

## ■ 壓敏電阻器

### ZINC OXIDE VARISTOR

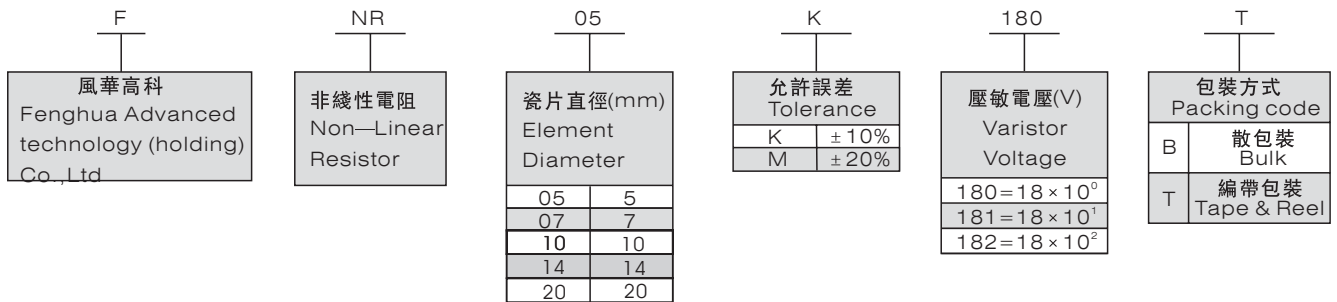
是以氧化鋅為主要原料制造的半導體電子陶瓷元件，其電阻值隨施加電壓的改變而呈非線性變化，由于電阻值對電壓變化十分敏感，故稱壓敏電阻器或突波吸收器

Are non-linear resistors utilize a semiconductor electronic ceramic element mainly composed of Zinc Oxide and its resistors change as a function of the applied voltage .It' s called Varistor or Transient surge absorbers

#### ● 特性 FEATURES

- \* 電壓範圍寬 (18V~1.8KV)      Widely voltage range 18V~1.8KV
- \* 反應速度快 (< 25ns)      Fast response to the rapidly increase Voltage(< 25ns)
- \* 非線性指數大      Excellent non-linearity voltage
- \* 無極性      Symmetric V-I characteristics
- \* 通流量大(2000A/cm<sup>2</sup>)      Great withstanding surge current (2000A/cm<sup>2</sup>)
- \* 無續流      No follow-on current
- \* 壽命長      Long life

#### ● 訂貨方式 HOW TO ORDER



#### ● 特性曲綫 CHARACTERISTICS

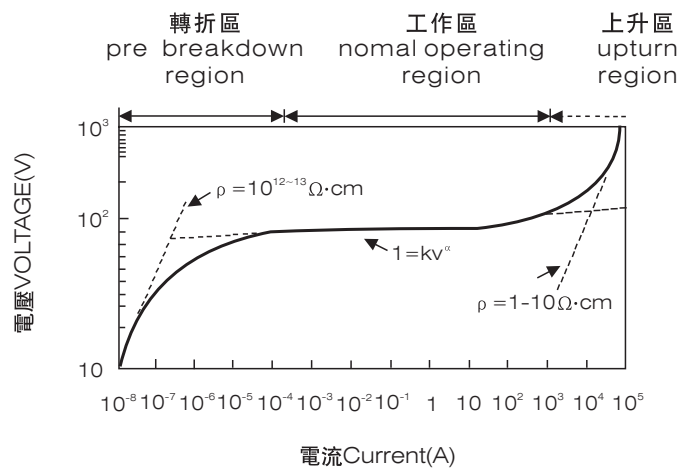
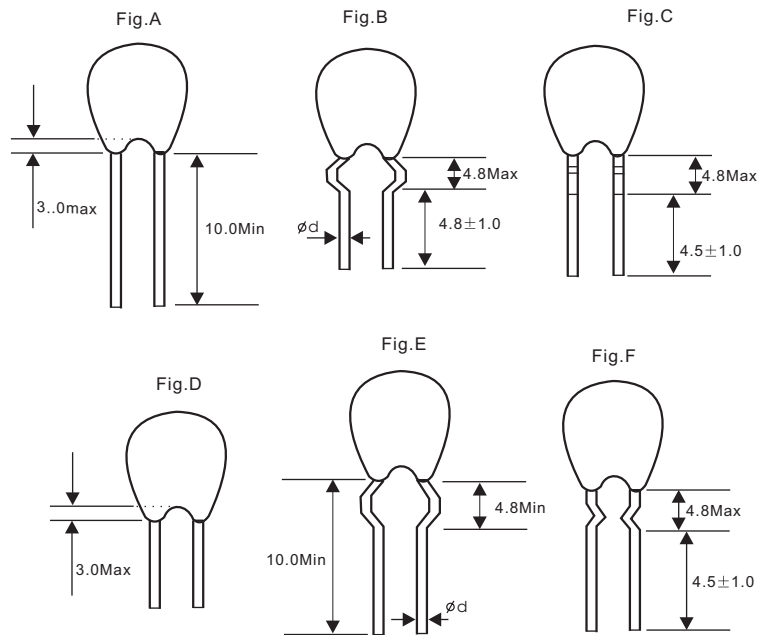


圖 Fig1  
Voltage Current Characteristic

# 壓敏電阻器 ZINC OXIDE VARISTOR

## • 引綫類型 LEAD STYLE

代碼 Code	結構 Configuration
A	長直脚 straight long
B	外彎短脚 Outside Crimped short
C	垂直彎脚 Vertical Crimped
D	直短脚 straight short
E	外彎長脚 Outside Crimped Long
F	內彎短脚 Inside Crimped short

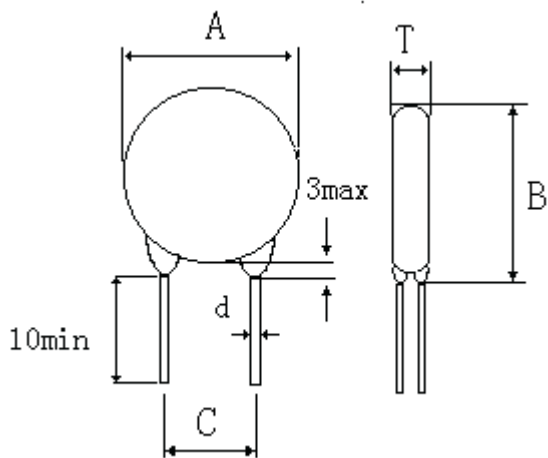


## • 包裝方式及數量 QUANTITY & MEASURE

規格 Code	數量 Quantity/塑料袋 Plastic bag		
	散裝 Bluk		編帶 Tape
	A.E	B.F.E	
05K	500	1000PCS	2500PCS
07K	500	1000PCS	1500PCS
10K	300	500PCS	1000PCS
14K	150	500PCS	1000PCS
20K	100	300PCS	500PCS
25K	50	200PCS	
32K	50		
40K	25		

• 結構尺寸 DIMENSION

T厚度 Thickness (max) (單位Unit:mm)



單位 (Unit) : mm

規格 Part Code	A	B	d	C
	MAX	MAX		
05K	7.5	10	0.6±0.05	5±1
07K	9.5	14	0.6±0.05	5±1
10K	14	19	0.8±0.05	7.5±1
14K	17.5	20/22	0.8±0.05	7.5±1
20K	24	28/30	1.0±0.05	10±1
25K	30	33	1.5±0.05	15±1
32K	38	43	1.5±0.05	18±1
40K	48	52	1.5±0.05	18±1

規格 Part Code	05k	07k	10k	14k	20k	25k	32k	40k
180	4.5	4.5	4.6	4.6	4.6			
220	4.6	4.6	4.7	4.7	4.9			
270	4.7	4.7	4.8	4.8	5.0			
330	4.9	4.9	5.0	5.0	5.2			
390	4.8	4.8	5.3	5.3	5.5			
470	4.9	4.9	5.4	5.4	5.6			
560	5.0	5.0	5.5	5.5	5.7			
680	5.2	5.2	5.6	5.6	5.8			
820	4.1	4.1	4.7	4.7	4.9			
101	4.3	4.3	4.9	4.9	5.1			
121	4.5	4.5	5.1	5.1	5.3			
151	4.8	4.8	5.4	5.4	5.6			
181	4.3	4.3	5.0	5.0	5.2			
201	4.4	4.4	5.0	5.0	5.2	5.4	5.6	5.6
221	4.5	4.5	5.0	5.0	5.3	5.5	5.7	5.7
241	4.6	4.6	5.2	5.2	5.4	5.6	5.8	5.8
271	4.9	4.9	5.4	5.4	5.6	5.8	6.0	6.0
301	5.0	5.0	5.5	5.5	5.7	5.9	6.1	6.1
331	5.1	5.1	5.8	5.8	6.0	6.1	6.3	6.3
361	5.2	5.2	6.0	6.0	6.2	6.4	6.6	6.6
391	5.4	5.4	6.2	6.2	6.4	6.6	6.8	6.8
431	5.7	5.7	6.5	6.5	6.7	6.9	7.1	7.1
471	6.0	6.0	6.8	6.8	7.0	7.2	7.4	7.4
511	6.0	6.0	6.8	6.8	7.0	7.2	7.4	7.4
561	6.0	6.0	6.8	6.8	7.0	7.2	7.9	7.9
621		7.1	7.3	7.3	7.8	8.0	8.2	8.2
681		7.3	7.6	7.6	7.8	8.0	8.2	8.2
751			8.0	8.0	8.2	8.4	8.6	8.6
781			8.1	8.1	8.3	8.5	8.7	8.7
821			8.3	8.3	8.5	8.7	8.9	8.9
911			8.8	8.8	9.0	9.2	9.4	9.4
102			9.3	9.3	9.5	9.7	9.9	9.9
112			9.9	9.9	10.1	10.3	10.5	10.5



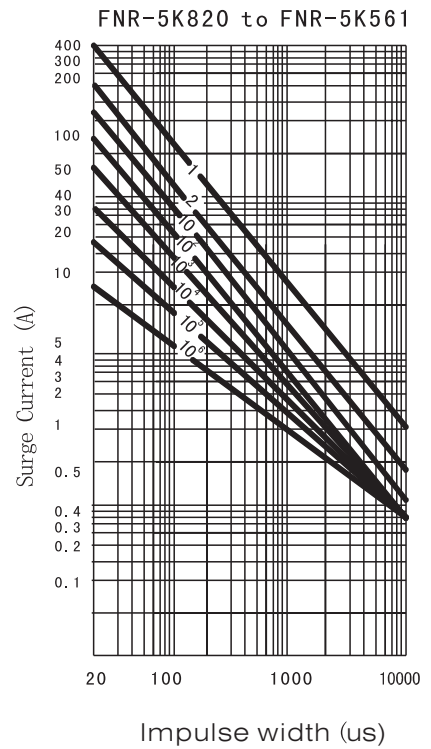
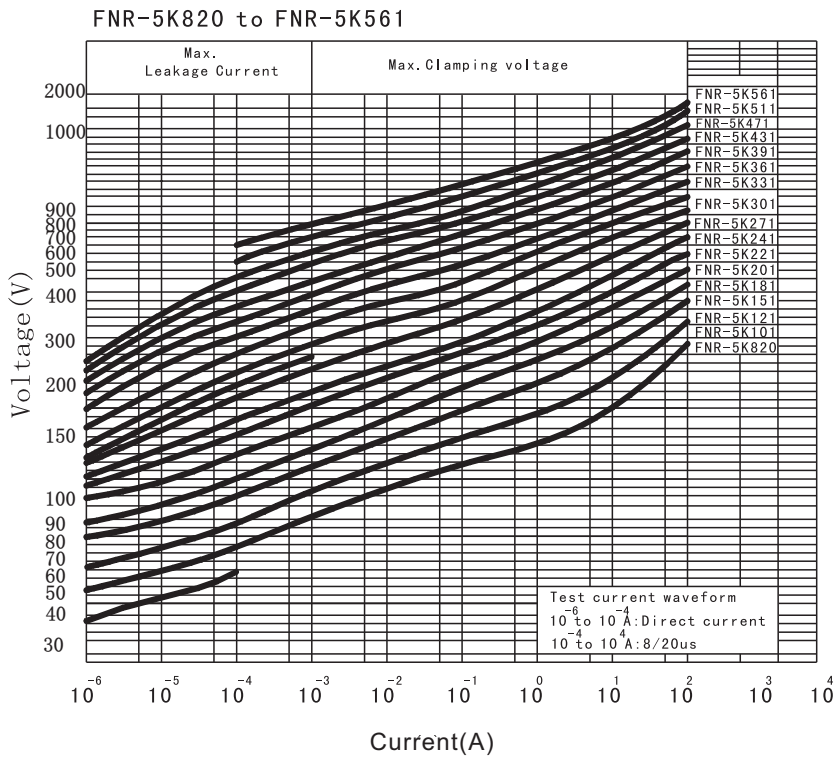
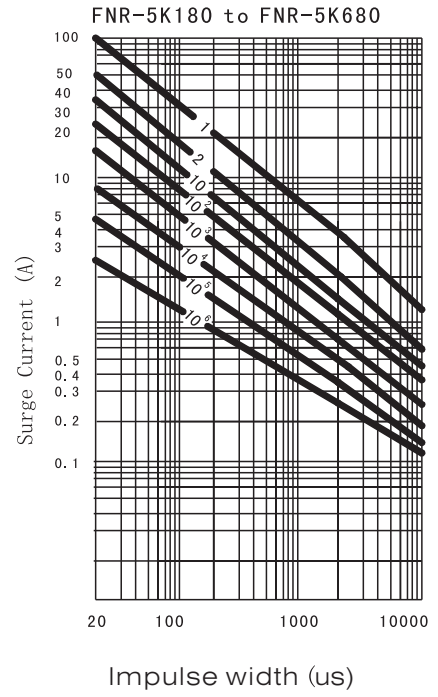
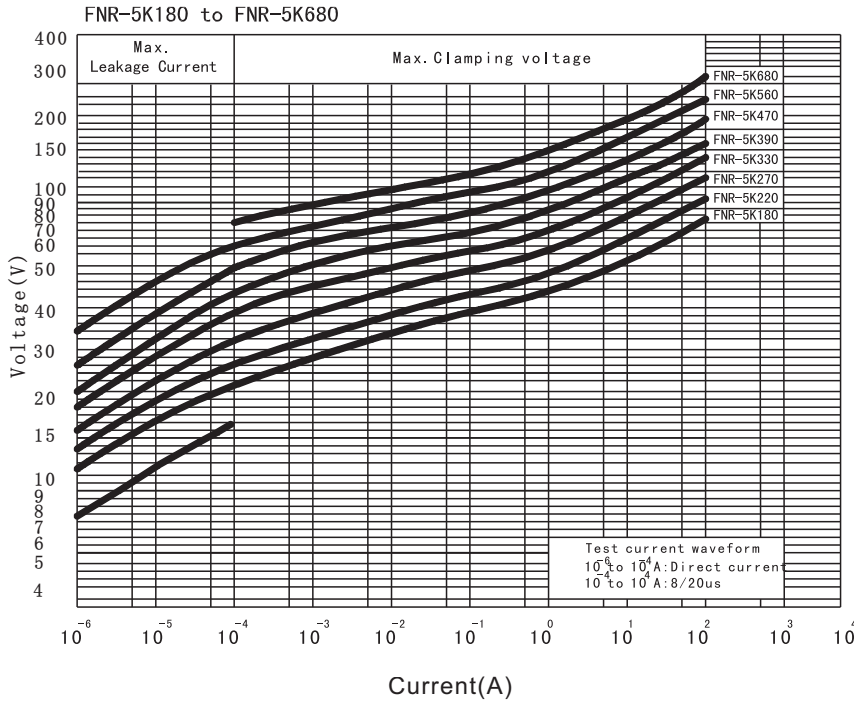
**• 5K系列電性能 SERIES SPECIFICATION**

