



ZINC OXIDE VARISTOR

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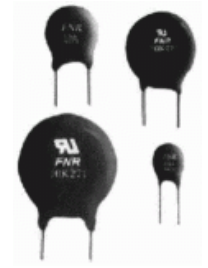
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# ZINC OXIDE VARISTOR

## FEATURES

- Widely voltage range 18v-1.8kv
- Fast response to the rapidly increase Voltage (Mu sec.)
- Excellent non-linearity voltage
- Symmetric V-1 characteristics
- Great withstanding surge current (2000A/cm2)

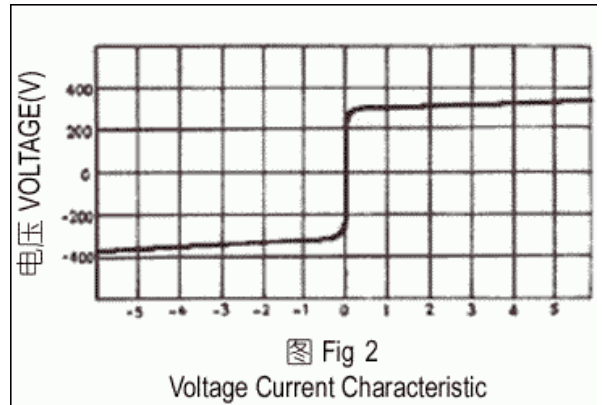
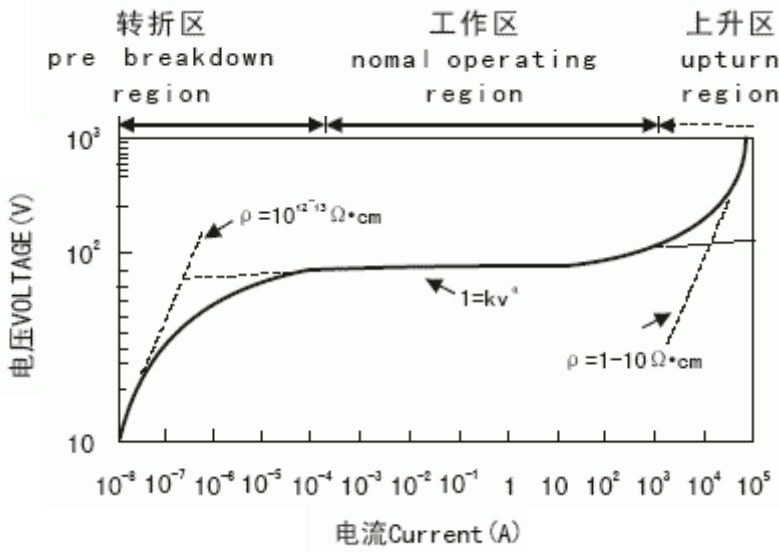


## HOW TO ORDER

|   |    |    |   |     |   |
|---|----|----|---|-----|---|
| F | NR | 05 | K | 180 | T |
|---|----|----|---|-----|---|

| Series Code | Non-Linear Resistor | Element Diameter (mm) |    | Tolerance |      | Varistor (V)           | bulk dimensions |             |
|-------------|---------------------|-----------------------|----|-----------|------|------------------------|-----------------|-------------|
| F           | NR                  | 05                    | 5  | K         | ±10% | 180=18x10 <sup>0</sup> | (leave blank)   | Bulk        |
|             |                     | 40                    | 40 | M         | ±20% | 181=18x10 <sup>1</sup> | T               | Tape & Reel |
|             |                     |                       |    |           |      | 182=18x10 <sup>2</sup> |                 |             |

## CHARACTERISTICS



## TEST CONDITION

| Item                           | Test Methods   |
|--------------------------------|--|
| Operating Temperature Range    | -40°C~+85°C  |
| Storage Temperature Range      | -40°C~+125°C   |
| Varistor Voltage               | Element Diameter<5mm Test Current 0.1mA(DC)                            |
| Max Clamping Voltage           | Element Diameter≥5mm Test Current 1mA(DC)<br>Current Wave shape 8x20μs |
| Energy                         | Current input of Rectangular Wave                                      |
| Max Withstanding Surge Current | Current Wave shape 8x20μs  |



# ZINC OXIDE VARISTOR

## ZINC OXIDE VARISTOR SELECTION (ONLY REFERENCE)

Varistor voltage

Varistor voltage should be more than the operating voltage in over-voltage protective circuit The formula is shown as the following:

$V1mA+a.v/b.c$

a-power Voltage ripple coefficient usually take 1.2

v-DC Voltage (significant value only AC power)

b-Tolerance usually take 0.85

c-Ageing coefficient usually take 0.9

The calibrated Value is 1.5 times of DC voltage, the face value should be  $\sqrt{2}$  times of the calibrated value because of the peak voltage in alternating current power.

Withstanding surge current

In general, withstanding surge current is max. Pulse current value which determined by test conditions such as wave-shape, shock times and interval time etc, the change ratio of Varistor Voltage should be less than  $\pm 10\%$  of the initial Value. The shock time is the function of wave - shape, amplitude and interval 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 absorbed by the varistor should be less than max. Withstanding surge current.

### GENERAL TYPE DIMENSIONS

General type is widely used in surge protection for IC. diode. trial semiconductor, thyristor, consumer, military industry telecommunication measuring & controlling instrument etc.

|    | (V) Varistor Voltage | D Max | D $\pm 0.1$ | W $\pm 1.0$ | H Max | T Max |  |
|----|----------------------|-------|-------------|-------------|-------|-------|--|
| 05 | 18~ 82               | 7.0   | 0.6         | 5.0         | 10.0  | 3.5   |  |
|    | 100~ 470             | 7.5   | 0.6         | 5.0         | 10.0  | 6.0   |  |
| 07 | 18~ 470              | 9.0   | 0.6         | 5.0         | 12.0  | 6.0   |  |
| 10 | 18~ 330              | 13.5  | 0.8         | 7.5         | 16.5  | 5.4   |  |
|    | 360~ 1100            | 14.0  | 0.8         | 7.5         | 17.0  | 8.5   |  |
| 14 | 18~ 330              | 17.0  | 0.8         | 7.5         | 20.0  | 5.4   |  |
|    | 360~ 1100            | 17.5  | 0.8         | 7.5         | 20.5  | 8.5   |  |
|    | 180                  | 25.0  | 0.8         | 15.0        | 30.0  | 12.0  |  |
| 20 | 18~ 330              | 23.0  | 1.0         | 10.0        | 27.0  | 5.5   |  |
|    | 360~ 1100            | 24.0  | 1.0         | 10.0        | 28.0  | 9.0   |  |
|    | 1800                 | 25.0  | 1.0         | 15.0        | 30.0  | 12.0  |  |

