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## SPECIFICATION FOR APPROVAL

CUSTOMER \_\_\_\_\_

CERTIFIED MODEL/TYPE

TVR10561-M

PART NO.

TVR10561KP323M (RoHS+HF)

APPLICATION \_\_\_\_\_

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

ISSUE DATE

Aug.11.2017

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

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

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





Zinc Oxide Varistor TVR Type  
Part No. :TVR10561KP323M

**REVISED RECORD SHEET**

REV. NO	REV. DATE	REVISED CONTENT



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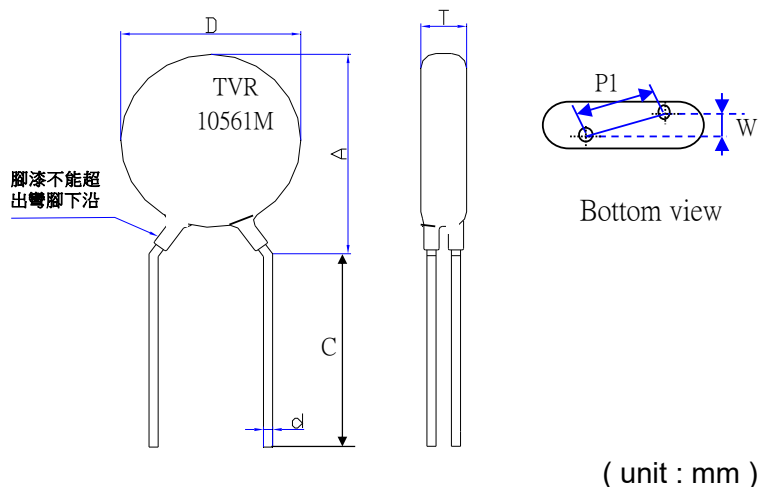
Part Number Code

Example :

**TVR**    **10**    **561**    **K**    **P**    **323M**  
 (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	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	P	Inner kink lead , Silicon coating, Green
(6)	Optional Suffix	323M	1.RoHS+HF compliance 2.D:9.6-11.8mm,T:4-4.9mm, P1:5+/-0.3mm,W:2.8+/-1mm, C:2.8+/-0.3mm

Structure and Dimensions



Body Size	D	P 1	d	A max.	C	T	W
φ 10	9.6~11.8	5.0±0.3	0.60±0.02	13.8	2.8±0.3	4~4.9	2.8±1

\*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(rms)</sub> (V)	V <sub>DC</sub> (V)	V <sub>p</sub> (V)	I <sub>p</sub> (A)	I (A)	W (J)
TVR10561KP323M	560 ± 10 %	350	450	930	25	3500	92

Part No.	Rated Power	Impulse Response Time	Max. Leakage Current at 75%V <sub>1mA</sub>	Operating Temperature Range	Storage temperature Range	Applications		
	P (W)	nSec	I <sub>L</sub> (μA)	( °C )	( °C )	UL 1449	IEC 60950-1	IEC 60065
TVR10561KP323M	0.4	<25	20	-40 ~ +125	-40 ~ +150	SPD Type 5	Annex Q	Clause 14.12

