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## SPECIFICATION FOR APPROVAL

CUSTOMER \_\_\_\_\_

CERTIFIED  
MODEL/TYPE

TVR07561

PART NO.

TVR07561KSCAAY (RoHS)

APPLICATION \_\_\_\_\_

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

ISSUE DATE

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





Zinc Oxide Varistor TVR Type  
Part No. :TVR07561KSCAAY

**REVISED RECORD SHEET**

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



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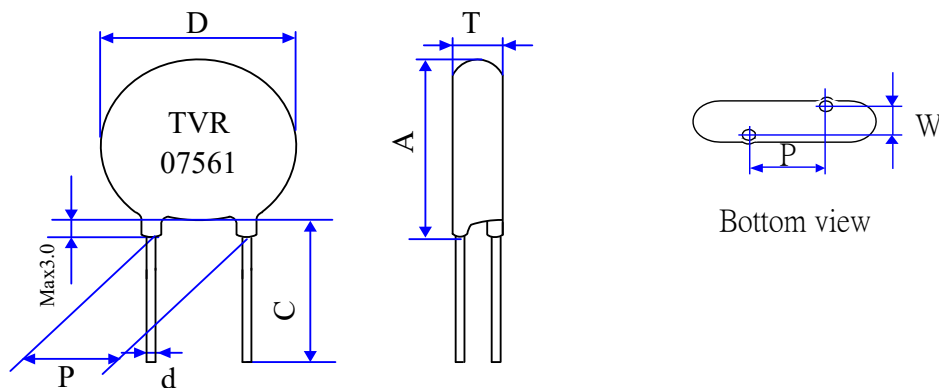
Part Number Code

Example :

**TVR**    **07**    **561**    **K**    **S**    **CAA**    **Y**  
 (1)        (2)        (3)        (4)        (5)        (6)        (7)

| No. | Item                          | Digit | Specification   |
|-----|-------------------------------|-------|---|
| (1) | Product Type                  | TVR   | Thinking varistor TVR type                                |
| (2) | Body Size                     | 07    | φ 07 mm   |
| (3) | Varistor Voltage              | 561   | $56 \times 10^1 \text{ V} = 560\text{V} (V_{1\text{mA}})$ |
| (4) | Tolerance of $V_{1\text{mA}}$ | K     | ±10%  |
| (5) | Appearance                    | S     | Straight lead , epoxy coating                             |
| (6) | Packaging                     | CAA   | Cut 10.0 mm Lead & bulk                                   |
| (7) | Optional Suffix               | Y     | RoHS compliance   |

Structure and Dimensions



( unit : mm )

| Body Size | D       | P       | d        | A max. | C    | T       | W       |
|-----------|---------|---------|----------|--------|------|---------|---------|
| φ 07      | 6.5~9.0 | 5.0±0.5 | 0.6±0.02 | 11.0   | 10±1 | 3.6-5.5 | 2.8±1.0 |

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

Electrical Characteristics ( Ambient Ta=25 °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 <sub>1mA</sub> (V)        | V <sub>AC</sub> (rms) (V) | V <sub>DC</sub> (V) | V <sub>p</sub> (V)             | I <sub>p</sub> (A) | I (A)                       | W (J)                   |
| TVR07561KSCAAY | 560 ± 10 %                  | 350                       | 450                 | 930                            | 10                 | 1200                        | 33                      |

| Part No.       | Rated Power | Impulse Response Time | Max. Leakage Current at 75%V <sub>1mA</sub> | Operating Temperature Range | Storage temperature Range |
|----------------|-------------|-----------------------|---|-----------------------------|---------------------------|
|                | P (W)       | nSec                  | I <sub>L</sub> (μA)                         | ( °C )                      | ( °C )                    |
| TVR07561KSCAAY | 0.25        | <25                   | 20  | -40 ~ +85                   | -40 ~ +125                |

