



Acuity Series AC4080 Series DIP Amplified Low Pressure Sensor Module

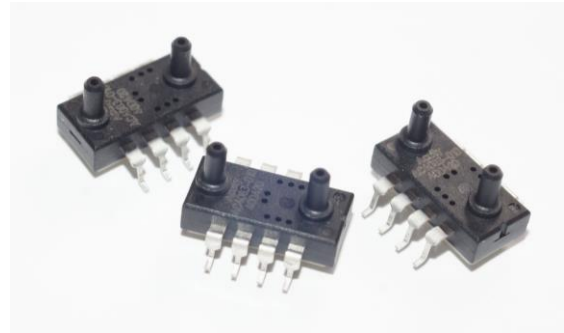
Acuity Incorporated
Fremont, California
USA 94539

The AC4080 series amplified pressure sensor is a low-pressure amplified product featuring the Acuity low pressure die housed with an ASIC signal conditioner in a plastic housing. It comes in both Gauge and Differential Versions and either with an Analog output or an I2C output.

| | |
|---------------|--|
| AC4080 | Analog Gauge Output – 0.5 V zero; 4 V Span |
| AC4081 | Analog Differential Output – 2.5 V zero; +/- 2 V Span |
| AC4082 | Digital I2C Gauge output - 1638 count zero; 13108 count Span |
| AC4083 | Digital I2C Differential output - 8192 count zero; +/- 6554 count Span |

The module corrects the sensor signal with a multi-point calibration algorithm using a dedicated signal processor ASIC over both temperature and pressure. It provides the calibrated and compensated output which enables the part to be used in stand-alone applications.

Because of the stability of the Acuity pressure sensing die, the AC4080 Series can use the full capability of the incorporated ASIC die while achieving at 10 mbar better than a 2.2% total

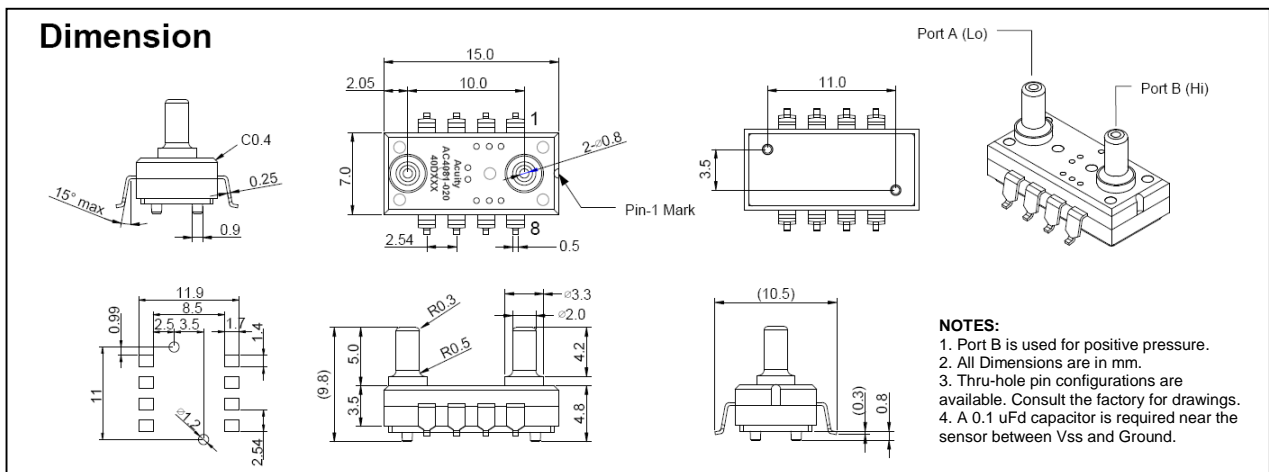


AC4080 Series DIP Pressure sensor

accuracy in calibration over pressure from 0 to 70 C and achieves better than 4.4% accuracy to the 5 mbar part.

The small foot-print of the package (less than 15 mm X 10 mm) allows easy positioning on printed circuit boards for imbedded OEM applications such as HVAC control and low-level air flow.

AC4080-AC4081 – Analog: 10 mbar - standard
AC4082-AC4083 – Digital: 5 and 10 mbar - standard
Special order ranges available on request.





