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	TVR07821
PART NO.	TVR07821KSARY(RoHS)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Oct.11.2021
REV. NO.	
REV. DATE	

FOR CUSTOMER APPROVAL	CHECKED BY
	Yuan Yuan
	APPROVED BY
	Huaifang Zhang

REVISED RECORD SHEET

REV. NO	REV. DATE	REVISED CONTENT

INDEX

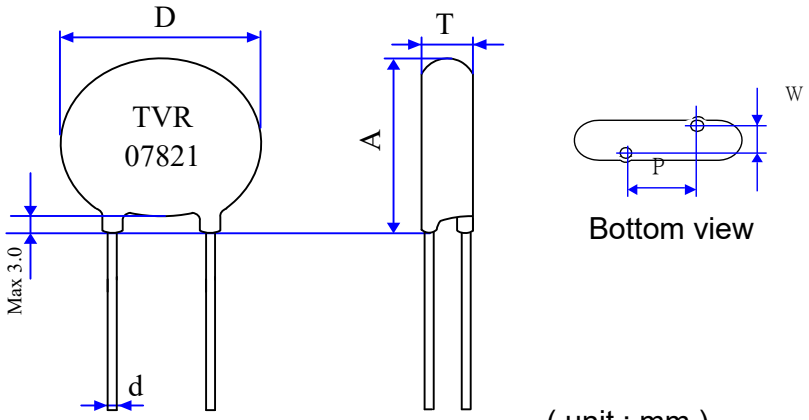
Part Number Code

Example :

TVR 07 821 K S AR Y
(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	821	82 x 10^1 V = 820V (V_{1mA})
(4)	Tolerance of V_{1mA}	K	±10%
(5)	Appearance	S	Straight lead , epoxy coating
(6)	Packaging	A	Repositioning tapping(hole pitch: 12.7mm)
		R	reel
(7)	Optional Suffix	Y	RoHS compliance

Structure and Dimensions



(unit : mm)

Body Size	D	P	d	A max.	T	W
ϕ 07	6.5~9.0	5.0±1.0	0.6±0.02	11.5	4.5~6.4	3.2±1.0

Coating material rating:UL 94 V-0

Electrical Characteristics (Ambient Ta=25 ℃)

Part No.	Varistor Voltage (@ 1mA DC)	Max. Continuous Voltage		Max. Clamping Voltage (8/20μS)		Max. Surge Current (8/20μS)
	V_{1mA} (V)	V_{AC}(rms) (V)	V_{DC} (V)	V_p (V)	I_P (A)	I (A)
TVR07821KSARY	820 ± 10%	510	670	1355	10	1200

Part No.	Max. Energy (10/1000μS)	Rated Power	Impulse Response Time	Max. Leakage Current at 75%V_{1mA}	Operating Temperature Range	Storage temperature Range
	W (J)	P (W)	nSec	I_L(μA)	(℃)	(℃)
TVR07821KSARY	42	0.25	<25	20	-40 ~ +105	-40 ~ +125

