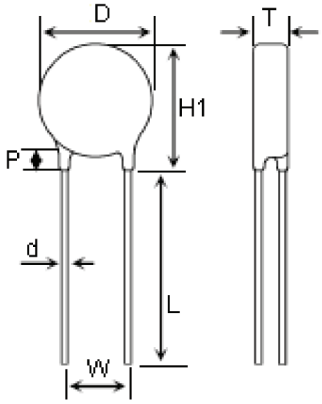
# Metal Oxide Varistors

## Straight Lead




## Dimensions Table

| Series | 5D | 7D | 10D | 14D | 20D |
|---|---|---|---|---|---|
| D max | 7 | 9.5 | 14 | 17.5 | 24 |
| d* | 0.6 | 0.6 | 0.8 | 0.8 | 1 |
| W** | 5 | 5 | 7.5 | 7.5 | 10 |
| H max | 12.5 | 14.5 | 20 | 22.5 | 29.5 |
| H1 max | 10 | 12 | 17 | 20.5 | 28 |
| T max | 4.9 | 4.9 | 8.5 | 8.5 | 9 |
| P max | 3 | 3 | 3 | 3 | 3 |

* ±0.02, ** ±1

Dimensions : Millimetres

## Characteristics

- High performance transient voltage suppression
- Short response time to surge voltage
- Low standby power dissipation
- Excellent clamping characteristics
- High performance withstanding surge currents
- High reliability

## Applications

- Surge protection in:
  - Consumer electronics
  - Industrial electronics
  - Communication electronics
  - Measuring and controlling systems
  - Electronic home appliances
- Protection against surges induced by lighting striking incoming power lines
- Suppression of surges caused by switching inductive loads such as transformers, relays and coils
- Protection of rectification diodes, SCRs, power transistors, semiconductor devices, etc

## Definition of Varistor Terms

**Rated RMS Voltage, Rated DC Voltage**

The maximum designated values of power system voltage that may be applied continuously between the terminals of a device

**Varistor Voltage**

Test characteristic that is used to classify varistors by type. A test current of 1 mA DC is typically used to determine varistor voltage classification type. Varistor voltage clamping characteristics can be defined at various test levels

**Rated Peak Single Pulse Transient Current**

Maximum surge current, 8 / 20 µs waveform which a varistor is rated to withstand for a single surge

**Rated Single Pulse Transient Energy**

Maximum allowable energy for a single impulse (see specified waveforms)

**Maximum Clamping Voltage**

Measured peak voltage across the device terminals when a current impulse of specified amplitude and waveform is conducted through the varistor

**Typical Capacitance**

Typical capacitance values are measured at a test frequency of 1 KHz. Capacitance values are only for reference purpose only, not subject to outgoing inspection

