

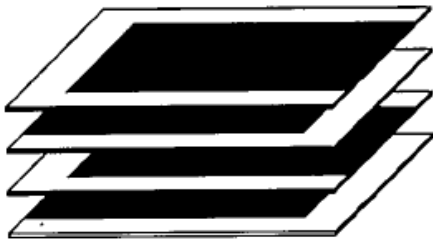


Multilayer Chip Varistor for Surge and ESD Protection – L Type Series

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1. Features

- 1.1 No polarity due to symmetrical current-voltage characteristics
- 1.2 Excellent electro static absorption capability
- 1.3 Variable capacitance
- 1.4 Working Voltage from 5.5 to 35 V_{RMS} : 5.5 to 45 Vdc
- 1.5 Suitable for ESD Protection
- 1.6 Structure :



Multilayer formation technologies



section of the chip

2. Applications

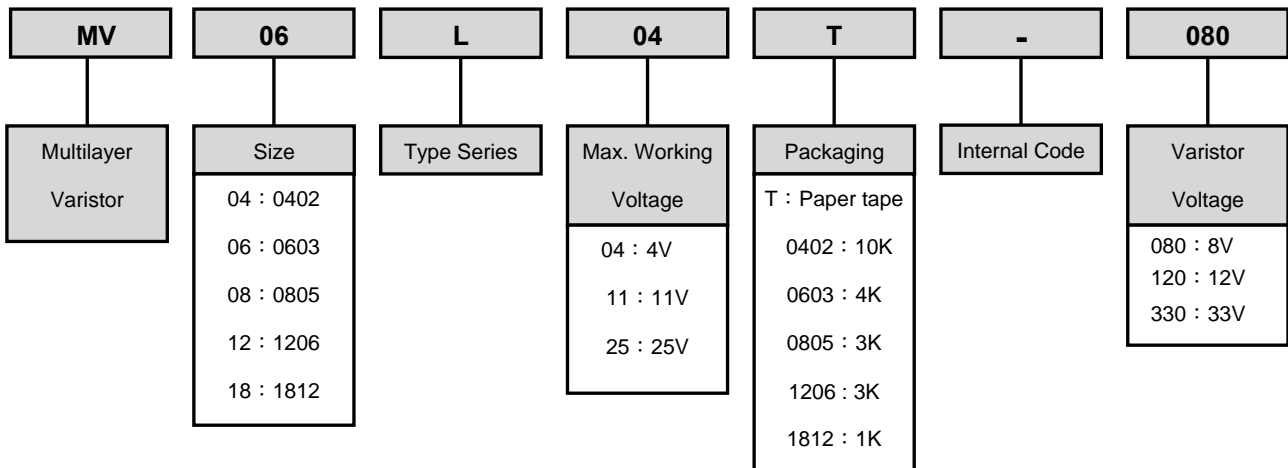
- 2.1 USB 3.0 Power and Data lines I/O Port protection
- 2.2 Notebook and PC Computers
- 2.3 Monitors and Flat Panel Displays
- 2.4 IEEE 1394 Firewire Ports
- 2.5 Video Graphics Cards
- 2.6 SIM ports Mobile phone
- 2.7 Digital Camera
- 2.9 MP3/MP4 player
- 2.10 LCD Module
- 2.11 HUB/ Telecom/ Wireless LAN
- 2.12 Keyboard



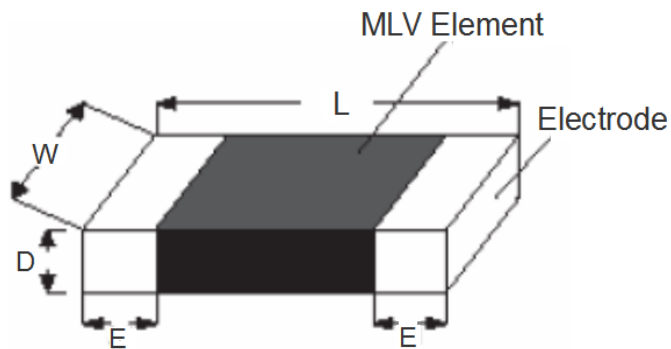
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3. Type Designation



