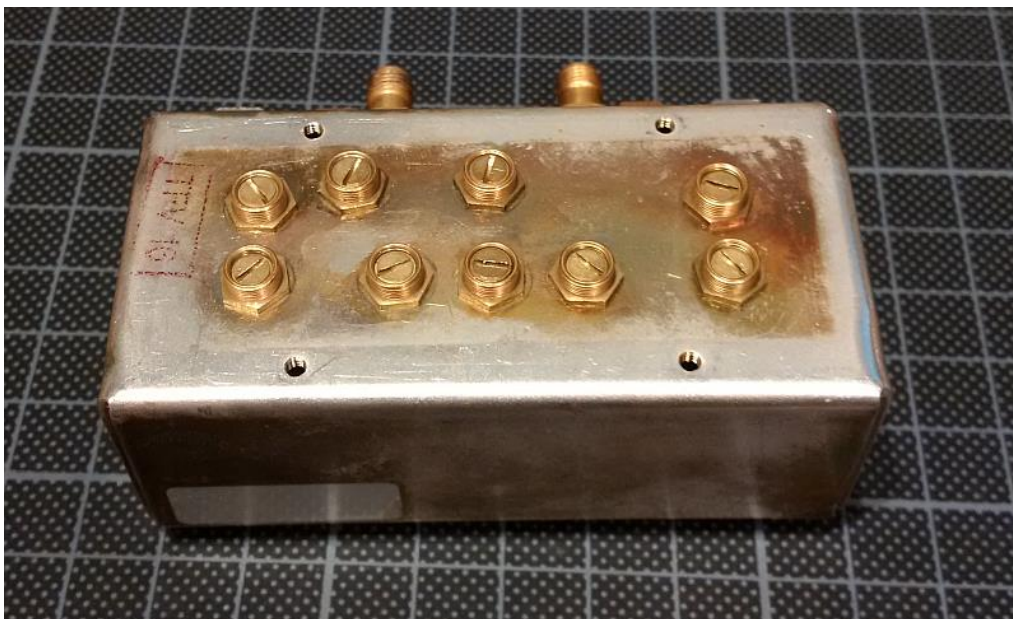


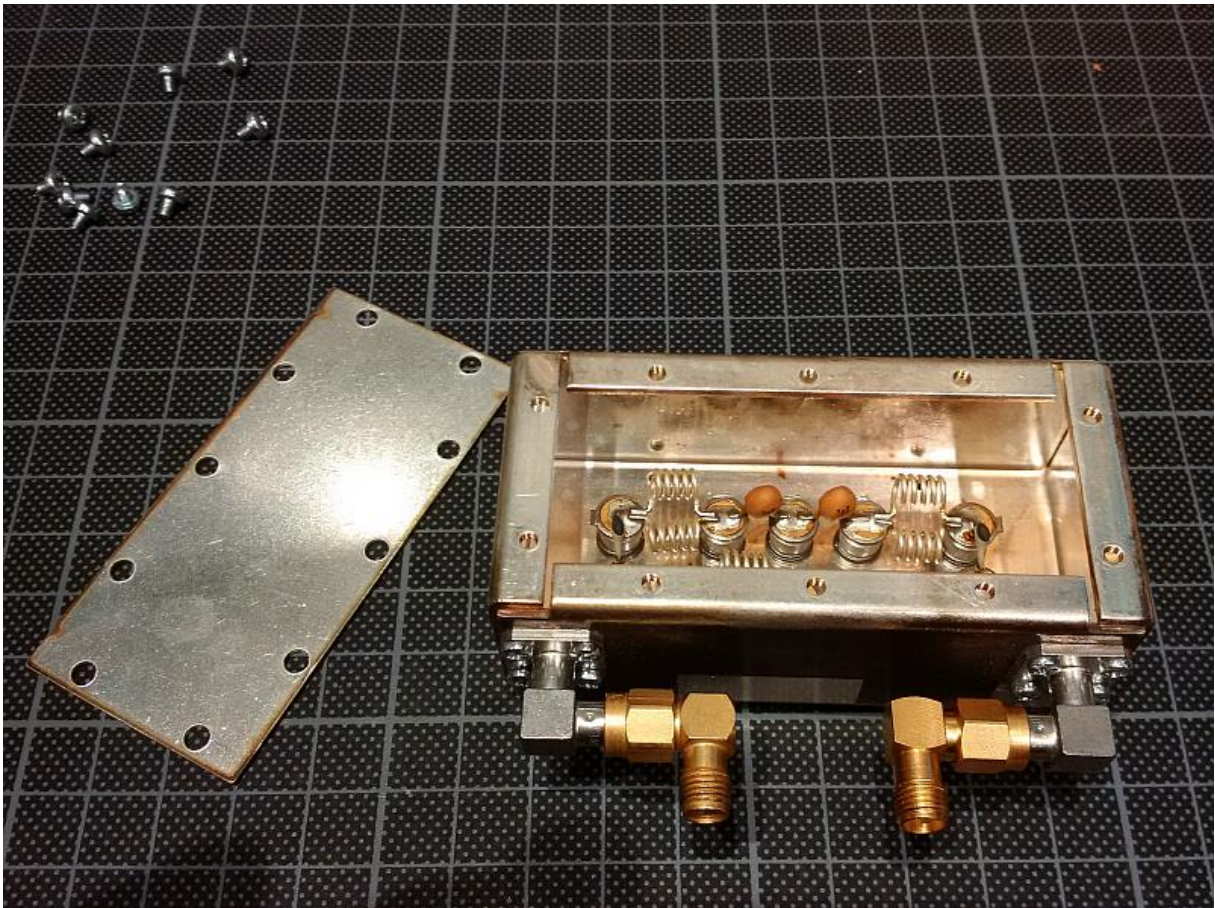
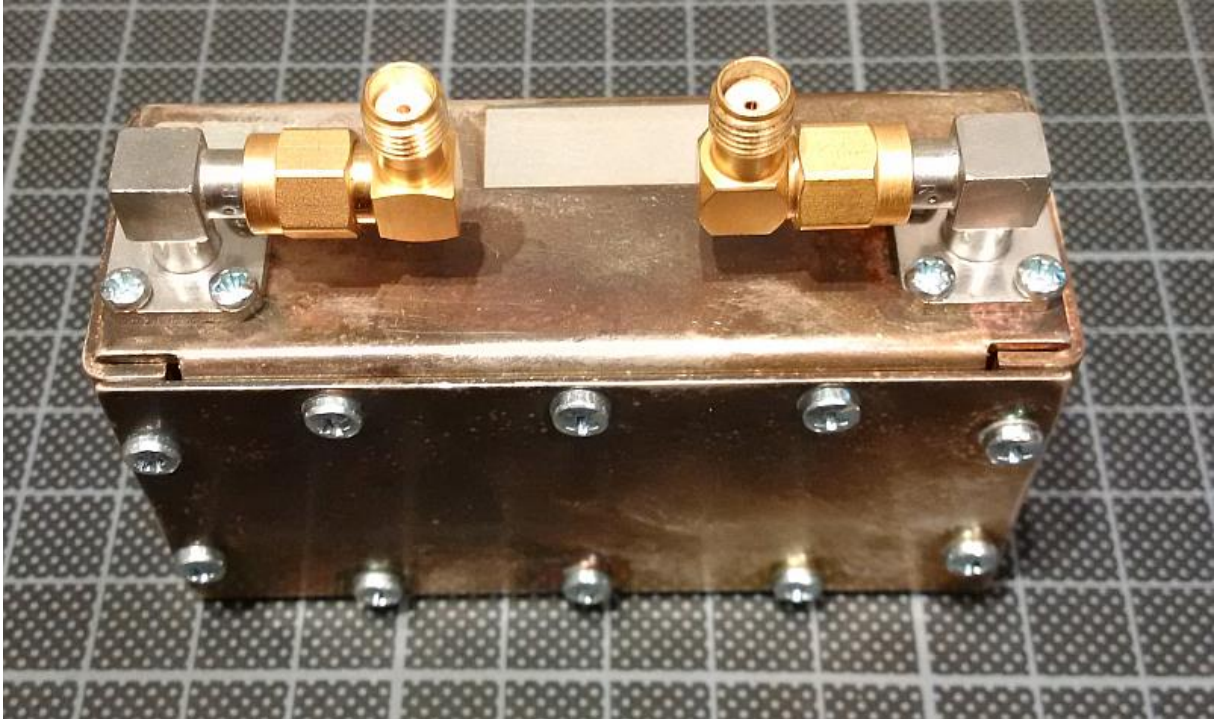
739 MHz bandpass filter for QO-100 satellite

