OPTIMUS

Multi Vibrator User Guide

Table of Contents

List of Figures

Introduction

A multivibrator is an electronic circuit that repeatedly switches between two states. This switching action makes it useful for generating timing signals, blinking outputs, and basic oscillations in electronic systems. There are three main types of multivibrators:

- Astable Multivibrator – continuously oscillates without any external trigger
- Monostable Multivibrator – generates a single timed pulse when triggered
- Bistable Multivibrator – has two stable states and works like a flip-flop memory

The circuit used in this product is an **Astable Multivibrator**, meaning it produces a continuous square-wave output. In this design, the two LEDs turn ON and OFF alternately, visually demonstrating the oscillation process.

Key Features

- Self-oscillating design – no external trigger required
- Alternating LED blinking for visual indication of operation
- Easily adjustable timing by changing resistor or capacitor values
- Stable and reliable operation for learning and hobby projects

Typical Applications

- LED blinkers or flasher circuits
- Basic timing circuits
- Pulse generation
- Clock signals for digital circuits
- Square-wave generators
- Educational demonstration

Working Principle

This circuit uses two NPN transistors, two capacitors, and two resistors to create a continuous switching action between its two halves. Each transistor controls an LED, allowing the LEDs to blink alternately as the circuit oscillates.

Consider that Q1 turns on first, causing LED1 to light. At that moment, the left side of C1 is at approximately 0 V, and the right side of C1 becomes negative, which keeps Q2 turned off, so LED2 remains off.

C1 then starts charging through R1. As the voltage on the right side of C1 rises, it eventually reaches about 0.7 V. At this point, Q2 turns on and LED2 lights.

When Q2 turns on, its collector voltage is pulled down to 0 V. This makes the right side of C2 drop to 0 V and the left side of C2 go negative. This negative voltage at the base of Q1 reverse-biases its base–emitter junction, turning Q1 off and switching LED1 off. This process repeats continuously, causing the LEDs to turn on and off alternately.

