Maria Rice MHR2154
Nolan Tremelling NNT2109
E3083 Electronics Circuits Lab
Experiment 1 Lab Report
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Experiment #1: Measurement of Diode I-V Characteristics Using a Homemade Curve Tracer

In *Figure 1, 2,* and *3* we can see the I-V curves for a 1N4148 diode, a germanium diode, and a red LED. In finding the I-V curves across a factor for vertical scale voltage to current. For the 1N4148 diode there were 400µA per division, resulting from a 400mV/div channel setting and a 1kΩ sense resistor. For the germanium diode there was also a 400µA per division, resulting from a 400mV/div channel setting and a 1kΩ sense resistor. For the red LED there were 280µA per division, resulting from a 280mV/div channel setting and a 1kΩ sense resistor.

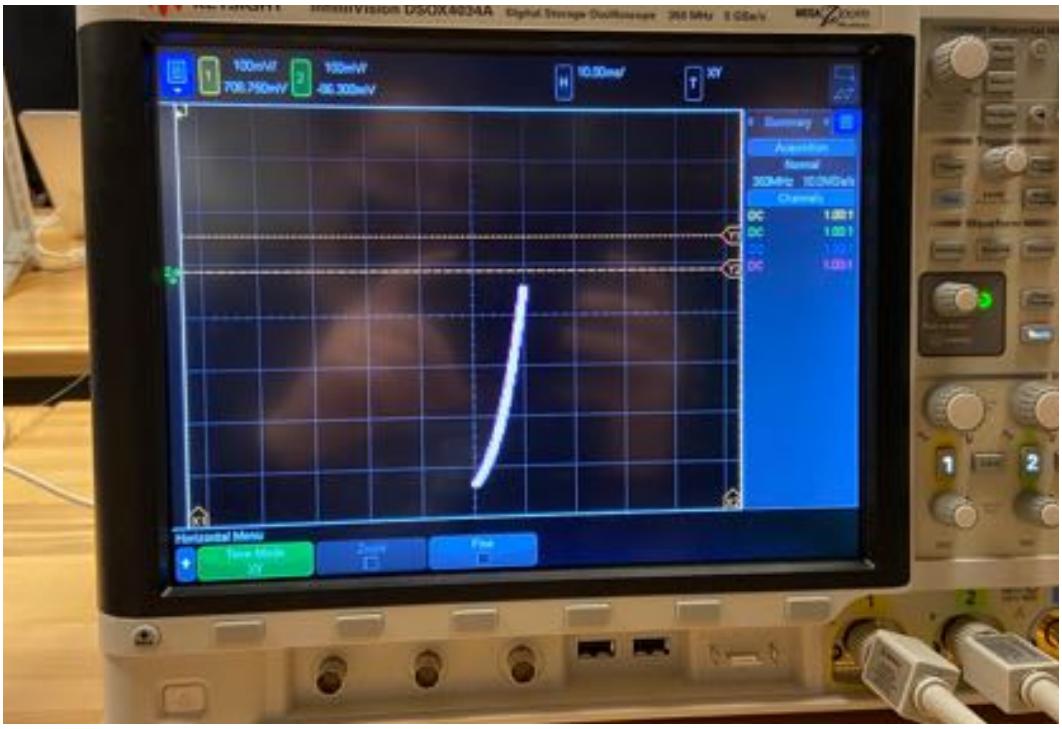

Figure 1: I-V Curve for 1N4148 diode.

