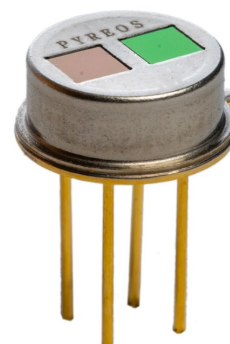


## Two Channel TO-39 Infrared Sensors with High Sensitivity in 3-5 $\mu\text{m}$ Gas Detection Applications

### Introduction

**New** in the Broadcom® dual TO-39 analog infrared sensor product line-optimised spectral absorption for CO<sub>2</sub>, Methane and other hydrocarbon gases leading to improved signal-to-noise ratio.

The thin film pyroelectric IR sensors for gas detection and other substance concentration measurements offer exceptionally high responsivity, low microphonics and class leading thermal and electrical stability. This high performance current mode sensor achieves SNR of ~10,000 and offers a fast, stable response over a wide operating frequency range. The sensor elements are built into a low noise circuit that has an internal CMOS op amp, with a 10 G $\Omega$  feedback resistor. The voltage signal output is centred around half the supply rail, allowing single power supply operation.



Sensor Characteristics		Electrical Characteristics	
Aperture	2x 2.6 mm x 2.6 mm	Max. Voltage (+V) <sup>3</sup>	8.0 V
Element size	1000 $\mu\text{m}$ x 1000 $\mu\text{m}$	Min. Voltage	2.7 V
Package	TO39	Output voltage normalised around mid-rail	
Responsivity <sup>1,2</sup>	up to 250,000 V/W	Supply Current	90 $\mu\text{A}$ typ @ 5 V
D* <sup>1</sup>	3.5 x 10 <sup>8</sup> cm $\sqrt{\text{Hz}}$ / W	Operating Temperature	-40 to +85 °C
Noise <sup>1</sup>	130 $\mu\text{V}/\sqrt{\text{Hz}}$	Storage Temperature	-40 to +110 °C
Microphonics	S <sub>vib</sub> ~2 $\mu\text{V}$ / g at 10Hz	Filters	See "Filters Available"
Time Constant	~12 ms		

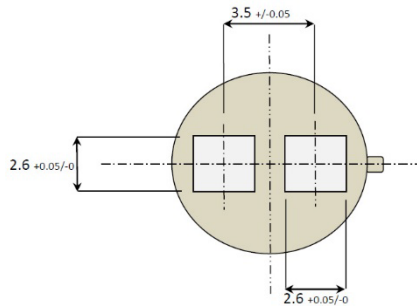
<sup>1</sup> 10 Hz, 500 K, room temperature, without window and optics

<sup>2</sup> Refer to product list at the end of this datasheet for product wavelength specific characteristics

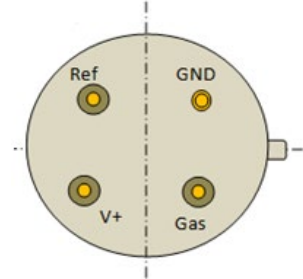
<sup>3</sup> Absolute maximum operating voltage

## Package Information

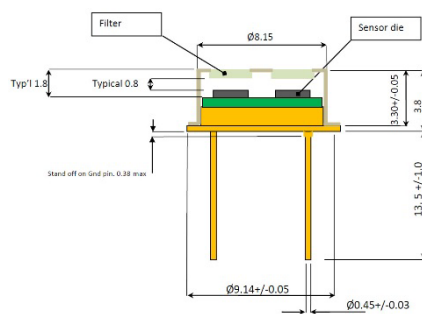
Filter window size



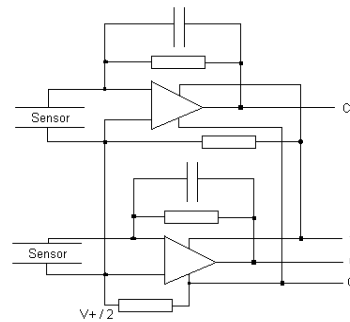
Top View



Bottom View



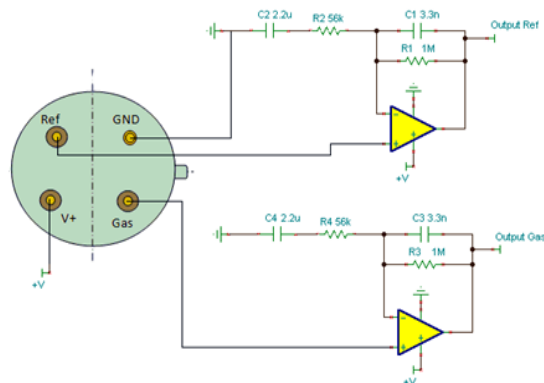
Package dimensions



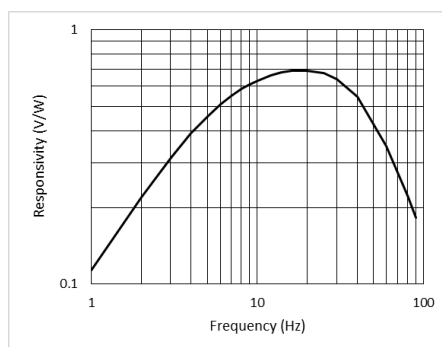
Internal Schematic

Note: Ensure that the sensor base is not in contact with the PCB in order to avoid shorts.

## Recommended Circuit Diagram



## Frequency Characteristics



## Filters Available

Pyreos has a range of standard filters available.

Part number (replaces)	Channel 1, Channel 2 (tab) CWL $\mu\text{m}$ / (HPB nm)	Use	Channel 1, Channel 2 In-Band Responsivity <sup>1</sup>	Broadband Responsivity (no filter)
<b>AFBR-S6PY2626</b>	3.91 / (90), 3.30 / (160)	CH <sub>4</sub>	355 000 V/W, 248 000 V/W	167 000 V/W
<b>AFBR-S6PY3151</b>	3.70 / (110), 4.26 / (180)	CO <sub>2</sub>	287 000 V/W, 184 000 V/W	167 000 V/W

<sup>1</sup> For the purpose of calculating the in-band responsivity, the incident radiation power is calculated as a proportion of the 500 K blackbody radiation available within the nominal filter wavelength range - e.g. for a 3.30/160 filter this would be from 3.28 to 3.38  $\mu\text{m}$

Note: In some implementations it may be necessary to add an optical high wavelength blocking filter externally to the sensor package.

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