

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: No.6, Xinjian S. Rd., Nanzi Dist., Kaohsiung City 811644, Taiwan
TEL: 886-7-9616668 FAX: 886-7-3866990
- ☐ 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
- ☐ JIANGXI FACTORY: Tangying Road, Ceramics Industry Garden, Jingdezhen City,
Jiangxi, China 333400
TEL: 86-798-2621372 FAX: 86-798-2126372

**SPECIFICATION FOR APPROVAL**

CUSTOMER	Blume-Mueller
CERTIFIED	
MODEL/TYPE	
PART NO.	TVM5C420K182R (RoHS+HF)
APPLICATION	
CUSTOMER P/N	
ISSUE DATE	Mar. 14, 2024
REV. NO.	
REV. DATE	

FOR CUSTOMER APPROVAL	CHECKED BY
	<i>Shu Ling Fu</i>
	APPROVED BY
	<i>Chun Chu Tu</i>





REVISED RECORD SHEET

REV. NO	REV. DATE	REVISED CONTENT



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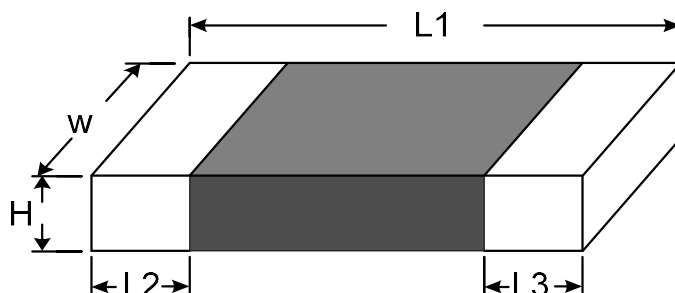
Part Number Code

Example :

TVM **5** **C** **420** **K182** **R**
(1) (2) (3) (4) (5) (6)

No.	Item	Digit	Specification
(1)	Product Type	TVM	Thinking varistor TVM type
(2)	Size (EIA)	5	1812
(3)	Type Series	C	Automotive series
(4)	Max. Continuous Voltage (V_{DC})	420	$42 \times 10^0 V = 42 V_{DC}$
(5)	Typical Capacitance	K182	$18 \times 10^2 pF = 1800 pF (@1KHz)$
(6)	Packaging	R	Reel

Structure and Dimensions



(unit : mm)

L1	W	H max.	L2 and L3
4.50±0.40	3.20±0.30	2.00	0.60±0.30

Electrical Characteristics

Part No.	Max. Continuous Voltage		V_{jump} (5min)	Varistor Voltage	Max. Clamping Voltage (8 / 20μS)	
	V_{AC} (V)	V_{DC} (V)	(V)	$V_{1\text{mA}}$ (V)	V_{P} (V)	I_{P} (A)
TVM5C420K182R	32	42	48	50.4 ~ 61.6	90	5

Part No.	Max. Surge Current (8 / 20μS)	Max. Energy (10 / 1000μS)	W_{LD} (10x)	Typical Capacitance @1KHz
	I_{max} (A)	W_{max} (J)	(J)	C (pF)
TVM5C420K182R	500	4	6	1800±20%

Part No.	Operating Temperature Range	Storage Temperature Range
	(°C)	(°C)
TVM5C420K182R	-55 ~ +125	-55 ~ +150

