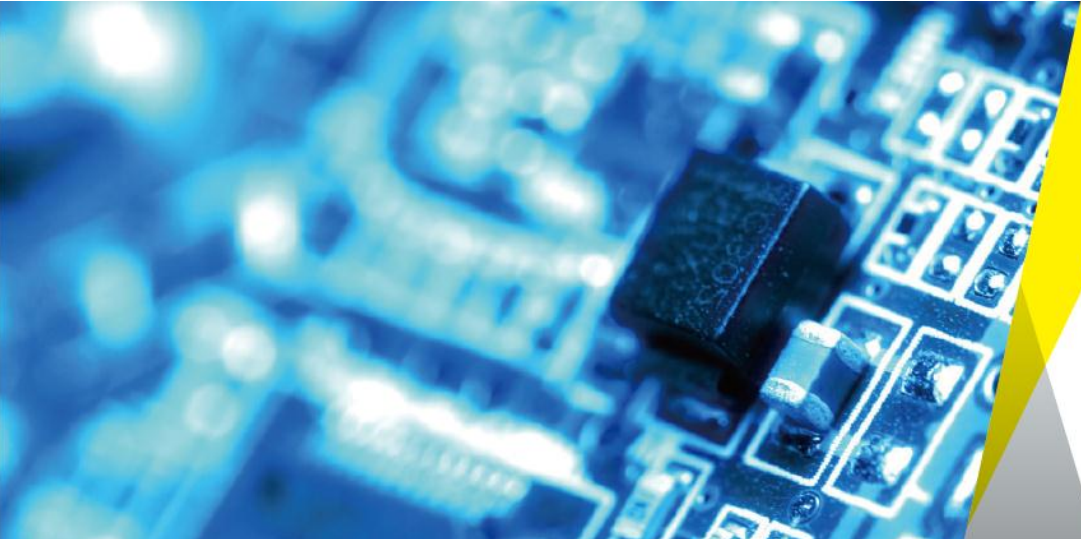




UniRoyal

DATASHEET

Product Name **High power non pin metal film resistor**

Part Name **P24 、 P27、 P39、 P41 Series**

File No. **DIP-SP-103**

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1. Scope

- 1.1 This specification for approve relates High power non pin metal film resistor manufactured by UNI-ROYAL.
- 1.2 Excellent in heat dissipation than chip resistor
- 1.3 Stronger mechanical structure to endure vibration and thermal shock
- 1.4 Low temperature coefficient and tolerances.
- 1.3 Excellent stability.
- 1.5 Superior power handling.
- 1.6 Compliant with RoHS directive.
- 1.7 Halogen free requirement.

2. Part No. System

The standard Part No. includes 14 digits with the following explanation:

2.1 The 1st to 3rd digits are to indicate the product type.

Example: P27= High power non pin metal film resistor;

2.2 The 4th~5th digits:

This is to indicate the wattage or power rating. To dieting the size and the numbers,

The following codes are used; and please refer to the following chart for detail:

W=Normal Size

Wattage	2/5	1	2	3
Normal Size	04	1W	2W	3W

2.3 The 6th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.

F=±1% G=±2% J=±5%

2.4 The 7th digit is to denote the Resistance Temperature Coefficient

2.5 The 8th to 11th digits is to denote the Resistance Value.

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

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

2.5.3 The following numbers and the letter codes are to be used to indicate the number of zeros in the 13th digit:

0=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵ 6=10⁶ J=10⁻¹ K=10⁻² L=10⁻³ M=10⁻⁴

2.6 The 12th, 13th & 14th digits.

The 12th digit is to denote the Packaging Type with the following codes:

