

■ 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-5 metal housing, with an 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. 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

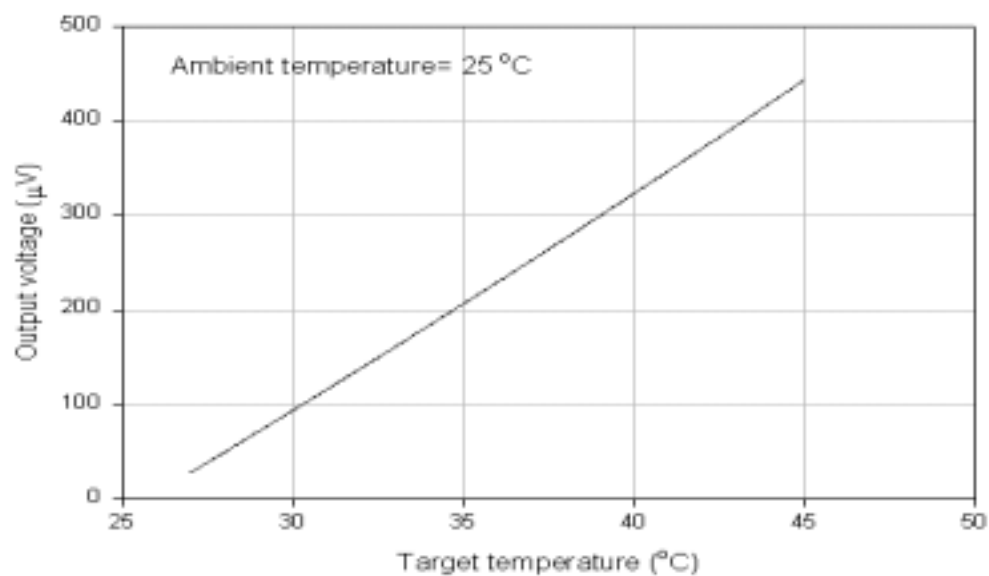
■ Electrical Characteristics

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
Temperature reference resistor					
Resistance	25°C	920	1000	1080	Ω
Temperature coefficient of resistance	25°C	3470	3700	3920	ppm/K

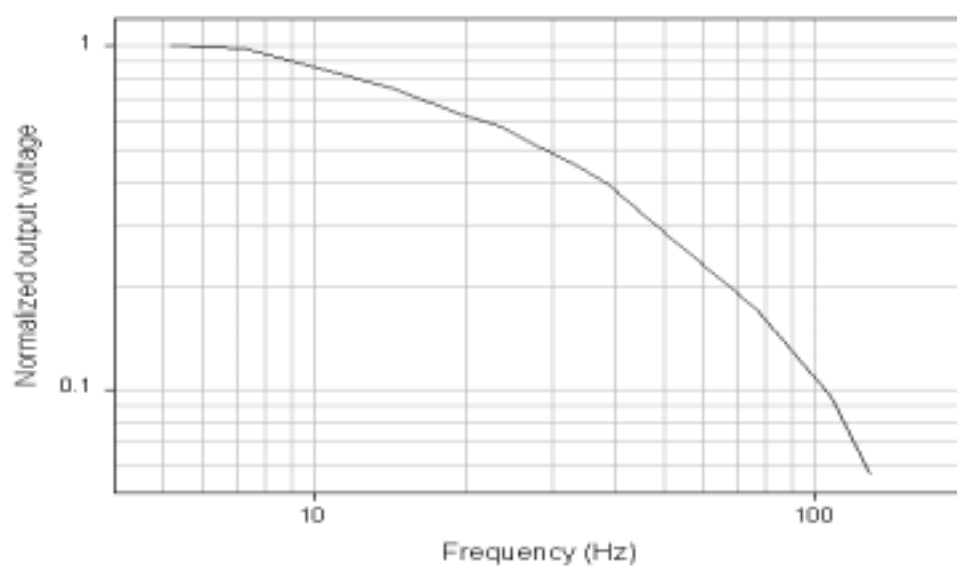
Measured at 1 Hz chopper frequency, within spectral range 5-14 μm , using a blackbody radiator of 500K temperature.

Note : Thermistor should be operated under 200 μA .

