EET-210L - Comparator Experiment using the LM34 & LM339.

Diagrams taken from: http://www.ermicro.com/blog/?p=1578

1.) The LM339 is a Quad Comparator, having 4 different comparators on a single 14 pin chip.

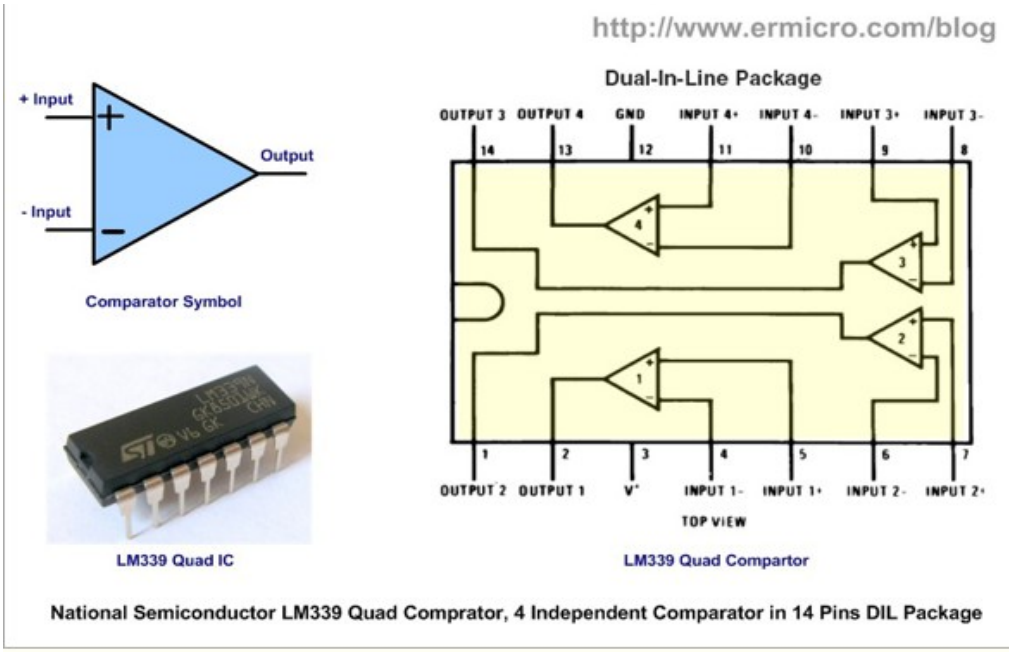


Fig. 1. LM339

2.) Single comparator output circuit. **(NOTE: Error in Schematic - Pin 12 is GROUND, Pin 3 is POWER)**

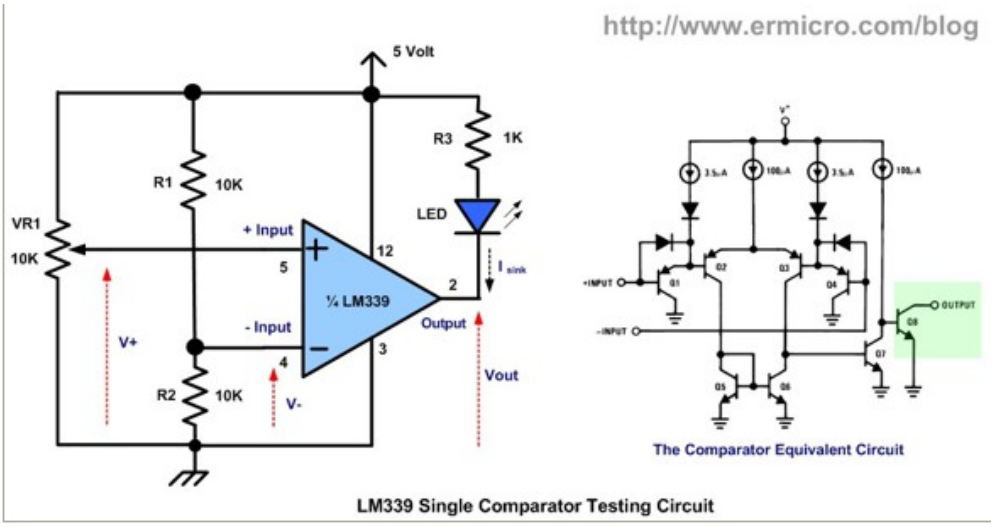


Fig. 2 Single Comparator circuit.

Replace VR1 with your LM34 output (see LM34 spec sheet) and replace R1 and R2 with a 10k pot so that you can create a reference voltage which corresponds to about 5 degrees above room temperature on the (-) input of the comparator. In general, the output of the comparator circuit above will be as shown in the diagram on the next page. You should be able to get the comparator to detect the rise in temperature of the LM34 as you grasp it.

