

ezPyro™ I²C Pyroelectric Infrared Motion Sensor (SMD)

Introduction

The ezPyro range of thin film digital pyroelectric IR sensors for motion detection 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 motion detection. High dynamic range allows motion detection nearby or over larger distances. 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. These sensors can also be daisy-chained to allow synchronized sampling across devices and offer various low power modes, including a wake-up by motion feature.



The 2x2 pixel version of this device allows users to determine direction of motion.

Sensor Characteristics

Filter aperture	d = 1.65
Element size	1 pixel device: 0.41 mm ² 4 pixel device: 4x 0.057 mm ²
SMD Package	5.65 x 3.7 x 1.55 mm
D* (typ.) ¹ (cm√Hz/ W)	1 pixel device: 2.5 x 10 ⁸ 4 pixel device: 5.5 x 10 ⁸
NEP (typ.) ¹ (W/√Hz)	1 pixel device: 2.7 x 10 ⁻¹⁰ 4 pixel device: 0.4 x 10 ⁻¹⁰
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 65 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

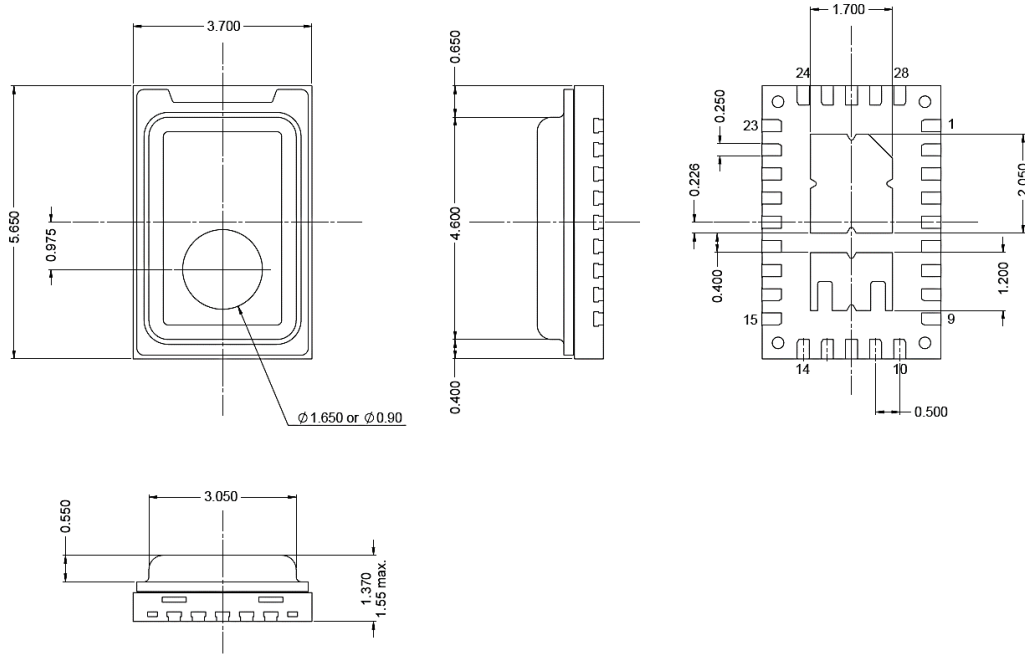
Part Number	Pixels	Filter μm
ePY22111	1	5.0 Long Pass
ePY22114	2x2	5.0 Long Pass

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

For more information contact: sales@pyreos.com

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Package Information



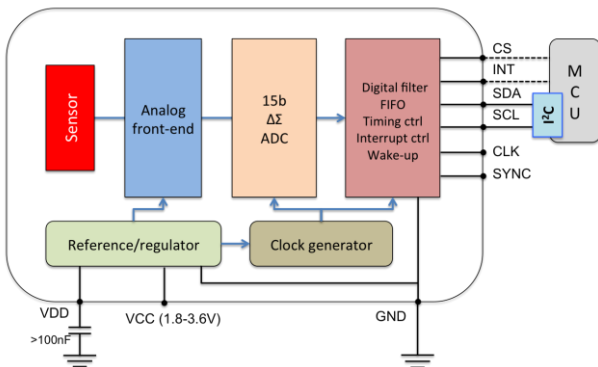
Signal Filtering & Power Modes

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

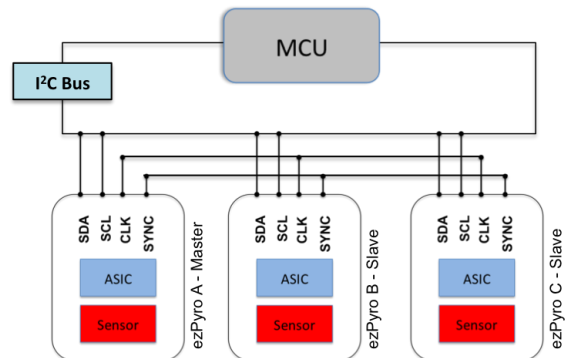
	Mode	Description	Typical Current Consumption (1.8 V, room temperature)
Power consumption	Normal Power Mode	Normal power consumption, 1 kHz max. sample rate	22 μ A (single pixel), 61 μ A (2x2)
	Low Power Mode	Low power consumption, 166 Hz max. sample rate	3.5 μ A (single pixel), 7.5 μ A (2x2)
Operational state	Normal Operation Mode	Sensor signal readout over I ² C	22 μ A (single pixel), 61 μ A (2x2)
	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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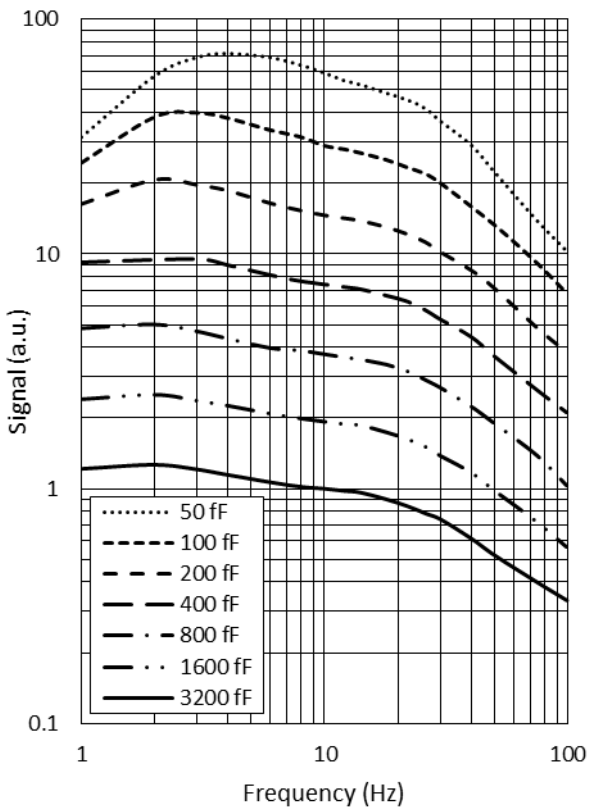
Infrared Frequency Characteristics



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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