

Approval Sheet

for

**Power Cement Resistors
Low Ohmic & Low Inductance Type**

LLC Series

$\pm 1\%$ & $\pm 2\%$ & $\pm 3\%$ & $\pm 5\%$

YAGEO CORPORATION

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**1. PRODUCT:**

Power Cement Resistors. Low ohmics, tight tolerance available, low inductance for high frequency.

(LLC SERIES)

2. PART NUMBER:

Part number of the power cement resistor is identified by the name, power, tolerance, packing, temperature coefficient and resistance value.

Example :

LLC	500	F	B	-	0R01
(1)	(2)	(3)	(4)	(5)	(6)
Series Name	Power Rating	Resistance Tolerance	Packing Style	Temperature Coefficient of Resistance	Resistance Value

(1) Style : LLC SERIES: Axial Type

(2) Power Rating : 450=4.5W 、 500=5W 、 600=6W 、 800=8W 、 10A=10W

(3) Tolerance : F=±1% 、 G=±2% 、 H=±3% 、 J = ±5%

(4) Packaging Type : B = Bulk Packing
R = Paper Taping Reel (on request)

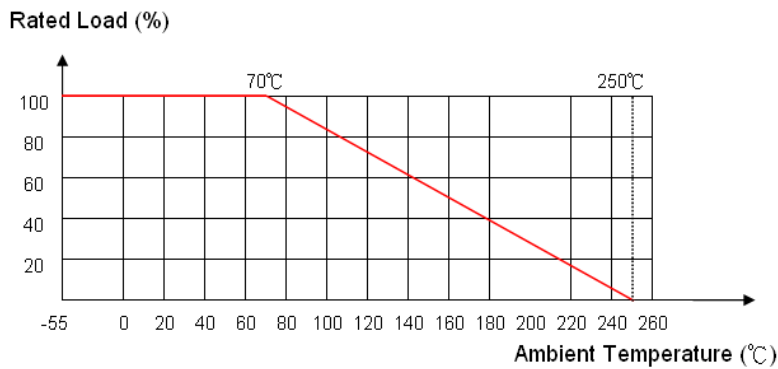
(5) Temperature Coefficient : “-“=base on spec.

(6) Resistance Value :
Example : 0R005, 0R01, 0R1,.....

3. ELECTRICAL CHARACTERISTICS

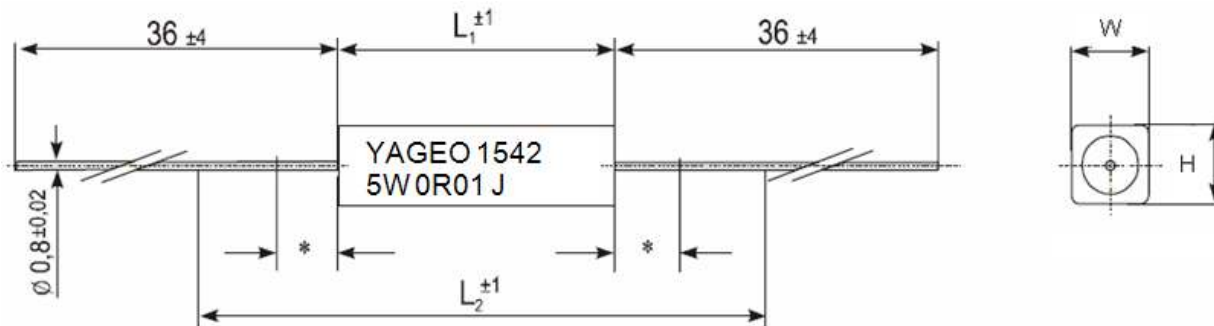
STYLE	LLC450	LLC500	LLC600	LLC800	LLC10A
Power Rating at 70 °C	4.5W	5W	6W	8W	10W
Max. Cont. Work. Voltage	$\sqrt{P70 \times R}$				
Thermal resistance _{cv} (°C/W)	65		50	35	30
Resistance Range	0.003Ω	0.004~0.051Ω	0.004~0.068Ω		0.005~0.1Ω
Insulation Voltage (1min.)	2000V				
Temperature Coefficient	+200~+1200PPM/°C (Depends on value)				
Operating Temp. Range	- 55 °C to + 250 °C				

