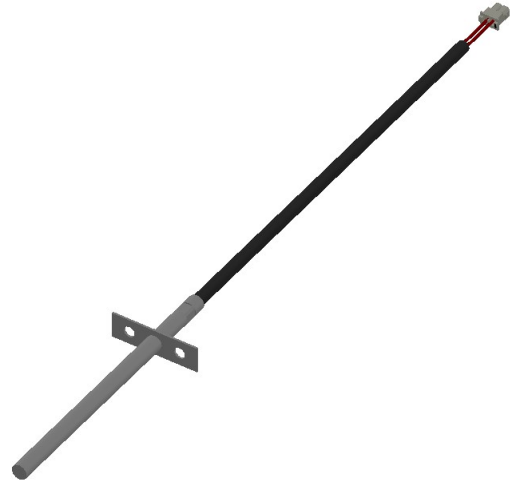


## SD50114XXX, PT RTD probe sensor

### Features / Applications :

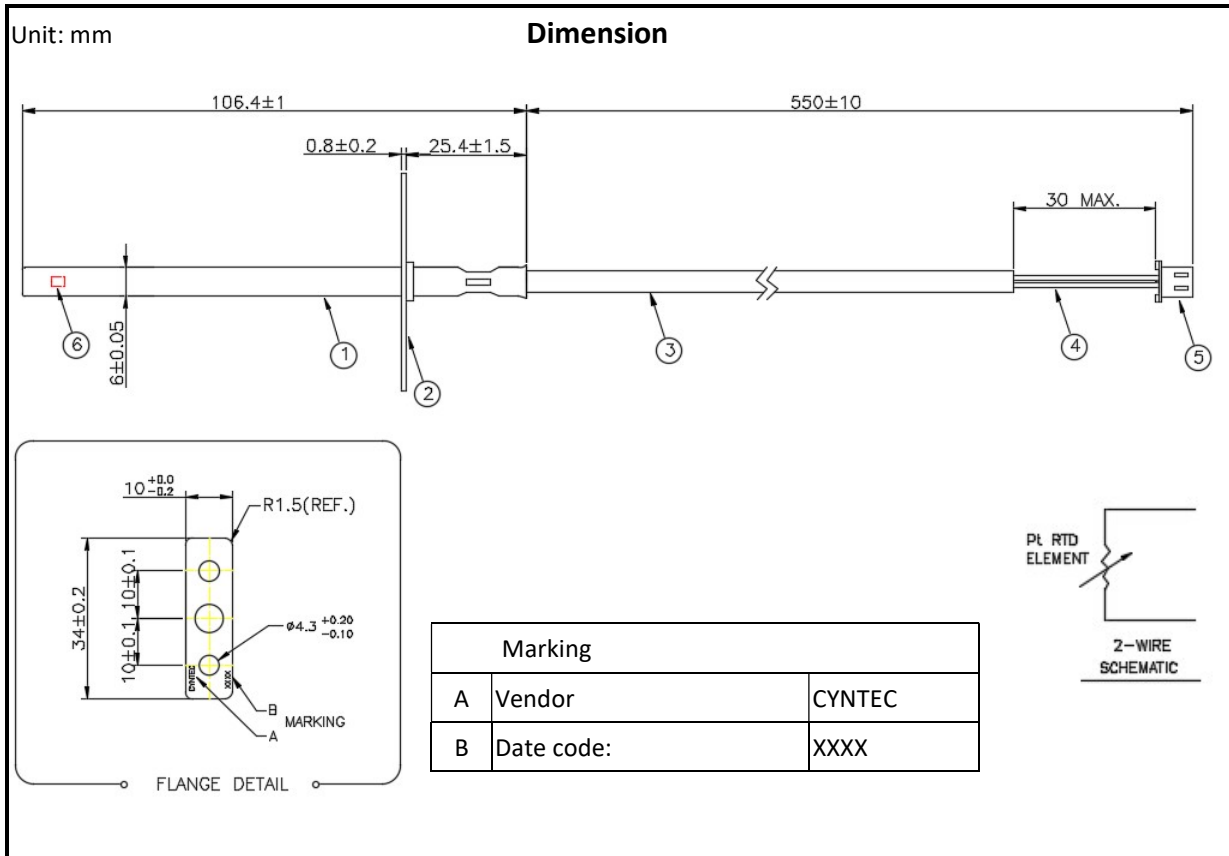
- Features:
  - Low drift
  - Long service life
  - Wide temperature range
  - Wide range of resistance values
  - Temperature linear control
  - High precision
  - Fast response time
  - RoHS compliant
  