Reliability

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

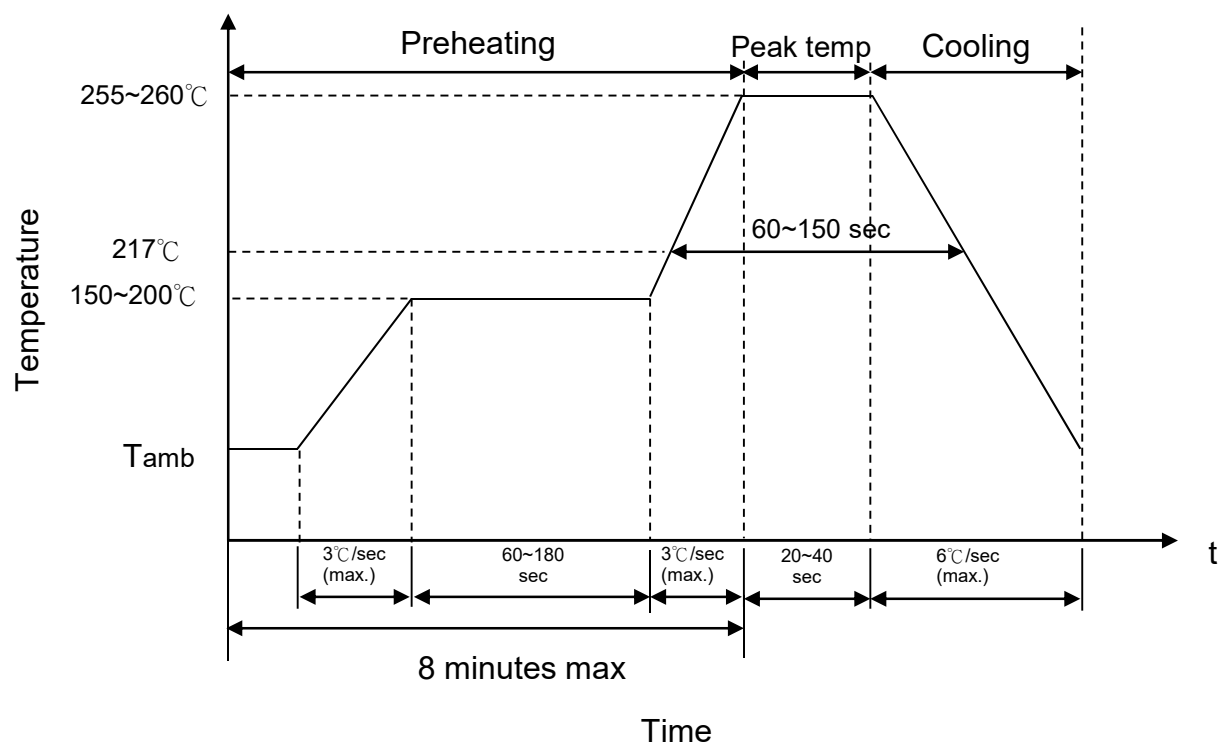
Item	Standard	Test conditions / Methods	Specifications
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	Test temp. : 150 +3/-0°C Duration: 1000 h Unpowered Measurement at 24±2 hours after test conclusion.	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 10\%$
Temperature Cycling	JESD22 Method JA-104	Lower test temp. : -55 +0/-3°C Upper test temp. : 125 +3/-0°C Soak Time at Lower or Upper Temp. : 30 min Maximum transition time : 1 min. Number of cycles : 1000 Measurement at 24±4 hours after test conclusion.	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 10\%$
Biased Humidity	MIL-STD-202 Method 103	Test temp. : 85°C Rel. humidity of air : 85% +5/-0% Duration: 1000 h Bias at Working Voltage V_{DC} . Measurement at 24±4 hours after test conclusion.	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 10\%$
Operational Life	MIL-STD-202 Method 108	Test temp.: 125 +3/-0°C Duration: 1000 h Bias at Working Voltage V_{DC} . Measurement at 24±4 hours after test conclusion.	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 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
Resistance to Solvents	MIL-STD-202 Method 215	Per MIL-STD-202 Method 215 Solvent 1: 1 part (by volume) of isopropyl alcohol 3 part (by volume) of mineral spirits.	No visible damage
Mechanical Shock	MIL-STD-202 Method 213	Test Condition F Peak value : 1500g's Half sine Waveform Normal duration (D) : 0.5ms In 3 directions perpendicularly intersecting each other (total 18 times).	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 10\%$
Vibration	MIL-STD-202 Method 204	Acceleration : 5 g's Sweep time: 20 min. Frequency range: 10 to 2000 Hz 3×12 cycles	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 10\%$

Reliability

Item	Standard	Test conditions / Methods	Specifications
Resistance to Soldering Heat	MIL-STD-202 Method 210	Condition B No pre-heat of samples. Temperature : 260±5°C, Time : 10±1s Immersion and emersion rate : 25±6 mm/s Number of heat cycles : 1	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 5\%$
ESD	AEC-Q200 -002	Discharge capacitance : 150 pF Test from 6KV DC to 25KV AD 1 pulse in each polarity (DC=Direct Contact Discharge, AD=Air Discharge)	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 10\%$
Solderability	IEC 60068-2-58 J-STD-002	a) 4 h @ 155°C dry heat Dip @245±5°C 3±0.3sec b) Steam aging 8h±15min @93±3°C Dip @260±5°C 7±0.5sec	95% of termination wetted
Electrical Characterization	Specifications	$V_{1mA}(-55^{\circ}\text{C})$ 、 $V_{1mA}(25^{\circ}\text{C})$ 、 $V_{1mA}(125^{\circ}\text{C})$	Within the specified values
Board Flex	AEC-Q200 -005	Bend the board : 2mm (min.) Duration : 60 (+5) Sec	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 10\%$
Terminal Strength	AEC-Q200 -006	Apply force : 0201=0.15kg (1.5 N) 0402=0.5kg (5 N) 0603=1.0kg (10 N) ≥ 0805=1.8kg (17.7 N) Duration : 60 (+1) Sec	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 10\%$
Electrical Transient Conduction	ISO-7637-2	Test pulses 5a Number of pulses: 10 Test Energy : W_{LD} (Load dump)	No visible damage $ \Delta V_{1mA}/V_{1mA} \leq 15\%$

