

Metal Oxide Varistors (MOV) Data Sheet

Features

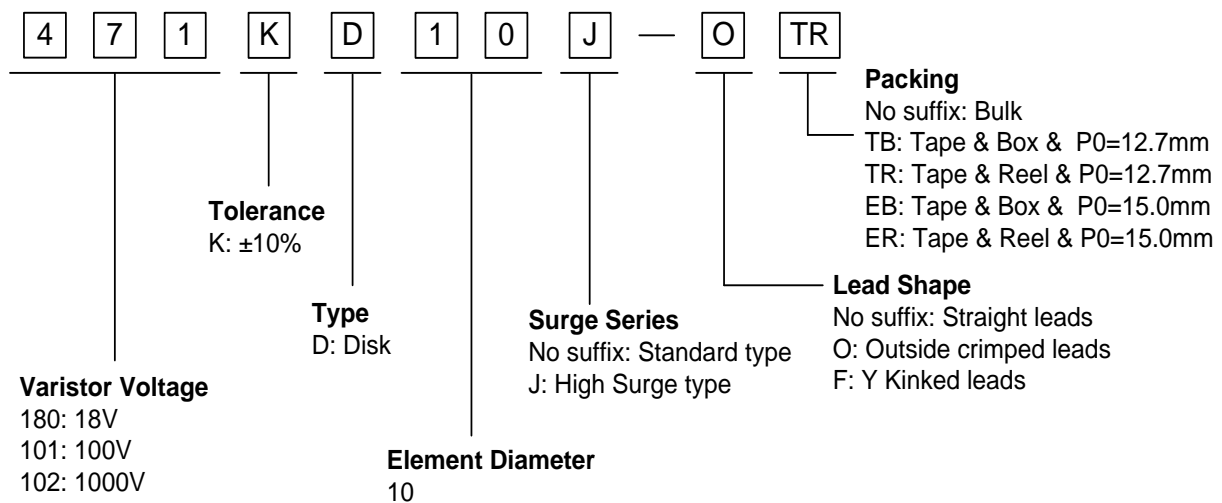
- Wide operating voltage (V_{1mA}) range from 18V to 1100V
- Fast responding to transient over-voltage
- Large absorbing transient energy capability
- Low clamping ratio and no follow-on current
- Meets MSL level 1, per J-STD-020
- Operating Temperature : $-40^{\circ}\text{C} \sim +105^{\circ}\text{C}$
- Storage Temperature : $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
- Safety certification : UL 、 CSA 、 VDE



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

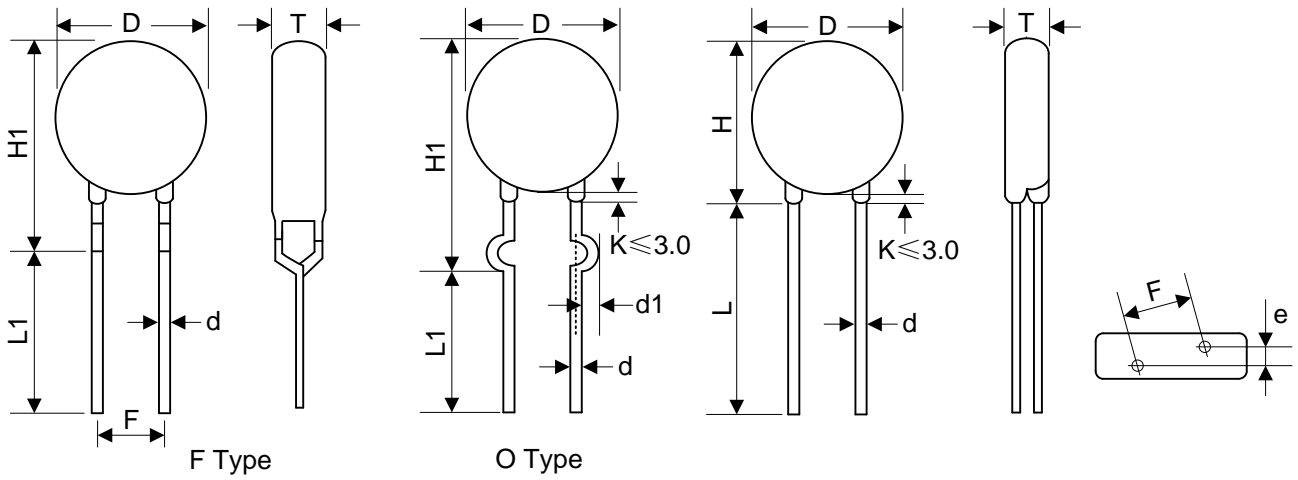


Table 1	
Unit: mm	
Symbol	Dimension
H	10.5~16.0
H1	13.0~17.5
L(min.)	20.0
L1(min.)	15.0
D	10.0~12.5
F(±0.8)	7.5
T	Table 2
e(±0.8)	Table 2
d(±0.05)	0.8
d1(±0.4)	1.4

Table 2					
Unit: mm					
Model	T	e	Model	T	e
180K	2.0~4.6	1.5	301K	2.7~5.5	2.5
220K	2.1~4.7	1.6	331K	2.7~5.8	2.5
270K	2.1~4.8	1.8	361K	2.9~6.0	2.7
330K	2.2~5.0	1.7	391K	3.0~6.2	2.8
390K	2.1~5.3	1.8	431K	3.2~6.5	3.0
470K	2.2~5.4	1.9	471K	3.3~6.7	3.2
560K	2.3~5.5	2.1	511K	3.4~6.8	3.4
680K	2.4~5.6	2.4	561K	3.6~7.0	3.6
820K	2.1~4.7	1.8	621K	3.8~7.3	3.9
101K	2.4~4.9	2.0	681K	4.0~7.6	4.2
121K	2.4~5.1	2.2	751K	4.3~8.0	4.3
151K	2.2~5.4	1.8	781K	4.4~8.1	4.4
181K	2.3~4.8	1.9	821K	4.6~8.3	4.6
201K	2.4~5.0	2.0	911K	4.8~8.8	5.0
221K	2.5~5.1	2.1	102K	5.4~9.3	5.0
241K	2.6~5.2	2.2	112K	5.8~9.9	5.4
271K	2.6~5.4	2.4			

