

■ T 系列压敏电阻器

T 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~1100V）	Widely voltage range 18 V~1100 V
*响应速度快（≤25ns）	Fast response to the rapidly increase Voltage (≤25ns)
*非线性指数大	Excellent non-linearity coefficient
*无极性	Symmetric V-I characteristics
*通流量大	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
*工作温度-40~125℃	Operating temperature-40~125℃

◆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、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	07T: CQC21001299315
				10T: CQC21001299313
				14T: CQC21001299311
				20T: CQC21001299302
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	T	621	K	B	2	S	20	P	N	1	G	NN
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭

代码说明 Part Number Code Description

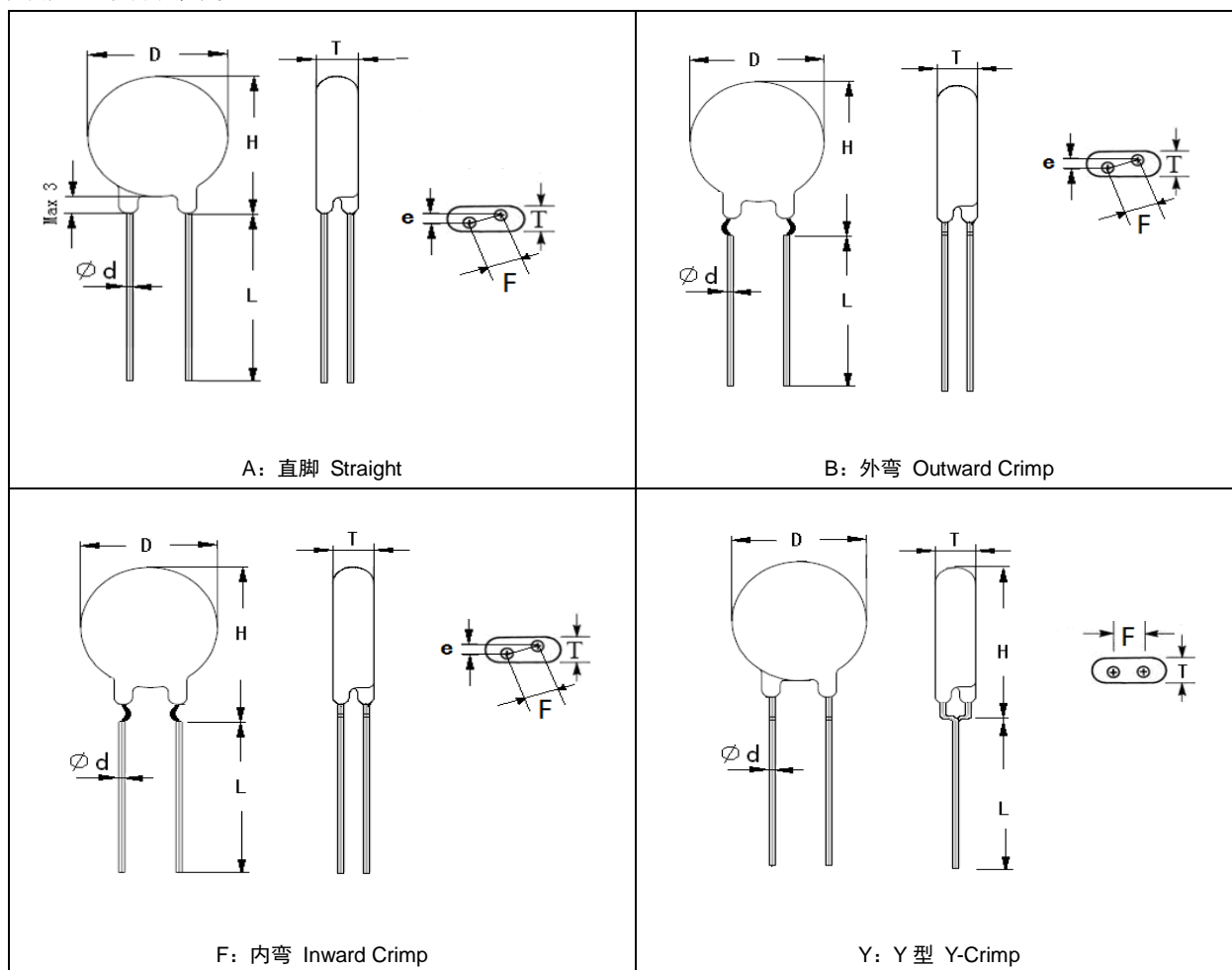
序号 NO	表 示 说 明 Description				
①	风华压敏电阻 FenghuaNonlinearResistor				
②	芯片标称直径 Diameter of Element	07: 7mm	10: 10mm	14: 14mm	20: 20mm
③	系列型号 Series Type	T 系列: 125℃硅树脂 T Series: 125℃ Silicon resin Varistor			
④	压敏电压 Varistor Voltage	180 : 18×10 ⁰ =18V	621 : 62×10 ¹ =180V		112 : 11×10 ² =1100V
⑤	压敏电压公差 Tolerance	K: ±10%			
⑥	引脚形状 Lead Style	A: 直脚 Straight B: 外弯 Outward-Crimp		F: 内弯 Inward--Crimp Y: Y 型 Y-Crimp	
⑦	引脚间距和线径 Pin spacing and Wire diameter	1: 脚距&线径: Spacing and Wire diameter: 5.0mm&φ0.6mm 2: 脚距&线径: Spacing and Wire diameter: 7.5mm&φ0.8mm 3: 脚距&线径: Spacing and Wire diameter: 10.0mm&φ1.0mm 4: 脚距&线径: Spacing and Wire diameter: 7.5mm&φ0.7mm 5: 脚距&线径: Spacing and Wire diameter: 10.0mm&φ0.8mm 6: 脚距&线径: Spacing and Wire diameter: 7.5mm&φ1.0mm X: 特殊要求参照承认书 Special requirements Refer to Structure & Dimension			
⑧	包装方式-长/短脚/编带/步距 Packaging-Long lead/Short lead/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			
⑨	编带 H ₀ 值/引脚长度 Taping H ₀ /Lead length	16: 编带 H ₀ 值: TapingH ₀ :16.0mm 19: 编带 H ₀ 值: TapingH ₀ :19.0mm 20: 长脚 Longlead （20mm Min.） 30: 短脚 Short-Lead length 3.0mm 35: 短脚 Short-Lead length 3.5mm			
⑩	引脚材料 Lead Material	U: 铜线 Tin-Plate Copper wire		P: 镀锡铜包钢线 Tin plating steel wire	
⑪	产品等级 Product level	N: 常规 Standard		E: 高能 High Energy	
⑫	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			
⑬	本体外观颜色/封装材 Body Color / Coating Material	G: 绿色硅树脂 Green Silicon resin			
⑭	内部控制码 Internal code				