■ Thermopile voltage vs. blackbody temperature

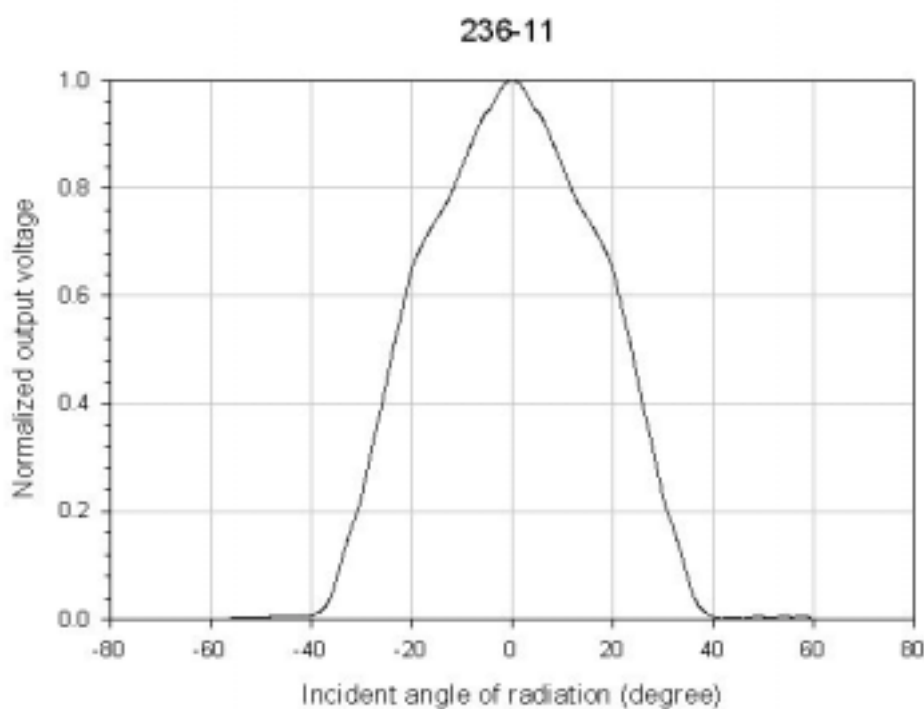


■ Frequency response

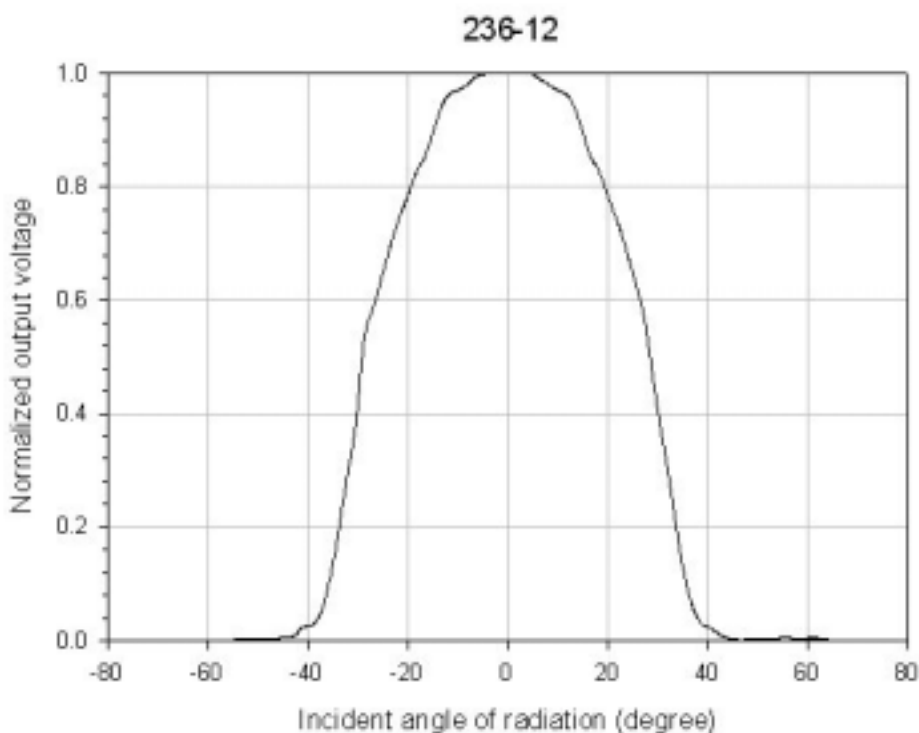


■ Field of view

1) window size: 2.57mm (diameter)

