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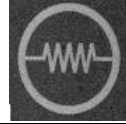
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Approval Sheet

for

**Cement Resistors
Power Wirewound & Axial / Vertical
Lead Type**

PSP & PSM series

$\pm 5\%$ & $\pm 10\%$

YAGEO CORPORATION

Headquarters: 3F, No.233-1, Pao Chiao Rd., Xindian, Taipei, Taiwan, R.O.C.

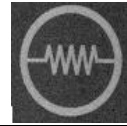
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| Rev. | Description | Issue Date | Drawn | Approved |
|------|---|---------------|-----------|-------------|
| 00 | issue new spec. | Feb 12, 2008 | Lynn Chen | Joyce Chung |
| 01 | Series adjustment | Sep 1, 2008 | Lynn Chen | Joyce Chung |
| 02 | Product marking information is included | Dec 3, 2010 | Feng Ye | Ken Hsu |
| 03 | Electrical characteristics table and environmental characteristics are adjusted | Dec 29, 2010 | Feng Ye | Ken Hsu |
| 04 | Revise dimension map | Dec 06, 2012 | Feng Ye | Flora Shen |
| 05 | Revise dimensions of PSM700, PSM7WS and PSM 900 series. | Dec 12, 2012 | Feng Ye | Flora Shen |
| 06 | Revise maps of derating curve and dimensions | Feb 21, 2013 | Feng Ye | Ken Hsu |
| 07 | PSP11A, PSP17A, PSM11A, PSM17A are included. | Jul. 07, 2016 | Feng Ye | Flora Shen |
| 08 | Taped in reel is included, add packing info. | Jul. 19, 2016 | Feng Ye | Flora Shen |
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|--------------------|---|-------------|----|
| Description | Cement Resistors-Power Wirewound & Axial/Vertical Lead Type | | |
| Series | PSP&PSM | Rev. | 08 |

**1. PRODUCT:**

1. Power Wirewound Resistors. Fiber Glass Core and with Ceramic Case. Wirewound construction, Insulated and Flameproof (PSP & PSM SERIES)

2. PART NUMBER:

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

Example :

| | | | | | |
|-------------|--------------|----------------------|---------------|---------------------------------------|------------------|
| PSP | 400 | J | B | - | 100R |
| (1) | (2) | (3) | (4) | (5) | (6) |
| Series Name | Power Rating | Resistance Tolerance | Packing Style | Temperature Coefficient of Resistance | Resistance Value |

(1) Style : PSP SERIES: Axial Type
PSM SERIES: Vertical Type

(2) Power Rating : 400=4W 、 500=5W 、 7WS=7W 、 700=7W 、 900=9W 、 11A=11W 、 17A=17W

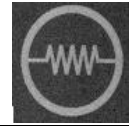
(3) Tolerance : J = $\pm 5\%$ 、 K = $\pm 10\%$

(4) Packaging Type : B = Bulk Packing
R = Taped in reel

(5) Temperature Coefficient : $\pm 400\text{ppm}/^\circ\text{C}$

(6) Resistance Value : E24 Series

Example : 0R1, 1R 、 10R 、 100R 、 10K.....



3. ELECTRICAL CHARACTERISTICS

| STYLE | PSP400 | PSP500 | PSP7WS | PSP700 | PSP900 | PSP11A | PSP17A |
|--------------------------|--------------------------|--------|-----------|-----------|--------|--------|--------|
| Power Rating at 70 °C | 4W | 5W | 7W | | 9W | 11W | 17W |
| Max. Cont. Work. Voltage | $\sqrt{P_{70} \times R}$ | | | | | | |
| Resistance range | 0.1~2.2KΩ | | 0.1~2.5KΩ | 0.5~3.9KΩ | | 1~10KΩ | |
| Operating Temp. Range | - 55 °C to + 275 °C | | | | | | |
| Temperature Coefficient | ±400ppm/°C | | | | | | |

