

RoHS TMOV® and iTMOV® Varistor Series



Description





The Littelfuse TMOV® and iTMOV® thermally protected varistors represent a new development in integrated circuit protection. Both versions are comprised of radial leaded MOVs (Metal Oxide Varistors) with an integrated thermally activated element designed to open in the event of overheating due to the abnormal overvoltage, limited current, conditions outlined in UL1449. The TMOV® and iTMOV® varistor's integrated thermal element, in conjunction with appropriate enclosure design, helps facilitate SPD module compliance to UL1449 for both cord connected and permanently connected applications.

The TMOV® and iTMOV® varistors offer quick thermal response due to the close proximity of the integrated thermal element to the MOV body. The integrated configuration also offers lower inductance than most discrete solutions resulting in improved clamping performance to fast overvoltage transients.

The iTMOV® varistor differs from the TMOV® varistor by the inclusion of a third lead for the purpose of indicating that the MOV has been disconnected from the circuit. This lead facilitates connection to monitoring circuitry.

Additionally TMOV® and iTMOV® varistors are wave solderable, thus simplifying end product assembly by reducing the the expense and rework associated with hand soldering operations.

Agency Approvals

| Agency Approval | Agency File Number |
|--|--------------------|
|  UL1414 | E56529 |
|  UL1449 | E320116 |
|  QC 42201-C001, QC42201-A001, IEC 60950-1 (Annex Q) | E1274/F |
|  IEC 61051-1, IEC 61051-2, IEC 60950-1 (Annex Q) | 40021525 |

Features

- RoHS compliant and Lead-free available
- Patented integrated thermal protection device - Patent #US6636403
- Designed to facilitate compliance to UL1449 3rd Edition for SPD product
- High peak surge current rating up to 10kA
- Wave solderable
- Standard lead form and spacing option
- Low leakage
- -55°C to +85°C operating temp range
- Three-lead version available for indication purposes

Applications

- SPD Products
- AC Panel Protection Modules
- AC Line Power Supplies
- Surge Protected Strip Connectors
- AC Power Meters
- Relocatable AC Power Taps
- GFCI (Ground Fault Current Interrupter)
- UPS (Uninterruptable Power Supply)
- White Goods
- Plug-in SPD
- Inverters
- AC/DC Power Supplies

TMOV®/iTMOV® Series

Absolute Maximum Ratings

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

| Continuous | TMOV® and iTMOV® Series | Units |
|--|-------------------------|------------|
| Steady State Applied Voltage: | | |
| AC Voltage Range ($V_{M(A)C(R)M(S)}$) | 115 to 750 | V |
| Transient: | | |
| Peak Pulse Current (I_{TM}) - For 8x20 μ s Current Wave, single pulse | 6,000 to 10,000 | A |
| Single-Pulse Energy Capability - For 2ms Current Wave | 35 to 480 | 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 |
| Indicator Lead Rating (Lead-3 - iTMOV® varistor only): | | |
| Continuous RMS current | 100 | mA |
| Surge Current, 8/20 μ s | 10,000 | A |

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.

