

# DATA SHEET

## METAL OXIDE VARISTORS POWER SUPPLY

25D series

RoHS compliant & Halogen free



Product specification— January 09, 2019 V.0



## Metal Oxide Varistor (MOV) Data Sheet

### Features

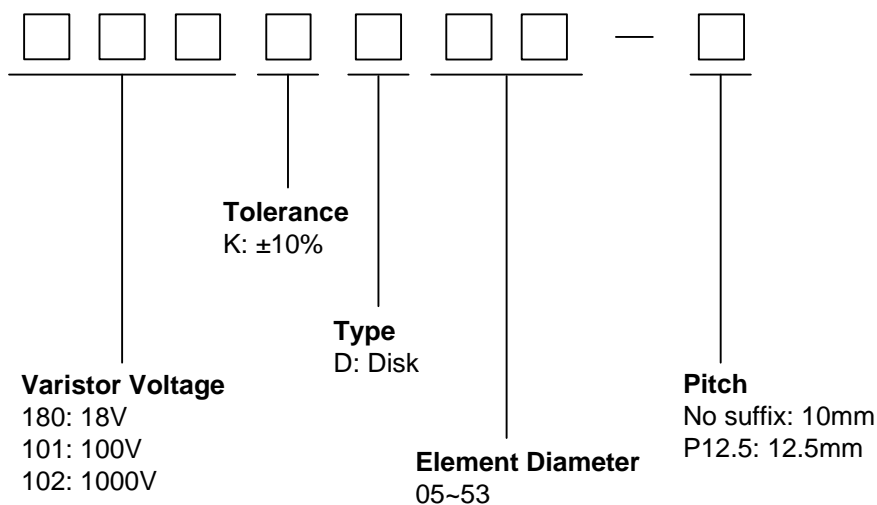
- Wide operating voltage ( $V_{1mA}$ ) range from 18V to 1800V
- Fast responding to transient over-voltage
- Large absorbing transient energy capability
- Low clamping ratio and no follow-on current
- Meets MSL level 1, per J-STD-020
- Operating Temperature:  $-40^{\circ}\text{C} \sim +105^{\circ}\text{C}$
- Storage Temperature:  $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
- Safety certification:   UL: E327997  
                                  CSA: 246579  
                                  VDE: 40027827



### Applications

- Transistor, diode, IC, thyristor or triac semiconductor protection
- Surge protection in consumer electronics
- Surge protection in industrial electronics
- Surge protection in electronic home appliances, gas and petroleum appliances
- Relay and electromagnetic valve surge absorption

### Part number code



Dimensions

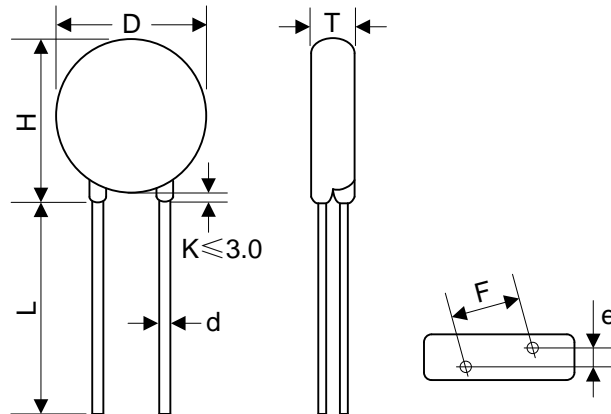
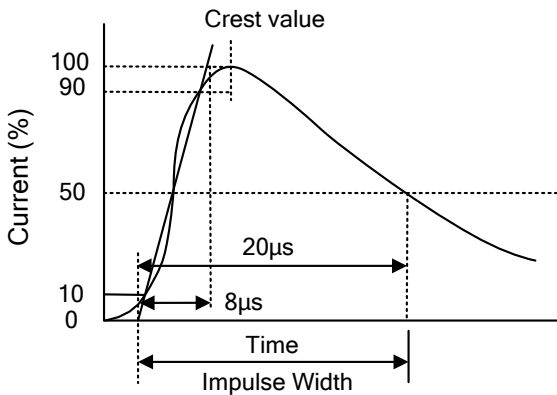


