

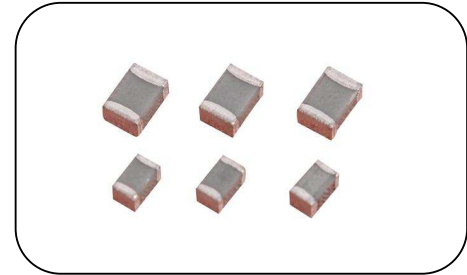
CPTC Thermistor : TPM Type

SMD CPTC Thermistor for Automotive Application



■ Features

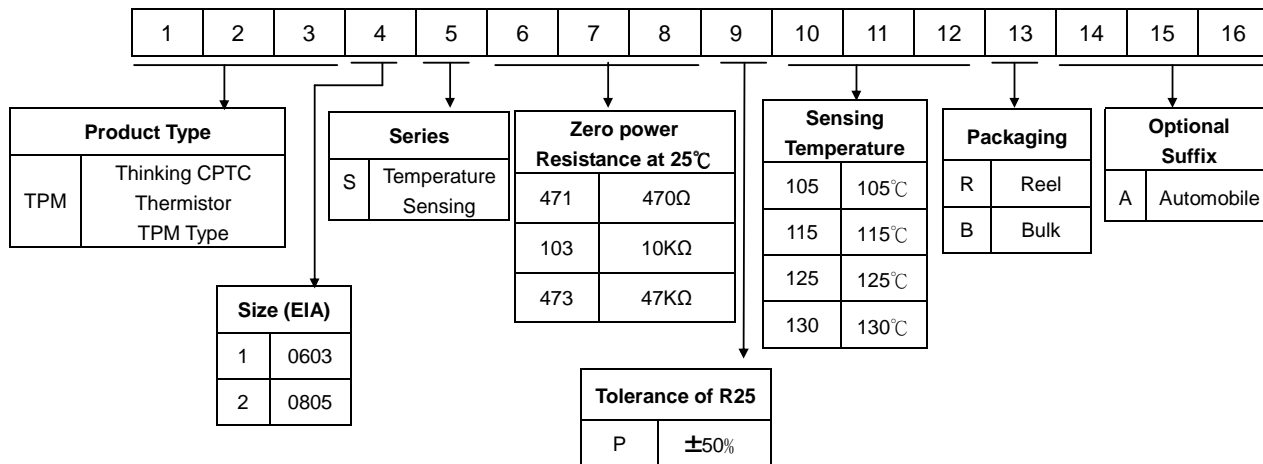
1. RoHS compliant
2. Thermistor chip with lead-free tinned terminations
3. EIA size 0603,0805
4. Fast and reliable response
5. Suitable for reflow soldering
6. Operating temperature range from -40 to 150°C
7. Agency Recognition: UL & cUL



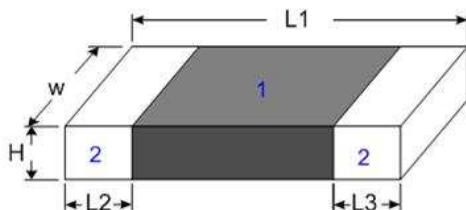
■ Recommended Applications

1. DC/DC converters
2. AC Adapter
3. Inverter
4. Overheat protection for transistor and ICs

■ Part Number Code



■ Structure and Dimensions



(Unit:mm)

Part No.	Size (EIA)	L1	W	H max.	L2 and L3
TPM1	0603	1.60±0.15	0.80±0.15	0.95	0.40±0.20
TPM2	0805	2.00±0.20	1.25±0.20	1.2	0.45±0.25

Note1: Material of body: PTC Thermistor Ceramics

Note2: Electrode: Ag-Zn/Ni/Sn

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■ Electrical Characteristics

