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**SPECIFICATION FOR APPROVAL**

<b>CUSTOMER</b>	TRG
<b>CERTIFIED MODEL/TYPE</b>	TPM1S471P085
<b>PART NO.</b>	TPM1S471P085RA (RoHS+HF)
<b>APPLICATION</b>	
<b>CUSTOMER P/N</b>	
<b>ISSUE DATE</b>	Nov. 14, 2013
<b>REV. NO.</b>	
<b>REV. DATE</b>	

<b>FOR CUSTOMER APPROVAL</b>	<b>CHECKED BY</b>
	<i>Shu Ling Fu</i>
	<b>APPROVED BY</b>
	<i>Chun Chu Tu</i>





**REVISED RECORD SHEET**

REV. NO	REV. DATE	REVISED CONTENT



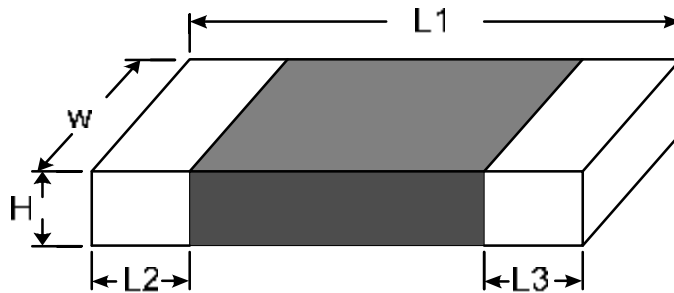
<b>INDEX</b>	<b>Page</b>
■ <b>Part Number Code</b>	<b>1</b>
■ <b>Structure and Dimensions</b>	<b>2</b>
■ <b>Electrical Characteristics</b>	<b>2</b>
■ <b>Reliability</b>	<b>3</b>
■ <b>Soldering Recommendation</b>	<b>4</b>
■ <b>Recommended Soldering Pad Dimensions</b>	<b>5</b>
■ <b>RoHS Compliant Declaration</b>	<b>5</b>
■ <b>Warehouse Storage Conditions of Products</b>	<b>5</b>
■ <b>Packaging</b>	<b>6</b>
■ <b>Safety Approvals &amp; Certificates &amp; Test Report</b>	<b>7</b>
■ <b>R-T Characteristic Curve</b>	<b>8</b>

Part Number Code

Example :

**TPM**   **1**   **S**   **471**   **P**   **085**   **R**   **A**  
 (1)   (2)   (3)   (4)   (5)   (6)   (7)   (8)

No.	Item	Digit	Specification
(1)	Product Type	TPM	Thinking CPTC thermistor TPM type
(2)	Size (EIA)	1	0603
(3)	Type Series	S	Sensing series
(4)	Zero Power Resistance at 25°C	471	$47 \times 10^1 = 470\Omega$
(5)	Tolerance of R <sub>25</sub>	P	± 50%
(6)	Sensing Temperature	085	T <sub>s</sub> =85°C
(7)	Packaging	R	Reel
(8)	Optional Suffix	A	Automobile

Structure and Dimensions


( unit : mm )