Circuit Diagram

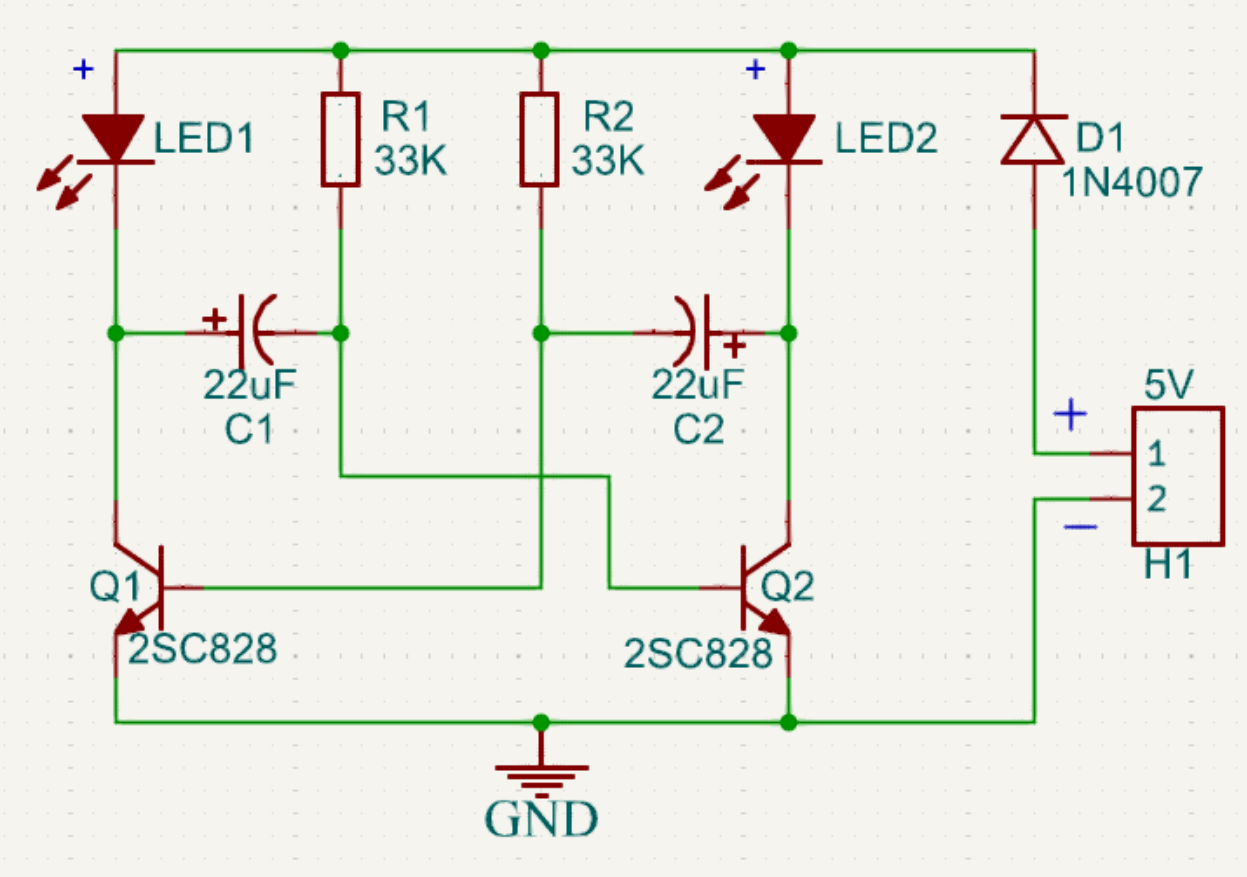


Figure 1 : Circuit diagram

Power Supply

Recommended Voltage: 3V

Maximum Voltage: 5V

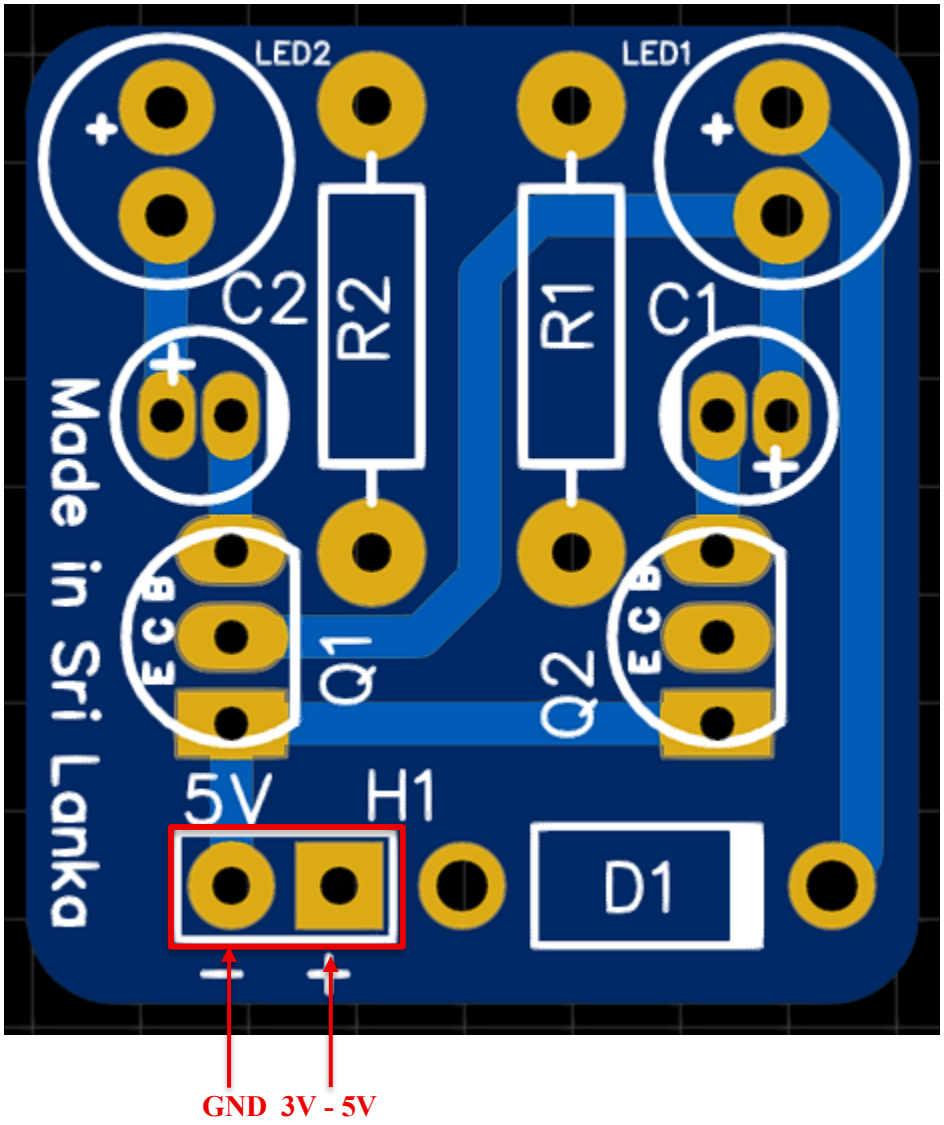
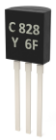


