

Features

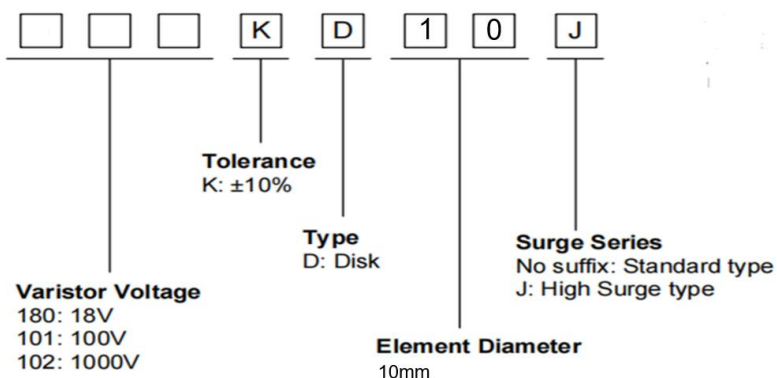
- ◆ Wide operating voltage (V_{1mA}) range from 18V to 1100V
- ◆ Fast responding to transient over-voltage
- ◆ Large absorbing transient energy capability
- ◆ Low clamping ratio and no follow-on current
- ◆ Meets MSL level 1, per J-STD-020
- ◆ Operating Temperature: $-40^{\circ}\text{C} \sim +105^{\circ}\text{C}$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



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 Coding System



Dimensions

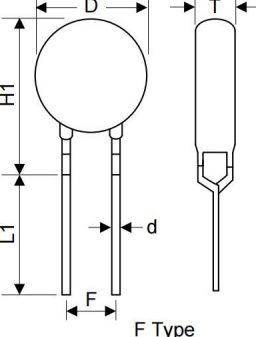
	Ref.	Millimeters	
		Min	Max
	H	10.5	16.0
	H1	13.0	17.5
	L	20.0	--
	L1	15.0	--
	D	10.0	12.5
	F	6.7	8.3
	T	Table 2	
