

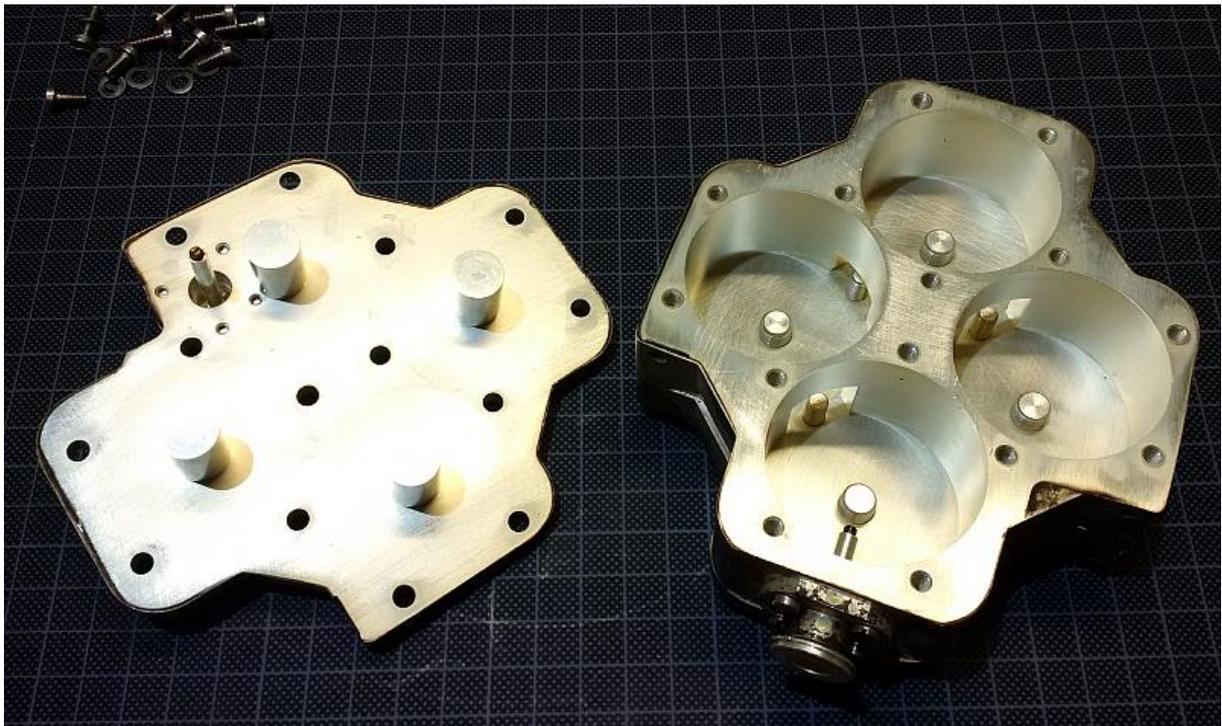
Surplus S-Band Filter retuned to 2.4 GHz

