

Tower Light Show Power Supply Design

Problem Statement

Redesign and improve the power supply for the LED light bars used in the Theophilus Tower light show put on by the University of Idaho Association for Computing Machinery.

Specifications

- Variable voltage that changes dynamically to the LED load.
- Voltage ranges between 7.5 Volts and 10.5 Volts
- Constant current output between 270mA and 300mA per string.
- Currently 40 LED strings per color. 120 LED strings total

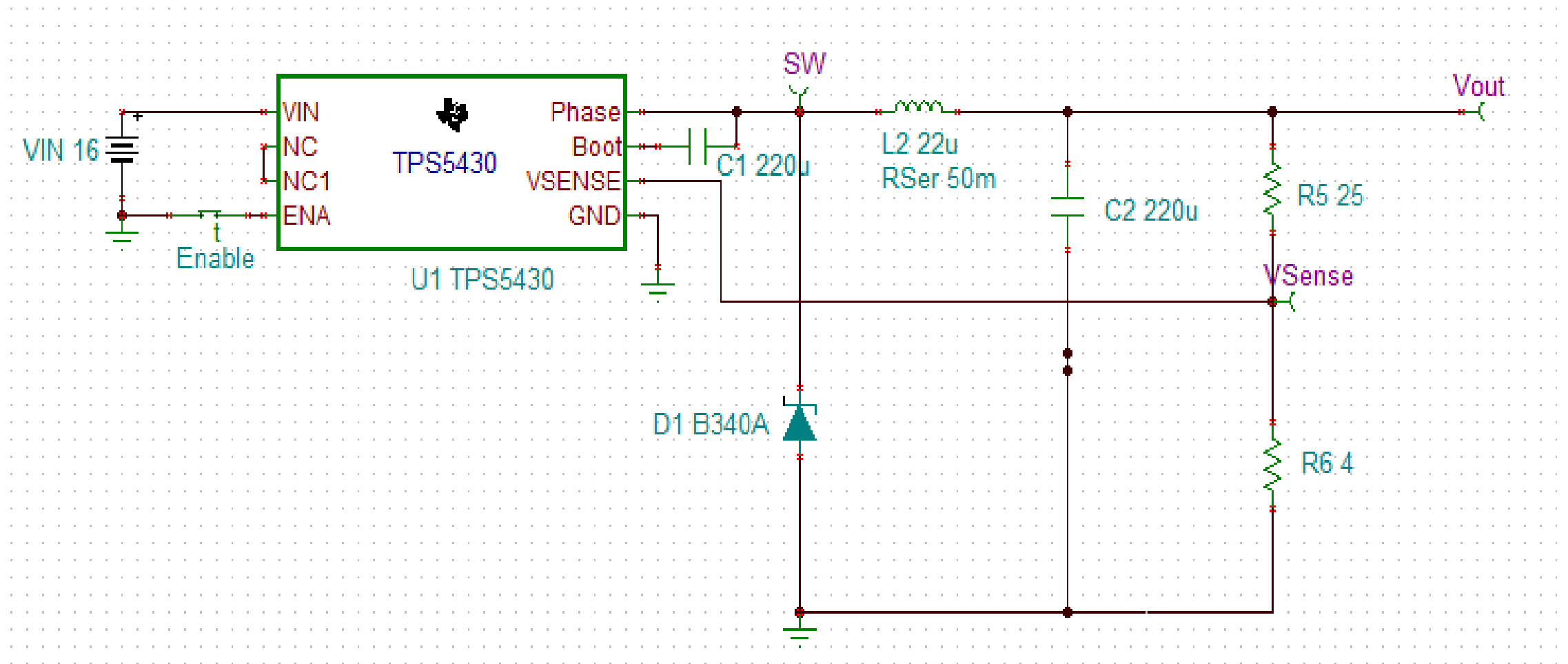
Improvements

- Potentially Improves power efficiency 35-50% depending on LED color.
- Load Resistor maintains constant current
- Simplifies circuit by eliminating need for extra transistors.

