

# 20 Watt PA for the 13 cm band Szhuashi YPM2420B

Matthias Bopp, DD1US, May 31<sup>st</sup> 2026, V1.2

Recently a friend asked me for help. He needed a small 13cm PA for a portable operation / DX-Pedition. Thus, I looked what is presently available and found a small 20 Watt PA module for the frequency range 2400 – 2500 MHz with the part number YPM2420B.



The Chinese online seller Szhuashi (who is probably also the company building those modules) publishes limited data in English but I found quite some additional information on a Russian website:

*A professional, high-performance amplifier for stable and long-range wireless communication in the 2.4 GHz frequency band. Ideal for Wi-Fi systems, video transmission, drones, access points, industrial facilities and all applications requiring a strong, clear and reliable signal.*

*Key benefits:*

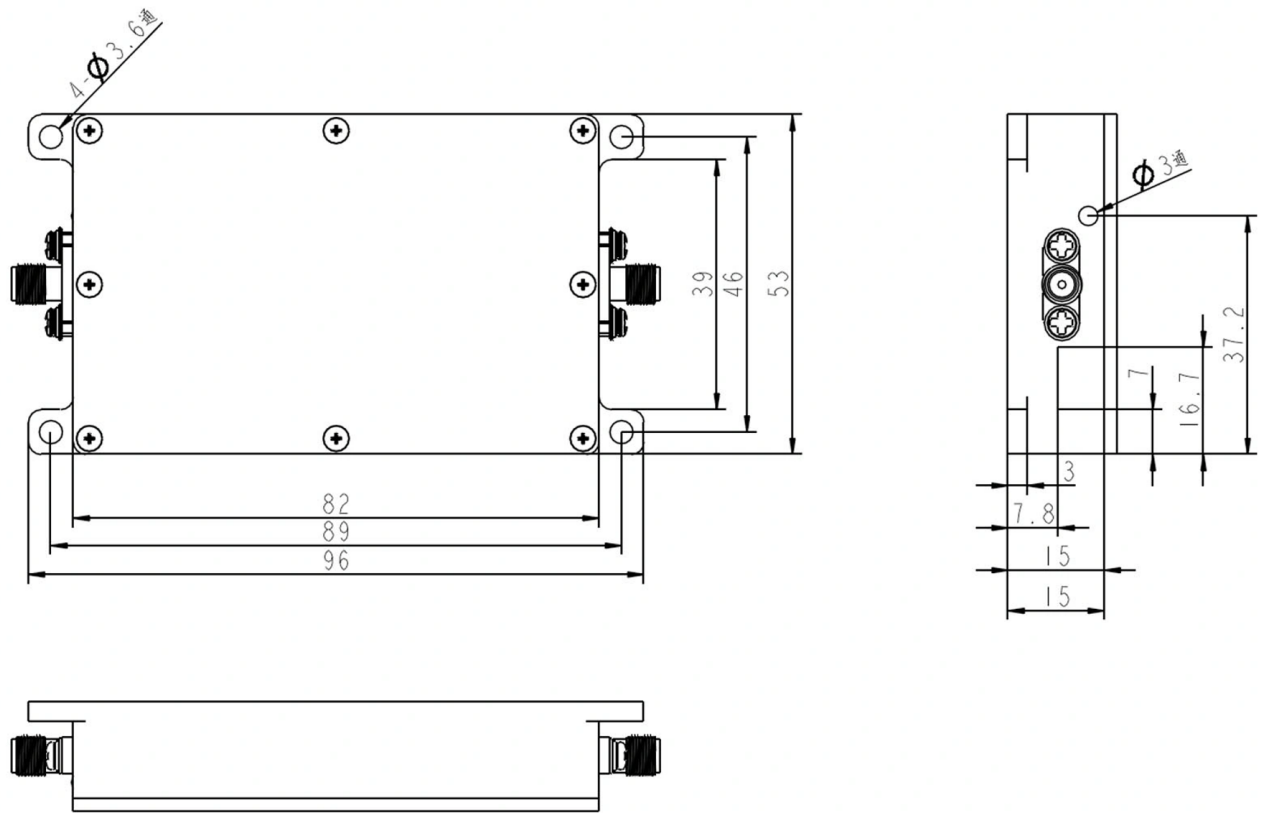
- *High transmit power of 20 W (43 dBm P1dB) – reliable operation over long distances*
- *16 dB gain – ensures stable signal reception even in noisy environments*
- *Wide supply voltage range of 12–24 V – universally applicable for various systems*
- *Minimal gain unevenness <1 dB – precise and predictable operation*
- *SMA sockets – compatible with most antennas and cables*

*Technical specifications*

- *Model: Szhuashi YPM2420B*
- *Frequency range: 2400–2500 MHz*
- *Output power (P1dB): 43 dBm (20 W)*
- *Input power: 27 dBm*
- *Gain: 36 dB*
- *Efficiency: 45 %*
- *Operating current: 2.2 A*
- *Supply voltage: 12–24 V*

- Connections: SMA socket (input/output)
- Gain uniformity: typ. 0.5 dB / < 1 dB

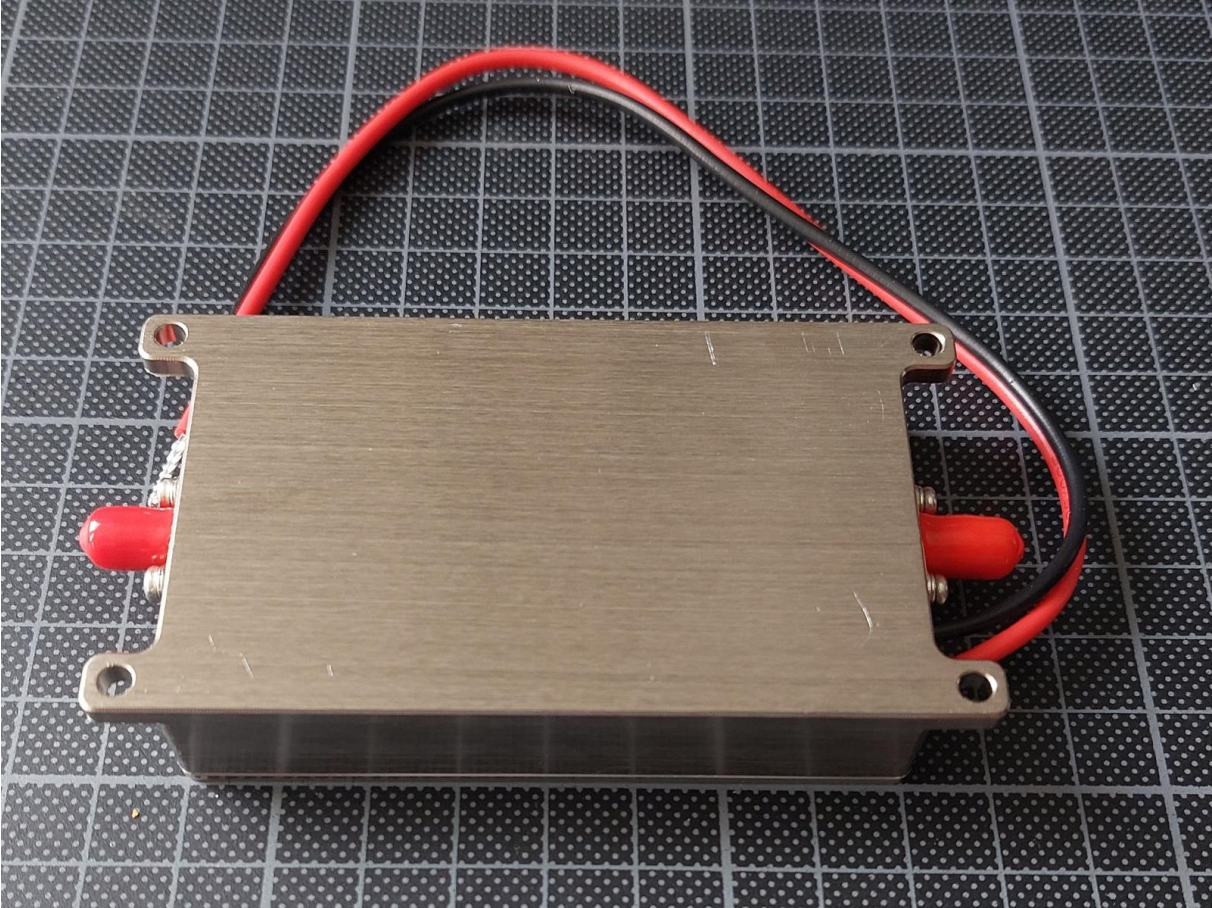
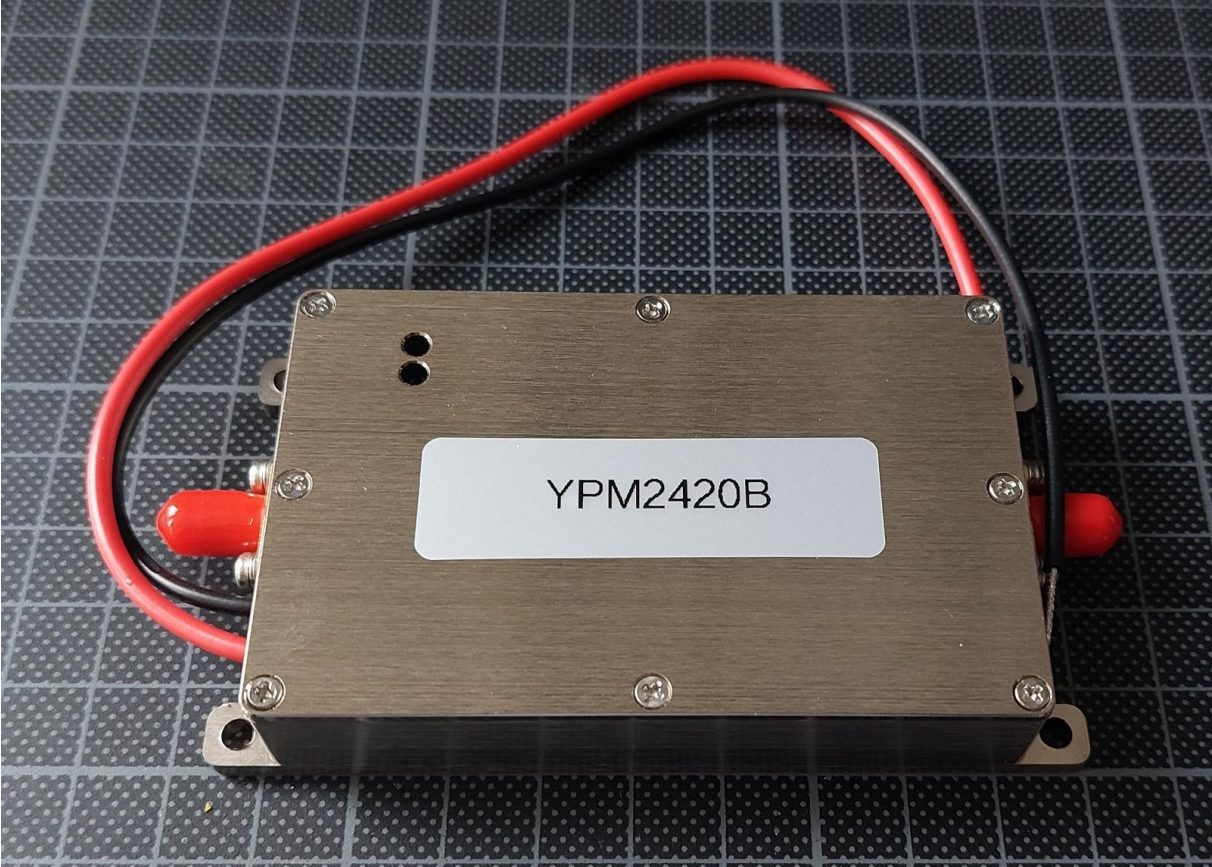
Dimensions:

