

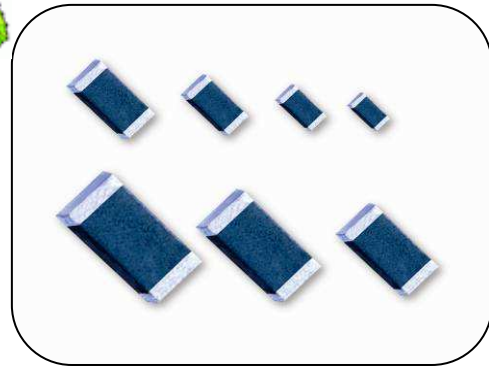
# Metal Oxide Varistor : TVM-B Series



## SMD Type for Surge Suppressor

### ■ Features

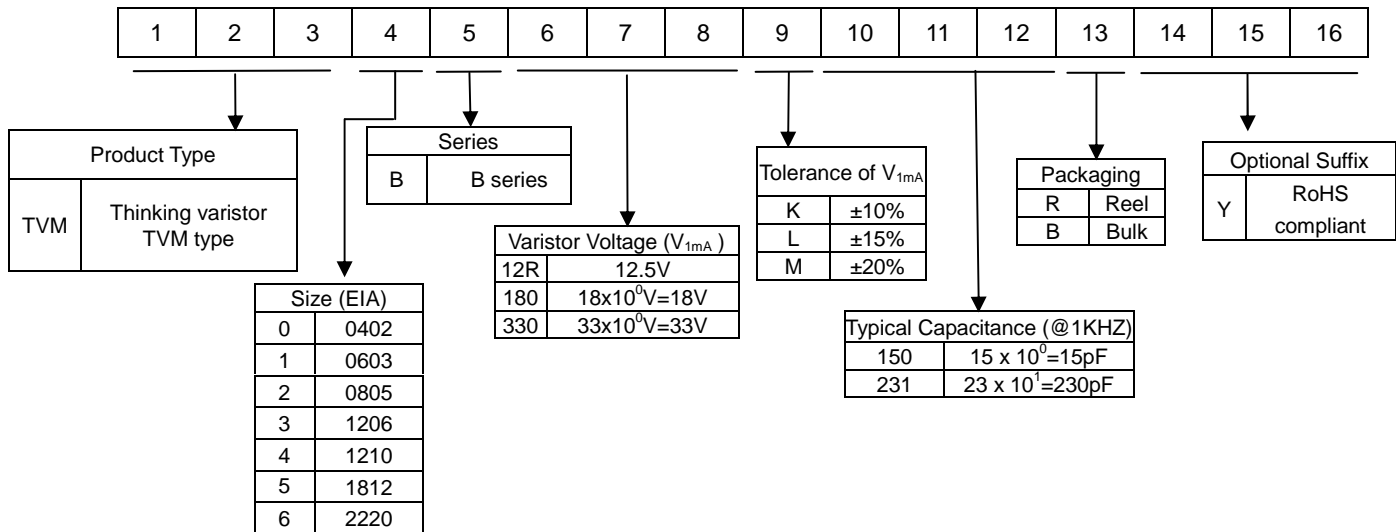
1. RoHS compliant
2. High surge suppress capability
3. EIA size 0402 ~ 2220
4. Operating voltage: 5.5 ~ 85 Vdc
5. Bidirectional and symmetrical V/I characteristics
6. Multilayer ceramic construction technology
7. Variable capacitance
8. -40 ~ +125°C operating temperature range



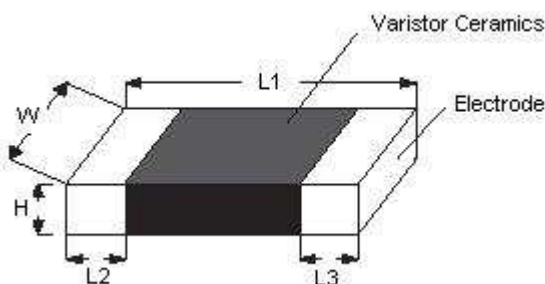
### ■ Recommended Applications

1. Power system
2. Mother board / notebook
3. Scanner
4. Handheld devices
5. Digital video
6. Set-top box

### ■ Part Number Code



### ■ Structure and Dimensions



(Unit:mm)

| Part No. | Size (EIA) | L1         | W         | H max. | L2 and L3 |
|----------|------------|------------|-----------|--------|-----------|
| TVM0     | 0402       | 1.00±0.15  | 0.50±0.10 | 0.60   | 0.20±0.10 |
| TVM1     | 0603       | 1.60±0.15  | 0.80±0.15 | 0.95   | 0.35±0.15 |
| TVM2     | 0805       | 2.00±0.20  | 1.25±0.20 | 1.20   | 0.40±0.20 |
| TVM3     | 1206       | 3.20 ±0.30 | 1.60±0.20 | 1.50   | 0.50±0.20 |
| TVM4     | 1210       | 3.20 ±0.30 | 2.50±0.25 | 1.50   | 0.50±0.20 |
| TVM5     | 1812       | 4.50 ±0.40 | 3.20±0.30 | 1.50   | 0.60±0.30 |
| TVM6     | 2220       | 5.70 ±0.40 | 5.00±0.30 | 2.00   | 0.60±0.30 |

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### Electrical Characteristics

