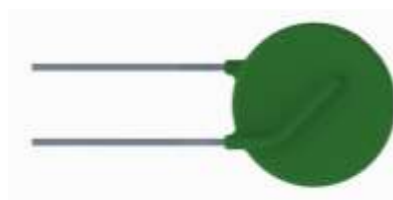


Features

- Wide operating voltage (V_{1mA}) range from 18V to 820V
- 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: $-40^{\circ}\text{C}\sim+125^{\circ}\text{C}$

Exterior



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

Schematic Symbol



Electrical Characteristics

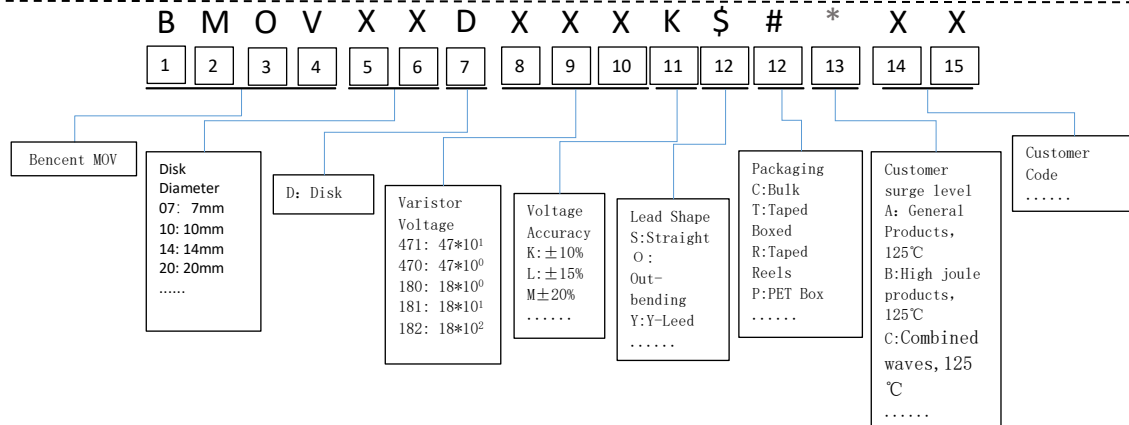
Part Number		Maximum Allowable Voltage		Varistor Voltage	Maximum Clamping Voltage		Withstanding Surge Current		Maximum Energy (10/1000μs)		Rated Power	Typical Capacitance (Reference)
Standard	High Surge	V_{AC} (V)	V_{DC} (V)	V_{1mA} (V)	IP (A)	VC (V)	I (A) Standard	I (A) High Surge	(J) Standard	(J) High Surge	(W)	@1KHz (pF)
07D180KA	07D180KB	11	12	18(15~21.6)	2.5	36	250	500	0.9	2.0	0.02	2800
07D220KA	07D220KB	14	18	22(19.5~26)	2.5	43	250	500	1.1	2.4	0.02	2300
07D270KA	07D270KB	17	22	27(24~31)	2.5	53	250	500	1.4	3.0	0.02	1800
07D330KA	07D330KB	20	26	33(29.5~36.5)	2.5	65	250	500	1.7	3.5	0.02	1500
07D390KA	07D390KB	25	31	39(35~43)	2.5	77	250	500	2.1	4.0	0.02	1300
07D470KA	07D470KB	30	38	47(42~52)	2.5	93	250	500	2.5	5.0	0.02	1100
07D560KA	07D560KB	35	45	56(50~62)	2.5	110	250	500	3.1	6.0	0.02	890
07D680KA	07D680KB	40	56	68(61~75)	2.5	135	250	500	3.6	7.0	0.02	740
07D820KA	07D820KB	50	65	82(74~90)	10	145	1200	1750	5.0	10.0	0.25	600

