

Filter Design
Project 3
ECE 6400 Electronic Instrumentation
Summer II 2008
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1. Textbook Problems (Franco, 3rd edition)

Complete problems 3.7 (VWS), 3.15 (VWS), 3.28 (VWS), 3.36 (VWS); VWS=verify with SPICE.

2. Filters for a Micro-Electrode Array Amplifier

The output of the micro-electrode array instrumentation amplifier that you designed in project 2 will be the input to an A/D converter circuit. Thus an anti-aliasing filter is needed. The highest frequency component in the electrode signal is anticipated to be 10 kHz. The anti-aliasing filter must have a roll-off of at least -80dB/decade beyond 10 kHz. Your circuit must also provide a gain of 20 V/V.

- a. Based on the above description, develop a list of quantitative specifications for your filter.
- b. Design a filter that meets the specifications of (a) using the Butterworth and Chebyshev approximations. Use the lowest order filter that will provide the desired performance.
- c. Design your filter using LT1124/LT1125 operational amplifier(s).
- d. Use LTspice/SwitcherCADTM to test your design to insure that all specifications are met.
- e. Find the dynamic input voltage range at the electrode.
- f. Prepare a report that summarizes your design and includes all requested information.

Note for both parts: Use only standard value components. You must use Digi-Key (digikey.com) as the parts provider. Provide a spreadsheet that lists all parts (description and Digi-Key part number), cost per part, and total cost for your designs.