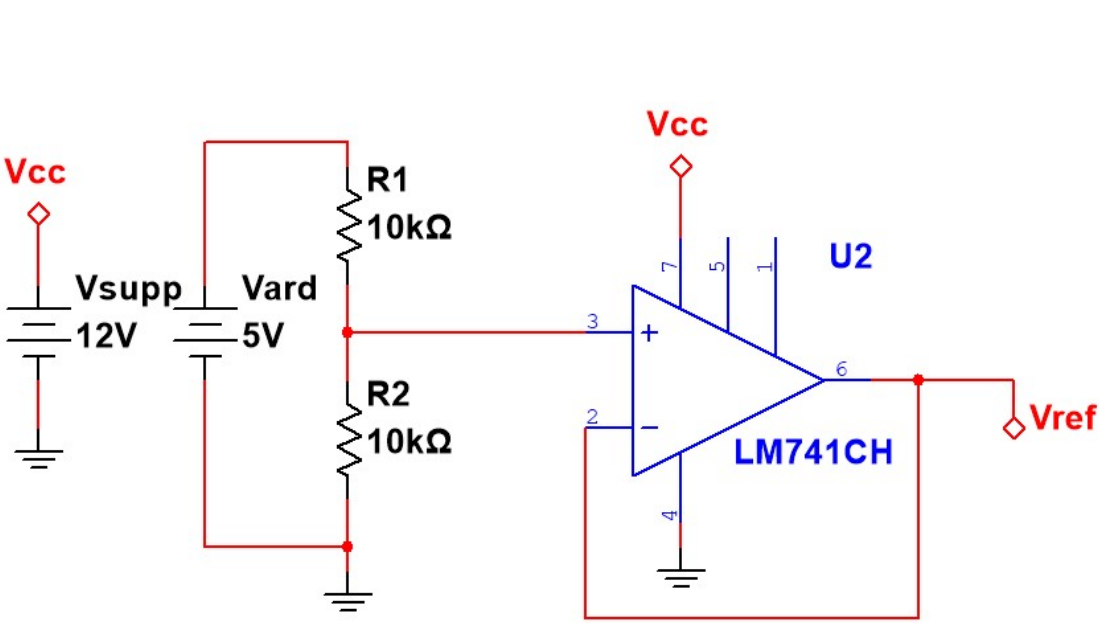
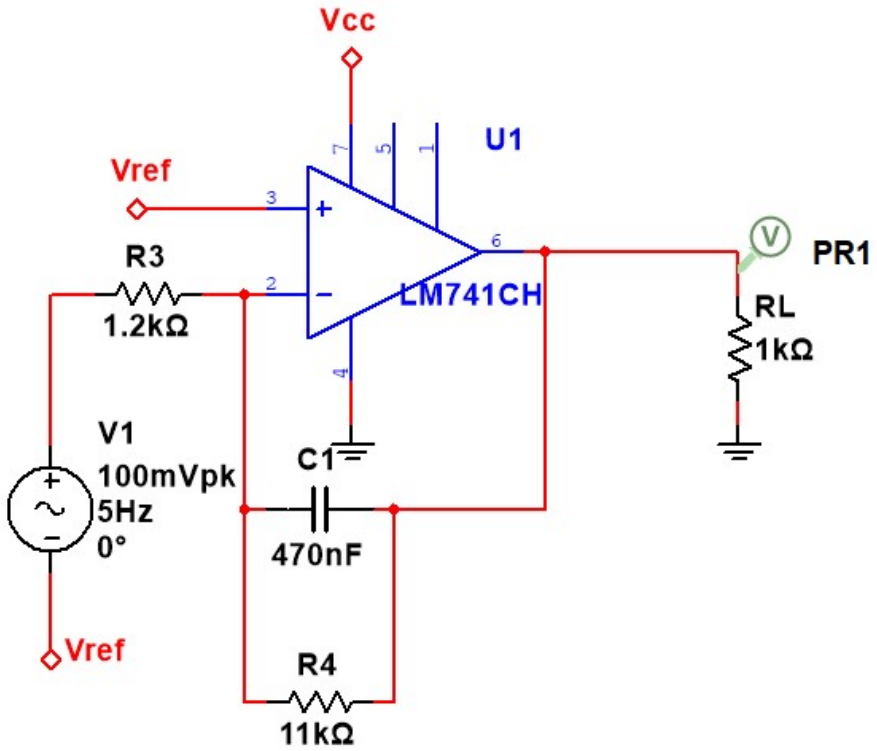