### LIGHTNING ARRESTER TYPE

Lightning arrester type is ideal for semiconductor, signal relay, telecommunication, calibrating equipment, communication inter-medium station, distribution board, surge absorption and lightning-protection of all sorts of electric equipment because of the properties, with the Great withstanding surge current, wide voltage, quick responding speed and low residual voltage etc.

| Part No. | Dimensions(mm) |    |    |     |  |
|----------|----------------|----|----|-----|--|
|          | D              | T  | W  | d   |  |
| FNR-25   | 30             | 12 | 15 | 1.5 |  |
| FNR-32   | 38             | 13 | 18 | 1.5 |  |
| FNR-40   | 45             | 13 | 20 | 1.5 |  |



# ZINC OXIDE VARISTOR

## GENERAL TYPE PRODUCTS SERIES

| Part No.   | Varistor Voltage | Maximum Operating Voltage |       | Maximum Clamping Voltage |       | Maximum Withstanding Surge Current(8x20us) |          | Maximum Energy(J) |             | Maximum Rated Wattage | Capacitance (Reference) 1kHz |
|------------|------------------|---------------------------|-------|--------------------------|-------|--|----------|-------------------|-------------|-----------------------|------------------------------|
|            | V(v)             | AC (v)                    | DC(v) | VC(v)                    | IP(A) | 2Time(A)                                   | 1Time(A) | 2ms               | 10/1000(us) | (W)                   | (PF)                         |
| FNR-05K180 | 18               | 11                        | 14    | 40                       | 1     | 50   | 100      | 0.3               | 0.4         | 0.01                  | 1600                         |
| FNR-07K180 | 18               | 11                        | 14    | 36                       | 2.5   | 125  | 250      | 0.8               | 0.9         | 0.02                  | 3500                         |
| FNR-10K180 | 18               | 11                        | 14    | 36                       | 5     | 250  | 500      | 1.5               | 2.1         | 0.05                  | 7500                         |
| FNR-14K180 | 18               | 11                        | 14    | 36                       | 10    | 500  | 1000     | 3.5               | 4.0         | 0.1                   | 18000                        |
| FNR-20K180 | 18               | 11                        | 14    | 36                       | 20    | 1000                                       | 2000     | 10.0              | 11.0        | 0.2                   | 37000                        |
| FNR-05K220 | 22               | 14                        | 18    | 48                       | 1     | 50   | 100      | 0.4               | 0.5         | 0.01                  | 1300                         |
| FNR-07K220 | 22               | 14                        | 18    | 43                       | 2.5   | 125  | 250      | 0.9               | 1.1         | 0.02                  | 2800                         |
| FNR-10K220 | 22               | 14                        | 18    | 43                       | 5     | 250  | 500      | 2.0               | 2.5         | 0.05                  | 6000                         |
| FNR-14K220 | 22               | 14                        | 18    | 43                       | 10    | 500  | 1000     | 4.0               | 5.0         | 0.1                   | 15000                        |
| FNR-20K220 | 22               | 14                        | 18    | 43                       | 20    | 1000                                       | 2000     | 13.0              | 14.0        | 0.2                   | 30000                        |
| FNR-05K270 | 27               | 17                        | 22    | 60                       | 1     | 50   | 100      | 0.5               | 0.6         | 0.01                  | 1050                         |
| FNR-07K270 | 27               | 17                        | 22    | 53                       | 2.5   | 125  | 250      | 1.0               | 1.4         | 0.02                  | 2000                         |
| FNR-10K270 | 27               | 17                        | 22    | 53                       | 5     | 250  | 500      | 2.5               | 3.0         | 0.05                  | 4000                         |
| FNR-14K270 | 27               | 17                        | 22    | 53                       | 10    | 500  | 1000     | 5.0               | 6.0         | 0.1                   | 10000                        |
| FNR-20K270 | 27               | 17                        | 22    | 53                       | 20    | 1000                                       | 2000     | 15.0              | 18.0        | 0.2                   | 22000                        |
| FNR-05K330 | 33               | 20                        | 26    | 73                       | 1     | 50   | 100      | 0.6               | 0.8         | 0.01                  | 900                          |
| FNR-07K330 | 33               | 20                        | 26    | 65                       | 2.5   | 125  | 250      | 1.2               | 1.7         | 0.02                  | 1500                         |
| FNR-10K330 | 33               | 20                        | 26    | 65                       | 5     | 250  | 500      | 3.0               | 4.0         | 0.05                  | 3000                         |
| FNR-14K330 | 33               | 20                        | 26    | 65                       | 10    | 500  | 1000     | 6.0               | 7.5         | 0.1                   | 7500                         |
| FNR-20K330 | 33               | 20                        | 26    | 65                       | 20    | 1000                                       | 2000     | 20.0              | 13.0        | 0.2                   | 17000                        |
| FNR-05K390 | 39               | 25                        | 31    | 86                       | 1     | 50   | 100      | 0.8               | 0.9         | 0.01                  | 500                          |
| FNR-07K390 | 39               | 25                        | 31    | 77                       | 2.5   | 125  | 250      | 1.5               | 2.1         | 0.02                  | 1350                         |