TMOV and iTMOV® Ratings & Specifications

| TMOV Lead-free And RoHS Compliant Models | | iTMOV Lead-free and RoHS Compliant Models | | Disc Diameter | Maximum Rating (85°C) | | | | | Specifications (25°C) | | | | |
|--|----------|---|----------|------------------|---------------------------|--------------------|-----------------|---------------------------------------|-----------------------------------|---|--|---|--------------------|-------|
| Part Number | Branding | Part Number | Branding | | Continuous | | Transient | | | Varistor Voltage at 1mA Test Current | Maximum Clamping Voltage 8/20 μ s | Typical Capaci- tance f = 1MHz | | |
| | | | | | AC Volts | DC Volts | Energy 2ms | Peak Surge Current 8/20 μ s | $V_{(N)DC}$ Min | | | | $V_{(N)DC}$ Max | V_C |
| | | | | (mm) | $V_{M(A)C(R)M(S)}$ (V) | $V_{(M)DC}$ (V) | W_{TM} (J) | $I_{TM} 1 \times$ Pulse (A) | $I_{TM} 2 \times$ Pulse (A) | (V) | (V) | (A) | (pF) | |
| TMOV14RP115E | P4T115E | TMOV14RP115M | P4T115M | 14 | 115 | 150 | 35 | 6000 | 4500 | 162 | 198 | 300 | 50 | 1100 |
| TMOV20RP115E | P2T115E | TMOV20RP115M | P2T115M | 20 | 115 | 150 | 52 | 10000 | 6500 | 162 | 198 | 300 | 100 | 2400 |
| TMOV14RP130E | P4T130E | TMOV14RP130M | P4T130M | 14 | 130 | 170 | 50 | 6000 | 4500 | 184 | 226 | 340 | 50 | 1000 |
| TMOV20RP130E | P2T130E | TMOV20RP130M | P2T130M | 20 | 130 | 170 | 100 | 10000 | 6500 | 184 | 226 | 340 | 100 | 1900 |
| TMOV14RP140E | P4T140E | TMOV14RP140M | P4T140M | 14 | 140 | 180 | 55 | 6000 | 4500 | 200 | 240 | 360 | 50 | 900 |
| TMOV20RP140E | P2T140E | TMOV20RP140M | P2T140M | 20 | 140 | 180 | 110 | 10000 | 6500 | 200 | 240 | 360 | 100 | 1750 |
| TMOV14RP150E | P4T150E | TMOV14RP150M | P4T150M | 14 | 150 | 200 | 60 | 6000 | 4500 | 216 | 264 | 395 | 50 | 800 |
| TMOV20RP150E | P2T150E | TMOV20RP150M | P2T150M | 20 | 150 | 200 | 120 | 10000 | 6500 | 216 | 264 | 395 | 100 | 1600 |
| TMOV14RP175E | P4T175E | TMOV14RP175M | P4T175M | 14 | 175 | 225 | 70 | 6000 | 4500 | 243 | 297 | 455 | 50 | 700 |
| TMOV20RP175E | P2T175E | TMOV20RP175M | P2T175M | 20 | 175 | 225 | 135 | 10000 | 6500 | 243 | 297 | 455 | 100 | 1400 |
| TMOV14RP200E | P4T200E | TMOV14RP200M | P4T200M | 14 | 200 | 260 | 75 | 6000 | 4500 | 281 | 344 | 530 | 50 | 630 |
| TMOV20RP200E | P2T200E | TMOV20RP200M | P2T200M | 20 | 200 | 260 | 154 | 10000 | 6500 | 281 | 344 | 530 | 100 | 1250 |
| TMOV14RP230E | P4T230E | TMOV14RP230M | P4T230M | 14 | 230 | 300 | 80 | 6000 | 4500 | 324 | 396 | 595 | 50 | 550 |
| TMOV20RP230E | P2T230E | TMOV20RP230M | P2T230M | 20 | 230 | 300 | 160 | 10000 | 6500 | 324 | 396 | 595 | 100 | 1100 |
| TMOV14RP250E | P4T250E | TMOV14RP250M | P4T250M | 14 | 250 | 320 | 100 | 6000 | 4500 | 351 | 429 | 650 | 50 | 500 |
| TMOV20RP250E | P2T250E | TMOV20RP250M | P2T250M | 20 | 250 | 320 | 170 | 10000 | 6500 | 351 | 429 | 650 | 100 | 1000 |
| TMOV14RP275E | P4T275E | TMOV14RP275M | P4T275M | 14 | 275 | 350 | 110 | 6000 | 4500 | 387 | 473 | 710 | 50 | 450 |
| TMOV20RP275E | P2T275E | TMOV20RP275M | P2T275M | 20 | 275 | 350 | 190 | 10000 | 6500 | 387 | 473 | 710 | 100 | 900 |
| TMOV14RP300E | P4T300E | TMOV14RP300M | P4T300M | 14 | 300 | 385 | 125 | 6000 | 4500 | 423 | 517 | 775 | 50 | 400 |
| TMOV20RP300E | P2T300E | TMOV20RP300M | P2T300M | 20 | 300 | 385 | 250 | 10000 | 6500 | 423 | 517 | 775 | 100 | 800 |
| TMOV14RP320E | P4T320E | TMOV14RP320M | P4T320M | 14 | 320 | 420 | 136 | 6000 | 4500 | 459 | 561 | 840 | 50 | 380 |
| TMOV20RP320E | P2T320E | TMOV20RP320M | P2T320M | 20 | 320 | 420 | 270 | 10000 | 6500 | 459 | 561 | 840 | 100 | 750 |
| TMOV14RP385E | P4T385E | TMOV14RP385M | P4T385M | 14 | 385 | 505 | 150 | 6000 | 4500 | 558 | 682 | 1025 | 50 | 360 |
| TMOV20RP385E | P2T385E | TMOV20RP385M | P2T385M | 20 | 385 | 505 | 300 | 10000 | 6500 | 558 | 682 | 1025 | 100 | 700 |
| TMOV14RP420E | P4T420E | TMOV14RP420M | P4T420M | 14 | 420 | 560 | 160 | 6000 | 4500 | 612 | 748 | 1120 | 50 | 300 |
| TMOV20RP420E | P2T420E | TMOV20RP420M | P2T420M | 20 | 420 | 560 | 320 | 10000 | 6500 | 612 | 748 | 1120 | 100 | 600 |
| TMOV20RP460E | P2T460E | TMOV20RP460M | P2T460M | 20 | 460 | 610 | 360 | 10000 | 6500 | 675 | 825 | 1240 | 100 | 200 |
| TMOV20RP510E | P2T510E | TMOV20RP510M | P2T510M | 20 | 510 | 670 | 325 | 10000 | 6500 | 738 | 902 | 1355 | 100 | 350 |
| TMOV20RP550E | P2T550E | TMOV20RP550M | P2T550M | 20 | 550 | 715 | 360 | 10000 | 6500 | 819 | 1001 | 1500 | 100 | 300 |
| TMOV20RP575E | P2T575E | TMOV20RP575M | P2T575M | 20 | 575 | 730 | 375 | 10000 | 6500 | 856 | 1047 | 1568 | 100 | 275 |
| TMOV20RP625E | P2T625E | TMOV20RP625M | P2T625M | 20 | 625 | 825 | 400 | 10000 | 6500 | 900 | 1100 | 1650 | 100 | 250 |
| TMOV20RP750E | P2T750E | TMOV20RP750M | P2T750M | 20 | 750 | 970 | 480 | 10000 | 6500 | 1080 | 1320 | 1980 | 100 | 175 |

NOTE: For 14mm devices with a voltage rating greater than 420V, please contact factory regarding availability.

