

Metal Oxide Varistors 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
- Moisture sensitivity level: Level 1
- Operating Temperature: $-40^{\circ}\text{C}\sim+125^{\circ}\text{C}$
- Storage Temperature: $-40^{\circ}\text{C}\sim+125^{\circ}\text{C}$

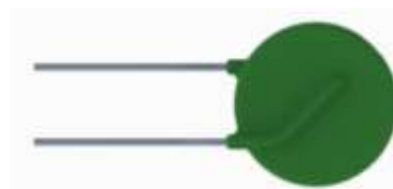
Application information

- 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

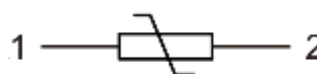
Agency Approvals

Icon	Description
RoHS	Compliance with 2011/65/EU
HF	Compliance with IEC61249-2-21:2003
	Mean lead free

Exterior



Schematic Symbol

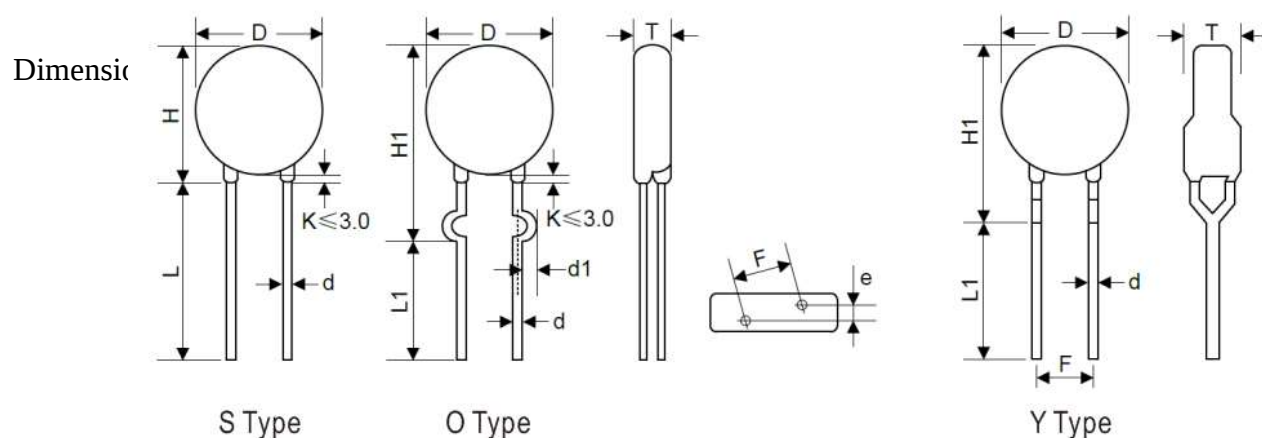
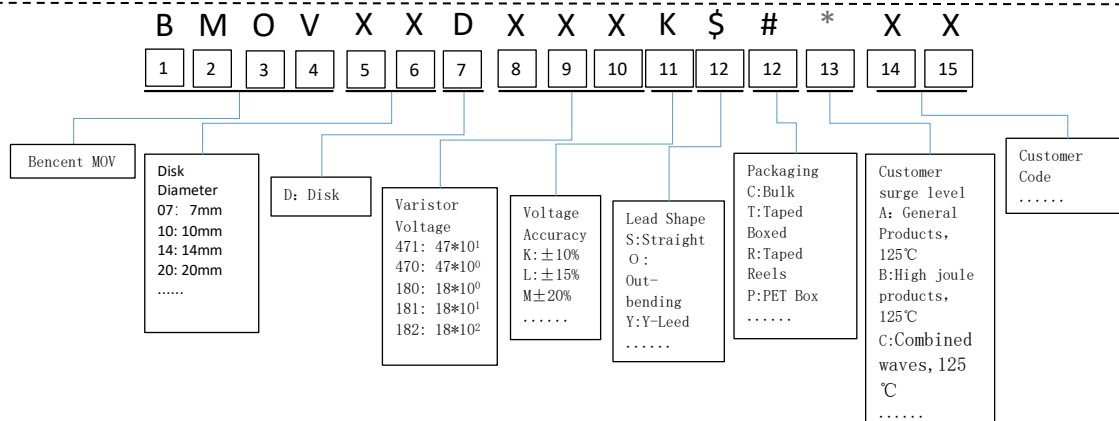


