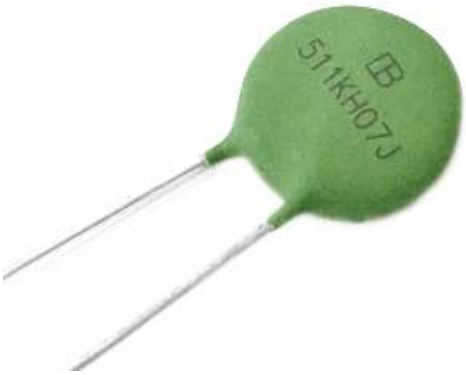
Metal Oxide Varistors (MOV) Data Sheet

Features

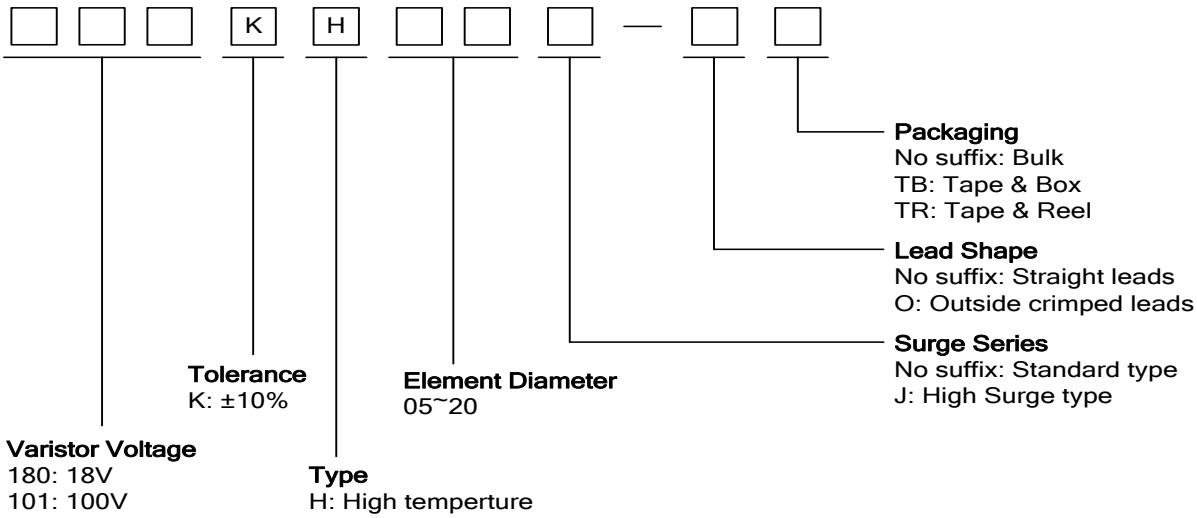
- Wide operating voltage (V_{1mA}) range from 18V to 91
- Fast responding to transient over-voltage
- Large absorbing transient energy capability
- Low clamping ratio and no follow-on current
- Meets MSL level 1, per J-STD-020
- Operating Temperature：-40℃ ~ +140℃
- Storage Temperature：-40℃ ~ +140℃
- Safety certification: UL: E327997
  TUV: B0960480010
  CQC:17001172542
  CSA: 246579



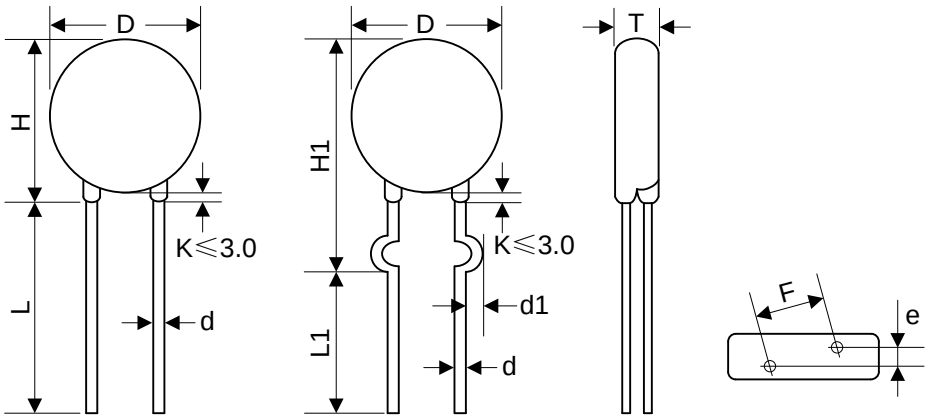
Applications

- 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

Table 1 Unit: mm	
Symbol	Dimension
H	7.5~13.0
H1	9.0~13.5
L(min.)	20.0
L1(min.)	15.0
D	7.0~10.0
F(±0.8)	5.0
T	Table 2
e(±0.8)	Table 2
d(±0.05)	0.6
d1(±0.4)	1.2