型號規格 Part Number	最大允許 使用電壓 Maximum operating Voltage		壓敏電壓 Varistor Voltage  V0.1mA (V)	最大限制電壓 Maximun clamping Voltage		最大通流容量 Maximum Withstanding Surge Current (8/20 μ S)	最大能量耐量 Maximum Energy ( 2ms)	最大靜態 功率 Rated Wattage	靜態電容量 (參考值) (1K Hz) Capacitance (Reference)
	AC (V)	DC (V)		Vc (V)	IP (A)				
FNR-05K180	11	14	18 (16.2~19.8)	40	1	100	0.4	0.01	1600
FNR-05K220	14	18	22 (19.8~24.2)	48	1	100	0.5	0.01	1300
FNR-05K270	17	22	27 (24.3~29.7)	60	1	100	0.6	0.01	1050
FNR-05K330	20	26	33 (29.7~36.3)	73	1	100	0.8	0.01	900
FNR-05K390	25	31	39 (35.1~42.9)	86	1	100	0.9	0.01	500
FNR-05K470	30	38	47 (42.3~51.7)	104	1	100	1.1	0.01	450
FNR-05K560	35	45	56 (50.4~61.6)	123	1	100	1.3	0.01	400
FNR-05K680	40	56	68 (61.2~74.8)	150	1	100	1.6	0.01	350
FNR-05K820	50	65	82 (73.8~90.2)	155	5	400	1.8	0.1	250
FNR-05K101	60	85	100 (90~110)	175	5	400	2.2	0.1	200
FNR-05K121	75	100	120 (108~132)	210	5	400	2.5	0.1	170
FNR-05K151	95	125	150 (135~165)	260	5	400	4.0	0.1	140
FNR-05K181	115	150	180 (162~198)	315	5	400	4.5	0.1	110
FNR-05K201	130	170	200 (180~220)	355	5	400	5.0	0.1	80
FNR-05K221	140	180	220 (198~242)	380	5	400	6.0	0.1	70
FNR-05K241	150	200	240 (216~264)	415	5	400	6.5	0.1	70
FNR-05K271	175	225	270 (243~297)	475	5	400	8.0	0.1	65
FNR-05K301	200	250	300 (270~330)	525	5	400	8.0	0.1	55
FNR-05K331	210	275	330 (297~363)	580	5	400	8.5	0.1	60
FNR-05K361	230	300	360 (324~396)	620	5	400	10.0	0.1	50
FNR-05K391	250	320	390 (351~429)	675	5	400	10.0	0.1	50
FNR-05K431	275	350	430 (387~473)	745	5	400	12.0	0.1	45
FNR-05K471	300	385	470 (423~517)	810	5	400	13.0	0.1	40
FNR-05K511	320	415	510 (459~561)	845	5	400	14.0	0.1	39
FNR-05K561	350	460	560 (504~616)	920	5	400	14.0	0.1	39

• 5K系列 Series

V-I Curve

Impulse Lifetime Ratings  
(2 time:5 minutes internal  
up to 10 times 2 minutes internal  
up to  $10^6$  times 10 seconds internal)

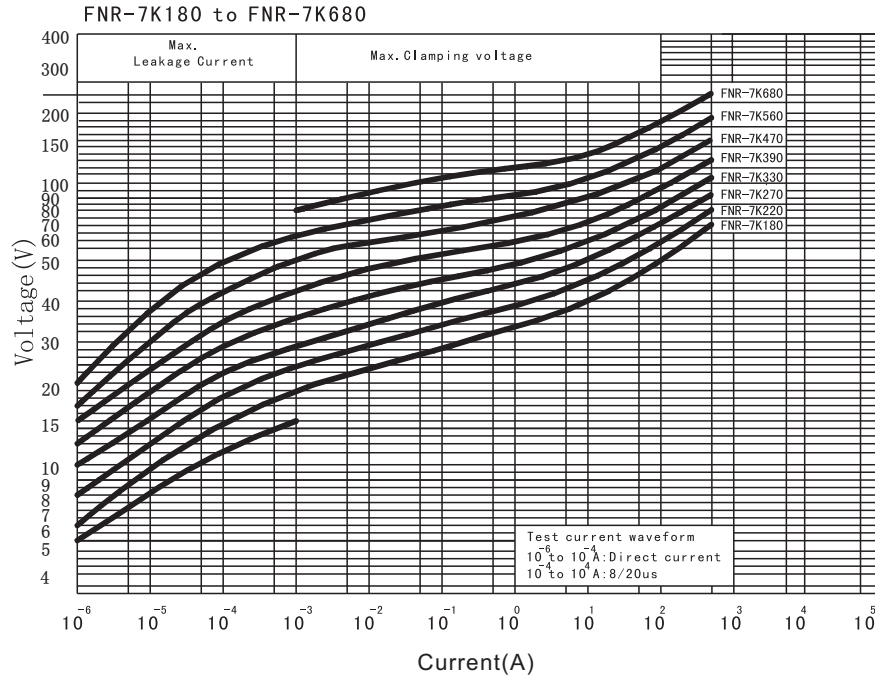


**• 7K系列電性能 SERIES SPECIFICATION**

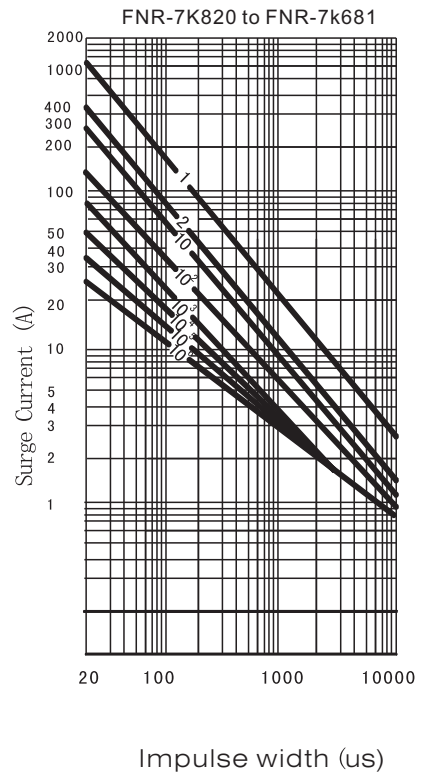
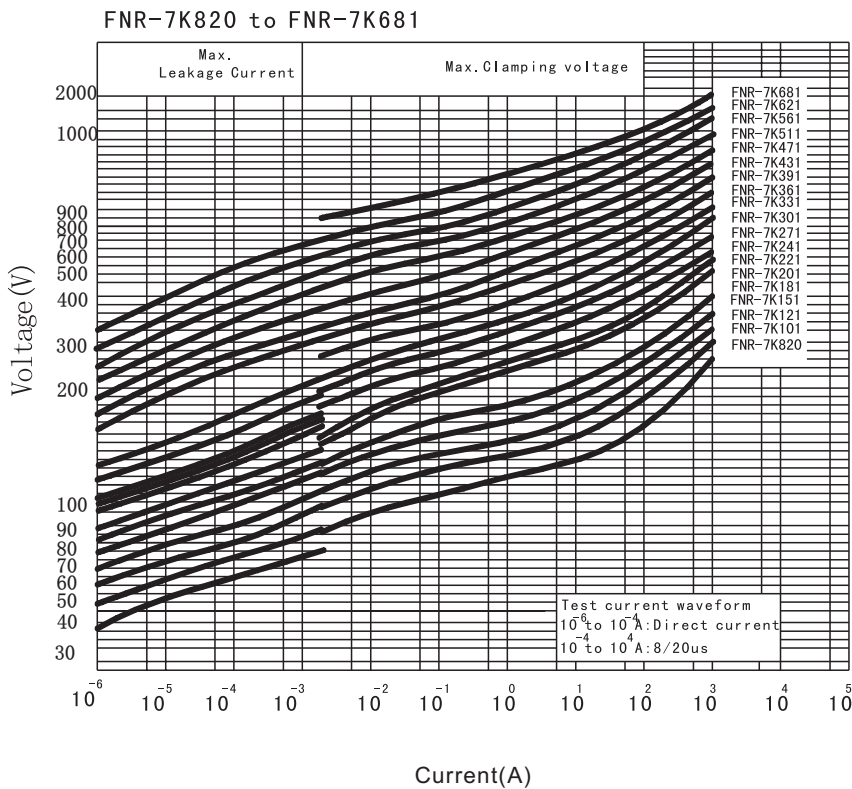
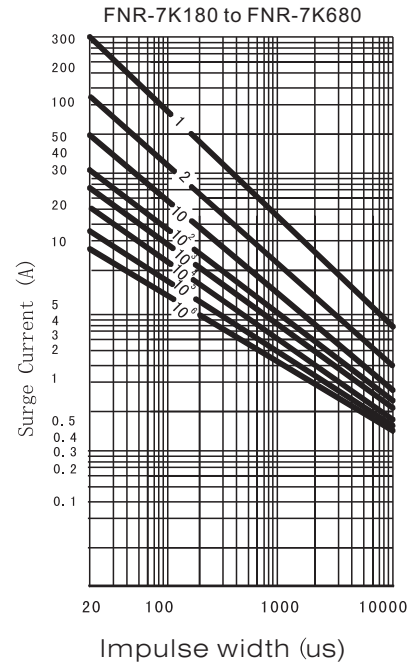
型號規格 Part Number	最大允許 使用電壓 Maximum operating Voltage		壓敏電壓 Varistor Voltage  V0.1mA (V)	最大限制電壓 Maximum clamping Voltage		最大通流容量 Maximum Withstanding Surge Current (8/20 $\mu$ S)	最大能量耐量 Maximum Energy (2ms)	最大靜態 功率 Rated Wattage	靜態電容量 (參考值) (1K Hz) Capacitance (Reference)
	AC (V)	DC (V)		Vc (V)	IP (A)				
FNR-07K180	11	14	18(16.2~19.8)	36	3	250	0.9	0.02	3500
FNR-07K220	14	18	22(19.8~24.2)	43	3	250	1.1	0.02	2800
FNR-07K270	17	22	27(24.3~29.7)	53	3	250	1.4	0.02	2000
FNR-07K330	20	26	33(29.7~36.3)	65	3	250	1.7	0.02	1500
FNR-07K390	25	31	39(35.1~42.9)	77	3	250	2.1	0.02	1350
FNR-07K470	30	38	47(42.3~51.7)	93	3	250	2.5	0.02	1150
FNR-07K560	35	45	56(50.4~61.6)	110	3	250	3.1	0.02	950
FNR-07K680	40	56	68(61.2~74.8)	135	3	250	3.6	0.02	700
FNR-07K820	50	65	82(73.8~90.2)	135	10	1200	4.2	0.25	550
FNR-07K101	60	85	100(90~110)	165	10	1200	4.8	0.25	500
FNR-07K121	75	100	120(108~132)	200	10	1200	5.9	0.25	450
FNR-07K151	95	125	150(135~165)	250	10	1200	8.0	0.25	350
FNR-07K181	115	150	180(162~198)	300	10	1200	10.0	0.25	300
FNR-07K201	130	170	200(180~220)	340	10	1200	13.0	0.25	250
FNR-07K221	140	180	220(198~242)	360	10	1200	13.0	0.25	250
FNR-07K241	150	200	240(216~264)	395	10	1200	13.0	0.25	200
FNR-07K271	175	225	270(243~297)	455	10	1200	15.0	0.25	170
FNR-07K301	200	250	300(270~330)	500	10	1200	17.0	0.25	150
FNR-07K331	210	275	330(297~363)	550	10	1200	22.0	0.25	150
FNR-07K361	230	300	360(324~396)	595	10	1200	20.0	0.25	130
FNR-07K391	250	320	390(351~429)	650	10	1200	22.0	0.25	130
FNR-07K431	275	350	430(387~473)	710	10	1200	26.0	0.25	110
FNR-07K471	300	385	470(423~517)	775	10	1200	26.0	0.25	100
FNR-07K511	320	415	510(459~561)	840	10	1200	26.0	0.25	100
FNR-07K561	350	460	560(504~616)	925	10	1200	26.0	0.25	90
FNR-07K621	385	505	620(558~682)	1025	10	1200	26.0	0.25	80
FNR-07K681	420	561	680(612~748)	1120	10	1200	26.0	0.25	75

