the filters in place with a tweezer. Look at the bottom side of the filters to place them in the good orientation. 3 traces on input side and output side. Filters can be placed in 2 orientations, both working fine.</p>	
<p>Solder all capacitors with the soldering iron. Due to the heat spreader the capacitors close to the power module need some more heat to solder. From experience the Weller 50W will work. If you have problems soldering, heat up the heat spreader to 60°C. See the result on the right.</p>	
<p>Solder all resistors with the soldering iron. No problems expected here. See the result on the right.</p>	

Solder both 5k trimmers.



Solder all other parts, regulator, diode and mmic's. Now the amplifier is ready to place in the enclosure.



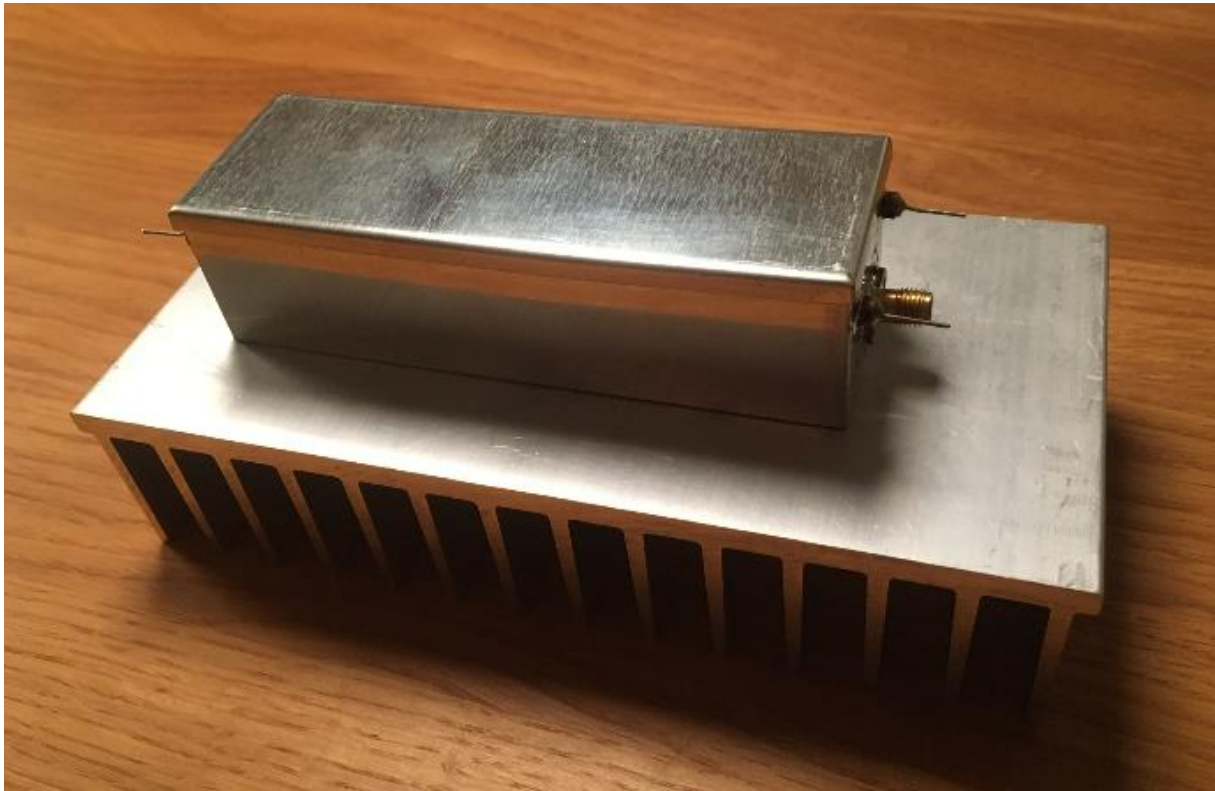
Place the heats spreader and pcb on a flat surface. The sides of the enclosure will fit the pcb (the side with the 3 holes on the output side!) . Solder first left and right next to the input and output trace. (see photo below). Make a few more soldering spots to keep the enclosure sides in its shape. It is not necessary to solder it all around.