| Part No.     | Varistor Voltage (@ 1mA DC) |                                      | Max. Operating Voltage   |                     | Max. Clamping Voltage (8/20 $\mu$ s) |                    | Max. Surge Current (8/20 $\mu$ s) | Max. Energy (10/1000 $\mu$ s) | Rate Power | Typical Capacitance @1KHz |
|--------------|-----------------------------|--------------------------------------|--------------------------|---------------------|--------------------------------------|--------------------|-----------------------------------|-------------------------------|------------|---------------------------|
|              | V <sub>1mA</sub> (V)        | $\Delta$ V <sub>1mA</sub> ( $\pm$ %) | V <sub>AC(rms)</sub> (V) | V <sub>DC</sub> (V) | V <sub>p</sub> (V)                   | I <sub>p</sub> (A) | I <sub>max</sub> (A)              | W <sub>max</sub> (J)          | P (W)      | C (pF)                    |
| TVM0B080M231 | 8                           | 20                                   | 4                        | 5.5                 | 19                                   | 1                  | 10                                | 0.05                          | 0.003      | 230                       |
| TVM1B080M951 | 8                           | 20                                   | 4                        | 5.5                 | 19                                   | 1                  | 30                                | 0.1                           | 0.003      | 950                       |
| TVM2B080M152 | 8                           | 20                                   | 4                        | 5.5                 | 19                                   | 1                  | 60                                | 0.1                           | 0.005      | 1500                      |
| TVM3B080M482 | 8                           | 20                                   | 4                        | 5.5                 | 17                                   | 1                  | 150                               | 0.3                           | 0.008      | 4800                      |
| TVM4B080M822 | 8                           | 20                                   | 4                        | 5.5                 | 17                                   | 2.5                | 250                               | 0.4                           | 0.01       | 8200                      |
| TVM5B080M183 | 8                           | 20                                   | 4                        | 5.5                 | 17                                   | 5                  | 500                               | 0.8                           | 0.015      | 18000                     |
| TVM6B080M293 | 8                           | 20                                   | 4                        | 5.5                 | 17                                   | 10                 | 1000                              | 1.4                           | 0.02       | 29000                     |
| TVM0B110M161 | 11                          | 20                                   | 6                        | 8                   | 27                                   | 1                  | 10                                | 0.05                          | 0.003      | 160                       |
| TVM1B110M601 | 11                          | 20                                   | 6                        | 8                   | 27                                   | 1                  | 30                                | 0.1                           | 0.003      | 600                       |
| TVM2B110M142 | 11                          | 20                                   | 6                        | 8                   | 27                                   | 1                  | 60                                | 0.2                           | 0.005      | 1400                      |
| TVM3B110M392 | 11                          | 20                                   | 6                        | 8                   | 25                                   | 1                  | 200                               | 0.4                           | 0.008      | 3900                      |
| TVM4B110M752 | 11                          | 20                                   | 6                        | 8                   | 25                                   | 2.5                | 300                               | 0.7                           | 0.01       | 7500                      |
| TVM5B110M153 | 11                          | 20                                   | 6                        | 8                   | 25                                   | 5                  | 500                               | 1                             | 0.015      | 15000                     |
| TVM6B110M253 | 11                          | 20                                   | 6                        | 8                   | 25                                   | 10                 | 1200                              | 3.6                           | 0.02       | 25000                     |
| TVM0B12RM141 | 12.5                        | 20                                   | 7                        | 9                   | 30                                   | 1                  | 10                                | 0.05                          | 0.003      | 140                       |
| TVM1B12RM571 | 12.5                        | 20                                   | 7                        | 9                   | 30                                   | 1                  | 30                                | 0.1                           | 0.003      | 570                       |
| TVM2B12RM112 | 12.5                        | 20                                   | 7                        | 9                   | 29                                   | 1                  | 60                                | 0.2                           | 0.005      | 1100                      |
| TVM0B150L121 | 15                          | 15                                   | 8                        | 11                  | 33                                   | 1                  | 10                                | 0.05                          | 0.003      | 120                       |
| TVM1B150L521 | 15                          | 15                                   | 8                        | 11                  | 33                                   | 1                  | 30                                | 0.1                           | 0.003      | 520                       |
| TVM2B150L951 | 15                          | 15                                   | 8                        | 11                  | 33                                   | 1                  | 60                                | 0.2                           | 0.005      | 950                       |
| TVM3B150L252 | 15                          | 15                                   | 8                        | 11                  | 30                                   | 1                  | 200                               | 0.5                           | 0.008      | 2500                      |
| TVM4B150L482 | 15                          | 15                                   | 8                        | 11                  | 30                                   | 2.5                | 400                               | 1                             | 0.01       | 4800                      |
| TVM5B150L103 | 15                          | 15                                   | 8                        | 11                  | 30                                   | 5                  | 800                               | 1.8                           | 0.015      | 10000                     |
| TVM6B150L183 | 15                          | 15                                   | 8                        | 11                  | 30                                   | 10                 | 1200                              | 4.2                           | 0.02       | 18000                     |
| TVM0B180K800 | 18                          | 10                                   | 11                       | 14                  | 35                                   | 1                  | 10                                | 0.05                          | 0.003      | 80                        |
| TVM1B180K421 | 18                          | 10                                   | 11                       | 14                  | 35                                   | 1                  | 30                                | 0.2                           | 0.003      | 420                       |
| TVM2B180K671 | 18                          | 10                                   | 11                       | 14                  | 35                                   | 1                  | 60                                | 0.2                           | 0.005      | 670                       |
| TVM3B180K152 | 18                          | 10                                   | 11                       | 14                  | 33                                   | 1                  | 200                               | 0.5                           | 0.008      | 1500                      |
| TVM4B180K292 | 18                          | 10                                   | 11                       | 14                  | 33                                   | 2.5                | 400                               | 1.2                           | 0.01       | 2900                      |
| TVM5B180K552 | 18                          | 10                                   | 11                       | 14                  | 33                                   | 5                  | 800                               | 1.9                           | 0.015      | 5500                      |
| TVM6B180K123 | 18                          | 10                                   | 11                       | 14                  | 33                                   | 10                 | 1200                              | 5.4                           | 0.02       | 12000                     |
| TVM0B220K600 | 22                          | 10                                   | 14                       | 18                  | 44                                   | 1                  | 10                                | 0.05                          | 0.003      | 60                        |
| TVM1B220K301 | 22                          | 10                                   | 14                       | 18                  | 40                                   | 1                  | 30                                | 0.2                           | 0.003      | 300                       |
| TVM2B220K431 | 22                          | 10                                   | 14                       | 18                  | 40                                   | 1                  | 60                                | 0.3                           | 0.005      | 430                       |
| TVM3B220K122 | 22                          | 10                                   | 14                       | 18                  | 42                                   | 1                  | 200                               | 0.5                           | 0.008      | 1200                      |
| TVM4B220K242 | 22                          | 10                                   | 14                       | 18                  | 38                                   | 2.5                | 400                               | 1.5                           | 0.01       | 2400                      |
| TVM5B220K502 | 22                          | 10                                   | 14                       | 18                  | 38                                   | 5                  | 800                               | 2.3                           | 0.015      | 5000                      |
| TVM6B220K103 | 22                          | 10                                   | 14                       | 18                  | 38                                   | 10                 | 1200                              | 5.8                           | 0.02       | 10000                     |