Part Number		Maximum Allowable Voltage		Varistor Voltage	Maximum Clamping Voltage		Withstanding Surge Current		Maximum Energy (10/1000 μ s)		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)
07D101KA	07D101KB	60	85	100(90~110)	10	165	1200	1750	6.5	12	0.25	500
07D121KA	07D121KB	75	100	120(108~132)	10	200	1200	1750	7.8	13.0	0.25	420
07D151KA	07D151KB	95	125	150(135~165)	10	250	1200	1750	9.7	15.0	0.25	330
07D181KA	07D181KB	115	150	180(162~198)	10	300	1200	1750	11.7	16.0	0.25	280
07D201KA	07D201KB	130	170	200(180~220)	10	340	1200	1750	13.0	17.0	0.25	250
07D221KA	07D221KB	140	180	220(198~242)	10	360	1200	1750	14.0	19.0	0.25	230
07D241KA	07D241KB	150	200	240(216~264)	10	395	1200	1750	15.0	21.0	0.25	210
07D271KA	07D271KB	175	225	270(243~297)	10	455	1200	1750	18.0	24.0	0.25	185
07D301KA	07D301KB	190	250	300(270~330)	10	500	1200	1750	20.0	26.0	0.25	165
07D331KA	07D331KB	210	275	330(297~363)	10	550	1200	1750	23.0	28.0	0.25	150
07D361KA	07D361KB	230	300	360(324~396)	10	595	1200	1750	24.0	32.0	0.25	140
07D391KA	07D391KB	250	320	390(351~429)	10	650	1200	1750	26.0	35.0	0.25	130
07D431KA	07D431KB	275	350	430(387~473)	10	710	1200	1750	28.0	40.0	0.25	115
07D471KA	07D471KB	300	385	470(423~517)	10	775	1200	1750	29.0	42.0	0.25	105
07D511KA	07D511KB	320	415	510(459~561)	10	845	1200	1750	31.0	45.0	0.25	100
07D561KA	07D561KB	350	460	560(504~616)	10	925	1200	1750	35.0	49.0	0.25	90
07D621KA	07D621KB	385	505	620(558~682)	10	1025	1200	1750	38.0	55.0	0.25	80
07D681KA	07D681KB	420	560	680(612~748)	10	1120	1200	1750	42.0	60.0	0.25	75
07D751KA	07D751KB	460	615	750(675~825)	10	1240	1200	1750	45.0	64.0	0.25	70
07D781KA	07D781KB	485	640	780(702~858)	10	1290	1200	1750	48.0	69.0	0.25	65
07D821KA	07D821KB	510	670	820(738~902)	10	1355	1200	1750	52.0	73.0	0.25	60

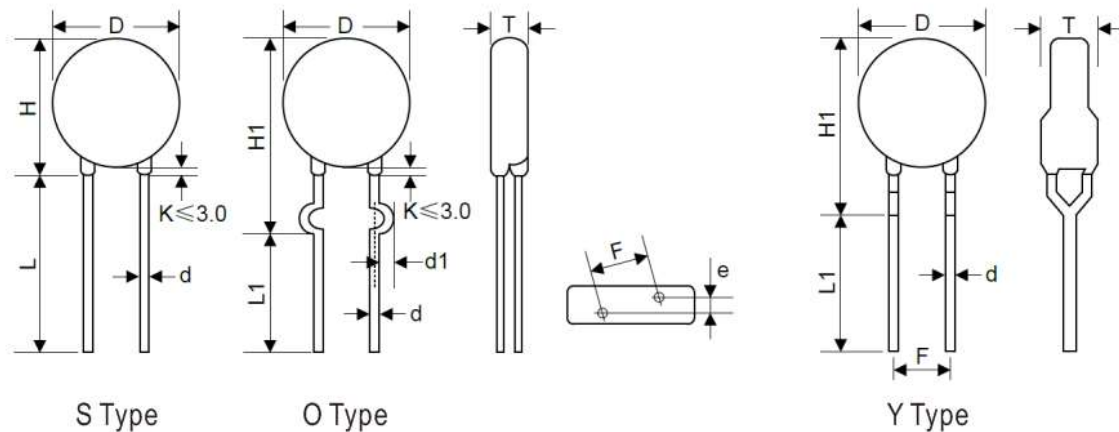
Notes: 1.The tolerance of varistor voltage between 18V and 27V is more than 10%;

