DESIGN OF OPTO ISOLATOR 4N25

INTRODUCTION:

Opto-isolators, or opto-couplers, are made up of a light emitting device, and a light sensitive device, all wrapped up in one package, but with no electrical connection between the two, just a beam of light. The light emitter is nearly always an LED. The light sensitive device may be a photodiode, phototransistor, or more esoteric devices such as thyristors, triacs etc. Opto-isolators prevent high voltages from affecting the system receiving the signal.Commercially available opto-isolators withstand input-to-output voltages up to 10KV and voltage transients with speeds up to 25 kV/μs.A common type of opto-isolator consists of an LED and a phototransistor in the same opaque package.

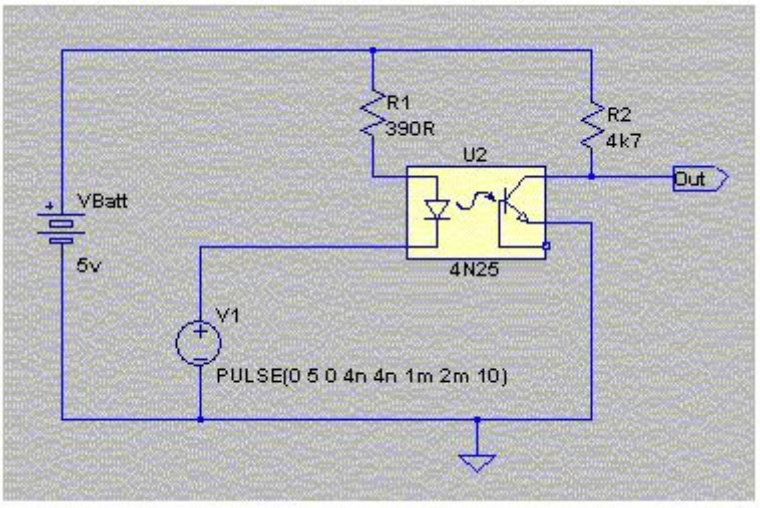


Fig1:Circuit Diagram of 4N25 Opto Isolator

OPERATION:

An opto-isolator contains a source (emitter) of light, almost always a near infrared light-emitting diode (LED), that converts electrical input signal into light, a closed optical channel (also called dielectrical channel), and a photosensor, which detects incoming light and either generates electric energy directly, or modulates electric current flowing from an external power supply. The sensor can be a photoresistor, a photodiode, a phototransistor, a silicon-controlled rectifier (SCR) or a triac. Since LEDs can sense light in addition to emitting it, construction of symmetrical, bidirectional opto-isolators is possible. An optocoupled solid-state relay contains a photodiode opto-isolator which drives a power switch, usually a complementary pair of MOSFETs. A slotted optical switch contains a source of light and a sensor, but its optical channel is open, allowing modulation of light by external objects obstructing the path of light or reflecting light into the sensor.

The main circuit and subcircuit of 4N25 is shown below.

