

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

■ Features

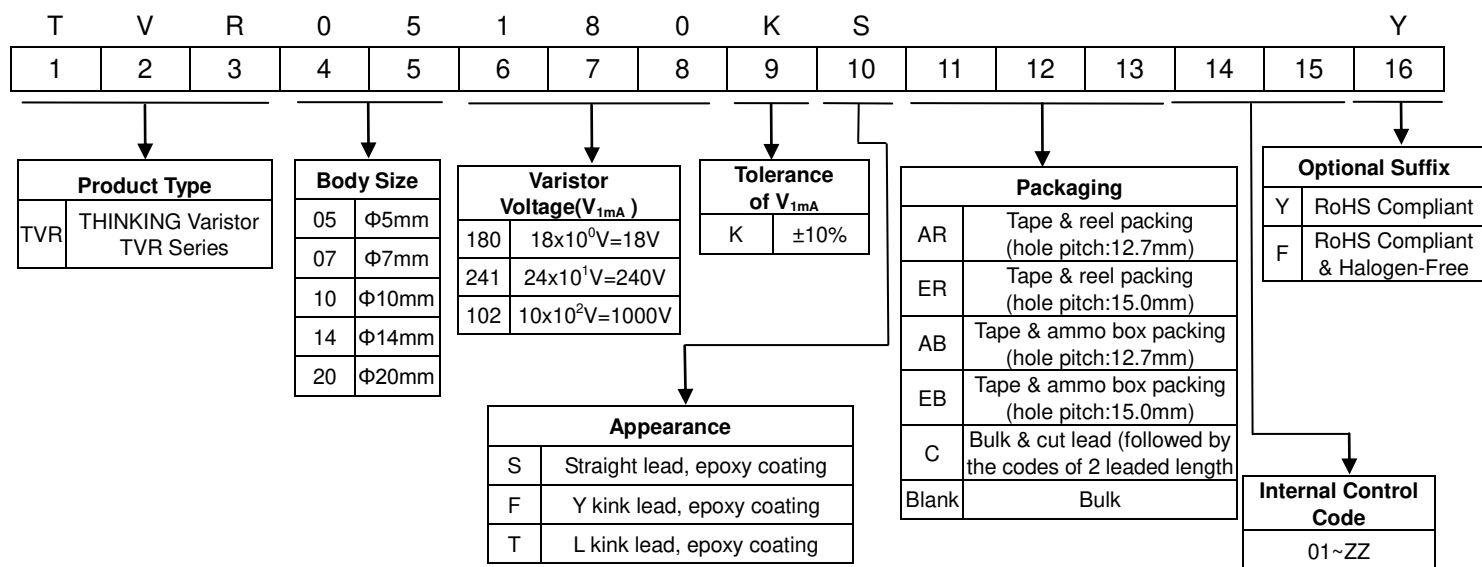
1. RoHS compliant
2. Halogen-free series are available
3. Body size: $\Phi 5 \sim \Phi 20\text{mm}$
4. Wide operating voltage range: 11Vac ~ 1000 Vac
5. Operating temperature range: $-40^{\circ}\text{C} \sim +105^{\circ}\text{C}$
Storage temperature range: $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
6. Agency recognition: UL 1449 4th / cUL / TUV/ VDE/ CQC



■ Recommended Applications

1. Power supply
2. Home appliance
3. Industrial equipment
4. Telecommunication or telephone system
5. Smart meter
6. PLC (Power line communication)
7. Lighting products
8. Photovoltaic industry

■ Part Number Code



Note: Optional suffix will be the 11th digit if packaging and internal control codes are not coded.

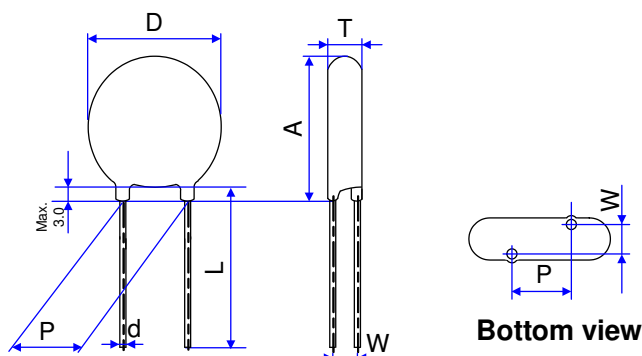
Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

Structures and Dimensions

S Type (Straight lead)



(Unit: mm)

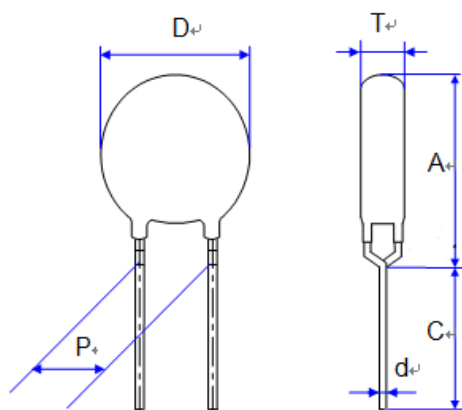
| Series | D | Lmin. | d | P | Amax. | Tmax. | W |
|--------|--|-------|----------|--|---|--|---|
| TVR05 | 5.0~7.0 | 26.5 | 0.6±0.02 | 5.0±0.5 (for TVR180-561) 5.0±1.0 (for TVR621-751) | 9.0 | Please refer to the Electrical Characteristics Table | |
| TVR07 | 6.5~9.0 | 26.5 | 0.6±0.02 | 5.0±0.5 (for TVR180-561) 5.0±1.0 (for TVR621-821) | 11.0 (for TVR07180~621) 11.5 (for TVR07681~821) | | |
| TVR10 | 9.5~12.5 9.5~13.5 (for TVR10182) | 26.5 | 0.8±0.02 | 7.5±0.5 (for TVR10180-561) 7.5±1.0 (for TVR10621-182) | 15.0 (for TVR10180-112) 15.5 (for TVR10122-182) | | |
| TVR14 | 13.5~16.0 | 26.5 | 0.8±0.02 | 7.5±0.5 (for TVR14180-561) 7.5±1.0 (for TVR14621-182) | 18.5 (for TVR14180-511) 19.0 (for TVR14561-182) | | |
| TVR20 | 19.5~22.0 | 22.5 | 1.0±0.02 | 10±1 | 25.5 (for TVR20180-511) 26.0 (for TVR20561-112) 26.5 (for TVR20122-182) | | |

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

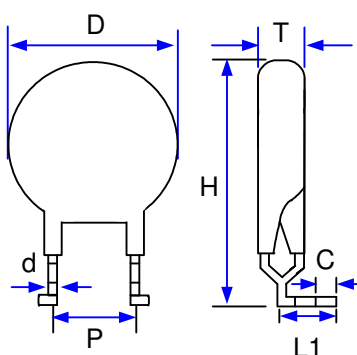
■ F Type (Y kink lead)



(Unit: mm)

| Series | D | Cmin. | d | P | Amax. | Tmax. |
|--------|--|-------|----------|--|-------|--|
| TVR05 | 5.0~7.0 | 20 | 0.6±0.02 | 5.0±0.5 (for TVR05180-561) 5.0±1.0 (for TVR05621-751) | 9.5 | Please refer to the Electrical Characteristics Table |
| TVR07 | 6.5~9.0 | 20 | 0.6±0.02 | 5.0±0.5 (for TVR07180-561) 5.0±1.0 (for TVR07621-821) | 11.5 | |
| TVR10 | 9.5~12.5 9.5~13.5 (for TVR10182) | 20 | 0.8±0.02 | 7.5±0.5 (for TVR10180-561) 7.5±1.0 (for TVR10621-182) | 16.0 | |
| TVR14 | 13.5 ~16.0 | 20 | 0.8±0.02 | 7.5±0.5 (for TVR14180-561) 7.5±1.0 (for TVR14621-182) | 19.0 | |
| TVR20 | 19.5~22 | 20 | 1.0±0.02 | 10±1 | 26.5 | |

■ T Type (L kink lead)



(Unit: mm)

| Series | D | C | d | P | Hmax. | L1 | Tmax. |
|--------|--|---------|----------|-------|-------|--------|--|
| TVR10 | 9.5~12.5 9.5~13.5 (for TVR10182) | 3.8±0.8 | 0.8±0.02 | 7.5±1 | 20.0 | 7.0±1 | Please refer to the Electrical Characteristics Table |
| TVR14 | 13.5 ~16.0 | | 0.8±0.02 | 7.5±1 | 23.5 | 10.0±1 | |
| TVR20 | 19.5~22 | | 1.0±0.02 | 10±1 | 30.5 | 9.0±1 | |

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

■ Electrical Characteristics 05mm Series

| Part No. | Varistor Voltage (@ 1mA DC) | Max. Continuous Voltage | | Max. Clamping Voltage (8/20 μ s) | | Max. Surge Current (8/20 μ s) | Rated Power | Max. Energy (10/1000 μ s) | Dimension | | |
|----------|--------------------------------|-------------------------|----------|---|-------|--------------------------------------|-------------|----------------------------------|-----------|-----------|----------------|
| | V_{1mA} | $V_{AC(rms)}$ | V_{DC} | V_P | I_P | I_{max} | P | W_{max} | T_{min} | T_{max} | W ± 1.0 |
| | (V) | (V) | (V) | (V) | (A) | (A) | (W) | (J) | (mm) | | |
| TVR05180 | 18 (16~20) | 11 | 14 | 40 | 1.0 | 100 | 0.01 | 0.4 | 2.2 | 3.9 | 1.5 |
| TVR05220 | 22 (20~24) | 14 | 18 | 48 | 1.0 | 100 | 0.01 | 0.5 | 2.2 | 4.1 | 1.5 |
| TVR05270 | 27 (24~30) | 17 | 22 | 60 | 1.0 | 100 | 0.01 | 0.6 | 2.4 | 4.3 | 1.5 |
| TVR05330 | 33 (30~36) | 20 | 26 | 73 | 1.0 | 100 | 0.01 | 0.8 | 2.6 | 4.5 | 1.5 |
| TVR05390 | 39 (35~43) | 25 | 31 | 86 | 1.0 | 100 | 0.01 | 0.9 | 2.6 | 4.6 | 1.5 |
| TVR05470 | 47 (42~52) | 30 | 38 | 104 | 1.0 | 100 | 0.01 | 1.1 | 2.3 | 4.2 | 1.5 |
| TVR05560 | 56 (50~62) | 35 | 45 | 123 | 1.0 | 100 | 0.01 | 1.3 | 2.6 | 4.3 | 1.5 |
| TVR05680 | 68 (61~75) | 40 | 56 | 150 | 1.0 | 100 | 0.01 | 1.6 | 2.8 | 4.6 | 1.5 |
| TVR05820 | 82 (74~90) | 50 | 65 | 145 | 5.0 | 400 | 0.1 | 2.5 | 2.0 | 3.9 | 1.5 |
| TVR05101 | 100 (90~110) | 60 | 85 | 175 | 5.0 | 400 | 0.1 | 3.0 | 2.1 | 4.1 | 1.6 |
| TVR05121 | 120 (108~132) | 75 | 100 | 210 | 5.0 | 400 | 0.1 | 4.0 | 2.5 | 4.3 | 1.8 |
| TVR05151 | 150 (135~165) | 95 | 125 | 260 | 5.0 | 400 | 0.1 | 4.8 | 2.0 | 4.6 | 1.6 |
| TVR05181 | 180 (162~198) | 115 | 150 | 315 | 5.0 | 400 | 0.1 | 5.9 | 2.0 | 3.9 | 1.4 |
| TVR05201 | 200 (180~220) | 130 | 170 | 355 | 5.0 | 400 | 0.1 | 6.5 | 2.1 | 4.0 | 1.5 |
| TVR05221 | 220 (198~242) | 140 | 180 | 380 | 5.0 | 400 | 0.1 | 7.0 | 2.1 | 4.0 | 1.5 |
| TVR05241 | 240 (216~264) | 150 | 200 | 415 | 5.0 | 400 | 0.1 | 8.0 | 2.3 | 4.2 | 1.6 |
| TVR05271 | 270 (243~297) | 175 | 225 | 475 | 5.0 | 400 | 0.1 | 8.5 | 2.4 | 4.4 | 1.7 |
| TVR05301 | 300 (270~330) | 195 | 250 | 525 | 5.0 | 400 | 0.1 | 8.5 | 2.7 | 4.4 | 1.9 |
| TVR05331 | 330 (297~363) | 215 | 275 | 585 | 5.0 | 400 | 0.1 | 9.2 | 2.8 | 4.5 | 2.0 |
| TVR05361 | 360 (324~396) | 230 | 300 | 620 | 5.0 | 400 | 0.1 | 10 | 2.9 | 4.6 | 2.1 |
| TVR05391 | 390 (351~429) | 250 | 320 | 675 | 5.0 | 400 | 0.1 | 12 | 3.1 | 4.8 | 2.3 |
| TVR05431 | 430 (387~473) | 275 | 350 | 745 | 5.0 | 400 | 0.1 | 13 | 3.0 | 5.1 | 2.3 |
| TVR05471 | 470 (423~517) | 300 | 385 | 810 | 5.0 | 400 | 0.1 | 15 | 3.2 | 5.2 | 2.4 |
| TVR05511 | 510 (459~561) | 320 | 410 | 878 | 5.0 | 400 | 0.1 | 16 | 3.4 | 5.4 | 2.6 |
| TVR05561 | 560 (504~616) | 350 | 450 | 962 | 5.0 | 400 | 0.1 | 18 | 3.6 | 5.5 | 2.8 |
| TVR05621 | 620 (558~682) | 395 | 510 | 1050 | 5.0 | 400 | 0.1 | 18 | 3.9 | 5.9 | 3.0 |
| TVR05681 | 680 (612~748) | 420 | 560 | 1120 | 5.0 | 400 | 0.1 | 18 | 4.1 | 6.2 | 3.2 |
| TVR05751 | 750 (675~825) | 465 | 615 | 1240 | 5.0 | 400 | 0.1 | 18 | 4.4 | 6.4 | 3.5 |

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

07mm Series

| Part No. | Varistor Voltage (@ 1mA DC) | Max. Continuous Voltage | | Max. Clamping Voltage (8/20μs) | | Max. Surge Current (8/20μs) | Rated Power | Max. Energy (10/1000μs) | Dimension | | |
|----------|--------------------------------|-------------------------|-----------------|-----------------------------------|----------------|--------------------------------|-------------|----------------------------|------------------|------------------|-----------|
| | V _{1mA} | V _{AC(rms)} | V _{DC} | V _P | I _P | I _{max} | P | W _{max} | T _{min} | T _{max} | W ±1.0 |
| | (V) | (V) | (V) | (V) | (A) | (A) | (W) | (J) | (mm) | | |
| TVR07180 | 18 (16~20) | 11 | 14 | 36 | 2.5 | 250 | 0.02 | 0.9 | 2.2 | 3.9 | 1.3 |
| TVR07220 | 22 (20~24) | 14 | 18 | 43 | 2.5 | 250 | 0.02 | 1.1 | 2.2 | 4.1 | 1.4 |
| TVR07270 | 27 (24~30) | 17 | 22 | 53 | 2.5 | 250 | 0.02 | 1.4 | 2.4 | 4.3 | 1.5 |
| TVR07330 | 33 (30~36) | 20 | 26 | 65 | 2.5 | 250 | 0.02 | 1.7 | 2.6 | 4.5 | 1.7 |
| TVR07390 | 39 (35~43) | 25 | 31 | 77 | 2.5 | 250 | 0.02 | 2.1 | 2.6 | 4.6 | 1.8 |
| TVR07470 | 47 (42~52) | 30 | 38 | 93 | 2.5 | 250 | 0.02 | 2.5 | 2.3 | 4.2 | 1.9 |
| TVR07560 | 56 (50~62) | 35 | 45 | 110 | 2.5 | 250 | 0.02 | 3.1 | 2.6 | 4.3 | 2.0 |
| TVR07680 | 68 (61~75) | 40 | 56 | 135 | 2.5 | 250 | 0.02 | 3.6 | 2.3 | 4.6 | 2.1 |
| TVR07820 | 82 (74~90) | 50 | 65 | 135 | 10 | 1200 | 0.25 | 5.5 | 2.0 | 3.9 | 1.5 |
| TVR07101 | 100 (90~110) | 60 | 85 | 165 | 10 | 1200 | 0.25 | 6.5 | 2.1 | 4.1 | 1.6 |
| TVR07121 | 120 (108~132) | 75 | 100 | 200 | 10 | 1200 | 0.25 | 7.8 | 2.5 | 4.3 | 1.8 |
| TVR07151 | 150 (135~165) | 95 | 125 | 250 | 10 | 1200 | 0.25 | 9.7 | 2.0 | 4.6 | 1.6 |
| TVR07181 | 180 (162~198) | 115 | 150 | 300 | 10 | 1200 | 0.25 | 11.7 | 2.0 | 3.9 | 1.4 |
| TVR07201 | 200 (180~220) | 130 | 170 | 340 | 10 | 1200 | 0.25 | 13 | 2.1 | 4.0 | 1.5 |
| TVR07221 | 220 (198~242) | 140 | 180 | 360 | 10 | 1200 | 0.25 | 14 | 2.1 | 4.0 | 1.5 |
| TVR07241 | 240 (216~264) | 150 | 200 | 395 | 10 | 1200 | 0.25 | 15 | 2.3 | 4.2 | 1.6 |
| TVR07271 | 270 (243~297) | 175 | 225 | 455 | 10 | 1200 | 0.25 | 18 | 2.4 | 4.4 | 1.7 |
| TVR07301 | 300 (270~330) | 195 | 250 | 500 | 10 | 1200 | 0.25 | 21 | 2.7 | 4.4 | 1.9 |
| TVR07331 | 330 (297~363) | 215 | 275 | 550 | 10 | 1200 | 0.25 | 23 | 2.8 | 4.5 | 2.0 |
| TVR07361 | 360 (324~396) | 230 | 300 | 595 | 10 | 1200 | 0.25 | 25 | 2.9 | 4.6 | 2.1 |
| TVR07391 | 390 (351~429) | 250 | 320 | 650 | 10 | 1200 | 0.25 | 25 | 3.1 | 4.8 | 2.3 |
| TVR07431 | 430 (387~473) | 275 | 350 | 710 | 10 | 1200 | 0.25 | 28 | 3.0 | 5.1 | 2.3 |
| TVR07471 | 470 (423~517) | 300 | 385 | 775 | 10 | 1200 | 0.25 | 30 | 3.2 | 5.2 | 2.4 |
| TVR07511 | 510 (459~561) | 320 | 410 | 845 | 10 | 1200 | 0.25 | 33 | 3.4 | 5.4 | 2.6 |
| TVR07561 | 560 (504~616) | 350 | 450 | 930 | 10 | 1200 | 0.25 | 33 | 3.6 | 5.5 | 2.8 |
| TVR07621 | 620 (558~682) | 395 | 510 | 1020 | 10 | 1200 | 0.25 | 35 | 3.9 | 5.9 | 3.0 |
| TVR07681 | 680 (612~748) | 420 | 560 | 1120 | 10 | 1200 | 0.25 | 35 | 4.1 | 6.2 | 3.2 |
| TVR07751 | 750 (675~825) | 465 | 615 | 1235 | 10 | 1200 | 0.25 | 38 | 4.4 | 6.4 | 3.5 |
| TVR07821 | 820 (738~902) | 510 | 670 | 1355 | 10 | 1200 | 0.25 | 42 | 4.5 | 6.4 | 3.2 |

