



**RoHS  UltraMOV™ 25S Varistor Series**

**Description**

The UltraMOV™ 25S Varistor Series is designed for applications requiring high peak surge current ratings and high energy absorption capability. UltraMOV™ varistors are primarily intended for use in AC Line Voltage applications such as Surge Protective Devices (SPD), Uninterruptable Power Supplies (UPS), AC Power Taps, AC Power Meters, or other products that require voltage clamping of high transient surge currents from sources such as lightning, inductive load switching, or capacitor bank switching.

These devices have 25mm square forms are produced in a radial lead package and offered with straight leads. UltraMOVs are manufactured with recognized epoxy encapsulation and are rated for ambient temperatures up to 85°C with no derating. This 25S Series is LASER-branded and is supplied in bulk packaging.

**Agency Approvals**

| Agency  | Agency File Number | Status   |
|---|--------------------|----------|
|  | E320116            | Approved |
|  | 091788             | Approved |

**Features**

- Lead-free and RoHS compliant.
- High peak surge current rating ( $I_{TM}$ ) 22kA, single 8/20 $\mu$ s pulse, (25mm)
- 40kA rating when 2 devices paralleled (VN(DC) matched within +/- 5%, contact factory for special selections
- Standard operating voltage range compatible with common AC line voltages (115 to 750VAC)
- Characterized for maximum standby current (Leakage)
- Custom voltage types available
- Standard lead form and lead space options

**ULTRAMOV™ 25S Series**
**Absolute Maximum Ratings**

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

| Continuous   | UltraMOV™ 25S Series | Units      |
|--|----------------------|------------|
| Steady State Applied Voltage:  |                      |            |
| AC Voltage Range ( $V_{M(AC)RMS}$ )  | 115 to 750           | V          |
| DC Voltage Range ( $V_{M(DC)}$ )   | 150 to 970           | V          |
| Transients:  |                      |            |
| Peak Pulse Current ( $I_{TM}$ ) 8x20 $\mu$ s Current Wave Single Pulse                       | 22,000               | A          |
| Single-Pulse Energy Capability ( $W_{TM}$ ) 2ms Current Wave                                 | 230 to 890           | J          |
| Operating Ambient Temperature Range ( $T_A$ )  | -55 to +85           | °C         |
| Storage Temperature Range ( $T_{STG}$ )  | -55 to +125          | °C         |
| Temperature Coefficient ( $\alpha$ ) of Clamping Voltage ( $V_C$ ) at Specified Test Current | <0.01                | %/C        |
| Hi-Pot Encapsulation (COATING Isolation Voltage Capability)                                  | 2500                 | V          |
| Dielectric Withstand DC for 1 min per MIL-STD-202, Method 301                                |                      |            |
| Insulation Resistance of the Epoxy Coating   | 1000                 | M $\Omega$ |

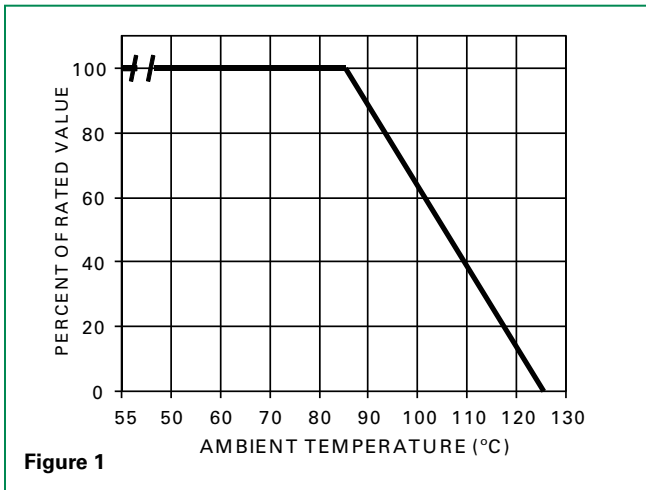
**CAUTION:** Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

