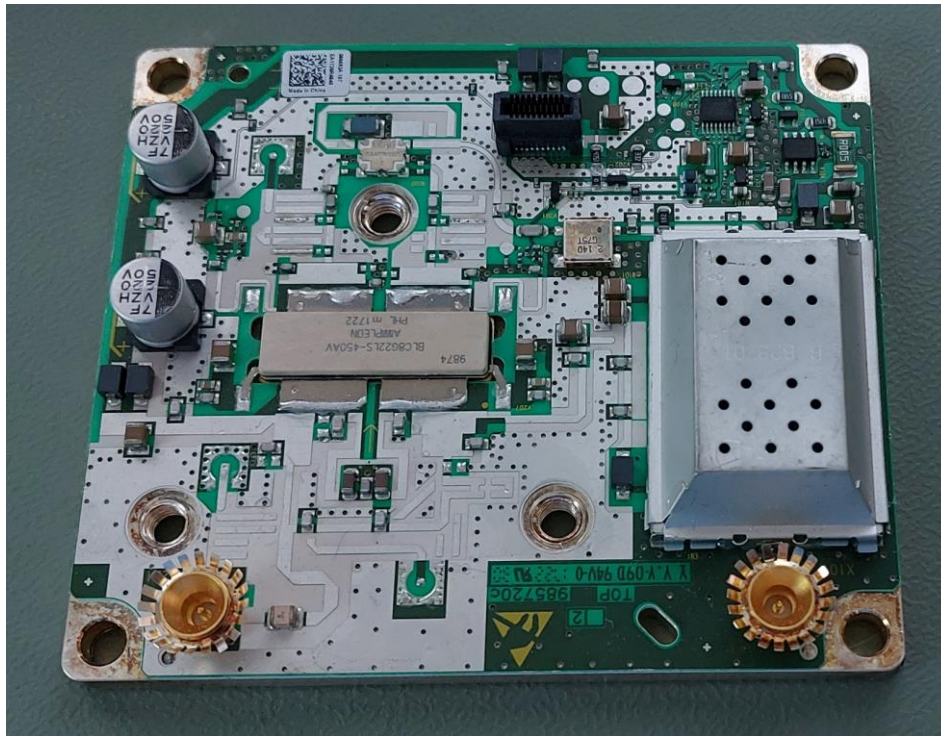


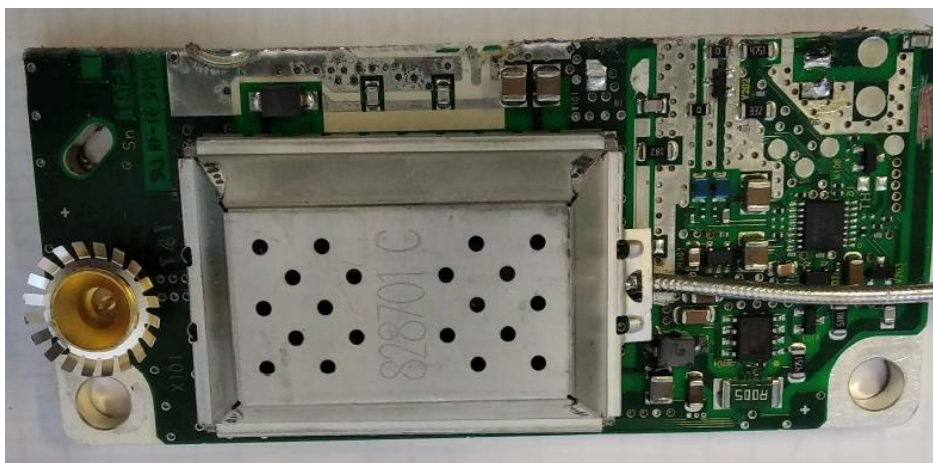
2400MHz Power Amplifier with 40W output power based on MW7IC2240

Matthias DD1US, September 4th 2022 rev 1.0

When optimizing an UMTS pallet for operation at 2.4 GHz I finally burnt the output matching capacitors during an extensive stress test at 130W RF output power.

