

PVR20D Series MOV Devices

Electrical Characteristics (Standard Product)

Part Number	Max Allowable Voltage		Varistor Voltage V_b @ 1 mA	Energy 10/1000 μ S	Withstand Surge Current 8/20 μ S	Rated Power (W)	Max Leakage Current @ V_{DC} (μ A)	Max Clamping Voltage		Typical Capacitance (pF)	Safety Certification	
	V_{RMS}	V_{DC}						V	I		UL/CSA	VDE
	(V)	(V)						(V)	(A)		(V)	(A)
PVR20D180L	10	14	18	6.1	2000	0.2	30	38	20.0	19000	✓	-
PVR20D220K	14	18	22	7.4	2000	0.2	30	43	20.0	15000	✓	-
PVR20D270K	17	22	27	9.1	2000	0.2	30	53	20.0	12000	✓	✓
PVR20D330K	20	26	33	11.2	2000	0.2	30	65	20.0	10000	✓	✓
PVR20D390K	25	31	39	13.2	2000	0.2	30	77	20.0	8500	✓	✓
PVR20D470K	30	38	47	16.8	2000	0.2	30	93	20.0	7400	✓	✓
PVR20D560K	35	45	56	19.6	2000	0.2	30	110	20.0	6500	✓	✓
PVR20D680K	40	56	68	23.8	2000	0.2	30	135	20.0	5800	✓	✓
PVR20D820K	50	65	82	37.8	6500	1.0	20	135	100.0	4900	✓	✓
PVR20D101K	60	85	100	42.0	6500	1.0	20	165	100.0	4000	✓	✓
PVR20D121K	75	100	120	56.0	6500	1.0	20	200	100.0	3300	✓	✓
PVR20D151K	95	125	150	70.0	6500	1.0	20	250	100.0	2700	✓	✓
PVR20D181K	115	150	180	84.0	6500	1.0	20	300	100.0	2200	✓	✓
PVR20D201K	130	170	200	98.0	6500	1.0	20	330	100.0	2000	✓	✓
PVR20D221K	140	180	220	105.0	6500	1.0	20	360	100.0	1800	✓	✓
PVR20D241K	150	200	240	112.0	6500	1.0	20	395	100.0	1650	✓	✓
PVR20D271K	175	225	270	126.0	6500	1.0	20	455	100.0	1500	✓	✓
PVR20D301K	190	250	300	133.0	6500	1.0	20	505	100.0	1300	✓	✓
PVR20D331K	210	275	330	140.0	6500	1.0	20	550	100.0	1200	✓	✓
PVR20D361K	230	300	360	168.0	6500	1.0	20	595	100.0	1100	✓	✓
PVR20D391K	250	320	390	182.0	6500	1.0	20	650	100.0	1000	✓	✓
PVR20D431K	275	350	430	196.0	6500	1.0	20	710	100.0	930	✓	✓
PVR20D471K	300	385	470	202.0	6500	1.0	20	775	100.0	850	✓	✓
PVR20D511K	320	415	510	207.0	6500	1.0	20	845	100.0	780	✓	✓
PVR20D561K	350	460	560	210.0	6500	1.0	20	920	100.0	715	✓	✓
PVR20D621K	385	505	620	224.0	6500	1.0	20	1025	100.0	650	✓	✓
PVR20D681K	420	560	680	224.0	6500	1.0	20	1120	100.0	600	✓	✓
PVR20D751K	460	615	750	230.0	6500	1.0	20	1240	100.0	530	✓	✓
PVR20D781K	485	640	780	240.0	6500	1.0	20	1290	100.0	510	✓	✓
PVR20D821K	510	670	820	250.0	6500	1.0	20	1355	100.0	500	✓	✓
PVR20D911K	550	745	910	260.0	6500	1.0	20	1500	100.0	440	✓	✓
PVR20D102K	625	825	1000	270.0	6500	1.0	20	1650	100.0	400	✓	-
PVR20D112K	680	895	1100	280.0	6500	1.0	20	1815	100.0	360	✓	-
PVR20D152K	900	1200	1500	420.0	6500	1.0	20	2475	100.0	260	✓	-
PVR20D182K	1000	1465	1800	560.0	6500	1.0	20	2970	100.0	220	✓	-

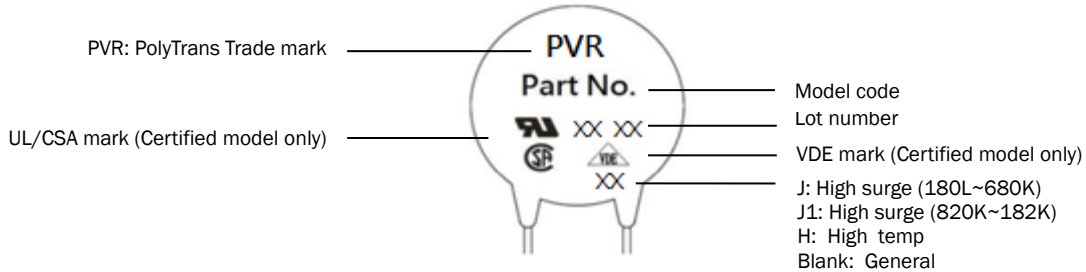
PVR20D Series MOV Devices

Electrical Characteristics (High Surge Product)