**Reliability**

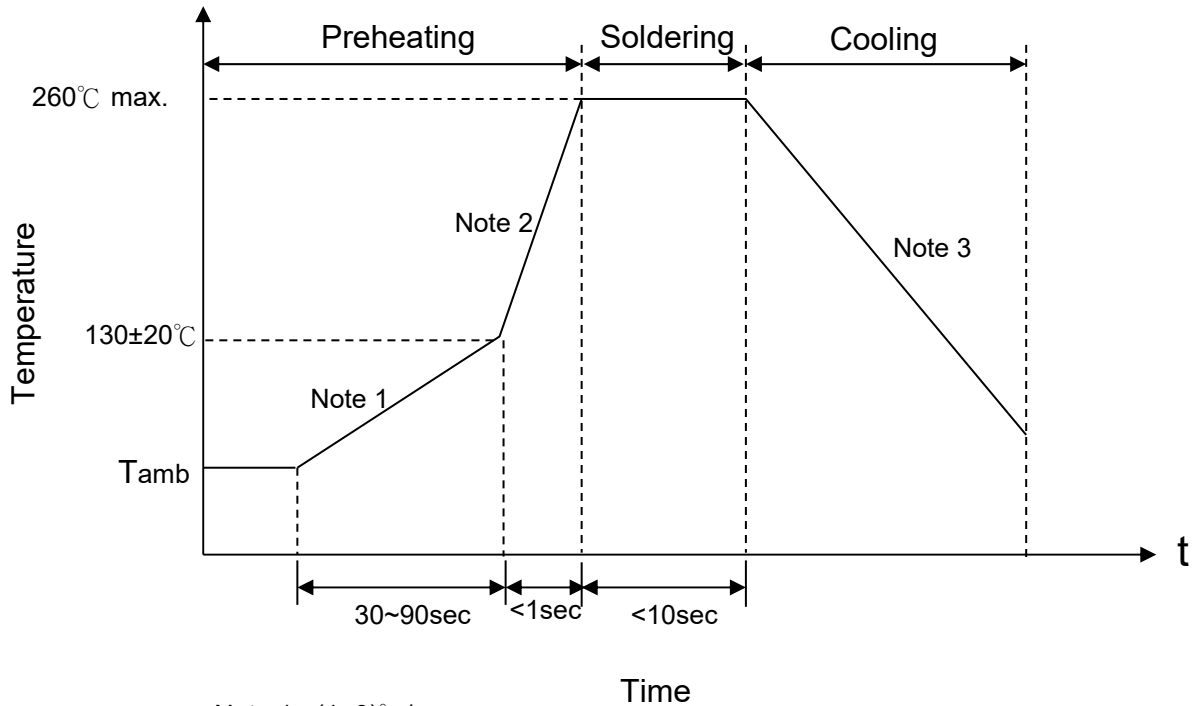
| Item                          | Standard               | Test conditions / Methods   | Specifications   |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
|-------------------------------|------------------------|---|--|------------------|------------------|-----|------------|--------|--------|------------------|--|---|--------|--------|---|------------------|-------|--|
| 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>$ \Delta V/V_{1mA}  \leq 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              | No visible damage<br>$ \Delta V/V_{1mA}  \leq 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.   | $ \Delta V/V_{1mA}  \leq 5\%$<br>No visible damage                                   |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| Solderability                 | IEC60068-2-20          | 245 ± 3 °C , 3 ± 0.3 sec  | At least 95% of terminal electrode is covered by new solder                          |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| Resistance to Soldering Heat  | IEC60068-2-20          | 260 ± 3 °C , 10 ± 1 sec   | No visible damage<br>$ \Delta V/V_{1mA}  \leq 5\%$                                   |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| High Temperature Storage      | IEC60068-2-2           | 125 ± 5 °C , 1000 ± 24 hrs  | No visible damage<br>$ \Delta V/V_{1mA}  \leq 5\%$                                   |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| Damp Heat, Steady State       | IEC 60068-2-78         | The test is divided into two groups .<br>a.40 ± 2°C , 90 ~ 95 % RH , 1344 hrs<br>b.40 ± 2°C , 90 ~ 95 % RH , at 10%V <sub>DC</sub> , 1344 hrs   | No visible damage<br>$ \Delta V/V_{1mA}  \leq 10\%$<br>Insulation Resistance ≥ 100MΩ |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| Rapid Change of Temperature   | IEC60068-2-14          | The conditions shown below shall be repeated 5 cycles<br><br><table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">-40 ± 3</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Room temperature</td> <td style="text-align: center;">5 ± 3</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">85 ± 2</td> <td style="text-align: center;">30 ± 3</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Room temperature</td> <td style="text-align: center;">5 ± 3</td> </tr> </tbody> </table> | Step   | Temperature (°C) | Period (minutes) | 1   | -40 ± 3    | 30 ± 3 | 2      | Room temperature | 5 ± 3  | 3 | 85 ± 2 | 30 ± 3 | 4 | Room temperature | 5 ± 3 | No visible damage<br>$ \Delta V/V_{1mA}  \leq 5\%$ |
| Step                          | Temperature (°C)       | Period (minutes)  |  |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| 1                             | -40 ± 3                | 30 ± 3  |  |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| 2                             | Room temperature       | 5 ± 3   |  |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| 3                             | 85 ± 2                 | 30 ± 3  |  |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| 4                             | Room temperature       | 5 ± 3   |  |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |
| High Temp. Load               | MIL-STD-202 Method 108 | 85 ± 2 °C , 1000 ± 24 hrs, at V <sub>DC</sub> or V <sub>rms</sub> (Max. Operating Voltage)  | $ \Delta V/V_{1mA}  \leq 10\%$<br>No visible damage                                  |                  |                  |     |            |        |        |                  |  |   |        |        |   |                  |       |  |