2. Leakage Current (@83% of V_{1mA}): IR≤50 μ A (180K~680K) ; IR≤25 μ A (820K~821K).

3. The foot shape can be customized according to customer needs.



Dimensions



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

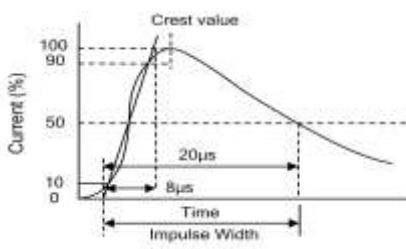
Unit: mm

Table 1	
Symbol	Dimension
H	7.5~13.0
H1	9.0~13.5
L(min)	20
L1(min)	15
D(max)	7.0~10.0
F	5.0 ± 0.8
T	Table 2
$e(\pm 0.8)$	Table 2
$d(\pm 0.05)$	0.6
$d1(\pm 0.4)$	1.2

Unit: mm

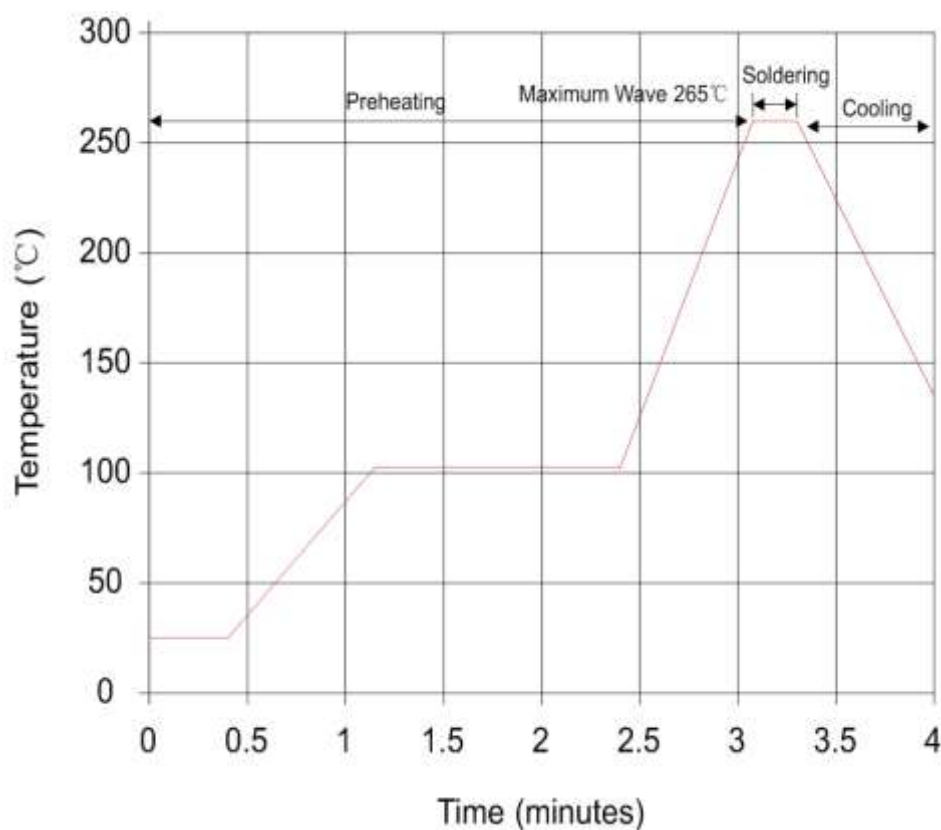
Table 2					
Model	T	e	Model	T	e
180K	2.03~4.85	1.3	241K	2.47~5.53	2.0
220K	2.18~4.98	1.4	271K	2.57~5.71	2.2
270K	2.23~5.17	1.6	301K	2.66~5.88	2.3
330K	2.36~5.35	1.5	331K	2.76~6.06	2.3
390K	2.31~5.16	1.6	361K	2.86~6.24	2.5
470K	2.44~5.37	1.7	391K	2.95~6.42	2.6
560K	2.58~5.60	1.8	431K	3.08~6.66	2.8
680K	2.77~5.88	2.0	471K	3.21~6.89	3.0
820K	2.18~4.89	1.4	511K	3.34~7.13	3.2
101K	2.28~5.06	1.6	561K	3.50~7.43	3.4
121K	2.40~5.26	1.7	621K	3.69~7.79	3.7
151K	2.18~4.99	1.8	681K	3.89~8.14	4.0
181K	2.28~5.17	1.7	751K	4.11~8.56	4.1
201K	2.36~5.32	1.8	781K	4.21~8.74	4.2
221K	2.41~5.41	1.9	821K	4.34~8.98	4.4

