



## High Temperature NDIR Gas Measurement Module

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If it is necessary to detect or control gas concentration in any kind of application it is possible to use NDIR- based sensors. The advantages are the high reliability, long term stability and accuracy.

This demonstrator is the base for customized gas measurement cells and shows Micro-Hybrid competence in high temperature and hermetic packaging technologies. The developed sensor withstand temperatures up to 190 °C and can also work in this harsh environment.

It can be used in processes where the determination of gas concentration is necessary at high temperatures e.g. in chemical or biochemical process control. Respectively in applications where the sensor is exposed to high temperatures.

### Concept

- double beam configuration with thermopile detector and MEMS emitter for long-term stability
- multichannel thermopile detector up to 3 different channel
- CO<sub>2</sub> measurement rang up to 20 vol%
- two zones temperature concept
  - measuring cell for temperature range up to 190 °C
  - signal conditioning electronic for temperature range up to 85 °C

### HT Components

- various number of hermetic housings like SMD, TO-case, reflector
- high sensitive thermopile single or multichannel detectors based on BiSb/Sb thermocouples
- MEMS-emitter based on temperature stable amorphous diamond like carbon coatings
- filament-emitter
- circuit boards of Al<sub>2</sub>O<sub>3</sub>, LTCC, P97-PCB
- HT-preamplifier in the measuring cell possible

### Advantages of HT-Components

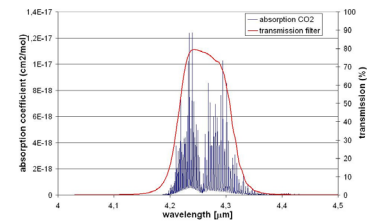
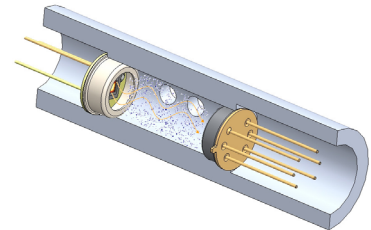
- real hermetic packaging technologies of all joints like soldering and welding
- no diffusions processes into the case contrary to adhesion joints
- long-term stability
- low dew points ( < -50 °C ) → advanced temperature range for coldness and hotness

### Specification Demonstrator-Module

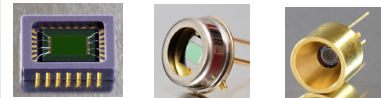
- measuring gas: CO<sub>2</sub> (double beam configuration)
- measuring range: 0 ... 20 vol%
- accuracy: ±0.2 vol% + 2 % of measured value
- response time: < 30s
- heat up time: < 15 min
- temperature range
  - sensor -25 ... +190 °C
  - extern electronic -25 ... +85 °C
- interfaces: 4 – 20 mA  
0 – 1 V, 0 – 10 V  
RS232, CAN
- supply voltage: 12 V ±1 V max. 2 W



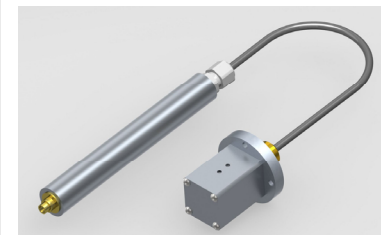
MICRO-HYBRID



NDIR measurement principle



ir-components packaging examples



HT CO<sub>2</sub> measurement module

# Preliminary



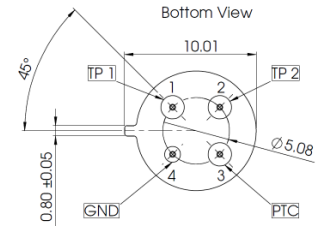
## Two Channel Thermopile TS2x2001HT180

High Temperature Thermopile Dual-Detector in with Narrow Band Filters for Gas Analysis.

Type	TS2x2001HT180	
Active Area	2 x (0.6 x 0.6)	mm <sup>2</sup>
Aperture	2 x (1.5 x 1.5)	mm <sup>2</sup>
Resistance of Thermopile (at 25 °C)	80 ±15	kΩ
Temperature Coefficient of Resistance <sup>1</sup>	typ. -0.002	%/K
Noise Voltage (at 25 °C)	typ. 37	nV/Hz <sup>1/2</sup>
DC Output Voltage (at 38 μW/mm <sup>2</sup> ) <sup>2</sup>	typ. 0.95	mV
DC Sensitivity (at 38 μW/mm <sup>2</sup> ) <sup>2</sup>	typ. 69	V/W
Crosstalk	typ. 0.2	%
Time Constant $t_{(0.63\%)}^2$	typ. 6	ms
Filling Gas	Nitrogen	
Specific Detectivity D* (500K black body, DC) <sup>2</sup>	1.11 x 10 <sup>8</sup>	cmHz <sup>1/2</sup> /W
Noise Equivalent Power NEP	0.54	nW/Hz <sup>1/2</sup>
Filters	CO <sub>2</sub> / Ref.	
Thermistor	PTC Ni1000	
Operation Temperature	-20 ... +180 °C	
Mass	0.95	g
Housing	TO39 (modified)	

<sup>1</sup> at temperature of +25 °C

<sup>2</sup> on air without windows



Pin Assignment:

Pin 1	Output TP1
Pin 2	Output TP2
Pin 3	PTC
Pin 4	Mass (GND)

TS2x2001 Dual Thermopile Detector CO <sub>2</sub> /Ref			
Gas	Channel	Filter	
		CWL [μm]	HBW [μm]
CO <sub>2</sub>	TP1	4.265	0.110
reference	TP2	4.000	0.080

June 2010 – subject to change without notice

### Order information :

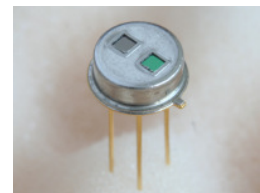
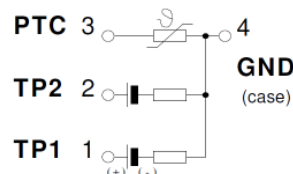
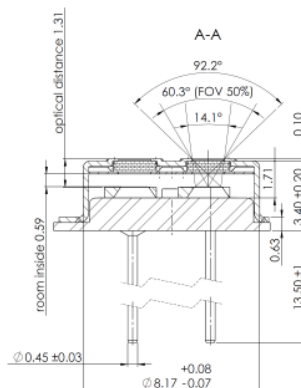
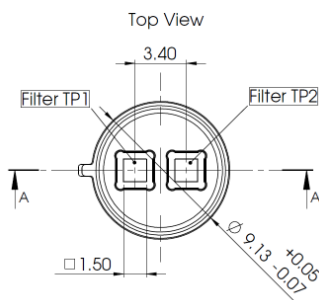
TS2x2001 Dual Thermopile Detector CO<sub>2</sub>/Ref

4594.50-F.01

Thermistor

1000 ± 2.5 Ω (at 0°C)

6178  $\frac{+62}{-72}$  ppm/K



### Optional parts:

IR-Source JSIR 450

Broadband IR emitters high performance for heavily absorbing media  
Art.-Nr. 6350.01-3.01