

Metal Oxide Varistor (MOV) Data Sheet

Features

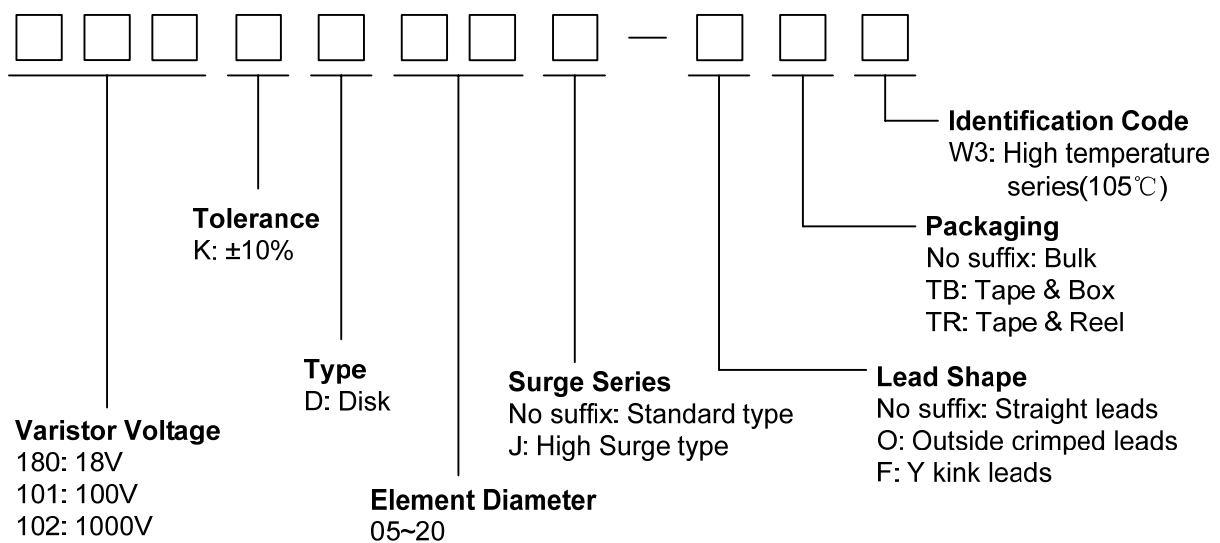
- Wide operating voltage (V_{1mA}) range from 18V to 1800V
- Fast responding to transient over-voltage
- Large absorbing transient energy capability
- Low clamping ratio and no follow-on current
- Meets MSL level 1, per J-STD-020
- Operating Temperature: $-40^{\circ}\text{C} \sim +105^{\circ}\text{C}$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



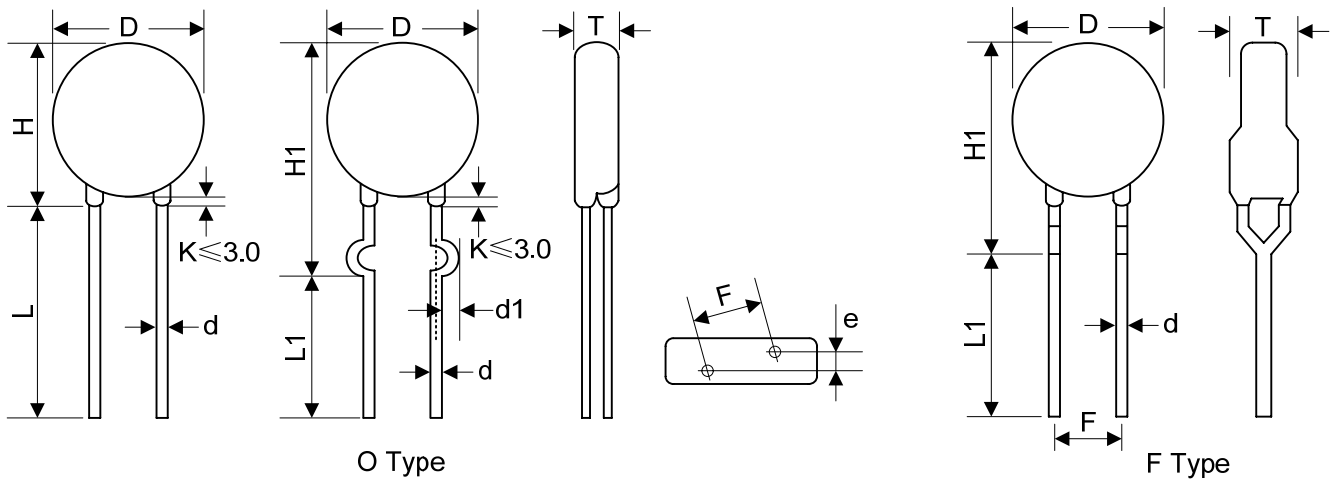
Applications

- 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



O Type

F Type

Table 1	
Unit: mm	
Symbol	Dimension
H	14.5~20.0
H1	17.0~21.0
L(min.)	20.0
L1(min.)	15.0
D	14.0~16.5
F(±0.8)	7.5
T	Table 2
e(±0.8)	Table 2
d(±0.05)	0.8
d1(±0.4)	1.4

Table 2					
Unit: mm					
Model	T	e	Model	T	e
180K	2.0~3.9	1.5	361K	2.9~5.2	2.7
220K	2.1~4.0	1.6	391K	3.0~5.4	2.8
270K	2.1~4.1	1.8	431K	3.2~5.6	3.0
330K	2.2~4.3	1.7	471K	3.3~5.8	3.2
390K	2.1~4.1	1.8	511K	3.4~6.1	3.4
470K	2.2~4.3	1.9	561K	3.6~6.4	3.6
560K	2.3~4.6	2.1	621K	3.8~6.8	3.9
680K	2.4~4.8	2.4	681K	4.0~7.1	4.2
820K	2.1~4.1	1.8	751K	4.3~7.2	4.3
101K	2.4~4.2	2.0	781K	4.4~7.3	4.4
121K	2.4~4.4	2.2	821K	4.6~7.5	4.6
151K	2.2~4.1	1.8	911K	4.8~7.5	5.0
181K	2.3~4.2	1.9	102K	5.4~8.0	5.0
201K	2.4~4.3	2.0	112K	5.8~8.5	5.4
221K	2.5~4.4	2.1	122K	5.9~9.0	5.8
241K	2.6~4.5	2.2	142K	6.9~10.5	6.6
271K	2.6~4.6	2.4	162K	7.4~11.0	7.4
301K	2.7~4.6	2.5	182K	7.6~12.0	8.2
331K	2.7~5.0	2.5			

