Innovative Service Around the Globe YAGEO

# DATA SHEET

## CURRENT SENSOR-LOW TCR

## PR2010

**5%,1%**

**RoHS Compliant**

YAGEO

Phicomp


Product specification – Feb. 22, 2010 V1

## SCOPE

This specification describes PR2010 series current sensor – low TCR chip resistors with lead-free terminations made by metal substrate.

## FEATURES

- Products with lead free terminations meet RoHS requirements.
- High component and equipment reliability
- Low thermal EMF(<1uV/℃).
- Ultra-low resistance and narrow tolerance can suitable for current detection.
- Low inductance 0.5nH to 5nH.

## Product Applications

- Battery Pack,
- Inverter/ Converter (DC-DC/AC-DC/DC-AC)
- Consumer Electrics
- Laptop

## ORDERING INFORMATION

Part number is identified by the series name, size, tolerance, packaging type, temperature coefficient of resistance, taping reel, resistance value and special packing quantity.

| PR2010 | X | X | X | XX | XXXXX | Z |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |

**(1) TOLERANCE**

J = ±5%

F = ±1%

**(2) PACKAGING TYPE**

K = Embossed taping reel

**(3) TEMPERATURE COEFFICIENT OF RESISTANCE**

E=±50ppm/°C

**(4) TAPING REEL**

07 = 7“ dia. Reel & 0.5W

7W = 7“ dia. Reel & 1W

**(5) RESISTANCE VALUE**

PR: 0R001~ 0R1
(1mΩ~100mΩ)

**(6) Special Packaging Quantity**

Z = 2,000 units/reel

## MARKING

PR2010


Fig.1 Value=4mΩ

( 4 digits, resistance greater or equal than 4mΩ)


Fig.2 Value=1mΩ

( 4 digits, resistance below or equal than 3mΩ)

## ORDERING EXAMPLE

The ordering code for a PR2010 0.5W chip resistor, value 0.015Ω with ±1% tolerance, supplied in 7-inch tape reel with 2Kpcs quantify is:

PR2010FKE070R015Z.

## DIMENSION

Table 1

| PR2010 | 1 mΩ~3 mΩ | 4 mΩ~100 mΩ |
|---|---|---|
| L (mm) | 5.10±0.25 | 5.10±0.25 |
| W (mm) | 2.54±0.25 | 2.54±0.25 |
| H (mm) | 0.80±0.25 | 0.64±0.25 |
| I1 (mm) | 1.30±0.25 | 0.80±0.25 |

For dimension see Table 1

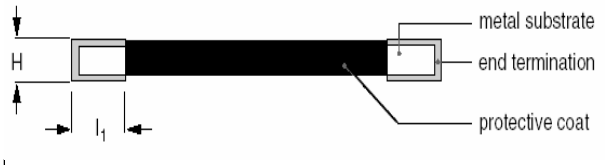



Fig.3

## CONSTRUCTION

The resistors are constructed in high grade materials. Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of metal alloy. See fig. 3.

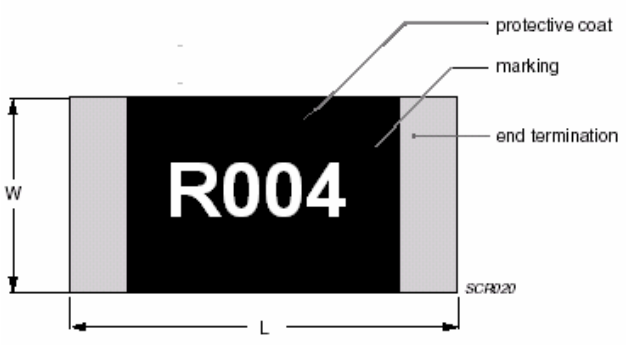
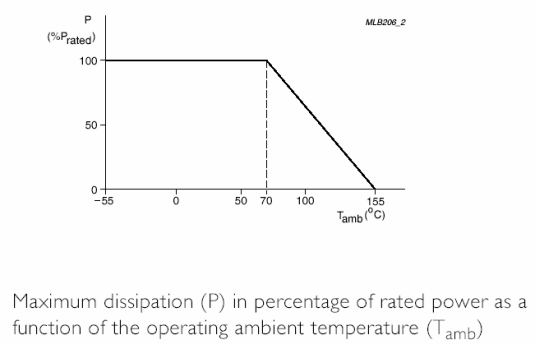



Fig.4 Chip resistor outlines

## POWER RATING

**PR2010 rated power at 70°C is 0.5W & 1W**




Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$)

## ELECTRICAL CHARACTERISTICS

Table 2

| CHARACTERISTICS | PR2010 0.5W & 1W |
|---|---|
| Operating Temperature Range | –55°C to +155°C |
| Maximum Working Voltage | $\sqrt{(P*R)}$ |
| Resistance Range | 1mΩ~100mΩ |
| Temperature Coefficient | ±50ppm/℃ |

## RATED VOLTAGE:

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

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

Where

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

P=Rated power

R=Resistance value

## TAPING REEL

Table 3

| DIMENSION | 2010 |
|---|---|
| Tape Width(mm) | 8 |
| ØA (mm) | 178.0±1.0 |
| ØN (mm) | 60.0±0.5 |
| ØC (mm) | 13.50±0.5 |
| ØD (mm) | 17.70±0.5 |
| W1 (mm) | 13.0±0.5 |
| W2 (mm) | 16.2±0.5 |

