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## SPECIFICATION FOR APPROVAL

CUSTOMER \_\_\_\_\_

CERTIFIED  
MODEL/TYPE

TVR10101-M

PART NO.

TVR10101KY209M(RoHS+HF)

APPLICATION \_\_\_\_\_

CUSTOMER P/N \_\_\_\_\_

ISSUE DATE

Oct.31.2018

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REV. DATE \_\_\_\_\_

| FOR CUSTOMER APPROVAL | CHECKED BY     |
|-----------------------|----------------|
|                       | Yuan Yuan      |
|                       | APPROVED BY    |
|                       | Huaifang Zhang |





**REVISED RECORD SHEET**

| REV. NO | REV. DATE | REVISED CONTENT |
|---------|-----------|-----------------|
|         |           |                 |



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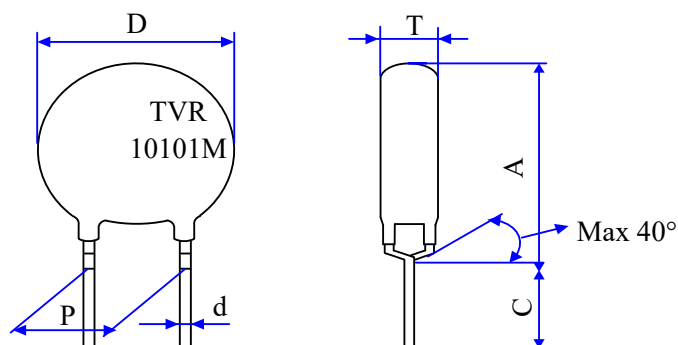
Part Number Code

Example :

**TVR**    **10**    **101**    **K**    **Y**    **209M**  
 (1)        (2)        (3)        (4)        (5)        (6)

| No. | Item                          | Digit | Specification   |
|-----|-------------------------------|-------|---|
| (1) | Product Type                  | TVR   | Thinking varistor TVR type                                |
| (2) | Body Size                     | 10    | φ10 mm  |
| (3) | Varistor Voltage              | 101   | $10 \times 10^1 \text{ V} = 100\text{V} (V_{1\text{mA}})$ |
| (4) | Tolerance of $V_{1\text{mA}}$ | K     | Tolerance of $V_{1\text{mA}}$                             |
| (5) | Appearance                    | Y     | Y Kink Lead, Silicon Coating                              |
| (6) | Optional Suffix               | 209M  | 1.RoHS+HF compliance<br>2.Tmax:4.7mm,C:3.5+/-0.5mm        |

Structure and Dimensions



( unit : mm )

| Body Size | Dmax | P     | d         | A max. | C       | Tmax |
|-----------|------|-------|-----------|--------|---------|------|
| φ 10      | 14   | 7.5±1 | 0.80±0.02 | 16.0   | 3.5±0.5 | 4.7  |

**\*Coating material rating:UL 94 V-0**

Electrical Characteristics ( Ambient  $T_a=25\text{ }^\circ\text{C}$  )

| Part No.       | Varistor Voltage (@ 1mA DC) | Max. Continuous Voltage |              | Max. Clamping Voltage (8/20μS) |           | Max. Surge Current (8/20μS) | Max. Energy (10/1000μS) |
|----------------|-----------------------------|-------------------------|--------------|--------------------------------|-----------|-----------------------------|-------------------------|
|                | $V_{1mA}$ (V)               | $V_{AC}(rms)$ (V)       | $V_{DC}$ (V) | $V_p$ (V)                      | $I_p$ (A) | I (A)                       | W (J)                   |
| TVR10101KY209M | 100±10%                     | 60                      | 85           | 165                            | 25        | 3500                        | 15                      |

| Part No.       | Rated Power | Impulse Response Time | Max. Leakage Current at 75% $V_{1mA}$ | Operating Temperature Range | Storage temperature Range |
|----------------|-------------|-----------------------|---------------------------------------|-----------------------------|---------------------------|
|                | P (W)       | nSec                  | $I_L(\mu A)$                          | ( $^\circ\text{C}$ )        | ( $^\circ\text{C}$ )      |
| TVR10101KY209M | 0.4         | <25                   | 20                                    | -40 ~ +125                  | -40 ~ +150                |

