

## Crowbar Circuit Using TRIAC with TL431 Precision Programmable Reference

This Crowbar project can be used for preventing an overvoltage or surge condition of a power supply unit from damaging the circuit connected to the power supply. It operates by putting a short circuit and fuse blow across the voltage output, like dropping a crowbar across the output terminals of the power supply. The circuit is implemented using a TRIAC, a TL431 precision programmable reference, and a fuse. The resistor divider of R1 and R3 provides the reference voltage for TL431. The divider resistor is set to 2.268V when the power supply voltage is 5V in normal operating conditions. Since this voltage is below the minimum reference voltage of TL431, it remains off and very little current is conducted through the TL431. If the cathode resistor is sized accordingly, very little voltage will be dropped across it and the TRIAC gate terminal will be essentially at the same potential as MT1, keeping the TRIAC off. If the supply voltage increases to 5.55V, the voltage across R3 will exceed VREF and the TL431 cathode will begin to draw current. The voltage at the gate terminal will be pulled down, exceeding the gate trigger voltage of the TRIAC, and latching it on and blowing the fuse. The circuit has been tested with a 500mA fuse.

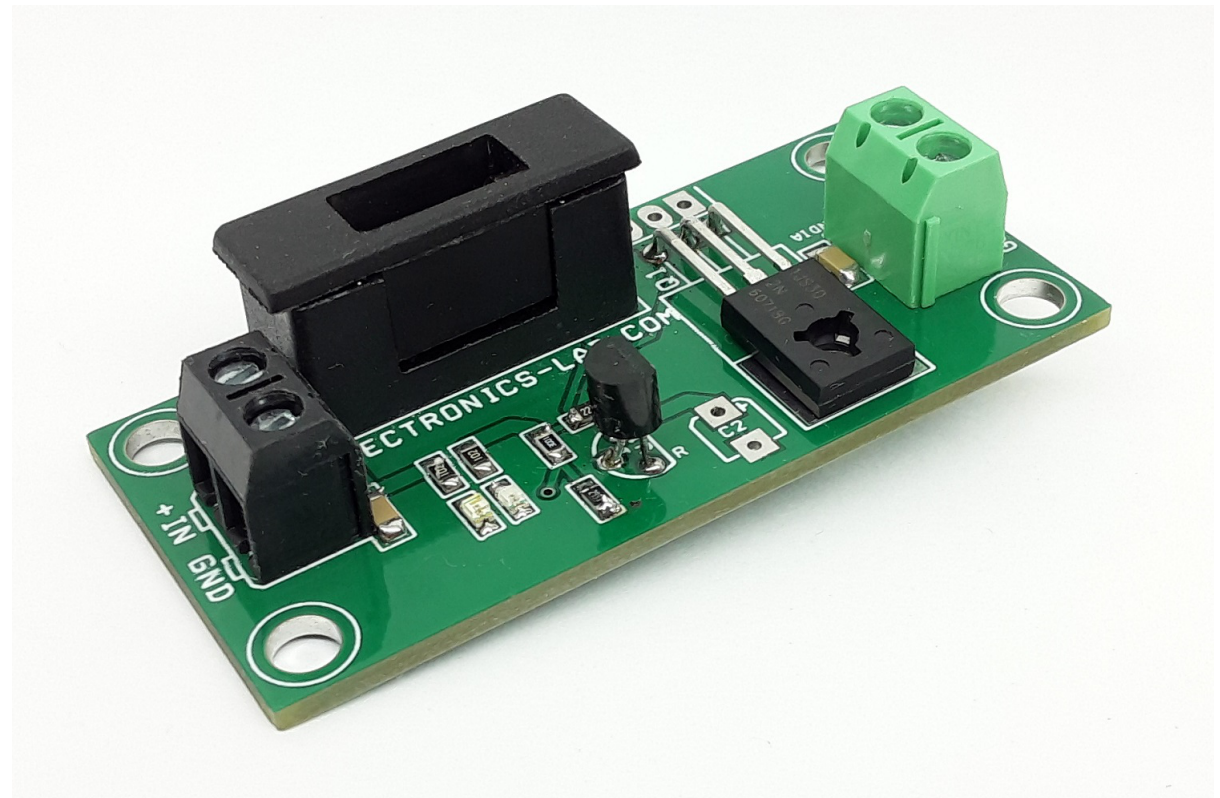
**Note:** Trip voltage is set at 5.55V, this can be modified and set as per user requirement by altering divider resistor values R1 and R3. The reference voltage is 2.5V.