Part No.	Size (EIA)	Sensing temperature (°C)	Resistance (Ω)			Max. Voltage (V)	Operating Temperature Range(°C)	Safety Approvals	
		Ts	25°C	Ts - 5°C	Ts + 5°C	V _{dc}	T _L ~T _U	UL	cUL
TPM1S471P065RA	0603	65±5	470	≤4,700	≥4,700	32	-40~+150	√	√
TPM1S471P075RA		75±5					-40~+150	√	√
TPM1S471P085RA		85±5					-40~+150	√	√
TPM1S471P095RA		95±5					-40~+150	√	√
TPM1S471P105RA		105±5					-40~+150	√	√
TPM1S471P115RA		115±5					-40~+150	√	√
TPM1S471P125RA		125±5					-40~+150	√	√
TPM1S471P135RA		135±5					-40~+150	√	√
TPM2S471P065RA	0805	65±5	470	≤4,700	≥4,700	32	-40~+150	√	√
TPM2S471P075RA		75±5					-40~+150	√	√
TPM2S471P085RA		85±5					-40~+150	√	√
TPM2S471P095RA		95±5					-40~+150	√	√
TPM2S471P105RA		105±5					-40~+150	√	√
TPM2S471P115RA		115±5					-40~+150	√	√
TPM2S471P125RA		125±5					-40~+150	√	√
TPM2S471P135RA		135±5					-40~+150	√	√

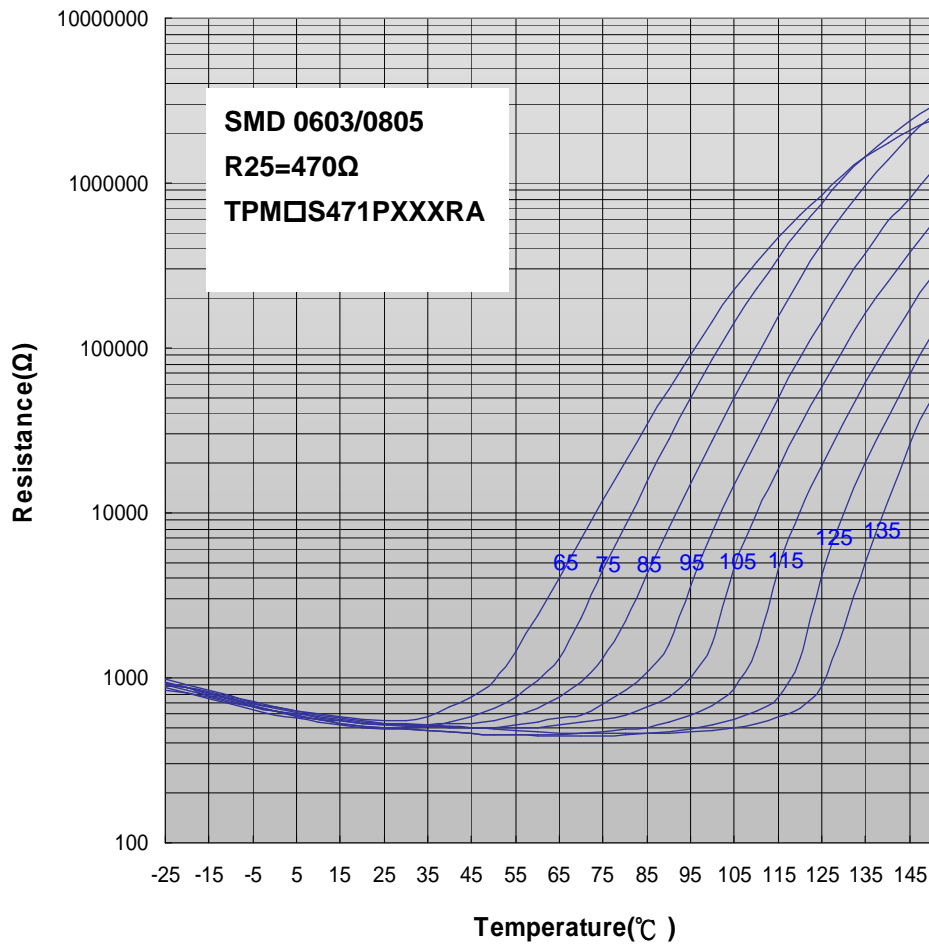
Note: UL&cUL File No. E138827

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■ Resistance-Temperature Characteristics (Typical)



