

■ K 系列压敏电阻器

K Series Varistor

氧化锌压敏电阻器是以氧化锌为主要材料制造的半导体无极性电子陶瓷元件。当施加在压敏电阻器两端的电压达到某一阈值时，压敏电阻器的电阻值迅猛变小，从而在电子（电力）线路上起降压作用，达到保护其它元器件的目的。

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.



◆特性 FEATURES

*电压范围宽（18V~1.8KV）	Widely voltage range 18 V~1.8 KV
*响应速度快	Fast response to the rapidly increase Voltage
*非线性指数大	Excellent non-linearity coefficient
*无极性	Symmetric V-I characteristics
*通流容量大	Great withstanding surge current
*寿命长	Long life
*符合 ROHS、REACH、无卤环保要求	Meet ROHS, REACH, HF requirements of environmental protection

◆应用 APPLICATIONS

家电、通讯、各类电源、新能源、电表、照明、工业设备

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

◆安规认证 Safety certification

序号 NO	安规认证 Safety certification		安规标准 Standards	证书编号 Certification Number
1	中国 China	CQC	GB/T10193 GB/T10194 GB 4943.1 GB 8898	05K: CQC14001111451
				07K: CQC14001111447
				10K: CQC14001111568
				14K: CQC14001111589
				20K: CQC14001111567
2	美国 American、加拿大 Canada	UL、CUL	UL1449	E325462
3	德国 Germany	VDE	IEC61051	40008242

◆型号表示法 Part Number

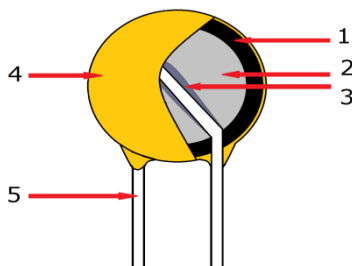
FNR	14	K	621	B	B	S	N	1	NN
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

代码说明 Part Number Code Description

序号 NO	表 示 说 明 Description					
①	风华压敏电阻 FenghuaNonlinearResistor					
②	芯片标称直径 Diameter of Element		05: 5mm	07: 7mm	10: 10mm	14: 14mm 20: 20mm
③	压敏电压公差 Tolerance		K: $\pm 10\%$			
④	压敏电压 Varistor Voltage		180 : $18 \times 10^0 = 18V$		621 : $62 \times 10^1 = 620V$ 112 : $11 \times 10^2 = 1100V$	
⑤	包装方式 Packing		B: 散装 Bulk			T: 编带 Taping
⑥	引脚形状 Lead Style		A: 直脚 Straight			F: 内弯 Inward--Crimp
			B: 外弯 Outward-Crimp			Y: Y型 Y-Crimp
⑦	引脚长度/编带孔距 LeadLength/Taping Pitch-row		S: 散装&长脚 Bulk& long lead C: 散装&短脚 Bulk&short lead T: 编带&孔距 12.7mmTaping &Pitch-row 12.7mm V: 编带&孔距 15.0mmTaping& Pitch-row 15.0mm			
⑧	产品等级 Product level		N: 常规 Standard			E: 高能 High Energy
⑨	产品配置 Product Configuration		1: 常规, 无护套无外壳 Conventional,no-jacket andno-explosion-proof 2: 透明套管 Lucency jacket 3: 黑色套管 Black jacket M: 立式防爆 Horizontal explosion-proof W: 卧式防爆 Vertical explosion-proof			
⑩	内部控制码 Internal code					

