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SPECIFICATION FOR APPROVAL

CUSTOMER	Codico
CERTIFIED MODEL/TYPE	TVR14511
PART NO.	TVR14511KFABY (RoHS)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Mar.12.2016
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

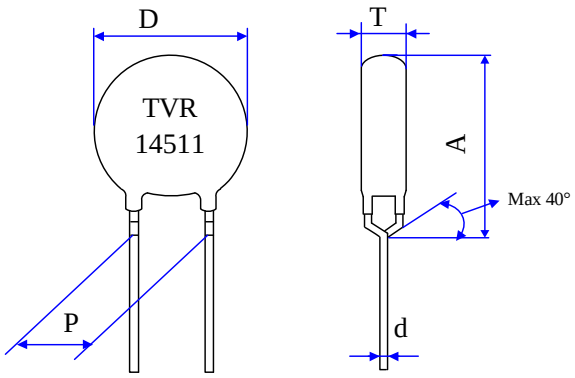
Part Number Code

Example :

TVR	**14**	**511**	**K**	**F**	**AB**	**Y**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**

No.	Item	Digit	Specification
(1)	Product Type	TVR	Thinking varistor TVR type
(2)	Body Size	14	ϕ 14 mm
(3)	Varistor Voltage	511	51×10^1 V = 510V (V_{1mA})
(4)	Tolerance of V_{1mA}	K	±10%
(5)	Appearance	F	Y Kink Lead, Epoxy Coating
(6)	Packaging	A	Repositioning tapping (hole pitch: 12.7mm)
		B	box
(7)	Optional Suffix	Y	RoHS compliance

Structure and Dimensions



(unit : mm)

Body Size	D	P	d	A max.	T
ϕ 14	13.5~16.0	7.5±0.5	0.80±0.02	19.0	3.8~5.8

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)	Max. Energy (10/1000μS)
	V_{1mA} (V)	V_{AC}(rms) (V)	V_{DC} (V)	V_p (V)	I_P (A)	I (A)	W (J)
TVR14511KFABY	510 ± 10 %	320	410	845	50	4500	125

Part No.	Rated Power	Impulse Response Time	Max. Leakage Current at 75%V_{1mA}	Operating Temperature Range	Storage temperature Range	Applications		
	P (W)	nSec	I_L(μA)	(℃)	(℃)	UL 1449	IEC 60950-1	IEC 60065
TVR14511KFABY	0.6	<25	20	-40 ~ +85	-40 ~ +125	SPD Type 5	Annex Q	Clause 14.12

