

DATASHEET

Product Name **Auto-grade Metal Film MELF**

Part Name **A24 、 A27 Series**

File No. **DIP-SP-096**

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

Manufacture Plant Uniroyal Electronics Industry Co., Ltd.

Aeon Technology Corporation

Royal Electronic Factory (Thailand) Co., Ltd.

Royal Technology (Thailand) Co., Ltd.

1. Scope

- 1.1 This datasheet is the characteristics of Auto-grade Metal Film MELF resistor manufactured by UNI-ROYAL.
- 1.2 AEC-Q200 Compliant.
- 1.3 Excellent solderability termination
- 1.4. Anti-sulfuration test qualified.
- 1.5 Do not contain substances of very high concern identified by European Chemicals Agency.
- 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: A27= Auto-grade Metal Film MELF;

2.2 The 4th~5th digits:

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

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

W=Normal Size

Wattage	1/4	1/2
Normal Size	W4	W2

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.

B=±0.1% C=±0.25% D=±0.5% F=±1% G=±2% J=±5%

2.4 The 7th digit is to denote the temperature coefficient of resistance ;

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

2.5.1 For the standard resistance values of E-24 series, the 8th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following;

2.5.2 The following numbers and the letter codes are to be used to indicate the number of zeros in the 11th 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.

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

T=Taping B=bulk

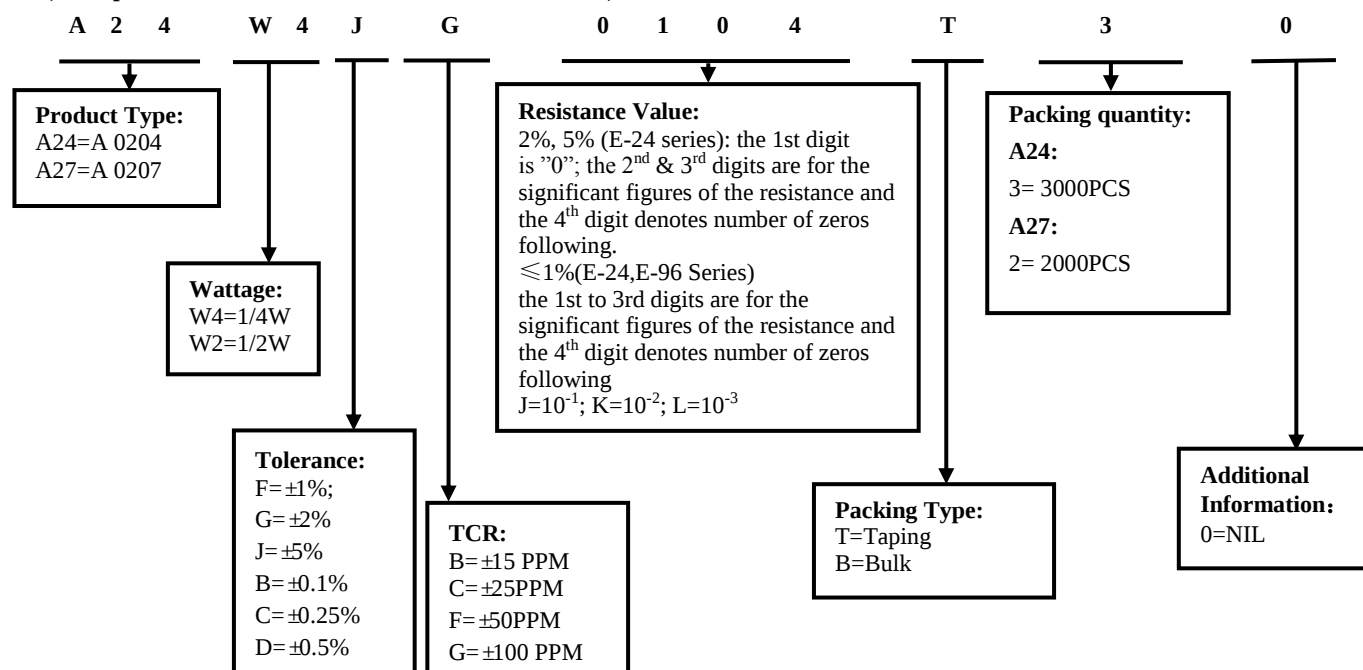
2.6.2 The 13th digit is normally to indicate the Packing Quantity of Tape/Box & Tape/Reel packaging types. The following letter code is to be used for some packing quantities:

