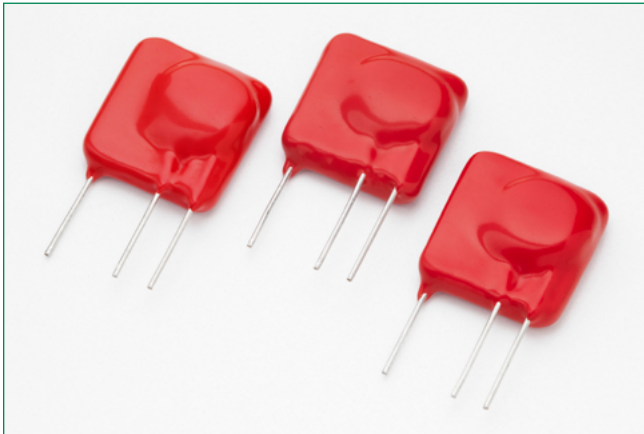


TMOV®25S Varistor Series

Radial Lead Varistors



Description

Metal Oxide Varistors (MOVs) are rated for specific AC line operating voltages, and exceeding these limits through the application of a sustained abnormal over-voltage condition could result in overheating and damage to the MOV.

The Littelfuse TMOV®25S Varistor Series was designed to address this condition in a single integrated package.

The TMOV®25S Varistor Series incorporates a patented integrated thermally responsive element within the body of the device which will open-circuit the varistor in case of overheating due to the abnormal over-voltage events.

The TMOV®25S Varistor Series meets the surge suppressor component recognition requirements of UL1449 3rd edition for both cord connected and permanently connected SPD end products.

Additional Information



Resources



Accessories



Samples

Agency Approvals

| Agency | Agency Approval | Agency File Number |
|--------|---|--------------------|
| | UL1449 | E320116 |
| | IEC 61051-1, IEC 61051-2, IEC 60950-1 (Annex Q) | J 50472797 |

Features & Benefits

- RoHS Compliant and Lead-free
- Wave solderable
- Standard Operating Voltage Range Compatible with Common AC Line Voltages (115VAC to 750VAC)
- High peak surge current
- rating up to 20kA at single 8/20µS impulse
- Standard lead form and spacing option
- -55°C to +85°C operating temperature range

Applications

- SPD Products
- AC Panel Protection Modules
- AC/DC power supplies
- UPS (Uninterruptible Power Supply)

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Absolute Maximum Ratings

- For ratings of individual members of a series, see Device Ratings and Specifications chart.

| Reading | TMOV [®] 25S Varistor Series | Units |
|--|---------------------------------------|------------|
| Continuous | | |
| AC Voltage Range ($V_{M(AC)RMS}$) | 115 to 750 | V |
| Transient | | |
| Peak Pulse Current (I_{TM}) | - | - |
| For 8x20 μ s Current Wave, single pulse | 20,000 | A |
| Single-Pulse Energy Capability | - | - |
| For 2ms Current Wave | 170 to 670 | J |
| Operating Ambient Temperature Range (T_A) | -55 to +85 | °C |
| Storage Temperature Range (T_{STG}) | -55 to +125 | °C |
| Temperature Coefficient (αV) of Clamping Voltage (V_C) at Specified Test Current | <0.01 | %/°C |
| Hi-Pot Encapsulation (COATING Isolation Voltage Capability) | 2,500 | V |
| Thermal Protection Isolation Voltage Capability (when operated)* | 600* | V |
| COATING Insulation Resistance | 1,000 | M Ω |

Note: * - See notes under Device Ratings & Specifications section for more information

