

# Datasheet Dual Integrated Sensor Type HID E22x F1 F2 Gx (PWM)



## Features and Benefits

- Thermopile Sensor with ASIC in 4-pin TO-5/TO-39 housing
- 2 IR channels with low noise chopper amplifiers and programmable gain
- Digital voltage output (via SMBus compatible RAM access)
- Selectable for hardwired preset to 3V or 5V supply voltage
- Complies with ROHS regulations

## Ordering Information

HID : Heimann thermopile sensors and ASIC in TO-5 housing

E22 : ->„E“ cap with 2 filter openings ;

->„22“ two thermopile sensors of type TP2

x : ASIC supply voltage ->„4“ : 5V ; ->„5“ : 3V

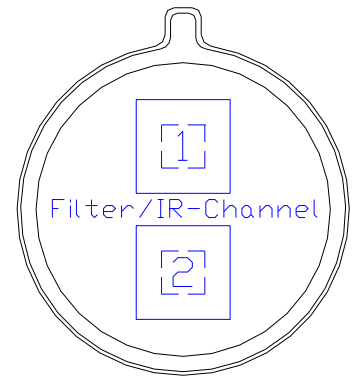
F1 : Filter 1 of IR channel 1, selection acc. to filter list

F2 : Filter 2 of IR channel 2, selection acc. to filter list

Gx : gain setting selectable x=25/50/100

PWM : optional: „PWM“ output - SDA/PWM-pin adusted to pulse width modulation

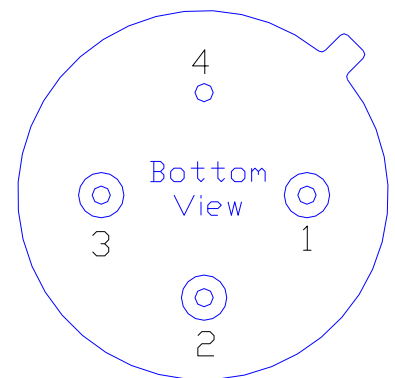
e.g. HID E224 F3.91-90 F4.26-180 G100



Filter Selection (Please contact Heimann customer service for special filter requirements)		
Filter Type	Application	Specification
F5.30-180	NO gas detection	NBP CWL 5.30µm HPB 180nm
F4.64-180	CO gas detection	NBP CWL 4.64µm HPB 180nm
F4.43-60	CO2 gas detection	NBP CWL 4.43µm HPB 60nm
F4.26-180	CO2 gas detection	NBP CWL 4.26µm HPB 180nm
F4.27-90	CO2 gas detection	NBP CWL 4.27µm HPB 90nm
F3.91-90	gas reference	NBP CWL 3.91µm HPB 90nm
F3.37-190	HC gas detection	NBP CWL 3.375µm HPB 190nm
F3.30-160	HC gas detection	NBP CWL 3.30µm HPB 160nm

## Pin Configuration

Pin	Sym	Description
1	SCL	Digital input , serial clock in SMBus compatible mode
2	VDD	Positive supply voltage
3	SDA/ PWM	Digital I/O , data input /output in SMBus compatible mode (open drain), pulse width modulated temperature(s) in PWM mode
4	VSS	Negative supply voltage / Ground (0V) (connected to housing)



## Maximum Ratings

Parameter	Max. value	Unit	Condition
Supply voltage 1 VDD	7	V	Type 5V
Supply voltage 2 VDD	5	V	Type 3V
Reverse voltage	0.4	V	Ground
ESD sensitivity	2	kV	Human body
Storage temperature	-40.. 125	°C	