2=2000pcs A=500pcs B=2500pcs C=10000pcs D=20000pcs G=25000pcs H=50000pcs

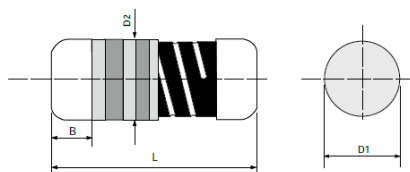
2.6.3 For some items, the 14th digit alone can use to denote special features of additional information with the following codes: 0=NIL

3. Ordering Procedure

(Example: A24 1/4W ±5% 100PPM 100K Ω T/R-3000)



3. Dimension



Type	Dimension (mm)			
	L	D1	D2	B
A24	3.52 ± 0.15	1.35 ± 0.1	D1+0.02/ -0.15	0.6 Min.
A27	5.90 ± 0.20	2.20 ± 0.1	D1+0.02/ -0.2	1.0 Min.

4. Electrical Specifications

4.1 Ratings

Type	Power Rating	Max Working Voltage	Max Overload Voltage	Resistance range	Resistance Tolerance
A24	1/4W	200V	400V	10 Ω ~ 1M Ω	± 0.5%
				22 Ω ~ 1M Ω	± 0.25%
				43 Ω ~ 1M Ω	± 0.1%
				0.47 Ω ~ 10M Ω	± 1%, ± 2%, ± 5%
A27	1/2W	300V	500V	10 Ω ~ 1M Ω	± 0.5%
				15 Ω ~ 1M Ω	± 0.25%
				33 Ω ~ 1M Ω	± 0.1%
				0.47 Ω ~ 10M Ω	± 1%, ± 2%, ± 5%

4.2 Characteristics

Characteristics	Limits	
Operating Temperature Range, °C	-55 ~ +155	
Temperature Coefficient, PPM / °C	± 0.1%, ± 0.25%, ± 0.5%	±15, ±25, ±50 (see below 4.3)
Temperature Coefficient, PPM / °C	± 1%, ± 2%	±25, ±50, ±100 (see below 4.3)
	± 5%	±100
Dielectric Withstanding Voltage, VAC or DC	A24: 300 A27: 500;	
Insulation Resistance, MΩ	>10 ⁴	
Tin Whisker (JESD201 Temperature Cycling & High Temp. /Humidity Storage), μm	<5	

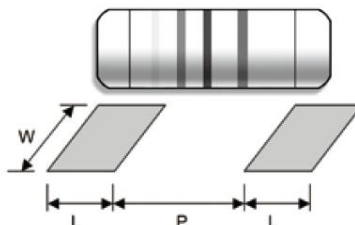
4.3 Temperature Coefficient Availability

Type	Tolerance	Resistance Values	TCR
A24	±0.5%	10Ω-330KΩ	±15PPM/°C
	±0.25%	22Ω-330KΩ	
	±0.1%	43Ω-330KΩ	
	±0.5%	10Ω-1MΩ	±25, ±50PPM/°C
	±0.25%	22Ω-1MΩ	
	±0.1%	43Ω-1MΩ	
	±1%、±2%	1.5Ω-10MΩ	±25, ±50, ±100PPM/°C
	±1%、±2%	<1.5Ω	
A27	±5%	0.47Ω-10MΩ	±100 PPM/°C
	±0.5%	10Ω-680KΩ	±15 PPM/°C
	±0.25%	15Ω-510KΩ	
	±0.1%	33Ω-510KΩ	

	±0.5%	10Ω-1MΩ	±25, ±50PPM/°C
	±0.25%	15Ω-1MΩ	
	±0.1%	33Ω-1MΩ	
	±1%、±2%	1.5Ω-10MΩ	±25, ±50, ±100 PPM/°C
	±1%、±2%	< 1.5Ω	±50PPM/°C
	±5%	0.47Ω-10MΩ	±100 PPM/°C

