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**SE10255018, The Platinum Resistance temperature sensor (PT-RTD)  
SMD****The history of revision change for the specification**

Date	Revision	Changes
1997/10/24	A0	New Approval
1998/05/08	A1	Add product name description and reliability conditions. Thermal response time change from 20 seconds to 6 seconds. Dissipating constant change from 8mW/°C to 3.5mW/°C. Operation temperature range change from -40°C~125°C to -55°C ~125°C.
1998/07/23	A2	Add temperature & resistance value table.
1999/04/11	A3	Change the number of drop test repetitions. Change the packaging quantity from 5000 pieces/reel to 1000 pieces/ reel.
2012/01/13	A4	Change carrier tape dimensions and reel dimensions.
2014/10/29	A5	Change the width of the A-side electrode from 0.3mm to 0.4mm.
2017/11/28	A6	Resistance to soldering heat add solder bath method.
2019/10/07	A7	Add Temperature – Resistance Diagram
2020/12/02	A8	Change carrier tape dimensions.

## SE10255018, The Platinum Resistance temperature sensor (PT-RTD) SMD

### Features / Applications :

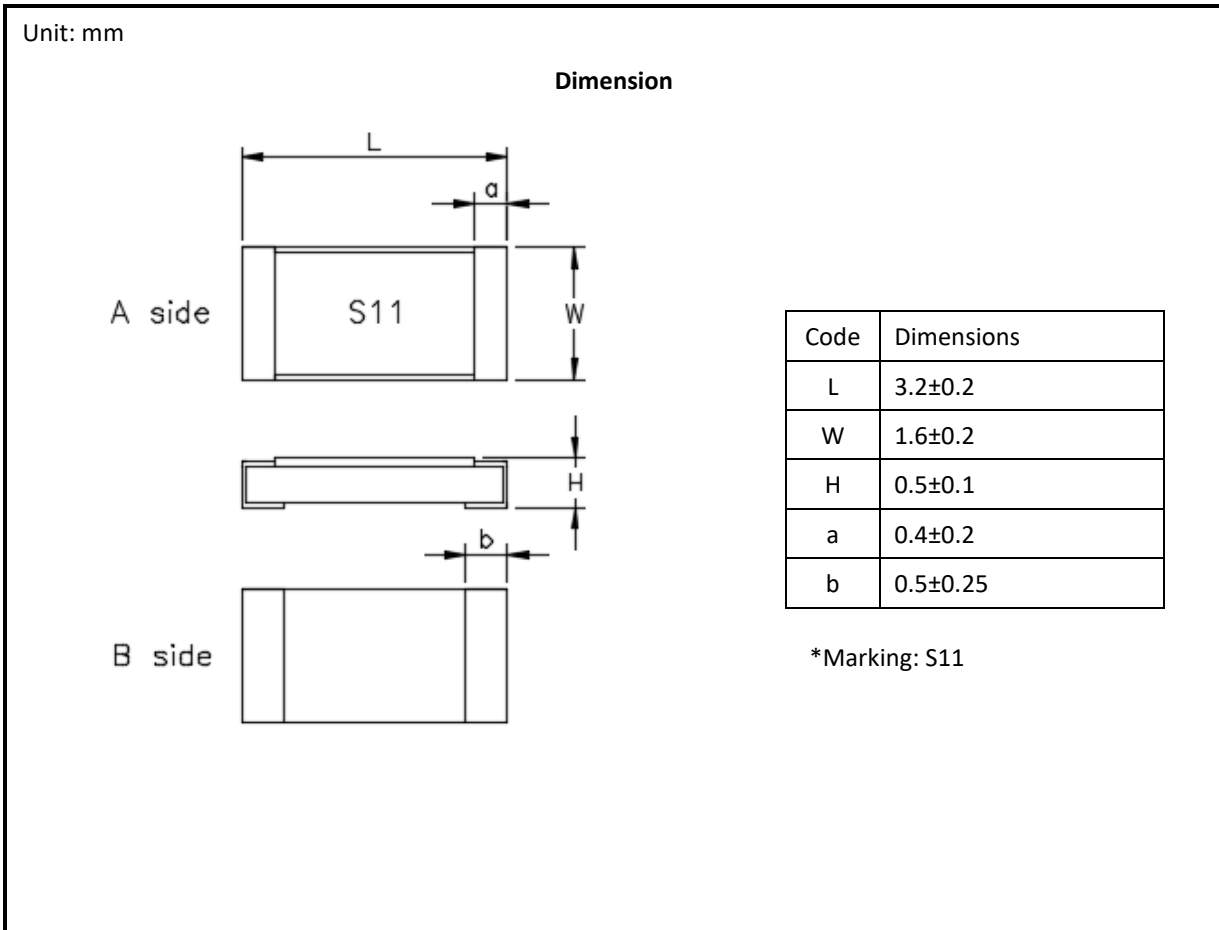
- Features:
  - Low drift
  - Long service life
  - Wide temperature range
  - Wide range of resistance values
  - Temperature linear control
  - High precision
  - Fast response time
  - RoHS compliant
  