Table 2 Unit: mm					
Model	T	e	Model	T	e
180K	2.03~4.85	1.3	271K	2.57~5.71	2.2
220K	2.18~4.98	1.4	301K	2.66~5.88	2.3
270K	2.23~5.17	1.6	331K	2.76~6.06	2.3
330K	2.36~5.35	1.5	361K	2.86~6.24	2.5
390K	2.31~5.16	1.6	391K	2.95~6.42	2.6
470K	2.44~5.37	1.7	431K	3.08~6.66	2.8
560K	2.58~5.60	1.8	471K	3.21~6.89	3.0
680K	2.77~5.88	2.0	511K	3.34~7.13	3.2
820K	2.18~4.89	1.4	561K	3.50~7.43	3.4
101K	2.28~5.06	1.6	621K	3.69~7.79	3.7
121K	2.40~5.26	1.7	681K	3.89~8.14	4.0
151K	2.18~4.99	1.8	751K	4.11~8.56	4.1
181K	2.28~5.17	1.7	781K	4.21~8.74	4.2
201K	2.36~5.32	1.8	821K	4.34~8.98	4.4
221K	2.41~5.41	1.9	911K	4.63~9.51	4.6
241K	2.47~5.53	2.0			

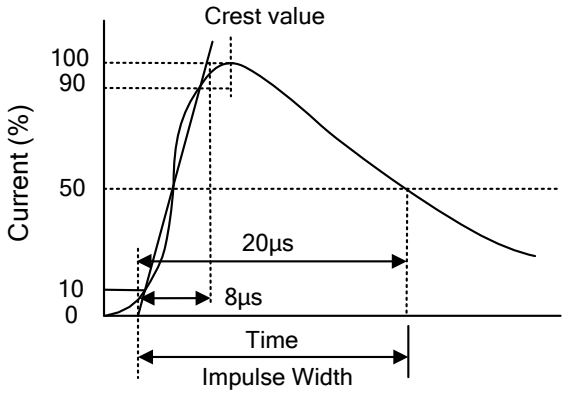
Electrical Characteristics

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)
180KH07	180KH07J	11	14	18(15~21.6)	2.5	36	250	500	0.9	2.0	0.02	2800
220KH07	220KH07J	14	18	22(19.5~26)	2.5	43	250	500	1.1	2.4	0.02	2300
270KH07	270KH07J	17	22	27(24~31)	2.5	53	250	500	1.4	3.0	0.02	1800
330KH07	330KH07J	20	26	33(29.5~36.5)	2.5	65	250	500	1.7	3.5	0.02	1500
390KH07	390KH07J	25	31	39(35~43)	2.5	77	250	500	2.1	4.0	0.02	1300
470KH07	470KH07J	30	38	47(42~52)	2.5	93	250	500	2.5	5.0	0.02	1100
560KH07	560KH07J	35	45	56(50~62)	2.5	110	250	500	3.1	6.0	0.02	890
680KH07	680KH07J	40	56	68(61~75)	2.5	135	250	500	3.6	7.0	0.02	740
820KH07	820KH07J	50	65	82(74~90)	10	135	1200	1750	5.0	10.0	0.25	600
101KH07	101KH07J	60	85	100(90~110)	10	165	1200	1750	6.5	12.0	0.25	500
121KH07	121KH07J	75	100	120(108~132)	10	200	1200	1750	7.8	13.0	0.25	420
151KH07	151KH07J	95	125	150(135~165)	10	250	1200	1750	9.7	15.0	0.25	330
181KH07	181KH07J	115	150	180(162~198)	10	300	1200	1750	11.7	16.0	0.25	280
201KH07	201KH07J	130	170	200(180~220)	10	340	1200	1750	13.0	17.0	0.25	250
221KH07	221KH07J	140	180	220(198~242)	10	360	1200	1750	14.0	19.0	0.25	230
241KH07	241KH07J	150	200	240(216~264)	10	395	1200	1750	15.0	21.0	0.25	210
271KH07	271KH07J	175	225	270(243~297)	10	455	1200	1750	18.0	24.0	0.25	185
301KH07	301KH07J	190	250	300(270~330)	10	500	1200	1750	20.0	26.0	0.25	165
331KH07	331KH07J	210	275	330(297~363)	10	550	1200	1750	23.0	28.0	0.25	150
361KH07	361KH07J	230	300	360(324~396)	10	595	1200	1750	24.0	32.0	0.25	140
391KH07	391KH07J	250	320	390(351~429)	10	650	1200	1750	26.0	35.0	0.25	130
431KH07	431KH07J	275	350	430(387~473)	10	710	1200	1750	28.0	40.0	0.25	115
471KH07	471KH07J	300	385	470(423~517)	10	775	1200	1750	29.0	42.0	0.25	105
511KH07	511KH07J	320	415	510(459~561)	10	845	1200	1750	31.0	45.0	0.25	100
561KH07	561KH07J	350	460	560(504~616)	10	925	1200	1750	35.0	49.0	0.25	90
621KH07	621KH07J	385	505	620(558~682)	10	1025	1200	1750	38.0	55.0	0.25	80
681KH07	681KH07J	420	560	680(612~748)	10	1120	1200	1750	42.0	60.0	0.25	75
751KH07	751KH07J	460	615	750(675~825)	10	1240	1200	1750	45.0	64.0	0.25	70
781KH07	781KH07J	485	640	780(702~858)	10	1290	1200	1750	48.0	69.0	0.25	65
821KH07	821KH07J	510	670	820(738~902)	10	1355	1200	1750	52.0	73.0	0.25	60
911KH07	911KH07J	550	745	910(819~1001)	10	1500	1200	1750	57.0	78.0	0.25	55

