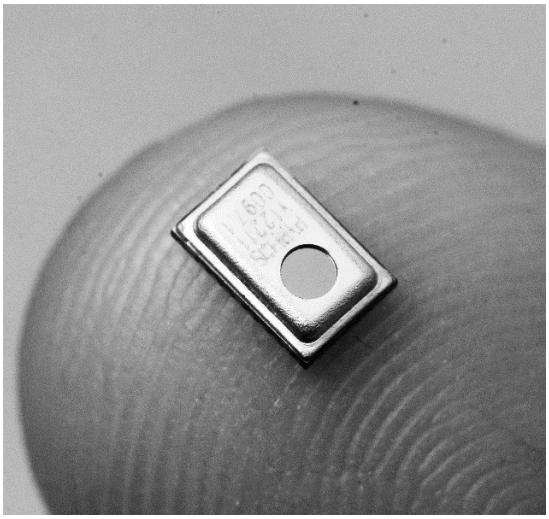
ezPyro™ SMD I²C Pyroelectric Infrared Flame Sensor

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 I²C 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.

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°

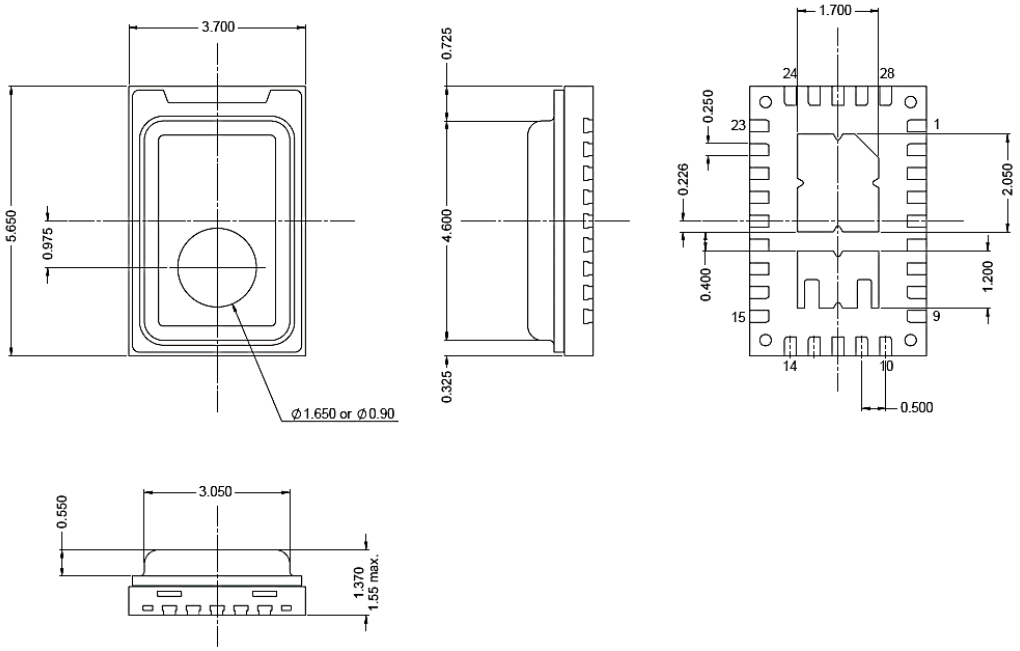
Electrical Characteristics	
Supply Voltage	1.75 to 3.6 V
Supply Current (typ.)	1 to 23 µA
Digital I/O	I²C (FM+ compatible)
ADC	15bit ΔΣ ADC @1ksp
Operating Temperature	–40 to +85 °C
Storage Temperature	–40 to +110 °C
Sensor Readout	Current mode
Configurable	Gain / digital filtering / sampling rate / power modes

