

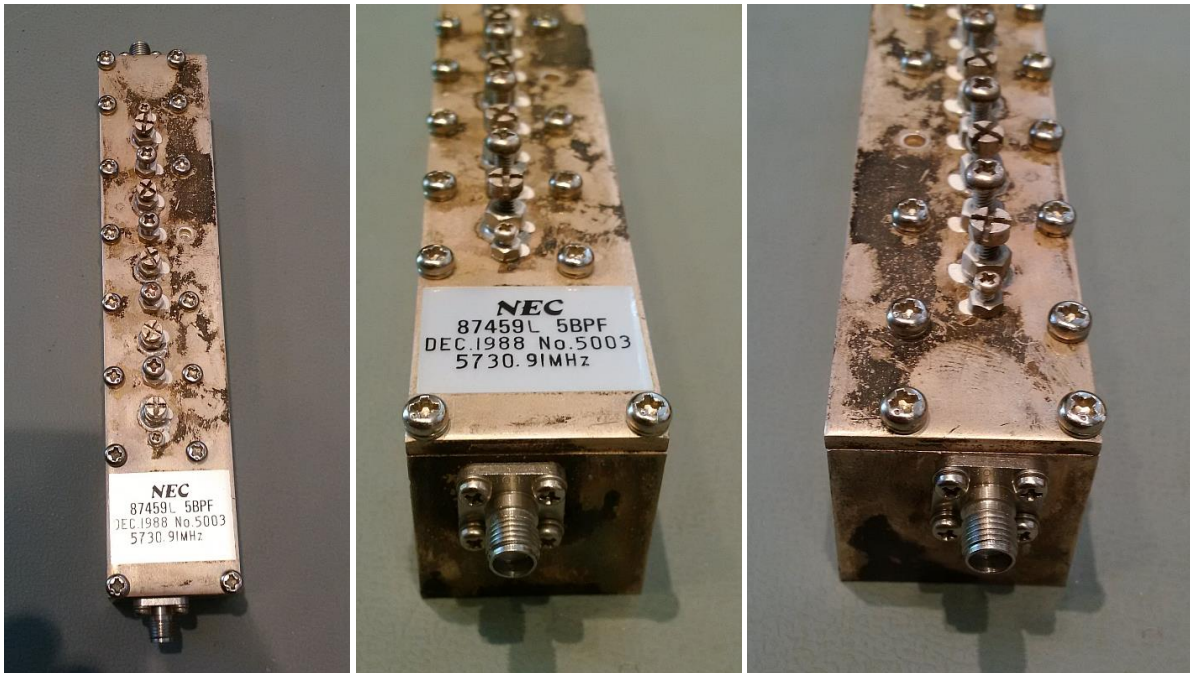
Surplus 5731MHz filter retuned to 5761MHz

Matthias, DD1US, September 8th 2020

Recently a friend gave me a bandpass filter from NEC. The part number on the label is 87459L 5BPF. It was apparently produced in December 1988 and has the serial number 5003. The label indicates that it was tuned to 5730.91MHz.

When having a closer look at the filter it turned out that it is actually a combination of an isolator and a 5-pole bandpass filter. The filter has SMA jacks at the input and the output.