B=Bulk T=Taping

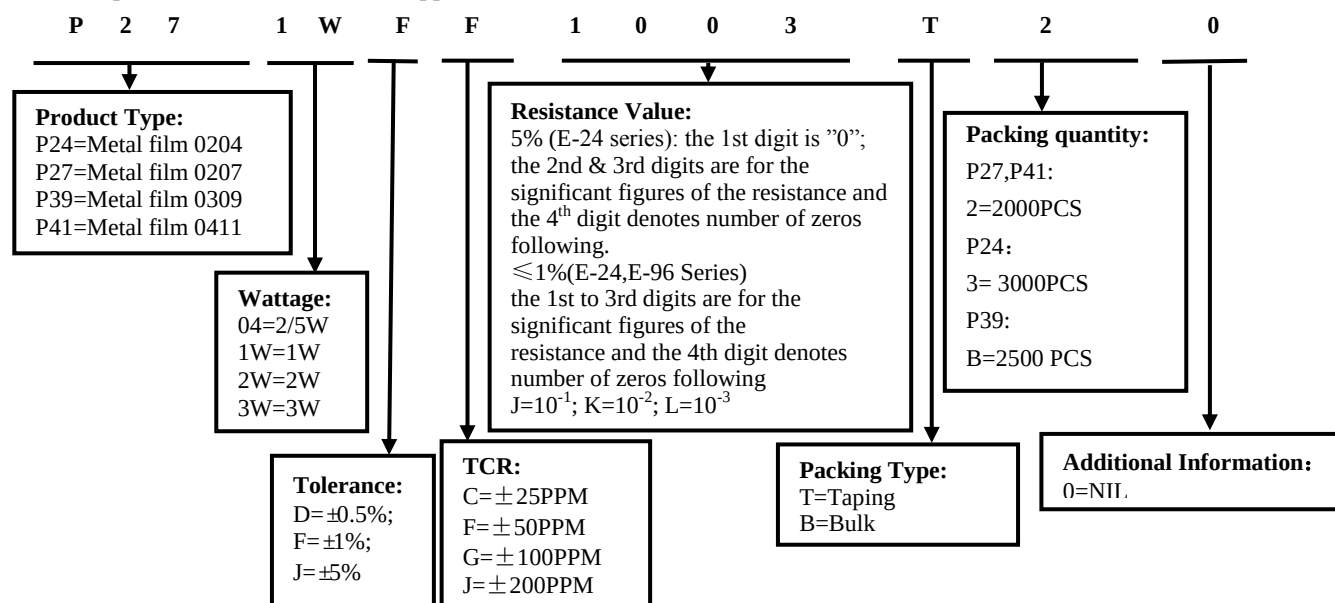
2.7 The 13th digit is normally to indicate the Packing Quantity of Tape/Box & Tape/Reel packaging types. The following letter code is to be used for some packing quantities:

2=2000pcs 3=3000pcs B=2500pcs

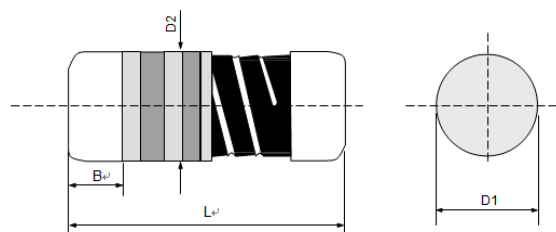
2.8 For some items, the 14th digit alone can use to denote special features of additional information with the following codes: 0=NIL

3. Ordering Procedure

(Example: P27 1W ±1% 100K Ω 50ppm T/R-2000)



4. Dimension



Type	Dimension (mm)			
	L	D1	D2	B
P24	3.52 ± 0.15	1.35 ± 0.1	D1+0.02/ -0.15	0.6 Min.
P27	5.90 ± 0.20	2.20 ± 0.1	D1+0.02/ -0.15	1.0 Min.
P39	8.50 ± 0.50	3.00 ± 0.2	D1+0.02/ -0.15	1.3 Min.
P41	10.5 ± 0.50	4.00 ± 0.5	D1+0.02/ -0.15	1.6 Min.

5. Electrical Specifications

5.1 Ratings

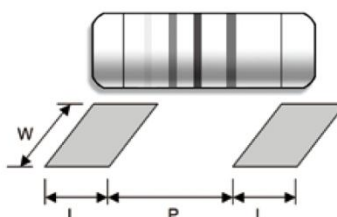
Type	Power Rating	Max Working Voltage	Max Overload Voltage	Resistance range	Resistance Tolerance
P24	2/5W	200V	400V	0Ω,0.5Ω~10MΩ	±0.5% ±1% ±5%
P27	1W	350V	700V		
P39	2W	400V	800V	0Ω,0.5Ω~1MΩ	
P41	3W	400V	800V		

5.2 Characteristics

Characteristics	Limits
Dielectric Withstanding Voltage, VAC or DC	P24: 200 ; P27: 500; P39: 700; P41: 1000
Temperature Coefficient, PPM / °C	±25, ±50, ±100, ±200
Operating Temperature Range, °C	-55 ~ +155
Insulation Resistance, MΩ	>10 ⁴

* Not applicable to all resistance values. Please check with us regarding the PPM of specific resistance value(s).

