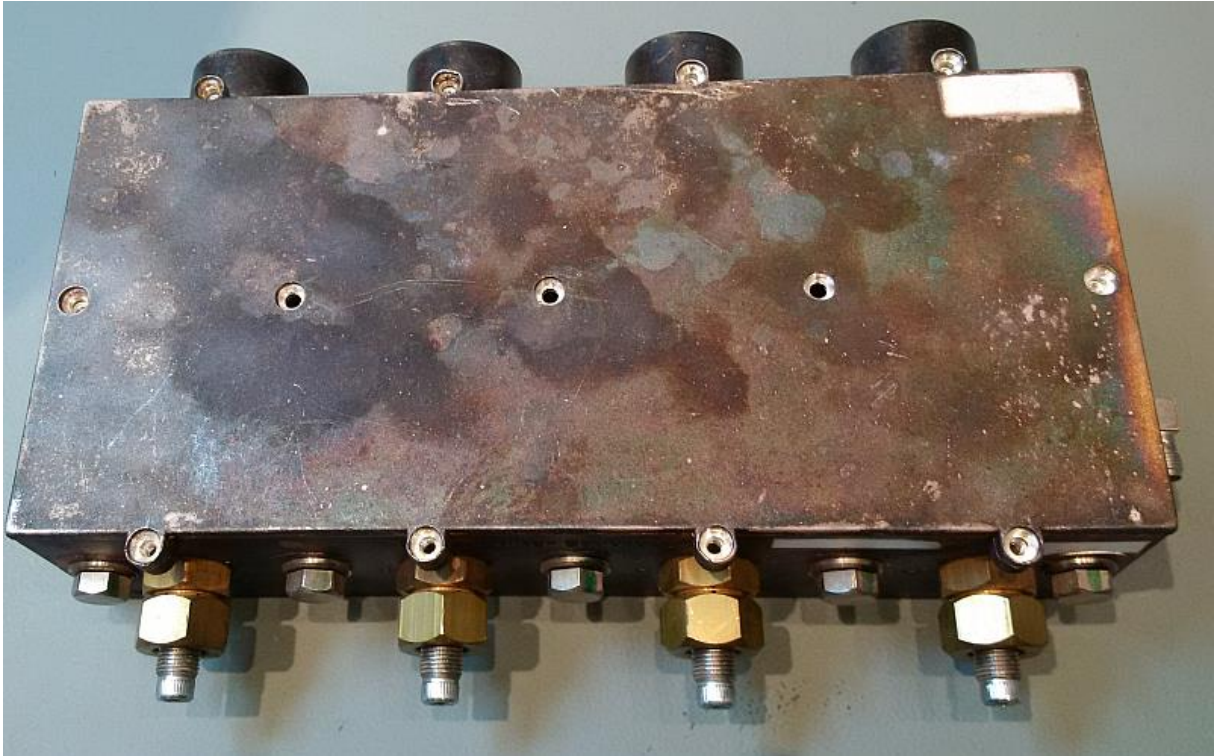


4 pole UHF bandpass filter recycled from UHF duplexer

Matthias, DD1US, April 12th 2024, rev 2.0

Recently I got hold of an unknown UHF duplex filter. Most likely it was used in the frequency range from 550 to 650MHz. When inspecting the duplexer, I found a very nice and professionally made construction. The filter is made from brass and is completely silver plated including the 4 high quality resonators. It is very well made and tuning the resonators is very smooth. Thus, I decided to disassemble the filter and try to make 2 UHF bandpass filters out of it tuned to the 70cm ham radio band. It turned out quite well and here are the results.

Here are some pictures of one of the filters:





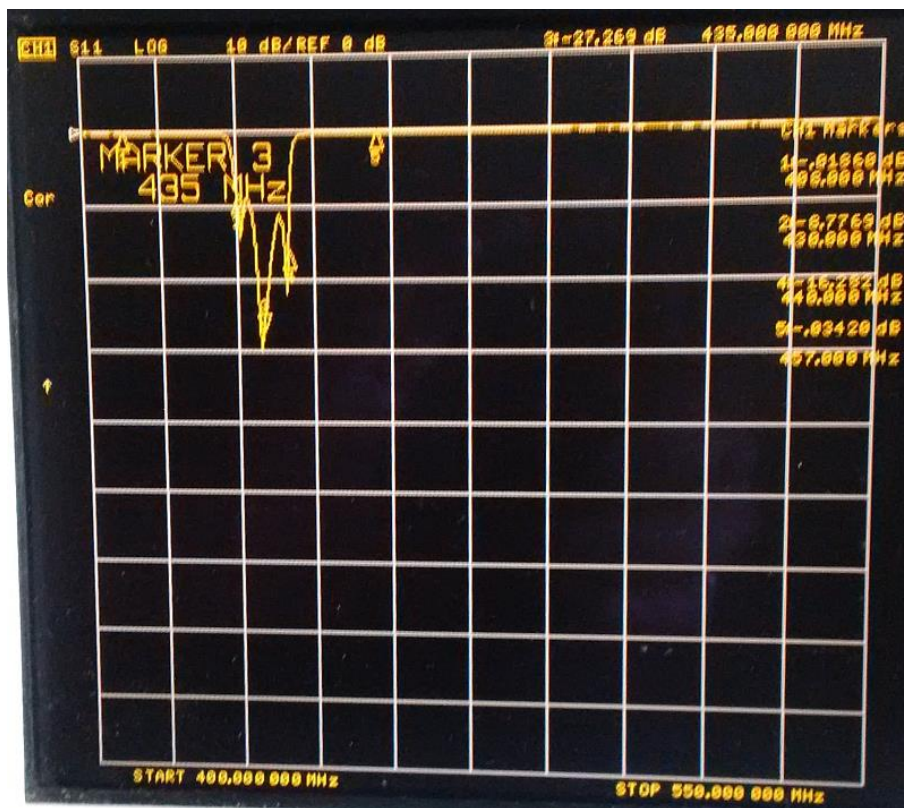




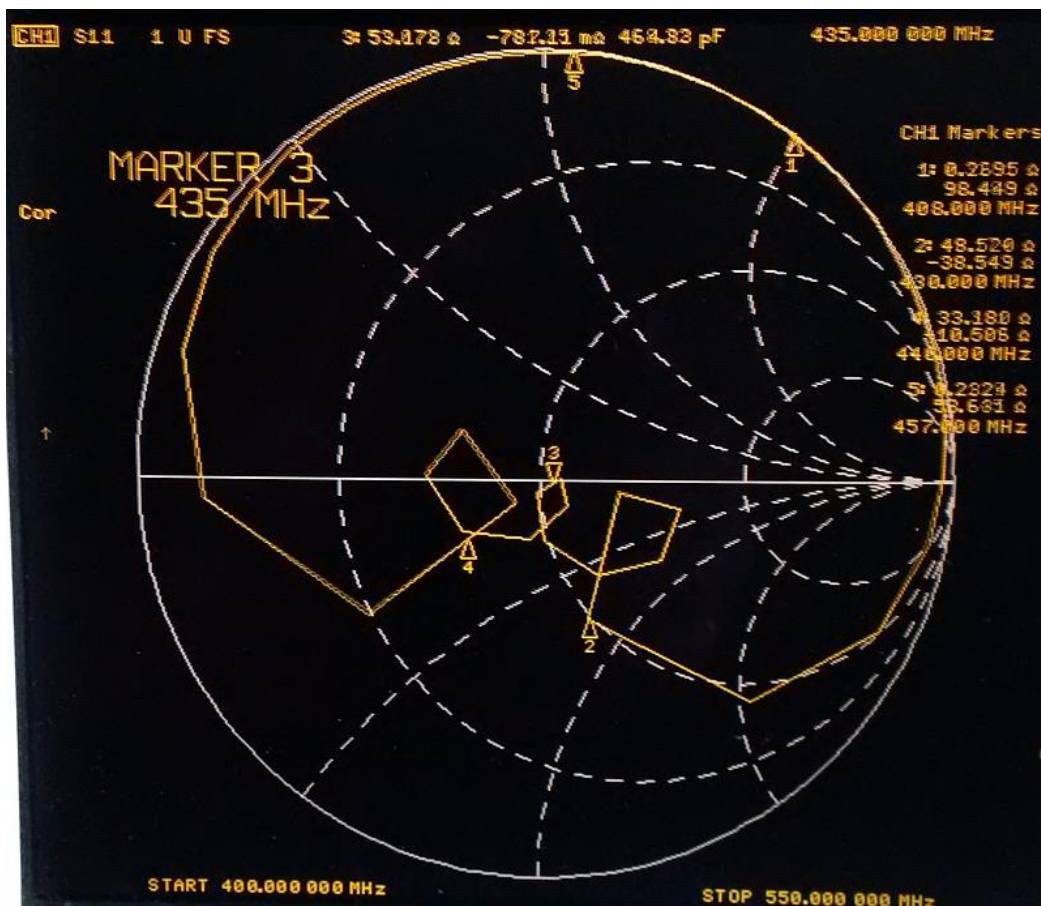
After splitting the 2 parts of the duplexer I assembled 2 SMA jacks on each of the open parts.