The mechanical force acted on the wire lead may cause cracks and chips of the coating, but which does not affect the performance of the component

**Reliability**

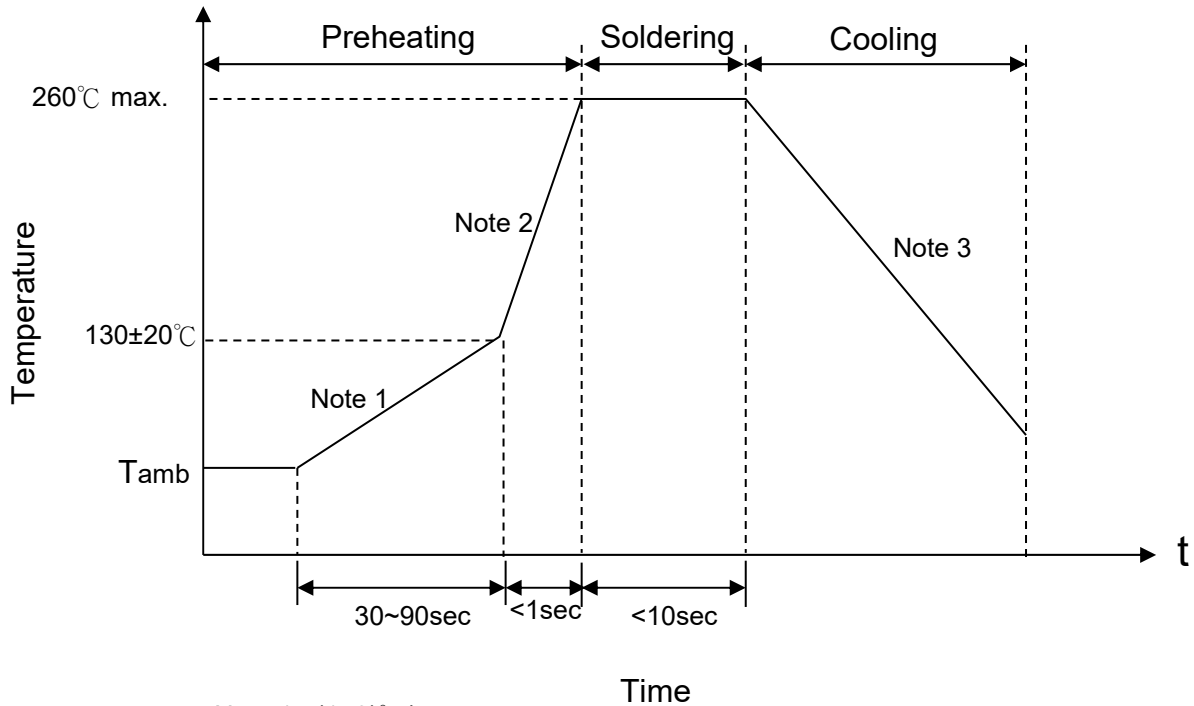
| Item                          | Standard               | Test conditions / Methods  | Specifications  |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
|-------------------------------|------------------------|--|---|------------------|------------------|-----|--------------|--------|--------|------------------|---|---|---------|--------|---|------------------|-------|---|
| Tensile Strength of Terminals | IEC60068-2-21          | Gradually applying the force specified and keeping the unit fixed for 10±1 sec.<br><br><table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Terminal diameter<br/>(mm)</td> <td style="text-align: center;">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> <tr> <td style="text-align: center;">1.25&lt;d</td> <td style="text-align: center;">4.0</td> </tr> </table>  | Terminal diameter<br>(mm)   | Force<br>(Kg)    | 0.5<d ≤ 0.8      | 1.0 | 0.8<d ≤ 1.25 | 2.0    | 1.25<d | 4.0              | No visible damage<br>  ΔV/V <sub>1mA</sub>   ≤ 5% |   |         |        |   |                  |       |   |
| Terminal diameter<br>(mm)     | Force<br>(Kg)          |  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 0.5<d ≤ 0.8                   | 1.0                    |  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 0.8<d ≤ 1.25                  | 2.0                    |  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 1.25<d                        | 4.0                    |  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| Bending Strength of Terminals | IEC60068-2-21          | 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="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Terminal diameter<br/>(mm)</td> <td style="text-align: center;">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> <tr> <td style="text-align: center;">1.25&lt;d</td> <td style="text-align: center;">2.0</td> </tr> </table>  | Terminal diameter<br>(mm)   | Force<br>(Kg)    | 0.5<d ≤ 0.8      | 0.5 | 0.8<d ≤ 1.25 | 1.0    | 1.25<d | 2.0              | ΔV/V <sub>1mA</sub>   ≤ 5%                        |   |         |        |   |                  |       |   |
| Terminal diameter<br>(mm)     | Force<br>(Kg)          |  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 0.5<d ≤ 0.8                   | 0.5                    |  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 0.8<d ≤ 1.25                  | 1.0                    |  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 1.25<d                        | 2.0                    |  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| Vibration                     | IEC 60068-2-6          | Frequency range:10~55Hz<br>Amplitude:0.75mm or 98m/S <sup>2</sup><br>Direction:3 mutually perpendicular directions,2hrs each.  | ΔV/V <sub>1mA</sub>   ≤ 5%<br>No visible damage                                     |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| Solderability                 | IEC60068-2-20          | 245 ± 3 °C , 3 ± 0.3 sec   | At least 95% of terminal electrode is covered by new solder                         |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| Resistance to Soldering Heat  | IEC60068-2-20          | 260 ± 3 °C , 10 ± 1 sec  | No visible damage<br>  ΔV/V <sub>1mA</sub>   ≤ 5%                                   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| High Temperature Storage      | IEC60068-2-2           | 150 ± 5 °C , 1000 ± 24 hrs   | No visible damage<br>  ΔV/V <sub>1mA</sub>   ≤ 5%                                   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| Damp Heat, Steady State       | IEC 60068-2-78         | The test is divided into two groups .<br>a.40 ± 2°C , 9 0 ~ 95 % RH , 1344 hrs<br>b.40 ± 2°C , 9 0 ~ 95 % RH , at 10%V <sub>DC</sub> , 1344 hrs  | No visible damage<br>  ΔV/V <sub>1mA</sub>   ≤ 10%<br>Insulation Resistance ≥ 100MΩ |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| Rapid Change of Temperature   | IEC60068-2-14          | The conditions shown below shall be repeated 5 cycles<br><table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">-40 ± 3</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Room temperature</td> <td style="text-align: center;">5 ± 3</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">125 ± 2</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Room temperature</td> <td style="text-align: center;">5 ± 3</td> </tr> </tbody> </table> | Step  | Temperature (°C) | Period (minutes) | 1   | -40 ± 3      | 30 ± 3 | 2      | Room temperature | 5 ± 3   | 3 | 125 ± 2 | 30 ± 3 | 4 | Room temperature | 5 ± 3 | No visible damage<br>  ΔV/V <sub>1mA</sub>   ≤ 5% |
| Step                          | Temperature (°C)       | Period (minutes)   |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 1                             | -40 ± 3                | 30 ± 3   |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 2                             | Room temperature       | 5 ± 3  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 3                             | 125 ± 2                | 30 ± 3   |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| 4                             | Room temperature       | 5 ± 3  |   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| High Temp. Load               | MIL-STD-202 Method 108 | 125 ± 2 °C , 1000 ± 24 hrs, at V <sub>DC</sub> or V <sub>rms</sub> (Max. Operating Voltage)  | ΔV/V <sub>1mA</sub>   ≤ 10%<br>No visible damage                                    |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |
| Flammability test             | Specification Standard | The varistor shall be subjected to 60sec.applications of test flame.<br>Burner:Bunsen gas burner 9000kcal/m <sup>3</sup><br>Diameter of flame nozzle: Φ9.5mm<br>Position : the specimen shall be fixed horizontal<br>Point of application shall be approximately center of the specimen  | No catching fire,and no flaming drops   |                  |                  |     |              |        |        |                  |   |   |         |        |   |                  |       |   |