### UltraMOV™ 25S Series Ratings & Specifications

| Part Number | Branding | Maximum Rating (85°C) |                    |                           |                             | Specifications (25°C)                   |                      |  |  |                              |
|-------------|----------|-----------------------|--------------------|---------------------------|-----------------------------|---|----------------------|--|--|------------------------------|
|             |          | Continuous            |                    | Transient                 |                             | Varistor Voltage at 1mA DC Test Current |                      | Maximum Clamping Voltage at 100A, 8 x 20µs | UL 1449 ed.3 Voltage Protection Rating | Typical Capacitance f = 1MHz |
|             |          | AC Volts              | DC Volts           | Energy 2ms                | Peak Surge Current 8 x 20µs |   |                      |  |  |                              |
|             |          | V <sub>M(AC)RMS</sub> | V <sub>M(DC)</sub> | W <sub>TM</sub> 1 x Pulse | I <sub>TM</sub> 1 x Pulse   | V <sub>NOM</sub> Min                    | V <sub>NOM</sub> Max | V <sub>C</sub>                             | VPR                                    | C                            |
| (V)         | (V)      | (J)                   | (A)                | (V)                       |                             | (V)                                     |                      | (pF)                                       |  |                              |
| V25S115P    | P25S115  | 115                   | 150                | 230                       | 22000                       | 162                                     | 198                  | 295  | 400                                    | 4500                         |
| V25S130P    | P25S130  | 130                   | 170                | 255                       | 22000                       | 184                                     | 226                  | 335  | 500                                    | 3900                         |
| V25S140P    | P25S140  | 140                   | 180                | 285                       | 22000                       | 200                                     | 240                  | 355  | 500                                    | 3500                         |
| V25S150P    | P25S150  | 150                   | 200                | 300                       | 22000                       | 216                                     | 264                  | 390  | 500                                    | 3200                         |
| V25S175P    | P25S175  | 175                   | 225                | 315                       | 22000                       | 243                                     | 297                  | 450  | 600                                    | 2550                         |
| V25S230P    | P25S230  | 230                   | 300                | 400                       | 22000                       | 324                                     | 396                  | 585  | 700                                    | 1900                         |
| V25S250P    | P25S250  | 250                   | 320                | 435                       | 22000                       | 351                                     | 429                  | 640  | 800                                    | 1750                         |
| V25S275P    | P25S275  | 275                   | 350                | 470                       | 22000                       | 387                                     | 473                  | 700  | 900                                    | 1610                         |
| V25S300P    | P25S300  | 300                   | 385                | 500                       | 22000                       | 423                                     | 517                  | 765  | 1000                                   | 1450                         |
| V25S320P    | P25S320  | 320                   | 420                | 540                       | 22000                       | 459                                     | 561                  | 825  | 1000                                   | 1350                         |
| V25S385P    | P25S385  | 385                   | 505                | 630                       | 22000                       | 558                                     | 682                  | 1010                                       | 1200                                   | 1080                         |
| V25S420P    | P25S420  | 420                   | 560                | 655                       | 22000                       | 612                                     | 748                  | 1100                                       | 1500                                   | 1000                         |
| V25S440P    | P25S440  | 440                   | 585                | 675                       | 22000                       | 643                                     | 787                  | 1160                                       | n/a                                    | 900                          |
| V25S460P    | P25S460  | 460                   | 615                | 690                       | 22000                       | 675                                     | 825                  | 1220                                       | n/a                                    | 870                          |
| V25S510P    | P25S510  | 510                   | 670                | 700                       | 22000                       | 738                                     | 902                  | 1335                                       | n/a                                    | 820                          |
| V25S550P    | P25S550  | 550                   | 745                | 765                       | 22000                       | 819                                     | 1001                 | 1475                                       | n/a                                    | 750                          |
| V25S625P    | P25S625  | 625                   | 825                | 800                       | 22000                       | 900                                     | 1100                 | 1625                                       | n/a                                    | 660                          |
| V25S750P    | P25S750  | 750                   | 970                | 890                       | 22000                       | 1080                                    | 1320                 | 1950                                       | n/a                                    | 550                          |

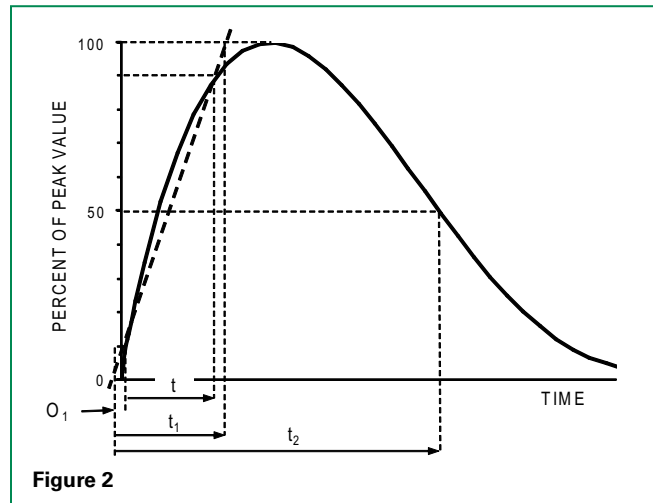
### Transient V-I Characteristics Curves

#### Peak Current, Energy and Power Derating Curve



For applications exceeding 85°C ambient temperature, the peak surge current and energy ratings must be reduced as shown above.

