

## VDR Metal Oxide Varistors Standard



| QUICK REFERENCE DATA  |   |      |
|---|---|------|
| PARAMETER   | VALUE   | UNIT |
| Maximum continuous voltage in operating temperature range:          |   |      |
| RMS   | 14 to 680   | V    |
| DC  | 18 to 895   | V    |
| Maximum non-repetitive transient current $I_{NRP}$ (8 x 20 $\mu$ s) | 100 to 6500   | A    |
| Maximum energy (10/1000 $\mu$ s)                                    | 0.5 to 496  | J    |
| Detailed specification  | Based on<br>IEC 61051-1<br>IEC 61051-2<br>IEC 61051-2-2 |      |
| Storage temperature   | -40 to +125   | °C   |
| Operating temperature   | -40 to +85  | °C   |

### ORDERING INFORMATION

The varistors are available in a number of packaging options:

- Bulk
- On tape and 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.

#### Note

- Special lead-configuration as inside or outside crimped leads on request.

### FEATURES

- Low  $\beta$  high purity zinc oxide disc
- Halogen free insulating epoxy coating
- Zinc oxide disc, HF epoxy coated
- Straight leads and kinked leads
- Straight leads with flange (VDRS05 and VDRS07 only)
- Certified according to UL 1449 edition 3, VDE/IEC 61051-1/2 and CSA
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATION

- Overvoltage and transient voltage protection

### DESCRIPTION

The varistors consist of a disc of low- $\beta$  ZnO ceramic material with two solid copper leads (S20 types only) or copper clad steel wire. The wires have a matte tin plating. They are coated with a layer of ochre colored halogen-free 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.

#### Typical soldering

235 °C, duration: 5 s (Pb-bearing)

245 °C, duration: 5 s (lead (Pb)-free)

#### Resistance to soldering heat

260 °C, duration: 10 s max.

### MARKING

The varistors are marked with the following information:

- Maximum continuous RMS voltage
- Series number (592, 593, 594, 595 or 596)
- Safety marks on VDRS10-14-20 types
- Manufacturers logo
- Date of manufacture (YYWW)

### INFLAMMABILITY

The varistors are passive non-flammable.

The encapsulation is made of flammable resistant epoxy in accordance with UL 94 V-0.



| 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 x 1000 μs) | MAXIMUM NON-REP. TRANSIENT CURRENT <sup>(5)</sup> I <sub>NRP</sub> (8 x 20 μs) | TYPICAL CAP. at 1 kHz | T (max.) | E         | UL 1449 ED3 SPD TYPE <sup>(7)</sup> | CATALOG NUMBERS <sup>(1)</sup> |
| RMS <sup>(2)</sup> (V)                   | DC (V) | (V)                            | V (V)                             | I (A) | (J)  | (A)  | (pF)                  | (mm)     | (mm)      |                                     | SAP <sup>(6)</sup>             |
| 14                                       | 18     | 22                             | 48                                | 1.0   | 0.5  | 100  | 1300                  | 4.1      | 0.7 ± 0.3 | 4                                   | VDRS05A014xyE                  |
|  |        |                                | 43                                | 2.5   | 1.7  | 250  | 2800                  | 4.1      | 0.7 ± 0.3 | 4                                   | VDRS07B014xyE                  |
|  |        |                                | 43                                | 5.0   | 4.3  | 500  | 6000                  | 4.4      | 0.9 ± 0.3 | 4                                   | VDRS10D014xyE                  |
|  |        |                                | 43                                | 10.0  | 5.4  | 1000   | 15 000                | 4.4      | 0.9 ± 0.3 | 4                                   | VDRS14G014xyE                  |
|  |        |                                | 43                                | 20.0  | 8.0  | 2000   | 30 000                | 4.6      | 1.1 ± 0.3 | 4                                   | VDRS20M014ByE                  |
| 17                                       | 22     | 27                             | 60                                | 1.0   | 0.7  | 100  | 1050                  | 4.1      | 0.8 ± 0.3 | 4                                   | VDRS05A017xyE                  |
|  |        |                                | 53                                | 2.5   | 2.0  | 250  | 2000                  | 4.1      | 0.8 ± 0.3 | 4                                   | VDRS07B017xyE                  |
|  |        |                                | 53                                | 5.0   | 5.3  | 500  | 4000                  | 4.4      | 1.0 ± 0.3 | 4                                   | VDRS10D017xyE                  |
|  |        |                                | 53                                | 10.0  | 6.9  | 1000   | 10 000                | 4.4      | 1.0 ± 0.3 | 4                                   | VDRS14G017xyE                  |
|  |        |                                | 53                                | 20.0  | 10.0   | 2000   | 20 000                | 4.6      | 1.2 ± 0.3 | 4                                   | VDRS20M017ByE                  |
| 20                                       | 26     | 33                             | 73                                | 1.0   | 0.8  | 100  | 900                   | 4.1      | 1.0 ± 0.3 | 4                                   | VDRS05A020xyE                  |
|  |        |                                | 65                                | 2.5   | 2.5  | 250  | 1500                  | 4.1      | 1.0 ± 0.3 | 4                                   | VDRS07B020xyE                  |
|  |        |                                | 65                                | 5.0   | 6.5  | 500  | 3000                  | 4.4      | 1.2 ± 0.3 | 4                                   | VDRS10D020xyE                  |
|  |        |                                | 65                                | 10.0  | 8.8  | 1000   | 7500                  | 4.4      | 1.2 ± 0.3 | 4                                   | VDRS14G020xyE                  |
|  |        |                                | 65                                | 20.0  | 12.0   | 2000   | 15 000                | 4.8      | 1.4 ± 0.3 | 4                                   | VDRS20M020ByE                  |
| 25                                       | 31     | 39                             | 86                                | 1.0   | 0.9  | 100  | 500                   | 4.2      | 1.2 ± 0.3 | 4                                   | VDRS05A025xyE                  |
|  |        |                                | 77                                | 2.5   | 3.0  | 250  | 1350                  | 4.2      | 1.2 ± 0.3 | 4                                   | VDRS07B025xyE                  |
|  |        |                                | 77                                | 5.0   | 7.7  | 500  | 2600                  | 4.6      | 1.4 ± 0.3 | 4                                   | VDRS10D025xyE                  |
|  |        |                                | 77                                | 10.0  | 9.4  | 1000   | 6500                  | 4.6      | 1.4 ± 0.3 | 4                                   | VDRS14G025xyE                  |
|  |        |                                | 77                                | 20.0  | 14.0   | 2000   | 13 000                | 5.0      | 1.6 ± 0.3 | 4                                   | VDRS20M025ByE                  |
| 30                                       | 38     | 47                             | 96                                | 1.0   | 1.1  | 100  | 700                   | 4.4      | 1.4 ± 0.5 | 4                                   | VDRS05A030xyE                  |
|  |        |                                | 93                                | 2.5   | 3.6  | 250  | 1600                  | 4.4      | 1.4 ± 0.5 | 4                                   | VDRS07B030xyE                  |
|  |        |                                | 93                                | 5.0   | 9.2  | 500  | 2700                  | 4.8      | 1.6 ± 0.5 | 4                                   | VDRS10D030xyE                  |
|  |        |                                | 93                                | 10.0  | 12.0   | 1000   | 6000                  | 4.8      | 1.6 ± 0.5 | 4                                   | VDRS14G030xyE                  |
|  |        |                                | 93                                | 20.0  | 17.0   | 2000   | 12 000                | 5.2      | 1.8 ± 0.5 | 4                                   | VDRS20M030ByE                  |
| 35                                       | 45     | 56                             | 123                               | 1.0   | 1.4  | 100  | 560                   | 4.8      | 1.7 ± 0.5 | 4                                   | VDRS05A035xyE                  |
|  |        |                                | 110                               | 2.5   | 4.4  | 250  | 1300                  | 4.8      | 1.7 ± 0.5 | 4                                   | VDRS07B035xyE                  |
|  |        |                                | 110                               | 5.0   | 11.0   | 500  | 2200                  | 5.2      | 1.9 ± 0.5 | 4                                   | VDRS10D035xyE                  |
|  |        |                                | 110                               | 10.0  | 14.0   | 1000   | 4800                  | 5.2      | 1.9 ± 0.5 | 4                                   | VDRS14G035xyE                  |
|  |        |                                | 110                               | 20.0  | 20.0   | 2000   | 9600                  | 5.6      | 2.1 ± 0.5 | 4                                   | VDRS20M035ByE                  |
| 40                                       | 56     | 68                             | 145                               | 1.0   | 1.6  | 100  | 460                   | 5.1      | 2.1 ± 0.5 | 4                                   | VDRS05A040xyE                  |
|  |        |                                | 135                               | 2.5   | 5.2  | 250  | 1000                  | 5.1      | 2.1 ± 0.5 | 4                                   | VDRS07B040xyE                  |
|  |        |                                | 135                               | 5.0   | 13.0   | 500  | 1800                  | 5.5      | 2.3 ± 0.5 | 4                                   | VDRS10D040xyE                  |
|  |        |                                | 135                               | 10.0  | 17.0   | 1000   | 3800                  | 5.5      | 2.3 ± 0.5 | 4                                   | VDRS14G040xyE                  |
|  |        |                                | 135                               | 20.0  | 24.0   | 2000   | 7600                  | 5.9      | 2.5 ± 0.5 | 4                                   | VDRS20M040ByE                  |
| 50                                       | 65     | 82                             | 145                               | 5.0   | 2.6  | 400  | 370                   | 4.1      | 0.6 ± 0.3 | 4                                   | VDRS05C050xyE                  |
|  |        |                                | 140                               | 10.0  | 7.0  | 1200   | 900                   | 4.1      | 0.6 ± 0.3 | 4                                   | VDRS07H050xyE                  |
|  |        |                                | 140                               | 25.0  | 12.0   | 2500   | 1500                  | 4.4      | 0.8 ± 0.3 | 4                                   | VDRS10P050xyE                  |
|  |        |                                | 140                               | 50.0  | 21.0   | 4500   | 3100                  | 4.4      | 0.8 ± 0.3 | 4                                   | VDRS14T050xyE                  |
|  |        |                                | 170                               | 5.0   | 2.9  | 400  | 290                   | 4.1      | 0.7 ± 0.3 | 4                                   | VDRS05C060xyE                  |
| 60                                       | 85     | 100                            | 165                               | 10.0  | 8.3  | 1200   | 700                   | 4.1      | 0.7 ± 0.3 | 4                                   | VDRS07H060xyE                  |
|  |        |                                | 165                               | 25.0  | 15.0   | 2500   | 1200                  | 4.4      | 0.9 ± 0.3 | 4                                   | VDRS10P060xyE                  |
|  |        |                                | 165                               | 50.0  | 24.0   | 4500   | 2300                  | 4.4      | 0.9 ± 0.3 | 3                                   | VDRS14T060xyE                  |
|  |        |                                | 165                               | 100.0 | 56.0   | 6500   | 4700                  | 4.5      | 1.1 ± 0.3 | 2                                   | VDRS20W060ByE                  |
|  |        |                                | 210                               | 5.0   | 3.4  | 400  | 240                   | 4.1      | 0.9 ± 0.3 | 4                                   | VDRS05C075xyE                  |
| 75                                       | 100    | 120                            | 200                               | 10.0  | 10.0   | 1200   | 530                   | 4.1      | 0.9 ± 0.3 | 4                                   | VDRS07H075xyE                  |
|  |        |                                | 200                               | 25.0  | 18.0   | 2500   | 1000                  | 4.4      | 1.1 ± 0.3 | 4                                   | VDRS10P075xyE                  |
|  |        |                                | 200                               | 50.0  | 29.0   | 4500   | 1900                  | 4.4      | 1.1 ± 0.3 | 3                                   | VDRS14T075xyE                  |
|  |        |                                | 200                               | 100.0 | 64.0   | 6500   | 3900                  | 4.8      | 1.3 ± 0.3 | 2                                   | VDRS20W075ByE                  |
|  |        |                                | 250                               | 5.0   | 4.1  | 400  | 180                   | 4.2      | 1.1 ± 0.3 | 4                                   | VDRS05C095xyE                  |
| 95                                       | 125    | 150                            | 250                               | 10.0  | 13.0   | 1200   | 450                   | 4.2      | 1.1 ± 0.3 | 4                                   | VDRS07H095xyE                  |
|  |        |                                | 250                               | 25.0  | 22.0   | 2500   | 800                   | 4.6      | 1.3 ± 0.3 | 4                                   | VDRS10P095xyE                  |
|  |        |                                | 250                               | 50.0  | 37.0   | 4500   | 1500                  | 4.6      | 1.3 ± 0.3 | 3                                   | VDRS14T095xyE                  |
|  |        |                                | 250                               | 100.0 | 88.0   | 6500   | 3000                  | 5.2      | 1.5 ± 0.3 | 2                                   | VDRS20W095ByE                  |



