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## SPECIFICATION FOR APPROVAL

CUSTOMER \_\_\_\_\_

CERTIFIED  
MODEL/TYPE

TVR07471-D

PART NO.

TVR07471KFC4AW

RoHS

APPLICATION \_\_\_\_\_

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

ISSUE DATE

Nov.29.2021

REV. NO. \_\_\_\_\_

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

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





Zinc Oxide Varistor TVR Type  
Part No. :TVR07471KFC4AW

**REVISED RECORD SHEET**

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



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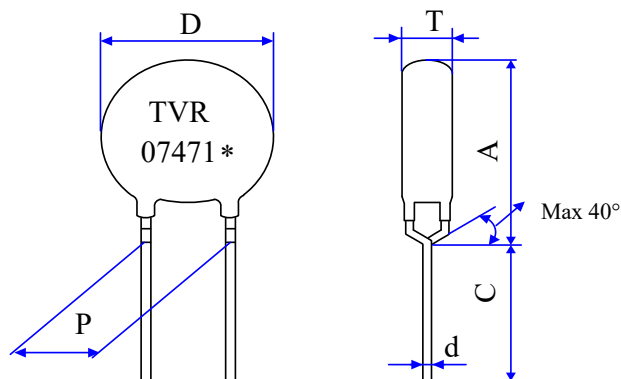
Part Number Code

Example :

**TVR**    **07**    **471**    **K**    **F**    **C4A**    **W**  
 (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       | 471   | $47 \times 10^1 V = 470V (V_{1mA})$ |
| (4) | Tolerance of $V_{1mA}$ | K     | ±10%                                |
| (5) | Appearance             | F     | Y Kink Lead, Epoxy Coating          |
| (6) | Internal Control Code  | C4A   | Cut 4.0 mm Lead & bulk              |
| (7) | Optional Suffix        | W     | RoHS compliance&High surge series   |

Structure and Dimensions



( unit : mm )

| Body Size | D       | P       | d        | A max. | C       | T       |
|-----------|---------|---------|----------|--------|---------|---------|
| φ 07D     | 7.5~9.5 | 5.0±0.5 | 0.6±0.02 | 12.5   | 4.0±0.5 | 3.2~5.2 |

\*Coating material rating:UL 94 V-0

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

| 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) |
|----------------|--------------------------------|-------------------------|-----------------|-----------------------------------|--------------|--------------------------------|----------------------------|
|                | $V_{1mA}$<br>(V)               | $V_{AC(rms)}$<br>(V)    | $V_{DC}$<br>(V) | $V_p$<br>(V)                      | $I_p$<br>(A) | I<br>(A)                       | W<br>(J)                   |
| TVR07471KFC4AW | 470 ± 10 %                     | 300                     | 385             | 775                               | 10           | 1800                           | 49                         |

| Part No.       | Rated Power | Impulse Response Time | Max. Leakage Current at<br>75% $V_{1mA}$ | Operating Temperature Range | Storage temperature Range |
|----------------|-------------|-----------------------|--|-----------------------------|---------------------------|
|                | P<br>(W)    | nSec                  | $I_L(\mu\text{A})$                       | ( $^{\circ}\text{C}$ )      | ( $^{\circ}\text{C}$ )    |
| TVR07471KFC4AW | 0.25        | <25                   | 20                                       | -40 ~ +105                  | -40 ~ +125                |

