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SPECIFICATION FOR APPROVAL

CUSTOMER	Ozdisan
CERTIFIED	
MODEL/TYPE	TVR10471-U
PART NO.	TVR10471K2PPU(RoHS+HF)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Apr.02.2025
REV. NO.	
REV. DATE	

FOR CUSTOMER APPROVAL	CHECKED BY
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	APPROVED BY
	Huaifang Zhang





Zinc Oxide Varistor TVR Type
Part No. :TVR10471K2PPU

REVISED RECORD SHEET

REV. NO	REV. DATE	REVISED CONTENT



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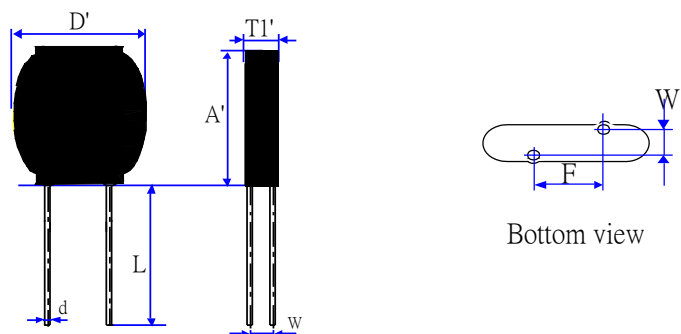
Part Number Code

Example :

TVR **10** **471** **K** **2** **PPU**
(1) (2) (3) (4) (5) (6)

No.	Item	Digit	Specification
(1)	Product Type	TVR	Thinking varistor TVR type
(2)	Body Size	10	φ 10 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	2	Straight lead , epoxy coating,drive pipe
(6)	Optional Suffix	PPU	RoHS+HF Ultra high energy series

Structure and Dimensions



(unit : mm)

Body Size	D'max	F	d	A 'max.	L min.	T'	W
ϕ 10D	15	7.5 ± 0.5	0.8 ± 0.05	20.5	15	3.9~7.2	2.6 ± 1.0

*Coating material rating:UL 94 V-0

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

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20 μ S)		Max. Surge Current (8/20 μ S)
	V_{1mA} (V)	$V_{AC(rms)}$ (V)	V_{DC} (V)	V_p (V)	I_p (A)	I (A)
TVR10471K2PPU	$470 \pm 10\%$	300	385	775	50	6000

Part No.	Nominal Discharging Current (8/20 μ S)	Max. Energy (10/1000 μ S)	Rated Power	Impulse Response Time	Max. Leakage Current at 75% V_{1mA}	Operating Temperature Range	Storage temperature Range
	I_n (A)	W (J)	P (W)	nSec	$I_L(\mu A)$	($^\circ\text{C}$)	($^\circ\text{C}$)
TVR10471K2PPU	3000	196	0.6	<25	20	-40 ~ +125	-40 ~ +150



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. <table><tr><td>Terminal diameter (mm)</td><td>Force (Kg)</td></tr><tr><td>0.5<d≤0.8</td><td>1.0</td></tr><tr><td>0.8<d≤1.25</td><td>2.0</td></tr><tr><td>1.25<d</td><td>4.0</td></tr></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 _{1mA} ≤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	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. <table><tr><td>Terminal diameter (mm)</td><td>Force (Kg)</td></tr><tr><td>0.5<d≤0.8</td><td>0.5</td></tr><tr><td>0.8<d≤1.25</td><td>1.0</td></tr><tr><td>1.25<d</td><td>2.0</td></tr></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 _{1mA} ≤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	Frequency range:10~55Hz Amplitude:0.75mm or 98m/S ² Direction:3 mutually perpendicular directions,2hrs each.	ΔV/V _{1mA} ≤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 _{1mA} ≤5%															
High Temperature Storage	IEC60068-2-2	150 ± 2 °C , 1000 ± 24 hrs	No visible damage ΔV/V _{1mA} ≤5%															
Damp Heat, Steady State	IEC 60068-2-78	The test is divided into two groups . a.40 ± 2°C , 9 0 ~ 95 % RH , 1344 hrs b.40 ± 2°C , 9 0 ~ 95 % RH , at 10%V _{DC} , 1344 hrs	No visible damage ΔV/V _{1mA} ≤10% Insulation Resistance ≥ 100MΩ															
Rapid Change of Temperature	IEC60068-2-14	The conditions shown below shall be repeated 5 cycles <table><tr><td>Step</td><td>Temperature (°C)</td><td>Period (minutes)</td></tr><tr><td>1</td><td>-40 ± 3</td><td>30 ± 3</td></tr><tr><td>2</td><td>Room temperature</td><td>≤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>≤3</td></tr></table>	Step	Temperature (°C)	Period (minutes)	1	-40 ± 3	30 ± 3	2	Room temperature	≤3	3	125 ± 2	30 ± 3	4	Room temperature	≤3	No visible damage ΔV/V _{1mA} ≤5%
Step	Temperature (°C)	Period (minutes)																
1	-40 ± 3	30 ± 3																
2	Room temperature	≤3																
3	125 ± 2	30 ± 3																
4	Room temperature	≤3																
High Temp. Load	MIL-STD-202 Method 108	125 ± 2 °C , 1000 ± 24 hrs, at V _{DC} or V _{rms} (Max. Operating Voltage)	ΔV/V _{1mA} ≤10% No visible damage															