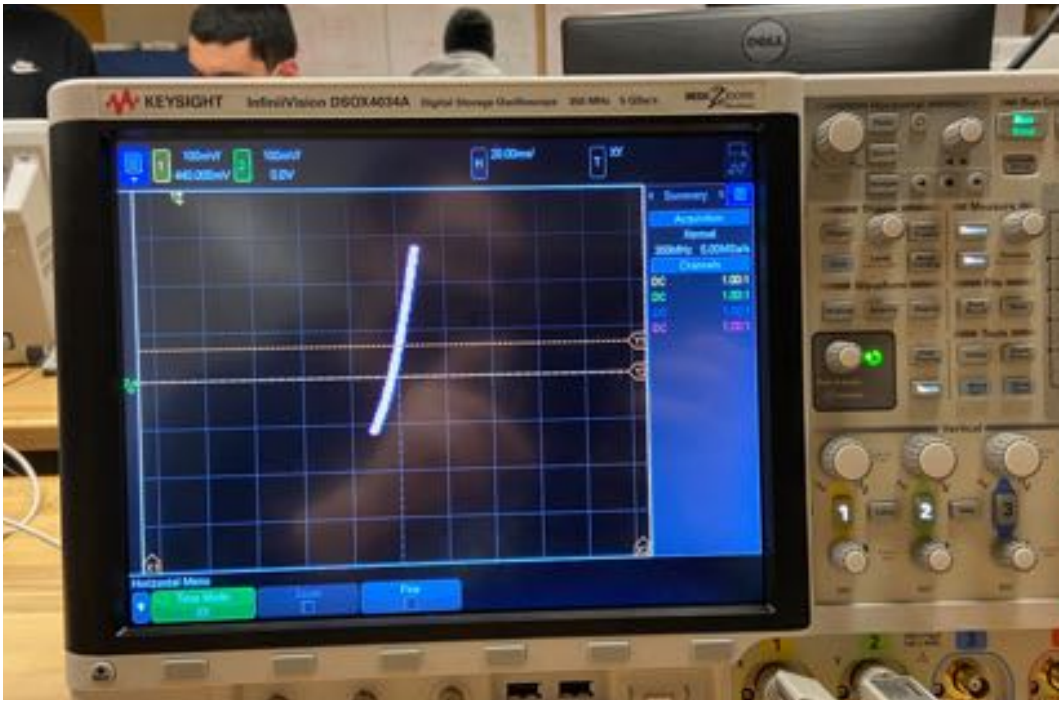

Figure 2: I-V Curve for germanium diode.

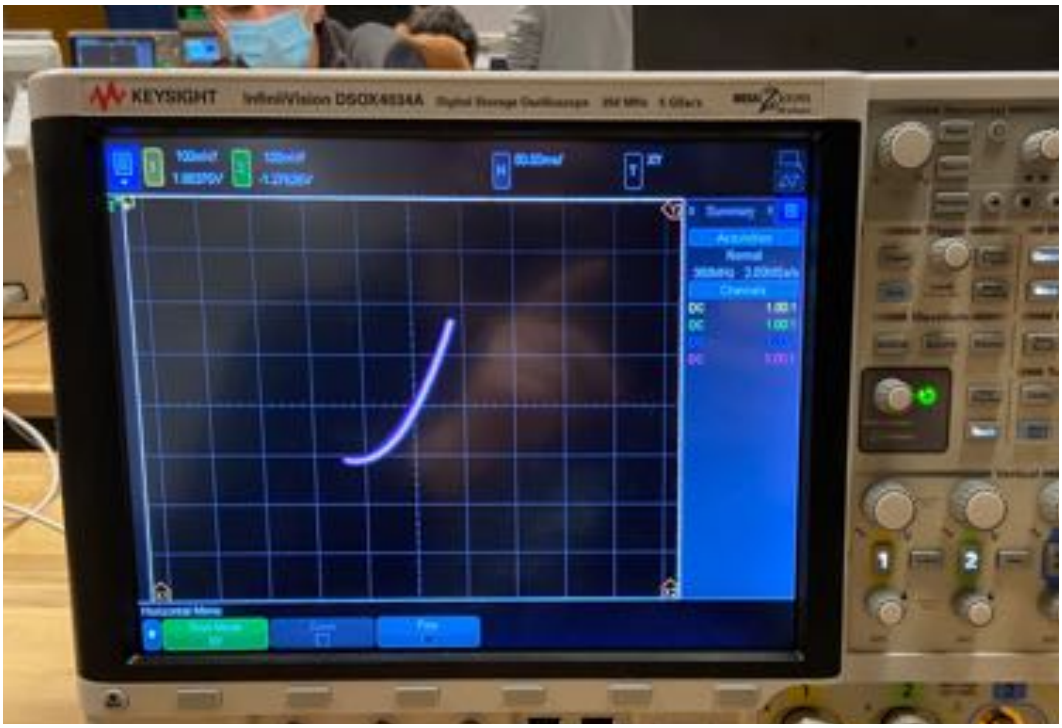

Figure 3: I-V Curve for red LED.

Experiment #2: Fun with Diodes I: Rectifiers

Half-Wave Rectifier

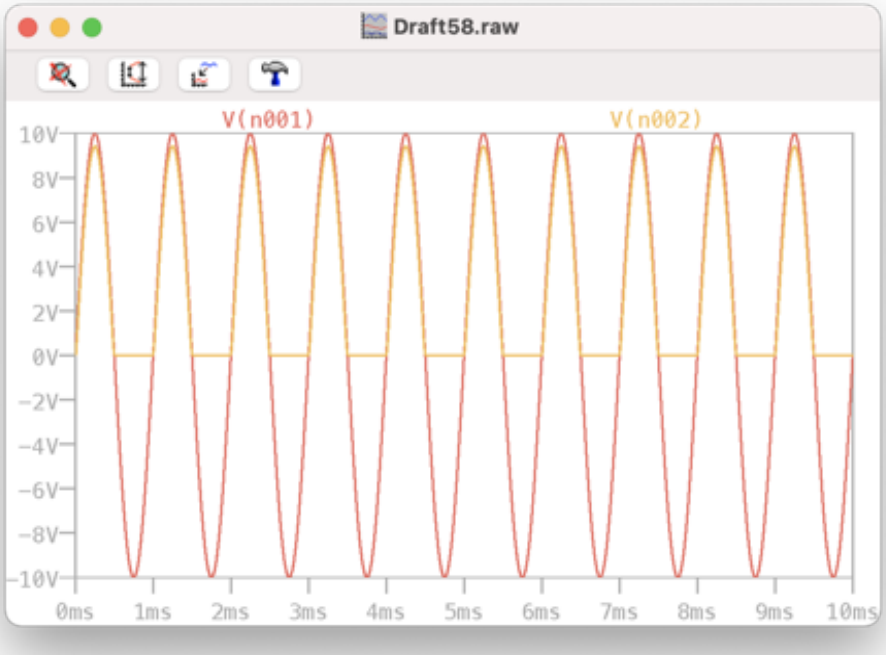

Figure 4: Simulation of half-wave rectifier simulation output.