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 $\pm 10\%$ when one impulse of 10/1000 μ s or 2ms is applied.						
Withstanding Surge Current	The maximum current within the varistor voltage change of $\pm 10\%$ with the standard impulse current (8/20 μ s) 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 $ $\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 $	$\leq 0.05\%/^{\circ}C$					
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 border="1"> <tr> <td rowspan="2">07Φ series</td><td>180K to 680K</td><td>25A (8/20μs)</td></tr> <tr> <td>820K to 821K</td><td>50A (8/20μs)</td></tr> </table>	07 Φ series	180K to 680K	25A (8/20 μ s)	820K to 821K	50A (8/20 μ s)	$\frac{\Delta V_b}{V_b} \leq \pm 10\%$
07 Φ series	180K to 680K		25A (8/20 μ s)				
	820K to 821K	50A (8/20 μ s)					

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

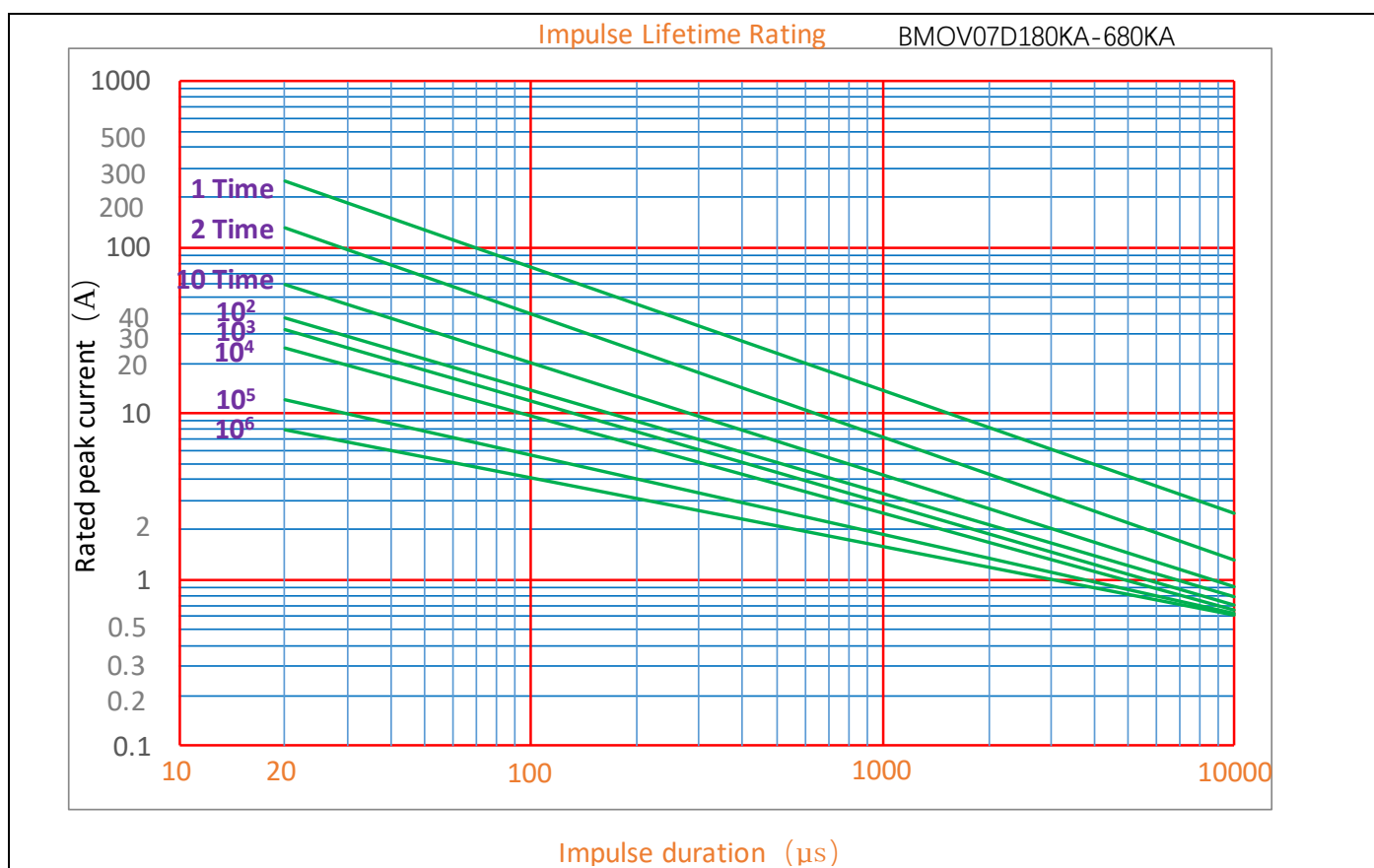
Items	Test conditions / Methods	Specifications	
Tensile Strength of Terminals	Gradually applying the force specified and keeping the unit fixed for 10±1 sec	No visible damage ΔV1mA/V1mA ≤5%	
	Terminal diameter (mm)		Force (kg)
	0.5 < d ≤ 0.8		1.0
	0.8 < d ≤ 1.25		2.0
	1.25 < d		4.0
Bending Strength of 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%	
	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℃ Dipping Time: 2±0.5 sec	Atleast 95% of terminal electrode is covered by new solder	
Resistance to Soldering Heat	Solder Temp: 260±5℃ Dipping Time: 10±1 sec	No visible damage ΔV1mA/V1mA ≤10%	

