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SPECIFICATION FOR APPROVAL

CUSTOMER 立創電子

CERTIFIED _____

MODEL/TYPE _____

PART NO. TVM2G090M521R (RoHS+HF)

APPLICATION _____

CUSTOMER P/N _____

ISSUE DATE Jul. 22, 2022

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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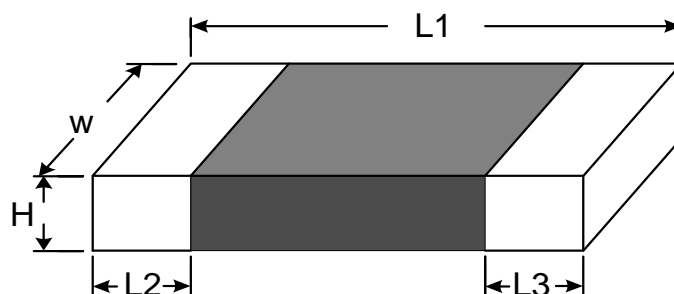
Part Number Code

Example :

TVM **2** **G** **090** **M521** **R**
(1) (2) (3) (4) (5) (6)

No.	Item	Digit	Specification
(1)	Product Type	TVM	ESD Suppressor SMD Varistor TVM Type
(2)	Size (EIA)	2	0805
(3)	Series	G	G series
(4)	Max. Continuous Voltage (V_{DC})	090	$9 \times 10^0 V = 9 V_{DC}$
(5)	Typical Capacitance	M521	$52 \times 10^1 pF = 520 pF (@1MHz)$
(6)	Packaging	R	Reel

Structure and Dimensions



(unit : mm)

L1	W	H max.	L2 and L3
2.00±0.20	1.25±0.20	1.00	0.40±0.20

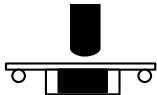
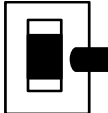
Electrical Characteristics

Part No.	Max. Continuous Voltage	Varistor Voltage	Max. Clamping Voltage (8 / 20μS)		Typical Capacitance @1MHz	Leakage Current @ V _{DC}
	V _{DC} (V)	V _{1mA} (V)	V _P (V)	I _P (A)	C (pF)	I _L (μA)
TVM2G090M521R	9	11 ~ 16	29	1	520±30%	≤20

Part No.	Max. Surge Current (8 / 20μS)	Max. Energy (10 / 1000μS)	Operating Temperature Range	Storage Temperature Range
	I _{max} (A)	W _{max} (J)	(°C)	(°C)
TVM2G090M521R	40	0.1	-40 ~ +85	-40 ~ +125