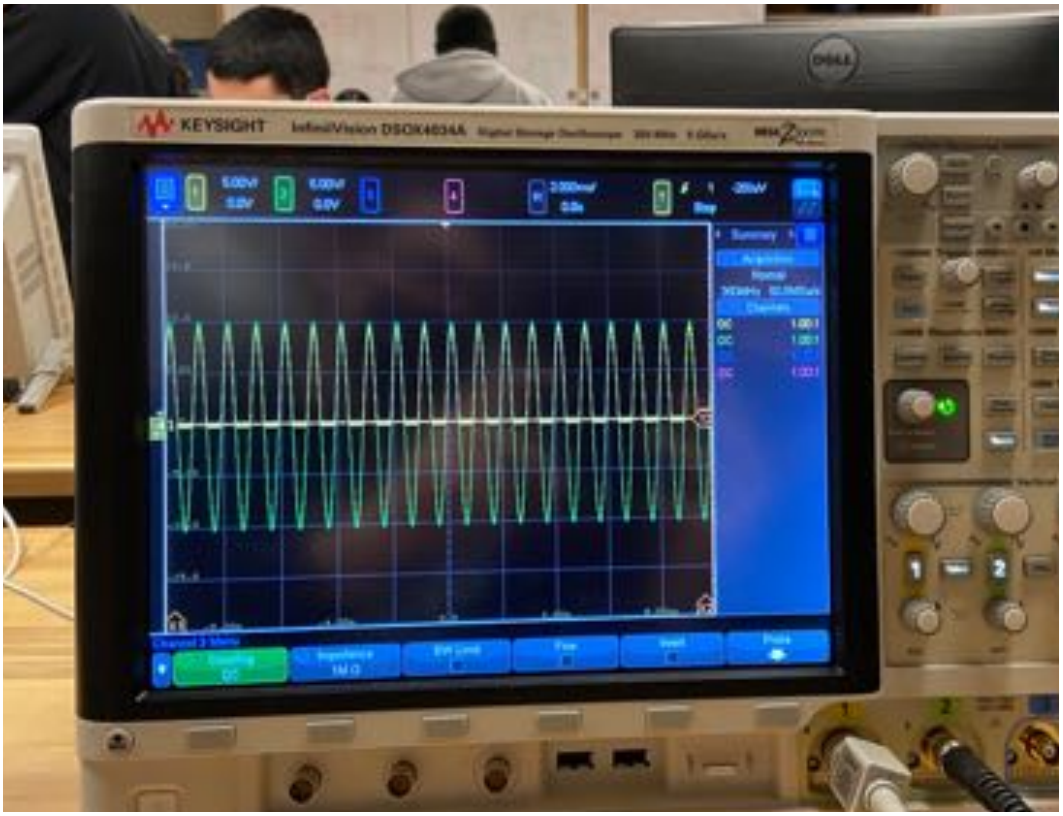

Figure 5: Half-wave rectifier output.

Peak Rectifier

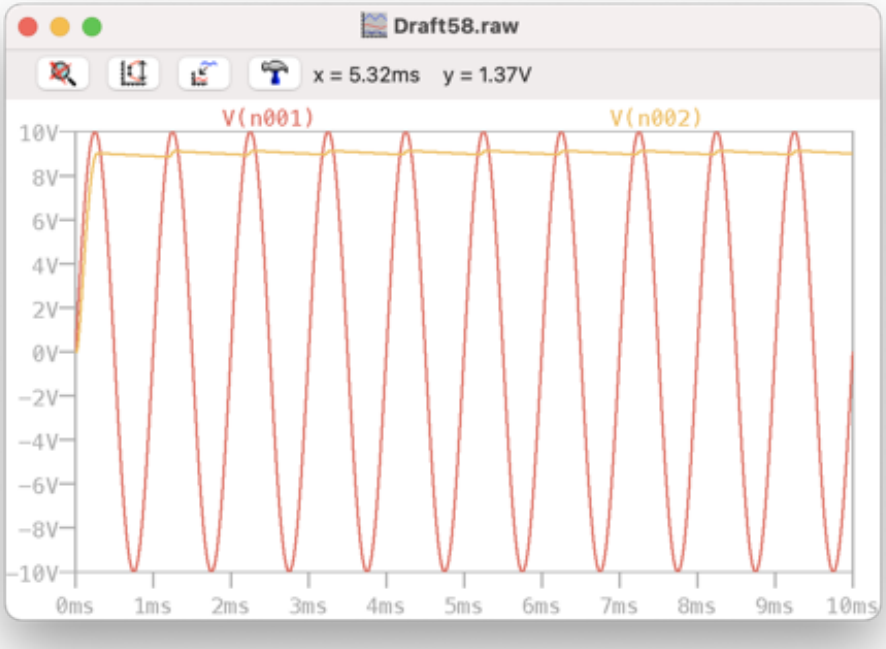

Figure 6: Peak rectifier with RL of 1kΩ, C of 47μF simulation output.

