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## SPECIFICATION FOR APPROVAL

CUSTOMER \_\_\_\_\_

CERTIFIED  
MODEL/TYPE

TVR07431

PART NO.

TVR07431KFARYJY (RoHS)

APPLICATION \_\_\_\_\_

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

ISSUE DATE

Jan.16.2021

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

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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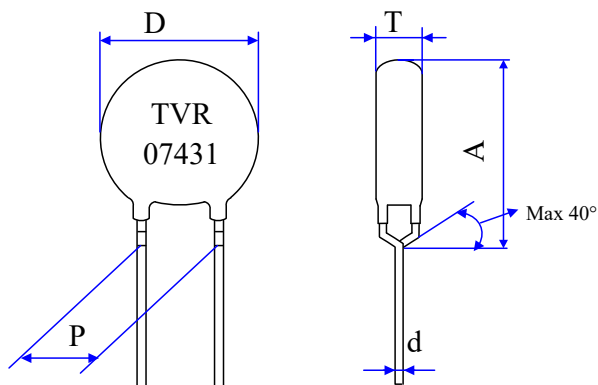
Part Number Code

Example :

**TVR**   **07**   **431**   **K**   **F**   **AR**   **YJY**  
 (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              | 431   | $43 \times 10^1 \text{ V} = 430\text{V} (V_{1\text{mA}})$ |
| (4) | Tolerance of $V_{1\text{mA}}$ | K     | ±10%  |
| (5) | Appearance                    | F     | Y Kink Lead, Epoxy Coating                                |
| (6) | Packaging                     | A     | Repositioning tapping( hole pitch: 12.7mm)                |
|     |                               | R     | reel  |
| (7) | Optional Suffix               | YJY   | 1.Tmax:4mm.<br>2.RoHS compliance                          |

Structure and Dimensions



( unit : mm )

| Body Size | D       | P       | d        | A max. | T max |
|-----------|---------|---------|----------|--------|-------|
| φ 07      | 6.5~9.0 | 5.0±0.5 | 0.6±0.02 | 11.5   | 4     |

**\*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)                   |
| TVR07431KFARYJY | 430 ± 10%                   | 275                     | 350          | 710                            | 10        | 1200                        | 28                      |

| Part No.        | Rated Power | Impulse Response Time | Max. Leakage Current at 75% $V_{1mA}$ | Operating Temperature Range | Storage temperature Range |
|-----------------|-------------|-----------------------|---------------------------------------|-----------------------------|---------------------------|
|                 | P (W)       | nSec                  | $I_L(\mu A)$                          | ( $^\circ\text{C}$ )        | ( $^\circ\text{C}$ )      |
| TVR07431KFARYJY | 0.25        | <25                   | 20                                    | -40 ~ +105                  | -40 ~ +125                |

