SA50160527, The Platinum Resistance temperature sensor (PT-RTD)

The history of revision change for the specification

Date	Revision	Changes
2004/11/04	A0	New Approval
2010/08/12	A1	The temperature deviation coefficient changed from a=0.6, b=0.007 to a=0.15, b=0.002
2014/04/08	A2	Nickel wire changed from 10mm to 8mm
2019/10/04	A3	Add temperature - resistance diagram and packaging
2020/01/07	A4	Tolerance changed from Class B to Class A

SA50160527, 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

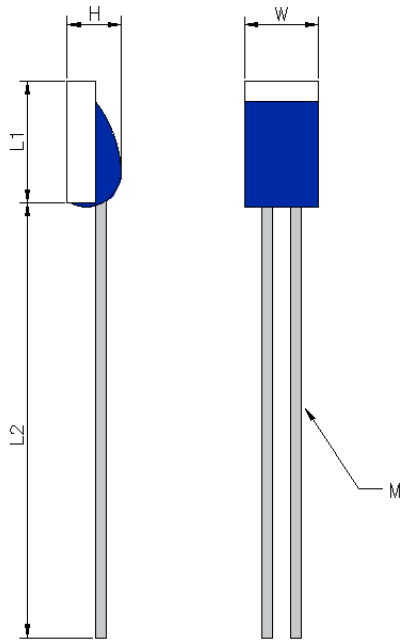
Electrical Specifications :

Characteristics	Feature
Resistance value at 0℃	500±0.3 ohm
Tolerance	Class A : ±0.06%
Temperature coefficient of resistance (TCR)	3850ppm/℃
Operation temperature range	-50℃~ +500℃
Maximum applied current	1 mA
Thermal response time (90%)	15 seconds max. (In air of 1 m/sec.)
Self-heating	2 mW/℃ (In air of 1 m/sec.)

Outline Drawing :

Unit: mm

Dimension



W	2.0±0.15
H	1.25±0.2(TYP.)
L1	3.0±0.15
L2	8±2
M	Ni wire ϕ0.22(TYP.)

Type Designation :

SA	501	6	0	XXX
(1)	(2)	(3)	(4)	(5)

Where:

(1) Series No: SA= Applicable temperature range 500℃

(2) Resistance Value: 501=50X10=500 ohm

(3) TCR/Class: 6 = 3850/A

(4) Package type : 0 = Glass coated

(5) Serial No

Characteristics :

Electrical

Item	Specification and Requirement	Test Method
Insulation resistance	>100 Megohms	Apply 500 VDC between the leads wire and glass coated for 1 minute at room temperature.
ESD	△R(0 degree):≤0.12%	Human body, 2KV.

Endurance

Item	Specification and Requirement	Test Method
Low temperature test	△R(0 degree):≤0.12% Without distinct damage in appearance.	Keep the PT sensor in -50℃ for 1000 hours.
High temperature test	△R(0 degree):≤0.12% Without distinct damage in appearance.	Keep the PT sensor in 500℃ for 1000 hours.
Humidity test	△R(0 degree):≤0.12% Without distinct damage in appearance.	Keep the PT sensor in 60℃ and 90%~95% R.H. for 1000 hours.
Thermal shock	△R(0 degree):≤012% Without distinct damage in appearance.	Keep the PT sensor in 0℃ ice water for at least 15 seconds then within 10 seconds directly put into 100℃ hot water for at least 15 seconds. The above process should be proceeded for at least 10 cycles.

Temperature and resistance relationship:

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

When T < 0℃ :

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

When T ≧ 0℃ :

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

Where

Rt: resistance at a certain temperature T

R0: resistance at 0℃

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

Coefficient for TCR=3850 PPM/℃ (IEC 751 Standard)