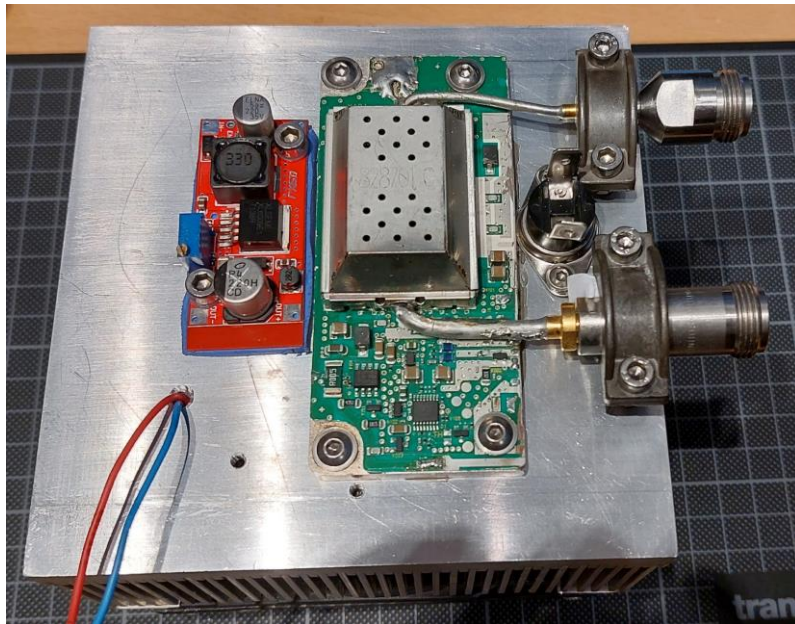


First, I planned to repair the PCB, as the LDMOS transistors themselves seem to be still ok. Then I saw a nice description “Modification the driver stage of SSPA UMTS module to 2320 and 2400 MHz” from Tom SP5XMU and Andrzej SP8XXN and decided to modify the damaged pallet accordingly. Tom and Andrzej were using only the driver stage of the pallet and obtained an output power of 35-42W with an input power of 60mW.

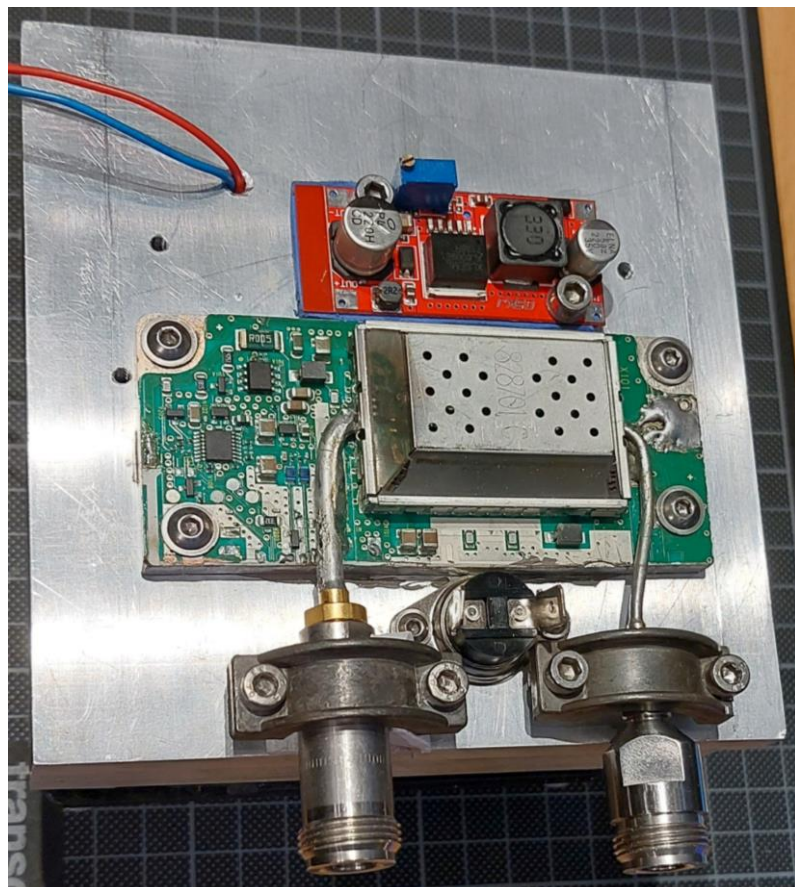


First, I cut off the driver stage from the pallet and then modified the input and output matching circuitry around the driver IC MW7IC2240N according to their excellent description. I will not repeat this modification in my description as I followed exactly their description which you can find here: http://www.sp5xmu.pl/13cm/MW7IC2240N%2035W_new_approach.pdf

Then, I mounted the module on a suitable heatsink. Ignore the DC-DC-Converter which you see on the picture. It was not used and removed later.



I am using a fan with a supply voltage range 12-24V. Normally it is supplied with 13V (by adding a suitable series resistor) which is perfectly fine for lower output levels and as the fan runs with lower speed it is rather quiet. Once the temperature of the heatsink exceeds 50V, the resistor is bridged by a thermo-switch and the fan runs with full speed at 28V supply voltage. You can see the switch between the RF board and the coaxial connectors.



