■K Series Varistor

Zinc Oxide Varistor are non-linear resistors utilizing semiconductor ceramic element which mainly composed of zinc oxide. When the applied voltage on both termination reach the surge value, the voltage of electronic circuit would be reduced to protect the other components.

◆FEATURES

* Widely voltage range 18 V~1.8 KV
* Fast response to the rapidly increase Voltage (≤25ns)
* Excellent non-linearity coefficient
* SymmetricV-I characteristics
* Great withstanding surge current
* Long life
* Meet ROHS, REACH, HF requirements of environmental protection

◆APPLICATIONS

Household Appliance、Communication equipment、All kinds of power supply、New energy、Electric meter、Lighting Power、Industrial equipment

◆Safety certification

NO	Safety certification		Standards	Certification Number
1	China	CQC	GB/T1093 GB/T1094 GB 4943.1 GB 8898	05K：CQC14001111451
				07K：CQC14001111447
				10K：CQC14001111568
				14K：CQC14001111589
				20K：CQC14001111567
2	American、Canada	UL、CUL	UL1449	E325462
3	Germany	VDE	IEC61051	40008242

◆Part Number

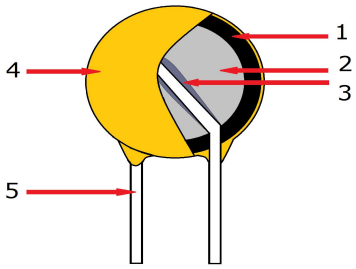
FNR	14	K	621	B	B	S	N	1	NN
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

Part Number Code Description

NO	Description					
①	FenghuaNonlinearResistor					
②	Diameter of Element	05：5mm	07：7mm	10：10mm	14：14mm	20：20mm
③	Tolerance	K：±10%				
④	Varistor Voltage	180 : 18×10^0=18V	621 : 62×10^1=620V	112 : 11×10^2=1100V		
⑤	Packing	B：Bulk	T：Taping			
⑥	Lead Style	A：Straight	F：Inward--Crimp			
		B：Outward-Crimp	Y：Y-Crimp			
⑦	LeadLength/Taping Pitch-row	S：Bulk& long lead C：Bulk&short lead T：12.7mmTaping &Pitch-row 12.7mm V：15.0mmTaping& Pitch-row 15.0mm				
⑧	Product level	N：Standard	E：High Energy			
⑨	Product Configuration	1：Conventional,no-jacket andno-explosion-proof 2：Lucency jacket 3：Black jacket M：Horizontal explosion-proof W：Vertical explosion-proof				
⑩	Internal code					

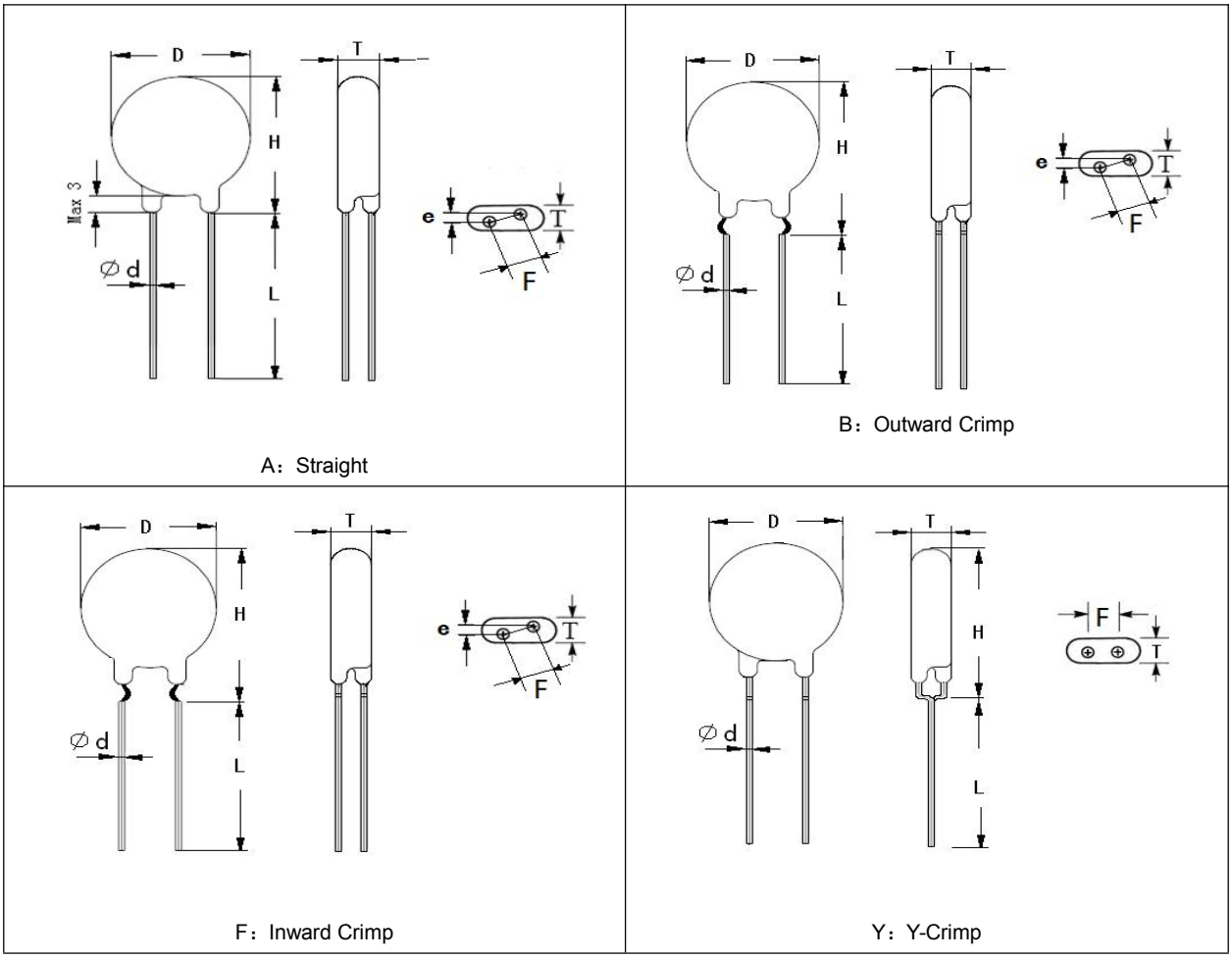
◆Structure And Dimensions

* Construction and main materials of products



NO	The main structure	Material composition
1	Ceramic disc	ZnO
2	Electrodes	Ag
3	Solder	Sn、Ag、Cu
4	Coating	Epoxy resin
5	Leads	Tin-Plate steel wireorTin-Plate Copper wire

* Bull Structure And Dimensions



A：Straight

B：Outward Crimp

F：Inward Crimp

Y：Y-Crimp

（Uint）：mm

Part NO.	D_{max}	Φd ±0.08	F ±1.0	H_{max}		L ±1.0	L ±0.5	L_{min}	T_{max}	e ±1.0
				Straight	Crimp	Straight Short-Lead	CrimpShort-Lead	Long-Lead		
05K	7.0	0.6	5.0	10.0	12.0	3.5	3.5	20	Please refer to the Electrical Characteristics Table	
07K	9.0	0.6	5.0	12.0	14.0	3.5	3.5	20		
10K	12.5	0.8	7.5	16.0	18.0	3.5	3.5	20		
14K	17.0	0.8	7.5	19.0	22.0	3.5	3.5	20		
20K	23.0	1.0	10.0	26.0	28.0	3.5	3.5	20		

* Taping Structure And Dimensions

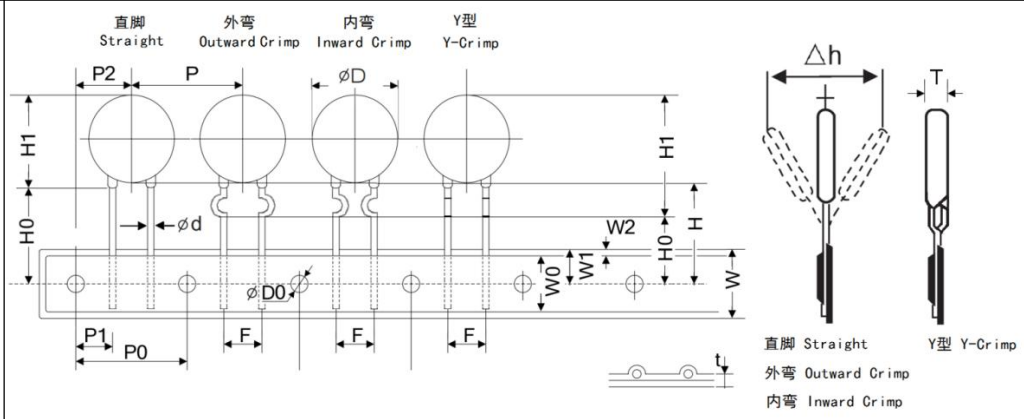
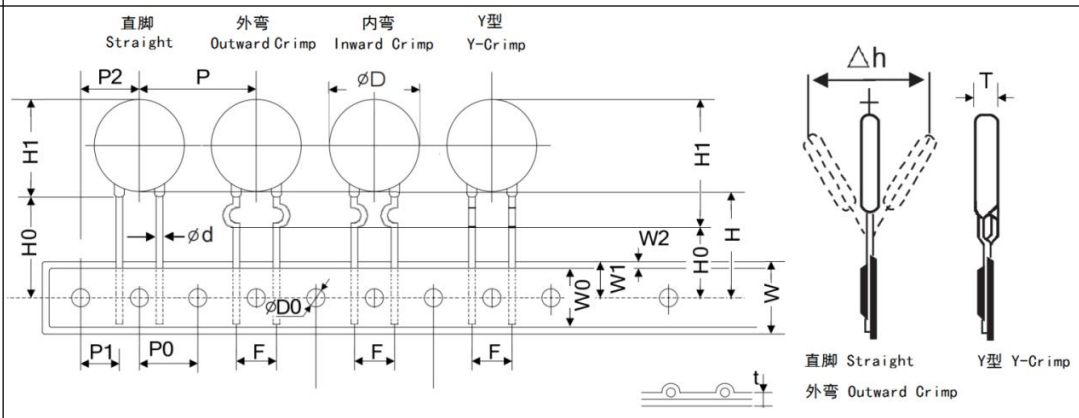
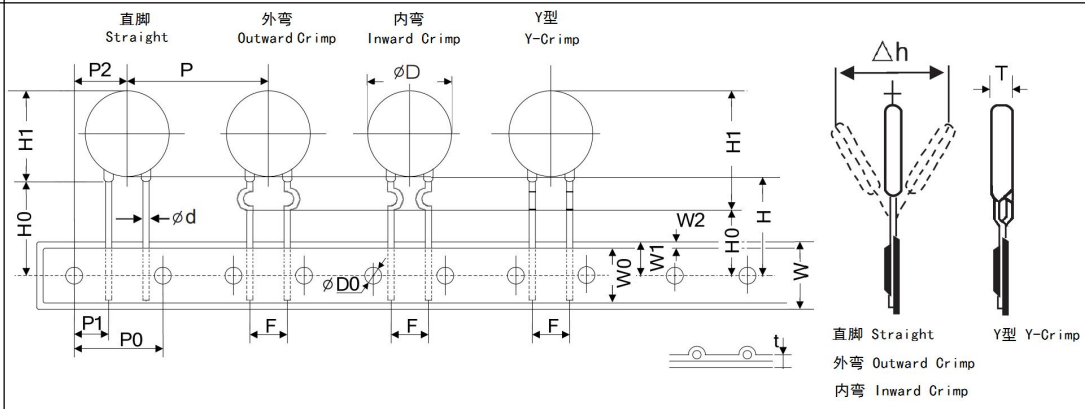
Fig NO.	Drawing
Fig A	
Fig B	
Fig C	