| Item  | Standard                  | Test conditions / Methods   | Specifications                                      |
|---|---------------------------|---|---|
| 8/20 $\mu$ S<br>Surge Life                  | IEC 61051-1 4.6           | 10,000 pulses( 8/20 $\mu$ S ) , unipolar, interval 10 secs, amplitude corr. to max. Surge current derating curves for 20 $\mu$ S  | $ \Delta V/V_{1mA}  \leq 10\%$<br>No visible damage |
| 10/1000 $\mu$ S<br>Surge Life               | IEC 61051-1 4.6           | 10/1000 $\mu$ S waveform, 10 surge currents,unipolar,interval 2mins, amplitude corr. to max. surge current derating curves for 1000 $\mu$ S   | $ \Delta V/V_{1mA}  \leq 10\%$<br>No visible damage |
| Varistor<br>Voltage<br>Temp.<br>Coefficient | Specification<br>Standard | $\frac{V_{1mA} \text{ at } 125^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{100} \times 100 (\% / ^{\circ}\text{C} )$<br>$\frac{V_{1mA} \text{ at } -40^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{65} \times 100 (\% / ^{\circ}\text{C} )$ | $-0.05 \leq TC \leq 0.05(\%/^{\circ}\text{C})$      |
| Voltage<br>Proof                            | IEC 61051-1 4.9           | Metal balls method, 1000 Vac 1 min  | No visible damage                                   |

## Soldering Recommendation

### Wave Soldering Profile



- Note 1 :  $(1\sim 3)^{\circ}\text{C/sec}$   
 Note 2 : Approx.  $200^{\circ}\text{C/sec}$   
 Note 3 :  $5^{\circ}\text{C/sec Max}$

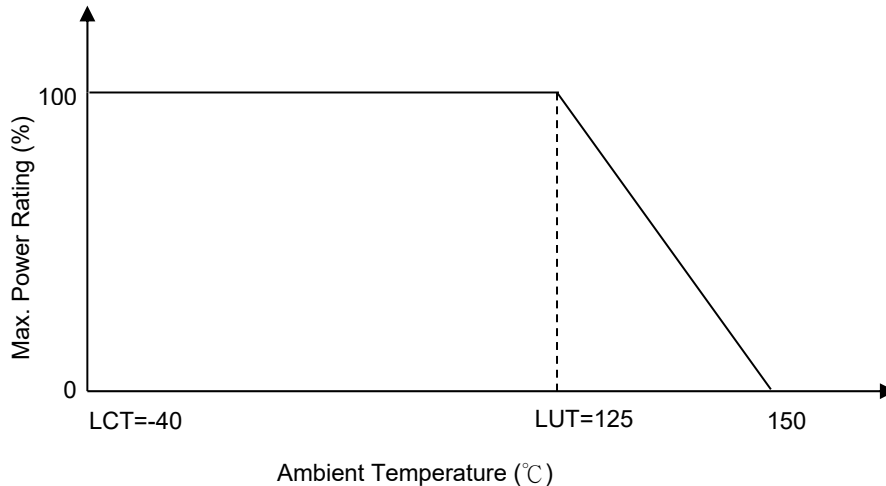
### Recommended Reworking Conditions with Soldering Iron

| Item                              | Conditions                   |
|-----------------------------------|------------------------------|
| Temperature of Soldering Iron-tip | $360^{\circ}\text{C (max.)}$ |
| Soldering Time                    | 3 sec (max.)                 |
| Distance from Varistor            | 2 mm (min.)                  |



### Power Derating Curve

When operating temperature exceeds  $125^{\circ}\text{C}$ , the power, the Max.continuous operation Voltage, the Max.Surge Current and the Max.Energy should be derated as below figure, the derated coefficient is -4%.



### RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS directive 2011/65/EU.

### Warehouse Storage Conditions of Products

(I) 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.