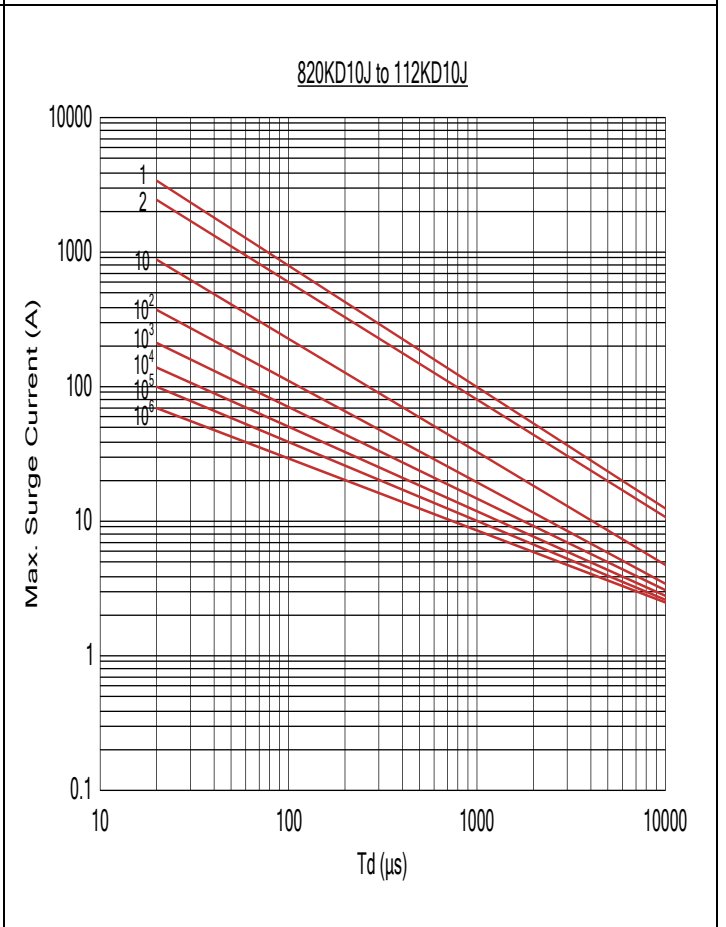
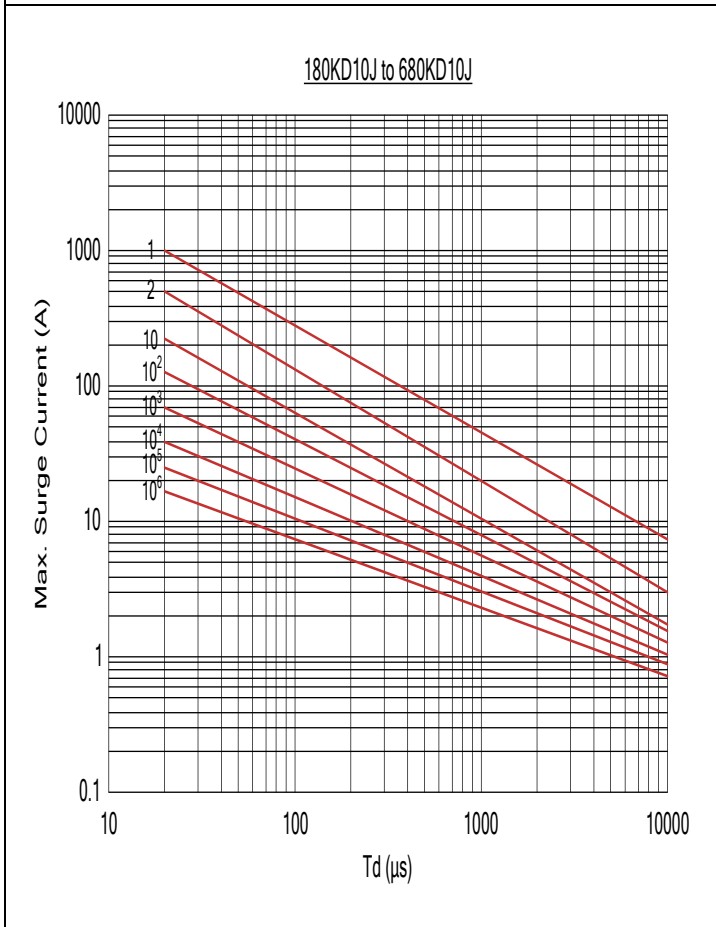
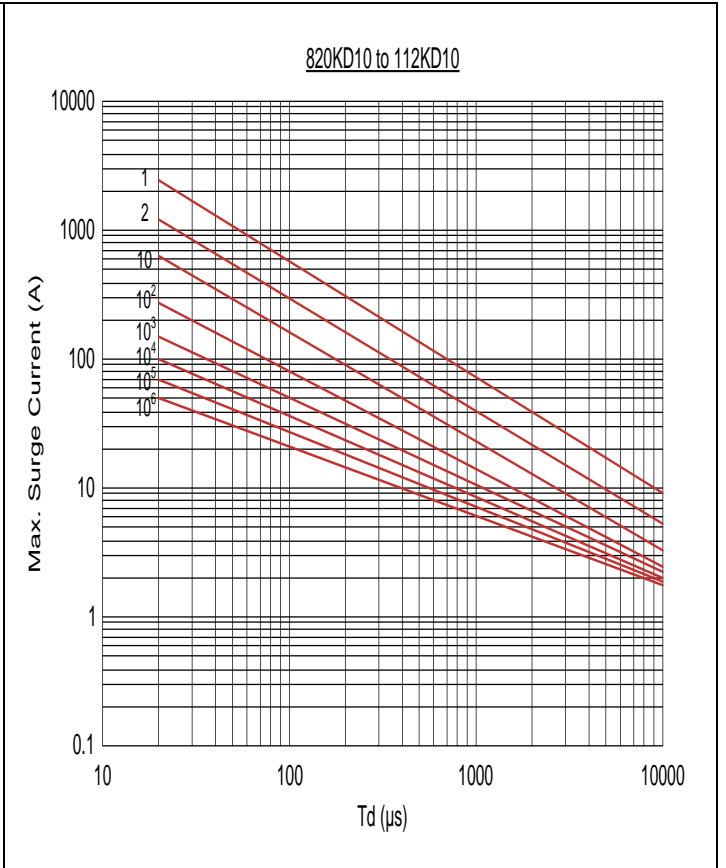
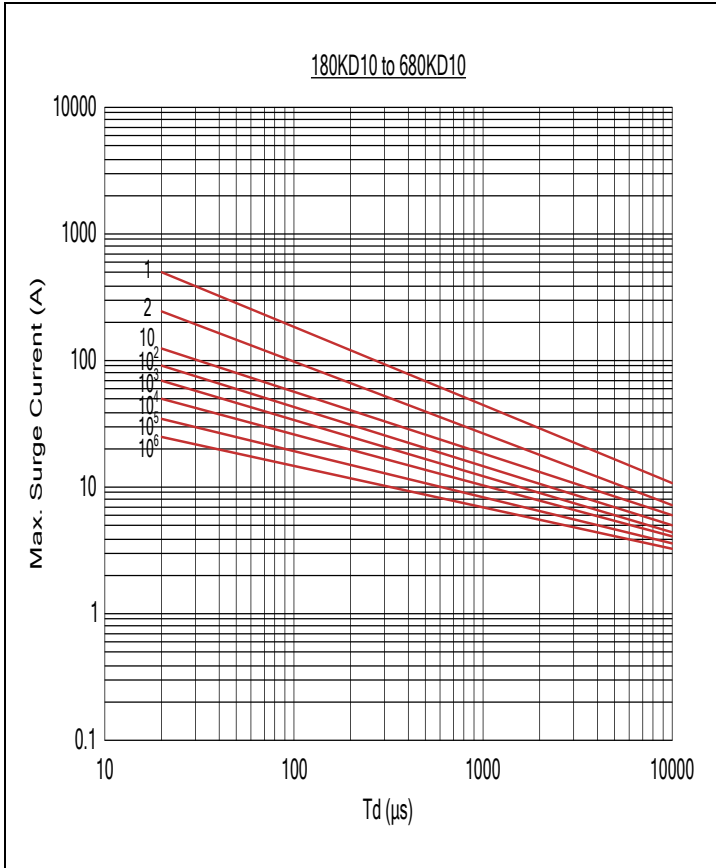
Electrical Characteristics

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)
180KD10	180KD10J	11	14	18(15~21.6)	5	36	500	1000	2.1	3.0	0.05	5600
220KD10	220KD10J	14	18	22(19.5~26)	5	43	500	1000	2.5	5.0	0.05	4500
270KD10	270KD10J	17	22	27(25~31)	5	53	500	1000	3.0	6.0	0.05	3700
330KD10	330KD10J	20	26	33(29.5~36.5)	5	65	500	1000	4.0	7.0	0.05	3000
390KD10	390KD10J	25	31	39(35~43)	5	77	500	1000	4.6	9.0	0.05	2400
470KD10	470KD10J	30	38	47(42~52)	5	93	500	1000	5.5	11.0	0.05	2100
560KD10	560KD10J	35	45	56(50~62)	5	110	500	1000	7.0	13.0	0.05	1800
680KD10	680KD10J	40	56	68(61~75)	5	135	500	1000	8.2	15.0	0.05	1500
820KD10	820KD10J	50	65	82(74~90)	25	135	2500	3500	12.0	17.0	0.4	1200
101KD10	101KD10J	60	85	100(90~110)	25	165	2500	3500	15.0	18.0	0.4	1000
121KD10	121KD10J	75	100	120(108~132)	25	200	2500	3500	18.0	21.0	0.4	830
151KD10	151KD10J	95	125	150(135~165)	25	250	2500	3500	22.0	25.0	0.4	670
181KD10	181KD10J	115	150	180(162~198)	25	300	2500	3500	27.0	30.0	0.4	560
201KD10	201KD10J	130	170	200(180~220)	25	340	2500	3500	30.0	35.0	0.4	500
221KD10	221KD10J	140	180	220(198~242)	25	360	2500	3500	32.0	39.0	0.4	450
241KD10	241KD10J	150	200	240(216~264)	25	395	2500	3500	35.0	42.0	0.4	420
271KD10	271KD10J	175	225	270(243~297)	25	455	2500	3500	37.0	49.0	0.4	370
301KD10	301KD10J	190	250	300(270~330)	25	500	2500	3500	40.0	54.0	0.4	330
331KD10	331KD10J	210	275	330(297~363)	25	550	2500	3500	43.0	58.0	0.4	300
361KD10	361KD10J	230	300	360(324~396)	25	595	2500	3500	47.0	65.0	0.4	280
391KD10	391KD10J	250	320	390(351~429)	25	650	2500	3500	60.0	70.0	0.4	260
431KD10	431KD10J	275	350	430(387~473)	25	710	2500	3500	65.0	80.0	0.4	230
471KD10	471KD10J	300	385	470(423~517)	25	775	2500	3500	67.0	85.0	0.4	210
511KD10	511KD10J	320	415	510(459~561)	25	845	2500	3500	69.0	90.0	0.4	200
561KD10	561KD10J	350	460	560(504~616)	25	925	2500	3500	70.0	92.0	0.4	180
621KD10	621KD10J	385	505	620(558~682)	25	1025	2500	3500	72.0	95.0	0.4	160
681KD10	681KD10J	420	560	680(612~748)	25	1120	2500	3500	75.0	98.0	0.4	150
751KD10	751KD10J	460	615	750(675~825)	25	1240	2500	3500	77.0	100.0	0.4	130
781KD10	781KD10J	485	640	780(702~858)	25	1290	2500	3500	80.0	105.0	0.4	125
821KD10	821KD10J	510	670	820(738~902)	25	1355	2500	3500	85.0	110.0	0.4	120
911KD10	911KD10J	550	745	910(819~1001)	25	1500	2500	3500	93.0	130.0	0.4	110
102KD10	102KD10J	625	825	1000(900~1100)	25	1650	2500	3500	102.0	140.0	0.4	100
112KD10	112KD10J	680	895	1100(990~1210)	25	1815	2500	3500	115.0	155.0	0.4	90

