

IC555 Testing Circuit

Theory:

IC555 is the most widely used in timers and control circuits. It performs an array of timing tasks in the electronic circuits and there is a huge list of experiments which can be performed with 555 IC. We have used a circuit which will test the functionality of the 555IC whether it is faulty or it is OK to used it in circuits.

First of all, insert the IC in socket (if used) very carefully so that no pin of 555 timer gets damage. Now to see the result, switch on the power supply. If your 555 timer is working properly, then both the LEDs will glow alternately. If any of the LED is OFF or both the LEDs are not glowing, it means that your 555 timer IC is faulty.

One can calculate the time duration with the below formula..

ON Time (HIGH) in Seconds = $0.693 * (R1 + R2) * C1$

OFF Time (LOW) in Seconds = $0.693 * R2 * C1$

Total Time Period in Seconds = $0.693 * (R1 + 2R2) * C1$

Frequency = $1.44 / ((R1 + 2R2) * C1)$

Here the IC555 is used as an astable mode of operation. As soon as power supply (12 volt) is provided, C1 will start charging through R1 and R2. When the voltage across C1 rises above 2/ 3 of supply voltage, the internal Flip Flop toggles. As a result, pin 7 becomes low and C1 starts discharging. When the voltage across C1 goes below 1/ 3 of supply voltage, the internal Flip Flop resets and pin 7 goes high. The C1 starts charging again. All this will happen only when your IC is in good condition. Based on the charging and discharging times of the Capacitor (as set by R1, R2 and C1), the output will stay HIGH or LOW and the LEDs will flash accordingly. From these observations, we can conclude that 555 Timer IC is faulty or not.

Schematic Diagram:

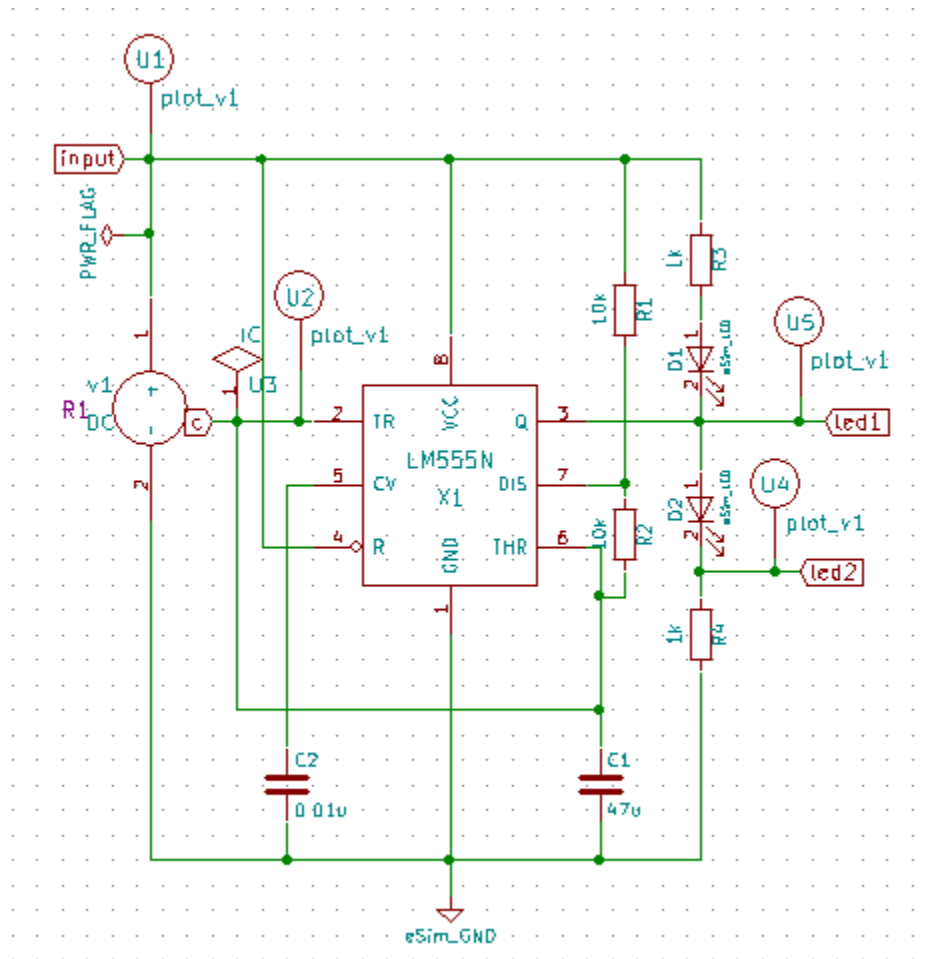


Figure 1: Schematic of IC555 Testing Circuit

Simulation Results:

1. Ngspice plots:

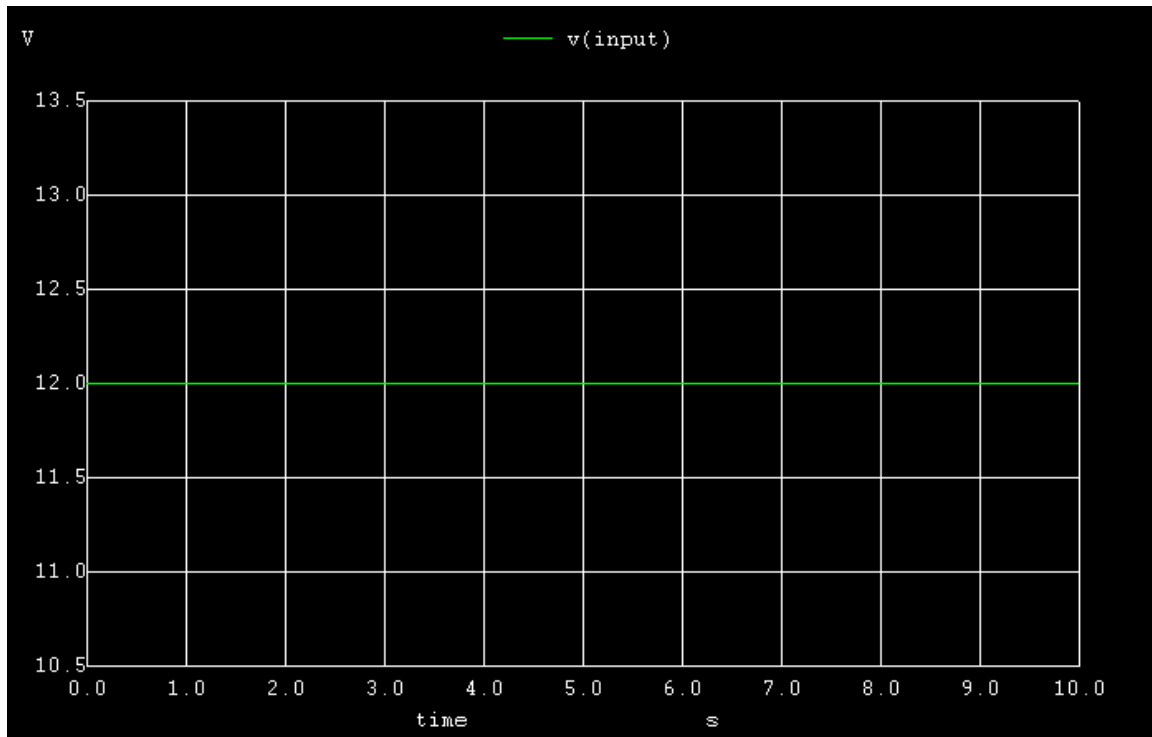


Figure 2: ngspice input plot

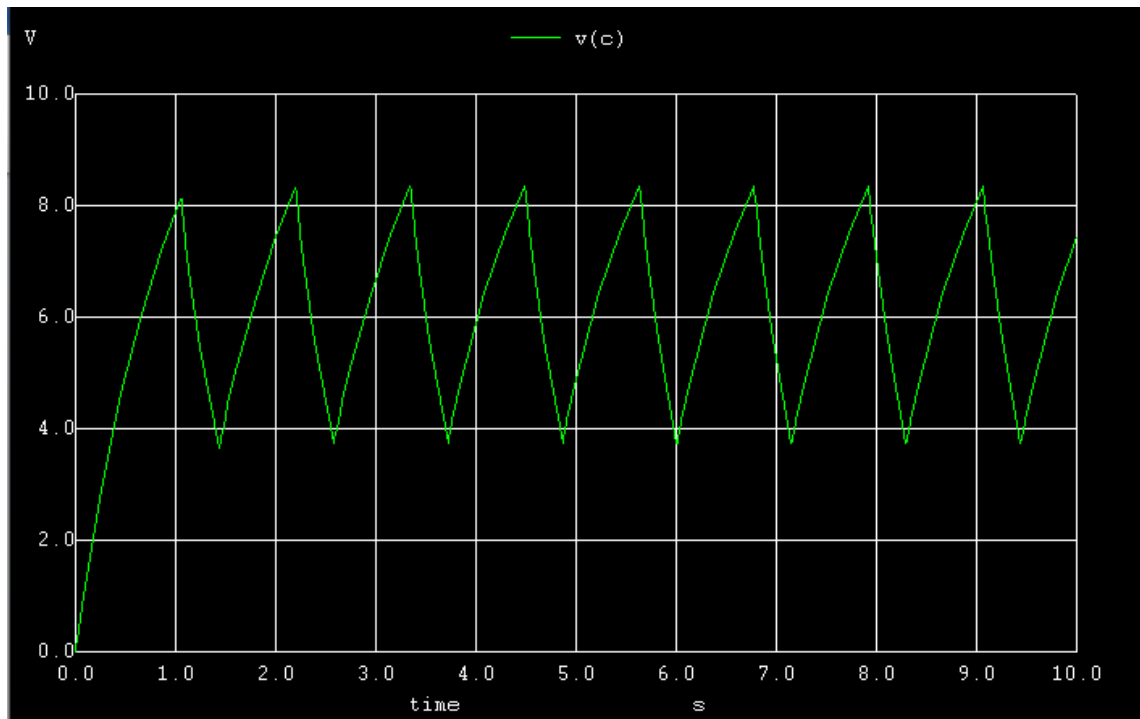


Figure 3: ngspice trigger plot at pin2

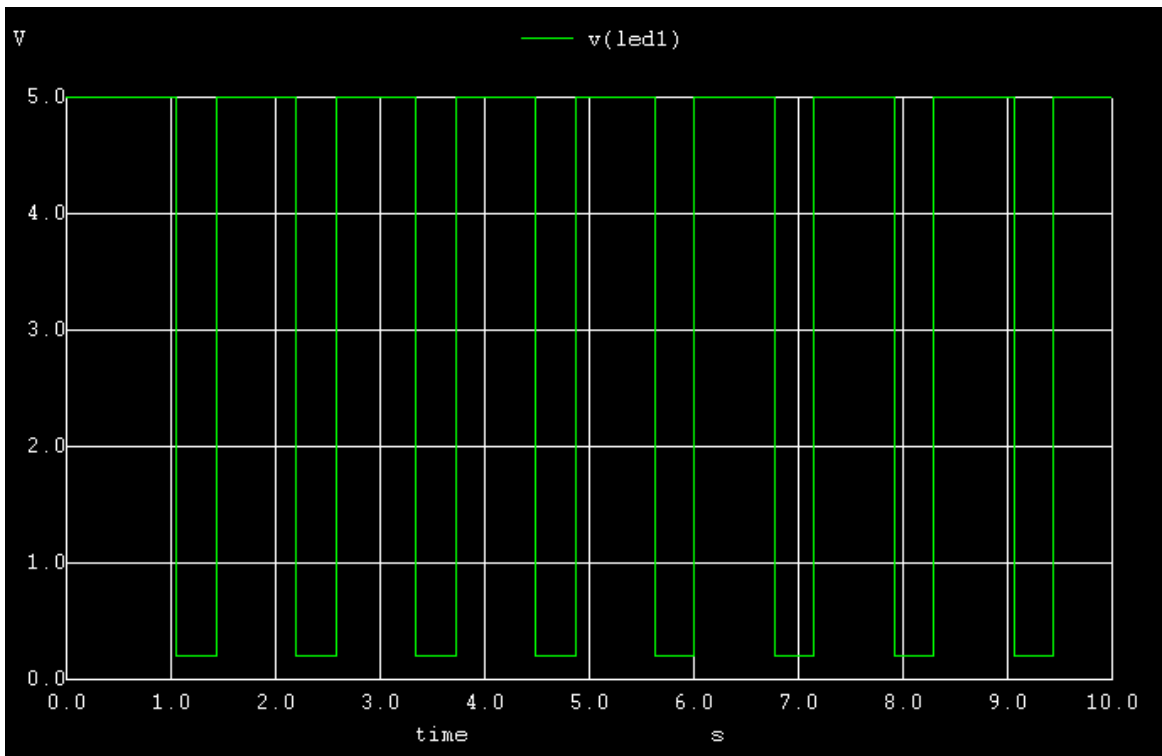