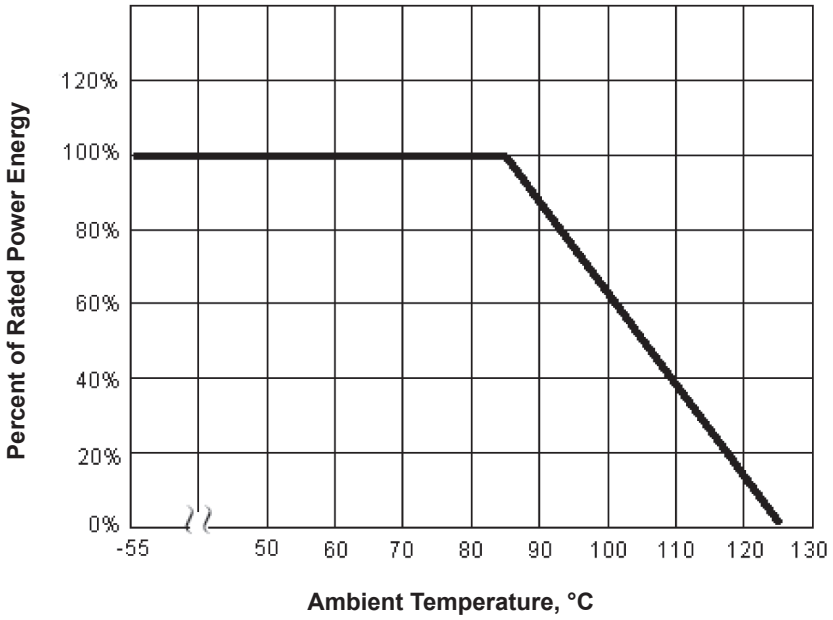
## General Characteristics

| | |
|---|---|
| Storage Temperature | : -55°C to +125°C |
| Operating Surface Temperature | : 125°C |
| Operating Ambient Temperature | : -55°C to +85°C (without derating) |
| Maximum Voltage Temperature Coefficient | : < -0.05% / °C |
| Minimum Insulation Resistance | : 1,000 MΩ |
| Hi Pot (Leads To Case, 1 Minimum) | : 2,500V DC |
| Typical Response Time | : <15 nano-seconds |
| Epoxy Rating | : 94V-0 |
| Current / Energy Derating (>85°C) | : -2.5% / °C |
| DC Leakage Current | : 200 µA maximum (at rated dc working voltage) |
| Solderability | : MIL-STD-202F |

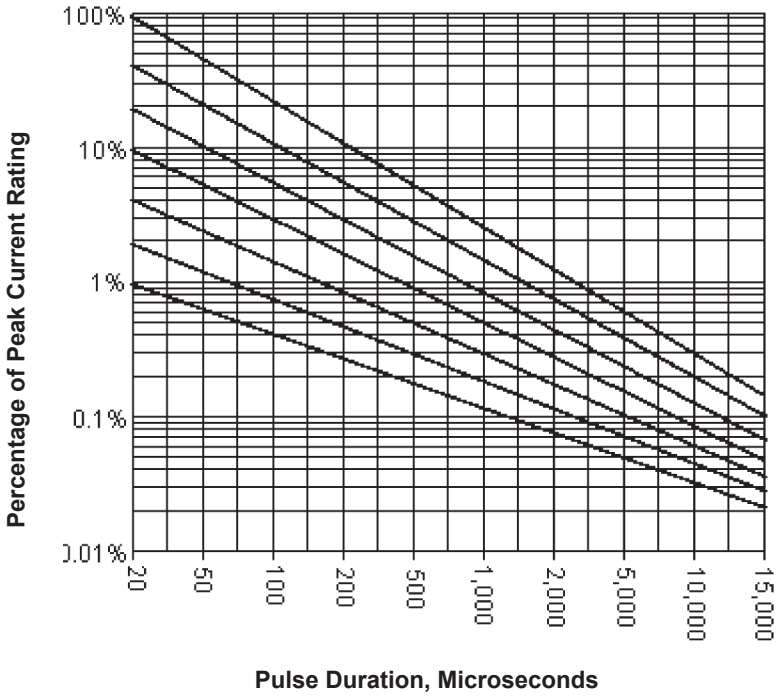
## Power Dissipation Ratings (P, in-watts)

| Disc Size | 11V AC to 40V AC | 50V AC to 680V AC |
|---|---|---|
| 5 mm | 0.01 | 0.15 |
| 7 mm | 0.02 | 0.25 |
| 10 mm | 0.05 | 0.4 |
| 14 mm | 0.1 | 0.6 |
| 20 mm | 0.2 | 1 |