Buck Converter Chip

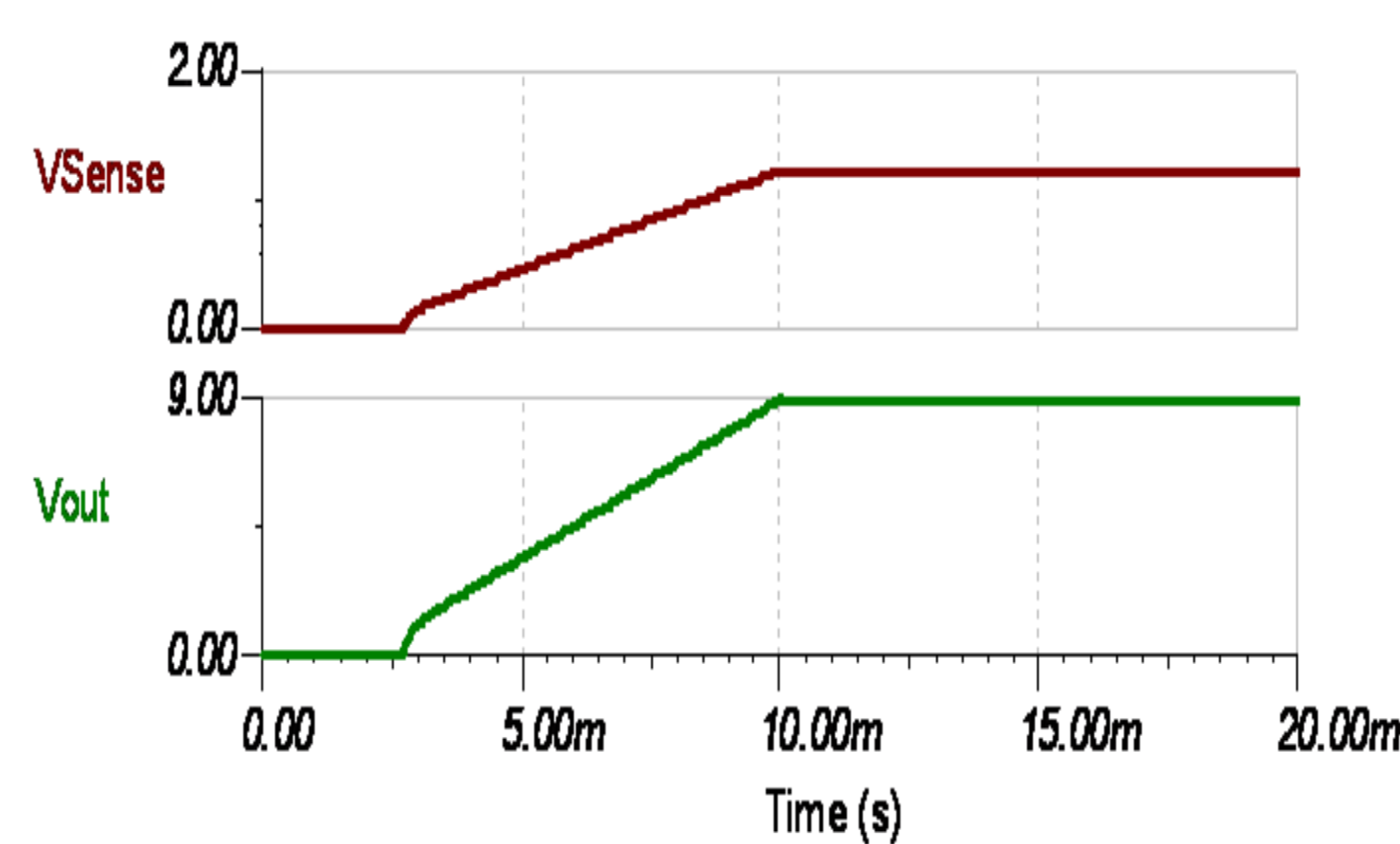
- 5.5V - 36 V Input Voltage
- Up to 3A output current
- 1.22 V - 31 V Output Voltage
- 500 kHz switching frequency
- Cost \$2.25 per unit.
- 95% efficiency