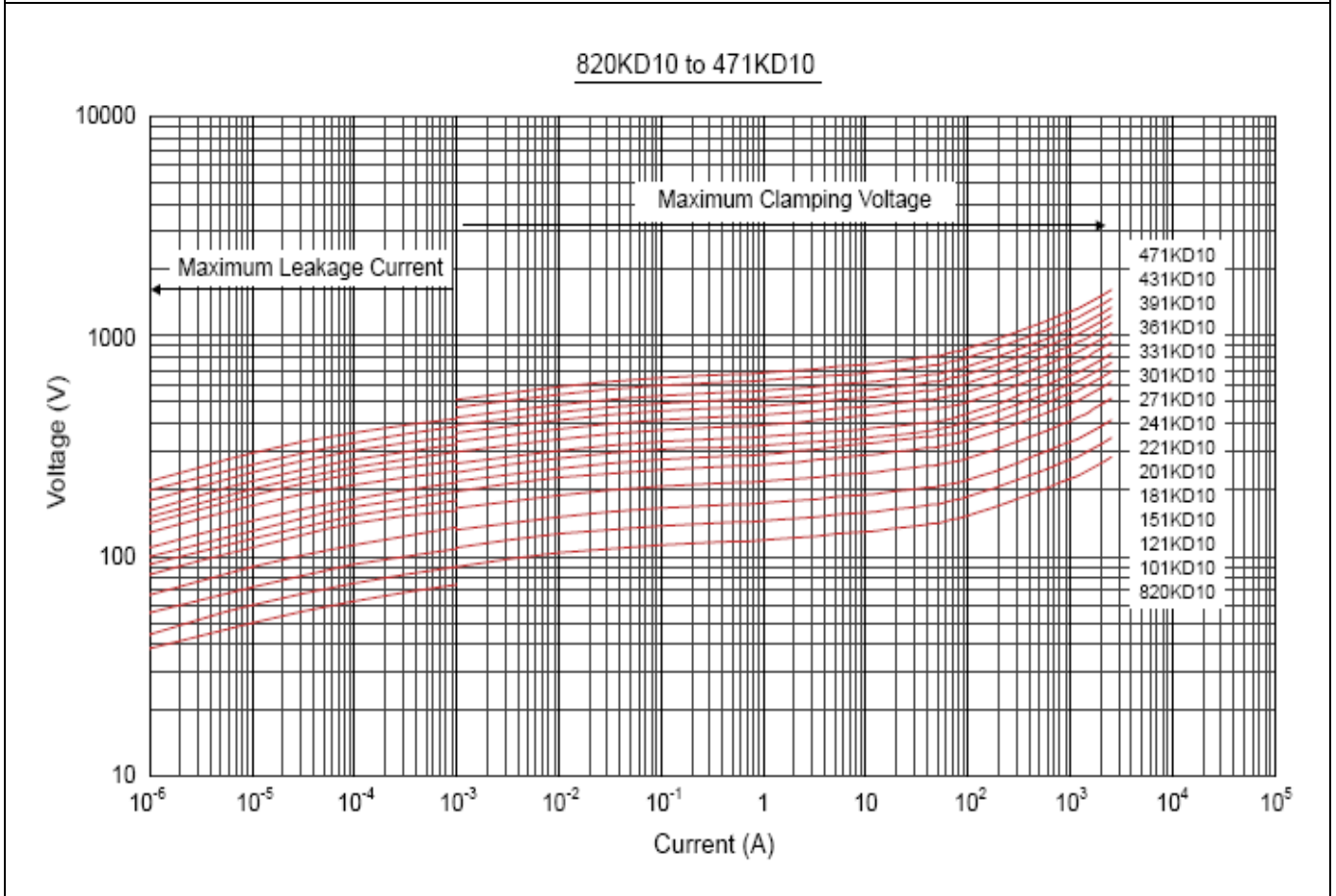
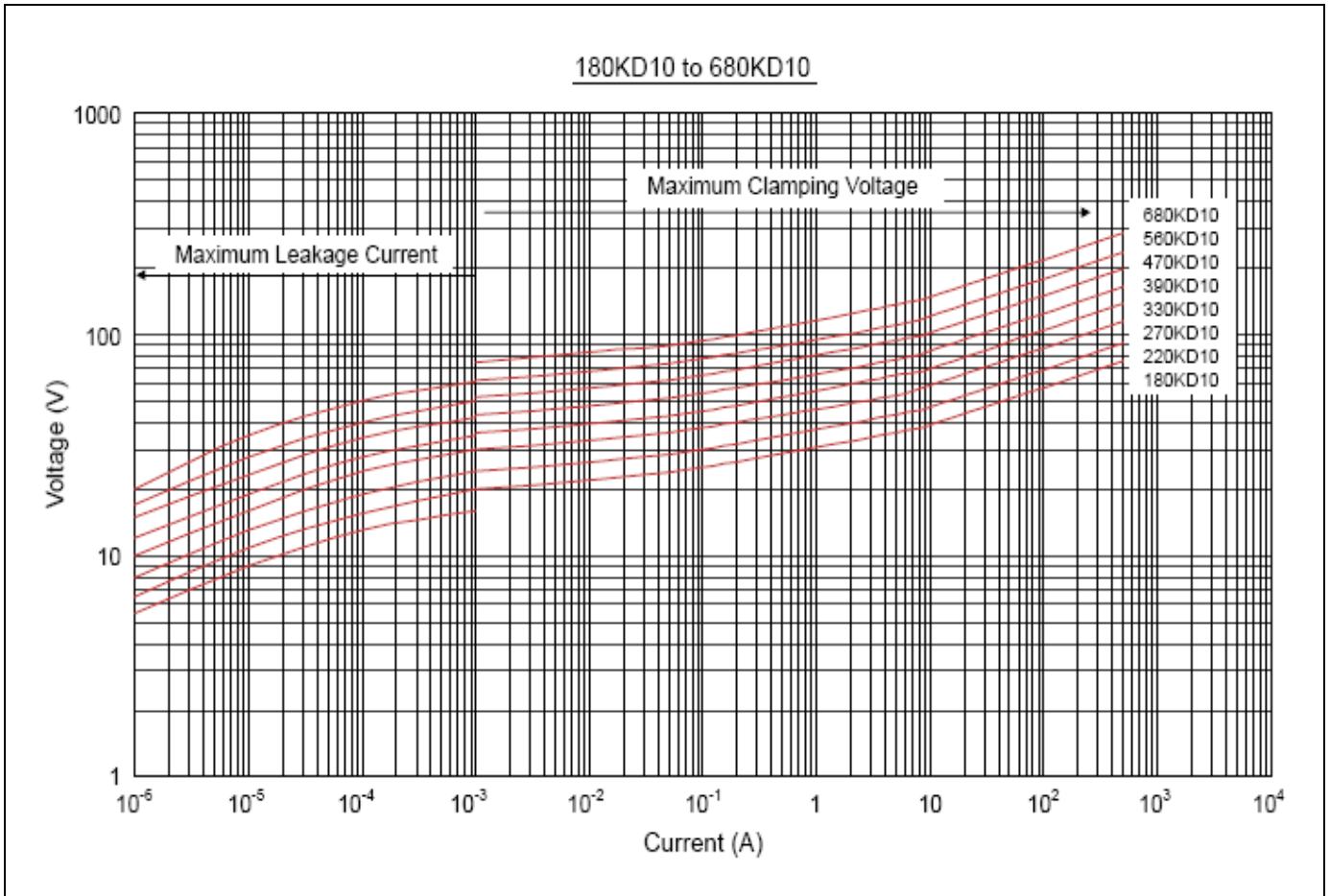
Notes: 1. The tolerance of varistor voltage between 18V and 27V is more than 10%.