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

10mm Series

| Part No. | Varistor Voltage (@ 1mA DC) | Max. Continuous Voltage | | Max. Clamping Voltage (8/20 μ s) | | Max. Surge Current (8/20 μ s) | Rated Power | Max. Energy (10/1000 μ s) | Dimension | | |
|----------|--------------------------------|-------------------------|----------|---|-------|--------------------------------------|-------------|----------------------------------|-----------|-----------|---------------|
| | V_{1mA} | $V_{AC(rms)}$ | V_{DC} | V_P | I_P | I_{max} | P | W_{max} | T_{min} | T_{max} | $W_{\pm 1.0}$ |
| | (V) | (V) | (V) | (V) | (A) | (A) | (W) | (J) | (mm) | | |
| TVR10180 | 18 (16~20) | 11 | 14 | 36 | 5.0 | 500 | 0.05 | 2.1 | 2.6 | 4.3 | 1.3 |
| TVR10220 | 22 (20~24) | 14 | 18 | 43 | 5.0 | 500 | 0.05 | 2.5 | 2.6 | 4.5 | 1.4 |
| TVR10270 | 27 (24~30) | 17 | 22 | 53 | 5.0 | 500 | 0.05 | 3.0 | 2.8 | 4.7 | 1.5 |
| TVR10330 | 33 (30~36) | 20 | 26 | 65 | 5.0 | 500 | 0.05 | 4.0 | 2.9 | 4.9 | 1.7 |
| TVR10390 | 39 (35~43) | 25 | 31 | 77 | 5.0 | 500 | 0.05 | 4.6 | 2.7 | 5.1 | 1.8 |
| TVR10470 | 47 (42~52) | 30 | 38 | 93 | 5.0 | 500 | 0.05 | 5.5 | 2.7 | 4.5 | 1.8 |
| TVR10560 | 56 (50~62) | 35 | 45 | 110 | 5.0 | 500 | 0.05 | 7.0 | 3.0 | 4.7 | 1.9 |
| TVR10680 | 68 (61~75) | 40 | 56 | 135 | 5.0 | 500 | 0.05 | 8.2 | 2.6 | 5.0 | 2.2 |
| TVR10820 | 82 (74~90) | 50 | 65 | 135 | 25 | 2500 | 0.4 | 12 | 2.4 | 4.3 | 1.6 |
| TVR10101 | 100 (90~110) | 60 | 85 | 165 | 25 | 2500 | 0.4 | 15 | 2.6 | 4.5 | 1.8 |
| TVR10121 | 120 (108~132) | 75 | 100 | 200 | 25 | 2500 | 0.4 | 18 | 2.9 | 4.7 | 2.0 |
| TVR10151 | 150 (135~165) | 95 | 125 | 250 | 25 | 2500 | 0.4 | 22 | 2.4 | 5.0 | 1.8 |
| TVR10181 | 180 (162~198) | 115 | 150 | 300 | 25 | 2500 | 0.4 | 27 | 2.4 | 4.3 | 1.6 |
| TVR10201 | 200 (180~220) | 130 | 170 | 340 | 25 | 2500 | 0.4 | 30 | 2.5 | 4.4 | 1.7 |
| TVR10221 | 220 (198~242) | 140 | 180 | 360 | 25 | 2500 | 0.4 | 32 | 2.5 | 4.4 | 1.7 |
| TVR10241 | 240 (216~264) | 150 | 200 | 395 | 25 | 2500 | 0.4 | 35 | 2.7 | 4.6 | 1.8 |
| TVR10271 | 270 (243~297) | 175 | 225 | 455 | 25 | 2500 | 0.4 | 40 | 2.8 | 4.8 | 1.9 |
| TVR10301 | 300 (270~330) | 195 | 250 | 500 | 25 | 2500 | 0.4 | 40 | 3.1 | 4.8 | 2.1 |
| TVR10331 | 330 (297~363) | 215 | 275 | 550 | 25 | 2500 | 0.4 | 43 | 3.2 | 4.9 | 2.2 |
| TVR10361 | 360 (324~396) | 230 | 300 | 595 | 25 | 2500 | 0.4 | 47 | 3.3 | 5.0 | 2.3 |
| TVR10391 | 390 (351~429) | 250 | 320 | 650 | 25 | 2500 | 0.4 | 60 | 3.5 | 5.2 | 2.5 |
| TVR10431 | 430 (387~473) | 275 | 350 | 710 | 25 | 2500 | 0.4 | 65 | 3.4 | 5.5 | 2.5 |
| TVR10471 | 470 (423~517) | 300 | 385 | 775 | 25 | 2500 | 0.4 | 70 | 3.6 | 5.6 | 2.6 |
| TVR10511 | 510 (459~561) | 320 | 410 | 845 | 25 | 2500 | 0.4 | 70 | 3.8 | 5.8 | 2.8 |
| TVR10561 | 560 (504~616) | 350 | 450 | 930 | 25 | 2500 | 0.4 | 70 | 4.0 | 5.9 | 3.0 |
| TVR10621 | 620 (558~682) | 395 | 510 | 1020 | 25 | 2500 | 0.4 | 70 | 4.3 | 6.3 | 3.2 |
| TVR10681 | 680 (612~748) | 420 | 560 | 1120 | 25 | 2500 | 0.4 | 70 | 4.5 | 6.6 | 3.4 |
| TVR10751 | 750 (675~825) | 465 | 615 | 1235 | 25 | 2500 | 0.4 | 75 | 4.8 | 6.8 | 3.7 |
| TVR10821 | 820 (738~902) | 510 | 670 | 1355 | 25 | 2500 | 0.4 | 85 | 4.9 | 6.8 | 3.4 |
| TVR10911 | 910 (819~1001) | 550 | 745 | 1500 | 25 | 2500 | 0.4 | 93 | 5.3 | 7.2 | 3.7 |
| TVR10102 | 1000 (900~1100) | 625 | 825 | 1650 | 25 | 2500 | 0.4 | 102 | 5.5 | 7.5 | 4.0 |
| TVR10112 | 1100 (990~1210) | 680 | 895 | 1815 | 25 | 2500 | 0.4 | 115 | 5.7 | 8.0 | 4.3 |
| TVR10122 | 1200 (1080~1320) | 725 | 975 | 1980 | 25 | 2500 | 0.4 | 125 | 6.0 | 8.1 | 5.2 |
| TVR10142 | 1400 (1260~1540) | 820 | 1140 | 2300 | 25 | 2500 | 0.4 | 145 | 6.6 | 8.7 | 6.0 |
| TVR10162 | 1600 (1440~1760) | 910 | 1300 | 2630 | 25 | 2500 | 0.4 | 165 | 7.1 | 9.8 | 6.7 |
| TVR10182 | 1800 (1620~1980) | 1000 | 1465 | 2950 | 25 | 2500 | 0.4 | 185 | 7.8 | 10.3 | 7.4 |

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

14mm Series

| Part No. | Varistor Voltage (@ 1mA DC) | Max. Continuous Voltage | | Max. Clamping Voltage (8/20 μ s) | | Max. Surge Current (8/20 μ s) | Rated Power | Max. Energy (10/1000 μ s) | Dimension | | |
|----------|--------------------------------|-------------------------|-----------------|---|----------------|--------------------------------------|-------------|----------------------------------|------------------|------------------|----------------|
| | V _{1mA} | V _{AC(rms)} | V _{DC} | V _P | I _P | I _{max} | P | W _{max} | T _{min} | T _{max} | W \pm 1.0 |
| | (V) | (V) | (V) | (V) | (A) | (A) | (W) | (J) | (mm) | | |
| TVR14180 | 18 (16~20) | 11 | 14 | 36 | 10 | 1000 | 0.1 | 4.0 | 2.6 | 4.3 | 1.3 |
| TVR14220 | 22 (20~24) | 14 | 18 | 43 | 10 | 1000 | 0.1 | 5.0 | 2.6 | 4.5 | 1.4 |
| TVR14270 | 27 (24~30) | 17 | 22 | 53 | 10 | 1000 | 0.1 | 6.0 | 2.8 | 4.7 | 1.5 |
| TVR14330 | 33 (30~36) | 20 | 26 | 65 | 10 | 1000 | 0.1 | 7.5 | 2.9 | 4.9 | 1.7 |
| TVR14390 | 39 (35~43) | 25 | 31 | 77 | 10 | 1000 | 0.1 | 8.6 | 2.7 | 5.1 | 1.8 |
| TVR14470 | 47 (42~52) | 30 | 38 | 93 | 10 | 1000 | 0.1 | 10 | 2.7 | 4.5 | 1.8 |
| TVR14560 | 56 (50~62) | 35 | 45 | 110 | 10 | 1000 | 0.1 | 11 | 3.0 | 4.7 | 1.9 |
| TVR14680 | 68 (61~75) | 40 | 56 | 135 | 10 | 1000 | 0.1 | 14 | 3.1 | 5.0 | 2.2 |
| TVR14820 | 82 (74~90) | 50 | 65 | 135 | 50 | 4500 | 0.6 | 22 | 2.4 | 4.3 | 1.6 |
| TVR14101 | 100 (90~110) | 60 | 85 | 165 | 50 | 4500 | 0.6 | 28 | 2.6 | 4.5 | 1.8 |
| TVR14121 | 120 (108~132) | 75 | 100 | 200 | 50 | 4500 | 0.6 | 32 | 2.9 | 4.7 | 2.0 |
| TVR14151 | 150 (135~165) | 95 | 125 | 250 | 50 | 4500 | 0.6 | 40 | 2.4 | 5.0 | 1.8 |
| TVR14181 | 180 (162~198) | 115 | 150 | 300 | 50 | 4500 | 0.6 | 52 | 2.4 | 4.3 | 1.6 |
| TVR14201 | 200 (180~220) | 130 | 170 | 340 | 50 | 4500 | 0.6 | 57 | 2.5 | 4.4 | 1.7 |
| TVR14221 | 220 (198~242) | 140 | 180 | 360 | 50 | 4500 | 0.6 | 60 | 2.5 | 4.4 | 1.7 |
| TVR14241 | 240 (216~264) | 150 | 200 | 395 | 50 | 4500 | 0.6 | 63 | 2.7 | 4.6 | 1.8 |
| TVR14271 | 270 (243~297) | 175 | 225 | 455 | 50 | 4500 | 0.6 | 70 | 2.8 | 4.8 | 1.9 |
| TVR14301 | 300 (270~330) | 195 | 250 | 500 | 50 | 4500 | 0.6 | 78 | 3.1 | 4.8 | 2.1 |
| TVR14331 | 330 (297~363) | 215 | 275 | 550 | 50 | 4500 | 0.6 | 85 | 3.2 | 4.9 | 2.2 |
| TVR14361 | 360 (324~396) | 230 | 300 | 595 | 50 | 4500 | 0.6 | 93 | 3.3 | 5.0 | 2.3 |
| TVR14391 | 390 (351~429) | 250 | 320 | 650 | 50 | 4500 | 0.6 | 100 | 3.5 | 5.2 | 2.5 |
| TVR14431 | 430 (387~473) | 275 | 350 | 710 | 50 | 4500 | 0.6 | 115 | 3.4 | 5.5 | 2.5 |
| TVR14471 | 470 (423~517) | 300 | 385 | 775 | 50 | 4500 | 0.6 | 125 | 3.6 | 5.6 | 2.6 |
| TVR14511 | 510 (459~561) | 320 | 410 | 845 | 50 | 4500 | 0.6 | 125 | 3.8 | 5.8 | 2.8 |
| TVR14561 | 560 (504~616) | 350 | 450 | 930 | 50 | 4500 | 0.6 | 125 | 4.0 | 5.9 | 3.0 |
| TVR14621 | 620 (558~682) | 395 | 510 | 1020 | 50 | 4500 | 0.6 | 125 | 4.3 | 6.3 | 3.2 |
| TVR14681 | 680 (612~748) | 420 | 560 | 1120 | 50 | 4500 | 0.6 | 130 | 4.5 | 6.6 | 3.4 |
| TVR14751 | 750 (675~825) | 465 | 615 | 1235 | 50 | 4500 | 0.6 | 143 | 4.8 | 6.8 | 3.7 |
| TVR14821 | 820 (738~902) | 510 | 670 | 1355 | 50 | 4500 | 0.6 | 157 | 4.9 | 6.8 | 3.4 |
| TVR14911 | 910 (819~1001) | 550 | 745 | 1500 | 50 | 4500 | 0.6 | 175 | 5.3 | 7.2 | 3.7 |
| TVR14102 | 1000 (900~1100) | 625 | 825 | 1650 | 50 | 4500 | 0.6 | 190 | 5.5 | 7.5 | 4.0 |
| TVR14112 | 1100 (990~1210) | 680 | 895 | 1815 | 50 | 4500 | 0.6 | 213 | 5.6 | 8.0 | 4.3 |
| TVR14122 | 1200 (1080~1320) | 725 | 975 | 1980 | 50 | 4500 | 0.6 | 230 | 6.0 | 8.1 | 5.2 |
| TVR14142 | 1400 (1260~1540) | 820 | 1140 | 2300 | 50 | 4500 | 0.6 | 250 | 6.6 | 8.7 | 6.0 |
| TVR14162 | 1600 (1440~1760) | 910 | 1300 | 2630 | 50 | 4500 | 0.6 | 315 | 7.1 | 9.8 | 6.7 |
| TVR14182 | 1800 (1620~1980) | 1000 | 1465 | 2950 | 50 | 4500 | 0.6 | 354 | 7.8 | 10.3 | 7.4 |

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

20mm Series





| Part No. | Varistor Voltage (@ 1mA DC) | Max. Continuous Voltage | | Max. Clamping Voltage (8/20 μ s) | | Max. Surge Current (8/20 μ s) | Rated Power | Max. Energy (10/1000 μ s) | Dimension | | |
|----------|--------------------------------|-------------------------|-----------------|---|----------------|--------------------------------------|-------------|----------------------------------|------------------|------------------|----------------|
| | V _{1mA} | V _{AC(rms)} | V _{DC} | V _P | I _P | I _{max} | P | W _{max} | T _{min} | T _{max} | W \pm 1.0 |
| | (V) | (V) | (V) | (V) | (A) | (A) | (W) | (J) | (mm) | | |
| TVR20180 | 18 (16~20) | 11 | 14 | 36 | 20 | 2000 | 0.2 | 11 | 3.0 | 4.7 | 1.3 |
| TVR20220 | 22 (20~24) | 14 | 18 | 43 | 20 | 2000 | 0.2 | 14 | 3.0 | 4.9 | 1.4 |
| TVR20270 | 27 (24~30) | 17 | 22 | 53 | 20 | 2000 | 0.2 | 18 | 3.2 | 5.1 | 1.5 |
| TVR20330 | 33 (30~36) | 20 | 26 | 65 | 20 | 2000 | 0.2 | 23 | 3.4 | 5.3 | 1.7 |
| TVR20390 | 39 (35~43) | 25 | 31 | 77 | 20 | 2000 | 0.2 | 26 | 3.1 | 5.5 | 1.7 |
| TVR20470 | 47 (42~52) | 30 | 38 | 93 | 20 | 2000 | 0.2 | 33 | 3.1 | 4.9 | 1.8 |
| TVR20560 | 56 (50~62) | 35 | 45 | 110 | 20 | 2000 | 0.2 | 41 | 3.4 | 5.1 | 2.0 |
| TVR20680 | 68 (61~75) | 40 | 56 | 135 | 20 | 2000 | 0.2 | 46 | 3.5 | 5.4 | 2.2 |
| TVR20820 | 82 (74~90) | 50 | 65 | 135 | 100 | 6500 | 1.0 | 48 | 2.8 | 4.7 | 1.8 |
| TVR20101 | 100 (90~110) | 60 | 85 | 165 | 100 | 6500 | 1.0 | 51 | 3.1 | 4.9 | 2.0 |
| TVR20121 | 120 (108~132) | 75 | 100 | 200 | 100 | 6500 | 1.0 | 55 | 3.3 | 5.1 | 2.2 |
| TVR20151 | 150 (135~165) | 95 | 125 | 250 | 100 | 6500 | 1.0 | 70 | 2.8 | 5.4 | 2.0 |
| TVR20181 | 180 (162~198) | 115 | 150 | 300 | 100 | 6500 | 1.0 | 84 | 2.8 | 4.7 | 1.8 |
| TVR20201 | 200 (180~220) | 130 | 170 | 340 | 100 | 6500 | 1.0 | 95 | 2.9 | 4.8 | 1.9 |
| TVR20221 | 220 (198~242) | 140 | 180 | 360 | 100 | 6500 | 1.0 | 100 | 2.9 | 4.8 | 1.9 |
| TVR20241 | 240 (216~264) | 150 | 200 | 395 | 100 | 6500 | 1.0 | 108 | 3.1 | 5.0 | 2.0 |
| TVR20271 | 270 (243~297) | 175 | 225 | 455 | 100 | 6500 | 1.0 | 127 | 3.2 | 5.2 | 2.1 |
| TVR20301 | 300 (270~330) | 195 | 250 | 500 | 100 | 6500 | 1.0 | 136 | 3.5 | 5.2 | 2.3 |
| TVR20331 | 330 (297~363) | 215 | 275 | 550 | 100 | 6500 | 1.0 | 150 | 3.6 | 5.3 | 2.4 |
| TVR20361 | 360 (324~396) | 230 | 300 | 595 | 100 | 6500 | 1.0 | 163 | 3.7 | 5.4 | 2.5 |
| TVR20391 | 390 (351~429) | 250 | 320 | 650 | 100 | 6500 | 1.0 | 180 | 3.9 | 5.6 | 2.7 |
| TVR20431 | 430 (387~473) | 275 | 350 | 710 | 100 | 6500 | 1.0 | 190 | 3.8 | 5.9 | 2.7 |
| TVR20471 | 470 (423~517) | 300 | 385 | 775 | 100 | 6500 | 1.0 | 220 | 4.0 | 6.0 | 2.8 |
| TVR20511 | 510 (459~561) | 320 | 410 | 845 | 100 | 6500 | 1.0 | 220 | 4.2 | 6.2 | 3.0 |
| TVR20561 | 560 (504~616) | 350 | 450 | 930 | 100 | 6500 | 1.0 | 220 | 4.4 | 6.3 | 3.2 |
| TVR20621 | 620 (558~682) | 395 | 510 | 1020 | 100 | 6500 | 1.0 | 220 | 4.7 | 6.7 | 3.4 |
| TVR20681 | 680 (612~748) | 420 | 560 | 1120 | 100 | 6500 | 1.0 | 230 | 4.9 | 7.0 | 3.6 |
| TVR20751 | 750 (675~825) | 465 | 615 | 1235 | 100 | 6500 | 1.0 | 255 | 5.2 | 7.2 | 3.9 |
| TVR20821 | 820 (738~902) | 510 | 670 | 1355 | 100 | 6500 | 1.0 | 282 | 5.3 | 7.2 | 3.6 |
| TVR20911 | 910 (819~1001) | 550 | 745 | 1500 | 100 | 6500 | 1.0 | 310 | 5.7 | 7.6 | 3.9 |
| TVR20102 | 1000 (900~1100) | 625 | 825 | 1650 | 100 | 6500 | 1.0 | 342 | 6.1 | 7.9 | 4.2 |
| TVR20112 | 1100 (990~1210) | 680 | 895 | 1815 | 100 | 6500 | 1.0 | 383 | 6.2 | 8.4 | 4.5 |
| TVR20122 | 1200 (1080~1320) | 725 | 975 | 1980 | 100 | 6500 | 1.0 | 415 | 6.4 | 8.5 | 5.4 |
| TVR20142 | 1400 (1260~1540) | 820 | 1140 | 2300 | 100 | 6500 | 1.0 | 480 | 7.0 | 9.1 | 6.2 |
| TVR20162 | 1600 (1440~1760) | 910 | 1300 | 2630 | 100 | 6500 | 1.0 | 550 | 7.5 | 10.2 | 6.9 |
| TVR20182 | 1800 (1620~1980) | 1000 | 1465 | 2950 | 100 | 6500 | 1.0 | 620 | 8.5 | 10.7 | 7.6 |

Metal Oxide Varistor : TVR Series

Disc Type Varistor for Surge Protection



■ Safety Approvals

| Certified Model No. | Agency | | | |
|---------------------|---|---|---|---|
| |  |  |  |  |
| | UL1449 4 th & cUL | EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2 | IEC 61051-1 IEC 61051-2 IEC 61051-2-2 | GB/T10193 GB/T10194 |
| | E314979 | J50411784 | 5944 | CQC03001005165 CQC03001007654 |
| TVR05180 | √ | √ | √ | √ |
| TVR05220 | √ | √ | √ | √ |
| TVR05270 | √ | √ | √ | √ |
| TVR05330 | √ | √ | √ | √ |
| TVR05390 | √ | √ | √ | √ |
| TVR05470 | √ | √ | √ | √ |
| TVR05560 | √ | √ | √ | √ |
| TVR05680 | √ | √ | √ | √ |
| TVR05820 | √ | √ | √ | √ |
| TVR05101 | √ | √ | √ | √ |
| TVR05121 | √ | √ | √ | √ |
| TVR05151 | √ | √ | √ | √ |
| TVR05181 | √ | √ | √ | √ |
| TVR05201 | √ | √ | √ | √ |
| TVR05221 | √ | √ | √ | √ |
| TVR05241 | √ | √ | √ | √ |
| TVR05271 | √ | √ | √ | √ |
| TVR05301 | √ | √ | √ | √ |
| TVR05331 | √ | √ | √ | √ |
| TVR05361 | √ | √ | √ | √ |
| TVR05391 | √ | √ | √ | √ |
| TVR05431 | √ | √ | √ | √ |
| TVR05471 | √ | √ | √ | √ |
| TVR05511 | √ | √ | √ | √ |
| TVR05561 | √ | √ | √ | √ |
| TVR05621 | √ | √ | √ | √ |
| TVR05681 | √ | √ | √ | √ |
| TVR05751 | √ | √ | √ | √ |

Note:





1. UL/cUL/TUV/CQC certification: Operating Temperature is 105°C

VDE certification: Operating Temperature is 85°C; 105°C rating is under application.

