

Adafruit INA219 current sensor breakout

<https://learn.adafruit.com/adafruit-ina219-current-sensor-breakout/pinouts>

Overview

The INA219B breakout board and the INA219 FeatherWing will solve all your power-monitoring problems. Instead of struggling with two multimeters, you can use this breakout to measure both the high side voltage and DC current draw over I2C with 1% precision.

Why the High Side?

Most current-measuring devices such as our current panel meter are only good for *low side* measuring. That means that unless you want to get a battery involved, you have to stick the measurement resistor between the target ground and true ground.

Since the voltage drop across the resistor is proportional to the current draw, this means that the ground reference will change with varying current. Having a shifting ground reference can cause problems for many circuits.

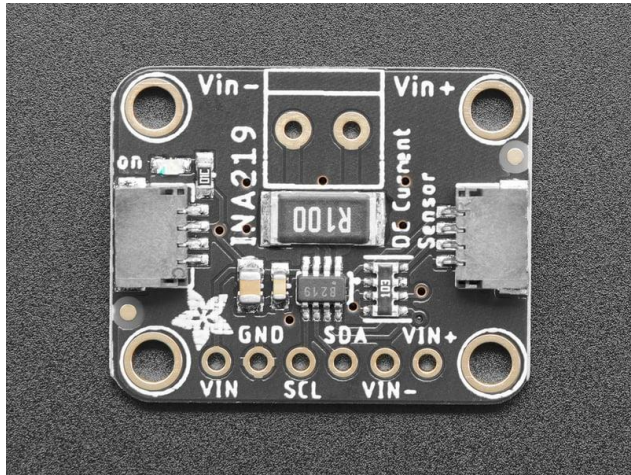
The INA219B chip is much smarter - it can handle high side current measuring, up to +26VDC, even though it is powered with 3 or 5V. It will also report back that high side voltage, which is great for tracking battery life or solar panels.

How does it work?

A precision amplifier measures the voltage across the 0.1 ohm, 1% sense resistor. Since the amplifier maximum input difference is $\pm 320\text{mV}$ this means it can measure up to ± 3.2 Amps. With the internal 12 bit ADC, the resolution at $\pm 3.2\text{A}$ range is 0.8mA. With the internal gain set at the minimum of div8, the max current is $\pm 400\text{mA}$ and the resolution is 0.1mA. Advanced hackers can remove the 0.1 ohm current sense resistor and replace it with their own to change the range (say a 0.01 ohm to measure up 32 Amps with a resolution of 8mA)

(The medium-gain mode we will use has a max current of 1 A and a resolution of—I think—0.4 mA).

Pinouts



Power Pins

The sensor on the breakout requires between a 2.7V and 5.5V.

- **VIN** - This is the power pin. To power the board, give it the same power as the logic level of your microcontroller - e.g. for a 5V micro like Arduino, use 5V, or for a Feather use 3.3V. (Arduino MKR is 3.3 V.)
- **GND** - This is common ground for power and logic.

I2C Pins

Default address is **0x40**.

- **SCL** - This is the I2C **clock pin**, connect to your microcontroller's I2C clock line. There's a **10K pullup** on this pin.
- **SDA** - This is the I2C **data pin**, connect to your microcontroller's I2C data line. There's a **10K pullup** on this pin.

Other Pins

- **Vin+** is the positive input pin. Connect to supply for high side current sensing or to load ground for low side sensing.
- **Vin-** is the negative input pin. Connect to load for high side current sensing or to board ground for low side sensing
- **A0 and A1 solder jumpers** - These can be bridged with solder to pull the address pin up to VIN to change the I2C address according to the list below.

I2C Addresses Based on Jumpers

- **Default** = 0x40
- **A0 soldered** = 0x41
- **A1 soldered** = 0x44
- **A0 and A1 soldered** = 0x45