# Radial Lead Varistor (MOV)

## 05D Series

### Description

The 05D series radial leaded varistors provides an ideal circuit protection solution for lower DC voltage applications by offering higher surge ratings than ever before available in such small discs.

The maximum peak surge current rating can reach up to 0.8KA (8/20 μs pulse) to protect against high peak surges, including indirect lightning strike interference, system switching transients and abnormal fast transients from the power source.



### Features

- Wide operating voltage (V1mA) range from 8V to 750V
- Fast responding to transient over-voltage
- Large absorbing transient energy capability
- Low clamping ratio and no following-on current
- Meets MSL level 1, per J-STD-020

### Applicable

- 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

| | |
|---|---|
| **Material** | No Radioactive Material |
| **Operating Temperature** | -55~85°C |
| **Storage Temperature** | -55~125°C |
| **Body** | Nickel Plated |
| **Leads** | Tin Plated |
| **Devices with No lead** | Nickel Plated |


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### Specifications – General Characteristics (25±5° C)

| Type Number | | Maximum Allowable voltage | | Varistor Voltage | Maximum Clamping Voltage | | Withstanding Surge Current | | | | Maximum Energy (10/1000μs) | | Rated Power | Typical Capacitance (Reference) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | I(A) Standard | | I(A) High Surge | | | | | |
| Standard | High Surge | $V_{AC}$ (V) | $V_{DC}$ (V) | V1mA (V) | $I_P$ (A) | $V_C$ (V) | 1 Time | 2 Times | 1 Time | 2 Times | (J) Standard | (J) High Surge | (W) | @1KHZ (pf) |
| 05D180K | 05D180KJ | 11 | 14 | 18(15~21.6) | 1 | 40 | 100 | 50 | 250 | 125 | 0.4 | 0.6 | 0.01 | 1400 |
| 05D220K | 05D220KJ | 14 | 18 | 22(19.5~26) | 1 | 48 | 100 | 50 | 250 | 125 | 0.5 | 0.7 | 0.01 | 1150 |
| 05D270K | 05D270KJ | 17 | 22 | 27(24~30) | 1 | 60 | 100 | 50 | 250 | 125 | 0.6 | 0.9 | 0.01 | 930 |
| 05D330K | 05D330KJ | 20 | 26 | 33(29.5~36.5) | 1 | 73 | 100 | 50 | 250 | 125 | 0.8 | 1.1 | 0.01 | 760 |
| 05D390K | 05D390KJ | 25 | 31 | 39(35~43) | 1 | 80 | 100 | 50 | 250 | 125 | 0.9 | 1.2 | 0.01 | 640 |
| 05D470K | 05D470KJ | 30 | 38 | 47(42~54) | 1 | 104 | 100 | 50 | 250 | 125 | 1.1 | 1.5 | 0.01 | 530 |
| 05D560K | 05D560KJ | 35 | 45 | 56(50~62) | 1 | 123 | 100 | 50 | 250 | 125 | 1.3 | 1.8 | 0.01 | 450 |