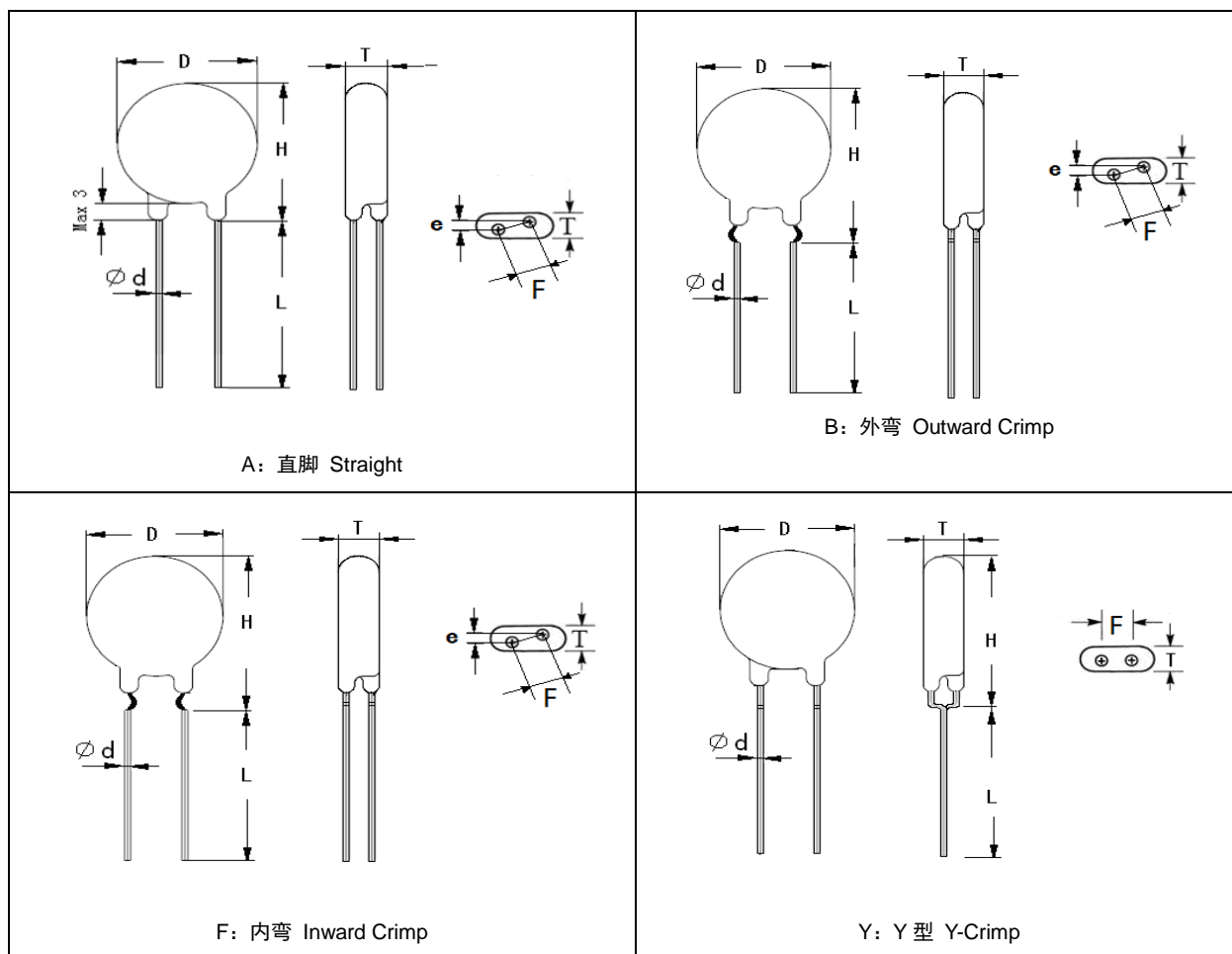
◆结构及尺寸 Structure And Dimensions

*产品结构和主要材料 Construction and main materials of products

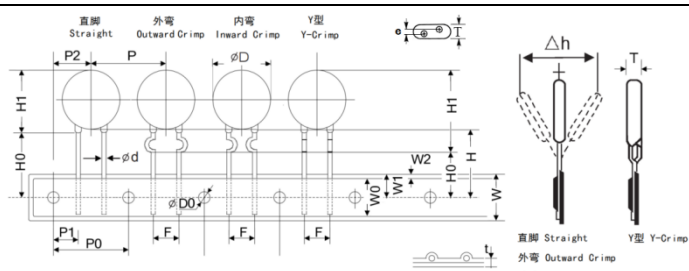
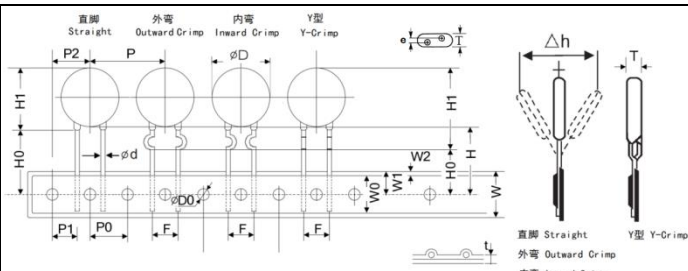
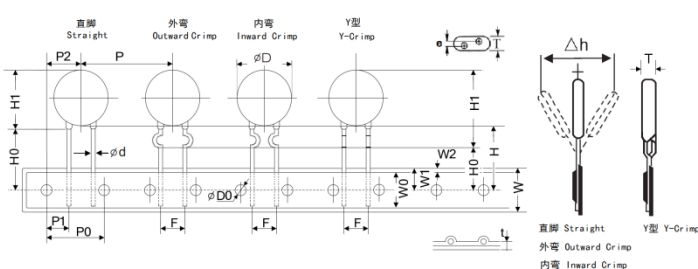
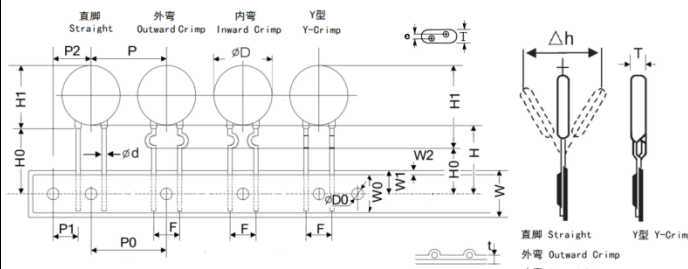


NO	主要结构 The main structure	物质成分 Material composition
1	瓷体 Ceramic disc	氧化锌 ZnO
2	电极 Electrodes	金属 Metal
3	焊点 Solder	锡 Sn、银 Ag、铜 Cu
4	包封层 Coating	环氧树脂 Epoxy resin
5	引线 Leads	镀锡铜包钢线或镀锡铜线 Tin-Plate steel wire or Tin-Plate Copper wire

*散装产品结构及尺寸 Bull Structure And Dimensions



单位（Unit）：mm										
规格 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
				直脚 Straight	弯脚 Crimp	短直脚 Straight Short-Lead	短弯脚 CrimpShort-Lead	长脚 Long-Lead		
05K	7.0	0.6	5.0	10.0	12.0	3.5	3.5	20	请参考电性能 参数表 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		

***编带产品结构及尺寸 Taping Structure And Dimensions**
图示 Drawing

图 A Fig A

图 B Fig B

图 C Fig C

图 D Fig D

图号 Fig NO.	规格 Part NO.	代号&公差 Symbol & Tolerance											单位 (Unit) : 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
D	10C	12.5	0.8	12.7	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

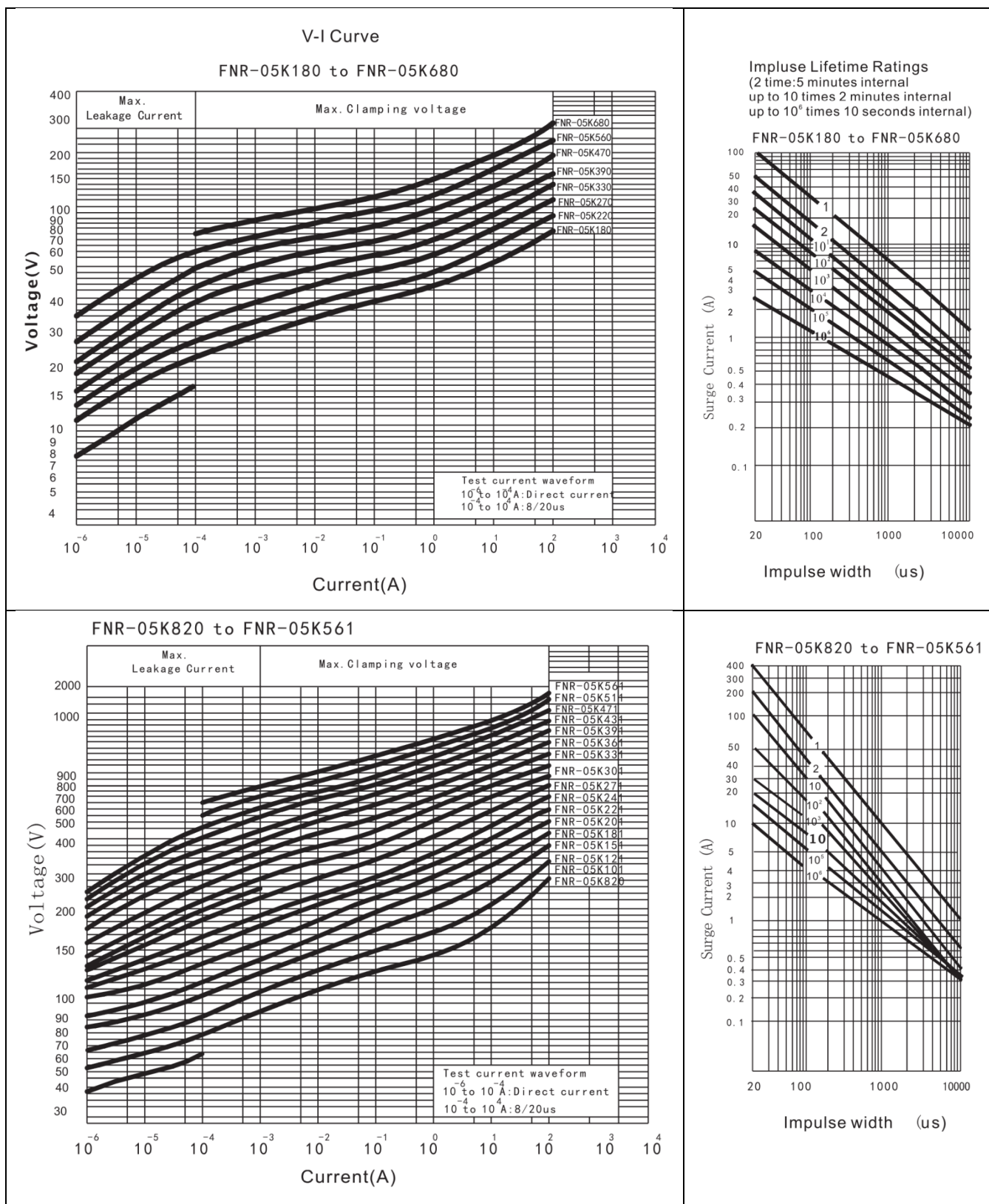
备注：产品厚度尺寸 T 请参考电性能参数表 Notes: Thickness T Please refer to the Electrical Characteristics Table.