- Applications:
  - Home Appliances: Air conditioner, Refrigerator, Calorimeter
  - Industrial Equipment: Temperature controller
  - Medical: Precision thermometer
  - Electronics: Over-Temperature protection



### Electrical Specifications :

Characteristics	Feature
Resistance value at 0°C	1000±4.8 ohm
Temperature deviation	Class D : ±0.48%
Temperature coefficient of resistance (TCR)	3750ppm/°C
Operation temperature range	-55°C~ +125°C
Maximum applied current	1 mA
Thermal response time (90%)	6 seconds max. (In air of 1 m/sec.)
Dissipating constant	3.5mW/°C (In air of 1 m/sec.)

## Outline Drawing :



## Type Designation :

SE    102    5    5    XXX  
 (1)    (2)    (3)    (4)    (5)

Where

- (1) Series No: SE= Applicable temperature range 125°C
- (2) Ice point resistance : 102=10X10<sup>2</sup>=1000 ohm
- (3) TCR/Class: 5 = 3750/D
- (4) Package type : 5 = surface mount
- (5) Serial No

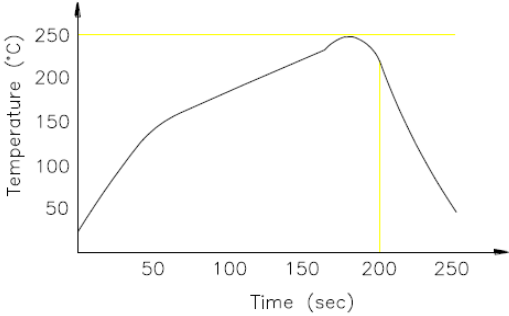
## Characteristics :

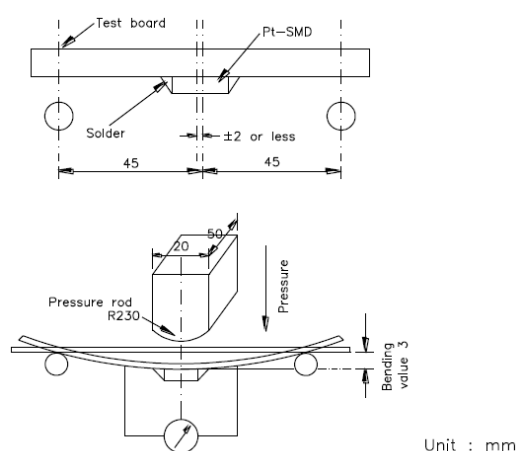
### Electrical

Item	Specification and Requirement	Test Method
Insulation resistance	>1000 Megohms	Test voltage: 100 VDC for 1 minute at room temperature.
Voltage proof	$\Delta R(0 \text{ degree}) \leq 0.48\%$ Without damage by flashover, fire or breakdown, etc.	Test voltage: 100 VAC r.m.s for 1 minute.
Intermittently overload	$\Delta R(0 \text{ degree}) \leq 0.48\%$	Input current 2.5 time the applied current for 1 sec. with pauses of 25 sec. for 1000 cycles.
ESD	$\Delta R(0 \text{ degree}) \leq 0.48\%$	Human body, 2KV.