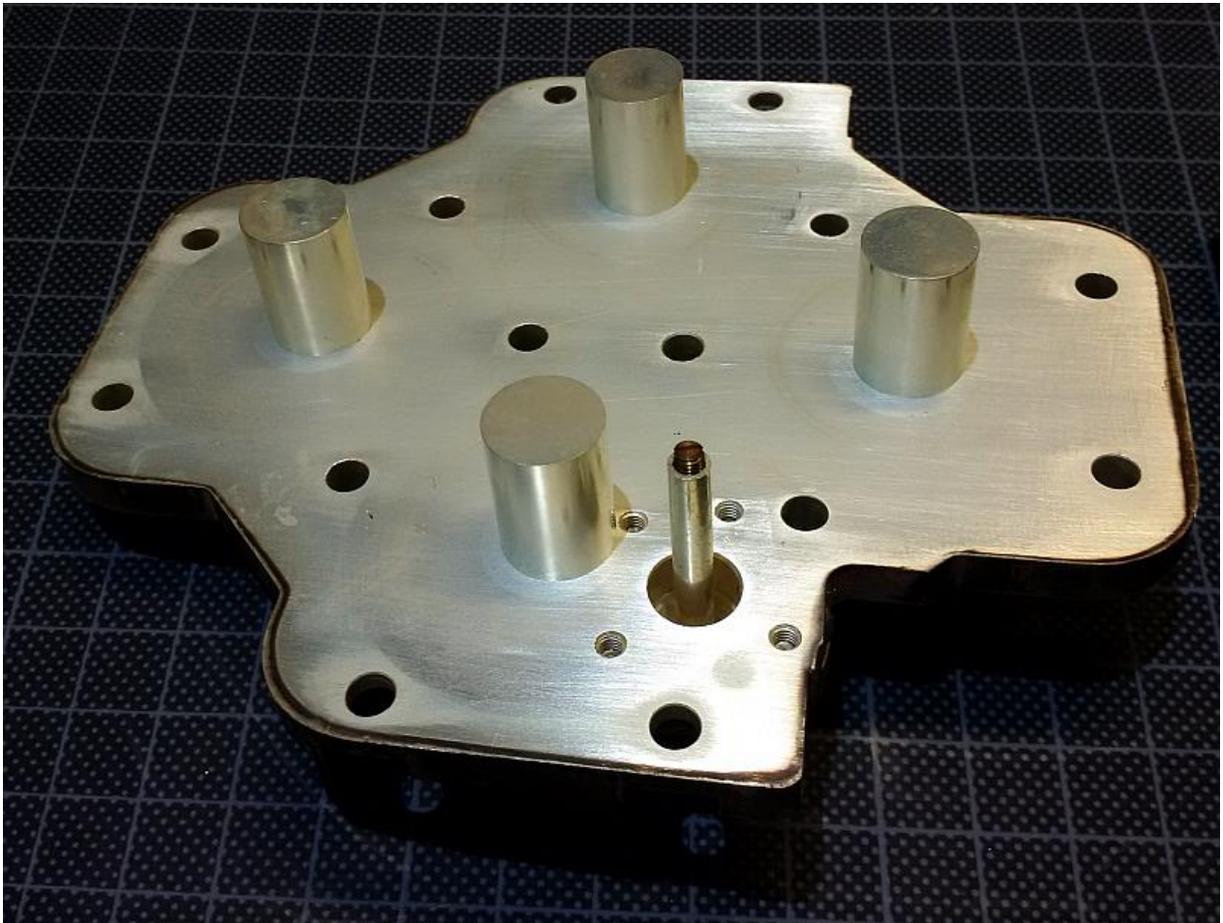
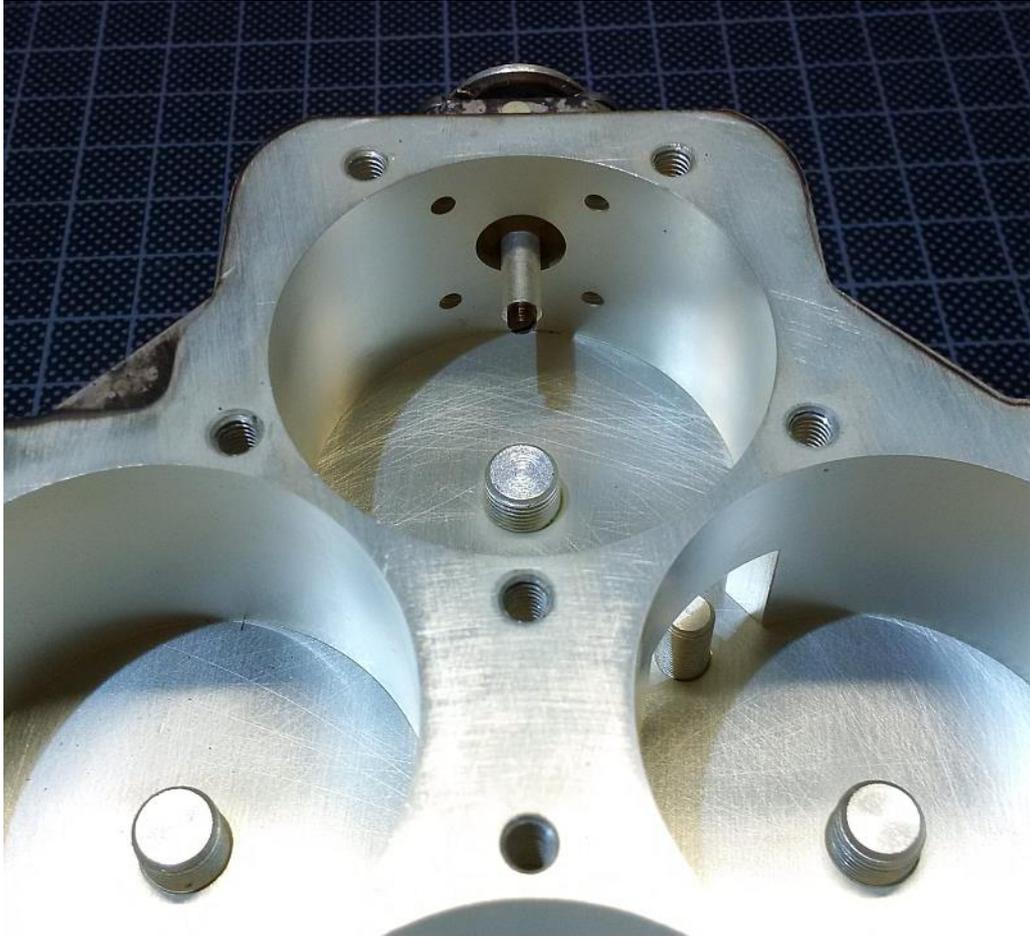
Matthias, DD1US, August 15th 2020

Recently I got hold of some surplus filters which were used in the frequency range 2450-2700 MHz.

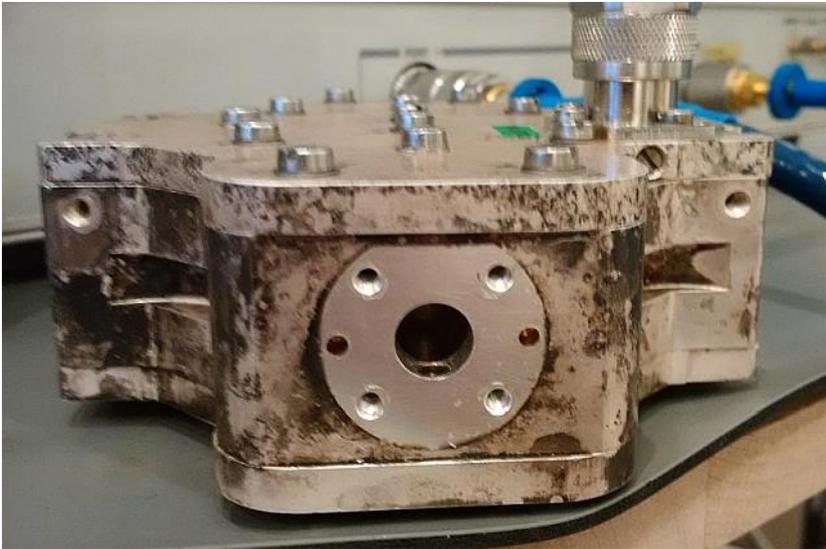


The filter is made from brass and is completely silver plated including the 4 high quality cavities.





As the connectors are were some special types which I am normally not using. The first step was thus to replace them with N-connectors and then retune the filter.