Soldering Recommendation

■ IR-reflow soldering profile

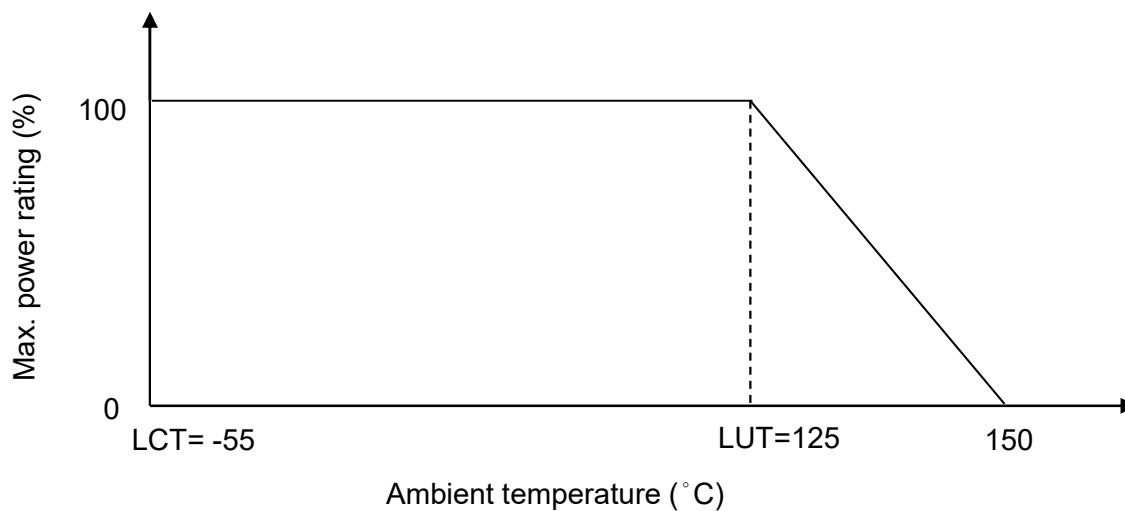


■ Recommended Reworking Conditions with Soldering Iron

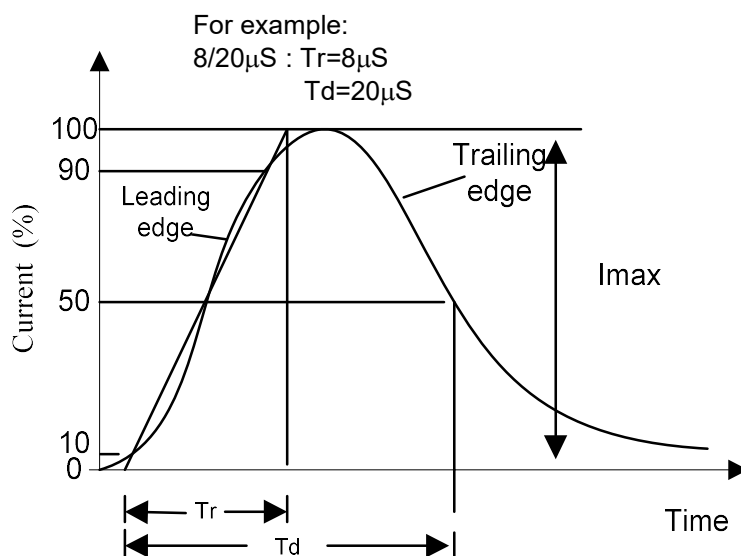
Item	Conditions
Temperature of Soldering Iron-tip	360°C (max.)
Soldering Time	3 sec (max.)
Diameter of Soldering Iron-tip	φ 3mm (max.)
Caution: Not to touch the component surface with soldering iron directly to prevent component damage.	