Zinc Oxide Varistor TVR Type

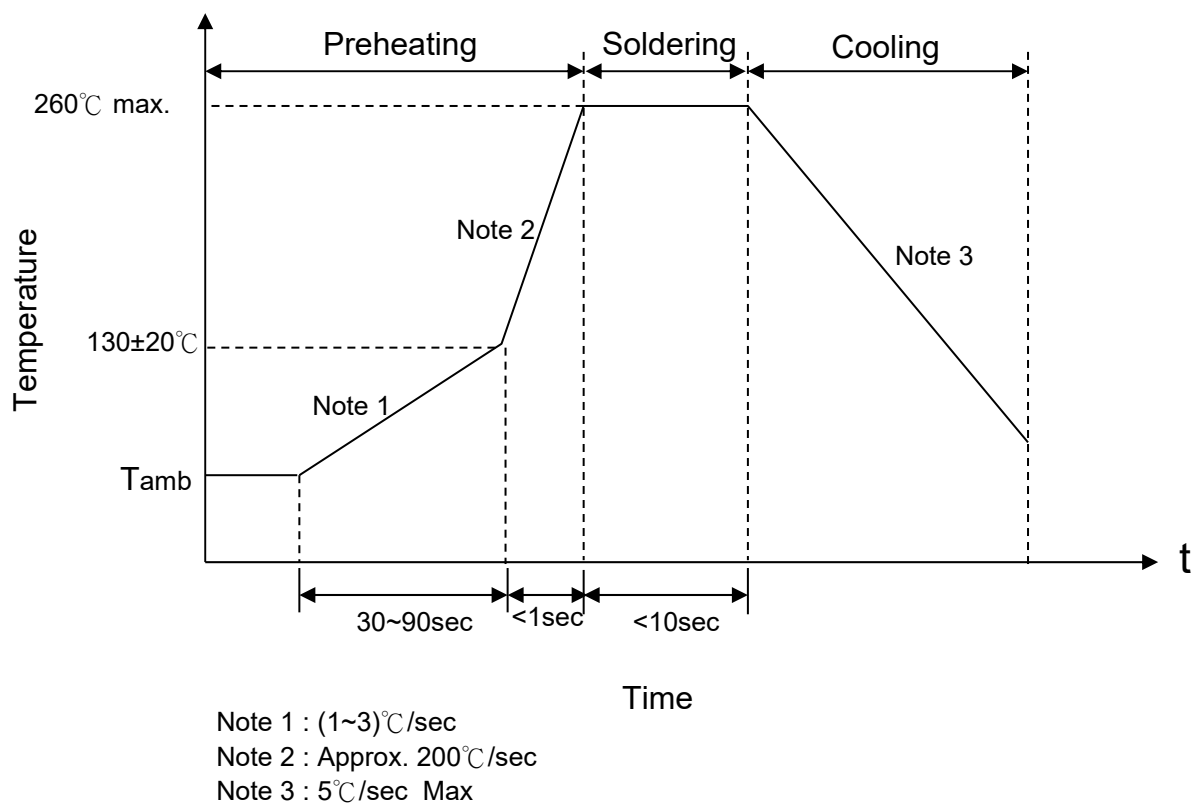
Part No. :TVR10471K2PPU

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Item	Standard	Test conditions / Methods	Specifications
10/1000 μ S Surge Life	IEC 61051-1	10/1000us waveform, 1/4 times the maximum energy, 10 surge currents,unipolar,interval 2mins	$ \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 6.9	Metal balls method, 2500 Vac 1 min	No visible damage

Soldering Recommendation

Wave Soldering Profile

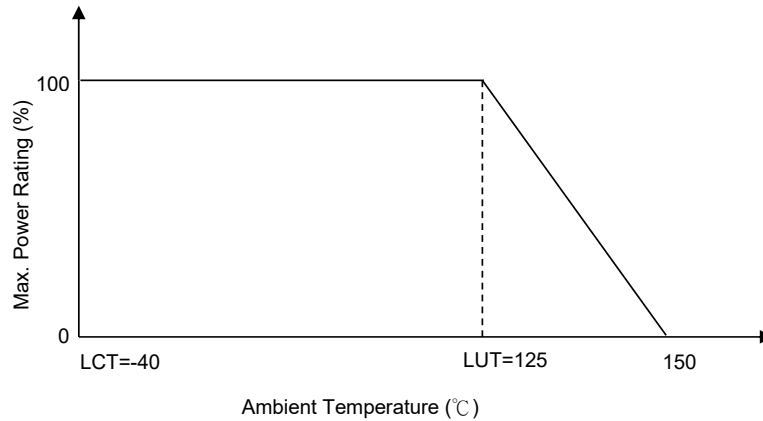


Recommended Reworking Conditions with Soldering Iron

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 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.

