

# DATA SHEET

## CURRENT SENSOR - LOW TCR

4 Termination

PS series

5%, 1%, 0.5%

sizes

0306/0612

RoHS compliant & Halogen free



**SCOPE**

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

**APPLICATIONS**

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

**FEATURES**

- Total lead free without RoHS exemption
- 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% (2mΩ, 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                                 | 0R001 = 1mΩ |
| 0UX                                   | 0R1 = 100mΩ |
| 0UX                                   | 0U5 = 0.5mΩ |

**ORDERING EXAMPLE**

The ordering code of a PS0306 1/4W chip resistor, value 0.003 Ω with ±1% tolerance, supplied in 7-inch tape reel is:  
**PS0306FRL070R003L**

**NOTE**

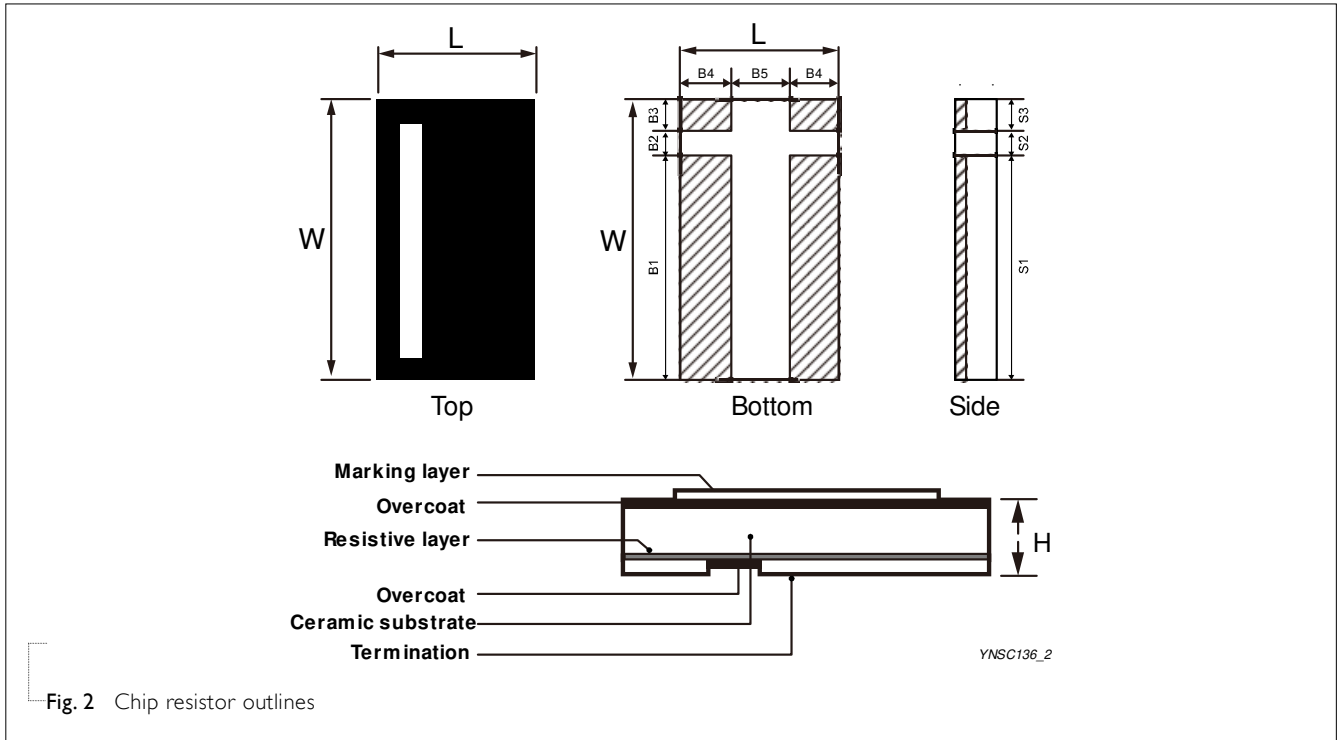
I. All our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead-Free Process"