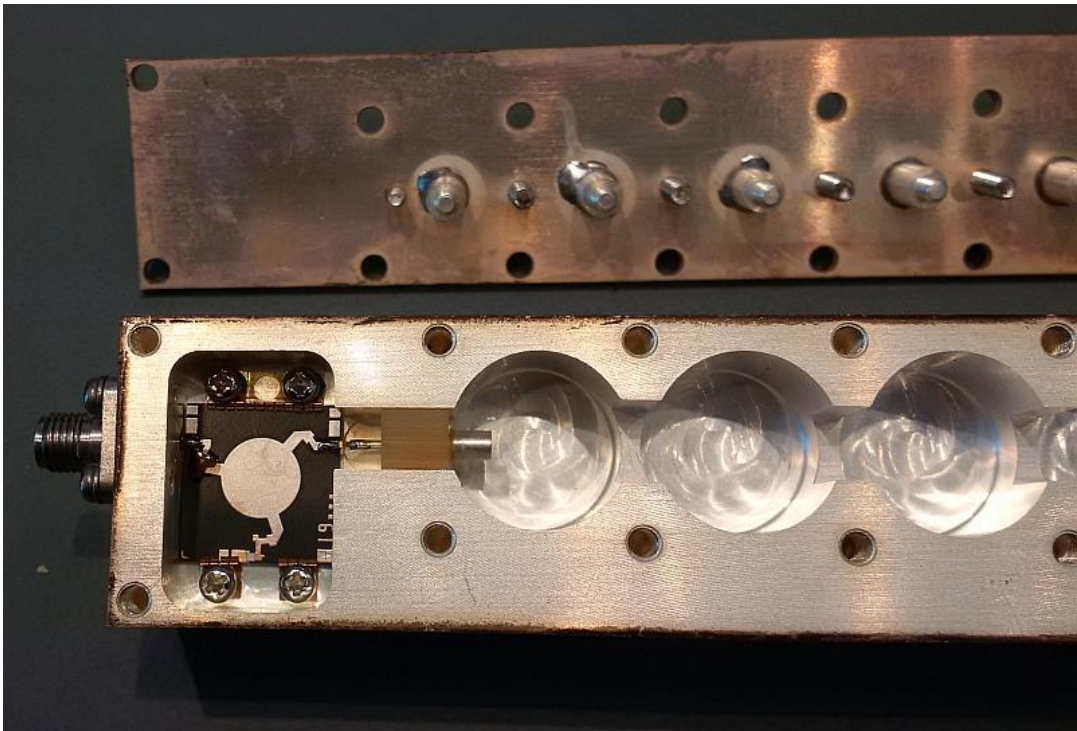
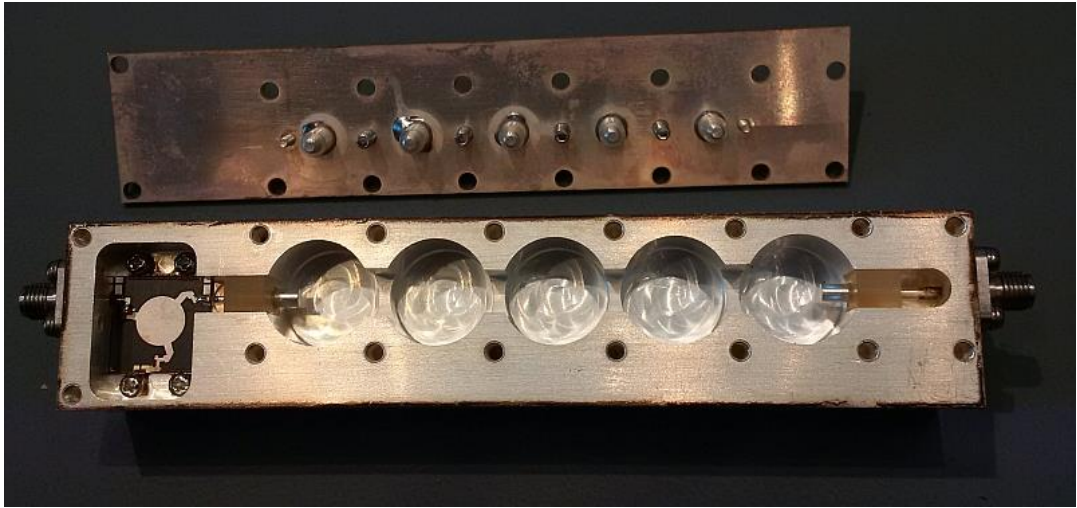
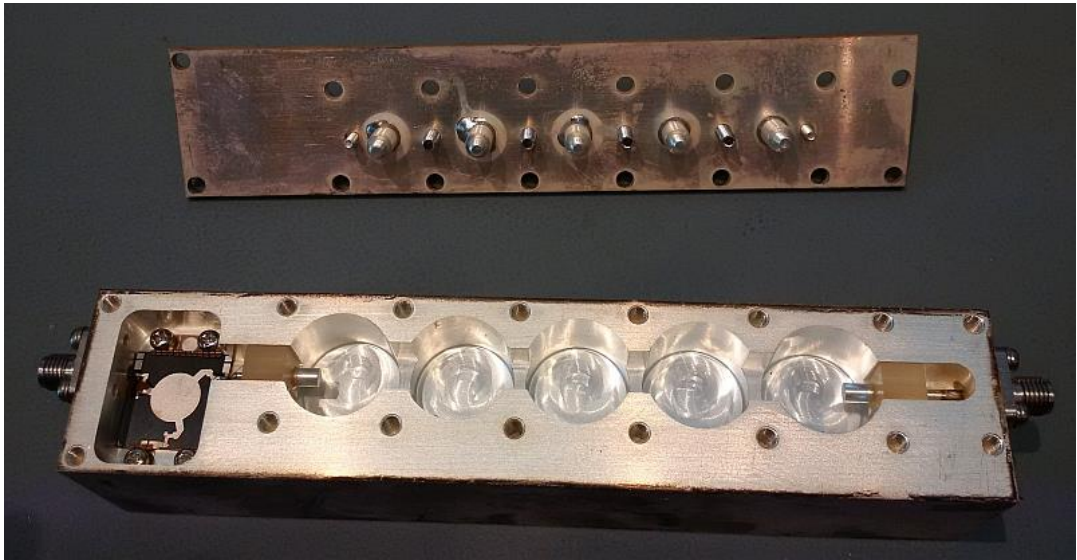
Here are some pictures of the filter:

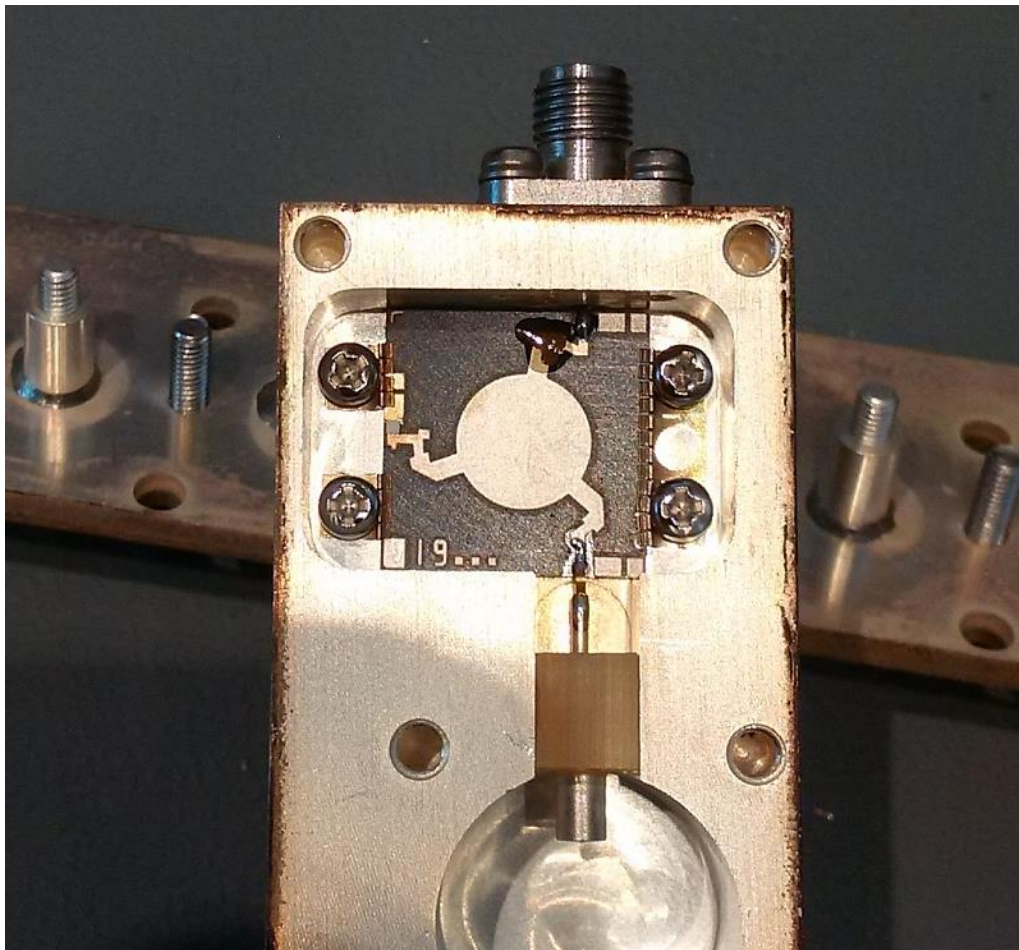
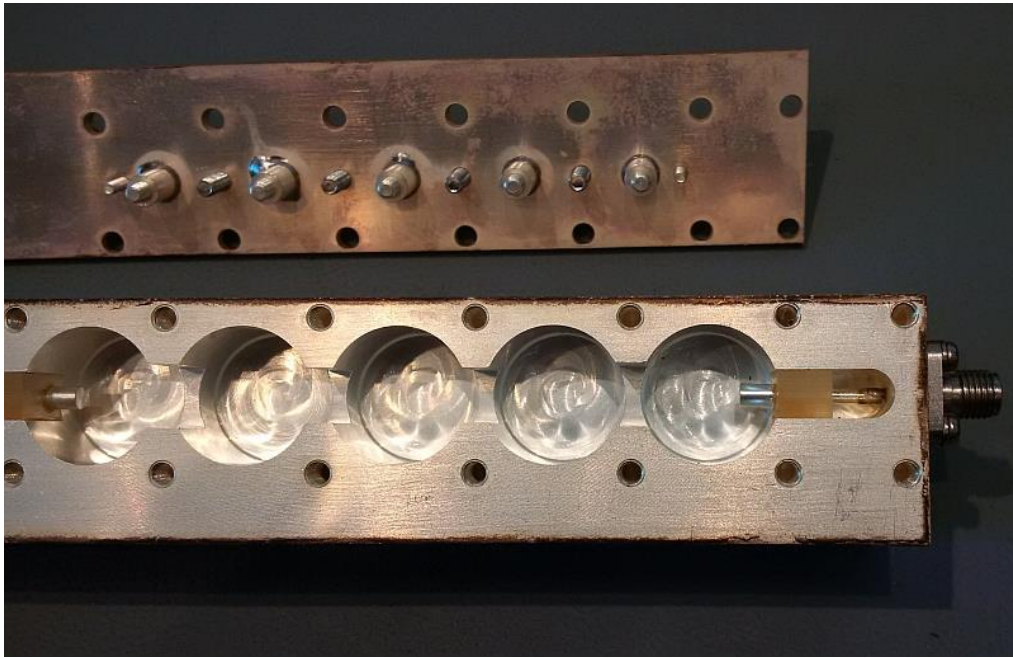