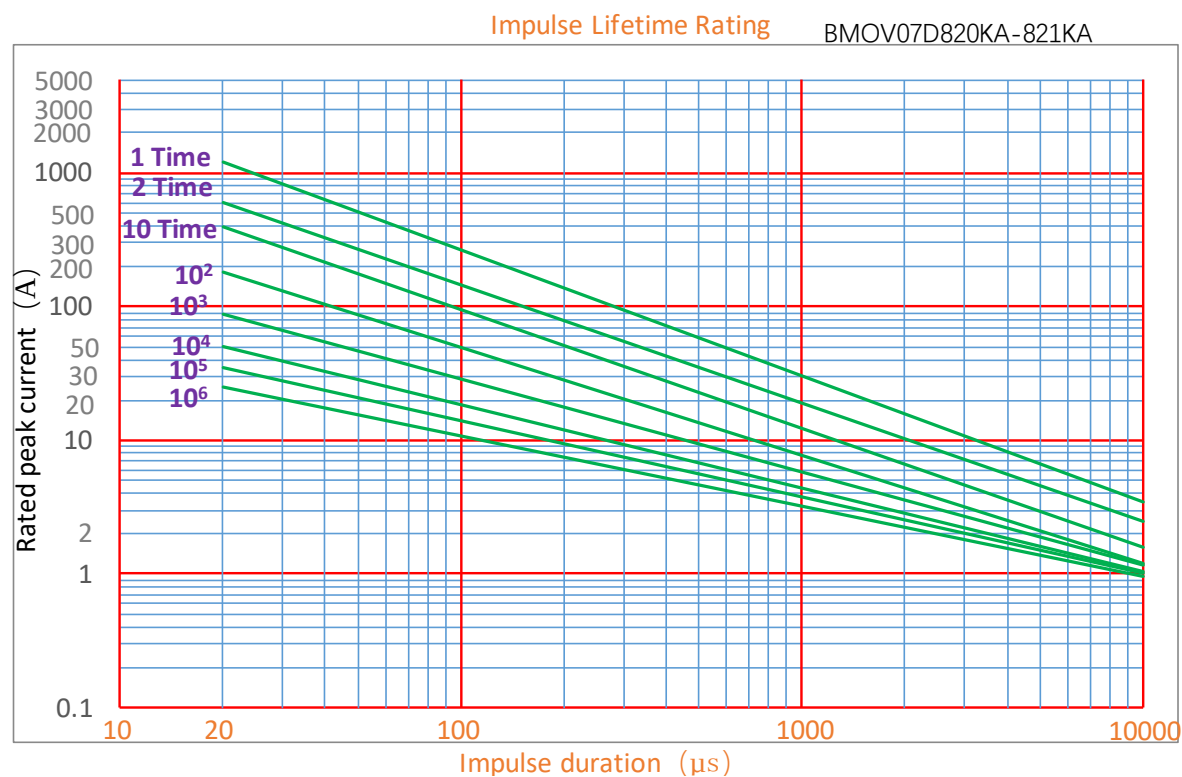
