

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

OPTO TECH CORPORATION

Address : No. 8, Innovation Road 1, Hsinchu Science Based Industrial Park,
Hsinchu city, Taiwan, R.O.C.

Tel. No. : 886-3-5777481, ext. 1603, 1608, 1611

Fax No. : 886-3-5783696

E-Mail : 2407@opto.com.tw

http : [//www.opto.com.tw](http://www.opto.com.tw)



■ 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°C	60	70	80	K Ω
Sensitivity	With 5-14 μm filter	40	55	70	V/W
Detecctivity		4*10 ⁷	7*10 ⁷	9*10 ⁷	cm*Hz ^{1/2} /W
Time Constant		---	30	---	ms
Noise voltage		---	34	---	nV/Hz ^{1/2}
NEP		---	0.8	---	nW/Hz ^{1/2}
Temperature range	Operation	-20	---	100	°C

Measured at 1 Hz chopper frequency, within spectral range 5-14 μm , using a blackbody radiator of 500K temperature.



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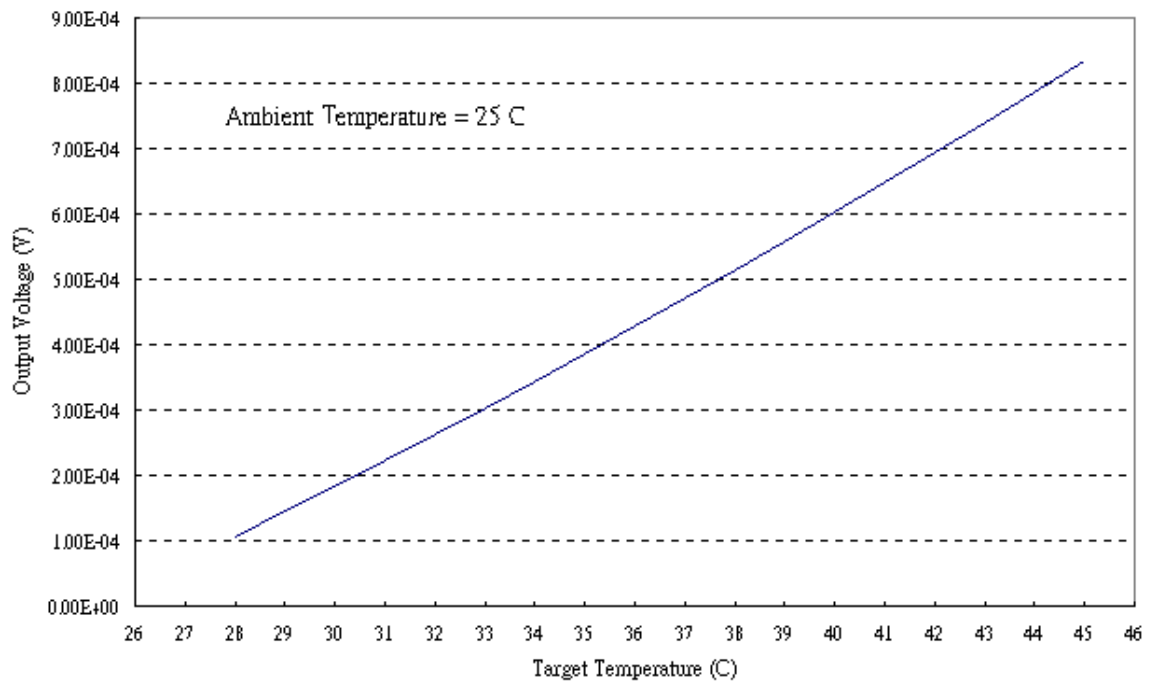
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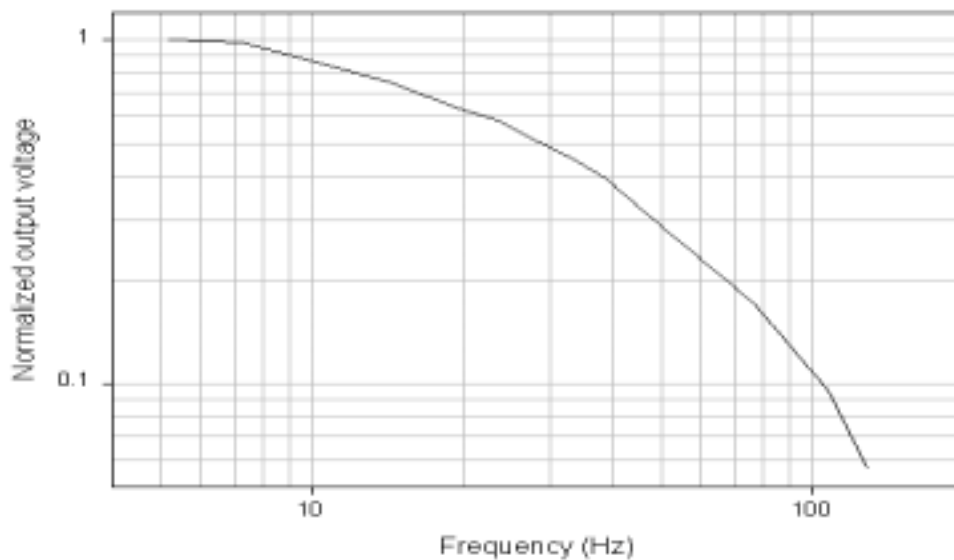
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■ Thermopile voltage vs. blackbody temperature



