

AFBR-S6PY2626, AFBR-S6PY3151

Thin-Film Pyroelectric Dual-Channel Sensor with High Sensitivity in 3- μm to 5- μm Wavelength Range



Introduction

The Broadcom® range of thin-film pyroelectric infrared (IR) detectors offers fast response and integrated electronics. The built-in transimpedance amplifier circuit produces exceptionally high responsivity.

The high-sensitivity (HS) variant produces high sensitivity in the 3- μm to 5- μm wavelength range, optimizing the spectral performance for CO₂, Methane, and other hydrocarbon gases leading to improved signal-to-noise ratio and closely matched gas and reference channel signal level.

Features

- Thin-film pyroelectric element
- Fast response: ~20-ms thermal time constant
- High responsivity: Integrated transimpedance amplifier
- High-sensitivity (HS) variant optimized for 3- μm to 5- μm wavelength range
- TO-39 package, analog output
- RoHS and REACH compliant

Applications

- NDIR gas detection systems
- Low-power NDIR systems
- Fast-response NDIR systems
- Capnography and anesthetic gas monitoring
- Breath CO₂ measurement
- Methane, hydrocarbon, and flammable gas detection
- Refrigerant gas detection

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause damage to the devices. Limits apply to each parameter in isolation. Absolute maximum ratings are those values beyond which damage to the device may occur if these limits are exceeded for other than a short period of time.

Parameter	Min.	Max.	Unit
Supply Voltage (V+)	—	8.0	V
Operating Temperature	–40	+85	°C
Storage Temperature	–40	+85	°C

Sensor Characteristics

Characteristics are measured at 5V supply voltage and room temperature unless otherwise specified.

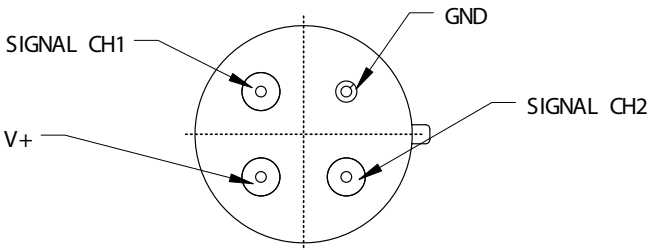
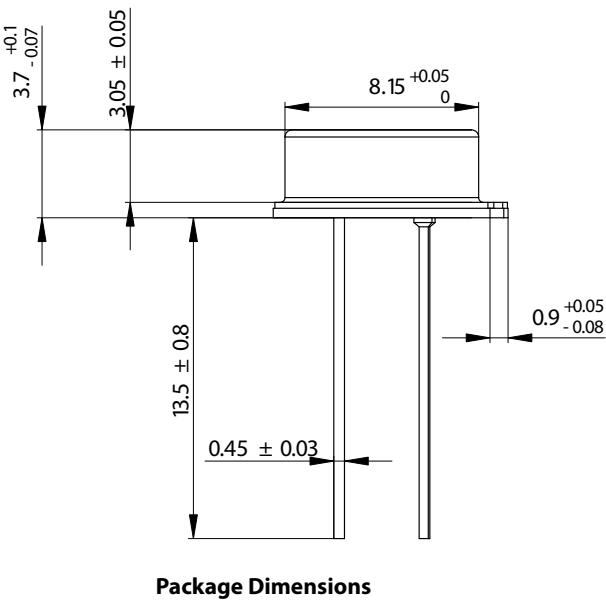
Parameter	Min.	Typ.	Max.	Unit
Filter Aperture	—	2 × 2.6 × 2.6	—	mm
Element Size	—	2 × 1.0 × 1.0	—	mm
Package	—	TO-39	—	—
Responsivity ^{a, b}	—	332,500	—	V/W
Specific Detectivity (D*) ^{a, b}	—	3.02 × 10 ⁸	—	cm $\sqrt{\text{Hz}}$ /W
Noise Spectral Density ^a	—	112	—	$\mu\text{V}/\sqrt{\text{Hz}}$
Supply Voltage (V+)	2.7	—	8.0	V
Supply Current	—	90	—	μA
Time Constant	—	20	—	ms
Signal DC Offset	—	V+/2	—	V
Optical Filters	See Table 1, Product Filter Configurations .			

a. AFBR-S6PY2626 Channel 1: 10 Hz, 500K, room temperature, incident power calculated for 3.865- μm to 3.955- μm wavelength range.