◆电气性能 Performance Specification

* 05K 系列电气性能 05K Series Performance Specification

05K 系列 05K Series	压敏电压 Varistor Voltage (@0.1mA DC)	最大连续工作压 Max. Allowable Voltage		最大限制电压 Max. Clamping Voltage (8/20μs)		最大 冲击电流 Max.Imp ulse Current (8/20μs)	能量 耐量 Energy (2mS)	能量 耐量 Energy (10/100 0μs)	额定 功率 Rated Wattage	静态 电容量 (参考值) Typical Capacita nce	产品尺寸 Dimensions	
规格型号 Part Number	$V_{0.1mA}$	Ac (V)	Dc (V)	Vc (V)	I _p (A)	1 Times	W_{max} (J)	W_{max} (J)	P (W)	C _p (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

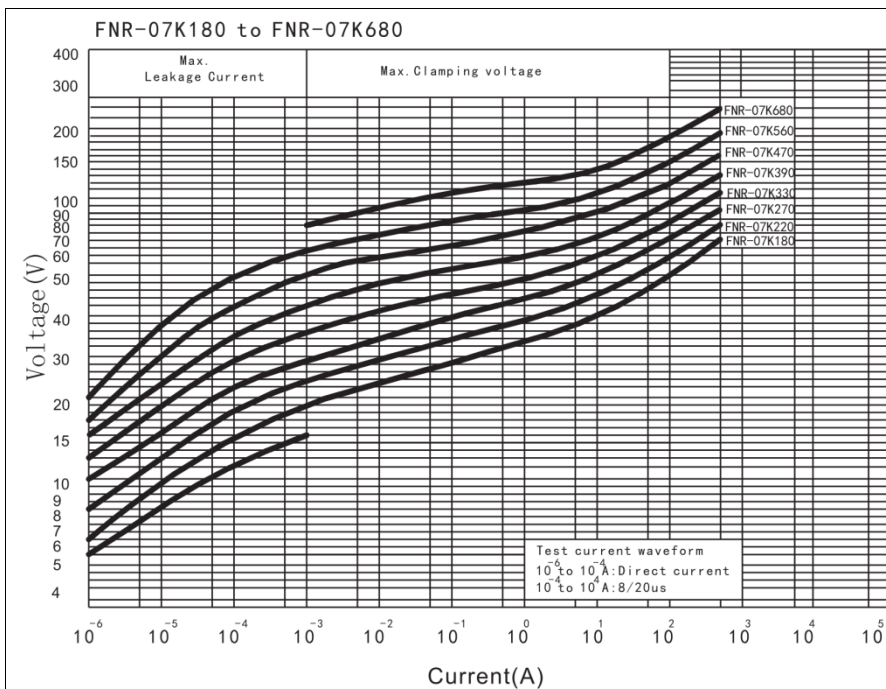
*05K 系列 V-I 特性曲线和最大浪涌电流降额曲线 05K Series V-I Curve and Max. Surge Current Derating Curves



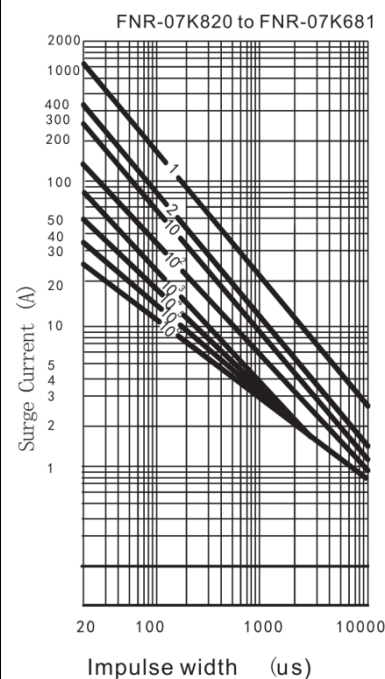
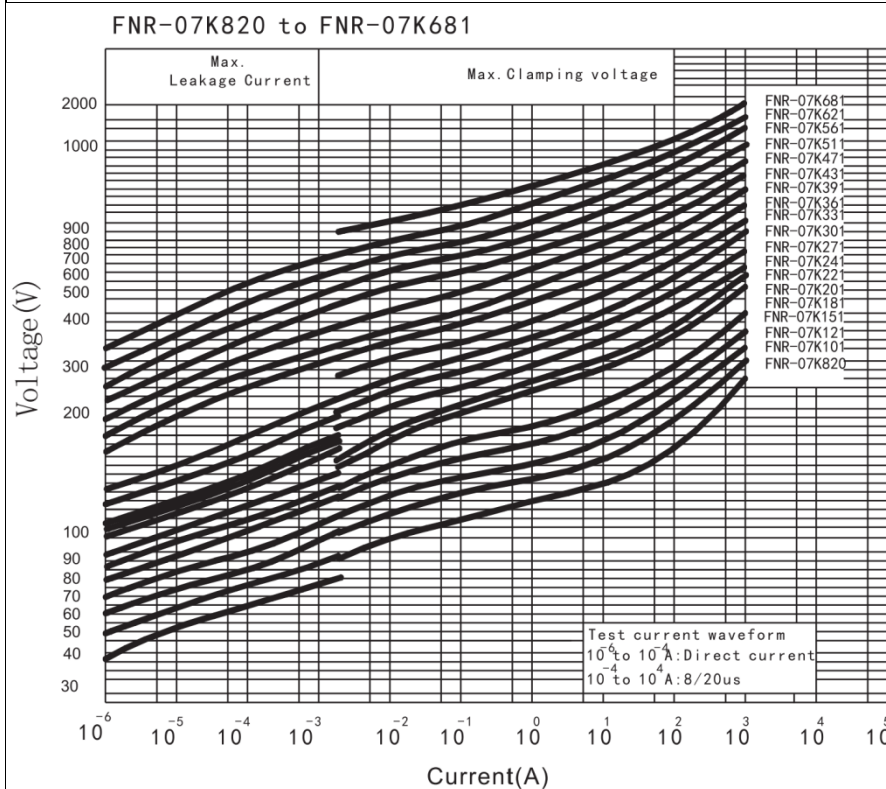
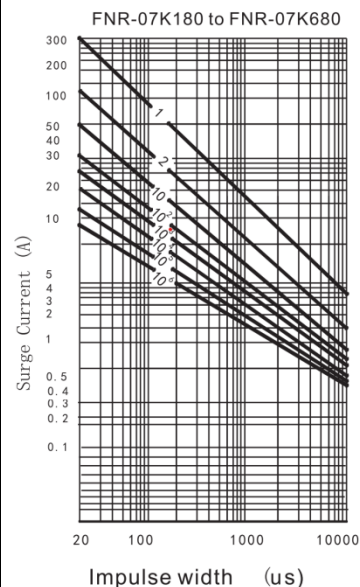
***07K 系列电气性能 07K Series Performance Specification**

