RG SERIES

ULTRA HIGH OHM VALUE METAL GLAZE FILM RESISTORS

ULTRA HIGH VOLTAGE METAL GLAZE FILM RESISTORS

Feature

· Advanced metal glaze film technology
· Very low TCR: up to ±25ppm/K
· Very low noise and voltage coefficient up to 1ppm
· High pulse loading capability
· Maximum working voltage up to 10,000V
· TÜV certificate from 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 high-grade ceramic rods (85%~96% AL_2O_3) and conditioned to achieve the desired stability and reliability.
The resistor elements are covered by a protective silicon coating designed for electrical, mechanical and climatic protection. The leads are covered with a final pure tin plating for keeping perfect solderability and wonderful outlooking.
Color code rings designate the resistance value and tolerance in accordance with IEC60062 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 series name, power rating, tolerance, temperature coefficient, packing type and resistance value.

For example：

RG	17S	J	2	T	5604
Series Name	Power Rating	Resistance Tolerance	Temperature Coefficient	Packing Type	Resistance Value

(1) Series name: RG series

(2) Power rating: 73=1/4W,74=1/2W,16=1.0W,17=2.0W,18=3.0W

(3) M= Tiny size; S= small size; “ “= normal size

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

(4) T.C.R.: C3=±25ppm/℃; C2=±50ppm/℃; C1=±100ppm/℃;

0=>±100ppm/℃

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

M type and F type forming are available on request

(6) Resistance Value: 1002=10k,3303=330k,1004=1M,1005=10M,

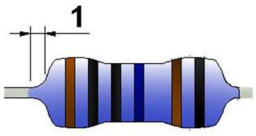
1006=100M, 1007=1000M=1G……

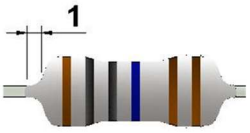
2. Derating curves

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. Marking:

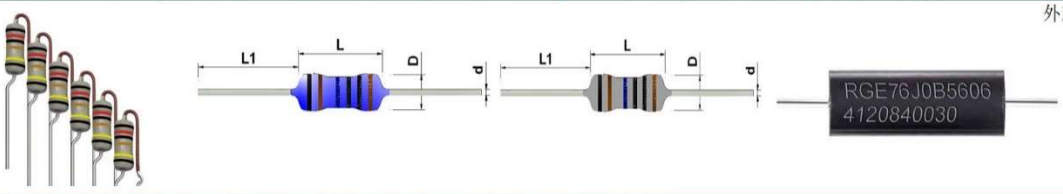
Color code (the 6th code is the identify code for RG series and Yellow code and white code is used to replace the golden code and silver code for protecting high voltage performance.) The black code behind the tolerance code is the identification code to distinguish metal glaze film from metal oxide film resistors and other resistors.





COLOR	1st	2nd	3rd	Multiple	tolerance	ID
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		
purple	7	7	7			
gray	8	8	8			
white	9	9	9			
golden				10^{-1}	J(±5.0%)	
silver				10^{-2}	K(±10%)	

