

EE 463

STATIC POWER CONVERSION I

HARDWARE PROJECT SIMULATION REPORT

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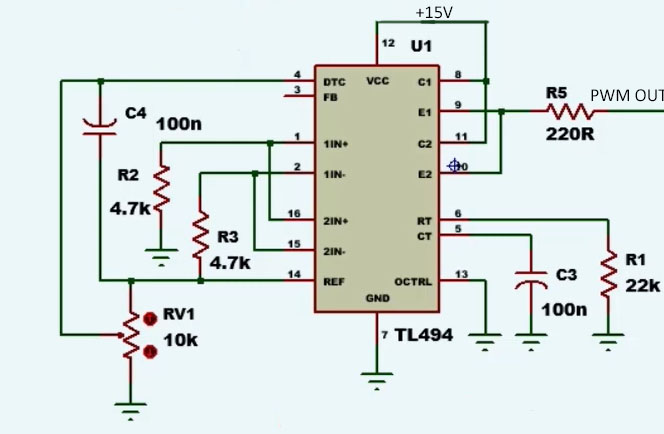
# Introduction

# Design Choices

After the simulation report is submitted and our suggested system topology is verified, some parts of the system needed to be designed in detail. PWM Generator, Optical Isolator & Gate Driver needed to be implemented to replace the PWM block in the simulation. Since we worked with real circuit elements, there were more elements which were not in the simulations but should be taken into consideration. Heat dissipation of semiconductors, stray inductances, placement of the components and ensuring proper connections were critical for proper and robust operation. Block by block, details about design choices are given in this section.

## PWM Generation

To generate PWM signal with adjustable duty cycle, TL494 IC is used. It is chosen since the chip is widely available (also in the laboratory), it is analog so does not require software programming and implementation is easy & understandable. A potentiometer is used to change the duty cycle which is actually a basic voltage divider. Difference between the potentiometer output and reference signal is used to calculate desired duty cycle by the IC. The circuitry is given is Figure X.



However, using this circuit to directly drive the IGBT would be impossible since TL494 can not supply the desired current to turn on the transistor. Therefore, additional circuitry was needed.

## Optocoupler & Gate Driver

# Simulation Results

# Test Results

# Challenges

# Conclusion