Electrical Characteristics

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)	IP (A)	VC (V)	I (A) Standard	I (A) High Surge	(J) Standard	(J) High Surge	(W)	@1KHz (pf)
10D180KA	10D180KB	11	12	18(15~21.6)	5	36	500	1000	2.1	3.0	0.05	5600
10D220KA	10D220KB	14	18	22(19.5~26)	5	43	500	1000	2.5	5.0	0.05	4500
10D270KA	10D270KB	17	22	27(24~31)	5	53	500	1000	3.0	6.0	0.05	3700
10D330KA	10D330KB	20	26	33(29.5~36.5)	5	65	500	1000	4.0	7.0	0.05	3000
10D390KA	10D390KB	25	31	39(35~43)	5	77	500	1000	4.6	9.0	0.05	2400
10D470KA	10D470KB	30	38	47(42~52)	5	93	500	1000	5.5	11.0	0.05	2100
10D560KA	10D560KB	35	45	56(50~62)	5	110	500	1000	7.0	13.0	0.05	1800
10D680KA	10D680KB	40	56	68(61~75)	5	135	500	1000	8.2	15.0	0.05	1500
10D820KA	10D820KB	50	65	82(74~90)	25	145	2500	3500	12.0	17.0	0.4	1200

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10D101KA	10D101KB	60	85	100(90~110)	25	165	2500	3500	15.0	18.0	0.4	1000
10D121KA	10D121KB	75	100	120(108~132)	25	200	2500	3500	18.0	21.0	0.4	830
10D151KA	10D151KB	95	125	150(135~165)	25	250	2500	3500	22.0	25.0	0.4	670
10D181KA	10D181KB	115	150	180(162~198)	25	300	2500	3500	27.0	30.0	0.4	560
10D201KA	10D201KB	130	170	200(180~220)	25	340	2500	3500	30.0	35.0	0.4	500
10D221KA	10D221KB	140	180	220(198~242)	25	360	2500	3500	32.0	39.0	0.4	450
10D241KA	10D241KB	150	200	240(216~264)	25	395	2500	3500	35.0	42.0	0.4	420
10D271KA	10D271KB	175	225	270(243~297)	25	455	2500	3500	37.0	42.0	0.4	370
10D301KA	10D301KB	190	250	300(270~330)	25	500	2500	3500	40.0	54.0	0.4	330
10D331KA	10D331KB	210	275	330(297~363)	25	550	2500	3500	43.0	58.0	0.4	300
10D361KA	10D361KB	230	300	360(324~396)	25	595	2500	3500	47.0	65.0	0.4	280
10D391KA	10D391KB	250	320	390(351~429)	25	650	2500	3500	60.0	70.0	0.4	260
10D431KA	10D431KB	275	350	430(387~473)	25	710	2500	3500	65.0	80.0	0.4	230
10D471KA	10D471KB	300	385	470(423~517)	25	775	2500	3500	67.0	85.0	0.4	210
10D511KA	10D511KB	320	415	510(459~561)	25	845	2500	3500	69.0	90.0	0.4	200
10D561KA	10D561KB	350	460	560(504~616)	25	925	2500	3500	70.0	92.0	0.4	180
10D621KA	10D621KB	385	505	620(558~682)	25	1025	2500	3500	72.0	95.0	0.4	160
10D681KA	10D681KB	420	560	680(612~748)	25	1120	2500	3500	75.0	98.0	0.4	150
10D751KA	10D751KB	460	615	750(675~825)	25	1240	2500	3500	77.0	100.0	0.4	130
10D781KA	10D781KB	485	640	780(702~858)	25	1290	2500	3500	80.0	105.0	0.4	125
10D821KA	10D821KB	510	670	820(738~902)	25	1355	2500	3500	85.0	110.0	0.4	120
10D911KA	10D911KB	550	745	910(819~1001)	25	1500	2500	3500	93.0	130.0	0.4	110
10D102KA	10D102KB	625	825	1000(900~1100)	25	1650	2500	3500	102.0	140.0	0.4	100
10D112KA	10D112KB	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).
 3. The foot shape can be customized according to customer needs.