◆结构及尺寸 Structure And Dimensions

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

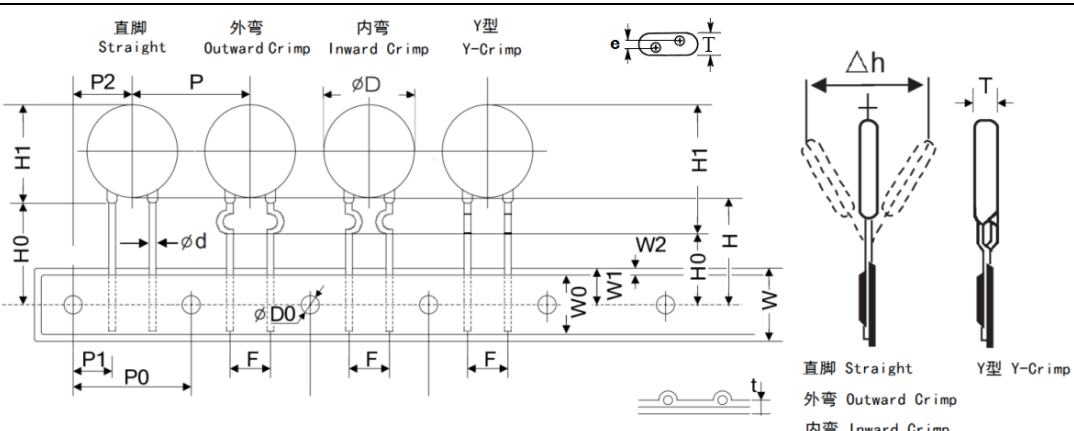
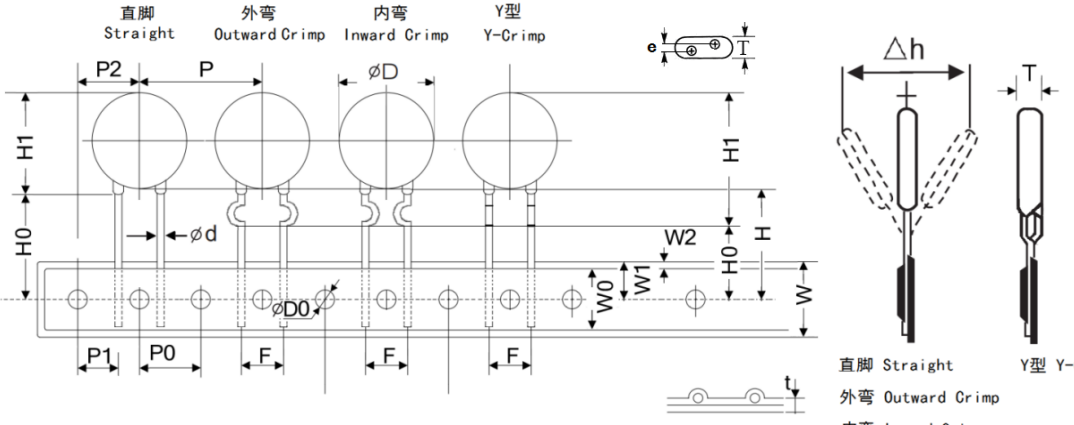
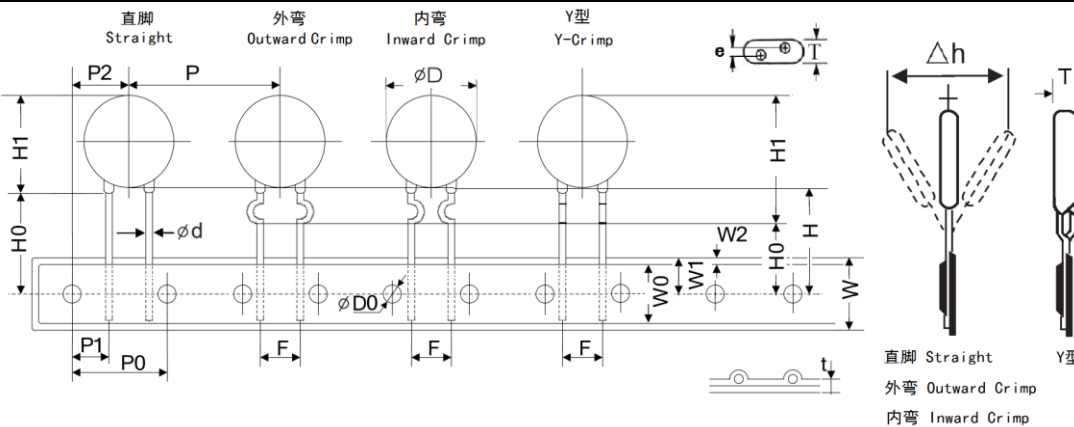
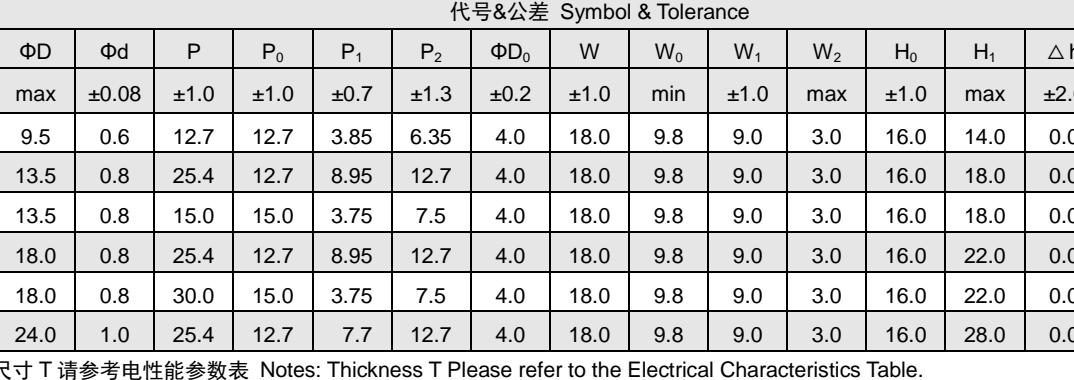
NO	主要结构 The main structure	物质成分 Material composition
1	瓷体 Ceramic disc	氧化锌 ZnO
2	电极 Electrodes	金属 Metal
3	焊点 Solder	锡 Sn、银 Ag、铜 Cu
4	包封层 Coating	硅树脂 Silicon resin
5	引线 Leads	镀锡铜包钢线或镀锡铜线 Tin-Plate steel wire or Tin-Plate Copper wire

*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		
07T	9.5	0.6	5.0	12.0	14.0	3.5	3.5	20	请参考电性能 参数表 Please refer to the Electrical Characteristics Table	
10T	13.5	0.8	7.5	16.0	18.0	3.5	3.5	20		
14T	18.0	0.8	7.5	19.0	22.0	3.5	3.5	20		
20T	24.0	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**

图号 Fig NO.		图示 Drawing															
图 A Fig A																	
																	
																	
																	
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	Δ 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	07T	9.5	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	10T	13.5	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	10T	13.5	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	14T	18.0	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	14T	18.0	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	20T	24.0	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