Table 1	
Unit: mm	
Symbol	Dimension
H	27.0~31.5
L(min.)	20.0
D	25.0~28.0
F( $\pm 1.0$ )	10.0/12.5
T	Table 2
e( $\pm 0.8$ )	Table 2
d( $\pm 0.1$ )	1.0

Table 2					
Unit: mm					
Model	T	e	Model	T	e
180K	2.5~4.8	1.7	361K	3.4~5.9	2.9
220K	2.6~4.9	1.8	391K	3.5~6.1	3.0
270K	2.6~5.0	2.0	431K	3.7~6.4	3.2
330K	2.7~5.2	1.9	471K	3.8~6.7	3.4
390K	2.6~5.5	2.0	511K	3.9~7.0	3.6
470K	2.7~5.1	2.1	561K	4.1~7.3	3.8
560K	2.8~5.4	2.3	621K	4.3~7.6	4.1
680K	2.9~5.7	2.6	681K	4.5~7.8	4.4
820K	2.6~4.5	2.0	751K	4.8~8.0	4.5
101K	2.9~4.6	2.2	781K	4.9~8.1	4.6
121K	2.9~4.8	2.4	821K	5.1~8.4	4.8
151K	2.7~4.9	2.0	911K	5.3~8.9	5.2
181K	2.8~5.2	2.1	102K	5.9~9.5	5.2
201K	2.9~5.2	2.2	112K	6.3~10.1	5.6
221K	3.0~5.3	2.3	122K	6.4~10.7	6.0
241K	3.1~5.8	2.4	142K	7.4~12.6	6.8
271K	3.1~5.3	2.6	162K	7.9~13.2	7.6
301K	3.2~5.5	2.7	182K	8.1~14.5	8.4
331K	3.2~5.7	2.7			

