

ECE 214 - Lab #9 — DC–DC Power Supply

4 April 2024

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

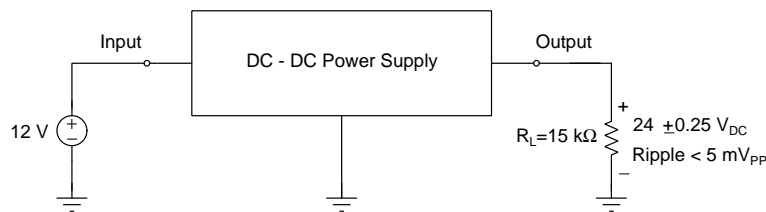


Figure 1: Block diagram of a DC–DC power supply.

Circuit Specifications

1. Input Voltage: $+12\text{ V}_{DC}$.
2. Output Load: $15\text{ k}\Omega$ resistor.
3. Output Voltage: $24 \pm 0.25\text{ V}_{DC}$ with a ripple $< 5\text{ mV}_{PP}$.

Pre-Lab

Design a DC–DC power supply to meet the circuit specifications. Simulate the design and verify the specifications are met.

Lab Procedure

Build the DC–DC power supply designed during the Pre-Lab. Apply power to the circuit for at least five minutes to allow the temperature to stabilize before making measurements. Test the circuit to verify the specifications are met. Redesign, resimulate, rebuild, and retest the circuit as necessary until the specifications are met. Photograph the circuit with a DVM attached across the $15\text{ k}\Omega$ resistor to illustrate the DC output voltage.

Post-Lab

Submit a technical report describing the design, simulations, and measured performance of the DC–DC power supply. Include a cost estimate to produce 1,000 units, an estimate of the power consumption, and the measured and simulated Thévenin equivalent output impedance. The report must be submitted as a hard copy document and uploaded electronically, in PDF format, to Brightspace, no later than 5:00 pm EDT on Friday, 26 April 2024.