07K 系列 07K Series	压敏电压 Varistor Voltage (@1mA DC)	最大连续工 作压 Max. Allowable Voltage		最大限制电压 Max. Clamping Voltage (8/20μs)		最大 冲击电流 Max.Impulse Current (8/20μs)		能量 耐量 Energy (2mS)		能量 耐量 Energy (10/1000 μs)		额定 功率 Rated Wattage	静态 电容量 (参考值) Typical Capacita nce	产品尺寸 Dimensions	
规格型号 Part Number	V _{1mA}	Ac (V)	Dc (V)	Vc (V)	I _p (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 系列 V-I 特性曲线和最大浪涌电流降额曲线 07K Series V-I Curve and Max. Surge Current Derating Curves**

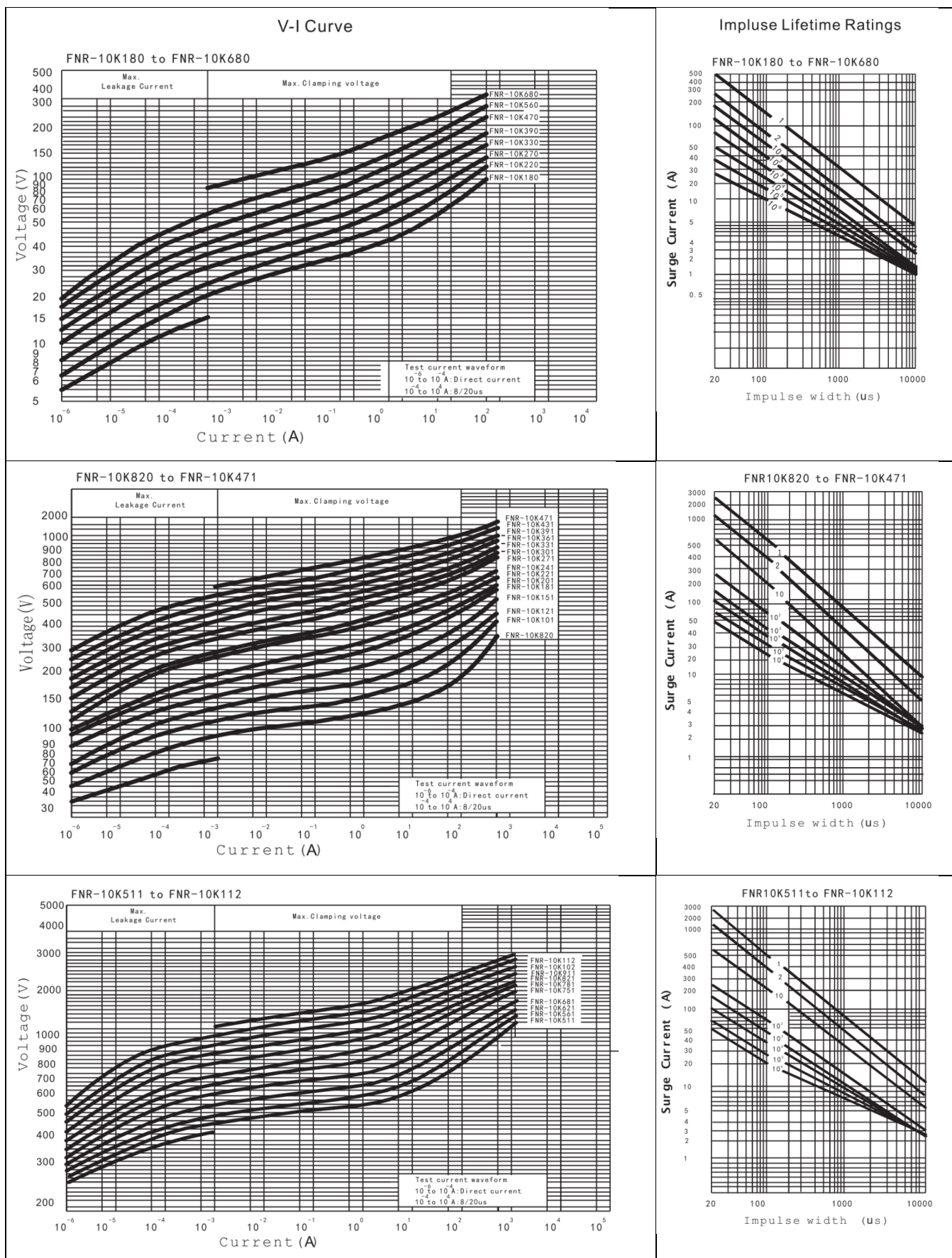


Impluse Lifetime Ratings
 (2 time:5 minutes internal
 up to 10 times 2 minutes internal
 up to 10^5 times 10 seconds internal)