4. DERATING CURVE



5. DIMENSIONS

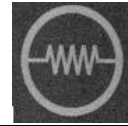
Dimensions in mm



* 6mm, reduced solderability in this area

Unit : mm

TYPE	L1	L2	W	H
LLC450	18	40	6.4 ± 0.3	6.4 ± 0.3
LLC500	18	40	6.4 ± 0.3	6.4 ± 0.3
LLC600	25	45	6.4 ± 0.3	6.4 ± 0.3
LLC800	25	45	9.0 ± 0.3	9.0 ± 0.3
LLC10A	38	60	9.0 ± 0.3	9.0 ± 0.3



Measuring length L2: Resistance value is measured over the centered length L2 on terminals free of oxide and contaminations. Differing conditions require adequate corrections ($R_{\text{terminal}} = 0.4\text{m}\Omega / \text{cm}$)

6. ENVIRONMENTAL CHARACTERISTICS

(1) Short Time Over Load Test

At 2.5 times of the rated voltage applied for 5 seconds, the resistor should be free from defects after the resistor is released from load for about 30 minutes

$$\text{Short Time Overload Voltage} = 2.5 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

The change of the resistance value should be within $\pm 2.0\%$

(2) Voltage Proof on Insulation

The resistor shall be clamped in the trough of a 90° metal V Block. Apply the insulation voltage of 2000V between the terminals connected together with the block for about 60 seconds.

The resistor shall be able to withstand without breakdown or flashover.

(3) Temperature Coefficient Test

Test of resistors above room temperature $100^\circ\text{C} \pm 2^\circ\text{C}$ (Testing Temperature 115°C to 130°C) at the constant temperature silicon plate for over 5 minutes. Then measure the resistance value.

The Temperature Coefficient is calculated by the following equation and its value should be within the range of 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 testing temperature

t₀ = Room temperature

(4) Insulation Resistance

Apply "measuring voltage" between protective coating and termination for 1 min., then measure. The measuring voltage shall be either $100\text{V} \pm 15\text{V}$ d.c. for resistors with an insulation voltage lower than 500V or $500\text{V} \pm 50\text{V}$ d.c. for resistors with an insulation voltage equal to or greater than 500V.

The test resistance should be higher than 10,000 Mohm.

(5) Solderability

Immerse the specimen into the solder pot at $245 \pm 5^\circ\text{C}$ for 3 ± 0.5 seconds.

At least 90% solder coverage on the termination.

(6) Solvent Resistance of Marking

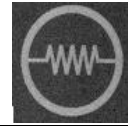
The specimen into the appropriate solvent of IPA condition of ultrasonic machine for 5 ± 0.5 minutes.

The specimen is no deterioration of coatings and color code.

(7) Robustness of Terminations

Direct Load – Resistors shall be held by one terminal and the load shall be gradually applied in the direction of the longitudinal axis of the resistor unit the applied load reached the requirement.

The load shall be held for 10 seconds. The load of weight shall be 5 kg (50N).



(8) Damp Heat Steady State

Place the specimen in a test chamber at 40 °C and 93 % relative humidity. Apply the rated voltage to the specimen at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 56 days
The change of the resistance value shall be within $\pm 0.5\%$

(9) Endurance at 70 °C

Placed in the constant temperature chamber of 70 ± 3 °C the resistor shall be connected to the lead wire at the point of 25mm. Length with each terminal, the resistors shall be arranged not much effected mutually by the temperature of the resistors and the excessive ventilation shall not be performed, for 90 minutes on and 30 minutes off under this condition the rated D.C. voltage is applied continuously for 1000+48/-0 hours then left at no-load for 1hour, measured at this time the resistance value ◦

The change of the resistance value shall be within ± 3.0 %.

There shall be no remarkable change in the appearance and the color code shall be legible after the test.

(10) Temperature Cycling Test

The temperature cycle shown in the following table shall be repeated 5 times consecutively. The measurement of the resistance value is done before the first cycle and after ending the fifth cycle, leaving in the room temperature for about 1 hour ◦

Temperature Cycling Conditions:

Step	Temperature(°C)	Time (minute)
1	-55 ± 3	30
2	25 ± 3	10 ~ 15
3	155 ± 3	30
4	25 ± 3	10 ~ 15

The change of the resistance value shall be within ± 0.5 %

After the test the resistor shall be free from the electrical or mechanical damage.

