

ECE 214 - Virtual Lab #10
Thévenin Equivalent Circuits
Modified for Analysis Only

17 April 2020

Introduction: In this lab, you will examine the Thévenin equivalent output impedance of the DC-DC Power Supply designed in [Lab #9](#).

Circuit Analysis:

1. For the DC-DC Power Supply of [Lab #9](#), derive the Thévenin equivalent circuit with respect to the output terminals of the DC-DC Power Supply. The Thévenin equivalent impedance should be calculated for the two operating conditions below.
 - (a) Condition 1: switch S1 in the boost converter is closed (the D and S terminals of the transistor are shorted) and switch S2 is open (there is no current through the diode).
 - (b) Condition 2: switch S1 in the boost converter is open (the D and S terminals of the transistor are open) and switch S2 is closed (the diode is a short-circuit).
2. Plot the following on a semi-log graph.
 - (a) The magnitude of the Thévenin equivalent output impedance as a function of frequency for frequencies between 1 Hz and 1 MHz for both operating conditions described in [step 1](#).
 - (b) The phase angle of the Thévenin equivalent output impedance as a function of frequency for frequencies between 1 Hz and 1 MHz for both operating conditions described in [step 1](#).
 - (c) The real part of the Thévenin equivalent output impedance as a function of frequency for frequencies between 1 Hz and 1 MHz for both operating conditions described in [step 1](#).
 - (d) The imaginary part of the Thévenin equivalent output impedance as a function of frequency for frequencies between 1 Hz and 1 MHz for both operating conditions described in [step 1](#).
3. Discuss the results of this analysis in your technical report.