■ Frequency response



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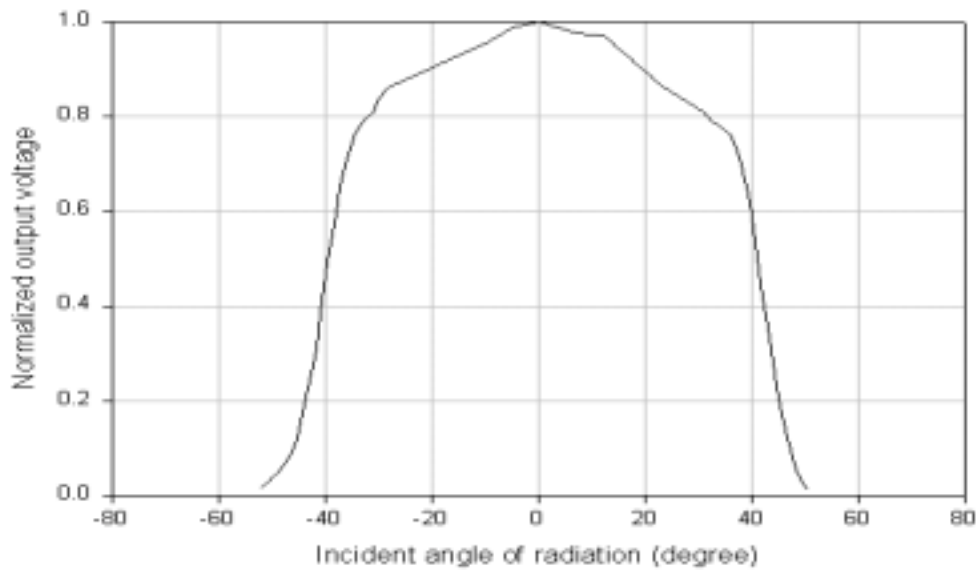
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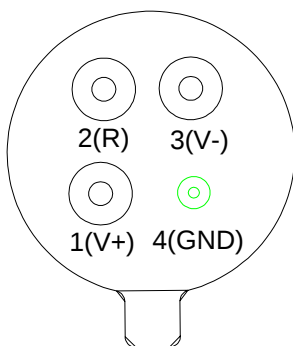