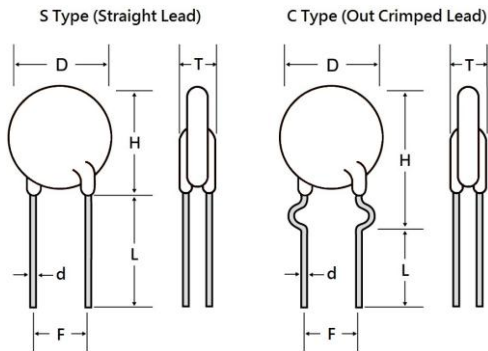
Part Number	Max Allowable Voltage		Varistor Voltage V_b @ 1 mA	Energy 10/1000 μ S	Withstand Surge Current 8/20 μ S	Rated Power (W)	Max Leakage Current @ V_{DC} (μ A)	Max Clamping Voltage		Typical Capacitance (pF)	Safety Certification	
	V_{RMS}	V_{DC}						V	I		UL/CSA	VDE
	(V)	(V)						(V)	(A)			
PVR20D180LJ	10	14	18	13.0	3000	0.2	30	38	20.0	19000	✓	-
PVR20D220KJ	14	18	22	16.0	3000	0.2	30	43	20.0	15000	✓	-
PVR20D270KJ	17	22	27	19.0	3000	0.2	30	53	20.0	12000	✓	✓
PVR20D330KJ	20	26	33	24.0	3000	0.2	30	65	20.0	10000	✓	✓
PVR20D390KJ	25	31	39	28.0	3000	0.2	30	77	20.0	8500	✓	✓
PVR20D470KJ	30	38	47	34.0	3000	0.2	30	93	20.0	7400	✓	✓
PVR20D560KJ	35	45	56	41.0	3000	0.2	30	110	20.0	6500	✓	✓
PVR20D680KJ	40	56	68	49.0	3000	0.2	30	135	20.0	5800	✓	✓
PVR20D820KJ	50	65	82	56.0	10000	1.0	20	135	100.0	4900	✓	✓
PVR20D101KJ	60	85	100	70.0	10000	1.0	20	165	100.0	4000	✓	✓
PVR20D121KJ	75	100	120	85.0	10000	1.0	20	200	100.0	3300	✓	✓
PVR20D151KJ	95	125	150	106.0	10000	1.0	20	250	100.0	2700	✓	✓
PVR20D181KJ	115	150	180	130.0	10000	1.0	20	300	100.0	2200	✓	✓
PVR20D201KJ	130	170	200	140.0	10000	1.0	20	330	100.0	2000	✓	✓
PVR20D221KJ	140	180	220	155.0	10000	1.0	20	360	100.0	1800	✓	✓
PVR20D241KJ	150	200	240	168.0	10000	1.0	20	395	100.0	1650	✓	✓
PVR20D271KJ	175	225	270	190.0	10000	1.0	20	455	100.0	1500	✓	✓
PVR20D301KJ	190	250	300	210.0	10000	1.0	20	505	100.0	1300	✓	✓
PVR20D331KJ	210	275	330	228.0	10000	1.0	20	550	100.0	1200	✓	✓
PVR20D361KJ	230	300	360	255.0	10000	1.0	20	595	100.0	1100	✓	✓
PVR20D391KJ	250	320	390	275.0	10000	1.0	20	650	100.0	1000	✓	✓
PVR20D431KJ	275	350	430	305.0	10000	1.0	20	710	100.0	930	✓	✓
PVR20D471KJ	300	385	470	350.0	10000	1.0	20	775	100.0	850	✓	✓
PVR20D511KJ	320	415	510	360.0	10000	1.0	20	845	100.0	780	✓	✓
PVR20D561KJ	350	460	560	366.0	10000	1.0	20	920	100.0	715	✓	✓
PVR20D621KJ	385	505	620	372.0	10000	1.0	20	1025	100.0	650	✓	✓
PVR20D681KJ	420	560	680	382.0	10000	1.0	20	1120	100.0	600	✓	✓
PVR20D751KJ	460	615	750	410.0	10000	1.0	20	1240	100.0	530	✓	✓
PVR20D781KJ	485	640	780	421.0	10000	1.0	20	1290	100.0	510	✓	✓
PVR20D821KJ	510	670	820	460.0	10000	1.0	20	1355	100.0	500	✓	✓
PVR20D911KJ	550	745	910	510.0	10000	1.0	20	1500	100.0	440	✓	✓
PVR20D102KJ	625	825	1000	560.0	10000	1.0	20	1650	100.0	400	✓	-
PVR20D112KJ	680	895	1100	620.0	10000	1.0	20	1815	100.0	360	✓	-
PVR20D152KJ	900	1200	1500	780.0	10000	1.0	20	2475	100.0	260	✓	-
PVR20D182KJ	1000	1465	1800	860.0	10000	1.0	20	2970	100.0	220	✓	-

PVR20D Series MOV Devices

Marking Definitions



Physical Dimensions



Symbol	Dimension	
	(mm)	
D	23.0 max.	
H	S type	25.0 max.
	C type	29.0 max.
L	15.0 min.	
F	10.0±0.8	
d	1.0±0.05	

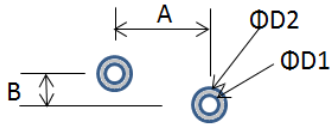
Part Number	T (Max)
	(mm)
PVR20D180L	4.0
PVR20D220K	4.0
PVR20D270K	4.0
PVR20D330K	4.2
PVR20D390K	4.5
PVR20D470K	4.5
PVR20D560K	4.1
PVR20D680K	4.1
PVR20D820K	4.1
PVR20D101K	4.3
PVR20D121K	4.5
PVR20D151K	4.8

Part Number	T (Max)
	(mm)
PVR20D181K	4.1
PVR20D201K	4.1
PVR20D221K	4.2
PVR20D241K	4.3
PVR20D271K	4.5
PVR20D301K	4.7
PVR20D331K	4.8
PVR20D361K	5.0
PVR20D391K	5.1
PVR20D431K	5.3
PVR20D471K	5.6
PVR20D511K	5.8

Part Number	T (Max)
	(mm)
PVR20D561K	6.2
PVR20D621K	6.4
PVR20D681K	6.4
PVR20D751K	6.5
PVR20D781K	6.8
PVR20D821K	7.2
PVR20D911K	7.6
PVR20D102K	7.8
PVR20D112K	8.5
PVR20D152K	11.0
PVR20D182K	12.5

PVR20D Series MOV Devices

Recommended Pad Layout



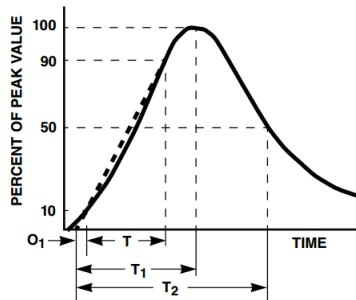
Symbol	Dimension (mm)
A	10.0 typ.
ΦD1	1.6 typ.
ΦD2	3.2 typ.

