

Part Number: **V26MLA1210**

Technology: **Varistors**

Series: **ML**

ML Series - Multilayer Transient Voltage Suppressor

The ML series family of Transient Voltage Surge Suppression devices is based on the Littelfuse Multilayer fabrication technology. These components are designed to suppress a variety of transient events, including those specified in IEC 6100-4-2 or other standards used for Electromagnetic Compliance (EMC). The ML Series is typically applied to protect integrated circuits and other components at the circuit board level.

The wide operating voltage and energy range make the ML Series suitable for numerous applications on power supply, control and signal lines.

The ML Series is manufactured from semiconducting ceramics, and is supplied in a leadless, surface mount package. The ML Series is compatible with modern reflow and wave soldering procedures.

It can operate over a wider temperature range than zener diodes, and has a much smaller footprint than plastic-housed components.

Electrical Characteristics

Property	Value
Size	1210 (3225)
Channels	1
V_{MAC} (V)	20
V_{MDC} (V)	26
$V_{NOM\ MIN}$ (V)	29
$V_{NOM\ max}$ (V)	38
I_{TM} (A)	300
W_{TM} (J)	1.2
V_C (V)	60
I_P	10
C_{TYP} (pF)	1040

RoHS ML Varistor Series



Size Table

Metric	EIA
1005	0402
1608	0603
2012	0805
3216	1206
3225	1210

Applications

- Suppression of inductive switching or other transient events such as EFT and surge voltage at the circuit board level
- ESD protection for IEC 61000-4-2, MIL-STD-883c method 3015.7, and other industry specifications (see also the MLE or MLN Series)
- Provides on-board transient voltage protection for ICS and transistors
- Used to help achieve electromagnetic compliance of end products
- Replace larger surface mount TVS Zeners in many applications

Description

The ML Series family of transient voltage surge suppression devices is based on the Littelfuse Multilayer fabrication technology. These components are designed to suppress a variety of transient events, including those specified in IEC 61000-4-2 or other standards used for Electromagnetic Compliance (EMC). The ML Series is typically applied to protect integrated circuits and other components at the circuit board level.

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Littelfuse Inc. manufactures other multilayer series products. See the MLE Series data sheet for ESD applications, MHS Series data sheet for high-speed ESD applications, the MLN Series for multilayer protection and the AUML Series for automotive applications.

Features

- RoHS compliant
- Leadless 0402, 0603, 0805, 1206 and 1210 chip sizes
- Multilayer ceramic construction technology
- -55°C to +125°C operating temp. range
- Operating voltage range $V_{MDC} = 5.5V$ to 120V
- Rated for surge current (8 x 20µs)
- Rated for energy (10 x 1000µs)
- Inherent bi-directional clamping
- No plastic or epoxy packaging assures better than UL94V-0 flammability rating
- Standard low capacitance types available

Absolute Maximum Ratings

For ratings of individual members of a series, see device ratings and specifications table.

Continuous	ML Series	Units
Steady State Applied Voltage:		
DC Voltage Range (V_{MDC})	3.5 to 120	V
AC Voltage Range ($V_{MIACRMS}$)	2.5 to 107	V
Transient:		
Non-Repetitive Surge Current, 8/20µs Waveform, (I_{TM})	4 to 500	A
Non-Repetitive Surge Energy, 10/1000µs Waveform, (W_{TM})	0.02 to 2.5	J
Operating Ambient Temperature Range (T_A)	-55 to +125	°C
Storage Temperature Range (T_{STG})	-55 to +150	°C
Temperature Coefficient (α_V) of Clamping Voltage (V_C) at Specified Test Current	<0.01	%/°C

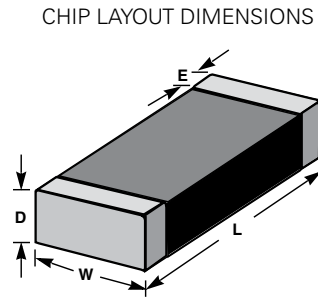
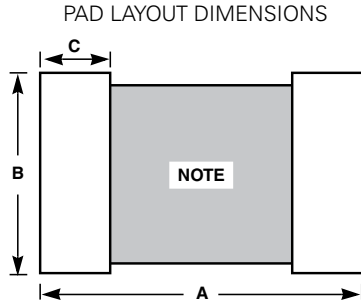
Device Ratings and Specifications

