

LC lowpass filter for the supply line of a noise source

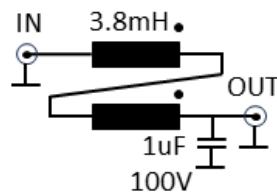
April 29th 2024, Matthias, DD1US, Rev 1.0

Noise sources are generally powered by a 28V DC power supply which is pulsed to make „hot/cold“ measurements. I checked my R&S spectrum analyzer and found that the repetition frequency of that pulsed 28V signal is about 1Hz.

For me it is not clear how much filtering is already used inside the noise source.

Therefore, I decided to build a lowpass filter to filter the pulsed 28V supply to avoid any unwanted modulation of the noise source by ripple on the supply voltage.

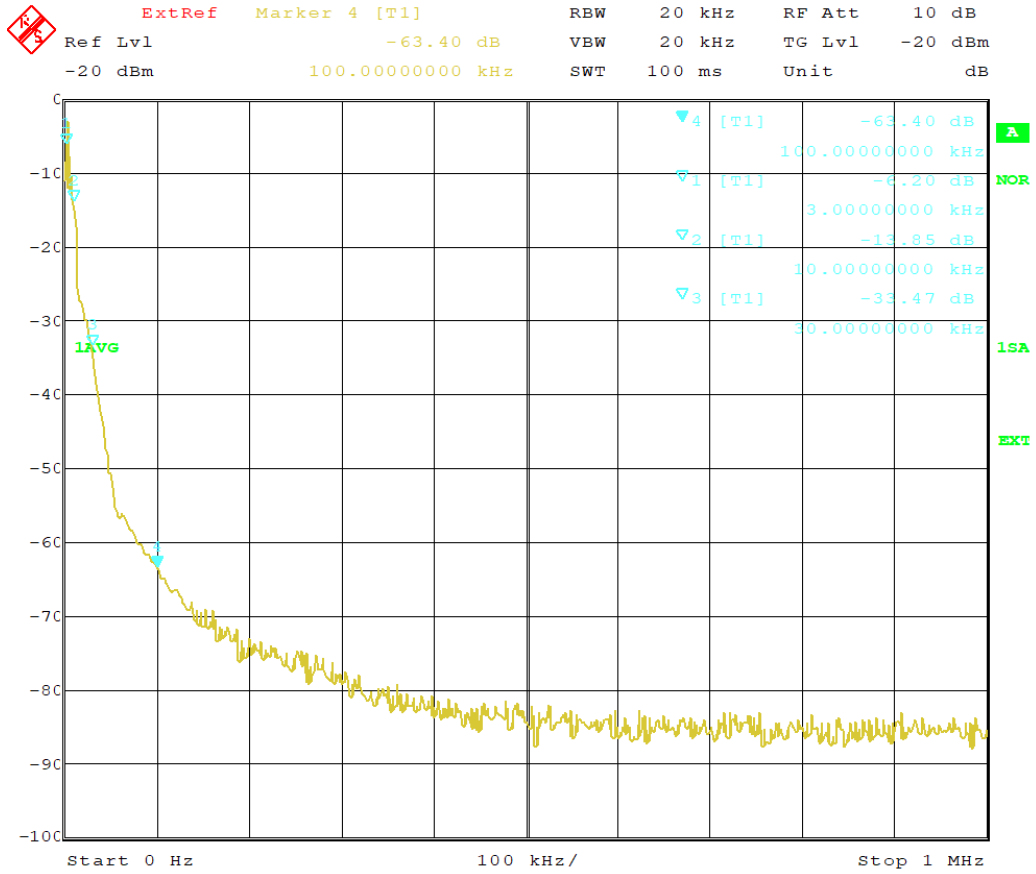
I built a simple LC lowpass filter from components which I had available. As inductor I used a common mode inductor and connected the two windings on a toroid core in series which resulted in a total inductance of 3.8mH. I used a 1uF/100V ceramic capacitor as second part of the lowpass filter which results in a cutoff frequency of approximately 2.6kHz.



