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### Features

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- I Wide operating voltage (V1mA) range from 18V to 750V
- I Fast responding to transient over-voltage.
- I Large absorbing transient energy capability.
- I Low clamping ratio and no following-on current.

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### General Information

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- I Surge protection in consumer electronics
- I Surge protection in industrial electronics
- I Relay and electromagnetic valve surge absorption
- I Transistor, diode, IC, thyristor or triac semiconductor protection
- I Surge protection in electronic home appliances, gas and petroleum appliances




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### General Characteristics

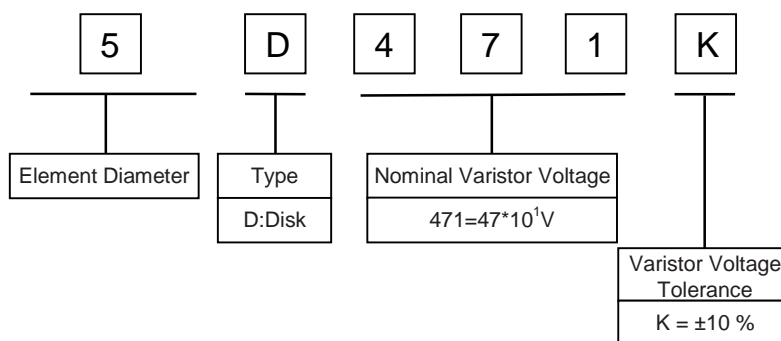
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- I Body: Nickel Plated
- I Devices with No Leads: Nickel Plated
- I Operating Temperature<sup>o</sup>: -40 C to<sup>o</sup> +85 C
- I Storage Temperature<sup>o</sup>: -40 C to  $\neq$ 125 C
- I Axial Devices: Tin Plated

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### Part Number Code

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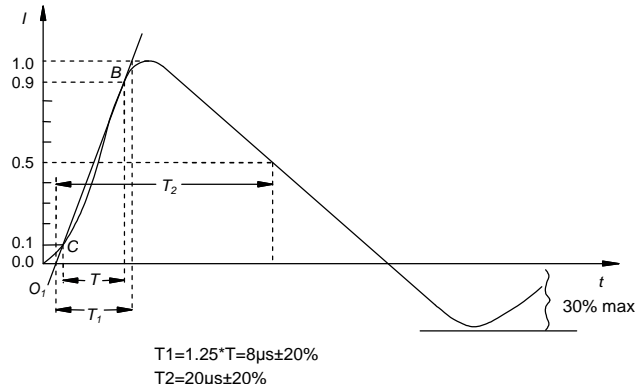


