Innovative Service Around the Globe YAGEO

# DATA SHEET

## CURRENT SENSOR - LOW TCR

4 Termination

PS Series

5%, 1%, 0.5%

**0306/0612**

**RoHS compliant & Halogen free**

YAGEO Phycomp

Product specification – July 17, 2019 V.1

## SCOPE

This specification describes PS series 4-terminal current sensor - low TCR chip resistors with lead-free terminations made by metal alloy process.

## APPLICATIONS

- Battery pack
- Inverter/Converter (DC-DC/AC-DC/DC-AC)
- Consumer electronics
- Laptops

## FEATURES

- This product with lead-free terminations meet RoHS requirements
- High component and equipment reliability
- Ultra low resistance and narrow tolerance suitable for current detection

## ORDERING INFORMATION - GLOBAL PART NUMBER

Global part numbers are identified by the series, size, tolerance, packing type, temperature coefficient, taping reel and resistance value.

### GLOBAL PART NUMBER

| PS | XXXX | X | X | X | XX | XXXX | L |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |

### (1) SIZE

0306 / 0612

### (2) TOLERANCE

D=±0.5% (10mΩ & 20mΩ)
F = ±1%
J = ±5%

### (3) PACKAGING TYPE

K= Embossed taping reel
R = Paper taping reel

### (4) TEMPERATURE COEFFICIENT OF RESISTANCE

M = ±75ppm/°C
F = ±100ppm/°C
L = ±150ppm/°C
G = ±200ppm/°C
P = ±300ppm/°C

### (5) TAPING REEL

07 / 7W / 7T= 7 inch dia. Reel and specific rated power.
Detailed power rating are shown in the Table 2.

### (6) RESISTANCE VALUE

0.5mΩ to 100mΩ
There are 3~5 digits indicated the resistance value. Letter R is decimal point.
Detailed coding rules of resistance are shown in the table of "Resistance rule of global part number".

### (7) DEFAULT CODE

Letter L is the system default code for ordering only. (Note)

Resistance rule of global part number

| Resistance code rule | Example |
|---|---|
| 0RXXX (0UX) | 0R001 = 1mΩ |
| | 0R1 = 100mΩ |
| | 0U5 = 0.5mΩ |

### ORDERING EXAMPLE

The ordering code of a PS0306 1W chip resistor, value 0.003 Ω with ±1% tolerance, supplied in 7-inch tape reel is:
PS0306FRL0R003L