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■ Typical Application Circuit

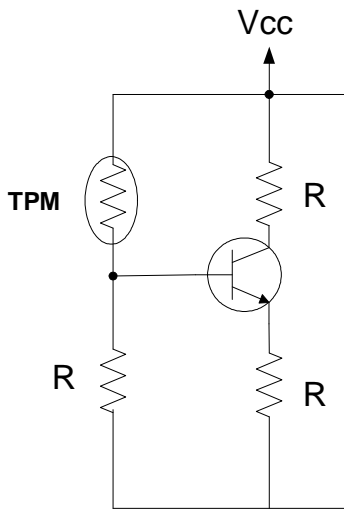


Fig 1. Overheat Protection

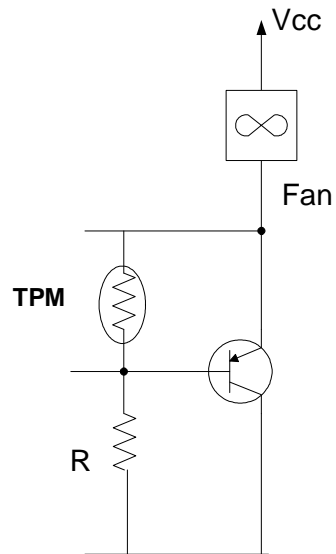


Fig 2. Temp. Sensing and Control

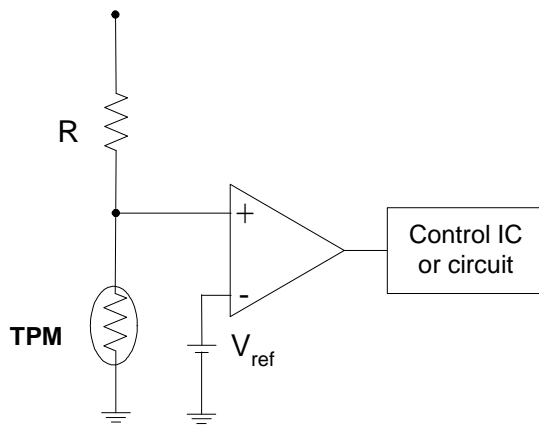


Fig 3. Comparator Circuit

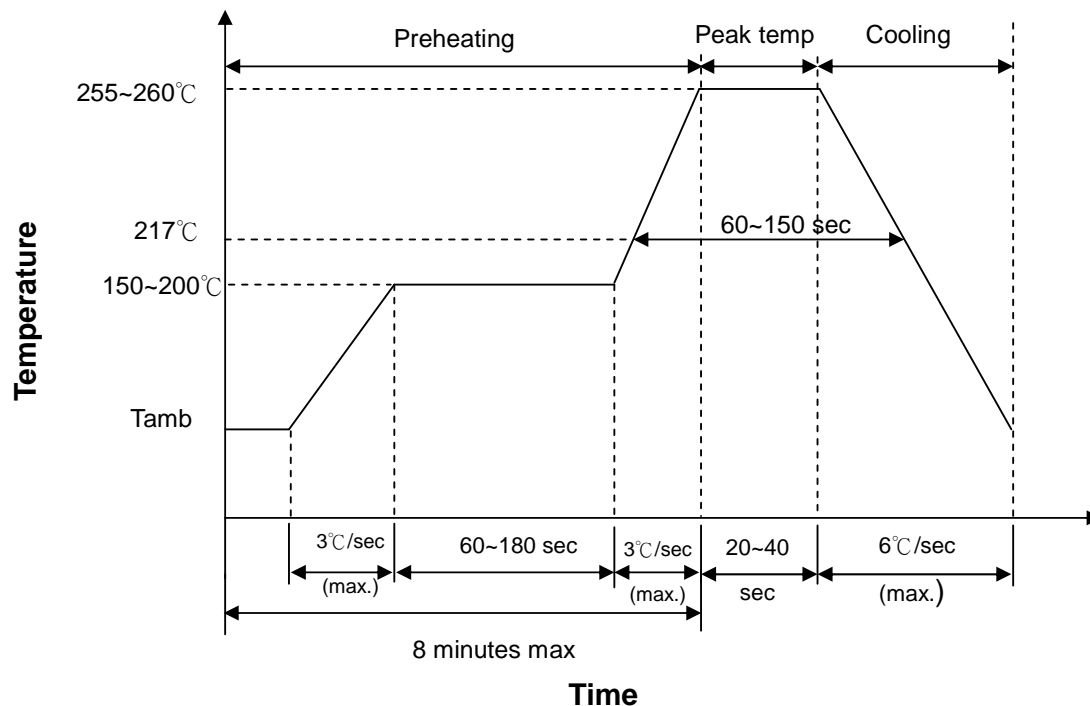
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Soldering Recommendation

