

## Varistors



### QUICK REFERENCE DATA

| PARAMETER                                                                  | VALUE                  | UNIT |
|----------------------------------------------------------------------------|------------------------|------|
| Maximum continuous voltage:                                                |                        |      |
| RMS                                                                        | 14 to 680              | V    |
| DC                                                                         | 18 to 895              | V    |
| Maximum non-repetitive transient current $I_{nrp}$ ( $8 \times 20 \mu s$ ) | 100 to 6500            | A    |
| Robustness of terminations                                                 | 10                     | N    |
| Drop test:                                                                 |                        |      |
| Height of fall                                                             | 1                      | m    |
| Detailed specification                                                     | based on<br>CECC 42000 |      |
| Climatic category                                                          | 40/085/56              |      |

### ORDERING INFORMATION

The varistors are available in a number of packaging options:

- Bulk
- On tape on reel
- On tape in ammpack.

The basic ordering code for each option is given in tables titled Varistors on Tape on Reel, Varistors on Tape in Ammpack and Varistors in Bulk. To complete the catalog number and to determine the required operating parameters, see Electrical Data and Ordering Information table.

### FEATURES

- Zinc oxide disc, epoxy coated
- Straight leads
- Straight leads with flange (2322 592 and 593 series only)
- Kinked leads.

### APPLICATION

- Suppression of transients.

### DESCRIPTION

The varistors consist of a disc of low- $\beta$  ceramic material with two tinned solid copper leads. They are coated with a layer of ochre coloured epoxy, which provides electrical, mechanical and climatic protection. The encapsulation is resistant to all cleaning solvents in accordance with "IEC 60068-2-45".

### MOUNTING

The varistors are suitable for processing on automatic insertion and cutting and bending equipment.

Varistors with flanged leads provide better positioning on printed-circuit boards (PCB) and more accurate control over component height. This is important for hand mounting and automatic insertion techniques; see Outlines of flanged leads drawing.

### Soldering

$\leq 240^\circ\text{C}$ ; duration  $\leq 5$  s.

### Resistance to heat

$\leq 260^\circ\text{C}$ ; duration  $\leq 5$  s.

### MARKING

The varistors are marked with the following information:

- Maximum continuous RMS voltage
- Series number (592, 593, 594, 595 or 596)
- Manufacturers logo
- Date of manufacture.

### INFLAMMABILITY

The varistors are non-flammable.

### ELECTRICAL DATA AND ORDERING INFORMATION

| MAXIMUM CONTINUOUS VOLTAGE |        | VOLTAGE <sup>(3)</sup> at 1 mA | MAXIMUM VOLTAGE at STATED CURRENT |       | MAXIMUM ENERGY <sup>(4)</sup> ( $10 \times 1000 \mu s$ ) | MAXIMUM NON-REP. TRANSIENT CURRENT <sup>(5)</sup> $I_{nrp}$ ( $8 \times 20 \mu s$ ) | TYPICAL CAPACITANCE at 1 kHz | CATALOG NUMBERS <sup>(1)</sup> |
|----------------------------|--------|--------------------------------|-----------------------------------|-------|----------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------|--------------------------------|
| RMS <sup>(2)</sup> (V)     | DC (V) | (V)                            | V (V)                             | I (A) | (J)                                                      | (A)                                                                                 | (PF)                         | 2322 ... ..                    |
| 14                         | 18     | 22                             | 48                                | 1.0   | 0.5                                                      | 100                                                                                 | 1300                         | 592 .1406 <sup>(6)</sup>       |
|                            |        |                                | 43                                | 2.5   | 1.7                                                      | 250                                                                                 | 2800                         | 593 .1406 <sup>(6)</sup>       |
|                            |        |                                | 43                                | 5.0   | 4.3                                                      | 500                                                                                 | 6000                         | 594 .1406 <sup>(6)</sup>       |
|                            |        |                                | 43                                | 10.0  | 5.4                                                      | 1000                                                                                | 15000                        | 595 .1406 <sup>(6)</sup>       |
| 17                         | 22     | 27                             | 60                                | 1.0   | 0.7                                                      | 100                                                                                 | 1050                         | 592 .1706 <sup>(6)</sup>       |
|                            |        |                                | 53                                | 2.5   | 2.0                                                      | 250                                                                                 | 2000                         | 593 .1706 <sup>(6)</sup>       |
|                            |        |                                | 53                                | 5.0   | 5.3                                                      | 500                                                                                 | 4000                         | 594 .1706 <sup>(6)</sup>       |
|                            |        |                                | 53                                | 10.0  | 6.9                                                      | 1000                                                                                | 10000                        | 595 .1706 <sup>(6)</sup>       |

