

EE 221

Experiment #9: Low Pass Filter

Problem: Design a low pass filter using only a $0.1 \mu\text{F}$ capacitor and a $1\text{k}\Omega$ resistor. Build and test your filter. Use the Agilent 33120A Function Generator to create a $3.535\text{V}_{\text{RMS}}$ sinusoidal voltage source that varies in frequency. Measure the input and output voltage waveforms with the oscilloscope using the input voltage as the reference signal for determining angles.

Your lab notebook must have the following in the order listed for INSTRUCTOR SIGN-OFF

- (a) Purpose of the experiment.
- (b) Circuit design with supporting equations and calculated voltage gain. Calculate the cutoff (half power) frequency. Show the predicted graph of voltage gain magnitude vs. frequency from 100 Hz up to at least 10 kHz. (You may want to use semi-log paper. You may use a computer to generate the graphs). Show the predicted graph of voltage gain angle vs. frequency.
- (c) Document the circuit you actually build. Indicate clearly where the output is measured. Note the equipment used to test circuit design.
- (d) Test results data. (Be sure to verify frequency response at the predicted cutoff frequency.)
- (e) Graphs of **measured** voltage gain magnitude vs. frequency and **measured** voltage gain angle vs. frequency. Note the **measured** cutoff frequency.
- (f) Discussion of results.
- (g) Conclusion