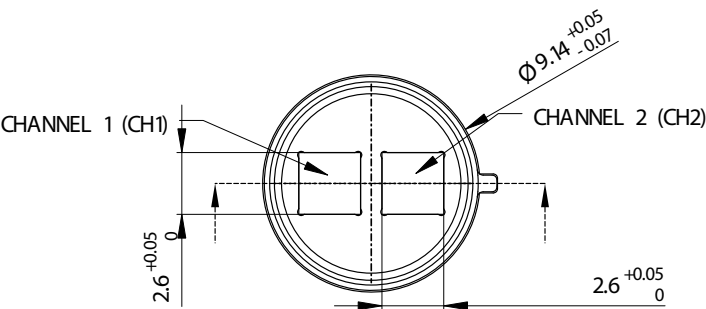
b. In-band responsivity varies with optical filter wavelength. Refer to [Table 1, Product Filter Configurations](#) for product wavelength-specific characteristics.

Package Information

Figure 1: Package Diagrams



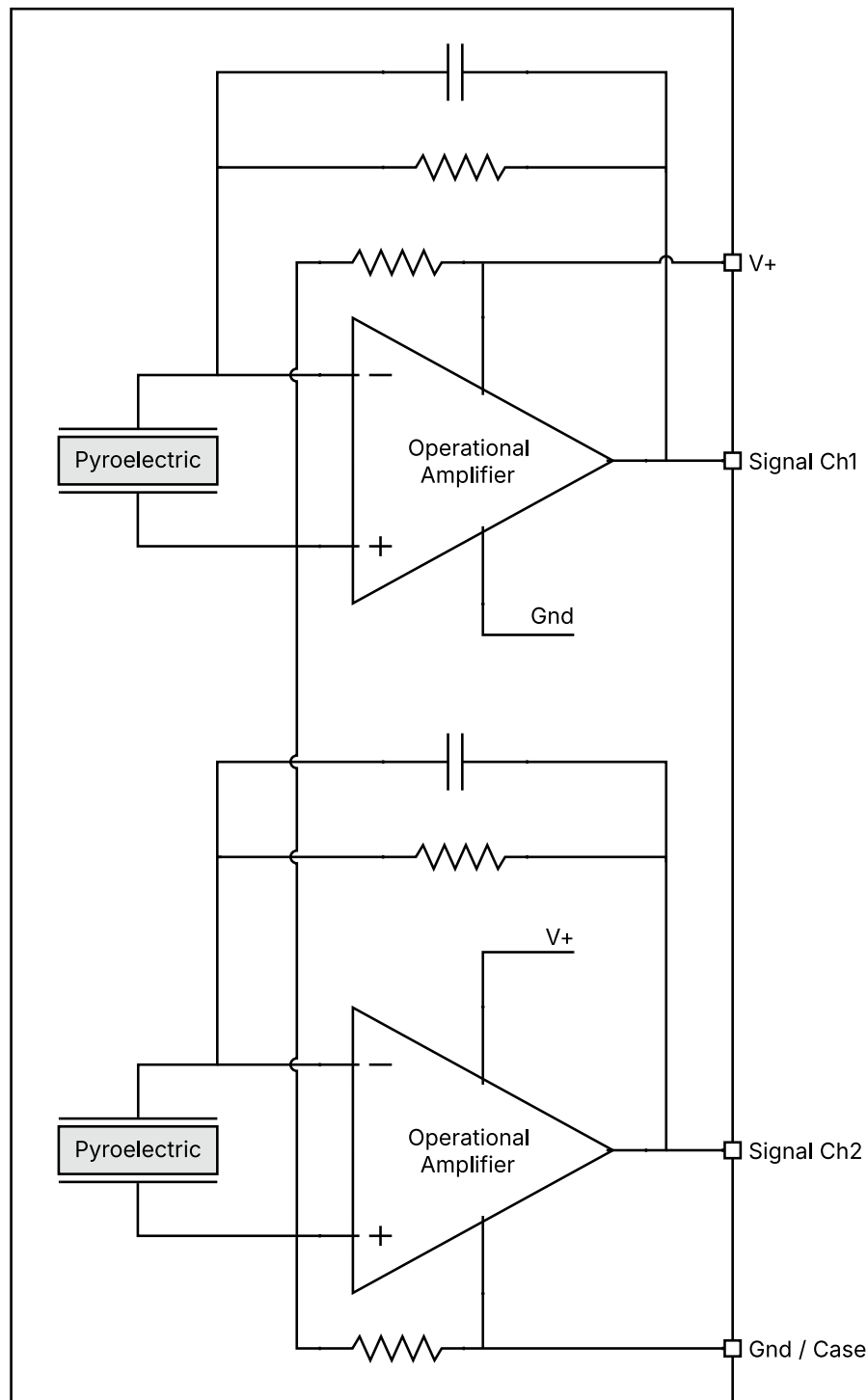
Bottom View



Top View

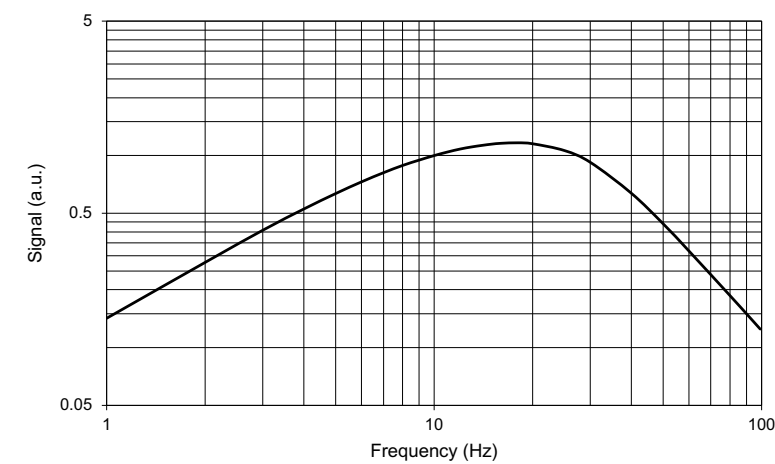
Figure 2: Internal Circuit Schematic

TO-39 Sensor

**NOTE:** To avoid shorts, ensure that the sensor base is not in contact with the PCB.

Frequency Characteristics

Figure 3: Frequency Response



Optical Filters

Broadcom has the following standard filters available.

Table 1: Product Filter Configurations

Part Number	Package Marking	Channel CWL μm/(HPB nm)	Use	In-Band Responsivity ^a	Broadband Responsivity (no filter)
AFBR-S6PY2626	PY2626		CH ₄		178,500 V/W
Channel 1		3.91/(90)		332,500 V/W	
Channel 2		3.30/(160)		248,400V/W	
AFBR-S6PY3151	PY3151		CO ₂		178,500 V/W
Channel 1		3.70/(110)		294,600 V/W	
Channel 2		4.26/(180)		203,900 V/W	

a. For the purpose of calculating the in-band responsivity, the incident radiation power is calculated as a proportion of the 500K blackbody radiation available within the nominal filter wavelength range. For example, for a 3.90/90 filter this would be from 3.865 μm to 3.955 μm.

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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