Cut the centre-pin of the connectors to 3mm with a wire cutter. Place the connector in position flat against the enclosure side. Solder the centre-pin to the pcb trace. The connector is now hold in position. Turn it straight and solder the outside from the connector to the enclosure side. This can take some time to heat all up. The last parts are the feed trough capacitors. These also need some heat to solder. Connect them to the spots on the pcb with a piece of wire. Now you are finished and it should look like the photo below.



Start up and testing.

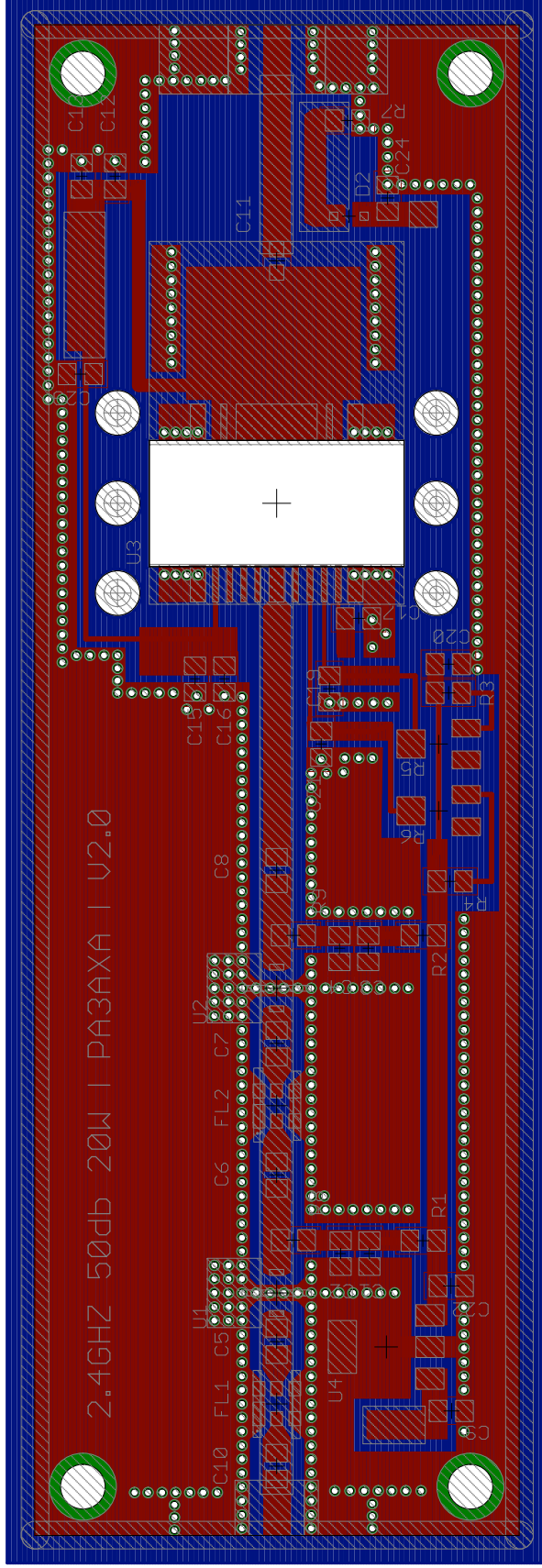


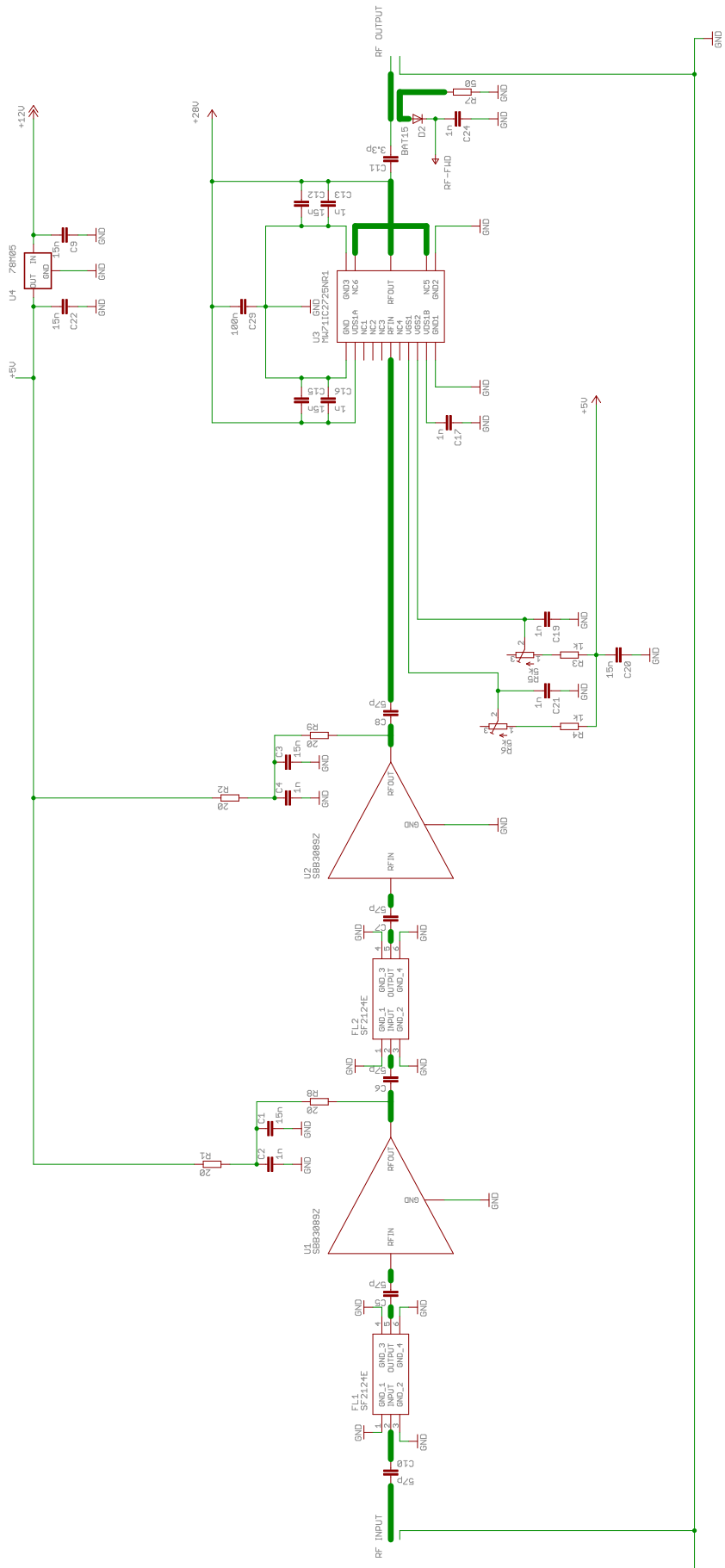
- Mount the amplifier on a decent heatsink. For start use only 2 screws trough the heat spreader. Take screws with small heads to prevent damage to the final module. **Also one screw need an isolation ring to prevent a short circuit with a pcb trace.**
- Connect the input to a signal source, set it to -10dBm (10dB attenuator behind the Pluto). For now leave it off. (no drive)
- Connect the output with the power meter capable of measuring 20W at 2400MHz
- Use 2 power sources, 12V (300mA) and 24 – 30V (2A).
- Set the 5K trimmers in the middle position.
- Connect the 24V to the feed trough capacitor supplying the final module, integrate an Amp meter in the line.
- Connect the 12 V to the feed trough capacitor supplying the mmic's an bias circuit.
- Now the 24V will draw some current 200 – 400 mA.
- Switch on the drive power, You will see about 5 - 10W of output power.
- Optimize the power with the trimmers. (Idle current will rise and gain also)
- You can increase the input power to -7 dBm.
- If you load the monitor output with a 1K5 resistor you measure 3,7V on it at 20W

More info at www.hybridpretender.nl

73 PE1CKK

Stripline FR4/1mm = 1.94mm





2.4GHz 50db 20Ω PA39AXA V2.0	
TITLE: 13CMPA_Mk71C2725N_V2	
Document Number:	REU:
Date: 23-09-19 16:51	Sheet: 1/1