

CPTC for Circuit Protection

Overcurrent Protection Chip Type

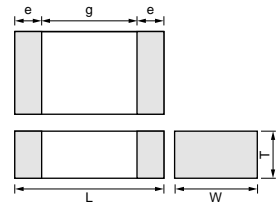
Overcurrent Protection device with resettable function suitable for current limiting resistor.

This product is a chip type PTC thermistor for overcurrent protection which is suitable for the following.

- Countermeasure for short circuit testing
- Current limiting resistor

■ Features

1. Rapid operation to protect the circuit in an overcurrent condition abnormality such as a short circuit.
By removing the overcurrent condition, these products automatically return to the initial condition and can be used repeatedly.
2. Suitable for countermeasure to short circuit test in safety standard
3. Stable resistance after operation due to ceramic PTC
4. Similar size (0603 size) is possible due to the large capacity for electric power.
5. Possible to use these products as current limiting resistors with overcurrent protection functions
6. SMD type is helpful for miniaturizing circuits because of its small size and light weight.



Part Number	Dimensions (mm)				
	L	W	T	e	g
0603(1608)	1.6±0.15	0.8±0.15	0.8±0.15	0.1 to 0.6	-
0805(2012)	2.0±0.2	1.25±0.2	0.9±0.2	0.2 min.	0.5 min.
0805(2012)	2.0±0.2	1.25±0.2	1.25±0.2	0.2 min.	0.5 min.

Chip Type 0603(1608) Size

Part Number	Max. Voltage (V)	Hold Current (at +60°C) (mA)	Hold Current (at +25°C) (mA)	Trip Current (at +25°C) (mA)	Trip Current (at -10°C) (mA)	Max. Current (mA)	Resistance (at +25°C) (ohm)
SMD0603-471RM007-24	24	7	10	21	25	60	470 ±20%
SMD0603-221RM010-24	24	10	14	29	35	130	220 ±20%
SMD0603-101RM015-24	24	15	21	45	55	300	100 ±20%
SMD0603-47RM020-24	24	20	29	61	75	630	47 ±20%
SMD0603-33RM025-24	24	25	36	71	85	900	33 ±20%
SMD0603-6R8M080-20	20	80	120	260	320	3500	6.8 ±20%
SMD0603-4R7M100-20	20	100	155	330	400	5000	4.7 ±20%
SMD0603-3R3M120-16	16	120	180	400	480	4500	3.3 ±20%
SMD0603-2R2M150-12	12	150	220	500	600	5000	2.2 ±20%
SMD0603-1R0M220-6	6	220	330	740	850	7500	1.0 ±20%

Maximum Current shows typical capacities of the transformer which can be used.

This series is applied to reflow soldering.

This series is recognized by UL.

Chip Type 0805(2012) Size

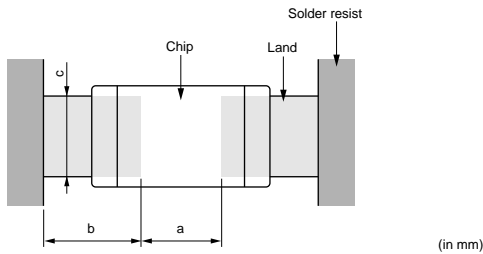
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SMD0805-22RM030-20	20	30	44	91	110	1100	22 ±20%
SMD0805-15RM040-20	20	40	59	116	140	1600	15 ±20%
SMD0805-6R8M080-24	24	80	120	260	320	3500	6.8 ±20%
SMD0805-4R7M100-24	24	100	155	330	400	5000	4.7 ±20%
SMD0805-3R3M120-20	20	120	180	400	480	6000	3.3 ±20%
SMD0805-2R2M150-16	16	150	220	500	600	6500	2.2 ±20%
SMD0805-1R0M220-12	12	220	330	740	850	10000	1.0 ±20%
SMD0805-0R6M285-6	6	285	420	920	1100	10000	0.6 ±20%
SMD0805-0R2M500-6	6	500	750	1620	2000	10000	0.2 ±20%

Maximum Current shows typical capacities of the transformer which can be used.

This series is applied to reflow soldering.