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| | |
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| AC4082 | Digital I2C Gauge output - 1638 count zero; 13108 count Span |
| AC4083 | Digital I2C Differential output - 8192 count zero; +/- 6554 count Span |

| AC4080 - AC4081 Analog | Analog Amplified Low Pressure Sensor - 10.0 mBar | | | | | Analog Amplified Low Pressure Sensor - 20.0 mBar | | | | | Analog Amplified Low Pressure Sensor - 50 mBar | | | | |
|---------------------------------|--|---------|-------|------------------|------|--|---------|-------|------------------|------|--|---------|-------|------------------|------|
| Output Series | Min | Nominal | Max | Unit | Note | Min | Nominal | Max | Unit | Note | Min | Nominal | Max | Unit | Note |
| Electrical Drive | | | | | | | | | | | | | | | |
| Supply Voltage | 4.75 | 5.000 | 5.25 | Volts | 1 | 4.75 | 5.000 | 5.25 | Volts | 1 | 4.75 | 5.000 | 5.25 | Volts | 1 |
| Supply Voltage Absolute Maximum | | | 6 | Volts | | | | 6 | Volts | | | | 6 | Volts | |
| Supply Current | | 2.5 | | mA | | | 2.5 | | mA | | | 2.5 | | mA | |
| Output Drive Current | -1 | | 1 | mA | | -1 | | 1 | mA | | -1 | | 1 | mA | |
| Step Response Delay | | 25 | | mS | | | 25 | | mS | | | 25 | | mS | |
| Internal Conversion Resolution | | | 12 | bits (1 in 4096) | | | | 12 | bits (1 in 4096) | | | | 12 | bits (1 in 4096) | |
| Output Resolution | | | 11 | bits (1 in 2048) | | | | 11 | bits (1 in 2048) | | | | 11 | bits (1 in 2048) | |
| Electrical | Min | Nominal | Max | | | Min | Nominal | Max | | | Min | Nominal | Max | | |
| ZERO | | | | | | | | | | | | | | | |
| Zero at 25 C - AC4080 | 0.320 | 0.50 | 0.680 | Volts | 1 | 0.412 | 0.50 | 0.588 | Volts | 1 | 0.412 | 0.50 | 0.588 | Volts | 1 |
| Zero at 25 C - AC4081 | 2.320 | 2.50 | 2.680 | Volts | 1 | 2.412 | 2.50 | 2.588 | Volts | 1 | 2.412 | 2.50 | 2.588 | Volts | 1 |
| SPAN | | | | | | | | | | | | | | | |
| Span at 25 C - AC4080 | | 4.0 | | Volts | 1 | | 4.0 | | Volts | 1 | | 4.0 | | Volts | 1 |
| Span at 25 C - AC4081 | | ±2.0 | | Volts | 1 | | ±2.0 | | Volts | 1 | | ±2.0 | | Volts | 1 |
| Total Error | | | | | | | | | | | | | | | |
| Total Combined Error | -4.5 | | 4.5 | % FS Reading | 2 | -2.2 | | 2.2 | % FS Reading | 2 | -2.2 | | 2.2 | % FS Reading | 2 |
| STABILITY | | | | | | | | | | | | | | | |
| Warm-up (1 hour after turn-on) | | 0.5 | | %FS | 3 | | 0.375 | | %FS | 2 | | 0.25 | | %FS | 2 |
| Position Sensitivity | | 0.125 | | %FS | 4 | | 0.075 | | %FS | 3 | | 0.035 | | %FS | 3 |
| Long-Term Drift (1 year) | | 0.75 | | %FS | 3 | | 0.625 | | %FS | 2 | | 0.375 | | %FS | 2 |
| Temperature Range | Min | | Max | | | Min | Target | Max | | | Min | Target | Max | | |
| Calibration | 0 | | 50 | °C | | 0 | | 50 | °C | | 0 | | 50 | °C | |
| Operation | -20 | | 85 | °C | | -20 | | 85 | °C | | -20 | | 85 | °C | |
| Storage | -55 | | 125 | °C | | -55 | | 125 | °C | | -55 | | 125 | °C | |
| Mechanical Pressure | Min | Target | Max | | | Min | Target | Max | | | Min | Target | Max | | |
| Full Scale Pressure Ranges | 10 | | | | mBar | 20 | | | | mBar | 50 | | | | mBar |
| Overpressure - Burst | >40X | | | FS Pressure | 5 | >20X | | | FS Pressure | 5 | >10X | | | FS Pressure | 5 |
| Overpressure - Proof | >20X | | | FS Pressure | 6 | >10X | | | FS Pressure | 6 | >5X | | | FS Pressure | 6 |

