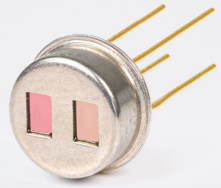
MICRO-HYBRID

MPS2SENS $LiTaO_3$

Two channel lithium tantalate pyro detector



Applications

- NDIR gas analysis
- Gas monitoring

Product benefits

- Less sensitive to external interference due to internal signal amplification
- Read-out rate up to 25 Hz
- Well known technology in NDIR gas analysis

Features

- 2 chips with $LiTaO_3$ crystal
- Broad spectral sensitivity from UV to LWIR
- High responsivity with modulation frequency 2 - 25 Hz
- Microphonics reduction as standard
- Amplified signal in current mode

Additional product information

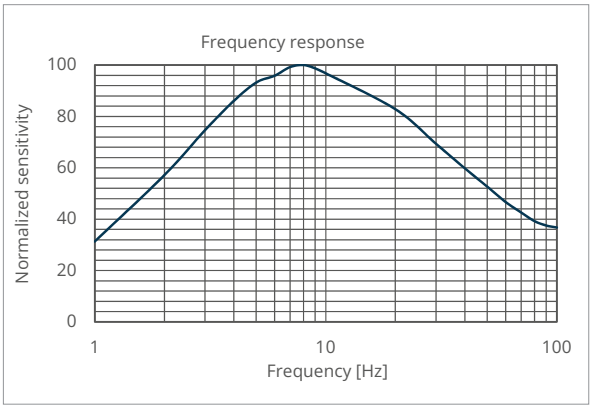
Lithium tantalate ($LiTaO_3$) is a ferroelectric crystal with pyroelectrical properties. Lithium tantalate detectors are used for optical sensors to detect infrared radiation. When infrared radiation is impinging the detector, it will be absorbed by the $LiTaO_3$ crystal via a high effective absorption layer . The absorbed radiation causes the $LiTaO_3$ layer to heat up. The electrical polarization of the lithium tantalate changes accordingly. This change generates an electrical charge at the electrodes of the $LiTaO_3$ crystal, the measurement signal. A preamplifier circuit amplifies the weak pyroelectric signal. The amplified signal can then be analyzed and evaluated.
Lithium tantalate pyroelectric detectors provide a reliable and effective method of detecting infrared radiation, making them important in a wide range of gas analysis applications.

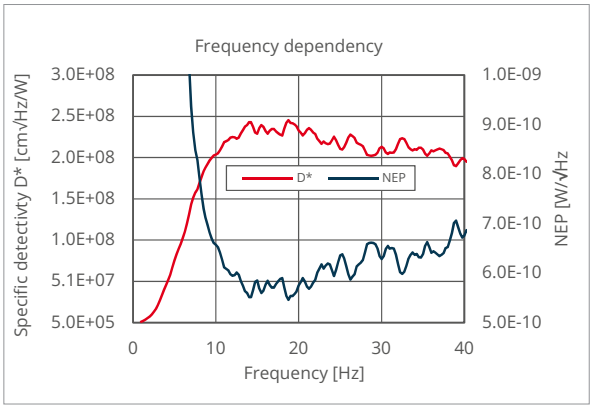
Technical data

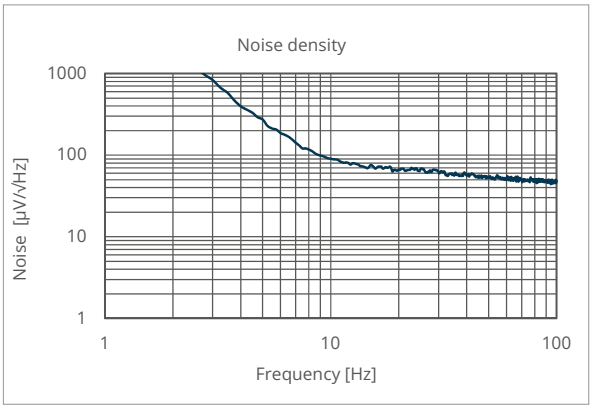
Technical parameter		Unit
Active area	2 x (1.8 x 1.0)	mm^2
Aperture	2x (2.7 x 1.8)	mm^2
Mode	Current	
Time constant $t_{(0\text{-}63\ \%)}$ thermal	typ. 57	ms
Time constant $t_{(0\text{-}63\ \%)}$ electrical	typ. 6	ms
AC sensitivity [1,2,3]	typ. 120 000	V/W
Noise density voltage	typ. 90	µV/ √ Hz
Noise equivalent power NEP [1,2,3]	typ. 7.00 x 10^{-10}	W/ √ Hz
Specific detectivity D* [1,2,3]	typ. 2 x 10^8	cm √ Hz/W
Acceleration response	typ. 550	µV/g
Filters	See document „Infrared filters", customized filters on request.	
Operation voltage VDD+	1.8 ... 5.5 (3 V recommended)	V DC
Operation temperature	-20 ... +85	°C
Housing	TO39	