Fig NO.	Part NO.	Symbol & Tolerance (Uint)：mm															
		ΦD	Φd	P	P_0	P_1	P_2	$ΦD_0$	W	W_0	W_1	W_2	H_0	H_1	△h	t	F
		max	±0.08	±1.0	±1.0	±0.7	±1.3	±0.2	±1.0	min	±1.0	max	±1.0	max	±2.0	±0.3	±1.0
A	05K	7.0	0.6	12.7	12.7	3.85	6.35	4.0	18.0	9.8	9.0	3.0	16.0	12.0	0.0	0.6	5.0
A	07K	9.0	0.6	12.7	12.7	3.85	6.35	4.0	18.0	9.8	9.0	3.0	16.0	14.0	0.0	0.6	5.0
B	10K	12.5	0.8	25.4	12.7	8.95	12.7	4.0	18.0	9.8	9.0	3.0	16.0	18.0	0.0	0.6	7.5
A	10K	12.5	0.8	15.0	15.0	3.75	7.5	4.0	18.0	9.8	9.0	3.0	16.0	18.0	0.0	0.6	7.5
B	14K	17.0	0.8	25.4	12.7	8.95	12.7	4.0	18.0	9.8	9.0	3.0	16.0	22.0	0.0	0.6	7.5
C	14K	17.0	0.8	30.0	15.0	3.75	7.5	4.0	18.0	9.8	9.0	3.0	16.0	22.0	0.0	0.6	7.5
B	20K	23.0	1.0	25.4	12.7	7.7	12.7	4.0	18.0	9.8	9.0	3.0	16.0	28.0	0.0	0.6	10.0

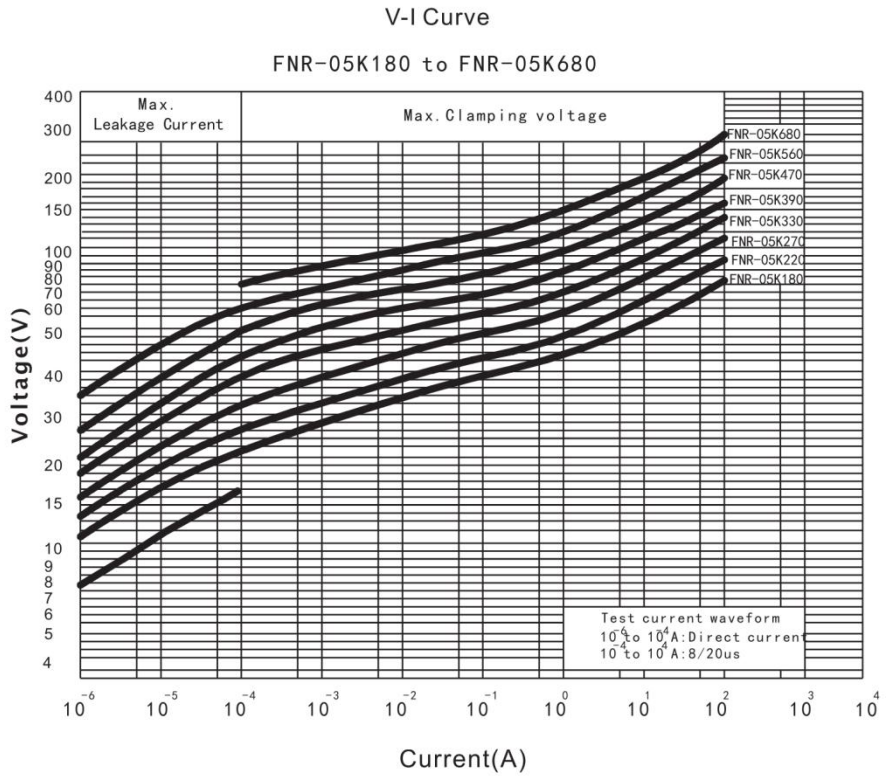
Notes: Thickness T Please refer to the Electrical Characteristics Table.

