RGM SERIES

ULTRA-HIGH OHM VALUE METAL GLAZE FILM RESISTORS

MELF TYPE ULTRA-HIGH WORKING VOLTAGE RESISTORS

Feature

· Advanced metal glaze film technology

· Very low TCR: up to ±25ppm/℃

· Very low noise and voltage coefficient up to 1ppm

· High pulse loading capability

· Maximum working voltage up to 10000V

· TÜV certificated in 2009

Description

Production is strictly controlled and follow an extensive set of instructions established in production procedure for reproducibility. A special homogeneous film of metal glaze is sintered on a high-grade ceramic core (85%~96% AL_2O_3) and conditioned to achieve the desired stability and reliability.
Color code rings designate the resistance value and tolerance in accordance with IEC 60062, but the yellow and white color rings are used to replace gold and silver rings for better high voltage performance.

Applications

· High resistance, high stability and high reliability at high voltage circumstances
· Municipal electricity input pulse especially electricity surges protecting
· High temperature and high humidity environments

1. PART NUMBER:

Part number of the metal glaze film resistor is identified by the type name, size code, tolerance, temperature coefficient, packing type, and resistance value.

For example：

RGM	74P0207	F	3	T	5603
Series Name	Size Code	Resistance Tolerance	Temperature Coefficient	Packing Type	Resistance Value of Resistance

(1) Type name: RGM series MELF resistors

(2) Size code: power rating listed in the Electric characteristics

(3) M= Tiny size; P= power mode; “ “= normal size

(3) Tolerance: D=±0.50%; F=±1.0%; J=±5%; K=±10%

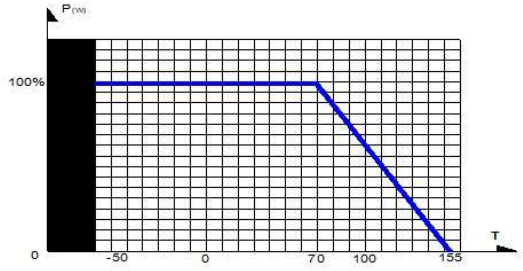
(4) T.C.R.: C3=±25ppm/℃; C2=±50ppm/℃; C2=±50ppm/℃;

C1=±100ppm/℃; 0=>±100ppm/℃

(5) Packaging Type: B＝BULK/BOX; T＝Reel/Box;

(6) Resistance Value: 1002=10k,3303=330k,1004=1M,1005=10M,
1006=100M, 1007=1000M=1G……

2. 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.

3. Color codes

(Yellow code and gray code are used to replace the golden code and silver code for better high voltage performance.)

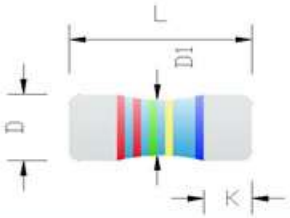
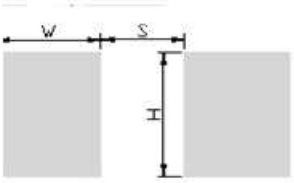
Four color bands codes for size 0204.

COLOR	1st	2nd	3rd	Multiple
black	0	0	0	1
brown	1	1	1	10
red	2	2	2	10^2
orange	3	3	3	10^3
yellow	4	4	4	10^4
green	5	5	5	10^5
blue	6	6	6	10^6
purple	7	7	7	
gray	8	8	8	
white	9	9	9	
golden				10^{-1}
silver				10^{-2}

Five color bands for size 0207, 0411, 0617

COLOR	1st	2nd	3rd	Multiple	tolerance
black	0	0	0	1	
brown	1	1	1	10	F(±1.0%)
red	2	2	2	10^2	G(±2.0%)
orange	3	3	3	10^3	
yellow	4	4	4	10^4	
green	5	5	5	10^5	D(±0.50%)
blue	6	6	6	10^6	C(±0.25%)
purple	7	7	7		B(±0.10%)
gray	8	8	8		
white	9	9	9		
golden				10^{-1}	J(±5.0%)
silver				10^{-2}	K(±10%)

4. ELECTRICAL CHARACTERISTICS AND DIMENSIONS

Type	Rated dissipation at 70℃	Max. working voltage U_{max}	Noise	Resistance range tolerance (%) Temperature coefficient (ppm/℃)		Dimension		Soldering pad (recommend)
				C; D; F C3;C2	F; J C1; C0	±0.3(mm)	(mm)	(mm)
RGM73P0204	0.25W	400V		10kΩ to 10MΩ	10kΩ to 100MΩ	L=3.5; D=1.3	K≥0.6;D1≥D-0.2	S=1.5; W=2; H=2.2
RGM74M0204	0.40W	600V		10kΩ to 10MΩ	10kΩ to 100MΩ	L=3.5; D=1.3	K⩾0.6;D1⩾D-0.2	S=1.5; W=2; H=2.2
RGM74P0207	0.60W	1600V		10kΩ to 100MΩ	10kΩ to 1GΩ	L=5.9; D=2.1	K⩾0.6;D1⩾D-0.3	S=2.9;W=3.2;H=3.2
RGM16M0207	1.0W	1600V		10kΩ to 100MΩ	10kΩ to 1GΩ	L=5.9; D=2.1	K≥0.6;D1≥D-0.3	S=2.9;W=3.2;H=3.2
RGM74P0411	0.60W	3500V	⩽1μV/V	10kΩ to 100MΩ	10kΩ to 1GΩ	L=8.7; D=3.1	K⩾0.8 D1⩾D-0.4	S=5.6;W=4.5;H=4.5
RGM16P0411	1.0W	3500V		10kΩ to 100MΩ	10kΩ to 1GΩ	L=8.7; D=3.1	K⩾0.8 D1⩾D-0.4	S=5.6;W=4.5;H=4.5
RGM17M0411	2.0W	3500V		10kΩ to 100MΩ	10kΩ to 1GΩ	L=8.7; D=3.1	K≥0.8 D1≥D-0.4	S=5.6;W=4.5;H=4.5
RGM17P0617	2.0W	7000V		10kΩ to 100MΩ	10kΩ to 1GΩ	L=10.6; D=4.1	K⩾1.0;D1⩾D-0.5	S=7.2;W=4;H=5
RGM18M0617	3.0W	7000V		10kΩ to 100MΩ	10kΩ to 1GΩ	L=10.6; D=4.1	K≥1.0;D1≥D-0.5	S=7.2;W=4;H=5
Outlines    								
Standard applied				Q\SLC007-2010				

