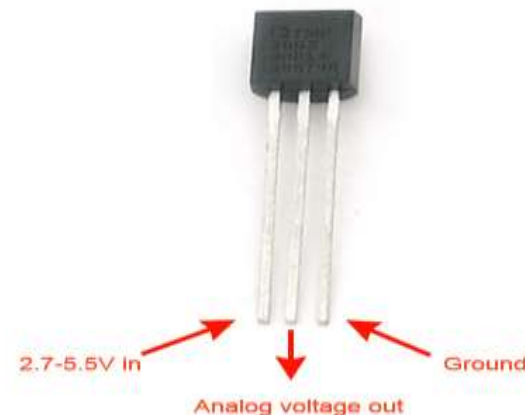


About project

- In this project, we are going to control the LEDs according to temperature around. If temperature goes beyond a particular level (50 Degree in this circuit) then Red LED will glow automatically, otherwise yellow LED remains on below that particular temperature. This threshold temperature value can be set by adjusting the Variable resistor in the circuit, according to requirement.
- In this project you will also learn about how to use LM35 sensor in any circuit. LM35 is very popular and inexpensive temperature sensor generally used as digital thermometer or to measure temperature.

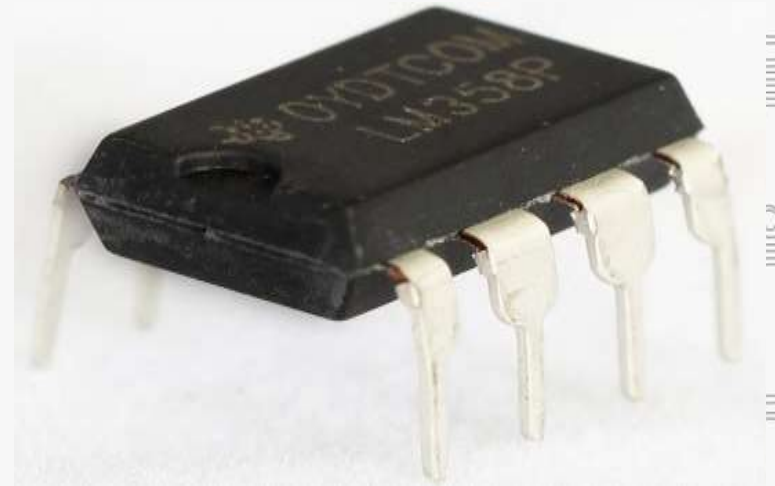
LM35 Temperature Sensor

LM35 is an integrated analog **temperature sensor** whose electrical output is proportional to Degree Centigrade. **LM35 Sensor** does not require any external calibration or trimming to provide typical accuracies. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