The filter is well made in a silver-plated brass encasing.



The input port is left with the circulator which has one port terminated with a 50 Ohm resistor.

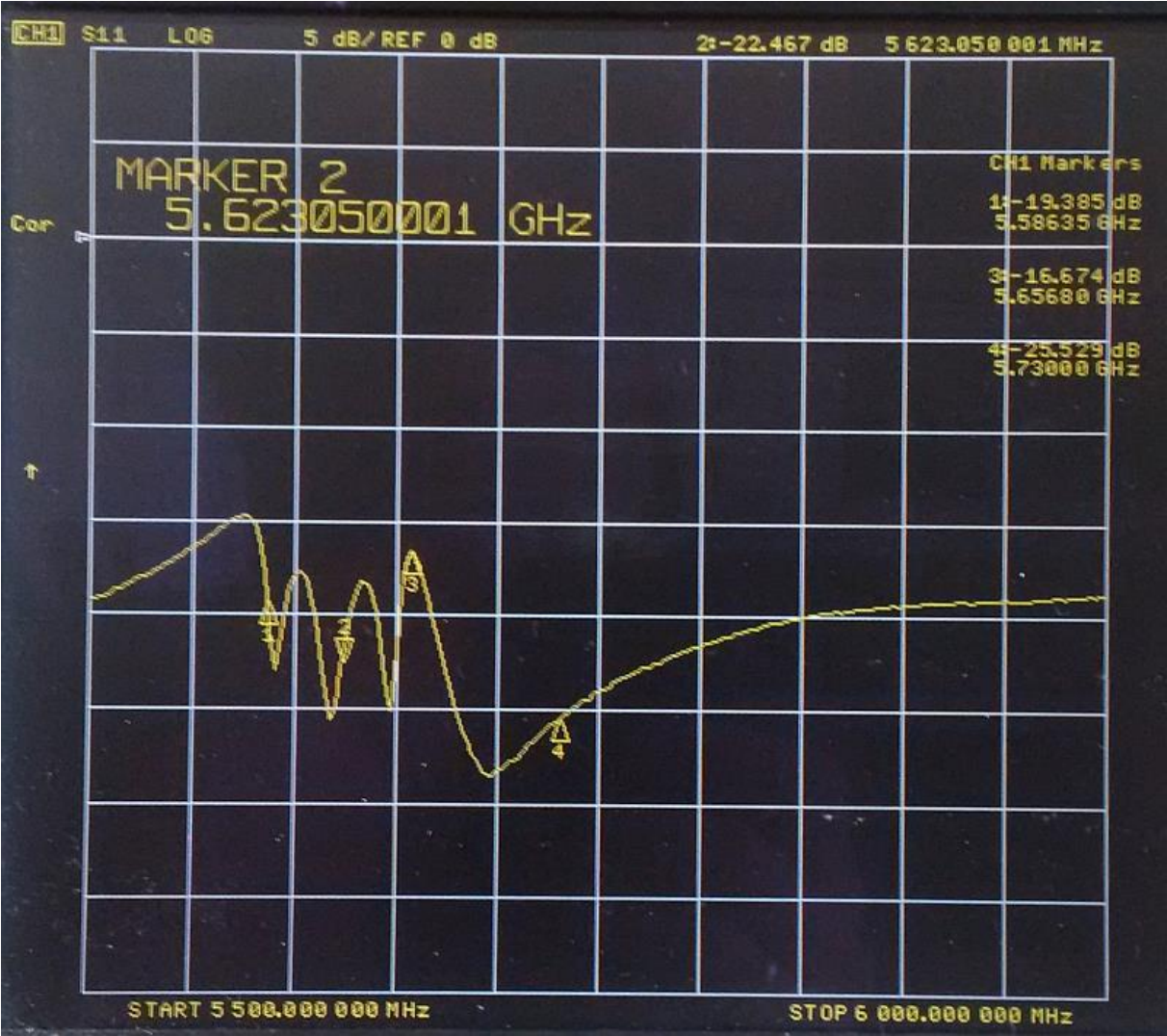




The filter has on its label a frequency printed which is 5730.91MHz. I expected that the frequency response is centered at that frequency but the measurement showed that it is actually centered at 5623MHz. Most likely someone had already retuned the filter. Below please find the measurement results of the filter.



