



## ■ Non-contact (IR) temperature sensor

# THERMOPILE

Thermopiles are IR temperature sensors that fully utilize SEMITEC original silicon-micromachining technology.

### ■ Product number

10TP583T

### ■ Applications

Ear thermometers, IR thermometers, microwave ovens and other non-contact temperature sensing applications

### ■ Specifications

Parameter	Value	Conditions
Sensitive area	1.05 x 1.05 mm	Size of absorbing film
Output voltage <sup>1</sup>	200 $\mu$ V $\pm$ 30%	—
Output voltage <sup>2</sup>	1.00 mV $\pm$ 30%	—
Thermopile resistance	65 k $\Omega$ $\pm$ 30%	Resistance value at 25 °C
Time constant	15 ms	Typical
Operating temperature range	- 20 to 100 °C	—
Storage temperature range	- 40 to 100 °C	—
Field of view	$\pm$ 50°	Incident angle to achieve 50% responsivity
Filter range	Cut on 5 $\mu$ m	—
Thermistor resistance value	100 k $\Omega$ $\pm$ 3%	Rated zero-power resistance value at 25 °C
Thermistor B value	3435 K $\pm$ 0.7%	B value calculated from rated zero-power resistance at 25 °C and 85 °C

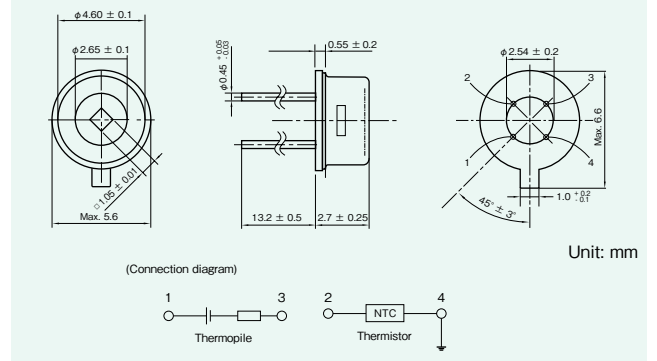
<sup>1</sup>Test conditions

Blackbody furnace: 500 K  
Sensor to blackbody distance: 100 mm  
Sensor temperature: 298 K  
Aperture size:  $\phi$  12.7 mm

<sup>2</sup>Test conditions

Blackbody furnace: 310 K  
Sensor temperature: 298 K

### ■ Dimensions

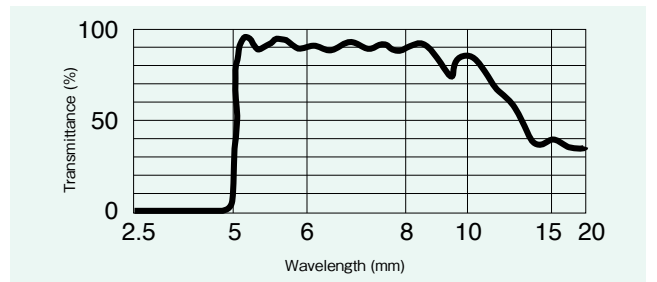


### ■ Optical characteristics

#### Field of view characteristics



#### Filter characteristics



### ■ Reliability data

Item	Test conditions	Criteria
Dry heat	1000 hours at 100 °C	Thermopile: $\Delta$ V $\pm$ 2% Thermistor: $\Delta$ R $\pm$ 0.5% Thermistor: $\Delta$ B $\pm$ 0.2%
Damp heat	1000 hours at 60 °C and 85% humidity	Thermopile: $\Delta$ V $\pm$ 2% Thermistor: $\Delta$ R $\pm$ 0.3% Thermistor: $\Delta$ B $\pm$ 0.2%
Temperature cycle (thermal shock)	10 cycles as below: 1. - 20 °C for 30 minutes 2. Room temperature for 3 minutes 3. 100 °C for 30 minutes 4. Room temperature for 3 minutes	
Resistance to soldering heat	5 s at 350 °C	
Free fall	Three times natural fall to a concrete floor from 1 m height.	

### ■ Data table (approx.)

		Sensor temperature (°C)								
		- 20	- 10	0	10	25	40	60	80	100
Temperature of measured object (°C)	- 20	0.000	- 0.510	- 1.081	- 1.718	- 2.809	- 4.078	- 6.078	- 8.473	- 11.31
	- 10	0.510	0.000	- 0.571	- 1.208	- 2.300	- 3.568	- 5.568	- 7.963	- 10.80
	0	1.081	0.571	0.000	- 0.637	- 1.728	- 2.997	- 4.997	- 7.392	- 10.23
	10	1.718	1.208	0.637	0.000	- 1.091	- 2.360	- 4.360	- 6.755	- 9.593
	30	3.211	2.702	2.131	1.493	0.402	- 0.867	- 2.867	- 5.261	- 8.099
	37	3.809	3.300	2.728	2.091	1.000	- 0.269	- 2.269	- 4.664	- 7.501
	40	4.078	3.568	2.997	2.360	1.269	0.000	- 2.000	- 4.395	- 7.233
	60	6.078	5.568	4.997	4.360	3.269	2.000	0.000	- 2.395	- 5.233
	80	8.473	7.963	7.392	6.755	5.664	4.395	2.395	0.000	- 2.838
	100	11.31	10.80	10.23	9.593	8.501	7.233	5.233	2.838	0.000
	120	14.64	14.13	13.56	12.93	11.83	10.57	8.565	6.171	3.333
140	18.53	18.02	17.45	16.81	15.72	14.45	12.45	10.05	7.215	
160	23.01	22.51	21.93	21.30	20.21	18.94	16.94	14.54	11.70	
180	28.17	27.66	27.09	26.45	25.36	24.09	22.09	19.70	16.86	
200	34.06	33.55	32.98	32.34	31.25	29.98	27.98	25.58	22.75	

Unit: mV

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