Notes: The foot shape can be customized according to customer needs.

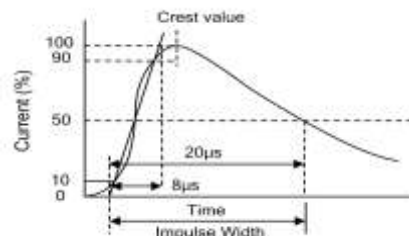
Unit: mm

Table 1	
Symbol	Dimension
H	10.5~16.5
H1	13.5~18.5
L(min)	20
L1(min)	15
D(max)	14
F	7.5±0.8
T	Table 2
e(±0.8)	Table 2
d(±0.05)	0.8
d1(±0.4)	1.4

Unit: mm

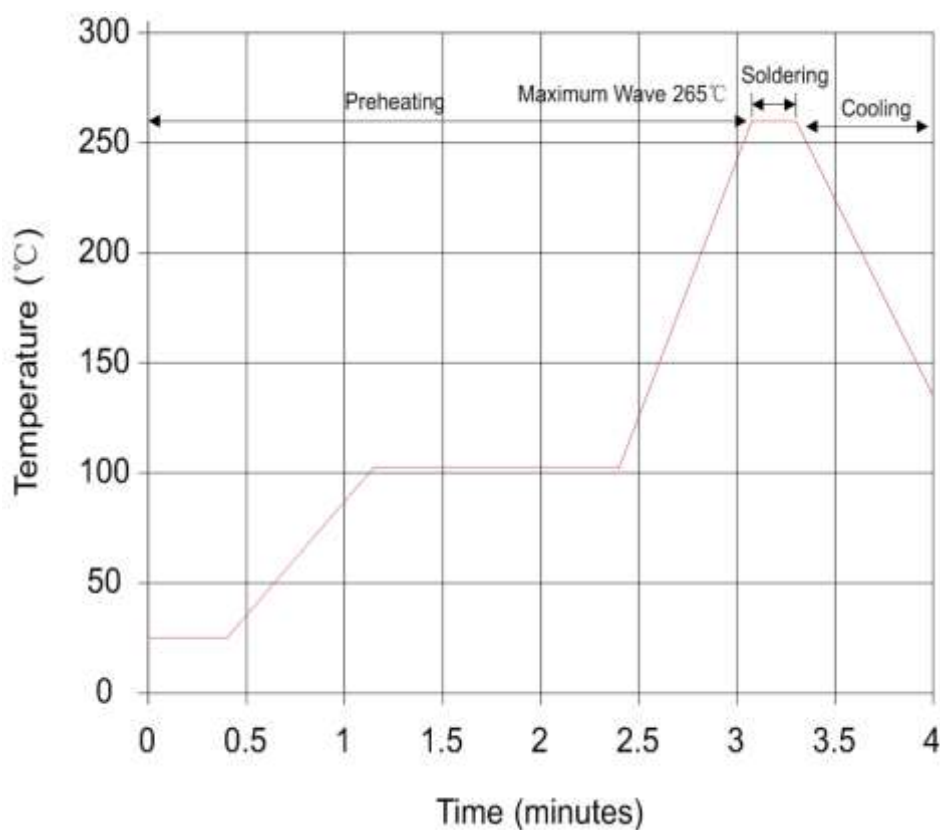
Table 2					
Model	T	e	Model	T	e
180K	2.44~5.27	1.5	301K	3.06~6.28	2.5
220K	2.54~5.41	1.6	331K	3.16~6.46	2.5
270K	2.65~5.61	1.8	361K	3.26~6.64	2.7
330K	2.77~5.79	1.7	391K	3.35~6.82	2.8
390K	2.73~5.58	1.8	431K	3.48~7.06	3.0
470K	2.85~5.80	1.9	471K	3.61~7.29	3.2
560K	2.99~6.04	2.0	511K	3.74~7.53	3.4
680K	3.19~6.32	2.2	561K	3.90~7.83	3.6
820K	2.58~5.30	1.8	621K	4.09~8.29	3.9
101K	2.69~5.47	2.0	681K	4.29~8.54	4.2
121K	2.81~5.67	2.2	751K	4.51~8.63	4.3
151K	2.58~5.39	1.8	781K	4.61~8.69	4.4
181K	2.68~5.57	1.9	821K	4.74~8.90	4.6
201K	2.76~5.72	2.0	911K	5.03~8.95	5.0
221K	2.81~5.81	2.1	102K	5.31~9.39	5.1
241K	2.87~5.93	2.2	112K	5.64~9.88	5.4
271K	2.97~6.11	2.4			