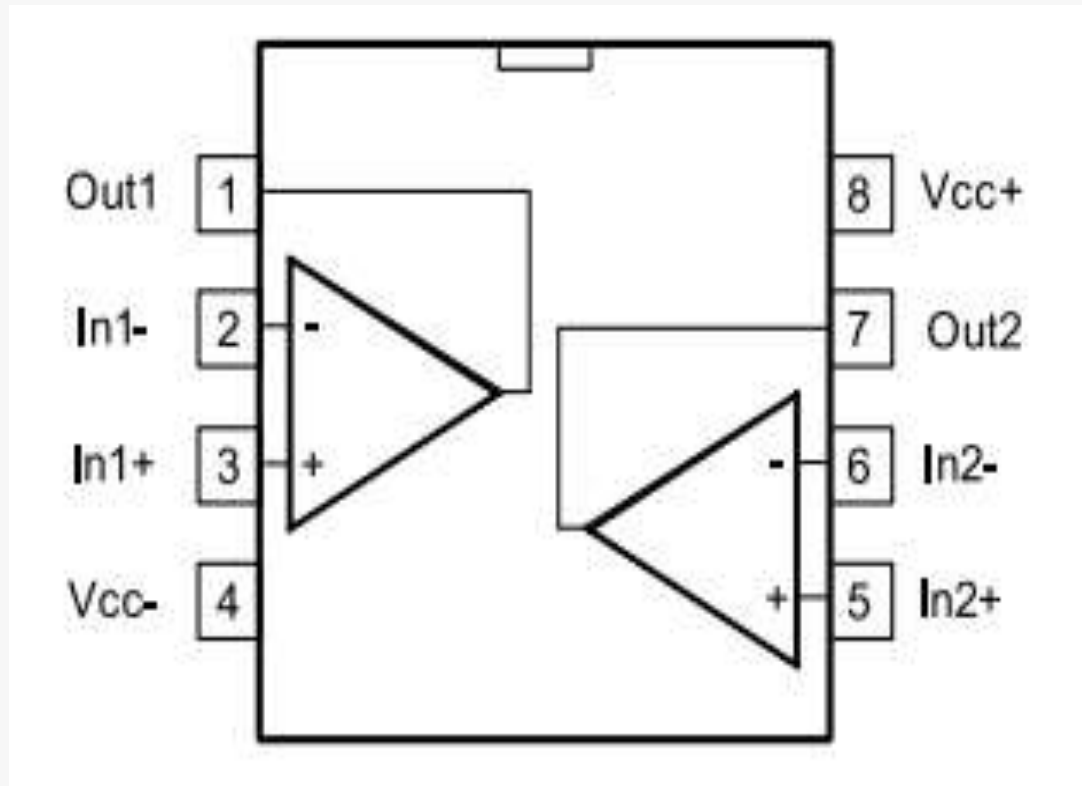


LM358 IC

The LM358 IC is a great, low power and easy to use dual channel op-amp IC. It is designed and introduced by national semiconductor. It consists of two internally frequency compensated, high gain, independent op-amps. This IC is designed for specially to operate from a single power supply over a wide range of voltages.