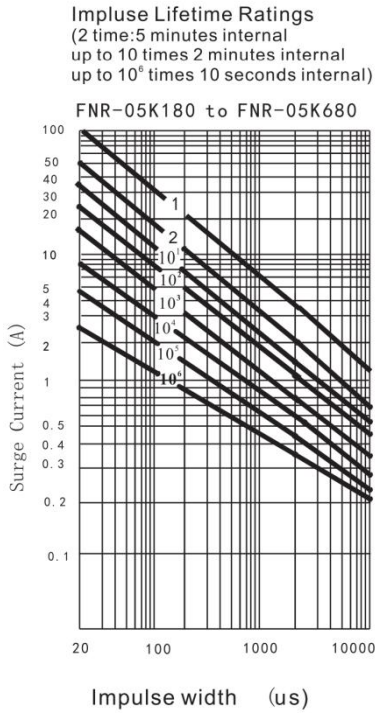
◆Performance Specification

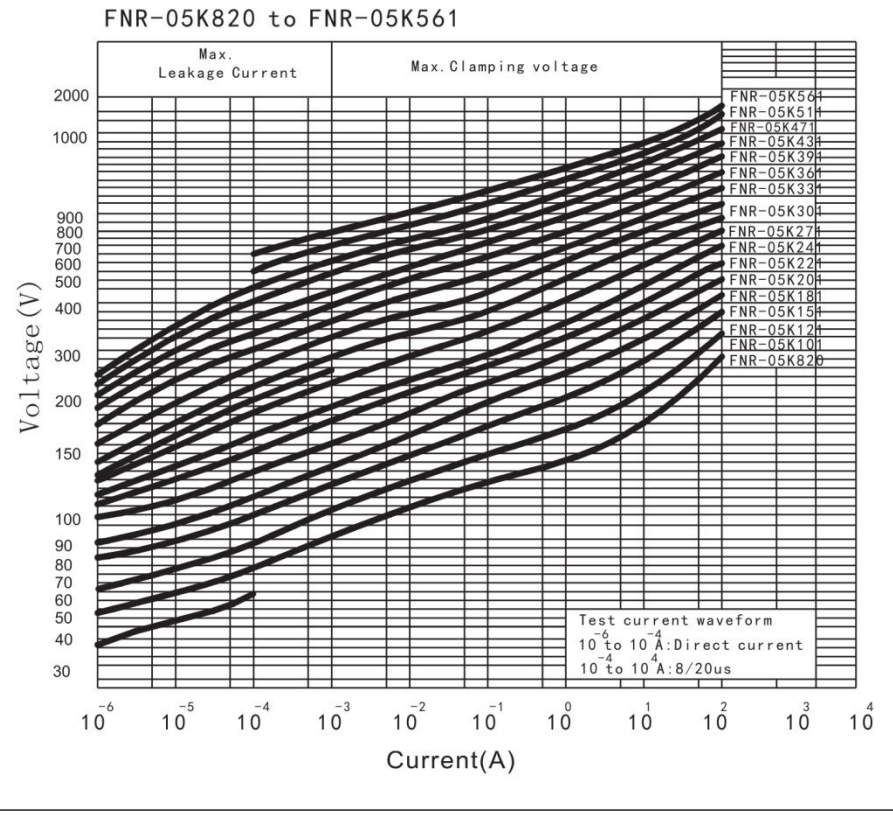
＊ 05K Series Performance Specification

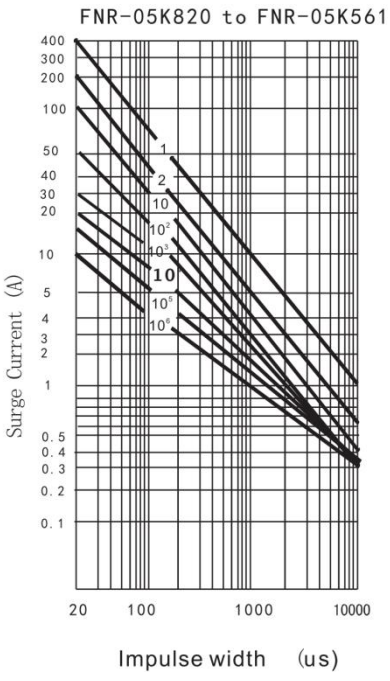
05K Series	Varistor Voltage (@0.1mA DC)	Max. Allowable Voltage		Max. Clamping Voltage (8/20μs)		Max.Impulse Current (8/20μs)	Max.Energy (2mS)	Max.Energy (10/1000μs)	Rated Wattage	Typical Capacitance	Dimensions	
Part Number	$V_{0.1mA}$	Ac (V)	Dc (V)	Vc (V)	Ip (A)	1 Times	W_{max} (J)	W_{max} (J)	P （W）	Cp （PF）	T max	e ±1.0
FNR-05K180	18（16.2~19.8）	11	14	40	1	100	0.3	0.4	0.01	1600	3.4	1.3
FNR-05K220	22（19.8~24.2）	14	18	48	1	100	0.4	0.5	0.01	1300	3.5	1.4
FNR-05K270	27（24.3~29.7）	17	22	60	1	100	0.5	0.6	0.01	1050	3.8	1.3
FNR-05K330	33（29.7~36.3）	20	26	73	1	100	0.6	0.8	0.01	900	3.5	1.4
FNR-05K390	39（35.1~42.9）	25	31	86	1	100	0.7	0.9	0.01	500	3.7	1.6
FNR-05K470	47（42.3~51.7）	30	38	104	1	100	0.9	1.1	0.01	450	3.8	1.8
FNR-05K560	56（50.4~61.6）	35	45	123	1	100	1.1	1.3	0.01	400	3.8	2.0
FNR-05K680	68（61.2~74.8）	40	56	150	1	100	1.3	1.6	0.01	350	4.0	2.3
FNR-05K820	82（73.8~90.2）	50	65	155	5	400	1.8	2.5	0.1	250	3.3	1.2
FNR-05K101	100（90~110）	60	85	175	5	400	2.2	3.0	0.1	200	3.6	1.3
FNR-05K121	120（108~132）	75	100	210	5	400	2.5	4.0	0.1	170	3.8	1.5
FNR-05K151	150（135~165）	95	125	260	5	400	3.4	4.8	0.1	140	4.1	1.8
FNR-05K181	180（162~198）	115	150	315	5	400	4.2	5.9	0.1	110	3.6	1.2
FNR-05K201	200（180~220）	130	170	355	5	400	4.6	6.5	0.1	80	3.7	1.2
FNR-05K221	220（198~242）	140	180	380	5	400	5.0	7.0	0.1	70	3.8	1.3
FNR-05K241	240（216~264）	150	200	415	5	400	5.7	8.0	0.1	70	4.0	1.4
FNR-05K271	270（243~297）	175	225	475	5	400	6.0	8.5	0.1	65	4.1	1.5
FNR-05K301	300（270~330）	195	250	525	5	400	6.0	8.5	0.1	55	4.3	1.6
FNR-05K331	330（297~363）	210	275	580	5	400	6.5	9.2	0.1	60	4.5	1.8
FNR-05K361	360（324~396）	230	300	620	5	400	7.2	10	0.1	50	4.6	1.9
FNR-05K391	390（351~429）	250	320	675	5	400	8.5	12	0.1	50	4.9	2.0
FNR-05K431	430（387~473）	275	350	745	5	400	9.2	13	0.1	45	5.1	2.2
FNR-05K471	470（423~517）	300	385	810	5	400	10.7	15	0.1	40	5.4	2.3
FNR-05K511	510（459~561）	320	410	845	5	400	11.4	16	0.1	39	5.6	2.5
FNR-05K561	560（504~616）	350	460	920	5	400	12.8	18	0.1	39	5.9	2.7

* 05K Series V-I Curve and Max. Surge Current Derating Curves





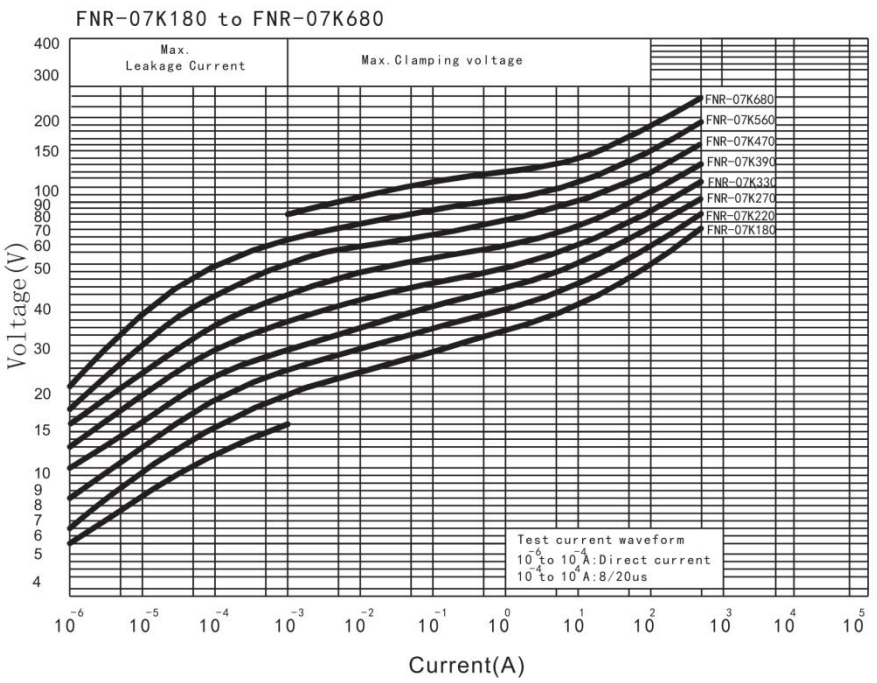


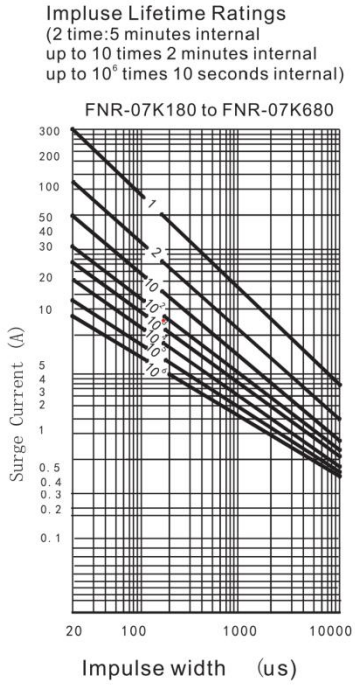


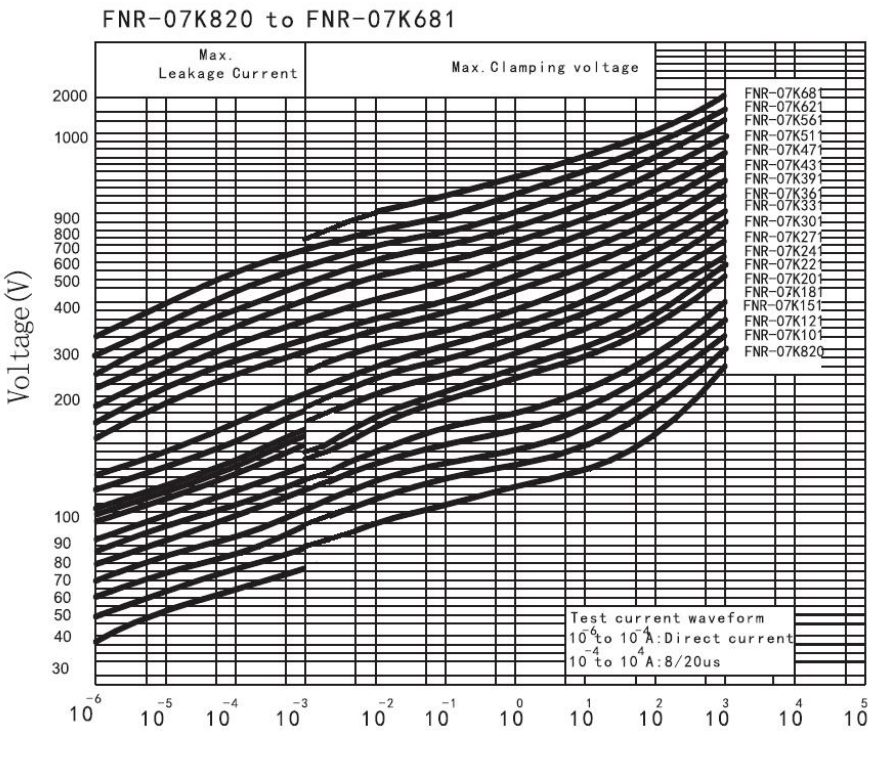
*07K Series Performance Specification

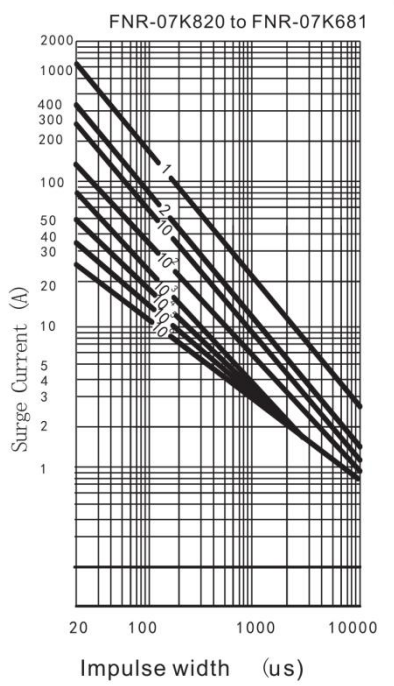
07K Series	Varistor Voltage (@1mA DC)	Max. Allowable Voltage		Max. Clamping Voltage (8/20μs)		Max.Impulse Current (8/20μs)		Max.Energy (2mS)		Max.Energy (10/1000 μs)		Rated Wattage	Typical Capacitance	Dimensions	
						Standard	High Energy	Standard	High Energy	Standard	High Energy				
Part Number	V_{1mA}	Ac (V)	Dc (V)	Vc (V)	Ip (A)	1 Times (A)		W_{max} (J)		W_{max} (J)		P (W)	Cp (PF)	T max	e ±1.0
FNR-07K180	18（16.2~19.8）	11	14	36	2.5	250	/	0.9	/	1.3	/	0.02	3500	3.6	1.1
FNR-07K220	22（19.8~24.2）	14	18	43	2.5	250	/	1.1	/	1.5	/	0.02	2800	3.8	1.2
FNR-07K270	27（24.3~29.7）	17	22	53	2.5	250	/	1.4	/	2.0	/	0.02	2000	4	1.1
FNR-07K330	33（29.7~36.3）	20	26	65	2.5	250	/	1.7	/	2.4	/	0.02	1500	3.7	1.2
FNR-07K390	39（35.1~42.9）	25	31	77	2.5	250	/	2.1	/	2.9	/	0.02	1350	3.9	1.4
FNR-07K470	47（42.3~51.7）	30	38	93	2.5	250	/	2.5	/	3.5	/	0.02	1150	4.1	1.6
FNR-07K560	56（50.4~61.6）	35	45	110	2.5	250	/	3.1	/	4.3	/	0.02	950	4.2	1.8
FNR-07K680	68（61.2~74.8）	40	56	135	2.5	250	/	3.6	/	5.0	/	0.02	700	4.3	2.1
FNR-07K820	82（73.8~90.2）	50	65	135	10	1200	/	4.2	/	5.5	/	0.25	550	3.5	1.2
FNR-07K101	100（90~110）	60	85	165	10	1200	/	4.8	/	6.5	/	0.25	500	3.8	1.3
FNR-07K121	120（108~132）	75	100	200	10	1200	/	5.9	/	7.8	/	0.25	450	4	1.5
FNR-07K151	150（135~165）	95	125	250	10	1200	/	8	/	9.7	/	0.25	350	4.3	1.8
FNR-07K181	180（162~198）	115	150	300	10	1200	1800	10	13.0	11.7	19.0	0.25	300	3.6	1.2
FNR-07K201	200（180~220）	130	170	340	10	1200	1800	13	15.0	14	21.0	0.25	250	3.7	1.2
FNR-07K221	220（198~242）	140	180	360	10	1200	1800	13	16.4	14	23.0	0.25	250	3.8	1.3
FNR-07K241	240（216~264）	150	200	395	10	1200	1800	13	17.8	14	25.0	0.25	200	4	1.4
FNR-07K271	270（243~297）	175	225	455	10	1200	1800	15	20.0	18	28.0	0.25	170	4.1	1.5
FNR-07K301	300（270~330）	195	250	500	10	1200	1800	17	22.8	21	32.0	0.25	150	4.3	1.6
FNR-07K331	330（297~363）	210	275	550	10	1200	1800	22	24.2	25	34.0	0.25	150	4.5	1.8
FNR-07K361	360（324~396）	230	300	595	10	1200	1800	22	26.4	25	37.0	0.25	130	4.6	1.9
FNR-07K391	390（351~429）	250	320	650	10	1200	1800	22	28.6	25	40.0	0.25	130	4.9	2.0
FNR-07K431	430（387~473）	275	350	710	10	1200	1800	26	32.8	28	46.0	0.25	110	5.1	2.2
FNR-07K471	470（423~517）	300	385	775	10	1200	1800	26	35.0	30	49.0	0.25	100	5.4	2.3
FNR-07K511	510（459~561）	320	410	840	10	1200	1800	26	38.5	33	54.0	0.25	100	5.6	2.5
FNR-07K561	560（504~616）	350	460	925	10	1200	1800	26	39.2	33	55.0	0.25	90	5.9	2.7
FNR-07K621	620（558~682）	385	505	1025	10	1200	1800	28	42.0	35	59.0	0.25	80	6.2	2.9
FNR-07K681	680（612~748）	420	560	1120	10	1200	1800	28	44.3	35	62.0	0.25	75	6.7	3.2

