Two Channel TO-39 Infrared Sensors with High Sensitivity in 3-5 µm Gas Detection Applications

Introduction

New in the Broadcom® dual TO-39 analog infrared sensor product line-optimised spectral absorption for CO_2, 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 GΩ feedback resistor. The voltage signal output is centred around half the supply rail, allowing single power supply operation.

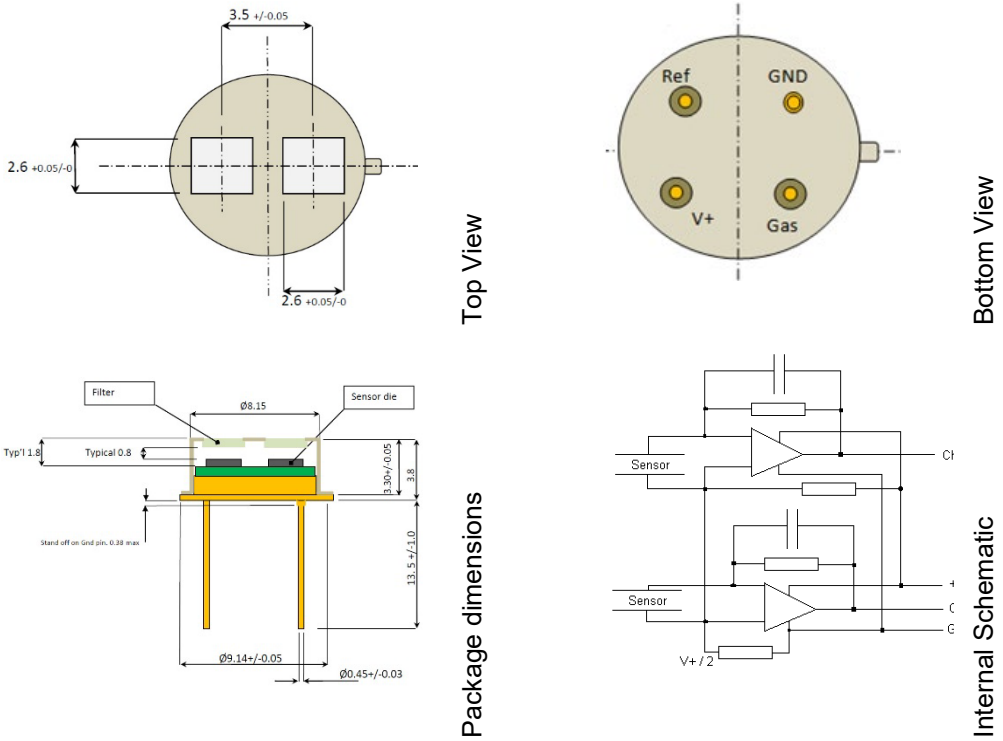
Sensor Characteristics	
Aperture	2x 2.6 mm x 2.6 mm
Element size	1000 µm x 1000 µm
Package	TO39
Responsivity [1,2]	up to 250,000 V/W
D* [1]	3.5 x 10^8 cm√Hz/ W
Noise [1]	130 µV√Hz
Microphonics	S_{vib}~2 µV/ g at 10Hz
Time Constant	~12 ms

Electrical Characteristics	
Max. Voltage (+V) [3]	8.0 V
Min. Voltage	2.7 V
Output voltage normalised around mid-rail	
Supply Current	90 µA typ @ 5 V
Operating Temperature	-40 to +85 °C
Storage Temperature	-40 to +110 °C
Filters	See "Filters Available"

[1] 10 Hz, 500 K, room temperature, without window and optics
[2] Refer to product list at the end of this datasheet for product wavelength specific characteristics
[3] Absolute maximum operating voltage

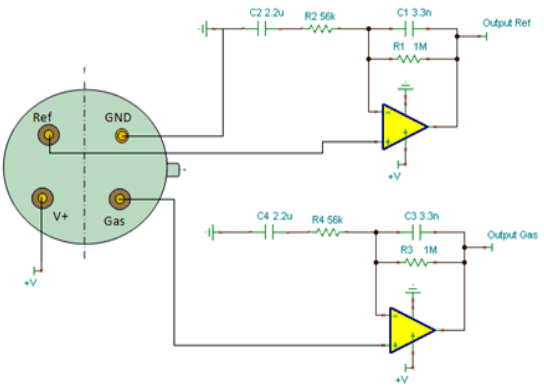
Package Information

Filter window size

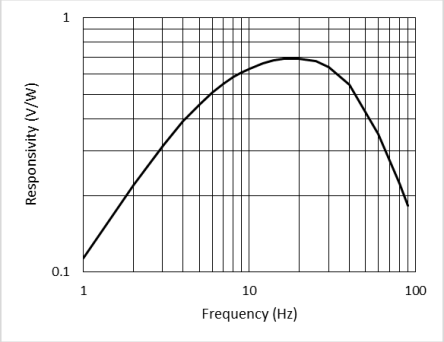


Note: Ensure that the sensor base is not in contact with the PCB in order to avoid shorts.

Recommended Circuit Diagram



Frequency Characteristics



Filters Available

Pyreos has a range of standard filters available.

Part number (replaces)	Channel 1, Channel 2 (tab) **CWL µm / (HPB nm)**	**Use**	Channel 1, Channel 2 **In-Band Responsivity** [1]	**Broadband Responsivity (no filter)**
AFBR-S6PY2626	3.91 / (90), 3.30 / (160)	CH_4	355 000 V/W, 248 000 V/W	167 000 V/W
AFBR-S6PY3151	3.70 / (110), 4.26 / (180)	CO_2	287 000 V/W, 184 000 V/W	167 000 V/W

[1] 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 µm

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

AFBR-S6ATO2HS-DS100