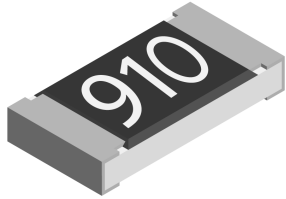


## Fusible Thin Film Chip Resistor



M25SI fusible thin film chip resistors are designed for overload protection in modern professional electronics. Typical applications include automotive, telecommunication and industrial equipment.

### FEATURES

- Metal film on high quality ceramic
- Special protective top coat
- Flame retardant
- Sn solder contacts on Ni barrier layer
- Fusible resistor for constant voltage
- Automatic placement compatibility
- Compliant to RoHS directive 2002/95/EC



**RoHS**  
COMPLIANT

### METRIC SIZE

INCH:	1206
METRIC:	RR 3216M

### TECHNICAL SPECIFICATIONS

DESCRIPTION	M25SI
Metric size	RR 3216M
Resistance range	5 $\Omega$ to 3.9 k $\Omega$
Resistance tolerance	$\pm 5 \%$
Temperature coefficient	$\pm 100$ ppm/K
Climatic category (LCT/UCT/days)	55/125/56
Rated dissipation, $P_{70}$ <sup>(1)</sup>	0.25 W
Limiting element voltage, $U_{max}$ , DC/AC <sub>RMS</sub>	$\sqrt{P \times R}$
Maximum permissible film temperature	125 °C
Insulation voltage (1 min), $U_{ins}$ DC/AC <sub>peak</sub>	> 300 V
Thermal resistance <sup>(2)</sup>	$\leq 220$ K/W
Insulation resistance	> 10 <sup>9</sup> $\Omega$
Failure rate	$\leq 1 \times 10^{-9}$ h <sup>-1</sup>
E-Series	24

#### Notes

<sup>(1)</sup> The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature is not exceeded. Furthermore, a high level of ambient temperature or of power dissipation may raise the temperature of the solder joint, hence special solder alloys or board materials may be required to maintain the reliability of the assembly.

<sup>(2)</sup> Measuring conditions in accordance with EN 140401-801

- Marking: 3 digits
- Tolerance 1 % on request
- Beige top coat

### PULSE TEST DATA

	0.9 W	0.3 W
Pulse power (square pulse)	0.9 W	0.3 W
Pulse duration $t_i$	100 $\mu$ s	100 ms
Pulse pause $t_p$	100 ms	1 s
Number of pulses	10 <sup>5</sup>	10 <sup>5</sup>
Drift after pulse test	< 0.1 %	< 0.1 %

## PART NUMBER AND PRODUCT DESCRIPTION (1)

PART NUMBER: M251206BB9109JP500



MODEL/SIZE	SPECIAL CHARACTER	TC	VALUE	TOLERANCE	PACKAGING	SPECIAL
M251206	B = SI	B = ± 100 ppm/K	3 digit value 1 digit multiplier	J = ± 5 %	P5	Up to 2 digits 00 = Standard

MULTIPLIER  
 8 = \*10<sup>-2</sup>  
 9 = \*10<sup>-1</sup>  
 0 = \*10<sup>0</sup>  
 1 = \*10<sup>1</sup>

PRODUCT DESCRIPTION: M25SI 100 91R 5 % P5

M25SI	100	91R	5 %	P5
MODEL	TCR	RESISTANCE VALUE	TOLERANCE	PACKAGING
M25SI	± 100 ppm/K	91R = 91 Ω	± 5 %	P5

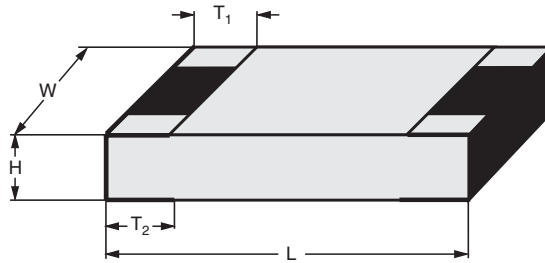
**Note**

(1) Products can be ordered using the PART NUMBER or PRODUCT DESCRIPTION

## PACKAGING

MODEL	TAPE WIDTH [mm]	PITCH	REEL DIAMETER [mm/inch]	PIECES PER REEL	PACKAGING CODE	TYPE OF CARRIER TAPE
M25SI	8	4	180/7	5000	P5	Paper

