

George Mason University

Basic Passive Filter Circuits

The purpose of the experiment is to gain a basic understanding of passive filter circuits.

Goals and Learning Outcomes

After having completed the experiments in this lab, you will –

- Know how to design and build a low pass and a high pass filter
- Understand phasor diagrams
- Know how to perform a frequency analysis

Assignment 1: Design and build a low-pass filter with a cut-off frequency of 1 kHz.

Design:

In your lab notebook –

- Draw the circuit diagram
- Calculate R and C
- Calculate the output voltage for 800 Hz and for 1200 Hz
- Determine the phase shift

Experimental verification:

- Build the circuit and record all measurements in your lab notebook –
- Measure R and C
- Measure the voltage for at least 6 different frequencies
- Plot the output voltage as a function of the frequency
- Plot the gain as a function of the frequency (Frequency response curve or bode plot)

Assignment 2: Design and build a high pass filter with a cut-off frequency of 1 kHz

Design:

In your lab notebook –

- Draw the circuit diagram
- Calculate R and C
- Calculate the output voltage for 800 Hz and for 1200 Hz

Experimental Verification:

- Build the circuit and record all measurements in your lab notebook-
- Measure R and C
- Measure the voltage for various frequencies
- Plot the output voltage as a function of the frequency
- Plot the gain as a function of the frequency (frequency response curve)

Discuss your results for both assignments.