* Unless otherwise specified, all values are tested at the following condition:

Temperature: 21℃ to 25℃; Relative humidity: 45% to 60%

* Unless otherwise specified, all values are calibrated at $100V_{DC}$

* Resistance value and tolerance out of range is available upon 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:>1μm + Ni:>0.6μm + Tin:>3μm.

* The post high temperature treatment after final tin plating is strictly controlled by our production procedure to minimize the tin whisker phenomenon

5. ENVIRONMENTAL CHARACTERISTICS

(1) Insulation Resistance

IEC 60115-1, 4.6: in V-block for 60 seconds, the test resistance should be high than 1,000 M Ohm.

(2) Dielectric Withstanding Voltage

IEC 60115-1 4.7: Place resistors in V-block for 60 Seconds, no breakdown or flashover.

(3) Temperature Coefficient Test

IEC 60115-1, 4.8: Test of resistors at room temperature and 60°C or 100°C on 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
R_0 = Resistance value at the room temperature
t = the 2nd testing temperature
t_0 = Room temperature

(4) 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, 5 seconds on and 45 seconds off, 10 cycles. The resistor should be free from defects. The change of the resistance value should be within ±(0.5%) as compared with the value before the test.

(5) Solderability

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

(6) Resistance to soldering heat:

IEC 60115-1, 4.18: 260±3°C for 10±1 Seconds, immersed to a point 3±0.5mm from the body. The change of the resistance value should be within ±(0.50%) as compared with the value before the test.

(7) Climatic sequence

IEC 60115-1, 4.19: The climatic sequence test cycle is shown in the following table. The measurement of the resistance value is done before the first cycle at room temperature and 1 hours leaving in the room temperature after the fifth cycle, the change of the resistance shall be within ± (1.50%). After the test the resistors shall be free from the electrical or mechanical damage.

dry heat	UCT; 16 h
damp heat,	55℃;24h; ≥90% RH
cyclic	1 cycle;
cold	LCT; 2 h
low air	8.5 kPa
pressure	25±10℃ 2h;
damp heat	55℃;24h; ≥90% RH ;
cyclic	5 cycles
	LCT=-55℃;
	UCT=155℃

(8) Damp Heat Steady State

IEC 60115-1, 4.24: 40±2°C, 90-95% RH for 56 days, loaded with 0.1 times RCWV or the maximum working voltage whichever is lower. The change of the resistance value should be within ±(5%) as compared with the value before the test.

(9) Load Life Test

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 ±(5%) as compared with the value before the test.

(10) Accidental Overload Test

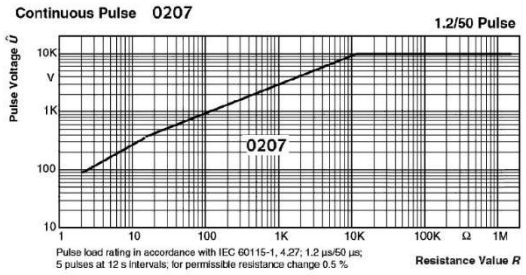
IEC 60115-1, 4.26: 4 times RCWV for 1 Minute. No evidence of flaming or arcing

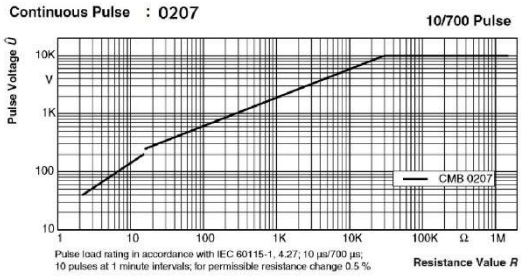
(11) Surge compatibility test

IEC 60115-1, 4.27: Surge voltage capability up to maximum10 kV 1.2/50 μs pulse, 5 pulses at 12s intervals; for permissible resistance change ± (0.5 %)

IEC 60115-1, 4.27: Surge voltage capability up to maximum 10 kV 10/700 μs pulse, 10 pulses at 1m intervals; for permissible resistance change ± (0.5 %)

The pulse loading voltage see the following graphs:





(12) Resistance to Solvent

IEC 60115-1, 4.30: IPA for 5±0.5 Min. with ultrasonic. No deterioration occurred.

(13) Electrostatic discharge (ESD human body mode)

IEC 60115-1, 4.40: Apply 3 negative and 3 positive discharges on resistors, discharge voltage 6000V on 0204 size and 16,000V on 0207 size and 0411 size and 0617 size (equivalent to MIL-STD-883, method 3015). The change of the resistance value should be within ±(0.50%) as compared with the value before the test.

Disclaimer

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

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