Power Derating Curve

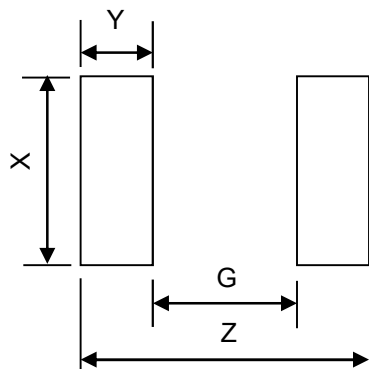
When operating temperature exceeds 125 °C, the power should be derated as below figure.



Surge Current Standard Waveform



Recommended Soldering Pad Dimensions



Size (EIA)	1812
Z	6.0 mm
G	3.0 mm
X	3.6 mm
Y	1.5 mm

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

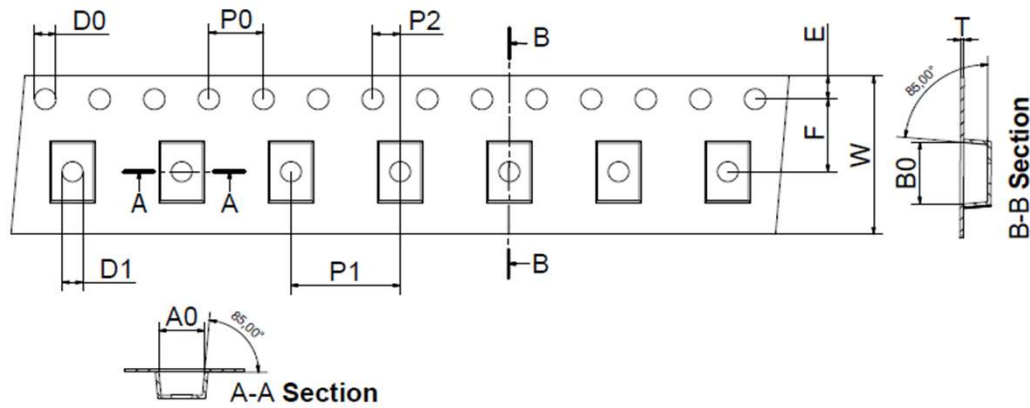
(I) Storage Conditions :

- 1.Storage Temperature : -10℃~+40℃
- 2.Relative Humidity : $\leq 75\%RH$
- 3.Keep away from corrosive atmosphere and sunlight.

(II) Period of Storage : 1 year

Packaging

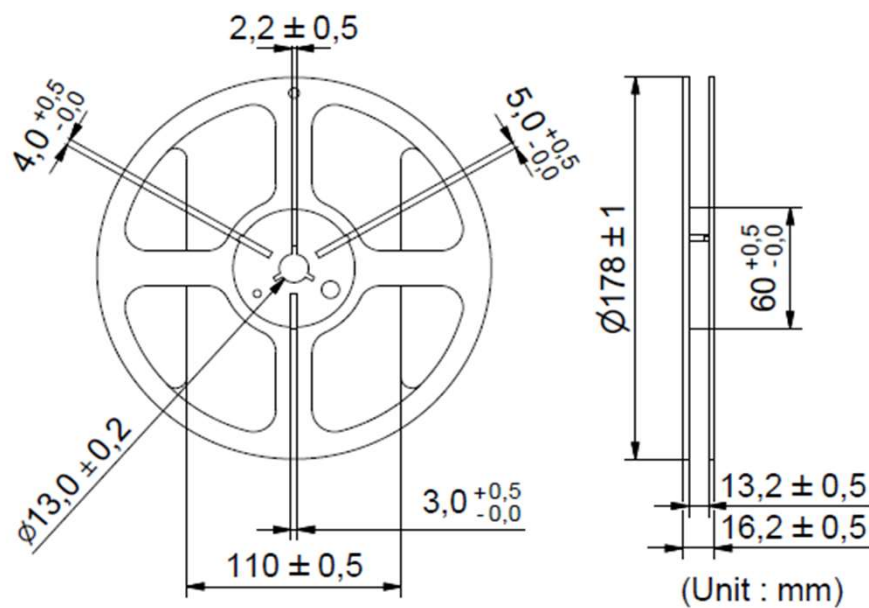
■ Taping Specification (1812 Series)



(Unit : mm)

