

# SMD Multilayer chip Varistor

## **PART NO. MV0402E120N3R0T**

### 1.1 Technical Data

	Symbol	Value	Unit
Maximum allowable continuous DC voltage	$V_{DC}$	12	V
Typical capacitance value measured*3	C	3	pF
Typical capacitance value tolerance		±50	%
Maximum clamping voltage measured*4	$V_C$	188	V

### 1.2 Reference Data

Response time	$T_{rise}$	<1	ns
Leakage current at $V_B \times 80\%$ (At initial state)	$I_{LVB}$	<20	$\mu A$
Leakage current at $V_B \times 80\%$ (After reliability Test)	$I_{LVBA}$	<100	$\mu A$
Operating ambient temperature		-40~+85	$^{\circ}C$
Storage temperature		-40~+125	$^{\circ}C$
Reflow temperature profile(Recommend)		260	$^{\circ}C$

### 1.3 Other Data

Body	ZnO
End termination	Ag/Ni/Sn
Packaging	Tape
Complies with Standard	IEC61000-4-2、IEC61000-4-5

### Notes:

\*1 AC voltage at 50~60Hz

\*2 Varistor voltage

\*3 Capacitance

\*4 Maximum clamping voltage

\*5 Rated peak single pulse transient current

Measured at 1mA DC

Measured at  $f=1kHz, V_{rms}=0.5V$

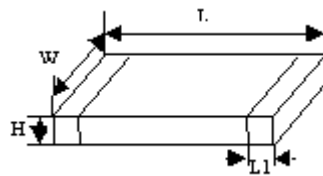
Measured at 1A by 8/20 $\mu s$  Pulse

Measured by 8/20 $\mu s$  Pulse

### Size:

Unit: mm

Type	Length (L)	Width (W)	High (H)	Termination (L1)
0402=1005	1.00±0.20	0.50±0.20	0.70 (max)	0.30±0.20