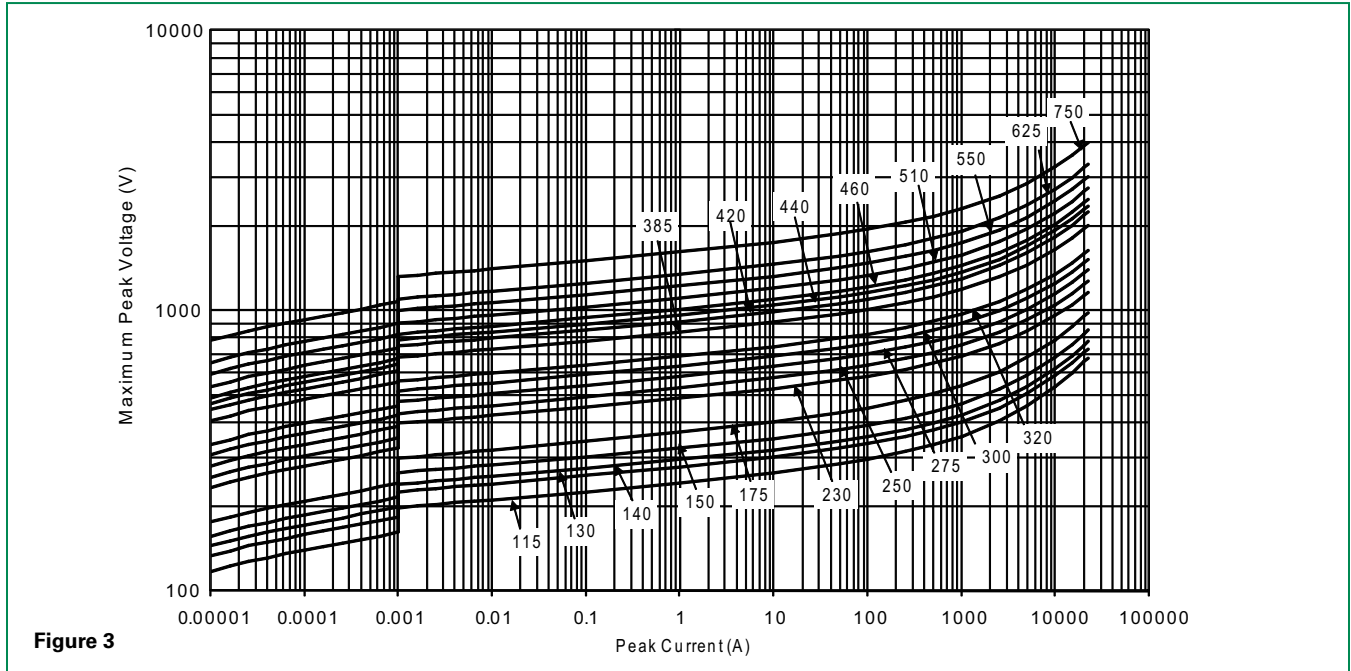
#### Peak Pulse Current Test Waveform for Clamping Voltage



O<sub>1</sub> = Virtual Origin of Wave  
 T = Time from 10% to 90% of Peak  
 T<sub>1</sub> = Rise Time = 1.25 x T  
 T<sub>2</sub> = Decay Time