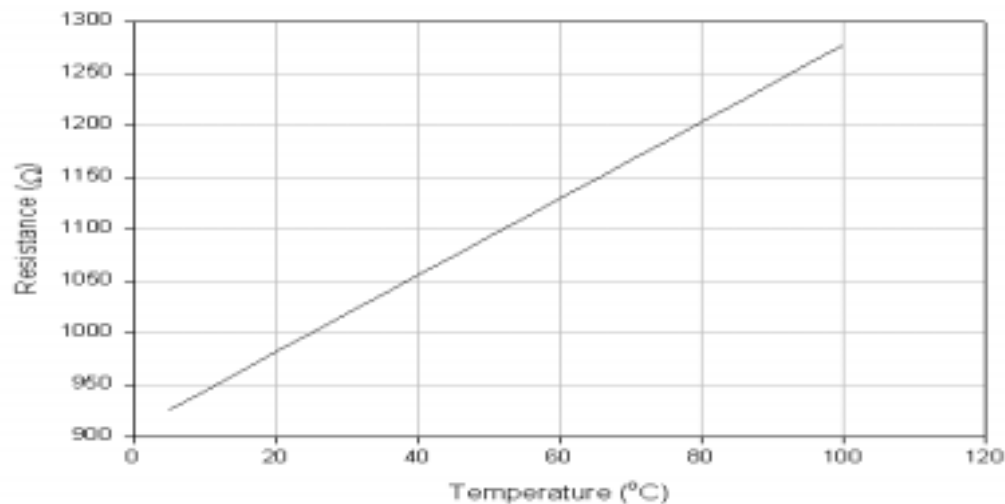


2) window size: 3.80mm (diameter)



■ Thermistor vs. temperature

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

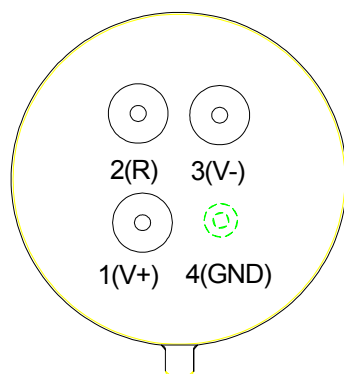


At temperature 25°C, the relation $R = R_0[1 + \alpha(T - T_0) + \beta(T - T_0)^2]$ is almost linear, where the typical value of β is $-3.6 \times 10^{-6} \ll 1$ and α (temperature co-efficient of resistance) is 3.7×10^{-3} defined as :

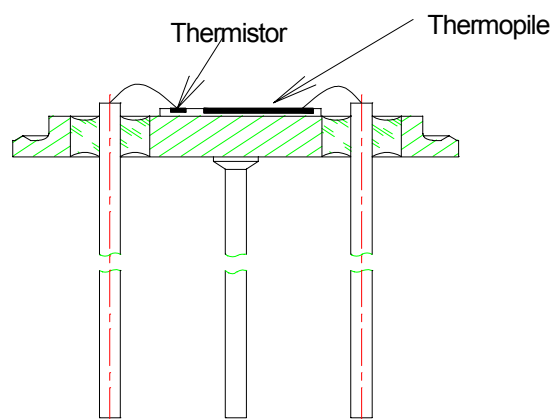
$$\alpha = \frac{1}{R} \frac{dR}{dT}$$

■ Pin assignment & description

- 2 thermistor pin
- 4 thermistor pin (GND)
- 1 thermopile output pin (+)
- 3 thermopile output pin (-)



