IRC-AT Carbon Dioxide infrared sensor – thermopile detector

Dimensions are in millimetres (± 0.15mm).

**Pin out details:**
- 1. Lamp return
- 2. Lamp +5V
- 3. Not connected
- 4. Detector output
- 5. Reference output
- 6. Thermistor output
- 7. OV supply

**Notes:**
1. Dimensions without tolerances are nominal
2. Recommended PCB socket: Wearnes Cambion Ltd. code: 450-3326-01-06-00
3. Weight: 15g
4. Use antistatic precautions when handling
5. Do not cut pins
6. Do not solder directly to pins
7. We suggest this sensor is best used in a fixed site instrument where calibration and measurement can be carried out in-situ, and the sensor is not subject to acute mechanical stress or changes of temperature.

**Performance**
- Maximum power requirements
- Minimum operating voltage
- Source drive frequency
- Active output in N₂ (peak-to-peak)
- Reference output in N₂ (peak-to-peak)
- Response time (t₉₀)
- Warm-up time

<table>
<thead>
<tr>
<th>Performance</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Minimum operating voltage</td>
<td>2.0 VDC, 20mA max. (50% duty cycle source drive)</td>
</tr>
<tr>
<td>Source drive frequency</td>
<td>3 Hz</td>
</tr>
<tr>
<td>Active output in N₂ (peak-to-peak)</td>
<td>4 to 7mV @ 3 Hz, 50% duty cycle</td>
</tr>
<tr>
<td>Reference output in N₂ (peak-to-peak)</td>
<td>2 to 5mV @ 3 Hz, 50% duty cycle</td>
</tr>
<tr>
<td>Response time (t₉₀)</td>
<td>&lt; 40s @ 20°C ambient</td>
</tr>
<tr>
<td>Warm-up time</td>
<td>To specification: &lt; 30 minutes @ 20°C</td>
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</tbody>
</table>

**Lifetime**
- MTBF
- > 5 years

**Key Specifications**
- Temperature signal
- Operating temperature range
- Storage temperature range
- Humidity range

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</thead>
<tbody>
<tr>
<td>IAQ</td>
<td>0 to 5000ppm (IAQ)</td>
<td>1</td>
<td>10ppm</td>
<td>50ppm</td>
<td>±20ppm</td>
<td>±50ppm</td>
<td>0.000325</td>
<td>0.9363</td>
<td>4000ppm</td>
</tr>
<tr>
<td>Other</td>
<td>0 to 5 % vol (Safety)</td>
<td>1.5</td>
<td>10ppm</td>
<td>100ppm</td>
<td>±500ppm</td>
<td>±500ppm</td>
<td>0.5411</td>
<td>0.6716</td>
<td>4%</td>
</tr>
<tr>
<td>Other</td>
<td>0 to 20 % vol (Combustion)</td>
<td>2.5</td>
<td>10ppm</td>
<td>2000ppm</td>
<td>±20ppm</td>
<td>±2500ppm</td>
<td>1.0459</td>
<td>0.2932</td>
<td>16%</td>
</tr>
<tr>
<td>Other</td>
<td>0 to 100 % vol (Process Control)</td>
<td>tbc</td>
<td>10ppm</td>
<td>tbc</td>
<td>±20ppm</td>
<td>tbc</td>
<td>tbc</td>
<td>tbc</td>
<td>100%</td>
</tr>
</tbody>
</table>

* *When ordering, select ‘IAQ’ or ‘Other’, depending on your application.*

For further information on the performance of this sensor or other sensors in the range or any other subject, please contact Alphasense Ltd. or visit our website at “www.alphasense.com.”
Figure 1 Beer-Lambert Performance

![Beer-Lambert Performance graph](image1)

Typical response from 0 to 5000ppm CO₂. The fit is very close to the theoretical curve, predicted by the Beer-Lambert Law.

Figure 2 Linearisation

![Linearisation graph](image2)

Custom linearisation is not necessary with the IRC-AT. Using universal linearisation constants, repeatability between cells is very good, allowing easy implementation. For an IAQ application, a zero and then single calibration at 4000ppm CO₂ gives the error shown above: typically less than ±40ppm from 0 to 4500ppm.

Figure 3 Resolution

![Resolution graph](image3)

Excellent resolution and noise at 1000ppm CO₂ for the IRC-AT is achieved by better design, not by using more expensive components.