| FNR-10K390 | 39               | 25                        | 31    | 77                       | 5     | 250  | 500      | 3.5               | 4.6         | 0.05                  | 2600                         |
| FNR-14K390 | 39               | 25                        | 31    | 77                       | 10    | 500  | 1000     | 7.0               | 8.6         | 0.1                   | 6500                         |
| FNR-20K390 | 39               | 25                        | 31    | 77                       | 20    | 1000                                       | 2000     | 24.0              | 26.0        | 0.2                   | 15000                        |
| FNR-05K470 | 47               | 30                        | 38    | 104                      | 1     | 50   | 100      | 1.0               | 1.1         | 0.01                  | 450                          |
| FNR-07K470 | 47               | 30                        | 38    | 93                       | 2.5   | 125  | 250      | 1.8               | 2.5         | 0.02                  | 1150                         |
| FNR-10K470 | 47               | 30                        | 38    | 93                       | 5     | 250  | 500      | 4.5               | 5.5         | 0.05                  | 2200                         |
| FNR-14K470 | 47               | 30                        | 38    | 93                       | 10    | 500  | 1000     | 8.5               | 10.0        | 0.1                   | 5500                         |
| FNR-20K470 | 47               | 30                        | 38    | 93                       | 20    | 1000                                       | 2000     | 30.0              | 33.0        | 0.2                   | 13000                        |
| FNR-05K560 | 56               | 35                        | 45    | 123                      | 1     | 50   | 100      | 1.0               | 1.3         | 0.01                  | 400                          |
| FNR-07K560 | 56               | 35                        | 45    | 110                      | 2.5   | 125  | 250      | 2.2               | 3.1         | 0.02                  | 950                          |
| FNR-10K560 | 56               | 35                        | 45    | 110                      | 5     | 250  | 500      | 5.5               | 7.0         | 0.05                  | 1800                         |
| FNR-14K560 | 56               | 35                        | 45    | 110                      | 10    | 500  | 1000     | 10.0              | 11.0        | 0.1                   | 4500                         |
| FNR-20K560 | 56               | 35                        | 45    | 110                      | 20    | 1000                                       | 2000     | 35.0              | 41.0        | 0.2                   | 11000                        |
| FNR-05K680 | 68               | 40                        | 56    | 150                      | 1     | 50   | 100      | 1.2               | 1.6         | 0.01                  | 350                          |
| FNR-07K680 | 68               | 40                        | 56    | 135                      | 2.5   | 125  | 250      | 2.5               | 3.6         | 0.02                  | 700                          |
| FNR-10K680 | 68               | 40                        | 56    | 135                      | 5     | 250  | 500      | 6.5               | 8.2         | 0.05                  | 1300                         |
| FNR-14K680 | 68               | 40                        | 56    | 135                      | 10    | 500  | 1000     | 12.0              | 14.0        | 0.1                   | 3300                         |
| FNR-20K680 | 68               | 40                        | 56    | 135                      | 20    | 1000                                       | 2000     | 40.0              | 46.0        | 0.2                   | 7000                         |
| FNR-05K820 | 82               | 50                        | 65    | 145                      | 1     | 50   | 100      | 1.7               | 2.5         | 0.1                   | 250                          |
| FNR-07K820 | 82               | 50                        | 65    | 135                      | 2.5   | 125  | 250      | 3.5               | 5.5         | 0.25                  | 550                          |
| FNR-10K820 | 82               | 50                        | 65    | 135                      | 5     | 250  | 500      | 8.0               | 12.0        | 0.4                   | 1800                         |
| FNR-14K820 | 82               | 50                        | 65    | 135                      | 10    | 500  | 1000     | 14.0              | 22.0        | 0.6                   | 2900                         |
| FNR-20K820 | 82               | 50                        | 65    | 135                      | 20    | 1000                                       | 2000     | 27.0              | 38.0        | 1.0                   | 5500                         |
| FNR-05K101 | 100              | 60                        | 85    | 175                      | 1     | 50   | 100      | 2.0               | 3.0         | 0.1                   | 200                          |
| FNR-07K101 | 100              | 60                        | 85    | 165                      | 2.5   | 125  | 250      | 4.0               | 6.5         | 0.25                  | 500                          |
| FNR-10K101 | 100              | 60                        | 85    | 165                      | 5     | 250  | 500      | 10.0              | 15.0        | 0.4                   | 1400                         |
| FNR-14K101 | 100              | 60                        | 85    | 165                      | 10    | 500  | 1000     | 18.0              | 28.0        | 0.5                   | 2400                         |
| FNR-20K101 | 100              | 60                        | 85    | 165                      | 20    | 1000                                       | 2000     | 30.0              | 45.0        | 1.0                   | 4800                         |



