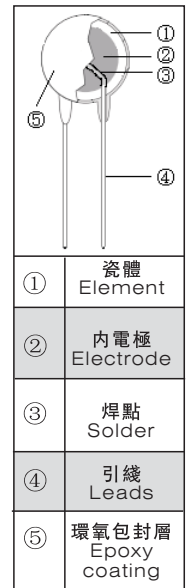


## ■ 壓敏電阻器

### 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

Zinc Oxide Varistor are non-linear resistors utilizing semiconductor electronic ceramic element mainly composed of zinc oxide and its non-linear resistance change as a function of the applied voltage .It' s called Varistor or Surge absorbers.



#### ● 特性 FEATURES

- \* 電壓範圍寬 ( 18 V~1.8 KV )                      Widely voltage range 18 V~1.8 KV
- \* 反應速度快 ( ≤25 ns )                              Fast response to the rapidly increase Voltage ( ≤25 ns )
- \* 非線性指數大    Excellent non-linearity coefficient
- \* 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
- \* 符合ROHS、REACH、無鹵環保要求              Meet ROHS, REACH, HF requirements of environmental protection

#### ● 訂貨方式 HOW TO ORDER

|                             |                                 |   |                   |  |  |  |  |
|-----------------------------|---------------------------------|---|-------------------|--|--|--|--|
| F                           | NR                              | 10  | K                 | 471  | B                                      | A  | S  |
| 風華高科<br>Fenghua<br>Advanced | 非線性電阻<br>Non-Linear<br>Resistor | 瓷片直徑<br>Element<br>Diameter                       | 允許誤差<br>Tolerance | 標稱壓敏電壓(V)<br>Nominal<br>Varistor<br>Voltage                                      | 包裝方式<br>Packaging                      | 引腳腳型<br>Lead<br>Type   | 引腳長度<br>Lead<br>Length                                   |
|                             |                                 | 05 5mm<br>07 7mm<br>10 10mm<br>14 14mm<br>20 20mm | K ± 10%           | 820=82 × 10 <sup>0</sup><br>471=47 × 10 <sup>1</sup><br>102=10 × 10 <sup>2</sup> | B 散包裝<br>Bulk<br>T 編帶<br>Tape<br>Style | A 直腳<br>Staight<br>B 外彎腳<br>Outward<br>Crimp<br>F 內彎腳<br>Inward<br>Crimp<br>Y Y型腳<br>Y-crimp | S 長腳<br>Long<br>C 短腳<br>Trimmed<br>T 編帶<br>Tape<br>Style |

#### ● 特性曲綫 CHARACTERISTIC CURVE

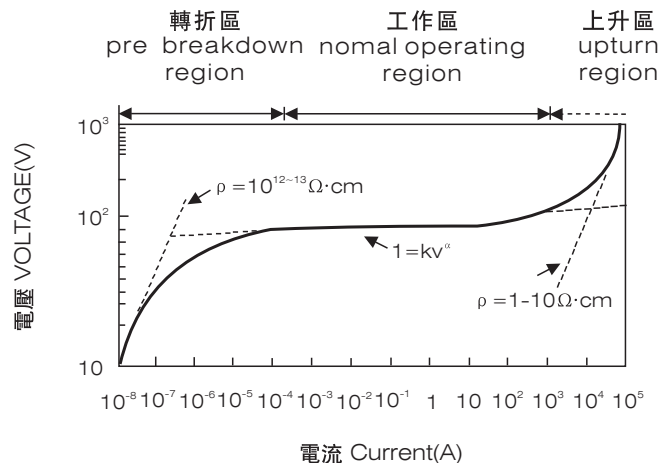


圖 Fig1  
Voltage Current Characteristic

# 壓敏電阻器 ZINC OXIDE VARISTOR

## ● 包裝方式及數量 (參考) PACKAGING & QUANTITY (Reference)

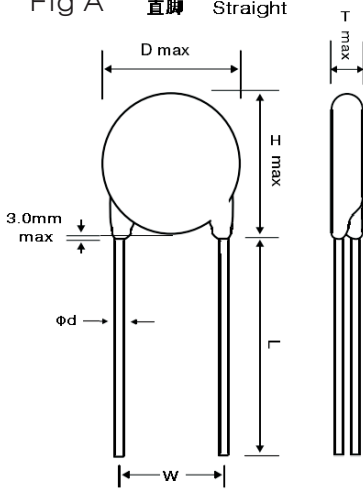
| 規格<br>Code | 數量 Quantity               |            |                      |
|------------|---------------------------|------------|----------------------|
|            | 散裝 Bluk / 塑料袋 Plastic bag |            | 編帶 Tape/盒裝 Paper Box |
|            | 長脚 Long                   | 短脚 Trimmed |                      |
| 05K        | 1000PCS                   | 1000PCS    | 1500 / 2000PCS       |
| 07K        | 500 / 1000PCS             | 1500PCS    | 1500 / 2000PCS       |
| 10K        | 500 / 1000PCS             | 500PCS     | 800 / 1000PCS        |
| 14K        | 250 / 500PCS              | 500PCS     | 600 / 800 / 1000PCS  |
| 20K        | 200 / 250PCS              | 400PCS     |                      |
| 25K        | 20PCS                     |            |                      |
| 32K        | 20PCS                     |            |                      |
| 40K        | 20PCS                     |            |                      |

## ● 結構尺寸 DIMENSION

### 散裝產品 BULK SPECIFICATION

單位 (Unit) : mm

Fig A 直脚 Straight



| 規格<br>Part<br>Code | D    | H                     |                    | d          | W         | L                 |                            |
|--------------------|------|-----------------------|--------------------|------------|-----------|-------------------|----------------------------|
|                    | MAX  | 直脚<br>Straight<br>MAX | 彎脚<br>Crimp<br>MAX | $\pm 0.05$ | $\pm 1.0$ | 長脚<br>Long<br>MIN | 短脚<br>Trimmed<br>$\pm 1.0$ |
| 05K                | 7.5  | 9.0                   | 10.0               | 0.6        | 5.0       | 10.0              | 3.5                        |
| 07K                | 9.0  | 12.0                  | 14.0               | 0.6        | 5.0       | 10.0              | 3.5                        |
| 10K                | 12.5 | 16.0                  | 18.0               | 0.8        | 7.5       | 10.0              | 3.5                        |
| 14K                | 17.0 | 19.0                  | 22.0               | 0.8        | 7.5       | 10.0              | 3.5                        |
| 20K                | 22.0 | 26.0                  | 28.0               | 1.0        | 10.0      | 10.0              | --                         |
| 25K                | 29.0 | 33.0                  | --                 | 1.5        | 15.0      | 10.0              | --                         |
| 32K                | 35.0 | 40.0                  | --                 | 1.5        | 18.0      | 10.0              | --                         |
| 40K                | 44.0 | 50.0                  | --                 | 1.5        | 18.0      | 10.0              | --                         |

Fig B 外彎脚 Outward Crimp

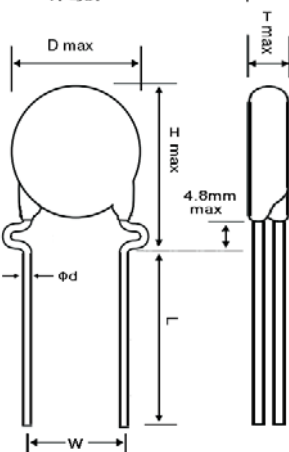


Fig F 內彎 Inward crimp

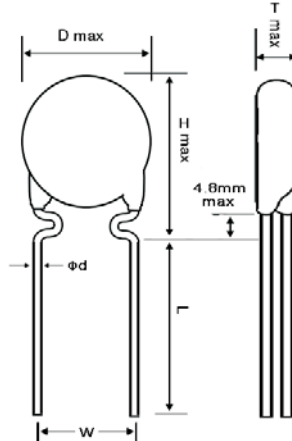
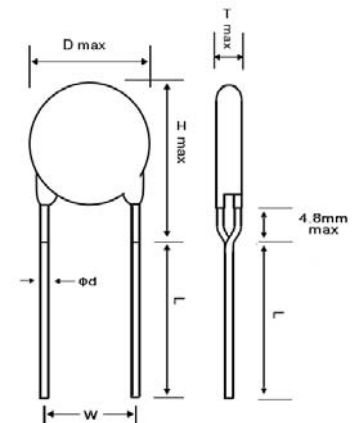


Fig Y Y型脚 Y-crimp



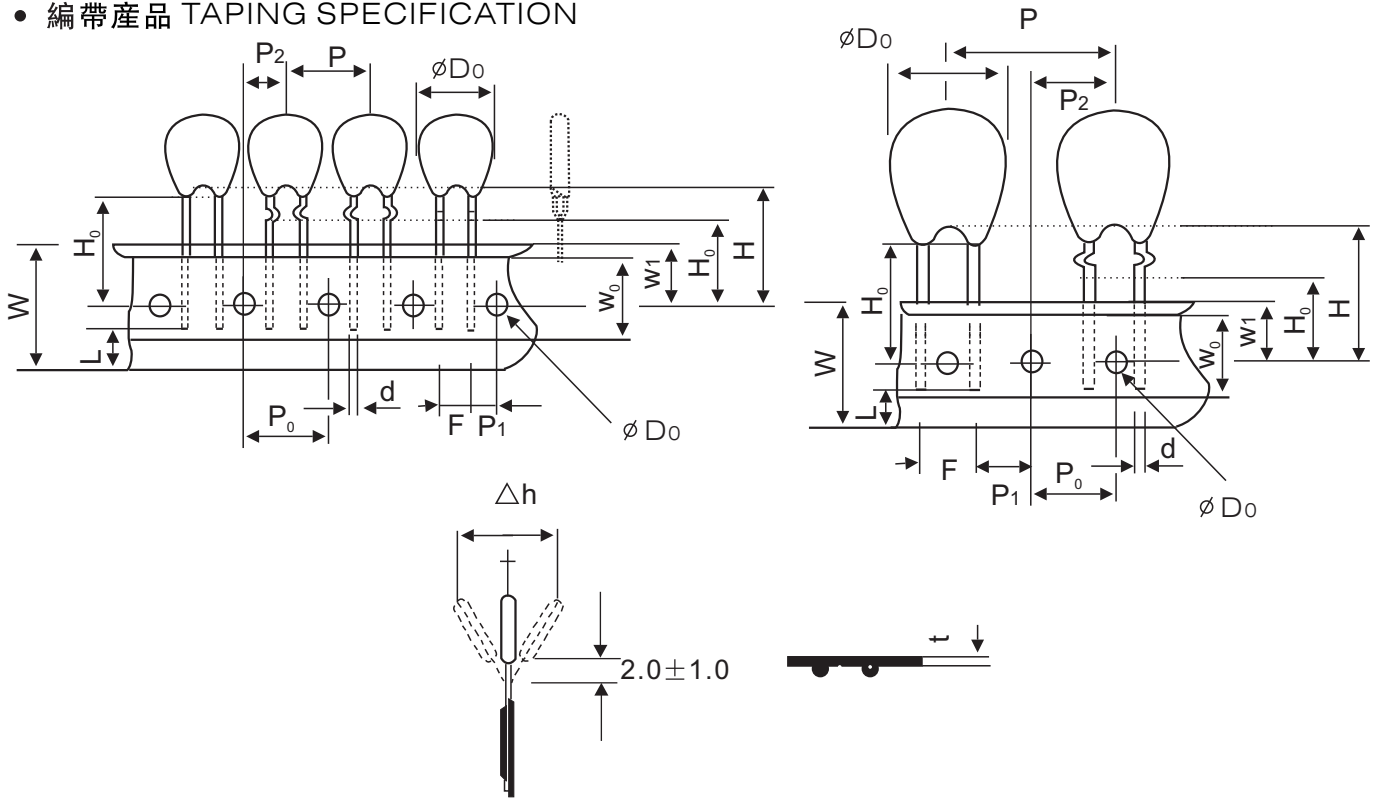
● 產品厚度 Thickness (max) (單位Unit:mm)

| 規格<br>Part<br>Code | 05k | 07k | 10k  | 14k  | 20k  | 25k  | 32k  | 40k  |
|--------------------|-----|-----|------|------|------|------|------|------|
| 180                | 3.4 | 3.6 | 4.0  | 4.1  | 4.5  |      |      |      |
| 220                | 3.6 | 3.8 | 4.1  | 4.3  | 4.6  |      |      |      |
| 270                | 3.8 | 4.0 | 4.3  | 4.5  | 4.8  |      |      |      |
| 330                | 3.5 | 3.7 | 4.1  | 4.5  | 5.0  |      |      |      |
| 390                | 3.7 | 3.9 | 4.3  | 4.4  | 4.7  |      |      |      |
| 470                | 3.8 | 4.1 | 4.5  | 4.6  | 4.9  |      |      |      |
| 560                | 3.8 | 4.2 | 4.5  | 4.7  | 5.0  |      |      |      |
| 680                | 4.0 | 4.3 | 4.5  | 4.5  | 5.0  |      |      |      |
| 820                | 3.3 | 3.5 | 3.8  | 4.0  | 4.3  |      |      |      |
| 101                | 3.6 | 3.8 | 4.2  | 4.3  | 4.6  |      |      |      |
| 121                | 3.8 | 4.0 | 4.4  | 4.5  | 4.6  |      |      |      |
| 151                | 4.1 | 4.3 | 4.7  | 4.8  | 5.1  |      |      |      |
| 181                | 3.6 | 3.6 | 4.3  | 4.5  | 4.6  |      |      |      |
| 201                | 3.7 | 3.7 | 4.4  | 4.6  | 4.8  | 5.4  | 5.6  | 5.6  |
| 221                | 3.8 | 3.8 | 4.5  | 4.7  | 4.9  | 5.5  | 5.7  | 5.7  |
| 241                | 4.0 | 4.0 | 4.7  | 4.9  | 5.0  | 5.6  | 5.8  | 5.8  |
| 271                | 4.1 | 4.1 | 4.8  | 5.0  | 5.2  | 5.8  | 6.0  | 6.0  |
| 301                | 4.3 | 4.3 | 5.0  | 5.2  | 5.4  | 5.9  | 6.1  | 6.1  |
| 331                | 4.5 | 4.5 | 5.2  | 5.4  | 5.6  | 6.1  | 6.3  | 6.3  |
| 361                | 4.6 | 4.6 | 5.3  | 5.5  | 5.9  | 6.4  | 6.6  | 6.6  |
| 391                | 4.9 | 4.9 | 5.6  | 5.8  | 6.0  | 6.6  | 6.8  | 6.8  |
| 431                | 5.1 | 5.1 | 5.7  | 5.9  | 6.1  | 6.9  | 7.1  | 7.1  |
| 471                | 5.4 | 5.4 | 6.1  | 6.3  | 6.5  | 7.2  | 7.4  | 7.4  |
| 511                | 5.6 | 5.6 | 6.3  | 6.5  | 6.7  | 7.2  | 7.4  | 7.4  |
| 561                | 5.9 | 5.9 | 6.6  | 6.8  | 6.9  | 7.2  | 7.9  | 7.9  |
| 621                |     | 6.2 | 6.9  | 7.1  | 7.3  | 8.0  | 8.2  | 8.2  |
| 681                |     | 6.7 | 7.3  | 7.5  | 7.7  | 8.0  | 8.2  | 8.2  |
| 751                |     |     | 7.7  | 7.9  | 8.0  | 8.4  | 8.6  | 8.6  |
| 781                |     |     | 7.8  | 8.0  | 8.2  | 8.5  | 8.7  | 8.7  |
| 821                |     |     | 8.1  | 8.3  | 8.5  | 8.7  | 8.9  | 8.9  |
| 911                |     |     | 8.7  | 8.9  | 9.1  | 9.2  | 9.4  | 9.4  |
| 102                |     |     | 8.1  | 8.3  | 8.5  | 9.7  | 9.9  | 9.9  |
| 112                |     |     | 8.6  | 8.8  | 9.0  | 10.3 | 10.5 | 10.5 |
| 182                |     |     | 12.8 | 12.8 | 13.0 | 13.0 | 13.2 | 13.5 |

