



# THINKING ELECTRONIC INDUSTRIAL CO., LTD.

HEAD OFFICE: 12F, No.93, Dashun 1st Rd., Zuoying Dist., Kaohsiung, Taiwan  
TEL: 886-7-5577660 FAX: 886-7-5570560

## MANUFACTURING SITE

- KAOHSIUNG FACTORY 1: No. 51, Kaifa Rd., N.E.P.Z, Kaohsiung City 81170, Taiwan  
TEL: 886-7-9616668 FAX: 886-7-9616698
- KAOHSIUNG FACTORY 2: No. 2-2, Xinjian S. Rd., N.E.P.Z., Kaohsiung City 81170, Taiwan  
TEL: 886-7-9630001 FAX: 886-7-3635113
- CHANGZHOU FACTORY: No.6 Longmen Rd., Wujin High & New-Tech Industrial  
Development Zone, Changzhou, Jiangsu, China 213161  
TEL: 86-519-86578999 FAX: 86-519-86558643
- DONG GUAN FACTORY: No.45, East Rd., Sha-Tao Dist., Chang-An Town,  
Dongguan City, Guangdong, China 523863  
TEL: 86-769-85542016 FAX: 86-769-85546890
- YICHANG FACTORY: No. 283 Xiaoting Avenue, Xiaoting Dist., Yichang  
City 443007, Hubei, China  
TEL: 86-717-6510010 FAX: 86-717-6511430



## SPECIFICATION FOR APPROVAL

CUSTOMER \_\_\_\_\_

CERTIFIED  
MODEL/TYPE

TVR07471-M

PART NO.

TVR07471KLQ00M(RoHS+HF)

APPLICATION \_\_\_\_\_

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

ISSUE DATE

Nov.18.2021

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

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

FOR CUSTOMER APPROVAL	CHECKED BY
	Yuan Yuan
	APPROVED BY
	Huaifang Zhang





Zinc Oxide Varistor TVR Type  
Part No. :TVR07471KLQ00M

**REVISED RECORD SHEET**

REV. NO	REV. DATE	REVISED CONTENT



<b>INDEX</b>	<b>Page</b>
■ Part Number Code	1
■ Structure and Dimensions	2
■ Electrical Characteristics	2
■ Reliability	3 ~ 4
■ Soldering Recommendation	5
■ Power Derating Curve	6
■ RoHS Compliant Declaration	6
■ Warehouse Storage Conditions of Products	6
■ Certificates	7
■ AEC Q-200	7
■ Test Reprot	7
■ Max. Surge Current Derating Curves	8
■ Max. Leakage Current and Max. Clamping Voltage Curve	9

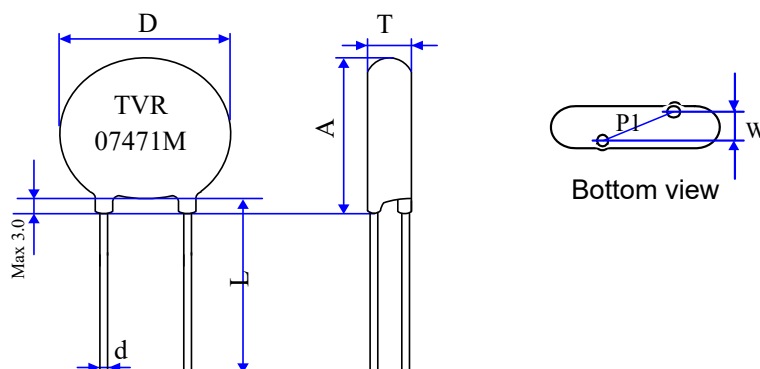
Part Number Code

Example :