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

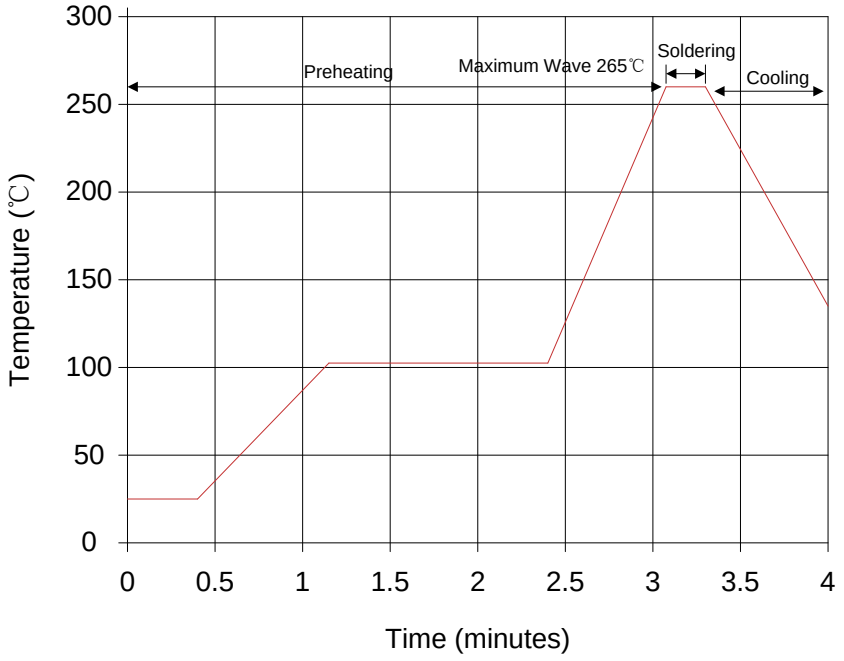
2. Leakage Current (@83% of V_{1mA})：IR≤40μA (180K~680K)　　IR≤20μA (820K~911K)

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 Vb.	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% with the standard impulse current (8/20μs) applied one time.	
Varistor Voltage Temp. Coefficient	$\left\lvert \frac{V_{1mA@140℃}-V_{1mA@25℃}}{V_{1mA@25℃}} \times \frac{1}{115} \times 100\%(\%/℃) \right\rvert$ $\left\lvert \frac{V_{1mA@-40℃}-V_{1mA@25℃}}{V_{1mA@25℃}} \times \frac{1}{65} \times 100\%(\%/℃) \right\rvert$	≤0.05%/℃
Surge Life	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. 7Φ series: 180K to 680K — 25A (8/20μs); 820K to 911K — 50A (8/20μs)	$\frac{\Delta Vb}{Vb} \leq \pm 10\%$

Soldering Recommendation

Lead-free Wave Soldering Recommendation



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

Recommendation Reworking Conditions with Soldering Iron

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

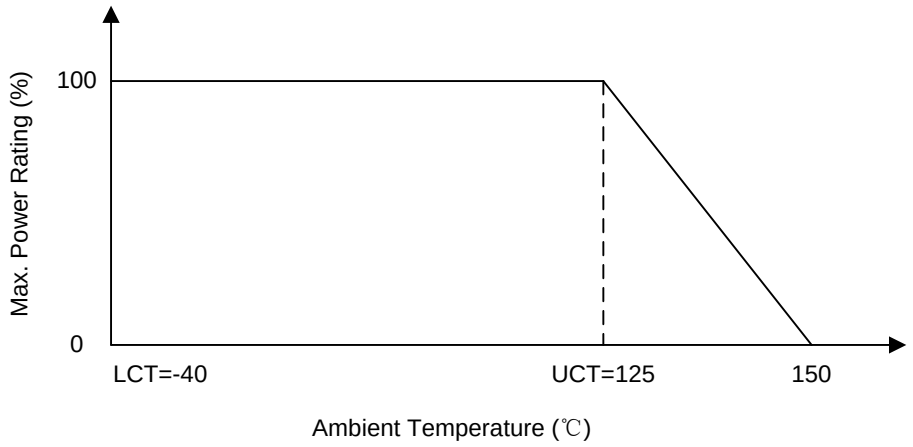
Mechanical Characteristics

Items	Test conditions / Methods	Specifications
Tensile Strength of Terminals	Gradually applying the force specified and keeping the unit fixed for 10±1 sec. 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 $\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 5\%$
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. 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 $\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 5\%$
Vibration	Frequency range: 10~55 Hz Amplitude: 0.75mm or 98m/s^2 Direction: 3 mutually perpendicular directions, 2hrs each.	No visible damage $\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 5\%$
Solder ability	Solder Temp: 245±5℃ 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℃ Dipping Time: 10±1 sec	No visible damage $\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 10\%$