# 壓敏電阻器

## ZINC OXIDE VARISTOR

### • 編帶產品 TAPING SPECIFICATION



單位:毫米 Unit:mm

| Series<br>Symbol | 05K             | 07K             | 10K             |                 | 14K             |                  | 20K             |
|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|-----------------|
| $\phi D$         | 7.0 Max         | 9.0 Max         | 12.5 Max        | 12.5 Max        | 17.0 Max        | 17.0 Max         | 22.0 Max        |
| $\phi d$         | $0.6 \pm 0.05$  | $0.6 \pm 0.05$  | $0.8 \pm 0.05$  | $0.8 \pm 0.05$  | $0.8 \pm 0.05$  | $0.8 \pm 0.05$   | $1.0 \pm 0.05$  |
| P                | $12.7 \pm 1.0$  | $12.7 \pm 1.0$  | $25.4 \pm 1.0$  | $15.0 \pm 1.0$  | $25.4 \pm 1.0$  | $30.0 \pm 1.0$   | $25.4 \pm 1.0$  |
| $P_0$            | $12.7 \pm 1.0$  | $12.7 \pm 1.0$  | $12.7 \pm 1.0$  | $15.0 \pm 1.0$  | $12.7 \pm 1.0$  | $15.0 \pm 1.0$   | $12.7 \pm 1.0$  |
| $P_1$            | $3.85 \pm 0.70$ | $3.85 \pm 0.70$ | $8.95 \pm 0.70$ | $3.85 \pm 0.70$ | $8.95 \pm 0.70$ | $11.15 \pm 0.70$ | $7.5 \pm 0.70$  |
| $P_2$            | $6.35 \pm 1.30$ | $6.35 \pm 1.30$ | $12.7 \pm 1.30$ | $7.5 \pm 1.30$  | $12.7 \pm 1.30$ | $15.0 \pm 1.30$  | $12.7 \pm 1.30$ |
| $\phi D_0$       | $4.0 \pm 0.2$   | $4.0 \pm 0.2$   | $4.0 \pm 0.2$   | $4.0 \pm 0.2$   | $4.0 \pm 0.2$   | $4.0 \pm 0.2$    | $4.0 \pm 0.2$   |
| W                | $18 \pm 1.0$    | $18 \pm 1.0$    | $18 \pm 1.0$    | $18 \pm 1.0$    | $18 \pm 1.0$    | $18 \pm 1.0$     | $18 \pm 1.0$    |
| $W_0$            | 12.5 Min        | 12.5 Min        | 12.5 Min        | 12.5 Min        | 12.5 Min        | 12.5 Min         | 12.5 Min        |
| $W_1$            | $9.0 \pm 1.0$   | $9.0 \pm 1.0$   | $9.0 \pm 1.0$   | $9.0 \pm 1.0$   | $9.0 \pm 1.0$   | $9.0 \pm 1.0$    | $9.0 \pm 1.0$   |
| $W_2$            | 3.0 Max         | 3.0 Max         | 3.0 Max         | 3.0 Max         | 3.0 Max         | 3.0 Max          | 3.0 Max         |
| H                | 20.0 Max        | 20.0 Max        | 20.0 Max        | 20.0 Max        | 20.0 Max        | 20.0 Max         | 20.0 Max        |
| $H_0$            | $16.0 \pm 1.0$  | $16.0 \pm 1.0$  | $16.0 \pm 1.0$  | $16.0 \pm 1.0$  | $16.0 \pm 1.0$  | $16.0 \pm 1.0$   | $16.0 \pm 1.0$  |
| $\Delta h$       | $0 \pm 2.0$     | $0 \pm 2.0$     | $0 \pm 2.0$     | $0 \pm 2.0$     | $0 \pm 2.0$     | $0 \pm 2.0$      | $0 \pm 2.0$     |
| t                | $0.6 \pm 0.3$   | $0.6 \pm 0.3$   | $0.6 \pm 0.3$   | $0.6 \pm 0.3$   | $0.6 \pm 0.3$   | $0.6 \pm 0.3$    | $0.6 \pm 0.3$   |
| L                | $9.0 \pm 1.0$   | $9.0 \pm 1.0$   | $9.0 \pm 1.0$   | $9.0 \pm 1.0$   | $9.0 \pm 1.0$   | $9.0 \pm 1.0$    | $9.0 \pm 1.0$   |
| F                | $5.0 \pm 1.0$   | $5.0 \pm 1.0$   | $7.5 \pm 1.0$   | $7.5 \pm 1.0$   | $7.5 \pm 1.0$   | $7.5 \pm 1.0$    | $10.0 \pm 1.0$  |

● 安規認證 AGENCY APPROVALS

| 認證機構<br>Agency        | UL & CUL | VDE      | CQC                 |
|-----------------------|----------|----------|---------------------|
| 認證檔案號<br>#File Number | E325462  | 40008242 | 05K: CQC14001111451 |
|                       |          |          | 07K: CQC14001111447 |
|                       |          |          | 10K: CQC14001111568 |
|                       |          |          | 14K: CQC14001111589 |
|                       |          |          | 20K: CQC14001111567 |

● 電性能參數 ELECTRICAL CHARACTERISTICS

● 05K系列電性能 05K SERIES SPECIFICATION

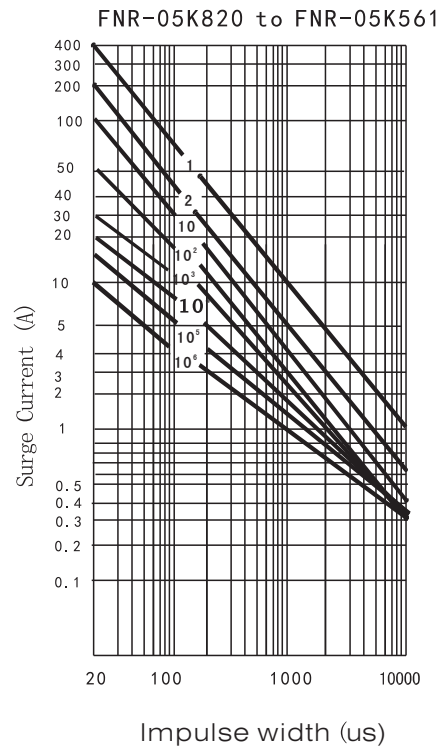
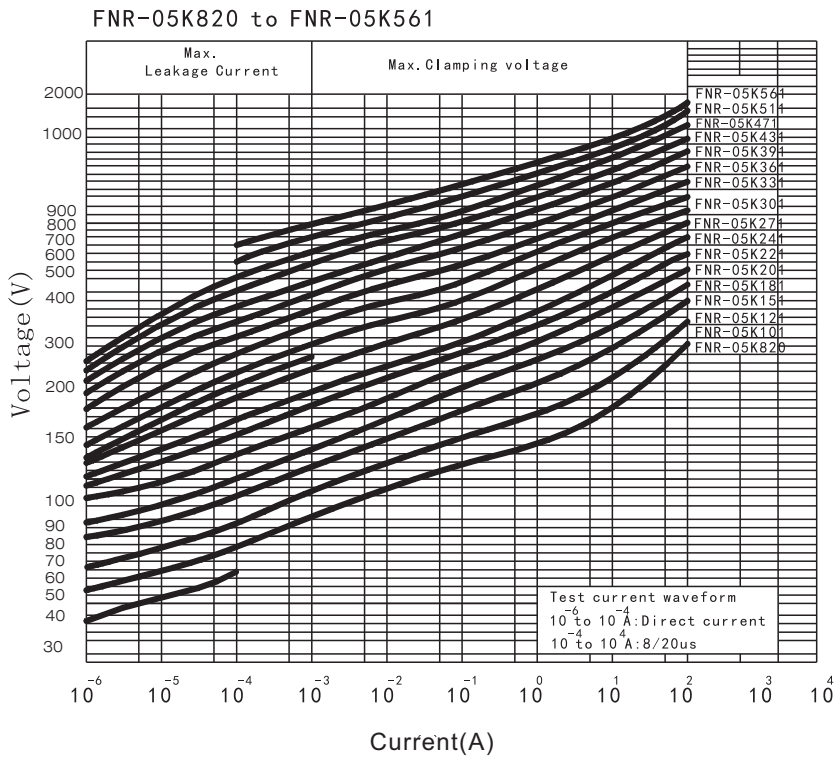
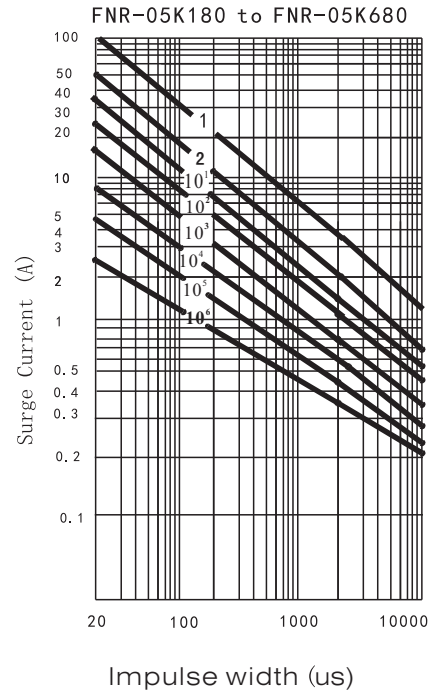
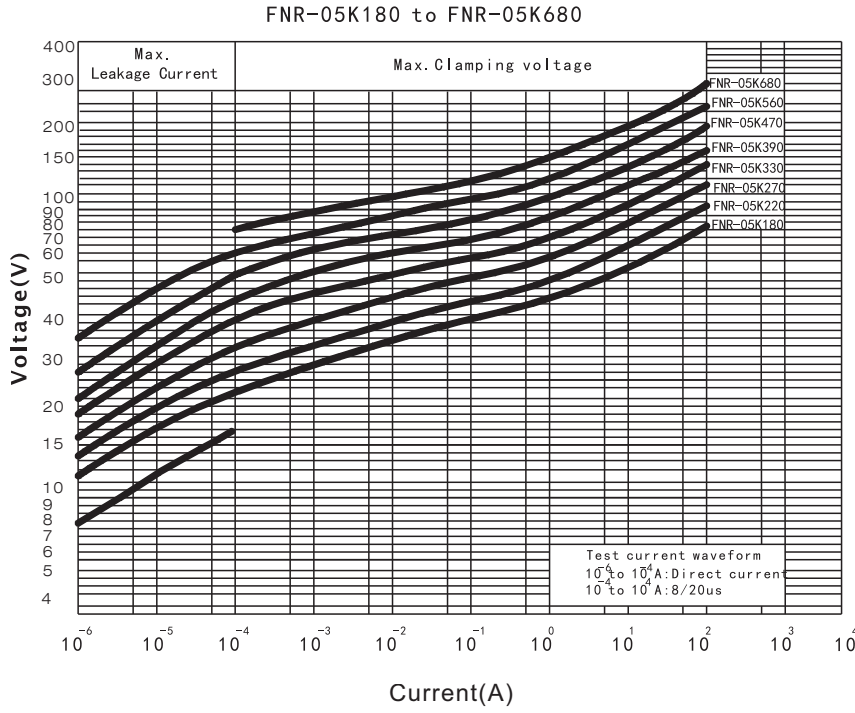
1500PCS

| 型號規格<br>Part<br>Number | 最大允許<br>使用電壓<br>Maximum<br>operating<br>Voltage |           | 壓敏電壓<br>Varistor<br>Voltage | 最大限制電壓<br>Maximum<br>clamping Voltage |           | 最大通流容量<br>Maximum<br>Withstanding<br>Surge Current<br>(8 / 20 μ s ) | 最大能量耐量<br>Maximum<br>Energy<br>(2ms) | 額定功率<br>Rated<br>Wattage | 靜態電容量<br>(參考值)<br>(1K Hz)<br>Capacitance<br>(Reference) |
|------------------------|---|-----------|-----------------------------|---------------------------------------|-----------|---|--------------------------------------|--------------------------|---|
|                        | AC<br>(V)                                       | DC<br>(V) | V0.1mA<br>(V)               | Vc<br>(V)                             | IP<br>(A) | 1 Time<br>(A)   | (J)                                  | (W)                      | (PF)  |
| 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             | 195   | 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   | 410       | 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  |

• 05K系列 Series

V-I Curve

Impulse Lifetime Ratings  
 (2 time:5 minutes internal  
 up to 10 times 2 minutes internal  
 up to 10<sup>6</sup> times 10 seconds internal)



