

ANTREX Electronics

Electronic Components Sourcing Information

Product Reference Information

Part Number: TMOV14R275EL2T7
Manufacturer: Littelfuse Inc.
Package: Disc 14mm
Availability: Please confirm with sales

Product Page:

<https://antrexco.com/product/details/littelfuse-inc/tmov14r275el2t7.html>

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Contact Information

Email: info@antrexco.com

WhatsApp: +86-186-8066-5326

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Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

TMOV™ and iTMOV™ Varistor Series



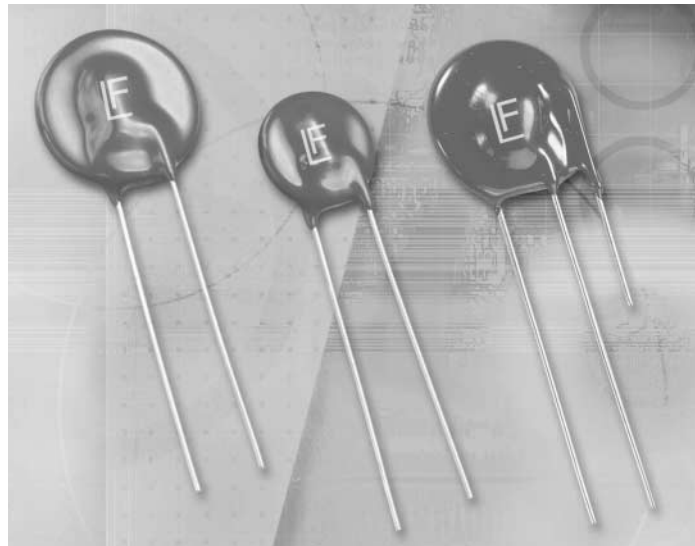
The Littelfuse TMOV and iTMOV thermally protected varistors represent a new development in integrated circuit protection. Both versions are comprised of radial leaded MOVs (Metal Oxide Varistors) with an integrated thermally activated element designed to open in the event of overheating due to the abnormal overvoltage, limited current, conditions outlined in UL1449.

The 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.

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

The TMOV and iTMOV varistors are both recognized surge suppression components to UL 1449. The TMOV and iTMOV varistor's integrated thermal element, in conjunction with appropriate enclosure design, helps facilitate TVSS module compliance to UL1449 for both cord connected and permanently connected applications.

TMOV and iTMOV varistors are compatible for use with industry standard wave-soldering processes or recommended hand-soldering methods.



Features

- Patent Pending Integrated Thermal Protection Device
- Designed to facilitate compliance to UL1449 for TVSS 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 Temperature Range
- Third lead for indication purposes.

AGENCY APPROVALS: Recognized under the components program of Underwriters Laboratories UL1449. Includes selected tests from UL1020, regarding thermal cutoffs.

AGENCY FILE NUMBERS: UL E75961

Applications

- TVSS Products
- AC Panel Protection Modules
- AC Line Power Supplies
- Surge Protected Strip Connectors
- AC Power Meters
- Re-locatable AC Power Taps

TMOV™ and iTMOV™ Varistor Series

TMOV Varistor Series - Absolute Maximum Ratings

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

Continuous:

Steady State Applied Voltage:

AC Voltage Range ($V_{M(AC)RMS}$) 115 to 420

Transient:

Peak Pulse Current (I_{TM})

For 8x20μs Current Wave, single pulse 6000 to 10,000

Single-Pulse Energy Capability

For 2ms Current Wave 35 to 320

Operating Ambient Temperature Range (T_A) -55 to 85

Storage Temperature Range (T_{STG}) -55 to 125

Temperature Coefficient (αV) of Clamping Voltage (V_C) at Specified Test Current <0.01