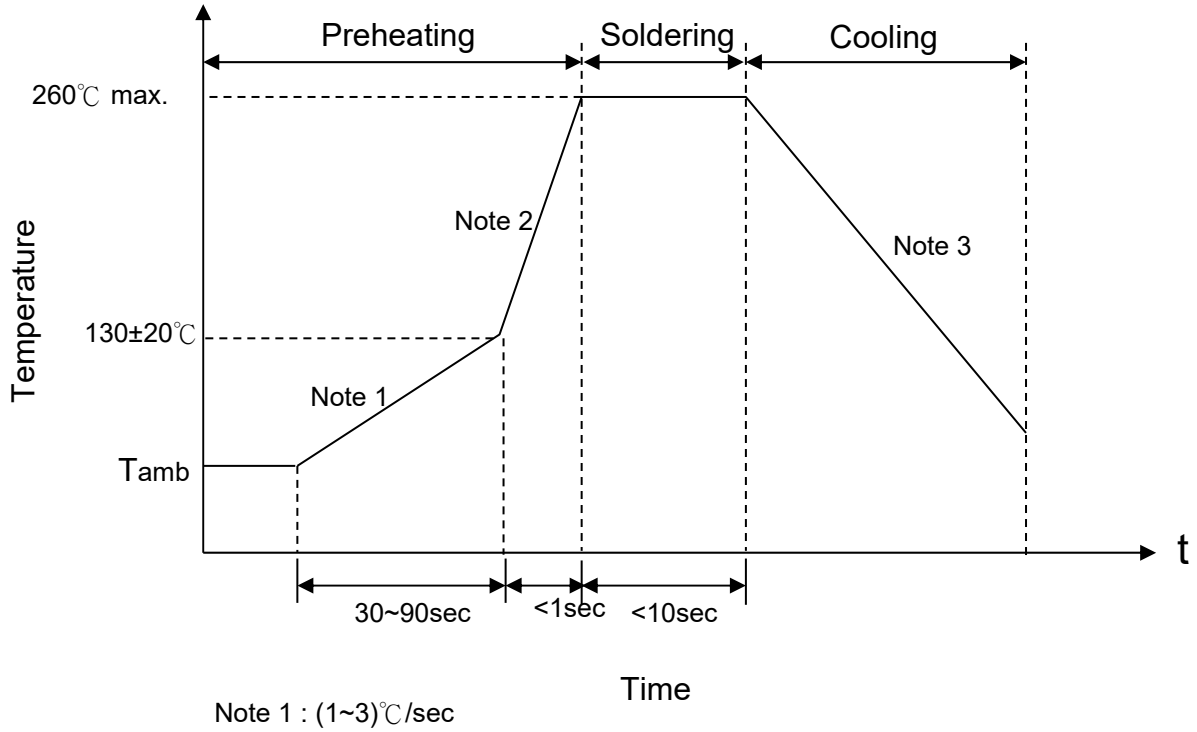
Reliability

<table>
<tr><th>Item</th><th>Standard</th><th>Test conditions / Methods</th><th>Specifications</th></tr>
<tr><td>Tensile Strength of Terminals</td><td>IEC60068-2-21</td><td>Gradually applying the force specified and keeping the unit fixed for 10±1 sec.
<table><tr><th>Terminal diameter (mm)</th><th>Force (Kg)</th></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></td><td>No visible damage
$|\triangle V/V_{1mA}| \leqq 5\%$</td></tr>
<tr><td>Bending Strength of Terminals</td><td>IEC60068-2-21</td><td>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><th>Terminal diameter (mm)</th><th>Force (Kg)</th></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></td><td>No visible damage
$|\triangle V/V_{1mA}| \leqq 5\%$</td></tr>
<tr><td>Vibration</td><td>IEC 60068-2-6</td><td>Frequency range:10~55Hz
Amplitude:0.75mm or 98m/S^2
Direction:3 mutually perpendicular directions,2hrs each.</td><td>$|\triangle V/V_{1mA}| \leqq 5\%$
No visible damage</td></tr>
<tr><td>Solderability</td><td>IEC60068-2-20</td><td>245 ± 3 ℃ , 3 ± 0.3 sec</td><td>At least 95% of terminal electrode is covered by new solder</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>IEC60068-2-20</td><td>260 ± 3 ℃ , 10 ± 1 sec</td><td>No visible damage
$|\triangle V/V_{1mA}| \leqq 5\%$</td></tr>
<tr><td>High Temperature Storage</td><td>IEC60068-2-2</td><td>125 ± 5 ℃ , 1000 ± 24 hrs</td><td>No visible damage
$|\triangle V/V_{1mA}| \leqq 5\%$</td></tr>
<tr><td>Damp Heat, Steady State</td><td>IEC 60068-2-78</td><td>The test is divided into two groups .
a.40 ± 2℃ , 9 0 ~ 95 % RH , 1344 hrs
b.40 ± 2℃ , 9 0 ~ 95 % RH , at 10%V_{DC}, 1344 hrs</td><td>No visible damage
$|\triangle V/V_{1mA}| \leqq 10\%$
Insulation Resistance ≧ 100MΩ</td></tr>
<tr><td>Rapid Change of Temperature</td><td>IEC60068-2-14</td><td>The conditions shown below shall be repeated 5 cycles
<table><tr><th>Step</th><th>Temperature (℃)</th><th>Period (minutes)</th></tr><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>105 ± 2</td><td>30 ± 3</td></tr><tr><td>4</td><td>Room temperature</td><td>5 ± 3</td></tr></table></td><td>No visible damage
$|\triangle V/V_{1mA}| \leqq 5\%$</td></tr>
<tr><td>High Temp. Load</td><td>MIL-STD-202 Method 108</td><td>105 ± 2 ℃, 1000 ± 24 hrs, at V_{DC} or V_{rms}(Max. Operating Voltage)</td><td>$|\triangle V/V_{1mA}| \leqq 10\%$
No visible damage</td></tr>
</table>