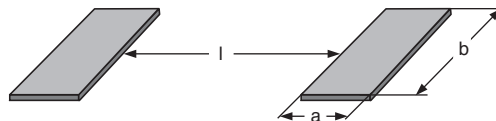
## DIMENSIONS



## DIMENSIONS AND MASS

SIZE		H (mm)	L (mm)	W (mm)	T <sub>1</sub> (mm)	T <sub>2</sub> (mm)	MASS (mg)
INCH	METRIC						
1206	3216	0.55 ± 0.05	3.2 + 0.10/- 0.20	1.6 ± 0.15	0.45 ± 0.2	0.4 ± 0.2	10

## SOLDER PAD DIMENSIONS



## RECOMMENDED SOLDER PAD DIMENSIONS

SIZE		WAVE SOLDERING			REFLOW SOLDERING		
INCH	METRIC	a (mm)	b (mm)	l (mm)	a (mm)	b (mm)	L (mm)
1206	3216	0.9	1.7	2.0	1.1	1.7	2.3

## DESCRIPTION

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. A homogeneous film of metal alloy is deposited on a high grade  $Al_2O_3$  ceramic substrate. Specially designed inner contacts are deposited on both sides. A special laser is used to achieve the target value by smoothly cutting a meander groove in the resistive layer without damaging the ceramics. The resistor elements are covered by a protective coating designed for electrical, mechanical and climatic protection. The terminations receive a final pure tin on nickel plating.

The result of the determined production is verified by an extensive testing procedure. Only accepted products are laid directly into the paper tape in accordance with **IEC 60286-3**.

## ASSEMBLY

The resistors are suitable for processing on automatic SMD assembly systems. They are suitable for automatic soldering using wave, reflow or vapour phase as shown in **IEC 61760-1** <sup>(3)</sup>. The encapsulation is resistant to all cleaning

solvents commonly used in the electronics industry, including alcohols, esters and aqueous solutions. The use of conformal coating is not permitted. The resistors are RoHS compliant; the pure tin plating provides compatibility with lead (Pb)-free and lead-containing soldering processes. Solderability is specified for 2 years after production or requalification. The permitted storage time is 20 years. The immunity of the plating against tin whisker growth has been proven under extensive testing.

All products comply with the **GADSL** <sup>(1)</sup> and the **CEFIC-EECA-EICTA** <sup>(2)</sup> list of legal restrictions on hazardous substances. This includes full compliance with the following directives:

- 2000/53/EC End of Vehicle life Directive (ELV) and Annex II (ELV II)
- 2002/95/EC Restriction of the use of Hazardous Substances directive (RoHS)
- 2002/96/EC Waste Electrical and Electronic Equipment Directive (WEEE)

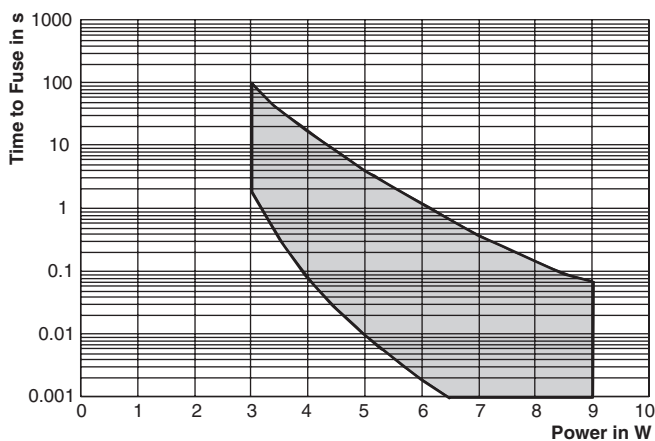
## Notes

<sup>(1)</sup> Global Automotive Declarable Substance List, see [www.gadsl.org](http://www.gadsl.org)