2. Leakage Current (@83% of V_{1mA}) : IR≤50μA (180K~680K) ; IR≤25μA (820K~112K)

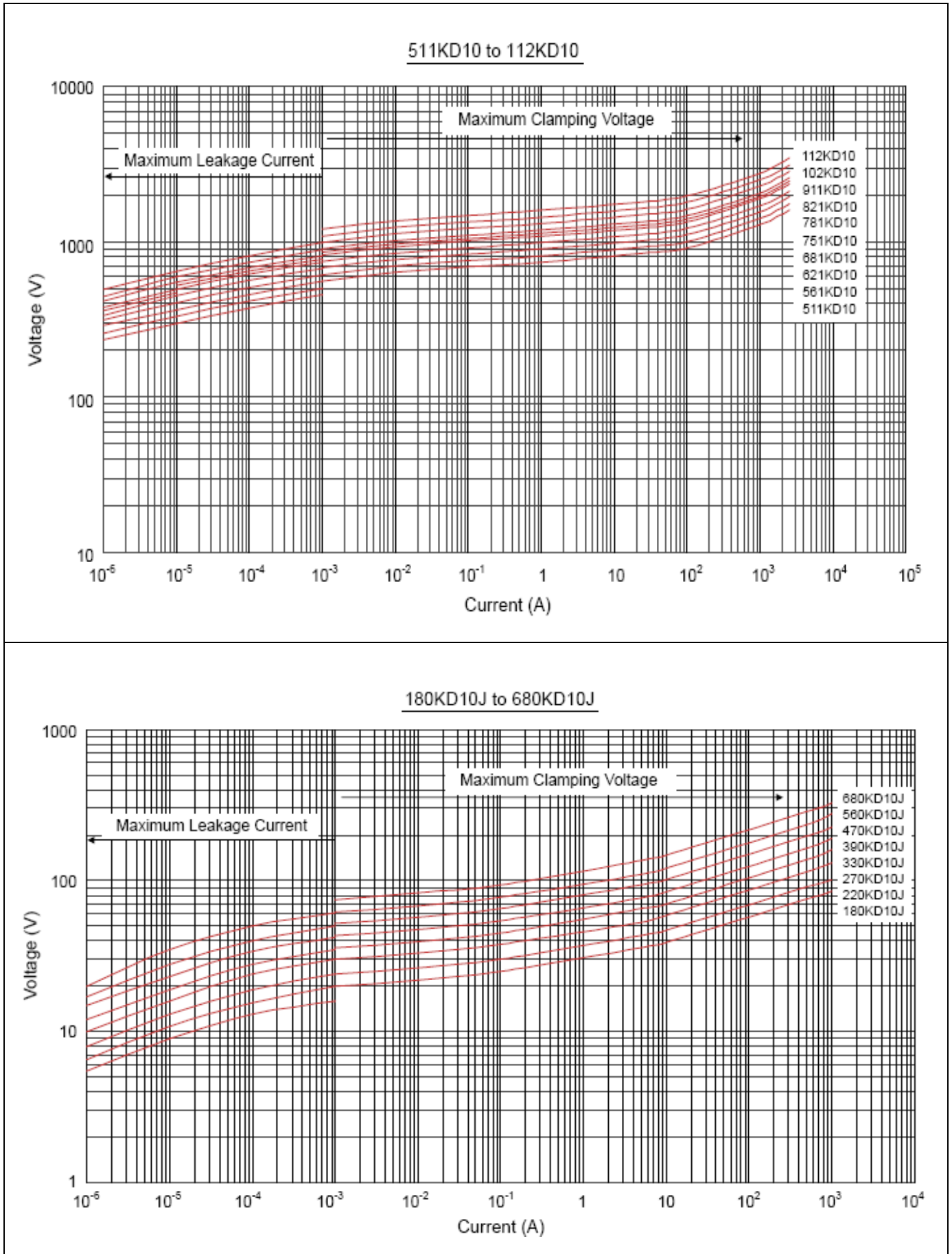
Maximum Surge Current Derating Curve



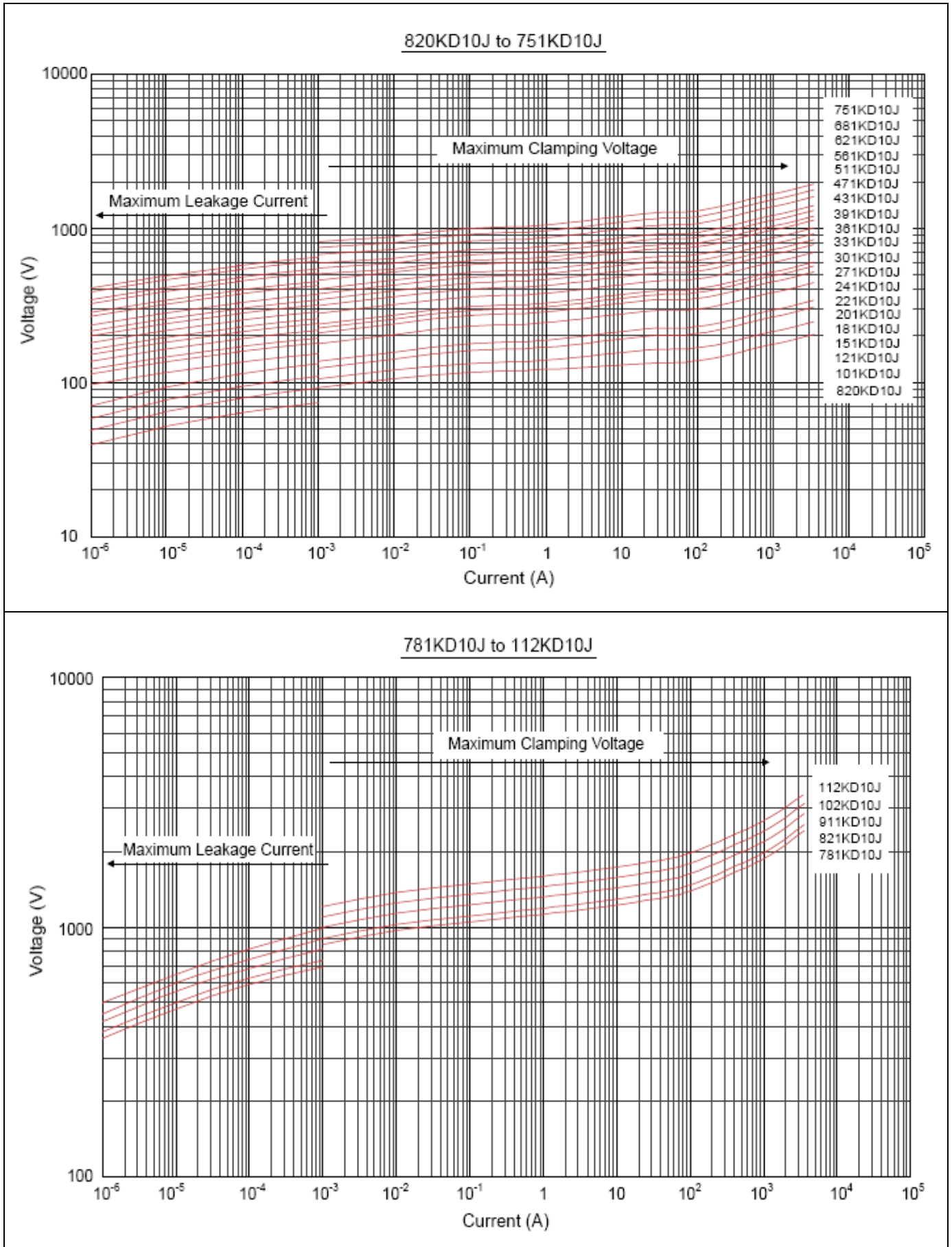
Maximum Leakage Current and Maximum Clamping Voltage Curve



