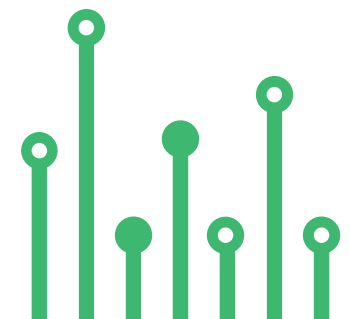


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SENSOR



4 Channel Current Sense Amplifier, Low- and High-Side Voltage Output



SKU: EL139132

4 Channel Current Sense Amplifier, Low- and High-Side Voltage Output



This 4-Channel current sense amplifier is designed for cost-optimized applications. This is a current-sense amplifier (also called a current-shunt monitor) that senses the voltage drop across current-sense resistors at common-mode voltages from -0.2 V to $+26\text{ V}$, independent of the supply voltage. The project was built using INA4180 chip which integrates a matched resistor gain network in four, fixed-gain 20V/V , this matched gain resistor network minimizes gain error and reduces the temperature drift. The board operates with a single 2.7-V to 5.5-V power supply. The four-channel INA4180 draws a maximum supply current of $900\text{ }\mu\text{A}$. Resistors R2, R6, R8, R12, R3, R7, R9, R13 and Capacitor C3, C4, C5, C6 used as input filters. The gain of the amplifier is 20V/V , and external input resistors resulting a 0.9% gain error.



Gain: The board is populated with an INA4180A1 chip that has a gain of 20V/V , the user may choose any of the above chips with a higher gain.

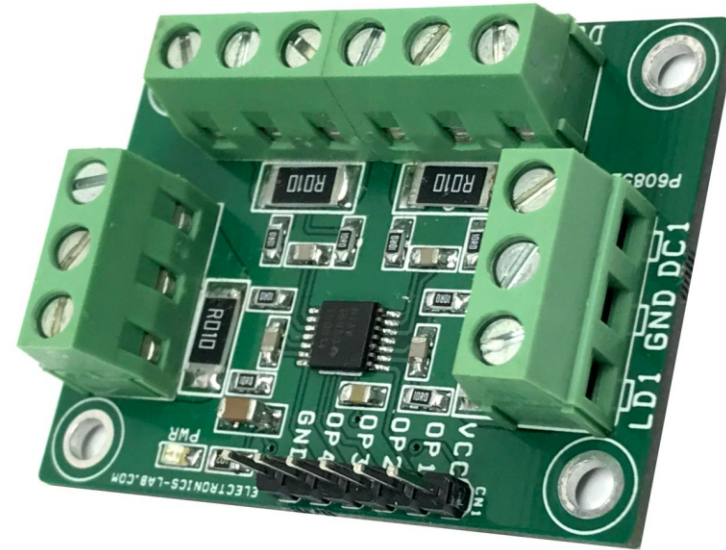


Note: Shunt Resistor 0.01Ω with 20V/V Gain Amplifier, Output = 0.2 V/A + Input Filter Circuit Error

- INA4180A1 Gain 20V/V
- INA4180A2 Gain 50V/V
- INA4180A3 Gain 100V/V
- INA4180A4 Gain 200V/V