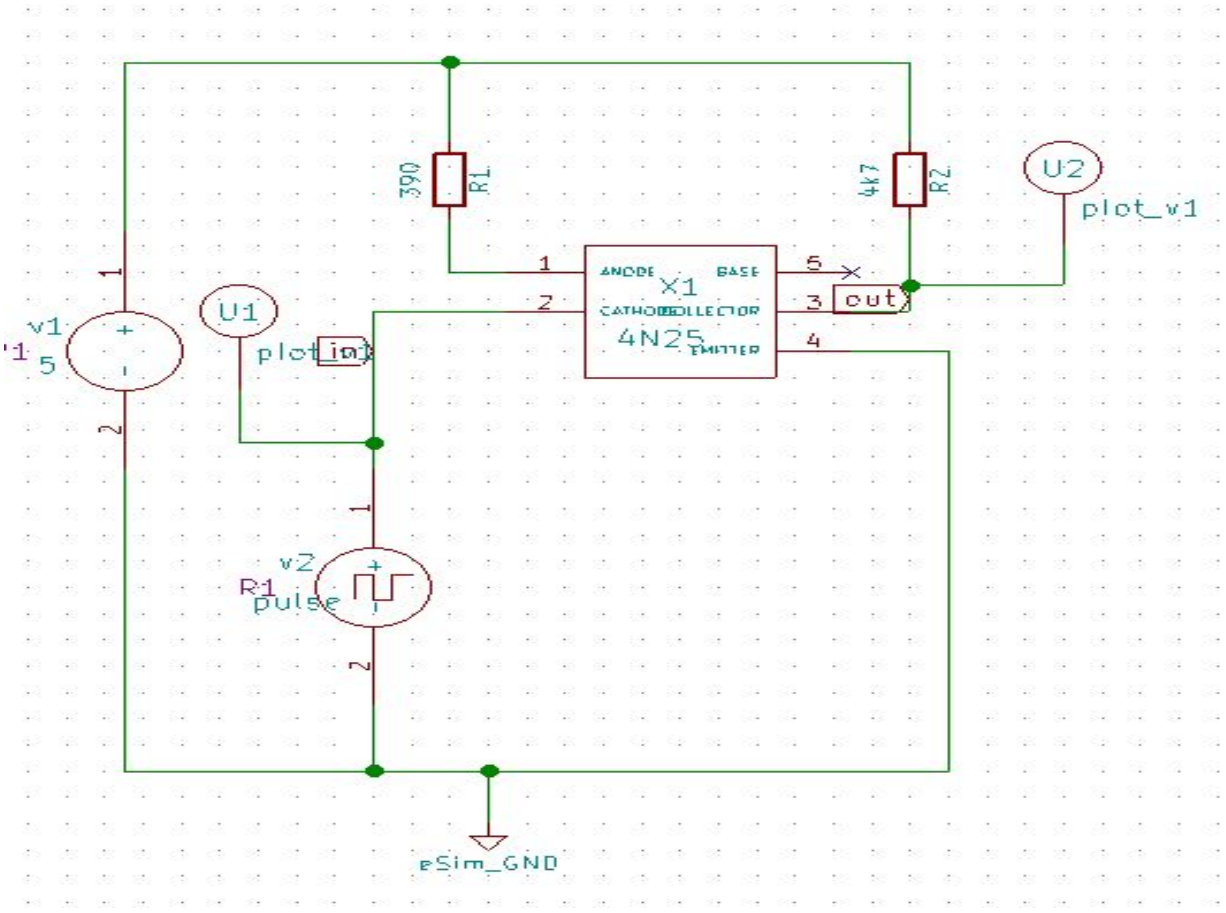


Fig2:Schematic Diagram of 4N25 OptoIsolator.

