

## Infrared Thermopile Sensor ISB-TS45D Product Instruction V1.0

Infrared Thermopile Sensor can measure the temperature without contact by detecting the infrared energy of an object. And the higher the temperature, the more infrared energy is produced. Thermopile sensing elements consist of small thermocouples on silicon chips that absorb energy and produce output signals.

ISB-TS45D Infrared Thermopile Sensor can be widely used in non-contact temperature measurement. This product consists of infrared filters, thermistors and other components, and packaged by TO-46. Made of metal, it has high reliability and high sensitivity.

### Feature:

- TO-46 package
- High sensitivity
- NTC thermistor compensation
- Fast response
- 5 $\mu$ m Long-wave pass filter

### Application:

- Non-contact temperature measurement
- Ear thermometer, forehead thermometer
- Industrial continuous temperature control



## Performance parameters

Parameter	Min.	Typ.	Max.	Unit	Conditions
Chip size	1.6 × 1.6			mm <sup>2</sup>	
Sensitive area	1.125 × 1.125			mm <sup>2</sup>	
Detection angle	90			°	
Thermopile resistance	95	120	140	K $\Omega$	Temp=25 $^{\circ}$ C
Noise voltage	45			nV/Hz <sup>1/2</sup>	Temp=25 $^{\circ}$ C
NEP	0.27			nW/Hz <sup>1/2</sup>	Blackbody=500K,1Hz@25 $^{\circ}$ C
Voltage Response	20.11			Vmm <sup>2</sup> /w	Blackbody=500K,1Hz@25 $^{\circ}$ C
Responsivity	124			V/w	Blackbody=500K,1Hz@25 $^{\circ}$ C
Temp. coefficient of resistance	0.1			%/ $^{\circ}$ C	Temp=25 $^{\circ}$ C ~ 75 $^{\circ}$ C
Time constant	10			ms	
Specific detectivity	1.0E+08			cmHz <sup>1/2</sup> /w	Blackbody=500K,1Hz@25 $^{\circ}$ C
NTC Resistance	100 $\pm$ 3%			K $\Omega$	25 $^{\circ}$ C
NTC $\beta$	3950 $\pm$ 1%			K	25/50 $^{\circ}$ C

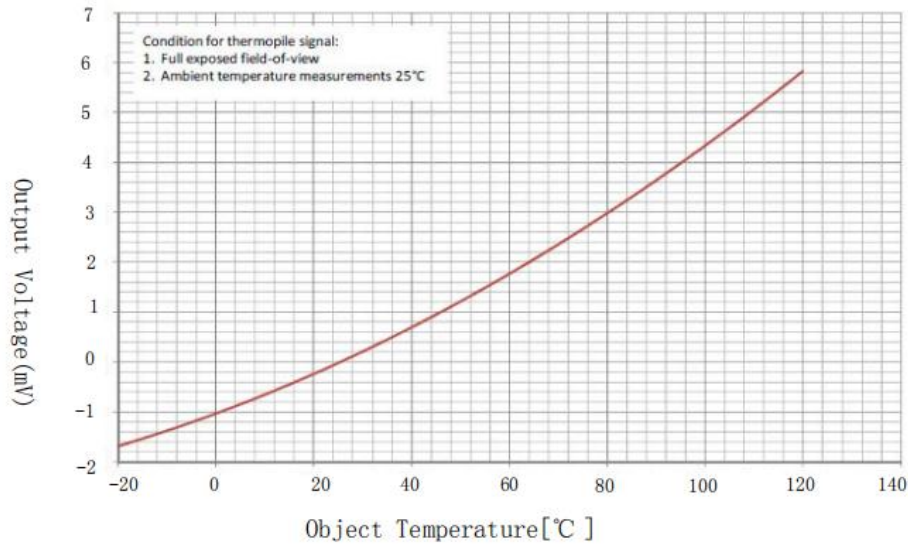
## Environmental requirements

- Working temperature: -30 $^{\circ}$ C ~ +85 $^{\circ}$ C
- Storage temperature: -30 $^{\circ}$ C ~ +100 $^{\circ}$ C

