

# DATASHEET

**Product Name**    **Metal Alloy Low Resistance Chip Resistor**

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**Part Name**    **ML05 Series**

**File No.**    **SMD-SP-056**

## **Uniroyal Electronics Global Co., Ltd.**

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Royal Technology (Thailand) Co., Ltd.

## 1. Scope

- 1.1 This specification for approve relates to the Metal Alloy Low Resistance Chip Resistor manufactured by UNI-ROYAL.
- 1.2 Low Resistance / Low TCR
- 1.3 Excellent long term stability
- 1.4 RoHS compliant and halogen free.
- 1.5 Lead free.

## 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.: ML05

2.2 5<sup>th</sup>~6<sup>th</sup> codes: Power rating.

Wattage	1/2	1
Normal Size	W2	1W

2.3 7<sup>th</sup> code: Tolerance. E.g.: D=±0.5%      F=±1%      G=±2%      J=±5%      K=±10%

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

2.4.1 If value belongs to standard value of  $\geq 5\%$  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  $\leq 2\%$  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<sup>0</sup>    1=10<sup>1</sup>    2=10<sup>2</sup>    3=10<sup>3</sup>    4=10<sup>4</sup>    5=10<sup>5</sup>    6=10<sup>6</sup>    J=10<sup>-1</sup>    K=10<sup>-2</sup>    L=10<sup>-3</sup>    M=10<sup>-4</sup>  
 N=10<sup>-5</sup>    P=10<sup>-6</sup>

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.

