

VDR Metal Oxide Varistors High Surge



FEATURES

- Low β high purity zinc oxide disc
- Halogen free insulating epoxy coating
- Straight or kinked leads
- Higher current surge/size ratio capability up to 10 kA for H20 types
- 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



QUICK REFERENCE DATA

| PARAMETER | VALUE | UNIT |
|---|---|--------------|
| Maximum continuous voltage in operating temperature range: | | |
| RMS | 11 to 680 | V |
| DC | 14 to 895 | V |
| Maximum non-repetitive transient current I_{NRP} (8 x 20 μ s) | 250 to 10 000 | A |
| Maximum energy (10/1000 μ s) | 0.7 to 620 | J |
| Detailed specification | Based on IEC 61051-1 IEC 61051-2 IEC 61051-2-2 | |
| Storage temperature | -40 to +150 | $^{\circ}$ C |
| Operating temperature | -40 to +125 | $^{\circ}$ C |

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.

Note

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

APPLICATION

- Overvoltage and transient voltage protection

DESCRIPTION

The varistors consist of a disc of low- β ceramic material with two solid copper leads (H20 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, cutting and bending equipment.

Typical Soldering

235 $^{\circ}$ C, duration: 5 s (Pb-bearing)
245 $^{\circ}$ C, duration: 5 s (lead (Pb)-free)

Resistance to Soldering Heat

260 $^{\circ}$ C; duration: 10 s max.

MARKING

The varistors are marked with the following information:

- Maximum continuous RMS voltage with - E suffix
- Series number (582, 583, 584, 585 or 586)
- Manufacture logo
- Date of manufacture (YYWW)
- Safety marks on VDRH10-14-20 types

INFLAMMABILITY

The varistors are passive non-flammable. The encapsulation is made of flame resistant epoxy in accordance with UL 94 V-0.



| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | | | | | |
|--|--------|--------------------------------|-----------------------------------|-------|--|--|------------------------------|----------|-----------|-------------------------------------|--------------------------------|
| MAXIMUM CONTINUOUS VOLTAGE | | VOLTAGE ⁽³⁾ at 1 mA | MAXIMUM VOLTAGE at STATED CURRENT | | MAXIMUM ENERGY ⁽⁴⁾ (10 x 1000 µs) | MAXIMUM NON-REP. TRANSIENT CURRENT ⁽⁵⁾ I _{NRP} (8 x 20 µs) | TYPICAL CAPACITANCE at 1 kHz | T (max.) | E | UL 1449 ED3 SPD TYPE ⁽⁷⁾ | CATALOG NUMBERS ⁽¹⁾ |
| RMS ⁽²⁾ (V) | DC (V) | (V) | V (V) | I (A) | (J) | (A) | (pF) | (mm) | (mm) | | SAP ⁽⁶⁾ |
| 11 | 14 | 18 | 40 | 1.0 | 0.7 | 250 | 1600 | 3.4 | 0.5 ± 0.3 | 4 | VDRH05B011xyE |
| | | | 36 | 2.5 | 1.5 | 500 | 3600 | 3.4 | 0.5 ± 0.3 | 4 | VDRH07D011xyE |
| | | | 36 | 5.0 | 2.6 | 1000 | 8000 | 3.8 | 0.7 ± 0.3 | 4 | VDRH10G011xyE |
| | | | 36 | 10.0 | 5.2 | 2000 | 20 000 | 3.8 | 0.7 ± 0.3 | 4 | VDRH14M011xyE |
| 14 | 18 | 22 | 48 | 1.0 | 0.8 | 250 | 1300 | 3.4 | 0.7 ± 0.3 | 4 | VDRH05B014xyE |
| | | | 43 | 2.5 | 1.7 | 500 | 2800 | 3.4 | 0.7 ± 0.3 | 4 | VDRH07D014xyE |
| | | | 43 | 5.0 | 3.2 | 1000 | 6000 | 3.8 | 0.9 ± 0.3 | 4 | VDRH10G014xyE |
| | | | 43 | 10.0 | 6.3 | 2000 | 15 000 | 3.8 | 0.9 ± 0.3 | 4 | VDRH14M014xyE |
| | | | 43 | 20.0 | 16.0 | 3000 | 30 000 | 4.2 | 1.1 ± 0.3 | 3 | VDRH20R014ByE |
| 17 | 22 | 27 | 60 | 1.0 | 1.1 | 250 | 1050 | 3.7 | 0.8 ± 0.3 | 4 | VDRH05B017xyE |
| | | | 53 | 2.5 | 2.1 | 500 | 2000 | 3.7 | 0.8 ± 0.3 | 4 | VDRH07D017xyE |
| | | | 53 | 5.0 | 3.9 | 1000 | 4000 | 4.1 | 1.0 ± 0.3 | 4 | VDRH10G017xyE |
| | | | 53 | 10.0 | 7.8 | 2000 | 10 000 | 4.1 | 1.0 ± 0.3 | 4 | VDRH14M017xyE |
| | | | 53 | 20.0 | 19.0 | 3000 | 20 000 | 4.5 | 1.2 ± 0.3 | 3 | VDRH20R017ByE |
| 20 | 26 | 33 | 73 | 1.0 | 1.3 | 250 | 900 | 3.9 | 1.0 ± 0.3 | 4 | VDRH05B020xyE |
| | | | 65 | 2.5 | 2.8 | 500 | 1500 | 3.9 | 1.0 ± 0.3 | 4 | VDRH07D020xyE |
| | | | 65 | 5.0 | 4.8 | 1000 | 3000 | 4.3 | 1.2 ± 0.3 | 4 | VDRH10G020xyE |
| | | | 65 | 10.0 | 9.5 | 2000 | 7500 | 4.3 | 1.2 ± 0.3 | 4 | VDRH14M020xyE |
| | | | 65 | 20.0 | 24.0 | 3000 | 15 000 | 4.7 | 1.4 ± 0.3 | 3 | VDRH20R020ByE |
| 25 | 31 | 39 | 86 | 1.0 | 1.5 | 250 | 500 | 4.2 | 1.2 ± 0.3 | 4 | VDRH05B025xyE |
| | | | 77 | 2.5 | 3.0 | 500 | 1350 | 4.2 | 1.2 ± 0.3 | 4 | VDRH07D025xyE |
| | | | 77 | 5.0 | 5.6 | 1000 | 2600 | 4.6 | 1.4 ± 0.3 | 4 | VDRH10G025xyE |
| | | | 77 | 10.0 | 11.0 | 2000 | 6500 | 4.6 | 1.4 ± 0.3 | 4 | VDRH14M025xyE |
| | | | 77 | 20.0 | 28.0 | 3000 | 13 000 | 5.0 | 1.6 ± 0.3 | 3 | VDRH20R025ByE |
| 30 | 38 | 47 | 104 | 1.0 | 1.8 | 250 | 700 | 4.4 | 1.4 ± 0.5 | 4 | VDRH05B030xyE |
| | | | 93 | 2.5 | 3.8 | 500 | 1600 | 4.4 | 1.4 ± 0.5 | 4 | VDRH07D030xyE |
| | | | 93 | 5.0 | 6.8 | 1000 | 2700 | 4.8 | 1.6 ± 0.5 | 4 | VDRH10G030xyE |
| | | | 93 | 10.0 | 14.0 | 2000 | 6000 | 4.8 | 1.6 ± 0.5 | 4 | VDRH14M030xyE |
| | | | 93 | 20.0 | 34.0 | 3000 | 12 000 | 5.2 | 1.8 ± 0.5 | 3 | VDRH20R030ByE |
| 35 | 45 | 56 | 123 | 1.0 | 2.2 | 250 | 560 | 4.8 | 1.7 ± 0.5 | 4 | VDRH05B035xyE |
| | | | 110 | 2.5 | 4.4 | 500 | 1300 | 4.8 | 1.7 ± 0.5 | 4 | VDRH07D035xyE |
| | | | 110 | 5.0 | 8.1 | 1000 | 2200 | 5.2 | 1.9 ± 0.5 | 4 | VDRH10G035xyE |
| | | | 110 | 10.0 | 16.0 | 2000 | 4800 | 5.2 | 1.9 ± 0.5 | 4 | VDRH14M035xyE |
| | | | 110 | 20.0 | 41.0 | 3000 | 9600 | 5.6 | 2.1 ± 0.5 | 3 | VDRH20R035ByE |
| 40 | 56 | 68 | 150 | 1.0 | 2.6 | 250 | 460 | 5.1 | 2.1 ± 0.5 | 4 | VDRH05B040xyE |
| | | | 135 | 2.5 | 5.4 | 500 | 1000 | 5.1 | 2.1 ± 0.5 | 4 | VDRH07D040xyE |
| | | | 135 | 5.0 | 9.8 | 1000 | 1800 | 5.5 | 2.3 ± 0.5 | 4 | VDRH10G040xyE |
| | | | 135 | 10.0 | 20.0 | 2000 | 3800 | 5.5 | 2.3 ± 0.5 | 4 | VDRH14M040xyE |
| | | | 135 | 20.0 | 49.0 | 3000 | 7600 | 5.9 | 2.5 ± 0.5 | 3 | VDRH20R040ByE |
| 50 | 65 | 82 | 145 | 5.0 | 3.5 | 800 | 370 | 3.5 | 0.6 ± 0.3 | 4 | VDRH05E050xyE |
| | | | 135 | 10.0 | 7.0 | 1750 | 900 | 3.5 | 0.6 ± 0.3 | 4 | VDRH07K050xyE |
| | | | 135 | 25.0 | 14.0 | 3500 | 1500 | 3.9 | 0.8 ± 0.3 | 3 | VDRH10S050xyE |
| | | | 135 | 50.0 | 28.0 | 6000 | 3100 | 3.9 | 0.8 ± 0.3 | 2 | VDRH14V050xyE |



| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | | | | | |
|--|--------|--------------------------------|-----------------------------------|-------|--|--|------------------------------|----------|-----------|-------------------------------------|--------------------------------|
| MAXIMUM CONTINUOUS VOLTAGE | | VOLTAGE ⁽³⁾ at 1 mA | MAXIMUM VOLTAGE at STATED CURRENT | | MAXIMUM ENERGY ⁽⁴⁾ (10 x 1000 µs) | MAXIMUM NON-REP. TRANSIENT CURRENT ⁽⁵⁾ I _{NRP} (8 x 20 µs) | TYPICAL CAPACITANCE at 1 kHz | T (max.) | E | UL 1449 ED3 SPD TYPE ⁽⁷⁾ | CATALOG NUMBERS ⁽¹⁾ |
| RMS ⁽²⁾ (V) | DC (V) | (V) | V (V) | I (A) | (J) | (A) | (pF) | (mm) | (mm) | | SAP ⁽⁶⁾ |
| 60 | 85 | 100 | 175 | 5.0 | 4.5 | 800 | 290 | 3.7 | 0.7 ± 0.3 | 4 | VDRH05E060xyE |
| | | | 165 | 10.0 | 9.0 | 1750 | 700 | 3.7 | 0.7 ± 0.3 | 4 | VDRH07K060xyE |
| | | | 165 | 25.0 | 18.0 | 3500 | 1200 | 4.1 | 0.9 ± 0.3 | 4 | VDRH10S060xyE |
| | | | 165 | 50.0 | 36.0 | 6000 | 2300 | 4.1 | 0.9 ± 0.3 | 2 | VDRH14V060xyE |
| | | | 165 | 100.0 | 72.0 | 10 000 | 4600 | 4.5 | 1.1 ± 0.3 | 2 | VDRH20X060ByE |
| 75 | 100 | 120 | 210 | 5.0 | 5.5 | 800 | 240 | 4.0 | 0.9 ± 0.3 | 4 | VDRH05E075xyE |
| | | | 200 | 10.0 | 11.0 | 1750 | 530 | 4.0 | 0.9 ± 0.3 | 4 | VDRH07K075xyE |
| | | | 200 | 25.0 | 22.0 | 3500 | 1000 | 4.4 | 1.1 ± 0.3 | 4 | VDRH10S075xyE |
| | | | 200 | 50.0 | 44.0 | 6000 | 1900 | 4.4 | 1.1 ± 0.3 | 2 | VDRH14V075xyE |
| | | | 200 | 100.0 | 88.0 | 10 000 | 3800 | 4.8 | 1.3 ± 0.3 | 2 | VDRH20X075ByE |
| 95 | 125 | 150 | 260 | 5.0 | 6.5 | 800 | 180 | 4.2 | 1.1 ± 0.3 | 4 | VDRH05E095xyE |
| | | | 250 | 10.0 | 13.0 | 1750 | 450 | 4.2 | 1.1 ± 0.3 | 4 | VDRH07K095xyE |
| | | | 250 | 25.0 | 25.0 | 3500 | 800 | 4.6 | 1.3 ± 0.3 | 4 | VDRH10S095xyE |
| | | | 250 | 50.0 | 53.0 | 6000 | 1500 | 4.6 | 1.3 ± 0.3 | 2 | VDRH14V095xyE |
| | | | 250 | 100.0 | 106.0 | 10 000 | 3000 | 5.0 | 1.5 ± 0.3 | 2 | VDRH20X095ByE |
| 115 | 150 | 180 | 320 | 5.0 | 8.0 | 800 | 150 | 3.6 | 0.9 ± 0.3 | 4 | VDRH05E115xyE |
| | | | 300 | 10.0 | 16.0 | 1750 | 390 | 3.6 | 0.9 ± 0.3 | 4 | VDRH07K115xyE |
| | | | 300 | 25.0 | 32.0 | 3500 | 680 | 4.0 | 1.1 ± 0.3 | 3 | VDRH10S115xyE |
| | | | 300 | 50.0 | 65.0 | 6000 | 1320 | 4.0 | 1.1 ± 0.3 | 2 | VDRH14V115xyE |
| | | | 300 | 100.0 | 130.0 | 10 000 | 2640 | 4.4 | 1.3 ± 0.3 | 2 | VDRH20X115ByE |
| 130 | 170 | 205 | 355 | 5.0 | 8.5 | 800 | 130 | 3.8 | 1.0 ± 0.3 | 4 | VDRH05E130xyE |
| | | | 340 | 10.0 | 17.5 | 1750 | 320 | 3.8 | 1.0 ± 0.3 | 4 | VDRH07K130xyE |
| | | | 340 | 25.0 | 35.0 | 3500 | 580 | 4.3 | 1.2 ± 0.3 | 3 | VDRH10S130xyE |
| | | | 340 | 50.0 | 70.0 | 6000 | 1050 | 4.3 | 1.2 ± 0.3 | 2 | VDRH14V130xyE |
| | | | 340 | 100.0 | 140.0 | 10 000 | 2100 | 4.8 | 1.4 ± 0.3 | 2 | VDRH20X130ByE |
| 140 | 180 | 220 | 380 | 5.0 | 9.0 | 800 | 120 | 3.9 | 1.0 ± 0.3 | 4 | VDRH05E140xyE |
| | | | 360 | 10.0 | 19.0 | 1750 | 290 | 3.9 | 1.0 ± 0.3 | 4 | VDRH07K140xyE |
| | | | 360 | 25.0 | 39.0 | 3500 | 540 | 4.3 | 1.2 ± 0.3 | 3 | VDRH10S140xyE |
| | | | 360 | 50.0 | 78.0 | 6000 | 950 | 4.3 | 1.2 ± 0.3 | 2 | VDRH14V140xyE |
| | | | 360 | 100.0 | 155.0 | 10 000 | 1900 | 4.8 | 1.5 ± 0.3 | 2 | VDRH20X140ByE |
| 150 | 200 | 240 | 415 | 5.0 | 10.5 | 800 | 110 | 4.1 | 1.1 ± 0.3 | 4 | VDRH05E150xyE |
| | | | 395 | 10.0 | 21.0 | 1750 | 270 | 4.1 | 1.1 ± 0.3 | 4 | VDRH07K150xyE |
| | | | 395 | 25.0 | 42.0 | 3500 | 490 | 4.3 | 1.3 ± 0.3 | 3 | VDRH10S150xyE |
| | | | 395 | 50.0 | 84.0 | 6000 | 850 | 4.3 | 1.3 ± 0.3 | 2 | VDRH14V150xyE |
| | | | 395 | 100.0 | 168.0 | 10 000 | 1700 | 4.8 | 1.5 ± 0.3 | 2 | VDRH20X150ByE |
| 175 | 225 | 275 | 475 | 5.0 | 11.0 | 800 | 90 | 4.1 | 1.3 ± 0.3 | 4 | VDRH05E175xyE |
| | | | 455 | 10.0 | 24.0 | 1750 | 230 | 4.1 | 1.3 ± 0.3 | 4 | VDRH07K175xyE |
| | | | 455 | 25.0 | 49.0 | 3500 | 430 | 4.5 | 1.5 ± 0.3 | 3 | VDRH10S175xyE |
| | | | 455 | 50.0 | 99.0 | 6000 | 750 | 4.5 | 1.5 ± 0.3 | 2 | VDRH14V175xyE |
| | | | 455 | 100.0 | 190.0 | 10 000 | 1500 | 4.9 | 1.7 ± 0.3 | 2 | VDRH20X175ByE |
| 195 | 250 | 300 | 525 | 5.0 | 12.0 | 800 | 80 | 4.3 | 1.4 ± 0.8 | 4 | VDRH05E195xyE |
| | | | 505 | 10.0 | 26.0 | 1750 | 210 | 4.3 | 1.4 ± 0.8 | 4 | VDRH07K195xyE |
| | | | 505 | 25.0 | 52.0 | 3500 | 380 | 4.8 | 1.6 ± 0.8 | 4 | VDRH10S195xyE |
| | | | 505 | 50.0 | 105.0 | 6000 | 690 | 4.8 | 1.6 ± 0.8 | 2 | VDRH14V195xyE |
| | | | 505 | 100.0 | 210.0 | 10 000 | 1350 | 5.1 | 1.9 ± 0.8 | 2 | VDRH20X195ByE |



| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | | | | | |
|--|--------|--------------------------------|-----------------------------------|-------|--|--|------------------------------|----------|-----------|-------------------------------------|--------------------------------|
| MAXIMUM CONTINUOUS VOLTAGE | | VOLTAGE ⁽³⁾ at 1 mA | MAXIMUM VOLTAGE at STATED CURRENT | | MAXIMUM ENERGY ⁽⁴⁾ (10 x 1000 µs) | MAXIMUM NON-REP. TRANSIENT CURRENT ⁽⁵⁾ I _{NRP} (8 x 20 µs) | TYPICAL CAPACITANCE at 1 kHz | T (max.) | E | UL 1449 ED3 SPD TYPE ⁽⁷⁾ | CATALOG NUMBERS ⁽¹⁾ |
| RMS ⁽²⁾ (V) | DC (V) | (V) | V (V) | I (A) | (J) | (A) | (pF) | (mm) | (mm) | | SAP ⁽⁶⁾ |
| 210 | 275 | 330 | 575 | 5.0 | 13.0 | 800 | 75 | 4.4 | 1.6 ± 0.8 | 4 | VDRH05E210xyE |
| | | | 550 | 10.0 | 28.0 | 1750 | 190 | 4.4 | 1.6 ± 0.8 | 4 | VDRH07K210xyE |
| | | | 550 | 25.0 | 58.0 | 3500 | 350 | 4.8 | 1.8 ± 0.8 | 4 | VDRH10S210xyE |
| | | | 550 | 50.0 | 115.0 | 6000 | 610 | 4.8 | 1.8 ± 0.8 | 2 | VDRH14V210xyE |
| | | | 550 | 100.0 | 228.0 | 10 000 | 1250 | 5.3 | 2.0 ± 0.8 | 2 | VDRH20X210ByE |
| 230 | 300 | 360 | 620 | 5.0 | 16.0 | 800 | 70 | 4.6 | 1.7 ± 0.8 | 4 | VDRH05E230xyE |
| | | | 595 | 10.0 | 32.0 | 1750 | 170 | 4.6 | 1.7 ± 0.8 | 4 | VDRH07K230xyE |
| | | | 595 | 25.0 | 65.0 | 3500 | 320 | 5.1 | 1.9 ± 0.8 | 4 | VDRH10S230xyE |
| | | | 595 | 50.0 | 130.0 | 6000 | 540 | 5.1 | 1.9 ± 0.8 | 2 | VDRH14V230xyE |
| | | | 595 | 100.0 | 255.0 | 10 000 | 1100 | 5.4 | 2.2 ± 0.8 | 2 | VDRH20X230ByE |
| 250 | 320 | 390 | 675 | 5.0 | 17.0 | 800 | 60 | 4.8 | 1.9 ± 0.8 | 4 | VDRH05E250xyE |
| | | | 650 | 10.0 | 35.0 | 1750 | 160 | 4.8 | 1.9 ± 0.8 | 4 | VDRH07K250xyE |
| | | | 650 | 25.0 | 70.0 | 3500 | 300 | 5.1 | 2.1 ± 0.8 | 4 | VDRH10S250xyE |
| | | | 650 | 50.0 | 140.0 | 6000 | 480 | 5.1 | 2.1 ± 0.8 | 2 | VDRH14V250xyE |
| | | | 650 | 100.0 | 275.0 | 10 000 | 960 | 5.5 | 2.3 ± 0.8 | 2 | VDRH20X250ByE |
| 275 | 350 | 430 | 745 | 5.0 | 20.0 | 800 | 55 | 4.9 | 2.0 ± 0.8 | 4 | VDRH05E275xyE |
| | | | 710 | 10.0 | 40.0 | 1750 | 140 | 4.9 | 2.0 ± 0.8 | 4 | VDRH07K275xyE |
| | | | 710 | 25.0 | 80.0 | 3500 | 270 | 5.3 | 2.2 ± 0.8 | 4 | VDRH10S275xyE |
| | | | 710 | 50.0 | 155.0 | 6000 | 440 | 5.3 | 2.2 ± 0.8 | 5 | VDRH14V275xyE |
| | | | 710 | 100.0 | 303.0 | 10 000 | 900 | 5.8 | 2.5 ± 0.8 | 5 | VDRH20X275ByE |
| 300 | 385 | 470 | 810 | 5.0 | 21.0 | 800 | 50 | 5.1 | 2.2 ± 0.8 | 4 | VDRH05E300xyE |
| | | | 775 | 10.0 | 42.0 | 1750 | 130 | 5.1 | 2.2 ± 0.8 | 4 | VDRH07K300xyE |
| | | | 775 | 25.0 | 85.0 | 3500 | 240 | 5.5 | 2.4 ± 0.8 | 4 | VDRH10S300xyE |
| | | | 775 | 50.0 | 175.0 | 6000 | 400 | 5.5 | 2.4 ± 0.8 | 5 | VDRH14V300xyE |
| | | | 775 | 100.0 | 350.0 | 10 000 | 810 | 5.9 | 2.7 ± 0.8 | 5 | VDRH20X300ByE |
| 320 | 420 | 510 | 880 | 5.0 | 22.0 | 800 | 45 | 5.5 | 2.4 ± 0.8 | 4 | VDRH05E320xyE |
| | | | 842 | 10.0 | 45.0 | 1750 | 120 | 5.5 | 2.4 ± 0.8 | 4 | VDRH07K320xyE |
| | | | 842 | 25.0 | 92.0 | 3500 | 220 | 6.0 | 2.6 ± 0.8 | 4 | VDRH10S320xyE |
| | | | 842 | 50.0 | 190.0 | 6000 | 370 | 6.0 | 2.6 ± 0.8 | 5 | VDRH14V320xyE |
| | | | 842 | 100.0 | 382.0 | 10 000 | 750 | 6.3 | 2.9 ± 0.8 | 5 | VDRH20X320ByE |
| 350 | 460 | 560 | 940 | 5.0 | 25.0 | 800 | 42 | 5.8 | 2.7 ± 0.8 | 4 | VDRH05E350xyE |
| | | | 920 | 10.0 | 51.0 | 1750 | 110 | 5.8 | 2.7 ± 0.8 | 4 | VDRH07K350xyE |
| | | | 920 | 25.0 | 102.0 | 3500 | 200 | 6.1 | 2.9 ± 0.8 | 4 | VDRH10S350xyE |
| | | | 920 | 50.0 | 205.0 | 6000 | 320 | 6.1 | 2.9 ± 0.8 | 2 | VDRH14V350xyE |
| | | | 920 | 100.0 | 410.0 | 10 000 | 650 | 6.5 | 3.2 ± 0.8 | 2 | VDRH20X350ByE |
| 385 | 505 | 620 | 1050 | 5.0 | 27.0 | 800 | 40 | 6.0 | 3.0 ± 0.8 | 4 | VDRH05E385xyE |
| | | | 1025 | 10.0 | 54.0 | 1750 | 95 | 6.0 | 3.0 ± 0.8 | 4 | VDRH07K385xyE |
| | | | 1025 | 25.0 | 107.0 | 3500 | 180 | 6.5 | 3.2 ± 0.8 | 3 | VDRH10S385xyE |
| | | | 1025 | 50.0 | 215.0 | 6000 | 280 | 6.5 | 3.2 ± 0.8 | 2 | VDRH14V385xyE |
| | | | 1025 | 100.0 | 420.0 | 10 000 | 570 | 6.8 | 3.5 ± 0.8 | 2 | VDRH20X385ByE |
| 420 | 560 | 680 | 1150 | 5.0 | 28.0 | 800 | 35 | 6.3 | 3.2 ± 0.8 | 4 | VDRH05E420xyE |
| | | | 1120 | 10.0 | 56.0 | 1750 | 85 | 6.3 | 3.2 ± 0.8 | 4 | VDRH07K420xyE |
| | | | 1120 | 25.0 | 112.0 | 3500 | 165 | 6.7 | 3.4 ± 0.8 | 3 | VDRH10S420xyE |
| | | | 1120 | 50.0 | 225.0 | 6000 | 250 | 6.7 | 3.4 ± 0.8 | 2 | VDRH14V420xyE |
| | | | 1120 | 100.0 | 430.0 | 10 000 | 510 | 7.1 | 3.7 ± 0.8 | 2 | VDRH20X420ByE |



| ELECTRICAL DATA AND ORDERING INFORMATION | | | | | | | | | | | |
|--|-----------|-----------------------------------|--------------------------------------|----------|---|--|---------------------------------|-------------|-----------|--|--------------------------------|
| MAXIMUM CONTINUOUS VOLTAGE | | VOLTAGE ⁽³⁾ at 1 mA | MAXIMUM VOLTAGE at STATED CURRENT | | MAXIMUM ENERGY ⁽⁴⁾ (10 x 1000 µs) | MAXIMUM NON-REP. TRANSIENT CURRENT ⁽⁵⁾ I _{NRP} (8 x 20 µs) | TYPICAL CAPACITANCE at 1 kHz | T (max.) | E | UL 1449 ED3 SPD TYPE ⁽⁷⁾ | CATALOG NUMBERS ⁽¹⁾ |
| RMS ⁽²⁾ (V) | DC (V) | (V) | V (V) | I (A) | (J) | (A) | (pF) | (mm) | (mm) | | SAP ⁽⁶⁾ |
| 460 | 615 | 750 | 1290 | 5.0 | 29.0 | 800 | 30 | 6.6 | 3.6 ± 0.8 | 4 | VDRH05E460xyE |
| | | | 1240 | 10.0 | 58.0 | 1750 | 75 | 6.6 | 3.6 ± 0.8 | 4 | VDRH07K460xyE |
| | | | 1240 | 25.0 | 115.0 | 3500 | 150 | 7.0 | 3.8 ± 0.8 | 3 | VDRH10S460xyE |
| | | | 1240 | 50.0 | 230.0 | 6000 | 225 | 7.0 | 3.8 ± 0.8 | 2 | VDRH14V460xyE |
| | | | 1240 | 100.0 | 440.0 | 10 000 | 450 | 7.5 | 4.1 ± 0.8 | 2 | VDRH20X460ByE |
| 485 | 640 | 780 | 1290 | 10.0 | 59.0 | 1750 | 65 | 6.8 | 3.7 ± 0.8 | 4 | VDRH07K485xyE |
| | | | 1290 | 25.0 | 116.0 | 3500 | 145 | 7.3 | 3.9 ± 0.8 | 3 | VDRH10S485xyE |
| | | | 1290 | 50.0 | 233.0 | 6000 | 220 | 7.3 | 3.9 ± 0.8 | 2 | VDRH14V485xyE |
| | | | 1290 | 100.0 | 450.0 | 10 000 | 400 | 7.6 | 4.2 ± 0.8 | 2 | VDRH20X485ByE |
| 510 | 670 | 820 | 1355 | 10.0 | 60.0 | 1750 | 62 | 7.0 | 3.9 ± 0.8 | 4 | VDRH07K510xyE |
| | | | 1355 | 25.0 | 118.0 | 3500 | 135 | 7.5 | 4.1 ± 0.8 | 3 | VDRH10S510xyE |
| | | | 1355 | 50.0 | 235.0 | 6000 | 220 | 7.5 | 4.1 ± 0.8 | 2 | VDRH14V510xyE |
| | | | 1355 | 100.0 | 460.0 | 10 000 | 400 | 7.9 | 4.4 ± 0.8 | 2 | VDRH20X510ByE |
| 550 | 745 | 910 | 1500 | 25.0 | 127.0 | 3500 | 120 | 7.9 | 4.5 ± 0.8 | 3 | VDRH10S550xyE |
| | | | 1500 | 50.0 | 255.0 | 6000 | 180 | 7.9 | 4.5 ± 0.8 | 3 | VDRH14V550xyE |
| | | | 1500 | 100.0 | 510.0 | 10 000 | 320 | 8.3 | 4.9 ± 0.8 | 2 | VDRH20X550ByE |
| 625 | 825 | 1000 | 1650 | 25.0 | 140.0 | 3500 | 105 | 8.4 | 5.0 ± 0.8 | 3 | VDRH10S625ByE |
| | | | 1650 | 50.0 | 283.0 | 6000 | 165 | 8.4 | 5.0 ± 0.8 | 3 | VDRH14V625ByE |
| | | | 1650 | 100.0 | 566.0 | 10 000 | 280 | 8.8 | 5.3 ± 0.8 | 2 | VDRH20X625ByE |
| 680 | 895 | 1100 | 1815 | 25.0 | 155.0 | 3500 | 80 | 9.8 | 5.4 ± 0.8 | 3 | VDRH10S680ByE |
| | | | 1815 | 50.0 | 310.0 | 6000 | 150 | 9.8 | 5.4 ± 0.8 | 3 | VDRH14V680ByE |
| | | | 1815 | 100.0 | 620.0 | 10 000 | 250 | 10.2 | 5.8 ± 0.8 | 2 | VDRH20X680ByE |