Part Number	B (Typ)
	(mm)
PVR20D180L	1.7
PVR20D220K	1.8
PVR20D270K	2.0
PVR20D330K	2.2
PVR20D390K	2.4
PVR20D470K	2.5
PVR20D560K	2.7
PVR20D680K	1.9
PVR20D820K	2.0
PVR20D101K	2.0
PVR20D121K	2.1
PVR20D151K	2.2

Part Number	B (Typ)
	(mm)
PVR20D181K	2.0
PVR20D201K	2.0
PVR20D221K	2.1
PVR20D241K	2.2
PVR20D271K	2.2
PVR20D301K	2.2
PVR20D331K	2.3
PVR20D361K	2.5
PVR20D391K	2.6
PVR20D431K	2.8
PVR20D471K	2.9
PVR20D511K	3.1

Part Number	B (Typ)
	(mm)
PVR20D561K	3.3
PVR20D621K	3.6
PVR20D681K	3.8
PVR20D751K	4.1
PVR20D781K	4.2
PVR20D821K	4.4
PVR20D911K	4.7
PVR20D102K	5.0
PVR20D112K	5.4
PVR20D152K	6.4
PVR20D182K	6.7

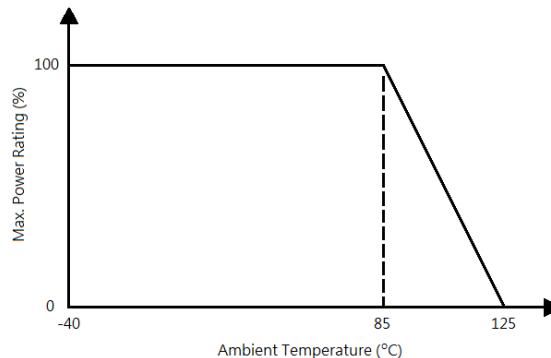
Peak Pulse Current Test Waveform



O₁ = Virtual Origin of Wave
 T = Time from 10% to 90% of Peak
 T₁ = Rise Time = 1.25 x T
 T₂ = Decay Time

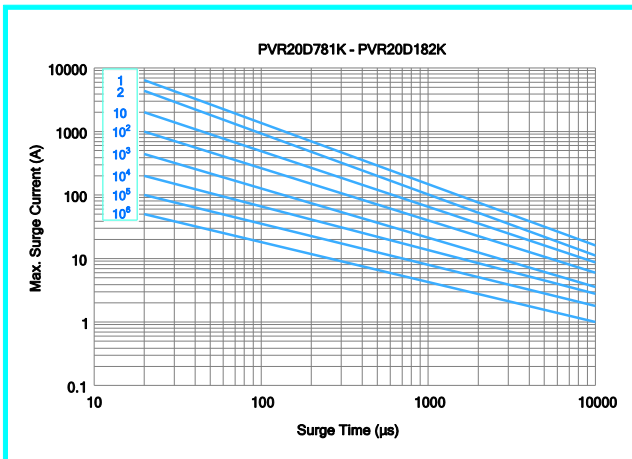
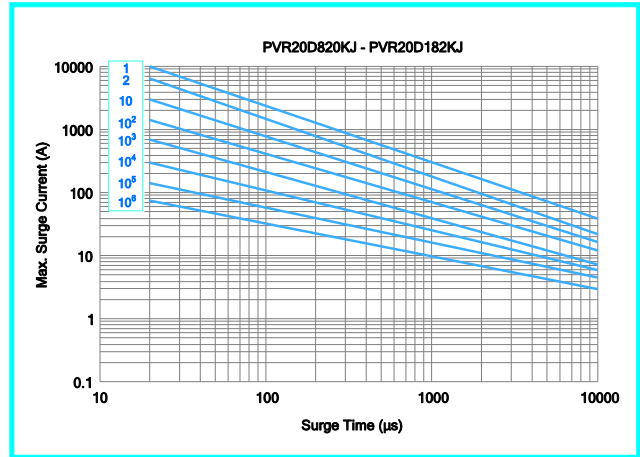
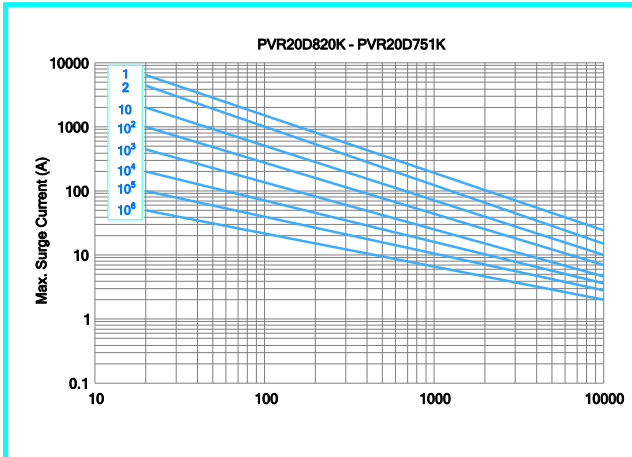
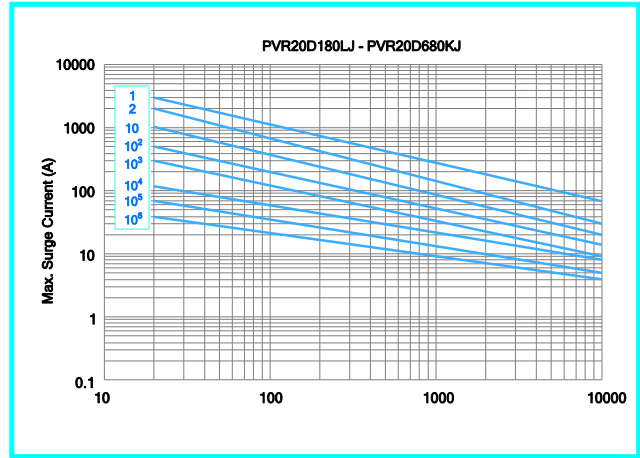
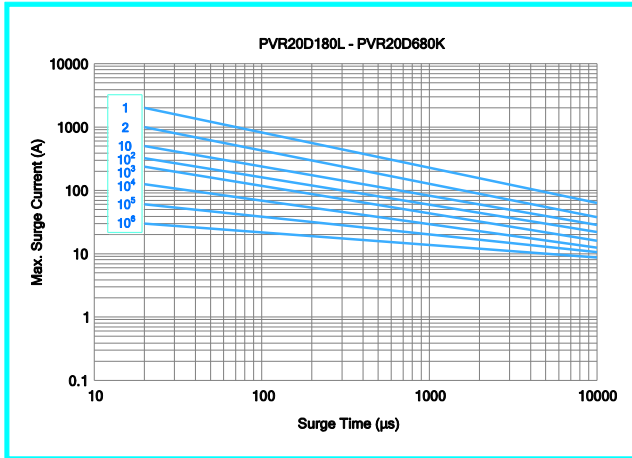
Example - For an 8/20 μs current waveform
 8 μs = T₁ = Rise Time
 20 μs = T₂ = Decay Time