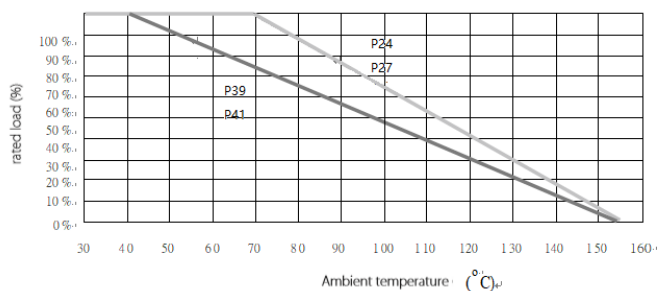
6. Soldering pad size recommended



Type	Dimension (mm)			
	Soldering Mode	L(Min)	P	W(Min)
P24	Reflow	1.3	1.6 ± 0.1	1.6
	Wave	1.5	1.5 ± 0.1	1.8
P27	Reflow	2.0	3.0 ± 0.1	3.0
	Wave	2.5	3.0 ± 0.1	3.0
P39	Reflow	3.0	4.9 ± 0.3	3.7
	Wave	3.5	4.8 ± 0.3	4.0
P41	Reflow	4.0	6.2 ± 0.4	5.0
	Wave	4.5	6.0 ± 0.4	5.0

For better heat dissipation / lower heat resistance, increase W & L.

7. Derating Curve



7.1 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 = rated dc or RMS ac continuous working voltage at commercial-line frequency and waveform (VOLT.)

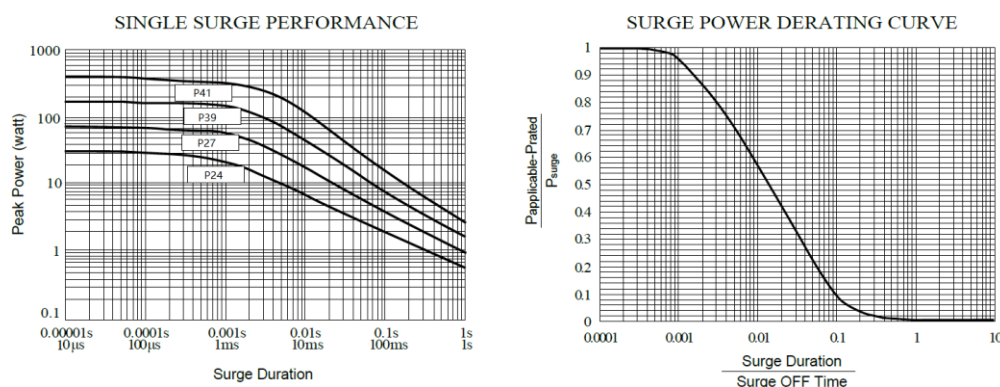
P = power rating (WATT.) R= nominal resistance (OHM)