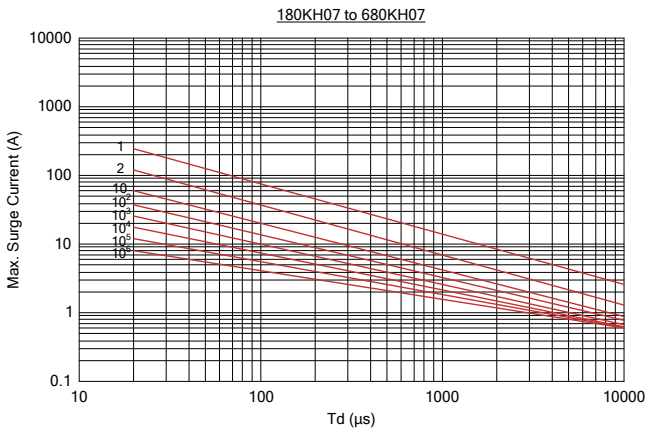
Reliability

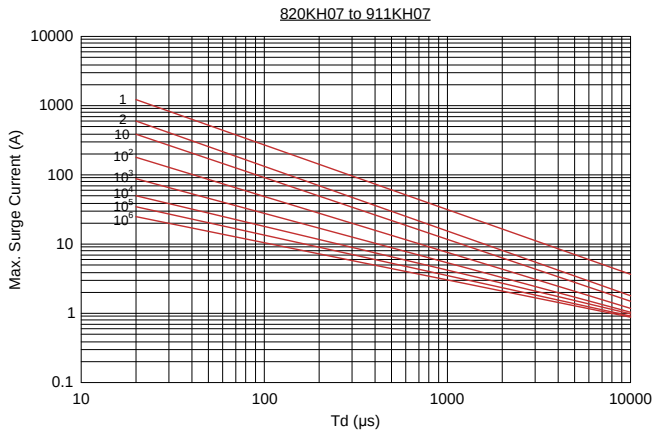
Items	Test conditions / Methods	Specifications
High Temperature Storage	Ambient Temp: 125±2℃ Duration: 1000hrs	$\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 5\%$
Low Temperature Storage	Ambient Temp: -40±2℃ Duration: 1000hrs	$\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 5\%$
Humidity	Ambient Temp: 40±2℃, 90~95% R.H. Duration: 1000hrs	$\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 5\%$
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 $\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 5\%$
High Temperature Load	Ambient Temp: 125±2℃ Duration: 1000hrs Load: Max. Allowable Voltage In AC eara.	$\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 10\%$
Damp Heat Load	Ambient Temp: 40±2℃, 90~95% R.H. Duration: 1000hrs Load: Max. Allowable Voltage	No visible damage $\lvert\Delta V_{1mA}/V_{1mA}\rvert \leq 10\%$
Voltage Proof	Metal balls method, 1000Vac 1 min.(180K~331K), 1500Vac 1 min.(361K~911K)	No visible damage