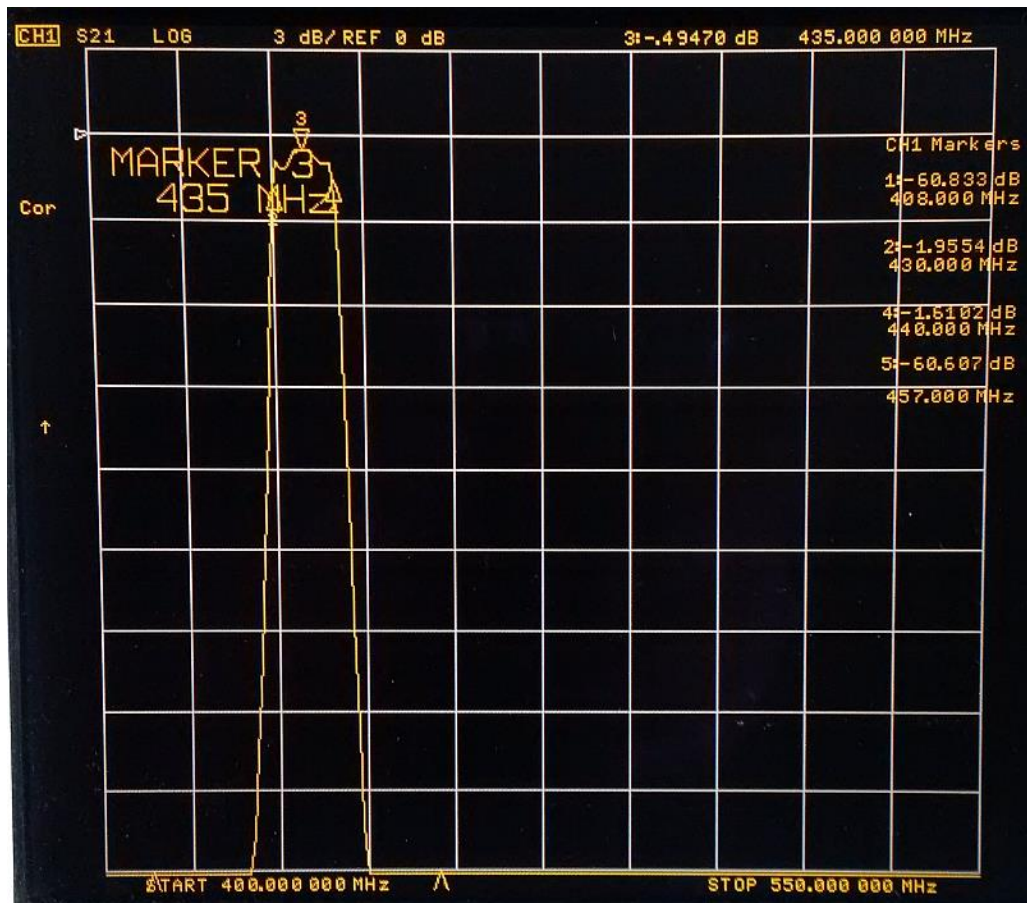
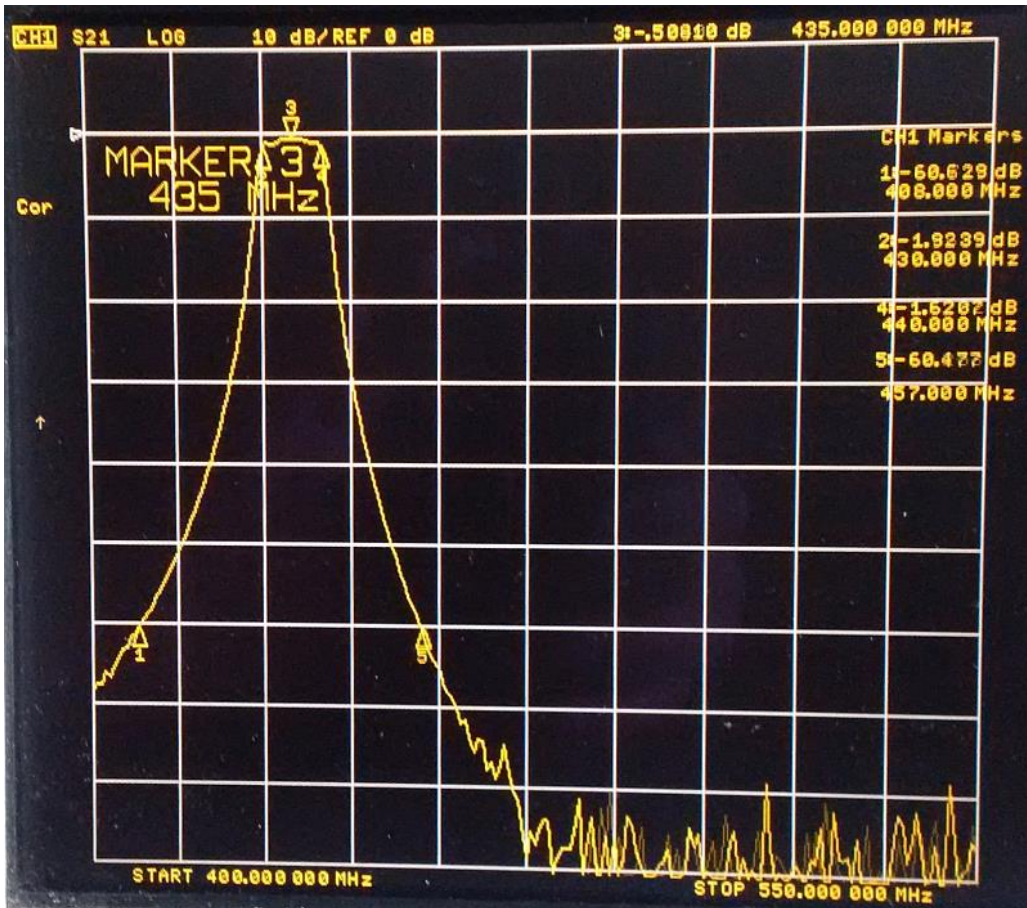
Here are the measurement results of the first filter:



