

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, 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**).

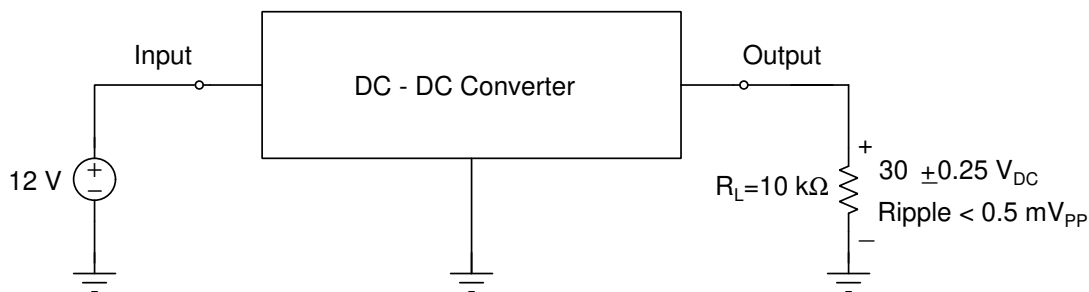


Figure 1: Block diagram of a DC–DC power supply.

Circuit Specifications:

1. Input Voltage: +12 V_{DC} .
2. Output Load: 10 $\text{k}\Omega$ resistor.
3. Output Voltage: $30 \pm 0.25\text{ V}_{\text{DC}}$ with a ripple $< 0.5\text{ mV}_{\text{PP}}$.
4. Temperature Range: as large as possible between -40° and $+60^\circ\text{ C}$.

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, and determine the temperature range over which the design meets the specification. The 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.