**ELECTRICAL DATA AND ORDERING INFORMATION**

| MAXIMUM CONTINUOUS VOLTAGE |           | VOLTAGE <sup>(3)</sup> at 1 mA | MAXIMUM VOLTAGE at STATED CURRENT |          | MAXIMUM ENERGY <sup>(4)</sup><br>(10 × 1000 µs) | MAXIMUM NON-REP. TRANSIENT CURRENT <sup>(5)</sup><br>I <sub>nrp</sub> (8 × 20 µs) | TYPICAL CAPACITANCE at 1 kHz | CATALOG NUMBERS(1)       |
|----------------------------|-----------|--------------------------------|-----------------------------------|----------|-------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------|--------------------------|
| RMS <sup>(2)</sup><br>(V)  | DC<br>(V) | (V)                            | V<br>(V)                          | I<br>(A) | (J)                                             | (A)                                                                               | (PF)                         | 2322 ... ..              |
| 20                         | 26        | 33                             | 73                                | 1.0      | 0.8                                             | 100                                                                               | 900                          | 592 .2006 <sup>(6)</sup> |
|                            |           |                                | 65                                | 2.5      | 2.5                                             | 250                                                                               | 1500                         | 593 .2006 <sup>(6)</sup> |
|                            |           |                                | 65                                | 5.0      | 6.5                                             | 500                                                                               | 3000                         | 594 .2006 <sup>(6)</sup> |
|                            |           |                                | 65                                | 10.0     | 8.8                                             | 1000                                                                              | 7500                         | 595 .2006 <sup>(6)</sup> |
| 25                         | 31        | 39                             | 86                                | 1.0      | 0.9                                             | 100                                                                               | 500                          | 592 .2506 <sup>(6)</sup> |
|                            |           |                                | 77                                | 2.5      | 3.0                                             | 250                                                                               | 1350                         | 593 .2506 <sup>(6)</sup> |
|                            |           |                                | 77                                | 5.0      | 7.7                                             | 500                                                                               | 2600                         | 594 .2506 <sup>(6)</sup> |
|                            |           |                                | 77                                | 10.0     | 9.4                                             | 1000                                                                              | 6500                         | 595 .2506 <sup>(6)</sup> |
| 30                         | 38        | 47                             | 96                                | 1.0      | 1.1                                             | 100                                                                               | 700                          | 592 .3006 <sup>(6)</sup> |
|                            |           |                                | 93                                | 2.5      | 3.6                                             | 250                                                                               | 1600                         | 593 .3006 <sup>(6)</sup> |
|                            |           |                                | 93                                | 5.0      | 9.2                                             | 500                                                                               | 2700                         | 594 .3006 <sup>(6)</sup> |
|                            |           |                                | 90                                | 10.0     | 12.0                                            | 1000                                                                              | 6000                         | 595 .3006 <sup>(6)</sup> |
| 35                         | 45        | 56                             | 123                               | 1.0      | 1.4                                             | 100                                                                               | 560                          | 592 .3506 <sup>(6)</sup> |
|                            |           |                                | 115                               | 2.5      | 4.4                                             | 250                                                                               | 1300                         | 593 .3506 <sup>(6)</sup> |
|                            |           |                                | 110                               | 5.0      | 11.0                                            | 500                                                                               | 2200                         | 594 .3506 <sup>(6)</sup> |
|                            |           |                                | 105                               | 10.0     | 14.0                                            | 1000                                                                              | 4800                         | 595 .3506 <sup>(6)</sup> |
| 40                         | 56        | 68                             | 145                               | 1.0      | 1.6                                             | 100                                                                               | 460                          | 592 .4006 <sup>(6)</sup> |
|                            |           |                                | 135                               | 2.5      | 5.2                                             | 250                                                                               | 1000                         | 593 .4006 <sup>(6)</sup> |
|                            |           |                                | 130                               | 5.0      | 13.0                                            | 500                                                                               | 1800                         | 594 .4006 <sup>(6)</sup> |
|                            |           |                                | 130                               | 10.0     | 17.0                                            | 1000                                                                              | 3800                         | 595 .4006 <sup>(6)</sup> |
| 50                         | 65        | 82                             | 145                               | 5.0      | 2.6                                             | 400                                                                               | 370                          | 592 .5006 <sup>(6)</sup> |
|                            |           |                                | 140                               | 10.0     | 7.0                                             | 1200                                                                              | 900                          | 593 .5006 <sup>(6)</sup> |
|                            |           |                                | 140                               | 25.0     | 12.0                                            | 2500                                                                              | 1500                         | 594 .5006 <sup>(6)</sup> |
|                            |           |                                | 140                               | 50.0     | 21.0                                            | 4500                                                                              | 3100                         | 595 .5006 <sup>(6)</sup> |
| 60                         | 85        | 100                            | 165                               | 5.0      | 2.9                                             | 400                                                                               | 290                          | 592 .6006 <sup>(6)</sup> |
|                            |           |                                | 165                               | 10.0     | 8.3                                             | 1200                                                                              | 700                          | 593 .6006 <sup>(6)</sup> |
|                            |           |                                | 165                               | 25.0     | 15.0                                            | 2500                                                                              | 1200                         | 594 .6006 <sup>(6)</sup> |
|                            |           |                                | 165                               | 50.0     | 24.0                                            | 4500                                                                              | 2300                         | 595 .6006 <sup>(6)</sup> |
|                            |           |                                | 165                               | 100.0    | 56.0                                            | 6500                                                                              | 4700                         | 596 .6006                |
| 75                         | 100       | 120                            | 190                               | 5.0      | 3.4                                             | 400                                                                               | 240                          | 592 .7506 <sup>(6)</sup> |
|                            |           |                                | 200                               | 10.0     | 10.0                                            | 1200                                                                              | 530                          | 593 .7506 <sup>(6)</sup> |
|                            |           |                                | 200                               | 25.0     | 18.0                                            | 2500                                                                              | 1000                         | 594 .7506 <sup>(6)</sup> |
|                            |           |                                | 200                               | 50.0     | 29.0                                            | 4500                                                                              | 1900                         | 595 .7506 <sup>(6)</sup> |
|                            |           |                                | 200                               | 100.0    | 64.0                                            | 6500                                                                              | 3900                         | 596 .7506                |
| 95                         | 125       | 150                            | 230                               | 5.0      | 4.1                                             | 400                                                                               | 180                          | 592 .9506 <sup>(6)</sup> |
|                            |           |                                | 250                               | 10.0     | 13.0                                            | 1200                                                                              | 450                          | 593 .9506 <sup>(6)</sup> |
|                            |           |                                | 250                               | 25.0     | 22.0                                            | 2500                                                                              | 800                          | 594 .9506 <sup>(6)</sup> |
|                            |           |                                | 250                               | 50.0     | 37.0                                            | 4500                                                                              | 1500                         | 595 .9506 <sup>(6)</sup> |
|                            |           |                                | 250                               | 100.0    | 88.0                                            | 6500                                                                              | 3000                         | 596 .9506                |
| 130                        | 170       | 205                            | 310                               | 5.0      | 5.5                                             | 400                                                                               | 130                          | 592 .1316 <sup>(6)</sup> |
|                            |           |                                | 340                               | 10.0     | 17.0                                            | 1200                                                                              | 320                          | 593 .1316 <sup>(6)</sup> |
|                            |           |                                | 340                               | 25.0     | 30.0                                            | 2500                                                                              | 580                          | 594 .1316 <sup>(6)</sup> |
|                            |           |                                | 340                               | 50.0     | 56.0                                            | 4500                                                                              | 1050                         | 595 .1316 <sup>(6)</sup> |
|                            |           |                                | 340                               | 100.0    | 114.0                                           | 6500                                                                              | 2100                         | 596 .1316                |
| 140                        | 180       | 220                            | 350                               | 5.0      | 6.3                                             | 400                                                                               | 120                          | 592 .1416 <sup>(6)</sup> |
|                            |           |                                | 370                               | 10.0     | 21.0                                            | 1200                                                                              | 290                          | 593 .1416 <sup>(6)</sup> |
|                            |           |                                | 370                               | 25.0     | 33.0                                            | 2500                                                                              | 540                          | 594 .1416 <sup>(6)</sup> |
|                            |           |                                | 370                               | 50.0     | 57.0                                            | 4500                                                                              | 950                          | 595 .1416 <sup>(6)</sup> |
|                            |           |                                | 360                               | 100.0    | 124.0                                           | 6500                                                                              | 1900                         | 596 .1416                |
| 150                        | 200       | 240                            | 395                               | 5.0      | 7.1                                             | 400                                                                               | 110                          | 592 .1516 <sup>(6)</sup> |
|                            |           |                                | 400                               | 10.0     | 20.0                                            | 1200                                                                              | 270                          | 593 .1516 <sup>(6)</sup> |
|                            |           |                                | 400                               | 25.0     | 36.0                                            | 2500                                                                              | 490                          | 594 .1516 <sup>(6)</sup> |
|                            |           |                                | 400                               | 50.0     | 59.0                                            | 4500                                                                              | 850                          | 595 .1516 <sup>(6)</sup> |
|                            |           |                                | 395                               | 100.0    | 134.0                                           | 6500                                                                              | 1700                         | 596 .1516                |
| 175                        | 225       | 275                            | 410                               | 5.0      | 7.3                                             | 400                                                                               | 90                           | 592 .1716 <sup>(6)</sup> |
|                            |           |                                | 455                               | 10.0     | 23.0                                            | 1200                                                                              | 230                          | 593 .1716 <sup>(6)</sup> |
|                            |           |                                | 455                               | 25.0     | 41.0                                            | 2500                                                                              | 430                          | 594 .1716 <sup>(6)</sup> |
|                            |           |                                | 455                               | 50.0     | 67.0                                            | 4500                                                                              | 750                          | 595 .1716 <sup>(6)</sup> |
|                            |           |                                | 455                               | 100.0    | 158.0                                           | 6500                                                                              | 1500                         | 596 .1716                |
| 230                        | 300       | 360                            | 560                               | 5.0      | 10.0                                            | 400                                                                               | 70                           | 592 .2316 <sup>(6)</sup> |
|                            |           |                                | 600                               | 10.0     | 30.0                                            | 1200                                                                              | 170                          | 593 .2316 <sup>(6)</sup> |
|                            |           |                                | 600                               | 25.0     | 54.0                                            | 2500                                                                              | 320                          | 594 .2316 <sup>(6)</sup> |
|                            |           |                                | 600                               | 50.0     | 88.0                                            | 4500                                                                              | 540                          | 595 .2316 <sup>(6)</sup> |
|                            |           |                                | 595                               | 100.0    | 208.0                                           | 6500                                                                              | 1100                         | 596 .2316                |

