

# Metal Oxide Varistor : TVR Series



## Disc Type Varistor for Surge Protection

### ■ Features

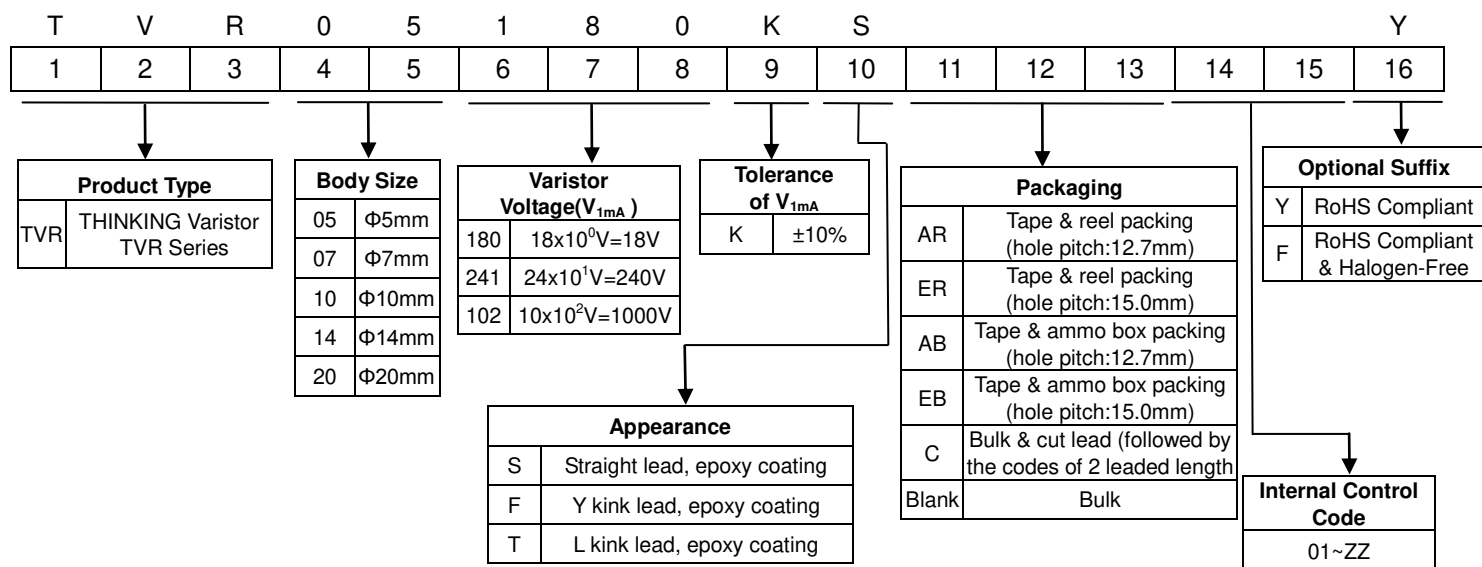
1. RoHS compliant
2. Halogen-free series are available
3. Body size:  $\Phi 5 \sim \Phi 20\text{mm}$
4. Wide operating voltage range: 11Vac ~ 1000 Vac
5. Operating temperature range:  $-40^{\circ}\text{C} \sim +105^{\circ}\text{C}$   
Storage temperature range:  $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$
6. Agency recognition: UL 1449 4<sup>th</sup> / 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 11<sup>th</sup> digit if packaging and internal control codes are not coded.

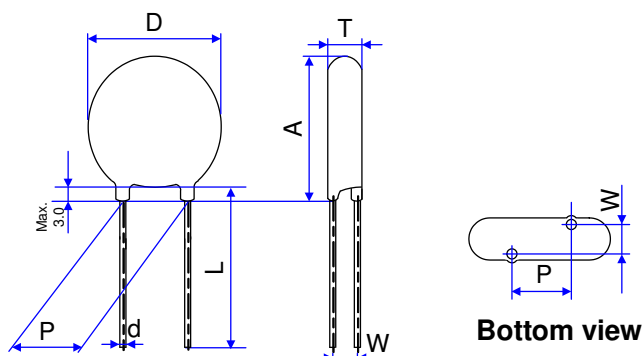
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## Disc Type Varistor for Surge Protection

### Structures and Dimensions

#### S Type (Straight lead)



(Unit: mm)

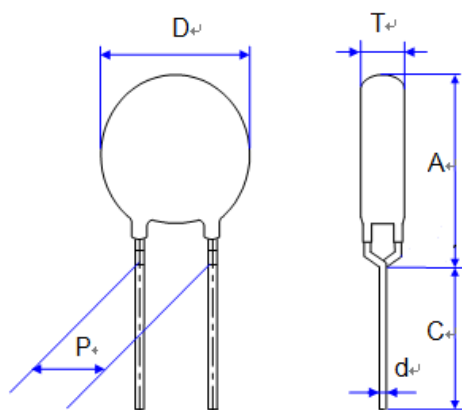
| Series | D                                      | Lmin. | d        | P  | Amax.   | Tmax.  | W |
|--------|--|-------|----------|--|---|--|---|
| TVR05  | 5.0~7.0                                | 26.5  | 0.6±0.02 | 5.0±0.5 (for TVR180-561)<br>5.0±1.0 (for TVR621-751)     | 9.0   | Please refer to the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

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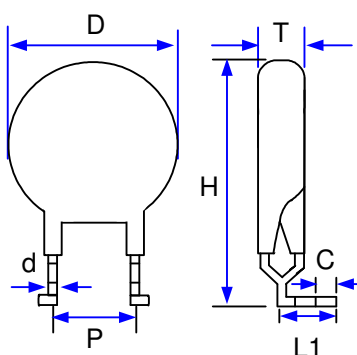
### ■ F Type (Y kink lead)



(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)<br>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)<br>5.0±1.0 (for TVR07621-821) | 11.5  |  |
| TVR10  | 9.5~12.5<br>9.5~13.5<br>(for TVR10182) | 20    | 0.8±0.02 | 7.5±0.5 (for TVR10180-561)<br>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)<br>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<br>9.5~13.5<br>(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<br>(@ 1mA DC) | Max. Continuous Voltage |          | Max. Clamping Voltage<br>(8/20 $\mu$ s) |       | Max. Surge Current<br>(8/20 $\mu$ s) | Rated Power | Max. Energy<br>(10/1000 $\mu$ s) | Dimension |           |                |
|----------|--------------------------------|-------------------------|----------|---|-------|--------------------------------------|-------------|----------------------------------|-----------|-----------|----------------|
|          | $V_{1mA}$                      | $V_{AC(rms)}$           | $V_{DC}$ | $V_P$                                   | $I_P$ | $I_{max}$                            | P           | $W_{max}$                        | $T_{min}$ | $T_{max}$ | W<br>$\pm 1.0$ |
|          | (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            |

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## Disc Type Varistor for Surge Protection

### 07mm Series

| Part No. | Varistor Voltage<br>(@ 1mA DC) | Max. Continuous Voltage |                 | Max. Clamping Voltage<br>(8/20 $\mu$ s) |                | Max. Surge Current<br>(8/20 $\mu$ s) | Rated Power | Max. Energy<br>(10/1000 $\mu$ s) | Dimension        |                  |                |
|----------|--------------------------------|-------------------------|-----------------|---|----------------|--------------------------------------|-------------|----------------------------------|------------------|------------------|----------------|
|          | V <sub>1mA</sub>               | V <sub>AC(rms)</sub>    | V <sub>DC</sub> | V <sub>P</sub>                          | I <sub>P</sub> | I <sub>max</sub>                     | P           | W <sub>max</sub>                 | T <sub>min</sub> | T <sub>max</sub> | W<br>$\pm 1.0$ |
|          | (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            |

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## Disc Type Varistor for Surge Protection

### 10mm Series

| Part No. | Varistor Voltage<br>(@ 1mA DC) | Max. Continuous Voltage |          | Max. Clamping Voltage<br>(8/20 $\mu$ s) |       | Max. Surge Current<br>(8/20 $\mu$ s) | Rated Power | Max. Energy<br>(10/1000 $\mu$ 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<br>(@ 1mA DC) | Max. Continuous Voltage |                 | Max. Clamping Voltage<br>(8/20 $\mu$ s) |                | Max. Surge Current<br>(8/20 $\mu$ s) | Rated Power | Max. Energy<br>(10/1000 $\mu$ s) | Dimension        |                  |                |
|----------|--------------------------------|-------------------------|-----------------|---|----------------|--------------------------------------|-------------|----------------------------------|------------------|------------------|----------------|
|          | V <sub>1mA</sub>               | V <sub>AC(rms)</sub>    | V <sub>DC</sub> | V <sub>P</sub>                          | I <sub>P</sub> | I <sub>max</sub>                     | P           | W <sub>max</sub>                 | T <sub>min</sub> | T <sub>max</sub> | W<br>$\pm$ 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<br>(@ 1mA DC) | Max. Continuous Voltage |                 | Max. Clamping Voltage<br>(8/20 $\mu$ s) |                | Max. Surge Current<br>(8/20 $\mu$ s) | Rated Power | Max. Energy<br>(10/1000 $\mu$ s) | Dimension        |                  |                |
|----------|--------------------------------|-------------------------|-----------------|---|----------------|--------------------------------------|-------------|----------------------------------|------------------|------------------|----------------|
|          | V <sub>1mA</sub>               | V <sub>AC(rms)</sub>    | V <sub>DC</sub> | V <sub>P</sub>                          | I <sub>P</sub> | I <sub>max</sub>                     | P           | W <sub>max</sub>                 | T <sub>min</sub> | T <sub>max</sub> | W<br>$\pm$ 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                               | <b>3.1</b>       | 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 <sup>th</sup> & 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 <sup>th</sup> & cUL  | EN/IEC 61051-1,<br>IEC 61051-2,<br>IEC 61051-2-2                                  | IEC 61051-1<br>IEC 61051-2<br>IEC 61051-2-2  | GB/T10193<br>GB/T10194  |
| E314979             | J50411784   | 5944  | Current No.:<br>CQC03001005165<br>CQC03001007654<br>New No.: (Refer to Note)<br>CQC18001199806<br>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 <sup>th</sup> & cUL  | EN/IEC 61051-1,<br>IEC 61051-2,<br>IEC 61051-2-2                                  | IEC 61051-1<br>IEC 61051-2<br>IEC 61051-2-2   | GB/T10193<br>GB/T10194   |
|                     | E314979   | J50411784   | 5944  | Current No.<br>CQC03001005165<br>CQC03001007654<br>New No: (Refer to Note)<br>CQC18001200336<br>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 <sup>th</sup> & 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.<br>CQC03001005165<br>CQC03001007654<br>New No: (Refer to Note)<br>CQC18001199842<br>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 <sup>th</sup> & 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.<br>CQC03001005165<br>CQC03001007654<br>New No: (Refer to Note)<br>CQC18001199807<br>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:**

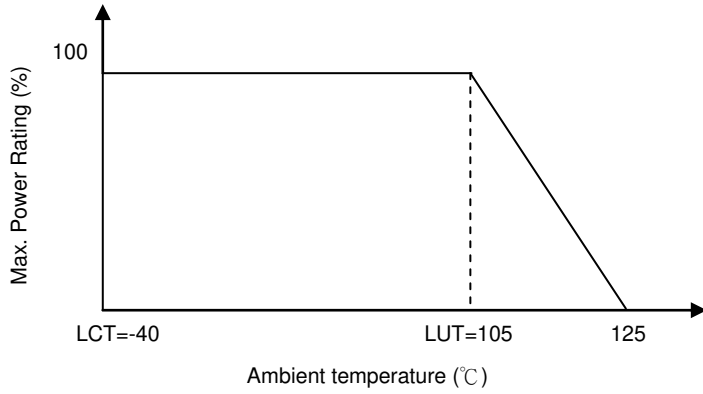
1. For CQC certification, its current and New numbers are both effective. However, its current number will be canceled on 2019/12/31, and only its NEW number will be available from 2020/01/01. Please use NEW number as your first priority.
2. UL/cUL/TUV/CQC certification: Operating Temperature is 105°C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