Electrical Characteristics

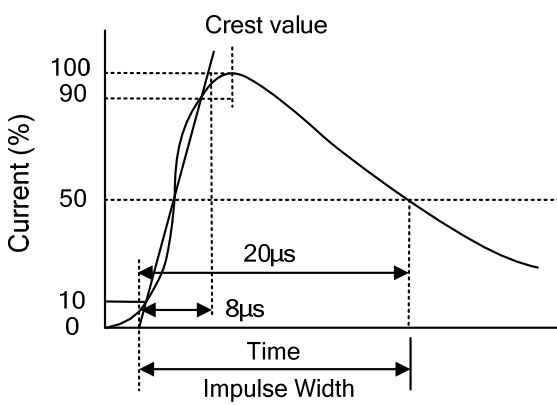
Part Number		Maximum Allowable Voltage		Varistor Voltage	Maximum Clamping Voltage		Withstanding Surge Current		Maximum Energy (10/1000μs)		Rated Power	Typical Capacitance (Reference)
Standard	High Surge	V _{AC} (V)	V _{DC} (V)	V _{1mA} (V)	I _P (A)	V _C (V)	I (A) Standard	I (A) High Surge	(J) Standard	(J) High Surge	(W)	@1KHz (pf)
180KD14-W3	180KD14J-W3	11	14	15~21.6	10	36	1000	2000	4.0	7.0	0.1	11100
220KD14-W3	220KD14J-W3	14	18	19.5~26	10	43	1000	2000	5.0	8.0	0.1	9100
270KD14-W3	270KD14J-W3	17	22	24~31	10	53	1000	2000	6.0	10.0	0.1	7400
330KD14-W3	330KD14J-W3	20	26	29.5~36.5	10	65	1000	2000	7.5	12.0	0.1	6100
390KD14-W3	390KD14J-W3	25	31	35~43	10	77	1000	2000	8.6	13.0	0.1	5100
470KD14-W3	470KD14J-W3	30	38	42~52	10	93	1000	2000	10.0	17.0	0.1	4300
560KD14-W3	560KD14J-W3	35	45	50~62	10	110	1000	2000	11.0	20.0	0.1	3600
680KD14-W3	680KD14J-W3	40	56	61~75	10	135	1000	2000	14.0	24.0	0.1	2900
820KD14-W3	820KD14J-W3	50	65	74~90	50	135	4500	6000	22.0	27.0	0.6	2400
101KD14-W3	101KD14J-W3	60	85	90~110	50	165	4500	6000	28.0	33.0	0.6	2000
121KD14-W3	121KD14J-W3	75	100	108~132	50	200	4500	6000	32.0	40.0	0.6	1700
151KD14-W3	151KD14J-W3	95	125	135~165	50	250	4500	6000	40.0	53.0	0.6	1300
181KD14-W3	181KD14J-W3	115	150	162~198	50	300	4500	6000	50.0	60.0	0.6	1100
201KD14-W3	201KD14J-W3	130	170	180~220	50	340	4500	6000	57.0	70.0	0.6	1000
221KD14-W3	221KD14J-W3	140	180	198~242	50	360	4500	6000	60.0	78.0	0.6	900
241KD14-W3	241KD14J-W3	150	200	216~264	50	395	4500	6000	63.0	84.0	0.6	830
271KD14-W3	271KD14J-W3	175	225	243~297	50	455	4500	6000	70.0	99.0	0.6	740
301KD14-W3	301KD14J-W3	190	250	270~330	50	500	4500	6000	77.0	108	0.6	670
331KD14-W3	331KD14J-W3	210	275	297~363	50	550	4500	6000	85.0	115	0.6	610
361KD14-W3	361KD14J-W3	230	300	324~396	50	595	4500	6000	93.0	130	0.6	560
391KD14-W3	391KD14J-W3	250	320	351~429	50	650	4500	6000	100	140	0.6	510
431KD14-W3	431KD14J-W3	275	350	387~473	50	710	4500	6000	115	155	0.6	460
471KD14-W3	471KD14J-W3	300	385	423~517	50	775	4500	6000	125	175	0.6	430
511KD14-W3	511KD14J-W3	320	415	459~561	50	845	4500	6000	125	180	0.6	390
561KD14-W3	561KD14J-W3	350	460	504~616	50	925	4500	6000	125	185	0.6	360
621KD14-W3	621KD14J-W3	385	505	558~682	50	1025	4500	6000	125	190	0.6	320
681KD14-W3	681KD14J-W3	420	560	612~748	50	1120	4500	6000	130	200	0.6	290
751KD14-W3	751KD14J-W3	460	615	675~825	50	1240	4500	6000	143	210	0.6	270
781KD14-W3	781KD14J-W3	485	640	702~858	50	1290	4500	6000	148	220	0.6	260
821KD14-W3	821KD14J-W3	510	670	738~902	50	1355	4500	6000	157	235	0.6	240
911KD14-W3	911KD14J-W3	550	745	819~1001	50	1500	4500	6000	175	255	0.6	220
102KD14-W3	102KD14J-W3	625	825	900~1100	50	1650	4500	6000	190	280	0.6	200
112KD14-W3	112KD14J-W3	680	895	990~1210	50	1815	4500	6000	213	310	0.6	180
122KD14-W3	122KD14J-W3	750	990	1080~1320	50	1980	4500	6000	232	324	0.6	160
142KD14-W3	142KD14J-W3	880	1140	1260~1540	50	2310	4500	6000	238	327	0.6	150
162KD14-W3	162KD14J-W3	1000	1280	1440~1760	50	2640	4500	6000	243	331	0.6	140
182KD14-W3	182KD14J-W3	1100	1465	1620~1980	50	2970	4500	5000	250	335	0.6	130

Notes: 1. The tolerance of varistor voltage between 18V and 27V is more than 10%.

2. Varistor voltage $\geq 1200V$, structure diagram is F type.

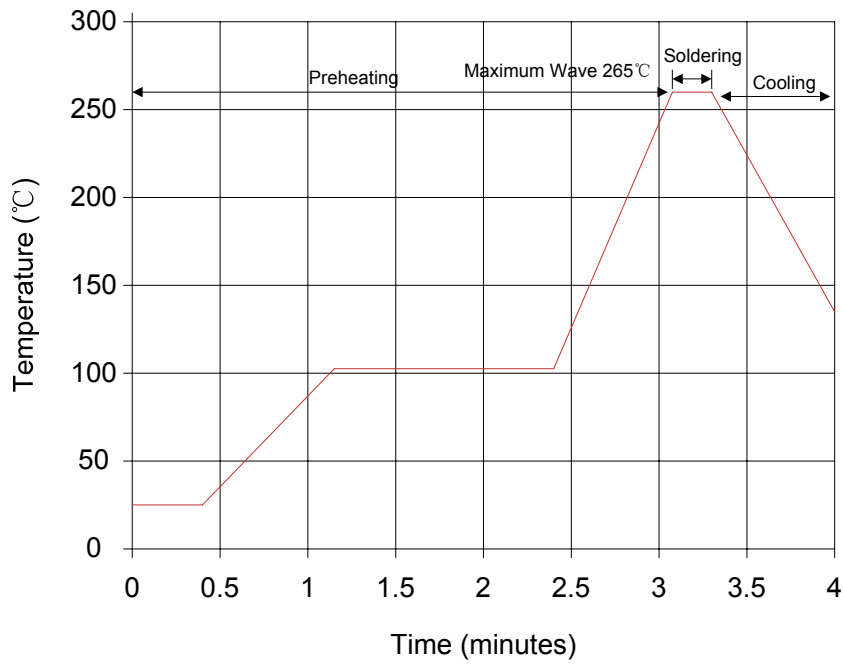
3. Leakage Current (@83% of V_{1mA}): IR $\leq 50\mu A$ (180K~680K) ; IR $\leq 25\mu A$ (820K~182K)