Reliability

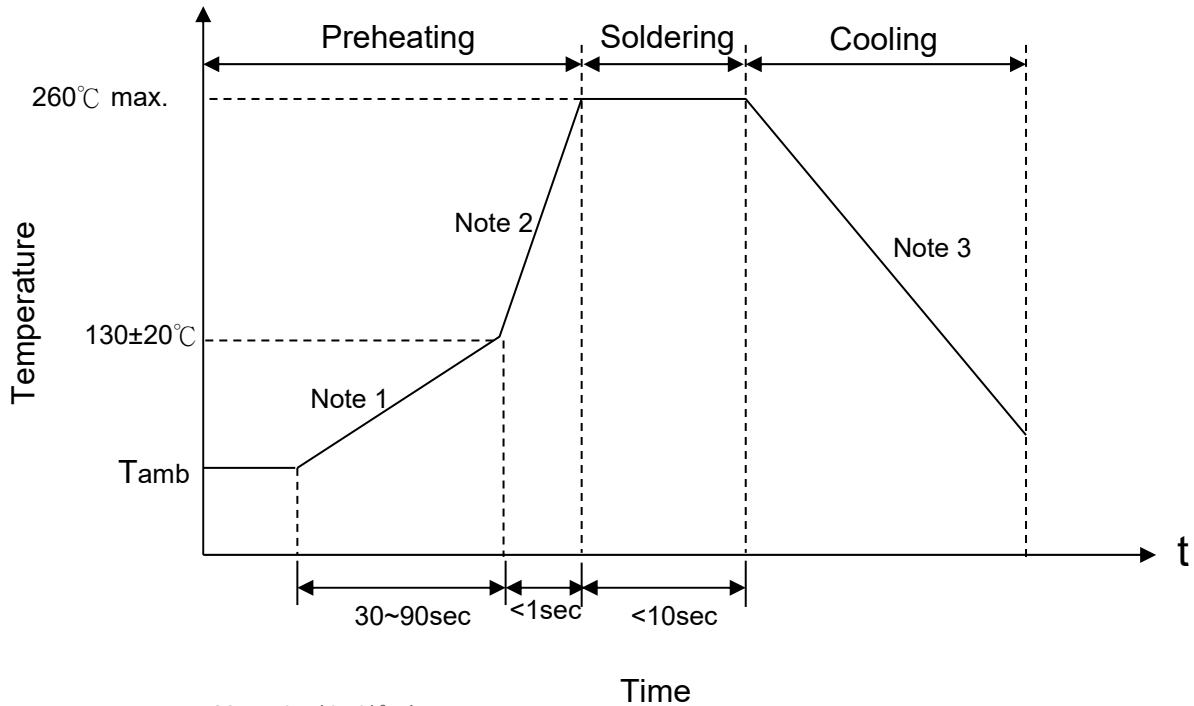
| Item                          | Standard               | Test conditions / Methods  | Specifications   |                  |                  |     |            |        |        |                  |  |   |         |        |   |                  |       |  |
|-------------------------------|------------------------|--|--|------------------|------------------|-----|------------|--------|--------|------------------|--|---|---------|--------|---|------------------|-------|--|
| 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>  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              | No visible damage<br>  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%    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           | 125 ± 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 , 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>  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><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>  ΔV/V <sub>1mA</sub>   ≤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)  | ΔV/V <sub>1mA</sub>   ≤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 : (1~3)°C/sec  
 Note 2 : Approx. 200°C/sec  
 Note 3 : 5°C/sec Max

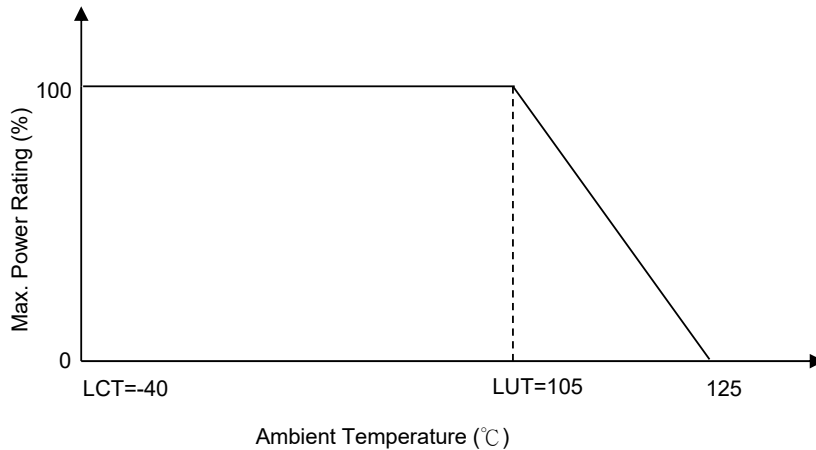
### Recommended Reworking Conditions with Soldering Iron

| Item                              | Conditions   |
|-----------------------------------|--------------|
| Temperature of Soldering Iron-tip | 360°C (max.) |
| Soldering Time                    | 3 sec (max.) |
| Distance from Varistor            | 2 mm (min.)  |