Reliability

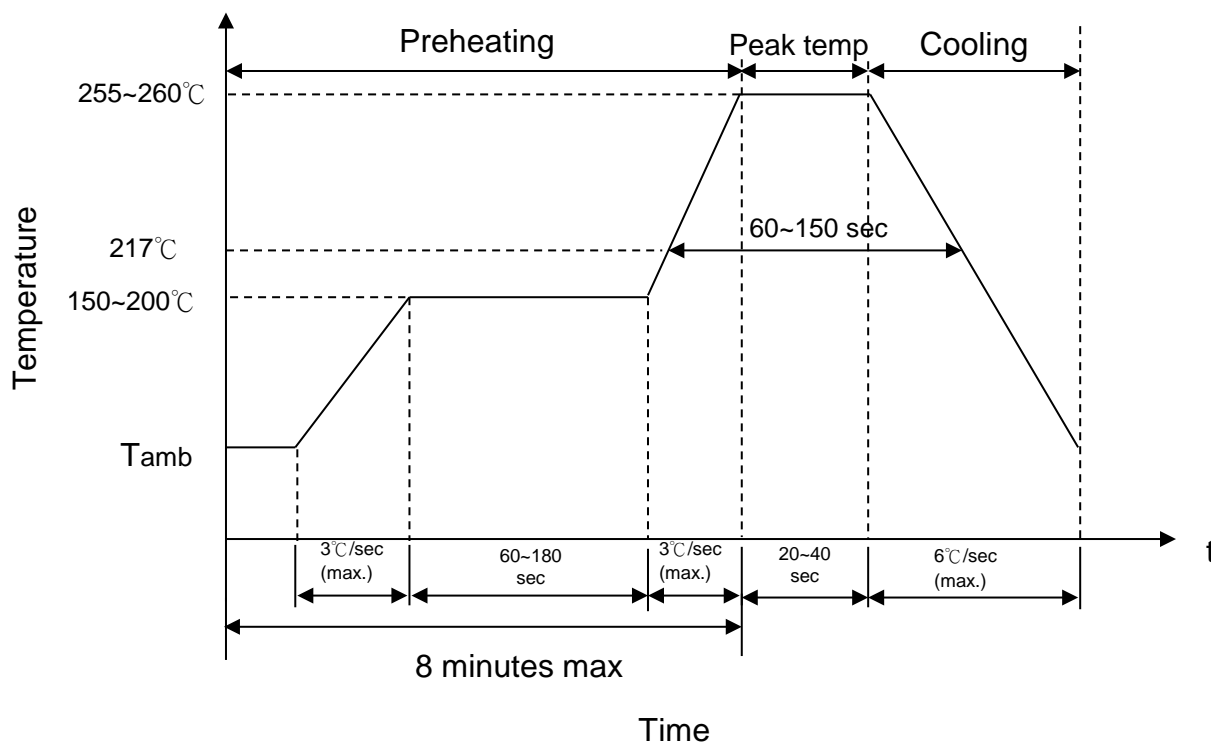
Item	Standard	Test conditions / Methods	Specifications															
Bending Strength	IEC 60068-2-21	Warp : 2mm ; Speed < 0.5mm/sec. Duration : 10 sec on PCB. 	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															
Adhesion	IEC 60068-2-21	Speed < 0.5mm/sec. on PCB 	$W \geq 0.5Kgf$ the terminal electrode shall be break off not the chip element															
Damp Heat Load, Steady State	IEC 60068-2-78	$40 \pm 2 \text{ }^\circ\text{C}$, 90~95% RH , 500 ± 24 hrs at V_{DC}	$ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage															
High Temp. Storage	IEC 60068-2-2	$125 \pm 5 \text{ }^\circ\text{C}$, 1000 ± 24 hrs	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															
Rapid Change of Temperature	IEC 60068-2-14	The conditions shown below shall be repeated 5 cycles on PCB <table border="1" data-bbox="552 1086 1203 1395"> <thead> <tr> <th>Step</th> <th>Temperature ($^\circ\text{C}$)</th> <th>Period (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40 ± 5</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> <tr> <td>3</td> <td>125 ± 5</td> <td>30 ± 3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>5 ± 3</td> </tr> </tbody> </table>	Step	Temperature ($^\circ\text{C}$)	Period (minutes)	1	-40 ± 5	30 ± 3	2	Room temperature	5 ± 3	3	125 ± 5	30 ± 3	4	Room temperature	5 ± 3	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage
Step	Temperature ($^\circ\text{C}$)	Period (minutes)																
1	-40 ± 5	30 ± 3																
2	Room temperature	5 ± 3																
3	125 ± 5	30 ± 3																
4	Room temperature	5 ± 3																
High Temp. Load	MIL-STD-202 Method 108	$85 \pm 2 \text{ }^\circ\text{C}$, 1000 ± 24 hrs at V_{DC}	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															
Low Temp. Load	IEC 60068-2-1	$-40 \pm 5 \text{ }^\circ\text{C}$, 1000 ± 24 hrs at V_{DC}	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															
Max. Energy	IEC 61051-1 4.6	10/1000 μS Waveform, W_{max} , 1 surge current	$ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage															
Vibration	IEC 60068-2-6	Frequency range : 10~55Hz Amplitude : 0.75mm or 98m/s^2 Direction : 3 mutually perpendicular directions, 2hrs each	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage															