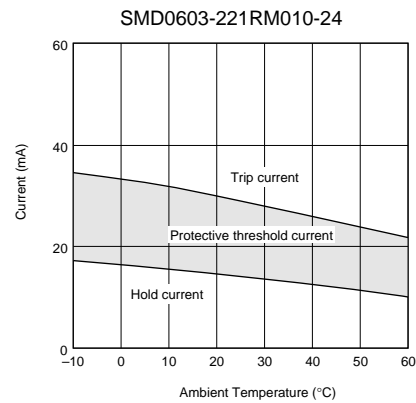
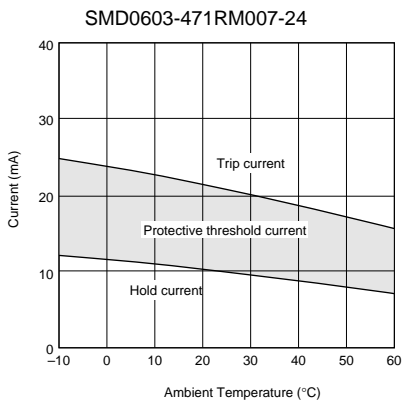
This series is recognized by UL.

Standard Land Pattern Dimensions

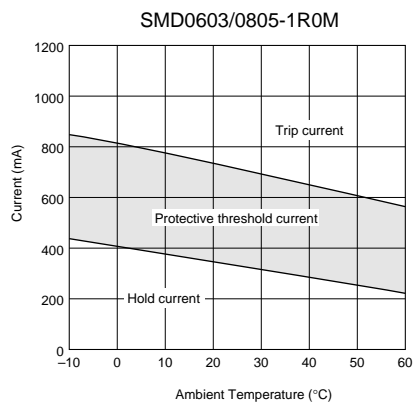
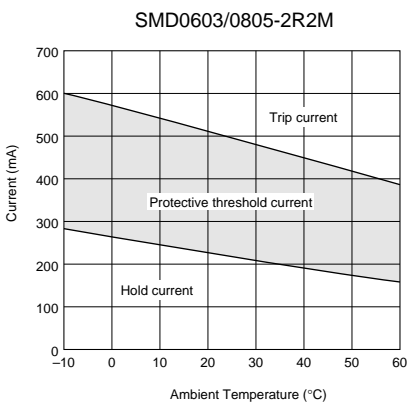
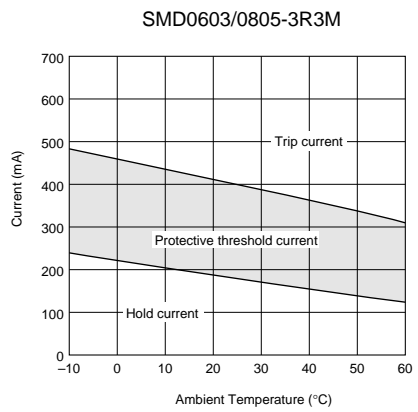
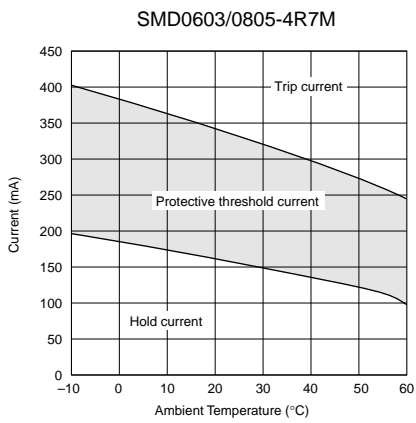
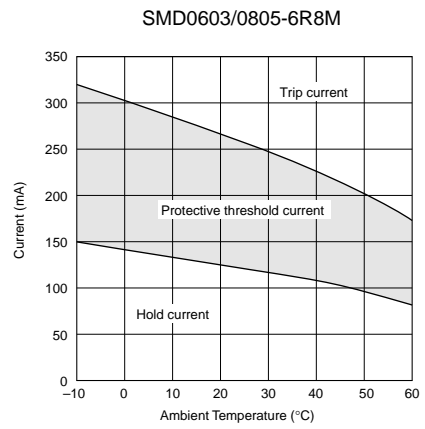
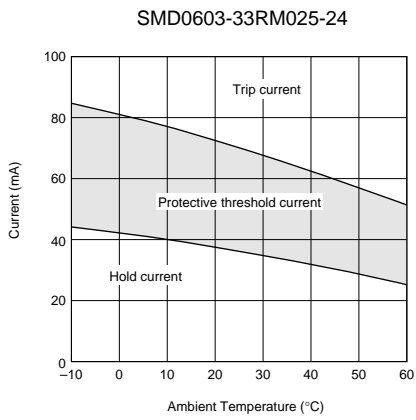
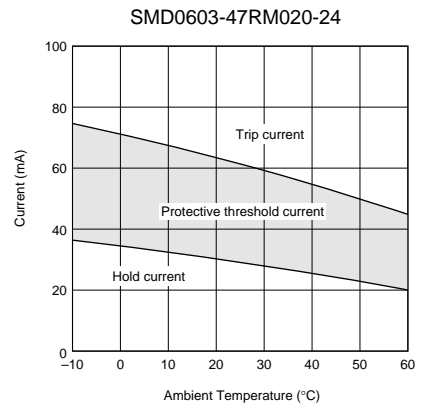
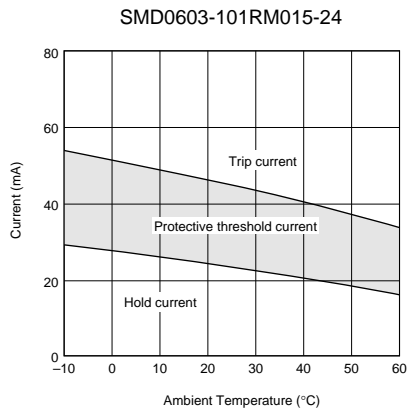


