Metal Oxide Varistor: TVB DS Series

Plastic Encapsulated Type Varistor for Surge Protection

■ Features

1. Low profile and space saving
2. Electrical characteristics equivalent to leaded type TVR10 series
3. Operating voltage ranges from 17V to 460V
4. Recommended for IR-reflow soldering
5. Flame-retardant encapsulation material (meeting UL94-V0 requirement)
6. RoHS compliant
7. Operating temperature range: -40°C ~ +105°C
   Storage temperature range: -40°C ~ +125°C
8. Agency recognition: UL/cUL

■ Recommended Applications

1. Power supply
2. Power supply for home appliance
3. Industrial equipment
4. Telecommunication system

■ Part Number Code

T	V	B	D	S	2	7	0	K	R			
1	2	3	4	5	6	7	8	9	10	11	12	13

Product Type	
TVB	THINKING Varistor TVB Series

Size (EIA)	
D	5548

Varistor Voltage (V_{1mA})	
180	$18x10^0$V=18V
241	$24x10^1$V=240V

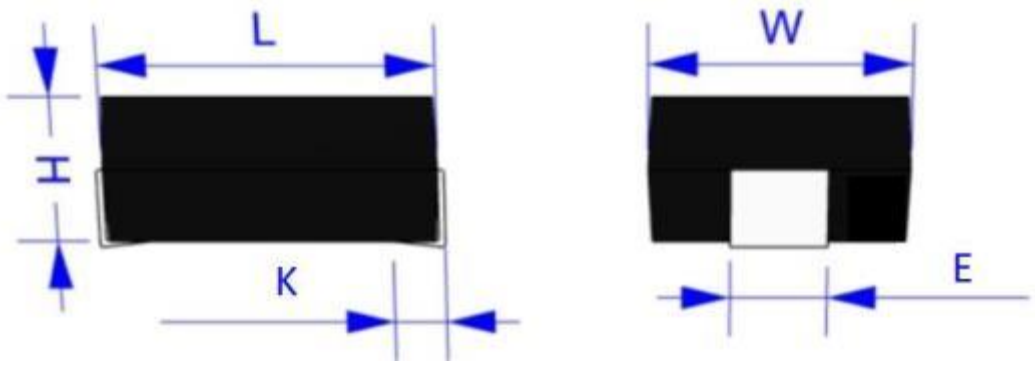
Packaging	
B	Bulk
R	Reel

Optional Suffix
001~999

Terminal Type	
S	Standard

Tolerance of V_{1mA}	
K	±10%

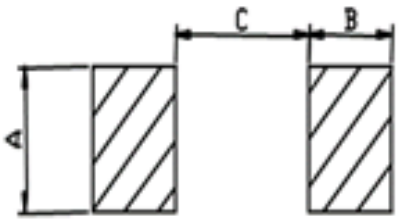
■ Structures and Dimensions



(Unit: mm)

Size (EIA)	V1mA (V)	L	W	H	K	E
5548	V_{1mA}=270~361	14±0.3	12.2±0.3	4.0±0.3	2±0.3	3±0.3
	V_{1mA}=391~751			6.0±0.3		

● Soldering Pads



(Unit: mm)

Item		A	B	C
Size (EIA)	5548	3.5	3.3	8.4

Metal Oxide Varistor: TVB DS Series

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■ Electrical Characteristics

