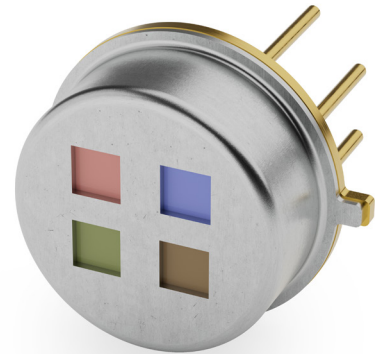


# MPS4SENS

Four channel premium pyroelectric detector with high signal-noise-ratio



## Applications

- NDIR gas analysis
- Gas monitoring

## Product benefits

- Higher precision and signal-noise-ratio
- Less sensitive to external interference due to internal signal amplification
- Less influence of temperature fluctuations due to low thermal mass
- Higher read-out rate up to 100 Hz
- Short response time
- High end solution for demanding applications

## Additional product information

The absorption of the incident infrared radiation forms a temperature gradient across the detector membrane. Due to the pyroelectric properties of the sensor material, this temperature change is converted into a charge change which can be measured at the electrodes of the sensor chip. Micro-Hybrid's CPM (ceramic pyroelectrical material) pyroelectric detectors use sensitive elements based on MEMS technology.

## Features

- 4 chips with MEMS based CPM membrane
- Broad spectral sensitivity 2 – 15  $\mu\text{m}$ , optimized from 3 - 5  $\mu\text{m}$
- High responsivity with modulation frequency up to 100 Hz
- Low microphone effect referring to low membrane mass
- Very low temperature dependence
- Amplified signal in current mode

The pyroelectric element consists of a approximately 0.5  $\mu\text{m}$  thick thinfilm CPM mounted on a modified silicon-based membrane which is produced by a DRIE back-etch process. The front electrode is optically transparent allowing infrared radiation to be absorbed by the active area. This area has a broad absorption range from 2 – 15  $\mu\text{m}$ .

**Online shop for IR components and sensors**

Filter products simply by selecting the desired properties and request your quotation.

 [microhybrid.com/shop](https://microhybrid.com/shop)



## Technical data

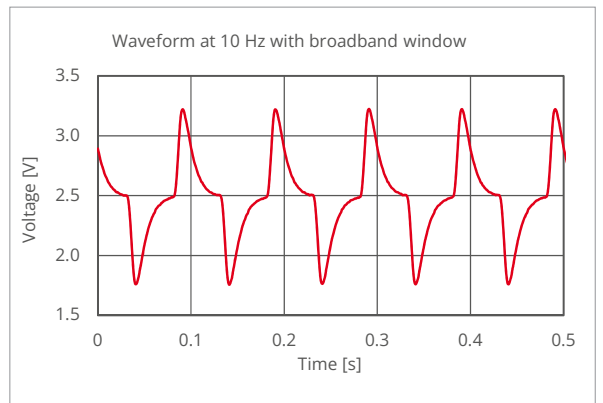
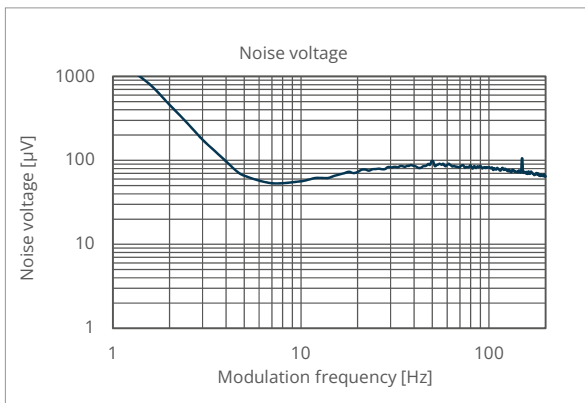
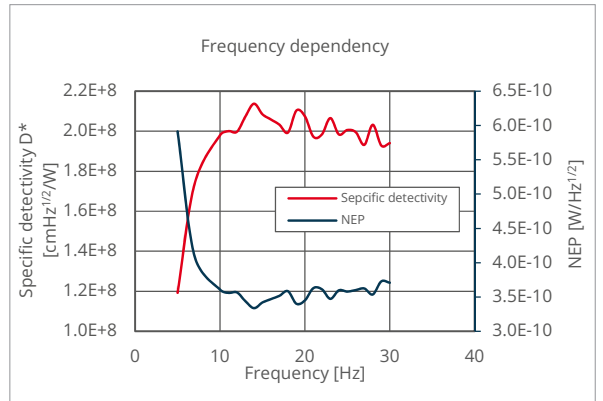
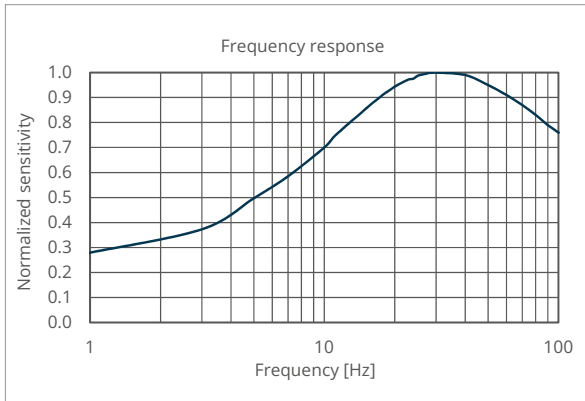
Technical parameter		Unit
Active area	4 x (0.7 x 0.7)	mm <sup>2</sup>
Aperture	4 x (1.5 x 1.5)	mm <sup>2</sup>
Mode	current	
Time constant $t_{(0-63\%)}^{\text{thermal}}$	typ. 16	ms
Time constant $t_{(0-63\%)}^{\text{electrical}}$	typ. 2	ms
AC sensitivity <sup>1,2,3</sup>	typ. 200 000	V/W
Noise density voltage <sup>1</sup>	typ. 50	μV/Hz <sup>1/2</sup>
Noise equivalent power NEP <sup>1,2,3</sup>	typ. $4 \times 10^{-10}$	W/Hz <sup>1/2</sup>
Specific detectivity $D^*$ <sup>1,2,3</sup>	typ. $4 \times 10^8$	cmHz <sup>1/2</sup> /W
Microphonic voltage <sup>1</sup>	typ. < 1000	μV/g
Filters	See document „Infrared filters“, customized filters on request.	
Operation voltage VDD	+5 ± 10 %	V DC
Operation voltage VSS-	+2,5 ± 10 %	V DC
Operation current	max. 10	mA
Operation temperature	-25 ... +85	°C
Housing	TO39	

