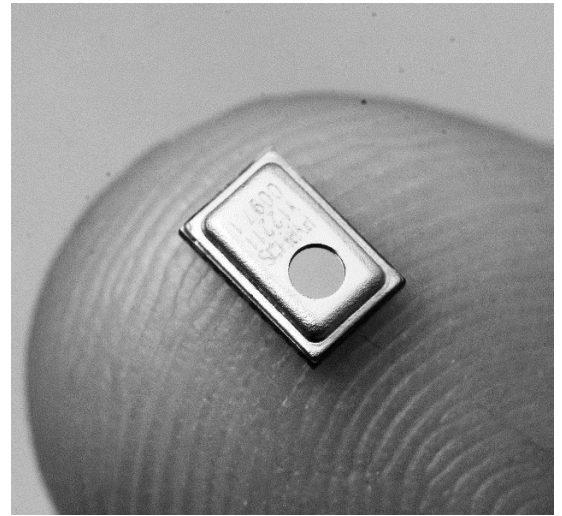


ezPyro™ I²C Pyroelectric Infrared Broadband Sensors (SMD)

Introduction

The ezPyro range of thin film digital pyroelectric IR sensors combines high quality sensors with a high level of configurable electronic integration in a small SMD package. High sensitivity combined with fast response times ensure rapid and accurate detection of target gases. These sensors integrate a digital, current mode read-out that enables lower IR-emitter duty cycles, thereby saving significantly on system level power consumption, while maintaining high SNR. Programmable gain and filtering offer maximum flexibility in system design. Industry standard I²C communication enables plug-and-play connectivity to microcontrollers and allows easy tuning and calibration. ezPyro sensors are very stable over time ensuring a long and maintenance-free operational lifespan. Various optical filter options are available.



To make it easier for customers to use their own optical bandpass filters Pyreos provides sensors with either a 2.5-6 μm or 6-14 μm broadband filter. Optical bandpass filters can be applied in front of these broadband filters.

Sensor Characteristics

| | |
|-------------------------|--------------------------------|
| Filter aperture | d = 1.65 mm |
| Element size | 0.64 x 0.64 mm ² |
| SMD Package | 5.65 x 3.7 x 1.55 mm |
| D* (typ.) ¹ | 2.5 x 10 ⁸ cm√Hz/ W |
| NEP (typ.) ¹ | 2.7 x 10 ⁻¹⁰ W/√Hz |
| Time Constant | ~10ms (10-20 Hz peak) |
| Field of View | ~90° |

Electrical Characteristics

| | |
|-----------------------|-----------------------------------|
| Supply voltage | 1.75 to 3.6 V |
| Supply current (typ.) | 1 to 23 μA |
| Digital I/O | I ² C (FM+ compatible) |
| ADC | 15bit ΔΣ ADC @1ksp |
| Operating Temperature | -40 to +85 °C |
| Storage Temperature | -40 to +110 °C |

| | |
|-----------------|--|
| Sensor read-out | Current mode Gain / digital filtering / sampling rate / power modes |
| Configurable | |

1) Measured without filter @ 500K, 10 Hz, room temperature

Order Information

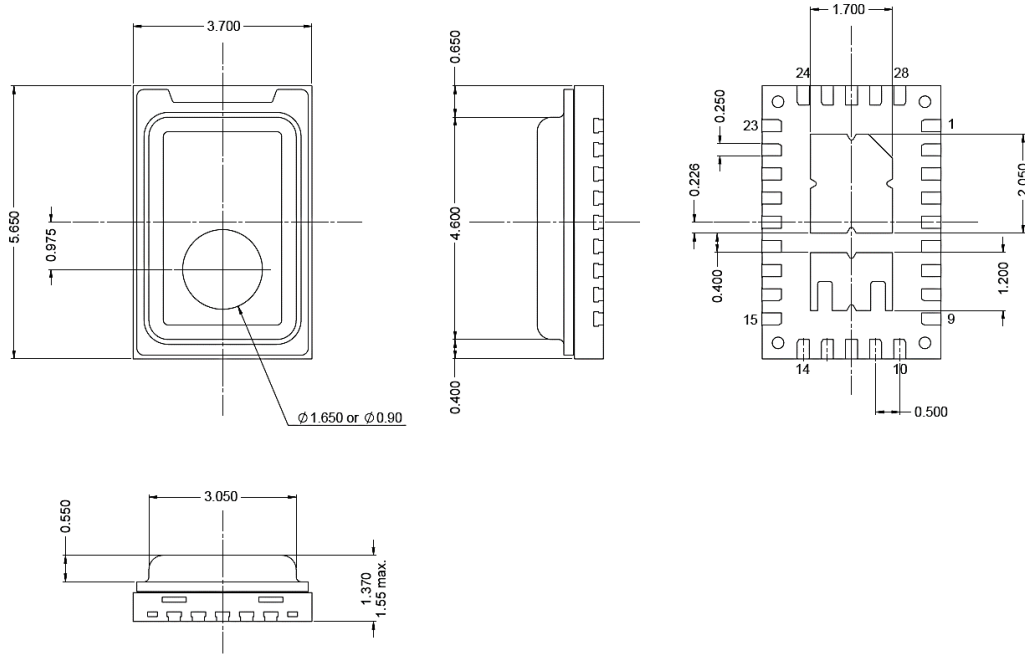
| Part Number | Filter | Filter Bandwidth |
|-------------|------------------|------------------|
| ePY12121 | 2.2 μm Long Pass | 2.5 - 6 μm |
| ePY12111 | 5.0 μm Long Pass | 5 - 14 μm |