### Mechanical

Item	Specification and Requirement	Test Method
Solderability	$\Delta R(0 \text{ degree}) \leq 0.48\%$ Without distinct damage in appearance.	A new uniform coating of solder shall cover minimum of 95% of the surface being immersed. Temperature of solder: $245 \pm 5^\circ\text{C}$ Immersion duration: $2 \pm 0.5 \text{ sec}$
Solvent resistance	Marking shall be legible. Without mechanical damage and distinct damage in appearance.	Immersion cleansing. At room temperature for 90 sec in isopropyl Alcohol.
Drop test	$\Delta R(0 \text{ degree}) \leq 0.48\%$	The Pt-SMD can resist to a 75 cm drop on a 6mm thick steel sheet with no damage on it's characteristics, repeat three times.

Item	Specification and Requirement	Test Method
Resistance to soldering heat	$\Delta R(0 \text{ degree}) \leq 0.48\%$ Without distinct deformation in appearance.	Shall be satisfied in the following methods. (1) Solder bath method Dipped into solder at $270 \pm 5^\circ\text{C}$ for $10 \pm 1$ seconds. (2) Reflow soldering method Peak temperature: $240 \pm 5^\circ\text{C}$ for 3 to 5 sec. Temperature : $220 \pm 5^\circ\text{C}$ for 40 sec. The Pt-SMD shall be stored at standard atmospheric conditions for 1 hours, after which the measurements shall be made. 
Vibration test	The Pt-SMD can resist to a vibration test with no damage on it's characteristic. Valuation of resistance should be within 0.48%.	Entire of frequency range: 10 Hz to 55 Hz to 10 Hz for 1 minute. Vibration amplitude : 1.5 mm For a period of 2 hours in each of 3 mutual perpendicular directions.
Shock test	The Pt-SMD can resist to a shock test with no damage on it's characteristic. Valuation of resistance should be within 0.48%.	Peak acceleration: 50G Duration of the pulse: 11 ms Each 3 times in each direction of 3 mutually perpendicular axis.

Item	Specification and Requirement	Test Method
Substrate bending	<p>Electrical characteristics shall be satisfied.</p> <p>If there are electrodes on both surfaces, it shall satisfy <math>1000 \pm 4.8</math> ohm on whichever surface it may be fixated on.</p> <p>Valuation of resistance should be within 0.48%.</p>	<p>Bent width: 3mm 30 sec.</p>  <p>Unit : mm</p>

## Endurance

Item	Specification and Requirement	Test Method
Rapid change of temperature	<p><math>\Delta R(0 \text{ degree}) : \leq 0.48\%</math></p> <p>Without distinct damage in appearance.</p>	<p>Perform 5 cycles as follows:</p> <ol style="list-style-type: none"> <li>(1) <math>-55 \pm 5^\circ\text{C}</math> cycles for 30 min.</li> <li>(2) Standard atmospheric conditions 2 to 3 min.</li> <li>(3) <math>125 \pm 5^\circ\text{C}</math> for 30 min.</li> <li>(4) Standard atmospheric conditions 2 to 3 min.</li> </ol>
Dump heat with load	<p><math>\Delta R(0 \text{ degree}) : \leq 0.48\%</math></p> <p>Without distinct damage in appearance.</p> <p>The marking shall be legible.</p>	<p><math>60 \pm 5^\circ\text{C}</math> with relative humidity of 90% to 95%.</p> <p>Input current 1mA for 1.5 hours on 30 minutes off, <math>1000 + 48 / - 0</math> hours.</p>
Endurance $70^\circ\text{C}$	<p><math>\Delta R(0 \text{ degree}) : \leq 0.48\%</math></p> <p>Without distinct damage in appearance.</p> <p>The marking shall be legible.</p>	<p>Input current 1mA for 1.5 hours on 30 minutes off, <math>1000 + 48 / - 0</math> hours at <math>70 \pm 5^\circ\text{C}</math></p>
Low temperature test	<p><math>\Delta R(0 \text{ degree}) : \leq 0.48\%</math></p> <p>Without distinct damage in appearance.</p>	<p>Keep the PT sensor in <math>-55^\circ\text{C}</math> for 1000 hours.</p>
High temperature test	<p><math>\Delta R(0 \text{ degree}) : \leq 0.48\%</math></p> <p>Without distinct damage in appearance.</p>	<p>Keep the PT sensor in <math>125^\circ\text{C}</math> for 1000 hours.</p>