| AC4082 - AC4083 Digital | Digital Amplified Low Pressure Sensor - 5.0 mBar | | | | | Digital Amplified Low Pressure Sensor - 10.0 mBar | | | | | Digital Amplified Low Pressure Sensor - 20 mBar | | | | |
|---------------------------------|--|---------|-----|------------------|------|---|---------|-----|------------------|------|---|---------|-----|------------------|------|
| Output Series | Min | Nominal | Max | Unit | Note | Min | Nominal | Max | Unit | Note | Min | Nominal | Max | Unit | Note |
| Electrical Drive | | | | | | | | | | | | | | | |
| Supply Voltage | 2.7 | 5.000 | 5.5 | Volts | 1 | 4.5 | 5.000 | 5.5 | Volts | 1 | 4.5 | 5.000 | 5.5 | Volts | 1 |
| Supply Voltage Absolute Maximum | | | 6 | Volts | | | | 6 | Volts | | | | 6 | Volts | |
| Supply Current | | 2.5 | | mA | | | 2.5 | | mA | | | 2.5 | | mA | |
| Output Drive Current | -1 | | 1 | mA | | -1 | | 1 | mA | | -1 | | 1 | mA | |
| Step Response Delay | | 25 | | mS | | | 25 | | mS | | | 25 | | mS | |
| Internal Conversion Resolution | | | 12 | bits (1 in 4096) | | | | 12 | bits (1 in 4096) | | | | 12 | bits (1 in 4096) | |
| Output Resolution/Accuracy | | | 11 | bits (1 in 2048) | | | | 11 | bits (1 in 2048) | | | | 11 | bits (1 in 2048) | |
| Electrical | Min | Nominal | Max | | | Min | Target | Max | | | Min | Target | Max | | |
| ZERO | | | | | | | | | | | | | | | |
| Zero at 25 C - AC4082 | | 1638 | | Count | 1 | | 1638 | | Count | 1 | | 1638 | | Count | 1 |
| Zero at 25 C - AC4083 | | 8196 | | Count | | | 8196 | | Count | | | 8196 | | Count | |
| SPAN | | | | | | | | | | | | | | | |
| Span at 25 C - AC4082 | | 13108 | | Count | 1 | | 13108 | | Count | 1 | | 13108 | | Count | 1 |
| Span at 25 C - AC4083 | | ±6554 | | Count | | | ±6554 | | Count | | | ±6554 | | Count | |
| Total Error | | | | | | | | | | | | | | | |
| Total Combined Error | -4.5 | | 4.5 | % FS Reading | 2 | -2.2 | | 2.2 | % FS Reading | 2 | -2.2 | | 2.2 | % FS Reading | 2 |
| STABILITY | | | | | | | | | | | | | | | |
| Warm-up (1 hour after turn-on) | | 0.5 | | %FS | 3 | | 0.375 | | %FS | 2 | | 0.25 | | %FS | 2 |
| Position Sensitivity | | 0.125 | | %FS | 4 | | 0.075 | | %FS | 3 | | 0.035 | | %FS | 3 |
| Long-Term Drift (1 year) | | 0.75 | | %FS | 3 | | 0.625 | | %FS | 2 | | 0.375 | | %FS | 2 |
| Temperature Range | Min | | Max | | | Min | Target | Max | | | Min | Target | Max | | |
| Calibration | 0 | | 50 | °C | | 0 | | 50 | °C | | 0 | | 50 | °C | |
| Operation | -20 | | 85 | °C | | -20 | | 85 | °C | | -20 | | 85 | °C | |
| Storage | -55 | | 125 | °C | | -55 | | 125 | °C | | -55 | | 125 | °C | |
| Mechanical Pressure | Min | Target | Max | | | Min | Target | Max | | | Min | Target | Max | | |
| Full Scale Pressure Ranges | 5 | | | | mBar | 10 | | | | mBar | 20 | | | | mBar |
| Overpressure - Burst | >40X | | | FS Pressure | 4 | >20X | | | FS Pressure | 4 | >10X | | | FS Pressure | 4 |
| Overpressure - Proof | >20X | | | FS Pressure | 6 | >10X | | | FS Pressure | 6 | >5X | | | FS Pressure | 6 |

1 Sensor Calibrated at 5.00 Volts but system can operate from 2.7 to 5.5 V. Note that the Analog Output Series (AC4080 and AC4081) are ratiometric to supply voltage. The Digital Output Series (AC4082 and AC4083) are NOT.

2 Total Combined error is deviation as % Full-Scale from a linear transfer line from the nominal zero count to the nominal full scale count (Span + Zero). It includes zero, TC zero, span, TC span, Pressure nonlinearity, and hysteresis over the calibration range.

3 Test-Rep_Acuity_Validation_G-sensitivity

4 Test-Rep_Acuity_Validation_G-sensitivity

5 Pressure at which sensor may break

6 Pressure where the sensor may routinely see without damage. However, with Amplified products, the output is limited to slightly above the rated pressure