4. ELECTRICAL CHARACTERISTICS

Type	RG73	RG74	RG16	RG17	RG18	型号
Standard applied	Q\SLC007-2000					温度系数
DIN-44061	0207	0414	0617	0719		德国工业标准型号
Cross to VISHAY's	VR25	VR37		VR68		对应Vishay 公司型号
Cross to CADDOCK's	MG655	MG660	MG710	MG721		对应Caddock 公司型号
Cross to PRP's	HV1/4	HV1/2	HV 1	HV 2	HV 3	对应PRP 公司型号
Cross to HYMEG's	HA-55	HA-60	HA-65	HA-70		对应HYMEG 公司型号
Cross to TEPRO's	TVH.25	TVH.5	TVH.75			对应TEPRO 公司型号
Cross to IRC/TT's	CGH-1/4 RG07	CGH-1/2 RG20	CGH-1	CGH-2		对应IRC/TT 公司型号
Cros to OHMITE's	MOX200	MOX300				对应OHMITE 公司型号
Cross to EBG's		RSX1/10	OGP 13	OGP 26		对应EBG 公司型号
Resistance range	1kΩ to 1GΩ	1kΩ to 1GΩ	1kΩ to 1GΩ	1kΩ to 2GΩ	1kΩ to 2GΩ	阻值范围
Resistance tolerance	D(±0.5%); F(±1%); J(±5.0%); K(±10%)					阻值精度
Temperature coefficient	±25ppm/℃; ±50ppm/℃; ±100ppm/℃; ±200ppm/℃					温度系数
Rated dissipation, P_{70}	0.25W	0.50W	1.0W	2.0W	3W	P_{70} 70℃以下功率
Max. operating voltage	1600V_{DC}	3500V_{DC}	5000V_{DC}	7000V_{DC}	10000V_{DC}	最大工作电压
Max. short time over load voltage	3500V_{DC}	3500V_{DC}	7000V_{DC}	10000V_{DC}	10000V_{DC}	最大短时间过载电压
	$U_{max}=2.5\times\sqrt{P_{70}\times R}$; 5s on and 45s off,10 cycles; △R/R≤0.5%					
Operating Temperature range	-55℃ to 155℃					工作温度范围
Insulation voltage	>500V_{DC}	>700V_{DC}	>700V_{DC}	700V_{DC}	1000V_{DC}	绝缘耐压
Noise	per IEC 60195 ≤0.5μV/V					稳态湿热实验
Derating curve	Linearly down from 70℃ to 155℃					降功率曲线
Dimension Max. (mm)	L=6, D=2.5	L=10, D=3.5	L=13, D=4.5	L=17, D=5.5	L=26, D=8.5	Max. (mm) 外型尺寸
±0.10(mm)	d=0.6	d=0.6	d=0.8	d=0.8	d=0.8	±0.10(mm)
Outlook						外观
Yellow code and gray code is used to replace the golden code and silver code for protecting high voltage performance.						
The black code behind the tolerance code is to distinguish the metal glaze film resistors from the others.						
黄色色环和灰色色环取代金色和银色色环,以避免色环中的金属微粒影响高压工作性能.						
精度色环之后的黑色色环作为金属釉膜电阻的特殊标志,用于区别金属釉膜电阻器和其它电阻器						

- Unless otherwise specified, all values are tested at the following condition:
  Temperature: 21℃ to 25℃; Relative humidity: 45% to 60%
- All resistance calibrated at 100Vdc unless otherwise specified.

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 ±(5.0%) 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 ±(5.0%) as compared with the value before the test.

(10) Accidental Overload Test

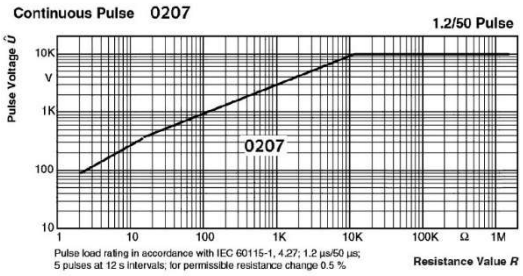
IEC 60115-1, 4.26: 4 times RCWV for 1 Minute. No evidence of flaming or arcing

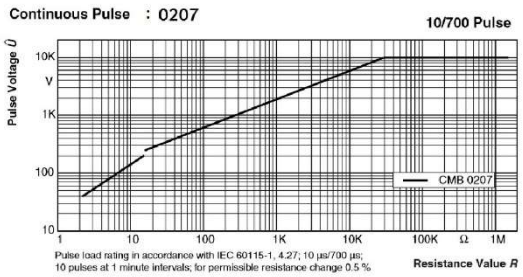
(11) Surge compatibility test

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

The pulse loading voltage see the following graphs:





(12) High voltage high pulse overload

IEC 60115-1, 4.28: Apply 10 pulses with 10 times rated voltage or 2 times the maximum working voltage whichever is lower to the resistor, the pulses parameter is 10μs/700μs. The change of the resistance shall be within ± (2.0%).

(13) Resistance to Solvent

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

(14) 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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