| Ordering Code | Description |
|---------------|-------------------------------|
| ePYxxxx-R7 | 800 pcs on 7" tape and reel |
| ePYxxxx-R13 | 4000 pcs on 13" tape and reel |
| ePYxxxx | bulk |
| ePYxxxx-B1 | Sensor on a breakout PCB |

For more information contact: sales@pyreos.com

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Package Information



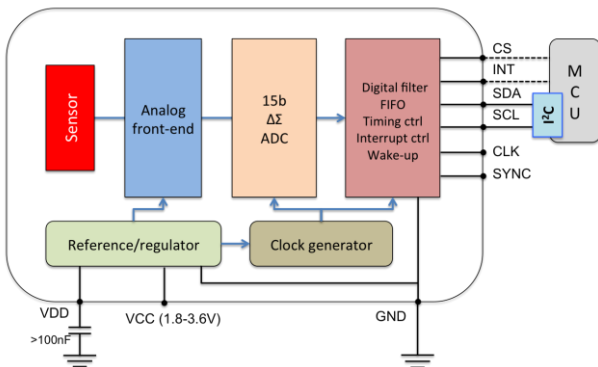
Signal Filtering & Power Modes

| Power Mode (base sample rate) | High Pass Filter – Analog (Hz) | | | | | Fixed Analog Low Pass Filter (Hz) | Fixed Digital Low Pass Filter (Hz) | Digital Low Pass Filter (Hz) | | | | Max ADC Sampling Rate (sps) |
|-------------------------------|--------------------------------|------|------|------|-----|-----------------------------------|------------------------------------|------------------------------|----|-----|------|-----------------------------|
| | Off | 1 | 2 | 4 | 8 | | | 180 | 90 | 45 | 22.5 | |
| Normal Power Mode | Off | 1 | 2 | 4 | 8 | 600 | 250 | 180 | 90 | 45 | 22.5 | 1000 |
| Low Power Mode | Off | 0.17 | 0.33 | 0.66 | 1.3 | 100 | 42 | 30 | 15 | 7.5 | 3.75 | 166 |

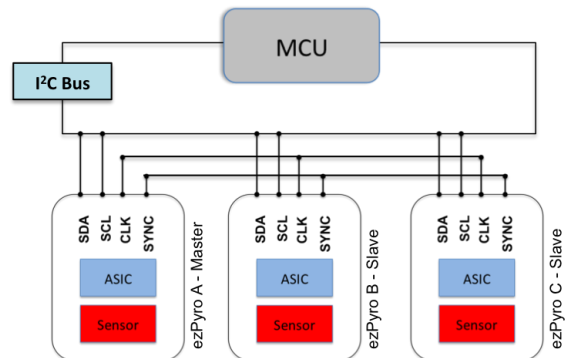
| | Mode | Description | Typical Current Consumption (1.8 V, room temperature) |
|-------------------|-----------------------|--|---|
| Power consumption | Normal Power Mode | Normal power consumption, 1 kHz max. sample rate | 22 μ A |
| | Low Power Mode | Low power consumption, 166 Hz max. sample rate | 3.5 μ A |
| Operational state | Normal Operation Mode | Sensor signal readout over I ² C | 22 μ A |
| | Sleep Mode | Hardware interrupt on infrared trigger | 21 μ A (Normal), 3.5 μ A (Low) |
| | Power Down Mode | Sensor is disabled | 1.1 μ A |

Circuit Diagrams

Single Device Block Diagram



Three Devices with Synchronised Sampling



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Infrared Frequency Characteristics