Simulation Circuit

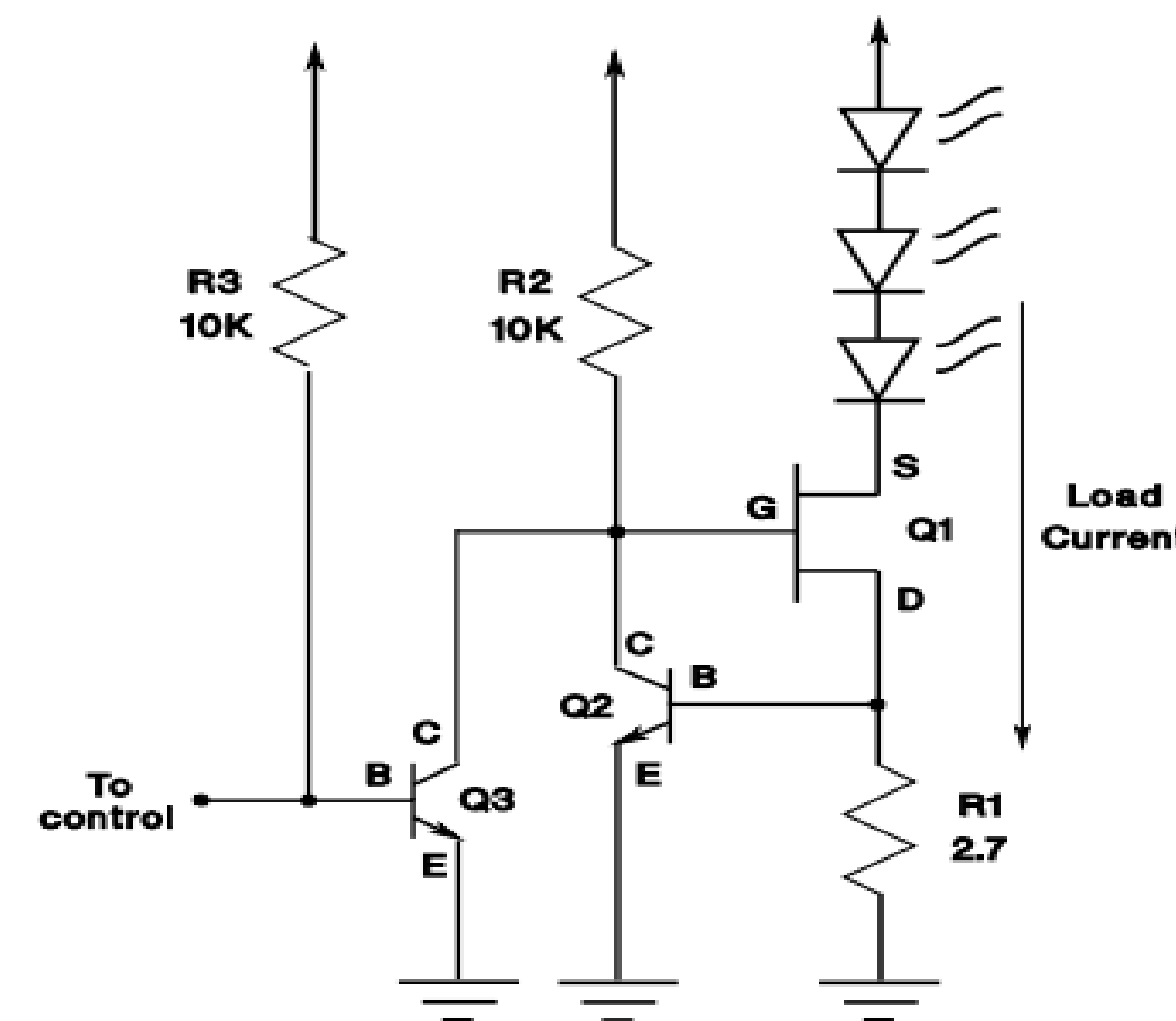


Simulation Results

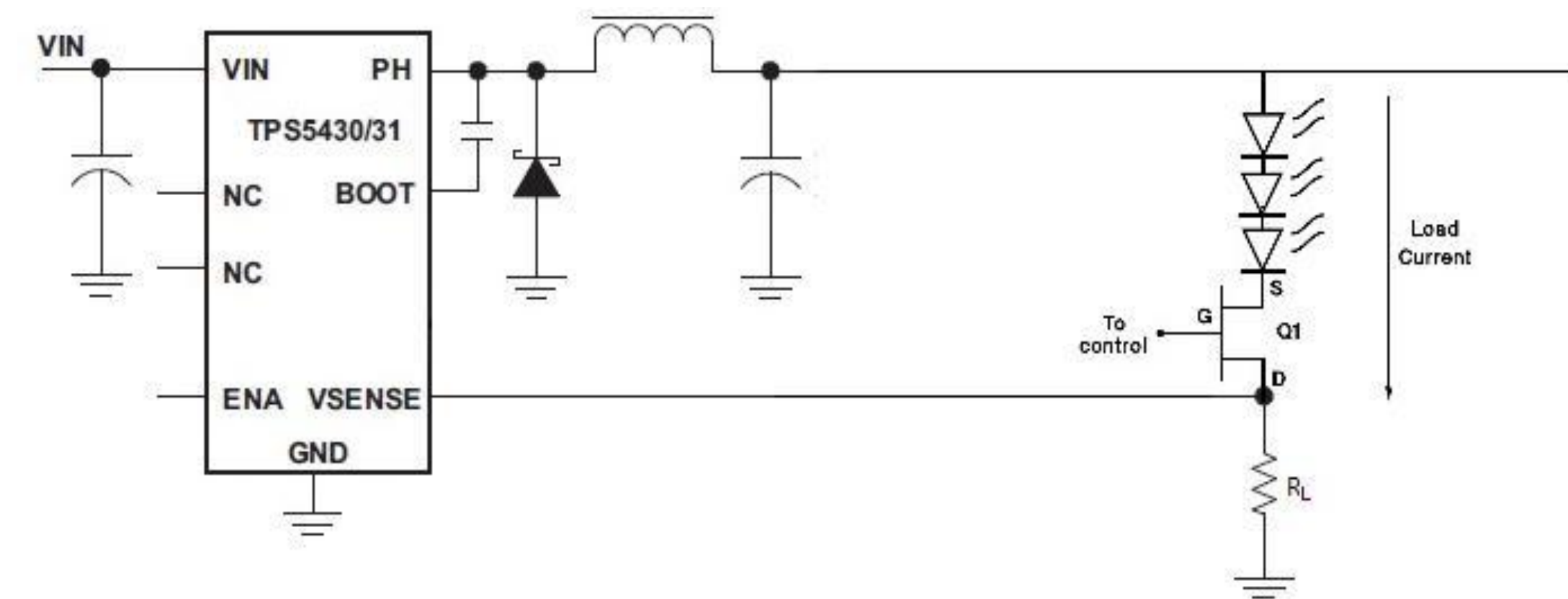
Output Voltages For Red LED Simulation



Old Circuit



Upgrade Circuit



Jesse Walson



Jake Wagner



Dave Miller



Team Advisor:
Touraj Assefi



Sponsor:
Robert Rinker