



**UNI-ROYAL**  
厚聲集團

# DATA SHEET

**Product Name** Metal Foil Chip Resistors

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**Part Name** MS12 Series

**File No.** SMD-SP-028

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Manufacture Plant Uniroyal Electronics Industry Co., Ltd.

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Royal Electronic Factory (Thailand) Co., Ltd.

Royal Technology (Thailand) Co., Ltd.

## 1. Scope

- 1.1 This datasheet is the characteristics of Metal Foil Chip Resistors manufactured by UNI-ROYAL.
- 1.2 High power rating.
- 1.3 Ultra low resistance value.
- 1.4 Excellent frequency response.
- 1.5 Excellent temperature coefficient characteristics.
- 1.6 RoHS compliant

## 2. Part No. System

Part No. includes 14 codes shown as below:

- 2.1 1<sup>st</sup>~4<sup>th</sup> codes: Part name. E.g.: MS12
- 2.2 5<sup>th</sup>~6<sup>th</sup> codes: Power rating.

Wattage	1	2	3
Normal Size	1W	2W	3W

- 2.3 7<sup>th</sup> code: Tolerance. E.g.: F=±1%                      J=±5%
- 8<sup>th</sup>~11<sup>th</sup> codes: Resistance Value.

2.4.1 If value belongs to standard value of E-24 series, the 8<sup>th</sup> code is zero, 9<sup>th</sup>~10<sup>th</sup> codes are the significant figures of resistance value, and the 11<sup>th</sup> code is the power of ten.

2.4.2 If value belongs to standard value of E-96 series, the 8<sup>th</sup>~10<sup>th</sup> codes are the significant figures of resistance value, and the 11<sup>th</sup> code is the power of ten.

2.4.3 11<sup>th</sup> codes listed as following:

$$0=10^0 \quad 1=10^1 \quad 2=10^2 \quad 3=10^3 \quad 4=10^4 \quad 5=10^5 \quad 6=10^6 \quad J=10^{-1} \quad K=10^{-2} \quad L=10^{-3} \quad M=10^{-4}$$

2.5 12<sup>th</sup>~14<sup>th</sup> codes.

2.5.1 12<sup>th</sup> code: Packaging Type. E.g.: C=Bulk                      T=Tape/Reel

2.5.2 13<sup>th</sup> code: Standard Packing Quantity.

$$4=4,000\text{pcs} \quad 5=5,000\text{pcs} \quad C=10,000\text{pcs} \quad D=20,000\text{pcs} \quad E=15,000\text{pcs}$$

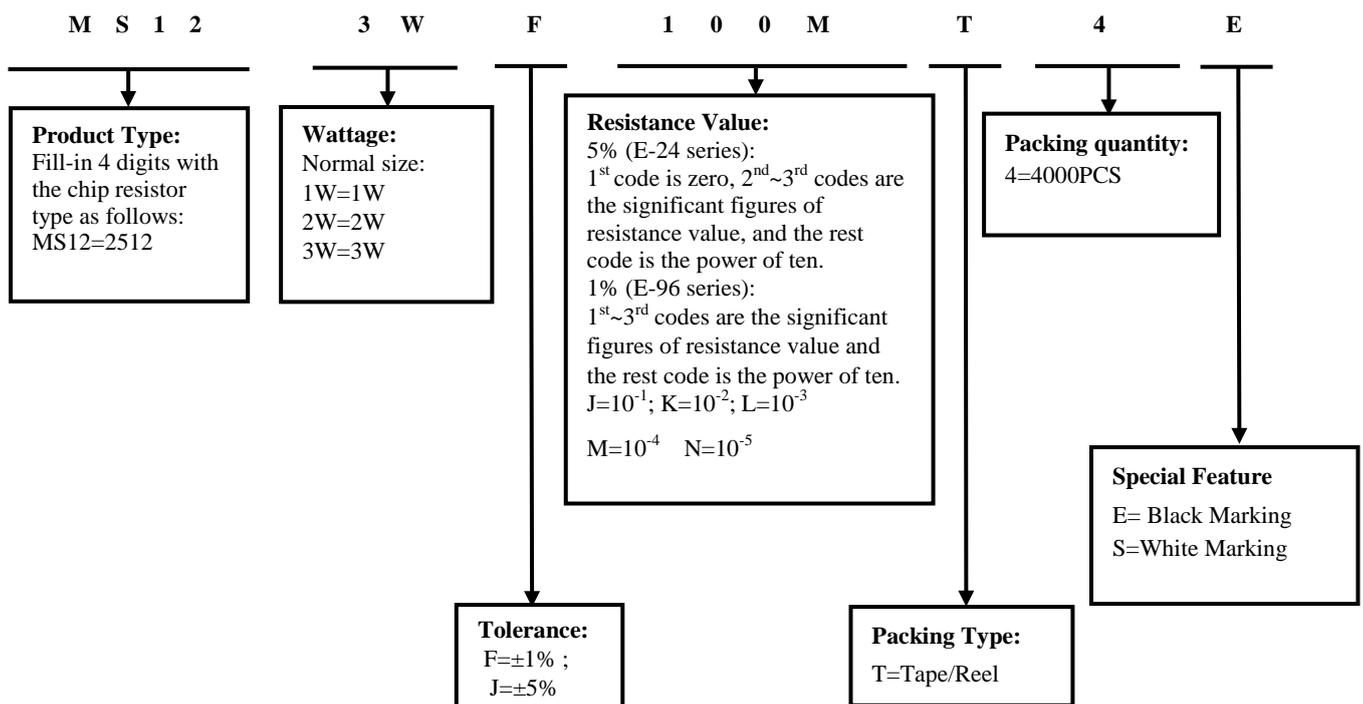
Chip Product: BD=B/B-20000pcs              TC=T/R-10000pcs