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μs)		Max. Surge Current (8/20μs)	Max. Energy (10/1000μs)	Rated Power	Safety Approvals*		
	V_{1mA} (V)	$V_{AC(rms)}$ (V)	V_{DC} (V)	V_P (V)	I_P (A)	Imax (A)	Wmax (J)	P (W)	UL 1449 &cUL	TUV	CQC
TVBDS270	27(24~30)	17	22	53	5	500	3.9	0.05	√	√	√
TVBDS330	33 (30~36)	20	26	65	5	500	4.8	0.05	√	√	√
TVBDS390	39 (35~43)	25	31	77	5	500	5.6	0.05	√	√	√
TVBDS470	47 (42~52)	30	38	93	5	500	6.8	0.05	√	√	√
TVBDS560	56 (50~62)	35	45	125	5	500	8.1	0.05	√	√	√
TVBDS680	68 (61~75)	40	56	135	5	500	9.8	0.05	√	√	√
TVBDS820	82 (74~90)	50	65	150	25	3500	14	0.4	√	√	√
TVBDS101	100 (90~110)	60	85	165	25	3500	17	0.4	√	√	√
TVBDS121	120 (108~132)	75	100	200	25	3500	20	0.4	√	√	√
TVBDS151	150 (135~165)	95	125	250	25	3500	25	0.4	√	√	√
TVBDS181	180 (162~198)	115	150	300	25	3500	30	0.4	√	√	√
TVBDS201	205 (185~226)	130	170	340	25	3500	35	0.4	√	√	√
TVBDS221	220 (198~242)	140	180	360	25	3500	39	0.4	√	√	√
TVBDS241	240 (216~264)	150	200	395	25	3500	42	0.4	√	√	√
TVBDS271	270 (243~297)	175	225	455	25	3500	49	0.4	√	√	√
TVBDS301	300 (270~330)	195	250	500	25	3500	53	0.4	√	√	√
TVBDS331	330 (297~363)	215	275	550	25	3500	58	0.4	√	√	√
TVBDS361	360 (324~396)	230	300	595	25	3500	65	0.4	√	√	√
TVBDS391	390(351~429)	250	320	650	25	3500	70	0.4	√	√	√
TVBDS431	430(387~473)	275	350	710	25	3500	80	0.4	√	√	√
TVBDS471	475(428~523)	300	385	775	25	3500	85	0.4	√	√	√
TVBDS511	510(459~561)	320	410	845	25	3500	92	0.4	√	√	√
TVBDS561	560(504~616)	350	450	930	25	3500	92	0.4	√	√	√
TVBDS621	620(558~682)	395	510	1020	25	3500	95	0.4	√	√	√
TVBDS681	680(612~748)	420	560	1120	25	3500	98	0.4	√	√	√
TVBDS751	750(675~825)	465	615	1235	25	3500	100	0.4	√	√	√

Note:

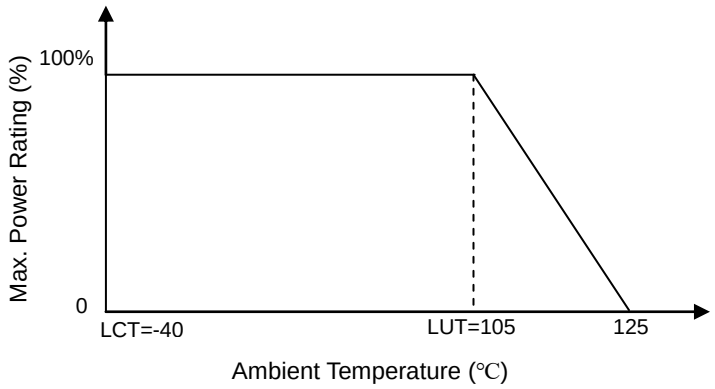
*1. Nominal discharge current (In) is the parameter measured with 8/20μs current waveform for UL 1449 5th edition.