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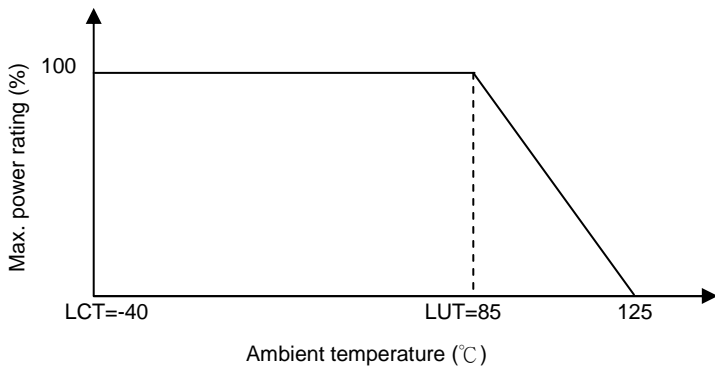
| Part No.     | Varistor Voltage (@ 1mA DC) |                                      | Max. Operating Voltage   |                     | Max. Clamping Voltage (8/20 $\mu$ s) |                    | Max. Surge Current (8/20 $\mu$ s) | Max. Energy (10/1000 $\mu$ s) | Rate Power | Typical Capacitance @1KHz |
|--------------|-----------------------------|--------------------------------------|--------------------------|---------------------|--------------------------------------|--------------------|-----------------------------------|-------------------------------|------------|---------------------------|
|              | V <sub>1mA</sub> (V)        | $\Delta$ V <sub>1mA</sub> ( $\pm$ %) | V <sub>AC(rms)</sub> (V) | V <sub>DC</sub> (V) | V <sub>p</sub> (V)                   | I <sub>p</sub> (A) | I <sub>max</sub> (A)              | W <sub>max</sub> (J)          | P (W)      | C (pF)                    |
| TVM0B270K500 | 27                          | 10                                   | 17                       | 22                  | 55                                   | 1                  | 10                                | 0.05                          | 0.003      | 50                        |
| TVM1B270K181 | 27                          | 10                                   | 17                       | 22                  | 46                                   | 1                  | 30                                | 0.2                           | 0.003      | 180                       |
| TVM2B270K331 | 27                          | 10                                   | 17                       | 22                  | 46                                   | 1                  | 60                                | 0.3                           | 0.005      | 330                       |
| TVM3B270K102 | 27                          | 10                                   | 17                       | 22                  | 48                                   | 1                  | 200                               | 0.6                           | 0.008      | 1000                      |
| TVM4B270K202 | 27                          | 10                                   | 17                       | 22                  | 44                                   | 2.5                | 400                               | 1.7                           | 0.01       | 2000                      |
| TVM5B270K402 | 27                          | 10                                   | 17                       | 22                  | 44                                   | 5                  | 800                               | 2.7                           | 0.015      | 4000                      |
| TVM6B270K772 | 27                          | 10                                   | 17                       | 22                  | 44                                   | 10                 | 1200                              | 7.2                           | 0.02       | 7700                      |
| TVM0B330K400 | 33                          | 10                                   | 20                       | 26                  | 63                                   | 1                  | 10                                | 0.05                          | 0.003      | 40                        |
| TVM1B330K151 | 33                          | 10                                   | 20                       | 26                  | 56                                   | 1                  | 30                                | 0.3                           | 0.003      | 150                       |
| TVM2B330K301 | 33                          | 10                                   | 20                       | 26                  | 56                                   | 1                  | 60                                | 0.3                           | 0.005      | 300                       |
| TVM3B330K801 | 33                          | 10                                   | 20                       | 26                  | 54                                   | 1                  | 200                               | 0.7                           | 0.008      | 800                       |
| TVM4B330K132 | 33                          | 10                                   | 20                       | 26                  | 54                                   | 2.5                | 400                               | 1.9                           | 0.01       | 1300                      |
| TVM5B330K322 | 33                          | 10                                   | 20                       | 26                  | 54                                   | 5                  | 800                               | 3                             | 0.015      | 3200                      |
| TVM6B330K582 | 33                          | 10                                   | 20                       | 26                  | 54                                   | 10                 | 1200                              | 7.8                           | 0.02       | 5800                      |
| TVM1B390K101 | 39                          | 10                                   | 25                       | 31                  | 67                                   | 1                  | 30                                | 0.3                           | 0.003      | 100                       |
| TVM2B390K181 | 39                          | 10                                   | 25                       | 31                  | 67                                   | 1                  | 60                                | 0.3                           | 0.005      | 180                       |
| TVM3B390K651 | 39                          | 10                                   | 25                       | 31                  | 65                                   | 1                  | 200                               | 1                             | 0.008      | 650                       |
| TVM4B390K102 | 39                          | 10                                   | 25                       | 31                  | 65                                   | 2.5                | 300                               | 1.7                           | 0.01       | 1000                      |
| TVM5B390K252 | 39                          | 10                                   | 25                       | 31                  | 65                                   | 5                  | 800                               | 3.7                           | 0.015      | 2500                      |
| TVM6B390K412 | 39                          | 10                                   | 25                       | 31                  | 65                                   | 10                 | 1200                              | 9.6                           | 0.02       | 4100                      |
| TVM2B470K151 | 47                          | 10                                   | 30                       | 38                  | 77                                   | 1                  | 60                                | 0.3                           | 0.005      | 150                       |
| TVM3B470K381 | 47                          | 10                                   | 30                       | 38                  | 77                                   | 1                  | 200                               | 1.1                           | 0.008      | 380                       |
| TVM4B470K901 | 47                          | 10                                   | 30                       | 38                  | 77                                   | 2.5                | 300                               | 2                             | 0.01       | 900                       |
| TVM5B470K202 | 47                          | 10                                   | 30                       | 38                  | 77                                   | 5                  | 800                               | 4.2                           | 0.015      | 2000                      |
| TVM6B470K302 | 47                          | 10                                   | 30                       | 38                  | 77                                   | 10                 | 1200                              | 12                            | 0.02       | 3000                      |
| TVM3B560K301 | 56                          | 10                                   | 35                       | 45                  | 90                                   | 1                  | 100                               | 0.4                           | 0.008      | 300                       |
| TVM4B560K601 | 56                          | 10                                   | 35                       | 45                  | 90                                   | 2.5                | 250                               | 2                             | 0.01       | 600                       |
| TVM5B560K122 | 56                          | 10                                   | 35                       | 45                  | 90                                   | 5                  | 500                               | 4                             | 0.015      | 1200                      |
| TVM6B560K202 | 56                          | 10                                   | 35                       | 45                  | 90                                   | 10                 | 1000                              | 7.7                           | 0.02       | 2000                      |
| TVM3B680K251 | 68                          | 10                                   | 40                       | 56                  | 110                                  | 1                  | 100                               | 0.5                           | 0.008      | 250                       |
| TVM4B680K451 | 68                          | 10                                   | 40                       | 56                  | 110                                  | 2.5                | 250                               | 2.3                           | 0.01       | 450                       |
| TVM5B680K102 | 68                          | 10                                   | 40                       | 56                  | 110                                  | 5                  | 500                               | 4.8                           | 0.015      | 1000                      |
| TVM6B680K152 | 68                          | 10                                   | 40                       | 56                  | 110                                  | 10                 | 1000                              | 9                             | 0.02       | 1500                      |
| TVM3B820K181 | 82                          | 10                                   | 50                       | 65                  | 135                                  | 1                  | 100                               | 0.6                           | 0.008      | 180                       |
| TVM4B820K301 | 82                          | 10                                   | 50                       | 65                  | 135                                  | 2.5                | 200                               | 1.6                           | 0.01       | 300                       |
| TVM5B820K601 | 82                          | 10                                   | 50                       | 65                  | 135                                  | 5                  | 400                               | 4.5                           | 0.015      | 600                       |
| TVM6B820K102 | 82                          | 10                                   | 50                       | 65                  | 135                                  | 10                 | 800                               | 5.6                           | 0.02       | 1000                      |
| TVM3B101K151 | 100                         | 10                                   | 60                       | 85                  | 146                                  | 1                  | 100                               | 0.7                           | 0.008      | 150                       |
| TVM4B101K161 | 100                         | 10                                   | 60                       | 85                  | 165                                  | 2.5                | 200                               | 2                             | 0.01       | 160                       |
| TVM5B101K301 | 100                         | 10                                   | 60                       | 85                  | 165                                  | 5                  | 400                               | 5.8                           | 0.015      | 300                       |
| TVM6B101K601 | 100                         | 10                                   | 60                       | 85                  | 165                                  | 10                 | 800                               | 6.8                           | 0.02       | 600                       |

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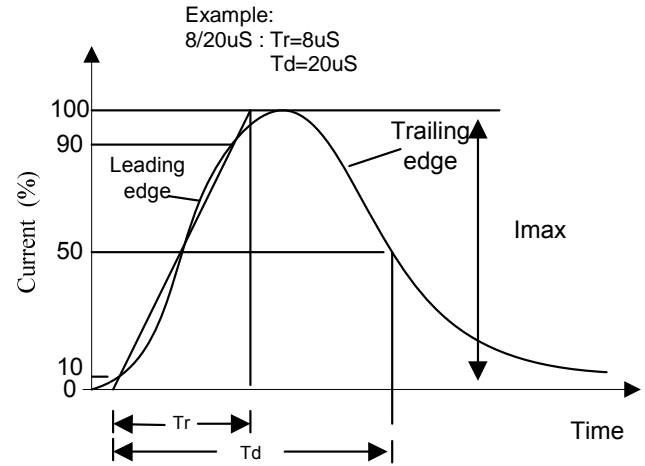