Item	Standard	Test conditions / Methods	Specifications
8/20μS Surge Life	IEC 61051-1 4.6	10 pulses(8/20μS) , unipolar, interval 30 secs,amplitude corr. to max. Surge current derating curves for 20μS.	$\lvert \triangle V/V_{1mA} \rvert \leqq 10\%$ 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	$\lvert \triangle V/V_{1mA} \rvert \leqq 10\%$ No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA}\ at105℃ - V_{1mA}\ at\ 25℃}{V_{1mA}\ at\ 25℃} X \frac{1}{80} X\ 100\ (\%\ /\ ℃)$ $\frac{V_{1mA}\ at\ -40℃ - V_{1mA}\ at\ 25℃}{V_{1mA}\ at\ 25℃} X \frac{1}{65} X\ 100\ (\%\ /\ ℃)$	$-0.05 \leqq TC \leqq 0.05(\%/℃)$
Voltage Proof	IEC 61051-1 4.9	Metal balls method, 2500 Vac 1 min	No visible damage

Soldering Recommendation

■ Wave Soldering Profile



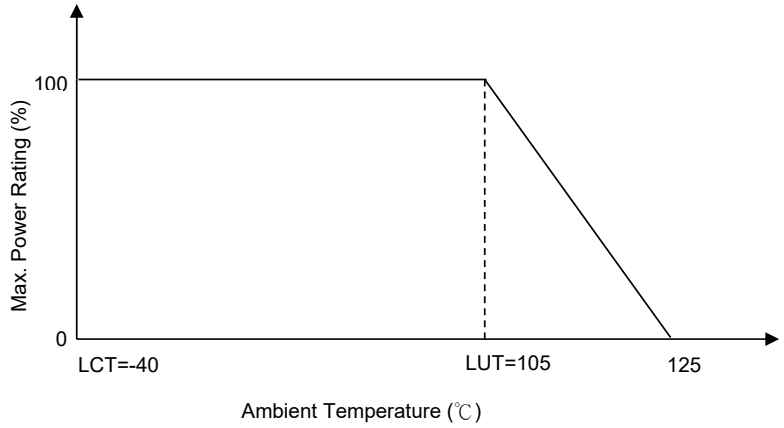
Note 1 : (1~3)℃/sec
Note 2 : Approx. 200℃/sec
Note 3 : 5℃/sec Max

■ Recommended Reworking Conditions with Soldering Iron

Item	Conditions
Temperature of Soldering Iron-tip	360℃ (max.)
Soldering Time	3 sec (max.)
Distance from Varistor	2 mm (min.)

Power Derating Curve

When operating temperature exceeds 105℃, 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 :