4. Dimension



Type	L	W	D	E
	mm	mm	mm	mm
0402	1.00 ± 0.10	0.50 ± 0.10	0.6 max	0.25 ± 0.10
0603	1.60 ± 0.15	0.80 ± 0.15	0.9 max	0.30 ± 0.10
0805	2.00 ± 0.20	1.25 ± 0.20	1.0 max	0.40 ± 0.20
1206	3.20 ± 0.20	1.60 ± 0.15	1.2 max	0.50 ± 0.20
1812	4.50 ± 0.20	3.20 ± 0.20	2.0 max	0.50 ± 0.30



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5. Rating and Characteristics

Part Number	Size	Working Voltage (MAX)		Breakdown Voltage	Peak Current	Clamping Voltage (MAX)	Energy Absorption (MAX)	Typical Capacitance	
		AC (V _{RMS})	DC (V)						1mA (V)
MV04L04T-080	0402	4	5.5	8(7.5~10.5)	20	20	0.05	200	
MV04L06T-120		6	9	12(10.2~13.8)	20	24	0.05	135	
MV04L11T-180		11	14	18(15.3~20.7)	20	35	0.05	50	
MV04L14T-240		14	18	24(21.6~26.4)	15	40	0.05	45	
MV06L04T-080	0603	4	5.5	8(7.5~10.5)	30	20	0.1	650	
MV06L06T-120		6	9	12(10.2~13.8)	30	20	0.1	300	
MV06L11T-180		11	14	18(15.3~20.7)	30	30	0.1	210	
MV06L14T-240		14	18	24(21.6~26.4)	30	39	0.1	160	
MV06L17T-270		17	22	27(24.3~29.7)	30	44	0.1	145	
MV06L20T-330		20	26	33(29.7~36.3)	30	54	0.1	130	
MV06L25T-390		25	30	39(35.1~42.9)	30	65	0.1	110	
MV06L30T-470		30	38	47(42.3~51.7)	30	77	0.1	90	
MV08L04T-080		0805	4	5.5	8(7.5~10.5)	80	20	0.1	1400
MV08L06T-120			6	9	12(10.2~13.8)	80	20	0.1	650
MV08L11T-180	11		14	18(15.3~20.7)	100	30	0.1	350	
MV08L14T-240	14		18	24(21.6~26.4)	100	39	0.2	300	
MV08L20T-330	20		26	33(29.7~36.3)	100	54	0.3	220	
MV08L25T-390	25		30	39(35.1~42.9)	100	65	0.3	200	
MV08L30T-470	30		38	47(42.3~51.7)	100	77	0.3	150	
MV08L35T-560	35		45	56(50.4~61.6)	80	90	0.3	110	
MV12L04T-080	1206	4	5.5	8(7.5~10.5)	100	20	0.2	3100	
MV12L11T-180		11	14	18(15.3~20.7)	100	30	0.3	800	
MV12L14T-240		14	18	24(21.6~26.4)	100	38	0.3	620	
MV12L17T-270		17	22	27(24.3~29.7)	100	44	0.4	700	
MV12L20T-330		20	26	33(29.7~36.3)	100	54	0.5	480	
MV12L25T-390		25	30	39(35.1~42.9)	100	65	0.6	400	
MV12L30T-470		30	38	47(42.3~51.7)	100	77	0.7	260	
MV18L14T-240	1812	14	18	24(21.6~26.4)	800	38	2.3	3500	
MV18L30T-470		30	38	47(42.3~51.7)	800	77	4.2	1600	

*The Clamping voltage was measured at 8*20 us standard current.