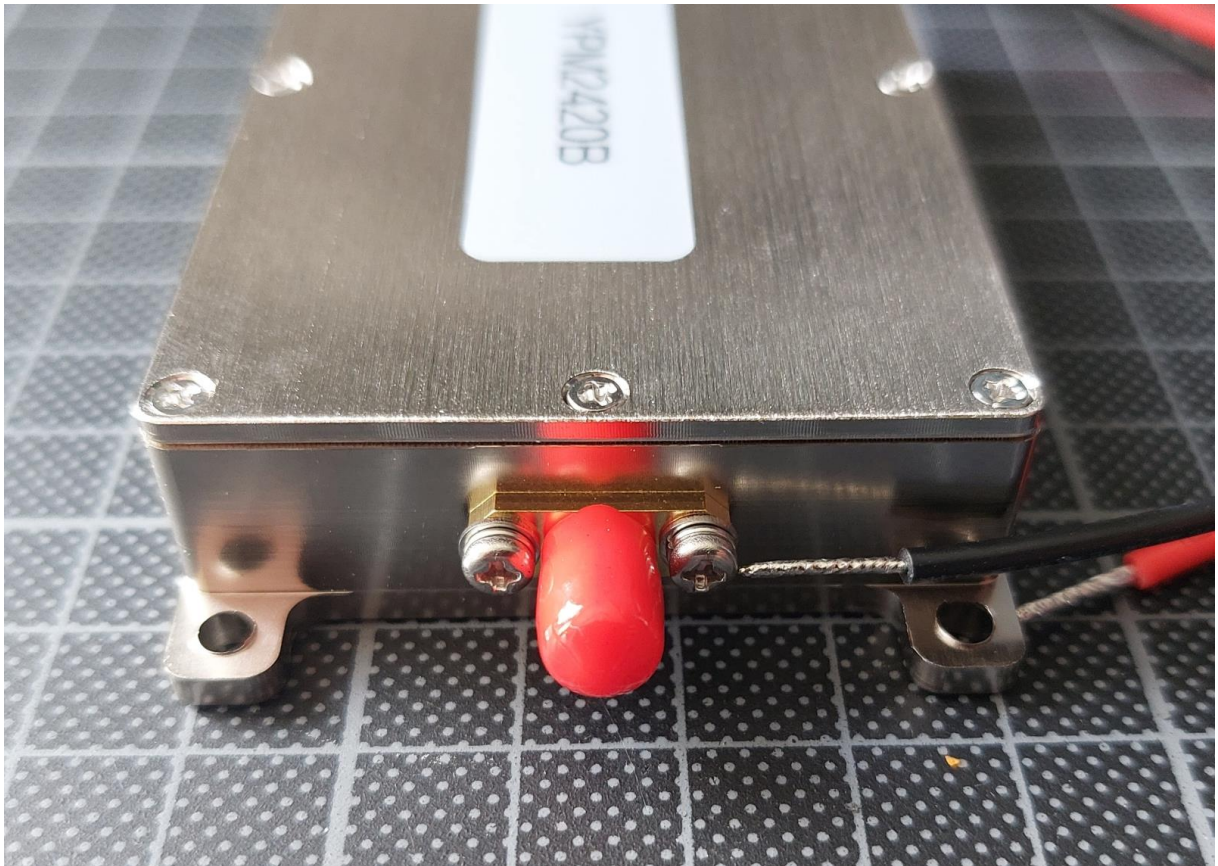
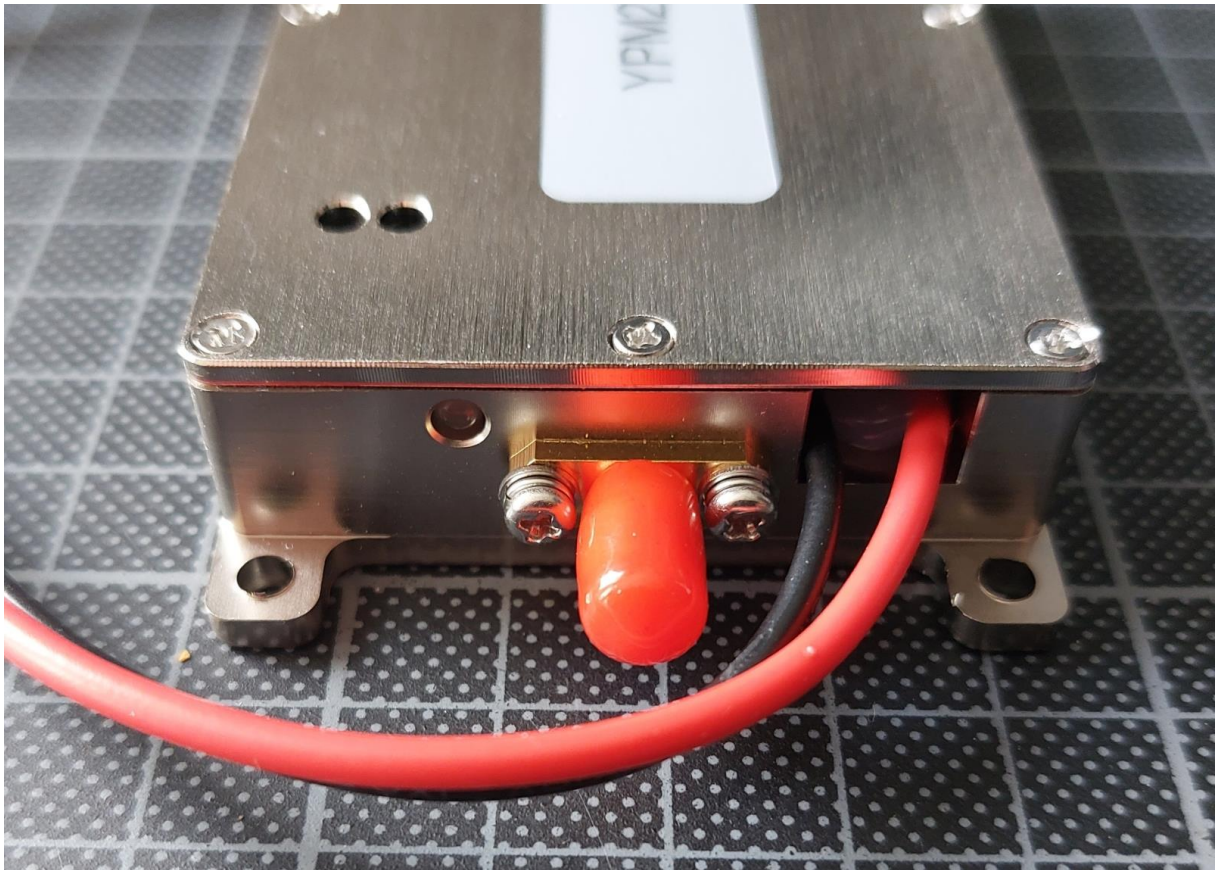


I found the advertised wide supply voltage range of 12 – 24 V interesting as it makes it possibly to use a common 12 V battery or power supply. Thus, I ordered one directly from China to test it.

