

## ■ Features

The thermopile sensor consists of a series of 116 thermoelements, forming a sensitive region size of  $900 \times 900 \mu\text{m}^2$ . The sensor is hermetically sealed into a TO-18 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

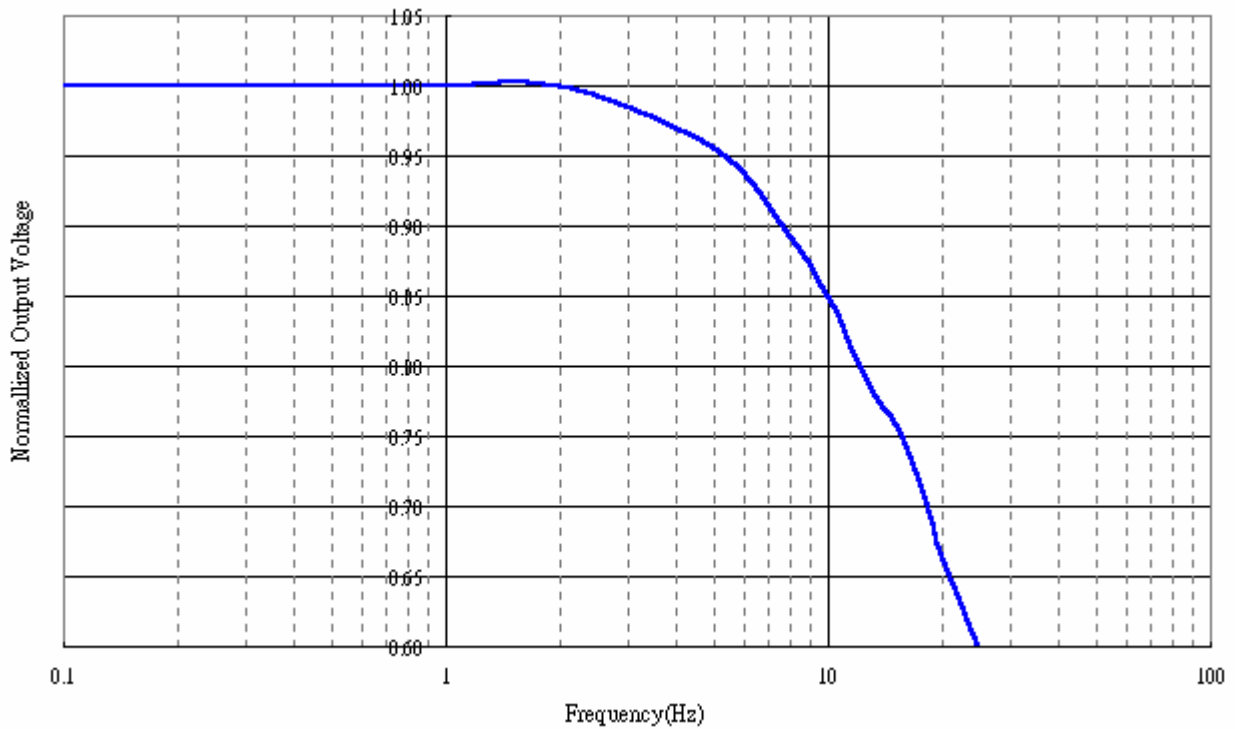
Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Thermopile</b>					
Output Voltage	T <sub>ambient</sub> =25C T <sub>black-body</sub> =37C	630	900	1170	uV
Number of thermojunctions		—	116	—	
Chip size		—	1740*1740	—	μm <sup>2</sup>
Active region size	High efficiency absorber layer	—	900*900	—	μm
Thickness of substrate	Silicon-substrate	600	625	650	μm
Resistance of thermopile	25°C	50	60	80	KΩ
Temperature Coefficient of Thermopile Resistance			<0.1 %/°C		
*Sensitivity *	With 5-14 μm filter	30	37	45	V/W
Detecctivity		0.8*10 <sup>8</sup>	1.1*10 <sup>8</sup>	1.3*10 <sup>8</sup>	cm*Hz <sup>1/2</sup> /W
Time constant		—	20	—	ms
Noise voltage		28	32	36	nV/Hz <sup>1/2</sup>
NEP		0.71	0.86	1.07	nW/Hz <sup>1/2</sup>
Filter Range			Cut on 5+/-0.5um		
Field of View	Incident Angle to achieve 10% responsivity		72		Degree
Sealing			<1*10 <sup>-7</sup>		Atm*cc/sec
Temperature range	Operation	-20	—	100	°C

<b>Temperature reference resistor</b>					
Resistance	25°C	97	100	103	KΩ
$\beta$ value	25°C/100°C	3944	3964	3984	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 1mA.