(II) Period of Storage : 1 year

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Safety Approvals (Certified Model/Type:TVR10101-M)



\* CQC GB/T10193-1997 ` GB/T10194-1997 recognized  
(File # CQC13001090357/CQC13001090356)

Certificates

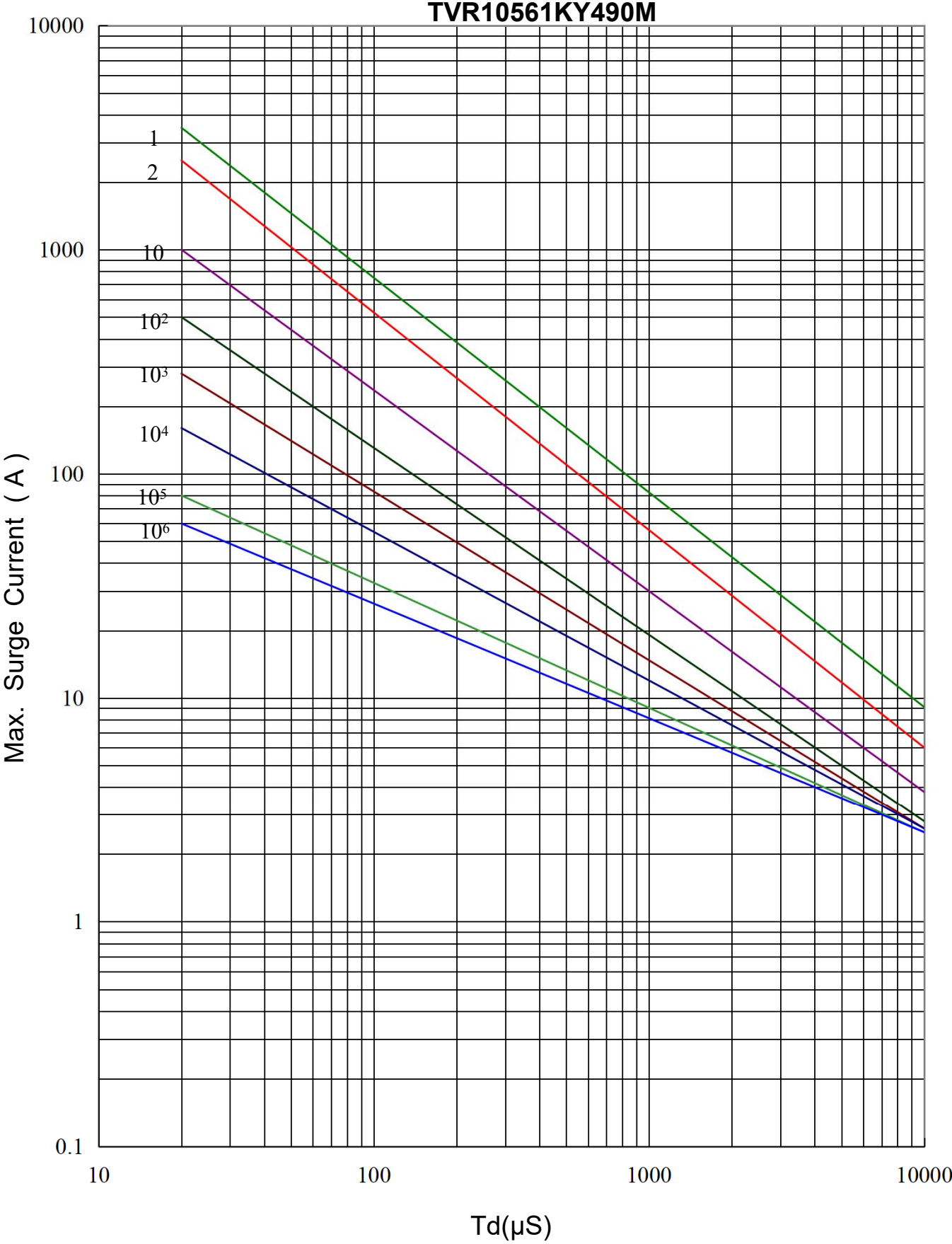
- (1) IATF 16949 certificate
- (2) ISO 9001 certificate