1) 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



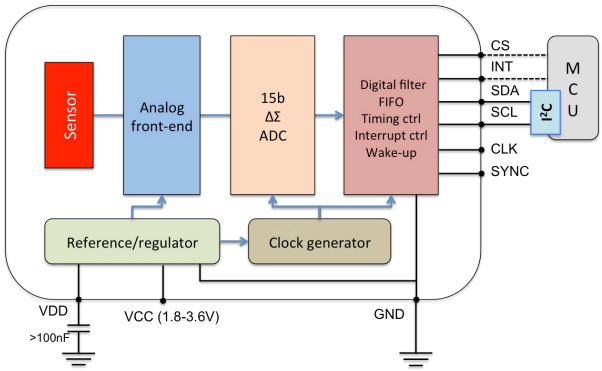
Signal Filtering & Power Modes

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

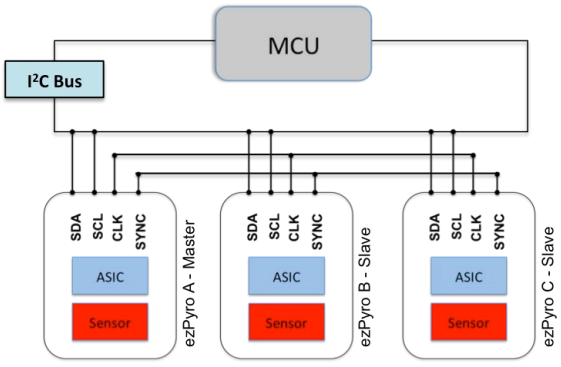
	Mode	Description	Typical Current Consumption (1.8 V, room temperature)
Power Consumption	Normal Power Mode	Normal power consumption, 1 kHz max. sample rate	22 µA
	Low Power Mode	Low power consumption, 166 Hz max. sample rate	3.5 µA
Operational State	Normal Operation Mode	Sensor signal readout over I²C	22 µA
	Sleep Mode	Hardware interrupt on infrared trigger	21 µA (Normal), 3.5 µA (Low)
	Power Down Mode	Sensor is disabled	1.1 µA

Circuit Diagrams

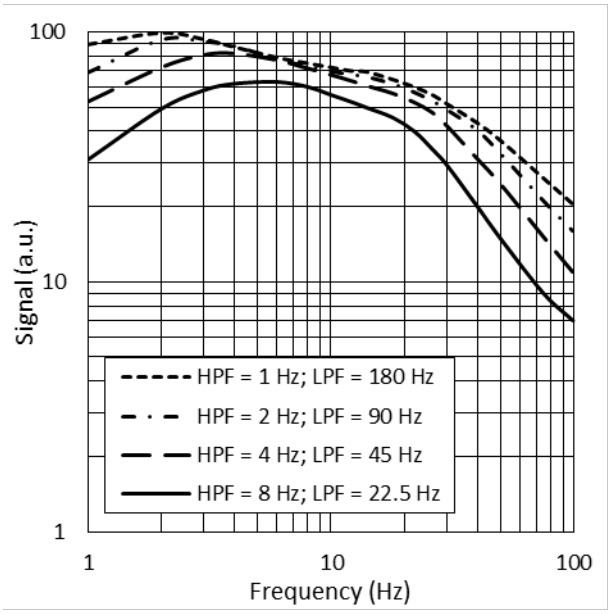
Single Device Block Diagram



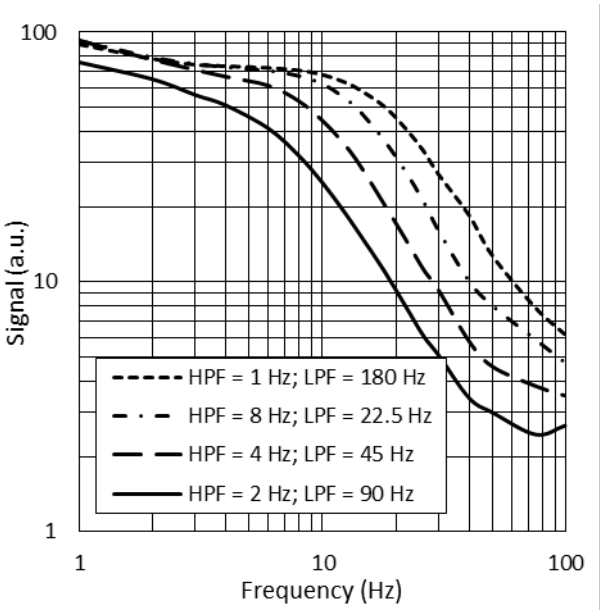
Three Devices with Synchronized Sampling



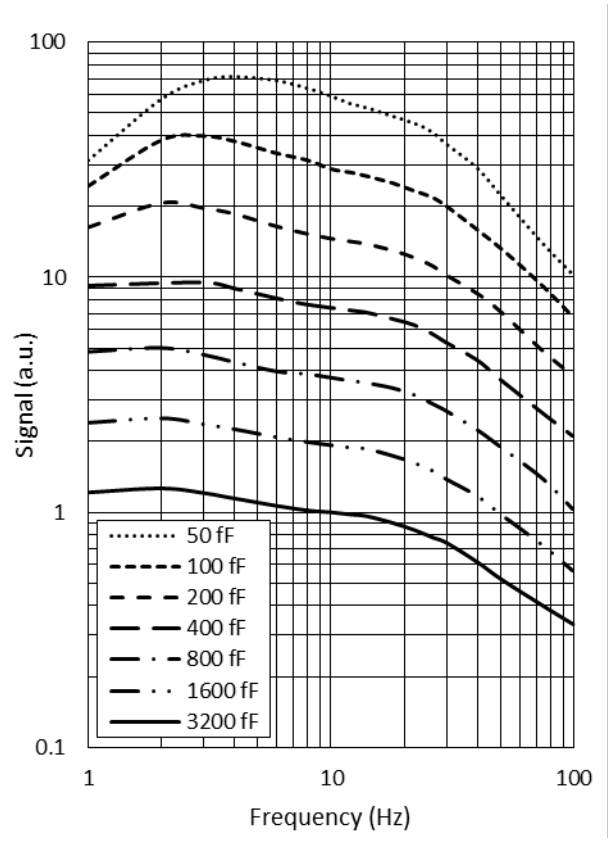
Infrared Frequency Characteristics



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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