Restriction of Weapon and Military End-Use

Thinking has established and implemented the fundamental policy on none of our product should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or goods or systems specially designed or intended for military end-use or utilization by military end-users.

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 :TVR10471-U)



* UL 1449 5th / cUL recognized (File # E314979)



* TUV recognized (File J50531421)

* CQC GB/T10193-1997 ` GB/T10194-1997 recognized
(File # CQC22001335732/CQC23001402171)

Certificates

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

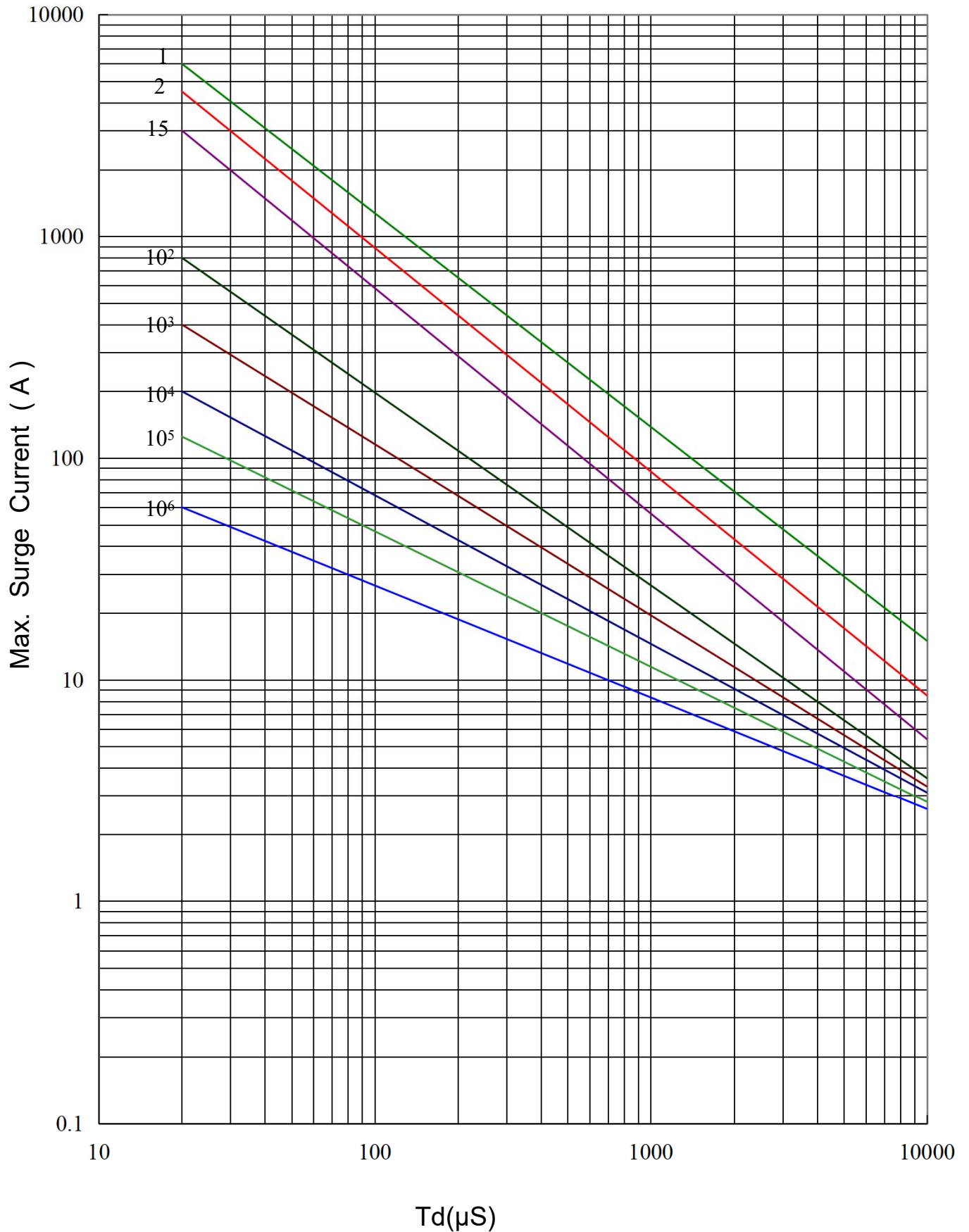
Test Report

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



Max. Surge Current Derating Curves

TVR10471K2PPU





Max. Leakage Current and Max. Clamping Voltage Curve

TVR10471K2PPU