Test Report

- (1) RoHS test report
- (2) Halogen-free test report

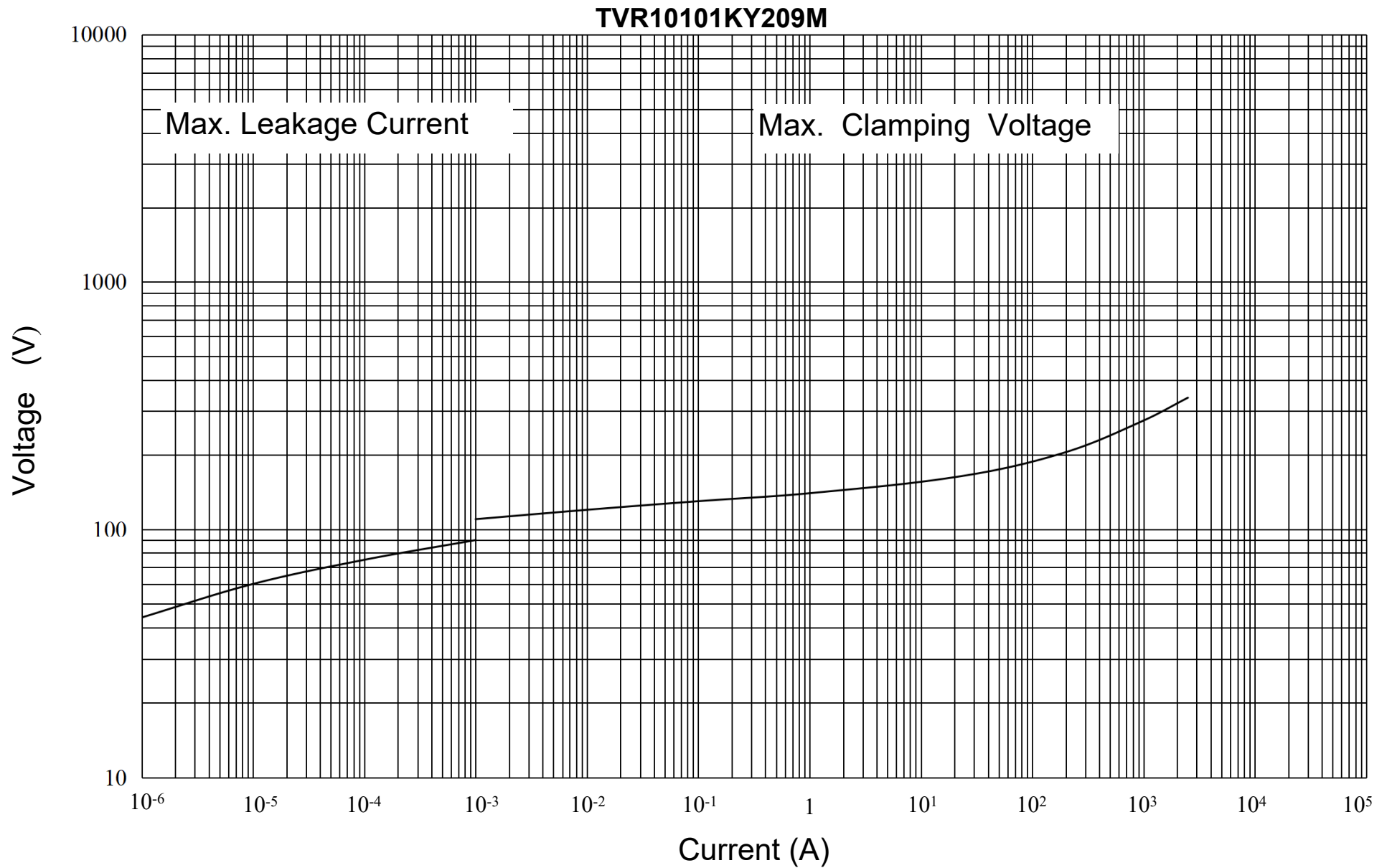


Max. Surge Current Derating Curves





Max. Leakage Current and Max. Clamping Voltage Curve



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