

## Multi Layer Varistor Overvoltage Protection Device

*Raychem Circuit Protection Products*

**PRODUCT: MLV0402-180-E030**

DOCUMENT: SCD 26838  
PCN: RF0902  
REV LETTER: C  
REV DATE: AUGUST 10, 2007  
PAGE NO.: 1 OF 5

### GENERAL DESCRIPTION

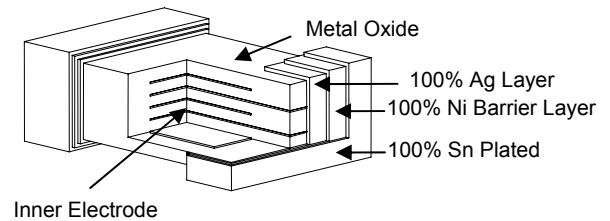
These Multi Layer Varistors are small, leadless, surface mount packages made of multiple layers of Zinc Oxide, with electrodes between them. They are used to help protect integrated circuits and other sensitive equipment. Their small size is ideal for high density printed circuit boards. The "E" series is a family of low capacitance parts, specifically designed for ESD protection of high data rate applications.

### BENEFITS

- Minimal signal distortion
- Help to protect sensitive equipment against typical ESD events
- Cost efficient assembly and protection
- Resistance to standard wave solder fluxes, provides excellent solderability
- Space savings
- Longer battery life due to low leakage current

### FEATURES

- Low capacitance
- Bidirectional clamping
- Compatible with standard surface mount methods
- Low and stable leakage current
- Low clamping voltage
- Quick response time (<1ns)
- High transient current capability
- RoHS Compliant



### APPLICATIONS

ESD protection of:

- High speed computer I/O ports and interfaces (USB, IEEE 1394, etc...)
- Portable devices
- Telecom equipment

### SYMBOL



### MATERIALS INFORMATION

**ROHS Compliant**

Directive 2002/95/EC  
Compliant

**ELV Compliant**

Directive 2000/53/EC  
Compliant

# Multi Layer Varistor

## Overtoltage Protection Device

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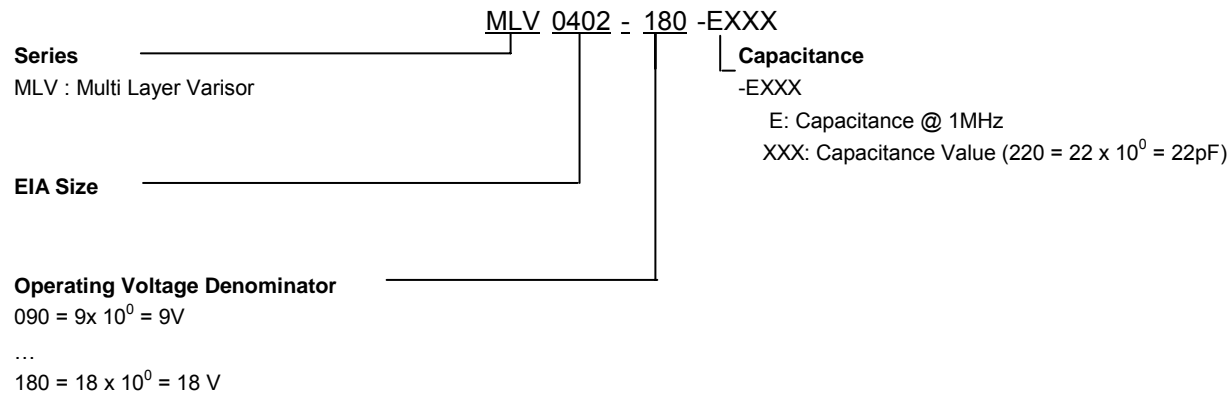
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### Ratings @ (25± 5°C)

	Maximum Working Voltage	Typical Clamping Voltage	Leakage Current	Typical Capacitance
<b>Symbol</b>	$V_{DC}$	$V_c^1$	$I_L$	$C_p$
<b>Units</b>	V (Max)	V	$\mu A$ (Max)	pF
<b>Test Conditions</b>	< 10 $\mu A$	ESD @ 8kV	@12V	@ 1MHz
MLV0402-180-E030	18	350	<1	3

Note 1: Measured during IEC61000-4-2, 8kV contact discharge, 30 ns after initiation of the ESD pulse.

### PART NUMBERING



### GENERAL CHARACTERISTICS

Operating Temperature: -40 to +85°C

Storage Temperature: -40 to +85°C

### ENVIRONMENTAL CHARACTERISTICS

Characterisitics	Specifications	Test Conditions
Bias Humidity	$\Delta V_v / V_v \leq \pm 10\%$	90% RH, 40°C, maximum working Voltage $V_{DC}$ , 1000 hours
Thermal Shock	$\Delta V_v / V_v \leq \pm 10\%$	-40°C to + 85°C, 30 min. cycle, 5 cycles
Full Load Voltage	$\Delta V_v / V_v \leq \pm 10\%$	Maximum working Voltage $V_{DC}$ , 85°C, 1000 hours
Solderability	95 % Coverage	230°C, 3s
Solder Heat Resistance	90% Coverage	260°C, 10s

# Multi Layer Varistor

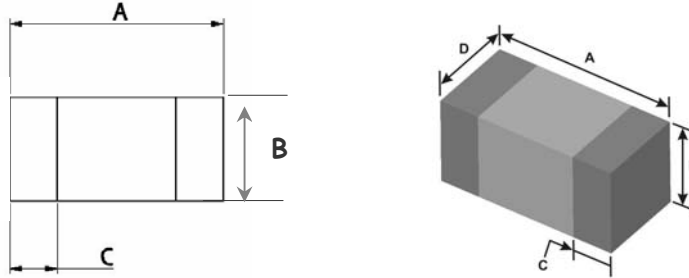
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### DIMENSIONS