| 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 x 1000 μs) | MAXIMUM NON-REP. TRANSIENT CURRENT <sup>(5)</sup> I <sub>NRP</sub> (8 x 20 μs) | TYPICAL CAP. at 1 kHz | T (max.) | E         | UL 1449 ED3 SPD TYPE <sup>(7)</sup> | CATALOG NUMBERS <sup>(1)</sup> |
| RMS <sup>(2)</sup> (V)                   | DC (V) | (V)                            | V (V)                             | I (A) | (J)  | (A)  | (pF)                  | (mm)     | (mm)      |                                     | SAP <sup>(6)</sup>             |
| 130                                      | 170    | 205                            | 345                               | 5.0   | 5.5  | 400  | 130                   | 4.2      | 1.0 ± 0.3 | 4                                   | VDRS05C130xyE                  |
|  |        |                                | 340                               | 10.0  | 17.0   | 1200   | 320                   | 4.2      | 1.0 ± 0.3 | 4                                   | VDRS07H130xyE                  |
|  |        |                                | 340                               | 25.0  | 30.0   | 2500   | 580                   | 4.6      | 1.2 ± 0.3 | 4                                   | VDRS10P130xyE                  |
|  |        |                                | 340                               | 50.0  | 56.0   | 4500   | 1050                  | 4.6      | 1.2 ± 0.3 | 3                                   | VDRS14T130xyE                  |
|  |        |                                | 340                               | 100.0 | 114.0  | 6500   | 2100                  | 5.3      | 1.4 ± 0.3 | 2                                   | VDRS20W130ByE                  |
| 140                                      | 180    | 220                            | 380                               | 5.0   | 6.3  | 400  | 120                   | 4.4      | 1.0 ± 0.3 | 4                                   | VDRS05C140xyE                  |
|  |        |                                | 360                               | 10.0  | 21.0   | 1200   | 290                   | 4.4      | 1.0 ± 0.3 | 4                                   | VDRS07H140xyE                  |
|  |        |                                | 360                               | 25.0  | 33.0   | 2500   | 540                   | 4.8      | 1.2 ± 0.3 | 4                                   | VDRS10P140xyE                  |
|  |        |                                | 360                               | 50.0  | 57.0   | 4500   | 950                   | 4.8      | 1.2 ± 0.3 | 3                                   | VDRS14T140xyE                  |
|  |        |                                | 360                               | 100.0 | 124.0  | 6500   | 1900                  | 5.4      | 1.5 ± 0.3 | 2                                   | VDRS20W140ByE                  |
| 150                                      | 200    | 240                            | 400                               | 5.0   | 7.1  | 400  | 110                   | 4.4      | 1.1 ± 0.3 | 4                                   | VDRS05C150xyE                  |
|  |        |                                | 395                               | 10.0  | 20.0   | 1200   | 270                   | 4.4      | 1.1 ± 0.3 | 4                                   | VDRS07H150xyE                  |
|  |        |                                | 395                               | 25.0  | 36.0   | 2500   | 490                   | 4.8      | 1.3 ± 0.3 | 4                                   | VDRS10P150xyE                  |
|  |        |                                | 395                               | 50.0  | 59.0   | 4500   | 850                   | 4.8      | 1.3 ± 0.3 | 3                                   | VDRS14T150xyE                  |
|  |        |                                | 395                               | 100.0 | 134.0  | 6500   | 1700                  | 5.5      | 1.6 ± 0.3 | 2                                   | VDRS20W150ByE                  |
| 175                                      | 225    | 275                            | 455                               | 5.0   | 7.3  | 400  | 90                    | 4.6      | 1.3 ± 0.3 | 4                                   | VDRS05C175xyE                  |
|  |        |                                | 455                               | 10.0  | 23.0   | 1200   | 230                   | 4.6      | 1.3 ± 0.3 | 4                                   | VDRS07H175xyE                  |
|  |        |                                | 455                               | 25.0  | 41.0   | 2500   | 430                   | 5.0      | 1.5 ± 0.3 | 4                                   | VDRS10P175xyE                  |
|  |        |                                | 455                               | 50.0  | 67.0   | 4500   | 750                   | 5.0      | 1.5 ± 0.3 | 3                                   | VDRS14T175xyE                  |
|  |        |                                | 455                               | 100.0 | 158.0  | 6500   | 1500                  | 5.7      | 1.7 ± 0.3 | 2                                   | VDRS20W175ByE                  |
| 230                                      | 300    | 360                            | 600                               | 5.0   | 10.0   | 400  | 70                    | 4.9      | 1.7 ± 0.8 | 4                                   | VDRS05C230xyE                  |
|  |        |                                | 595                               | 10.0  | 30.0   | 1200   | 170                   | 4.9      | 1.7 ± 0.8 | 4                                   | VDRS07H230xyE                  |
|  |        |                                | 595                               | 25.0  | 54.0   | 2500   | 320                   | 5.4      | 1.9 ± 0.8 | 4                                   | VDRS10P230xyE                  |
|  |        |                                | 595                               | 50.0  | 88.0   | 4500   | 540                   | 5.4      | 1.9 ± 0.8 | 3                                   | VDRS14T230xyE                  |
|  |        |                                | 595                               | 100.0 | 208.0  | 6500   | 1100                  | 6.2      | 2.2 ± 0.8 | 2                                   | VDRS20W230ByE                  |
| 250                                      | 320    | 390                            | 650                               | 5.0   | 11.0   | 400  | 60                    | 4.9      | 1.9 ± 0.8 | 4                                   | VDRS05C250xyE                  |
|  |        |                                | 650                               | 10.0  | 33.0   | 1200   | 160                   | 4.9      | 1.9 ± 0.8 | 4                                   | VDRS07H250xyE                  |
|  |        |                                | 650                               | 25.0  | 58.0   | 2500   | 300                   | 5.4      | 2.1 ± 0.8 | 4                                   | VDRS10P250xyE                  |
|  |        |                                | 650                               | 50.0  | 96.0   | 4500   | 480                   | 5.4      | 2.1 ± 0.8 | 3                                   | VDRS14T250xyE                  |
|  |        |                                | 650                               | 100.0 | 240.0  | 6500   | 960                   | 6.4      | 2.3 ± 0.8 | 2                                   | VDRS20W250ByE                  |
| 275                                      | 350    | 430                            | 710                               | 5.0   | 12.0   | 400  | 55                    | 4.9      | 2.0 ± 0.8 | 4                                   | VDRS05C275xyE                  |
|  |        |                                | 710                               | 10.0  | 36.0   | 1200   | 140                   | 4.9      | 2.0 ± 0.8 | 4                                   | VDRS07H275xyE                  |
|  |        |                                | 710                               | 25.0  | 63.0   | 2500   | 270                   | 5.4      | 2.2 ± 0.8 | 4                                   | VDRS10P275xyE                  |
|  |        |                                | 710                               | 50.0  | 104.0  | 4500   | 440                   | 5.4      | 2.2 ± 0.8 | 3                                   | VDRS14T275xyE                  |
|  |        |                                | 710                               | 100.0 | 264.0  | 6500   | 900                   | 6.6      | 2.5 ± 0.8 | 2                                   | VDRS20W275ByE                  |
| 300                                      | 385    | 470                            | 800                               | 5.0   | 13.0   | 400  | 50                    | 5.3      | 2.2 ± 0.8 | 4                                   | VDRS05C300xyE                  |
|  |        |                                | 775                               | 10.0  | 40.0   | 1200   | 130                   | 5.3      | 2.2 ± 0.8 | 4                                   | VDRS07H300xyE                  |
|  |        |                                | 775                               | 25.0  | 71.0   | 2500   | 240                   | 5.9      | 2.4 ± 0.8 | 4                                   | VDRS10P300xyE                  |
|  |        |                                | 775                               | 50.0  | 117.0  | 4500   | 400                   | 5.9      | 2.4 ± 0.8 | 3                                   | VDRS14T300xyE                  |
|  |        |                                | 775                               | 100.0 | 280.0  | 6500   | 810                   | 6.9      | 2.7 ± 0.8 | 2                                   | VDRS20W300ByE                  |
| 320                                      | 420    | 510                            | 850                               | 5.0   | 15.0   | 400  | 45                    | 5.5      | 2.4 ± 0.8 | 4                                   | VDRS05C320xyE                  |
|  |        |                                | 842                               | 10.0  | 44.0   | 1200   | 120                   | 5.5      | 2.4 ± 0.8 | 4                                   | VDRS07H320xyE                  |
|  |        |                                | 842                               | 25.0  | 77.0   | 2500   | 220                   | 6.2      | 2.6 ± 0.8 | 4                                   | VDRS10P320xyE                  |
|  |        |                                | 842                               | 50.0  | 120.0  | 4500   | 370                   | 6.2      | 2.6 ± 0.8 | 3                                   | VDRS14T320xyE                  |
|  |        |                                | 842                               | 100.0 | 296.0  | 6500   | 750                   | 7.1      | 2.9 ± 0.8 | 2                                   | VDRS20W320ByE                  |
| 350                                      | 460    | 560                            | 940                               | 5.0   | 19.5   | 400  | 42                    | 5.8      | 2.7 ± 0.8 | 4                                   | VDRS05C350xyE                  |
|  |        |                                | 920                               | 10.0  | 39.0   | 1200   | 110                   | 5.8      | 2.7 ± 0.8 | 4                                   | VDRS07H350xyE                  |
|  |        |                                | 920                               | 25.0  | 78.0   | 2500   | 200                   | 6.6      | 2.9 ± 0.8 | 4                                   | VDRS10P350xyE                  |
|  |        |                                | 920                               | 50.0  | 156.0  | 4500   | 325                   | 6.6      | 2.9 ± 0.8 | 3                                   | VDRS14T350xyE                  |
|  |        |                                | 920                               | 100.0 | 312.0  | 6500   | 660                   | 7.4      | 3.2 ± 0.8 | 2                                   | VDRS20W350ByE                  |
| 385                                      | 505    | 620                            | 1025                              | 5.0   | 18.0   | 400  | 40                    | 6.0      | 3.0 ± 0.8 | 4                                   | VDRS05C385xyE                  |
|  |        |                                | 1025                              | 10.0  | 51.0   | 1200   | 95                    | 6.0      | 3.0 ± 0.8 | 4                                   | VDRS07H385xyE                  |
|  |        |                                | 1025                              | 25.0  | 67.0   | 2500   | 180                   | 6.6      | 3.2 ± 0.8 | 4                                   | VDRS10P385xyE                  |
|  |        |                                | 1025                              | 50.0  | 110.0  | 4500   | 280                   | 6.6      | 3.2 ± 0.8 | 3                                   | VDRS14T385xyE                  |
|  |        |                                | 1025                              | 100.0 | 328.0  | 6500   | 570                   | 7.7      | 3.5 ± 0.8 | 2                                   | VDRS20W385ByE                  |



