

Varistor Products

High Energy Industrial Thermally Protected

TMOV34S® Varistor Series



The Littelfuse Industrial TMOV34S series thermally protected varistor represents a new development in circuit protection. It consists of a 34mm square format varistor element (MOV) with an integral thermally activated element designed to open in the event of overheating due to abnormal over-voltage, limited current conditions as outlined in UL1449 Feb. 1998 edition. The device has a third lead, an indicator lead, which may be used to indicate that the MOV has been disconnected from the circuit. This lead facilitates connection to monitoring circuitry. The TMOV34S devices 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 discreet solutions resulting in improved clamping performance to fast over-voltage transients.

Features

- US Patent for Thermally Protected MOV- Patent # 6636403
- Designed to facilitate compliance to UL1449 for TVSS product.
- Hi Peak Current Rating to 40 kA.
- -55 Deg C to +85 Deg C operating temp.
- Agency Recognition : UL
- Alternative Design available with narrow 3mm wide monitor (right) lead.

AGENCY APPROVALS:

Recognized by UL under File UL E75901

34mm Devices-Devices are approved as an MOV to UL1449. Devices with ratings greater than 420VAC are not affected by these abnormal voltage conditions.

Accelerated Aging Testing-34mm devices comply with Accelerated Aging Test requirements per. ANSI/IEEE C62.11 and may be used in secondary surge arrestors.

AGENCY FILE NUMBERS: ULE75961 (UL1449)



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Applications

- TVSS Products
- AC Panel Protection Modules
- AC Line Power Supplies
- AC Power Meters
- UPS (Uninterruptable Power Supply)
- Inverters
- AC/DC Power Supplies
- DIN Rail

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Absolute Maximum Ratings

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

| | UNITS |
|--|----------------|
| Continuous: | |
| Steady State Applied Voltage: | |
| AC Voltage Range (V _{M(AC)RMS}) | 115 to 750 V |
| Transient: | |
| Peak Pulse Current (I _{TM}) | |
| For 8x20µs Current Wave, single pulse | up to 40,000 A |
| Single-Pulse Energy Capability | |
| For 2ms Current Wave | 235 to 1050 J |
| Operating Ambient Temperature Range (T _A) | -55 to +85 °C |
| Storage Temperature (T _{STG}) | -55 to +125 °C |
| Temperature Coefficient (αV) of Clamping Voltage (V _C) at Specified Test Current | <0.01 %/°C |
| Hi-Pot Encapsulation (Isolation Voltage Capability) | 2500 V |
| Thermal Protection Isolation Voltage Capability (when operated) | |
| -Under UL1449 Limited Current Test Procedure-see Note #1 | 600 V |
| Insulation Resistance | 1,000 MΩ |

#1 - Under UI1449 limited current testing parts rated >420V will not open due to 600V voltage limit. Devices with ratings >420V have not yet been evaluated.

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 and Specifications - TMOV Varistor Series

