<u>L-Band bandpass filters from RLC retuned to 1690MHz for Weather Satellite Downlink</u>

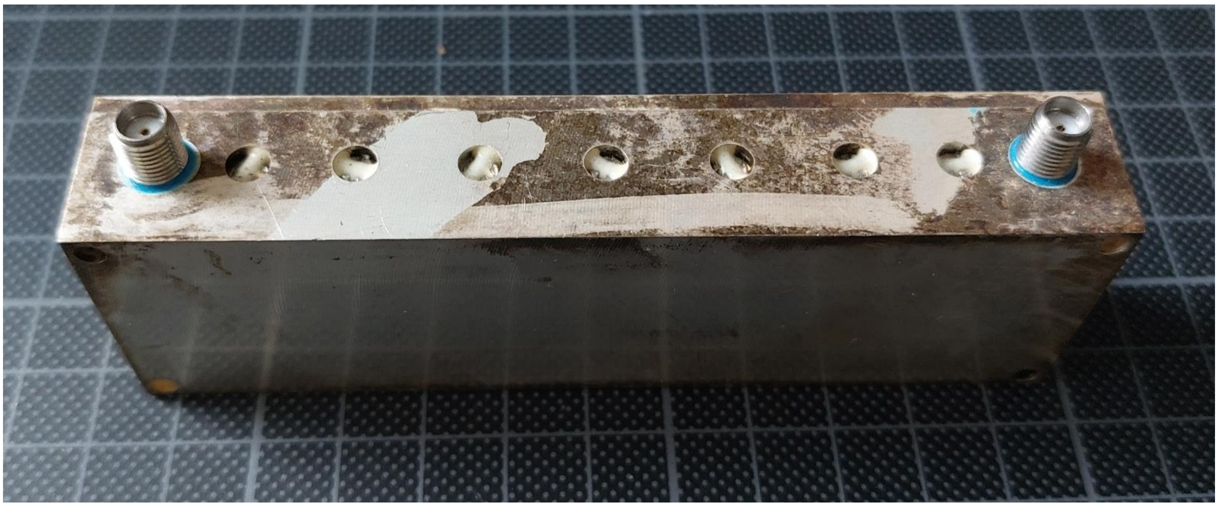
May 2nd 2024 Matthias DD1US Rev 1.0

Hello,

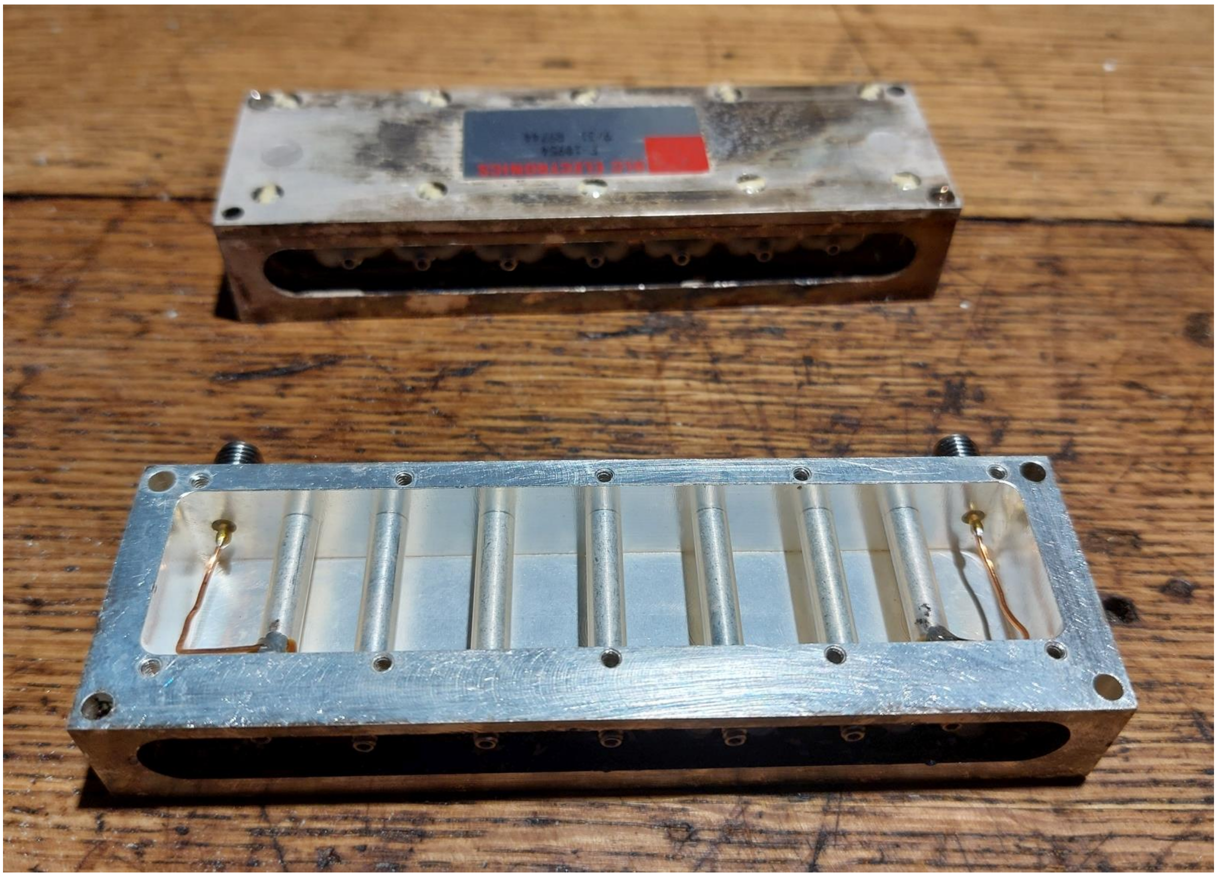
Some time ago I got some L-band filters and finally found the time to have a closer look at them. The source of the filters is RLC. I have two different versions and all filters were tuned to the frequency range 1720 – 1980Mhz.