• 7K系列 Series

V-I Curve



Impluse Lifetime Ratings  
 (2 time:5 minutes internal  
 up to 10 times 2 minutes internal  
 up to  $10^6$  times 10 seconds internal)





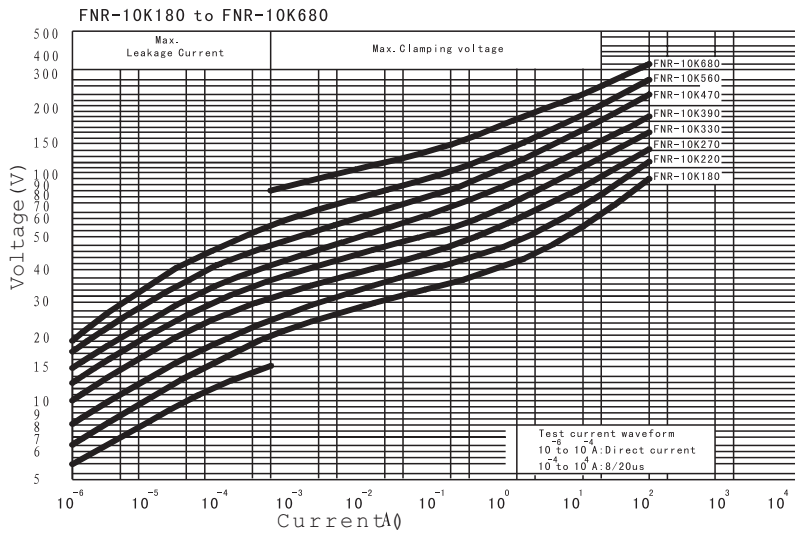
• 10K系列電性能 SERIES SPECIFICATION

型號規格 Part Number	最大允許 使用電壓 Maximum operating Voltage		壓敏電壓 Varistor Voltage	最大限制電壓 Maximum clamping Voltage		最大通流容量 Maximum Withstanding Surge Current (8/20 $\mu$ S)	最大能量耐量 Maximum Energy ( 2ms)	最大靜態 功率 Rated Wattage	靜態電容量 (參考值) (1k Hz) Capacitance (Reference)
	AC (V)	DC (V)		V0.1mA (V)	Vc (V)				
FNR-10K180	11	14	18(16.2~19.8)	36	5	500	2.1	0.05	7500
FNR-10K220	14	18	22(19.8~24.2)	43	5	500	2.5	0.05	6000
FNR-10K270	17	22	27(24.3~29.7)	53	5	500	3.0	0.05	4000
FNR-10K330	20	26	33(29.7~36.3)	65	5	500	4.0	0.05	3000
FNR-10K390	25	31	39(35.1~42.9)	77	5	500	4.6	0.05	2600
FNR-10K470	30	38	47(42.3~51.7)	93	5	500	5.5	0.05	2200
FNR-10K560	35	45	56(50.4~61.6)	110	5	500	7.0	0.05	1800
FNR-10K680	40	56	68(61.2~74.8)	135	5	500	8.2	0.05	1300
FNR-10K820	50	65	82(73.8~90.2)	135	25	2500	8.4	0.4	1800
FNR-10K101	60	85	100(90~110)	165	25	2500	10.0	0.4	1400
FNR-10K121	75	100	120(108~132)	200	25	2500	15.0	0.4	1100
FNR-10K151	95	125	150(135~165)	250	25	2500	20.0	0.4	900
FNR-10K181	115	150	180(162~198)	300	25	2500	23.0	0.4	700
FNR-10K201	130	170	200(180~220)	340	25	2500	26.0	0.4	500
FNR-10K221	140	180	220(198~242)	360	25	2500	30.0	0.4	450
FNR-10K241	150	200	240(216~264)	395	25	2500	32.0	0.4	400
FNR-10K271	175	225	270(243~297)	455	25	2500	40.0	0.4	350
FNR-10K301	200	250	300(270~330)	500	25	2500	35.0	0.4	325
FNR-10K331	210	275	330(297~363)	550	25	2500	39.0	0.4	325
FNR-10K361	230	300	360(324~396)	595	25	2500	32.0	0.4	300
FNR-10K391	250	320	390(351~429)	650	25	2500	52.0	0.4	270
FNR-10K431	275	350	430(387~473)	710	25	2500	58.0	0.4	250
FNR-10K471	300	385	470(423~517)	775	25	2500	58.0	0.4	230
FNR-10K511	318	415	510(459~561)	840	25	2500	58.0	0.4	200
FNR-10K561	350	455	560(504~616)	925	25	2500	58.0	0.4	180
FNR-10K621	385	505	620(558~682)	1025	25	2500	58.0	0.4	130
FNR-10K681	420	560	680(612~748)	1120	25	2500	60.0	0.4	130
FNR-10K751	460	615	750(675~825)	1240	25	2500	65.0	0.4	120
FNR-10K781	485	640	780(702~858)	1290	25	2500	65.0	0.4	120
FNR-10K821	510	670	820(738~902)	1355	25	2500	71.0	0.4	110
FNR-10K911	550	745	910(819~1001)	1500	25	2500	78.0	0.4	100
FNR-10K102	625	825	1000(900~1100)	1650	25	2500	84.0	0.4	90
FNR-10K112	680	895	1100(990~1210)	1815	25	2500	91.0	0.4	80

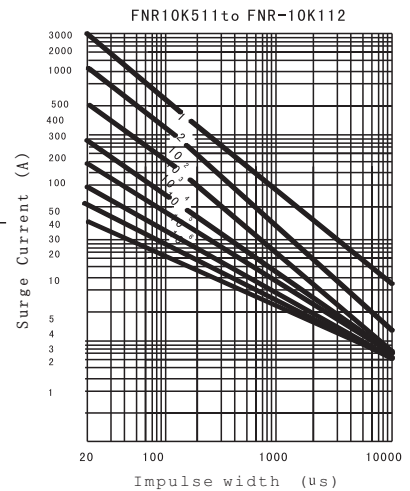
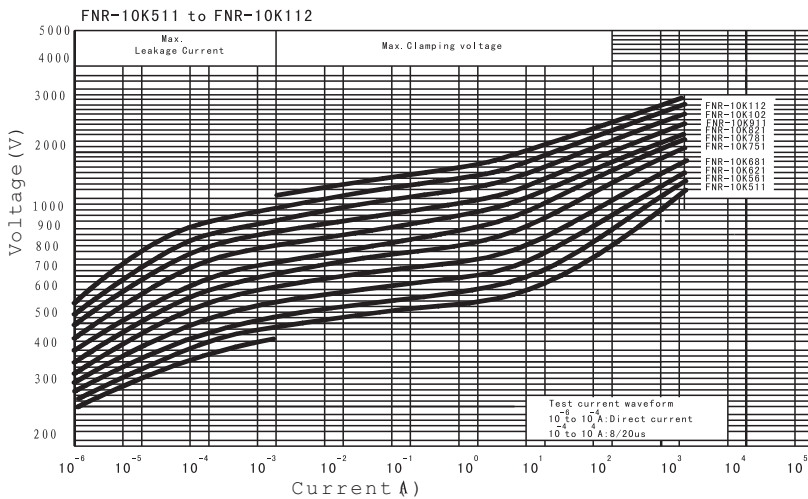
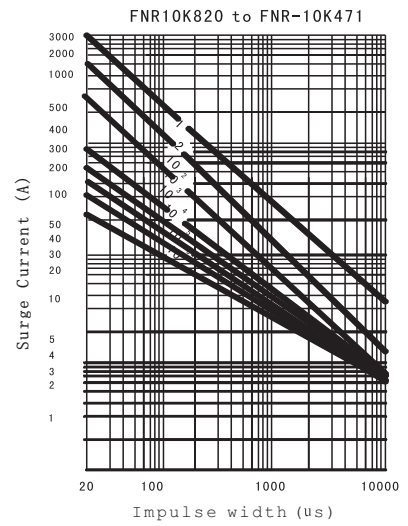
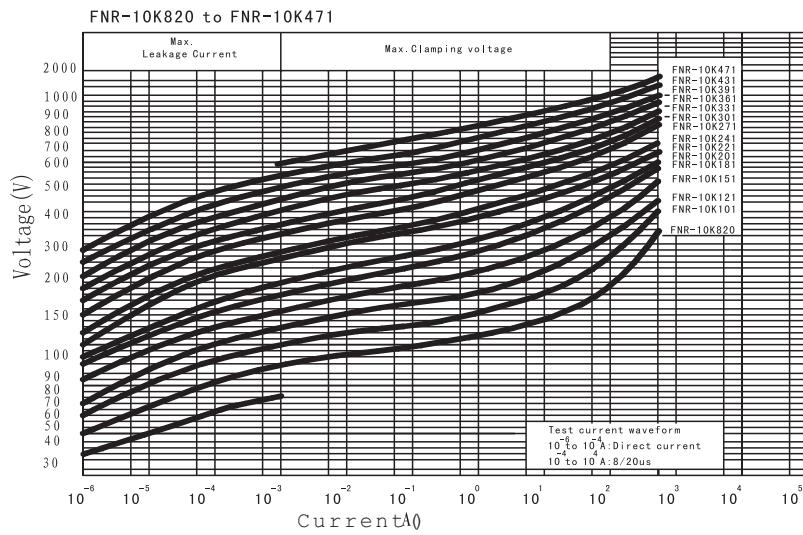
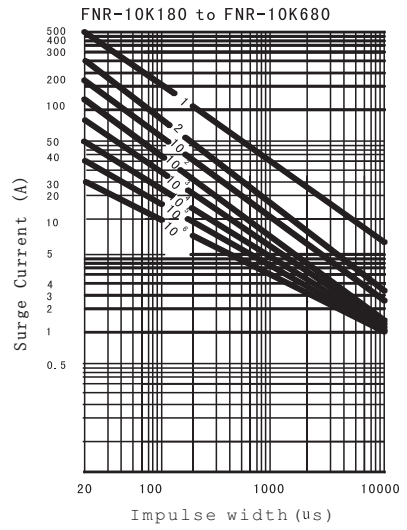
# 壓敏電阻器 ZINC OXIDE VARISTOR