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

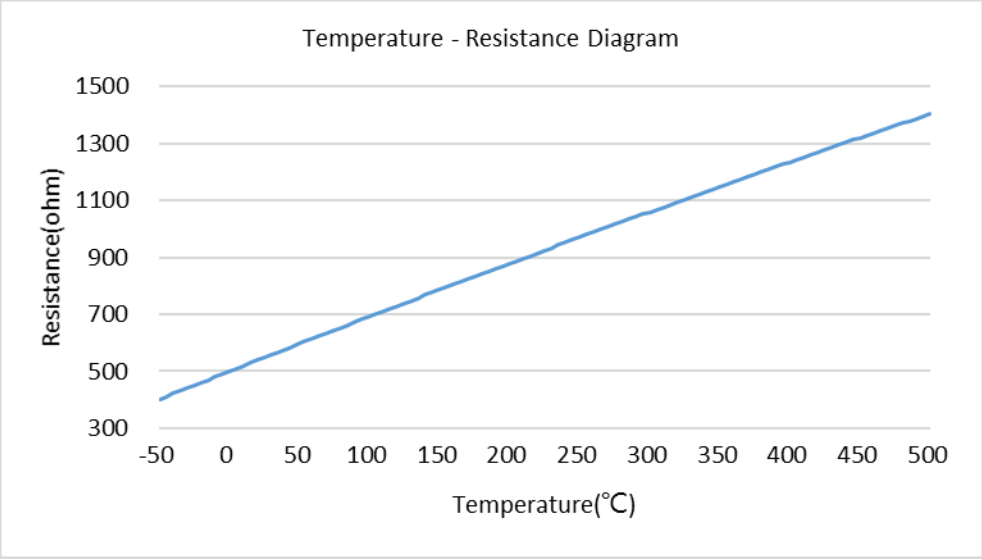
■ Temperature deviation

±(a+b |t|)℃

a= 0.15

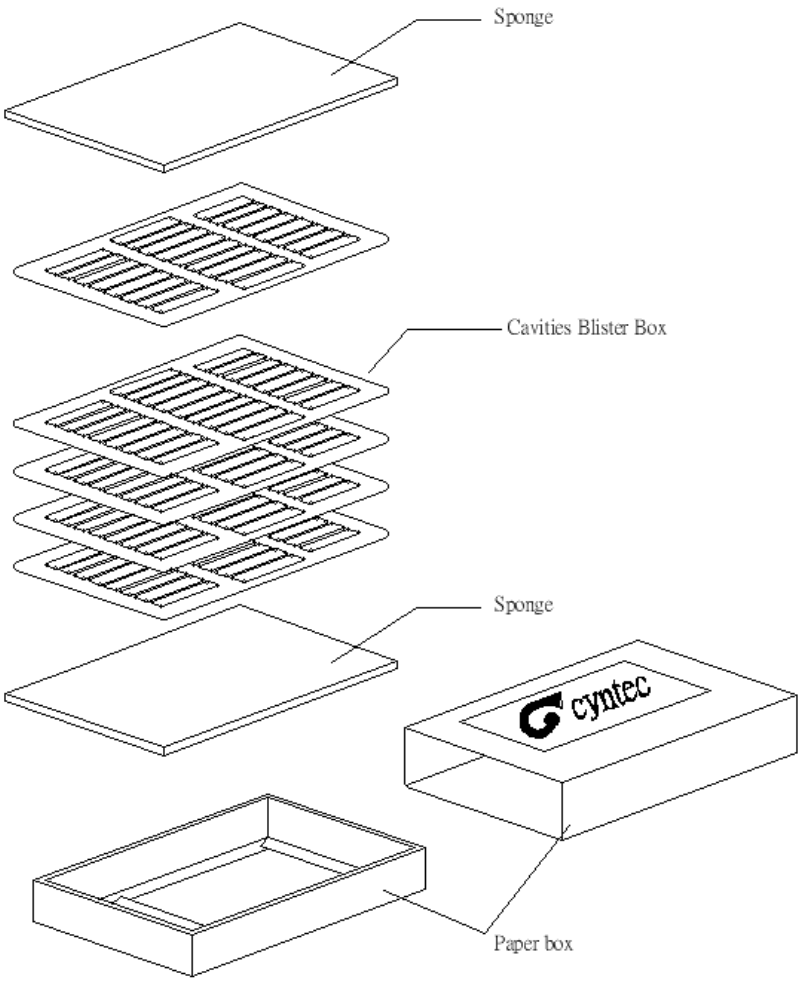
b= 0.002

■ Temperature – Resistance Diagram



Packaging :

Box dimension	Quantity per box
97x62x22mm	100pcs



Order Information :

Part Number	Dimension (mm)		Nominal Resistance at 0°C	Operating Temperature Range
	Sensor Body	Wire Length		
SA50160527	2.0 x 3.0	8	500±0.3Ω	-50℃~ +500℃

Resistance tolerance and Temperature Deviation table of PT 500 Class A:

Temperature (℃)	Resistance (Ω)	Temperature deviation (±℃)	Resistance tolerance (±Ω)	Temperature (℃)	Resistance (Ω)	Temperature deviation (±℃)	Resistance tolerance (±Ω)
-50	401.53	0.25	0.50	130	749.16	0.41	0.77
-45	411.45	0.24	0.48	135	758.55	0.42	0.79
-40	421.35	0.23	0.46	140	767.92	0.43	0.81
-35	431.24	0.22	0.43	145	777.28	0.44	0.82
-30	441.11	0.21	0.41	150	786.63	0.45	0.84
-25	450.96	0.20	0.39	155	795.96	0.46	0.86
-20	460.80	0.19	0.37	160	805.27	0.47	0.88
-15	470.62	0.18	0.35	165	814.57	0.48	0.89
-10	480.43	0.17	0.33	170	823.86	0.49	0.91
-5	490.22	0.16	0.31	175	833.13	0.50	0.93
0	500.00	0.15	0.30	180	842.39	0.51	0.94
5	509.76	0.16	0.31	185	851.64	0.52	0.96
10	519.51	0.17	0.33	190	860.86	0.53	0.98
15	529.25	0.18	0.35	195	870.08	0.54	0.99
20	538.97	0.19	0.37	200	879.28	0.55	1.01
25	548.67	0.20	0.39	205	888.47	0.56	1.03
30	558.36	0.21	0.41	210	897.64	0.57	1.04
35	568.04	0.22	0.43	215	906.79	0.58	1.06
40	577.70	0.23	0.44	220	915.94	0.59	1.08
45	587.35	0.24	0.46	225	925.07	0.60	1.09
50	596.99	0.25	0.48	230	934.18	0.61	1.11
55	606.60	0.26	0.50	235	943.28	0.62	1.13
60	616.21	0.27	0.52	240	952.36	0.63	1.14
65	625.80	0.28	0.54	245	961.43	0.64	1.16
70	635.38	0.29	0.55	250	970.49	0.65	1.18
75	644.94	0.30	0.57	255	979.53	0.66	1.19
80	654.48	0.31	0.59	260	988.56	0.67	1.21
85	664.02	0.32	0.61	265	997.57	0.68	1.22
90	673.53	0.33	0.63	270	1006.57	0.69	1.24
95	683.04	0.34	0.65	275	1015.55	0.70	1.26
100	692.53	0.35	0.66	280	1024.52	0.71	1.27
105	702.00	0.36	0.68	285	1033.48	0.72	1.29
110	711.46	0.37	0.70	290	1042.42	0.73	1.30
115	720.91	0.38	0.72	295	1051.35	0.74	1.32
120	730.34	0.39	0.74	300	1060.26	0.75	1.34
125	739.76	0.40	0.75	305	1069.15	0.76	1.35

Temperature (℃)	Resistance (Ω)	Temperature deviation (±℃)	Resistance tolerance (±Ω)
310	1078.04	0.77	1.37
315	1086.91	0.78	1.38
320	1095.76	0.79	1.40
325	1104.60	0.80	1.41
330	1113.42	0.81	1.43
335	1122.24	0.82	1.44
340	1131.03	0.83	1.46
345	1139.81	0.84	1.47
350	1148.58	0.85	1.49
355	1157.33	0.86	1.50
360	1166.07	0.87	1.52
365	1174.80	0.88	1.53
370	1183.51	0.89	1.55
375	1192.20	0.90	1.56
380	1200.88	0.91	1.58
385	1209.55	0.92	1.59
390	1218.20	0.93	1.61
395	1226.84	0.94	1.62
400	1235.46	0.95	1.64
405	1244.07	0.96	1.65
410	1252.66	0.97	1.67
415	1261.24	0.98	1.68
420	1269.81	0.99	1.69
425	1278.36	1.00	1.71
430	1286.89	1.01	1.72
435	1295.42	1.02	1.74
440	1303.92	1.03	1.75
445	1312.42	1.04	1.77
450	1320.90	1.05	1.78
455	1329.36	1.06	1.79
460	1337.81	1.07	1.81
465	1346.24	1.08	1.82
470	1354.67	1.09	1.83
475	1363.07	1.10	1.85
480	1371.46	1.11	1.86
485	1379.84	1.12	1.87
490	1388.20	1.13	1.89
495	1396.55	1.14	1.90
500	1404.89	1.15	1.92