Metal Oxide Varistor : TVR Series

Disc Type Varistor for Surge Protection



| Certified Model No. | Agency | | | |
|---------------------|---|---|--|---|
| |  |  |  |  |
| | UL1449 4 th & cUL | EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2 | IEC 61051-1 IEC 61051-2 IEC 61051-2-2 | GB/T10193 GB/T10194 |
| E314979 | J50411784 | 5944 | Current No.: CQC03001005165 CQC03001007654 New No.: (Refer to Note) CQC18001199806 CQC18001199789 | |
| TVR07180 | √ | √ | √ | √ |
| TVR07220 | √ | √ | √ | √ |
| TVR07270 | √ | √ | √ | √ |
| TVR07330 | √ | √ | √ | √ |
| TVR07390 | √ | √ | √ | √ |
| TVR07470 | √ | √ | √ | √ |
| TVR07560 | √ | √ | √ | √ |
| TVR07680 | √ | √ | √ | √ |
| TVR07820 | √ | √ | √ | √ |
| TVR07101 | √ | √ | √ | √ |
| TVR07121 | √ | √ | √ | √ |
| TVR07151 | √ | √ | √ | √ |
| TVR07181 | √ | √ | √ | √ |
| TVR07201 | √ | √ | √ | √ |
| TVR07221 | √ | √ | √ | √ |
| TVR07241 | √ | √ | √ | √ |
| TVR07271 | √ | √ | √ | √ |
| TVR07301 | √ | √ | √ | √ |
| TVR07331 | √ | √ | √ | √ |
| TVR07361 | √ | √ | √ | √ |
| TVR07391 | √ | √ | √ | √ |
| TVR07431 | √ | √ | √ | √ |
| TVR07471 | √ | √ | √ | √ |
| TVR07511 | √ | √ | √ | √ |
| TVR07561 | √ | √ | √ | √ |
| TVR07621 | √ | √ | √ | √ |
| TVR07681 | √ | √ | √ | √ |
| TVR07751 | √ | √ | √ | √ |
| TVR07821 | √ | √ | √ | √ |





Note:

1. For CQC certification, its current and New numbers are both effective. However, its current number will be canceled on 2019/12/31, and only its NEW number will be available from 2020/01/01. Please use NEW number as your first priority.
2. UL/cUL/TUV/CQC certification: Operating Temperature is 105°C
VDE certification: Operating Temperature is 85°C; 105°C rating is under application.

Metal Oxide Varistor : TVR Series

Disc Type Varistor for Surge Protection



| Certified Model No. | Agency | | | |
|---------------------|---|---|---|--|
| |  |  |  |  |
| | UL1449 4 th & cUL | EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2 | IEC 61051-1 IEC 61051-2 IEC 61051-2-2 | GB/T10193 GB/T10194 |
| | E314979 | J50411784 | 5944 | Current No. CQC03001005165 CQC03001007654 New No: (Refer to Note) CQC18001200336 CQC18001199790 |
| TVR10180 | √ | √ | √ | √ |
| TVR10220 | √ | √ | √ | √ |
| TVR10270 | √ | √ | √ | √ |
| TVR10330 | √ | √ | √ | √ |
| TVR10390 | √ | √ | √ | √ |
| TVR10470 | √ | √ | √ | √ |
| TVR10560 | √ | √ | √ | √ |
| TVR10680 | √ | √ | √ | √ |
| TVR10820 | √ | √ | √ | √ |
| TVR10101 | √ | √ | √ | √ |
| TVR10121 | √ | √ | √ | √ |
| TVR10151 | √ | √ | √ | √ |
| TVR10181 | √ | √ | √ | √ |
| TVR10201 | √ | √ | √ | √ |
| TVR10221 | √ | √ | √ | √ |
| TVR10241 | √ | √ | √ | √ |
| TVR10271 | √ | √ | √ | √ |
| TVR10301 | √ | √ | √ | √ |
| TVR10331 | √ | √ | √ | √ |
| TVR10361 | √ | √ | √ | √ |
| TVR10391 | √ | √ | √ | √ |
| TVR10431 | √ | √ | √ | √ |
| TVR10471 | √ | √ | √ | √ |
| TVR10511 | √ | √ | √ | √ |
| TVR10561 | √ | √ | √ | √ |
| TVR10621 | √ | √ | √ | √ |
| TVR10681 | √ | √ | √ | √ |
| TVR10751 | √ | √ | √ | √ |
| TVR10821 | √ | √ | √ | √ |
| TVR10911 | √ | √ | √ | √ |
| TVR10102 | √ | √ | √ | √ |
| TVR10112 | √ | √ | √ | √ |
| TVR10122 | √ | √ | √ | √ |
| TVR10142 | √ | √ | √ | √ |
| TVR10162 | √ | √ | √ | √ |
| TVR10182 | √ | √ | √ | √ |

Note:

1. For CQC certification, its current and New numbers are both effective. However, its current number will be canceled on 2019/12/31, and only its NEW number will be available from 2020/01/01. Please use NEW number as your first priority.
2. UL/cUL/TUV/CQC certification: Operating Temperature is 105°C
VDE certification: Operating Temperature is 85°C; 105°C rating is under application.

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

| Certified Model No. | Agency | | | | | | |
|---------------------|------------------------------|--|--|--|--|--------------------------------|----------------------------|
| | | | | | | | |
| | UL1449 4 th & cUL | EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2 | IEC/EN 60950-1 Annex Q, IEC/EN 62368-1 Annex G.8.2 | EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2 | IEC 62368-1 Annex G.8.2 | GB/T10193-1997, GB/T10194-1997 | GB8898-2011, GB4943.1-2011 |
| E314979 | J50411784 | | 5944 | | Current No. CQC03001005165 CQC03001007654 New No: (Refer to Note) CQC18001199842 CQC18001198951 | | |
| TVR14180 | √ | √ | | √ | | √ | |
| TVR14220 | √ | √ | | √ | | √ | |
| TVR14270 | √ | √ | | √ | | √ | |
| TVR14330 | √ | √ | | √ | | √ | |
| TVR14390 | √ | √ | | √ | | √ | |
| TVR14470 | √ | √ | | √ | | √ | |
| TVR14560 | √ | √ | | √ | | √ | |
| TVR14680 | √ | √ | | √ | | √ | |
| TVR14820 | √ | √ | | √ | | √ | |
| TVR14101 | √ | √ | | √ | | √ | |
| TVR14121 | √ | √ | | √ | | √ | |
| TVR14151 | √ | √ | | √ | | √ | |
| TVR14181 | √ | √ | √ | √ | √ | √ | |
| TVR14201 | √ | √ | √ | √ | √ | √ | √ |
| TVR14221 | √ | √ | √ | √ | √ | √ | √ |
| TVR14241 | √ | √ | √ | √ | √ | √ | √ |
| TVR14271 | √ | √ | √ | √ | √ | √ | √ |
| TVR14301 | √ | √ | √ | √ | √ | √ | √ |
| TVR14331 | √ | √ | √ | √ | √ | √ | √ |
| TVR14361 | √ | √ | √ | √ | √ | √ | √ |
| TVR14391 | √ | √ | √ | √ | √ | √ | √ |
| TVR14431 | √ | √ | √ | √ | √ | √ | √ |
| TVR14471 | √ | √ | √ | √ | √ | √ | √ |
| TVR14511 | √ | √ | √ | √ | √ | √ | √ |
| TVR14561 | √ | √ | √ | √ | √ | √ | √ |
| TVR14621 | √ | √ | √ | √ | √ | √ | √ |
| TVR14681 | √ | √ | √ | √ | √ | √ | √ |
| TVR14751 | √ | √ | √ | √ | √ | √ | √ |
| TVR14821 | √ | √ | √ | √ | √ | √ | √ |
| TVR14911 | √ | √ | √ | √ | √ | √ | √ |
| TVR14102 | √ | √ | √ | √ | √ | √ | √ |
| TVR14112 | √ | √ | √ | √ | √ | √ | √ |
| TVR14122 | √ | √ | √ | √ | √ | √ | √ |
| TVR14142 | √ | √ | √ | √ | √ | √ | √ |
| TVR14162 | √ | √ | √ | √ | √ | √ | √ |
| TVR14182 | √ | √ | √ | √ | √ | √ | √ |

Note:

1. For CQC certification, its current and New numbers are both effective. However, its current number will be canceled on 2019/12/31, and only its NEW number will be available from 2020/01/01. Please use NEW number as your first priority.
2. UL/cUL/TUV/CQC certification: Operating Temperature is 105°C
VDE certification: Operating Temperature is 85°C; 105°C rating is under application.

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

| Certified Model No. | Agency | | | | | | |
|---------------------|------------------------------|--|---|--|--|-------------------------------|---------------------------|
| | | | | | | | |
| | UL1449 4 th & cUL | EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2 | IEC/EN 60950-1 Annex Q IEC/EN 62368-1 Annex G.8.2 | EN/IEC 61051-1, IEC 61051-2, IEC 61051-2-2 | IEC 62368-1 Annex G.8.2 | GB/T10193-1997 GB/T10194-1997 | GB8898-2011 GB4943.1-2011 |
| E314979 | J50411784 | | 5944 | | Current No. CQC03001005165 CQC03001007654 New No: (Refer to Note) CQC18001199807 CQC18001198952 | | |
| TVR20180 | √ | √ | | √ | | √ | |
| TVR20220 | √ | √ | | √ | | √ | |
| TVR20270 | √ | √ | | √ | | √ | |
| TVR20330 | √ | √ | | √ | | √ | |
| TVR20390 | √ | √ | | √ | | √ | |
| TVR20470 | √ | √ | | √ | | √ | |
| TVR20560 | √ | √ | | √ | | √ | |
| TVR20680 | √ | √ | | √ | | √ | |
| TVR20820 | √ | √ | | √ | | √ | |
| TVR20101 | √ | √ | | √ | | √ | |
| TVR20121 | √ | √ | | √ | | √ | |
| TVR20151 | √ | √ | | √ | | √ | |
| TVR20181 | √ | √ | √ | √ | √ | √ | |
| TVR20201 | √ | √ | √ | √ | √ | √ | √ |
| TVR20221 | √ | √ | √ | √ | √ | √ | √ |
| TVR20241 | √ | √ | √ | √ | √ | √ | √ |
| TVR20271 | √ | √ | √ | √ | √ | √ | √ |
| TVR20301 | √ | √ | √ | √ | √ | √ | √ |
| TVR20331 | √ | √ | √ | √ | √ | √ | √ |
| TVR20361 | √ | √ | √ | √ | √ | √ | √ |
| TVR20391 | √ | √ | √ | √ | √ | √ | √ |
| TVR20431 | √ | √ | √ | √ | √ | √ | √ |
| TVR20471 | √ | √ | √ | √ | √ | √ | √ |
| TVR20511 | √ | √ | √ | √ | √ | √ | √ |
| TVR20561 | √ | √ | √ | √ | √ | √ | √ |
| TVR20621 | √ | √ | √ | √ | √ | √ | √ |
| TVR20681 | √ | √ | √ | √ | √ | √ | √ |
| TVR20751 | √ | √ | √ | √ | √ | √ | √ |
| TVR20821 | √ | √ | √ | √ | √ | √ | √ |
| TVR20911 | √ | √ | √ | √ | √ | √ | √ |
| TVR20102 | √ | √ | √ | √ | √ | √ | √ |
| TVR20112 | √ | √ | √ | √ | √ | √ | √ |
| TVR20122 | √ | √ | √ | √ | √ | √ | √ |
| TVR20142 | √ | √ | √ | √ | √ | √ | √ |
| TVR20162 | √ | √ | √ | √ | √ | √ | √ |
| TVR20182 | √ | √ | √ | √ | √ | √ | √ |

Note:

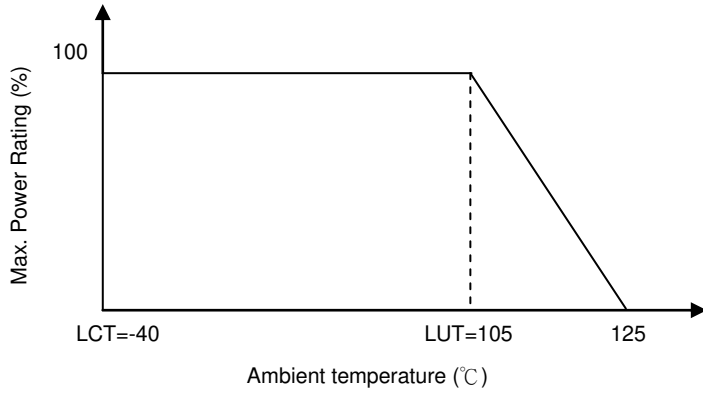
1. For CQC certification, its current and New numbers are both effective. However, its current number will be canceled on 2019/12/31, and only its NEW number will be available from 2020/01/01. Please use NEW number as your first priority.
2. UL/cUL/TUV/CQC certification: Operating Temperature is 105°C
VDE certification: Operating Temperature is 85°C; 105°C rating is under application.

Metal Oxide Varistor : TVR Series

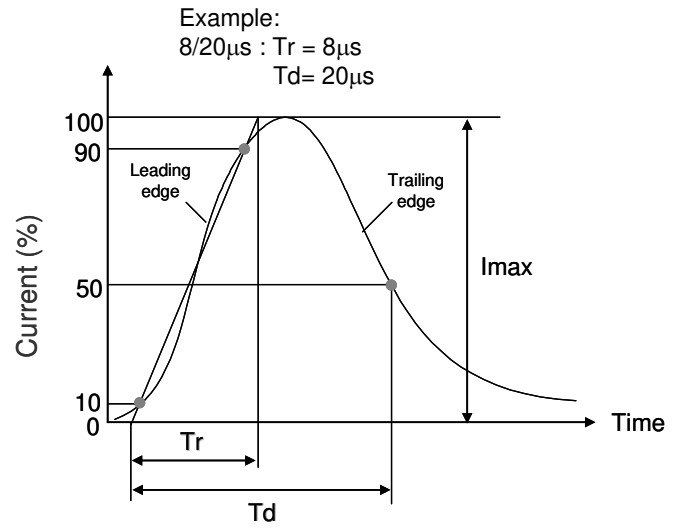


Disc Type Varistor for Surge Protection

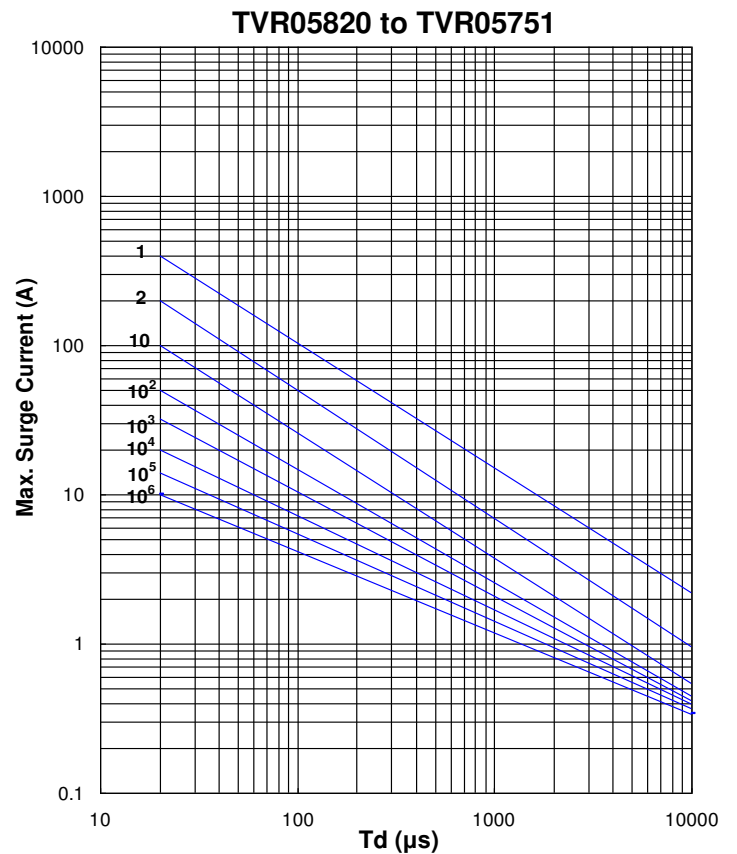
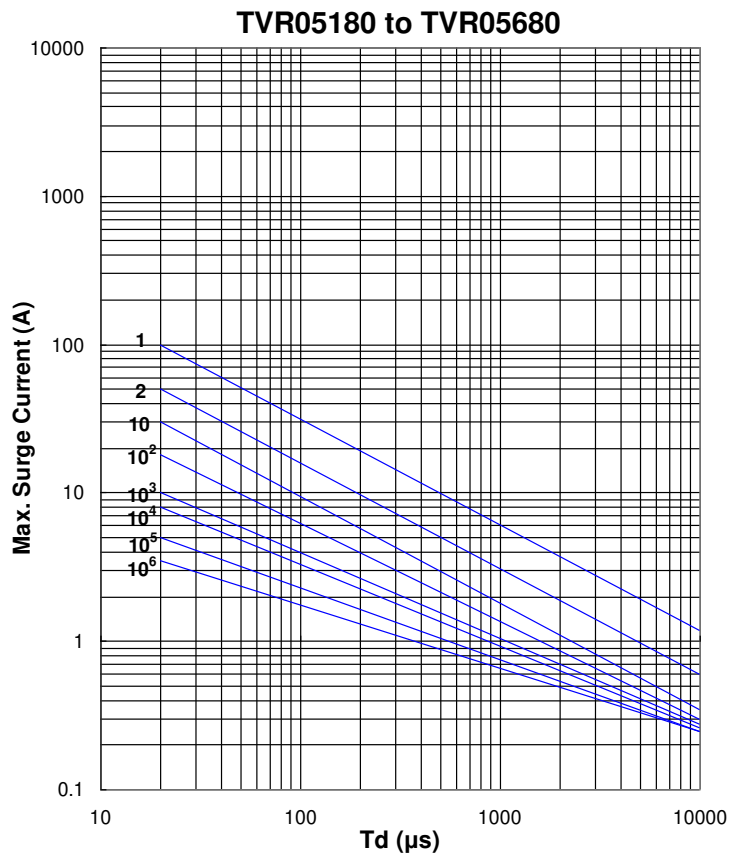
Power Derating Curve