Electrical Ratings

Items	Test Condition/Description			Requirement					
Varistor Voltage	The voltage between the two terminals with the specified measuring current 1mA.DC applied is called V _{1mA} .			To meet the Specified value					
Maximum Allowable Voltage	The recommended maximum sine wave voltage (RMS) or the Maximum DC voltage can be applied continuously.								
Maximum Clamping Voltage	The maximum voltage between the two terminals with the specification standard impulse current. Applied waveform: 8/20μs 								
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% withthe standard impulse current (8/20μs) applied one time.								
Varistor Voltage Temp. Coefficient	$\left \frac{V_{1mA@125^{\circ}C}-V_{1mA@25^{\circ}C}}{V_{1mA@25^{\circ}C}} \times \frac{1}{100} \times 100\%(\%/^{\circ}C) \right$			≤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	The change of V_b shall be measured after the impulse listed below which is applied 10,000 times continuously with the interval of ten seconds at room temperature. <table><tr><td rowspan="2">10Φ series</td><td>180K to 680K</td><td>50A (8/20μs)</td></tr><tr><td>820K to 112K</td><td>100A (8/20μs)</td></tr></table>			10Φ series	180K to 680K	50A (8/20μs)	820K to 112K	100A (8/20μs)	$\frac{\Delta v_b}{v_b} \leq \pm 10\%$
10Φ series	180K to 680K	50A (8/20μs)							
	820K to 112K	100A (8/20μs)							

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
Soldering Time	3 seconds (max)
Distance from Varistor	2mm (min)

