

IamaPLC: INA226 - current/voltage/power monitor with I²C communication



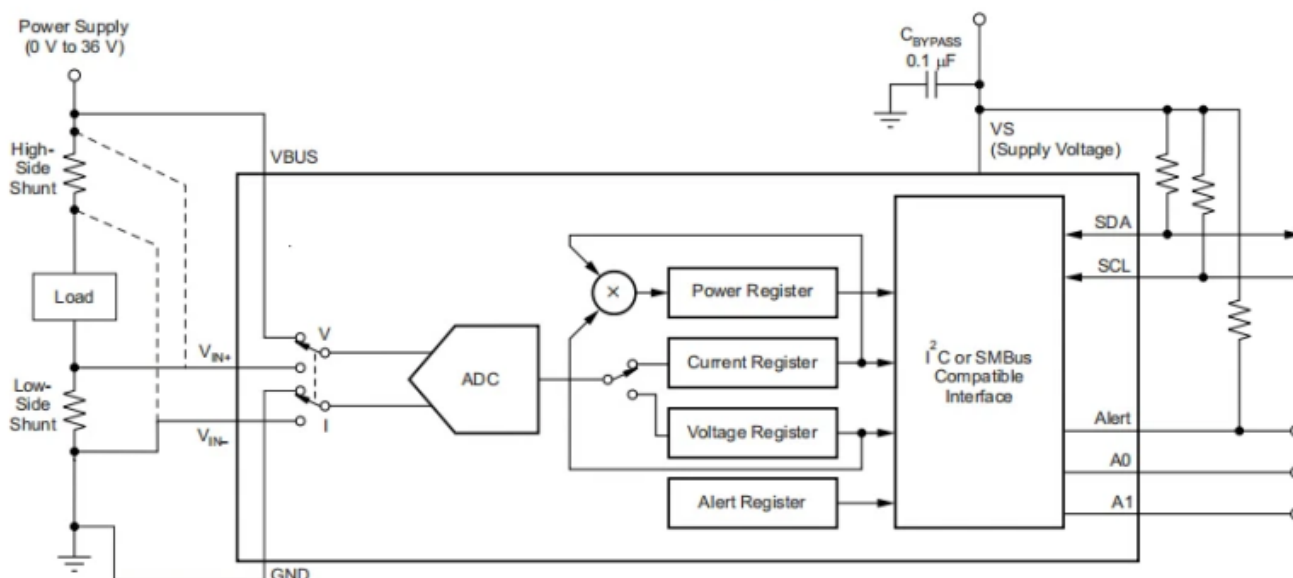
36V, 16-bit, ultra-precise i²c output current/voltage/power monitor w/alert

The INA226 is a current shunt and power monitor with an I²C or SMBUS-compatible interface. It monitors both a shunt-voltage drop and the bus supply voltage. Programmable calibration values, conversion times, and averaging, combined with an internal multiplier, enable direct readouts of current in amperes and power in watts.

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The INA226 supports the fast mode (1 kHz to 400 kHz) and high-speed mode (1 kHz to 2.94 MHz) transmission protocols. All data bytes are transmitted in most significant byte-first order.