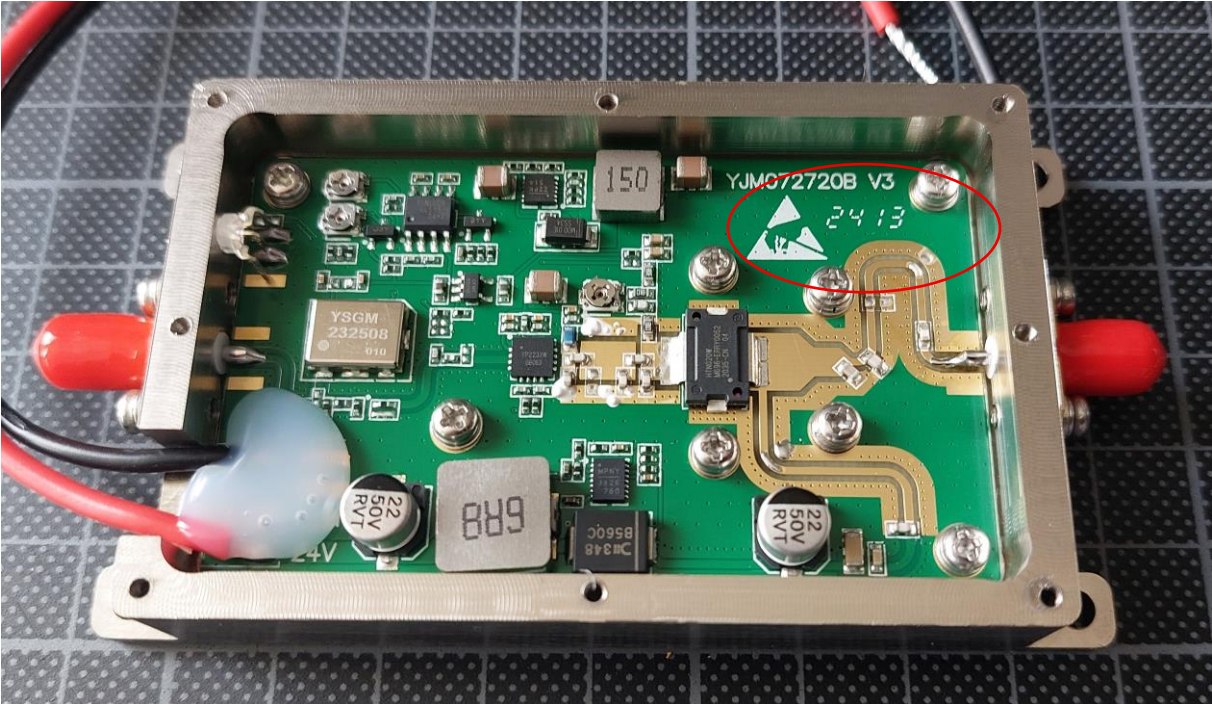
A few weeks later, the device arrived safely. The PA is housed in an aluminium casing. In addition to the two SMA sockets for the RF input and RF output, there is only a twin lead red/black for the supply voltage and a 3 mm LED that indicates when the supply voltage is present. A PTT switch input or detector outputs, as often found in other PAs optimised for amateur radio purposes, are not provided.

Here are some pictures of this power amplifier module:

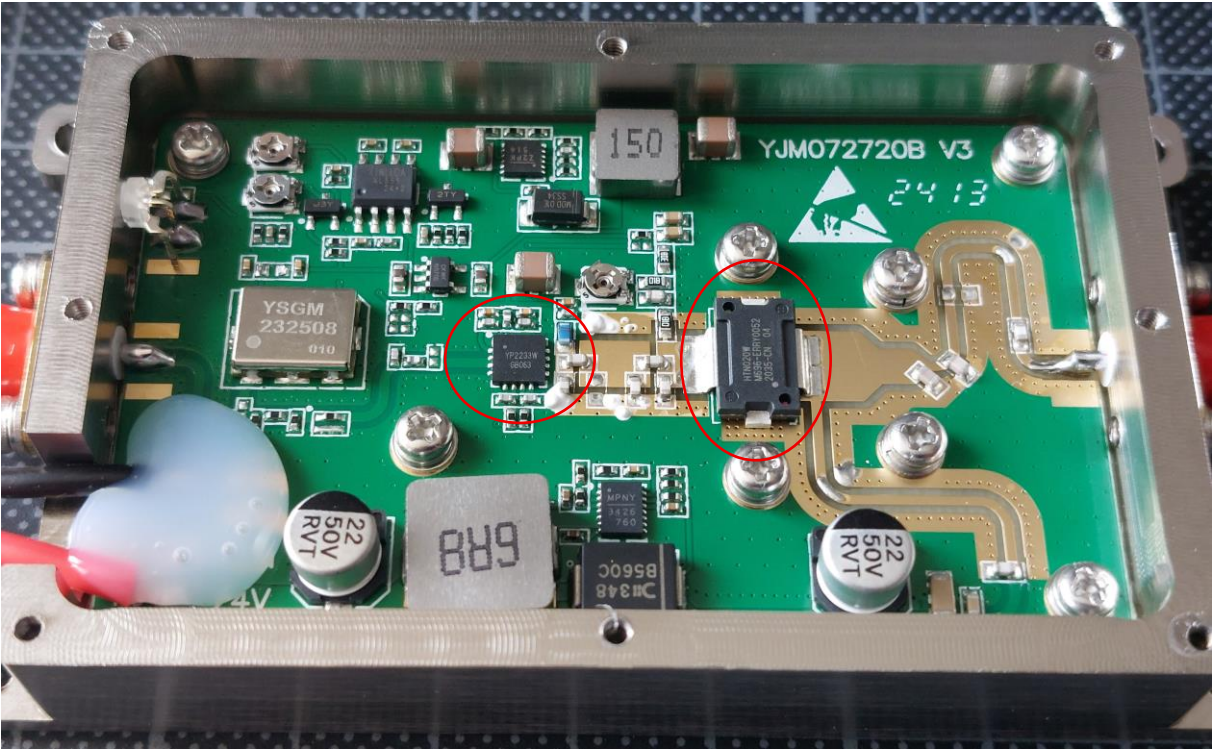




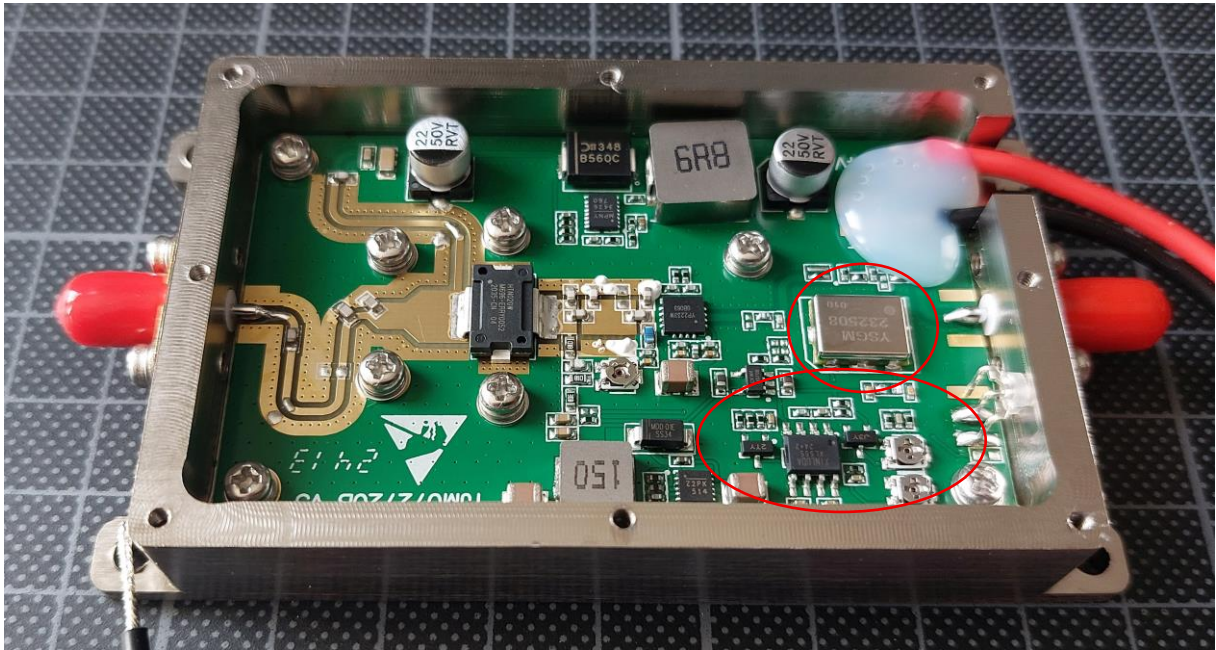
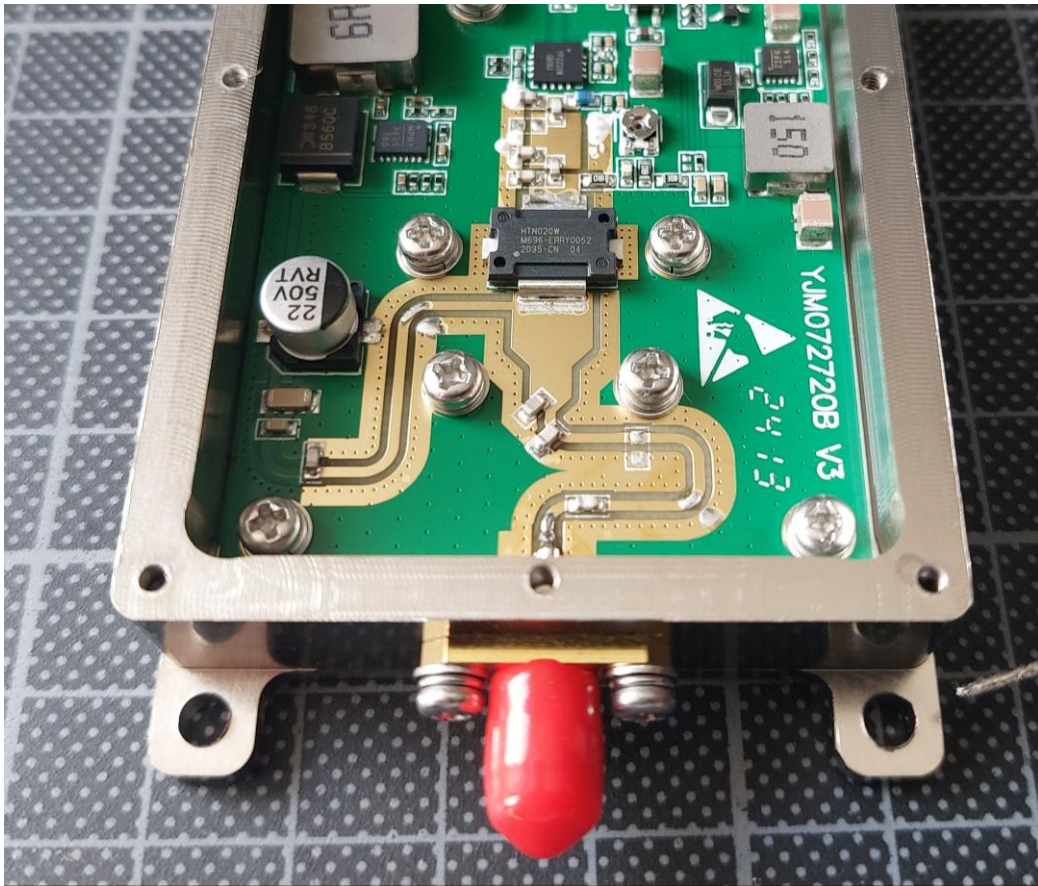
Here are some pictures of the inside of the YPM2420B power amplifier module:



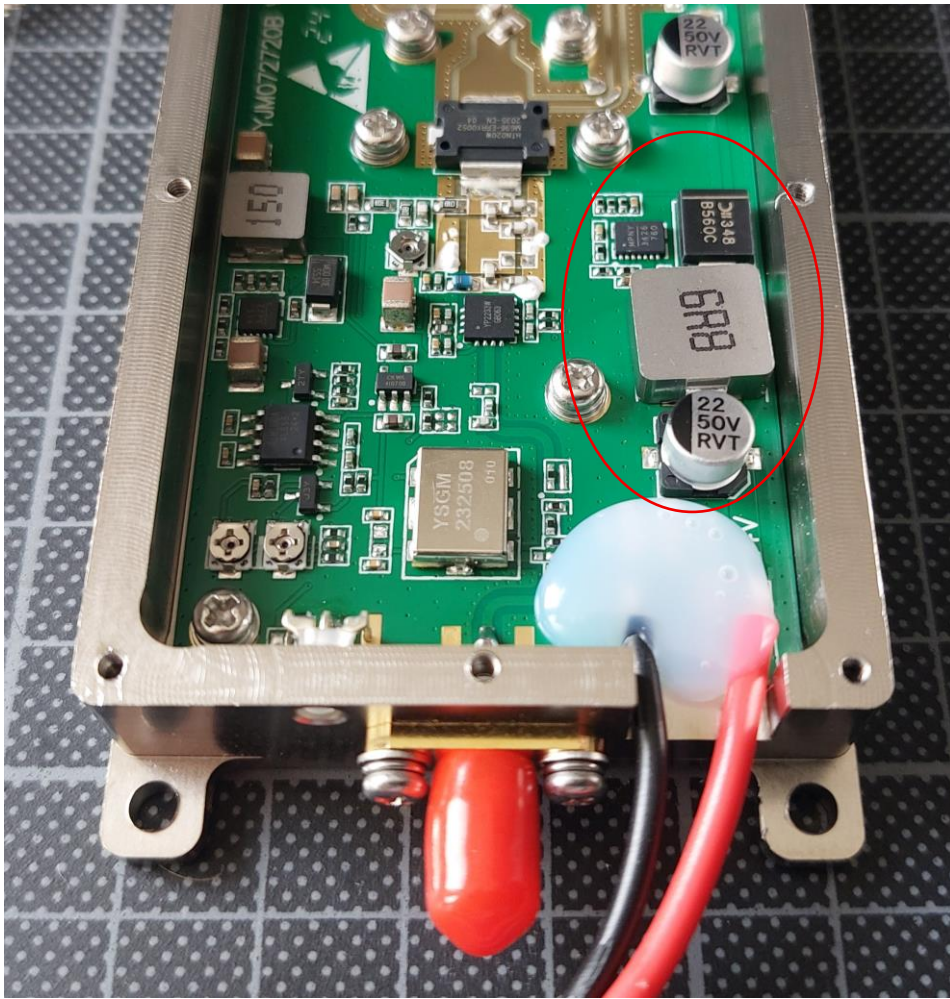
The PCB is marked a YJM072720B V3 2413.



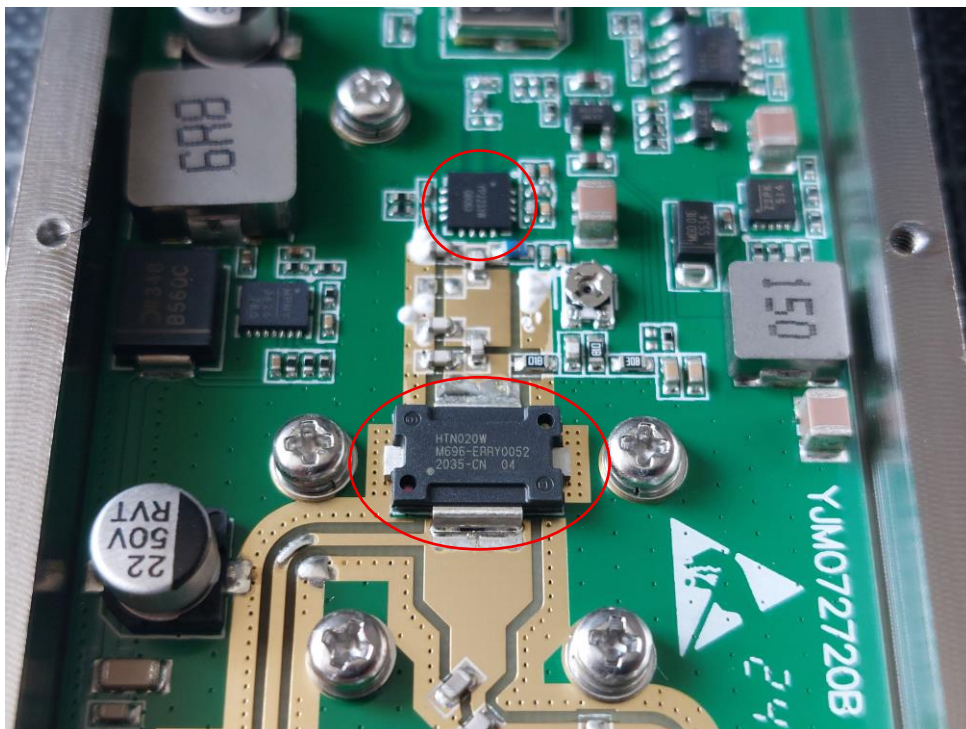
The modules uses a driver amplifier in a QFN package marked as “YP2233W” and a final stage marked as “HTN020W”.



As I had seen already in other Chinese amplifiers, the module contains also a VCO with the associated control and bias circuit as it can apparently used as a drone jammer device.



The amplifier includes a DC-DC-Upconverter to generate the drain voltage for the LDMOS device. This explains why a supply voltage of only 12 V is sufficient for this amplifier.



The final stage LDMOS transistor is housed in a TO-270-A plastic package. It is marked as:

HTN020W  
M696-ERRY0052  
2035-CN 04

I found some data from the supplier “HOLTO” who describes it as a 20W amplifier for the frequency range 400 MHz to 2.7 GHz with the main application being drone (UAV) jamming.

The amplifier is advertised as a replacement for the NXP A2T27S020NR1 and the Ampleon BLP9G0722-20G, which are both 20 W LDMOS transistors specified for a similar frequency range.

The driver amplifier is housed in a 16-pin 4mm x 4 mm QFN package. It is marked as:

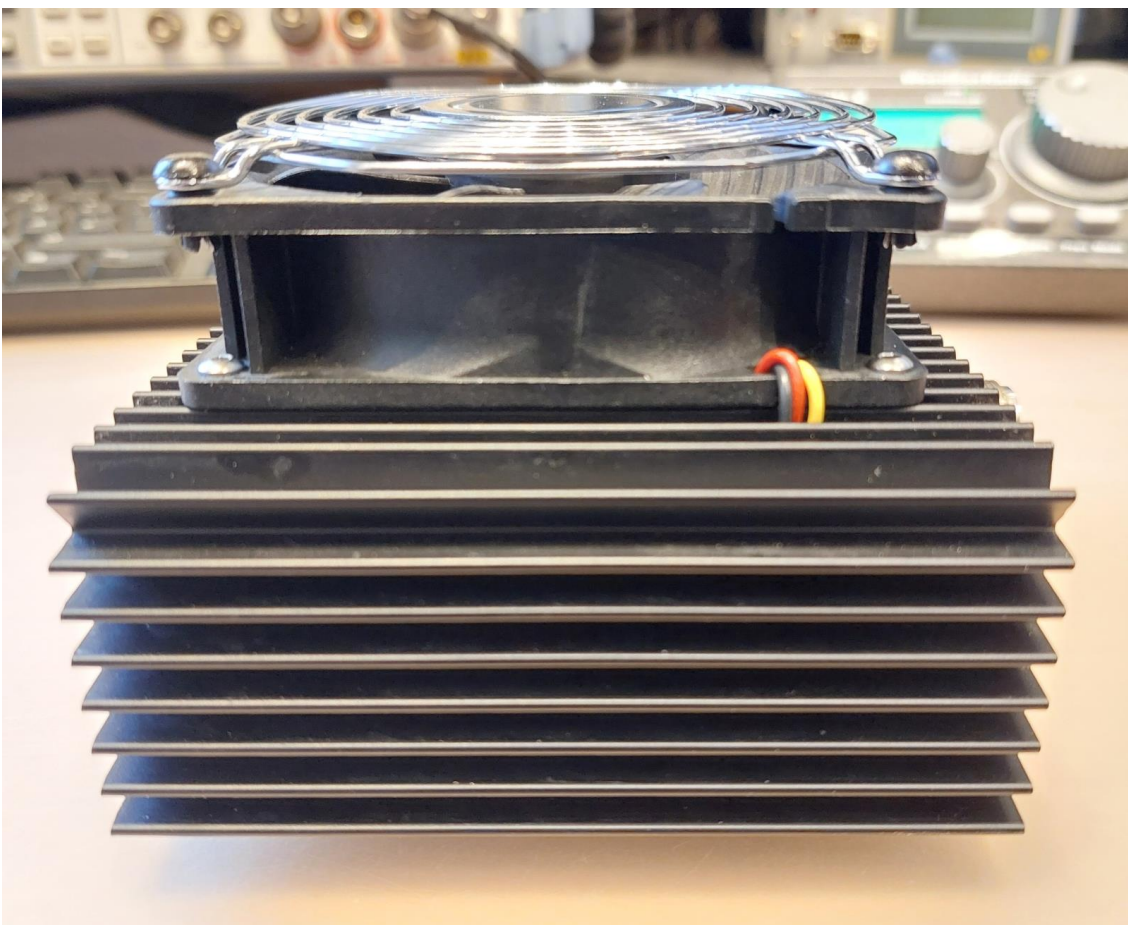
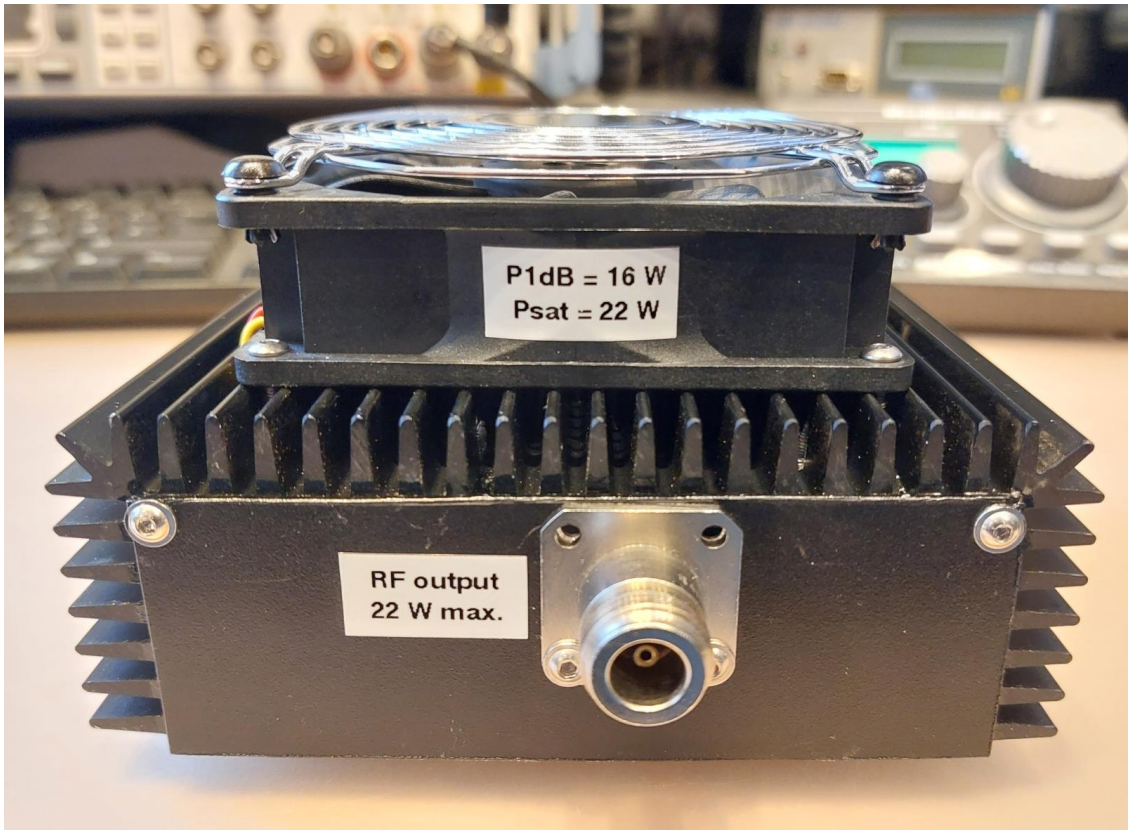
YP2233W  
GB062

Fortunately, I found a datasheet for this integrated device from the supplier “LOVID International Electronics”. It is a InGaP HBT broadband amplifier for the frequency range 700 - 2700 MHz with a maximum output power of 34.5 dBm = 2.8 W (@ 1.63 GHz) and a gain of 26 dB. The supply voltage is 5 V.

As this PA module should definitely be mounted on a heat sink before operating it I built a suitable encasing based on an aluminium profile with fins as a heatsink. In addition, I mounted a fan on the encasing to allow extended transmit periods without excessive heating of the amplifier.

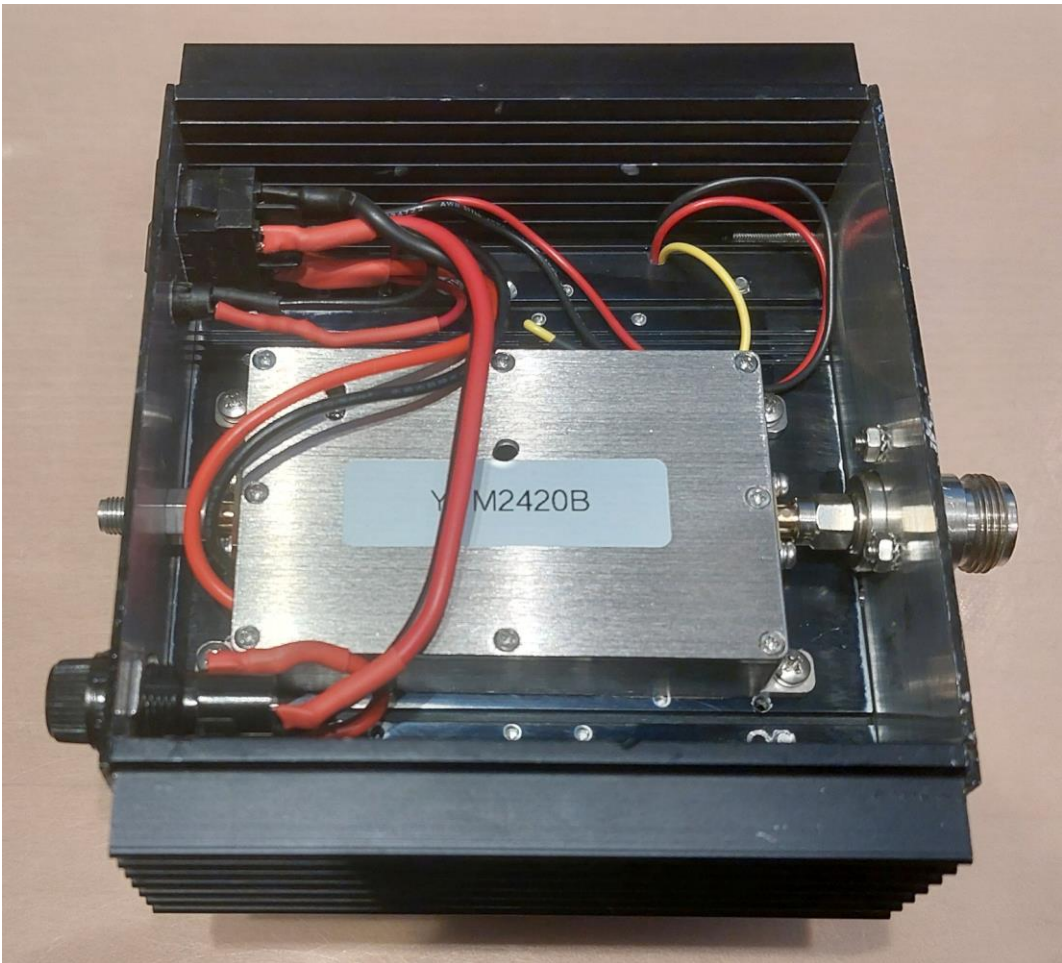
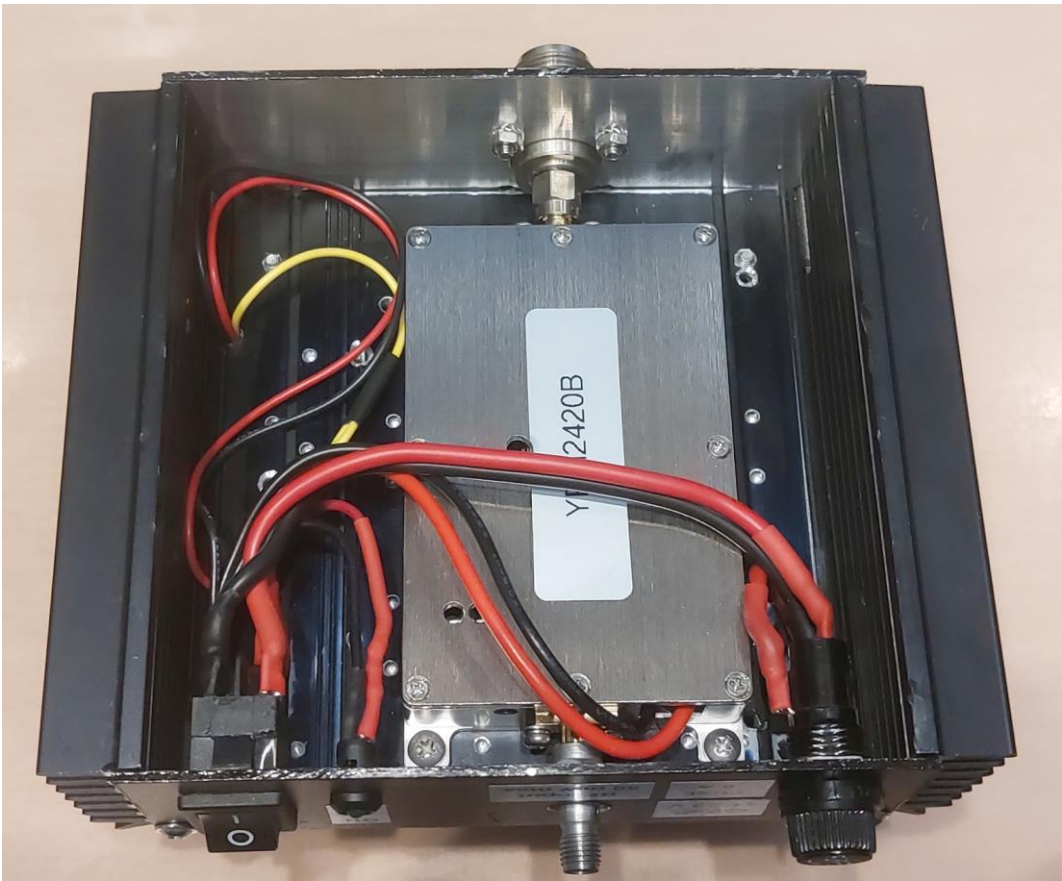
Here are some pictures:



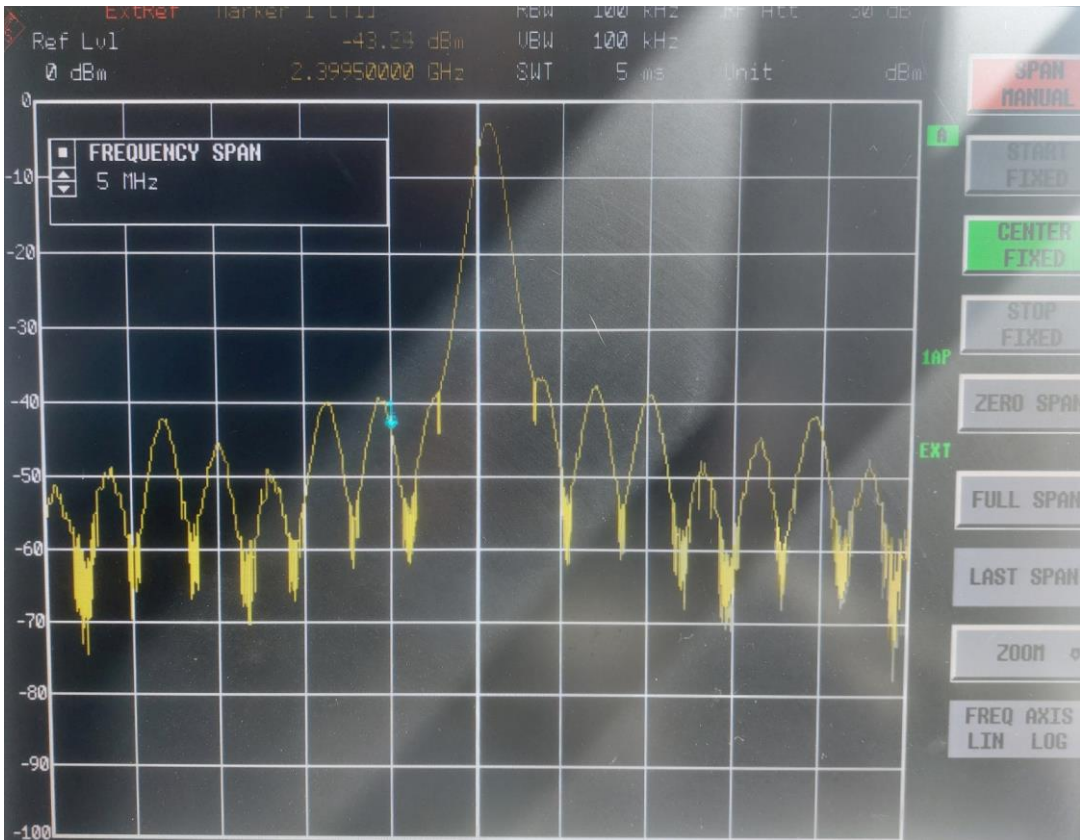
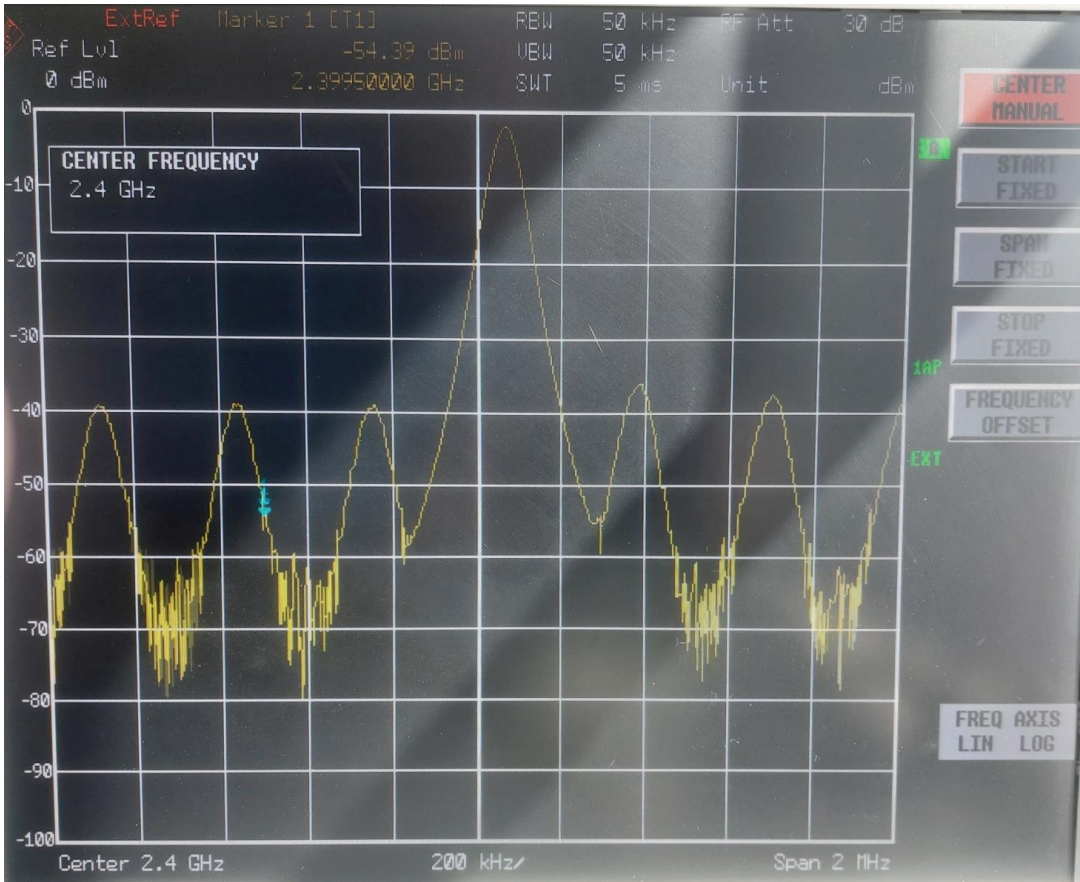