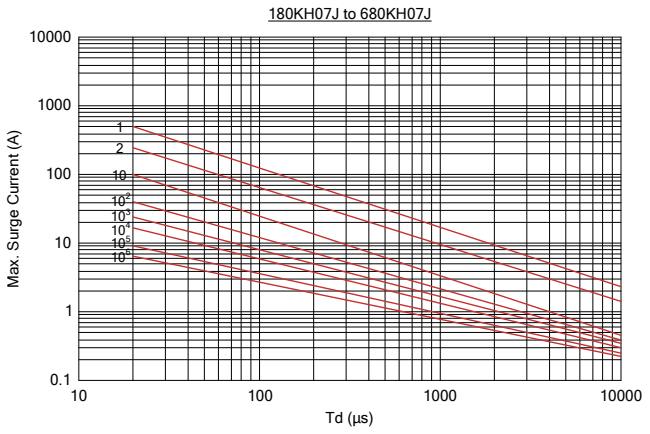
Power Derating Curve

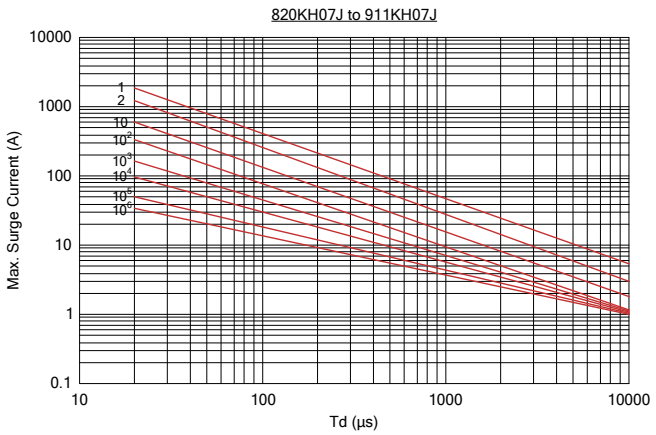


Maximum Surge Current Derating Curve