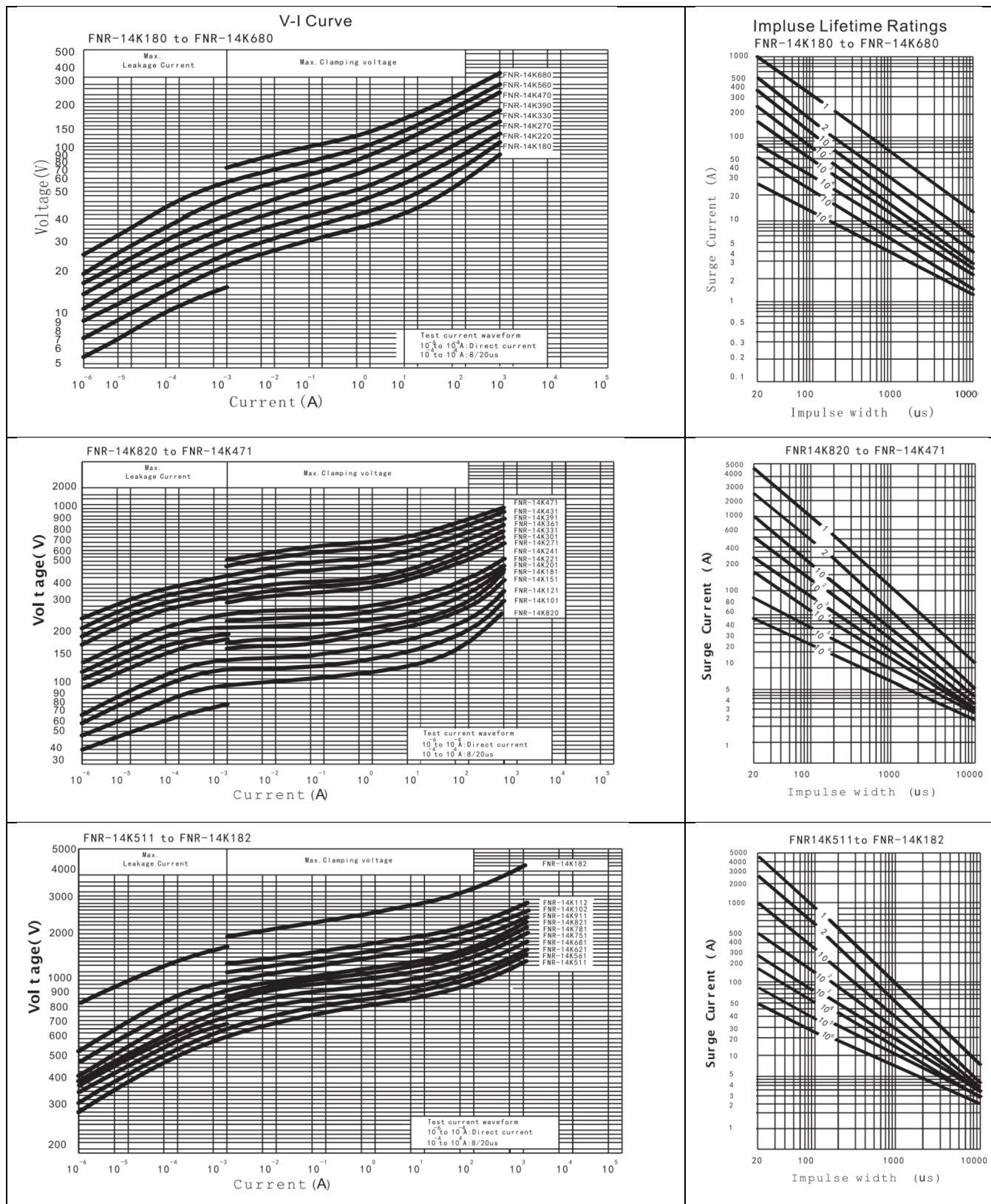
***10K 系列电气性能 10K Series Performance Specification**

10K 系列 10K Series	压敏电压 Varistor Voltage (@1mA DC)	最大连续工作 压 Max. Allowable Voltage		最大限制电 压 Max. Clamping Voltage (8/20μs)		最大 冲击电流 Max.Impulse Current (8/20μs)		能量 耐量 Energy (2mS)		能量 耐量 Energy (10/1000 μs)		额定 功率 Rated Wattage	静态 电容量 (参考值) Typical Capacitance	产品尺寸 Dimensions	
规格型号 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-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 系列 V-I 特性曲线和最大浪涌电流降额曲线 10K Series V-I Curve and Max. Surge Current Derating Curves**


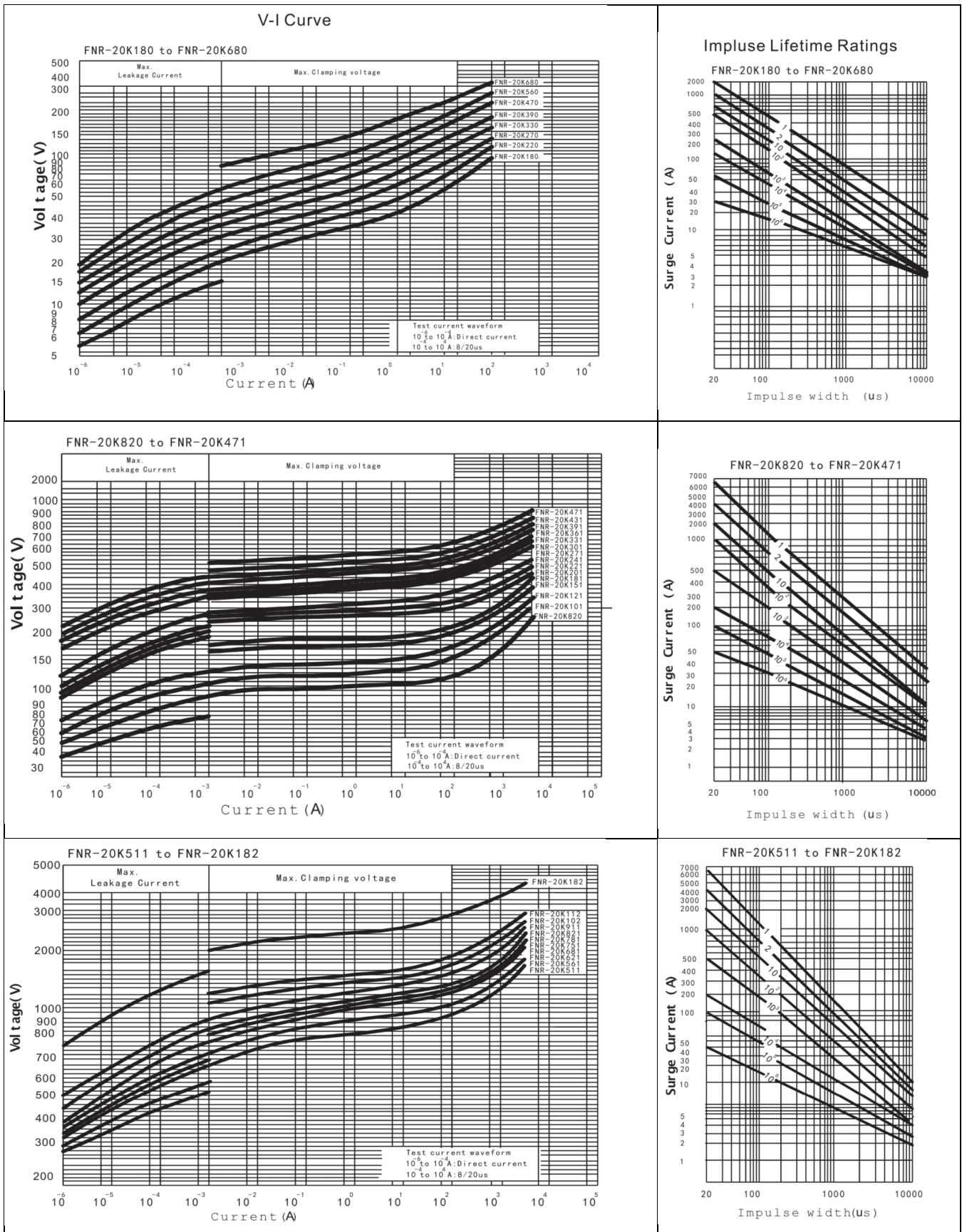
***14K 系列电气性能 14K Series Performance Specification**