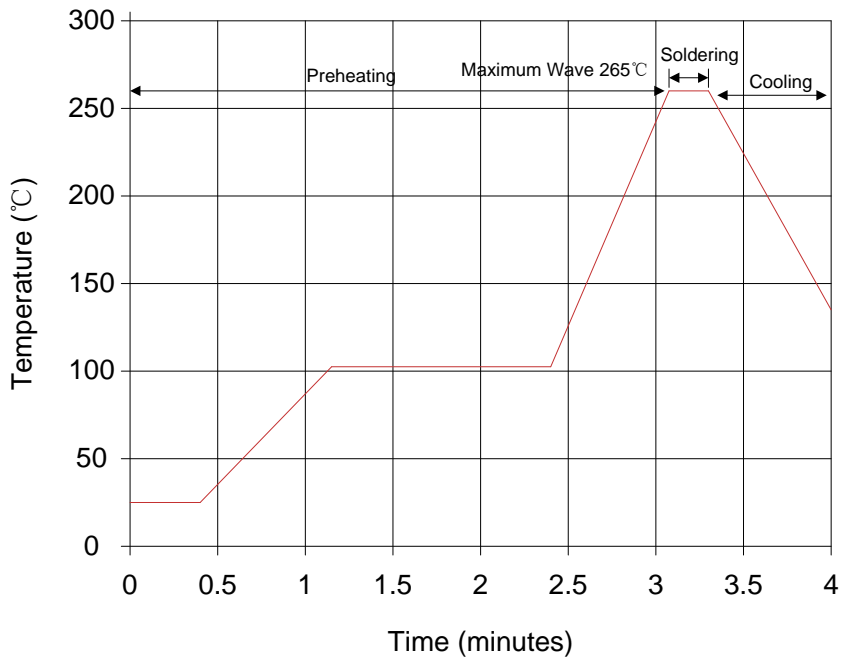


**Electrical Ratings**

Items	Test Condition/Description	Requirement					
Varistor Voltage	The voltage between two terminals with the specified measuring current 1mA.DC applied is called Vb.						
Maximum Allowable Voltage	The recommended maximum sine wave voltage (RMS) or the Maximum DC voltage can be applied continuously.						
Maximum Clamping Voltage	<p>The maximum voltage between two terminals with the specification standard impulse current. Applied waveform: 8/20µs</p> 	To meet the Specified value					
Rated Wattage	The maximum average power that can be applied within the specified ambient temperature.						
Energy	The maximum energy within the varistor voltage change of ±10% when one impulse of 10/1000µs or 2ms is applied.						
Withstanding Surge Current	The maximum current within the varistor voltage change of ±10% with the standard impulse current (8/20µs) applied one time.						
Varistor Voltage Temp. Coefficient	$\left  \frac{V_{1mA@85^{\circ}C} - V_{1mA@25^{\circ}C}}{V_{1mA@25^{\circ}C}} \times \frac{1}{60} \times 100\% (\%/^{\circ}C) \right $	≤0.05%/°C					
	$\left  \frac{V_{1mA@-40^{\circ}C} - V_{1mA@25^{\circ}C}}{V_{1mA@25^{\circ}C}} \times \frac{1}{65} \times 100\% (\%/^{\circ}C) \right $						
Surge Life	<p>The change of Vb shall be measured after the impulse listed below which is applied 10,000 times continuously with the interval of ten seconds at room temperature.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td rowspan="2" style="text-align: center;">25Φ series</td> <td style="text-align: center;">180K to 680K</td> <td style="text-align: center;">250A (8/20µs)</td> </tr> <tr> <td style="text-align: center;">820K to 182K</td> <td style="text-align: center;">450A (8/20µs)</td> </tr> </table>	25Φ series	180K to 680K	250A (8/20µs)	820K to 182K	450A (8/20µs)	$\frac{\Delta V_b}{V_b} \leq \pm 10\%$
25Φ series	180K to 680K		250A (8/20µs)				
	820K to 182K	450A (8/20µs)					

**Soldering Recommendation**

Wave Lead Free Soldering Recommendation



Item	Conditions
Peak Temperature	265°C
Dipping Time	10 seconds (max.)
Soldering	1 time

Recommendation Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 seconds (max.)
Distance from Varistor	2mm (min.)

