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## SPECIFICATION FOR APPROVAL

CUSTOMER

CERTIFIED MODEL/TYPE

PART NO.

APPLICATION

CUSTOMER P/N

ISSUE DATE

REV. NO

REV. DATE

TVR20102-D
TVR20102KSC6AW(RoHS)
Jul.18,2014

FOR CUSTOMER APPROVAL	CHECKED BY
	Yun Xu
	APPROVED BY
	Huaifang Zhang





Zinc Oxide Varistor TVR Type  
Part No. :TVR20102KSC6AW

**REVISED RECORD SHEET**

REV. NO	REV. DATE	REVISED CONTENT



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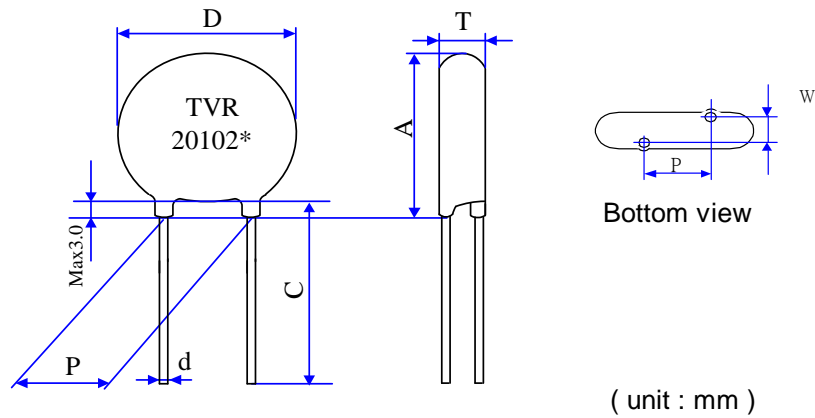
Part Number Code

Example :

**TVR**    **20**    **102**    **K**    **S**    **C6A**    **W**  
 (1)    (2)    (3)    (4)    (5)    (6)    (7)

No.	Item	Digit	Specification
(1)	Product Type	TVR	Thinking varistor TVR type
(2)	Body Size	20	φ 20 mm
(3)	Varistor Voltage	102	$10 \times 10^2 \text{ V} = 1000\text{V} (V_{1\text{mA}})$
(4)	Tolerance of $V_{1\text{mA}}$	K	±10%
(5)	Appearance	S	Straight lead , epoxy coating
(6)	Packaging	C6A	Cut 6.0 mm Lead & bulk
(7)	Optional Suffix	W	RoHS compliance & High surge series

Structure and Dimensions



Body Size	D	P	d	A max.	C	T	W
φ 20D	22.0~24.5	10.0±1	1.00±0.02	28.5	6±1	6.1~7.9	4.2±1.0

\*Coating material rating:UL 94 V-0

Electrical Characteristics ( Ambient Ta=25 °C )

Part No.	Varistor Voltage (@ 1mA DC)	MMax. 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)
TVR20102KSC6AW	1000 ± 10 %	625	825	1650	100	13000	650

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
TVR20102KSC6AW	1	<25	20	-40 ~ +85	-40 ~ +125	SPD Type 3	Annex Q	Clause 14.12