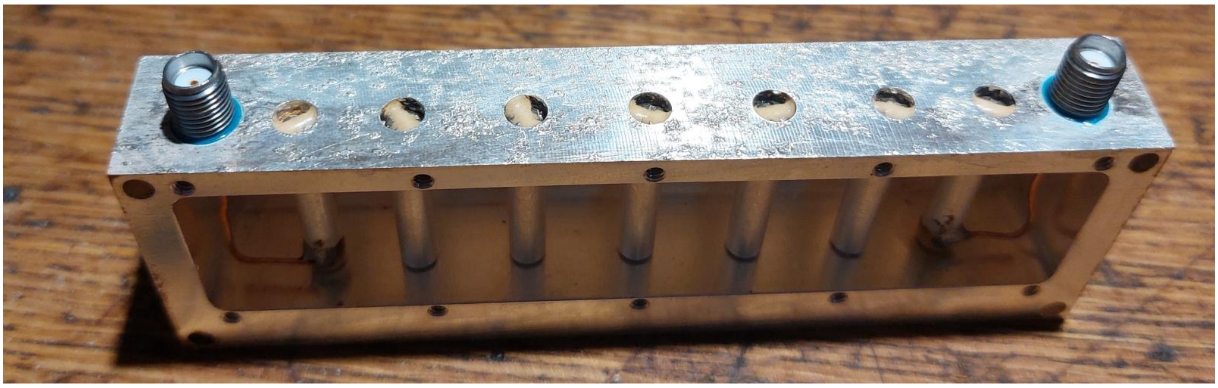
The slightly smaller filter is a comb line filters with 6 resonators originally tuned to the frequency range 1720 – 1880MHz. It has the part number F-9313 and looks like this:

The slightly bigger filter is a comb line filter with 7 resonators originally tuned to the frequency range 1800 - 1980MHz. It has the part number F10954 and looks like this:



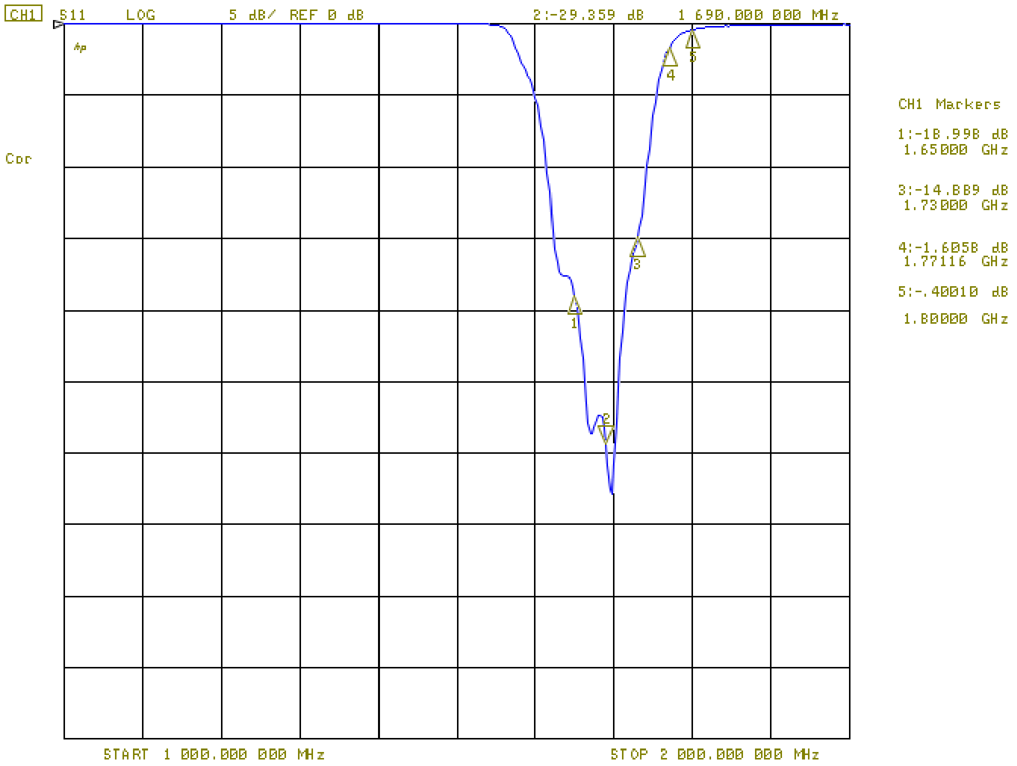
Here is a picture of the opened comb line filter with 7 resonators:

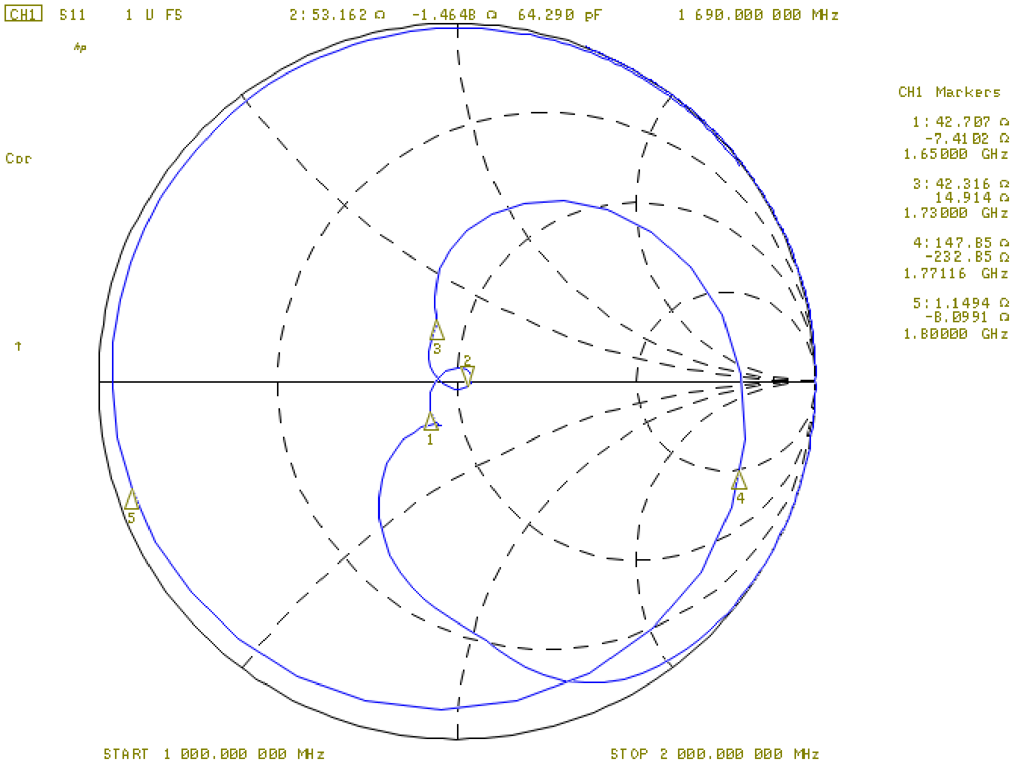




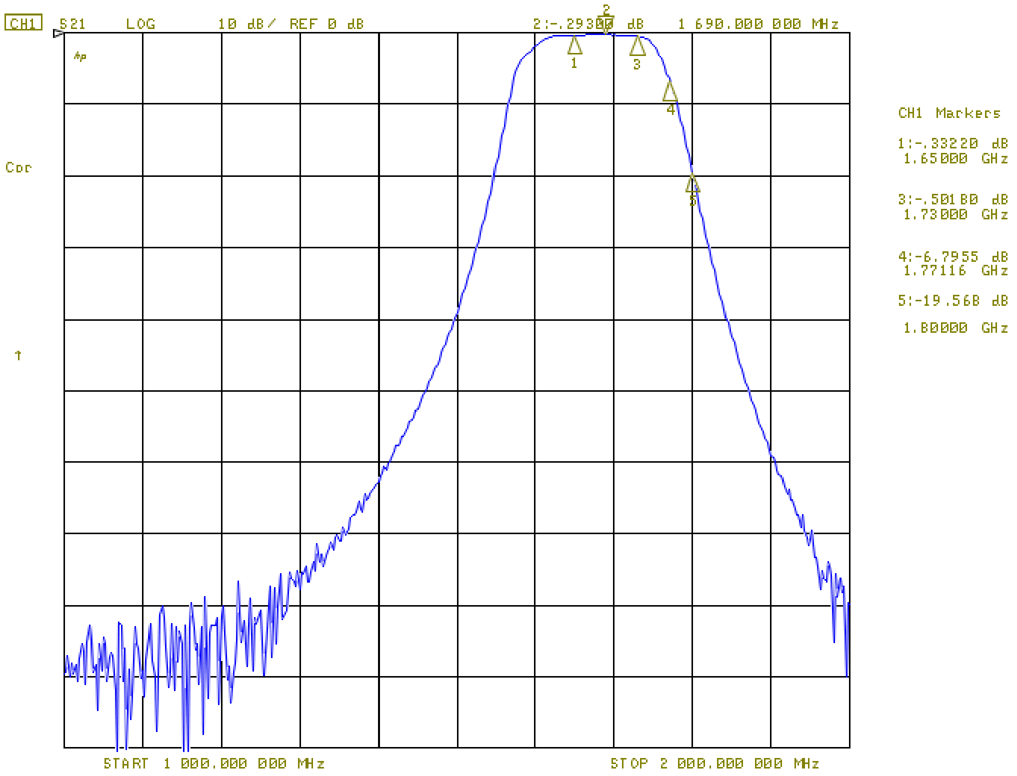
The tuning points of the filters are protected by some special lacquer. The easiest way I found was to heat up the lacquer so that it gets brittle and then it can be removed easier. The process is still a bit tedious especially cleaning the tuning screws including the lock nut.

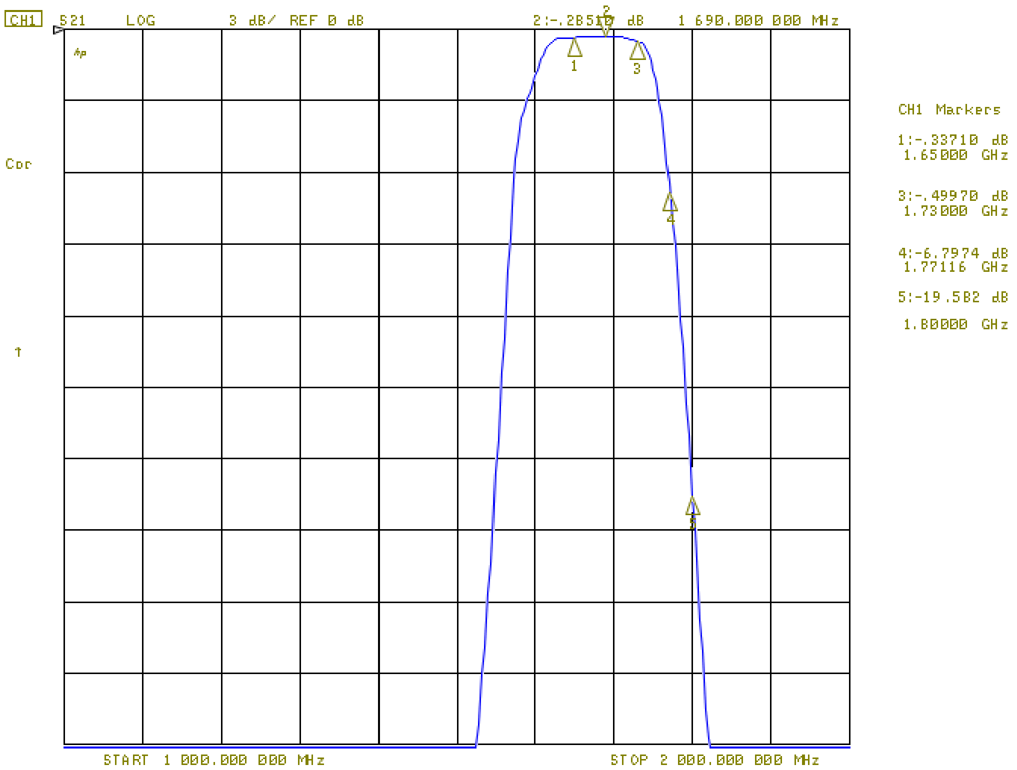
Here are the S-parameters of a 6-resonator filter after tuning to the L-band weather satellite downlink band:



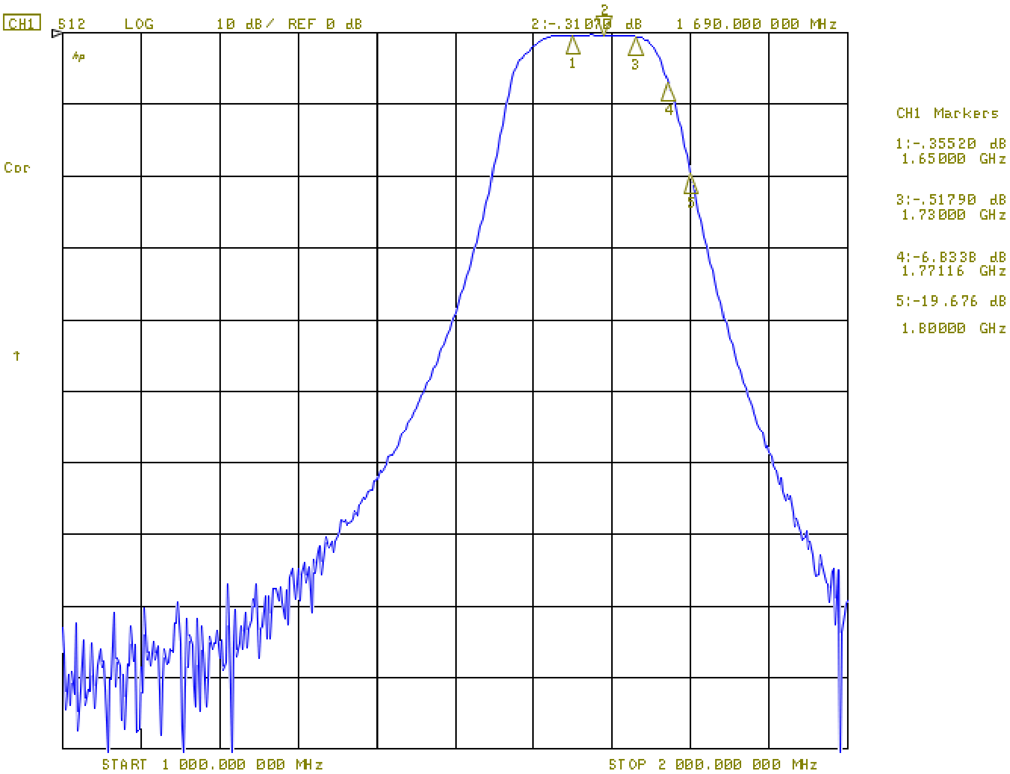


Input return S11 loss is almost 30dB @1690MHz.