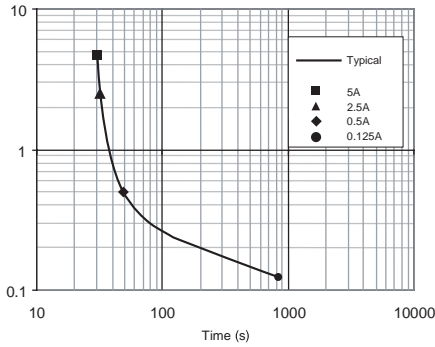
| PART NUMBER | MAXIMUM RATING (85°C) | | | | | SPECIFICATIONS (25°C) | | | |
|--------------------------|-----------------------|--------------------|-----------------------|---------------|---------------------------|--------------------------------------|------------------------|---|------------------------------|
| | CONTINUOUS | | | TRANSIENT | | VARISTOR VOLTAGE AT 1mA TEST CURRENT | | MAXIMUM CLAMPING VOLTAGE 8/20µs at 200A | TYPICAL CAPACITANCE f = 1MHz |
| | AC VOLTS | DC VOLTS | MCOV SURGE ARRESTER | ENERGY 2ms | PEAK SURGE CURRENT 8/20µs | | | | |
| | V _{M(AC)RMS} | V _{M(AC)} | V _{M(AC)RMS} | WTM 1 x PULSE | ITM 1 x PULSE | V _{N(DC) MIN} | V _{N(DC) MAX} | V _C | C |
| (V) | | (V) | (J) | (A) | (V) | | (V) | (pF) | |
| TMOV34S111M | 115 | 150 | 98 | 235 | 40000 ¹ | 163 | 202 | 305 | 11500 |
| TMOV34S131M | 130 | 175 | 111 | 270 | 40000 ² | 184 | 228 | 345 | 10000 |
| TMOV34S141M | 140 | 188 | 119 | 291 | 40000 ³ | 198 | 248 | 375 | 9000 |
| TMOV34S151M | 150 | 200 | 128 | 300 | 40000 ⁴ | 212 | 268 | 405 | 8000 |
| TMOV34S181M | 180 | 240 | 153 | 330 | 40000 ⁵ | 254 | 312 | 488 | 6800 |
| TMOV34S201M | 200 | 265 | 170 | 335 | 40000 | 283 | 357 | 540 | 6500 |
| TMOV34S251M | 250 | 330 | 213 | 370 | 40000 | 354 | 429 | 650 | 5000 |
| TMOV34S271M | 275 | 369 | 234 | 400 | 40000 | 389 | 473 | 730 | 4500 |
| TMOV34S301M | 300 | 400 | 255 | 435 | 40000 | 433 | 528 | 780 | 4050 |
| TMOV34S321M | 320 | 420 | 272 | 460 | 40000 | 462 | 561 | 830 | 3800 |
| TMOV34S331M | 330 | 435 | 281 | 475 | 40000 | 476 | 581 | 855 | 3700 |
| TMOV34S351M | 350 | 460 | 298 | 500 | 40000 | 505 | 616 | 910 | 3500 |
| TMOV34S391M | 385 | 506 | 327 | 550 | 40000 | 555 | 678 | 1005 | 3300 |
| TMOV34S421M ⁶ | 420 | 560 | 357 | 600 | 40000 | 610 | 748 | 1130 | 3000 |
| TMOV34S461M ⁶ | 460 | 610 | 391 | 620 | 40000 | 642 | 783 | 1188 | 2800 |
| TMOV34S481M ⁶ | 480 | 640 | 408 | 650 | 40000 | 670 | 825 | 1240 | 2700 |
| TMOV34S511M ⁶ | 510 | 675 | 434 | 700 | 40000 | 735 | 910 | 1350 | 2500 |
| TMOV34S551M ⁶ | 550 | 700 | 468 | 735 | 40000 | 770 | 939 | 1415 | 2250 |
| TMOV34S571M ⁶ | 575 | 730 | 489 | 770 | 40000 | 805 | 1000 | 1480 | 2200 |
| TMOV34S621M ⁶ | 620 | 800 | 527 | 840 | 40000 | 880 | 1074 | 1589 | 2100 |
| TMOV34S661M ⁶ | 660 | 850 | 561 | 900 | 40000 | 940 | 1160 | 1720 | 2000 |
| TMOV34S681M ⁶ | 680 | 890 | 578 | 950 | 40000 | 980 | 1195 | 1772 | 1970 |
| TMOV34S751M ⁶ | 750 | 970 | 638 | 1050 | 40000 | 1080 | 1320 | 2000 | 1800 |

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Thermal Characteristics



* Figure 4: Typical time to open circuit under UL1449 Abnormal Overvoltage Limited Current Test

Note : The Industrial TMOV Series TMOV34S devices are intended, in conjunction with appropriate enclosure design, to help facilitate TVSS module compliance to UL 1449, Section 37.4 (abnormal over-voltage limited current requirements). Under these extreme abnormal over-voltage conditions, the units will exhibit substantial heating and potential venting prior to opening. Modules should be designed to contain this possibility. Application testing is strongly recommended.

