LamaPLC: CJMCU-8221 Analog Devices Precision instrumentation amplifier module

The **CJMCU-8221** is a high-performance, gain-programmable precision instrumentation amplifier module based on the **AD8221AR** chip by Analog Devices. It is specifically designed to amplify small signals in noisy environments with high accuracy.

Key Technical Specifications

- **Core Chip:** Analog Devices AD8221.
- **Programmable Gain:** Set via a single external resistor from 1 to 1000.
- **Supply Voltage:** Supports single or dual supplies from ±2.3 V to ±18 V.
- **High CMRR:** Minimum Common-Mode Rejection Ratio (CMRR) of 80 dB to 90 dB (at G=1), enabling rejection of wideband interference and line harmonics.
- **Low Noise:** Input voltage noise of approximately 8 nV/√Hz at 1 kHz.
- **Form Factor:** Compact MSOP package on a breakout board for easy prototyping.

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CJMCU-8221 Pinout

Pin #	Mnemonic	Description
1	-IN	Negative Input Terminal for the differential signal.
2	RG	Gain Setting Terminal. Connect one end of the gain resistor here.
3	RG	Gain Setting Terminal. Connect the other end of the resistor here.
4	+IN	Positive Input Terminal for the differential signal.
5	-VS	Negative Power Supply. Connect to negative rail (e.g., -5V) or Ground for a single supply.
6	REF	Reference Voltage. Sets the output "zero" level. Typically connected to Ground (GND).
7	VOUT	Output Signal. The amplified result of (+IN) - (-IN).
8	+VS	Positive Power Supply. Connect to positive rail (e.g., +5V to +18V).

- **Dual vs. Single Supply:** While it can operate on a single supply (4.6V to 36V), using a dual supply (±2.3V to ±18V) is recommended to ensure the output can swing fully to zero.
- **REF Pin:** Do not leave this pin floating. Tie it to GND for a 0V reference or to a specific voltage if you need to level-shift the output.
- **Decoupling:** Always place bypass capacitors (e.g., 0.1µF) between the supply pins and ground to minimize noise.

Gain Calculation

The gain (G) of the module is determined by the external resistor (R_G) connected across the R_G pins. Use the following formula:

Target Gain	Resistor (R_G)
1	Open (No resistor)
10	5.49 kΩ
100	499 Ω
1000	49.4 Ω

Many breakout boards come with a pre-soldered 499 Ω resistor, setting the default gain to approximately 100.

Arduino Code Example

```
void setup() {
  Serial.begin(9600);
}

void loop() {
  int sensorValue = analogRead(A0);
  // OUT Pin: Connect to an Arduino Analog Input (e.g., A0)
  float voltage = sensorValue * (5.0 / 1023.0); // Convert to voltage
  Serial.println(voltage);
  delay(100);
}
```

CJMCU-8221, AD8221AR, Analog Devices, amplifier, sensor, CJMCU