**NOTE**

1. All our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead-Free Process"

## MARKING

PS0306/0612

Fig. 1 Bar marking

**Outlines**

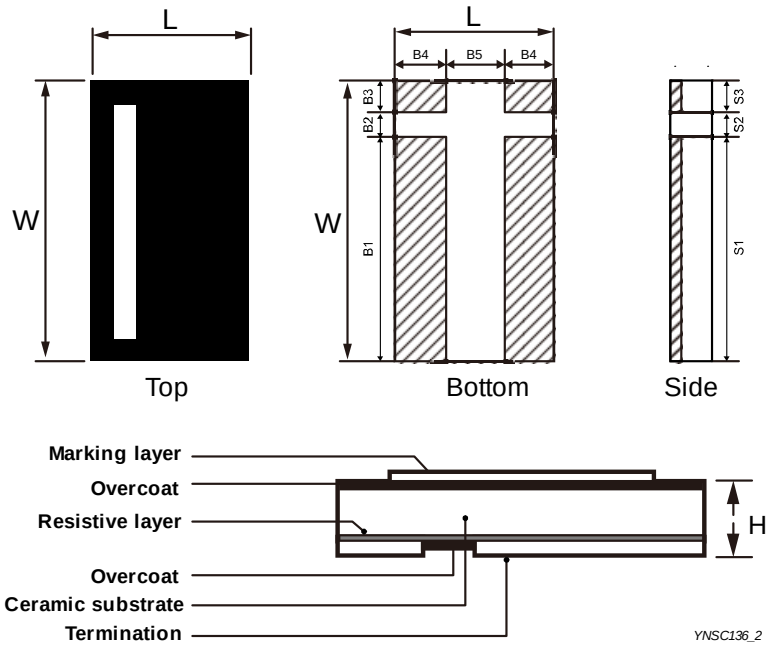


Fig. 2 Chip resistor outlines

## DIMENSION

Table 1

| TYPE | L (mm) | W (mm) | B1/S1 (mm) | B2/S2 (mm) | B3/S3 (mm) | B4 (mm) | B5 (mm) | H (mm) |
|---|---|---|---|---|---|---|---|---|
| PS0306 | 0.80±0.15 | 1.60±0.20 | 1.10±0.20 | 0.25±0.10 | 0.25±0.10 | 0.20±0.10 | 0.40±0.20 | 0.50±0.20 |
| PS0612 | 1.60+0.15/-0.20 | 3.20±0.20 | 2.20±0.20 | 0.50±0.20 | 0.50±0.20 | 0.45±0.20 | 0.70±0.20 | (0.5~1mΩ) 0.70±0.20<br>(2~10mΩ) 0.60±0.20<br>(12~100mΩ) 0.50±0.20 |

Note:
1. For relevant physical dimensions, please refer to construction outlines.
2. Please contact with sales offices, distributors and representatives in your region before ordering.

## ELECTRICAL CHARACTERISTICS

Table 2

| SERIES | SIZE | POWER RATING | TOLERANCE | RESISTANCE RANGE | TEMPERATURE COEEFICIENT OF RESISTANCE |
|---|---|---|---|---|---|
| PS | 0306 | 1/4W | ± 0.5%(10, 20mΩ) ±1%, ±5% | 2mΩ ≤ R < 5mΩ | ±150ppm/°C |
| | | 1/3W | | 5mΩ ≤ R ≤ 100mΩ | ±75ppm/°C ±100ppm/°C |
| | | 1/2W | | | |
| | 0612 | 1W | | 0.5mΩ | ±300ppm/°C |
| | | | | 1mΩ | ±100ppm/°C ±150ppm/°C |
| | | | | 2mΩ ≤ R ≤ 9mΩ | ±100ppm/°C |
| | | | | 14mΩ ≤ R ≤ 100mΩ | ±100ppm/°C |
| | | | | 10mΩ ≤ R ≤ 13mΩ | ±200ppm/°C |

Note: Please contact with sales offices, distributors and representatives in your region before ordering.

## FUNCTIONAL DESCRIPTION

### OPERATING TEMPERATURE RANGE

PS0612 0.5mΩ ≤ R ≤ 10mΩ -55℃ to +155℃
12mΩ ≤ R ≤ 100mΩ -55℃ to +125℃

PS0306 -55℃ to +125℃

### POWER RATING

Standard rated power at 70°C

### RATED VOLTAGE

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$$V = \sqrt{(P*R)}$$

Where

V = Continuous rated DC or AC (rms) working voltage (V)

P = Rated power (W)

R = Resistance value (Ω)

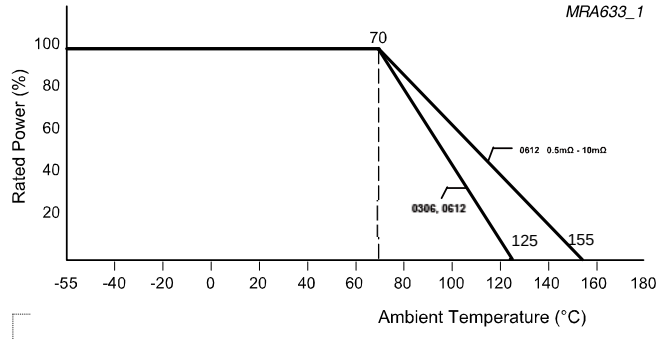


**Fig. 3** Maximum dissipation ($P_{max}$) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$)

## PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

| PACKING STYLE | REEL DIMENSION | PS0306 | PS0612 |
|---|---|---|---|
| Paper taping reel (R) | 7" (178 mm) | 5,000 | --- |
| Embossed taping reel (K) | 7" (178 mm) | --- | 4,000 |