## SMD Type for Surge Suppressor

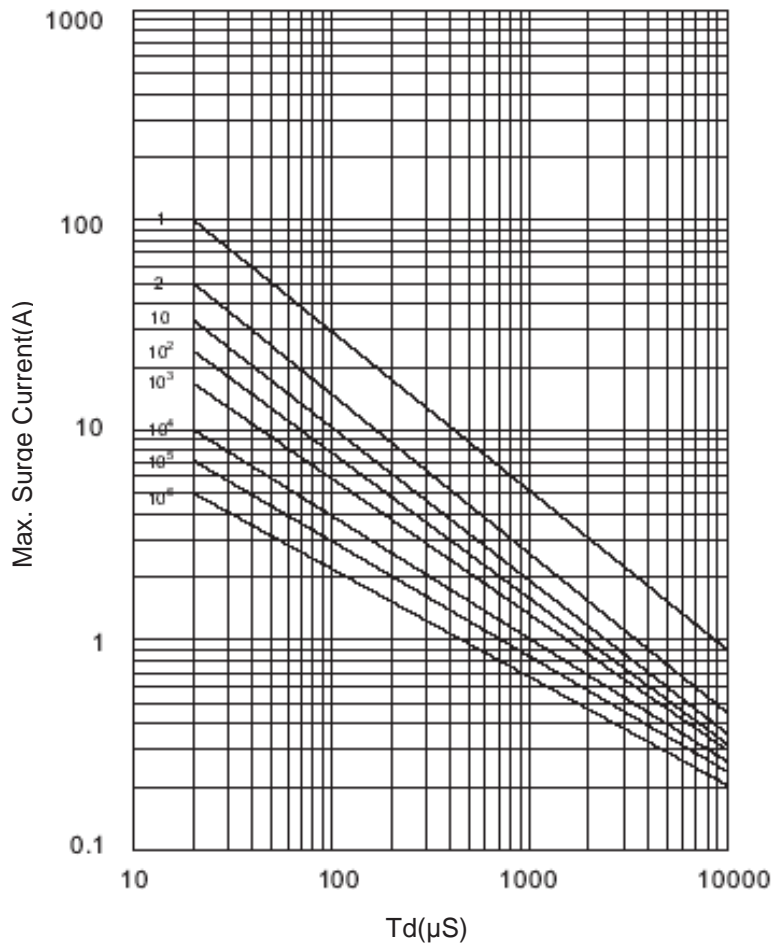
### ■ Power Derating Curve



### ■ Surge Current Standard Waveform



### ■ Max. Surge Current Derating Curves ( Reference )



Note: The standard max. surge current derating curves are available upon request

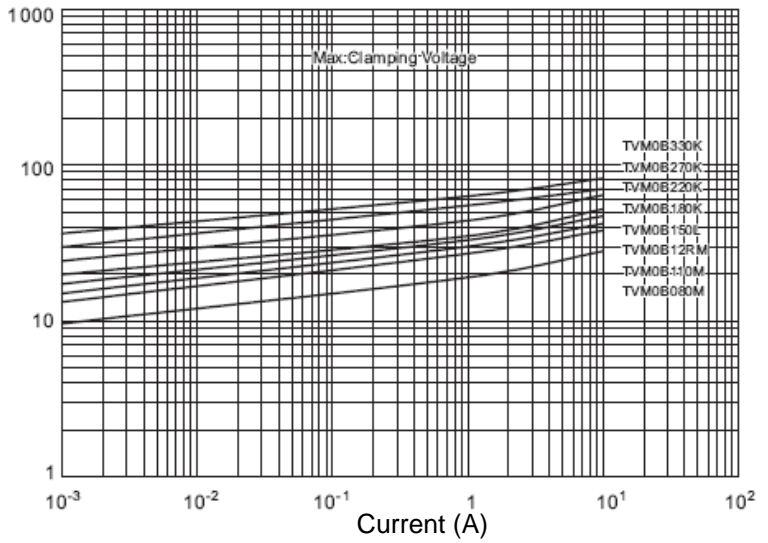
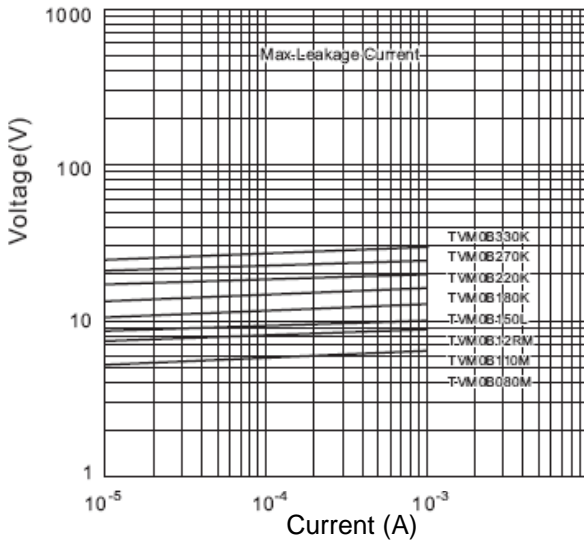
# Metal Oxide Varistor : TVM-B Series

## SMD Type for Surge Suppressor

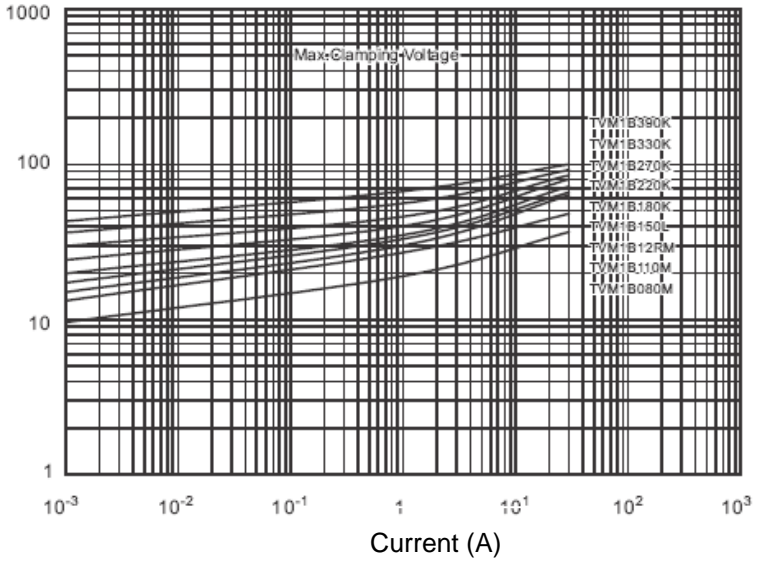
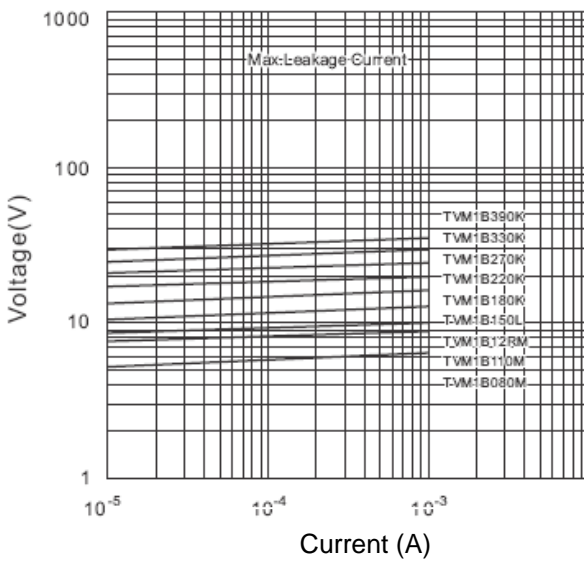