	e(± 0.8)	Table 2	
	d(± 0.05)	0.75	0.85
	d1(± 0.4)	1	1.8

Table2 Millimeters					
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 ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

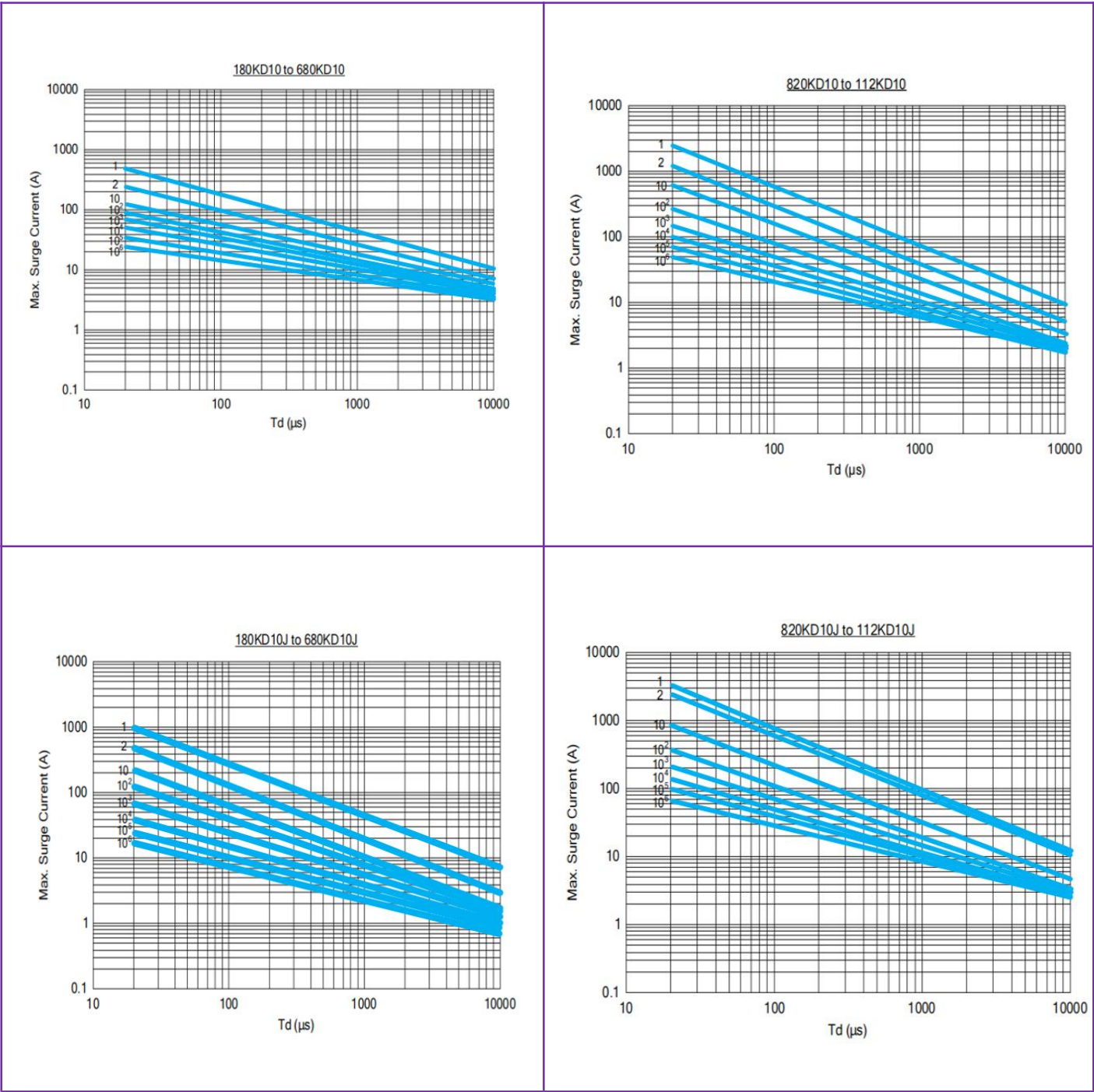
Part Number		Maximum Allowable Voltage		Varistor Voltage	Maximum Clamping Voltage		Withstanding Surge Current		Maximum Energy (10/1000 μs)		Rated Power	Typical Capacitance (Reference)
Standard	High Surge	$V_{AC}(V)$	$V_{DC}(V)$	$V_{1mA}(V)$	$I_P(A)$	$V_C(V)$	I (A) Standard	I (A) High Surge	(J) Standard	(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}): $I_R \leq 50\mu\text{A}$ (180K~680K) ; $I_R \leq 25\mu\text{A}$ (820K~182K)