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Device Ratings & Specifications

| 2 Leaded Device - Without Indicator Lead | | 3 Leaded Device - With Indicator Lead Option | | Model Size Disc Diameter (mm) | Maximum Rating (85°C) | | | | Specifications (25 °C) | | | |
|--|----------|--|----------|-------------------------------|-----------------------|-------------|-----------|------------------|-------------------------------------|-----------------|--|------------------------------|
| | | | | | Continuous | | Transient | | Varistor Voltage @ 1mA Test Current | | Clamping Voltage @ 100A Current 8/20 μ s | Typical Capacitance (f=1MHz) |
| Part Number | Branding | Part Number | Branding | | $V_{M(AC)RMS}$ | $V_{M(DC)}$ | W_{TM} | I_{TM} 1xPulse | $V_{N(DC)}$ Min | $V_{N(DC)}$ Max | V_C | C |
| | | | | | (V) | (V) | (J) | (A) | (V) | (V) | (V) | (pF) |
| TMOV25SP115E | P25T115E | TMOV25SP115M | P25T115M | 25 | 115 | 150 | 170 | 20000 | 162 | 198 | 295 | 3200 |
| TMOV25SP130E | P25T130E | TMOV25SP130M | P25T130M | | 130 | 170 | 190 | | 184.5 | 225.5 | 335 | 2800 |
| TMOV25SP140E | P25T140E | TMOV25SP140M | P25T140M | | 140 | 180 | 210 | | 198 | 242 | 355 | 2500 |
| TMOV25SP150E | P25T150E | TMOV25SP150M | P25T150M | | 150 | 200 | 220 | | 216 | 264 | 390 | 2300 |
| TMOV25SP175E | P25T175E | TMOV25SP175M | P25T175M | | 175 | 225 | 250 | | 243 | 297 | 450 | 1900 |
| TMOV25SP200E | P25T200E | TMOV25SP200M | P25T200M | | 200 | 265 | 270 | | 283 | 345 | 530 | 1700 |
| TMOV25SP230E | P25T230E | TMOV25SP230M | P25T230M | | 230 | 300 | 300 | | 324 | 396 | 585 | 1500 |
| TMOV25SP250E | P25T250E | TMOV25SP250M | P25T250M | | 250 | 320 | 330 | | 351 | 429 | 640 | 1400 |
| TMOV25SP275E | P25T275E | TMOV25SP275M | P25T275M | | 275 | 350 | 350 | | 387 | 473 | 700 | 1250 |
| TMOV25SP300E | P25T300E | TMOV25SP300M | P25T300M | | 300 | 385 | 370 | | 423 | 517 | 765 | 1150 |
| TMOV25SP320E | P25T320E | TMOV25SP320M | P25T320M | | 320 | 420 | 390 | | 459 | 561 | 825 | 1080 |
| TMOV25SP385E | P25T385E | TMOV25SP385M | P25T385M | | 385 | 505 | 430 | | 558 | 682 | 1010 | 900 |
| TMOV25SP420E | P25T420E | TMOV25SP420M | P25T420M | | 420 | 560 | 460 | | 612 | 748 | 1100 | 820 |
| TMOV25SP440E | P25T440E | TMOV25SP440M | P25T440M | | 440 | 585 | 470 | | 643.5 | 786.5 | 1160 | 790 |
| TMOV25SP460E | P25T460E | TMOV25SP460M | P25T460M | | 460 | 615 | 490 | | 675 | 825 | 1220 | 750 |
| TMOV25SP510E | P25T510E | TMOV25SP510M | P25T510M | | 510 | 670 | 520 | | 738 | 902 | 1335 | 680 |
| TMOV25SP550E | P25T550E | TMOV25SP550M | P25T550M | | 550 | 745 | 550 | | 819 | 1001 | 1475 | 630 |
| TMOV25SP625E | P25T625E | TMOV25SP625M | P25T625M | | 625 | 825 | 600 | | 900 | 1100 | 1625 | 550 |
| TMOV25SP750E | P25T750E | TMOV25SP750M | P25T750M | | 750 | 970 | 670 | | 1080 | 1320 | 1950 | 460 |

