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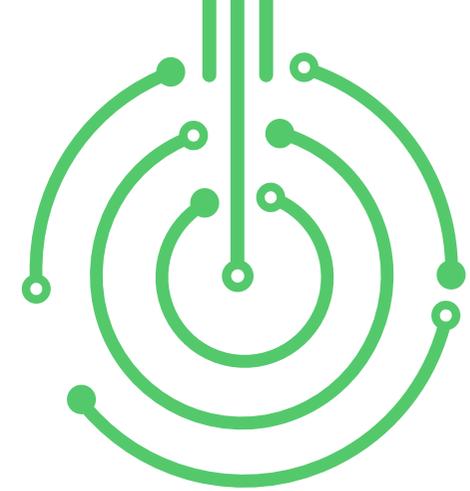
Thermistor Signal Amplifier for Thermoelectric Cooler using INA330

SKU: EL130470

Thermistor Signal Amplifier for Thermoelectric Cooler using INA330

The INA330 breakout board is a great tool for TEC plate temperature measurements. The INA330 based precision amplifier is designed for thermoelectric cooler (TEC) control in optical networking applications. It is optimized for use in 10k thermistor-based temperature controllers. The INA330 provides thermistor excitation and generates an output voltage proportional to the difference in resistances applied to the inputs. The board uses only one precision resistor R3 plus the thermistor RT1, thus providing an alternative to the traditional bridge circuit. The circuit maintains excellent accuracy for temperature control applications. An excitation voltage is applied to the thermistor (RTHERM) RT1 and precision resistor (RSET) R3, generating current I1 and I2. The current conveyor circuit produces an output current, I0, equal to I1 – I2, which flows through the external gain-setting resistor. A buffered voltage output proportional to I0 is also provided.

Features

- Supply 5V DC
- Reference Input 0 to 5V
- Output 0.9V/C Centigrade
- On Board Power LED
- On Board Precision Reference Generator Chip LM385
- PCB Dimensions 23.34 x 17.62 mm

Connections

- **CN1:** Pin 1 = VCC 5V DC, Pin 2 = V Output, Pin 3 = GND
- **CN2:** Pin 1 = Reference Control Loop 0 to 5V, Pin 2 = GND, Pin 3 VCC 5V DC, Pin 4 = GND, Pin 5 = Enable-High/Disable-Low, Pin 6 = VCC 5V DC
- **D1:** Power LED

The loop controls temperature to an adjustable set-point of 22.5°C to 27.5°C. The nominal 10kΩ at 25°C thermistor ranges from approximately 11.4kΩ to 8.7kΩ over this range. A 1V excitation voltage is applied to V1 and V2, producing a nominal 100µA current in the 10kΩ RSET resistor. The thermistor current is approximately 100µA at 25°C, but will vary above or below this value over the ±2.5°C set-point temperature range. The difference between these two currents flows in the gain-set resistor, RG. This produces a voltage output of approximately 0.9V/°C. The set-point temperature is adjusted with VADJ. Thus, the voltage at VO is the sum of (IO)(RG) + VADJ. VADJ can be manually adjusted or set with a Digital-to-Analog (D/A) converter. Optionally, the set-point temperature can be adjusted by choosing a different fixed-value resistor more closely approximates the value of RTHERM at the desired temperature.

> **Note:** INA330 can also use a 3.3V supply, however, components must be chosen appropriate to the smaller output voltage range.

Temperature Control Loop
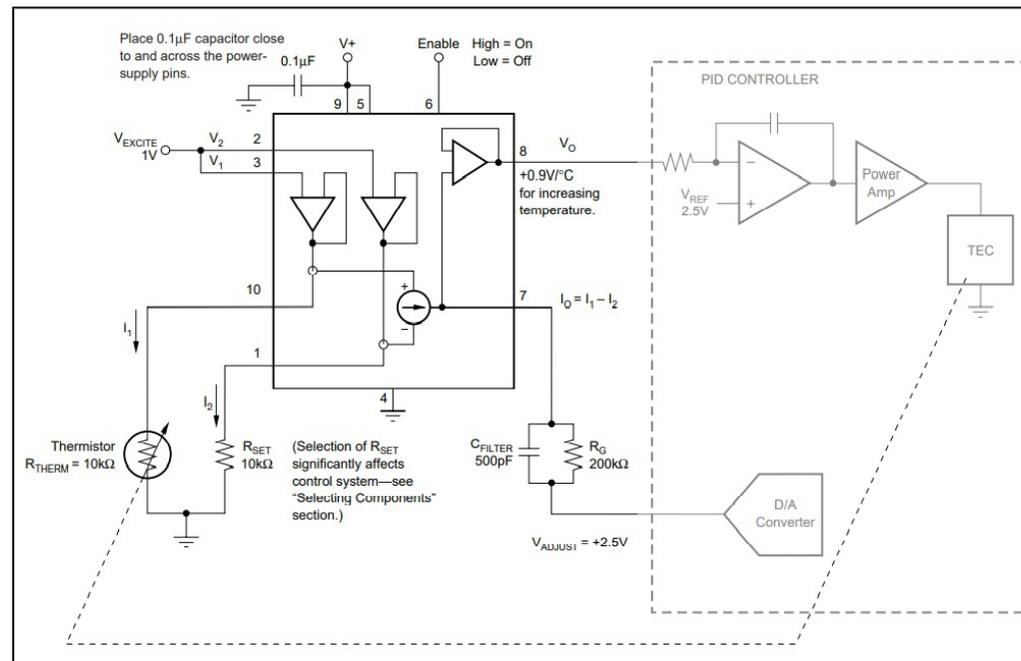

The INA330 In Simplified Temperature Control Loop.