# Metal Oxide Varistor : TVR Series

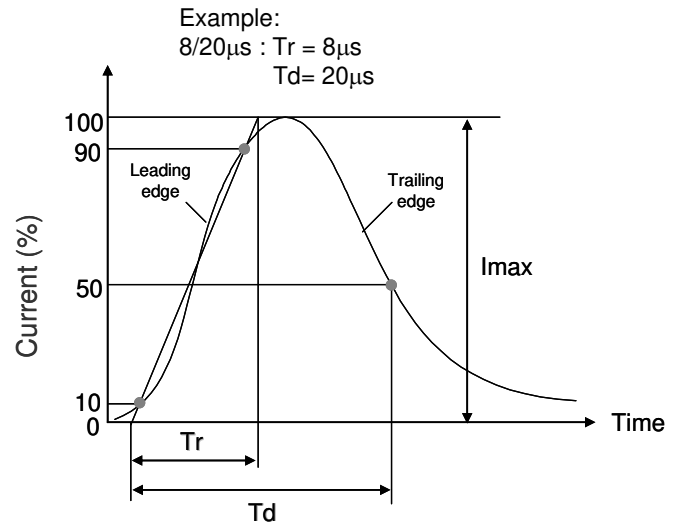


## Disc Type Varistor for Surge Protection

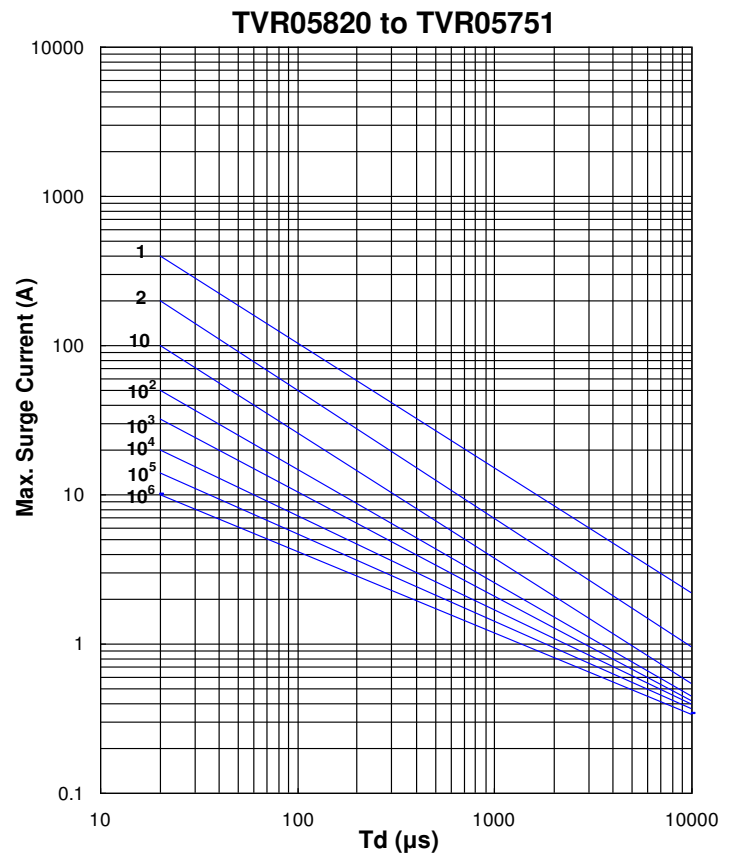
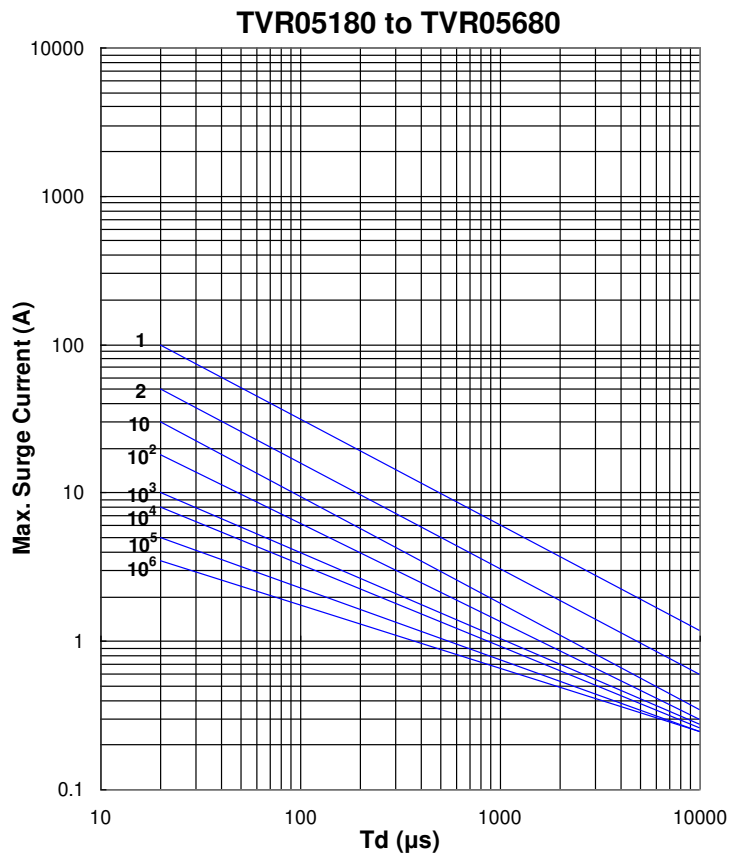
### Power Derating Curve



### Surge Current Standard Waveform



### Max. Surge Current Derating Curves



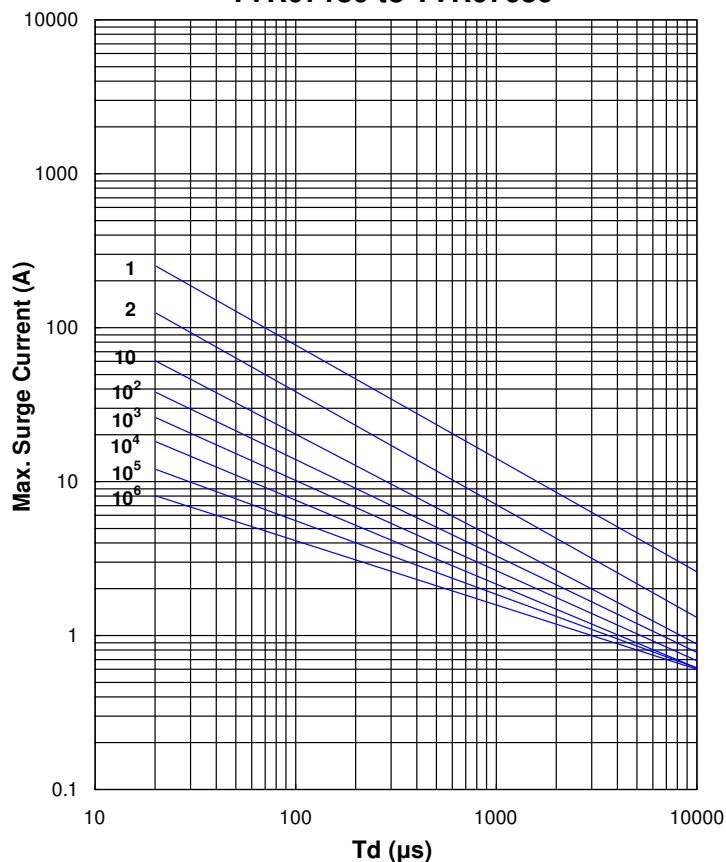
# Metal Oxide Varistor : TVR Series



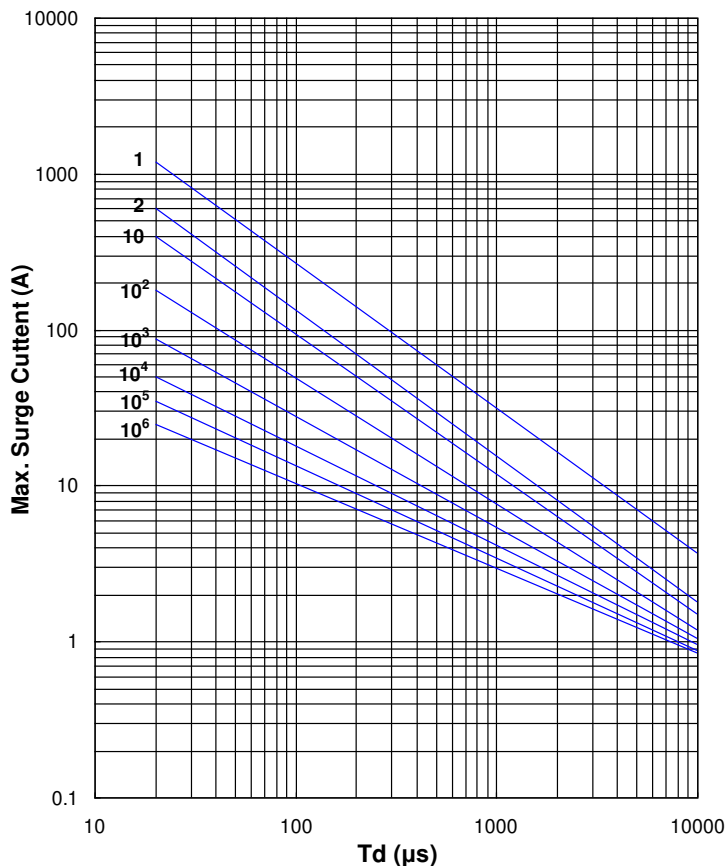
## Disc Type Varistor for Surge Protection