Surge Current Standard Waveform



Max. Surge Current Derating Curves



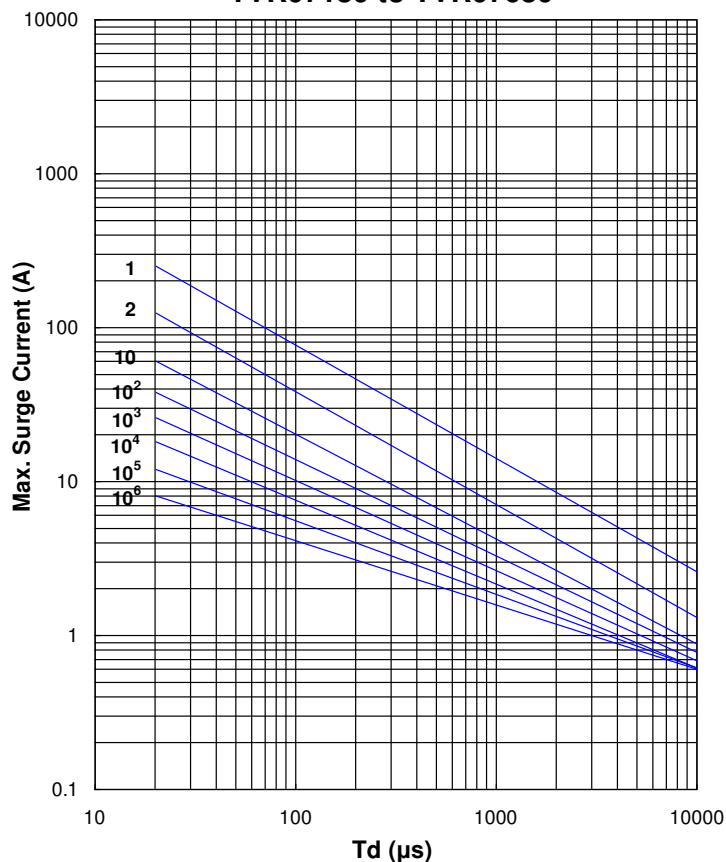
Metal Oxide Varistor : TVR Series



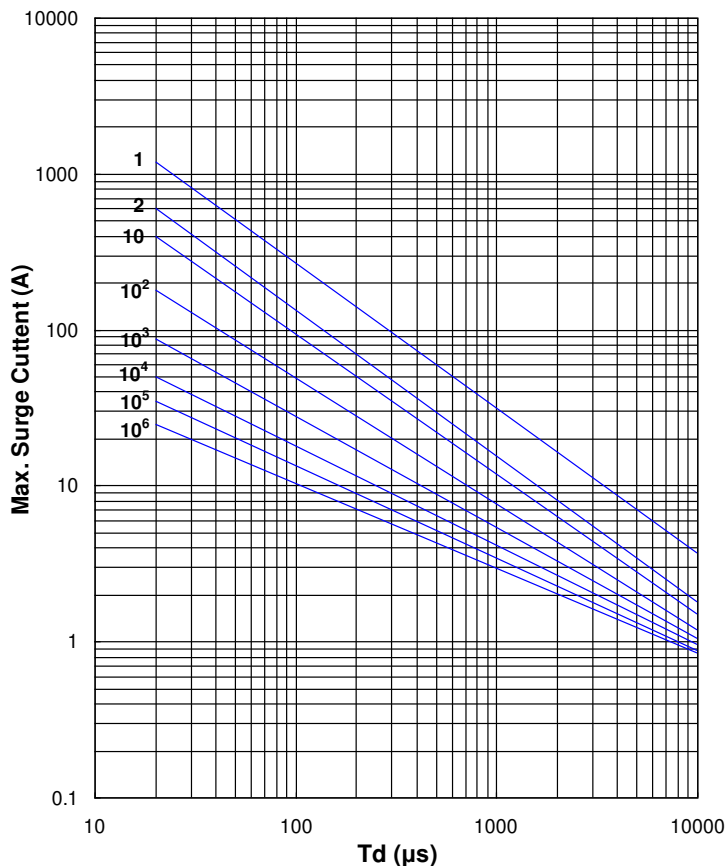
Disc Type Varistor for Surge Protection

■ Max. Surge Current Derating Curves

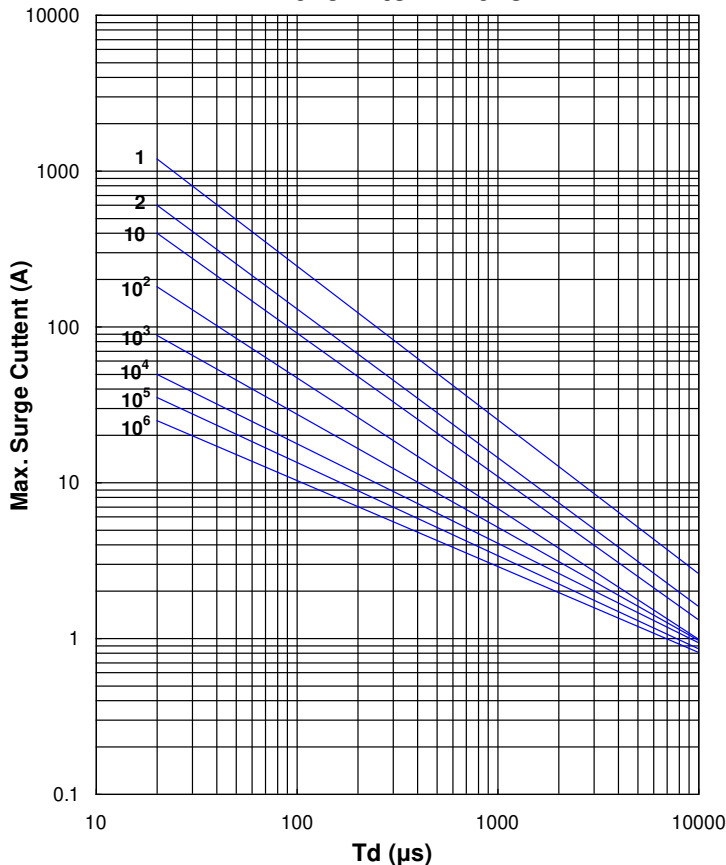
TVR07180 to TVR07680



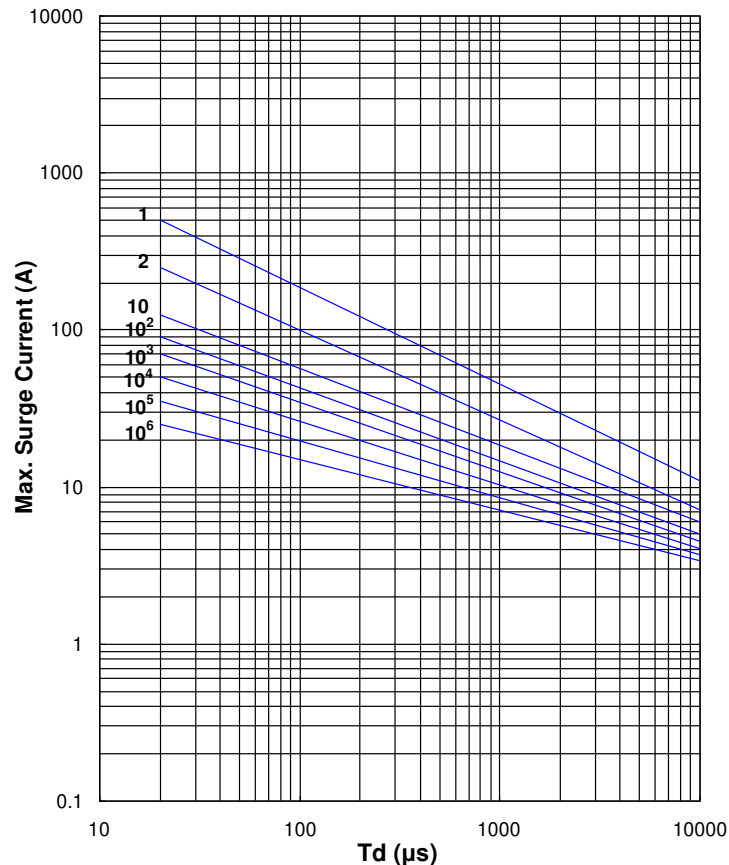
TVR07820 to TVR07471



TVR07511 to TVR07821



TVR10180 to TVR10680



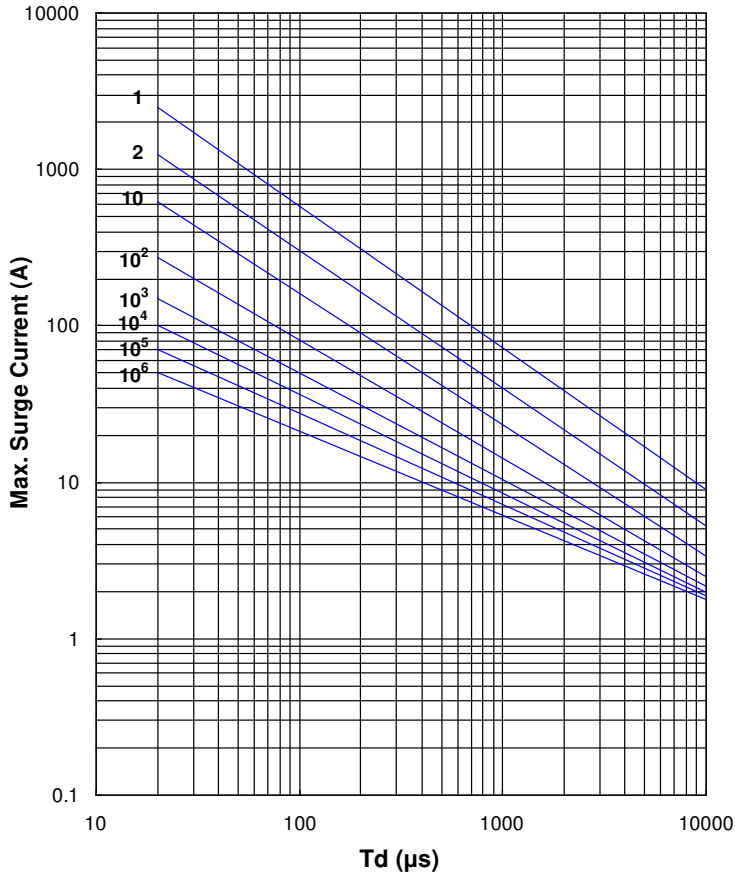
Metal Oxide Varistor : TVR Series



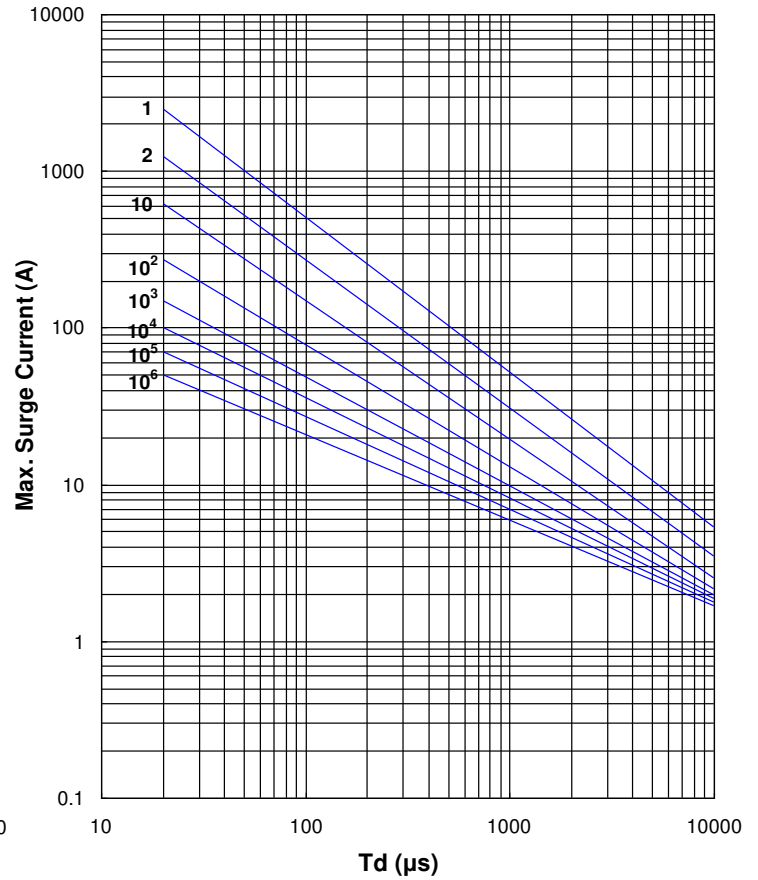
Disc Type Varistor for Surge Protection

Max. Surge Current Derating Curves

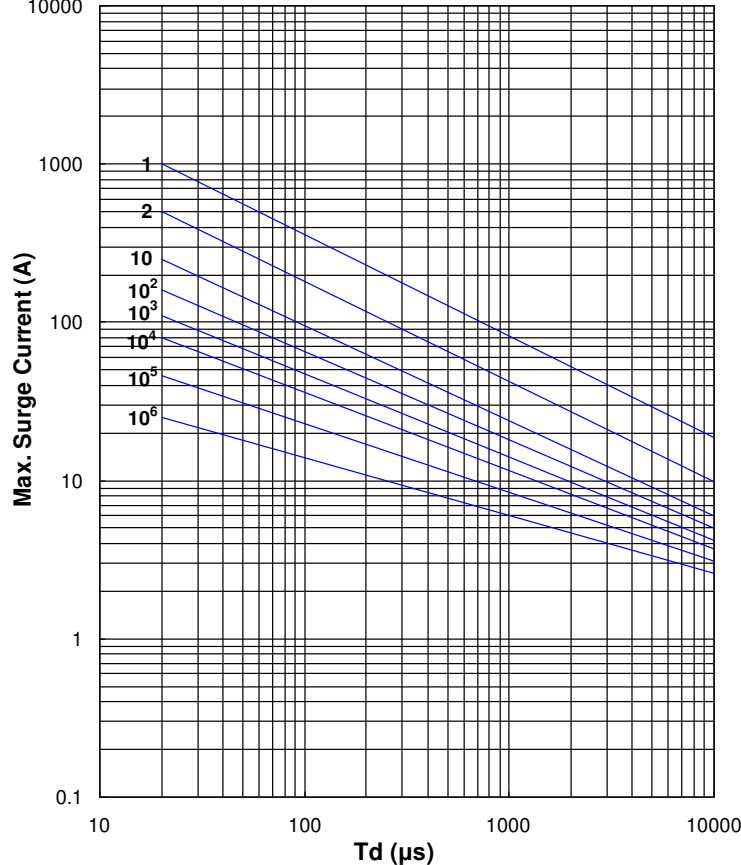
TVR10820 to TVR10751



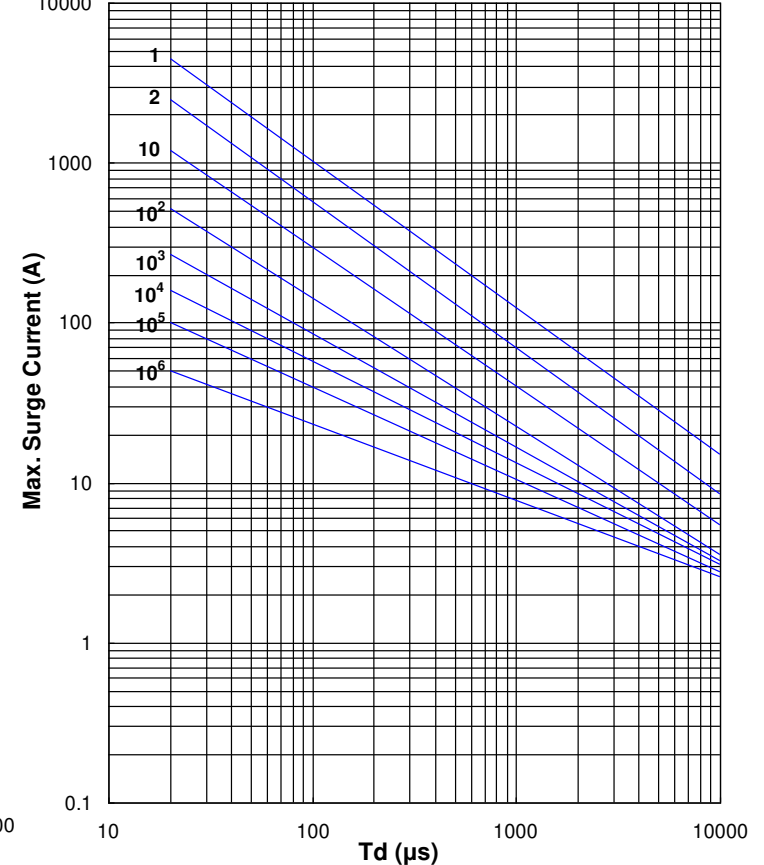
TVR10821 to TVR10182



TVR14180 to TVR14680



TVR14820 to TVR14751



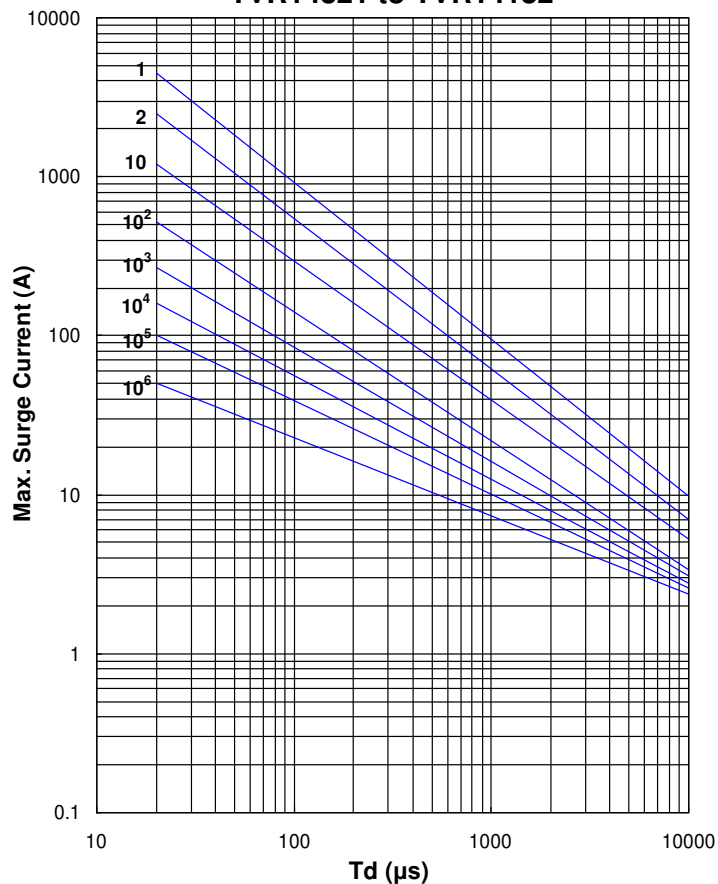
Metal Oxide Varistor : TVR Series