**MARKING**

PS0306/0612



**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 | (0.75/1mΩ) 0.70±0.15 |
|        |                 |           |            |            |            |           |           | (2~100mΩ) 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  |
|        |                 |           |            |            |            |           |           | (2~10mΩ) 0.60±0.20   |
|        |                 |           |            |            |            |           |           | (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 <sup>(4)</sup> | TOLERANCE <sup>(2)</sup> | RESISTANCE RANGE | TEMPERATURE COEFFICIENT OF RESISTANCE <sup>(3)</sup> |
|--------|------|-----------------------------|--------------------------|------------------|--|
| 0306   |      | 1/4W(07)                    | ±1%(F)<br>±5%(J)         | 0.75/1mΩ         | ± 300ppm/°C(P)                                       |
|        |      | 1/3W(7W)                    |                          | 2mΩ ≤ R < 5mΩ    | ±150ppm/°C(L)  |
|        |      | 1/2W(7T)                    |                          | 5mΩ ≤ R ≤ 100mΩ  | ±75ppm/°C(M)<br>±100ppm/°C(F)                        |
| PS     |      |                             | ±0.5%(D)(2, 10, 20mΩ)    | 0.5mΩ            | ±300ppm/°C(P)  |
|        |      |                             |                          | 1mΩ              | ±100ppm/°C(F)<br>±150ppm/°C(L)                       |
| 0612   |      | 1W(07)                      | ±1%(F)<br>±5%(J)         | 2mΩ ≤ R ≤ 9mΩ    | ±100ppm/°C(F)  |
|        |      |                             |                          | 14mΩ ≤ R ≤ 100mΩ | ±100ppm/°C(F)  |
|        |      |                             |                          | 10mΩ ≤ R ≤ 13mΩ  | ±200ppm/°C(G)  |
|        |      |                             |                          |                  |  |

Note: 1. Please contact with sales offices, distributors and representatives in your region before ordering.  
 2. Global part number (code 7)  
 3. Global part number (code 9)  
 4. Global part number (code 10-11)

**FUNCTIONAL DESCRIPTION**

**OPERATING TEMPERATURE RANGE**

PS0612 0.5mΩ ≤ R ≤ 10mΩ -55°C to +155°C  
 12mΩ ≤ R ≤ 100mΩ -55°C to +125°C  
 PS0306 -55°C to +125°C

**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:

$$V = \sqrt{P \cdot R}$$

Where

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

P = Rated power (W)

R = Resistance value (Ω)

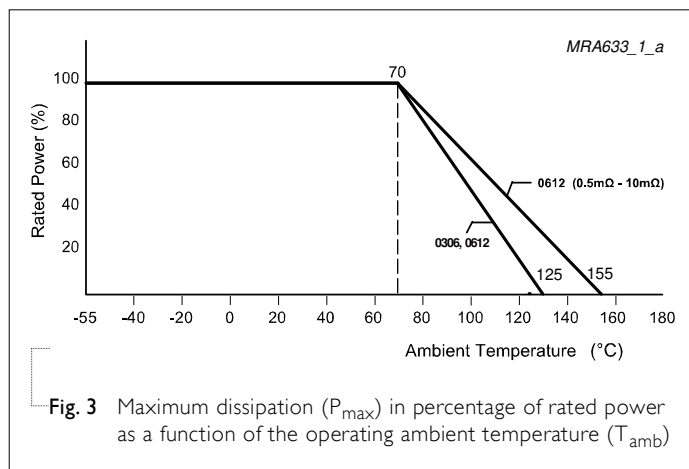


Fig. 3 Maximum dissipation (P<sub>max</sub>) in percentage of rated power as a function of the operating ambient temperature (T<sub>amb</sub>)

