

## Two channel TO-39 infrared sensors with high sensitivity in 3-5µm gas detection applications

### Introduction

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

Pyreos 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 GΩ 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 µm x 1000 µm	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 µA typ @ 5 V
D* <sup>1</sup>	3.5 x 10 <sup>8</sup> cm√Hz/ W	Operating Temperature	-40 to +85 °C
Noise <sup>1</sup>	130 µV/√Hz	Storage Temperature	-40 to +110 °C
Microphonics	S <sub>vib</sub> ~2 µV/ g at 10Hz	Filters	See "Filters Available"
Time Constant	~12 ms		

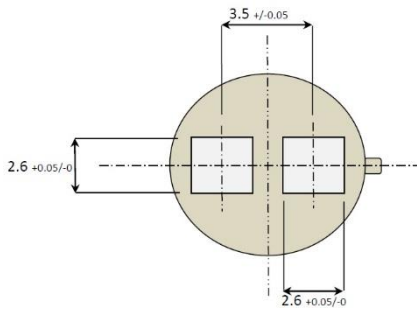
<sup>1</sup> 10 Hz, 500 K, room temperature, without window and optics

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

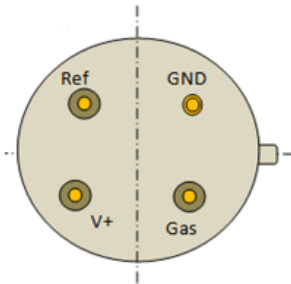
<sup>3</sup> Absolute maximum operating voltage

**Package Information**

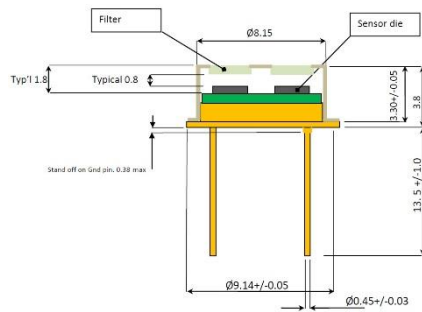
Filter window size



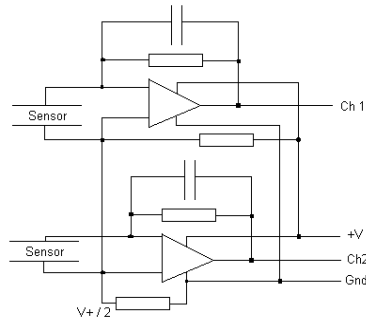
Top View



Bottom View



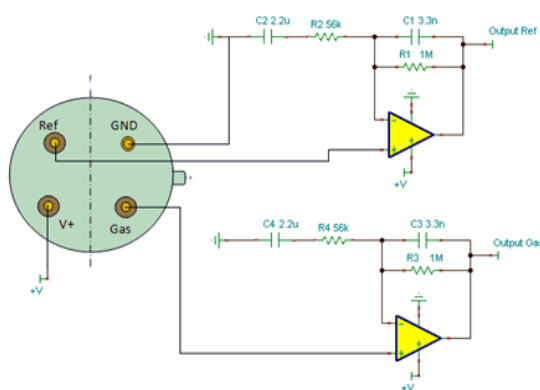
Package dimensions



Internal Schematic

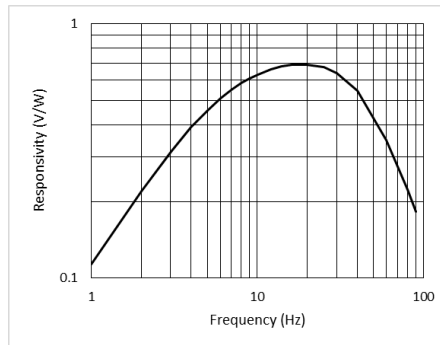
Note: Ensure that the sensor base is not in contact with the PCB in order to avoid shorts.

**Recommended Circuit Diagram**



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**Frequency Characteristics**



**Order Information**

Please quote PY-DUAL-TO39(3+1) and your desired filter combination or quote specific part number ESXXX or PYXXX as per filter table. Contact: [sales@pyreos.com](mailto:sales@pyreos.com)

Search terms: current mode, voltage mode, infrared detector, infrared sensor, MIR, mid-IR, thermopile, photodiode

**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>PY2626</b> ES2626 (PY0317)	3.91 / (90), 3.30 / (160)	CH <sub>4</sub>	355 000 V/W, 248 000 V/W	167 000 V/W
<b>PY2738</b> ES2738 (PY02486)	3.91 / (90), 3.33 / (160)	H-C	355 000 V/W, tbc	167 000 V/W
<b>PY2739</b> ES2739 (PY0261)	3.91 / (90), 3.375 / (190)	H-C	355 000 V/W, 187 000 V/W	167 000 V/W
<b>PY3151</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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