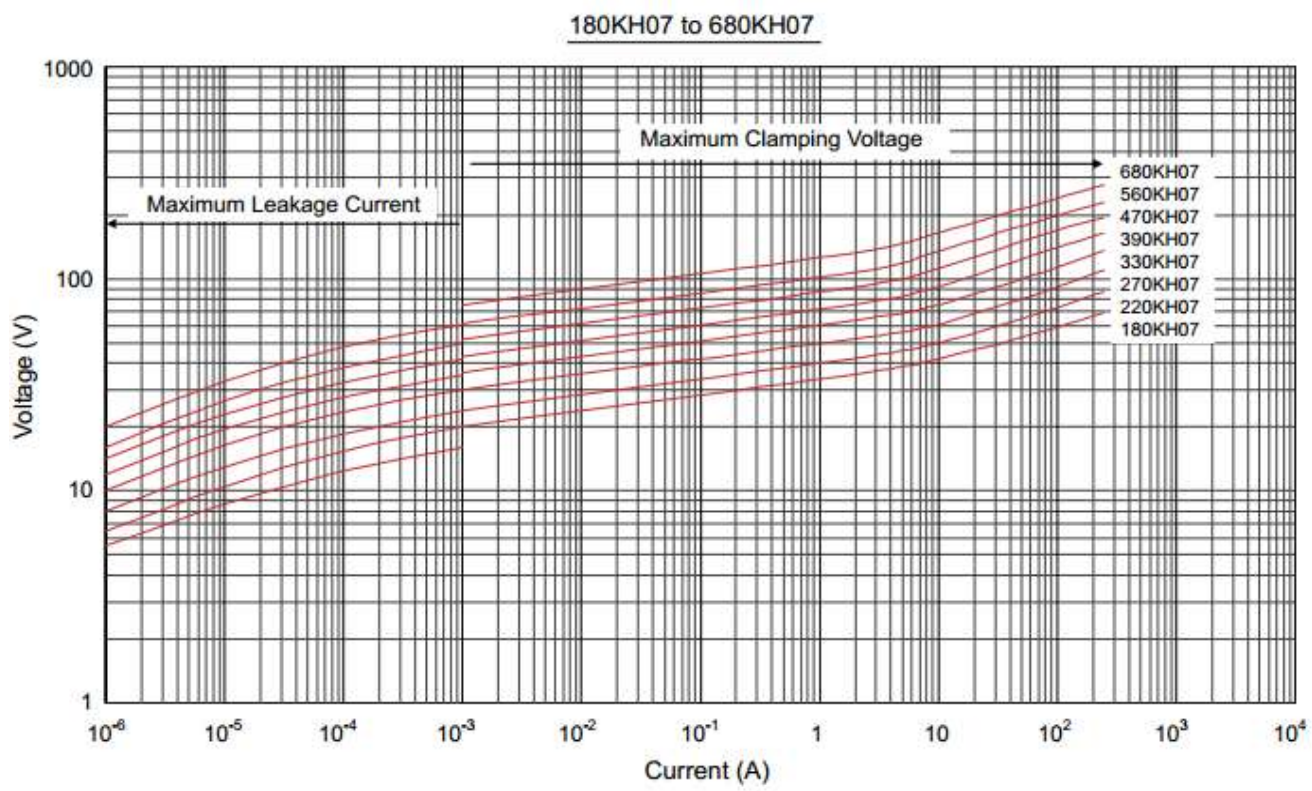


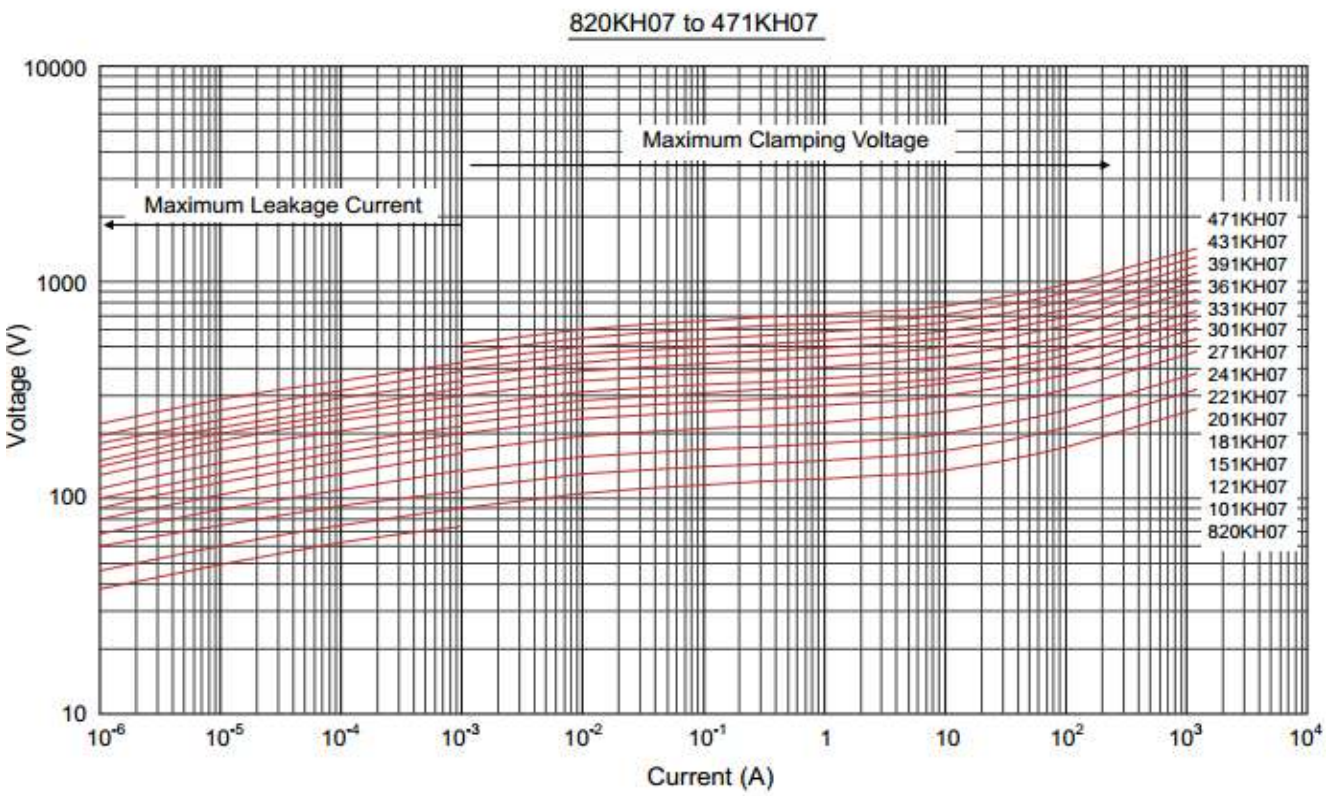