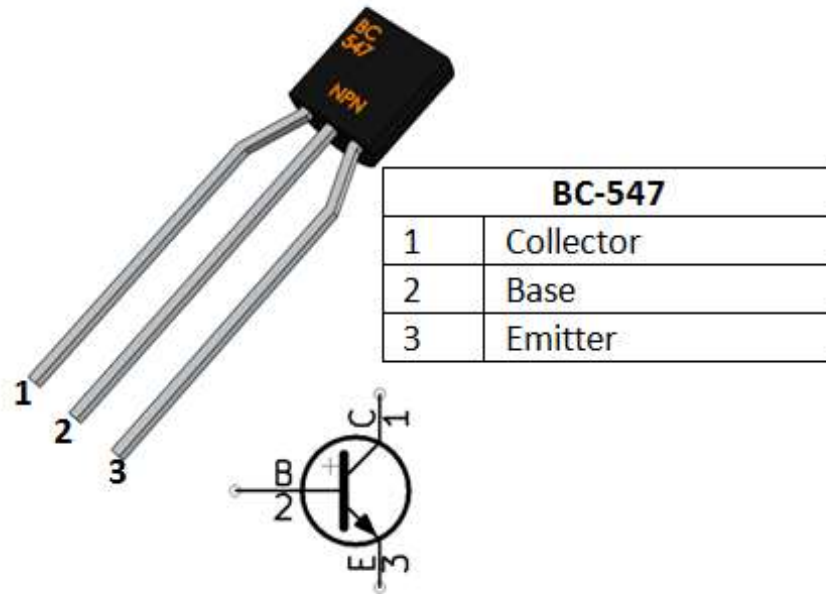


Pin configuration of LM358 IC



BC547

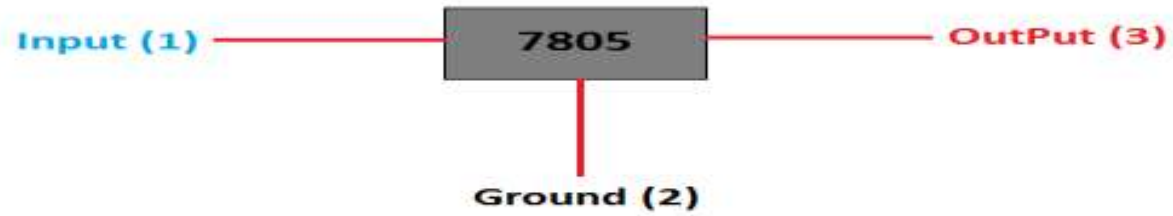
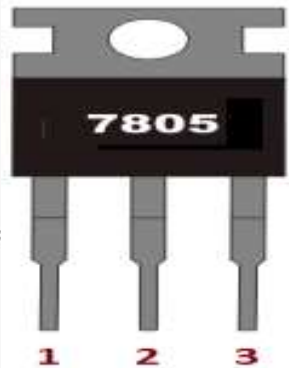
BC547 is a NPN transistor hence the collector and emitter will be left open (Reverse biased) when the base pin is held at ground and will be closed (Forward biased) when a signal is provided to base pin.



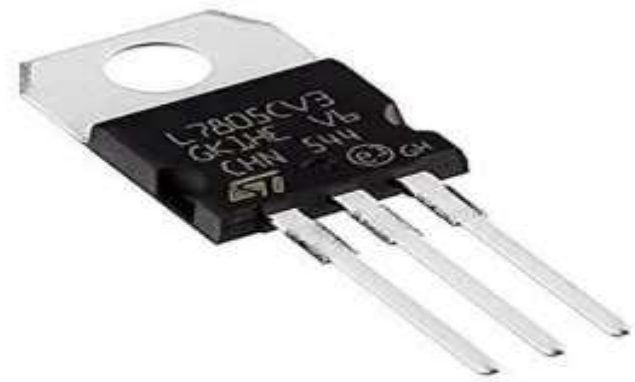
IC 7805

IC 7805 is a **5V Voltage Regulator** that restricts the output voltage to **5V output** for various ranges of input voltage. It acts as an excellent component against input voltage fluctuations for circuits, and adds an additional safety to your circuitry. It is inexpensive, easily available and very much commonly used. With few capacitors and this IC you can build pretty solid and reliable voltage regulator in no time.