### PAPER TAPE

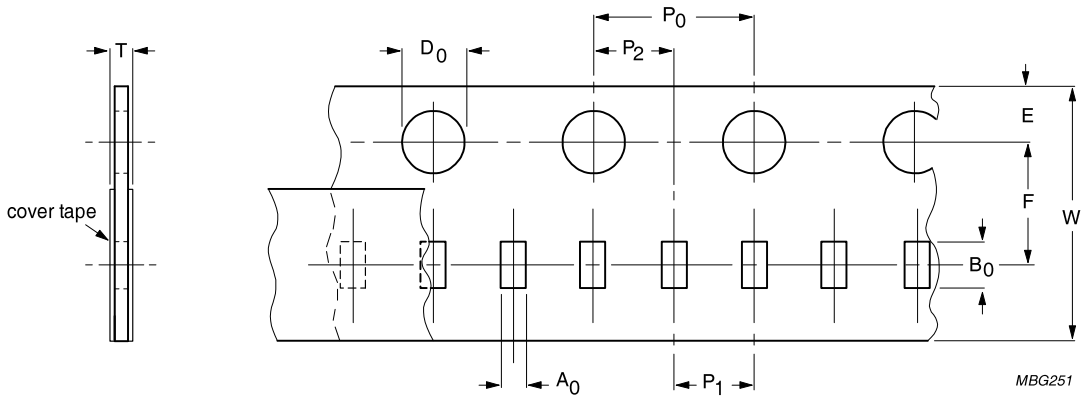


Fig. 4 Paper Tape

Table 4 Dimensions of paper tape for relevant chip resistors size

| SIZE | SYMBOL | | | | | | | | | Unit: mm |
|---|---|---|---|---|---|---|---|---|---|---|
| | $A_0$ | $B_0$ | W | E | F | $P_0$ | $P_1$ | $P_2$ | $\varnothing D_0$ | T |
| PS0306 | 1.10±0.15 | 1.90±0.15 | 8.00±0.30 | 1.75±0.10 | 3.50±0.10 | 4.00±0.10 | 4.00±0.10 | 2.00±0.10 | 1.5±0.10 | 0.80±0.10 |

## EMBOSSED TAPE

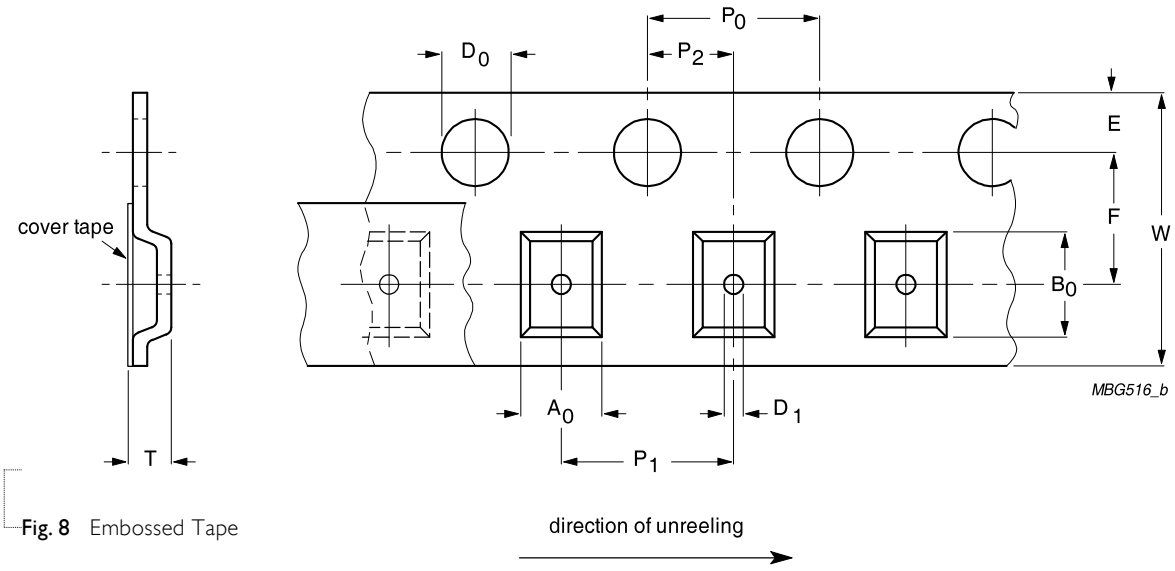


Fig. 8 Embossed Tape

Table 5 Dimensions of embossed tape for relevant chip resistors size

| SIZE | SYMBOL | | | | | | | | | Unit: mm |
|---|---|---|---|---|---|---|---|---|---|---|
| | $A_0$ | $B_0$ | W | E | F | $P_0$ | $P_1$ | $P_2$ | $\varnothing D_0$ | T |
| PS0612 | 1.91±0.05 | 3.65±0.05 | 8.00+0.30/-0.10 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.10 | 2.00±0.05 | 1.5±0.10 | 0.88±0.05 |

