

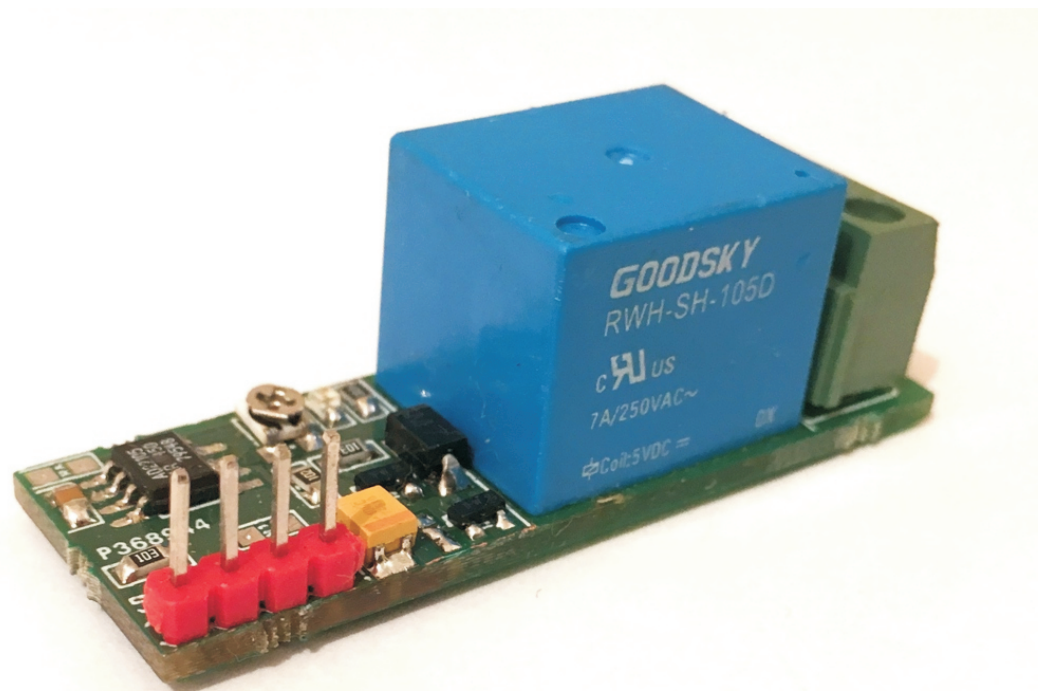
Programable Thermoelectric Switch

This project simply switches the system off or on whenever temperature rise at desired set point. Desired set point can be set using fixed resistor R6 or PR1 trimmer potentiometer. Use any of at a time R6 or PR1.

Determine the set point resistor R6 by the following equation.

$$R_{SET} (R6) = 39M \text{ Ohms Centigrade} / T_{SET} + 281.6 - 93.3K \text{ Ohms}$$

Relay provided to switch on or off the load, relay can switch 7Amps/250V AC load. D2 LED indicates the relay operations. This project is built using AD22105 IC from Analog devices. The AD22105 is a single-supply semiconductor thermostat switch that uses circuit architecture to realize the combined functions of a temperature sensor, set point comparator, and output stage all in one IC. By using one external resistor or trimmer pot, the AD22105 can be programmed to switch at any temperature selected by the system designer in the -40°C to +150°C range. The internal comparator is designed to switch accurately as the ambient temperature rises past the set point temperature. When the ambient temperature falls, the comparator relaxes its output at a somewhat lower temperature than that at which the comparator originally switched. The difference between the switch and unswitched temperatures, known as the hysteresis, is nominally 4°C.





To combine and calculate the initial tolerance and thermal drift effects of the set point resistor R6 use the following equation:

$$R_{MAX} = R_{NOM} \times (1 + \epsilon) \times (1 + TC \times (T_{SET} - 25^{\circ}C))$$

Where: RMAX is the worst case value that the set point resistor can be at TSET. RNOM is the standard resistor with a value closest to the desired RSET. ϵ is the 25°C tolerance of the chosen resistor (usually 1%, 5%, or 10%). TC is the temperature coefficient of the available resistor. TSET is the desired set point temperature.

After calculation, compare RMAX to the desired RSET from Equation 1. The required value of RSET at a TSET of 125°C is 5.566 kΩ. If the nearest standard resistor value is 5.600 kΩ, its worst case maximum value at +125°C is 5.713 kΩ, which is +2.6% higher than RSET, leading to a total additional error of - 0.52°C beyond that given in Table 1.