Hi-Pot Encapsulation (Isolation Voltage Capability) 2500

Thermal Protection Isolation Voltage Capability (when operated) 600

Insulation Resistance 1,000

TMOV Varistor UNITS

2

VARISTOR
PRODUCTS

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	DEVICE MODEL NUMBER BRAND- ING	DISC DIA- METER	MAXIMUM RATING (85°C)						SPECIFICATIONS (25°C)				
			CONTINUOUS		TRANSIENT				VARISTOR VOLTAGE AT 1mA TEST CURRENT		MAXIMUM CLAMPING VOLTAGE 8/20μs		TYPICAL CAPACI- TANCE f = 1MHz
			AC VOLTS	SUPPRESSED VOLTAGE RATING	ENERGY 2ms	PEAK SURGE CURRENT 8/20μs							
						I _{TM} 1 x PULSE	I _{TM} 2 x PULSE						
			V _{M(AC)RMS}	UL 1449 TABLE 60.1	W _{TM}	V _(DC) MIN	V _(DC) MAX	V _C	I _{PK}	C			
(mm)	(V)	(V)	(J)	(A)	(A)	(V)	(V)	(A)	(pF)				
TMOV14R115E	4T115E	14	115	300	35	6000	4500	162	198	300	50	1100	
TMOV20R115E	20T115E	20	115	300	52	10000	6500	162	198	300	100	2400	
TMOV14R130E	4T130E	14	130	400	50	6000	4500	184	226	340	50	1000	
TMOV20R130E	20T130E	20	130	400	100	10000	6500	184	226	340	100	1900	
TMOV14R140E	4T140E	14	140	500	55	6000	4500	200	240	360	50	900	
TMOV20R140E	20T140E	20	140	400	110	10000	6500	200	240	360	100	1750	
TMOV14R150E	4T150E	14	150	500	60	6000	4500	216	264	395	50	800	
TMOV20R150E	20T150E	20	150	400	120	10000	6500	216	264	395	100	1600	
TMOV14R175E	4T175E	14	175	700	70	6000	4500	243	297	455	50	700	
TMOV20R175E	20T175E	20	175	700	135	10000	6500	243	297	455	100	1400	
TMOV14R230E	4T230E	14	230	700	80	6000	4500	324	396	595	50	550	
TMOV20R230E	20T230E	20	230	700	160	10000	6500	324	396	595	100	1100	
TMOV14R250E	4T250E	14	250	800	100	6000	4500	351	429	650	50	500	
TMOV20R250E	20T250E	20	250	700	170	10000	6500	351	429	650	100	1000	
TMOV14R275E	4T275E	14	275	900	110	6000	4500	387	473	710	50	450	
TMOV20R275E	20T275E	20	275	700	190	10000	6500	387	473	710	100	900	
TMOV14R320E	4T320E	14	320	900	136	6000	4500	459	561	840	50	380	
TMOV20R320E	20T320E	20	320	900	273	10000	6500	459	561	840	100	750	
TMOV14R385E	4T385E	14	385	1200	150	6000	4500	558	682	1025	50	360	
TMOV20R385E	20T385E	20	385	1200	300	10000	6500	558	682	1025	100	700	
TMOV14R420E	4T420E	14	420	1200	160	6000	4500	612	748	1120	50	300	
TMOV20R420E	20T420E	20	420	1200	320	10000	6500	612	748	1120	100	600	

Varistor Products

Thermally Protected

TMOV™ and iTMOV™ Varistor Series

iTMOV Varistor Series - Absolute Maximum Ratings

Absolute Maximum Ratings

Continuous:

Steady State Applied Voltage:

AC Voltage Range ($V_{M(AC)RMS}$) 115 to 420 V

Transient:

Pulse Peak Current (I_{TM})

For 8/20 μ s Current Wave, Single Pulse 10,000 A

Single-Pulse Energy Capability

For 10/1000 μ s Current Wave 52 to 320 J

Operating Ambient Temperature Range (T_A) -55 to 85 °C

Storage Temperature Range (T_{STG}) -55 to 125 °C

Temperature Coefficient (α_V) of Clamping Voltage (V_C) at Specified Test Current <0.01 %/°C

