EE SERIES

MOLD TYPE HIGH PRECISION METAL FILM RESISTORS

Feature

· Advanced thin film technology
· Excellent overall stability: Class 0.05%
· Very low TCR: up to ±5ppm/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 an extensive set of instructions established in production procedure for reproducibility. A homogeneous film of metal alloy is deposited on the surface of **CeramTec**'s ceramic cores (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 prefect electronics performance by smoothly cutting a helical groove in the resistance layer on the ceramic rods without damaging the ceramics. 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. PART NUMBER:

Part number is identified by the type series name, power rating, tolerance, temperature coefficient, packing type and resistance value.

Example：

EE	1/8	B	5	B	10R0
Series Name	Power rating	Resistance Tolerance	Temperature Coefficient	Packing Style	Resistance

(1) Style: EE SERIES

(2) Power rating at 70℃: 1/10=0.25W; 1/8=0.50W; 1/4=0.75W; 1/2=1W

(3) Tolerance: W=±0.05%; B=±0.10%; C=0.25%; D=0.50%; F=1.0%

(4) T.C.R.: 7=5ppm/℃; 6=10ppm/℃; 5=15ppm/℃; 3=25ppm/℃;

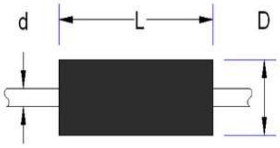
(5) Packaging Type: B=BULK; T=Taping

(6) Resistance Value: 10R0=10Ω, 1201=1k2, 3302=33k, 4733=473k, 1004=1M

2. MARKING

Digital marking with part number and batch number

3. ELECTRICAL CHARACTERISTICS

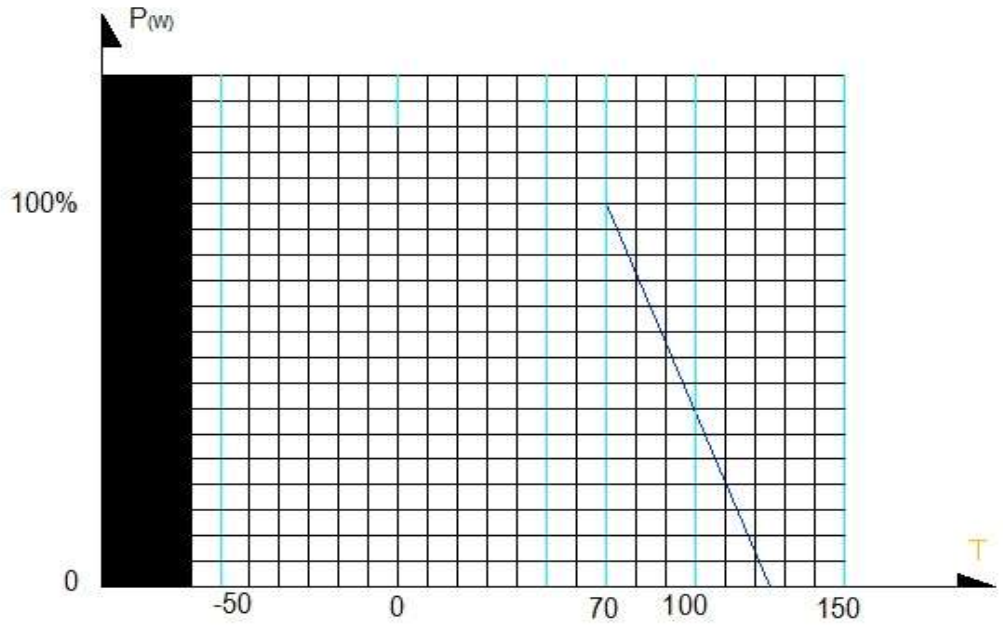
THUNDER type		EE1/10	EE1/8	EE1/4	EE1/2	型号
MIL-R-10509F type		RN55	RN60	RN65	RN70	美国军标 MIL-R-10509F 型号
Cross to VISHAY's		PTF56	PTF65			对应美国 VISHAY 公司型号
Cross to PRP's		PR1/10	PR1/8	PR1/4A	PR1/4	对应PRP 公司型号
Cross to AAC's		SRN55	SRN60	SRN65	SRN70	对应AAC 公司型号
Cross to TEPRO's		RNF55	RNF60	RNF65		对应TEPRO 公司型号
Cross to RCD's		PMF1/10	PMF1/8	PMF1/4	PMF1/2	对应RCD 公司型号
Cross to IRC&WELWYN/TT's		CAR5	CAR6	CAR7		对应IRC&WELWYN/TT 公司型号
Rated dissipation	P_{70}	0.25W	0.50W	0.75W	1.0W	P_{70} 70℃以下功率
Rated dissipation	P_{125}	0.10W	0.125W	0.25W	0.50W	P_{125} 125℃以下功率
Operating voltage	U_{max}	250V	300V	350V	400V	U_{max} 最大工作电压
Short time over load voltage	$2U_{max}$	500V	600V	700V	800V	$2U_{max}$ 大短时间过载电压
Resistance range via tolerance	P(±0.025%)	100Ω to 100kΩ	100Ω to 100kΩ	100Ω to 100kΩ	100Ω to 100kΩ	对应于不同精度的阻值范围
