

Under Voltage Lockout Relay -Latching Voltage Monitor

This project prevents/disconnects the load when an under-voltage condition occurs. The circuit latches the output when input sense voltage drops below the lockout threshold. Lockout threshold voltage can be adjusted using the onboard trimmer potentiometer PR1. Tactile switch SW1 is provided to reset the latch when input sense voltage is back to normal. The circuit consists of a MAX835 chip, 5V Relay, BC857 PNP transistor to drive the Relay, power LED, Relay/Output LED, and tactile switch.

MAX835 chip features a level-sensitive latch, eliminating the need to add hysteresis to prevent oscillations in load-disconnect applications. MAX835 micropower voltage monitors have a 1.204V precision bandgap reference, comparator, and latched output in a 5-pin SOT23 package. Using the latched output prevents deep discharge of batteries and disconnects the load from the power supply when Undervoltage is detected at input sense voltage. MAX835 has a push-pull output driver. Two external resistors set the trip-threshold voltage.

Operation

Connect an adjustable power supply to CN3 and apply input sense voltage in the range 3.4V to 8V, turn the PR1 trimmer potentiometer till the LED D3 is ON. Then the board is set for Undervoltage detection. For example, apply 4.90V to the CN3, rotate the PR1 so LED D3/Relay is on, the circuit is set for under-voltage detection threshold of 4.90V, now increase the input sense voltage to 5V and reset the latch using Sw1.

Note 1: Relay contacts can handle load current up to 7A, use higher contact relay for high current load. Relays up to 16A are available with the same PCB footprint (same dimensions)

Note 2: The project can also be used to prevent deep discharge of batteries, it disconnects the load when battery voltage drops below the set point, read the datasheet of MAX835 to configure the input voltage range of battery using PR1 trimmer potentiometer and resistor R5.

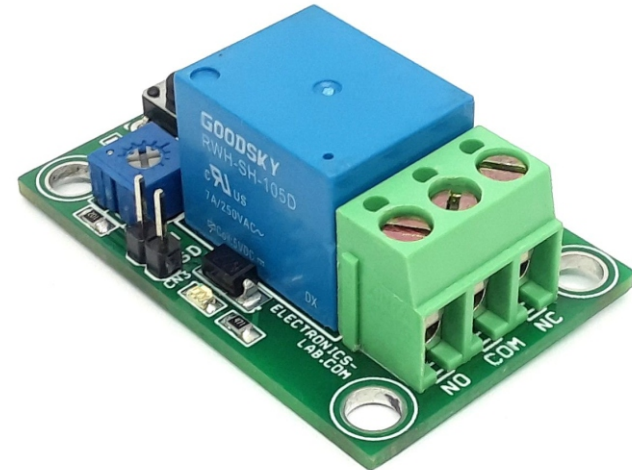
Note 3: Input sense voltage range is 3.4V to 8V and can be adjusted using trimmer potentiometer PR1. The circuit can be configured to detect higher voltage. To achieve that choose the right value for PR1 and R5. Read the datasheet of MAX835 for more info.

