

# LA Series

## Radial Lead Varistors



### Description

The LA Varistor Series of transient voltage surge suppressors are radial leaded varistors (MOVs) that are designed to be operated continuously across AC power lines. These UL recognized varistors require very little mounting space, and are offered in various standard lead form options.

The LA Varistor Series are available in four model sizes: 7mm, 10mm, 14mm and 20mm; and have a  $V_{M(A)C(R)MS}$  voltage range from 130V to 1000V, and an energy absorption capability up to 360J. Some LA Series model numbers are available with clamping voltage selections, designated by a model number suffix of either A or B. The 'A' selection is the standard model; the 'B' selection provides a lower clamping voltage. See LA Series Device Ratings and Specifications Table for part number and brand information.

### Web Resources



Download ECAD models, order samples, and find technical resources at [www.littelfuse.com/la-varistors](http://www.littelfuse.com/la-varistors)

### Agency Approvals

| Agency | Agency Approval                                                                              | Agency File Number |
|--------|----------------------------------------------------------------------------------------------|--------------------|
| cULus  | UL1449                                                                                       | E320116            |
| VDE    | CECC 42201-006<br>IEC 61051-1<br>IEC 61051-2<br>IEC 60950-1 (Annex Q) for 14mm and 20mm only | 116895             |
| E      | CECC 42201-006<br>IEC 61051-1<br>IEC 61051-2<br>IEC 60950-1 (Annex Q) for 14mm and 20mm only | E1273/F            |

### Features & Benefits

- Lead-free, Halogen-Free and RoHS compliant.
- Energy absorption capability ( $W_{TM}$ ) up to 360J
- Wide operating voltage range  $V_{M(A)C(R)MS}$  130V to 1000V
- No derating up to 85°C ambient
- Available in tape and reel or bulk pack

### Absolute Maximum Ratings

• For ratings of individual members of a series, see Device Ratings and Specifications chart

| Continuous                                                                                                                                                 | LA Series    | Units      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------|
| <b>Steady State Applied Voltage:</b>                                                                                                                       |              |            |
| AC Voltage Range ( $V_{M(A)C(R)MS}$ )                                                                                                                      | 130 to 1000  | V          |
| DC Voltage Range ( $V_{M(DC)}$ )                                                                                                                           | 175 to 1200  | V          |
| <b>Transients:</b>                                                                                                                                         |              |            |
| Peak Pulse Current ( $I_{TM}$ )                                                                                                                            |              |            |
| For 8/20 $\mu$ s Current Wave (See Figure 2)                                                                                                               | 1200 to 6500 | A          |
| Single Pulse Energy Range                                                                                                                                  |              |            |
| For 10/1000 $\mu$ s Current Wave ( $W_{TM}$ )                                                                                                              | 11 to 360    | J          |
| Operating Ambient Temperature Range ( $T_A$ )                                                                                                              | -55 to +85   | °C         |
| Storage Temperature Range ( $T_{STG}$ )                                                                                                                    | -55 to +125  | °C         |
| Temperature Coefficient ( $\alpha^{\circ}$ ) of Clamping Voltage ( $V_C$ ) at Specified Test Current                                                       | <0.01        | %/°C       |
| Hi-Pot Encapsulation (COATING Isolation Voltage Capability)<br>(Dielectric must withstand indicated DC voltage for one minute per MIL-STD 202, Method 301) | 2500         | V          |
| COATING Insulation Resistance                                                                                                                              | 1000         | M $\Omega$ |

**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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### LA Series Ratings & Specifications