Power Derating Curve



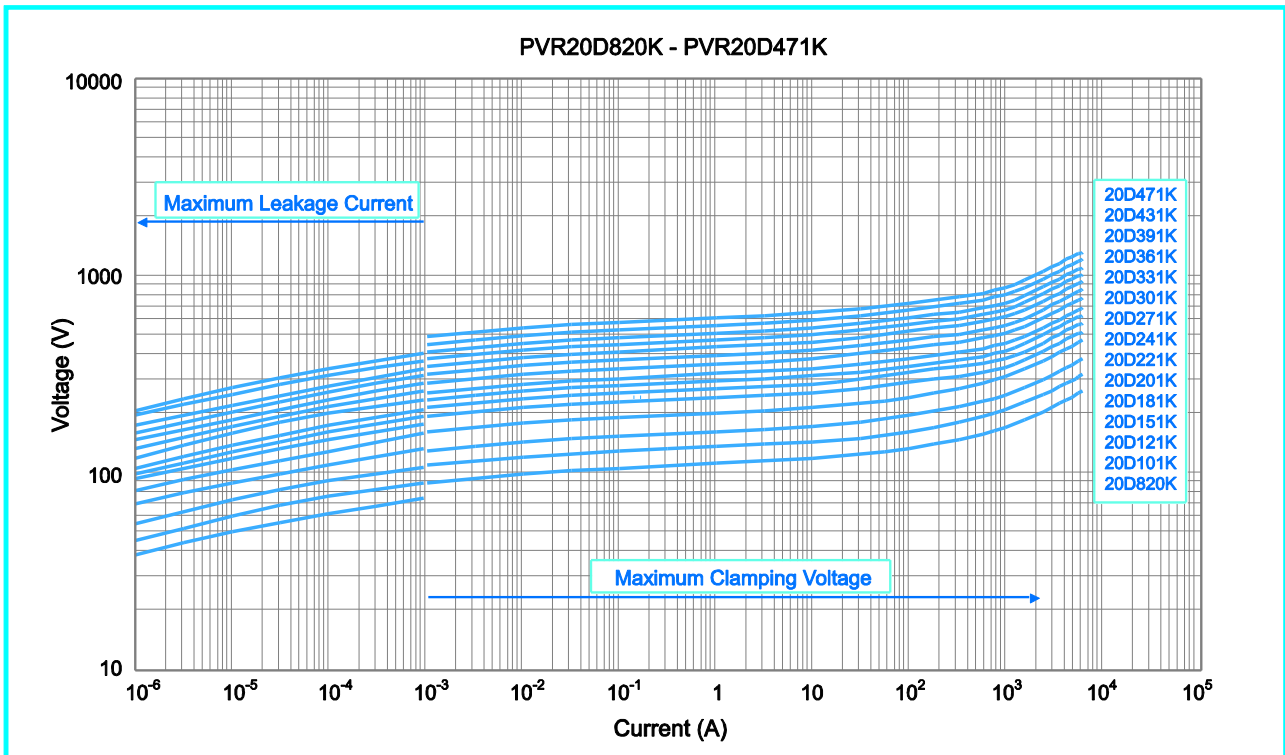
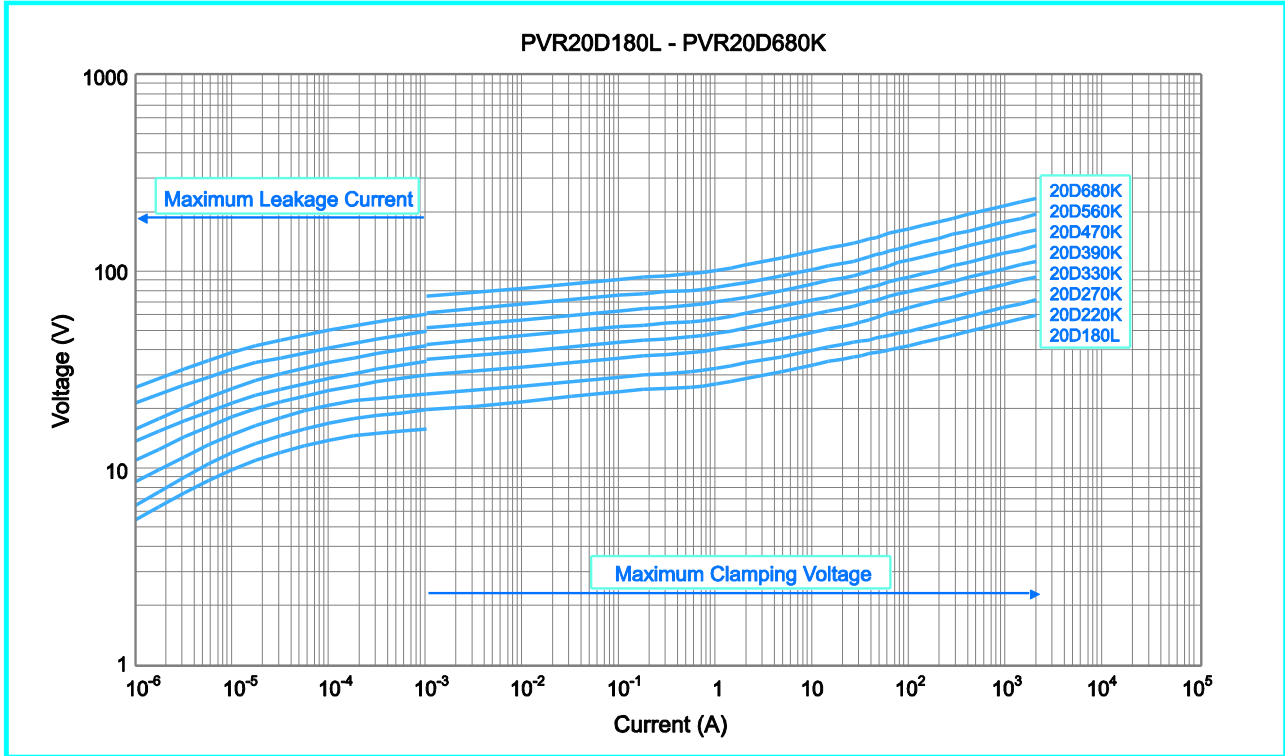
PVR20D Series MOV Devices

