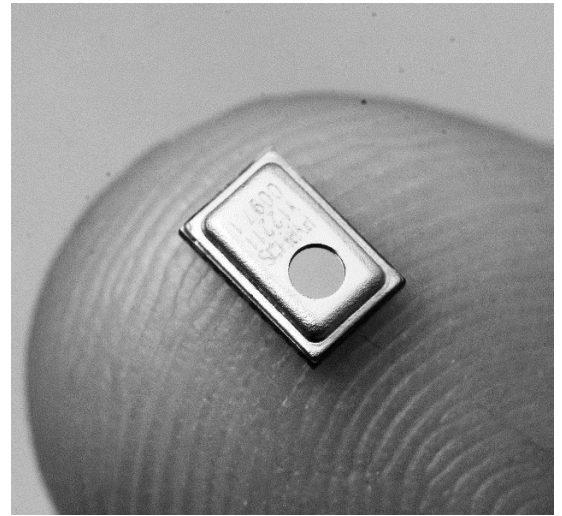


## ezPyro™ I<sup>2</sup>C Pyroelectric Infrared Broadband Sensors (SMD)

### 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 I<sup>2</sup>C 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 <sup>2</sup>    |
| SMD Package             | 5.65 x 3.7 x 1.55 mm           |
| D* (typ.) <sup>1</sup>  | 2.5 x 10 <sup>8</sup> cm√Hz/ W |
| NEP (typ.) <sup>1</sup> | 2.7 x 10 <sup>-10</sup> 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 <sup>2</sup> 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<br>Gain / digital filtering /<br>sampling rate / power<br>modes |
| Configurable    |  |

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

### Order Information

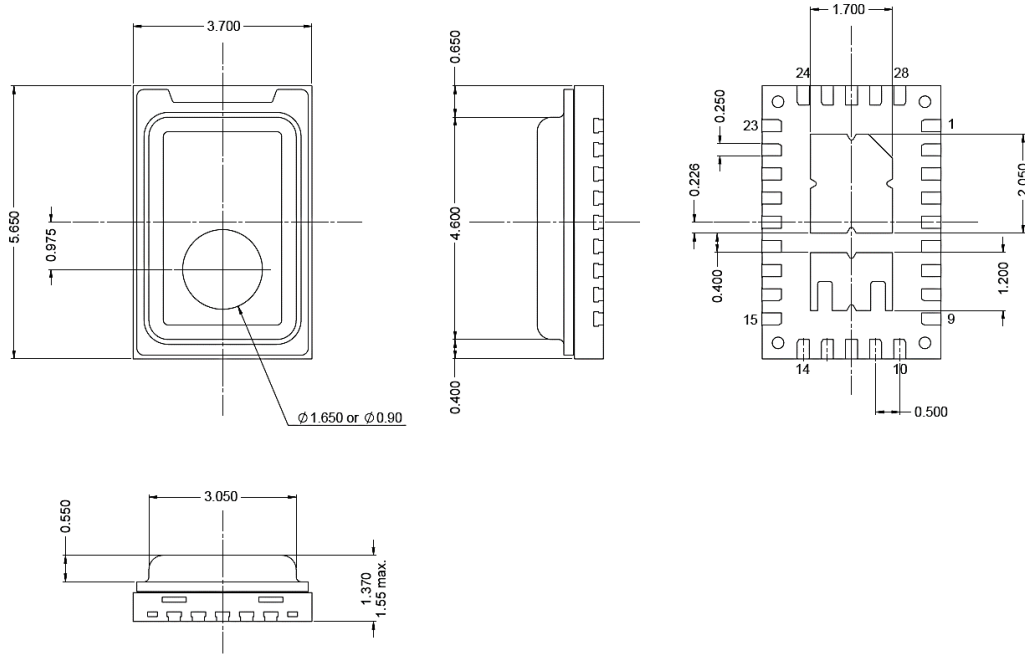
| Part Number | Filter           | Filter Bandwidth |
|-------------|------------------|------------------|
| ePY12121    | 2.2 μm Long Pass | 2.5 - 6 μm       |
| ePY12111    | 5.0 μm Long Pass | 5 - 14 μm        |

| 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](mailto:sales@pyreos.com)

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## Package Information



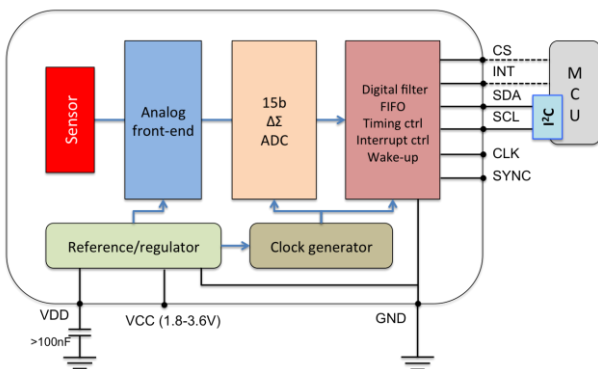
## Signal Filtering & Power Modes

| 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 |                             |
| <b>Normal Power Mode</b>      | Off                            | 1    | 2    | 4    | 8   | 600                               | 250                                | 180                          | 90 | 45  | 22.5 | 1000                        |
| <b>Low Power Mode</b>         | Off                            | 0.17 | 0.33 | 0.66 | 1.3 | 100                               | 42                                 | 30                           | 15 | 7.5 | 3.75 | 166                         |