	W(±0.05%)	10Ω to1MΩ	10Ω to 1MΩ	10Ω to 1MΩ	10Ω to 1MΩ	
	B(±0.10%); C(±0.25%)	1Ω to 3MΩ	1Ω to 3MΩ	1Ω to 3MΩ	1Ω to 3MΩ	
	D(±0.50%); F(±1.0%)	1Ω to 5MΩ	1Ω to 10MΩ	1Ω to 10MΩ	1Ω to 10MΩ	
Resistance range via temperature coefficient	C7(±5ppm/℃)	3Ω to 1MΩ	3Ω to 1MΩ	3Ω to 1MΩ	3Ω to 1MΩ	C7(±5ppm/℃) 对应于不同温度系数 的阻值范围
	C6(±10ppm/℃)	3Ω to 1MΩ	3Ω to 1MΩ	3Ω to 1MΩ	3Ω to 1MΩ	C6(±10ppm/℃)
	C5(±15ppm/℃)	3Ω to 1MΩ	3Ω to 1MΩ	3Ω to 1MΩ	3Ω to 1MΩ	C5(±15ppm/℃)
	C3(±25ppm/℃)	1Ω to 3MΩ	1Ω to 5MΩ	1Ω to 5MΩ	1Ω to 5MΩ	C3(±25ppm/℃)
Dimension	±0.40(mm)	L=6.8, D=2.5	L=10, D=3.7	L=14.8, D=5.2	L=18.3, D=6.5	±0.40(mm) 外型尺寸
	±0.05(mm)	d=0.6	d=0.6	d=0.6	d=0.8	±0.05(mm)
Outlines						外观
Resistance range and tolerance can be extended upon request						阻值范围，精度等可以根据要求适当调整

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

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

* Rated Continuous Working Voltage (RCWV)= $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$

4. DERATING CURVE



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.

5. ENVIRONMENTAL CHARACTERISTICS

(1) Insulation Resistance

IEC 60115-1, 4.6: in V-block for 60 seconds, the test resistance should be high than 10,000 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.

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

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 10 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± (0.02%+0.05Ω) 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 ±(0.05%+0.05 Ω) as compared with the value before the test.

(7) Climatic sequence

IEC 60115-1, 4.19: -55°C to Room Temp. to +155°C to Room Temp. (5 cycles). The change of the resistance value shall be within ± (0.05%+0.05Ω) as compared with the value before the load. After the test the resistors shall be free from the electrical or mechanical damage.

(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 ± (0.05%+0.05Ω) as compared with the value before the load.

(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 ± (0.05%+0.05Ω) as compared with the value before the load.

(10) Resistance to Solvent

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

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.