| EE-518: POWER CONVERTER ANALYSIS AND DESIGN LAB |
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| **Experiment No 1:** Design of TLP gate driver circuit and step down chopper circuit in LT-spice and implement the same in hardware. |
| **Date of submission:** JANUARY 23, 2024 |
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Brief Report

PROBLEM 1: Design of TLP gate driver circuit and step-down chopper circuit in LT-spice.

COMPONENT: Source, Resistor, Wire, LED, Capacitor, Transformer,

Bridge rectifier, Switch , Zener diode, TLP250.
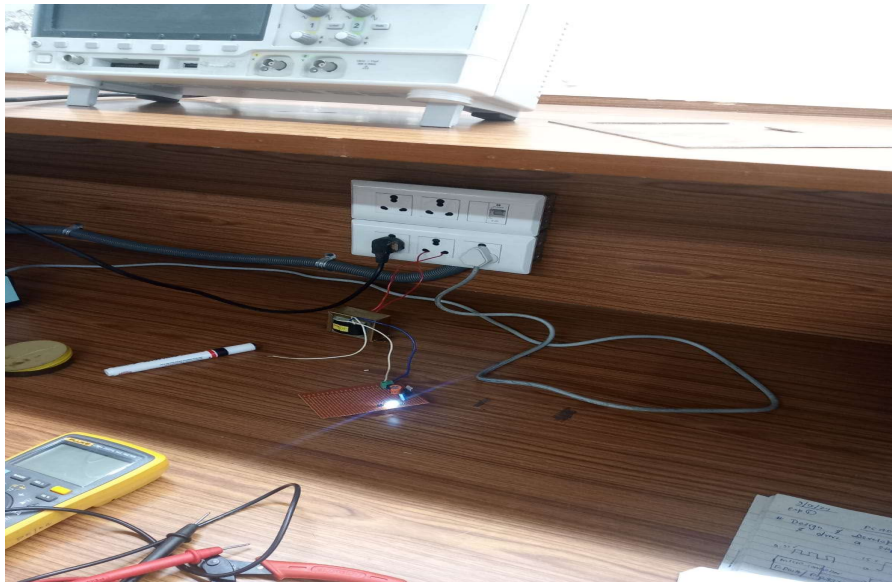
LT-SPICE:
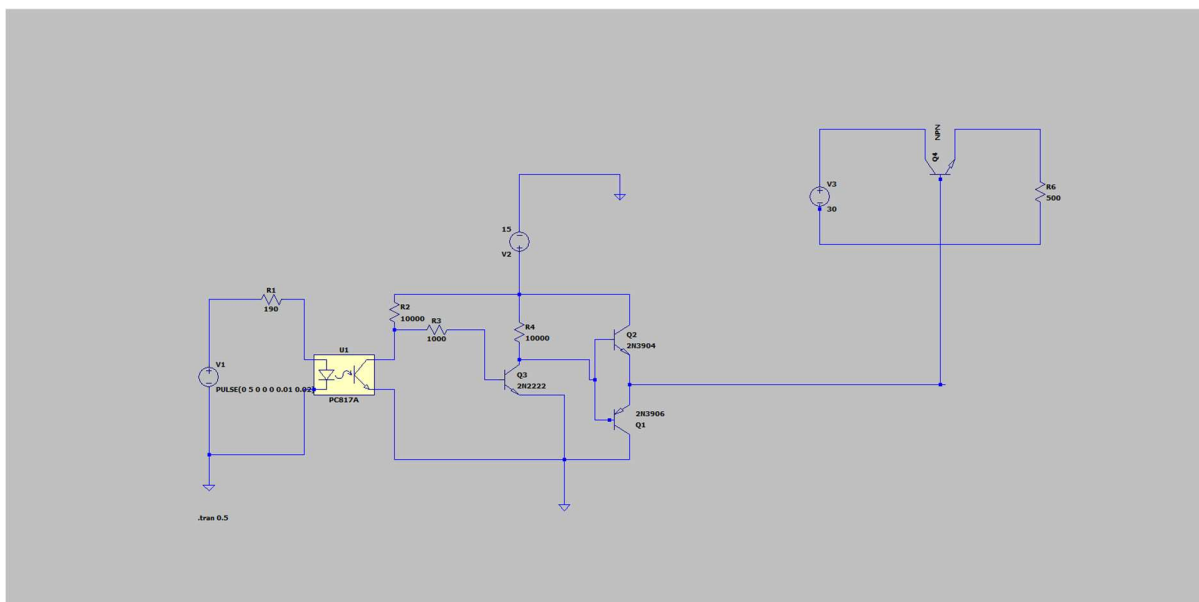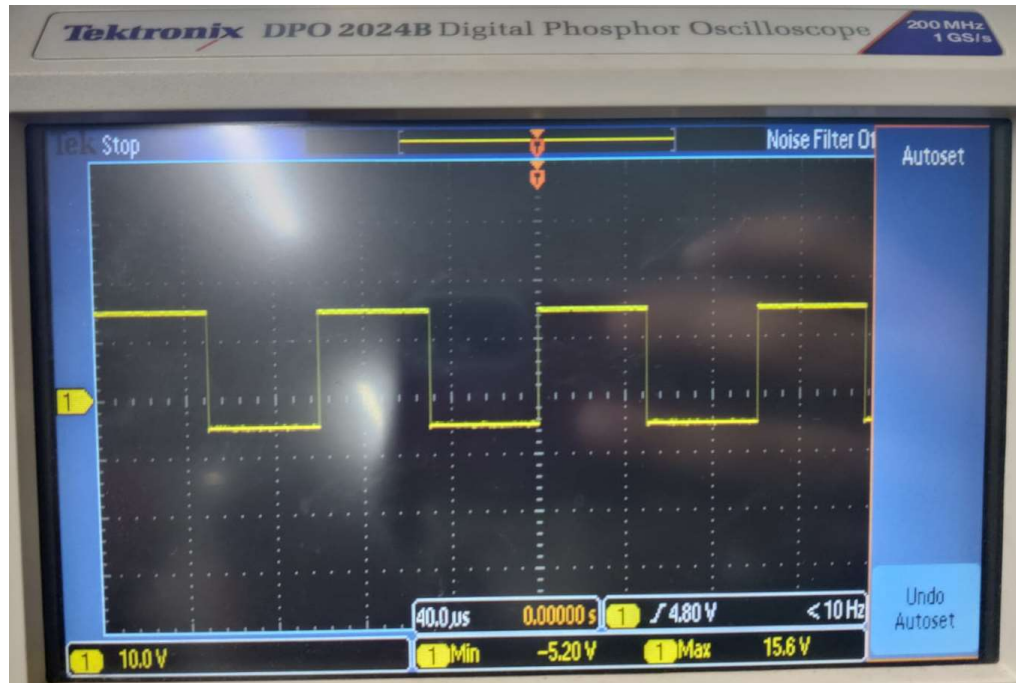

