



**UNI-ROYAL**  
厚聲集團

# DATA SHEET

**Product Name** Metal Foil Chip Resistors

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**Part Name** MS Series

## Uniroyal Electronics Global Co., Ltd.

88 Longteng Road, Economic & Technical Development Zone, Kunshan, Jiangsu, China

Tel +86 512 5763 1411 / 22 /33

Email [marketing@uni-royal.cn](mailto:marketing@uni-royal.cn)

Manufacture Plant Uniroyal Electronics Industry (kunshan) co., ltd.  
Uniroyal Electronics Industry Co., Ltd.  
Uniroyal Electronics Global Co.,Ltd Shenzhen Branch  
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Uniroyal Electronics Global Co.,Ltd Xiamen Branch  
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Brands *RoyalOhm* *UniOhm*



## 1. Scope

- 1.1 This specification for approve relates to the 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 1st~4th codes: Part name. E.g.: MS05 , MS06 , MS10, MS12

2.2 5th~6th codes: Power rating.

E.g.: W=Normal Size                      “1~G” = “1~16”

Wattage	1/2	1	1.5	2	3
Normal Size	W2	1W	1A	2W	3W

2.3 7<sup>th</sup> code: Tolerance. E.g.: F=±1%    J=±5%

2.4 8<sup>th</sup>~11<sup>th</sup> codes: Resistance Value.

2.4.1 If value belongs to standard value of ≥5% series, 8<sup>th</sup> code would be zero, 9<sup>th</sup>~10<sup>th</sup> codes are significant figures of the resistance and 11<sup>th</sup> code is the power of ten.

2.4.2 If value belongs to standard value of ≤2% series, 8<sup>th</sup>~10<sup>th</sup> codes are significant figures of the resistance, and 11<sup>th</sup> code is the power of ten.

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

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

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

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

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

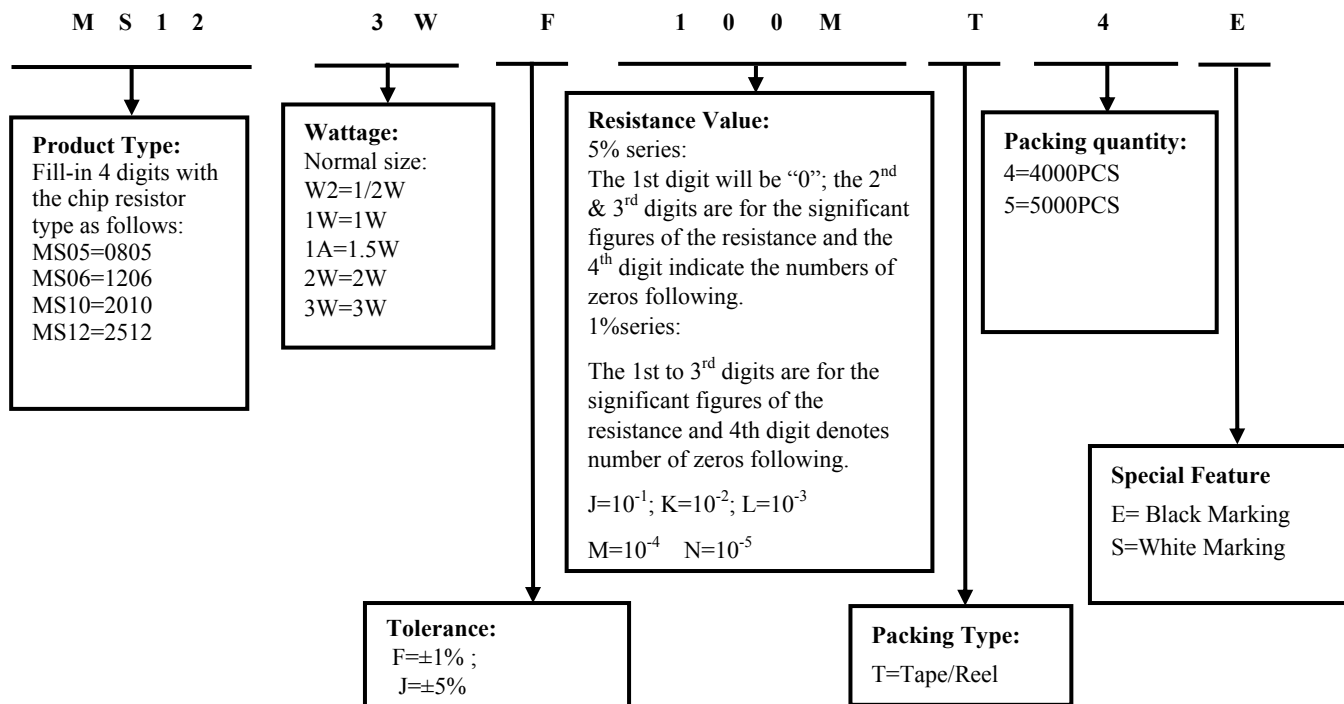
$$4=4000\text{pcs} \quad 5=5000\text{pcs}$$