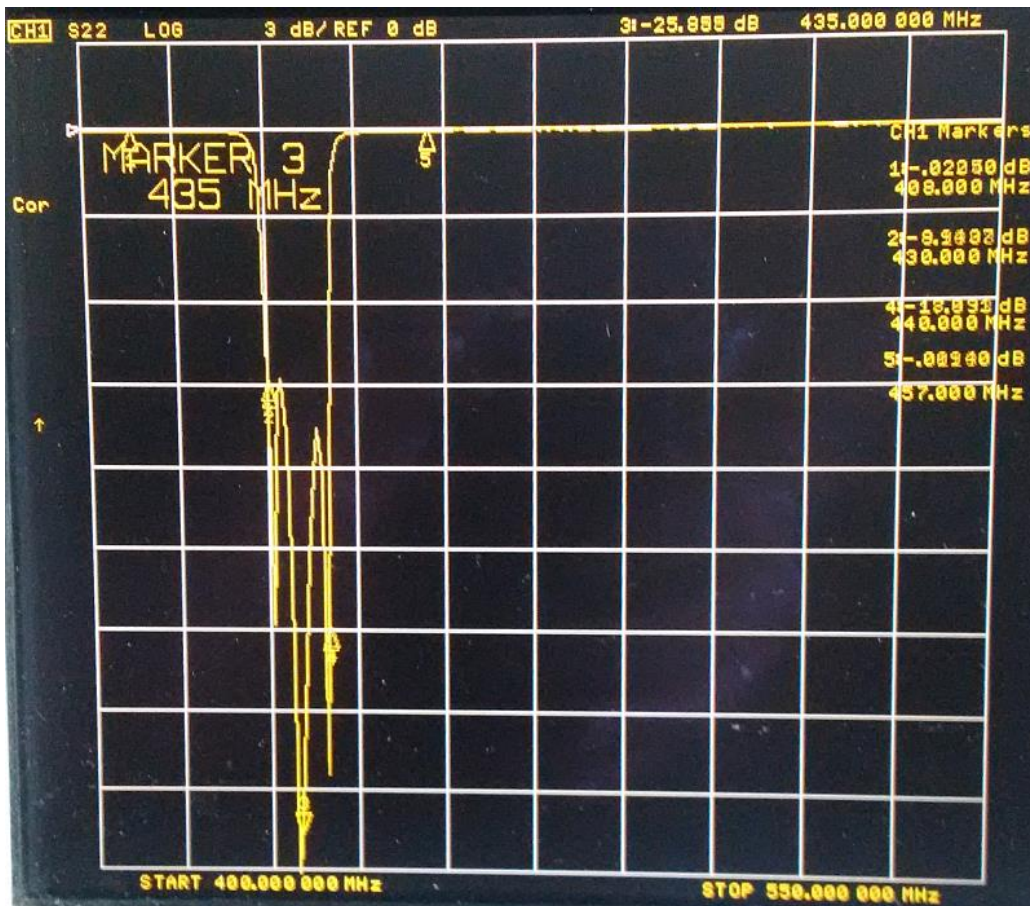
S11 log mag: return loss 27dB @435 MHz



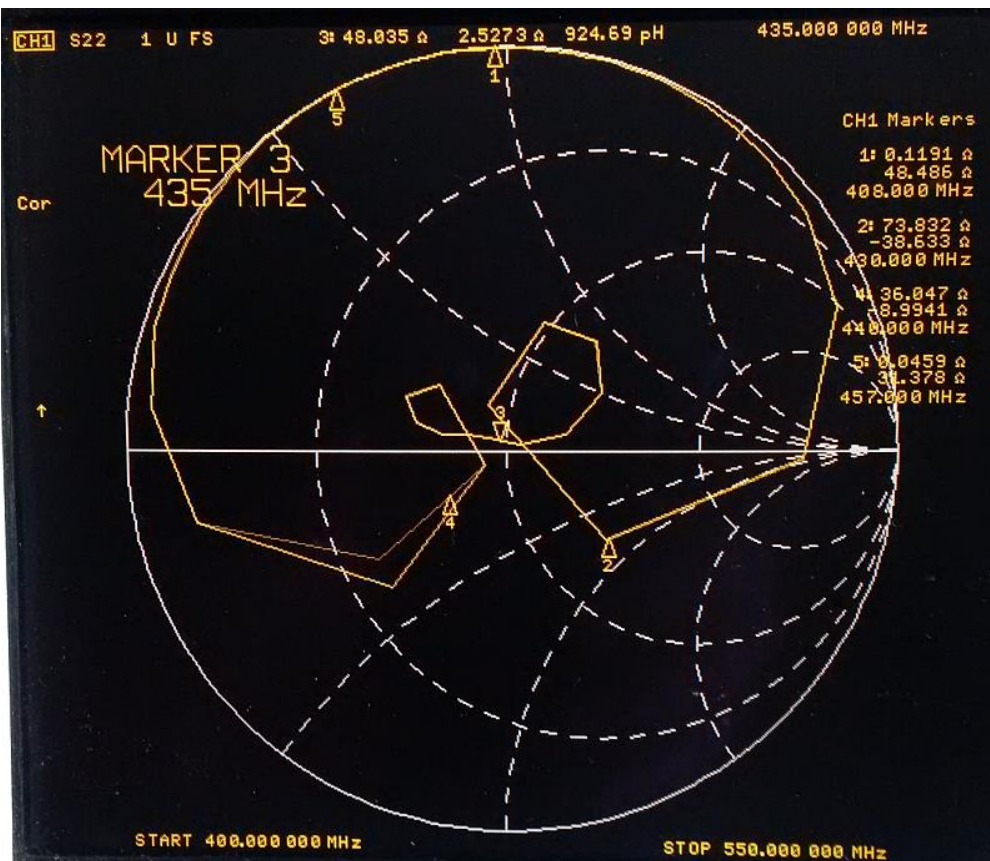
S11 Smith Chart



S21 log mag: insertion loss about 0.5dB @435 MHz

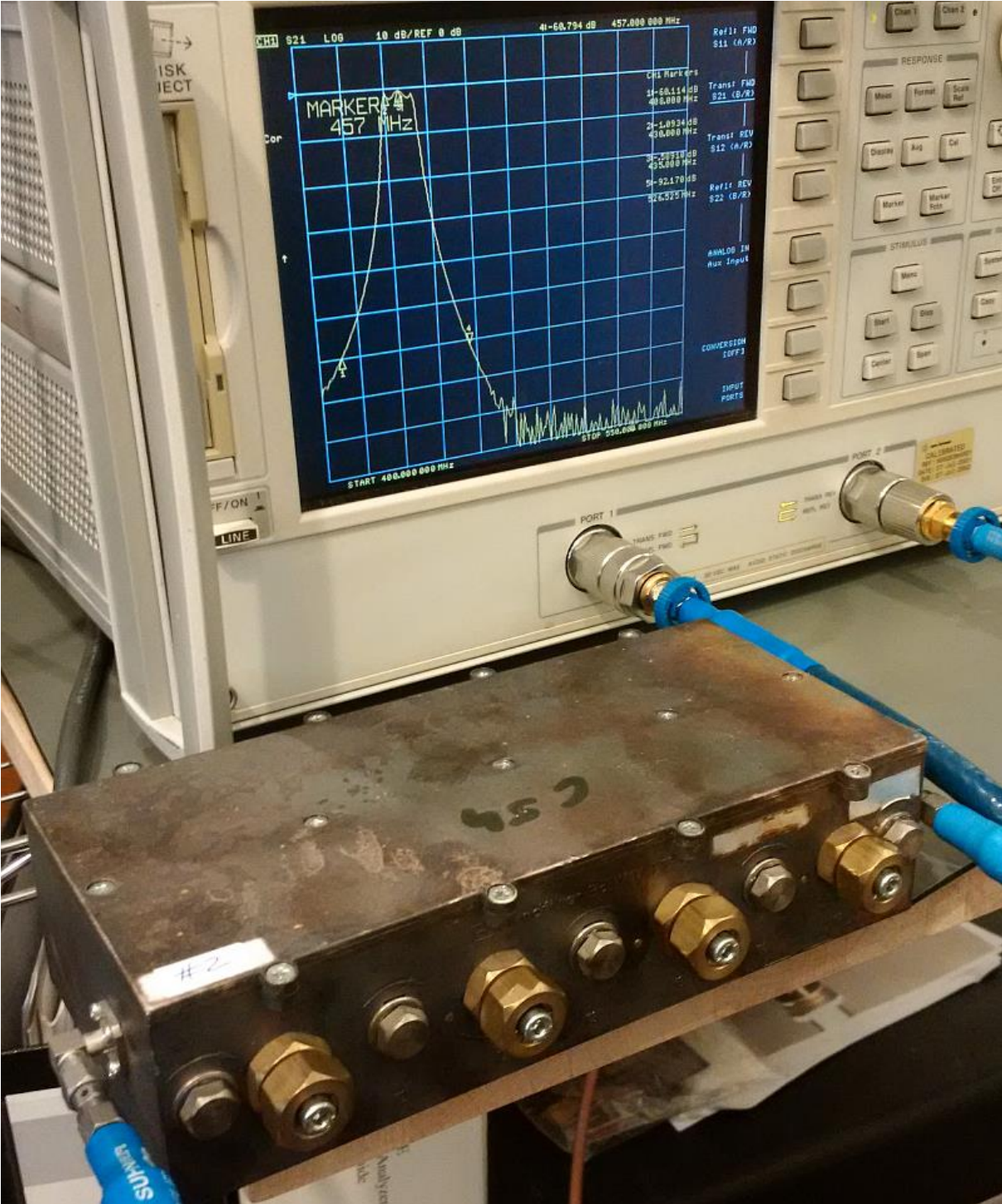


S22 log mag: return loss about 26dB @435 MHz

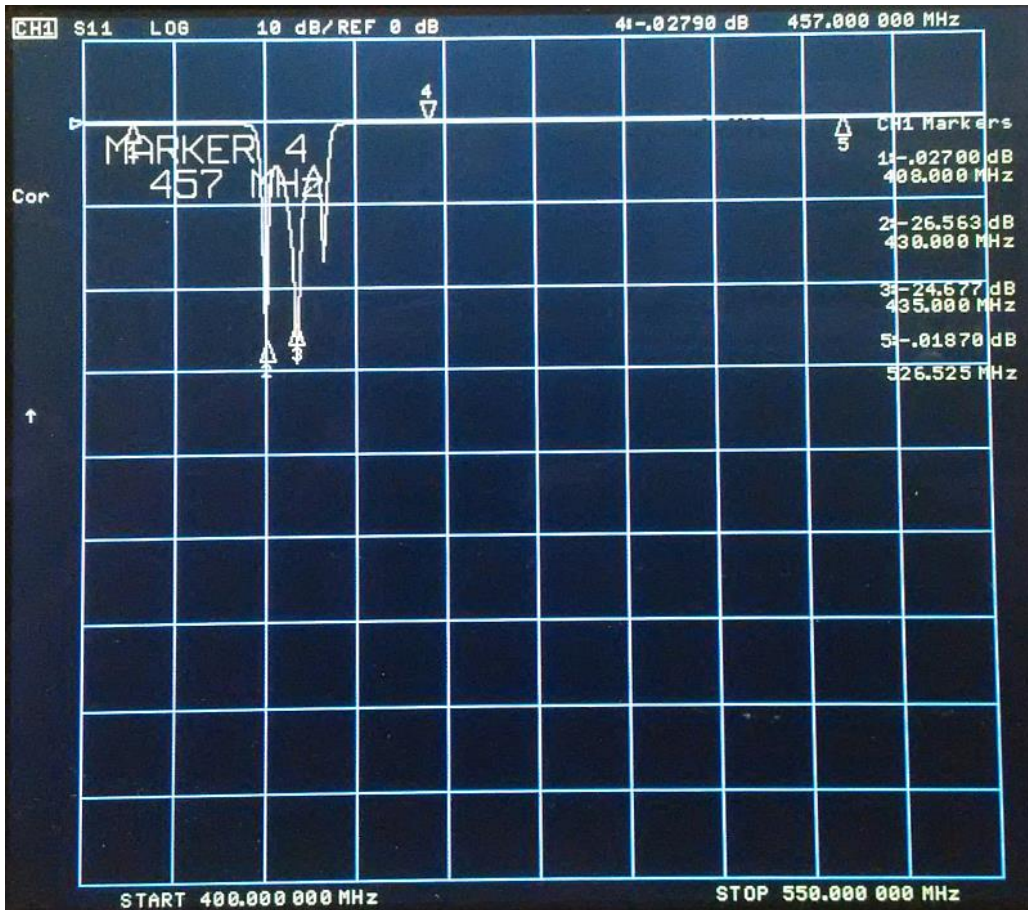


S22 Smith Chart

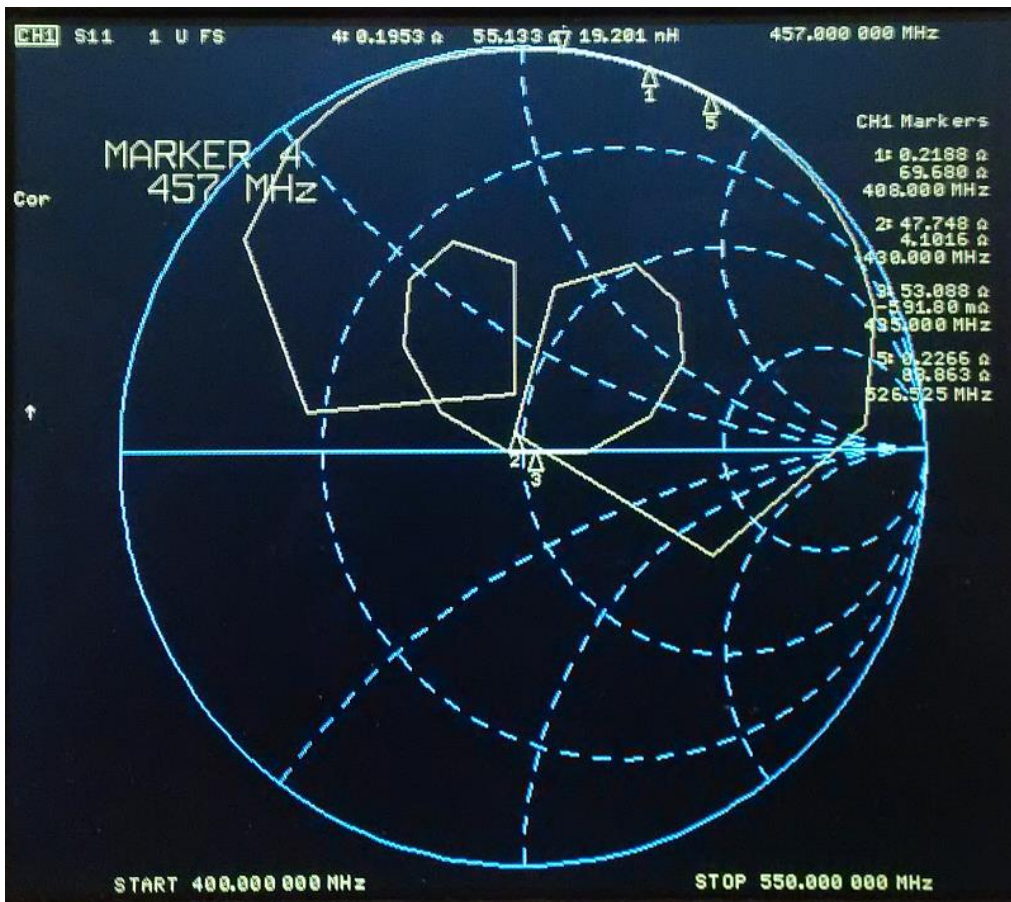
Next, I retuned the second filter also to 435MHz. The results are very similar to the first filter. I might retune this second filter eventually to a center frequency of 432MHz.