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

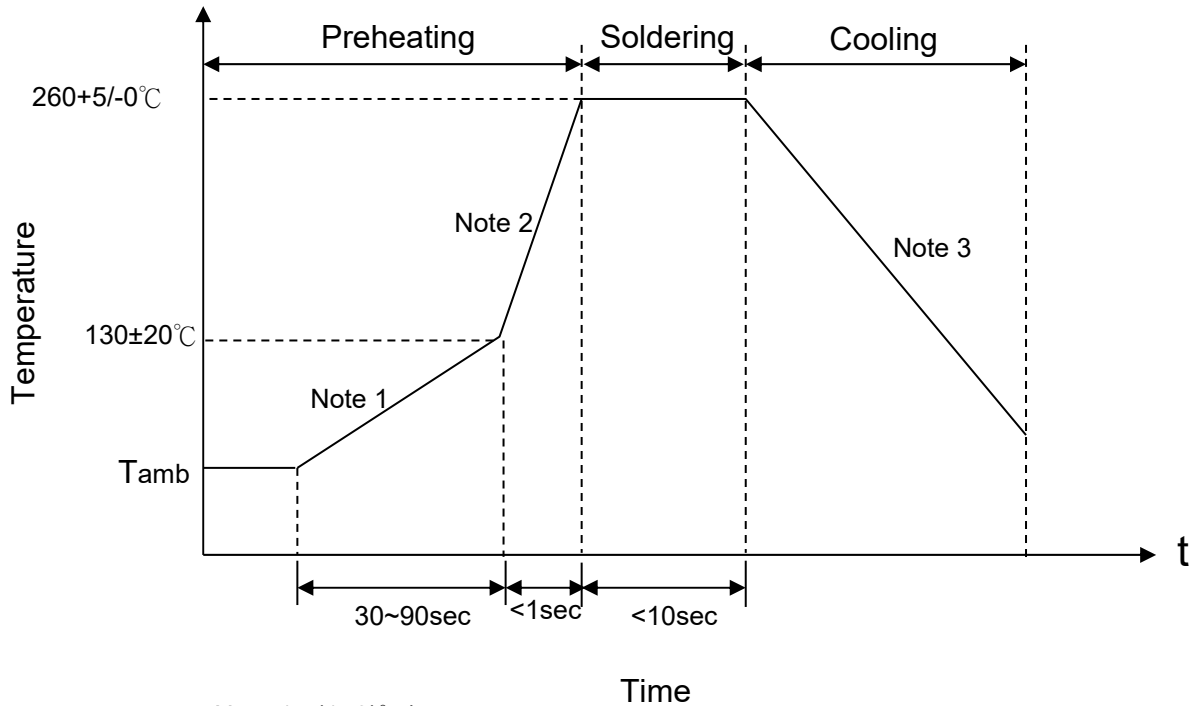
Item	Standard	Test conditions / Methods	Specifications															
Tensile Strength of Terminals	IEC60068-2-21	Gradually applying the force specified and keeping the unit fixed for 10±1 sec.  Terminal diameter (mm)      Force (Kg) ----- 0.5<d≤0.8                      1.0 0.8<d≤1.25                     2.0 1.25<d                            4.0	No visible damage   ΔV/V <sub>1mA</sub>   ≤10% IL≤70μA															
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.  Terminal diameter (mm)      Force (Kg) ----- 0.5<d≤0.8                      0.5 0.8<d≤1.25                     1.0 1.25<d                            2.0	No visible damage   ΔV/V <sub>1mA</sub>   ≤10% IL≤70μA															
Vibration	IEC 60068-2-6	Frequency range:10~55Hz Amplitude:0.75mm or 98m/S <sup>2</sup> Direction:3 mutually perpendicular directions,2hrs each.	No visible damage   ΔV/V <sub>1mA</sub>   ≤10% IL≤70 μA															
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 ± 5 °C , 10 ± 1 sec	No visible damage   ΔV/V <sub>1mA</sub>   ≤5%															
High Temperature Storage	IEC60068-2-2	150 ± 5 °C , 1000 ± 24 hrs	No visible damage   ΔV/V <sub>1mA</sub>   ≤5%															
Damp Heat, Steady State	IEC 60068-2-78	The test is divided into two groups . a.40 ± 2°C , 90 ~ 95 % RH , 1344 hrs b.40 ± 2°C , 90 ~ 95 % RH , at 10%V <sub>DC</sub> , 1344 hrs	ΔV/V <sub>1mA</sub>   ≤10% IL≤70μA															
Rapid Change of Temperature	IEC60068-2-14	The conditions shown below shall be repeated 1000cycles <table border="1" data-bbox="496 1552 1034 1720"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40 ± 3</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> <tr> <td>3</td> <td>125 ± 2</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>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   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% IL≤70μA															
Flammability test	Specification Standard	The varistor shall be subjected to 60sec.applications of test flame. Burner:Bunsen gas burner 9000kcal/m <sup>3</sup> Diameter of flame nozzle: Φ9.5mm Position : the specimen shall be fixed horizontal 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 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\%$ No visible damage
10/1000 $\mu$ S 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\%$ No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA} \text{ at } 125^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{100} \times 100 (\% / ^{\circ}\text{C} )$ $\frac{V_{1mA} \text{ at } -40^{\circ}\text{C} - V_{1mA} \text{ at } 25^{\circ}\text{C}}{V_{1mA} \text{ at } 25^{\circ}\text{C}} \times \frac{1}{65} \times 100 (\% / ^{\circ}\text{C} )$	$-0.05 \leq TC \leq 0.05 (\% / ^{\circ}\text{C} )$
Voltage Proof	IEC 61051-1 4.9	Metal balls method, 1000 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