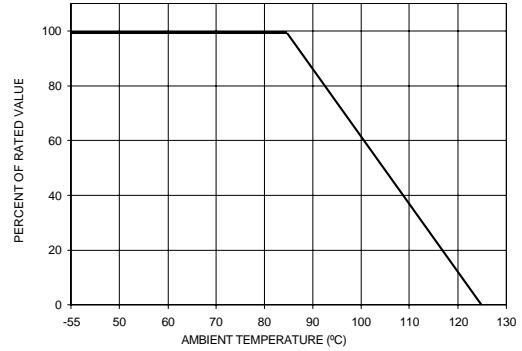


Figure 5: Peak Current & Energy Derating Curve

For applications exceeding 85°C ambient temperature, the peak surge current and energy ratings must be reduced as shown in Figure 3.

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Pulse Rating Curves

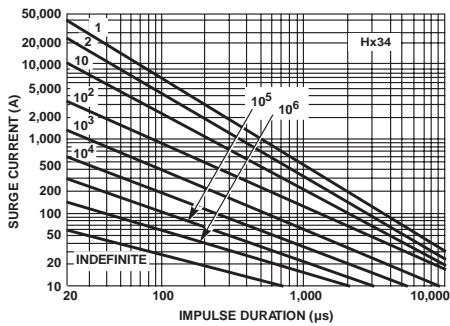


FIGURE 6. SURGE CURRENT RATING CURVES FOR HB34, HF34 and HG34

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Transient V-I Characteristic Curves