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@105^{\circ}C} - V_{1mA@25^{\circ}C}}{V_{1mA@25^{\circ}C}} \times \frac{1}{80} \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" data-bbox="438 1848 1204 1982"> <tr> <td rowspan="2">14Φ series</td> <td>180K to 680K</td> <td>75A (8/20μs)</td> </tr> <tr> <td>820K to 182K</td> <td>150A (8/20μs)</td> </tr> </table>	14Φ series	180K to 680K	75A (8/20μs)	820K to 182K	150A (8/20μs)	$\frac{\Delta V_b}{V_b} \leq \pm 10\%$
14Φ series	180K to 680K		75A (8/20μs)				
	820K to 182K	150A (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.)

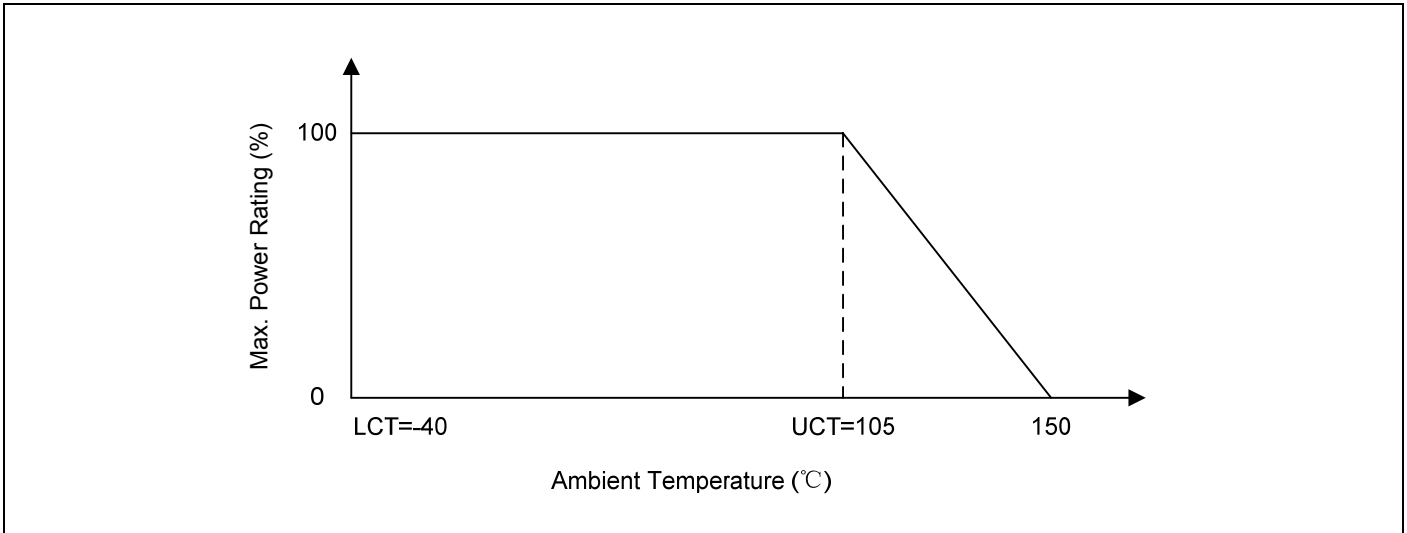
Mechanical Characteristics

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" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force (kg)</th> </tr> </thead> <tbody> <tr> <td>0.5<d≤0.8</td> <td>1.0</td> </tr> <tr> <td>0.8<d≤1.25</td> <td>2.0</td> </tr> <tr> <td>1.25<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 _{1mA} /V _{1mA} ≤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" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force (kg)</th> </tr> </thead> <tbody> <tr> <td>0.5<d≤0.8</td> <td>0.5</td> </tr> <tr> <td>0.8<d≤1.25</td> <td>1.0</td> </tr> <tr> <td>1.25<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 _{1mA} /V _{1mA} ≤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 ² Direction: 3 mutually perpendicular directions, 2hrs each.	No visible damage ΔV _{1mA} /V _{1mA} ≤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 _{1mA} /V _{1mA} ≤10%								