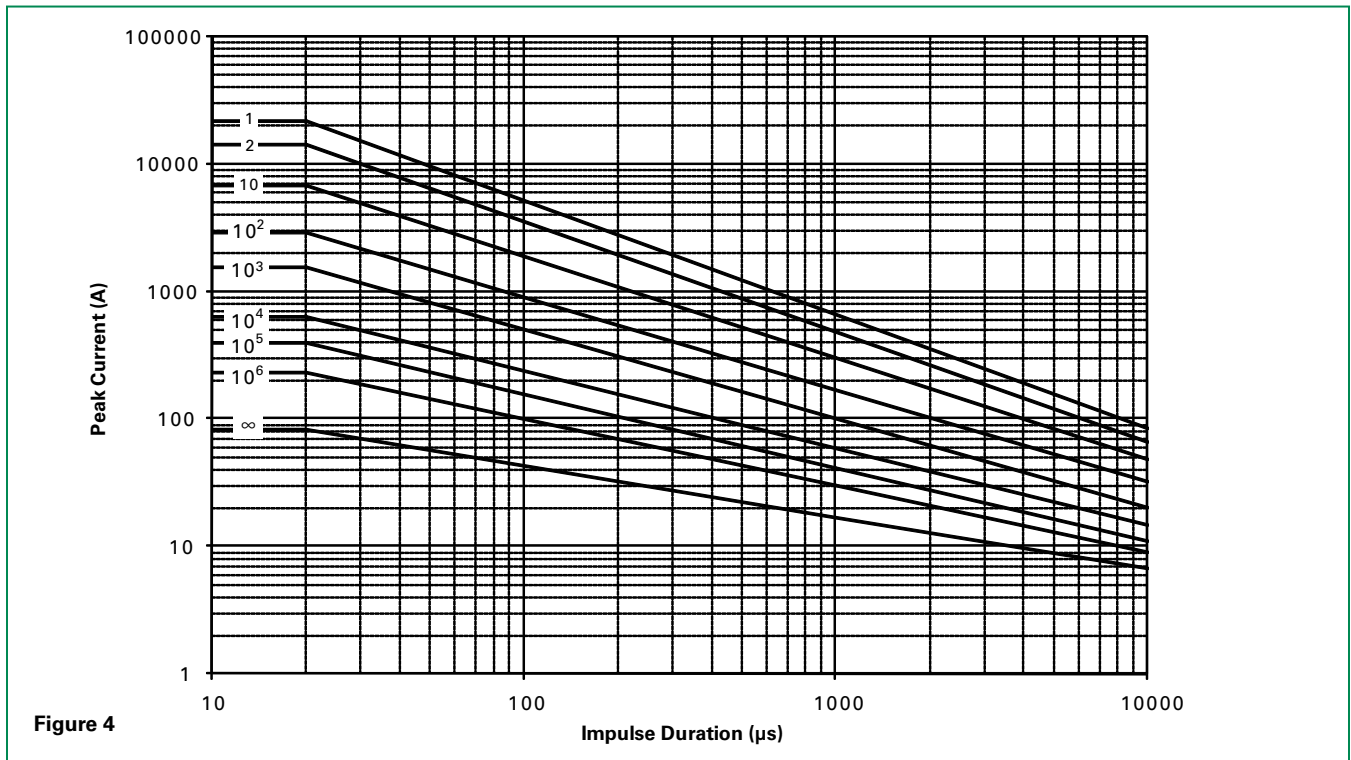
**Example** - For an 8/20 µs Current Waveform:  
 8µs = T<sub>1</sub> = Rise Time  
 20µs = T<sub>2</sub> = Decay Time

**V-I Limit Curves**



**Figure 3**

**Pulse Rating Curves**



**Figure 4**

**ULTRAMOV™ 25S Series**

**Wave Solder Profile**

**Non Lead-free Wave Solder Profile**

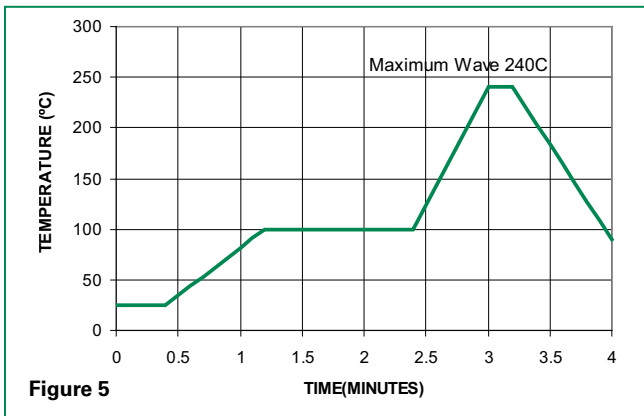


Figure 5

**Lead-free Wave Solder Profile**

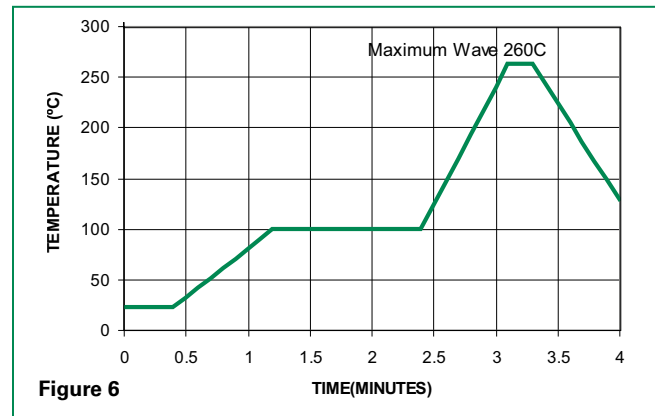


Figure 6

**Physical Specifications**

|                                  |   |
|----------------------------------|---|
| <b>Lead Material</b>             | Tin-coated Copper wire  |
| <b>Soldering Characteristics</b> | Solderability per MIL-STD-202, Method 208E                      |
| <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**