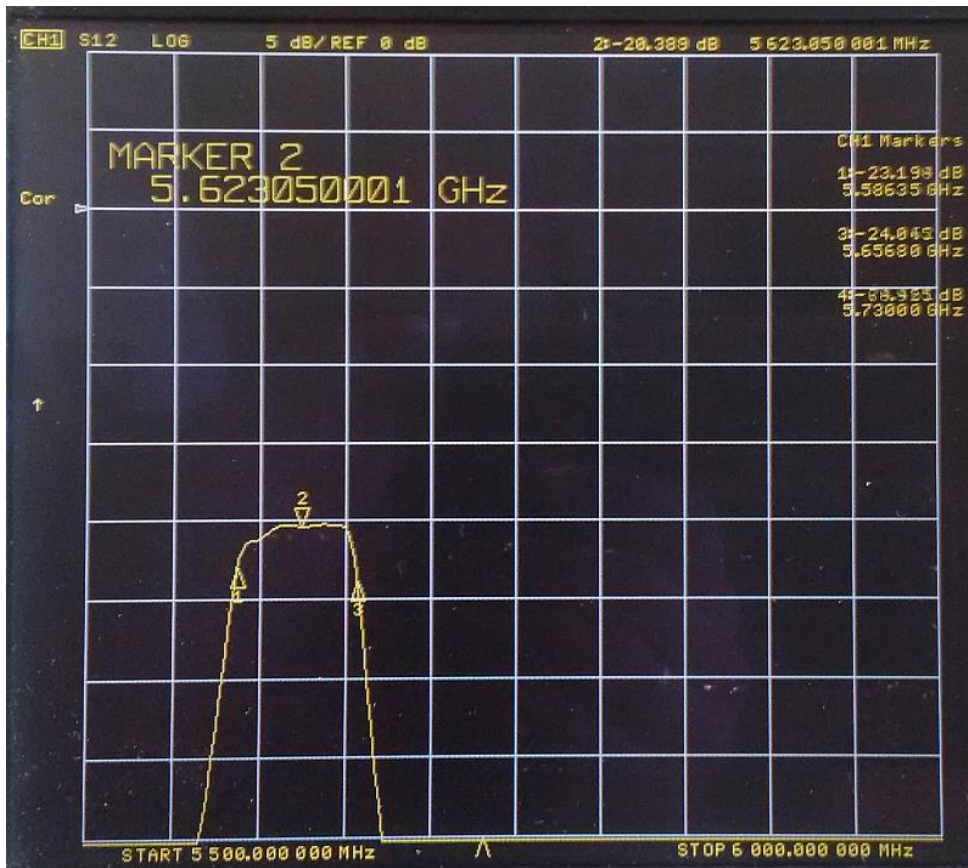
Left is the input (S1 in the measurements) and right is the output port (S2 in the measurements):



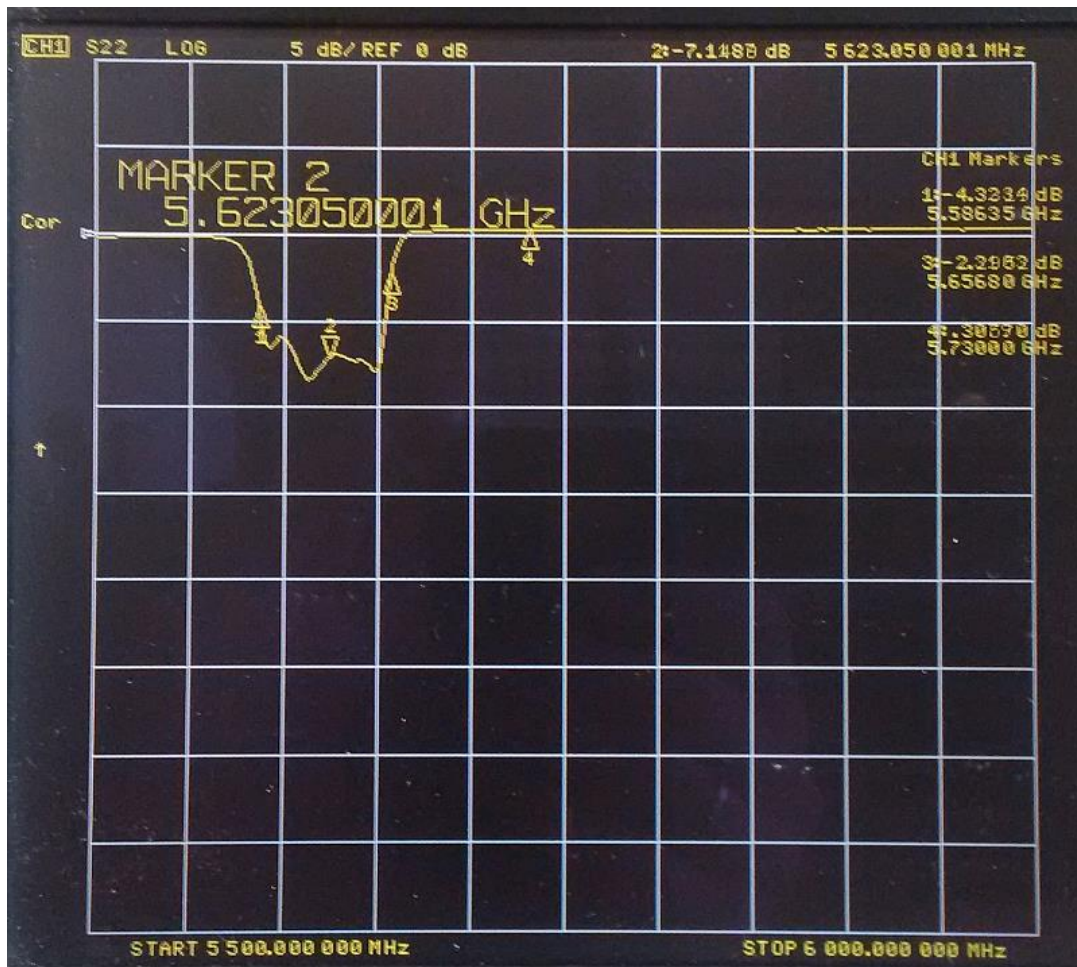
The input return loss S11 is very broadband and always better than 15dB in the frequency range 5.5 to 6.0 GHz. The isolator provides such a high return loss. This can be very helpful to provide and LNA in front of the filter a wideband good match and thus keep it unconditionally stable.



