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## SPECIFICATION FOR APPROVAL

CUSTOMER \_\_\_\_\_

CERTIFIED  
MODEL/TYPE

TVR05271

PART NO.

TVR05271KFS1F-H(RoHS+HF)

APPLICATION \_\_\_\_\_

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

ISSUE DATE

Apr.29.2022

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

| FOR CUSTOMER APPROVAL | CHECKED BY         |
|-----------------------|--------------------|
|                       | Yuan Yuan          |
|                       | <b>APPROVED BY</b> |
|                       | Huaifang Zhang     |





**REVISED RECORD SHEET**

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



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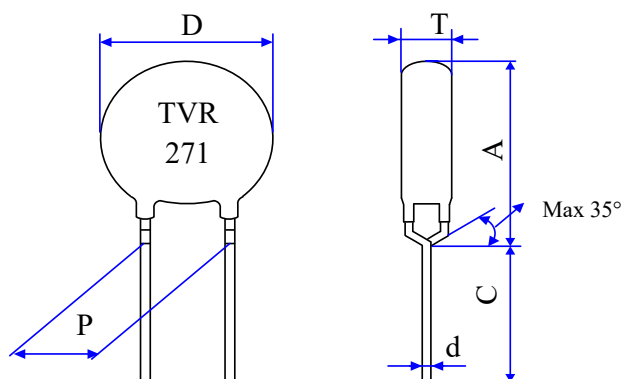
Part Number Code

Example :

**TVR**    **05**    **271**    **K**    **F**    **S1F**    **-H**  
 (1)    (2)    (3)    (4)    (5)    (6)    (7)

| No. | Item                          | Digit | Specification   |
|-----|-------------------------------|-------|---|
| (1) | Product Type                  | TVR   | Thinking varistor TVR type                                |
| (2) | Body Size                     | 05    | φ 05 mm   |
| (3) | Varistor Voltage              | 271   | $27 \times 10^1 \text{ V} = 270\text{V} (V_{1\text{mA}})$ |
| (4) | Tolerance of $V_{1\text{mA}}$ | K     | ±10%  |
| (5) | Appearance                    | F     | Y Kink Lead, Epoxy Coating                                |
| (6) | Optional Suffix               | S1F   | 1.Amax:9mm. 2.RoHS+HF compliance                          |
| (7) | Customer code                 | -H    | Design Location Region                                    |

Structure and Dimensions



( unit : mm )

| Body Size | D       | P       | d         | A max. | C min | T       |
|-----------|---------|---------|-----------|--------|-------|---------|
| φ 05      | 5.0~7.0 | 5.0±0.5 | 0.60±0.02 | 9.0    | 20    | 2.4~4.4 |

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

Electrical Characteristics ( Ambient Ta=25 °C )

| Part No.        | Varistor Voltage<br>(@ 1mA DC) | Max. Continuous Voltage      |                        | Max. Clamping Voltage<br>(8/20μS) |                       | Max. Surge Current<br>(8/20μS) | Max. Energy<br>(10/1000μS) |
|-----------------|--------------------------------|------------------------------|------------------------|-----------------------------------|-----------------------|--------------------------------|----------------------------|
|                 | V <sub>1mA</sub><br>(V)        | V <sub>AC</sub> (rms)<br>(V) | V <sub>DC</sub><br>(V) | V <sub>p</sub><br>(V)             | I <sub>p</sub><br>(A) | I<br>(A)                       | W<br>(J)                   |
| TVR05271KFS1F-H | 270 ± 10 %                     | 175                          | 225                    | 475                               | 5                     | 400                            | 8.5                        |

| Part No.        | Rated Power | Impulse Response Time | Max. Leakage Current at 75%V <sub>1mA</sub> | *Reference Capacitance @1KHZ | Operating Temperature Range | Storage temperature Range |
|-----------------|-------------|-----------------------|---|------------------------------|-----------------------------|---------------------------|
|                 | P<br>(W)    | nSec                  | I <sub>L</sub> (μA)                         | C<br>(pF)                    | ( °C )                      | ( °C )                    |
| TVR05271KFS1F-H | 0.1         | <25                   | 20  | 65±50%                       | -40 ~ +105                  | -40 ~ +125                |

