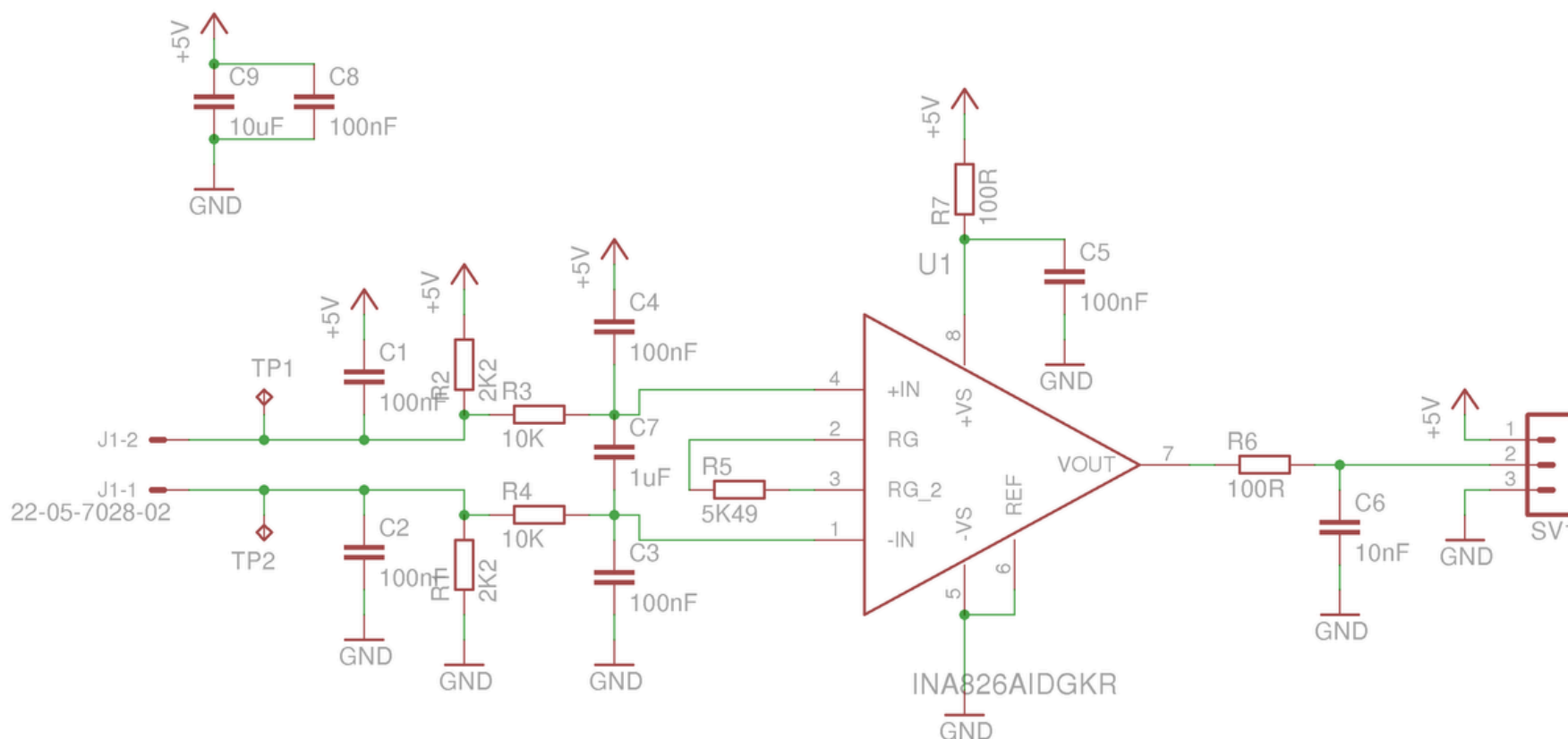


Working of INA826 instrumentation amplifier for Pt100 RTD

Asked 6 years, 1 month ago Modified 6 years, 1 month ago Viewed 3k times

The schematic below contains an INA826 used to amplify the resistance of the Pt100 RTD across J1. Gain is set to 10 through the 5.49K ohm resistor.

0



1. Is this circuit amplifying only the voltage across the RTD or are any other voltages involved?

2. Why not connect -IN to GND, and +IN to a junction of a 5V voltage divider consisting of known resistance and the RTD?
3. What is the advantage of the present schematic over the one mentioned above?

operational-amplifier

gain

instrumentation-amplifier

rtd

pt100

Share Cite Follow

edited Jul 22, 2019 at 20:53

asked Jul 22, 2019 at 19:42



quuwuza

317 2 6 12

-
- 1 Please ask a question that can be answered, this is a Q&A site. You'll get better answers this way. – Voltage Spike ♦ Jul 22, 2019 at 19:46
-
- 1 You seem to have far too low a gain. [maximintegrated.com/en/design/reference-design-center/...](https://www.maximintegrated.com/en/design/reference-design-center/) – Tony Stewart EE since 1975 Jul 22, 2019 at 20:56
-
- @SunnyskyguyEE75 This circuit is being used in a 3D printer. So the Pt100 temperatures 0 C and 850 C correspond to 100 ohm and 390 ohms respectively. This circuit gives a resolution of 0.6 ohms when read by the 12 bit ADC on LPC1768. – quuwuza Jul 22, 2019 at 21:06 ✎
-
- OK I wasn't expecting you need 0°C and so much dynamic temp range. I think you want 0.1°C resolution not 2 deg. – Tony Stewart EE since 1975 Jul 22, 2019 at 21:23 ✎
-