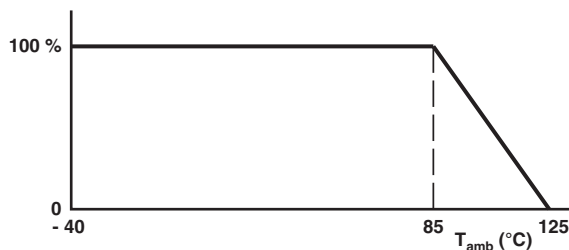


**ELECTRICAL CHARACTERISTICS**

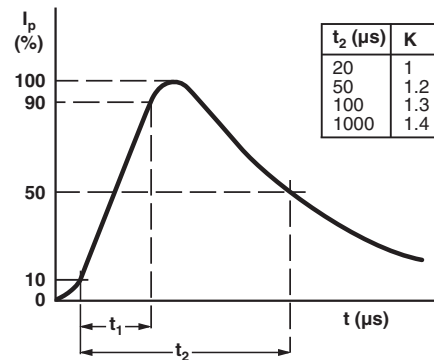
| ELECTRICAL DATA   |              |                 |
|---|--------------|-----------------|
| PARAMETER   | VALUE        | UNIT            |
| Maximum continuous voltage:   |              |                 |
| RMS   | 14 to 680    | V               |
| DC  | 18 to 895    | V               |
| Maximum non-repetitive transient current ( $I_{NRP}$ ) (8 x 20 $\mu$ s) |              |                 |
| VDRS05  | 100 or 400   | A               |
| VDRS07  | 250 or 1200  | A               |
| VDRS10  | 500 or 2500  | A               |
| VDRS14  | 1000 or 4500 | A               |
| VDRS20  | 2000 or 6500 | A               |
| Thermal resistance:   |              |                 |
| VDRS05  | $\approx$ 80 | K/W             |
| VDRS07  | $\approx$ 70 | K/W             |
| VDRS10  | $\approx$ 60 | K/W             |
| VDRS14  | $\approx$ 50 | K/W             |
| VDRS20  | $\approx$ 40 | K/W             |
| Maximum dissipation:  |              |                 |
| VDRS05  | 100          | mW              |
| VDRS07  | 250          | mW              |
| VDRS10  | 400          | mW              |
| VDRS14  | 600          | mW              |
| VDRS20  | 1000         | mW              |
| Temperature coefficient of voltage at 1 mA maximum                      | $\pm$ 0.05   | %/K             |
| Voltage proof between interconnected leads and case                     | 2500         | V <sub>AC</sub> |
| Storage temperature   | -40 to +125  | $^{\circ}$ C    |
| Operating temperature   | -40 to +85   | $^{\circ}$ C    |

**DERATING CURVE**

Maximum Voltage  
Maximum Dissipation  
Maximum Energy  
Maximum Transient Current



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



| COMPONENT DIMENSIONS (BULK TYPE) in millimeters AND CATALOG NUMBERS |           |                |           |                     |           |        |                       |                  |                |               |                |
|---|-----------|----------------|-----------|---------------------|-----------|--------|-----------------------|------------------|----------------|---------------|----------------|
| D MAX.  |           | A MAX.         |           | A <sub>0</sub> MAX. |           | L MIN. | T <sup>(1)</sup> MAX. | E <sup>(1)</sup> | d              | F             | CATALOG NUMBER |
| V $\leq$ 320 V  | V > 320 V | V $\leq$ 300 V | V > 300 V | V $\leq$ 320 V      | V > 320 V |        |                       |                  |                |               |                |
| 7.0   |           | 9.0            |           | 11.0                |           | 24.0   | 6.5                   | 0.7 to 3.6       | 0.6 $\pm$ 0.05 | 5 $\pm$ 1.0   | VDRS05         |
|   | 9.0       | 11.0           |           | 13.0                |           | 24.0   | 6.5                   | 0.7 to 3.6       | 0.6 $\pm$ 0.05 | 5 $\pm$ 1.0   | VDRS07         |
| 12.0  | 12.5      | 14.5           | 15.0      | 16.5                | 17.0      | 17.0   | 8.0                   | 0.9 to 4.5       | 0.8 $\pm$ 0.05 | 7.5 $\pm$ 1.0 | VDRS10         |
| 16.0  | 16.5      | 19.0           |           | 21.0                | 21.5      | 16.0   | 8.0                   | 0.9 to 4.5       | 0.8 $\pm$ 0.05 | 7.5 $\pm$ 1.0 | VDRS14         |
| 22.5  | 23.0      | 25.5           |           | 27.5                | 28.0      | 24.0   | 10.0                  | 1.1 to 5.8       | 1.0 $\pm$ 0.05 | 10 $\pm$ 1.0  | VDRS20         |

**Note**

<sup>(1)</sup> T<sub>max</sub> and E values per size and voltage level can be found back in the Electrical Data table

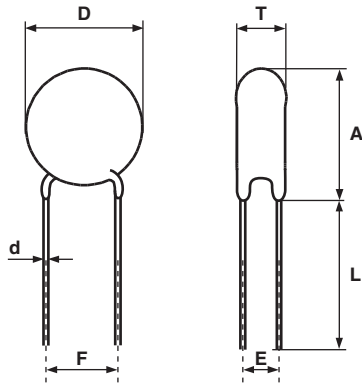
| <b>VARISTORS IN BULK</b>   |   |   |  |  |  |
|--|---|---|--|--|--|
| <b>TYPE</b>  | <b>VDRS05...<br/>Ø 5 mm<br/>14 V to 460 V</b> | <b>VDRS07...<br/>Ø 7 mm<br/>14 V to 460 V</b> | <b>VDRS10...<br/>Ø 10 mm<br/>14 V to 550 V</b> | <b>VDRS14...<br/>Ø 14 mm<br/>14 V to 550 V</b> | <b>VDRS20...<br/>Ø 20 mm<br/>14 V to 680 V</b> |
| Straight leads; see outline of components with straight leads drawing <sup>(1)</sup> | BSE   | BSE   | BSE  | BSE  | BSE  |
| Straight leads with flange; see outline of components with flanged leads drawing     | BFE   | BFE   | -  | -  | -  |
| Kinked leads; see outline of components with kinked leads drawing                    | BKE   | BKE   | BKE  | BKE  | BKE  |
| <b>Packaging quantities</b>  |   |   |  |  |  |
| 14 V to 95 V   | 250   | 250   | 250  | 100  | 50   |
| 130 V to 385 V   | 250   | 250   | 250  | 100  | 50   |
| 420 V to 460 V   | 250   | 250   | 200  | 100  | 50   |
| 485 V to max. V  | -   | 250   | 150  | 100  | 50   |

**Note**

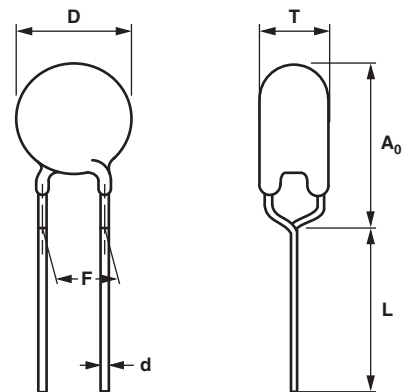
<sup>(1)</sup> Outline of the Ø 20 mm differs from the other dimensions

**DIMENSIONS** in millimeters: See Component Dimensions and Electrical Data table

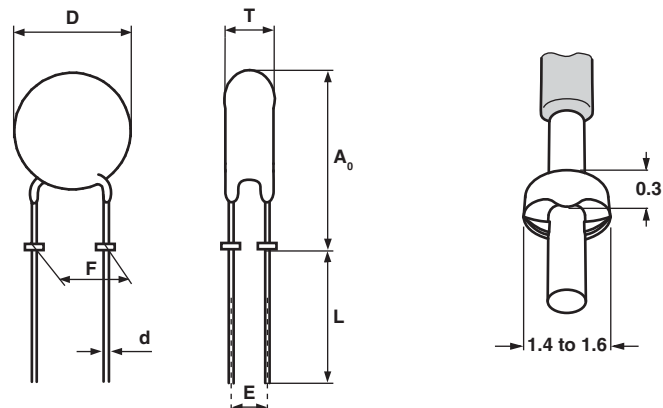
Outline of component with straight leads