Reliability

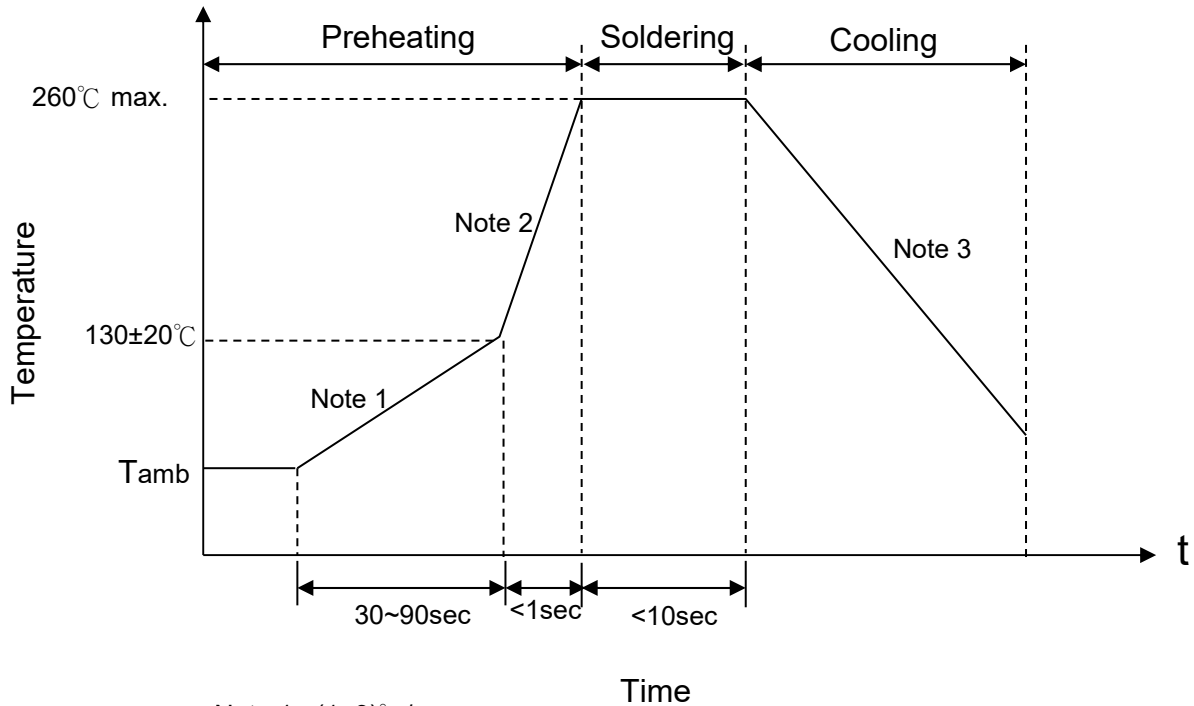
| Item                          | Standard               | Test conditions / Methods  | Specifications  |                  |                  |     |            |        |        |                  |   |   |         |        |   |                  |       |   |
|-------------------------------|------------------------|--|---|------------------|------------------|-----|------------|--------|--------|------------------|---|---|---------|--------|---|------------------|-------|---|
| 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>  $\Delta V/V_{1mA}$   ≤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>  $\Delta V/V_{1mA}$   ≤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.  | $\Delta V/V_{1mA}$   ≤5%    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 , 5 ± 1 sec   | No visible damage<br>  $\Delta V/V_{1mA}$   ≤5%                                   |                  |                  |     |            |        |        |                  |   |   |         |        |   |                  |       |   |
| High Temperature Storage      | IEC60068-2-2           | 125 ± 5 °C , 1000 ± 24 hrs   | No visible damage<br>  $\Delta V/V_{1mA}$   ≤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>  $\Delta V/V_{1mA}$   ≤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;">105 ± 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 | 105 ± 2 | 30 ± 3 | 4 | Room temperature | 5 ± 3 | No visible damage<br>  $\Delta V/V_{1mA}$   ≤5% |
| 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. Operating Voltage)  | $\Delta V/V_{1mA}$   ≤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 | $\frac{V_{1mA} \text{ at } 105^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{80} \times 100 (\% / ^{\circ}\text{C} )$<br>$\frac{V_{1mA} \text{ at } -40^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{65} \times 100 (\% / ^{\circ}\text{C} )$ | $-0.05 \leq TC \leq 0.05(\%/^{\circ}\text{C})$      |
| 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 :  $(1\sim 3)^\circ\text{C/sec}$   
 Note 2 : Approx.  $200^\circ\text{C/sec}$   
 Note 3 :  $5^\circ\text{C/sec Max}$

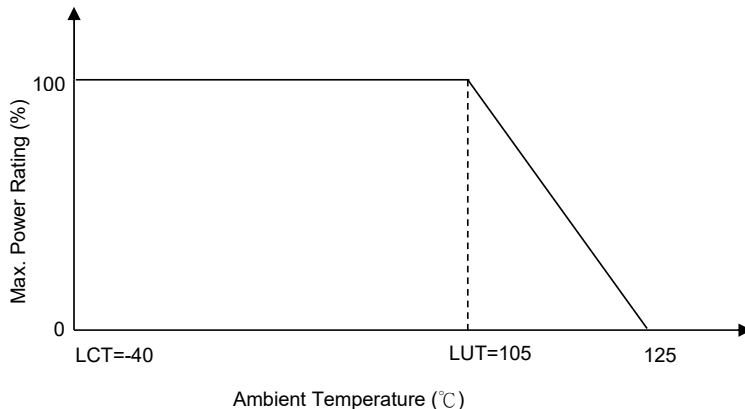
### Recommended Reworking Conditions with Soldering Iron

| 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  $105^{\circ}\text{C}$ , 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 -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 :  $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$
- 2.Relative Humidity :  $\leq 75\% \text{RH}$
- 3.Keep away from corrosive atmosphere and sunlight.