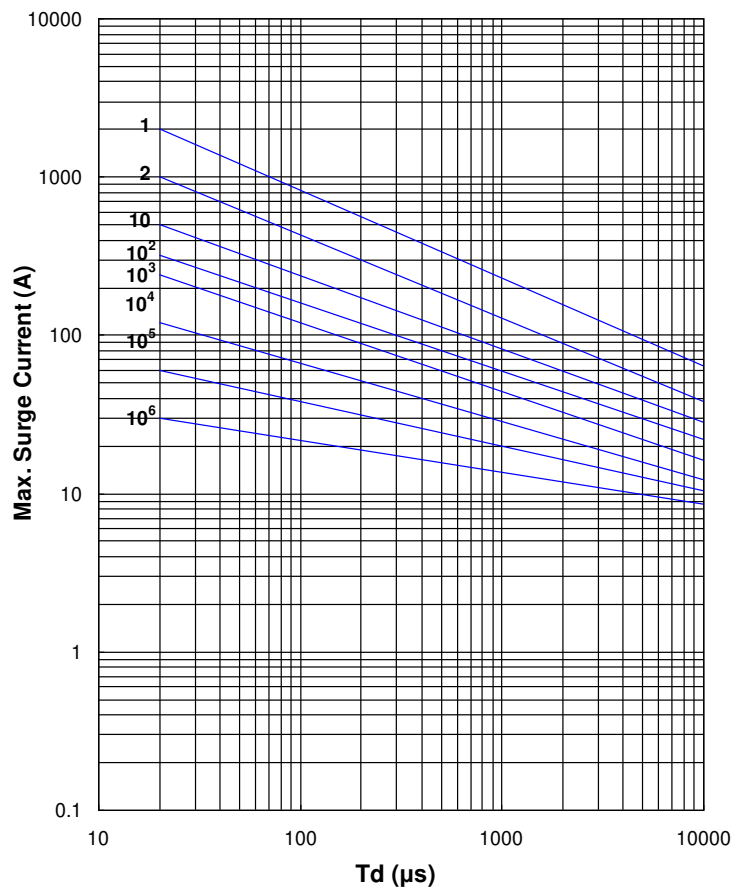
Disc Type Varistor for Surge Protection

■ Max. Surge Current Derating Curves

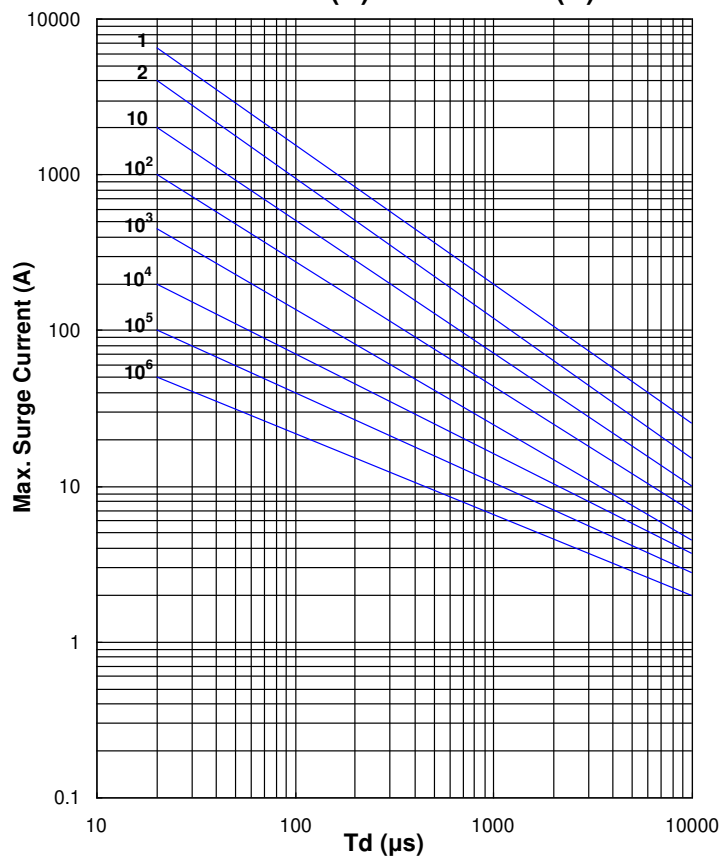
TVR14821 to TVR14182



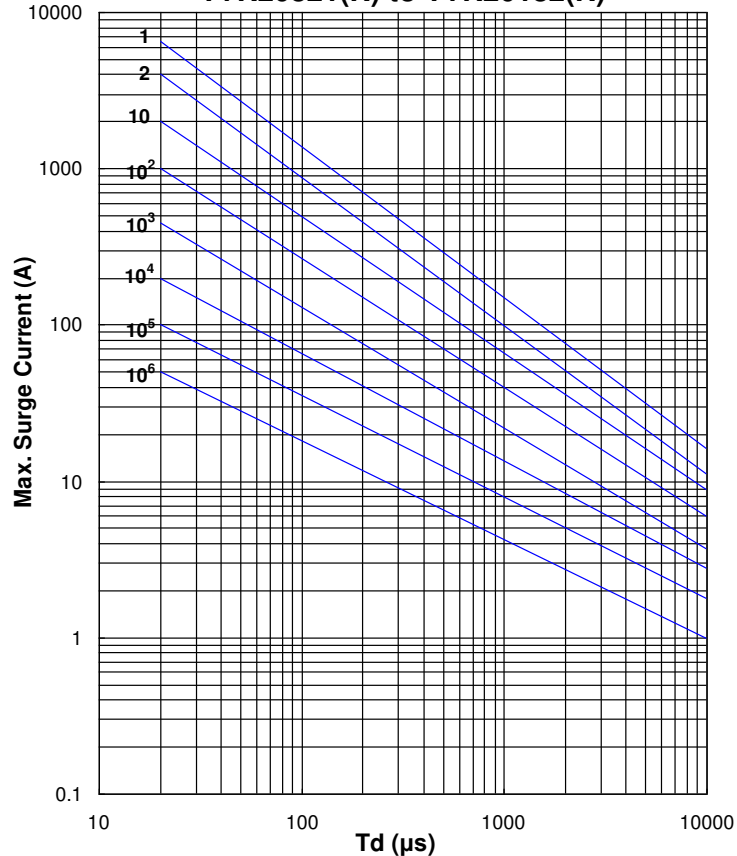
TVR20180 to TVR20680



TVR20820(R) to TVR20751(R)



TVR20821(R) to TVR20182(R)



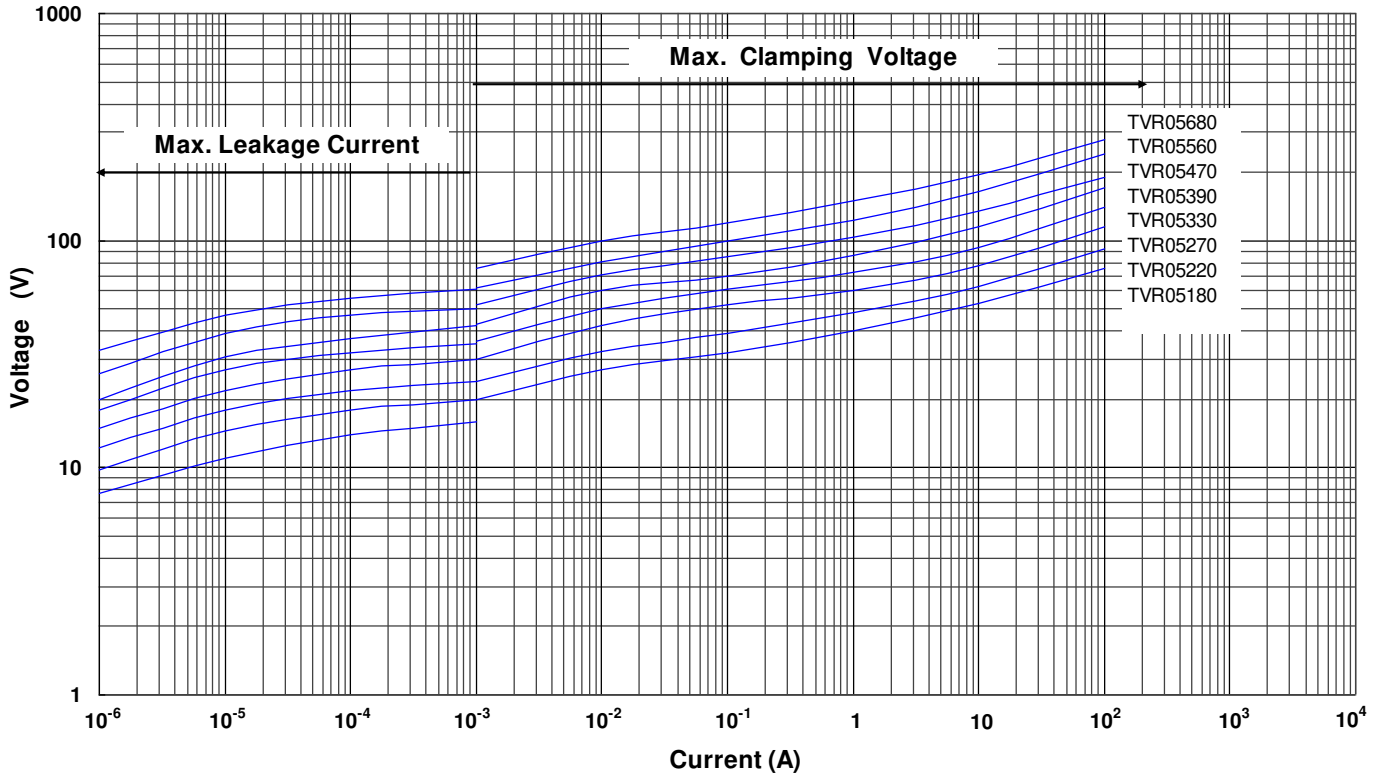
Metal Oxide Varistor : TVR Series

Disc Type Varistor for Surge Protection

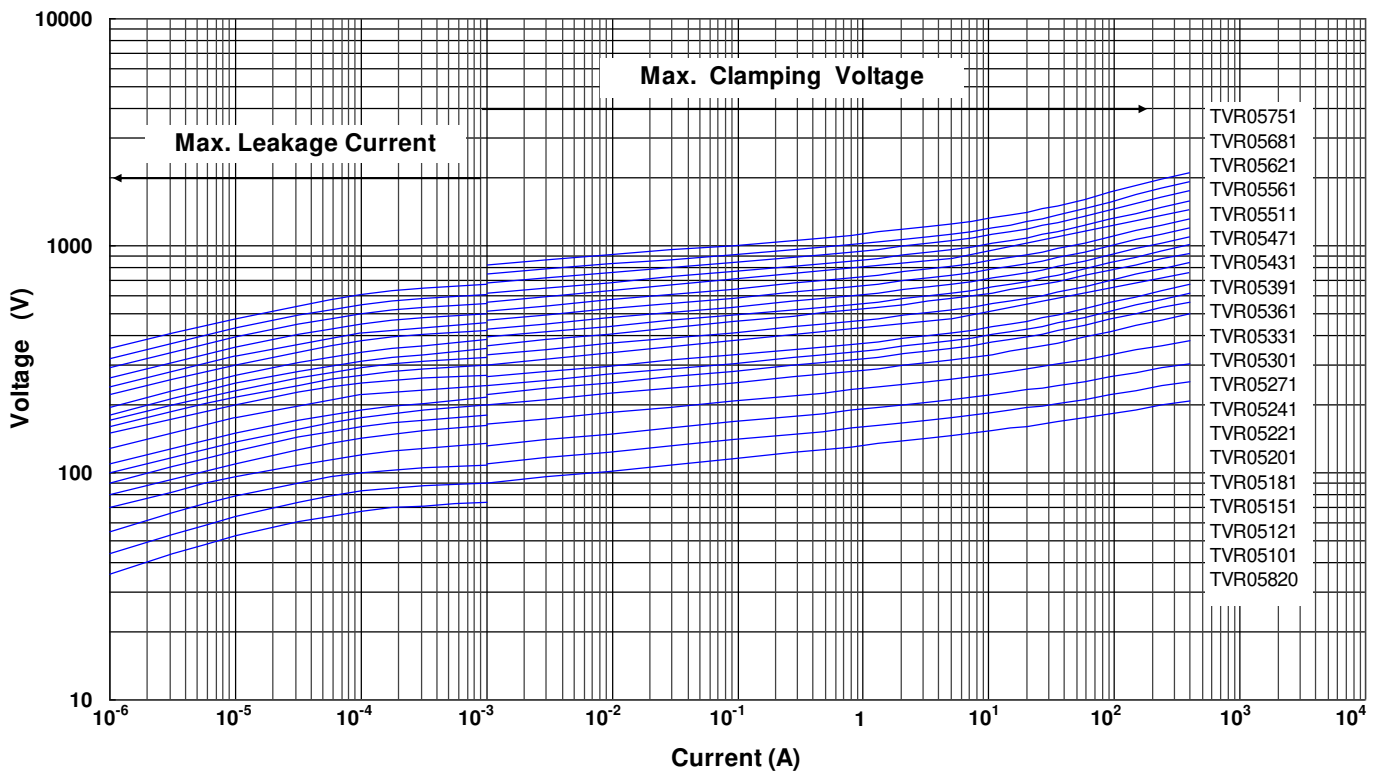


■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR05180 to TVR05680)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR05820 to TVR05751)



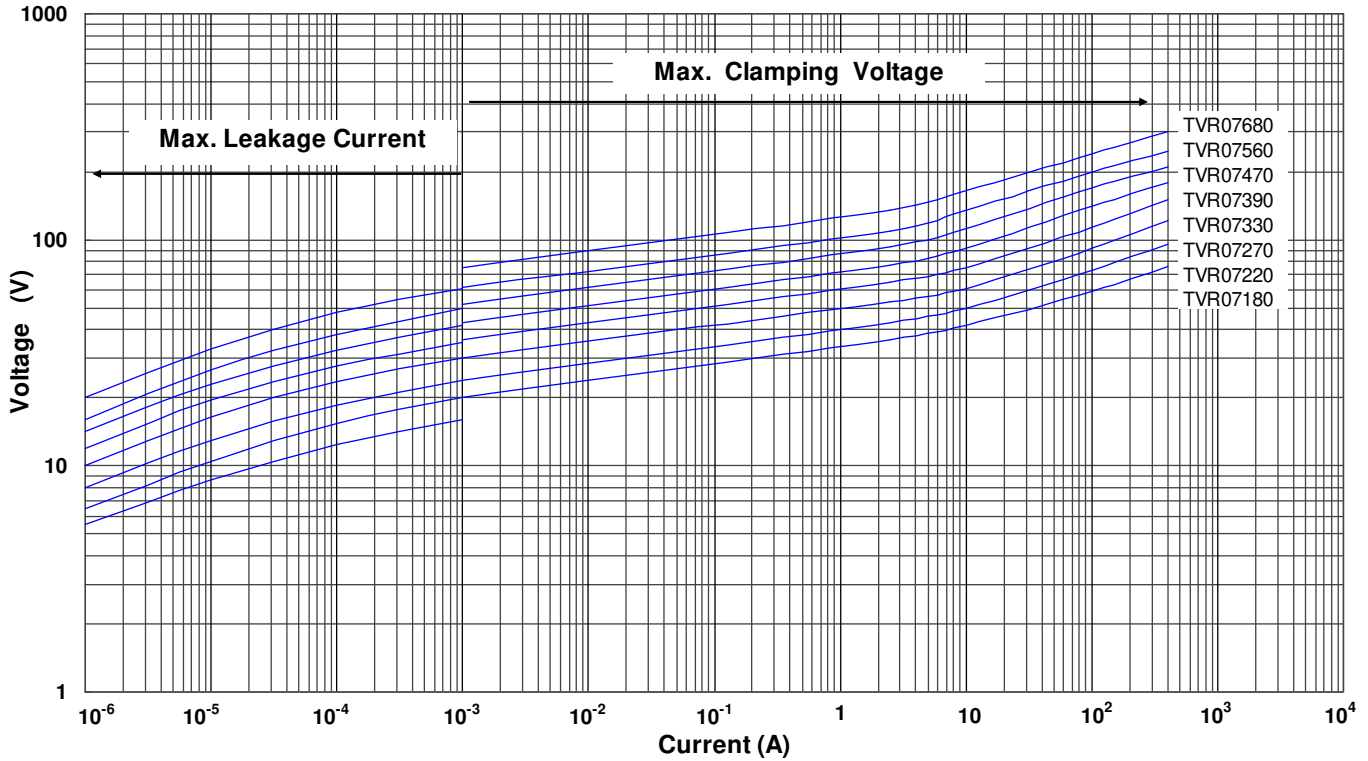
Metal Oxide Varistor : TVR Series



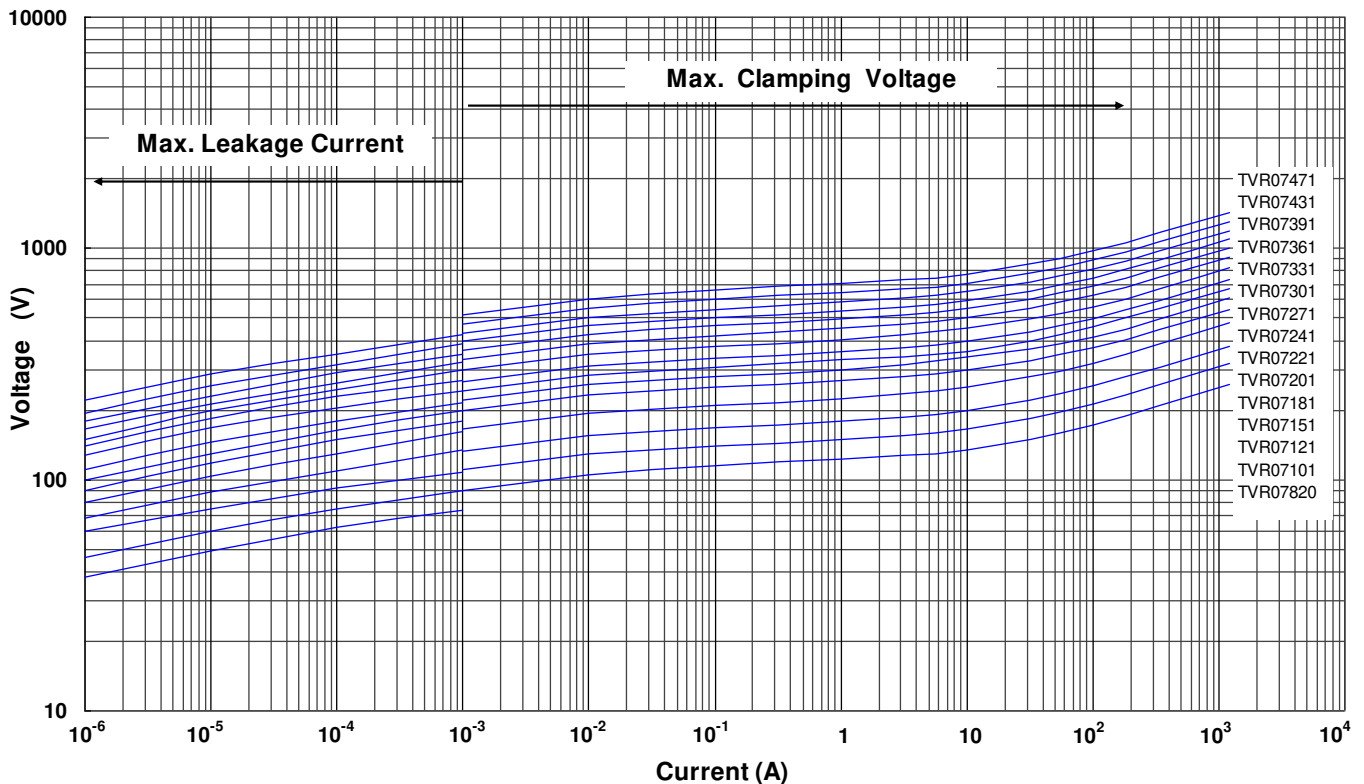
Disc Type Varistor for Surge Protection

■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR07180 to TVR07680)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR07820 to TVR07471)