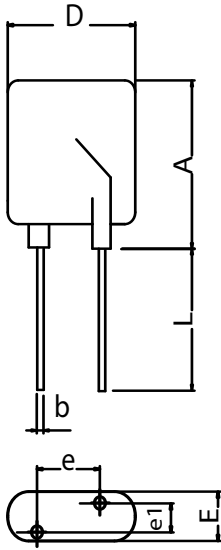
|                                      |  |
|--------------------------------------|--|
| <b>Operating/Storage Temperature</b> | -55°C to +85°C/<br>-55°C to +125°C                         |
| <b>Passive Aging</b>                 | +85°C, 1000 hours<br>+/-10% typical voltage change         |
| <b>Humidity 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 215F                                   |
| <b>Moisture Sensitivity</b>          | Level 1, J-STD-020C  |

**UltraMOV™ 25S Series Varistors for High-Temperature Operating Conditions:**

Phenolic coated devices are available with improved maximum operating temperature 125°C. These devices also have improved temperature cycling capability. Ratings and specifications are per standard series except Hi-Pot Encapsulation (Isolation Voltage Capability) = 500V.

**To order:** add 'X1347' to part number (e.g. V25S150PX1347). These devices are NOT UL, CSA, CECC or VDE certified. Contact factory for further details.

### Product Dimensions (mm)



|          | A<br>max    | b<br>min    | b<br>max    | D<br>max  | e<br>min    | e<br>max    | e1<br>min | e1<br>max | E<br>max | L<br>min    |
|----------|-------------|-------------|-------------|-----------|-------------|-------------|-----------|-----------|----------|-------------|
| V25S115P | <b>32.5</b> | <b>0.95</b> | <b>1.05</b> | <b>28</b> | <b>11.7</b> | <b>13.7</b> | 1.5       | 2.7       | 5.7      | <b>25.4</b> |
| V25S130P |             |             |             |           |             |             | 1.6       | 2.9       | 5.9      |             |
| V25S140P |             |             |             |           |             |             | 1.7       | 3.0       | 6.0      |             |
| V25S150P |             |             |             |           |             |             | 1.8       | 3.1       | 6.1      |             |
| V25S175P |             |             |             |           |             |             | 1.9       | 3.3       | 6.3      |             |
| V25S230P |             |             |             |           |             |             | 2.0       | 3.4       | 6.4      |             |
| V25S250P |             |             |             |           |             |             | 2.1       | 3.5       | 6.5      |             |
| V25S275P |             |             |             |           |             |             | 2.3       | 3.7       | 6.7      |             |
| V25S300P |             |             |             |           |             |             | 2.4       | 3.9       | 6.9      |             |
| V25S320P |             |             |             |           |             |             | 2.6       | 4.1       | 7.1      |             |
| V25S385P |             |             |             |           |             |             | 3.0       | 4.7       | 7.7      |             |
| V25S420P |             |             |             |           |             |             | 3.3       | 5.0       | 8.0      |             |
| V25S440P |             |             |             |           |             |             | 3.4       | 5.2       | 8.2      |             |
| V25S460P |             |             |             |           |             |             | 3.6       | 5.4       | 8.4      |             |
| V25S510P |             |             |             |           |             |             | 1.6       | 3.4       | 8.7      |             |
| V25S550P |             |             |             |           |             |             | 1.9       | 3.9       | 9.2      |             |
| V25S625P |             |             |             |           |             |             | 2.3       | 4.3       | 9.6      |             |
| V25S750P | 3.1         | 5.4         | 10.7        |           |             |             |           |           |          |             |

### Notes

1. Additional optional lead form, packaging and lead spacing requirements are subject to availability and to minimum order requirements. Please contact factory for details.
2. Nickel Barrier Wire option (Suffix 'X2855') Standard parts use Tin-Coated Copper wire. Nickel Barrier Coated Wire is available as an option. This is Copper Wire with a flashing of Nickel, followed by a top coat of Tin. To order please add suffix 'X2855' to end of standard part number. Contact factory for more details if required.
3. UltraMOV 25S have been qualified as type 1 application by UL1449 edition 3, which allows Permanent Connection between the secondary of the service transformer and the line side of the service equipment overcurrent device, as well as the load side, including watt-hour meter socket enclosures and intended to be installed without an external overcurrent protective device.