## Features

The thermopile sensor consists of a series of 44 thermoelements, forming a sensitive area of 0.5*0.5 $mm^2$. 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 $\mu$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. The thermopile sensors are featured with an additional temperature reference resistor on the same chip. The standard version of temperature reference resistor is housing connected to ground.

## 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

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## Electrical Characteristics

| Parameter | Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| **Thermopile** | | | | | |
| Number of thermojunctions | | --- | 44 | --- | |
| Chip size | | --- | 1920*1725 | --- | $\mu m^2$ |
| Active area | Interference layer | --- | 500*500 | --- | $\mu m^2$ |
| Thickness of substrate | Silicon-substrate | 600 | 625 | 650 | $\mu m$ |
| Resistance of thermopile | 25℃ | 60 | 70 | 80 | KΩ |
| Sensitivity | With 5-14 $\mu m$ 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 | ℃ |
| **Temperature reference resistor** | | | | --- | |
| Resistance | 25℃ | 920 | 1000 | 1080 | Ω |
| Temperature coefficient of resistance | 25℃ | 3470 | 3700 | 3920 | ppm/K |

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

Note : Thermistor should be operated under 200 $\mu A$.



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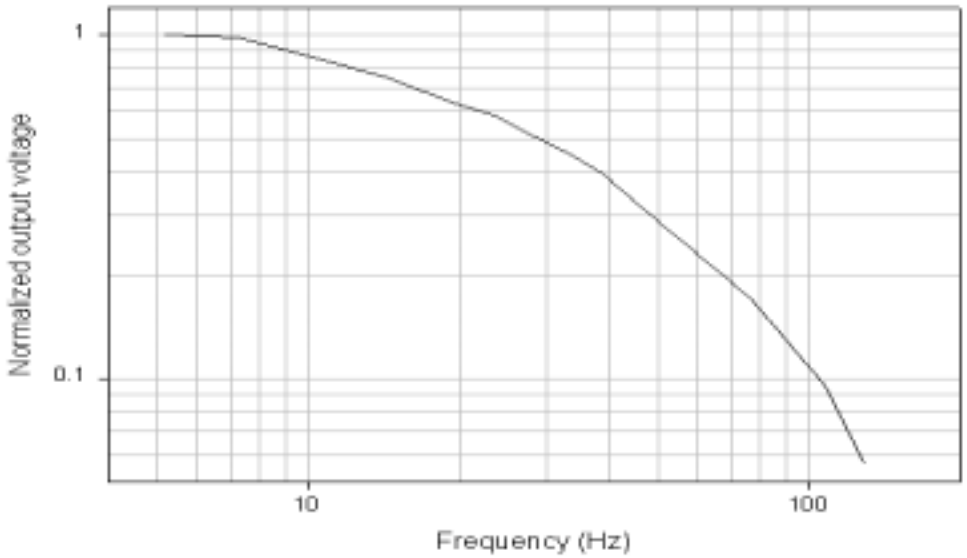
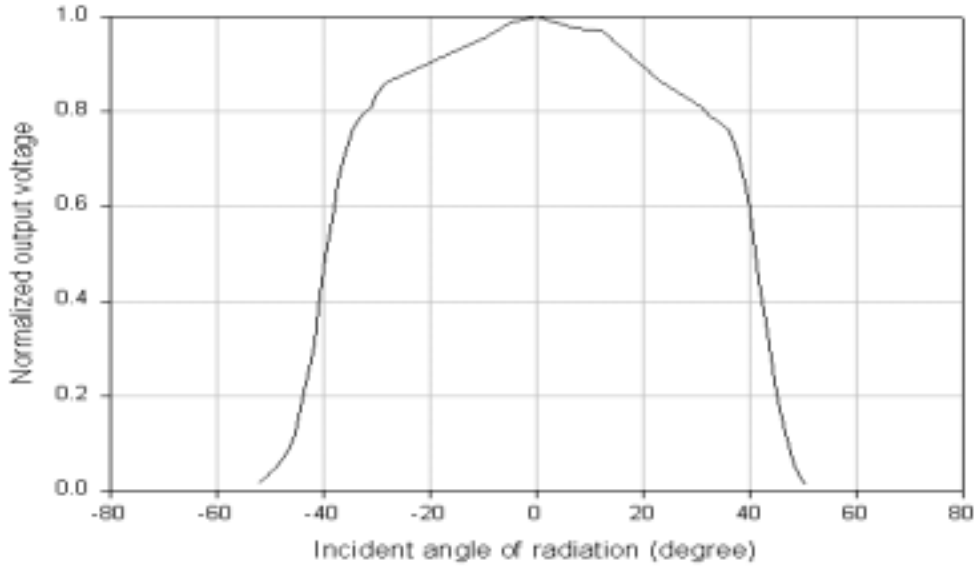
## Frequency response