Part Number	Maximum Ratings (125° C)					Specifications (25°C)		
	Maximum Continuous Working Voltage		Maximum Non-repetitive Surge Current (8/20µs)	Maximum Non-repetitive Surge Energy (10/1000µs)	Maximum Clamping Voltage at 1A (or as Noted) (8/20µs)	Nominal Voltage at 1mA DC Test Current		Typical Capacitance at f = 1MHz
	V _{M(DC)}	V _{M(A/C)}	I _{TM}	W _{TM}	V _C	V _{N(DC) Min}	V _{N(DC) Max}	C
	(V)	(V)	(A)	(J)	(V)	(V)	(V)	(pF)
V3.5MLA0603N ⁵	3.5	2.5	30	0.100	13.0	3.7	7.0	1270
V3.5MLA0805N	3.5	2.5	120	0.300	13.0	3.7	7.0	2530
V3.5MLA0805LN	3.5	2.5	40	0.100	13.0	3.7	7.0	1380
V3.5MLA1206N	3.5	2.5	100	0.300	13.0	3.7	7.0	6000
V5.5MLA0402N	5.5	4.0	20	0.050	21.0	7.1	10.8	220
V5.5MLA0402LN	5.5	4.0	20	0.050	39.0	15.9	21.5	70
V5.5MLA0603N ⁵	5.5	4.0	30	0.100	17.5	7.1	9.3	760
V5.5MLA0603LN ⁴	5.5	4.0	30	0.100	17.5	7.1	9.3	450
V5.5MLA0805N	5.5	4.0	120	0.300	17.5	7.1	9.3	1840
V5.5MLA0805LN	5.5	4.0	40	0.100	17.5	7.1	9.3	990
V5.5MLA1206N	5.5	4.0	150	0.400	17.5	7.1	9.3	3500
V9MLA0402N	9.0	6.5	20	0.050	30.0	11.0	16.0	120
V9MLA0402LN	9.0	6.5	4	0.020	35.0	11.0	16.0	33
V9MLA0603N ⁵	9.0	6.5	30	0.100	25.5	11.0	16.0	490
V9MLA0603LN ⁴	9.0	6.5	30	0.100	25.5	11.0	16.0	360
V9MLA0805LN	9.0	6.5	40	0.100	25.5	11.0	16.0	520
V12MLA0805LN	12.0	9.0	40	0.100	29.0	14.0	18.5	410
V14MLA0402N	14.0	10.0	20	0.050	39.0	15.9	21.5	70
V14MLA0603N	14.0	10.0	30	0.100	34.5	15.9	21.5	180
V14MLA0805N	14.0	10.0	120	0.300	32.0	15.9	20.3	560
V14MLA0805LN	14.0	10.0	40	0.100	32.0	15.9	20.3	320
V14MLA1206N	14.0	10.0	150	0.400	32.0	15.9	20.3	1400
V18MLA0402N	18.0	14.0	20	0.050	50.0	22.0	28.0	40
V18MLA0603N	18.0	14.0	30	0.100	50.0	22.0	28.0	120
V18MLA0805N	18.0	14.0	120	0.300	44.0	22.0	28.0	520
V18MLA0805LN	18.0	14.0	40	0.100	44.0	22.0	28.0	290
V18MLA1206N	18.0	14.0	150	0.400	44.0	22.0	28.0	1270
V18MLA1210N	18.0	14.0	500	2.500	44.0 at 2.5	22.0	28.0	1440
V26MLA0603N	26.0	20.0	30	0.100	60.0	31.0	38.0	110
V26MLA0805N	26.0	20.0	100	0.300	60.0	29.5	38.5	220
V26MLA0805LN	26.0	20.0	40	0.100	60.0	29.5	38.5	140
V26MLA1206N	26.0	20.0	150	0.600	60.0	29.5	38.5	600
V26MLA1210N	26.0	20.0	300	1.200	60.0 at 2.5	29.5	38.5	1040
V30MLA0603N	30.0	25.0	30	0.100	74.0	37.0	46.0	90
V30MLA0805LN	30.0	25.0	30	0.100	72.0	37.0	46.0	90
V30MLA1210N	30.0	25.0	280	1.200	68.0 at 2.5	35.0	43.0	1820
V30MLA1210LN	30.0	25.0	220	0.900	68.0 at 2.5	35.0	43.0	1760
V33MLA1206N	33.0	26.0	180	0.800	75.0	38.0	49.0	500
V42MLA1206N	42.0	30.0	180	0.800	92.0	46.0	60.0	425
V48MLA1210N	48.0	40.0	250	1.200	105.0 at 2.5	54.5	66.5	520
V48MLA1210LN	48.0	40.0	220	0.900	105.0 at 2.5	54.5	66.5	500
V56MLA1206N	56.0	40.0	180	1.000	120.0	61.0	77.0	180
V60MLA1210N	60.0	50.0	250	1.500	130.0 at 2.5	67.0	83.0	440
V68MLA1206N	68.0	50.0	180	1.000	140.0	76.0	90.0	100
V85MLA1210N	85.0	67.0	250	2.500	180.0 at 2.5	95.0	115.0	260
V120MLA1210N	120.0	107.0	125	2.000	260.0 at 2.5	135.0	165.0	80

