ECE 214 - Virtual Lab #9
DC–DC Power Supply
Modified for Simulation Only

10 April 2020

Introduction: In this virtual lab, you will design and simulate a DC–DC power supply. The power supply must meet the circuit specifications listed below at the nominal temperature of 27° C. You will perform a yield analysis, determine the efficiency of the power supply, and determine the temperature range over which the power supply can be operated.

A block diagram of the DC–DC power supply is shown in Figure 1. The circuit should incorporate a boost converter (Lab #7), an oscillator (Lab #8), and a low pass filter (Lab #3).

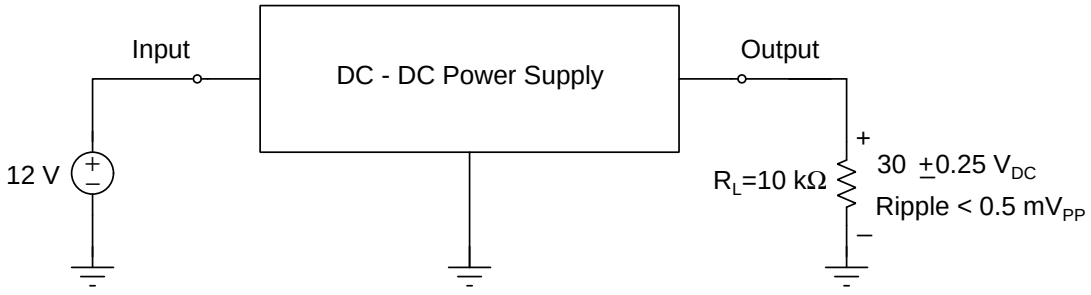

Figure 1: Block diagram of a DC–DC power supply.

Circuit Specifications:

1. Input Voltage: +12 V_{DC}.
2. Output Load: 10 kΩ resistor.
3. Output Voltage: 30 ± 0.25 V_{DC} with a ripple < 0.5 mV_{PP}.
4. Temperature Range: as large as possible between -40° and +60° C.

Virtual Lab: Design a DC–DC power supply to meet the circuit specifications. Simulate the design to determine if the specifications have been met. Perform a yield analysis on the design, determine the efficiency of the power supply, and determine the temperature range over which the design meets the specification. The efficiency calculation and yield analysis will be described in a virtual class.

Write and submit a technical report describing the design and simulation results showing the performance of the DC–DC power supply. Include a cost analysis for the production of 10,000 units of the DC–DC power supply. A possible outline for the report is available at: https://ece214.davidkotecki.com/report/ECE214_Report_Outline_2020.pdf.

Submit the report electronically, in PDF format, to kotecki@maine.edu no later than 1700 EDT on Friday, 1 May 2020.