Maximum Leakage Current and Maximum Clamping Voltage Curve



Maximum Leakage Current and Maximum Clamping Voltage Curve

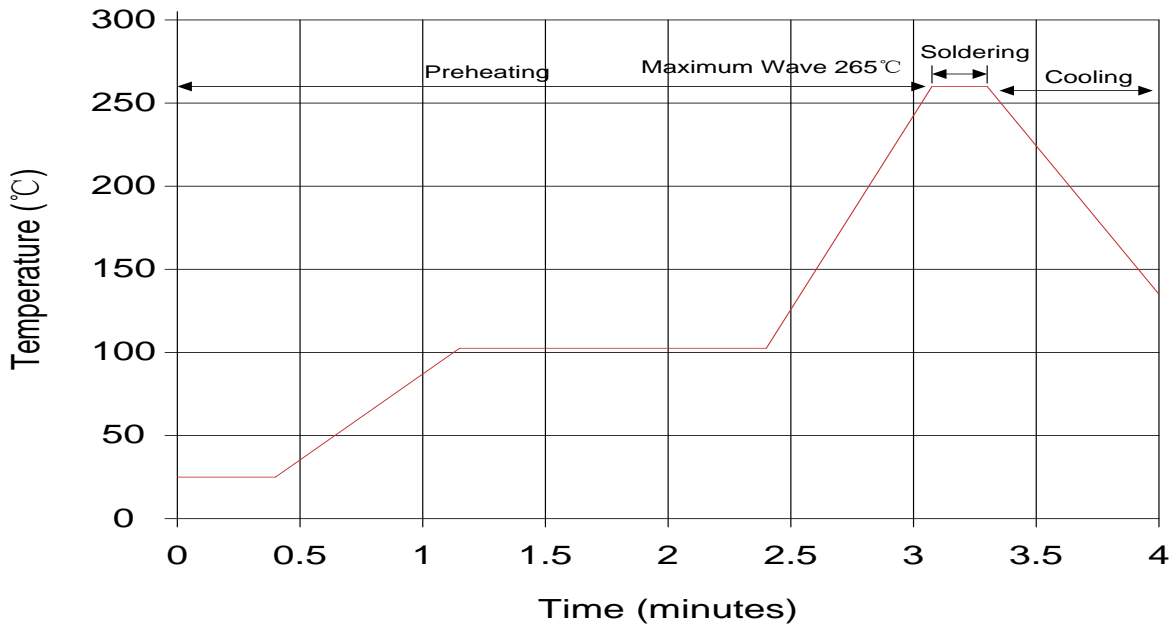


Reliability

Items	Standard	Test conditions / Methods	Specifications															
Tensile Strength of Terminals	IEC60068-2-21	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 < 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	IEC60068-2-21	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 < 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	IEC60068-2-6	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%															
Solderability	IEC60068-2-20	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	IEC60068-2-20	Solder Temp: 260±5 °C Dipping Time: 10±1 sec	No visible damage ΔV _{1mA} /V _{1mA} ≤ 5%															
High Temperature Storage	IEC60068-2-2	Ambient Temp: 125±2 °C Duration: 1000±24hrs	No visible damage ΔV _{1mA} /V _{1mA} ≤ 5%															
Low Temperature Storage	IEC60068-2-1	Ambient Temp: -40±2 °C Duration: 1000±24hrs	No visible damage ΔV _{1mA} /V _{1mA} ≤ 5%															
Damp Heat, Steady State	IEC60068-2-78	The test is divided into two groups . a. 40±2 °C , 90~95% RH for 1344±24hrs b. 40±2 °C , 90~95% RH, at 10%VDC , 1344±24 hrs	No visible damage ΔV _{1mA} /V _{1mA} ≤ 10% Insulation Resistance ≥ 100MΩ															
High Temperature Load	MIL-STD-202 Method 108	Ambient Temp: 105±2 °C Duration: 1000±24hrs Load: Max. Allowable Voltage In AC.	ΔV _{1mA} /V _{1mA} ≤ 10%															
Temperature Cycle	IEC60068-2-14	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>5±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>5±3</td> </tr> </tbody> </table>	Step	Temperature (°C)	Period (minutes)	1	-40±3	30±3	2	Room temperature	5±3	3	125±3	30±3	4	Room temperature	5±3	No visible damage ΔV _{1mA} /V _{1mA} ≤ 5%
Step	Temperature (°C)	Period (minutes)																
1	-40±3	30±3																
2	Room temperature	5±3																
3	125±3	30±3																
4	Room temperature	5±3																
8/20uS Surge Life	IEC61051-1	8/20μS waveform, 10 surge currents, unipolar, interval 30secs, amplitude corresponding to max. surge current derating curves for 20μS.	No visible damage ΔV _b (1mA) ≤ ±10%															
10/1000μS Surge Life	IEC61051-1	10/1000μS waveform, 10 surge currents, unipolar, interval 2mins, amplitude corresponding to max. surge current derating curves for 1000μS.	No visible damage ΔV _{1mA} /V _{1mA} ≤ 10%															
Voltage Proof	IEC61051-1	Metal balls method, 2500Vac 1 min.	No visible damage															

Soldering Recommendation

Lead-free Wave Soldering Recommendation

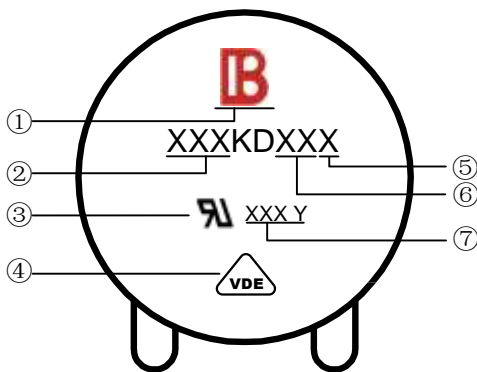


Item	Conditions
Peak Temperature	265°C
Dipping Time	10 seconds (max.)
Soldering	1 time