Reliability

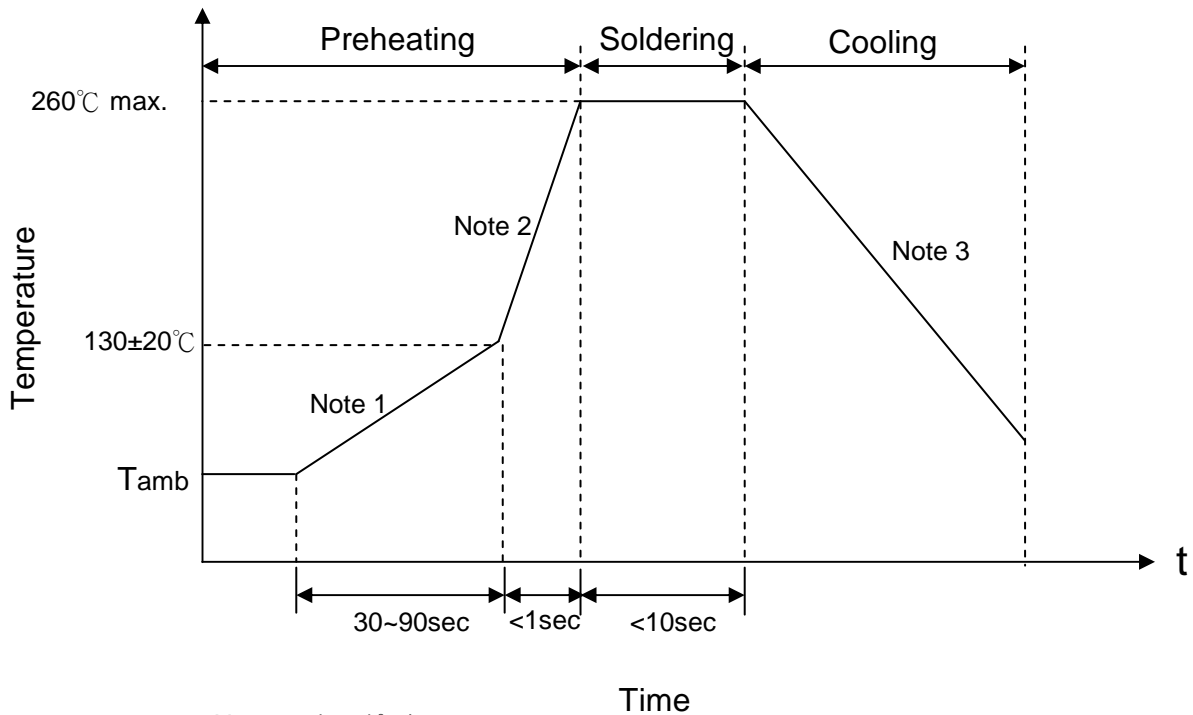
Item	Standard	Test conditions / Methods	Specifications															
Tensile Strength of Terminals	IEC60068-2-21	<p>Gradually applying the force specified and keeping the unit fixed for 10±1 sec.</p> <table border="1"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force (Kg)</th> </tr> </thead> <tbody> <tr> <td>0.5&lt;d≤0.8</td> <td>1.0</td> </tr> <tr> <td>0.8&lt;d≤1.25</td> <td>2.0</td> </tr> <tr> <td>1.25&lt;d</td> <td>4.0</td> </tr> </tbody> </table>	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>   ≤5%							
Terminal diameter (mm)	Force (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	<p>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.</p> <table border="1"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force (Kg)</th> </tr> </thead> <tbody> <tr> <td>0.5&lt;d≤0.8</td> <td>0.5</td> </tr> <tr> <td>0.8&lt;d≤1.25</td> <td>1.0</td> </tr> <tr> <td>1.25&lt;d</td> <td>2.0</td> </tr> </tbody> </table>	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>   ≤5%							
Terminal diameter (mm)	Force (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	<p>Frequency range:10~55Hz Amplitude:0.75mm or 98m/S<sup>2</sup> Direction:3 mutually perpendicular directions,2hrs each.</p>	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   ΔV/V <sub>1mA</sub>   ≤5%															
High Temperature Storage	IEC60068-2-2	125 ± 5 °C , 1000 ± 24 hrs	No visible damage   ΔV/V <sub>1mA</sub>   ≤5%															
Damp Heat, Steady State	IEC 60068-2-78	<p>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</p>	No visible damage   ΔV/V <sub>1mA</sub>   ≤10% Insulation Resistance ≥ 100MΩ															
Rapid Change of Temperature	IEC60068-2-14	<p>The conditions shown below shall be repeated 5 cycles</p> <table border="1"> <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>85 ± 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	85 ± 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	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)	ΔV/V <sub>1mA</sub>   ≤10% No visible damage															



Item	Standard	Test conditions / Methods	Specifications
Operating Duty Cycle test	UL1449 3 <sup>rd</sup>	6KV/3KA 1.2/50μs+8/20μs combination waveform with Vac(@ Deg 90) for 15 times. Interval time between tests is 60 secs.	$ \Delta V_p / V_p  \leq 10\%$ No visible damage
8/20μS Surge Life	IEC 61051-1 4.6	10,000 pulses( 8/20 μ S ) , unipolar, interval 10 secs, amplitude corr. to max. Surge current derating curves for 20 μ S	$ \Delta V / V_{1mA}  \leq 10\%$ No visible damage
10/1000μS Surge Life	IEC 61051-1 4.6	10/1000μS waveform, 10 surge currents,unipolar,interval 2mins, amplitude corr. to max. surge current derating curves for 1000μS	$ \Delta V / V_{1mA}  \leq 10\%$ No visible damage
Varistor Voltage Temp. Coefficient	Specification 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 Proof	IEC 61051-1 4.9	Metal balls method, 2500 Vac 1 min	No visible damage

## Soldering Recommendation

### ■ Wave Soldering Profile



- Note 1 :  $(1\sim3)^{\circ}\text{C}/\text{sec}$   
 Note 2 : Approx.  $200^{\circ}\text{C}/\text{sec}$   
 Note 3 :  $5^{\circ}\text{C}/\text{sec}$  Max