**TVR**    **07**    **471**    **K**    **L**    **Q00**    **M**  
 (1)    (2)    (3)    (4)    (5)    (6)    (7)

No.	Item	Digit	Specification
(1)	Product Type	TVR	Thinking varistor TVR type
(2)	Body Size	07	φ07 mm
(3)	Varistor Voltage	471	$47 \times 10^1 \text{ V} = 470\text{V} (V_{1\text{mA}})$
(4)	Tolerance of $V_{1\text{mA}}$	K	±10%
(5)	Appearance	L	Straight Lead , Silicon Coating
(6)	Optional Suffix	Q00	RoHS+HF varistor products for automobile
(7)	Type Code	M	Automobile application

Structure and Dimensions



( unit : mm )

Body Size	D	P 1	d	A max.	L min.	T	W
φ 07	7.5~9.6	5.0±1	0.6±0.02	11.0	26.5	4.24~6.36	2.4±1.0

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

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)
TVR07471KLQ00M	470 ± 10 %	300	385	775	10	1750	42

Part No.	Rated Power	Impulse Response Time	Max. Leakage Current at 75% $V_{1mA}$	Operating Temperature	Storage Temperature	Applications
	P (W)	nSec	$I_L(\mu A)$	( $^{\circ}\text{C}$ )	( $^{\circ}\text{C}$ )	AEC-Q200
TVR07471KLQ00M	0.25	<25	20	-40 ~ +125	-40 ~ +150	Self-declared

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

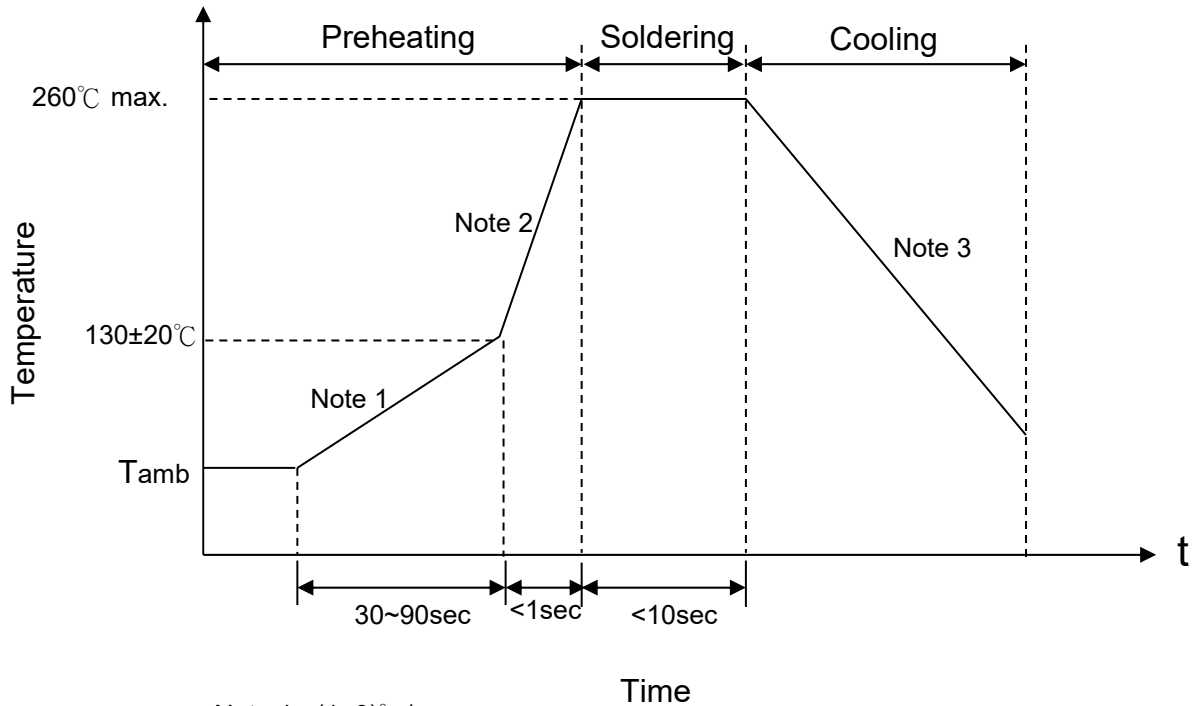
Tests of Leaded Varistor are based on AEC-Q200 Rev-D.

