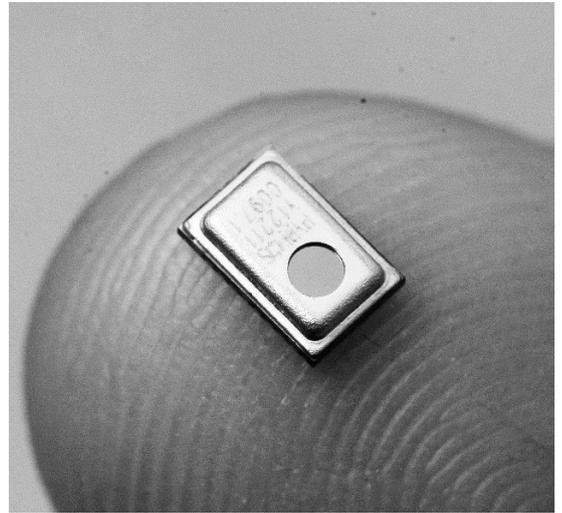


## ezPyro™ SMD I<sup>2</sup>C Pyroelectric Infrared Sensor for Gas Sensing

### Introduction

The ezPyro™ range of thin film digital pyroelectric IR sensor for gas detection and concentration measurement 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. These sensors can also be daisy-chained to allow synchronized sampling across devices.



#### 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 <sup>√</sup> 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

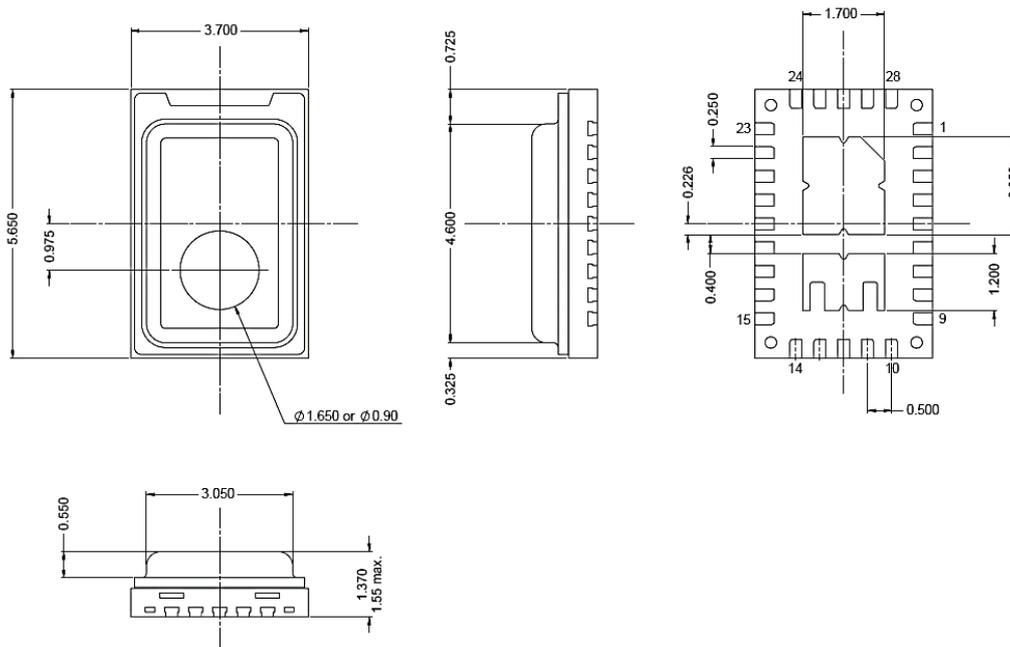
Supply voltage	1.75 to 3.6 V
Supply current (typ.)	1 to 23 μA
Digital I/O	I <sup>2</sup> C (FM+ compatible)
ADC	15bit ΔΣ ADC @1ksp
Operating Temperature	-40 to +85 °C
Storage Temperature	-40 to +110 °C
Sensor read-out	Current mode Gain / digital filtering / sampling rate / power modes
Configurable	

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

### Order Information

Part Number	Marking	Filter μm	Filter BW μm	Gas	Package Size
AFBR-S6EPY12211R	Y12211	3.91	90	Reference	800 pcs on 7-in. tape and reel
AFBR-S6EPY12231R	Y12231	4.26	180	CO <sub>2</sub>	800 pcs on 7-in. tape and reel