Part Number	Soldering Methods	Dimensions (mm)			
		Chip (L×W)	a	b	c
0603(1608)	Reflow Soldering	1.6×0.8	0.6-0.8	0.6-0.7	0.6-0.8
0805(2012)	Reflow Soldering	2.0×1.25	1.0-1.2	0.5-0.7	1.0-1.2

Protective Threshold Current Range

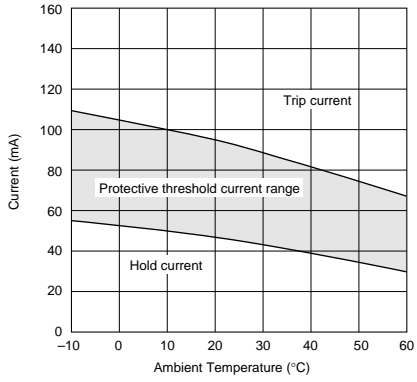


■ Protective Threshold Current Range

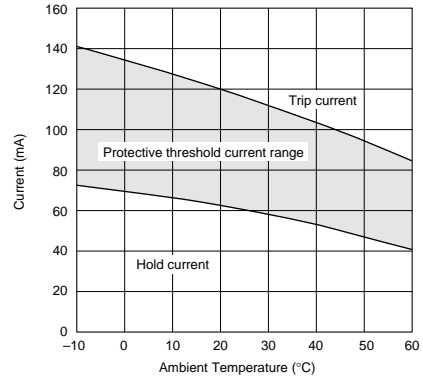


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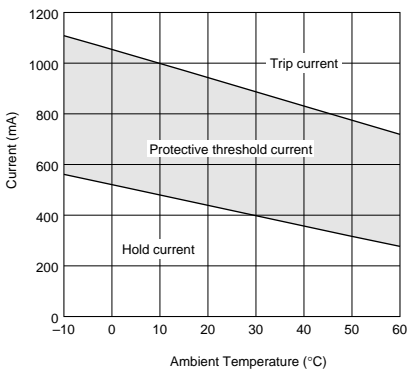
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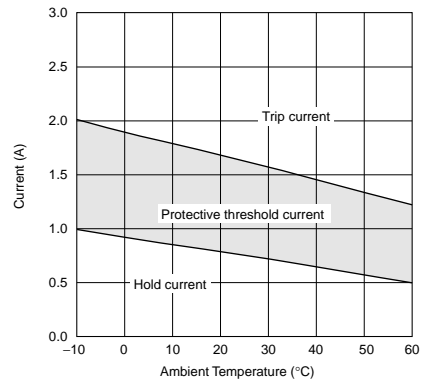
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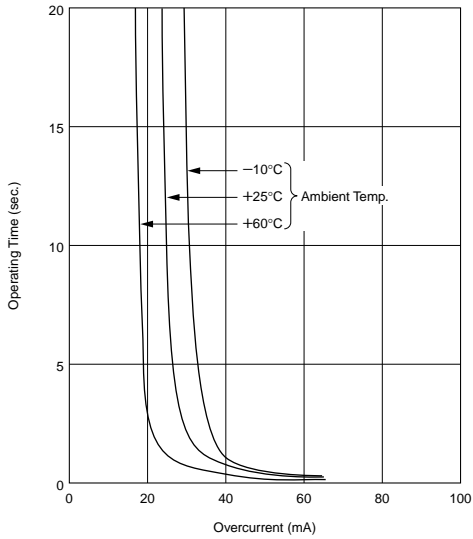