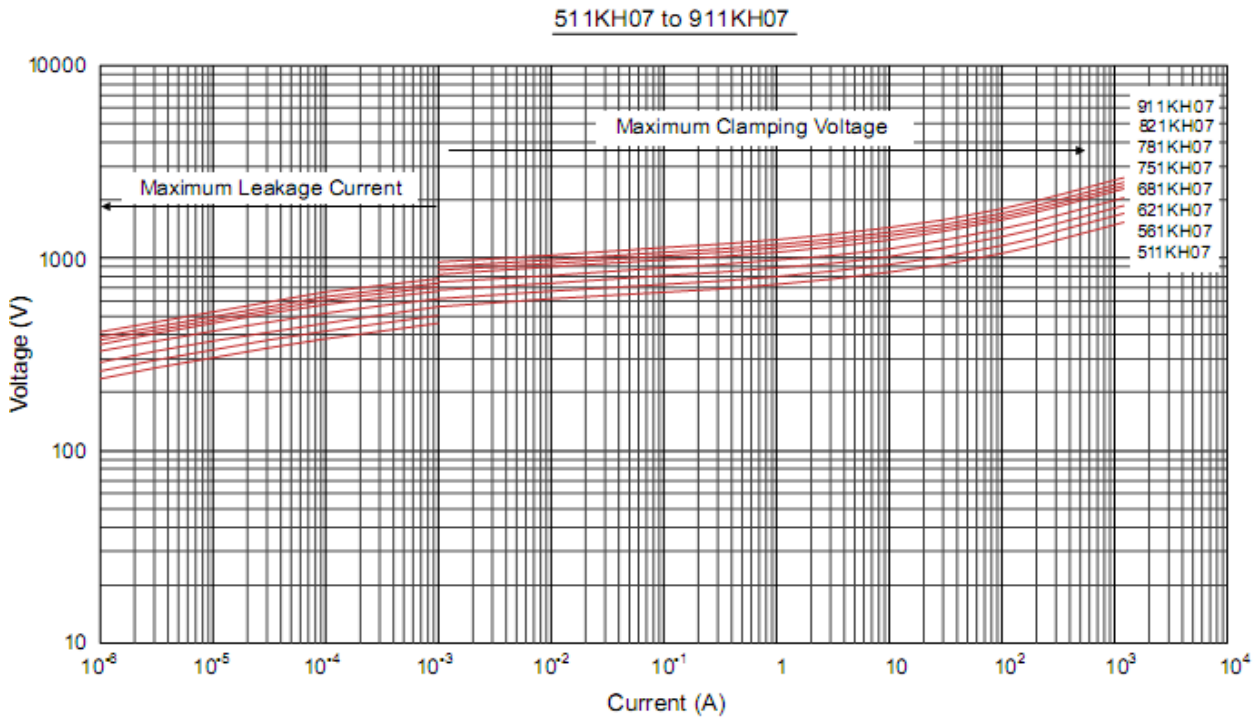


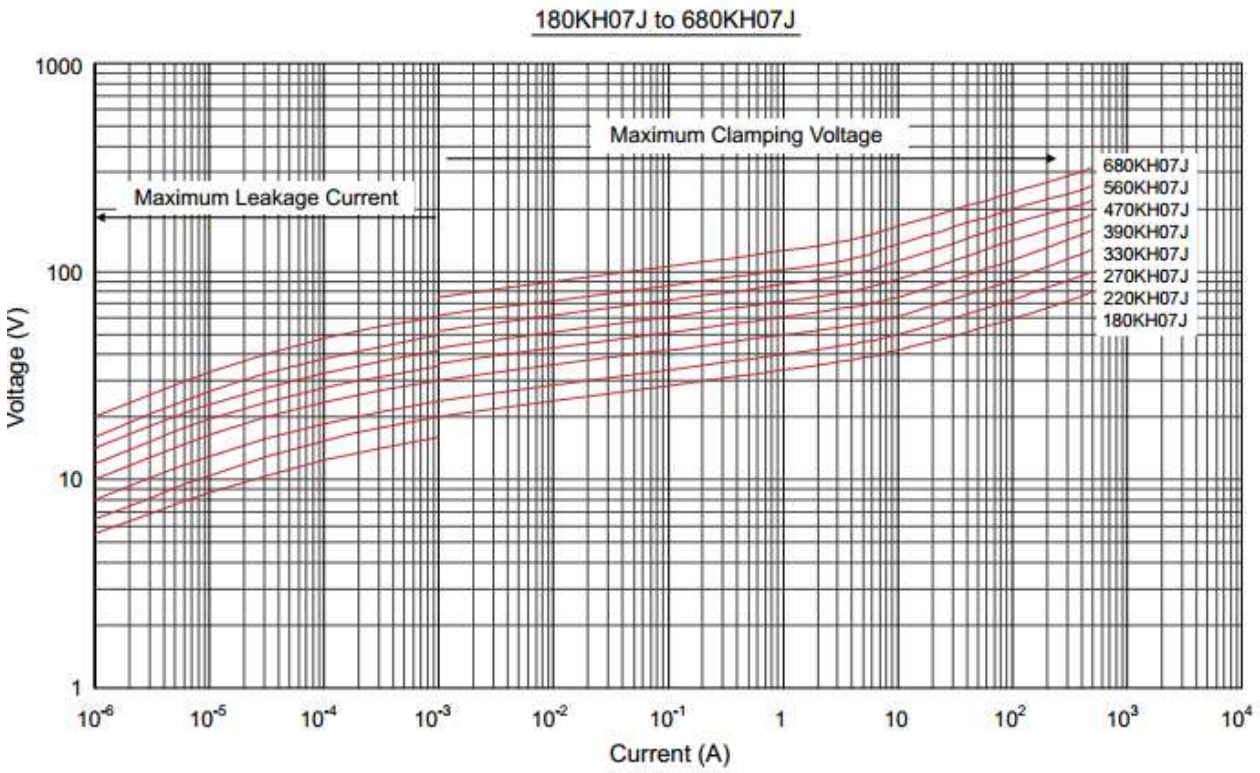
Maximum Leakage Current and Maximum Clamping Voltage Curve