## ELECTRICAL DATA AND ORDERING INFORMATION

| MAXIMUM CONTINUOUS VOLTAGE |        | VOLTAGE <sup>(3)</sup> at 1 mA | MAXIMUM VOLTAGE at STATED CURRENT |       | MAXIMUM ENERGY <sup>(4)</sup> (10 × 1000 µs) | MAXIMUM NON-REP. TRANSIENT CURRENT <sup>(5)</sup> I <sub>nrp</sub> (8 × 20 µs) | TYPICAL CAPACITANCE at 1 kHz | CATALOG NUMBERS <sup>(1)</sup> |
|----------------------------|--------|--------------------------------|-----------------------------------|-------|----------------------------------------------|--------------------------------------------------------------------------------|------------------------------|--------------------------------|
| RMS <sup>(2)</sup> (V)     | DC (V) | (V)                            | V (V)                             | I (A) | (J)                                          | (A)                                                                            | (PF)                         | 2322 ... ..                    |
| 250                        | 320    | 390                            | 600                               | 5.0   | 11.0                                         | 400                                                                            | 60                           | 592 .2516(6)                   |
|                            |        |                                | 650                               | 10.0  | 33.0                                         | 1200                                                                           | 160                          | 593 .2516(6)                   |
|                            |        |                                | 650                               | 25.0  | 58.0                                         | 2500                                                                           | 300                          | 594 .2516(6)                   |
|                            |        |                                | 650                               | 50.0  | 96.0                                         | 4500                                                                           | 480                          | 595 .2516(6)                   |
|                            |        |                                | 650                               | 100.0 | 240.0                                        | 6500                                                                           | 960                          | 596 .2516                      |
| 275                        | 350    | 430                            | 695                               | 5.0   | 12.0                                         | 400                                                                            | 55                           | 592 .2716(6)                   |
|                            |        |                                | 710                               | 10.0  | 36.0                                         | 1200                                                                           | 140                          | 593 .2716(6)                   |
|                            |        |                                | 710                               | 25.0  | 63.0                                         | 2500                                                                           | 270                          | 594 .2716(6)                   |
|                            |        |                                | 710                               | 50.0  | 104.0                                        | 4500                                                                           | 440                          | 595 .2716(6)                   |
|                            |        |                                | 710                               | 100.0 | 264.0                                        | 6500                                                                           | 900                          | 596 .2716                      |
| 300                        | 385    | 470                            | 750                               | 5.0   | 13.0                                         | 400                                                                            | 50                           | 592 .3016(6)                   |
|                            |        |                                | 800                               | 10.0  | 40.0                                         | 1200                                                                           | 130                          | 593 .3016(6)                   |
|                            |        |                                | 800                               | 25.0  | 71.0                                         | 2500                                                                           | 240                          | 594 .3016(6)                   |
|                            |        |                                | 800                               | 50.0  | 117.0                                        | 4500                                                                           | 400                          | 595 .3016(6)                   |
|                            |        |                                | 775                               | 100.0 | 280.0                                        | 6500                                                                           | 810                          | 596 .3016                      |
| 320                        | 420    | 510                            | 800                               | 5.0   | 15.0                                         | 400                                                                            | 45                           | 592 .3216(6)                   |
|                            |        |                                | 850                               | 10.0  | 44.0                                         | 1200                                                                           | 120                          | 593 .3216(6)                   |
|                            |        |                                | 850                               | 25.0  | 77.0                                         | 2500                                                                           | 220                          | 594 .3216(6)                   |
|                            |        |                                | 850                               | 50.0  | 120.0                                        | 4500                                                                           | 370                          | 595 .3216(6)                   |
|                            |        |                                | 842                               | 100.0 | 296.0                                        | 6500                                                                           | 750                          | 596 .3216                      |
| 385                        | 505    | 620                            | 1000                              | 5.0   | 18.0                                         | 400                                                                            | 40                           | 592 .3816(6)                   |
|                            |        |                                | 1025                              | 10.0  | 51.0                                         | 1200                                                                           | 95                           | 593 .3816(6)                   |
|                            |        |                                | 1025                              | 25.0  | 67.0                                         | 2500                                                                           | 180                          | 594 .3816(6)                   |
|                            |        |                                | 1025                              | 50.0  | 110.0                                        | 4500                                                                           | 280                          | 595 .3816(6)                   |
|                            |        |                                | 1025                              | 100.0 | 328.0                                        | 6500                                                                           | 570                          | 596 .3816                      |
| 420                        | 560    | 680                            | 1100                              | 5.0   | 20.0                                         | 400                                                                            | 35                           | 592 .4216(6)                   |
|                            |        |                                | 1120                              | 10.0  | 56.0                                         | 1200                                                                           | 85                           | 593 .4216(6)                   |
|                            |        |                                | 1120                              | 25.0  | 73.0                                         | 2500                                                                           | 165                          | 594 .4216(6)                   |
|                            |        |                                | 1120                              | 50.0  | 120.0                                        | 4500                                                                           | 250                          | 595 .4216(6)                   |
|                            |        |                                | 1120                              | 100.0 | 344.0                                        | 6500                                                                           | 510                          | 596 .4216                      |
| 460                        | 615    | 750                            | 1200                              | 5.0   | 21.0                                         | 400                                                                            | 30                           | 592 .4616(6)                   |
|                            |        |                                | 1240                              | 10.0  | 63.0                                         | 1200                                                                           | 75                           | 593 .4616(6)                   |
|                            |        |                                | 1240                              | 25.0  | 82.0                                         | 2500                                                                           | 150                          | 594 .4616(6)                   |
|                            |        |                                | 1240                              | 50.0  | 135.0                                        | 4500                                                                           | 225                          | 595 .4616(6)                   |
|                            |        |                                | 1240                              | 100.0 | 360.0                                        | 6500                                                                           | 460                          | 596 .4616                      |
| 510                        | 670    | 820                            | 1355                              | 25.0  | 89.0                                         | 2500                                                                           | 135                          | 594 .5116(6)                   |
|                            |        |                                | 1355                              | 50.0  | 145.0                                        | 4500                                                                           | 220                          | 595 .5116(6)                   |
|                            |        |                                | 1355                              | 100.0 | 376.0                                        | 6500                                                                           | 450                          | 596 .5116                      |
|                            |        |                                | 1500                              | 25.0  | 98.0                                         | 2500                                                                           | 120                          | 594 .5516(6)                   |
| 550                        | 745    | 910                            | 1500                              | 50.0  | 160.0                                        | 4500                                                                           | 180                          | 595 .5516(6)                   |
|                            |        |                                | 1500                              | 100.0 | 408.0                                        | 6500                                                                           | 370                          | 596 .5516                      |
|                            |        |                                | 1650                              | 100.0 | 448.0                                        | 6500                                                                           | 320                          | 596 .6216                      |
| 625                        | 825    | 1000                           | 1815                              | 100.0 | 496.0                                        | 6500                                                                           | 270                          | 596 .6816                      |
| 680                        | 895    | 1100                           | 1815                              | 100.0 | 496.0                                        | 6500                                                                           | 270                          | 596 .6816                      |

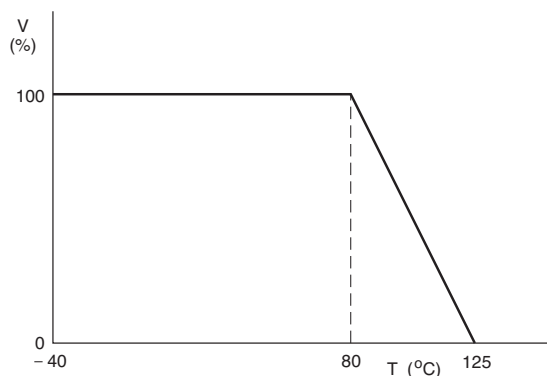
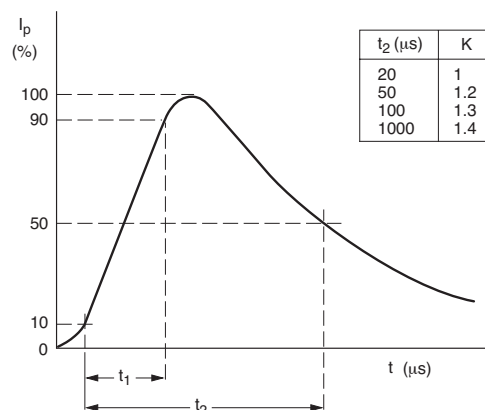
## Notes

- Lists with products certified according to UL (E98144), VDE (122380E), CSA (219883) and CECC (42201-001) are available at [www.vishay.com](http://www.vishay.com) or on request.
- The sinusoidal voltage is assumed as the normal operating condition. If a non-sinusoidal voltage is present, type selection should be based on multiplying the peak voltage by a factor of 0.707.
- The voltage measured at 1 mA meets the requirements of "paragraph 4.3 of CECC specification 42000". The tolerance on the voltage at 1 mA is ±10%.
- High energy surges are generally of longer duration. The maximum energy for one pulse of 10 × 1000 µs is given as a reference for longer duration pulses. This pulse can be characterised by peak current (I<sub>p</sub>) and pulse width t<sub>2</sub> (virtual time of half I<sub>p</sub> value, following "IEC 60060-2, section 6"). If V<sub>p</sub> is the clamping voltage corresponding to I<sub>p</sub>, the energy absorbed in the varistor is determined by the formula:  

$$E = K \times V_p \times I_p \times t_2$$
 where:  
 a) K is dependent on the value of t<sub>2</sub> when the value of t<sub>1</sub> is between 8 µs and 10 µs; see Peak Current as a Function of Pulse Width drawing.
- A current wave of 8 × 20 µs (requirement of "paragraph B.2.10.1 of CECC specification 42000") is used as a standard for pulse current and clamping voltage ratings. The maximum non-repetitive transient current is given for one pulse applied during the life of the component.
- Replace the last digit of the catalog number with a '7' for ordering on tape in ammpack.

**ELECTRICAL CHARACTERISTICS**

| <b>ELECTRICAL DATA</b>                                                          |              |      |
|---------------------------------------------------------------------------------|--------------|------|
| PARAMETER                                                                       | VALUE        | UNIT |
| Maximum continuous voltage:                                                     |              |      |
| RMS                                                                             | 14 to 680    | V    |
| DC                                                                              | 18 to 895    | V    |
| Maximum non-repetitive transient current ( $I_{nrp}$ ) ( $8 \times 20 \mu s$ ): |              |      |
| 2322 592 ....                                                                   | 100 or 400   | A    |
| 2322 593 ....                                                                   | 250 or 1200  | A    |
| 2322 594 ....                                                                   | 500 or 2500  | A    |
| 2322 595 ....                                                                   | 1000 or 4500 | A    |
| 2322 596 ....                                                                   | 6500         | A    |
| Thermal resistance:                                                             |              |      |
| 2322 592 ....                                                                   | $\approx 80$ | K/W  |
| 2322 593 ....                                                                   | $\approx 70$ | K/W  |
| 2322 594 ....                                                                   | $\approx 60$ | K/W  |
| 2322 595 ....                                                                   | $\approx 50$ | K/W  |
| 2322 596 ....                                                                   | $\approx 40$ | K/W  |
| Maximum dissipation:                                                            |              |      |
| 2322 592 ....                                                                   | 100          | mW   |
| 2322 593 ....                                                                   | 250          | mW   |
| 2322 594 ....                                                                   | 400          | mW   |
| 2322 595 ....                                                                   | 600          | mW   |
| 2322 596 ....                                                                   | 1000         | mW   |
| Temperature coefficient of voltage at 1 mA maximum                              | -0.065       | %/K  |
| Voltage proof between interconnected leads and case                             | 2500         | V    |
| Climatic category                                                               | 40/085/56    |      |