2.5.3 14<sup>th</sup> code: Special features.

E = Environmental Protection, Lead Free, or Standard type.

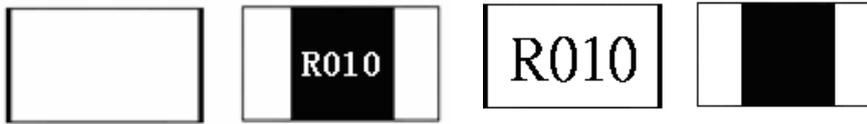
## 3. Ordering Procedure

(Example: MS12 3W ±1% 10mΩ T/R-4000)



4. Marking

The first digit . Is “R” which as decimal point.

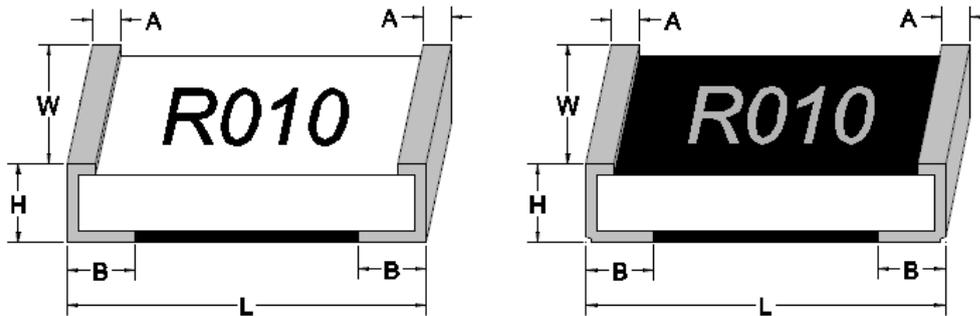


R010 → 10mΩ

5. Dimension

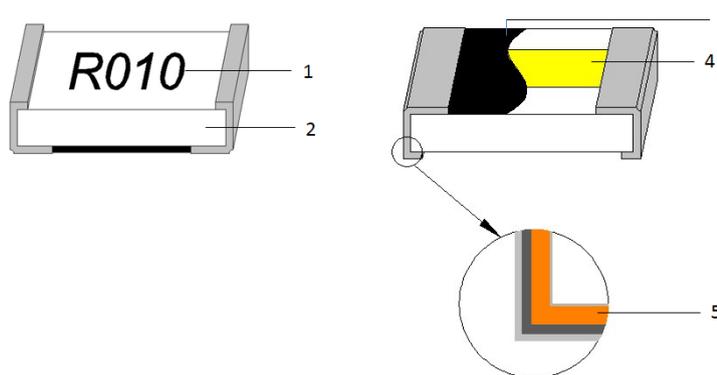
E = Black Marking

S=White Marking



Type	70°C Power	Dimension(mm)					Resistance Range	T.C.R PPM/°C
		L	W	H	A	B		
MS12	2W 3W	6.35±0.20	3.20±0.25	0.70±0.20	≤1.0	1.35±0.30	5mΩ	≥10mΩ : ±50 <10mΩ : ±100
						1.15±0.30	6mΩ	
						1.75±0.30	7mΩ 8mΩ	
						1.15±0.30	9mΩ~15mΩ	
	0.90±0.30	16mΩ~100mΩ						
2W	6.35±0.20	3.20±0.25	0.70±0.20	≤1.0	0.90±0.30	101mΩ~200mΩ		

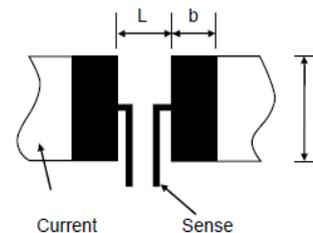
6. Structure



1	Marking	4	Resistance layer
2	Alumina Substrate	5	Terminal (Cu/Ni/ Sn)
3	Protective layer		

## 7. Soldering pad size recommended

Type	Dimension(mm)		
	L	b	a
MS12	2.20±0.10	3.40±0.10	4.00±0.10



## 8. Derating Curve

Power rating will change based on continuous load at ambient temperature from -55 to 155°C.