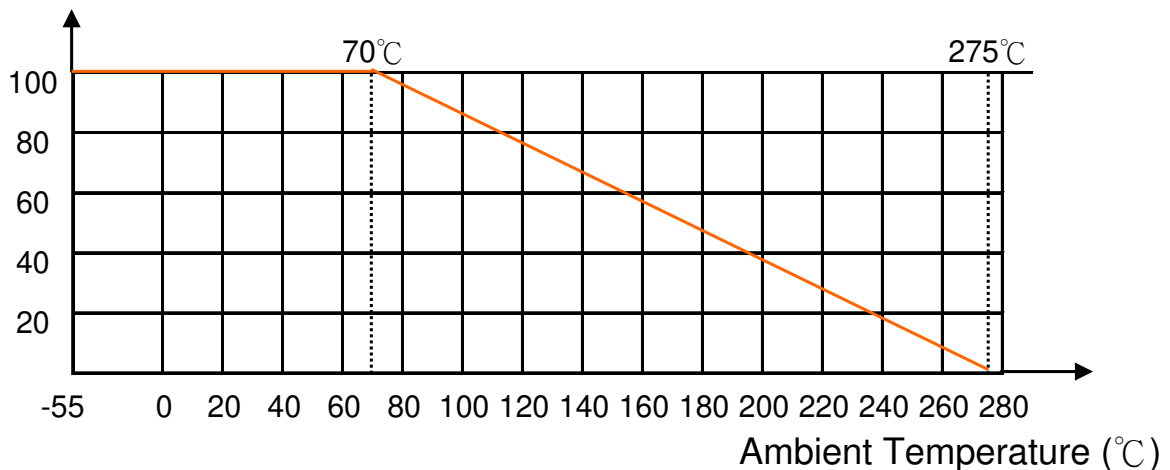
| STYLE | PSM400 | PSM500 | PSM7WS | PSM700 | PSM900 | PSM11A | PSM17W |
|--------------------------|--------------------------|--------|-----------|----------|--------|--------|--------|
| Power Rating at 70 °C | 4W | 5W | 7W | | 9W | 11W | 17W |
| Max. Cont. Work. Voltage | $\sqrt{P_{70} \times R}$ | | | | | | |
| Resistance range | 0.1~2.2KΩ | | 0.1~2.5KΩ | 0.5~3K9Ω | | 1~10KΩ | |
| Operating Temp. Range | - 55 °C to + 275 °C | | | | | | |
| Temperature Coefficient | ±400ppm/°C | | | | | | |

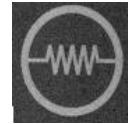
* Below or over this resistance range on request

4. DERATING CURVE

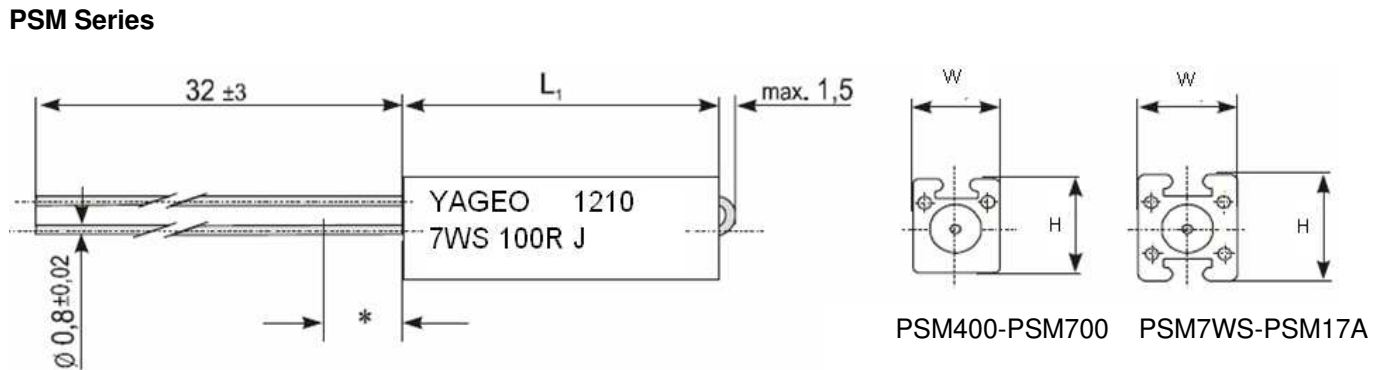
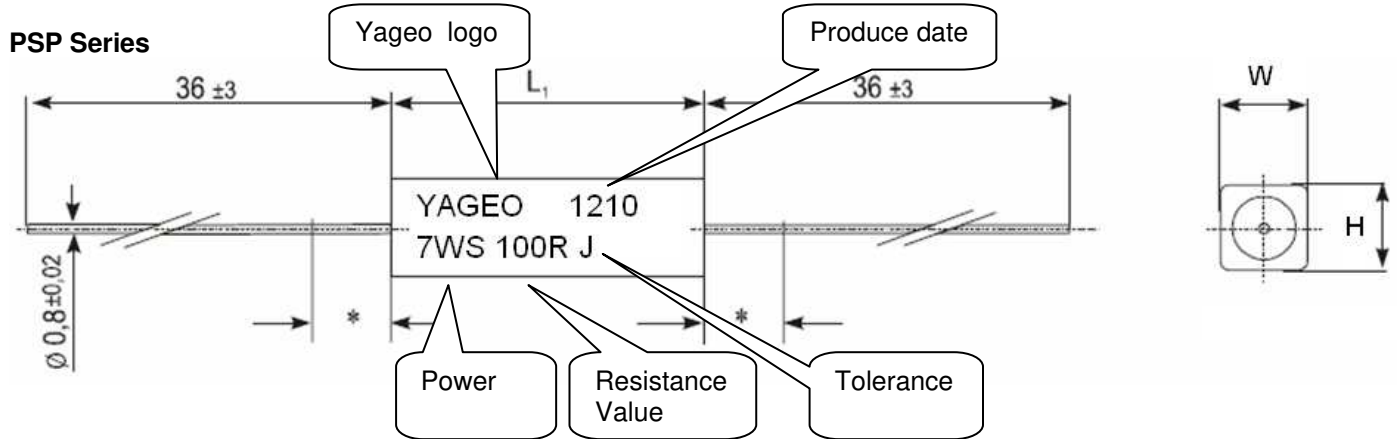
For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below.