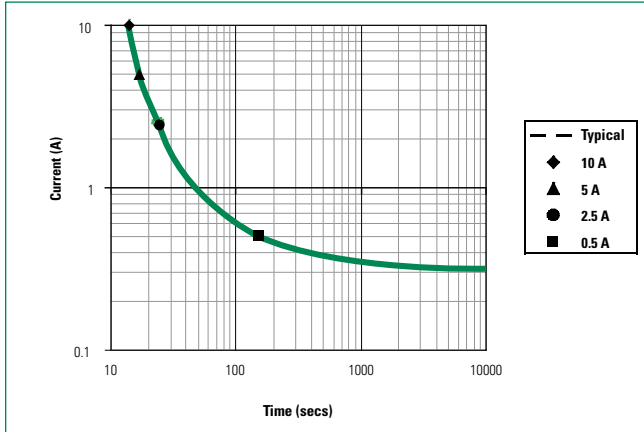
Notes: Average power dissipation of transients should not exceed 1.5 watts.

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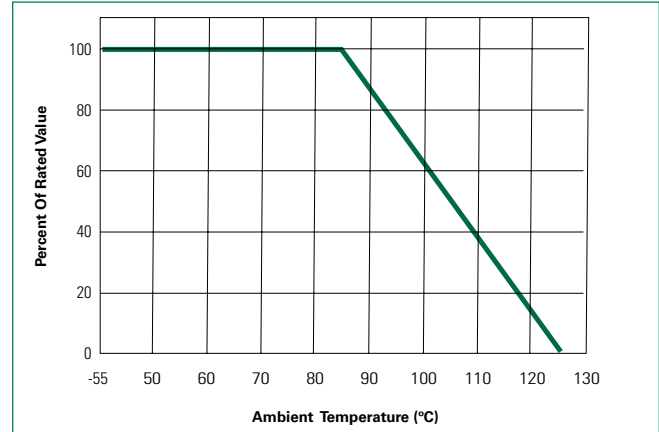
Thermal Characteristics

Typical time to open circuit under UL 1449 Abnormal Overvoltage Limited Current Test:

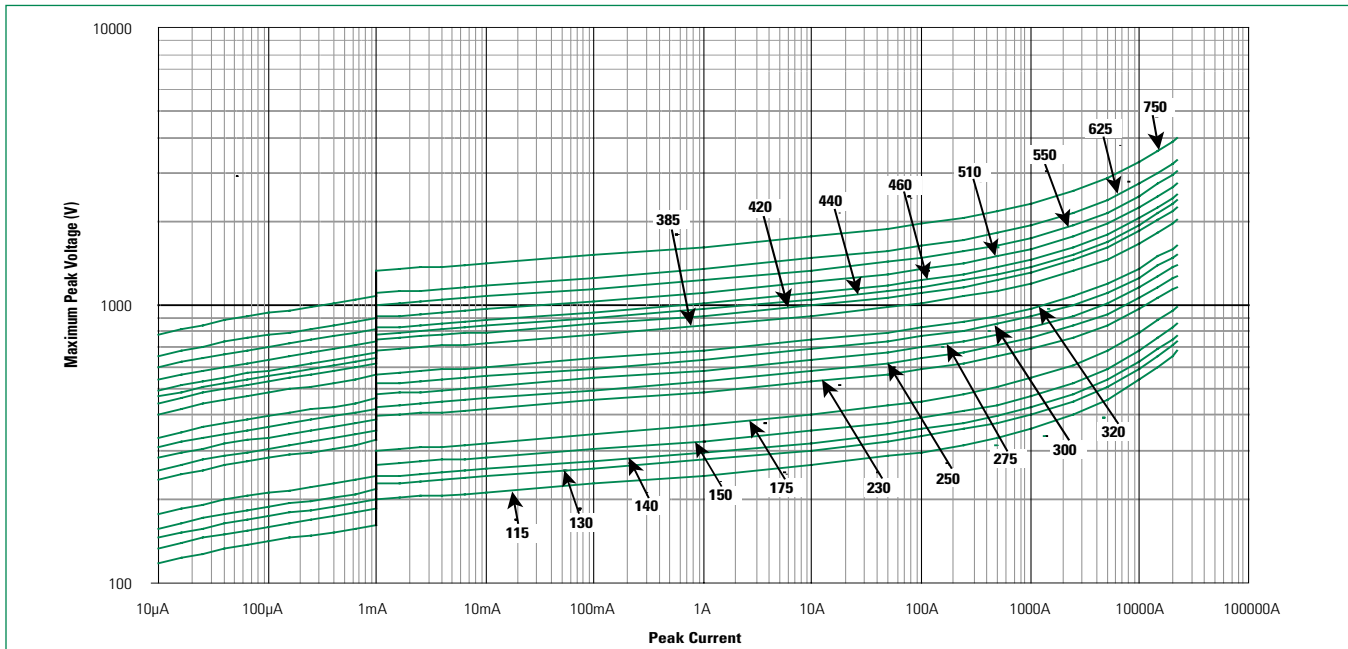


Peak Current & Energy Derating Curve

For applications exceeding 85°C ambient temperature, the peak surge current and energy ratings must be reduced as shown.