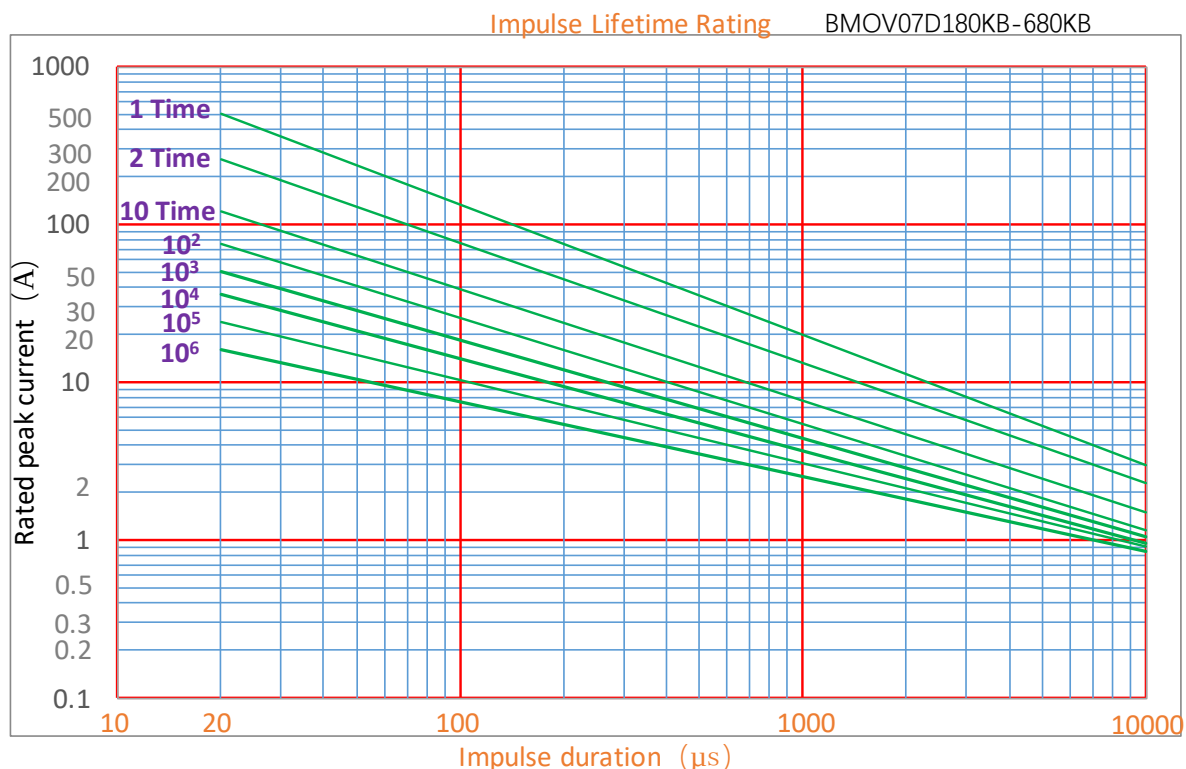
Reliability