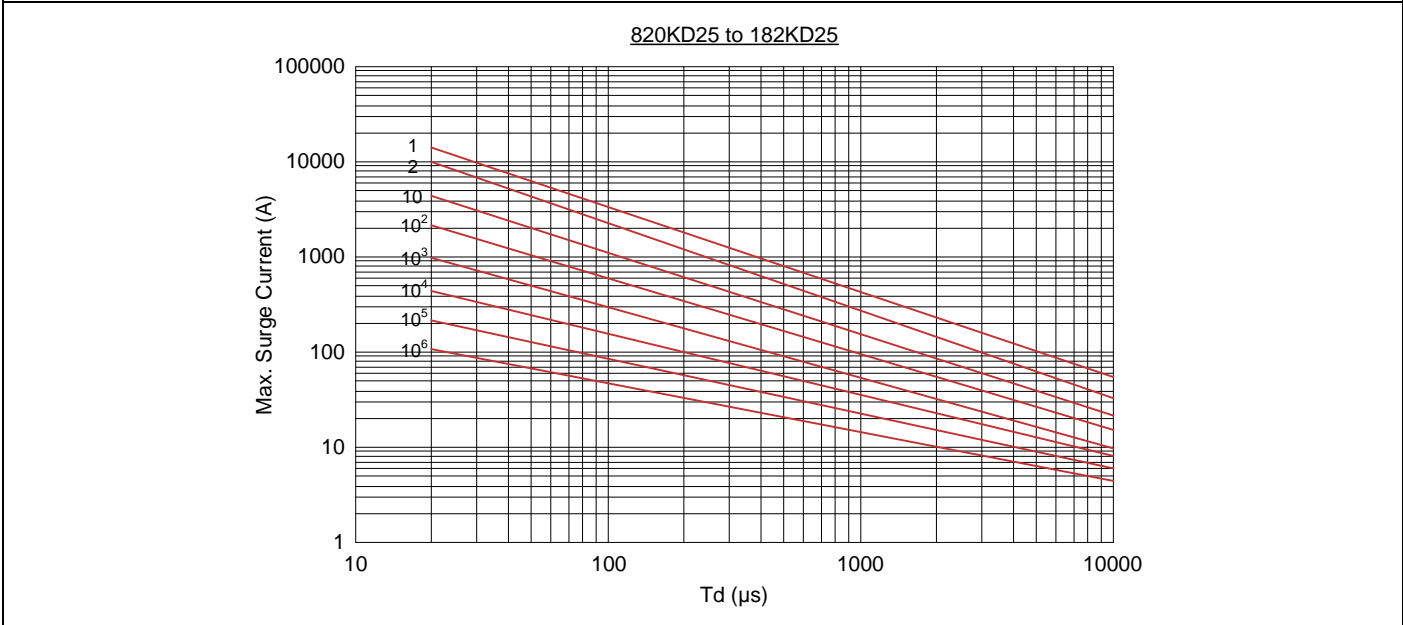
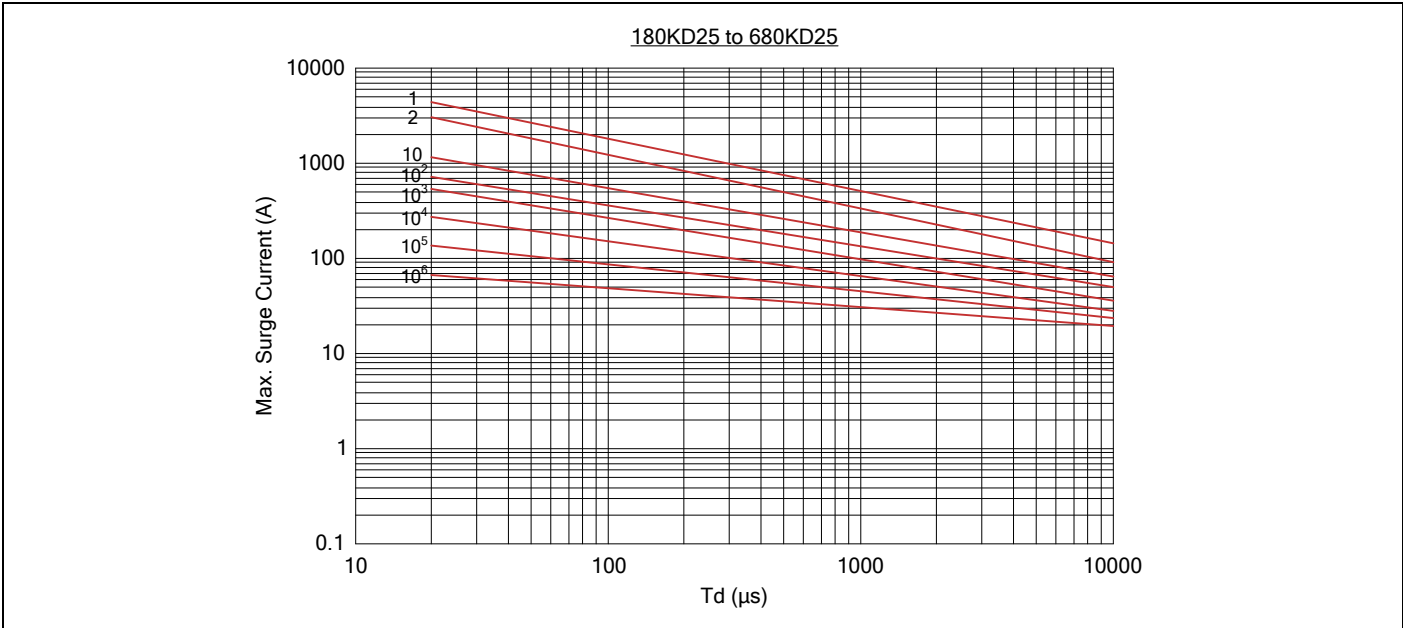
**Mechanical Characteristics**