**DERATING CURVE****PEAK CURRENT AS A FUNCTION OF PULSE WIDTH**

**VARISTORS IN BULK**

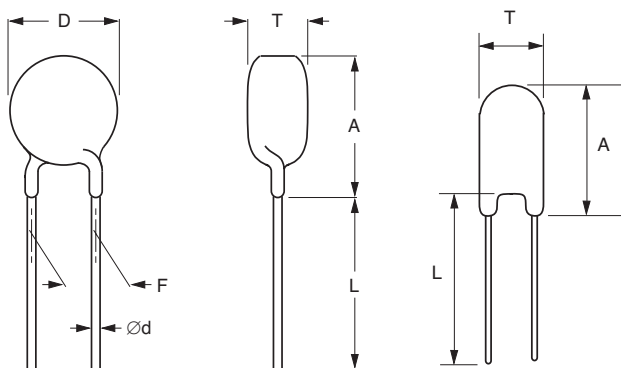
| TYPE                                                                             | 2322 592 .....<br>Ø5 mm<br>14 V to 460 V | 2322 593 .....<br>Ø7 mm<br>14 V to 460 V | 2322 594 .....<br>Ø10 mm<br>14 V to 550 V | 2322 595 .....<br>Ø14 mm<br>14 V to 550 V | 2322 596 .....<br>Ø20 mm<br>60 V to 680 V |
|----------------------------------------------------------------------------------|------------------------------------------|------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
| Straight leads; see Outline of components with straight leads drawing(1)         | 5...6                                    | 5...6                                    | 5...6                                     | 5...6                                     | 5...6                                     |
| Straight leads with flange; see Outline of components with flanged leads drawing | 7...6                                    | 7...6                                    | –                                         | –                                         | –                                         |
| Kinked leads; see Outline of components with kinked leads drawing                | 6...6                                    | 6...6                                    | 6...6                                     | 6...6                                     | 6...6                                     |
| <b>Package quantities</b>                                                        | 250                                      | 250                                      | 250                                       | 100 and 250                               | 1 000                                     |

**Note**

1. Outline of the Ø20 mm differs from the other dimensions.

**DIMENSIONS** in millimeters

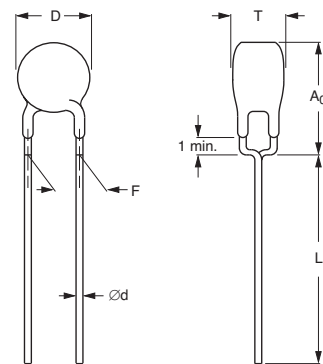
Outline of component with straight leads.



For dimensions, see Component Dimensions and catalog Numbers table.

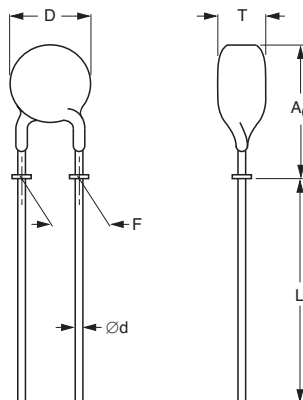
Ø20 mm only.

Outline of component with kinked leads.



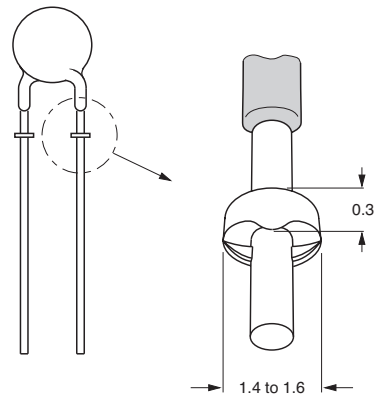
For dimensions, see Component Dimensions and catalog Numbers table.

Outline of component with flanged leads.



For dimensions, see Component Dimensions and catalog Numbers table.

Outline of flanged leads.

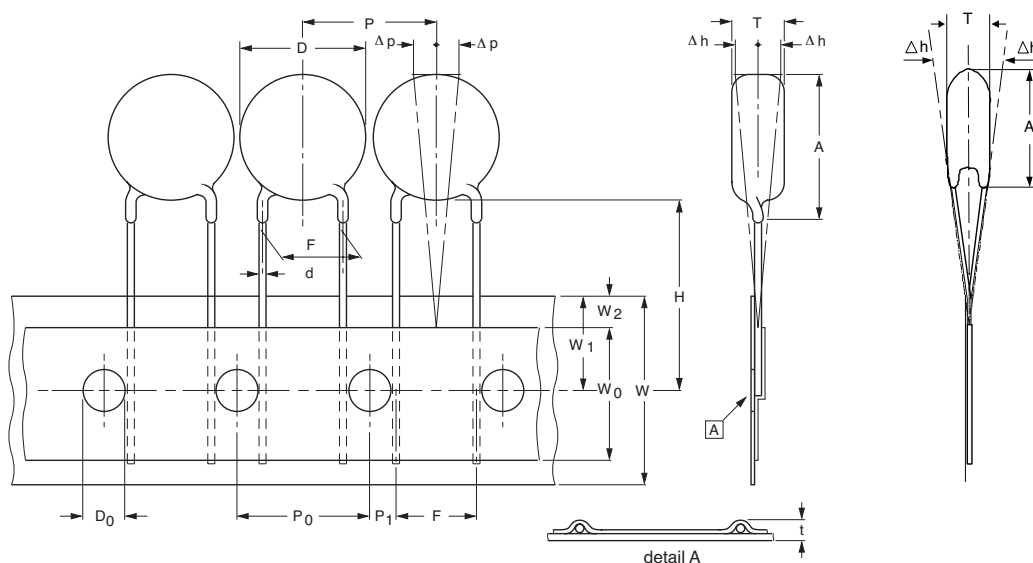
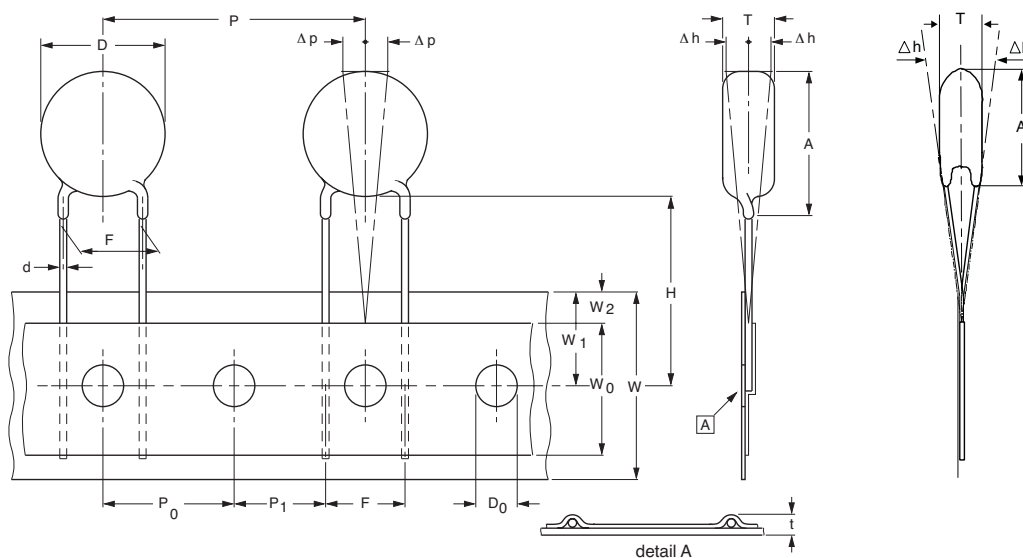


**COMPONENT DIMENSIONS AND CATALOG NUMBERS** in millimeters

| D<br>MAX. | A<br>MAX. | A <sub>0</sub><br>MAX. | L<br>MIN. | T<br>MAX. | T<br>MIN. | ØD        | F           | CATALOG NUMBER |
|-----------|-----------|------------------------|-----------|-----------|-----------|-----------|-------------|----------------|
| 7.0       | 9.0       | 11.0                   | 27.0      | 6         | 4.1       | 0.6 ±0.05 | 5 +0.6/-0.1 | 2322 592 ..... |
| 9.0       | 11.0      | 13.0                   | 27.0      | 6         | 4.1       | 0.6 ±0.05 | 5 +0.6/-0.1 | 2322 593 ..... |
| 13.5      | 15.5      | 18.0                   | 17.0      | 7         | 4.4       | 0.8 ±0.05 | 7.5 ±0.8    | 2322 594 ..... |
| 17.0      | 19.0      | 23.0                   | 16.0      | 7         | 4.4       | 0.8 ±0.05 | 7.5 ±0.8    | 2322 595 ..... |
| 23.0      | 25.0      | 28.0                   | 24.0      | 7         | 5.0       | 1.0 ±0.05 | 10 ±0.8     | 2322 596 ..... |