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

E = Black Marking.    S=White Marking

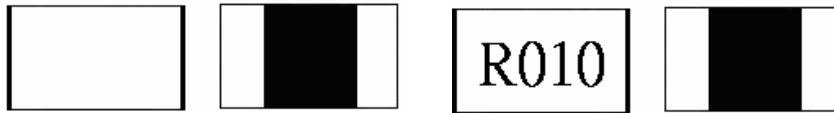
## 3. Ordering Procedure

(Example: MS12 3W ±1% 10mΩ T/R-4000)



#### 4. Marking

The first digit . Is "R" which as decimal point.

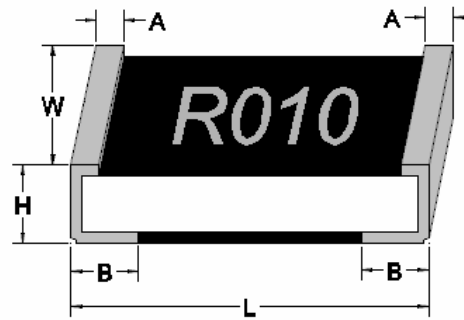
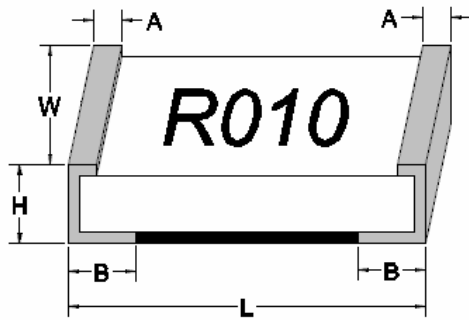