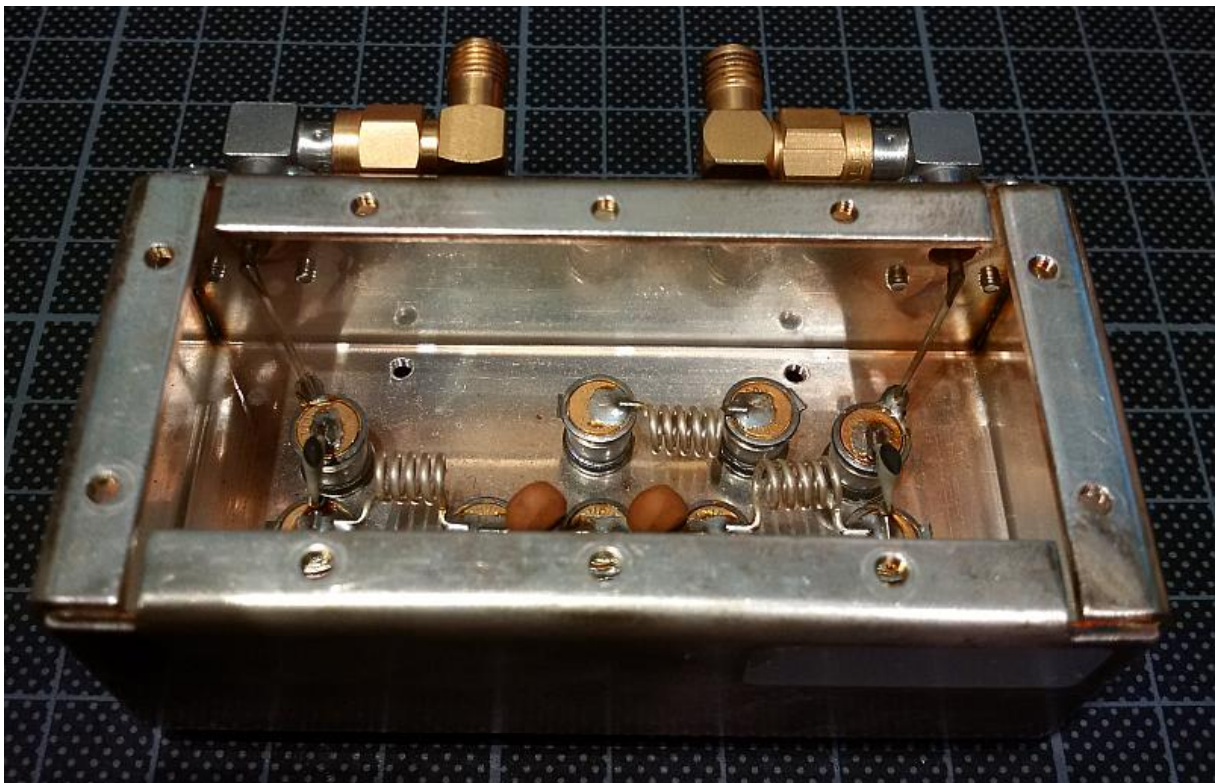
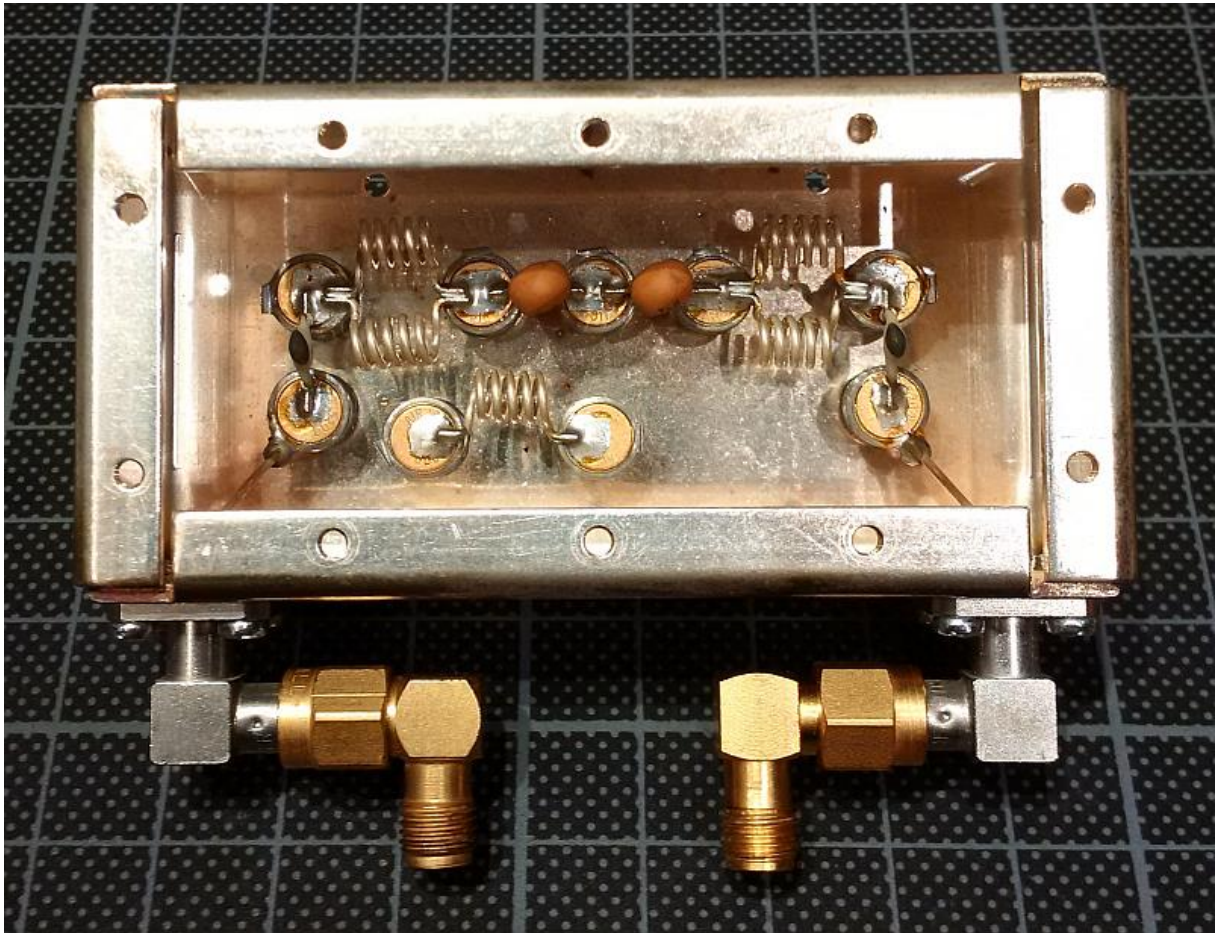
Matthias, DD1US, August 18th 2020