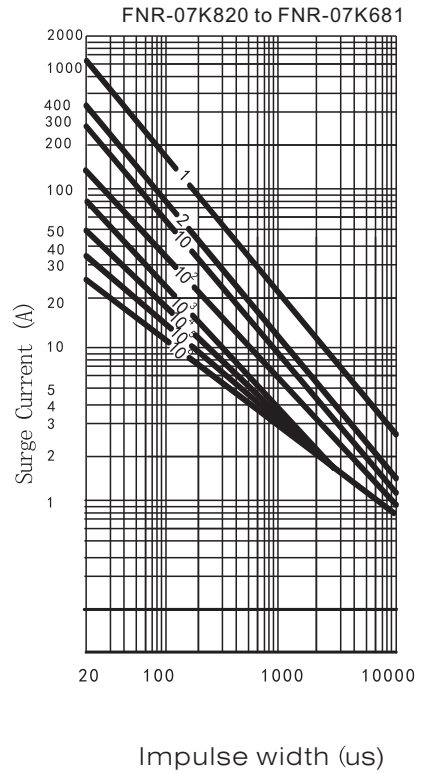
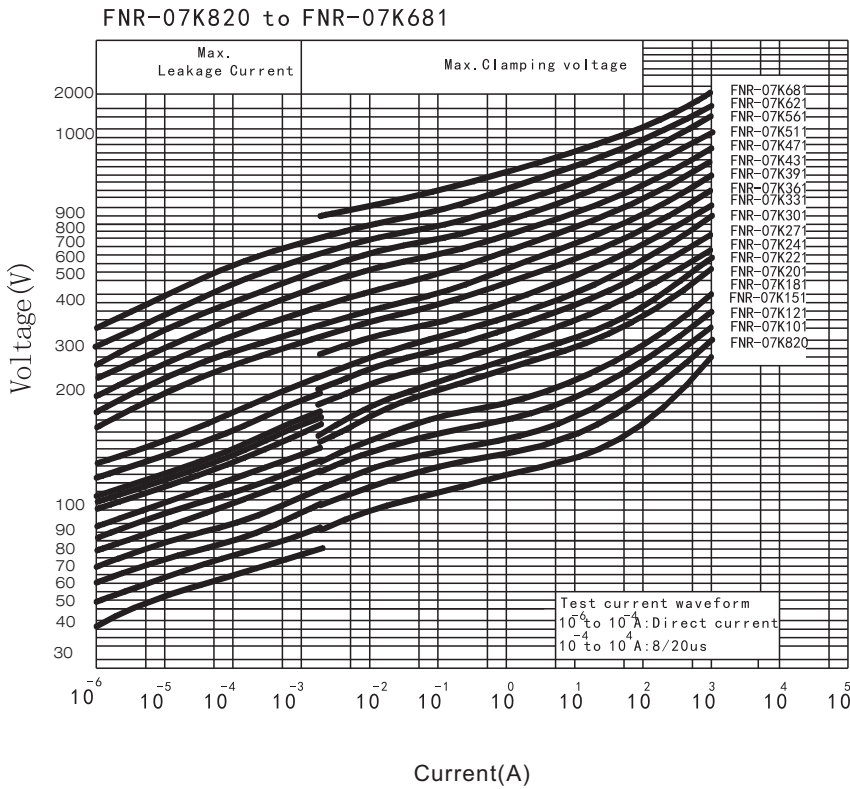
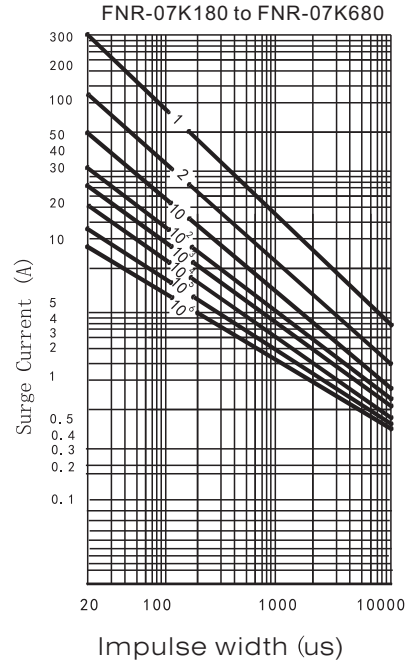
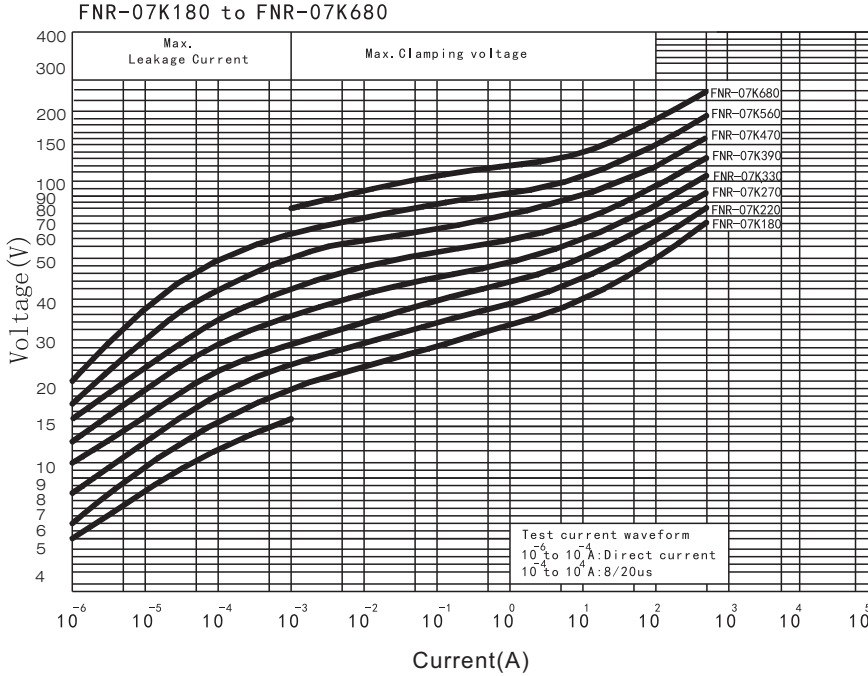
● 07K系列電性能 07K SERIES SPECIFICATION

| 型號規格<br>Part<br>Number | 最大允許<br>使用電壓<br>Maximum<br>operating<br>Voltage |           | 壓敏電壓<br>Varistor<br>Voltage | 最大限制電壓<br>Maximum<br>clamping Voltage |           | 最大通流容量<br>Maximum<br>Withstanding<br>Surge Current<br>(8/20 μS) | 最大能量耐量<br>Maximum<br>Energy<br>( 2ms) | 額定功率<br>Rated<br>Wattage | 靜態電容量<br>(參考值)<br>(1K Hz)<br>Capacitance<br>(Reference) |
|------------------------|---|-----------|-----------------------------|---------------------------------------|-----------|---|---------------------------------------|--------------------------|---|
|                        | AC<br>(V)                                       | DC<br>(V) |                             | V1mA<br>(V)                           | Vc<br>(V) |   |                                       |                          |   |
| FNR-07K180             | 11  | 14        | 18(16.2~19.8)               | 36                                    | 2.5       | 250   | 0.9                                   | 0.02                     | 3500  |
| FNR-07K220             | 14  | 18        | 22(19.8~24.2)               | 43                                    | 2.5       | 250   | 1.1                                   | 0.02                     | 2800  |
| FNR-07K270             | 17  | 22        | 27(24.3~29.7)               | 53                                    | 2.5       | 250   | 1.4                                   | 0.02                     | 2000  |
| FNR-07K330             | 20  | 26        | 33(29.7~36.3)               | 65                                    | 2.5       | 250   | 1.7                                   | 0.02                     | 1500  |
| FNR-07K390             | 25  | 31        | 39(35.1~42.9)               | 77                                    | 2.5       | 250   | 2.1                                   | 0.02                     | 1350  |
| FNR-07K470             | 30  | 38        | 47(42.3~51.7)               | 93                                    | 2.5       | 250   | 2.5                                   | 0.02                     | 1150  |
| FNR-07K560             | 35  | 45        | 56(50.4~61.6)               | 110                                   | 2.5       | 250   | 3.1                                   | 0.02                     | 950   |
| FNR-07K680             | 40  | 56        | 68(61.2~74.8)               | 135                                   | 2.5       | 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             | 195   | 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   | 410       | 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   | 560       | 680(612~748)                | 1120                                  | 10        | 1200  | 26.0                                  | 0.25                     | 75  |

• 07K系列 07K Series

V-I Curve

Impulse Lifetime Ratings  
 (2 time:5 minutes internal  
 up to 10 times 2 minutes internal  
 up to 10<sup>6</sup> times 10 seconds internal)





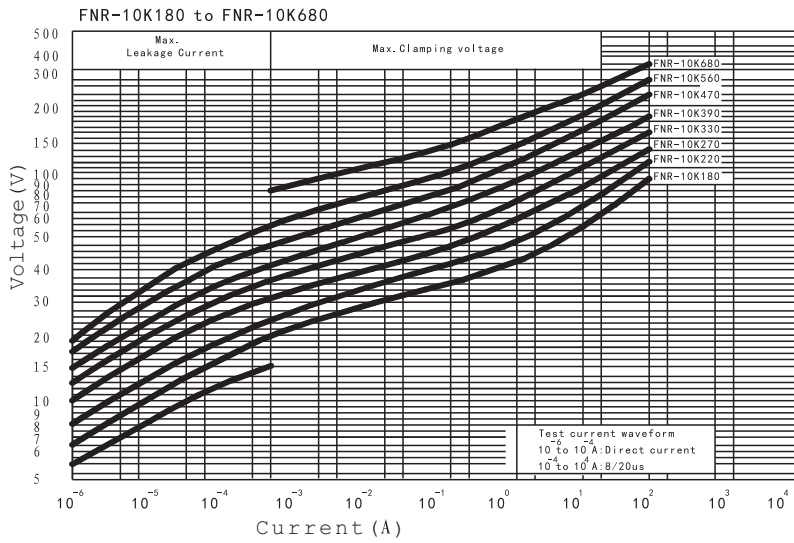
● 10K系列電性能 10K SERIES SPECIFICATION

| 型號規格<br>Part<br>Number | 最大允許<br>使用電壓<br>Maximum<br>operating<br>Voltage |           | 壓敏電壓<br>Varistor<br>Voltage | 最大限制電壓<br>Maximum<br>clamping Voltage |           | 最大通流容量<br>Maximum<br>Withstanding<br>Surge Current<br>(8/20 μ S) | 最大能量耐量<br>Maximum<br>Energy<br>( 2ms) | 額定功率<br>Rated<br>Wattage | 靜態電容量<br>(參考值)<br>(1k Hz)<br>Capacitance<br>(Reference) |
|------------------------|---|-----------|-----------------------------|---------------------------------------|-----------|--|---------------------------------------|--------------------------|---|
|                        | AC<br>(V)                                       | DC<br>(V) |                             | V1mA<br>(V)                           | Vc<br>(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             | 195   | 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             | 320   | 410       | 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  |

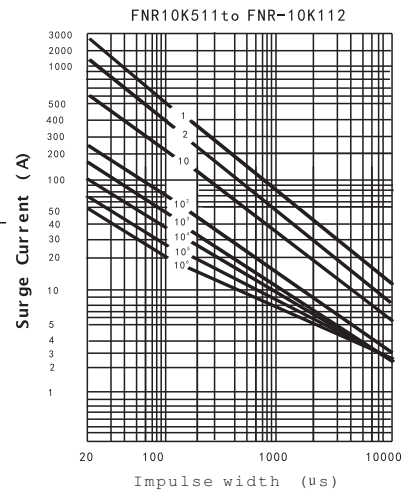
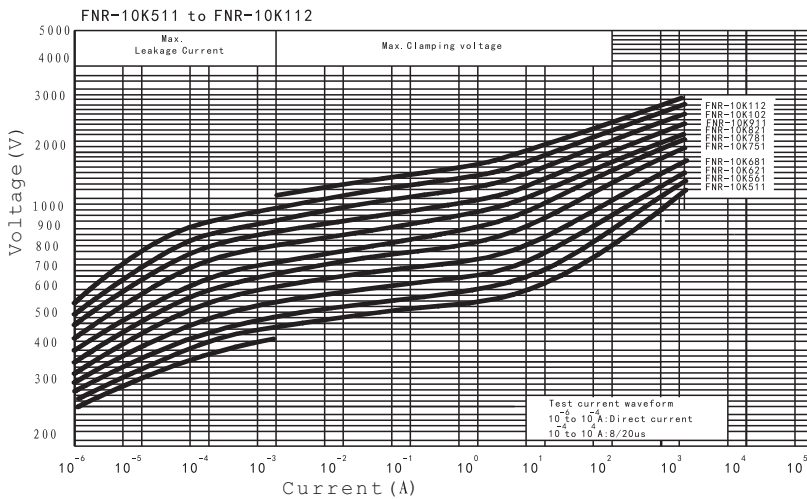
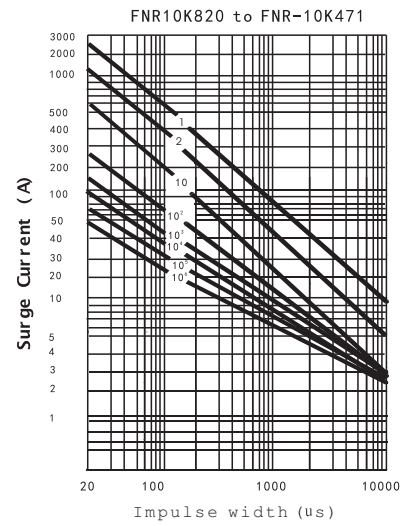
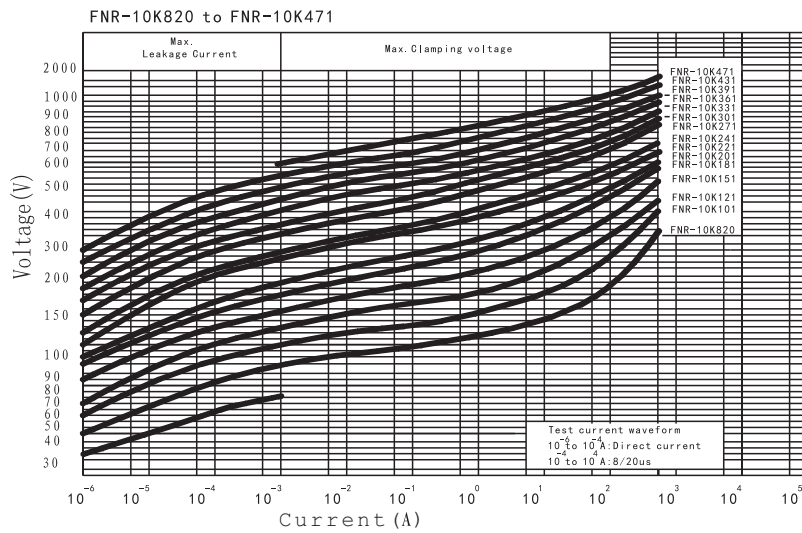
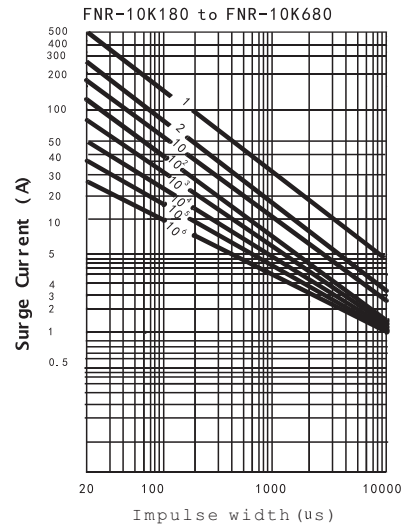
# 壓敏電阻器 ZINC OXIDE VARISTOR

