

thermopile detectors



Features

- Available in TO-39 and TO-18 housings
- Integrated signal processing ASIC available (TPMI)
- Single, dual or quad elements
- 8 element line arrays and 4x4 matrix arrays with various lens optics and integrated ASIC with multiplexer
- Various filters for optical broadband or narrow-band applications
- Excellent repeatability of electro-optical parameters
- Ambient temperature reference (thermistor) included
- High sensitivity of several 10 V/W; DC radiation sensitive
- Extremely low temperature coefficient of sensitivity and resistivity
- Constant response over the infrared spectrum
- The absence of microphonic noise effects
- Low susceptibility to electromagnetic pulses (EMP) due to the low internal resistance (<100 kΩ)
- Rugged construction based on CMOS silicon micromachining technology



Typical Applications

- Remote Temperature Sensing, Hand-Held or Industrial Pyrometers
- Ear or Body Thermometers
- Temperature-Sensor Modules in Microwave Ovens, Hair Dryers, Cookers, Toasters
- Sensor Modules for Control of Air Condition Systems (Heat Management, Home, Automotive)
- Temperature Control in Copiers and Printers
- Sensor Arrays for Spatial Temperature Measurements (Imaging Applications)
- Sensors with Infrared Bandpass Filters for Gas Detection by Infrared Absorption

Datasheets available upon request

Description

Thermopile detectors directly sense thermal radiation, providing the perfect device for remotely measuring temperatures without the need for any mechanical chopper. PerkinElmer's proprietary and innovative Si-based micromachining technology guarantees a new generation of components: extreme long-term stability, very low temperature coefficient in sensitivity, and excellent repeatability of electro-optical parameters.

Thermopile sensors allow remote temperature sensing at a low system cost. The sensor does not require cooling, and can reach an accuracy of $\pm 1^\circ\text{C}$, dependent on the measurement range. For narrow temperature ranges, as in body temperature measurement, a precision of 0.1°C is possible.

Single-Element Thermopile Detectors: TPS series

The different available chip sizes and packaging types, together with the variety in window openings with and without a silicon lens, enable the adaptation of the PerkinElmer thermopiles to virtually every application where a remote temperature measurement or control is needed.

Dual- and Quad-Element Types: TPS 2, TPS 4 series

PerkinElmer offers thermopile detectors with two or four channels, each of which can be equipped with one of the many available infrared spectral bandpass filters. The main application of multiple channel thermopiles is gas detection through IR absorption. Prominent gases to be detected are CO_2 , hydrocarbons and CO.

Thermopile Modules

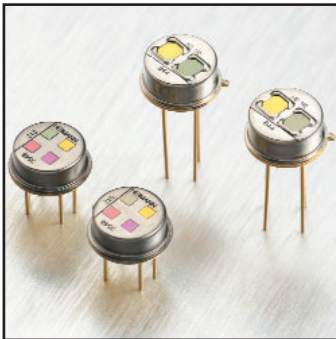
with integrated signal processing: TPMI series

For convenient use, PerkinElmer offers thermopile sensors with an integrated electronic circuit for the necessary signal condition and ambient temperature compensation – the TPMI. This very compact and miniature thermopile module is offered as a fully calibrated, ready-to-go sensor. Various temperature ranges and optics are available.

Thermopile Line and Matrix Arrays: TPL, TPA series

The latest PerkinElmer thermopile technology development features more than a single test spot. The new TPA- (matrix array) and TPL- (line array) series offer multi-element thermopile arrays combined with an optical lens, amplifier, and interface electronics (multiplexer, ambient temperature sensor) in a compact TO-39-type housing. This combines solid-state, non-choppered temperature measurement without the need for in-field calibration.

Typically, the array sensors are sold as a modular type, i.e. on a PCB with external data memory. These TPA- and TPL-Modules are pre-calibrated with the data stored in an EEPROM. In an application, the associated micro controller (μC) reads this calibration information and converts the sensor signals to the object temperatures.



