



Micro Commercial Components

Micro Commercial Components  
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**MLV1005 Series**  
**MLV1608 Series**  
**MLV2012 Series**  
**MLV3216 Series**  
**MLV3225 Series**

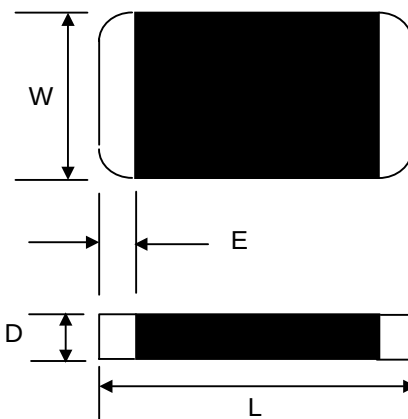
## Features

- Monolithic Multilayer Construction with 1005, 1608, 2012, 3216 and 3225 Model Sizes
- Wide Operating Voltage Range  $V_{DC}=3.3V$  to 48V
- Excellent Nonlinear Voltage-Current Characteristics with Low Clamping Voltage and Large Surge Current/Energy Handling Capabilities at Small Size
- Available in Tape and Reel or Bulk Pack

## Maximum Ratings

- Operating Ambient Temperature Range:  $-55^{\circ}C$  to  $+125^{\circ}C$
- Leakage Current: 1.  $< 50 \mu A$  at ambient temp.  
2.  $< 100 \mu A$  for  $3.3V_{DC}$   
(Test Conditions: The current measured with  $V_{DC}$  applied)
- Maximum Surge Energy (WS):  $\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$   
Test Conditions: On standard circumstance Impulse the 10/1000  $\mu s$  specified current wave 1 time ,  
Measure the variation of  $V_{1mA}$
- Maximum Surge Current ( $I_S$ ):  $\Delta V_{1mA} / V_{1mA} \leq \pm 10\%$   
Test Conditions: 1 At room temperature and humidity  
2. 8/20  $\mu s$  waveform  
3. Impulse of +/- polarity  
4. Measure the variation of  $V_{1mA}$

## Normal Type Multilayer Varistor



| Size           | DIM | INCHES |       | MM   |      |
|----------------|-----|--------|-------|------|------|
|                |     | MIN    | MAX   | MIN  | MAX  |
| 1005<br>(0402) | L   | 0.036  | 0.044 | 0.90 | 1.00 |
|                | W   | 0.016  | 0.024 | 0.40 | 0.60 |
|                | D   | ---    | 0.024 | ---  | 0.60 |
|                | E   | 0.004  | 0.016 | 0.10 | 0.40 |
| 1608<br>(0603) | L   | 0.057  | 0.069 | 1.50 | 1.80 |
|                | W   | 0.026  | 0.038 | 0.65 | 0.95 |
|                | D   | ---    | 0.350 | ---  | 0.90 |
|                | E   | 0.007  | 0.023 | 0.20 | 0.60 |
| 2012<br>(0805) | L   | 0.071  | 0.087 | 1.80 | 2.20 |
|                | W   | 0.041  | 0.057 | 1.05 | 1.45 |
|                | D   | ---    | 0.510 | ---  | 1.30 |
|                | E   | 0.007  | 0.023 | 0.20 | 0.60 |
| 3216<br>(1206) | L   | 0.116  | 0.136 | 2.95 | 3.45 |
|                | W   | 0.036  | 0.044 | 1.40 | 1.80 |
|                | D   | ---    | 0.067 | ---  | 1.70 |
|                | E   | 0.010  | 0.030 | 0.25 | 0.75 |
| 3225<br>(1210) | L   | 0.116  | 0.136 | 2.95 | 3.45 |
|                | W   | 0.088  | 0.108 | 2.25 | 2.75 |
|                | D   | ---    | 0.067 | ---  | 1.70 |
|                | E   | 0.010  | 0.030 | 0.25 | 0.75 |