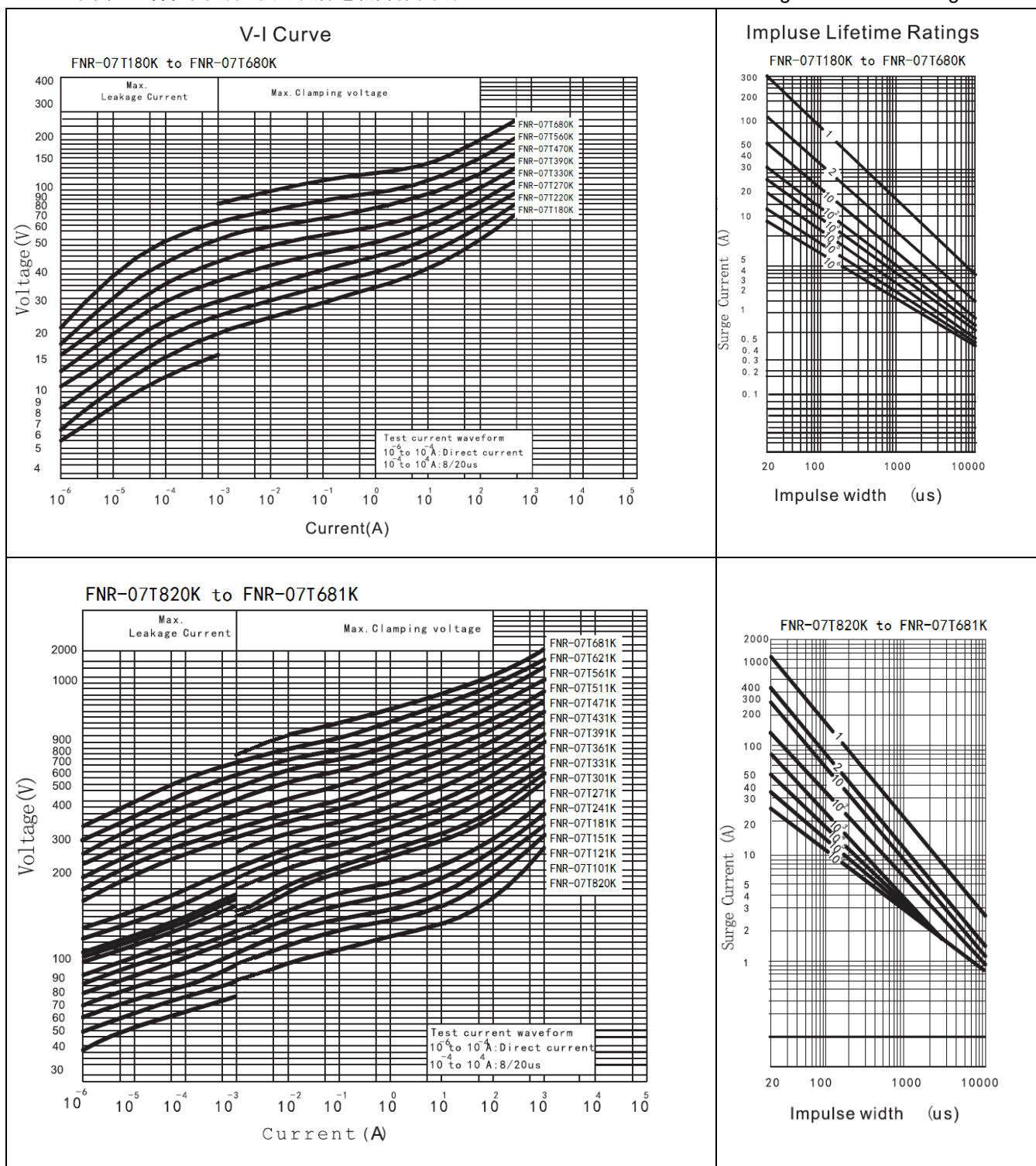
备注：产品厚度尺寸 T 请参考电性能参数表 Notes: Thickness T Please refer to the Electrical Characteristics Table.

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

07T 系列 07T 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 Capacitanc e	产品尺寸 Dimensions	
规格型号 Part Number	V1mA (V)	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-07T180K	18 (16.2~19.8)	11	14	36	2.5	250	/	0.9	/	1.3	/	0.02	3500	4.60	1.1
FNR-07T220K	22 (19.8~24.2)	14	18	43	2.5	250	/	1.1	/	1.5	/	0.02	2800	4.80	1.2
FNR-07T270K	27 (24.3~29.7)	17	22	53	2.5	250	/	1.4	/	2.0	/	0.02	2000	5.00	1.1
FNR-07T330K	33 (29.7~36.3)	20	26	65	2.5	250	/	1.7	/	2.4	/	0.02	1500	4.70	1.2
FNR-07T390K	39 (35.1~42.9)	25	31	77	2.5	250	/	2.1	/	2.9	/	0.02	1350	4.90	1.4
FNR-07T470K	47 (42.3~51.7)	30	38	93	2.5	250	/	2.5	/	3.5	/	0.02	1150	5.10	1.6
FNR-07T560K	56 (50.4~61.6)	35	45	110	2.5	250	/	3.1	/	4.3	/	0.02	950	5.20	1.8
FNR-07T680K	68 (61.2~74.8)	40	56	135	2.5	250	/	3.6	/	5.0	/	0.02	700	5.30	2.1
FNR-07T820K	82 (73.8~90.2)	50	65	135	10	1200	/	4.2	/	5.5	/	0.25	550	4.50	1.2
FNR-07T101K	100 (90~110)	60	85	165	10	1200	/	4.8	/	6.5	/	0.25	500	4.80	1.3
FNR-07T121K	120 (108~132)	75	100	200	10	1200	/	5.9	/	7.8	/	0.25	450	5.00	1.5
FNR-07T151K	150 (135~165)	95	125	250	10	1200	/	8.0	/	9.7	/	0.25	350	5.30	1.8
FNR-07T181K	180 (162~198)	115	150	300	10	1200	1800	10	13.0	11.7	19.0	0.25	300	4.60	1.2
FNR-07T201K	200 (180~220)	130	170	340	10	1200	1800	13	15.0	14	21.0	0.25	250	4.70	1.2
FNR-07T221K	220 (198~242)	140	180	360	10	1200	1800	13	16.4	14	23.0	0.25	250	4.80	1.3
FNR-07T241K	240 (216~264)	150	200	395	10	1200	1800	13	17.8	14	25.0	0.25	200	5.00	1.4
FNR-07T271K	270 (243~297)	175	225	455	10	1200	1800	15	20.0	18	28.0	0.25	170	5.10	1.5
FNR-07T301K	300 (270~330)	195	250	500	10	1200	1800	17	22.8	21	32.0	0.25	150	5.30	1.6
FNR-07T331K	330 (297~363)	210	275	550	10	1200	1800	22	24.2	25	34.0	0.25	150	5.50	1.8
FNR-07T361K	360 (324~396)	230	300	595	10	1200	1800	20	26.4	25	37.0	0.25	130	5.60	1.9
FNR-07T391K	390 (351~429)	250	320	650	10	1200	1800	22	28.6	25	40.0	0.25	130	5.90	2.0
FNR-07T431K	430 (387~473)	275	350	710	10	1200	1800	26	32.8	28	46.0	0.25	110	6.10	2.2
FNR-07T471K	470 (423~517)	300	385	775	10	1200	1800	26	35.0	30	49.0	0.25	100	6.40	2.3
FNR-07T511K	510 (459~561)	320	410	840	10	1200	1800	26	38.5	33	54.0	0.25	100	6.60	2.5
FNR-07T561K	560 (504~616)	350	460	925	10	1200	1800	26	39.2	33	55.0	0.25	90	6.90	2.7
FNR-07T621K	620 (558~682)	385	505	1025	10	1200	1800	26	42.0	35	59.0	0.25	80	7.20	2.9
FNR-07T681K	680 (612~748)	420	560	1120	10	1200	1800	26	44.3	35	62.0	0.25	75	7.70	3.2