Figure 2 : Power supply connection diagram

Required Components

Value	Designator	Quantity	Image
22uF / 50V	C1, C2	2	
1N4007	D1	1	
Header	H1	1	
5mm Red LED	LED1, LED2	2	
C828	Q1, Q2	2	
33k	R1, R2	2	

Pin Assignments

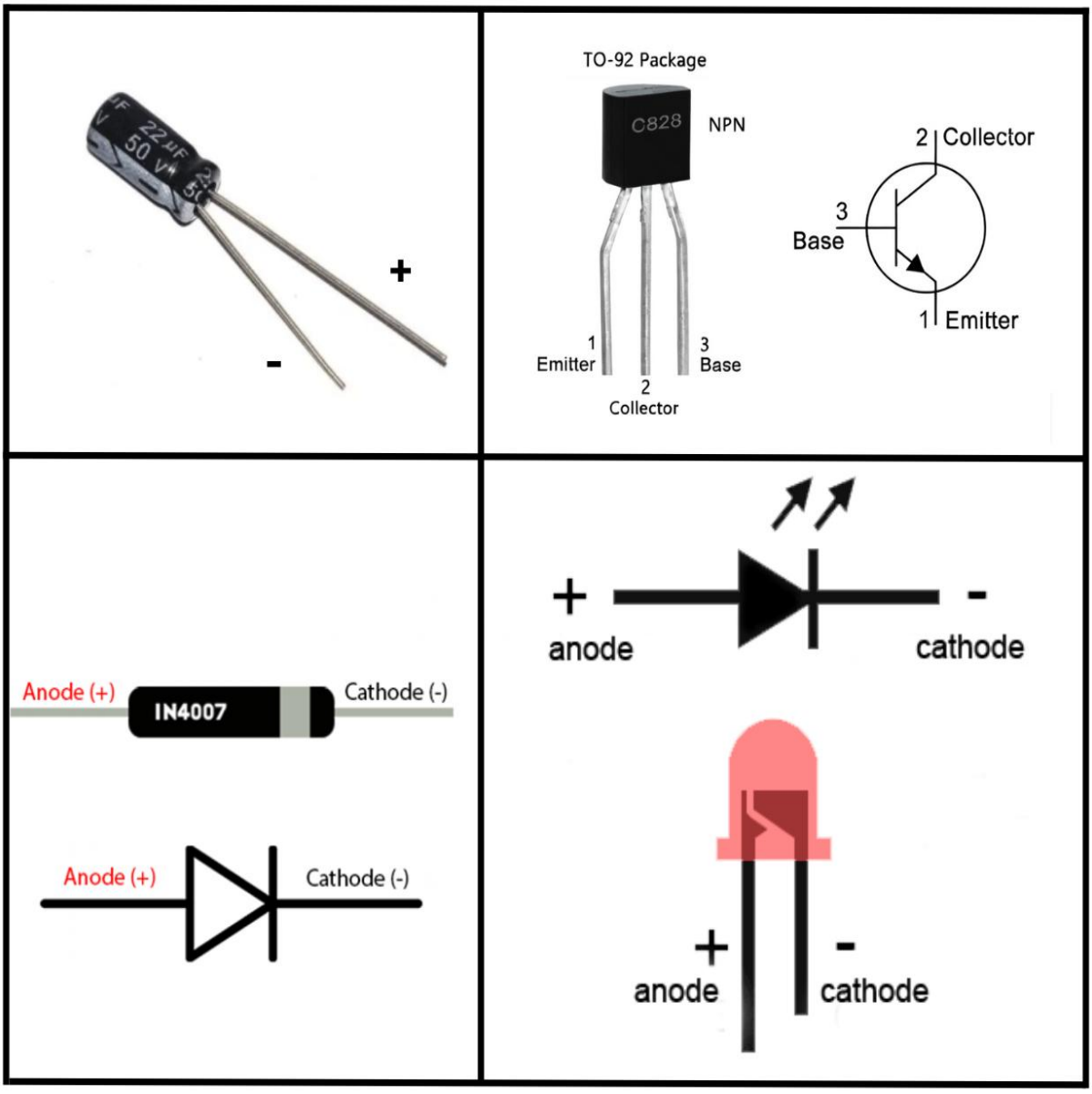


Figure 3 : Pin assignments

Components and Final Assembly

Figure 4 : PCB and required components

Figure 5 : Final assembly

Doc Version: 1.0.0
Product Version: 1.0.0
Report issues to: support@tesla.lk
© 2025 Tesla Robotics. All Rights Reserved