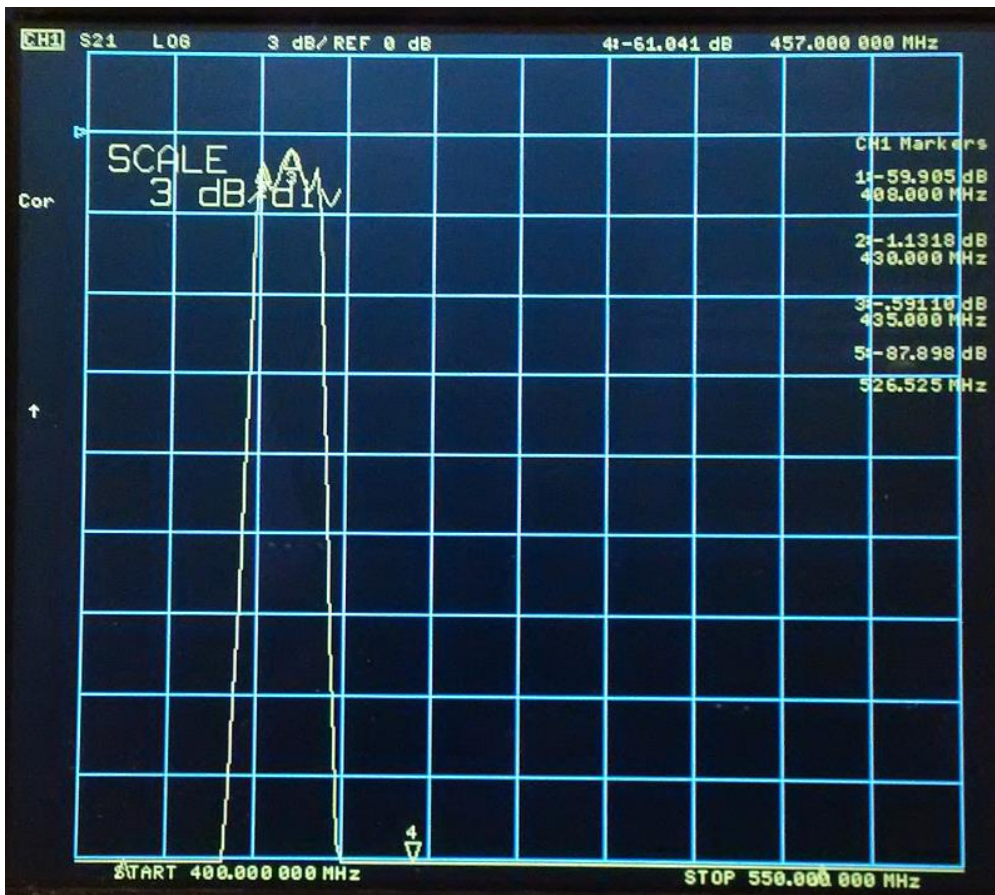
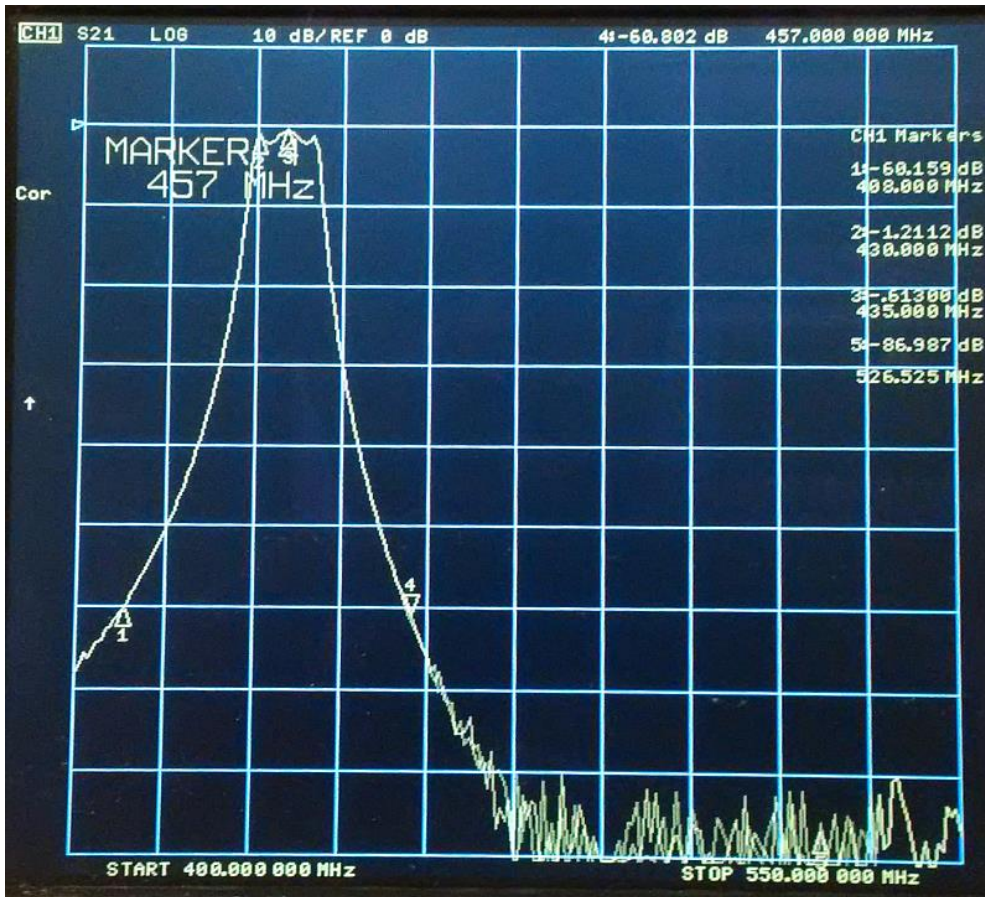
Second filter in the test setup