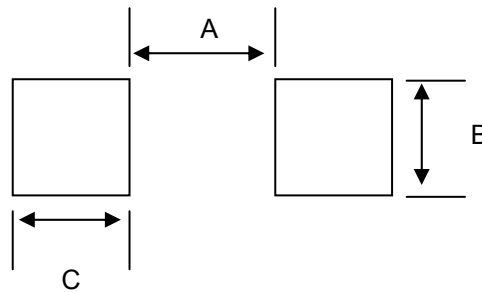
Drawing Not To Scale

	length A		Height B		Terminal Width C		Width D	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
mm:	0.85	1.15	0.4	0.6	0.1	0.4	0.4	0.6
in*:	(0.033)	(0.045)	(0.016)	(0.024)	(0.004)	(0.016)	(0.016)	(0.024)

\* Rounded off approximation

### RECOMMENDED PAD LAYOUT

Print solder with a thickness of 150 to 200µm



	A	B	C
mm:	0.35	0.75	0.85
in*:	(0.014)	(0.030)	(0.033)

\* Rounded off approximation

# Multi Layer Varistor

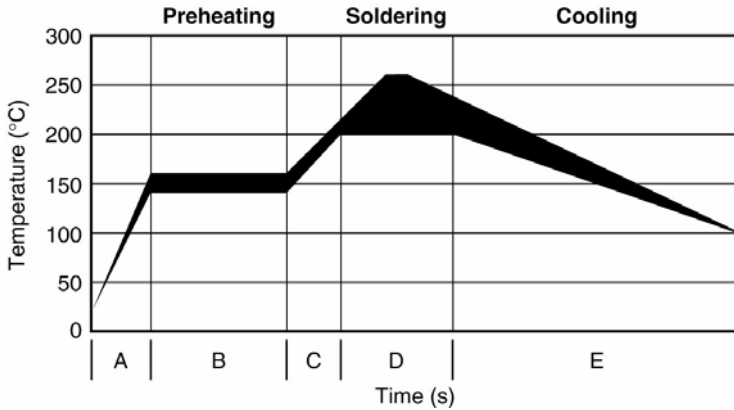
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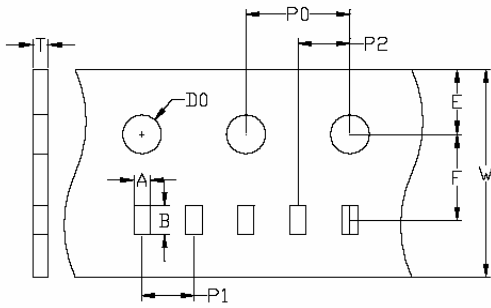
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### SOLDER REFLOW RECOMMENDATIONS



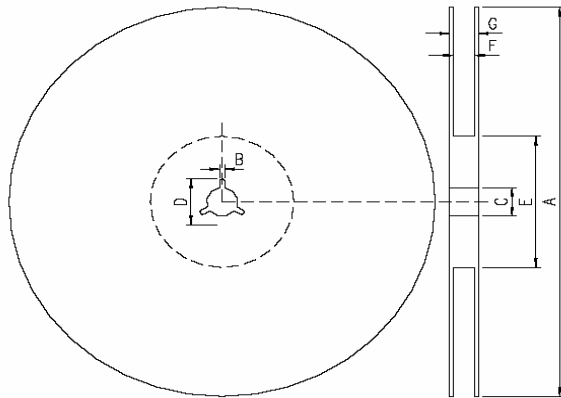
A	Temperature ramp up 1	From ambient to Preheating temperature	30s to 60s
B	Preheating	140°C - 160°C	60s to 120s
C	Temperature ramp up 2	From preheating to Main heating temperature	20s to 40s
D	Main Heating	at 200°C	60s ~ 70s
		at 220°C	50s ~ 60s
		at 240°C	30s ~ 40s
		at 260°C	5s ~ 10s
E	Cooling	From main heating temperature to 100°C	max 4°C/s

### PACKAGING



	A		B		W		E		F		P0		P1		P2		D0		T	
mm	0.59	0.65	1.09	1.15	7.7	8.3	1.7	1.8	3.45	3.55	3.9	4.1	1.95	2.05	1.95	2.05	1.4	1.6	0.55	0.65
inch*	(0.023)	(0.025)	(0.042)	(0.045)	(0.303)	(0.326)	(0.066)	(0.070)	(0.135)	(0.139)	(0.153)	(0.161)	(0.076)	(0.080)	(0.076)	(0.080)	(0.055)	(0.062)	(0.021)	(0.025)

\*Rounded off approximation



A	178.0±2.0
B	2.0±0.5
C	13.0±0.5
D	21.0±0.8
E	62.0±1.5
F	9.0±0.5
G	13.0±1.0



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### **RECOMMENDED STORAGE CONDITIONS**

Storage time: 12 months max  
Storage temperature: 5 to 40°C  
Storage Relative humidity: 65% max

### **POST REFLOW, CLEANING CONDITIONS**

A 5% saponifier combined with water during wash.

For Ultrasonic process water temperature should be at 50°C and board should be submerged for a minimum of one minute in the solutions, then rinse and dry.

For in-line washing, the temperature of the water sprayed should be at 110°C, rinse and drying is done in-line.

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