

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

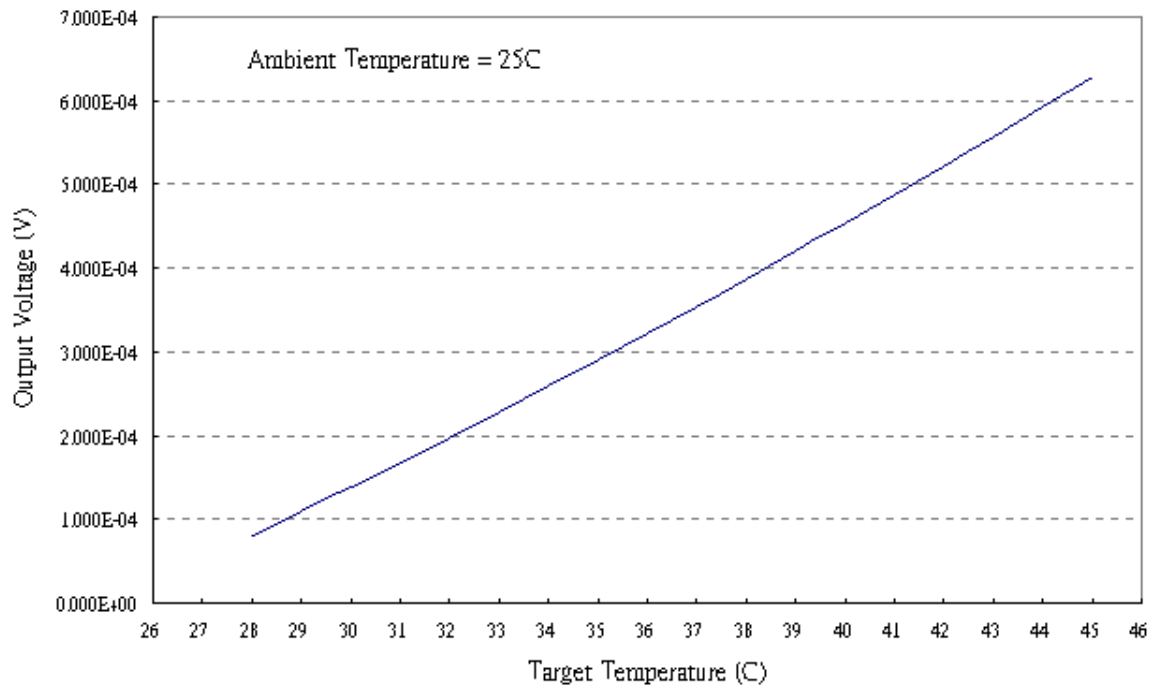
- * Ear thermometers; clinic thermometers
- * Infrared thermometers
- * Consumer applications: hair dryer, micro-wave oven, air conditioner, refrigerator
- * Continuous temperature control of manufacturing
- * Security system
- * Radiation monitor switch system
- * Absorbing measurement for gas analysis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

■ Electrical Characteristics

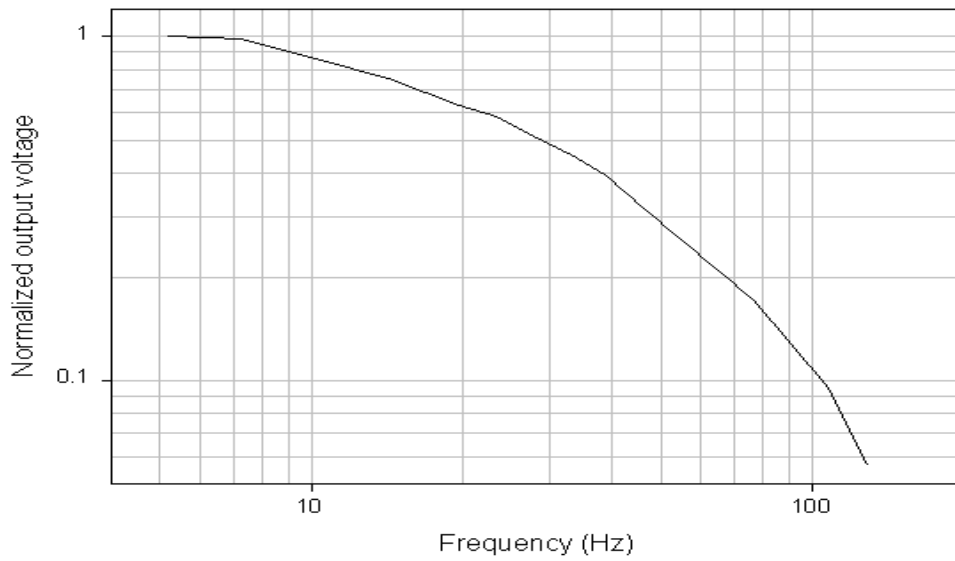
Parameter	Condition	Min.	Typ.	Max.	Unit
Thermopile					
Number of thermojunctions		---	44	---	
Chip size		---	1920*1725	---	μm^2
Active area	Interference layer	---	500*500	---	μm^2
Thickness of substrate	Silicon-substrate	600	625	650	μm
Resistance of thermopile	25 \square	60	70	80	$\text{K}\Omega$
Sensitivity	With 5-14 μm filter	40	55	70	V/W
Detecctivity		$4*10^7$	$7*10^7$	$9*10^7$	$\text{cm}*\text{Hz}^{1/2}/\text{W}$
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 μm , using a blackbody radiator of 500K temperature.

