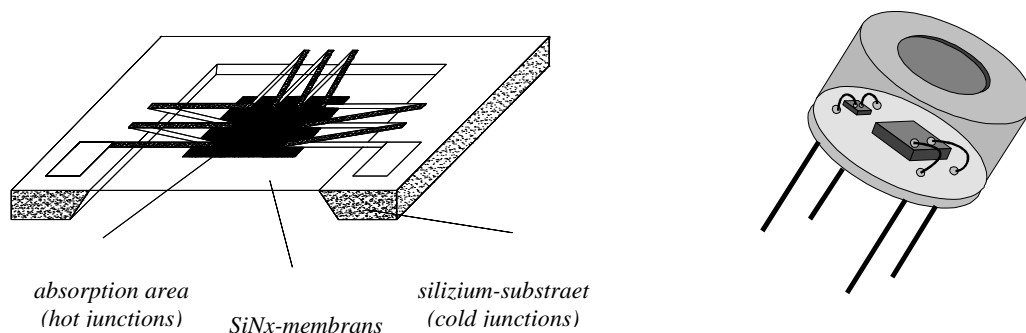


**THERMOPILES** are used for non-contact surface temperature measuring.

Any object emits infrared radiation. The radiation power is increasing with growing surface temperatures. Based on this relation, **THERMOPILES** measure the emitted power and determine the object's temperature precisely.

### Function Principle

**THERMOPILES** are based on the Seebeck effect, which is used since a long time for conventional thermocouples. The application of micromechanics and thin film technology allows the production of miniaturized and cost effective sensor elements.



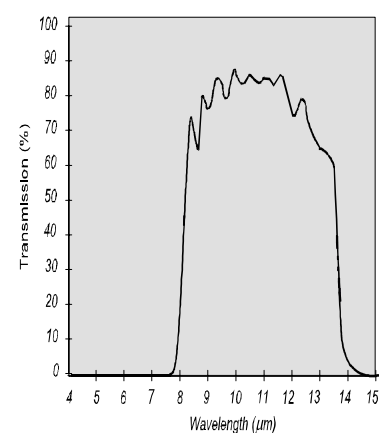
A multitude of thermojunctions deposited on a silicon substrate is connected in series to form a **THERMOPILE**. The hot junctions are thermally insulated from the cold junctions on the substrate by etching a self-supporting extremely thin membrane. An absorbing layer on the hot junctions transforms the incoming radiation into heat. A voltage proportional to the radiation is generated by the thermoelectric effect. The sensors are delivered in TO05 packages. Different housings and filter types can be selected to find an optimal solution for each application. Chips without housing are available as well.

### Specifications

Parameter	Symbol	Unit	Value	Condition
Number of thermojunctions	n		100	
Material			BiSb, NiCr	
Active Area	A <sub>A</sub>	mm <sup>2</sup>	0.7 * 0.7	
Chip Size	A <sub>C</sub>	mm <sup>2</sup>	2.0 * 2.0	
Resistance of Thermopile	R	kΩ	50 ±15	25 °C
TC of resistance	TCR	% / K	-0.03 ±0.02	+25...+75 °C
Sensitivity of sensor	S	V / W	typical 80	25°C, 500 K, DC
TC of sensitivity	TCS	% / K	-0.52 ±0.08	+25...+75 °C
Specific detectivity	D*	cm*Hz <sup>1/2</sup> / W	1.5 * 10 <sup>8</sup>	500 K, DC
Noise equivalent power	NEP	nW	0.46	500 K, 1 Hz
Time constant	t <sub>63</sub>	ms	40 ±10	500 K, 1 Hz
Operation temperature	T	°C	-20 ... +100	
Storage temperature	T	°C	-40 ... +100	
<b>Reference Resistor</b>				
Resistance	R <sub>Ni</sub>	Ω	1000 ±0.4%	0 °C
TC of resistance	TCR <sub>Ni</sub>	ppm / K	6178 ±1%	0 °C...100 °C

Function:  $R(T) = 1000\Omega + 6,17 * T * \Omega$ , for detailed information see data sheet of reference resistor

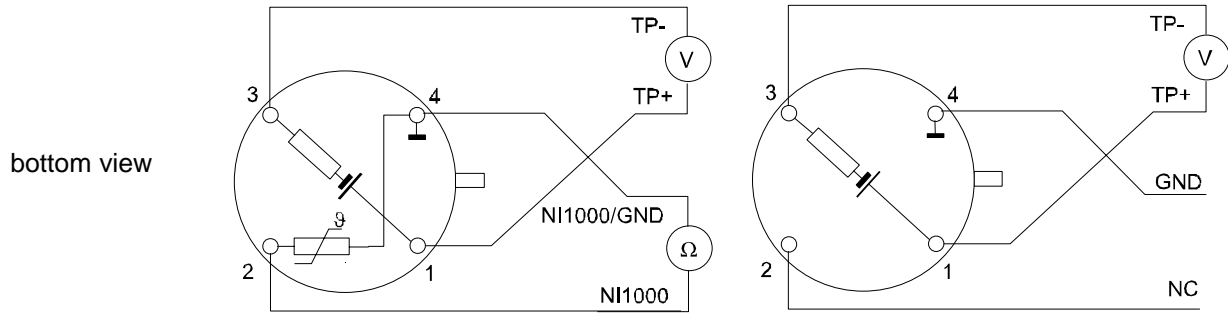
### Filter



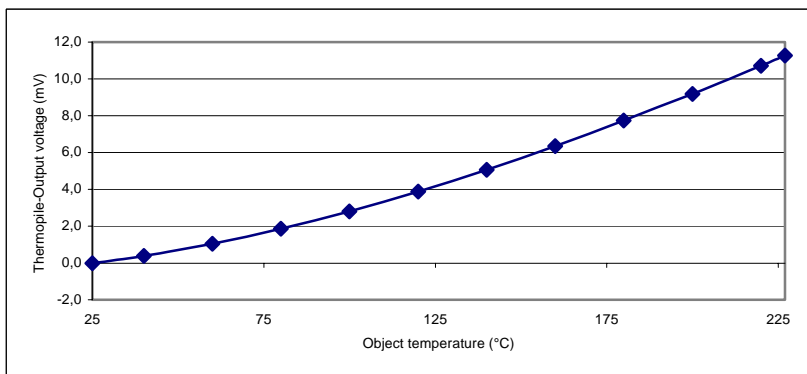
### Connecting Diagram

#### TS118-3

#### TS118-4



### Output Voltage versus Object Temperature



Conditions:

Distance from Thermopile to Black Body is 5 cm, emissivity equals 1, surrounding temperature is 25°C

Tables with emissivity of different materials and surface are available.

### Housing TO 18



### Applications

- contactless measurement of surface temperatures or IR-Radiation
- temperature measurement of moving objects
- manufacturing temperature control systems
- thermal alarm systems
- consumer, safety- and environmental systems
- absorption measurement for gas analysis (see special data sheet)
- industrial and automotive climate control systems
- medical instruments

Additional products with different filters and packages are also available.  
Tables with emissivity of different materials and surfaces are available.

Specifications are subject to change without notice !