Item	Standard	Test conditions / Methods	Specifications
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	Test temp.: 150 +3/-0°C Duration: 1000 h Unpowered Measurement at 24±2 hours after test conclusion.	No visible damage ,   ΔV1mA/V1mA   ≤10% ,   ΔVclamp/Vclamp   ≤10%
Temperature Cycling	JESD22 Method JA-104	Lower test temp. : -40( +0/-10°C) Upper test temp. : 125 (+15/-0°C) Soak Time at Lower or Upper Temp. : 15 min transfer time : ≤1min Number of cycles : 1000 Measurement at 24±2 hours after test conclusion.	No visible damage ,   ΔV1mA/V1mA   ≤10% ,   ΔVclamp/Vclamp   ≤10%
Biased Humidity	MIL-STD-202 Method 103	Test temp.:85°C Rel. humidity of air: 85% Duration: 1000 h Test Power : Bias at 85%(+5%/-0%)of rated Varistor voltage Measurement at 24±2 hours after test conclusion.	No visible damage ,   ΔV1mA/V1mA   ≤10% ,   ΔVclamp/Vclamp   ≤10%
Operational Life	MIL-STD-202 Method 108	Test temp.: 125 +3/-0°C Duration: 1000 h Test Power: Bias at 85%(+5%/-0%)of rated Varistor voltage Measurement at 24±2 hours after test conclusion.	No visible damage ,   ΔV1mA/V1mA   ≤10% ,   ΔVclamp/Vclamp   ≤10%
External Visual	MIL-STD-883 Method 2009	Inspect device construction, marking and workmanship.	No visible damage
Physical Dimension	JESD22 Method JB-100	Verify physical dimensions to the applicable device specification.	Within the specified values
Terminal Strength	MIL-STD-202 Method 211	1. Pull test (2.27 kg), 2. Wire-lead bend test (227 g) Duration of the applied forces: 10 ±1sec	No visible damage ,   ΔV1mA/V1mA   ≤10% ,   ΔVclamp/Vclamp   ≤10%
Resistance to Solvents	MIL-STD-202 Method 215	Note: Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.	No visible damage
Mechanical Shock	MIL-STD -202-213	Peak value: 100g's Half sine Waveform Normal duration (D): 6ms In 3 directions perpendicularly intersecting each other (total 18 times)	No visible damage ,   ΔV1mA/V1mA   ≤10% ,   ΔVclamp/Vclamp   ≤10%
Vibration	MIL-STD-202 Method 204	Acceleration : 5 g's Sweep time: 20 min Frequency range: 10Hz~2KHz~10Hz 3×12 cycles	No visible damage ,   ΔV1mA/V1mA   ≤10% ,   ΔVclamp/Vclamp   ≤10%
Resistance to Soldering Heat	MIL-STD-202 Method 210	No pre-heat of samples. Temperature : 260 ±5°C, Time : 10 ±1 s Depth : 1.5mm from Solder bath to body of the specimen Immersion and emersion rate : 25mm/s ±6 mm/s Number of heat cycles : 1	No visible damage ,   ΔV1mA/V1mA   ≤10% ,   ΔVclamp/Vclamp   ≤10%

Item	Standard	Test conditions / Methods	Specifications
Solderability	J-STD-002	Steam aging 8hr@93±3°C, 235±5°C      5 +0/-0.5sec	95% of termination wetted
Electrical Characterization	User Spec.	Varistor voltage and clamping voltage	Within the specified values
8/20μS Surge Current Derating	IEC61051-1	10 surge currents ( 8/20 μ S ) ,unipolar,interval 30 s,amplitude corresponding to derating curve for 10 impulses at 20 μS	No visible damage ,   ΔV1mA/V1mA   ≤ 10% ,   ΔVclamp/Vclamp   ≤ 10%