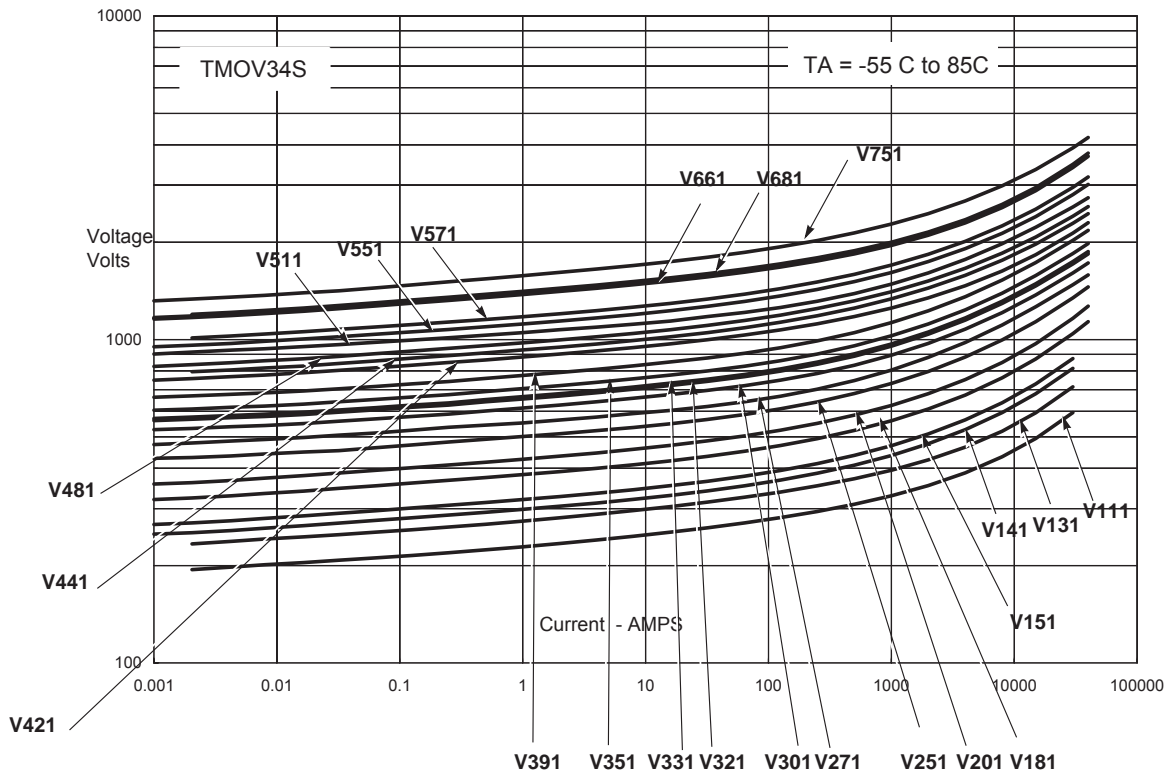


Fig 7. V-I Characteristic Curves For TMOV34S® Varistor

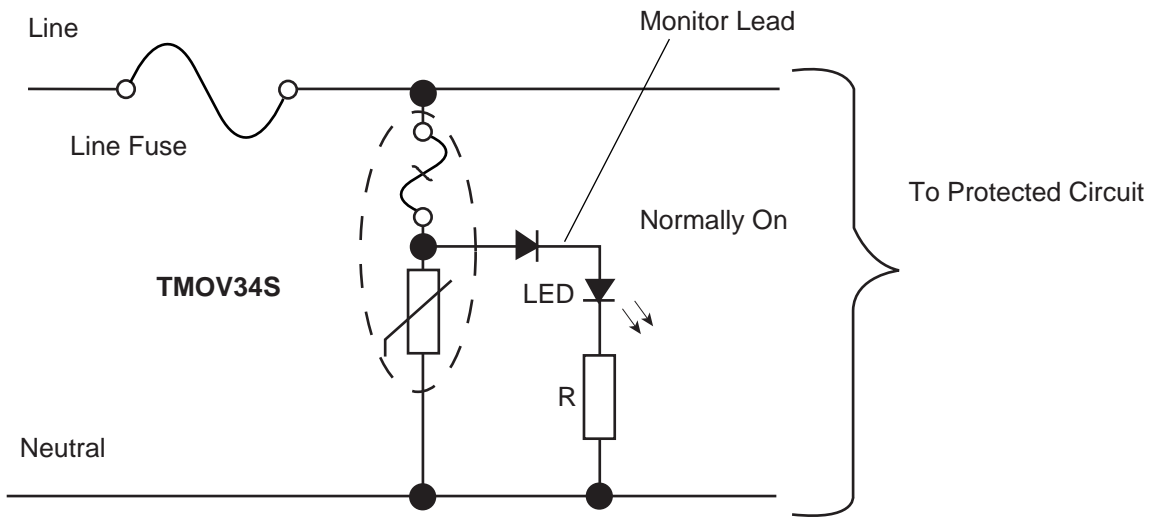
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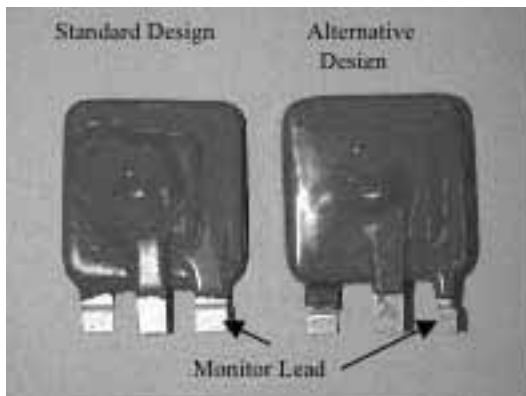
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iTMOV Varistor Application Examples

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.