Mechanical Characteristics

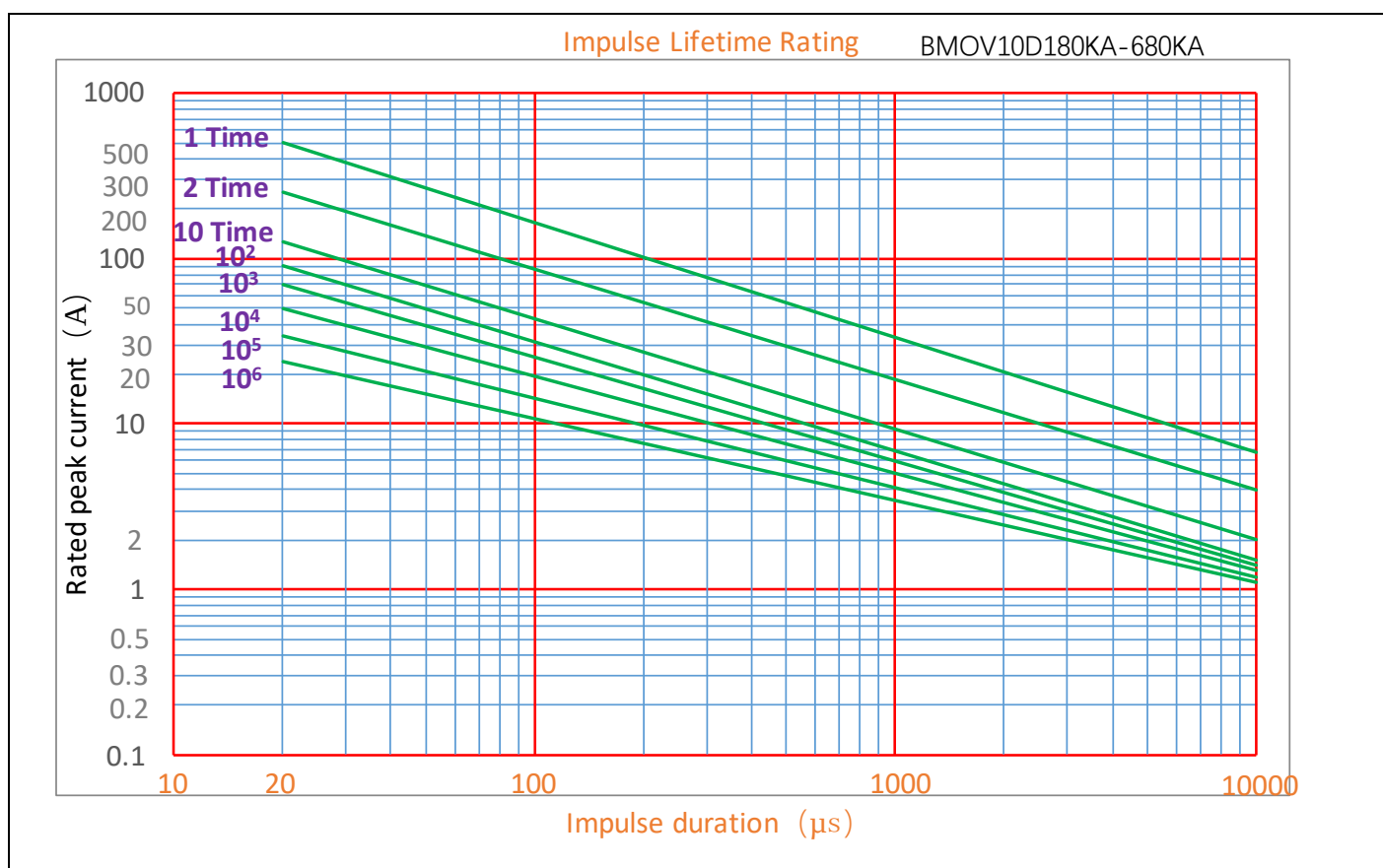
Items	Test conditions / Methods	Specifications								
Tensile Strength of Terminals	Gradually applying the force specified and keeping the unit fixed for 10±1 sec	No visible damage ΔV1mA/V1mA ≤5%								
	<table><tr><th>Terminal diameter (mm)</th><th>Force (kg)</th></tr><tr><td>0.5 < d ≤ 0.8</td><td>1.0</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></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
	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.	No visible damage ΔV1mA/V1mA ≤5%								
	<table><tr><th>Terminal diameter (mm)</th><th>Force (kg)</th></tr><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></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
	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/s² Direction: 3 mutually perpendicular directions, 2hrs each.	No visible damage ΔV1mA/V1mA ≤5%								
Solder ability	Solder Temp: 245±5°C Dipping Time: 2±0.5 sec	Atleast 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 ΔV1mA/V1mA ≤10%								