## Energy Derating Versus Temperature




## Peak Current Per Pulse Versus Pulse Duration




**Number of Pulses on Order from 100% Respectively :**

1 Pulse
10 Pulses
$10^2$ Pulses
$10^3$ Pulses
$10^4$ Pulses
$10^5$ Pulses
$10^6$ Pulses

## Varistors - 5D Series

| Max. Allowable Voltage | | Varistor Voltage | | Withstanding Surge Current (8 / 20 µs) | Max. Clamping Voltage (8 / 20 µs) | | Max. Energy | | Typical Capacitance | Part Number |
|---|---|---|---|---|---|---|---|---|---|---|
| ACrms | DC | DC | Volts | 1 time | Vc | Ip | 2 ms | 10 / 1,000 s | at 1 KHz | |
| Volts | Volts | Min. | Max. | Amperes | Volts | Amperes | Joules | | PF | |
| 11 | 14 | 16 | 20 | 100 | 36 | 1 | 0.4 | 0.6 | 1,500 | MCV180K05DS |
| 14 | 18 | 20 | 24 | 100 | 43 | 1 | 0.6 | 0.8 | 1,260 | MCV220K05DS |
| 17 | 22 | 24 | 30 | 100 | 53 | 1 | 0.7 | 0.9 | 1,050 | MCV270K05DS |
| 20 | 26 | 30 | 36 | 100 | 65 | 1 | 0.9 | 1.2 | 850 | MCV330K05DS |
| 25 | 31 | 35 | 43 | 100 | 77 | 1 | 1.1 | 1.3 | 600 | MCV390K05DS |
| 30 | 38 | 42 | 52 | 100 | 93 | 1 | 1.4 | 1.6 | 500 | MCV470K05DS |
| 35 | 45 | 50 | 62 | 100 | 110 | 1 | 1.5 | 1.9 | 400 | MCV560K05DS |
| 40 | 56 | 61 | 75 | 100 | 135 | 1 | 1.8 | 2.3 | 360 | MCV680K05DS |
| 50 | 66 | 74 | 90 | 400 | 135 | 5 | 2.4 | 3 | 350 | MCV820K05DS |
| 75 | 102 | 108 | 132 | 400 | 200 | 5 | 3 | 5 | 250 | MCV121K05DS |
| 95 | 127 | 135 | 165 | 400 | 250 | 5 | 3.5 | 5.5 | 180 | MCV151K05DS |
| 130 | 175 | 185 | 225 | 400 | 340 | 5 | 5 | 8.5 | 140 | MCV201K05DS |
| 150 | 200 | 216 | 264 | 400 | 395 | 5 | 6.5 | 10 | 115 | MCV241K05DS |
| 230 | 300 | 324 | 396 | 400 | 595 | 5 | 9 | 13 | 80 | MCV361K05DS |
| 250 | 330 | 351 | 429 | 400 | 650 | 5 | 10 | 15 | 75 | MCV391K05DS |
| 275 | 370 | 387 | 473 | 400 | 710 | 5 | 11 | 16 | 65 | MCV431K05DS |
| 300 | 385 | 423 | 517 | 400 | 775 | 5 | 13 | 19 | 55 | MCV471K05DS |
| 420 | 560 | 612 | 748 | 400 | 1,120 | 5 | 21 | 30 | 30 | MCV681K05DS |

## Varistors - 7D Series

| Max. Allowable Voltage | | Varistor Voltage | | Withstanding Surge Current (8 / 20 µs) | Max. Clamping Voltage (8 / 20 µs) | | Max. Energy | | Typical Capacitance | Part Number |
|---|---|---|---|---|---|---|---|---|---|---|
| ACrms | DC | DC | Volts | 1 time | Vc | Ip | 2 ms | 10 / 1,000 s | at 1 KHz | |
| Volts | Volts | Min. | Max. | Amperes | Volts | Amperes | Joules | | PF | |
| 11 | 14 | 16 | 20 | 250 | 36 | 2.5 | 0.8 | 1 | 2,900 | MCV180K07DS |
| 14 | 18 | 20 | 24 | 250 | 43 | 2.5 | 0.9 | 1.3 | 2,400 | MCV220K07DS |
| 17 | 22 | 24 | 30 | 250 | 53 | 2.5 | 1 | 1.4 | 1,800 | MCV270K07DS |
| 20 | 26 | 30 | 36 | 250 | 65 | 2.5 | 1.2 | 1.7 | 1,500 | MCV330K07DS |
| 25 | 31 | 35 | 43 | 250 | 77 | 2.5 | 1.5 | 2.1 | 1,230 | MCV390K07DS |
| 30 | 38 | 42 | 52 | 250 | 93 | 2.5 | 1.8 | 2.5 | 950 | MCV470K07DS |
| 35 | 45 | 50 | 62 | 250 | 110 | 2.5 | 2.2 | 3.1 | 890 | MCV560K07DS |
| 40 | 56 | 61 | 75 | 250 | 135 | 2.5 | 2.5 | 3.8 | 850 | MCV680K07DS |
| 50 | 66 | 74 | 90 | 1,200 | 135 | 10 | 3.5 | 5.5 | 830 | MCV820K07DS |
| 75 | 102 | 108 | 132 | 1,200 | 200 | 10 | 5 | 7.8 | 570 | MCV121K07DS |
| 95 | 127 | 135 | 165 | 1,200 | 250 | 10 | 6.5 | 9.7 | 400 | MCV151K07DS |
| 130 | 175 | 185 | 225 | 1,200 | 340 | 10 | 10 | 13 | 275 | MCV201K07DS |
| 150 | 200 | 216 | 264 | 1,200 | 395 | 10 | 11 | 16 | 230 | MCV241K07DS |
| 230 | 300 | 324 | 396 | 1,200 | 595 | 10 | 15 | 25 | 155 | MCV361K07DS |
| 250 | 330 | 351 | 429 | 1,200 | 650 | 10 | 17 | 26 | 145 | MCV391K07DS |
| 275 | 370 | 387 | 473 | 1,200 | 710 | 10 | 20 | 28 | 130 | MCV431K07DS |
| 300 | 385 | 423 | 517 | 1,200 | 775 | 10 | 21 | 30 | 115 | MCV471K07DS |
| 420 | 560 | 612 | 748 | 1,200 | 1120 | 10 | 32 | 45 | 78 | MCV681K07DS |