### Max. Surge Current Derating Curves

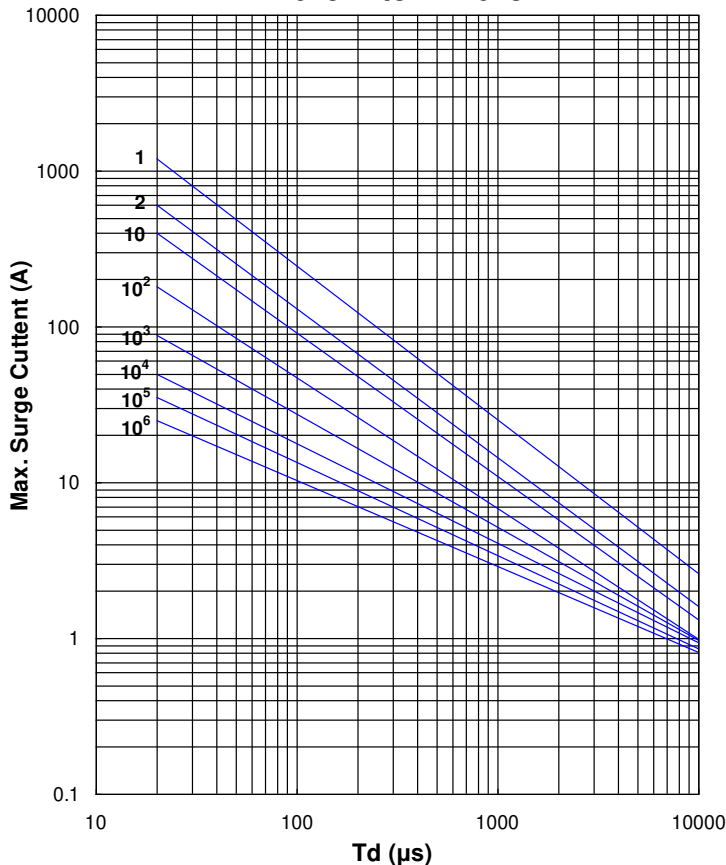
TVR07180 to TVR07680



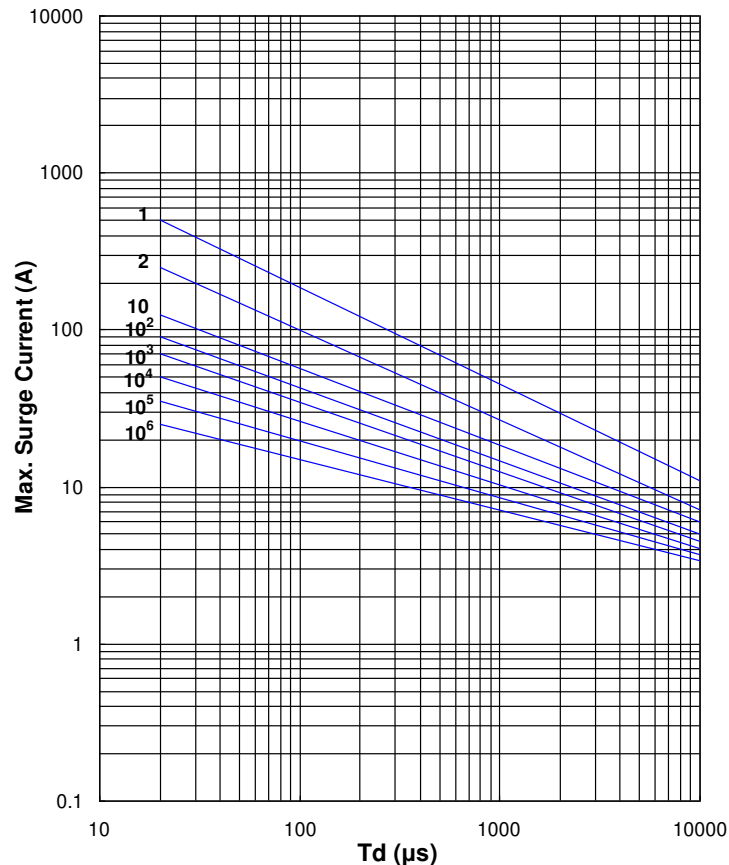
TVR07820 to TVR07471



TVR07511 to TVR07821



TVR10180 to TVR10680



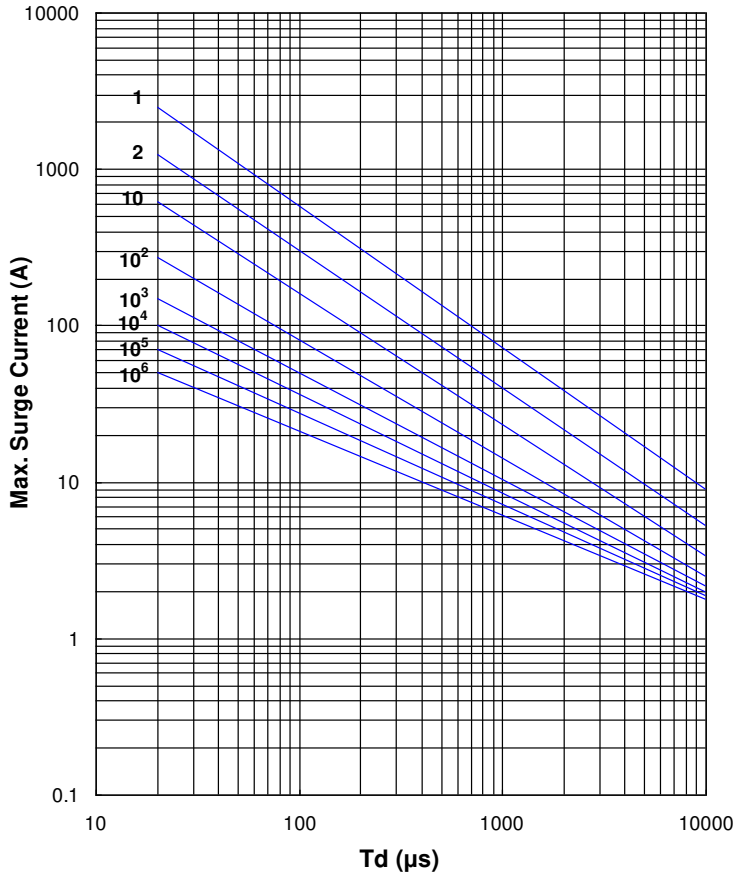
# Metal Oxide Varistor : TVR Series



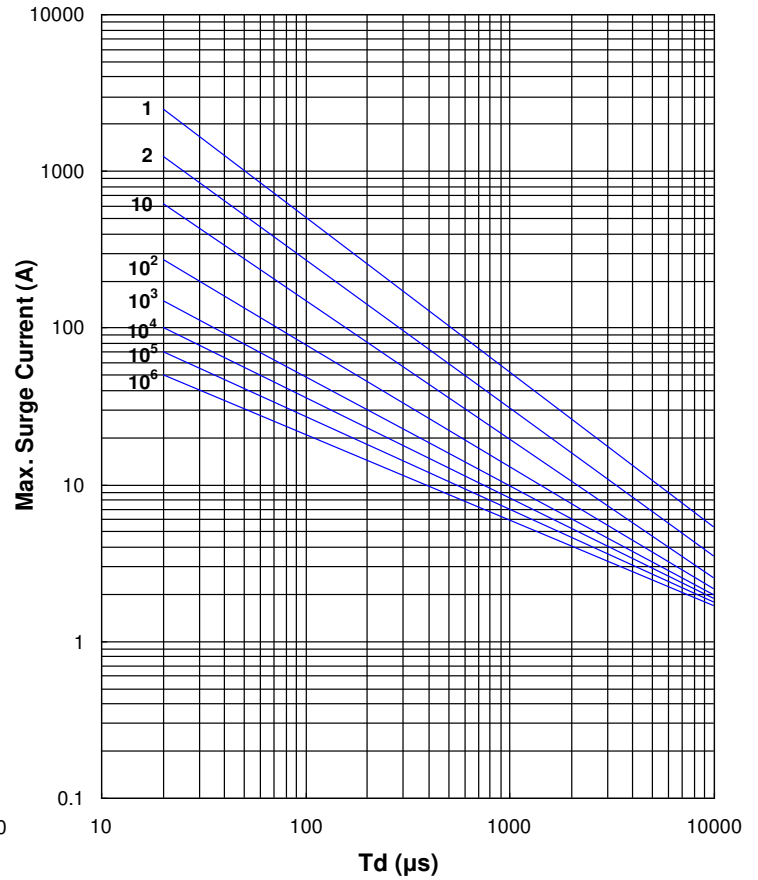
## Disc Type Varistor for Surge Protection

### Max. Surge Current Derating Curves

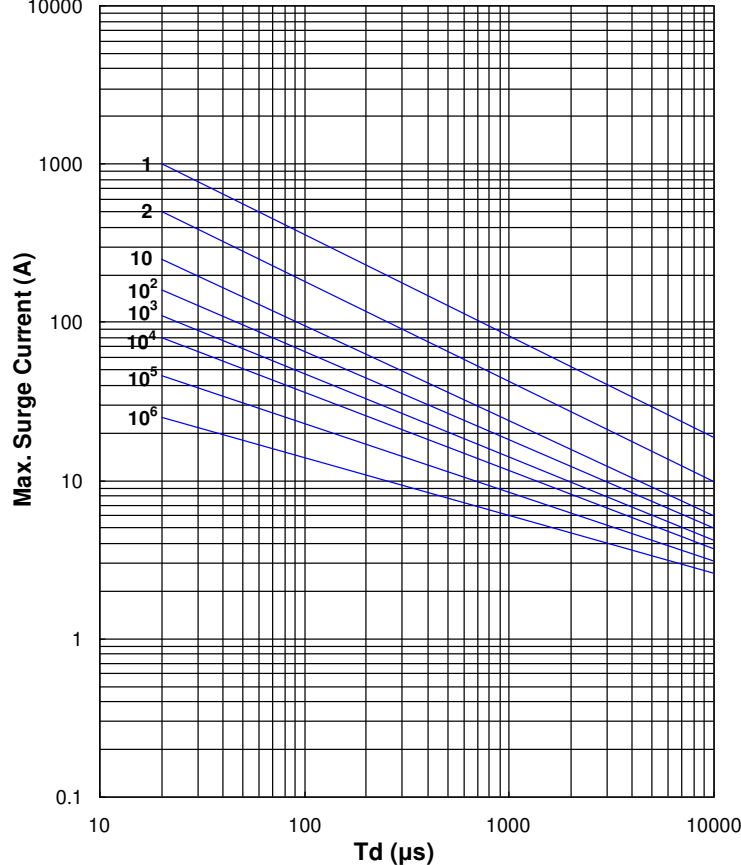
TVR10820 to TVR10751



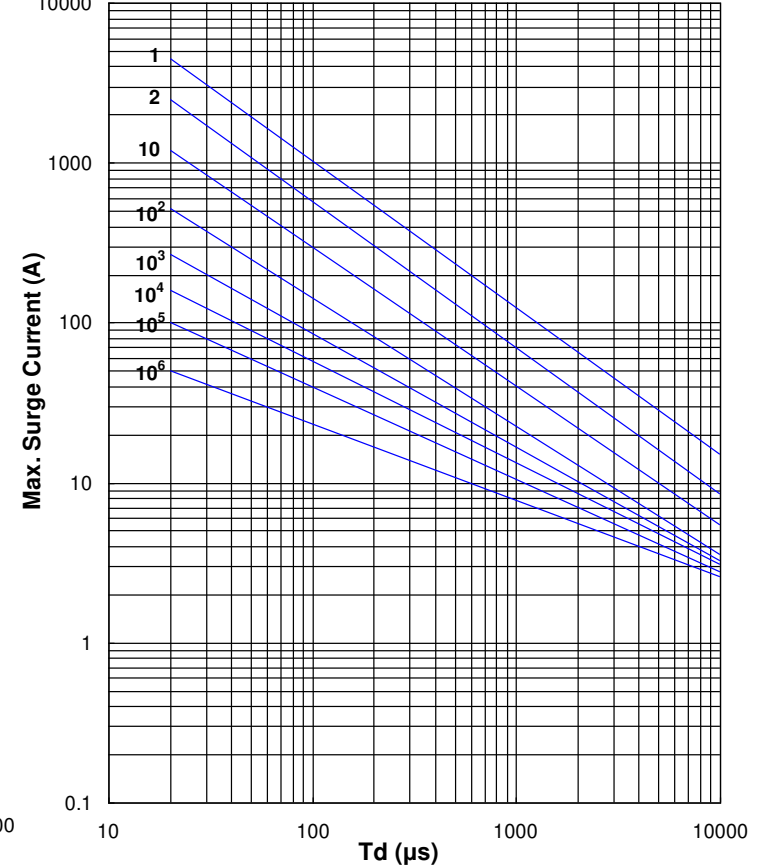
TVR10821 to TVR10182



TVR14180 to TVR14680



TVR14820 to TVR14751





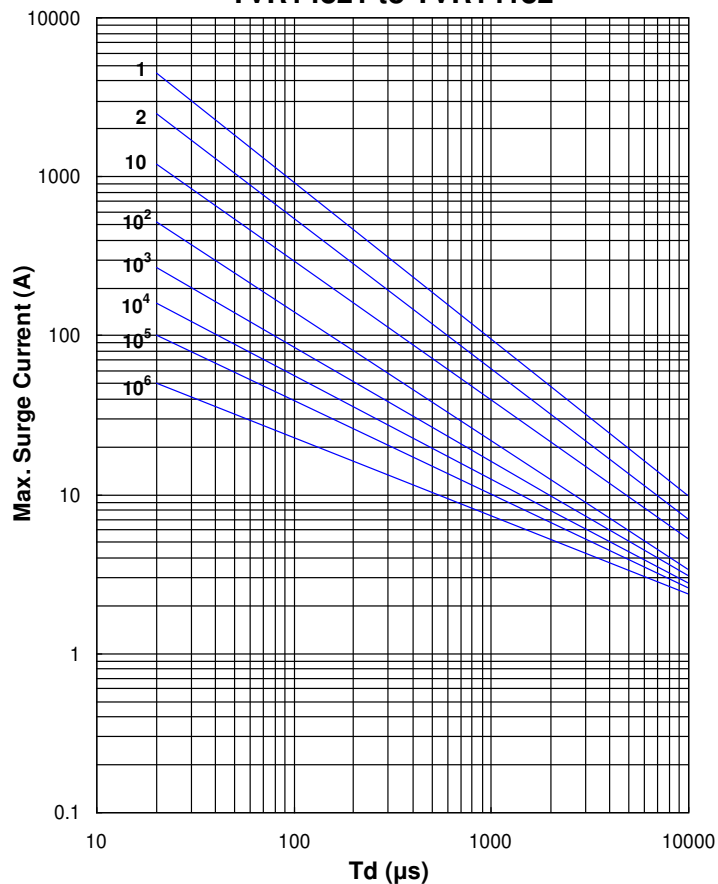
# Metal Oxide Varistor : TVR Series



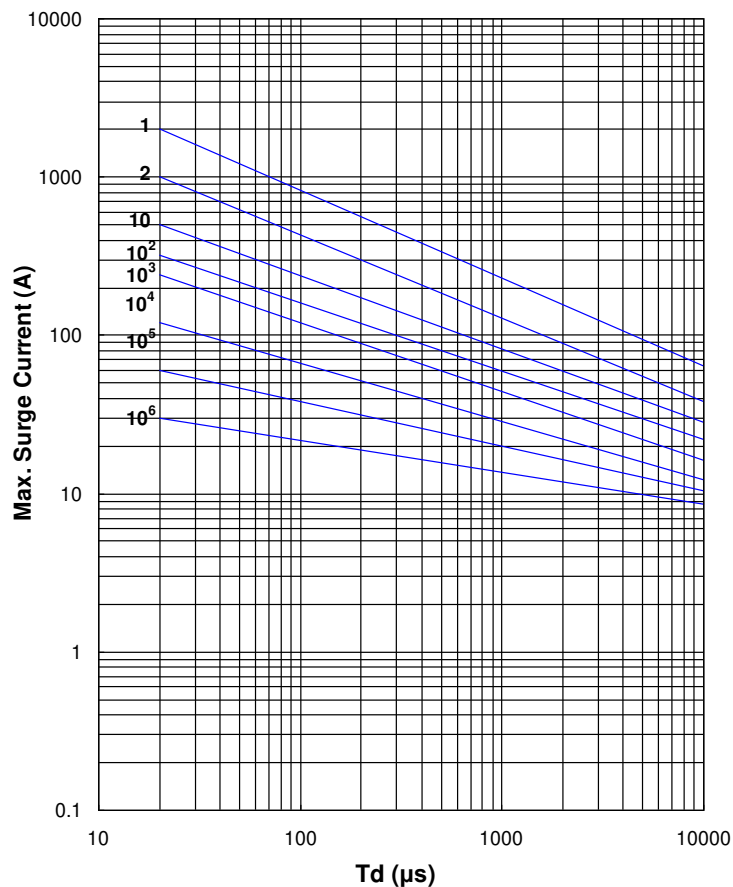
## Disc Type Varistor for Surge Protection