Rated Load (%)





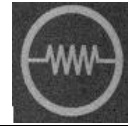
5. DIMENSIONS



Unit : mm

| TYPE | L1 | W | H |
|--------|--------|-----------|-----------|
| PSP400 | 20±1.0 | 6.4 ± 0.3 | 6.4 ± 0.3 |
| PSP500 | 25±1.0 | 6.4 ± 0.3 | 6.4 ± 0.3 |
| PSP700 | 38±1.0 | 6.4 ± 0.3 | 6.4 ± 0.3 |
| PSP7WS | 25±1.0 | 9.0 ± 0.3 | 9.0 ± 0.3 |
| PSP900 | 38±1.0 | 9.0 ± 0.3 | 9.0 ± 0.3 |
| PSP11A | 50±1.5 | 9.0 ± 0.3 | 9.0 ± 0.3 |
| PSP17A | 75±2.0 | 9.0 ± 0.3 | 9.0 ± 0.3 |

| TYPE | L1 | W | H |
|--------|--------|-----------|------------|
| PSM400 | 20±1.0 | 7.0 ± 0.5 | 8.0 ± 0.4 |
| PSM500 | 25±1.0 | 7.0 ± 0.5 | 8.0 ± 0.4 |
| PSM700 | 38±1.0 | 7.0 ± 0.5 | 8.0 ± 0.4 |
| PSM7WS | 25±1.0 | 9.0 ± 0.4 | 10.0 ± 0.4 |
| PSM900 | 38±1.0 | 9.0 ± 0.4 | 10.0 ± 0.4 |
| PSM11A | 50±1.5 | 9.0 ± 0.4 | 10.0 ± 0.4 |
| PSM17A | 75±2.0 | 9.0 ± 0.4 | 10.0 ± 0.4 |



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 $\pm 2.0 \% + 0.05\Omega$

(2) Voltage Proof

The resistor shall be clamped in the trough of a 90° metal V Block. Apply the insulation voltage of 1000V 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 high than 1,000M ohm.

(5) Solderability

Immerse the specimen into the solder pot at $235 \pm 5^{\circ}\text{C}$ for 3 ± 0.5 seconds.
At least 90% solder coverage on the termination.

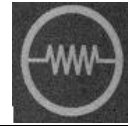
(6) Solvent Resistance of Marking

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 ≥ 2.5 kg (24.5N).