<sup>1</sup> At  $T_{\text{amb}} = 25 \text{ °C}$ , 10 Hz, band width 1 Hz

<sup>2</sup> Blackbody  $T = 500 \text{ K}$ ;  $E = 38 \text{ W/m}^2$

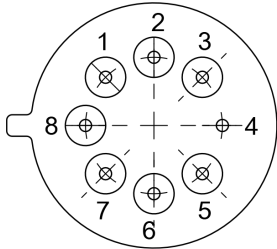
<sup>3</sup> On air without windows

## Typical operating characteristics



## Electrical schemata

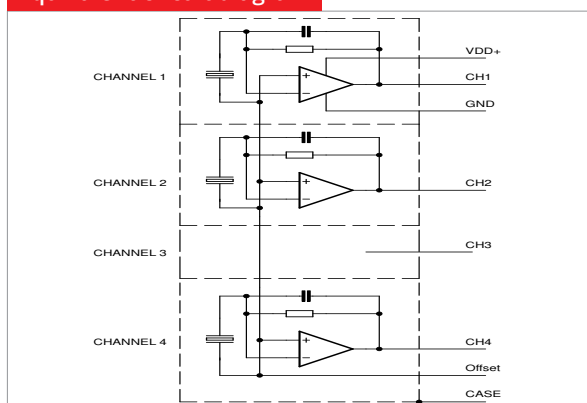
### Pin out (bottom view)



- Pin 1 – Channel 4
- Pin 2 – VDD +
- Pin 3 – Channel 3
- Pin 4 – Case
- Pin 5 – Channel 2
- Pin 6 –  $V_{offset}$
- Pin 7 – Channel 1
- Pin 8 – GND