Outline of component with kinked leads



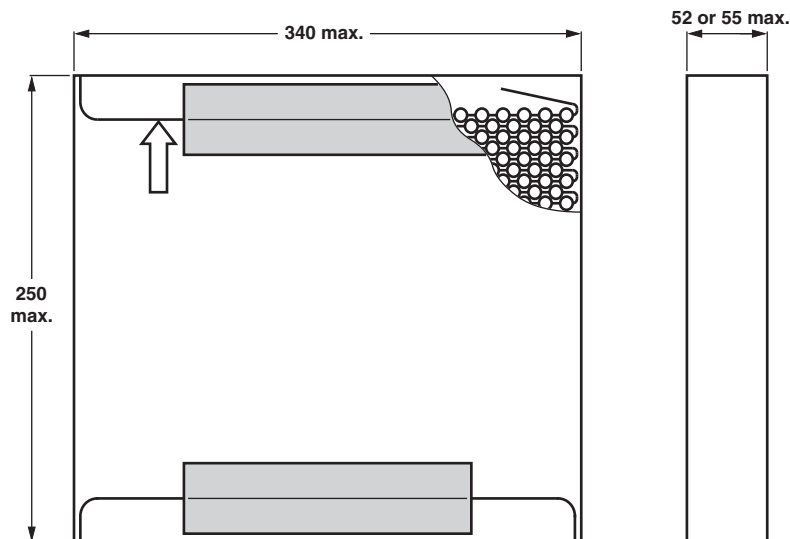
Outline of component with flanged leads



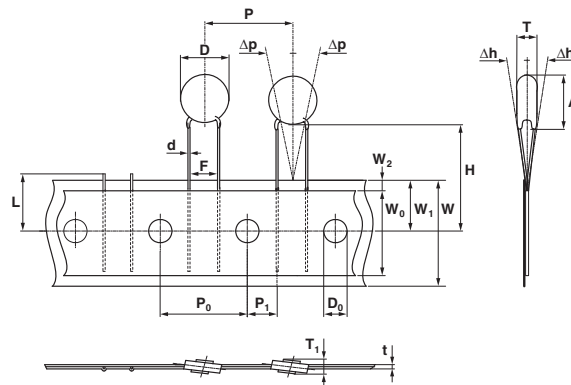
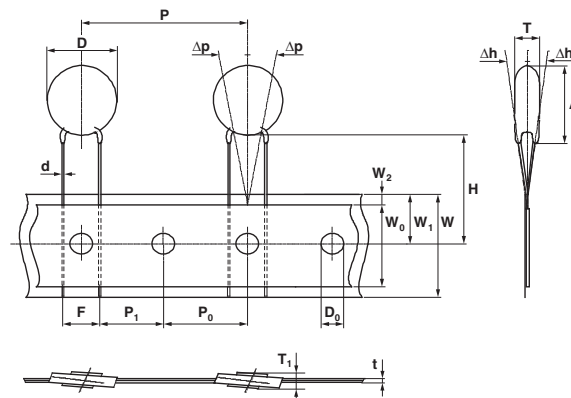
| <b>VARISTORS ON TAPE IN AMMOPACK</b>   |   |   |  |  |
|--|---|---|--|--|
| <b>TYPE</b>  | <b>VDRS05...<br/>Ø 5 mm<br/>14 V to 460 V</b> | <b>VDRS07...<br/>Ø 7 mm<br/>14 V to 460 V</b> | <b>VDRS10...<br/>Ø 10 mm<br/>14 V to 550 V</b> | <b>VDRS14...<br/>Ø 14 mm<br/>14 V to 550 V</b> |
| Straight leads<br>H = 18 mm<br>H = 20 mm<br>See drawing: taped version with straight leads   | -<br>ASE                                      | -<br>ASE                                      | ASE<br>-                                       | ASE<br>-                                       |
| Straight leads with flange<br>H <sub>0</sub> = 16 mm<br>H <sub>0</sub> = 18.25 mm<br>See drawing: taped version with flanged leads | AGE<br>AHE                                    | AGE<br>AHE                                    | -<br>-   | -<br>-   |
| Kinked leads<br>H <sub>0</sub> = 18.25 mm<br>H <sub>0</sub> = 16 mm<br>See drawing: taped version with kinked leads                | AME<br>ALE                                    | AME<br>ALE                                    | AME<br>ALE                                     | AME<br>ALE                                     |
| <b>Packaging quantities</b>  |   |   |  |  |
| 14 V to 210 V  | 1500 <sup>(1)</sup>                           | 1500 <sup>(1)</sup>                           | 500  | 500  |
| 230 V to 510 V   | 1000  | 1000  | 500  | 500  |
| 550 V  | -   | -   | 400  | 400  |

**Note**

<sup>(1)</sup> Except for 35 V and 40 V = 1000 pieces

**DIMENSIONS OF AMMOPACK IN MILLIMETERS**


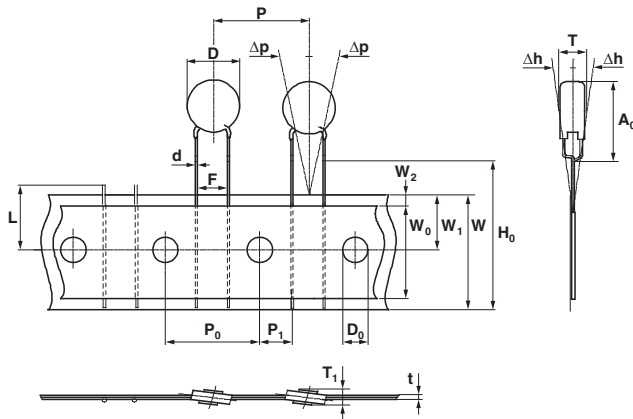
| <b>VARISTORS ON TAPE AND REEL</b>  |   |   |  |  |
|--|---|---|--|--|
| <b>TYPE</b>  | <b>VDRS05...<br/>Ø 5 mm<br/>14 V to 460 V</b> | <b>VDRS07...<br/>Ø 7 mm<br/>14 V to 460 V</b> | <b>VDRS10...<br/>Ø 10 mm<br/>14 V to 550 V</b> | <b>VDRS14...<br/>Ø 14 mm<br/>14 V to 550 V</b> |
| Straight leads<br>H = 18 mm<br>H = 20 mm<br>See drawing: taped version with straight leads   | -<br>TSE                                      | -<br>TSE                                      | TSE<br>-                                       | TSE<br>-                                       |
| Straight leads with flange<br>H <sub>0</sub> = 16 mm<br>H <sub>0</sub> = 18.25 mm<br>See drawing: taped version with flanged leads | TGE<br>THE                                    | TGE<br>THE                                    | -<br>-   | -<br>-   |
| Kinked leads<br>H <sub>0</sub> = 18.25 mm<br>H <sub>0</sub> = 16 mm<br>See drawing: taped version with kinked leads                | TME<br>TLE                                    | TME<br>TLE                                    | TME<br>TLE                                     | TME<br>TLE                                     |
| <b>Packaging quantities</b>  |   |   |  |  |
| 14 V to 250 V  | 1500  | 1500  | 1000   | 750  |
| 275 V to 300 V   | 1500  | 1500  | 750  | 750  |
| 320 V to 350 V   | 1000  | 1000  | 500  | 500  |
| 385 V to max. V  | 1000  | 1000  | 500  | 500  |

**PACKAGING**
**TAPED VERSION WITH STRAIGHT LEADS** (only for VDRS05 and VDRS07)

**TAPED VERSION WITH STRAIGHT LEADS** (only for VDRS10 and VDRS14)




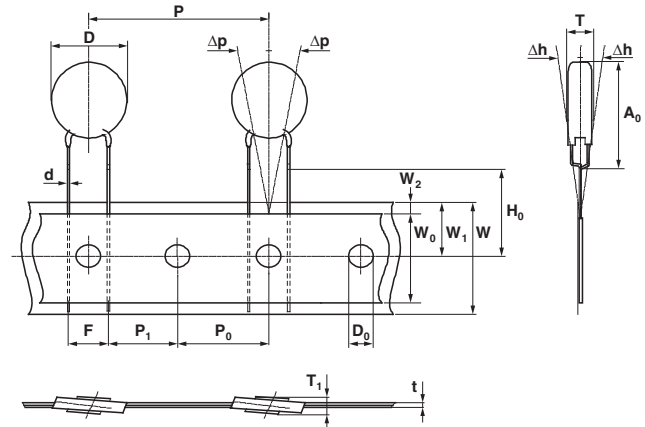
### TAPED VERSION WITH KINKED LEADS

(only for VDRS05 and VDRS07)



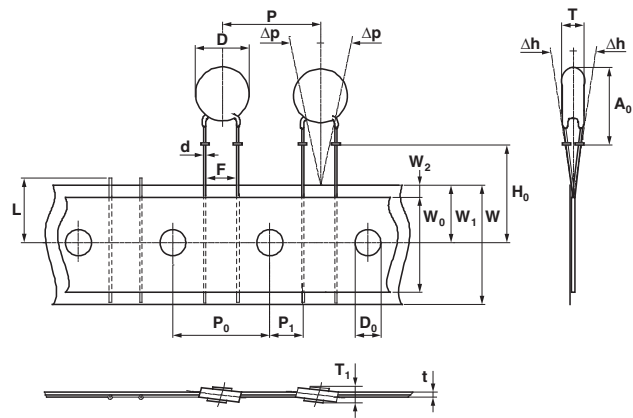
### TAPED VERSION WITH KINKED LEADS

(only for VDRS10 and VDRS14)



### TAPED VERSION WITH FLANGED LEADS

(only for VDRS05 and VDRS07)



| TAPING DATA (based on IEC 60286-2) |  |                           |        |                  |        |      |
|------------------------------------|--|---------------------------|--------|------------------|--------|------|
| SYMBOL                             | PARAMETER  | DIMENSIONS/TOLERANCE      |        |                  |        |      |
|                                    |  | VDRS05                    | VDRS07 | VDRS10           | VDRS14 |      |
| A max.                             | Max. mounting height                             | $V \leq 300\text{ V}$     | 9.0    | 11.0             | 14.5   | 19.0 |
|                                    |  | $V > 300\text{ V}$        |        |                  | 15.0   |      |
| A <sub>0</sub> max.                | Max. mounting height                             | $V \leq 320\text{ V}$     | 11.0   | 13.0             | 16.5   | 21.0 |
|                                    |  | $V > 320\text{ V}$        |        |                  | 17.0   | 21.5 |
| D max.                             | Max. body diameter                               | $V \leq 320\text{ V}$     | 7.0    | 9.0              | 12.0   | 16.0 |
|                                    |  | $V > 320\text{ V}$        |        |                  | 12.5   | 16.5 |
| d                                  | Lead wire diameter                               | 0.6 ± 0.05                |        | 0.8 ± 0.05       |        |      |
| F                                  | Lead to lead distance <sup>(1)</sup>             | 5.0 + 0.8/- 0.2           |        | 7.5 ± 0.8        |        |      |
| H                                  | Distance component to tape center <sup>(2)</sup> | 20.0 + 2.0/- 0.0          |        | 18.0 + 2.0/- 0.0 |        |      |
| H <sub>0</sub>                     | Lead wire clinch height                          | 16.0 or 18.25 ± 0.5       |        |                  |        |      |
| P                                  | Pitch of components on tape                      | 12.7 ± 1.0                |        | 25.4 ± 1.0       |        |      |
| T                                  | Total thickness                                  | See Electrical Data table |        |                  |        |      |

#### Notes

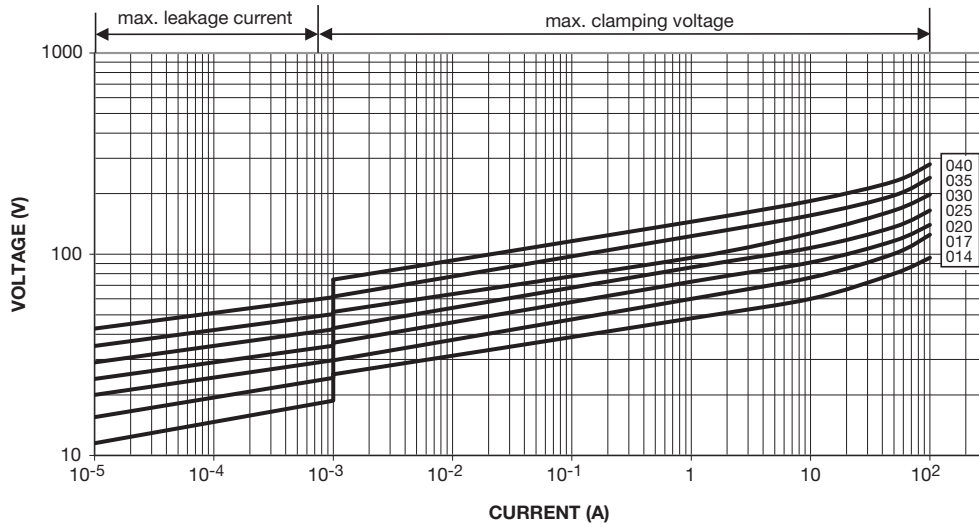
(1) Guaranteed between component and tape