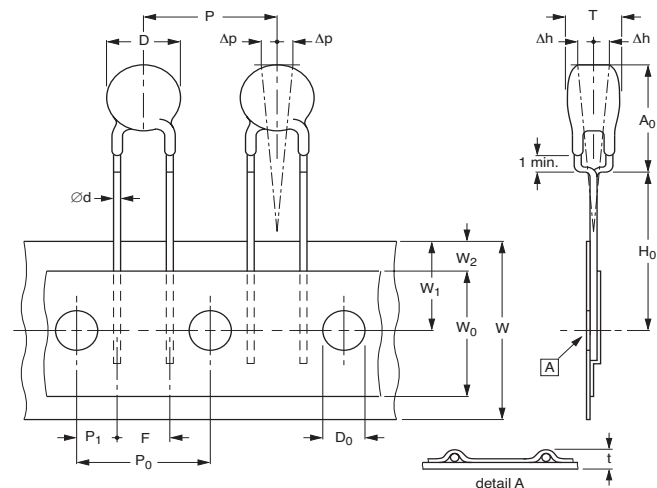
**VARISTORS ON TAPE ON REEL**

| TYPE                                                                                                                                        | 2322 592 .....<br>Ø5 mm<br>14 V to 460 V | 2322 593 .....<br>Ø7 mm<br>14V to 460 V | 2322 594 .....<br>Ø10 mm<br>14 V to 550 V | 2322 595 .....<br>Ø14 mm<br>14V to 460 V |
|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------------|-------------------------------------------|------------------------------------------|
| Straight leads:                                                                                                                             |                                          |                                         |                                           |                                          |
| H = 18 mm (2322 594 and 2322 595); see Taped version with straight leads (only for 2322 594 and 2322 595 series) drawing                    | —                                        | —                                       | 0...6                                     | 0...6                                    |
| H = 20 mm (2322 592 and 2322 593); see Taped version with straight leads (only for 2322 592 and 2322 593 series) drawing                    | 0...6                                    | 0...6                                   | —                                         | —                                        |
| Straight leads with flange; H <sub>0</sub> = 16 mm; see Taped version with flanged leads (only for 2322 592 and 2322 593 series) drawing    | 1...6                                    | 1...6                                   | —                                         | —                                        |
| Straight leads with flange; H <sub>0</sub> = 18.25 mm; see Taped version with flanged leads (only for 2322 592 and 2322 593 series) drawing | 2...6                                    | 2...6                                   | —                                         | —                                        |
| Kinked leads; H <sub>0</sub> = 18.25 mm; see Taped version with kinked leads (only for 2322 594 and 2322 595 series) drawing                | 3...6                                    | 3...6                                   | 3...6                                     | 3...6                                    |
| Kinked leads; H <sub>0</sub> = 16 mm; see Taped version with kinked leads (only for 2322 592 and 2322 593 series) drawing                   | 8...6                                    | 8...6                                   | 8...6                                     | 8...6                                    |
| <b>Package quantities</b>                                                                                                                   |                                          |                                         |                                           |                                          |
| 14 V to 385 V                                                                                                                               | 3000                                     | 3000                                    | 1500                                      | 1500                                     |
| ≥420 V                                                                                                                                      | —                                        | —                                       | —                                         | 1000                                     |
| 510 V to 550 V                                                                                                                              | —                                        | —                                       | 1200                                      | 1200                                     |

**PACKAGING****TAPED VERSION WITH STRAIGHT LEADS** (only for 2322 592 and 2322 593 series).**TAPED VERSION WITH STRAIGHT LEADS** (only for 2322 594 and 2322 595 series).

**TAPED VERSION WITH KINKED LEADS**

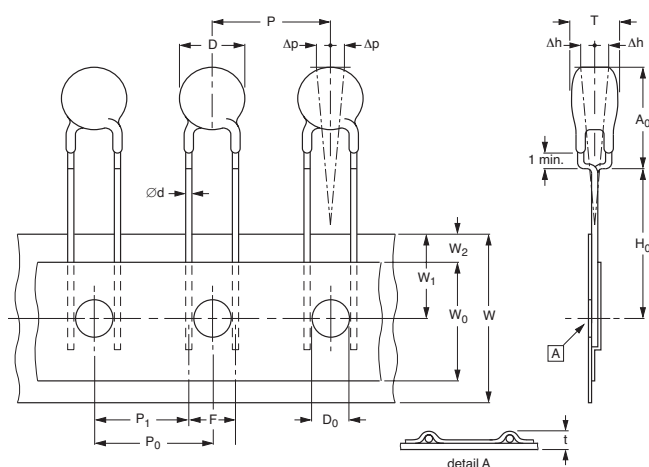
(only for 2322 592 and 2322 593 series).



For dimensions, see Taping data table.

**TAPED VERSION WITH KINKED LEADS**

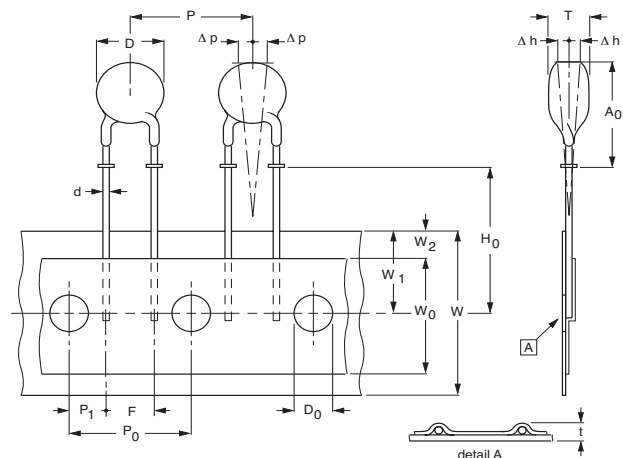
(only for 2322 594 and 2322 595 series).



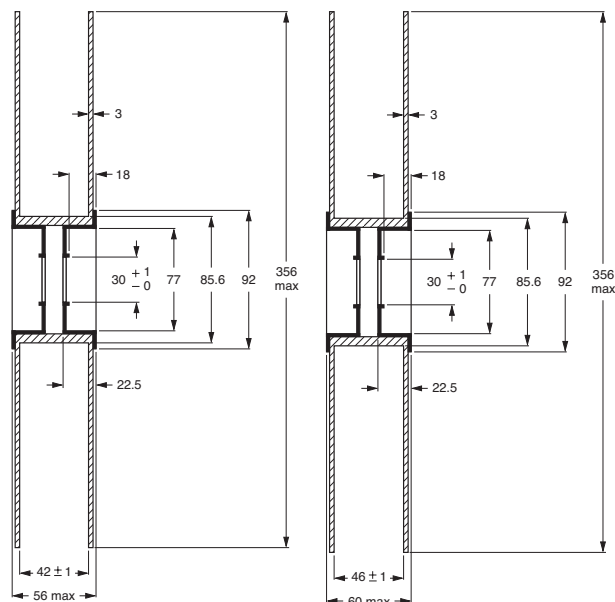
For dimensions, see Taping data table.

**TAPED VERSION WITH FLANGED LEADS**

(only for 2322 592 and 2322 593 series).



For dimensions, see Taping data table.