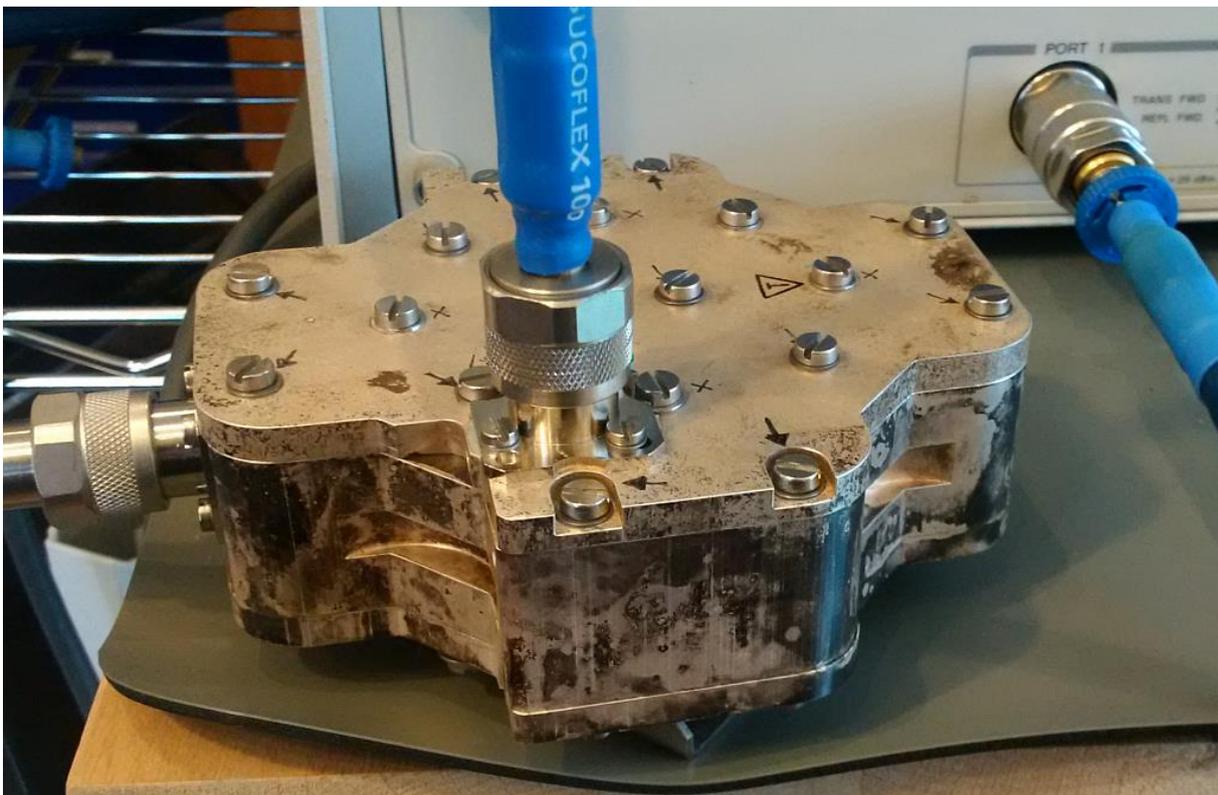


In the next pictures you can see in detail how the modified connector looks like:

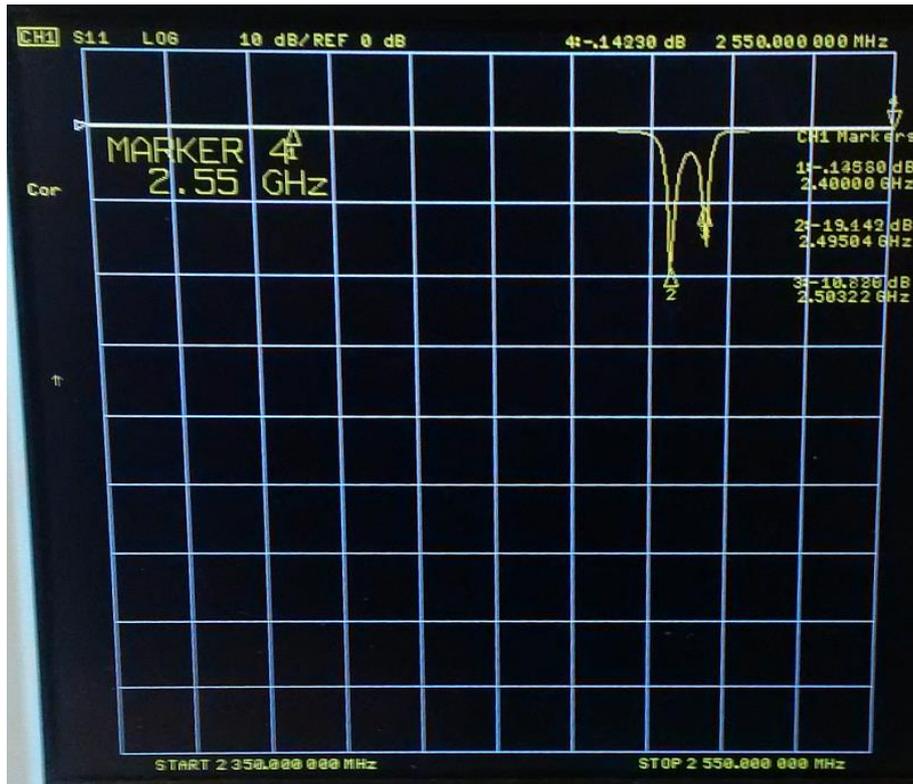


The monopole length can be adjusted with the screw inside the tube. These parts were recycled from the original connector setup. The 4 holes had to be widened to make the jack fit to the original holes in the body of the filter.