## Varistors - 10D Series

| Max. Allowable Voltage | | Varistor Voltage | | Withstanding Surge Current (8 / 20 µs) | Max.Clamping Voltage (8 / 20 µs) | | Max. Energy | | Typical Capacitance | Part Number |
|---|---|---|---|---|---|---|---|---|---|---|
| ACrms | DC | DC | Volts | 1 time | Vc | Ip | 2 ms | 10 / 1,000 s | at 1 KHz | |
| Volts | Volts | Min. | Max. | Amperes | Volts | Amperes | Joules | | PF | |
| 11 | 14 | 16 | 20 | 500 | 36 | 5 | 1.5 | 2.1 | 6,000 | MCV180K10DS |
| 14 | 18 | 20 | 24 | 500 | 43 | 5 | 2 | 2.5 | 5,000 | MCV220K10DS |
| 17 | 22 | 24 | 30 | 500 | 53 | 5 | 2.5 | 3 | 4,000 | MCV270K10DS |
| 20 | 26 | 30 | 36 | 500 | 65 | 5 | 3 | 4 | 3,500 | MCV330K10DS |
| 25 | 31 | 35 | 43 | 500 | 77 | 5 | 3.5 | 4.6 | 3,100 | MCV390K10DS |
| 30 | 38 | 42 | 52 | 500 | 93 | 5 | 4.5 | 5.5 | 2,800 | MCV470K10DS |
| 35 | 45 | 50 | 62 | 500 | 110 | 5 | 5.5 | 7 | 2,400 | MCV560K10DS |
| 40 | 56 | 61 | 75 | 500 | 135 | 5 | 6.5 | 8.2 | 2,100 | MCV680K10DS |
| 50 | 66 | 74 | 90 | 2,500 | 135 | 25 | 8 | 12 | 1,600 | MCV820K10DS |
| 75 | 102 | 108 | 132 | 2,500 | 200 | 25 | 12 | 18 | 1,200 | MCV121K10DS |
| 95 | 127 | 135 | 165 | 2,500 | 250 | 25 | 16 | 22 | 1,100 | MCV151K10DS |
| 130 | 175 | 185 | 225 | 2,500 | 340 | 25 | 20 | 30 | 640 | MCV201K10DS |
| 150 | 200 | 216 | 264 | 2,500 | 395 | 25 | 25 | 35 | 560 | MCV241K10DS |
| 230 | 300 | 324 | 396 | 2,500 | 595 | 25 | 35 | 47 | 380 | MCV361K10DS |
| 250 | 330 | 351 | 429 | 2,500 | 650 | 25 | 40 | 60 | 350 | MCV391K10DS |
| 275 | 370 | 387 | 473 | 2,500 | 710 | 25 | 45 | 65 | 310 | MCV431K10DS |
| 300 | 385 | 423 | 517 | 2,500 | 775 | 25 | 46 | 70 | 280 | MCV471K10DS |
| 420 | 560 | 612 | 748 | 2,500 | 1,120 | 25 | 50 | 74 | 130 | MCV681K10DS |