Thermal Characteristics

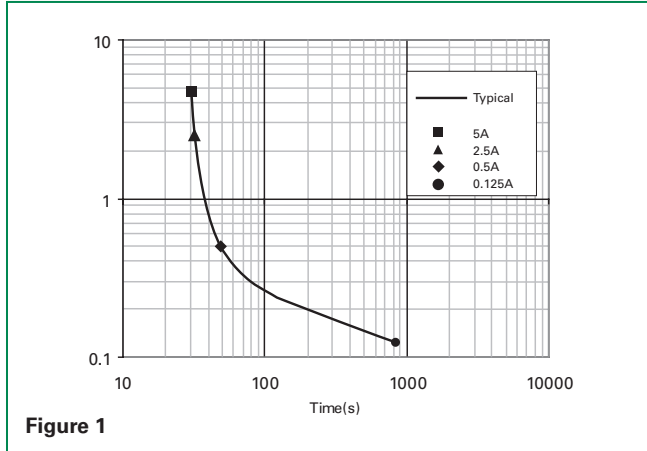


Figure 1

Note : The TMOV® and iTMOV® varistors are intended, in conjunction with appropriate enclosure design, to help facilitate SPD module compliance to UL 1449, 3rd Edition Section 39.4 (abnormal overvoltage limited current requirements). Under these extreme abnormal overvoltage conditions, some units will exhibit substantial heating, arcing and venting prior to opening. Modules should be designed to contain this possibility. Application testing is strongly recommended.