8. Performance Specification

Characteristics	Test Conditions	Limits
Short Time Overload	IEC 60115-1 4.13 2 seconds 2.5x rated voltage (not over max. overload voltage)	$\pm(0.5\%+0.01 \Omega)$
Load Life In Humidity	IEC 60115-1 4.24 56 days rated load (not over max. working voltage) at $(40 \pm 2) ^\circ\text{C}$ and $(93 \pm 3)\%$ relative humidity	$\pm(3.0\%+0.01 \Omega)$
Load Life In Humidity (accelerated mode)	IEC 60115-1 4.37 1,000 hours at 85°C and 85% relative humidity with $0.1 \times$ rated voltage (not over 100V)	P24, P27: $\pm(2.5\%+0.01 \Omega)$
		P39, P41: $\pm(3.5\%+0.01 \Omega)$
Load Life	IEC 60115-1 4.25.1 Rated load (not over max. working voltage) 1,000 hours with 1.5 hours ON, 0.5 hours OFF, at $(70 \pm 2) ^\circ\text{C}$ for P24, P27; $(40 \pm 2) ^\circ\text{C}$ for P39 and P41.	$\pm(3.0\%+0.01 \Omega)$
Periodic Electric Overload	IEC 60115-1 4.39 3.9x rated voltage (not over max. overload voltage) with 0.1s ON, 2.5s OFF for 1,000 cycles	$\pm(0.75\%+0.01 \Omega)$
Resistance To Soldering Heat	IEC 60115-1 4.18.2 Dip the resistor into a solder bath measured $(260 \pm 5) ^\circ\text{C}$ and hold it for a 10 ± 1 seconds	$\pm(0.5\%+0.01 \Omega)$
Solderability	IEC 60115-1 4.17.2 Solder area covered after $(235 \pm 3) ^\circ\text{C}/(2 \pm 0.2)$ seconds with flux applied	95% min.coverage
Vibratin	IEC 60115-1 4.22 Six hours in each parallel and axial direction with a simple harmonic motion having an amplitude of 0.75mm and 10 to 500 Hz.	$\pm(0.25\%+0.01 \Omega)$
Thermal Endurance	IEC 60115-1 4.25.3 1000 hours at 155°C without load	$\pm(2.0\%+0.01 \Omega)$
Thermal Shock	IEC 60115-1 4.19 -55°C 30minutes, $+155^\circ\text{C}$ 30minutes, 5 cycles	$\pm(0.25\%+0.01 \Omega)$
Electrostatic discharge (Human body model)	IEC 60115-1 4.38 3 positive & 3 negative discharges with 2KV for P24 or 4KV for P27, P39& P41(For continuous surge application please see Surge Performance paragraph)	$\pm(0.25\%+0.01 \Omega)$

Climatic test	IEC 60115-1 4.23 4.23.2 - dry heat: 16 hours 155 °C 4.23.3 - damp heat: 24 hours 55 °C with 95% relative humidity 4.23.4 - cold: 2 hours -55 °C 4.23.5 - negative air pressure: 2 hour 8.5KPa at (25±10) °C 4.23.6 - damp heat cyclic: 5 days 55 °C with 95% relative humidity 4.23.7 - DC load: rated voltage at -55 °C and 155 °C each 1 Min.	±(1.0%+0.01 Ω)
Bending test	IEC 60115-1 4.33 Pressing depth 2mm, 3 times	±(0.25%+0.01 Ω)
Flammability	IEC 60115-1 4.35 Needle flame test 10s	No burning after 30s

9.Single Surge Performance



Notes:

- Single Surge Performance graph is good for Non Repetitive applications operating in an ambient temperature of 70 °C or less. For temperatures above 70 °C, the graph power must be derated further linearly down to zero at 155 °C.
- To determine applicable surge power in continuous-surge applications:
 1. Identify allowable duration and peak power P_{surge} of single surge;
 2. Determine ratio of surge duration/surge OFF time in application;
 3. Calculate P_{applicable} backwardly according to Y-axis of surge power Derating curve.

10. Note

- 10.1 UNI-ROYAL recommends the storage condition temperature: 15 to 35 °C under humidity between 25 to 75%RH (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.
- 10.2 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.
- 10.3 Product performance and soldered connections may deteriorate if the products are stored in the following places:
 - a. Storage in high Electrostatic.
 - b. Storage in direct sunshine、rain and snow or condensation.
 - c. Where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, NO₂, Br etc .

10. Record

Version	Description of amendment	Page	Date	Amended by	Checked by
1	First issue of this specification	1~5	May.14,2020	Song Nie	Yuhua Xu
2	1.Adjust the resistance range 2.Update the Performance Specification 3.Add the Single Surge Performance	3 4 5	Sep.10,2021	Song Nie	Haiyan Chen
3	1. Modify the resistance range 2. Modify the performance	3 4~5	Jul.30,2024	Haiyan Chen	Yuhua Xu
4	Modify the performance	4~5	Nov.12,2024	Haiyan Chen	Yuhua Xu

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