## • 10K系列 10K Series

V-I Curve



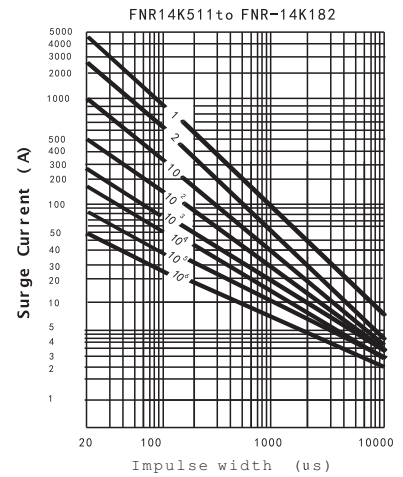
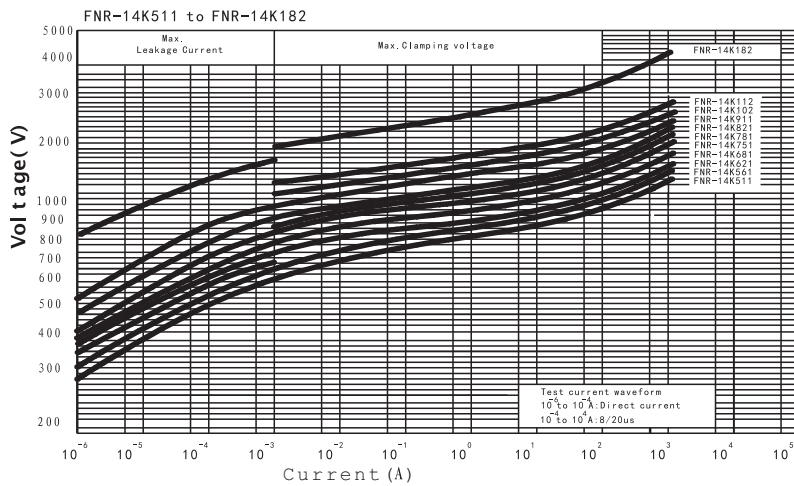
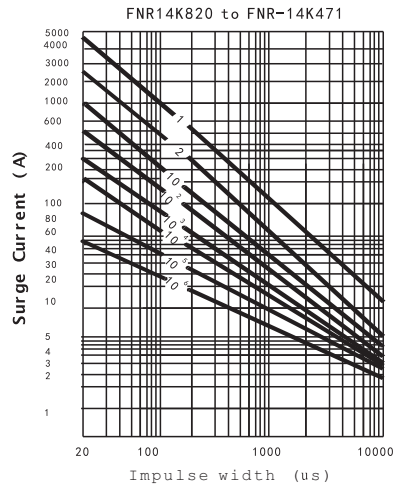
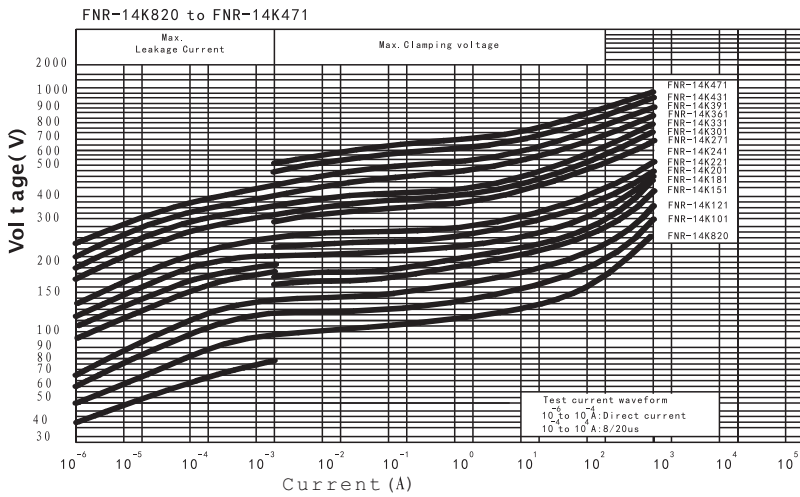
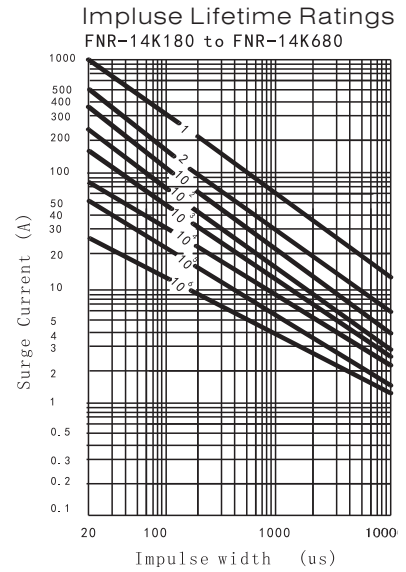
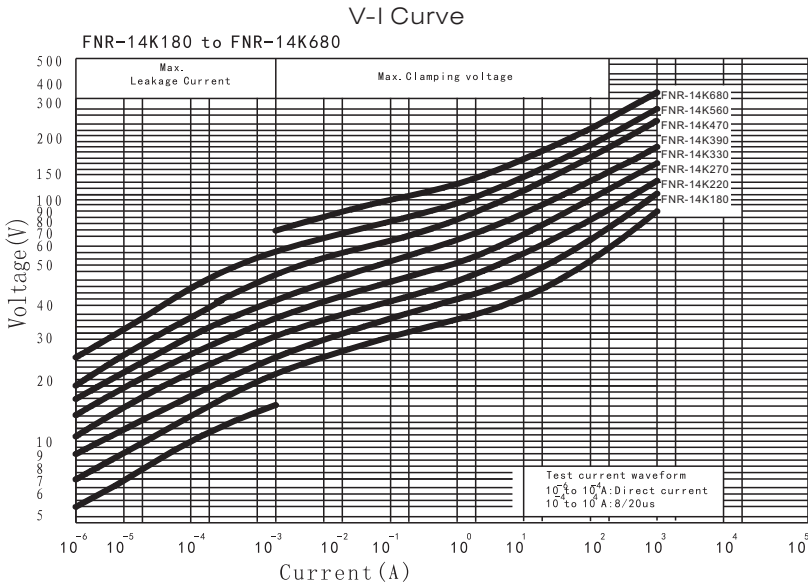
Impulse Lifetime Ratings



● 14K系列電性能 14K SERIES SPECIFICATION

| 型號規格<br>Part<br>Number | 最大允許<br>使用電壓<br>Maximum<br>operating<br>Voltage |           | 壓敏電壓<br>Varistor<br>Voltage | 最大限制電壓<br>Maximun<br>clamping Voltage |           | 最大通流容量<br>Maximum<br>Withstanding<br>Surge Current<br>(8/20 $\mu$ S) | 最大能量耐量<br>Maximum<br>Energy<br>( $\mu$ ms) | 額定功率<br>Rated<br>Wattage | 靜態電容量<br>(參考值)<br>(1K Hz)<br>Capacitance<br>(Reference) |
|------------------------|---|-----------|-----------------------------|---------------------------------------|-----------|--|--|--------------------------|---|
|                        | AC<br>(V)                                       | DC<br>(V) |                             | V1mA<br>(V)                           | Vc<br>(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(108~132)                | 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             | 195   | 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             | 320   | 410       | 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(558~682)                | 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(738~902)                | 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   |

• 14K系列 14K Series



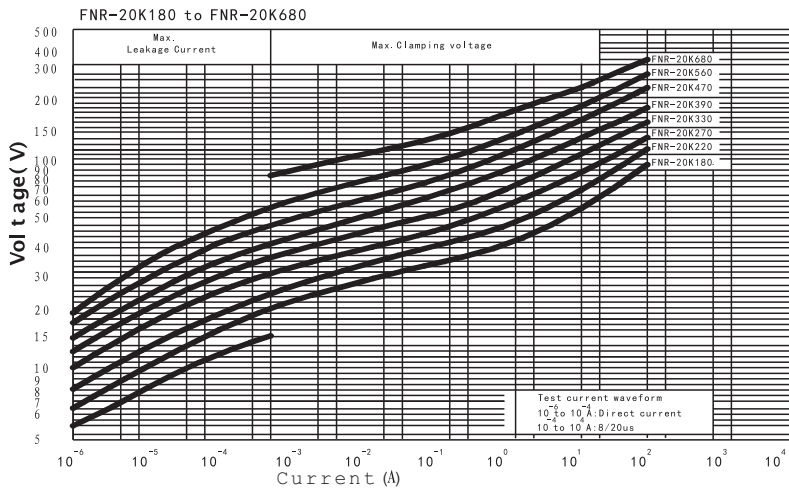
● 20K系列電性能 20K SERIES SPECIFICATION

| 型號規格<br>Part<br>Number | 最大允許<br>使用電壓<br>Maximum<br>operating<br>Voltage |           | 壓敏電壓<br>Varistor<br>Voltage | 最大限制電壓<br>Maximum<br>clamping Voltage |           | 最大通流容量<br>Maximum<br>Withstanding<br>Surge Current<br>(8/20 $\mu$ S) | 最大能量耐量<br>Maximum<br>Energy<br>(2ms) | 額定功率<br>Rated<br>Wattage | 靜態電容量<br>(參考值)<br>(1K Hz)<br>Capacitance<br>(Reference) |
|------------------------|---|-----------|-----------------------------|---------------------------------------|-----------|--|--------------------------------------|--------------------------|---|
|                        | AC<br>(V)                                       | DC<br>(V) | V1mA<br>(V)                 | Vc<br>(V)                             | IP<br>(A) | 1 Time<br>(A)  | (J)                                  | (W)                      | (PF)  |
| 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(108~132)                | 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             | 195   | 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             | 320   | 410       | 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(558~682)                | 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(738~902)                | 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   |

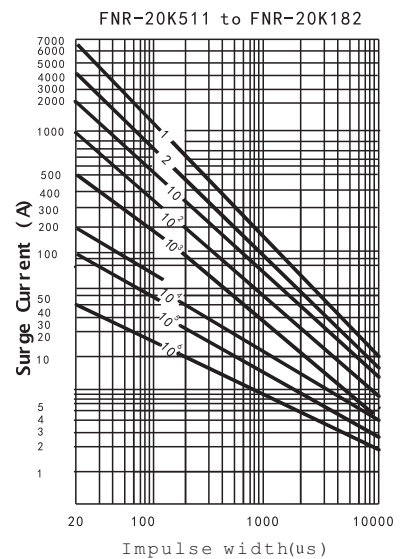
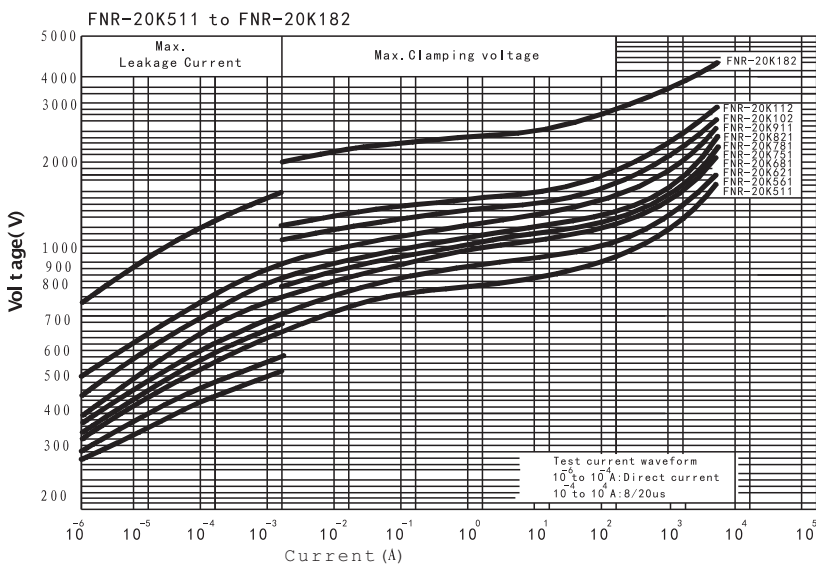
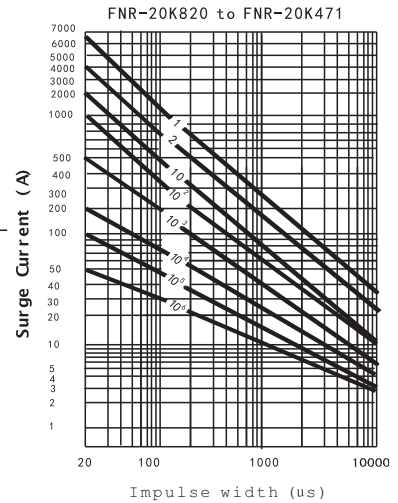
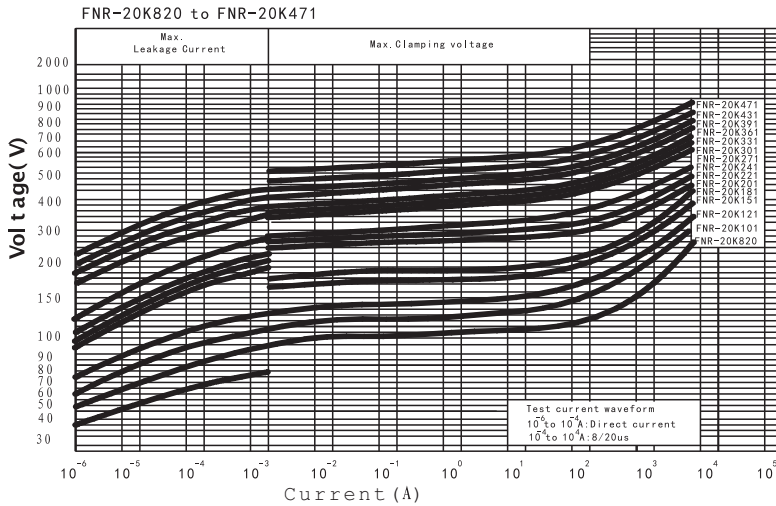
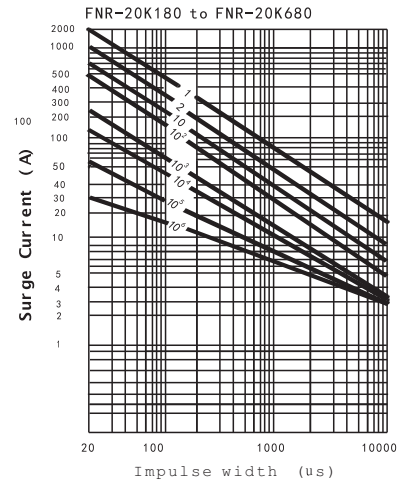
# 壓敏電阻器 ZINC OXIDE VARISTOR