Hi-Pot Encapsulation (Isolation Voltage Capability) 2500 V_(AC)

Isolation Voltage Capability (When Thermal Element Has Opened) 600 V_(AC)

Insulation Resistance 1000 M Ω

Indicator Lead Rating (Lead-3):

Continuous RMS current 100 mA

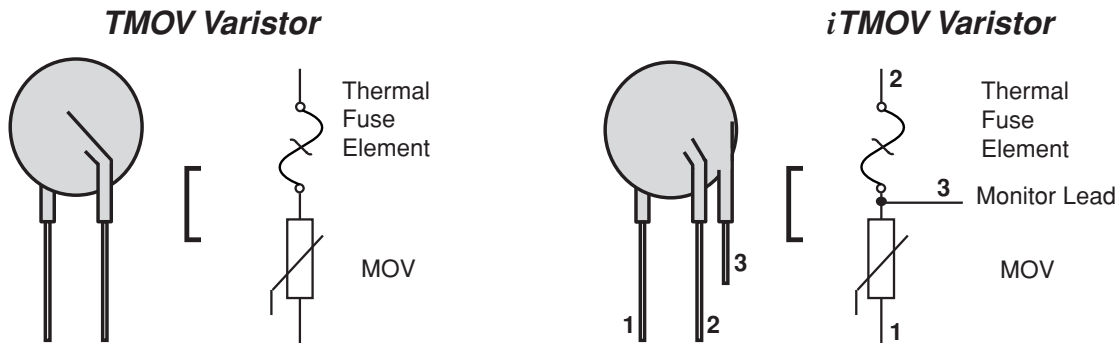
Surge Current, 8/20 μ s 10,000 A

Device Ratings and Specifications - iTMOV Varistor Series

PART NUMBER	DEVICE MODEL NUMBER BRAND- ING	DISC DIA- METER	MAXIMUM RATING (85°C)						SPECIFICATIONS (25°C)				
			CONTINUOUS		TRANSIENT				VARISTOR VOLTAGE AT 1mA TEST CURRENT		MAXIMUM CLAMPING VOLTAGE 8/20μs		TYPICAL CAPACI- TANCE f = 1MHz
			RMS VOLTS	MINIMUM SUPPRESSED VOLTAGE RATING	ENERGY 2ms	PEAK SURGE CURRENT 8/20μs							
						I _{TM} 1 x PULSE	I _{TM} 2 x PULSE	V _{N(DC)} MIN					
			V _{M(AC)}	UL 1449 TABLE 60.1	W _{TM}			V _{N(DC)} MIN	V _{N(DC)} MAX	V _C	I _{PK}	C	
(V)	(V)	(J)	(A)	(A)	(V)	(V)	(V)	(A)	(pF)				
TMOV20R115M	20T115M	20	115	300	52	10000	6500	162	198	300	100	2400	
TMOV20R130M	20T130M	20	130	400	100	10000	6500	184	226	340	100	1900	
TMOV20R140M	20T140M	20	140	400	110	10000	6500	200	240	360	100	1750	
TMOV20R150M	20T150M	20	150	400	120	10000	6500	216	264	395	100	1600	
TMOV20R175M	20T175M	20	175	700	135	10000	6500	243	297	455	100	1400	
TMOV20R230M	20T230M	20	230	700	160	10000	6500	324	396	595	100	1100	
TMOV20R250M	20T250M	20	250	700	170	10000	6500	351	429	650	100	1000	
TMOV20R275M	20T275M	20	275	700	190	10000	6500	387	473	710	100	900	
TMOV20R320M	20T320M	20	320	900	273	10000	6500	459	561	840	100	750	
TMOV20R385M	20T385M	20	385	1200	300	10000	6500	558	682	1025	100	700	
TMOV20R420M	20T420M	20	420	1200	320	10000	6500	612	748	1120	100	600	

TMOV™ and iTMOV™ Varistor Series

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 (Figure 1)

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

Application Example 2 (Figure 2)

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

Application Example 3 (Figure 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 deactivate, cutting power to the protected circuit and the fault LED will illuminate.