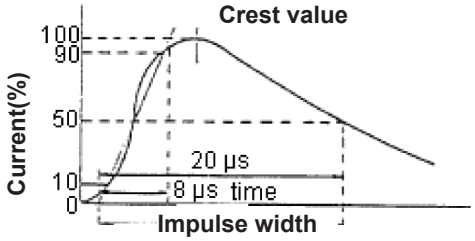
## Varistors - 14D Series

| Max. Allowable Voltage | | Varistor Voltage | | Withstanding Surge Current (8 / 20 µs) | Max. Clamping Voltage (8 / 20 µs) | | Max. Energy | | Typical Capacitance | Part Number |
|---|---|---|---|---|---|---|---|---|---|---|
| ACrms | DC | DC | Volts | 1 time | Vc | Ip | 2 ms | 10 / 1,000 s | at 1 KHz | |
| Volts | Volts | Min. | Max. | Amperes | Volts | Amperes | Joules | | PF | |
| 11 | 14 | 16 | 20 | 1,000 | 36 | 10 | 3.5 | 4 | 15,000 | MCV180K14DS |
| 14 | 18 | 20 | 24 | 1,000 | 43 | 10 | 4 | 5 | 12,000 | MCV220K14DS |
| 17 | 22 | 24 | 30 | 1,000 | 53 | 10 | 5 | 6 | 8,500 | MCV270K14DS |
| 20 | 26 | 30 | 36 | 1,000 | 65 | 10 | 6 | 7.5 | 7,200 | MCV330K14DS |
| 25 | 31 | 35 | 43 | 1,000 | 77 | 10 | 7 | 8.6 | 6,300 | MCV390K14DS |
| 30 | 38 | 42 | 52 | 1,000 | 93 | 10 | 8.5 | 10 | 5,500 | MCV470K14DS |
| 35 | 45 | 50 | 62 | 1,000 | 110 | 10 | 10 | 11 | 4,800 | MCV560K14DS |
| 40 | 56 | 61 | 75 | 1,000 | 135 | 10 | 12 | 14 | 4,000 | MCV680K14DS |
| 50 | 66 | 74 | 90 | 4,500 | 135 | 50 | 15 | 22 | 3,300 | MCV820K14DS |
| 75 | 102 | 108 | 132 | 4,500 | 200 | 50 | 22 | 34 | 2,600 | MCV121K14DS |
| 95 | 127 | 135 | 165 | 4,500 | 250 | 50 | 30 | 45 | 2,000 | MCV151K14DS |
| 130 | 175 | 185 | 225 | 4,500 | 340 | 50 | 38 | 60 | 1,370 | MCV201K14DS |
| 150 | 200 | 216 | 264 | 4,500 | 395 | 50 | 45 | 66 | 1,060 | MCV241K14DS |
| 230 | 300 | 324 | 396 | 4,500 | 595 | 50 | 70 | 98 | 725 | MCV361K14DS |
| 250 | 330 | 351 | 429 | 4,500 | 650 | 50 | 72 | 102 | 665 | MCV391K14DS |
| 275 | 370 | 387 | 473 | 4,500 | 710 | 50 | 75 | 115 | 600 | MCV431K14DS |
| 300 | 385 | 423 | 517 | 4,500 | 775 | 50 | 80 | 125 | 570 | MCV471K14DS |