**Electrical Characteristics****Micro Commercial Components**

| Part Number    | Working Voltage  |                 | Breakdown Voltage | Maximum Transient             |                |                 | Typical Capacitance |
|----------------|------------------|-----------------|-------------------|-------------------------------|----------------|-----------------|---------------------|
|                |                  |                 |                   | Clamping Voltage <sup>1</sup> | Surge Current  | Surge Energy    |                     |
| Symbol         | V <sub>RMS</sub> | V <sub>DC</sub> | V <sub>B</sub>    | V <sub>C</sub>                | I <sub>S</sub> | W <sub>S</sub>  | C                   |
| Units          | Volts(max.)      | Volts(max.)     | Volts             | Volts(max.)                   | Amps(max.)     | Joules(max)     | PF(typ.)            |
| Test Condition |                  |                 | 1mA DC            | 8/20 $\mu$ s (1A)             | 8/20 $\mu$ s   | 10/1000 $\mu$ s | 0.5V <sub>rms</sub> |
|                |                  |                 |                   |                               |                |                 | 1KHz                |
| MLV1005N030    | 2.5              | 3.3             | 5(4.4-6.0)        | 10                            | 20             | 0.05            | 390                 |
| MLV1005N050    | 4                | 5.5             | 8(6.4-9.6)        | 16                            | 20             | 0.05            | 295                 |
| MLV1005N090    | 6                | 9               | 12(9.6-14.4)      | 20                            | 20             | 0.05            | 190                 |
| MLV1005N110    | 8                | 11              | 15(12.75-17.25)   | 25                            | 20             | 0.05            | 160                 |
| MLV1005N140    | 11               | 14              | 18(16.5-20.3)     | 30                            | 20             | 0.05            | 135                 |
| MLV1005N160    | 12               | 16.5            | 22(19.8-24.2)     | 36                            | 20             | 0.05            | 105                 |
| MLV1005N180    | 14               | 18              | 24(21.6-27)       | 40                            | 20             | 0.05            | 93                  |
| MLV1005N220    | 17               | 22              | 27(24.3-29.8)     | 45                            | 20             | 0.05            | 75                  |
| MLV1005N260    | 20               | 26              | 33(29.7-36.3)     | 54                            | 20             | 0.05            | 54                  |
| MLV1005N300    | 25               | 30              | 39(35.1-42.9)     | 65                            | 20             | 0.05            | 45                  |
| MLV1005N380    | 30               | 38              | 47(42.3-51.7)     | 77                            | 20             | 0.05            | 27                  |
|                |                  |                 |                   |                               |                |                 |                     |
| MLV1608N030    | 2.5              | 3.3             | 5(4.4-6.0)        | 10                            | 30             | 0.1             | 1250                |
| MLV1608N050    | 4                | 5.5             | 8(6.4-9.6)        | 16                            | 30             | 0.1             | 800                 |
| MLV1608N090    | 6                | 9               | 12(9.6-14.4)      | 20                            | 30             | 0.1             | 680                 |
| MLV1608N110    | 8                | 11              | 15(12.75-17.25)   | 25                            | 30             | 0.1             | 460                 |
| MLV1608N140    | 11               | 14              | 18(16.5-20.3)     | 30                            | 30             | 0.1             | 350                 |
| MLV1608N160    | 12               | 16.5            | 22(19.8-24.2)     | 36                            | 30             | 0.1             | 300                 |
| MLV1608N180    | 14               | 18              | 24(21.6-27)       | 39                            | 30             | 0.1             | 270                 |
| MLV1608N220    | 17               | 22              | 27(24.3-29.8)     | 44                            | 30             | 0.1             | 235                 |
| MLV1608N260    | 20               | 26              | 33(29.7-36.3)     | 54                            | 30             | 0.1             | 200                 |
| MLV1608N300    | 25               | 30              | 39(35.1-42.9)     | 65                            | 30             | 0.1             | 120                 |
| MLV1608N380    | 30               | 38              | 47(42.3-51.7)     | 77                            | 30             | 0.1             | 100                 |
| MLV1608N450    | 35               | 45              | 56(50.4-61.6)     | 90                            | 30             | 0.1             | 80                  |