## • 10K系列 Series

V-I Curve



Impulse Lifetime Ratings

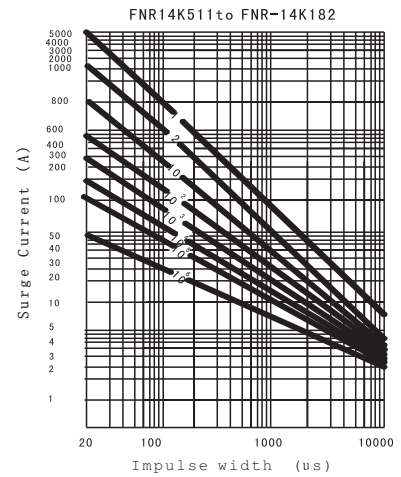
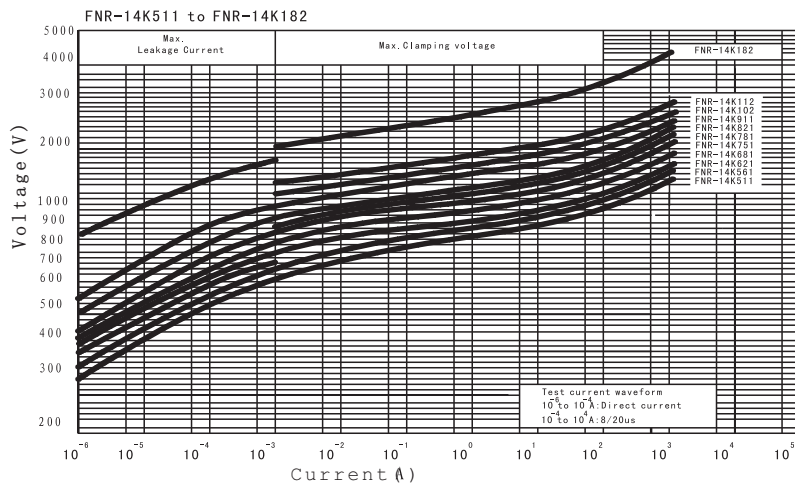
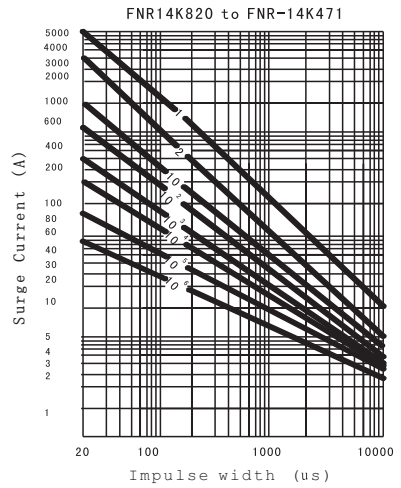
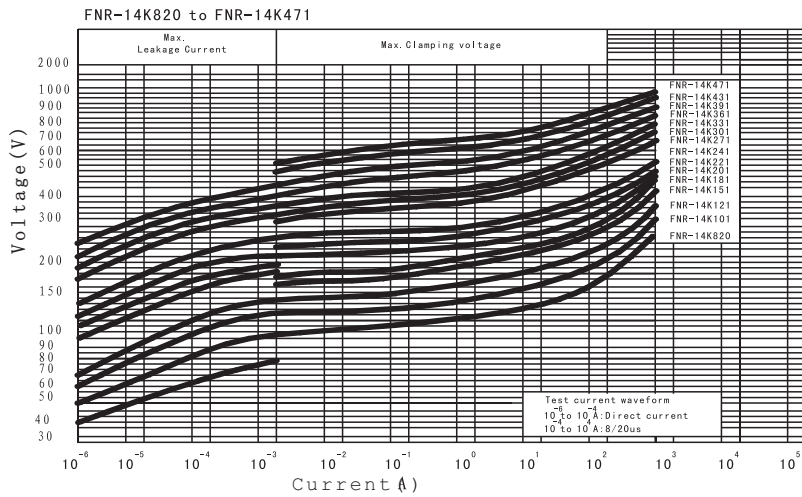
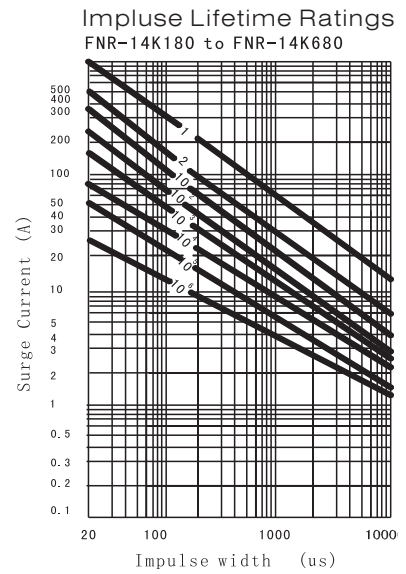
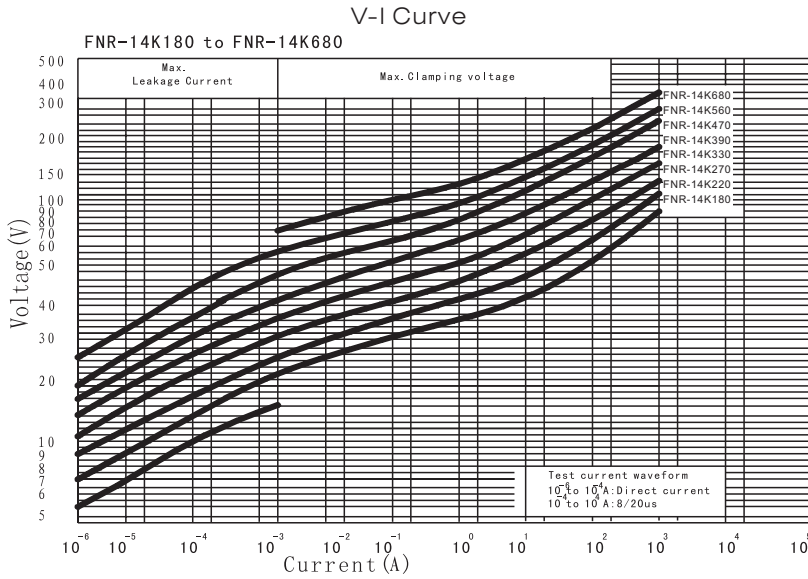


## • 14K系列電性能 SERIES SPECIFICATION

型號規格 Part Number	最大允許 使用電壓 Maximum operating Voltage		壓敏電壓 Varistor Voltage	最大限制電壓 Maximun clamping Voltage		最大通流容量 Maximum Withstanding Surge Current (8/20 $\mu$ S)	最大能量耐量 Maximum Energy ( 2ms)	最大靜態 功率 Rated Wattage	靜態電容量 (參考值) (1K Hz) Capacitance (Reference)
	AC (V)	DC (V)		V <sub>0.1mA</sub> (V)	V <sub>c</sub> (V)				
FNR-14K180	11	14	18(16.2~19.8)	36	10	1000	4.0	0.1	18000
FNR-14K220	14	18	22(19.8~24.2)	43	10	1000	5.0	0.1	15000
FNR-14K270	17	22	27(24.3~29.7)	53	10	1000	6.0	0.1	10000
FNR-14K330	20	26	33(29.7~36.3)	65	10	1000	7.5	0.1	7500
FNR-14K390	25	31	39(35.1~42.9)	77	10	1000	8.6	0.1	6500
FNR-14K470	30	38	47(42.3~51.7)	93	10	1000	10.0	0.1	5500
FNR-14K560	35	45	56(50.4~61.6)	110	10	1000	11.0	0.1	4500
FNR-14K680	40	56	68(61.2~74.8)	135	10	1000	14.0	0.1	3300
FNR-14K820	50	65	82(73.8~90.2)	135	50	4500	15.0	0.6	2900
FNR-14K101	60	85	100(90~110)	165	50	4500	18.0	0.6	2400
FNR-14K121	75	100	120(108~220)	200	50	4500	26.0	0.6	1900
FNR-14K151	95	125	150(135~165)	250	50	4500	32.0	0.6	1500
FNR-14K181	115	150	180(162~198)	300	50	4500	39.0	0.6	1250
FNR-14K201	130	170	200(180~220)	340	50	4500	45.0	0.6	1000
FNR-14K221	140	180	220(198~242)	360	50	4500	52.0	0.6	1000
FNR-14K241	150	200	240(216~264)	395	50	4500	52.0	0.6	900
FNR-14K271	175	225	270(243~297)	455	50	4500	65.0	0.6	750
FNR-14K301	200	250	300(270~330)	500	50	4500	71.0	0.6	650
FNR-14K331	210	275	330(297~363)	550	50	4500	78.0	0.6	650
FNR-14K361	230	300	360(324~396)	595	50	4500	84.0	0.6	550
FNR-14K391	250	320	390(351~429)	650	50	4500	91.0	0.6	500
FNR-14K431	275	350	430(387~473)	710	50	4500	97.0	0.6	450
FNR-14K471	300	385	470(423~517)	775	50	4500	104.0	0.6	440
FNR-14K511	318	415	510(459~561)	840	50	4500	104.0	0.6	380
FNR-14K561	350	455	560(504~616)	925	50	4500	104.0	0.6	345
FNR-14K621	385	505	620(585~682)	1025	50	4500	110.0	0.6	250
FNR-14K681	420	560	680(612~748)	1120	50	4500	117.0	0.6	250
FNR-14K751	460	615	750(675~825)	1240	50	4500	130.0	0.6	230
FNR-14K781	485	640	780(702~858)	1290	50	4500	136.0	0.6	230
FNR-14K821	510	670	820(738~903)	1355	50	4500	143.0	0.6	200
FNR-14K911	550	745	910(819~1001)	1500	50	4500	156.0	0.6	180
FNR-14K102	625	825	1000(900~1100)	1650	50	4500	169.0	0.6	150
FNR-14K112	680	895	1100(990~1210)	1815	50	4500	182.0	0.6	150
FNR-14K182	1000	1465	1800(1620~1980)	2970	50	4500	312.0	0.6	100

# 壓敏電阻器 ZINC OXIDE VARISTOR

## • 14K系列 Series



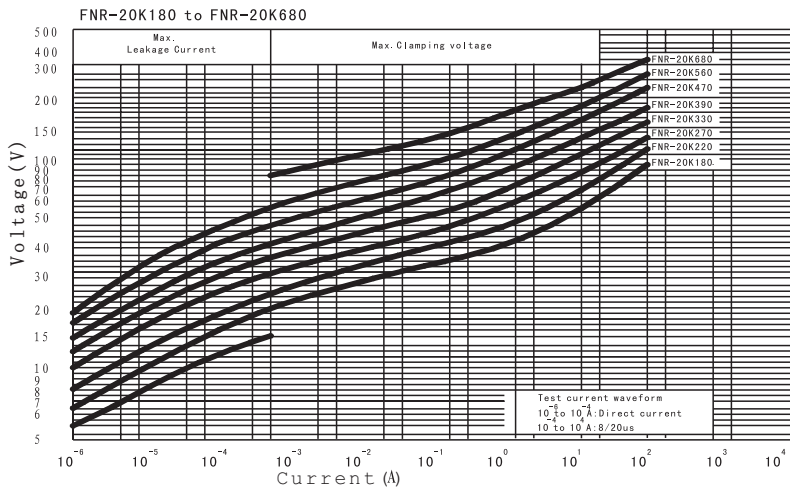
● 20K系列電性能 SERIES SPECIFICATION

型號規格 Part Number	最大允許 使用電壓 Maximum operating Voltage		壓敏電壓 Varistor Voltage  V0.1mA (V)	最大限制電壓 Maximum clamping Voltage		最大通流容量 Maximum Withstanding Surge Current (8/20 $\mu$ S)	最大能量耐量 Maximum Energy ( 2ms) (J)	最大靜態 功率 Rated Wattage (W)	靜態電容量 (參考值) (1K Hz) Capacitance (Reference) (PF)
	AC (V)	DC (V)		Vc (V)	IP (A)				
FNR-20K180	11	14	18(16.2~19.8)	36	20	2000	11.0	0.2	18000
FNR-20K220	14	18	22(19.8~24.2)	43	20	2000	13.0	0.2	30000
FNR-20K270	17	22	27(24.3~29.7)	53	20	2000	15.0	0.2	20000
FNR-20K330	20	26	33(29.7~36.3)	65	20	2000	20.0	0.2	17000
FNR-20K390	25	31	39(35.1~42.9)	77	20	2000	24.0	0.2	15000
FNR-20K470	30	38	47(42.3~51.7)	93	20	2000	30.0	0.2	13000
FNR-20K560	35	45	56(50.4~61.6)	110	20	2000	35.0	0.2	11000
FNR-20K680	40	56	68(61.2~74.8)	135	20	2000	40.0	0.2	7000
FNR-20K820	50	65	82(73.8~90.2)	135	100	6500	27.0	1.0	5500
FNR-20K101	60	85	100(90~110)	165	100	6500	33.0	1.0	4800
FNR-20K121	75	100	120(108~220)	200	100	6500	52.0	1.0	3800
FNR-20K151	95	125	150(135~165)	250	100	6500	65.0	1.0	3000
FNR-20K181	115	150	180(162~198)	300	100	6500	78.0	1.0	2500
FNR-20K201	130	170	200(180~220)	340	100	6500	91.0	1.0	2000
FNR-20K221	140	180	220(198~242)	360	100	6500	97.0	1.0	2000
FNR-20K241	150	200	240(216~264)	395	100	6500	100.0	1.0	1800
FNR-20K271	175	225	270(243~297)	455	100	6500	117.0	1.0	1600
FNR-20K301	200	250	300(270~330)	500	100	6500	136.0	1.0	1400
FNR-20K331	210	275	330(297~363)	550	100	6500	136.0	1.0	1400
FNR-20K361	230	300	360(324~396)	595	100	6500	156.0	1.0	1200
FNR-20K391	250	320	390(351~429)	650	100	6500	169.0	1.0	1000
FNR-20K431	275	350	430(387~473)	710	100	6500	182.0	1.0	900
FNR-20K471	300	385	470(423~517)	775	100	6500	195.0	1.0	900
FNR-20K511	318	415	510(459~561)	840	100	6500	195.0	1.0	800
FNR-20K561	350	455	560(504~616)	925	100	6500	195.0	1.0	700
FNR-20K621	385	505	620(585~682)	1025	100	6500	195.0	1.0	500
FNR-20K681	420	560	680(612~748)	1120	100	6500	208.0	1.0	460
FNR-20K751	460	615	750(675~825)	1240	100	6500	227.0	1.0	420
FNR-20K781	485	640	780(702~858)	1290	100	6500	234.0	1.0	420
FNR-20K821	510	670	820(738~903)	1355	100	6500	247.0	1.0	400
FNR-20K911	550	745	910(819~1001)	1500	100	6500	280.0	1.0	350
FNR-20K102	625	825	1000(900~1100)	1650	100	6500	299.0	1.0	320
FNR-20K112	680	895	1100(990~1210)	1815	100	6500	325.0	1.0	300
FNR-20K182	1000	1465	1800(1620~1980)	2970	100	6500	400.0	1.0	200