BACKSIDE VIEW



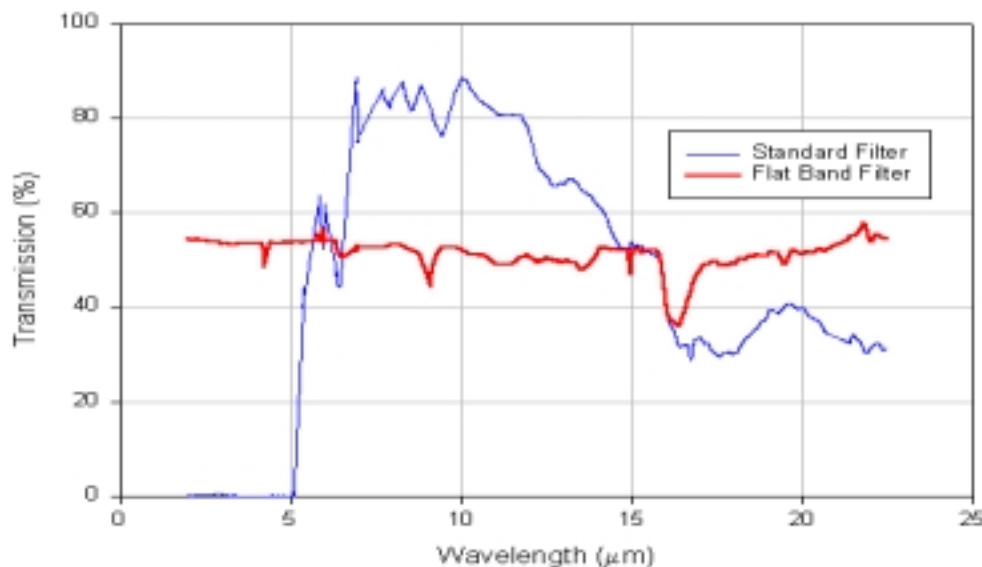
SIDE VIEW

■ Order information : OTC-236-AB

- A : 1 : standard filter (5-14 μ m)
- 2 : silicon filter with flat band transmission
- 3 : band pass filter
- B : 1 : window size = 2.57mm (diameter)
- 2 : window size = 3.80mm (diameter)