Rev: 2015-01-09A



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Preliminary

| <p>Ordering Information:</p> <p>AC408X-PPP-Z</p> <p>Where: X = 0 for Analog Gauge 1 for Analog Differential</p> <p>PPP = Pressure Range</p> <p>Z = S for Surface Mount * T for Thru-Hole Mount</p> <p>ANALOG OUTPUT</p> | <table border="1"> <thead> <tr> <th>Range</th> <th>Full-Scale Pressure</th> </tr> </thead> <tbody> <tr> <td>010</td> <td>10 mbar *</td> </tr> <tr> <td>020</td> <td>20 mbar</td> </tr> <tr> <td>050</td> <td>50 mbar</td> </tr> </tbody> </table> <p>* = "In-Stock" Options</p> | Range | Full-Scale Pressure | 010 | 10 mbar * | 020 | 20 mbar | 050 | 50 mbar | <p>AC4080/AC4081 - Analog Output</p> <table border="1"> <thead> <tr> <th>Pin #</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>NC</td> </tr> <tr> <td>2</td> <td>NC</td> </tr> <tr> <td>3</td> <td>NC</td> </tr> <tr> <td>4</td> <td>Vss (-Supply voltage)</td> </tr> <tr> <td>5</td> <td>Vss (-Supply voltage)</td> </tr> <tr> <td>6</td> <td>Analog Signal</td> </tr> <tr> <td>7</td> <td>Vdd (+ Supply voltage)</td> </tr> <tr> <td>8</td> <td>NC</td> </tr> </tbody> </table> <p>NC = May not be used as an electrical feed-thru. Pins should be soldered to the board but not connected to any other circuitry.</p> | Pin # | Description | 1 | NC | 2 | NC | 3 | NC | 4 | Vss (-Supply voltage) | 5 | Vss (-Supply voltage) | 6 | Analog Signal | 7 | Vdd (+ Supply voltage) | 8 | NC | | |
|---|---|-------|---------------------|-----|-----------|-----|-----------|-----|---------|--|---------|---|-------|-------------|---|-----------------------|---|----|---|------------------------|---|-----------------------|---|---------------|---|------------------------|---|-----|---|----|
| Range | Full-Scale Pressure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 010 | 10 mbar * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 020 | 20 mbar | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 050 | 50 mbar | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pin # | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | NC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | NC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | NC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Vss (-Supply voltage) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Vss (-Supply voltage) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Analog Signal | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Vdd (+ Supply voltage) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | NC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Ordering Information:</p> <p>AC408X-PPP</p> <p>Where: X = 2 for Digital Gauge 3 for Digital Differential</p> <p>PPP = Pressure Range</p> <p>Z = S for Surface Mount * T for Thru-Hole Mount</p> <p>DIGITAL OUTPUT</p> | <table border="1"> <thead> <tr> <th>Range</th> <th>Full-Scale Pressure</th> </tr> </thead> <tbody> <tr> <td>005</td> <td>5 mbar *</td> </tr> <tr> <td>010</td> <td>10 mbar *</td> </tr> <tr> <td>020</td> <td>20 mbar</td> </tr> <tr> <td>050</td> <td>50 mbar</td> </tr> </tbody> </table> <p>* = "In-Stock" Options</p> | Range | Full-Scale Pressure | 005 | 5 mbar * | 010 | 10 mbar * | 020 | 20 mbar | 050 | 50 mbar | <p>AC4082/AC4083 - Digital Output</p> <table border="1"> <thead> <tr> <th>Pin #</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Vss (-Supply voltage)</td> </tr> <tr> <td>2</td> <td>NC</td> </tr> <tr> <td>3</td> <td>Vdd (+ Supply voltage)</td> </tr> <tr> <td>4</td> <td>NC</td> </tr> <tr> <td>5</td> <td>NC</td> </tr> <tr> <td>6</td> <td>SDA</td> </tr> <tr> <td>7</td> <td>SDL</td> </tr> <tr> <td>8</td> <td>NC</td> </tr> </tbody> </table> <p>NC = May not be used as an electrical feed-thru. Pins should be soldered to the board but not connected to any other circuitry.</p> | Pin # | Description | 1 | Vss (-Supply voltage) | 2 | NC | 3 | Vdd (+ Supply voltage) | 4 | NC | 5 | NC | 6 | SDA | 7 | SDL | 8 | NC |
| Range | Full-Scale Pressure | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 005 | 5 mbar * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 010 | 10 mbar * | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 020 | 20 mbar | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 050 | 50 mbar | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pin # | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Vss (-Supply voltage) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | NC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Vdd (+ Supply voltage) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | NC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | NC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | SDA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | SDL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | NC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Ship from Stock – Pressure ranges of 5 mbar and 10 mbar are routinely stocked in limited prototyping quantities for the digital versions (AC4082 and AC4083) and 10 mbar for the analog products (AC4080 and AC4081). Other ranges are available with a typical 4 to 6 week lead-time. Consult Acuity Sales (Sales@acuitymicro.com) for current lead times.

Custom Ranges and Pressure Ports: Acuity will customize products to meet customer needs both in port configuration and pressure ranges on large orders. Consult Acuity Sales (Sales@acuitymicro.com) for details.

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