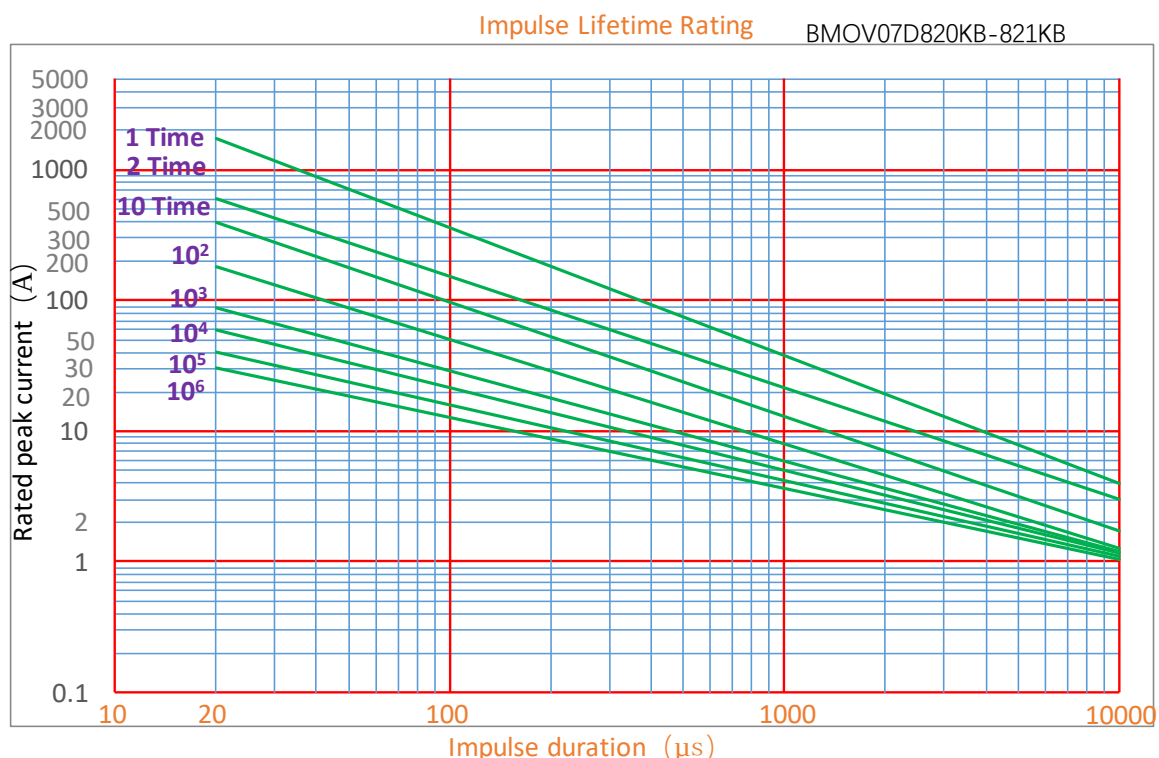
Items	Test conditions / Methods	Specifications		
High Temperature Storage	Ambient Temp: 125±2℃ Duration: 1000hrs	ΔV1mA/V1mA ≤5%		
Low Temperature Storage	Ambient Temp: -40±2℃ Duration: 1000hrs	ΔV1mA/V1mA ≤5%		
Humidity	Ambient Temp: 40±2℃, 90~95% R.H. Duration: 1000hrs	ΔV1mA/V1mA ≤5%		
Temperature Cycle	The conditions shown below shall be repeated 5 cycles		No visible damage ΔV1mA/V1mA ≤5%	
	Step	Temperature (℃)		Period (minutes)
	1	-40±3		30±3
	2	Room temperature		15±3
	3	125±3		30±3
	4	Room temperature		15±3