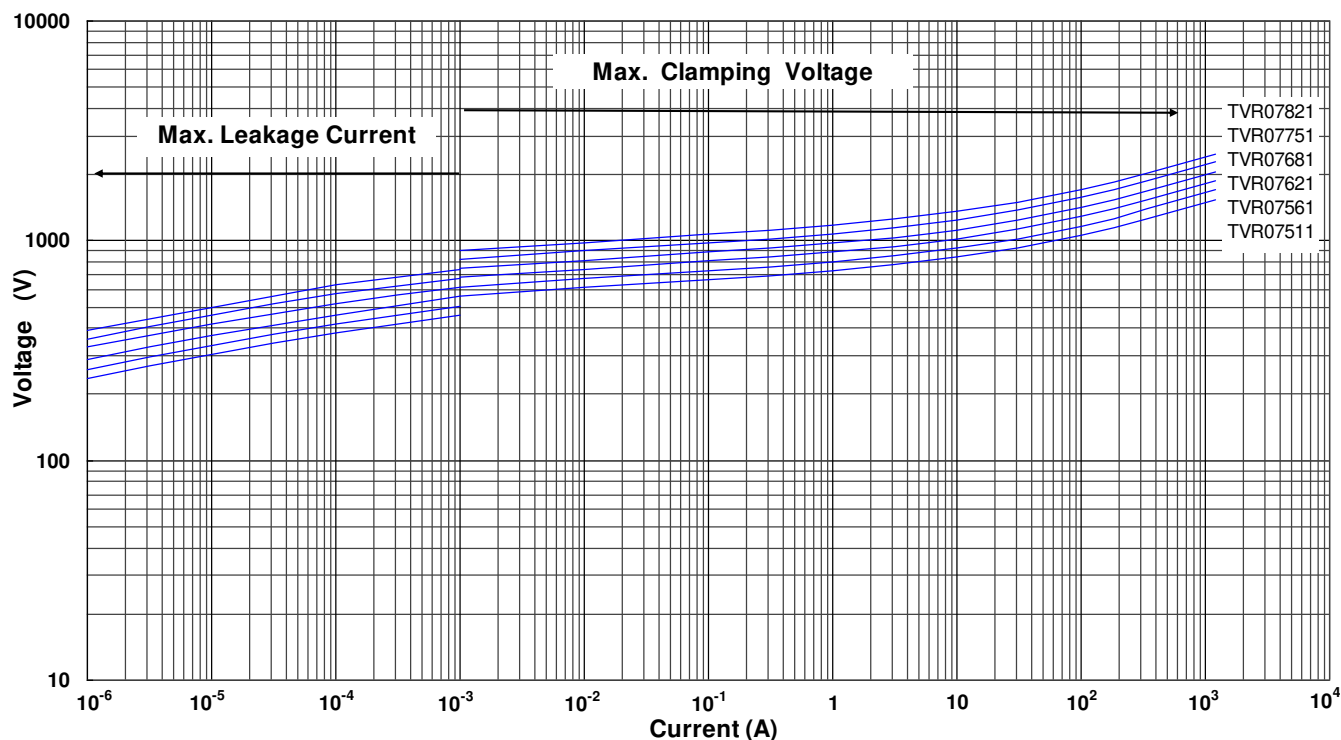
Metal Oxide Varistor : TVR Series



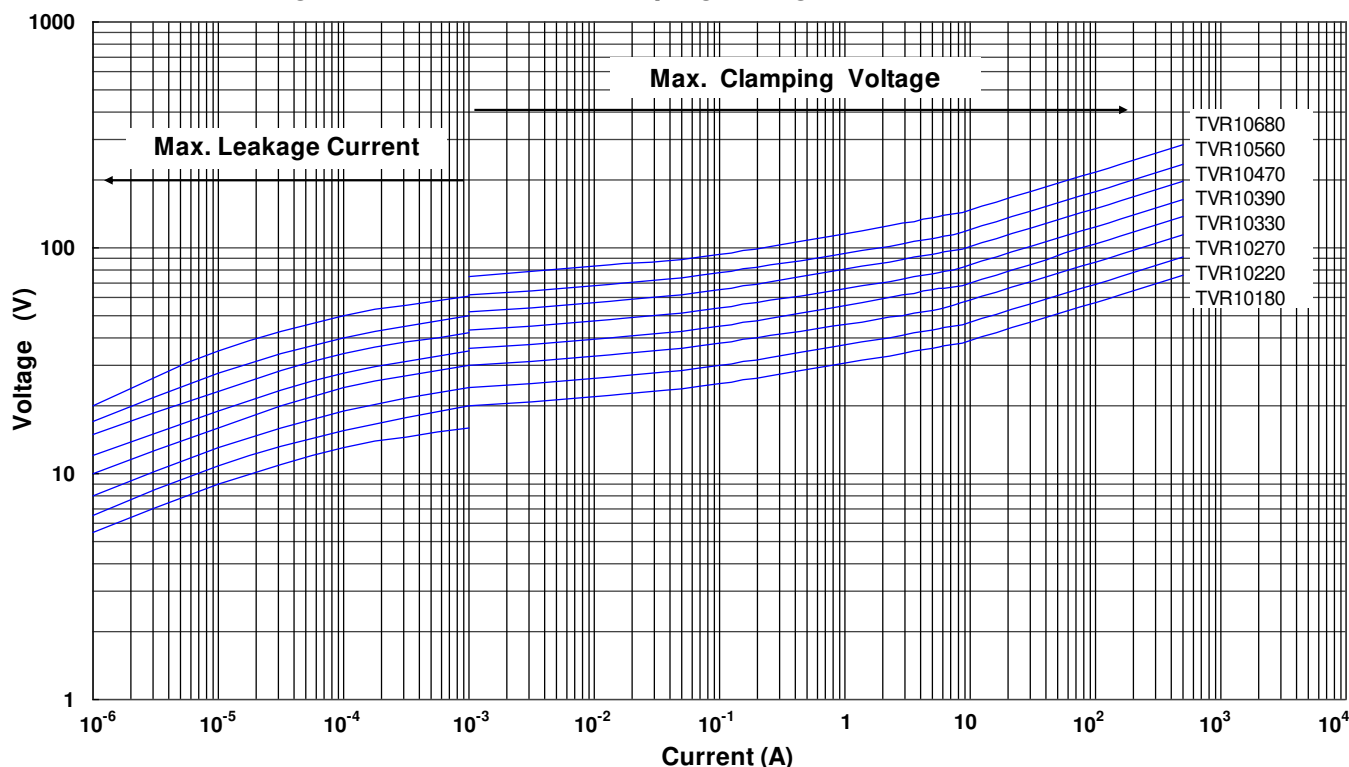
Disc Type Varistor for Surge Protection

■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR07511 to TVR07821)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR10180 to TVR10680)



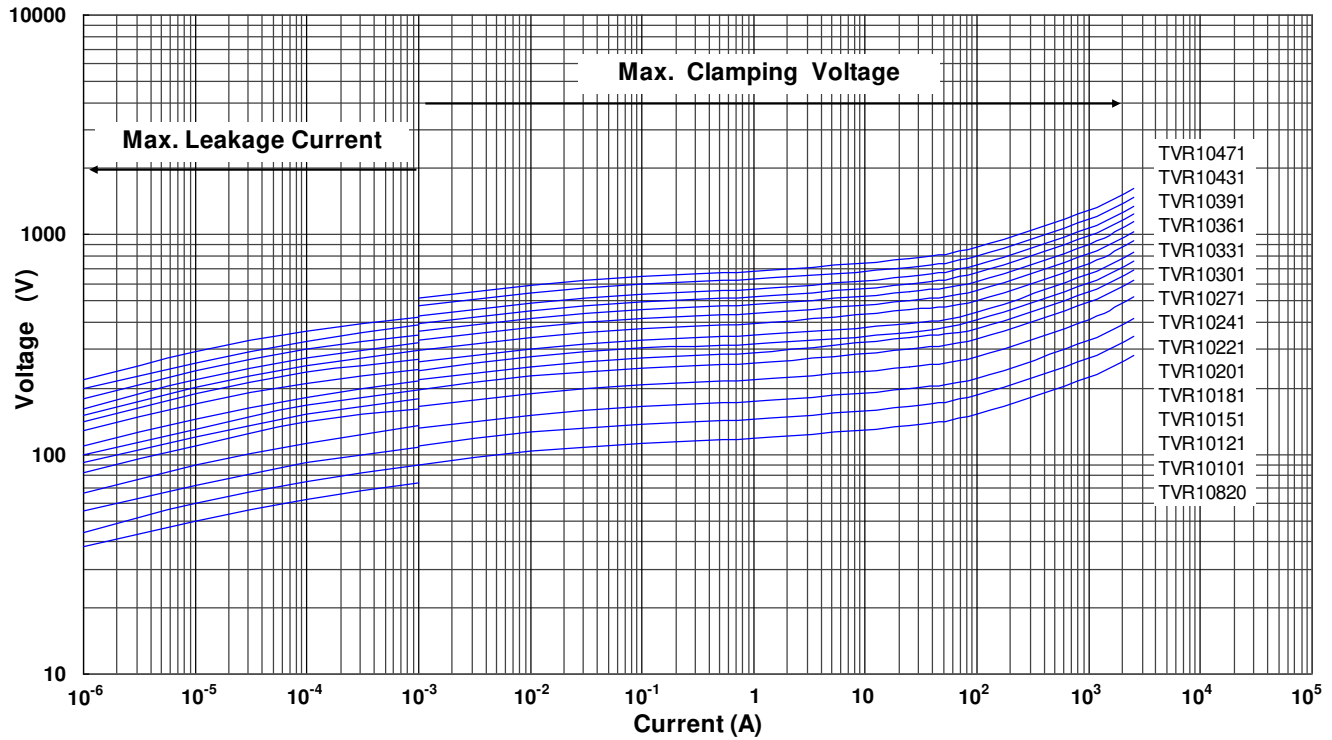
Metal Oxide Varistor : TVR Series



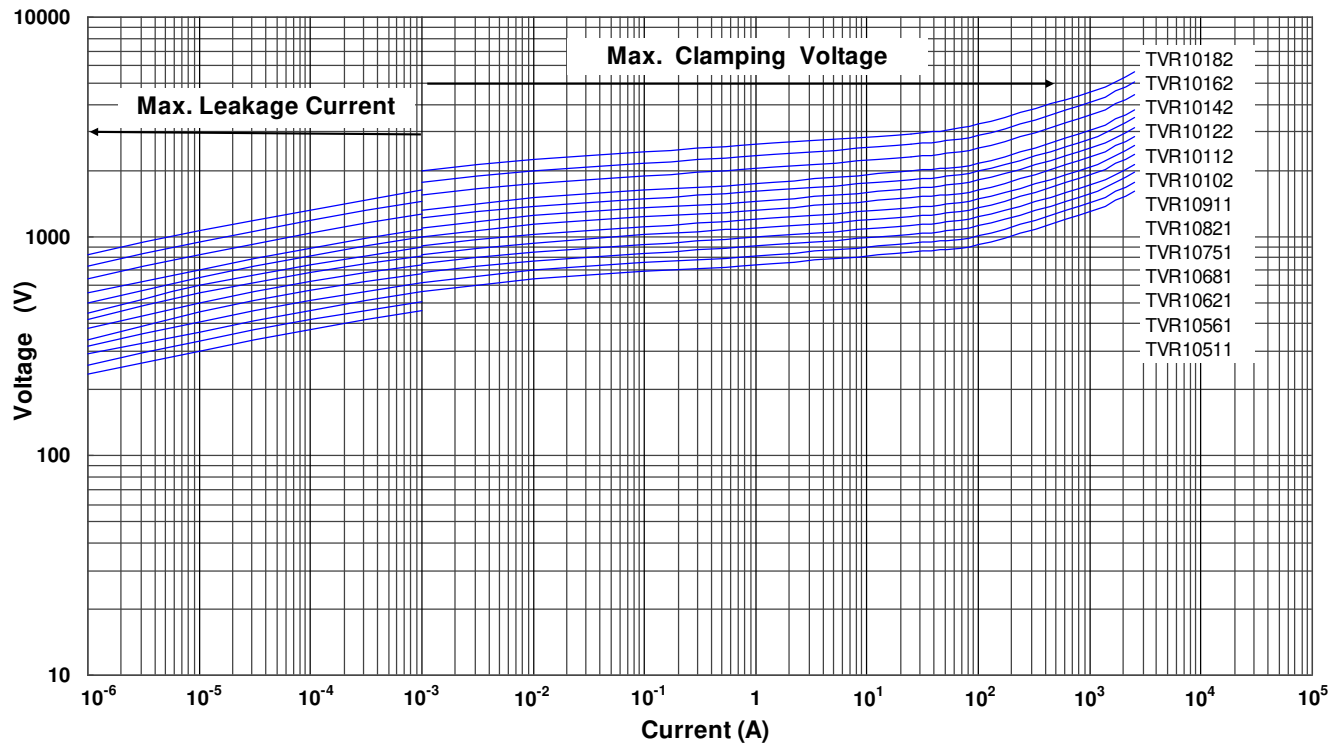
Disc Type Varistor for Surge Protection

■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR10820 to TVR10471)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR10511 to TVR10182)



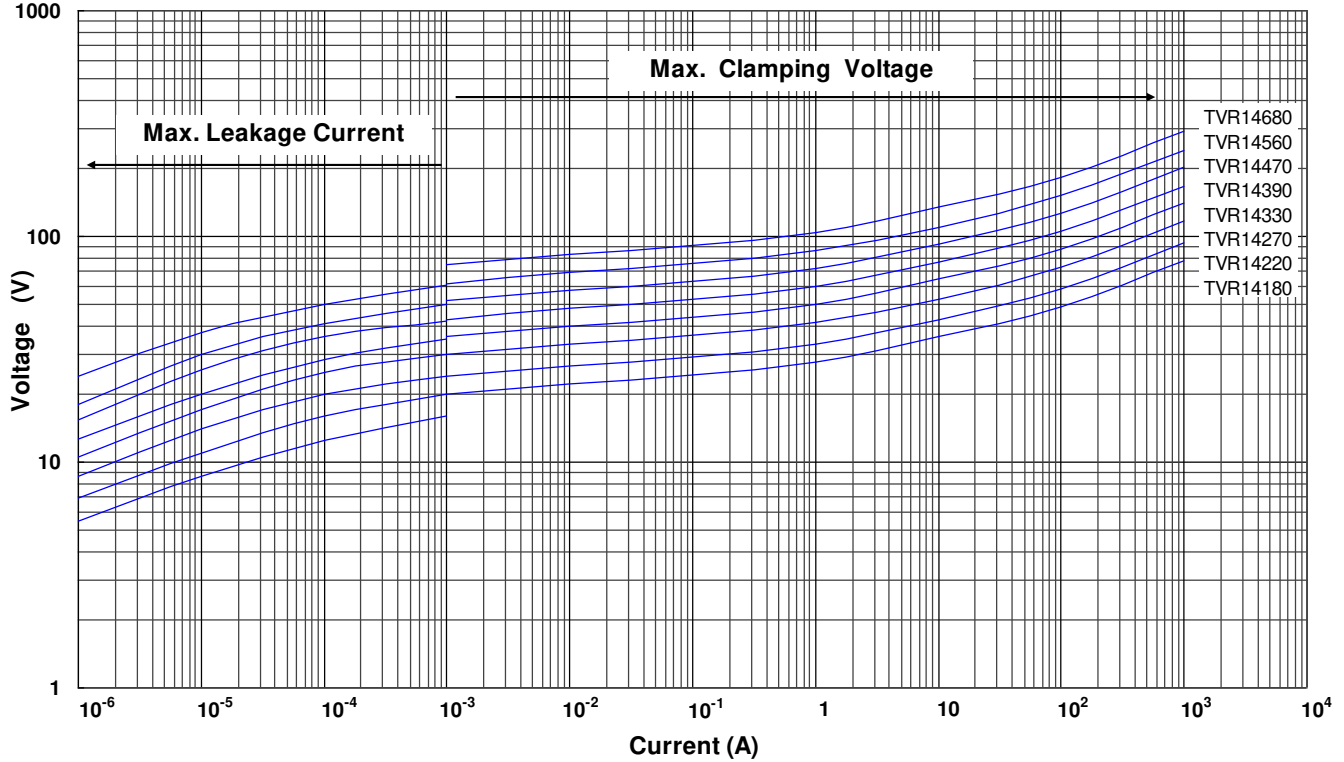
Metal Oxide Varistor : TVR Series



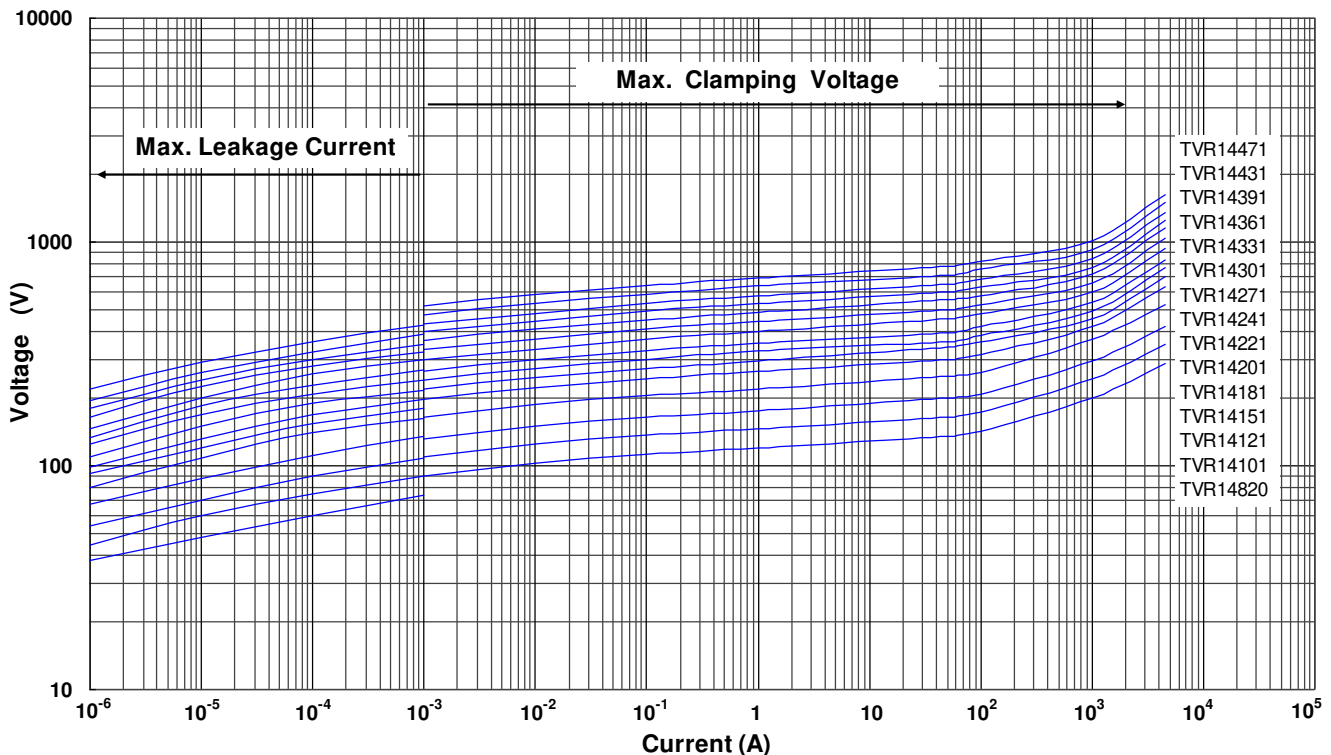
Disc Type Varistor for Surge Protection

■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR14180 to TVR14680)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR14820 to TVR14471)