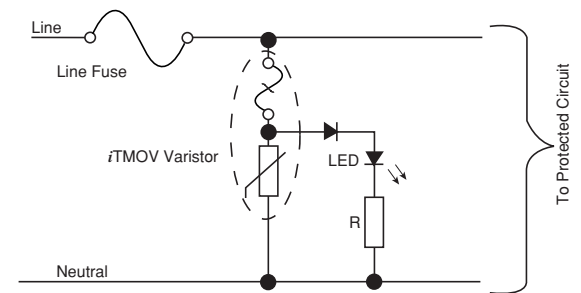


Figure 1. Application example 1

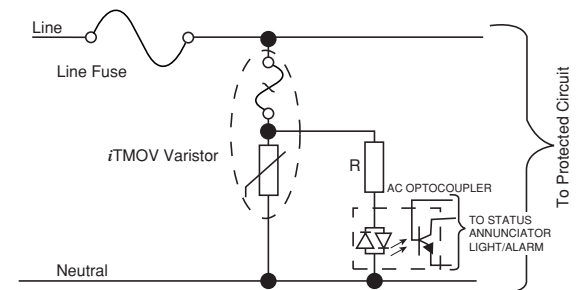


Figure 2. Application example 2

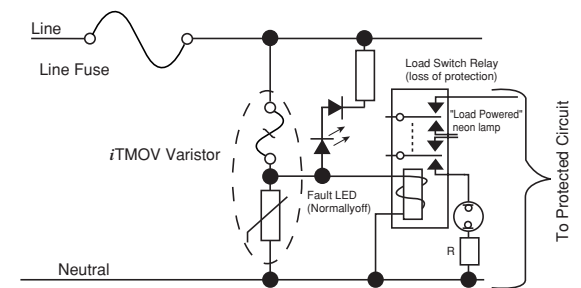
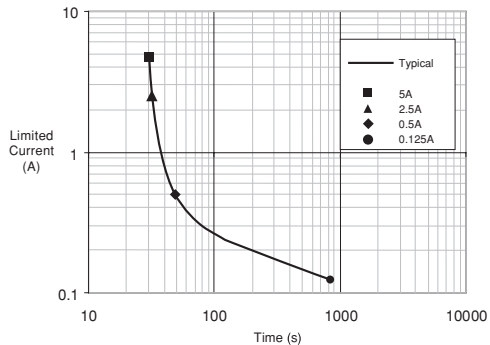


Figure 3. Application example 3

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.

TMOV™ and iTMOV™ Varistor Series

Thermal Characteristics



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

Note : The TMOV and iTMOV varistors are intended, in conjunction with appropriate enclosure design, to help facilitate TVSS module compliance to UL 1449, Section 37.4 (abnormal overvoltage limited current requirements). Under these extreme abnormal overvoltage 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.

