

# OPA211 Sallen-key

## simulations

Art Kay

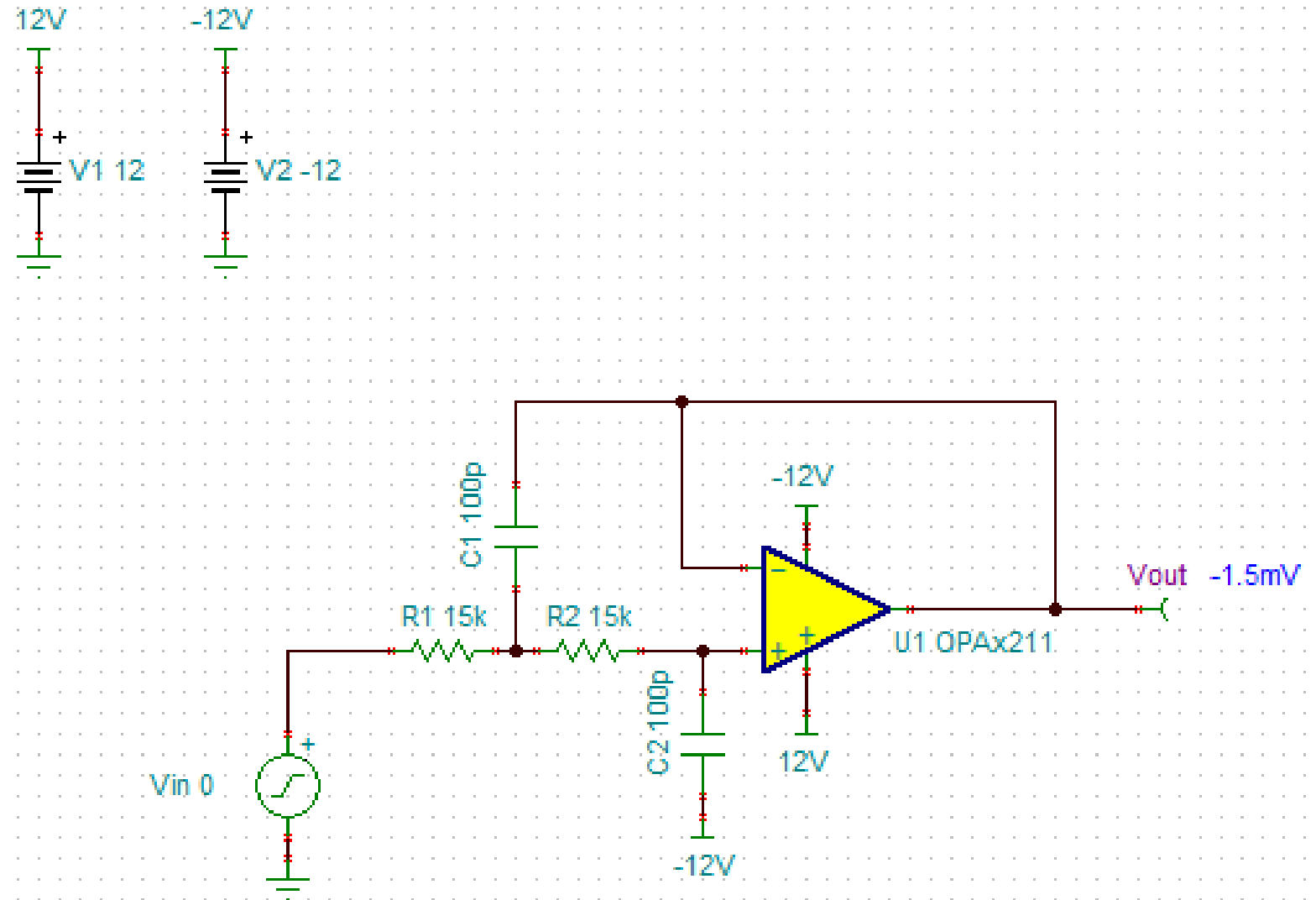
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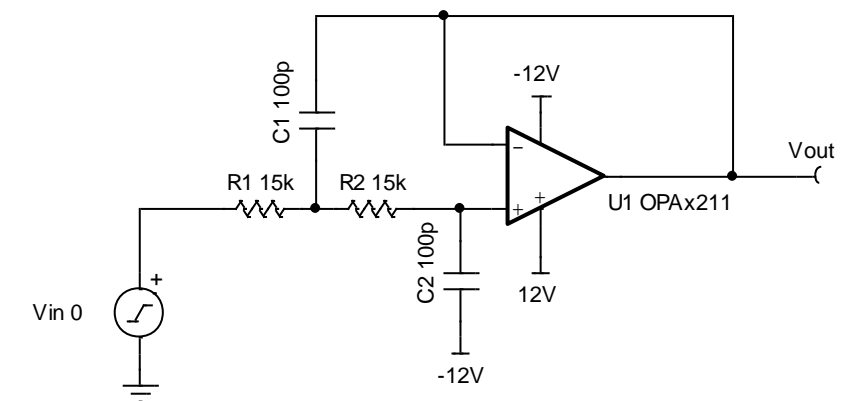
