Lab 3 Progress Report

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1 Introduction

In this lab, we analyzed a low pass filter, a high pass filter, and an RLC circuit using the Analog Discovery 2.

2 Measuring Capacitance

We built a low pass filter circuit (Figure 1) with the oscilloscope of the AD 2 monitoring the input and output voltages. Using the impedance function in the Waveforms software we measured the series capacitance of the capacitor, C1. We measured 3 capacitors. One was reported to be 100 nF. The second was reported to be 10 nF. The last was reported to be 1 μF. In the diagram, R1 is 10 k$\Omega$for the 100 nF capacitor, 100 k$\Omega$for the 10 nF capacitor, and 1 k$\Omega$for the 1 μF capacitor. We also measured the capacitances using the Mastech MS8268 Multi-Meter. The capacitances were 90.6 nF, 9.2 nF, and 1.13 nF respectively.

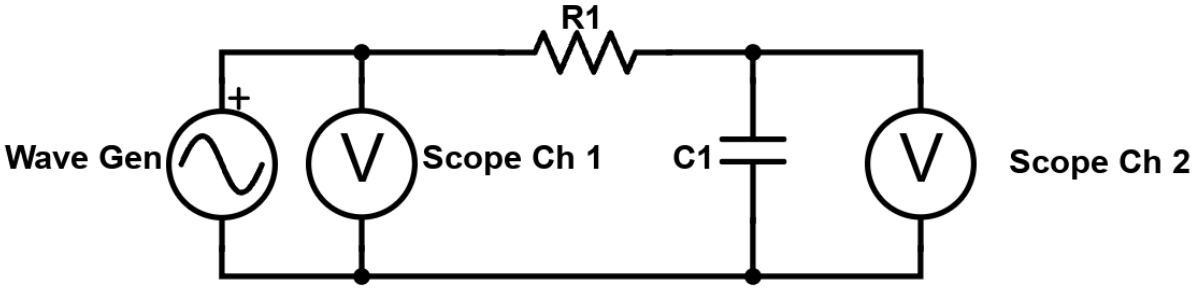

Figure 1: Low Pass Filter

We conclude that the reported capacitance values of the capacitors are not accurate. The measurements made by the Active Discovery 2 and the multimeter are fairly close. I trust the measurements made by the active discovery more because it reports the capacitance for a particular frequency while the multimeter does not.

Frequency (Hz)	Capacitance (nF)
1000	89.2
500	90.1
200	91.3
100	92.1

Table 1: Capacitor 1 Measurements using AD2

Frequency (Hz)	Capacitance (nF)
1000	9.16
500	9.21
200	9.29
100	9.34

Table 2: Capacitor 2 Measurements using AD2

Frequency (Hz)	Capacitance (μF)
1000	1.05
500	1.08
200	1.15
100	1.19

Table 3: Capacitor 3 Measurements using AD2

3 Low Pass Filter

In this part of the lab, we continue to use the previous circuit (Figure 1), with R1=10 kΩ and C1=100 nF. We sent a square wave from the wave generator through the filter and used the oscilloscope channel 1 to record the input voltage and channel 2 to record the output voltage. The fall time as determined by the AD 2 was 1.87 μs and the rise time as determined by the AD 2 was 1.07 μs

4 High Pass Filter

5 RLC Circuit - Resonance