FEATURES

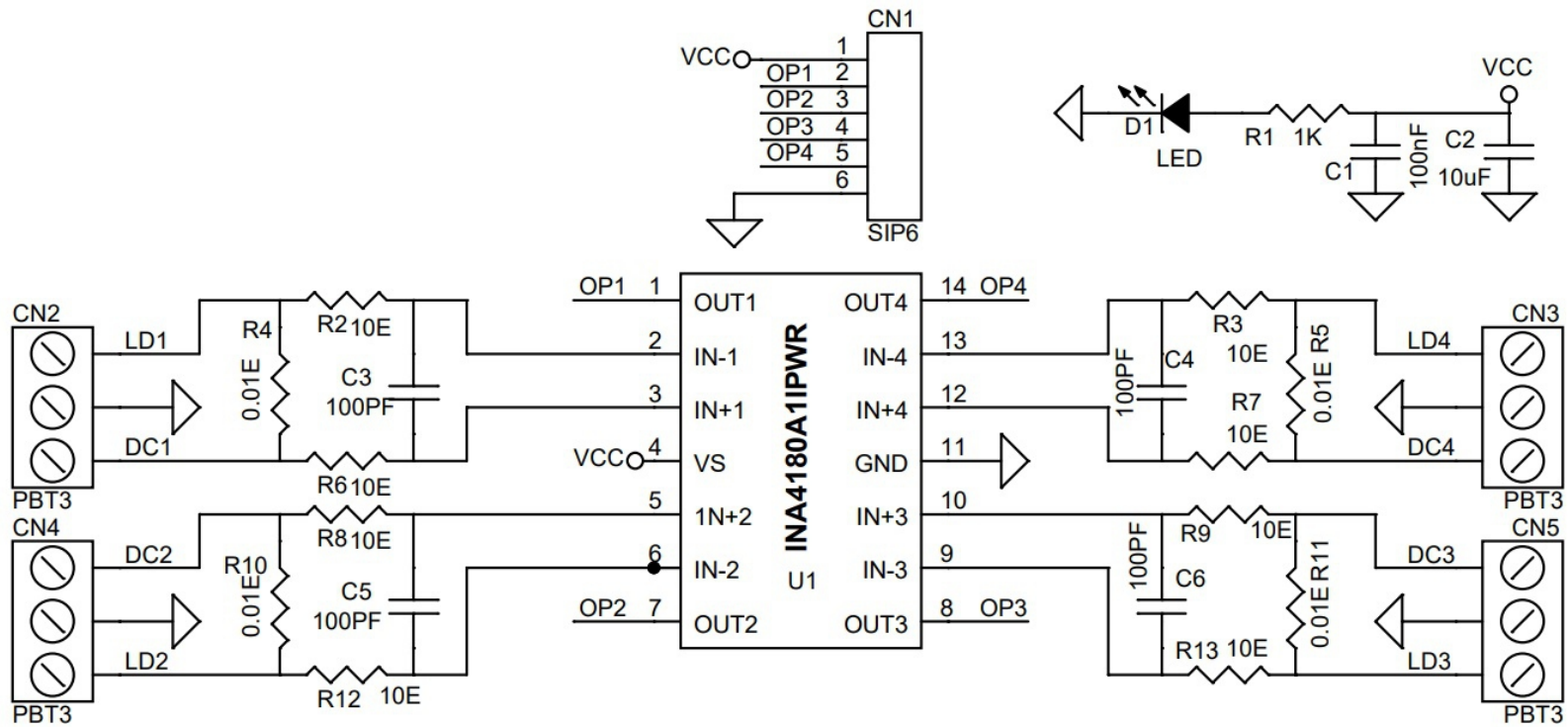
- Operating Power Supply 2.7V to 5V DC 10mA
- Output 0.2V/A (2V @ 10Amps)
- Common-mode voltage -0.2V To 26V
- Input offset (\pm) (max) (μ V)150
- Input offset drift (\pm) (typ) (μ V/ $^{\circ}$ C) 0.2
- Voltage gain (V/V) 20
- CMRR (min) (dB) 84
- Bandwidth (kHz) 350
- Gain error (%)0.8
- Gain error drift (\pm) (max) (ppm/ $^{\circ}$ C)20
- On Board Power LED
- Screw Terminal for Current Sense Load
- Header Connector for Logic supply and Outputs
- PCB Dimensions 47.78 X 36.20 MM
- 4 X 2.5MM Mounting Holes



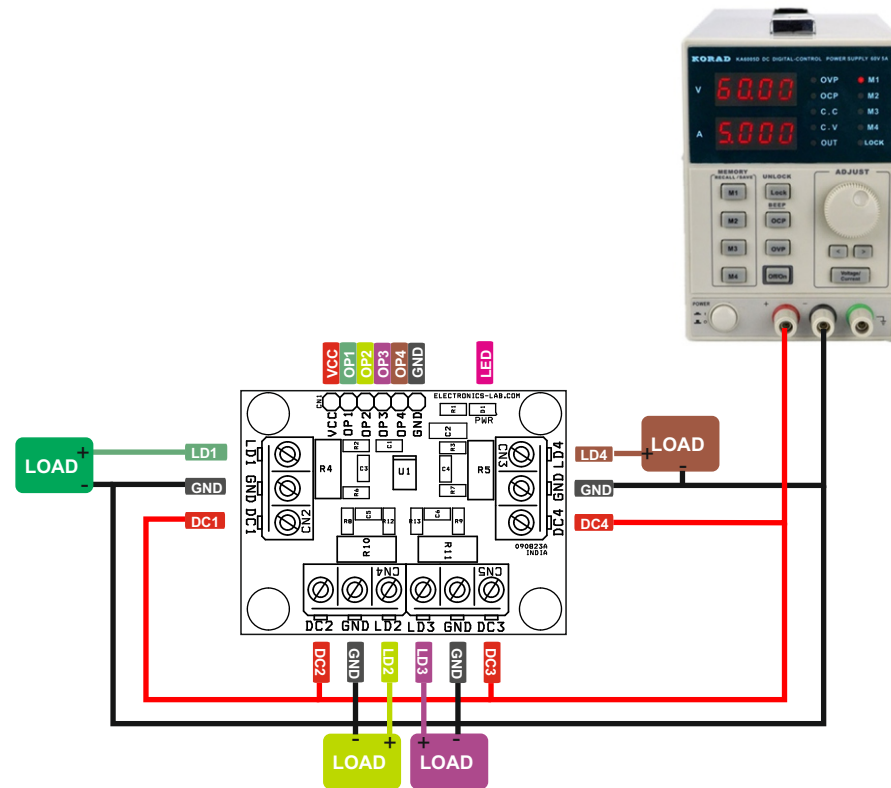
RSENSE and Device Gain Selection

The project is tested with 4 x 0.01 Ω /3W current resistors, considering approx. current sense range up to 10A. The users may choose the appropriate current sense resistor and Amplifier with different gains as per requirement. Refer to the datasheet of the chip for more info. The accuracy of the INA4180 is maximized by choosing the current-sense resistor to be as large as possible. A large sense resistor maximizes the differential input signal for a given amount of current flow and reduces the error contribution of the offset voltage. However, there are practical limits as to how large the current-sense resistor can be in a given application. The INA4180 has a typical input bias current of 80 μ A for each input when operated at a 12V common-mode voltage input. When large current-sense resistors are used, these bias currents cause increased offset error and reduced common-mode rejection. Therefore, using current-sense resistors larger than a few ohms is generally not recommended for applications that require current-monitoring accuracy. A second common restriction on the value of the current-sense resistor is the maximum allowable power dissipation that is budgeted for the resistor.