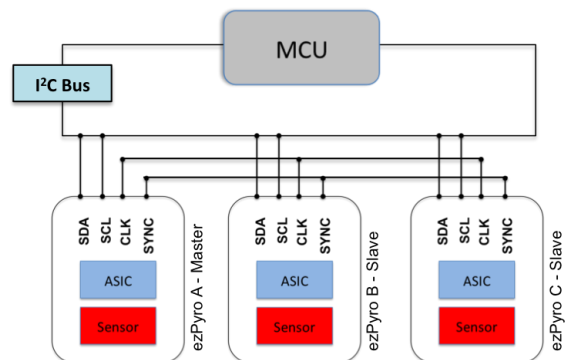
|                   | Mode                  | Description                                      | Typical Current Consumption (1.8 V, room temperature) |
|-------------------|-----------------------|--|---|
| Power consumption | Normal Power Mode     | Normal power consumption, 1 kHz max. sample rate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

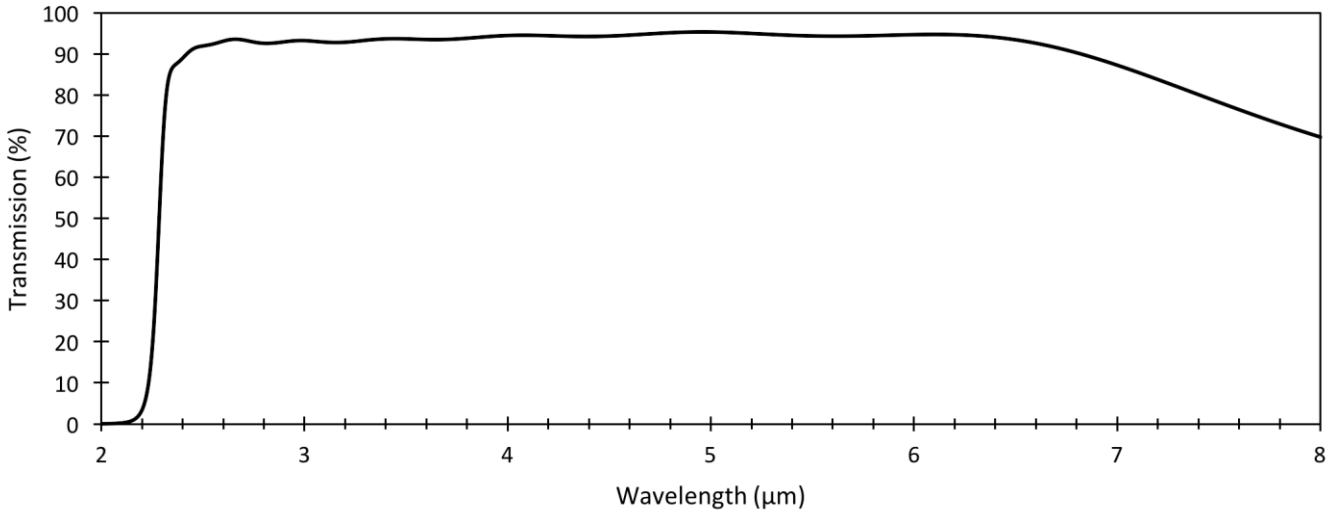


**Typical Frequency Response at Different Gain Settings**

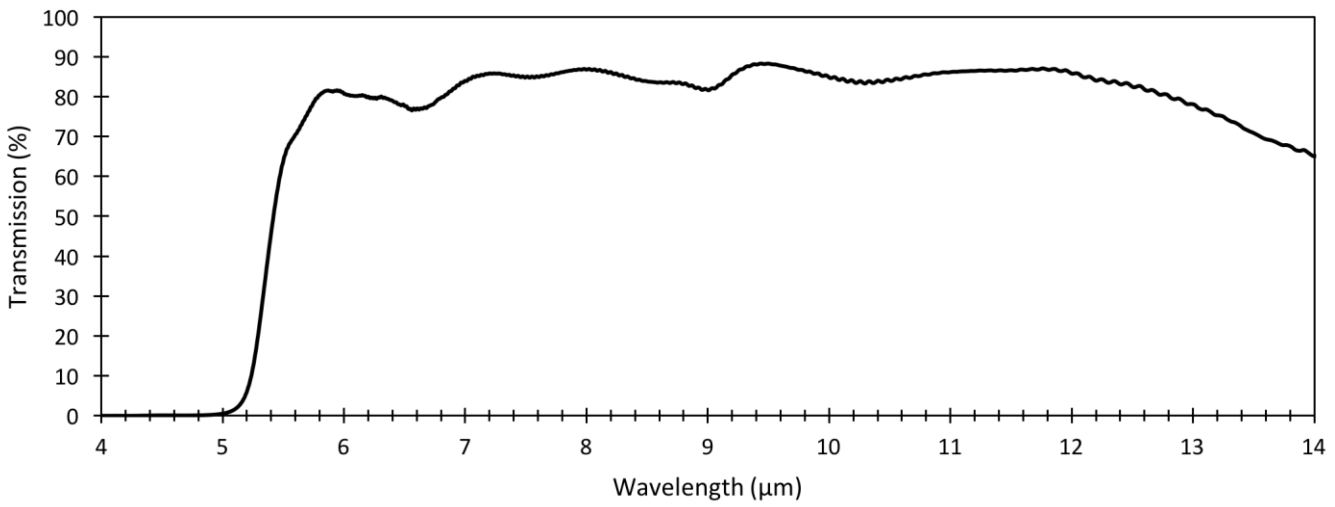
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**Filter Transmission Profiles**

Typical 2.2  $\mu\text{m}$  LP Filter Transmission



Typical 5.0  $\mu\text{m}$  LP Filter Transmission



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