Index	A ₀	B ₀	W	E	F	P ₁	P ₂	P ₀	D ₀	D ₁	T
Size	±0.2	±0.2	±0.3	±0.1	±0.05	±0.1	±0.05	±0.1	±0.1	±0.1	±0.1
1812	3.65	4.96	12	1.75	5.5	8	2	4	1.55	1.5	0.25

■ Quantity (1000 pcs / reel)



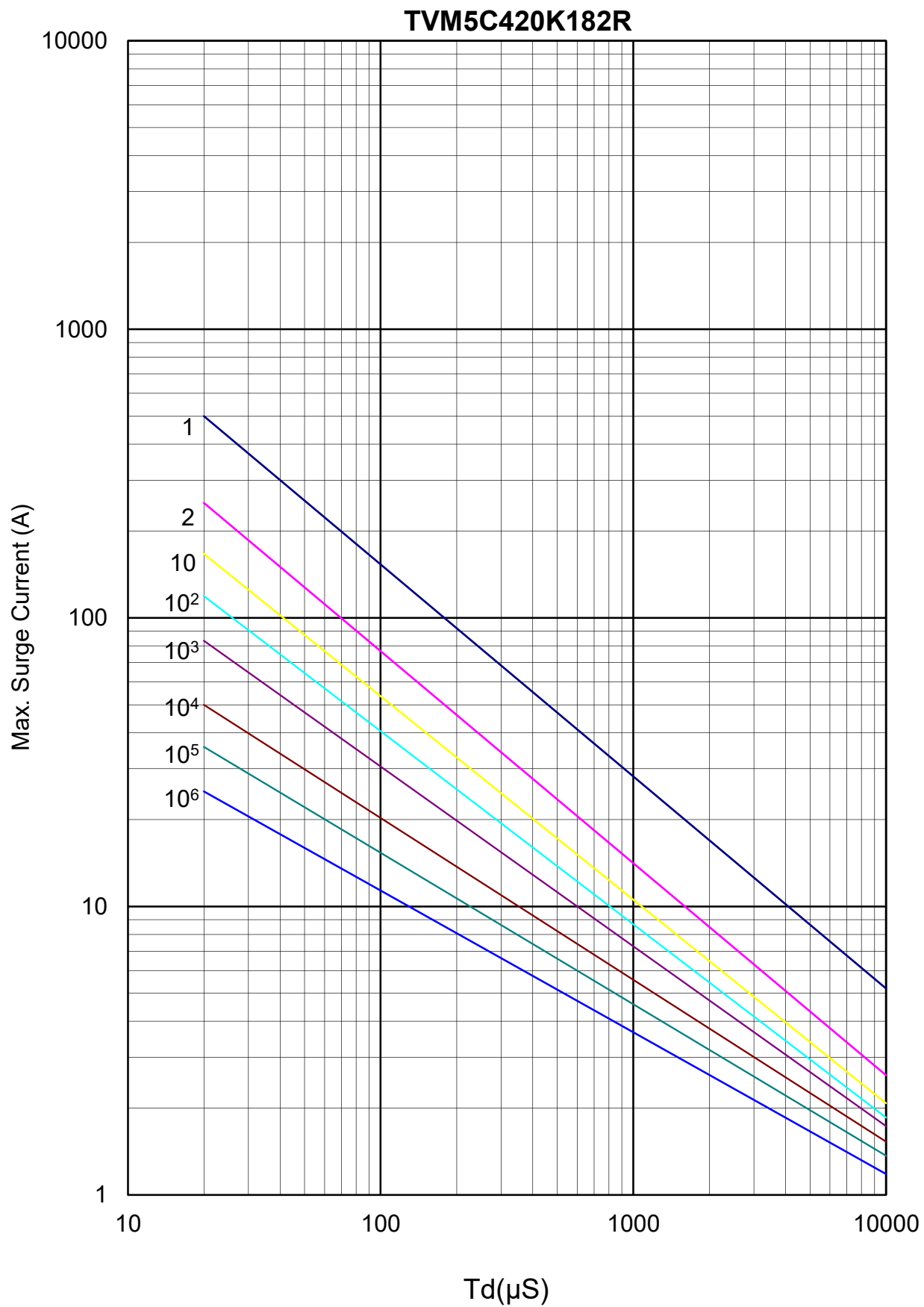
Certificates

- (1) IATF 16949 certificate
- (2) ISO 9001 certificate
- (3) QC 080000 certificate

Test Report

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

Max. Surge Current Derating Curves



Max. Leakage Current and Max. Clamping Voltage Curve

