

High-Side Positive Current Sensor Monitors Negative Supply

All dedicated current-sense amplifiers are designed for high-side sensing on a positive supply, but you can adapt them to monitor a negative supply (Figure 1). The positive supply pin (V+) connects to the system's positive supply, and the ground pin (GND) connects to the negative supply (V_{EE}). That arrangement monitors the negative supply while providing a positive output voltage for the external interface (typically an A/D converter). The RS+ pin of the current-sense amplifier (U1) connects to the load, and the RS- pin connects to the negative supply.

U1's current-source output drives a current that is proportional to load current flowing to ground (not to the GND pin). Output resistor R_O converts the current to a voltage, which is then digitized by an ADC (optional):

$$V_{OUT} = \frac{R_O R_S I_S}{100}$$

The maximum output voltage is limited by saturation in the internal transistors (which occurs at approximately V+ - 1.2V). Thus, V+ must exceed the full-scale output by at least 1.2V. If, for instance, the full-scale output is 1V, then V+ ≥ +2.2V. To meet the device's maximum and minimum operating voltages, 0 ≥ V_{EE} ≥ -(32 - V+) and (V+ - V_{EE}) ≥ +3V. Figure 2 shows the variation of current-measurement accuracy with load current.

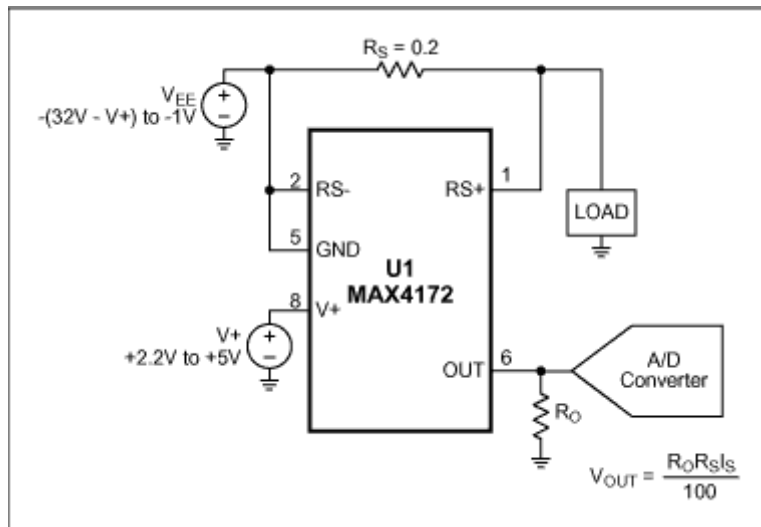


Figure 1. Connecting this positive-supply-current monitor (U1) as shown lets it monitor a negative current while generating a positive output voltage for the ADC.

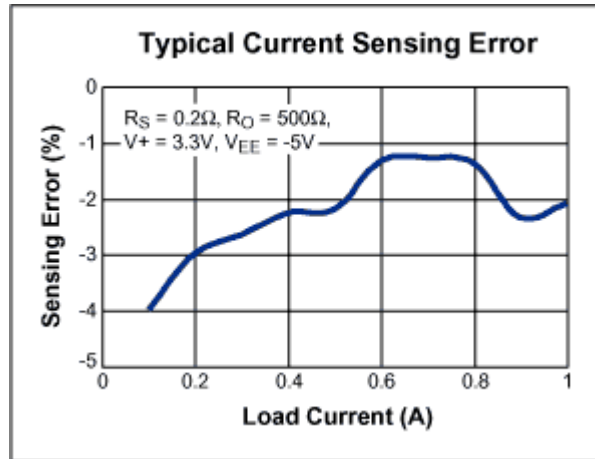


Figure 2. The Figure 1 current-sensing error varies with load current as shown.

MORE INFORMATION

MAX4172: [QuickView](#)

-- [Full \(PDF\) Data Sheet \(96k\)](#)

-- [Free Sample](#)