Notes

- (1) The products are certified according to (c)UL (E332800), VDE (40013495), and CSA (219883)
- (2) 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.
- (3) The voltage measured at 1 mA meets the requirements of IEC 61051. The tolerance on the voltage at 1 mA is ± 10 %.
- (4) High energy surges are generally of longer duration. The maximum energy for one pulse of 10 x 1000 µs is given as a reference for longer duration pulses. This pulse can be characterised by peak current (I_p) and pulse width t₂ (virtual time of half I_p value, following "IEC 60060-2, section 6"). If V_p is the clamping voltage corresponding to I_p, the energy absorbed in the varistor is determined by the formula: E = K x V_p x I_p x t₂ where K is dependent on the value of t₂ (see Peak Current as a Function of Pulse Width drawing).
- (5) A current wave of 8 x 20 µs 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.
- (6) For composition of the SAP part number:
 Replace "x" by B for bulk type
 T for tape and reel
 A for tape and ammpack
 Replace "y" by S for straight leads
 K for kinked leads (bulk only)
 L for kinked leads with H0 = 16 mm (tape and reel/ammo)
 M for kinked leads with H0 = 18.25 mm (tape and reel/ammo)
- (7) All varistors are recognized under VZAC2/VZCA8 surge protective devices, components type 4 as specified in UL 1449 edition 3 for operating temperatures up to 85 °C. The parts with indication type 2 or 3 SPD's, are tested and certified to be used in type 2 or 3 SPD applications for operating temperatures up to 85 °C. The parts with indication type 5 SPD, are tested and certified for operation up to 105 °C ambient temperature for use in type 2 SPD applications with nominal discharge current of 3 kA. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to underwriters laboratories Inc.

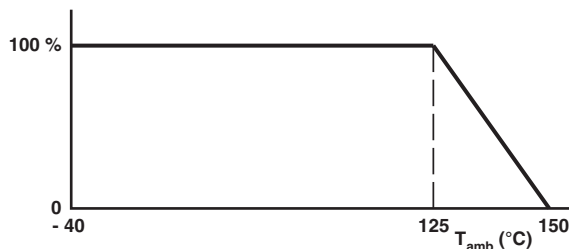


ELECTRICAL CHARACTERISTICS

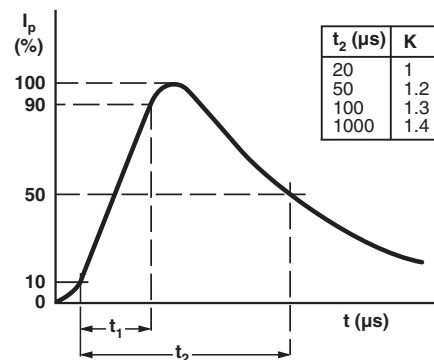
| ELECTRICAL DATA | | |
|---|----------------|--------------|
| PARAMETER | VALUE | UNIT |
| Maximum continuous voltage: | | |
| RMS | 11 to 680 | V |
| DC | 14 to 895 | V |
| Maximum non-repetitive transient current (I_{NRP}) (8 x 20 μ s) | | |
| VDRH05 | 250 or 800 | A |
| VDRH07 | 500 or 1750 | A |
| VDRH10 | 1000 or 3500 | A |
| VDRH14 | 2000 or 6000 | A |
| VDRH20 | 3000 or 10 000 | A |
| Thermal resistance: | | |
| VDRH05 | \approx 80 | K/W |
| VDRH07 | \approx 70 | K/W |
| VDRH10 | \approx 60 | K/W |
| VDRH14 | \approx 50 | K/W |
| VDRH20 | \approx 40 | K/W |
| Maximum dissipation: | | |
| VDRH05 | 100 | mW |
| VDRH07 | 250 | mW |
| VDRH10 | 400 | mW |
| VDRH14 | 600 | mW |
| VDRH20 | 1000 | mW |
| Temperature coefficient of voltage at 1 mA maximum | \pm 0.05 | %/K |
| Voltage proof between interconnected leads and case | 2500 | V |
| Storage temperature | -40 to +150 | $^{\circ}$ C |
| Operating temperature | -40 to +125 | $^{\circ}$ 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 ₀ MAX. | | L MIN. | T ⁽¹⁾ MAX. | E ⁽¹⁾ | 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 | VDRH05 |
| | 9.0 | 11.0 | | 13.0 | | 24.0 | 6.5 | 0.7 to 3.6 | 0.6 \pm 0.05 | 5 \pm 1.0 | VDRH07 |
| 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 | VDRH10 |
| 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 | VDRH14 |
| 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 | VDRH20 |

Note

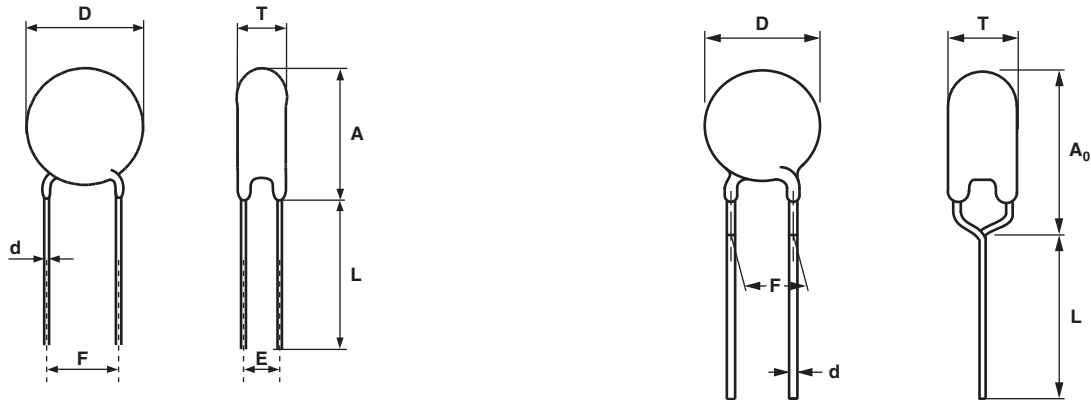
⁽¹⁾ T_{max} . and E values per size and voltage level can be found back in the Electrical Data table

| VARISTORS IN BULK | | | | | |
|---|--|--|---|---|---|
| TYPE | VDRH05.... Ø 5 mm 11 V to 460 V | VDRH07.... Ø 7 mm 11 V to 510 V | VDRH10.... Ø 10 mm 11 V to 680 V | VDRH14.... Ø 14 mm 11 V to 680 V | VDRH20.... Ø 20 mm 11 V to 680 V |
| Straight leads; see outline of components with straight leads drawing | BSE | BSE | BSE | BSE | BSE |
| Kinked leads; see outline of components with kinked leads drawing | BKE | BKE | BKE | BKE | BKE |
| Packaging quantities | | | | | |
| 11 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 |