**Electrical Characteristics**

| Part Number    | Working Voltage  |                 | Breakdown Voltage | Maximum Transient             |                |                | Typical Capacitance |
|----------------|------------------|-----------------|-------------------|-------------------------------|----------------|----------------|---------------------|
|                |                  |                 |                   | Clamping Voltage <sup>1</sup> | Surge Current  | Surge Energy   |                     |
| Symbol         | V <sub>RMS</sub> | V <sub>DC</sub> | V <sub>B</sub>    | V <sub>C</sub>                | I <sub>S</sub> | W <sub>S</sub> | C                   |
| Units          | Volts(max.)      | Volts(max.)     | Volts             | Volts(max.)                   | Amps(max.)     | Joules(max)    | PF(typ.)            |
| Test Condition |                  |                 | 1mA DC            | 8/20 μ s (1A)                 | 8/20 μ s       | 10/1000 μ s    | 0.5V <sub>rms</sub> |
|                |                  |                 |                   |                               |                |                | 1KHz                |
| MLV2012N030    | 2.5              | 3.3             | 5(4.4-6.0)        | 10                            | 40             | 0.1            | 2450                |
| MLV2012N050    | 4                | 5.5             | 8(6.4-9.6)        | 16                            | 80             | 0.1            | 1600                |
| MLV2012N090    | 6                | 9               | 12(9.6-14.4)      | 20                            | 80             | 0.1            | 1180                |
| MLV2012N110    | 8                | 11              | 15(12.75-17.25)   | 25                            | 100            | 0.1            | 1050                |
| MLV2012N140    | 11               | 14              | 18(16.5-20.3)     | 30                            | 100            | 0.1            | 750                 |
| MLV2012N160    | 12               | 16.5            | 22(19.8-24.2)     | 36                            | 100            | 0.2            | 680                 |
| MLV2012N180    | 14               | 18              | 24(21.6-27)       | 39                            | 100            | 0.2            | 550                 |
| MLV2012N220    | 17               | 22              | 27(24.3-29.8)     | 44                            | 100            | 0.3            | 400                 |
| MLV2012N260    | 20               | 26              | 33(29.7-36.3)     | 54                            | 100            | 0.3            | 350                 |
| MLV2012N300    | 25               | 30              | 39(35.1-42.9)     | 65                            | 100            | 0.3            | 310                 |
| MLV2012N380    | 30               | 38              | 47(42.3-51.7)     | 77                            | 100            | 0.3            | 280                 |
| MLV2012N450    | 35               | 45              | 56(50.4-61.6)     | 90                            | 80             | 0.3            | 195                 |
| MLV2012N560    | 40               | 56              | 68(61.2-74.8)     | 110                           | 80             | 0.3            | 145                 |
| MLV2012N650    | 50               | 65              | 82(73.8-90.2)     | 135                           | 60             | 0.3            | 85                  |
|                |                  |                 |                   |                               |                |                |                     |
| MLV3216N030    | 2.5              | 3.3             | 5(4.4-6.0)        | 10                            | 60             | 0.1            | 3850                |
| MLV3216N050    | 4                | 5.5             | 8(6.4-9.6)        | 16                            | 100            | 0.2            | 3200                |
| MLV3216N090    | 6                | 9               | 12(9.6-14.4)      | 20                            | 100            | 0.2            | 2200                |
| MLV3216N110    | 8                | 11              | 15(12.75-17.25)   | 25                            | 100            | 0.2            | 1300                |
| MLV3216N140    | 11               | 14              | 18(16.5-20.3)     | 30                            | 100            | 0.3            | 1150                |
| MLV3216N160    | 12               | 16.5            | 22(19.8-24.2)     | 36                            | 100            | 0.3            | 1000                |
| MLV3216N180    | 14               | 18              | 24(21.6-27)       | 38                            | 100            | 0.3            | 900                 |
| MLV3216N220    | 17               | 22              | 27(24.3-29.8)     | 44                            | 100            | 0.4            | 840                 |
| MLV3216N260    | 20               | 26              | 33(29.7-36.3)     | 54                            | 100            | 0.5            | 490                 |
| MLV3216N300    | 25               | 30              | 39(35.1-42.9)     | 65                            | 100            | 0.6            | 440                 |
| MLV3216N380    | 30               | 38              | 47(42.3-51.7)     | 77                            | 100            | 0.7            | 400                 |
| MLV3216N450    | 35               | 45              | 56(50.4-61.6)     | 90                            | 100            | 0.8            | 310                 |
| MLV3216N560    | 40               | 56              | 68(61.2-74.8)     | 110                           | 100            | 1.0            | 280                 |
| MLV3216N650    | 50               | 65              | 82(73.8-90.2)     | 135                           | 100            | 0.5            | 240                 |
| MLV3216N850    | 60               | 85              | 100(90-110)       | 165                           | 100            | 0.6            | 160                 |
| MLV3216N900    | 70               | 90              | 110(99-121)       | 180                           | 100            | 0.6            | 120                 |