Virtual Ground Circuit



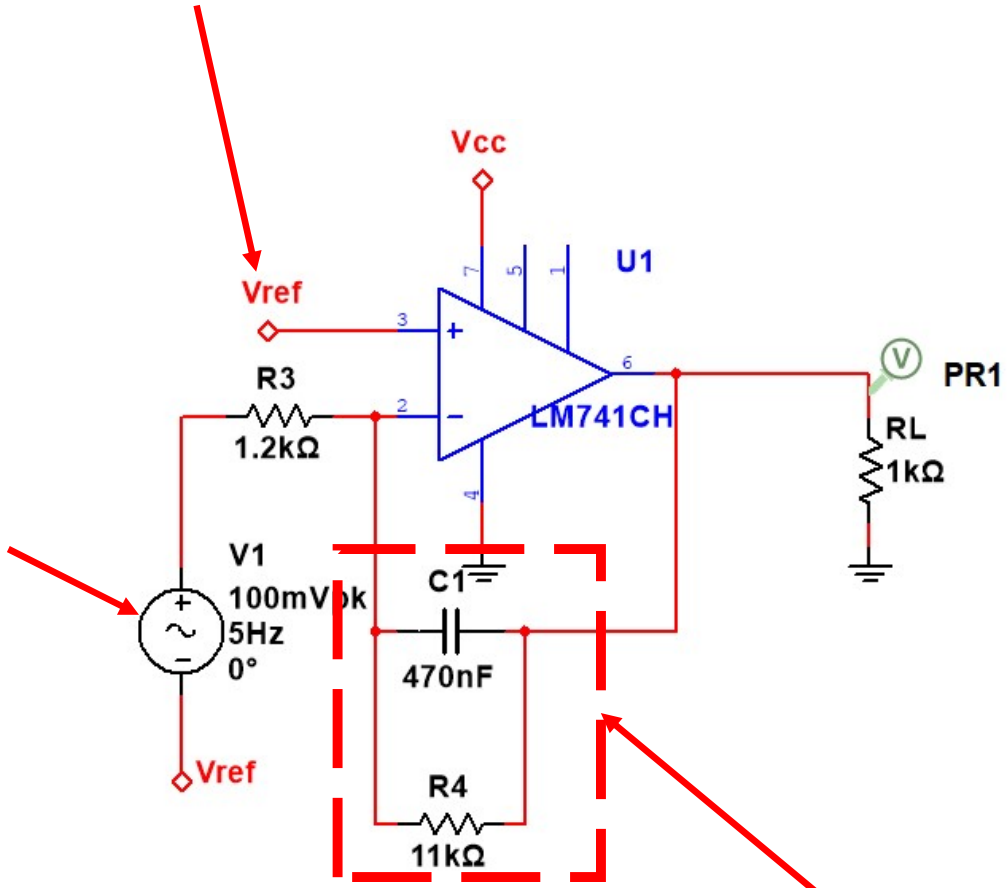
Active Lowpass Filter

Vref is the reference voltage from the virtual ground circuit which is 2.5V

We are using an input signal of $100mV_{p-p}$

The active filter can go up to input signal of $150mV_{p-p}$

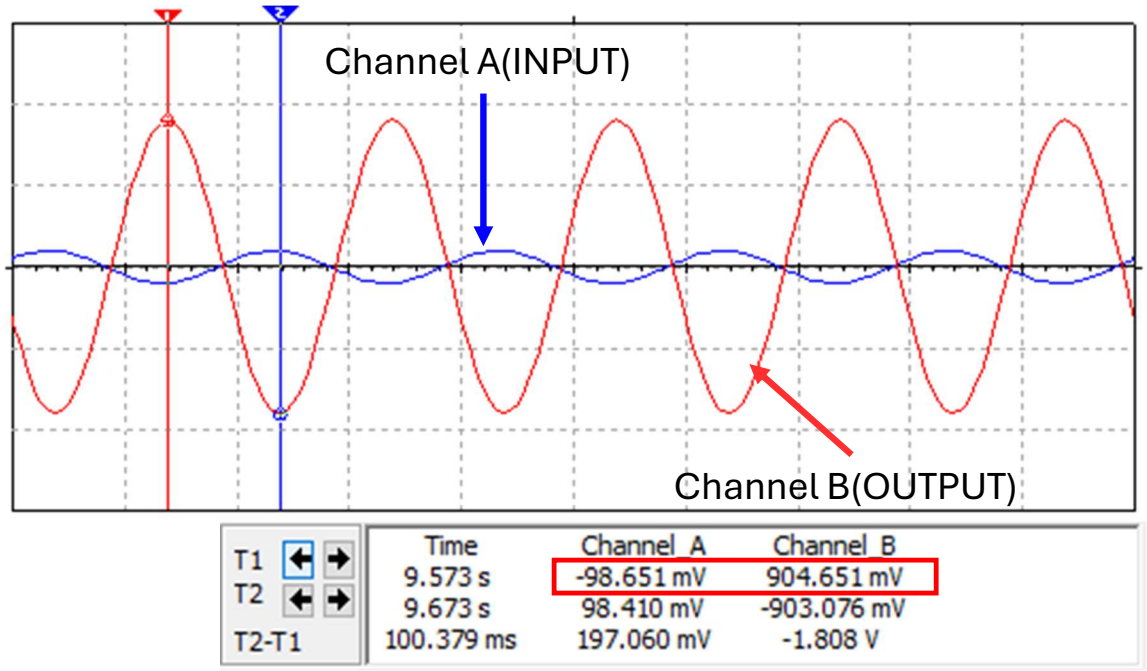
On higher voltage then 150mV output starts clipping.