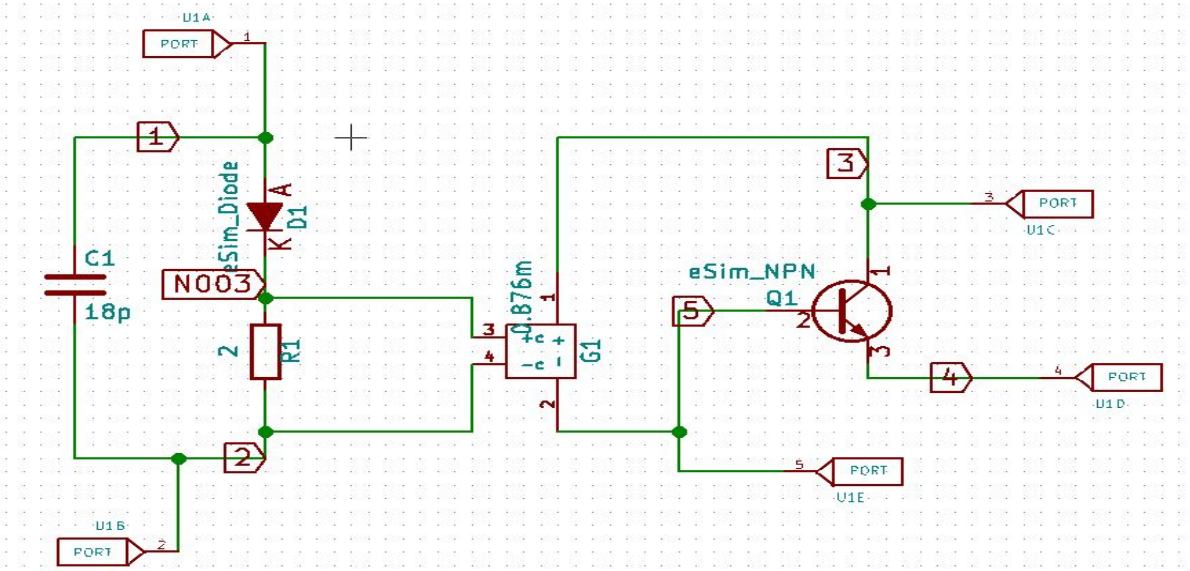
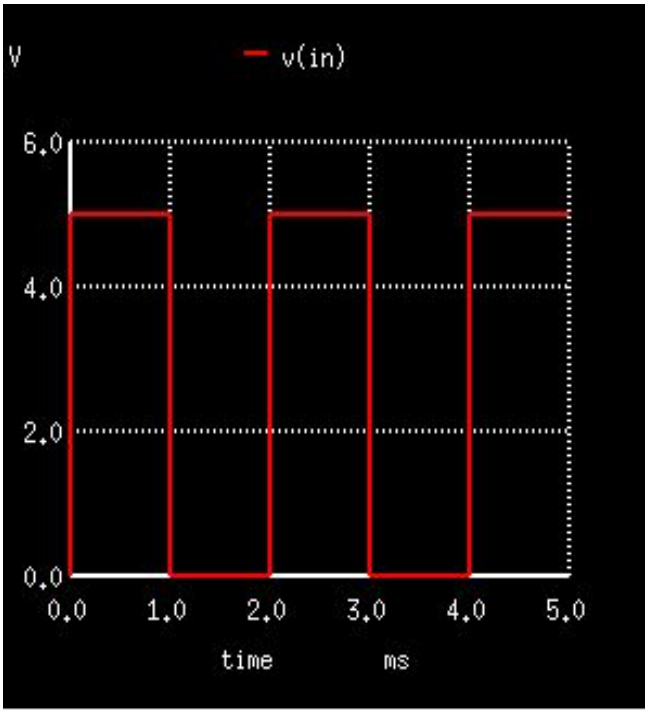


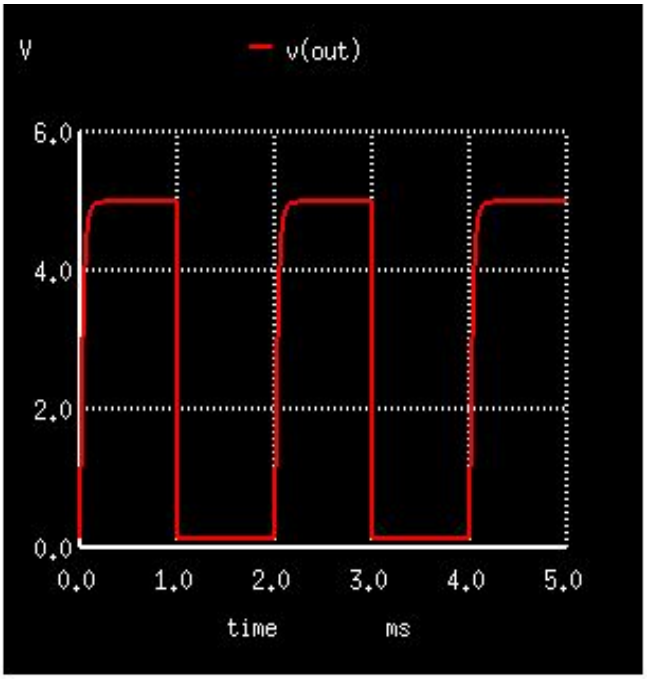
Fig3:Subcircuit of 4N25 OptoIsolator.