DIMENSIONS in millimeters: See Component Dimensions and Electrical Data table

OUTLINE of Component with Straight Leads

OUTLINE of Component with Kinked Leads



| VARISTORS ON TAPE IN AMMOPACK | | | | |
|---|--|--|---|---|
| TYPE | VDRH05.... Ø 5 mm 11 V to 460 V | VDRH07.... Ø 7 mm 11 V to 510 V | VDRH10.... Ø 10 mm 11 V to 680 V | VDRH14.... Ø 14 mm 11 V to 680 V |
| Straight leads H = 18 mm H = 20 mm See drawing: taped version with straight leads | - | - | ASE | ASE |
| Kinked leads H ₀ = 18.25 mm H ₀ = 16 mm See drawing: taped version with kinked leads | AME | AME | AME | AME |
| | ALE | ALE | ALE | ALE |
| Packaging quantities | | | | |
| 14 V to 210 V | 1500 ⁽¹⁾ | 1500 ⁽¹⁾ | 500 | 500 |
| 230 V to 510 V | 1000 | 1000 | 500 | 500 |
| 550 V to max. V | - | - | 400 | 400 |

Note

⁽¹⁾ Except for 35 V and 40 V = 1000 pieces

DIMENSIONS OF AMMOPACK in millimeters


| VARISTORS ON TAPE AND REEL | | | | |
|---|---------------------------------------|---------------------------------------|--|--|
| TYPE | VDRH05.... Ø 5 mm 11 V to 460 V | VDRH07.... Ø 7 mm 11 V to 510 V | VDRH10.... Ø 10 mm 11 V to 680 V | VDRH14.... Ø 14 mm 11 V to 680 V |
| H = 18 mm H = 20 mm See drawing: taped version with straight leads | Straight leads - | - | TSE | TSE |
| Kinked leads H ₀ = 18.25 mm H ₀ = 16 mm See drawing: taped version with kinked leads | TME TLE | TME TLE | TME TLE | TME TLE |
| Packaging quantities | | | | |
| 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 VDRH05 and VDRH07)

TAPED VERSION WITH STRAIGHT LEADS (only for VDRH10 and VDRH14)


TAPED VERSION WITH KINKED LEADS

(only for VDRH05 and VDRH07)


TAPED VERSION WITH KINKED LEADS

(only for VDRH10 and VDRH14)



| TAPING DATA (based on IEC 60286-2) | | | | | | |
|------------------------------------|--|------------------------|---------------------------|--------|------------------|--------|
| SYMBOL | PARAMETER | | DIMENSIONS/TOLERANCE | | | |
| | | | VDRH05 | VDRH07 | VDRH10 | VDRH14 |
| 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_0 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 ⁽¹⁾ | | 5.0 + 0.8/- 0.2 | | 7.5 ± 0.8 | |
| H | Distance component to tape center ⁽²⁾ | | 20.0 + 2.0/- 0.0 | | 18.0 + 2.0/- 0.0 | |
| H_0 | 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 VDRH14V510xSE and VDRH14V550xSE: H = 20 mm ± 1 mm