Typical Frequency Response in Normal Power Mode



Typical Frequency Response in Low Power Mode

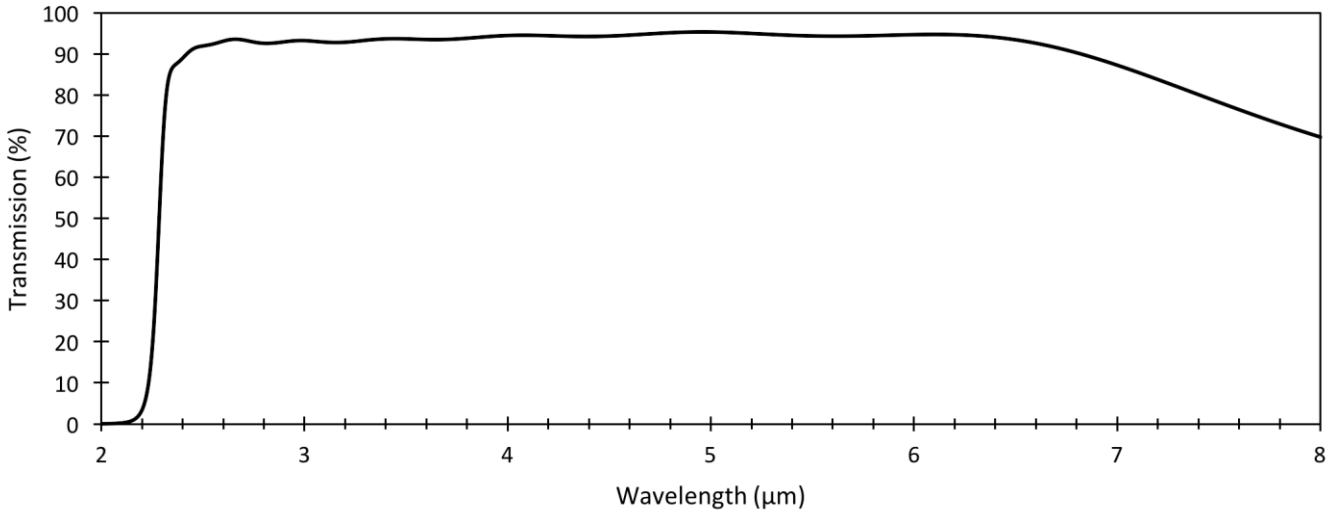


Typical Frequency Response at Different Gain Settings

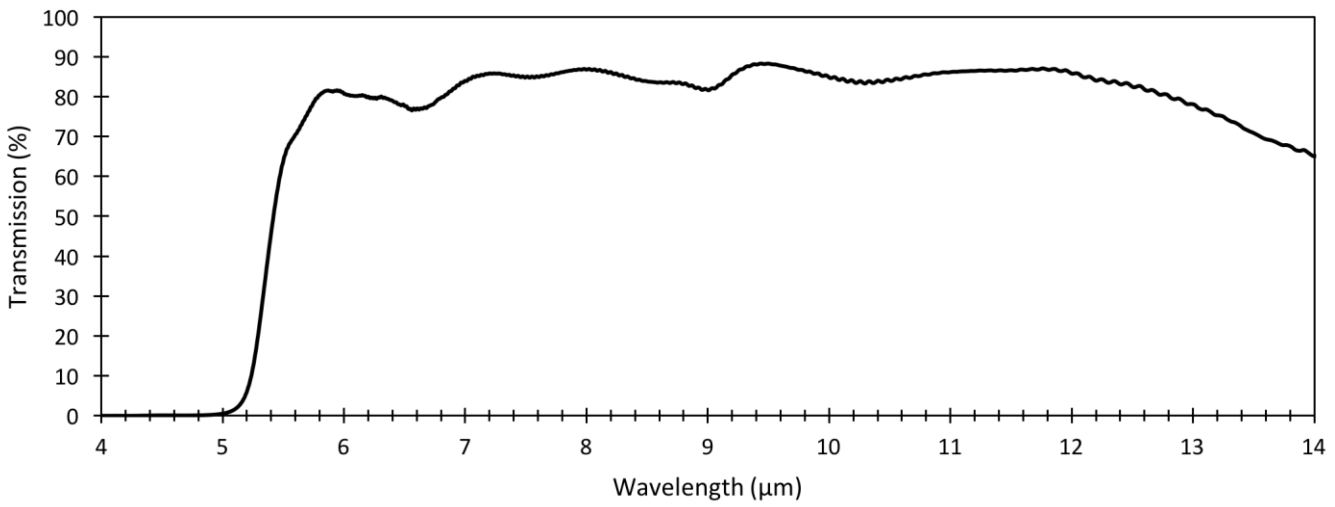
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Filter Transmission Profiles

Typical 2.2 μm LP Filter Transmission



Typical 5.0 μm LP Filter Transmission



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