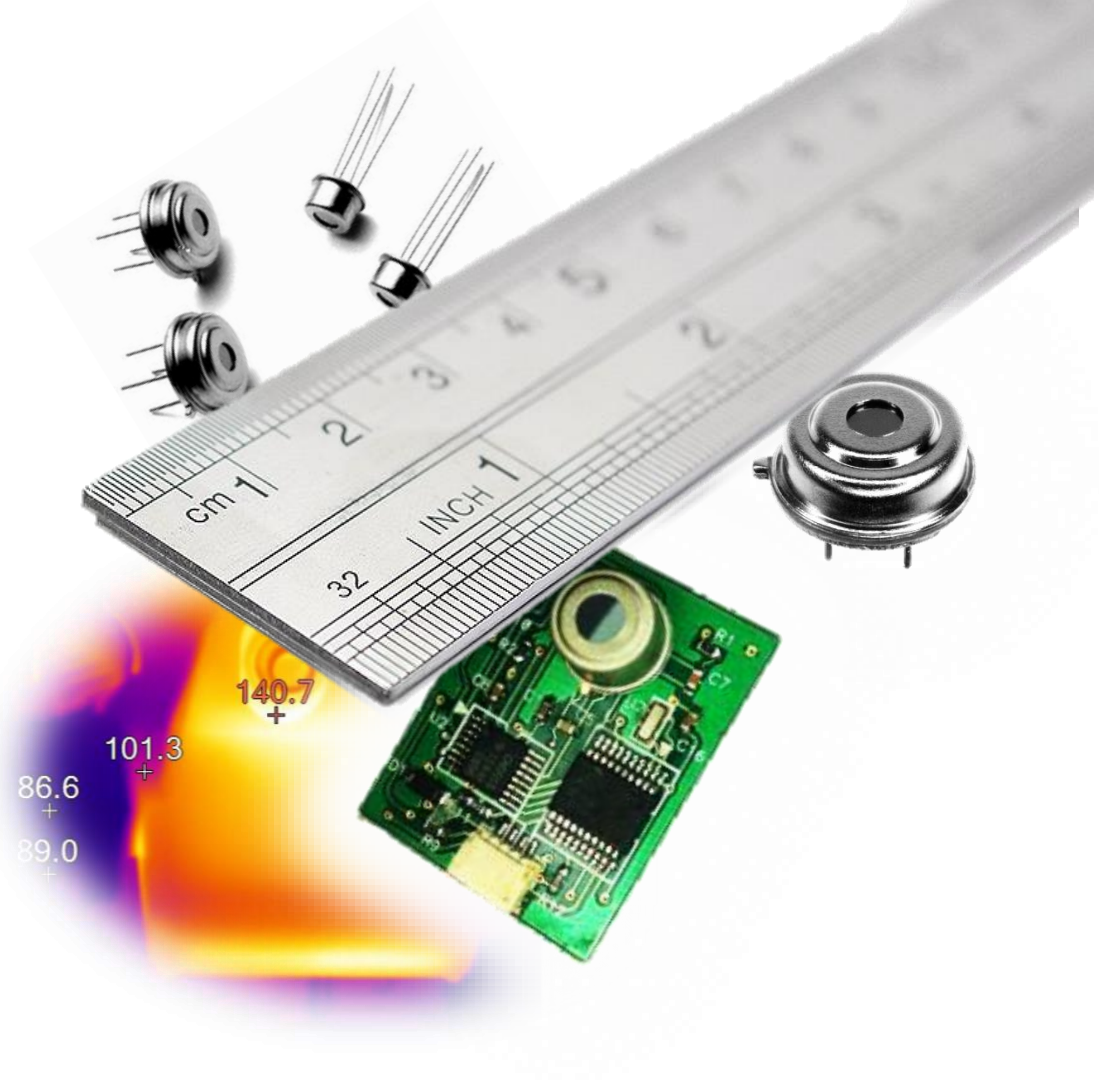
Amphenol
Advanced Sensors

IR application Development procedure



Amphenol Sensing Korea
Technology Team
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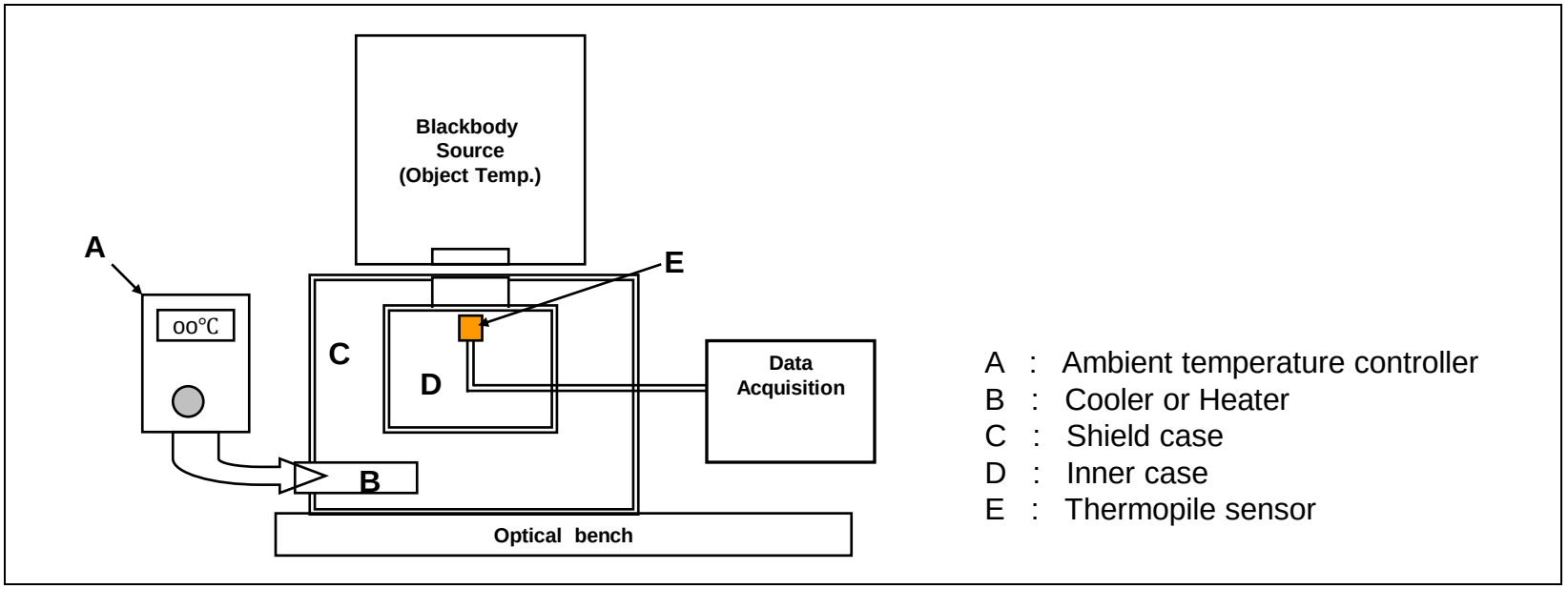
Ambient temperature characteristics measurement of thermopile sensor itself for “Look-up Table”



[Fig. 1] Test Apparatus
(Test condition can changed by application condition)

※ TEST Procedure

1. Fix sensor at “ E ” position.
2. Set object temperature to measure.(ex,55℃)
3. Get data under different ambient temperature using ambient controller.
4. Measure #2 and #3 under different Object temperature.
5. Make “Look-up table” based on the test result. (See [Table 1])

