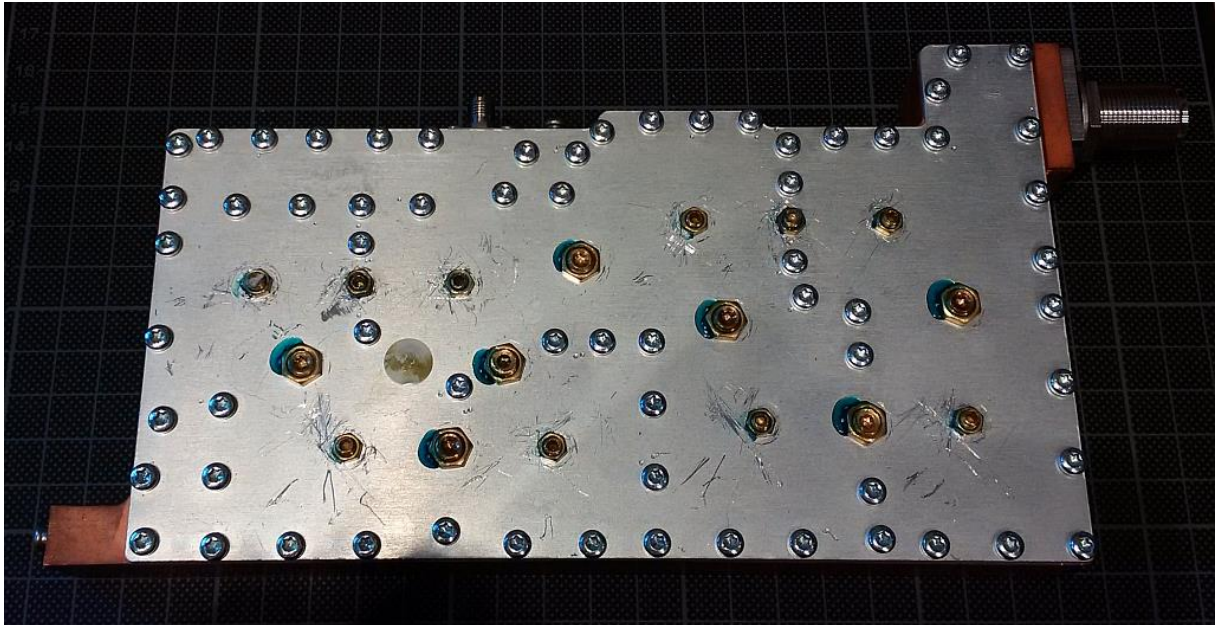


# Commercial 2300-2400 MHz band-pass filter retuned for QO-100 uplink at 2400-2410 MHz

Matthias, DD1US, January 30<sup>th</sup> 2020

Recently some surplus band-pass filters for 2300-2400 MHz turned up in Ebay and other forums. The commercial filter is originally tuned to 2300-2400 MHz. One port is a female SMA connector (in the rest of this document called Port 1) and the other port a female N-connector (Port 2). Here are some pictures of the filter.

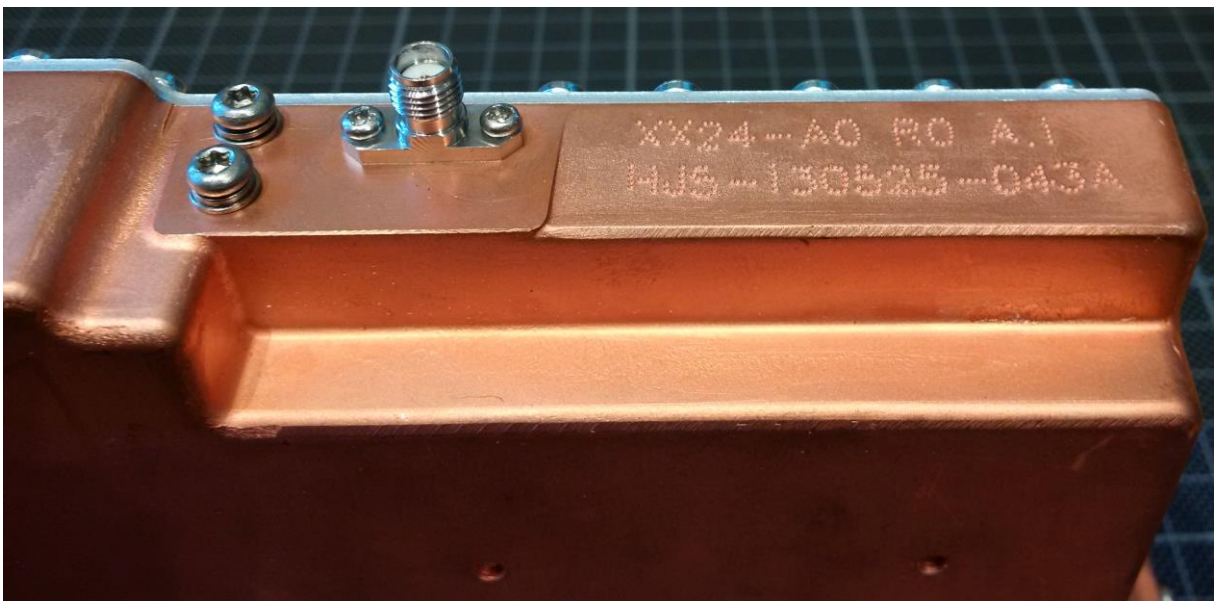


It looks quite unique because it has a distinctive shape and the lower part of the encasing looks like it is made from copper.