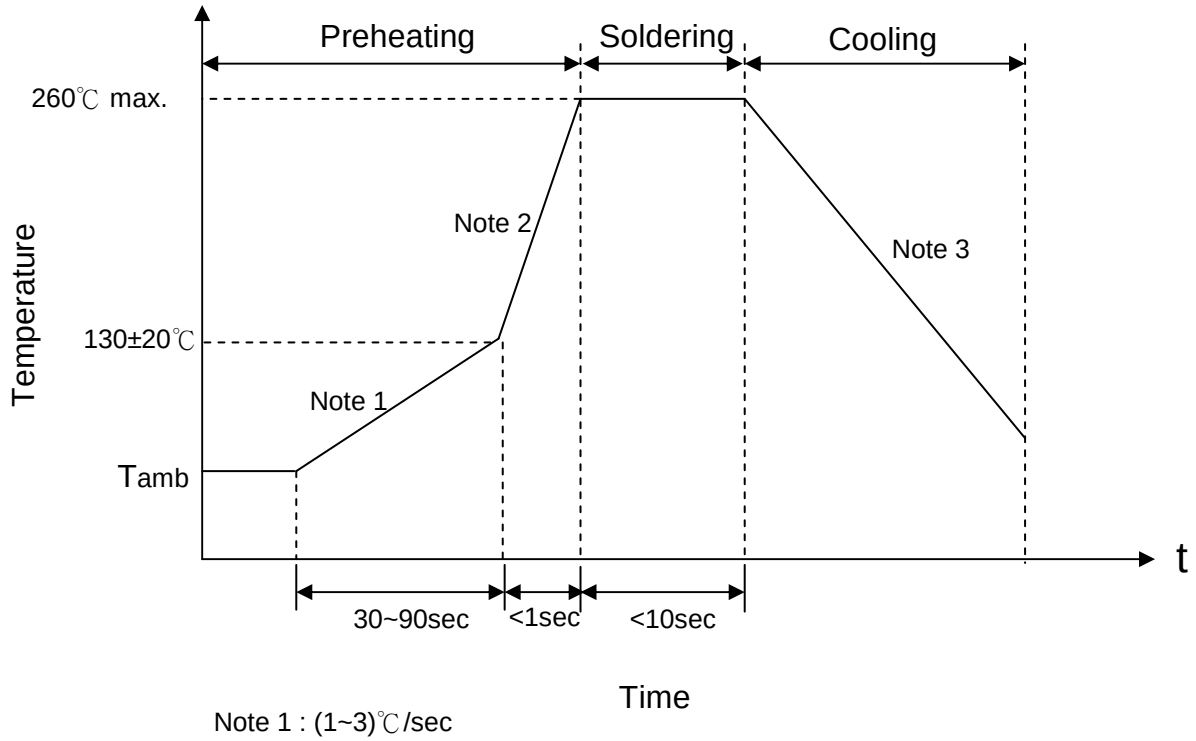
Reliability

<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>85 ± 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>85 ± 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
Operating Duty Cycle test	UL1449 4th	6KV/3KA 1.2/50μs+8/20μs combination waveform with Vac(@ Deg 90) for 15 times. Interval time between tests is 60 secs.	|△Vp /Vp| ≦10 % No visible damage
8/20μS Surge Life	IEC 61051-1 4.6	10,000 pulses(8/20 μS) , unipolar, interval 10 secs, amplitude corr. to max. Surge current derating curves for 20 μS	|△V/V_{1mA}| ≦ 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	|△V/V_{1mA}| ≦ 10% No visible damage
Varistor Voltage Temp. Coefficient	Specification Standard	$\frac{V_{1mA} \text{ at } 85℃ - V_{1mA} \text{ at } 25℃}{V_{1mA} \text{ at } 25℃} \times \frac{1}{60} \times 100$ (% / ℃) $\frac{V_{1mA} \text{ at } -40℃ - V_{1mA} \text{ at } 25℃}{V_{1mA} \text{ at } 25℃} \times \frac{1}{65} \times 100$ (% / ℃)	-0.05≦TC≦0.05(%/℃)
Voltage Proof	IEC 61051-1 4.9	Metal balls method, 2500 Vac 1 min	No visible damage

Soldering Recommendation

■ Wave Soldering Profile



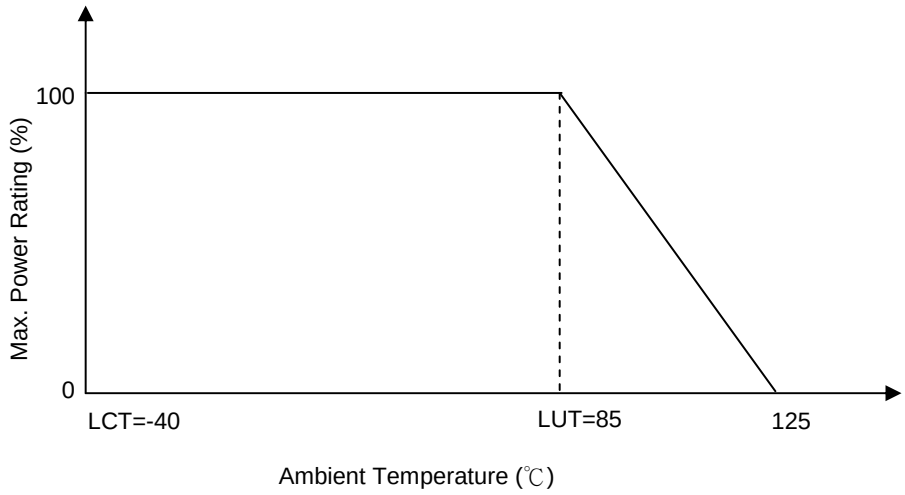
Note 1 : (1~3)℃/sec
Note 2 : Approx. 200℃/sec
Note 3 : 5℃/sec Max

■ 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 85℃, 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 :