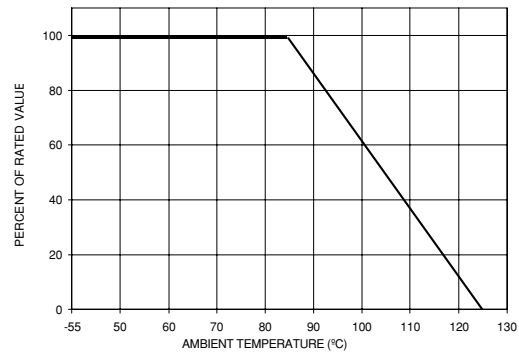


Figure 5: Peak Current & Energy Derating Curve

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

Transient V-I Characteristic Curves

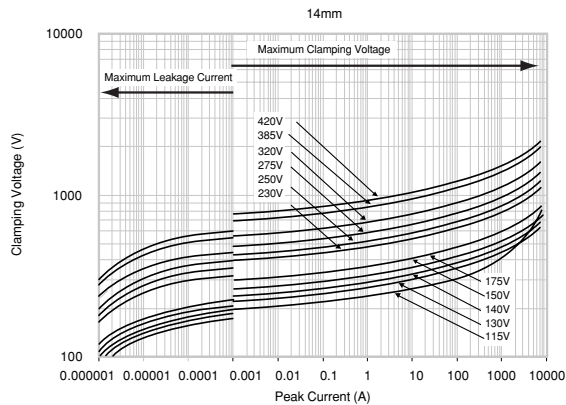


Figure 6: V-I Characteristic Curves for 14mm Types

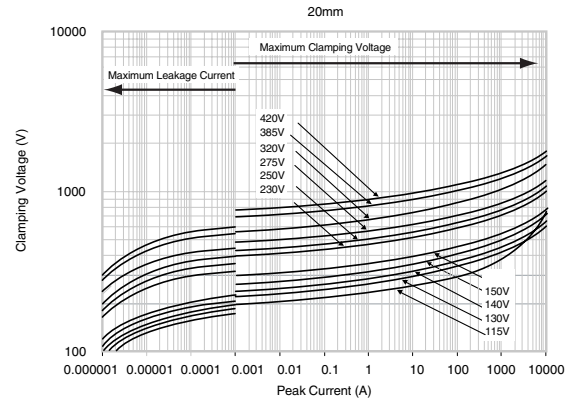


Figure 7: V-I Characteristic Curves for 20mm Types

Pulse Rating Curves

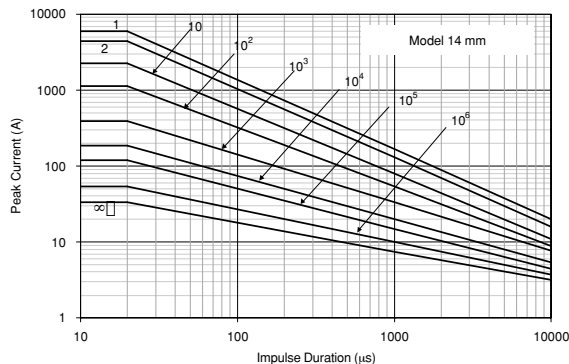


Figure 8: Pulse Rating Curves for 14mm types

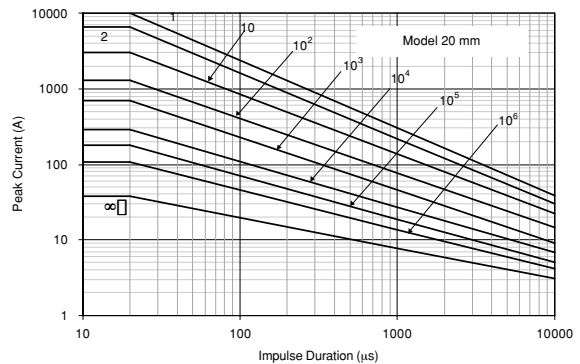


Figure 9: Pulse Rating Curves for 20mm types

TMOV™ and iTMOV™ Varistor Series

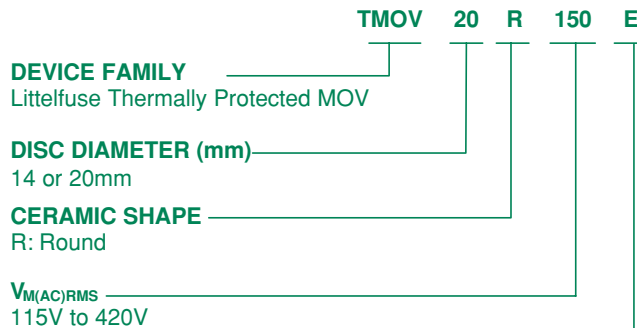
Soldering Recommendations

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 use 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 surface-mounted devices. It is critically important that all preheat stage and the solder bath temperatures are rigidly controlled.