**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**

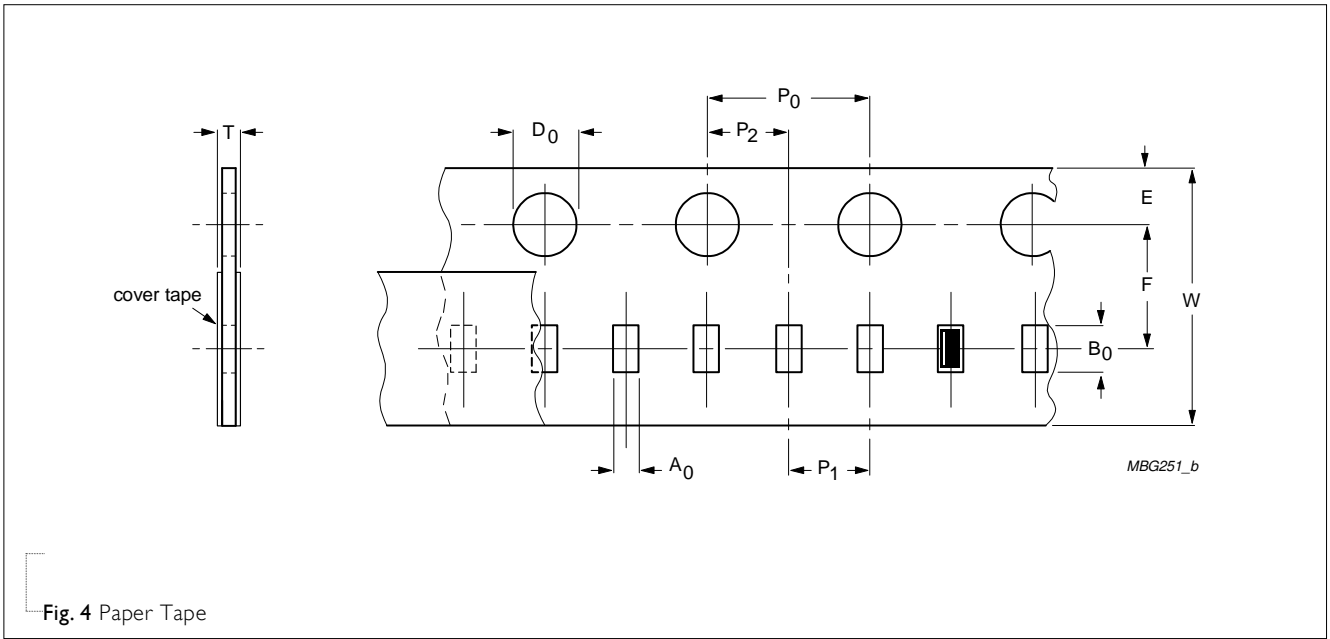


Fig. 4 Paper Tape

Table 4 Dimensions of paper tape for relevant chip resistors size

| SIZE   | SYMBOL         |                |           |           |           |                |                |                |                 |           | Unit: mm |
|--------|----------------|----------------|-----------|-----------|-----------|----------------|----------------|----------------|-----------------|-----------|----------|
|        | A <sub>0</sub> | B <sub>0</sub> | W         | E         | F         | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ØD <sub>0</sub> | 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      | 1.50±0.10       | 0.80±0.10 |          |