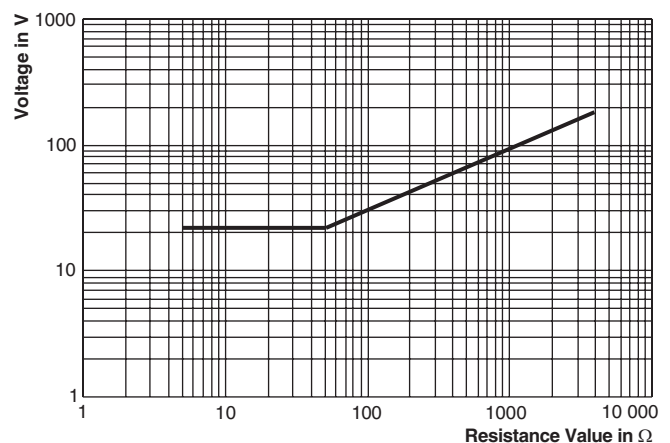
<sup>(2)</sup> CEFIC (European Chemical Industry Council), EECA (European Electronic Component Manufacturers Association), EICTA (European trade organisation representing the information and communications technology and consumer electronics), see [www.eicta.org](http://www.eicta.org) → issues → environment policy → chemicals → chemicals for electronics

<sup>(3)</sup> The quoted IEC standards are also released as EN standards with the same number and identical contents

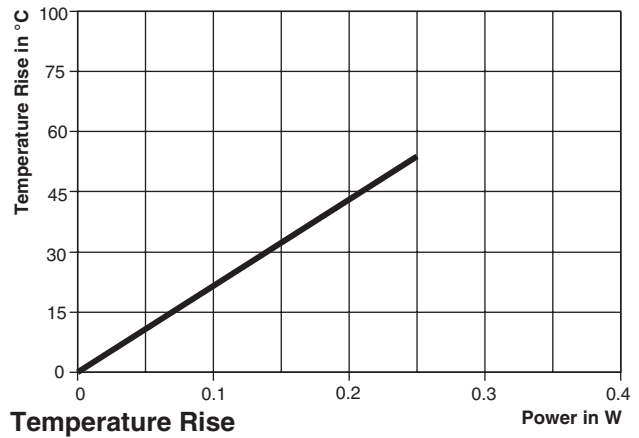
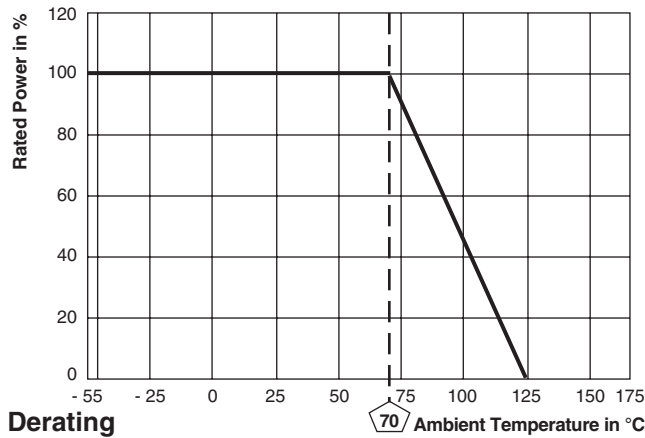
## FUNCTIONAL PERFORMANCE



Fusing Performance



Maximum Applicable Voltage after Fusing



**TEST AND REQUIREMENTS**

All tests except the fusing characteristics are carried out in accordance with the following specifications:

EN 60115-1, generic specification

EN 140400, sectional specification

The tests are carried out in accordance with IEC 60068 (3) and under standard atmospheric conditions in accordance with IEC 60068-1, 5.3 (3). Climatic category LCT/UCT/56 (rated temperature range: Lower category temperature,

upper category temperature; damp heat, long term, 56 days) is valid.

Unless otherwise specified the following values apply:

Temperature: 15 °C to 35 °C

Relative humidity: 45 % to 75 %

Air pressure: 86 kPa to 106 kPa (860 mbar to 1060 mbar).

The components are mounted for testing on boards in accordance with EN 60115-1, 4.31 unless otherwise specified.

TEST PROCEDURES AND REQUIREMENTS		
TEST	CONDITIONS OF TEST	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)
Endurance test at 70 °C IEC 60115-1 4.25.1	1000 h at 70 °C 1.5 h ON, 0.5 h OFF	≤ ± 1 %
Endurance at UCT IEC 60115-1 4.25.3	1000 h at 125 °C without load	≤ ± 1 %
Thermal shock IEC 60115-1 4.19, IEC 60068-2-14	Rapid change between upper and lower category temperature	≤ ± 0.2 %
Damp heat steady state IEC 60115-1 4.24, IEC 60068-2-78	56 days at 40 °C and 93 % relative humidity	≤ ± 0.5 %
Resistance to soldering heat IEC 60115-1 4.18, IEC 60068-2-58	10 s at 260 °C solder bath temperature	≤ ± 0.2 %



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.