Pulse Rating Curves



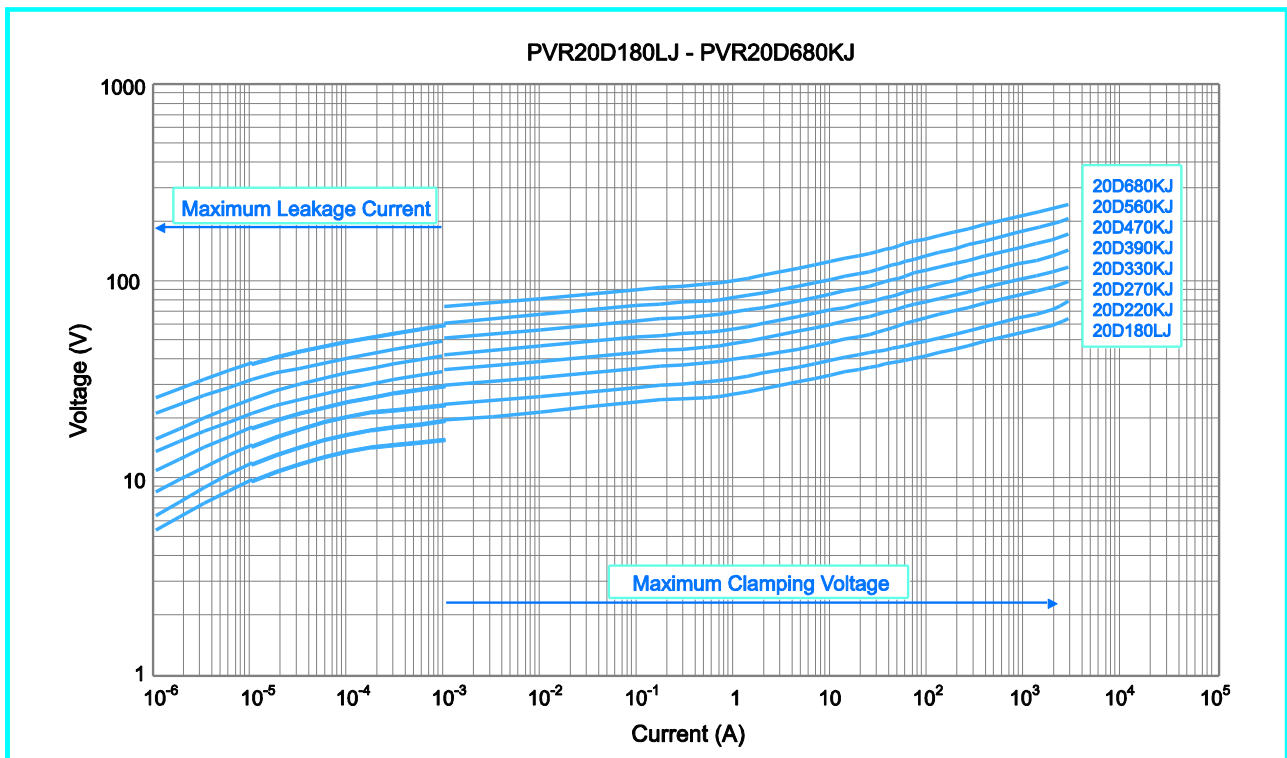
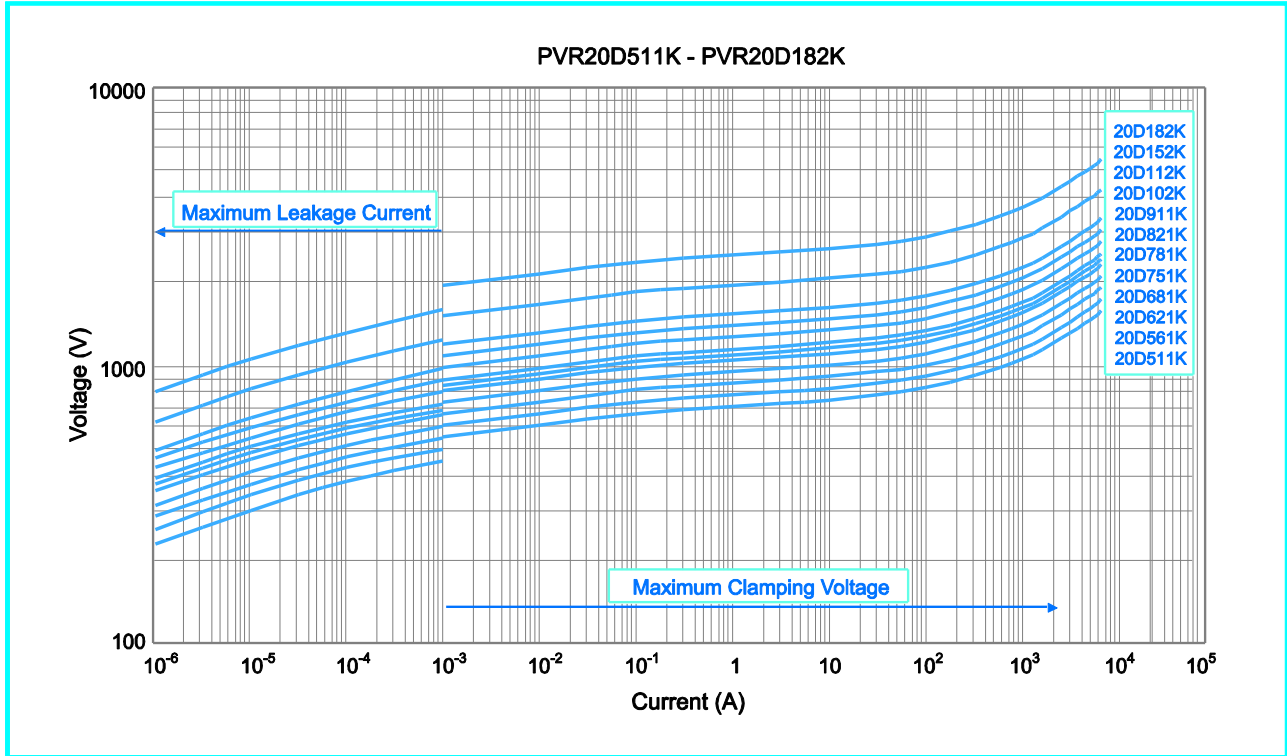
PVR20D Series MOV Devices