The recommended solder for the TMOV and iTMOV varistors is a 62/36/2 (Sn/Pb/Ag), 60/40 (Sn/Pb) or 63/37 (Sn/Pb). Littelfuse also recommends an RMA solder flux.

Ordering Information

Standard Parts



NOTE: By ordering the standard part number, i.e. TMOV20R150E, standard lead styles, packing and lead spacing will be supplied. These specifications are as follows:

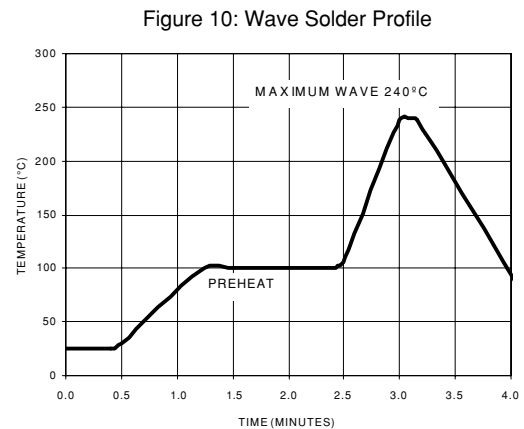
- Straight Leads
- Bulk Packed
- 7.5mm Lead Spacing

To change any of the ordering information use the additional option nomenclature.

Series Designator

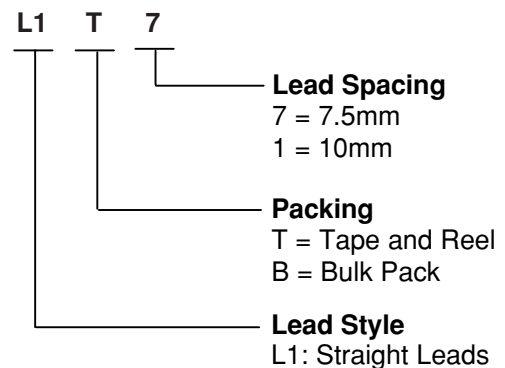
E: 2-Leaded TMOV Varistor Series
Supplied in Bulk Pack with 7.5mm lead spacing.

M: 3-Leaded iTMOV Varistor Series
Supplied in Bulk Pack with 7.5mm lead spacing (between leads 1 & 2)
(Available in 20mm only)



Additional Options

Standard Part

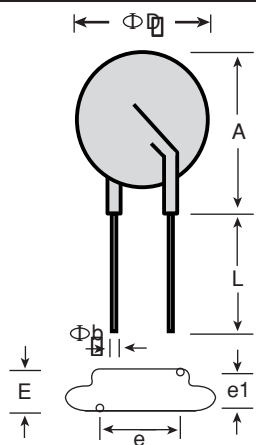
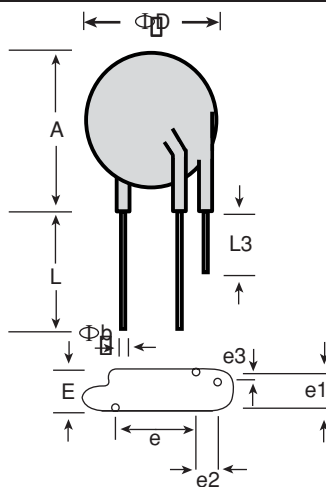


NOTE: For additional options, all 3 additional fields must be added to the standard part number, i.e. TMOV20R275E L1 T 1,

- Don't use additional option fields for standard parts.

NOTE: Lead spacing is for MOV leads only. The indicator lead space (iTMOV Varistor) is only available at 5mm.