| Part Number | Branding | Model Size<br>Disc Dia.<br>(mm) | Maximum Rating (85°C)     |                           |                             |                                   | Specifications (25°C)                         |                             |                                               |                        |                                    |
|-------------|----------|---------------------------------|---------------------------|---------------------------|-----------------------------|-----------------------------------|-----------------------------------------------|-----------------------------|-----------------------------------------------|------------------------|------------------------------------|
|             |          |                                 | Continuous                |                           | Transient                   |                                   | Varistor Voltage at<br>1mA<br>DC Test Current |                             | Maximum Clamping<br>Voltage<br>8 x 20 $\mu$ s |                        | Typical<br>Capacitance<br>f = 1MHz |
|             |          |                                 | V <sub>RMS</sub>          | V <sub>DC</sub>           | Energy 10<br>x 1000 $\mu$ s | Peak<br>Current 8 x<br>20 $\mu$ s |                                               |                             |                                               |                        |                                    |
|             |          |                                 | V <sub>M(AC)</sub><br>(V) | V <sub>M(DC)</sub><br>(V) | W <sub>TM</sub><br>(J)      | I <sub>TM</sub><br>(A)            | V <sub>NOM</sub> Min<br>(V)                   | V <sub>NOM</sub> Max<br>(V) | V <sub>C</sub><br>(V)                         | I <sub>PK</sub><br>(A) | C<br>(pF)                          |
| V130LA1P    | P1301    | 7                               | 130                       | 175                       | 11                          | 1200                              | 198                                           | 242                         | 390                                           | 10                     | 180                                |
| V130LA2P    | P1302    | 7                               | 130                       | 175                       | 11                          | 1200                              | 184.5                                         | 225.5                       | 340                                           | 10                     | 180                                |
| V130LA5P    | P1305    | 10                              | 130                       | 175                       | 20                          | 2500                              | 184.5                                         | 225.5                       | 340                                           | 25                     | 450                                |
| V130LA10AP  | P130L10  | 14                              | 130                       | 175                       | 38                          | 4500                              | 184.5                                         | 225.5                       | 340                                           | 50                     | 1000                               |
| V130LA20AP  | P130L20  | 20                              | 130                       | 175                       | 70                          | 6500                              | 184.5                                         | 225.5                       | 340                                           | 100                    | 1900                               |
| V130LA20BP  | P130L20B | 20                              | 130                       | 175                       | 70                          | 6500                              | 190                                           | 220                         | 325                                           | 100                    | 1900                               |
| V140LA2P    | P1402    | 7                               | 140                       | 180                       | 12                          | 1200                              | 198                                           | 242                         | 360                                           | 10                     | 160                                |
| V140LA5P    | P1405    | 10                              | 140                       | 180                       | 22                          | 2500                              | 198                                           | 242                         | 360                                           | 25                     | 400                                |
| V140LA10AP  | P140L10  | 14                              | 140                       | 180                       | 42                          | 4500                              | 198                                           | 242                         | 360                                           | 50                     | 900                                |
| V140LA20AP  | P140L20  | 20                              | 140                       | 180                       | 75                          | 6500                              | 198                                           | 242                         | 340                                           | 100                    | 1750                               |
| V150LA1P    | P1501    | 7                               | 150                       | 200                       | 13                          | 1200                              | 225                                           | 275                         | 430                                           | 10                     | 150                                |
| V150LA2P    | P1502    | 7                               | 150                       | 200                       | 13                          | 1200                              | 216                                           | 264                         | 395                                           | 10                     | 150                                |
| V150LA5P    | P1505    | 10                              | 150                       | 200                       | 25                          | 2500                              | 216                                           | 264                         | 395                                           | 25                     | 360                                |
| V150LA10AP  | P150L10  | 14                              | 150                       | 200                       | 45                          | 4500                              | 216                                           | 264                         | 395                                           | 50                     | 800                                |
| V150LA20AP  | P150L20  | 20                              | 150                       | 200                       | 80                          | 6500                              | 216                                           | 264                         | 395                                           | 100                    | 1600                               |
| V150LA20BP  | P150L20B | 20                              | 150                       | 200                       | 80                          | 6500                              | 216                                           | 243                         | 360                                           | 100                    | 1600                               |
| V175LA2P    | P1752    | 7                               | 175                       | 225                       | 15                          | 1200                              | 243                                           | 297                         | 455                                           | 10                     | 130                                |
| V175LA5P    | P1755    | 10                              | 175                       | 225                       | 30                          | 2500                              | 243                                           | 297                         | 455                                           | 25                     | 350                                |
| V175LA10AP  | P175L10  | 14                              | 175                       | 225                       | 55                          | 4500                              | 243                                           | 297                         | 455                                           | 50                     | 700                                |
| V175LA20AP  | P175L20  | 20                              | 175                       | 225                       | 90                          | 6500                              | 243                                           | 297                         | 455                                           | 100                    | 1400                               |
| V230LA4P    | P2304    | 7                               | 230                       | 300                       | 20                          | 1200                              | 324                                           | 396                         | 595                                           | 10                     | 100                                |
| V230LA10P   | P230L    | 10                              | 230                       | 300                       | 35                          | 2500                              | 324                                           | 396                         | 595                                           | 25                     | 250                                |
| V230LA20AP  | P230L20  | 14                              | 230                       | 300                       | 70                          | 4500                              | 324                                           | 396                         | 595                                           | 50                     | 550                                |
| V230LA40AP  | P230L40  | 20                              | 230                       | 300                       | 122                         | 6500                              | 324                                           | 396                         | 595                                           | 100                    | 1100                               |
| V250LA2P    | P2502    | 7                               | 250                       | 330                       | 21                          | 1200                              | 369                                           | 451                         | 730                                           | 10                     | 90                                 |
| V250LA4P    | P2504    | 7                               | 250                       | 330                       | 21                          | 1200                              | 351                                           | 429                         | 650                                           | 10                     | 90                                 |
| V250LA10P   | P250L    | 10                              | 250                       | 330                       | 40                          | 2500                              | 351                                           | 429                         | 650                                           | 25                     | 220                                |
| V250LA20AP  | P250L20  | 14                              | 250                       | 330                       | 72                          | 4500                              | 351                                           | 429                         | 650                                           | 50                     | 500                                |
| V250LA40AP  | P250L40  | 20                              | 250                       | 330                       | 130                         | 6500                              | 351                                           | 429                         | 650                                           | 100                    | 1000                               |
| V250LA40BP  | P250L40B | 20                              | 250                       | 330                       | 130                         | 6500                              | 354                                           | 413                         | 620                                           | 100                    | 1000                               |
| V275LA2P    | P2752    | 7                               | 275                       | 369                       | 23                          | 1200                              | 405                                           | 495                         | 775                                           | 10                     | 80                                 |
| V275LA4P    | P2754    | 7                               | 275                       | 369                       | 23                          | 1200                              | 387                                           | 473                         | 710                                           | 10                     | 80                                 |
| V275LA10P   | P275L    | 10                              | 275                       | 369                       | 45                          | 2500                              | 387                                           | 473                         | 710                                           | 25                     | 200                                |
| V275LA20AP  | P275L20  | 14                              | 275                       | 369                       | 75                          | 4500                              | 387                                           | 473                         | 710                                           | 50                     | 450                                |
| V275LA40AP  | P275L40  | 20                              | 275                       | 369                       | 140                         | 6500                              | 387                                           | 473                         | 710                                           | 100                    | 900                                |
| V275LA40BP  | P275L40B | 20                              | 275                       | 369                       | 140                         | 6500                              | 389                                           | 453                         | 680                                           | 100                    | 900                                |
| V300LA2P    | P3002    | 7                               | 300                       | 405                       | 25                          | 1200                              | 441                                           | 539                         | 870                                           | 10                     | 70                                 |
| V300LA4P    | P3004    | 7                               | 300                       | 405                       | 25                          | 1200                              | 423                                           | 517                         | 775                                           | 10                     | 70                                 |
| V300LA10P   | P300L    | 10                              | 300                       | 405                       | 46                          | 2500                              | 423                                           | 517                         | 775                                           | 25                     | 180                                |
| V300LA20AP  | P300L20  | 14                              | 300                       | 405                       | 77                          | 4500                              | 423                                           | 517                         | 775                                           | 50                     | 400                                |
| V300LA40AP  | P300L40  | 20                              | 300                       | 405                       | 165                         | 6500                              | 423                                           | 517                         | 775                                           | 100                    | 800                                |
| V320LA7P    | P3207    | 7                               | 320                       | 420                       | 25                          | 1200                              | 459                                           | 561                         | 850                                           | 10                     | 65                                 |
| V320LA10P   | P320L    | 10                              | 320                       | 420                       | 48                          | 2500                              | 459                                           | 561                         | 850                                           | 25                     | 170                                |
| V320LA20AP  | P320L20  | 14                              | 320                       | 420                       | 80                          | 4500                              | 459                                           | 561                         | 850                                           | 50                     | 380                                |
| V320LA40BP  | P320L40  | 20                              | 320                       | 420                       | 150                         | 6500                              | 462                                           | 540                         | 810                                           | 100                    | 750                                |
| V385LA7P    | P3857    | 7                               | 385                       | 505                       | 27                          | 1200                              | 558                                           | 682                         | 1025                                          | 10                     | 60                                 |
| V385LA10P   | P385L    | 10                              | 385                       | 505                       | 51                          | 2500                              | 558                                           | 682                         | 1025                                          | 25                     | 160                                |
| V385LA20AP  | P385L20  | 14                              | 385                       | 505                       | 85                          | 4500                              | 558                                           | 682                         | 1025                                          | 50                     | 360                                |
| V385LA40BP  | P385L40  | 20                              | 385                       | 505                       | 160                         | 6500                              | 558                                           | 682                         | 1025                                          | 100                    | 700                                |

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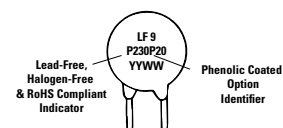
### LA Series Ratings & Specifications (Continued...)