14K 系列 14K Series	压敏电压 Varistor Voltage (@1mA DC)	最大连续工 作压 Max. Allowable Voltage		最大限制电 压 Max. Clamping Voltage (8/20μs)		最大 冲击电流 Max.Impulse Current (8/20μs)		能量 耐量 Energy (2mS)		能量 耐量 Energy (10/1000 μs)		额定 功率 Rated Wattage	静态 电容量 (参考 值) Typical Capacitance	产品尺寸 Dimensions	
规格型号 Part Number	V _{1mA}	Ac (V)	Dc (V)	Vc (V)	I _p (A)	1 Times (A)		W _{max} (J)		W _{max} (J)		P (W)	C _p (PF)	T _{max}	e ±1.0
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 系列 V-I 特性曲线和最大浪涌电流降额曲线 14K Series V-I Curve and Max. Surge Current Derating Curves**


***20K 系列电气性能 20K Series Performance Specification**

20K 系列 20K Series	压敏电压 Varistor Voltage (@1mA DC)	最大连续工 作压 Max. Allowable Voltage		最大限制电 压 Max. Clamping Voltage (8/20μs)		最大 冲击电流 Max.Impulse Current (8/20μs)		能量 耐量 Energy (2mS)		能量 耐量 Energy (10/1000 μs)		额定 功率 Rated Wattage	静态 电容量 (参考 值) Typical Capacit ance	产品尺寸 Dimensions	
规格型号 PartNumber	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-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 系列 V-I 特性曲线和最大浪涌电流降额曲线 20K Series V-I Curve and Max. Surge Current Derating Curves**


◆电气性能 Electrical Performance Test

序号 NO	项目 Item	测试标准 Standard	测试方法 Test method	特性 Performance
1	压敏电压 Varistor Voltage	规格标准 Specification Standard	在规定电流条件下(05K 规格为 $DC_{0.1mA}$, 其它规格 DC_{1mA}) 的两端电压值。 The voltage between two terminals with the specified measuring current (Only 05K for $DC_{0.1mA}$, orthers DC_{1mA}).	参见电气性能 To meet Performance Specification
2	漏电流 Leakage current	规格标准 Specification Standard	在标准测试条件下, 施加 83% 压敏电压时流过压敏电阻器的电流值。 The direct current flowing from the Varistor at $0.83V_v$. V_v : 压敏电压 (05K 规格为 $DC_{0.1mA}$, 其它规格 DC_{1mA}) V_v : Varistor Voltage (Only 05K for $DC_{0.1mA}$, orthers DC_{1mA}).	在 25℃ 时: $\geq 82V$ $IR \leq 20\mu A$ $< 82V$ $IR \leq 40\mu A$ (V_v of 83%)
3	限制电压 Clamping Voltage	规格标准 Specification Standard	在 8/20us 波形下, 施加规定电流后压敏电阻器两端的电压峰值。 The maximum voltage between two terminals with the specified standard impulse current (8/20us) applied.	参见电气性能 To meet Performance Specification
4	最大冲击电流 Maximum Impulse Current (withstanding surge current)	规格标准 Specification Standard	在环境温度 25℃ 下, 施加 1 次 8/20us 的标准冲击电流后, 压敏电阻电压变化率在 $\pm 10\%$ 内。 The maximum current within the varistor voltage change of $\pm 10\%$ with the standard impulse applied by the specified condition.	参见电气性能 To meet Performance Specification $ \Delta V/V \leq 10\%$
5	能量耐量 Maximum energy	规格标准 Specification Standard	在环境温度 25℃ 下, 施加 1 次 2ms 或 10/1000uS 的标准冲击电流后, 压敏电阻电压变化率在 $\pm 10\%$ 内。 The maximum energy (2ms or 10/1000uS wave) within the Varistor Voltage change of $\pm 10\%$ when the specified impulse is applied.	参见电气性能 To meet Performance Specification $ \Delta V/V \leq 10\%$
6	电压温度系数 Temperature coefficient of varistor Voltage	规格标准 Specification Standard	在规定温度下显示压敏电压的变化值。 Coefficient indicating dependency of Varistor Voltage on Specified temperature. $\frac{V_{1mA@105^{\circ}C} - V_{1mA@25^{\circ}C}}{V_{1mA@25^{\circ}C}} \times \frac{1}{80} \times 100\% (\%/^{\circ}C)$ $\frac{V_{1mA@-40^{\circ}C} - V_{1mA@25^{\circ}C}}{V_{1mA@25^{\circ}C}} \times \frac{1}{65} \times 100\% (\%/^{\circ}C)$	$-0.05 \leq T_c \leq 0.05 (\%/^{\circ}C)$
7	静态电容量 Capacitance	规格标准 Specification Standard	在环境温度为 $25 \pm 2^{\circ}C$, 测试频率为 $1KHz \pm 10\%$, $1V_{rms}$ (max) 下所测得的介电损失。 Dielectric loss tangent shall be measured at $1KHz \pm 10\%$, $1V_{rms}$ max bias and $25 \pm 2^{\circ}C$.	参见电气性能 To meet Performance Specification

◆可靠性试验项目 Reliability Testing Item

序号 NO	项目 Item	测试标准 Standard	测试方法 Test method	特性 Performance								
1	端子抗拉强度 Tensile Strength of Terminals	IEC 60068-2-21	<p>逐渐施加规定的力，并保持装置固定 10±1 秒。 Gradually applying the force specified and keepingthe unit fixed for 10±1 sec.</p> <table><tr><td>引线直径 Terminal diameter(mm)</td><td>拉力 Force(N)</td></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>	引线直径 Terminal diameter(mm)	拉力 Force(N)	0.5<d≤0.8	10	0.8<d≤1.25	20	1.25<d	40	<p>无可见损伤。 压敏电压变化率在±5%内。 Novisibledamage. Δ V/V ≤5%.</p>
引线直径 Terminal diameter(mm)	拉力 Force(N)											
0.5<d≤0.8	10											
0.8<d≤1.25	20											
1.25<d	40											
2	引线弯折试验 Bending Strength of Terminals	IEC 60068-2-21	<p>固定试样，并将以下规定的力施加到每个引脚上。将样品弯曲至 90°，然后回到原样位置。在相反的方向上重复此步骤。 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.</p> <table><tr><td>引线直径 Terminal diameter(mm)</td><td>拉力 Force(N)</td></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>	引线直径 Terminal diameter(mm)	拉力 Force(N)	0.5<d≤0.8	5	0.8<d≤1.25	10	1.25<d	20	<p>无可见损伤。 压敏电压变化率在±5%内。 Novisibledamage. Δ V/V ≤5%.</p>
引线直径 Terminal diameter(mm)	拉力 Force(N)											
0.5<d≤0.8	5											
0.8<d≤1.25	10											
1.25<d	20											
3	振动试验 Resistance Vibration	IEC 60068-2-6	<p>振动频率：10 ~ 55 Hz 振幅：0.75mm 或 98 m/s² 持续时间：6 小时(3 x 2 小时) Frequency range:10Hz-55Hz, Amplitude: 0.75mm or 98m/s²,three direction,Totalduration: 6h.</p>	<p>无可见损伤。 压敏电压变化率在±5%内。 Novisibledamage. Δ V/V ≤5%.</p>								
4	碰撞 Bump	IEC 60068-2-29	<p>400m/S²，6ms，三个方向，共 4000 次。 Acceleration: 400m/S²，6ms，three direction，umber of bumps: 4000。</p>	<p>无可见损伤。 压敏电压变化率在±5%内。 Novisibledamage. Δ V/V ≤5%.</p>								
5	耐溶剂性 Permanency of marking	IEC 60068-2-45	<p>溶剂：丙酮溶液 温度：23±5℃ 浸入时间：1 分钟。 Class of reagent :acetone solution Test temperature:23±5℃ Immersing time:1min</p>	<p>无损伤、标志清楚，容易辨认。 Novisibledamage and legibly marking. Δ V/V ≤5%.</p>								
6	可焊性 Solderability	IEC 60068-2-20	<p>槽焊法 245±3℃，3±0.3 秒 Solder bath method245±5℃,3±0.3ses.</p>	<p>着锡面积≥95% At least 95% of terminal electrode is covered by new solder.</p>								

