Current Sense Amplifier BD14210G-LA

Error value when REF terminal voltage is applied by resistor voltage divider

This user's guide explains the voltage value discrepancy when the voltage applied to the REF pin on the current sense amplifier evaluation board BD14210G-EVK-001 is applied by an external resistor voltage divider.

About BD14210G-EVK-001

BD14210G-EVK-001 is an evaluation board for the current sense amplifier BD14210G-LA. (Figure 1)

For details, please refer to the user's guide at URL below.

https://fscdn.rohm.com/en/products/databook/applinote/ic/sensor/current/bd14210g-evk-001_ug-e.pdf

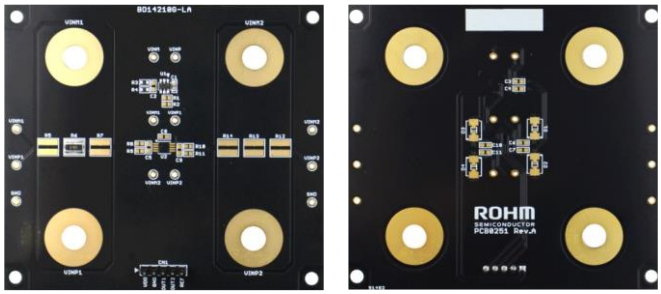

Figure 1. BD14210G-EVK-001

Error in REF pin voltage

BD14210G-EVK-001 is designed to apply voltage to the REF pin by resistive voltage divider of R1 and R2 as shown in Figure 2.

When applying voltage to the REF pin by resistive voltage divider, it is necessary to consider the voltage deviation due to the internal resistance of the IC.

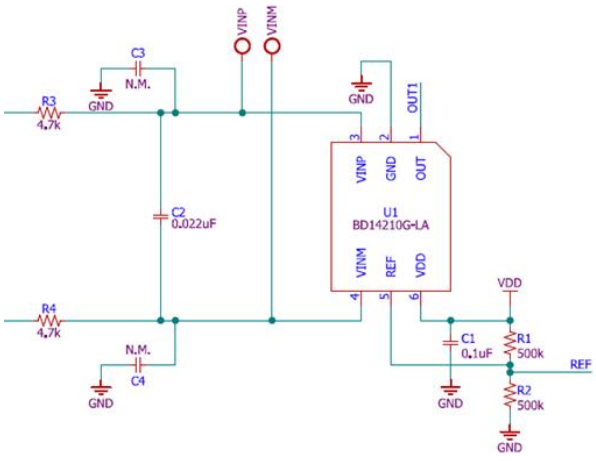

Figure 2. BD14210G-EVK-001 circuit diagram

The equivalent circuit of the REF pin is shown in Figure 3, and the voltage shift is caused by the 1100kΩ resistance inside the IC. The equations are shown in Equations 1 and 2 below.

Vpullup-R1*(I2+I3) = R2*I2 ···1

R2*I2 = R3*I3+1/3*VDD ···2

By calculating I2 from the above equation, it is possible to calculate the REF pin voltage value when applied by resistive voltage divider.

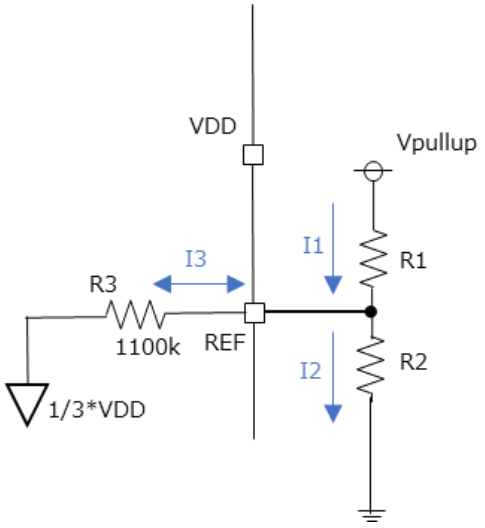

Figure 3. REF pin equivalent circuit diagram

Calculation results for varying R1/R2 resistance values under the following conditions are posted below. Please use them as a reference for your design.

VDD=Vpullup=5.0V

R1,R2 (kΩ)	REF Voltage(V)
1000	2.240
500	2.346
100	2.464
10	2.496
1	2.500

* The above results are calculated under Typical conditions and do not take into account variations.

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