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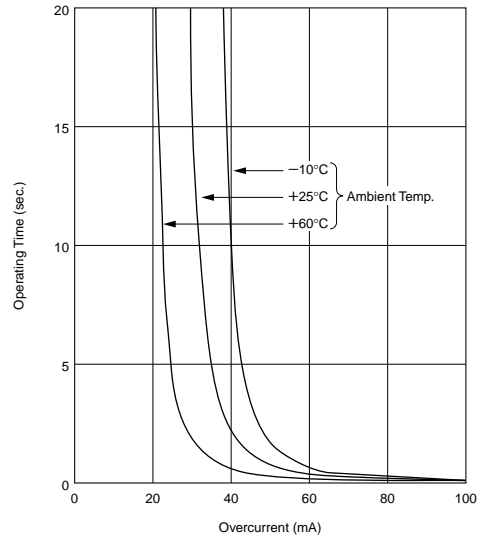


■ Operating Time (Typical Curve)

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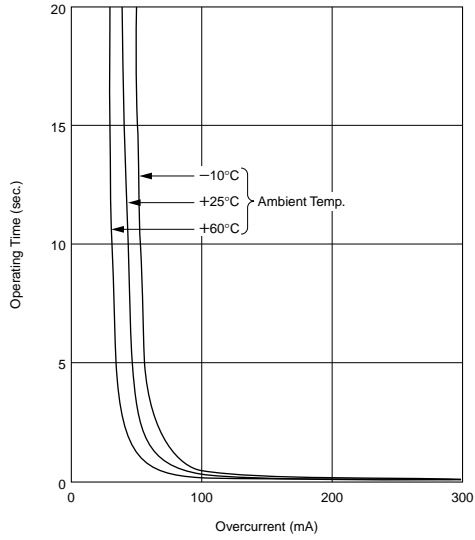


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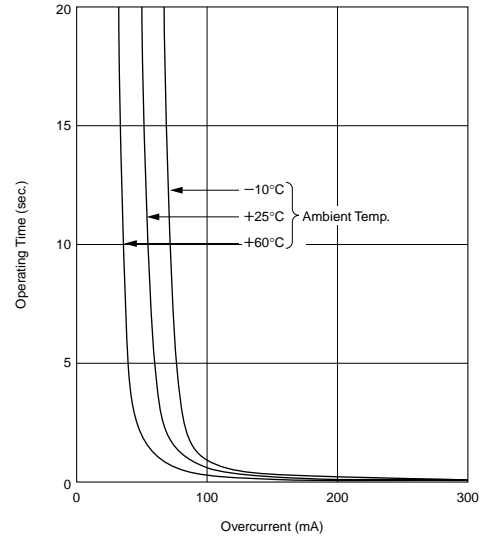


■ Operating Time (Typical Curve)