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| Part No.   | Varistor Voltage | Maximum Operating Voltage |       | Maximum Clamping Voltage |       | Maximum Withstanding surge Current(8x20us) |          | Maximum Energy(J) |             | maximum Rated Wattage | Capacitance (Reference)1kHz |
|------------|------------------|---------------------------|-------|--------------------------|-------|--|----------|-------------------|-------------|-----------------------|-----------------------------|
|            | V(v)             | AC(v)                     | DC(v) | VC(v)                    | IP(A) | 2Time(A)                                   | 1Time(A) | 2ms               | 10/1000(us) | (W)                   | (PF)                        |
| FNR-05K121 | 120              | 75                        | 100   | 210                      | 5     | 200  | 400      | 2.5               | 4.0         | 0.1                   | 170                         |
| FNR-07K121 | 120              | 75                        | 100   | 200                      | 10    | 600  | 1200     | 5.0               | 4.8         | 0.25                  | 450                         |
| FNR-10K121 | 120              | 75                        | 100   | 200                      | 25    | 1250                                       | 2500     | 12.0              | 18.0        | 0.4                   | 1100                        |
| FNR-14K121 | 120              | 75                        | 100   | 200                      | 50    | 2500                                       | 4500     | 20.0              | 32.0        | 0.6                   | 1900                        |
| FNR-20K121 | 120              | 75                        | 100   | 200                      | 100   | 4000                                       | 6500     | 40.0              | 55.0        | 1.0                   | 3800                        |
| FNR-05K151 | 150              | 95                        | 125   | 260                      | 5     | 200  | 400      | 3.0               | 4.8         | 0.1                   | 140                         |
| FNR-07K151 | 150              | 95                        | 125   | 250                      | 10    | 600  | 1200     | 6.0               | 9.7         | 0.25                  | 350                         |
| FNR-10K151 | 150              | 95                        | 125   | 250                      | 25    | 1250                                       | 2500     | 16.0              | 22.0        | 0.4                   | 900                         |
| FNR-14K151 | 150              | 95                        | 125   | 250                      | 50    | 2500                                       | 4500     | 25.0              | 40.0        | 0.6                   | 1500                        |
| FNR-20K151 | 150              | 95                        | 125   | 250                      | 100   | 4000                                       | 6500     | 50.0              | 70.0        | 1.0                   | 3000                        |
| FNR-05K181 | 180              | 115                       | 150   | 315                      | 5     | 200  | 400      | 3.5               | 5.5         | 0.1                   | 110                         |
| FNR-07K181 | 180              | 115                       | 150   | 300                      | 10    | 600  | 1200     | 8.0               | 1.0         | 0.25                  | 300                         |
| FNR-10K181 | 180              | 115                       | 150   | 300                      | 25    | 1250                                       | 2500     | 18.0              | 25.0        | 0.4                   | 700                         |
| FNR-14K181 | 180              | 115                       | 150   | 300                      | 50    | 2500                                       | 4500     | 30.0              | 50.0        | 0.6                   | 1250                        |
| FNR-20K181 | 180              | 115                       | 150   | 300                      | 100   | 4000                                       | 6500     | 60.0              | 85.0        | 1.0                   | 2500                        |
| FNR-05K201 | 200              | 130                       | 170   | 355                      | 5     | 200  | 400      | 4.0               | 6.5         | 0.1                   | 80                          |
| FNR-07K201 | 200              | 130                       | 170   | 340                      | 10    | 600  | 1200     | 10.0              | 13.0        | 0.25                  | 250                         |
| FNR-10K201 | 200              | 130                       | 170   | 340                      | 25    | 1250                                       | 2500     | 20.0              | 30.0        | 0.4                   | 500                         |
| FNR-14K201 | 200              | 130                       | 170   | 340                      | 50    | 2500                                       | 4500     | 35.0              | 57.0        | 0.6                   | 1000                        |
| FNR-20K201 | 200              | 130                       | 170   | 340                      | 100   | 4000                                       | 6500     | 70.0              | 95.0        | 1.0                   | 2000                        |
| FNR-05K221 | 220              | 140                       | 180   | 380                      | 5     | 200  | 400      | 4.5               | 7.0         | 0.1                   | 70                          |
| FNR-07K221 | 220              | 140                       | 180   | 360                      | 10    | 600  | 1200     | 10.0              | 14.0        | 0.25                  | 250                         |
| FNR-10K221 | 220              | 140                       | 180   | 360                      | 25    | 1250                                       | 2500     | 23.0              | 32.0        | 0.4                   | 450                         |
| FNR-14K221 | 220              | 140                       | 180   | 360                      | 50    | 2500                                       | 4500     | 40.0              | 60.0        | 0.6                   | 1000                        |
| FNR-20K221 | 220              | 140                       | 180   | 360                      | 100   | 4000                                       | 6500     | 75.0              | 100.0       | 1.0                   | 200                         |
| FNR-05K241 | 240              | 150                       | 200   | 415                      | 5     | 200  | 400      | 4.5               | 8.0         | 0.1                   | 70                          |
| FNR-07K241 | 240              | 150                       | 200   | 395                      | 10    | 600  | 1200     | 10.0              | 15.0        | 0.25                  | 2000                        |
| FNR-10K241 | 240              | 150                       | 200   | 395                      | 25    | 1250                                       | 2500     | 23.0              | 35.0        | 0.4                   | 400                         |
| FNR-14K241 | 240              | 150                       | 200   | 395                      | 50    | 2500                                       | 4500     | 40.0              | 63.0        | 0.6                   | 900                         |
| FNR-20K241 | 240              | 150                       | 200   | 395                      | 100   | 4000                                       | 6500     | 80.0              | 108.0       | 1.0                   | 1800                        |
| FNR-05K271 | 270              | 175                       | 225   | 475                      | 5     | 200  | 400      | 6.0               | 8.5         | 0.1                   | 65                          |
| FNR-07K271 | 270              | 175                       | 225   | 455                      | 10    | 600  | 1200     | 12.0              | 18.0        | 0.25                  | 170                         |
| FNR-10K271 | 270              | 175                       | 225   | 455                      | 25    | 1250                                       | 2500     | 30.0              | 40.0        | 0.4                   | 350                         |
| FNR-14K271 | 270              | 175                       | 225   | 455                      | 50    | 2500                                       | 4500     | 50.0              | 70.0        | 0.6                   | 750                         |
| FNR-20K271 | 270              | 175                       | 225   | 455                      | 100   | 4000                                       | 6500     | 90.0              | 127.0       | 1.0                   | 1600                        |
| FNR-05K301 | 300              | 200                       | 250   | 525                      | 5     | 200  | 400      | 6.0               | 9.0         | 0.1                   | 55                          |
| FNR-07K301 | 300              | 200                       | 250   | 500                      | 10    | 600  | 1200     | 13.0              | 20.8        | 0.25                  | 150                         |
| FNR-10K301 | 300              | 200                       | 250   | 500                      | 25    | 1250                                       | 2500     | 27.0              | 42.0        | 0.4                   | 325                         |
| FNR-14K301 | 300              | 200                       | 250   | 500                      | 50    | 2500                                       | 4500     | 55.0              | 75.0        | 0.6                   | 650                         |
| FNR-20K301 | 300              | 200                       | 250   | 500                      | 100   | 4000                                       | 6500     | 105.0             | 135.0       | 1.0                   | 1400                        |
| FNR-05K331 | 330              | 210                       | 275   | 580                      | 5     | 200  | 400      | 6.5               | 9.0         | 0.1                   | 60                          |
| FNR-07K331 | 330              | 210                       | 275   | 550                      | 10    | 600  | 1200     | 14.5              | 22.0        | 0.25                  | 150                         |
| FNR-10K331 | 330              | 210                       | 275   | 550                      | 25    | 1250                                       | 2500     | 30.0              | 44.0        | 0.4                   | 325                         |
| FNR-14K331 | 330              | 210                       | 275   | 550                      | 50    | 2500                                       | 4500     | 60.0              | 80.0        | 0.6                   | 650                         |
| FNR-20K331 | 330              | 210                       | 275   | 550                      | 100   | 4000                                       | 6500     | 105.0             | 155.0       | 1.0                   | 1400                        |
| FNR-05K361 | 360              | 230                       | 300   | 620                      | 5     | 200  | 400      | 7.5               | 10.0        | 0.1                   | 50                          |
| FNR-07K361 | 360              | 230                       | 300   | 595                      | 10    | 600  | 1200     | 15.0              | 25.0        | 0.25                  | 130                         |
| FNR-10K361 | 360              | 230                       | 300   | 595                      | 25    | 1250                                       | 2500     | 25.0              | 47.0        | 0.4                   | 300                         |
| FNR-14K361 | 360              | 230                       | 300   | 595                      | 50    | 2500                                       | 4500     | 65.0              | 93.0        | 0.6                   | 550                         |
| FNR-20K361 | 360              | 230                       | 300   | 595                      | 100   | 4000                                       | 6500     | 120.0             | 163.0       | 1.0                   | 1200                        |