### Max. Leakage Current and Max. Clamping Voltage Curves

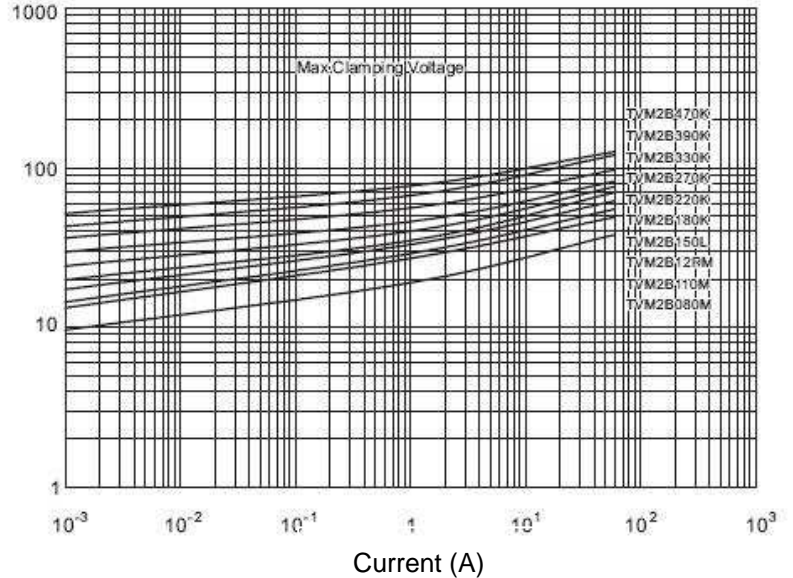
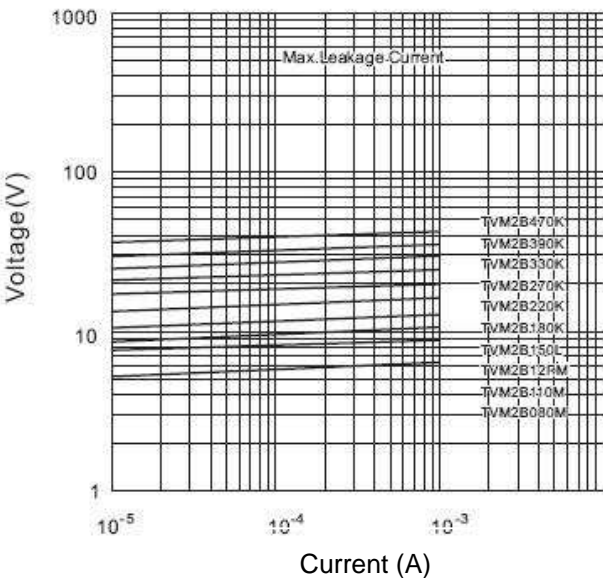
**TVM0B080M~TVM0B330K**



**TVM1B080M~TVM1B390K**



**TVM2B080M~TVM2B470K**

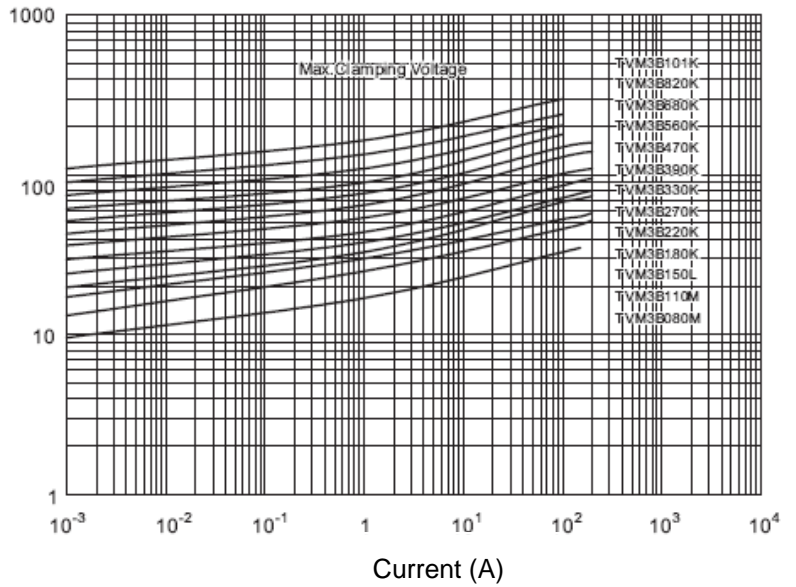
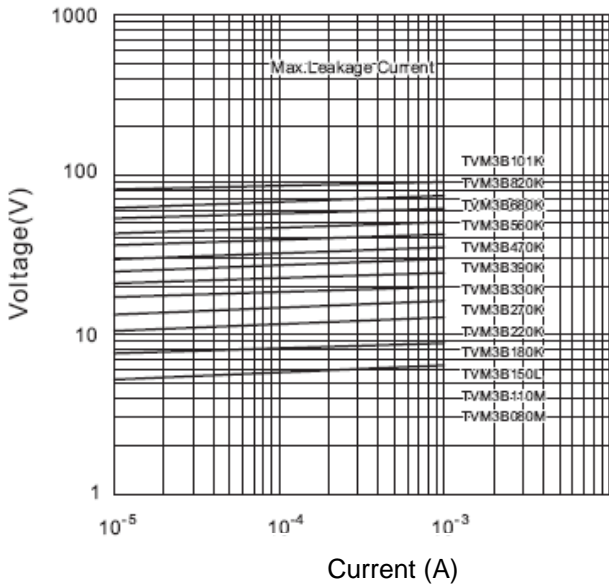


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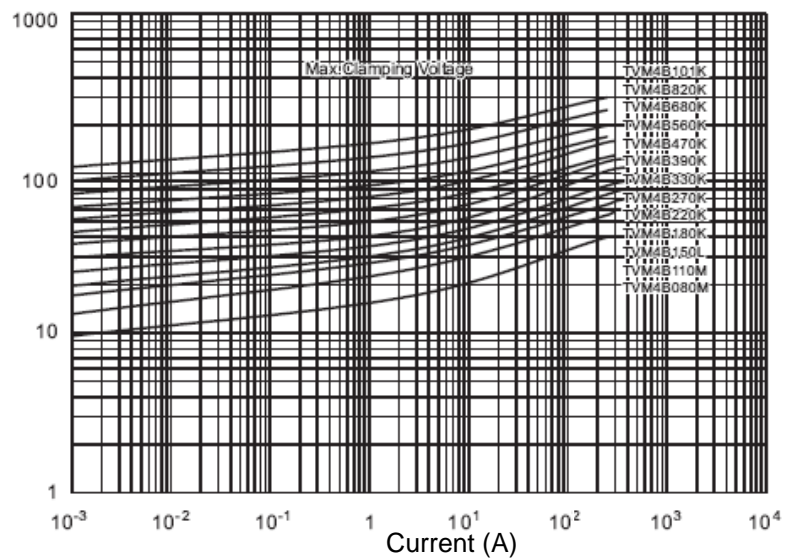
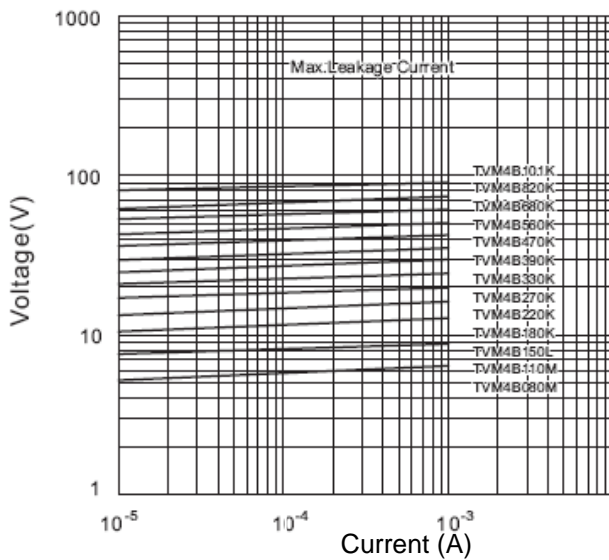
## SMD Type for Surge Suppressor