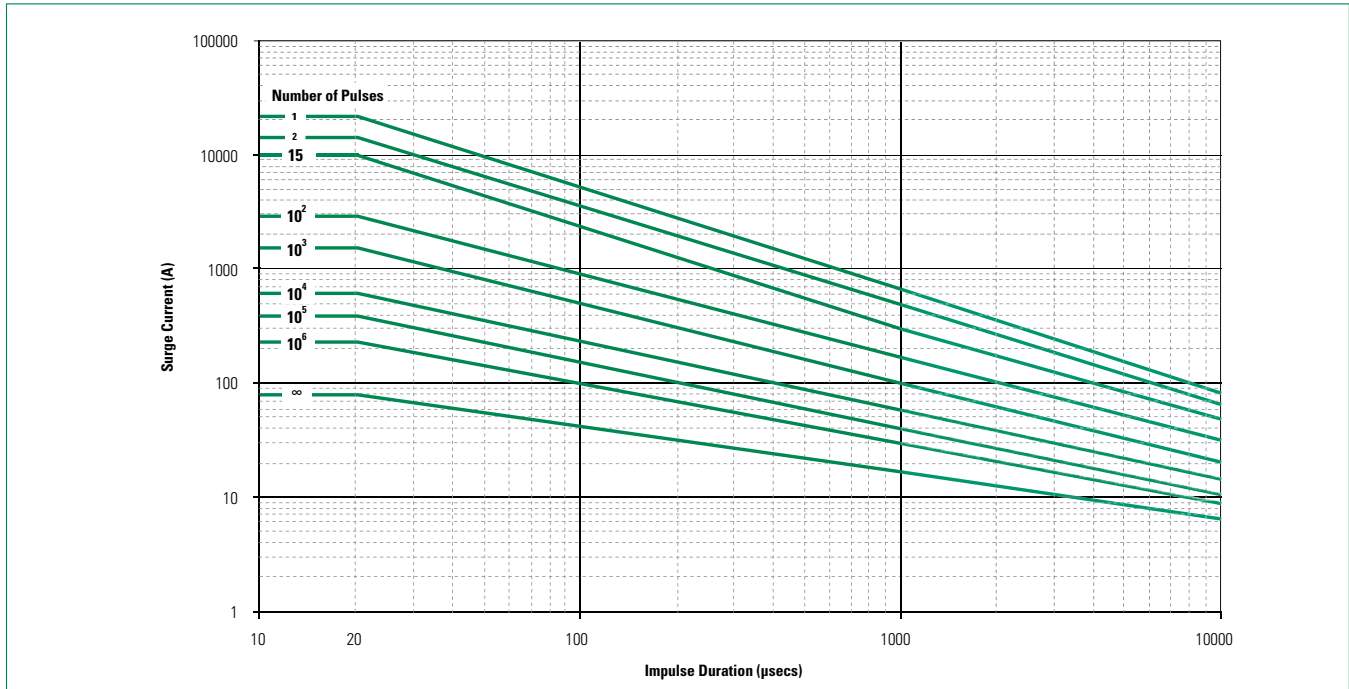
Transient V-I Characteristic Curves



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Pulse Rating Curve

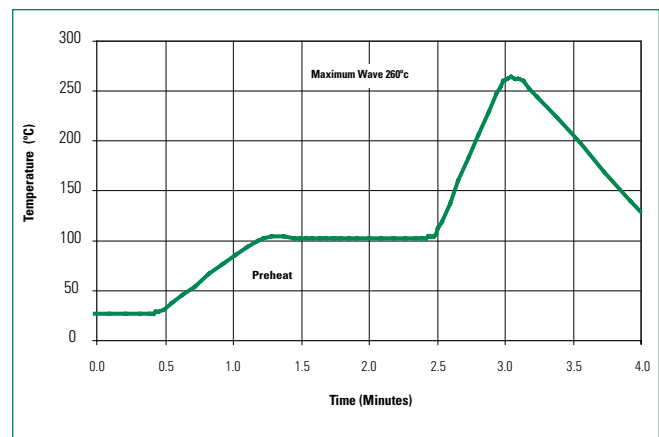


Wave Solder Profile

Because the TMOV[®]25S Varistor Series contains a thermally responsive device, care must be taken when soldering the device into place. Two soldering methods are possible. Firstly, hand soldering: We recommend the use of pliers to heat-sink the leads of the device. Secondly, wave-soldering: This is a strenuous process requiring pre-heat stages to reduce the stresses on devices.

It is critically important that all preheat stage and the solder bath temperatures are rigidly controlled. The recommended solder for the TMOV[®] Varistor Series is a 62/36/2 (Sn/Pb/Ag), 60/40 (Sn/Pb) or 63/37 (Sn/Pb). Littelfuse also recommends an RMA solder flux. SAC solders (SnAgCu) are recommended for Lead-free applications.

Soldering Profile



Physical Specifications

| | |
|----------------------------------|---|
| Lead Material | Copper Clad Steel Wire |
| Soldering Characteristics | Solderability per MIL-STD-202, Method 208 |
| Insulating Material | Cured, flame retardant epoxy polymer meets UL94V-0 requirements |
| Device Labeling | Marked with LF, voltage, UL logos, and date code |

Environmental Specifications

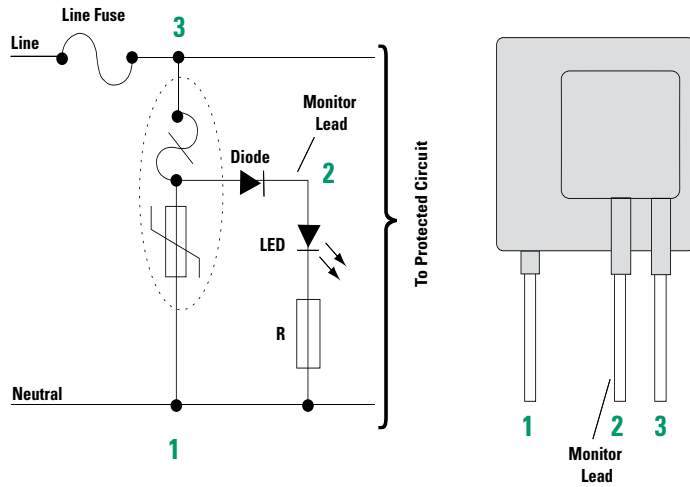
| | |
|--------------------------------------|---|
| Operating/Storage Temperature | -55°C to +85°C |
| Humidity Aging | +85°C, 85%R.H., 1000 hours -/+10% typical voltage change |
| Thermal Shock | +85°C to -40°C 5 times -/+10% typical voltage change |
| Solvent Resistance | MIL-STD-202, Method 215 |
| Moisture Sensitivity | Level 1, J-STD-020 |

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Application Example

The application example left shows how the indicator lead on the TMOV[®] Varistor can be used to indicate that thermal element has been opened. This signifies that the circuit is no longer protected from transients by the MOV.



Dimensions