Current, Energy, Power Derating Curve

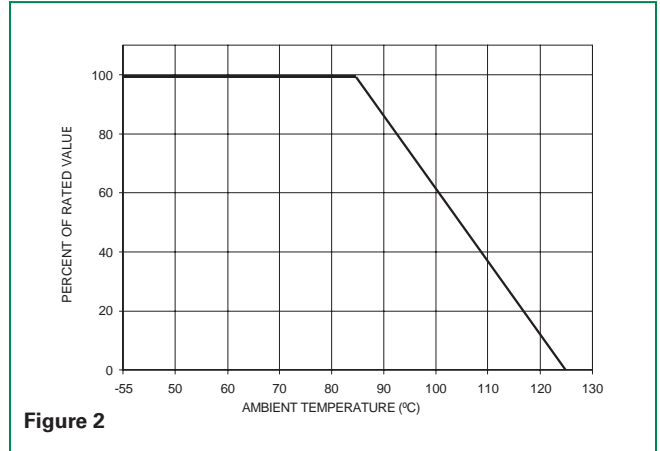


Figure 2

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

Maximum Clamping Voltage for 14mm Parts

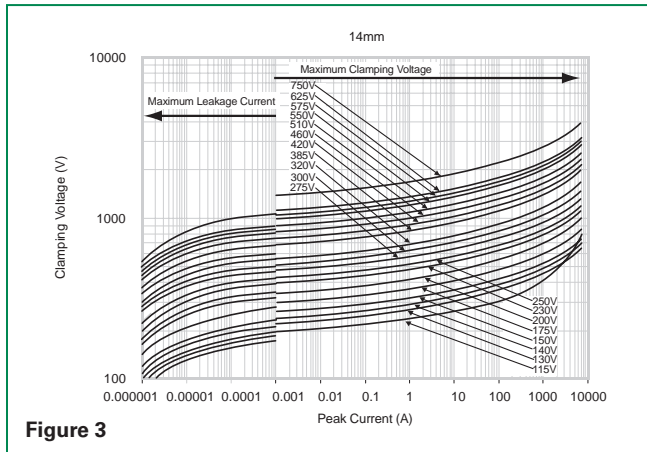


Figure 3

Maximum Clamping Voltage for 20mm Parts

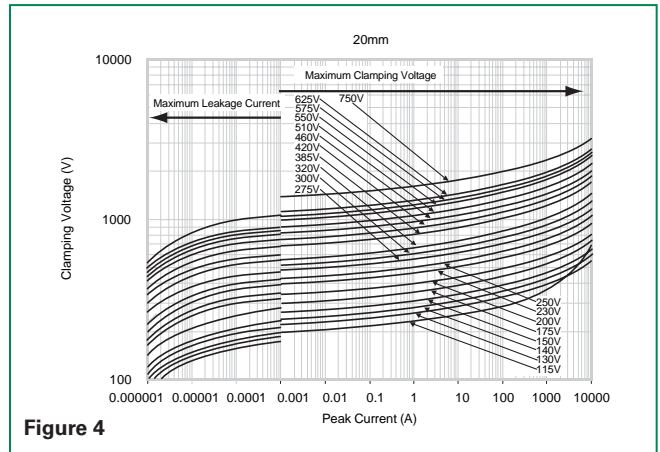


Figure 4

TMOV®/iTMOV® Series

Repetitive Surge Capability for 14mm Parts

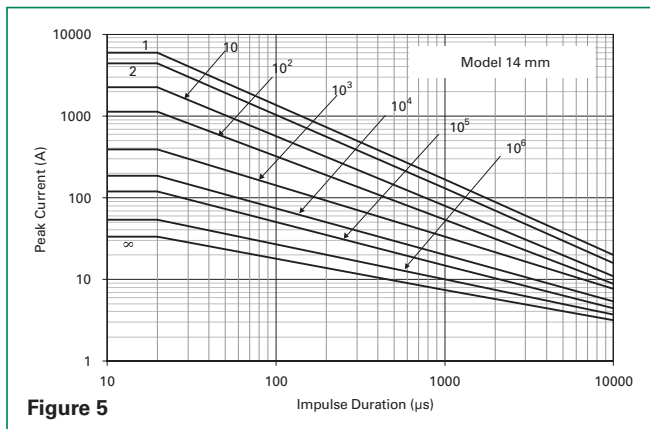


Figure 5

NOTE: Average power dissipation of transients should not exceed 0.6W

Repetitive Surge Capability for 20mm Parts

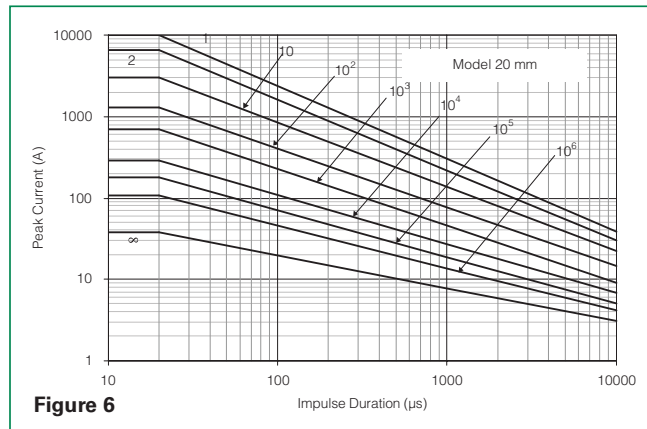


Figure 6

NOTE: Average power dissipation of transients should not exceed 1.0W

Wave Solder Profile

Because the TMOV® and iTMOV® varistors contain a thermal protection device, care must be taken when soldering the devices into place. Two soldering methods are possible. Firstly, hand soldering: It is recommended to heat-sink the leads of the device. Secondly, wave soldering: It is critically important that all preheat stage and the solder bath temperatures are rigidly controlled.