## ■ Frequency response



■ Thermopile voltage(uV) vs. blackbody & ambient temperature(C)

Ta \ Tb	32	33	34	35	36	37	38	39	40	41	42
5	1643	1713	1783	1855	1927	2000	2073	2147	2222	2298	2374
6	1590	1660	1731	1802	1875	1947	2021	2095	2170	2245	2322
7	1537	1607	1678	1749	1822	1894	1968	2042	2117	2192	2269
8	1484	1554	1624	1696	1768	1841	1914	1988	2063	2139	2215
9	1429	1499	1570	1642	1714	1786	1860	1934	2009	2085	2161
10	1374	1444	1515	1587	1659	1731	1805	1879	1954	2030	2106
11	1319	1389	1460	1531	1603	1676	1749	1824	1898	1974	2050
12	1262	1332	1403	1475	1547	1620	1693	1767	1842	1918	1994
13	1205	1276	1346	1418	1490	1563	1636	1710	1785	1861	1937
14	1148	1218	1289	1360	1432	1505	1579	1653	1728	1803	1879
15	1090	1160	1230	1302	1374	1447	1520	1595	1669	1745	1821
16	1031	1101	1172	1243	1315	1388	1461	1536	1610	1686	1762
17	971	1041	1112	1183	1256	1328	1402	1476	1551	1626	1703
18	911	981	1052	1123	1195	1268	1342	1416	1491	1566	1642
19	850	920	991	1062	1135	1207	1281	1355	1430	1505	1582
20	789	859	929	1001	1073	1146	1219	1293	1368	1444	1520
21	726	797	867	939	1011	1084	1157	1231	1306	1382	1458
22	664	734	804	876	948	1021	1094	1168	1243	1319	1395
23	600	670	741	812	885	957	1031	1105	1180	1255	1332
24	536	606	677	748	820	893	967	1041	1116	1191	1267
25	471	541	612	683	756	828	902	976	1051	1126	1203
26	406	476	547	618	690	763	836	911	985	1061	1137
27	340	410	480	552	624	697	770	845	919	995	1071
28	273	343	414	485	557	630	704	778	853	928	1004
29	205	276	346	418	490	563	636	710	785	861	937
30	137	207	278	350	422	495	568	642	717	793	869
31	69	139	209	281	353	426	499	574	648	724	800
32	0	69	140	212	284	356	430	504	579	655	731
33	-71	0	70	142	214	286	360	434	509	585	661
34	-141	-71	0	71	143	216	289	363	438	514	590
35	-213	-143	-72	0	72	144	218	292	367	442	519
36	-285	-215	-144	-73	0	72	146	220	295	370	447
37	-357	-287	-217	-145	-73	0	73	147	222	298	374
38	-431	-361	-290	-219	-146	-74	0	74	149	224	301
39	-505	-435	-364	-292	-220	-148	-74	0	75	151	227
40	-579	-509	-439	-367	-295	-222	-149	-75	0	76	152



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**■ Thermistor vs. temperature**

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

Ta(C)	min(k-ohms)	Typical(k-ohms)	Max(k-ohms)
-40	2958	3106	3259
-35	2157	2262	2369
-30	1590	1664	1740
-25	1183	1236	1291
-20	888.9	927.3	966.5
-15	673.8	701.9	730.4
-10	515.1	535.8	556.8
-5	397.1	412.4	427.9
0	308.4	319.9	331.5
5	241.4	250.1	258.8
10	190.3	196.9	203.5
15	151.0	156.1	161.1
20	120.7	124.5	128.4
25	97.0	100.0	103.0
30	78.29	80.80	83.31
35	63.56	65.66	67.78
40	51.89	53.67	55.45
45	42.60	44.10	45.61
50	35.15	36.43	37.71
55	29.16	30.24	31.34
60	24.30	25.23	26.17

At temperature 25°C,  $R(T)=R_{25}e^{\beta\left[\frac{1}{T}-\frac{1}{T_{25}}\right]}$  describes the resistance vs. temperature, where  $R_{25}$  is the resistance at ambient temperature 25°C and T,  $T_{25}$  are the ambient temperatures in unit of kelvin degrees.

Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
<b>0.0</b>	308.4	319.9	331.5
0.1	306.9	318.3	329.9
0.2	305.4	316.7	328.2
0.3	303.9	315.2	326.6
0.4	302.4	313.6	324.9
0.5	300.9	312.0	323.3
0.6	299.4	310.5	321.7
0.7	297.9	308.9	320.1
0.8	296.4	307.4	318.5
0.9	295.0	305.9	316.9
<b>1.0</b>	293.5	304.4	315.3
1.1	292.1	302.9	313.8
1.2	290.6	301.4	312.2
1.3	289.2	299.9	310.6
1.4	287.8	298.4	309.1
1.5	286.4	296.9	307.6
1.6	285.0	295.4	306.0
1.7	283.6	294.0	304.5
1.8	282.2	292.5	303.0
1.9	280.8	291.1	301.5
<b>2.0</b>	279.4	289.6	300.0
2.1	278.0	288.2	298.5
2.2	276.7	286.8	297.0
2.3	275.3	285.4	295.6
2.4	274.0	284.0	294.1
2.5	272.6	282.6	292.6
2.6	271.3	281.2	291.2
2.7	270.0	279.8	289.8
2.8	268.6	278.4	288.3
2.9	267.3	277.1	286.9
<b>3.0</b>	266.0	275.7	285.5
3.1	264.7	274.4	284.1
3.2	263.4	273.0	282.7
3.3	262.2	271.7	281.3
3.4	260.9	270.4	279.9
3.5	259.6	269.0	278.5
3.6	258.4	267.7	277.2
3.7	257.1	266.4	275.8
3.8	255.9	265.1	274.5
3.9	254.6	263.8	273.1
<b>4.0</b>	253.4	262.5	271.8

Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
4.1	252.2	261.3	270.4
4.2	250.9	260.0	269.1
4.3	249.7	258.7	267.8
4.4	248.5	257.5	266.5
4.5	247.3	256.2	265.2
4.6	246.1	255.0	263.9
4.7	244.9	253.7	262.6
4.8	243.7	252.5	261.3
4.9	242.6	251.3	260.1
<b>5.0</b>	241.4	250.1	258.8
5.1	240.2	248.8	257.5
5.2	239.1	247.6	256.3
5.3	237.9	246.4	255.0
5.4	236.8	245.3	253.8
5.5	235.6	244.1	252.6
5.6	234.5	242.9	251.3
5.7	233.4	241.7	250.1
5.8	232.3	240.6	248.9
5.9	231.2	239.4	247.7
<b>6.0</b>	230.1	238.2	246.5
6.1	229.0	237.1	245.3
6.2	227.9	236.0	244.1
6.3	226.8	234.8	242.9
6.4	225.7	233.7	241.8
6.5	224.6	232.6	240.6
6.6	223.5	231.5	239.4
6.7	222.5	230.3	238.3
6.8	221.4	229.2	237.1
6.9	220.3	228.1	236.0
<b>7.0</b>	219.3	227.0	234.9
7.1	218.3	226.0	233.7
7.2	217.2	224.9	232.6
7.3	216.2	223.8	231.5
7.4	215.2	222.7	230.4
7.5	214.1	221.7	229.3
7.6	213.1	220.6	228.2
7.7	212.1	219.6	227.1
7.8	211.1	218.5	226.0
7.9	210.1	217.5	224.9
<b>8.0</b>	209.1	216.4	223.8
8.1	208.1	215.4	222.8



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Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
8.2	207.1	214.4	221.7
8.3	206.2	213.4	220.6
8.4	205.2	212.4	219.6
8.5	204.2	211.4	218.5
8.6	203.2	210.3	217.5
8.7	202.3	209.4	216.5
8.8	201.3	208.4	215.4
8.9	200.4	207.4	214.4
<b>9.0</b>	199.4	206.4	213.4
9.1	198.5	205.4	212.4
9.2	197.6	204.4	211.4
9.3	196.6	203.5	210.4
9.4	195.7	202.5	209.4
9.5	194.8	201.6	208.4
9.6	193.9	200.6	207.4
9.7	193.0	199.7	206.4
9.8	192.1	198.7	205.4
9.9	191.2	197.8	204.4
<b>10.0</b>	190.3	196.9	203.5
10.1	189.4	195.9	202.5
10.2	188.5	195.0	201.6
10.3	187.6	194.1	200.6
10.4	186.8	193.2	199.7
10.5	185.9	192.3	198.7
10.6	185.0	191.4	197.8
10.7	184.2	190.5	196.9
10.8	183.3	189.6	195.9
10.9	182.4	188.7	195.0
<b>11.0</b>	181.6	187.8	194.1
11.1	180.7	186.9	193.2
11.2	179.9	186.1	192.3
11.3	179.1	185.2	191.4
11.4	178.2	184.3	190.5
11.5	177.4	183.5	189.6
11.6	176.6	182.6	188.7
11.7	175.8	181.8	187.8
11.8	175.0	180.9	186.9
11.9	174.1	180.1	186.1
<b>12.0</b>	173.3	179.2	185.2
12.1	172.5	178.4	184.3
12.2	171.7	177.6	183.5

Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
12.3	171.0	176.8	182.6
12.4	170.2	175.9	181.8
12.5	169.4	175.1	180.9
12.6	168.6	174.3	180.1
12.7	167.8	173.5	179.2
12.8	167.0	172.7	178.4
12.9	166.3	171.9	177.6
<b>13.0</b>	165.5	171.1	176.7
13.1	164.8	170.3	175.9
13.2	164.0	169.5	175.1
13.3	163.2	168.8	174.3
13.4	162.5	168.0	173.5
13.5	161.8	167.2	172.7
13.6	161.0	166.4	171.9
13.7	160.3	165.7	171.1
13.8	159.5	164.9	170.3
13.9	158.8	164.1	169.5
<b>14.0</b>	158.1	163.4	168.7
14.1	157.4	162.6	167.9
14.2	156.6	161.9	167.2
14.3	155.9	161.1	166.4
14.4	155.2	160.4	165.6
14.5	154.5	159.7	164.9
14.6	153.8	158.9	164.1
14.7	153.1	158.2	163.3
14.8	152.4	157.5	162.6
14.9	151.7	156.8	161.8
<b>15.0</b>	151.0	156.1	161.1
15.1	150.3	155.3	160.4
15.2	149.7	154.6	159.6
15.3	149.0	153.9	158.9
15.4	148.3	153.2	158.2
15.5	147.6	152.5	157.4
15.6	147.0	151.8	156.7
15.7	146.3	151.1	156.0
15.8	145.6	150.5	155.3
15.9	145.0	149.8	154.6
<b>16.0</b>	144.3	149.1	153.9
16.1	143.7	148.4	153.2
16.2	143.0	147.7	152.5
16.3	142.4	147.1	151.8



Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
16.4	141.7	146.4	151.1
16.5	141.1	145.7	150.4
16.6	140.5	145.1	149.7
16.7	139.8	144.4	149.0
16.8	139.2	143.8	148.4
16.9	138.6	143.1	147.7
<b>17.0</b>	137.9	142.5	147.0
17.1	137.3	141.8	146.3
17.2	136.7	141.2	145.7
17.3	136.1	140.6	145.0
17.4	135.5	139.9	144.4
17.5	134.9	139.3	143.7
17.6	134.3	138.7	143.1
17.7	133.7	138.0	142.4
17.8	133.1	137.4	141.8
17.9	132.5	136.8	141.1
<b>18.0</b>	131.9	136.2	140.5
18.1	131.3	135.6	139.9
18.2	130.7	135.0	139.2
18.3	130.1	134.4	138.6
18.4	129.5	133.8	138.0
18.5	129.0	133.2	137.4
18.6	128.4	132.6	136.7
18.7	127.8	132.0	136.1
18.8	127.3	131.4	135.5
18.9	126.7	130.8	134.9
<b>19.0</b>	126.1	130.2	134.3
19.1	125.6	129.6	133.7
19.2	125.0	129.0	133.1
19.3	124.5	128.5	132.5
19.4	123.9	127.9	131.9
19.5	123.4	127.3	131.3
19.6	122.8	126.8	130.7
19.7	122.3	126.2	130.1
19.8	121.7	125.6	129.6
19.9	121.2	125.1	129.0
<b>20.0</b>	120.7	124.5	128.4
20.1	120.1	124.0	127.8
20.2	119.6	123.4	127.3
20.3	119.1	122.9	126.7
20.4	118.5	122.3	126.1

Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
20.5	118.0	121.8	125.6
20.6	117.5	121.3	125.0
20.7	117.0	120.7	124.5
20.8	116.5	120.2	123.9
20.9	116.0	119.6	123.4
<b>21.0</b>	115.4	119.1	122.8
21.1	114.9	118.6	122.3
21.2	114.4	118.1	121.7
21.3	113.9	117.6	121.2
21.4	113.4	117.0	120.6
21.5	112.9	116.5	120.1
21.6	112.4	116.0	119.6
21.7	111.9	115.5	119.0
21.8	111.5	115.0	118.5
21.9	111.0	114.5	118.0
<b>22.0</b>	110.5	114.0	117.5
22.1	110.0	113.5	117.0
22.2	109.5	113.0	116.4
22.3	109.0	112.5	115.9
22.4	108.6	112.0	115.4
22.5	108.1	111.5	114.9
22.6	107.6	111.0	114.4
22.7	107.2	110.5	113.9
22.8	106.7	110.0	113.4
22.9	106.2	109.6	112.9
<b>23.0</b>	105.8	109.1	112.4
23.1	105.3	108.6	111.9
23.2	104.9	108.1	111.4
23.3	104.4	107.7	110.9
23.4	103.9	107.2	110.5
23.5	103.5	106.7	110.0
23.6	103.0	106.3	109.5
23.7	102.6	105.8	109.0
23.8	102.2	105.3	108.5
23.9	101.7	104.9	108.1
<b>24.0</b>	101.3	104.4	107.6
24.1	100.8	104.0	107.1
24.2	100.4	103.5	106.7
24.3	100.0	103.1	106.2
24.4	99.54	102.6	105.7
24.5	99.11	102.2	105.3



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Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
24.6	98.69	101.7	104.8
24.7	98.26	101.3	104.4
24.8	97.84	100.9	103.9
24.9	97.42	100.4	103.4
<b>25.0</b>	97.00	100.0	103.0
25.1	96.58	99.57	102.6
25.2	96.16	99.14	102.1
25.3	95.74	98.71	101.7
25.4	95.33	98.29	101.2
25.5	94.92	97.86	100.8
25.6	94.51	97.44	100.4
25.7	94.10	97.02	99.95
25.8	93.69	96.61	99.52
25.9	93.29	96.19	99.10
<b>26.0</b>	92.88	95.78	98.67
26.1	92.48	95.37	98.25
26.2	92.09	94.96	97.83
26.3	91.69	94.55	97.42
26.4	91.29	94.15	97.00
26.5	90.90	93.74	96.59
26.6	90.51	93.34	96.18
26.7	90.12	92.94	95.77
26.8	89.73	92.55	95.36
26.9	89.35	92.15	94.96
<b>27.0</b>	88.97	91.76	94.55
27.1	88.58	91.37	94.15
27.2	88.20	90.98	93.75
27.3	87.83	90.59	93.35
27.4	87.45	90.20	92.96
27.5	87.08	89.82	92.57
27.6	86.70	89.44	92.17
27.7	86.33	89.06	91.78
27.8	85.97	88.68	91.40
27.9	85.60	88.30	91.01
<b>28.0</b>	85.23	87.93	90.62
28.1	84.87	87.55	90.24
28.2	84.51	87.18	89.86
28.3	84.15	86.81	89.48
28.4	83.79	86.45	89.11
28.5	83.43	86.08	88.73
28.6	83.08	85.72	88.36

Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
28.7	82.73	85.35	87.99
28.8	82.37	84.99	87.62
28.9	82.02	84.63	87.25
<b>29.0</b>	81.68	84.28	86.88
29.1	81.33	83.92	86.52
29.2	80.98	83.57	86.15
29.3	80.64	83.21	85.79
29.4	80.30	82.86	85.43
29.5	79.96	82.52	85.07
29.6	79.62	82.17	84.72
29.7	79.29	81.82	84.36
29.8	78.95	81.48	84.01
29.9	78.62	81.14	83.66
<b>30.0</b>	78.29	80.80	83.31
30.1	77.96	80.46	82.96
30.2	77.63	80.12	82.62
30.3	77.30	79.78	82.27
30.4	76.98	79.45	81.93
30.5	76.65	79.12	81.59
30.6	76.33	78.79	81.25
30.7	76.01	78.46	80.91
30.8	75.69	78.13	80.57
30.9	75.37	77.80	80.24
<b>31.0</b>	75.05	77.48	79.91
31.1	74.74	77.15	79.57
31.2	74.43	76.83	79.24
31.3	74.11	76.51	78.92
31.4	73.80	76.19	78.59
31.5	73.50	75.88	78.26
31.6	73.19	75.56	77.94
31.7	72.88	75.25	77.62
31.8	72.58	74.93	77.30
31.9	72.28	74.62	76.98
<b>32.0</b>	71.97	74.31	76.66
32.1	71.67	74.00	76.34
32.2	71.37	73.70	76.03
32.3	71.08	73.39	75.71
32.4	70.78	73.09	75.40
32.5	70.49	72.79	75.09
32.6	70.19	72.48	74.78
32.7	69.90	72.18	74.47



OPTO TECH CORPORATION  
 Tel: 886-3-5638951  
 Fax: 886-3-5783696  
<http://www.opto.com.tw>

Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
32.8	69.61	71.89	74.17
32.9	69.32	71.59	73.86
<b>33.0</b>	69.03	71.29	73.56
33.1	68.75	71.00	73.26
33.2	68.46	70.71	72.96
33.3	68.18	70.42	72.66
33.4	67.90	70.13	72.36
33.5	67.62	69.84	72.06
33.6	67.34	69.55	71.77
33.7	67.06	69.26	71.48
33.8	66.78	68.98	71.18
33.9	66.51	68.69	70.89
<b>34.0</b>	66.23	68.41	70.60
34.1	65.96	68.13	70.31
34.2	65.69	67.85	70.03
34.3	65.42	67.57	69.74
34.4	65.15	67.30	69.46
34.5	64.88	67.02	69.17
34.6	64.61	66.75	68.89
34.7	64.35	66.47	68.61
34.8	64.08	66.20	68.33
34.9	63.82	65.93	68.06
<b>35.0</b>	63.56	65.66	67.78
35.1	63.30	65.40	67.50
35.2	63.04	65.13	67.23
35.3	62.78	64.86	66.96
35.4	62.52	64.60	66.69
35.5	62.26	64.34	66.42
35.6	62.01	64.07	66.15
35.7	61.76	63.81	65.88
35.8	61.50	63.55	65.61
35.9	61.25	63.30	65.35
<b>36.0</b>	61.00	63.04	65.08
36.1	60.75	62.78	64.82
36.2	60.51	62.53	64.56
36.3	60.26	62.27	64.30
36.4	60.01	62.02	64.04
36.5	59.77	61.77	63.78
36.6	59.53	61.52	63.52
36.7	59.28	61.27	63.27
36.8	59.04	61.02	63.01

Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
36.9	58.80	60.78	62.76
<b>37.0</b>	58.57	60.53	62.51
37.1	58.33	60.29	62.26
37.2	58.09	60.04	62.01
37.3	57.86	59.80	61.76
37.4	57.62	59.56	61.51
37.5	57.39	59.32	61.26
37.6	57.16	59.08	61.02
37.7	56.92	58.84	60.78
37.8	56.69	58.61	60.53
37.9	56.47	58.37	60.29
<b>38.0</b>	56.24	58.14	60.05
38.1	56.01	57.90	59.81
38.2	55.78	57.67	59.57
38.3	55.56	57.44	59.33
38.4	55.34	57.21	59.10
38.5	55.11	56.98	58.86
38.6	54.89	56.75	58.63
38.7	54.67	56.53	58.39
38.8	54.45	56.30	58.16
38.9	54.23	56.08	57.93
<b>39.0</b>	54.01	55.85	57.70
39.1	53.80	55.63	57.47
39.2	53.58	55.41	57.24
39.3	53.37	55.19	57.01
39.4	53.15	54.97	56.79
39.5	52.94	54.75	56.56
39.6	52.73	54.53	56.34
39.7	52.52	54.31	56.12
39.8	52.31	54.10	55.89
39.9	52.10	53.88	55.67
<b>40.0</b>	51.89	53.67	55.45
40.1	51.68	53.45	55.23
40.2	51.48	53.24	55.02
40.3	51.27	53.03	54.80
40.4	51.07	52.82	54.58
40.5	50.86	52.61	54.37
40.6	50.66	52.40	54.15
40.7	50.46	52.19	53.94
40.8	50.26	51.99	53.73
40.9	50.06	51.78	53.52



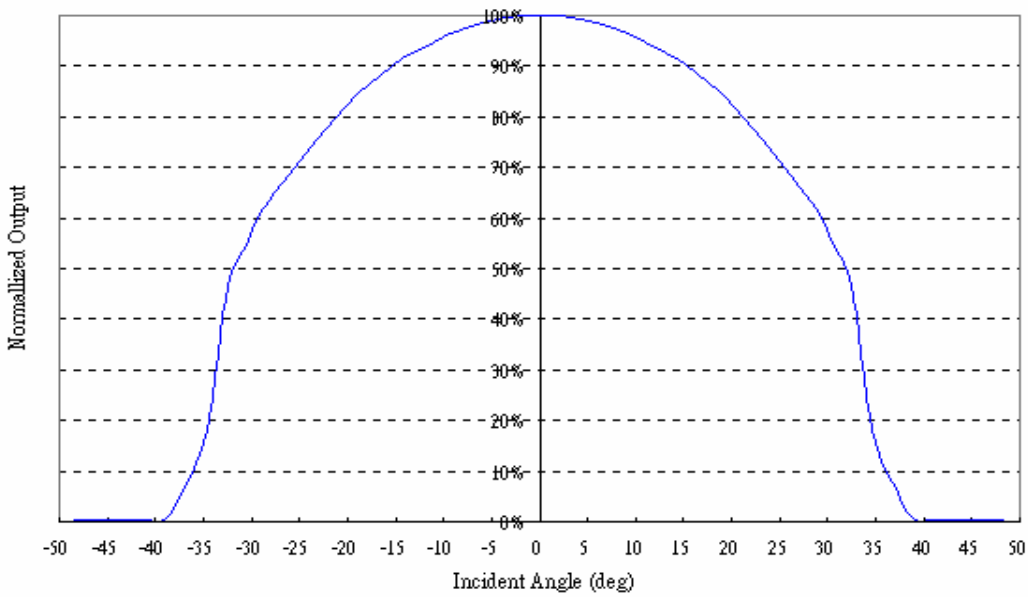
Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
<b>41.0</b>	49.86	51.58	53.31
41.1	49.66	51.37	53.10
41.2	49.47	51.17	52.89
41.3	49.27	50.97	52.68
41.4	49.07	50.77	52.47
41.5	48.88	50.57	52.27
41.6	48.69	50.37	52.06
41.7	48.49	50.17	51.86
41.8	48.30	49.97	51.66
41.9	48.11	49.78	51.45
<b>42.0</b>	47.92	49.58	51.25
42.1	47.73	49.39	51.05
42.2	47.54	49.19	50.85
42.3	47.36	49.00	50.65
42.4	47.17	48.81	50.46
42.5	46.98	48.62	50.26
42.6	46.80	48.43	50.06
42.7	46.61	48.24	49.87
42.8	46.43	48.05	49.67
42.9	46.25	47.86	49.48
<b>43.0</b>	46.07	47.67	49.29
43.1	45.89	47.49	49.10
43.2	45.71	47.30	48.91
43.3	45.53	47.12	48.72
43.4	45.35	46.93	48.53
43.5	45.17	46.75	48.34
43.6	44.99	46.57	48.15
43.7	44.82	46.39	47.96
43.8	44.64	46.20	47.78
43.9	44.47	46.03	47.59
<b>44.0</b>	44.29	45.85	47.41
44.1	44.12	45.67	47.23
44.2	43.95	45.49	47.04
44.3	43.78	45.31	46.86
44.4	43.61	45.14	46.68
44.5	43.44	44.96	46.50
44.6	43.27	44.79	46.32
44.7	43.10	44.62	46.14
44.8	42.93	44.44	45.97
44.9	42.76	44.27	45.79
<b>45.0</b>	42.60	44.10	45.61

Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
45.1	42.43	43.93	45.44
45.2	42.27	43.76	45.26
45.3	42.10	43.59	45.09
45.4	41.94	43.42	44.92
45.5	41.78	43.25	44.74
45.6	41.62	43.09	44.57
45.7	41.45	42.92	44.40
45.8	41.29	42.76	44.23
45.9	41.13	42.59	44.06
<b>46.0</b>	40.98	42.43	43.89
46.1	40.82	42.26	43.72
46.2	40.66	42.10	43.56
46.3	40.50	41.94	43.39
46.4	40.35	41.78	43.23
46.5	40.19	41.62	43.06
46.6	40.04	41.46	42.90
46.7	39.88	41.30	42.73
46.8	39.73	41.14	42.57
46.9	39.58	40.99	42.41
<b>47.0</b>	39.42	40.83	42.25
47.1	39.27	40.67	42.09
47.2	39.12	40.52	41.93
47.3	38.97	40.36	41.77
47.4	38.82	40.21	41.61
47.5	38.67	40.05	41.45
47.6	38.52	39.90	41.29
47.7	38.38	39.75	41.14
47.8	38.23	39.60	40.98
47.9	38.08	39.45	40.82
<b>48.0</b>	37.94	39.30	40.67
48.1	37.79	39.15	40.52
48.2	37.65	39.00	40.36
48.3	37.50	38.85	40.21
48.4	37.36	38.70	40.06
48.5	37.22	38.56	39.91
48.6	37.08	38.41	39.76
48.7	36.94	38.26	39.61
48.8	36.79	38.12	39.46
48.9	36.65	37.98	39.31
<b>49.0</b>	36.52	37.83	39.16
49.1	36.38	37.69	39.01



Temp.(C)	min.(KΩ)	typical(KΩ)	max.(KΩ)
49.2	36.24	37.55	38.87
49.3	36.10	37.40	38.72
49.4	35.96	37.26	38.57
49.5	35.83	37.12	38.43
49.6	35.69	36.98	38.28
49.7	35.56	36.84	38.14
49.8	35.42	36.70	38.00
49.9	35.29	36.57	37.86
<b>50.0</b>	35.15	36.43	37.71

## Field of view

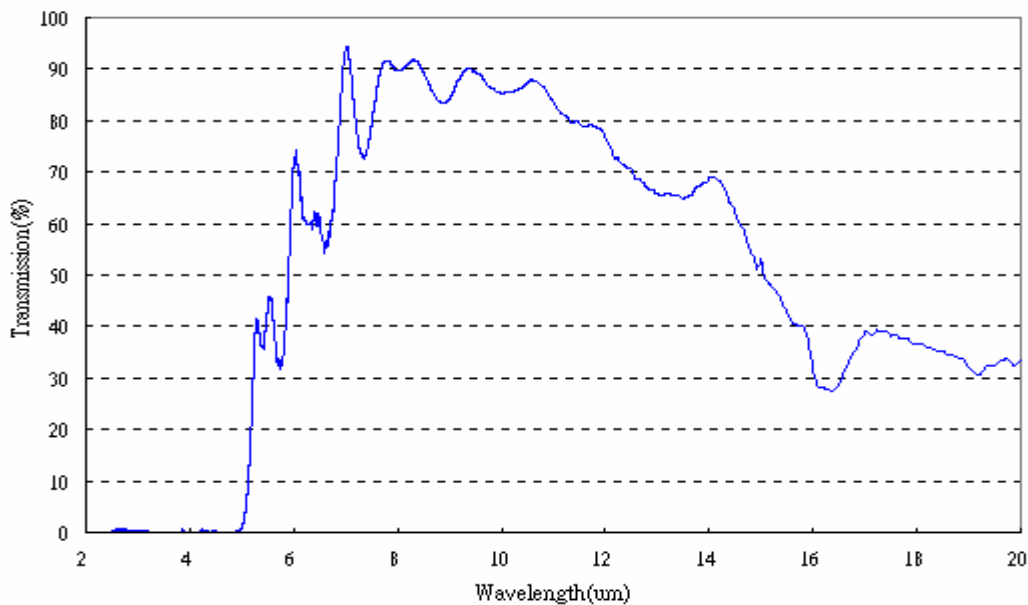


## Transmission of filter

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

Cut on wavelength : 5.0  $\pm$  0.5  $\mu$ m

Band range and minimum average transmission : 7~14  $\mu$ m , 78%

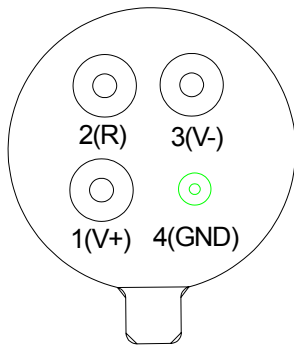


## ■ Reliability Test

Items	Conditions	Variation of Output Voltage	MIL-STD reference	IEC reference
Vibration	15g, 20 min/ cycle, 12 cycles/ axis	<+/- 2%	202F, 204D, B	
Mechanical Shock	Half-sine, 100g, 6 ms	<+/- 2%		IEC 68-2-27 test Ea
Damp Heat	85°C, 85RH, 504 Hrs	<+/- 2%		IEC 68-2-3 test Ca
Cold	-40°C, 504Hrs	<+/- 2%		IEC 68-2-1 test Aa
Dry Heat	130°C, 1008 Hrs	<+/- 3%		IEC 68-2-2 test Ba
Thermal Shock	-40°C/85°C, 30 mins dwell, 10 Cycles	<+/- 2%		IEC 68-2-14 test Nb
General preservation	1atm, 15°C~35°C, 1 years	<+/- 2%		
Leakage	35psig, 30min, (1 x 10 <sup>-7</sup> atm*cc/sec)	100% No Leakage	883D, 1014.9, E	
Lead tension strength		> 5Kg		