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

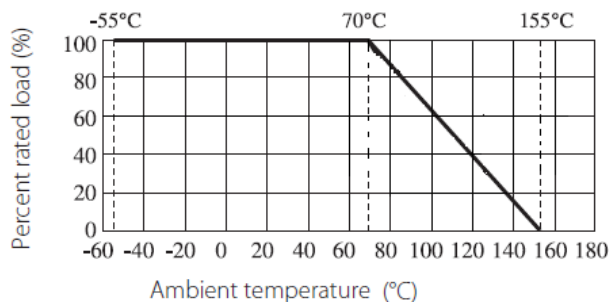
5. Soldering pad size recommended



Type	Dimension (mm)			
	Soldering Mode	L(Min)	P	W(Min)
A24	Reflow	1.3	1.6 ± 0.1	1.6
	Wave	1.5	1.5 ± 0.1	1.8
A27	Reflow	2.0	3.0 ± 0.1	3.0
	Wave	2.5	3.0 ± 0.1	3.0

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

6. Derating Curve



6.1 Voltage rating:

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.

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 = Rating Continuous Working Voltage (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 lower.

7. Performance Specification

Characteristics	Test Conditions	Tolerance	Limits	
High Temperature Exposure (Storage)	AEC-Q200 REV D. Stress NO.3(refer to MIL-STD-202 Method 108) 1,000 hours at 125°C without load	±1%	0.47Ω to <332KΩ	±(0.5%+0.01 Ω)
		±2%	332KΩ to 1MΩ	±(0.75%+0.01 Ω)
		±5%	>1MΩ	±(1%+0.01 Ω)
		±0.1%	10Ω to 332KΩ	±(0.5%+0.01 Ω)
Temperature Cycling	AEC-Q200 REV D. Stress NO.4 (refer to IEC 60115-1 4.19/ JESD22 Method JA-104) -55°C 30minutes, +125°C 30minutes, 1,000 cycles	±0.25%	>332KΩ	±(0.75%+0.01 Ω)
		±0.5%		
		±1%		±(0.5%+0.01 Ω)
		±2%		
Biased Humidity	AEC-Q200 REV D. Stress NO.7 (refer to IEC 60115-1 4.37/ MIL-STD-202 Method 103) 1,000 hours at 85°C and 85% relative humidity with 10% operating power (not over 100V)	±5%	10Ω to 332KΩ	±(0.5%+0.01 Ω)
		±0.1%	>332KΩ	±(0.75%+0.01 Ω)
		±0.25%		
		±0.5%		
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°C	±1%	0.47Ω to <100KΩ	±(1%+0.01 Ω)
		±2%	100KΩ to 332KΩ	±(2%+0.01 Ω)
		±5%	>332KΩ	±(3%+0.01 Ω)
		±0.1%	10Ω to <10KΩ	±(0.75%+0.01 Ω)
Resistance to Solvents	AEC-Q200 REV D. Stress NO.8 (refer to MIL-STD-202 Method 108) 1,000 hours at 125°C with de-rated continuous working voltage (not over max. working voltage)	±0.25%	10KΩ to <332KΩ	±(1.5%+0.01 Ω)
		±0.5%	>332KΩ	±(2.5%+0.01 Ω)
		±1%		
		±2%		
Mechanical Shock	AEC-Q200 REV D. Stress NO.12 (refer to MIL-STD-202 Method 215) Add Aqueous wash chemical-OKEM Clean or equivalent. Do not use banned solvents.	±5%	0.47Ω to <1Ω	±(2%+0.01 Ω)
		±0.1%	1Ω to 332KΩ	±(1.5%+0.01 Ω)
		±0.25%	>332KΩ	±(2.5%+0.01 Ω)
		±0.5%		
Vibration	AEC-Q200 REV D. Stress NO.13 (refer to MIL-STD-202 Method 213 Condition C) Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen. Peak value: 100 g's, Duration: 6 ms, Velocity change: 12.3 ft/s, Waveform: Half sine	±1%	10Ω to 332KΩ	±(1.5%+0.01 Ω)
		±0.25%	>332KΩ	±(3%+0.01 Ω)
		±0.5%		
		±1%		
Vibration	AEC-Q200 REV D. Stress NO.14 (refer to MIL-STD-202 Method 204) 5 g's for 20 min., 12 cycles each of 3 orientations, Test from 10 - 2,000 Hz.	±0.25%		
		±0.5%		
		±1%		
		±2%		