■ IR-Reflow Soldering Profile



■ Reworking Conditions With Soldering Iron

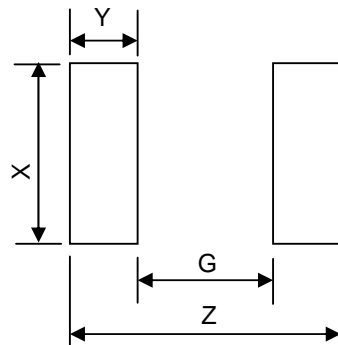
Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Diameter of Soldering Iron-tip	Φ3mm (max.)
Soldering Time	3 sec (max.)

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■ Recommended Pad Dimensions



Size	Z (mm)	G (mm)	X (mm)	Y (mm)
0603	2.7~2.8	0.6~0.7	0.9~1.0	1.0~1.1
0805	3.1~3.2	0.6~0.7	1.4~1.5	1.2~1.3

Followed Standard:IPC-SM-782A

■ Reliability

Item	Standard	Test Conditions / Methods	Specifications															
Bending Strength	IEC-60068-2-21	Warp 3mm for 0603&0805 Size; Speed < 0.5mm/sec. Duration: 10 sec on PCB.	No visible damage $ \Delta R_{25}/R_{25} \leq 10\%$															
Damp Heat, Steady State	IEC 60068-2-3	$85 \pm 3^\circ\text{C}$, 80 ~ 85% RH , 1000± 24 HRS	No visible damage $ \Delta R_{25}/R_{25} \leq 20\%$															
High Temp. Storage	IEC 60738-1 IEC 60068-2-2	$150 \pm 5^\circ\text{C}$, 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. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature ($^\circ\text{C}$)</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 ($^\circ\text{C}$)	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 ($^\circ\text{C}$)	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	$85 \pm 5^\circ\text{C}$ Vmax. , 1000 ± 24HRS	No visible damage $ \Delta R_{25}/R_{25} \leq 20\%$															