R010 → 10mΩ

#### 5. Dimension

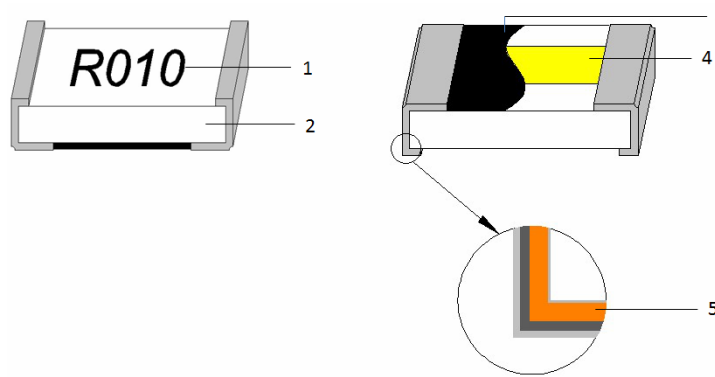
E = Black Marking

S=White Marking



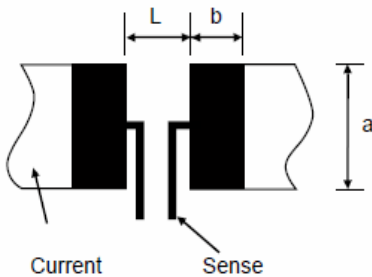
Type	70°C Power	Dimension(mm)					Resistance Range	T.C.R
		L	W	H	A	B	±1%&±5%	PPM/°C
MS05	1/2W	2.00±0.30	1.20±0.30	0.60±0.20	≤1.0	0.65±0.15	5 mΩ~9mΩ	±150
	0.57±0.15					12 mΩ~13mΩ		
	1W	2.00±0.30	1.20±0.30	0.60±0.20	≤1.0	0.42±0.15	15mΩ~30mΩ	
MS06	1W	3.10±0.20	1.60±0.30	0.70±0.20	≤1.0	0.86±0.25	7mΩ	±100
						0.76±0.25	5mΩ~6mΩ 8mΩ 9mΩ	±100
							27mΩ~35mΩ	±50
						0.46±0.25	10mΩ~25mΩ	±100
MS10	1.5W	5.00±0.20	2.50±0.25	0.70±0.20	≤1.0	1.45±0.30	6mΩ	±50
						1.25±0.30	4mΩ 7mΩ	
						1.00±0.30	5mΩ 8mΩ 9mΩ 10mΩ	±50
							11mΩ~25mΩ 150mΩ	±30
MS12	3W	6.35±0.20	3.20±0.25	1.00±0.20	≤1.0	2.55±0.30	1mΩ	±50
				0.70±0.20	≤1.0	1.75±0.30	2mΩ	
						2.15±0.30	3mΩ	
						1.75±0.30	4mΩ 7mΩ 8mΩ	
						1.35±0.30	5mΩ	
						1.15±0.30	6mΩ 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		

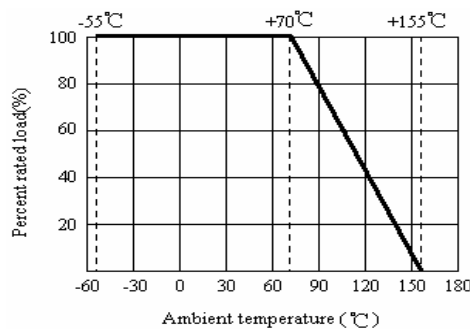
7. Recommend land pattern



Type	Dimension(mm)		
	L	b	a
MS05	1.20±0.05	1.20±0.05	1.2±0.05
MS06	1.40±0.10	1.90±0.10	1.80±0.10
MS10	3.60±0.10	1.40±0.10	3.00±0.10
MS12	2.20±0.10	3.40±0.10	4.00±0.10

8. Derating Curve

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55°C to 70°C. For temperature in excess of 70°C, the load shall be derated as shown in figure 1



8.1 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:

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

Where: RCWV commercial-line frequency and waveform (Volt.)

P = power rating (WATT.) R = nominal resistance (OHM)

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

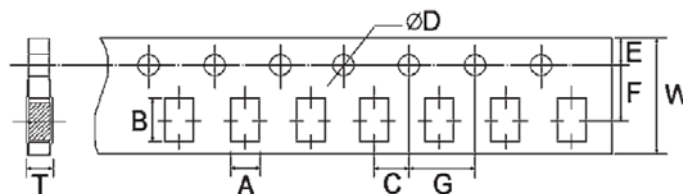
The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is less

## 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 (Upper limit temperature or Lower limit temperature) t <sub>1</sub> : +25°C or specified room temperature t <sub>2</sub> : Upper limit temperature or Lower limit temperature test temperature
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,90~95%RH , 1.5hrs ON,0.5hrs OFF
	5%	± (3.0%+0.001Ω)	

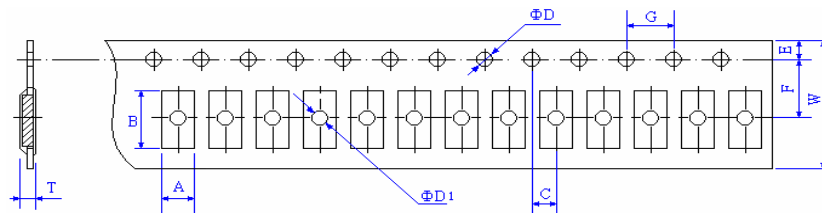
## 10. Packing of Surface Mount Resistors

