SA10100609, The Platinum Resistance temperature sensor (PT-RTD)

The history of revision change for the specification

Date	Revision	Changes
2004/03/03	A0	New Approval
2019/10/04	A1	Add temperature - resistance diagram and packaging
2024/12/26	A2	Adjust ppm to lowercase

SA10100609, The Platinum Resistance temperature sensor (PT-RTD)

Features / Applications



- Features:
  - Low drift
  - Long service life
  - Wide temperature range
  - Wide range of resistance values
  - Temperature linear control
  - High precision
  - Fast response time
  - RoHS compliant

- Applications:
  - Home Appliances: oven, air conditioner, refrigerator, calorimeter
  - Industrial Equipment: temperature controller
  - Medical: precision thermometer
  - Electronics: over-temperature protection

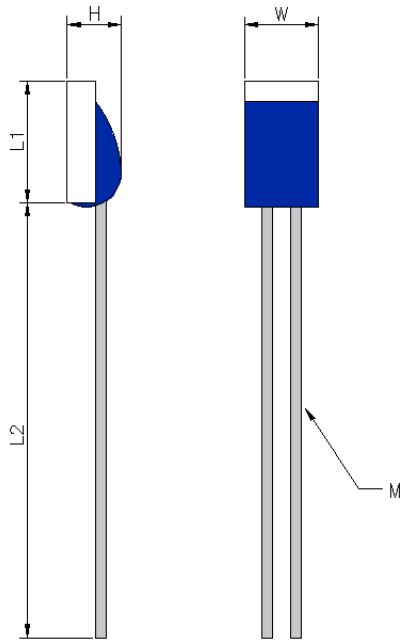
Electrical Specifications

Characteristics	Feature
Resistance value at 0°C	100 ± 0.12 Ω
Tolerance	Class B: ± 0.12%
Temperature coefficient of resistance (TCR)	3850 ppm/°C
Operation temperature range	-50°C ~ +500°C
Maximum applied current	1 mA
Thermal response time (90%)	10 seconds max. (In air at 1 m/sec.)
Self-heating	2.5 mW/°C (In air at 1 m/sec.)

Outline Drawing

Unit: mm

Dimension



W	1.7 ± 0.15
H	1.25 ± 0.2(TYP.)
L1	2.8 ± 0.15
L2	10 ± 2
M	Ni wire ϕ0.22(TYP.)

Type Designation

SA	101	0	0	XXX
(1)	(2)	(3)	(4)	(5)

Where

(1) Series number: SA = Applicable temperature range 500°C

(2) Resistance Value: 101 = $10X10^{1}$ = 100 Ω

(3) TCR / Class: 0 = 3850 ppm/°C / B class

(4) Package type: 0 = Glass coated

(5) Serial number

Characteristics

Electrical

Item	Specification and requirement	Test method
Insulation resistance	>100 MΩ	Apply 500 VDC between the lead wire and the glass coating for 1 minute at room temperature.
ESD	△R(0°C): ≤0.12%	Human body, 2KV.

Endurance

Item	Specification and requirement	Test method
Low temperature test	△R(0°C): ≤0.12% Without distinct damage in appearance.	Keep the PT sensor in -50°C for 1000 hours.
High temperature test	△R(0°C): ≤0.12% Without distinct damage in appearance.	Keep the PT sensor in 500°C for 1000 hours.
Humidity test	△R(0°C): ≤0.12% Without distinct damage in appearance.	Keep the PT sensor in 60°C and 90% ~ 95% R.H. for 1000 hours.
Thermal shock	△R(0°C): ≤0.12% Without distinct damage in appearance.	Keep the PT sensor in 0°C ice water for at least 15 seconds, then within 10 seconds, directly place it into 100°C hot water for at least 15 seconds. Repeat the above process for at least 10 cycles.

Temperature and resistance relationship

- The temperature and resistance relationships used in this standard are as follows:

When T < 0°C:

$Rt = R0 [1 + aT + bT^2 + cT^3 (T – 100)]$

When T ≧ 0°C:

$Rt = R0 (1+ aT + bT^2)$

Where

Rt: resistance at a certain temperature T

R0: resistance at 0°C

a, b, c: coefficient (refer to the following table)

Coefficient for TCR = 3850 ppm/°C (IEC 751 Standard)

Temperature	a	b	c
T < 0°C	3.90830E-03	-5.77500E-07	-4.18300E-12
T ≧ 0°C	3.90830E-03	-5.77500E-07	0