**Reliability**

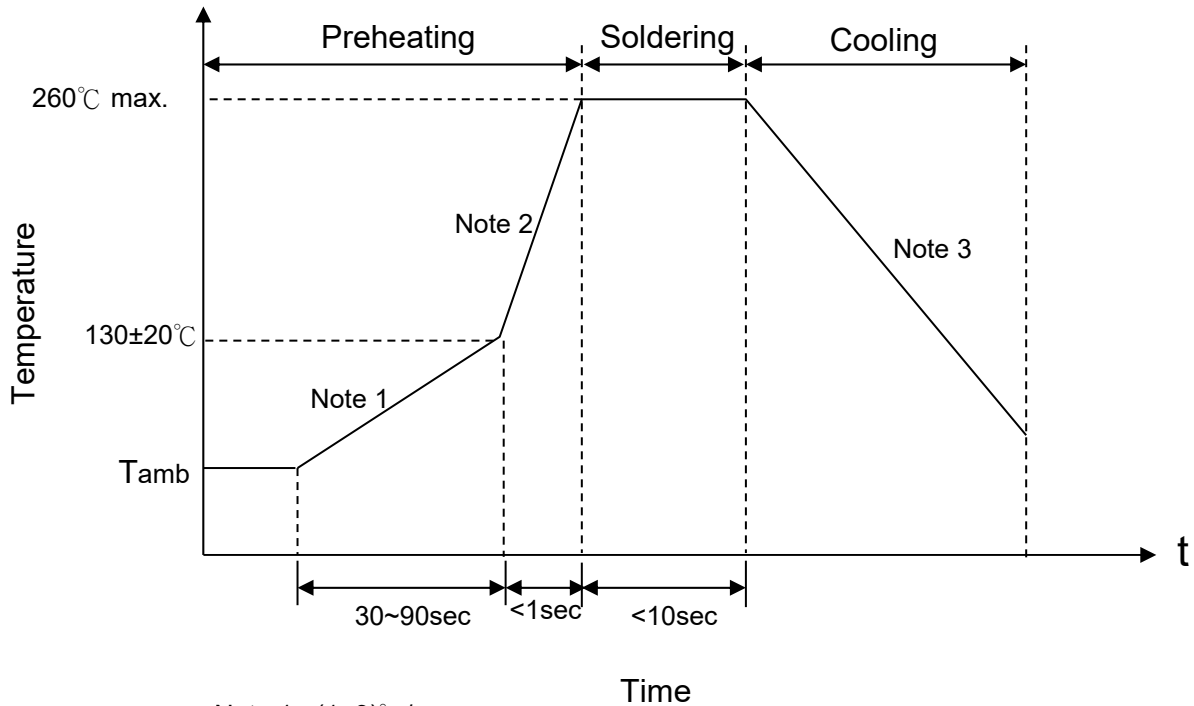
| Item                          | Standard               | Test conditions / Methods  | Specifications   |                  |                  |     |            |        |        |                  |  |   |         |        |   |                  |       |  |
|-------------------------------|------------------------|--|--|------------------|------------------|-----|------------|--------|--------|------------------|--|---|---------|--------|---|------------------|-------|--|
| 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%<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           | 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 | $\frac{V_{1mA} \text{ at } 105^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{80} \times 100 (\% / ^{\circ}\text{C} )$ $\frac{V_{1mA} \text{ at } -40^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{65} \times 100 (\% / ^{\circ}\text{C} )$ | $-0.05 \leq TC \leq 0.05 (\% / ^{\circ}\text{C} )$  |
| 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 :  $5^\circ\text{C/sec Max}$

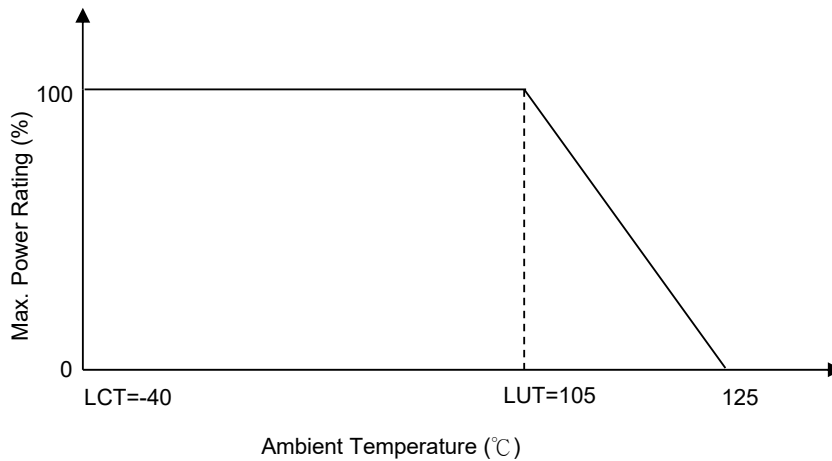
### Recommended Reworking Conditions with Soldering Iron

| 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°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.