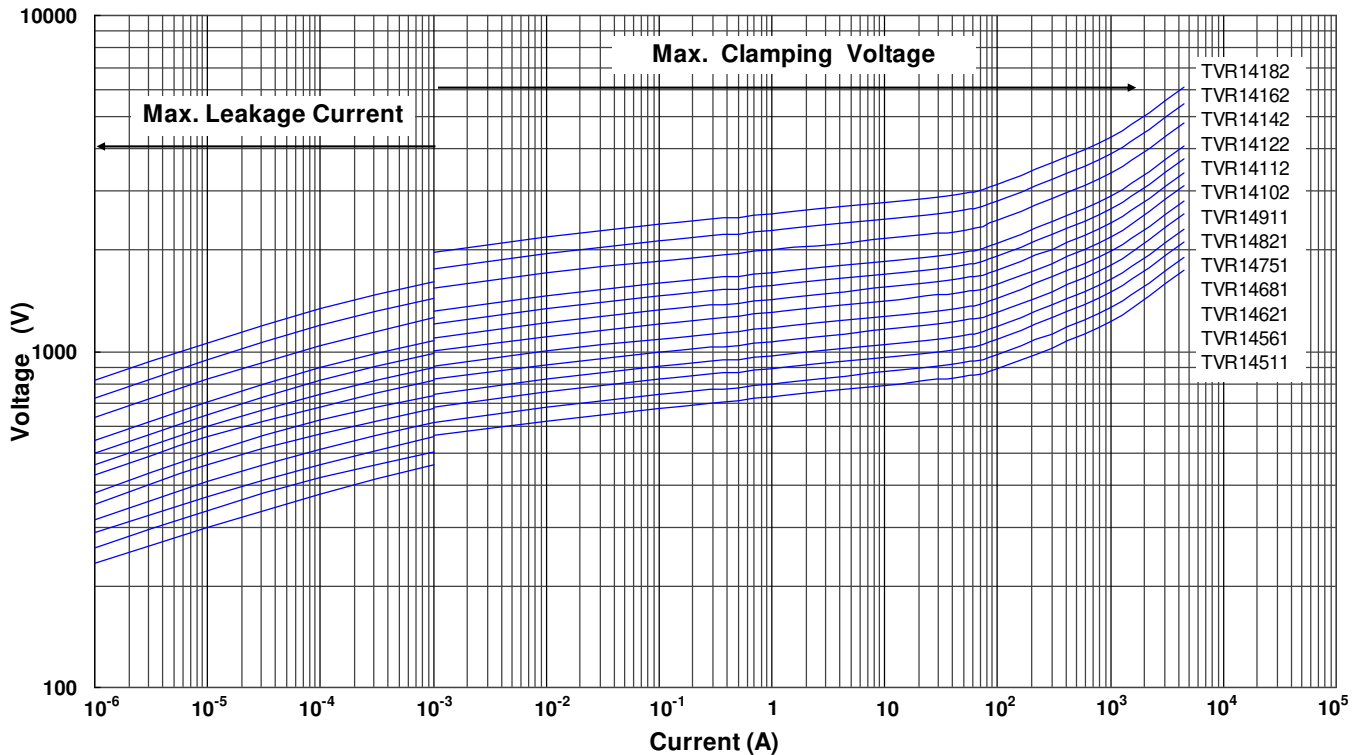
Metal Oxide Varistor : TVR Series



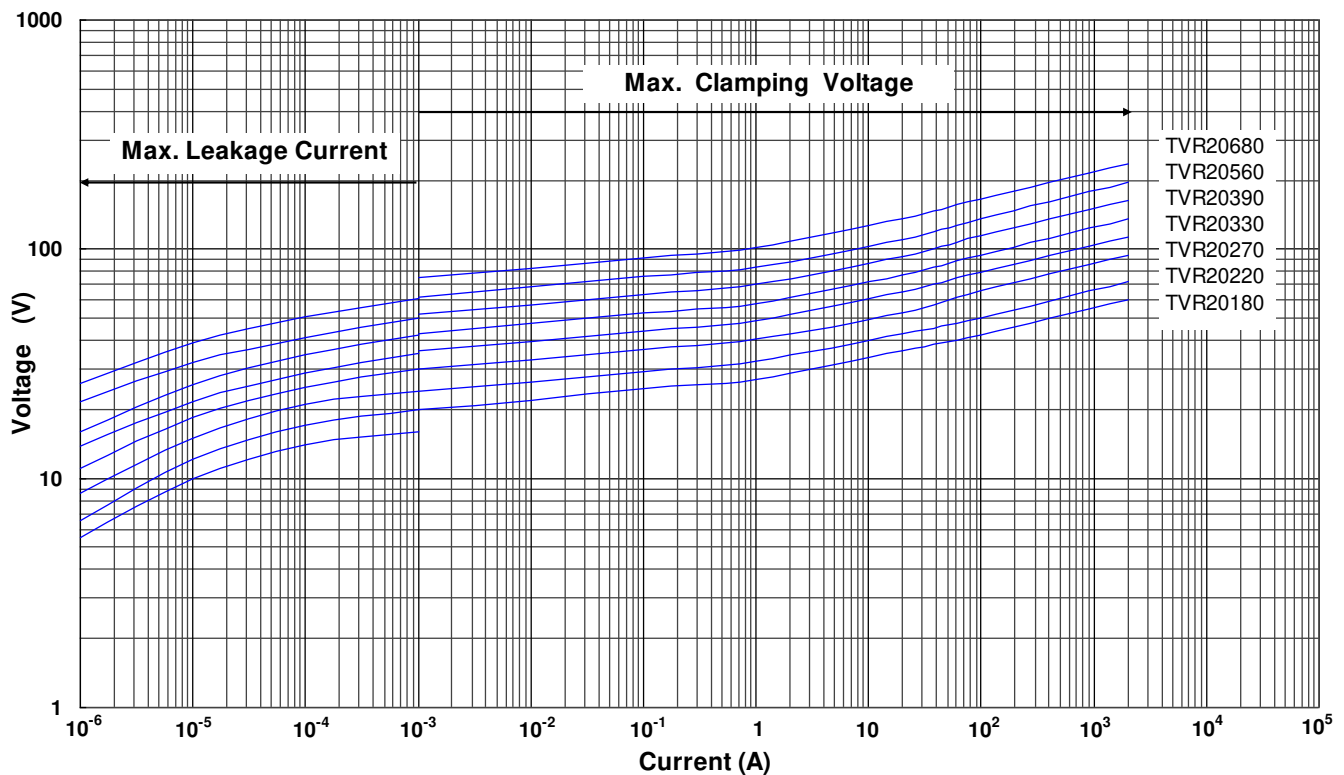
Disc Type Varistor for Surge Protection

■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR14511 to TVR14182)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR20180 to TVR20680)



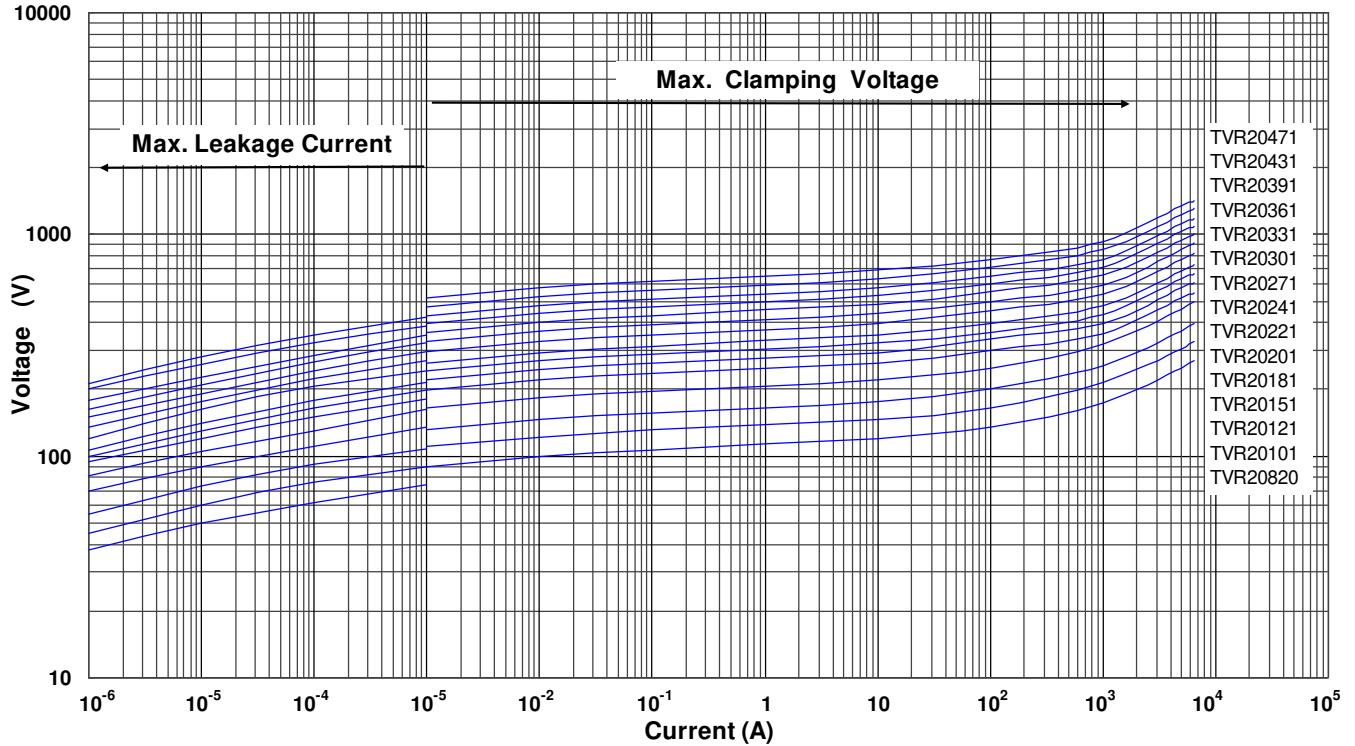
Metal Oxide Varistor : TVR Series



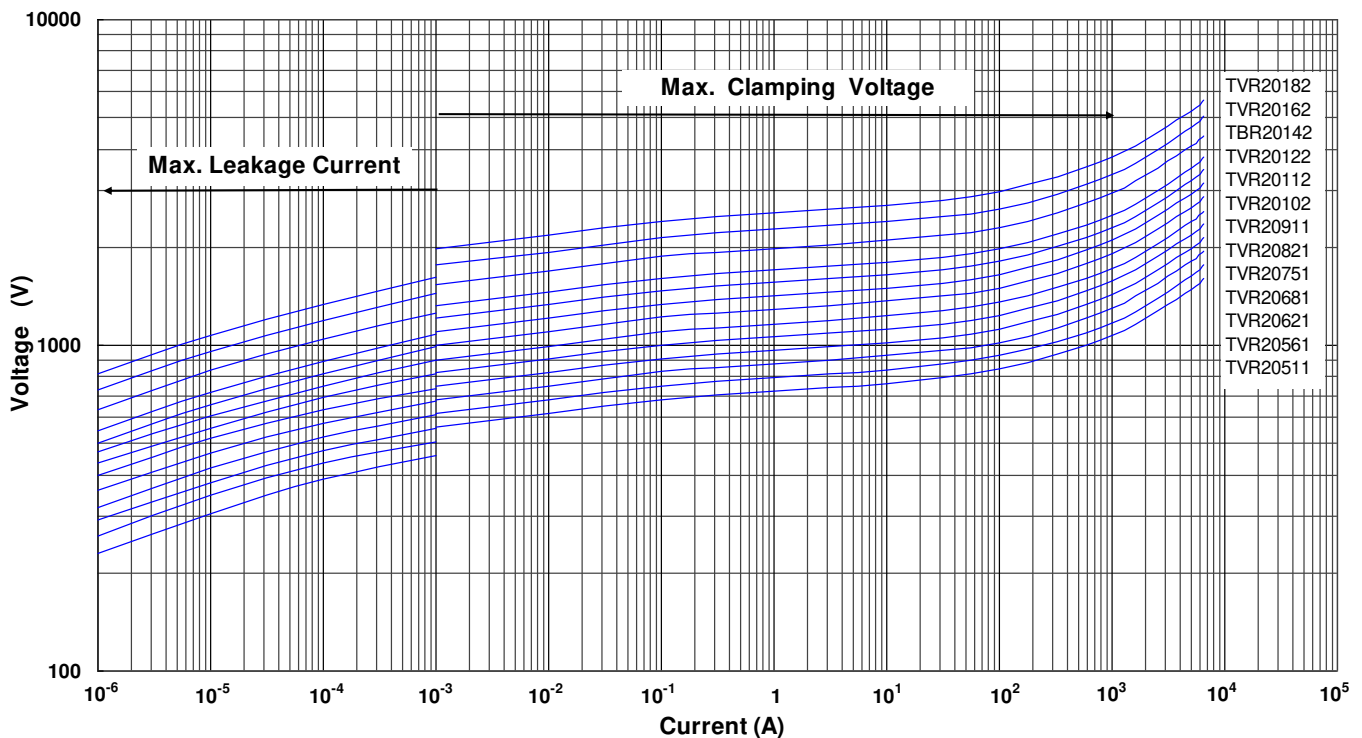
Disc Type Varistor for Surge Protection

■ Max. Leakage Current and Max. Clamping Voltage Curves

Max. Leakage Current and Max. Clamping Voltage Curves (TVR20820 to TVR20471)



Max. Leakage Current and Max. Clamping Voltage Curves (TVR20511 to TVR20182)



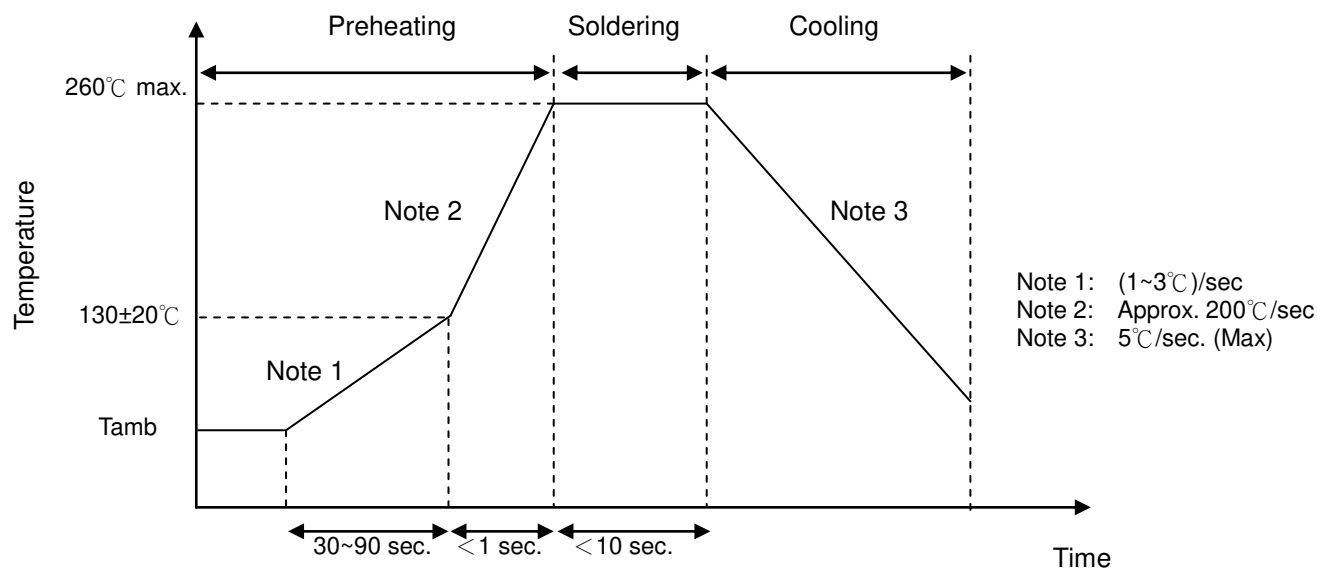
Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

■ Soldering Recommendation

● Wave Soldering Profile



● Recommended Reworking Conditions with Soldering Iron

| Item | Conditions |
|-----------------------------------|----------------------------|
| Temperature of Soldering Iron-tip | 360°C (max.) |
| Soldering Time | 3 sec (max.) |
| Distance from Varistor | 2 mm (min.) |