## ZINC OXIDE VARISTOR

| Part No.   | Varistor Voltage | Maximum Operating Voltage |       | Maximum Clamping Voltage |       | Maximum Withstanding surge Current(8/20us) |          | maximum Energy (J) |             | maximum Rated Wattage (W) | Capacitance (Reference)1kHz (PF) |
|------------|------------------|---------------------------|-------|--------------------------|-------|--|----------|--------------------|-------------|---------------------------|----------------------------------|
|            |                  | AC(v)                     | DC(v) | VC(v)                    | IP(A) | 2Time(A)                                   | 1Time(A) | 2ms                | 10/1000(us) |                           |                                  |
| FNR-05K391 | 390              | 250                       | 320   | 675                      | 5     | 200  | 400      | 8.0                | 12.0        | 0.1                       | 50                               |
| FNR-07K391 | 390              | 250                       | 320   | 650                      | 10    | 600  | 1200     | 17.0               | 25.0        | 0.25                      | 130                              |
| FNR-10K391 | 390              | 250                       | 320   | 650                      | 25    | 1250                                       | 2500     | 40.0               | 60.0        | 0.4                       | 270                              |
| FNR-14K391 | 390              | 250                       | 320   | 650                      | 50    | 2500                                       | 4500     | 70.0               | 100.0       | 0.6                       | 500                              |
| FNR-20K391 | 390              | 250                       | 320   | 650                      | 100   | 4000                                       | 6500     | 130.0              | 180.0       | 1.0                       | 1000                             |
| FNR-05K431 | 430              | 275                       | 350   | 745                      | 5     | 200  | 400      | 9.0                | 13.0        | 0.1                       | 45                               |
| FNR-07K431 | 430              | 275                       | 350   | 710                      | 10    | 600  | 1200     | 20.0               | 28.0        | 0.25                      | 110                              |
| FNR-10K431 | 430              | 275                       | 350   | 710                      | 25    | 1250                                       | 2500     | 45.0               | 65.0        | 0.4                       | 250                              |
| FNR-14K431 | 430              | 275                       | 350   | 710                      | 50    | 2500                                       | 4500     | 75.0               | 115.0       | 0.6                       | 450                              |
| FNR-20K431 | 430              | 275                       | 350   | 710                      | 100   | 4000                                       | 6500     | 140.0              | 190.0       | 1.0                       | 900                              |
| FNR-05K471 | 470              | 300                       | 385   | 810                      | 5     | 200  | 400      | 10.0               | 15.0        | 0.1                       | 40                               |
| FNR-07K471 | 470              | 300                       | 385   | 775                      | 10    | 600  | 1200     | 20.0               | 30.0        | 0.25                      | 100                              |
| FNR-10K471 | 470              | 300                       | 385   | 775                      | 25    | 1250                                       | 2500     | 45.0               | 70.0        | 0.4                       | 230                              |
| FNR-14K471 | 470              | 300                       | 385   | 775                      | 50    | 2500                                       | 4500     | 80.0               | 125.0       | 0.6                       | 440                              |
| FNR-20K471 | 470              | 300                       | 385   | 775                      | 100   | 4000                                       | 6500     | 150.0              | 220.0       | 1.0                       | 900                              |
| FNR-10K511 | 510              | 318                       | 415   | 840                      | 25    | 1250                                       | 2500     | 45.0               | 70.0        | 0.4                       | 200                              |
| FNR-14K511 | 510              | 318                       | 415   | 840                      | 50    | 2500                                       | 4500     | 80.0               | 125.0       | 0.6                       | 380                              |
| FNR-20K511 | 510              | 318                       | 415   | 840                      | 100   | 4000                                       | 6500     | 150.0              | 220.0       | 1.0                       | 800                              |
| FNR-10K561 | 560              | 350                       | 455   | 925                      | 25    | 1250                                       | 2500     | 45.0               | 70.0        | 0.4                       | 180                              |
| FNR-14K561 | 560              | 350                       | 455   | 925                      | 50    | 2500                                       | 4500     | 80.0               | 125.0       | 0.6                       | 345                              |
| FNR-20K561 | 560              | 350                       | 455   | 925                      | 100   | 4000                                       | 6500     | 150.0              | 220.0       | 1.0                       | 700                              |
| FNR-10K621 | 620              | 380                       | 505   | 1025                     | 25    | 1250                                       | 2500     | 45.0               | 70.0        | 0.4                       | 130                              |
| FNR-14K621 | 620              | 380                       | 505   | 1025                     | 50    | 2500                                       | 4500     | 80.0               | 125.0       | 0.6                       | 250                              |
| FNR-20K621 | 620              | 380                       | 505   | 1025                     | 100   | 4000                                       | 6500     | 150.0              | 220.0       | 1.0                       | 500                              |
| FNR-10K681 | 680              | 420                       | 560   | 1120                     | 25    | 1250                                       | 2500     | 45.0               | 70.0        | 0.4                       | 130                              |
| FNR-14K681 | 680              | 420                       | 560   | 1120                     | 50    | 2500                                       | 4500     | 90.0               | 130.0       | 0.6                       | 250                              |
| FNR-20K681 | 680              | 420                       | 560   | 1120                     | 100   | 4000                                       | 6500     | 160.0              | 230.0       | 1.0                       | 460                              |
| FNR-10K751 | 750              | 460                       | 615   | 1240                     | 25    | 1250                                       | 2500     | 50.0               | 75.0        | 0.4                       | 120                              |
| FNR-14K751 | 750              | 460                       | 615   | 1240                     | 50    | 2500                                       | 4500     | 100.0              | 143.0       | 0.6                       | 230                              |
| FNR-20K751 | 750              | 460                       | 615   | 1240                     | 100   | 4000                                       | 6500     | 175.0              | 255.0       | 1.0                       | 420                              |
| FNR-10K781 | 780              | 485                       | 640   | 1290                     | 25    | 1250                                       | 2500     | 50.0               | 80.0        | 0.4                       | 120                              |
| FNR-14K781 | 780              | 485                       | 640   | 1290                     | 50    | 2500                                       | 4500     | 105.0              | 148.0       | 0.6                       | 230                              |
| FNR-20K781 | 780              | 485                       | 640   | 1290                     | 100   | 4000                                       | 6500     | 180.0              | 265.0       | 1.0                       | 420                              |
| FNR-10K821 | 820              | 510                       | 670   | 1355                     | 25    | 1250                                       | 2500     | 55.0               | 85.0        | 0.4                       | 1100                             |
| FNR-14K821 | 820              | 510                       | 670   | 1355                     | 50    | 2500                                       | 4500     | 110.0              | 157.0       | 0.6                       | 200                              |
| FNR-20K821 | 820              | 510                       | 670   | 1355                     | 100   | 4000                                       | 6500     | 190.0              | 282.0       | 1.0                       | 400                              |
| FNR-10K911 | 910              | 550                       | 745   | 1500                     | 25    | 1250                                       | 2500     | 60.0               | 93.0        | 0.4                       | 100                              |
| FNR-14K911 | 910              | 550                       | 755   | 1500                     | 50    | 2500                                       | 4500     | 120.0              | 175.0       | 0.6                       | 180                              |
| FNR-20K911 | 910              | 550                       | 755   | 1500                     | 100   | 4000                                       | 6500     | 215.0              | 310.0       | 1.0                       | 350                              |
| FNR-10K102 | 1000             | 625                       | 825   | 1650                     | 25    | 1250                                       | 2500     | 65.0               | 102.0       | 0.4                       | 90                               |
| FNR-14K102 | 1000             | 625                       | 825   | 1650                     | 50    | 2500                                       | 4500     | 130.0              | 190.0       | 0.6                       | 150                              |
| FNR-20K102 | 1000             | 625                       | 825   | 1650                     | 100   | 4000                                       | 6500     | 230.0              | 342.0       | 1.0                       | 320                              |
| FNR-10K112 | 1100             | 680                       | 895   | 1815                     | 25    | 1250                                       | 2500     | 70.0               | 115.0       | 0.4                       | 80                               |
| FNR-14K112 | 1100             | 680                       | 895   | 1815                     | 50    | 2500                                       | 4500     | 140.0              | 213.0       | 0.6                       | 150                              |
| FNR-20K112 | 1100             | 680                       | 895   | 1815                     | 100   | 4000                                       | 6500     | 250.0              | 383.0       | 1.0                       | 300                              |
| FNR-14K182 | 1800             | 1000                      | 1465  | 2970                     | 25    | 1250                                       | 2500     | 240.0              | 337.0       | 0.6                       | 100                              |
| FNR-20K182 | 1800             | 1000                      | 1465  | 2970                     | 50    | 2500                                       | 4500     | 400.0              | 625.0       | 1.0                       | 200                              |