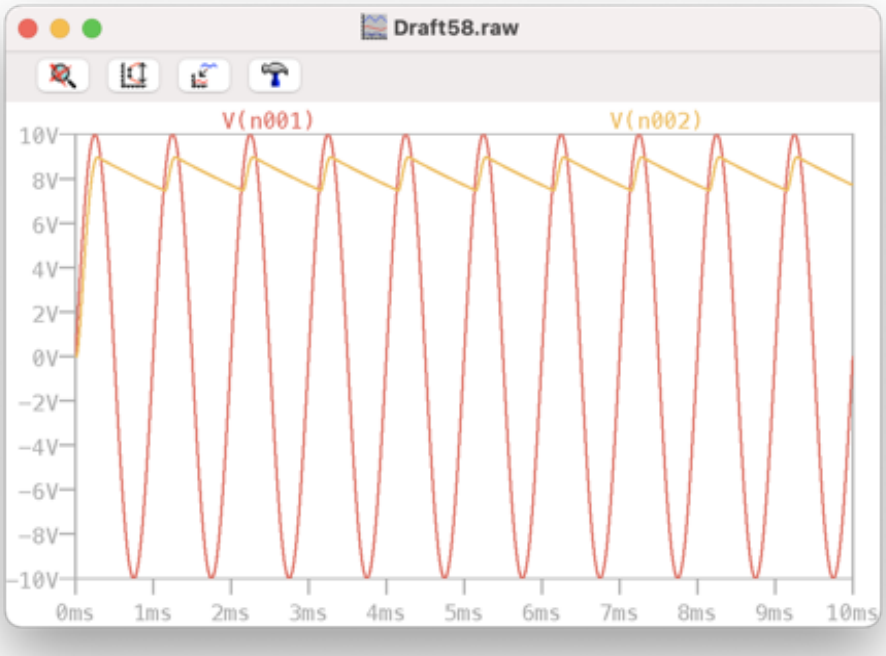

Figure 7: Peak rectifier with RL of 100Ω, C of 47μF simulation output.

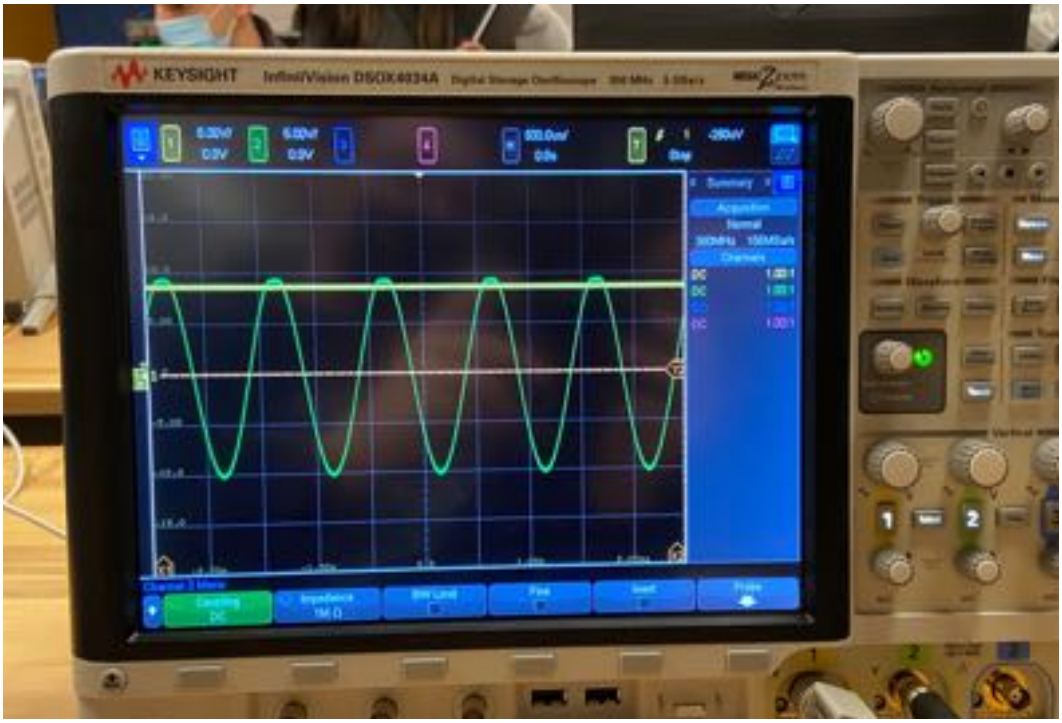

Figure 8: Peak rectifier with RL of 1kΩ, C of 47μF output.

Note: While we measured a peak rectifier with RL of 100Ω, we forgot to take a photo. The waveform generated was much like that of *Figure 8*, differing only in that the voltage across the resistor dropped more than in *Figure 8*.

Precision Rectifier

Figure 9: Precision rectifier simulation output.