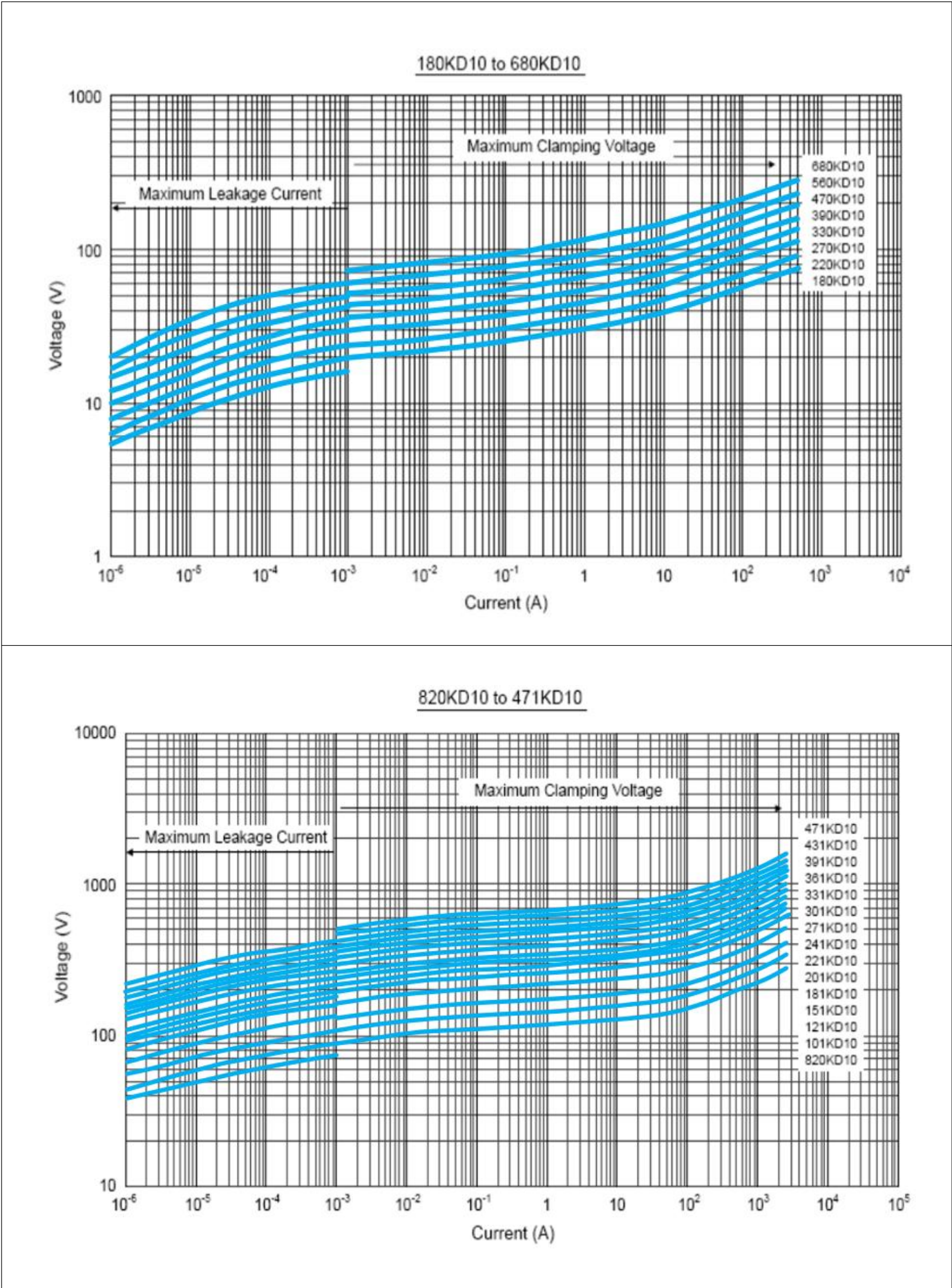
Reliability

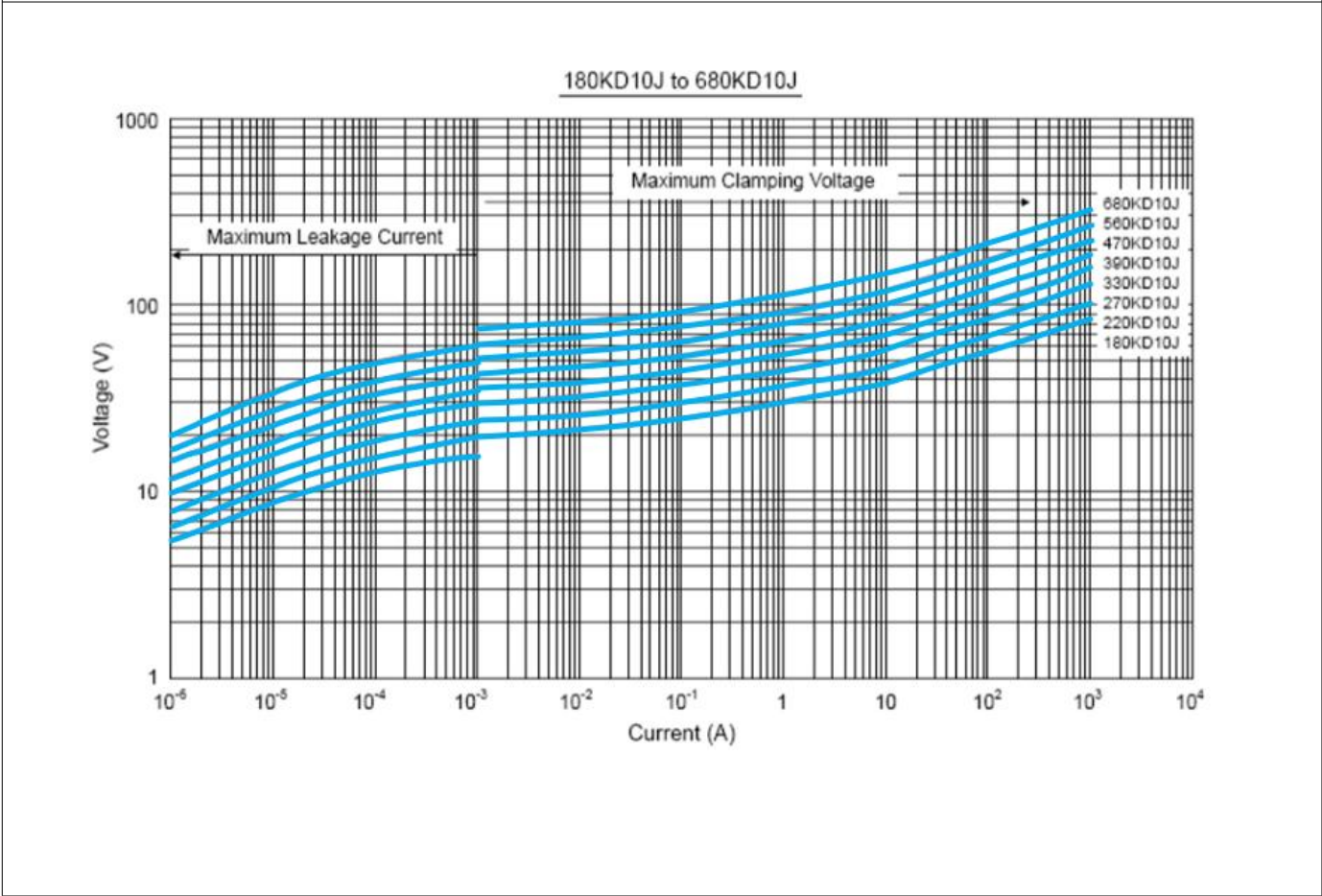
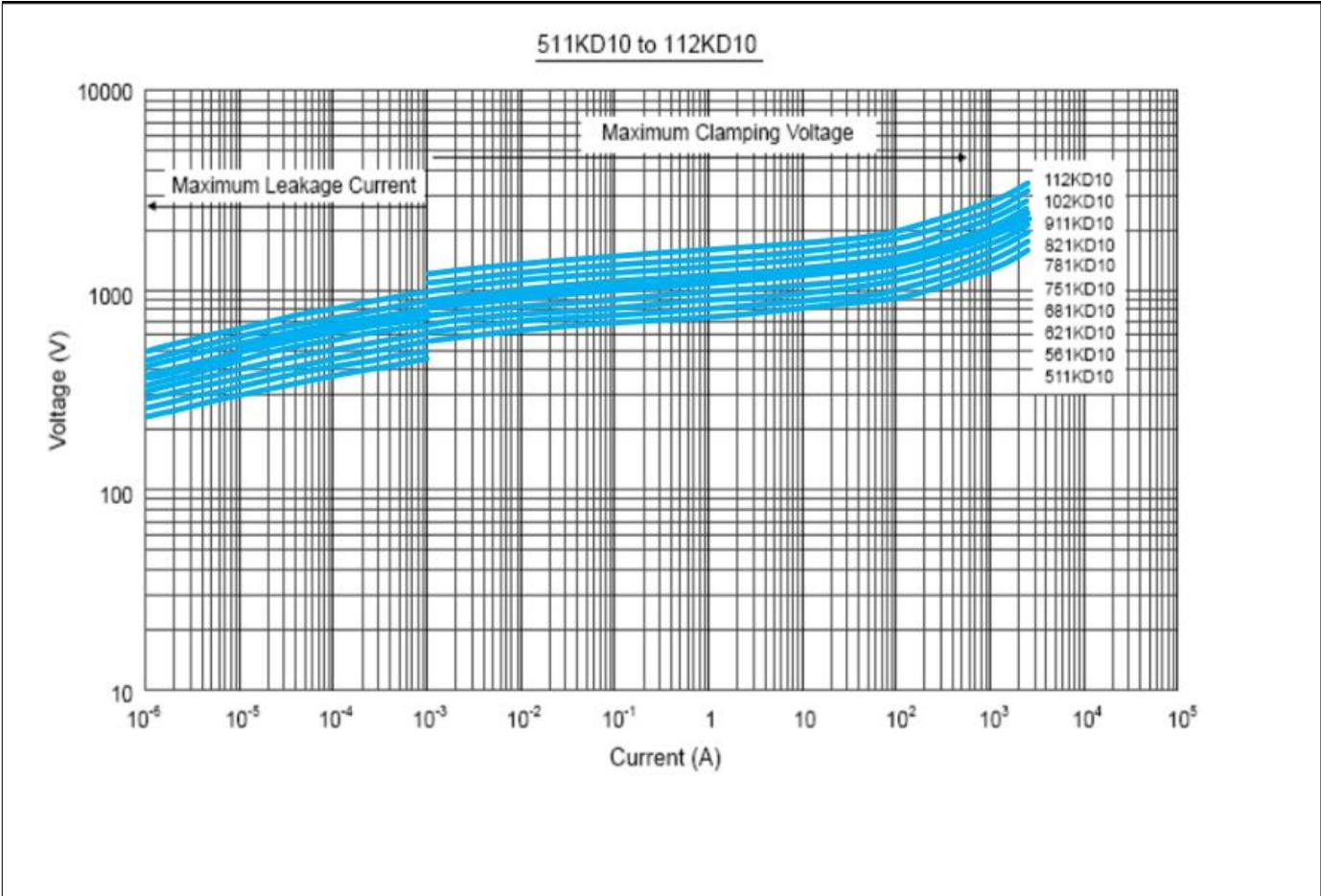
Items	Standard	Specifications	Test conditions / Methods				
Tensile Strength of Terminals	IEC60068-2-21	No visible damage $ \Delta V1mA/V1mA \leq 5\%$	Gradually applying the force specified and keeping the unit fixed for 10 ± 1 sec. Terminal diameter (mm) $0.5 < d \leq 0.8$ $0.8 < d \leq 1.25$ $1.25 < d$ Force (kg) 1.0 2.0 4.0				
Bending Strength of Terminals	IEC60068-2-21	No visible damage $ \Delta V1mA/V1mA \leq 5\%$	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) $0.5 < d \leq 0.8$ $0.8 < d \leq 1.25$ $1.25 < d$ Force (kg) 0.5 1.0 2.0				