## 2. Ordering Information

### 2.1 Standards

MV   0402   E   120   N   3R0   T  
 ①   ②   ③   ④   ⑤   ⑥   ⑦

① production series: Varistor

② size: 0402=1005, 0603=1608

③ type: G: general ; E: ESD ; H: high energy

④ working voltage (DC): 5R0=5.0V 120=12V 180=18V 260=26V

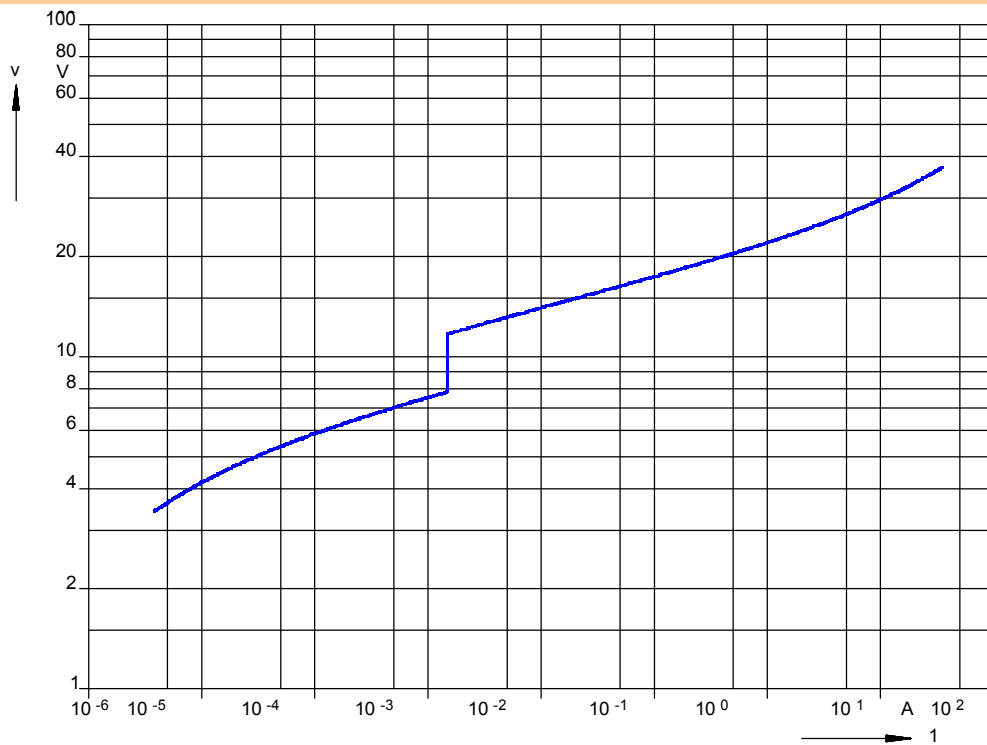
⑤ end termination: S: Ag/Pd N: Ag/Ni/Sn

⑥ typical capacitance value measured :

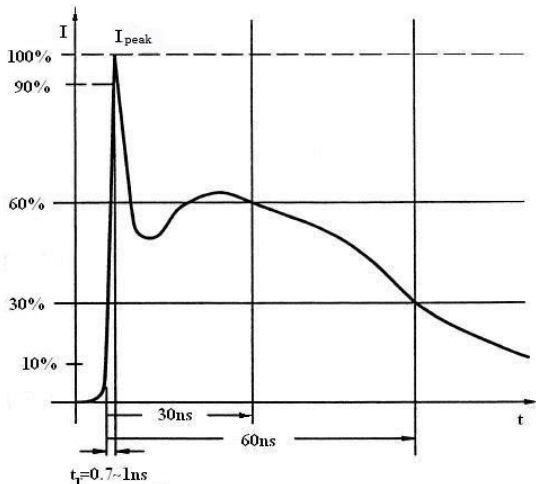
X: 无容值要求; 101=100PF, 500=50PF, 100=10PF, 050=5PF, 5R0=5PF, 3R0=3PF, 1R0=1PF, 0R2=0.2PF

⑦ package: T: taping B: bulk

### 3. V-I characteristic



### 4. ESD Wave Form

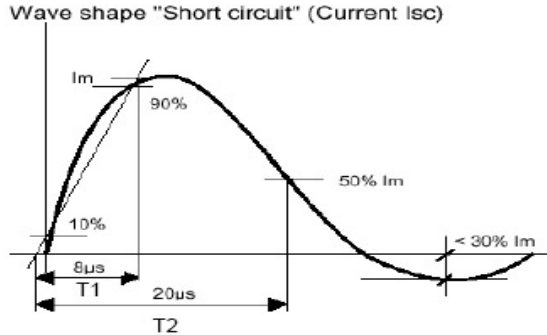


IEC61000-4-2 Standards

SEVERITY LEVEL	AIRDIRCHARGE	DIRECT ISCHARGE
1	2 kV	2 kV
2	4 kV	4 kV
3	8 kV	6 kV
4	15 kV	8 kV

IEC61000-4-2 Compliant ESD Current Pulse Waveform

**5.Surge Wave Form**



SEVERITY LEVEL	T1	T2
1	8 µs	20 µs

IEC61000-4-5 Standards

**6.Environmental Reliability Test**

Characteristic	Test method and description			
High Temperature Storage	The specimen shall be subjected to 125°C for 1000 hours in a thermostatic bath without load and then stored at room temperature and humidity for 1 to 2 hours. The change of varistor voltage shall be within 10%.			
Temperature Cycle	The temperature cycle of specified temperature shall be repeated five times and then stored at room temperature and humidity for one two hours. The change of varistor voltage shall be within 10%and mechanical damage shall be examined.	Step	Temperature	Period
		1	-40±3°C	30min±3
		2	Room Temperature	1~2hours
		3	125±2°C	30min±3
4	Room Temperature	1~2hours		
High Temperature Load	After being continuously applied the maximum allowable voltage at 85°C for 1000hours, the specimen shall be stored at room temperature and humidity for one or hours, the change of varistor voltage shall be within 10%.			
Damp Heat Load/ Humidity Load	The specimen should be subjected to 40°C, 90 to 95%RH environment, and the maximum allowable voltage applied for 1000 hours, then stored at room temperature and humidity for one or two hours. The change of varistor voltage shall be within 10%.			
Low Temperature Storage	The specimen should be subjected to -40°C, without load for 1000 hours and then stored at room temperature for one two hours. The change of varistor voltage shall be within 10%.			