**DIMENSIONS OF REELS** in millimeters


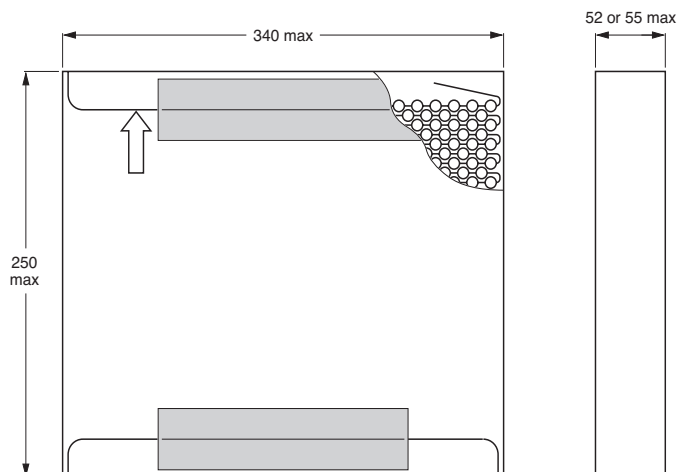
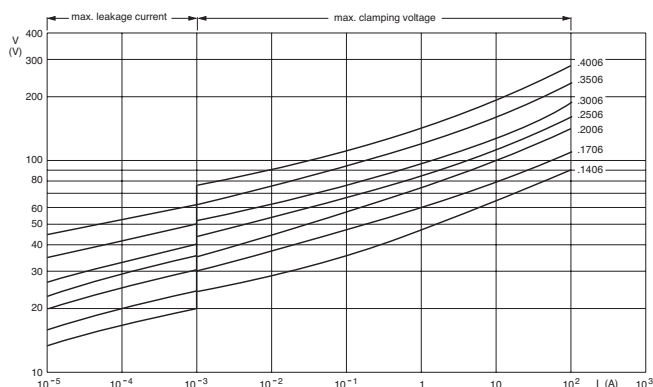
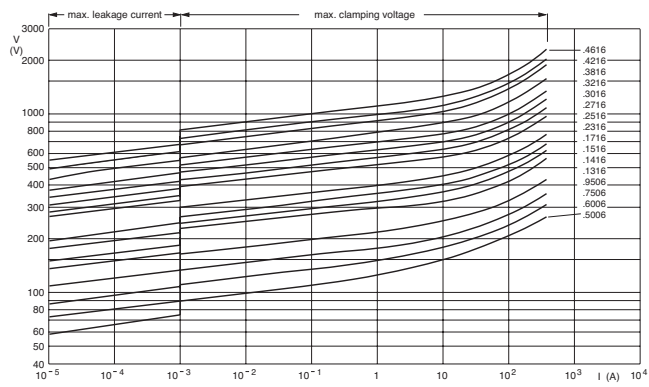
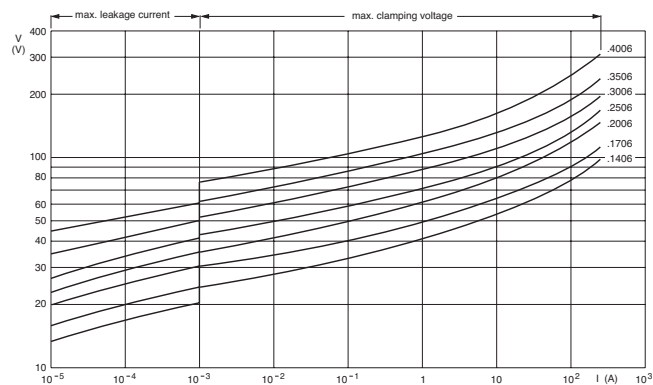
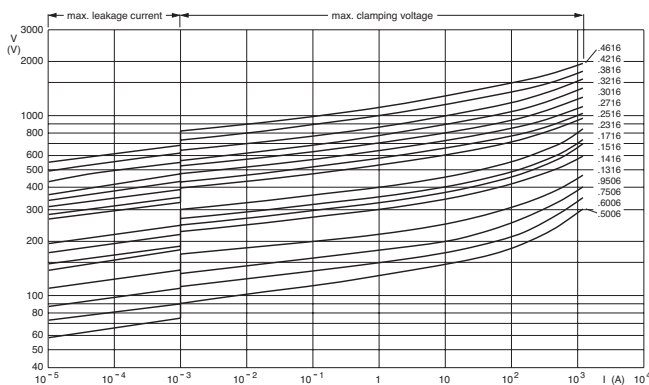


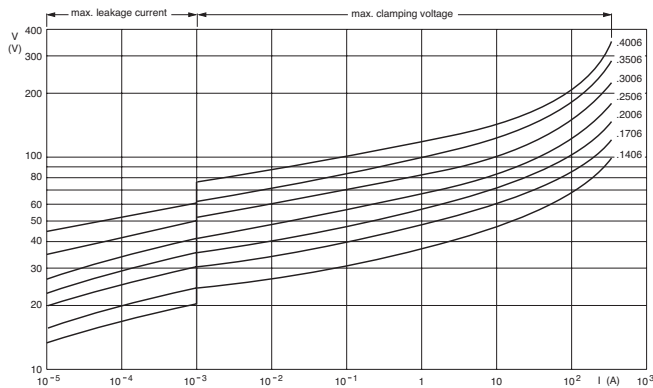
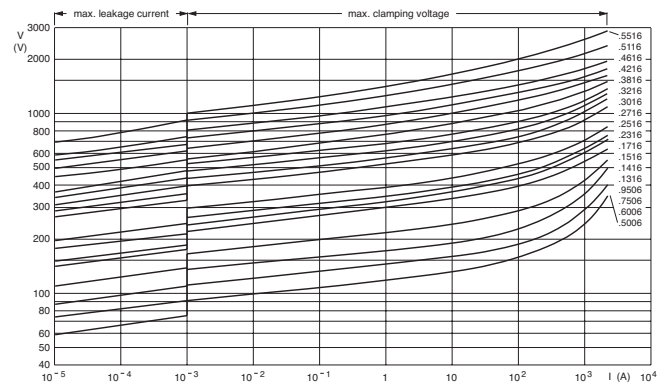
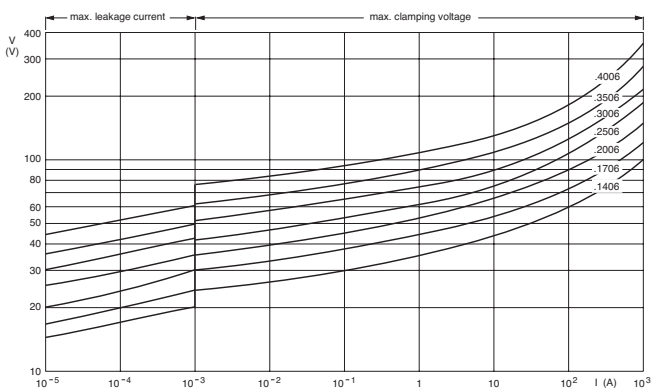
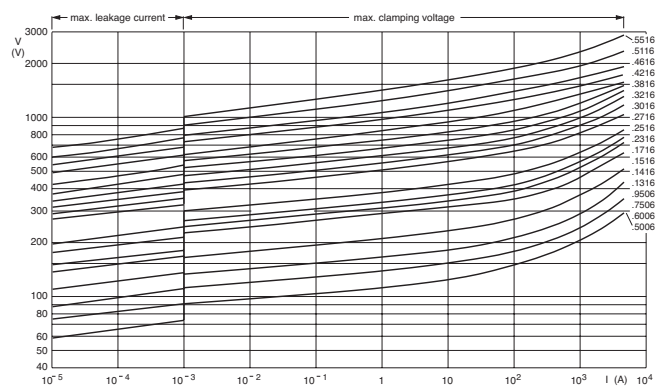
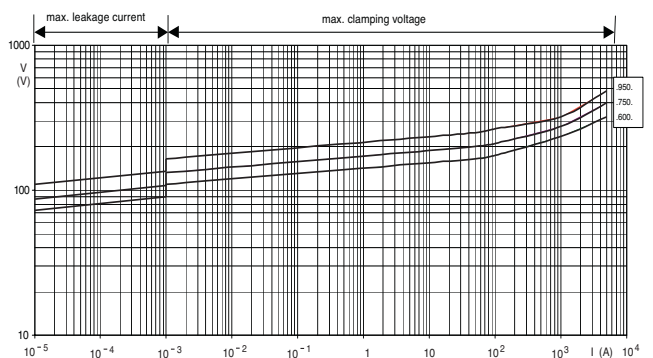
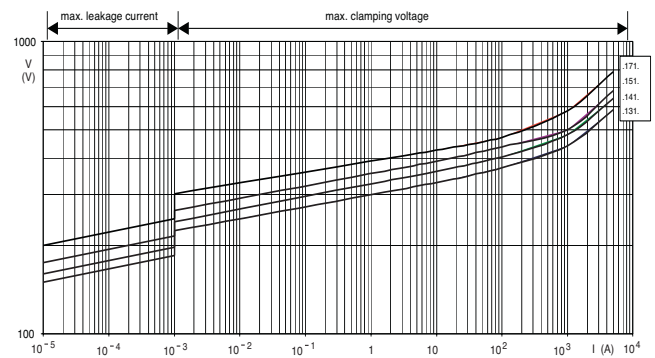
**TAPING DATA** (based on "IEC 60286-2")

| SYMBOL             | PARAMETER                                | DIMENSIONS<br>NOMINAL (mm)     | TOLERANCE<br>(mm) | REMARKS                                     |
|--------------------|------------------------------------------|--------------------------------|-------------------|---------------------------------------------|
| D                  | body diameter                            | see Component Dimensions table |                   |                                             |
| T                  | total thickness                          | see Component Dimensions table |                   |                                             |
| A <sub>0</sub> ; A | mounting height                          | see Component Dimensions table |                   |                                             |
| Ød                 | lead diameter                            | see Component Dimensions table |                   |                                             |
| F                  | lead to lead distance                    | see Component Dimensions table |                   | guaranteed between component and tape       |
| P                  | component pitch                          | 12.7 or 25.4                   | ±1.0              |                                             |
| P <sub>0</sub>     | feed hole pitch                          | 12.7                           | ±0.3              | cumulative pitch error ±1                   |
| P <sub>1</sub>     | feed hole centre to lead centre          | 3.85 or 8.95                   | ±0.7              | guaranteed between component and tape       |
| Δp                 | component alignment                      | 0.0                            | ±1.3              |                                             |
| Δh                 | component alignment                      | 0.0                            | ±2.0              |                                             |
| W                  | tape width                               | 18.0                           | +1.0/-0.5         |                                             |
| W <sub>0</sub>     | hold down tape width                     | ≥12.5                          |                   |                                             |
| W <sub>1</sub>     | hole position                            | 9.0                            | ±0.5              |                                             |
| W <sub>2</sub>     | hold down tape position                  | ≤3.0                           |                   |                                             |
| H                  | height between component and tape centre | 18.0                           | +2.0/-0.0         | straight lead version 2322 594 and 2322 595 |
|                    |                                          | 20.0                           | +2.0/-0.0         | straight lead version 2322 592 and 2322 593 |
| H <sub>0</sub>     | lead-wire flange height                  | 16.0 or 18.25                  | ±0.5              | flanged and kinked lead versions            |
| D <sub>0</sub>     | feed hole diameter                       | 4.0                            | ±0.2              |                                             |
| t                  | total tape thickness                     | ≤1.4                           |                   | with cardboard tape 0.5 ±0.1 mm             |