# ZINC OXIDE VARISTOR

| Part No.   | Varistor Voltage | Maximum Operating Voltage |       | Maximum Clamping Voltage |       | maximum Withstanding surge Current(A) | maximum Energy(J) | maximum Rated Wattage | Capacitance (Reference)1kHz |
|------------|------------------|---------------------------|-------|--------------------------|-------|---------------------------------------|-------------------|-----------------------|-----------------------------|
|            | V(v)             | AC(v)                     | DC(v) | VC(v)                    | IP(A) | 8/20us                                | 2ms               | (W)                   | (PF)                        |
| FNR-25K470 | 47               | 30                        | 38    | 89                       | 40    | 1250                                  | 15                | 1.0                   | 10000                       |
| FNR-32K470 | 47               | 30                        | 38    | 89                       | 40    | 2500                                  | 25                | 1.2                   | 11000                       |
| FNR-40K470 | 47               | 30                        | 38    | 89                       | 40    | 5000                                  | 40                | 1.4                   | 15000                       |
| FNR-25K560 | 56               | 35                        | 45    | 106                      | 40    | 1250                                  | 18                | 1.0                   | 8000                        |
| FNR-32K560 | 56               | 35                        | 45    | 106                      | 40    | 2500                                  | 30                | 1.2                   | 10000                       |
| FNR-40K560 | 56               | 35                        | 45    | 106                      | 40    | 5000                                  | 45                | 1.4                   | 14000                       |
| FNR-25K680 | 68               | 40                        | 56    | 129                      | 40    | 1250                                  | 21                | 1.0                   | 7000                        |
| FNR-32K680 | 68               | 40                        | 56    | 129                      | 40    | 2500                                  | 32                | 1.2                   | 9000                        |
| FNR-40K680 | 68               | 40                        | 56    | 129                      | 40    | 5000                                  | 50                | 1.4                   | 13000                       |
| FNR-25K820 | 82               | 50                        | 65    | 156                      | 200   | 5000                                  | 23                | 1.0                   | 6000                        |
| FNR-32K820 | 82               | 50                        | 65    | 156                      | 200   | 10000                                 | 35                | 1.2                   | 8000                        |
| FNR-40K820 | 82               | 50                        | 65    | 156                      | 200   | 20000                                 | 60                | 1.4                   | 12000                       |
| FNR-25K101 | 100              | 60                        | 85    | 190                      | 200   | 5000                                  | 25                | 1.0                   | 5000                        |
| FNR-32K101 | 100              | 60                        | 85    | 190                      | 200   | 10000                                 | 38                | 1.2                   | 7000                        |
| FNR-40K101 | 100              | 60                        | 85    | 190                      | 200   | 20000                                 | 75                | 1.4                   | 11500                       |
| FNR-25K121 | 120              | 75                        | 100   | 216                      | 200   | 5000                                  | 28                | 1.0                   | 4000                        |
| FNR-32K121 | 120              | 75                        | 100   | 216                      | 200   | 10000                                 | 42                | 1.2                   | 6000                        |
| FNR-40K121 | 120              | 75                        | 100   | 216                      | 200   | 20000                                 | 90                | 1.4                   | 11000                       |
| FNR-25K151 | 150              | 95                        | 125   | 270                      | 200   | 5000                                  | 30                | 1.0                   | 3000                        |
| FNR-32K151 | 150              | 95                        | 125   | 270                      | 200   | 10000                                 | 50                | 1.2                   | 5000                        |
| FNR-40K151 | 150              | 95                        | 125   | 270                      | 200   | 20000                                 | 120               | 1.4                   | 10500                       |
| FNR-25K201 | 200              | 130                       | 170   | 360                      | 200   | 5000                                  | 35                | 1.0                   | 2400                        |
| FNR-32K201 | 200              | 130                       | 170   | 360                      | 200   | 10000                                 | 70                | 1.2                   | 4700                        |
| FNR-40K201 | 200              | 130                       | 170   | 360                      | 200   | 20000                                 | 160               | 1.4                   | 10000                       |
| FNR-25K221 | 220              | 140                       | 180   | 385                      | 200   | 5000                                  | 40                | 1.0                   | 2200                        |
| FNR-32K221 | 220              | 140                       | 180   | 385                      | 200   | 10000                                 | 90                | 1.2                   | 4300                        |
| FNR-40K221 | 220              | 140                       | 180   | 385                      | 200   | 20000                                 | 180               | 1.4                   | 9500                        |
| FNR-25K241 | 240              | 150                       | 200   | 420                      | 200   | 5000                                  | 60                | 1.0                   | 2000                        |
| FNR-32K241 | 240              | 150                       | 200   | 420                      | 200   | 10000                                 | 120               | 1.2                   | 4000                        |
| FNR-40K241 | 240              | 150                       | 200   | 420                      | 200   | 20000                                 | 220               | 1.4                   | 9000                        |
| FNR-25K271 | 270              | 175                       | 225   | 473                      | 200   | 5000                                  | 90                | 1.0                   | 1700                        |
| FNR-32K271 | 270              | 175                       | 225   | 473                      | 200   | 10000                                 | 150               | 1.2                   | 3500                        |
| FNR-40K271 | 270              | 175                       | 225   | 473                      | 200   | 20000                                 | 260               | 1.4                   | 750                         |
| FNR-25K361 | 360              | 230                       | 300   | 612                      | 200   | 5000                                  | 120               | 1.0                   | 1400                        |
| FNR-32K361 | 360              | 230                       | 300   | 612                      | 200   | 10000                                 | 180               | 1.2                   | 3000                        |
| FNR-40K361 | 360              | 230                       | 300   | 612                      | 200   | 20000                                 | 300               | 1.4                   | 6000                        |
| FNR-25K391 | 390              | 250                       | 320   | 663                      | 200   | 5000                                  | 150               | 1.0                   | 1200                        |
| FNR-32K391 | 390              | 250                       | 320   | 663                      | 200   | 10000                                 | 220               | 1.2                   | 2500                        |
| FNR-40K391 | 390              | 250                       | 320   | 663                      | 200   | 20000                                 | 340               | 1.4                   | 5000                        |