## Electrical Characteristics

| Type Number | Varistor Voltage     | Max. Allowable Voltage |                     | Max. Energy (2ms) | Max. Clamping Voltage (8/20μs!) |                    | Withstanding Surge Current (8/20μs!) | Rated Power | Typical Capacitance (Reference) |
|-------------|----------------------|------------------------|---------------------|-------------------|---------------------------------|--------------------|--------------------------------------|-------------|---------------------------------|
|             | V <sub>1mA</sub> (V) | V <sub>AC</sub> (V)    | V <sub>DC</sub> (V) | (J)               | I <sub>P</sub> (A)              | V <sub>C</sub> (V) | I(A)                                 | (W)         | @1KHz(pf)                       |
| 5D180K      | 16~20                | 11                     | 14                  | 0.3               | 1                               | 40                 | 100                                  | 0.01        | 2400                            |
| 5D220K      | 20~24                | 14                     | 18                  | 0.4               | 1                               | 48                 | 100                                  | 0.01        | 1800                            |
| 5D270K      | 24~30                | 17                     | 22                  | 0.5               | 1                               | 60                 | 100                                  | 0.01        | 1500                            |
| 5D330K      | 30~36                | 20                     | 26                  | 0.6               | 1                               | 73                 | 100                                  | 0.01        | 1200                            |
| 5D390K      | 35~43                | 25                     | 31                  | 0.7               | 1                               | 86                 | 100                                  | 0.01        | 1000                            |
| 5D470K      | 42~52                | 30                     | 38                  | 0.8               | 1                               | 104                | 100                                  | 0.01        | 850                             |
| 5D560K      | 50~62                | 35                     | 45                  | 1.0               | 1                               | 123                | 100                                  | 0.01        | 700                             |
| 5D680K      | 61~75                | 40                     | 56                  | 1.2               | 1                               | 145                | 100                                  | 0.01        | 560                             |
| 5D820K      | 74~90                | 50                     | 65                  | 1.5               | 5                               | 150                | 400                                  | 0.1         | 480                             |
| 5D101K      | 90~110               | 60                     | 85                  | 1.8               | 5                               | 175                | 400                                  | 0.1         | 420                             |
| 5D121K      | 108~132              | 75                     | 100                 | 2.2               | 5                               | 210                | 400                                  | 0.1         | 360                             |
| 5D151K      | 135~165              | 95                     | 125                 | 2.7               | 5                               | 260                | 400                                  | 0.1         | 280                             |
| 5D181K      | 162~198              | 115                    | 150                 | 3.2               | 5                               | 320                | 400                                  | 0.1         | 200                             |
| 5D201K      | 180~220              | 130                    | 170                 | 3.6               | 5                               | 355                | 400                                  | 0.1         | 160                             |
| 5D221K      | 198~242              | 140                    | 180                 | 4.0               | 5                               | 380                | 400                                  | 0.1         | 110                             |
| 5D241K      | 216~264              | 150                    | 200                 | 4.3               | 5                               | 415                | 400                                  | 0.1         | 85                              |
| 5D271K      | 243~297              | 175                    | 225                 | 4.9               | 5                               | 475                | 400                                  | 0.1         | 75                              |
| 5D301K      | 270~330              | 195                    | 250                 | 5.4               | 5                               | 525                | 400                                  | 0.1         | 75                              |
| 5D331K      | 297~363              | 210                    | 275                 | 5.9               | 5                               | 575                | 400                                  | 0.1         | 75                              |
| 5D361K      | 324~396              | 230                    | 300                 | 6.5               | 5                               | 620                | 400                                  | 0.1         | 70                              |
| 5D391K      | 351~429              | 250                    | 320                 | 7.0               | 5                               | 675                | 400                                  | 0.1         | 70                              |
| 5D431K      | 387~473              | 275                    | 350                 | 7.7               | 5                               | 745                | 400                                  | 0.1         | 65                              |
| 5D471K      | 423~517              | 300                    | 385                 | 8.5               | 5                               | 810                | 400                                  | 0.1         | 55                              |
| 5D511K      | 459~561              | 320                    | 418                 | 9.2               | 5                               | 882                | 400                                  | 0.1         | 55                              |
| 5D561K      | 504~616              | 350                    | 460                 | 10.1              | 5                               | 968                | 400                                  | 0.1         | 50                              |
| 5D621K      | 558~682              | 385                    | 505                 | 11.2              | 5                               | 1072               | 400                                  | 0.1         | 45                              |
| 5D681K      | 612~748              | 420                    | 560                 | 12.2              | 5                               | 1176               | 400                                  | 0.1         | 40                              |
| 5D751K      | 675~825              | 460                    | 615                 | 13.5              | 5                               | 1300               | 400                                  | 0.1         | 35                              |

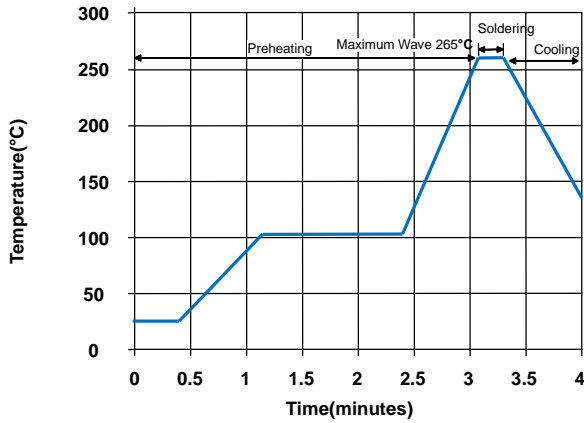
Note: The energy (10/1000μs) is about 1.4 times of energy(2ms)