| 05D680K | 05D680KJ | 40 | 56 | 68(61~75) | 1 | 150 | 100 | 50 | 250 | 125 | 1.6 | 2.2 | 0.01 | 370 |
| 05D820K | 05D820KJ | 50 | 65 | 82(74~90) | 5 | 145 | 400 | 200 | 800 | 600 | 2.5 | 4.0 | 0.1 | 300 |
| 05D101K | 05D101KJ | 60 | 85 | 100(90~110) | 5 | 177 | 400 | 200 | 800 | 600 | 3.0 | 4.1 | 0.1 | 250 |
| 05D121K | 05D121KJ | 75 | 100 | 120(108~132) | 5 | 210 | 400 | 200 | 800 | 600 | 4.0 | 4.9 | 0.1 | 210 |
| 05D151K | 05D151KJ | 95 | 125 | 150(135~165) | 5 | 260 | 400 | 200 | 800 | 600 | 4.1 | 6.5 | 0.1 | 165 |
| 05D181K | 05D181KJ | 115 | 150 | 180(162~198) | 5 | 320 | 400 | 200 | 800 | 600 | 4.9 | 7.5 | 0.1 | 140 |
| 05D201K | 05D201KJ | 130 | 170 | 200(180~220) | 5 | 355 | 400 | 200 | 800 | 600 | 6.5 | 8.5 | 0.1 | 125 |
| 05D221K | 05D221KJ | 140 | 180 | 220(198~242) | 5 | 380 | 400 | 200 | 800 | 600 | 7.5 | 9.0 | 0.1 | 110 |
| 05D241K | 05D241KJ | 150 | 200 | 240(216~264) | 5 | 415 | 400 | 200 | 800 | 600 | 8.0 | 10.5 | 0.1 | 100 |
| 05D271K | 05D271KJ | 175 | 225 | 270(243~297) | 5 | 475 | 400 | 200 | 800 | 600 | 8.5 | 11.0 | 0.1 | 95 |
| 05D301K | 05D301KJ | 190 | 250 | 300(270~330) | 5 | 520 | 400 | 200 | 800 | 600 | 9.0 | 12.0 | 0.1 | 85 |
| 05D331K | 05D331KJ | 210 | 275 | 330(297~363) | 5 | 570 | 400 | 200 | 800 | 600 | 9.5 | 13.0 | 0.1 | 75 |
| 05D361K | 05D361KJ | 230 | 300 | 360(324~396) | 5 | 620 | 400 | 200 | 800 | 600 | 10.0 | 16.0 | 0.1 | 70 |
| 05D391K | 05D391KJ | 250 | 320 | 390(351~429) | 5 | 675 | 400 | 200 | 800 | 600 | 12.0 | 17.0 | 0.1 | 65 |
| 05D431K | 05D431KJ | 275 | 350 | 430(387~473 | 5 | 745 | 400 | 200 | 800 | 600 | 13.0 | 20.0 | 0.1 | 60 |
| 05D471K | 05D471KJ | 300 | 335 | 470(423~517) | 5 | 810 | 400 | 200 | 800 | 600 | 15.0 | 21.0 | 0.1 | 55 |
| 05D511K | 05D511KJ | 320 | 415 | 510(459~561) | 5 | 845 | 400 | 200 | 800 | 600 | 16.0 | 22.5 | 0.1 | 50 |
| 05D561K | 05D561KJ | 350 | 460 | 560(504~616) | 5 | 920 | 400 | 200 | 800 | 600 | 16.0 | 24.0 | 0.1 | 50 |
| 05D621K | 05D621KJ | 385 | 505 | 620(558~682) | 5 | 1025 | 400 | 200 | 800 | 600 | 21.0 | 25.0 | 0.1 | 40 |
| 05D681K | 05D681KJ | 420 | 560 | 680(612~748) | 5 | 1120 | 400 | 200 | 800 | 600 | 21.0 | 29.0 | 0.1 | 35 |
| 05D751K | 05D751KJ | 460 | 615 | 750(675~825) | 5 | 1240 | 400 | 200 | 800 | 600 | 22.4 | 32.0 | 0.1 | 30 |

**Remark:** Voltage>33V, K is ±10%



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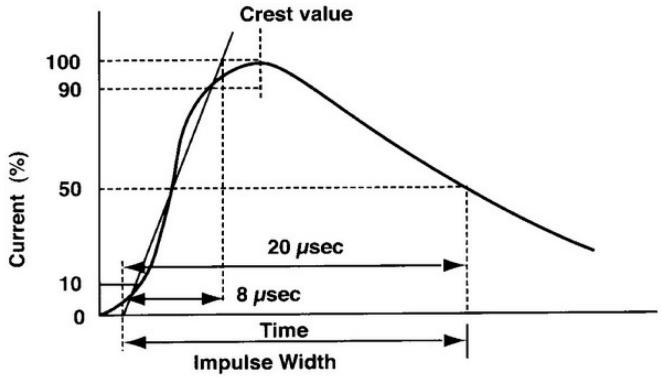
### Electrical Rating