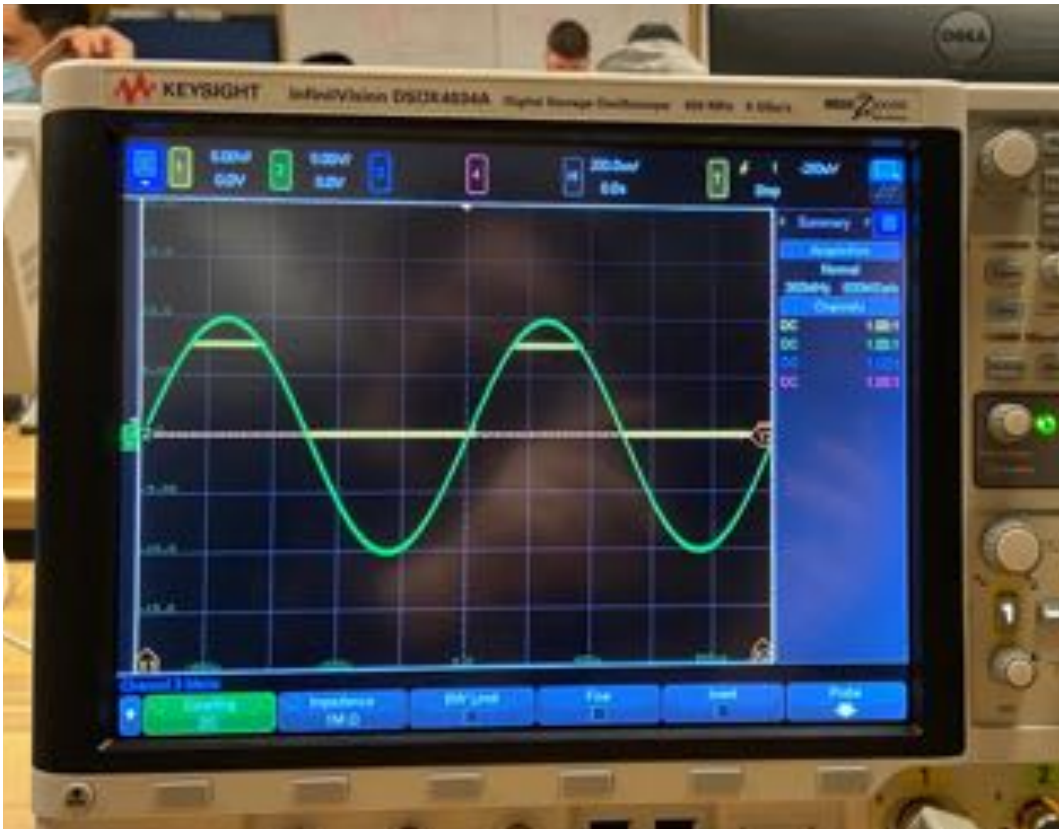

Figure 10: Precision rectifier output.

Experiment #3: Fun with Diodes II: Limiting and Clamping Circuits

Diode Limiter

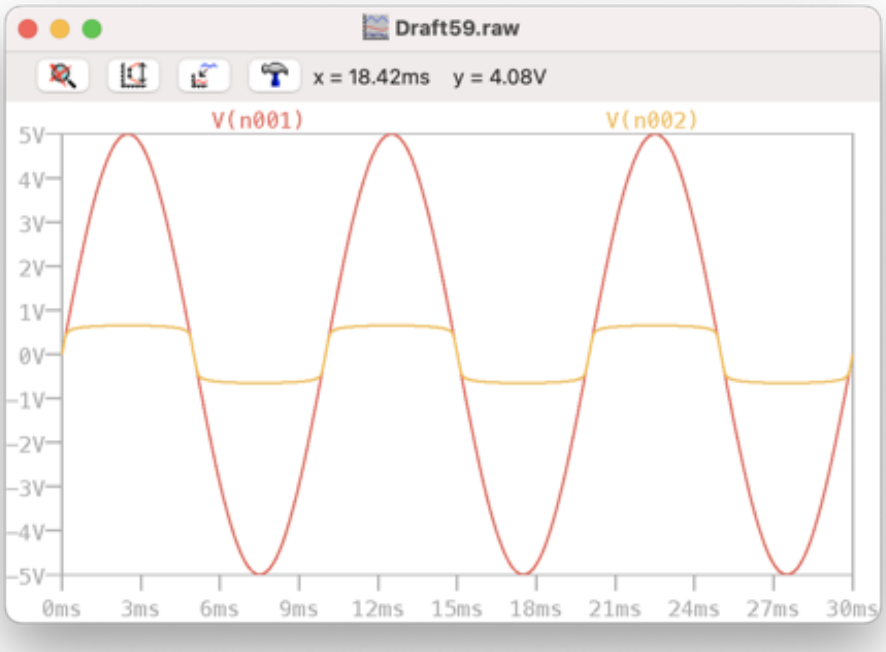

Figure 11: Diode limiter simulation output.