Non Lead-free Profile

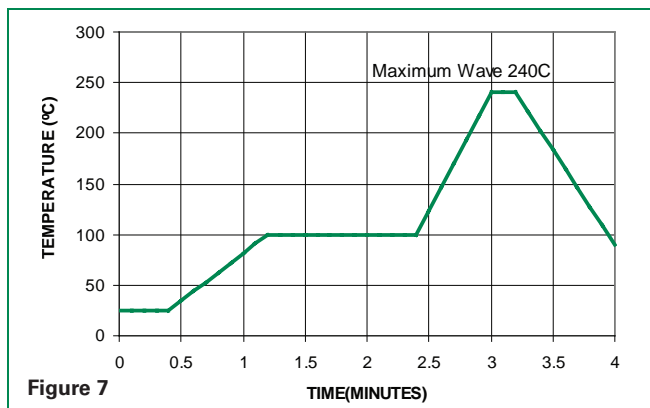


Figure 7

Lead-free Profile

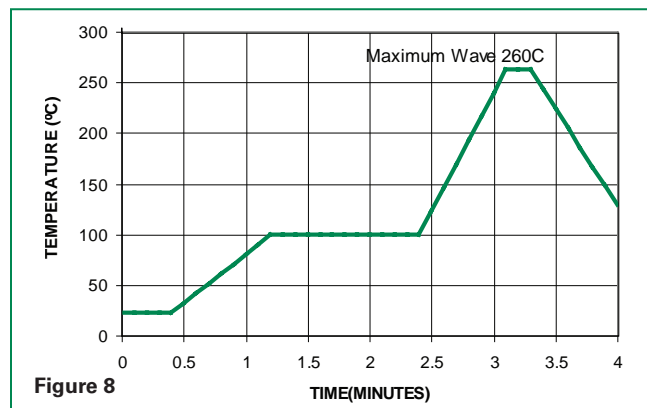


Figure 8

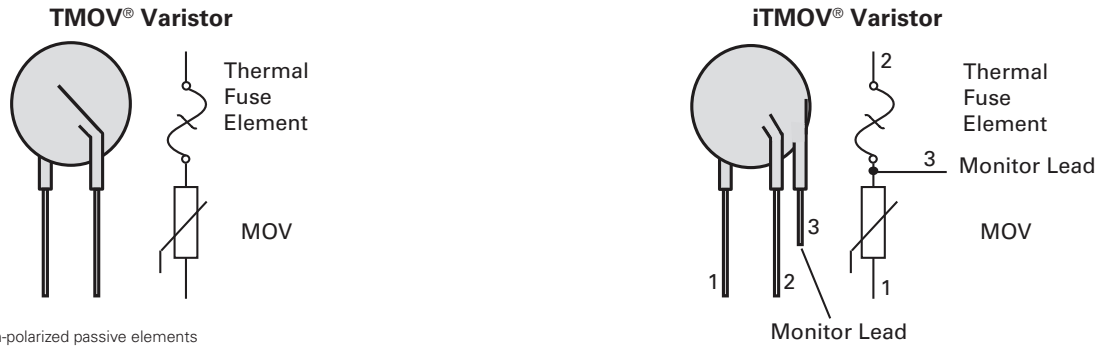
Physical Specifications

| | |
|----------------------------------|--|
| Lead Material | Non Lead-free parts: Solder coated Copper wire, or Tin-coated Copper wire Lead-free parts: Tin-coated Copper wire |
| Soldering Characteristics | Solderability per MIL-STD-202, Method 208E |
| Insulating Material | Cured, flame retardant epoxy polymer meets UL94V-0 requirements |
| Device Labeling | Marked with LF, voltage, UL/CSA logos, and date code |

Environmental Specifications

| | |
|--------------------------------------|--|
| Operating/Storage Temperature | -40°C to +85°C |
| Passive Aging | +85°C, 1000 hours +/-10% typical voltage change |
| Humidity Aging | +85°C, 85% RH, 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 215F |
| Moisture Sensitivity | Level 1, J-STD-020C |

Lead Configurations



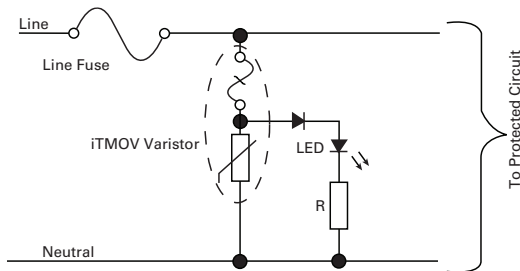
Note: MOVs are non-polarized passive elements

iTMOV® Varistor Application Examples

The application examples below show how the indicator lead on the iTMOV® can be used to indicate that the thermal element has been opened. This signifies that the circuit is no longer protected from transients by the MOV.

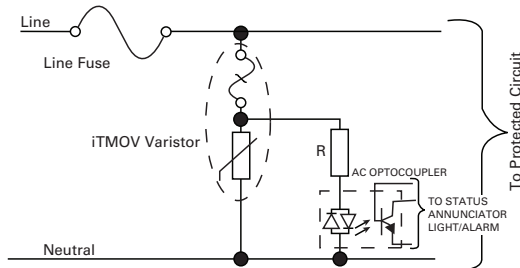
Application Example 1

In this case, the LED is normally on, and is off when the thermal element opens.



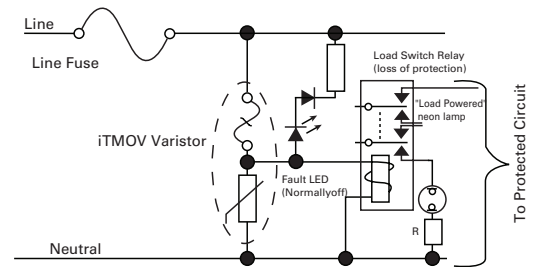
Application Example 2

This circuit utilizes an optocoupler to provide galvanic isolations between the iTMOV® varistor and the indicating or alarm circuitry.