(2) For VDRS14T510xSE and VDRS14T550xSE: H = 20 mm ± 1 mm

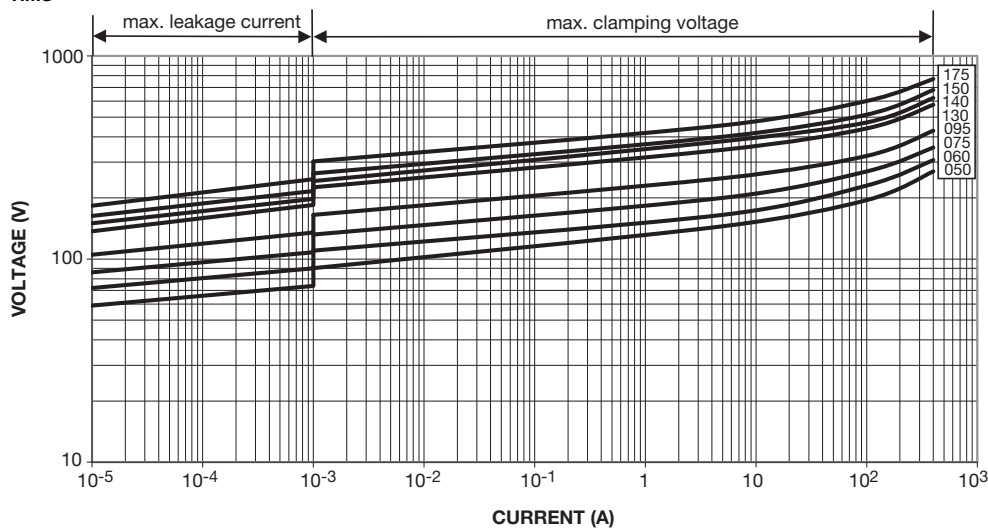


V/I CHARACTERISTICS

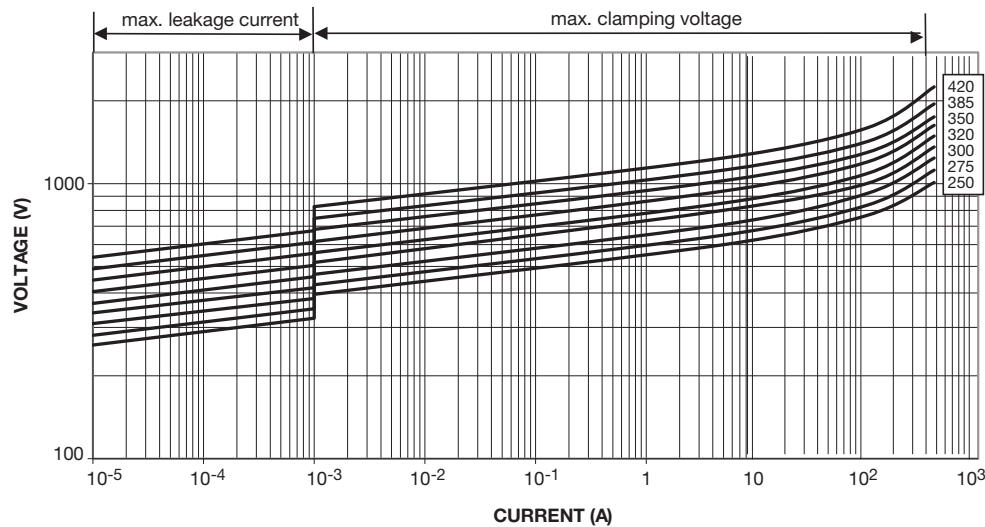
14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS05



50 V<sub>RMS</sub> to 175 V<sub>RMS</sub>; VDRS05

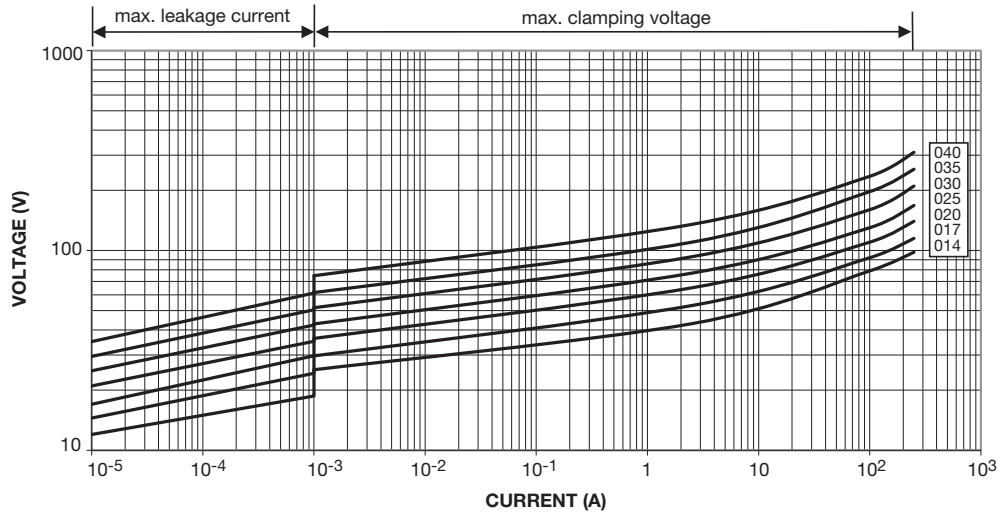


230 V<sub>RMS</sub> to 460 V<sub>RMS</sub>; VDRS05

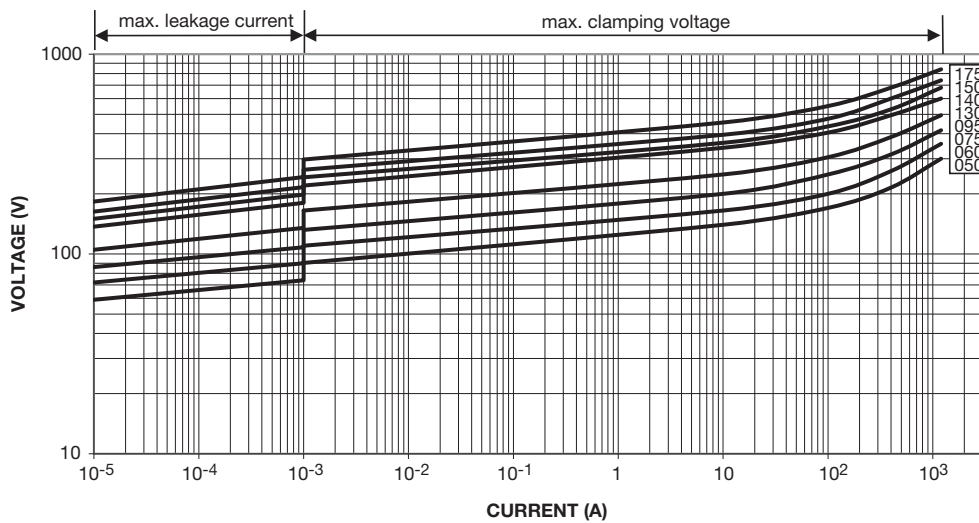




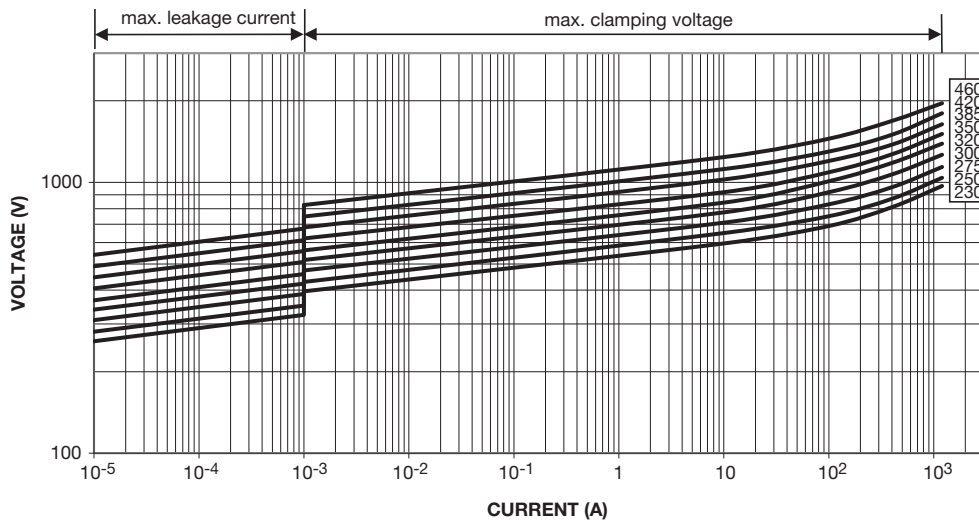
14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS07



