

ECE 214 - Lab #9 — DC–DC Power Supply

12 April 2021

Introduction

In this lab, you will design, simulate, build, and test a DC–DC power supply. The power supply must meet the circuit specifications listed below at the nominal temperature of 27° C.

A block diagram of the DC–DC power supply is shown in **Figure 1**. The circuit incorporates a boost converter from [Lab #7](#) and the oscillator from [Lab #8](#).

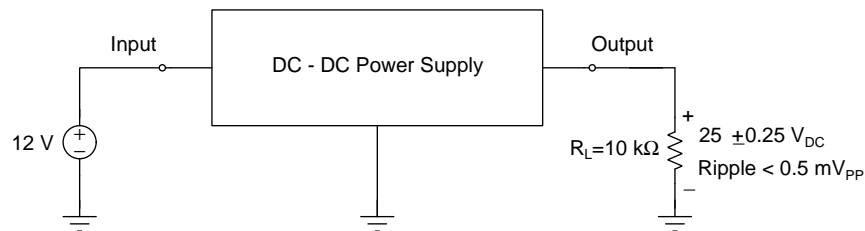


Figure 1: Block diagram of a DC–DC power supply.

Circuit Specifications

1. Input Voltage: $+12\text{ V}_{\text{DC}}$.
2. Output Load: $10\text{ k}\Omega$ resistor.
3. Output Voltage: $25 \pm 0.25\text{ V}_{\text{DC}}$ with a ripple $< 0.5\text{ mV}_{\text{PP}}$.

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. Apply power to the circuit for at least five minutes to allow the temperature to stabilize before taking the final measurements. Determine the efficiency of the DC-DC converter.

Post-Lab

Submit a technical report describing the design, simulations, 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 class. The report must be submitted electronically, in PDF format, to kotecki@maine.edu no later than midnight EDT on Sunday, 2 May 2021.