*2. UL 1449 5th/cUL file no.: E314979

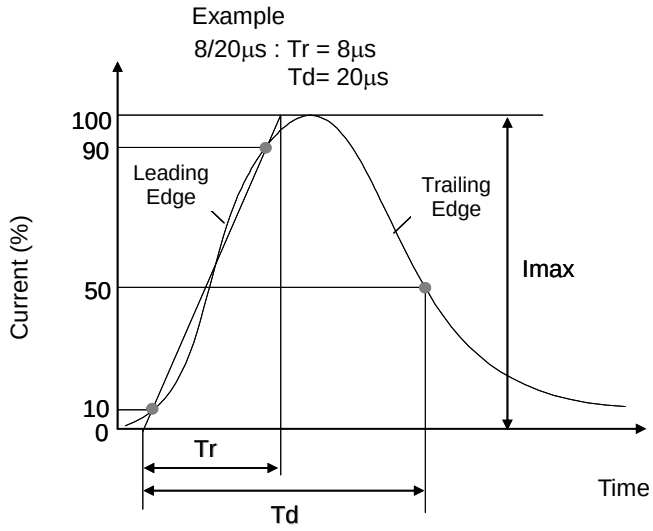
TUV file no.: J50517635

CQC file no.: CQC21001325226

■ Power Derating Curve