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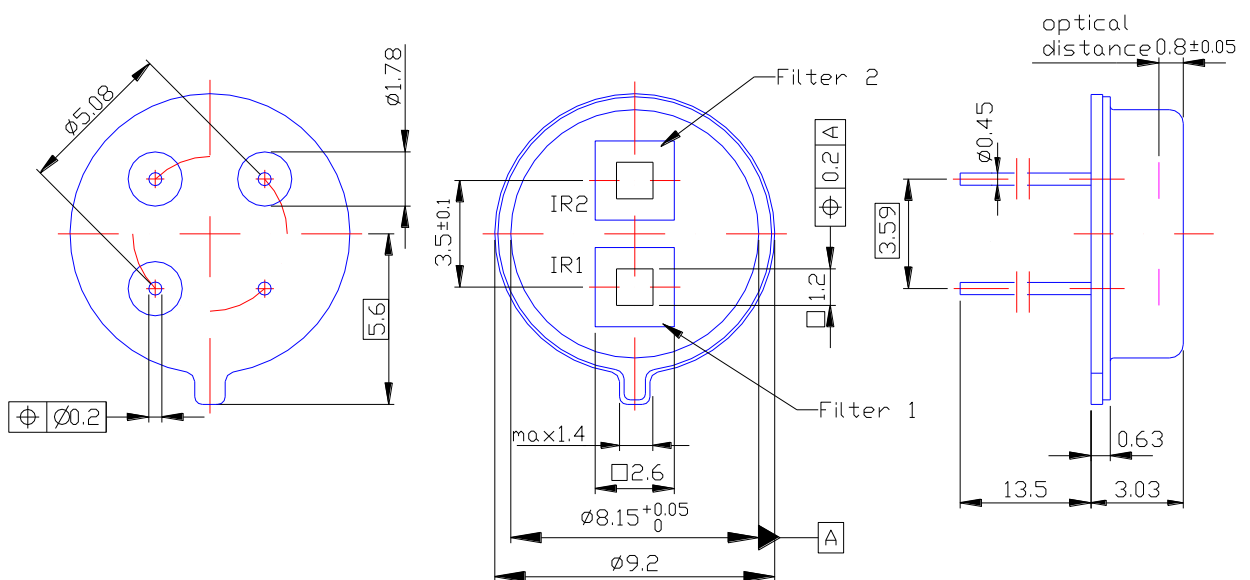
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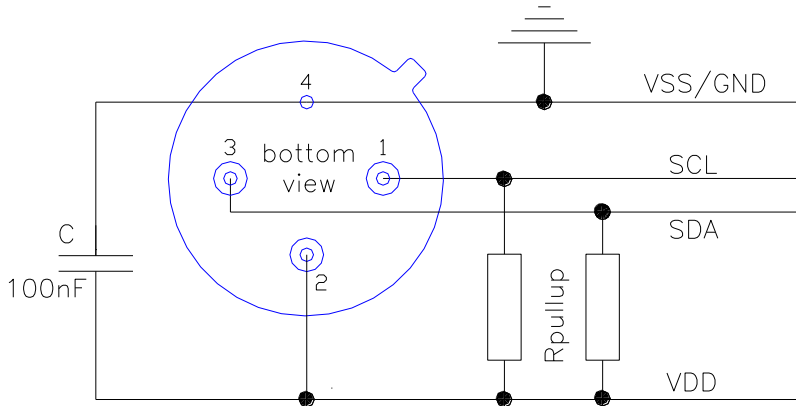
## Operating Conditions

Parameter	Typical Value	Unit	Condition
Supply voltage 1 VDD	5	V	Preset option "x -> 4"
Supply voltage 2 VDD	3	V	Preset option "x -> 5"
Supply voltage VSS	0	V	Ground
Supply current	1	mA	Without load
Start up time after POR	0.15	sec	
Sensor absorbing area	1.2 x 1.2	mm <sup>2</sup>	Sensor type TP2
Sensitivity thermopile sensor	38	V/W	Sensor chip, 500K, 1Hz
Voltage response thermopile sensor	55	Vmm <sup>2</sup> /W	Sensor chip
Gain factor preset	25/50/100	V/V	
ADC resolution	17	Bit	ADC <sub>REF</sub> = 1.2V (typ.)
ADC differential input voltage range	-0.4 .. 0.4	V	ADC <sub>REF</sub>
Voltage resolution	0.0293	mV/step	RAM cells V <sub>TP</sub>
Response time / Refresh rate IR1/IR2	8 / 100/140	ms	Sensor chip / Digital out
Temperature sensor range	-40 .. +125	°C	RAM T <sub>A</sub>
Slave address	5Ah	hex	Factory default
Operating temperature range	-40.. 125	°C	
Interface (EEPROM Configuration )	2-wire SMBus compatible, output preset to open drain NMOS		
	1-wire PWM output, 10 bit resolution, output configurable to push-pull or open drain		