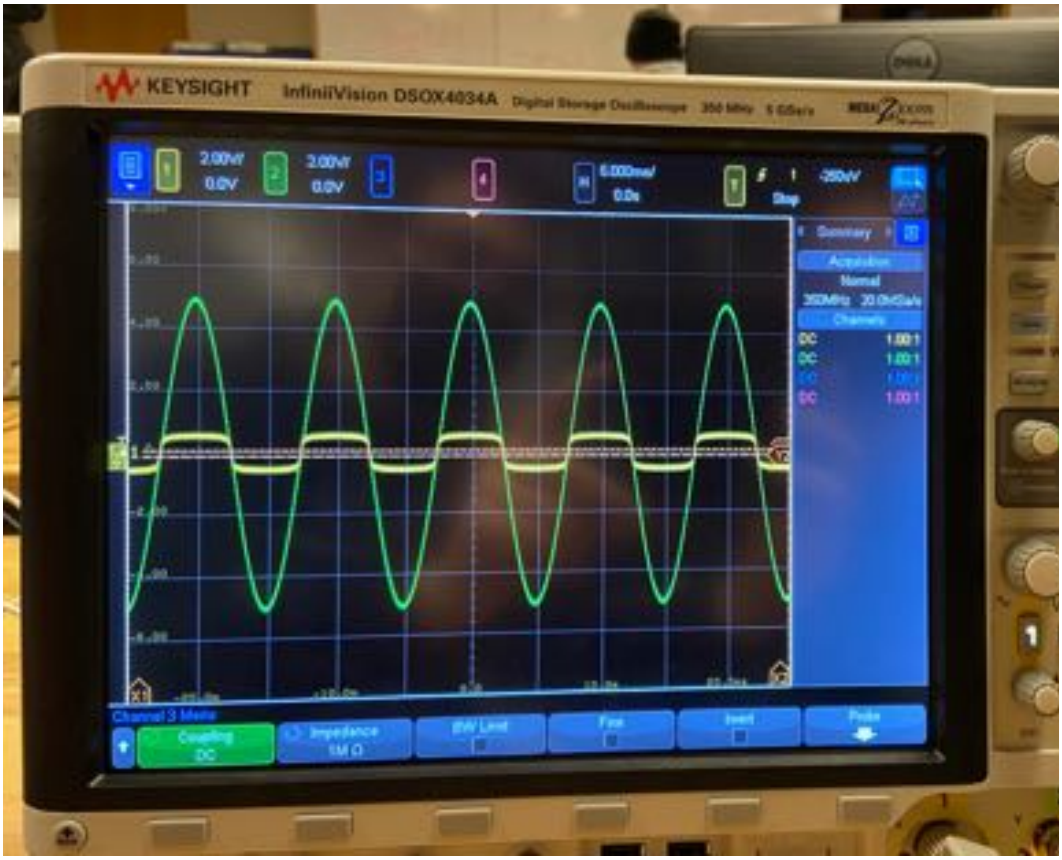

Figure 12: Diode limiter output.

Clamped Capacitor

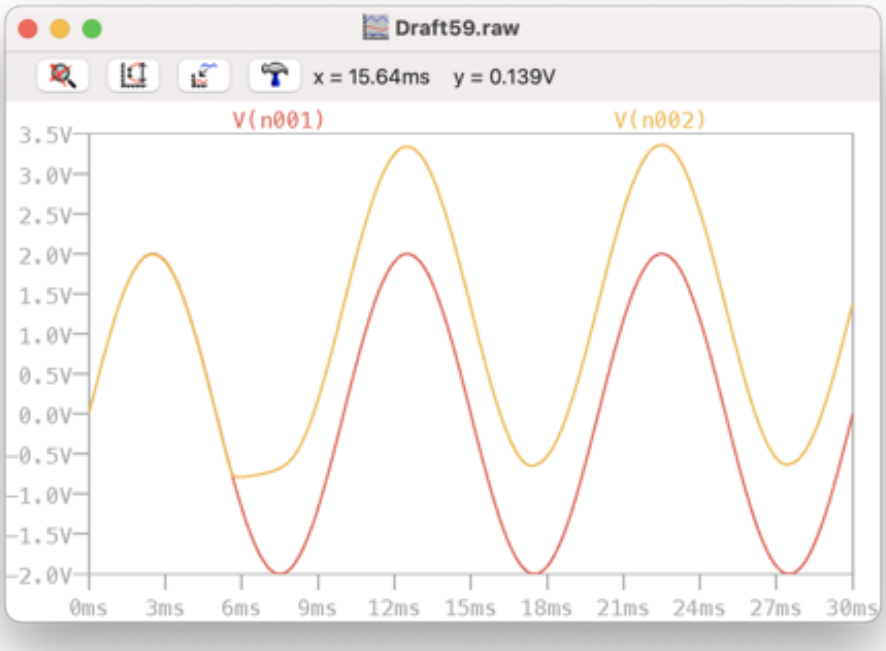

Figure 13: Clamped capacitor simulation output. Note that the peak voltage was approximately 3.5V.