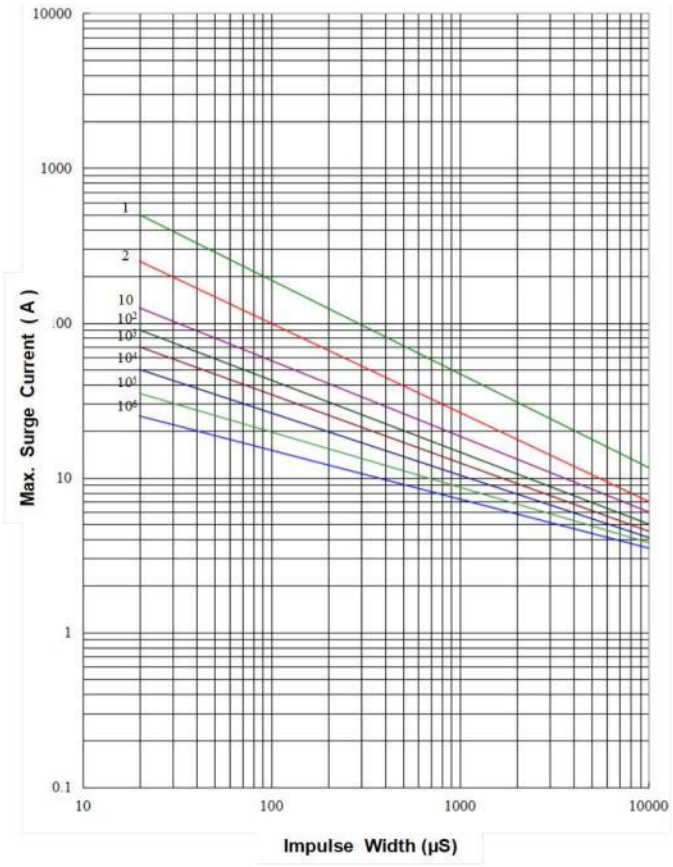


■ Surge Current Standard Waveform

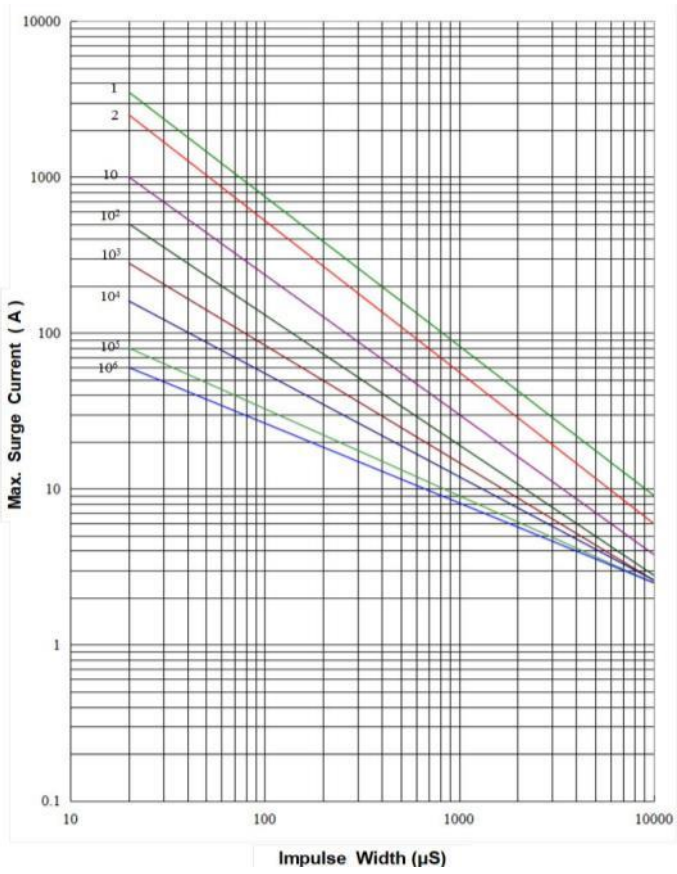


■ Max. Surge Current Derating Curves

TVB DS270 to TVB DS680