L1	W	H max.	L2 and L3
1.60±0.15	0.80±0.15	0.95	0.40±0.20

Electrical Characteristics

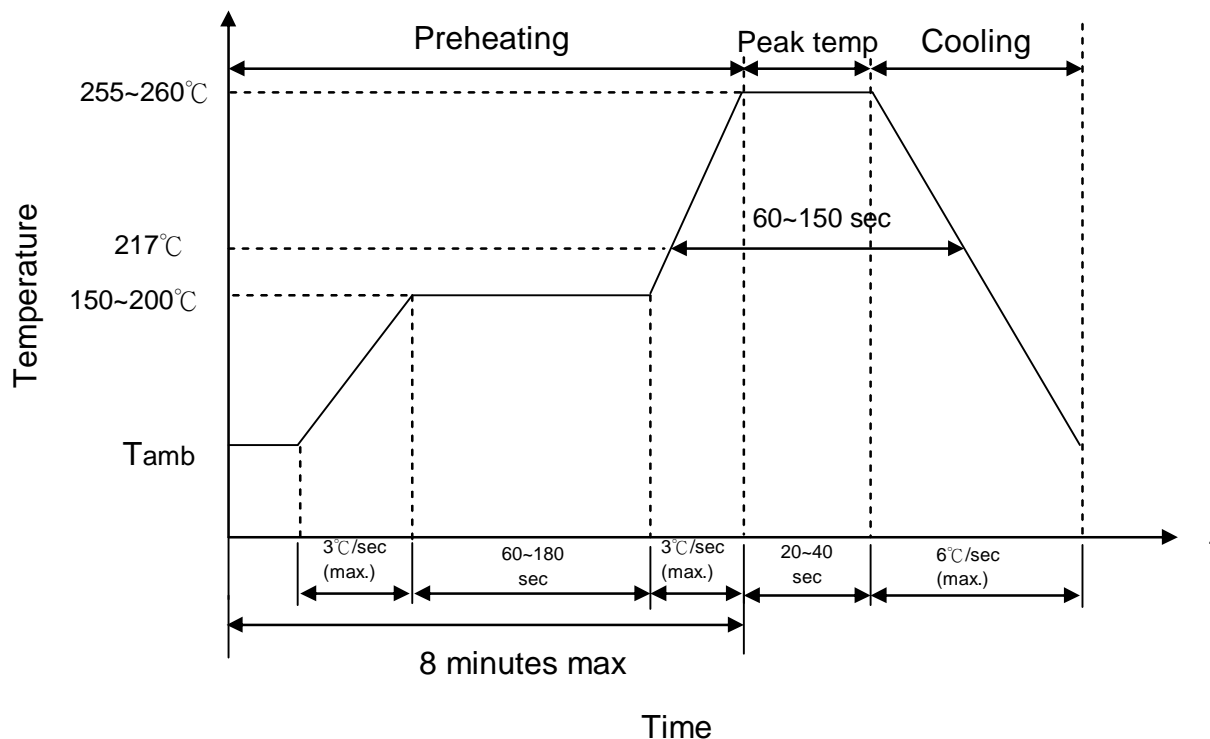
Part No.	Sensing Temperature	Resistance Value			Max. Voltage	Operating Temperature Range
	Ts (°C)	25°C (Ω)	Ts-5°C (Ω)	Ts+5°C (Ω)	Vmax (V <sub>DC</sub> )	(°C)
TPM1S471P085RA	85±5	470±50%	≤4,700	≥4,700	32	-40 ~ +150

**Reliability**

Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm ; Speed < 0.5mm/sec. Duration : 10 sec on PCB. 	No visible damage   $\Delta R_{25}/R_{25}$   $\leq 10\%$															
Damp Heat, Steady State	IEC 60068-2-78	85 ± 3 °C , 80 ~ 85% RH , 1000± 24 hrs	No visible damage   $\Delta R_{25}/R_{25}$   $\leq 20\%$															
High Temp. & humidity Load	IEC 60068-2-67	85 ± 5 °C , 80 ~ 85% RH , Vmax. , 1000± 24 hrs	No visible damage   $\Delta R_{25}/R_{25}$   $\leq 20\%$															
High Temp. Storage	IEC 60068-2-2	150 ± 5 °C , 1000 ± 24 hrs	No visible damage   $\Delta R_{25}/R_{25}$   $\leq 20\%$															
Low Temp. Storage	IEC 60068-2-1	-40 ± 3 °C , 1000 ± 24 hrs	No visible damage   $\Delta R_{25}/R_{25}$   $\leq 20\%$															
Rapid Change of Temperature	IEC 60068-2-14	The conditions shown below shall be repeated 1000 cycles on PCB <table border="1" data-bbox="486 1097 1133 1411"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55 ± 5</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> <tr> <td>3</td> <td>125 ± 5</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-55 ± 5	30 ± 3	2	Room temperature	5 ± 3	3	125 ± 5	30 ± 3	4	Room temperature	5 ± 3	No visible damage   $\Delta R_{25}/R_{25}$   $\leq 20\%$
Step	Temperature (°C)	Period (minutes)																
1	-55 ± 5	30 ± 3																
2	Room temperature	5 ± 3																
3	125 ± 5	30 ± 3																
4	Room temperature	5 ± 3																
High Temp. Load	IEC 60738-1 7.24.3	85 ± 5 °C , Vmax. , 1000 ± 24 hrs	No visible damage   $\Delta R_{25}/R_{25}$   $\leq 20\%$															
Climatic Sequence	IEC 60738-1 7.22	a. T <sub>U</sub> x 16 hrs b. 1st cycle : 40 °C 95 %RH x 24 hrs c. -25 °C x 2 hrs d. 5 cycles : 40°C 95% RH x 24 hrs / Cycle	No visible damage   $\Delta R_{25}/R_{25}$   $\leq 20\%$															
Solderability	IEC 60068-2-58	245 ± 5 °C , 3 ± 0.3 sec	At least 95% of terminal electrode is covered by new solder															
Resistance to Soldering Heat	IEC 60068-2-58	8.1.2.2 Solder reflow method Preheating: 150~180°C ,60~120 secs. Peak temp.: 245~255°C , $\leq 20$ secs. (reflow)	No visible damage   $\Delta R_{25}/R_{25}$   $\leq 20\%$															

## Soldering Recommendation

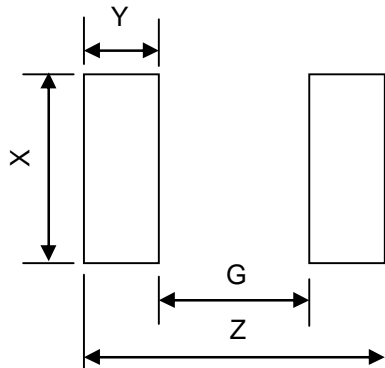
### IR-Reflow Soldering Profile



### Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec (max.)
Diameter of Soldering Iron-tip	φ 3mm (max.)
Caution: Not to touch the component surface with soldering iron directly to prevent component damage.	