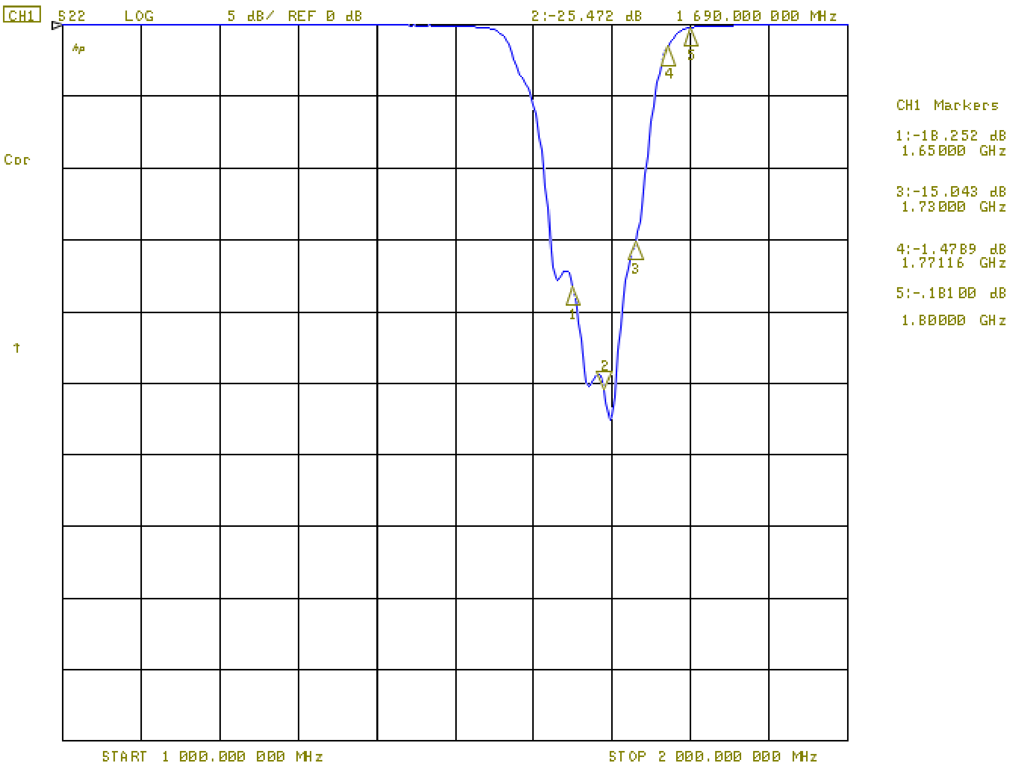


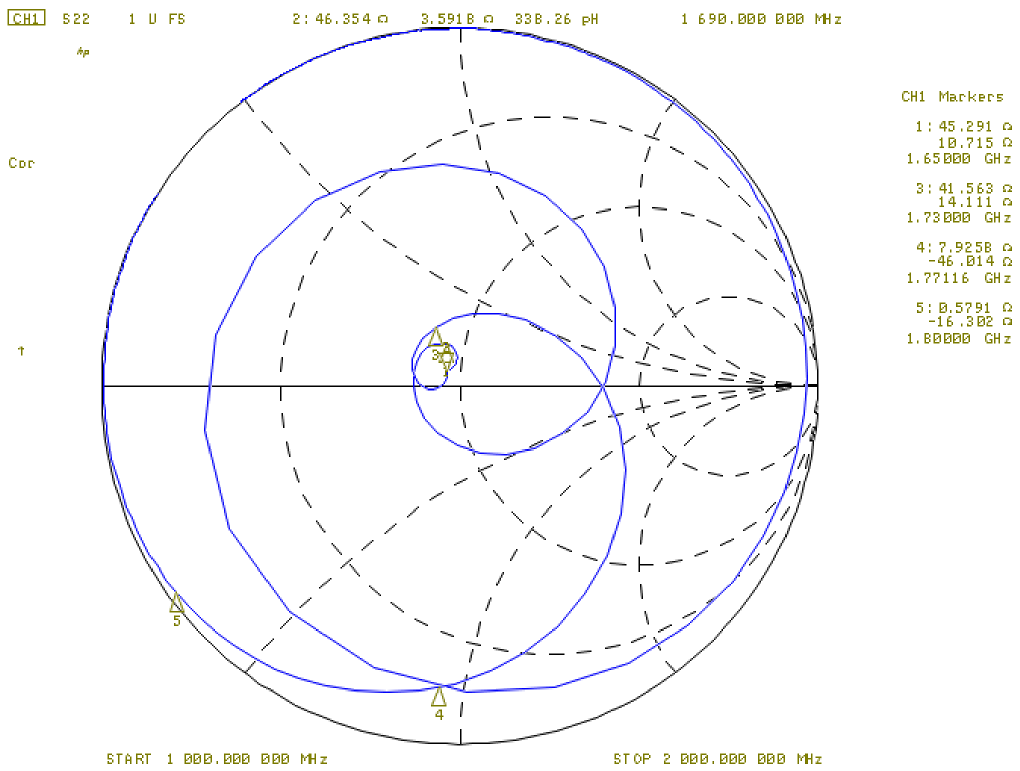


Insertion loss S21 is 0.29dB @1690MHz.



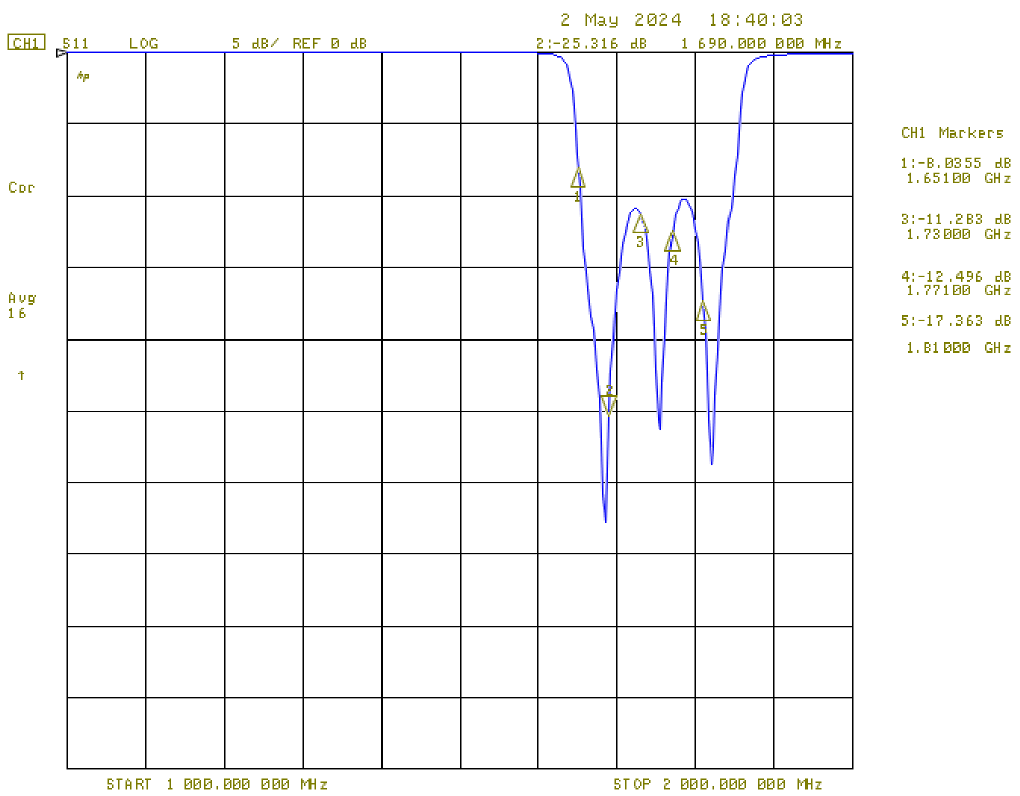
Insertion loss in opposite direction S12 is almost identical to S21.

