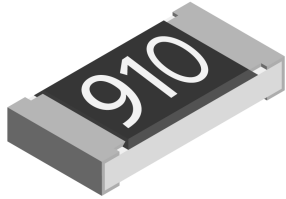


Fusible Thin Film Chip Resistor



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

Notes

⁽¹⁾ 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.

⁽²⁾ 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 μ s	100 ms
Pulse pause t_p	100 ms	1 s
Number of pulses	10 ⁵	10 ⁵
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 = *10⁻²
 9 = *10⁻¹
 0 = *10⁰
 1 = *10¹

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

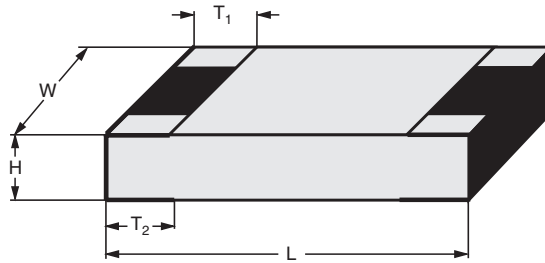
Note

(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

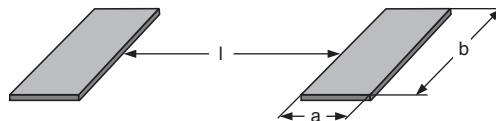
DIMENSIONS



DIMENSIONS AND MASS

SIZE		H (mm)	L (mm)	W (mm)	T ₁ (mm)	T ₂ (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** ⁽³⁾. 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** ⁽¹⁾ and the **CEFIC-EECA-EICTA** ⁽²⁾ 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)

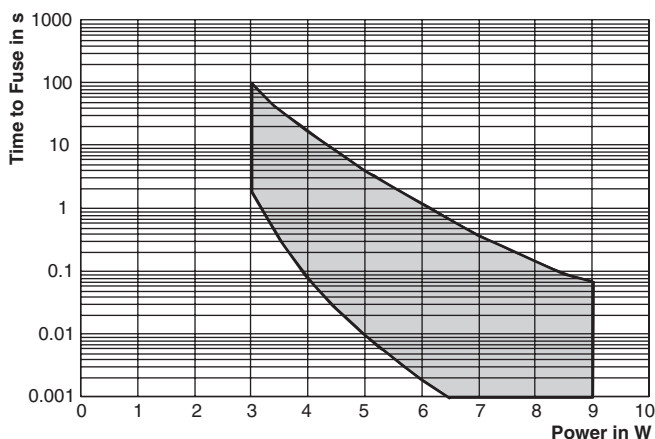
Notes

⁽¹⁾ Global Automotive Declarable Substance List, see www.gadsl.org

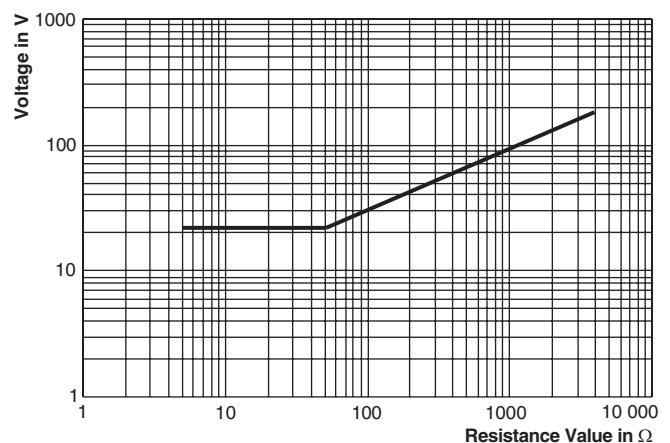
⁽²⁾ CEFIC (European Chemical Industry Council), EECA (European Electronic Component Manufacturers Association), EICTA (European trade organisation representing the information and communications technology and consumer electronics), see www.eicta.org → issues → environment policy → chemicals → chemicals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

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

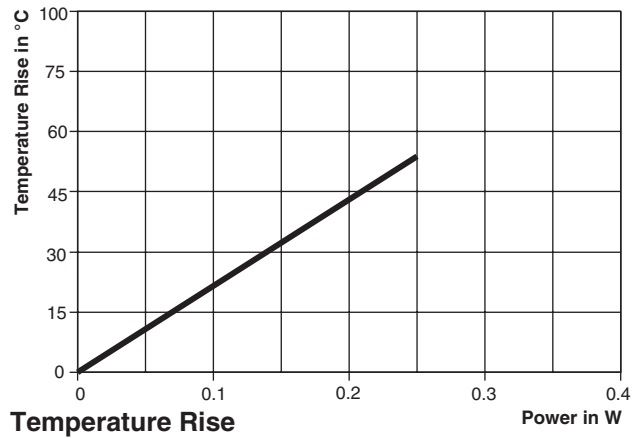
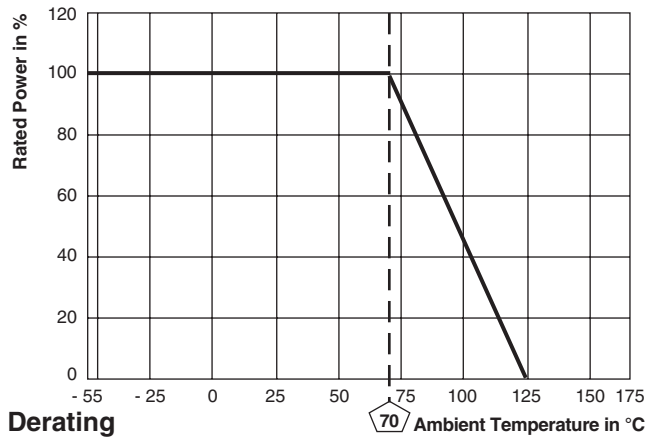
FUNCTIONAL PERFORMANCE



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 %



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