(II) Period of Storage : 1 year

Safety Approvals (Certified Model/Type :TVR05271)

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



\* 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 # CQC03001005165/CQC03001007654)

Certificates

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

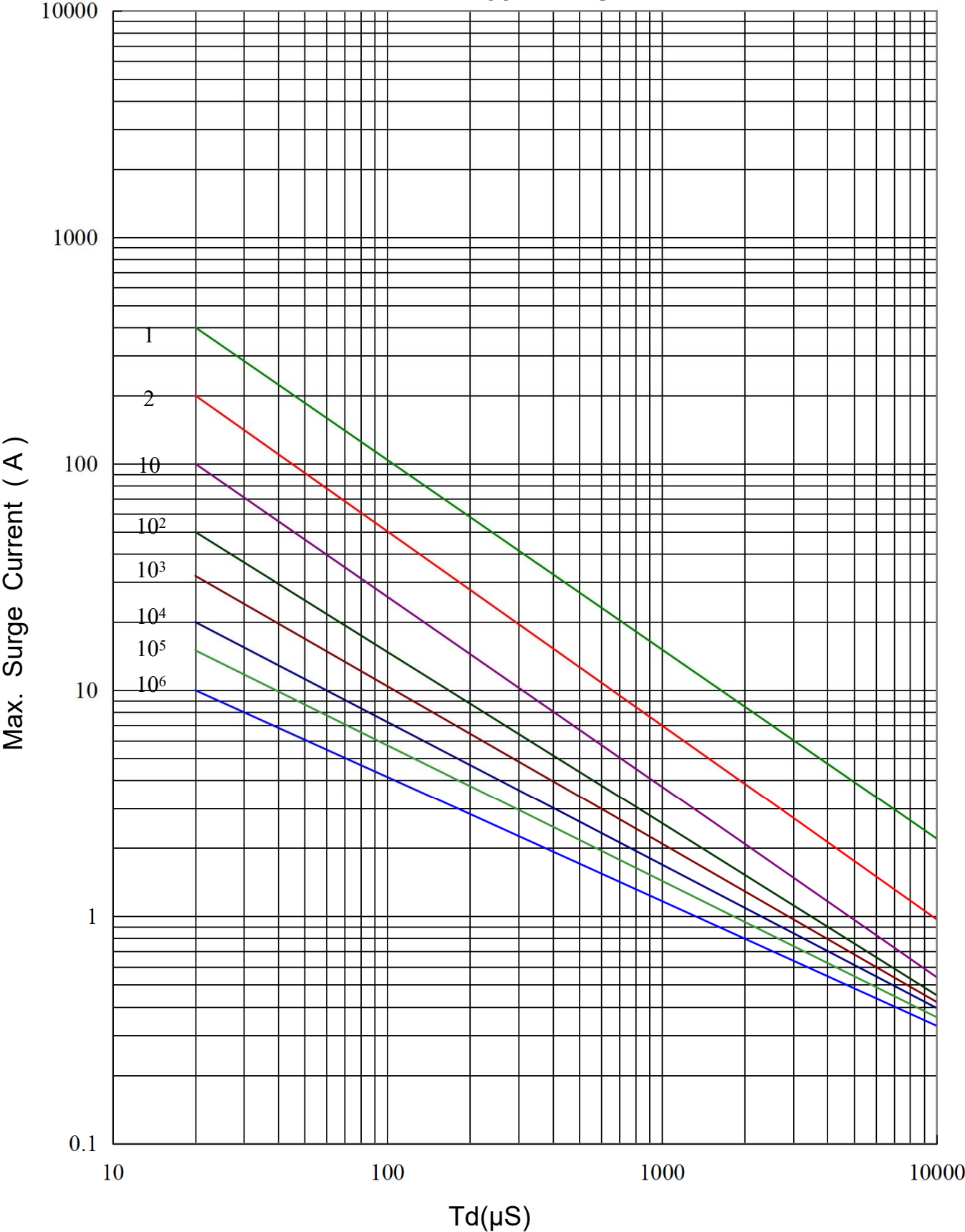
Test Report

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



Max. Surge Current Derating Curves

TVR05271KFS1F-H



Max. Leakage Current and Max. Clamping Voltage Curve

**TVR05271KFS1F-H**

