



RJMU SERIES

ULTRA-PRECISION MELF RESISTORS

ULTRA-STABLE MELF RESISTORS, COATED TYPE

Feature

- Advanced thin film technology
- Excellent overall stability: Class 0.025%
- Very low TCR: up to $\pm 5\text{ppm/K}$
- Very low noise and voltage coefficient
- Compliant to RoHS directive 2011/65/EU
- Compliant to REACH (EC No. 1907/2006)) (last updated: 27/06/2018)



Description

Production is strictly controlled and follows extensive set of instructions established in production procedure for reproducibility. A homogeneous film of metal alloy is deposited on the surface of high-grade ceramic cores (85%~96% Al_2O_3) and conditioned to achieve the desired stability and the temperature coefficients.

A professional laser is pressed on the metalized rods to not only achieve the target value but also perfect electronics performance by smoothly cutting a helical groove in the resistance layer on the ceramic rods without damaging the ceramics^{*1}. The resistance layers are covered by a protective coating and hard Bakelite designed for electrical, mechanical and climatic protection.

The resistors are tested in accordance with MIL-R-10509F which refers to MIL-STD-202 or IEC60115.

The established reliability in accordance with CECC 40401-803 Version E is available upon request.

*1 some resistors with low Ohm value could be cut by fine grain diamond grinding wheel.

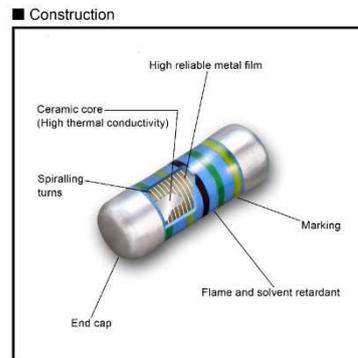


1. PRODUCT: ULTRA-STABLE METAL FILM MELF RESISTORS
2. PART NUMBER: Part number of the ultra-precision metal film MELF type resistor is identified by the series name, power rating and size code, tolerance, temperature coefficient, packing type and resistance value.
Example:

RJM	73U	0204	B	6	T	5051
Series Name	Power rating	Size code	Tolerance	Temperature Coefficient	Packing Style	Resistance Value

- (1) Series name: RJMU SERIES ULTRA-PRECISION TYPE
- (2) Power Rating: 73U=0.07W^(PRECISION MODE); 74U=0.11W^(PRECISION MODE)
- (3) Size code: 73U = DIN: 0204; 74U = DIN: 0207
- (4) Tolerance: P=±0.025%; W=±0.05%; B=±0.1%; C=±0.25%;
- (5) T.C.R.: 7= ±5ppm/°C; 6= ±10ppm/°C; 5=±15ppm/°C; 3=±25ppm/°C;
- (6) Packaging Type: B=BULK/BOX; T=REEL/BOX
- (7) Resistance Value: 100K(1003)、22K5(2252)、2K15(2151)、120R(1200)、10R(10R0).....

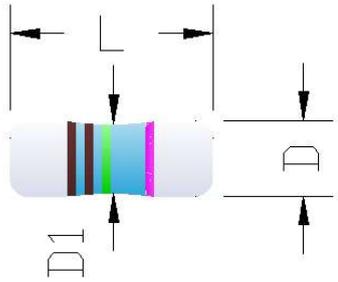
3. Construction of the resistors:





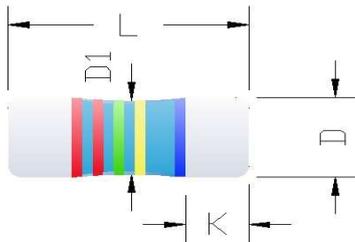
4. COLOR BAND-CODE:

Four color band codes for size 0204.



颜色	1 st	2 nd	3 rd	倍率
黑色	0	0	0	1
棕色	1	1	1	10
红色	2	2	2	10 ²
棕色	3	3	3	10 ³
黄色	4	4	4	10 ⁴
绿色	5	5	5	10 ⁵
蓝色	6	6	6	10 ⁶
紫色	7	7	7	10 ⁷
灰色	8	8	8	
白色	9	9	9	
金色				10 ⁻¹
银色				10 ⁻²