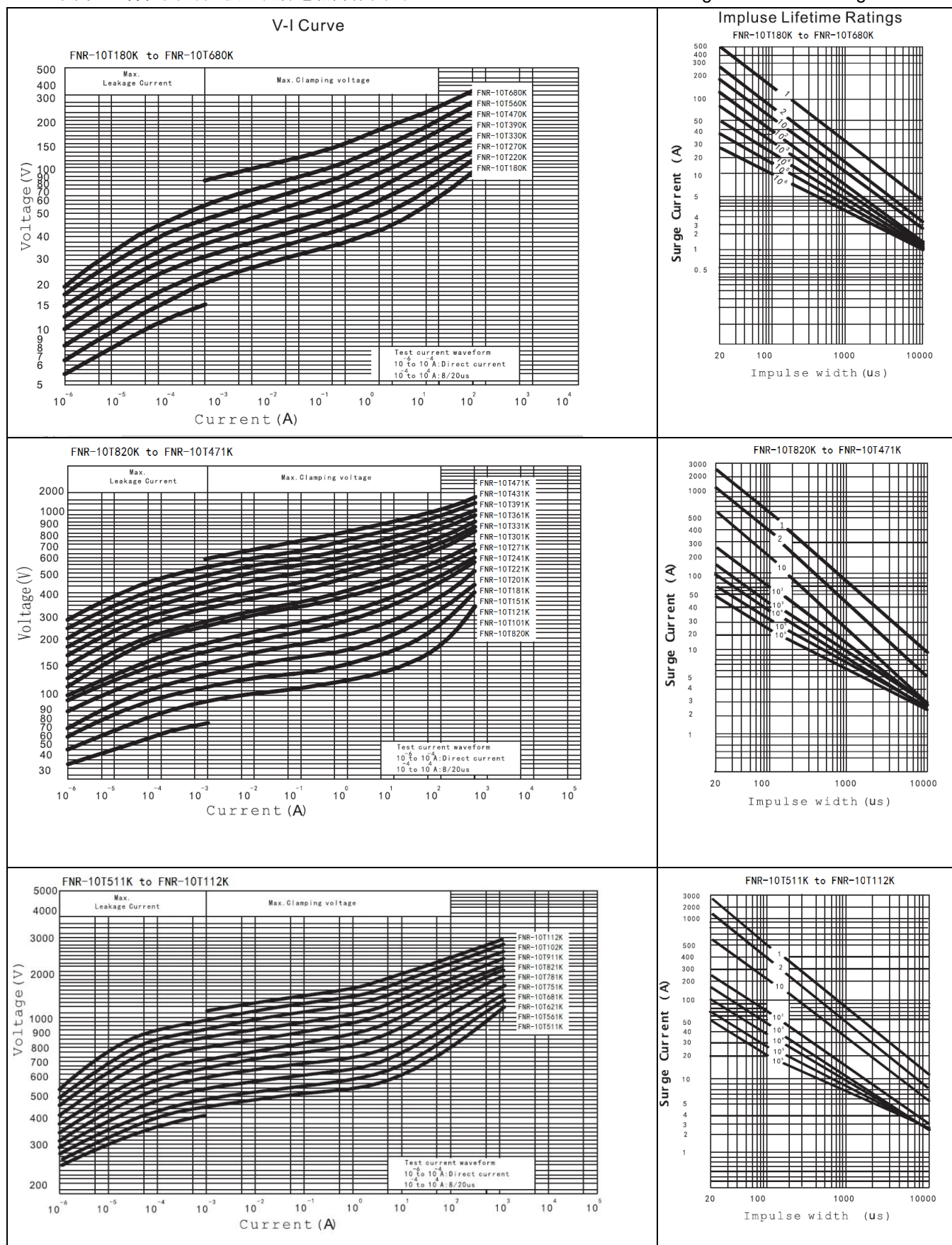
*07T 系列 V-I 特性曲线和最大浪涌电流降额曲线 07T Series V-I Curve and Max. Surge Current Derating Curves



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

10T 系列 10T 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	V1mA (V)	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-10T180K	18 (16.2~19.8)	11	14	36	5	500	/	2.1	/	2.9	/	0.05	7500	5.00	1.3
FNR-10T220K	22 (19.8~24.2)	14	18	43	5	500	/	2.5	/	3.5	/	0.05	6000	5.10	1.4
FNR-10T270K	27 (24.3~29.7)	17	22	53	5	500	/	3.0	/	4.2	/	0.05	4000	5.30	1.3
FNR-10T330K	33 (29.7~36.3)	20	26	65	5	500	/	4.0	/	5.6	/	0.05	3000	5.10	1.4
FNR-10T390K	39 (35.1~42.9)	25	31	77	5	500	/	4.6	/	6.4	/	0.05	2600	5.30	1.6
FNR-10T470K	47 (42.3~51.7)	30	38	93	5	500	/	5.5	/	7.7	/	0.05	2200	5.50	1.8
FNR-10T560K	56 (50.4~61.6)	35	45	110	5	500	/	7.0	/	9.8	/	0.05	1800	5.50	1.9
FNR-10T680K	68 (61.2~74.8)	40	56	135	5	500	/	8.2	/	11	/	0.05	1300	5.50	2.0
FNR-10T820K	82 (73.8~90.2)	50	65	135	25	2500	/	8.4	/	12	/	0.4	1800	4.80	1.4
FNR-10T101K	100 (90~110)	60	85	165	25	2500	/	10	/	15	/	0.4	1400	5.20	1.5
FNR-10T121K	120 (108~132)	75	100	200	25	2500	/	15	/	18	/	0.4	1100	5.40	1.7
FNR-10T151K	150 (135~165)	95	125	250	25	2500	/	20	/	22	/	0.4	900	5.70	2.0
FNR-10T181K	180 (162~198)	115	150	300	25	2500	3500	23	27	27	33	0.4	700	5.30	1.4
FNR-10T201K	200 (180~220)	130	170	340	25	2500	3500	26	30	30	35	0.4	500	5.40	1.4
FNR-10T221K	220 (198~242)	140	180	360	25	2500	3500	30	32	32	39	0.4	450	5.50	1.5
FNR-10T241K	240 (216~264)	150	200	395	25	2500	3500	32	35	35	42	0.4	400	5.70	1.6
FNR-10T271K	270 (243~297)	175	225	455	25	2500	3500	40	41	40	49	0.4	350	5.80	1.7
FNR-10T301K	300 (270~330)	195	250	500	25	2500	3500	35	45	40	53	0.4	325	6.00	1.8
FNR-10T331K	330 (297~363)	210	275	550	25	2500	3500	39	49	43	58	0.4	325	6.20	2.0
FNR-10T361K	360 (324~396)	230	300	595	25	2500	3500	45	53	47	65	0.4	300	6.30	2.1
FNR-10T391K	390 (351~429)	250	320	650	25	2500	3500	52	58	60	70	0.4	270	6.60	2.2
FNR-10T431K	430 (387~473)	275	350	710	25	2500	3500	58	63	65	80	0.4	250	6.70	2.4
FNR-10T471K	470 (423~517)	300	385	775	25	2500	3500	58	69	70	85	0.4	230	7.10	2.5
FNR-10T511K	510 (459~561)	320	410	840	25	2500	3500	58	69	70	92	0.4	200	7.30	2.7
FNR-10T561K	560 (504~616)	350	455	925	25	2500	3500	58	69	70	92	0.4	180	7.60	2.9
FNR-10T621K	620 (558~682)	385	505	1025	25	2500	3500	58	69	70	95	0.4	130	7.90	3.2
FNR-10T681K	680 (612~748)	420	560	1120	25	2500	3500	60	74	72	98	0.4	130	8.30	3.4
FNR-10T751K	750 (675~825)	460	615	1240	25	2500	3500	65	81	75	100	0.4	120	8.70	3.7
FNR-10T781K	780 (702~858)	485	640	1290	25	2500	3500	65	85	75	100	0.4	120	8.80	3.8
FNR-10T821K	820 (738~902)	510	670	1355	25	2500	3500	71	99	85	110	0.4	110	9.10	4.0
FNR-10T911K	910 (819~1001)	550	745	1500	25	2500	3500	78	109	93	130	0.4	100	9.70	4.3
FNR-10T102K	1000 (900~1100)	625	825	1650	25	2500	3500	84	117	102	140	0.4	90	10.2	4.7
FNR-10T112K	1100 (990~1210)	680	895	1815	25	2500	3500	91	127	115	155	0.4	80	10.7	5.0

