



Cirius 3

Miniature large range infrared CO₂ gas sensor



Patent No. GB2449433

Characteristic

- The latest MEMS detector technology
- Typical detection range: 0-30% vol CO₂ to 0-100% vol CO₂
- Absolute limit range: 0-10% vol CO₂ to 0-100% vol CO₂
- all-metal construction
- Patented sensor designs
- Small internal volume
- Low power consumption
- Active signal and reference signal output
- Embedded thermistor temperature sensor output
- Wide operating temperature range
- quick response
- Prevention of "poisoning"
- Fault protection operations
- Electrically isolated enclosure

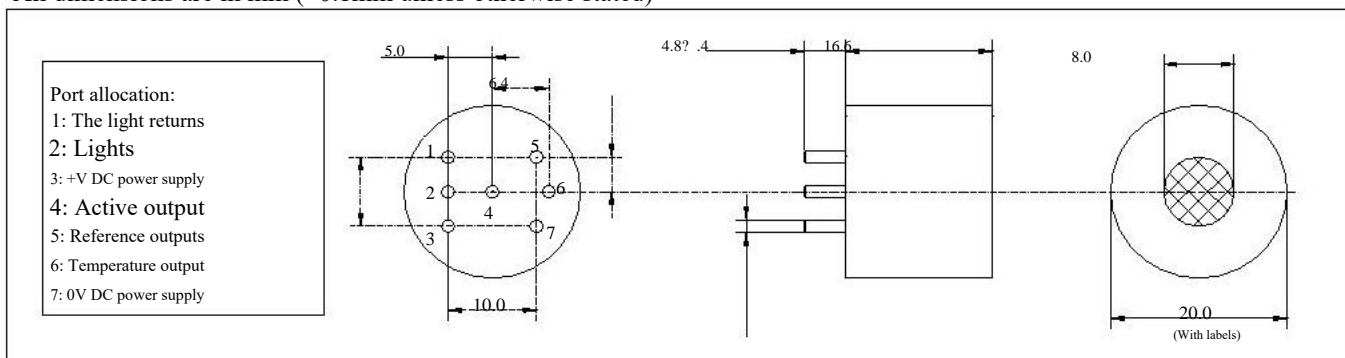
Introduction and Operation

The Cirius series sensors utilize non-diffuse infrared technology to detect gas presence. The sensor comprises an infrared emitter, a dual-infrared detector, and a unique gas-diffusing optical waveguide. The dual-infrared detector responds to variations in incident light, typically requiring the infrared emitter to be driven at 2-4Hz with a 50% duty cycle to activate the sensor. Subsequently, the sensor outputs active wavelength and reference wavelength measurements. If target gas is present, the active wavelength changes while the reference wavelength remains constant. These outputs consist of small AC signals synchronized with source pulses, which are superimposed on DC blanking pulse levels. The sensor also provides an internal temperature measurement through embedded thermistors. Power supply is required for the infrared detectors, and the external connections comply with the industrial-standard 7-pin configuration.

To operate the sensor effectively, it must be connected to a suitable circuit that provides a source driver and can extract a small AC signal from DC dimming pulse levels. The circuit should amplify this AC signal, extract a specific value, and process the result to generate a linear output related to gas concentration. For comprehensive performance specifications, the sensor's temperature output should be utilized for temperature compensation. Clairair Limited offers technical support regarding implementation and application notes.

Outline Dimension

All dimensions are in mm (±0.1mm unless otherwise stated)