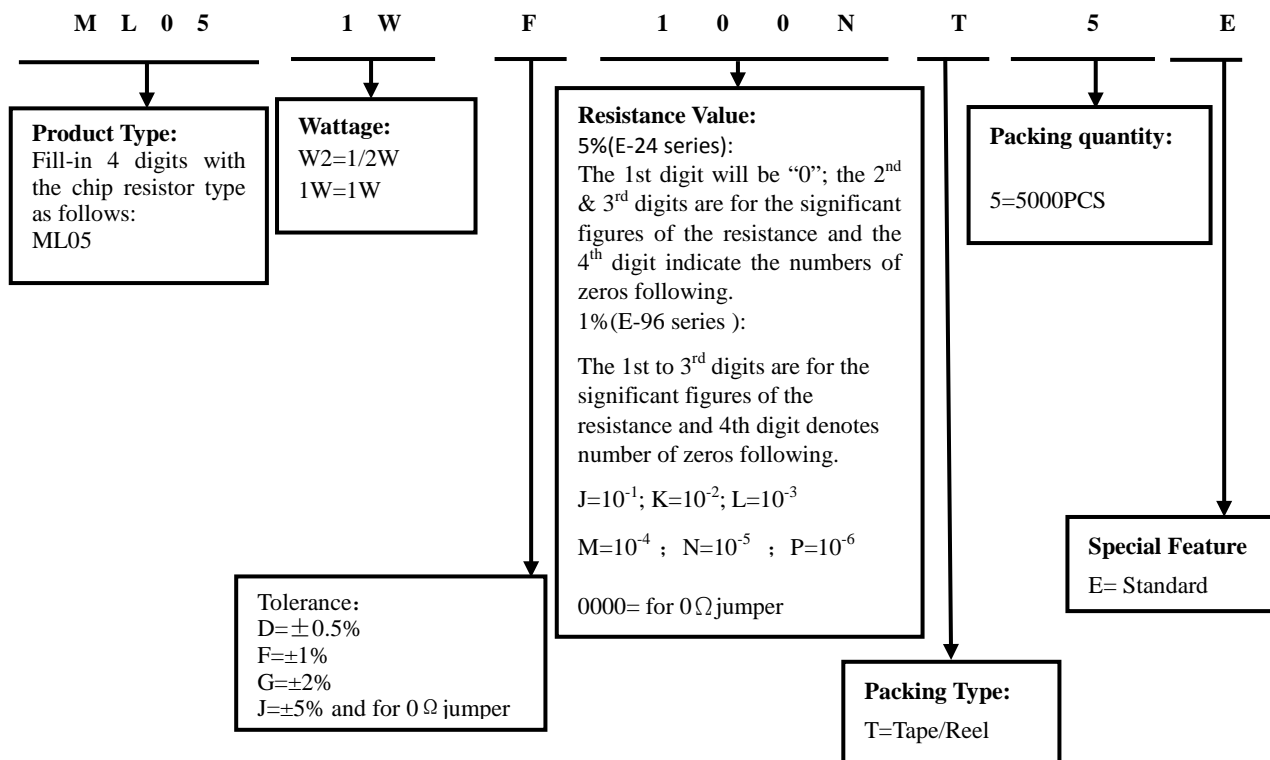
5=5000pcs

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

E = Standard

## 3. Ordering Procedure

(Example: ML05 1W ±1% 1mΩ T/R-5000)



## 4. Electrical Specifications

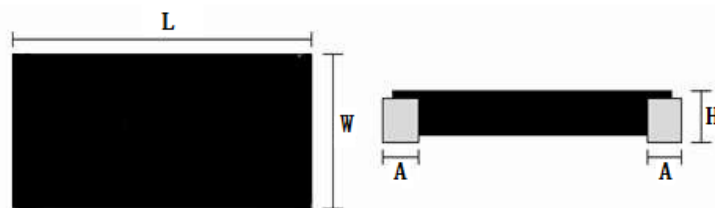
### 5.1 Standard Electrical Specifications

Type	Rating Power	T.C.R. (ppm/°C)	Max. Rating Current (A)	Max. Overload Current (A)	Resistance Range (mΩ)		Operating Temperature Range (°C)
					0.5% (D)	1.0% (F) 2.0% (G) 5.0% (J)	
ML05	1/2W	$\leq \pm 100$	31.62A	70.71A	---	0.5~1	-55°C~+170°C
		$\leq \pm 75$	18.26A	40.82A	---	1.5~2	
		$\leq \pm 50$	14.14A	31.62A	7~13	2.5~13	
	1W	$\leq \pm 100$	44.72A	89.44A	---	0.5~1	
		$\leq \pm 75$	25.81A	51.63A	---	1.5~2	
		$\leq \pm 50$	20.0A	40.0A	7~13	2.5~13	

### 5.2 Jumper Specifications

Type	Rating Power	Max. Rating Current	Resistance (mΩ)	Operating Temperature Range (°C)
ML05	1/2W	50A	$\leq 0.2$	-55°C~+170°C
	1W	70.7A		

## 5. Dimension(Unit:mm)



Type	Power Rating	Resistance Range	L	W	H	A
ML05 (0805)	1/2W 1W	0.5mΩ	2.05±0.25	1.30±0.30	0.60±0.20	0.75±0.20
		1mΩ			0.55±0.20	0.40±0.20
		1.5mΩ			0.45±0.20	
		2mΩ			0.35±0.20	
		2.5mΩ			0.45±0.20	
		3~8mΩ			0.35±0.20	
		9~13mΩ			0.37±0.20	

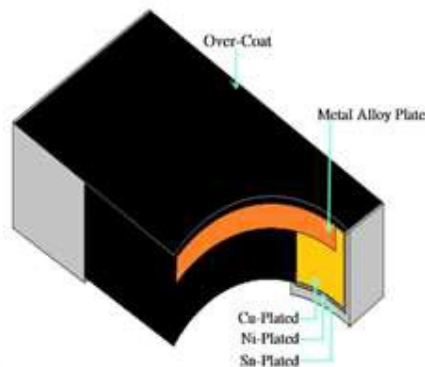
### JumperDimension

Unit:mm						
Type	Power Rating	Resistance Range	L	W	H	A
ML05 (0805)	1/2W 1W	$\leq 0.2\text{m}\Omega$	2.05±0.25	1.30±0.30	0.45±0.20	0.40±0.20