Lowpass Filter

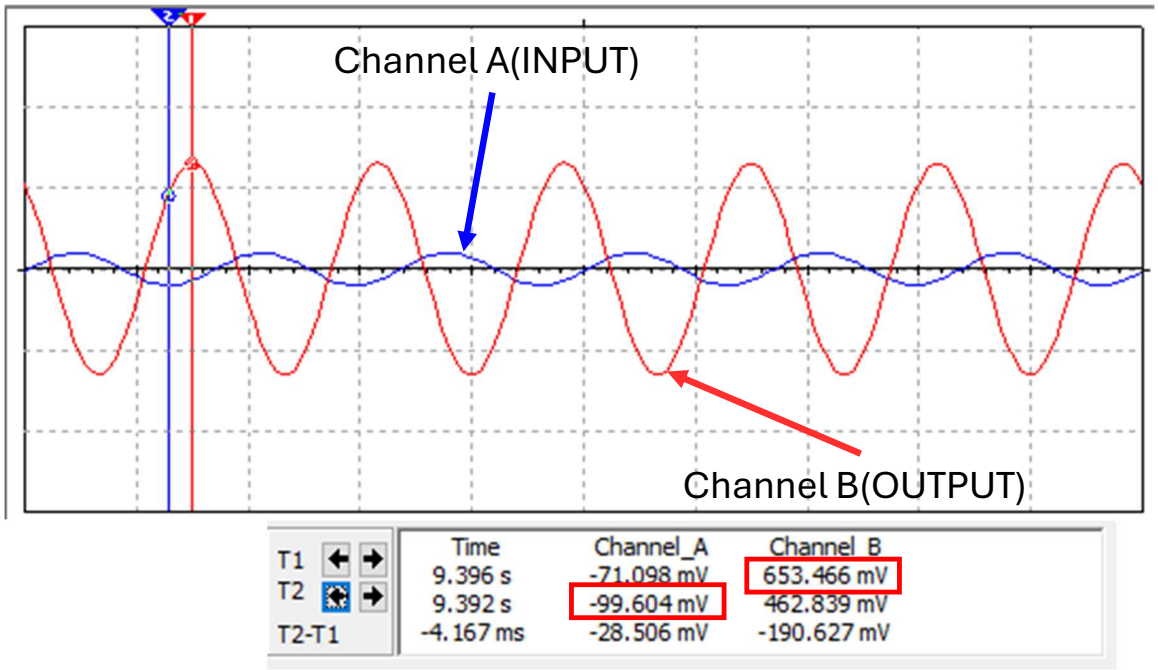
Simulation

- Input and Output comparison below the cutoff frequency.
- At cursor 1 channel A and channel B is -100 mV and 904 mV
- $\frac{904}{100} = 9.04 = gain$



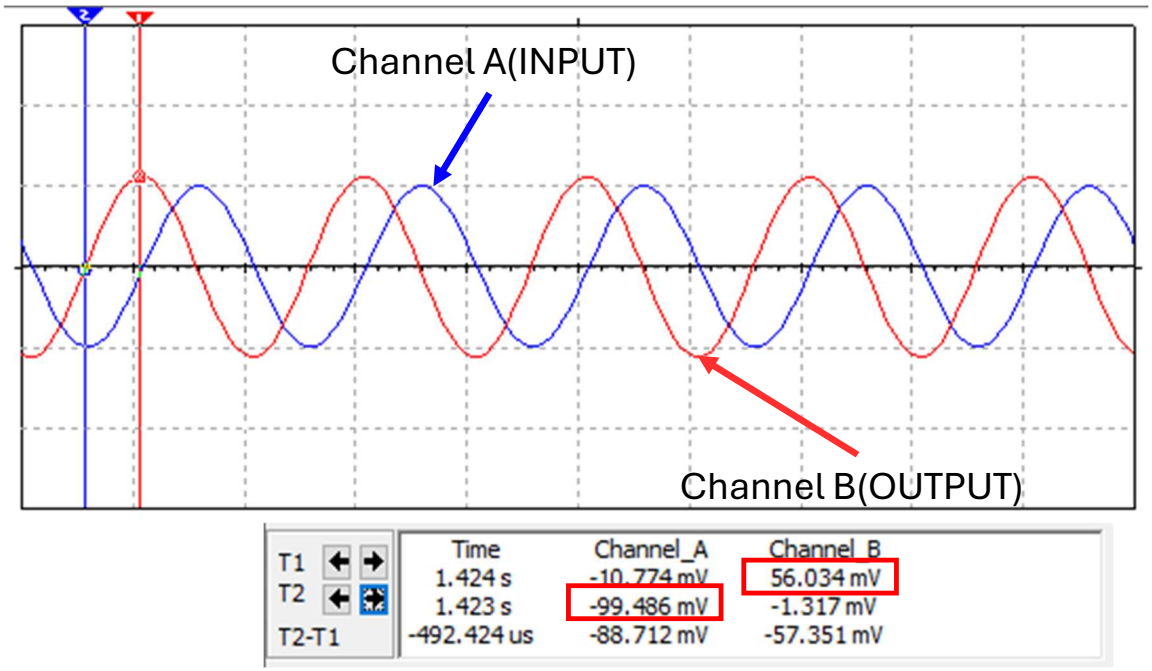
Simulation

- Input and Output comparison at the cutoff frequency.
- Phase shift is visible in the plot as the peaks mismatch.
- $\frac{653}{100} = 6.53 = gain$
- About 3dB loss.