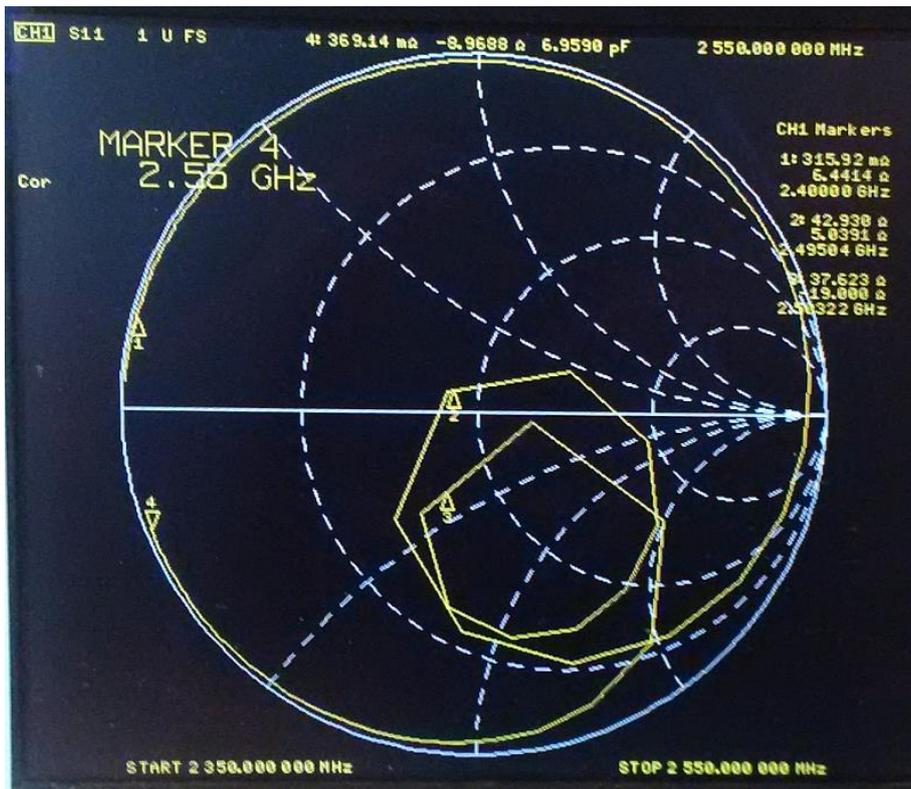
Here is a picture of the filter modified with N-jacks:



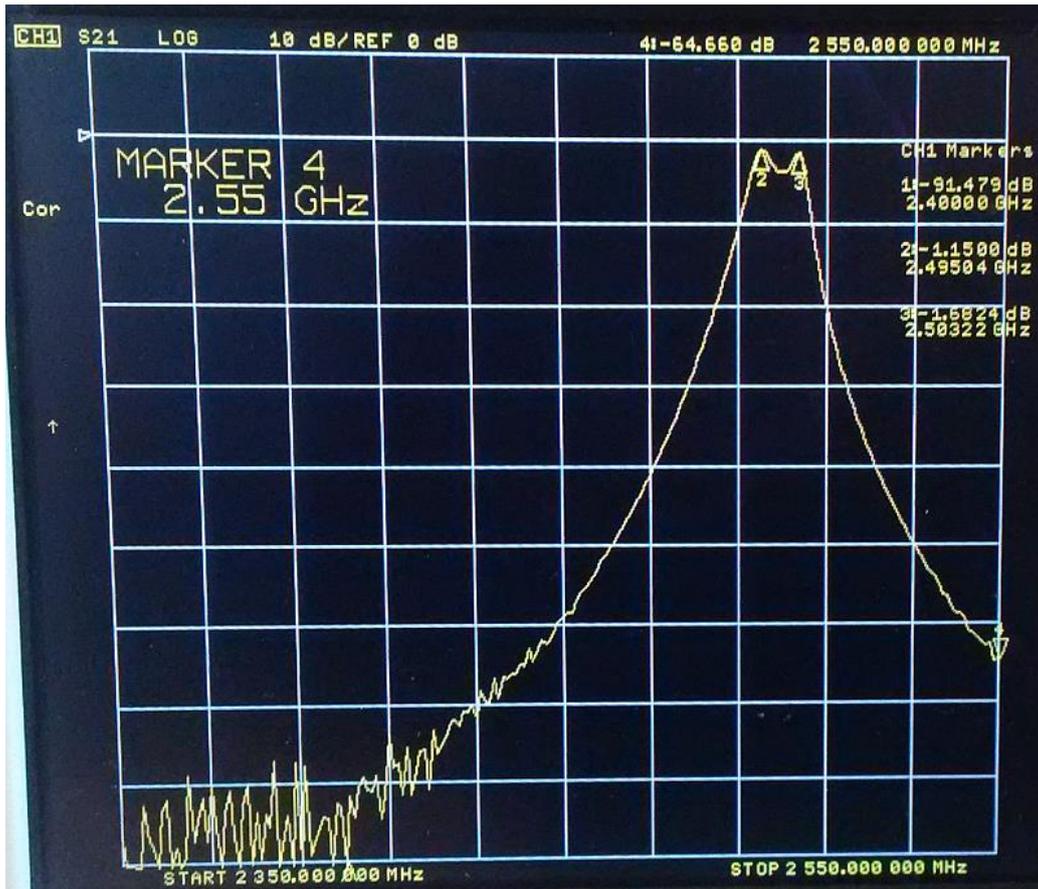
The first filter I retuned was originally tuned to 2498,5MHz. After changing the connectors, I optimized the length of the monopoles in the input and output connectors. I did not touch the other tuning points and got the following results:



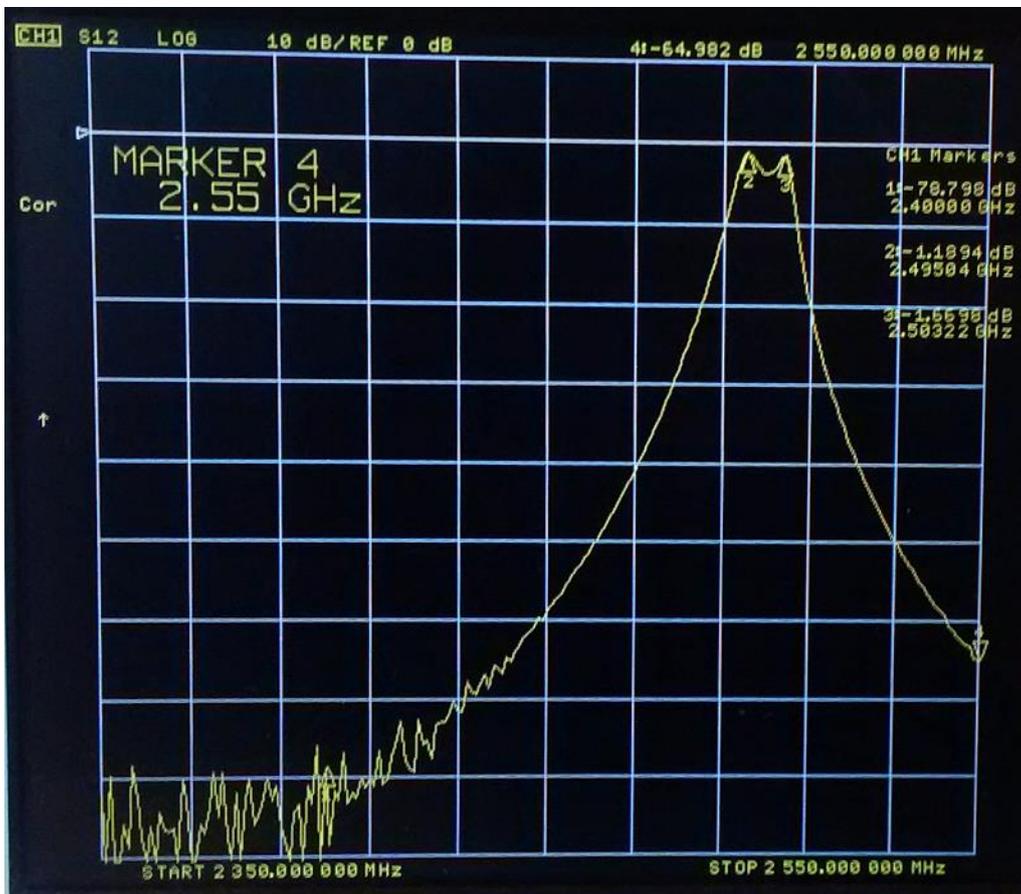
S11 log mag: return loss only about 4dB



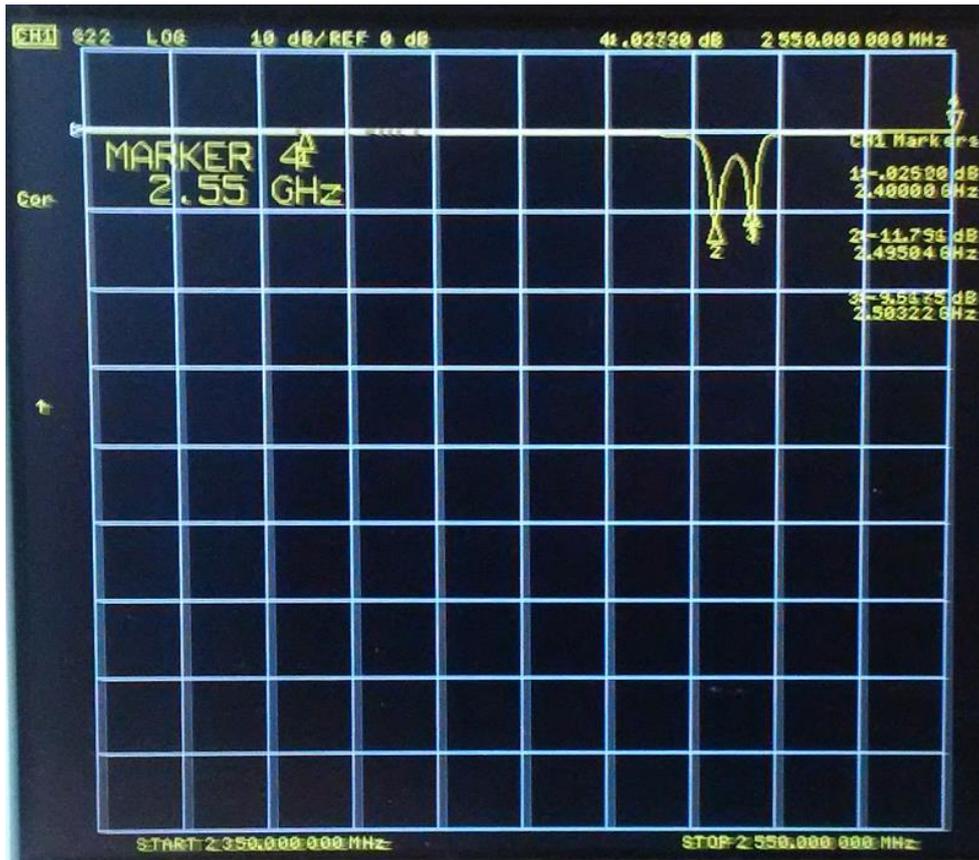
S11 Smith Chart



S21 log mag: insertion loss about 2.5dB with strong ripple in the passband



S12 log mag: essentially the same as S21

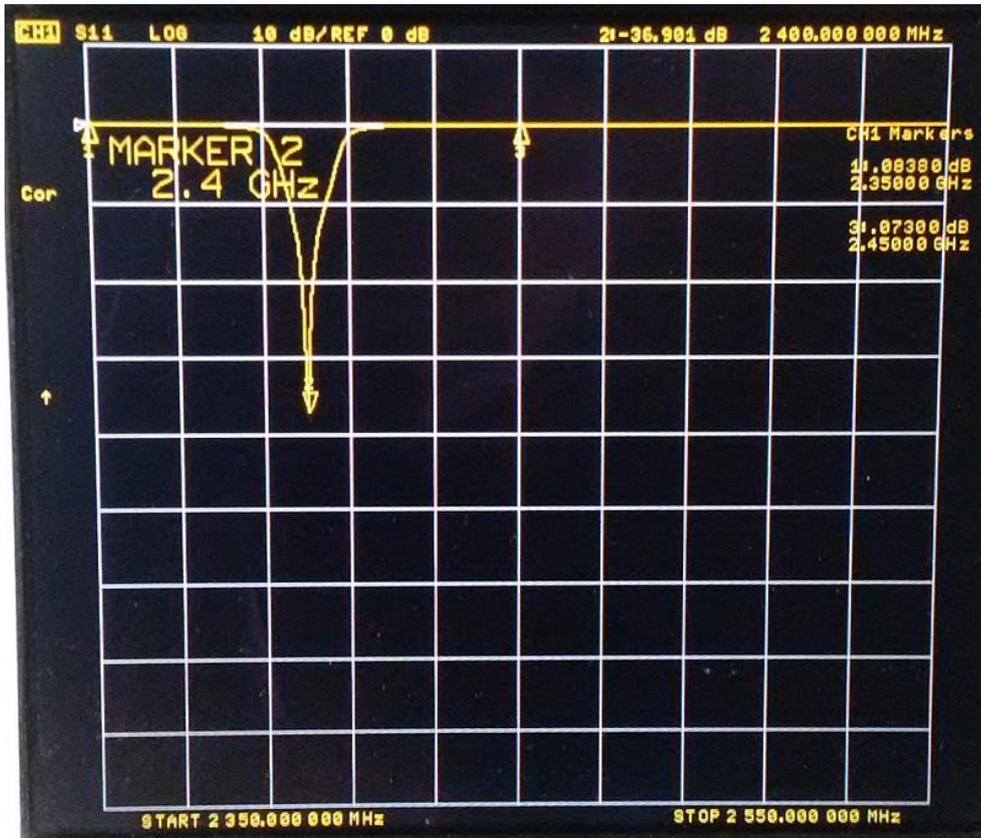


S22 log mag; return loss only about 4dB

