

## Excellent Integrated System Limited

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[TE Connectivity Raychem Circuit Protection  
MLV0402-120-E120](#)

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308 Constitution Drive  
Menlo Park, CA 94025-1164  
Phone: 800-227-4856  
www.circuitprotection.com

## Multi Layer Varistor Overvoltage Protection Device

*Raychem Circuit Protection Products*

**PRODUCT: MLV0402-120-E120**

DOCUMENT: SCD 26383  
PCN : RF0108  
REV. LETTER: E  
REV. DATE: JANUARY 22, 2008  
PAGE NO.: 1 OF 5

### GENERAL DESCRIPTION

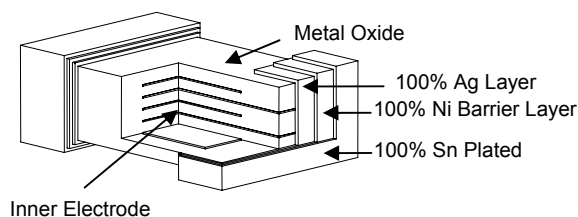
These Multi Layer Varistors are small, leadless, surface mount packages made of multiple layers of Zinc Oxide, with electrodes between them. They are used to help protect integrated circuits and other sensitive equipment. Their small size is ideal for high density printed circuit boards. The "E" series 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
- Capable of withstanding over 1000 pulses of IEC 61000-4-2, level 4
- Lead Free



### 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



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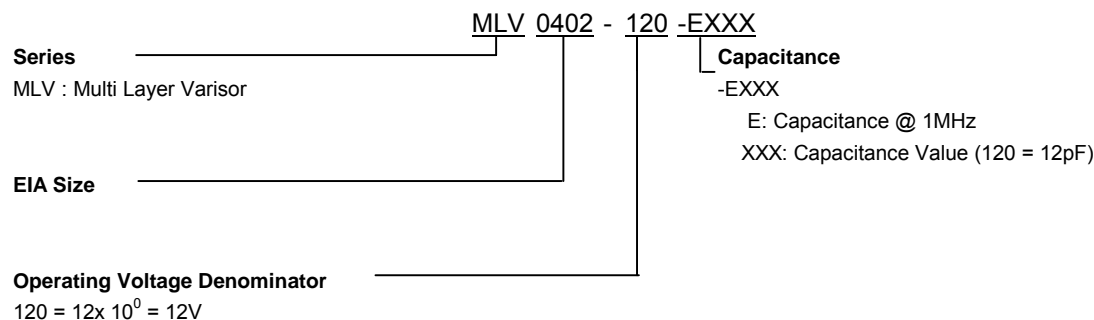
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**Ratings @ (25± 5°C)**

	Maximum Working Voltage	Typical Clamping Voltage <sup>†</sup>	Leakage Current	Typical Capacitance
<b>Symbol</b>	V <sub>DC</sub>	V <sub>c</sub>	I <sub>L</sub>	C <sub>p</sub>
<b>Units</b>	V (Max)	V	μA (Max)	pF
<b>Test Conditions</b>	< 10μA	IEC Pulse	@12V	@ 1MHz
MLV0402-120-E120	12	100	<1	12

Note 1: Measure 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**

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



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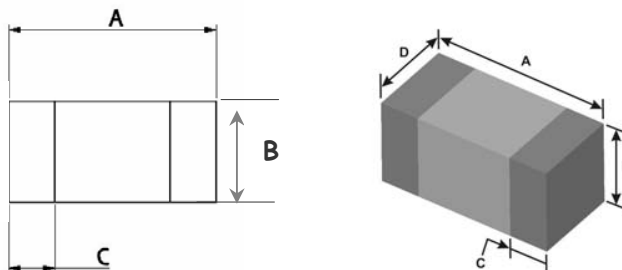
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## DIMENSIONS



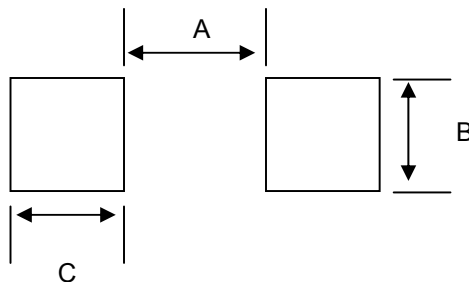
Drawing Not To Scale

	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



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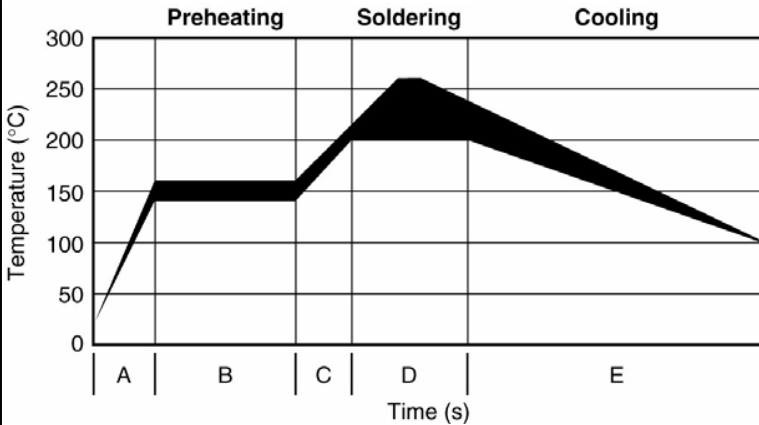
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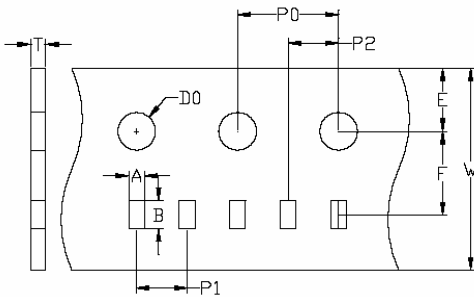
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### SOLDER REFLOW RECOMMENDATIONS



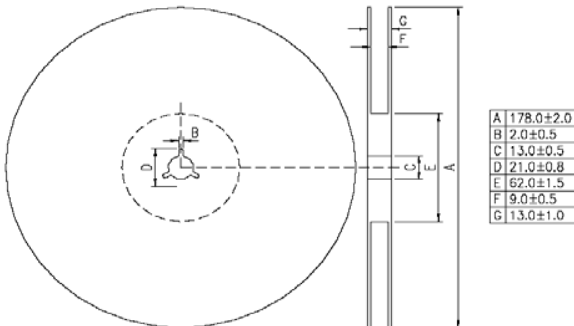
A	Temperature ramp up 1	From ambient to Preheating temperature	30s to 60s
B	Preheating	140°C - 160°C	60s to 120s
C	Temperature ramp up 2	From preheating to Main heating temperature	20s to 40s
D	Main Heating	at 200°C	60s ~ 70s
		at 220°C	50s ~ 60s
		at 240°C	30s ~ 40s
		at 260°C	5s ~ 10s
E	Cooling	From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

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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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