* 07K Series V-I Curve and Max. Surge Current Derating Curves







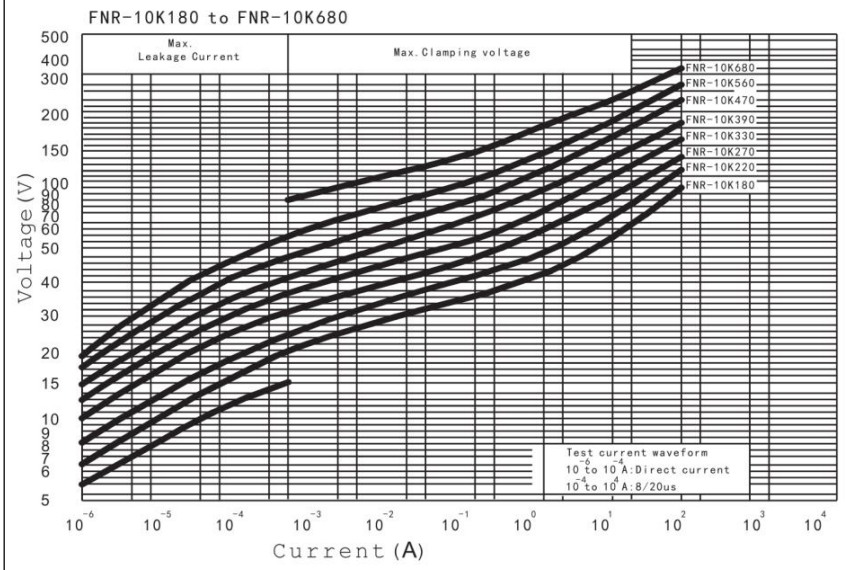


*10K Series Performance Specification

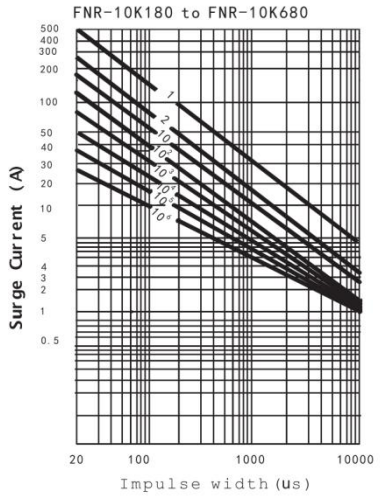
10K Series	Varistor Voltage (@1mA DC)	Max. Allowable Voltage		Max. Clamping Voltage (8/20μs)		Max.Impulse Current (8/20μs)		Max.Energy (2mS)		Max.Energy (10/1000 μs)		Rated Wattage	Typical Capacitance	Dimensions	
						Standard	High Energy	Standard	High Energy	Standard	High Energy				
Part Number	V_{1mA}	Ac (V)	Dc (V)	Vc (V)	Ip (A)	1 Times (A)		W_{max} (J)		W_{max} (J)		P (W)	V_{1mA}	Ac (V)	Dc (V)
FNR-10K180	18（16.2~19.8）	11	14	36	5	500	/	2.1	/	2.9	/	0.05	7500	4	1.3
FNR-10K220	22（19.8~24.2）	14	18	43	5	500	/	2.5	/	3.5	/	0.05	6000	4.1	1.4
FNR-10K270	27（24.3~29.7）	17	22	53	5	500	/	3.0	/	4.2	/	0.05	4000	4.3	1.3
FNR-10K330	33（29.7~36.3）	20	26	65	5	500	/	4.0	/	5.6	/	0.05	3000	4.1	1.4
FNR-10K390	39（35.1~42.9）	25	31	77	5	500	/	4.6	/	6.4	/	0.05	2600	4.3	1.6
FNR-10K470	47（42.3~51.7）	30	38	93	5	500	/	5.5	/	7.7	/	0.05	2200	4.5	1.8
FNR-10K560	56（50.4~61.6）	35	45	110	5	500	/	7.0	/	9.8	/	0.05	1800	4.5	1.9
FNR-10K680	68（61.2~74.8）	40	56	135	5	500	/	8.2	/	11	/	0.05	1300	4.5	2.0
FNR-10K820	82（73.8~90.2）	50	65	135	25	2500	/	8.4	/	12	/	0.4	1800	3.8	1.4
FNR-10K101	100（90~110）	60	85	165	25	2500	/	10	/	15	/	0.4	1400	4.2	1.5
FNR-10K121	120（108~132）	75	100	200	25	2500	/	15	/	18	/	0.4	1100	4.4	1.7
FNR-10K151	150（135~165）	95	125	250	25	2500	/	20	/	22	/	0.4	900	4.7	2.0
FNR-10K181	180（162~198）	115	150	300	25	2500	3500	23	27	27	33	0.4	700	4.3	1.4
FNR-10K201	200（180~220）	130	170	340	25	2500	3500	26	30	30	35	0.4	500	4.4	1.4
FNR-10K221	220（198~242）	140	180	360	25	2500	3500	30	32	32	39	0.4	450	4.5	1.5
FNR-10K241	240（216~264）	150	200	395	25	2500	3500	32	35	35	42	0.4	400	4.7	1.6
FNR-10K271	270（243~297）	175	225	455	25	2500	3500	35	41	40	49	0.4	350	4.8	1.7
FNR-10K301	300（270~330）	195	250	500	25	2500	3500	35	45	40	53	0.4	325	5	1.8
FNR-10K331	330（297~363）	210	275	550	25	2500	3500	39	49	43	58	0.4	325	5.2	2.0
FNR-10K361	360（324~396）	230	300	595	25	2500	3500	45	53	47	65	0.4	300	5.3	2.1
FNR-10K391	390（351~429）	250	320	650	25	2500	3500	52	58	60	70	0.4	270	5.6	2.2
FNR-10K431	430（387~473）	275	350	710	25	2500	3500	58	63	65	80	0.4	250	5.7	2.4
FNR-10K471	470（423~517）	300	385	775	25	2500	3500	58	69	70	85	0.4	230	6.1	2.5
FNR-10K511	510（459~561）	320	410	840	25	2500	3500	58	69	70	92	0.4	200	6.3	2.7
FNR-10K561	560（504~616）	350	455	925	25	2500	3500	58	69	70	92	0.4	180	6.6	2.9
FNR-10K621	620（558~682）	385	505	1025	25	2500	3500	58	69	70	95	0.4	130	6.9	3.2
FNR-10K681	680（612~748）	420	560	1120	25	2500	3500	60	74	72	98	0.4	130	7.3	3.4
FNR-10K751	750（675~825）	460	615	1240	25	2500	3500	65	81	75	100	0.4	120	7.7	3.7
FNR-10K781	780（702~858）	485	640	1290	25	2500	3500	65	85	75	100	0.4	120	7.8	3.8
FNR-10K821	820（738~902）	510	670	1355	25	2500	3500	71	99	85	110	0.4	110	8.1	4.0
FNR-10K911	910（819~1001）	550	745	1500	25	2500	3500	78	109	93	130	0.4	100	8.7	4.3
FNR-10K102	1000（900~1100）	625	825	1650	25	2500	3500	84	117	102	140	0.4	90	8.1	4.7
FNR-10K112	1100（990~1210）	680	895	1815	25	2500	3500	91	127	115	155	0.4	80	8.6	5.0
FNR-10K182	1800（1620~1980）	1000	1465	2970	25	2500	3500	132	185	185	255	0.4	70	12.8	6.8