- Appliances:
  - Home Appliances: Oven



### Electrical Specifications :

Characteristics	Feature
Resistance value at 0°C	500±1.2 Ω
Temperature coefficient of resistance (TCR)	3850ppm/°C
Operation Temperature Range	-40°C~ +538°C
Maximum Applied current	2 mA

## Outline Drawing :



## Outline Specifications :

No.	Material	Specification
①	Probe tube	Φ6XL106.4 mm, material: 300 series stainless steel tube. Discoloration due to welding and high temperature testing is acceptable.
②	Flange	Material: 300 series stainless steel.
③	Cable	Silicone cable, maximum temperature 180 °C
④	Wire	24 awg pure nickel wire with Teflon insulation over each.
⑤	Connector	Terminal: Molex 5263, 08-70-1039 Housing: Molex 5264-N2,50-37-5023
⑥	Sensor element	500 ohms thin film platinum RTD, alpha(TCR)= 3850 ppm/°C ESD sensitivity level: ±2KV

## Type Designation :

SD 501 1 4 XXX  
 (1) (2) (3) (4) (5)

Where:

- (1) Series No: SD= PT probe
- (2) Resistance Value: 501=50X10=500 ohm
- (3) TCR/Class: 1 = 3850/C
- (4) Package type : 4 = Metal tube type
- (5) Serial no

## Characteristics :

### Electrical

Item	Specification and Requirement	Test Method
Dielectric strength	Current leakage<1mA No breakdown.	Apply 2000 VAC for 1 minute at 500°C and 3000 VAC for 1 second at room temperature.
Insulation resistance	>50 Mega ohms	Apply 500 VDC between the leads wire and stainless steel tube for 1 second.
Short time overload	$\Delta R(0 \text{ degree}) \leq 0.24\%$ Without distinct damage in appearance.	Repeat 10 cycles as follow: Apply current: 5mA rated current for 5 seconds and 30 seconds at room temperature.
ESD	$\Delta R(0 \text{ degree}) \leq 0.24\%$	Human body, 2KV.

## Mechanical

Item	Specification and Requirement	Test Method
Bracket pull force	>8 kgf	Apply axial pull force on the bracket assembled in probe housing.
Wire pull force	>2.5 kgf	Apply axial pull force on the leads wire in probe housing.
Crimping pull out force	>3 kgf	Fix the crimped terminal to the jig, apply axial pull out force on the wire at the speed rate of 100 mm/minute

## Endurance

Item	Specification and Requirement	Test Method
Low temperature test	$\Delta R(0 \text{ degree}) \leq 0.24\%$ Without distinct damage in appearance.	Keep the probe sensor in $-55^{\circ}\text{C}$ for 1000 hours.
High temperature test	$\Delta R(0 \text{ degree}) \leq 0.24\%$ Without distinct damage in appearance.	Keep the probe sensor in $538^{\circ}\text{C}$ for 1000 hours.
Humidity test	$\Delta R(0 \text{ degree}) \leq 0.24\%$ Without distinct damage in appearance.	Keep the probe sensor in $60^{\circ}\text{C}$ and 90%~95% R.H. for 1000 hours.
Thermal cycles	$\Delta R(0 \text{ degree}) \leq 0.24\%$ Without distinct damage in appearance.	(1) Keep the probe sensor in $538^{\circ}\text{C}$ for 3 hours. (2) keep the probe sensor in $70^{\circ}\text{C}$ for 30 minutes. Repeat (1) ~ (2) for 150 cycles.
Thermal shock	$\Delta R(0 \text{ degree}) \leq 0.24\%$ Without distinct damage in appearance.	(1) Keep the probe sensor in $538^{\circ}\text{C}$ for 10 minutes. (2) Keep the probe sensor in room temperature for 5 minutes. Repeat (1)~(2) for 250 times.