\*The thermopile sensor can be damaged by ESD . Please take appropriate precautions of the handling .

## ■ Pin assignment & description



**BACKSIDE VIEW**

Pin assignment:

2 : thermistor pin

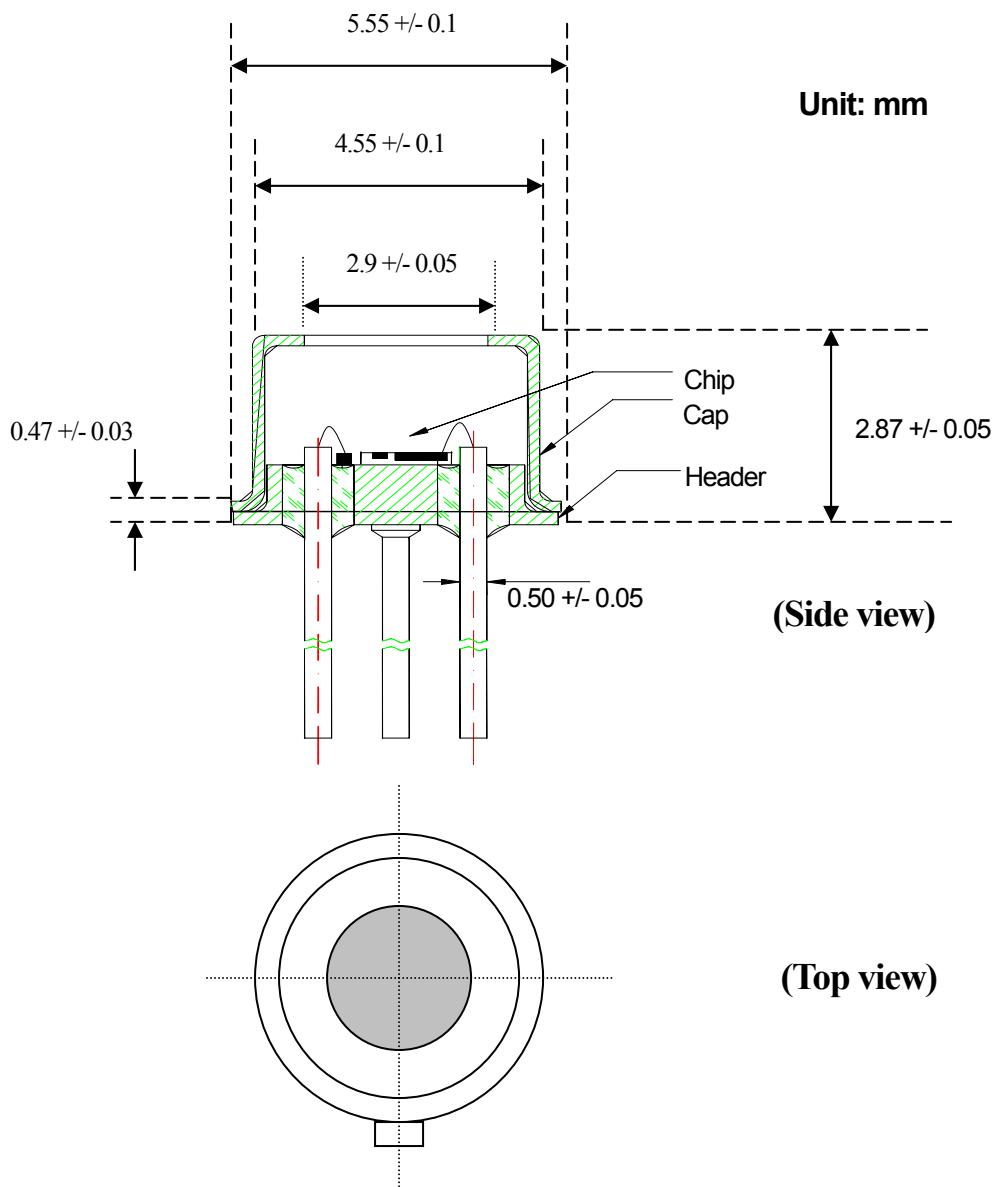
4 : thermistor pin (GND)

1 : thermopile output pin (+)

3 : thermopile output pin (-)

## ■ 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  $5\mu\text{m}$  wavelength. The dimensions of header and cap are shown below.



**(Bottom view)**

