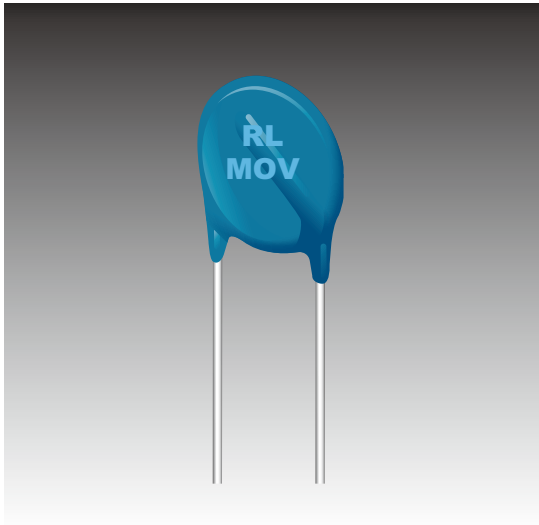


Metal Oxide Varistors

Varistor>10D180~182KJ Series



Applications

- 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.

Features

- Wide operating voltage (V1mA) range from 8V to 1800V.
- Fast responding to transient over-voltage.
- Large absorbing transient energy capability.
- Low clamping ratio and no following-on current.

General Information

The MOV-10DxxxK Series of 10 mm radial leaded varistor devices protects against overvoltage transients such as lightning, power contact and power induction. The metal oxide varistors offer a choice of varistor voltages from 18 V to 1800 V and Vrms voltages from 11 V to 1000 V.

The devices have a high current handling, high energy absorption capability and fast response times to protect against transient faults up to rated limits.

General Characteristics

No Radioactive Material

Storage Temperature: -55°C to +125°C

Operating Temperature: -55°C to +85°C

Body: Nickel Plated

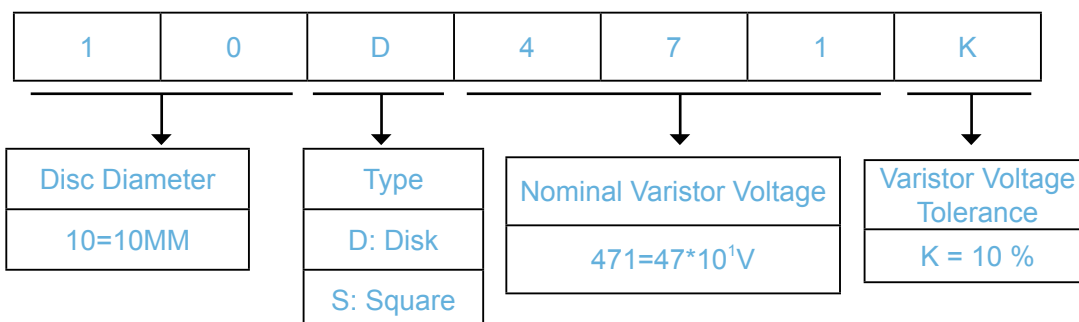
Leads: Surface-mount, Axial Devices: Tin Plated

Devices with No Leads: Nickel Plated

Packaging Information

| Part Number | Component package | Quantity | Packaging Option | Packaging Specification |
|-------------|-------------------|----------|------------------|-------------------------|
| 10D | 10.0 | 500 | BOX | 1000 |

Product Name



Electrical Characteristics (@ TA = 25 °C Unless Otherwise Noted)