### Power Derating Curve

When operating temperature exceeds 105°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 2011/65/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 :TVR07471-D)



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



\* TUV recognized (File J50411760)



\*VDE IEC 61051-1:2007/IEC 61051-2:1991/ IEC 61051-2-2:1991  
DIN EN 61051-1:2009/IEC 61051-2 AMD1:2009 recognize(File # 40021243)



\* CQC GB/T10193-1997 ` GB/T10194-1997 recognized  
(File # CQC10001041750/CQC10001041751)

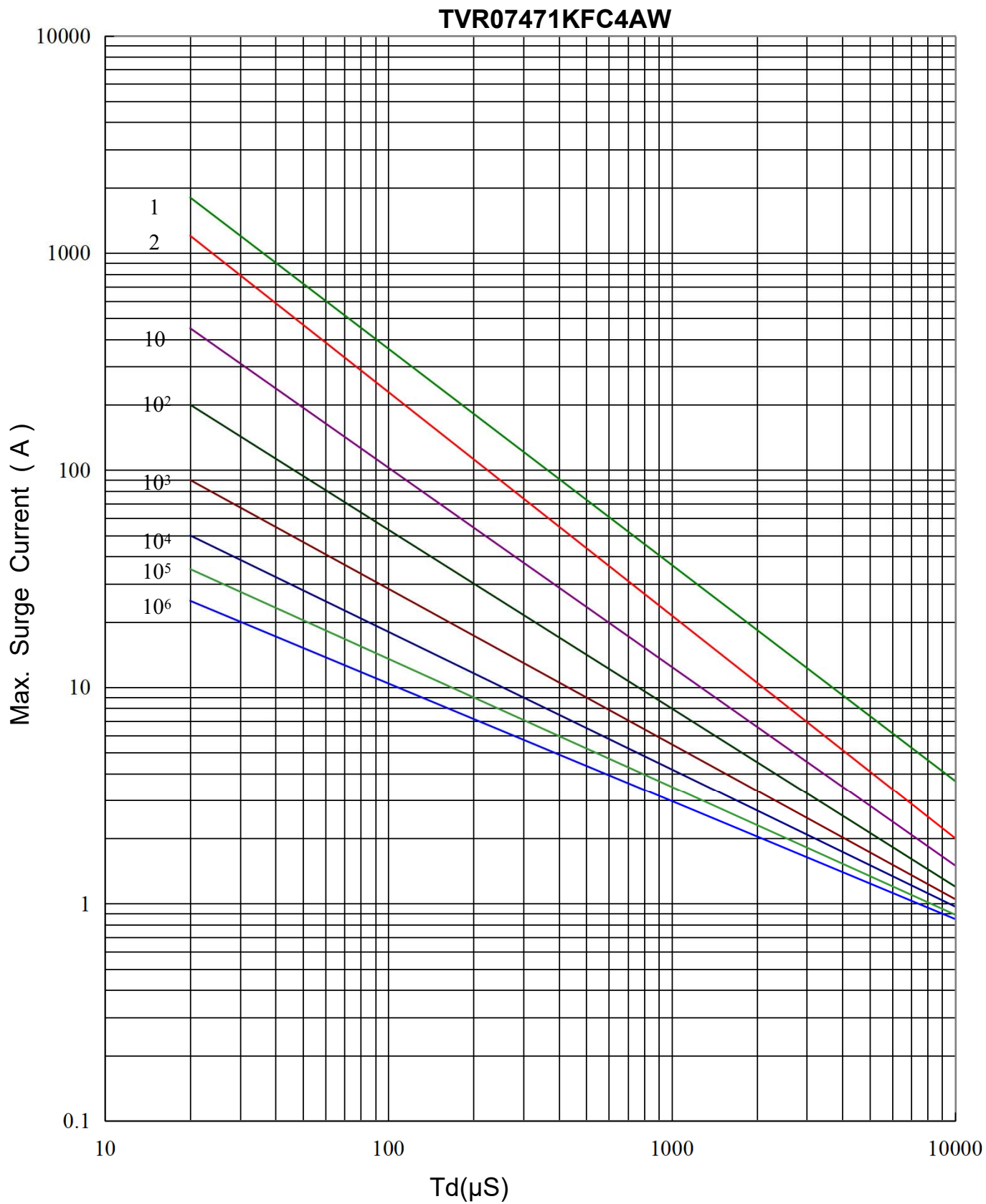
Certificates

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

Test Report

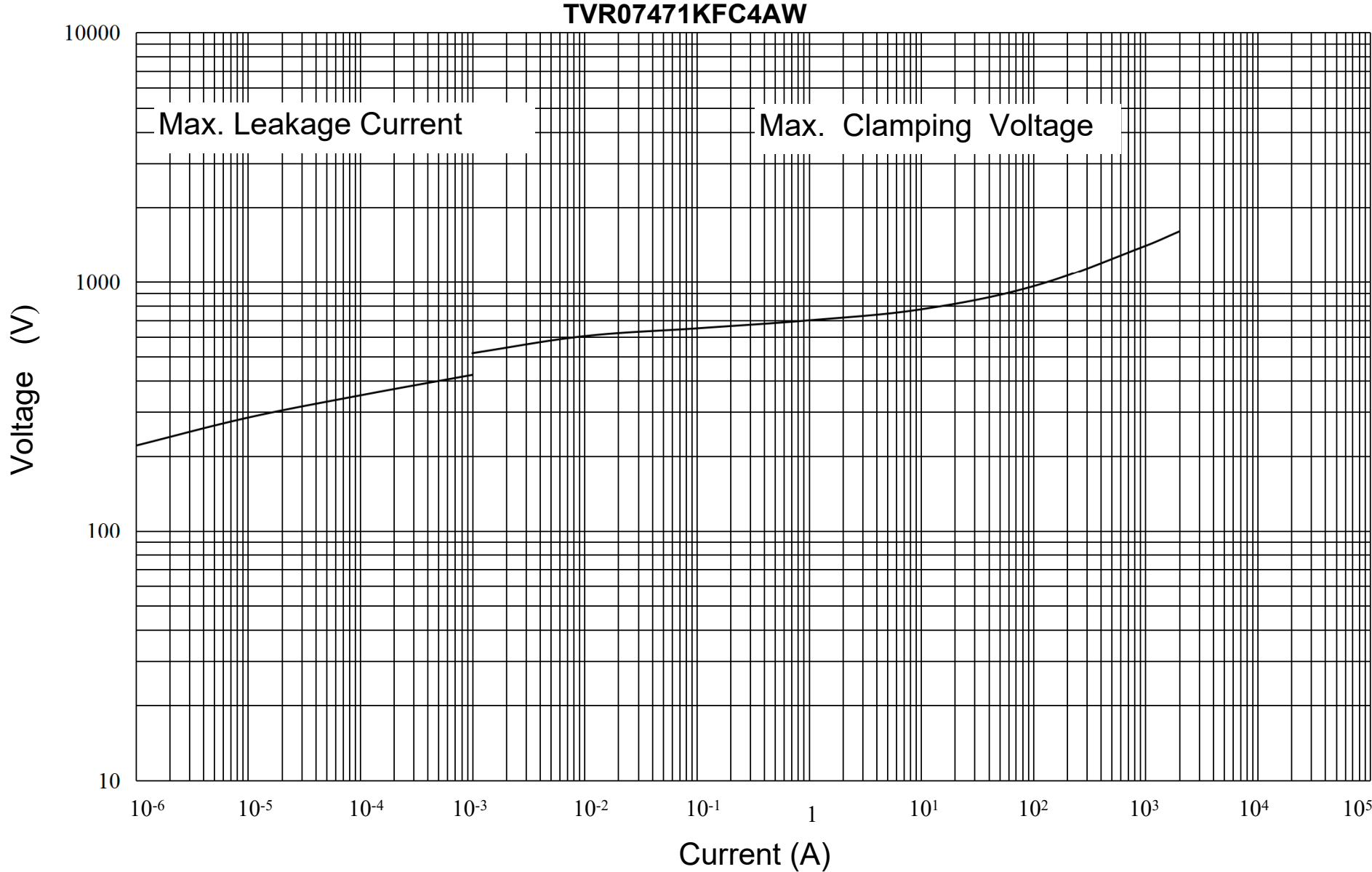
- (1) RoHS test report

Max. Surge Current Derating Curves





Max. Leakage Current and Max. Clamping Voltage Curve



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