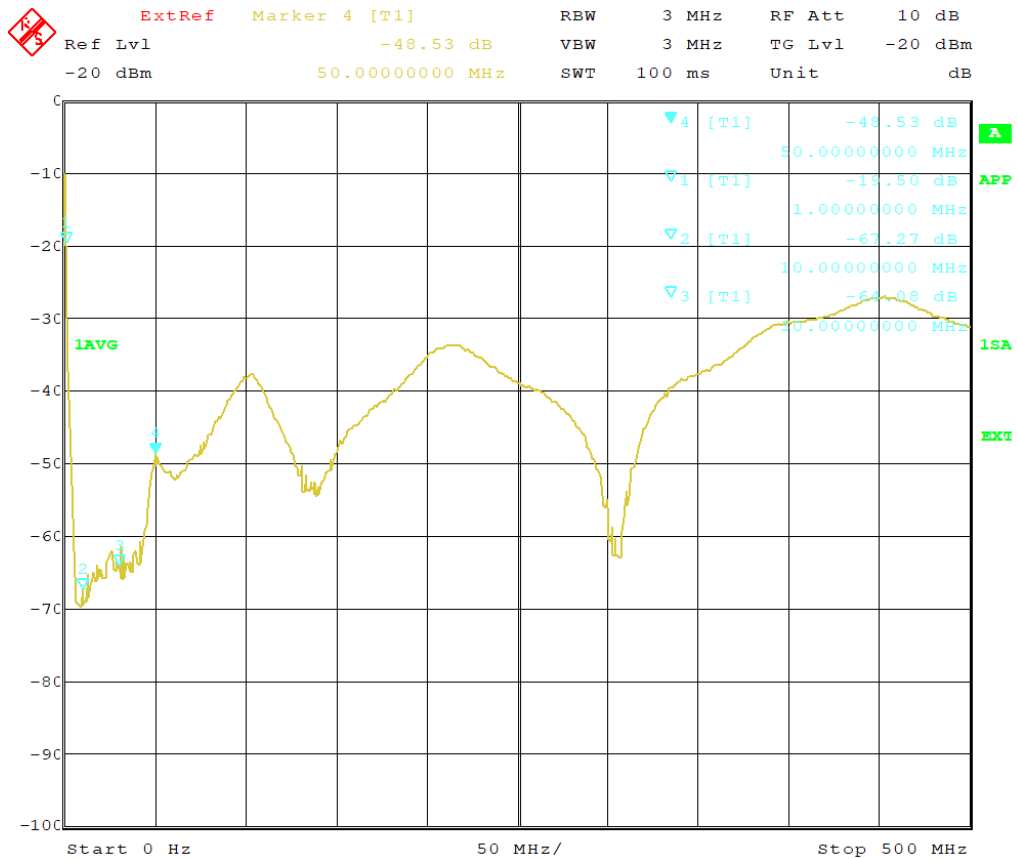
All fits inside a little aluminium encasing which I had at hands. The input connector is a female BNC jack. The output connector is a male BNC jack which can be directly attached to the DC input of the noise source.



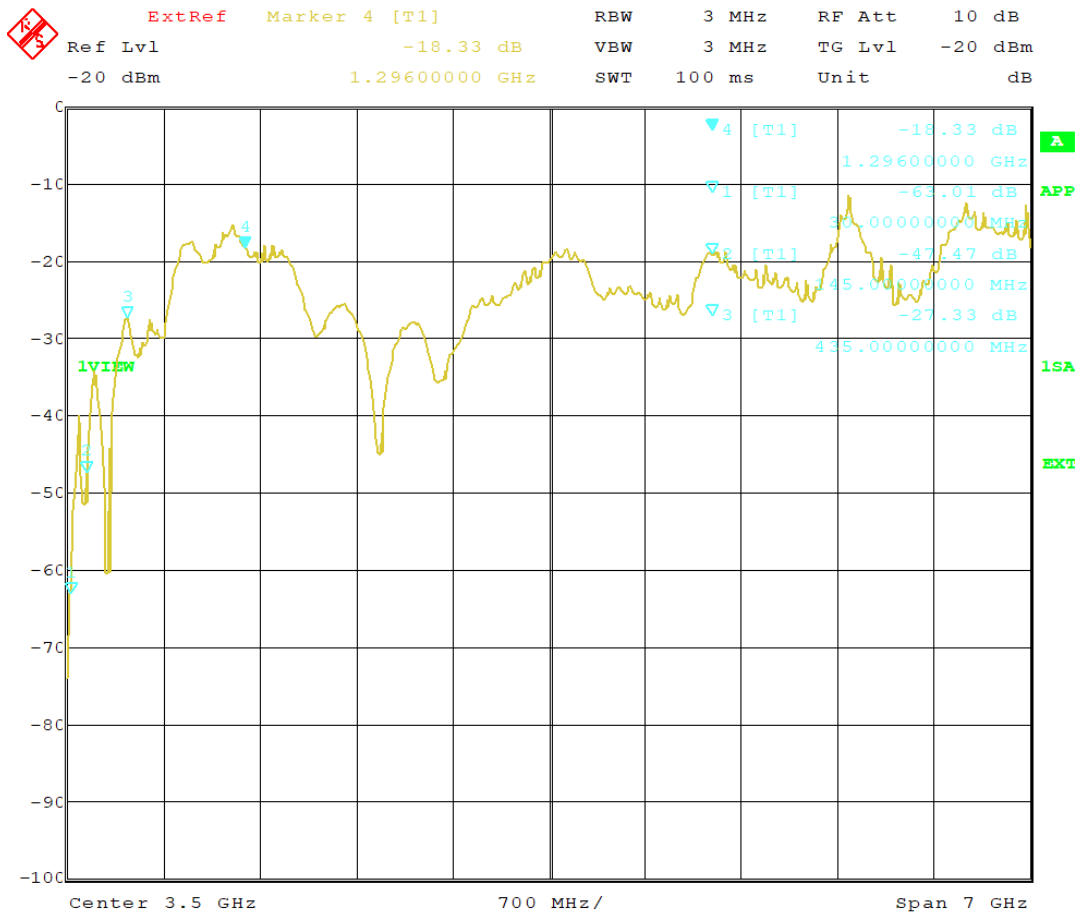
I measured the frequency response of the filter with a spectrum analyzer and tracking generator.



The measurements show a suppression of up to 80dB in the frequency range up to 1MHz.



In the HF frequency range up to 50MHz the suppression is close to 50dB.



At higher frequencies above 50Mhz the suppression shows a lot of variation between 12dB and 45dB.

When checking the pulsed 28V signal on an oscilloscope without and with the LC low pass filter I could see a significant reduction of the noise superimposed on the 28V signal. As mentioned before I do not know how much filtering is happening inside the noise source thus I feel more comfortable performing noise figure measurements including this lowpass filter in the supply line of the noise source.

I always appreciate any feedback and be happy to answer any questions.

Please send it to my Email address below.

Kind regards

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