Reliability

Item	Standard	Test conditions / Methods	Specifications
Varistor Voltage Temp. Coefficient	Specification Standard	measure V_{1mA} at -40°C 、 25°C 、 125°C	$ Tc \leq 0.05\%/^{\circ}\text{C}$
Climatic Sequence	IEC 61051-1 4.18	a. 125°C x 16 hrs b. 1st cycle : 55°C 93 %RH x 24 hrs c. -40°C x 2 hrs d. 5 cycles : 55°C 93% RH x 24 hrs / Cycle	$ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage
Max. Surge Current	IEC 61051-1 4.6	8/20 μS waveform , I_{max} , 1 surge current	$ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage
Solderability	IEC 60068-2-58	$245 \pm 5^{\circ}\text{C}$, 3 ± 0.3 sec	at least 95% of terminal electrode is covered by new solder
Resistance to Soldering Heat	IEC 60068-2-58	$260 \pm 5^{\circ}\text{C}$, 10 ± 1 sec	$ \Delta V_{1mA}/V_{1mA} \leq 5\%$ No visible damage
Electrostatic Discharge (ESD)	IEC 61000-4-2	Contact discharge test voltage : 8KV Polarity : Positive / Negative Number of test pulses : 10 / 10 times Discharge network : 150pF , 330 Ω Operating temperature : $15 \sim 35^{\circ}\text{C}$ Operating humidity : 25~75%RH	$ \Delta V_{1mA}/V_{1mA} \leq 10\%$ No visible damage

Soldering Recommendation

■ IR-reflow soldering profile



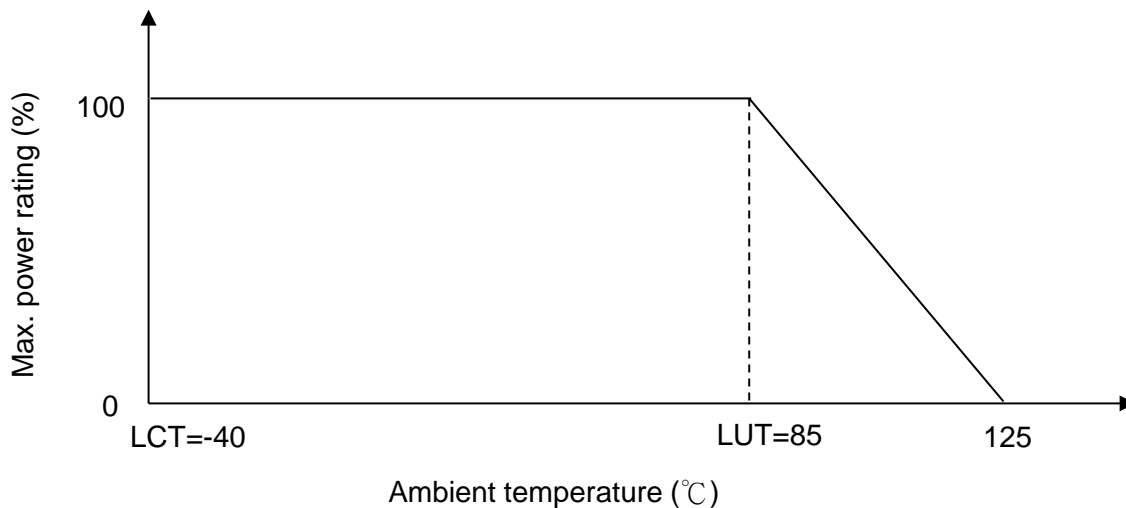
■ Recommended Reworking Conditions with Soldering Iron

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.	