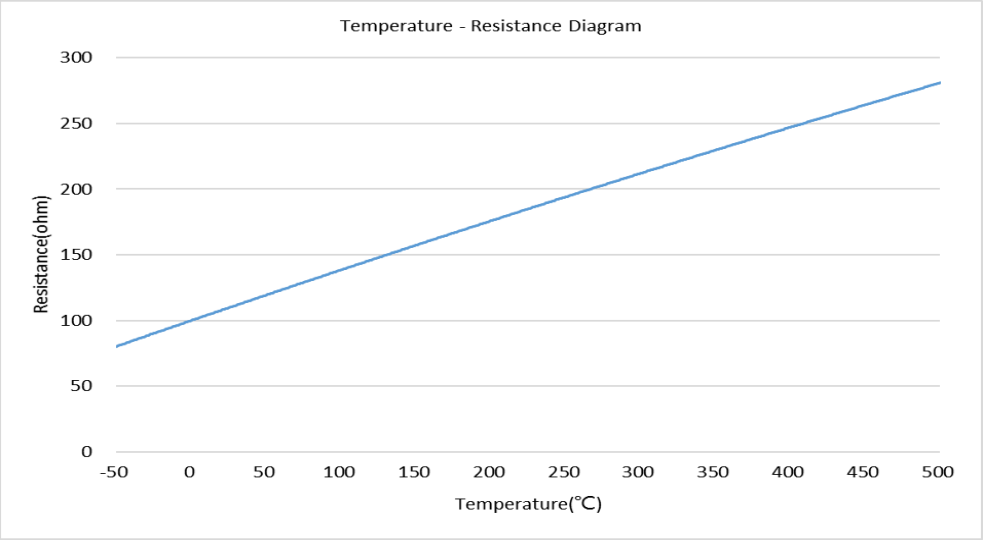
- Temperature deviation

± (a+b |t|) °C

a = 0.3

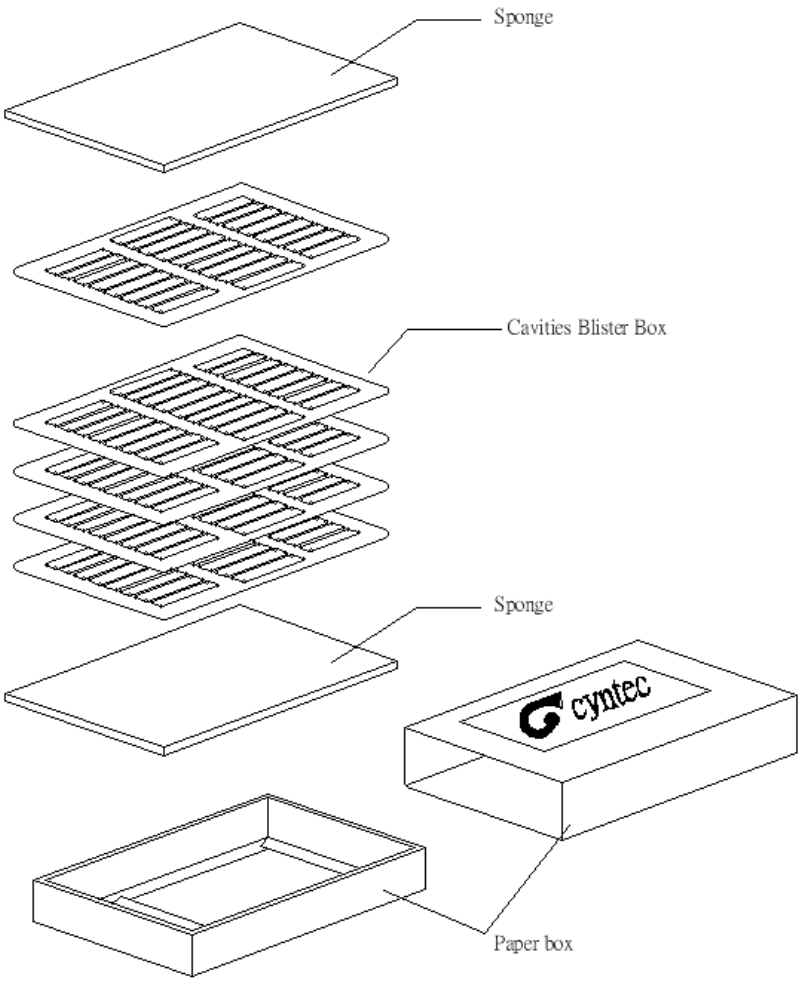
b = 0.005

- Temperature – Resistance Diagram



Packaging

Box dimension	Quantity per box
97*62*22 mm	100 pcs



Order Information

Part number	Dimension (mm)		Nominal resistance at 0°C	Operating temperature range
	Sensor body	Wire length		
SA10100609	1.7 * 2.8	10	100 ± 0.12 Ω	-50°C ~ +500°C