| Item | Test Condition / Description | Requirement |
|---|---|---|
| **Maximum Allowable Voltage** | The recommended maximum sine wave voltage (RMS) or the maximum DC voltage can be applied continuously. | To meet the specified value |
| **Varistor Voltage** | The voltage between two terminals with the specified measuring current 1mA.DC applied is call Vb. | |
| **Maximum Clamping Voltage** | The maximum voltage between two terminals with the specification standard impulse current.<br>Applied waveform: 8/20μs<br> | |
| **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 10/1000μs. 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** | $\frac{\text{Vb at 20°C - Vb at 70°C}}{\text{Vb at 20°C}} \times \frac{1}{50} \times 100(\%/°C)$ | 0.05% / °C max |
| **Surge Life** | 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. | △Vb / Vb ≤ ±10% |

| | | |
|---|---|---|
| 5D Series | 180K to 680K | 10A (8/20μs) |
| | 820K to 751K | 20A (8/20μs) |
| 7D Series | 180K to 680K | 25A (8/20μs) |
| | 820K to 751K | 50A (8/20μs) |
| 10D Series | 180K to 680K | 50A (8/20μs) |
| | 820K to 751K | 100A (8/20μs) |
| 14D Series | 180K to 680K | 75A (8/20μs) |
| | 820K to 751K | 150A (8/20μs) |
| 20D Series | 180K to 680K | 100A (8/20μs) |
| | 820K to 751K | 200A (8/20μs) |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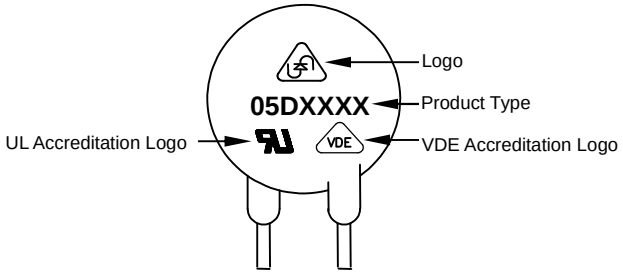
### Part Numbering

**05 D XXX K J**

- J: High Surge, without: Standard
- Tolerance: K: ±10%, L: ±15%, M: ±20%
- Varistor Voltage
- Type: D: Disk, S: Square
- Element Diameter

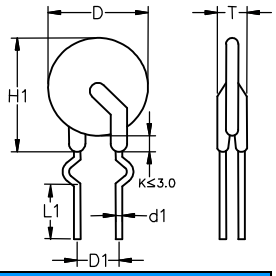
### Part Marking

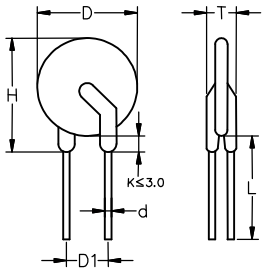



### Packaging Information

| Part Number | Quantity | Packaging Option | Packaging Specification |
|---|---|---|---|
| 05DXXXXX | 1000 | BOX | Bulk Pack |

### Package Dimensions Unit: mm




| TABLE1 | |
|---|---|
| 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.) | TABLE2 |
| d(±0.05) | 0.6 |
| d1(±0.4) | 1.2 |

| TABLE2 | | | |
|---|---|---|---|
| Model | T(max.) | Model | T(max.) |
| 180K | 4.5 | 221K | 4.5 |
| 220K | 4.6 | 241K | 4.6 |
| 270K | 4.7 | 271K | 4.9 |
| 330K | 4.9 | 301K | 5.0 |
| 390K | 4.8 | 331K | 5.1 |
| 470K | 4.9 | 361K | 5.2 |
| 560K | 5.0 | 391K | 5.4 |
| 680K | 5.2 | 431K | 5.7 |
| 820K | 4.1 | 471K | 6.0 |
| 101K | 4.3 | 511K | 6.2 |
| 121K | 4.5 | 561K | 6.5 |
| 151K | 4.8 | 621K | 6.4 |
| 181K | 4.3 | 681K | 6.5 |
| 201K | 4.4 | 751K | 6.5 |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