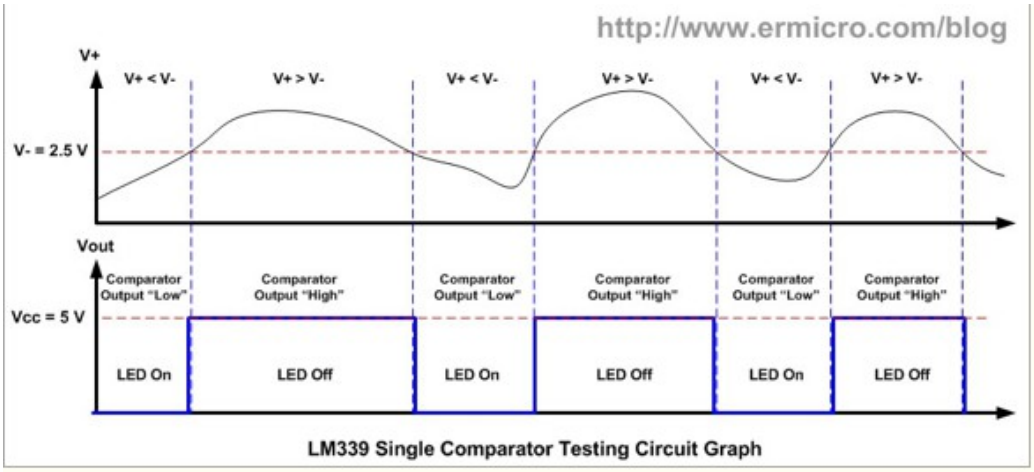
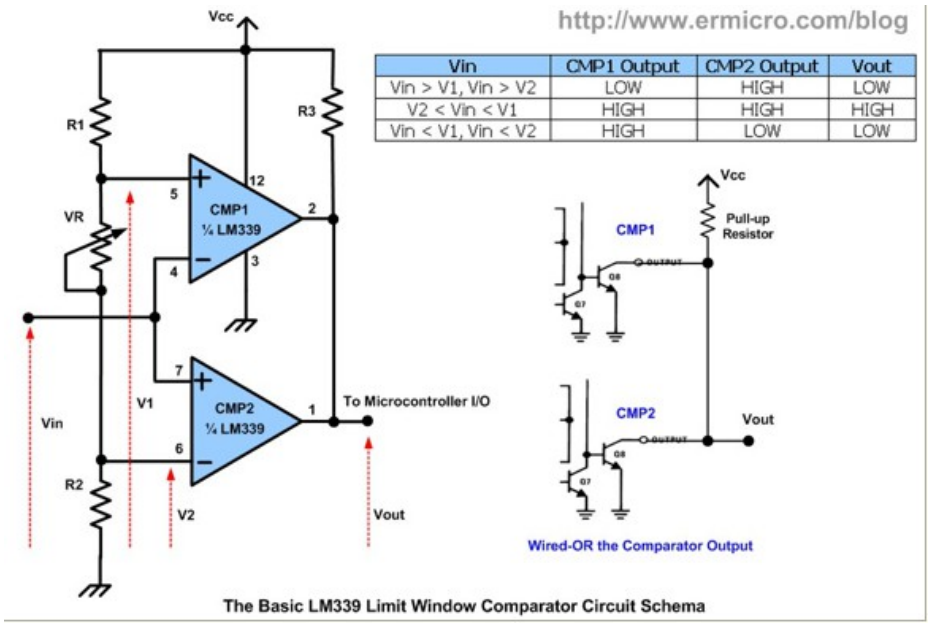


Fig. 3. Single Comparator Output

3.) Construct the Window Detector Circuit below. **(NOTE: Error in Schematic - Pin 12 is GROUND, Pin 3 is POWER)**



Vin	CMP1 Output	CMP2 Output	Vout
Vin > V1, Vin > V2	LOW	HIGH	LOW
V2 < Vin < V1	HIGH	HIGH	HIGH
Vin < V1, Vin < V2	HIGH	LOW	LOW

Fig. 4. Window Comparator Circuit

For this circuit, you will use the output of your LM34 for the input (Vin) and figure out how to add a Green LED to the Output (Vout) to function as defined in the "NOTE" below.. Instead of using R1, R2 and VR as shown, use two separate pots (5K or 10k) to to independently set the upper threshold, V_1, (V+ for CMP1) to a voltage equivalent to about 5 degrees above room temperature and the lower threshold V_2, (V- for CMP2) to a voltage equivalent to about 5 degrees below room temperature. **Note:** *When the temperature is between the two threshold voltages, the Green LED should light, indicating the temperature is within the acceptable range. If the temperature goes too high, or too low, the Green LED should go out, indicating the temperature is no longer within range. Demonstrate your circuit to your instructor:*

Instructor initial _____

4.) Modify your circuit from step #3 so that a RED LED will be lit when the temperature is out of range and a GREEN LED will be lit when within the temperature window. Draw your schematic below. Show it to your instructor before constructing it. When you have arrived at a satisfactory solution, demonstrate the operation to your instructor.

Instructor initial _____

5.) Once you are sure your circuit works properly and have received your instructor's initials, remove the LM34 from the circuit in step #4 and replace it with a 10 Hz triangle ramp signal. This signal must have the following characteristics:

a.) a center voltage equivalent to the output voltage of the LM 34 at ambient temperature: V_{ctr} = _____

b.) a peak positive voltage equal to the (ambient temperature + 15 degrees) voltage: V_{+peak} = _____

c.) a peak negative voltage equal to the (ambient temperature - 15 degrees) voltage: V_{-peak}=_____

NOTE: (Use the D.C. Offset along with the amplitude control to develop this triangle signal.)

Take a screen shot showing both the input signal and the output signal of the comparator signals. If you still have the LED's connected, you should see them flash as the ramp signal voltage passes in and out of the window detection voltage. Your screen shot should be labelled with your name and show the measurements of the following:

a.) Frequency of the Input
b.) +Peak of the Input signal
c.) - Peak of the Input signal
d.) Peak-to-Peak voltage of the Output Signal.

Post this screen shot on the Forums as part of your progress report under the week this lab was assigned.

6.) Put away all of your components and equipment in the proper place.

7.) Post your Progress Report in the proper area on the cset Forums.