## Field of view



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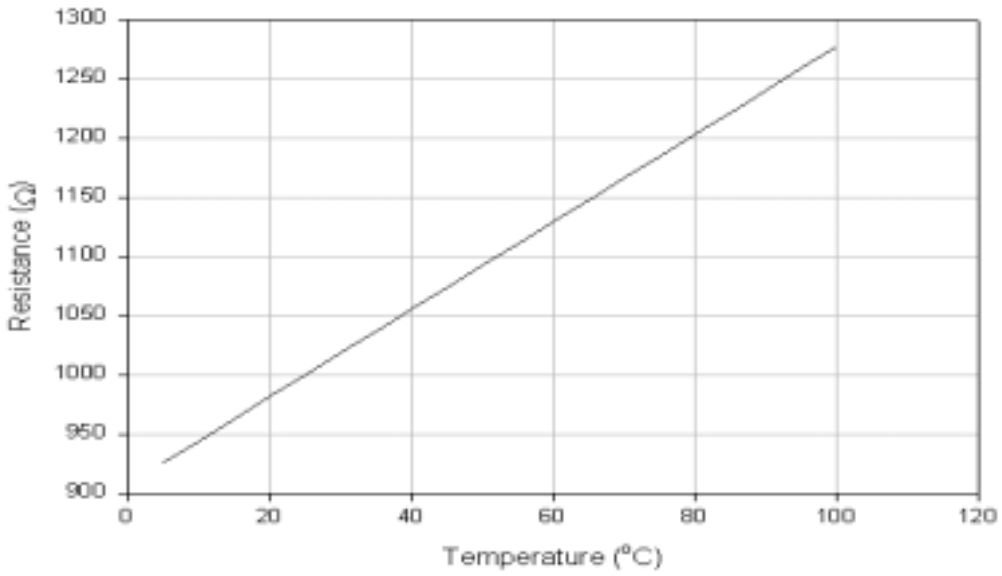
## Temperature reference resistor vs. temperature

The resistance of the temperature reference resistor varies with temperature and the behaviour is illustrated in the following figure.




At temperature 25℃, the relation $R = Ro[(1+\alpha(T-To)+\beta(T-To)^2)]$ is almost linear, where the typical value of $\beta$ is $-3.6*10^{-6} << 1$ and $\alpha$ (temperature coefficient of resistance) is $3.7*10^{-3}$ defined as :

$$\alpha = \frac{1}{R}\frac{dR}{dT}$$

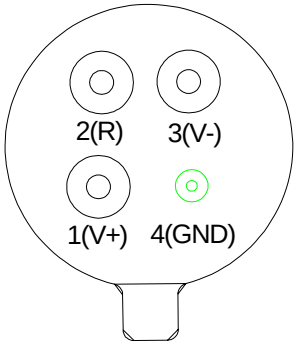
## Pin assignment & description

2 thermistor pin

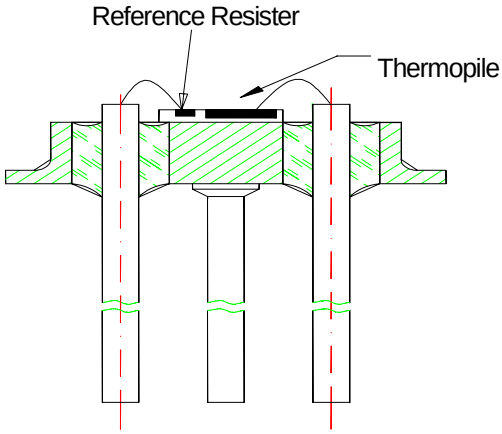
4 thermistor pin (GND)