## Soldering Recommendation

### Wave Soldering Profile



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

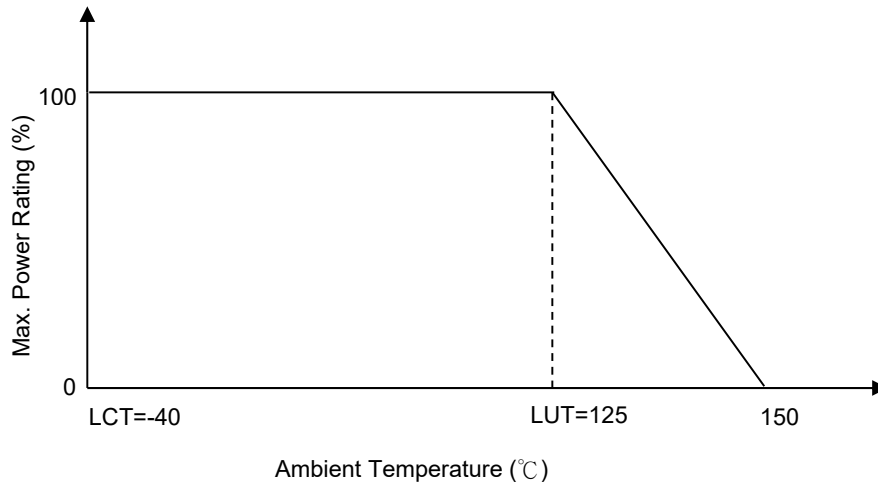
### Recommended Reworking Conditions with Soldering Iron

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 125°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 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

Safety Approvals (Certified Model/Type:TVR07471-M)

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



- \* VDE IEC 61051-1:2007-04 / IEC 61051-2:1991
- IEC 61051-2-2:1991 recognized (File # 40036061)



- \* CQC GB/T10193-1997 ` GB/T10194-1997 recognized
- (File #CQC15001128788/CQC15001128790)