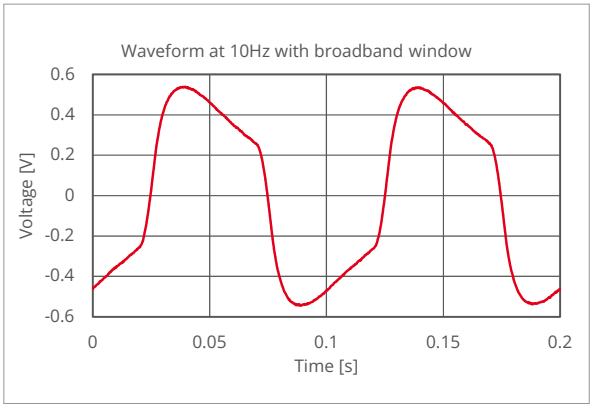
[1] Without filter
[2] Blackbody T = 500 K; E = 38 W/m^2
[3] At T_{amb} = 25 °C, 10 Hz, band with 1 Hz

Typical operating characteristics



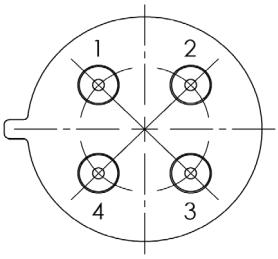






Electrical schemata

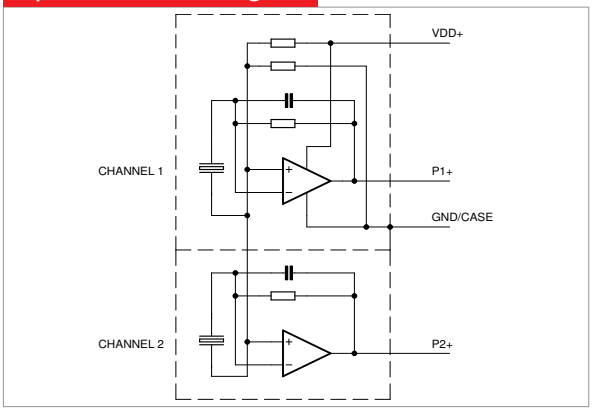
Pin out (bottom view)



- Pin 1 – P1+
- Pin 2 – VDD+
- Pin 3 – P2+
- Pin 4 – GND/ Case

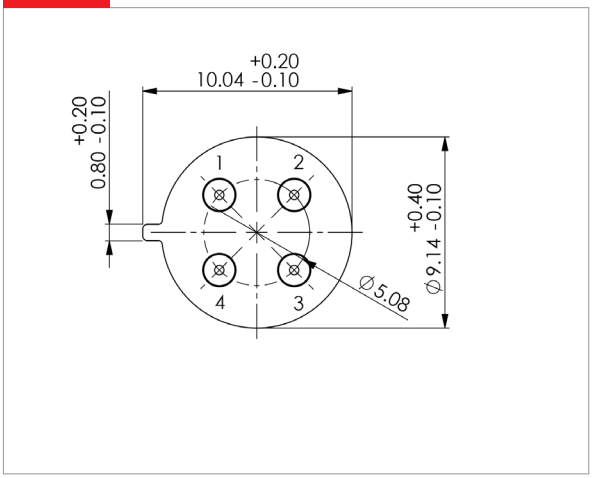
Circuits

Equivalent circuit diagram

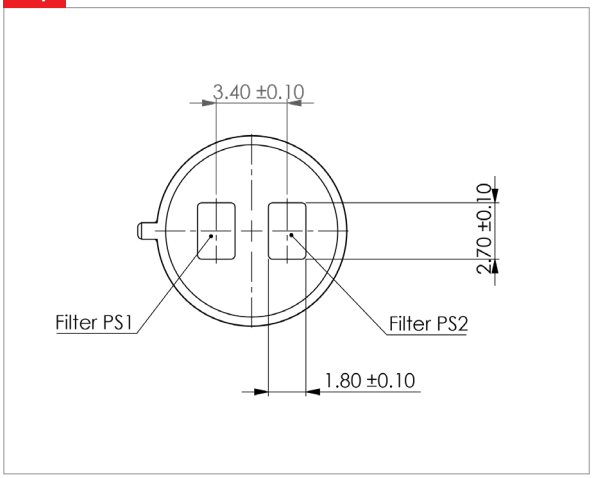


Mechanical drawings

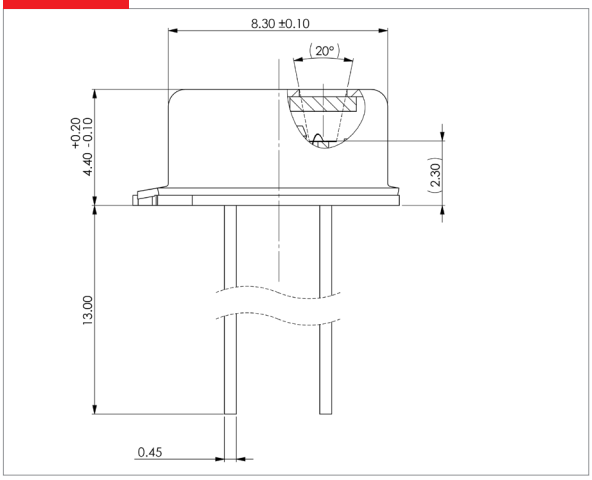
Bottom



Top



Sectional



→ All geometrical dimensions in mm

Product overview

Article	Type	Filling gas	Temp. min	Temp. max	Aperture	Gas to measure
PS2x9C3-A-U-R2.7-N2-E1/D2	TO39 with cap	N_2	-20 °C	85 °C	2.7 x 1.8 mm²	CO_2
PS2x9C3-A-U-R2.7-N2-G2/D2	TO39 with cap	N_2	-20 °C	85 °C	2.7 x 1.8 mm²	HC

Disclaimer