Schematic
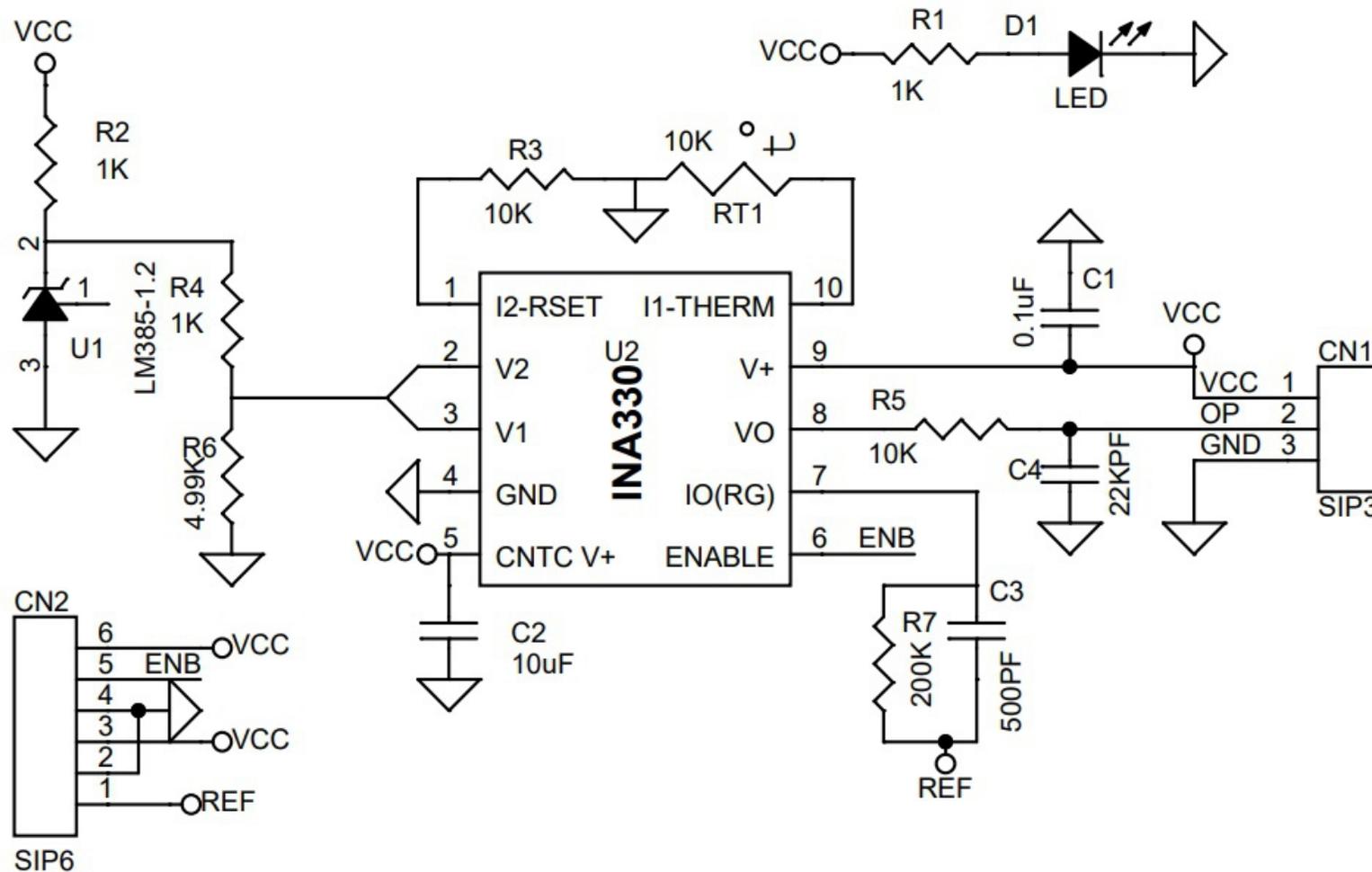
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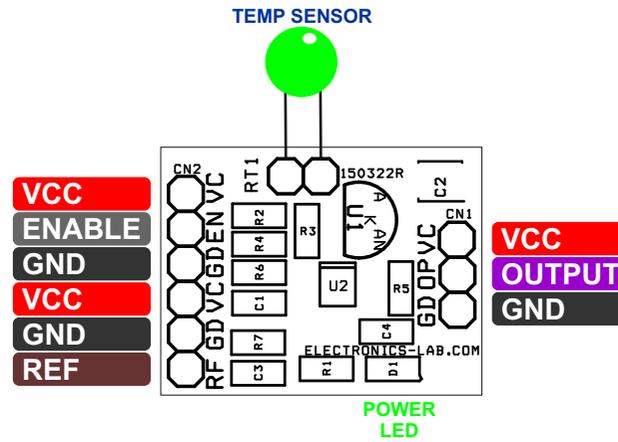
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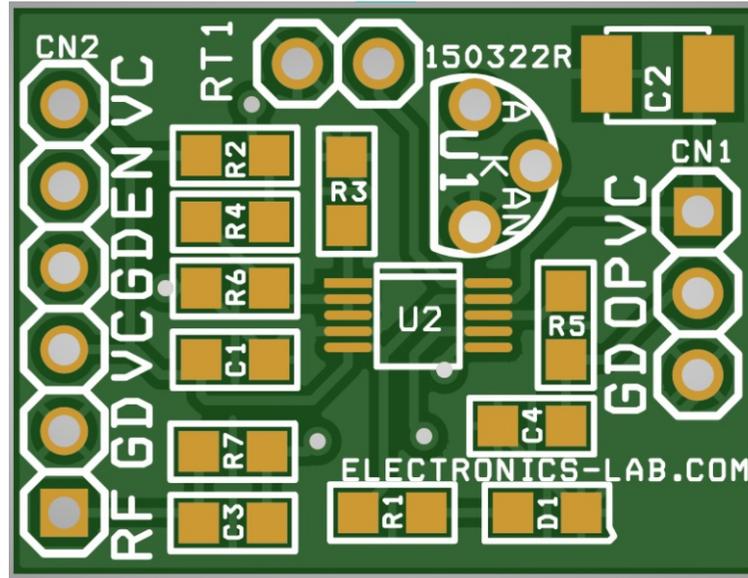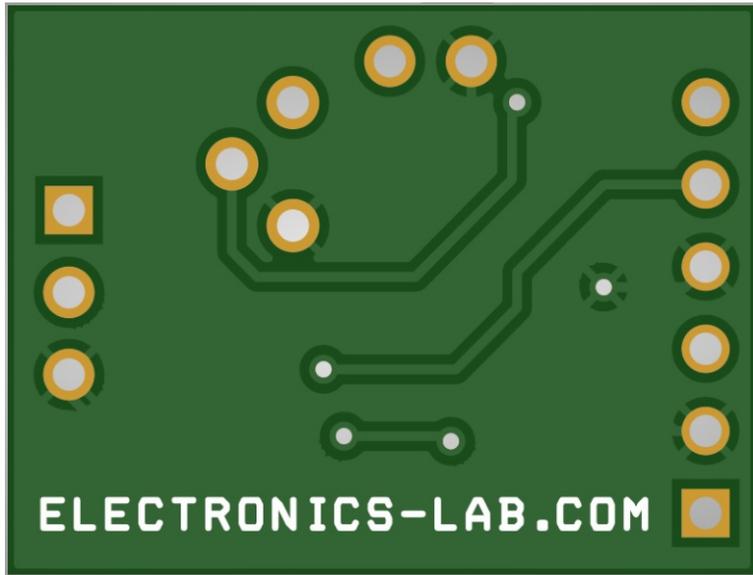


