ECE 214 - Lab #9 — DC–DC Converter

10 April 2018

Introduction: In this lab, you will design, simulate, build, and test a DC–DC converter. The converter must meet the circuit specifications listed below. The working circuit must be shown to the TA to obtain credit for this lab.

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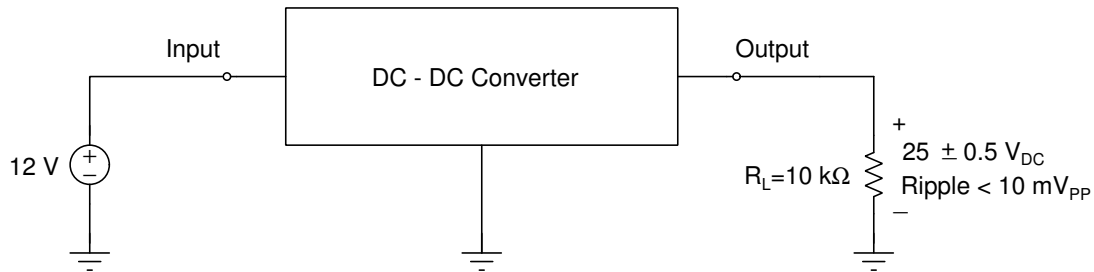

Figure 1: Block diagram of a DC–DC power converter.

Circuit Specifications:

1. Input Voltage: $+12$ V_{DC} (from a power supply).

2. Output Load: 10 kΩ resistor.

3. Output Voltage: 25 ± 0.5 V_{DC}

4. Output Ripple: < 10 mV_{PP}

Pre-Lab: Design a DC–DC converter which meets the circuit specifications. Simulate the design to verify the specifications are met.

Lab Procedure: Build the DC–DC converter designed during the Pre-Lab. Test the circuit to verify the specifications are met. Redesign, resimulate, rebuild, and retest the circuit as necessary until the specifications are met.

Post-Lab: Write and submit a technical report describing the final design, simulation results, and measured performance of the DC–DC converter. Include a cost analysis to produce 1,000 units of the DC–DC converter circuit. The format of the report will be described in ECP 214. The report must be submitted electronically, in PDF format, to kotecki@maine.edu no later than 1700 EDT on Friday 4 May 2018.