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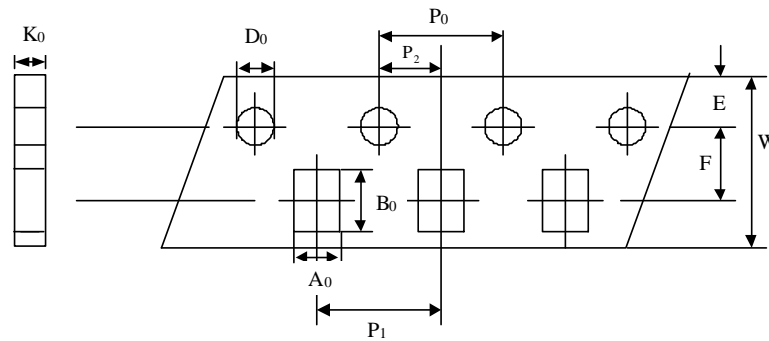
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Item	Standard	Test Conditions / Methods	Specifications
Climatic Sequence	IEC 60738-1	a. 150 °C x 16 HRS b. 1st cycle : 40 °C 95 %RH x 24 HRS c. -25 °C x 2 HRS d. 5 cycles : 40°C 95% RH x 24 HRS / Cycle	No visible damage $ \Delta R_{25}/R_{25} \leq 20\%$
High Temp. & Humidity Load	Specification Standard	85 ± 5 °C , 80 ~ 85% RH , Vmax. , 1000± 24 hrs	No visible damage $ \Delta R_{25}/R_{25} \leq 20\%$
Solderability	IEC 60068-2-2	235 ± 5 °C , 2 ± 0.5 sec	At least 95% of terminal electrode is covered by new solder
Resistance to Soldering Heat	IEC 60068-2-2	260 ± 5 °C , 10 ± 1 sec	No visible damage $ \Delta R_{25}/R_{25} \leq 20\%$
Low Temp. Storage	Specification Standard	-40 ± 3 °C , 1000 ± 24 HRS	No visible damage $ \Delta R_{25}/R_{25} \leq 20\%$

■ Package

● Taping Specification



(Unit: mm)

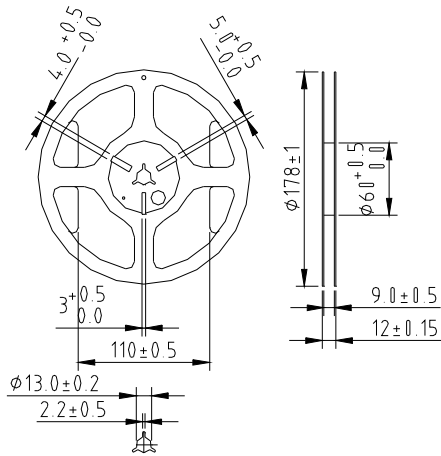
Index Type	A_0 ±0.2	B_0 ±0.2	W ±0.2	E ±0.1	F ±0.05	P_1 ±0.1	P_2 ±0.05	P_0 ±0.1	D_0 ±0.1	K_0 ±0.1
0603	1.1	1.9	8	1.75	3.5	4	2	4	1.55	0.95
0805	1.5	2.3	8	1.75	3.5	4	2	4	1.55	0.95

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- Quantity



Type	Quantity(pcs/reel)
0603	4000
0805	3500

■ Storage Condition of Products

- Storage Conditions :
 1. Storage Temperature: -10°C ~ +40°C
 2. Relative humidity: ≤ 75%RH
 3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage : 1 year

■ Cross Reference

Size (EIA)	R25	Sensing Temperature	THINKING Part Number	Murata Part Number	EPCOS Part Number
		Ts (°C)			
0603	470Ω	65±5	TPM1S471P065RA	PRF18BG471QS2RB	--
		75±5	TPM1S471P075RA	PRF18BF471QS2RB	--
		85±5	TPM1S471P085RA	PRF18BE471QS2RB	--
		95±5	TPM1S471P095RA	PRF18BD471QS2RB	--
		105±5	TPM1S471P105RA	PRF18BC471QS2RB	--
		115±5	TPM1S471P115RA	PRF18BB471QS2RB	--
		125±5	TPM1S471P125RA	PRF18BA471QS2RB	--
		135±5	TPM1S471P135RA	PRF18AR471QS2RB	--

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Size (EIA)	R25	Sensing Temperature	THINKING Part Number	Murata Part Number	EPCOS Part Number
		Ts (°C)			
0805	470Ω	65±5	TPM2S471P065RA	--	--
		75±5	TPM2S471P075RA	--	--
		85±5	TPM2S471P085RA	--	--
		95±5	TPM2S471P095RA	--	--
		105±5	TPM2S471P105RA	--	--
		115±5	TPM2S471P115RA	--	--
		125±5	TPM2S471P125RA	--	--
		135±5	TPM2S471P135RA	--	--