### Max. Surge Current Derating Curves

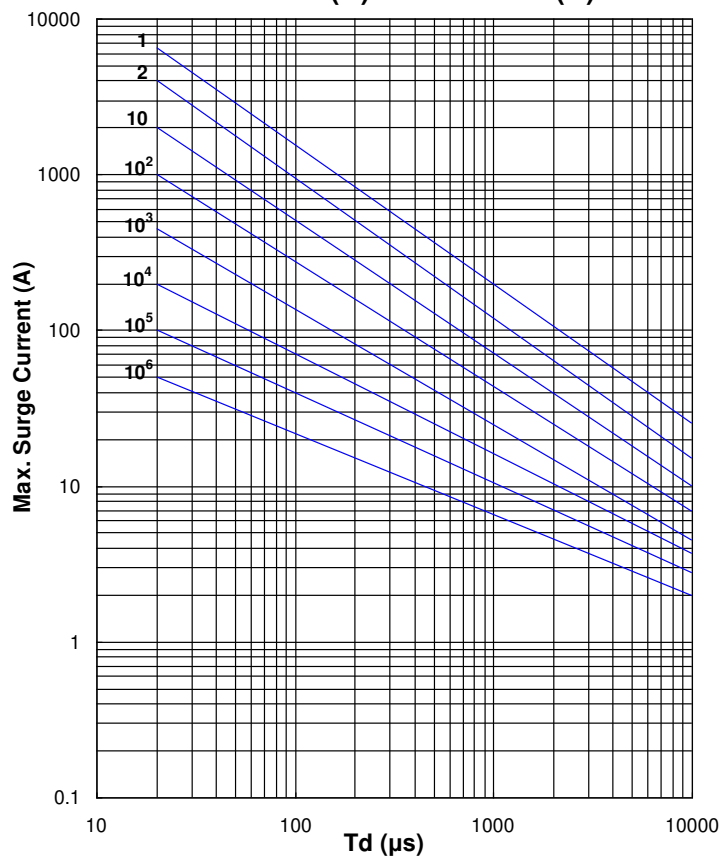
TVR14821 to TVR14182



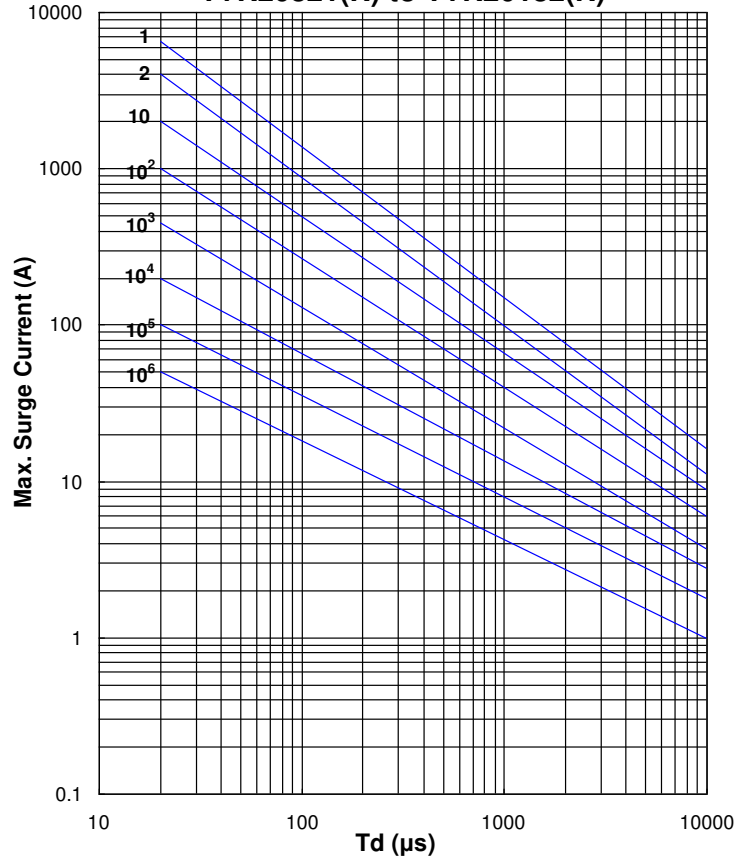
TVR20180 to TVR20680



TVR20820(R) to TVR20751(R)



TVR20821(R) to TVR20182(R)