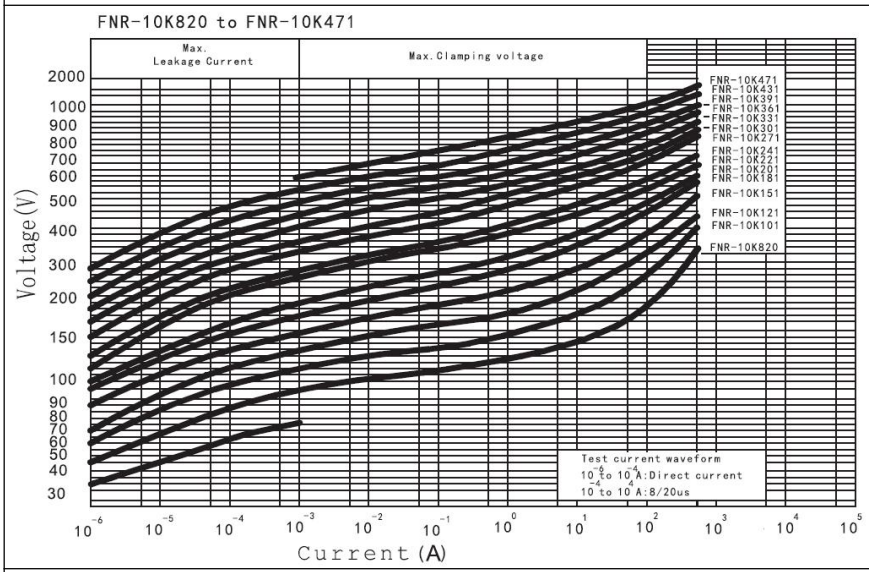
* 10K Series V-I Curve and Max. Surge Current Derating Curves