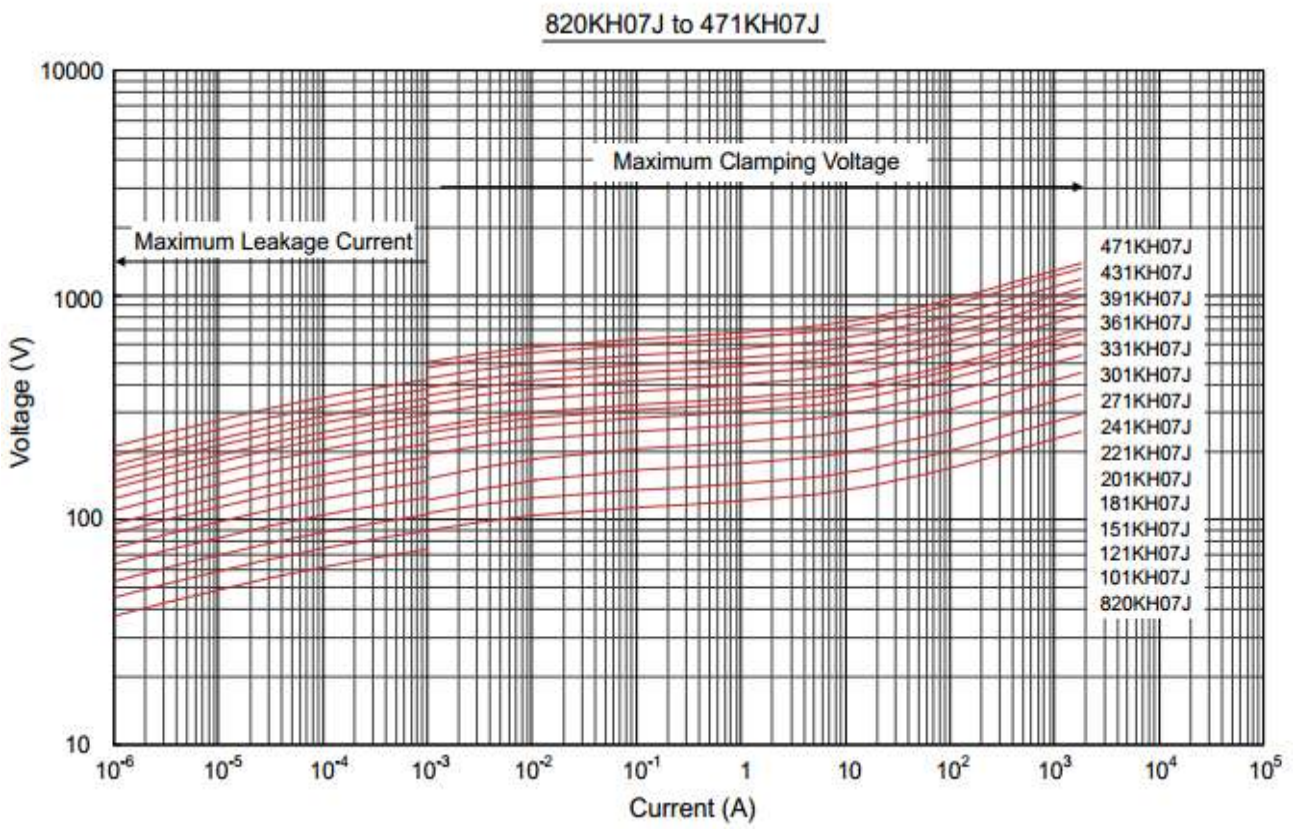


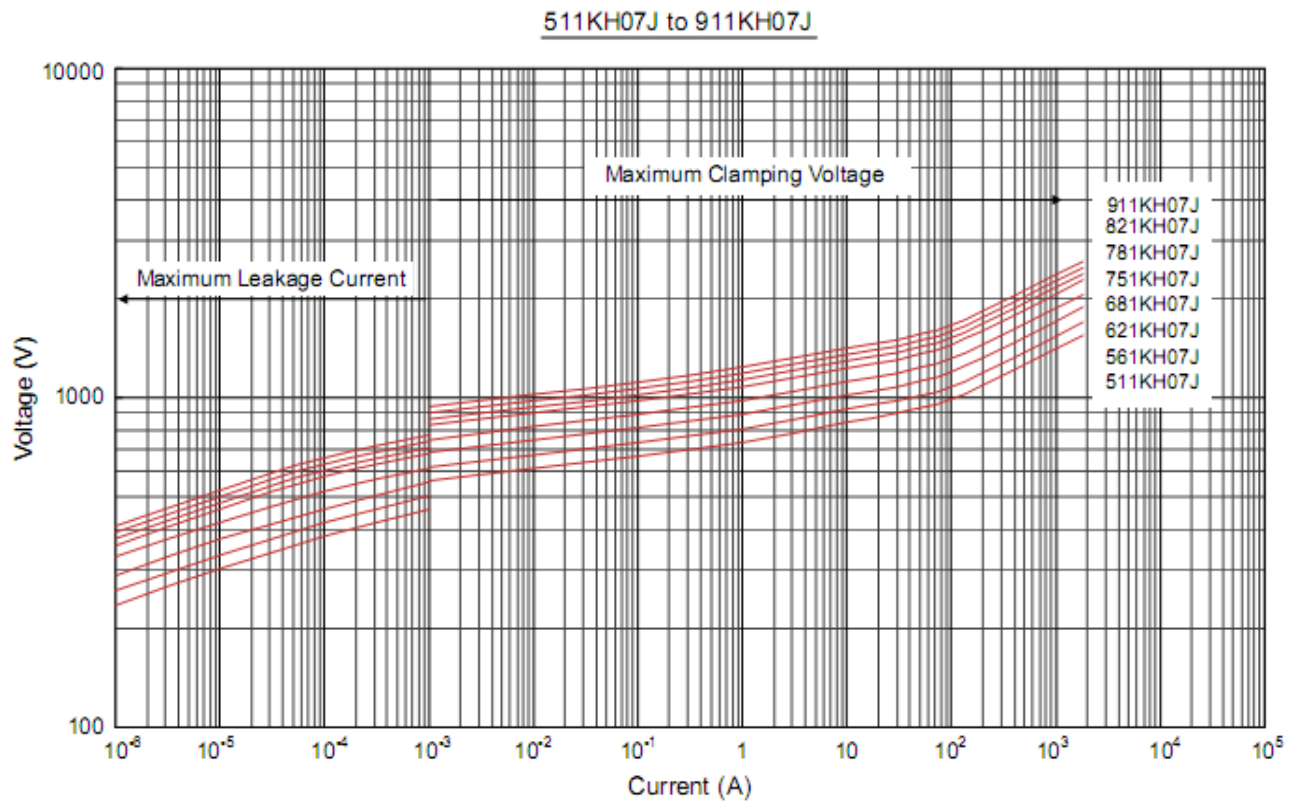
Maximum Leakage Current and Maximum Clamping Voltage Curve



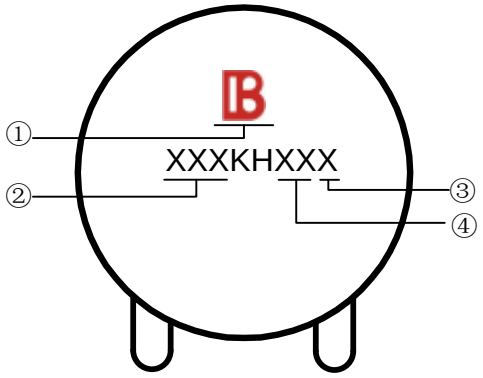


Maximum Leakage Current and Maximum Clamping Voltage Curve



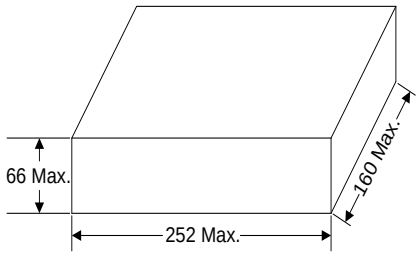


Marking Code



① Brightking Logo
② Varistor Voltage
③ “J” is High Surge Code, no “J” is Standard Surge
④ Varistor Size

Quantity

Packaging Dimensions (Unit: mm)	Quantity
Bulk 	1000pcs/bag 2bags/box (180K~391K)
	800pcs/bag 2bags/box (431K~621K)
	600pcs/bag 2bags/box (681K~911K)