50 V<sub>RMS</sub> to 175 V<sub>RMS</sub>; VDRS07

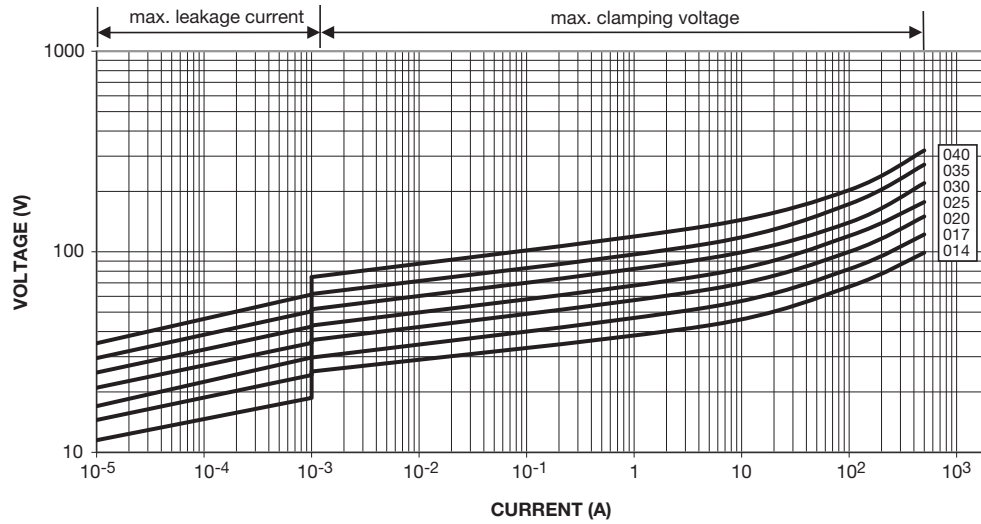


230 V<sub>RMS</sub> to 460 V<sub>RMS</sub>; VDRS07

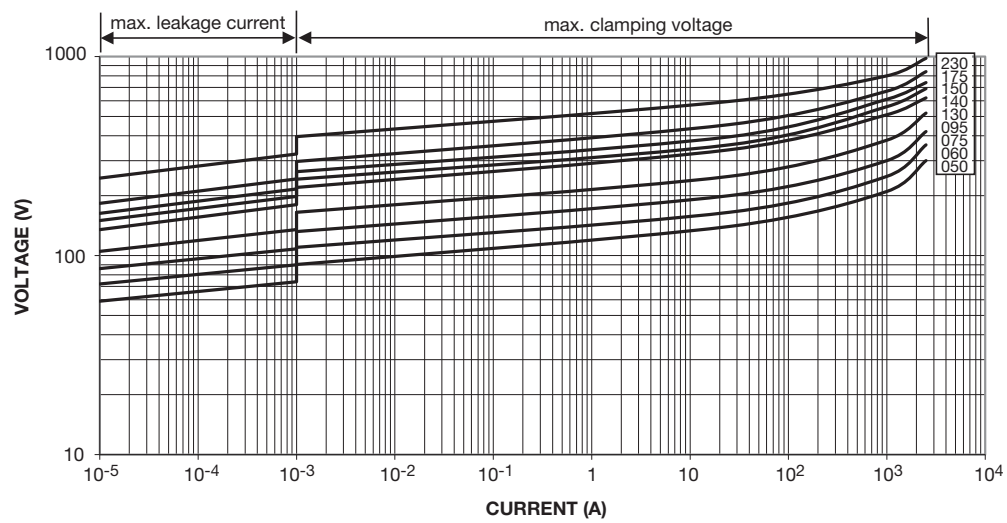




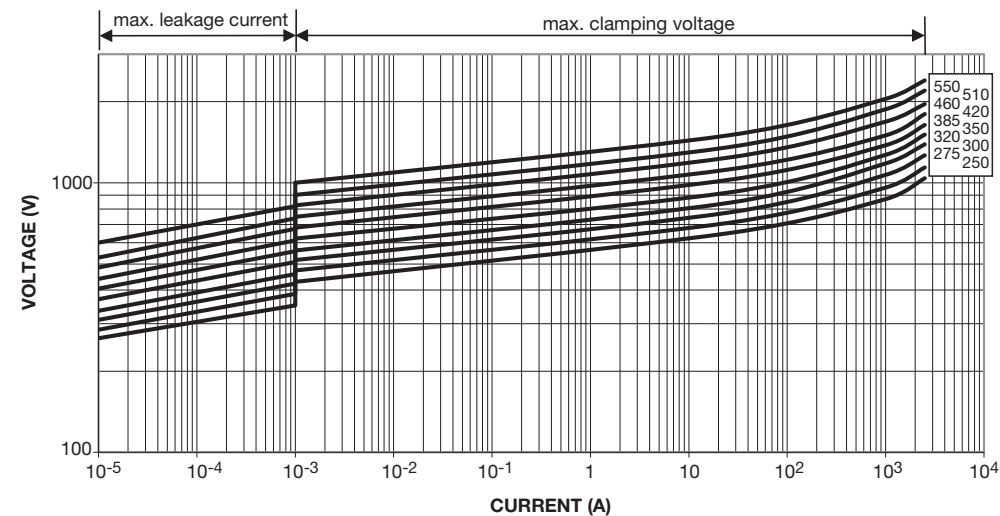
14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS10



50 V<sub>RMS</sub> to 230 V<sub>RMS</sub>; VDRS10

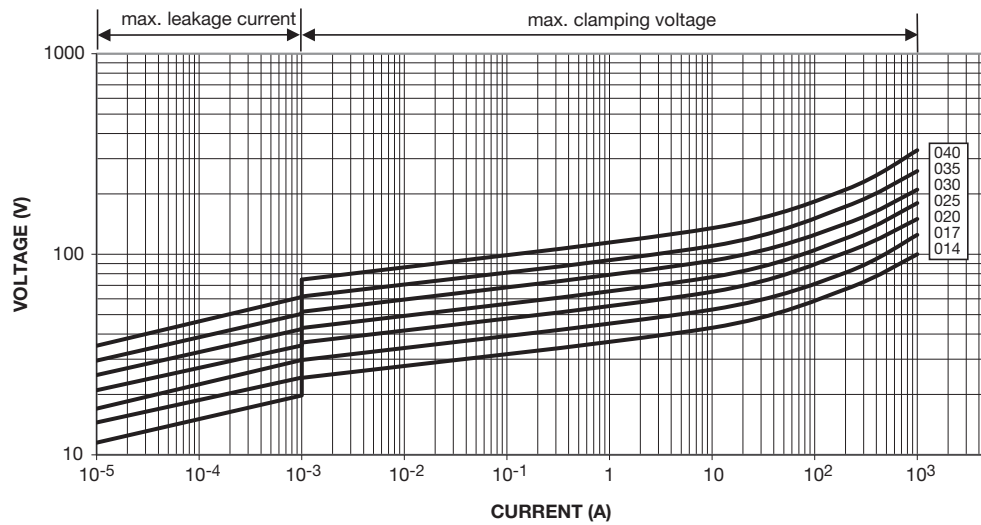


250 V<sub>RMS</sub> to 550 V<sub>RMS</sub>; VDRS10

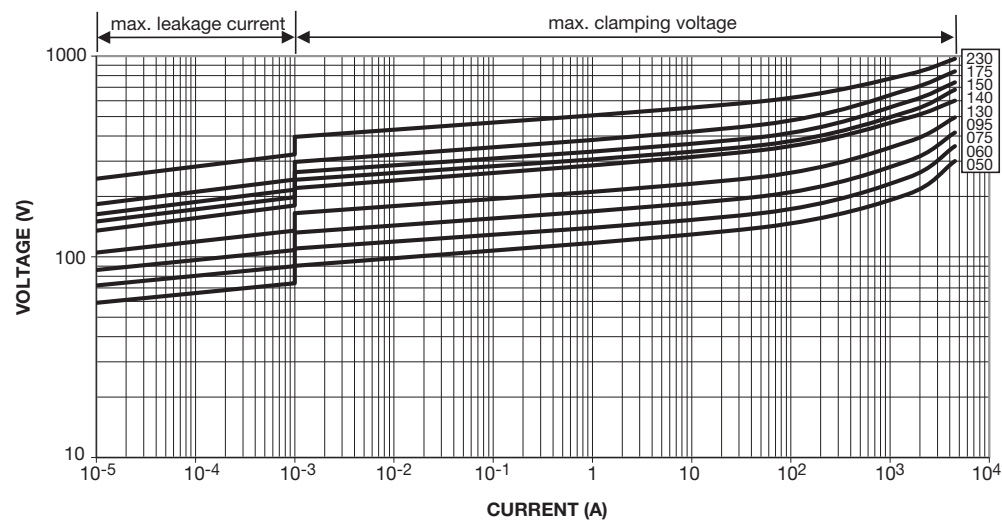




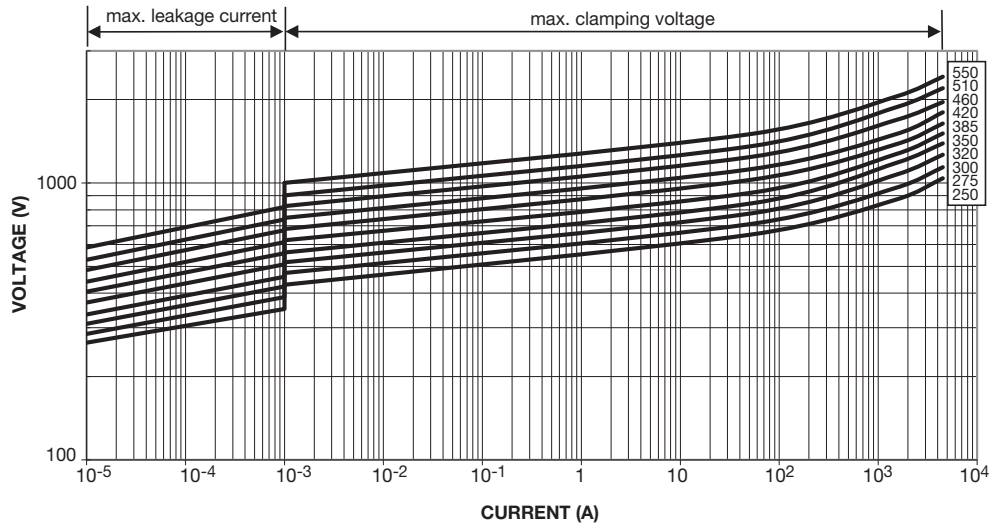
### 14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS14



### 50 V<sub>RMS</sub> to 230 V<sub>RMS</sub>; VDRS14

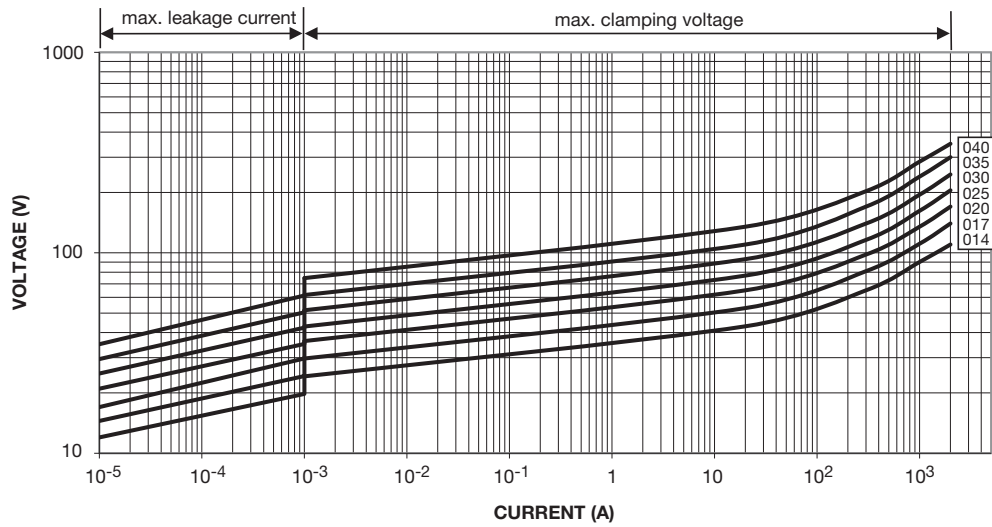


### 250 V<sub>RMS</sub> to 550 V<sub>RMS</sub>; VDRS14

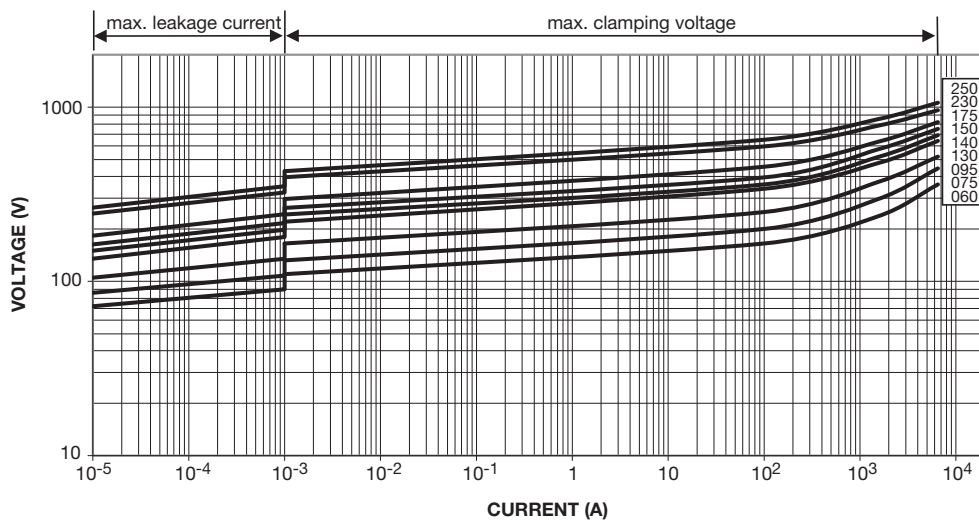




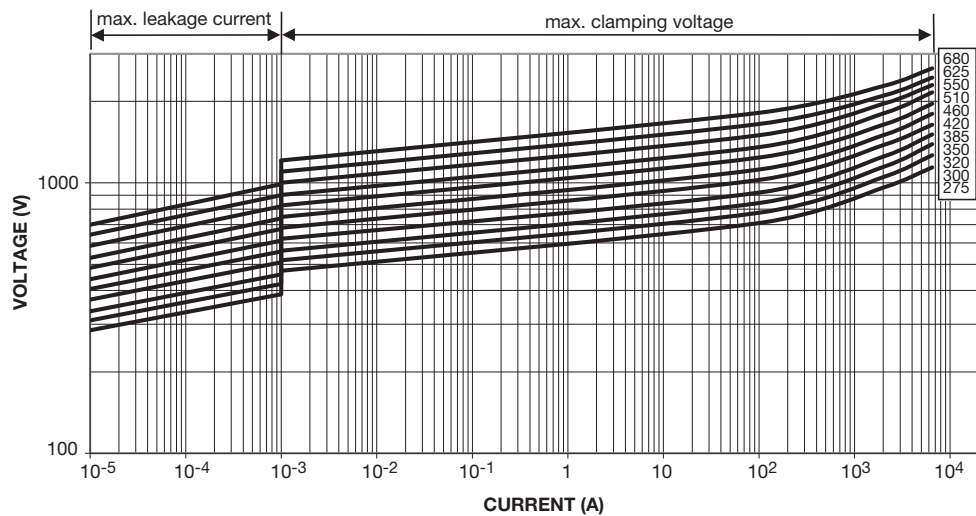
### 14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS20