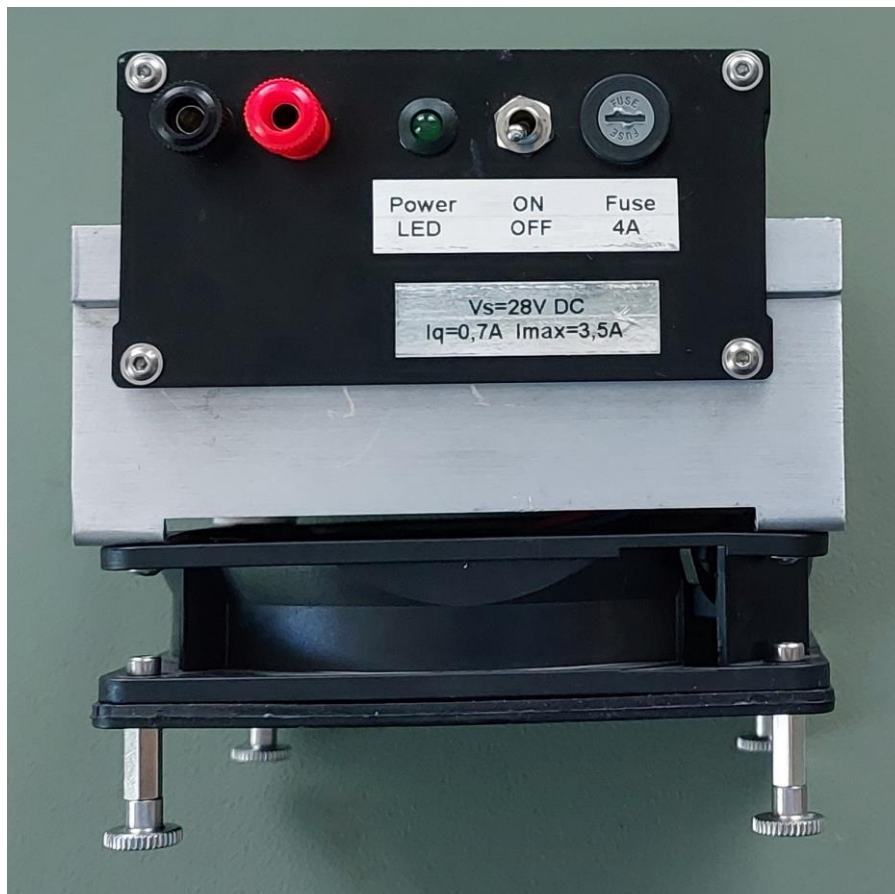
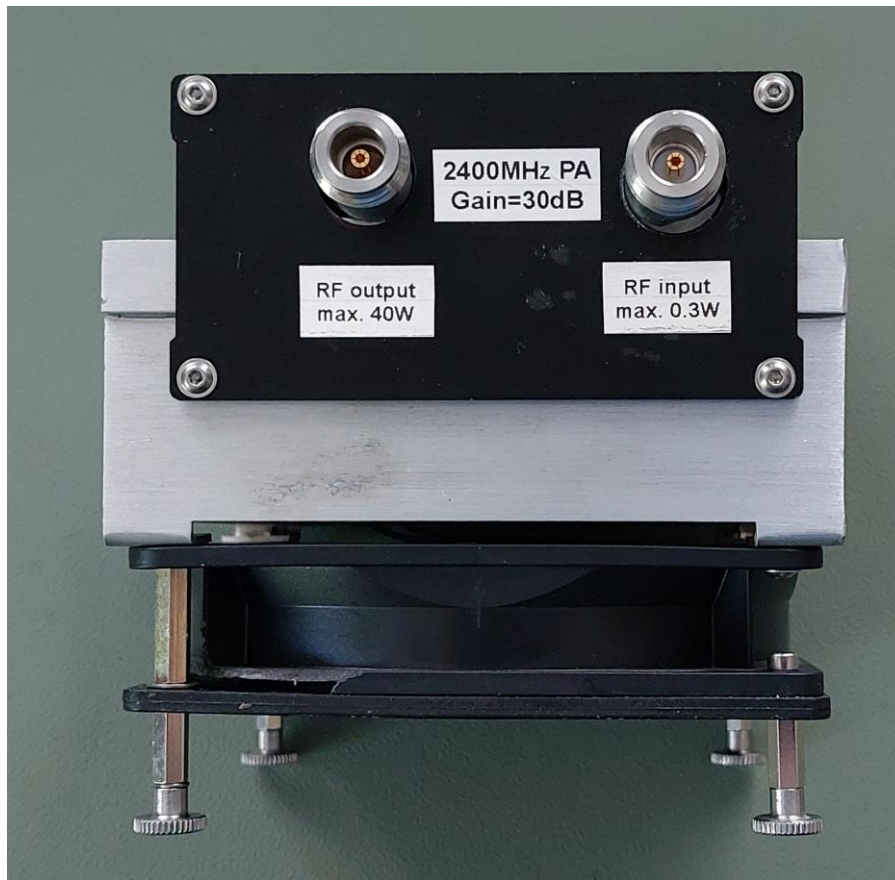
I covered the RF-board with half of a standard aluminium enclosure to protect it and also to add the DC-power connectors, ON/OFF switch and a fuse.