Dual and Quad Element Thermopile Detectors

General Data

Tc of sensitivity (absolute value): 0.02%/K
 Tc of resistance (absolute value): 0.02%/K
 Max. operating temperature: -20 to 100°C
 Max. storage temperature: -40 to 100°C
 Thermistor BETA: 3964 K
 Option for all types: 8-14 um
 Pyrometry filter: G9

Single Element Thermopile Detectors

Technical Specification

Part Number	Housing	Field of View	DC Sensitivity V/W	Time Constant ms	Active Area mm ²	TP Chip Resistance kΩ	Noise nV/√Hz	NEP nW/√Hz	D* cm√Hz/W	Thermistor (25°C) kΩ
TPS333	TO-18	100°	35	25	0.7x0.7	75	35	1	0.7x10 ⁸	100
TPS334	TO-39	60°	35	25	0.7x0.7	75	35	1	0.7x10 ⁸	30
TPS334L5.5	TO-39**	7°	55	25	0.7x0.7	75	35	0.6	1.1x10 ⁸	30
TPS434	TO-39	55°	35	20	0.5x0.5	35	24	0.7	0.7x10 ⁸	30
TPS434IRA	TO-39***	15°	55	20	0.5x0.5	35	24	0.4	1.1x10 ⁸	30
TPS534	TO-39	80°	20	35	1.2x1.2	50	29	1.4	0.8x10 ⁸	30
TPS535	TO-39	80°	20	35	1.2x1.2	50	29	1.4	0.8x10 ⁸	30

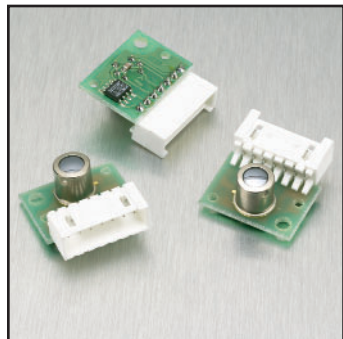
Test conditions: T = 25°C * 500 K black body
 Field of view: at 50% intensity points ** with 5.5 mm lens
 Noise: r.m.s., 300 K *** with int. reflector

Dual and Quad Thermopile Detectors

Technical Specification

Part Number	Housing	Field of View	DC Sensitivity V/W	Time Constant ms	Active Area mm ²	TP Chip Resistance kΩ	Noise nV/√Hz	NEP nW/√Hz	D* cm√Hz/W	Thermistor (25°C) kΩ
TPS2534	TO-39**	2x90°	42	35	1.2x1.2	50	29	0.7	1.8x10 ⁸	30
TPS4339	TO-39***	4x60°	75	25	0.7x0.7	75	35	0.5	1.5x10 ⁸	100

Test conditions: T = 25°C * 500 K black body
 Field of view: at 50% intensity points ** with 2 channels
 Noise: r.m.s., 300 K *** with 4 channels
 Above data are referenced without the bp filter. Option for all types: individual bp filters for each channel



Thermopile Arrays

Line and Matrix Arrays

Technical Specification

Part Number	Housing	Number of Pixels	Field of View	Optics	Output Voltage V (80°C object, 20°C ambient)	Object temperature	Noise mV/√Hz (5-20Hz)
TPLM086L5.5	TO-39 on PCB	8 element line	41°x6°	f/1 optics, f=5.5 mm	0.95	-20-100°C	0.4
TPLM086L3.9	TO-39 on PCB	8 element line	56°x8°	f/1 optics, f=3.9 mm	0.95	-20-100°C	0.4
TPAM166L3.9	TO-39 on PCB	4x4 matrix	41°x32°	f/1 optics, f=3.9 mm	0.95	-20-100°C	0.4

Test conditions: T = 25°C
 Operating voltage: 5 V Sample frequency: 3 kHz
 Operating current: 1 mA Max. operating temperature: -20-100°C
 Zero signal offset: V_{DD}/2 Max. storage temperature: -40-100°C
 Output resistance: 200 Ω Temperature reference slope: 10 mV/K
 Power up time: 0.3 s Temperature reference offset: 0 mV



Thermopile TPMI Modules

TPMI Modules

Technical Specification

Part Number	Housing	Optics	Field of View
a2TPMI 334	TO-39	window opening 2.5 mm	60°
a2TPMI 334 L5.5	TO-39	integrated Si lens, 5.5 mm focal length	7° (D:S = 8:1)
a2TPMI 334 L10.6	TO-39	integrated Si lens, 10.6 mm focal length	5° (D:S = 11:1)
a2TPMI 334 IRA	TO-39	internal mirror	15° (D:S = 4:1)

For further details please contact us.