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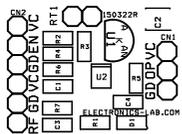
SILK SCREEN TOP
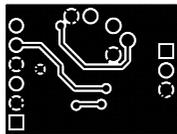
BOTTOM LAYER
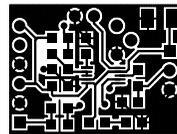
TOP LAYER

PCB DIMENSIONS 23.34MM X 17.62MM

Parts List

NO.	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
			BOM			
1	1	CN1	3 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5316-ND
2	1	CN2	6 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5319-ND
3	1	C1	0.1uF/50V CERAMIC SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
4	1	C2	10uF/16V CERAMIC SMD SIZE 1206 OR 1210	YAGEO/MURATA	DIGIKEY	
5	1	C3	500PF/50V CERAMIC SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
6	1	C4	22KPF/50V CERAMIC SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
7	1	D1	LED RED SMD SIZE 0805	OSRAM	DIGIKEY	475-1278-1-ND
8	2	R3,R5	10K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
9	3	R1,R2,R4	1K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
10	1	R6	4.99K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
11	1	R7	200K 1% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
12	1	U1	LM386-1.2V	TI	DIGIKEY	LM385BXZ-1.2/NOPB-ND
13	1	U2	INA330	TI	DIGIKEY	296-13861-1-ND
14	1	RT1	10K 1% SMD SIZE 0805	AMPHENOL	DIGIKEY	235-1058-ND

Notes

APP
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Android App

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