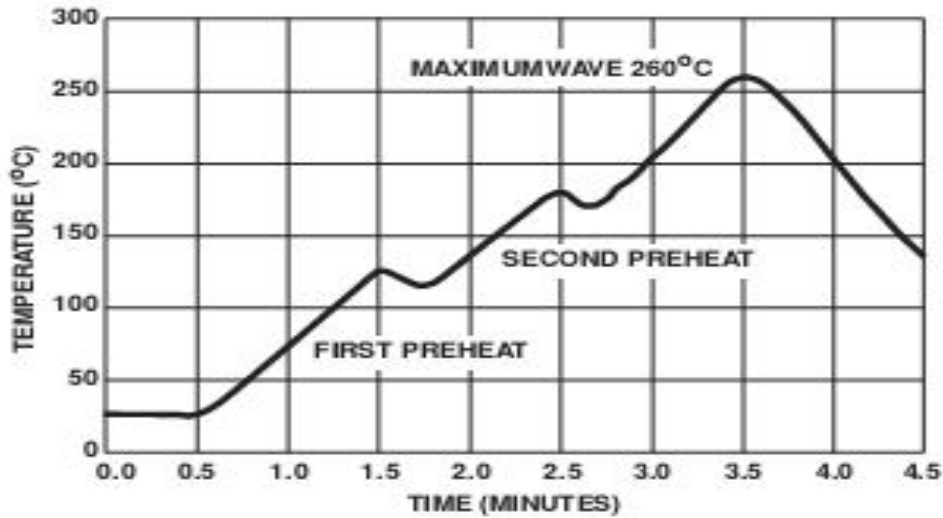
**7.Soldering Recommendation**

The principal techniques used for the soldering of components in surface mount technology are infrared reflow and wave soldering.

**7.1 Wave Soldering**

When wave soldering. The MLCV is attach to the circuit board by means of an adhesive. The assembly is then place on a conveyor and run though the soldering process to contact the wave. Wave soldering is the most strenuous of the processes. To avoid the possibility of generating stresses due to thermal shock., a preheat stage in the soldering process is recommended, and the peak temperature of the solder process should be rigidly controlled. The following is the typical profiles.

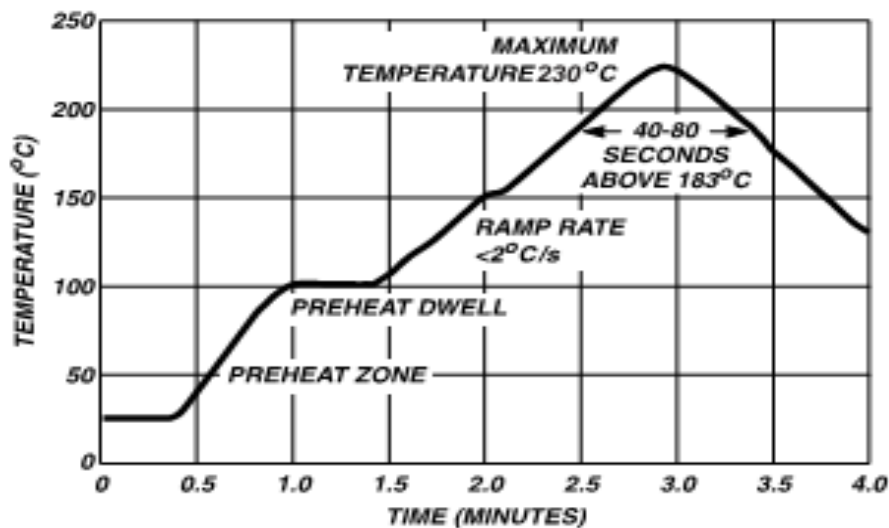
## SMD Multilayer chip Varistor



**WAVE SOLDER PROFILE**

### 7.2 Reflow Soldering

When reflow soldering, the device is placed a solder paste on the substrate ,as the solder paste is heated, it re-flows and solders the unite to board. When using a reflow process ,care should be taken to ensure that the MLCV is not subjected to an thermal gradient steeper than 4 degrees per second; the ideal gradient being 2degrees per second. During the soldering process, preheating to within 100 degrees of the soldier’s peak temperature is essential to minimize thermal shock. The following is typical profile.



