

# OTC-238

## THERMOPILE INFRARED SENSOR

Date : Oct. 10, 2000

### ■ Features

The thermopile sensor consists of a series of 44 thermoelements, forming a sensitive area of  $0.5 \times 0.5 \text{ mm}^2$ . The sensor is hermetically sealed into a TO-18 metal housing, with optical filter. This standard filter allows measurements to be made in the spectral range above  $5 \mu\text{m}$  wavelength. The thermosensor exhibits an almost white noise, comparable to an ohmic resistance. It has a constant signal versus frequency up to its frequency limit, and is directly proportional to incident radiation.

### ■ Applications

- \* Ear thermometers; clinic thermometers
- \* Infrared thermometers
- \* Consumer applications: hair dryer, micro-wave oven, air conditioner, refrigerator
- \* Continuous temperature control of manufacturing
- \* Security system
- \* Radiation monitor switch system
- \* Absorbing measurement for gas analysis
- \* Thermoelectric converter
- \* Heat flux flowmeter

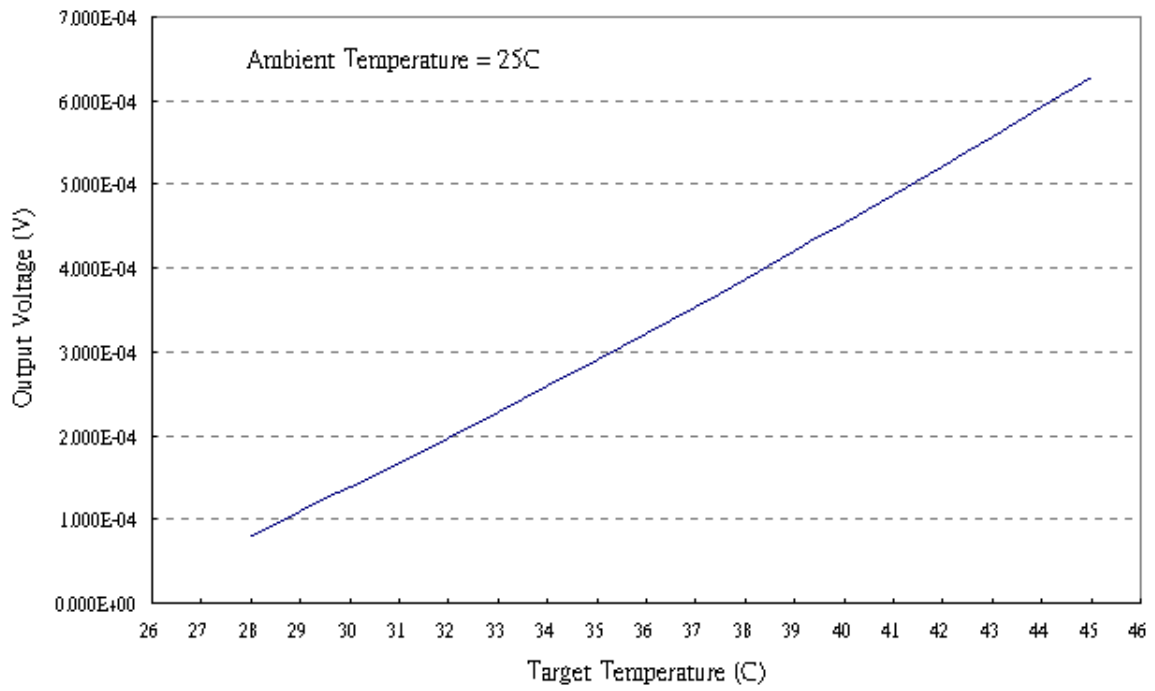
Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Thermopile</b>					
Number of thermojunctions		---	44	---	
Chip size		---	1920*1725	---	$\mu\text{m}^2$
Active area	Interference layer	---	500*500	---	$\mu\text{m}^2$
Thickness of substrate	Silicon-substrate	600	625	650	$\mu\text{m}$
Resistance of thermopile	25 $\square$	60	70	80	$\text{K}\Omega$
Sensitivity	With 5-14 $\mu\text{m}$ filter	40	55	70	V/W
Detectivity		$4*10^7$	$7*10^7$	$9*10^7$	$\text{cm}*\text{Hz}^{1/2}/\text{W}$
Time Constant		---	30	---	ms
Noise voltage		---	34	---	$\text{nV}/\text{Hz}^{1/2}$
NEP		---	0.8	---	$\text{nW}/\text{Hz}^{1/2}$
Temperature range	Operation	-20	---	100	$\square$