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6. Reliability Test

Environmental Specification	Test Method and Description			
High Temperature Storage/ Dry Heat	The specimen shall be subjected to $125 \pm 2^{\circ}\text{C}$ for 1000 ± 12 hours in a thermostatic bath without load and then stored at room temperature and normal 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 normal humidity for one or two hours. The change of varistor voltage shall be within 10% and mechanical damage shall be examined.	Step	Temperature	Period
		1	-40 ± 3	30Min \pm 3
		2	Room Temperature	1 hour
		3	125 ± 3	30Min \pm 3
High Temperature Load	After being continuously applied the maximum allowable voltage at $85 \pm 2^{\circ}\text{C}$ for 1000 ± 2 hours, the specimen shall be stored at room temperature and normal humidity for one or two hours, the change of varistor voltage shall be within 10% .	4	Room Temperature	1 hours
Damp Heat Load	The specimen should be subjected to $40 \pm 2^{\circ}\text{C}$, 90 to 95 % RH environment, and the maximum allowable voltage applied for 1000 hours, then stored at room temperature and normal humidity for one or two hours. The change of varistor voltage shall be within 10%			
Humidity Load				
Low Temperature Storage/ Cold	The specimen should be subjected to $-40 \pm 2^{\circ}\text{C}$, without load for 500 hours and then stored at room temperature for one or two hours. The change of varistor voltage shall be within 10 %			

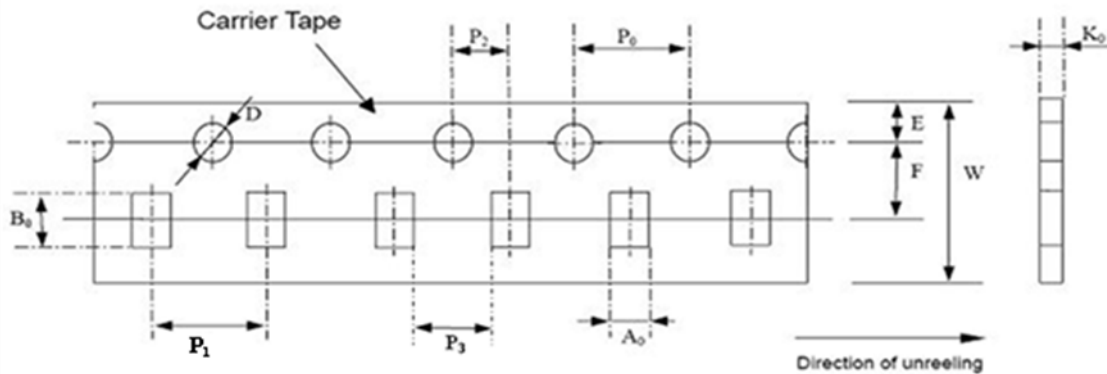


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7. Taping and Reel

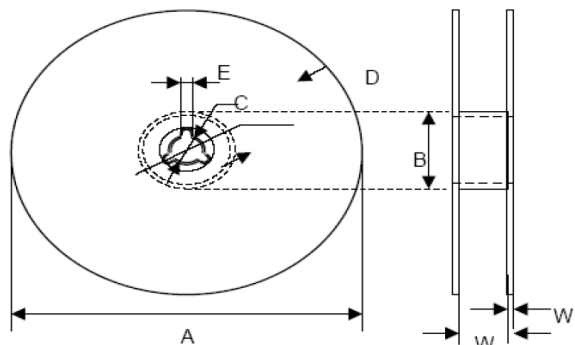
7.1 Packaging



Symbol	A_0 0.10	B_0 0.10	K_0 0.10	D +0.10 -0.00	P_1 0.10	P_2 0.05	P_0 0.10	P_3 0.10	W 0.20	E 0.10	F 0.05
0402	0.85	1.25	0.65	1.50	3.00	2.00	4.00	2.15	8.00	1.75	3.50
0603	1.08	1.88	0.95	1.50	4.00	2.00	4.00	2.92	8.00	1.75	3.50
0805	1.42	2.30	1.04	1.50	4.00	2.00	4.00	2.58	8.00	1.75	3.50
1206	1.88	3.50	1.27	1.50	4.00	2.00	4.00	2.12	8.00	1.75	3.50
1812	3.66	4.95	1.74	1.50	8.00	2.00	4.00	4.34	12.00	1.75	5.50