Five color band codes for size 0207

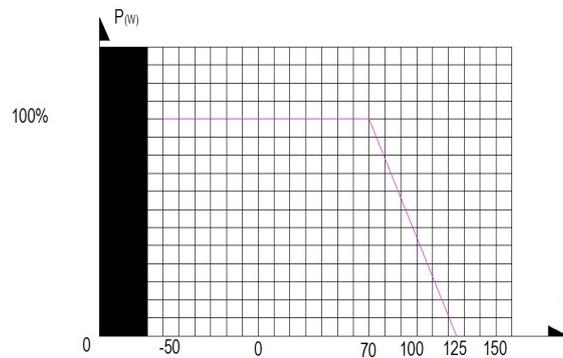


颜色	1 st	2 nd	3 rd	倍率	精度
黑色	0	0	0	1	
棕色	1	1	1	10	F(±1.0%)
红色	2	2	2	10 ²	G(±2.0%)
棕色	3	3	3	10 ³	
黄色	4	4	4	10 ⁴	
绿色	5	5	5	10 ⁵	D(±0.50%)
蓝色	6	6	6	10 ⁶	C(±0.25%)
紫色	7	7	7		B(±0.10%)
灰色	8	8	8		
白色	9	9	9		
金色				10 ⁻¹	J(±5.0%)
银色				10 ⁻²	K(±10%)



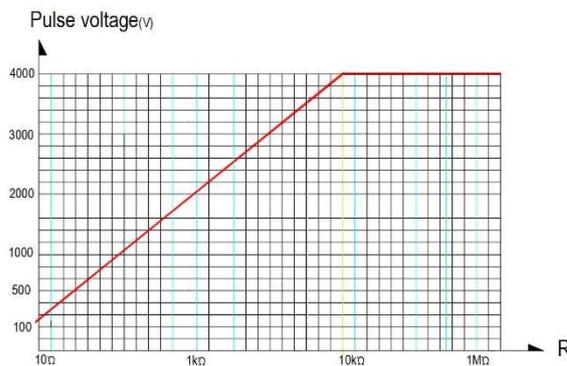
5. Derating curves

The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature is not exceeded. These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.

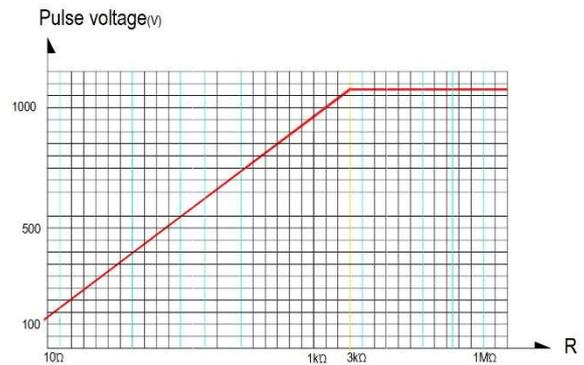


For MELF resistors working at an ambient temperature of 70°C or above, the power rating shall be derated in accordance with the above curves.

6. Pulse load capability



Pulse load rating in accordance with IEC 60115-1,4.27; **1.2µs/50µs**; 5 pulses loaded, for permissible resistance change $\leq \pm(0.5\%+0.05\Omega)$



Pulse load rating in accordance with IEC 60115-1,4.27; **10µs/700µs**; 10 pulses loaded, for permissible resistance change $\leq \pm(0.5\%+0.05\Omega)$



7. ELECTRICAL CHARACTERISTICS

Type		RJM73U		RJM74U		型号
Metric type		DIN: 0204		DIN: 0207		德国工业标准型号
CECC type		RC 3715M		RC 6123M		CECC 型号
Cross to Vishay' Type		UMA0204		UMB0207		对应 Vishay 公司型号
Resistance range		22Ω to 332kΩ		100Ω to 390kΩ		阻值范围
Resistance tolerance	%	W(±0.05); B(±0.10); C(±0.25);		P(W±0.025); W(±0.05); B(±0.10); C(±0.25);		精度
Temperature coefficient		C7(±5ppm/°C); C6(±10ppm/°C); C5(±15ppm/°C);				温度系数
Rated dissipation	P_{70}	0.07W ^(PRECISION MODE)	0.25W ^(STANDARD MODE)	0.11W ^(PRECISION MODE)	0.40W ^(STANDARD MODE)	P_{70} 70°C 以下额定功率
Operating voltage	U_{max}	200V _{AC}	250V _{AC}	300V _{AC}	350V _{AC}	U_{max} 最大工作电压
Max short time overload voltage		400V _{AC}	400V _{AC}	600V _{AC}	600V _{AC}	最大短时间过载电压
Operating temperature range		-55°C to 125°C				工作温度范围
Dimension	mm	L=3.5±0.2; D=1.3±0.1		L=5.7±0.2; D=2.2±0.1		外型尺寸
	mm	K≥0.6; D ₁ ≥D-0.2		K≥0.6; D ₁ ≥D-0.3		
Soldering pad (recommended)	mm	S=1.5; W=2; H=2.2		S=2.8; W=3; H=3		建议焊盘尺寸
Outlines						外观
Minimum packing quantity		3000		2000		最小包装数量
Average mass	mg	22		80		平均重量
Standard applied		Q\SLC009-2010; GB/T5729-1994; GB/T9546-1995; GB/T9547-1995				技术标准