### 60 V<sub>RMS</sub> to 250 V<sub>RMS</sub>; VDRS20



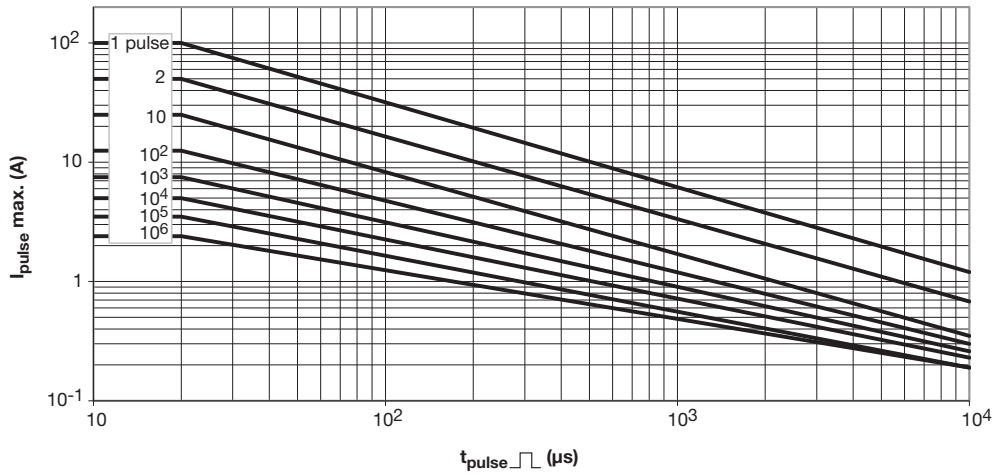
### 275 V<sub>RMS</sub> to 680 V<sub>RMS</sub>; VDRS20



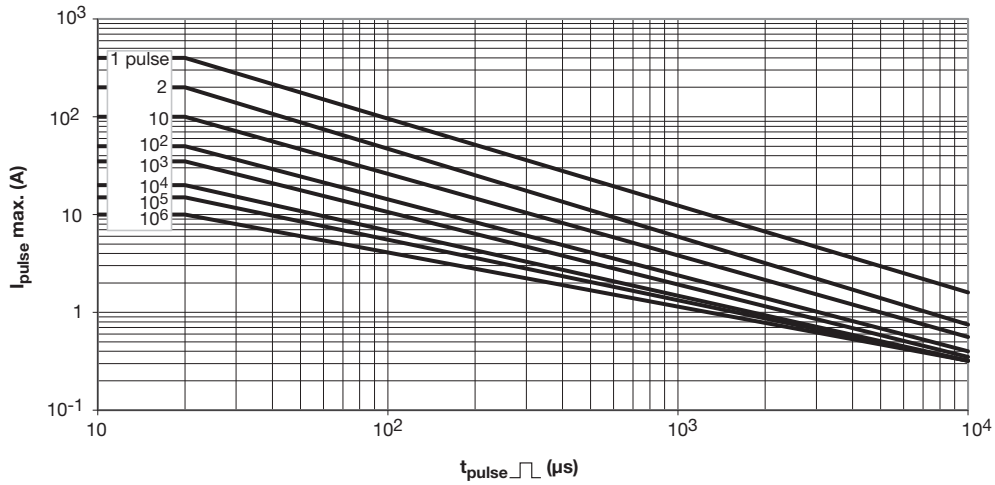


**MAXIMUM APPLICABLE TRANSIENT CURRENT AS A FUNCTION OF PULSE DURATION**

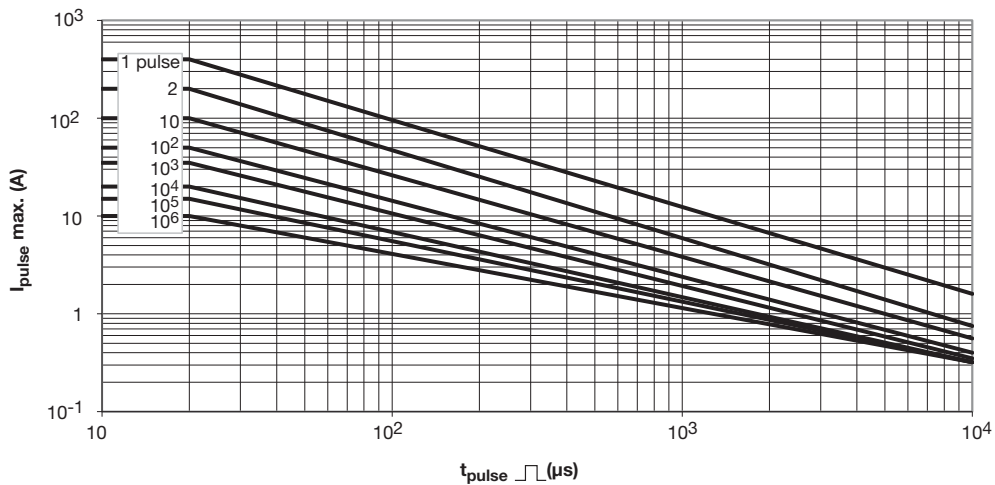
14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS05



50 V<sub>RMS</sub> to 460 V<sub>RMS</sub>; VDRS05

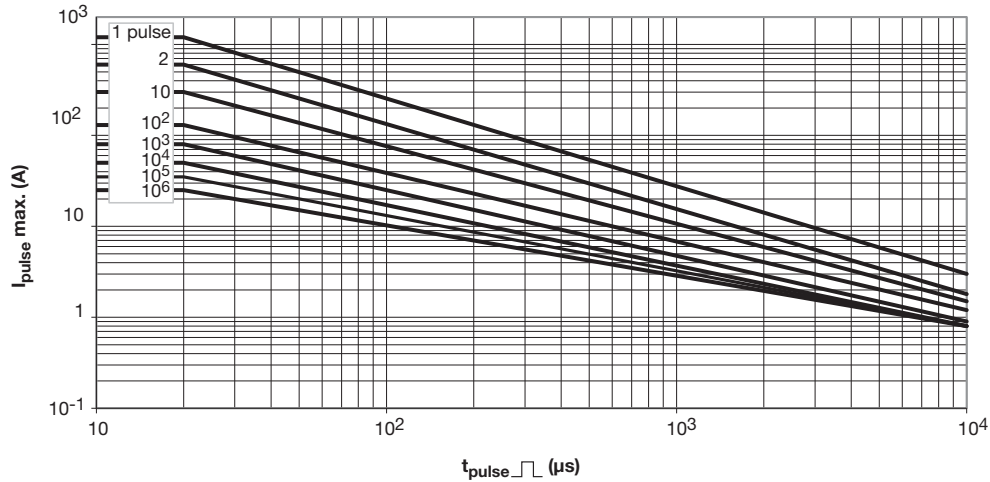


14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS07

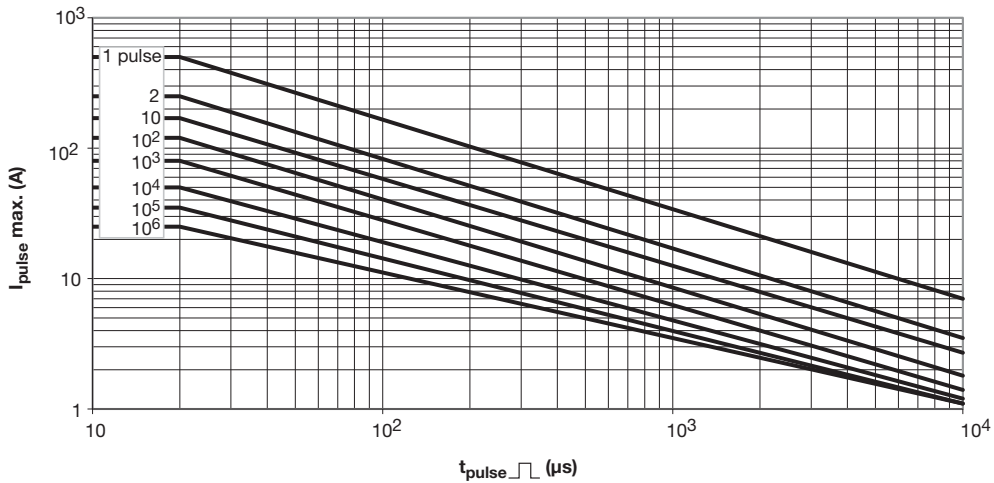




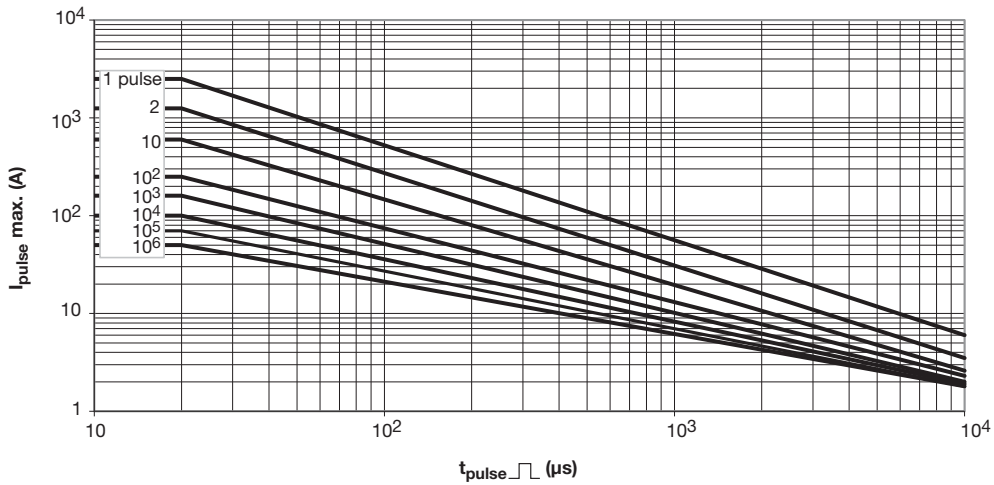
50 V<sub>RMS</sub> to 510 V<sub>RMS</sub>; VDRS07