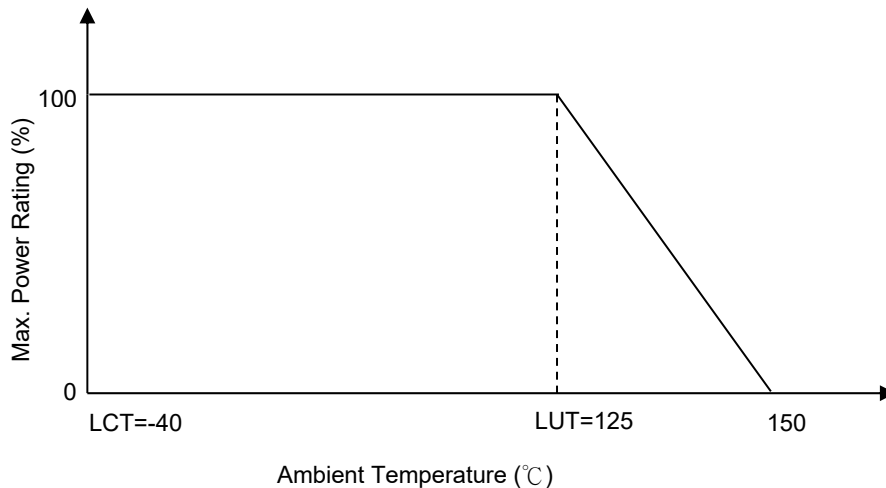
### Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	350°C~400°C
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

Safety Approvals (Certified Model/Type:TVR10561-M)

- \* UL 1449 4th / cUL recognized (File # E314979)
- UL1449 (file number E314979) for use in SPD Type 5



- \* VDE DIN EN 61051-1:2009-04 / IEC 61051-1:2007
- IEC 61051-2-2:1991 / IEC 60950-1:2013 Annex Q recognized (File # 40036061)