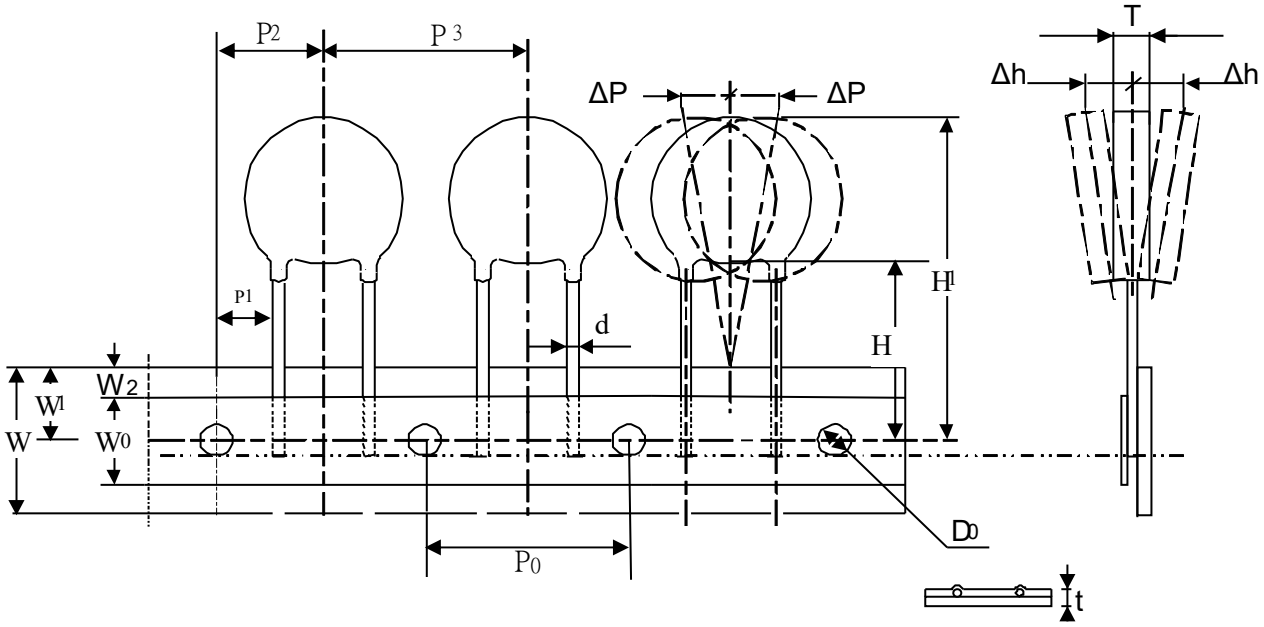
1.Storage Temperature : -10℃~+40℃

2.Relative Humidity : ≦75%RH

3.Keep away from corrosive atmosphere and sunlight.

(II) Period of Storage : 1 year

Taping and Dimensions

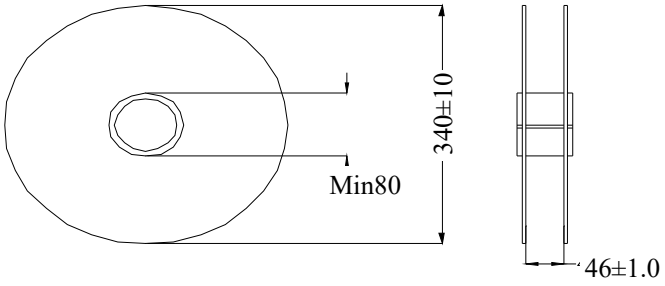


ITEM.	P_0	P_1	P_2	P_3	H	H_1 Max	W_0	W_1	W_2 Max	W	△p Max	△h Max	D_0	t
Nor.	12.7	3.55	6.35	12.7	18	30	12	9	3	18	1.0	2.0	4	0.6
ToL.	±0.3	±1	±1.3	±1	+2/-0	---	±1	+0.75/ -0.5	---	±1	---	---	±0.2	±0.2

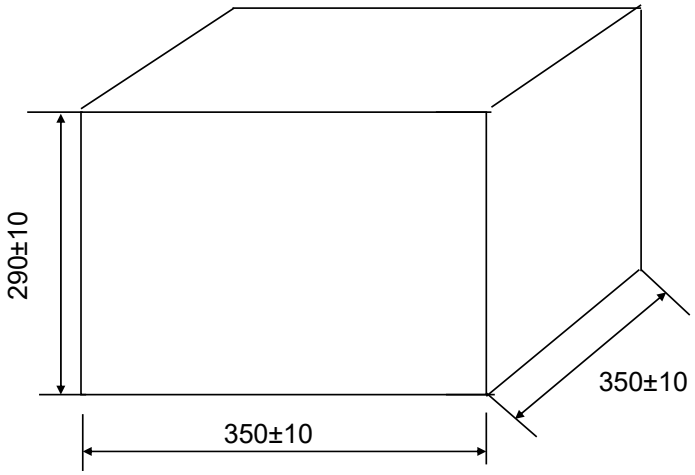
(Unit:mm)

Packaging

(1) SPQ: 1000 Pcs/ Reel



(2) Outer Box: 5Reels/ Carton



(Unit:mm)