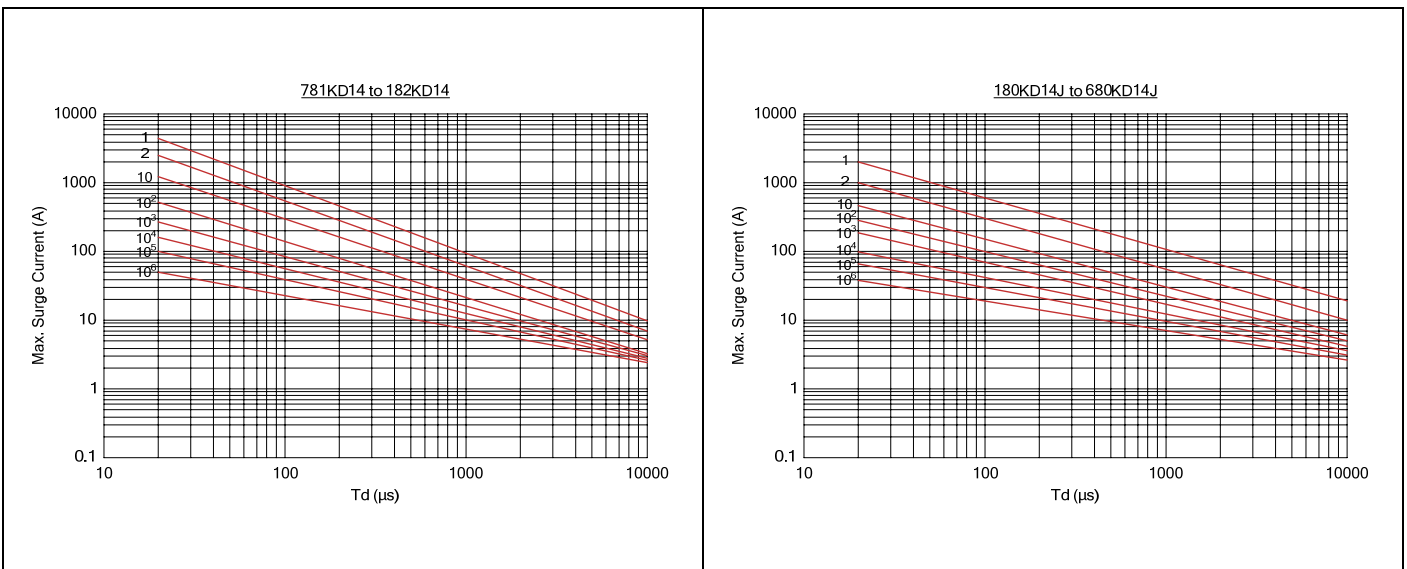
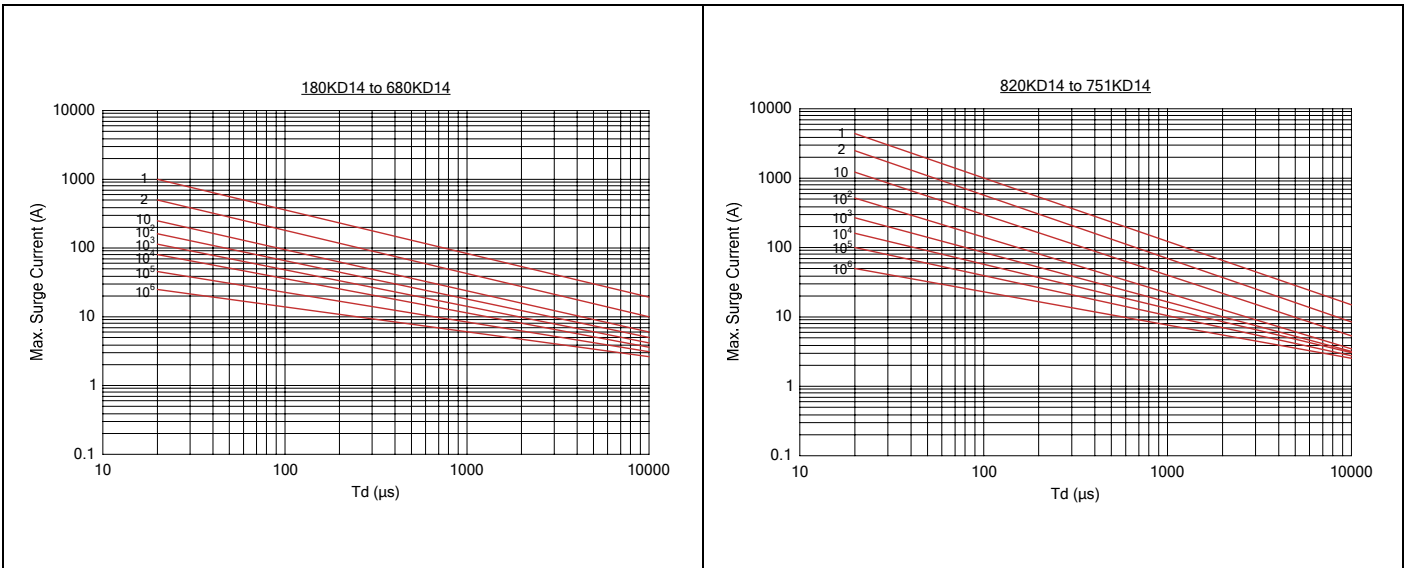
Reliability

Items	Test conditions / Methods	Specifications															
High Temperature Storage	Ambient Temp: 125±2°C Duration: 1000hrs	ΔV _{1mA} /V _{1mA} ≤5%															
Low Temperature Storage	Ambient Temp: -40±2°C Duration: 1000hrs	ΔV _{1mA} /V _{1mA} ≤5%															
Humidity	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs	ΔV _{1mA} /V _{1mA} ≤5%															
Temperature Cycle	The conditions shown below shall be repeated 5 cycles <table border="1" style="margin-left: auto; margin-right: auto;"> <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 _{1mA} /V _{1mA} ≤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 _{1mA} /V _{1mA} ≤10%															
Damp Heat Load	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs Load: Max. Allowable Voltage	No visible damage ΔV _{1mA} /V _{1mA} ≤10%															
Voltage Proof	Metal balls method, 2500Vac 1 min.	No visible damage															