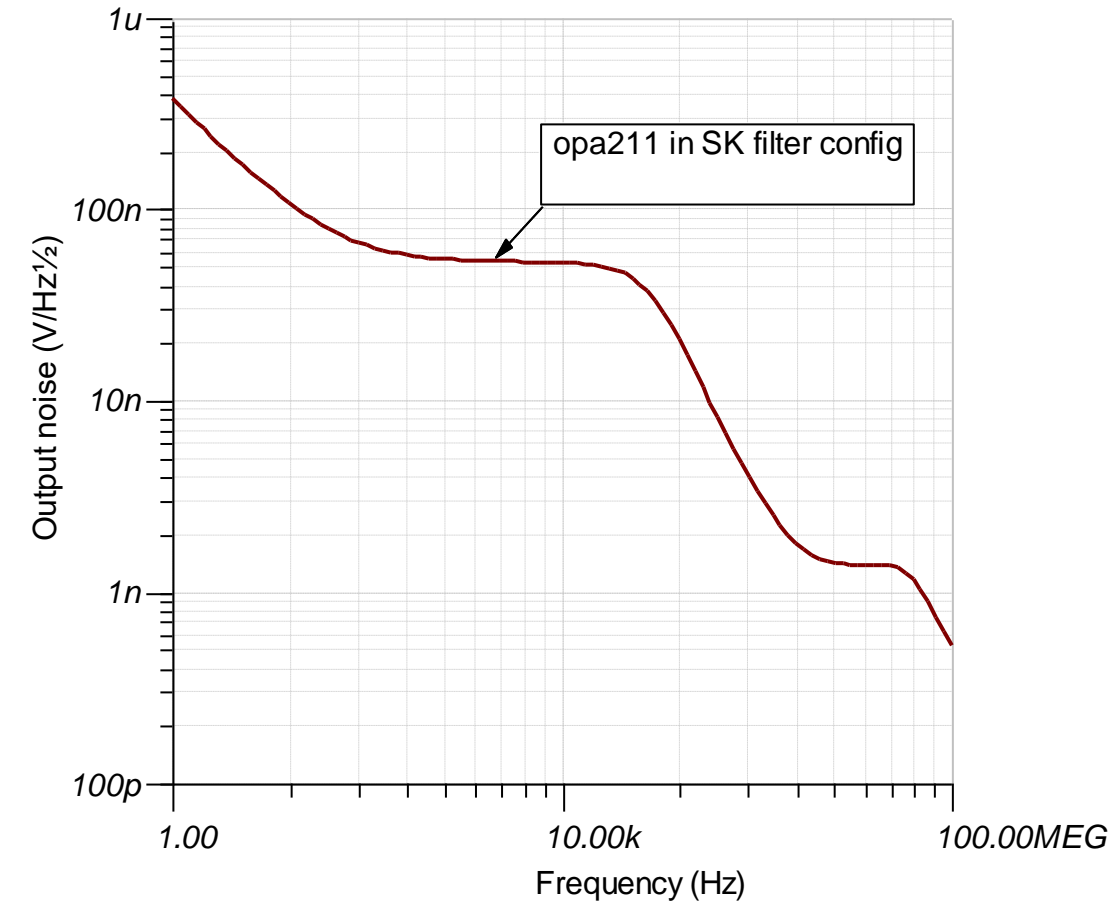
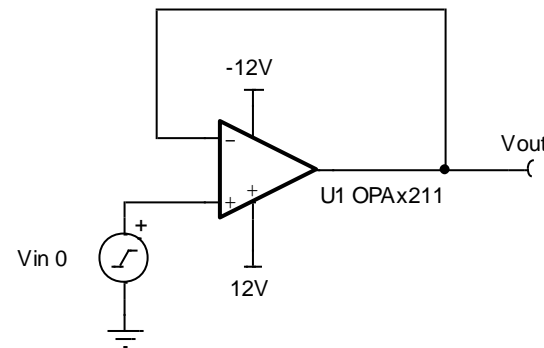
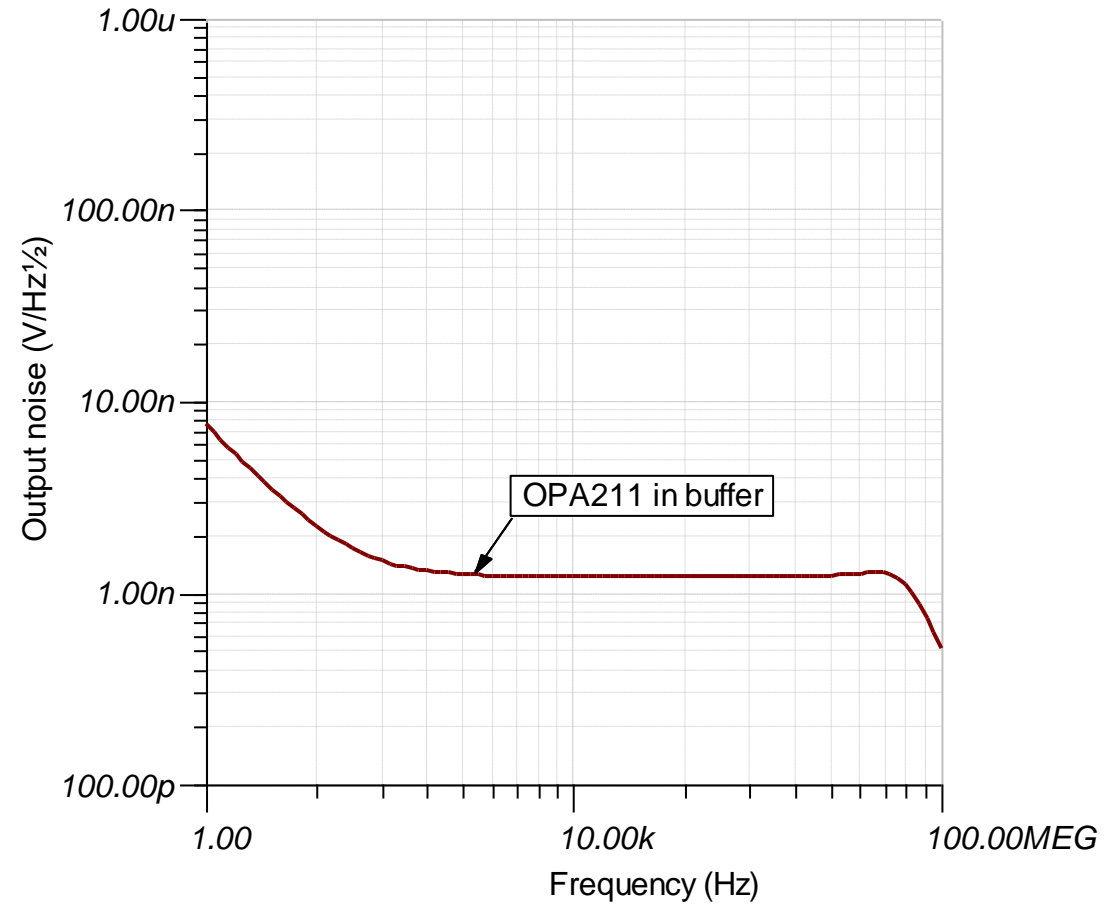
# Offset due to bias current