[Table 1] Look-up table

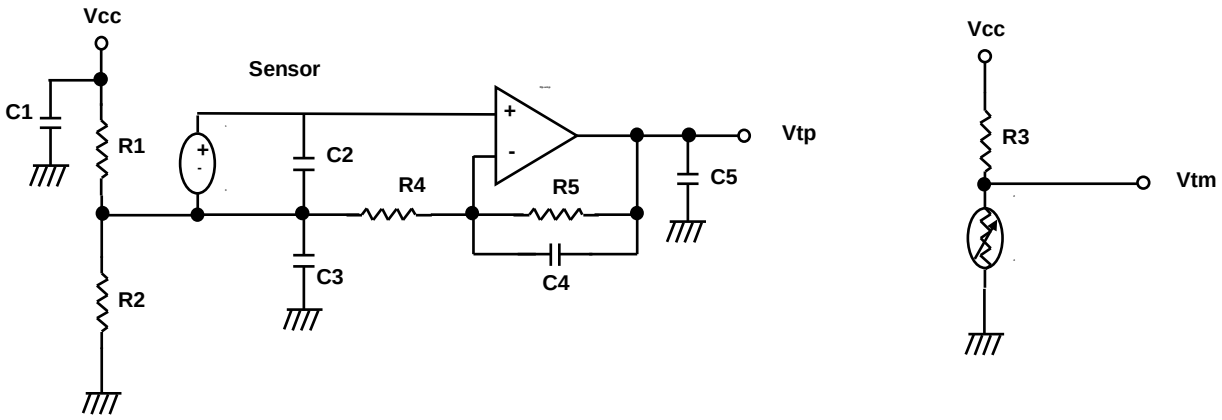
V_{ir} (To,Ta)		Nominal Thermopile Output Voltage (mV)												
Thermopile Object Temperature (℃) ----->		-40	-25	-15	-5	5	15	25	35	45	55	65	75	85
Sensor Ambient Temperature (℃)	-40	0	1.336	2.266	3.257	4.318	5.458	6.628	7.91	9.375	11.069	13.022	15.22	17.622
	-25	-1.336	0	0.93	1.921	2.982	4.122	5.292	6.574	8.039	9.733	11.686	13.884	16.286
	-15	-2.266	-0.93	0	0.991	2.052	3.192	4.362	5.644	7.109	8.803	10.756	12.954	15.356
	-5	-3.257	-1.921	-0.991	0	1.061	2.201	3.371	4.653	6.118	7.812	9.765	11.963	14.365
	5	-4.318	-2.982	-2.052	-1.061	0	1.14	2.31	3.592	5.057	6.751	8.704	10.902	13.304
	15	-5.458	-4.122	-3.192	-2.201	-1.14	0	1.17	2.452	3.917	5.611	7.564	9.762	12.164
	25	-6.628	-5.292	-4.362	-3.371	-2.31	-1.17	0	1.282	2.747	4.441	6.394	8.592	10.994
	35	-7.91	-6.574	-5.644	-4.653	-3.592	-2.452	-1.282	0	1.465	3.159	5.112	7.31	9.712
	45	-9.375	-8.039	-7.109	-6.118	-5.057	-3.917	-2.747	-1.465	0	1.694	3.647	5.845	8.247
	55	-11.069	-9.733	-8.803	-7.812	-6.751	-5.611	-4.441	-3.159	-1.694	0	1.953	4.151	6.553
	65	-13.022	-11.686	-10.756	-9.765	-8.704	-7.564	-6.394	-5.112	-3.647	-1.953	0	2.198	4.6
	75	-15.22	-13.884	-12.954	-11.963	-10.902	-9.762	-8.592	-7.31	-5.845	-4.151	-2.198	0	2.402
	85	-17.622	-16.286	-15.356	-14.365	-13.304	-12.164	-10.994	-9.712	-8.247	-6.553	-4.6	-2.402	0

1. Using Look-up table

Make separate circuits of Thermopile and Thermistor to see object temperature and ambient temperature separately. See [Fig.1]

Evaluate temperature compensated output substituting each values of Thermopile and Thermistor on the look-up table. See [Table 2 & Example in next page].

This method is used for Precision measurement.



[Fig.1] Circuit

Tambient(℃)	Vth(V)
22.0	2.666
22.5	2.638
23.0	2.610
23.5	2.583
24.0	2.555
24.5	2.527
25.0	2.500
25.5	2.473
26.0	2.445
26.5	2.418
27.0	2.391
27.5	2.364
28.0	2.337
28.5	2.310
29.0	2.284
29.5	2.257
30.0	2.231
30.5	2.205
31.0	2.178
31.5	2.153
32.0	2.127
32.5	2.101
33.0	2.076
33.5	2.050
34.0	2.025
34.5	2.000
35.0	1.975
35.5	1.951
36.0	1.926
36.5	1.902

[Table 2] Vtm output

Example)

If measurement Results as below

- Thermopile Output : 3.159mV
- Thermistor output : 1.975V

→ *Actual Object temp. : 55℃*

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	-25	-1.336	0	0.93	1.921	2.982	4.122	5.292	6.574	8.039	9.733	11.686	13.884	16.286
	-15	-2.266	-0.93	0	0.991	2.052	3.192	4.362	5.644	7.109	8.803	10.756	12.954	15.356
	-5	-3.257	-1.921	-0.991	0	1.061	2.201	3.371	4.653	6.118	7.812	9.765	11.963	14.365
	5	-4.318	-2.982	-2.052	-1.061	0	1.14	2.31	3.592	5.057	6.751	8.704	10.902	13.304
	15	-5.458	-4.122	-3.192	-2.201	-1.14	0	1.17	2.452	3.917	5.611	7.564	9.762	12.164
	25	-6.628	-5.292	-4.362	-3.371	-2.31	-1.17	0	1.282	2.747	4.441	6.394	8.592	10.994
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	65	-13.022	-11.686	-10.756	-9.765	-8.704	-7.564	-6.394	-5.112	-3.647	-1.953	0	2.198	4.6
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	85	-17.622	-16.286	-15.356	-14.365	-13.304	-12.164	-10.994	-9.712	-8.247	-6.553	-4.6	-2.402	0