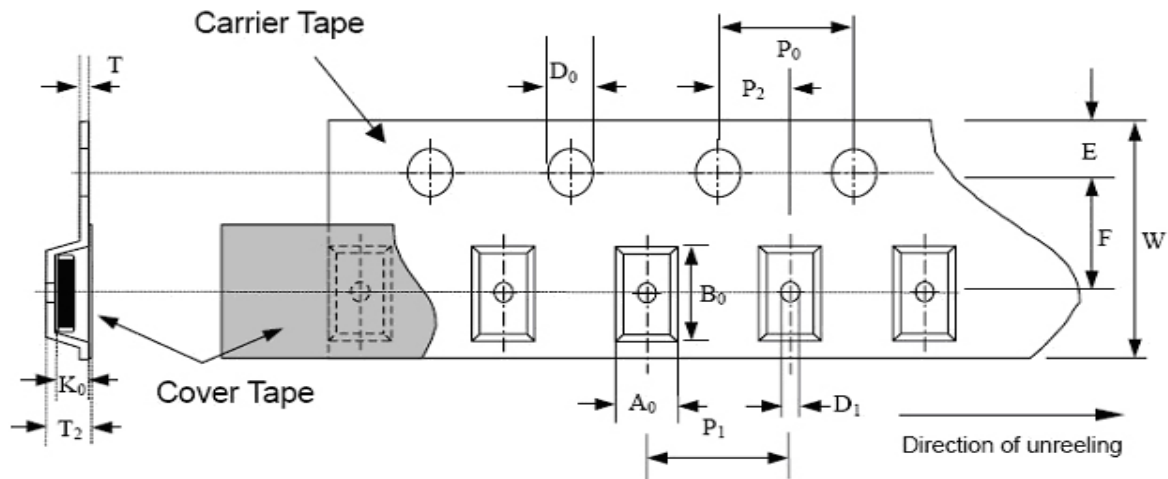
**REFLOW SOLDER PROFILE**

## 8 Packaging Specification

**8.1** Carrier tape transparent cover tape should be heat-sealed to carry the products, and the reel should be used to reel the carrier tape.

**8.2** The adhesion of the heat-sealed cover tape shall be  $40 + 20 / - 15$  grams.

**8.3** Both the head and the end portion of taping shall be empty for reel package and SMT auto-pickup machine. And a normal paper tape shall be connected in the head of taping for the operator handle.



type	$A_0$ $\pm 0.10$	$B_0$ $\pm 0.10$	$K_0$ $\pm 0.10$	$T$ $\pm 0.05$	$T_2$ $\pm 0.05$	$D_0$ $+0.10$ $-0.00$	$D_1$ $\pm 0.05$	$P_1$ $\pm 0.10$	$P_2$ $\pm 0.05$	$P_0$ $\pm 0.05$	$W$ $\pm 0.20$	$E$ $\pm 0.10$	$F$ $\pm 0.05$
1005	1.08	1.88	1.04	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
1608	1.08	1.88	1.04	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
2012	1.42	2.30	1.04	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
3216	1.88	3.50	1.27	0.20	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
3225	2.18	3.46	1.45	0.22	0.10	1.50	1.00	4.00	2.00	4.00	8.00	1.75	3.50
4532	3.66	4.95	1.74	0.25	0.10	1.50	1.50	8.00	2.00	4.00	12.00	1.75	5.50
5650	5.10	5.97	2.80	0.25	0.10	1.50	1.50	8.00	2.00	4.00	12.00	1.75	5.50



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