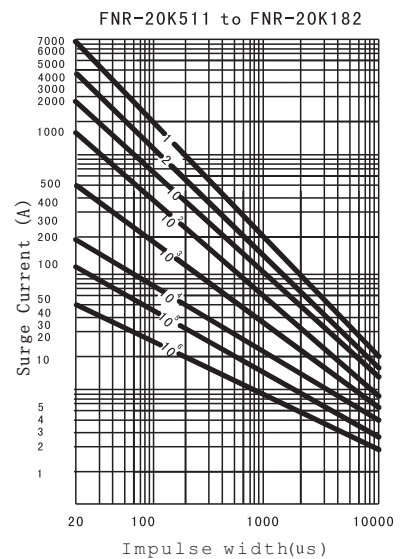
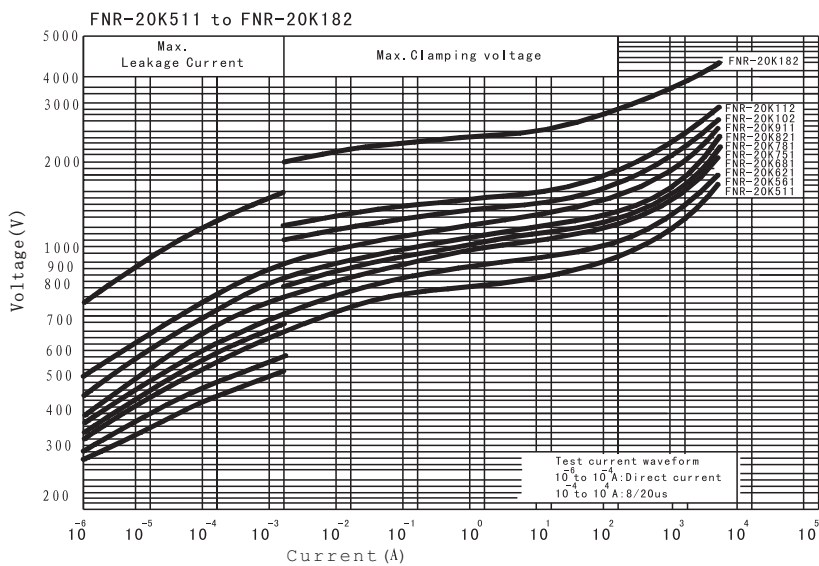
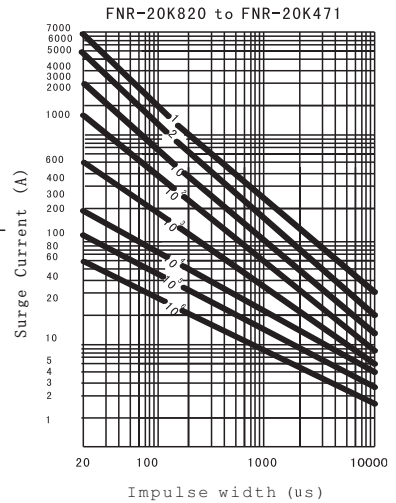
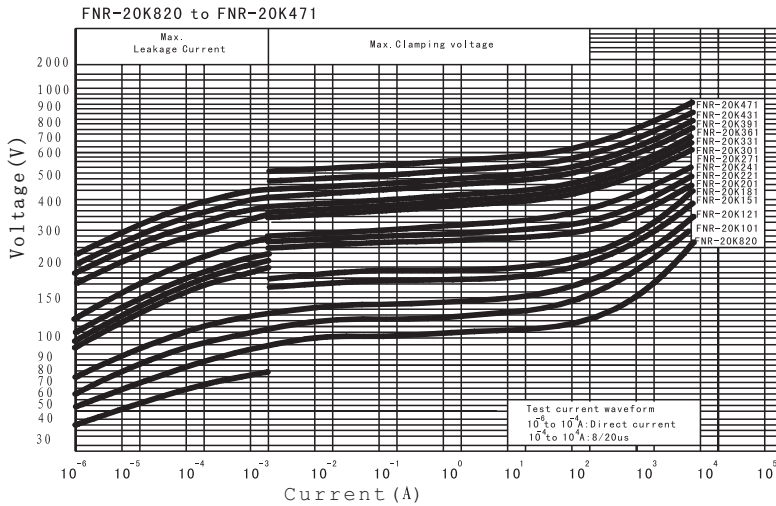
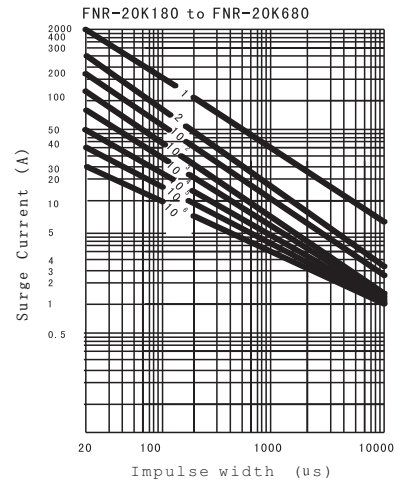
# 壓敏電阻器 ZINC OXIDE VARISTOR

## • 20K系列 Series

V-I Curve



Impluse Lifetime Ratings



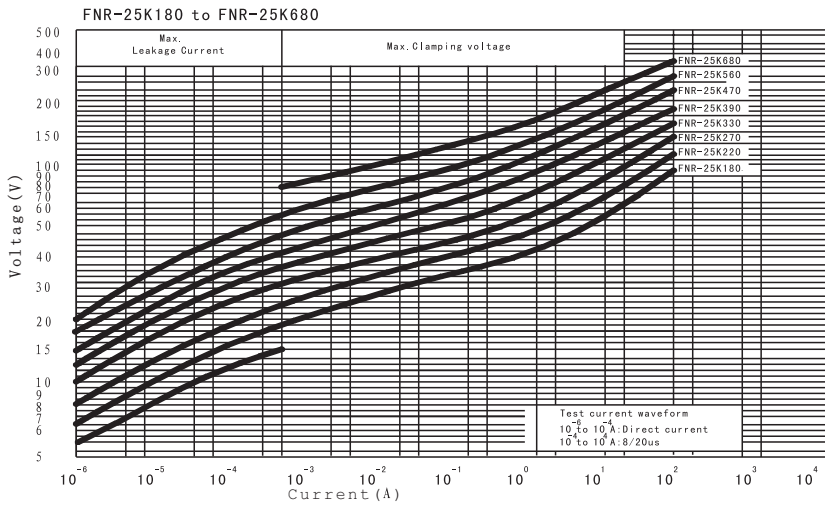
**• 25K系列電性能 SERIES SPECIFICATION**

型號規格 Part Number	最大允許 使用電壓 Maximum operating Voltage		壓敏電壓 Varistor Voltage  V0.1mA (V)	最大限制電壓 Maximum clamping Voltage		最大通流容量 Maximum Withstanding Surge Current (8/20 $\mu$ S)	最大能量耐量 Maximum Energy (2ms) (J)	最大靜態 功率 Rated Wattage (W)	靜態電容量 (參考值) (1K Hz) Capacitance (Reference) (PF)
	AC (V)	DC (V)		Vc (V)	IP (A)				
FNR-25K470	30	38	47(42.3~51.7)	89	40	2500	15	1.0	10000
FNR-25K560	35	45	56(50.4~61.6)	106	40	2500	21	1.0	8000
FNR-25K680	40	56	68(61.2~74.8)	129	40	2500	23	1.0	7000
FNR-25K820	50	65	82(73.8~90.2)	156	200	10000	35	1.0	6000
FNR-25K101	60	85	100(90~110)	190	200	10000	32	1.0	5000
FNR-25K121	75	100	120(108~132)	216	200	10000	36	1.0	4000
FNR-25K151	95	125	150(135~165)	270	200	10000	39	1.0	3000
FNR-25K201	130	170	200(180~220)	360	200	10000	45	1.0	2400
FNR-25K221	140	180	220(198~242)	385	200	10000	52	1.0	2200
FNR-25K241	150	200	240(216~264)	420	200	10000	78	1.0	2000
FNR-25K271	175	225	270(243~297)	473	200	10000	117	1.0	1700
FNR-25K301	200	250	300(270~330)	500	200	10000	130	1.0	1500
FNR-25K331	210	275	330(297~363)	550	200	10000	140	1.0	1400
FNR-25K361	230	300	360(324~396)	595	200	10000	156	1.0	1400
FNR-25K391	250	320	390(351~429)	650	200	10000	195	1.0	1200
FNR-25K431	275	350	430(387~473)	710	200	10000	234	1.0	1100
FNR-25K471	300	385	470(423~517)	775	200	10000	286	1.0	1000
FNR-25K511	318	415	510(459~561)	840	200	10000	290	1.0	900
FNR-25K561	350	455	560(504~616)	925	200	10000	300	1.0	850
FNR-25K621	385	505	620(558~682)	1025	200	10000	338	1.0	800
FNR-25K681	420	560	680(612~748)	1120	200	10000	390	1.0	1200
FNR-25K751	460	615	750(675~825)	1240	200	10000	455	1.0	1100
FNR-25K781	485	640	780(702~858)	1290	200	10000	481	1.0	1050
FNR-25K821	510	670	820(738~902)	1355	200	10000	520	1.0	1000
FNR-25K911	550	745	910(819~1001)	1500	200	10000	546	1.0	900
FNR-25K102	625	825	1000(900~1100)	1650	200	10000	585	1.0	800
FNR-25K112	680	895	1100(990~1210)	1815	200	10000	650	1.0	700
FNR-25K182	1000	1465	1800(1620~1980)	2970	200	10000	700	1.0	600