Measured at 1 Hz chopper frequency, within spectral range 5-14 $\mu\text{m}$ , using a blackbody radiator of 500K temperature.

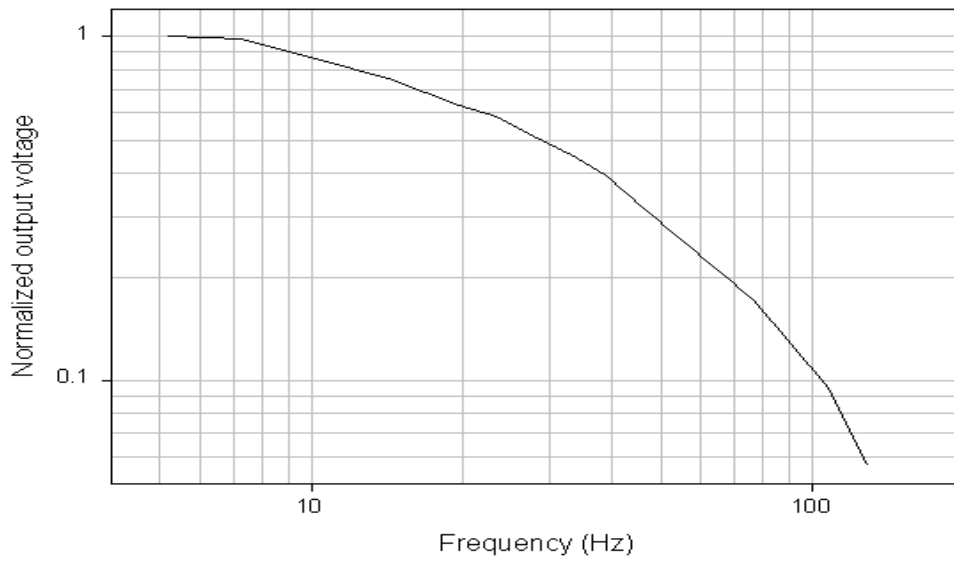


## Thermopile voltage vs. blackbody temperature

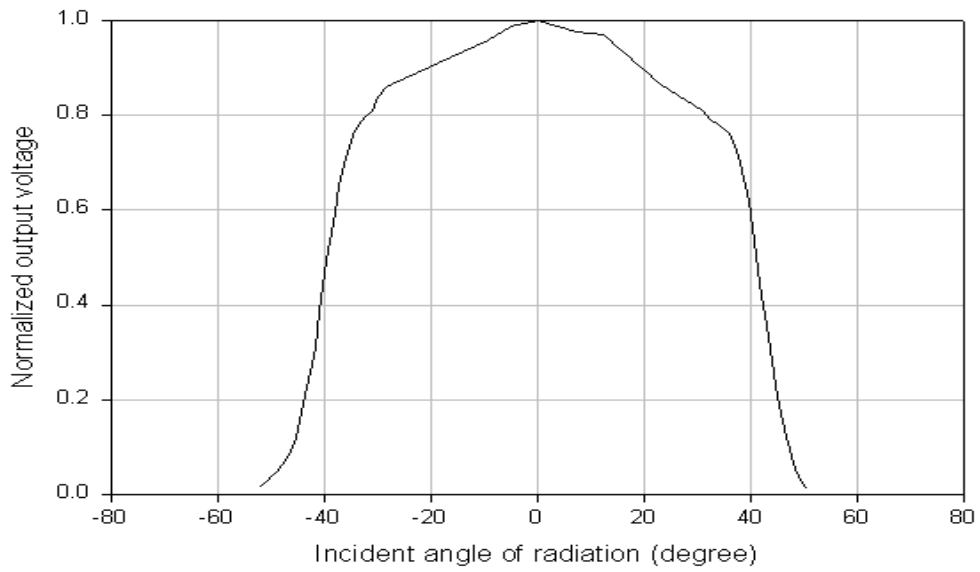
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## Frequency response