(8) Periodic-pulse Overload

Apply 4 times of rated voltage to the specimen at the 1 second on and 25 seconds off cycle, subjected to voltage application cycles specified in 10,000 time ◦

The change of the resistance value shall be within $\pm 2.0\% + 0.05 \Omega$

(9) 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 1,000 hours

The change of the resistance value shall be within $\pm 5.0 \% + 0.05 \Omega$

(10) Endurance at 70 °C

Placed in the constant temperature chamber of $70 \pm 3 \text{ }^\circ\text{C}$ 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 1 hour, measured at this time the resistance value ◦

The change of the resistance value shall be within $\pm 5.0 \% + 0.05 \Omega$.

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

(11) 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 $\pm 2.0 \% + 0.05 \Omega$

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

(12) Resistance to Soldering Heat

The terminal lead shall be dipped into the solder pot at $260 \pm 3 \text{ }^\circ\text{C}$ for 10 ± 1.0 seconds up to 2.5 ~ 3.5 mm.

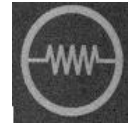
The change of the resistance value shall be within $\pm 1.0 \% + 0.05 \Omega$

(13) Overload Flame Retardant

At 4 times of the rated voltage. (If the voltage exceeds the maximum load voltage, the maximum load voltage will be used as the rated voltage) applied for 1 minute

$$\text{Overload Test Voltage} = 4 * \sqrt{\text{Power Rating} \times \text{Resistance Value}}$$

The resistor shall be able to no evidence of flaming arcing



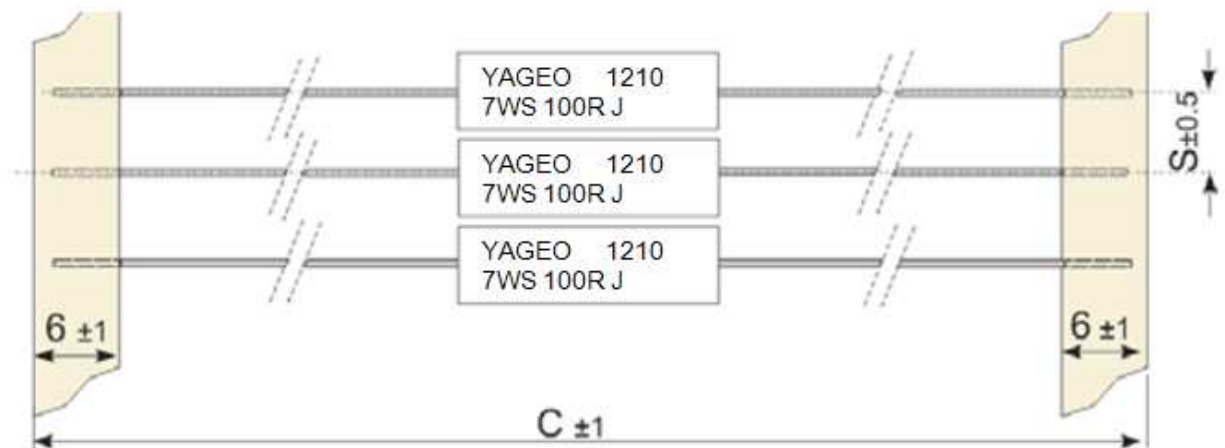
7. PACKING

Bulk

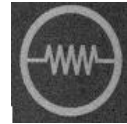
| TYPE | Packing | Pieces | Pack. Code | TYPE | Packing | Pieces | Pack. Code |
|--------|---------|--------|------------|--------|---------|--------|------------|
| PSP400 | Bulk | 200 | B | PSM400 | Bulk | 200 | B |
| PSP500 | | 200 | | PSM500 | | 200 | |
| PSP700 | | 200 | | PSM700 | | 200 | |
| PSP7WS | | 200 | | PSM7WS | | 200 | |
| PSP900 | | 200 | | PSM900 | | 200 | |
| PSP11A | | 100 | | PSM11A | | 200 | |
| PSP17A | | 100 | | PSM17A | | 100 | |

Tape/Reel

Only for PSP type



| TYPE | Packing | Pieces | Pack. Code | C | S |
|--------|---------------|--------|------------|----|----|
| PSP400 | Taped in Reel | 1000 | R | 95 | 10 |
| PSP500 | | 1000 | | 95 | 10 |
| PSP700 | | 1000 | | 95 | 10 |
| PSP7WS | | 500 | | 95 | 10 |
| PSP900 | | 500 | | 95 | 10 |



8. Plant Address

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