V-I Characteristics Curves



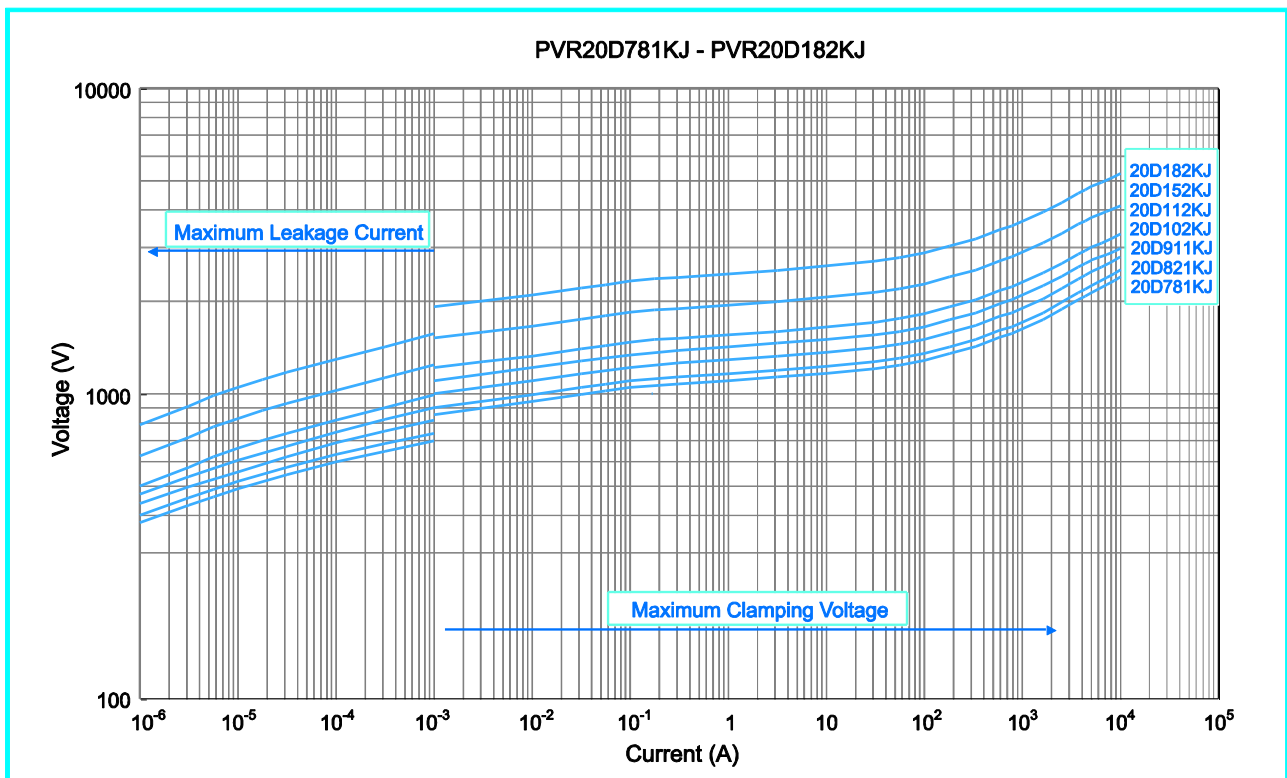
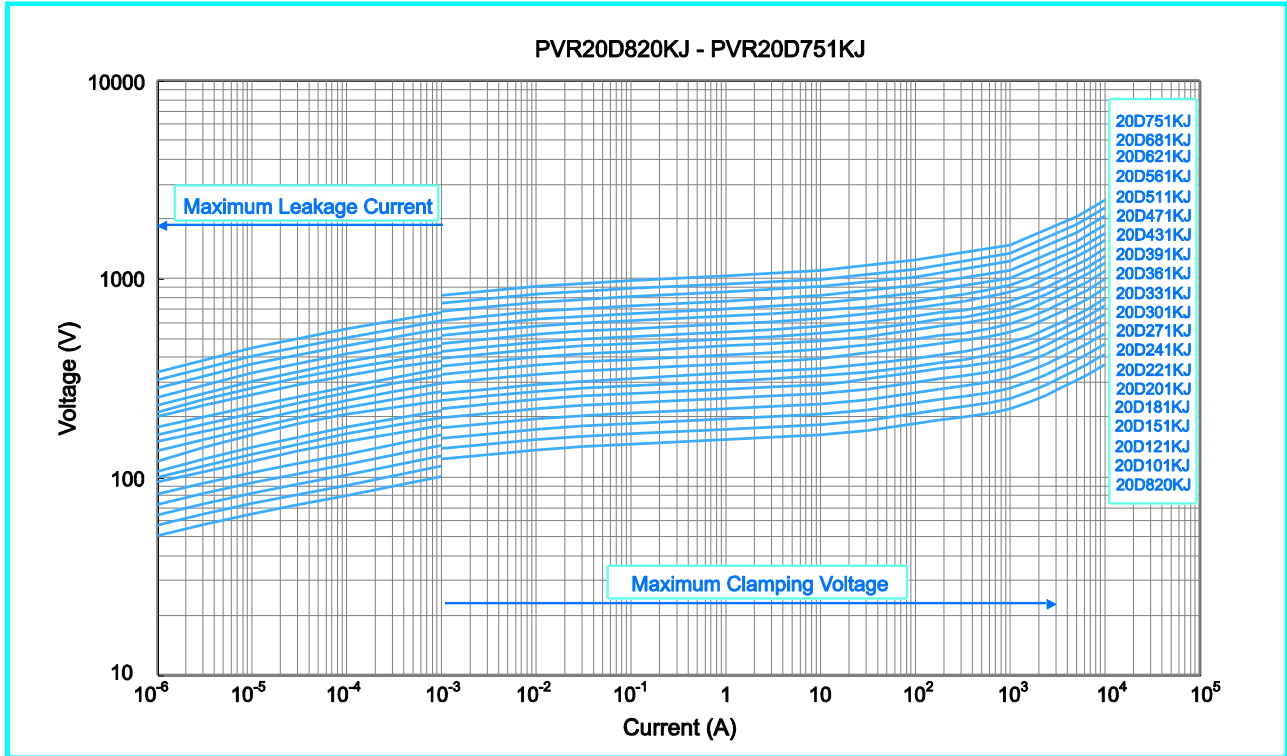
PVR20D Series MOV Devices