## • 20K系列 20K Series

V-I Curve



Impluse Lifetime Ratings

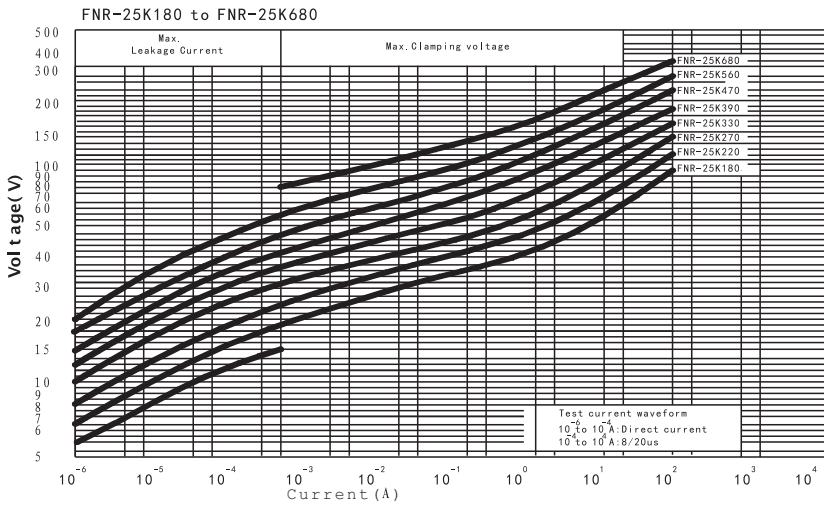


● 25K系列電性能 25K SERIES SPECIFICATION

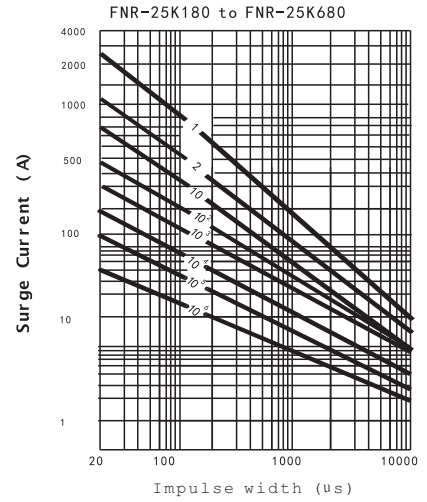
| 型號規格<br>Part<br>Number | 最大允許<br>使用電壓<br>Maximum<br>operating<br>Voltage |           | 壓敏電壓<br>Varistor<br>Voltage<br><br>V1mA<br>(V) | 最大限制電壓<br>Maximum<br>clamping Voltage |           | 最大通流容量<br>Maximum<br>Withstanding<br>Surge Current<br>(8/20 $\mu$ S) | 最大能量耐量<br>Maximum<br>Energy<br>(2ms) | 額定功率<br>Rated<br>Wattage | 靜態電容量<br>(參考值)<br>(1K Hz)<br>Capacitance<br>(Reference) |
|------------------------|---|-----------|--|---------------------------------------|-----------|--|--------------------------------------|--------------------------|---|
|                        | AC<br>(V)                                       | DC<br>(V) |  | Vc<br>(V)                             | IP<br>(A) |  |                                      |                          |   |
| FNR-25K470             | 30  | 38        | 47(42.3~51.7)                                  | 93                                    | 40        | 2500   | 15                                   | 1.0                      | 15000   |
| FNR-25K560             | 35  | 45        | 56(50.4~61.6)                                  | 110                                   | 40        | 2500   | 21                                   | 1.0                      | 13000   |
| FNR-25K680             | 40  | 56        | 68(61.2~74.8)                                  | 135                                   | 40        | 2500   | 23                                   | 1.0                      | 10000   |
| FNR-25K820             | 50  | 65        | 82(73.8~90.2)                                  | 156                                   | 150       | 20000  | 35                                   | 1.0                      | 8500  |
| FNR-25K101             | 60  | 85        | 100(90~110)                                    | 175                                   | 150       | 20000  | 32                                   | 1.0                      | 7000  |
| FNR-25K121             | 75  | 100       | 120(108~132)                                   | 210                                   | 150       | 20000  | 36                                   | 1.0                      | 6000  |
| FNR-25K151             | 95  | 125       | 150(135~165)                                   | 270                                   | 150       | 20000  | 39                                   | 1.0                      | 5000  |
| FNR-25K201             | 130   | 170       | 200(180~220)                                   | 360                                   | 150       | 20000  | 45                                   | 1.0                      | 3400  |
| FNR-25K221             | 140   | 180       | 220(198~242)                                   | 385                                   | 150       | 20000  | 52                                   | 1.0                      | 3200  |
| FNR-25K241             | 150   | 200       | 240(216~264)                                   | 420                                   | 150       | 20000  | 78                                   | 1.0                      | 3000  |
| FNR-25K271             | 175   | 225       | 270(243~297)                                   | 473                                   | 150       | 20000  | 117                                  | 1.0                      | 2200  |
| FNR-25K301             | 195   | 250       | 300(270~330)                                   | 500                                   | 150       | 20000  | 130                                  | 1.0                      | 2000  |
| FNR-25K331             | 210   | 275       | 330(297~363)                                   | 550                                   | 150       | 20000  | 140                                  | 1.0                      | 2000  |
| FNR-25K361             | 230   | 300       | 360(324~396)                                   | 595                                   | 150       | 20000  | 156                                  | 1.0                      | 1900  |
| FNR-25K391             | 250   | 320       | 390(351~429)                                   | 650                                   | 150       | 20000  | 195                                  | 1.0                      | 1800  |
| FNR-25K431             | 275   | 350       | 430(387~473)                                   | 710                                   | 150       | 20000  | 234                                  | 1.0                      | 1500  |
| FNR-25K471             | 300   | 385       | 470(423~517)                                   | 775                                   | 150       | 20000  | 286                                  | 1.0                      | 1500  |
| FNR-25K511             | 320   | 410       | 510(459~561)                                   | 840                                   | 150       | 20000  | 290                                  | 1.0                      | 1400  |
| FNR-25K561             | 350   | 455       | 560(504~616)                                   | 925                                   | 150       | 20000  | 300                                  | 1.0                      | 1350  |
| FNR-25K621             | 380   | 505       | 620(558~682)                                   | 1025                                  | 150       | 20000  | 338                                  | 1.0                      | 1300  |
| FNR-25K681             | 420   | 560       | 680(612~748)                                   | 1120                                  | 150       | 20000  | 390                                  | 1.0                      | 1250  |
| FNR-25K751             | 460   | 615       | 750(675~825)                                   | 1240                                  | 150       | 20000  | 455                                  | 1.0                      | 1200  |
| FNR-25K781             | 485   | 640       | 780(702~858)                                   | 1290                                  | 150       | 20000  | 481                                  | 1.0                      | 1200  |
| FNR-25K821             | 510   | 670       | 820(738~902)                                   | 1355                                  | 150       | 20000  | 520                                  | 1.0                      | 1100  |
| FNR-25K911             | 550   | 745       | 910(819~1001)                                  | 1500                                  | 150       | 20000  | 546                                  | 1.0                      | 1000  |
| FNR-25K102             | 625   | 825       | 1000(900~1100)                                 | 1650                                  | 150       | 20000  | 585                                  | 1.0                      | 800   |
| FNR-25K112             | 680   | 895       | 1100(990~1210)                                 | 1815                                  | 150       | 20000  | 650                                  | 1.0                      | 700   |
| FNR-25K182             | 1000  | 1465      | 1800(1620~1980)                                | 2970                                  | 150       | 20000  | 700                                  | 1.0                      | 600   |