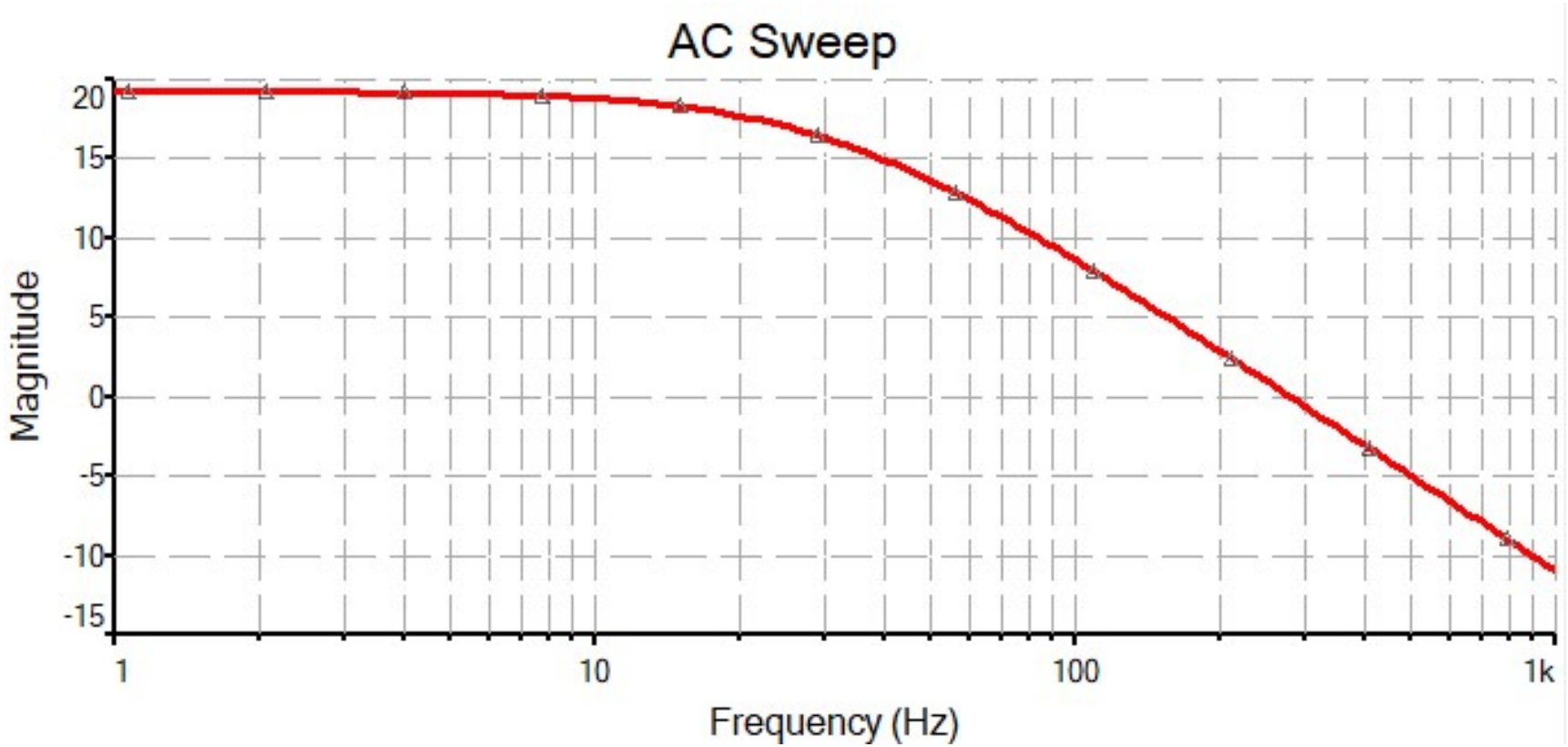


Simulation

- Input and Output comparison above the cutoff frequency.
- $\frac{56}{100} = 0.56 = gain$