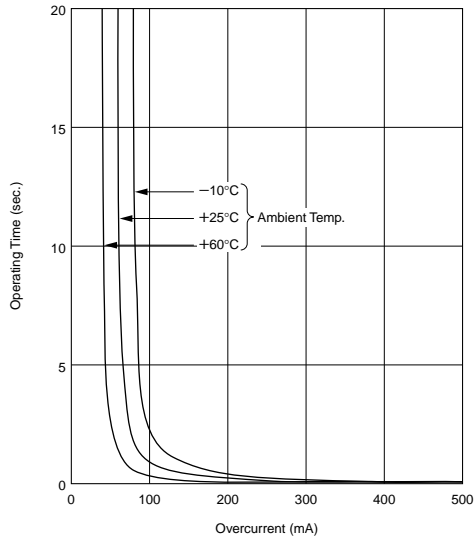
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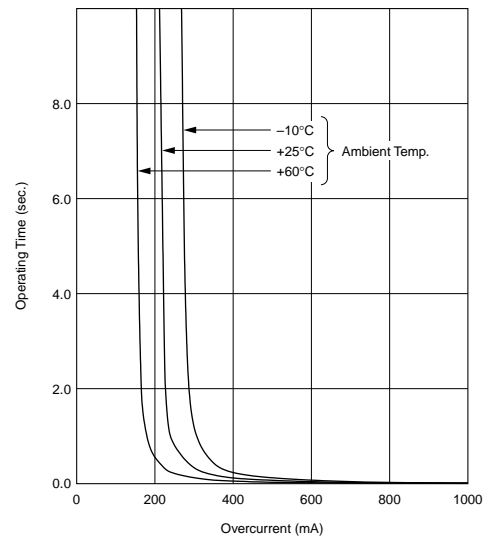
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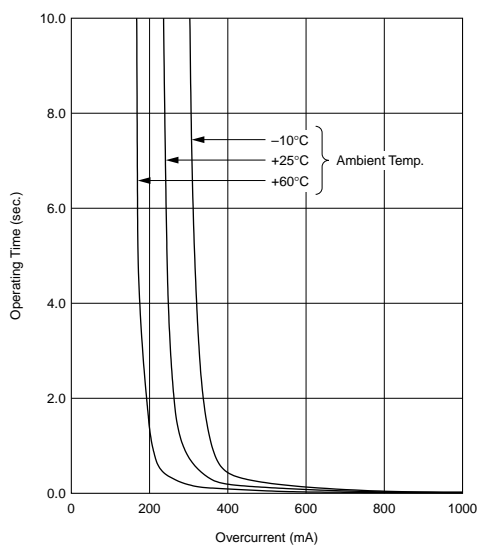
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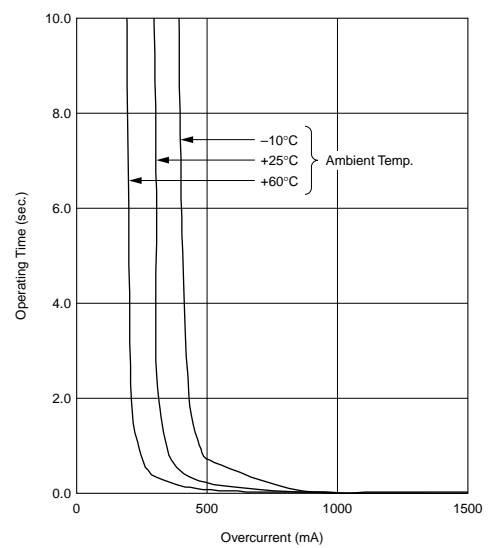