# ZINC OXIDE VARISTOR

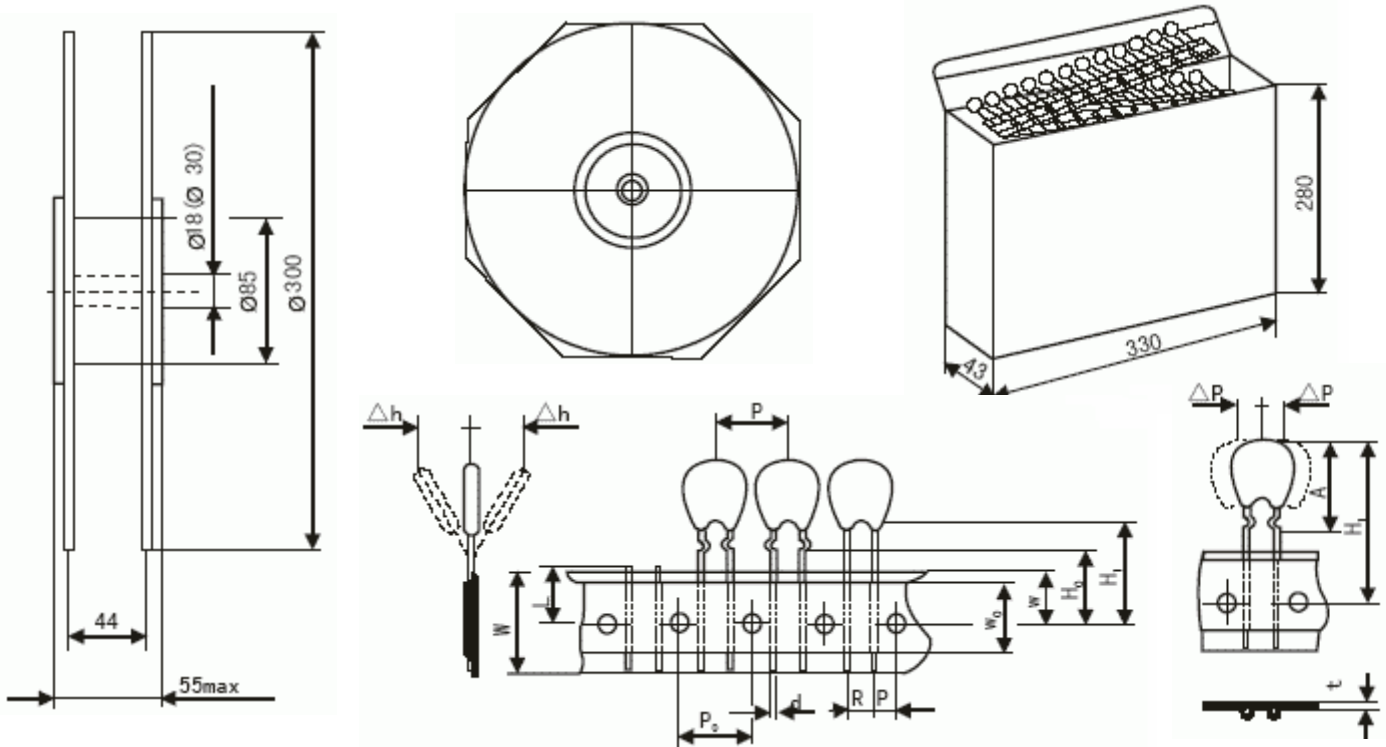
| Part No.   | Varistor Voltage | Maximum Operating Voltage |        | Maximum Clamping Voltage |        | Maximum Withstanding surge Current(A) | maximum Energy(J) | maximum Rated Wattage | Capacitance (Reference)1kHz |
|------------|------------------|---------------------------|--------|--------------------------|--------|---------------------------------------|-------------------|-----------------------|-----------------------------|
|            | V(v)             | AC (v)                    | DC (v) | VC (v)                   | IP (A) | 8/20us                                | 2ms               | (W)                   | (PF)                        |
| FNR-25K431 | 430              | 275                       | 350    | 731                      | 200    | 5000                                  | 180               | 1.0                   | 1100                        |
| FNR-32K431 | 430              | 275                       | 350    | 731                      | 200    | 10000                                 | 260               | 1.2                   | 2250                        |
| FNR-40K431 | 430              | 275                       | 350    | 731                      | 200    | 20000                                 | 380               | 1.4                   | 4500                        |
| FNR-25K471 | 470              | 300                       | 380    | 799                      | 200    | 5000                                  | 220               | 1.0                   | 1000                        |
| FNR-32K471 | 470              | 300                       | 380    | 799                      | 200    | 10000                                 | 300               | 1.2                   | 1900                        |
| FNR-40K471 | 470              | 300                       | 380    | 799                      | 200    | 20000                                 | 420               | 1.4                   | 3600                        |
| FNR-25K621 | 620              | 385                       | 505    | 1054                     | 200    | 5000                                  | 260               | 1.0                   | 1500                        |
| FNR-32K621 | 620              | 385                       | 505    | 1054                     | 200    | 10000                                 | 340               | 1.2                   | 3200                        |
| FNR-40K621 | 620              | 385                       | 505    | 1054                     | 200    | 20000                                 | 450               | 1.4                   | 3300                        |
| FNR-25K681 | 680              | 420                       | 560    | 1160                     | 200    | 5000                                  | 300               | 1.0                   | 1200                        |
| FNR-32K681 | 680              | 420                       | 560    | 1160                     | 200    | 10000                                 | 380               | 1.2                   | 3000                        |
| FNR-40K681 | 680              | 420                       | 560    | 1160                     | 200    | 20000                                 | 500               | 1.4                   | 3000                        |
| FNR-25K751 | 750              | 460                       | 615    | 1275                     | 200    | 5000                                  | 350               | 1.0                   | 1100                        |
| FNR-25K751 | 750              | 460                       | 615    | 1275                     | 200    | 10000                                 | 450               | 1.2                   | 27000                       |
| FNR-25K751 | 750              | 460                       | 615    | 1275                     | 200    | 20000                                 | 550               | 1.4                   | 2500                        |
| FNR-25K781 | 780              | 485                       | 640    | 1326                     | 200    | 5000                                  | 370               | 1.0                   | 1050                        |
| FNR-32K781 | 780              | 485                       | 640    | 1326                     | 200    | 10000                                 | 480               | 1.2                   | 2600                        |
| FNR-40K781 | 780              | 485                       | 640    | 1326                     | 200    | 20000                                 | 600               | 1.4                   | 2450                        |
| FNR-25K821 | 820              | 510                       | 670    | 1400                     | 200    | 5000                                  | 400               | 1.0                   | 1000                        |
| FNR-32K821 | 820              | 510                       | 670    | 1400                     | 200    | 10000                                 | 530               | 1.2                   | 2400                        |
| FNR-40K821 | 820              | 510                       | 670    | 1400                     | 200    | 20000                                 | 640               | 1.4                   | 2400                        |
| FNR-25K911 | 910              | 550                       | 745    | 1550                     | 200    | 5000                                  | 420               | 1.0                   | 900                         |
| FNR-32K911 | 910              | 550                       | 745    | 1550                     | 200    | 10000                                 | 580               | 1.2                   | 2200                        |
| FNR-40K911 | 910              | 550                       | 745    | 1550                     | 200    | 20000                                 | 700               | 1.4                   | 2200                        |
| FNR-25K102 | 1000             | 625                       | 825    | 1700                     | 200    | 5000                                  | 450               | 1.0                   | 800                         |
| FNR-32K102 | 1000             | 625                       | 825    | 1700                     | 200    | 10000                                 | 630               | 1.2                   | 1900                        |
| FNR-40K102 | 1000             | 625                       | 825    | 1700                     | 200    | 20000                                 | 800               | 1.4                   | 2000                        |
| FNR-25K112 | 1100             | 680                       | 895    | 1870                     | 200    | 5000                                  | 500               | 1.0                   | 700                         |
| FNR-32K112 | 1100             | 680                       | 895    | 1870                     | 200    | 10000                                 | 700               | 1.2                   | 1700                        |
| FNR-40K112 | 1100             | 680                       | 895    | 1870                     | 200    | 20000                                 | 850               | 1.4                   | 1800                        |
| FNR-32K182 | 1800             | 1000                      | 1465   | 3060                     | 200    | 10000                                 | 750               | 1.2                   | 1600                        |
| FNR-40K182 | 1800             | 1000                      | 1465   | 3060                     | 200    | 20000                                 | 1000              | 1.4                   | 1600                        |