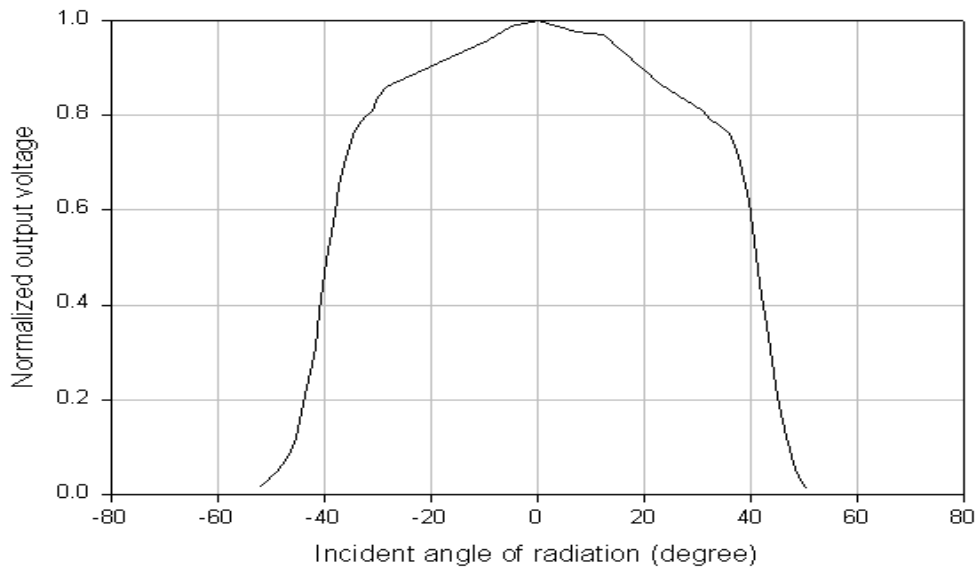
Thermopile voltage vs. blackbody temperature