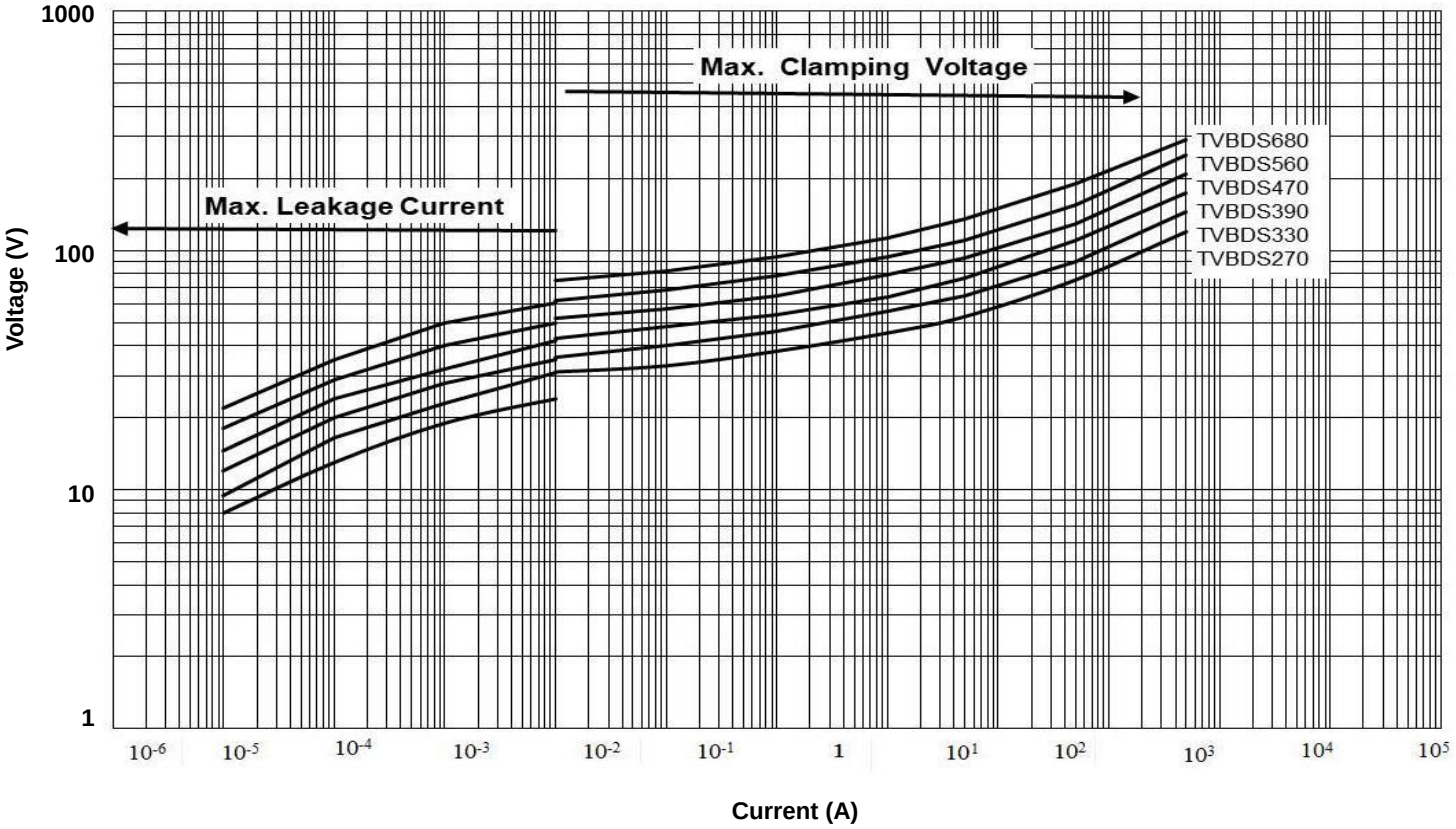


TVB DS820 to TVB DS751

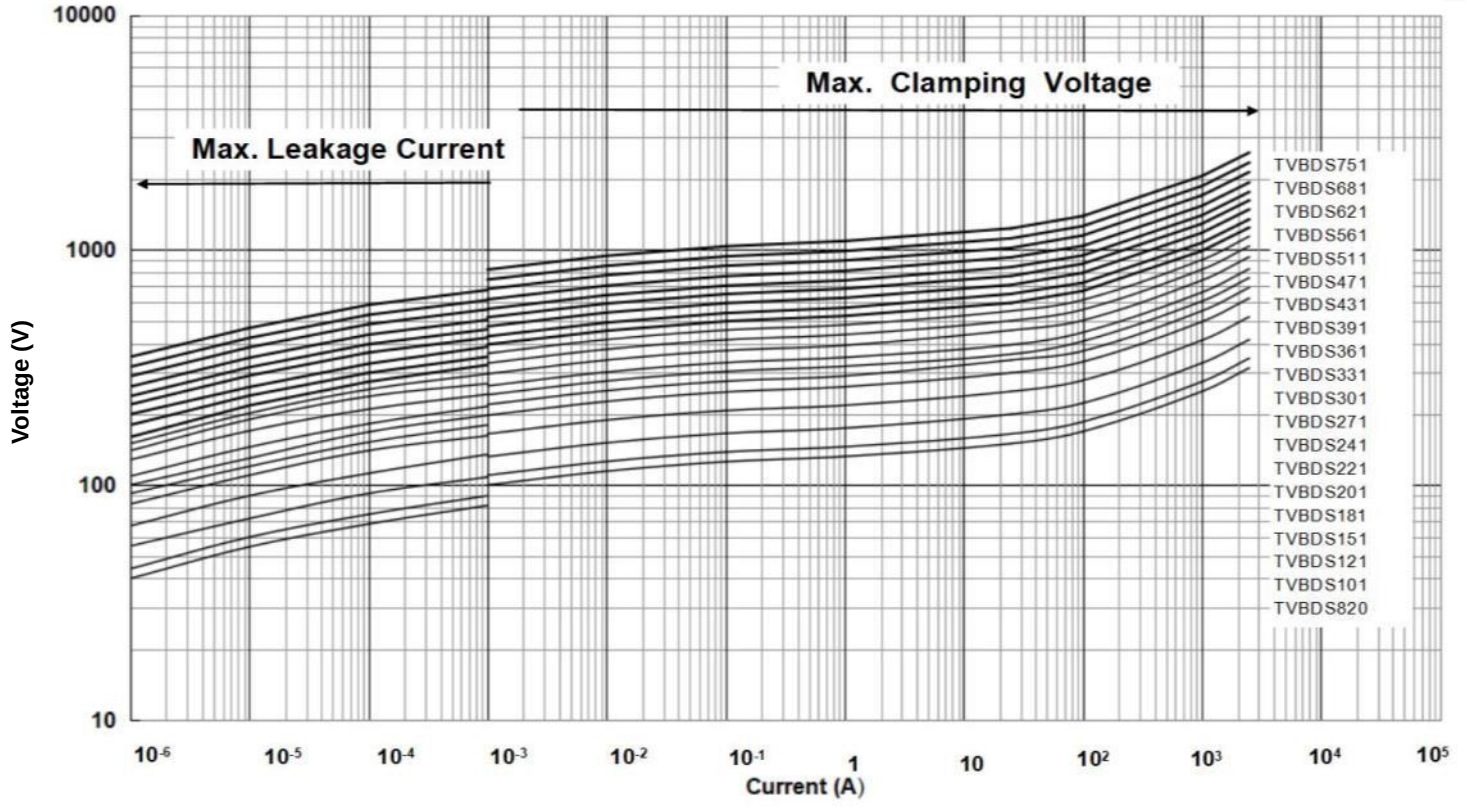


■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVB DS 270 to TVB DS 680)