## 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  $\text{TCR}=3750 \text{ PPM}/^{\circ}\text{C}$

Temperature	a	b	c
$T < 0^{\circ}\text{C}$	3.90830E-03	-6.01875E-07	-6.14500E-12
$T \geq 0^{\circ}\text{C}$	3.90830E-03	-6.01875E-07	0

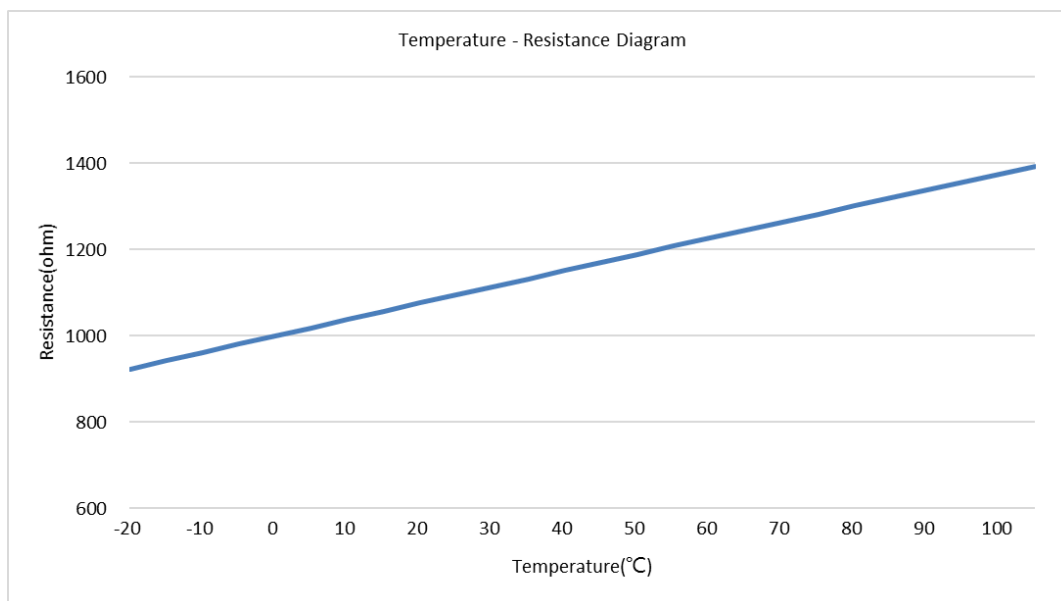
