

# Diode Thermometer

## Intended Use

The purpose of the **Diode Thermometer** is to be a low cost method to measure how well a new drywall material will perform with heat. The current-voltage characteristics of a diode changes with temperature, therefore by fixing the current across the diode at  $100\mu\text{A}$ , the voltage can be measured to calculate the temperature. In comparison to a reference temperature value measured by the LM35, the **Diode Thermometer** has an error range of  $\pm 2$  degrees Celsius.

## Operating Conditions

Operating voltage range of the device: 1.8V to 6V

Operating temperature:  $-55^\circ\text{C}$  to  $+125^\circ\text{C}$

Storage temperature:  $-65^\circ\text{C}$  to  $+150^\circ\text{C}$

Maximum DC Current per I/O pin: 40.0mA

## Setup Instructions

To operate the device, connect VCC (Pin 7) to a voltage source that is within the operating voltage range (1.8V to 6V), GND (Pin 8, 22) to ground, and a 12V supply to the current source. Refer to Figure 1 for the device's schematic.

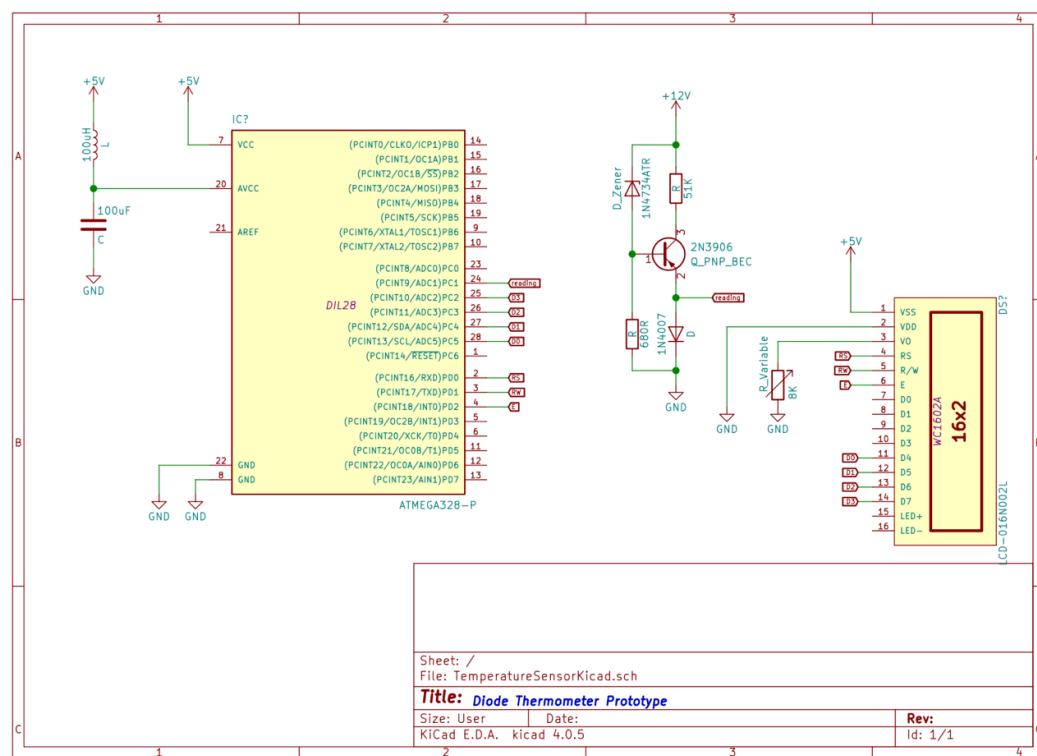


Figure 1: Diode Thermometer Schematic

## Testing

The **Diode Thermometer** was tested to display the temperature of a  $100\Omega$  resistor on an LCD as a result of applied voltage through the measurement of the voltage drop across the diode. To simulate the use and accuracy of the diode thermometer, the actual temperature of the resistor is displayed on the LCD through the measurement of the LM35. In the figures shown below, it can be seen that at any point the temperature value measured by the diode has an error range of  $\pm 2$  degrees Celsius in comparison to the LM35. The maximum input voltage to the heater is 21V to keep within the 5W specification of the resistor.