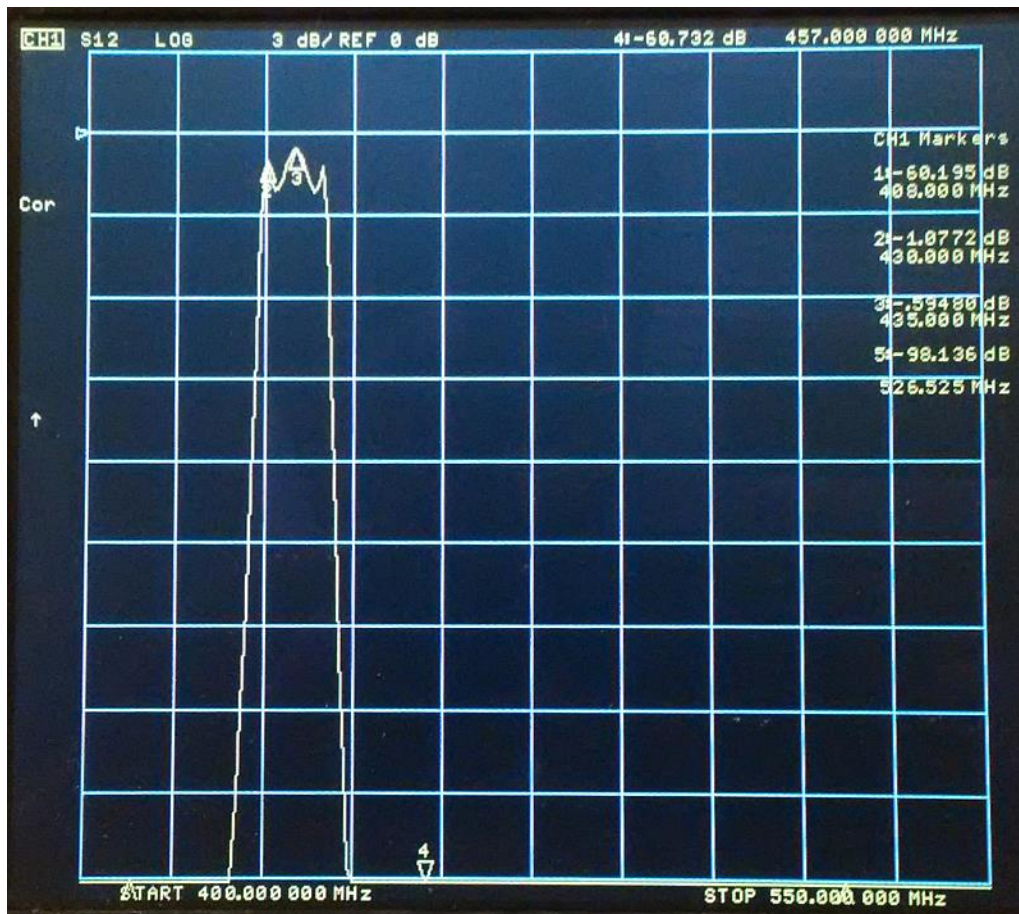
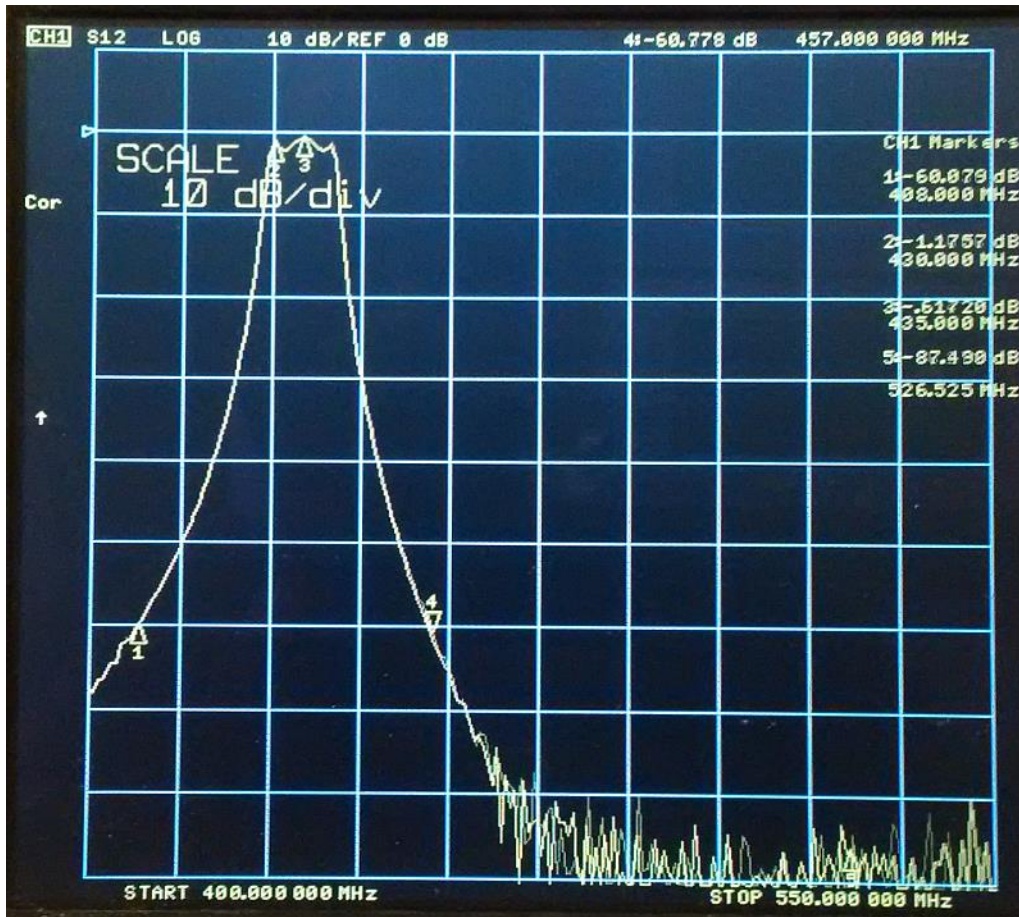
S11 log mag: return loss 25dB@435 MHz



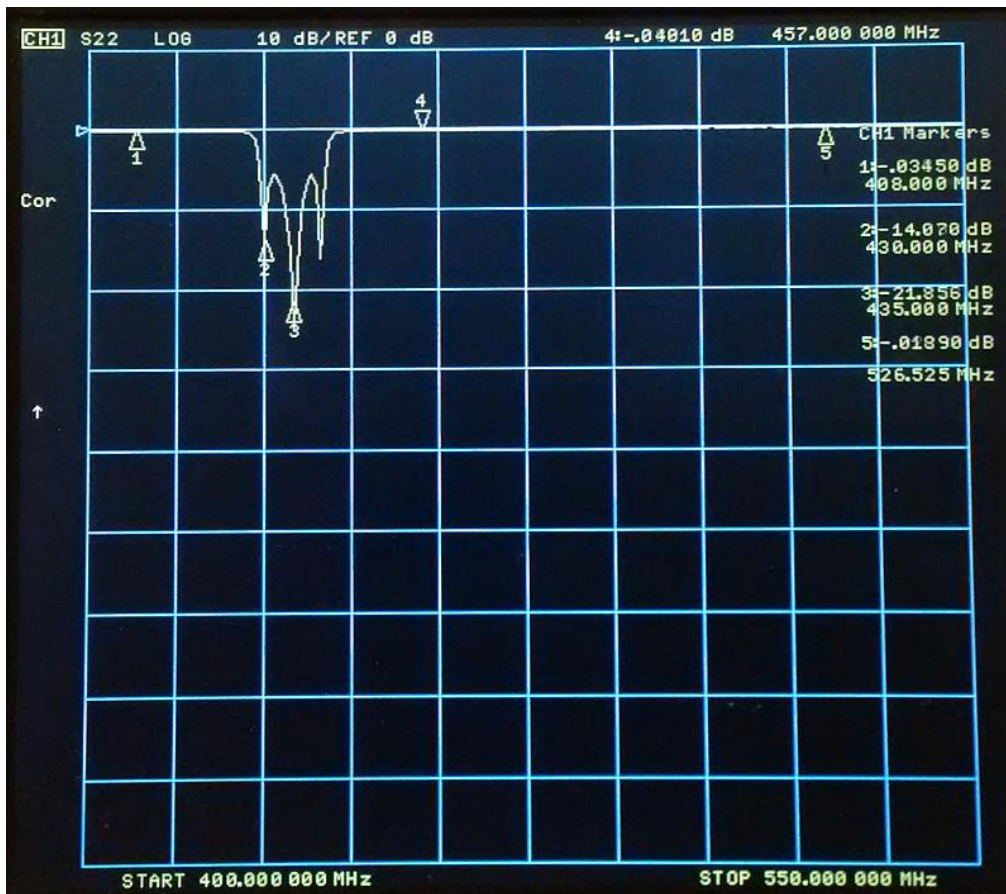
S11 Smith Chart



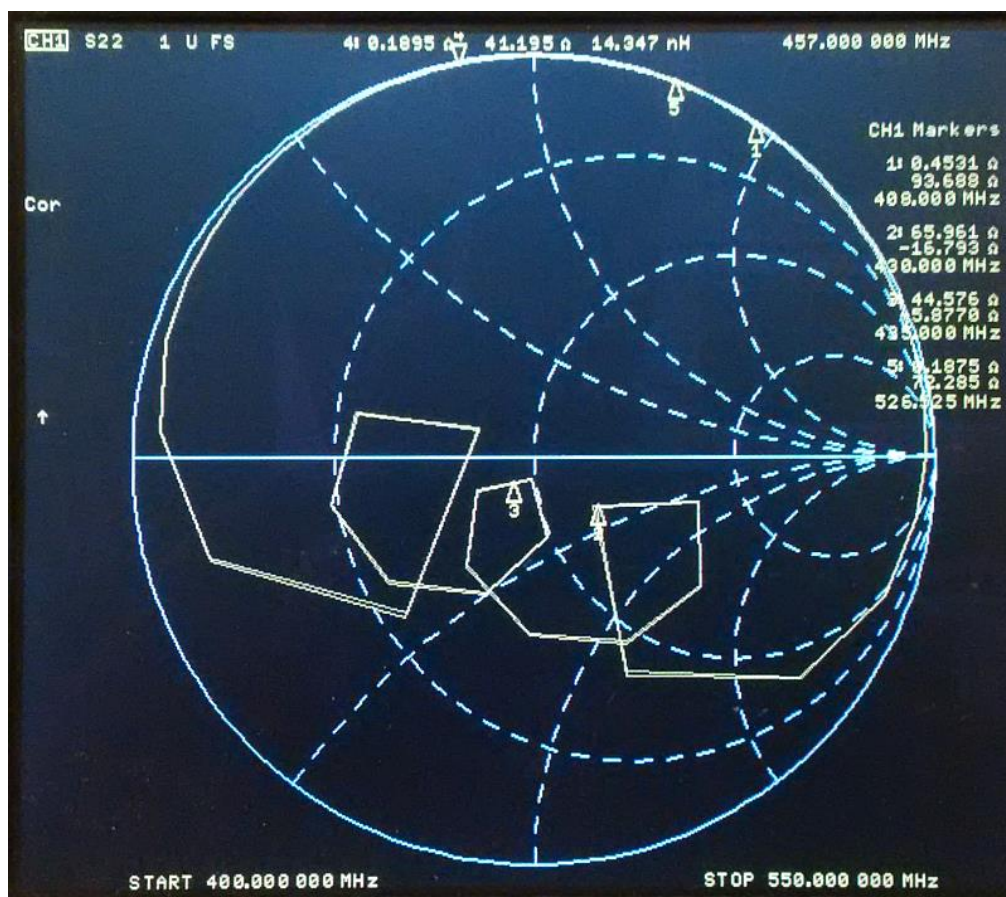
S21 log mag: insertion loss about 0.6dB @435 MHz