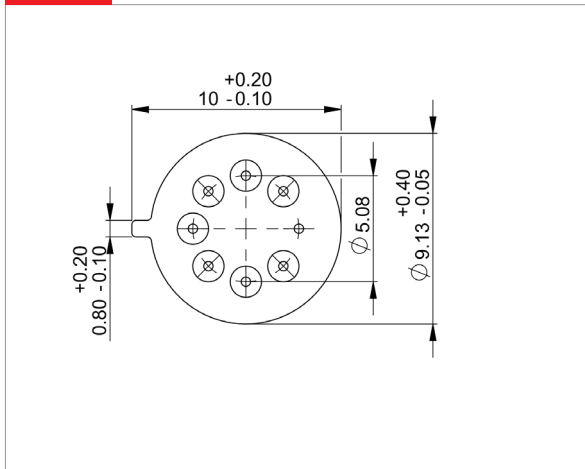
## Circuits

### Equivalent circuit diagram

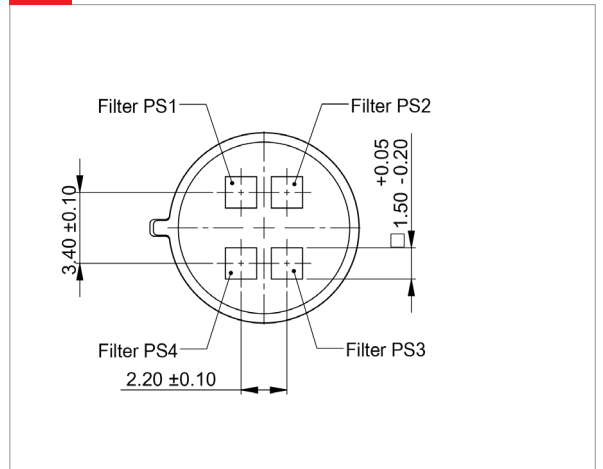


## Mechanical drawings

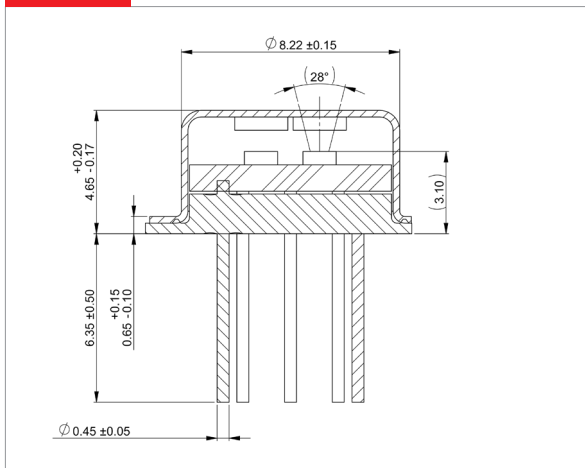
Bottom



Top



Sectional



➔ All geometrical dimensions in mm

## Product overview

Article	Type	Filling gas	Temp. min	Temp. max	Aperture	gas to measure
<a href="#">PS4x4C2-A-U-S1.5-Kr-D2/E1/F1/G2</a>	TO39 with cap	Kr	-20 °C	85 °C	1.5 mm	3C with low CO <sub>2</sub> concentration
<a href="#">PS4x4C2-A-U-S1.5-Kr-D2/E2/F1/G2</a>	TO39 with cap	Kr	-20 °C	85 °C	1.5 mm	3C with high CO <sub>2</sub> concentration
<a href="#">PS4x4C2-A-U-S1.5-Kr-I1/E1/M1/D2</a>	TO39 with cap	Kr	-20 °C	85 °C	1.5 mm	Test
<a href="#">PS4x4C2-A-U-S1.5-Kr-I1/L1/H1/D5</a>	TO39 with cap	Kr	-20 °C	85 °C	1.5 mm	NOX
<a href="#">PS4x4C2-A-U-S1.5-Kr-E1/K1/V1/W1</a>	TO39 with cap	Kr	-20 °C	85 °C	1.5 mm	Anesthesia

## RoHS compliance

Our infrared detectors on pyroelectric basis, MPS series, are based on one or more MEMS sensor chips in a hermetic packaging, which in addition to a silicon carrier contain the piezoceramic PZT (lead zirconium titanate) as a functional thin film in small quantities. The substance compound PZT is excluded from the restriction according to Annex III (7c. I). Furthermore, our pyroelectric-based infrared detectors are exempt from RoHS Directive 2011/65/EU Article 4 (1) according to Annex IV (1c) when used as a medical device and as a monitoring and control instrument and are therefore RoHS compliant.



## Disclaimer

All rights reserved. All information in this data sheet are based on latest knowledge, results of practical experience and tests carried out. Earlier specifications are hereby invalid. All specifications – technical included – are subject to change without notice. It is the customer's responsibility to ensure that the performance of the product is suitable for customer's specific application. No liability is accepted for indirect damage, in particular for the use or inability to use the product. Any liability we may have is limited to the value of the product itself.