## Varistors - 20D Series

| Max. Allowable Voltage | | Varistor Voltage | | Withstanding Surge Current (8 / 20 µs) | Max. Clamping Voltage (8 / 20 µs) | | Max. Energy | | Typical Capacitance | Part Number |
|---|---|---|---|---|---|---|---|---|---|---|
| ACrms | DC | DC | Volts | 1 time | Vc | Ip | 2 ms | 10 / 1,000 s | at 1 KHz | |
| Volts | Volts | Min. | Max. | Amperes | Volts | Amperes | Joules | | PF | |
| 11 | 14 | 16 | 20 | 2,000 | 36 | 20 | 10 | 12 | 27,000 | MCV180K20DS |
| 14 | 18 | 20 | 24 | 2,000 | 43 | 20 | 13 | 15 | 20,000 | MCV220K20DS |
| 17 | 22 | 24 | 30 | 2,000 | 53 | 20 | 15 | 17 | 15,000 | MCV270K20DS |
| 20 | 26 | 30 | 36 | 2,000 | 65 | 20 | 22 | 22 | 12,200 | MCV330K20DS |
| 25 | 31 | 35 | 43 | 2,000 | 77 | 20 | 24 | 26 | 10,000 | MCV390K20DS |
| 30 | 38 | 42 | 52 | 2,000 | 93 | 20 | 30 | 33 | 9,350 | MCV470K20DS |
| 35 | 45 | 50 | 62 | 2,000 | 110 | 20 | 35 | 38 | 8,000 | MCV560K20DS |
| 40 | 56 | 61 | 75 | 2,000 | 135 | 20 | 40 | 43 | 6,800 | MCV680K20DS |
| 50 | 66 | 74 | 90 | 6,500 | 135 | 100 | 37 | 48 | 5,600 | MCV820K20DS |
| 75 | 102 | 108 | 132 | 6,500 | 200 | 100 | 40 | 55 | 4,100 | MCV121K20DS |
| 95 | 127 | 135 | 165 | 6,500 | 250 | 100 | 50 | 70 | 3,200 | MCV151K20DS |
| 130 | 175 | 185 | 225 | 6,500 | 340 | 100 | 70 | 95 | 2,200 | MCV201K20DS |
| 150 | 200 | 216 | 264 | 6,500 | 395 | 100 | 82 | 110 | 1,900 | MCV241K20DS |
| 230 | 300 | 324 | 396 | 6,500 | 595 | 100 | 120 | 163 | 1,320 | MCV361K20DS |
| 250 | 330 | 351 | 429 | 6,500 | 650 | 100 | 130 | 180 | 1,210 | MCV391K20DS |
| 275 | 370 | 387 | 473 | 6,500 | 710 | 100 | 140 | 190 | 1,120 | MCV431K20DS |
| 300 | 385 | 423 | 517 | 6,500 | 775 | 100 | 150 | 220 | 1,000 | MCV471K20DS |

## Mechanical Ratings

<table>
<tr><td>Characteristics</td><td>Test method and specifications</td></tr>
<tr><td>Standard Test Condition</td><td>Temperature range : 5 to 35°C<br>Relative humidity : 45 to 85% R.H.</td></tr>
<tr><td>Varistor Voltage</td><td>Voltage across the varistor measured at 1 mA DC rectangular pulse current</td></tr>
<tr><td>Maximum Allowable Voltage</td><td>Maximum continuous sinusoidal RMS voltage or DC voltage which may be applied within the specified environmental temperature range</td></tr>
<tr><td>Maximum Clamping Voltage</td><td>Peak voltage across the varistor under condition of a specified standard impulse current (8 / 20 μs)<br> 
</td></tr>
<tr><td>Withstanding Surge Current</td><td>Maximum current across the varistor measured at a given standard waveform (8 / 20 μs) applied one time or two times with the varistor voltage less than ±10%</td></tr>
<tr><td>Rated Transient Average Power Dissipation</td><td>Maximum average power which may be dissipated due to a group of pulses occurring within a specified isolated time period, without causing device failure</td></tr>
<tr><td>Maximum Energy</td><td>The maximum energy within the varistor voltage change of ±10% when one impulse of 2 ms or 10 / 1,000 μs is applied</td></tr>
<tr><td>Capacitance (Reference)</td><td>Capacitance between the terminals of the varistor measured at 1 KHz,1 VRMS, zero bias and room temperature (Exception 100 pF below measured at 1 MHz)</td></tr>
<tr><td>Temperature Coefficient of Varistor Voltage</td><td>(V at 85°C to V at 25°C) / ( V at 25°C × 60) × 100 (% / °C) should be less than -0.05% / °C</td></tr>
<tr><td>Withstanding Voltage (Body insulation)</td><td>The specified voltage shall be applied both terminals of the varistor connected together and metal foil closely wrapped round its body for 1 minute without breakdown</td></tr>
<tr><td>Impulse Life</td><td>The variation of varistor voltage should less than ±10% after the impulse listed below is applied 10,000 times continuously with the interval of 10 seconds at room temperature
<table>
<tr><td rowspan="3">5D series</td><td>MCV180K05DS to MCV680K05DS</td><td>0.5A (2 ms)</td></tr>
<tr><td>MCV681K05DS</td><td>NA</td></tr>
<tr><td>MCV820K05DS to MCV471K05DS</td><td>20A (8 / 20 μs)</td></tr>
<tr><td rowspan="3">7D series</td><td>MCV180K07DS to MCV680K07DS</td><td>18A (8 / 20 μs)</td></tr>
<tr><td>MCV681K07DS</td><td>NA</td></tr>
<tr><td>MCV820K07DS to MCV471K07DS</td><td>50A (8 / 20 μs)</td></tr>
<tr><td rowspan="3">10D series</td><td>MCV180K10DS to MCV680K10DS</td><td>50A (8 / 20 μs)</td></tr>
<tr><td>MCV681K10DS</td><td>NA</td></tr>
<tr><td>MCV820K10DS to MCV112K10DS</td><td>100A (8 / 20 μs)</td></tr>
<tr><td rowspan="2">14D series</td><td>MCV180K14DS to MCV680K14DS</td><td>75A (8 / 20 μs)</td></tr>
<tr><td>MCV820K14DS to MCV112K14DS</td><td>150A (8 / 20 μs)</td></tr>
<tr><td rowspan="2">20D series</td><td>MCV180K20DS to MCV680K20DS</td><td>100A (8 / 20 μs)</td></tr>
<tr><td>MCV820K20DS to MCV112K20DS</td><td>200A (8 / 20 μs)</td></tr>
</table></td></tr>
</table>