This device is bipolar, so the bias current is somewhat higher than for many device (60nA typical, 175nA max). The simulation shows typical results  $60\text{nA} \times 30\text{k} = 1.8\text{mV}$ . Max offset due to bias current would be  $175\text{nA} \times 30\text{k} = 5.2\text{mV}$ . This is much smaller than what you measured, but is high compared to the input offset voltage of the device. The most common reason for using the OPA211 is that it has extremely low noise. However, R1 and R2 generate noise and also translate the current noise into voltage noise. Depending on your requirements, you might consider a CMOS amplifier like OPA192. The bias current and bias current noise are very low on this device. The OPA205 is a bipolar device with superbeta inputs so bias current and  $i_b$  noise is low.



# Noise of OPA211 buffer vs Filter

Here you can see the noise of the OPA211 buffer vs the SK filter. Because the source impedance is 30k ohms, the current noise translates to voltage noise and also the 30k resistor generate noise. This is not the issue you are seeing but is a reason why the OPA211 isn't a good option from a noise perspective in this application. Note: 30k has 22nV/rtHz of thermal noise.



# Why reference the filter to -12V.

I'm not sure why you reference this capacitor to -12V. This isn't necessary a problem but for bipolar supplies it is normally connected to GND. Just curious and trying to understand your implementation.