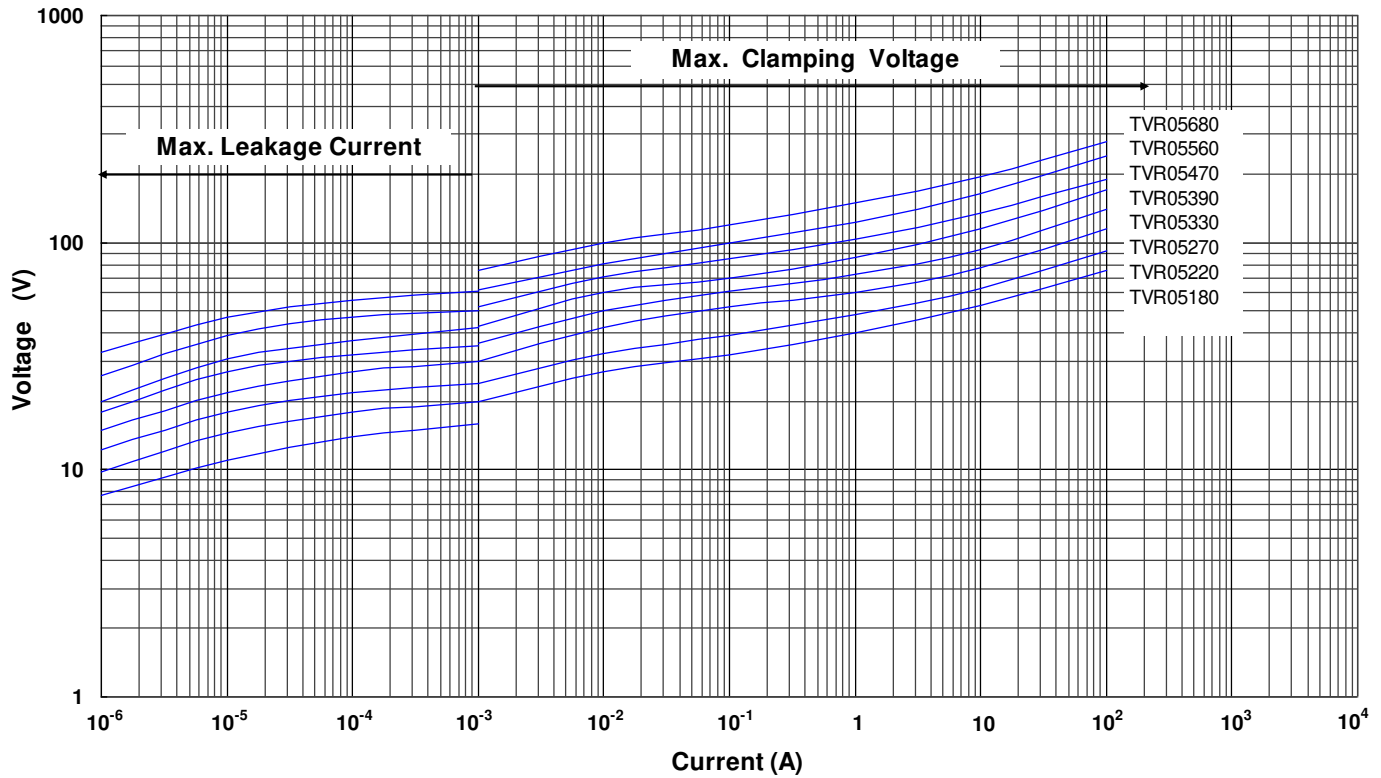
# Metal Oxide Varistor : TVR Series

## Disc Type Varistor for Surge Protection

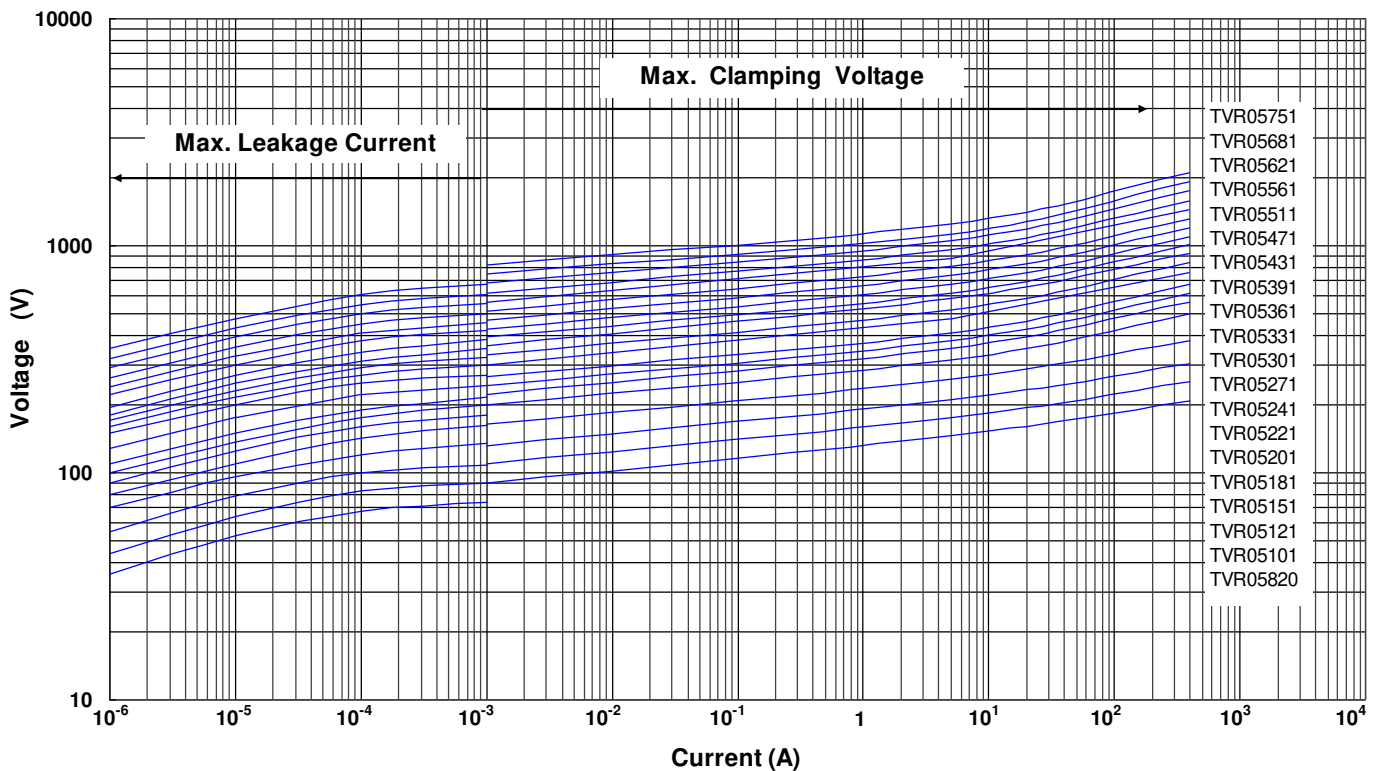


### ■ Max. Leakage Current and Max. Clamping Voltage Curves

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



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



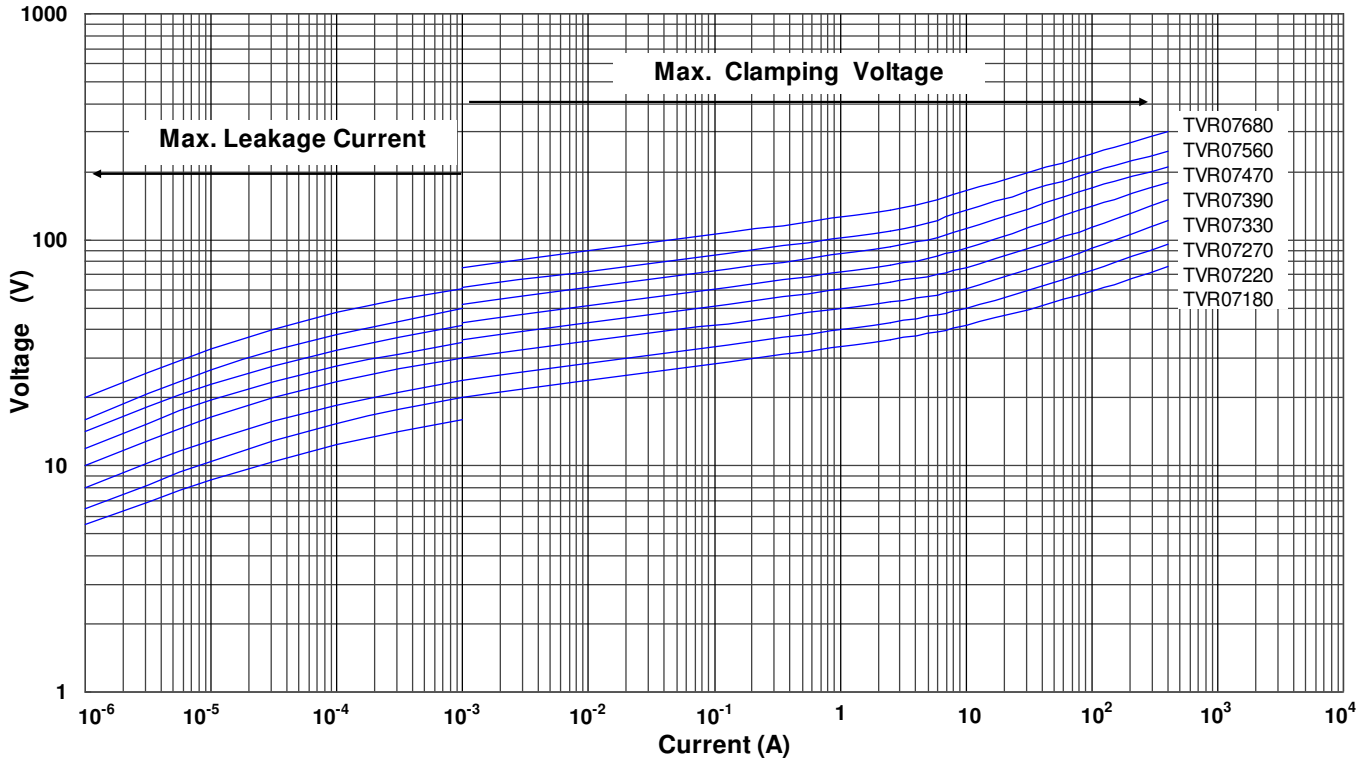
# Metal Oxide Varistor : TVR Series



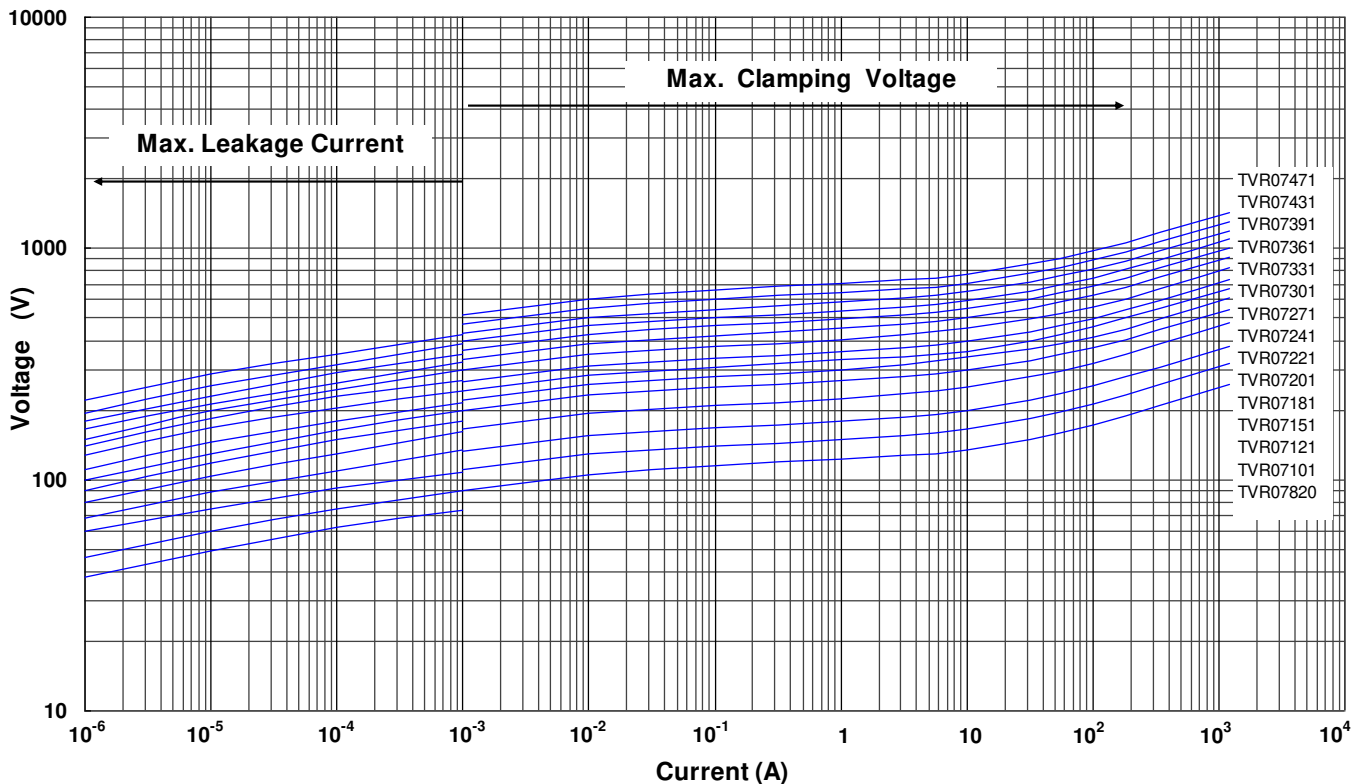
## Disc Type Varistor for Surge Protection

### ■ 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)



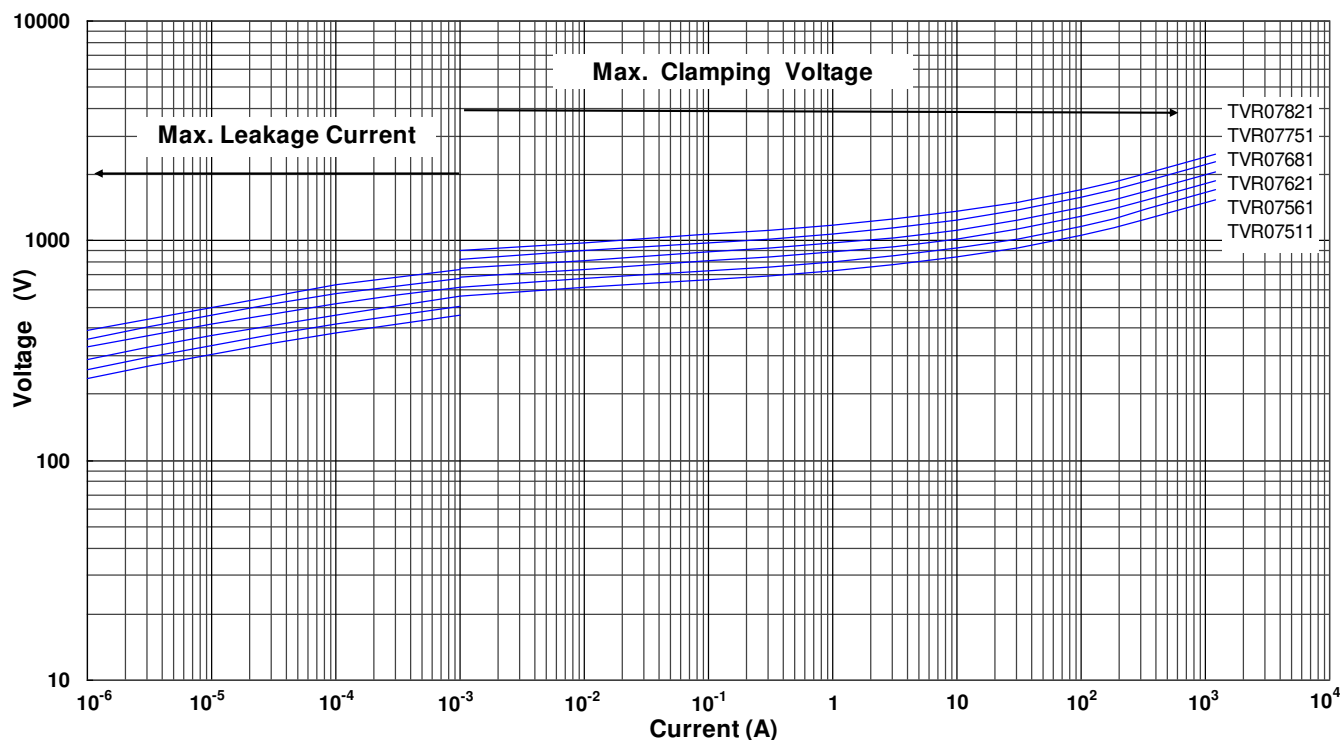
# Metal Oxide Varistor : TVR Series



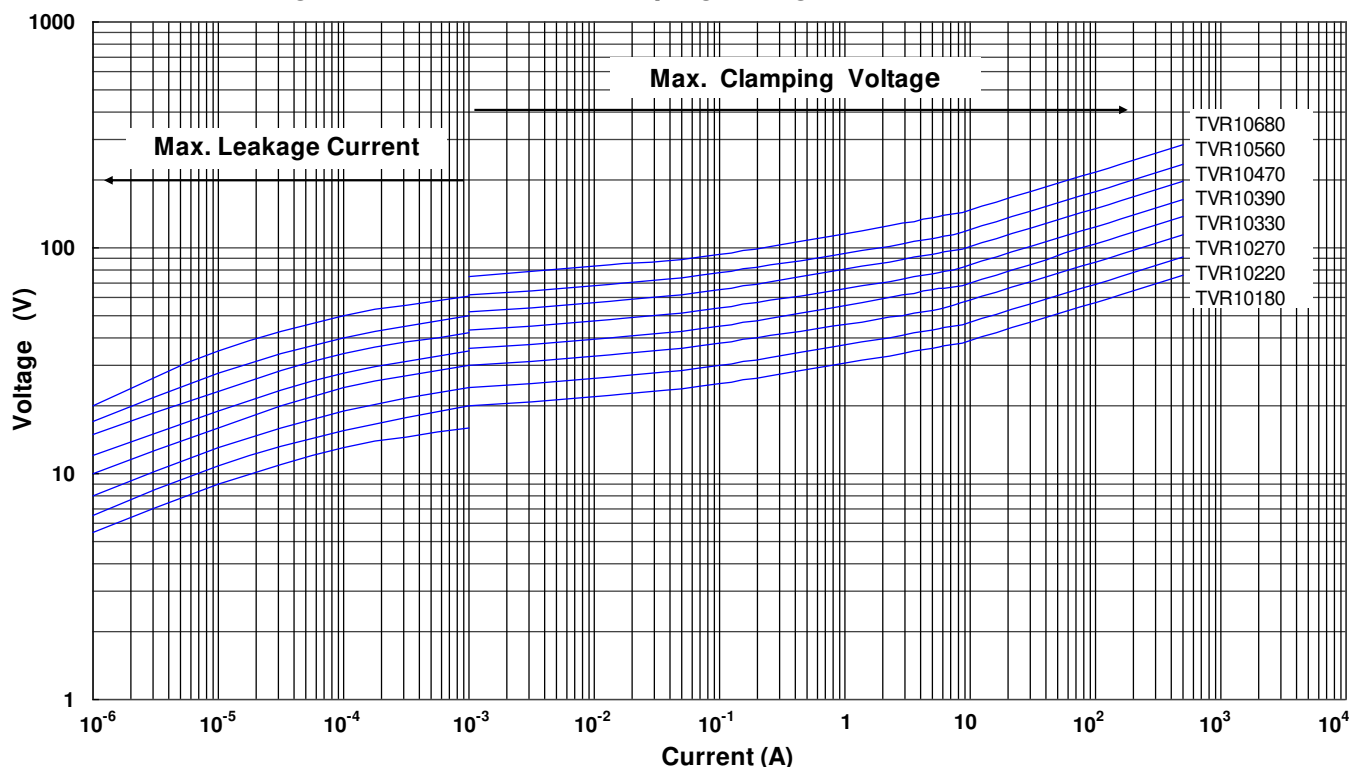
## Disc Type Varistor for Surge Protection