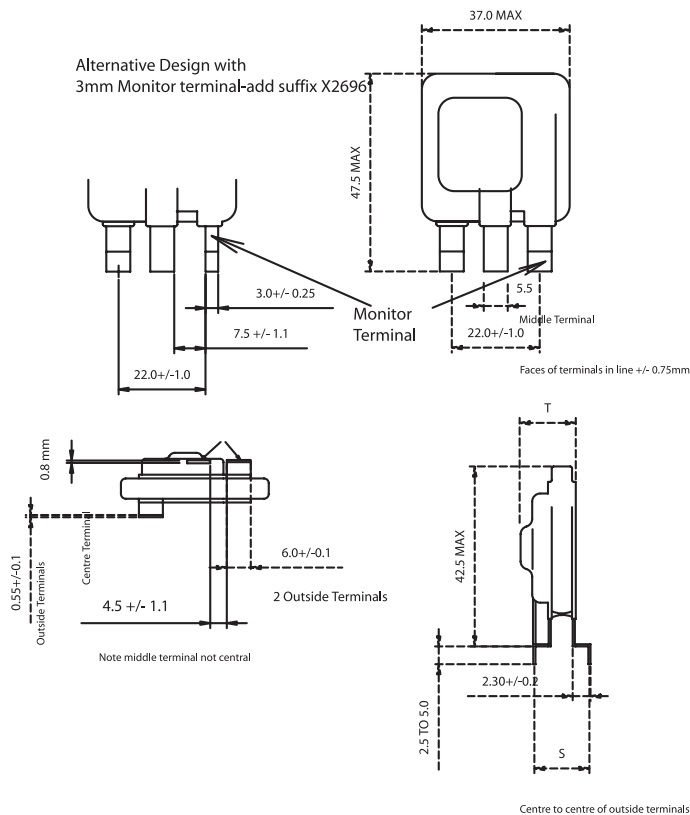
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| Part Number | T max Body Thickness | S Mounting Terminal Offset |
|-------------|-------------------------|----------------------------------|
| TMOV34S111M | 11.9 | 5.2 ±.65 |
| TMOV34S131M | 12.2 | 5.5 ±.65 |
| TMOV34S141M | 12.3 | 5.7 ±0.85 |
| TMOV34S151M | 12.4 | 5.9 ±0.85 |
| TMOV34S181M | 12.8 | 6.3 ±0.85 |
| TMOV34S201M | 13.0 | 6.5 ±0.85 |
| TMOV34S251M | 11.8 | 6.25 ±0.85 |
| TMOV34S271M | 12.0 | 6.5 ±0.85 |
| TMOV34S301M | 12.3 | 6.8 ±1.0 |
| TMOV34S321M | 12.5 | 6.9 ±1.0 |
| TMOV34S331M | 13.0 | 7.2 ±1.0 |
| TMOV34S351M | 13.1 | 7.4 ±1.0 |
| TMOV34S391M | 13.2 | 7.6 ±1.0 |
| TMOV34S421M | 13.4 | 7.85 ±1.0 |
| TMOV34S461M | 13.7 | 8.15 ±1.0 |
| TMOV34S481M | 13.9 | 8.25 ±1.0 |
| TMOV34S511M | 14.2 | 8.6 ±1.0 |
| TMOV34S551M | 14.8 | 8.65 ±1.0 |
| TMOV34S571M | 15.0 | 8.85 ±1.0 |
| TMOV34S621M | 15.4 | 9.25 ±1.0 |
| TMOV34S661M | 15.8 | 9.65 ±1.0 |
| TMOV34S681M | 16.0 | 9.85 ±1.0 |
| TMOV34S751M | 16.3 | 10.65 ±1.0 |

NOTE:
 Dimension in mm is typical, unless otherwise specified
 To order alternative design with narrow 3mm monitor lead(right hand terminal as shown) add suffix X2696 to part number

Ordering Information

Standard Parts

TMOV 34 S 150 M X2696

DEVICE FAMILY

Littelfuse Thermally Protected MOV

DISC DIAMETER (mm)

34 mm

CERAMIC SHAPE

S: Square

V_{M(AC)RMS}

115V to 750V

Optional Design

5 digit suffix when alternative 3mm wide monitor lead is required

Series Designator

M: 3-Leaded TMOV34S Varistor Series
 Supplied in Bulk Pack