| Part Number  | Branding | Model Size<br>Disc Dia.<br>(mm) | Maximum Rating (85°C) |                    |                             |                                   | Specifications (25°C)                         |                      |                                               |                 |                                         |
|--------------|----------|---------------------------------|-----------------------|--------------------|-----------------------------|-----------------------------------|-----------------------------------------------|----------------------|-----------------------------------------------|-----------------|-----------------------------------------|
|              |          |                                 | Continuous            |                    | Transient                   |                                   | Varistor Voltage at<br>1mA<br>DC Test Current |                      | Maximum Clamping<br>Voltage<br>8 x 20 $\mu$ s |                 | Typical<br>Capaci-<br>tance f =<br>1MHz |
|              |          |                                 | $V_{RMS}$             | $V_{DC}$           | Energy 10<br>x 1000 $\mu$ s | Peak<br>Current 8 x<br>20 $\mu$ s |                                               |                      |                                               |                 |                                         |
|              |          |                                 | $V_{M(AC)}$<br>(V)    | $V_{M(DC)}$<br>(V) | $W_{TM}$<br>(J)             | $I_{TM}$<br>(A)                   | $V_{NOM}$ Min<br>(V)                          | $V_{NOM}$ Max<br>(V) | $V_C$<br>(V)                                  | $I_{PK}$<br>(A) | C<br>(pF)                               |
| V420LA7P     | P4207    | 7                               | 420                   | 560                | 30                          | 1200                              | 612                                           | 748                  | 1120                                          | 10              | 55                                      |
| V420LA10P    | P420L    | 10                              | 420                   | 560                | 55                          | 2500                              | 612                                           | 748                  | 1120                                          | 25              | 140                                     |
| V420LA20AP   | P420L20  | 14                              | 420                   | 560                | 90                          | 4500                              | 612                                           | 748                  | 1120                                          | 50              | 300                                     |
| V420LA40BP   | P420L40  | 20                              | 420                   | 560                | 160                         | 6500                              | 610                                           | 720                  | 1060                                          | 100             | 600                                     |
| V460LA7P     | P4607    | 7                               | 460                   | 615                | 37                          | 1200                              | 643.5                                         | 786.5                | 1190                                          | 10              | 55                                      |
| V460LA10P    | P460L    | 10                              | 460                   | 615                | 56                          | 2500                              | 643.5                                         | 786.5                | 1190                                          | 25              | 120                                     |
| V460LA20AP   | P460L20  | 14                              | 460                   | 615                | 100                         | 4500                              | 643.5                                         | 786.5                | 1190                                          | 50              | 280                                     |
| V460LA40BP   | P460L40  | 20                              | 460                   | 615                | 170                         | 6500                              | 643.5                                         | 755.5                | 1110                                          | 100             | 560                                     |
| V480LA7P     | P4807    | 7                               | 480                   | 640                | 35                          | 1200                              | 675                                           | 825                  | 1240                                          | 10              | 50                                      |
| V480LA10P    | P480L    | 10                              | 480                   | 640                | 60                          | 2500                              | 675                                           | 825                  | 1240                                          | 25              | 120                                     |
| V480LA40AP   | P480L40  | 14                              | 480                   | 640                | 105                         | 4500                              | 675                                           | 825                  | 1240                                          | 50              | 270                                     |
| V480LA80BP   | P480L80  | 20                              | 480                   | 640                | 180                         | 6500                              | 675                                           | 790                  | 1160                                          | 100             | 550                                     |
| V510LA10P    | P510L    | 10                              | 510                   | 675                | 63                          | 2500                              | 738                                           | 902                  | 1350                                          | 25              | 100                                     |
| V510LA40AP   | P510L40  | 14                              | 510                   | 675                | 110                         | 4500                              | 738                                           | 902                  | 1350                                          | 50              | 250                                     |
| V510LA80BP   | P510L80  | 20                              | 510                   | 675                | 190                         | 6500                              | 738                                           | 860                  | 1280                                          | 100             | 500                                     |
| V575LA10P    | P575L    | 10                              | 575                   | 730                | 65                          | 2500                              | 819                                           | 1001                 | 1500                                          | 25              | 90                                      |
| V575LA40AP   | P575L40  | 14                              | 575                   | 730                | 120                         | 4500                              | 819                                           | 1001                 | 1500                                          | 50              | 220                                     |
| V575LA80BP   | P575L80  | 20                              | 575                   | 730                | 220                         | 6500                              | 819                                           | 960                  | 1410                                          | 100             | 450                                     |
| V625LA10P    | P625L    | 10                              | 625                   | 825                | 67                          | 2500                              | 900                                           | 1100                 | 1650                                          | 25              | 80                                      |
| V625LA40AP   | P625L40  | 14                              | 625                   | 825                | 125                         | 4500                              | 900                                           | 1100                 | 1650                                          | 50              | 210                                     |
| V625LA80BP   | P625L80  | 20                              | 625                   | 825                | 230                         | 6500                              | 900                                           | 1100                 | 1650                                          | 100             | 425                                     |
| V680LA10P    | P680L    | 10                              | 680                   | 875                | 75                          | 2500                              | 990                                           | 1210                 | 1875                                          | 25              | 65                                      |
| V680LA80AP   | P680L80  | 14                              | 680                   | 875                | 145                         | 4500                              | 990                                           | 1210                 | 1875                                          | 50              | 190                                     |
| V680LA100BP  | P680L100 | 20                              | 680                   | 875                | 260                         | 6500                              | 990                                           | 1130                 | 1700                                          | 100             | 380                                     |
| V660LA10P    | P660L    | 10                              | 660                   | 850                | 70                          | 2500                              | 972                                           | 1188                 | 1820                                          | 25              | 70                                      |
| V660LA50AP   | P660L50  | 14                              | 660                   | 850                | 140                         | 4500                              | 972                                           | 1188                 | 1820                                          | 50              | 200                                     |
| V660LA100BP  | P660L100 | 20                              | 660                   | 850                | 250                         | 6500                              | 940                                           | 1100                 | 1650                                          | 100             | 400                                     |
| V1000LA80AP  | P1000L8  | 14                              | 1000                  | 1200               | 220                         | 4500                              | 1500                                          | 1800                 | 2700                                          | 50              | 130                                     |
| V1000LA160BP | P1000L16 | 20                              | 1000                  | 1200               | 360                         | 6500                              | 1425                                          | 1600                 | 2420                                          | 100             | 250                                     |

**Note:** Average power dissipation of transients not to exceed 0.25W, 0.4W, 0.6W or 1W for model sizes 7mm, 10mm, 14mm and 20mm, respectively.

### Phenolic Coating vOption -- LA Series Varistors for Hi-Temperature Operating Conditions:

- Phenolic-coated LA Series devices are available with improved maximum operating maximum temperature 125°C.
- These devices also have improved temperature cycling performance capability.
- Ratings and Specifications are as per standard LA Series except Hi-Pot Encapsulation (Isolation Voltage Capability) = 500V.
- These devices are not UL, CSA, VDE or CECC certified.
- To order: add X1347 to end of part number (e.g. V230LA20APX1347).
- Product marking:

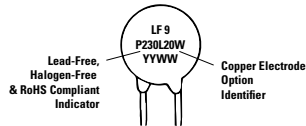


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### Copper Electrode Option:

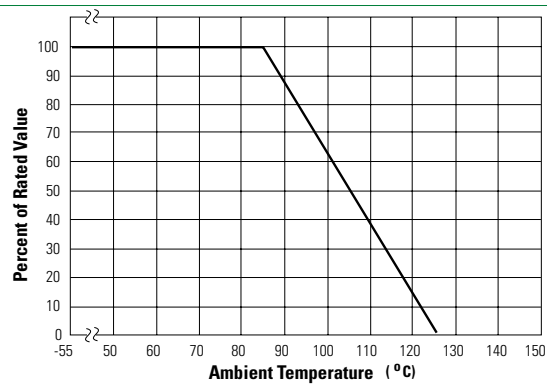
- Add 'W' to the end of the part number (e.g. V230LA20AP**W**)
- Product marking:



### Current Energy and Power Dissipation Ratings

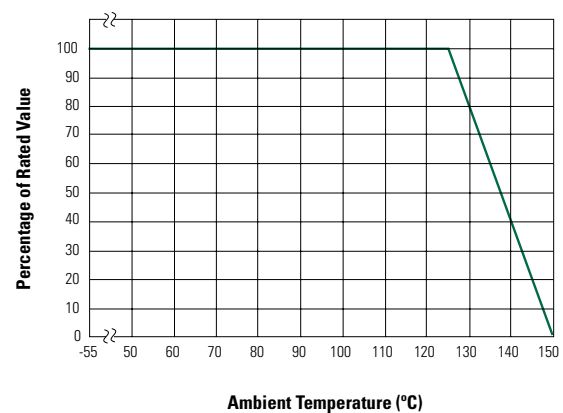
Should transients occur in rapid succession, the average power dissipation is the energy (watt-seconds) per pulse times the number of pulses per second. The power so developed must be within the specifications shown on the Device Ratings and Specifications Table for the specific device. The operating values of a MOV need to be derated at high temperatures as shown above. Because varistors only dissipate a relatively small amount of average power they are not suitable for repetitive applications that involve substantial amounts of average power dissipation.