Vibration	IEC60068-2-6	No visible damage $ \Delta V1mA/V1mA \leq 5\%$	Frequency range: 10~55 Hz Amplitude: 0.75mm or 98m/s2 Direction: 3 mutually perpendicular directions, 2hrs each.				
Solderability	IEC60068-2-20	At least 95% of terminal electrode is covered by new solder	Solder Temp: $245 \pm 5^\circ\text{C}$ Dipping Time: 2 ± 0.5 sec				
Resistance to Soldering Heat	IEC60068-2-20	No visible damage $ \Delta V1mA/V1mA \leq 5\%$	Solder Temp: $260 \pm 5^\circ\text{C}$ Dipping Time: 10 ± 1 sec				
High Temperature Storage	IEC60068-2-2	No visible damage $ \Delta V1mA/V1mA \leq 5\%$	Ambient Temp: $125 \pm 2^\circ\text{C}$ Duration: 1000 ± 24 hrs				
Low Temperature Storage	IEC60068-2-1	No visible damage $ \Delta V1mA/V1mA \leq 5\%$	Ambient Temp: $-40 \pm 2^\circ\text{C}$ Duration: 1000 ± 24 hrs				
Damp Heat, Steady State	IEC60068-2-78	No visible damage $ \Delta V1mA/V1mA \leq 10\%$ Insulation Resistance $\geq 100\text{M}\Omega$	The test is divided into two groups . a. $40 \pm 2^\circ\text{C}$, 90~95% RH for 1344 ± 24 hrs b. $40 \pm 2^\circ\text{C}$, 90~95% RH,at 10%VDC , 1344 ± 24 hrs				
High Temperature Load	MIL-STD-202 Method 108	$ \Delta V1mA/V1mA \leq 10\%$	Ambient Temp: $105 \pm 2^\circ\text{C}$ Duration: 1000 ± 24 hrs Load: Max. Allowable Voltage In AC.				