## Electrical Ratings

| Items                      | Test Condition/Description  | Requirement                 |                   |                   |              |                    |  |
|----------------------------|---|-----------------------------|-------------------|-------------------|--------------|--------------------|--|
| Varistor Voltage           | The voltage between two terminals with the specified measuring current 1mA.DC applied is called Vb.   | To meet the Specified value |                   |                   |              |                    |  |
| Maximum Allowable Voltage  | The recommended maximum sine wave voltage (RMS) or the Maximum DC voltage can be applied continuously.  |                             |                   |                   |              |                    |  |
| Maximum Clamping Voltage   | The maximum voltage between two terminals with the specification standard impulse current.<br>Applied waveform: 8/20 $\mu$ s<br><br>$T_1 = 1.25 * T = 8\mu s \pm 20\%$<br>$T_2 = 20\mu s \pm 20\%$  |                             |                   |                   |              |                    |  |
| Rated Wattage              | The maximum average power that can be applied within the specified ambient temperature.   |                             |                   |                   |              |                    |  |
| Energy                     | The maximum energy within the varistor voltage change of $\pm 10\%$ when one impulse of 10/1000 $\mu$ s or 2ms is applied.  |                             |                   |                   |              |                    |  |
| Withstanding Surge Current | The maximum current within the varistor voltage change of $\pm 10\%$ with the standard impulse current (8/20 $\mu$ s) applied one time.   |                             |                   |                   |              |                    |  |
| Surge Life                 | The change of Vb shall be measured after the impulse listed below which is applied 10,000 times continuously with the interval of ten seconds at room temperature. <table border="1" data-bbox="510 1355 1157 1451" style="margin: 20px auto;"> <tbody> <tr> <td rowspan="2" style="text-align: center;">5<math>\Phi</math> series</td> <td style="text-align: center;">180K to 680K</td> <td style="text-align: center;">5A (8/20<math>\mu</math>s)</td> </tr> <tr> <td style="text-align: center;">820K to 751K</td> <td style="text-align: center;">20A (8/20<math>\mu</math>s)</td> </tr> </tbody> </table> | 5 $\Phi$ series             | 180K to 680K      | 5A (8/20 $\mu$ s) | 820K to 751K | 20A (8/20 $\mu$ s) | $\frac{\Delta V_b}{V_b} \leq \pm 10\%$ |
| 5 $\Phi$ series            | 180K to 680K  |                             | 5A (8/20 $\mu$ s) |                   |              |                    |  |
|                            | 820K to 751K  | 20A (8/20 $\mu$ s)          |                   |                   |              |                    |  |

## Soldering Recommendation

### Wave Lead Free Soldering Recommendation

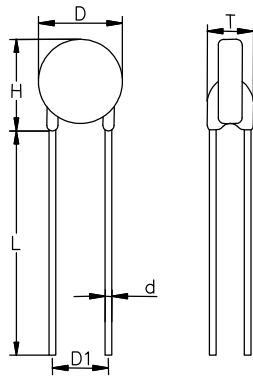


| Item             | Conditions        |
|------------------|-------------------|
| Peak Temperature | 265°C             |
| Dipping Time     | 10 seconds (max.) |
| Soldering        | 1 time            |

### Recommendation Reworking Conditions with Soldering Iron

| Item                              | Conditions       |
|-----------------------------------|------------------|
| Temperature of Soldering Iron-tip | 360°C (max.)     |
| Soldering Time                    | 3 seconds (max.) |
| Distance from Varistor            | 2mm (min.)       |

## Dimensions



| Symbol                          | Millimeters | Inches |
|---------------------------------|-------------|--------|
| H(max)                          | 10.0        | 0.394  |
| L(min.)                         | 15.0        | 0.591  |
| D(max)                          | 7.0         | 0.276  |
| D1(±1.0)                        | 5.0         | 0.197  |
| T(max.)                         | TABLE 2     |        |
| d(±0.1)                         | 0.6         | 0.024  |
| Packaging Quantity: 1000pcs/bag |             |        |

TABLE 2---T(max.)

| Model     | Millimeters | Inches | Model     | Millimeters | Inches |
|-----------|-------------|--------|-----------|-------------|--------|
| 180K~390K | 4.0         | 0.157  | 331K~391K | 6.0         | 0.236  |
| 470K~680K | 4.5         | 0.177  | 431K~561K | 6.5         | 0.256  |
| 820K~151K | 5.0         | 0.197  | 621K~751K | 7.0         | 0.276  |
| 181K~271K | 5.5         | 0.217  |           |             |        |