• 25K系列 25K Series

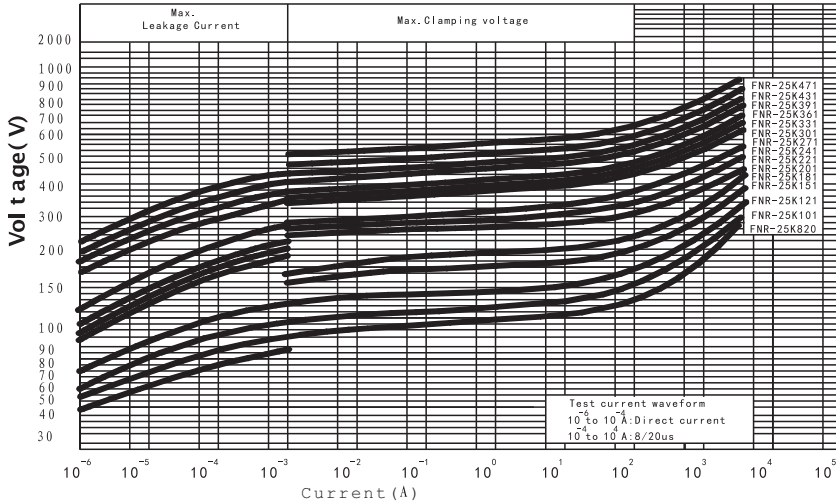
V-I Curve



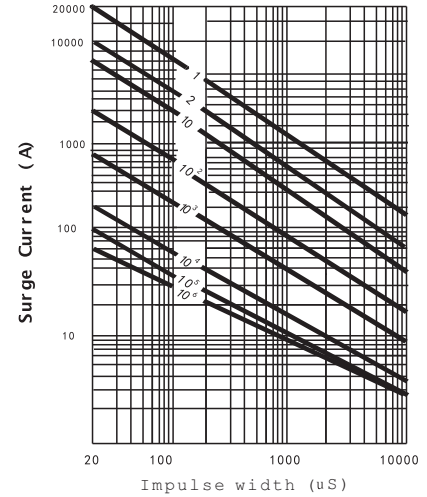
Impulse Lifetime Ratings



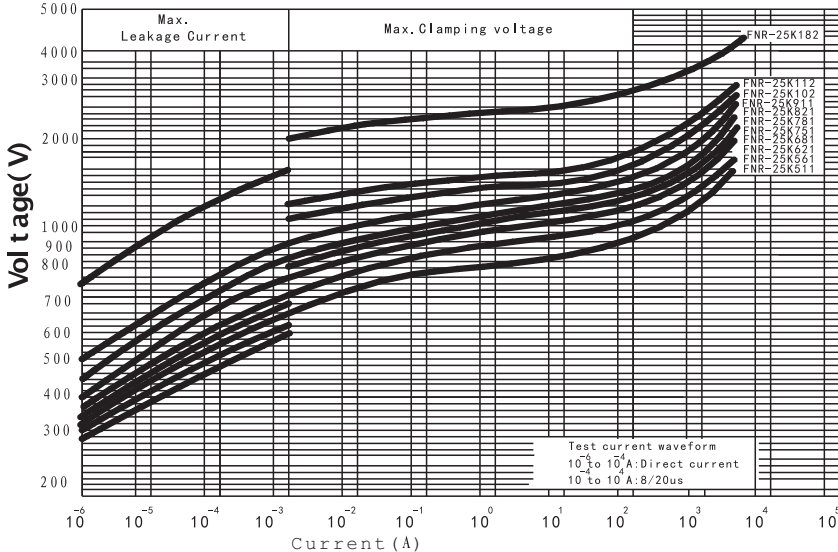
FNR-25K820 to FNR-25K471



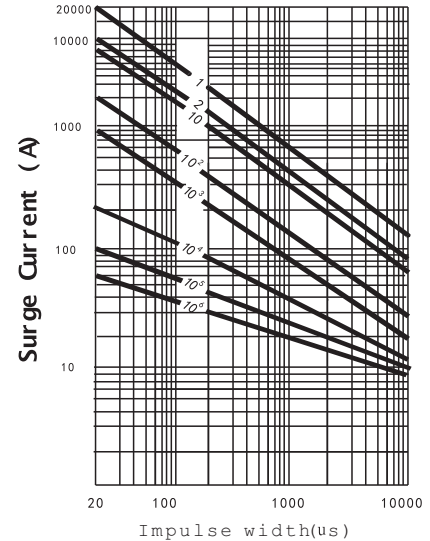
FNR-25K820 to FNR-25K471



FNR-25K511 to FNR-25K182



FNR-25K511 to FNR-25K182



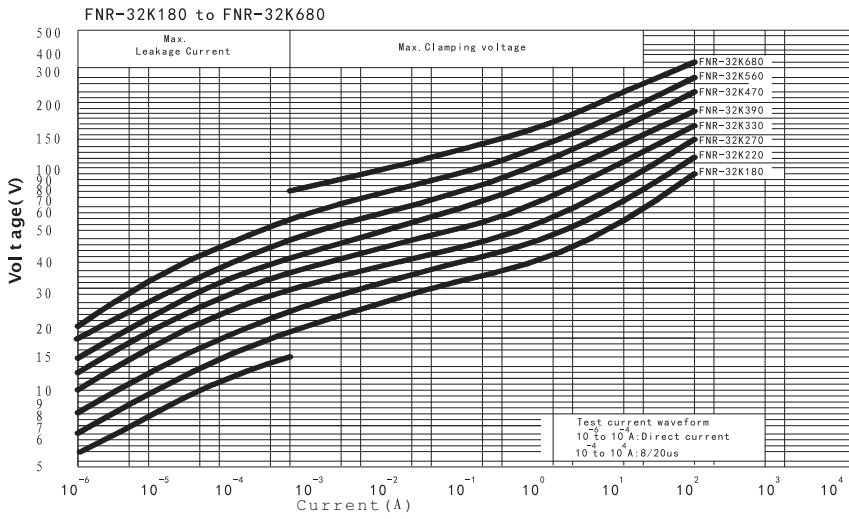


● 32K系列電性能 32K SERIES SPECIFICATION

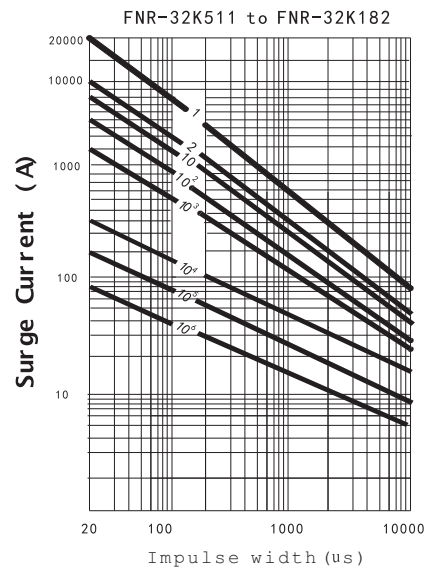
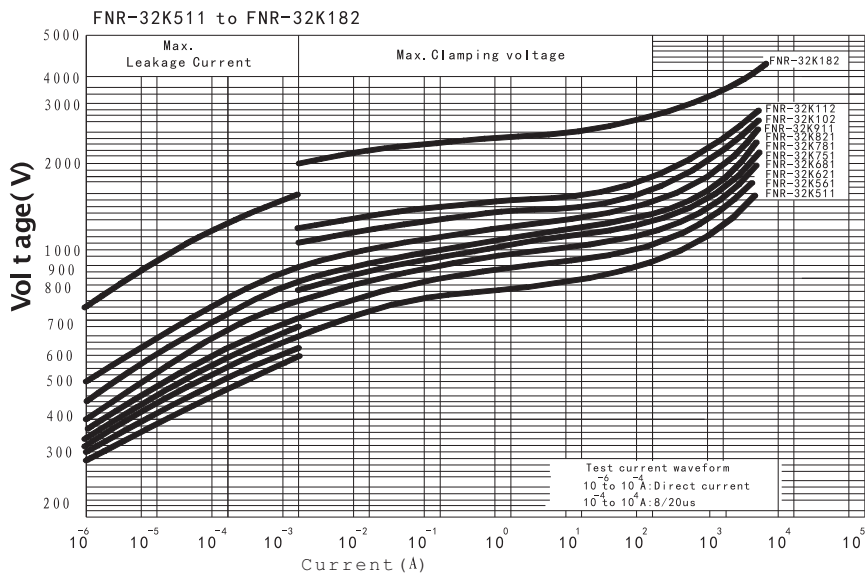
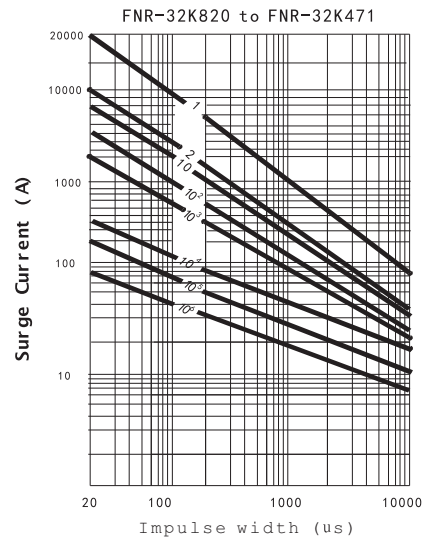
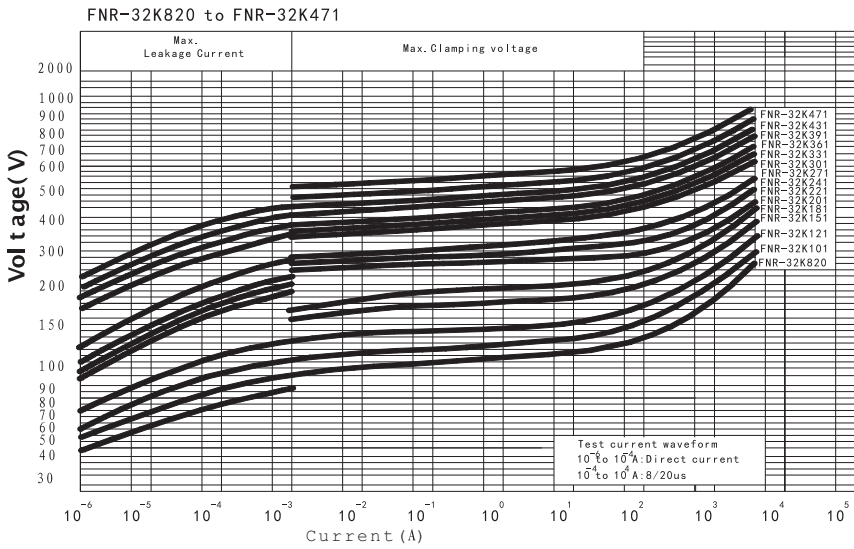
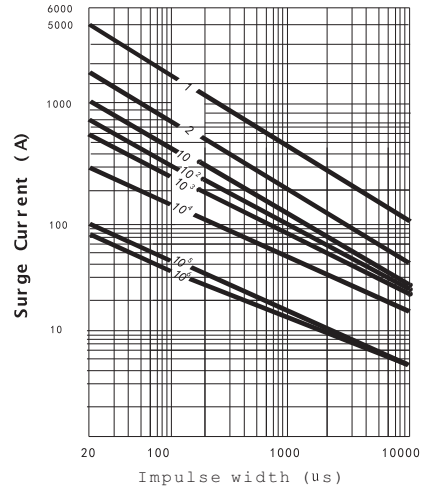
| 型號規格<br>Part<br>Number | 最大允許<br>使用電壓<br>Maximum<br>operating<br>Voltage |           | 壓敏電壓<br>Varistor<br>Voltage | 最大限制電壓<br>Maximum<br>clamping Voltage |           | 最大通流容量<br>Maximum<br>Withstanding<br>Surge Current<br>(8/20 $\mu$ S) | 最大能量耐量<br>Maximum<br>Energy<br>(2ms) | 額定功率<br>Rated<br>Wattage | 靜態電容量<br>(參考值)<br>(1K Hz)<br>Capacitance<br>(Reference) |
|------------------------|---|-----------|-----------------------------|---------------------------------------|-----------|--|--------------------------------------|--------------------------|---|
|                        | AC<br>(V)                                       | DC<br>(V) |                             | V1mA<br>(V)                           | VC<br>(V) |  |                                      |                          |   |
| FNR-32K470             | 30  | 38        | 47(42.3~51.7)               | 89                                    | 40        | 5000   | 25                                   | 1.2                      | 27000   |
| FNR-32K560             | 35  | 45        | 56(50.4~61.6)               | 106                                   | 40        | 5000   | 30                                   | 1.2                      | 23000   |
| FNR-32K680             | 40  | 56        | 68(61.2~74.8)               | 129                                   | 40        | 5000   | 32                                   | 1.2                      | 18000   |
| FNR-32K820             | 50  | 65        | 82(73.8~90.2)               | 156                                   | 200       | 20000  | 35                                   | 1.2                      | 15000   |
| FNR-32K101             | 60  | 85        | 100(90~110)                 | 190                                   | 200       | 20000  | 49                                   | 1.2                      | 13000   |
| FNR-32K121             | 75  | 100       | 120(108~132)                | 216                                   | 200       | 20000  | 54                                   | 1.2                      | 10000   |
| FNR-32K151             | 95  | 125       | 150(135~165)                | 270                                   | 200       | 20000  | 65                                   | 1.2                      | 9000  |
| FNR-32K201             | 130   | 170       | 200(180~220)                | 360                                   | 200       | 20000  | 91                                   | 1.2                      | 5500  |
| FNR-32K221             | 140   | 180       | 220(198~242)                | 385                                   | 200       | 20000  | 117                                  | 1.2                      | 5200  |
| FNR-32K241             | 150   | 200       | 240(216~264)                | 395                                   | 200       | 20000  | 156                                  | 1.2                      | 5000  |
| FNR-32K271             | 175   | 225       | 270(243~297)                | 455                                   | 200       | 20000  | 195                                  | 1.2                      | 4200  |
| FNR-32K301             | 195   | 250       | 300(270~330)                | 500                                   | 200       | 20000  | 200                                  | 1.2                      | 4000  |
| FNR-32K331             | 210   | 275       | 330(297~363)                | 550                                   | 200       | 20000  | 210                                  | 1.2                      | 4000  |
| FNR-32K361             | 230   | 300       | 360(324~396)                | 595                                   | 200       | 20000  | 234                                  | 1.2                      | 3500  |
| FNR-32K391             | 250   | 320       | 390(351~429)                | 650                                   | 200       | 20000  | 286                                  | 1.2                      | 3000  |
| FNR-32K431             | 275   | 350       | 430(387~473)                | 710                                   | 200       | 20000  | 338                                  | 1.2                      | 2500  |
| FNR-32K471             | 300   | 385       | 470(423~517)                | 775                                   | 200       | 20000  | 390                                  | 1.2                      | 2500  |
| FNR-32K511             | 320   | 410       | 510(459~561)                | 840                                   | 200       | 20000  | 400                                  | 1.2                      | 2400  |
| FNR-32K561             | 350   | 455       | 560(504~616)                | 925                                   | 200       | 20000  | 410                                  | 1.2                      | 2300  |
| FNR-32K621             | 385   | 505       | 620(558~682)                | 1025                                  | 200       | 20000  | 442                                  | 1.2                      | 2200  |
| FNR-32K681             | 420   | 560       | 680(612~748)                | 1120                                  | 200       | 20000  | 492                                  | 1.2                      | 2100  |
| FNR-32K751             | 460   | 615       | 750(675~825)                | 1240                                  | 200       | 20000  | 559                                  | 1.2                      | 2000  |
| FNR-32K781             | 485   | 640       | 780(702~858)                | 1290                                  | 200       | 20000  | 624                                  | 1.2                      | 1900  |
| FNR-32K821             | 510   | 670       | 820(738~902)                | 1355                                  | 200       | 20000  | 689                                  | 1.2                      | 1800  |
| FNR-32K911             | 550   | 745       | 910(819~1001)               | 1500                                  | 200       | 20000  | 754                                  | 1.2                      | 1700  |
| FNR-32K102             | 625   | 825       | 1000(900~1100)              | 1650                                  | 200       | 20000  | 819                                  | 1.2                      | 1000  |
| FNR-32K112             | 680   | 895       | 1100(990~1210)              | 1815                                  | 200       | 20000  | 910                                  | 1.2                      | 1000  |
| FNR-32K182             | 1000  | 1465      | 1800(1620~1980)             | 2970                                  | 200       | 20000  | 920                                  | 1.2                      | 800   |

• 32K系列 32K Series

V-I Curve



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



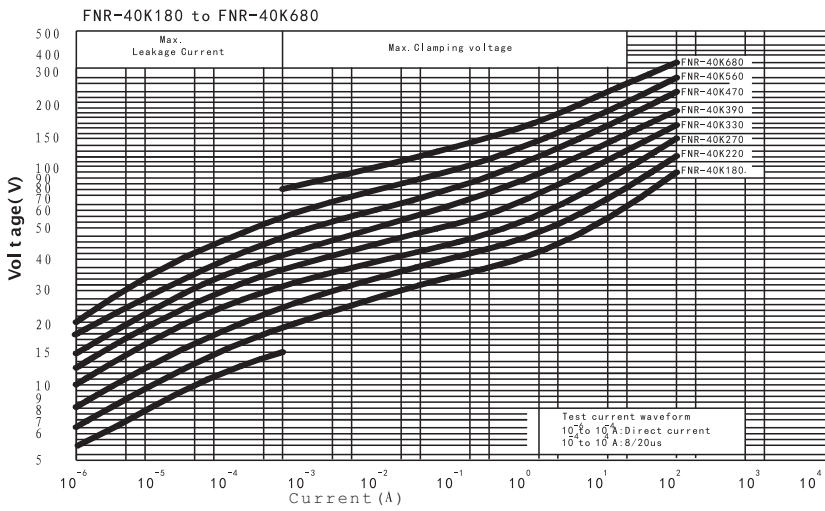
● 40K系列電性能 40K SERIES SPECIFICATION

| 型號規格<br>Part<br>Number | 最大允許<br>使用電壓<br>Maximum<br>operating<br>Voltage |           | 壓敏電壓<br>Varistor<br>Voltage | 最大限制電壓<br>Maximum<br>clamping Voltage |                       | 最大通流容量<br>Maximum<br>Withstanding<br>Surge Current<br>(8/20 $\mu$ S) | 最大能量耐量<br>Maximum<br>Energy<br>(2ms) | 額定功率<br>Rated<br>Wattage | 靜態電容量<br>(參考值)<br>1K Hz<br>Capacitance<br>(Reference) |
|------------------------|---|-----------|-----------------------------|---------------------------------------|-----------------------|--|--------------------------------------|--------------------------|---|
|                        | AC<br>(V)                                       | DC<br>(V) |                             | V1mA<br>(V)                           | V <sub>C</sub><br>(V) |  |                                      |                          |   |
| FNR-40K201             | 130   | 170       | 200(180~220)                | 360                                   | 250                   | 40000  | 208                                  | 1.4                      | 10000   |
| FNR-40K221             | 140   | 180       | 220(198~242)                | 385                                   | 250                   | 40000  | 234                                  | 1.4                      | 9500  |
| FNR-40K241             | 150   | 200       | 240(216~264)                | 395                                   | 250                   | 40000  | 286                                  | 1.4                      | 9000  |
| FNR-40K271             | 175   | 225       | 270(243~297)                | 455                                   | 250                   | 40000  | 308                                  | 1.4                      | 8000  |
| FNR-40K301             | 195   | 250       | 300(270~330)                | 500                                   | 250                   | 40000  | 320                                  | 1.4                      | 7000  |
| FNR-40K331             | 210   | 275       | 330(297~363)                | 550                                   | 250                   | 40000  | 330                                  | 1.4                      | 6500  |
| FNR-40K361             | 230   | 300       | 360(324~396)                | 595                                   | 250                   | 40000  | 390                                  | 1.4                      | 6000  |
| FNR-40K391             | 250   | 320       | 390(351~429)                | 650                                   | 250                   | 40000  | 442                                  | 1.4                      | 5000  |
| FNR-40K431             | 275   | 350       | 430(387~473)                | 710                                   | 250                   | 40000  | 494                                  | 1.4                      | 4500  |
| FNR-40K471             | 300   | 385       | 470(423~517)                | 775                                   | 250                   | 40000  | 546                                  | 1.4                      | 4000  |
| FNR-40K511             | 320   | 410       | 510(459~561)                | 840                                   | 250                   | 40000  | 585                                  | 1.4                      | 3800  |
| FNR-40K561             | 350   | 455       | 560(504~616)                | 925                                   | 250                   | 40000  | 585                                  | 1.4                      | 3700  |
| FNR-40K621             | 385   | 505       | 620(558~682)                | 1025                                  | 250                   | 40000  | 585                                  | 1.4                      | 3400  |
| FNR-40K681             | 420   | 560       | 680(612~748)                | 1120                                  | 250                   | 40000  | 650                                  | 1.4                      | 3000  |
| FNR-40K751             | 460   | 615       | 750(675~825)                | 1240                                  | 250                   | 40000  | 715                                  | 1.4                      | 2700  |
| FNR-40K781             | 485   | 640       | 780(702~858)                | 1290                                  | 250                   | 40000  | 780                                  | 1.4                      | 2500  |
| FNR-40K821             | 510   | 670       | 820(738~902)                | 1355                                  | 250                   | 40000  | 832                                  | 1.4                      | 2500  |
| FNR-40K911             | 550   | 745       | 910(819~1001)               | 1500                                  | 250                   | 40000  | 910                                  | 1.4                      | 2250  |
| FNR-40K102             | 625   | 825       | 1000(900~1100)              | 1650                                  | 250                   | 40000  | 1040                                 | 1.4                      | 2000  |
| FNR-40K112             | 680   | 895       | 1100(990~1210)              | 1815                                  | 250                   | 40000  | 1105                                 | 1.4                      | 1800  |
| FNR-40K182             | 1000  | 1465      | 1800(1620~1980)             | 2970                                  | 250                   | 40000  | 1300                                 | 1.4                      | 1600  |