My filter has the following marking:  
XX24-A0 R0 A.1  
HJS-130525-043A

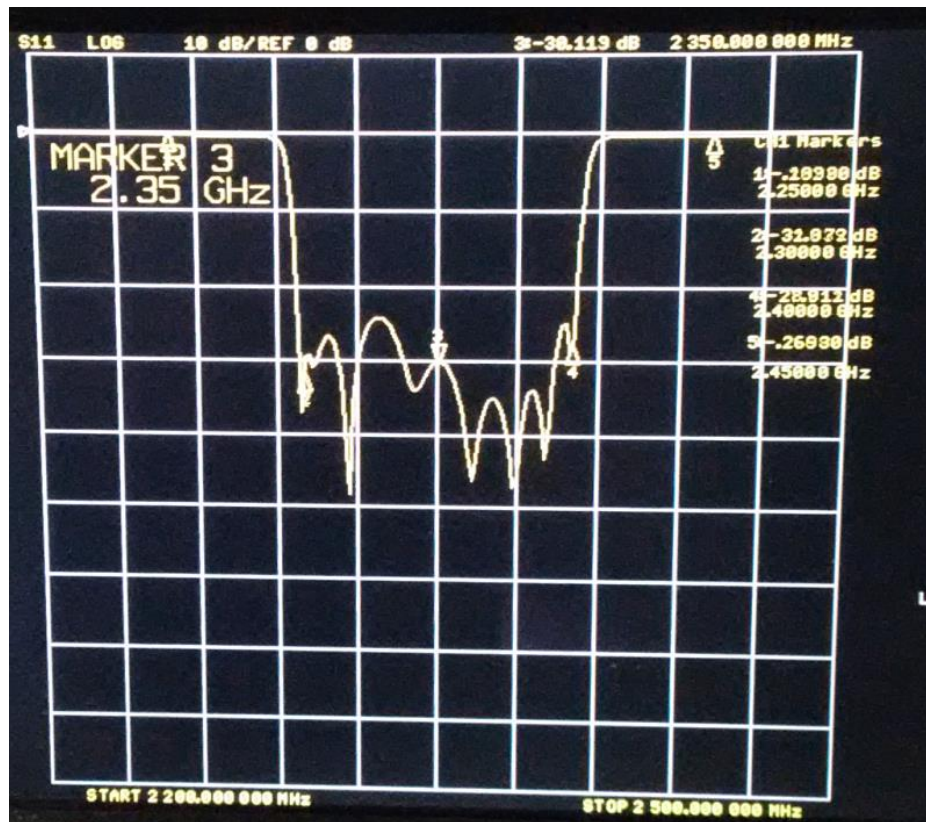


In addition, it has a label with the following information:

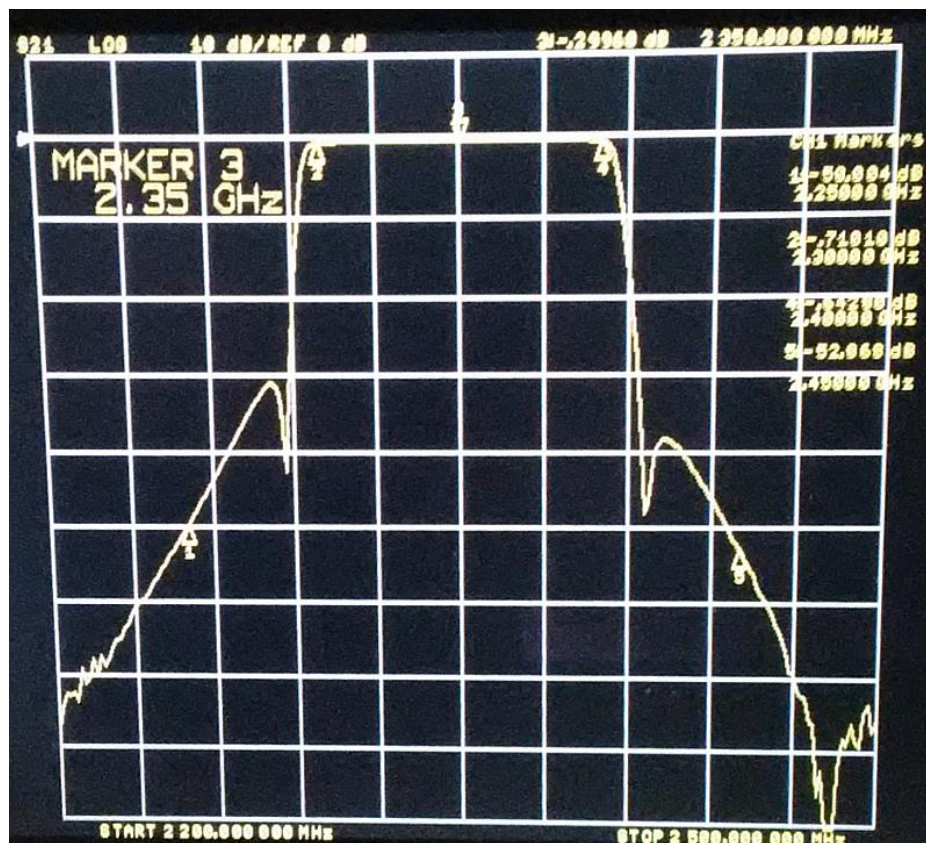
Model name: XX24-Ao R0  
Freq: 2300-2400 MHz  
Ace Axis P/N: 330-00024-003 Rev: 2.0  
S/N: D2A-00034313275744

Here are some measurements of the filter before I retuned it.