High-Side or Low-Side Sensing Application

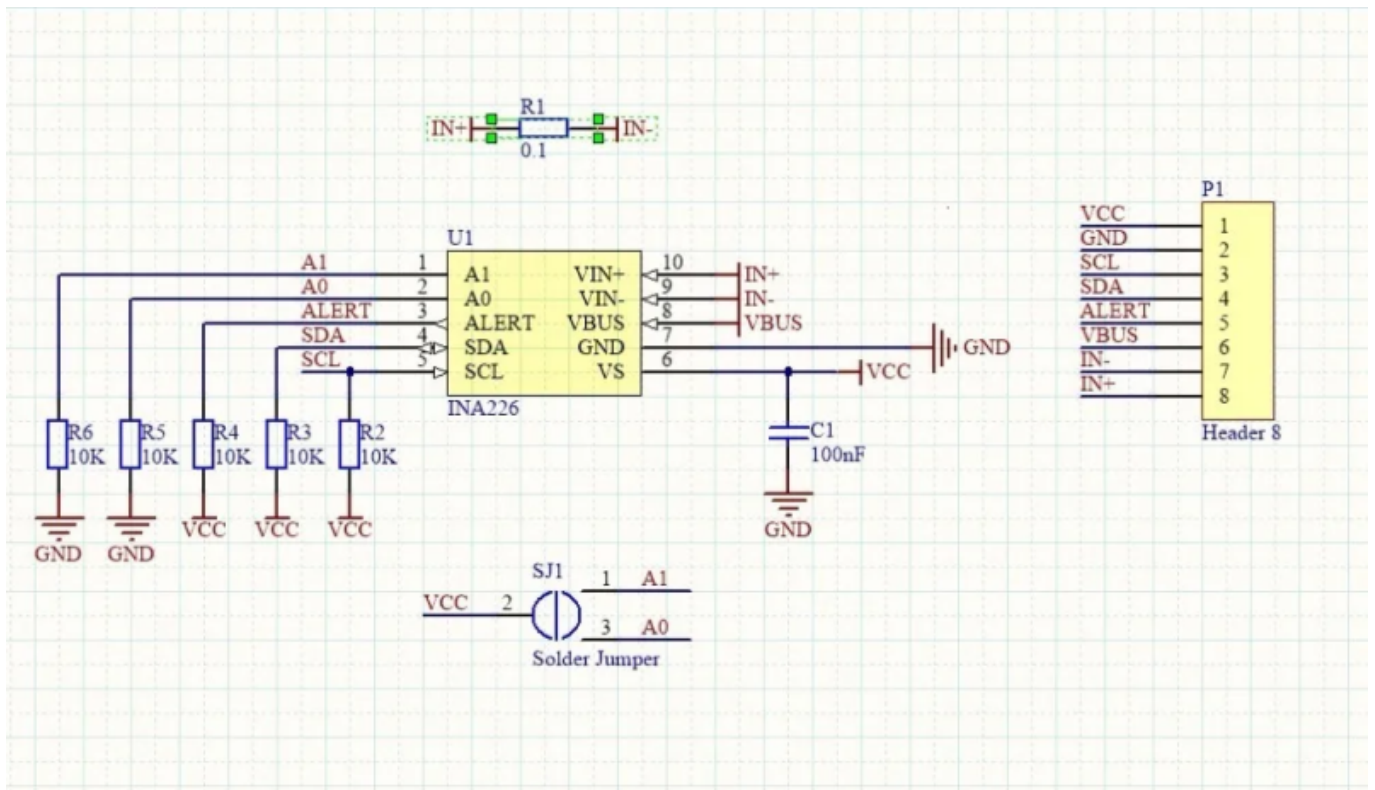


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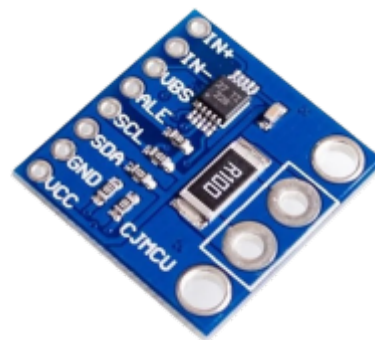
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INA226 Features

- Senses Bus Voltages: 0 V .. 36 V
- Shunt Voltage Maximum: 81.9 V
- Current Maximum: 20 A
- High-Side or Low-Side Sensing
- Reports Current, Voltage, and Power
- High Accuracy:
 - 0.1% Gain Error (Max)
 - 10 μ V Offset (Max)
- Configurable Averaging Options
- 16 Programmable Addresses
- Operates from 2.7V to 5.5V Power Supply
- 10-Pin, DGS (VSSOP) Package