Frequency response

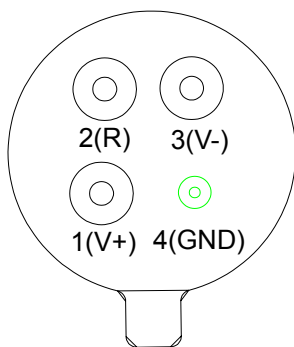


Field of view

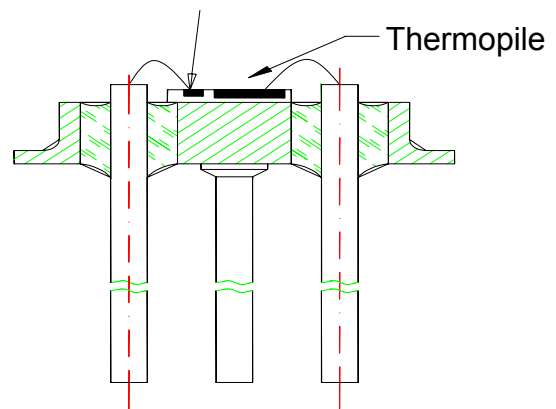


Pin assignment & description

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



BACKSIDE VIEW



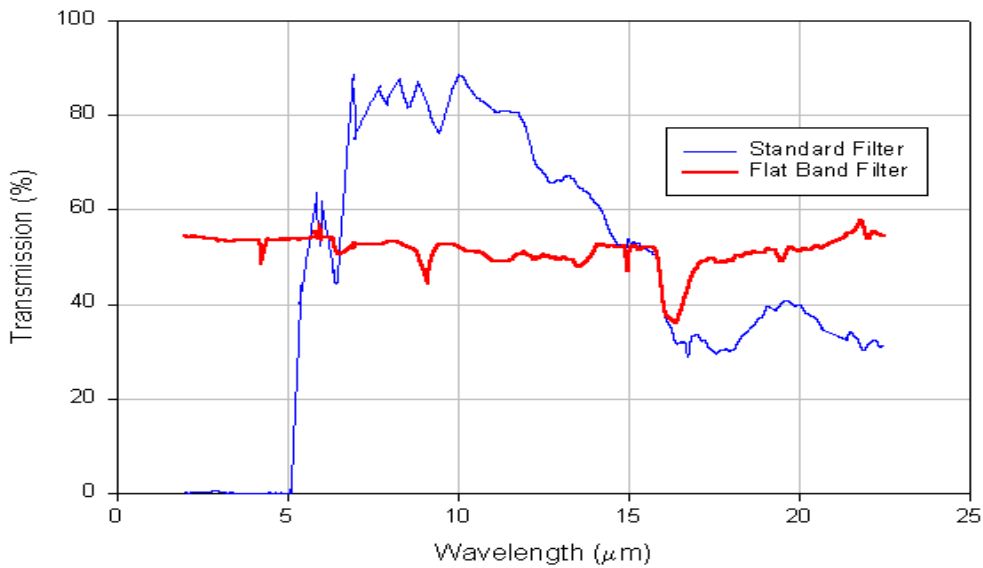
SIDE VIEW

■ **Order information : OTC-238-A**

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

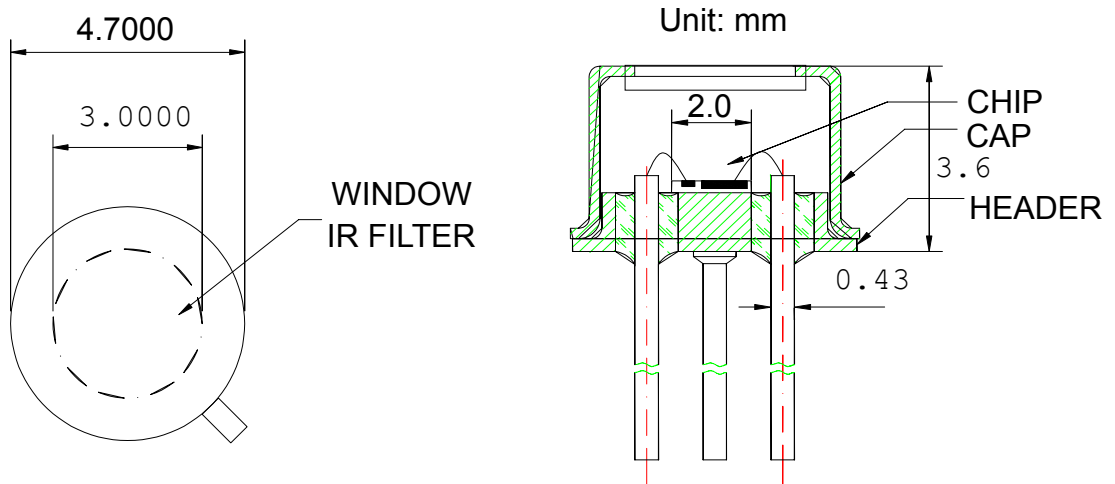
■ **Transmission of filter**

Transmission of optical filter is measured by FTIR from 2 μ m



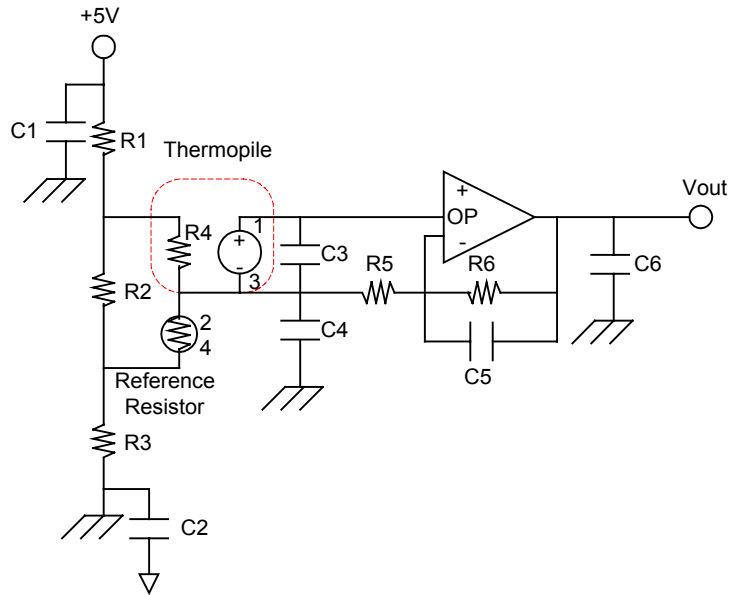
■ **Package**

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 μ m wavelength. The dimensions of header and cap are shown below.



Application circuit

Circuit 1 :



Circuit 2 :