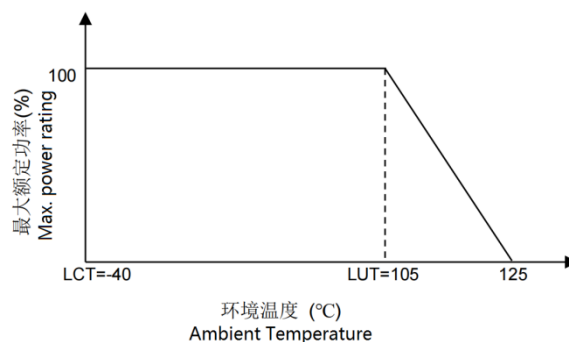
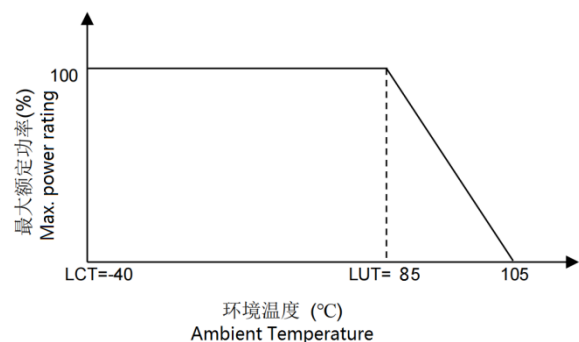
7	耐焊接热 Resistance to soldering heat	IEC 60068-2-20	槽焊法 260±5℃,10±1 秒,深度: 至引线根部 2.0~2.5mm 浸入速度: 25±2.5mm/sec Solder bath method 260±5℃, 10±1ses.Depth of immersion: up to 2.0~2.5mm from the root of the lead wire covered with thermal screen. Speed of immersion:25±2.5mm/sec.	无可见损伤。 压敏电压变化率在±5%内。 Novisibledamage. Δ V/V ≤5%.															
8	稳态湿热 Resistance to damp heat (steady state)	IEC 60068-2-78	试验分 a、b 两组: a. 40±2℃, 90 ~ 95 % RH, 1344 小时 b. 40±2℃, 90 ~ 95 % RH, 10% VDC, 1344 小时 Group: a、b a. 40±2℃, 90 ~ 95 % RH, 1344 hrs b. 40±2℃, 90 ~ 95 % RH, 10% VDC, 1344 hrs	无可见损伤。 压敏电压变化率在±10%内。 绝缘电阻≥100MΩ。 No visible damage. Δ V/V ≤10% Insulation resistance≥100MΩ															
9	上限类别温度耐久性 High temperature load	MIL-STD-202 Method 108	施加电压: 最大连续交流电压。 试验温度: 105 ± 2 ℃ 试验时间: 1000h at V _{AC} (Max. Operating Voltage) 105 ± 2 ℃, 1000 ± 24 hrs,	外观无可见损伤。 压敏电压变化率在±10%内。 No visible damage. Δ V/V ≤10%															
10	高温贮存试验 Shelf life test	IEC 60068-2-2	在 125±2℃环境下无负荷贮 1000h。 The Zinc oxide varistor are then stored with no voltage applied at a temperature of 125±2℃ for 1000h.	外观无可见损伤。 压敏电压变化率在±5%内。 No visible damage. Δ V/V ≤5%															
11	温度快速变化 Temperature cycling	IEC60068-2-14	温度循环应重复 5 次, 并在室温和湿度下保存 1 至 2 小时。 The conditions shown below shall be repeated 5 cycles. <table><tr><td>步骤 Step</td><td>温度 Temperature</td><td>时间 Period</td></tr><tr><td>1</td><td>-40±3℃</td><td>30min</td></tr><tr><td>2</td><td>室温 Room temperature</td><td>15min</td></tr><tr><td>3</td><td>+105±2℃</td><td>30min</td></tr><tr><td>4</td><td>室温 Room temperature</td><td>15min</td></tr></table>	步骤 Step	温度 Temperature	时间 Period	1	-40±3℃	30min	2	室温 Room temperature	15min	3	+105±2℃	30min	4	室温 Room temperature	15min	外观无可见损伤。 压敏电压变化率在±5%内。 No visible damage. Δ V/V ≤5%
步骤 Step	温度 Temperature	时间 Period																	
1	-40±3℃	30min																	
2	室温 Room temperature	15min																	
3	+105±2℃	30min																	
4	室温 Room temperature	15min																	
12	脉冲寿命 Impulse life	IEC 61051-1	固定冲击电流用 8/20μS 标准波冲击 10000 次,时间间隔 10S,恢复时间室温 1~2 小时。 @8/20μS,10000 times,the interval 10 seconds. The specimen shall be stored at room temperature and humidity for 1 to 2 hours.	外观无可见损伤。 压敏电压变化率在±10%内。 No visible damage. Δ V/V ≤10%															
13	耐压试验 Voltage Proof	IEC 61051-1	金属球法, 2500 V _{AC} 1 分钟 Metal balls method, 2500 V _{AC} 1 min	外观无可见损伤。 No visible damage.															
14	阻燃性试验 Fire hazard	IEC 60695-11-5	针焰测试 施加火焰时间: 10 秒	不燃烧或残焰不超过 30s; 滴落物不引燃垫纸。															

			needle flame test Severity: vertical 10 s	Flames or glowing of the specimen and the layer below extinguish in 30s, there has been no ignition of the specified layer.
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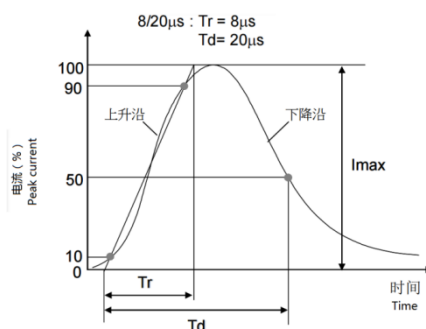
◆功率降额曲线 Power Derating Curve