INA226 Pin Description



Pin Name	Description
V+ / VS	Power Supply: 2.7V to 5.5V for the chip's own logic
GND	Ground: Reference point for power and I ² C
SCL	I²C Clock: Connect to the microcontroller's SCL pin
SDA	I²C Data: Connect to the microcontroller's SDA pin
VBUS	Bus Voltage Input: Connect this to the high-side or load-side to measure the actual bus voltage (up to 36V)
IN+	Shunt Positive: Connect to the supply side of the external shunt resistor
IN-	Shunt Negative: Connect to the load side of the external shunt resistor
A0 & A1	Address Pins: Used to set the I ² C address by tying them to GND, VS, SDA, or SCL
ALERT	Programmable Alert: Open-drain output that can trigger on over/under voltage or current thresholds

Typical Wiring (High-Side Sensing)

- **V+ and GND:** Connect to your microcontroller's 3.3V or 5V power and ground.
- **SDA and SCL:** Connect to your microcontroller's I²C pins.
- **IN+ and IN-:** Place the shunt resistor in series with your load's positive line. Connect IN+ before the resistor and IN- after it.
- **VBUS:** Connect this pin to IN- (load side) for standard high-side power monitoring.

INA226 I2C Address Table

The Texas Instruments INA226 supports up to 16 unique I²C addresses. The address is set by connecting the two address pins (A0 and A1) to one of four possible points: GND, VS (power supply), SDA, or SCL.

The default address is **0x40** (when both pins are connected to GND).

A1 Pin	A0 Pin	Hex Address
GND	GND	0x40
GND	VS	0x41
GND	SDA	0x42
GND	SCL	0x43
VS	GND	0x44
VS	VS	0x45
VS	SDA	0x46

A1 Pin	A0 Pin	Hex Address
VS	SCL	0x47
SDA	GND	0x48
SDA	VS	0x49
SDA	SDA	0x4A
SDA	SCL	0x4B
SCL	GND	0x4C
SCL	VS	0x4D
SCL	SDA	0x4E
SCL	SCL	0x4F

INA226 Arduino wiring

- VCC/VSS → Arduino 5V (or 3.3V)
- GND → Arduino GND
- SDA → Arduino SDA (A4 on Uno)
- SCL → Arduino SCL (A5 on Uno)

INA226 Arduino example code

In the Arduino IDE, go to *Tools > Manage Libraries*, search for “**INA226_WE**”, and install the version by *Wollewald*.

This sketch initializes the sensor at the default address (**0x40**) and prints current, voltage, and power to the Serial Monitor.

```
#include <Wire.h>
#include <INA226_WE.h>

#define I2C_ADDRESS 0x40

INA226_WE ina226 = INA226_WE(I2C_ADDRESS);

void setup() {
  Serial.begin(9600);
  Wire.begin();

  // Initialize INA226
  if (!ina226.init()) {
    Serial.println("Failed to find INA226 chip. Check wiring!");
    while (1);
  }

  /*
   * Optional: Calibrate for your shunt.
   * The default is usually 0.1 Ohm.
   * Parameters: (Shunt value in Ohms, Max expected current in Amps)
   */
}
```

```

    ina226.waitUntilConversionCompleted();
    Serial.println("INA226 Ready!");
}

void loop() {
    float shuntVoltage_mV = 0.0;
    float loadVoltage_V = 0.0;
    float busVoltage_V = 0.0;
    float current_mA = 0.0;
    float power_mW = 0.0;

    // Read values
    ina226.readAndClearFlags();
    shuntVoltage_mV = ina226.getShuntVoltage_mV();
    busVoltage_V = ina226.getBusVoltage_V();
    current_mA = ina226.getCurrent_mA();
    power_mW = ina226.getBusPower_mW();
    loadVoltage_V = busVoltage_V + (shuntVoltage_mV / 1000);

    // Print results
    Serial.print("Bus Voltage: "); Serial.print(busVoltage_V);
    Serial.println(" V");
    Serial.print("Current: "); Serial.print(current_mA);
    Serial.println(" mA");
    Serial.print("Power: "); Serial.print(power_mW); Serial.println("
mW");
    Serial.println("-----");

    delay(2000);
}

```

I²C topics on lamaPLC

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