Temperature Cycle	IEC60068-2-14	No visible damage $ \Delta V1mA/V1mA \leq 5\%$	The conditions shown below shall be repeated 5 cycles				
			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		
8/20μS Surge Life	IEC61051-1	No visible damage $\Delta Vb(1mA) \leq \pm 10\%$	1.2/50@8/20μs waveform,6KV/3KA , 4 phase angles $0^\circ / 90^\circ / 180^\circ / 270^\circ$,10 times per phase, a total of 40 times, with an interval of 1 minute				
10/1000μS Surge Life	IEC61051-1	No visible damage $ \Delta V1mA/V1mA \leq 10\%$	1.2/50@8/20μs waveform,6KV/3KA , 4 phase angles $0^\circ / 90^\circ / 180^\circ / 270^\circ$,10 times per phase, Total 40 times, interval time: 1min				
Voltage Proof	IEC61051-1	No visible damage	Metal balls method, 2500Vac 1 min.				

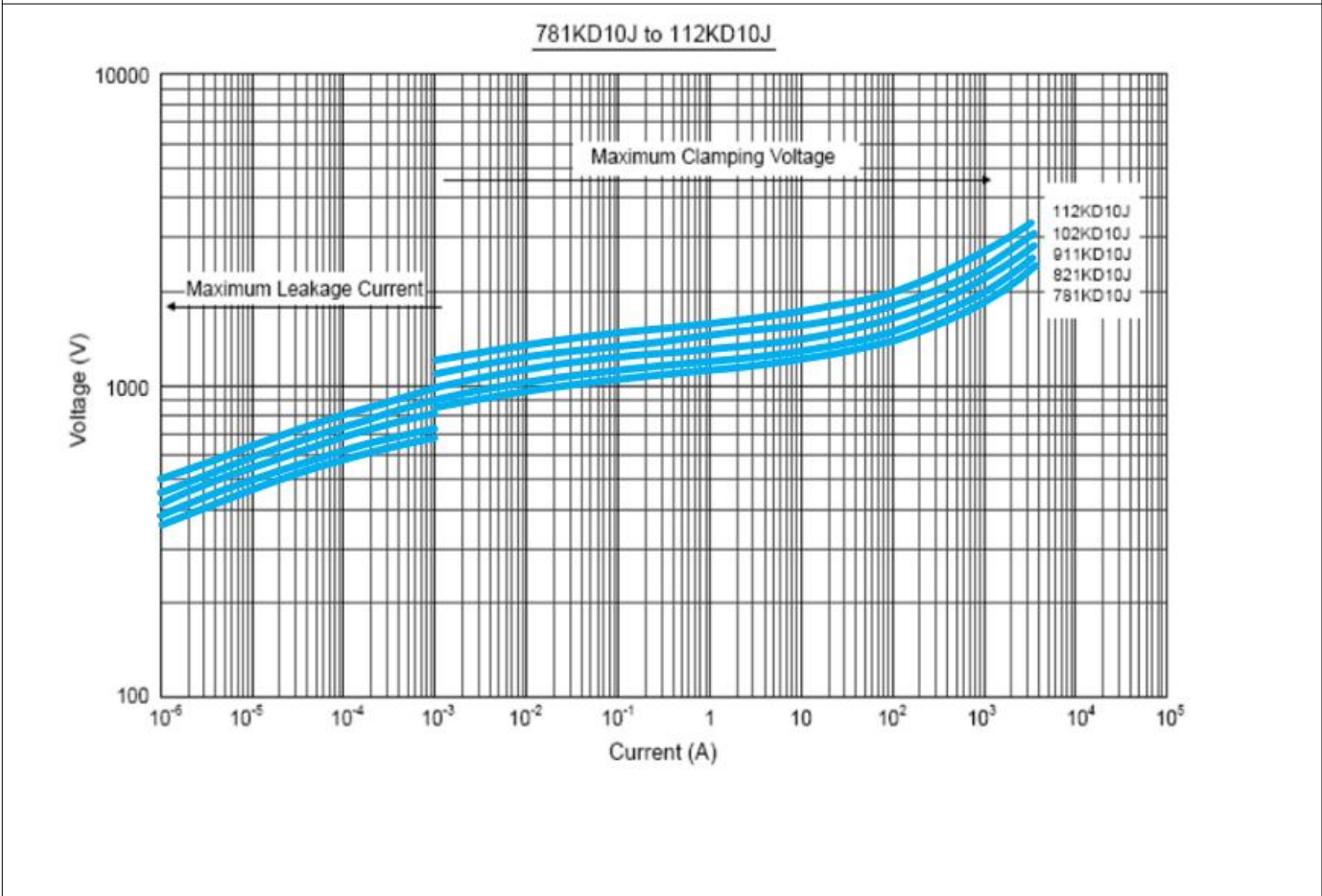
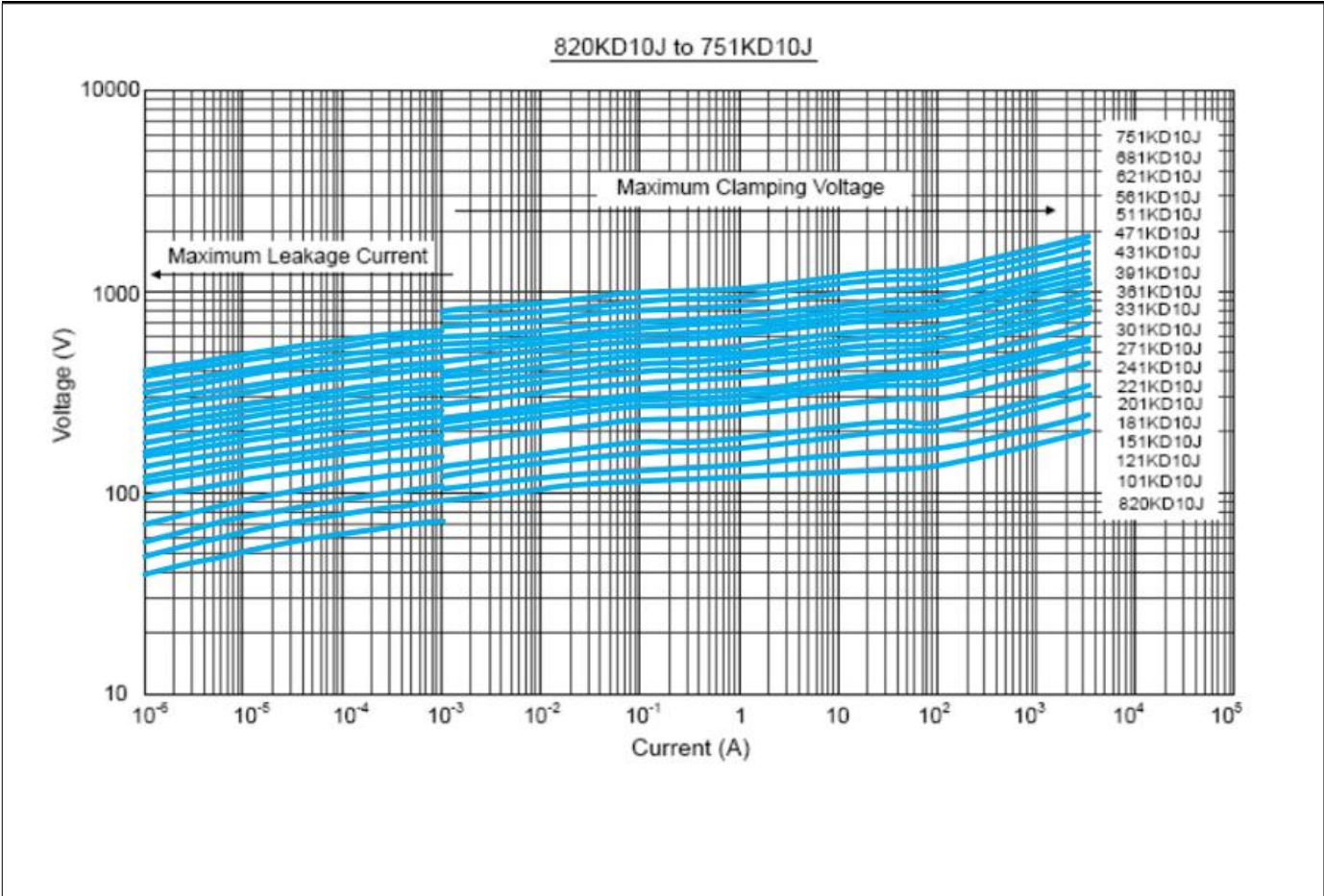
Maximum Surge Current Derating Curve



Maximum Leakage Current and Maximum Clamping Voltage Curve







Wave Soldering Parameters