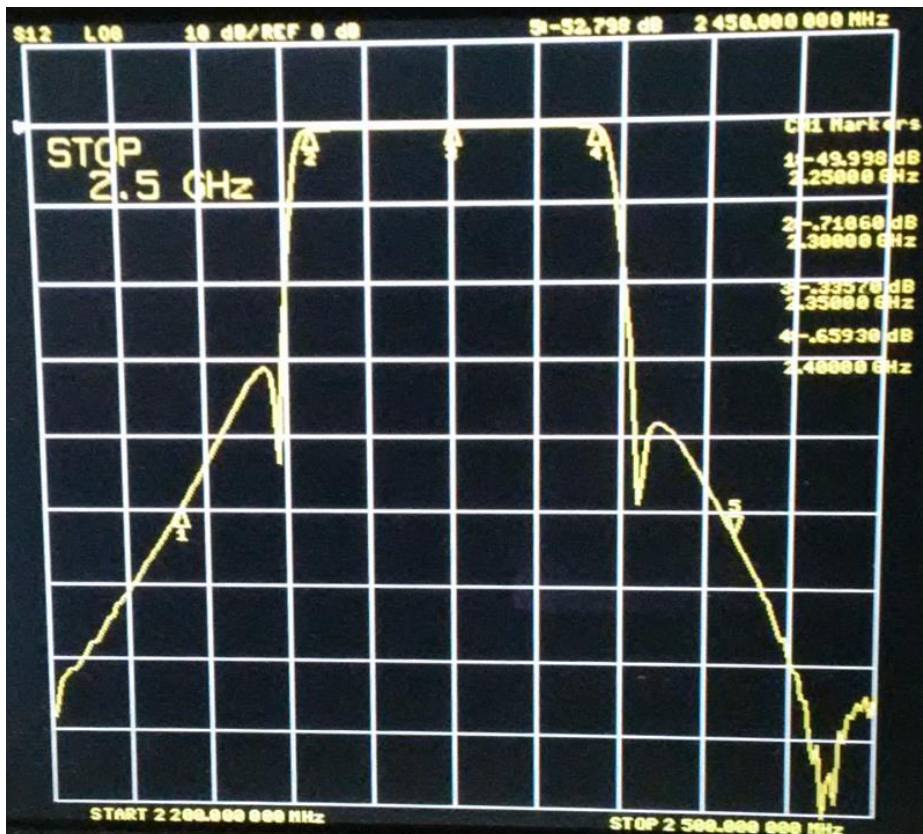
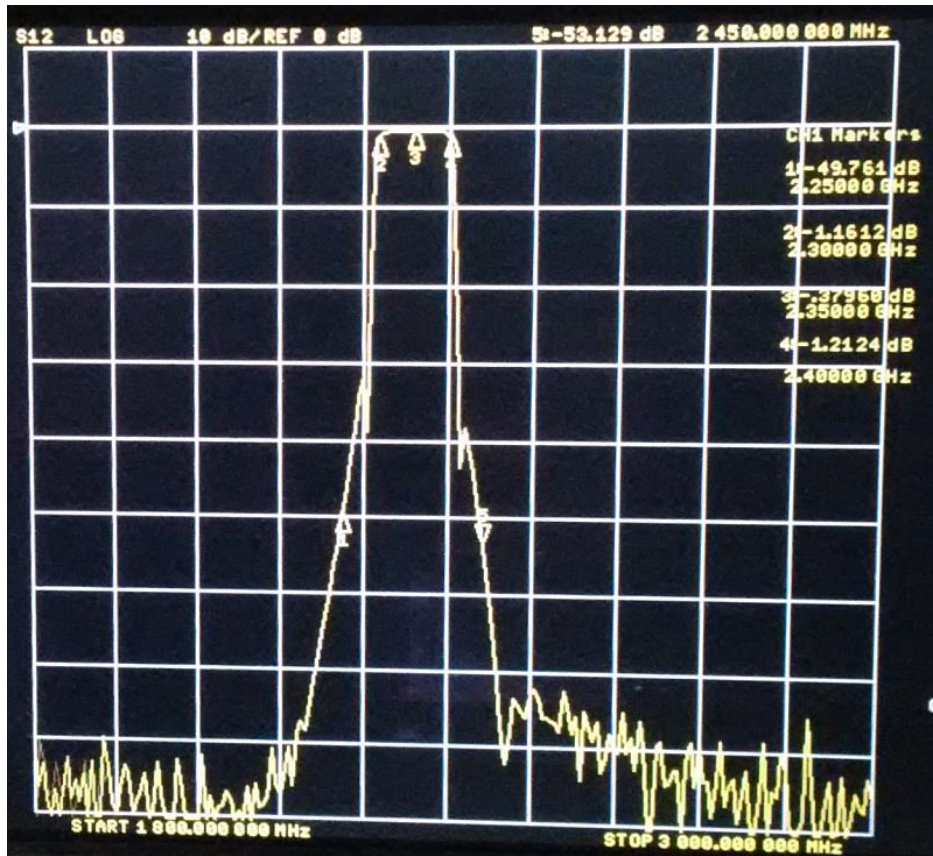
S11: input return loss > 25dB from 2300...2400 MHz