2 Answers

Sorted by: Highest score (default) ⚡



2



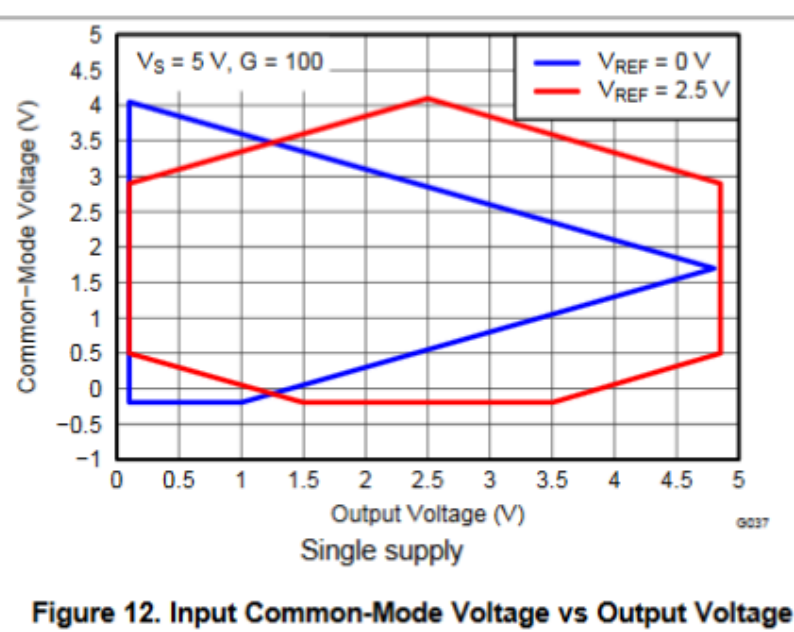
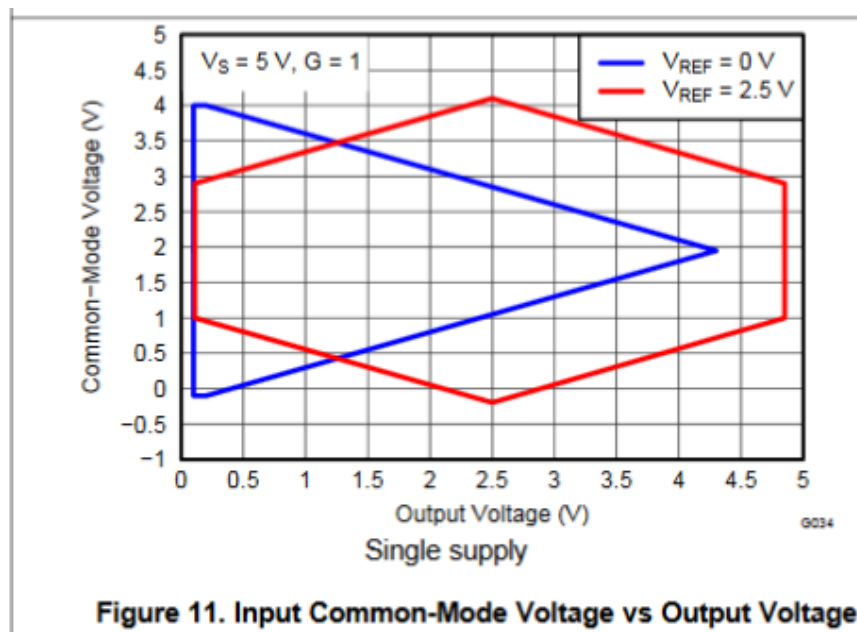
Is this circuit amplifying only the voltage across the RTD or are any other voltages involved?

It's amplifying the voltage across the RTD. The 10k resistors in conjunction with the 100nF caps have a filter time constant of 1ms.

Why not connect -IN to GND, and +IN to a junction of a 5V voltage divider consisting of known resistance and the RTD?

The common mode of the instrumentation amplifier would not support low voltages when at 5V as shown in the graphs below (at a gain of 10 the common mode would be between the blue squares as only gains of 1 and 100 are shown). If the output of the amplifier

were at 5V then the input needs to be centered around 2.5V or the instrumentation amplifier would not gain up the signal correctly.



What is the advantage of the present schematic over the one mentioned above?

The ability to amplify all of the RTD's resistance range.

Share Cite Follow

edited Jun 11, 2020 at 15:10

Community Bot
1

answered Jul 22, 2019 at 20:31



Voltage Spike ♦
92.8k 51 92 242

That explains my doubts. – [quwuwuza](#) Jul 22, 2019 at 20:37

So is the equivalent RTD configuration 2 wire or 4 wire in the present schematic? – [quwuwuza](#) Jul 22, 2019 at 20:38



R2, R11, and the RTD are connected in series to the +5v. This makes current flow through the thermometer, and the diff amp senses the voltage drop across it. R3 and R4 along with c4, c7, and c3 filter out any high frequency noise. C1 and C2 also filter high

1 frequencies out, but are not really needed or a good idea. R6 and c6 are another filter. R7 is to prevent any resonances on the power lines for the diff amp. C5 is a power bypass capacitor.



Share Cite Follow

answered Jul 22, 2019 at 20:27



[user69795](#)

1,835 10 8

Is there a purpose behind R2 and R11? Why not just pass +5V through the RTD without the resistors? – [quwuwuza](#) Jul 22, 2019 at 20:34

1 R2 and R11 set the nominal current through the RTD to 5/4.1 ma. Perhaps this is the desired current.? – [user69795](#) Jul 24, 2019 at 2:51

Start asking to get answers

Find the answer to your question by asking.

[Ask question](#)

Explore related questions

[operational-amplifier](#)

[gain](#)

[instrumentation-amplifier](#)

[rtd](#)

[pt100](#)

See similar questions with these tags.