- Temperature deviation

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

$$a = 1.28$$

$$b = 0.014$$

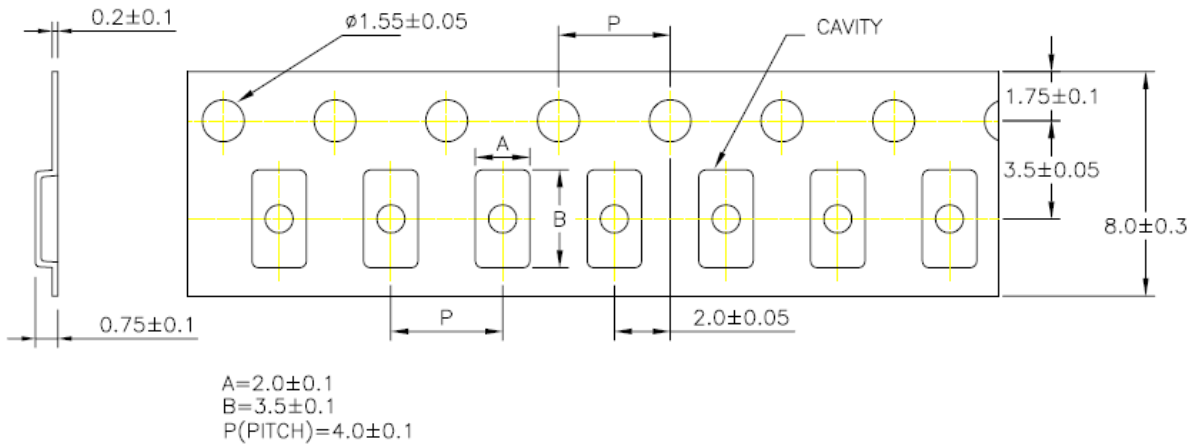
- Temperature – Resistance Diagram



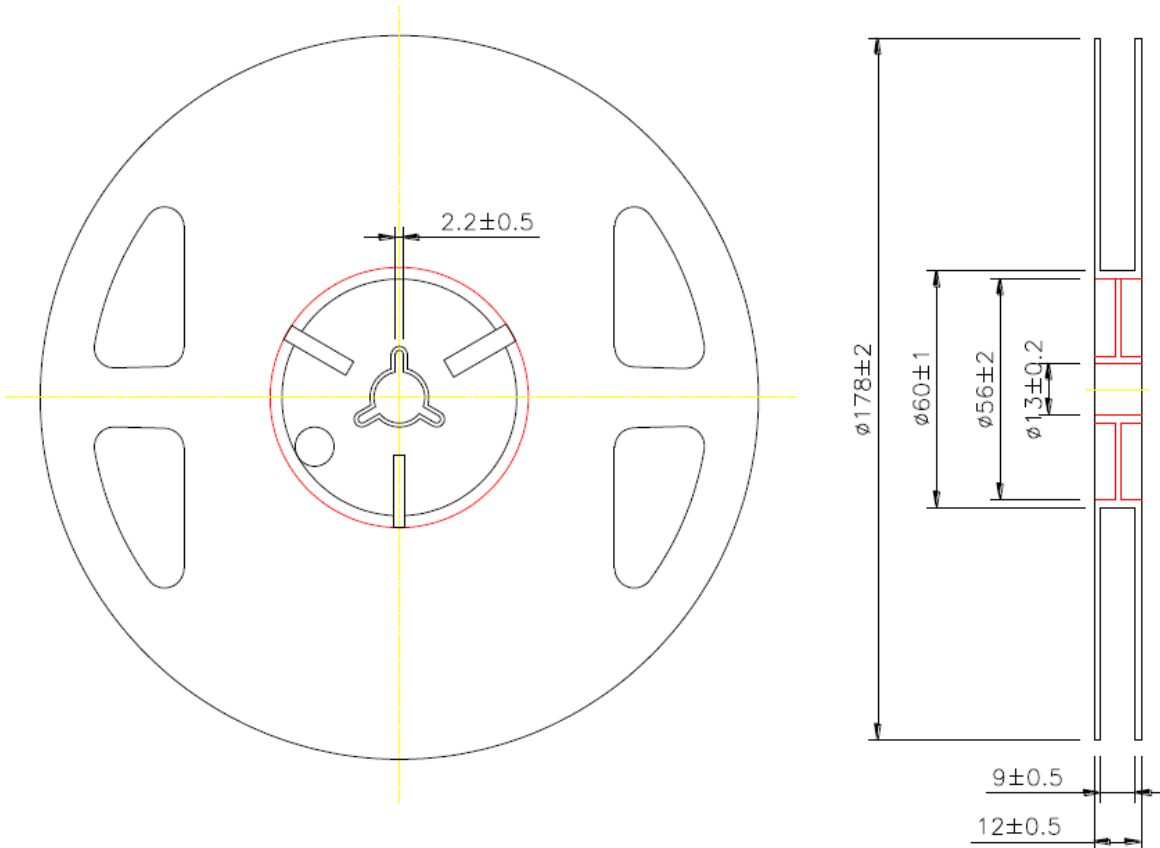
Packaging :