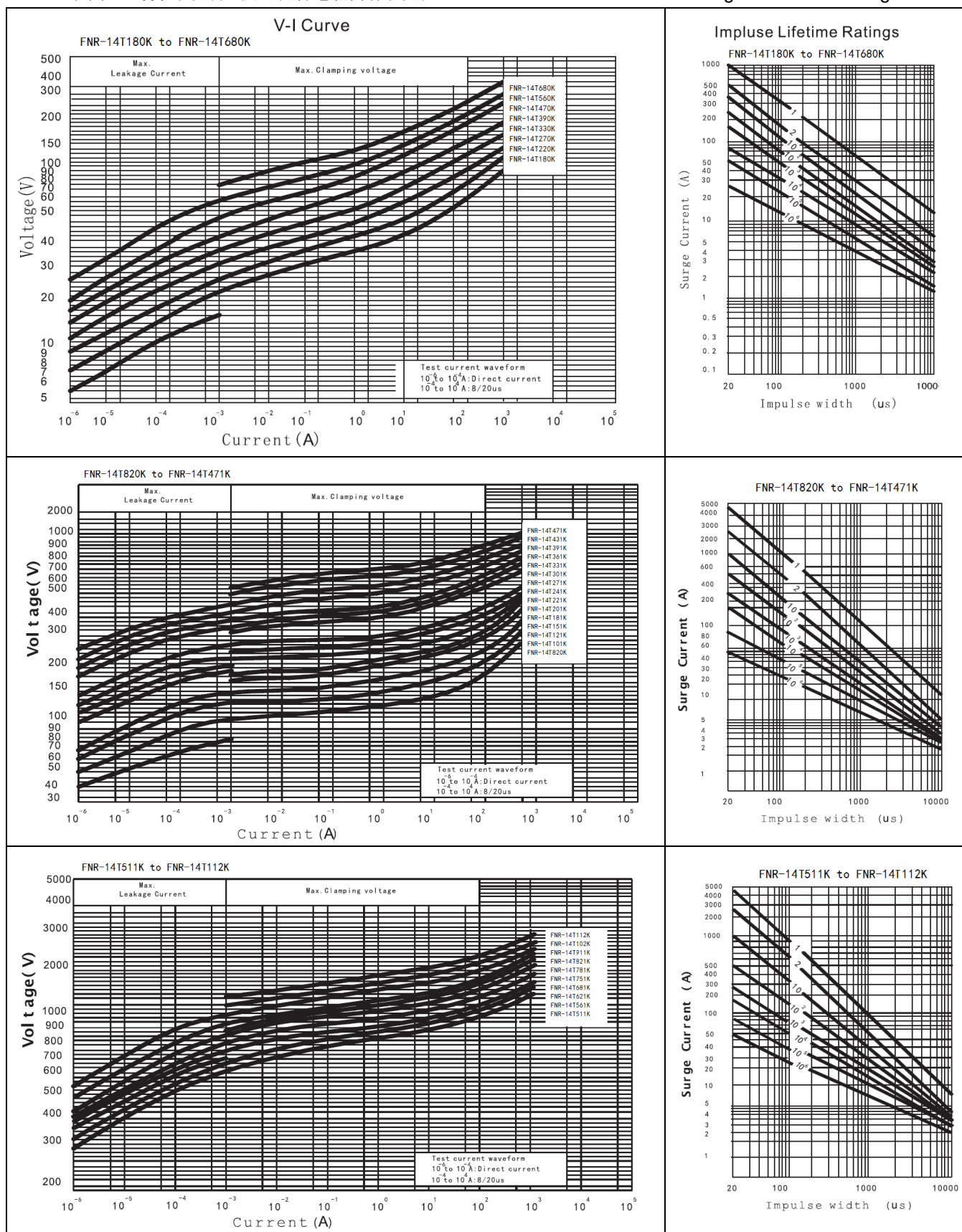
*10T 系列 V-I 特性曲线和最大浪涌电流降额曲线 10T Series V-I Curve and Max. Surge Current Derating Curves