## Mechanical Ratings

<table>
<tr><th>Characteristics</th><th>Test Method and Specifications</th></tr>
<tr><td>Terminal Pull Strength</td><td>The two terminals shall be no outstanding damage visually after gradually applying the force listed below
<table>
<tr><th>Terminal Diameter</th><th>Force</th></tr>
<tr><td>0.6 mm</td><td>9.8 N (1 kgf)</td></tr>
<tr><td>0.8 mm</td><td>9.8 N (1 kgf)</td></tr>
<tr><td>1 mm</td><td>19.6 N (2 kgf)</td></tr>
</table></td></tr>
<tr><td>Terminal Bending Strength</td><td>Hold the specimen and keep its lead-out axis vertical Suspend 1 Kg weight on the terminal. Bend the specimen through 90° then return to the original position. Repeat the procedure in the opposite direction. Test and examine every terminal</td></tr>
<tr><td>Vibration</td><td>Varistors subjected to simple harmonic motion of 0.75 mm amplitude between limits of 10 to 55 Hz. Frequency scan shall be traversed in 1 minute. This motion shall then be applied for period of 2 hours in each of three mutually perpendicular directions. Thereafter, varistors shall be no outstanding damage visually</td></tr>
<tr><td>Solderability</td><td>The two terminals shall be covered uniformly with solder approximately 95% after dipping the terminals to a depth of approximately 3 mm from the body in a soldering bath of 260 ±5°C for 2 ±0.5 seconds</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>Varistors shall be no outstanding damage and the variation varistor voltage should be less than ±5% (ΔVB / VB = ±5%) after each lead shall be dipped into a solder bath having a temperature 300 ±5°C to a point 2 to 2.5 mm from the body of the unit, using the shielding board (thickness 1.5 mm), be held there for a specified time (5D series 5 ±1 second the other series 10 ±1 second), and then be stored at room ambient for 1 to 2 hours</td></tr>
<tr><td>Dry Heat (High Temperature)</td><td>Varistors shall be subjected to 125 ±2°C, for 1,000 hours in a thermostatic bath without load and then stored at room ambient condition for 1 to 2 hours. The variation of varistor voltage should be less than ±5% (ΔVB / VB = ±5%)</td></tr>
<tr><td>Damp Heat (Humidity)</td><td>Varistors shall be subjected to 40 ±2°C, 90 to 95% R.H. for 1,000 hours in a thermostatic bath without load and then stored at room ambient condition for 1 to 2 hours.<br>The variation of varistor voltage should be less then ±5%(ΔVB / VB = ±5%)</td></tr>
<tr><td>Cold (Low Temperature Storage)</td><td>Varistors shall be subjected to -40 ±2°C for 1,000 hours in a thermostatic bath without load and then stored at room ambient condition for 1 to 2 hours. The variation of varistor voltage should be less than ±5% (ΔVB / VB = ±5%)</td></tr>
<tr><td>Temperature Cycle<br>(Thermal Shock)</td><td>The temperature cycling listed below shall be repeated 5 times and the variation of varistor voltage should be less than ±5% and no outstanding damage visually
<table>
<tr><th>Step</th><th>Temperature (°C)</th><th>Time (Minutes)</th></tr>
<tr><td>1</td><td>40 ±2</td><td>30 ±2</td></tr>
<tr><td>2</td><td>Room Temperature</td><td>3 Maximum</td></tr>
<tr><td>3</td><td>125 ±2</td><td>30 ±2</td></tr>
<tr><td>4</td><td>Room Temperature</td><td>3 Maximum</td></tr>
</table></td></tr>
<tr><td>Dry Heat Load (High Temperature)</td><td>Varistors shall be subjected to 85 ±2°C for 1,000 hours in a thermostatic bath with maximum allowable voltage continuously applied and then stored at room ambient condition for 1 to 2 hours. The variation of varistor voltage should be less than ±10% (ΔVB / VB = ±10%)</td></tr>
</table>