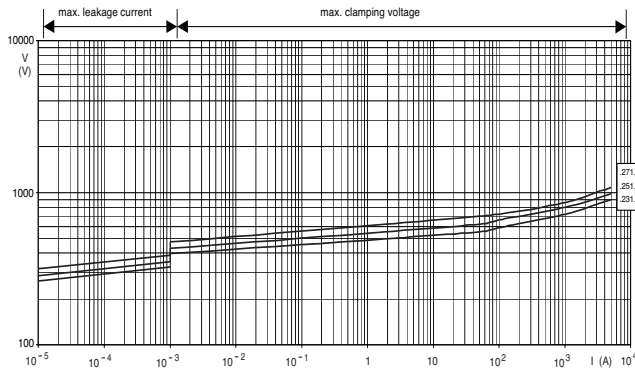
**VARISTORS ON TAPE IN AMMOPACK**

| TYPE                                                                                                                                                                                                     | 2322 592 .....<br>ØMM<br>14 V TO 460 V | 2322 593 .....<br>Ø7 MM<br>14 V TO 460 V | 2322 594 .....<br>Ø10 MM<br>14 V TO 550 V | 2322 595 .....<br>Ø14 MM<br>14V TO 550 V |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|------------------------------------------|-------------------------------------------|------------------------------------------|
| Straight leads;<br>H = 18 or 20 mm; see Taped version with straight leads (only for 2322 592 and 2322 593 series) and Taped version with straight leads (only for 2322 594 and 2322 595 series) drawings | 0...7                                  | 0...7                                    | 0...7                                     | 0...7                                    |
| Straight leads with flange;<br>H <sub>0</sub> = 16 mm; see Taped version with flanged leads (only for 2322 592 and 2322 593 series) drawing                                                              | 1...7                                  | 1...7                                    | –                                         | –                                        |
| Straight leads with flange;<br>H <sub>0</sub> = 18.25 mm; see Taped version with flanged leads (only for 2322 592 and 2322 593 series) drawing                                                           | 2...7                                  | 2...7                                    | –                                         | –                                        |
| Kinked leads;<br>H <sub>0</sub> = 18.25 mm; see Taped version with kinked leads (only for 2322 594 and 2322 595 series) drawing                                                                          | 3...7                                  | 3...7                                    | 3...7                                     | 3...7                                    |
| Kinked leads;<br>H <sub>0</sub> = 16 mm; see Taped version with kinked leads (only for 2322 592 and 2322 593 series) drawing                                                                             | 8...7                                  | 8...7                                    | 8...7                                     | 8...7                                    |
| Package quantities                                                                                                                                                                                       |                                        |                                          |                                           |                                          |
| 14 to 175 V                                                                                                                                                                                              | 1500                                   | 1500                                     | 750                                       | 750                                      |
| 230 to 460 V                                                                                                                                                                                             | 1000                                   | 1000                                     | –                                         | –                                        |
| 230 to 300 V                                                                                                                                                                                             | –                                      | –                                        | 600                                       | 600                                      |
| 320 to 550 V                                                                                                                                                                                             | –                                      | –                                        | 500                                       | 500                                      |

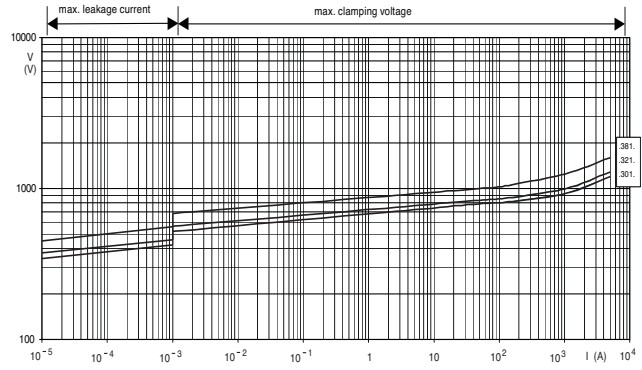
**DIMENSIONS OF AMMOPACK** in millimeters

**V/I CHARACTERISTICS, 14 V TO 40 V (RMS);**  
2322 592 series.

**V/I CHARACTERISTICS, 50V TO 460 V (RMS);**  
2322 592 series.

**V/I CHARACTERISTICS, 14V TO 40 V (RMS);**  
2322 593 series.

**V/I CHARACTERISTICS, 50V TO 460 V (RMS);**  
2322 593 series.


**V/I CHARACTERISTICS, 14V TO 40 V (RMS);**  
 2322 594 series.

**V/I CHARACTERISTICS, 50V TO 550V (RMS);**  
 2322 594 series.

**V/I CHARACTERISTICS, 14V TO 40V (RMS);**  
 2322 595 series.

**V/I CHARACTERISTICS, 50V TO 550V (RMS);**  
 2322 595 series.

**V/I CHARACTERISTICS, 60V TO 95V (RMS);**  
 2322 596 series.

**V/I CHARACTERISTICS, 130V TO 175V (RMS);**  
 2322 596 series.


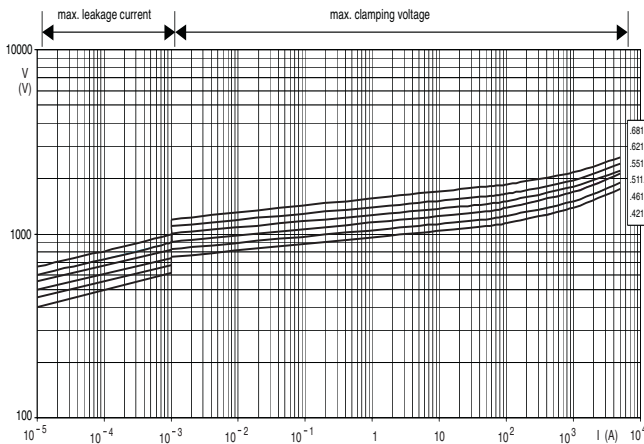
**V/I CHARACTERISTICS, 230V TO 275V (RMS);**  
2322 596 series.



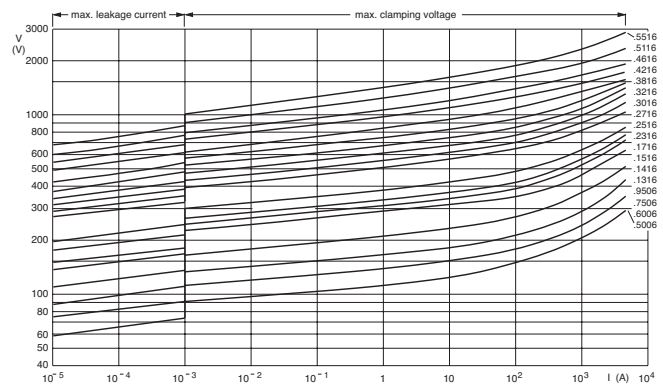
**V/I CHARACTERISTICS, 300V TO 385V (RMS);**  
2322 596 series.



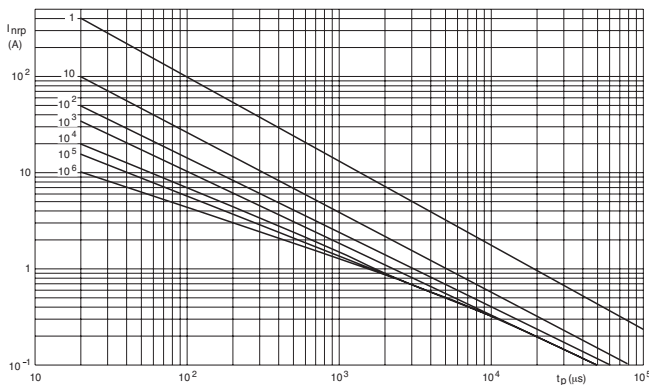
**V/I CHARACTERISTICS, 420V TO 680V (RMS);**  
2322 596 series.



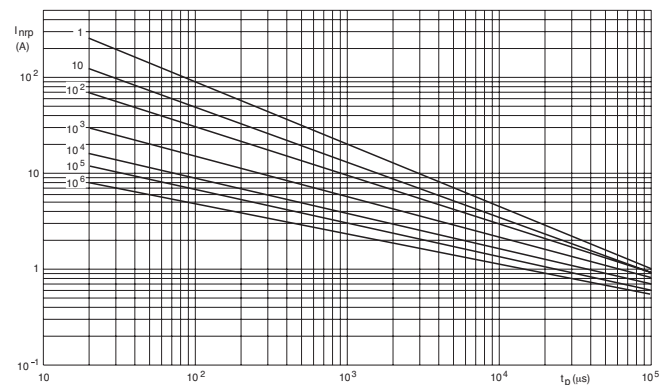
**MAXIMUM APPLICABLE TRANSIENT CURRENT AS A FUNCTION OF PULSE DURATION, 14V TO 40V (RMS);** 2322 592 series.