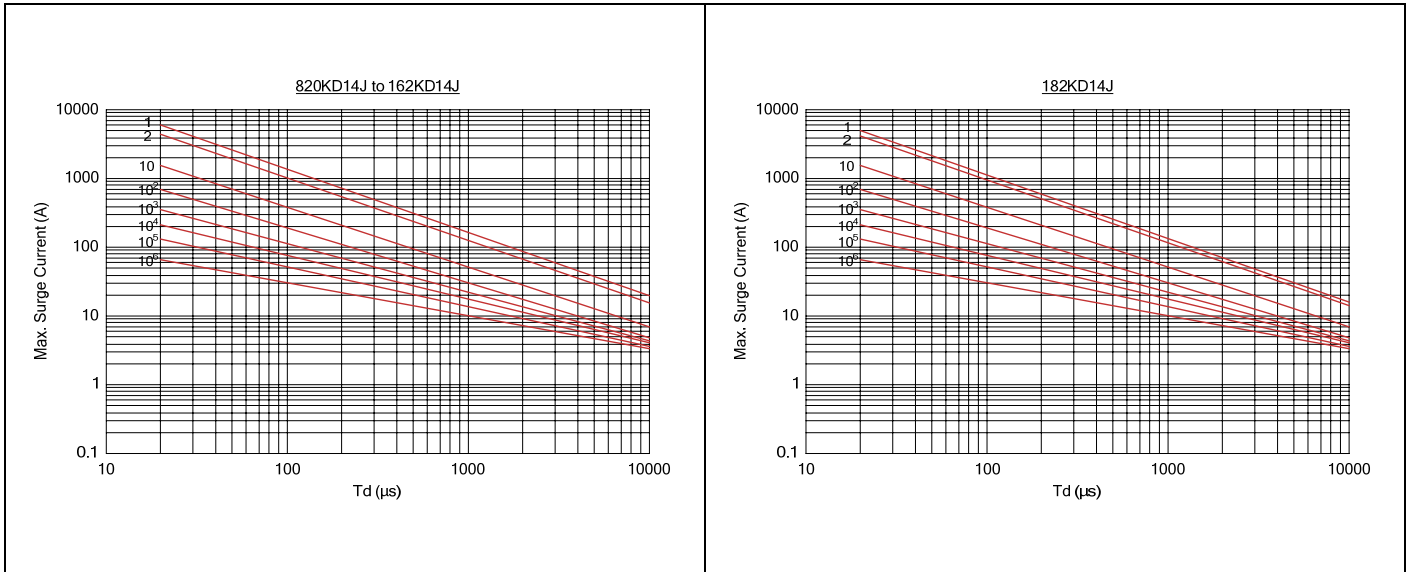
Power Derating Curve



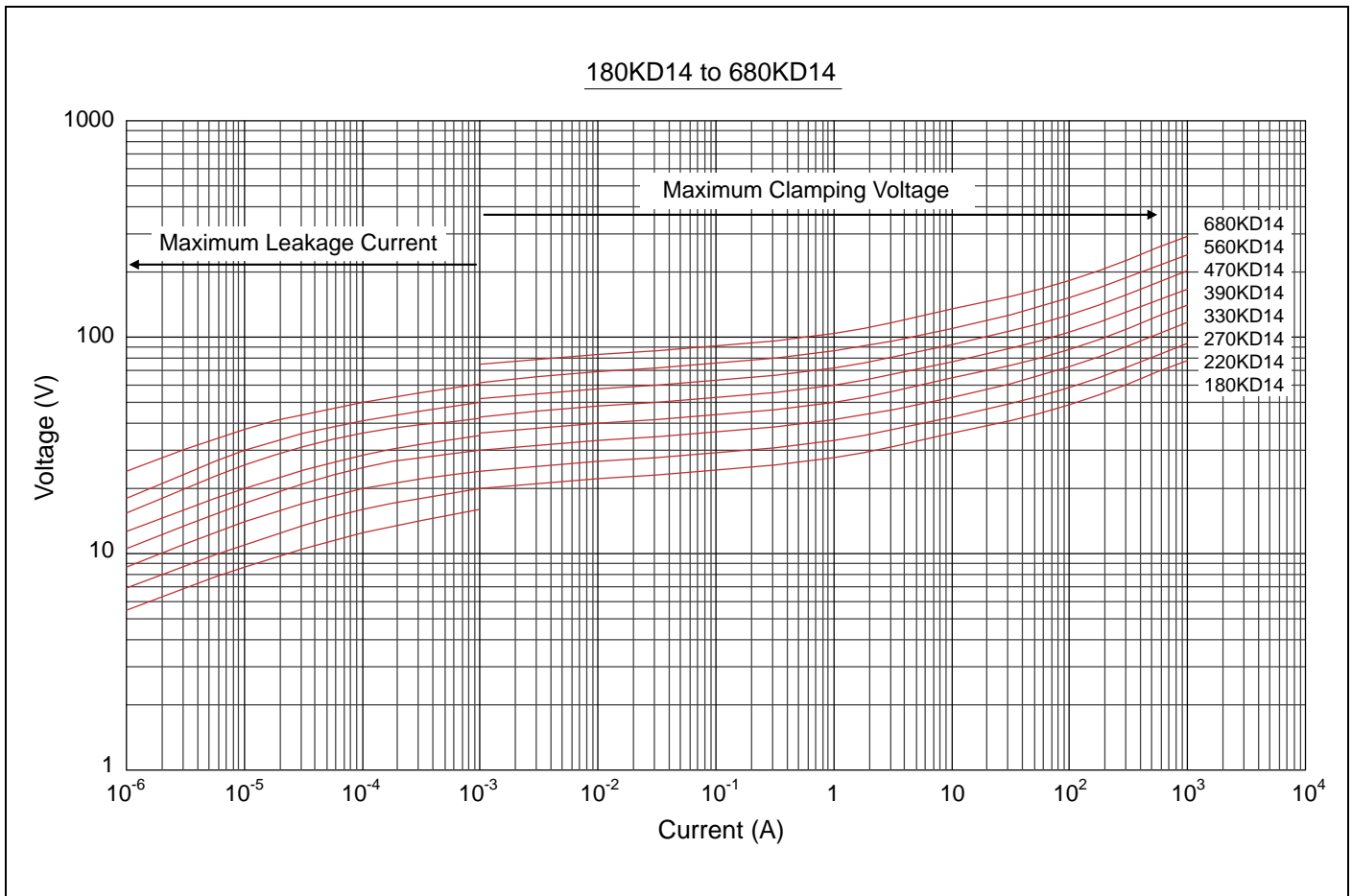
Maximum Surge Current Derating Curve