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

14T 系列 14T 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 Capacitanc e	产品尺寸 Dimensions	
规格型号 Part Number	V1mA (V)	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-14T180K	18 (16.2~19.8)	11	14	36	10	1000	/	4.0	/	5.0	/	0.1	18000	5.10	1.3
FNR-14T220K	22 (19.8~24.2)	14	18	43	10	1000	/	5.0	/	6.0	/	0.1	15000	5.30	1.4
FNR-14T270K	27 (24.3~29.7)	17	22	53	10	1000	/	6.0	/	7.0	/	0.1	10000	5.50	1.3
FNR-14T330K	33 (29.7~36.3)	20	26	65	10	1000	/	7.5	/	8.5	/	0.1	7500	5.50	1.4
FNR-14T390K	39 (35.1~42.9)	25	31	77	10	1000	/	8.6	/	10	/	0.1	6500	5.40	1.6
FNR-14T470K	47 (42.3~51.7)	30	38	93	10	1000	/	10	/	12	/	0.1	5500	5.60	1.8
FNR-14T560K	56 (50.4~61.6)	35	45	110	10	1000	/	11	/	14	/	0.1	4500	5.70	1.9
FNR-14T680K	68 (61.2~74.8)	40	56	135	10	1000	/	14	/	18	/	0.1	3300	5.50	2.2
FNR-14T820K	82 (73.8~90.2)	50	65	135	50	4500	/	15	/	22	/	0.6	2900	5.00	1.4
FNR-14T101K	100 (90~110)	60	85	165	50	4500	/	18	/	28	/	0.6	2400	5.30	1.5
FNR-14T121K	120 (108~132)	75	100	200	50	4500	/	26	/	32	/	0.6	1900	5.50	1.7
FNR-14T151K	150 (135~165)	95	125	250	50	4500	/	32	/	40	/	0.6	1500	5.80	1.8
FNR-14T181K	180 (162~198)	115	150	300	50	4500	6000	39	54	52	60	0.6	1250	5.50	1.4
FNR-14T201K	200 (180~220)	130	170	340	50	4500	6000	45	61	57	84	0.6	1000	5.60	1.4
FNR-14T221K	220 (198~242)	140	180	360	50	4500	6000	52	65	63	91	0.6	1000	5.70	1.5
FNR-14T241K	240 (216~264)	150	200	395	50	4500	6000	52	71	63	98	0.6	900	5.90	1.6
FNR-14T271K	270 (243~297)	175	225	455	50	4500	6000	65	81	70	112	0.6	750	6.00	1.7
FNR-14T301K	300 (270~330)	195	250	500	50	4500	6000	71	90	78	123	0.6	650	6.20	1.9
FNR-14T331K	330 (297~363)	210	275	550	50	4500	6000	78	99	85	133	0.6	650	6.40	2.0
FNR-14T361K	360 (324~396)	230	300	595	50	4500	6000	84	107	93	147	0.6	550	6.50	2.2
FNR-14T391K	390 (351~429)	250	320	650	50	4500	6000	91	117	100	161	0.6	500	6.80	2.3
FNR-14T431K	430 (387~473)	275	350	710	50	4500	6000	97	127	115	182	0.6	450	6.90	2.4
FNR-14T471K	470 (423~517)	300	385	775	50	4500	6000	104	140	125	196	0.6	440	7.30	2.5
FNR-14T511K	510 (459~561)	320	410	840	50	4500	6000	104	150	125	210	0.6	380	7.50	2.7
FNR-14T561K	560 (504~616)	350	455	925	50	4500	6000	104	165	125	231	0.6	345	7.80	2.6
FNR-14T621K	620 (558~682)	385	505	1025	50	4500	6000	110	180	130	252	0.6	250	8.10	2.8
FNR-14T681K	680 (612~748)	420	560	1120	50	4500	6500	117	190	136	266	0.6	250	8.50	3.0
FNR-14T751K	750 (675~825)	460	615	1240	50	4500	6000	130	200	143	280	0.6	230	8.90	3.3
FNR-14T781K	780 (702~858)	485	640	1290	50	4500	6000	136	200	150	280	0.6	230	9.00	3.4
FNR-14T821K	820 (738~902)	510	670	1355	50	4500	6000	143	203	157	285	0.6	200	9.30	3.5
FNR-14T911K	910 (819~1001)	550	745	1500	50	4500	6000	156	220	175	308	0.6	180	9.90	3.9
FNR-14T102K	1000 (900~1100)	625	825	1650	50	4500	6000	169	240	190	336	0.6	150	10.5	4.1
FNR-14T112K	1100 (990~1210)	680	895	1815	50	4500	6000	182	260	213	364	0.6	150	11.0	4.5

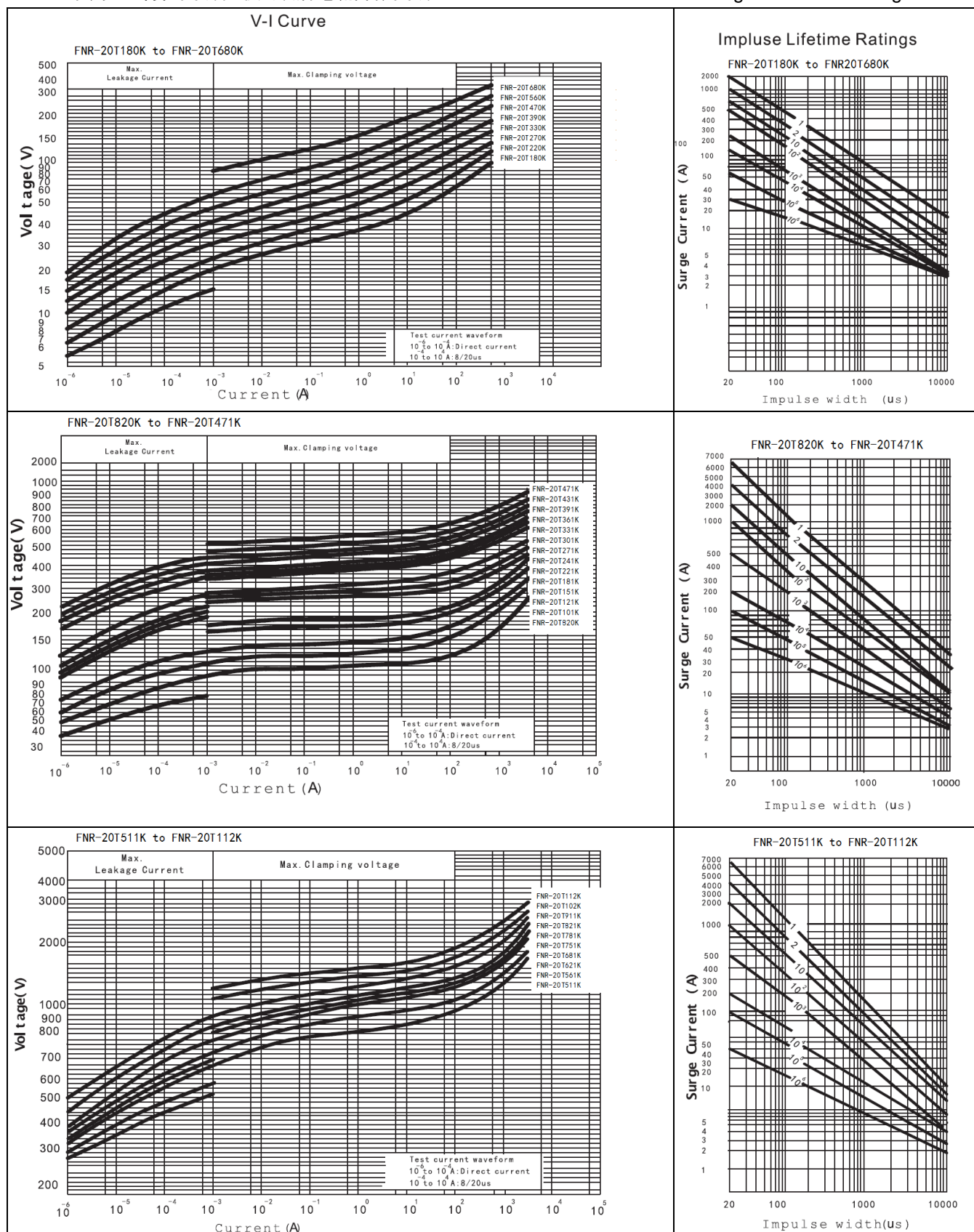
*14T 系列 V-I 特性曲线和最大浪涌电流降额曲线 14T Series V-I Curve and Max. Surge Current Derating Curves