AEC Q-200

Self-Declared

Certificates

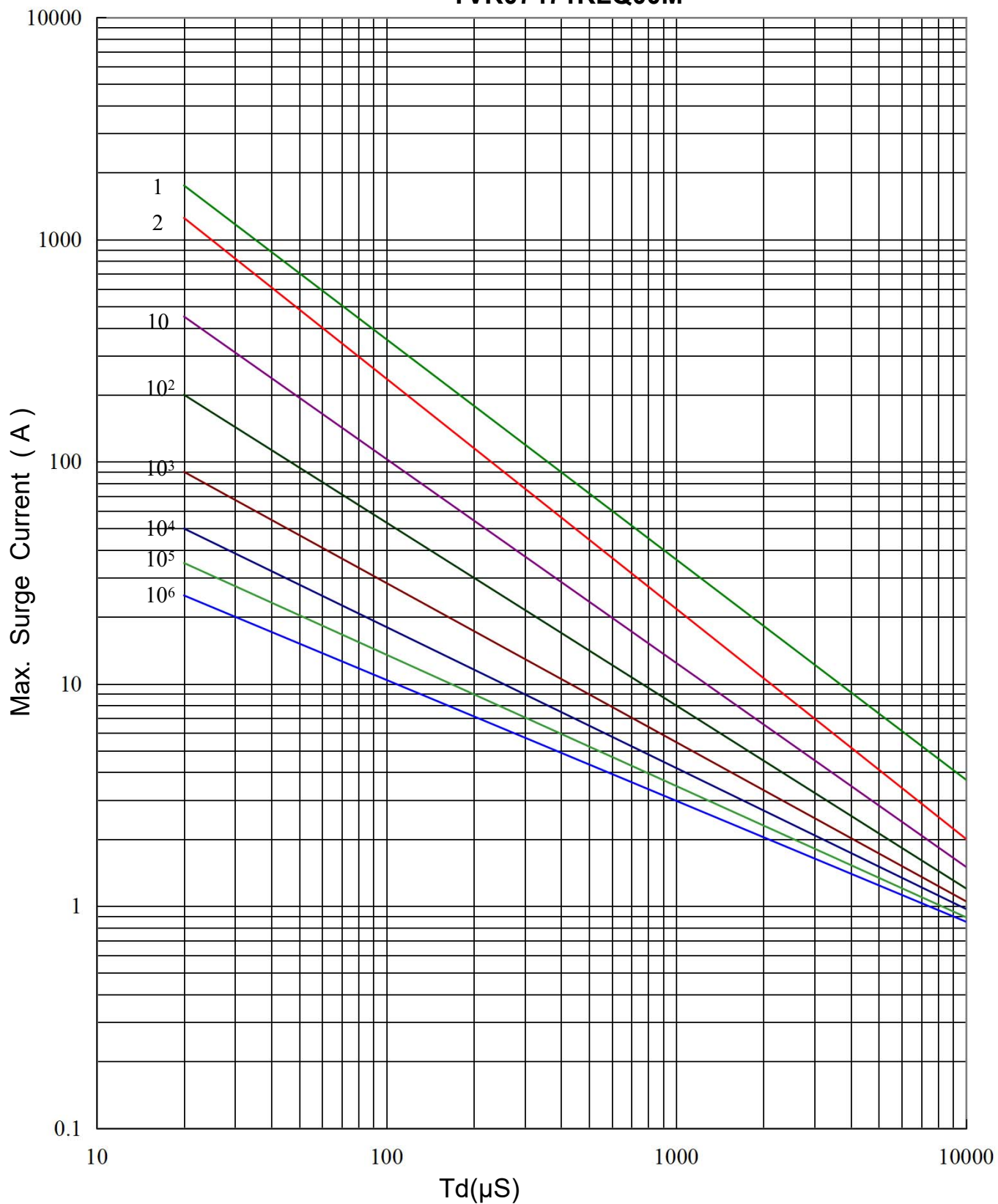
- (1) TS 16949 certificate
- (2) ISO 9001 certificate

