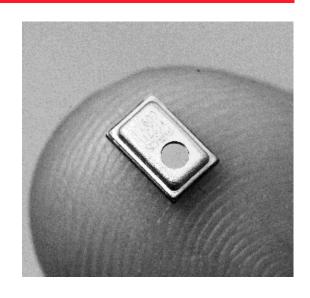


# ezPyro™ SMD I2C Pyroelectric Infrared Flame Sensor

### Introduction

The Broadcom® ezPyro™ thin film digital pyroelectric IR sensors for flame detection combine 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 flame detection. The high dynamic range allows detection of small and large flames, nearby or over larger distances. These sensors integrate a digital, current mode read-out offering high responsivity over the full frequency range of the flame flicker (3 to 30 Hz). 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. These 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 and offer various low-power modes.

<b>Sensor Charact</b>	teristics
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.) 1	$2.5 \times 10^8 \text{ cm}\sqrt{\text{Hz}/\text{ W}}$
NEP (typ.) 1	2.7 x 10 <sup>-10</sup> W/√Hz
Time Constant	~10ms (10-20 Hz peak)
Field of View	~90°

<b>Electrical Characteris</b>	tics
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 Readout	Current mode
Configurable	Gain / digital filtering / sampling rate / power modes

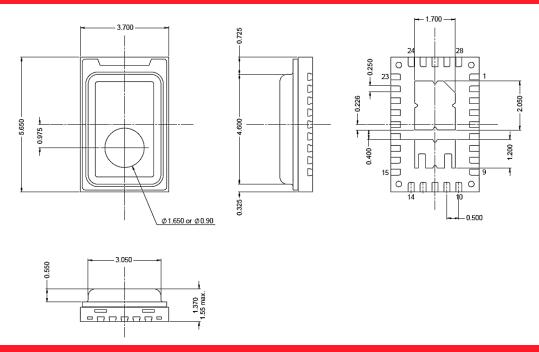
<sup>1)</sup> Measured without a filter @ 500K, 10 Hz, room temperature

### **Order Information**

Part Number	Marking	Filter µm	Filter BW µm	Comment	Package Size
AFBR-S6EPY12111R	Y12111	5.00	Long Pass	Human motion rejection	800 pcs on 7-in. tape and reel
AFBR-S6EPY12211R	Y12211	3.91	90 nm	Rejection channel	800 pcs on 7-in. tape and reel
AFBR-S6EPY12251R	Y12251	4.48	620 nm	Flame channel (main)	800 pcs on 7-in. tape and reel



# **Package Information**



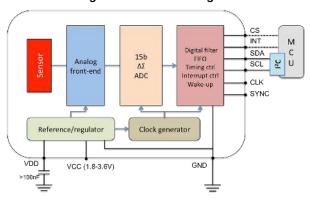
# **Signal Filtering & Power Modes**

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)				
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

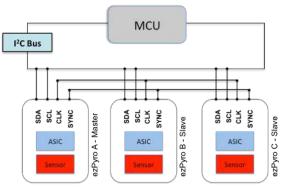
	Mode	Description	Typical Current Consumption (1.8 V, room temperature)		
Power	Normal Power Mode	Normal power consumption, 1 kHz max. sample rate	22 μΑ		
Consumption Low Power Mode		Low power consumption, 166 Hz max. sample rate	3.5 μΑ		
	Normal Operation Mode	Sensor signal readout over I <sup>2</sup>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

# **Circuit Diagrams**

### Single Device Block Diagram

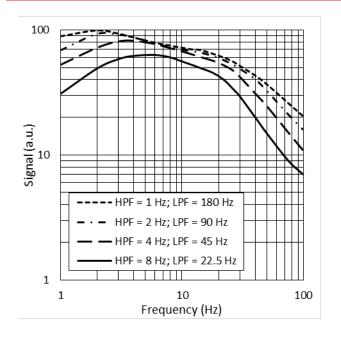


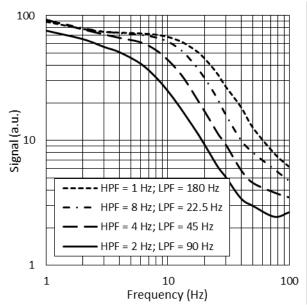
### Three Devices with Synchronized Sampling





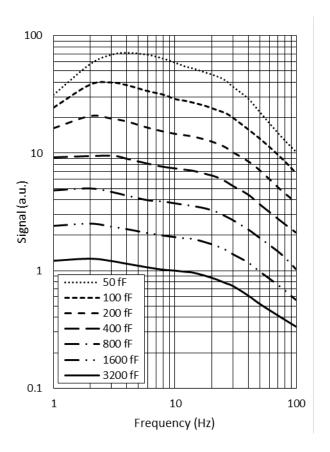
## **Infrared Frequency Characteristics**





**Typical Frequency Response in Normal Power Mode** 





**Typical Frequency Response at Different Gain Settings** 

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