V-I Characteristics Curves



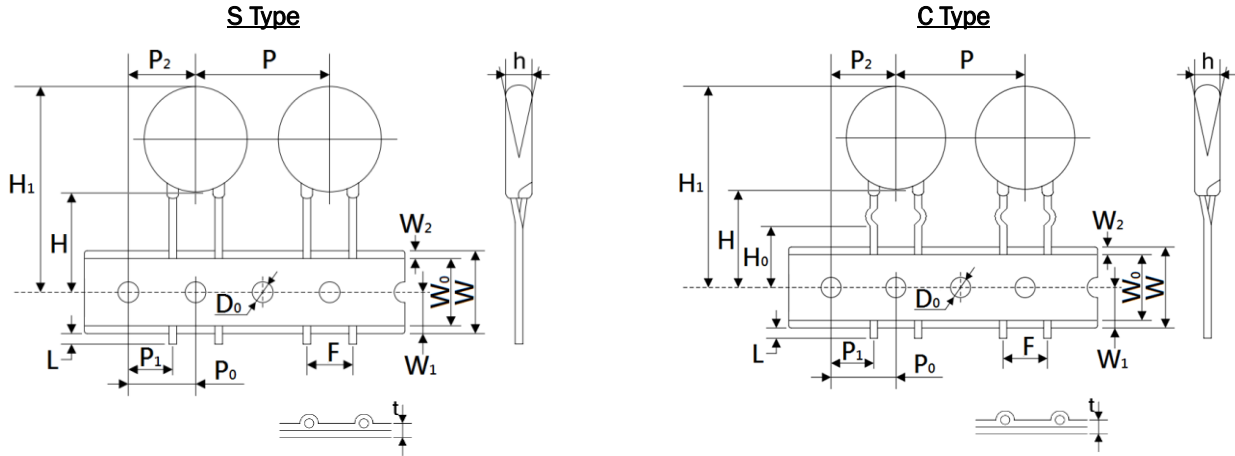
PVR20D Series MOV Devices

V-I Characteristics Curves



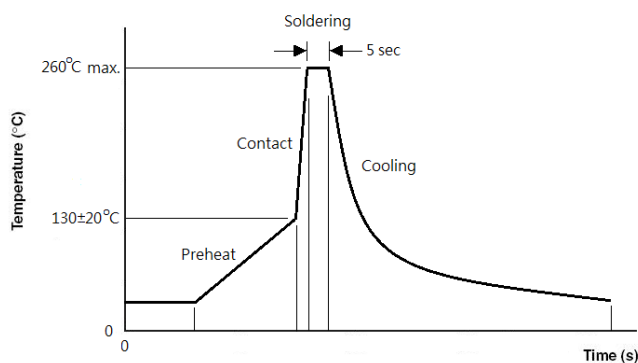
PVR20D Series MOV Devices

Taping Dimensions



Symbol	Dimension	Symbol	Dimension
	(mm)		(mm)
P	25.4±1.0	W ₂	3.0 max.
P ₀	12.7±1.0	H	20.0±2.0
P ₁	8.95±0.7	H ₀	16.0±1.0
P ₂	12.7±1.3	H ₁	46.5 max.
F	7.5±0.8	h	0±0.2
W	18.0±1.0	L	1.0 max.
W ₀	12.5 max.	D ₀	4.0±0.2
W ₁	9.0±0.5	t	0.6±0.3

Lead Free Wave Soldering Recommendations

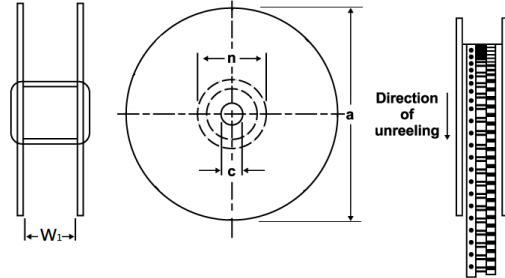


Preheat	
- Temperature Min (T _{s_min})	110°C
- Temperature Max (T _{s_max})	150°C
- Time (T _{s_min} to T _{s_max})	30-90 seconds
- Average Ramp-Up Rate	1~3°C/second
Peak Temperature	260°C
Max Time at Peak Temperature	5 seconds
Ramp-Down Rate	5 °C /second max.