**ZINC OXIDE VARISTOR**  
**REEL DIMENSIONS**

**Ammo Packagin**



| Item                                | Code       | 5        | 7       | 10       | 14       |
|-------------------------------------|------------|----------|---------|----------|----------|
| Element                             | $\Phi$     | 5        | 7       | 10       | 14       |
| Body Diameter                       | D          | 7.5Max.  | 9.0Max. | 13.5Max. | 16.5Max. |
| Lead Wire Diameter                  | d          | 0.6      |         | 0.8      |          |
| Pitch of Component                  | p          | 12.7±1   |         | 25.4±1   |          |
| Feed Hole Pitch                     | p          | 12.7±3   |         | 12.7±0.3 |          |
| Feed Hole Center to Lead            | p          | 3.85±0.7 |         | 7.5±0.8  |          |
| Lead to Lead Pitch                  | R          | 5±0.8    |         | 7.5±0.8  |          |
| Component Alignment                 | $\Delta h$ | 2.0Max.  |         | 2.0Max.  |          |
| Base paper Tape Width               | W          | 18       |         | 18       |          |
| Adhesive                            | W0         | 13Min.   |         | 13Mon.   |          |
| Hole Position                       | W1         | 9±0.5    |         | 9±0.5    |          |
| Component Height                    | H1         | 30Max.   |         | 40Max.   |          |
| Lead-Wire Clinch Height             | H0         | 16±0.5   |         | 1.0Max.  |          |
| Feed Hole Diameter                  | D0         | 4±0.2    |         | 4±0.2    |          |
| Total Tape Thickness                | t          | 0.9Max.  |         | 0.9Max.  |          |
| Length of Clipped Lead              | L          | 11Max.   |         | 11Max.   |          |
| Component Height from Seating Plane | A          | 13Max.   | 15Max.  | 19.5Max. | 22.5Max. |
| Component Position Tolerance        | $\Delta P$ | ±1.3Max. |         | ±2.0Max. |          |

**AMMO AND REEL PACKAGING QUANTITY**

| Element Diameter | Quantity(pcs) |            |
|------------------|---------------|------------|
|                  | 18-270(V)     | 300-470(V) |
| 05               | 2500          | 1500       |
| 07               | 2500          | 1500       |
| 10               | 2000          | 1500       |
| 14               | 2000          | 1500       |