Recommendation Reworking Conditions with Soldering Iron

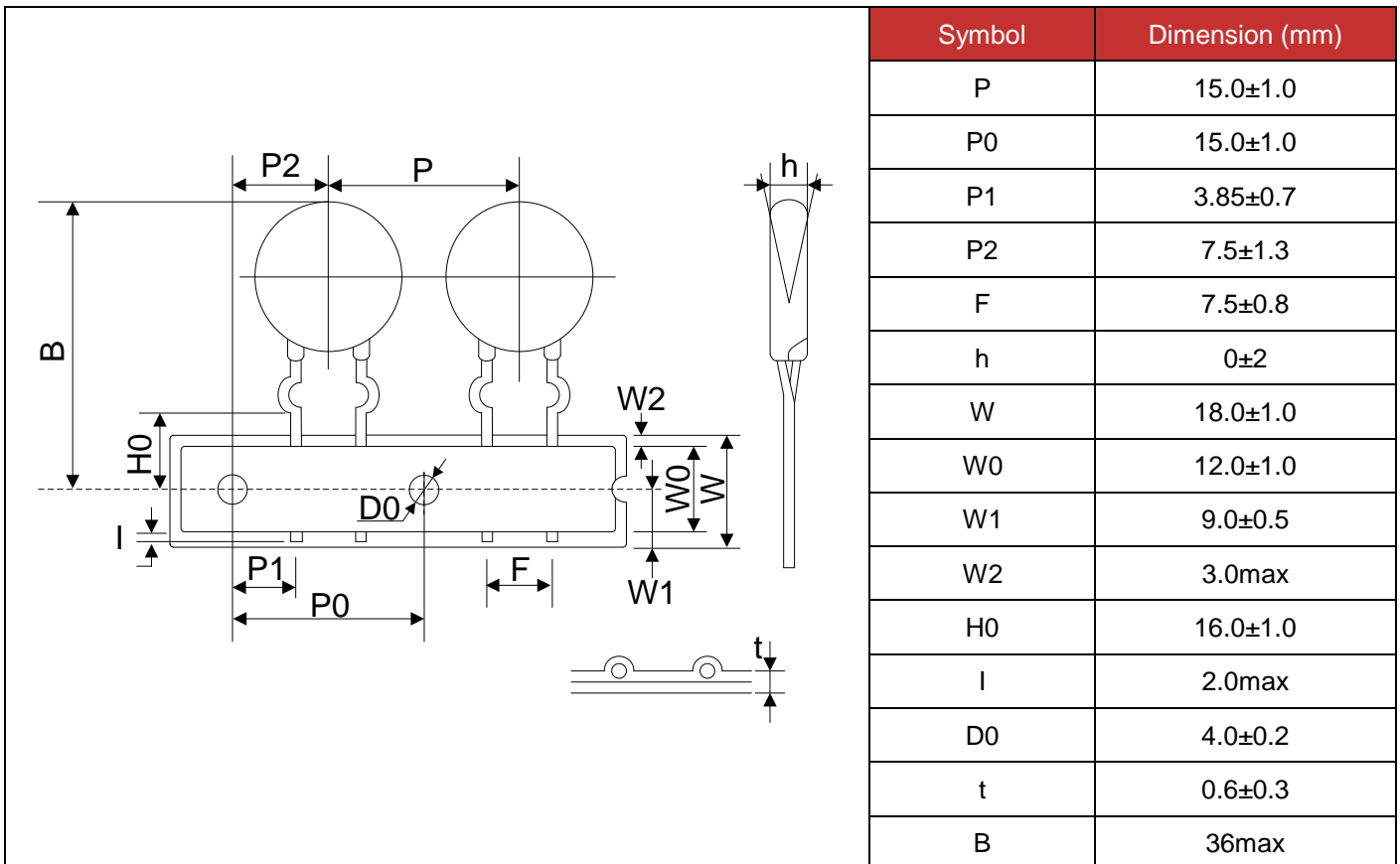
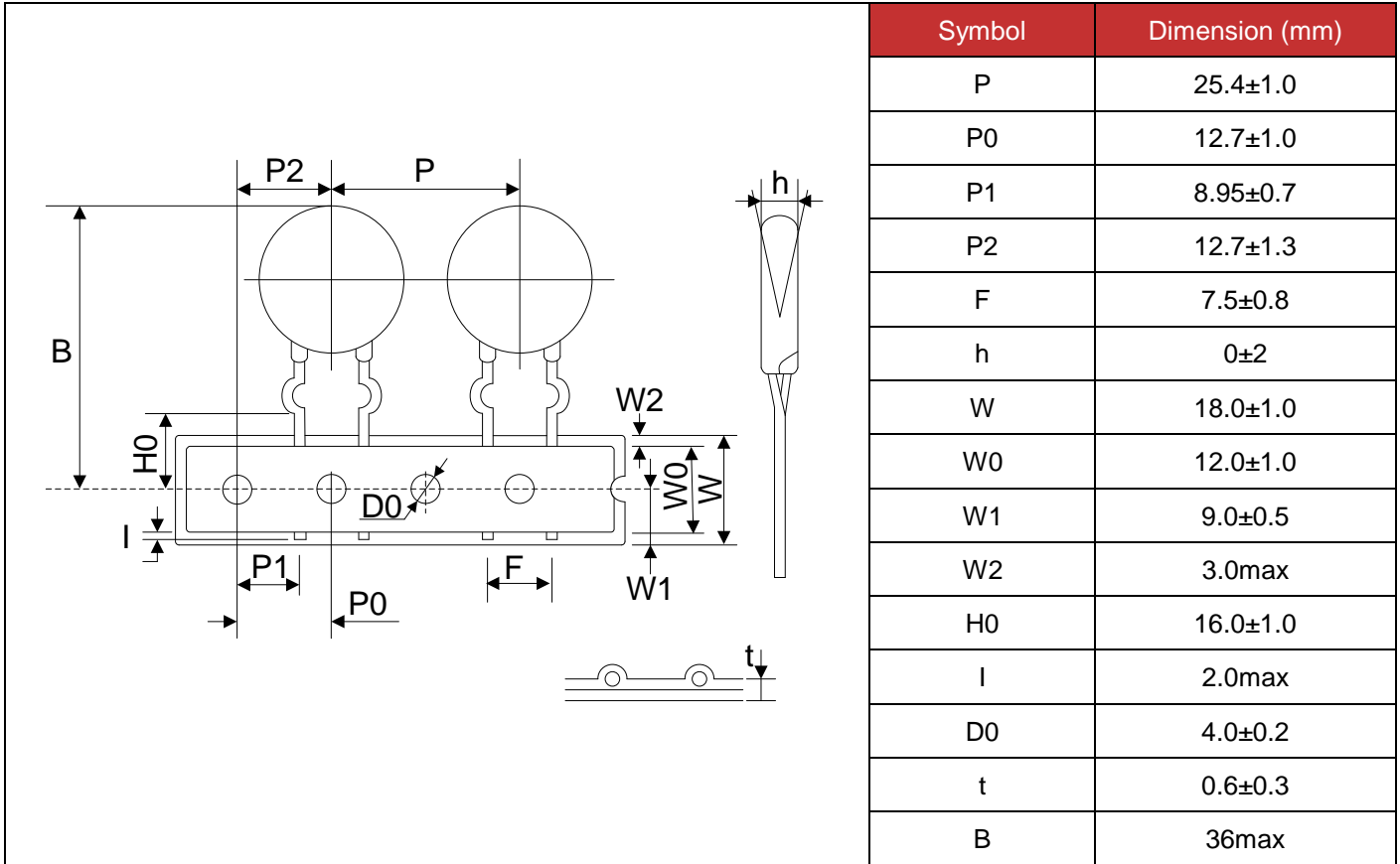
Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 seconds (max.)
Distance from Varistor	2mm (min.)

Marking Code

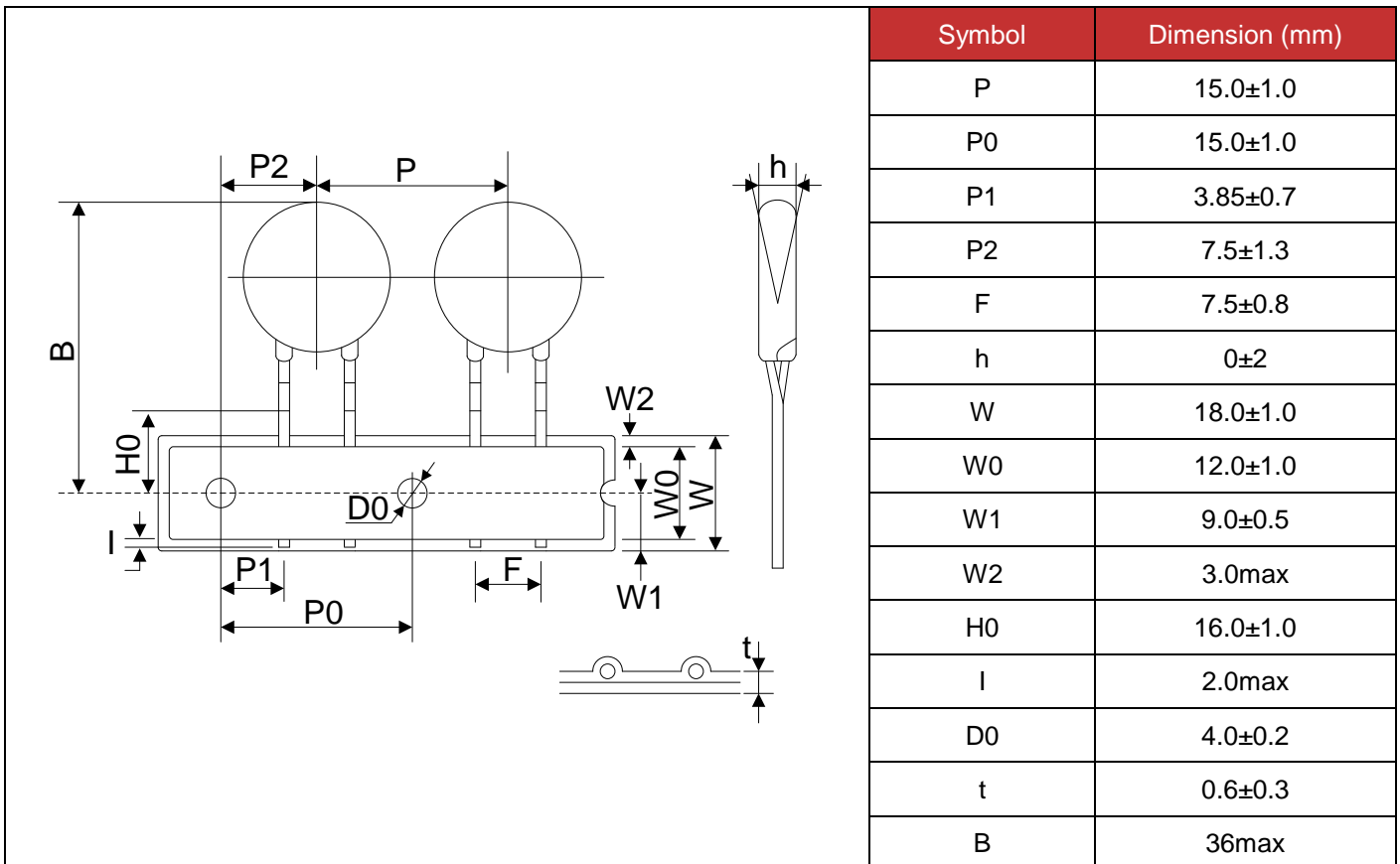
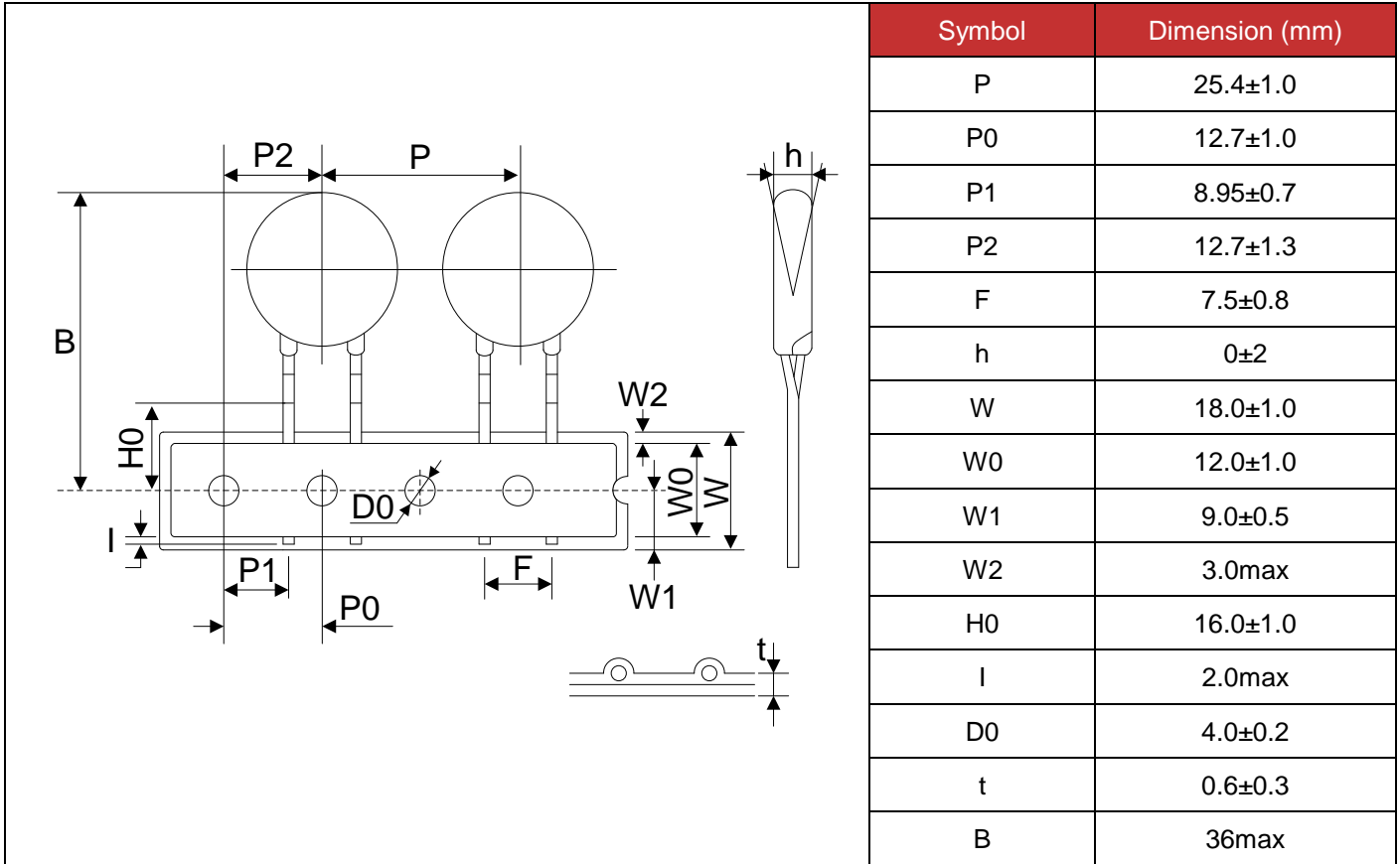