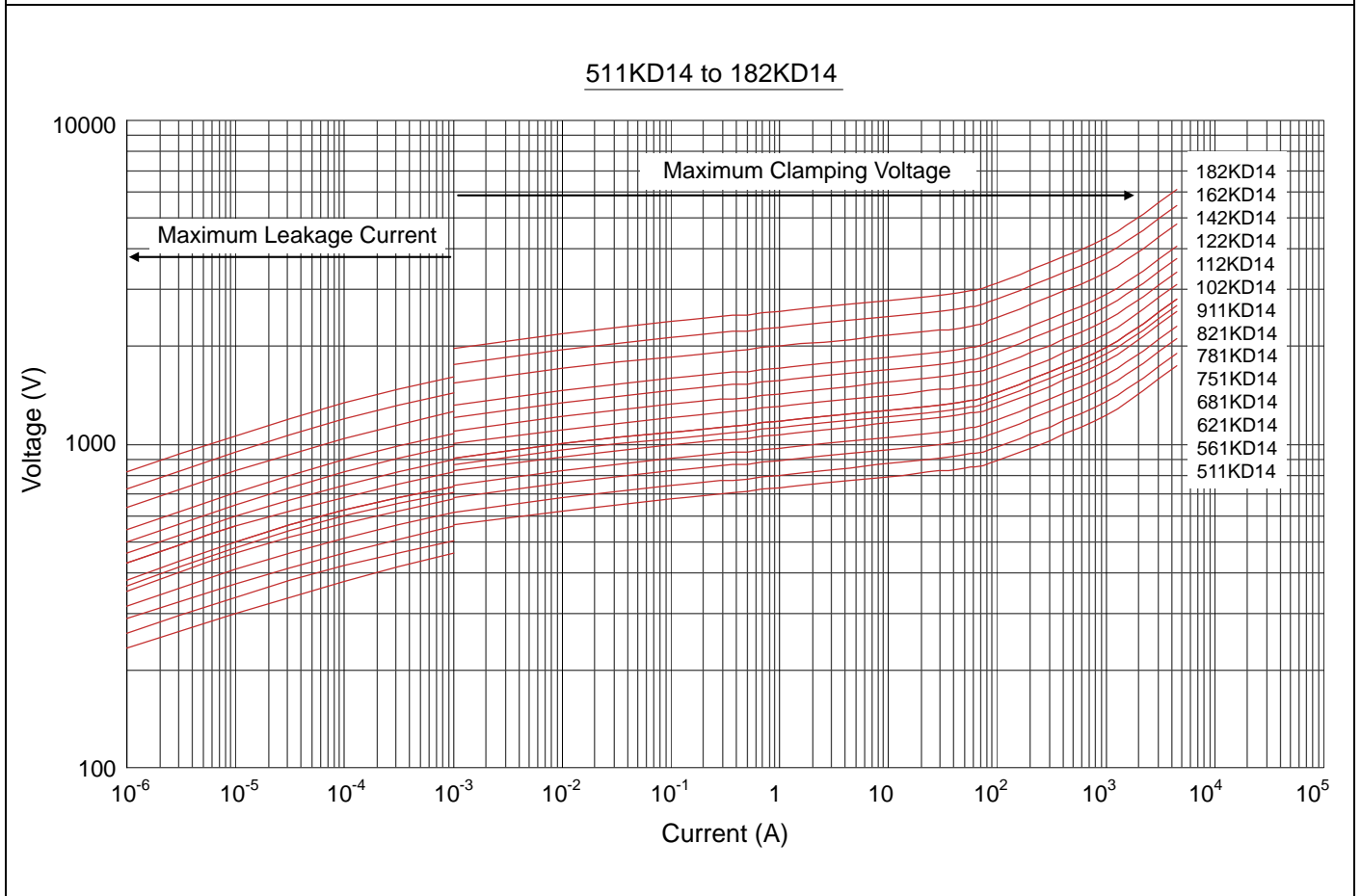
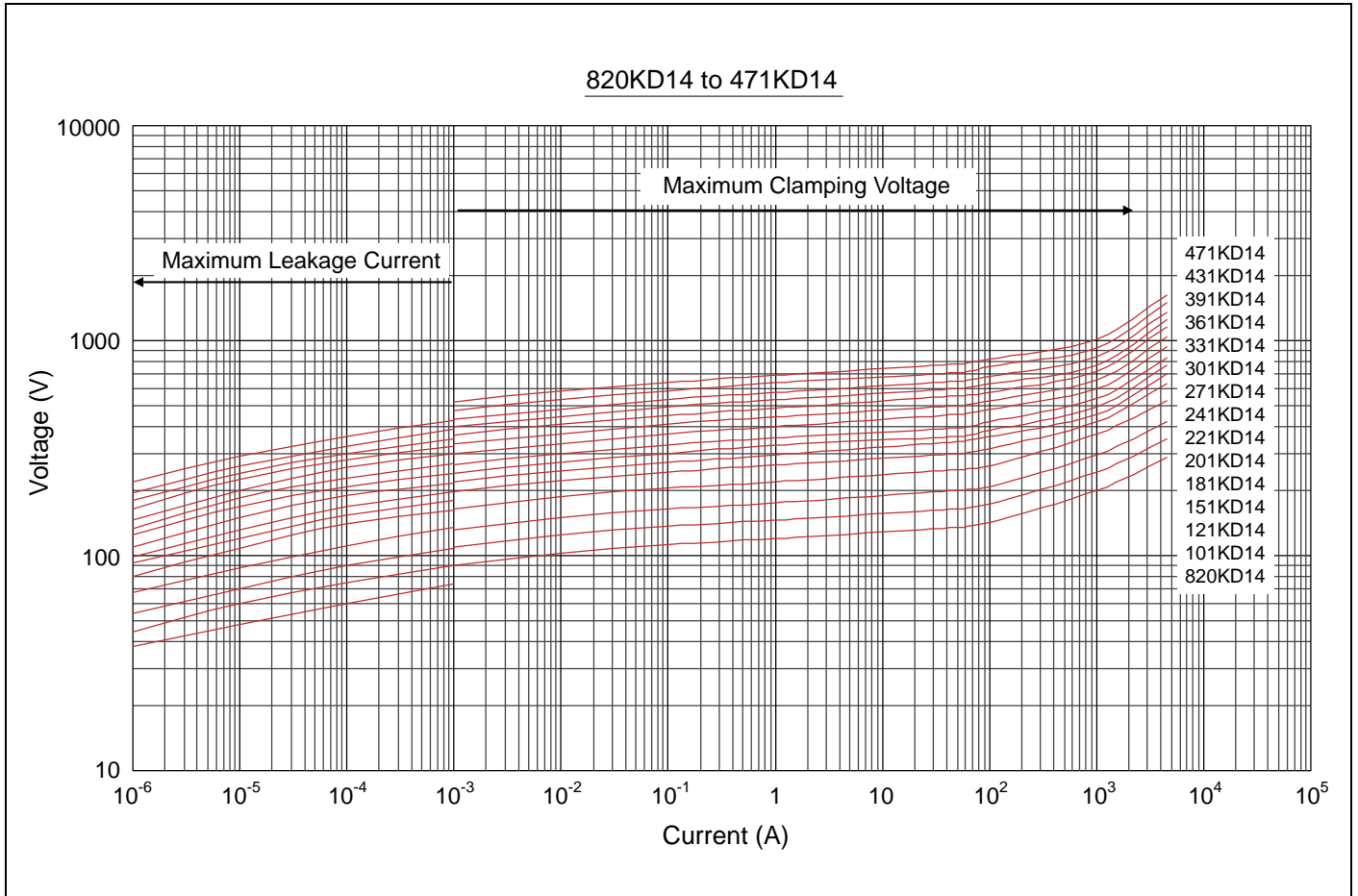
Maximum Surge Current Derating Curve