### ■ 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)



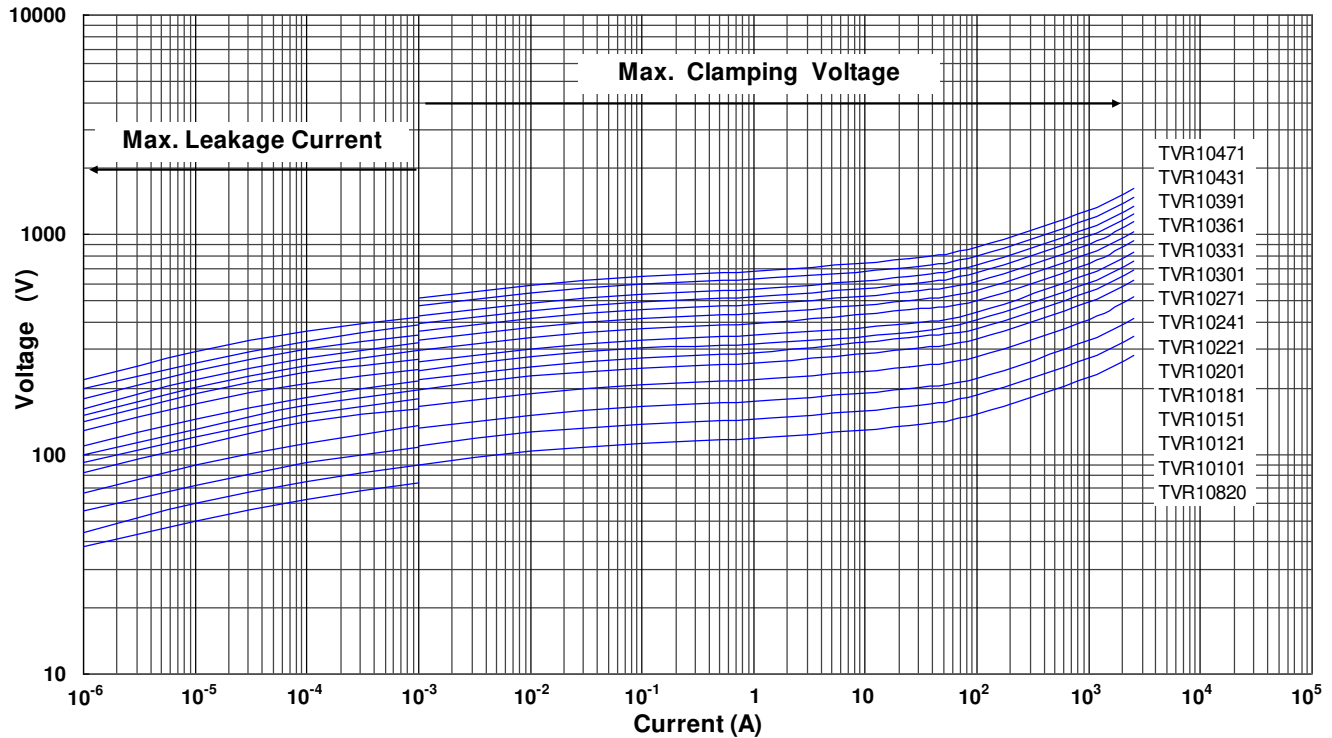
# Metal Oxide Varistor : TVR Series



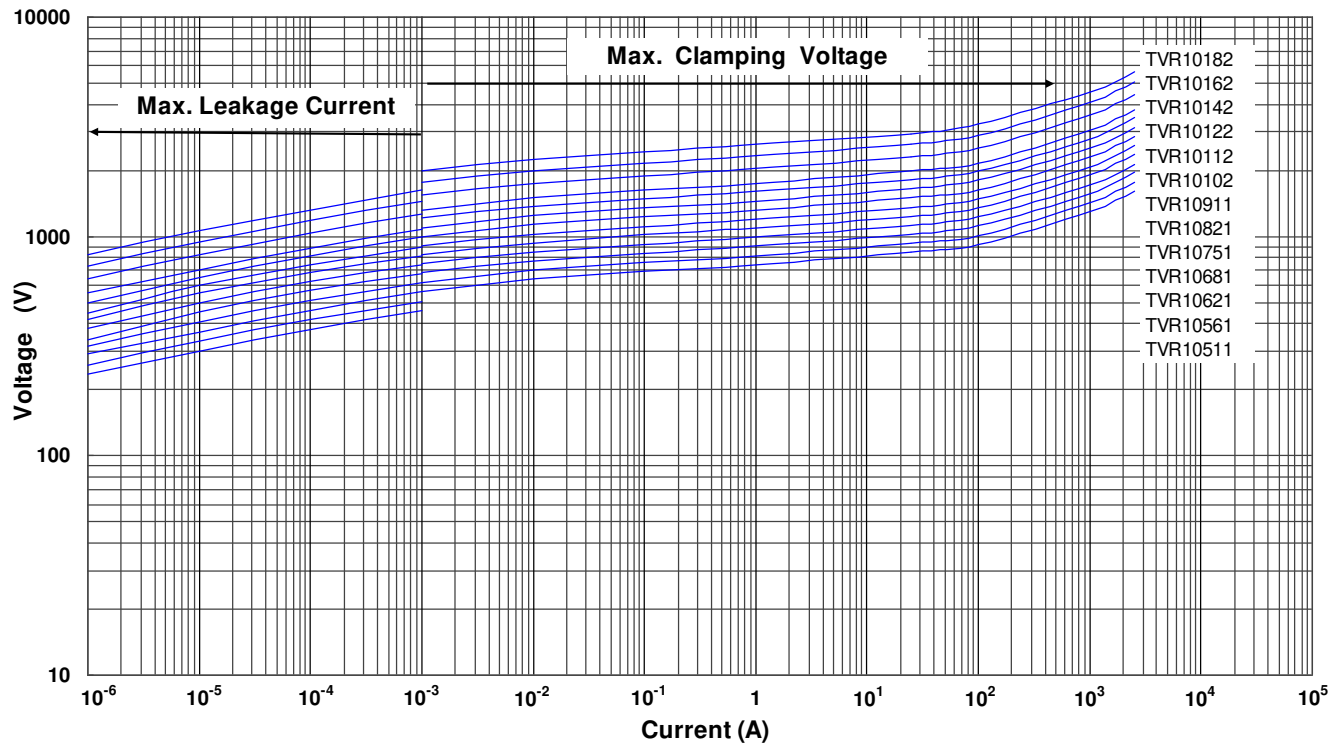
## Disc Type Varistor for Surge Protection

### ■ 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)



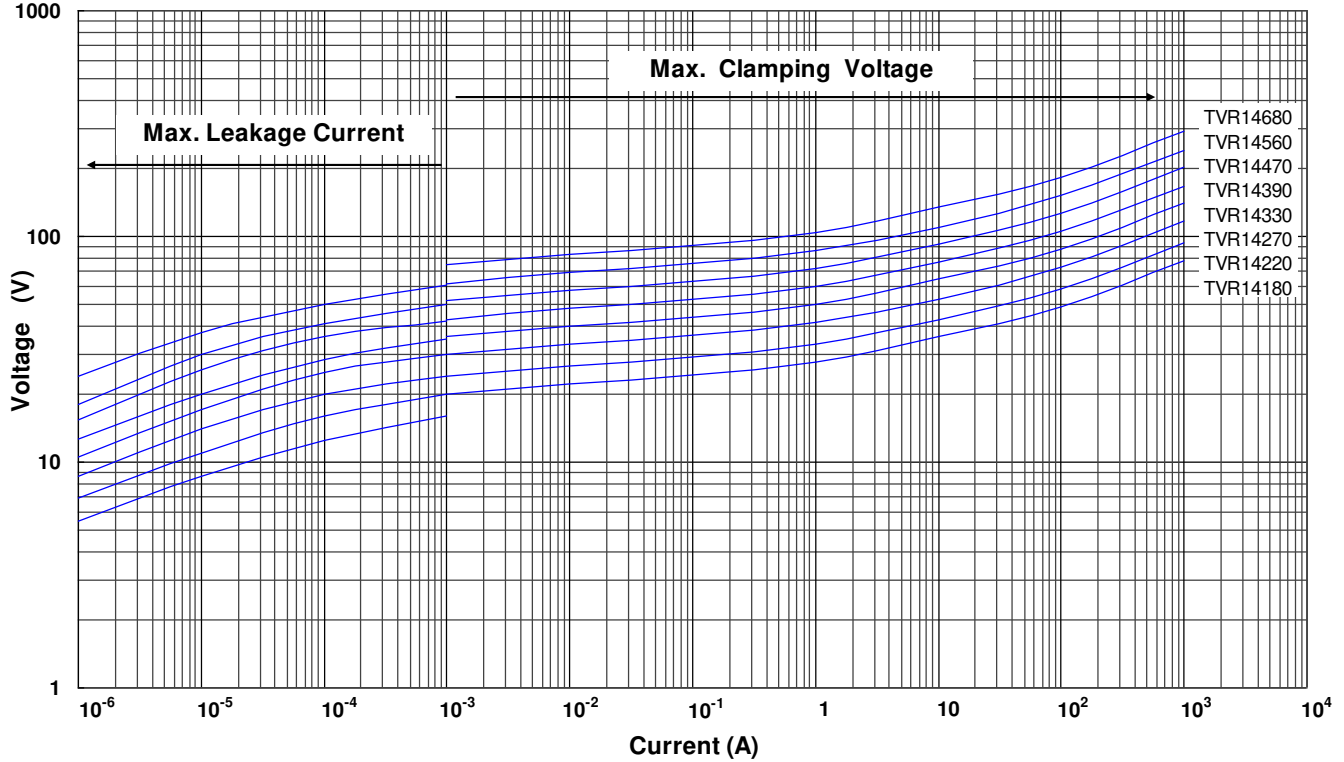
# Metal Oxide Varistor : TVR Series



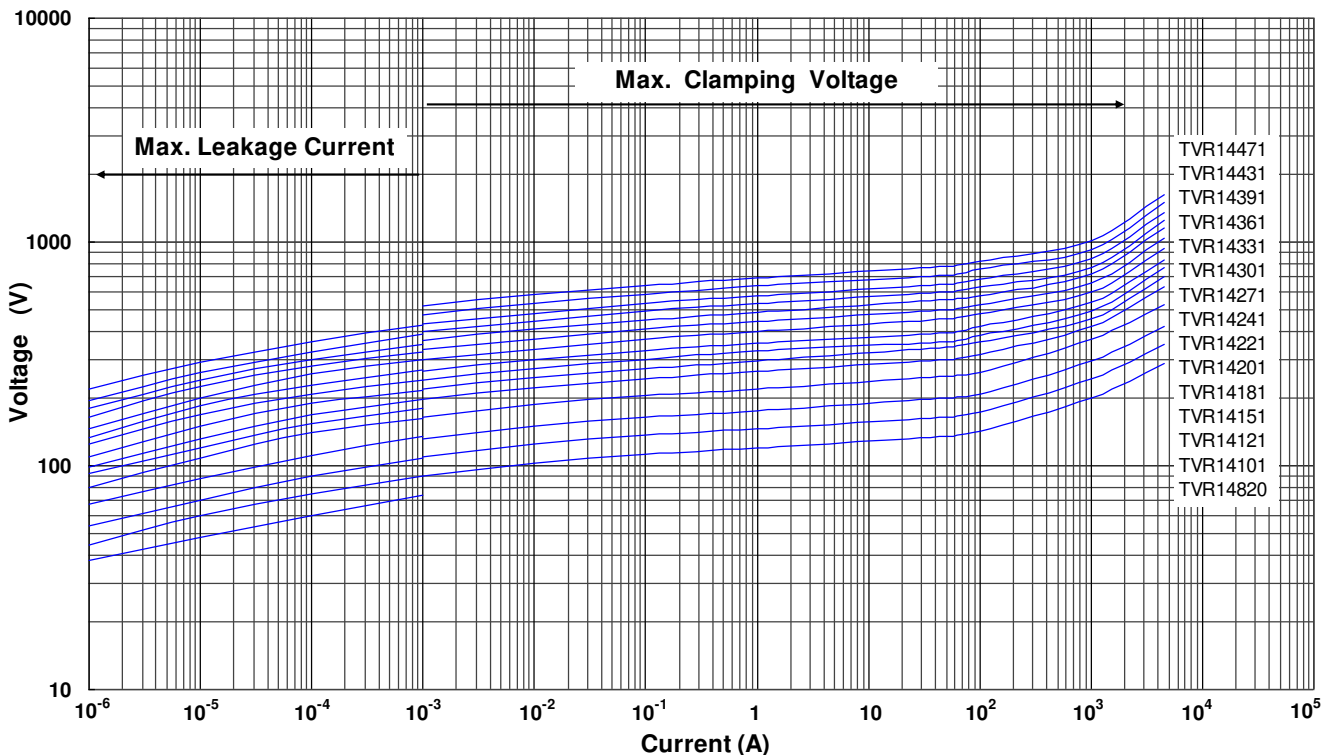
## Disc Type Varistor for Surge Protection