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

20T 系列 20T 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 Capacitanc e	产品尺寸 Dimensions	
规格型号 Part Number	V1mA (V)	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-20T180K	18 (16.2~19.8)	11	14	36	20	2000	/	10	/	11	/	0.2	18000	5.50	1.3
FNR-20T220K	22 (19.8~24.2)	14	18	43	20	2000	/	13	/	14	/	0.2	30000	5.60	1.4
FNR-20T270K	27 (24.3~29.7)	17	22	53	20	2000	/	15	/	18	/	0.2	20000	5.80	1.3
FNR-20T330K	33 (29.7~36.3)	20	26	65	20	2000	/	18	/	23	/	0.2	17000	6.00	1.4
FNR-20T390K	39 (35.1~42.9)	25	31	77	20	2000	/	20	/	26	/	0.2	15000	5.70	1.6
FNR-20T470K	47 (42.3~51.7)	30	38	93	20	2000	/	25	/	33	/	0.2	13000	5.90	1.8
FNR-20T560K	56 (50.4~61.6)	35	45	110	20	2000	/	30	/	41	/	0.2	11000	6.00	1.9
FNR-20T680K	68 (61.2~74.8)	40	56	135	20	2000	/	33	/	46	/	0.2	7000	6.00	2.2
FNR-20T820K	82 (73.8~90.2)	50	65	135	100	6500	/	38	/	48	/	1.0	5500	5.30	1.4
FNR-20T101K	100 (90~110)	60	85	165	100	6500	/	42	/	51	/	1.0	4800	5.60	1.5
FNR-20T121K	120 (108~132)	75	100	200	100	6500	/	52	/	55	/	1.0	3800	5.60	1.7
FNR-20T151K	150 (135~165)	95	125	250	100	6500	/	65	/	70	/	1.0	3000	6.10	1.8
FNR-20T181K	180 (162~198)	115	150	300	100	6500	10000	78	90	84	126	1.0	2500	5.60	1.4
FNR-20T201K	200 (180~220)	130	170	340	100	6500	10000	91	102	95	142	1.0	2000	5.80	1.4
FNR-20T221K	220 (198~242)	140	180	360	100	6500	10000	97	108	100	151	1.0	2000	5.90	1.5
FNR-20T241K	240 (216~264)	150	200	395	100	6500	10000	100	118	108	165	1.0	1800	6.00	1.6
FNR-20T271K	270 (243~297)	175	225	455	100	6500	10000	117	136	127	191	1.0	1600	6.20	1.7
FNR-20T301K	300 (270~330)	195	250	500	100	6500	10000	136	150	150	210	1.0	1400	6.40	1.9
FNR-20T331K	330 (297~363)	210	275	550	100	6500	10000	136	165	150	231	1.0	1400	6.60	2.0
FNR-20T361K	360 (324~396)	230	300	595	100	6500	10000	156	178	163	249	1.0	1200	6.90	2.2
FNR-20T391K	390 (351~429)	250	320	650	100	6500	10000	169	195	180	273	1.0	1000	7.00	2.3
FNR-20T431K	430 (387~473)	275	350	710	100	6500	10000	182	213	190	298	1.0	900	7.10	2.4
FNR-20T471K	470 (423~517)	300	385	775	100	6500	10000	195	232	220	325	1.0	900	7.50	2.5
FNR-20T511K	510 (459~561)	320	410	840	100	6500	10000	195	232	220	325	1.0	800	7.70	2.7
FNR-20T561K	560 (504~616)	350	455	925	100	6500	10000	195	232	220	325	1.0	700	7.90	2.6
FNR-20T621K	620 (558~682)	385	505	1025	100	6500	10000	195	246	220	344	1.0	500	8.30	2.8
FNR-20T681K	680 (612~748)	420	560	1120	100	6500	10000	208	268	230	376	1.0	460	8.70	3.0
FNR-20T751K	750 (675~825)	460	615	1240	100	6500	10000	227	297	255	416	1.0	420	9.00	3.3
FNR-20T781K	780 (702~858)	485	640	1290	100	6500	10000	234	309	265	433	1.0	420	9.50	3.4
FNR-20T821K	820 (738~902)	510	670	1355	100	6500	10000	247	325	282	455	1.0	400	10.20	3.5
FNR-20T911K	910 (819~1001)	550	745	1500	100	6500	10000	280	360	310	504	1.0	350	10.70	3.9
FNR-20T102K	1000 (900~1100)	625	825	1650	100	6500	10000	299	396	340	554	1.0	320	11.20	4.1
FNR-20T112K	1100 (990~1210)	680	895	1815	100	6500	10000	325	435	383	609	1.0	300	11.60	4.5

*20T 系列 V-I 特性曲线和最大浪涌电流降额曲线 20T 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 (DC _{1mA}) 的两端电压值。 The voltage between two terminals with the specified measuring current (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 (DC _{1mA}) V _V : Varistor Voltage (DC _{1mA}).	在 25℃ 时: ≥82V IR≤20μA <82V IR≤40μA (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 ±10% 内。 The maximum current within the varistor voltage change of ±10% with the standard impulse applied by the specified condition.	参见电气性能 To meet Performance Specification ΔV/V ≤ 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 ±10% 内。 The maximum energy (2ms or 10/1000uS wave) within the Varistor Voltage change of ±10% when the specified impulse is applied.	参见电气性能 To meet Performance Specification ΔV/V ≤ 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. $\frac{V_{1mA@125^{\circ}\text{C}} - V_{1mA@25^{\circ}\text{C}}}{V_{1mA@25^{\circ}\text{C}}} \times \frac{1}{60} \times 100\% \text{ (}\%/^{\circ}\text{C)}$ $\frac{V_{1mA@-40^{\circ}\text{C}} - V_{1mA@25^{\circ}\text{C}}}{V_{1mA@25^{\circ}\text{C}}} \times \frac{1}{65} \times 100\% \text{ (}\%/^{\circ}\text{C)}$	-0.05 ≤ T _c ≤ 0.05 (%/°C)
7	静态电容容量 Capacitance	规格标准 Specification Standard	在环境温度为 25±2℃, 测试频率为 1KHz±10%, 1Vrms (max) 下所测得的介电损失。 Dielectric loss tangent shall be measured at 1KHz±10%, 1Vrms max bias and 25±2℃.	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	IEC60068-2-21	<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 3 方向，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>								