- * Unless otherwise specified, all values are tested at the following condition:
Temperature: 21°C to 25°C; Relative humidity: 45% to 70%
- * Rated Continuous Working Voltage (RCWV)= $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$
- * Resistance value out of range is available on request.
- * Terminal caps of the resistors are all with three electroplating: the inner is copper plating + nickel plating to minimize the tin whisker phenomenon and final plating is tin to improve the solderability. The thickness of the 3 layers are Cu:0.8~1.5μm + Ni:<1μm + Tin:>3μm.
- * The post high temperature treatment after final tin plating is strictly controlled by our production procedure to minimize the tin whisker phenomenon



8. ENVIRONMENTAL CHARACTERISTICS

(1) Temperature Coefficient Test

IEC 60115-1, 4.8: Test of resistors at room temperature and 60°C (or 100°C upon request) above room temperature. Then measure the resistance. The Temperature Coefficient is calculated by the following equation and its value should be within the range requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature

R₀ = Resistance value at the room temperature

t = the 2nd testing temperature

t₀ = Room temperature

(2) Short Time over Load Test

IEC60115-1 4.13: At 2.5 times rated voltage or 2 times the maximum working voltage whichever is lower for 5 seconds, the resistor should be free from defects. The change of the resistance value should be within ±(0.015%+0.1Ω) as compared with the value before the test.

(3) Solderability

IEC 60115-1, 4.17: 235±5°C for 3±0.5 Seconds, there are at least 95% solder coverage on the termination.

(4) Resistance to soldering heat:

IEC 60115-1, 4.18: 260±3°C for 10±1 Seconds, immersed the terminals of resistor one by one into the solder pot. The change of the resistance value should be within ±(0.15%+0.1Ω) as compared with the value before the test.

(5) Damp heat, steady state

IEC 60115-1, 4.24: 40±2°C, 90-95% RH for 1000±48 hours. loaded with 0.1 times RCWV or the maximum working voltage or 100V whichever is lower. The change of the resistance value should be within ± (0.05%+0.1Ω) as compared with the value before the load.



(6) Climatic sequence

IEC 60115-1, 4.23: Cycling Conditions:

dry heat	UCT; 16 h
damp heat, cyclic	55°C;24h; ≥90% RH 1 cycle;
cold	LCT; 2 h
low air pressure	8.5 kPa 25±10°C 2h;
damp heat cyclic	55°C;24h; ≥90% RH ; 5 cycles
	LCT=-55°C; UCT=125°C

Apply RCWV or the maximum working voltage whichever is lower for 1 min. The change of the resistance value should be within $\pm(0.05\%+0.1\Omega)$ as compared with the value before the load.

(7) Load Life Test 1000 hours

IEC 60115-1, 4.25: 70±2°C at RCWV or the maximum working voltage whichever is lower for 1,000+48/-0 Hr. (1.5Hr. on, 0.5Hr. off). The resistors shall be arranged not much effected mutually by the temperature of others and the excessive ventilation shall not be performed.

The change of the resistance value should be within $\pm (0.05\%+0.1\Omega)$ as compared with the value before the load.

(8) Accidental Overload Test

IEC 60115-1, 4.26: 4 times RCWV or 2 times the maximum working voltage whichever is lower for 1 Minute. No evidence of flaming or arcing.

(9) Component solvent resistance

IEC 60115-1, 4.29: Isopropyl alcohol; 50 °C; method 2. No visible damage.



(10) Solvent resistance of marking

IEC 60115-1, 4.30: Isopropyl alcohol; 50 °C; method 1, toothbrush. Marking legible; no visible damage

(11) Flammability

IEC 60115-1, 4.35: IEC 60695-11-5 (1), needle flame test; 10 s. No burning after 30 seconds.

(12) Damp heat, steady state, accelerated

IEC 60115-1, 4.37: $(85 \pm 2)^{\circ}\text{C}$, $(85 \pm 5)\% \text{RH}$; $U = 0.3 \times \text{RCWV}$ or $U = 0.3 \times U_{\text{max}}$ or 100V whichever is lower for 1000 hours. The change of the resistance value should be within $\pm(0.25\%+0.1\Omega)$ as compared with the value before the load.

(13) Electrostatic discharge (Human Body Model)

IEC 60115-1, 4.38: IEC 61340-3-1 (1); 3 pos. + 3 neg. discharges.

RJM73U0204: 2kV; RJM74U0207: 3kV;

The change of the resistance value should be within $\pm(0.50\%+0.1\Omega)$ as compared with the value before the load.



Disclaimer

All products, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.

Thunder Precision Resistors makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product to the maximum extent permitted by applicable law.