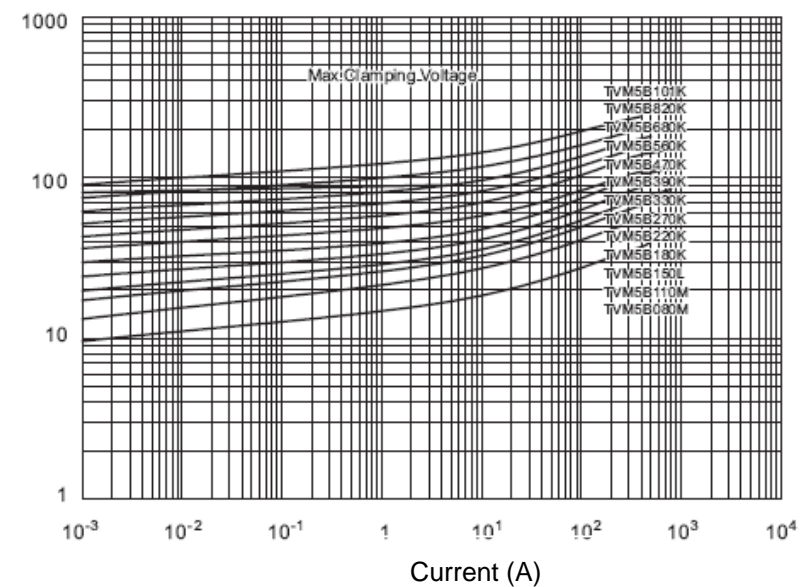
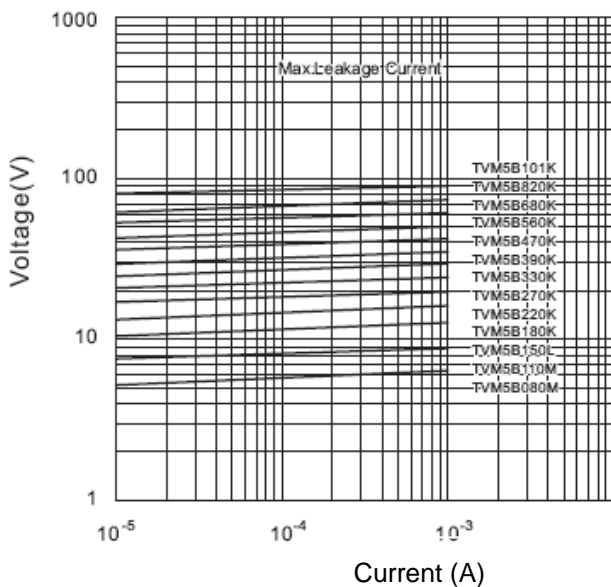
**TVM3B080M~TVM3B101K**



**TVM4B080M~TVM4B101K**



**TVM5B080M~TVM5B101K**

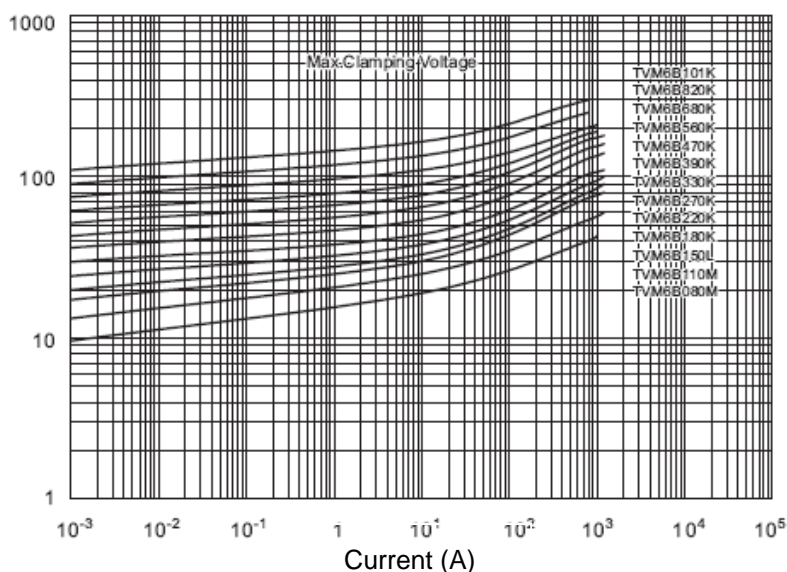
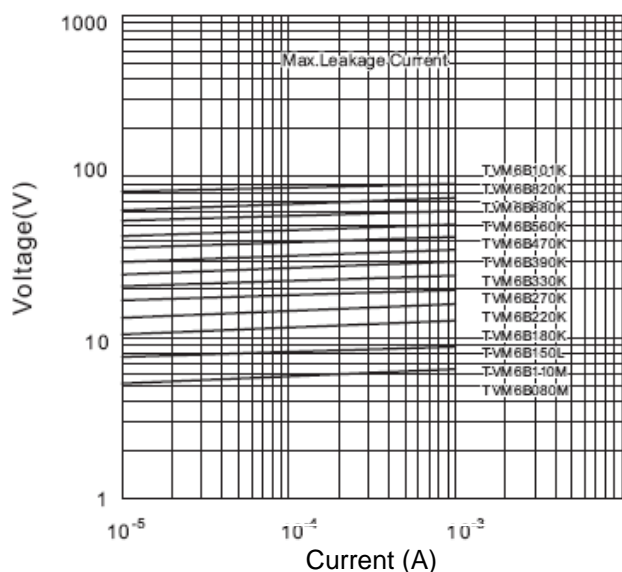


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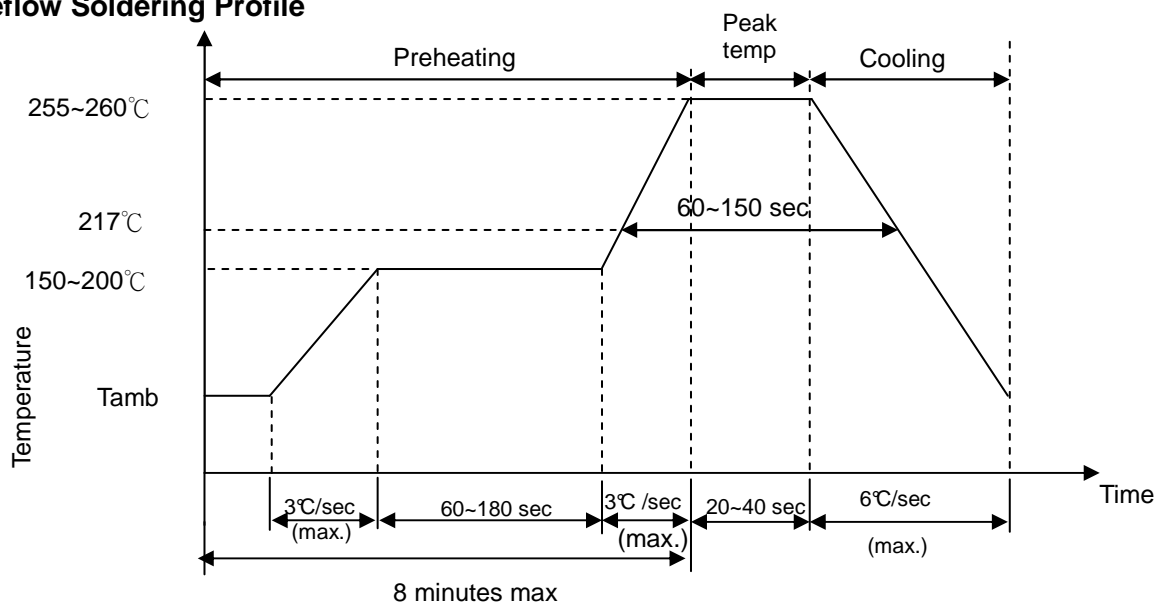


