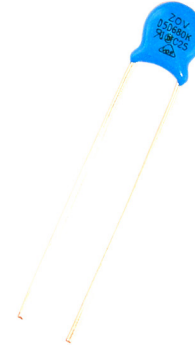


## DATA SHEET

### METAL OXIDE VARISTOR – 5Φ SERIES

#### FEATURE

- ✧ Wide operating voltage ( $V_{1mA}$ ) range from 18V to 750V.
- ✧ Fast responding to transient over-voltage.
- ✧ Large absorbing transient energy capability.
- ✧ Low clamping ratio and no follow-on current.
- ✧ Meets MSL level 1, per J-STD-020



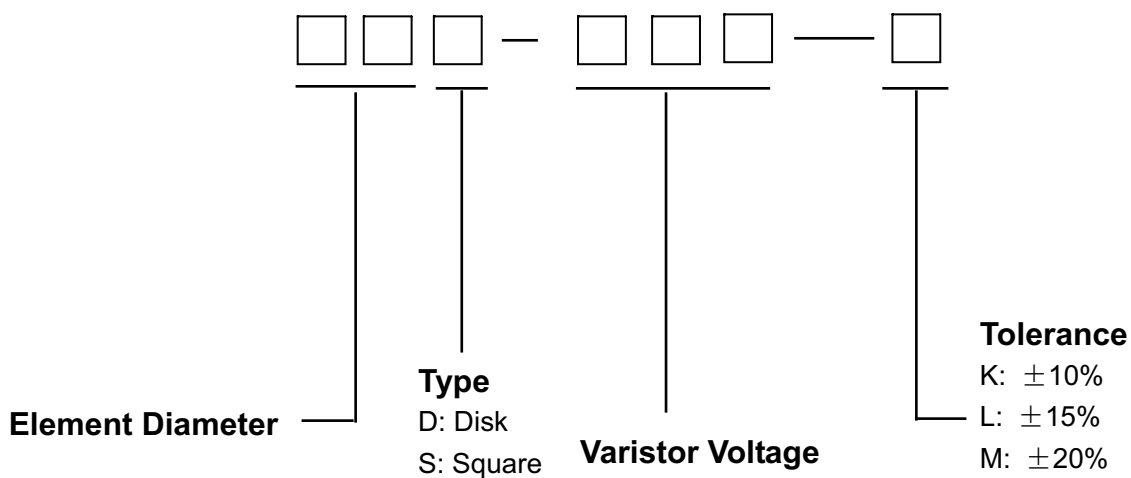
#### APPLICATION

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

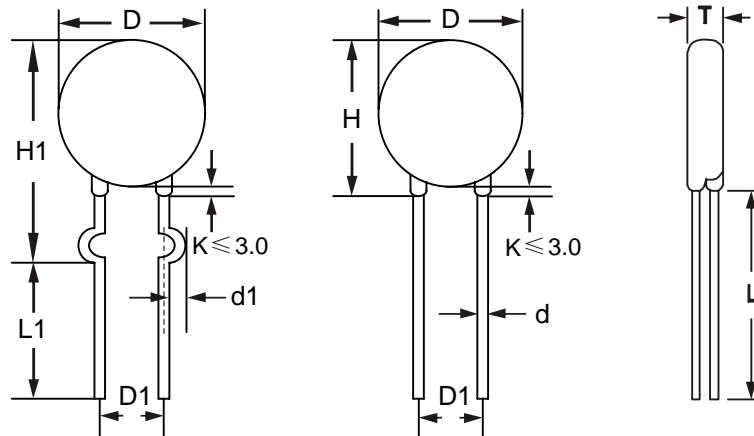
#### GENERAL CHARACTERISTICS DEFINITION

- ✧ Operating Temperature:  $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- ✧ Storage Temperature:  $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$

#### PART NUMBER CODE



**PACKAGE DIMENSIONS**



| TABLE 1  |            |
|----------|------------|
| unit:mm  |            |
| Symbol   | Dimensions |
| H(max.)  | 10.5       |
| H1(max.) | 13.0       |
| L(min.)  | 20.0       |
| L1(min.) | 15.0       |
| D(max.)  | 7.5        |
| D1(±0.8) | 5.0        |
| T(Max.)  | TABLE 2    |
| d(±0.05) | 0.6        |
| d1(±0.4) | 1.2        |