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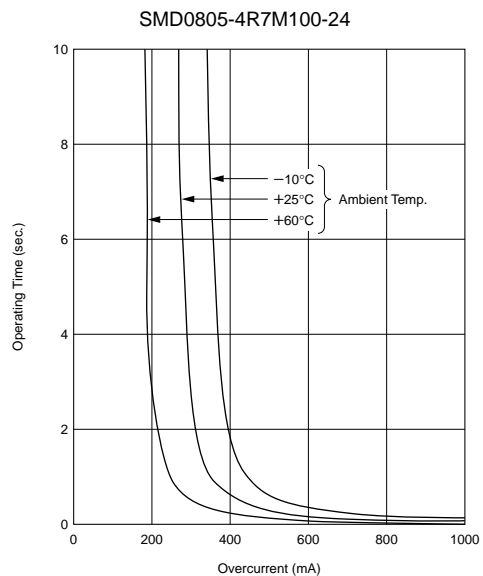
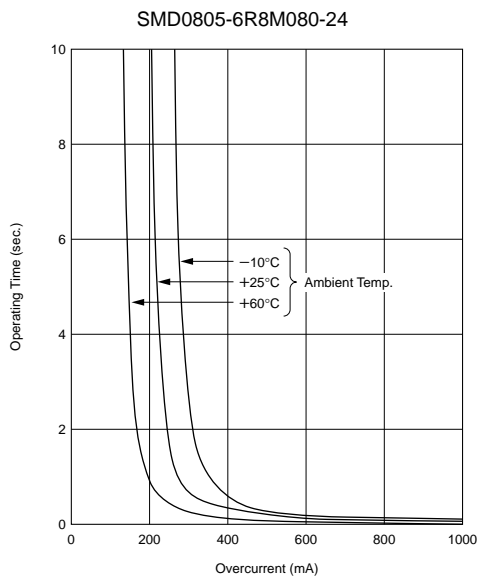
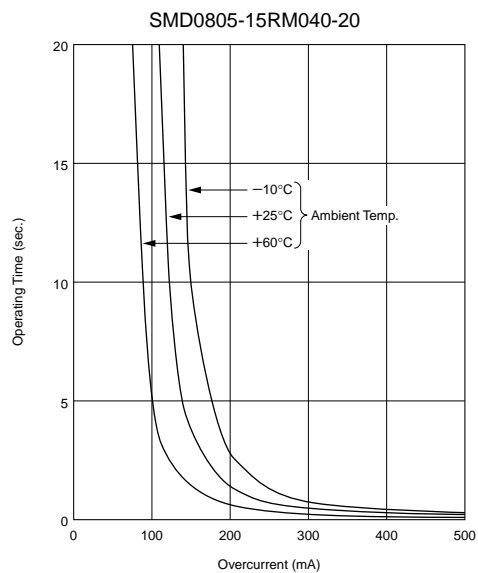
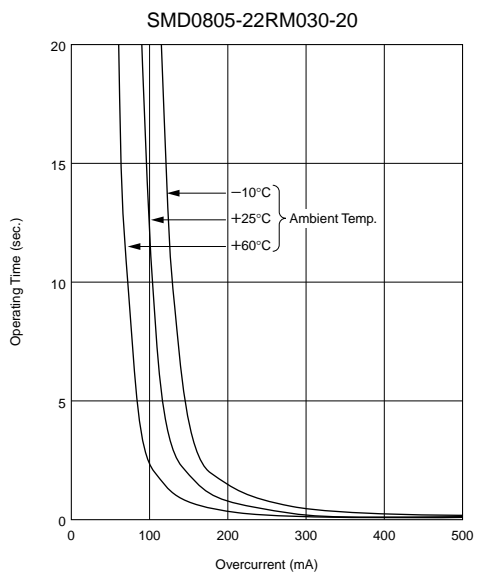
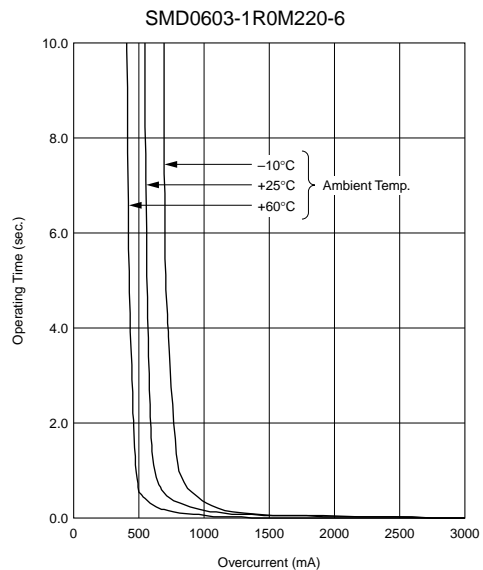
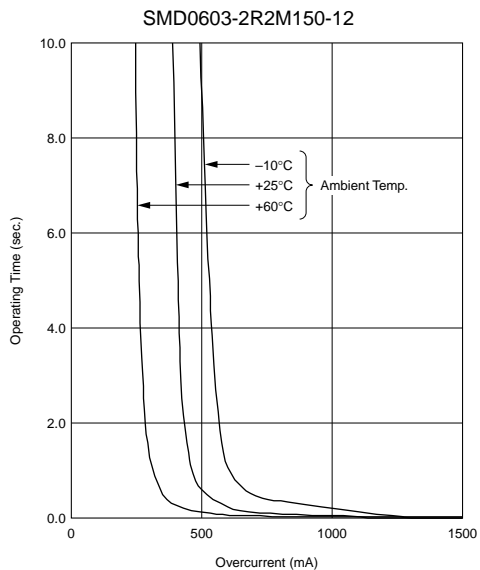