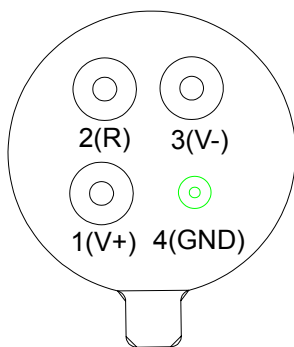


### Field of view

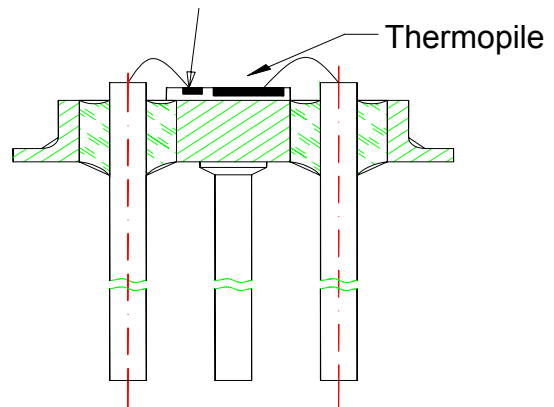


### Pin assignment & description

- 1 thermopile output pin (+)
- 3 thermopile output pin (-)



**BACKSIDE VIEW**



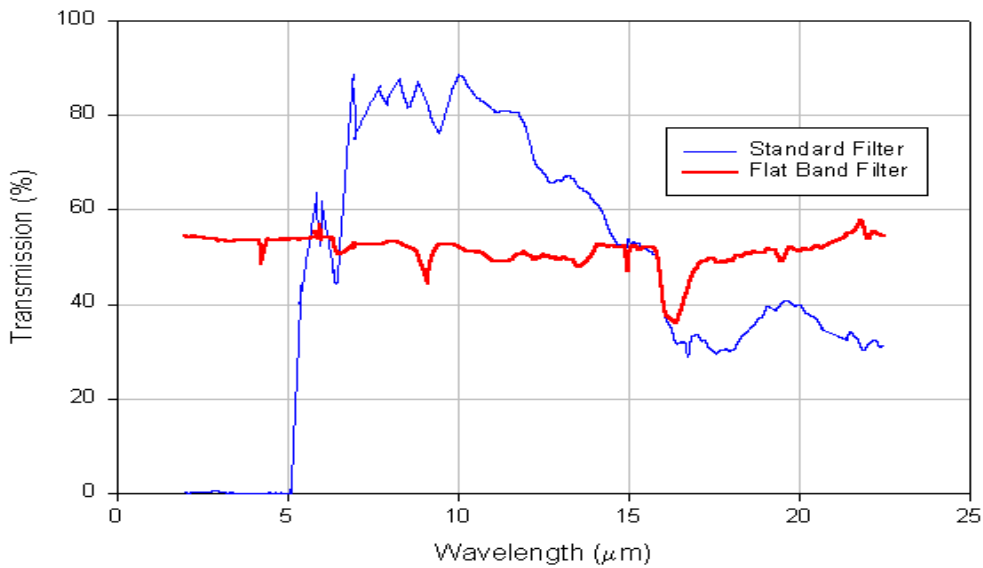
**SIDE VIEW**

### Order information : OTC-238-A

- A : 1 : standard filter (5-14 $\mu$ m)
- 2 : silicon filter with flat band transmission