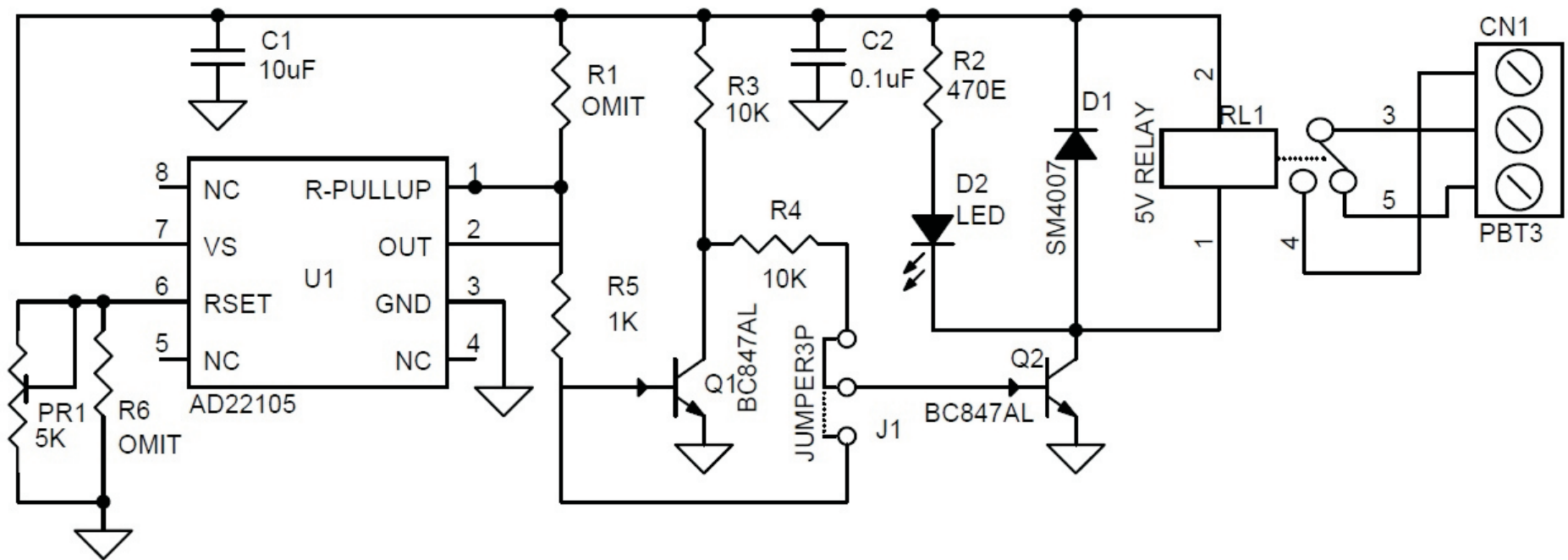
Features

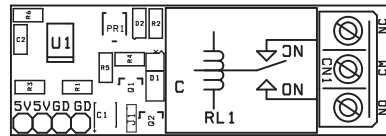
Supply 5V DC

Current Consumption 60mA (When Relay is on)

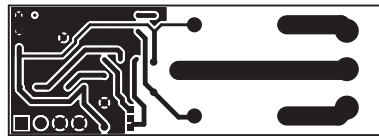
Adjustable Temperature PR1



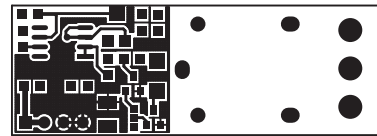




SILK SCREEN TOP



BOTTOM LAYER

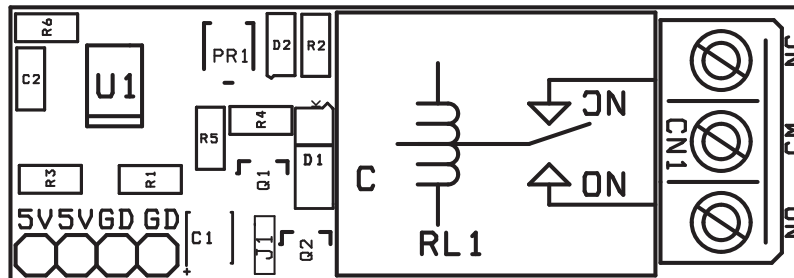


TOP LAYER

PCB DIMENSIONS 50.03 X 17.13MM

TEMPERATURE
SENSOR

LED



5V SUPPLY JUMPER

BOM

SR.	QNTY.	REF.	DESC.
1	1	CN1	3 PIN SCREW TERMINAL
2	1	C1	10uF/16V SMD 1210
3	1	C2	0.1uF/50V SMD 0805
4	1	D1	SM4007 SMD
5	1	D2	LED SMD 0805
6	1	J1	PCB JUMPER
7	1	PR1	5K SMD 3MM
8	2	Q1,Q2	BC847AL
9	1	RL1	5V RELAY
10	2	R1,R6	OMIT
11	1	R2	470E SMD 0805
12	2	R3,R4	10K SMD 0805
13	1	R5	1K SMD 0805
14	1	U1	AD22105 SMD SO8