■ Dimensions

Tape packaging dimensions

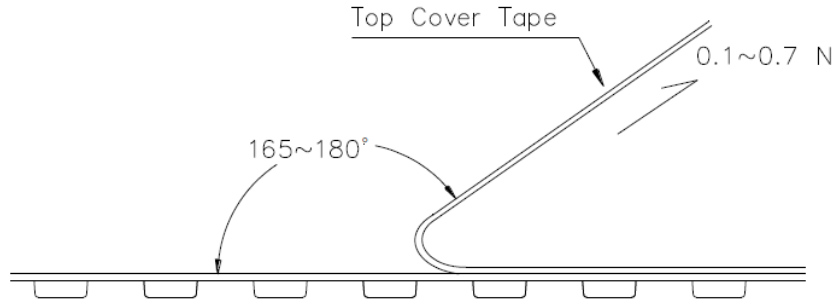


Reel dimensions





■ Peel force of top cover tape



■ Numbers of taping

1000 pieces/reel

■ Marking

The following items shall be marked on the reel.

- (1) Type designation
- (2) Quantity
- (3) Taping number
- (4) Manufacturer's name

## Order Information :

Part Number	Dimension (mm)	Nominal Resistance at 0°C	Operating Temperature Range
	Sensor Body		
SE10255018	1.6 x 3.2	1000±4.8Ω	-55°C~ +125°C

Resistance tolerance and Temperature Deviation table of PT 1000 Class D:

Temperature (°C)	Resistance (Ω)	Temperature deviation (±°C)	Resistance tolerance (±Ω)	Temperature (°C)	Resistance (Ω)	Temperature deviation (±°C)	Resistance tolerance (±Ω)
-55	788.46	2.05	7.97	125	1466.87	3.03	11.09
-50	807.87	1.98	7.68				
-45	827.24	1.91	7.39				
-40	846.57	1.84	7.11				
-35	865.87	1.77	6.82				
-30	885.13	1.70	6.54				
-25	904.36	1.63	6.26				
-20	923.55	1.56	5.98				
-15	942.71	1.49	5.70				
-10	961.84	1.42	5.43				
-5	980.93	1.35	5.15				
0	1000.00	1.28	4.80				
5	1019.04	1.35	5.14				
10	1038.04	1.42	5.39				
15	1057.02	1.49	5.65				
20	1075.96	1.56	5.91				
25	1094.88	1.63	6.16				
30	1113.76	1.70	6.42				
35	1132.62	1.77	6.67				
40	1151.44	1.84	6.92				
45	1170.24	1.91	7.17				
50	1189.00	1.98	7.43				
55	1207.74	2.05	7.68				
60	1226.44	2.12	7.92				
65	1245.12	2.19	8.17				
70	1263.76	2.26	8.42				
75	1282.38	2.33	8.67				
80	1300.96	2.40	8.91				
85	1319.52	2.47	9.16				
90	1338.04	2.54	9.40				
95	1356.54	2.61	9.65				
100	1375.00	2.68	9.89				
105	1393.43	2.75	10.13				
110	1411.84	2.82	10.37				
115	1430.21	2.89	10.61				
120	1448.56	2.96	10.85				