Schematic



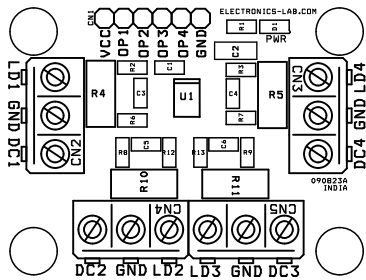
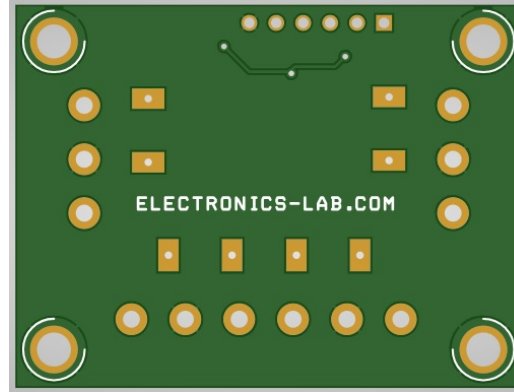
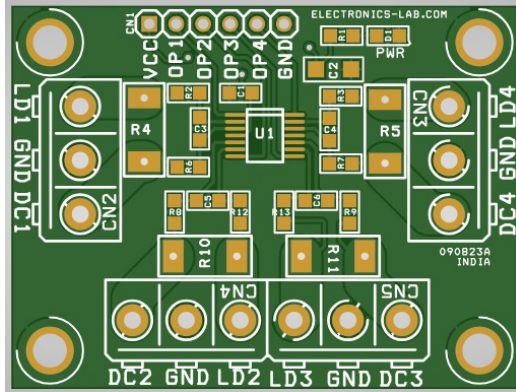
Connections



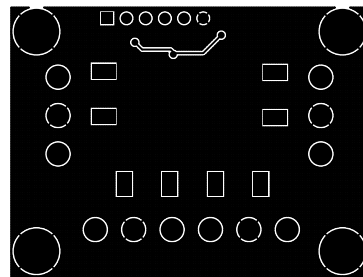
Connections and Other details

- CN1: Pin 1 = VCC 2.7V to 5.5V Dc Input, Pin 2 = Output 1, Pin 3 = Output 2, Pin 4 = Output 3, Pin 5 = Output 4, Pin 6 = GND
- CN2: Pin 1 = Load 1, Pin 2 = GND, Pin 3 = DC 1 Input
- CN3: Pin 1 = Load 4, Pin 2 = GND, Pin 3 = DC 4 Input
- CN4: Pin 1 = Load 2, Pin 2 = GND, Pin 3 = DC 2 Input
- CN5: Pin 1 = Load 3, Pin 2 = GND, Pin 3 = DC 3 Input
- D1: Power LED

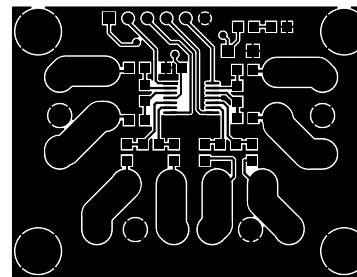
PCB



SILK SCREEN TOP



BOTTOM LAYER



TOP LAYER

PCB DIMENSIONS 47.78 X 36.20 MM

Parts List

BOM						
NO	QNTY.	REF.	DESC.	MANUFACTURER	SUPPLIER	SUPPLIER PART NO
1	1	CN1	6 PIN MALE HEADER PITCH 2.54MM	WURTH	DIGIKEY	732-5319-ND
2	4	CN2,CN3,CN4,CN5	3 PIN SCREW TERMINAL PITCH 5.08MM	PHOENIX	DIGIKEY	277-1248-ND
3	1	C1	100nF/50V CERAMIC SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
4	1	C2	10uF/25V CERAMIC SMD SIZE 1206	YAGEO/MURATA	DIGIKEY	
5	4	C3,C4,C5,C6	100PF/50V CERAMIC SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
6	1	D1	LED RED SMD SIZE 0805	OSRAM	DIGIKEY	475-1278-1-ND
7	1	R1	1K 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
8	8	R2,R3,R6,R7,R8,R9,R12,R13	10E 5% SMD SIZE 0805	YAGEO/MURATA	DIGIKEY	
9	4	R4,R5,R10,R11	0.01E/3W 1% SMD SIZE 2512	BORNS INC	DIGIKEY	CRA2512-FZ-R010ELFCT-ND
10	1	U1	INA4180A1PWR	TI	DIGIKEY	296-49094-1-ND



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