**Figure 1A - Power Derating for Epoxy Coated**

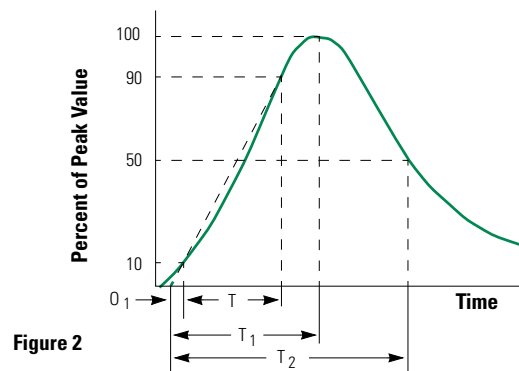


**Figure 1 Current, Energy and power Derating Curve**

**Figure 1B - Power Derating for Phenolic Coated**



### Peak Pulse Current Test Waveform



**Figure 2**

01 = Virtual Origin of Wave

T = Time from 10% to 90% of Peak

T1 = Rise Time = 1.25 x T

T2 = Decay Time

**Example:** For an 8/20  $\mu$ s Current Waveform:

8 $\mu$ s = T1 = Rise Time

20 $\mu$ s = T2 = Decay Time

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### Transient V-I Characteristics Curves

#### Maximum Clamping Voltage for 7mm Parts

V130LA1(P) - V300LA2(P)

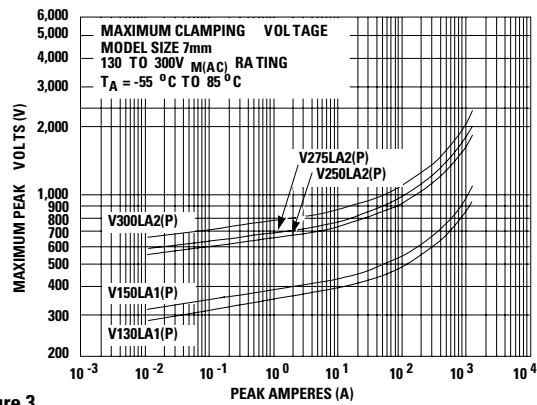


Figure 3

V130LA2(P) - V300LA4(P)

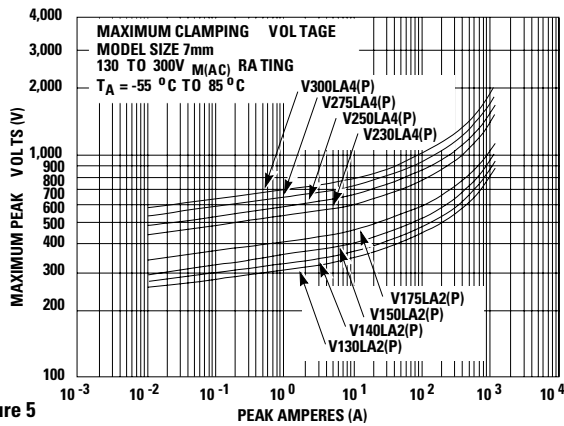


Figure 5

V320LA7(P) - V480LA7(P)

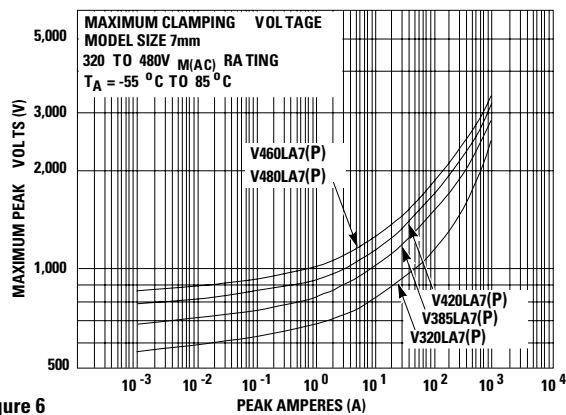


Figure 6

### Pulse Rating Curves

#### Repetitive Surge Capability for 7mm Parts

V130LA1(P) - V480LA7(P)

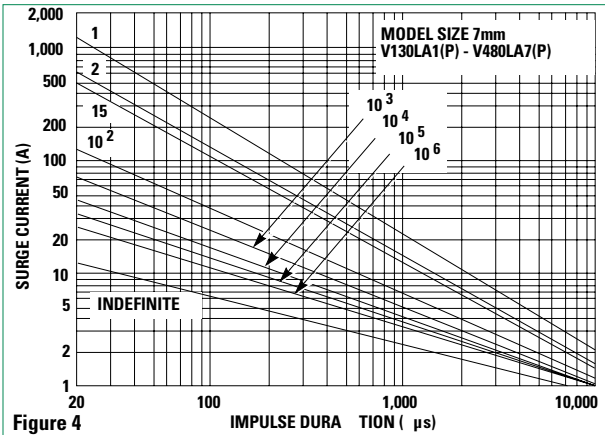


Figure 4

#### Note:

Repetitive surge capability is qualified and tested based on 8/20μs current waveform (not combination waveform) and UL1449 40.7.3 (Edition 4) test condition.

# LA Series

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### Transient V-I Characteristics Curves (Continued...)

#### Maximum Clamping Voltage for 10mm Parts

V130LA5(P) - V420LA10(P)

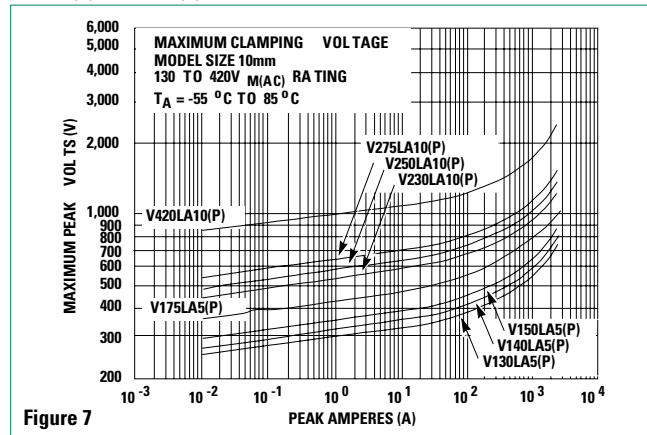


Figure 7

### Pulse Rating Curves (Continued...)

#### Repetitive Surge Capability for 10mm Parts

V130LA5(P) - V680LA10(P)

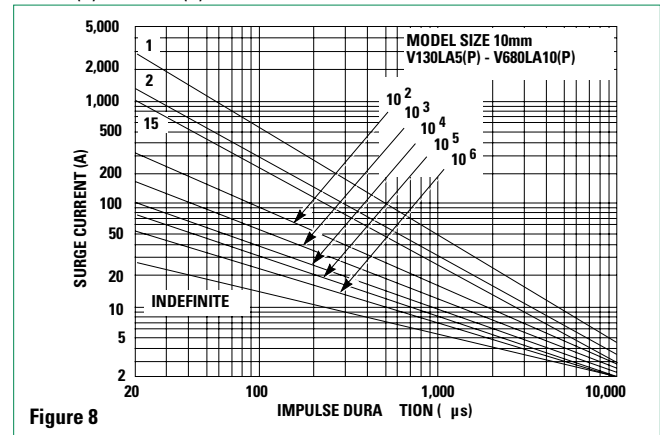


Figure 8

V300LA10(P) - V680LA10(P)

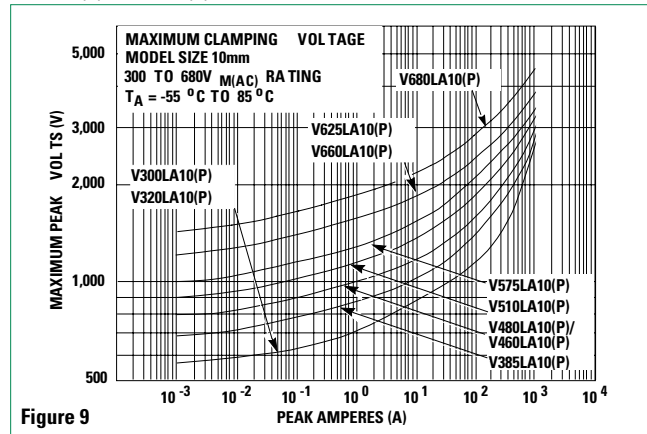


Figure 9

#### Note:

Repetitive surge capability is qualified and tested based on 8/20μs current waveform (not combination waveform) and UL1449 40.7.3 (Edition 4) test condition.

# LA Series

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### Transient V-I Characteristics Curves (Continued...)