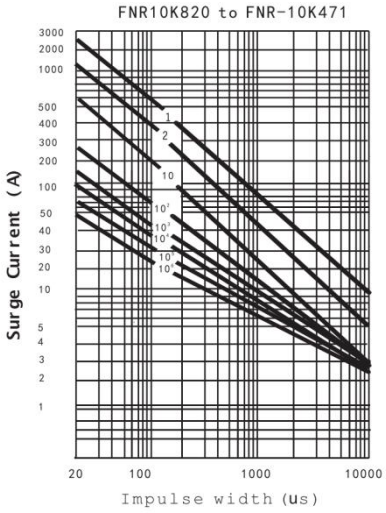
V-I Curve

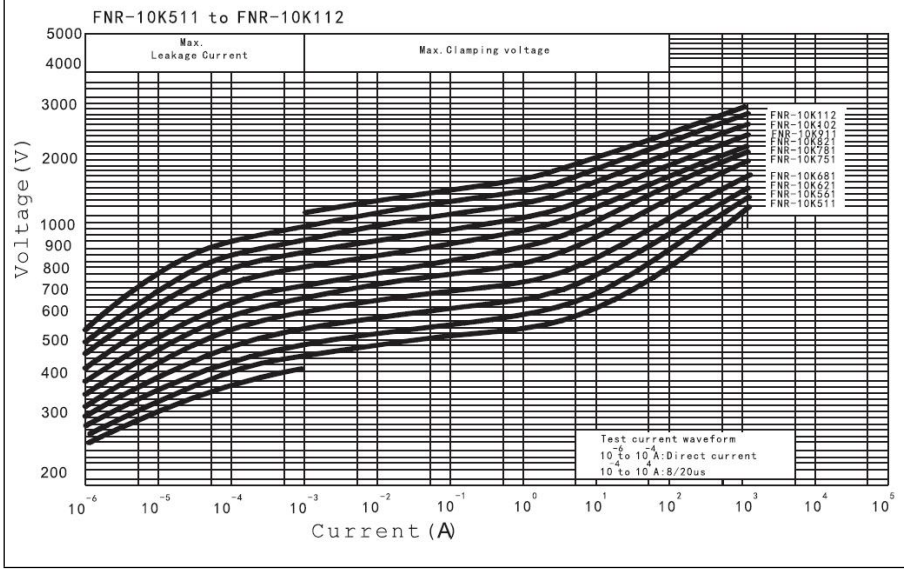


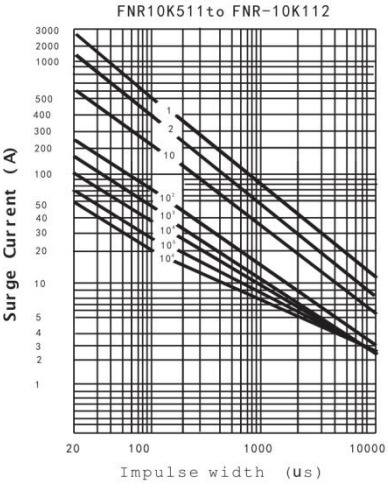
Impluse Lifetime Ratings







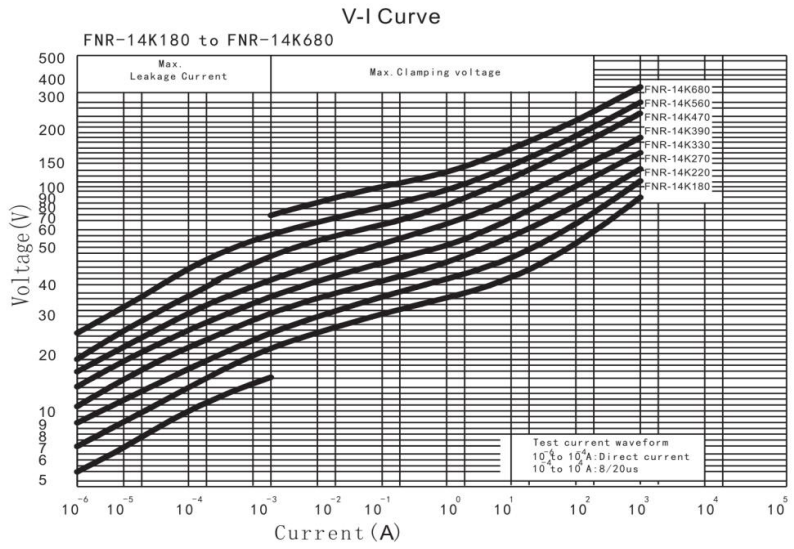


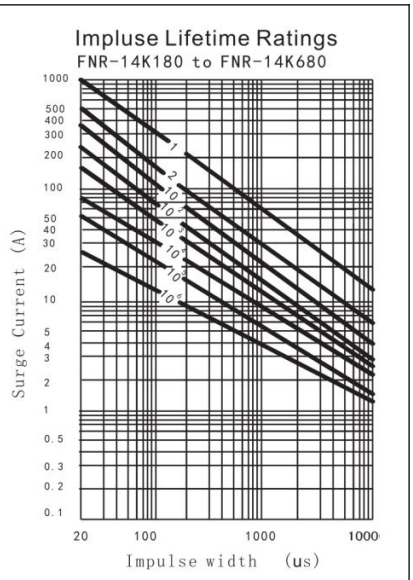


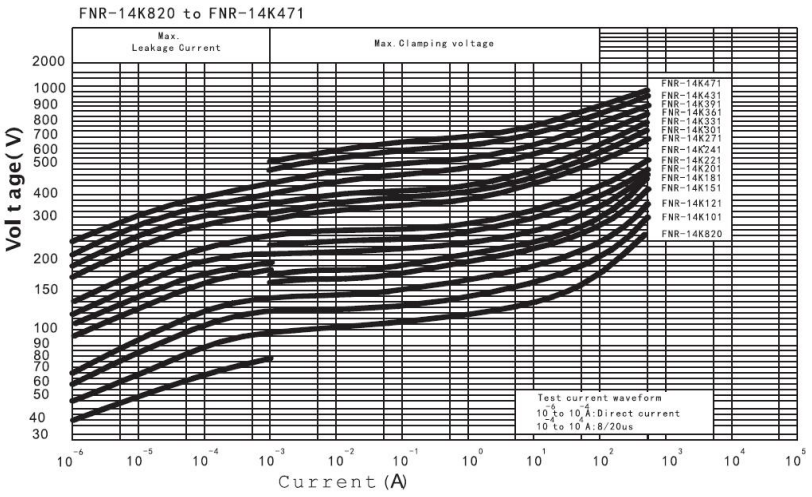
* 14K Series Performance Specification

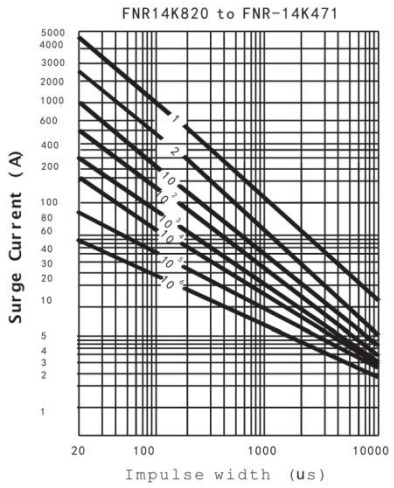
14K Series	Varistor Voltage (@1mA DC)	Max. Allowable Voltage		Max. Clamping Voltage (8/20μs)		Max.Impulse Current (8/20μs)		Max.Energy (2mS)		Max.Energy (10/1000 μs)		Rated Wattage	Typical Capacitance	Dimensions	
						Standard	High Energy	Standard	High Energy	Standard	High Energy				
Part Number	V_{1mA}	Ac (V)	Dc (V)	Vc (V)	Ip (A)	1 Times (A)		W_{max} (J)		W_{max} (J)		P (W)	V_{1mA}	Ac (V)	Dc (V)
FNR-14K180	18（16.2~19.8）	11	14	36	10	1000	/	4.0	/	5.0	/	0.1	18000	4.1	1.3
FNR-14K220	22（19.8~24.2）	14	18	43	10	1000	/	5.0	/	6.0	/	0.1	15000	4.3	1.4
FNR-14K270	27（24.3~29.7）	17	22	53	10	1000	/	6.0	/	7.0	/	0.1	10000	4.5	1.3
FNR-14K330	33（29.7~36.3）	20	26	65	10	1000	/	7.5	/	8.5	/	0.1	7500	4.5	1.4
FNR-14K390	39（35.1~42.9）	25	31	77	10	1000	/	8.6	/	10	/	0.1	6500	4.4	1.6
FNR-14K470	47（42.3~51.7）	30	38	93	10	1000	/	10	/	12	/	0.1	5500	4.6	1.8
FNR-14K560	56（50.4~61.6）	35	45	110	10	1000	/	11	/	14	/	0.1	4500	4.7	1.9
FNR-14K680	68（61.2~74.8）	40	56	135	10	1000	/	14	/	18	/	0.1	3300	4.5	2.2
FNR-14K820	82（73.8~90.2）	50	65	135	50	4500	/	15	/	22	/	0.6	2900	4	1.4
FNR-14K101	100（90~110）	60	85	165	50	4500	/	18	/	28	/	0.6	2400	4.3	1.5
FNR-14K121	120（108~132）	75	100	200	50	4500	/	26	/	32	/	0.6	1900	4.5	1.7
FNR-14K151	150（135~165）	95	125	250	50	4500	/	32	/	40	/	0.6	1500	4.8	1.8
FNR-14K181	180（162~198）	115	150	300	50	4500	6000	39	54	52	60	0.6	1250	4.5	1.4
FNR-14K201	200（180~220）	130	170	340	50	4500	6000	45	61	57	84	0.6	1000	4.6	1.4
FNR-14K221	220（198~242）	140	180	360	50	4500	6000	52	65	63	91	0.6	1000	4.7	1.5
FNR-14K241	240（216~264）	150	200	395	50	4500	6000	52	71	63	98	0.6	900	4.9	1.6
FNR-14K271	270（243~297）	175	225	455	50	4500	6000	65	81	70	112	0.6	750	5	1.7
FNR-14K301	300（270~330）	195	250	500	50	4500	6000	71	90	78	123	0.6	650	5.2	1.9
FNR-14K331	330（297~363）	210	275	550	50	4500	6000	78	99	85	133	0.6	650	5.4	2.0
FNR-14K361	360（324~396）	230	300	595	50	4500	6000	84	107	93	147	0.6	550	5.5	2.2
FNR-14K391	390（351~429）	250	320	650	50	4500	6000	91	117	100	161	0.6	500	5.8	2.3
FNR-14K431	430（387~473）	275	350	710	50	4500	6000	97	127	115	182	0.6	450	5.9	2.4
FNR-14K471	470（423~517）	300	385	775	50	4500	6000	104	140	125	196	0.6	440	6.3	2.5
FNR-14K511	510（459~561）	320	410	840	50	4500	6000	104	150	125	210	0.6	380	6.5	2.7
FNR-14K561	560（504~616）	350	455	925	50	4500	6000	104	165	125	231	0.6	345	6.8	2.6
FNR-14K621	620（558~682）	385	505	1025	50	4500	6000	110	180	130	252	0.6	250	7.1	2.8
FNR-14K681	680（612~748）	420	560	1120	50	4500	6000	117	190	136	266	0.6	250	7.5	3.0
FNR-14K751	750（675~825）	460	615	1240	50	4500	6000	130	200	143	280	0.6	230	7.9	3.3
FNR-14K781	780（702~858）	485	640	1290	50	4500	6000	136	200	150	280	0.6	230	8	3.4
FNR-14K821	820（738~902	510	670	1355	50	4500	6000	143	203	157	285	0.6	200	8.3	3.5
FNR-14K911	910（819~1001）	550	745	1500	50	4500	6000	156	220	175	308	0.6	180	8.9	3.9
FNR-14K102	1000（900~1100）	625	825	1650	50	4500	6000	169	240	190	336	0.6	150	8.3	4.1
FNR-14K112	1100（990~1210）	680	895	1815	50	4500	6000	182	260	213	364	0.6	150	8.8	4.5
FNR-14K182	1800（1620~1980）	1000	1465	2970	50	4500	6000	312	356	354	510	0.6	100	12.8	7.0

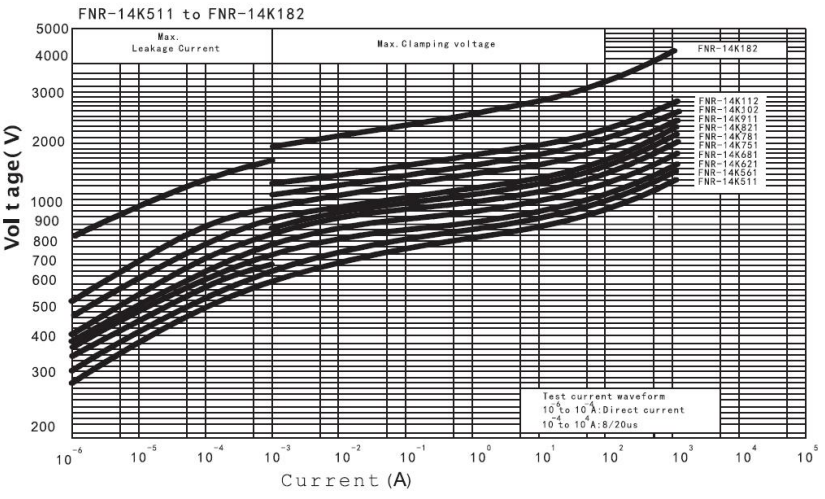
* 14K Series V-I Curve and Max. Surge Current Derating Curves

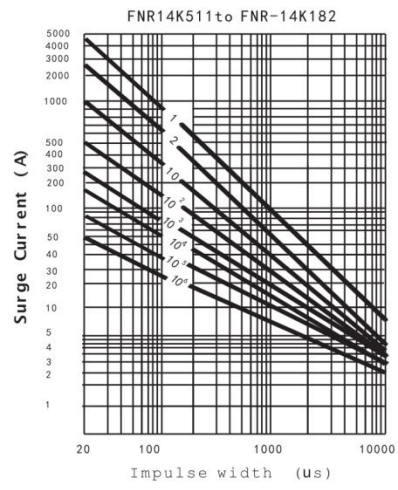










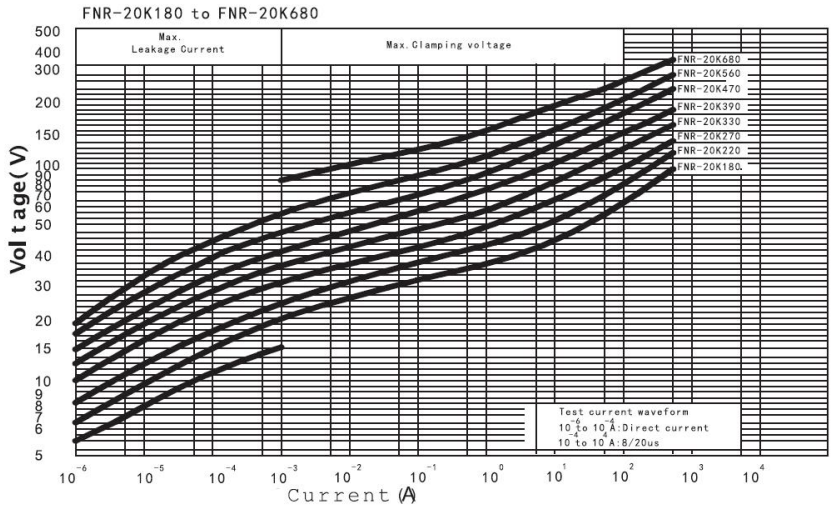


* 20K Series Performance Specification

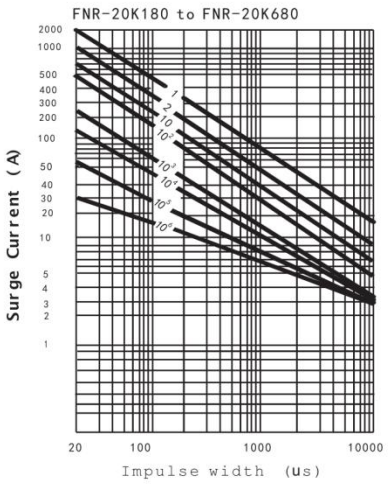
20K Series	Varistor Voltage (@1mA DC)	Max. Allowable Voltage		Max. Clamping Voltage (8/20μs)		Max.Impulse Current (8/20μs)		Max.Energy (2mS)		Max.Energy (10/1000 μs)		Rated Wattage	Typical Capacitance	Dimensions	
						Standard	High Energy	Standard	High Energy	Standard	High Energy				
Part Number	V_{1mA}	Ac (V)	Dc (V)	Vc (V)	Ip (A)	1 Times (A)		W_{max} (J)		W_{max} (J)		P (W)	V_{1mA}	Ac (V)	Dc (V)
FNR-20K180	18（16.2~19.8）	11	14	36	20	2000	/	10	/	11	/	0.2	18000	4.5	1.4
FNR-20K220	22（19.8~24.2）	14	18	43	20	2000	/	13	/	14	/	0.2	30000	4.6	1.6
FNR-20K270	27（24.3~29.7）	17	22	53	20	2000	/	15	/	18	/	0.2	20000	4.8	1.5
FNR-20K330	33（29.7~36.3）	20	26	65	20	2000	/	18	/	23	/	0.2	17000	5.0	1.6
FNR-20K390	39（35.1~42.9）	25	31	77	20	2000	/	20	/	26	/	0.2	15000	4.7	1.7
FNR-20K470	47（42.3~51.7）	30	38	93	20	2000	/	25	/	33	/	0.2	13000	4.9	1.9
FNR-20K560	56（50.4~61.6）	35	45	110	20	2000	/	30	/	41	/	0.2	11000	5.0	2.1
FNR-20K680	68（61.2~74.8）	40	56	135	20	2000	/	33	/	46	/	0.2	7000	5.0	2.3
FNR-20K820	82（73.8~90.2）	50	65	135	100	6500	/	38	/	48	/	1.0	5500	4.3	1.6
FNR-20K101	100（90~110）	60	85	165	100	6500	/	42	/	51	/	1.0	4800	4.6	1.7
FNR-20K121	120（108~132）	75	100	200	100	6500	/	52	/	55	/	1.0	3800	4.6	1.9
FNR-20K151	150（135~165）	95	125	250	100	6500	/	65	/	70	/	1.0	3000	5.1	2.0
FNR-20K181	180（162~198）	115	150	300	100	6500	10000	78	90	84	126	1.0	2500	4.6	1.6
FNR-20K201	200（180~220）	130	170	340	100	6500	10000	91	102	95	142	1.0	2000	4.8	1.6
FNR-20K221	220（198~242）	140	180	360	100	6500	10000	97	108	100	151	1.0	2000	4.9	1.7
FNR-20K241	240（216~264）	150	200	395	100	6500	10000	100	118	108	165	1.0	1800	5.0	1.8
FNR-20K271	270（243~297）	175	225	455	100	6500	10000	117	136	127	191	1.0	1600	5.2	2.0
FNR-20K301	300（270~330）	195	250	500	100	6500	10000	136	150	150	210	1.0	1400	5.4	2.1
FNR-20K331	330（297~363）	210	275	550	100	6500	10000	136	165	150	231	1.0	1400	5.6	2.2
FNR-20K361	360（324~396）	230	300	595	100	6500	10000	156	178	163	249	1.0	1200	5.9	2.4
FNR-20K391	390（351~429）	250	320	650	100	6500	10000	169	195	180	273	1.0	1000	6.0	2.5
FNR-20K431	430（387~473）	275	350	710	100	6500	10000	182	213	190	298	1.0	900	6.1	2.6
FNR-20K471	470（423~517）	300	385	775	100	6500	10000	195	232	220	325	1.0	900	6.5	2.8
FNR-20K511	510（459~561）	320	410	840	100	6500	10000	195	232	220	325	1.0	800	6.7	3.0
FNR-20K561	560（504~616）	350	455	925	100	6500	10000	195	232	220	325	1.0	700	6.9	2.8
FNR-20K621	620（558~682）	385	505	1025	100	6500	10000	195	246	220	344	1.0	500	7.3	3.0
FNR-20K681	680（612~748）	420	560	1120	100	6500	10000	208	268	230	376	1.0	460	7.7	3.2
FNR-20K751	750（675~825）	460	615	1240	100	6500	10000	227	297	255	416	1.0	420	8.0	3.5
FNR-20K781	780（702~858）	485	640	1290	100	6500	10000	234	309	265	433	1.0	420	8.2	3.6
FNR-20K821	820（738~902）	510	670	1355	100	6500	10000	247	325	282	455	1.0	400	8.5	3.8
FNR-20K911	910（819~1001）	550	745	1500	100	6500	10000	280	360	310	504	1.0	350	9.1	4.0
FNR-20K102	1000（900~1100）	625	825	1650	100	6500	10000	299	396	340	554	1.0	320	8.5	4.4
FNR-20K112	1100（990~1210）	680	895	1815	100	6500	10000	325	435	383	609	1.0	300	9.0	4.8
FNR-20K182	1800（1620~1980）	1000	1465	2970	100	6500	10000	400	707	620	990	1.0	200	13.0	7.2