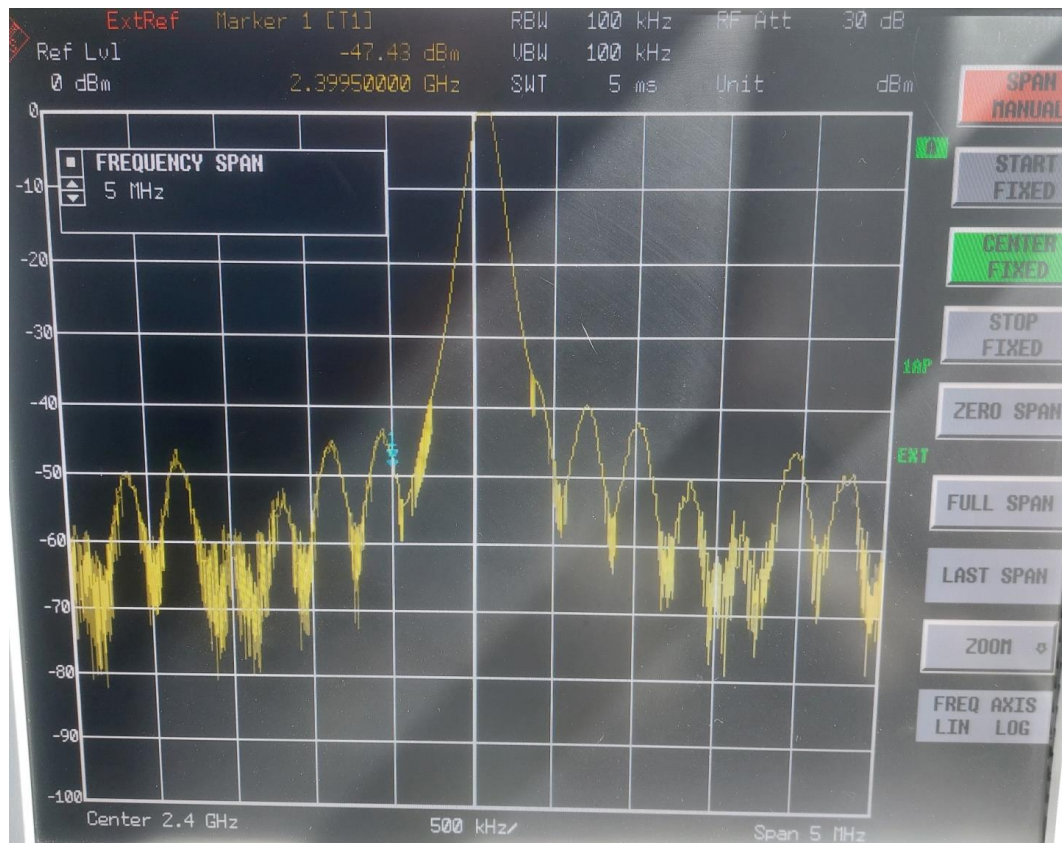
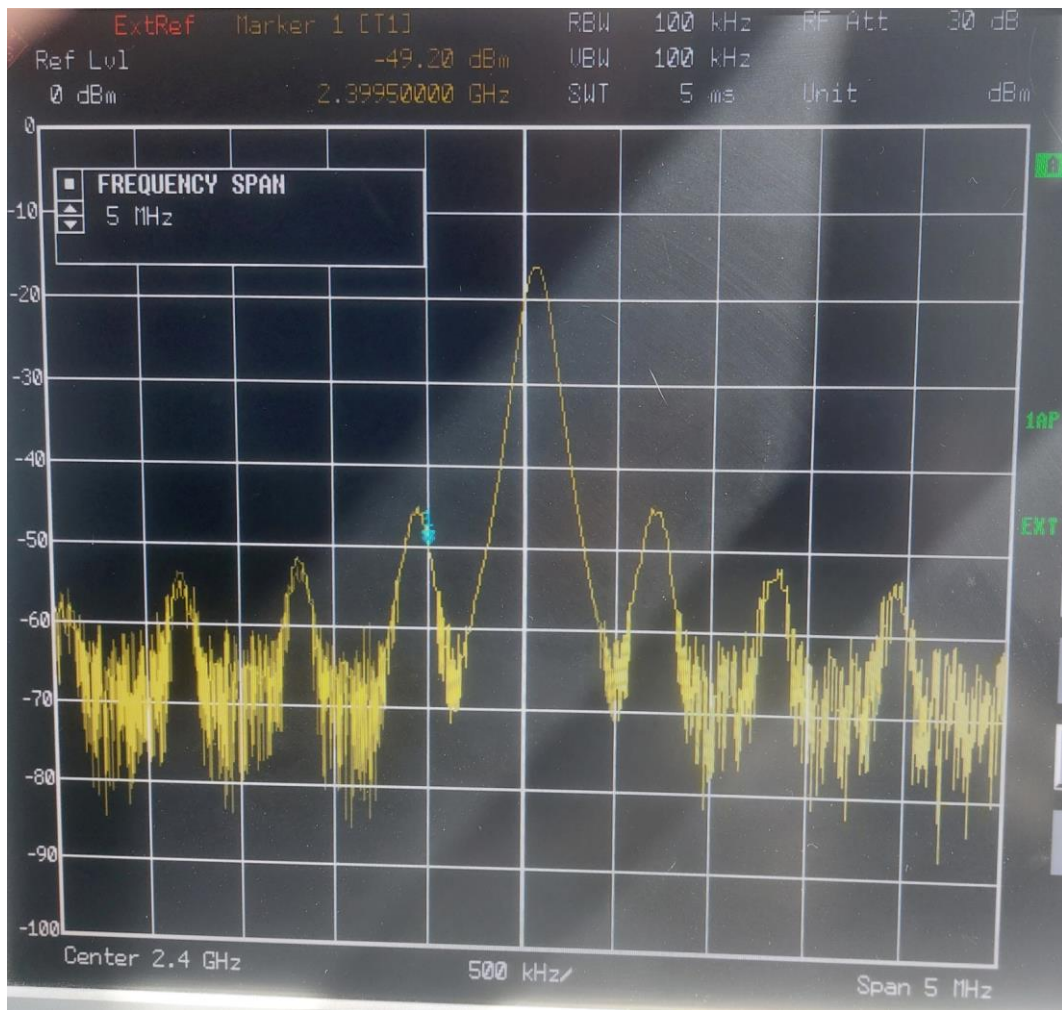






As usual when characterizing an unknown device, I first check the output signal of the power amplifier using a power attenuator at its output and a spectrum analyzer. The spectrum was not clean but showed strong sidebands. Here are pictures of the output spectrum:



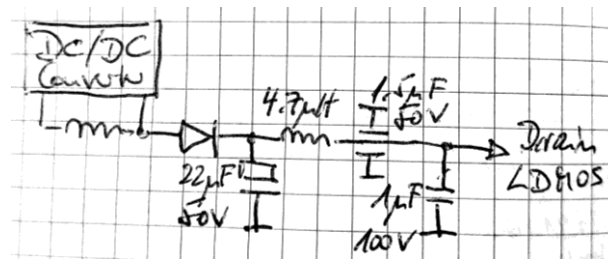


I had checked before that the VCO used for jamming purposed was disabled. However, I decided to unmount some more of the VCO related components such as the XL555 = NE555 which is used to modulate the VCO. However, that did not cure the problem of the spurious emissions.

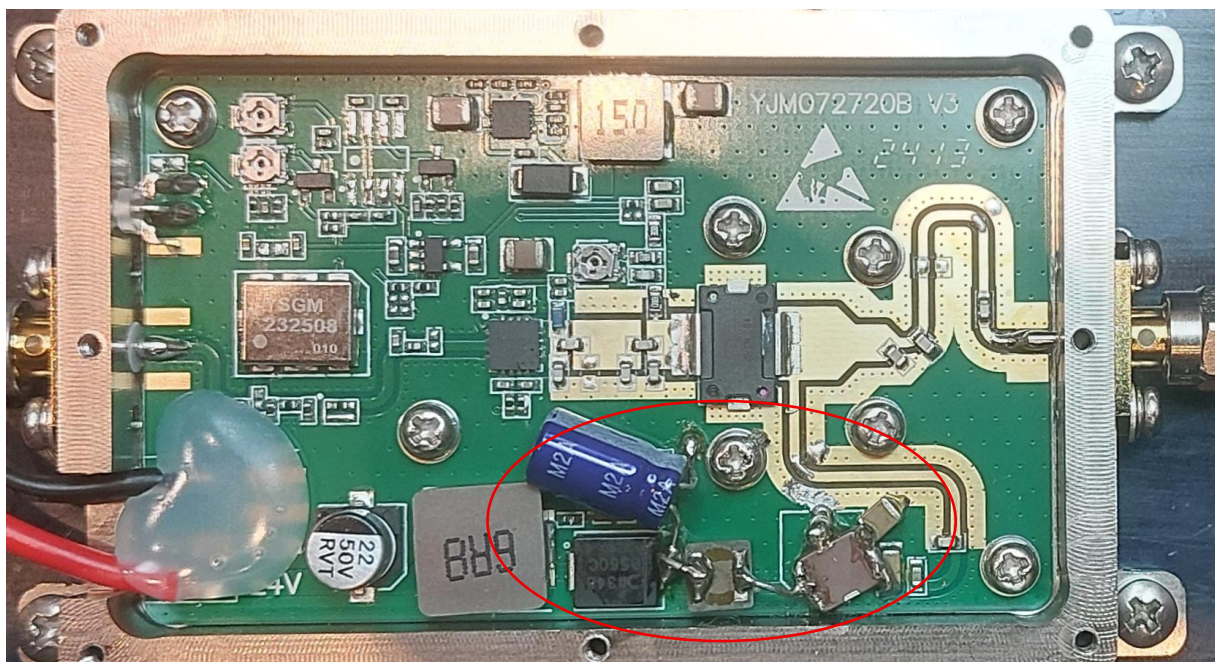
I checked the gate bias voltage of the LDMOS transistor with an oscilloscope and it was very clean. The gate bias voltage is generated by a DC-DC-Downconverter providing 5.1 V and a subsequent linear regulator stabilizing the voltage to 3.3 V. In addition, there is a RC lowpass-filter from the 3.1 V to the gate.

Next, I checked the drain voltage of the LDMOS transistor. It is generated by a DC-DC-Upconverter generating 31 V from the lower input supply voltage. The drain voltage was not clean but showed strong interference with a frequency of about 600 kHz.

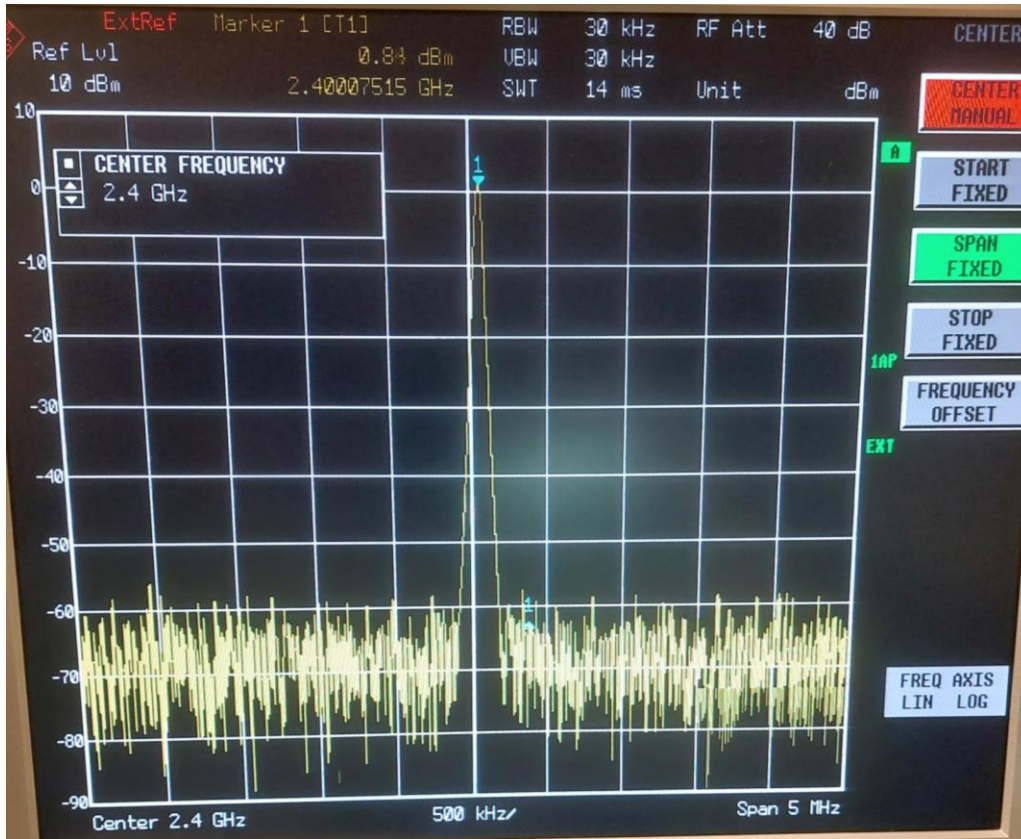
In order to filter the drain voltage, I inserted a 22  $\mu\text{F}$  / 50 V shunt electrolyte capacitor to ground followed by a 4.7  $\mu\text{H}$  series inductor (Coilcraft XGL5030-472MEC) with a series resonance frequency  $\text{SRF} = 23 \text{ MHz}$  and a high current capability of 6.3 A. Following the inductor I added a Murata EMIFIL 1.5  $\mu\text{F}$  / 50 V / 6 A capacitor. This capacitor is a feedthrough SMD capacitor with a specified rejection of  $> 40 \text{ dB}$  @600 kHz. At its output I finally added a ceramic 1  $\mu\text{F}$  / 100 V capacitor (X7R-G1210 1.0). Here is a sketch of the modified schematic:



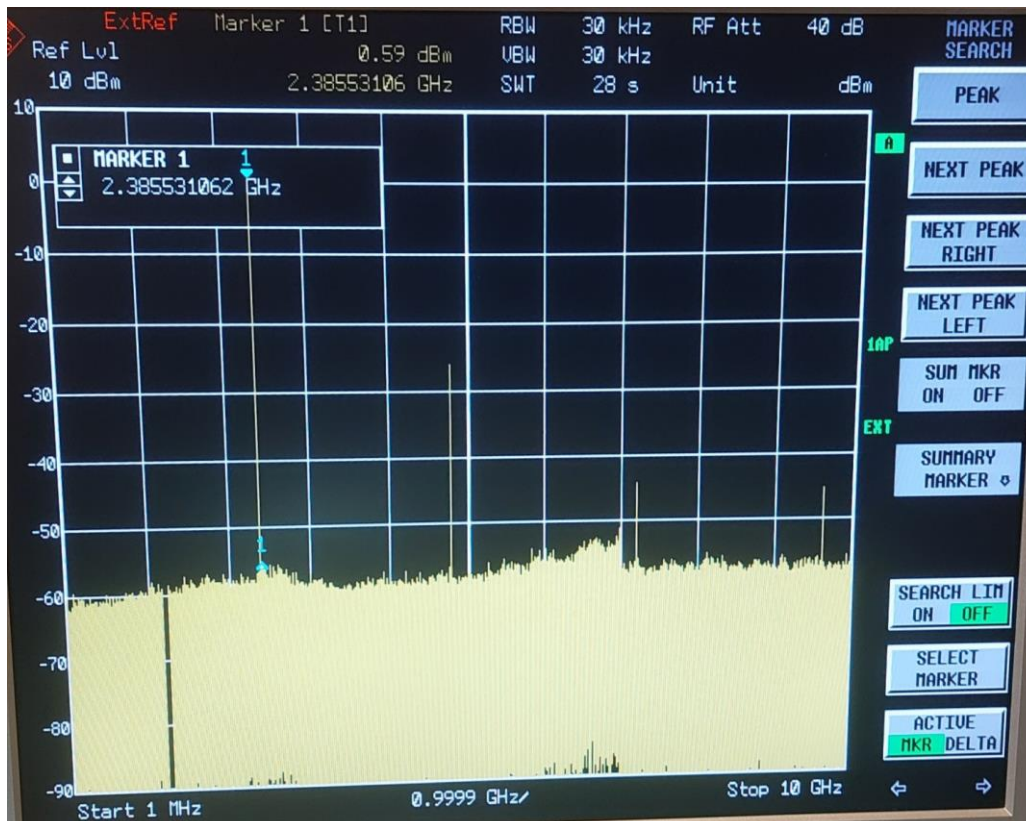
With this combination the drain voltage at the LDMOS transistor looked very clean.



Checking the output spectrum of the power amplifier showed a perfectly clean signal:



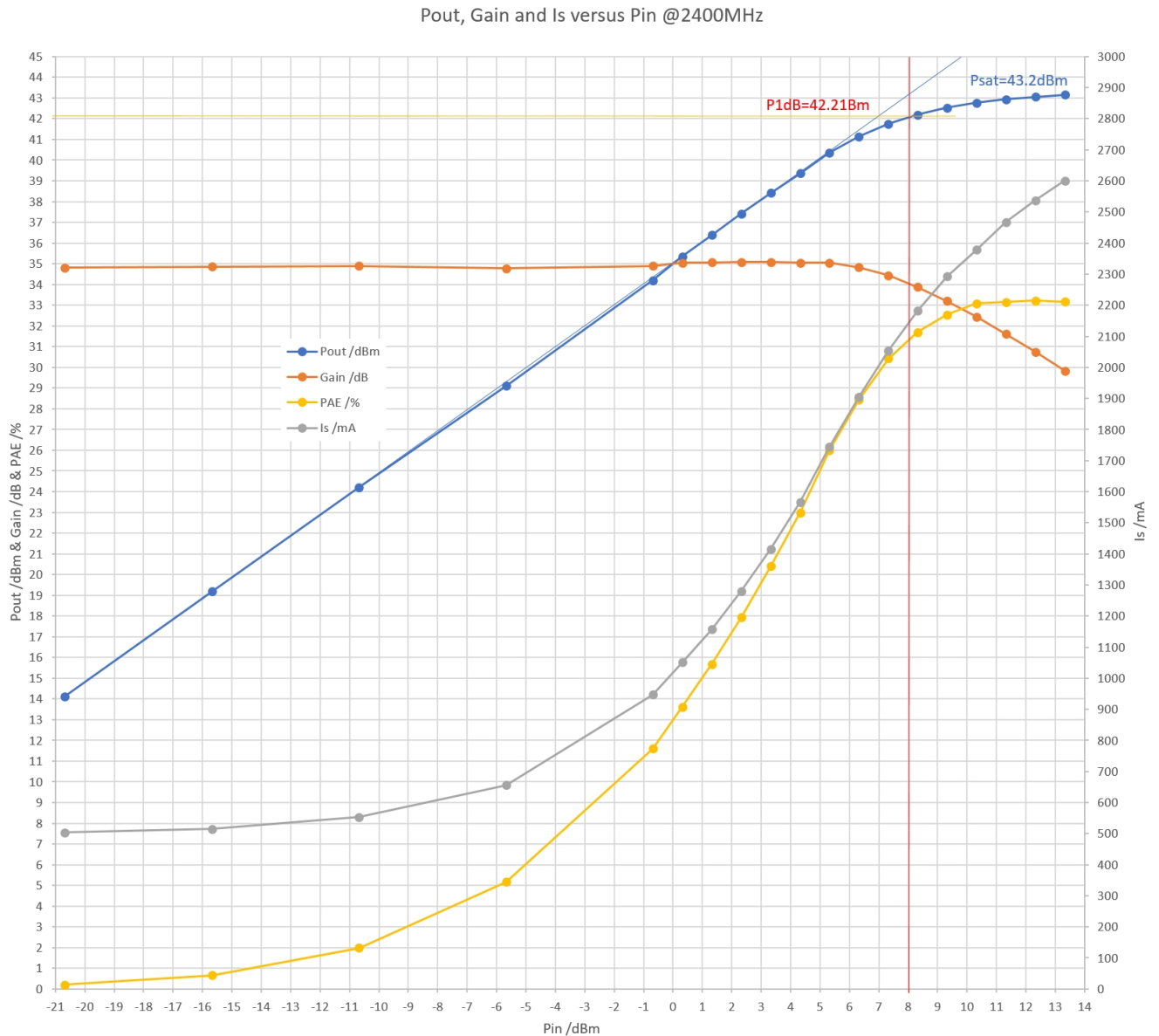
Also checking the output spectrum in a wide frequency band shows no spurious emissions. The 2<sup>nd</sup> harmonic is only 30 dB suppressed; 3<sup>rd</sup> and 4<sup>th</sup> harmonic are more than 50 dB down:



I increased the quiescent current of the power amplifier to 1.6 A @12 V respectively 1.42 A @ 13.8 V.

Finally, I measured output power / dBm, gain / dB and power added efficiency / % as a function of input power / dBm at a supply voltage of 24 V and a frequency of 2400 MHz.

I double checked at a supply voltage of 12 V and the performance is basically identical (of course the supply current is ½ compared to 24 V).



To summarise, this amplifier must not be used as sold by the vendor. I noticed them but they did not indicate that they are willing to fix this problem. Thus, we have to expect that also future modules will face the same problem. I guess for drone application additional spurious emissions are even welcome 😊

After filtering the drain voltage with the fixes explained above the spectrum of this 20 W PA module is clean. With a saturation power of 22 W and a small signal gain 35 dB, this amplifier it is well suited to be driven by common upconverters.

If you want to use it to boost the output signal of an SDRs like ADALM Pluto or LimeSDR you can either remove the existing input attenuator which I did not touch or add a small amplifier between the SDR and this PA. The PAE in saturation region is only 33 % and thus significantly lower than the 45 % specified by the supplier. However, it is not a major problem in my application.

I am always happy to receive feedback and to answer questions.

My e-mail address can be found on my homepage.

Best regards

Matthias DD1US

[www.dd1us.de](http://www.dd1us.de)