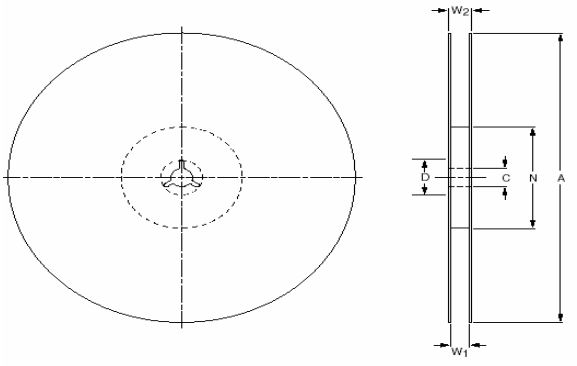



Fig.5 Reel

## EMBOSSED TAPE SPECIFICATION

Table 4

| DIMENSION | 2010 |
|---|---|
| $A_0$ (mm) | 2.90±0.10 |
| $B_0$ (mm) | 5.45±0.10 |
| W (mm) | 12.00±0.15 |
| E (mm) | 1.75±0.10 |
| F (mm) | 5.50±0.10 |
| $P_0$ (mm) | 4.00±0.10 |
| $P_1$ (mm) | 4.00±0.10 |
| $P_2$ (mm) | 2.00±0.10 |
| $D_0$ (mm) | 1.50±0.05 |
| $D_1$ (mm) | 1.50±0.10 |
| T (mm) | 1.10±0.10 |

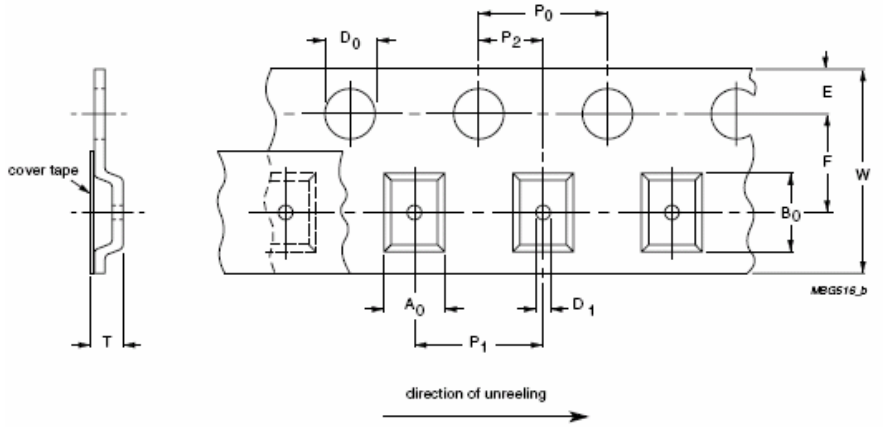



Fig.6 Embossed Dimensions

## PACKING STYLE AND PACKAGING QUATITY

| PACKING STYLE | REEL | DIMENSION | 2010 |
|---|---|---|---|
| Embossed Taping Reel | 7" (178 mm) | | 2,000 Units |

## TESTS AND REQUIREMENTS

| TEST | TEST METHOD | PROCEDURE | REQUIREMENT |
|---|---|---|---|
| T.C.R | IEC 60115-1 4.8 | At +25/+125 °C<br>Formula:<br>$T.C.R = \frac{R2-R1}{R1(t2-t1)} \times 10^6$ (ppm/°C)<br>Where<br>t1=+25 °C or specified room temperature<br>t2=+125 °C test temperature<br>R1=resistance at room temperature in ohms<br>R2=resistance at test temperature in ohms | Refer to table 2 |
| Life/Endurance | IEC 60115-1 4.25.1 | 1,000 hours at 70±5 °C applied RCWV<br>1.5 hours on, 0.5 hour off, still air required | ±(1%+0.0005Ω) |
| High Temperature Exposure/ Endurance at upper category temperature | IEC 60068-2-2 | 1,000 hours at maximum operating temperature depending on specification, un-powered<br>No direct impingement of forced air to the parts<br>Tolerances: 155±3 °C | ±(1%+0.0005Ω) |
| Moisture Resistance | MIL-STD-202 Method 106G | Mil-STD-202, Method 106,0% power,7a and 7b not required, t=24h/cycle,10 cycles, Unpowered. | ±(0.5%+0.0005Ω) |
| Short time overload | IEC 60115-1 4.13 | 4 times RCWV, rating power 5 secs | ±(0.5%+0.0005Ω) |
| Board Flex/ Bending | IEC 60068-2-21 | Device mounted on PCB test board as described,<br>only 1 board bending required<br>2 mm bending<br>Bending time: 60±1 seconds<br>Ohmic value checked during bending | ±(1%+0.0005Ω) |
| Solder-ability<br>- Wetting | IPC/JEDEC J-STD-002B 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±5 °C, 10±1seconds immersion time<br>Procedure 2 for SMD: devices fluxed and cleaned with isopropanol | ±(0.5%+0.0005Ω)<br>No visible damage |
| Bias Humidity | JIS C5202-7.9 | ±85 °C,85% RH,10% Bias, Extended Life Test: 1,000 hours, 1.5 hours On, 0.5 hours Off | ±(0.5%+0.0005Ω) |

## REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|---|---|---|---|
| Version 0 | 2009-03-11 | | - First issue of this specification |
| Version 1 | 2010-02-22 | | - Marking Rule Defined |