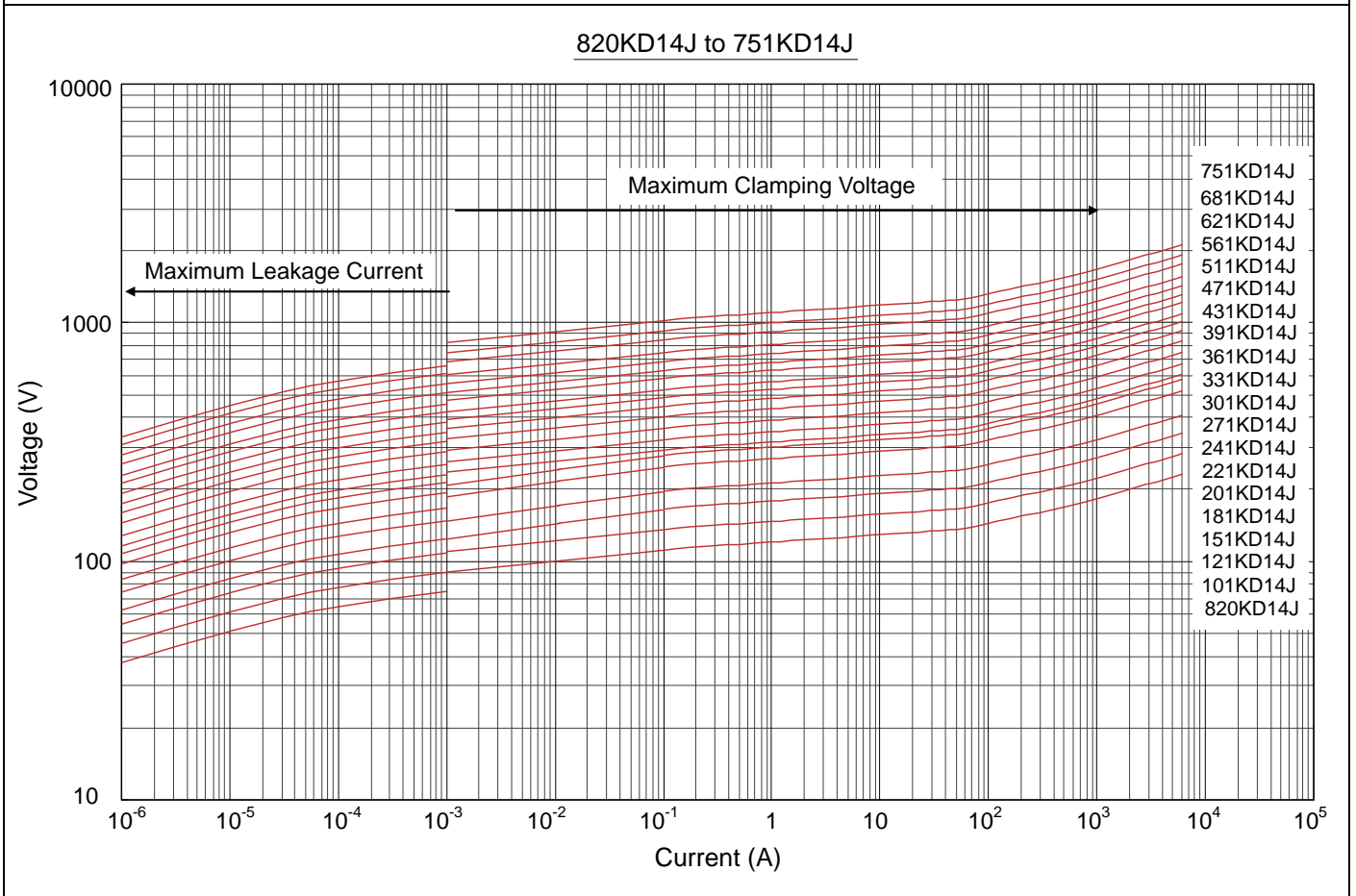
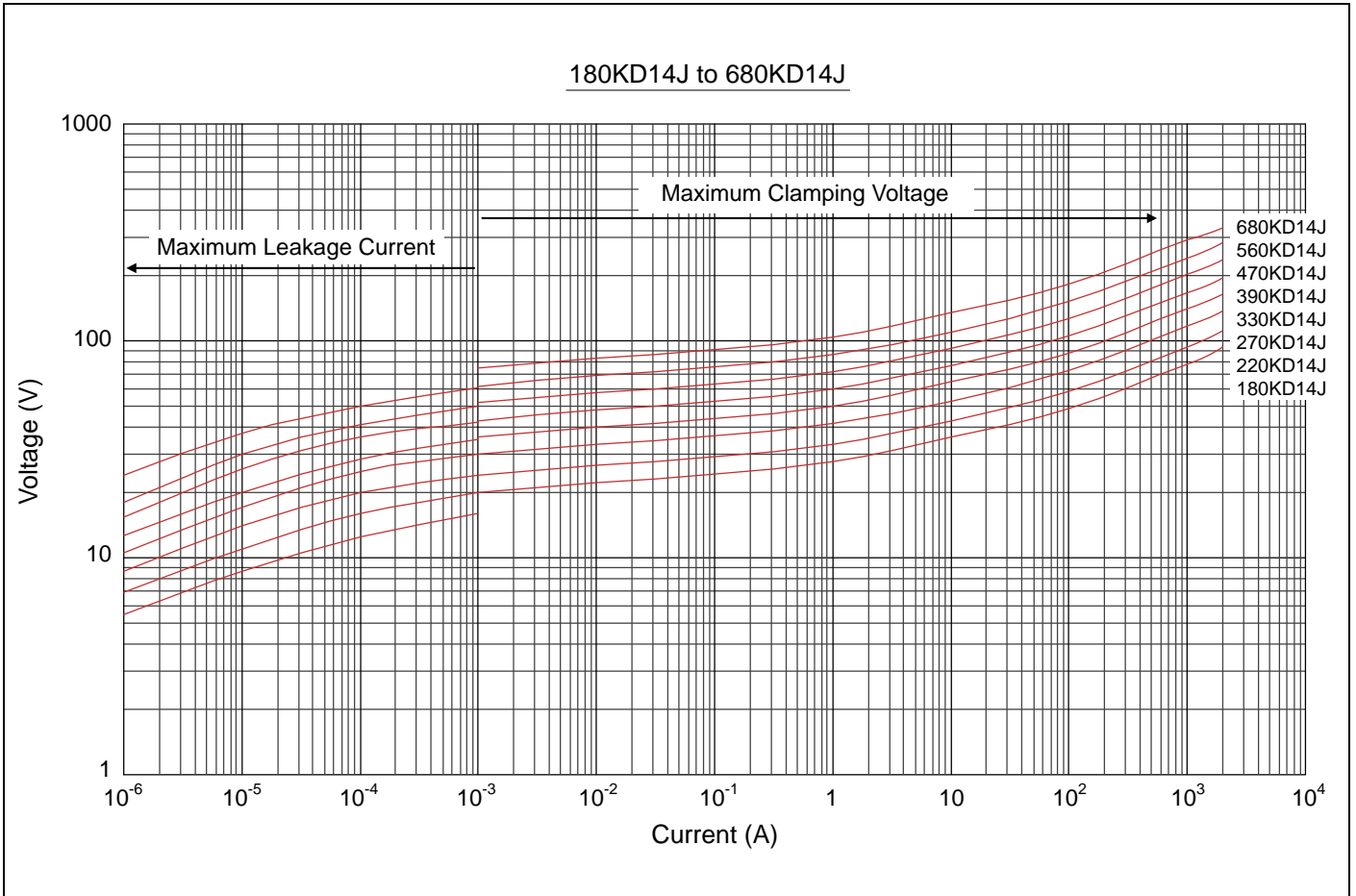
Maximum Leakage Current and Maximum Clamping Voltage Curve