## REEL SPECIFICATION

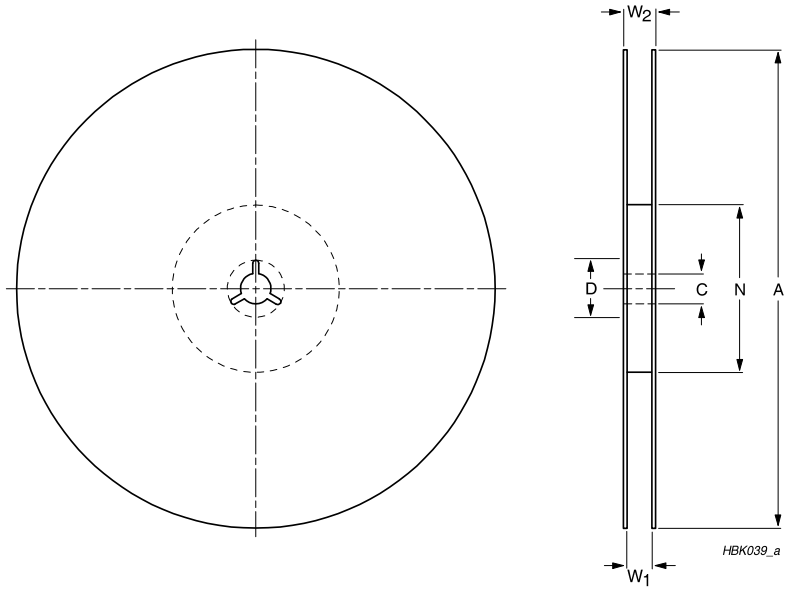


Fig. 5 Reel

Table 6 Dimensions of reel specification for relevant chip resistors size

| SIZE | QUANTITY PER REEL | REEL SIZE | SYMBOL | | | | Unit: mm |
|---|---|---|---|---|---|---|---|
| | | 8 mm TAPE WIDE | A | N | $W_1$ | $W_{2\ MAX.}$ | |
| PS0306 | 5000 | 7"(Ø 178 mm) | 178.0±5 | 60.0±2 | 9.0±0.2 | 12.0±0.2 | |
| PS0612 | 4000 | 7"(Ø 178 mm) | 178.0± 5 | 60.0±2 | 9.0±0.2 | 12.0±0.2 | |

## SOLDERING PROFILES

For recommended soldering profiles, please refer to data sheet “Chip resistors mounting”.