| Item  | Standard                  | Test conditions / Methods  | Specifications                                      |
|---|---------------------------|--|---|
| 8/20 $\mu$ S<br>Surge Life                  | IEC 61051-1 4.6           | 10 pulses( 8/20 $\mu$ S) , unipolar, interval 30 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 | $\frac{V_{1mA} \text{ at } 85^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{60} \times 100 (\% / ^{\circ}\text{C} )$ $\frac{V_{1mA} \text{ at } -40^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{65} \times 100 (\% / ^{\circ}\text{C} )$ | $-0.05 \leq TC \leq 0.05 (\% / ^{\circ}\text{C} )$  |
| Voltage<br>Proof                            | IEC 61051-1 4.9           | Metal balls method, 2500 Vac 1 min   | No visible damage                                   |

## Soldering Recommendation

### Wave Soldering Profile



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

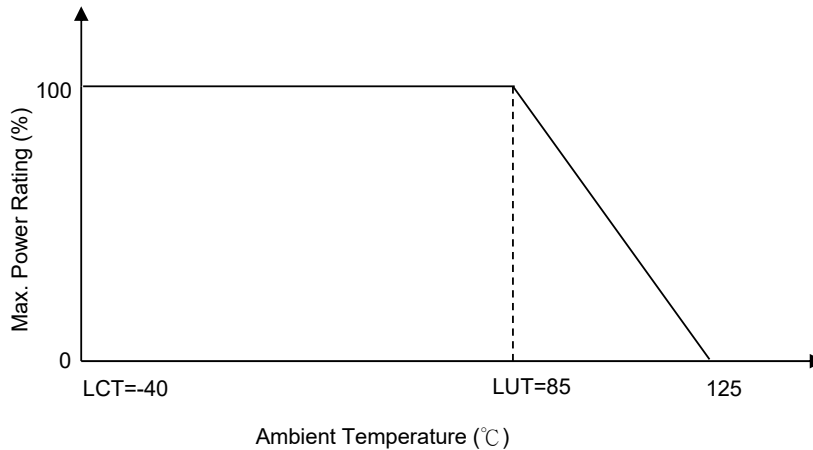
### Recommended Reworking Conditions with Soldering Iron

| 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 85°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 -2.5%.



### RoHS Compliant Declaration

We hereby declare that the components delivered to your company are compliant with RoHS directive 2015/863/EU.

### Warehouse Storage Conditions of Products

(I) Storage Conditions :

- 1.Storage Temperature : -10°C~+40°C
- 2.Relative Humidity :  $\leq 75\%RH$
- 3.Keep away from corrosive atmosphere and sunlight.

