



# Prime IR

## Pellistor Replacement Infrared MEMS Element Detection



### Voltage Output Infrared Gas Sensors

Patented GB2449433

## Features

- Operates independent of supply polarity
- Latest technology MEMS detectors
- Digital Interfacing
- Integrated electronics produce a linear or a pellistor format voltage output
- Operating voltage range 3.0V – 5.0V
- Designed to comply with the SIL specification
- All metal construction
- Small internal volume
- Low power
- Flexible electronic configuration access
- User calibration also enabled by hardware connections
- Wide operating temperature range
- Fast response
- Immunity from 'poisoning'
- Electrically isolated housing

### Sensing Ranges:

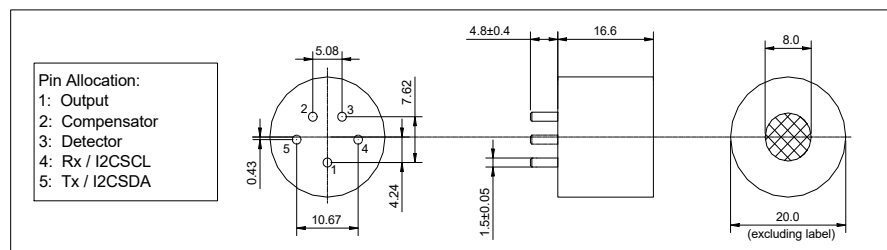
| Prime IR Sensor Type | Sensing Ranges                                                  |
|----------------------|-----------------------------------------------------------------|
| Prime 2              | 0-2000ppm Carbon Dioxide to 0-10% Volume Carbon Dioxide         |
| Prime 3              | 10-100% Volume Carbon Dioxide                                   |
| Prime PELL           | True Pellistor replacement for hydrocarbons, 0-100% Lel, 3 Pins |

## Description and Operation

The Prime IR range of sensors use the NDIR (non-dispersive infrared) method to detect the presence of gases. The sensors contain an infrared radiation source, a dual element infrared detector, a unique optical waveguide into which gas diffuses and integrated ARM7 cored microprocessor based electronics to provide a voltage output which is independent of the power supply polarity. The sensors can be configured to provide a linear voltage output, typically 0.4V – 2.0V over range with respect to the negative supply pin, or a pellistor format output, typically mid supply at zero, with the voltage output increasing with respect to the detector pin by 100mV at range. In addition, the output can be read and the internal configuration can be accessed by a UART or I<sup>2</sup>C serial communications link. The integrated electronics perform all the functions of driving the optical parts of the sensor, extracting the detector signals, converting the signals to a concentration, applying temperature compensation and scaling the output. When in a pellistor configuration, the Prime IR Sensor can replace catalytic sensors in existing circuitry, subject to the power supply requirements. External components will be required to meet the power supply requirement when Prime IR Sensors are used in constant current pellistor circuitry. Technical support on implementation and application notes is available from Clairair Limited.

## Outline Details

All dimensions in millimetres  
(±0.1mm unless noted)



Little Braxted Hall, Little Braxted, Witham, Essex, CM8 3EU, U.K

Tel: +44 (0) 1376 516414, Fax: +44 (0) 1376 516415

Email: [info@clairair.com](mailto:info@clairair.com) Website: [www.clairair.com](http://www.clairair.com)

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# Absolute Maximum Ratings

Ambient temperature range: -40°C to +80°C

Supply voltage (measured between pins 2 and 3): 5.5V

## Handling Precautions



### Electrostatic Sensitive Devices

The Prime **IR** range of sensors contain electrostatic sensitive components. Anti-static handling precautions should be observed when handling these products.

### Soldering to pins may seriously damage the sensor

Connections should be made via PCB sockets only.

## Performance

Unless otherwise stated all data was taken using:

Supply voltage of 3.5V. Ambient temperature (between 20°C and 25°C). Ambient pressure (between 995 hPa and 1020 hPa). Gases diluted in nitrogen. Gas Flowrate 1litre/min across sensor face.

|                                  |                                                    |
|----------------------------------|----------------------------------------------------|
| Power consumption:               | 280mW typical                                      |
| Default output range:            |                                                    |
| Voltage mode:                    | 0.4V – 2.0V (Default)                              |
| Pellistor mode:                  | 0 – 100mV from mid supply relative to detector pin |
| Response time (T <sub>90</sub> ) | < 30s                                              |
| Warm up time:                    |                                                    |
| To operation                     | < 60s                                              |
| To specification                 | < 30 minutes                                       |
| Minimum resolution:              |                                                    |
| At zero                          | < 0.5% of range                                    |
| At range                         | <2% of range                                       |
| Zero repeatability:              | ± 1% of range                                      |
| MTBF                             | > 5 years                                          |
| Weight:                          | 18.0 grams                                         |
| Vibration:                       | Complies with EN61779-1                            |
| Relative humidity:               | 0 – 95% RH non-condensing                          |
| Operating temperature range:     | -30°C to +60°C                                     |
| Operating pressure range:        | 700 – 1300 hPa                                     |
| Storage temperature range:       | -40°C to +80°C                                     |
| Supply voltage range:            | 3.0V – 5.0V                                        |

*In the interest of continued product improvement Clairair Ltd reserves the right to change the design features and specifications without prior notification. The data contained in this document is for guidance only. Whilst Clairair Ltd has taken care to ensure the accuracy of the information in this document it accepts no responsibility for the consequences of any use of this document or the information contained within it.*

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