**EMBOSSED TAPE**

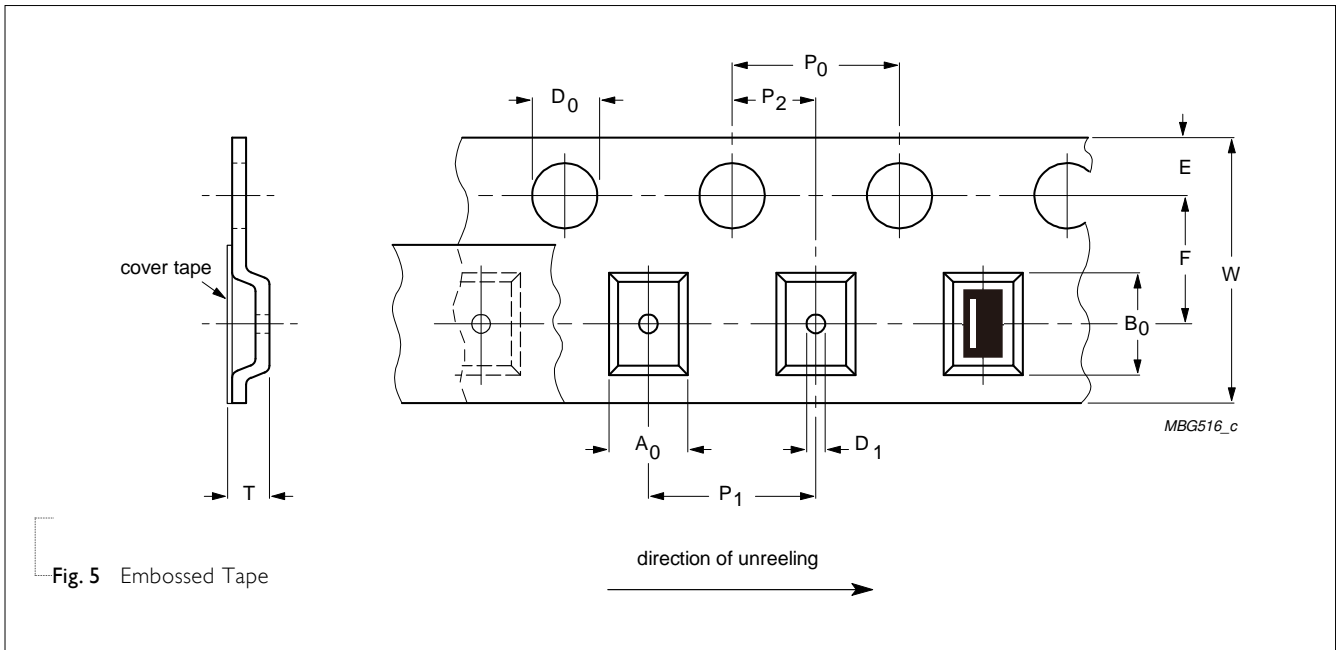
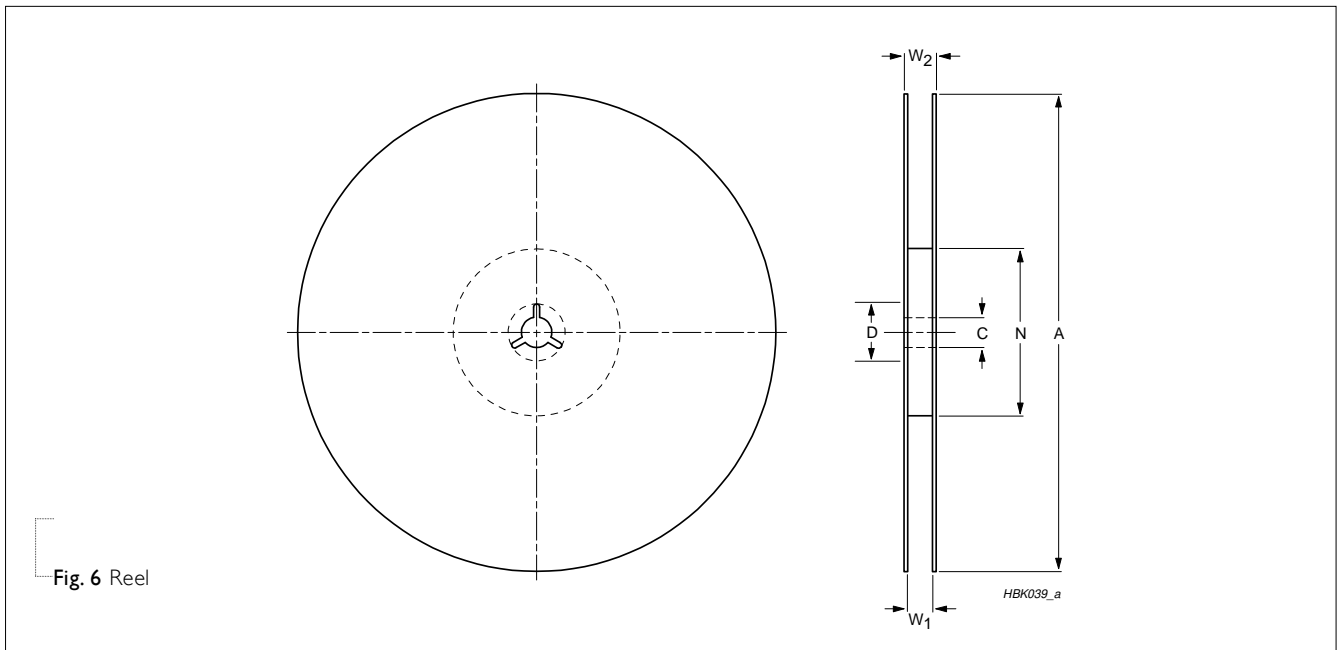


Fig. 5 Embossed Tape

Table 5 Dimensions of embossed tape for relevant chip resistors size

| SIZE   | SYMBOL         |                |                 |           |           |                |                |                |                 |                 |           | Unit: mm |
|--------|----------------|----------------|-----------------|-----------|-----------|----------------|----------------|----------------|-----------------|-----------------|-----------|----------|
|        | A <sub>0</sub> | B <sub>0</sub> | W               | E         | F         | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ØD <sub>0</sub> | ØD <sub>1</sub> | 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      | 1.50±0.10       | 1.00±0.10       | 0.88±0.05 |          |

**REEL SPECIFICATION**



**Table 6** Dimensions of reel specification for relevant chip resistors size

| SIZE   | QUANTITY<br>PER REEL | REEL SIZE         |               | SYMBOL    |          |                | Unit: mm            |
|--------|----------------------|-------------------|---------------|-----------|----------|----------------|---------------------|
|        |                      | 8 mm<br>TAPE WIDE | 7" (Ø 178 mm) | A         | N        | W <sub>1</sub> | W <sub>2</sub> MAX. |
| PS0306 | 5000                 | 8 mm              | 7" (Ø 178 mm) | 178.0±5.0 | 60.0±2.0 | 9.0±0.2        | 12.0±0.2            |
| PS0612 | 4000                 | 8 mm              | 7" (Ø 178 mm) | 178.0±5.0 | 60.0±2.0 | 9.0±0.2        | 12.0±0.2            |