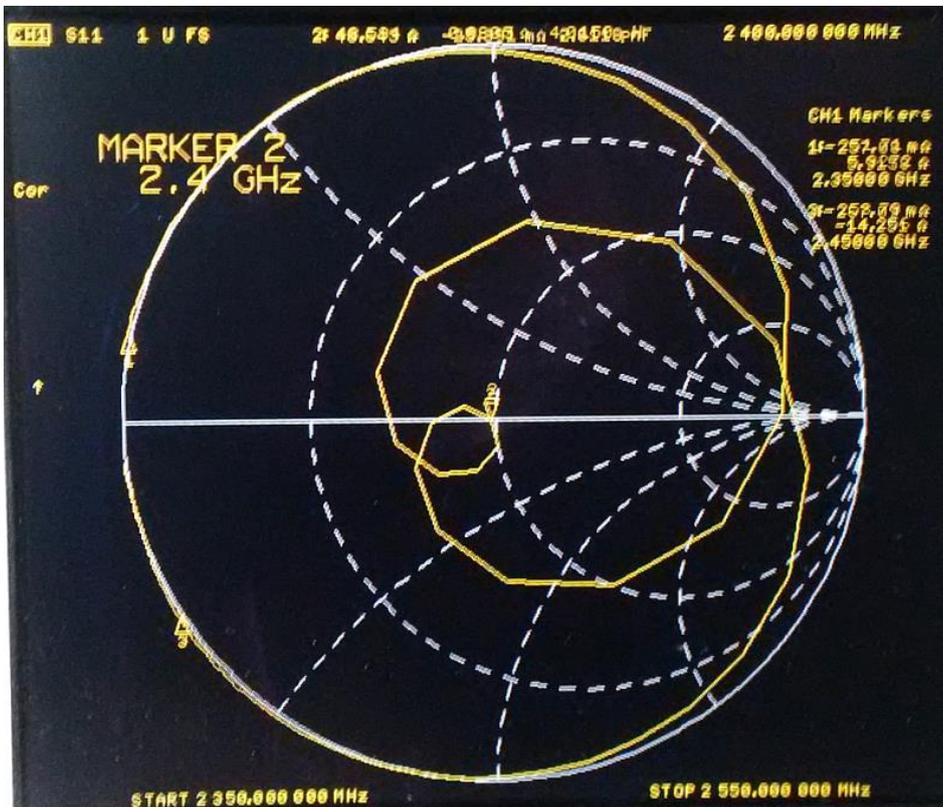


S22 Smith Chart

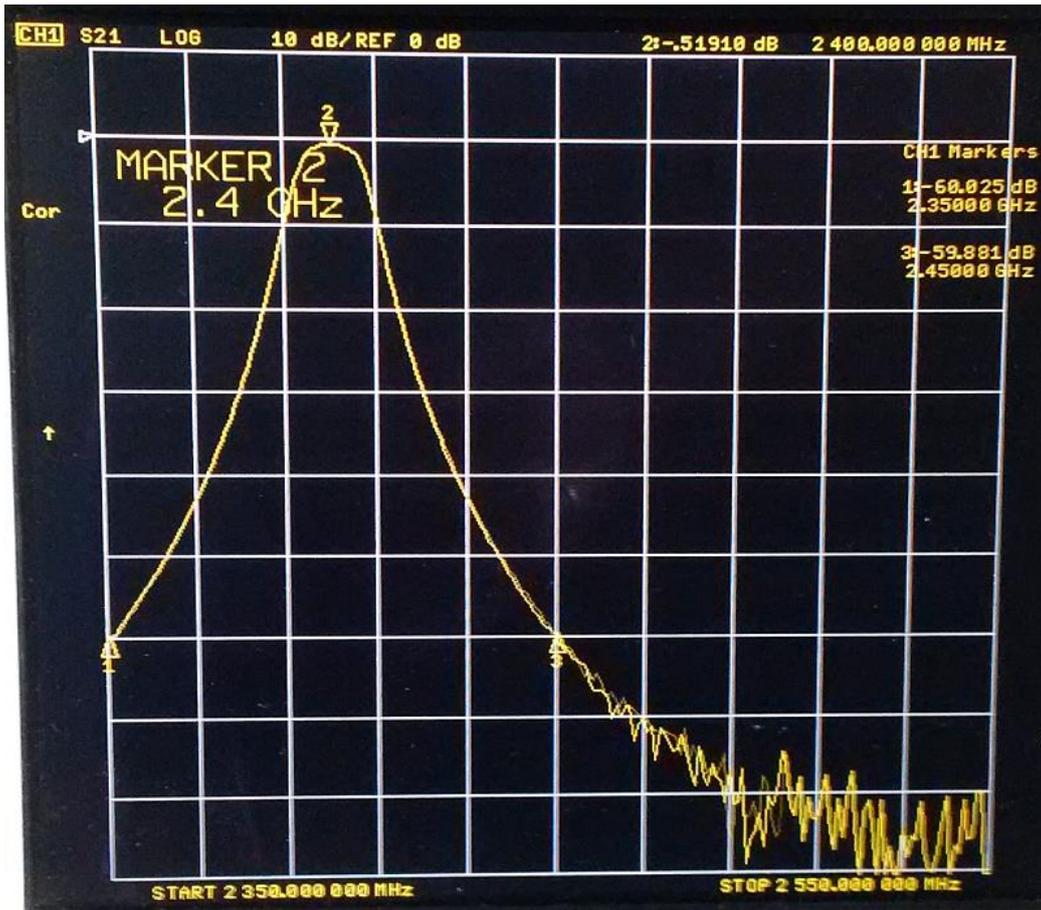
Next, I returned the filter to 2400MHz. For use at the QO-100 NB TPX uplink the needed bandwidth is only 500kHz (from 2400,0 – 2400,5MHz). If one wants to cover both transponders of QO-100 the needed frequency range is 2400,0 – 2410,0MHz.