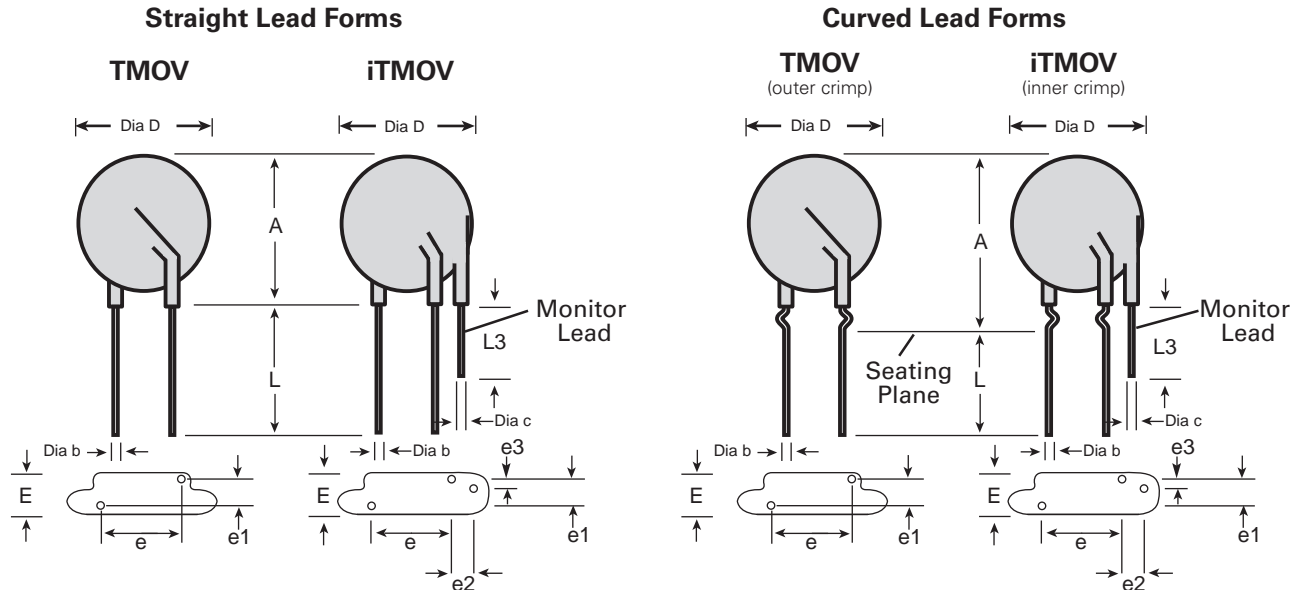
Application Example 3

This circuit illustrates the use of the monitoring lead of the iTMOV® varistor to ensure that equipment is only operated when overvoltage protection present. In normal operation the load switch relay solenoid is powered via the indicator lead of the iTMOV® varistor. In the event of the thermal element being activated, the relay will de-activate, cutting power to the protected circuit and the fault LED will illuminate.



Please note: Indicator circuits are provided as a guideline only. Verification of actual indicator circuitry is the responsibility of the end user. Component values selected must be appropriate for the specific AC line voltage service and application.

Device Dimensions



| Dimension | V _{RMS} Voltage Model | TMOV® Varistor | | | | iTMOV® Varistor | | | |
|---|--------------------------------|----------------|--------------|--------------|--------------|-----------------|--------------|--------------|--------------|
| | | 14mm Size | | 20mm Size | | 14mm Size | | 20mm Size | |
| | | Min. mm (in) | Max. mm (in) | Min. mm (in) | Max. mm (in) | Min. mm (in) | Max. mm (in) | Min. mm (in) | Max. mm (in) |
| A Straight Lead | ALL | 17.0 (0.669) | 22.0 (0.866) | 23.0 (0.906) | 28.0 (1.10) | 17.0 (0.669) | 22.0 (0.866) | 23.0 (0.906) | 28.0 (1.10) |
| A Crimped Lead | ALL | -- | 22.5 (0.886) | -- | 31.0 (1.221) | -- | 22.5 (0.886) | -- | 31.0 (1.221) |
| Dia D | ALL | 13.5 (0.531) | 17.0 (0.669) | 19.0 (0.748) | 23.0 (0.906) | 13.5 (0.531) | 17.0 (0.669) | 19.0 (0.748) | 23.0 (0.906) |
| e | ALL | 6.5 (0.256) | 8.5 (0.335) | 6.5 (0.256) | 8.5 (0.335) | 6.5 (0.256) | 8.5 (0.335) | 6.5 (0.256) | 8.5 (0.335) |
| e1 Bulk Pack | 115-175 | 1.5 (0.059) | 4.0 (0.157) | 1.5 (0.059) | 4.0 (0.157) | 1.5 (0.059) | 4.0 (0.157) | 1.5 (0.059) | 4.0 (0.157) |
| | 200-275 | 2.0 (0.079) | 4.5 (0.177) | 2.0 (0.079) | 4.5 (0.177) | 2.0 (0.079) | 4.5 (0.177) | 2.0 (0.079) | 4.5 (0.177) |
| | 300-420 | 3.0 (0.118) | 5.5 (0.217) | 3.0 (0.118) | 5.5 (0.217) | 3.0 (0.118) | 5.5 (0.217) | 3.0 (0.118) | 5.5 (0.217) |
| | 460-750 | n/a | n/a | 0 | 2.0 (0.079) | n/a | n/a | 0 | 2.0 (0.079) |
| e1 Tape & Reel and In-Line Lead | 115-420 | 0 | 2.0 (0.079) | 0 | 2.0 (0.079) | 0 | 2.0 (0.079) | 0 | 2.0 (0.079) |
| | 460-550* | n/a | n/a | 0 | 2.0 (0.079) | n/a | n/a | 0 | 2.0 (0.079) |
| e2 | ALL | n/a | n/a | n/a | n/a | 4.0 (0.138) | 6.0 (0.236) | 4.0 (0.157) | 6.0 (0.236) |
| e3 | ALL | n/a | n/a | n/a | n/a | 0 | 2.0 (0.079) | 0 | 2.0 (0.079) |
| E | 115-175 | -- | 9.0 (0.335) | -- | 9.0 (0.335) | -- | 9.0 (0.335) | -- | 9.0 (0.335) |
| | 200-275 | -- | 9.5 (0.374) | -- | 9.5 (0.374) | -- | 9.5 (0.374) | -- | 9.5 (0.374) |
| | 300-460 | -- | 11.0 (0.433) | -- | 11.0 (0.433) | -- | 11.0 (0.433) | -- | 11.0 (0.433) |
| | 510-575 | -- | n/a | -- | 12.0 (0.472) | -- | n/a | -- | 12.0 (0.472) |
| | 625-750 | -- | n/a | -- | 13.0 (0.512) | -- | n/a | -- | 13.0 (0.512) |
| L | ALL | 25.4 (1.00) | -- | 25.4 (1.00) | -- | 25.4 (1.00) | -- | 25.4 (1.00) | -- |
| L3 | ALL | n/a | n/a | n/a | n/a | 6.0 (0.236) | -- | 6.0 (0.236) | -- |
| Dia b | 115-420 | 0.76 (0.030) | 0.86 (0.034) | 0.76 (0.030) | 0.86 (0.034) | 0.76 (0.030) | 0.86 (0.034) | 0.76 (0.030) | 0.86 (0.034) |
| | 460-750 | n/a | n/a | 0.95 (0.037) | 1.05 (0.041) | n/a | n/a | 0.95 (0.037) | 1.05 (0.041) |
| Dia c Outside Lead Only | ALL | n/a | n/a | n/a | n/a | 0.76 (0.030) | 0.86 (0.034) | 0.76 (0.030) | 0.86 (0.034) |