在室温下操作超过 85°C/105°C 功率会按下图降级。

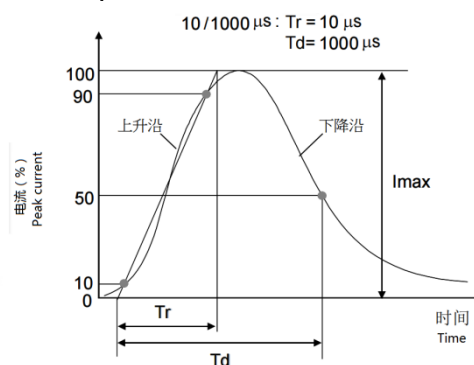
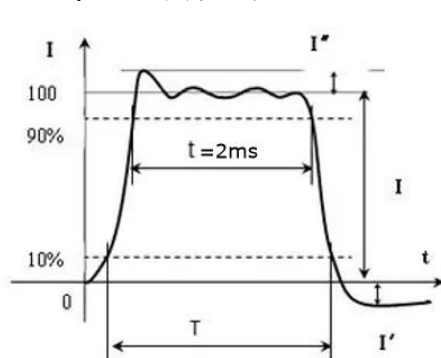
For operation at ambient temperature in excess of 85°C/105°C, the power should be derated in accordance with below figure.



◆8/20 μ S 标准脉冲波形 8/20 μ S Peak Pulse Current Test Waveform

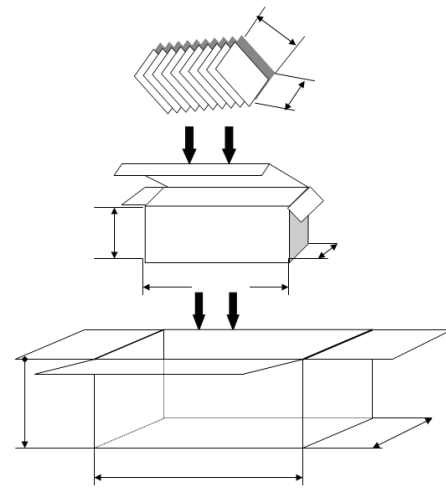


◆2ms 和 10/1000 μ S 标准脉冲波形 2ms and 10/1000 μ S Peak Pulse Current Test Waveform

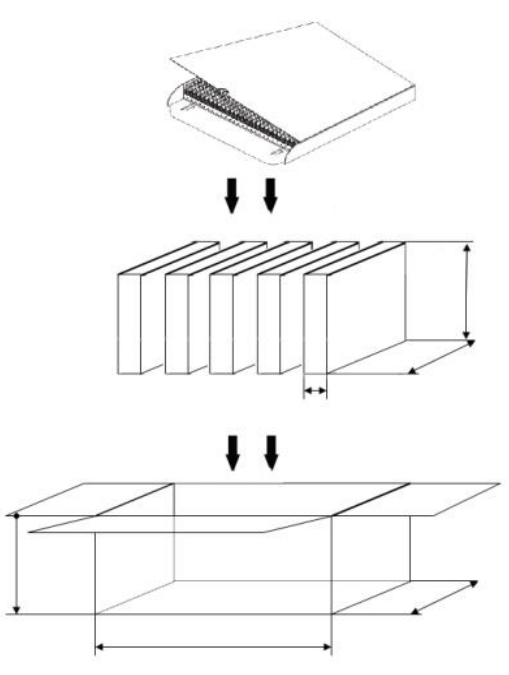


◆包装 Packaging

*1. 散装 Bulk

长脚 Long-Lead			短脚 Short-Lead			
规格 Series	适用 电压范围 Varistor Voltage Range	包装 数量 (支 / 袋) Quantity PCS/bag	规格 Series	适用 电压范围 Varistor Voltage Range	包装 数量 (支 / 袋) Quantity PCS/bag	
05K	180-561	1000	05K	180-561	1000	
07K	180-821	1000	07K	180-821	1500	
10K	180-331	1000	10K	180-112	500	
	361-182	500		142-182	200	
14K	180-621	500	14K	180-112	500	
	681-182	250		142-182	200	
20K	180-361	250	20K	180-911	400	
	391-182	200		102-182	150	

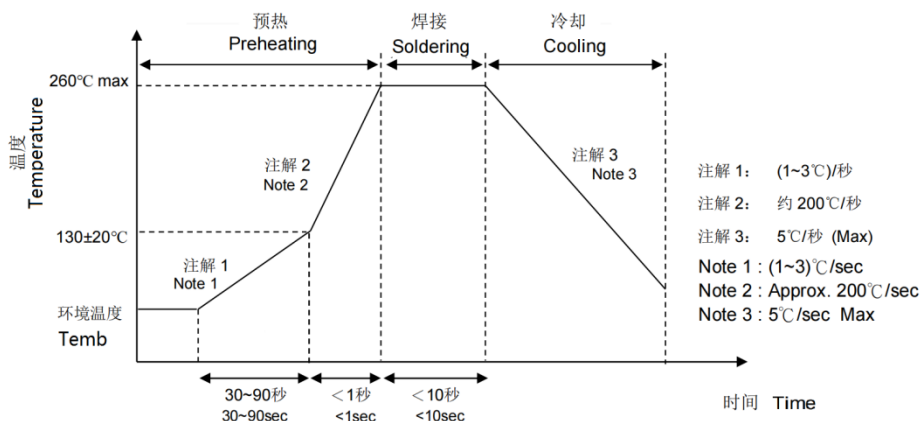
*2. 编带 Tape & Box

规格 Series	适用电压范围 Varistor Voltage Range	包装数量(支 / 盒)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	

我司提供的所有压敏电阻物料均符合最新欧盟 ROHS 指令及 Reach 法规要求，请贵司放心使用。

◆推荐焊接条件 Soldering Recommendation

*波峰焊曲线 Wave soldering profile



*手工焊接 Iron soldering

项目 Item	条件 Conditions
烙铁头温度 Temperature of solderingIron-tip	360℃ (max.)
焊接时间 Soldering Time	3s (max.)
焊接位置与涂装层距离 Distance from Varistor	2mm (min.)

◆贮存方法 Storage Methods

元器件必须储存在清洁、通风、无腐蚀性气体的仓库内；除另有规定外，仓库的温度和相对湿度必须满足如下要求：a.温度：5~30℃；
b.相对湿度：20%~75%；存储期限：1年。

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 °C;b. Relative humidity: 20% ~ 75%; Period of Storage: 1 year.

◆使用注意事项 Precautions For Use

- 1、工作环境温度应该在技术条件规定的范围以内。

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

- 2、不应该靠近发热或可燃元器件安装，最好有大于 3 毫米的间隔，以免损坏元器件。

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、接触引脚时请先佩戴手套。Please wear gloves when the contact pin.

◆修订履历 Update history

版本 Version	日期 Date	修订内容 Revision Content	修订人 Reviser