- ① Brightking Logo
- ② Varistor Voltage
- ③ UL Accreditation Logo
- ④ VDE Accreditation Logo
- ⑤ “J” is High Surge Code, no “J” is Standard Surge
- ⑥ Disk Size
- ⑦ Internal control code

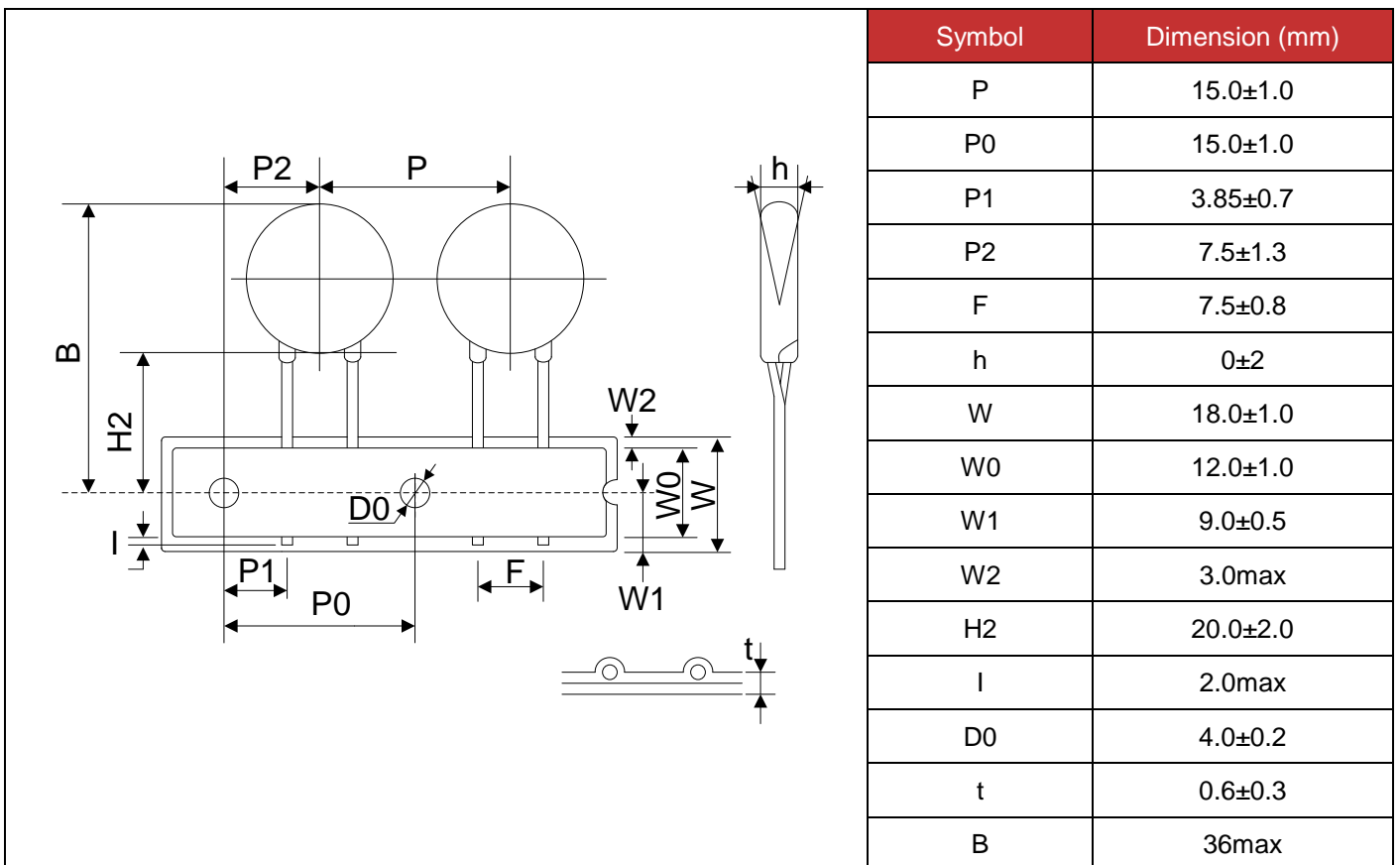
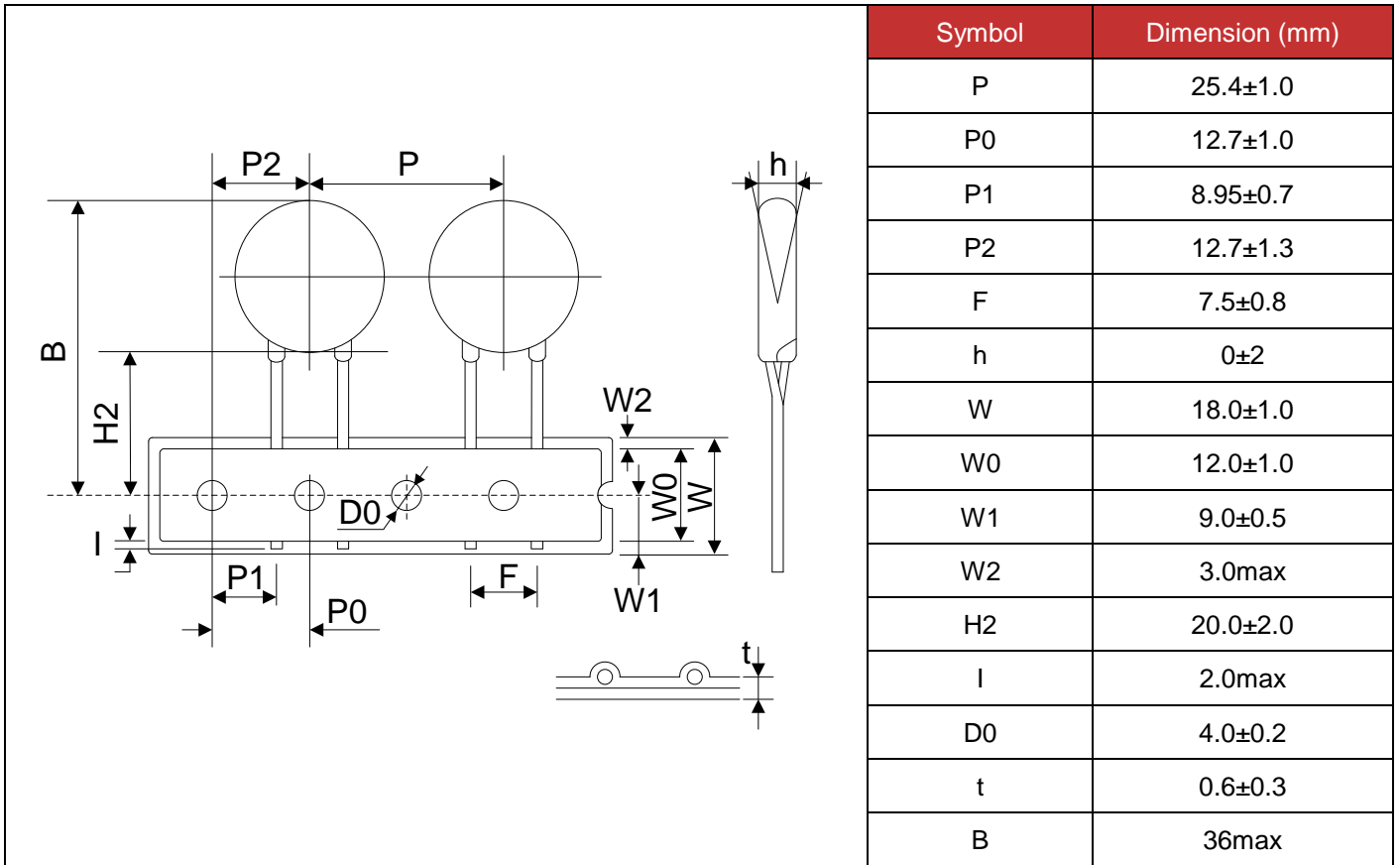
Taping Dimensions