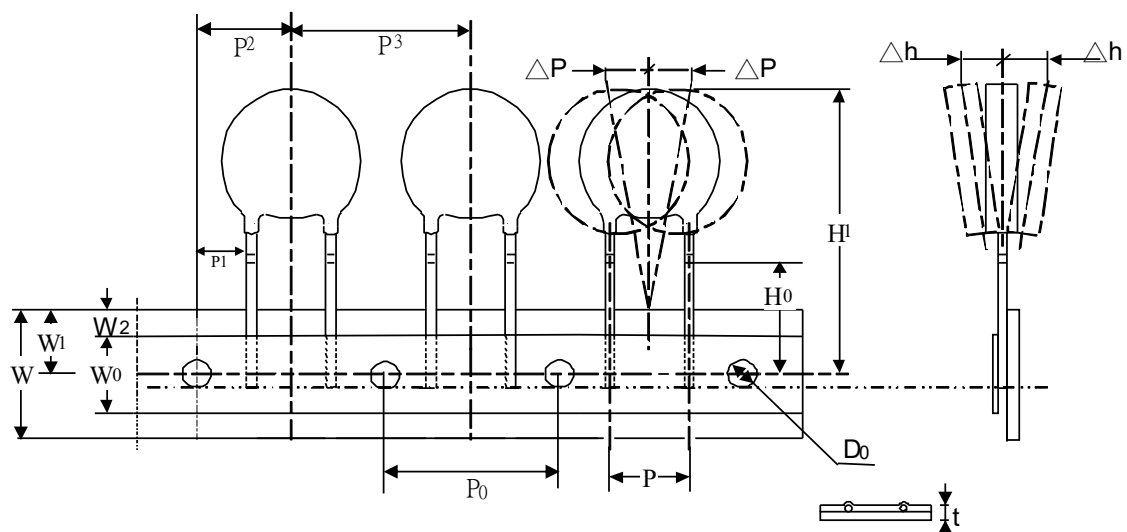
### Warehouse Storage Conditions of Products

(I) Storage Conditions :

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

(II) Period of Storage : 1 year

Taping and Dimensions

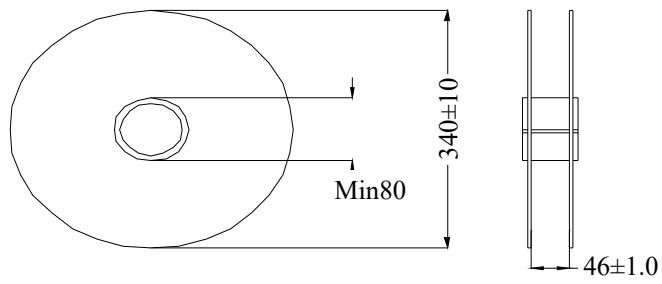


( Unit : mm )

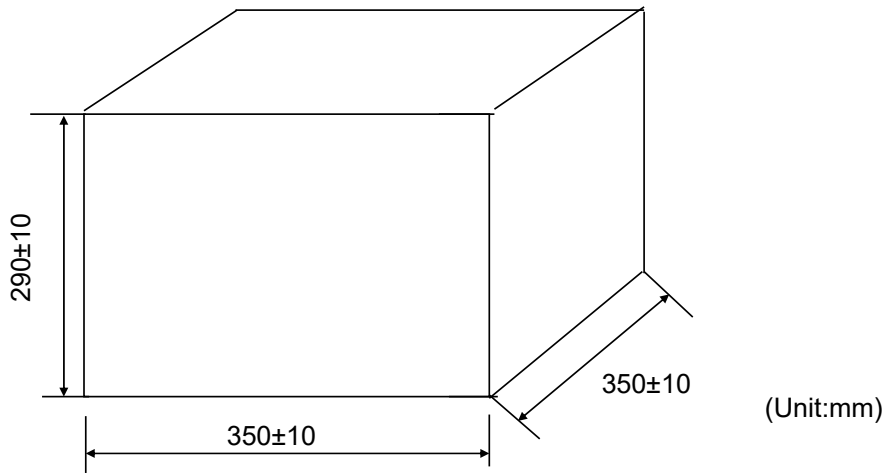
| ITEM. | P <sub>0</sub> | P    | P <sub>1</sub> | P <sub>2</sub> | P <sub>3</sub> | H <sub>0</sub> | H <sub>1</sub><br>Max | W <sub>0</sub> | W <sub>1</sub> | W <sub>2</sub><br>Max | W  | Δp<br>Max | Δh<br>Max | D <sub>0</sub> | t    |
|-------|----------------|------|----------------|----------------|----------------|----------------|-----------------------|----------------|----------------|-----------------------|----|-----------|-----------|----------------|------|
| Nor.  | 12.7           | 5.0  | 3.55           | 6.35           | 12.7           | 16             | 30                    | 12             | 9              | 3                     | 18 | 1.0       | 2.0       | 4              | 0.6  |
| ToL.  | ±0.3           | ±0.5 | ±1             | ±1.3           | ±1             | ±0.5           | ---                   | ±1             | +0.75/<br>-0.5 | ---                   | ±1 | ---       | ---       | ±0.2           | ±0.2 |