## Materials Safety Data Sheet

Component type / Wistron P/N : Varistor

| Main Purposes | % | Chemical Substances | Chemical formula | % | Typical ppm |
|---|---|---|---|---|---|
| Ceramic | 26 | Zinc oxide | ZnO | 89.7 | - |
| | | Bismuth trioxide | $Bi_2O_3$ | 2.8 | 69 PPm pb |
| | | Boron trioxide | $B_2O_3$ | 0.005 | - |
| | | Titanium dioxide | $TiO_2$ | 0 | - |
| | | Nickel oxide | NiO | 0.75 | - |
| | | Aluminium trioxide | $Al_2O_3$ | 0.018 | - |
| Silver Paste | 2 | Silver | Ag | 80 | 10PPm pb |
| | | Glass | - | 4 | |
| Coating | 40 | Epoxy resin | - | 30 to 40 | 5 PPm pb |
| | | Filler | - | 45 to 55 | |
| Wire | 30 | Copper | Cu | 96 | 66 PPm pb |
| Plating (Lead free) | 2 | Nickel | Ni | 0 | |
| | | Tin | Sn | 96 | |
| Plating (Lead contained) | 0.04 | Nickel | Ni | 100 | 2,200 |
| | | Lead | Pb | 10 | 200 |
| | | Tin | Sn | 90 | 1,300 |

## Part Number Explanation:

| MCV | 121 | K | 10 | D | S |
|---|---|---|---|---|---|
| | Varistor Voltage | Tolerance | Disk Size Code | Disk Type | Lead Type Taping Code |

Varistor Voltage : (DC volt) (from 180 to 112) two significant digits followed by number of zeros
: 180 = 18V, 101=100V, 102=1,000V
Tolerance : K = ±10%
Disk Size Code : 05 = 5mm, 07 = 7mm, 10 = 10mm, 14 = 14mm, 20 = 20mm
Disk Type : D = Standard disk type
Lead Type Taping Code : S = Straight Lead

**Important Notice :** This data sheet and its contents (the "Information") belong to the members of the Premier Farnell group of companies (the "Group") or are licensed to it. No licence is granted for the use of it other than for information purposes in connection with the products to which it relates. No licence of any intellectual property rights is granted. The Information is subject to change without notice and replaces all data sheets previously supplied. The Information supplied is believed to be accurate but the Group assumes no responsibility for its accuracy or completeness, any error in or omission from it or for any use made of it. Users of this data sheet should check for themselves the Information and the suitability of the products for their purpose and not make any assumptions based on information included or omitted. Liability for loss or damage resulting from any reliance on the Information or use of it (including liability resulting from negligence or where the Group was aware of the possibility of such loss or damage arising) is excluded. This will not operate to limit or restrict the Group's liability for death or personal injury resulting from its negligence. Multicomp is the registered trademark of the Group. © Premier Farnell plc 2012.