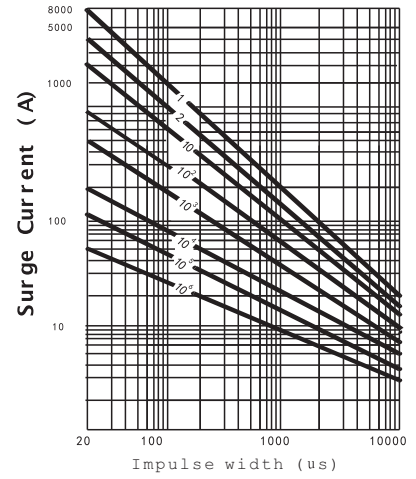
# 壓敏電阻器 ZINC OXIDE VARISTOR

- 40K系列 40K Series

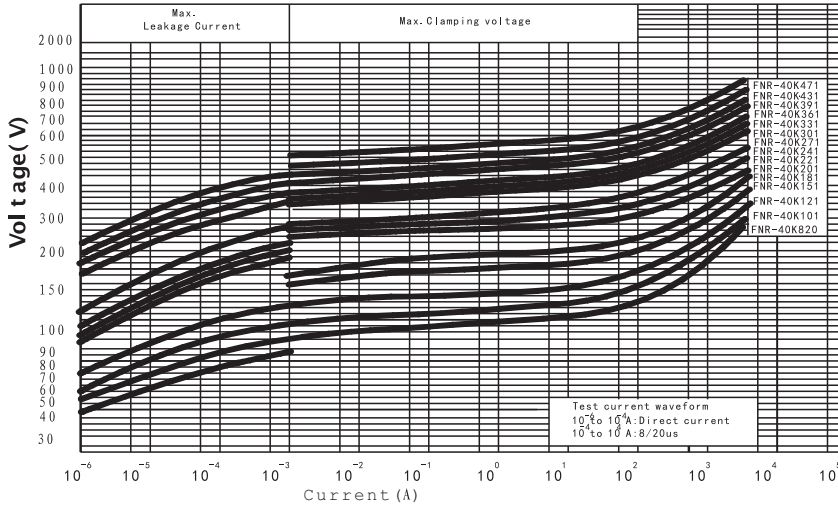
V-I Curve



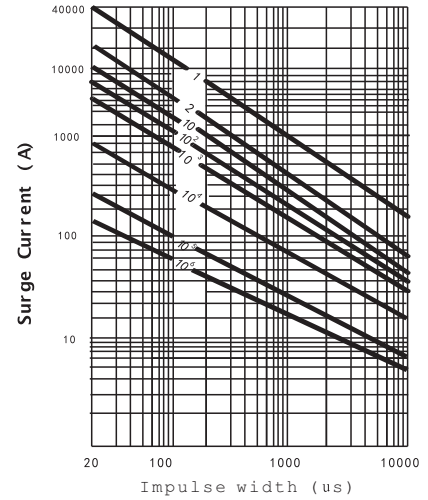
Impulse Lifetime Ratings  
FNR-40K180 to FNR-40K680



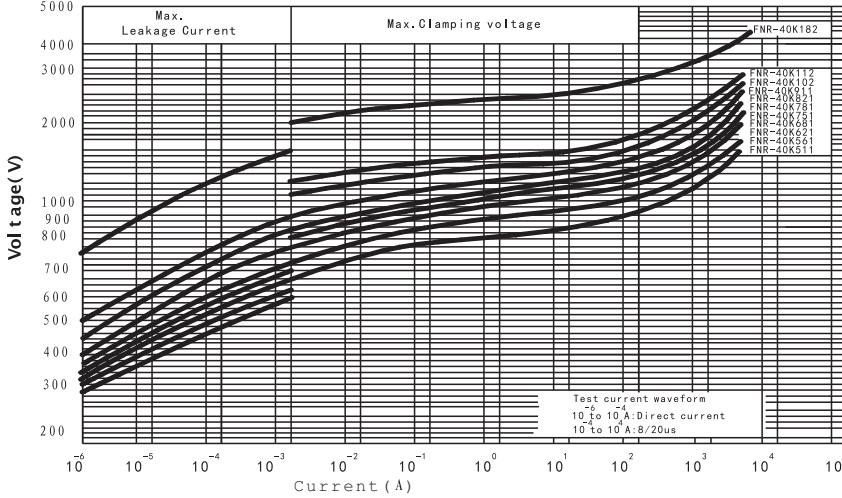
FNR-40K820 to FNR-40K471



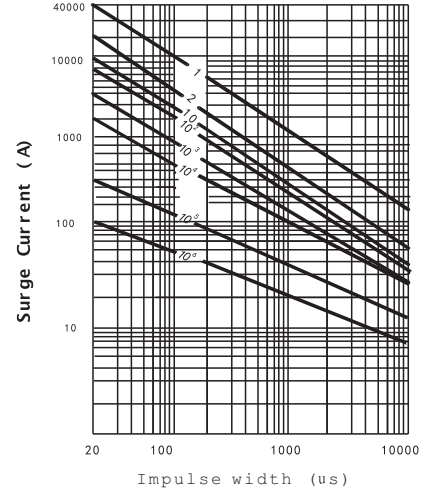
FNR-40K820 to FNR-40K471



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，壓敏電壓值應大於實際電路的電壓值，一般用以下公式計算：

$$V_v = a \cdot v / b \cdot c$$

a 電源電壓波動係數，一般取值1.2

v 在電路中壓敏電阻器兩端的電壓(交流時取電壓峰值,一般為交流標示有效值的1.414倍)

b 壓敏電壓誤差，一般取0.85

c 元件的老化係數，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.

$$V_v = a \cdot v / b \cdot c$$

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於產品的最大通流量，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

### C: 注意事項與保護方法

- 1) 建議將長期工作電壓控制在壓敏電阻最大允許使用電壓的80%以下。如果超過額定值，可能會使壓敏電阻老化、短路。
- 2) 用於吸收感性負載(L)的浪涌時，請根據浪涌的能量以及施加次數，選擇合適的壓敏電阻。
- 3) 浪涌的大小無法推定時，為防止額定值以上的過大浪涌導致壓敏電阻破裂，請在回路中插入與壓敏電阻串聯的保險絲或溫度保險絲。還需要考慮其周圍的環境，比如安裝時遠離可燃物體等。

### C: Warnings

- 1) It is recommended that the circuit voltage which is applied on a steady basis to be used at 80% or less of the max operating voltage. Exceeding the specification will cause deterioration, short-circuits and etc.
- 2) Select proper products according to the surge energy and the number of the impressions if the varistors are used to absorb the surge for an inductive loading.
- 3) Give consideration on the layout of the ambient parts not to be fixed close to combustible materials and to take measures on the circuits (fuses or thermo fuses) in case of varistors' short-circuit due to an excessive surge over the rating.

• 用途 APPLICATIONS

| MODEL NUMBER<br>5mm | MODEL NUMBER<br>7mm | MODEL NUMBER<br>10mm | MODEL NUMBER<br>14mm | MODEL NUMBER<br>20mm | 主要用途<br>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                             <ul style="list-style-type: none"> <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> </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<br>5mm         | MODEL NUMBER<br>7mm                       | MODEL NUMBER<br>10mm                      | MODEL NUMBER<br>14mm                      | MODEL NUMBER<br>20mm                      | 主要用途<br>Recommended Applications  |
|-----------------------------|---|---|---|---|---|
| FNR-05 K431<br>FNR -05 K471 | FNR-07 K431<br>FNR-07 K471                | FNR-10 K431<br>FNR-10 K471                | FNR-14 K431<br>FNR-14 K471                | FNR-20 K431<br>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<br>FNR-07 K621<br>FNR-07 K681 | FNR-10 K561<br>FNR-10 K621<br>FNR-10 K681 | FNR-14 K561<br>FNR-14 K621<br>FNR-14 K681 | FNR-20 K561<br>FNR-20 K621<br>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<br>FNR-10 K781<br>FNR-10 K821 | FNR-14 K751<br>FNR-14 K781<br>FNR-14 K821 | FNR-20 K751<br>FNR-20 K781<br>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<br>FNR-10 K112                | FNR-14 K102<br>FNR-14 K112                | FNR-20 K102<br>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 | 501 to 2000 | 2001 to 6000 |
|--|-----------|-------------|--------------|
| Fuse rating                              | 3A        | 5A          | 10A          |

● 建議儲存方法 Storage methods

元器件必須儲存在清潔、通風、無腐蝕性氣體的倉庫內；除另有規定外，倉庫的溫度和相對濕度必須滿足如下要求：溫度：5~30℃；相對濕度：20%~75%。

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: Temperature: 5 ~ 30 ℃; Relative humidity:20%~75%.

## 壓敏電阻器

## ZINC OXIDE VARISTOR

### ● 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<br>Item  | 測試方法<br>Test method   | 性能<br>Performance   |
|---|---|---|
| 標稱壓敏電壓<br>Nominal varistor voltage                    | 在規定電流條件(DC 1mA, 僅 $\phi 5$ 產品為DC 0.1mA)下的兩端電壓值定為標稱壓敏電壓。<br>The voltage between two terminals with the specified measuring current (DC 1mA, only $\phi 5$ for DC 0.1mA) applied is called $V_V$ .            | 公差: $\pm 10\%$<br>Tolerance: $\pm 10\%$   |
| 漏電流<br>Leakage current                                | 在壓敏電阻兩端施加實測壓敏電壓值的0.83倍電壓時, 通過壓敏電阻的直流電流值。<br>The direct current flowing from the Varistor at $0.83V_V$ .   | 低壓產品(壓敏電壓不於68V)不於 $40\mu A$<br>中高壓產品(壓敏電壓不於82V)不於 $13\mu A$<br>$V \leq 68V: I_L \leq 40\mu A$ $V > 82V: I_L \leq 13\mu A$ |
| 限制電壓<br>Clamping Voltage                              | 在8/20 $\mu S$ 波形下施加規定電流后壓敏電阻器兩端的電壓峰值。<br>The maximum voltage between two terminals with the specified standard impulse current(8/20 $\mu S$ ) applied.  | 請看電性能參數表格<br>Please see electrical characteristics  |
| 最大通流容量<br>Max peak current                            | 施加1次8/20 $\mu s$ 的標準衝擊電流后, 壓敏電阻電壓的變化率在 $\pm 10\%$ 以內時的最大電流值。<br>The maximum peak current within the varistor voltage change rate of $\pm 10\%$ , when a single standard impulse of 8/20 $\mu s$ is applied. | 無可見損傷;<br>壓敏電壓變化率在 $\pm 10\%$ 內。<br>No visible damage;<br>$-10\% \leq \Delta V/V \leq 10\%$                               |
| 能量耐量<br>Maximum energy                                | 施加1次2ms的方波后, 壓敏電阻電壓的變化率在 $\pm 10\%$ 以內時的最大能量。<br>The maximum energy within the varistor voltage change rate of $\pm 10\%$ when a single impulse of 2ms is applied.  | 無可見損傷;<br>壓敏電壓變化率在 $\pm 10\%$ 內。<br>No visible damage;<br>$-10\% \leq \Delta V/V \leq 10\%$                               |
| 電壓溫度係數<br>Temperature coefficient of varistor Voltage | 在規定溫度下壓敏電壓的變化值。<br>Varistor Voltage changed percentage on Specified temperature.  | $TCR \leq \pm 0.05\% / ^\circ C$  |
| 靜態電容量<br>Capacitance                                  | 條件: 1KHz, 1V<br>Condition: 1KHz, 1V   | 請看電性能參數表格<br>Please see electrical characteristics  |
| 耐電壓<br>Voltage proof                                  | 條件: 2500VAC<br>引出端與外殼間1min.<br>Condition: 2500VAC<br>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。<br>Requirement:<br>No visible damage;<br>No breakdown or flashover.                                 |
| 絕緣電阻<br>Insulation resistance                         | 條件: 500VDC<br>Condition: 500VDC   | $\geq 100 M\Omega$  |
| 脈衝壽命<br>Life against surge current cycles             | 在8/20 $\mu S$ 波形下單方向施加規定脈衝電流 $10^4$ 次, 間隔10s<br>$10^4$ surge currents (8/20 $\mu s$ ), unipolar, interval 10 s, amplitude corresponding to derating curve for $10^4$ impulses at 20 $\mu s$                 | 要求: 外觀無可見損傷;<br>壓敏電壓變化率在 $\pm 10\%$ 內。<br>Requirement: No visible damage;<br>$-10\% \leq \Delta V/V \leq 10\%$            |