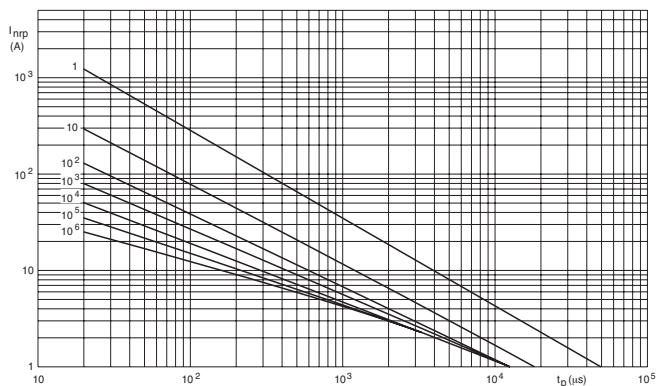
**MAXIMUM APPLICABLE TRANSIENT CURRENT AS A FUNCTION OF PULSE DURATION, 50V TO 460V (RMS);** 2322 592 series.



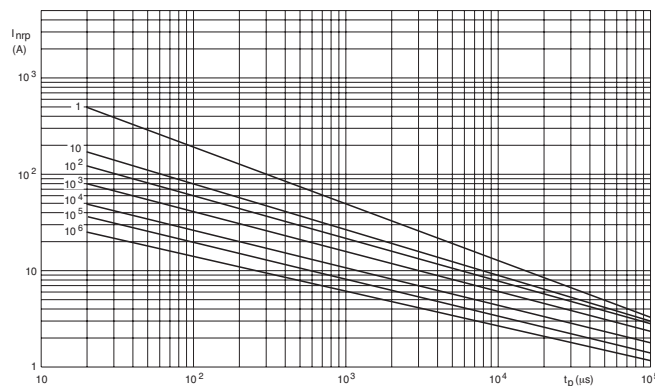
**MAXIMUM APPLICABLE TRANSIENT CURRENT AS A FUNCTION OF PULSE DURATION, 14V TO 40V (RMS);** 2322 593 series.



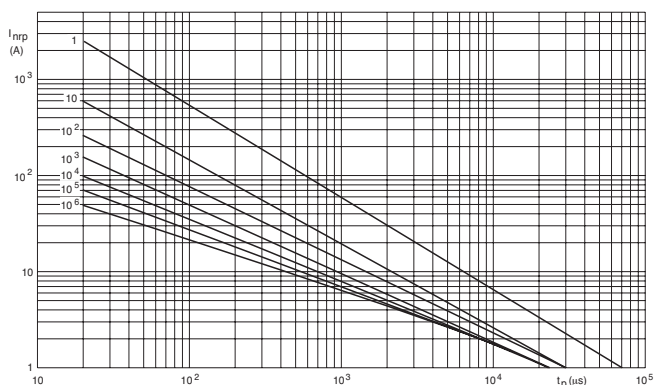
**MAXIMUM APPLICABLE TRANSIENT  
CURRENT AS A FUNCTION OF PULSE  
DURATION, 50V TO 460V (RMS); 2322 593 series.**



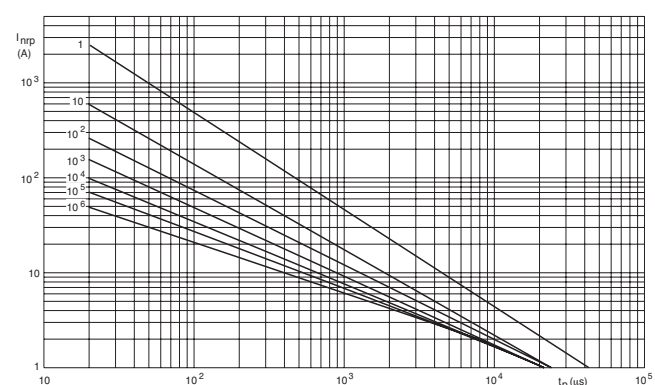
**MAXIMUM APPLICABLE TRANSIENT  
CURRENT AS A FUNCTION OF PULSE  
DURATION, 14V TO 40V (RMS); 2322 594 series.**



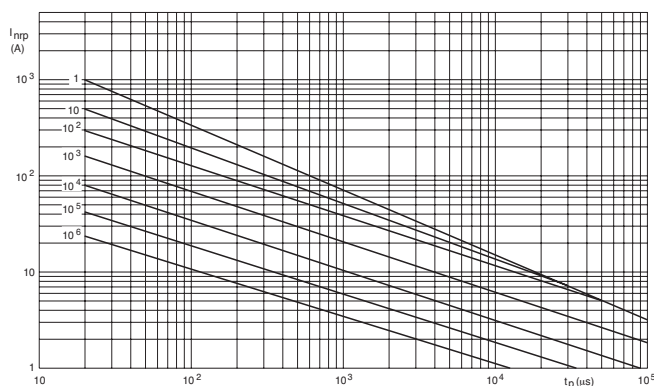
**MAXIMUM APPLICABLE TRANSIENT  
CURRENT AS A FUNCTION OF PULSE  
DURATION, 50V TO 320V (RMS); 2322 594 series.**



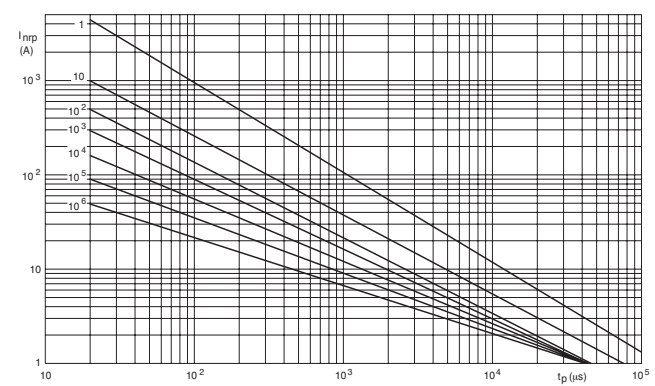
**MAXIMUM APPLICABLE TRANSIENT  
CURRENT AS A FUNCTION OF PULSE  
DURATION, 385V TO 550V (RMS); 2322 594 series.**



**MAXIMUM APPLICABLE TRANSIENT  
CURRENT AS A FUNCTION OF PULSE  
DURATION, 14V TO 40V (RMS); 2322 595 series.**

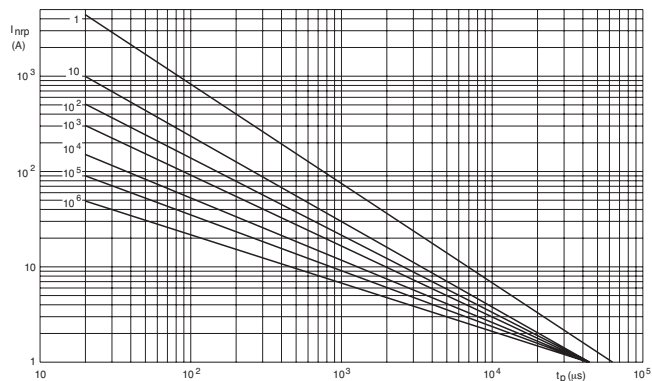


**MAXIMUM APPLICABLE TRANSIENT  
CURRENT AS A FUNCTION OF PULSE  
DURATION, 50V TO 320V (RMS); 2322 595 series.**

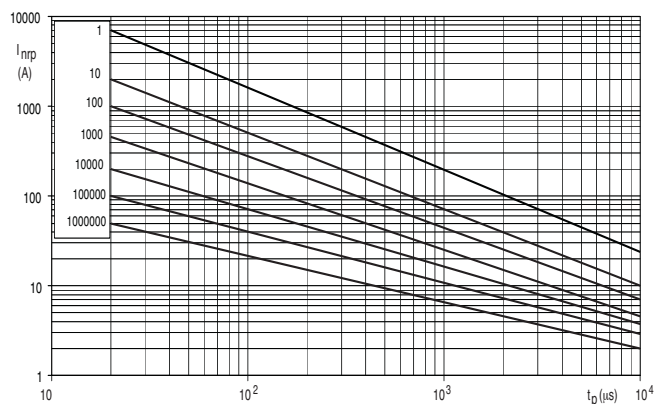




**MAXIMUM APPLICABLE TRANSIENT  
CURRENT AS A FUNCTION OF PULSE  
DURATION, 385V TO 550V (RMS); 2322 595 series.**



**MAXIMUM APPLICABLE TRANSIENT  
CURRENT AS A FUNCTION OF PULSE  
DURATION, 60V TO 300V (RMS); 2322 596 series.**



**MAXIMUM APPLICABLE TRANSIENT  
CURRENT AS A FUNCTION OF PULSE  
DURATION, 320V TO 680V (RMS); 2322 596 series.**