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

Certificates

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

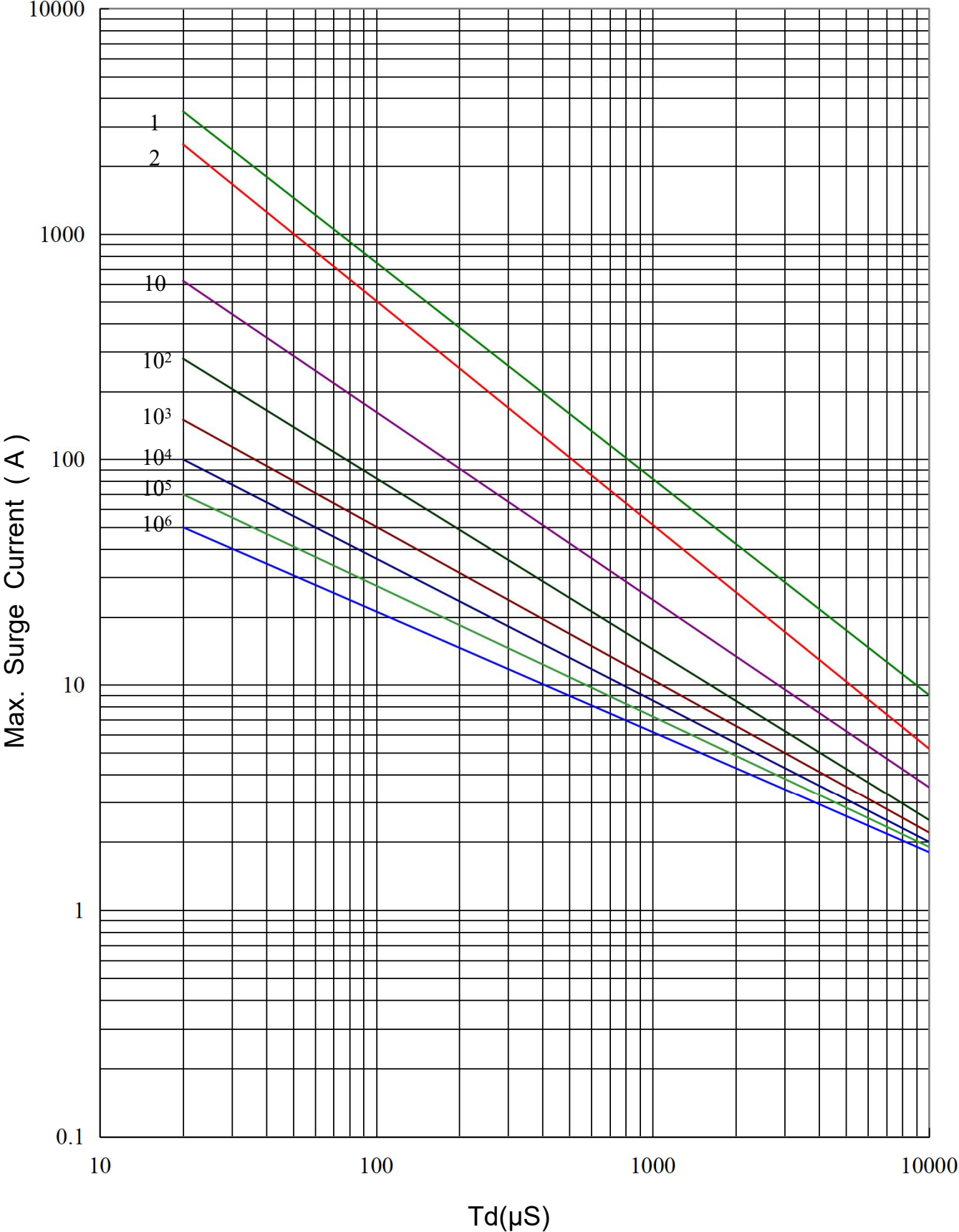
Test Report

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



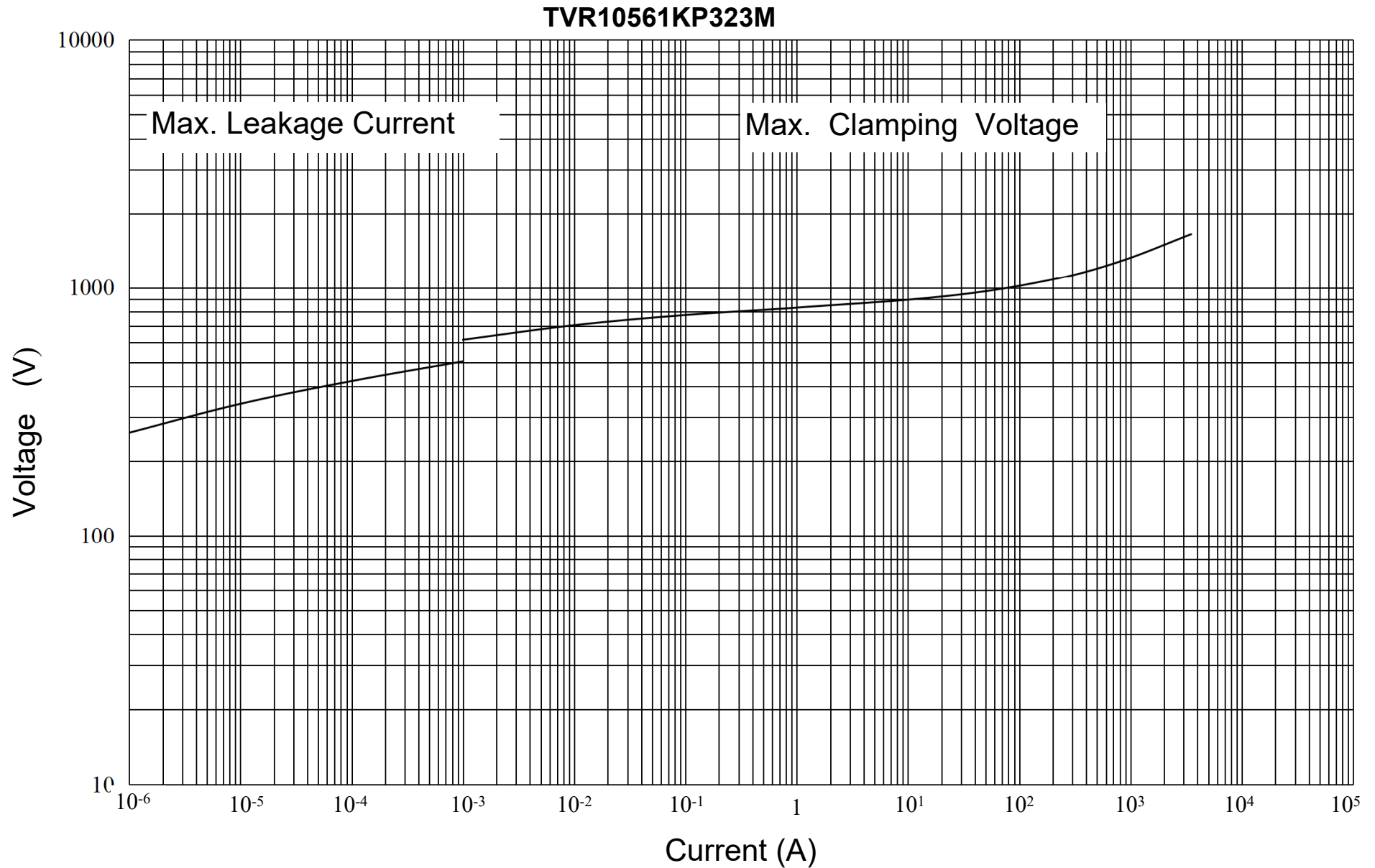
Max. Surge Current Derating Curves

TVR10561KP323M





Max. Leakage Current and Max. Clamping Voltage Curve



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