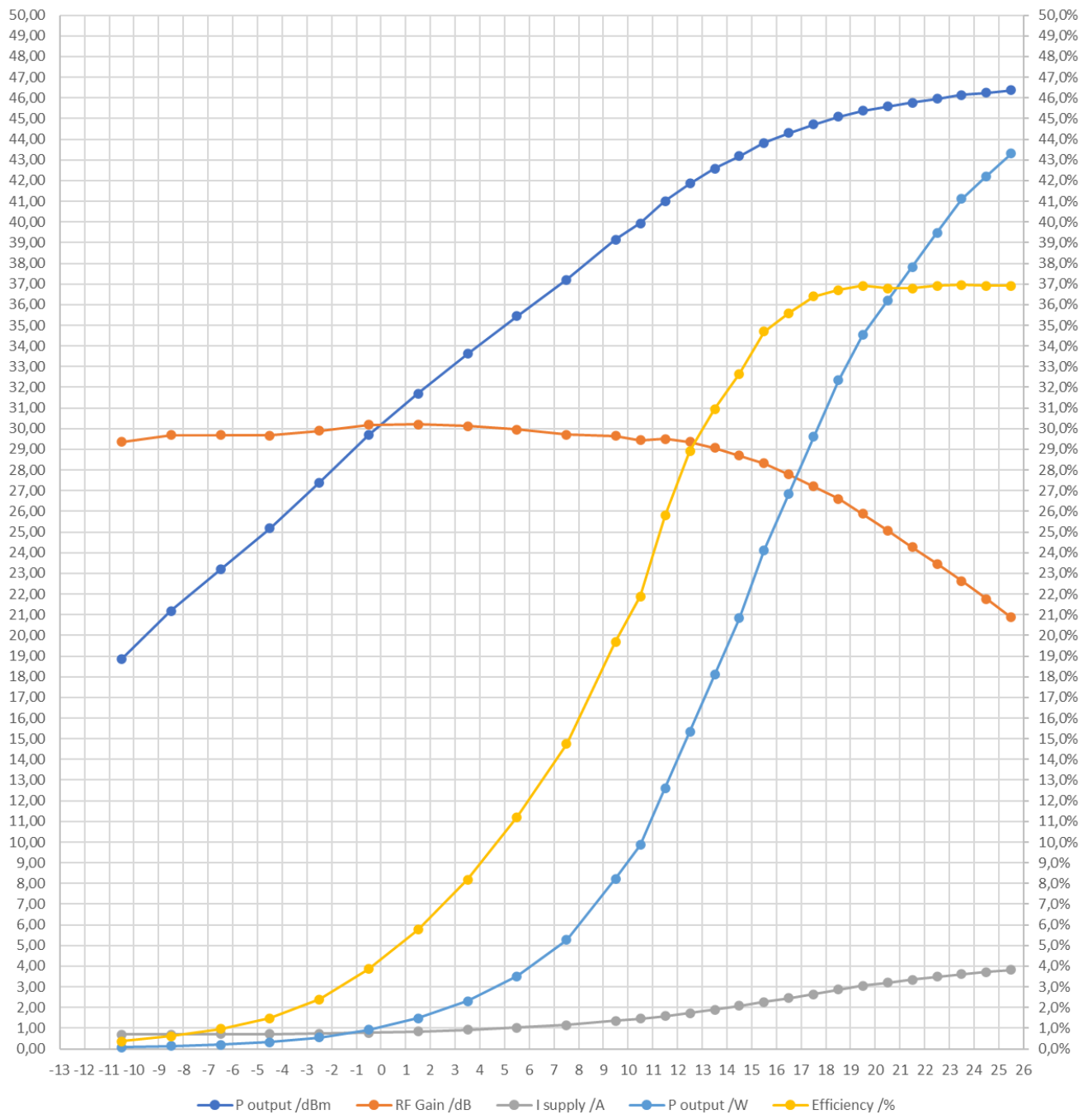
The heatsink is from a flea-market and is adequate for this kind of PA. The stand-offs can be easily removed in case this PA gets integrated together with a 28V power supply in a larger encasing.



You can find the key parameters of the PA on the labels shown on the subsequent pictures.



Here are measurements of output power, gain, current consumption and drain efficiency as a function of input power. All measurements were performed at 2400MHz.



My measurements confirm the results of Tom SP5XMU and Andrzej SP8XXN. Thank you to both of them for making their documents available.

I think this PA is best used with an output power of 20W and a drain efficiency of 33%. This needs an input power of 25mW.

I am always happy to receive feedback or answer questions.

Kind regards

Matthias dd1us@amsat.org

www.dd1us.de