S21 log mag: essentially the same as S21

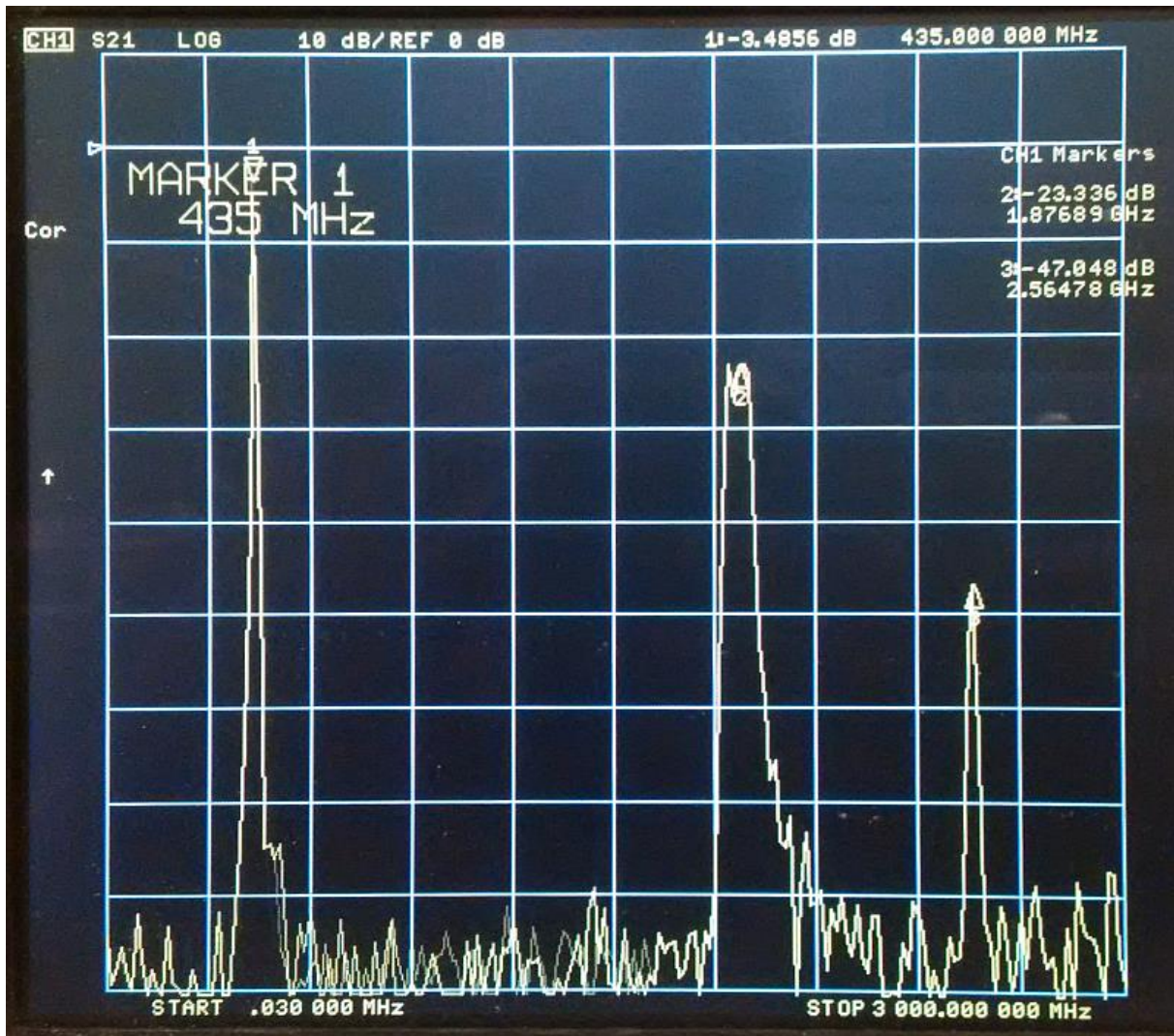


S22 log mag: return loss 22dB @435MHz



S22 Smith Chart: almost perfect

Finally, I checked the response of the filter in a wide frequency range:



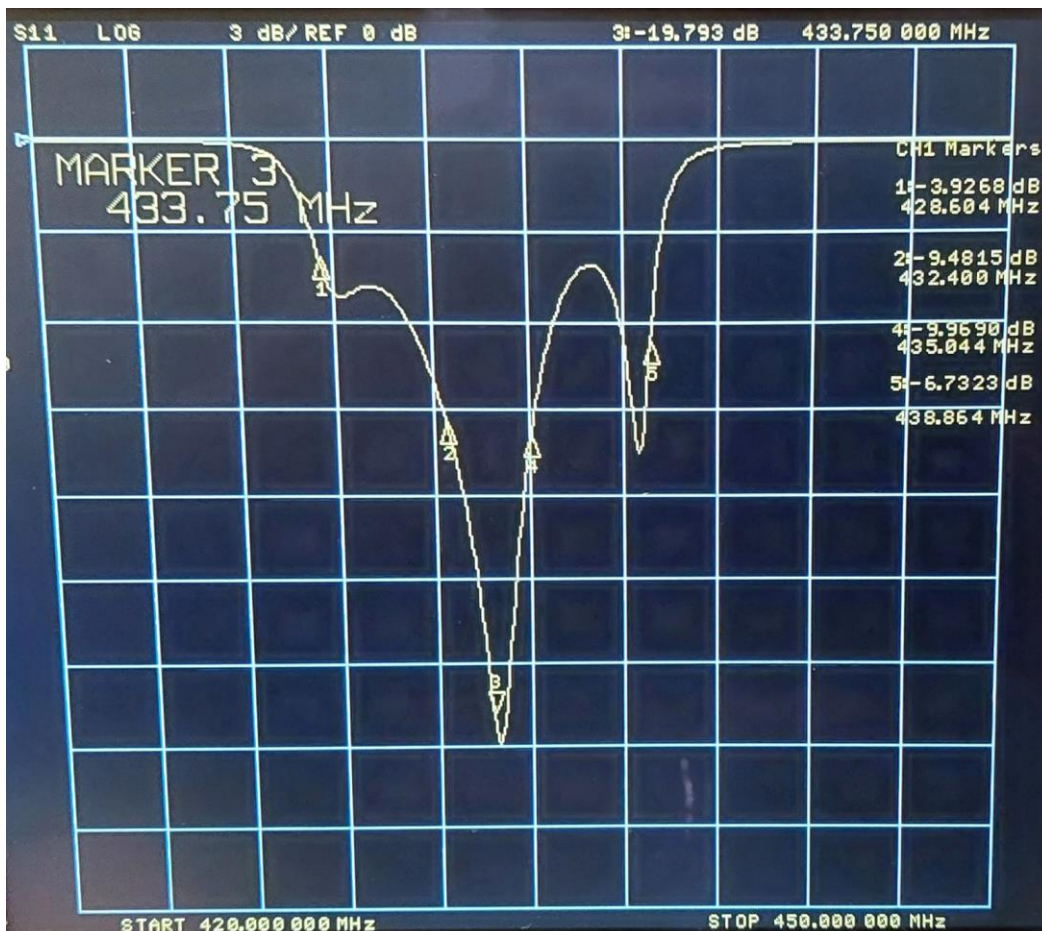
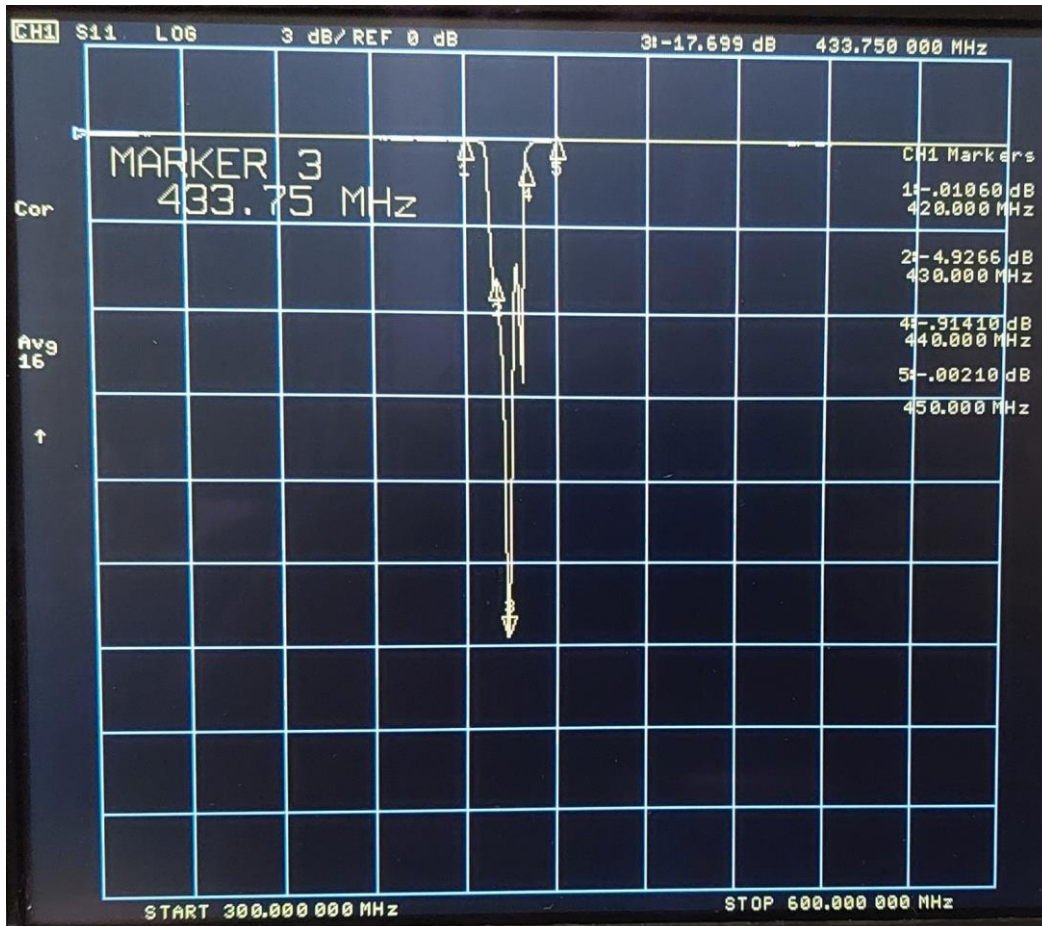
Frequency response of the filter in the frequency range 0-3GHz