#### Maximum Clamping Voltage for 14mm Parts

V130LA10A(P) - V320LA20A

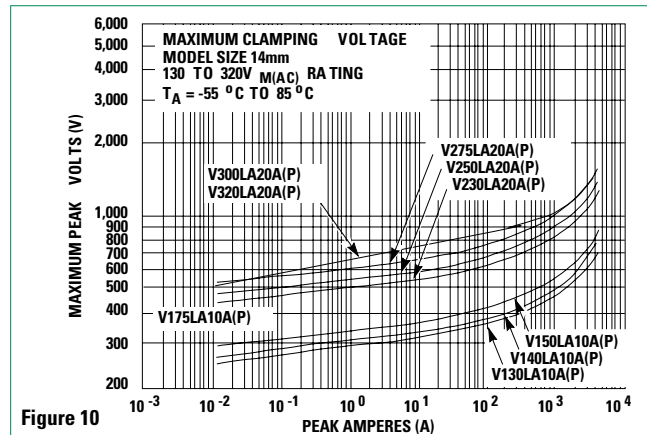


Figure 10

### Pulse Rating Curves (Continued...)

#### Repetitive Surge Capability for 14mm Parts

V130LA10A(P) - V320LA20A(P)

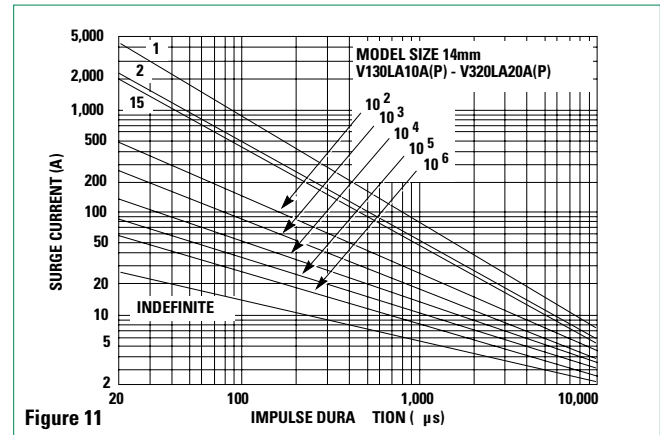


Figure 11

V385LA20A(P) V1000LA80A(P)

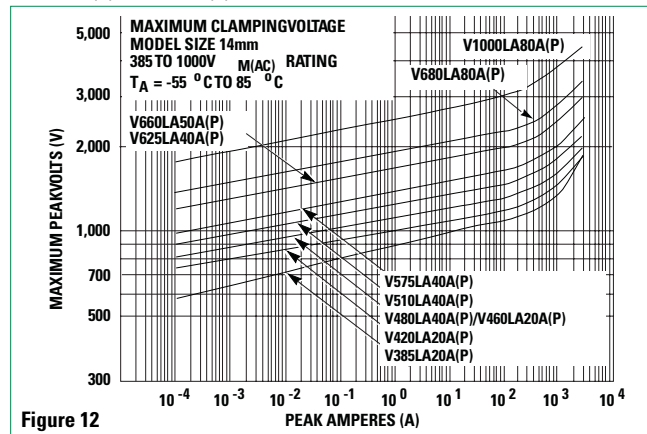


Figure 12

V385LA20A(P) - V1000LA80A(P)

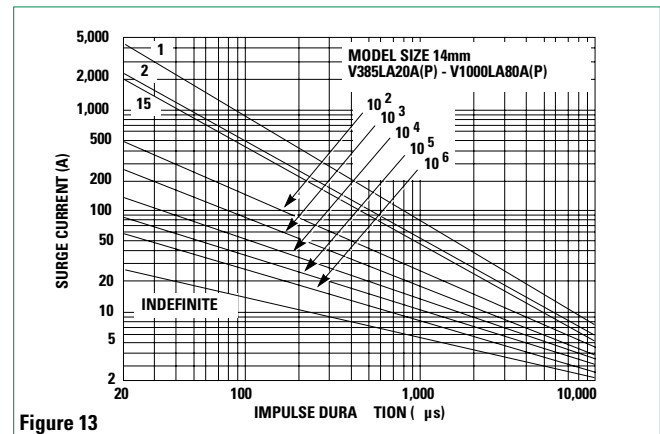


Figure 13

#### Note:

Repetitive surge capability is qualified and tested based on 8/20μs current waveform (not combination waveform) and UL1449 40.7.3 (Edition 4) test condition.

# LA Series

## Radial Lead Varistors

### Maximum Clamping Voltage for 20mm Parts

V130LA20A(P) - V275LA40A(P)

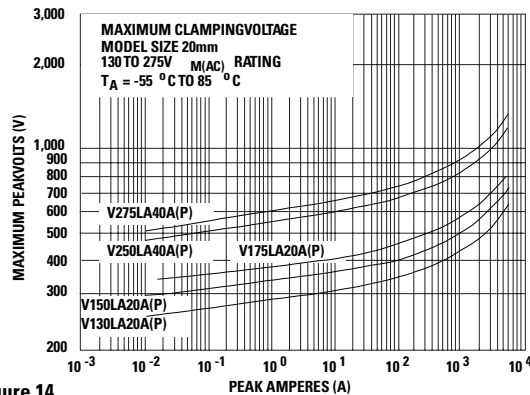


Figure 14

V300LA40A - V1000LA160B

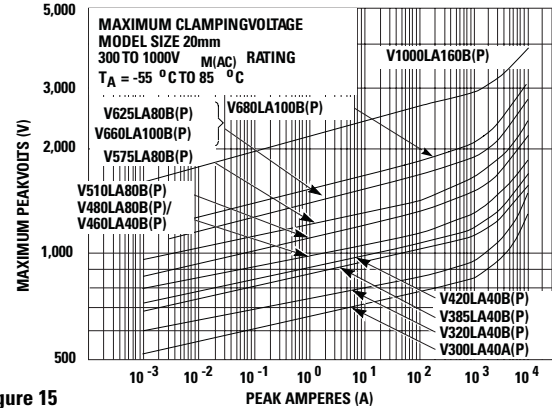


Figure 15

V130LA20B(P) - V275LA40(P)

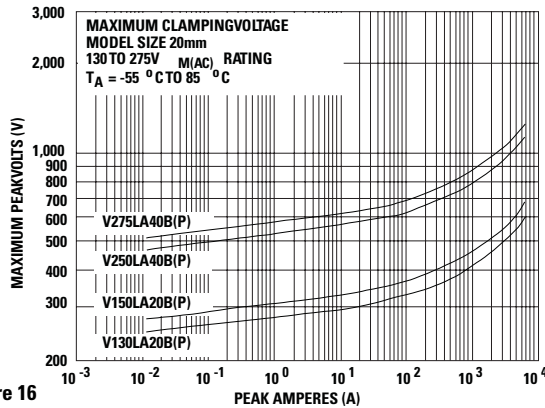


Figure 16

### Repetitive Surge Capability for 20mm Parts

V130LA20A(P) - V320LA40B(P)

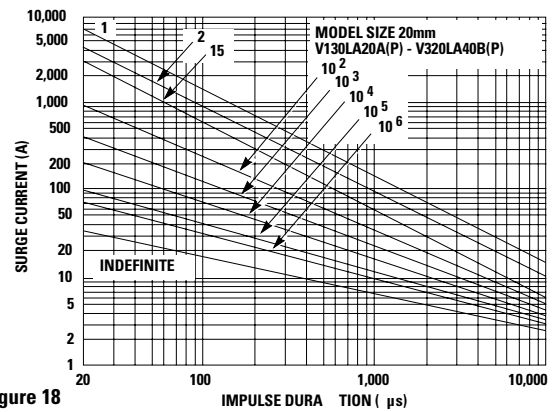


Figure 18

V130LA20A(P) - V275LA40A(P)

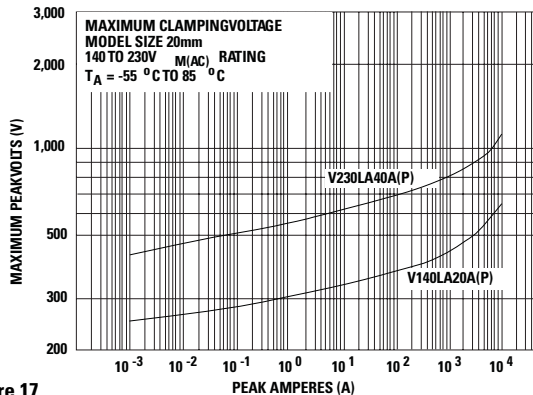


Figure 17

#### Note:

If pulse ratings are exceeded, a shift of VN(DC) (at specified current) of more than  $\pm 10\%$  could result. This type of shift, which normally results in a decrease of VN(DC), may result in the device not meeting the original published specifications, but does not prevent the device from continuing to function, and to provide ample protection.