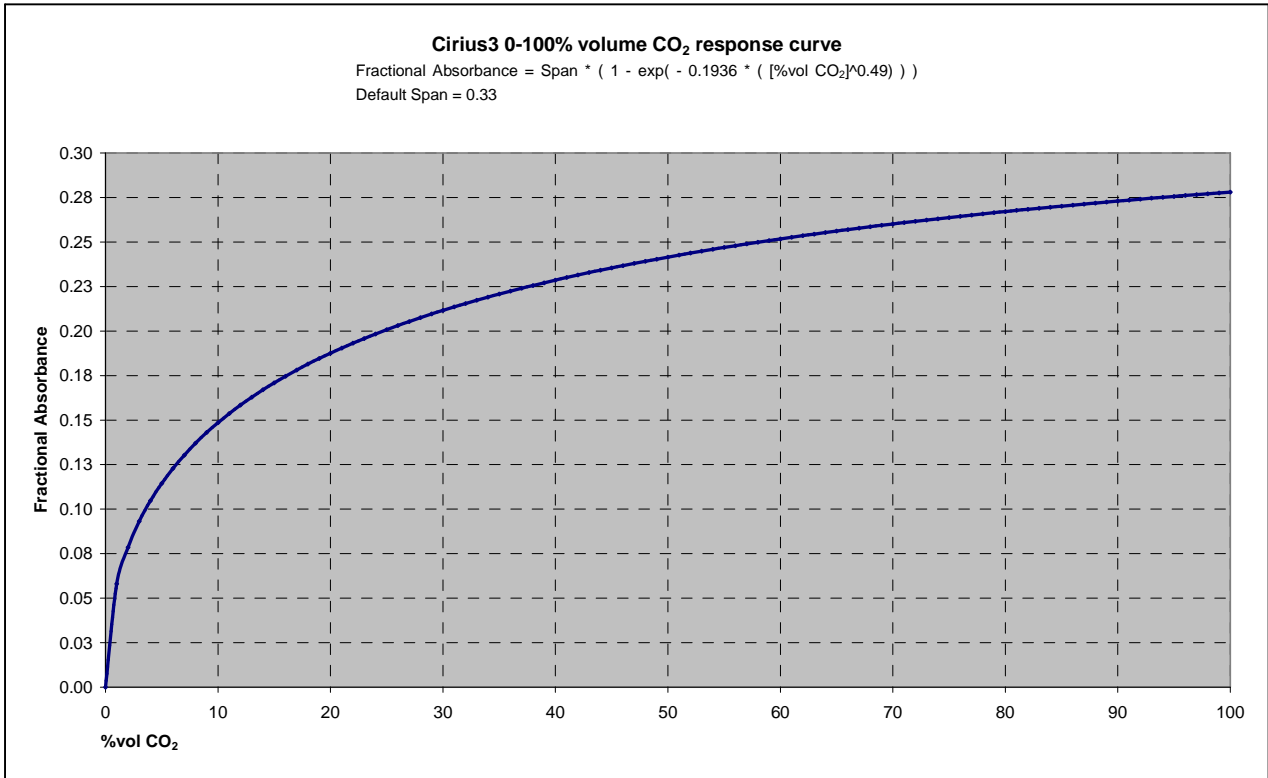
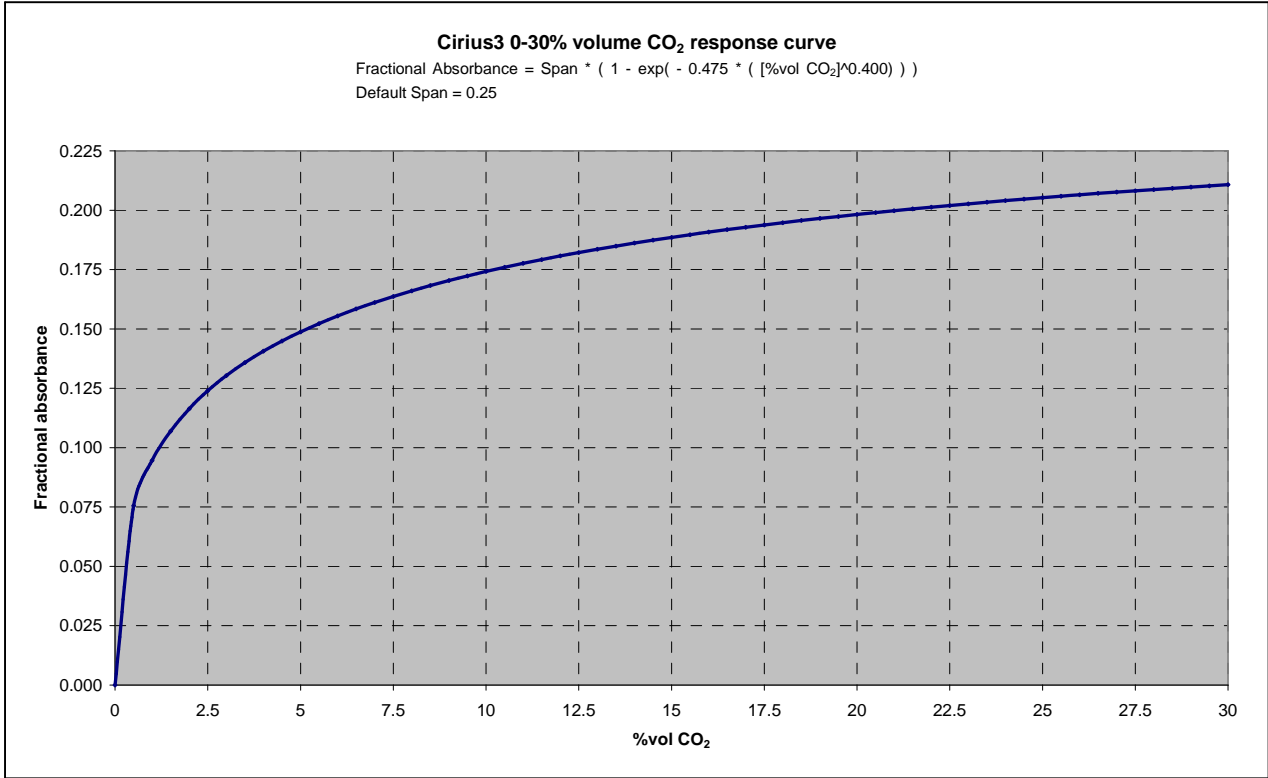
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Response Characteristic