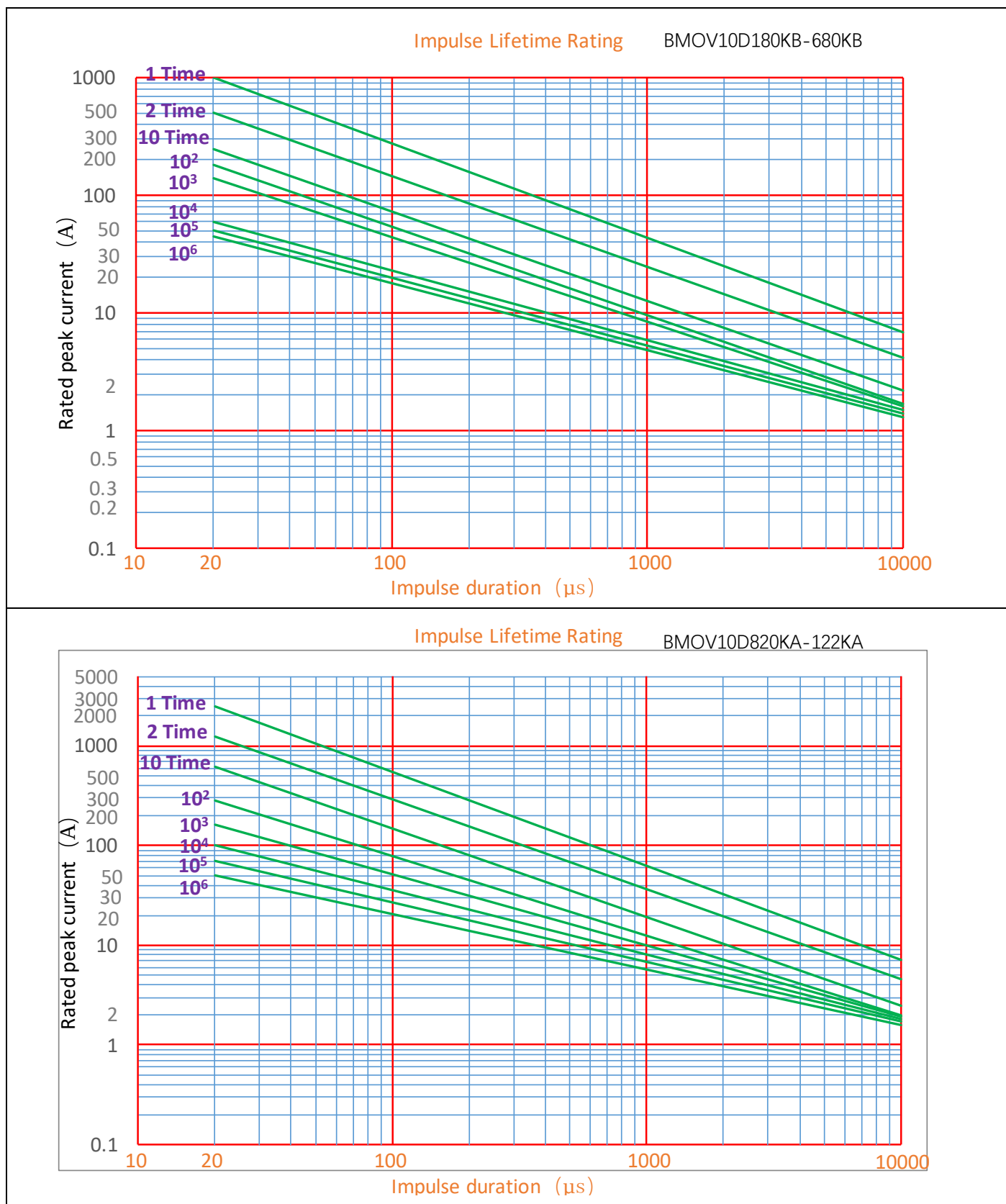
Reliability

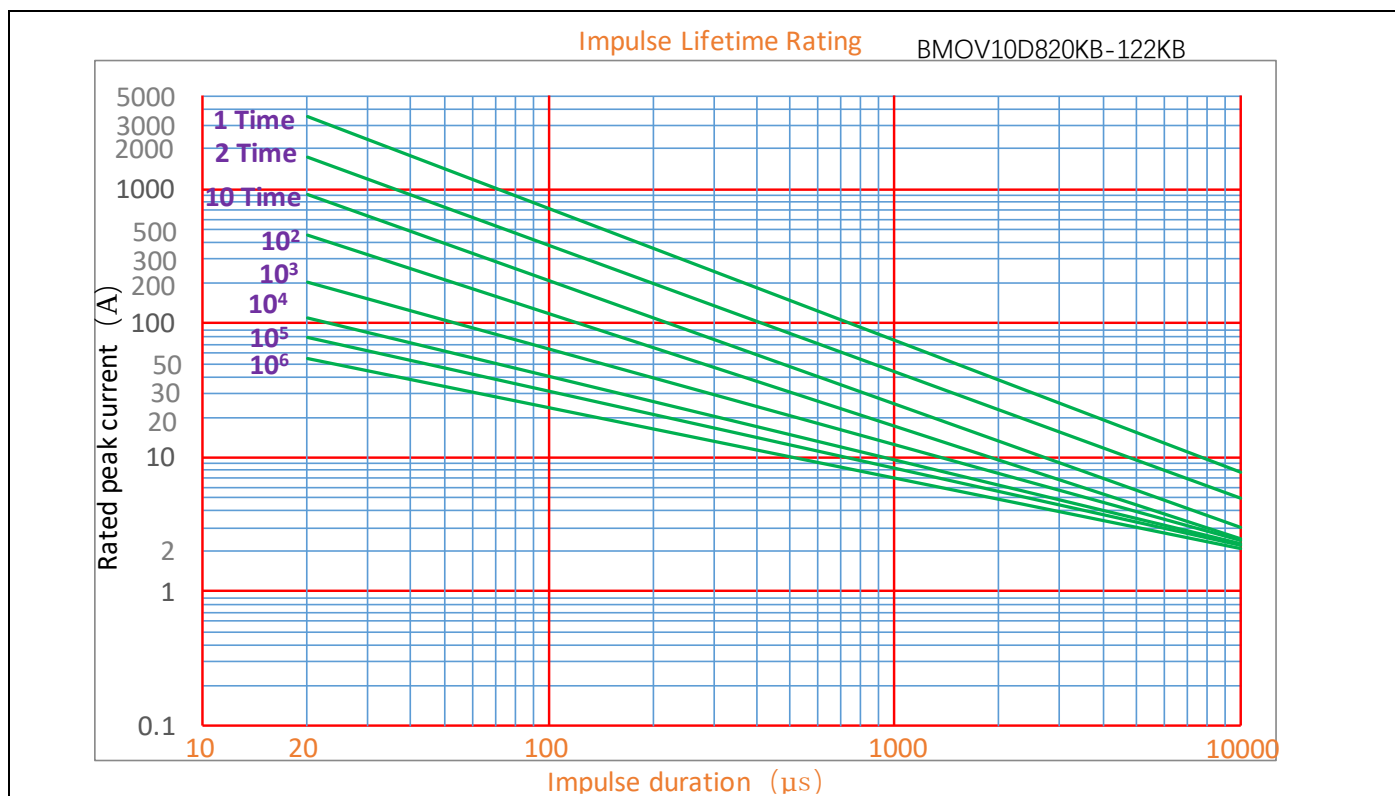
Items	Test conditions / Methods	Specifications	
High Temperature Storage	Ambient Temp: 125±2℃ Duration: 1000hrs	ΔV1mA/V1mA ≤5%	
Low Temperature Storage	Ambient Temp: -40±2℃ Duration: 1000hrs	ΔV1mA/V1mA ≤5%	
Humidity	Ambient Temp: 40±2℃, 90~95% R.H. Duration: 1000hrs	ΔV1mA/V1mA ≤5%	
Temperature Cycle	The conditions shown below shall be repeated 5 cycles		
	Step	Temperature (℃)	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 ΔV1mA/V1mA ≤5%	

Items	Test conditions / Methods	Specifications
High Temperature Load	Ambient Temp: 125±2°C Duration: 1000hrs Load: Max. Allowable Voltage In AC eara.	$ \Delta V_{1mA}/V_{1mA} \leq 10\%$
Damp Heat Load	Ambient Temp: 40±2°C, 90~95% R.H. Duration: 1000hrs Load: Max. Allowable Voltage	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 10\%$
Voltage Proof	Metal balls method, 1000Vac 1 min.(180K~331K), 1500Vac 1 min.(361K~112K)	No visible damage