### 10.1 Dimension of Paper Taping :(Unit: mm)



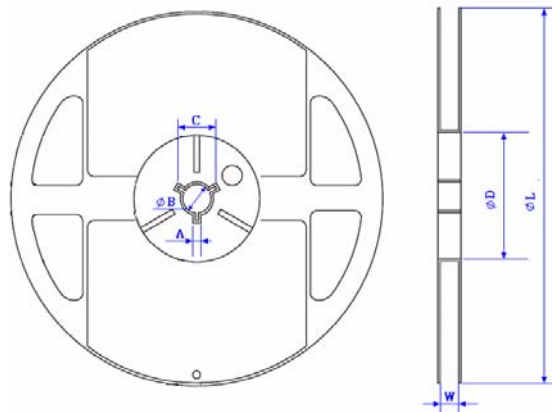
Type	A ±0.2	B ±0.2	C ±0.05	$\begin{matrix} +0.1\Phi \\ D \\ -0 \end{matrix}$	E ±0.1	F ±0.05	G ±0.1	W ±0.2	T ±0.1
MS05	1.65	2.40	2.00	1.50	1.75	3.50	4.00	8.00	0.81
MS06	2.00	3.60	2.00	1.50	1.75	3.50	4.00	8.00	0.81

10.2 Dimension of Embossed Taping: (Unit: mm)



Type	A ± 0.2	B ± 0.2	C ± 0.05	+0.1 φD -0	+0.25 φD1 -0	E ± 0.1	F ± 0.05	W ± 0.2	T ±0.10	G ±0.1
MS10	2.90	5.60	2.00	1.50	1.50	1.75	5.50	12.00	1.00	4.00
MS12	3.50	6.70	2.00	1.50	1.50	1.75	5.50	12.00	1.00	4.00

10.3 Dimension of Reel : (Unit: mm)



Type	TAPING	Qty/Reel	A±0.5	B±0.5	C±0.5	φD±1	φL±2	W±1	Wt. (mg)
MS05	Paper	5,000pcs	2.0	13.0	21.0	60.0	178.0	10.0	5.9
MS06	Paper	5,000pcs	2.0	13.0	21.0	60.0	178.0	10.0	13.6
MS10	Embossed	4,000pcs	2.0	13.0	21.0	60.0	178.0	13.8	35.0
MS12	Embossed	4,000pcs	2.0	13.0	21.0	60.0	178.0	13.8	50~104

**11. Note**

- 11.1. UNI-ROYAL recommend the storage condition temperature: 15°C~35°C, humidity :25%~75%.  
(Put condition for individual product).Even under UNI-ROYAL recommended storage condition, solderability of products over 1 year old.  
(Put condition for each product) may be degraded.
- 11.2. Store / transport cartons in the correct direction, which is indicated on a carton as a symbol.  
Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
- 11.3. Product performance and soldered connections may deteriorate if the products are stored in the following places:
- Storage in high Electrostatic.
  - Storage in direct sunshine 、rain and snow or condensation.
  - Where the products are exposed to sea winds or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, NO<sub>2</sub>.

**12. Record**

Version	Description of amendment	Page	Date	Amended by	Checked by
1	First issue of this specification	1~7	Mar.20, 2018	Chen Haiyan	Chen Nana
2	1. Add MS03 specifications 2. Modify dimension resistance detail	1~7 3~4	July.12, 2018	Chen Haiyan	Chen Nana
3	1. Delete unrecommended specifications and blocks 2. Add 1.6 items and modify 2.51, 2.52, 2.53, 3 3. Add 5.0 item white code diagram 4. Add 10.3 items of 1000-grain weight data 5. Delete the 9.0 performance item Rapid change of temperature、Biased Humidity、Leaching	1~7 2 3 3 6 5	Dec.4, 2018	Liao Dongmei	Wu shuai
4	Change the resistance range	3	Jan.24,2019	Wu shuai	Song qingfeng
5	Modify the product name	1~7	Feb.16, 2019	Chen Haiyan	Xu Yuhua

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