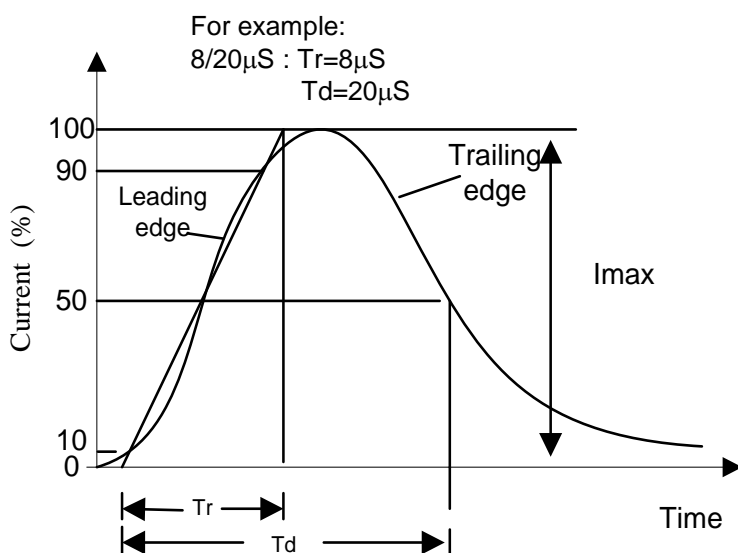


Power Derating Curve

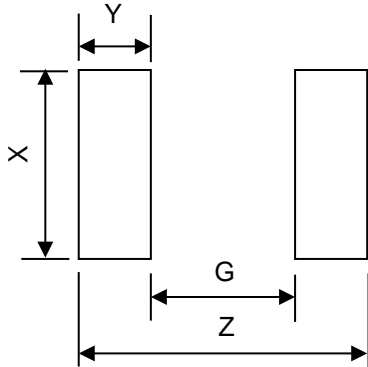
When operating temperature exceeds 85°C, the power should be derated as below figure.



Surge Current Standard Waveform



Recommended Soldering Pad Dimensions



Size (EIA)	0805
Z	3.4 mm
G	1.0 mm
X	1.4 mm
Y	1.2 mm

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

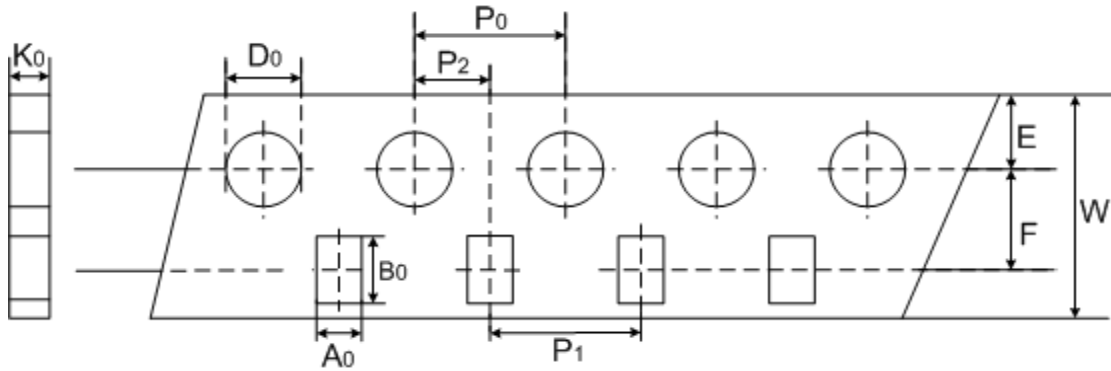
(I) Storage Conditions :

- 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

Packaging

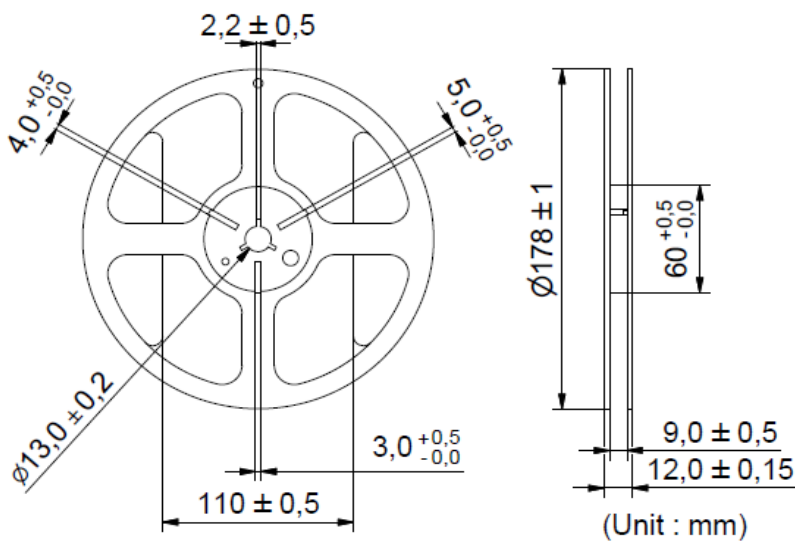
■ Taping specification (0805 Series)



(Unit : mm)

Index	A ₀	B ₀	W	E	F	P ₁	P ₂	P ₀	D ₀	K ₀
Size	±0.2	±0.2	±0.2	±0.1	±0.05	±0.1	±0.05	±0.1	±0.1	±0.1
0805	1.5	2.3	8	1.75	3.5	4	2	4	1.55	1

■ Quantity (3500 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

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