Unit : mm

7.2 Reel Dimensions



Symbol	A	B	C	D	E	W	W_1
0402	178±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.5	1.5±0.15
0603	178±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.5	1.5±0.15
0805	178±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.5	1.5±0.15
1206	178±1.0	60.0±0.5	13.0±0.2	21.0±0.2	2.0±0.5	9.0±0.5	1.5±0.15
1812	178±1.0	60.0±0.5	13.0±0.1	21.0±0.2	2.0±0.5	13.6±0.2	1.5±0.15

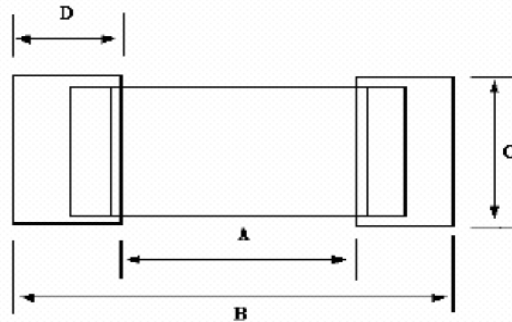


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8. Recommended land patterns

8.1 Solder pad layout



	A	B	C	D
0402	0.4 ~ 0.6	1.4 ~ 1.8	0.5 ~ 0.6	0.6 ~ 1.2
0603	0.8 ~ 1.2	2.2 ~ 2.8	0.6 ~ 1.0	0.9 ~ 1.5
0805	1.0 ~ 1.5	2.6 ~ 3.2	1.2 ~ 1.5	1.1 ~ 1.8
1206	1.8 ~ 2.5	4.2 ~ 5.2	1.2 ~ 1.8	1.2 ~ 1.8
1812	2.5 ~ 3.3	5.5 ~ 6.7	2.8 ~ 3.6	1.3 ~ 2.2

(Unit : mm)

8.2 The SIR test of the solder paste shall be done (Based on JIS-Z-3284)

8.3 Steel plate and foot distance printing

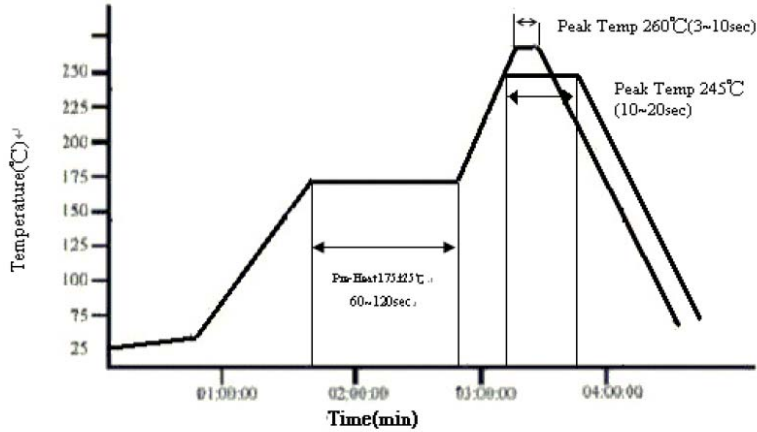
Foot distance printing(mm/mils)	Steel Plate
>0.65mm/25 mil	0.18mm
0.65mm/25 mils ~0.5mm/20mils	0.15mm
0.5mm/20 mils ~0.40mm/16mils	0.12mm
>=0.40 mm/16 mils	0.10mm