The figure below illustrates the sensitivity versus concentration relationship prior to linearization. For more details, refer to the Infrared Sensor Application Notes from Clairair Ltd.



Absolute Maximum Rated Parameter

Environmental temperature range: $-40^{\circ}\text{C} \sim +80^{\circ}\text{C}$

Light source power supply voltage (measured between pins 1 and 2): 5.1V

Sensor supply voltage (measured between pins 3 and 7): 5.5V

Operational Notes



Static sensitive equipment

The Cirius series of sensors contains electrostatic sensitive components. Follow anti-static precautions when using the product.

Welding pins can seriously damage the sensor

Sensors can only be connected through the PCB slot.

Recommended slots: Wearnes Cambion reference 450-3326-01-06-00

Function

Unless otherwise specified, all acquired data are based on the following parameters: power supply voltage 5.0V, lamp modulation 0V-5.0V with 50% duty cycle, 3.0Hz frequency, ambient temperature (20°C to 25°C), ambient pressure (995 hPa to 1020 hPa), and nitrogen dilution gas. The airflow rate across the sensor surface is 1 liter per minute.

power dissipation :	150mW (typical)
<Nsp_1> 2 Typical active signals in N:	2.3mV RMS (6.5mV equivalent of the positive and negative peak values of the sinusoidal curve)
2 Typical reference signals in N:	3.5mV RMS (10mV sinusoidal curve between positive and negative peaks equivalent)
Temperature output:	3k Ω \pm 5% NTC thermistor internally connected to 0V, Beta value 3450K
Percentage of typical voltage drop in active signal at 100% CO vol ₂	35%
Response time (T ₉₀)	< 30s
preheating time :	
Time to normal work	<30 seconds
Time required for inspection	<30 minutes
nominal range :	0 -10% CO ₂ (minimum) 0 -100% CO ₂ (maximum)
Minimum resolution: at zero point	< 0.5% FS
When in range	< 2% FS
mean free error time	> 5 years
weight :	17.6 g
antiknock characteristics :	Complies with EN61779-1
relative humidity :	0 -95% RH non-condensing
operating temperature range :	-30 $^{\circ}\text{C}$ ~ +75 $^{\circ}\text{C}$
working pressure range :	700 ~1300 hPa
Storage temperature range:	-40 $^{\circ}\text{C}$ ~ +80 $^{\circ}\text{C}$
service voltage :	2.8V ~ 5.5V
Light drive voltage range:	2.8V ~ 5.0V (50% duty cycle)

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