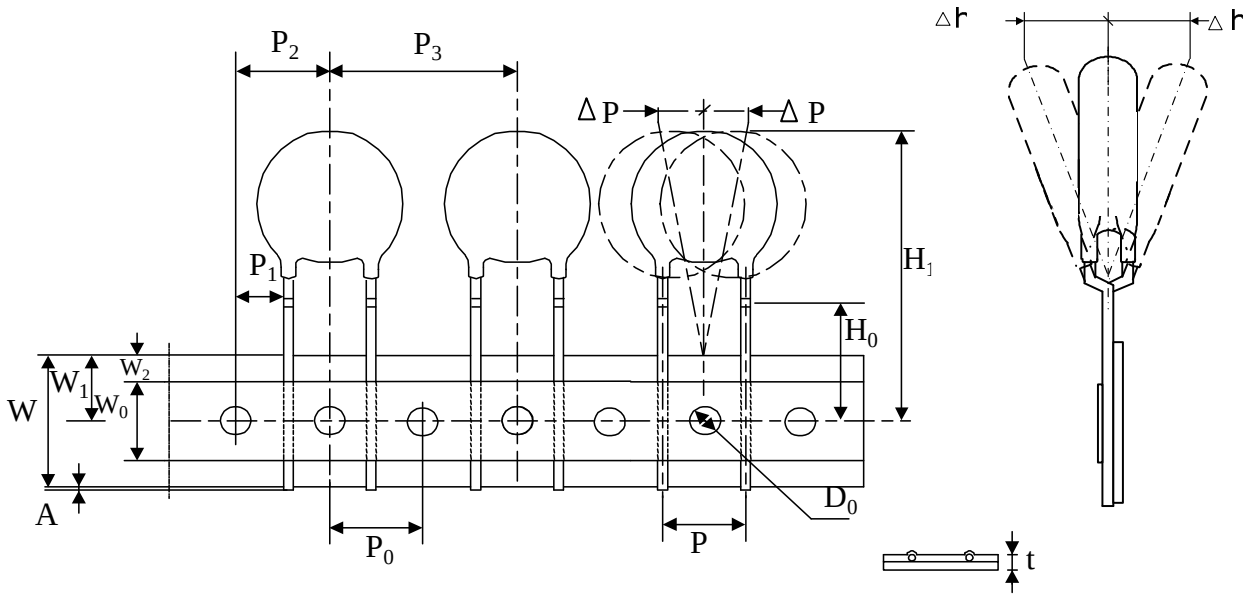
1.Storage Temperature : -10℃~+40℃

2.Relative Humidity : ≦75%RH

3.Keep away from corrosive atmosphere and sunlight.

(II) Period of Storage : 1 year

Taping and Dimensions

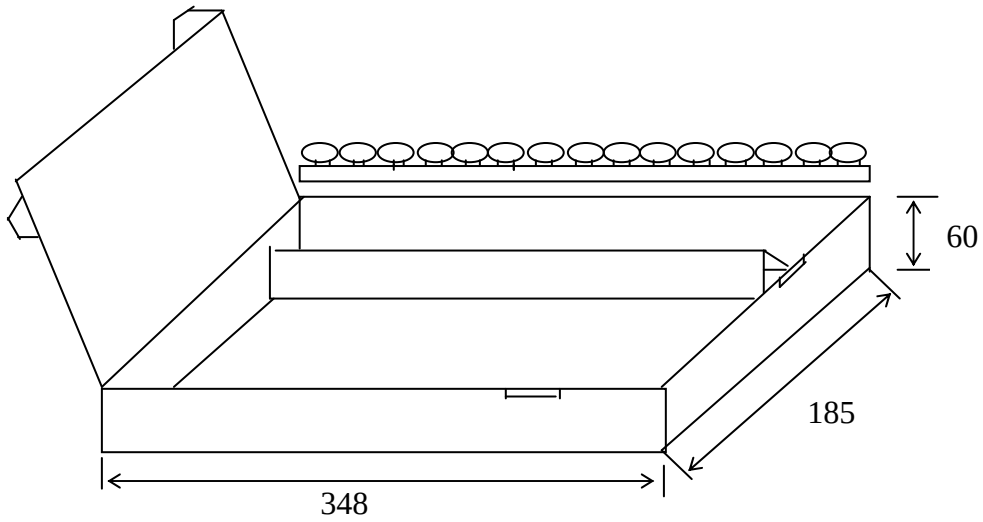


(Unit : mm)

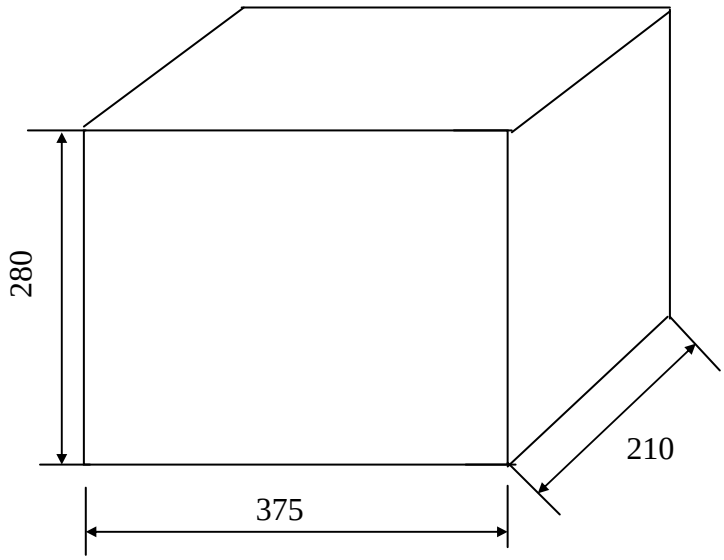
ITEM.	P_0	P	P_1	P_2	P_3	H_0	H_1 Max	W_0	W_1	W_2 Max	W	△p Max	△h Max	A Max	D_0	t
Nor.	12.7	7.5	8.55	12.7	25.4	16	38	12	9	3	18	1.0	2.0	0.5	4	0.6
ToL.	±0.3	±0.5	±1	±1.3	±1	±0.5	---	±1	+0.75/ -0.5	---	±1	---	---	---	±0.2	±0.2