IC 7805 Pinout



Pinout 7805



Typical 7805

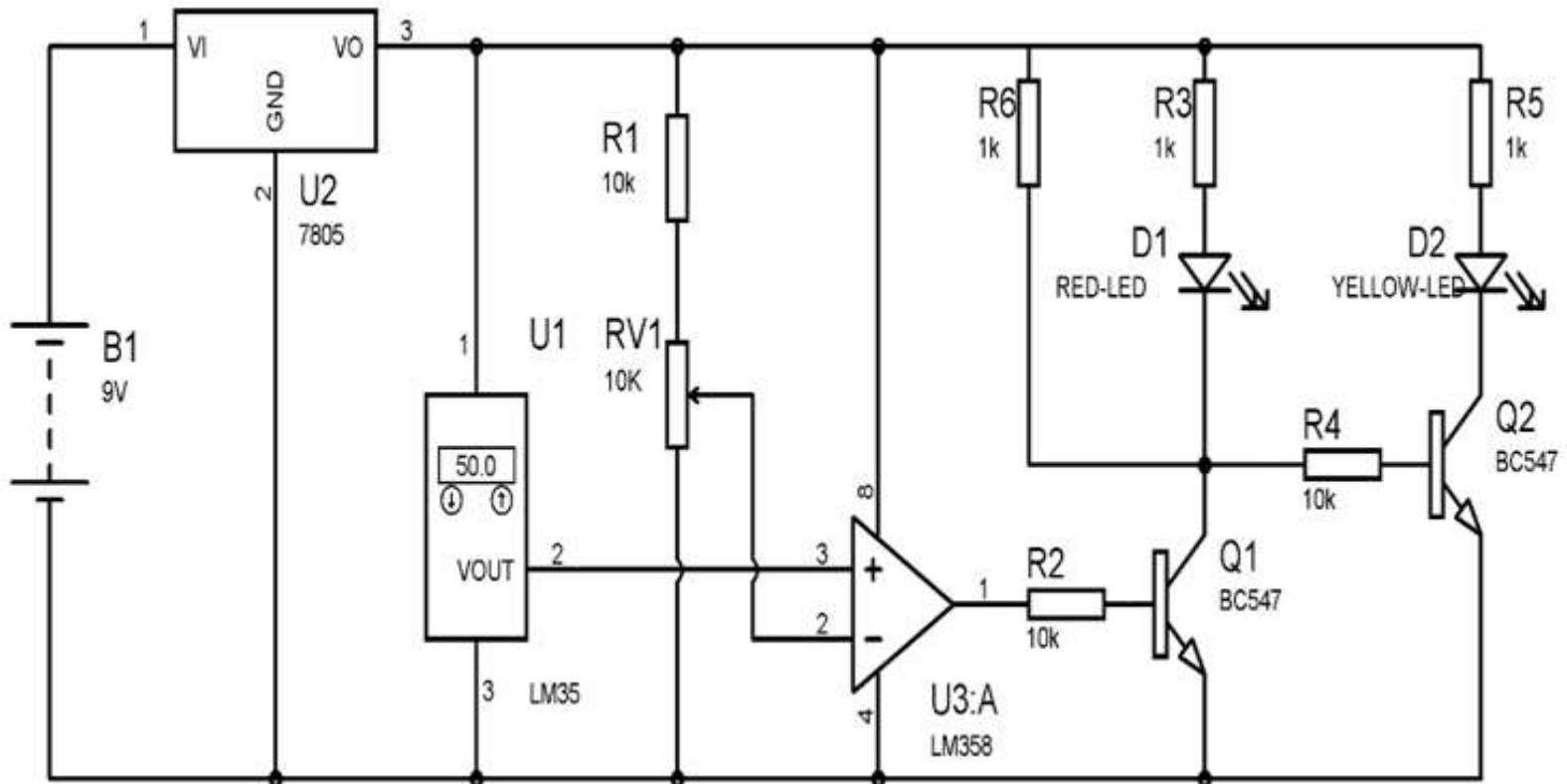
Working of project

- In this circuit 9v general purpose battery is used to power up the whole circuit and IC7805 is used to provide the regulated 5v supply to the circuit. When temperature is below 50 degree then output of LM358 remains LOW and Q1 remains in OFF state and transistor Q2 remains in ON state.
- Now when surrounding's temperature goes beyond 50 Degree Celsius, output voltage of LM35 at pin 2 also goes higher than 0.5 volt or 500mV.
- Output of LM35 is connected to Pin 3 of Op-amp LM358 and as we have set the reference voltage (voltage at Pin 2 of LM358) to 0.5 volt, so now voltage at Pin 3 (non-inverting input) becomes higher than voltage at Pin 2 (inverting input) and output of op-amp LM358 (PIN 1) becomes HIGH.
- Output of LM358 connected to the base of NPN transistor Q1, so Q1 also becomes ON and Red LED starts glowing. At the same time, base of Transistor Q2 gets ground and Q2 becomes OFF and yellow LED also becomes OFF.

Components Required

- One LM358 IC
- One 7805 IC
- One LM35 Temperature Sensor
- Two BC547 Transistors
- One 10k Variable Resistor
- Three 10k and Three 1k Resistors
- One Red Led and One Yellow Led
- One Breadboard
- One +9 Volt Battery
- One Battery Cap
- Connecting Wires

Connection Diagram



Project Link : <https://youtu.be/3srRvZSICHk>