Safety Approvals (Certified Model/Type :TVR07821)

* 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℃)

* CQC GB/T10193-1997 ` GB/T10194-1997 recognized
(File # CQC18001199806/ CQC18001199789)

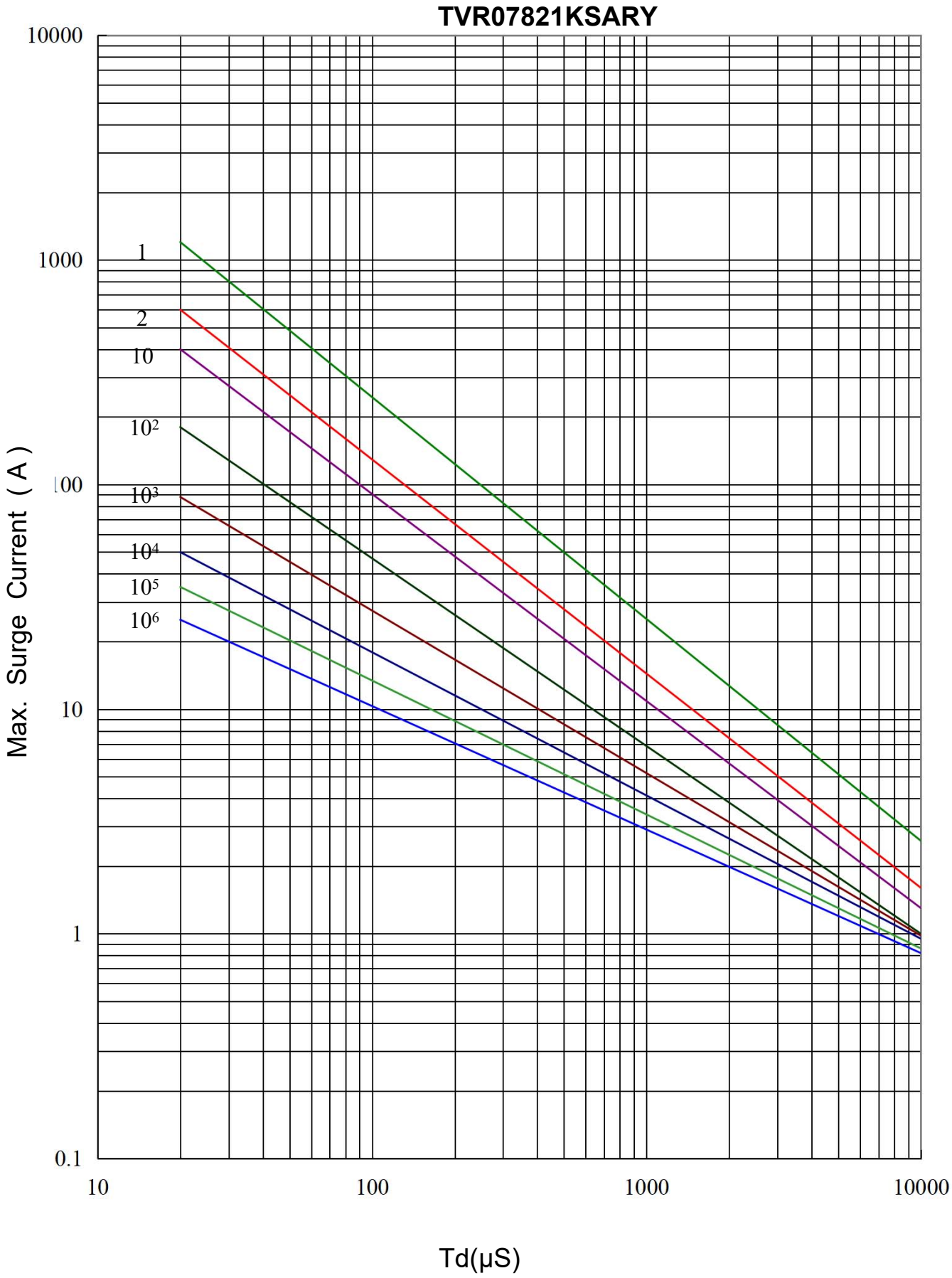
Certificates

(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