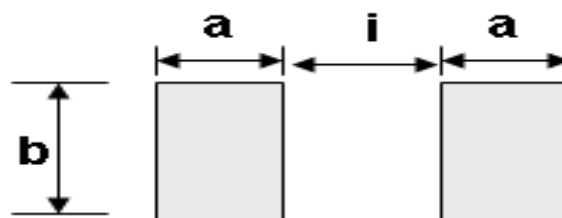
## 6. Marking

ML05 products no marking

## 7. Structure



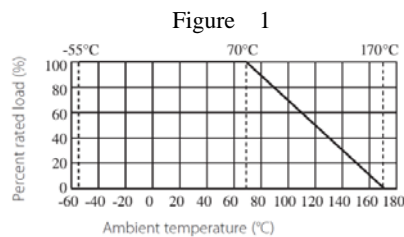
## 8. Recommend land pattern



Unit: mm				
Type	Resistance Range	a	b	i
ML05	0.5mΩ	1.35	1.80	0.30
	Jumper /1mΩ~13mΩ	1.00	1.80	1.00

## 9. Derating Curve

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70 °C. For temperature in excess of 70 °C , The load shall be derate as shown in figure 1.



The following equation may be used to determine the DC (Direct Current) or AC (Alternating Current) (RMS, root mean square value) of normal rated power. However, if the result value exceeds the highest current of regulated standards, the highest normal rated power is to be used

$$I = \sqrt{P/R}$$

I = Rating current (A)

P= Rating Power (W)

R= Resistance(Ω)

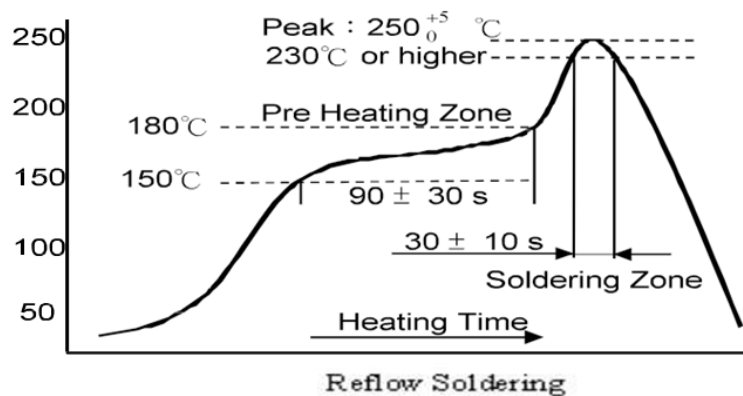
## 10. Performance Specification

Test Item	Test Methods (GB/T 5729, JIS-C-5201, IEC 60115-1)	Requirements
Temperature Coefficient	At 25°C /+150°C , 25°C is the reference temperature	List by specification
Short-time overload	4.13 The number of rated power are as follows : ML05-1/2W: 5 times of rated power; ML05-1W: 4 times of rated power; for 5 seconds	$\Delta R \leq \pm 1.0\%$
Load Life	4.25.1 Permanent Resistance change after 1000 hours operating at rated working current or Max .Working Current whichever less with duty cycle of 1.5hours “ON” , 0.5 hour “OFF” at 70±2°C ambient.	$\Delta R \leq \pm 1.0\%$
High Temperature Exposure	<b>MIL-STD-202 108A</b> Exposed to a temperature of 155±2°C for 1000H.	$\Delta R \leq \pm 1.0\%$
Biased Humidity	<b>MIL-STD-202 Method 103</b> 1000 hours 85°C/85%RH. Note: Specified conditions:10% of operating power. Measurement at 24±4 hours after test conclusion.	$\Delta R \leq \pm 0.5\%$
Rapid change of temperature	4.19. 30 min at -55 °C and 30 min at 155°C; 100 cycles	$\Delta R \leq \pm 0.5\%$
Terminal bending	4.33. 2mm , 10Sec	$\Delta R \leq \pm 0.5\%$
Resistance to Solder Heat	4.18 Dip the resistor into a temperature of 260±5°C and hold it for a 10±1 seconds.	$\Delta R \leq \pm 0.5\%$
Solderability	4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Temperature of solder: 245±3°C; Dwell time in solder: 2~3seconds.	>95% Coverage
Dielectric Withstanding Voltage	4.7 Applied 500 VAC for 1 minute , and Limit surge current 50 mA (max.)	No short or burned on the appearance
Terminal Strength	4.16 5N , 10 seconds	No broken