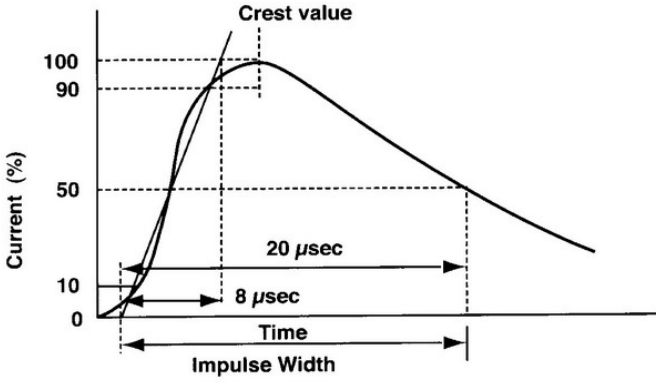
| TABLE 2 |         |       |         |
|---------|---------|-------|---------|
| unit:mm |         |       |         |
| Model   | T(Max.) | Model | T(Max.) |
| 180K    | 4.50    | 221K  | 4.50    |
| 220K    | 4.60    | 241K  | 4.60    |
| 270K    | 4.70    | 271K  | 4.90    |
| 330K    | 4.90    | 301K  | 5.00    |
| 390K    | 4.80    | 331K  | 5.10    |
| 470K    | 4.90    | 361K  | 5.20    |
| 560K    | 5.00    | 391K  | 5.40    |
| 680K    | 5.20    | 431K  | 5.70    |
| 820K    | 4.10    | 471K  | 6.00    |
| 101K    | 4.30    | 511K  | 6.20    |
| 121K    | 4.50    | 561K  | 6.50    |
| 151K    | 4.80    | 621K  | 6.50    |
| 181K    | 4.30    | 681K  | 6.87    |
| 201K    | 4.40    | 751K  | 6.90    |