TVM6B080M~TVM6B101K



### ■ Soldering Recommendation

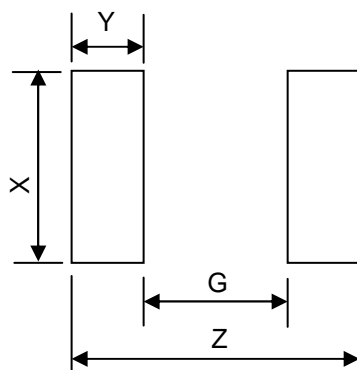
#### ● IR-reflow Soldering Profile



#### ● Reworking Conditions with Soldering Iron

| Item                              | Conditions   |
|-----------------------------------|--------------|
| Temperature of Soldering Iron-tip | 360°C (max.) |
| Soldering Time                    | 3 sec (max.) |
| Diameter of Soldering Iron-tip    | Φ 3mm (max.) |

### ■ Recommended Soldering Pad Dimensions



| Size | Z (mm)  | G (mm)  | X (mm)  | Y (mm)  |
|------|---------|---------|---------|---------|
| 0402 | 2.1~2.2 | 0.4~0.5 | 0.6~0.7 | 0.9~1.0 |
| 0603 | 2.7~2.8 | 0.6~0.7 | 0.9~1.0 | 1.0~1.1 |
| 0805 | 3.1~3.2 | 0.6~0.7 | 1.4~1.5 | 1.2~1.3 |
| 1206 | 4.3~4.4 | 1.2~1.3 | 1.7~1.8 | 1.5~1.6 |
| 1210 | 4.3~4.4 | 1.2~1.3 | 2.6~2.7 | 1.5~1.6 |
| 1812 | 5.7~5.8 | 2.0~2.1 | 3.3~3.4 | 1.8~1.9 |
| 2220 | 6.9~7.0 | 2.6~2.7 | 5.1~5.2 | 2.1~2.2 |

Followed Standard: IPC-SM-782A

### ■ Storage Conditions of Products

#### ● Storage Conditions :

1. Storage Temperature:  $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
2. Relative Humidity:  $\leq 75\% \text{RH}$
3. Keep away from corrosive atmosphere and sunlight.

#### ● Period of Storage : 1 year

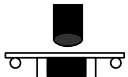
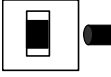


# Metal Oxide Varistor : TVM-B Series

## SMD Type for Surge Suppressor



### ■ Reliability

| Item                               | Standard                         | Test conditions / Methods   | Specifications   |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
|------------------------------------|----------------------------------|---|--|----------------------------------|------------------|---|-------------|------------|---|------------------|-----------|---|-------------|------------|---|------------------|-----------|--|
| Bending Strength                   | IEC 1051-1                       | Warp:2mm ; Speed<0.5mm/sec<br>Duration : 10 sec on PCB..    | $ \Delta V_{1mA} / V_{1mA}  \leq 5\%$<br>No visible damage                               |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Adhesion                           | Specification Standard           | Speed < 0.5mm/sec. on PCB   | $W \geq 0.5\text{Kgf}$<br>the terminal electrode shall be break off not the chip element |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Damp Heat Load, Steady State       | IEC 1051-1                       | $40 \pm 2^\circ\text{C}$ 90~95% RH<br>500±24 hrs at $V_{DC}$  | $ \Delta V_{1mA} / V_{1mA}  \leq 10\%$<br>No visible damage                              |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| High Temp. Storage                 | IEC 1051-1                       | $125 \pm 5^\circ\text{C}$ x 1000±24 hrs   | $ \Delta V_{1mA} / V_{1mA}  \leq 5\%$<br>No visible damage                               |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Rapid Change of Temperature        | IEC 1051-1                       | The conditions shown below shall be repeated 5 cycles on PCB<br><table border="1" data-bbox="504 958 1193 1218"> <thead> <tr> <th>Step</th> <th>Temperature (<math>^\circ\text{C}</math>)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-40 \pm 5</math></td> <td><math>30 \pm 3</math></td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td><math>5 \pm 3</math></td> </tr> <tr> <td>3</td> <td><math>125 \pm 5</math></td> <td><math>30 \pm 3</math></td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td><math>5 \pm 3</math></td> </tr> </tbody> </table> | Step   | Temperature ( $^\circ\text{C}$ ) | Period (minutes) | 1 | $-40 \pm 5$ | $30 \pm 3$ | 2 | Room temperature | $5 \pm 3$ | 3 | $125 \pm 5$ | $30 \pm 3$ | 4 | Room temperature | $5 \pm 3$ | $ \Delta V_{1mA} / V_{1mA}  \leq 5\%$<br>No visible damage |
| Step                               | Temperature ( $^\circ\text{C}$ ) | Period (minutes)  |  |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| 1                                  | $-40 \pm 5$                      | $30 \pm 3$  |  |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| 2                                  | Room temperature                 | $5 \pm 3$   |  |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| 3                                  | $125 \pm 5$                      | $30 \pm 3$  |  |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| 4                                  | Room temperature                 | $5 \pm 3$   |  |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| High Temp. Load                    | IEC 1051-1                       | $85 \pm 2^\circ\text{C}$ 1000±24 hrs at $V_{DC}$  | $ \Delta V_{1mA} / V_{1mA}  \leq 5\%$<br>No visible damage                               |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Low Temp. Load                     | Specification Standard           | $-40 \pm 5^\circ\text{C}$ 1000±24 hrs at $V_{DC}$   | $ \Delta V_{1mA} / V_{1mA}  \leq 5\%$<br>No visible damage                               |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Max. Energy                        | Specification Standard           | 10/1000 $\mu\text{S}$ Waveform, $W_{max}$ , 1 surge current   | $ \Delta V_{1mA} / V_{1mA}  \leq 10\%$<br>No visible damage                              |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Vibration                          | IEC 1051-1                       | Frequency range:10~55Hz<br>Amplitude:0.75mm or 98m/S2<br>Direction:3 mutually perpendicular directions,2hrs each  | $ \Delta V_{1mA} / V_{1mA}  \leq 5\%$<br>No visible damage                               |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Varistor Voltage Temp. Coefficient | Specification Standard           | measure $V_{1mA}$ at $-40^\circ\text{C}$ 、 $25^\circ\text{C}$ 、 $125^\circ\text{C}$   | $ T_c  \leq 0.05\%/^\circ\text{C}$   |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Climatic Sequence                  | IEC 1051-1                       | a. $125^\circ\text{C}$ x 16 hrs<br>b. 1st cycle : $55^\circ\text{C}$ 93%RH x 24 hrs<br>c. $-40^\circ\text{C}$ x 2 hrs<br>d. 5 cycles : $55^\circ\text{C}$ 93%RH x 24 hrs/cycle  | $ \Delta V_{1mA} / V_{1mA}  \leq 10\%$<br>No visible damage                              |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Solderability                      | IEC 60068-2-20                   | $235 \pm 5^\circ\text{C}$ 2±0.5 sec.  | At least 95% of terminal electrode is covered by new solder                              |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |
| Resistance to Soldering Heat       | IEC 60068-2-20                   | $260 \pm 5^\circ\text{C}$ 10±1 sec.   | $ \Delta V_{1mA} / V_{1mA}  \leq 5\%$<br>No visible damage                               |                                  |                  |   |             |            |   |                  |           |   |             |            |   |                  |           |  |

