**Document Purpose**

The purpose of this document is to present the performance specification of the IRceL CO2 Carbon Dioxide gas sensor.

This document should be used in conjunction with the Operating Principles (OP17) and the Product Safety Datasheet (PSDS 21).

The data provided in this document are valid at 20°C, 50% RH and 1013 mBar for 3 months from the date of sensor manufacture.

Output signal can drift below the lower limit over time. For guidance on the safe use of the sensor, please refer to the Operating Principles OP17.
Product Data Sheet

Key Features & Benefits:
- Integrated thermister for accurate temperature compensation
- EEPROM programmed with sensor specific performance characteristics
- Compact Size

Technical Specifications

**MEASUREMENT**
- Operating Principle: Non-Dispersive Infra-Red (NDIR)
- Measurement Range: 0-5% vol. CO₂
- Accuracy (-20°C to +50°C)*: Within ± (0.1% vol CO₂ + 4% of concentration)
- Response Time (T₉₀)*: <35 Seconds
  - Zero: < ±0.003% CO₂
  - 5% CO₂: < ±0.075% CO₂
  - Linearity: See Operating Principles OP17

**ELECTRICAL**
- Supply Voltage: 3-5 VDC, 3.3 V to utilise EEPROM calibration
- Power Consumption: <100 mW at 3.3 V
- Recommended Lamp Frequency: 2 Hz, 50% duty cycle
- Minimum Resolution: 0.005% CO₂ at zero
- 0.15% CO₂ at range
- Warm-up Time: <10 Seconds

**MECHANICAL**
- Housing Material: Stainless Steel (see back page)
- Weight: 23 g
- Orientation: Any

**ENVIRONMENTAL**
- Operating Temperature Range: -20°C to +50°C
- Operating Humidity Range: 0 to 99% rH (non-condensing)
- Operating Pressure Range: 700 to 1300 mBar with compensation

**LIFETIME**
- Long Term Zero Drift: < 80 ppm CO₂ per month
- Recommended Storage Temp: -20°C to +50°C
- MTBF: > 5 years

**PRODUCT DIMENSIONS**

All dimensions in mm
All tolerances ±0.15mm unless otherwise stated

**IMPORTANT NOTE:**
Connection should be made via PCB sockets only. Soldering to the pins will seriously damage your sensor.

* Specifications are valid at 20°C, 50% RH and 1013 mBar, using City Technology recommended circuitry. Performance characteristics outline the performance of sensors supplied within the first 3 months. Output signal can drift below the lower limit over time.
**Product Approval**

**Approval Body:** UNDERWRITERS LABORATORIES INC®

**Test Standard:**
- UL913
- CSA.C22.2 No 157

**Product Categories:** Class 1, Division 1, Groups A, B, C, D

**File Number:** E180262

**Approval Body:** SIRA CERTIFICATION SERVICE

**Test Standard:**
- EN 60079-0:2006 General Requirements
- EN 60079-1:2007 Flameproof Enclosures "d"
- EN 61241-0:2006 Electrical Apparatus for use in the presence of Combustible Dust Part 0 : General Requirements.
- EN 61241-1:2004 Electrical Apparatus For use in th epresence of Combustible Dust Part 1 : Protection of Enclosures "id"

**Product Categories:**
- ExdIIIC T4 (T__ -20°C to +55°C),
- Pmax = 1.4W MbGb
- ExIIIICP6xDb
- II2GD/IM2 0518

**Certificate Number:** Sira 04ATEX1084X

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**Instructions specific to hazardous area installations (reference European ATEX Directive 94 / 9 / EC, Annex II, 1.0.6.)**

The following instructions apply to equipment covered by certificate number Sira 04ATEX1084X;

1. The equipment may be used with flammable gases and vapours with apparatus groups IIA, IIB and IIC and with temperature classifications T1, T2, T3 and T4.

2. The equipment is certified for use in ambient temperatures of -20°C to +55°C.

3. The equipment has not been assessed as a safety related device (as referred to by Directive 94 / 9 / EC Annex II, clause 1.5).

4. Installation of the equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. EN 60079-14)

5. Inspection and maintenance of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. EN 60079-17).

6. Repair of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice (e.g. EN 60079-19).

7. Special conditions for safe use

7.1. The IRceL is designed to be connected to a gas detector which shall provide an intrinsically safe supply and having a maximum output power ($P_{\text{max}}$) not greater than 1.4 watt.

7.2. Because the IRceL has not been proven to withstand the impact and drop tests prescribed in EN 60079-0:2006, clauses 26.4.2 and 26.4.3, additional protection shall be provided to ensure that it cannot be subjected to such mechanical stresses.
8. The certification of this equipment relies upon the following materials used in its construction;

- **Enclosure material**: either 303 stainless steel, which contains less than 6% magnesium or 304 stainless steel, which contains less than 6% magnesium
- **Flame arrester**: 316 stainless steel mesh
- **Cement**: CW2248/HY956EN by Ciba-Geigy
  - **Type of compound**: Epoxy resin
  - **Colour**: Beige (natural)
  - **Filler type and %**: 55.2% trihydrated Al₂O₃
  - **Other additives**: 8.3%
  - **Surface treatments**: None
  - **Temperature index**: 170°C
  - **City Tech reference**: RM 497

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

- **Aggressive substances**: e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials.
- **Suitable precautions**: regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

9. The IRceL is available in several formats depending upon the optical filter and components employed. The Certification marking is shown below using the IRceL CH4 label as an example:

Every effort has been made to ensure the accuracy of this document at the time of printing. In accordance with the company’s policy of continued product improvement City Technology Limited reserves the right to make product changes without notice. The products are always subject to a programme of improvement and testing which may result in some changes in the characteristics quoted. As the products may be used by the client in circumstances beyond the knowledge and control of City Technology Limited, we cannot give any warranty as to the relevance of these particulars to an application. It is the clients' responsibility to carry out the necessary tests to determine the usefulness of the products and to ensure their safety of operation in a particular application.

**SAFETY NOTE**
This sensor is designed to be used in safety critical applications. To ensure that the sensor and/or instrument in which it is used, are operating properly, it is a requirement that the function of the device is confirmed by exposure to target gas (bump check) before each use of the sensor and/or instrument. Failure to carry out such tests may jeopardize the safety of people and property.