V385LA40B(P) - V1000LA160B(P)

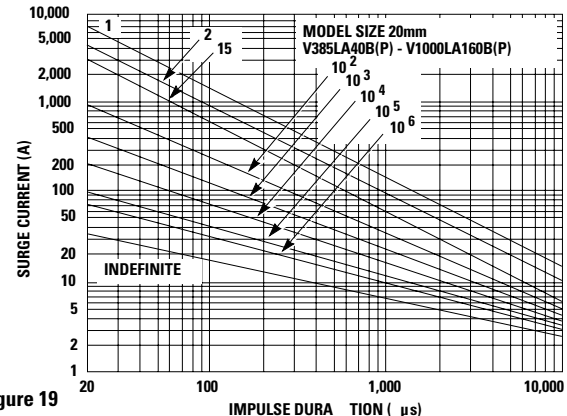


Figure 19

#### Note:

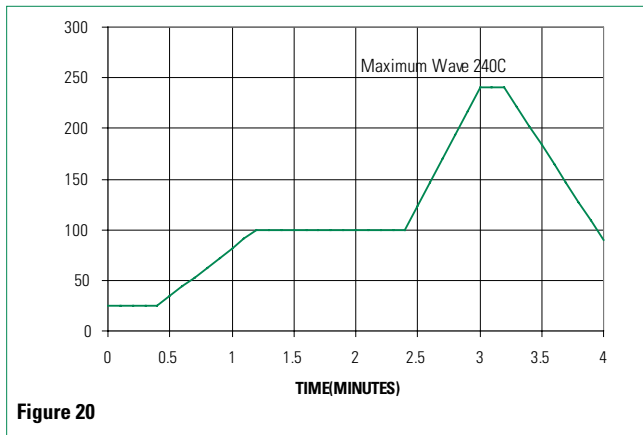
Repetitive surge capability is qualified and tested based on 8/20 $\mu\text{s}$  current waveform (not combination waveform) and UL1449 40.7.3 (Edition 4) test condition.

# LA Series

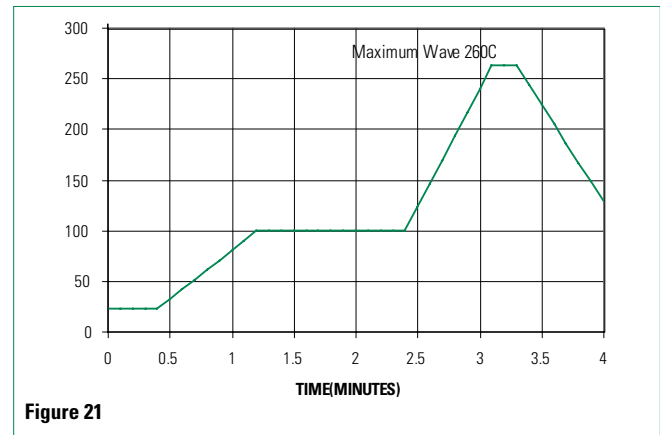
## Radial Lead Varistors

### Wave Solder Profile

#### Non Lead-free Profile



#### Lead-free Profile



### Physical Specifications

|                                  |                                                                 |
|----------------------------------|-----------------------------------------------------------------|
| <b>Lead Material</b>             | Copper Clad Steel Wire                                          |
| <b>Soldering Characteristics</b> | Solderability per MIL-STD-202, Method 208                       |
| <b>Insulating Material</b>       | Cured, flame retardant epoxy polymer meets UL94V-0 requirements |
| <b>Device Labeling</b>           | Marked with LF, voltage, UL/CSA logos, and date code            |

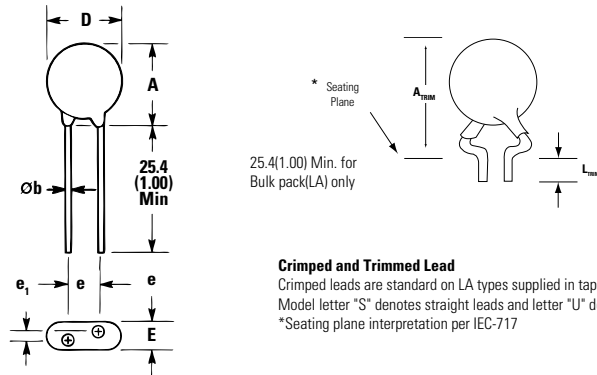
### Environmental Specifications

|                                            |                                                            |
|--------------------------------------------|------------------------------------------------------------|
| <b>Operating Ambient Temperature Range</b> | -55°C to +85°C                                             |
| <b>Storage Temperature Range</b>           | -55°C to +125°C                                            |
| <b>Humidity Aging</b>                      | +85°C, 85% RH, 1000 hours<br>+/-10% typical voltage change |
| <b>Thermal Shock</b>                       | +85°C to -40°C 5 times<br>+/-10% typical voltage change    |
| <b>Solvent Resistance</b>                  | MIL-STD-202, Method 215                                    |
| <b>Moisture Sensitivity</b>                | Level 1, J-STD-020                                         |

# LA Series

## Radial Lead Varistors

### Product Dimensions (mm)



| Dimension         | V <sub>RMS</sub><br>Voltage<br>Model | 7mm Size        |                 | 10mm Size       |                 | 14mm Size       |                          | 20mm Size                |                          |
|-------------------|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------------|--------------------------|--------------------------|
|                   |                                      | Min.<br>mm (in) | Max.<br>mm (in) | Min.<br>mm (in) | Max.<br>mm (in) | Min.<br>mm (in) | Max.<br>mm (in)          | Min.<br>mm (in)          | Max.<br>mm (in)          |
| A                 | V130LA-V320LA                        | -               | 12 (0.472)      | -               | 16 (0.630)      | -               | 20 (0.787)               | -                        | 26.5 (1.043)             |
|                   | V385LA-V1000LA                       | -               | 13 (0.512)      | -               | 17 (0.689)      | -               | 20.5 (0.807)             | -                        | 28 (1.102)               |
|                   | All                                  | -               | 9 (0.354)       | -               | 12.5 (0.492)    | -               | 17 (0.669)               | -                        | 23 (0.906)               |
| e                 | All                                  | 4 (0.157)       | 6 (0.236)       | 6.5 (0.256)     | 8.5 (0.335)     | 6.5 (0.256)     | 8.5 (0.335)              | 6.5 (0.256)<br>(Note 2)  | 8.5 (Note 2)             |
| e <sub>1</sub>    | V130LA-V320LA                        | 1.5 (0.059)     | 3.5 (0.138)     | 1.5 (0.059)     | 3.5 (0.138)     | 1.5 (0.059)     | 3.5 (0.138)              | 1.5 (0.059)              | 3.5 (0.138)              |
|                   | V385LA-V1000LA                       | 2.5 (0.098)     | 5.5 (0.217)     | 2.5 (0.098)     | 5.5 (0.217)     | 2.5 (0.098)     | 5.5 (0.217)              | 2.5 (0.098)              | 5.5 (0.217)              |
| E                 | V130LA-V320LA                        | -               | 5.6 (0.220)     | -               | 5.6 (0.220)     | -               | 5.6 (0.220)              | -                        | 5.6 (0.220)              |
|                   | V385LA-V510LA                        | -               | 7.3 (0.287)     | -               | 7.3 (0.287)     | -               | 7.3 (0.287)              | -                        | 7.3 (0.287)              |
|                   | V550LA-V680LA                        | -               | 8.3 (0.327)     | -               | 8.3 (0.327)     | -               | 8.3 (0.327)              | -                        | 8.3 (0.327)              |
|                   | V1000LA                              | -               | -               | -               | -               | -               | 10.8 (0.425)             | -                        | 10.8 (0.425)             |
| Øb                | All<br>(Note 3)                      | 0.585 (0.023)   | 0.685 (0.027)   | 0.76 (0.030)    | 0.86 (0.034)    | 0.76 (0.030)    | 0.86 (0.034)             | 0.76 (0.030)<br>(Note 2) | 0.86 (0.034)<br>(Note 2) |
| A <sub>TRIM</sub> | All                                  | -               | 15 (0.591)      | -               | 19.5 (0.768)    | -               | 22.5 (0.886)<br>(Note 4) | -                        | 29.0 (1.142)             |
| L <sub>TRIM</sub> | All                                  | 2.41 (0.095)    | 4.69 (0.185)    | 2.41 (0.095)    | 4.69 (0.185)    | 2.41 (0.095)    | 4.69 (0.185)             | 2.41 (0.095)             | 4.69 (0.185)             |