TMOV™ and iTMOV™ Varistor Series

SYMBOL	V _{RMS} MODEL VOLTAGE	TMOV Varistor				iTMOV Varistor	
		VARISTOR MODEL SIZE					
		14mm		20mm		20mm	
		MIN mm (inch)	MAX mm (inch)	MIN mm (inch)	MAX mm (inch)	MIN mm (inch)	MAX mm (inch)
A	ALL	13.5 (0.531)	20 (0.787)	17.5 (0.689)	28 (1.102)	17.5 (0.689)	28 (1.102)
	ALL	13.5 (0.531)	17 (0.669)	17.5 (0.689)	23 (0.906)	17.5 (0.689)	23 (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)
e1	130-250	2.5 (0.098)	5.5 (0.216)	2.5 (0.098)	5.5 (0.216)	2.5 (0.098)	5.5 (0.216)
	275-420	2.5 (0.098)	5.5 (0.216)	2.5 (0.098)	5.5 (0.216)	2.5 (0.098)	5.5 (0.216)
e2	ALL					4.0 (0.157)	6.0 (0.236)
e3	ALL					-	1.3 (0.051)
E	130-250	-	8.3 (0.327)	-	8.3 (0.327)	-	8.3 (0.327)
	275-420	-	11 (0.433)	-	11 (0.433)	-	11 (0.433)
L	ALL	25.4 (1.00)		25.4 (1.00)		25.4 (1.00)	-
L3	ALL					10.0 (0.394)	-
	ALL	0.76 (0.030)	0.86 (0.034)	0.76 (0.030)	0.86 (0.034)	0.76 (0.030)	0.86 (0.034)
							

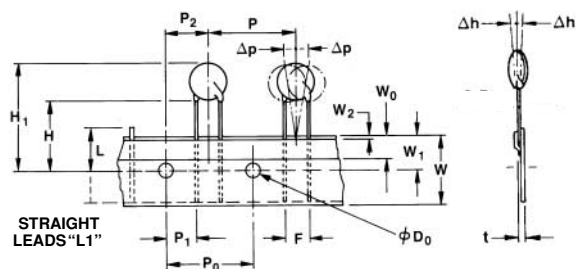
For other lead spacing contact your Littelfuse Sales Representative.

Standard Bulk Pack Quantities

VOLTAGE MODEL	STANDARD BULK PACK QUANTITY		TAPE AND REEL
	VARISTOR MODEL SIZE		
	14mm	20mm	
130 - 250	500	400	Contact a Littelfuse Sales Representative
275 or Higher	400	300	

TMOV™ and iTMOV™ Varistor Series

Tape Specifications for Reel or Ammo Pack (Fan-Fold)



- Conforms to ANSI and EIA specifications.
- Can be supplied to IEC Publication 286-2
- Reel capacity varies with voltage.

Contact Littelfuse for details.

SYMBOL	PARAMETER	MODEL SIZE	
		14mm	20mm
B_1	Component Top to Seating Plane	21.50 ± 0.50	28.00 ± 0.50
P	Pitch of Component	25.4 ± 1.0	25.4 ± 1.0
P_0	Feed Hole Pitch	12.7 ± 0.2	12.7 ± 0.2
P_1	Feed Hole Center to Pitch	2.6 ± 0.7	2.6 ± 0.7
P_2	Hole Center to Component Center	6.35 ± 0.7	6.35 ± 0.7
F	Lead to Lead Distance	7.5 ± 0.8	10.0 ± 0.8
Δh	Component Alignment	2.0 Max	2.0 Max
W	Tape Width	$18.0 + 1.0$ $18.0 - 0.5$	$18.0 + 1.0$ $18.0 - 0.5$
W_0	Hold Down Tape Width	6.0 ± 0.3	12.0 ± 0.3
W_1	Hole Position	$9.0 + 0.75$ $9.0 - 0.50$	$9.0 + 0.75$ $9.0 - 0.50$
W_2	Hold Down Tape Position	0.5 Max	0.5 Max
H	Height from Tape Center to Component Base	$18.0 + 2.0$ $18.0 - 0.0$	$18.0 + 2.0$ $18.0 - 0.0$
H_1	Component Height	40.0 Max	46.5 Max
D_0	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

Dimensions are in mm.