

LM393P – 8 Pin DIP

Pinout and Breadboard Orientation (Top View)

Top View (Notch at Top)

LM393P on Breadboard (Top View)

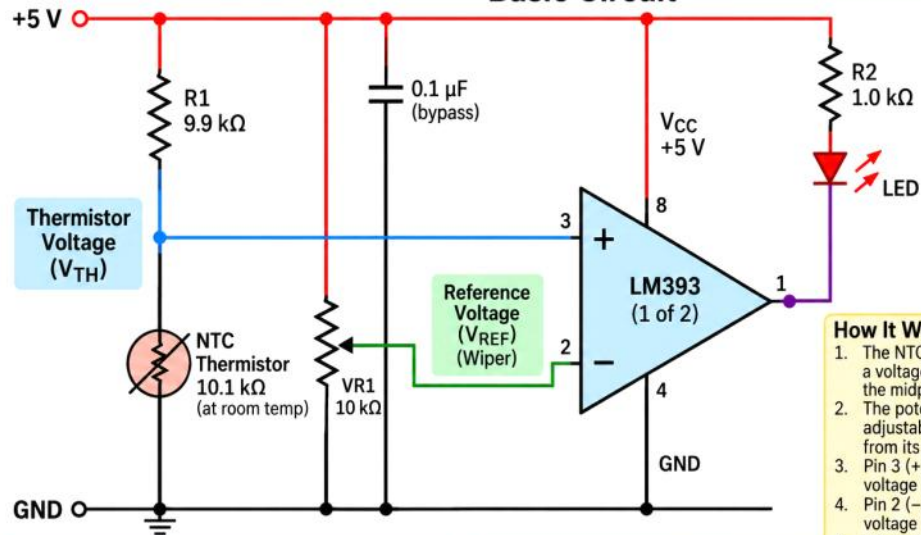
Pin	Name	Description
1	OUT1	Output 1 (open collector, pulls low to ground)
2	IN1 -	Inverting input 1 (-)
3	IN1 +	Non-inverting input 1 (+)
4	GND	Ground (0 V)
5	IN2 +	Non-inverting input 2 (+)
6	IN2 -	Inverting input 2 (-)
7	OUT2	Output 2 (open collector, pulls low to ground)
8	V _{cc}	Positive supply voltage (+5.05 V)

Important Notes

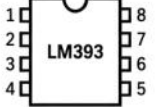
- The notch is at the top, between pins 1 and 8.
- Pin numbers go counterclockwise when viewed from the top.
- Pin 8 is the positive supply ($V_{CC} = +5.05\text{ V}$).
- Pin 4 is ground (GND).
- Outputs (pins 1 and 7) are open-collector, so they can pull low to ground but do not drive high.
- Place the IC across the center gap of the breadboard with the notch at the top.

LM393 Thermistor Comparator

Basic Circuit



LM393 Pinout (Top View)



- 1 – Output 1
- 2 – Inverting Input (-)
- 3 – Non-inverting Input (+)
- 4 – GND
- 5 – Output 2
- 6 – Inverting Input 2 (-)
- 7 – Non-inverting Input 2 (+)
- 8 – VCC (+5 V)

How It Works:

1. The NTC thermistor and R1 form a voltage divider. The voltage at the midpoint is V_{TH} .
2. The potentiometer provides an adjustable reference voltage (V_{REF}) from its wiper.
3. Pin 3 (+) gets the thermistor voltage (V_{TH}).
4. Pin 2 (-) gets the reference voltage (V_{REF}).
5. When V_{TH} drops below V_{REF} (thermistor warms), the output transistor turns ON and pulls pin 1 LOW, turning the LED ON.
6. The LM393 has an open-collector output. It can sink current but does not drive a HIGH output.

Thermistor Divider Equation:

$$V_{TH} = V_{CC} \frac{R_{TH}}{R_1 + R_{TH}}$$

$V_{CC} = 5.05 \text{ V}$ (measured)
 $R_1 = 9.9 \text{ k}\Omega$
 $R_{TH} \approx 10.1 \text{ k}\Omega$ (at room temp)

Measured Values (Our Build):

$V_{CC} = 5.05 \text{ V}$
 Pin 2 (V_{REF}) $\approx 2.45 \text{ V}$ (set with potentiometer)
 Pin 3 (V_{TH}) $\approx 2.59 \text{ V}$ (room temp, LED OFF)
 Pin 3 (V_{TH}) $\approx 2.42 \text{ V}$ (warmed, LED ON)