| Type 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 _{AC} (V) | V _{DC} (V) | V _{1mA} (V) | I _P (A) | V _C (V) | I(A) Standard | I(A) High Surge | (J) Standard | (J) High Surge | (W) | @1KHz(pf) |
| 10D180K | 10D180KJ | 11 | 14 | 18(15~21.6) | 5 | 36 | 500 | 1000 | 2.1 | 3.0 | 0.05 | 5600 |
| 10D220K | 10D220KJ | 14 | 18 | 22(19.5~26) | 5 | 43 | 500 | 1000 | 2.5 | 5.0 | 0.05 | 4500 |
| 10D270K | 10D270KJ | 17 | 22 | 27(24~30) | 5 | 53 | 500 | 1000 | 3.0 | 6.0 | 0.05 | 3700 |
| 10K330K | 10K330KJ | 20 | 26 | 33(29.5~36.5) | 5 | 66 | 500 | 1000 | 4.0 | 7.0 | 0.05 | 3000 |
| 10D390K | 10D390KJ | 25 | 31 | 39(35~43) | 5 | 77 | 500 | 1000 | 4.6 | 9.0 | 0.05 | 2400 |
| 10D470K | 10D470KJ | 30 | 38 | 47(42~54) | 5 | 93 | 500 | 1000 | 5.5 | 11.0 | 0.05 | 2100 |
| 10D560K | 10D560KJ | 35 | 45 | 56(50~62) | 5 | 100 | 500 | 1000 | 7.0 | 13.0 | 0.05 | 1800 |
| 10D680K | 10D680KJ | 40 | 56 | 68(61~75) | 5 | 135 | 500 | 1000 | 8.2 | 15.0 | 0.05 | 1500 |
| 10D820K | 10D820KJ | 50 | 65 | 82(74~90) | 25 | 135 | 2500 | 3500 | 12.0 | 17.0 | 0.4 | 1200 |
| 10D101K | 10D101KJ | 60 | 85 | 100(90~110) | 25 | 165 | 2500 | 3500 | 15.0 | 18.0 | 0.4 | 1000 |
| 10D121K | 10D121KJ | 75 | 100 | 120(108~132) | 25 | 200 | 2500 | 3500 | 18.0 | 21.0 | 0.4 | 830 |
| 10D151K | 10D151KJ | 95 | 125 | 150(135~165) | 25 | 250 | 2500 | 3500 | 22.0 | 25.0 | 0.4 | 670 |
| 10D181K | 10D181KJ | 115 | 150 | 180(162~198) | 25 | 300 | 2500 | 3500 | 27.0 | 30.0 | 0.4 | 560 |
| 10D201K | 10D201KJ | 130 | 170 | 200(180~220) | 25 | 340 | 2500 | 3500 | 30.0 | 35.0 | 0.4 | 500 |
| 10D221K | 10D221KJ | 140 | 180 | 220(198~242) | 25 | 360 | 2500 | 3500 | 32.0 | 39.0 | 0.4 | 450 |
| 10D241K | 10D241KJ | 150 | 200 | 240(216~264) | 25 | 395 | 2500 | 3500 | 35.0 | 42.0 | 0.4 | 420 |
| 10D271K | 10D271KJ | 175 | 225 | 270(243~297) | 25 | 455 | 2500 | 3500 | 40.0 | 49.0 | 0.4 | 370 |
| 10D301K | 10D301KJ | 190 | 250 | 300(270~330) | 25 | 500 | 2500 | 3500 | 40.0 | 54.0 | 0.4 | 330 |
| 10D331K | 10D331KJ | 210 | 275 | 330(297~363) | 25 | 550 | 2500 | 3500 | 40.0 | 58.0 | 0.4 | 300 |
| 10D361K | 10D361KJ | 230 | 300 | 360(324~396) | 25 | 595 | 2500 | 3500 | 43.0 | 65.0 | 0.4 | 280 |
| 10D391K | 10D391KJ | 250 | 320 | 390(351~429) | 25 | 650 | 2500 | 3500 | 47.0 | 70.0 | 0.4 | 260 |
| 10D431K | 10D431KJ | 275 | 350 | 430(387~473) | 25 | 710 | 2500 | 3500 | 60.0 | 80.0 | 0.4 | 230 |
| 10D471K | 10D471KJ | 300 | 385 | 470(423~517) | 25 | 775 | 2500 | 3500 | 65.0 | 85.0 | 0.4 | 210 |
| 10D511K | 10D511KJ | 320 | 415 | 510(459~561) | 25 | 845 | 2500 | 3500 | 70.0 | 90.0 | 0.4 | 200 |
| 10D561K | 10D561KJ | 350 | 460 | 560(504~616) | 25 | 925 | 2500 | 3500 | 70.0 | 92.0 | 0.4 | 180 |
| 10D621K | 10D621KJ | 385 | 505 | 620(558~682) | 25 | 1025 | 2500 | 3500 | 70.0 | 95.0 | 0.4 | 160 |
| 10D681K | 10D681KJ | 420 | 560 | 680(612~748) | 25 | 1120 | 2500 | 3500 | 70.0 | 98.0 | 0.4 | 150 |
| 10D751K | 10D751KJ | 460 | 615 | 750(675~825) | 25 | 1240 | 2500 | 3500 | 70.0 | 100.0 | 0.4 | 130 |
| 10D781K | 10D781KJ | 485 | 640 | 780(702~858) | 25 | 1290 | 2500 | 3500 | 80.0 | 105.0 | 0.4 | 130 |
| 10D821K | 10D821KJ | 510 | 670 | 820(738~902) | 25 | 1355 | 2500 | 3500 | 85.0 | 110.0 | 0.4 | 120 |
| 10D911K | 10D911KJ | 550 | 745 | 910(819~1001) | 25 | 1500 | 2500 | 3500 | 93.0 | 130.0 | 0.4 | 110 |
| 10D102K | 10D102KJ | 625 | 825 | 1000(900~1100) | 25 | 1650 | 2500 | 3500 | 102.0 | 140.0 | 0.4 | 100 |
| 10D112K | 10D112KJ | 680 | 895 | 1100(990~1210) | 25 | 1815 | 2500 | 3500 | 115.0 | 155.0 | 0.4 | 90 |
| 10D182K | 10D182KJ | 1000 | 1465 | 1800(1620~1980) | 25 | 2970 | 2500 | 3500 | 133.0 | 250.0 | 0.4 | 70 |