### For Jumper

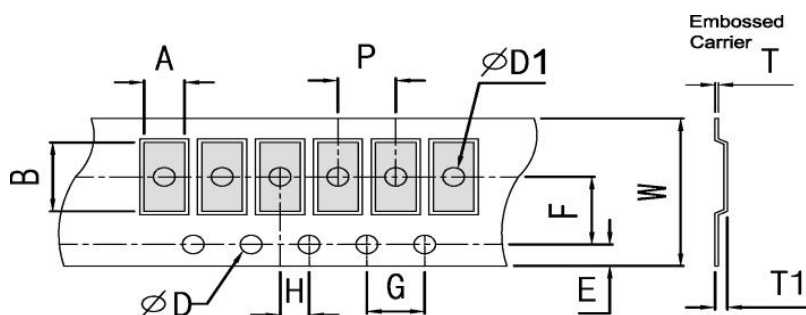
Test Item	Test Methods (GB/T 5729, JIS-C-5201, IEC 60115-1)	Requirements
Short Time Overload	4.13 Permanent resistance change after the application of a potential of 4 times power rate for 5 seconds	$\leq 0.2m\Omega$
Rapid change of temperature	4.19 30 min at -55 °C and 30 min at 155°C; 100 cycles	$\leq 0.2m\Omega$
High Temperature Exposure	<b>MIL-STD-202 108A</b> Exposed to a temperature of 155±2°C for 1000H.	$\leq 0.2m\Omega$
Biased Humidity	<b>MIL-STD-202 Method 103</b> 1000 hours 85°C/85%RH. Note: Specified conditions:10% of operating power . Measurement at 24±4 hours after test conclusion.	$\leq 0.2m\Omega$
Load Life	4.25 Permanent Resistance change after 1000 hours operating at rated working current or Max .Working Current whichever less with duty cycle of 1.5hours “ON” , 0.5 hour “OFF” at 70±2°C ambient.	$\leq 0.2m\Omega$
Solderability	4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Temperature of solder : 245±3°C; Dwell time in solder: 2~3 seconds.	>95% coverage

## 11. Soldering Profile



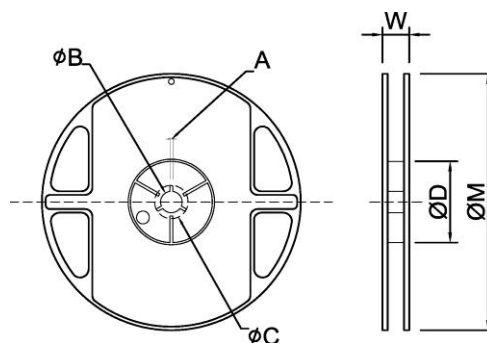
## 12. Packing of Surface Mount Resistors

### 12.1 Embossed Dimensions:(Unit: mm)



Type	Resistance Range	W	P	E	F	φ D	φ D1	G	H	A	B	T1	T
ML05	0~2.5m Ω	8.0±0.30	4.0±0.10	1.75±0.10	3.5±0.10	1.50 <sup>+0.1</sup> <sub>-0</sub>	1.0±0.10	4.0±0.10	2.0±0.10	1.70±0.10	2.45±0.10	0.90±0.25	0.20±0.05
ML05	3~13m Ω	8.0±0.30	4.0±0.10	1.75±0.10	3.5±0.10	1.50 <sup>+0.1</sup> <sub>-0</sub>	1.0±0.10	4.0±0.10	2.0±0.10	1.70±0.10	2.45±0.10	0.55±0.25	0.20±0.05

### 12.2 Dimension of Reel : (Unit: mm)



Type	Taping	Qty/Reel	A	φ B	φ C	φ D	W	φ M
ML05	Embossed	5,000pcs	2.0±0.5	13.2±0.5	17.7±0.5	60.0±0.5	12.0±0.5	178±1.0

## 13. Note

- 13.1 UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35°C under humidity between 25 to 75%RH.  
Even under UNI-ROYAL recommended storage condition, solderability of products over 1 year old. (Put condition for each product) may be degraded.
- 13.2 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.
- 13.3 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>, Br. etc.

## 14. Record

Version	Description	Page	Date	Amended by	Checked by
1	First version	1~7	Apr.29, 2021	Haiyan Chen	Yuhua Xu

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