**ELECTRICAL CHARACTERISTIC**

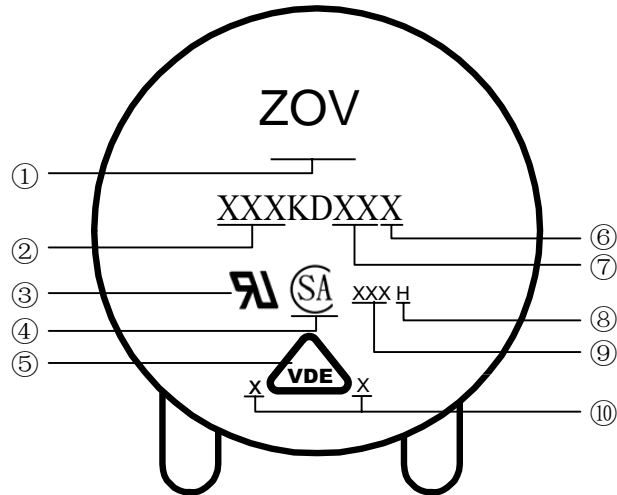
| Part Number |            | Maximum Allowable Voltage |                     | Varistor Voltage     | Maximum Clamping Voltage |                    | Withstanding Surge Current |                    | Maximum Energy (10/1000μs) |                   | Rated Power | Typical Capacitance (Reference) |
|-------------|------------|---------------------------|---------------------|----------------------|--------------------------|--------------------|----------------------------|--------------------|----------------------------|-------------------|-------------|---------------------------------|
| Standard    | High Surge | V <sub>AC</sub> (V)       | V <sub>DC</sub> (V) | V <sub>1mA</sub> (V) | I <sub>P</sub> (A)       | V <sub>C</sub> (V) | I(A)<br>Standard           | I(A)<br>High Surge | (J)<br>Standard            | (J)<br>High Surge | (W)         | @1KHZ(pf)                       |
| 05D180K     | 05D180J    | 11                        | 14                  | 18(15~21.6)          | 1                        | 40                 | 100                        | 250                | 0.4                        | 0.6               | 0.01        | 1400                            |
| 05D220K     | 05D220J    | 14                        | 18                  | 22(19.5~26)          | 1                        | 48                 | 100                        | 250                | 0.5                        | 0.7               | 0.01        | 1150                            |
| 05D270K     | 05D270J    | 17                        | 22                  | 27(24~31)            | 1                        | 60                 | 100                        | 250                | 0.6                        | 0.9               | 0.01        | 930                             |
| 05D330K     | 05D330J    | 20                        | 26                  | 33(29.5~36.5)        | 1                        | 73                 | 100                        | 250                | 0.8                        | 1.1               | 0.01        | 760                             |
| 05D390K     | 05D390J    | 25                        | 31                  | 39(35~43)            | 1                        | 80                 | 100                        | 250                | 0.9                        | 1.2               | 0.01        | 640                             |
| 05D470K     | 05D470J    | 30                        | 38                  | 47(42~52)            | 1                        | 104                | 100                        | 250                | 1.1                        | 1.5               | 0.01        | 530                             |
| 05D560K     | 05D560J    | 35                        | 45                  | 56(50~62)            | 1                        | 123                | 100                        | 250                | 1.3                        | 1.8               | 0.01        | 450                             |
| 05D680K     | 05D680J    | 40                        | 56                  | 68(61~75)            | 1                        | 145                | 100                        | 250                | 1.6                        | 2.2               | 0.01        | 370                             |
| 05D820K     | 05D820J    | 50                        | 65                  | 82(74~90)            | 5                        | 150                | 400                        | 800                | 2.5                        | 4.0               | 0.1         | 300                             |
| 05D101K     | 05D101J    | 60                        | 85                  | 100(90~110)          | 5                        | 177                | 400                        | 800                | 3.0                        | 4.1               | 0.1         | 250                             |
| 05D121K     | 05D121J    | 75                        | 100                 | 120(108~132)         | 5                        | 210                | 400                        | 800                | 4.0                        | 4.9               | 0.1         | 210                             |
| 05D151K     | 05D151J    | 95                        | 125                 | 150(135~165)         | 5                        | 260                | 400                        | 800                | 4.1                        | 6.5               | 0.1         | 165                             |
| 05D181K     | 05D181J    | 115                       | 150                 | 180(162~198)         | 5                        | 320                | 400                        | 800                | 4.9                        | 7.5               | 0.1         | 140                             |
| 05D201K     | 05D201J    | 130                       | 170                 | 200(180~220)         | 5                        | 355                | 400                        | 800                | 6.5                        | 8.5               | 0.1         | 125                             |
| 05D221K     | 05D221J    | 140                       | 180                 | 220(198~242)         | 5                        | 380                | 400                        | 800                | 7.5                        | 9.0               | 0.1         | 110                             |
| 05D241K     | 05D241J    | 150                       | 200                 | 240(216~264)         | 5                        | 415                | 400                        | 800                | 8.0                        | 10.5              | 0.1         | 100                             |
| 05D271K     | 05D271J    | 175                       | 225                 | 270(243~297)         | 5                        | 475                | 400                        | 800                | 8.5                        | 11.0              | 0.1         | 95                              |
| 05D301K     | 05D301J    | 190                       | 250                 | 300(270~330)         | 5                        | 520                | 400                        | 800                | 9.0                        | 12.0              | 0.1         | 85                              |
| 05D331K     | 05D331J    | 210                       | 275                 | 330(297~363)         | 5                        | 570                | 400                        | 800                | 9.5                        | 13.0              | 0.1         | 75                              |
| 05D361K     | 05D361J    | 230                       | 300                 | 360(324~396)         | 5                        | 620                | 400                        | 800                | 10.0                       | 16.0              | 0.1         | 70                              |
| 05D391K     | 05D391J    | 250                       | 320                 | 390(351~429)         | 5                        | 675                | 400                        | 800                | 12.0                       | 17.0              | 0.1         | 65                              |
| 05D431K     | 05D431J    | 275                       | 350                 | 430(387~473)         | 5                        | 745                | 400                        | 800                | 13.0                       | 20.0              | 0.1         | 60                              |
| 05D471K     | 05D471J    | 300                       | 385                 | 470(423~517)         | 5                        | 810                | 400                        | 800                | 15.0                       | 21.0              | 0.1         | 55                              |
| 05D511K     | 05D511J    | 320                       | 415                 | 510(459~561)         | 5                        | 845                | 400                        | 800                | 16.0                       | 22.5              | 0.1         | 50                              |
| 05D561K     | 05D561J    | 350                       | 460                 | 560(504~616)         | 5                        | 920                | 400                        | 800                | 16.0                       | 24.0              | 0.1         | 45                              |
| 05D621K     | 05D621J    | 385                       | 505                 | 620(558~682)         | 5                        | 1025               | 400                        | 800                | 21.0                       | 25.0              | 0.1         | 40                              |
| 05D681K     | 05D681J    | 420                       | 560                 | 680(612~748)         | 5                        | 1120               | 400                        | 800                | 21.0                       | 29.0              | 0.1         | 35                              |
| 05D751K     | 05D751J    | 460                       | 615                 | 750(675~825)         | 5                        | 1240               | 400                        | 800                | 22.4                       | 32.0              | 0.1         | 30                              |

The tolerance of varistor voltage between 18V and 27V is more than 10%.