#### Notes:

- Dimensions in millimeters, (inches) in parentheses.
- 10mm (9mm Min. & 11mm Max.) ALSO AVAILABLE; see additional lead style options
- 1000V parts supplied with lead wire of diameter 1.00 -/+ 0.05 (0.039 -/+ 0.002)
- 'A' Max. for V1000LC80A (P) = 24.00 (0.945")

# LA Series

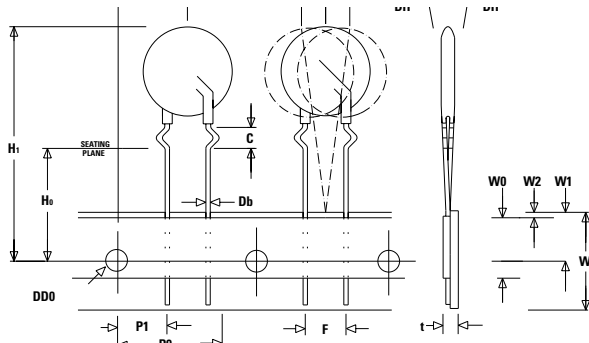
## Radial Lead Varistors

### Tape and Reel Specifications

(Dimensions presented on following page.)

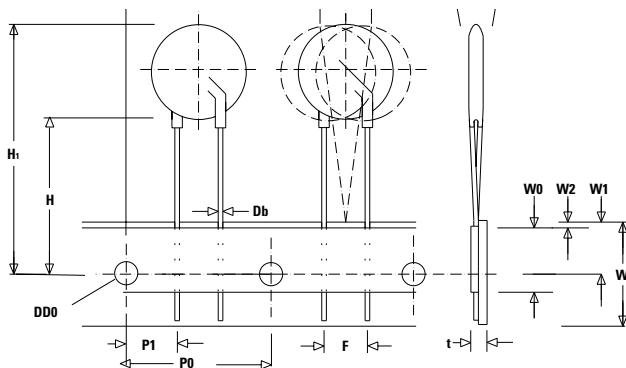
#### 7mm Devices

##### Crimped Leads "LT"



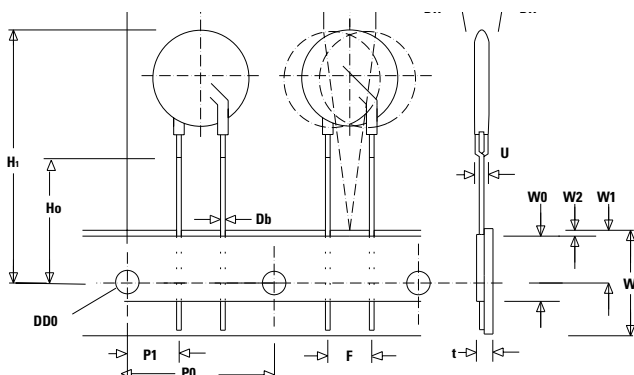
##### Crimped Leads "ZT"

##### Straight Leads "Ls"



##### Straight Leads "ZS"

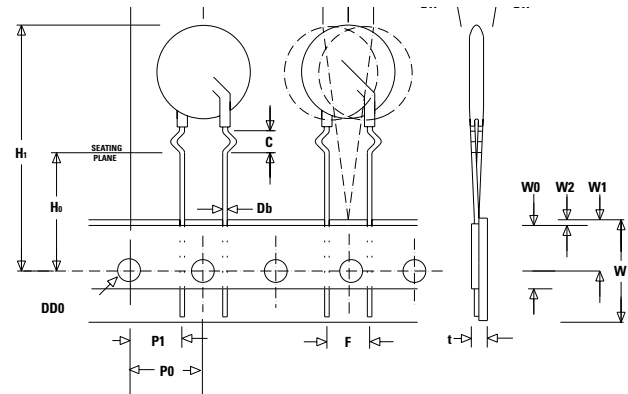
##### Under-crimped Leads "Lu"



##### Under-crimped Leads "ZU"

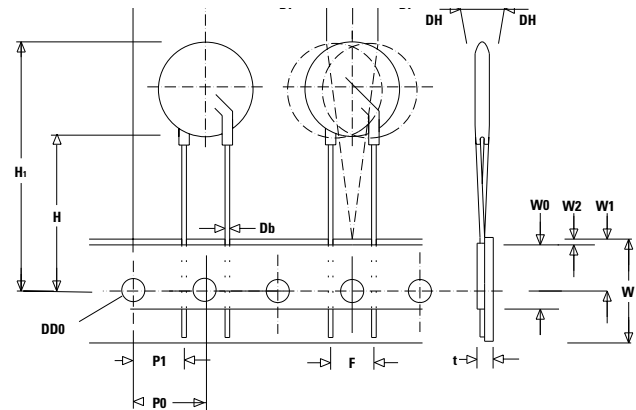
#### 10, 14 and 20mm Devices

##### Crimped Leads "LT"



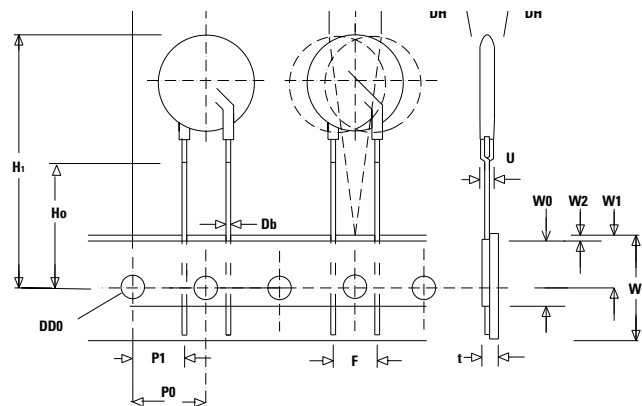
##### Crimped Leads "ZT"