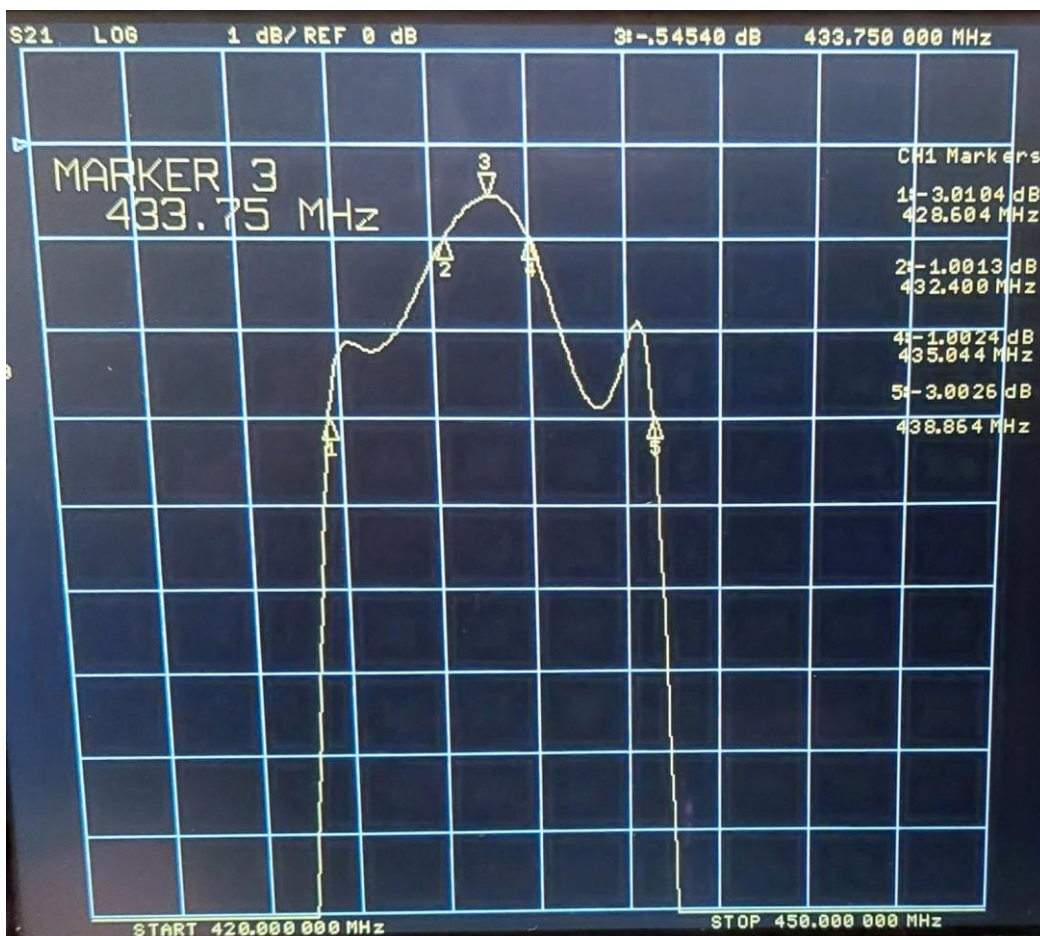
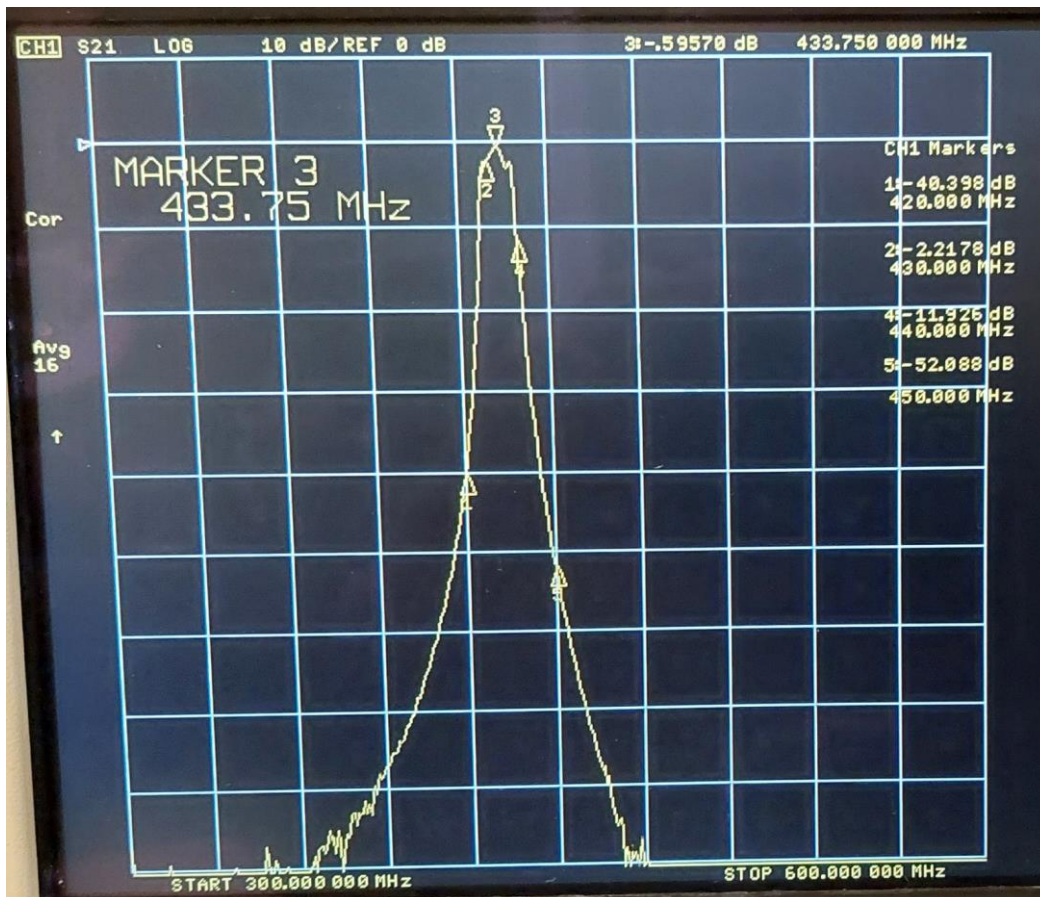
The filter shows two spurious responses, the first one at 1.87GHz and the second one at 2.56GHz. Both frequencies are far off the passband at 435MHz. The filter rejects all unwanted signals in the frequency range 0-1.8GHz by more than 80dB.