### ■ 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)



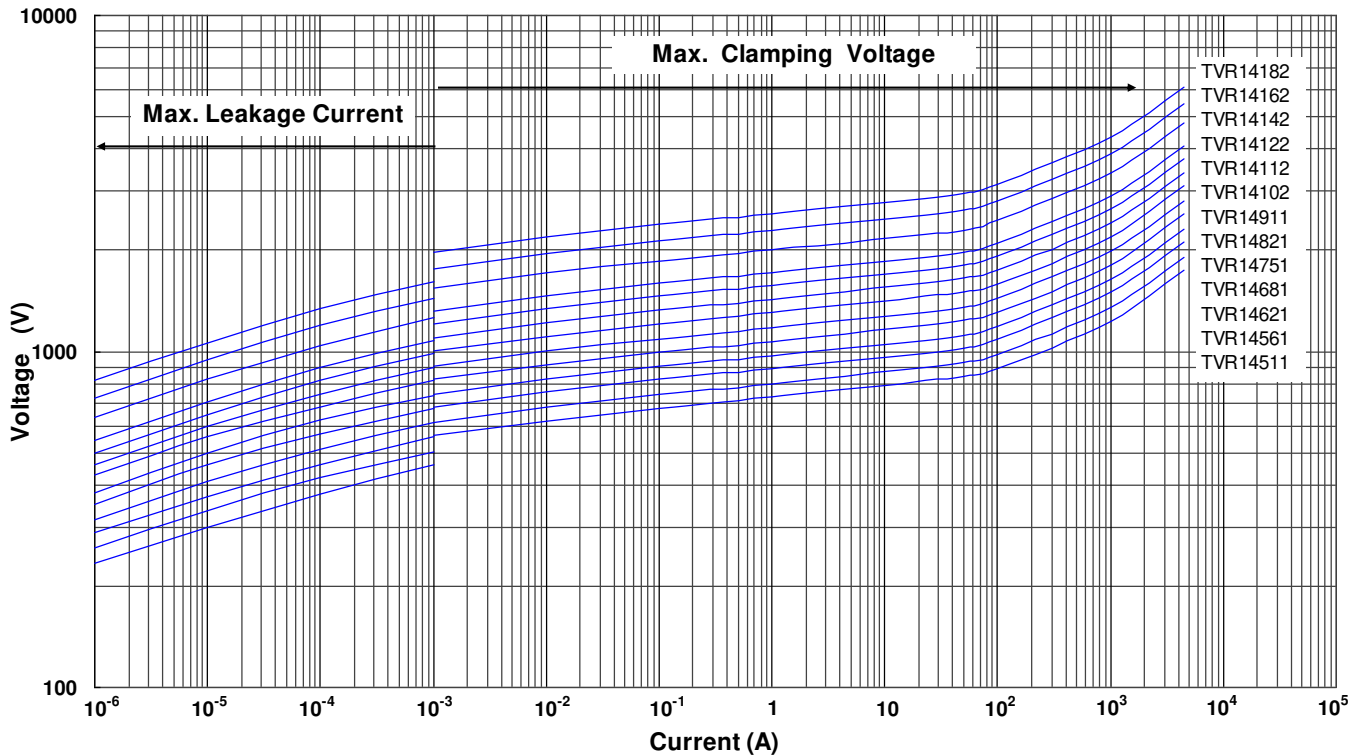
# Metal Oxide Varistor : TVR Series



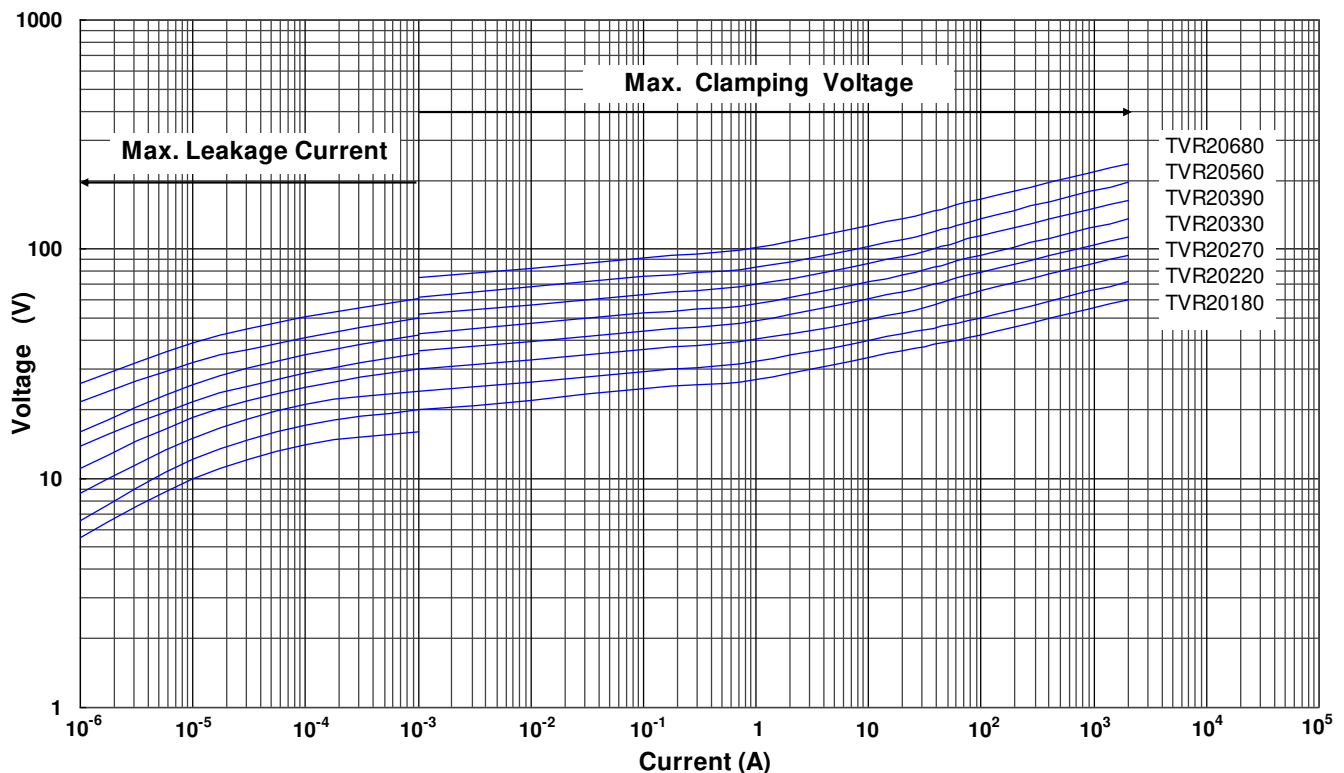
## Disc Type Varistor for Surge Protection

### ■ 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)



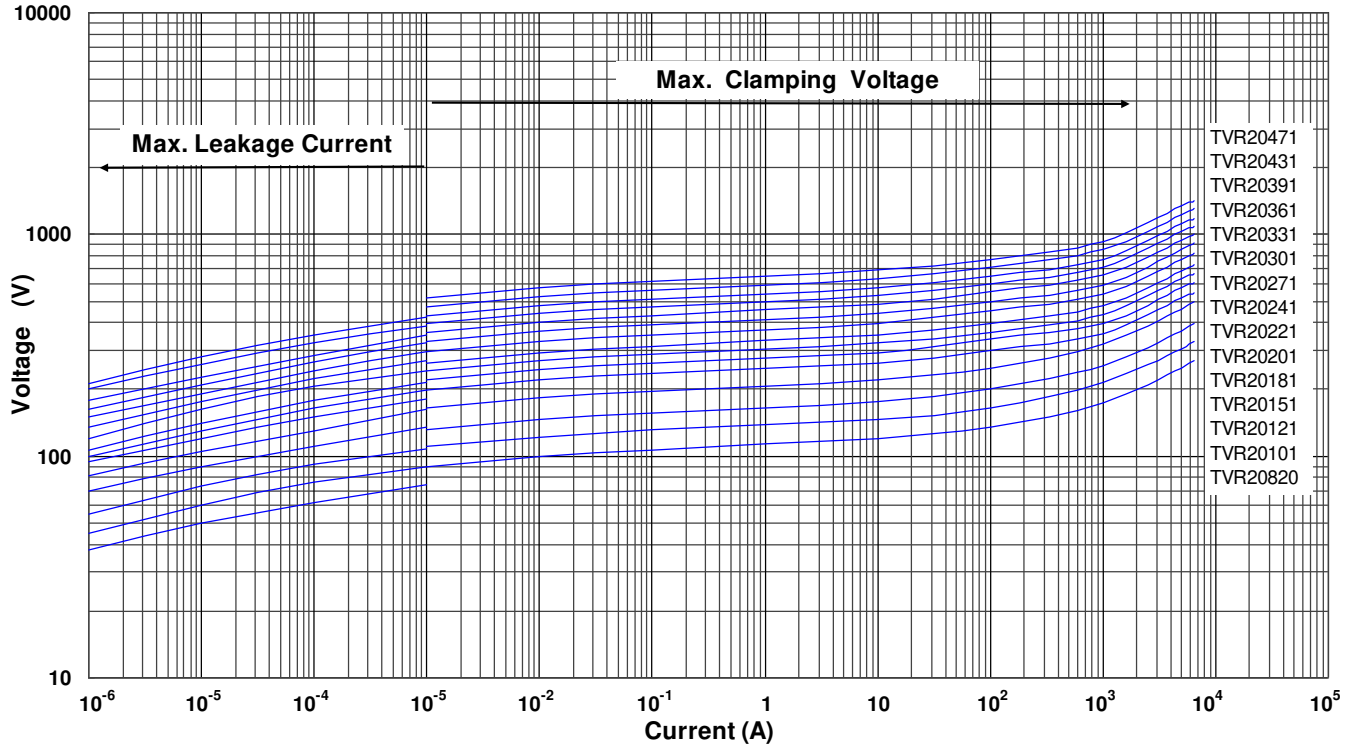
# Metal Oxide Varistor : TVR Series



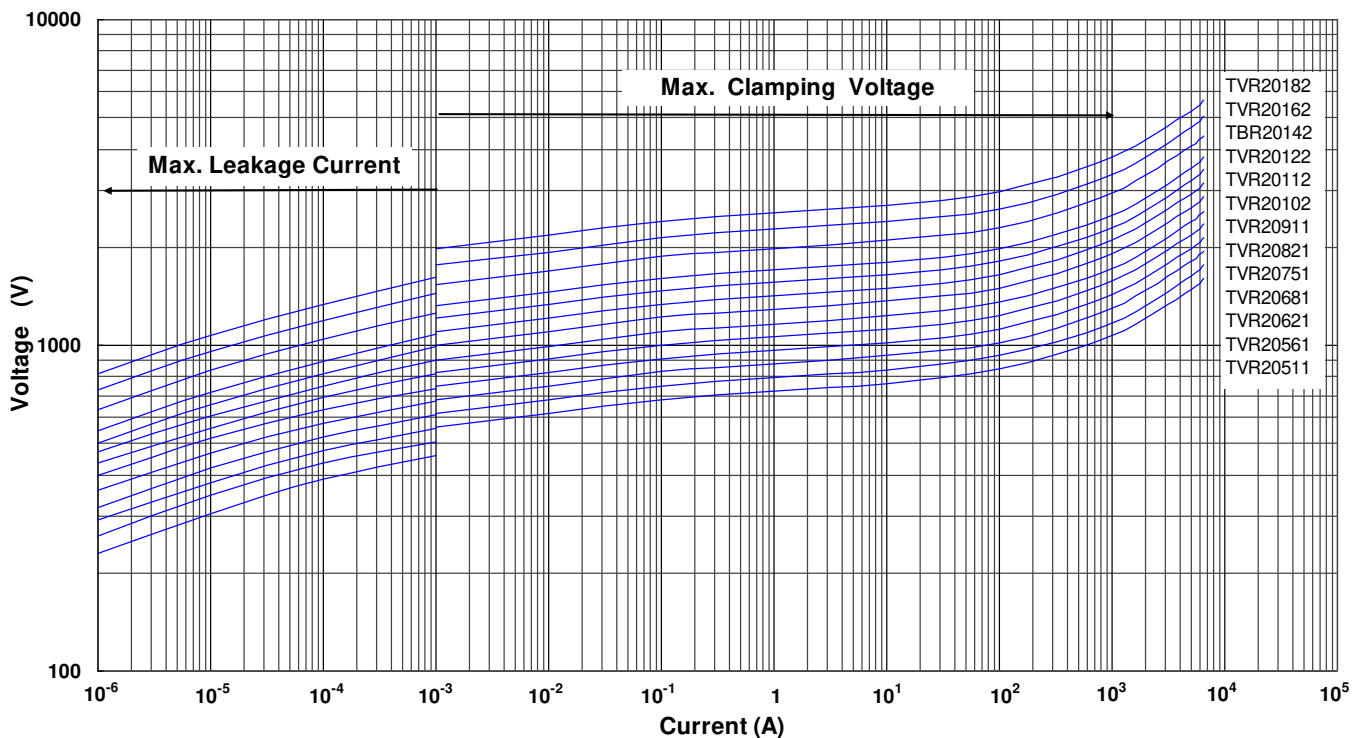
## Disc Type Varistor for Surge Protection