## Output Sensitivity

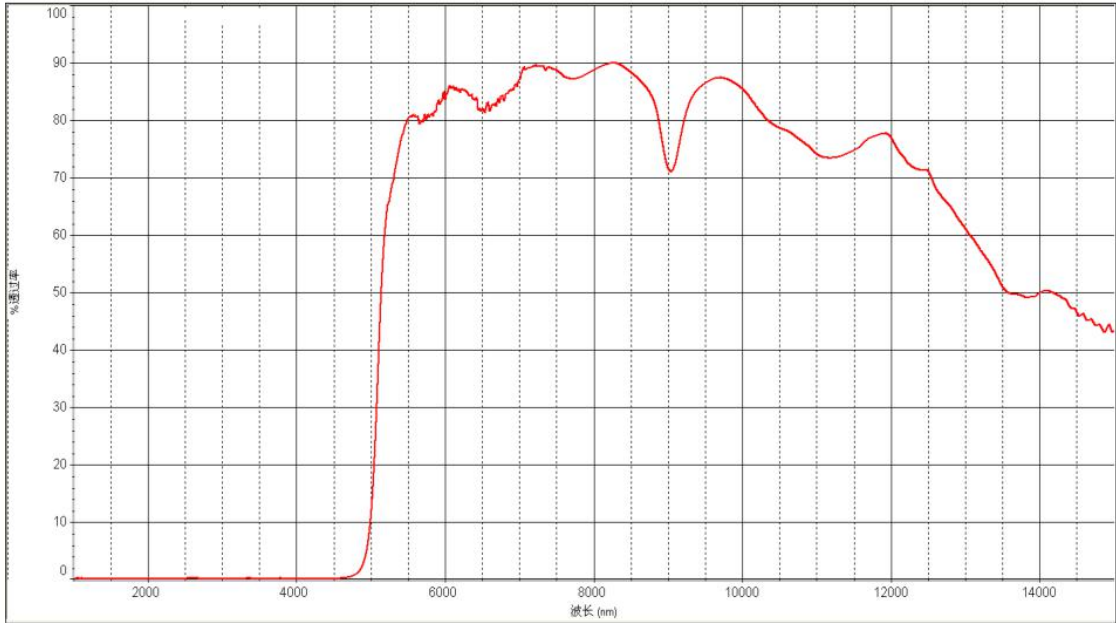
Test conditions: under 25 °C, the measured object temperature vs the typical output voltage of thermopile

\* Note: This parameter is tested with TO-46 package and LWP 5.0 filter.