## Dimensional Drawing

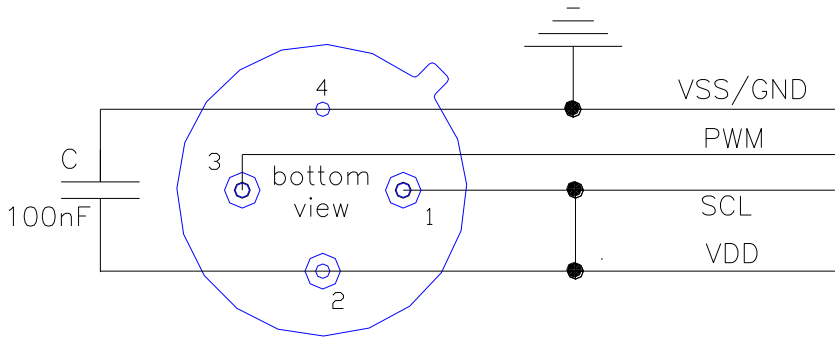


**Applications Circuitry SM-Bus Operation**



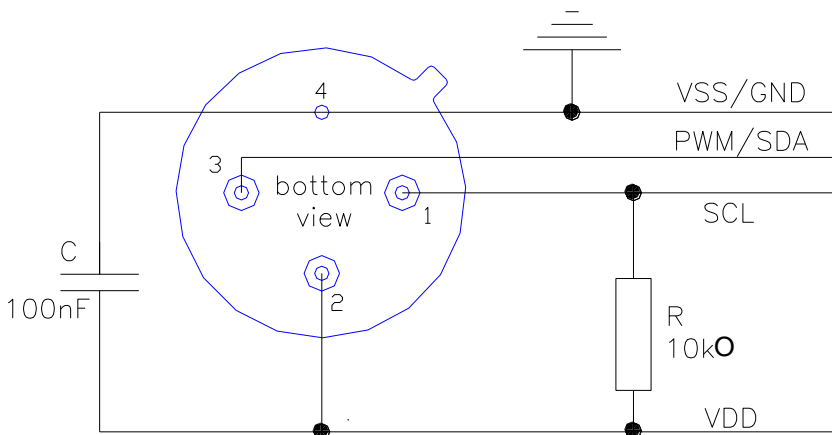
Pull-up resistor recommendation:  
 low power applications  
 20kOhm (SM-Bus DC specification  $I_{pullup}$  100 $\mu$ A .. 350 $\mu$ A)  
 high power applications  
 1.5kOhm (SM-Bus DC specification  $I_{pullup}$  min. 4mA)

**Applications Circuitry PWM Operation**



PWM mode is free running after power on.  
 Pin 3 (SCL) must be forced high for PWM mode  
 PWM output is configured as push pull  
 Default PWM output of object temperature 1

**Applications Circuitry PWM Operation with SM-Bus Option**



PWM mode is free running after power on.  
 SM-Bus operation available by added pull-up resistor  
 PWM output is configured as push pull  
 Default PWM output of object temperature 1

## Application Hints

### **Sensor voltage readout for gas application**

For gas applications it is recommended to readout sensor voltages by RAM access on address 04h for thermopile sensor 1 and on address 05h for thermopile sensor 2. The supplied voltages have gain factor included.

The sensor voltages can be calculated from RAM content based on following equations:

$$\text{VTP\_reg} < 32768 \text{ (0x8000)} : \text{VTP1[mV]} = \text{VTP\_reg} * 0.02932$$

$$\text{VTP\_reg} \geq 32768 \text{ (0x8000)} : \text{VTP1[mV]} = (\text{VTP\_reg} - 32768) * -0.02932$$

Please note that ADC differential input voltage range is limited from -0.4V to 0.4V.

### **Sensor temperature readout**

The actual sensor temperature is provided on RAM address 06h. The sensor die temperature is measured with a PTAT element. All the sensor conditioning and data processing is handled on-chip and the linearized sensor die temperature  $T_A$  is made available in RAM memory. The resolution of the calculated temperature is 0.02 °C. The sensor is factory calibrated for the temperature range (-40 to 125 °C). In RAM cell 006h, 2DE4h corresponds to -38.2 °C (linearization output lower limit) and 4DC4h (19908d) corresponds to 125 °C. The conversions from RAM content to real  $T_A$  can be done using the following relation:

$$T_A [\text{°K}] = T_{A\_reg} * 0.02 \rightarrow 0.02 \text{ °K / LSB}$$

### **PWM output**

Sensor voltages cannot be supplied by PWM output. There are only data provided derived from sensor output voltage and sensor die temperature in case of PWM.

## Disclaimer

Changes or modifications at the product which haven't influence to the performance and/or quality of the device haven't to be announced to the customers in advance. Customers are requested to consult with Heimann Sensor representatives before the use of Heimann Sensor products in special applications where failure or abnormal operation may directly affect human lives or cause physical injury or property damage. The company or their representatives will not be responsible for damage arising from such use without prior approval.