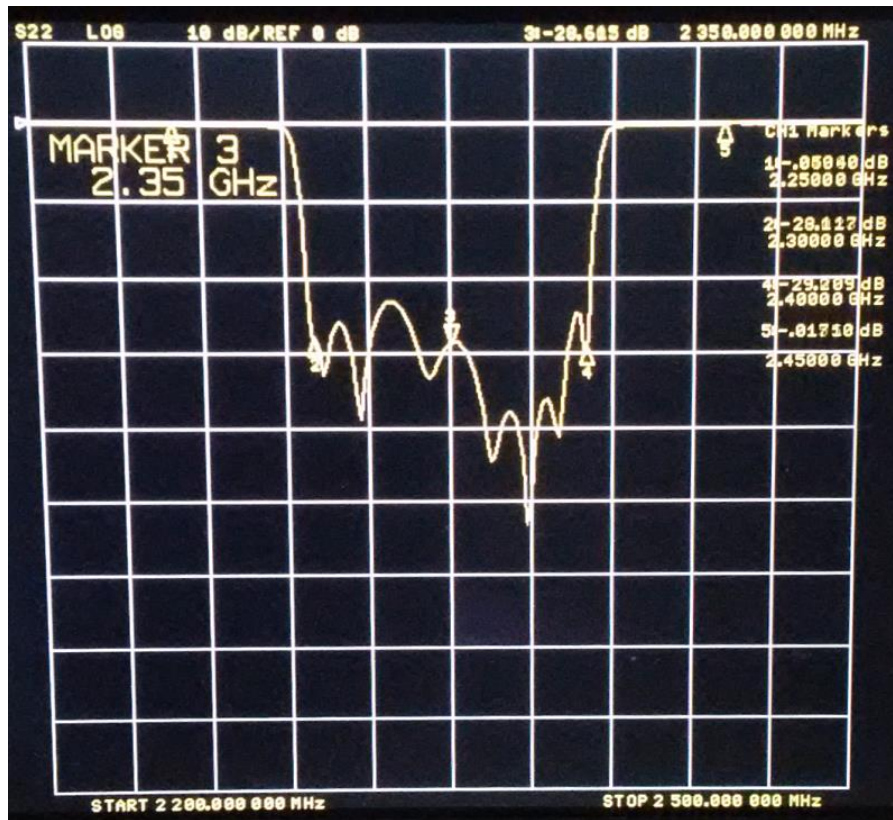
S21: insertion loss < 0.72dB from 2300...2400 MHz with very low ripple (2410 MHz already approx. 10dB)



S12: insertion loss <0.72dB from 2300...2400 MHz (2410 MHz already approx. 10dB)