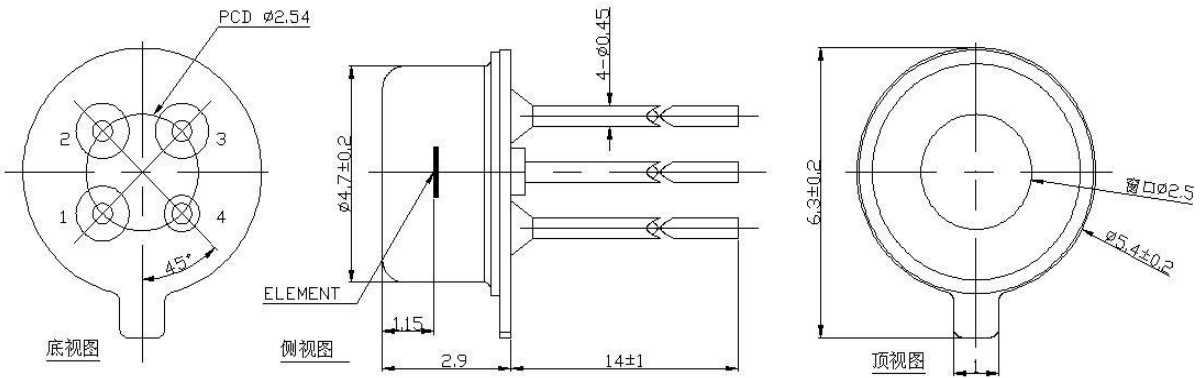


T (°C)	VOUT (mV)	T (°C)	VOUT (mV)	T (°C)	VOUT (mV)	T (°C)	VOUT (mV)
-20	-1.690						
-19	-1.660	16	-0.414	51	1.261	86	3.365
-18	-1.631	17	-0.372	52	1.315	87	3.431
-17	-1.601	18	-0.330	53	1.370	88	3.498
-16	-1.570	19	-0.287	54	1.425	89	3.565
-15	-1.539	20	-0.244	55	1.480	90	3.633
-14	-1.508	21	-0.201	56	1.535	91	3.700
-13	-1.477	22	-0.157	57	1.591	92	3.769
-12	-1.445	23	-0.113	58	1.648	93	3.837
-11	-1.413	24	-0.069	59	1.704	94	3.906
-10	-1.381	25	-0.024	60	1.761	95	3.975
-9	-1.348	26	0.021	61	1.818	96	4.045
-8	-1.315	27	0.066	62	1.876	97	4.115
-7	-1.281	28	0.112	63	1.934	98	4.185
-6	-1.247	29	0.158	64	1.992	99	4.255
-5	-1.213	30	0.205	65	2.051	100	4.326
-4	-1.179	31	0.251	66	2.110	101	4.398
-3	-1.144	32	0.299	67	2.170	102	4.469
-2	-1.108	33	0.346	68	2.229	103	4.541
-1	-1.073	34	0.394	69	2.289	104	4.614
0	-1.037	35	0.442	70	2.350	105	4.686
1	-1.001	36	0.491	71	2.411	106	4.760
2	-0.964	37	0.540	72	2.472	107	4.833
3	-0.927	38	0.589	73	2.533	108	4.907
4	-0.890	39	0.638	74	2.595	109	4.981
5	-0.852	40	0.688	75	2.657	110	5.055
6	-0.814	41	0.739	76	2.720	111	5.130
7	-0.775	42	0.789	77	2.783	112	5.205
8	-0.737	43	0.840	78	2.846	113	5.281
9	-0.697	44	0.892	79	2.910	114	5.357
10	-0.658	45	0.943	80	2.974	115	5.433
11	-0.618	46	0.996	81	3.038	116	5.509
12	-0.578	47	1.048	82	3.103	117	5.586
13	-0.538	48	1.101	83	3.168	118	5.664
14	-0.497	49	1.154	84	3.233	119	5.741
15	-0.456	50	1.207	85	3.299	120	5.819

Spectral curve



Dimensions



Unit: mm

- 1.THERMOPILE(+)
- 2.THERMISTOR
- 3.THERMOPILE(-)
- 4.GROUND

## Caution

### Design restrictions

The sensor is designed for indoor use.

Make sure to use the suitable optical filters and moisture-proof structures in outdoor applications using.

In order to prevent the secondary failures caused by operational failures or malfunctions, the fail-safe features can be added in advance.

### Use restrictions

In order to prevent sensor failure, operational failure or any other malfunction, do not use this sensor under the conditions below.

- A. Severe changes in ambient temperature.
- B. Strong vibration or vibration.
- C. The detecting area is full with barrier material (glass, fog, etc.)
- D. In liquids, corrosive gases and seawater.
- E. Continuous use in a high-humidity atmosphere.
- F. Static electric field or strong electromagnetic radiation.
- G. Corrosive gas or sea breeze.
- H. Dirty and dusty environment that may contaminate the optical window.

### Welding restrictions

A. Soldering with soldering iron. The welding temperature should be under 260°C in 10 seconds. Long time overheating of the sensor pins should be avoided.

B. All flux must be washed off after soldering and rinsed with a brush. Using an ultrasonic cleaner may cause performance problems.

### Usage restrictions

Use and sell should be under any applicable law or regulation.

The sensor failure caused by incorrect handling or storage is not the responsibility of manufacturer.