Note: If the wave soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

PVR20D Series MOV Devices

Reel and Ammo Packing Dimensions/Quantity

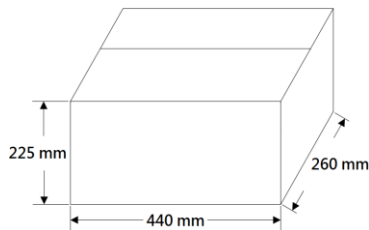


Symbol	Dimension (mm)
W ₁	55±1
a	340±10
c	31±1

Symbol	Dimension (mm)
W	348±5
L	275±5
H	60±5

Part Number	Reel pack		Ammo pack	
	Box	Carton	Box	Carton
180L - 471K	N/A	N/A	500	5000
511K - 821K	N/A	N/A	300	3000

Bulk Packing Quantity



Part Number	Bulk pack			
	Type	Bag	Small Carton	Carton
180L - 681K	Long leg	250	1500	3000
	Short leg	250	2000	4000
751K - 182K	Long leg	200	1000	2000
	Short leg	200	1500	3000

PVR20D Series MOV Devices

Reliability Test

Mechanical Ratings										
Test Parameter	Test Condition / Description	Performance Requirements								
Terminal Pull Strength	<p>After gradually applying the load specified below and keeping the unit fixed for ten seconds, the terminal shall be visually examined for any damage.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Diameter</td> <td style="text-align: center;">Loading</td> </tr> <tr> <td style="text-align: center;">0.6 mm</td> <td style="text-align: center;">1.0 kg</td> </tr> <tr> <td style="text-align: center;">0.8 mm</td> <td style="text-align: center;">1.0 kg</td> </tr> <tr> <td style="text-align: center;">1.0 mm</td> <td style="text-align: center;">2.0 kg</td> </tr> </table>	Diameter	Loading	0.6 mm	1.0 kg	0.8 mm	1.0 kg	1.0 mm	2.0 kg	No visible damage
Diameter	Loading									
0.6 mm	1.0 kg									
0.8 mm	1.0 kg									
1.0 mm	2.0 kg									
Terminal Bending Strength	<p>The unit shall be secured with its terminal kept vertical and the weight specified below be applied in axial direction. The terminal shall gradually be bent by 90° in one direction, then 90° in the opposite direction, and again back to the original position. The damage of the terminal shall be visually examined.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Diameter</td> <td style="text-align: center;">Loading</td> </tr> <tr> <td style="text-align: center;">0.6 mm</td> <td style="text-align: center;">0.5 kg</td> </tr> <tr> <td style="text-align: center;">0.8 mm</td> <td style="text-align: center;">0.5 kg</td> </tr> <tr> <td style="text-align: center;">1.0 mm</td> <td style="text-align: center;">1.0 kg</td> </tr> </table>	Diameter	Loading	0.6 mm	0.5 kg	0.8 mm	0.5 kg	1.0 mm	1.0 kg	No visible damage
Diameter	Loading									
0.6 mm	0.5 kg									
0.8 mm	0.5 kg									
1.0 mm	1.0 kg									
Vibration	The specimen shall be vibrated by its lead wires with a total amplitude of 1.5 mm and a varying frequency of 10~55~10Hz (each minutes) for a period of 2 hours respectively in each X, Y and Z directions.	No Visible damage $\Delta V_b/V_b \leq 5\%$								
Solderability	After dipping the terminal the depth of approximately 3 mm from the specimen in a soldering bath of 260°C for 10±1 (D5: 5±1) seconds. Thereafter the terminal shall be visually examined.	Terminations shall be uniformly covered by solder								
Resistance to solder heat	After preheating the specimen, the specimen shall be completely immersed into a soldering bath having a temperature of 260±5°C for 10±1 (D5: 5±1) seconds or iron of 400±5°C for 3±0.5 seconds. Thereafter the change of V_b and mechanical damage shall be examined.	No Visible damage $\Delta V_b/V_b \leq 5\%$								
Environmental Ratings										
Test Parameter	Test Condition / Description	Performance Requirements								
Dry Heat Loading	<p>The specimen shall be applied continuously the maximum allowable voltage at the specified conditions for specified period and then stored at room temperature and normal humidity over 2 hours. Thereafter, the change of V_b and mechanical damage shall be examined.</p> <p>Ambient temp: 125±2°C / Period: 1000±24hours</p>	$\Delta V_b/V_b \leq 10\%$								
High Temp Storage	<p>In a dry oven without load.</p> <p>Ambient temp: 125±2°C / Period: 1000±24hours</p>	$\Delta V_b/V_b \leq 5\%$								
Damp Heat Loading	<p>The specimen shall be applied continuously the maximum allowable voltage at the specified conditions for specified period and then stored at room temperature and normal humidity over 2 hours. Thereafter, the change of V_b and mechanical damage shall be examined.</p> <p>Ambient temp: 40±2°C, 90~95%RH / Period: 1000±24hours</p>	$\Delta V_b/V_b \leq 10\%$								
Temperature Cycle	<p>Condition the specimen to each temperature from step 1 to step 4 in this order for the period shown in the table of specifications. The change of V_b and mechanical damage shall be examined after 2 hours.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Step 1</td> <td style="text-align: center;">-40±3°C / 30min.</td> </tr> <tr> <td style="text-align: center;">Step 2</td> <td style="text-align: center;">Room temp / 15min.</td> </tr> <tr> <td style="text-align: center;">Step 3</td> <td style="text-align: center;">85±2°C / 30min.</td> </tr> <tr> <td style="text-align: center;">Step 4</td> <td style="text-align: center;">Room temp / 15min.</td> </tr> </table>	Step 1	-40±3°C / 30min.	Step 2	Room temp / 15min.	Step 3	85±2°C / 30min.	Step 4	Room temp / 15min.	No Visible damage $\Delta V_b/V_b \leq 10\%$
Step 1	-40±3°C / 30min.									
Step 2	Room temp / 15min.									
Step 3	85±2°C / 30min.									
Step 4	Room temp / 15min.									
Surge Lifetime Rating	The change of V_b shall be measured after the impulse listed below is applied 10,000 times continuously with the interval of ten seconds at room temperature.	No Visible damage $\Delta V_b/V_b \leq 10\%$								
Voltage Proof	Voltage: 2500 Vac / Leakage current ≤ 0.5 mA / Time: 60 seconds	No Breakdown								