■ Field of view

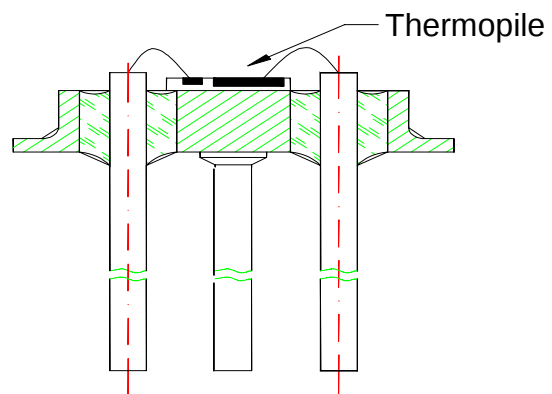


■ Pin assignment & description

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



BACKSIDE VIEW



SIDE VIEW

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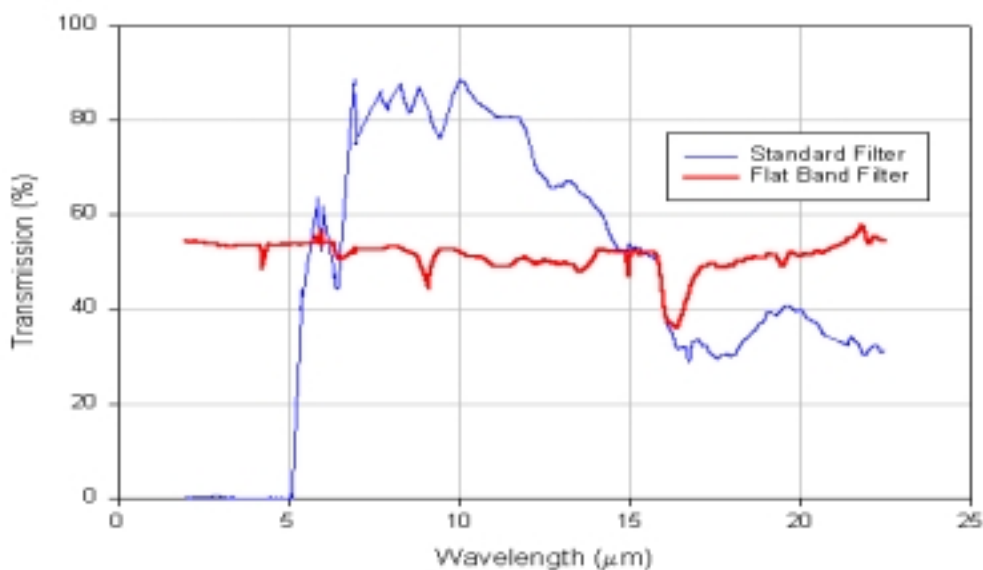


■ Order information : OTC-238-A

- 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.