Electrical Rating

| Item | Test Condition / Description | Requirement | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|--|--|------------------|---------------------|------------------------|---------------------|------------------------|-----------------|---------------------|------------------------|---------------------|------------------------|-------------------|---------------------|------------------------|---------------------|-------------------------|-------------------|---------------------|------------------------|---------------------|-------------------------|-------------------|---------------------|-------------------------|---------------------|
| Varistor Voltage | The voltage between two terminals with the specified measuring current 1mA.DC applied is call 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. | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rated Wattaget | The maximum average power that can be applied within the specified ambient temperature. | | | | | | | | | | | | | | | | | | | | | | | | | |
| I _{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. | $\frac{\Delta V_b}{V_b} \leq \pm 10\%$ | | | | | | | | | | | | | | | | | | | | | | | | |
| 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"> <tbody> <tr> <td rowspan="2">5D 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">7Dseries</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">10D series</td> <td>180K to 680K</td> <td>50A (8/20µsec.)</td> </tr> <tr> <td>820K to 182K</td> <td>100A (8/20µsec.)</td> </tr> <tr> <td rowspan="2">14D 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">20D 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> | | 5D series | 180K to 680K | 10A (8/20µsec.) | 820K to 751K | 20A (8/20µsec.) | 7Dseries | 180K to 680K | 25A (8/20µsec.) | 820K to 821K | 50A (8/20µsec.) | 10D series | 180K to 680K | 50A (8/20µsec.) | 820K to 182K | 100A (8/20µsec.) | 14D series | 180K to 680K | 75A (8/20µsec.) | 820K to 182K | 150A (8/20µsec.) | 20D series | 180K to 680K | 100A (8/20µsec.) | 820K to 182K |
| 5D series | 180K to 680K | 10A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 820K to 751K | 20A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |
| 7Dseries | 180K to 680K | 25A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 820K to 821K | 50A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |
| 10D series | 180K to 680K | 50A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 820K to 182K | 100A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |
| 14D series | 180K to 680K | 75A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 820K to 182K | 150A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |
| 20D series | 180K to 680K | 100A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |
| | 820K to 182K | 200A (8/20µsec.) | | | | | | | | | | | | | | | | | | | | | | | | |

Current Energy and Power Dissipation Ratings

Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be within the specifications shown on the Device Ratings and Specifications Table for the specific

device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.