**SOLDERING PROFILES**

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

**FOOTPRINT**

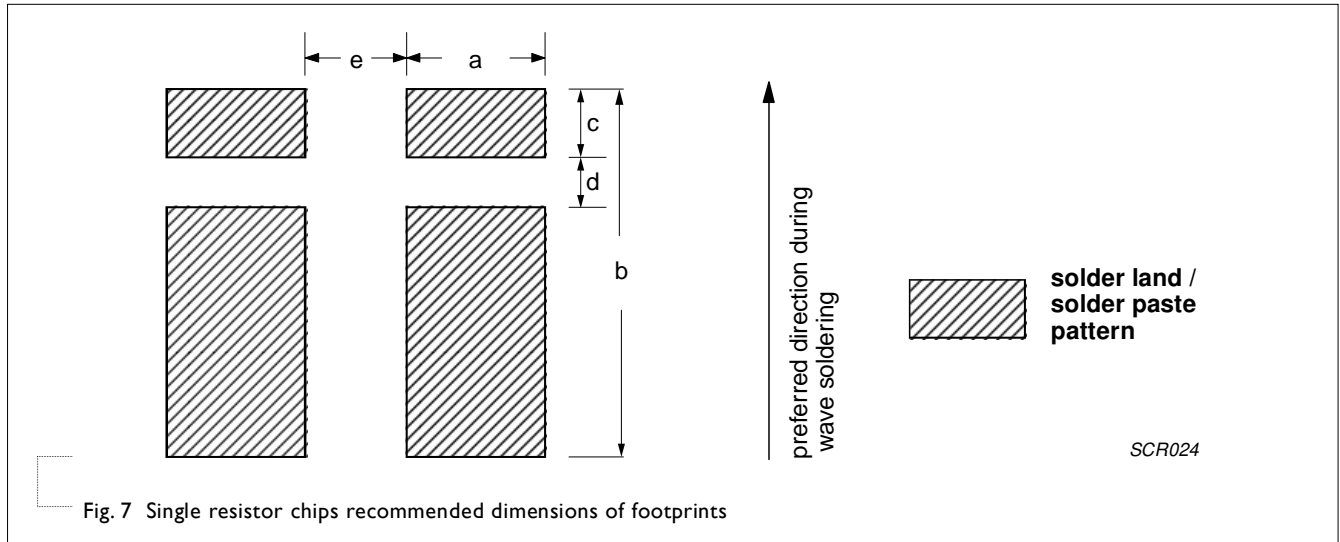


Fig. 7 Single resistor chips recommended dimensions of footprints

Table 7 Footprint dimensions

| SIZE<br>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/<br>Operational Life/<br>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<br>Temperature<br>Exposure/<br>Endurance at<br>Upper Category<br>Temperature | IEC 60068-2-2                                | 1,000 hours at 125 °C & 155 °C ,unpowered   | ±(1%+0.0005 Ω)                      |
| Moisture<br>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><br>Parts mounted on test-boards, without condensation on parts<br><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><br>Note: Number of cycles required is 300.<br>Devices mounted<br><br>Maximum transfer time is 20 seconds.<br>Dwell time is 15 minutes. Air – Air  | ±(1%+0.0005 Ω)                      |
| Short Time<br>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/<br>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>1 <sup>st</sup> step: method B, aging 4 hours at 155 °C<br>dry heat<br>2 <sup>nd</sup> 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<br>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<br>cleaned with isopropanol  | ±(0.5%+0.0005 Ω)<br>No visible damage           |

REVISION HISTORY

| REVISION  | DATE          | CHANGE NOTIFICATION | DESCRIPTION  |
|-----------|---------------|---------------------|--|
| Version 2 | May 18, 2021  | -                   | - Mark resistor outline in diagrams of paper tape (Fig. 4) and embossed tape (Fig. 5)<br>- Add Tol. 0.5% for PS06 I2, 2mΩ and extend resistor value for PS0306 |
| Version 1 | July 16, 2019 | -                   | - Extend resistor value  |
| Version 0 | Mar. 06, 2017 | -                   | - New datasheet for current sensor - low TCR 4 terminal PS series  |

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