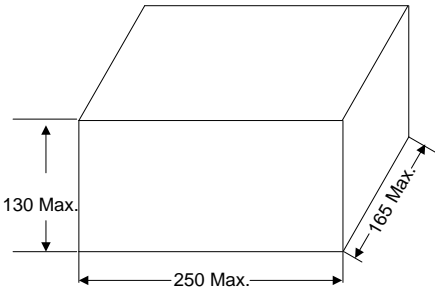

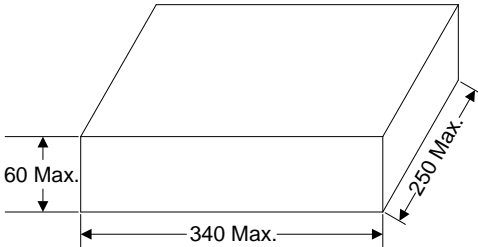
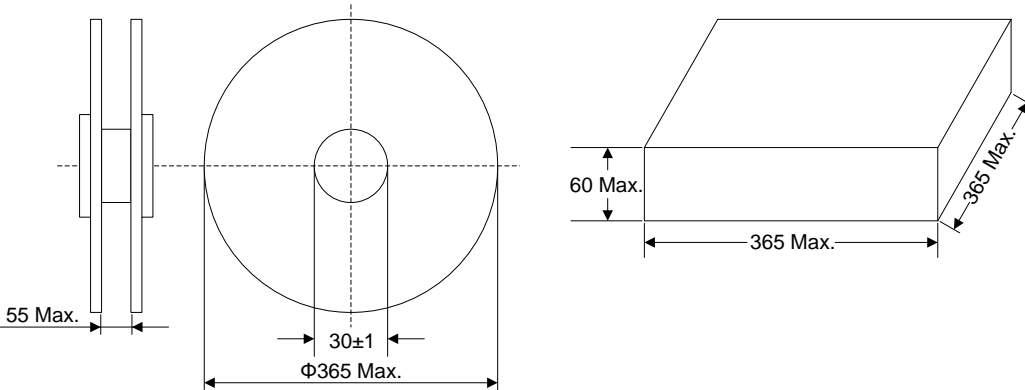
Taping Dimensions



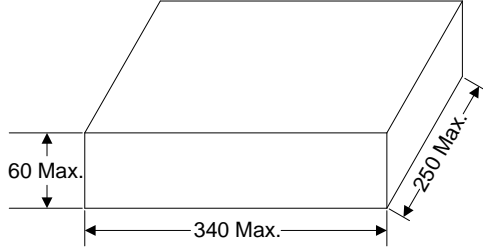
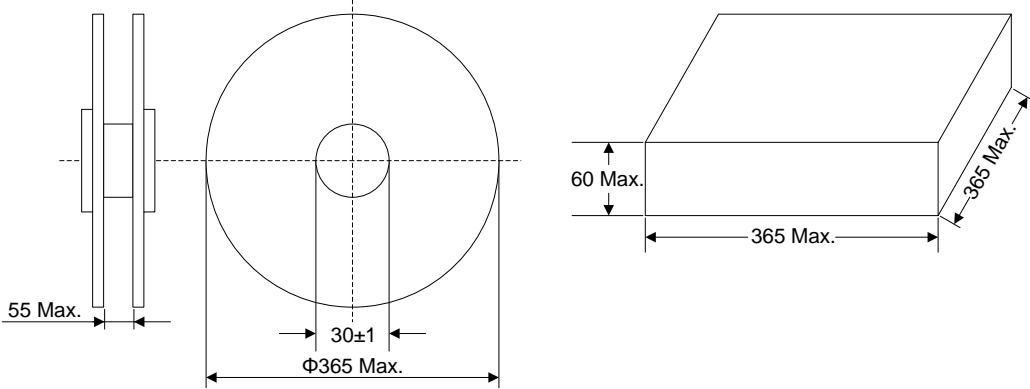
Taping Dimensions



Quantity

Packaging Dimensions (Unit: mm)	Quantity
<p>In bulk for Terminals Untrimmed Products</p> 	500pcs/bag 4bags/box (180K~621K)
	400pcs/bag 4bags/box (681K~112K)
	300pcs/bag 4bags/box (122K~182K)
<p>In bulk for Terminals Trimmed Products</p> 	500pcs/bag 4bags/box (180K~621K)
	400pcs/bag 4bags/box (681K~112K)
	300pcs/bag 4bags/box (122K~182K)
Packaging Dimensions (Unit: mm)	Quantity
<p>Tape & Box & P0=12.7mm</p> 	750pcs/box (180K~241K)
	600pcs/box (271K~391K)
	500pcs/box (431K~621K)
	300pcs/box (681K~112K)
<p>Tape & Reel & P0=12.7mm</p> 	1000pcs/reel (180K~391K)
	750pcs/reel (431K~621K)
	500pcs/reel (681K~112K)

Quantity

Packaging Dimensions (Unit: mm)	Quantity
<p>Tape & Box & P0=15.0mm</p> 	1000pcs/box (180K~391K)
	750pcs/box (431K~621K)
	600pcs/box (681K~751K)
	500pcs/box (781K~112K)
<p>Tape & Reel & P0=15.0mm</p> 	1000pcs/reel (180K~391K)
	750pcs/reel (431K~751K)
	500pcs/reel (781K~112K)

Storage Condition of Products

(I) Storage Conditions :

- 1.Storage Temperature : -10°C ~ +40°C
- 2.Relative Humidity : ≅ 80%RH
- 3.Keep away from corrosive atmosphere and sunlight.

(II) Period of Storage : 1 year