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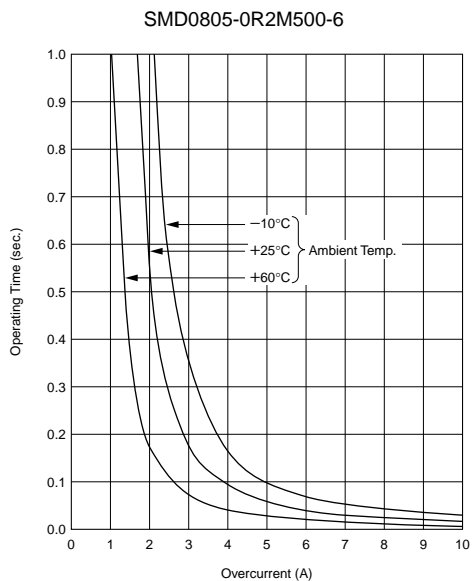
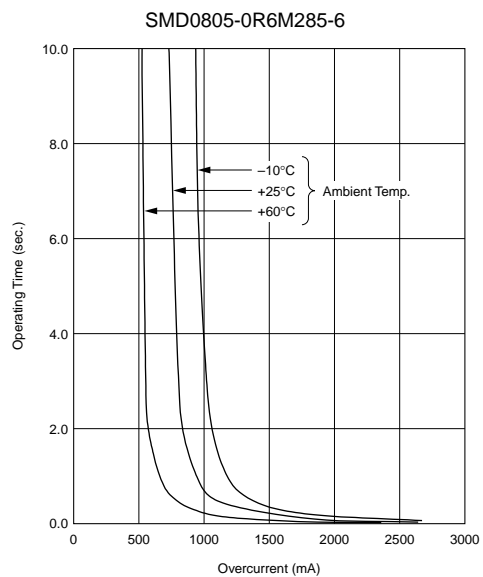
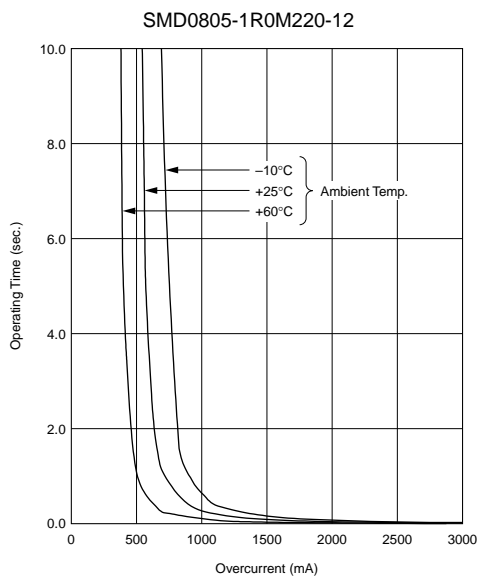
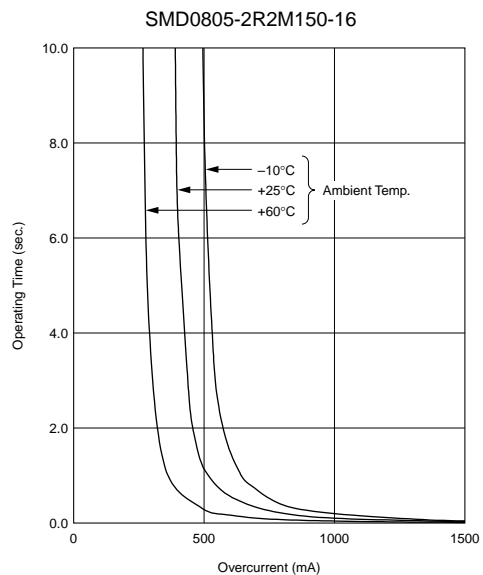
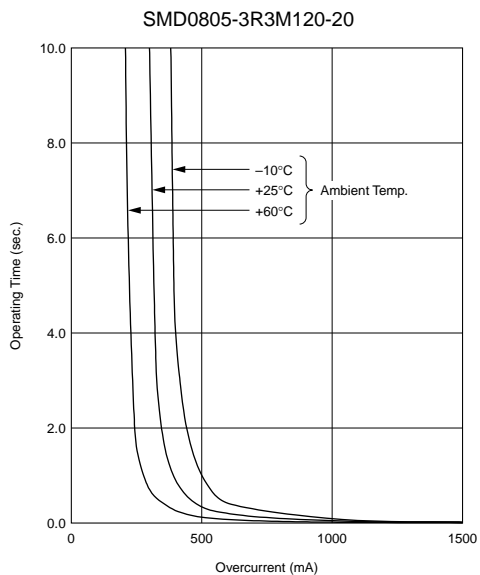
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■ Operating Time (Typical Curve)