Packaging

(1) SPQ: 1000 Pcs/ Reel



(2) Outer Box: 5Reels/ Carton



Safety Approvals (Certified Model/Type:TVR07431)



\* 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)

(VDE approval to IEC 61051 with upper category temperature = 85°C)



\* CQC GB/T10193-1997 ` GB/T10194-1997 recognized

(File # CQC18001199806/ CQC18001199789)

Certificates

(1) IATF 16949 certificate

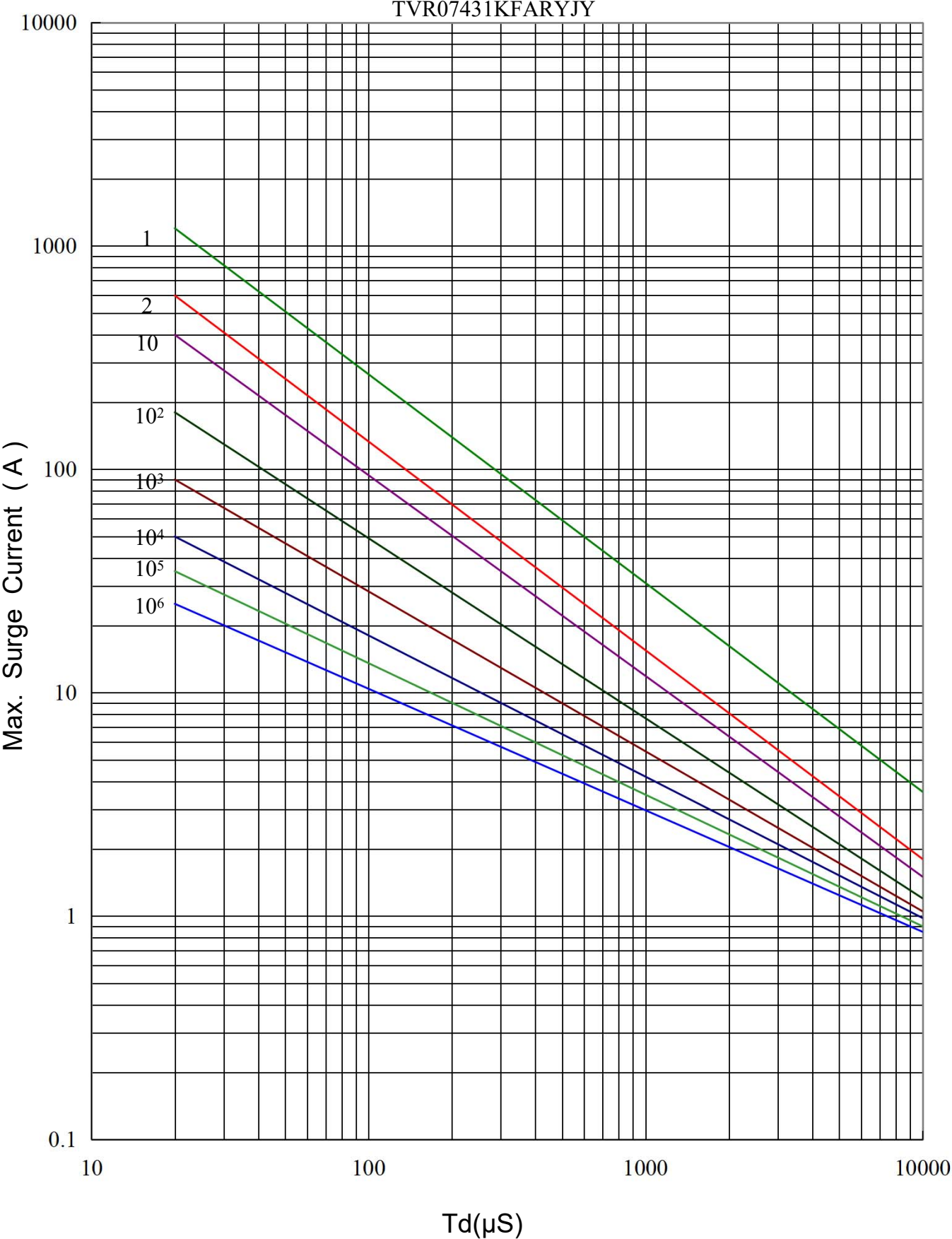
(2) ISO 9001 certificate

Test Report

(1) RoHS test report

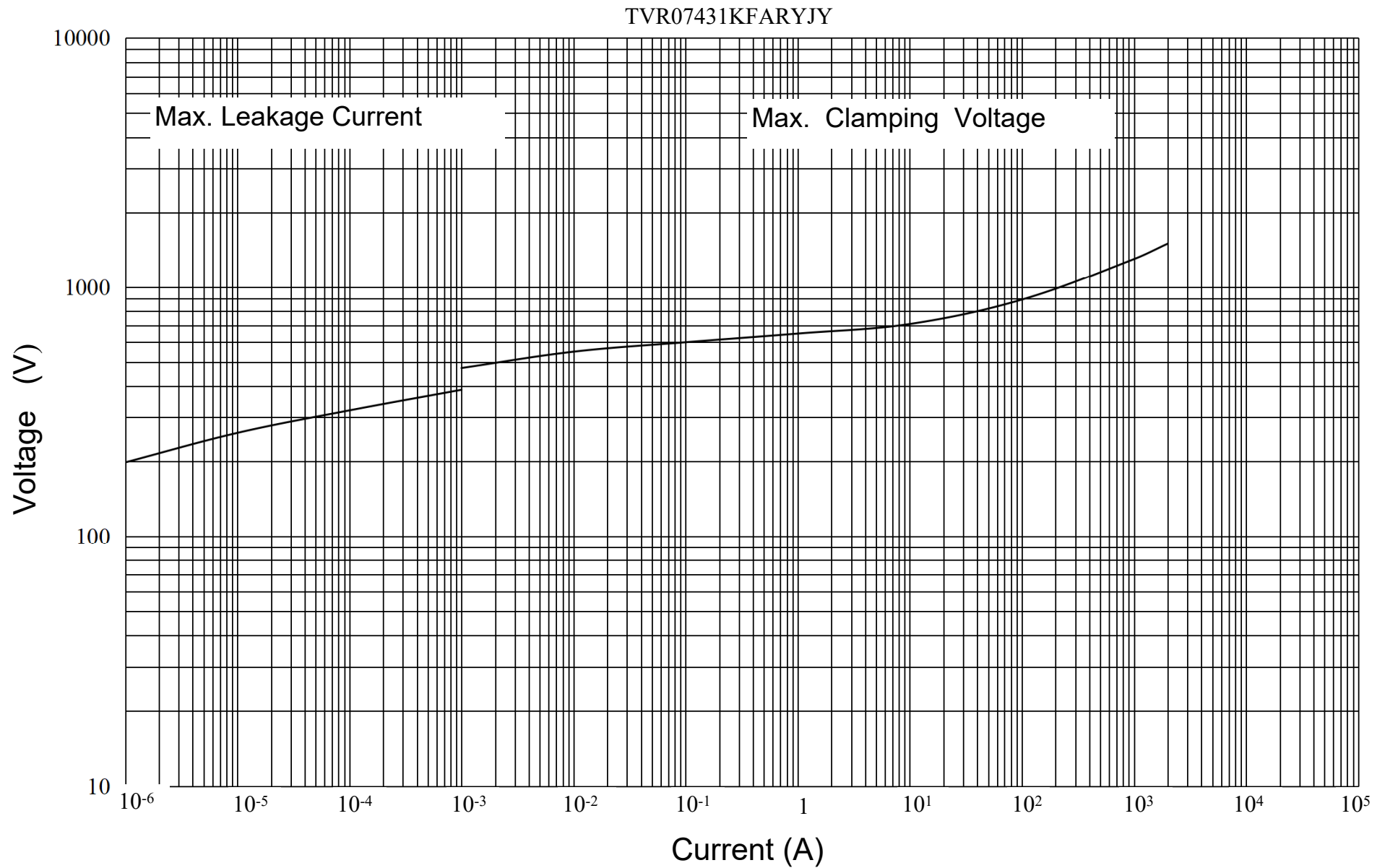


Max. Surge Current Derating Curves





Max. Leakage Current and Max. Clamping Voltage Curve



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