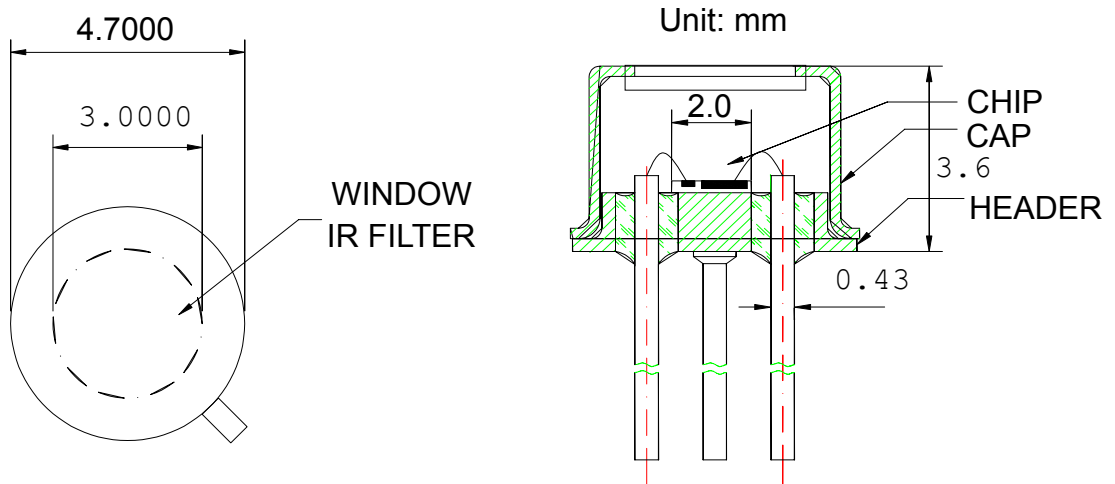
### Transmission of filter

Transmission of optical filter is measured by FTIR from 2 $\mu$ m



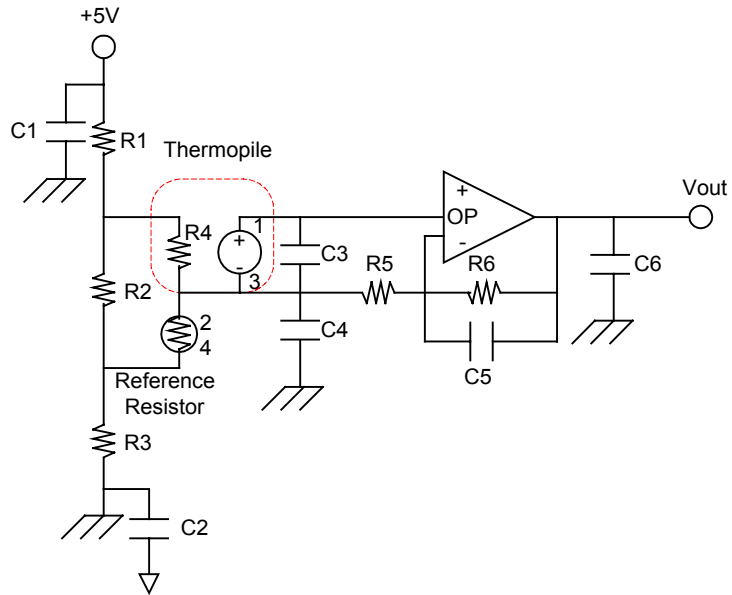
### Package

The sensor is hermetically sealed into a TO-18 metal housing, with optical filter. This standard filter allows measurements to be made in the spectral range above 5 $\mu$ m wavelength. The dimensions of header and cap are shown below.



# Application circuit

Circuit 1 :



Circuit 2 :