14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS10



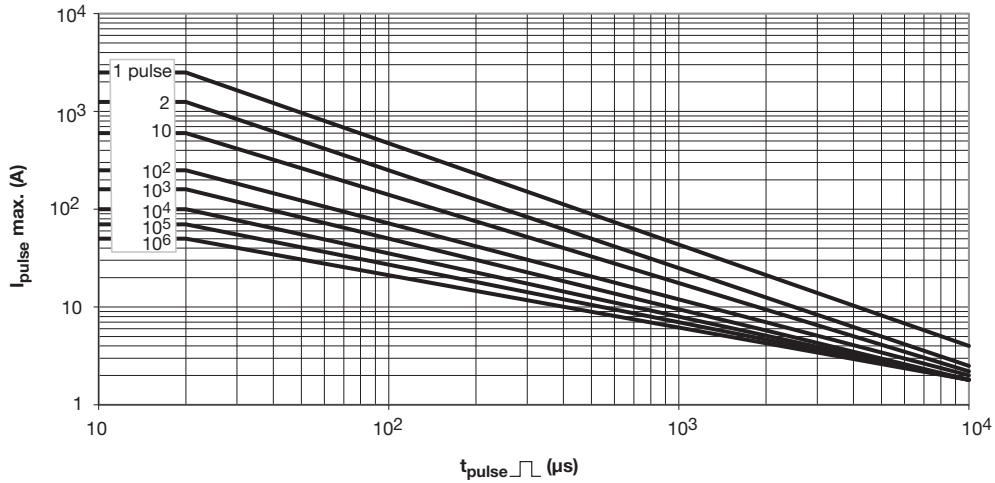
50 V<sub>RMS</sub> to 300 V<sub>RMS</sub>; VDRS10



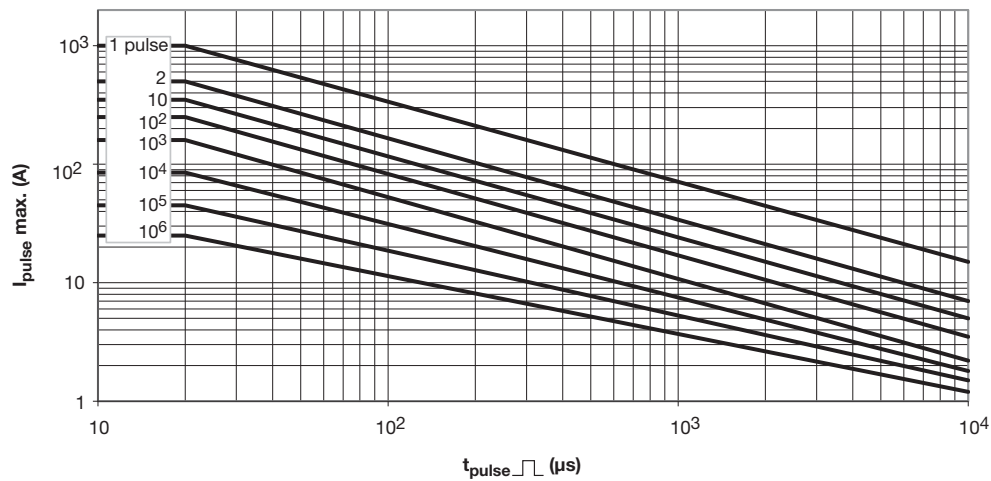




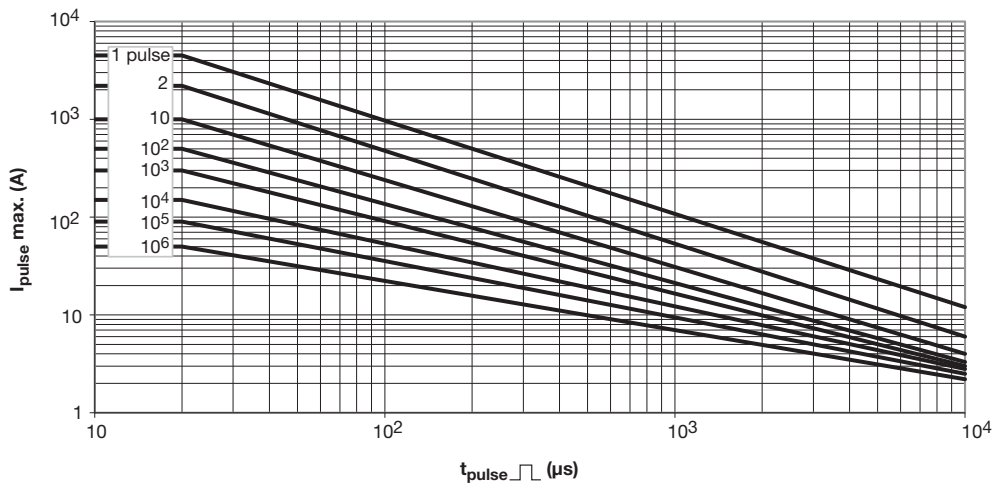
320 V<sub>RMS</sub> to 680 V<sub>RMS</sub>; VDRS10



14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS14

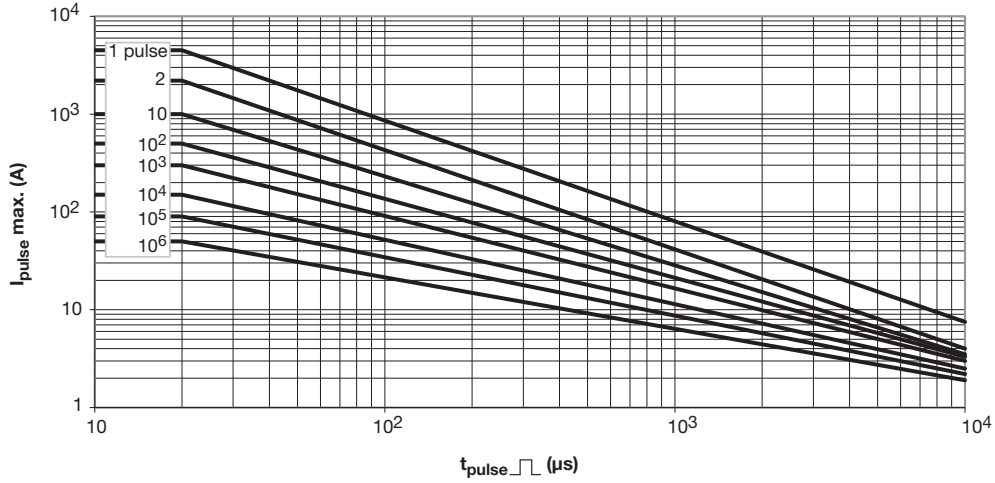


50 V<sub>RMS</sub> to 300 V<sub>RMS</sub>; VDRS14

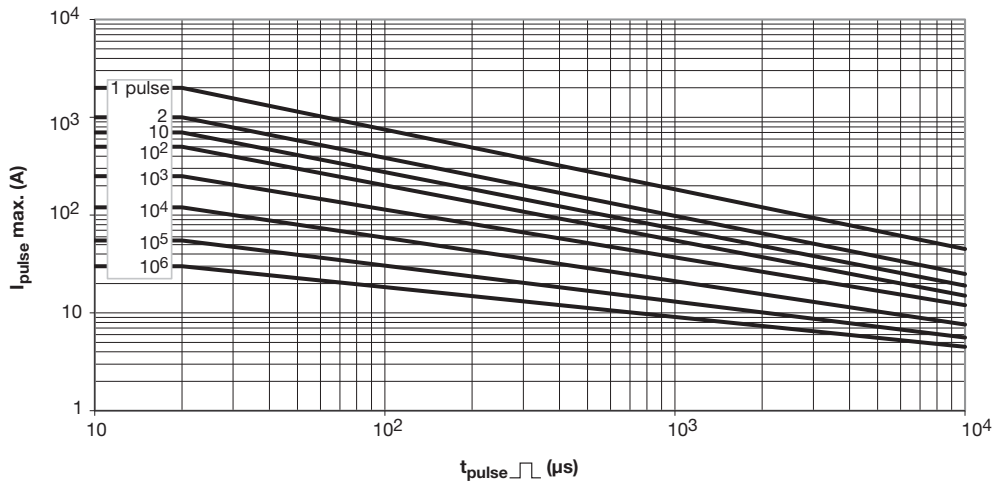




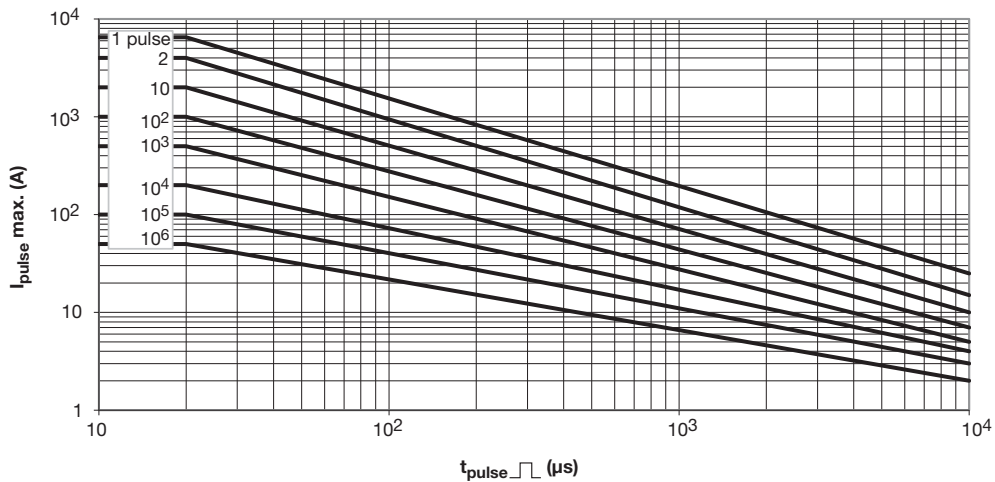
320 V<sub>RMS</sub> to 680 V<sub>RMS</sub>; VDRS14



14 V<sub>RMS</sub> to 40 V<sub>RMS</sub>; VDRS20

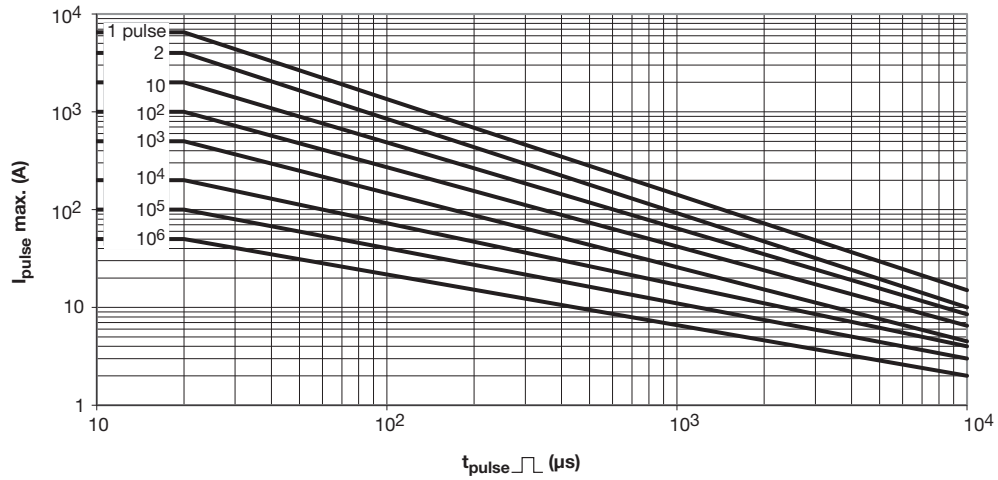


60 V<sub>RMS</sub> to 300 V<sub>RMS</sub>; VDRS20





320 V<sub>RMS</sub> to 680 V<sub>RMS</sub>; VDRS20





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