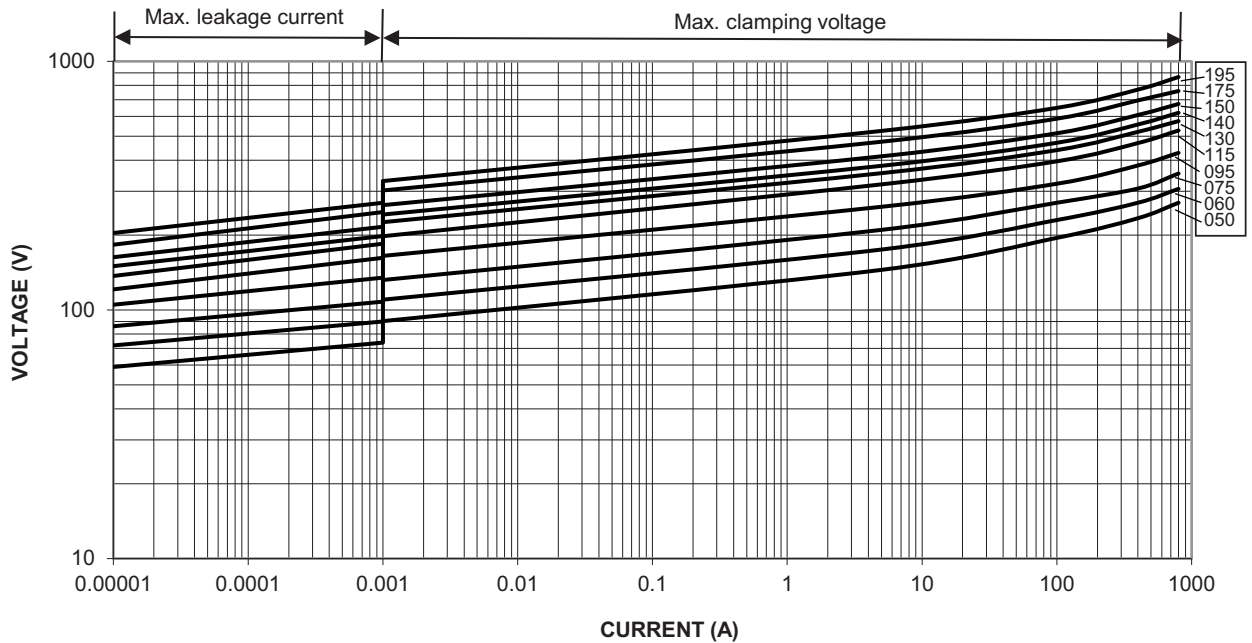


V/I CHARACTERISTICS

11 V_{RMS} to 40 V_{RMS}; VDRH05

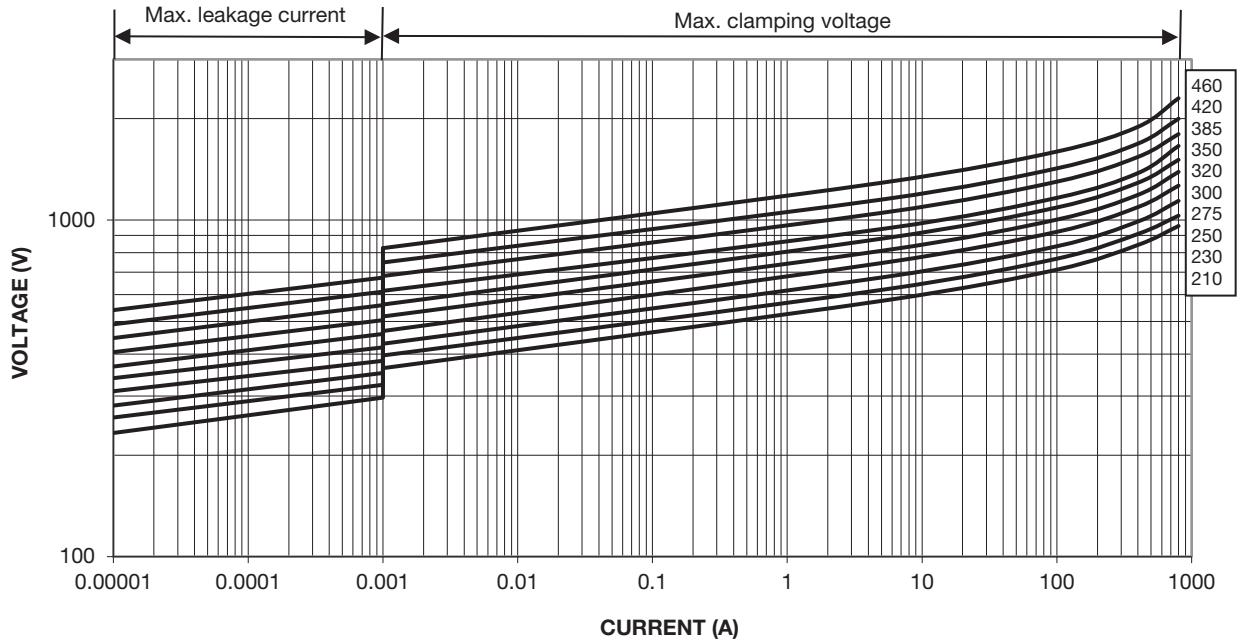


50 V_{RMS} to 195 V_{RMS}; VDRH05

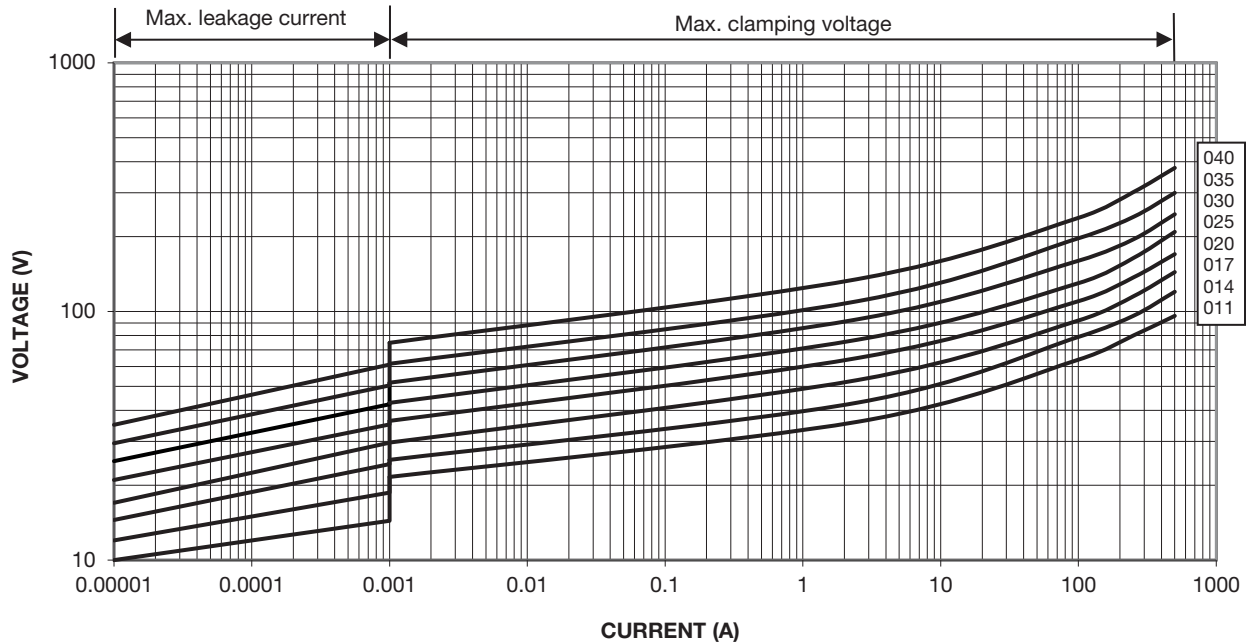




210 V_{RMS} to 460 V_{RMS}; VDRH05



11 V_{RMS} to 40 V_{RMS}; VDRH07





50 V_{RMS} to 210 V_{RMS}; VDRH07

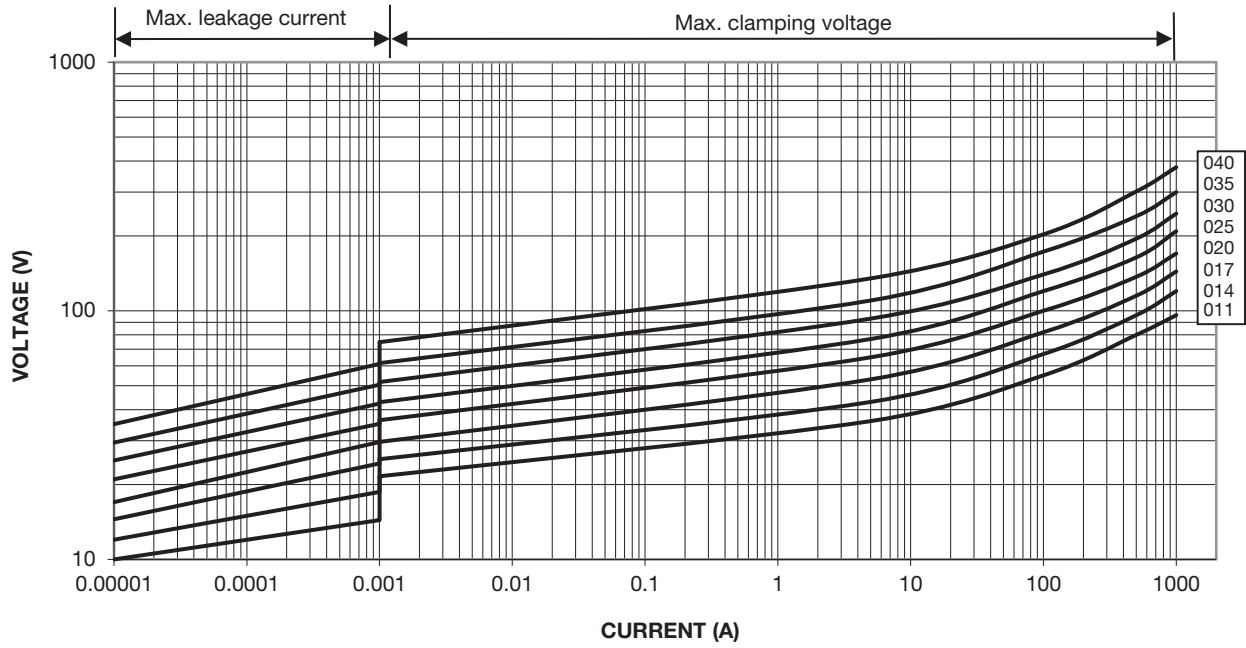


230 V_{RMS} to 510 V_{RMS}; VDRH07

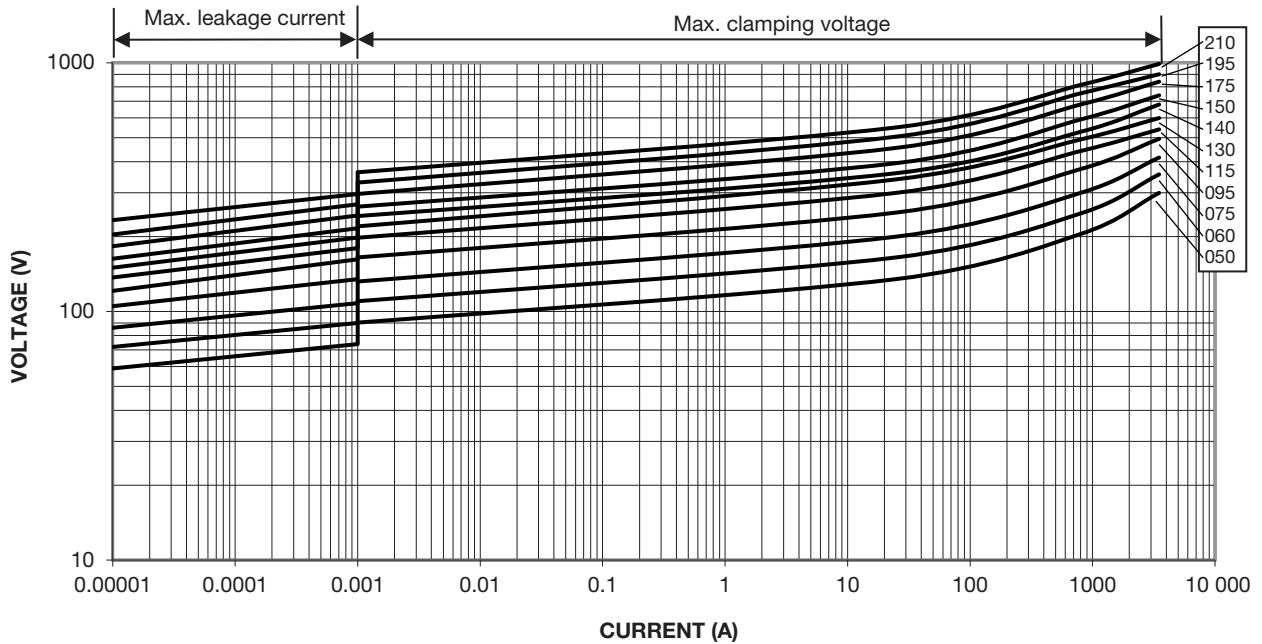




11 V_{RMS} to 40 V_{RMS}; VDRH10

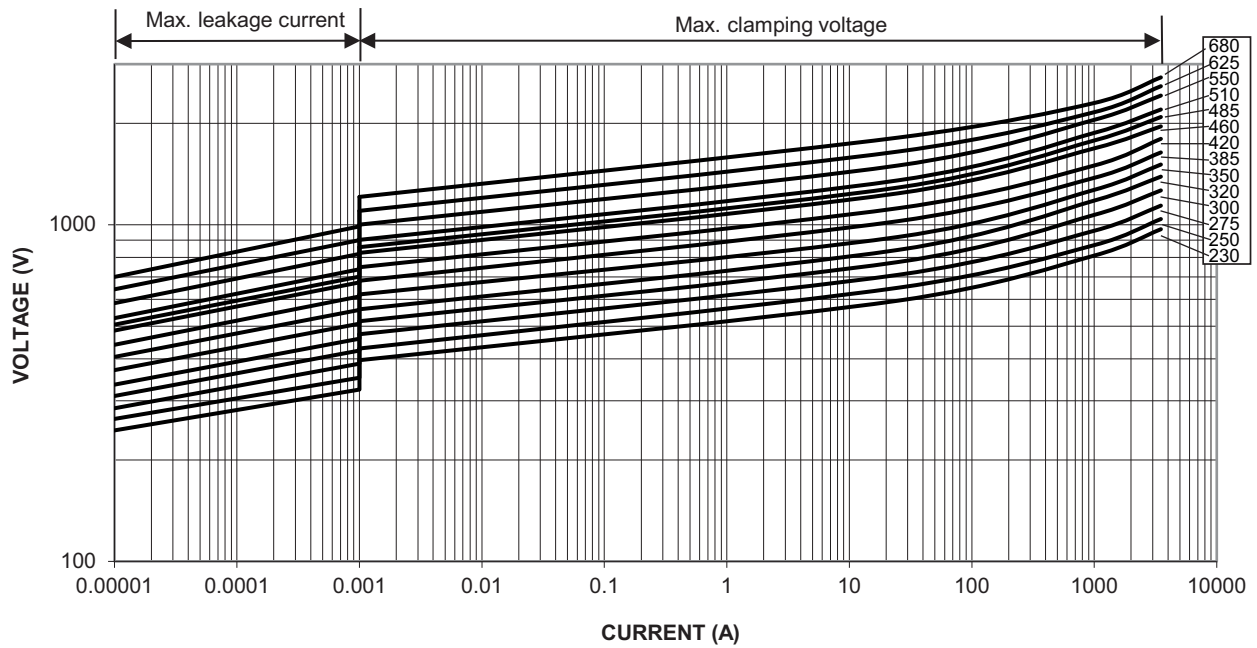


50 V_{RMS} to 210 V_{RMS}; VDRH10