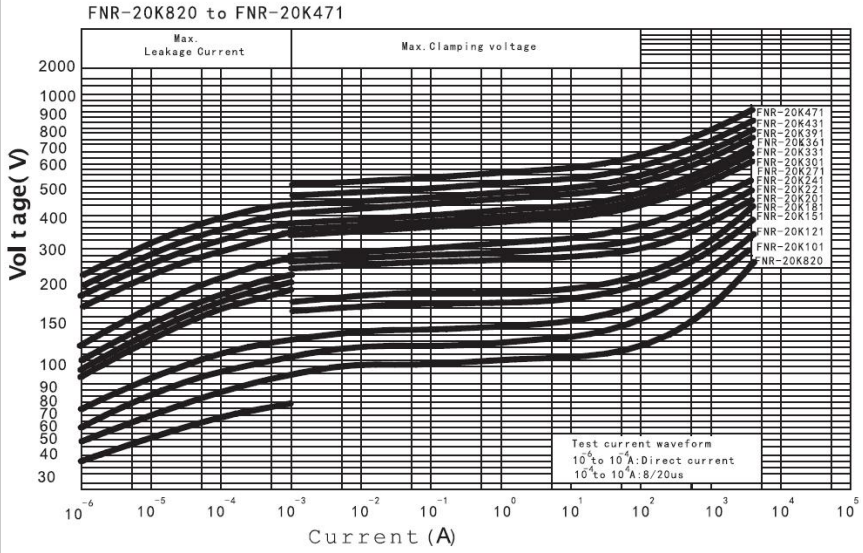
* 20K Series V-I Curve and Max. Surge Current Derating Curves

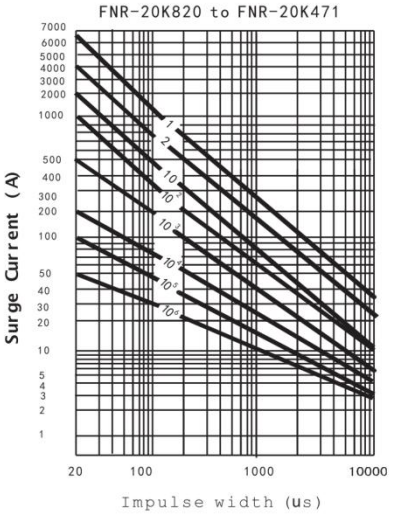
V-I Curve

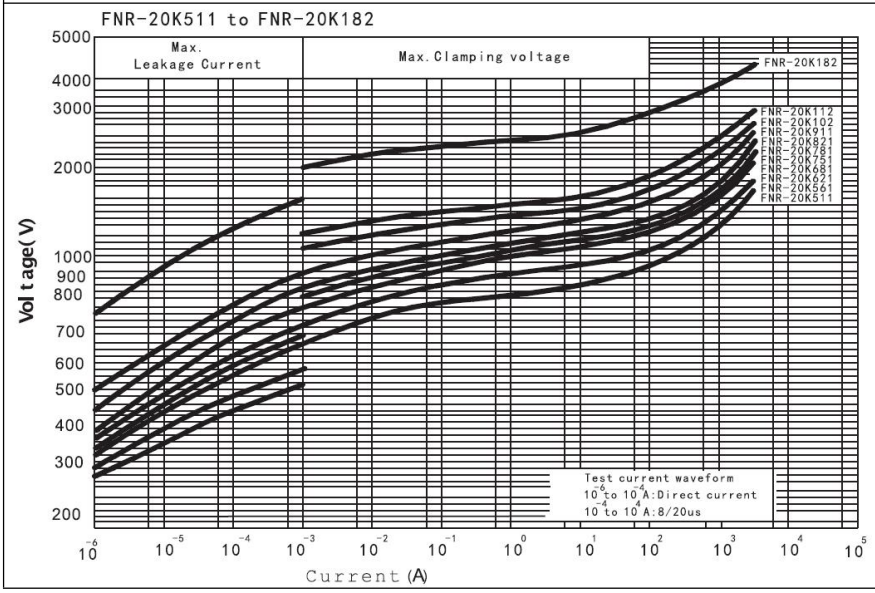


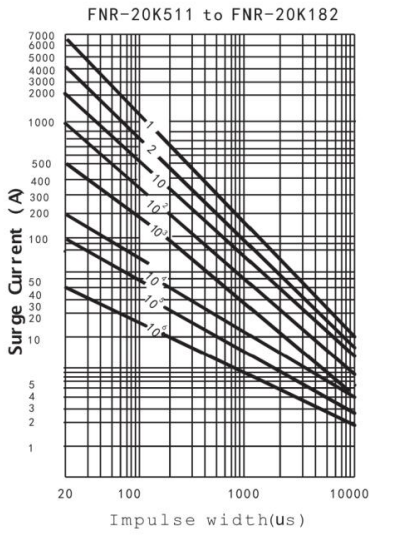
Impluse Lifetime Ratings











◆Electrical Performance Test

NO	Item	Standard	Test method	Performance
1	Varistor Voltage	Specification Standard	The voltage between two terminals with the specified measuring current (Only 05K for $DC_{0.1mA}$,orthers DC_{1mA}).	To meet Performance Specification
2	Leakage current	Specification Standard	The direct current flowing from the Varistor at0.83V_v. V_v:Varistor Voltage(DC_{1mA}).	Test temperature:25℃ ≥82V IR≤20μA ＜82V IR≤40μA （$V_v$of 83%）
3	Clamping Voltage	Specification Standard	The maximum voltage between two terminals with the specified standard impulse current(8/20us) applied.	To meet Performance Specification
4	Maximum Impulse Current (withstanding surge current)	Specification Standard	The maximum current within the varistor voltage change of ±10% with the standard impulse applied by the specified condition.	To meet Performance Specification |△V/V|≤10%
5	Maximum energy	Specification Standard	The maximum energy（2ms or 10/1000uS wave）within the Varistor Voltage change of ±10% when the specified impulse is applied.	To meet Performance Specification |△V/V|≤10%
6	Temperature coefficient of varistor Voltage	Specification Standard	Coefficient indicating dependency of Varistor Voltage on Specified temperature. $\frac{V1mA@105℃ - V1mA@25℃}{V1mA@25℃} \times \frac{1}{80} \times 100\%$（%/℃） $\frac{V1mA@-40℃ - V1mA@25℃}{V1mA@25℃} \times \frac{1}{65} \times 100\%$（%/℃）	-0.05≤Tc≤0.05(%/℃)
7	Capacitance	Specification Standard	Dielectric loss tangent shall be measured at 1KHz±10%, 1Vrms max bias and 25±2℃.	To meet Performance Specification