Items	Test conditions / Methods	Specifications								
Tensile Strength of Terminals	Gradually applying the force specified and keeping the unit fixed for 10±1 sec.  <table border="1"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force (kg)</th> </tr> </thead> <tbody> <tr> <td>0.5&lt;d≤0.8</td> <td>1.0</td> </tr> <tr> <td>0.8&lt;d≤1.25</td> <td>2.0</td> </tr> <tr> <td>1.25&lt;d</td> <td>4.0</td> </tr> </tbody> </table>	Terminal diameter (mm)	Force (kg)	0.5<d≤0.8	1.0	0.8<d≤1.25	2.0	1.25<d	4.0	No visible damage  ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤5%
Terminal diameter (mm)	Force (kg)									
0.5<d≤0.8	1.0									
0.8<d≤1.25	2.0									
1.25<d	4.0									
Bending Strength of Terminals	Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, then return to the original position. Repeat the procedure in the opposite direction.  <table border="1"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force (kg)</th> </tr> </thead> <tbody> <tr> <td>0.5&lt;d≤0.8</td> <td>0.5</td> </tr> <tr> <td>0.8&lt;d≤1.25</td> <td>1.0</td> </tr> <tr> <td>1.25&lt;d</td> <td>2.0</td> </tr> </tbody> </table>	Terminal diameter (mm)	Force (kg)	0.5<d≤0.8	0.5	0.8<d≤1.25	1.0	1.25<d	2.0	No visible damage  ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤5%
Terminal diameter (mm)	Force (kg)									
0.5<d≤0.8	0.5									
0.8<d≤1.25	1.0									
1.25<d	2.0									
Vibration	Frequency range: 10~55 Hz Amplitude: 0.75mm or 98m/s <sup>2</sup> Direction: 3 mutually perpendicular directions, 2hrs each.	No visible damage  ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤5%								
Solder ability	Solder Temp: 245±5°C Dipping Time: 2±0.5 sec	At least 95% of terminal electrode is covered by new solder								
Resistance to Soldering Heat	Solder Temp: 260±5°C Dipping Time: 10±1 sec	No visible damage  ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤10%								