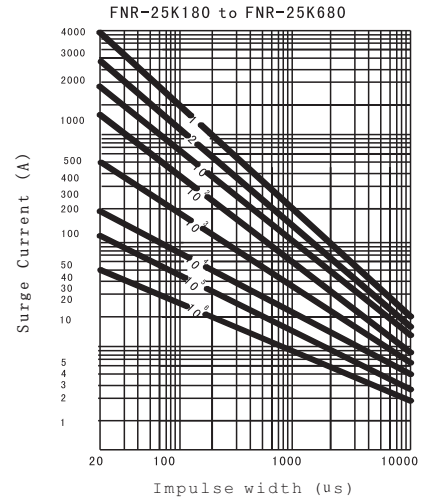


• 25K系列 Series

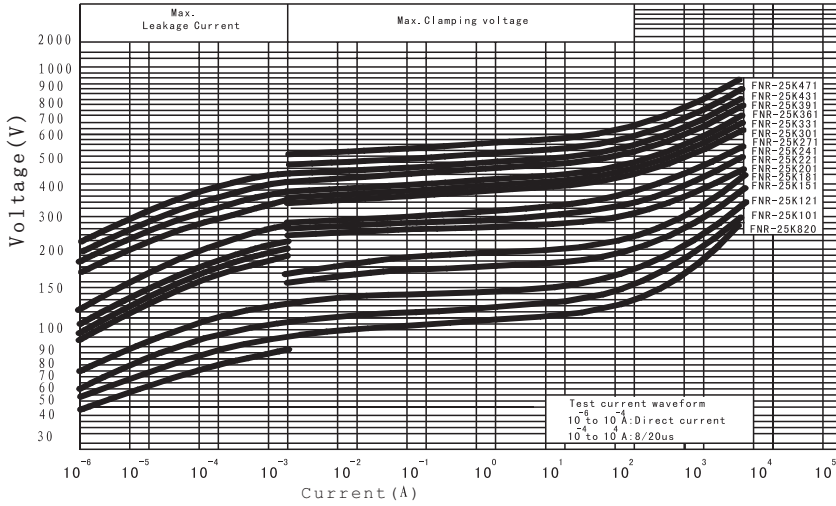
V-I Curve



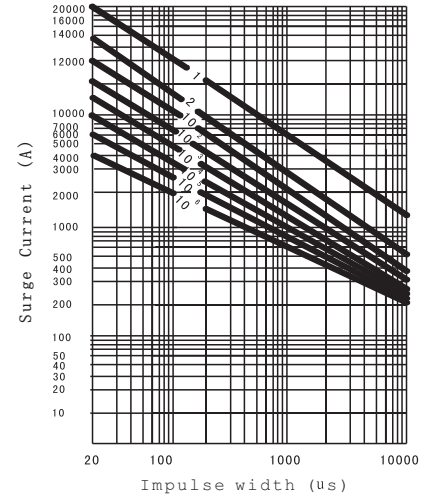
Impulse Lifetime Ratings



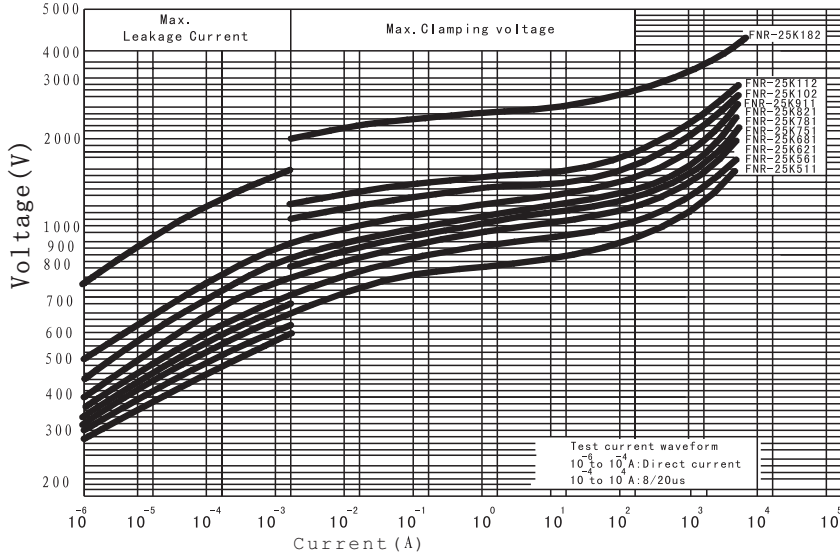
FNR-25K820 to FNR-25K471



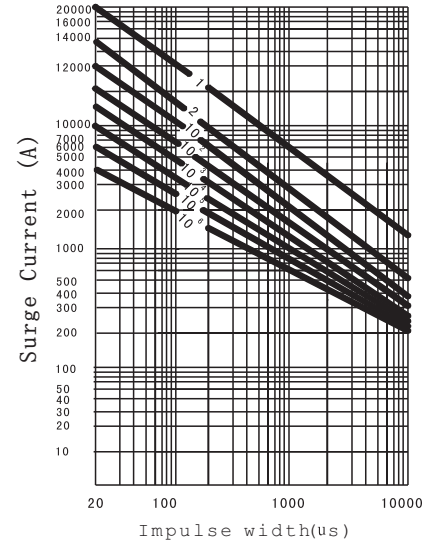
FNR-25K820 to FNR-25K471



FNR-25K511 to FNR-25K182



FNR-25K511 to FNR-25K182



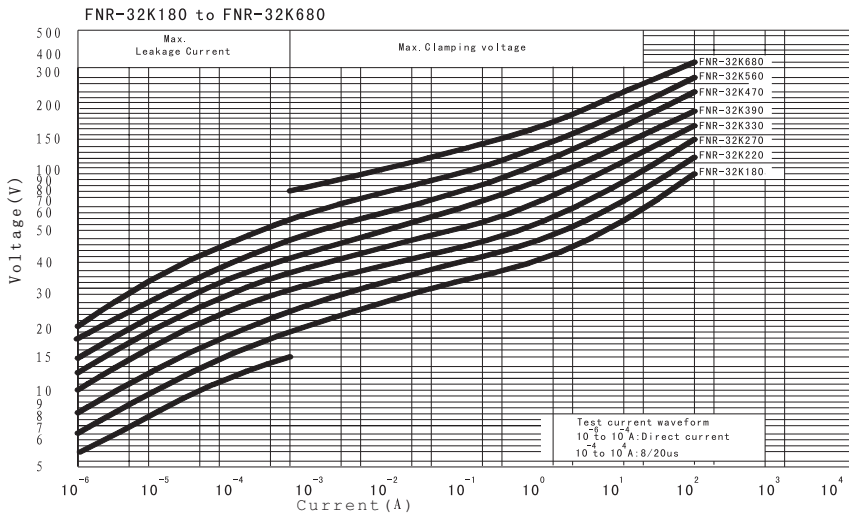


**• 32K系列電性能 SERIES SPECIFICATION**

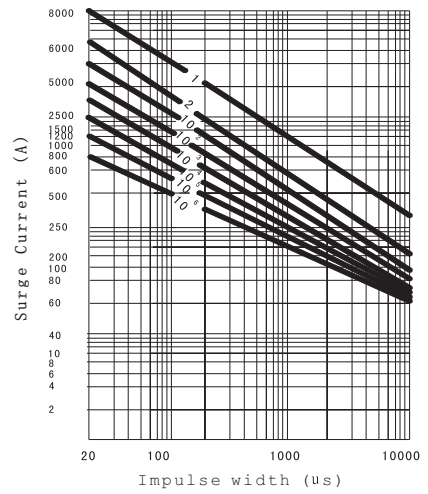
型號規格 Part Number	最大允許 使用電壓 Maximum operating Voltage		壓敏電壓 Varistor Voltage  V0.1mA (V)	最大限制電壓 Maximum clamping Voltage		最大通流容量 Maximum Withstanding Surge Current (8/20 $\mu$ S)	最大能量耐量 Maximum Energy (2ms) (J)	最大靜態 功率 Rated Wattage (W)	靜態電容量 (參考值) (1K Hz) Capacitance (Reference) (PF)
	AC (V)	DC (V)		VC (V)	IP (A)				
FNR-32K470	30	38	47(42.3~51.7)	89	40	5000	25	1.2	11000
FNR-32K560	35	45	56(50.4~61.6)	106	40	5000	30	1.2	10000
FNR-32K680	40	56	68(61.2~74.8)	129	40	5000	32	1.2	9000
FNR-32K820	50	65	82(73.8~90.2)	156	200	20000	35	1.2	8000
FNR-32K101	60	85	100(90~110)	190	200	20000	49	1.2	7000
FNR-32K121	75	100	120(108~132)	216	200	20000	54	1.2	6000
FNR-32K151	95	125	150(135~165)	270	200	20000	65	1.2	5000
FNR-32K201	130	170	200(180~220)	360	200	20000	91	1.2	4700
FNR-32K221	140	180	220(198~242)	385	200	20000	117	1.2	4300
FNR-32K241	150	200	240(216~264)	395	200	20000	156	1.2	4000
FNR-32K271	175	225	270(243~297)	455	200	20000	195	1.2	3500
FNR-32K301	200	250	300(270~330)	500	200	20000	200	1.2	3200
FNR-32K331	210	275	330(297~363)	550	200	20000	210	1.2	3000
FNR-32K361	230	300	360(324~396)	595	200	20000	234	1.2	3000
FNR-32K391	250	320	390(351~429)	650	200	20000	286	1.2	2500
FNR-32K431	275	350	430(387~473)	710	200	20000	338	1.2	2250
FNR-32K471	300	385	470(423~517)	775	200	20000	390	1.2	1900
FNR-32K511	318	415	510(459~561)	840	200	20000	400	1.2	1800
FNR-32K561	350	455	560(504~616)	925	200	20000	410	1.2	1700
FNR-32K621	380	505	620(558~682)	1025	200	20000	442	1.2	3200
FNR-32K681	420	560	680(612~748)	1120	200	20000	492	1.2	3000
FNR-32K751	460	615	750(675~825)	1240	200	20000	559	1.2	2700
FNR-32K781	485	640	780(702~858)	1290	200	20000	624	1.2	2600
FNR-32K821	510	670	820(738~902)	1355	200	20000	689	1.2	2400
FNR-32K911	550	745	910(819~1001)	1500	200	20000	754	1.2	2200
FNR-32K102	625	825	1000(900~1100)	1650	200	20000	819	1.2	1900
FNR-32K112	680	895	1100(990~1210)	1815	200	20000	910	1.2	1700
FNR-32K182	1000	1465	1800(1620~1980)	2970	200	20000	920	1.2	1000

• 32K系列 Series

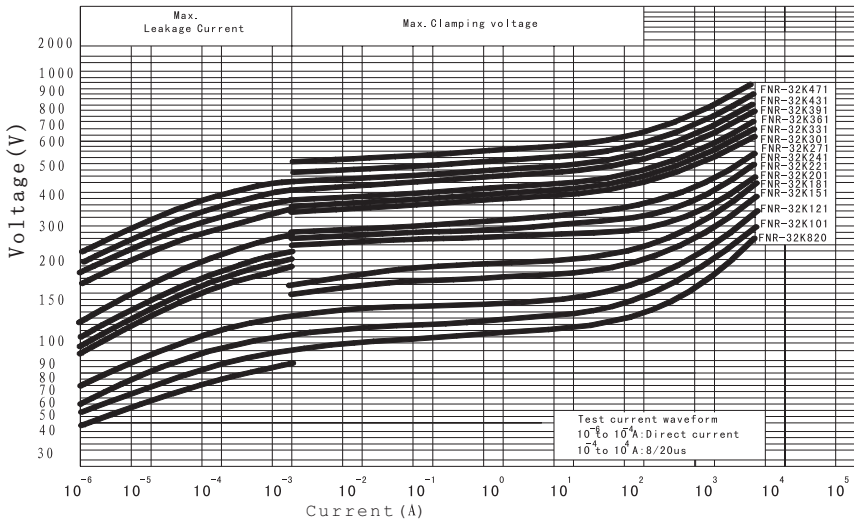
V-I Curve



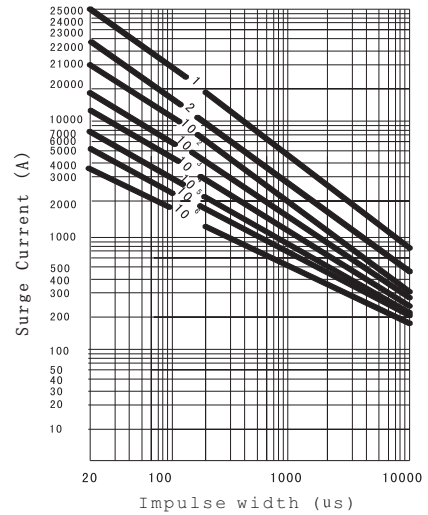
Impluse Lifetime Ratings  
FNR-32K180 to FNR-32K680