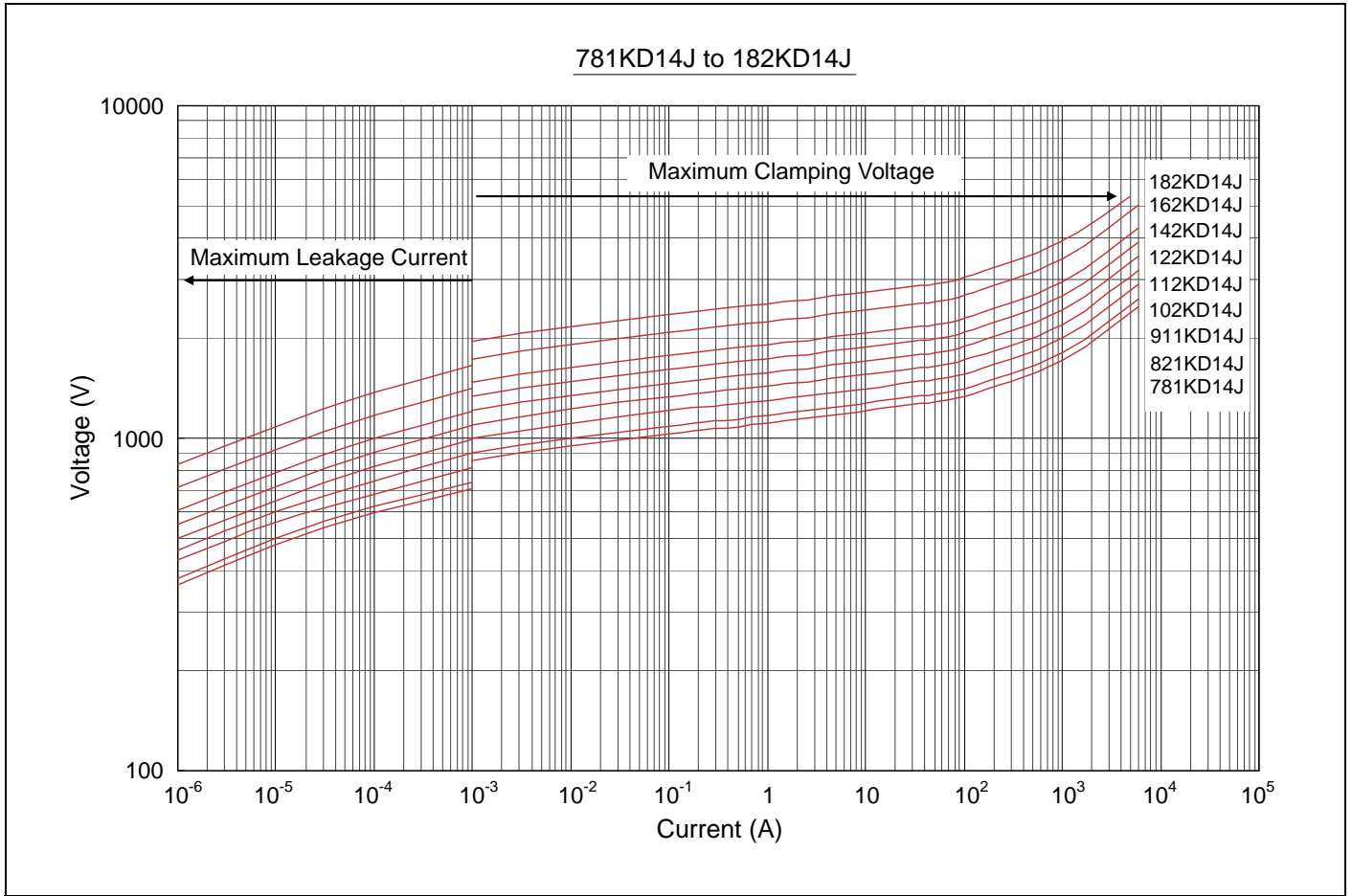
Maximum Leakage Current and Maximum Clamping Voltage Curve



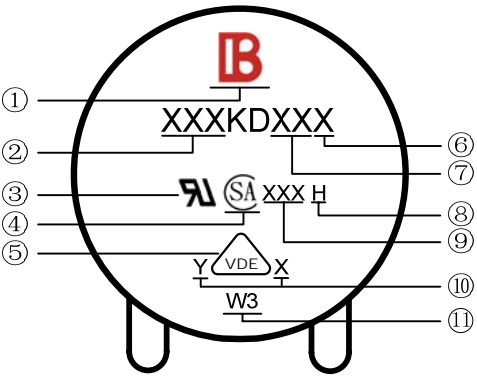
Maximum Leakage Current and Maximum Clamping Voltage Curve



Maximum Leakage Current and Maximum Clamping Voltage Curve

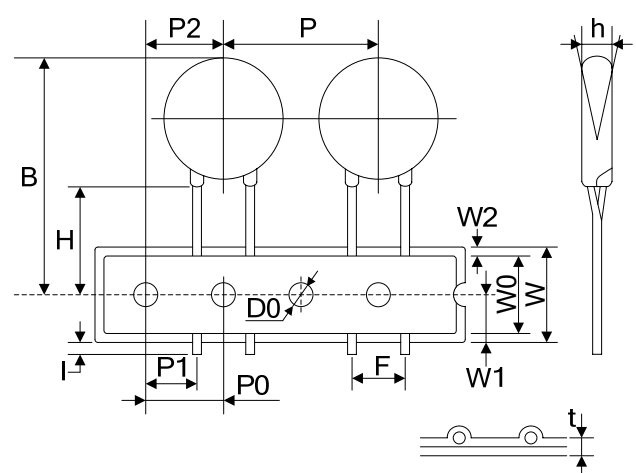


Marking Code




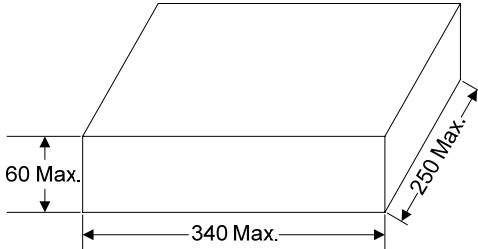
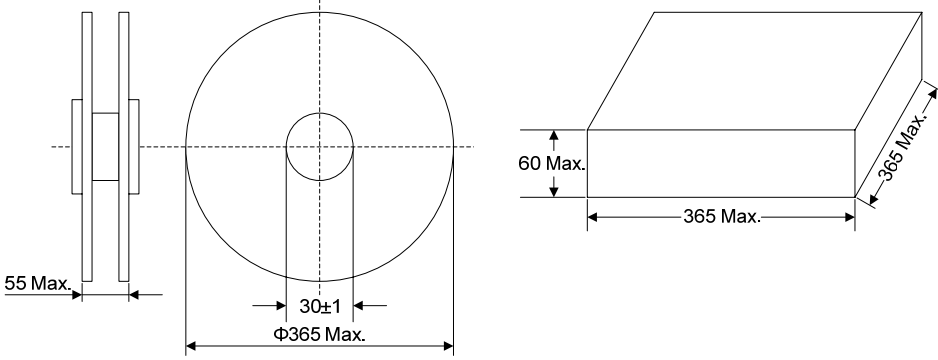
① Brightking Logo
 ② Varistor Voltage
 ③ UL Accreditation Logo
 ④ CSA Accreditation Logo
 ⑤ VDE Accreditation Logo
 ⑥ “J” is High Surge Code, no “J” is Standard Surge
 ⑦ Disk Size
 ⑧ “H” is Halogen Free Code, no “H” is Halogen
 ⑨ Date Code
 ⑩ Product Line Code (“Y” may be A thru Z or blank)
 ⑪ High Temperature Code (105°C)

Taping Dimensions



Symbol	Dimensions (mm)
P	25.4±1.0
P0	12.7±1.0
P1	8.95±0.7
P2	12.7±1.3
F	7.5±0.8
h	0±4
W	18.0±1.0
W0	12.0±1.0
W1	9.0±0.5
W2	3.0max
H	20.0±2.0
I	1.0max
D0	4.0±0.2
t	0.6±0.3
B	40max

Quantity

Packaging Dimensions (Unit: mm)	Quantity
<p>Bulk</p> 	<p>400pcs/bag 2bags/box (180K~331K)</p> <p>300pcs/bag 2bags/box (361K~621K)</p> <p>250pcs/bag 2bags/box (681K~112K)</p> <p>150pcs/bag 2bags/box (122K~182K)</p>
<p>Tape & Box</p> 	<p>750pcs/box (180K~331K)</p> <p>500pcs/box (361K~621K)</p> <p>400pcs/box (681K~751K)</p>
<p>Tape & Reel</p> 	<p>1000pcs/reel (180K~331K)</p> <p>750pcs/reel (361K~621K)</p> <p>500pcs/reel (681K~751K)</p>