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

3 : band pass filter

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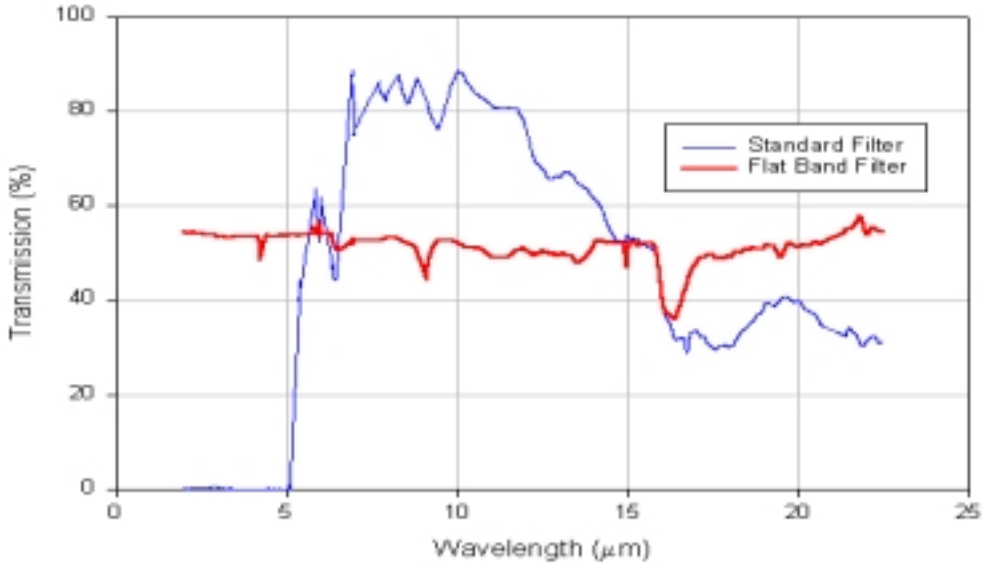
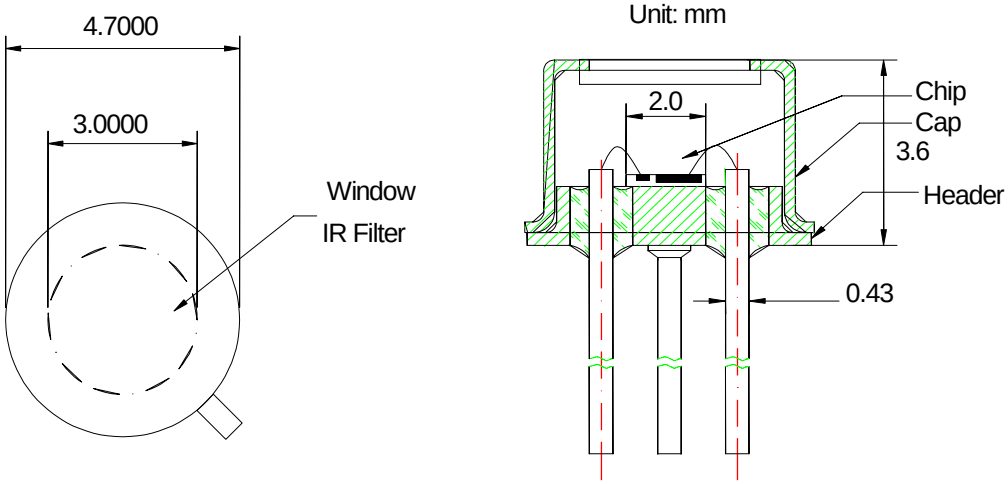
## Transmission of filter

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



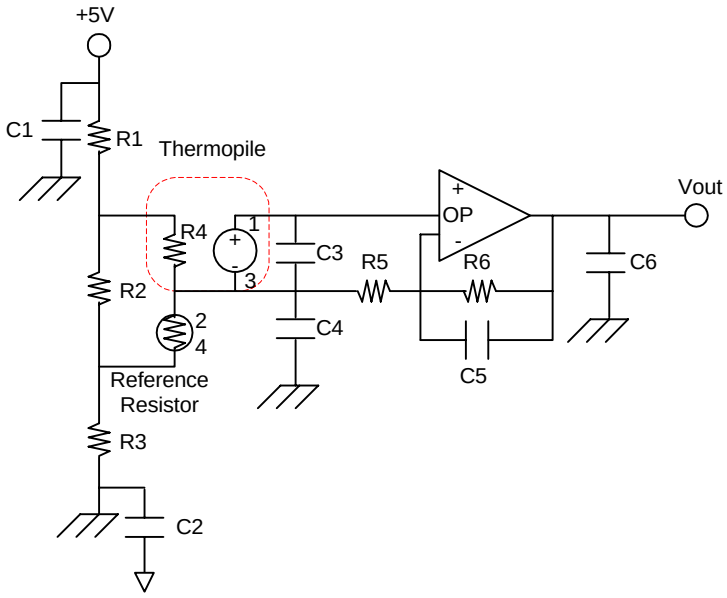

## Package

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 :