Figure 4: ngspice led1 output plot

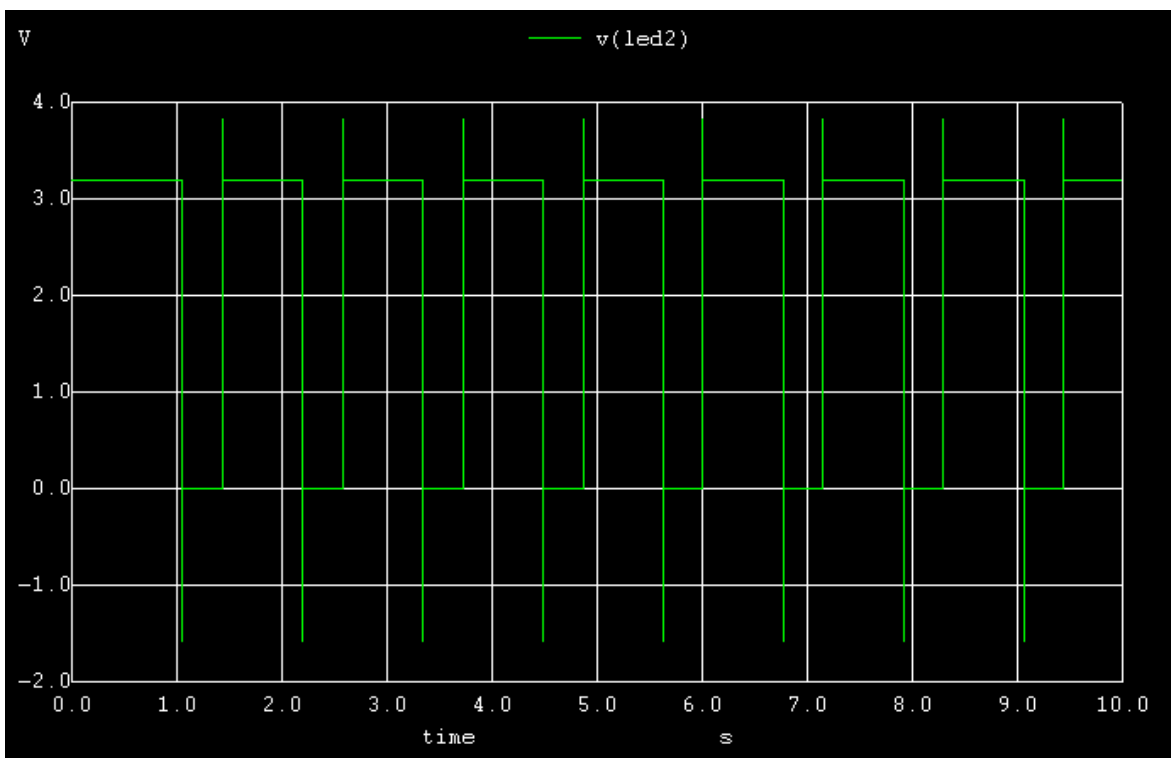


Figure 5: ngspice led2 output plot

2. Python Plot:

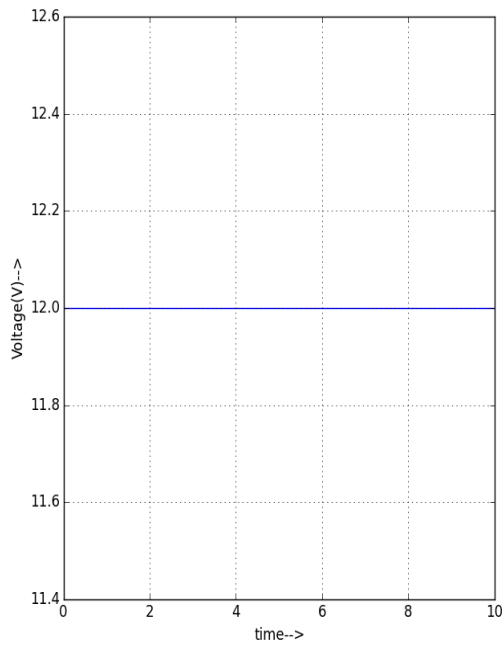


Figure 6: python input plot

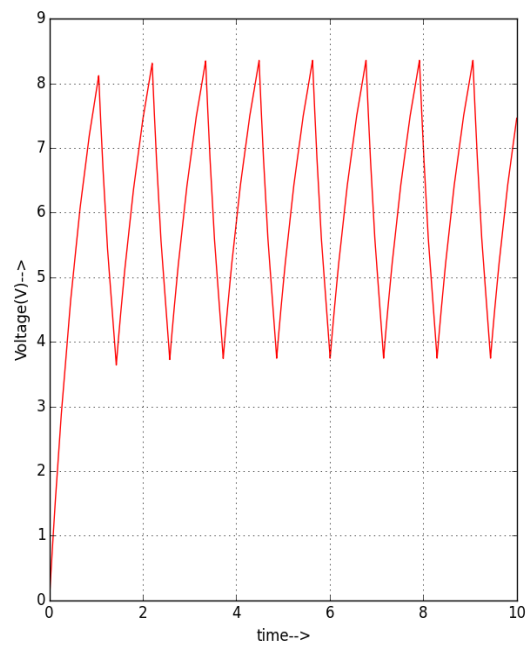