The filter is centered at 5623 MHz and has an insertion loss of 1.8dB. The 3dB bandwidth is about 60MHz.



Due to the isolator the isolation (S12) is about 20dB.

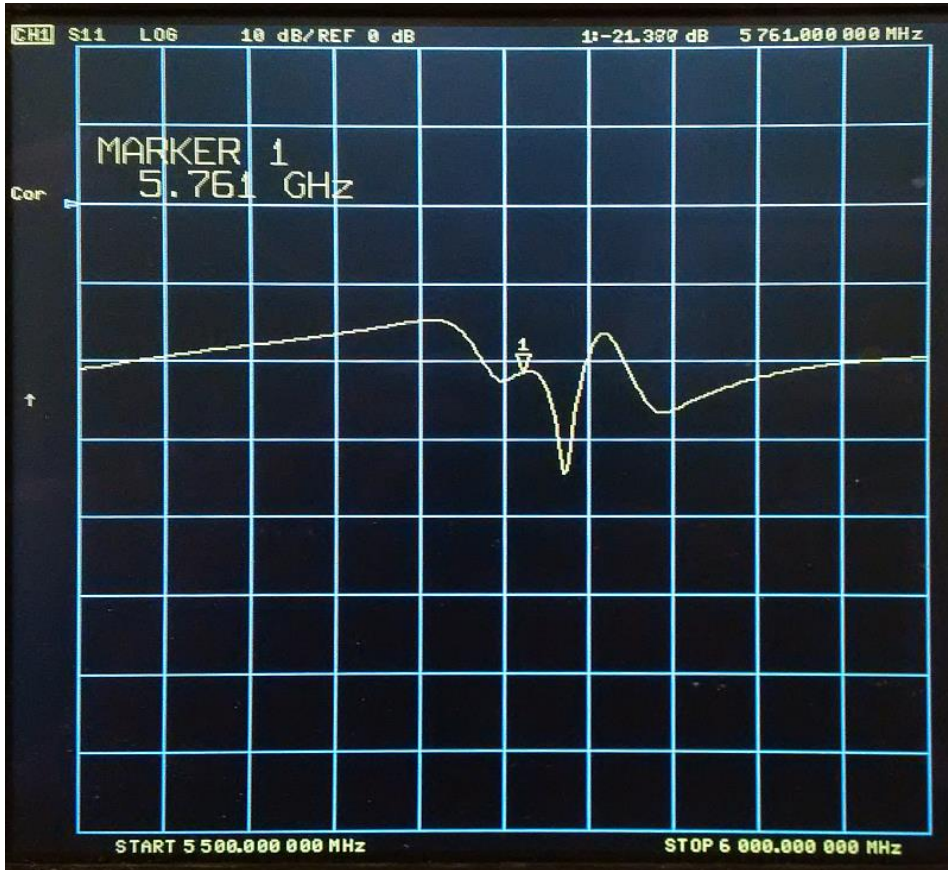


The output return loss is much more narrowband and only 7dB.

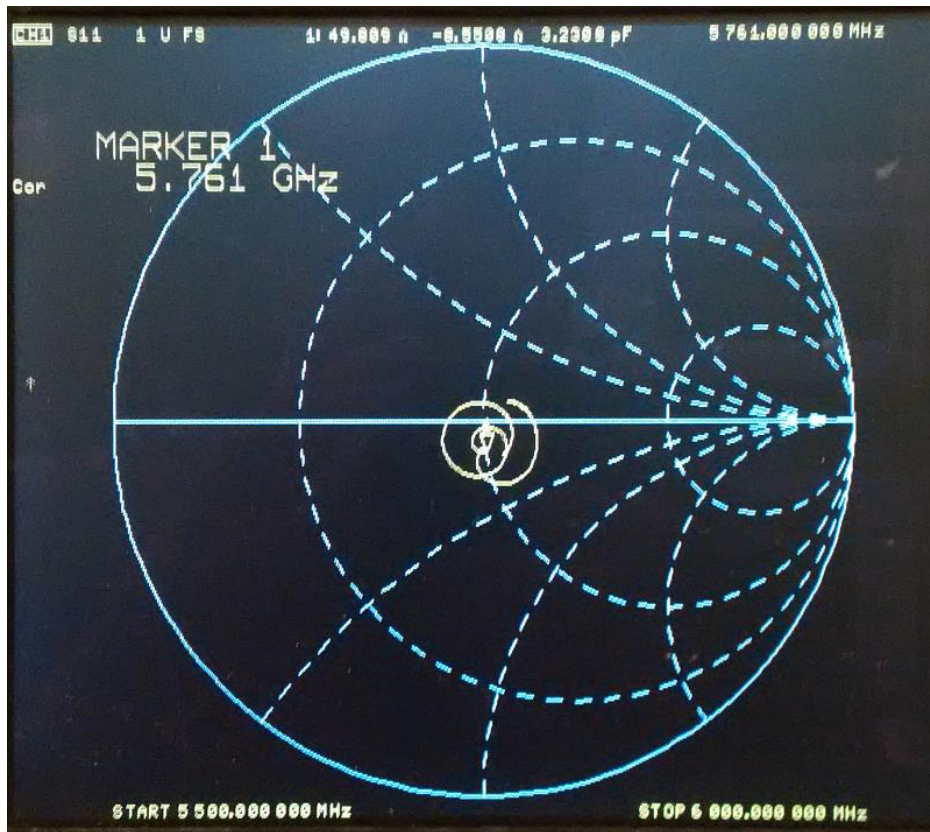
As I plan to extend my EME portable setup also to the 6cm band I decided to retune the filter to a center frequency of 5761MHz. Below please find the measurement results:



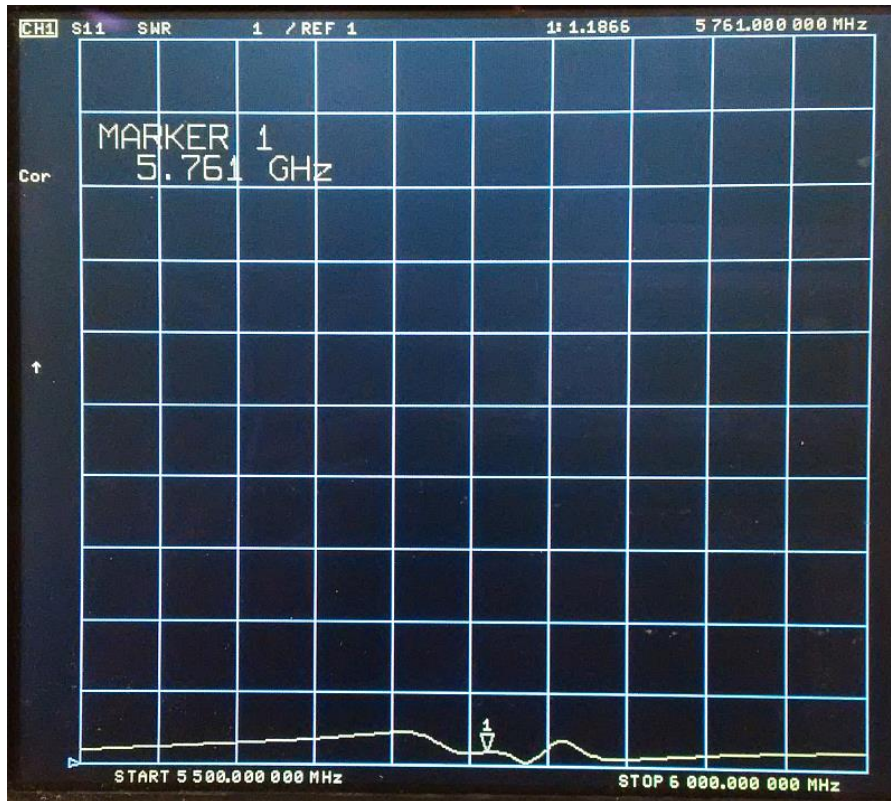
In the subsequent measurements the input port was left (where the isolator is next to the port) and the output port was right.