**ELECTRICAL RATINGS**

| Item                               | Test Condition/Description  | Requirement      |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
|------------------------------------|---|------------------|-----------------------------|-----------------|--------------|-----------------|-----------|--------------|-----------------|--------------|-----------------|------------|--------------|-----------------|--------------|------------------|------------|--------------|-----------------|--------------|------------------|------------|--------------|------------------|--------------|------------------|--|
| Varistor Voltage                   | The voltage between two terminals with the specified measuring current 1mA.DC applied is call Vb.   |                  |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| Maximum Allowable Voltage          | The recommended maximum sine wave voltage (RMS) or the maximum DC voltage can be applied continuously.  |                  |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| Maximum Clamping Voltage           | <p>The maximum voltage between two terminals with the specification standard impulse current.<br/>Applied waveform: 8/20μsec.</p>   |                  | To meet the specified value |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| 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 ±10% when one impulse of 10/1000μsec. or 2 msec. is applied.   |                  |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| Withstanding Surge Current         | The maximum current within the varistor voltage change of ±10% with the standard impulse current (8/20μsec.) applied one time.  |                  |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| Varistor Voltage Temp. Coefficient | $\frac{V_b \text{ at } 20^\circ\text{C} - V_b \text{ at } 70^\circ\text{C}}{V_b \text{ at } 20^\circ\text{C}} \times \frac{1}{50} \times 100 (\% \text{ } ^\circ\text{C})$  | 0.05% / °C max   |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| Surge Life                         | <p>The change of Vb shall be measured after the impulse listed below is applied 10,000 times continuously with the interval of ten seconds at room temperature.</p> <table border="1" data-bbox="395 1451 1246 1973"> <tbody> <tr> <td rowspan="2">5Φ series</td> <td>180K to 680K</td> <td>10A (8/20μsec.)</td> </tr> <tr> <td>820K to 751K</td> <td>20A (8/20μsec.)</td> </tr> <tr> <td rowspan="2">7Φ series</td> <td>180K to 680K</td> <td>25A (8/20μsec.)</td> </tr> <tr> <td>820K to 821K</td> <td>50A (8/20μsec.)</td> </tr> <tr> <td rowspan="2">10Φ series</td> <td>180K to 680K</td> <td>50A (8/20μsec.)</td> </tr> <tr> <td>820K to 112K</td> <td>100A (8/20μsec.)</td> </tr> <tr> <td rowspan="2">14Φ series</td> <td>180K to 680K</td> <td>75A (8/20μsec.)</td> </tr> <tr> <td>820K to 182K</td> <td>150A (8/20μsec.)</td> </tr> <tr> <td rowspan="2">20Φ series</td> <td>180K to 680K</td> <td>100A (8/20μsec.)</td> </tr> <tr> <td>820K to 182K</td> <td>200A (8/20μsec.)</td> </tr> </tbody> </table> | 5Φ series        | 180K to 680K                | 10A (8/20μsec.) | 820K to 751K | 20A (8/20μsec.) | 7Φ series | 180K to 680K | 25A (8/20μsec.) | 820K to 821K | 50A (8/20μsec.) | 10Φ series | 180K to 680K | 50A (8/20μsec.) | 820K to 112K | 100A (8/20μsec.) | 14Φ series | 180K to 680K | 75A (8/20μsec.) | 820K to 182K | 150A (8/20μsec.) | 20Φ series | 180K to 680K | 100A (8/20μsec.) | 820K to 182K | 200A (8/20μsec.) | $\frac{\Delta V_b}{V_b} \leq \pm 10\%$ |
| 5Φ series                          | 180K to 680K  |                  | 10A (8/20μsec.)             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
|                                    | 820K to 751K  | 20A (8/20μsec.)  |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| 7Φ series                          | 180K to 680K  | 25A (8/20μsec.)  |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
|                                    | 820K to 821K  | 50A (8/20μsec.)  |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| 10Φ series                         | 180K to 680K  | 50A (8/20μsec.)  |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
|                                    | 820K to 112K  | 100A (8/20μsec.) |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| 14Φ series                         | 180K to 680K  | 75A (8/20μsec.)  |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
|                                    | 820K to 182K  | 150A (8/20μsec.) |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
| 20Φ series                         | 180K to 680K  | 100A (8/20μsec.) |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |
|                                    | 820K to 182K  | 200A (8/20μsec.) |                             |                 |              |                 |           |              |                 |              |                 |            |              |                 |              |                  |            |              |                 |              |                  |            |              |                  |              |                  |  |

**MARKING CODE**



- ① ZOV Logo
- ② Varistor Voltage
- ③ UL Accreditation Logo
- ④ CSA Accreditation Logo
- ⑤ VDE Accreditation Logo
- ⑥ “J” is High Surge Code,not “J” is Standard Surge
- ⑦ Disk Size
- ⑧ “H” is Halogen Free Code,not “H” is Halogen
- ⑨ Date Code
- ⑩ Product Line Code