NOTES:

- 1 'L' suffix is a low capacitance and energy version; Contact your Littelfuse sales representative for custom capacitance requirements
- 2 Typical leakage at 25°C < 25µA, maximum leakage 100µA at V_{M(DC)}; for 0402 size, typical leakage < 5µA, maximum leakage < 20µA at V_{M(DC)}
- 3 Average power dissipation of transients for 0402, 0603, 0805, 1206 and 1210 sizes not to exceed 0.03W, 0.05W, 0.1W, 0.1W and 0.15W respectively
- 4 Only available in 'R' packing option
- 5 Only available in 'H', 'T' and 'A' packing options

Product Dimensions (mm)

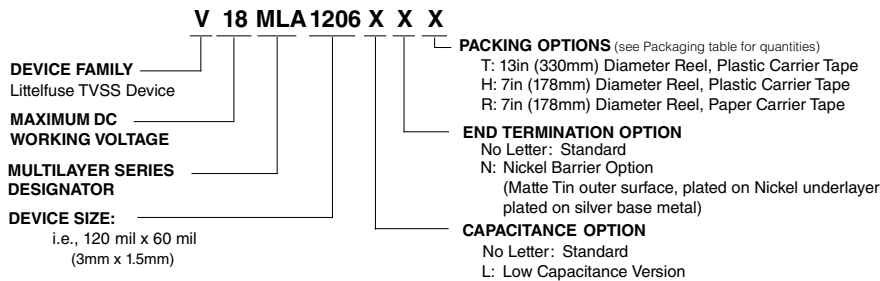


NOTE : Avoid metal runs in this area, parts not recommended for use in applications using Silver (Ag) epoxy paste.

Dimension	1210 Size		1206 Size		0805 Size		0603 Size		0402 Size	
	IN	MM	IN	MM	IN	MM	IN	MM	IN	MM
A	0.160	4.06	0.160	4.06	0.120	3.05	0.100	2.54	0.067	1.70
B	0.100	2.54	0.065	1.65	0.050	1.27	0.030	0.76	0.020	0.51
C	0.040	1.02	0.040	1.02	0.040	1.02	0.035	0.89	0.024	0.61
D (max.)	0.113	2.87	0.071	1.80	0.043	1.10	0.040	1.00	0.024	0.60
E	0.020 -/+0.010	0.50 -/+0.25	0.020 -/+0.010	0.50 -/+0.25	0.020 +/- 0.010	0.50 +/- 0.25	0.015 -/+0.008	0.4 -/+0.20	0.010 -/+0.006	0.25 -/+0.15
L	0.125 -/+0.012	3.20 -/+0.30	0.125 -/+0.012	3.20 -/+0.30	0.079 -/+0.008	2.01 -/+0.20	0.063 -/+0.006	1.6 -/+0.15	0.039 -/+0.004	1.00 -/+0.10
W	0.100 -/+0.012	2.54 -/+0.30	0.060 -/+0.011	1.60 -/+0.28	0.049 -/+0.008	1.25 -/+0.20	0.032 -/+0.060	0.8 -/+0.15	0.020 -/+0.004	0.50 -/+0.10