NGSPICE PLOTS:

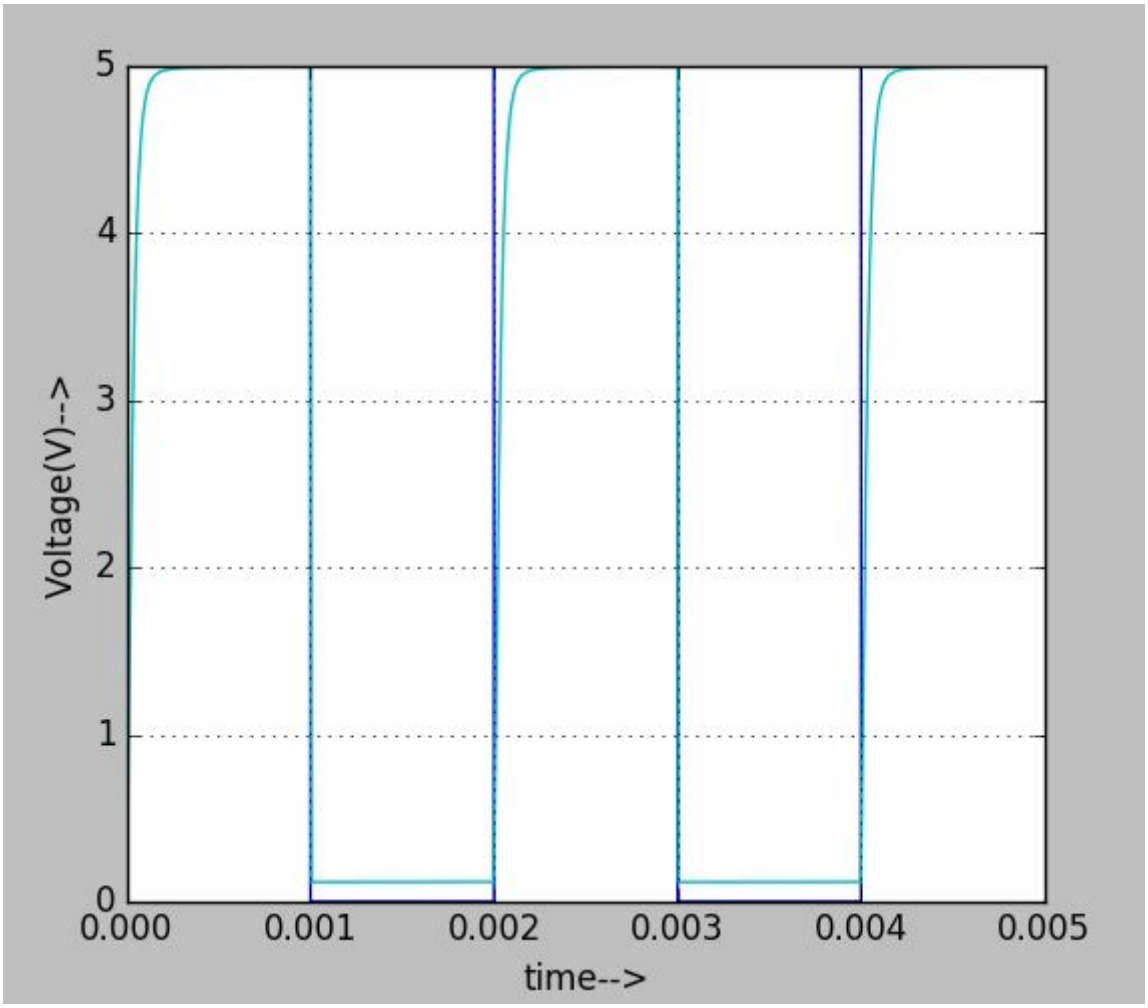
INPUT PLOT:



OUTPUT PLOT:



PYTHON PLOT:



REFERENCES:

http://robots.freehostia.com/SpeedControl/Optos.html
https://components101.com/ics/4n25-optocoupler