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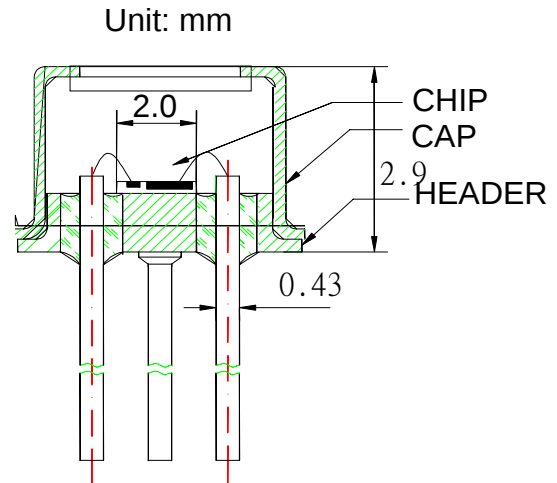
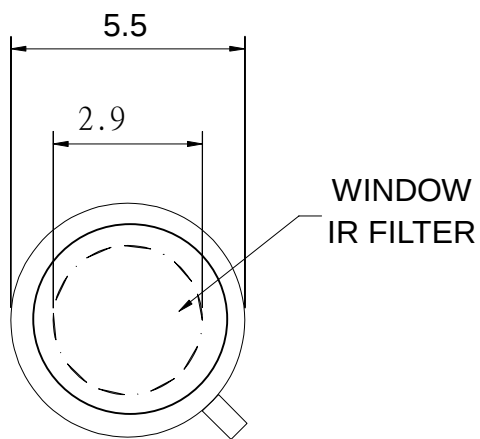
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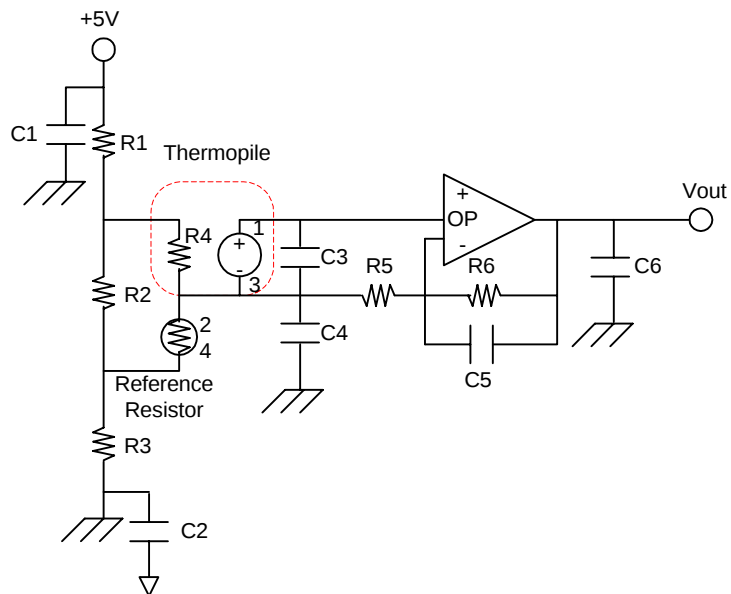
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■ Application circuit

Circuit 1 :



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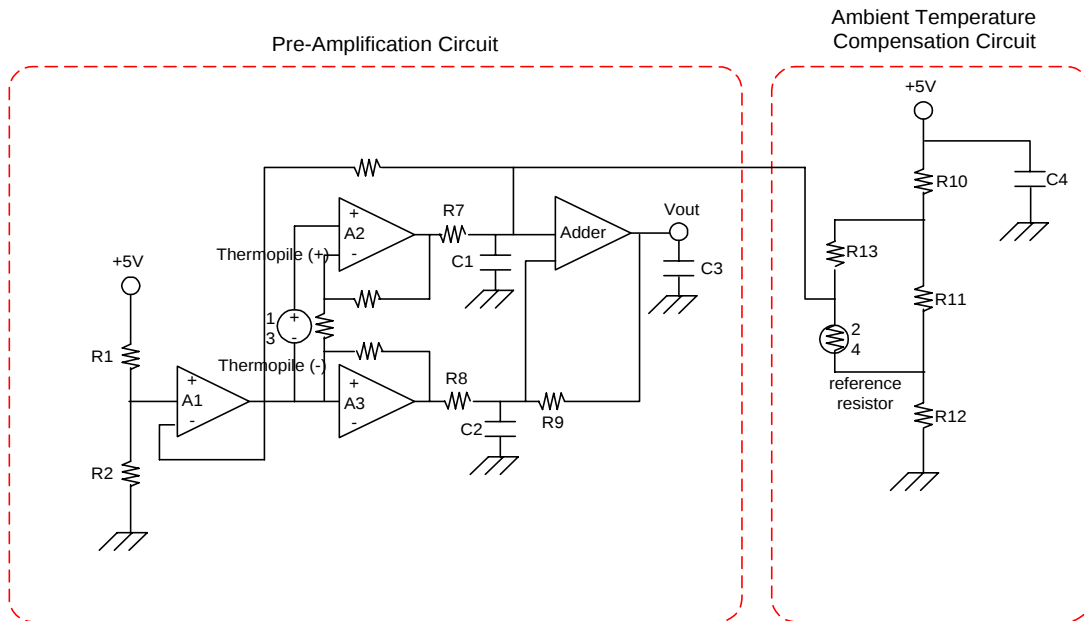
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Circuit 2 :



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