Figure 1: Circuit in LTspice
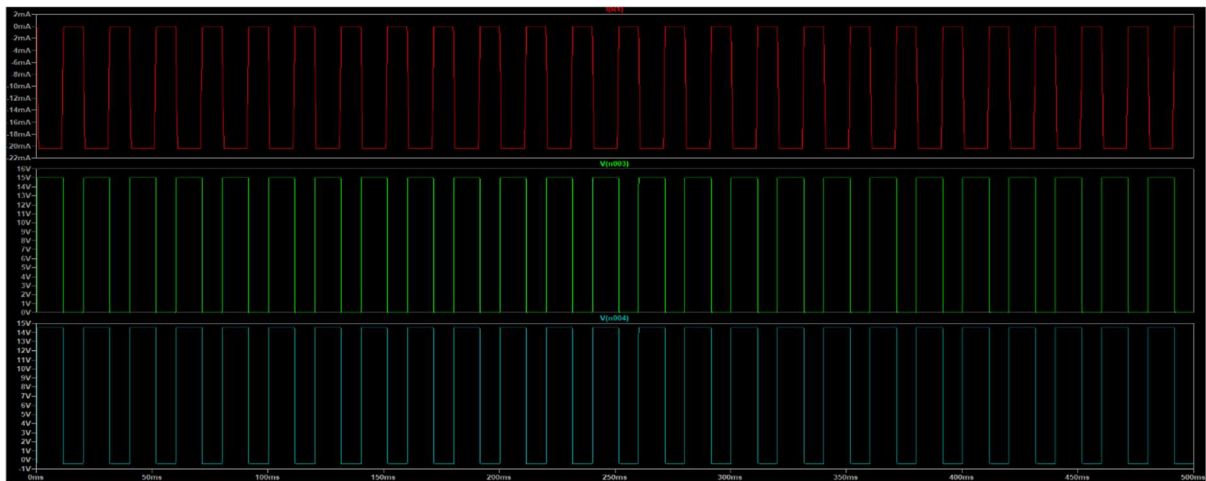
Figure 2: Output Waveform from LTspice
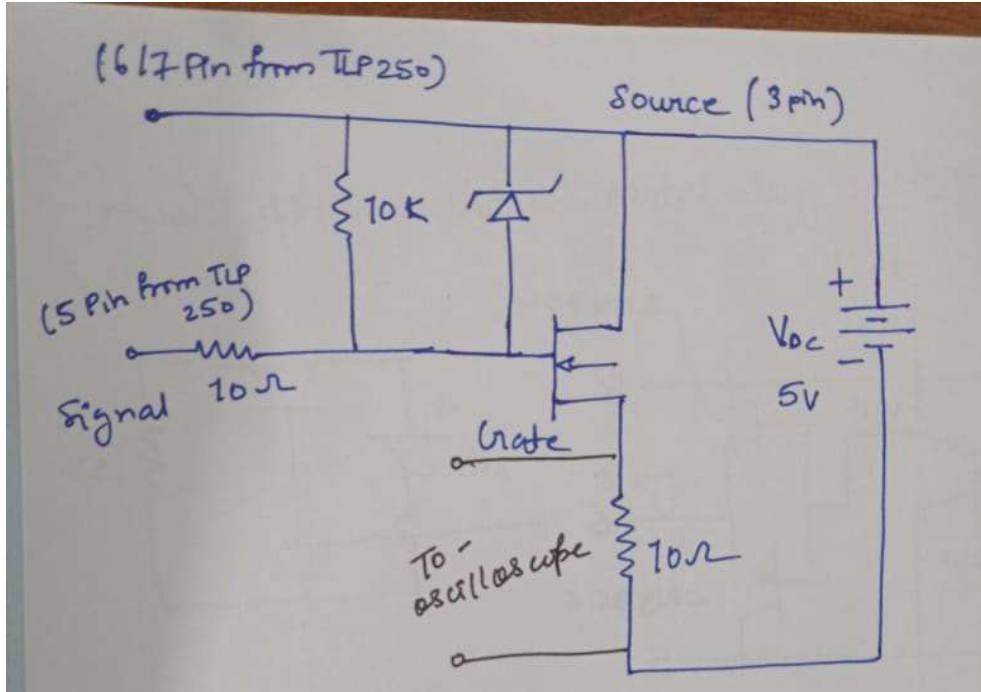
Practical Implementation:

Step 1: First, we constructed the 15V DC-regulated supply for providing TLP250 input.

As the LED glows and gets 15V output across the LED, or we can check across the capacitor, which is in parallel to the LED.

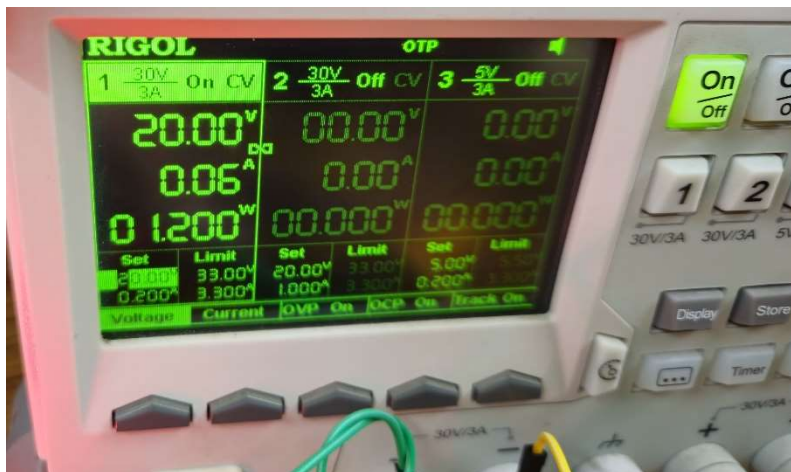**Figure 3:** Output of TLP250 across ground and pin number 7

Step 2:

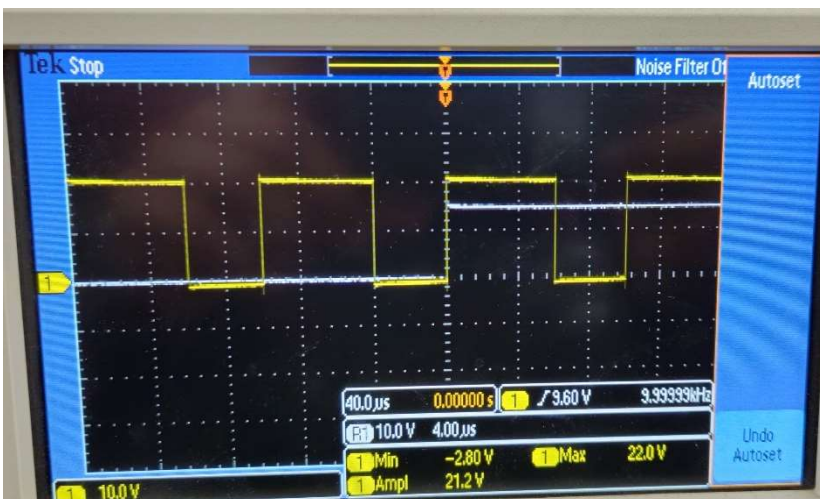**Figure 4 :**chopper Circuit we have to design

Output:

A)For DUTY 60 % :

Figure 5: Function Generator setting

Figure 6: Supply setting

Figure 7: Output across Resistor

Conclusion:
The design and implementation of the TLP gate driver circuit and the step-down chopper circuit represented a comprehensive exploration of theoretical concepts translated into practical applications. Through the combined use of LTspice simulations and physical hardware realization, we aimed to bridge the gap between simulation models and real-world performance, gaining valuable insights into the behavior and efficacy of the designed circuits.

The TLP gate driver circuit successfully demonstrated its capability to provide efficient isolation between the control signal source and the power transistor. LTspice simulations allowed for a detailed analysis of the circuit's response to control signals, ensuring proper functionality and responsiveness. The subsequent hardware implementation validated the simulation results, confirming the reliability and robustness of the TLP gate driver in practical scenarios. The isolation achieved is crucial in high-power applications, safeguarding control electronics and enhancing overall system stability.

Throughout the experiment, we encountered challenges inherent in the transition from simulation to hardware implementation. Issues such as getting sine waves as output required careful consideration and iterative refinement of the designs. These challenges served as valuable learning experiences, emphasizing the importance of a holistic and practical approach in the design process.