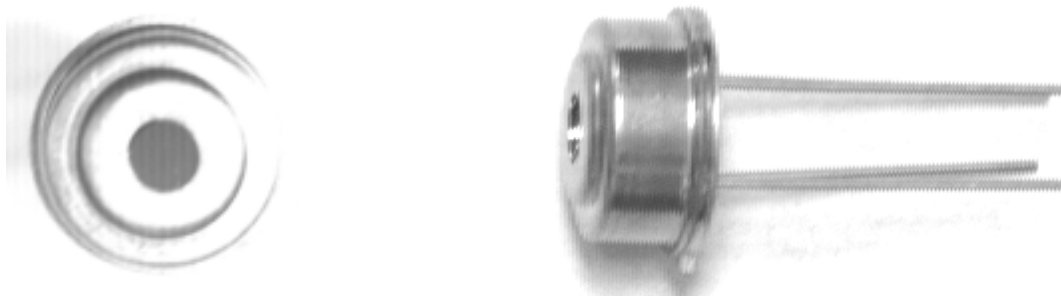
■ Transmission of filter

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

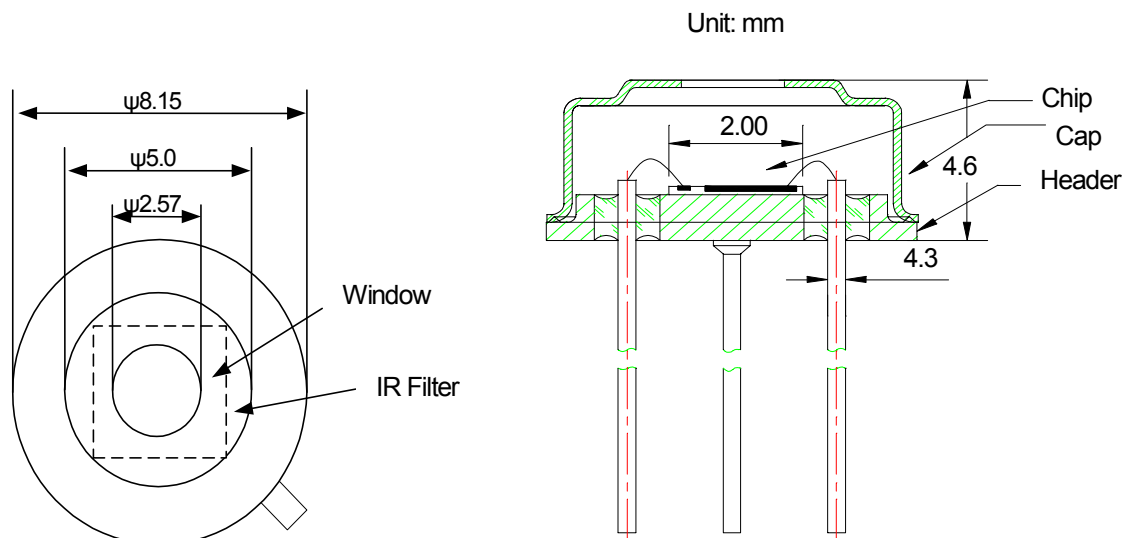


■ Package

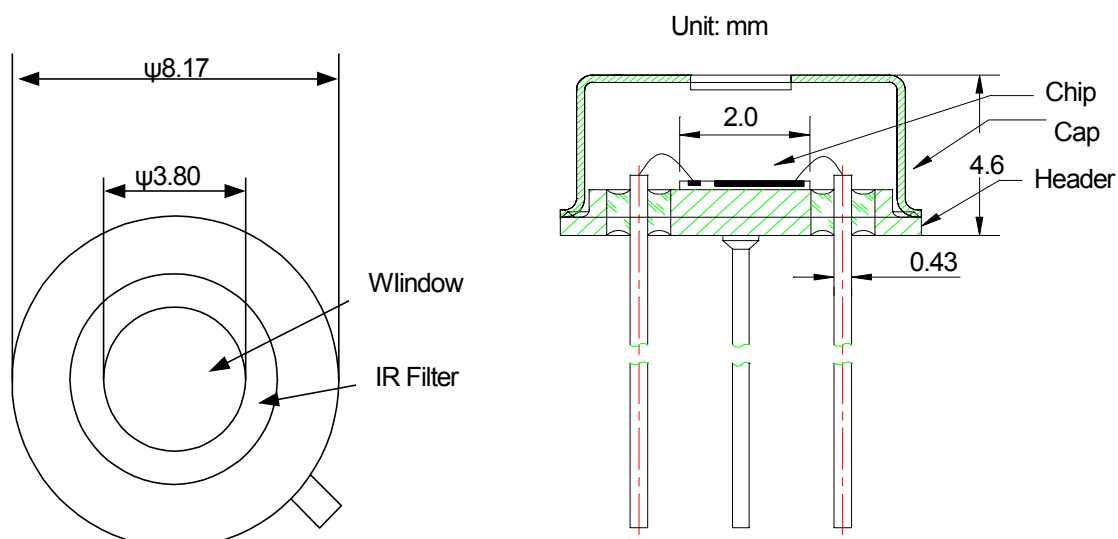
The sensor is hermetically sealed into a TO-5 metal housing, with an optical filter. This standard filter allows measurements to be made in the spectral range above $5\ \mu\text{m}$ wavelength. The dimensions of header and cap are shown below.



OTC-236-11

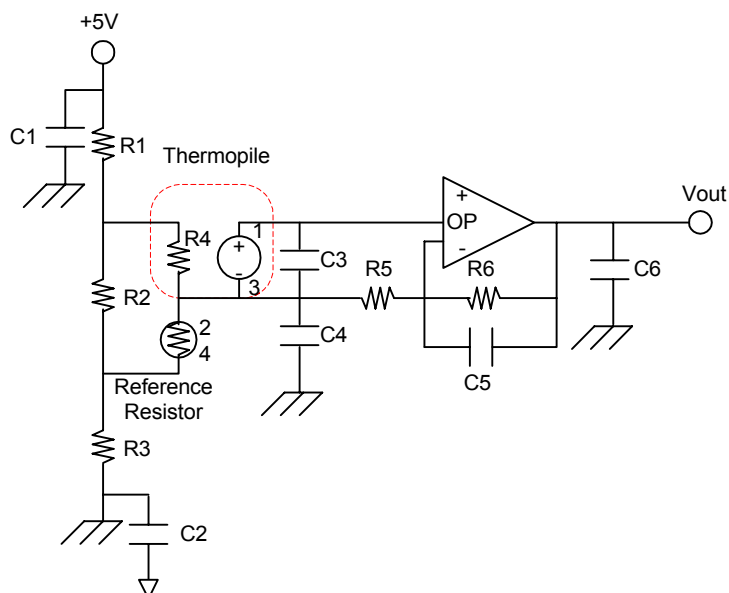


OTC-236-12



■ Application circuit

Circuit 1 :



Circuit 2 :