Test Report

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

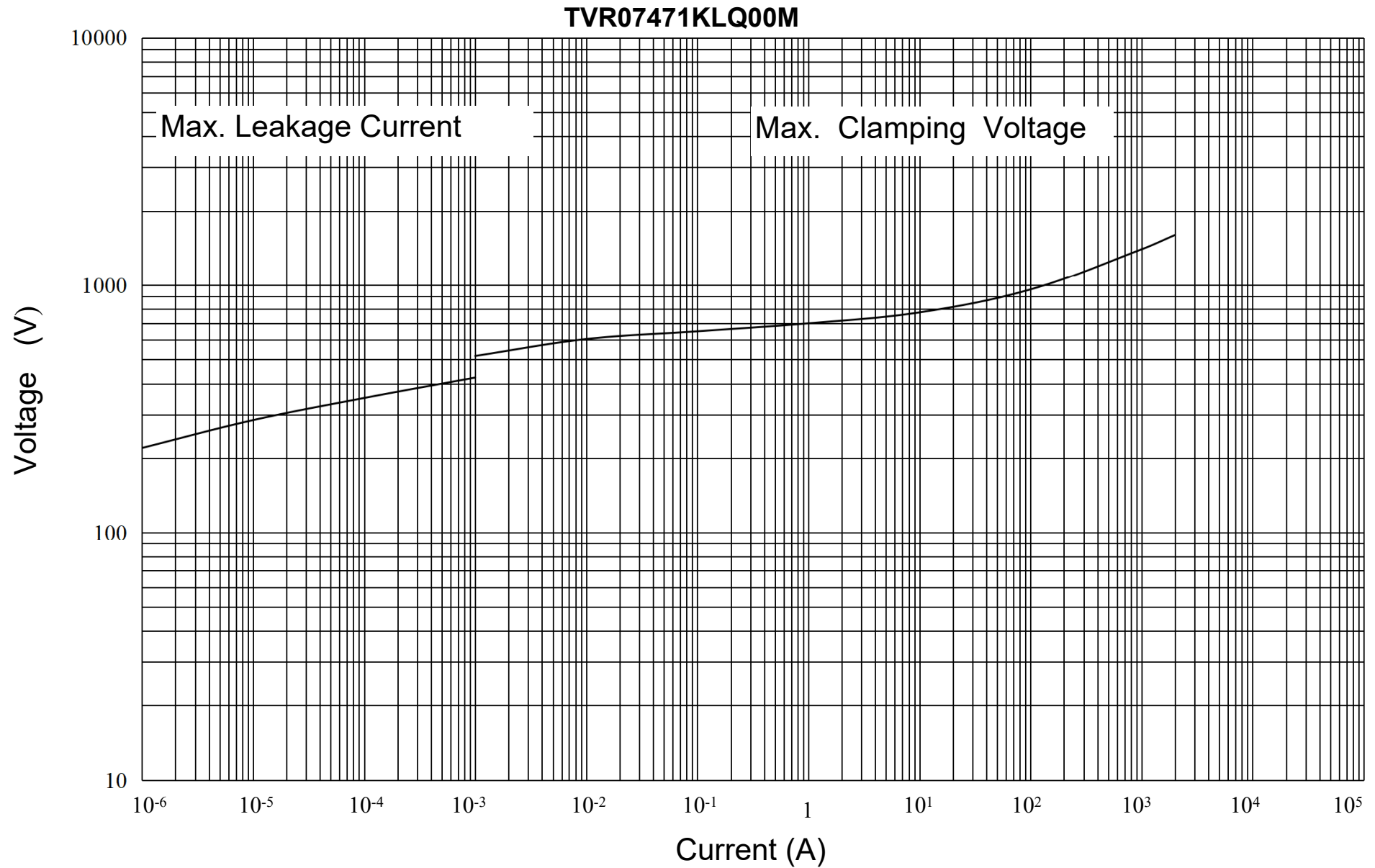
Max. Surge Current Derating Curves

TVR07471KLQ00M





Max. Leakage Current and Max. Clamping Voltage Curve



## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Varistors](#) category:*

*Click to view products by [TKS](#) manufacturer:*

Other Similar products are found below :

[820443211E](#) [MOV05131AIA](#) [MOV07231AQA](#) [MOV18131CZA](#) [R71ZOV151HC](#) [D58ZOV500RA01T1](#) [B72205S271K111](#)  
[B72214S110K151](#) [B72214S251K151](#) [B72232B131K1](#) [B72280B271K1](#) [B72530E1140S272](#) [B72540E250K62](#) [B72650M0151K093](#)  
[B72660M0271K093](#) [NTE1V020](#) [NTE1V130](#) [NTE2V010](#) [NTE2V130](#) [238159352716](#) [25FN511K](#) [S10K11G5S5](#) [ERZ-C14DK361U](#) [ERZ-](#)  
[C20DK221U](#) [ERZ-C32CK201B](#) [207869-1](#) [AS-13](#) [TMOV25SP625E](#) [TND10V-471KB00AAA0](#) [B72210S251K531](#) [B72214S200K551](#)  
[B72280B112K1](#) [B72280B381K1](#) [B72590D360A60](#) [B72650M301K93](#) [B72670M1140K72](#) [MOV07251ARA](#) [MOV10131EDA](#)  
[MOV10151EFA](#) [MOV14151CWA](#) [MOV20251DFA](#) [TVZ18EC271KBS](#) [TVZ20EB911KBS](#) [TVZ25D201KBS](#) [TVZ25D241KBS](#)  
[VDRH20X230BSE](#) [VZ07D220KBS](#) [VZ40D241K](#) [VZ25D511KBS-N](#) [VZ20E511KBSX](#)