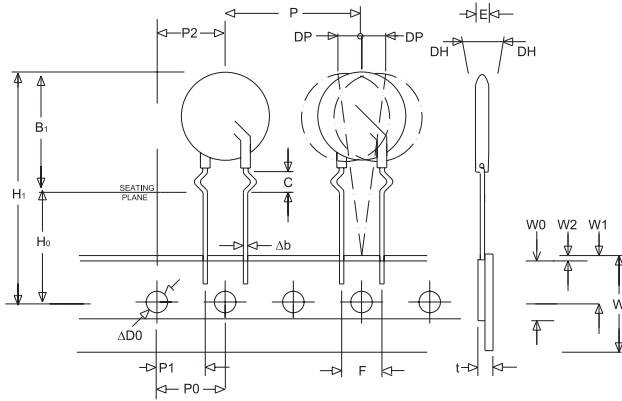
NOTES:

For 14mm ratings above 420 V_{RMS} contact factory for specifications.

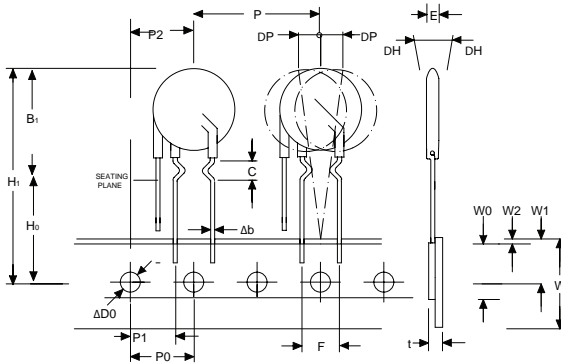
* Items above 550 V_{RMS} are not available packaged as tape and reel (bulk pack only)

Tape and Reel Specification

TMOV® VARISTOR WITH OUTER CRIMP



iTMOV® VARISTOR WITH INNER CRIMP



- Reel capacity varies with voltage.
- Leads are crimped and in-line. This excludes the monitor lead on iTMOV® devices which are not crimped and not in-line.
- To order tape and reel option please add suffix 'L2T7' to end of standard part number.
- Tape and reel option is available for rated voltages up to 420V. Contact factory regarding availability of higher voltages.

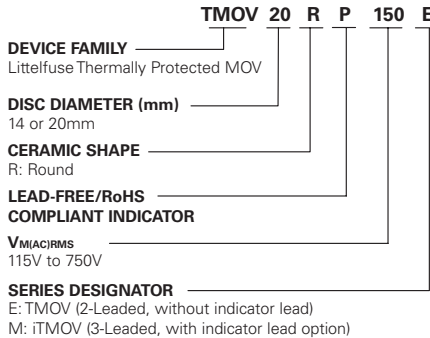
Contact Littelfuse for additional details.

| | DESCRIPTION | MODEL SIZE | |
|----------------------|---------------------------------|------------------|-----------------|
| | | 14mm | 20mm |
| B₁ | Component Top to Seating Plane | 22.5 Max | 31 Max |
| P | Pitch of Component | 25.4 +/- 1.0 | 25.4 +/- 1.0 |
| P₀ | Feed Hole Pitch | 12.7 +/- 0.2 | 12.7 +/- 0.2 |
| P₁ | Feed Hole Center to Pitch | 8.95 +/- 0.7 | 8.95 +/- 0.7 |
| P₂ | Hole Center to Component Center | 12.7 +/- 0.7 | 12.7 +/- 0.7 |
| F | Lead to Lead Distance | 7.5 +/- 0.8 | 7.5 +/- 0.8 |
| Δh | Component Alignment | 2.0 Max | 2.0 Max |
| W | Tape Width | 18.0 +1.0/-0.5 | 18.0 +1.0/-0.5 |
| W₀ | Hold Down Tape Width | 12.0 +/- 0.3 | 12.0 +/- 0.3 |
| W₁ | Hole Position | 9.0 +0.75/-0.50 | 9.0 +0.75/-0.50 |
| W₂ | Hold Down Tape Position | 0.5 Max | 0.5 Max |
| H₁ | Component Height | 40.0 Max | 46.5 Max |
| D₀ | Feed Hole Diameter | 4.0 +/- 0.2 | 4.0 +/- 0.2 |
| t | Total Tape Thickness | 0.7 +/- 0.2 | 0.7 +/- 0.2 |
| L | Length of Clipped Lead | 11.0 Max | 11.0 Max |
| Δp | Component Alignment | 3 Max. 1.00mm | 3 Max |
| C | Crimp Length | 2.6 typ | 2.6 typ |
| H₀ | Seating Plane Height | 16.0 +/- 0.5 | 16.0 +/- 0.5 |