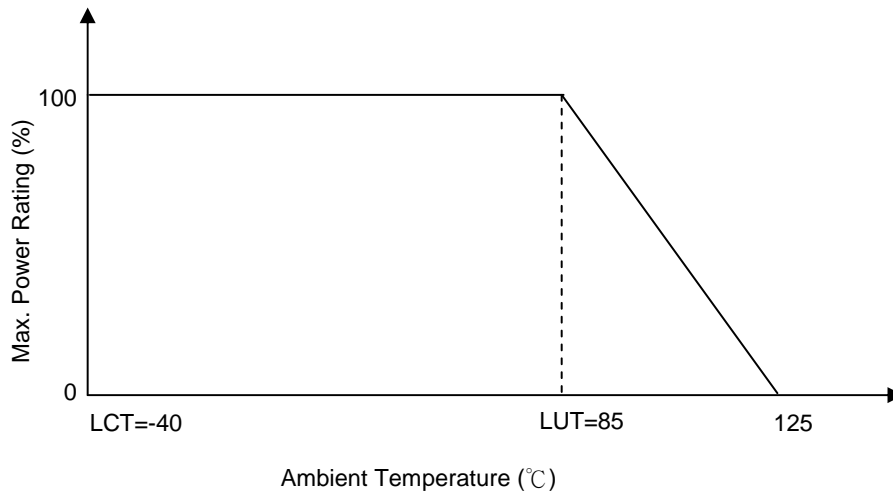
### ■ Recommended Reworking Conditions with Soldering Iron

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 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 :TVR20102-D)

- \* UL 1449 3rd / cUL recognized (File # E314979)
- UL1449 (file number E314979) for use in SPD Type 3
- Meet the surge requirements 6KV/3KA combination wave of IEC 60950-1 Annex Q and IEC 60065 14.12



- \* VDE IEC 61051-1:2007-04 / IEC 61051-2:1991
- IEC 61051-2-2:1991 recognized (File # 40021243)