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8.4 Reflow and temperature



8.5 IR reflow Pb Free Process suggestion profile

- (1) The solder recommend is Sn96.5/Ag 3.5 of 120 to 150 μ m
 - (2) Ramp-up rate (217°C to Peak) + 3°C/second max
 - (3) Temp. maintain at 175 +/-25°C 180 seconds max
 - (4) Temp. maintain above 217°C 60-150 seconds
 - (5) Peak temperature range 245°C+20°C/-10°C time within 5°C of actually peak temperature (tp) 10~20 seconds
 - (6) Ramp down rate +6 °C/second max.
- ※ Perform adequate test in advance, as the reflow temperature profile will vary according to the conditions of the manufacturing process, and the specification of the reflow furnace.

8.6 Resistance to soldering heat-High Temperature Resistance:260 °C,10sec-3times.

8.7 Hand Soldering

In hand soldering of the Varistors. Large temperature gradient between preheated the Varistors and the tip of soldering iron may cause electrical failures and mechanical damages such as cracking or breakings of the devices. The soldering shall be carefully controlled and carried out so that the temperature gradient is kept minimum with following recommended conditions for hand soldering.



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8.7.1 Recommended Soldering Condition 1

(1) Solder:

0.12~0.18mm Thread solder (Sn96.5:Ag3.5) with soldering flux in the core. Rosin-based and non-activated flux is recommended.

(2) Preheating:

The Varistors shall be preheated so that Temperature Gradient between the devices and the tip of soldering iron is 150°C or below.

(3) Soldering Iron:

Rated Power of 20W max with 3mm soldering tip in diameter.

Temperature of soldering iron tip 380°C max, 3-5sec (The required amount of solder shall be melted in advance on the soldering tip.)

(4) Cooling:

After soldering. The Varistors shall be cooled gradually at room ambient temperature.

8.7.2 Recommended Soldering Condition 2 (Without preheating)

(1) Solder iron tip shall not directly touch to ceramic dielectrics.

(2) Solder iron tip shall be fully preheated before soldering while soldering iron tip to the external electrode of Varistors.

8.8 Post Soldering Cleaning

8.8.1 Residues of corrosive soldering fluxes on the PC board after cleaning may greatly have influences on the electrical characteristic and the reliability (such as humidity resistance) of the Varistors which have been mounted on the board. It shall be confirmed that the characteristic and the reliability of the devices are not affected by the applied cleaning conditions

8.8.2 When an ultrasonic cleaning is applied to the mounted Varistors on PC Boards.

Following conditions are recommended for preventing failures or damages of the devices due to the large vibration energy and the resonance caused by the ultrasonic waves.

(1) Frequency 29MHz max

(2) Radiated Power 20w/lithr max

(3) Period 5minuets max

9. Operating and Storage condition of products

9.1 Operating Temperature : -50~85°C

9.2 Storage Conditions:

(1) Storage Temperature: -10°C ~+40°C

(2) Relative humidity: ≤75%RH

(3) Varistor must be kept away from sunlight and stored in a non-corrosive atmosphere.

9.3 Period of Storage: 1 year



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10. ECN

Engineering Change Notice: The customer will be informed with ECN if there is significant modification on the characteristics and materials described in Approval Sheet.

11. Manufacturing Country & City:

(1) TA-I TECHNOLOGY (SU ZHOU) CO., LTD. (China – Su Zhou)

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(2) TA-I TECHNOLOGY ELECTRONIC (DONGGUAN) CO., LTD. (China –Dongguan)

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(3) FORTUNE TASK RESISTOR FACTORY (China – Dongguan)

Tel : (+86) 769-8339-4790~3 Fax : (+86) 769-8339-4794

(4) TAI OHM ELECTRONICS (M) SDN. BHD. (Malaysia – Penang)

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(5) P.T.TAI ELECTRONIC Indonesia (Indonesia – Jakarta)

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