

**TELEDYNE SOLID STATE**

**METAL OXIDE VARISTOR (MOV)  
FOR TRANSIENT VOLTAGE PROTECTION**

**SERIES  
970**

**DESCRIPTION**

Teledyne 970 Series Metal Oxide Varistors (MOV's) are characterized specifically for use with Teledyne solid state AC relays and I/O converter modules for protection against high voltage transients that are prevalent on AC lines or otherwise generated when switching inductive loads. They can also be used for general circuit protective service other than solid state relays.

MOV's are bidirectional voltage sensitive devices that assume a low impedance state when their design voltage threshold is exceeded. As such, they perform a transient voltage clipping or suppression function on the AC line similar to back-to-back zener diodes and are ideal for circuit protection use from the standpoint of performance, economy and ease of installation.

The 970-1 and -2 have a specified 20 A minimum clamping capability at 400V and 600V peak respectively. When shunting SSR's the transient energy dissipated by the MOV's is limited by the SSR load impedance as well as the line source impedance. The MOV's thus characterized, protect SSR's against voltage transients such as those defined in IEEE STD 472-1974.

(Consult factory for information regarding MOV's with higher ratings.)

**ELECTRICAL SPECIFICATIONS**

(-40°C ≤ Ta ≤ 85°C)

CHARACTERISTICS		MIN.	MAX.	UNITS	TEST CONDITIONS	NOTES	
Allowable Continuous AC RMS Voltage	-1		140	V rms	I = 1 mA	Note 2	
	-2		250				
	-3		264				
	-4		410				
Average Power Dissipation			0.4	Watts			
Transient Energy Rating	-1		5	Joules	10 A 2 ms Pulse	Note 1, 4 Fig 2	
	-2		10				
	-3		10				
	-4		40				
Peak Allowable Surge Current (End of Life)			500	A	20 $\mu$ s Pulse Applied Twice	Note 1, 4 Fig 2	
Clamping Voltage	-1		400	Volts (Peak)	I = 20 A Peak	Note 2-4 Fig 1	
	-2		600				
	-3		800		I = 5 A Peak		
	-4						
MOV Lifetime			10 <sup>4</sup>	Number of Transients	1 = 100 A 20 $\mu$ s Pulse 10 s Between Pulses	Note 1, 4 Fig 2	
Dielectric Strength		1500		V rms 60 Hz SINE WAVE	Leads to Case		
Insulation Resistance		10 <sup>9</sup>		$\Omega$	Leads to Case		

**PART NUMBERING**

PART NUMBER	TRANSIENT (PEAK) RATING OF RELAY (MIN.)	MAXIMUM CONTINUOUS LINE VOLTAGE
970-1*	400	140 Vac
970-2*	600	250 Vac
970-3	600	264 Vac
970-4	800	410 Vac

\*UL RECOGNIZED FILE #E64310

## CHARACTERISTIC CURVES

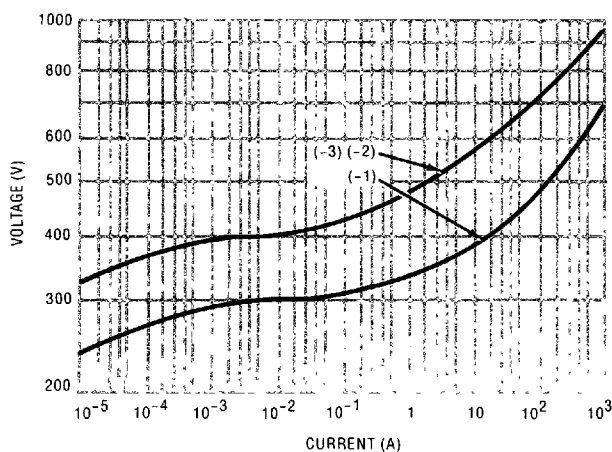


FIGURE 1 — MAXIMUM VOLT-AMPERE CHARACTERISTICS

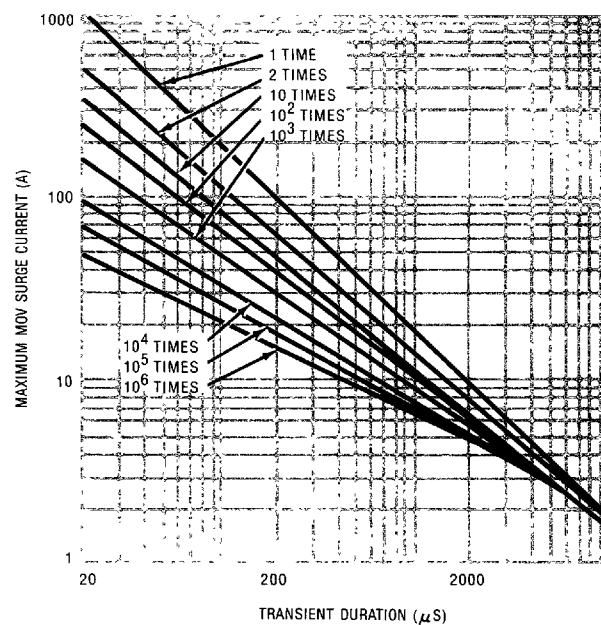
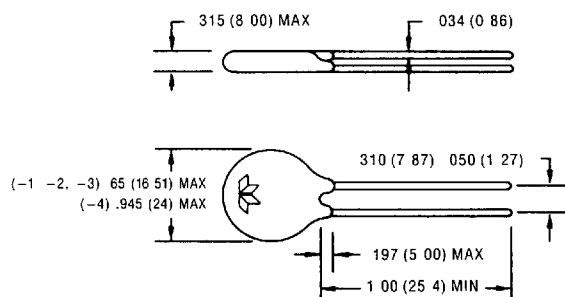


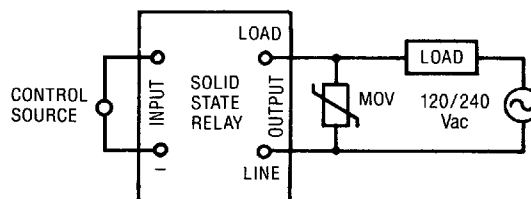
FIGURE 2 — MOV LIFETIME

## MECHANICAL SPECIFICATIONS (NOTE 5)



- Ambient Temperature Range:  
-40°C to +85°C Operating  
-40°C to +125°C Storage
- Solderability per MIL-STD-202, Method 208

## TYPICAL APPLICATION:



## NOTES:

- 1 End of life for these tests is when the post-test value of MOV voltage corresponding to 1 mA of leakage varies by more than 10% from the initial value
- 2 The (-1) MOV is designed to be used on 140 Vac maximum line voltage, to protect solid state relays with 400V peak blocking capability.  
The (-2) MOV is designed to be used on 250 Vac maximum line voltage, to protect solid state relays with 600V peak blocking capability.
- 3 The maximum line transient ( $V_p$ ) which can be clipped by the MOV without triac voltage breakdown is given by.  
(Where  $R_L$  is the load + source impedance)  
 $V_p = 20 R_L + 400$  (For -1 MOV)  $V_p = 20 R_L + 600$  (For -2 MOV)
- 4 Tested using a pulse having an 8 microsecond rise time
- 5 Consult factory for ring, spade and quick-disconnect terminal options.