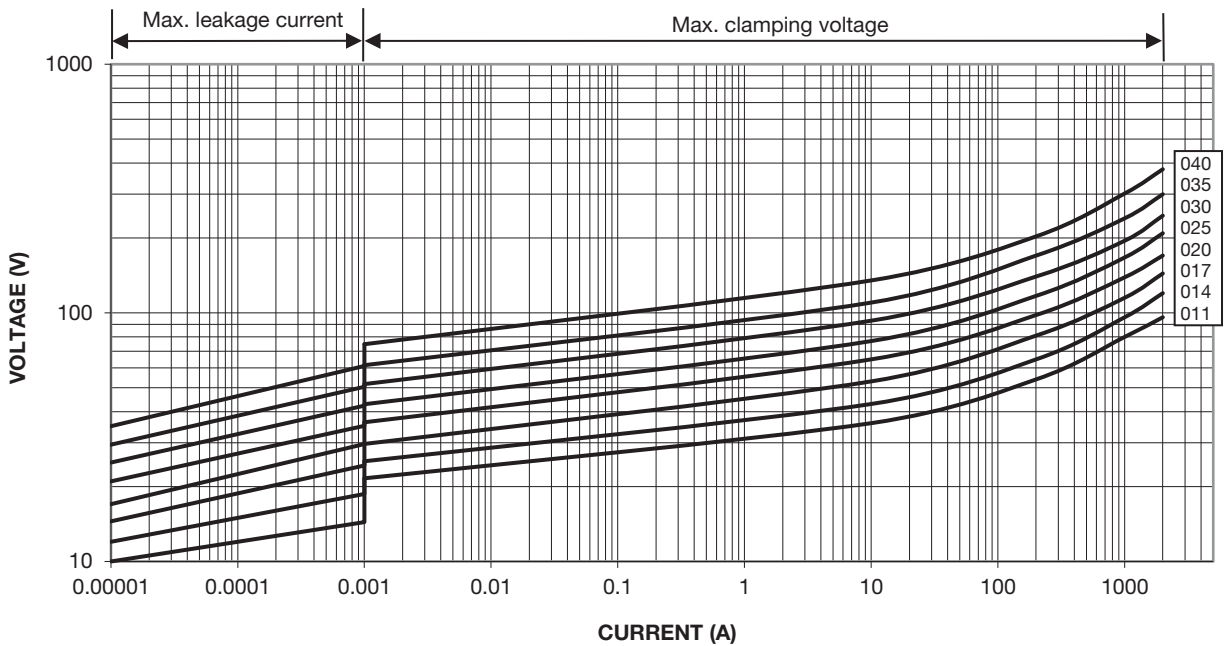




230 V_{RMS} to 680 V_{RMS}; VDRH10

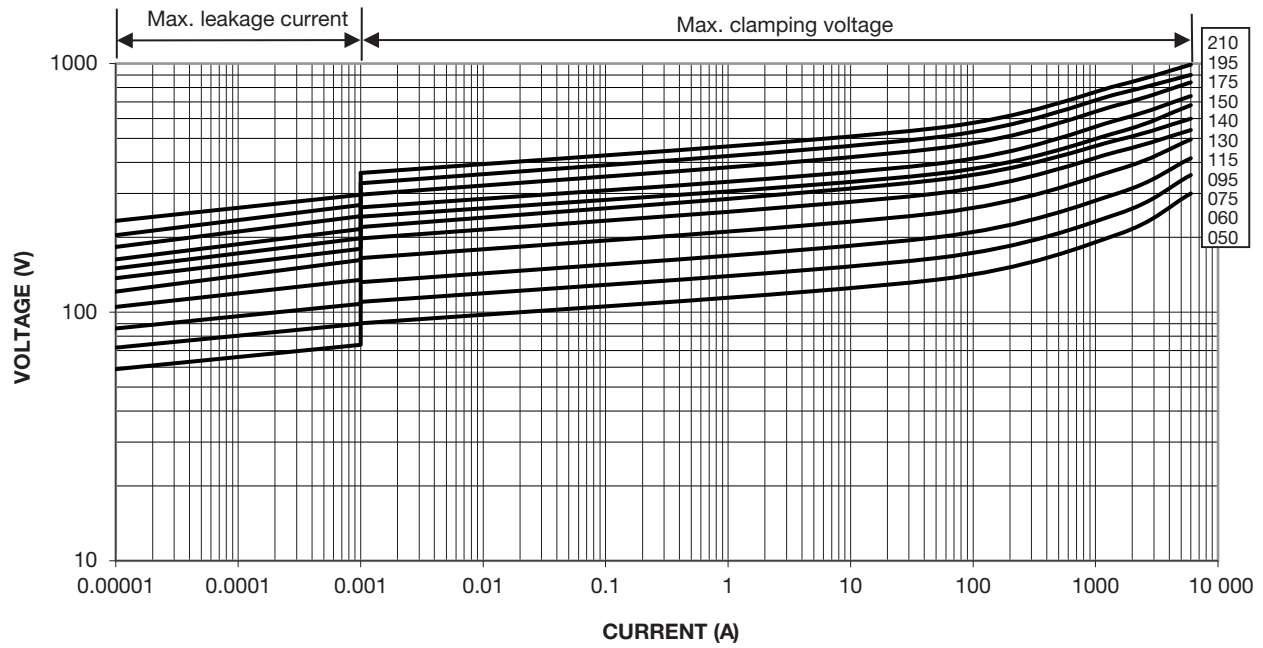


11 V_{RMS} to 40 V_{RMS}; VDRH14

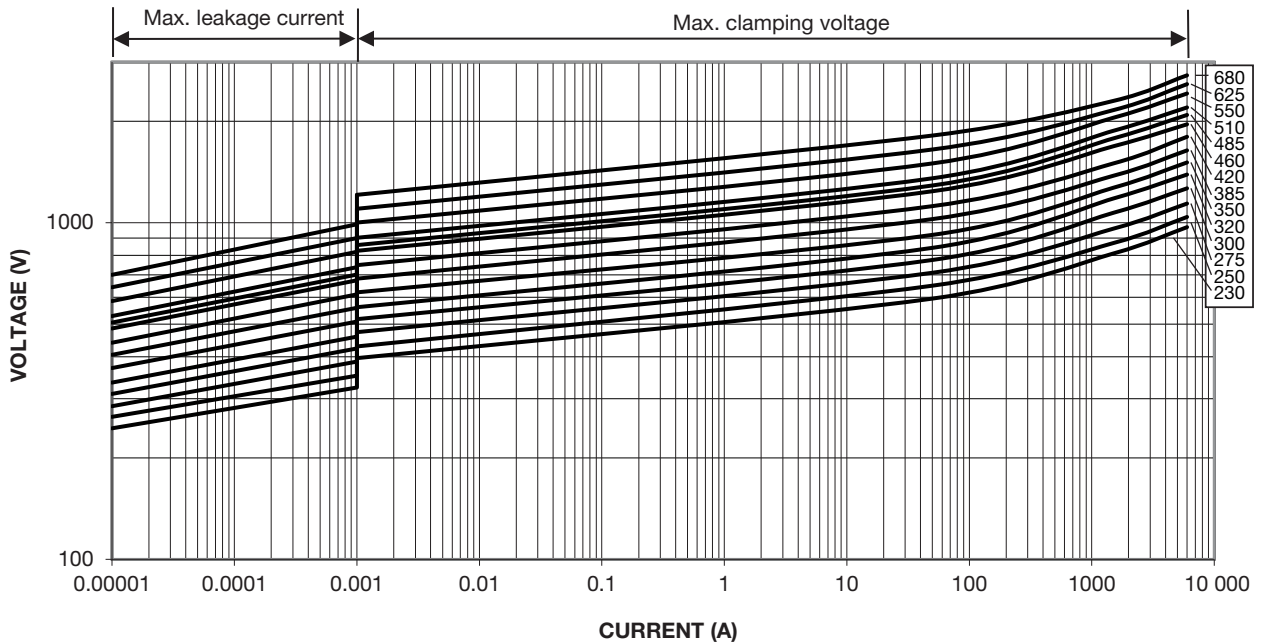




50 V_{RMS} to 210 V_{RMS}; VDRH14



230 V_{RMS} to 680 V_{RMS}; VDRH14





14 V_{RMS} to 40 V_{RMS}; VDRH20

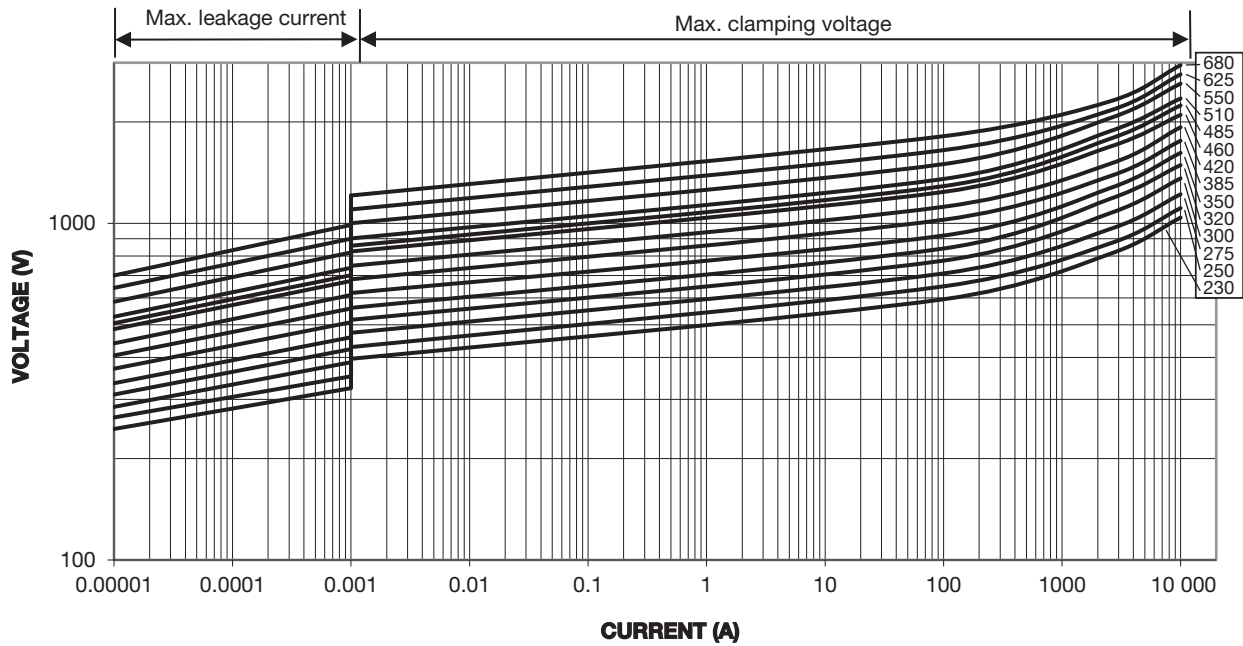


60 V_{RMS} to 210 V_{RMS}; VDRH20





230 V_{RMS} to 680 V_{RMS}; VDRH20



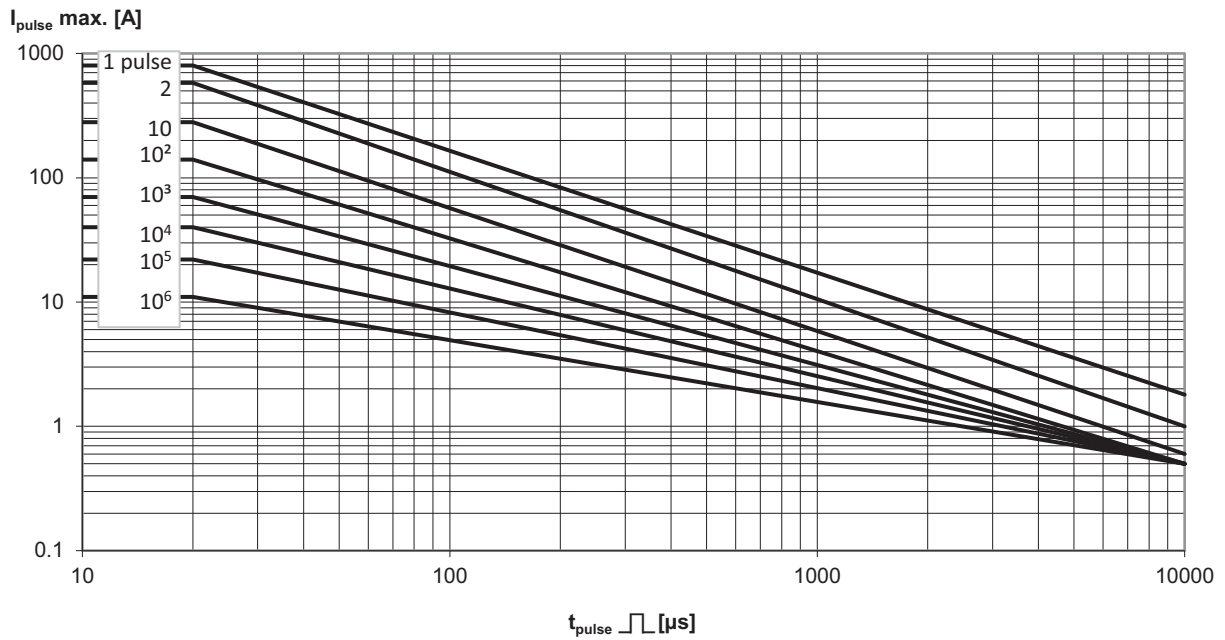
MAXIMUM APPLICABLE TRANSIENT CURRENT AS A FUNCTION OF PULSE DURATION

11 V_{RMS} to 40 V_{RMS}; VDRH05