**Reliability**

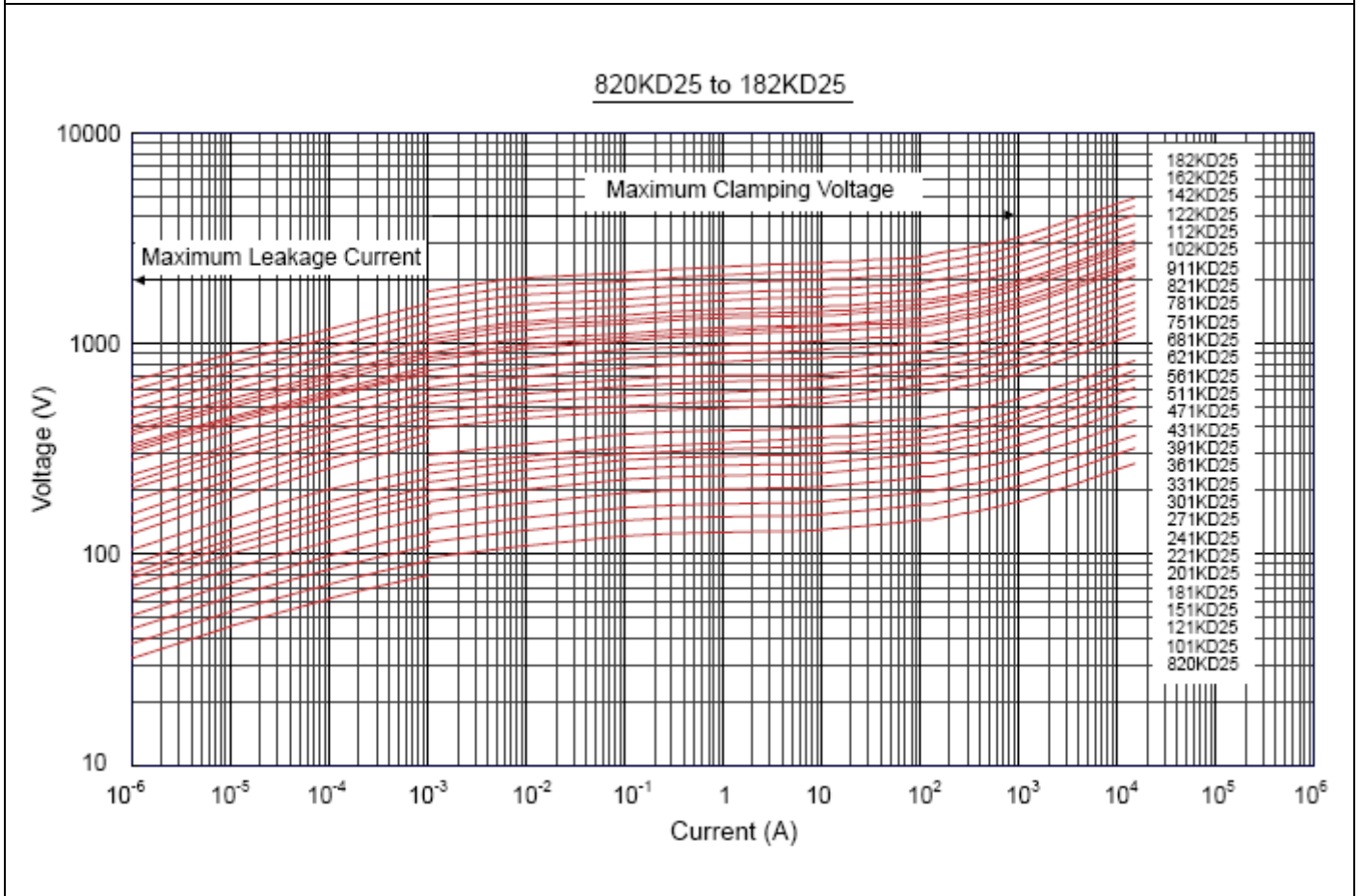
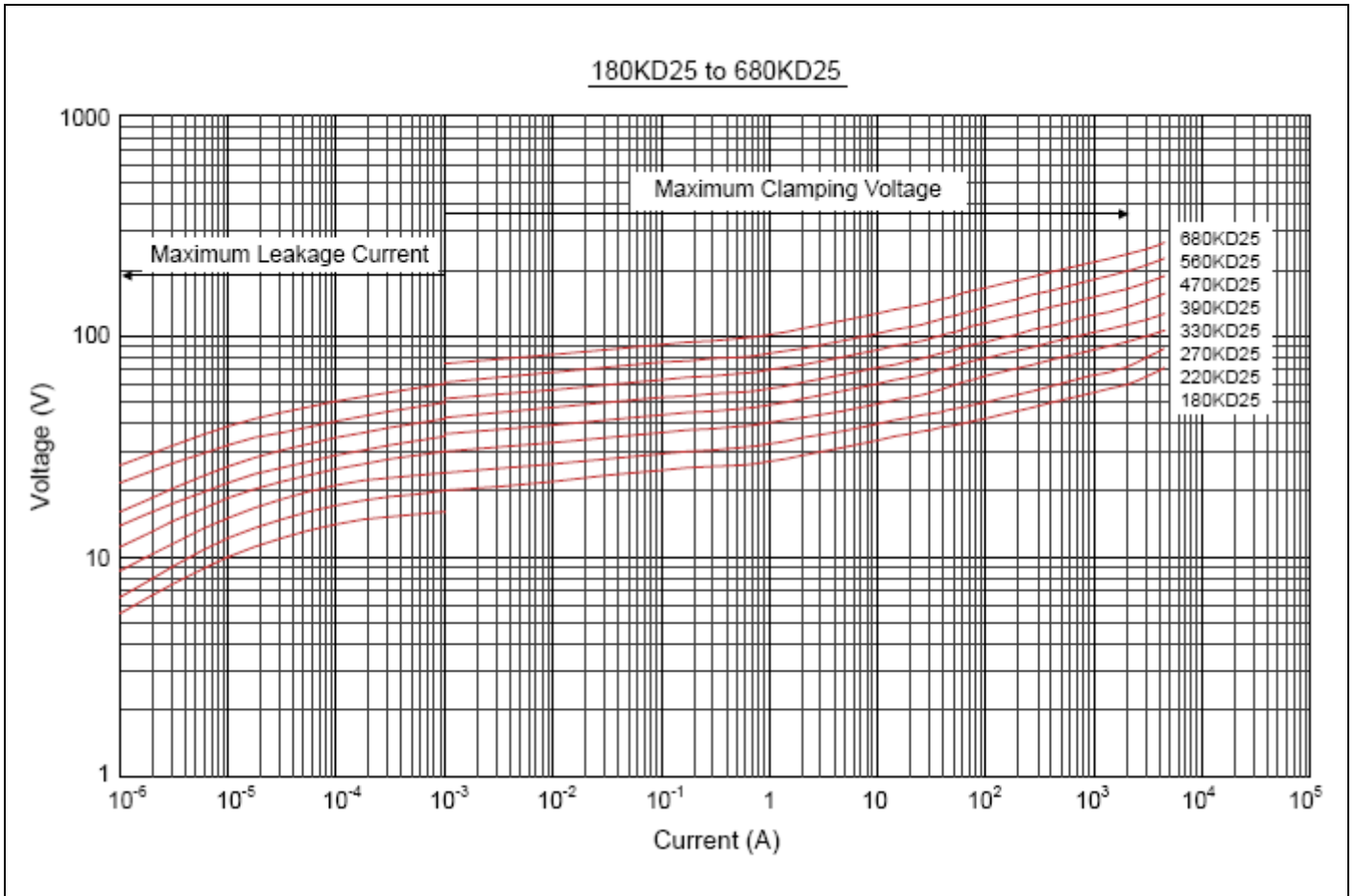
Items	Test conditions / Methods	Specifications															
High Temperature Storage	Ambient Temp: 125±2°C Duration: 1000hrs	ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤5%															
Low Temperature Storage	Ambient Temp: -40±2°C Duration: 1000hrs	ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤5%															
Humidity	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs	ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤5%															
Temperature Cycle	The conditions shown below shall be repeated 5 cycles <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>15±3</td> </tr> <tr> <td>3</td> <td>125±3</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>15±3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-40±3	30±3	2	Room temperature	15±3	3	125±3	30±3	4	Room temperature	15±3	No visible damage  ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤5%
Step	Temperature (°C)	Period (minutes)															
1	-40±3	30±3															
2	Room temperature	15±3															
3	125±3	30±3															