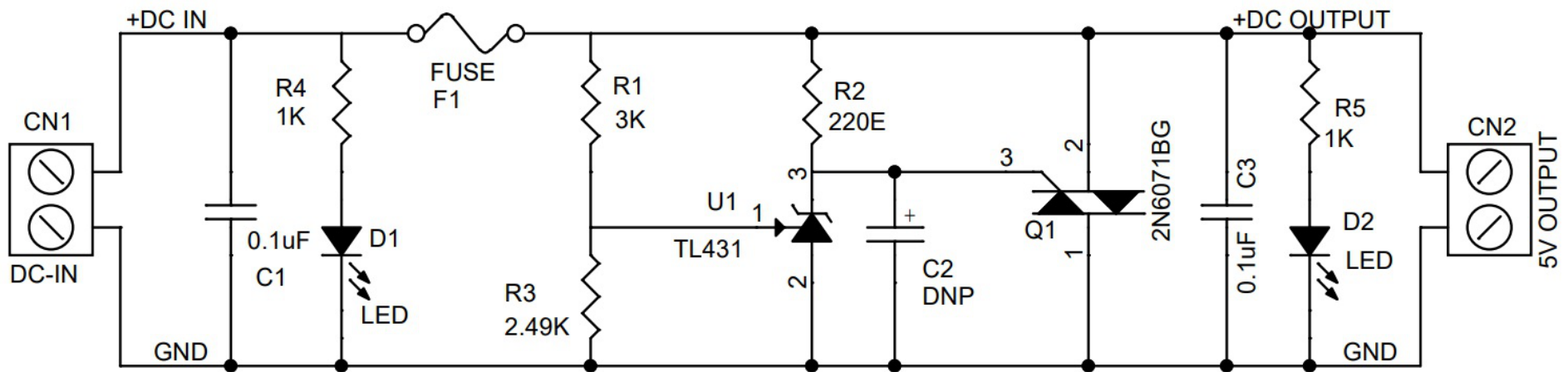
### Connections and Other Details

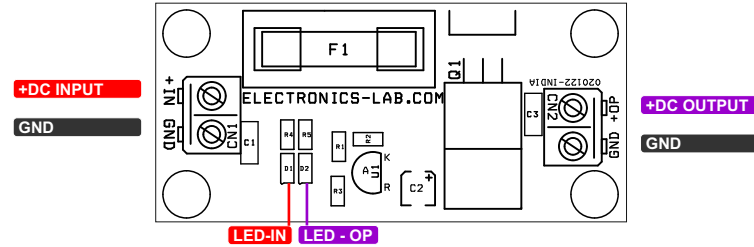
- **Connector CN1:** Pin 1 = VCC 5V Input, Pin 2 = GND
- **Connector CN2:** Pin 1 = VCC Output, Pin 2 = GND
- **Fuse F1:** Blow when voltage exceed 5.5V DC
- **LED D1:** Input Power Indicator
- **LED D2:** Output Power Indicator

### Features

- Input Supply 5V DC ( Should not Exceed 18V )
- Load Current 400mA (Fuse 500mA)
- Trip Voltage 5.55V DC
- PCB Dimensions 61.60MM X 28.89MM
- 4 X 3.2MM Mounting Holes







BOM						
NO.	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	2 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1247-ND
2	1	CN2	2 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1247-ND
3	2	C1,C3	0.1uF/25V CERAMIC 1206	YAGEO/MURATA	DIGIKEY	
4	1	C2	DNP			
5	2	D1,D2	LED RED OR GREEN SMD SIZE 0805	OSRAM	DIGIKEY	475-1278-1-ND
6	1	F1	FUSE CARTRIDGE	LITTELFUSE	DIGIKEY	0617.500MXP-ND
7	1	Q1	2N6071BG	LITTELFUSE	DIGIKEY	2N6071BGOS-ND
8	1	R1	3K 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
9	1	R2	220E 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
10	1	R3	2.49K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
11	2	R4,R5	1K 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
12	1	U1	TL431/TO92	ONSEMI	DIGIKEY	TL431BVLPRAGOSTR-ND
13	1	F1G	FUSE HOLDER	WURTH	DIGIKEY	732-11376-ND
14	1	F1C	FUSE HOLDER CLIP	WURTH	DIGIKEY	732-11379-ND



## PCB DIMENSIONS 61.60MM X 28.89MM