Recently I got hold of an unknown UHF bandpass filter. I checked it and it was originally tuned to about 580MHz. As I have been looking for an IF filter for my QO-100 setup I decided to retune the filter for an IF of 739MHz. This IF results when using a unmodified LNB with a local oscillator of 9750 MHz and receiving the QO-100 satellite around 10489MHz. Many receivers such as TV tuners and SDRs are sensitive to strong out of band interference and this can be suppressed by adding a bandpass filter in the IF path before feeding the received signal to the receiver. There have been reports about some SDR receivers creating problems because of receiving other transponders at the same direction as QO-100. The SDRs did receive them at twice the intended IF frequency. This can be easily suppressed by a suitable bandpass filter.

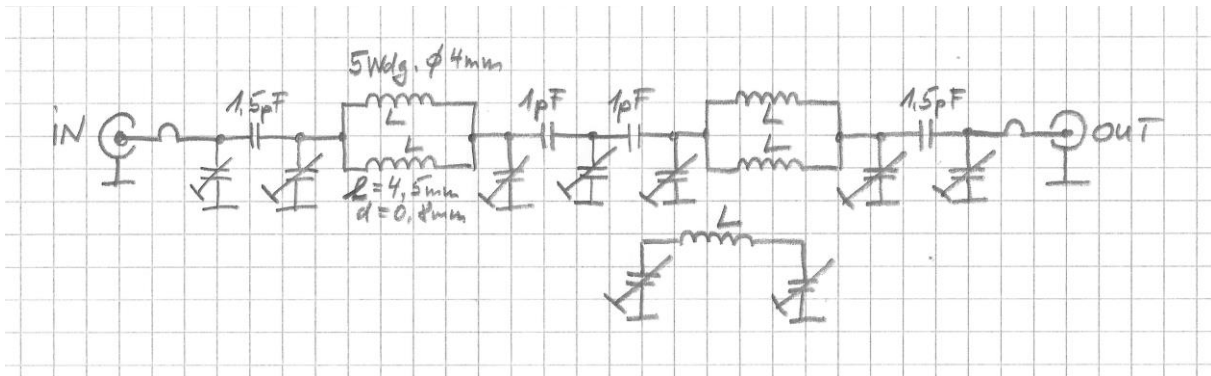
Here are some pictures of the filter:



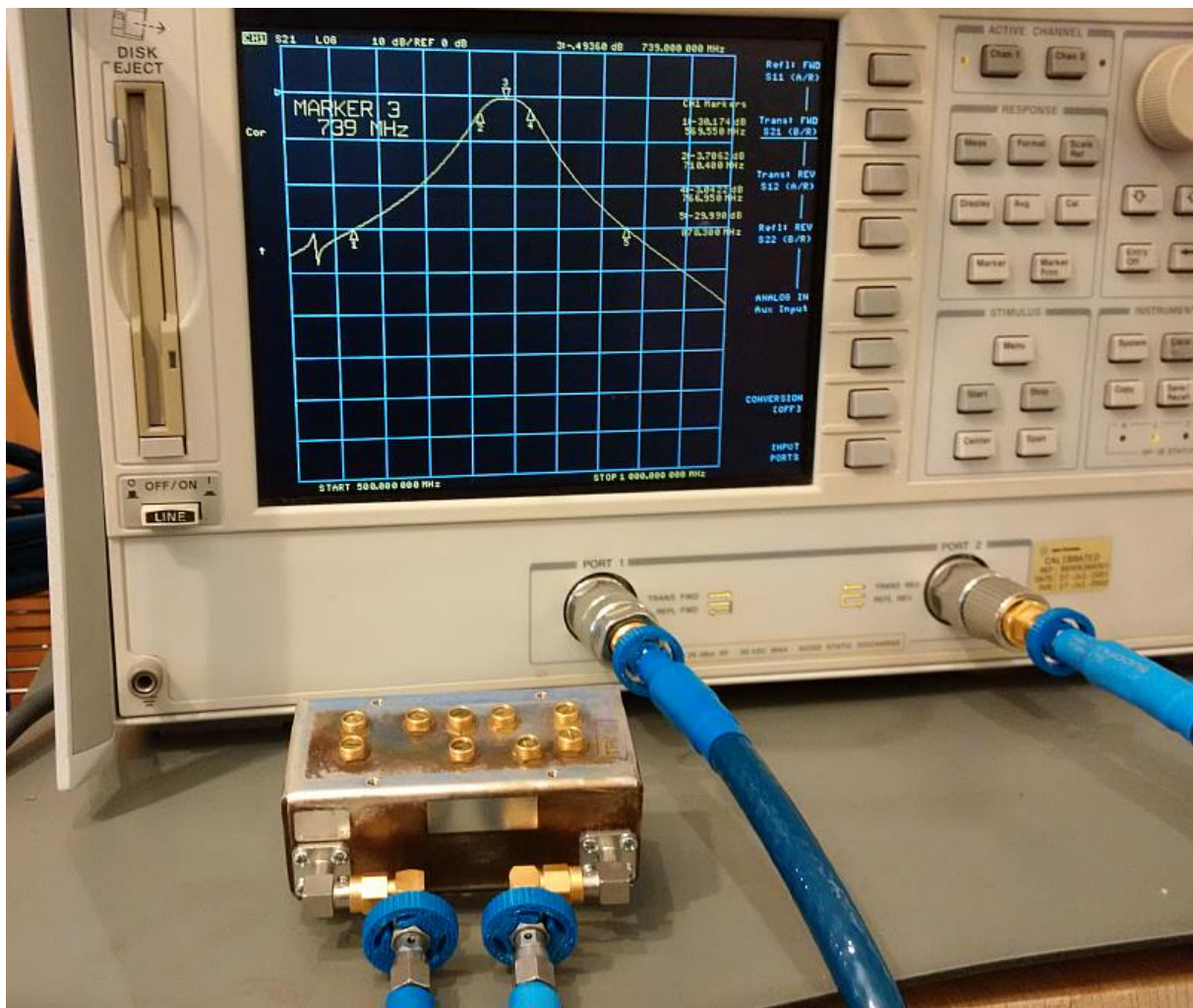




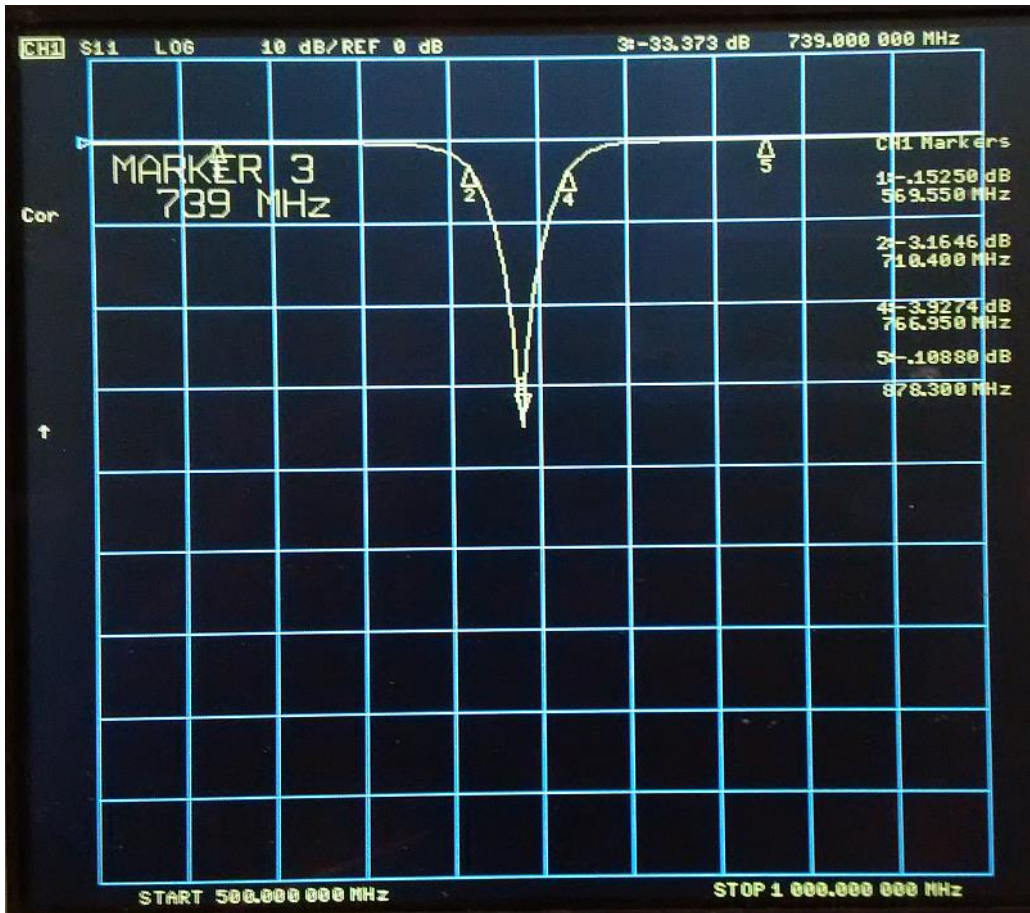
Here is a sketch of the schematic of this filter:



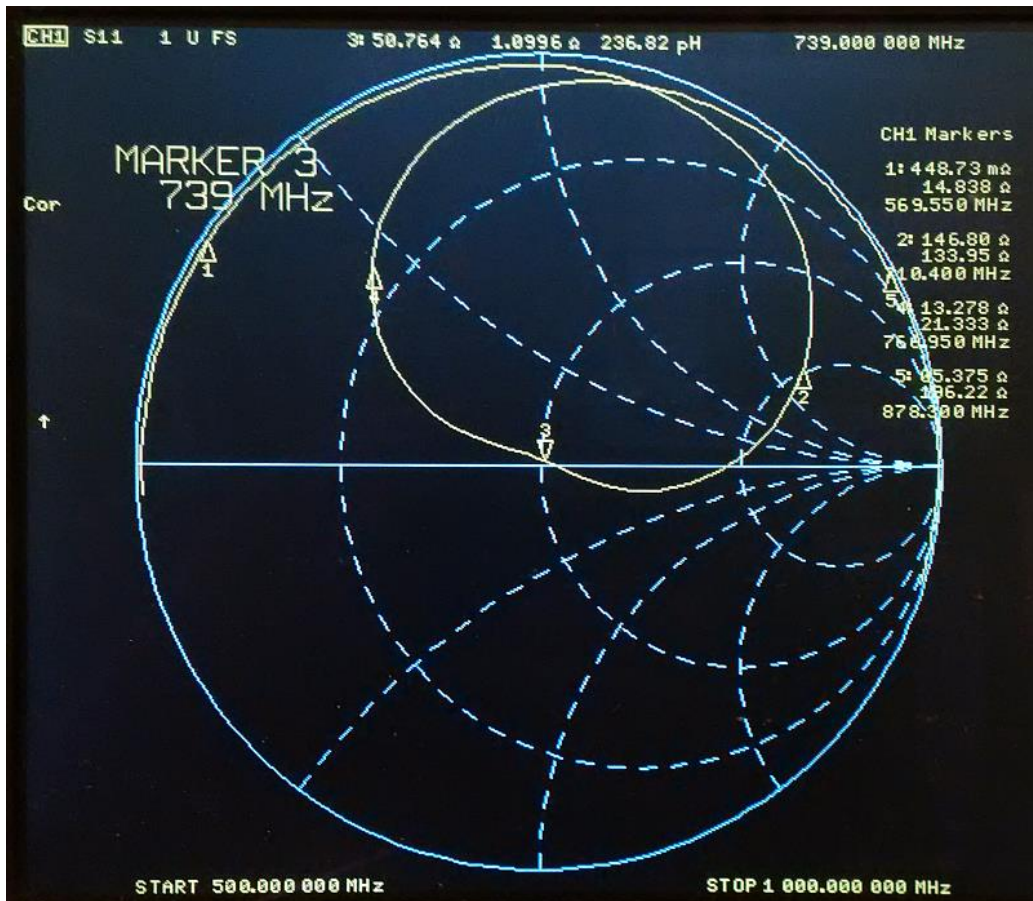
All trimmer capacitors are of the same type and apparently value. All Inductors are also the same type. A 0.8mm silver plated copper wire is used. The inductor has 5 windings, a diameter of 4mm and a total length of 4.5mm. The filter assembly includes a notch filter. The notch function is only effective when tuned close to the center of the bandpass filter. The notch filter is not used in my application and therefore, it has been tuned far out of the band of interest. The filter has SMA jacks at the input and output.