# Metal Oxide Varistor : TVM-B Series

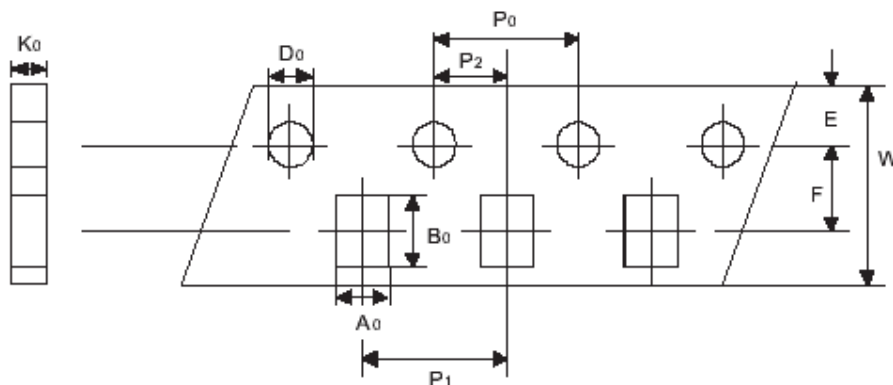


## SMD Type for Surge Suppressor

### ■ Packaging

#### ● Taping Specification

0402 ~ 0805 type

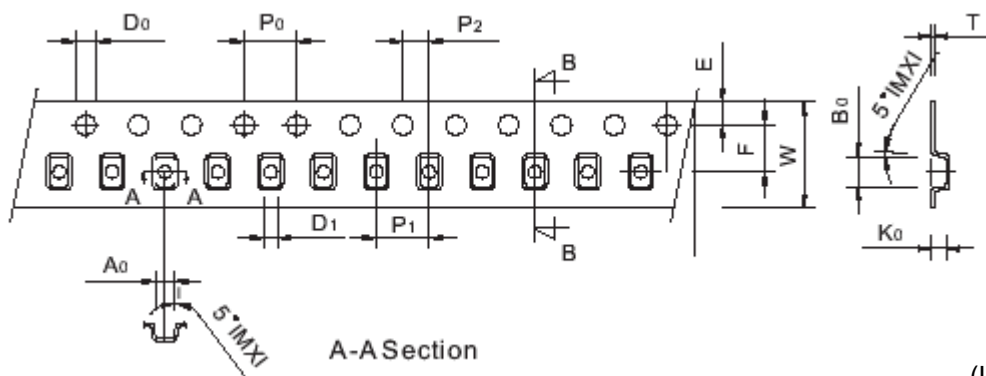


(Unit: mm)

| Index<br>Type | A <sub>0</sub> | B <sub>0</sub> | W    | E    | F     | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | D <sub>0</sub> | K <sub>0</sub> |
|---------------|----------------|----------------|------|------|-------|----------------|----------------|----------------|----------------|----------------|
| 0402          | ±0.05          | ±0.12          | ±0.2 | ±0.1 | ±0.05 | ±0.1           | ±0.05          | ±0.1           | ±0.1           | ±0.1           |

| Index<br>Type | A <sub>0</sub> | B <sub>0</sub> | W    | E    | F     | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | D <sub>0</sub> | K <sub>0</sub> |
|---------------|----------------|----------------|------|------|-------|----------------|----------------|----------------|----------------|----------------|
| 0603          | ±0.2           | ±0.2           | ±0.2 | ±0.1 | ±0.05 | ±0.1           | ±0.05          | ±0.1           | ±0.1           | ±0.1           |
| 0805          | 1.5            | 2.3            | 8    | 1.75 | 3.5   | 4              | 2              | 4              | 1.55           | 0.95           |

1206~ 2220 type



(Unit: mm)

| Index<br>Type | A <sub>0</sub> | B <sub>0</sub> | W    | E    | F     | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | D <sub>0</sub> | D <sub>1</sub> | T    |
|---------------|----------------|----------------|------|------|-------|----------------|----------------|----------------|----------------|----------------|------|
| 1206          | ±0.2           | ±0.2           | ±0.2 | ±0.1 | ±0.05 | ±0.1           | ±0.05          | ±0.1           | ±0.1           | ±0.1           | ±0.1 |
| 1210          | 1.85           | 3.45           | 8    | 1.75 | 3.5   | 4              | 2              | 4              | 1.55           | 1              | 0.25 |

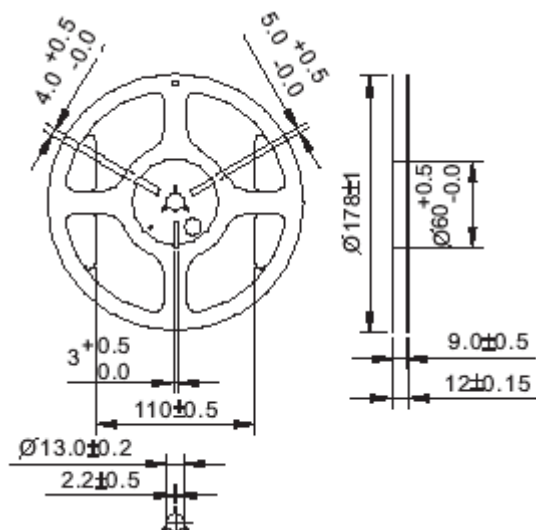
| Index<br>Type | A <sub>0</sub> | B <sub>0</sub> | W    | E    | F     | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | D <sub>0</sub> | D <sub>1</sub> | T    |
|---------------|----------------|----------------|------|------|-------|----------------|----------------|----------------|----------------|----------------|------|
| 1812          | ±0.2           | ±0.2           | ±0.3 | ±0.1 | ±0.05 | ±0.1           | ±0.05          | ±0.1           | ±0.1           | ±0.1           | ±0.1 |
| 2220          | 3.65           | 4.96           | 12   | 1.75 | 5.5   | 8              | 2              | 4              | 1.55           | 1.5            | 0.25 |

# Metal Oxide Varistor : TVM-B Series

## SMD Type for Surge Suppressor

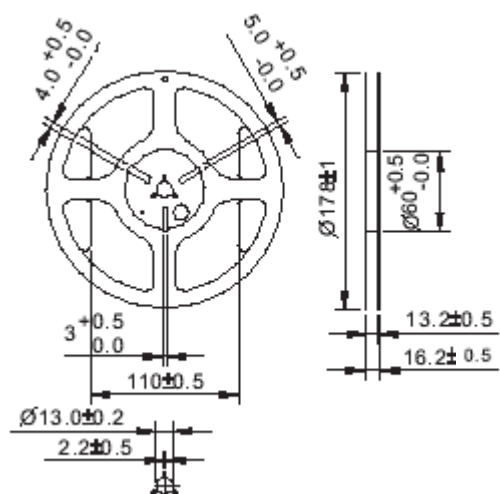


- Quantity



(Unit: mm)

| Type | Quantity (pcs/reel) |
|------|---------------------|
| 0402 | 10000               |
| 0603 | 4000                |
| 0805 | 3500                |
| 1206 | 2500                |
| 1210 | 2500                |



(Unit: mm)

| Type | Quantity (pcs/reel) |
|------|---------------------|
| 1812 | 1000                |
| 2220 | 1000                |