Figure 1A - Power Derating for Epoxy Coated

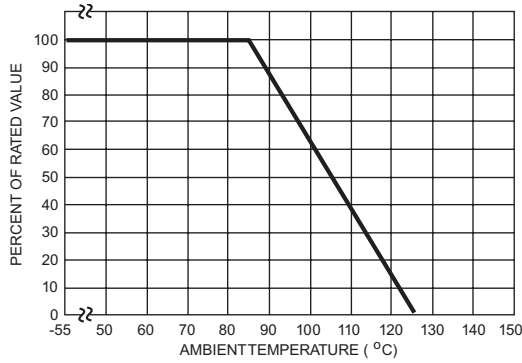
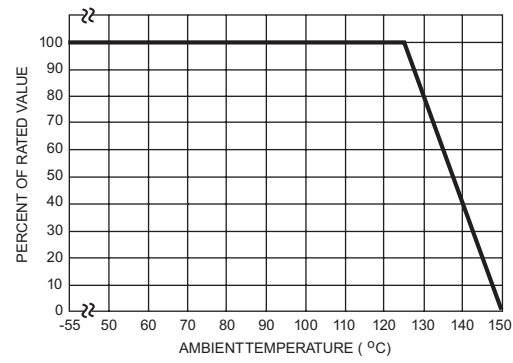


Figure 1B - Power Derating for Pholenic Coated



Peak Pulse Current Test Waveform

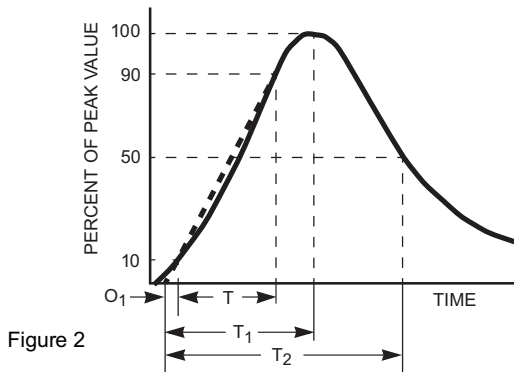


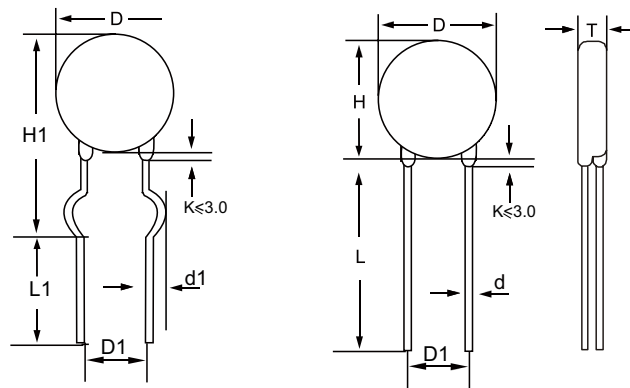
Figure 2

- O_1 = Virtual Origin of Wave
- T = Time from 10% to 90% of Peak
- T_1 = Rise Time = $1.25 \times T$
- T_2 = Decay Time

Example - For an 8/20 μ s Current Waveform:

- $8\mu\text{s} = T_1 = \text{Rise Time}$
- $20\mu\text{s} = T_2 = \text{Decay Time}$

Package Dimensions



Unit:mm

TABLE 1

| Symbol | Dimensions |
|----------|------------|
| H(max.) | 12.0 |
| H1(max.) | 13.5 |
| L(min.) | 20.0 |
| L1(min.) | 15.0 |
| D(max.) | 9.0 |
| D1(±0.8) | 5.0 |
| T(max.) | TABLE 2 |
| d(±0.05) | 0.6 |
| d1(±0.4) | 1.2 |

TABLE 2

| 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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