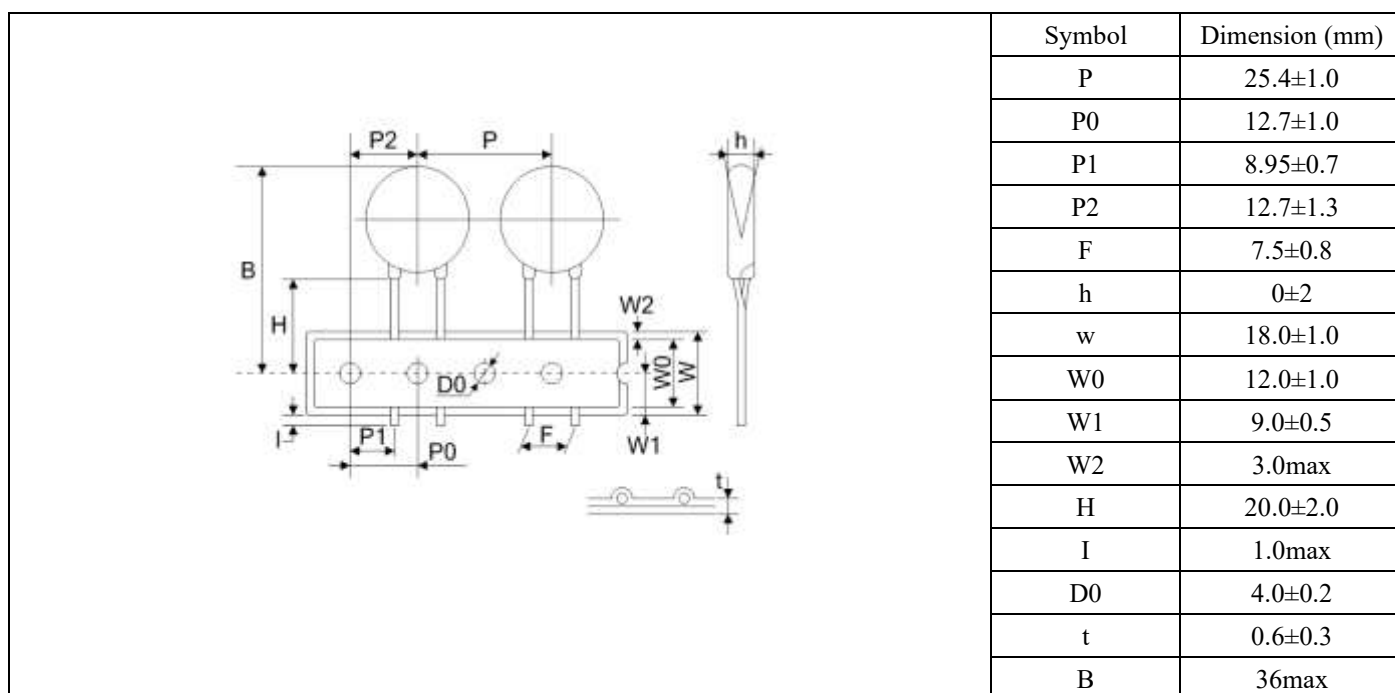
Maximum Surge Current Derating Curve

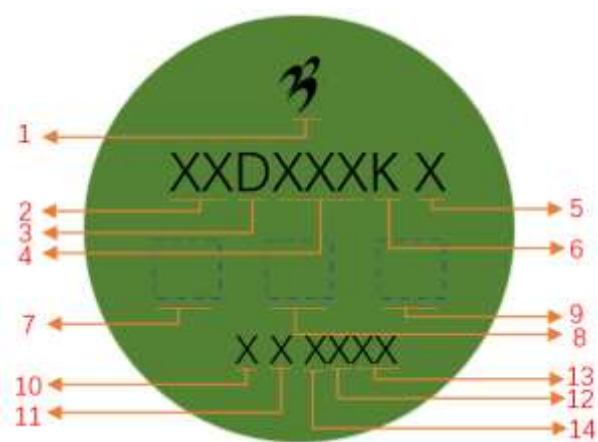






Taping Dimensions





- 1 B:Bencent
- 2 XX:Disk size (mm): 07、10、14、20、25...
- 3 D:Round; S:Square; R:Superposition;N/M/E:TMOV
- 4 XXX:Varistor voltage specifications
- 5A:Standards, 125°C B:High Surge 125°C,
C: Combined waves, 125°C
- 6 K:The varistor voltage range,±10%;L: ±15%;M: ±20%
- 7UL Mark; 8 CQC Mark; 9 TUV Mark
- 10X:Disk product line Code ; 11X:Finished line code
- 12X:Month Code, A 、 B 、 C...J、 K 、 L
- 13XX:Date Code, 1、 2、 3...29、 30、 31
- 14X:Year Code, A 、 B 、 C...X、 Y、 Z

Quantity

Packaging Dimensions (Unit: mm)

Inner box size		Outer box size	Quantity
Bulk			500pcs/bag 2bags/box (180K~621K)
			400pcs/bag 2bags/box (681K~112K)
Tape & Box			100pcs/box (180K~331K)
			750pcs/box (361K~621K)
			500pcs/box (681K~112K)
Reel size	Inner box size	Outer box size	Quantity
Tape & Reel			750pcs/reel (180K~331K)
			500pcs/reel (361K~621K)
			300pcs/reel (681K~112K)