## FOOTPRINT

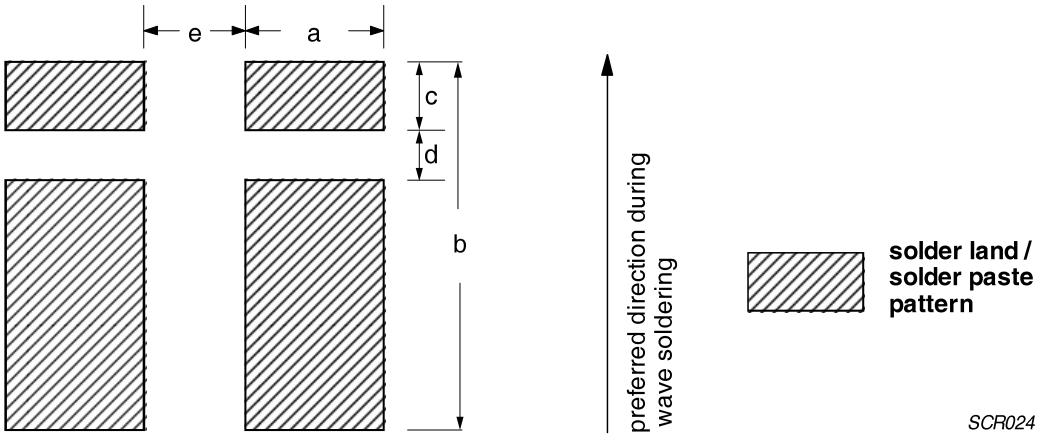


Fig. 6 Single resistor chips recommended dimensions of footprints

Table 7 Footprint dimensions

| SIZE FOOTPRINT | DIMENSIONS CODE | | | | | Unit: mm |
|---|---|---|---|---|---|---|
| | a | b | c | d | e | t(um) |
| PS0306 | 0.40 | 1.75 | 0.35 | 0.20 | 0.20 | 105 |
| PS0612 | 1.00 | 3.50 | 0.80 | 0.38 | 0.75 | 105 |

## TESTS AND REQUIREMENTS

Table 8 Test condition, procedure and requirements

| TEST | TEST METHOD | PROCEDURE | REQUIREMENTS |
|---|---|---|---|
| Life/ Operational Life/ Endurance | MIL-STD-202-method 108<br>IEC 60115-1 4.25.1 | 1,000 hours at 70±2 °C applied RCWV<br>1.5 hours on, 0.5 hour off, still air required | ±(1%+0.0005 Ω) |
| High Temperature Exposure/ Endurance at Upper Category Temperature | IEC 60068-2-2 | 1,000 hours at 125 °C &155 °C ,unpowered | ±(1%+0.0005 Ω) |
| Moisture Resistance | MIL-STD-202-method 106 | Each temperature / humidity cycle is defined at 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25 °C / 65 °C 95% R.H, without steps 7a & 7b, unpowered<br>Parts mounted on test-boards, without condensation on parts<br>Measurement at 24±2 hours after test conclusion | ±(0.5%+0.0005 Ω) |
| Thermal Shock | MIL-STD-202-method 107 | -55/+125 °C<br>Note: Number of cycles required is 300. Devices mounted<br>Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air – Air | ±(1%+0.0005 Ω) |
| Short Time Overload | IEC60115-1 4.13 | 5 times of rated power for 5 seconds at room temperature | ±(1%+0.0005 Ω)<br>No visible damage |
| Board Flex/ Bending | IEC 60068-2-21 | Chips mounted on a 90mm glass epoxy resin PCB(FR4)<br>2 mm bending<br>Bending time: 60±5 seconds | ±(1%+0.0005 Ω)<br>No visible damage |

| TEST | TEST METHOD | PROCEDURE | REQUIREMENTS |
|---|---|---|---|
| Solderability<br>- Wetting | J-STD-002 test B | Electrical Test not required<br>Magnification 50X<br>SMD conditions:<br>1st step: method B, aging 4 hours at 155 °C dry heat<br>2nd step: leadfree solder bath at 245±3 °C<br>Dipping time: 3±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| - Resistance to Soldering Heat | IEC 60068-2-58 | Condition B, no pre-heat of samples<br>Leadfree solder, 260 °C,<br>10 seconds immersion time<br>Procedure 2 for SMD: devices fluxed and cleaned with isopropanol | ±(0.5%+0.0005 Ω)<br>No visible damage |

## REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|---|---|---|---|
| Version 1 | July 16, 2019 | - | - Extend resistor value |
| Version 0 | Mar. 06, 2017 | - | - New datasheet for current sensor - low TCR 4 terminal PS series |

# Mouser Electronics

Authorized Distributor

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## Yageo:

PS0612FKG070R01L PS0306FRL7W0R003L PS0612FKF070R001L PS0306FRF7W0R025L PS0612FKF070R005L PS0612FKL070R001L PS0612FKP070U5L PS0306FRF7T0R01L PS0612FKF070R004L PS0306FRM070R005L PS0612FKP070U75L PS0612FKF070R025Z PS0306FRM7W0R005L PS0306FRM7T0R04L PS0306FRF7W0R05L PS0306FRF070R005L PS0612FKF070R01Z PS0306FRL070R005L PS0306FRM7T0R005L PS0306FRL7W0R005L PS0306FRF7W0R035L PS0612FKF070R02L

## YAGEO:

PS0612FKM070R002L PS0612FKL070R005Z