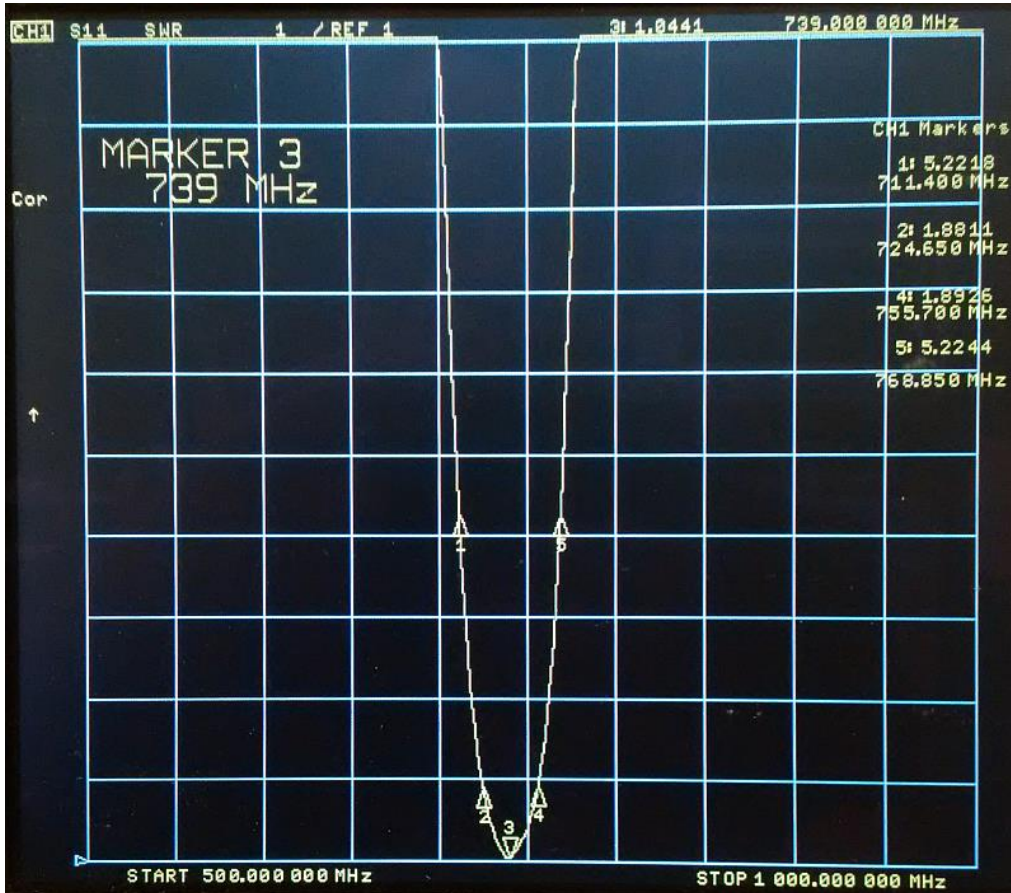
On the next pages you can find the measurement results after retuning the filter it to a center frequency of 739 MHz:



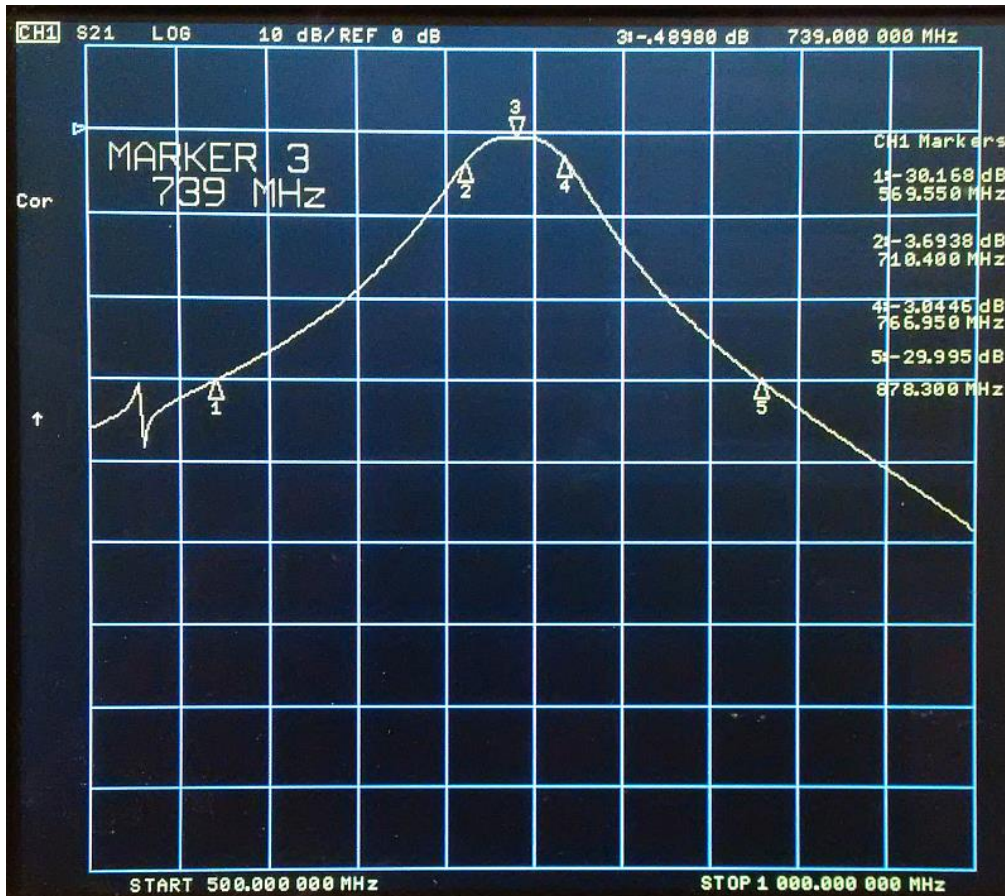
S11 log mag: return loss 33dB @739 MHz



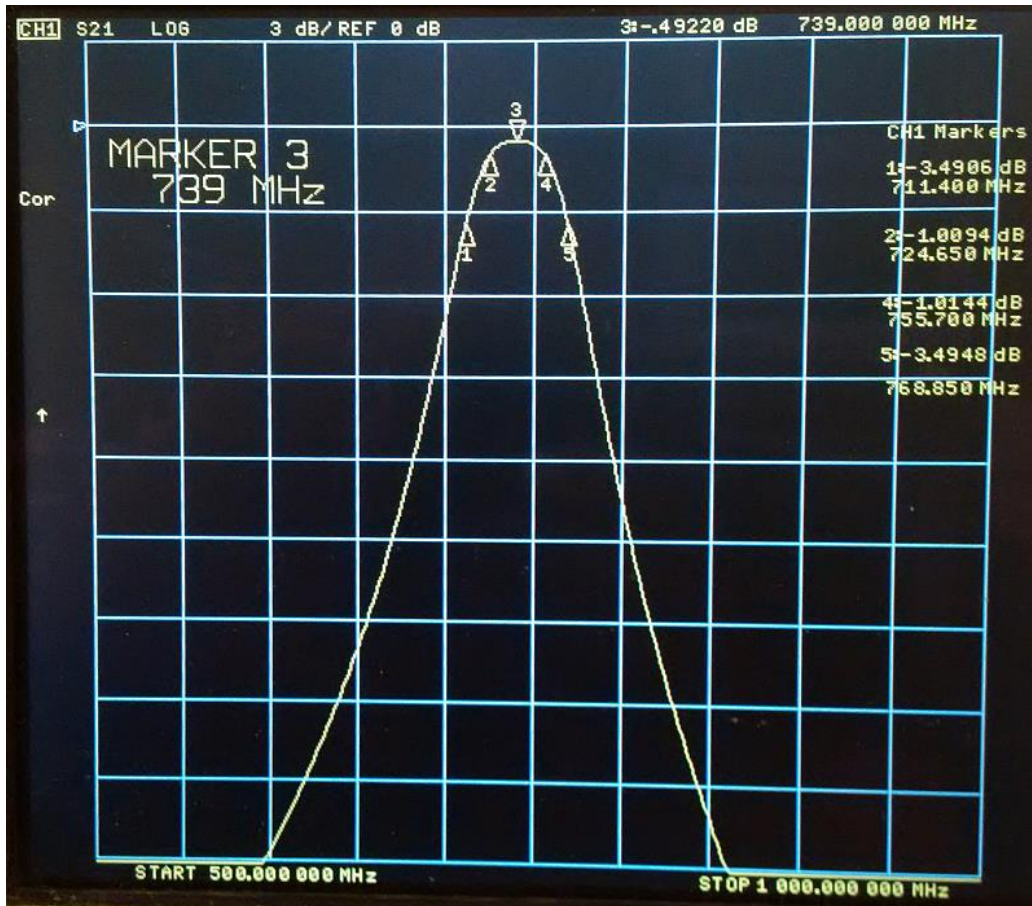
S11 Smith Chart