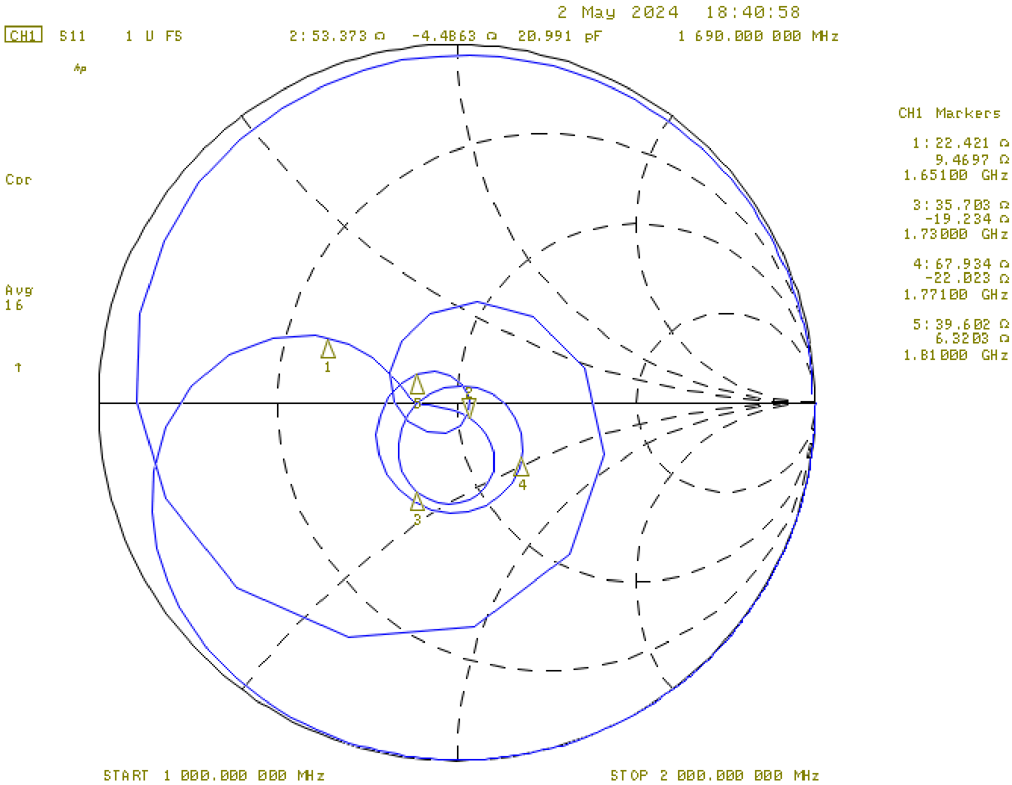




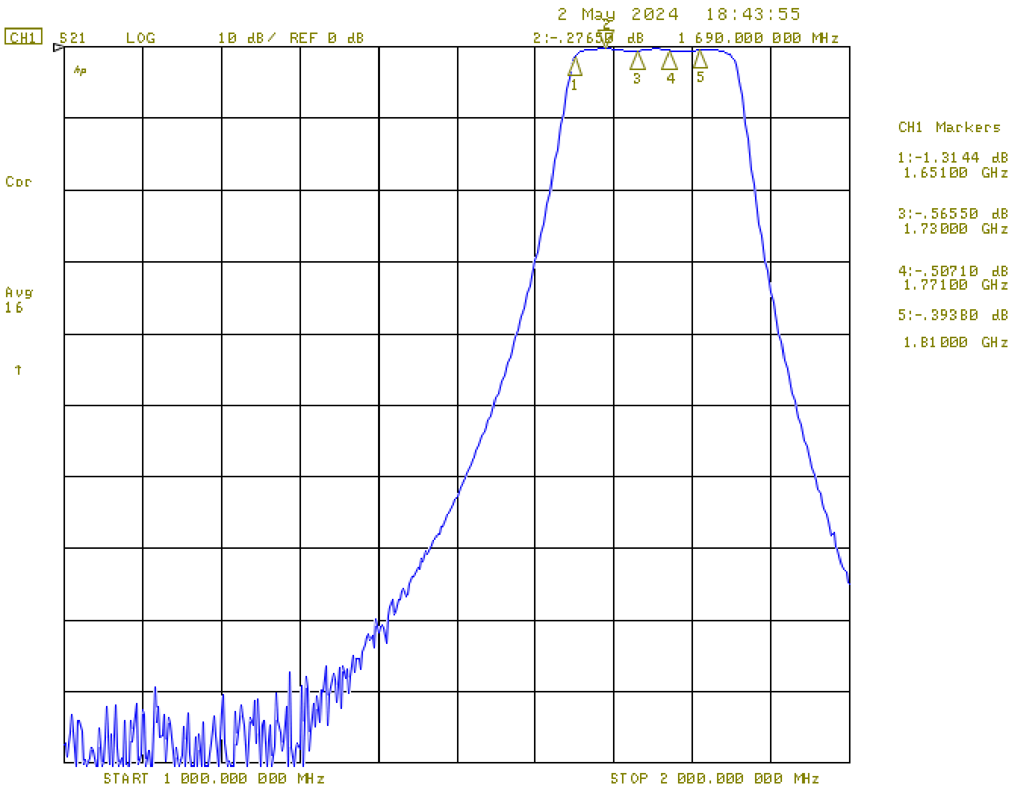
Output return loss S22 is more that 25dB @1690MHz.

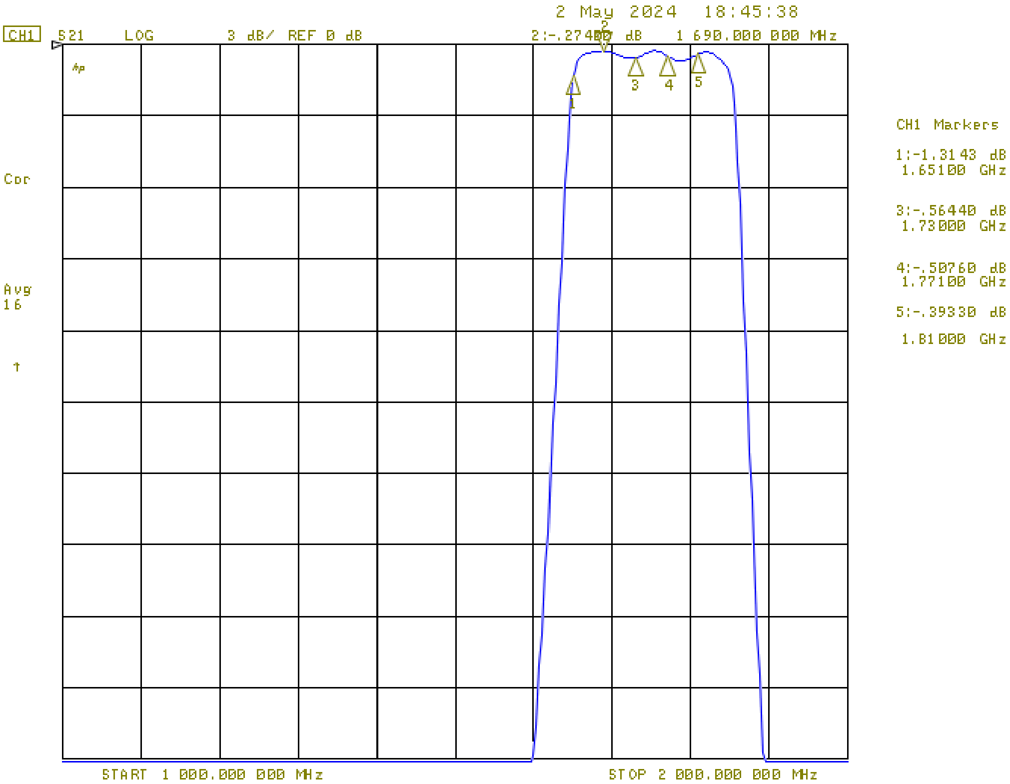
Here are the S-parameters of a 7-resonator filter after tuning to the L-band weather satellite downlink band:



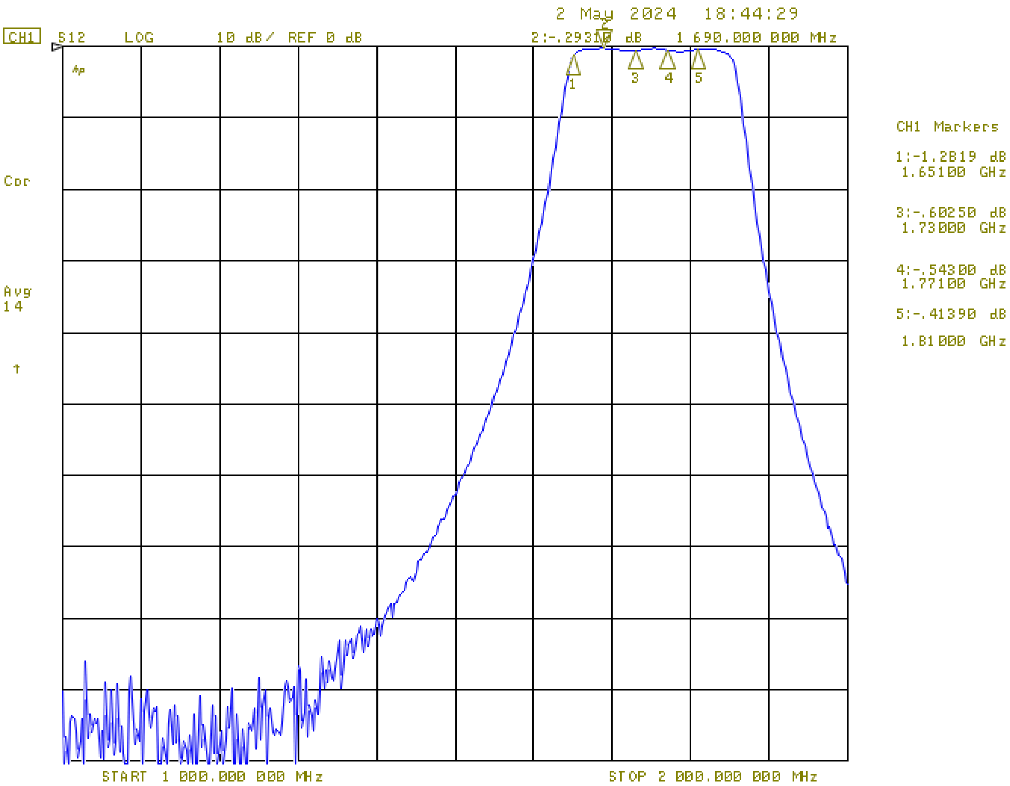


Input return S11 loss is 25dB @1690MHz.