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~821K)	No visible damage

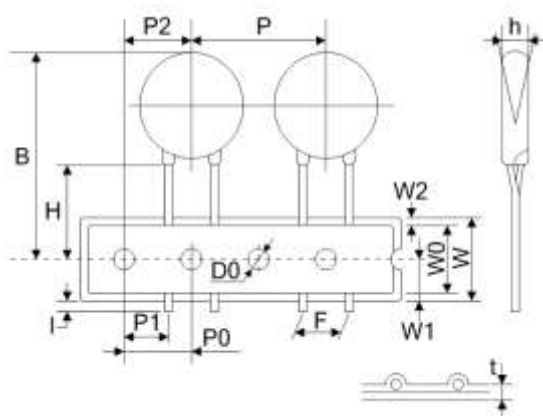
Maximum Surge Current Derating Curve





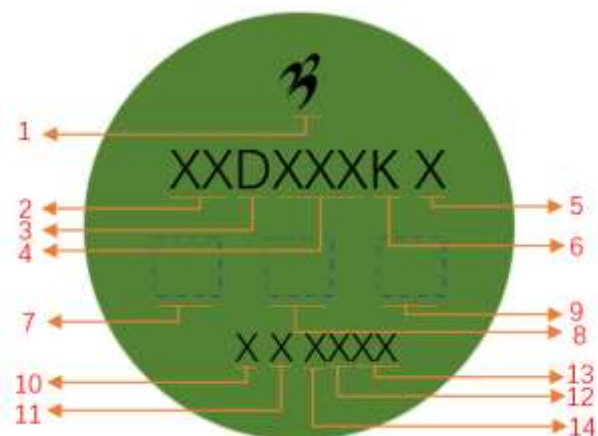


Taping Dimensions



Symbol	Dimension (mm)
P	12.7±1.0
P0	12.7±1.0
P1	3.85±0.7
P2	6.35±1.3
F	5.0±0.8
h	0±2
w	18.0±1.0
W0	12.0±1.0
W1	9.0±0.5
W2	3.0max
H	20.0±2.0
I	2.0max
D0	4.0±0.2
t	0.6±0.3
B	32max

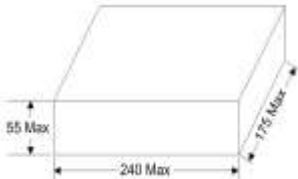
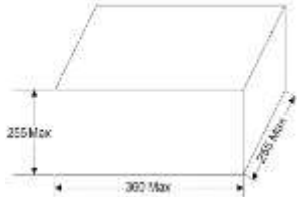
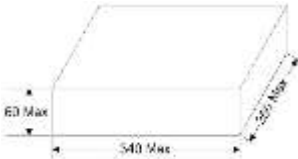
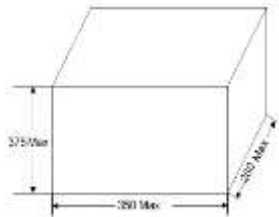
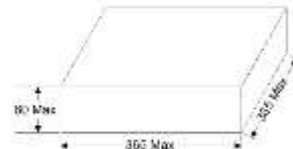
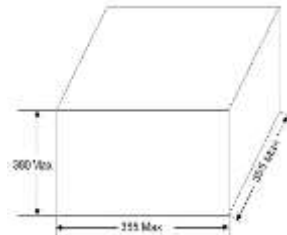
Marking Code



- 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, $\pm 10\%$; L: $\pm 15\%$; M: $\pm 20\%$
- 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			1000pcs/bag 2bags/box (180K~681K)
			500pcs/bag 2bags/box (751K~821K)
Tape & Box			1500pcs/box (180K~331K)
			1500pcs/box (361K~391K)
			1000pcs/box (431K~471K)
			1000pcs/box (561K~681K)
Reel size	Inner box size	Outer box size	Quantity
Tape & Reel			2000pcs/reel (180K~331K)
			1500pcs/reel (361K~391K)
			1500pcs/reel (431K~471K)
			1500pcs/reel (561K~681K)