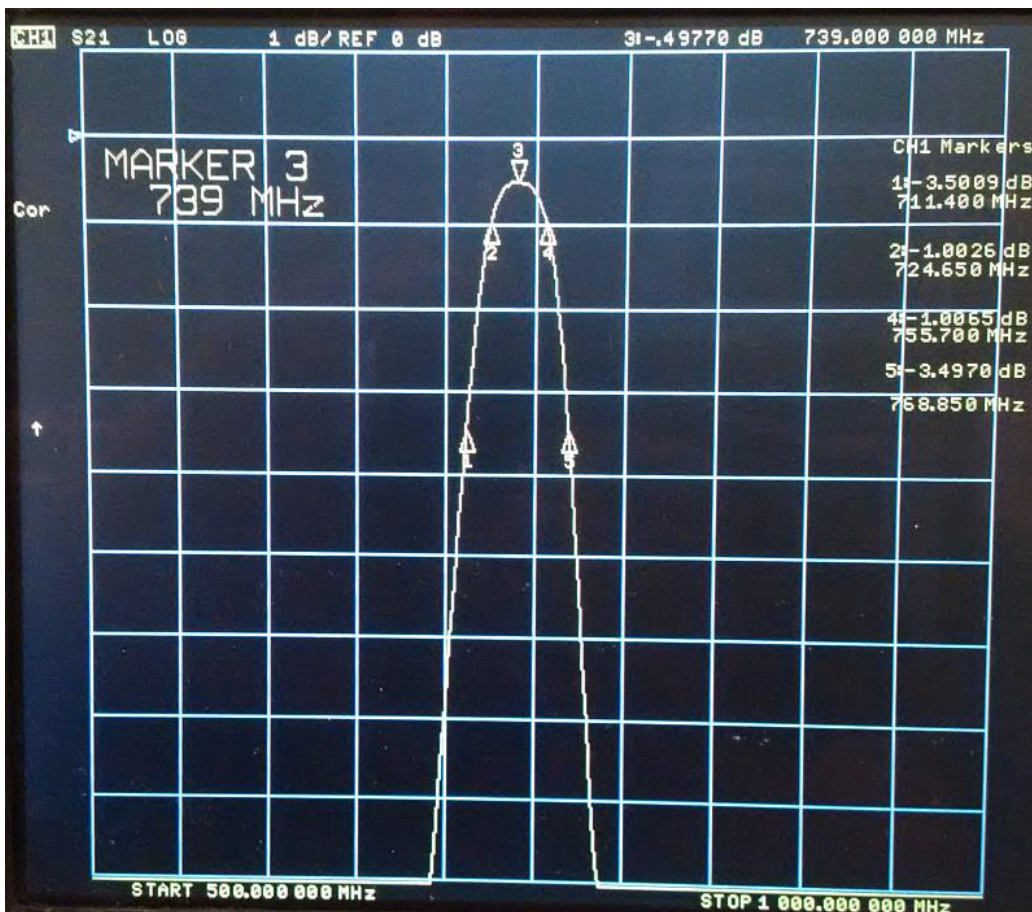
S11 VSWR: 1.04 @739MHz



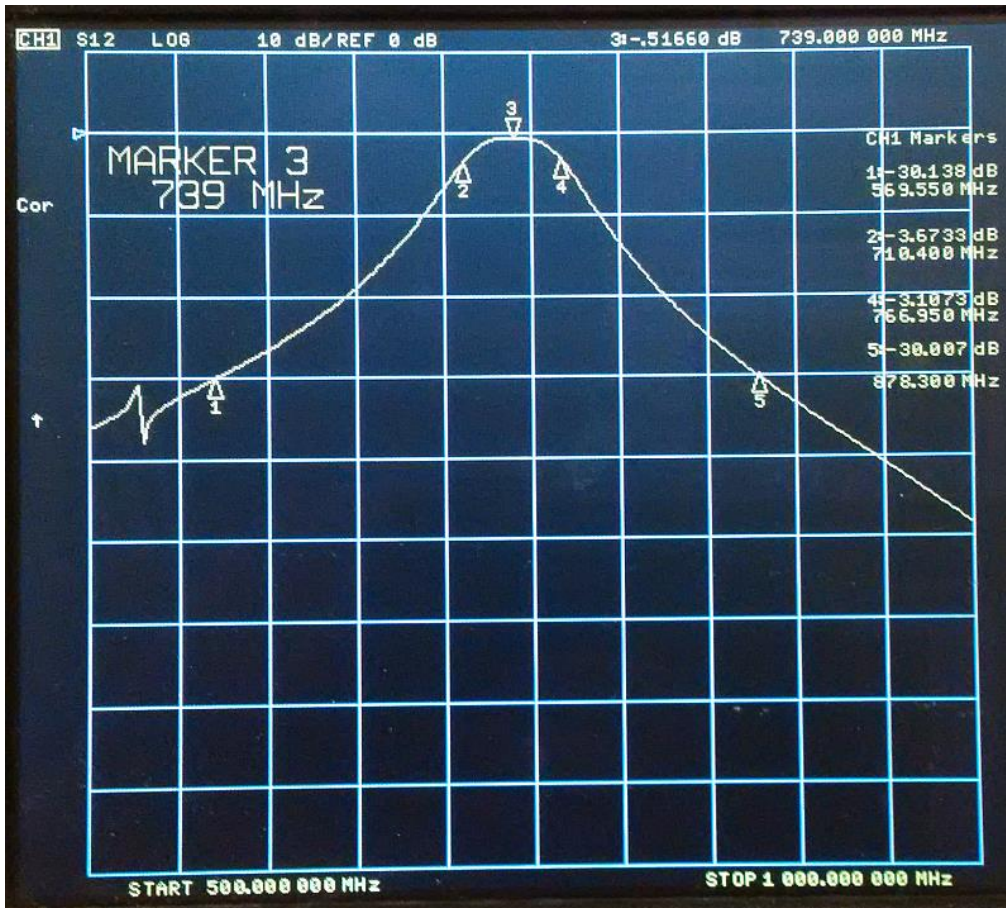
S21 log mag: insertion loss about 0.5dB @739 MHz