Resistance tolerance and Temperature Deviation table of PT 100 Class B

Temperature (°C)	Resistance (Ω)	Temperature deviation (± °C)	Resistance tolerance (± Ω)	Temperature (°C)	Resistance (Ω)	Temperature deviation (± °C)	Resistance tolerance (± Ω)
-50	80.31	0.55	0.22	130	149.83	0.95	0.36
-45	82.29	0.53	0.21	135	151.71	0.98	0.37
-40	84.27	0.50	0.20	140	153.58	1.00	0.37
-35	86.25	0.48	0.19	145	155.46	1.03	0.38
-30	88.22	0.45	0.18	150	157.33	1.05	0.39
-25	90.19	0.43	0.17	155	159.19	1.08	0.40
-20	92.16	0.40	0.16	160	161.05	1.10	0.41
-15	94.12	0.38	0.15	165	162.91	1.13	0.42
-10	96.09	0.35	0.14	170	164.77	1.15	0.43
-5	98.04	0.33	0.13	175	166.63	1.18	0.44
0	100.00	0.30	0.12	180	168.48	1.20	0.44
5	101.95	0.33	0.13	185	170.33	1.23	0.45
10	103.90	0.35	0.14	190	172.17	1.25	0.46
15	105.85	0.38	0.15	195	174.02	1.28	0.47
20	107.79	0.40	0.16	200	175.86	1.30	0.48
25	109.73	0.43	0.16	205	177.69	1.33	0.49
30	111.67	0.45	0.17	210	179.53	1.35	0.49
35	113.61	0.48	0.18	215	181.36	1.38	0.50
40	115.54	0.50	0.19	220	183.19	1.40	0.51
45	117.47	0.53	0.20	225	185.01	1.43	0.52
50	119.40	0.55	0.21	230	186.84	1.45	0.53
55	121.32	0.58	0.22	235	188.66	1.48	0.54
60	123.24	0.60	0.23	240	190.47	1.50	0.54
65	125.16	0.63	0.24	245	192.29	1.53	0.55
70	127.08	0.65	0.25	250	194.10	1.55	0.56
75	128.99	0.68	0.26	255	195.91	1.58	0.57
80	130.90	0.70	0.27	260	197.71	1.60	0.58
85	132.80	0.73	0.28	265	199.51	1.63	0.59
90	134.71	0.75	0.29	270	201.31	1.65	0.59
95	136.61	0.78	0.29	275	203.11	1.68	0.60
100	138.51	0.80	0.30	280	204.90	1.70	0.61
105	140.40	0.83	0.31	285	206.70	1.73	0.62
110	142.29	0.85	0.32	290	208.48	1.75	0.63
115	144.18	0.88	0.33	295	210.27	1.78	0.63
120	146.07	0.90	0.34	300	212.05	1.80	0.64
125	147.95	0.93	0.35	305	213.83	1.83	0.65

Temperature (°C)	Resistance (Ω)	Temperature deviation (± °C)	Resistance tolerance (± Ω)
310	215.61	1.85	0.66
315	217.38	1.88	0.66
320	219.15	1.90	0.67
325	220.92	1.93	0.68
330	222.68	1.95	0.69
335	224.45	1.98	0.70
340	226.21	2.00	0.70
345	227.96	2.03	0.71
350	229.72	2.05	0.72
355	231.47	2.08	0.73
360	233.21	2.10	0.73
365	234.96	2.13	0.74
370	236.70	2.15	0.75
375	238.44	2.18	0.76
380	240.18	2.20	0.76
385	241.91	2.23	0.77
390	243.64	2.25	0.78
395	245.37	2.28	0.79
400	247.09	2.30	0.79
405	248.81	2.33	0.80
410	250.53	2.35	0.81
415	252.25	2.38	0.81
420	253.96	2.40	0.82
425	255.67	2.43	0.83
430	257.38	2.45	0.84
435	259.08	2.48	0.84
440	260.78	2.50	0.85
445	262.48	2.53	0.86
450	264.18	2.55	0.86
455	265.87	2.58	0.87
460	267.56	2.60	0.88
465	269.25	2.63	0.88
470	270.93	2.65	0.89
475	272.61	2.68	0.90
480	274.29	2.70	0.91
485	275.97	2.73	0.91
490	277.64	2.75	0.92
495	279.31	2.78	0.93
500	280.98	2.80	0.93

Reversion History

Date	Revision	Changes
2004/03/03	A0	New Approval
2019/10/04	A1	Update spec form (Suchun Liu)
2024/12/27	A2	調整 ppm 為小寫, ℃ 符號