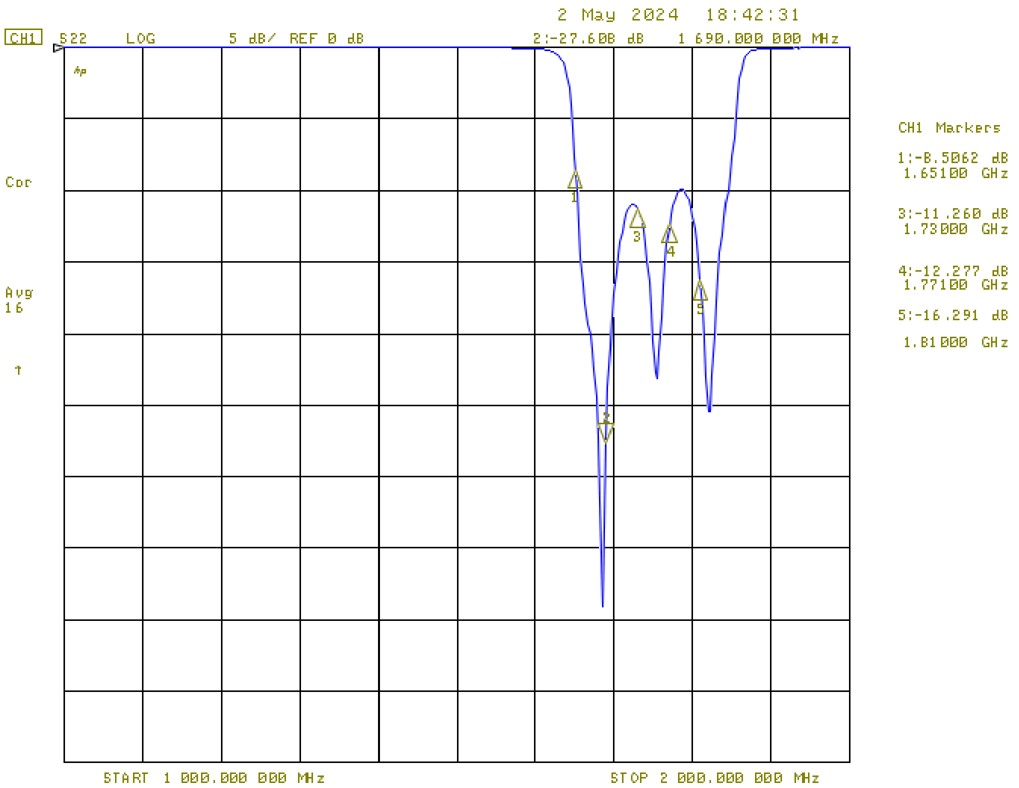


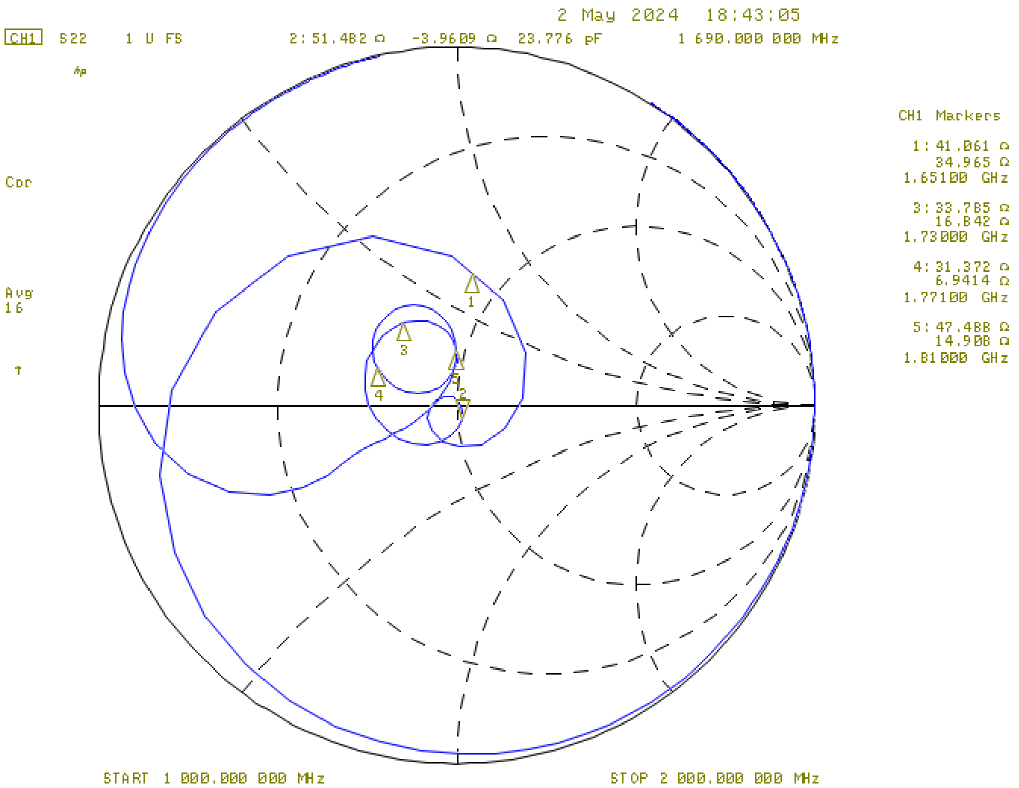


Insertion loss S21 is 0.28dB @1690MHz.

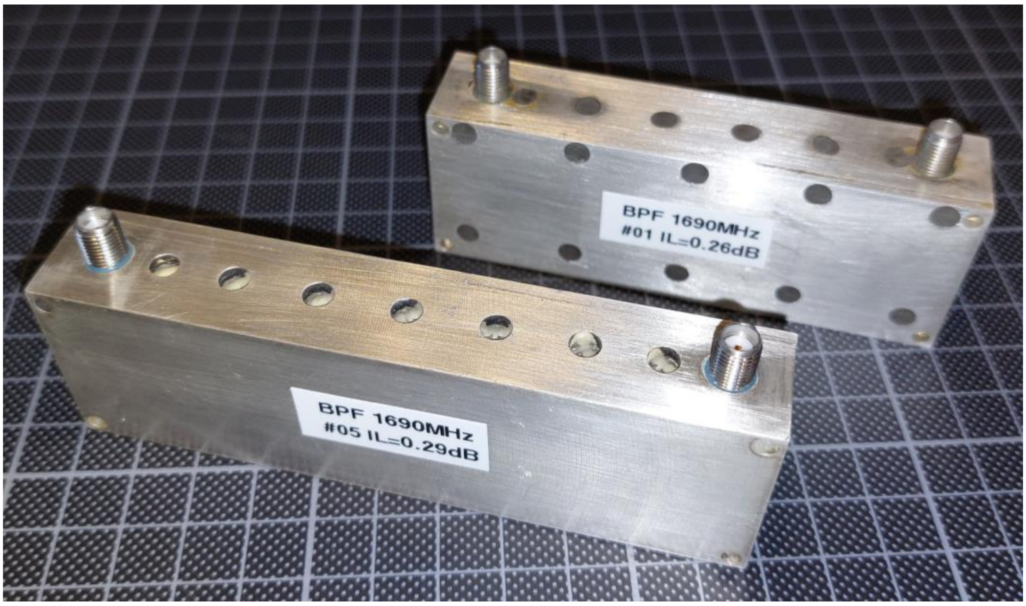


Insertion loss in opposite direction S12 is almost identical to S21.





Output return loss S22 is 27dB @1690MHz.



Retuning the filters to 1690MHz worked well for most filters but there were also 7-resonator filters where the tuning range was not sufficient. All filters which I was able to retune had finally an insertion loss of less than 0.3dB.

In summary these filters are excellent frontend filters for L-band weather satellite receivers at 1690MHz with very low insertion loss and very high selectivity.

I always appreciate feedback and additional information. Please send them to the Email address given below.

Best regards

Matthias

Email: dd1us@amsat.org Homepage: www.dd1us.de