

## Type K Thermocouple Sensor Amplifier Arduino Shield

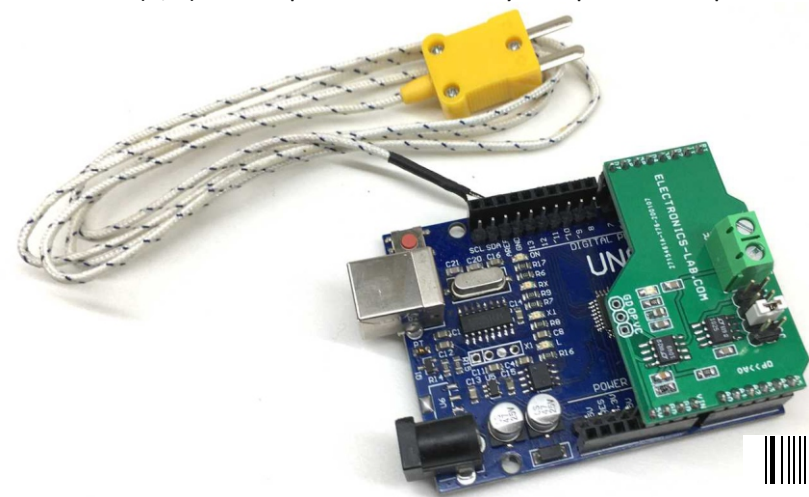
Type K Thermocouple Sensor Amplifier Arduino Shield allows an Arduino board to acquire temperatures from a thermocouple of type K. This shield works with single supply and takes 5V DC from Arduino supply, output of the circuit is 0 to 4V dc for 0 degree centigrade to 400V centigrade. Output of the amplifier is connected to A0 analog pin of Arduino. A typical application of thermocouples is in boilers, soldering stations and heaters. Also, 3D printers rely on thermocouples to measure the extruder temperature.

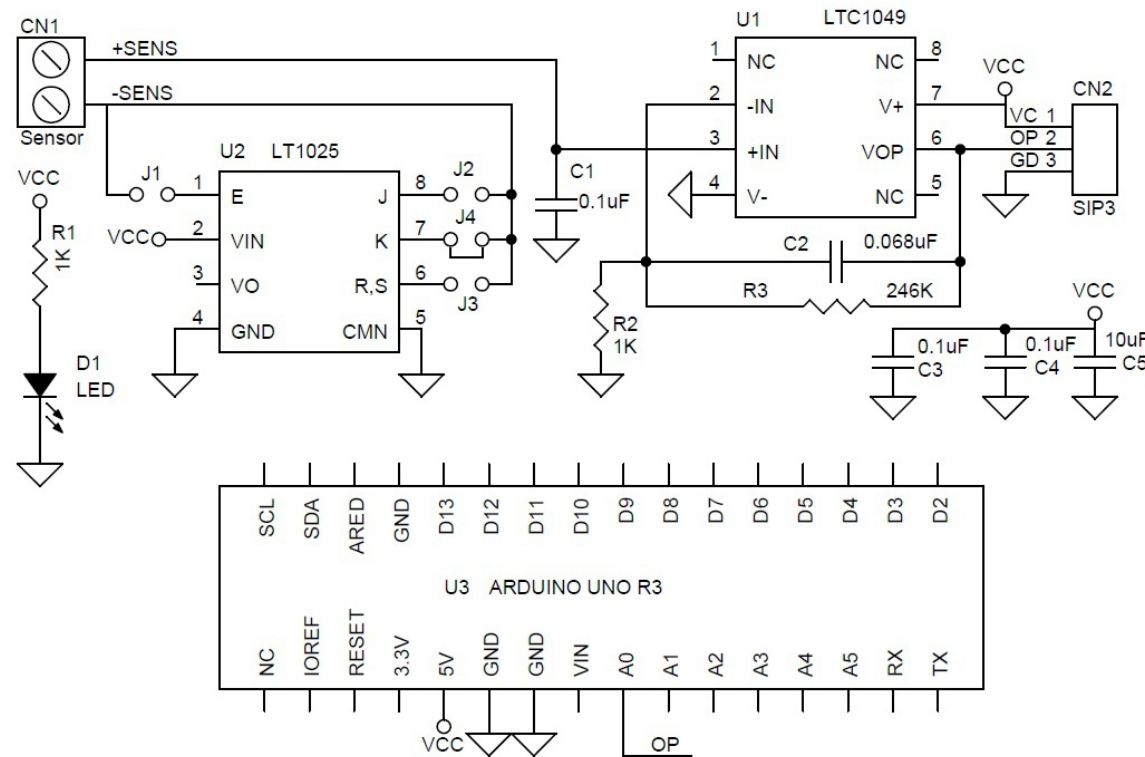
The K thermocouple has usually two wires, made of Alumel and Chromel that need to be connected with special care: no solder, just mechanical connection, therefore it is advisable to use special connectors available for thermocouples.