ML Series

Part Numbering System



*NOTES:

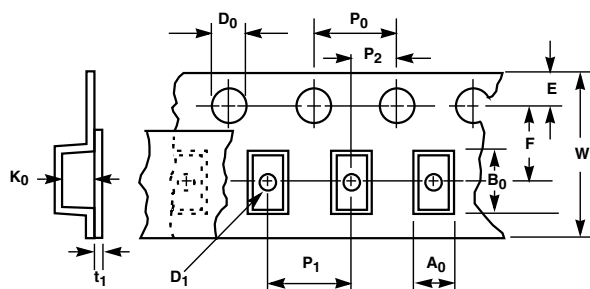
1 V120MLA1210 standard shipping quantities are 1000 pieces per reel for the "H" option and 4000 pieces per reel for "T" option.
 2 V3.5 MLA0603, V5.5MLA0603 and V9MLA0603 only available in "H," "T" and "A" packing options.

Packaging*

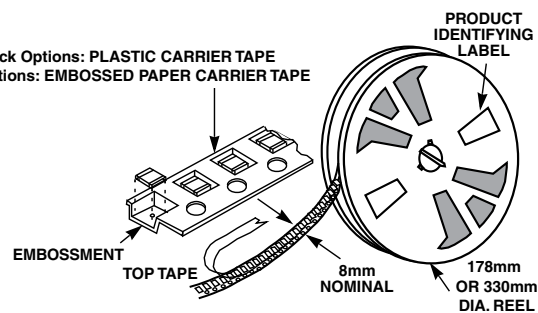
Device Size	Quantity			
	13" Inch Reel ("T" Option)	7" Inch Reel ("H" Option)	7" Inch Reel ("R" Option)	Bulk Pack ("A" Option)
1210	8,000	2,000	N/A	2,000
1206	10,000	2,500	N/A	2,500
0805	10,000	2,500	N/A	2,500
0603	10,000	2,500	4,000	2,500
0402	N/A	N/A	10,000	N/A

*(Packaging) It is recommended that parts be kept in the sealed bag provided and that parts be used as soon as possible when removed from bags.

Tape and Reel Specifications



For T and H Pack Options: PLASTIC CARRIER TAPE
 For R Pack Options: EMBOSSED PAPER CARRIER TAPE



Symbol	Description	Dimensions in Millimeters	
		0402 Size	0603, 0805, 1206 & 1210 Sizes
A_0	Width of Cavity	Dependent on Chip Size to Minimize Rotation.	
B_0	Length of Cavity	Dependent on Chip Size to Minimize Rotation.	
K_0	Depth of Cavity	Dependent on Chip Size to Minimize Rotation.	
W	Width of Tape	8 \pm 0.2	8 \pm 0.3
F	Distance Between Drive Hole Centers and Cavity Centers	3.5 \pm 0.05	3.5 \pm 0.05
E	Distance Between Drive Hole Centers and Tape Edge	1.75 \pm 0.1	1.75 \pm 0.1
P_1	Distance Between Cavity Centers	2 \pm 0.05	4 \pm 0.1
P_2	Axial Drive Distance Between Drive Hole Centers & Cavity Centers	2 \pm 0.1	2 \pm 0.1
P_0	Axial Drive Distance Between Drive Hole Centers	4 \pm 0.1	4 \pm 0.1
D_0	Drive Hole Diameter	1.55 \pm 0.05	1.55 \pm 0.05
D_1	Diameter of Cavity Piercing	N/A	1.05 \pm 0.05
T_1	Top Tape Thickness	0.1 Max	0.1 Max

NOTES:

- Conforms to EIA-481-1, Revision A
- Can be supplied to IEC publication 286-3