## Package Information



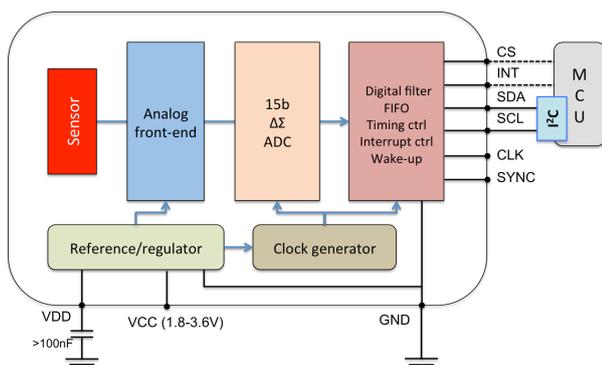
## Signal Filtering & Power Modes

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

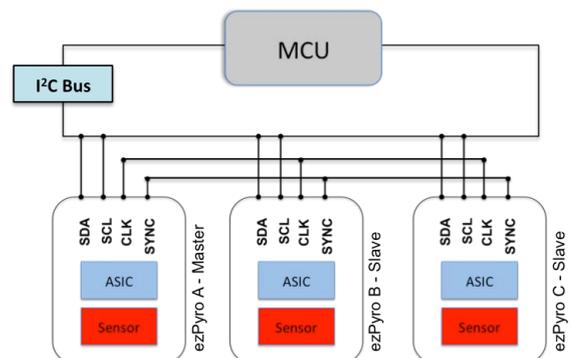
	Mode	Description	Typical Current Consumption (1.8 V, room temperature)
Power consumption	Normal Power Mode	Normal power consumption, 1 kHz max. sample rate	22 $\mu$ A
	Low Power Mode	Low power consumption, 166 Hz max. sample rate	3.5 $\mu$ A
Operational state	Normal Operation Mode	Sensor signal readout 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

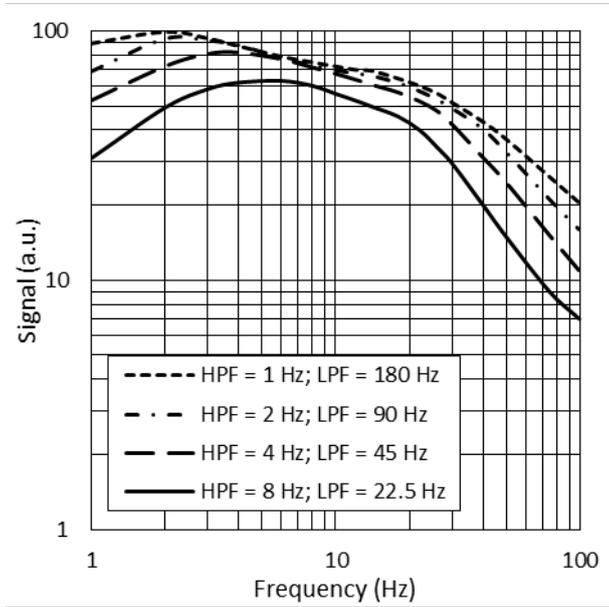
### Single Device Block Diagram



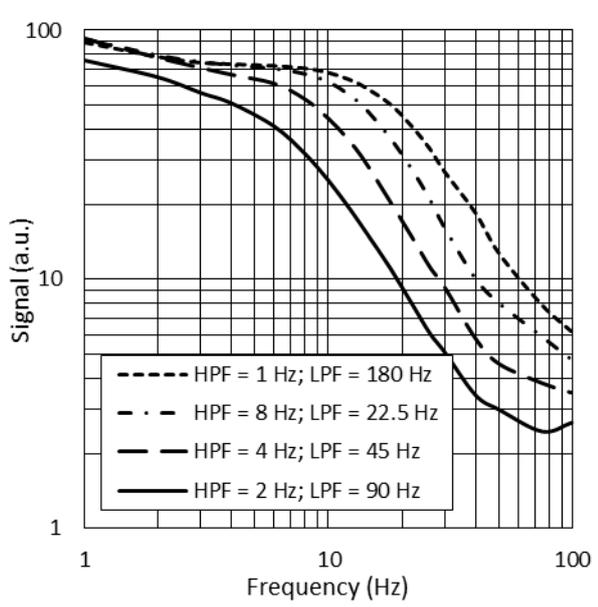
### Three Devices with Synchronised Sampling



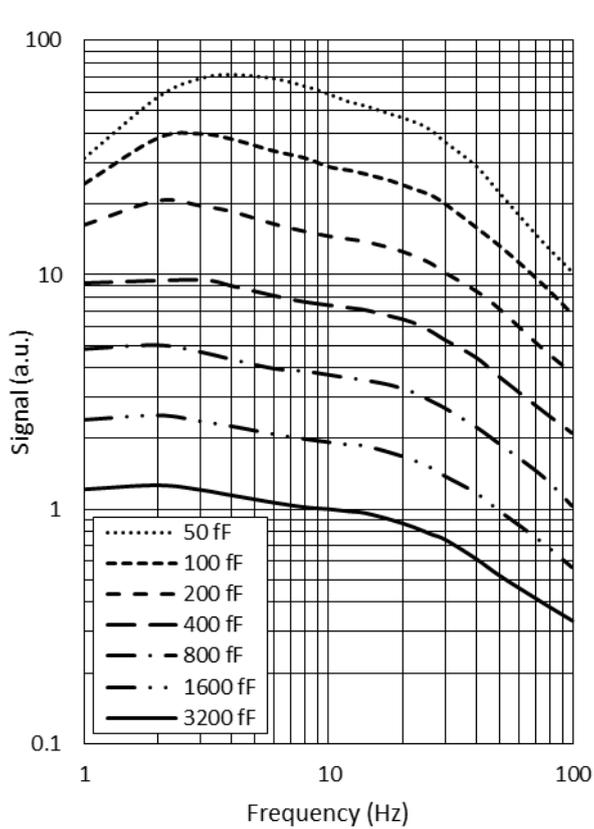
## Infrared Frequency Characteristics



**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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AFBR-S6EPYSMD-GA-DS100