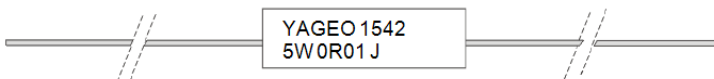
(11) Resistance to Soldering Heat

The terminal lead shall be dipped into the solder pot at 260 ± 3 °C for 10 ± 1.0 seconds up to 2.5 ~ 3.5 mm.

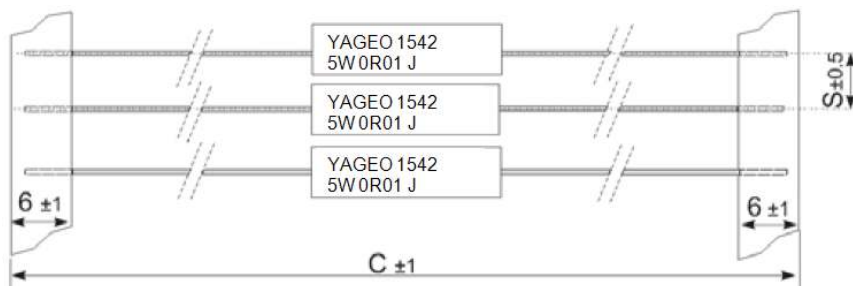
The change of the resistance value shall be within ± 0.2 %

7. PACKAGING

The standard packaging for KN in axial type is bulk, dimensions below.



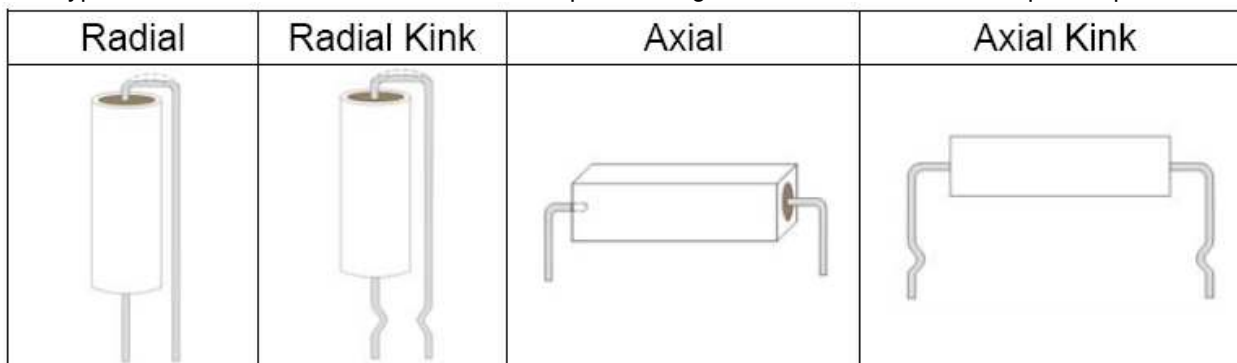
Type	Packaging	Pieces	Pack.-Code
LLC450	Bulk	200	B
LLC500	Bulk	200	B
LLC600	Bulk	200	B
LLC800	Bulk	200	B
LLC10A	Bulk	200	B



Type	Packaging	Pieces	Pack.-Code	C	S
LLC450	Taped in Reel	1000	R	85	10
LLC500	Taped in Reel	1000	R	85	10
LLC600	Taped in Reel	1000	R	95	10
LLC800	Taped in Reel	500	R	95	10
LLC10A	Taped in Reel	500	R	95	10

8. SPECIAL TYPE (FORMING DIMENSIONS)

This type resistor, is also available in a different pre-forming, as shown below, other's upon request.



9. Plant Address

- A. China Dongguan Plant
7-1, Gaoli Road, Gaoli Industrial Zone
Tangxia Zhen, Dongguan, Guangdong, China
(廣東省東莞市塘廈鎮高麗工業區高麗路 7-1 號)
Tel. 86-769-8772 0275
Fax. 86-769-8772 0275 #4333
- B. China Suzhou Plant
No.158, Jinchang Road, No.1 Building of Nan Bang IND. Zone,
Mu Du New District, Suzhou, China
(江蘇省蘇州市木瀆新區金長路 158 號南濱工業區 1 號)
Tel. 86-512-66518889
Fax. 86-512-66519889