Connections

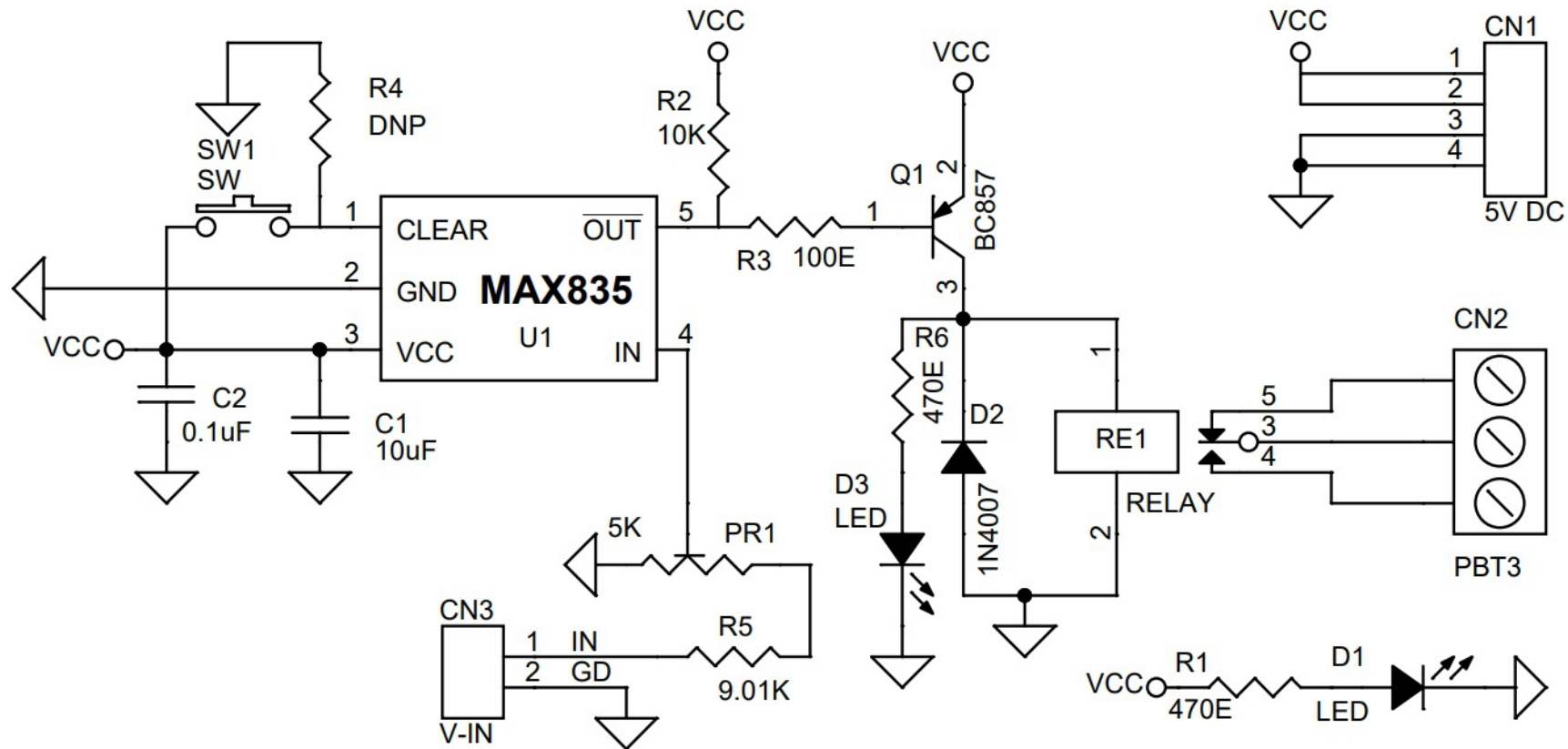
- CN1 = Pin1 VCC, Pin 2 VCC, Pin 3 GND, Pin 4 GND
- CN2= Pin 1 Sense Voltage Input, Pin 2 GND
- SW1 = Reset Switch
- D1 = Power LED
- D3 = Function LED – Relay Output
- PR1 = Trimmer Potentiometer Input Sense Voltage Adjust
- CN2 = Load Connection, Pin 1 Normally Closed, Pin 2 Common, Pin 3 Normally Open