### Recommended Soldering Pad Dimensions



Size (EIA)	0603
Z	3.0 mm
G	1.0 mm
X	1.0 mm
Y	1.0 mm

### RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS directive 2011/65/EU.

### Warehouse Storage Conditions of Products

(I) Storage Conditions :

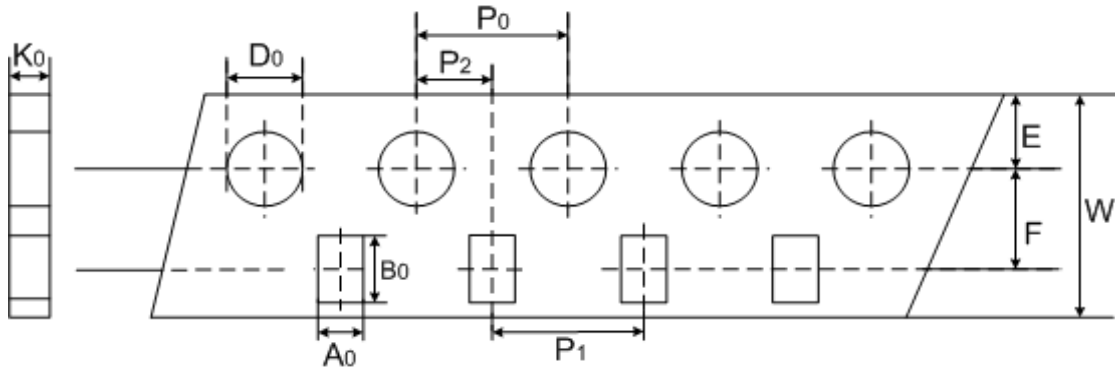
- 1.Storage Temperature :  $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
- 2.Relative Humidity :  $\leq 75\% \text{RH}$
- 3.Keep away from corrosive atmosphere and sunlight.

(II) Period of Storage : 1 year



Packaging

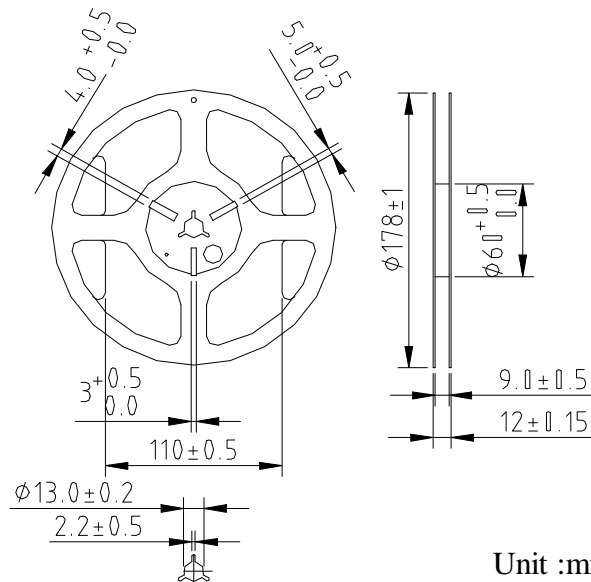
■ Taping Specification ( 0603 type)



(Unit : mm)

Index	$A_0$	$B_0$	$W$	$E$	$F$	$P_1$	$P_2$	$P_0$	$D_0$	$K_0$
Type	$\pm 0.2$	$\pm 0.2$	$\pm 0.2$	$\pm 0.1$	$\pm 0.05$	$\pm 0.1$	$\pm 0.05$	$\pm 0.1$	$\pm 0.1$	$\pm 0.1$
0603	1.1	1.9	8.0	1.75	3.5	4.0	2.0	4.0	1.55	0.95

■ Quantity ( 4000 pcs / reel )



Unit :mm

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Safety Approvals (Certified Model/Type : TPM1S471P085)



\* UL 1434 / cUL recognized (File # E138827)



\* TUV recognized (File # R 50133294)

Certificates

- (1) TS 16949 certificate
- (2) ISO 9001 certificate
- (3) QC 080000 certificate

Test Report

- (1) RoHS test report
- (2) Halogen-free test report



R-T Characteristic Curve

TPM1S471P085RA