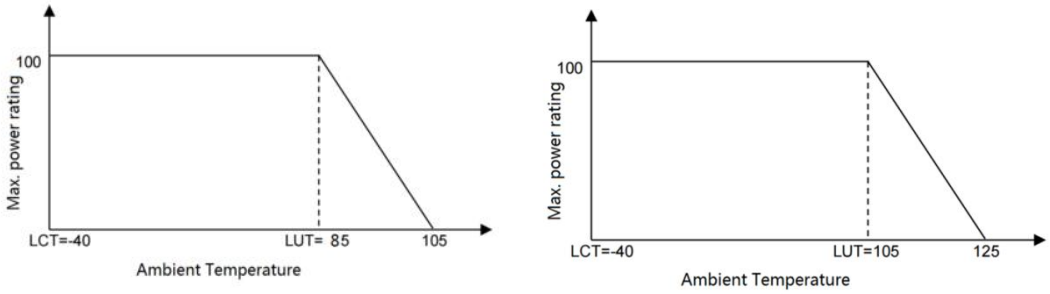
◆Reliability Testing Item

<table>
<tr><th>NO</th><th>Item</th><th>Standard</th><th>Test method</th><th>Performance</th></tr>
<tr><td>1</td><td>Tensile Strength of Terminals</td><td>IEC60068-2-21</td><td>Gradually applying the force specified and keepingthe unit fixed for 10±1 sec.<table><tr><th>Terminal diameter(mm)</th><th>Force(N)</th></tr><tr><td>0.5＜d≤0.8</td><td>10</td></tr><tr><td>0.8＜d≤1.25</td><td>20</td></tr><tr><td>1.25＜d</td><td>40</td></tr></table></td><td>No visible damage.
｜△V/V ｜≤5%.</td></tr>
<tr><td>2</td><td>Bending Strength of Terminals</td><td>IEC 60068-2-21</td><td>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.<table><tr><th>Terminal diameter(mm)</th><th>Force(N)</th></tr><tr><td>0.5＜d≤0.8</td><td>5</td></tr><tr><td>0.8＜d≤1.25</td><td>10</td></tr><tr><td>1.25＜d</td><td>20</td></tr></table></td><td>No visible damage.
｜△V/V ｜≤5%.</td></tr>
<tr><td>3</td><td>Resistance Vibration</td><td>IEC 60068-2-6</td><td>Frequency range:10Hz-55Hz,
Amplitude: 0.75mm or 98m/s^2,threedirection,Totalduration: 6h.</td><td>No visible damage.
｜△V/V ｜≤5%.</td></tr>
<tr><td>4</td><td>Bump</td><td>IEC 60068-2-29</td><td>Acceleration: 400m/S^2， 6ms， three direction， umber of bumps: 4000。</td><td>No visible damage.
｜△V/V ｜≤5%.</td></tr>
<tr><td>5</td><td>Permanency of marking</td><td>IEC 60068-2-45</td><td>Class of reagent :acetone solution
Test temperature:23±5℃
Immersing time:1min</td><td>No visible damage.
and legibly marking.
｜△V/V ｜≤5%.</td></tr>
<tr><td>6</td><td>Solderability</td><td>IEC 60068-2-20</td><td>Solder bath method245±5℃,3±0.3ses.</td><td>At least 95% of terminal electrode is covered by new solder.</td></tr>
<tr><td>7</td><td>Resistance to soldering heat</td><td>IEC 60068-2-20</td><td>Solder bath method
260±5℃, 10±1ses.Depth of immersion: up to 2.0～2.5mm from the root of the lead wire covered with thermal screen.
Speed of immersion:25±2.5mm/sec.</td><td>No visible damage.
｜△V/V ｜≤5%.</td></tr>
</table>

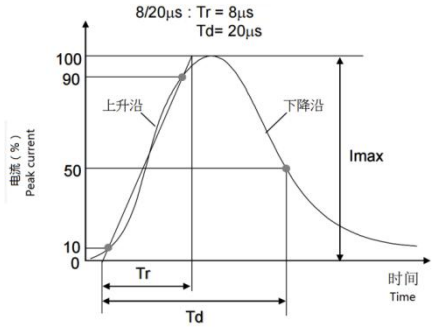
<table>
<tr><td>8</td><td>Resistance to damp heat (steady state)</td><td>IEC 60068-2-78</td><td>Group: a、b
a. 40±2℃, 90 ~ 95 % RH, 1344 hrs
b. 40±2℃, 90 ~ 95 % RH, 10% VDC, 1344 hrs</td><td>No visible damage.
|△V/V|≤10%
Insulation resistance≥100MΩ</td></tr>
<tr><td>9</td><td>High temperature load</td><td>MIL-STD-202 Method 108</td><td>at V_{AC}(Max. Operating Voltage)
105 ± 2 ℃, 1000 ± 24 hrs.</td><td>No visible damage.
|△V/V|≤10%</td></tr>
<tr><td>10</td><td>Shelf life test</td><td>IEC 60068-2-2</td><td>The Zinc oxide varistor are then stored with no voltage applied at a temperature of 125±2℃ for 1000h.</td><td>No visible damage.
|△V/V|≤5%</td></tr>
<tr><td>11</td><td>Temperature cycling</td><td>IEC60068-2-14</td><td>The conditions shown below shall be repeated 5 cycles.
<table>
<tr><td>Step</td><td>Temperature</td><td>Period</td></tr>
<tr><td>1</td><td>-40±3℃</td><td>30min</td></tr>
<tr><td>2</td><td>Room temperature</td><td>15min</td></tr>
<tr><td>3</td><td>+105±2℃</td><td>30min</td></tr>
<tr><td>4</td><td>Room temperature</td><td>15min</td></tr>
</table></td><td>No visible damage.
|△V/V|≤5%</td></tr>
<tr><td>12</td><td>Impulse life</td><td>IEC 61051-1</td><td>@8/20μS,10000times,the interval 10 seconds.
The specimen shall be stored at room temperature and humidity for 1 to 2 hours.</td><td>No visible damage.
|△V/V|≤10%</td></tr>
<tr><td>13</td><td>Voltage Proof</td><td>IEC 61051-1</td><td>Metal balls method, 2500 V_{AC} 1 min</td><td>No visible damage.</td></tr>
<tr><td>14</td><td>Fire hazard</td><td>IEC 60695-11-5</td><td>needle flame test
Severity: vertical 10 s</td><td>Flames or glowing of the specimen and the layer below extinguish in 30s，there has been no ignition of the specified layer.</td></tr>
</table>

◆Power Derating Curve

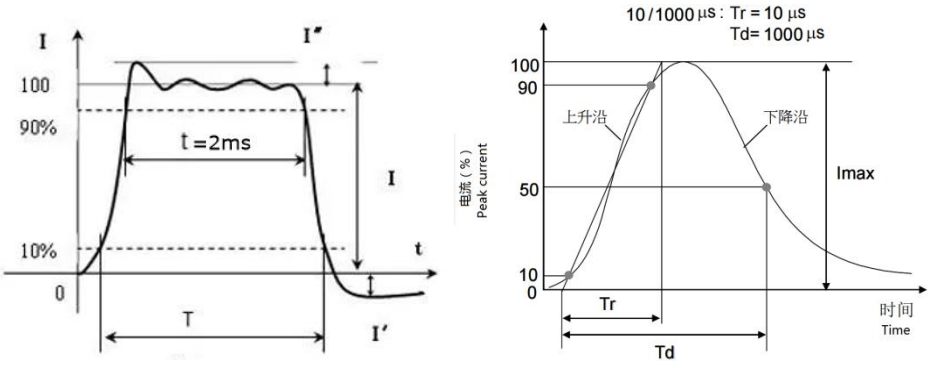
For operation at ambient temperature in excess of 85℃/105℃, the power should bederatedin accordance with below figure.



◆8/20 μ S Peak Pulse Current Test Waveform



◆2ms and 10/1000 μ S Peak Pulse Current Test Waveform



◆Packaging

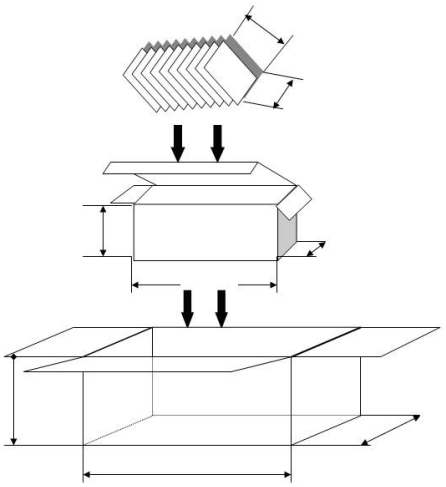
1. Bulk

Long-Lead

Series	Varistor Voltage Range	Quantity PCS/bag
05K	180-561	1000
07K	180-821	1000
10K	180-331	1000
	361-182	500
14K	180-621	500
	681-182	250
20K	180-361	250
	391-182	200

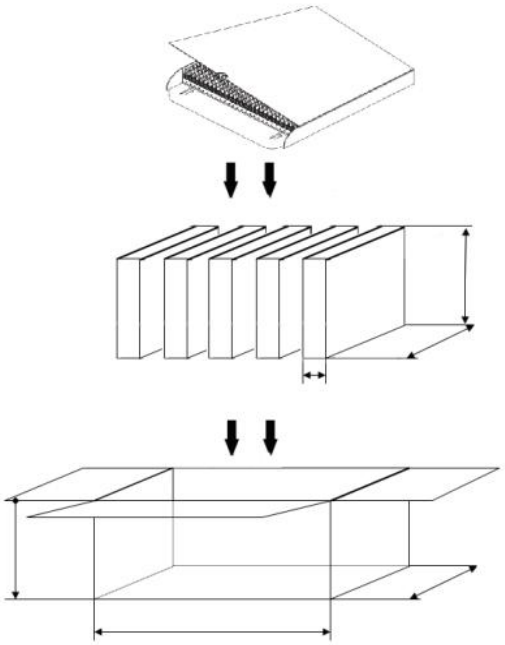
Short-Lead

Series	Varistor Voltage Range	Quantity PCS/bag
05K	180-561	1000
07K	180-821	1500
10K	180-112	500
	142-182	200
14K	180-112	500
	142-182	200
20K	180-911	400
	102-182	150



2. Tape & Box

Series	Varistor Voltage Range	Quantity PCS/box
05K	180-391	2000
	431-471	1500
	511-751	1000
07K	180-271	2000
	331-821	1500
10K	180-471	1000
	511-911	800
	102	400
	122-182	200
14K	180-431	1000
	471-621	800
	821-182	600
20K	180-271	500
	301-621	400
	681-102	300
	112-182	200

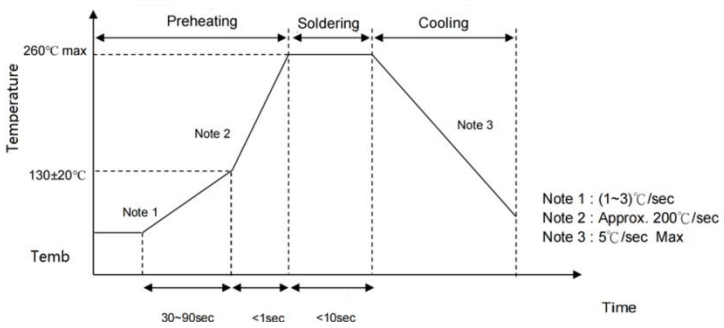


◆Environmental Protection Statement

We provide all varistor materials conform to the requirements of the latest EU ROHS directive and the Reach regulation, please rest assured to use.

◆Soldering Recommendation

* Wave soldering profile



* Iron soldering

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

◆Storage Methods

Components must be stored in a clean, ventilated, non-corrosive gases warehouse; Unless otherwise specified, the warehouse temperature and relative humidity must meet the following requirements: a.Temperature: 5 ~ 30 ℃;b. Relative humidity: 20% ~ 75%; Period of Storage：1 year.

◆Precautions For Use

1、Working environment temperature should be within the prescribed scope of technical conditions.

2、Near a fever or flammable components should not be installed, it is better to have more than 3 mm intervals, so as not to damage the components.

3、Please wear gloves when the contact pin.