### ■ 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)





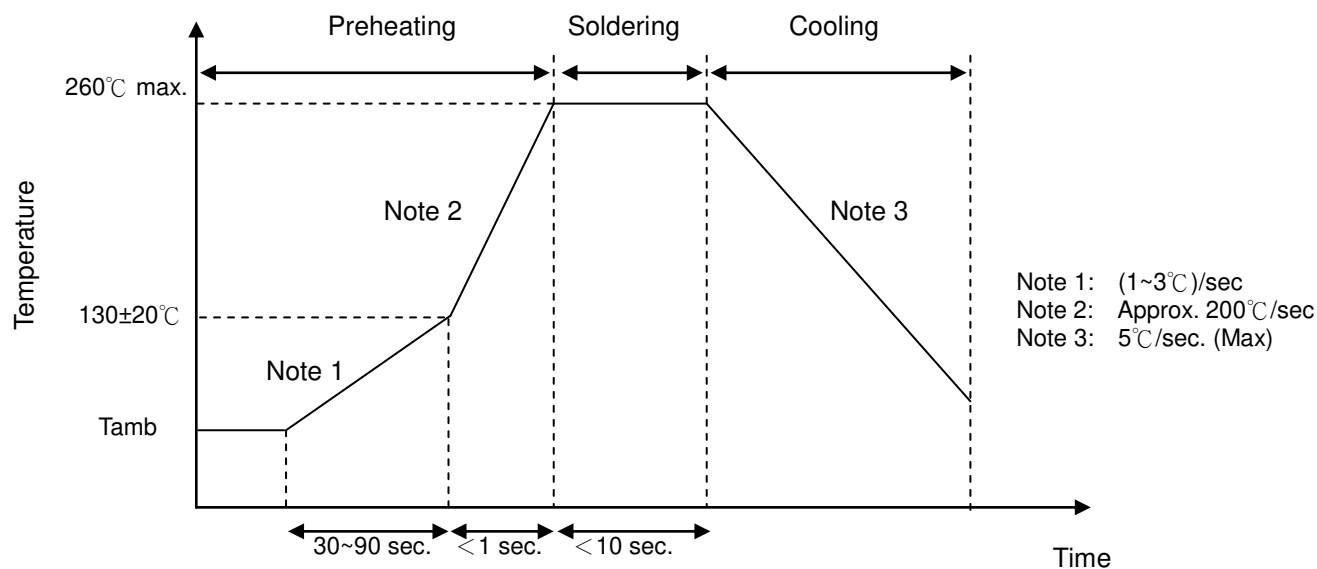
# Metal Oxide Varistor : TVR Series



## Disc Type Varistor for Surge Protection

### ■ Soldering Recommendation

#### ● Wave Soldering Profile



#### ● Recommended Reworking Conditions with Soldering Iron

| Item                              | Conditions                 |
|-----------------------------------|----------------------------|
| Temperature of Soldering Iron-tip | $360^\circ\text{C}$ (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.<br><br><table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border-bottom: 1px solid black;">Terminal diameter<br/>(mm)</td> <td style="text-align: center; border-bottom: 1px solid black;">Force<br/>(Kg)</td> </tr> <tr> <td style="text-align: center;">0.5&lt;d≤0.8</td> <td style="text-align: center;">1.0</td> </tr> <tr> <td style="text-align: center;">0.8&lt;d≤1.25</td> <td style="text-align: center;">2.0</td> </tr> </table>   | Terminal diameter<br>(mm)   | Force<br>(Kg)    | 0.5<d≤0.8        | 1.0 | 0.8<d≤1.25 | 2.0  | $ \Delta V_{1mA}/V_{1mA}  \leq 5\%$<br>No visible damage |                  |     |   |       |      |   |                  |     |  |
| Terminal diameter<br>(mm)          | Force<br>(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.<br><br><table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border-bottom: 1px solid black;">Terminal diameter<br/>(mm)</td> <td style="text-align: center; border-bottom: 1px solid black;">Force<br/>(Kg)</td> </tr> <tr> <td style="text-align: center;">0.5&lt;d≤0.8</td> <td style="text-align: center;">0.5</td> </tr> <tr> <td style="text-align: center;">0.8&lt;d≤1.25</td> <td style="text-align: center;">1.0</td> </tr> </table> | Terminal diameter<br>(mm)   | Force<br>(Kg)    | 0.5<d≤0.8        | 0.5 | 0.8<d≤1.25 | 1.0  | $ \Delta V_{1mA}/V_{1mA}  \leq 5\%$<br>No visible damage |                  |     |   |       |      |   |                  |     |  |
| Terminal diameter<br>(mm)          | Force<br>(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<br>Amplitude: 0.75mm or 98 m/s <sup>2</sup><br>Direction: 3 mutually perpendicular directions, 2 hrs each  | $ \Delta V_{1mA}/V_{1mA}  \leq 5\%$<br>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,<br>(5±0.5 sec for TVR05)  | $ \Delta V_{1mA}/V_{1mA}  \leq 5\%$<br>No visible damage                                    |                  |                  |     |            |      |  |                  |     |   |       |      |   |                  |     |  |
| High Temperature Storage           | IEC 60068-2-2          | 125±5°C x 1000±24 hrs  | $ \Delta V_{1mA}/V_{1mA}  \leq 5\%$<br>No visible damage                                    |                  |                  |     |            |      |  |                  |     |   |       |      |   |                  |     |  |
| Damp Heat, Steady State            | IEC60068-2-78          | a. 40±2°C, 90 ~ 95 % RH, 1344 hrs<br>b. 40±2°C, 90 ~ 95 % RH, at 10%Vdc, 1344 hrs  | $ \Delta V_{1mA}/V_{1mA}  \leq 5\%$<br>No visible damage<br>Insulation Resistance<br>≥100MΩ |                  |                  |     |            |      |  |                  |     |   |       |      |   |                  |     |  |
| Rapid Change of Temperature        | IEC 60068-2-14         | The conditions shown below shall be repeated 5 cycles<br><br><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\%$<br>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 <sub>DC</sub> or V <sub>rms</sub> (Max. Continuous Voltage)  | $ \Delta V_{1mA}/V_{1mA}  \leq 10\%$<br>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\%$<br>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\%$<br>No visible damage                                   |                  |                  |     |            |      |  |                  |     |   |       |      |   |                  |     |  |
| Voltage Proof                      | IEC 61051-1            | Metal balls method, 2500 Vac 1 min   | No visible damage   |                  |                  |     |            |      |  |                  |     |   |       |      |   |                  |     |  |
| Varistor Voltage Temp. Coefficient | Specification Standard | $\frac{V_{1mA \text{ at } 105^{\circ}\text{C}} - V_{1mA \text{ at } 25^{\circ}\text{C}}}{V_{1mA \text{ at } 25^{\circ}\text{C}}} \times \frac{1}{80} \times 100 (\% / ^{\circ}\text{C})$<br>$\frac{V_{1mA \text{ at } -40^{\circ}\text{C}} - V_{1mA \text{ at } 25^{\circ}\text{C}}}{V_{1mA \text{ at } 25^{\circ}\text{C}}} \times \frac{1}{65} \times 100 (\% / ^{\circ}\text{C})$   | -0.05 ≤ TC ≤ 0.05 (%/°C)  |                  |                  |     |            |      |  |                  |     |   |       |      |   |                  |     |  |

# Metal Oxide Varistor : TVR Series



## Disc Type Varistor for Surge Protection

### ■ Packaging

#### ● Taping Specification

#### S Type (Straight Lead)

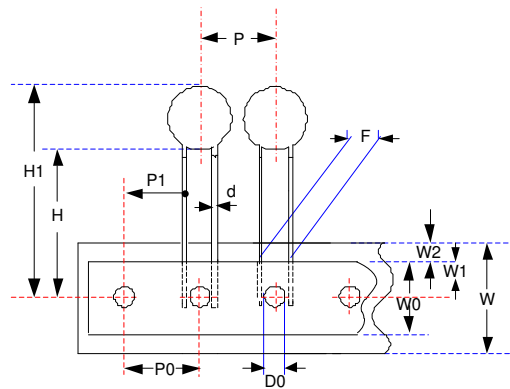


Figure A

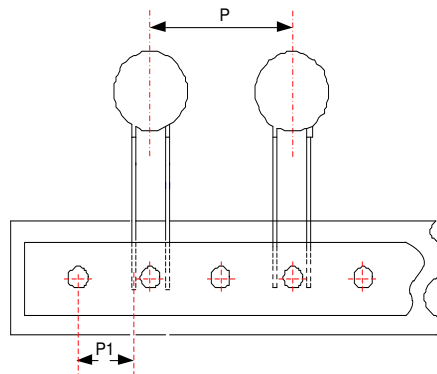


Figure B

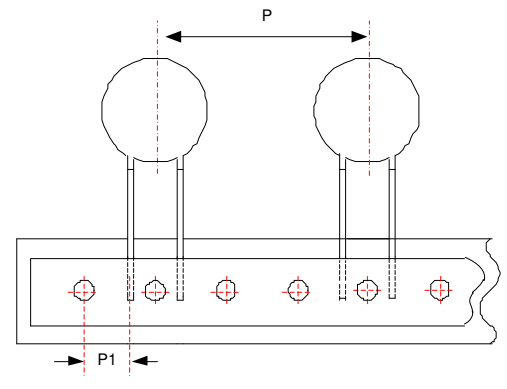


Figure C

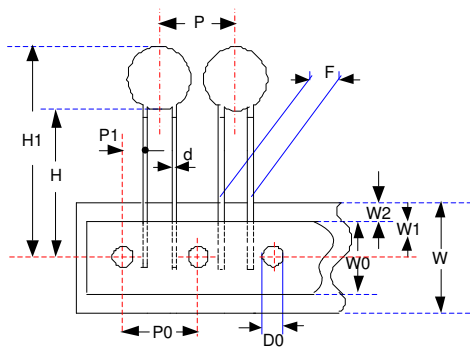


Figure D

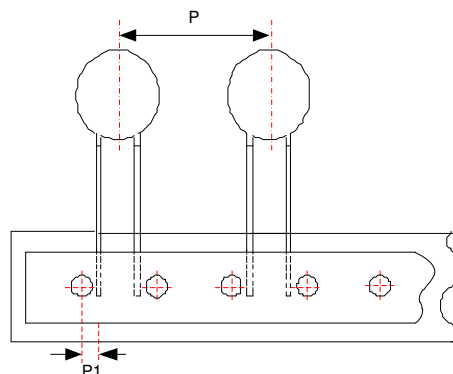
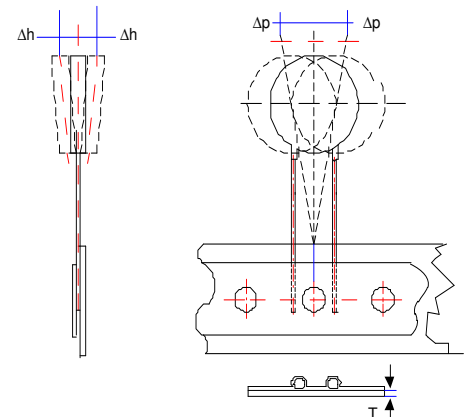


Figure E



(Unit: mm)

| Taping Code                 | Body Size | P <sub>0</sub> | F    | P    | P <sub>1</sub> | H     | H <sub>1</sub> | d     | W <sub>0</sub> | W <sub>1</sub> | W <sub>2</sub> | W       | Δ P  | Δ h  | D <sub>0</sub> | 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<br>(P <sub>0</sub> :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<br>(P <sub>0</sub> :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)

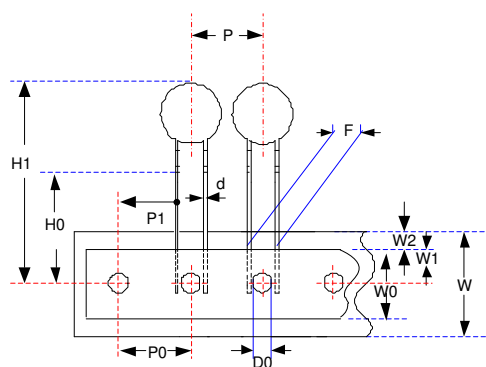


Figure A

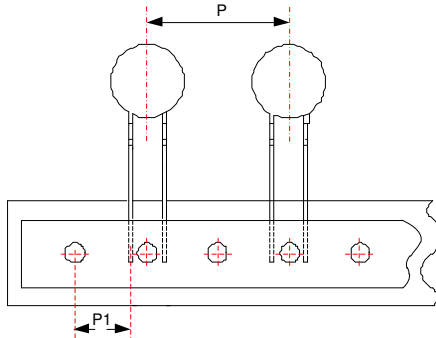


Figure B

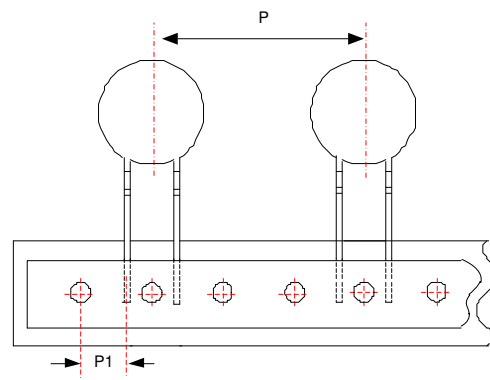


Figure C

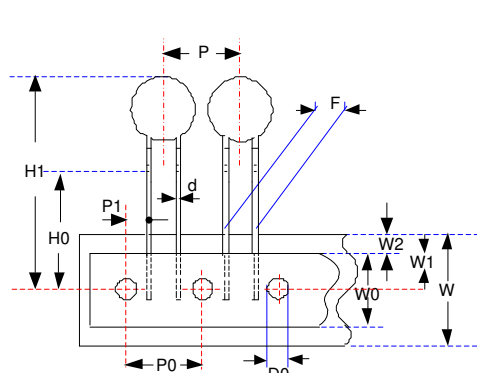


Figure D

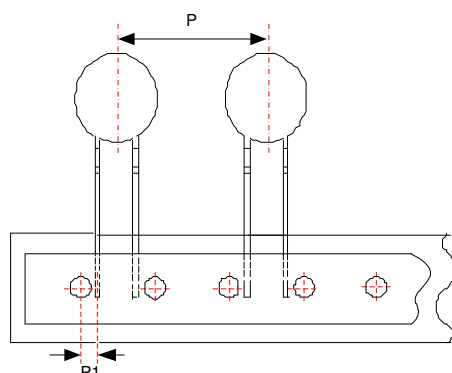
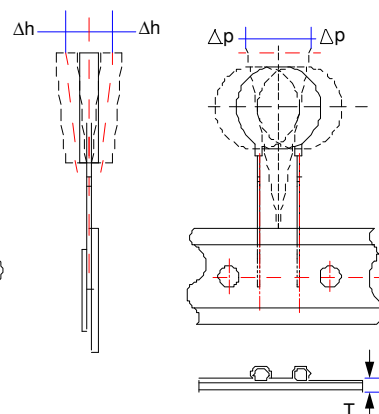


Figure E



(Unit: mm)

| Taping Code                 | Body Size | P <sub>0</sub> | F    | P    | P <sub>1</sub> | H <sub>0</sub> | H <sub>1</sub> | d     | W <sub>0</sub> | W <sub>1</sub> | W <sub>2</sub> | W       | ΔP   | Δh   | D <sub>0</sub> | 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<br>(P <sub>0</sub> :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<br>(P <sub>0</sub> :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

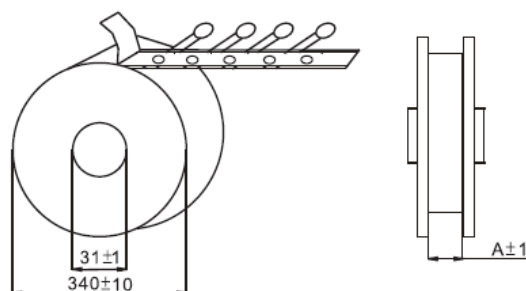
### ■ Quantity

#### ● Bulk Packing

| Series          | Straight Lead Type<br>Quantity (pcs/bag) | Cut Lead Type<br>Quantity (pcs/bag) | Kink Type<br>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)

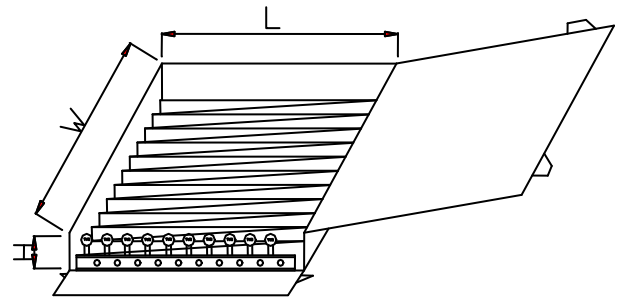
# Metal Oxide Varistor : TVR Series



## Disc Type Varistor for Surge Protection

### ● Ammo Packing

| Series         | Quantity<br>(pcs/box)<br>P0=12.7mm | Quantity<br>(pcs/box)<br>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<br>~ 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