50 V_{RMS} to 460 V_{RMS}; VDRH05

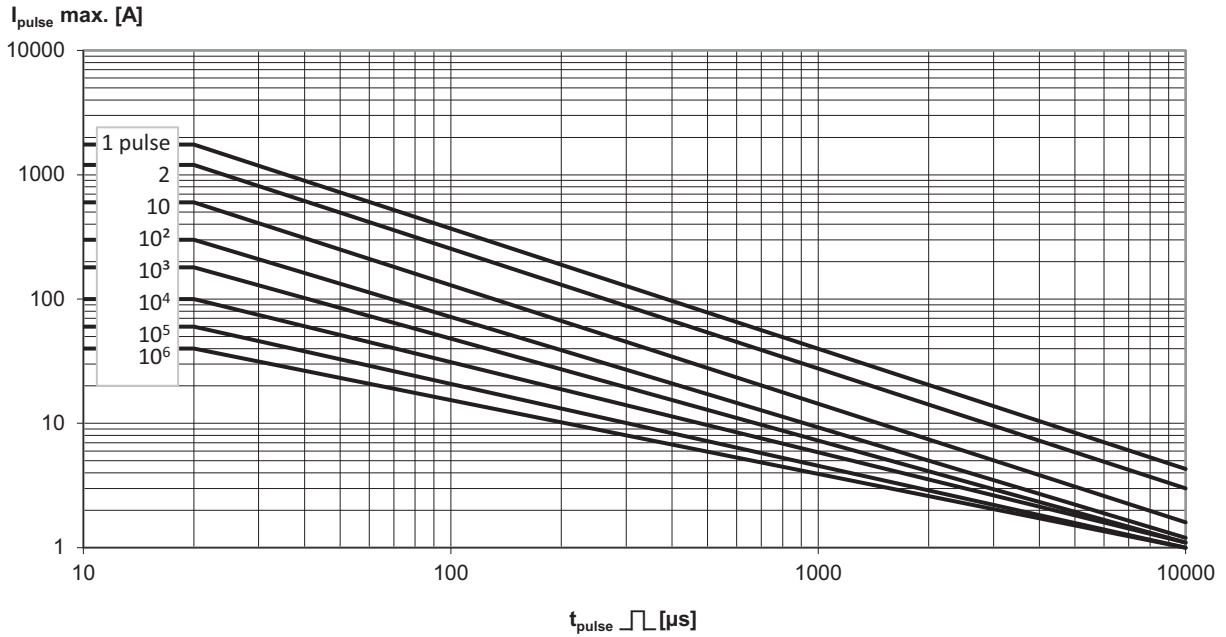


11 V_{RMS} to 40 V_{RMS}; VDRH07





50 V_{RMS} to 510 V_{RMS}; VDRH07



11 V_{RMS} to 40 V_{RMS}; VDRH10

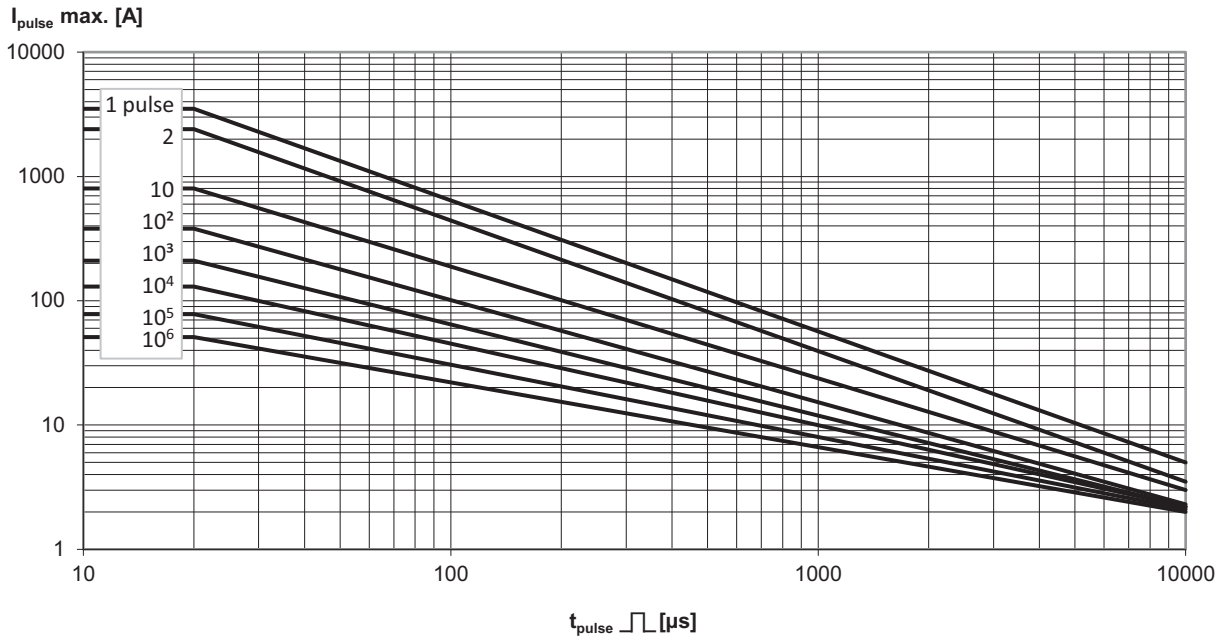




50 V_{RMS} to 300 V_{RMS}; VDRH10



320 V_{RMS} to 680 V_{RMS}; VDRH10





11 V_{RMS} to 40 V_{RMS}; VDRH14



50 V_{RMS} to 300 V_{RMS}; VDRH14





320 V_{RMS} to 680 V_{RMS}; VDRH14



14 V_{RMS} to 40 V_{RMS}; VDRH20





60 V_{RMS} to 300 V_{RMS}; VDRH20



320 V_{RMS} to 680 V_{RMS}; VDRH20





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