**Electrical Characteristics**

| Part Number    | Working Voltage  |                 | Breakdown Voltage | Maximum Transient             |                |                | Typical Capacitance |
|----------------|------------------|-----------------|-------------------|-------------------------------|----------------|----------------|---------------------|
|                |                  |                 |                   | Clamping Voltage <sup>1</sup> | Surge Current  | Surge Energy   |                     |
| Symbol         | V <sub>RMS</sub> | V <sub>DC</sub> | V <sub>B</sub>    | V <sub>C</sub>                | I <sub>S</sub> | W <sub>S</sub> | C                   |
| Units          | Volts(max.)      | Volts(max.)     | Volts             | Volts(max.)                   | Amps(max.)     | Joules(max)    | PF(typ.)            |
| Test Condition |                  |                 | 1mA DC            | 8/20 μ s (1A)                 | 8/20 μ s       | 10/1000 μ s    | 0.5V <sub>rms</sub> |
|                |                  |                 |                   |                               |                |                | 1KHz                |
| MLV3225N050    | 4                | 5.5             | 8(6.4-9.6)        | 16                            | 250            | 0.4            | 6200                |
| MLV3225N090    | 6                | 9               | 12(9.6-14.4)      | 20                            | 250            | 0.5            | 4400                |
| MLV3225N110    | 8                | 11              | 15(12.75-17.25)   | 25                            | 250            | 0.6            | 3520                |
| MLV3225N140    | 11               | 14              | 18(16.5-20.3)     | 30                            | 250            | 0.7            | 3260                |
| MLV3225N160    | 12               | 16.5            | 22(19.8-24.2)     | 36                            | 250            | 0.8            | 2100                |
| MLV3225N180    | 14               | 18              | 24(21.6-27)       | 38                            | 250            | 0.8            | 1950                |
| MLV3225N220    | 17               | 22              | 27(24.3-29.8)     | 44                            | 250            | 1.0            | 1720                |
| MLV3225N260    | 20               | 26              | 33(29.7-36.3)     | 54                            | 250            | 1.2            | 1090                |
| MLV3225N300    | 25               | 30              | 39(35.1-42.9)     | 65                            | 250            | 1.4            | 920                 |
| MLV3225N380    | 30               | 38              | 47(42.3-51.7)     | 77                            | 250            | 1.6            | 780                 |
| MLV3225N450    | 35               | 45              | 56(50.4-61.6)     | 90                            | 250            | 2.0            | 470                 |
| MLV3225N560    | 40               | 56              | 68(61.2-74.8)     | 110                           | 250            | 2.3            | 390                 |
| MLV3225N650    | 50               | 65              | 82(73.8-90.2)     | 135                           | 250            | 1.2            | 320                 |
| MLV3225N850    | 60               | 85              | 100(90-110)       | 165                           | 200            | 1.4            | 220                 |
| MLV3225N900    | 70               | 90              | 110(99-121)       | 180                           | 200            | 1.4            | 200                 |

<sup>1</sup> MLV3225 maximum clamping voltage testing current 2.5A

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