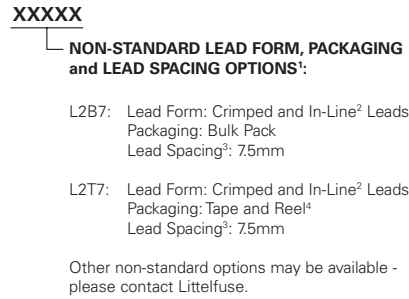
Dimensions in mm

Part Numbering System

Base Part Codes
(See ratings & specifications tables and notes below)



Option Codes¹
(See below)



NOTES:

- Use Base Part Code only to receive standard product:
Lead Form: Straight Leads. Devices greater than 420Vrms are provided In-Line².
Packaging: Bulk Pack
Lead Spacing: 7.5mm +/-1.0mm
- "In-Line" refers to straight row of leads at the tip where product is to contact the circuit board.
Refer to "e1" in Device Dimensions section.
- Lead Spacing refers to span between leads as "e" dimension in Device Dimensions section.
- Due to device bulk, tape and reel packaging option is available only for devices up to 420Vrms

Pack Quantities

| Rated Voltage | Pack Quantities | | | |
|---------------|-----------------|------|---------------|------|
| | Bulk Pack | | Tape and Reel | |
| | Model Size | | Model Size | |
| | 14mm | 20mm | 14mm | 20mm |
| 115-250 | 600 | 400 | 500 | 400 |
| 275-550 | 500 | 300 | 400 | 300 |
| 575-750 | 400 | 200 | n/a | n/a |

NOTE: Tape and Reel available up to 420V only - please contact factory regarding availability of higher voltage parts.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Littelfuse:

[TMOV20R275EP](#) [TMOV14R150EP](#) [TMOV14R275EP](#) [TMOV14R300EP](#) [TMOV20R130EP](#) [TMOV14R385E](#)
[TMOV20R115M](#) [TMOV20R300M](#) [TMOV20R750E](#) [TMOV20R420M](#) [TMOV14R200E](#) [TMOV14R140E](#) [TMOV14R130E](#)
[TMOV14R300M](#) [TMOV20R510E](#) [TMOV20R550E](#) [TMOV14R175M](#) [TMOV20R750M](#) [TMOV20R175M](#)
[TMOV20R230M](#) [TMOV20R575E](#) [TMOV20R150M](#) [TMOV14R130M](#) [TMOV14R385M](#) [TMOV20R130M](#)
[TMOV14R420E](#) [TMOV20R575M](#) [TMOV20R300E](#) [TMOV20R140E](#) [TMOV20R230E](#) [TMOV20R275M](#) [TMOV20R420E](#)
[TMOV20R460E](#) [TMOV20R550M](#) [TMOV14R115E](#) [TMOV20R150E](#) [TMOV20R200M](#) [TMOV14R150M](#)
[TMOV14R250M](#) [TMOV14R300E](#) [TMOV20R320M](#) [TMOV20R320E](#) [TMOV20R625M](#) [TMOV14R175E](#)
[TMOV14R230M](#) [TMOV14R140M](#) [TMOV14R275E](#) [TMOV14R150E](#) [TMOV20R510M](#) [TMOV14R200M](#)
[TMOV14R250E](#) [TMOV14R320E](#) [TMOV20R115E](#) [TMOV20R625E](#) [TMOV20R200E](#) [TMOV20R250M](#) [TMOV14R230E](#)
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[TMOV20R275E](#) [TMOV20R385E](#) [TMOV20R460M](#) [TMOV20R130E](#) [TMOV20R250E](#) [TMOV20R140EL2T7](#)
[TMOV20R300ML2T7](#) [TMOV20R250EP](#) [TMOV20RP320EL4B1](#) [TMOV20RP250EL1B1](#) [TMOV20RP115EL1B1](#)
[TMOV20RP385EL4B1](#) [TMOV20RP230EL1B1](#) [TMOV20RP095E](#) [TMOV20RP095EL2B7](#) [TMOV20RP320EL1B1](#)
[TMOV20RP420EL1B1](#) [TMOV20RP130EL1B1](#) [TMOV20RP140EL1B1](#) [TMOV20RP150EL1B1](#) [TMOV20RP095EL4B7](#)
[TMOV20RP275EL4B1](#) [TMOV20RP385EL1B1](#) [TMOV20RP175EL1B1](#) [TMOV20RP230EL4B1](#) [TMOV20RP115EL4B1](#)
[TMOV20RP275EL1B1](#) [TMOV20R275EL2T7](#)