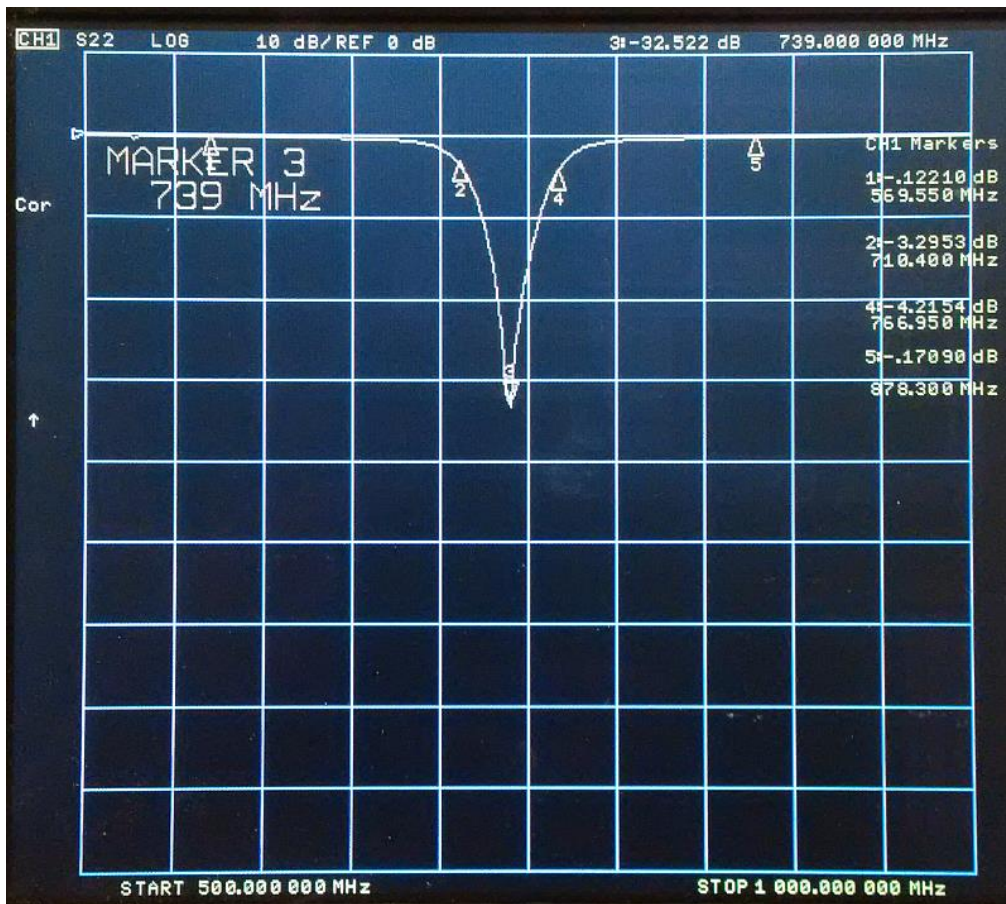
S21 log mag: 0.5dB bandwidth 31MHz



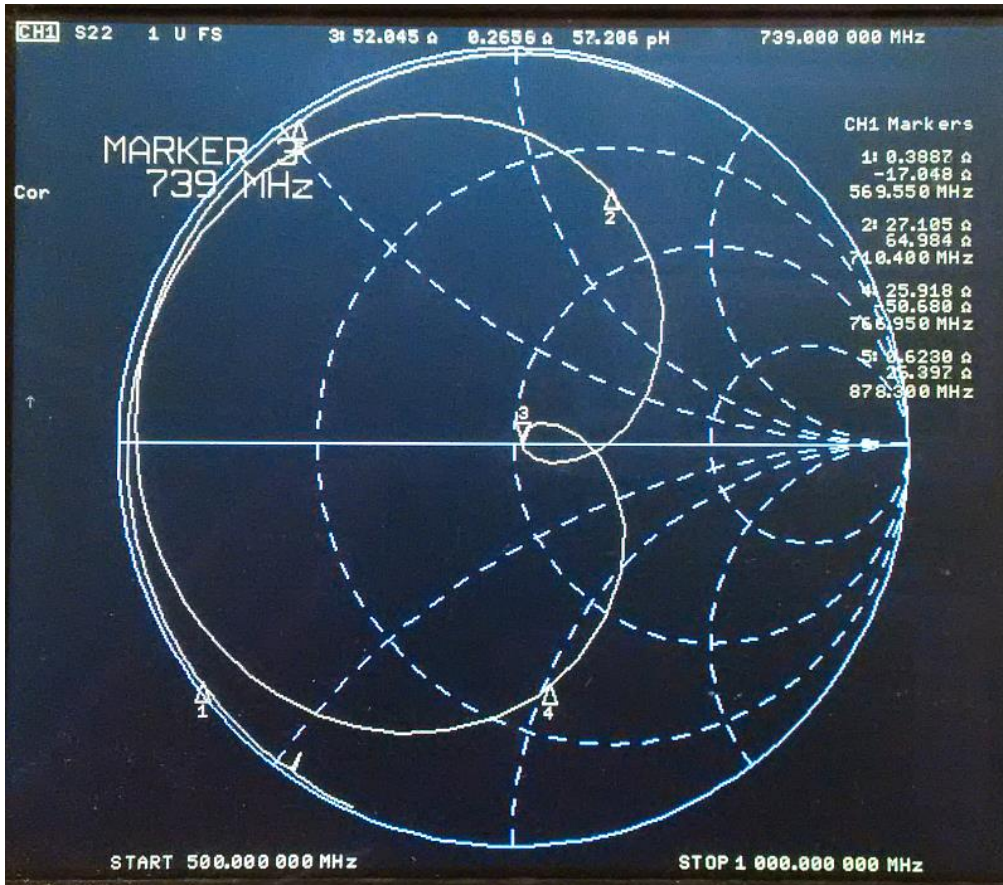
S21 log mag: 3dB bandwidth 57MHz



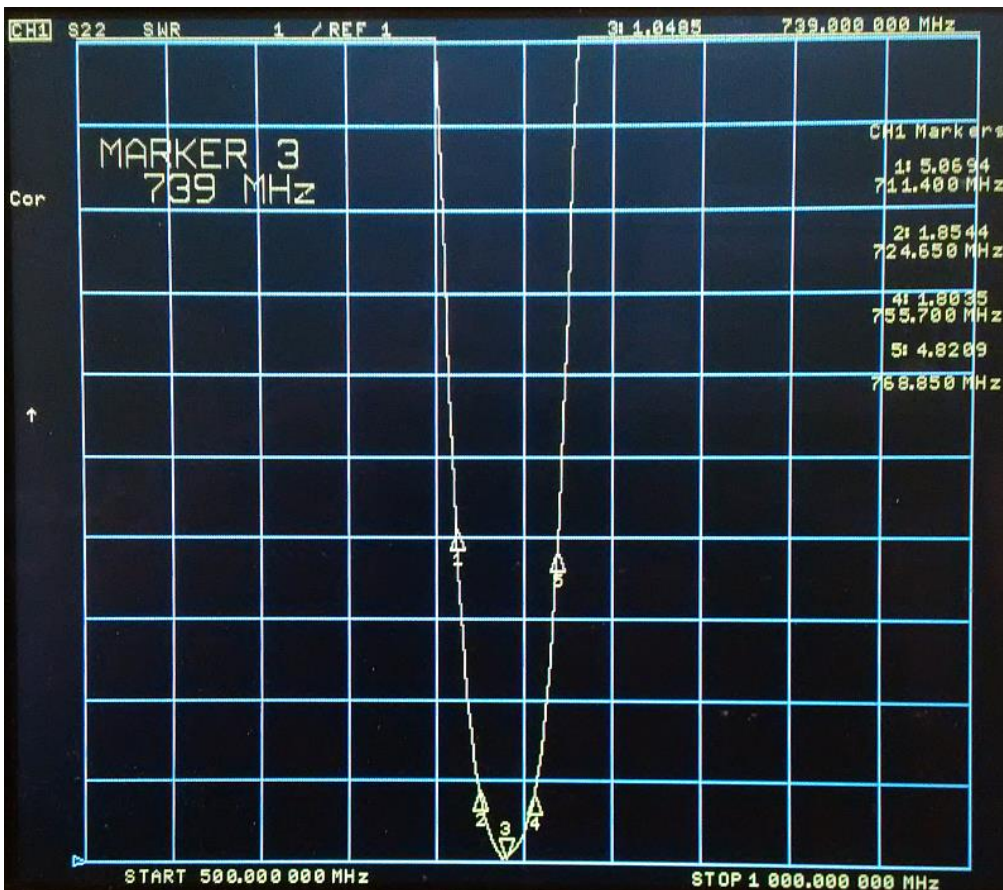
S12 log mag: essentially the same as S21



S22 log mag: return loss about 32dB @739 MHz



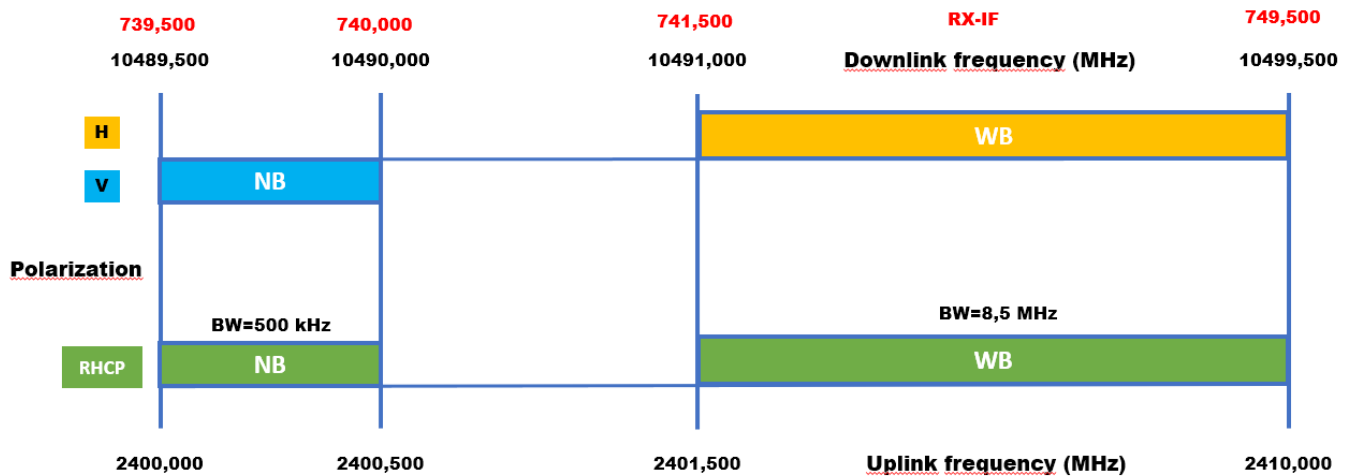
S22 Smith Chart



S22 VSWR: 1.05 @739MHz



In summary this filter makes a perfect IF filter for the receive path of a QO-100 station. The insertion loss is only 0.5dB. Input and output return loss are excellent exceeding both 30dB. Within a bandwidth of 57MHz the insertion loss is still only 1dB. As you can see in the next graph, the total bandwidth of the narrowband and wideband transponder is 10 MHz and thus fits perfectly well.



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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