4	Room temperature	15±3															
High Temperature Load	Ambient Temp: 105±2°C      Duration: 1000hrs Load: Max. Allowable Voltage In AC eara.	ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤10%															
Damp Heat Load	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs      Load: Max. Allowable Voltage	No visible damage  ΔV <sub>1mA</sub> /V <sub>1mA</sub>   ≤10%															
Voltage Proof	Metal balls method, 2500Vac 1 min.	No visible damage															

### Maximum Surge Current Derating Curve





Maximum Leakage Current and Maximum Clamping Voltage Curve



**Marking code**

- ① Brightking Logo
- ② Varistor Voltage
- ③ UL Accreditation Logo
- ④ CSA Accreditation Logo
- ⑤ VDE Accreditation Logo
- ⑥ “J” is High Surge Code, no “J” is Standard Surge
- ⑦ Disk Size
- ⑧ Product Line Code (“Y” may be A(a) thru Z(z))
- ⑨ Date Code

**Quantity**

Packaging Dimensions (Unit: mm)	Quantity
<p>Exposure in bulk</p> <div style="text-align: center; margin-top: 20px;"> </div>	<p>100pcs/bag 4bags/box (180K~621K)</p>
<p>Cut the feet in bulk</p> <div style="text-align: center; margin-top: 20px;"> </div>	<p>50pcs/bag 4bags/box (681K~182K)</p>