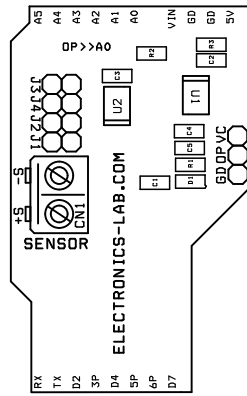
Circuit is built using LTC1049 op-amp and Thermocouple Cold Junction Compensator chip LTC1025. The board supports other sensors like Type E, J, R, S, and T, however I have tested this circuit with Type K Sensor, jumpers provided to use and select other type of sensors.

**The LTC1049** is a high performance, low power zero-drift operational amplifier. The two sample-and-hold capacitors usually required externally by other chopper stabilized amplifiers are integrated on the chip. Further, the LTC1049 offers superior DC and AC performance with a nominal supply current of only 200 $\mu$ A. The LTC1049 has a typical offset voltage of 2 $\mu$ V, drift of 0.02 $\mu$ V/ $^{\circ}$ C, 0.1Hz to 10Hz input noise voltage of 3 $\mu$ V<sub>P-P</sub> and typical voltage gain of 160dB. The slew rate is 0.8V/ $\mu$ s with a gain bandwidth product of 0.8MHz.

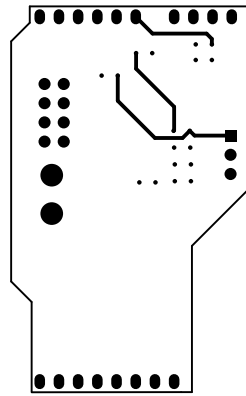
**The LT<sup>®</sup>1025** is a micropower thermocouple cold junction compensator for use with type E, J, K, R, S, and T thermocouples. It utilizes wafer level and post-package trimming to achieve 0.5 $^{\circ}$ C initial accuracy. Special curvature correction circuitry is used to match the “bow” found in all thermocouples so that accurate cold junction compensation is maintained over a wider temperature range. The LT1025 will operate with a supply voltage from 4V to 36V. Typical supply current is 80mA, resulting in less than 0.1 $^{\circ}$ C internal temperature rise for supply voltages under 10V. A 10mV/ $^{\circ}$ C output is available at low impedance, in addition to the direct thermocouple voltages of 60.9mV/ $^{\circ}$ C (E), 51.7mV/ $^{\circ}$ C (J), 40.3mV/ $^{\circ}$ C (K, T) and 5.95mV/ $^{\circ}$ C (R, S). All outputs are essentially independent of power supply voltage



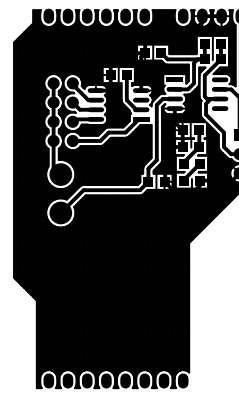




SILK SCREEN TOP

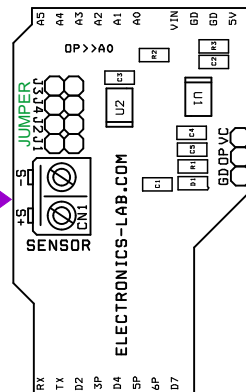


BOTTOM LAYER



TOP LAYER

PCB DIMENSION 31.75MM X 51.12MM



SR.	QNTY.	REF.	DESC.
1	1	CN1	2 PIN SCREW TERMINAL
2	1	CN2	DNP
3	3	C1,C3,C4	0.1uF/50V SMD 0805
4	1	C2	0.068uF/16V SMD 0805
5	1	C5	10uF/15V SMD 1210
6	1	D1	LED RED SMD 0805
7	4	J1,J2,J3,J4	JUMPER/CLOSURE
8	2	R1,R2	1K SMD 0805
9	1	R3	246K SMD 0805
10	1	U1	LTC1049 SMD SO8
11	1	U2	LT1025 SMD SO8
12	1	U3	ARDUINO UNO R3 SHIELD