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

Certificates

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

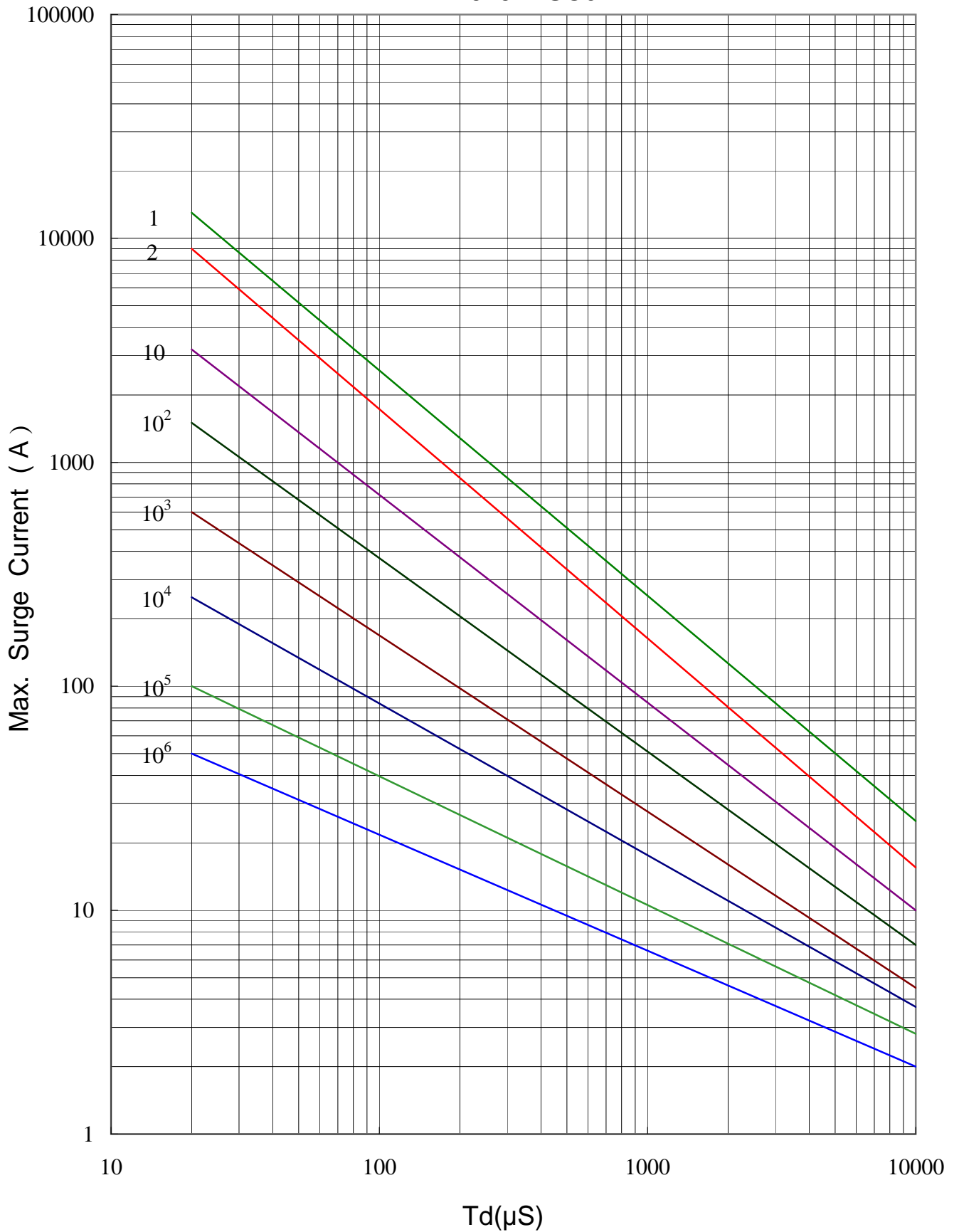
Test Report

- (1) RoHS test report



Max. Surge Current Derating Curves

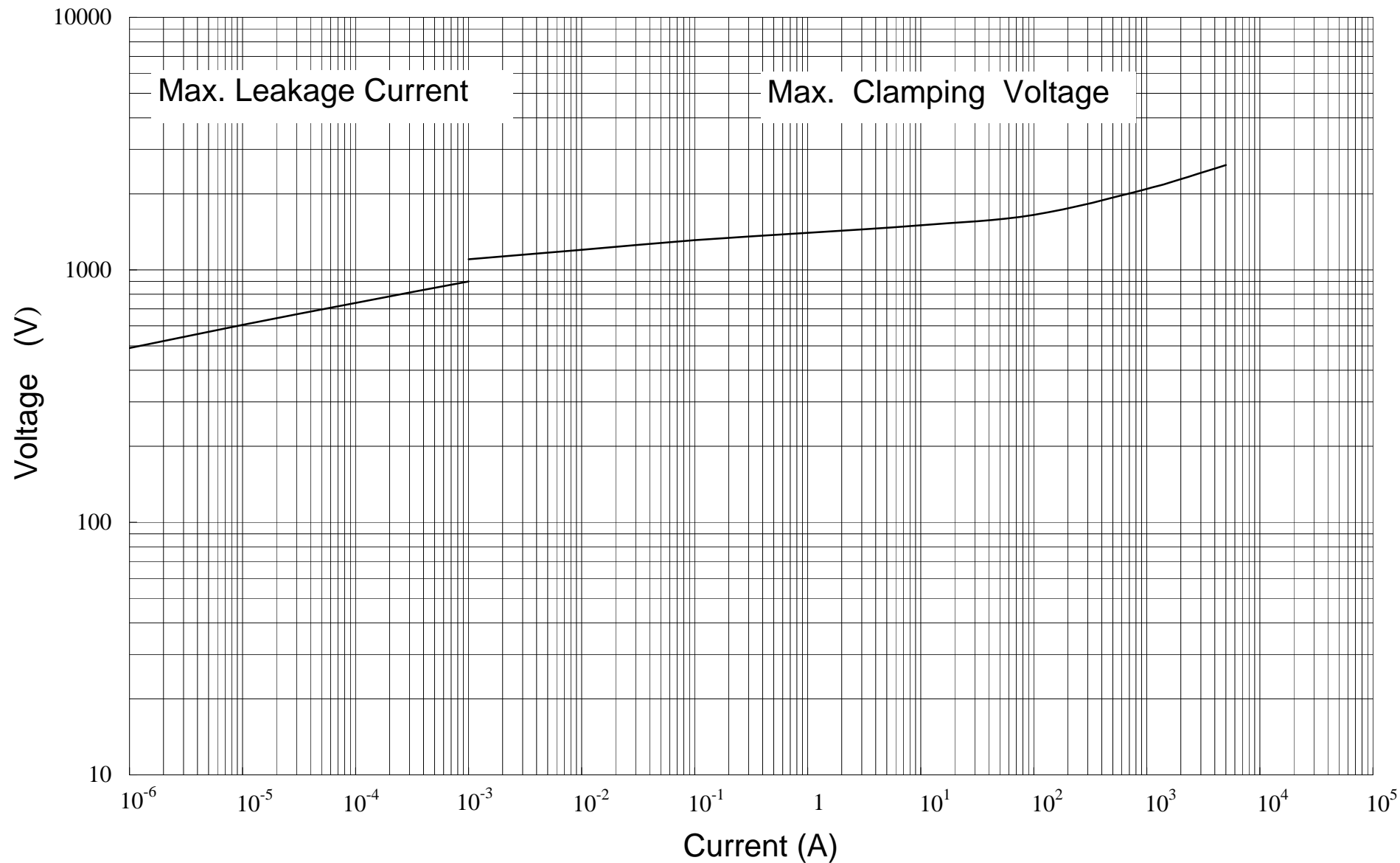
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Max. Leakage Current and Max. Clamping Voltage Curve

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