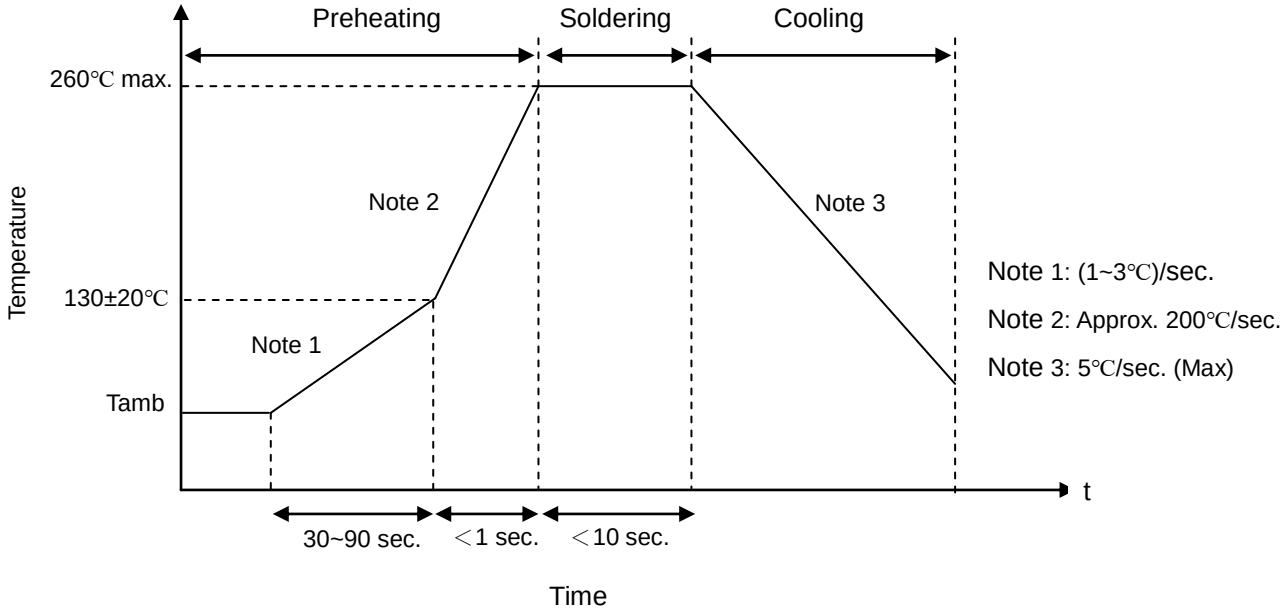


Max. Leakage Current and Max. Clamping Voltage Curves (TVBDS820 to TVBDS751)



■ Soldering Recommendation

● IR-reflow Soldering Profile



● Recommended Reworking Conditions with Soldering Iron

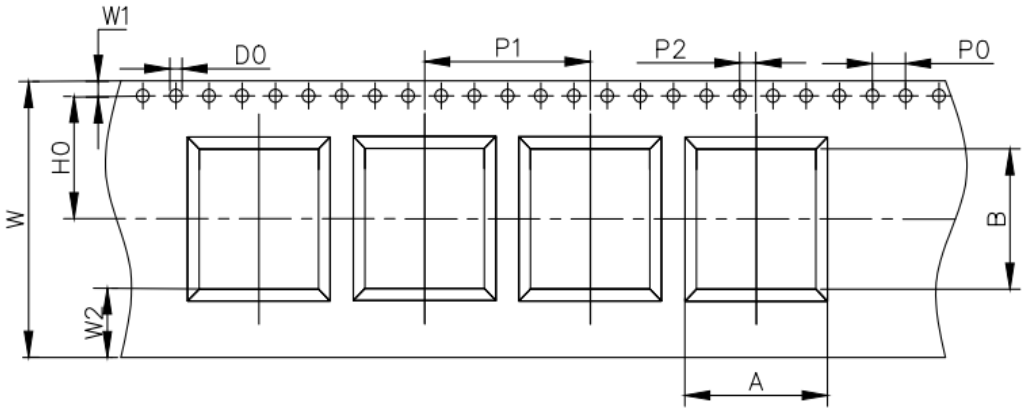
Item	Conditions
Temperature of Soldering Iron-tip	360℃ (max.)
Soldering Time	3 sec (max.)
Diameter of Soldering Iron-tip	Φ3 mm (max.)