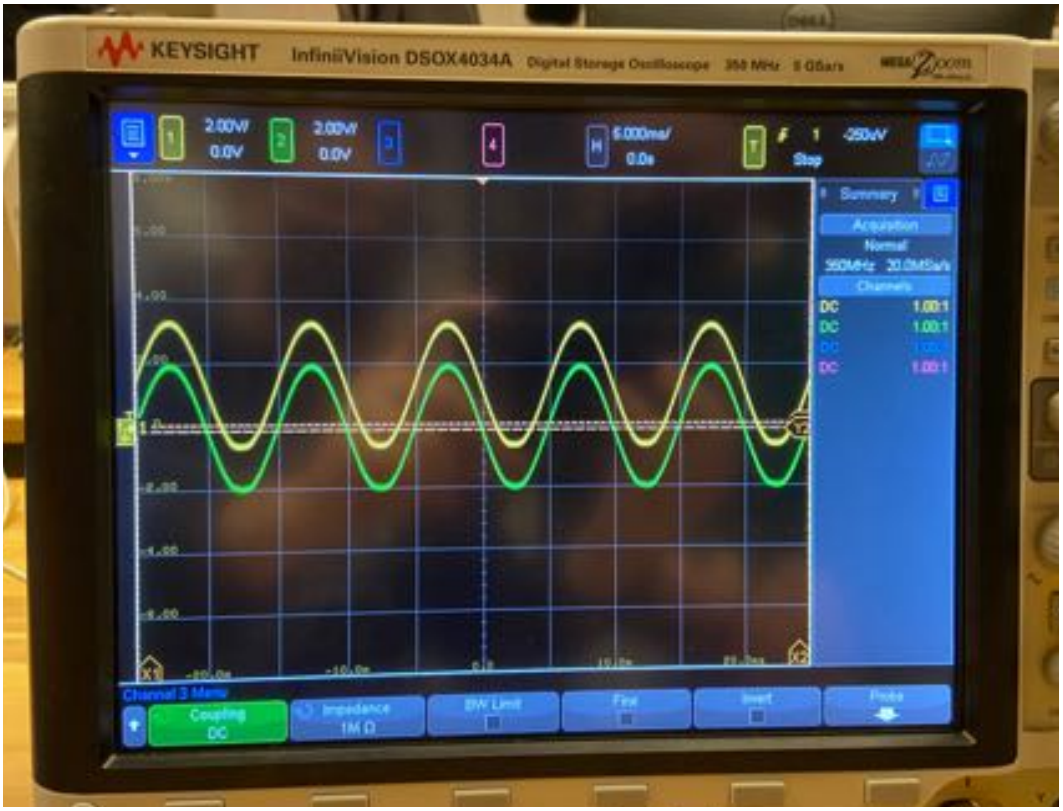

Figure 14: Clamped capacitor output.

Voltage Doubler

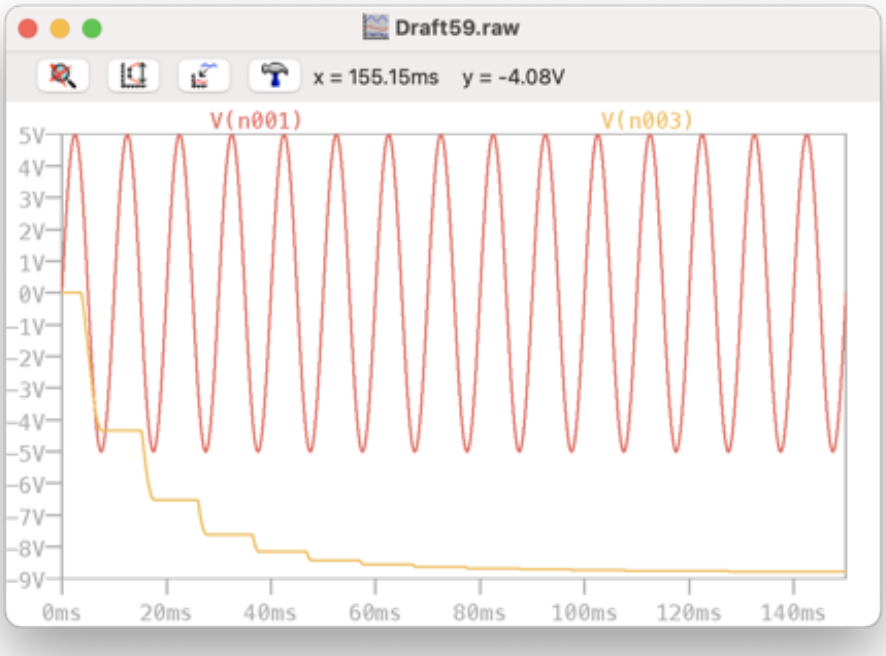

Figure 15: Voltage doubler simulation output.