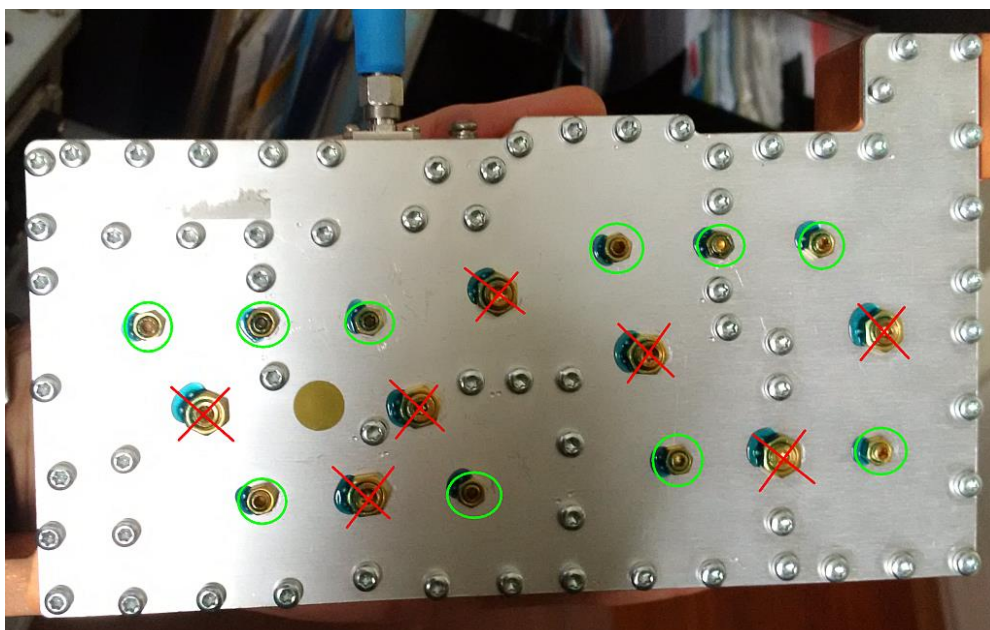


S22: output return loss > 25dB from 2300...2400 MHz



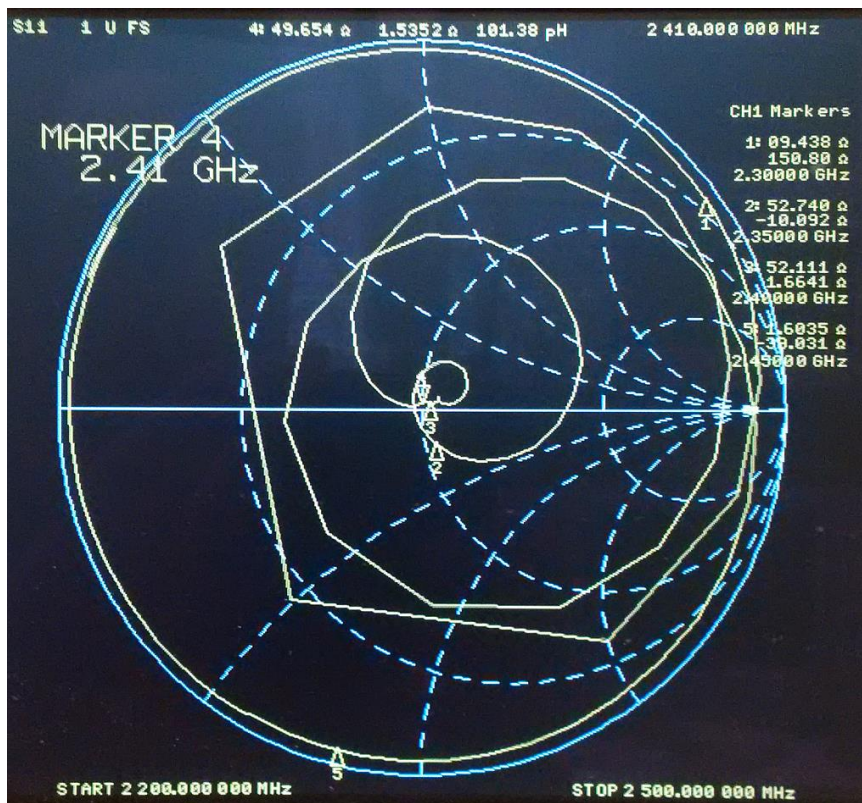
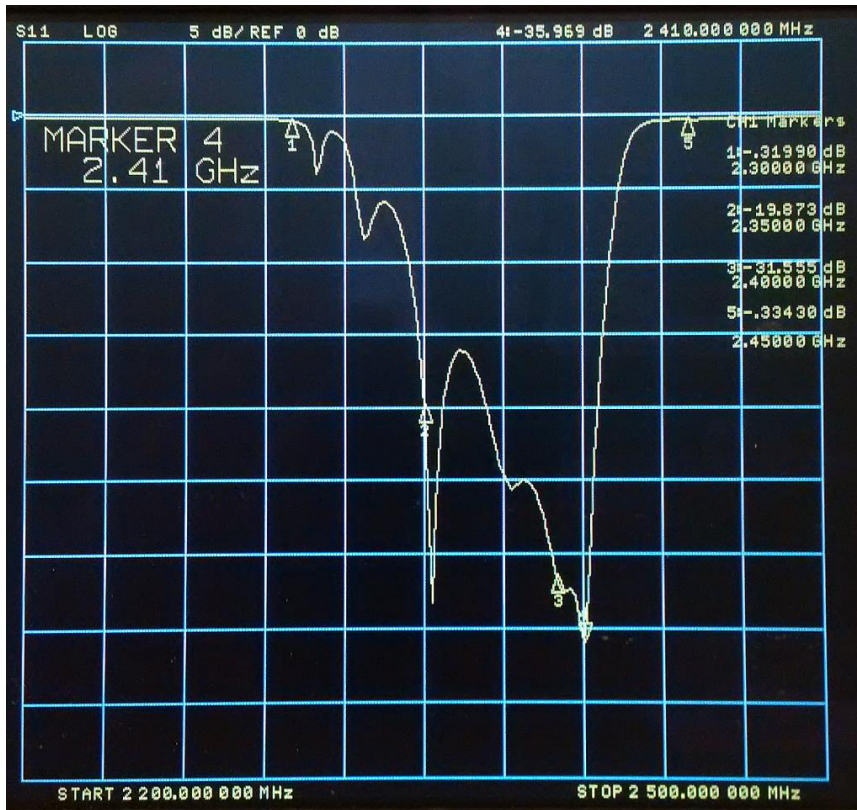
As I want to use this filter primarily to filter my TX signal for the QO-100 narrowband and wideband transponder uplink, I decided to retune it. Before retuning, the insertion loss in the frequency range of the wideband transponder was too high. My target was to reduce the insertion loss in the frequency range 2400-2410 MHz and still keep the nice selectivity of this filter. I found some measurement results published by Manfred DK5FA which showed very promising results.

In the next picture you can see marked in green, which screws I used to retune the filter. I have not touched the bigger screws which are marked in red because I assume that they determine the coupling factor between the different filter sections. All screws are secured with a nut and in additional with some bolt adhesive. Before tuning, remove the bolt adhesive and loosen the nut only very little so that you can just turn the nut. There should be still some tension of the nut when tuning the screw to keep a proper ground connection of the screw.