Packaging

（1）Inner Box (250pcs /Box)



（2） Outer Box (4 Boxes /Carton)



(Unit:mm)

Net Weight：3.64Kg

Gross Weight：4.14Kg

Safety Approvals **(Certified Model/Type :TVR14511)**

* UL 1449 4th / cUL recognized (File # E314979)

· UL1449 (file number E314979) for use in SPD Type5

· 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/IEC 60950-1:2013 Annex Q recognized (File # 5944)

* CQC GB/T10193-1997丶GB/T10194-1997 recognized

(File # CQC03001005165/CQC03001007654)

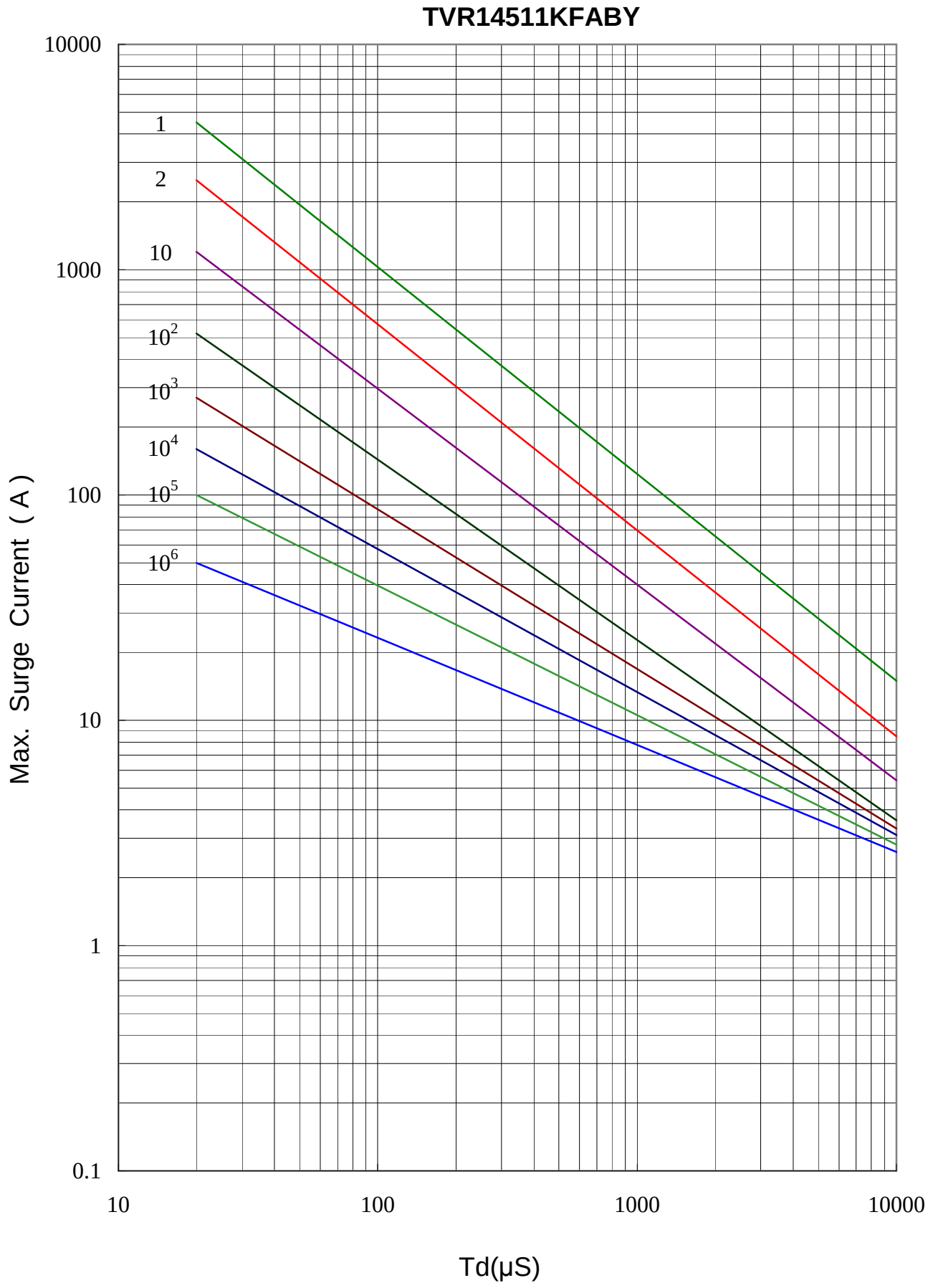
Certificates

(1) TS 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