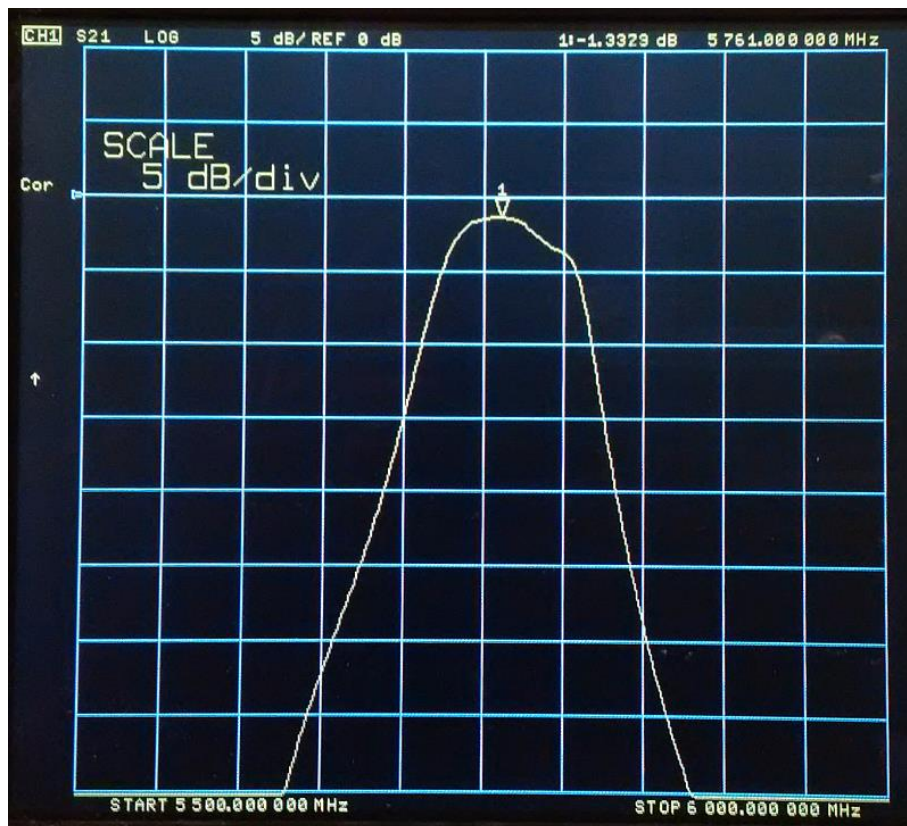
S11 log mag: return loss 21dB



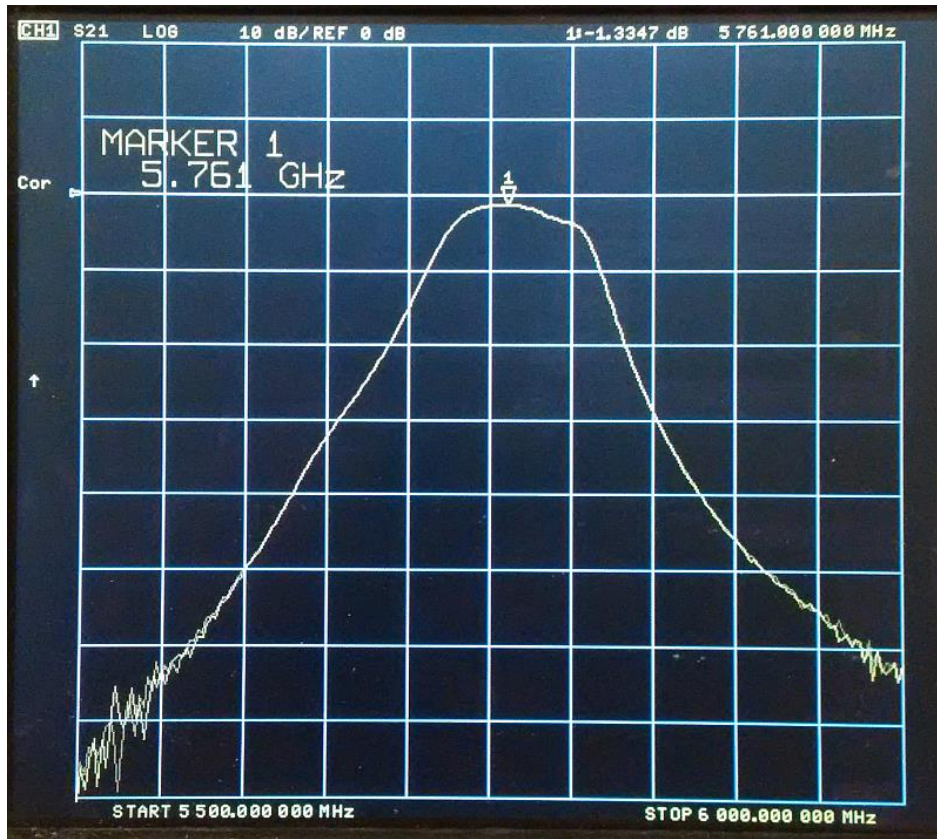
S11 Smith Chart: good wideband match



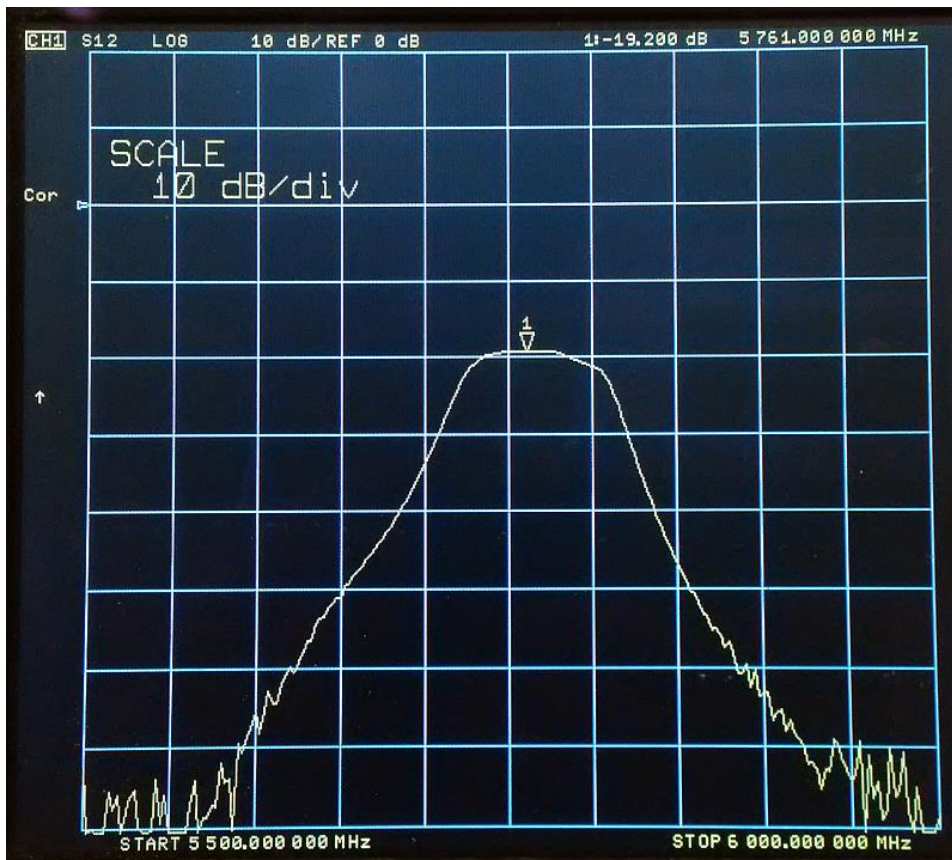
S11 VSWR: 1.19 @5761MHz



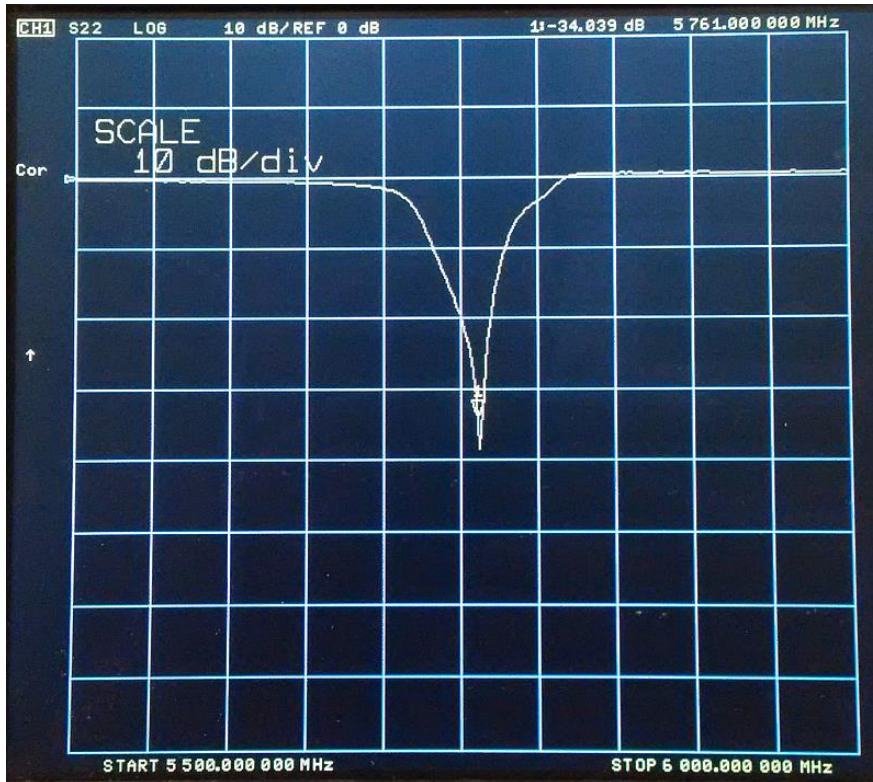
S21 log mag: insertion loss 1.33dB @5761MHz (vertical scale 5dB / div)