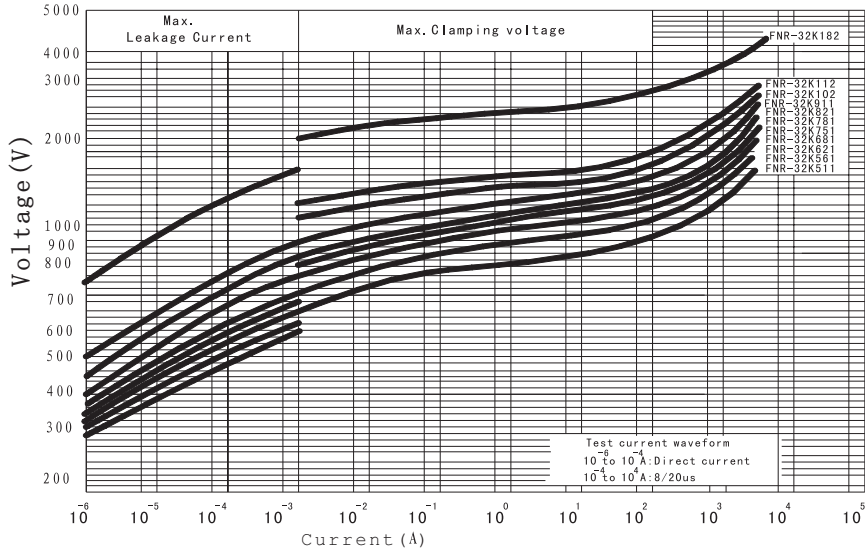
FNR-32K820 to FNR-32K471



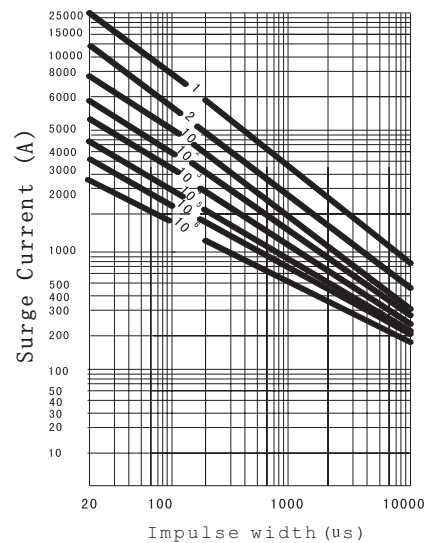
FNR-32K820 to FNR-32K471



FNR-32K511 to FNR-32K182



FNR-32K511 to FNR-32K182



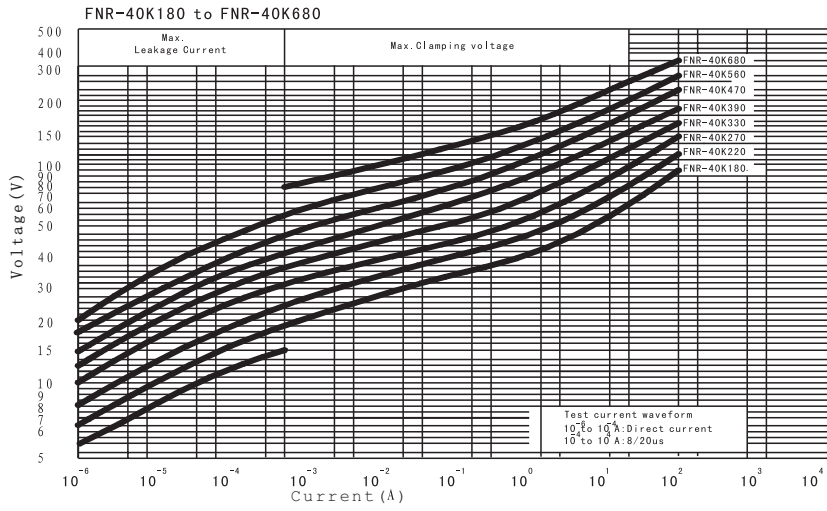
● 40K系列電性能 SERIES SPECIFICATION

型號規格 Part Number	最大允許 使用電壓 Maximum operating Voltage		壓敏電壓 Varistor Voltage  V0.1mA (V)	最大限制電壓 Maximum clamping Voltage		最大通流容量 Maximum Withstanding Surge Current (8/20 μ S )	最大能量耐量 Maximum Energy ( 2ms )	最大靜態 功率 Rated Wattage	靜態電容量 (參考值) 1K Hz Capacitance (Reference)
	AC (V)	DC (V)		VC (V)	IP (A)				
FNR-40K201	130	170	200(180~220)	360	200	40000	208	1.4	10000
FNR-40K221	140	180	220(198~242)	360	200	40000	234	1.4	9500
FNR-40K241	150	200	240(216~264)	395	200	40000	286	1.4	9000
FNR-40K271	175	225	270(243~297)	455	200	40000	308	1.4	7500
FNR-40K301	200	250	300(270~330)	500	200	40000	320	1.4	7000
FNR-40K331	210	275	330(297~363)	550	200	40000	330	1.4	6500
FNR-40K361	230	300	360(324~396)	595	200	40000	390	1.4	6000
FNR-40K391	250	320	390(351~429)	650	200	40000	442	1.4	5000
FNR-40K431	275	350	430(387~473)	710	200	40000	494	1.4	4500
FNR-40K471	300	385	470(423~517)	775	200	40000	546	1.4	3600
FNR-40K511	318	415	510(459~561)	840	200	40000	585	1.4	3300
FNR-40K561	350	455	560(504~616)	925	200	40000	585	1.4	3000
FNR-40K621	380	505	620(558~682)	1025	200	40000	585	1.4	3300
FNR-40K681	420	560	680(612~748)	1120	200	40000	650	1.4	3000
FNR-40K751	460	615	750(675~825)	1240	200	40000	715	1.4	2500
FNR-40K781	485	640	780(702~858)	1290	200	40000	780	1.4	2450
FNR-40K821	510	670	820(738~902)	1355	200	40000	832	1.4	2400
FNR-40K911	550	745	910(819~1001)	1500	200	40000	910	1.4	2200
FNR-40K102	625	825	1000(900~1100)	1650	200	40000	1040	1.4	2000
FNR-40K112	680	895	1100(990~1210)	1815	200	40000	1105	1.4	1800
FNR-40K182	1000	1465	1800(1620~1980)	1970	200	40000	1300	1.4	1600

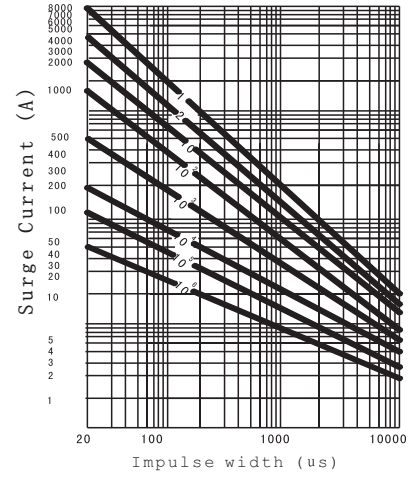
# 壓敏電阻器 ZINC OXIDE VARISTOR

## • 40K系列 Series

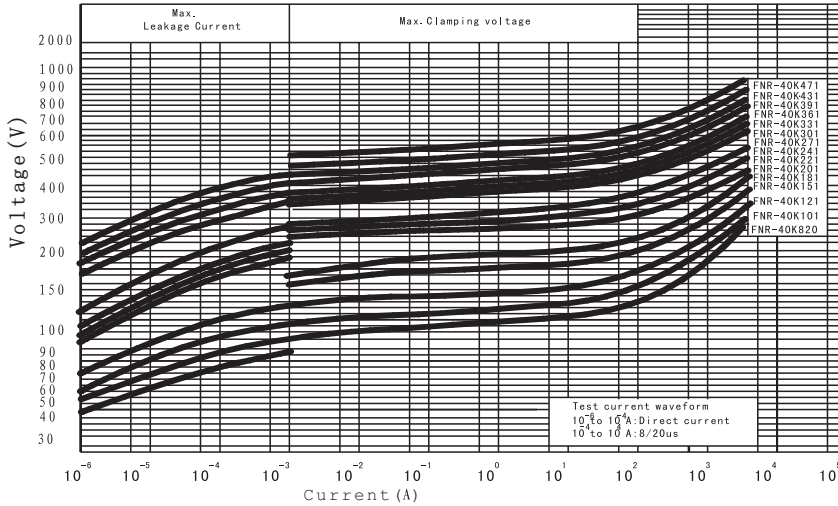
V-I Curve



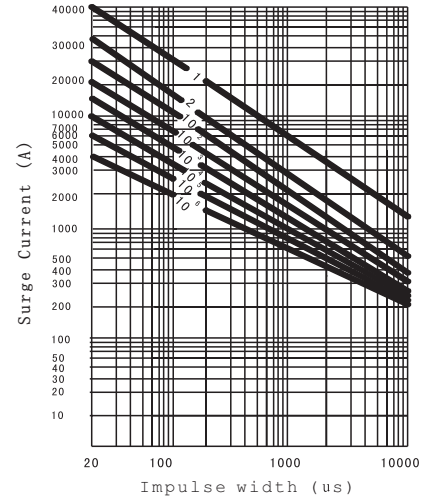
Impulse Lifetime Ratings  
FNR-40K180 to FNR-40K680



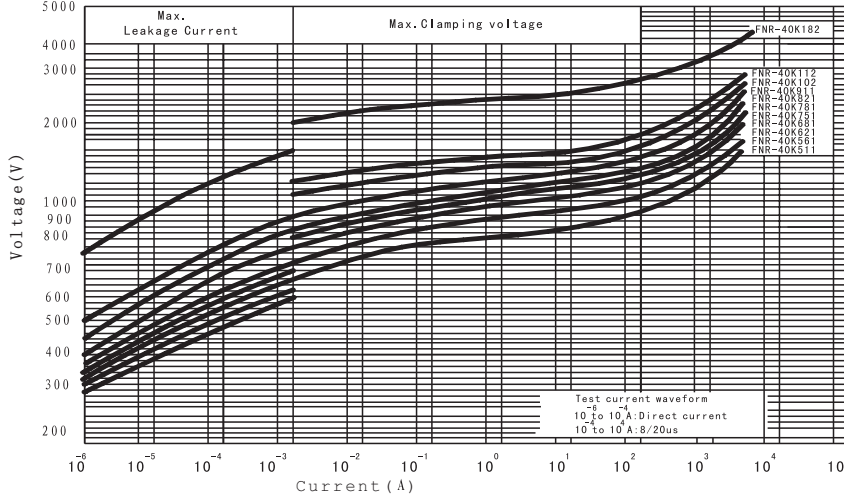
FNR-40K820 to FNR-40K471



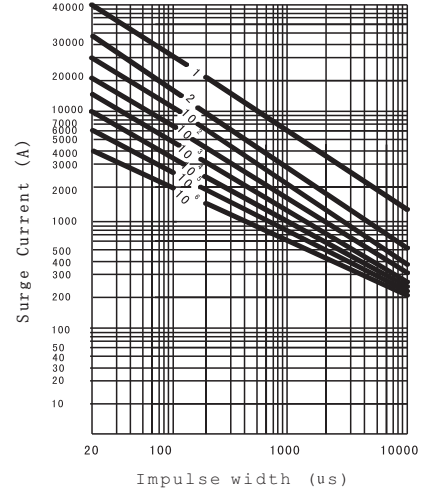
FNR-40K820 to FNR-40K471



FNR-40K511 to FNR-40K182



FNR-40K511 to FNR-40K182



- 壓敏電阻器選用方法(參考) HOW TO SELECT A VARISTOR(ONLY REFERENCE)

A:壓敏電壓的選取

對於過壓保護方面的應用，壓敏電壓值應大于實際電路的電壓值，一般用以下公式計算：

$$V_{1mA} = a \cdot v / b \cdot c$$

a電源電壓波動系數，一般取值1.2

v在電路中壓敏電阻器兩端的直流電壓（交流時取電壓峰值）

b壓敏電壓誤差，一般取0.85

c元件的老化系數，一般取0.9

A:Varistor voltage

Varistor Voltage should be more than the operating voltage in over protective circuit,The formula is shown as the following.

$$V_{1mA} = a \cdot v / b \cdot c$$

a-power Voltage ripple coefficient usually 1.2

v-DC Voltage (significant value only AC power)

b-Tolerance usually take 0.85

c-Ageing coefficient usually take 0.9

B:通流量的選取

通常產品給出的通流量是按照產品標準給定的波形、衝擊次數和間隙時間進行脈衝實驗時產品所能承受的最大電流值，產品所能承受的衝擊數是波形、幅值和間隙時間的函數，當電流波形幅值降低50%時衝擊次數可增加一倍，所以在實際應用中，壓敏電阻器所吸收的浪涌電流應小于產品的最大通流量，以延長產品的工作壽命。

B:Withstanding surge current

In general, withstanding surge current is max, Pulse current value which determined by test conditions such as wave- shape ,amplitude and intermal time, when the amplitude decrease to 50% of the initial , it should be increased to 2 times of the initial in order to keep the life longer, the surge current which is sbsorbed by the varistor should be less than max. withstanding surge current