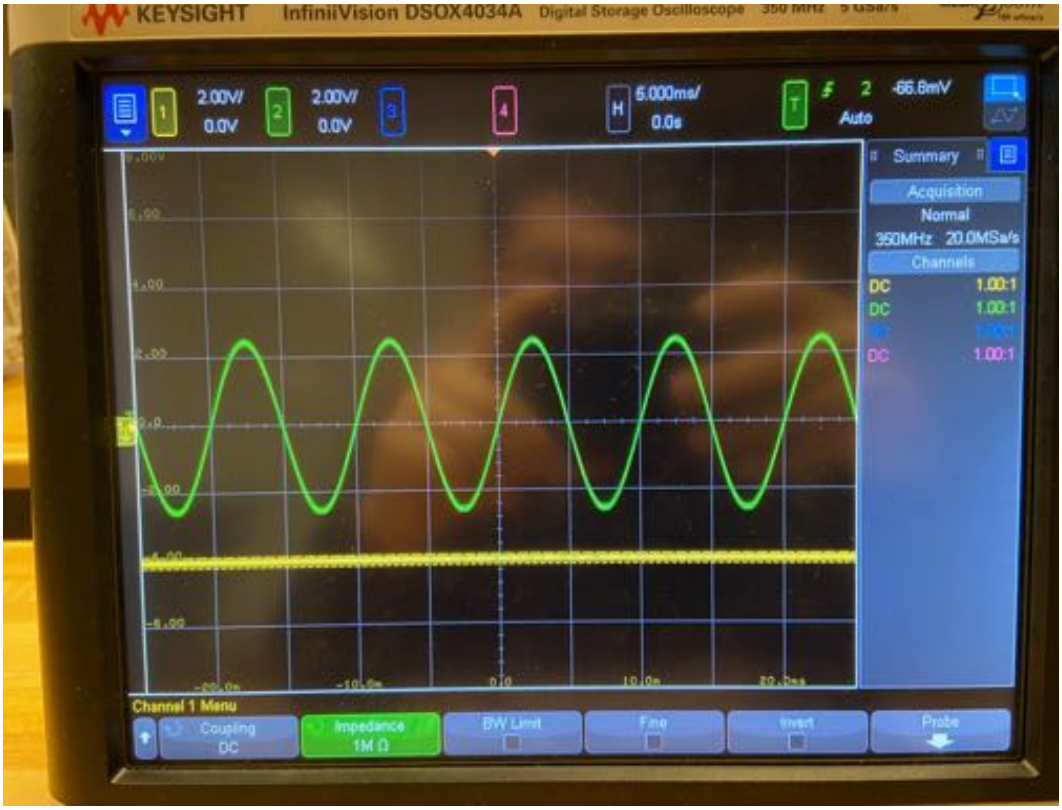

Figure 16: Voltage doubler output. A peak voltage of ~-4V is observed.

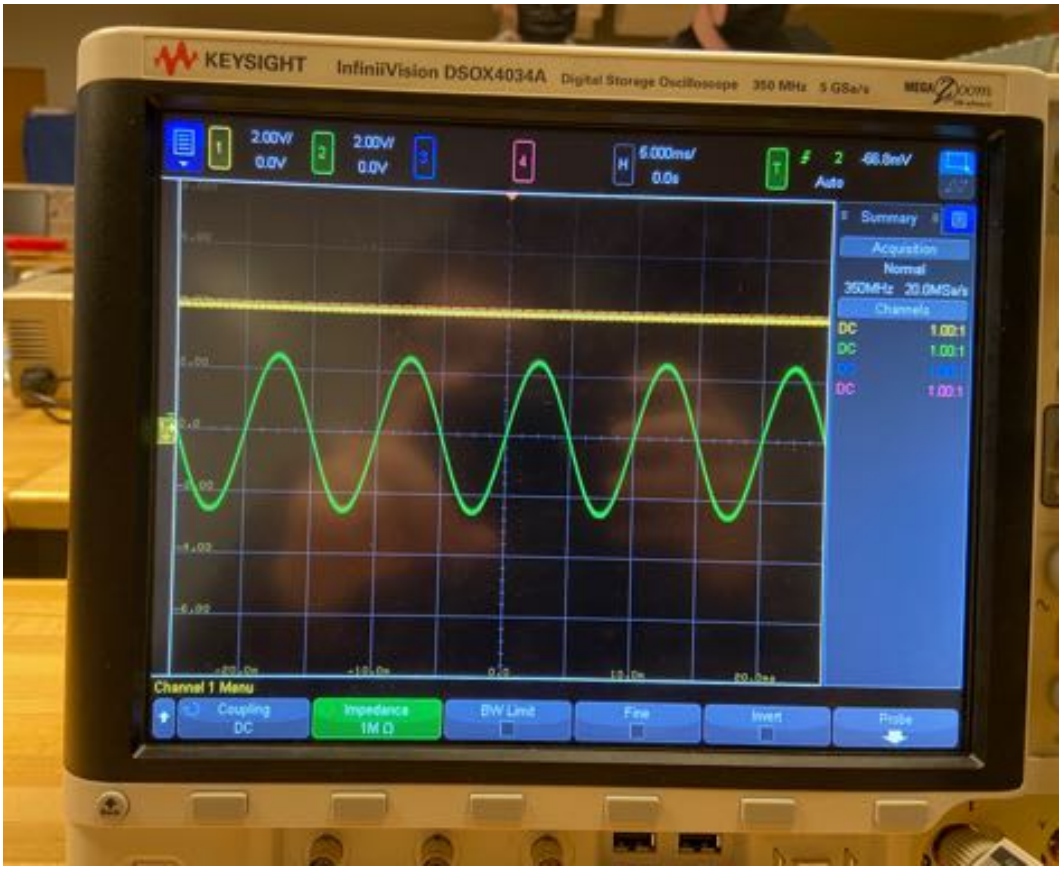

Figure 17: Voltage doubler output with diode reversed. A peak voltage of ~4V is observed.