Circuit Simulation Project

https://esim.fossee.in/circuit-simulation-project

Name of the participant : Tharun D

Title of the circuit : Avalanche Pulse Generator for TILS experiments

Theory/Description : The **Avalanche Pulse Generator for TILS (Time-Resolved Laser Spectroscopy) experiments** is a specialized electronic circuit designed to produce ultrafast, high-voltage pulses with sharp rise times in the nanosecond range. It operates by driving a transistor, typically a fast avalanche transistor, into avalanche breakdown mode, where a small trigger rapidly releases a large stored charge. This sudden discharge generates clean, high-speed pulses ideal for exciting laser systems or synchronizing time-resolved measurements. Due to its simplicity, low cost, and ability to produce repeatable nanosecond-scale pulses, the avalanche pulse generator is widely used in laboratory setups for TILS and other experiments requiring precise timing and high-voltage pulse generation.

Circuit Diagram(s) :

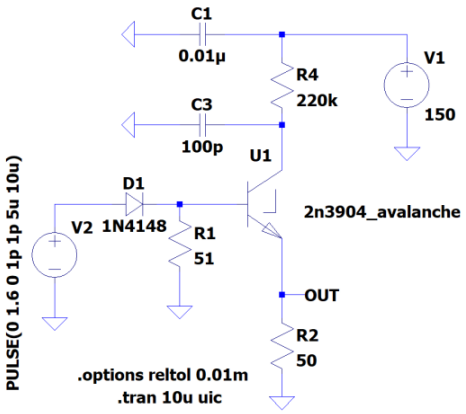

Figure 7 – Avalanche pulse generator for TILS experiments

Results (Input, Output waveforms and/or Multimeter readings) :

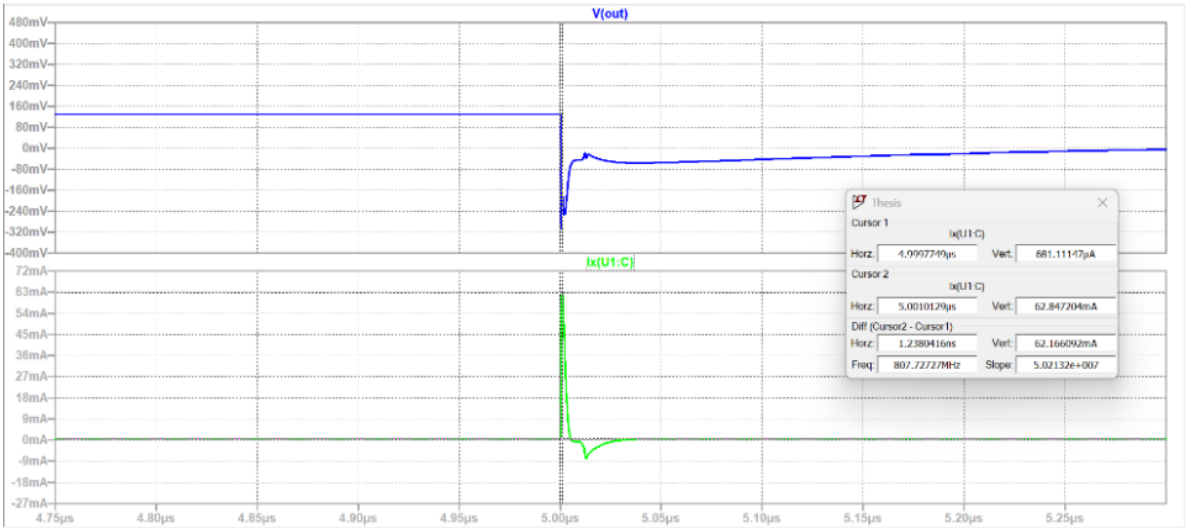

Figure 8 – Output pulse of TILS pulse generator

Source/Reference(s) :

https://oasis.library.unlv.edu/cgi/viewcontent.cgi?article=5847&context=thesesdissertations

https://cmosedu.com/jbaker/students/theses/An_Avalanche_Transistor_Based_Pulse_Generator_Design_for_Infrared_Laser_Applications.pdf

Lopez, A., Strong, H. N., McGlothen, K. I., Hines, D. J., & Baker, R. J. (2022). A Compact Avalanche-Transistor-Based Pulse Generator for Transcranial Infrared Light Stimulation (TILS)Experiments. Instruments, 6(3), 20.