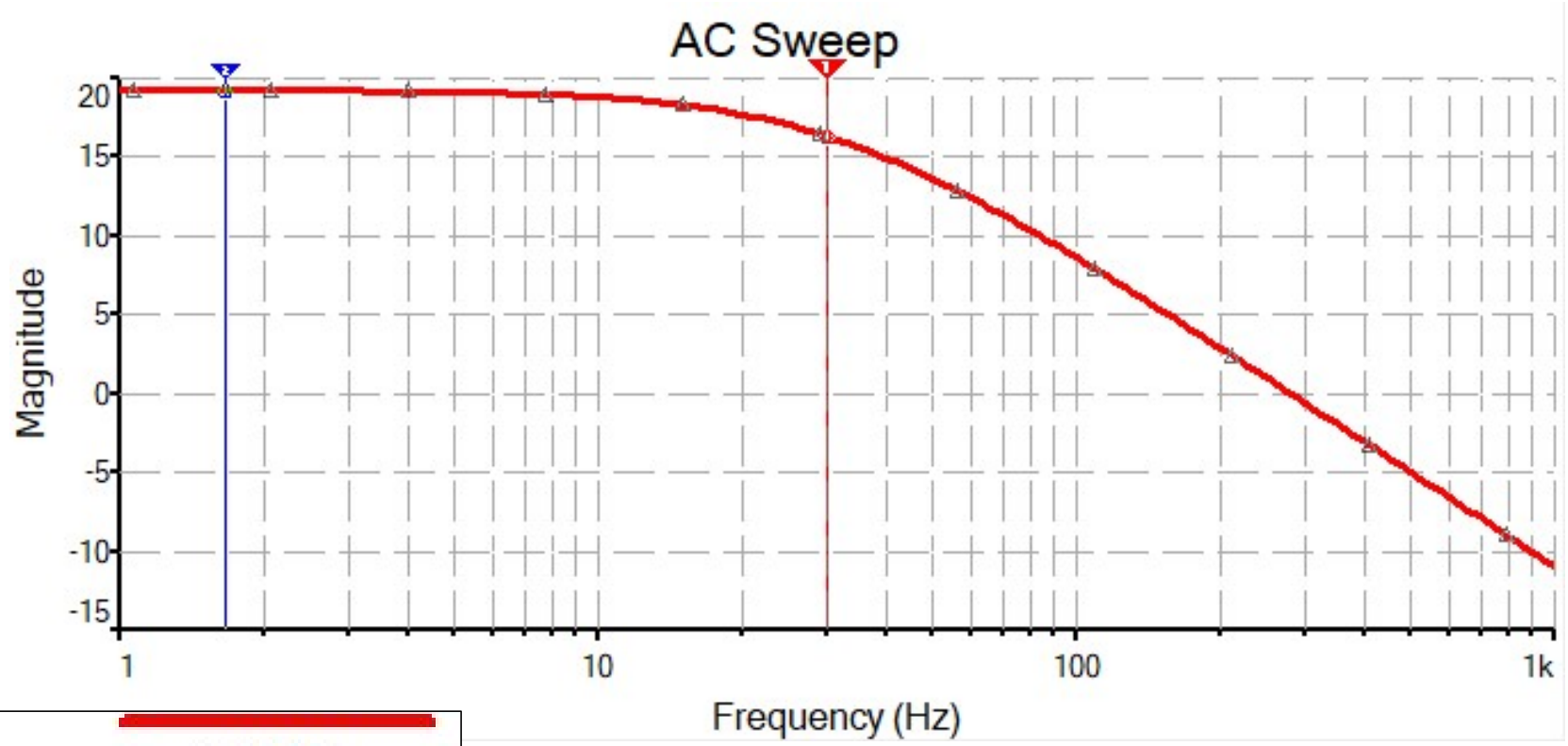


Frequency Analysis

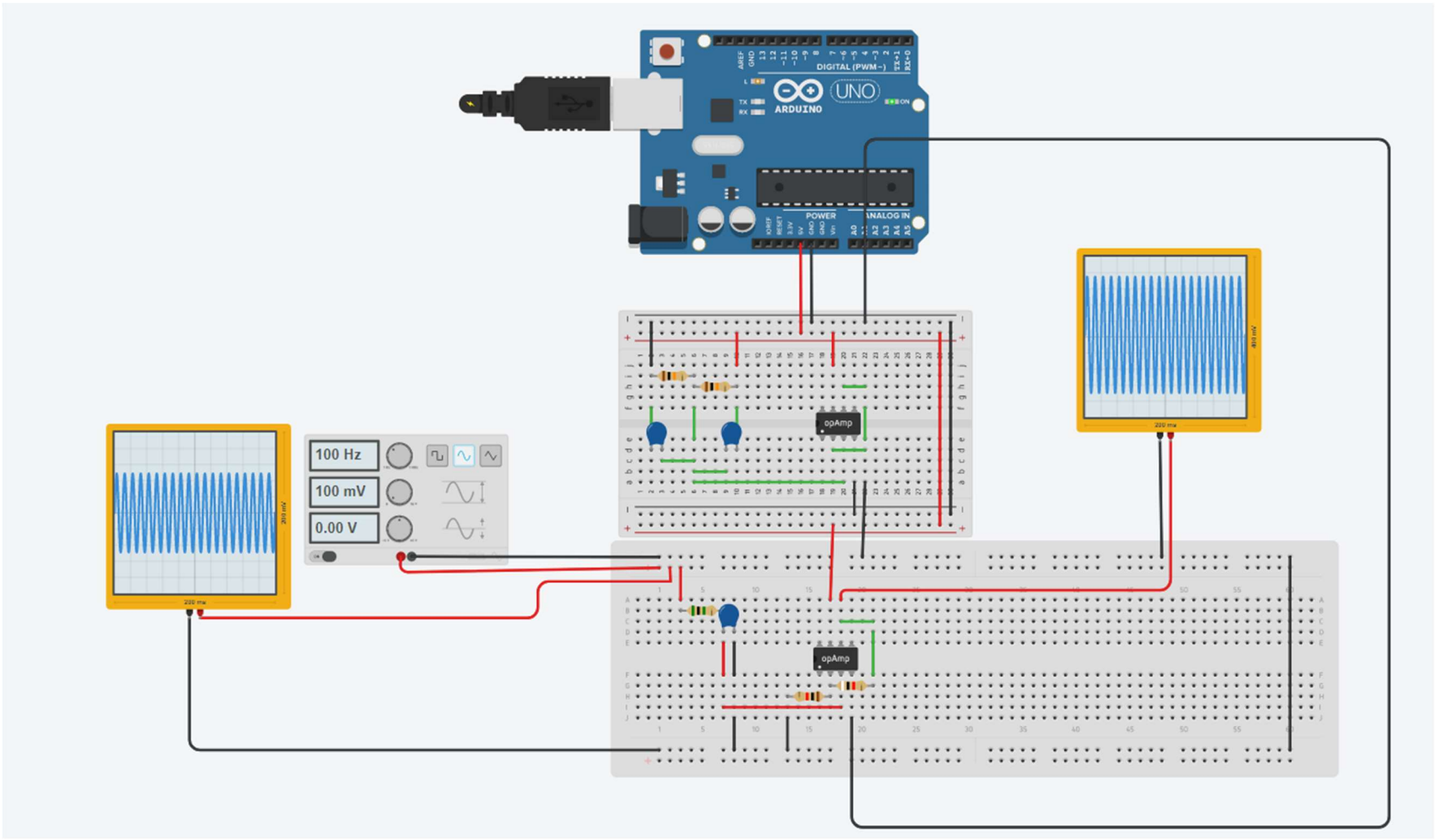


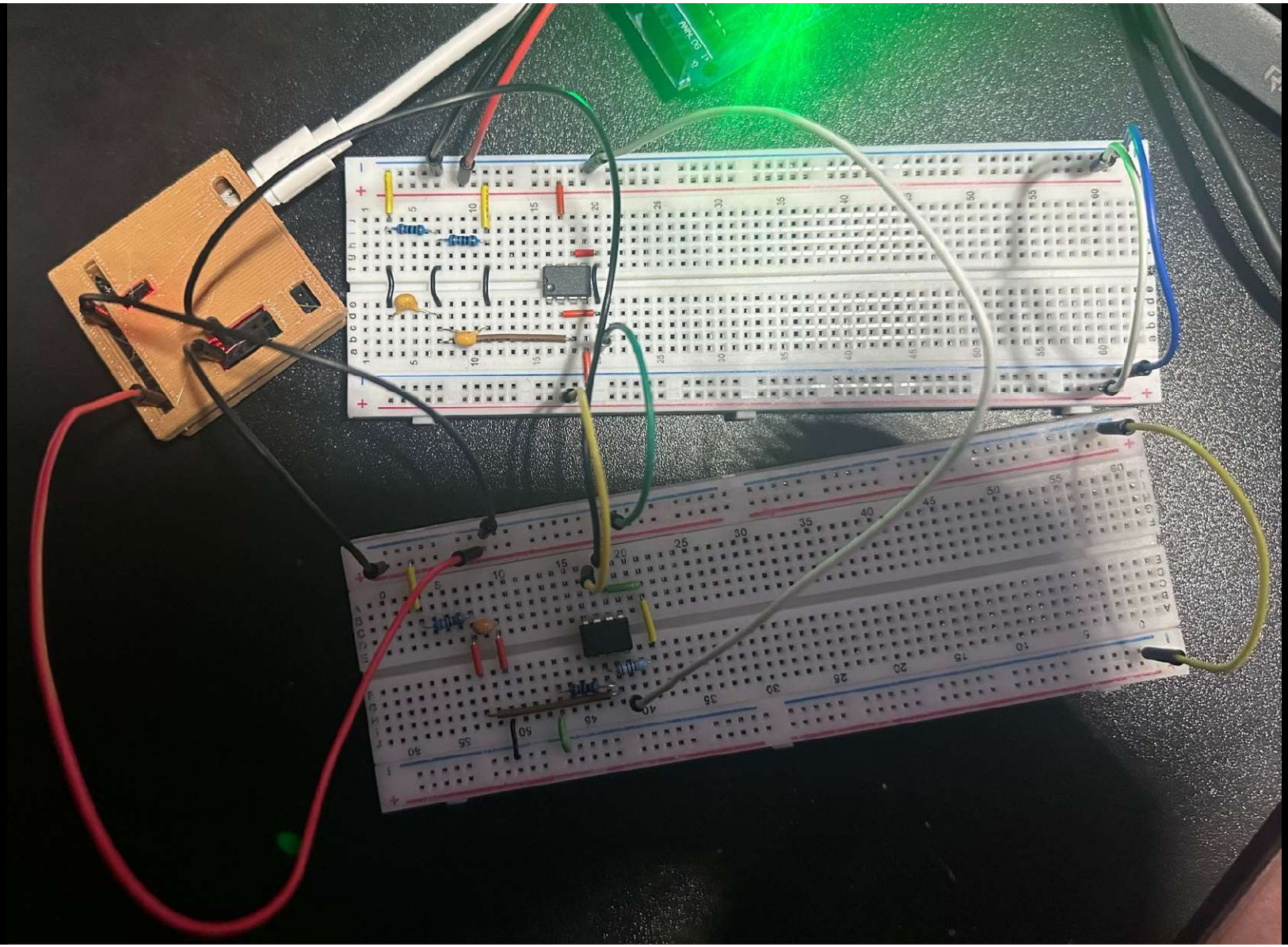
- At the cutoff frequency, a filter have a -3dB loss.
- Our active filter have a gain of 9.
- For gain of 9 we have a magnitude of 19dB.
- Thus, at the cutoff frequency we will have a:

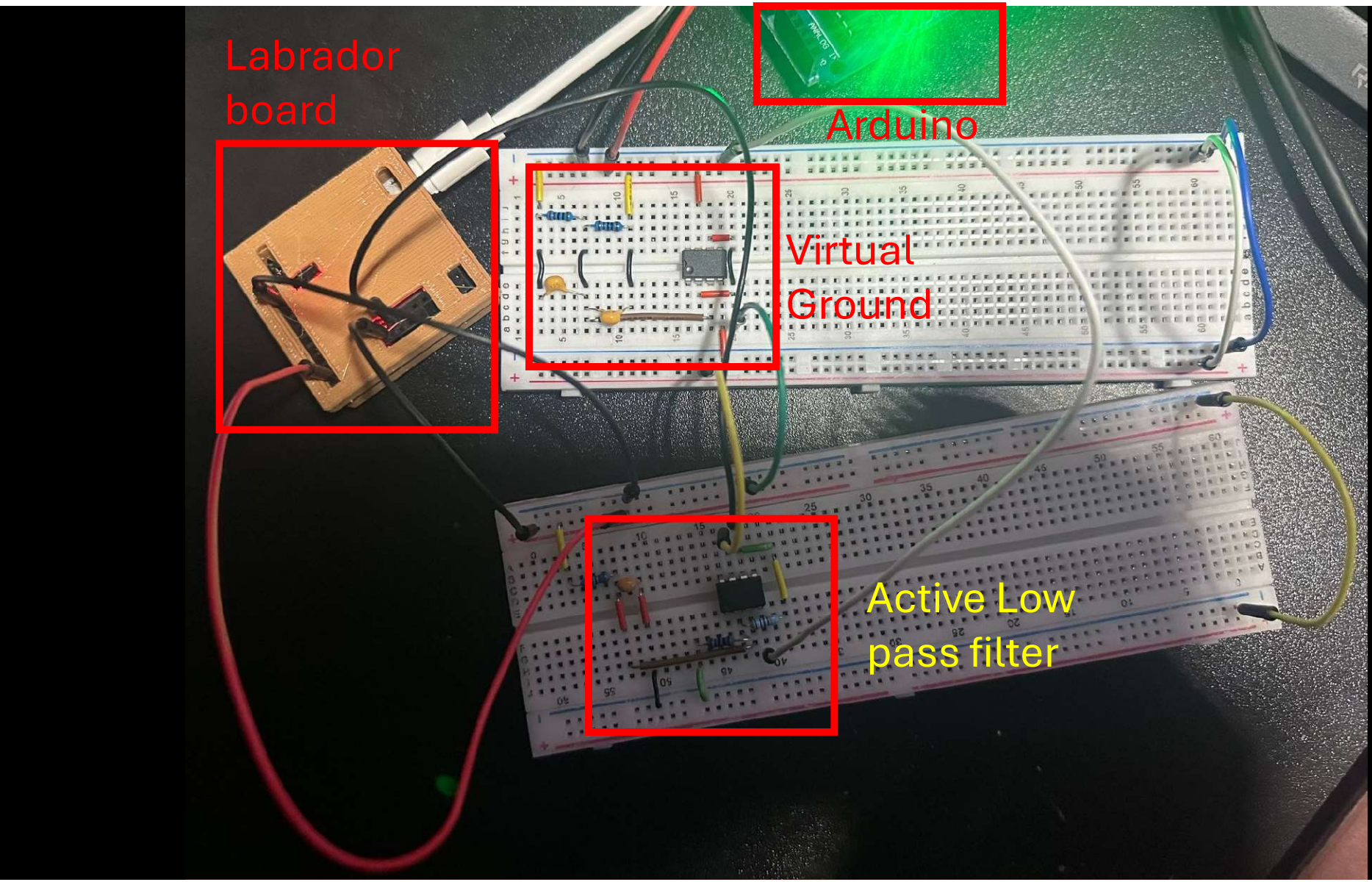
$$19 - 3 = 16dB\ at\ 30Hz$$

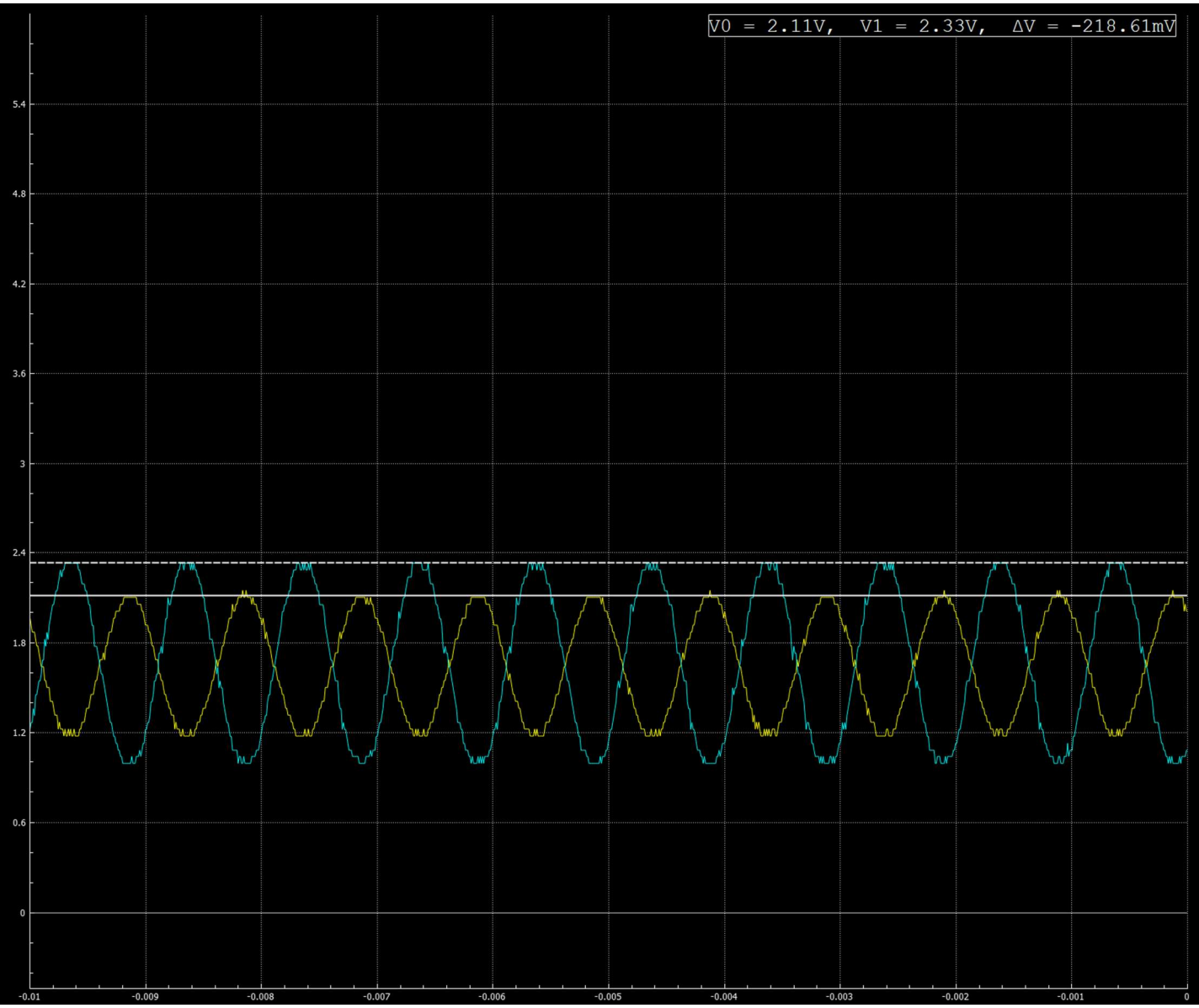


	V(PR1)
x1	30.0696
y1	16.3329
x2	1.6547
y2	19.2312


DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN
opAmp
opAmp
100 Hz
100 mV
0.00 V




Labrador board
Arduino
Virtual Ground
Active Low pass filter


V0 = 2.11V, V1 = 2.33V, ΔV = -218.61mV
5.4
4.8
4.2
3.6
3
2.4
1.8
1.2
0.6
0
-0.01
-0.009
-0.008
-0.007
-0.006
-0.005
-0.004
-0.003
-0.002
-0.001
0