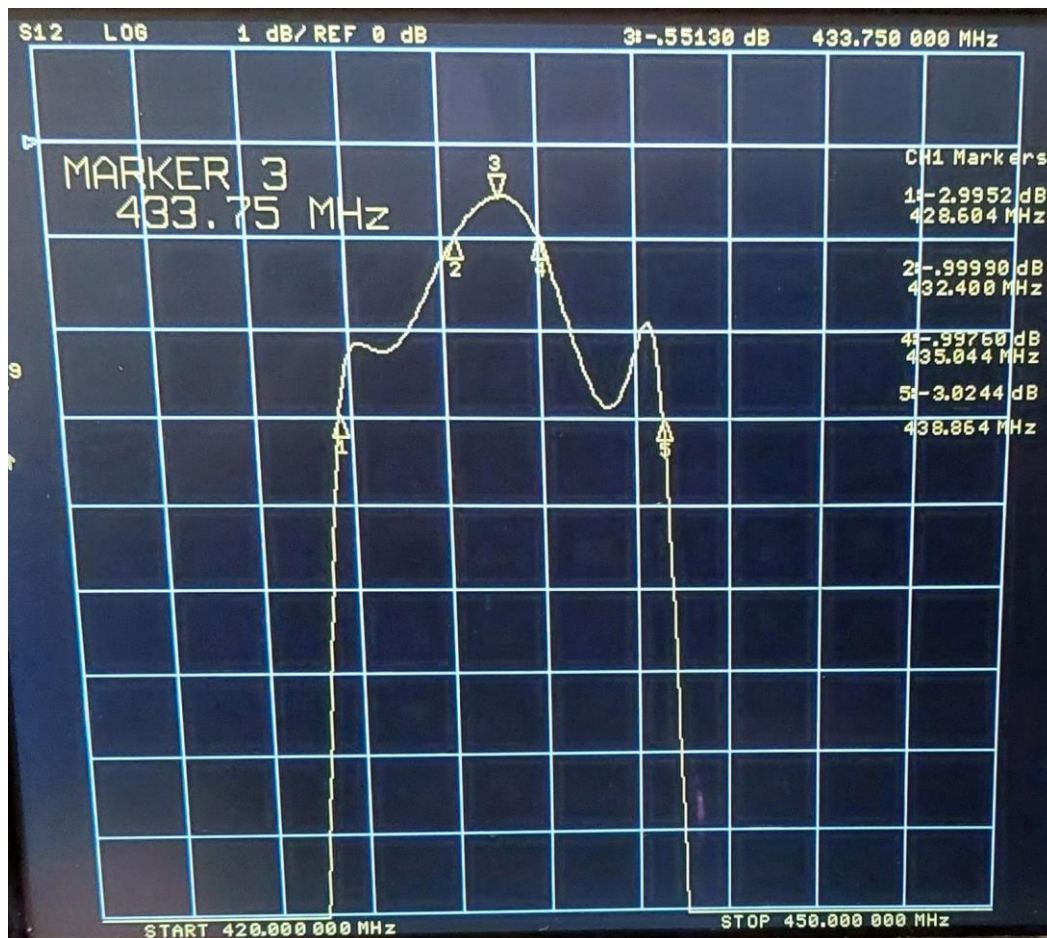
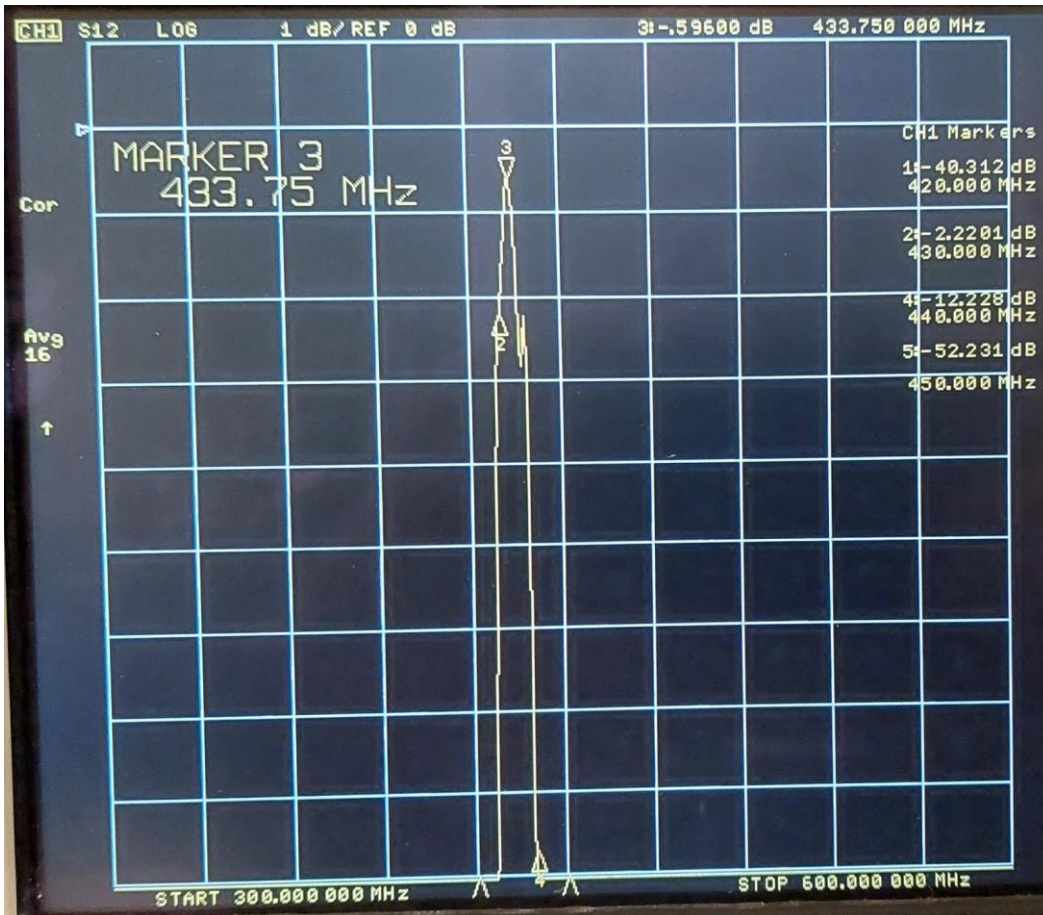
In summary, this duplexer can be easily modified and retuned to 435MHz. Its low loss of about 0.6dB makes it suitable both as a highly selective receive filter for the 70cm band or as a transmit filter with an estimated power handling capability of more than 100 Watts.

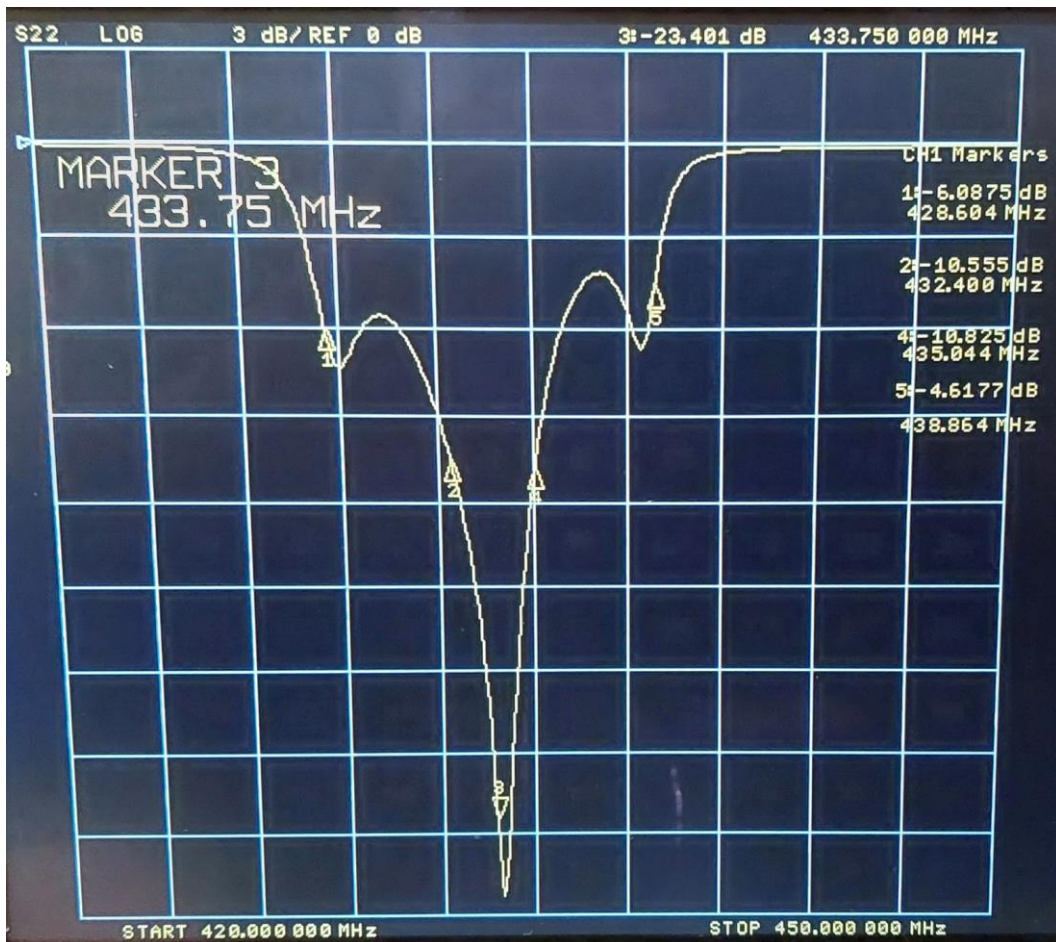
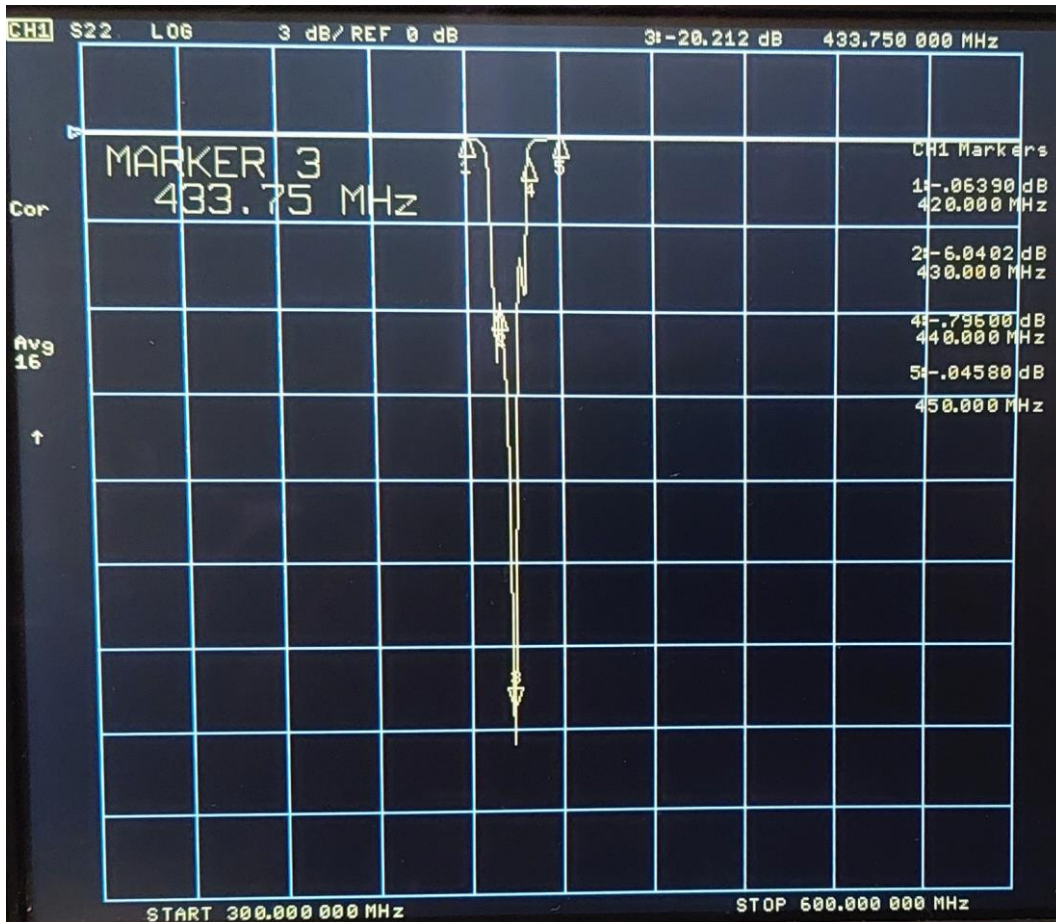
Update:

Some weeks ago, someone asked me for such a filter and whether I can optimize it for 433.775MHz as he wants to use it for Lora-APRS in the 70cm band. Thus, I retuned the second filter and sent it to him. Here are the measurement results after retuning:









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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