Temperature and resistance relationship:

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

When  $T < 0^{\circ}\text{C}$  :

$$R_t = R_0 [ 1 + aT + bT^2 + cT^3 ( T - 100 ) ]$$

When  $T \geq 0^{\circ}\text{C}$  :

$$R_t = R_0 (1 + aT + bT^2)$$

Where

$R_t$ : resistance at a certain temperature  $T$

$R_0$ : resistance at  $0^{\circ}\text{C}$

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

Coefficient for  $\text{TCR}=3850 \text{ PPM}/^{\circ}\text{C}$  (IEC 751 Standard)

Temperature	a	b	c
$T < 0^{\circ}\text{C}$	3.90830 E-03	-5.77500E-07	-4.18300E-12
$T \geq 0^{\circ}\text{C}$	3.90830E-03	-5.77500E-07	0

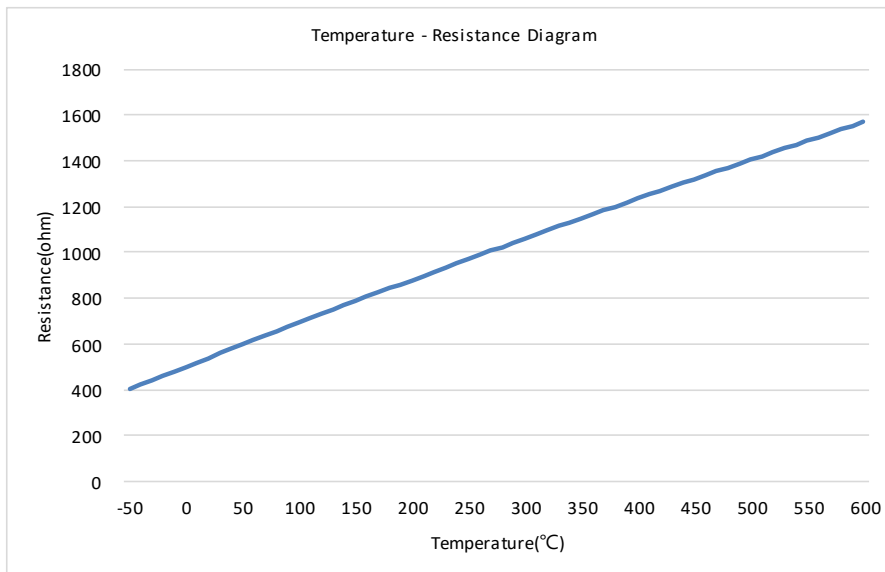
- Temperature deviation

$$\pm(a+b |t|)^{\circ}\text{C}$$

$$a = 0.60$$

$$b = 0.007$$

- Temperature – Resistance Diagram



Resistance tolerance and Temperature Deviation table of PT 500:

Temperature (°C)	Resistance (Ω)	Permissible Deviation (±°C)	Permissible Deviation (±Ω)	Temperature (°C)	Resistance (Ω)	Permissible Deviation (±°C)	Permissible Deviation (±Ω)
-50	401.53	0.95	1.89	90	673.53	1.23	2.34
-45	411.45	0.92	1.81	95	683.04	1.27	2.40
-40	421.35	0.88	1.74	100	692.53	1.30	2.47
-35	431.24	0.85	1.67	105	702.00	1.34	2.53
-30	441.11	0.81	1.60	110	711.46	1.37	2.59
-25	450.96	0.78	1.53	115	720.91	1.41	2.65
-20	460.80	0.74	1.45	120	730.34	1.44	2.71
-15	470.62	0.71	1.38	125	739.76	1.48	2.78
-10	480.43	0.67	1.31	130	749.16	1.51	2.84
-5	490.22	0.64	1.24	135	758.55	1.55	2.90
0	500.00	0.60	1.20	140	767.92	1.58	2.96
5	509.76	0.64	1.24	145	777.28	1.62	3.02
10	519.51	0.67	1.31	150	786.63	1.65	3.08
15	529.25	0.71	1.37	155	795.96	1.69	3.14
20	538.97	0.74	1.44	160	805.27	1.72	3.20
25	548.67	0.78	1.50	165	814.57	1.76	3.26
30	558.36	0.81	1.57	170	823.86	1.79	3.32
35	568.04	0.85	1.63	175	833.13	1.83	3.38
40	577.70	0.88	1.70	180	842.39	1.86	3.44
45	587.35	0.92	1.76	185	851.64	1.90	3.50
50	596.99	0.95	1.83	190	860.86	1.93	3.56
55	606.60	0.99	1.89	195	870.08	1.97	3.62
60	616.21	1.02	1.96	200	879.28	2.00	3.68
65	625.80	1.06	2.02	205	888.47	2.04	3.74
70	635.38	1.09	2.09	210	897.64	2.07	3.79
75	644.94	1.13	2.15	215	906.79	2.11	3.85
80	654.48	1.16	2.21	220	915.94	2.14	3.91
85	664.02	1.20	2.28	225	925.07	2.18	3.97

Temperature (°C)	Resistance (Ω)	Permissible Deviation (±°C)	Permissible Deviation (±Ω)	Temperature (°C)	Resistance (Ω)	Permissible Deviation (±°C)	Permissible Deviation (±Ω)
230	934.18	2.21	4.03	380	1200.88	3.26	5.66
235	943.28	2.25	4.08	385	1209.55	3.30	5.71
240	952.36	2.28	4.14	390	1218.20	3.33	5.76
245	961.43	2.32	4.20	395	1226.84	3.37	5.81
250	970.49	2.35	4.25	400	1235.46	3.40	5.86
255	979.53	2.39	4.31	405	1244.07	3.44	5.91
260	988.56	2.42	4.37	410	1252.66	3.47	5.96
265	997.57	2.46	4.42	415	1261.24	3.51	6.01
270	1006.57	2.49	4.48	420	1269.81	3.54	6.06
275	1015.55	2.53	4.53	425	1278.36	3.58	6.11
280	1024.52	2.56	4.59	430	1286.89	3.61	6.16
285	1033.48	2.60	4.64	435	1295.42	3.65	6.21
290	1042.42	2.63	4.70	440	1303.92	3.68	6.26
295	1051.35	2.67	4.75	445	1312.42	3.72	6.30
300	1060.26	2.70	4.81	450	1320.90	3.75	6.35
305	1069.15	2.74	4.86	455	1329.36	3.79	6.40
310	1078.04	2.77	4.92	460	1337.81	3.82	6.45
315	1086.91	2.81	4.97	465	1346.24	3.86	6.50
320	1095.76	2.84	5.02	470	1354.67	3.89	6.55
325	1104.60	2.88	5.08	475	1363.07	3.93	6.59
330	1113.42	2.91	5.13	480	1371.46	3.96	6.64
335	1122.24	2.95	5.19	485	1379.84	4.00	6.69
340	1131.03	2.98	5.24	490	1388.20	4.03	6.73
345	1139.81	3.02	5.29	495	1396.55	4.07	6.78
350	1148.58	3.05	5.34	500	1404.89	4.10	6.83
355	1157.33	3.09	5.40				
360	1166.07	3.12	5.45				
365	1174.80	3.16	5.50				
370	1183.51	3.19	5.55				
375	1192.20	3.23	5.60				