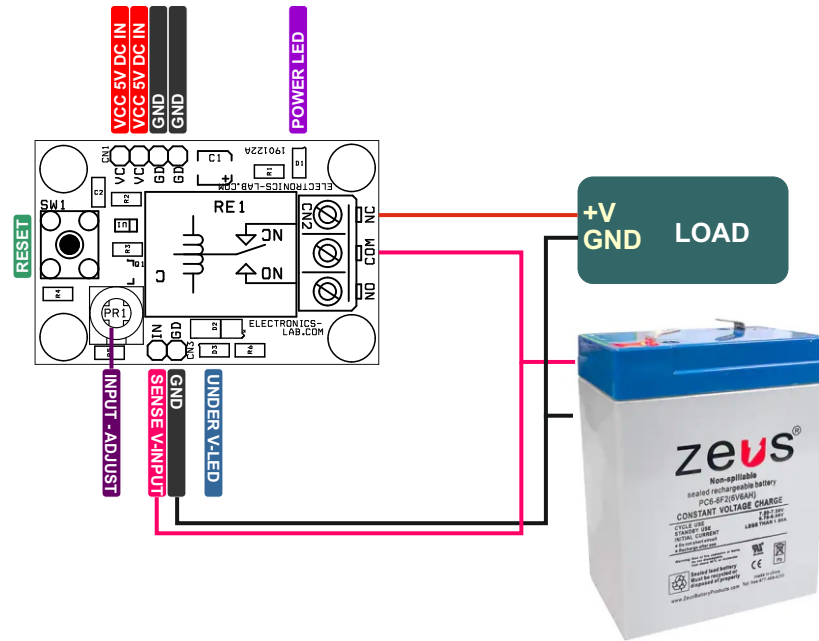
Features

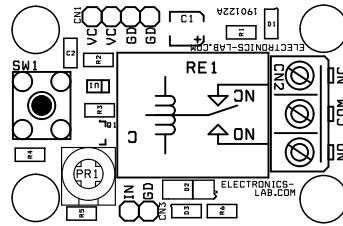
- Supply 5V DC @ 50mA when Relay is on
- Load Up to 7Amps, can be increase Read Note 1
- Input Voltage Range 3.4V to 8V



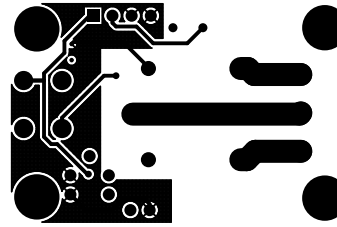
- On Board Tact Switch for Latch Reset Sw1
- Latched Output (Once Low, Stays Low Until Cleared)
- Precision +/-1.25% Voltage Threshold
- LED D3, Alert Monitor – LED is ON when output is Latched (OFF)
- LED D1, Power LED
- 4 X 3MM Mounting Holes
- PCB Dimensions 45.25MM X 29.53MM



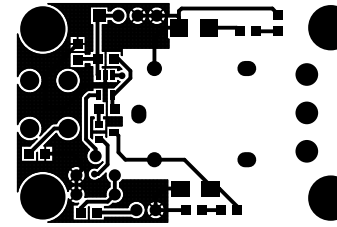




SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

PCB DIMENSIONS 45.25MM X 29.53MM

BOM						
NO.	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	4 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5317-ND
2	1	CN2	3 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1248-ND
3	1	CN3	2 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5315-ND
4	1	C1	10uF/16V SMD SIZE 1210 OR 1206	YAGEO/MURATA	DIGIKEY	
5	1	C2	0.1uF/50V SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
6	1	D1	LED SMD RED	LITE ON INC	DIGIKEY	160-1427-1-ND
7	1	D2	1N4007 SMD	DIODE	DIGIKEY	S1MBDITR-ND
8	1	PR1	5K TRIMMER POTENTIOMETER	BOURNS	DIGIKEY	3362H-502LF-ND
9	1	Q1	BC857 SMD SOT23-3	ONSEMI	DIGIKEY	BC857CDW1T1GOSCT-ND
10	1	RE1	RELAY 5V DC	CIT RELAY	DIGIKEY	2449-J107F1CS125VDC.36-ND
11	2	R1,R6	470E 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
12	1	R2	10K 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
13	1	R3	100E 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
14	1	R4	DNP			
15	1	R5	9.01K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
16	1	SW1	4 PIN TACTILE SWITCH	NKK SWITCH	DIGIKEY	HP0215AFKP2-ND
17	1	U1	MAX835 SOT223 5 PIN	MAXIM	DIGIKEY	MAX835EUK+TCT-ND
18	1	D3	LED SMD GREEN SMD SIZE 0805	DIALIGHT	DIGIKEY	350-2044-1-ND