It is constant between -55 to 70°C, and derate to zero when temperature rise from 70 to 155°C.

Voltage rating:

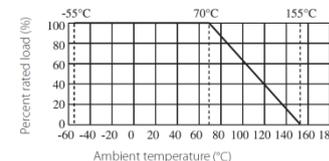
Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

$$RCWV = \sqrt{P \times R}$$

Remark: RCWV: Rating Continuous Working Voltage (Volt.) P: power rating (Watt) R: nominal resistance (Ω)

In no case, the rated DC or RMS AC continuous working voltage must be greater than the applicable maximum value.

The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is lower.



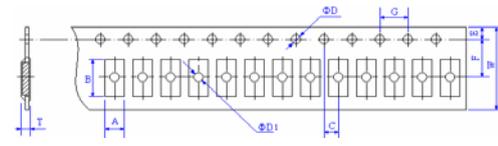
## 9. Performance Specification

Characteristic	Limits		Test Methods (GB/T5729&JIS-C-5201&IEC60115-1)
Temperature Coefficient	Refer to item 5.0		4.8 Natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/}^\circ\text{C)}$ R <sub>1</sub> : Resistance Value at room temperature (t <sub>1</sub> ) ; R <sub>2</sub> : Resistance at test temperature (t <sub>2</sub> ) t <sub>1</sub> : +25°C or specified room temperature t <sub>2</sub> : Test temperature (+125°C)
Short-time overload	1%	±(1.0%+0.001Ω)	4.13 Permanent resistance change after the application of a potential of 5 times rated power for 5 seconds.
	5%	±(2.0%+0.001Ω)	
Low Temperature Storage	±(1.0%+0.001Ω)		4.23.4 Lower limit temperature ∙ for 1000H
High Temperature Exposure	±(1.0%+0.001Ω)		4.23.2 Upper limit temperature ∙ for 1000H
Solderability	More than 95% coverage rate		4.17 The surface of solder must be new, smooth, clean, shiny and continuous, and without concentrated pinholes. The solder's temperature must be within 245±3°C. Hold in hot solder 2~3seconds.
soldering heat	±(0.5%+0.005Ω)		4.18 Dipped into solder at 260°C for 10 seconds.
Load life	1%	± (1%+0.001Ω)	4.25.1 Permanent resistance change after 1,000 hours operating at rated power at 70±2°C, 1.5hrs ON ,0.5hrs OFF.
	5%	± (3%+0.001Ω)	
Load life in humidity	1%	± (1.0%+0.001Ω)	7.9 40±2°C, 1000hrs at rated power, 90~95RH , 1.5hrs ON, 0.5hrs OFF
	5%	± (3.0%+0.001Ω)	

## 10. Packing

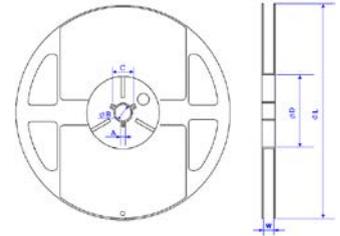
10.1 Dimension of plastic taping: (Unit: mm)

Type	A ± 0.2	B ± 0.2	C ± 0.05	$\Phi D_{-0}^{+0.1}$	$\Phi D1_{-0}^{+0.25}$	E ± 0.1	F ± 0.05	W ± 0.2	T ± 0.10	G ± 0.1
MS12	3.50	6.70	2.00	1.50	1.50	1.75	5.50	12.00	1.00	4.00



10.2 Dimension of Reel : (Unit: mm)

Type	TAPING	Qty/Reel	A±0.5	B±0.5	C±0.5	$\Phi D \pm 1$	$\Phi L \pm 2$	W±1	Wt. (mg)
MS12	Embossed	4,000pcs	2.0	13.0	21.0	60.0	178.0	13.8	50~58



## 11. Note

- 12.1. UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35°C under humidity between 25 to 75%RH.  
 Even under storage conditions recommended above, solder ability of products will be degraded stored over 1 year old.
- 11.2. Cartons must be placed in correct direction which indicated on carton, otherwise the reel or wire will be deformed.
- 11.3. Storage conditions as below are inappropriate:
- Stored in high electrostatic environment
  - Stored in direct sunshine, rain, snow or condensation.
  - Exposed to sea wind or corrosive gases, such as Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>, etc.

## 12. Record

Version	Description	Page	Date	Amended by	Checked by
1	First version	1~5	Aug.23, 2021	Dongmei Liao	Shuai Wu
2	Modify the temperature coefficient test conditions	4	Oct.31, 2022	Haiyan Chen	Yuhua Xu

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