■ Reliability

<table>
<tr><th>Item</th><th>Standard</th><th>Test conditions / Methods</th><th>Specifications</th></tr>
<tr><td>Vibration</td><td>IEC 60068-2-6</td><td>Frequency range: 10~55Hz
Amplitude: 0.75mm or 98m/s^2
Direction: 6hrs (3 x 2 hrs)</td><td>$\left|\triangle V_{1mA}/V_{1mA}\right| \leqq 5\%$
No visible damage</td></tr>
<tr><td>Solderability</td><td>IEC 60068-2-20</td><td>245±3℃, 3±0.3 sec.</td><td>At least 95% of terminal electrode is covered by new solder</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>IEC 60068-2-20</td><td>260±53℃, 10±1 sec.</td><td>$\left|\triangle V_{1mA}/V_{1mA}\right| \leqq 5\%$
No visible damage</td></tr>
<tr><td>High Temperature Storage</td><td>IEC 60068-2-2</td><td>125±5℃ x 1000 ±24 hrs</td><td>$\left|\triangle V_{1mA}/V_{1mA}\right| \leqq 5\%$
No visible damage</td></tr>
<tr><td>Damp Heat, Steady State</td><td>IEC 60068-2-78</td><td>a. 40±2℃, 90 ~ 95 % RH, 1344 hrs.
b. 40±2℃, 90 ~ 95 % RH, at 10%Vdc, 1344 hrs</td><td>$\left|\triangle V_{1mA}/V_{1mA}\right| \leqq 5\%$
No visible damage
Insulation Resistance≧100MΩ</td></tr>
<tr><td>Rapid Change of Temperature</td><td>IEC 60068-2-14</td><td>The conditions shown below shall be repeated 5 cycles
<table>
<tr><th>Step</th><th>Temperature (℃)</th><th>Period (minutes)</th></tr>
<tr><td>1</td><td>-40±3</td><td>30±3</td></tr>
<tr><td>2</td><td>Room temperature</td><td>5±3</td></tr>
<tr><td>3</td><td>105±2</td><td>30±3</td></tr>
<tr><td>4</td><td>Room temperature</td><td>5±3</td></tr>
</table></td><td>$\left|\triangle V_{1mA}/V_{1mA}\right| \leqq 5\%$
No visible damage</td></tr>
<tr><td>High Temp. Load</td><td>MIL-STD-202 Method 108</td><td>105℃,
1000±24hrs at V_{rms} (Max. Continuous Voltage)
$V_{AC(rms)}$ is applied to180-151
V_{DC} is applied to181-751</td><td>$\left|\triangle V_{1mA}/V_{1mA}\right| \leqq 10\%$
R≧1000MΩ
No visible damage</td></tr>
<tr><td>8/20μs Surge Life</td><td>IEC 61051-1</td><td>8/20μs waveform, 10 surge currents, unipolar, interval 30 sec, amplitude</td><td>$\left|\triangle V_{1mA}/V_{1mA}\right| \leqq 10\%$
No visible damage</td></tr>
<tr><td>10/1000μs Surge Life</td><td>IEC 61051-1</td><td>10/1000μs waveform, 10 surge currents, unipolar, interval 2 mins</td><td>$\left|\triangle V_{1mA}/V_{1mA}\right| \leqq 10\%$
No visible damage</td></tr>
<tr><td>Voltage Proof</td><td>IEC 61051-1</td><td>Metal balls method, 2500 V_{ac} 1 min</td><td>No visible damage</td></tr>
<tr><td>Varistor Voltage Temp. Coefficient</td><td>Specification Standard</td><td>Varistor voltage is measured at -40℃, +105℃, and +25℃</td><td>$-0.05 \leqq T_C \leqq 0.05$ (%/℃)</td></tr>
</table>

■ Packaging

● Taping Specification

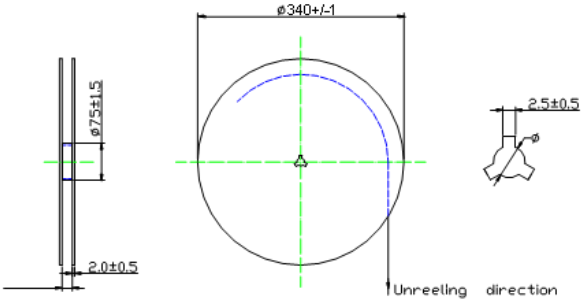


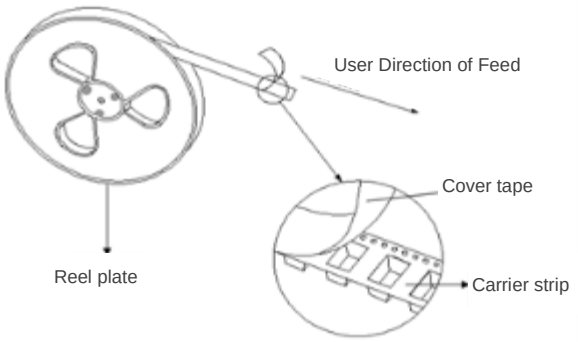
(Unit: mm)

Item		A*B	P0	P1	P2	H0	W	W1	W2	D0
Tolerance		±0.2	±0.1	±0.1	±0.05	±0.05	±0.3	±0.1	Min.	+0.1/0
Size	5548	12.5*14.3	4.0	20	2	11.5	24	1.75	3.6	1.5

● Quantity

Reel Packing





(Unit: mm)

Size	Quantity (pcs/reel)	W	Φd
5548	500	25±1	13.5+1/-0.5

■ Warehouse Storage Conditions of Products

- Storage Conditions:
  1. Storage Temperature: -10℃~+40℃
  2. Relative Humidity: ≦75%RH
  3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year