(II) Period of Storage : 1 year

Safety Approvals (Certified Model/Type:TVR07561)

\* UL 1449 4th / cUL recognized (File #E314979)



\*CSA 22.2 recognized (File # 97495)



\* TUV recognized (File J50411784)



\*VDE IEC 61051-1:2007/IEC 61051-2:1991/ IEC 61051-2-2:1991  
DIN EN 61051-1:2009/IEC 61051-2 AMD1:2009(File # 5944)



\* CQC GB/T10193-1997 ` GB/T10194-1997 recognized  
(File # CQC18001199806/ CQC18001199789)

Certificates

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

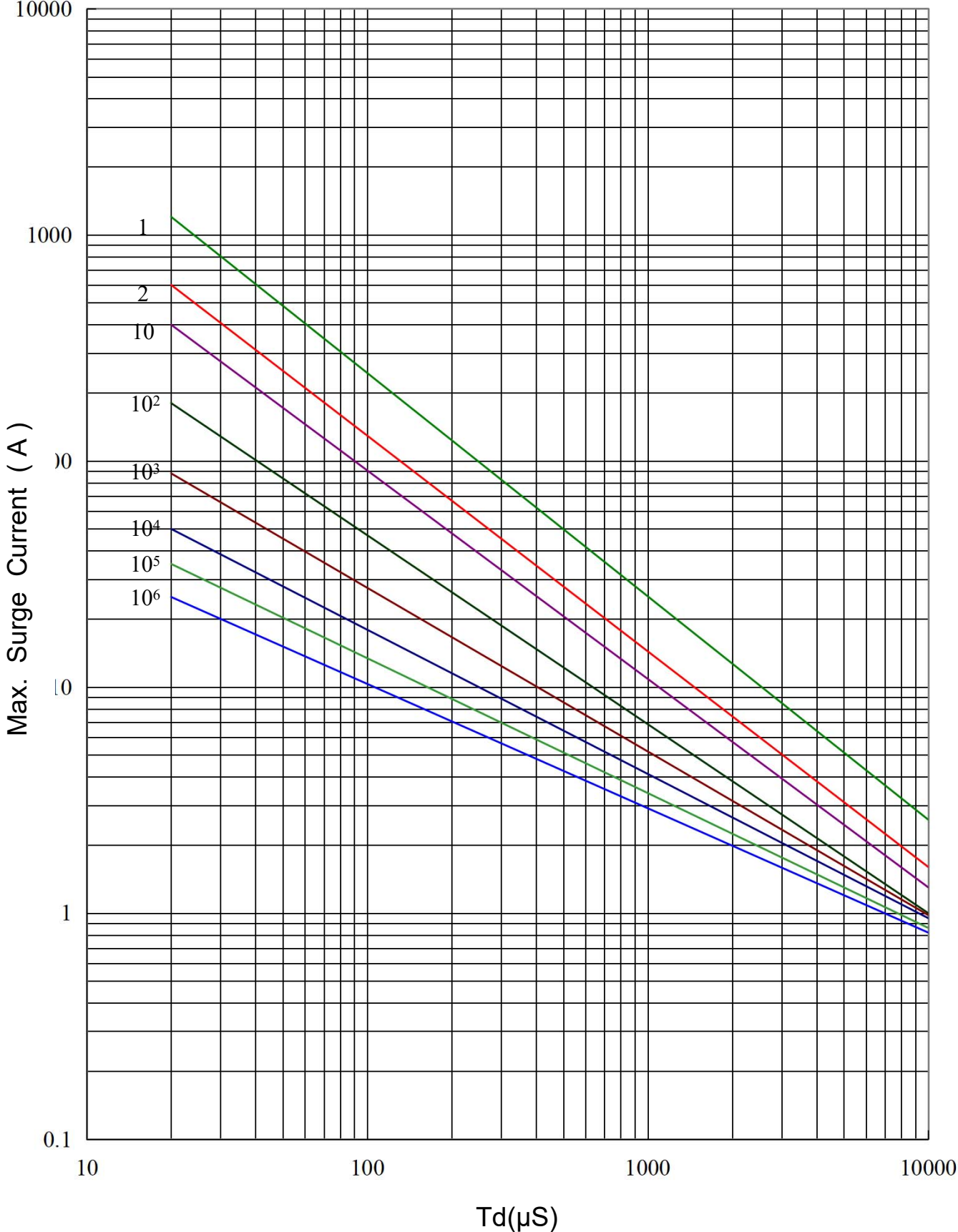
Test Report

- (1) RoHS test report



Max. Surge Current Derating Curves

**TVR07561KSCAAY**





Max. Leakage Current and Max. Clamping Voltage Curve