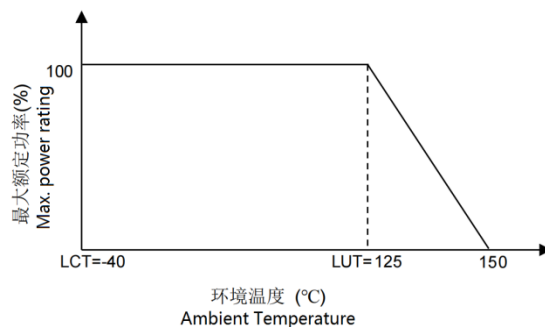
7	耐焊接热 Resistance to soldering heat	IEC 60068-2-20	槽焊法 260±5℃,10±1 秒,深度: 至引线根部 2.0~2.5mm 浸入速度: 25±2.5mm/sec Solder bath method 260±5℃, 10±1ses.Depth of immersion: up to 2.0~2.5mm from the root of the lead wire covered with thermal screen. Speed of immersion:25±2.5mm/sec.	无可见损伤。 压敏电压变化率在±5%内。 Novisibledamage. 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: 125±2℃ 试验时间: 1000h At V _{AC} (Max. Operating Voltage) 125 ± 2 °C, 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 1000 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>+125±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	+125±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	+125±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, 1000 V _{AC} 1 分钟 Metal balls method, 1000 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 needle flame test Severity: vertical 10 s	不燃烧或残焰不超过 30s; 滴落物不引燃垫纸。 Flames or glowing of the specimen and the layer below extinguish in 30s, there has been no ignition of the specified layer.

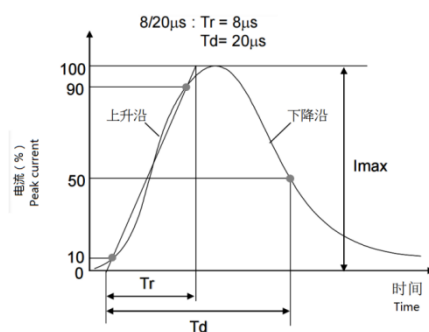
◆功率降额曲线 Power Derating Curve

在室温下操作超过 125°C 功率会按下图降额。

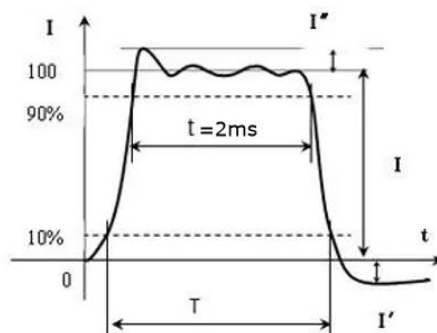
For operation at ambient temperature in excess of 125°C, the power should be derated in accordance with below figure.



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



◆2ms 标准脉冲波形 2ms Peak Pulse Current Test Waveform



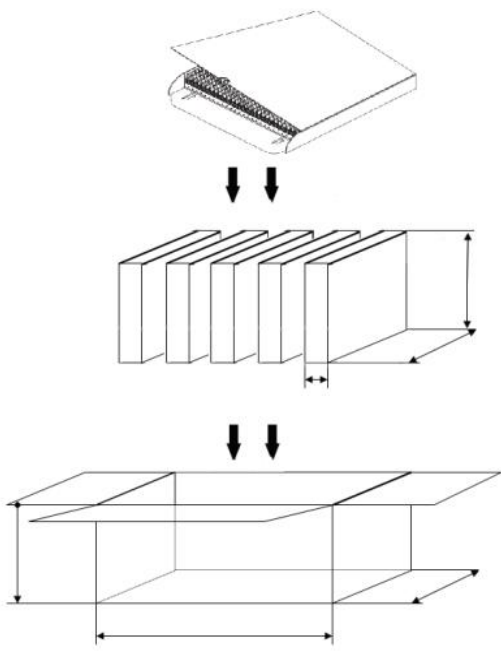
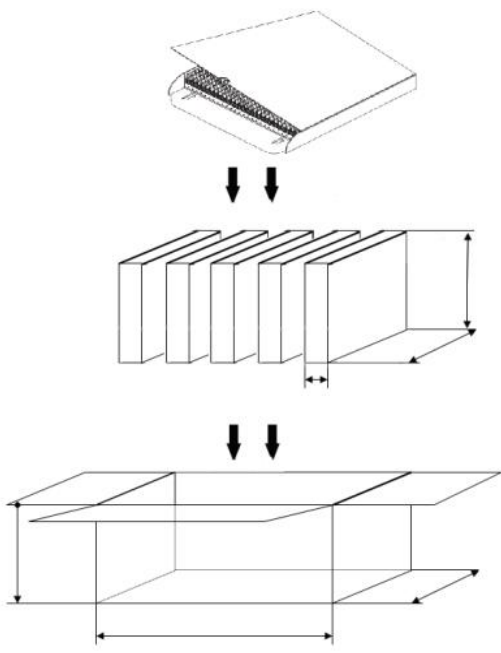
◆包装 Packaging

*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
07T	180-681	1000	07T	180-681	1500
10T	180-331	1000	10T	180-112	500
	361-112	500			
14T	180-621	500	14T	180-112	500
	681-112	250			
20T	180-361	250	20T	180-911	400
	391-112	200		102-112	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	
07T	180-271	2000	
	331-681	1500	
10T	180-681	1000	
	751-911	800	
	102	400	
14T	112	200	
	180-431	1000	
	471-621	800	
20T	821-112	600	
	180-271	500	
	301-621	400	
	681-102	300	
	112	200	

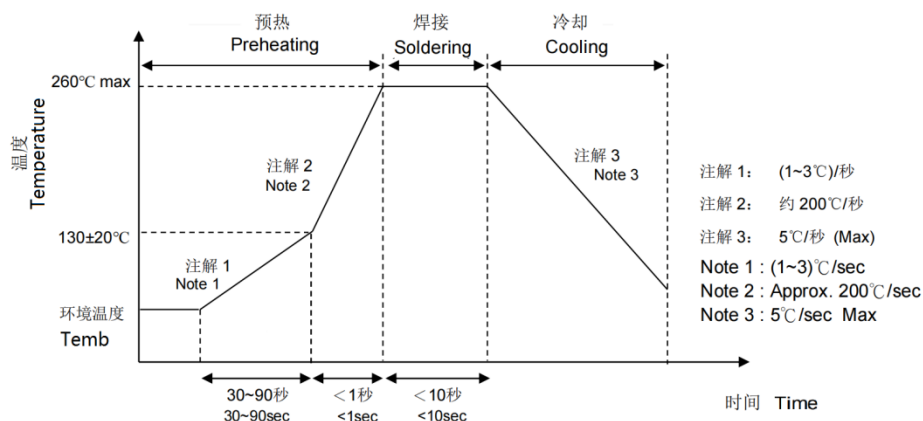
◆环保情况说明 Environmental Protection Statement

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。

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

◆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 soldering Iron-tip	$360^{\circ}\text{C (max.)}$
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： $5 \sim 30^{\circ}\text{C}$ ；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: $5 \sim 30^{\circ}\text{C}$; 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