Figure 7: python trigger plot at pin2

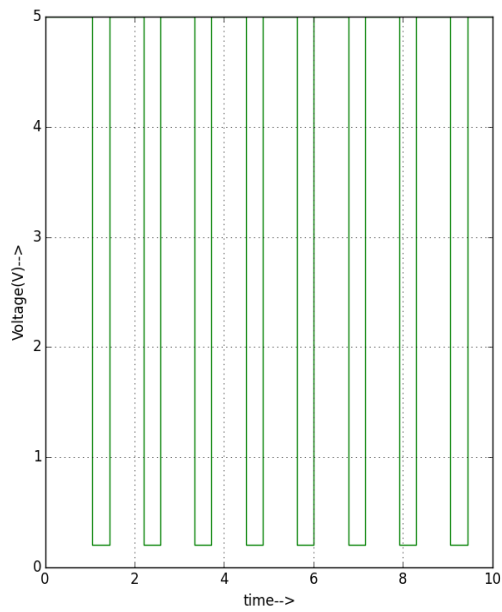


Figure 8: python led1 output plot

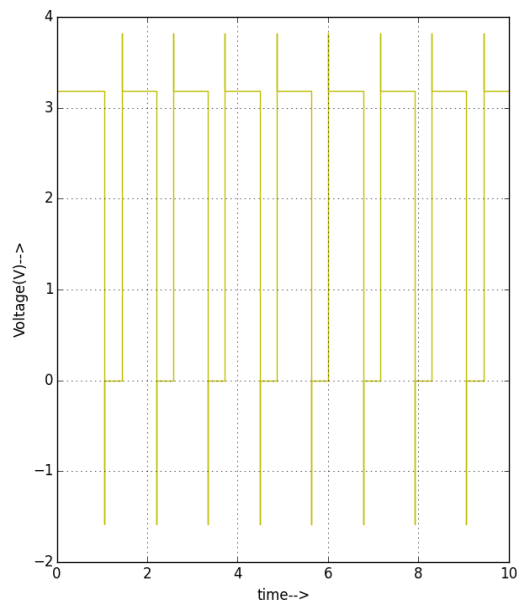


Figure 9: python led2 output plot

Conclusion :

Thus, we have designed and simulated the IC555 Testing circuit and , studied the circuit and the waveform obtained in eSim.

Reference:

1. <https://www.electronicshub.org/how-555-timer-ic-testing-circuit-works/>
2. <http://www.circuitstoday.com/555-tester-circuit>