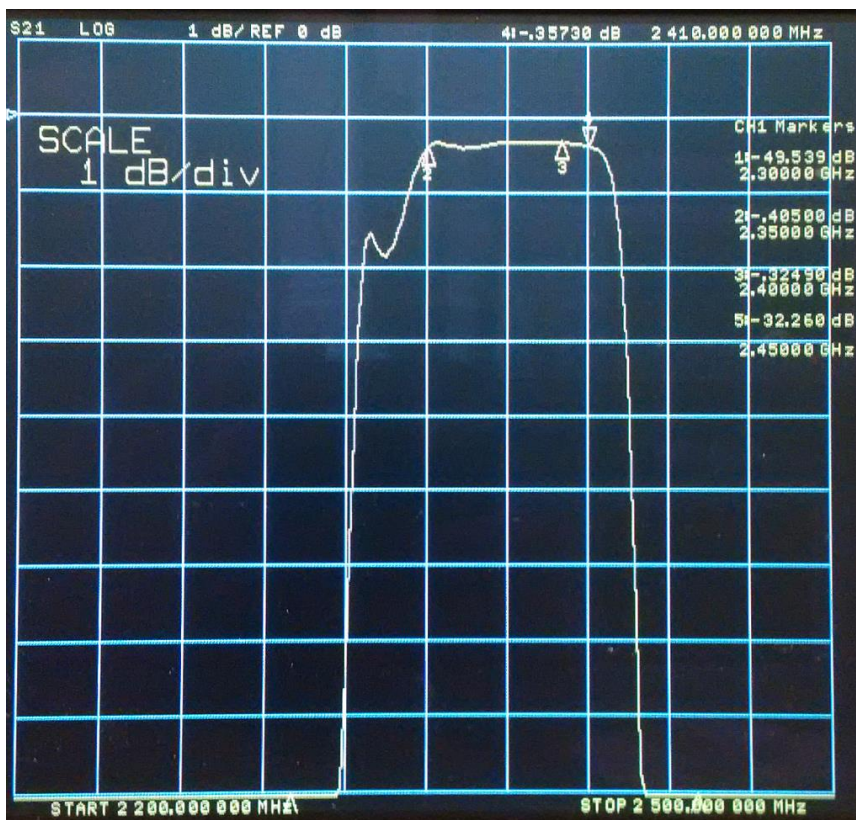
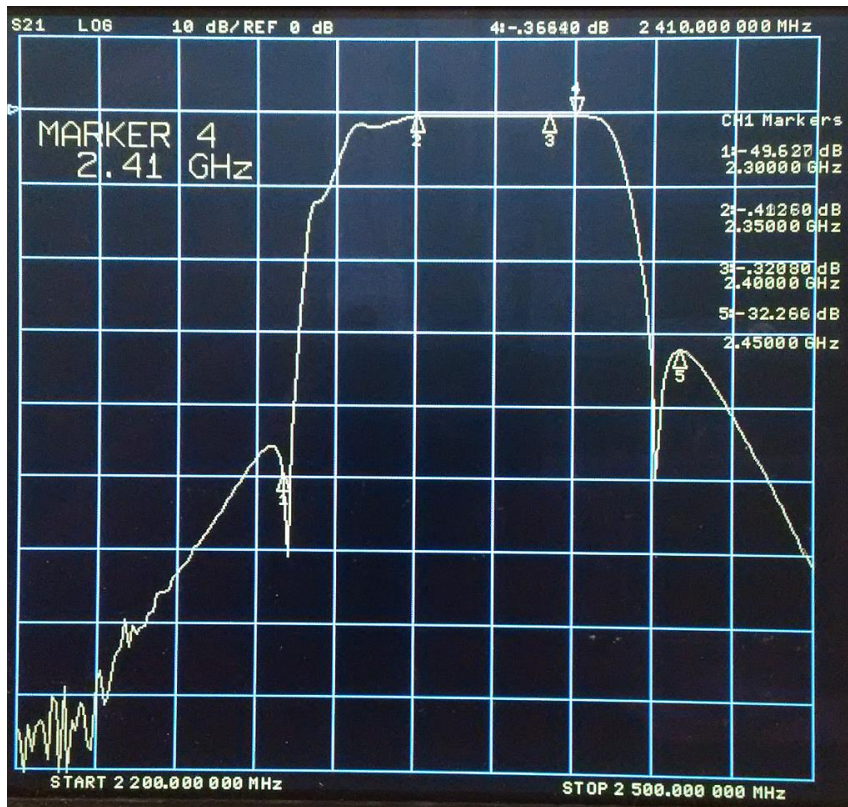