Resistance to Soldering Heat	AEC-Q200 REV D. Stress NO.15 (refer to IEC 60115-1 4.18.2/ MIL-STD-202 Method 210) Dip the resistor into a solder bath measured (260±5)°C and hold it for a 10±1 seconds	±(0.5%+0.01 Ω)		
ESD	AEC-Q200 REV D. Stress NO.17 (refer to AEC-Q200-002/ ISO/DIS 10605) (150pF/ 2000Ohm discharge network) Human body model, 1 positive & 1 negative discharges with 2KV source	±(0.25%+0.01 Ω)		
Solderability	AEC-Q200 REV D. Stress NO.18 (refer to J-STD-002 or IEC 60115-1 4.17) Solder area covered after (235±3)°C/(2±0.2) seconds with flux applied	95% min. coverage		
Board Flex	AEC-Q200 REV D. Stress NO.21 (refer to AEC-Q200-005) 60S(min) holding time.	±(0.25%+0.01 Ω)		
Terminal Strength	AEC-Q200 REV D. Stress NO.22 (refer to AEC-Q200-006) Force of 1.8kg for 60 seconds	±(0.25%+0.01 Ω)		
Short Time Overload	IEC 60115-1 4.13 5 seconds 2.5x rated voltage(not over max. overload voltage)	±1%	0.47Ω to 332KΩ	±(0.25%+0.01 Ω)
		±2%	>332KΩ	±(0.5%+0.01 Ω)
		±5%		
		±0.1%	10Ω to 1MΩ	±(0.25%+0.01 Ω)
		±0.25%		
		±0.5%		
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%+0.01 Ω)		
Load Life In Humidity	IEC 60115-1 4.24 56 days rated load (not over max. working voltage) at (40±2)°C and (93±3)% relative humidity	±1%	0.47Ω to 332KΩ	±(0.75%+0.01 Ω)
		±2%	>332KΩ	±(1.5%+0.01 Ω)
		±5%		
		±0.1%	10Ω to 332KΩ	±(0.5%+0.01 Ω)
		±0.25%	>332KΩ	±(0.75%+0.01 Ω)
		±0.5%		
Single pulse high voltage overload	IEC 60115-1 4.27 5 pulses of 1.2/50μs at 10x rated voltage (not over max. overload voltage) with interval of 12 sec.	±(0.5%+0.01 Ω)		
	10 pulses of 10/700μs at 10x rated voltage (not over max. overload voltage) with interval of 60 sec.	±(0.5%+0.01 Ω)		
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	±1%	±(0.5%+0.01 Ω)	
		±2%		
		±5%		
Anti-sulfuration test	EIA-977(conditions B) 750 hours at (105±2)°C without load	±0.1%	±(0.1%+0.01 Ω)	
		±0.25%	±(0.25%+0.01 Ω)	
		±0.5%	±(0.5%+0.01 Ω)	
		±1%	±(1%+0.01 Ω)	
		±2%	±(2%+0.01 Ω)	
		±5%	±(5%+0.01 Ω)	

8. Note

8.1 UNI-ROYAL recommend products store in warehouse with temperature between 15 to 35℃ 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.

8.2 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.

8.3 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.

9. Record

Version	Description of amendment	Page	Date	Amended by	Checked by
1	First issue of this specification	1~5	Sep.07,2020	Song Nie	Yuhua Xu
2	Add ±0.1%±0.25%±0.5% tolerance and parameters	1~7	May.24,2021	Haiyan Chen	John Zhao
3	Modify performance	5~6	Aug.01,2025	Haiyan Chen	Yuhua Xu

Uniroyal Electronics Global Co., Ltd. , all rights reserved. Spec. herein would be changed at any time without prior notice.