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

■ Reliability

| Item | Standard | Test conditions / Methods | Specifications | | | | | | | | | | | | | | | |
|------------------------------------|------------------------|--|---|------------------|------------------|-----|------------|------|--|------------------|-----|---|-------|------|---|------------------|-----|--|
| Tensile Strength of Terminals | IEC60068-2-21 | Gradually apply the specified force and keep the unit fixed for 10±1 sec. <table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border-bottom: 1px solid black;">Terminal diameter (mm)</td> <td style="text-align: center; border-bottom: 1px solid black;">Force (Kg)</td> </tr> <tr> <td style="text-align: center;">0.5<d≤0.8</td> <td style="text-align: center;">1.0</td> </tr> <tr> <td style="text-align: center;">0.8<d≤1.25</td> <td style="text-align: center;">2.0</td> </tr> </table> | Terminal diameter (mm) | Force (Kg) | 0.5<d≤0.8 | 1.0 | 0.8<d≤1.25 | 2.0 | $ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage | | | | | | | | | |
| Terminal diameter (mm) | Force (Kg) | | | | | | | | | | | | | | | | | |
| 0.5<d≤0.8 | 1.0 | | | | | | | | | | | | | | | | | |
| 0.8<d≤1.25 | 2.0 | | | | | | | | | | | | | | | | | |
| Bending Strength of Terminals | IEC 60068-2-21 | Hold specimen and apply the force specified below to each lead. Bend the specimen to 90°, then return to the original position. Repeat the procedure in the opposite direction. <table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border-bottom: 1px solid black;">Terminal diameter (mm)</td> <td style="text-align: center; border-bottom: 1px solid black;">Force (Kg)</td> </tr> <tr> <td style="text-align: center;">0.5<d≤0.8</td> <td style="text-align: center;">0.5</td> </tr> <tr> <td style="text-align: center;">0.8<d≤1.25</td> <td style="text-align: center;">1.0</td> </tr> </table> | Terminal diameter (mm) | Force (Kg) | 0.5<d≤0.8 | 0.5 | 0.8<d≤1.25 | 1.0 | $ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage | | | | | | | | | |
| Terminal diameter (mm) | Force (Kg) | | | | | | | | | | | | | | | | | |
| 0.5<d≤0.8 | 0.5 | | | | | | | | | | | | | | | | | |
| 0.8<d≤1.25 | 1.0 | | | | | | | | | | | | | | | | | |
| Vibration | IEC 60068-2-6 | Frequency range: 10-55 Hz Amplitude: 0.75mm or 98 m/s ² Direction: 3 mutually perpendicular directions, 2 hrs each | $ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage | | | | | | | | | | | | | | | |
| Solderability | IEC 60068-2-20 | 245±3°C, 3±0.3 sec | At least 95% of terminal electrode is covered by new solder | | | | | | | | | | | | | | | |
| Resistance to Soldering Heat | IEC 60068-2-20 | 260±3°C, 10±1 sec, (5±0.5 sec for TVR05) | $ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage | | | | | | | | | | | | | | | |
| High Temperature Storage | IEC 60068-2-2 | 125±5°C x 1000±24 hrs | $ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage | | | | | | | | | | | | | | | |
| Damp Heat, Steady State | IEC60068-2-78 | a. 40±2°C, 90 ~ 95 % RH, 1344 hrs b. 40±2°C, 90 ~ 95 % RH, at 10%Vdc, 1344 hrs | $ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage Insulation Resistance ≥100MΩ | | | | | | | | | | | | | | | |
| Rapid Change of Temperature | IEC 60068-2-14 | The conditions shown below shall be repeated 5 cycles <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40±3</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>5±3</td> </tr> <tr> <td>3</td> <td>105±2</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>5±3</td> </tr> </tbody> </table> | Step | Temperature (°C) | Period (minutes) | 1 | -40±3 | 30±3 | 2 | Room temperature | 5±3 | 3 | 105±2 | 30±3 | 4 | Room temperature | 5±3 | $ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage |
| Step | Temperature (°C) | Period (minutes) | | | | | | | | | | | | | | | | |
| 1 | -40±3 | 30±3 | | | | | | | | | | | | | | | | |
| 2 | Room temperature | 5±3 | | | | | | | | | | | | | | | | |
| 3 | 105±2 | 30±3 | | | | | | | | | | | | | | | | |
| 4 | Room temperature | 5±3 | | | | | | | | | | | | | | | | |
| High Temp. Load | MIL-STD-202 Method 108 | 105±2°C, 1000±24 hrs at V _{DC} or V _{rms} (Max. Continuous Voltage) | $ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage | | | | | | | | | | | | | | | |
| 8/20μs Surge Life | IEC 61051-1 | 8/20μs waveform, 10 surge currents, unipolar, interval 30 secs, amplitude corresponding to max. surge current derating curves for 20μs. | $ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage | | | | | | | | | | | | | | | |
| 10/1000μs Surge Life | IEC 61051-1 | 10/1000μs waveform, 10 surge currents, unipolar, interval 2mins, amplitude corresponding to max. surge current derating curves for 1000μs. | $ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage | | | | | | | | | | | | | | | |
| Voltage Proof | IEC 61051-1 | Metal balls method, 2500 Vac 1 min | No visible damage | | | | | | | | | | | | | | | |
| Varistor Voltage Temp. Coefficient | Specification Standard | $\frac{V_{1mA \text{ at } 105^{\circ}\text{C}} - V_{1mA \text{ at } 25^{\circ}\text{C}}}{V_{1mA \text{ at } 25^{\circ}\text{C}}} \times \frac{1}{80} \times 100 (\% / ^{\circ}\text{C})$ $\frac{V_{1mA \text{ at } -40^{\circ}\text{C}} - V_{1mA \text{ at } 25^{\circ}\text{C}}}{V_{1mA \text{ at } 25^{\circ}\text{C}}} \times \frac{1}{65} \times 100 (\% / ^{\circ}\text{C})$ | -0.05 ≤ TC ≤ 0.05 (%/°C) | | | | | | | | | | | | | | | |

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

■ Packaging

● Taping Specification

S Type (Straight Lead)

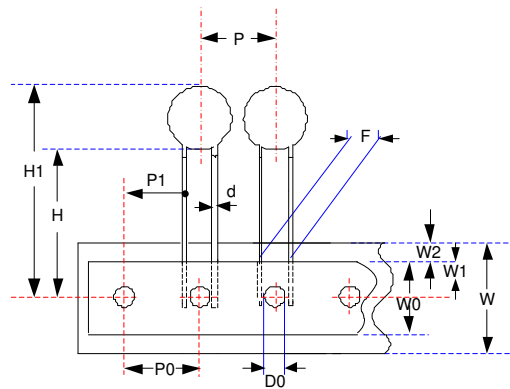


Figure A

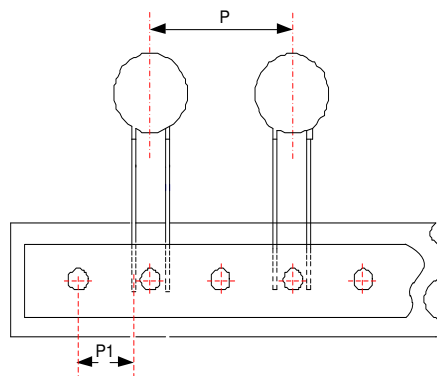


Figure B

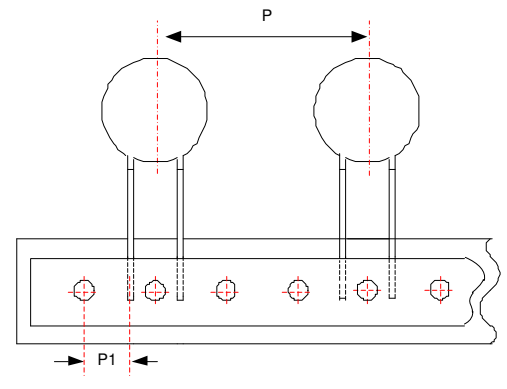


Figure C

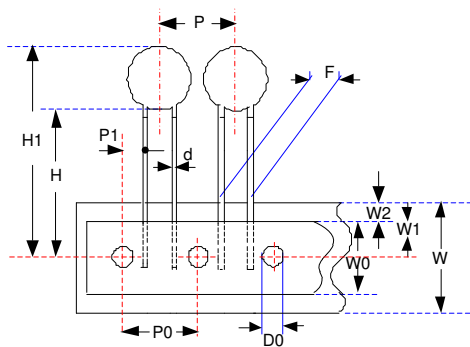


Figure D

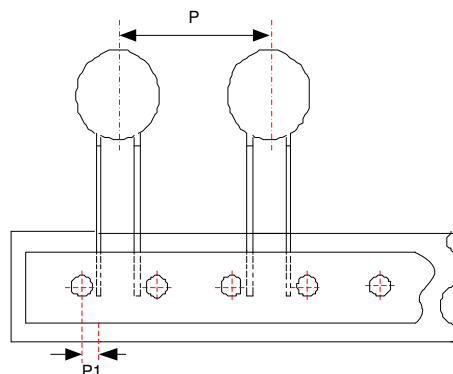
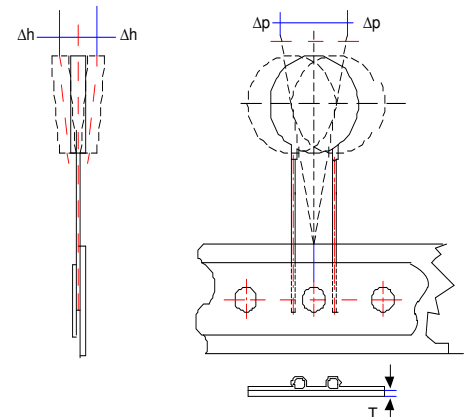


Figure E



(Unit: mm)

| Taping Code | Body Size | P ₀ | F | P | P ₁ | H | H ₁ | d | W ₀ | W ₁ | W ₂ | W | Δ P | Δ h | D ₀ | T | Figure |
|-----------------------------|-----------|----------------|------|------|----------------|-------|----------------|-------|----------------|----------------|----------------|---------|------|------|----------------|------|--------|
| | | ±0.3 | ±1 | ±1 | ±1 | +2/-0 | Max. | ±0.02 | ±1 | +0.75/-0.5 | Max | +1/-0.5 | Max. | Max. | ±0.2 | ±0.2 | |
| A (P ₀ :12.7) | 05 | 12.7 | 5.0 | 12.7 | 3.55 | 18 | 28.0 | 0.6 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 07 | 12.7 | 5.0 | 12.7 | 3.55 | 18 | 30.0 | 0.6 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 10 | 12.7 | 7.5 | 12.7 | 8.55 | 18 | 33.5 | 0.8 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | A |
| | 14 | 12.7 | 7.5 | 25.4 | 8.55 | 18 | 38.0 | 0.8 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | B |
| | 20 | 12.7 | 10.0 | 38.1 | 7.20 | 18 | 40.5 | 1.0 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | C |
| E (P ₀ :15.0) | 05 | 15 | 5.0 | 15.0 | 4.70 | 18 | 28.0 | 0.6 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 07 | 15 | 5.0 | 15.0 | 4.70 | 18 | 30.0 | 0.6 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 10 | 15 | 7.5 | 15.0 | 3.35 | 18 | 33.5 | 0.8 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 14 | 15 | 7.5 | 30.0 | 3.35 | 18 | 38.0 | 0.8 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | E |
| | 20 | 15 | 10.0 | 30.0 | 9.50 | 18 | 40.5 | 1.0 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | B |

Metal Oxide Varistor : TVR Series

Disc Type Varistor for Surge Protection



F Type (Y Kink Lead)

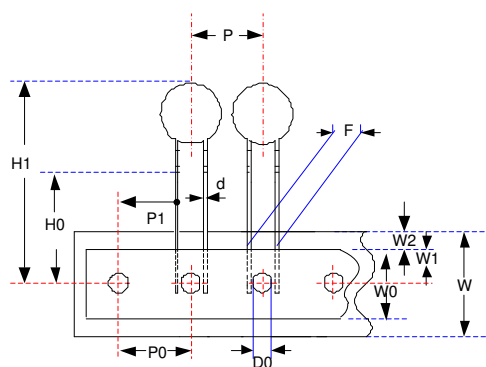


Figure A

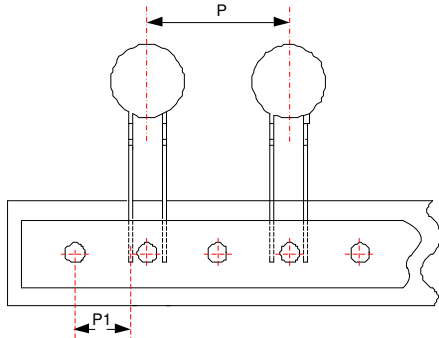


Figure B

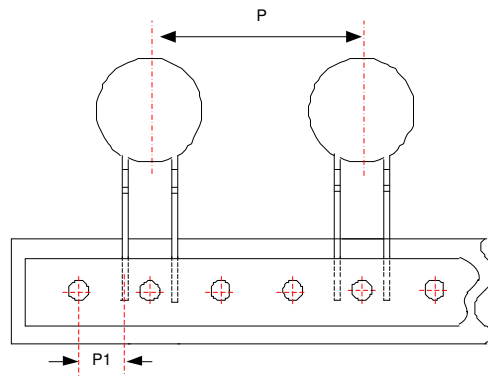


Figure C

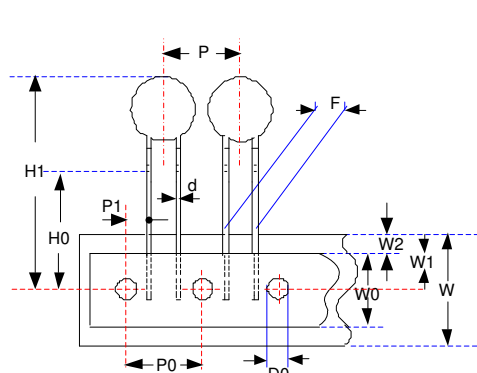


Figure D

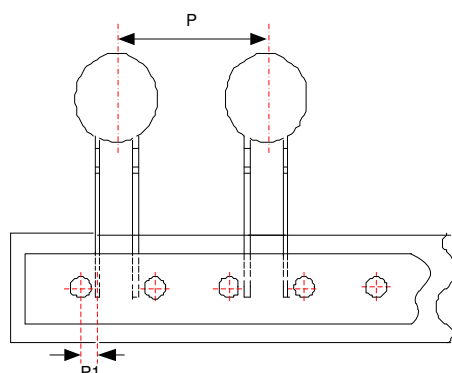
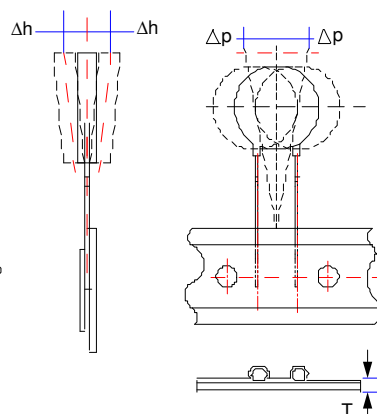


Figure E



(Unit: mm)

| Taping Code | Body Size | P ₀ | F | P | P ₁ | H ₀ | H ₁ | d | W ₀ | W ₁ | W ₂ | W | ΔP | Δh | D ₀ | T | Figure |
|-----------------------------|-----------|----------------|------|------|----------------|----------------|----------------|-------|----------------|----------------|----------------|---------|------|------|----------------|------|--------|
| | | ±0.3 | ±1 | ±1 | ±1 | ±0.5 | Max. | ±0.02 | ±1 | +0.75/-0.5 | Max | +1/-0.5 | Max. | Max. | ±0.2 | ±0.2 | |
| A (P ₀ :12.7) | 05 | 12.7 | 5.0 | 12.7 | 3.55 | 16 | 28.0 | 0.6 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 07 | 12.7 | 5.0 | 12.7 | 3.55 | 16 | 30.0 | 0.6 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 10 | 12.7 | 7.5 | 12.7 | 8.55 | 16 | 33.5 | 0.8 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | A |
| | 14 | 12.7 | 7.5 | 25.4 | 8.55 | 16 | 38.0 | 0.8 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | B |
| | 20 | 12.7 | 10.0 | 38.1 | 7.20 | 16 | 44.5 | 1.0 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | C |
| E (P ₀ :15.0) | 05 | 15 | 5.0 | 15.0 | 4.70 | 16 | 28.0 | 0.6 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 07 | 15 | 5.0 | 15.0 | 4.70 | 16 | 30.0 | 0.6 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 10 | 15 | 7.5 | 15.0 | 3.35 | 16 | 33.5 | 0.8 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | D |
| | 14 | 15 | 7.5 | 30.0 | 3.35 | 16 | 38.0 | 0.8 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | E |
| | 20 | 15 | 10.0 | 30.0 | 9.50 | 16 | 44.5 | 1.0 | 12 | 9 | 3 | 18 | 1 | 2 | 4 | 0.6 | B |

Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

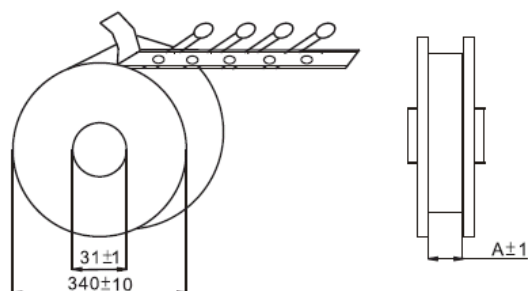
■ Quantity

● Bulk Packing

| Series | Straight Lead Type Quantity (pcs/bag) | Cut Lead Type Quantity (pcs/bag) | Kink Type Quantity (pcs/bag) |
|-----------------|--|-------------------------------------|---------------------------------|
| TVR05 | 250 | 250 | --- |
| TVR07 | 250 | 250 | 200 |
| TVR10 (180~751) | 200 | 200 | 200 |
| TVR10 (821~182) | 100 | 100 | 100 |
| TVR14 | 100 | 100 | 100 |
| TVR20 | 50 | 50 | 50 |

● Reel Packing

| Series | A (mm) | Quantity (pcs/reel) |
|----------------|--------|---------------------|
| TVR05(180~391) | 46 | 1,500 |
| TVR05(431~751) | | 1,000 |
| TVR07(180~391) | | 1,500 |
| TVR07(431~821) | | 1,000 |
| TVR10(180~911) | | 1,000 |
| TVR10(102~112) | | 750 |
| TVR10(122~182) | | 500 |
| TVR14(180~470) | | 800 |
| TVR14(560~391) | | 750 |
| TVR14(431~182) | | 500 |
| TVR20(180~431) | 52 | 500 |
| TVR20(471~681) | | 400 |
| TVR20(751~182) | | 250 |



(Unit: mm)

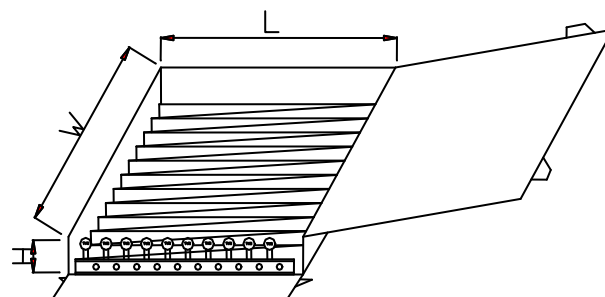
Metal Oxide Varistor : TVR Series



Disc Type Varistor for Surge Protection

● Ammo Packing

| Series | Quantity (pcs/box) P0=12.7mm | Quantity (pcs/box) P0=15.0mm |
|----------------|------------------------------------|------------------------------------|
| TVR05(180~391) | 1,500 | 1,500 |
| TVR05(431~751) | 1,200 | 1,000 |
| TVR07(180~391) | 1,500 | 1,500 |
| TVR07(431~511) | 1,200 | 1,200 |
| TVR07(561~821) | 1,000 | 1,200 |
| TVR10(180~361) | 1,200 | 950 |
| TVR10(391~621) | 1,200 | 750 |
| TVR10(681~112) | 800 | 600 |
| TVR10(122~182) | 700 | 400 |
| TVR14(180~271) | 650 | 500 |
| TVR14(301~561) | 500 | 450 |
| TVR14(621~751) | 400 | 350 |
| TVR14(821~112) | 300 | 300 |
| TVR14(122~182) | 300 | 250 |
| TVR20(180~751) | 300 | 300 |
| TVR20(821~182) | 250 | 250 |



(Unit: mm)

| Series | W±5 | L±5 | H±5 |
|------------------|-----|-----|-----|
| TVR05 ~ TVR20 | 345 | 275 | 55 |

■ Warehouse Storage Conditions of Products

- Storage Conditions:
 1. Storage Temperature: -10°C~+40°C
 2. Relative Humidity: ≤75%RH
 3. Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year