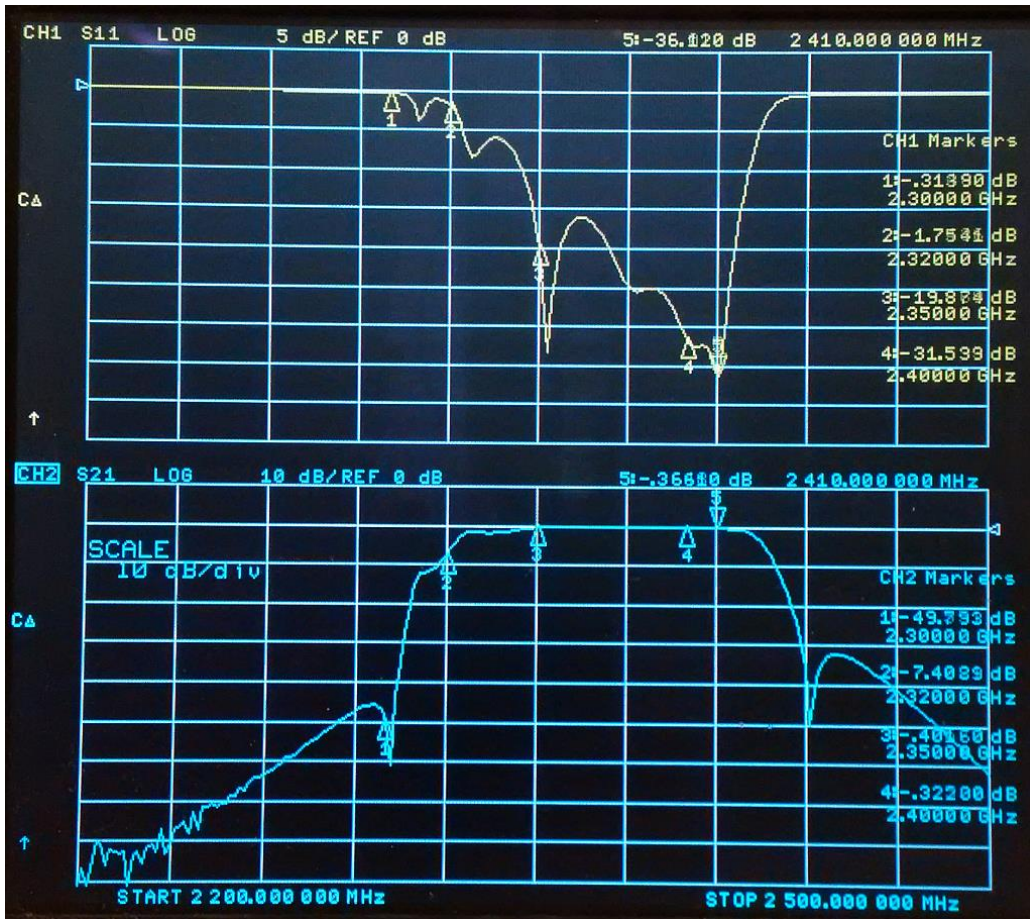
Here are some measurements after retuning the filter:

S11: input return loss > 30dB from 2400...2410 MHz



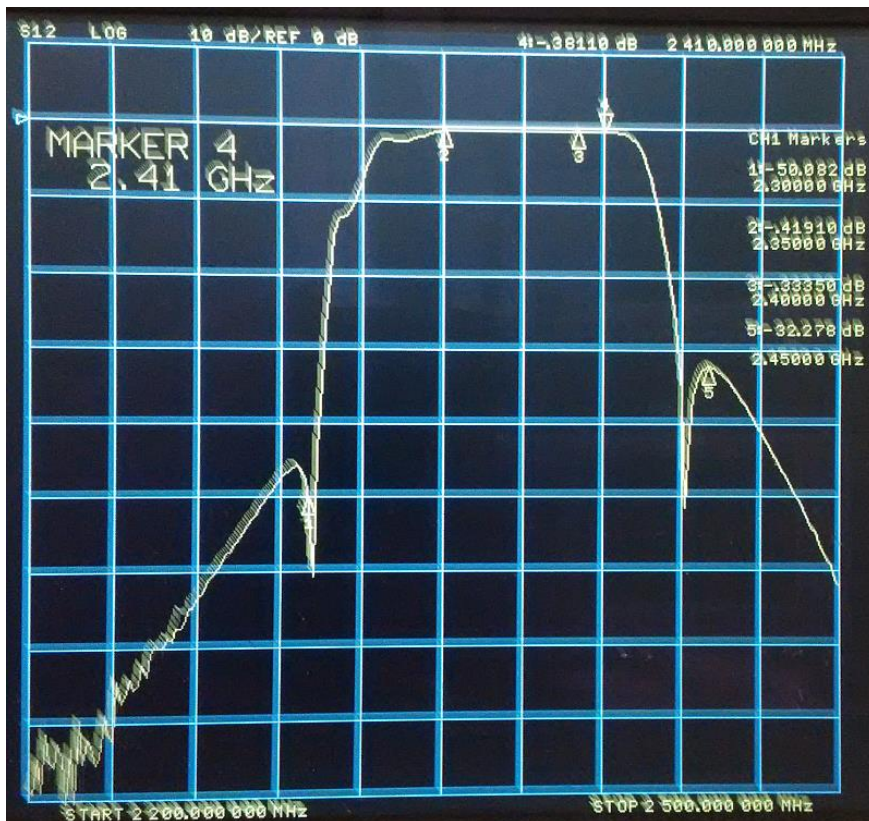
S21: insertion loss <0.4dB from 2400...2410 MHz