• 用途 APPLICATIONS

MODEL NUMBER 5mm	MODEL NUMBER 7mm	MODEL NUMBER 10mm	MODEL NUMBER 14mm	MODEL NUMBER 20mm	主要用途 Recommended Applications
FNR-05 K180	FNR-07 K180	FNR-10 K180	FNR-14 K180	FNR-20 K180	<ul style="list-style-type: none"> <li>Protection of various kinds of semiconductors</li> <li>Protection of automobile equipment</li> <li>Absorption of switching surge from various kinds of relays and electro-magnetic valves (DC below 48V)</li> <li>Protection of electronic equipment from electrostatic discharge</li> <li>積體電路、電晶體等半導體元件保護</li> <li>汽車電裝品</li> <li>DC 48V以下激磁線圈，如：繼電器、電磁等</li> <li>靜電防制</li> <li>移動電話</li> </ul>
FNR-05 K220	FNR-07 K220	FNR-10 K220	FNR-14 K220	FNR-20 K220	
FNR-05 K270	FNR-07 K270	FNR-10 K270	FNR-14 K270	FNR-20 K270	
FNR-05 K330	FNR-07 K330	FNR-10 K330	FNR-14 K330	FNR-20 K330	
FNR-05 K390	FNR-07 K390	FNR-10 K390	FNR-14 K390	FNR-20 K390	
FNR-05 K470	FNR-07 K470	FNR-10 K470	FNR-14 K470	FNR-20 K470	
FNR-05 K560	FNR-07 K560	FNR-10 K560	FNR-14 K560	FNR-20 K560	
FNR-05 K680	FNR-07 K680	FNR-10 K680	FNR-14 K680	FNR-20 K680	
FNR-05 K820	FNR-07 K820	FNR-10 K820	FNR-14 K820	FNR-20 K820	<ul style="list-style-type: none"> <li>Telephone. Communication line (DC 48V)</li> <li>電話機用: DC48V通信回路</li> </ul>
FNR-05 K101	FNR-07 K101	FNR-10 K101	FNR-14 K101	FNR-20 K101	
FNR-05 K121	FNR-07 K121	FNR-10 K121	FNR-14 K121	FNR-20 K121	
FNR-05 K151	FNR-07 K151	FNR-10 K151	FNR-14 K151	FNR-20 K151	
FNR-05 K181	FNR-07 K181	FNR-10 K181	FNR-14 K181	FNR-20 K181	<ul style="list-style-type: none"> <li>AC 100V Line-Line Applications (Japan)</li> <li>用于AC 100V電源綫之間(日本)</li> </ul>
FNR-05 K201	FNR-07 K201	FNR-10 K201	FNR-14 K201	FNR-20 K201	
FNR-05 K221	FNR-07 K221	FNR-10 K221	FNR-14 K221	FNR-20 K221	
FNR-05 K241	FNR-07 K241	FNR-10 K241	FNR-14 K241	FNR-20 K241	<ul style="list-style-type: none"> <li>AC 100V to 120V, Line-Line Applications (Japan, u.s., Canada)</li> <li>用于AC100V、120V電源綫之間(日本、美國、加拿大等)</li> </ul>
FNR-05 K271	FNR-07 K271	FNR-10 K271	FNR-14 K271	FNR-20 K271	
FNR-05 K301	FNR-07 K301	FNR-10 K301	FNR-14 K301	FNR-20 K301	
FNR-05 K331	FNR-07 K331	FNR-10 K331	FNR-14 K331	FNR-20 K331	<ul style="list-style-type: none"> <li>Telephone Line Application (250V Insulation Resistance Test Applicable)</li> <li>用于電話機250V絕緣阻抗測試。</li> </ul>
FNR-05 K361	FNR-07 K361	FNR-10 K361	FNR-14 K361	FNR-20 K361	
FNR-05 K391	FNR-07 K391	FNR-10 K391	FNR-14 K391	FNR-20 K391	

MODEL NUMBER 5mm	MODEL NUMBER 7mm	MODEL NUMBER 10mm	MODEL NUMBER 14mm	MODEL NUMBER 20mm	主要用途 Recommended Applications
FNR-05 K431 FNR -05 K471	FNR-07 K431 FNR-07 K471	FNR-10 K431 FNR-10 K471	FNR-14 K431 FNR-14 K471	FNR-20 K431 FNR-20 K471	<ul style="list-style-type: none"> <li>· AC200-220V Line-Line Applications</li> <li>· AC100V to 220V. Line-Ground Applications</li> <li>· Ac200-220電源綫間應用</li> <li>· Ac100 to 220電源與對地應用</li> </ul>
FNR-05 K561	FNR-07 K561 FNR-07 K621 FNR-07 K681	FNR-10 K561 FNR-10 K621 FNR-10 K681	FNR-14 K561 FNR-14 K621 FNR-14 K681	FNR-20 K561 FNR-20 K621 FNR-20 K681	<ul style="list-style-type: none"> <li>· AC 240V Line-Line Applications ( U.K., Australia, Middle East Countries)</li> <li>· AC 240V電源綫間應用 ( 英國、中東、澳洲等國)</li> </ul>
		FNR-10 K751 FNR-10 K781 FNR-10 K821	FNR-14 K751 FNR-14 K781 FNR-14 K821	FNR-20 K751 FNR-20 K781 FNR-20 K821	<ul style="list-style-type: none"> <li>· AC 380V, Line-Line Ground Applications</li> <li>AC 380V 電源綫間應用及電源對地間應用。</li> </ul>
		FNR-10 K911	FNR-14 K911	FNR-20 K911	<ul style="list-style-type: none"> <li>· AC 415V, Line-Line line-Ground Applications</li> <li>AC 415V電源綫間應用及電源對地間應用</li> </ul>
		FNR-10 K102 FNR-10 K112	FNR-14 K102 FNR-14 K112	FNR-20 K102 FNR-20 K112	<ul style="list-style-type: none"> <li>· AC 480V, Line-Line Ground Applications</li> <li>AC 480V 電源綫間應用及電源對地間應用</li> </ul>
			FNR-14 K182	FNR-20 K182	<ul style="list-style-type: none"> <li>· Line Ground Applications ( For AC 1200V Withstanding Test )</li> <li>· AC 1200V電源對地間應用</li> </ul>

• 保險絲配用建議(SELECT OF FUSE in conformity to FNR Varistor):

\* 和壓敏電阻大小配合選用表 ( If conform with diameter):

Part Number	FNR05K series	FNR07K series	FNR10K series	FNR14K series	FNR20K series
Fuse rating	1 To 2 A	2 to 3A	3 to 5A	3 to 10A	5 to 15A

\* 和壓敏電阻最大峰值電流配合選用表 ( If conform with Max Peak current):

Max. Peak Current8/20 $\mu$ S 1 time (A)	Up to 500	5001 to 2000	2001 to 6000
Fuse rating	3A	5A	10A

● 電氣特性及測試方法 ELECTRICAL PERFORMANCE TEST

標準測試條件: 溫度:5℃~35℃, 濕度:45%~85%

Standard Test Conditions: Temperature: 5℃~35℃, humidity: 45%~85%

項目 Item	測試方法 Test method	性能 Performance
壓敏電壓 Varistor Voltage	在DC 1mA (φ5產品為 DC 0.1mA) 電流條件下的電壓值U <sub>1mA</sub> (φ5產品為U <sub>0.1mA</sub> ) 定為壓敏電壓。 In DC 1mA (only φ5 products voltage at DC 0.1mA) would be setted to varistor's voltage in ±10%.	公差: ±10% Tolerance: ±10%
漏電流 Leakage current	在0.83U <sub>1mA</sub> (φ5產品為U <sub>0.1mA</sub> ) 電壓下的電流值。 Current in 0.83U <sub>1mA</sub> (φ5products U <sub>0.1mA</sub> ) voltage.	請看標準 Please see standard
限制電壓 Clamping Voltage	在規定波形下施加規定電流后壓敏電阻器兩端的電壓峰值。 The max voltage between two terminals with the specified standard impulse current.	請看標準 Please see standard
最大通流容量 Max peak current	用8/20μS波形衝擊后應無損傷, 壓敏電壓變率 ≤ ±10%。 Use 8/20μS wave form, According to following current no damage after shock one times in single direction every five minutes, voltage change percentage ≤ ±10%.	壓敏電壓變化率在 ±10%內。 Varistor Voltage changed percentage ≤ ±10%.
能量耐量 Maximum energy	用2ms方波衝擊一次, 衝擊后應無損傷, 壓敏電壓變化率 ≤ ±10%。 No camage after shock with 2ms square wave, Varistor voltage changed percentage ≤ ±10%.	壓敏電壓變化率在 ±10%內。 Varistor Voltage changed percentage ≤ ±10%.
電壓溫度系數 Temperature coefficient of varistor Voltage	在規定溫度下顯示壓敏電壓的變化值。 Varistor Voltage changed percentage on Specified temperature.	≤ ±0.05%
靜態電容量 Capacitance	條件: 1KHz, 1V Condition: 1KHz, 1V	
耐電壓 Bear of voltage	條件: 2500VAC 引出端與外殼間1min。 Condition: 2500VAC The distance of leads terminal and crust is 1 min.	要求: 外觀無可見損傷; 應無擊穿或飛弧。 Request: No break out and damage; No hit into product and flying arc.



● 機械性能測試 (Machine characteristic test)

項目	試驗方法及測試設備	要求
引出端強度 Lead terminal tensile strength	條件：拉力：10N；10±10S 彎曲：5N；90°，二次 Condition: Pull:10N；10±1S Bend:5N；90°，two times	要求：無可見損傷。 Request:No break out and damage
可焊性 Solder ability	條件：試驗Tb,方法1; 槽焊法。 T=235±5°C；t=±0.5S Condition:Test Tb ,Method 1; Solder in trough method T=235±5°C；t=±0.5S	要求：焊料在2S內流合。 Request:Solder
標志耐溶劑 The sign of melted-resistant solvent	條件：70%的1.1.2三氯，1.2.2氟乙烷和30%的異丙醇的混合物；室溫，浸漬5min；用脫脂棉在正反方向各擦拭5次，共10次；擦拭速度：2次/S。 Condition:Mixture with 70% 1.1.2 three chlorin, 1.2.2 fluorin-ethane and 30% cymene-alcohol; room temperature, dip 5 min;clean 5 times on positive and negative direction with absorbent cotton, total 10 times;cleaning speed: 2 times/S	要求：標志清晰。 -5%≤ΔV/V≤5% Request:Clear Sign. -5%≤ΔV/V≤5%
耐焊接熱 Solder ability	條件：260±5°C；5±1S Condition:260±5°C；5±1S	要求：無可見損傷 -5%≤ΔV/V≤5% I <sub>L</sub> ≤20μA Request:No break out and damage -5%≤ΔV/V≤5% I <sub>L</sub> ≤20μA
振動 Vibration	條件：正弦波； 10Hz~55Hz~10Hz 一次掃描時間：1 min 全振幅：1.5mm 3個方向，共6h。 Condition:sine wave; 10Hz~55Hz~10Hz Scanning time once:1 min Whole view picture:1.5mm 3 direction, total 6h.	要求：無可見損傷 -5%≤ΔV/V≤5% Request:No break out and damage -5%≤ΔV/V≤5%
碰撞 Impact	條件：390m/S <sup>2</sup> 6ms 三個方向，共4000次。 Condition:390m/S <sup>2</sup> 6ms 3 Direction, total 4000 times.	要求：無可見損傷 -5%≤ΔV/V≤5% Request:No break out and damage -5%≤ΔV/V≤5%

● 氣候試驗

項目	試驗方法及測試設備	要求
溫度快速變化 Temp cycle test	條件: $\theta A: -40 \pm 2^{\circ}C$ ; $\theta B: -40 \pm 2^{\circ}C$ ; T1:30min t2:2min~3min 循環次數: 5次 Condition: $\theta A: -40 \pm 2^{\circ}C$ ; $\theta B: -40 \pm 2^{\circ}C$ ; T1:30min t2:2min~3min Cycle times:5	要求: 無可見損傷 $-5\% \leq \Delta V/V \leq 5\%$ Request: No break out and damage $-5\% \leq \Delta V/V \leq 5\%$
高溫負荷 Heat burthen	條件: $85^{\circ}C$ 施加電壓: 505VDC 負荷方式: 連續 周期測量時間: 500h 累計試驗時間: 1000h 恢復1h~2h后測量。 Condition: $85^{\circ}C$ , Inflicted voltage: 505VDC Burthen quomodo: continuous; Circular measure time: 500h Total testing time: 1000h Measure after coming back in 1h~2h.	要求: 無可見損傷、標志清晰 $-10\% \leq \Delta V/V \leq 10\%$ Request: No break out and damage, and sign is clear; $-10\% \leq \Delta V/V \leq 10\%$
高溫貯存 Stockpile in high temperature	條件: $125 \pm 2^{\circ}C$ 周期測量時間: 500h 恢復時間: 1000h Conidition: $125 \pm 2^{\circ}C$ Circular measure time: 500h Total testing time: 1000h Measure after coming back in 1h~2h.	要求: 無可見損傷 $-5\% \leq \Delta V/V \leq 5\%$ Request: No break out and damage $-5\% \leq \Delta V/V \leq 5\%$
氣候順序 Weather oder	條件: 干熱: $85 \pm 2^{\circ}C$ , 16h 循環濕熱: Db, 一個循環, 24h, $55^{\circ}C$ 級; 低溫: $-40 \pm 3^{\circ}C$ , 2h Condition: Dry and heat: $85 \pm 2^{\circ}C$ , 16h Low temperature $-40 \pm 3^{\circ}C$ , 2h Circular wet and heat: Db, a cycle, 24h, $55^{\circ}C$ level;	要求: 無可見損傷 $-5\% \leq \Delta V/V \leq 5\%$ Request: No break out and damage $-5\% \leq \Delta V/V \leq 5\%$
穩態濕熱 Steady state hot and damp	4只樣品不施加電壓, 另4只樣品施加最大連續電壓的10% 嚴酷度: 96h 4 samples not with voltage, and other 4 samples with 10 percent of maximal continuous voltage Strict degree: 96h	要求: 外觀無可見損傷 限制電壓變化率 $\leq +20\%$ 壓敏電壓變化率 $\leq \pm 10\%$ Request: No break out and damage. Limited voltage changed rate $\leq +20\%$ Varistor voltage changed rete $\leq \pm 10\%$

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