# 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<sub>G</sub>) |
|---|---|
| 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