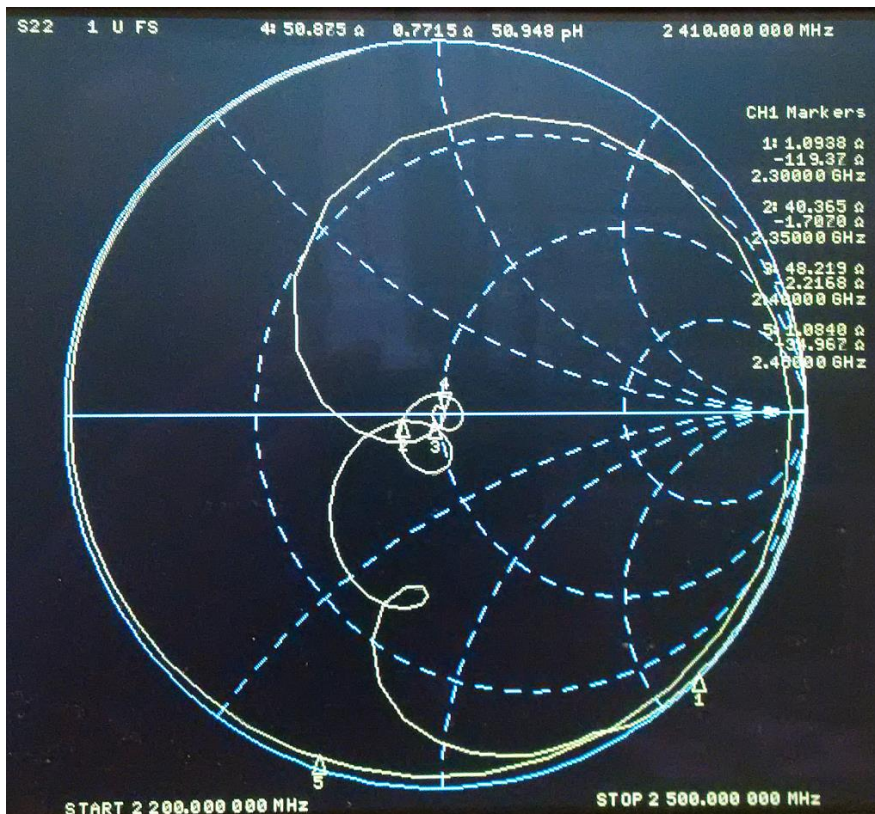
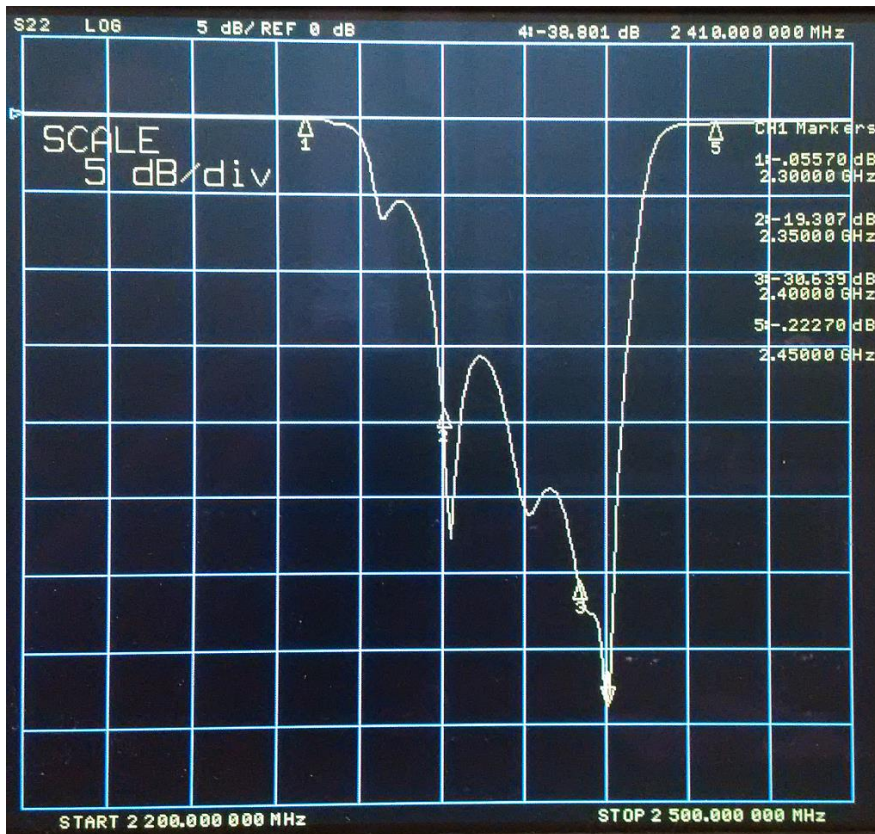
When tuning the filter it is very helpful to monitor both S11 and S21 simultaneously.

S12: insertion loss <0.4dB from 2400...2410 MHz





S22: output return loss > 35dB from 2400...2410 MHz



After retuning the filter, the insertion loss in the passband from 2400-2410 MHz is below 0.4dB. Input and output matching are >30dB and thus excellent.

I am interested to get more information about this filter, for example the maximum power handling capabilities. Also, if you know in which equipment it was integrated or who produced it please let me know.

I am searching for another such filter which I want to use for terrestrial operations. If you have one which you want to sell or know where such filters are still available please send me an Email.

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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