##### Straight Leads "Ls"



##### Straight Leads "ZS"

##### Under-crimped Leads "LU"



##### Under-crimped Leads "ZU"

# LA Series

## Radial Lead Varistors

### Tape and Reel Specifications (continued)

- Can be supplied to IEC Publication 286-2
- Radial devices on tape are supplied with crimped leads, straight leads, or under-crimped leads
- 7mm parts are available on tape and reel up to 480 VAC only
- 10mm parts are available on tape and reel up to 510 VAC only
- 14mm and 20mm parts are available on tape and reel up to 550 VAC only

| Symbol               | Description                               | Model Size        |                   |                   |                   |
|----------------------|-------------------------------------------|-------------------|-------------------|-------------------|-------------------|
|                      |                                           | 7mm               | 10mm              | 14mm              | 20mm              |
| <b>P</b>             | Pitch of Component                        | 12.7 +/- 1.0      | 25.4 +/- 1.0      | 25.4 +/- 1.0      | 25.4 +/- 1.0      |
| <b>P<sub>0</sub></b> | Feed Hole Pitch                           | 12.7 +/- 0.2      | 12.7 +/- 0.2      | 12.7 +/- 0.2      | 12.7 +/- 0.2      |
| <b>P<sub>1</sub></b> | Feed Hole Center to Pitch                 | 3.85 +/- 0.7      | 8.85 +/- 0.7      | 8.85 +/- 0.7      | 8.85 +/- 0.7      |
| <b>P<sub>2</sub></b> | Hole Center to Component Center           | 6.35 +/- 0.7      | 12.7 +/- 0.7      | 12.7 +/- 0.7      | 12.7 +/- 0.7      |
| <b>F</b>             | Lead to Lead Distance                     | 5.0 +/- 0.8       | 7.5 +/- 0.8       | 7.5 +/- 0.8       | 7.5 +/- 0.8       |
| <b>h</b>             | Component Alignment                       | 2.0 Max           | 2.0 Max           | 2.0 Max           | 2.0 Max           |
| <b>W</b>             | Tape Width                                | 18.0 +1.0 / -0.5  | 18.0 +1.0 / -0.5  | 18.0 +1.0 / -0.5  | 18.0 +1.0 / -0.5  |
| <b>W<sub>0</sub></b> | Hold Down Tape Width                      | 12.0 +/- 0.3      | 12.0 +/- 0.3      | 12.0 +/- 0.3      | 12.0 +/- 0.3      |
| <b>W<sub>1</sub></b> | Hole Position                             | 9.0 +0.75 / -0.50 | 9.0 +0.75 / -0.50 | 9.0 +0.75 / -0.50 | 9.0 +0.75 / -0.50 |
| <b>W<sub>2</sub></b> | Hold Down Tape Position                   | 0.5 Max           | 0.5 Max           | 0.5 Max           | 0.5 Max           |
| <b>H</b>             | Height from Tape Center to Component Base | 18.0 +2.0 / -0.0  | 18.0 +2.0 / -0.0  | 18.0 +2.0 / -0.0  | 18.0 +2.0 / -0.0  |
| <b>H<sub>0</sub></b> | Seating Plane Height                      | 16.0 +/- 0.5      | 16.0 +/- 0.5      | 16.0 +/- 0.5      | 16.0 +/- 0.5      |
| <b>H<sub>1</sub></b> | Component Height                          | 32.0 Max          | 36.0 Max          | 40.0 Max          | 46.5 Max          |
| <b>D<sub>0</sub></b> | Feed Hole Diameter                        | 4.0 +/- 0.2       | 4.0 +/- 0.2       | 4.0 +/- 0.2       | 4.0 +/- 0.2       |
| <b>T</b>             | Total Tape Thickness                      | 0.7 +/- 0.2       | 0.7 +/- 0.2       | 0.7 +/- 0.2       | 0.7 +/- 0.2       |
| <b>U</b>             | Under-crimp Width                         | 8.0 Max           | 8.0 Max           | 8.0 Max           | 8.0 Max           |
| <b>P</b>             | Component Alignment                       | 3° Max 1.00mm     | 3° Max 1.00mm     | 3° Max 1.00mm     | 3° Max            |

Note: Dimensions are in mm.

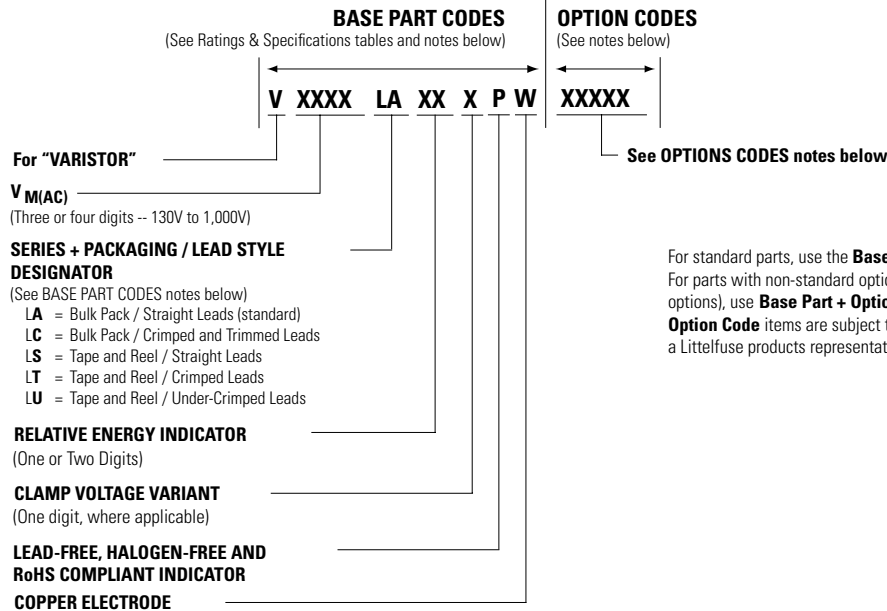
### Standard Bulk Pack Quantity

| Varistor Voltage Model | Standard Bulk Pack Quantity |      |      |      |
|------------------------|-----------------------------|------|------|------|
|                        | Varistor Model Size         |      |      |      |
|                        | 7mm                         | 10mm | 14mm | 20mm |
| 130-275                | 1500                        | 1000 | 700  | 500  |
| 300-460                | 1500                        | 1000 | 600  | 400  |
| 510-625                | 1500                        | 1000 | 500  | 400  |
| 660                    | N/A                         | 1000 | 500  | 400  |
| 680                    | N/A                         | 1000 | 400  | 300  |
| 1000                   | N/A                         | N/A  | 300  | 200  |

# LA Series

## Radial Lead Varistors

### Part Numbering System



For standard parts, use the **Base Part** designator only.

For parts with non-standard options (such as additional form, packaging and lead space options), use **Base Part + Option Code**.

**Option Code** items are subject to availability and minimum order requirements. Please contact a Littelfuse products representative for additional information or questions

### Ordering Notes:

#### BASE PART CODES:

##### Series + Packaging / Lead Style Designators:

Ordering examples:

| Straight Lead Bulk Pack (standard) | Straight Lead Tape & Reel | Crimped Lead Tape & Reel | Crimped & Trimmed Lead Bulk Pack | Under-Crimp Lead Tape & Reel |
|------------------------------------|---------------------------|--------------------------|----------------------------------|------------------------------|
| V130LA2P                           | V130LS2P                  | V130LT2P                 | V130LC2P                         | V130LU2P                     |

Crimped leads are standard on LA Series varistors supplied in tape and reel, denoted with "LT." For crimped leads without trimming and any variations other than that described above, please contact Littelfuse.

Littelfuse LA Series varistors are shipped standard in bulk pack with straight leads and lead spacing outlined in the Package Dimensions section of this data sheet. Contact your Littelfuse sales representative to discuss non-standard options.

#### OPTION CODES:

**X10:** 10mm lead spacing option --

For 10 (-/+1) mm lead spacing (available on 20mm diameter models only), append standard model BASE PART number with "X10."

Example:

| Standard Model | Order As      |
|----------------|---------------|
| V130LA20AP     | V130LA20APX10 |

**X2855:** Nickel Barrier coated wire option --

All standard parts use tinned copper clad steel wire. Nickel Barrier coated wire is available as an option, consisting of Copper wire with a flashing of Nickel followed by a top coating of Tin. To order append standard model BASE PART number with "X2855."

Example:

| Standard Model | Order As        |
|----------------|-----------------|
| V130LA20AP     | V130LA20APX2855 |

**X1347:** Hi-Temperature phenolic coating option --

Phenolic Coated LA Series devices are available with improved maximum operating maximum temperature of 125°C.

To order, add X1347 to end of part number

(Example: V230LA20APX1347).

For additional information please refer to the section labeled "Phenolic Coating Option" on the third page of this document under the "Electrical Characteristics" table.

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