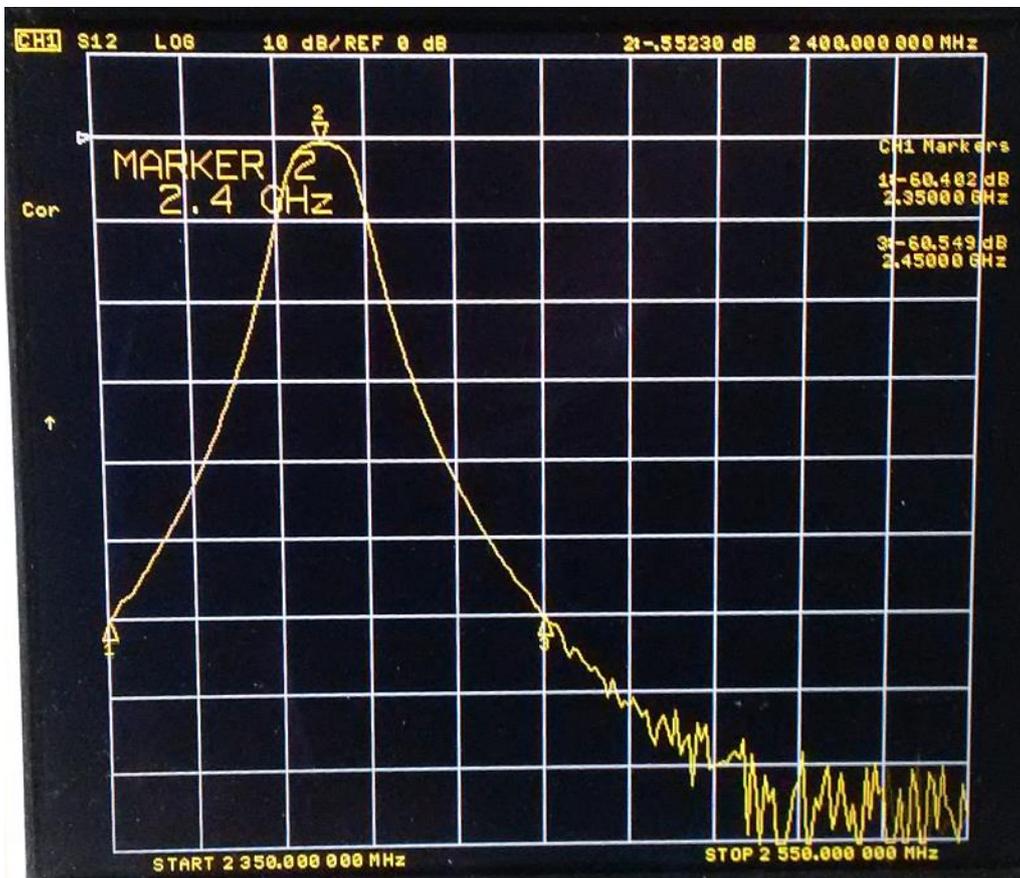
S11 log mag: return loss 36dB



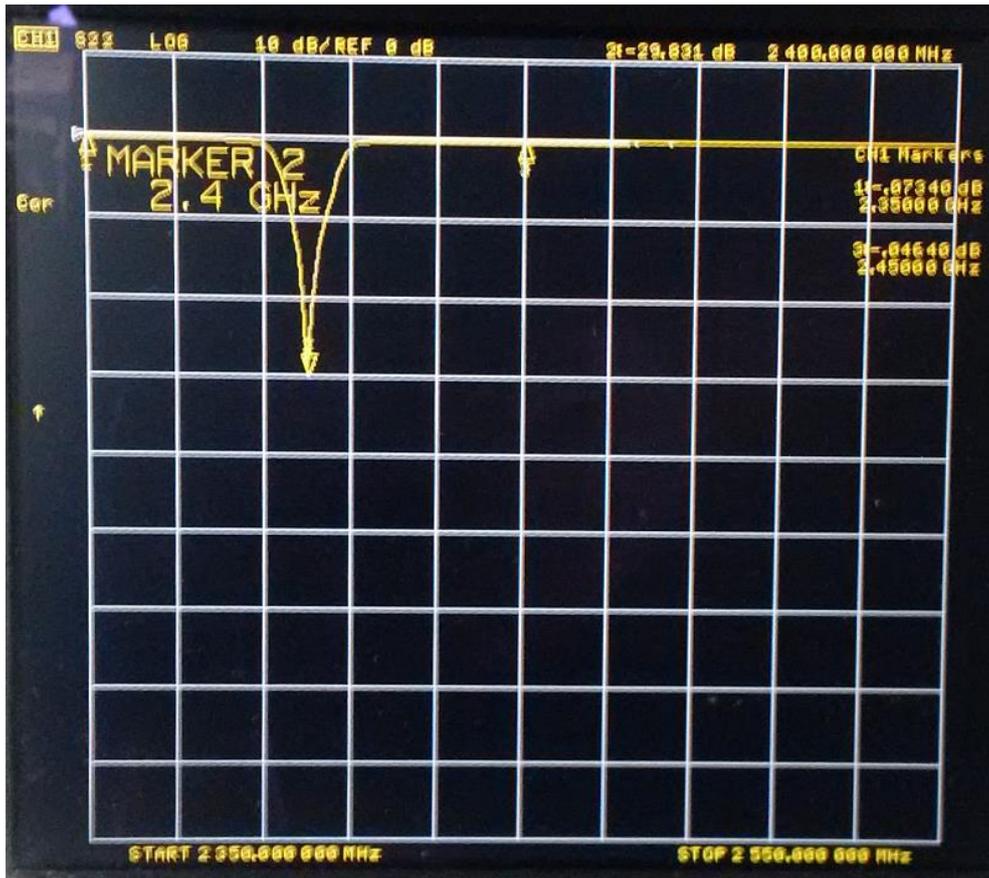
S11 Smith Chart: almost perfect



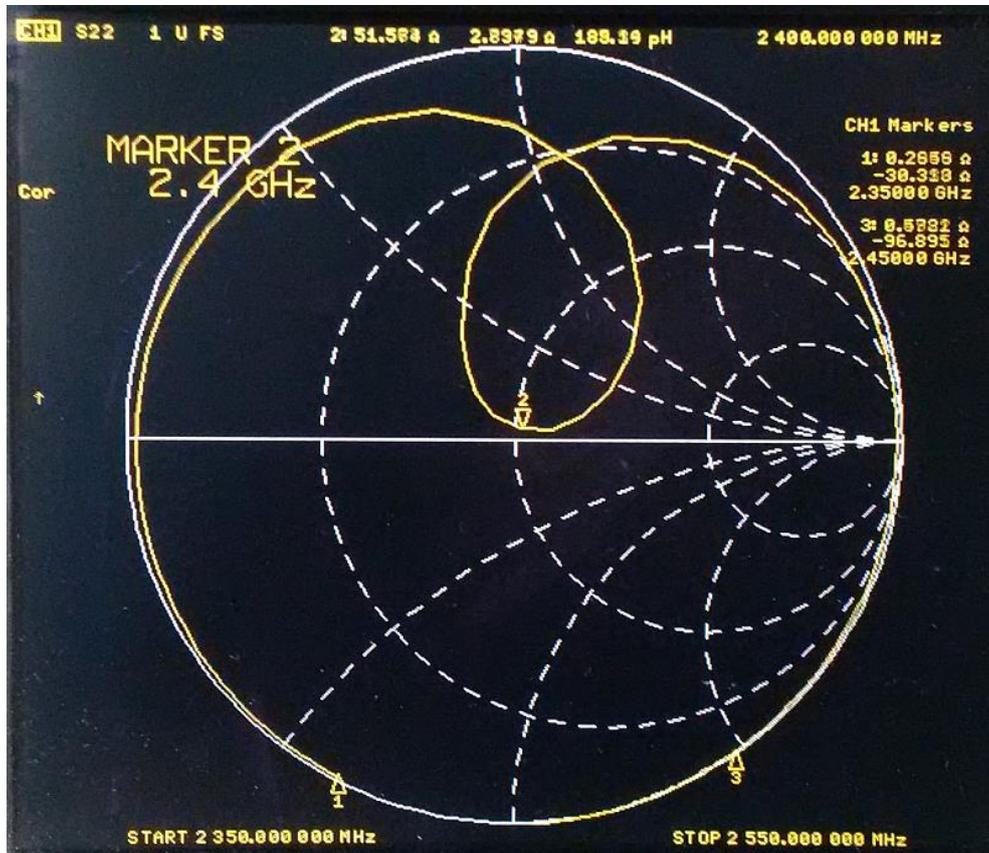
S21 log mag: insertion loss 0.5dB, nice selectivity -60dB at +/- 50MHz



S21 log mag: essentially the same as S21



S22 log mag: return loss 30dB



S22 Smith Chart: almost perfect

In summary this filter can be easily modified and retuned to 2.4GHz. Its low loss of about 0.5dB makes it suitable both as a highly selective receive filter for the 13cm band or as a transmit filter with an estimated power handling capability of more than 200 Watts.

I always appreciate feedback and will be happy to answer questions. Please send them to the Email address given below. Many thanks in advance.

Best regards

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