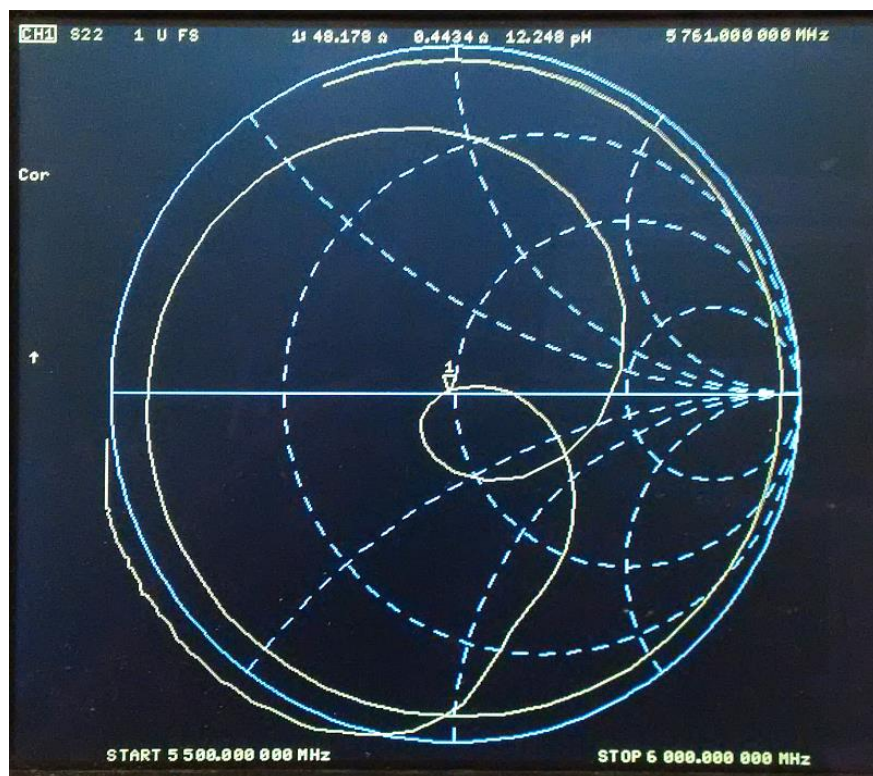
S21 log mag: insertion loss 1.33dB @5761MHz (vertical scale 10dB / div)



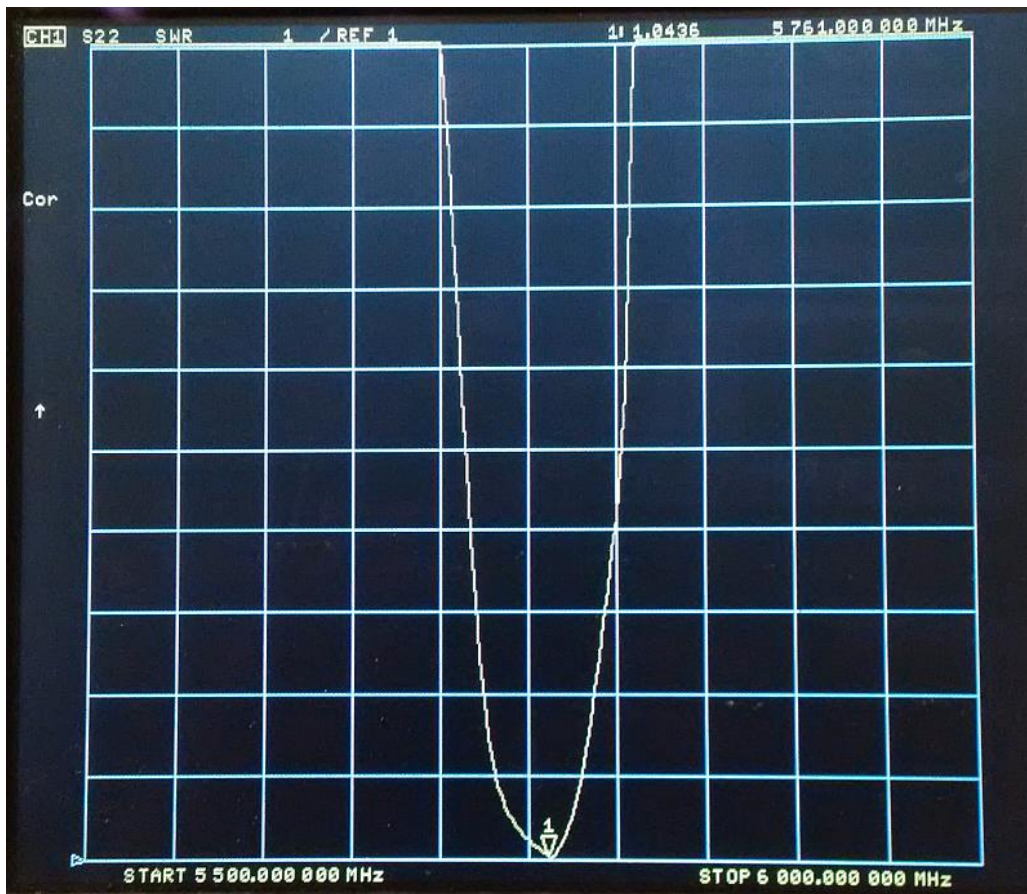
S21 log mag: insertion loss 19.2dB @5761MHz (vertical scale 10dB / div)



S22 log mag: return loss 34dB @5761MHz



S22 Smith Chart: perfect



S22 VSWR: 1.04 @5761MHz

In summary this filter can be easily retuned within the 6cm band. At 5761MHz a quite low insertion loss of 1.33dB has been achieved. Most likely most of the insertion loss is due to the isolator. The filter features a nice broadband input match and the return loss of the narrowband output is 34dB.

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

Matthias DD1US

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