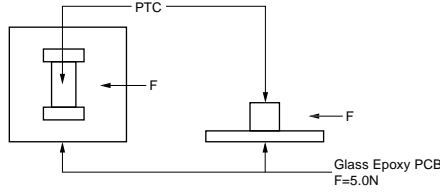


■ Operating Time (Typical Curve)



Chip Type Specifications and Test Methods

■ SMD Series

No.	Item	Rating Value	Method of Examination															
1	Operating Temp.	-10 to 60°C	Temperature range with maximum voltage applied to PTC.															
2	Resistance Value (at 25°C)	The resistance value should be within the specified tolerance.	After applying maximum operating voltage for 3 mins. and leaving for 2 hrs. in 25°C, measured by applying voltage of less than 1.5Vdc (by a direct current of less than 10mA).															
3	Withstanding Voltage	Without damage	We apply 120% of the maximum operating voltage to PTC by raising gradually for 180±5 secs. at 25°C. (A protective resistor is to be connected in series, and the inrush current through PTC must be limited below maximum rated value.)															
4	Adhesive Strength	There is no sign of exfoliation on electrode.	<p>EIAJ ET-7403 term 9 Soldered PTC to PCB and add a force of 5.0N in the direction as shown below.</p> 															
5	Vibration	Normal appearance Resistance change: not to exceed ±20% (*)	<p>JIS C 5102 term 8.2 Soldered PTC to PCB Vibration: A 10-55-10Hz (1 min.) Width: 1.5mm Vibrate for 2 hrs. in each of 3 mutually perpendicular planes for a total of 6 hrs.</p>															
6	Solderability	Min. 75% electrode is covered with new solder. Resistance change: not to exceed ±20% (*)	<p>JIS C 5102 term 8.4 Solder: Sn 63%/Pb 37% (or 60/40%) Solder temp: 230±5°C Soaking time: 3±0.5 secs. Soaking position: Until a whole electrode is soaked</p>															
7	Solder-heatability	Normal appearance Resistance change: not to exceed ±20% (*)	<p>Solder: Sn 63%/Pb 37% (or 60/40%) Flux: Solder paste containing less than 0.2wt% of chlorine. Preheating: 150±5°C 3 mins. Peak temp.: 260±5°C 10±5 secs. (reflow) PCB: Glass Epoxy PCB (JIS C 6484)</p>															
8	Temperature Cycling	Normal appearance Resistance change: not to exceed ±20% (*)	<p>JIS C 5102 term 9.3 Times: 5 cycles</p> <table border="1" data-bbox="938 1332 1321 1456"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-20 +0, -3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10-15</td> </tr> <tr> <td>3</td> <td>+85 +3, -0</td> <td>30</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10-15</td> </tr> </tbody> </table>	Step	Temp. (°C)	Time (min.)	1	-20 +0, -3	30	2	Room temp.	10-15	3	+85 +3, -0	30	4	Room temp.	10-15
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3	+85 +3, -0	30																
4	Room temp.	10-15																
9	Humidity Test	Normal appearance Resistance change: not to exceed ±20% (*)	<p>JIS C 5102 term 9.5 40±2°C, 90-95%RH leave for 500±4 hrs.</p>															
10	High Temperature Load Test	Normal appearance Resistance change: not to exceed ±20% (*)	<p>JIS C 5102 term 9.10 60±3°C (in air), PTC is applied maximum operating voltage for 1.5 hrs. on and 0.5 hrs. off. This cycle is repeated for 1000±10 hrs.</p>															

(*) Measure resistance after the test by applying voltage of less than 1.5Vdc by a direct current of less than 10mA after product is left at 25±2°C for 2 hours.

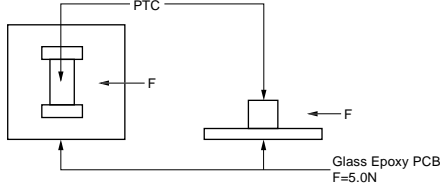
Above mentioned soldering in "4. Adhesive Strength" and "5. Vibration" is done under the following conditions at our site.

- Glass-Epoxy PC board
- Standard land dimension
- Standard solder paste
- Standard solder profile

Above conditions are mentioned in Notice.

Chip Type Specifications and Test Methods

■ SMD Series

No.	Item	Rating Value	Method of Examination															
1	Operating Temp.	-10 to 60°C	Temperature range with maximum voltage applied to PTC.															
2	Resistance Value (at 25°C)	The resistance value should be within the specified tolerance.	After leaving for 24 hrs. or more in 25°C, it measures by 4 wire measuring methods using the direct-current terminal current of 10mA or less (0.1 or less Vdcs).															
3	Withstanding Voltage	Without damage	We apply 120% of the maximum operating voltage to PTC by raising gradually for 180±5 secs. at 25°C. (A protective resistor is to be connected in series, and the inrush current through PTC must be limited below maximum rated value.)															
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8	High Temperature Test		60±3°C leave for 1000±10 hrs.															
9	Low Temperature Test		-10±3°C leave for 1000±10 hrs.															
10	Humidity Test		60±2°C, 90-95%RH leave for 500±4 hrs.															
11	Temperature Cycling	Normal appearance Resistance change: not to exceed ±20% (*)	<p>JIS C 5102 term 9.3 Times: 5 cycles</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temp. (°C)</th> <th>Time (min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-20 +0, -3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10-15</td> </tr> <tr> <td>3</td> <td>+85 +3, -0</td> <td>30</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10-15</td> </tr> </tbody> </table>	Step	Temp. (°C)	Time (min.)	1	-20 +0, -3	30	2	Room temp.	10-15	3	+85 +3, -0	30	4	Room temp.	10-15
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12	High Temperature Load Test		60±3°C (in air), PTC is applied maximum operating voltage for 1.5 hrs. on and 0.5 hrs. off. This cycle is repeated for 500±10 hrs.															

(*) The resistance measurement after the test.

After leaving for 24 hours or more in 25±2°C, it measures by 4 wire measuring methods using the direct-current terminal current of 10mA or less (0.1 or less Vdcs).

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