● 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<br>Lead terminal tensile strength       | 條件: 拉力: $\phi 0.6$ 、 $0.8\text{mm}$ : 10N, $\phi 1.0\text{mm}$ : 20N; $10 \pm 10\text{S}$<br>彎曲: $\phi 0.6$ 、 $0.8\text{mm}$ : 5N, $\phi 1.0\text{mm}$ : 10N; $90^\circ$ , 二次<br>Condition:<br>Force: $\phi 0.6$ 、 $0.8\text{mm}$ : 10N, $\phi 1.0\text{mm}$ : 20N; $10 \pm 1\text{S}$<br>Bend: $\phi 0.6$ 、 $0.8\text{mm}$ : 10N, $\phi 1.0\text{mm}$ : 20N; $90^\circ$ , two times | 要求: 無可見損傷。<br>Requirement: No visible damage   |
| 可焊性<br>Solder ability                         | 條件: 試驗Tb,方法1;<br>槽焊法。距本體 $2 \pm 0.5\text{mm}$<br>$235 \pm 5^\circ\text{C}$ ; $2 \pm 0.5\text{s}$<br>Condition: Test Tb, Method 1;<br>Solder in trough method. $2 \pm 0.5\text{mm}$ from the body of the specimen<br>$T = 235 \pm 5^\circ\text{C}$ ; $t = 2 \pm 0.5\text{s}$  | 要求: 焊料在2S內流合。<br>Requirement: Uniformly tinned in 2s.  |
| 標志耐溶劑<br>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。<br>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。<br>壓敏電壓變化率 $\leq \pm 5\%$<br>Requirement: Legible marking.<br>$-5\% \leq \Delta V/V \leq 5\%$  |
| 耐焊接熱<br>Resistance to soldering heat          | 條件: 試驗Tb,方法1;<br>槽焊法。距本體 $2 \pm 0.5\text{mm}$<br>$260 \pm 5^\circ\text{C}$ ; $5 \pm 1\text{s}$ ;<br>Condition: Test Tb, Method 1;<br>Solder in trough method; $2 \pm 0.5\text{mm}$ from the body of the specimen<br>$T = 260 \pm 5^\circ\text{C}$ ; $t = 5 \pm 1\text{s}$  | 要求: 無可見損傷<br>壓敏電壓變化率 $\leq \pm 5\%$<br>漏電流 $\leq 20 \mu\text{A}$ (低壓產品 $\leq 40 \mu\text{A}$ )<br>Requirement: No visible damage<br>$-5\% \leq \Delta V/V \leq 5\%$<br>$I_L \leq 20 \mu\text{A}$ ( $V \leq 68\text{V}$ ; $I_L \leq 40 \mu\text{A}$ ) |
| 振動<br>Vibration                               | 條件: 正弦波;<br>$10\text{Hz} \sim 55\text{Hz} \sim 10\text{Hz}$<br>一次掃描時間: 1 min<br>振幅: $0.75\text{mm}$ 或 $98\text{m/s}^2$ (取較小者)<br>3個方向, 共6h。<br>Condition: sine wave;<br>$10\text{Hz} \sim 55\text{Hz} \sim 10\text{Hz}$<br>Scanning time once: 1 min<br>Amplitude: $0.75\text{mm}$ or $98\text{m/s}^2$ (which is the less)<br>3 direction, total 6h.                                 | 要求: 無可見損傷<br>壓敏電壓變化率 $\leq \pm 5\%$<br>Requirement: No visible damage<br>$-5\% \leq \Delta V/V \leq 5\%$   |
| 碰撞<br>Impact                                  | 條件: $390\text{m/S}^2$ 6ms<br>三個方向, 共4000次。<br>Condition: $390\text{m/S}^2$ 6ms<br>3 Direction, total 4000 times.   | 要求: 無可見損傷<br>壓敏電壓變化率 $\leq \pm 5\%$<br>Requirement: No visible damage<br>$-5\% \leq \Delta V/V \leq 5\%$   |

● 氣候試驗 CLIMATIC ENVIRONMENT TEST

| 項目  | 試驗方法及測試設備  | 要求   |
|---|--|--|
| 溫度快速變化<br>Rapid change of temperature           | 條件: $\theta A: -40 \pm 2^{\circ}C$ ;<br>$\theta B: 85 \pm 2^{\circ}C$ ;<br>T1:30min t2:2min~3min<br>循環次數: 5次<br>Condition: $\theta A: -40 \pm 2^{\circ}C$ ;<br>$\theta B: 85 \pm 2^{\circ}C$ ;<br>T1:30min t2:2min~3min<br>Cycle times:5   | 要求: 無可見損傷<br>壓敏電壓變化率 $\leq \pm 5\%$<br>Requirement: No visible damage<br>$-5\% \leq \Delta V/V \leq 5\%$   |
| 高溫負荷<br>Endurance at upper category temperature | 條件: $85 \pm 2^{\circ}C$<br>施加電壓: 最大連續工作直流電壓<br>負荷方式: 連續<br>周期測量時間: 500h<br>累計試驗時間: 1000h<br>Condition: $85 \pm 2^{\circ}C$ ,<br>Inflicted voltage: 505VDC<br>Burthen quomodo: continuous;<br>Circular measure time: 500h<br>Total testing time: 1000h  | 要求: 無可見損傷、標志清晰<br>壓敏電壓變化率 $\leq \pm 10\%$<br>Requirement: No visible damage, and legible marking;<br>$-10\% \leq \Delta V/V \leq 10\%$   |
| 高溫貯存<br>Endurance at upper category temperature | 條件: $125 \pm 2^{\circ}C$<br>周期測量時間: 500h<br>恢復時間: 1000h<br>Conidition: $125 \pm 2^{\circ}C$<br>Circular measure time: 500h<br>Total testing time: 1000h  | 要求: 無可見損傷<br>壓敏電壓變化率 $\leq \pm 5\%$<br>Requirement: No visible damage<br>$-5\% \leq \Delta V/V \leq 5\%$   |
| 氣候順序<br>Climatic sequence                       | 條件: 干熱: $85 \pm 2^{\circ}C$ , 16h<br>循環濕熱: Db, 一個循環, 24h, $55^{\circ}C$ 級;<br>低溫: $-40 \pm 3^{\circ}C$ , 2h<br>循環濕熱: Db, 一個循環, 24h, $55^{\circ}C$ 級;<br>Condition: Dry and heat: $85 \pm 2^{\circ}C$ , 16h<br>Low temperature $-40 \pm 3^{\circ}C$ , 2h<br>Circular wet and heat: Db, a cycle, 24h, $55^{\circ}C$ level; | 要求: 無可見損傷<br>壓敏電壓變化率 $\leq \pm 5\%$<br>Requirement: No visible damage<br>$-5\% \leq \Delta V/V \leq 5\%$   |
| 穩態濕熱<br>Steady state and damp heat              | 條件: 溫度: $40 \pm 2^{\circ}C$ ; 濕度: 90~95%<br>一半樣品不施加電壓, 另一半樣品施加最大連續直流電壓的10%<br>周期測量時間: 500h<br>累計試驗時間: 1000h<br>Half of samples without voltage, others with 10 percent of the maximum continuous DC voltage<br>Circular measure time: 500h<br>Total testing time: 1000h  | 要求: 外觀無可見損傷<br>限制電壓變化率 $\leq \pm 20\%$<br>壓敏電壓變化率 $\leq \pm 10\%$<br>Requirement: No visible damage.<br>$-20\% \leq \Delta V_c/V_c \leq 20\%$<br>$-10\% \leq \Delta V/V \leq 10\%$ |

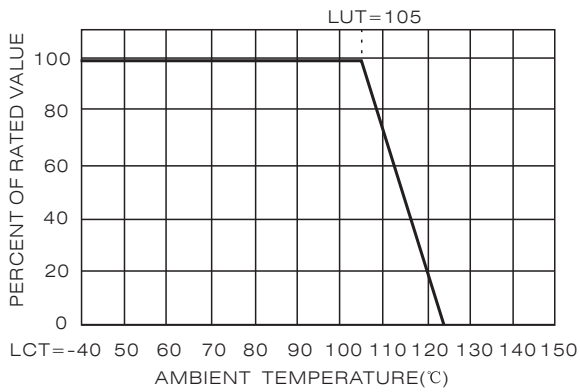
注: 以上要求測試電性能的項目, 應試驗后在標準條件下放置1~2小時后測試。

Note: When electrical test above are required, measurement shall be made after 1 or 2 hours of recovery under the standard condition.

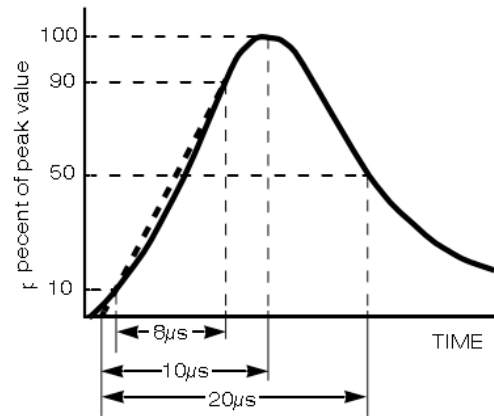
• 阻燃試驗 Fire hazard testing

| 項目                   | 試驗方法及測試設備  | 要求  |
|----------------------|--|---|
| 着火 危險<br>Fire hazard | 條件: 火焰施加點: 電阻器側面<br>火焰種類: 針焰, $12 \pm 1\text{mm}$<br>施加火焰時間: 15s<br>次數: 3次<br><br>Condition: Position: ;<br>Species: needle flame, $12 \pm 1\text{mm}$ ;<br>T: 15s<br>Times: 3 | 要求: 殘焰時間: 第一次、第二次不超過15s;<br>第三次不超過30s; 滴落物不引燃墊紙<br><br>Requirement: Flames or glowing of the specimen and the layer below extinguish in 15s for first and second time, 30s for the third after removal of the flame;<br>No ignition of the wrapping tissue. |

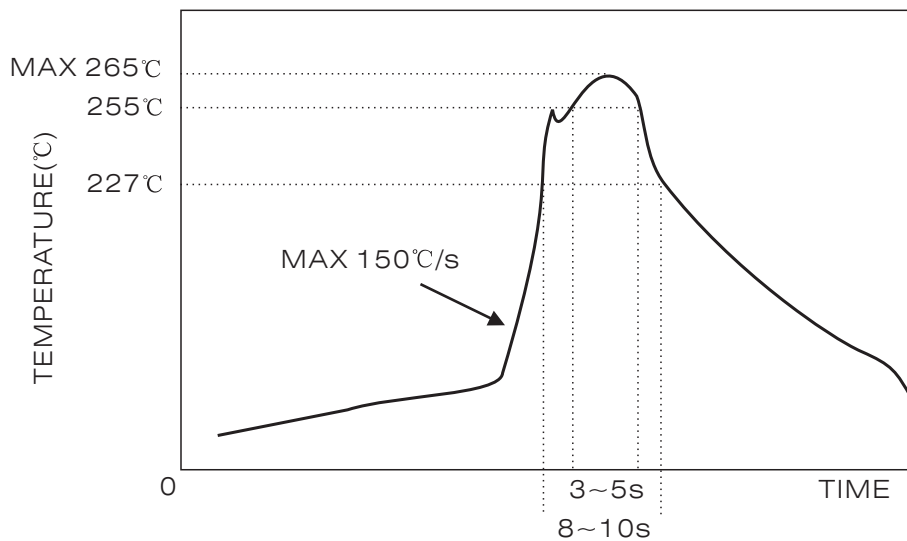
• 溫度降額曲綫 Derating Curve



• 標準衝擊波形 Peak Pulse Current Test Waveform



• 推薦波峰焊接曲綫 Recommended Wave Soldering Curve



## 壓敏電阻器

## ZINC OXIDE VARISTOR

### • 高能產品

高能系列產品提供高通流容量、高重複次數通流容量、高負荷脈衝容量、高能量耐量等不同性能提升，用于要求具備高峯值浪涌額定電流和高能量吸收能力的應用。

High-energy series is designed for higher peak current rating, higher repetitive surge ratings, high combination pulse rating or higher repetitive surge ratings, higher energy absorption capability, is primarily intended for use in applications requiring high peak surge current ratings and high energy absorption capability.

### • 電性能 Specifications

| 型號系列<br>Part Series | 壓敏電壓<br>Varistor Voltage | 最大通流容量<br>Maximum Withstanding Surge Current (8/20 μ S) |                |                  | 最大復合脈衝容量<br>Maximum Peak Current(8/20 μ S, combination pulse) | 最大能量耐量<br>Maximum Energy ( 2ms)  |
|---------------------|--------------------------|---|----------------|------------------|---|--|
|                     | V <sub>V</sub><br>(V)    | 1 Time<br>(KA)  | 2 Time<br>(KA) | 10 Times<br>(KA) | 15 Times<br>(A)   | (J)  |
| 05K                 | 18~68                    | 0.2   | 0.1            | 0.025            | ---   | 按通用系列<br>提高30%<br>1.3 times<br>in comparison<br>with the<br>general series |
| 05K                 | 82~560                   | 0.8   | 0.4            | 0.1              | ---   |  |
| 07K                 | 18~68                    | 0.5   | 0.25           | 0.05             | ---   |  |
| 07K                 | 82~680                   | 1.8   | 1.2            | 0.6              | ---   |  |
| 10K                 | 18~68                    | 1   | 0.5            | 0.18             | ---   |  |
| 10K                 | 82~1100                  | 3.5   | 2.5            | 0.5~1            | 4.0KV/2.0KA   |  |
| 14K                 | 18~68                    | 2   | 1              | 0.35             | ---   |  |
| 14K                 | 82~1100                  | 6.5 / 8   | 4.5            | 1 ~ 3            | 6.0KV/3.0KA   |  |
| 20K                 | 18~68                    | 4   | 2              | 0.8              | ---   |  |
| 20K                 | 82~750                   | 10  | 6.5            | 3 ~ 5            | 6.0KV/3.0KA   |  |
| 20K                 | 820~1100                 | 10  | 6.5            | 3 ~ 5            | 8.0KV/4.0KA   |  |

注：1.未列出的參數與通用系列相同 2.請聯系工程師獲取并確定參數。

Note: 1. Specifications not listed are the same as the general series; 2. Please contact the engineer to get and determine the specifications.

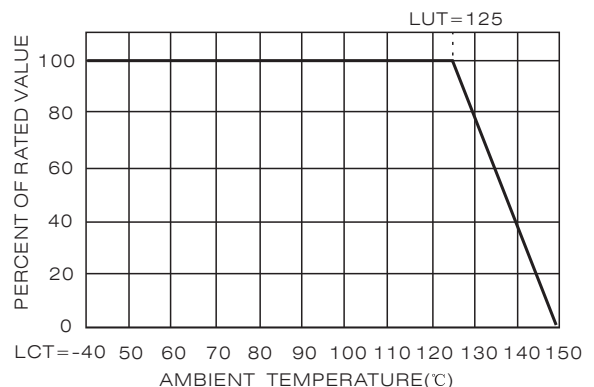
### • 高工作溫度產品

工作溫度可達125℃，適用於持續高溫工作的場合。

Operating temperature up to 125℃(ambient), it is designed for the applications requiring high temperature.

| 型號系列<br>Part Series | 壓敏電壓<br>Varistor Voltage | 工作溫度<br>Operating temperature |
|---------------------|--------------------------|-------------------------------|
| 07K series          | 82~680                   | -40~125℃                      |
| 10K series          | 82~1100                  | -40~125℃                      |
| 14K series          | 82~1100                  | -40~125℃                      |
| 20K series          | 82~1100                  | -40~125℃                      |

### • 溫度降額曲線 Derating Curve



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