

DATA SHEET

CURRENT SENSOR - LOW TCR

PR/PF series (Pb Free)

5%, 1%

sizes 1206/2010/2512



SCOPE

This specification describes PR/PF series current sensor - low TCR with lead-free terminations.

ORDERING INFORMATION

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

YAGEO ORDERING CODE

CTC CODE

PR/PF XXXX X X X XX XXXX L
 (1) (2) (3) (4) (5) (6) (7)

(1) SIZE

- 1206
- 2010
- 2512

(2) TOLERANCE

- F = ±1%
- J = ±5%

(3) PACKAGING TYPE

- R = Paper taping reel
- K = Embossed taping reel

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

- F = ±100 ppm/°C
- G = ±200 ppm/°C

(5) TAPING REEL

- 07 = 7 inch dia. Reel

(6) RESISTANCE VALUE

- PR series: 0R001, 0R002, 0R003, 0R004, 0R005.
 (0R0015 also available on request)
- PF series: 0R006, 0R056, 0R56, 1R

(7) RESISTOR TERMINATIONS

- L = Lead free terminations (matte tin) ^(a)

ORDERING EXAMPLE

The ordering code of a PR2512 chip resistor, value 0.005 Ω with ±1% tolerance, supplied in 7-inch tape reel is: PR2512FKF070R005L.

NOTE

- a. The “L” at the end of the code is only for ordering. On the reel label, the standard CTC will be mentioned an additional stamp “LFP”= lead free production.
- b. Products with lead in terminations fulfil the same requirements as mentioned in this datasheet.
- c. Products with lead in terminations will be phased out in the coming months (before July 1st, 2006).

MARKING

$1\text{ m}\Omega \leq R < 20\text{ m}\Omega$



Fig. 1 Value = 5 mΩ

4 digits: $10\text{ m}\Omega \leq R$, E-24 series; and $R = 1/2/3/4/5/6/7/8/9\text{ m}\Omega$

The “R” is used as a decimal point; the other 3 digits are significant.

$20\text{ m}\Omega \leq R \leq 1,000\text{ m}\Omega$



Fig. 2 R820 = 820 mΩ

E-24 series: 4 digits

The “R” is used as a decimal point; the other 3 digits are significant.

For marking codes, please see EIA-marking code rules in data sheet “Chip resistors marking”.

CONSTRUCTION

The resistors are constructed using outstanding TCR level material, which makes Yageo PR/PF resistors excellent for current sensing application in battery charger circuit & DC-DC converter.

The composition of the resistive material is adjusted to give the approximate required resistance and is covered with a protective coating, which printed with the resistance value.

Finally, the two external terminations (matte Tin) are added. See fig. 3.

OUTLINES

For dimension see Table 1 & 2

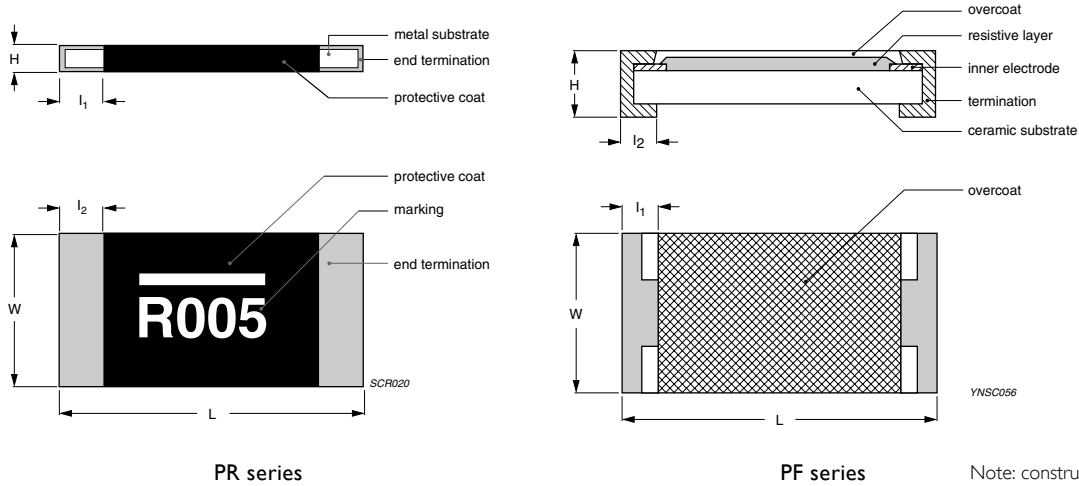


Fig. 3 Chip resistor outlines

Note: construction will be adjusted to resistance value (only for PF series).

DIMENSION

Table 1 Chip resistor type and relevant physical dimensions for "PR series"; see fig. 3

TYPE	RESISTANCE RANGE	L (mm)	W (mm)	H (mm)	l ₁ (mm)	l ₂ (mm)
PR2010	0.001 to 0.006 Ω	5.10 ±0.25	2.54 ±0.25	0.60 ±0.25	0.50 ±0.25	0.50 ±0.25
	0.001 to 0.002 Ω	6.40 ±0.20	3.20 ±0.20	0.75 ±0.15	1.20 ±0.20	1.20 ±0.20
PR2512	0.003 to 0.005 Ω	6.40 ±0.20	3.20 ±0.20	0.55 ±0.15	0.60 ±0.20	0.60 ±0.20

Table 2 Chip resistor type and relevant physical dimensions for "PF series" see fig. 3

TYPE	RESISTANCE RANGE	L (mm)	W (mm)	H (mm)	l ₁ (mm)	l ₂ (mm)
PF1206	0.006 to 0.014 Ω	3.20 ±0.25	1.60 ±0.25	0.60 ±0.25	0.55 ±0.25	0.35 ±0.25
	0.015 to 1 Ω	3.20 ±0.25	1.60 ±0.25	0.60 ±0.25	0.55 ±0.25	0.75 ±0.25
PF2010	0.007 to 0.014 Ω	5.10 ±0.25	2.54 ±0.25	0.60 ±0.25	1.00 ±0.25	0.45 ±0.25
	0.015 to 1 Ω	5.10 ±0.25	2.54 ±0.25	0.60 ±0.25	1.00 ±0.25	1.55 ±0.25
PF2512	0.006 to 0.014 Ω	6.50 ±0.25	3.15 ±0.25	0.60 ±0.25	1.00 ±0.25	1.75 ±0.25
	0.015 to 1 Ω	6.50 ±0.25	3.15 ±0.25	0.60 ±0.25	1.00 ±0.25	0.60 ±0.25

ELECTRICAL CHARACTERISTICS

Table 3

TYPE / RESISTANCE RANGE		TEMPERATURE COEFFICIENT OF RESISTANCE	
PR series	PR2010 2 mΩ ≤ R < 7 mΩ	2 mΩ	2 mΩ < R < 7 mΩ
		±200 ppm/°C	±100 ppm/°C
	PR2512 1 mΩ ≤ R < 6 mΩ	1 mΩ ≤ R ≤ 2 mΩ	2 mΩ < R < 6 mΩ
		±200 ppm/°C	±100 ppm/°C
PF series	PF1206 6 mΩ ≤ R ≤ 1,000 mΩ	±100 ppm/°C	
	PF2010 7 mΩ ≤ R ≤ 1,000 mΩ	±100 ppm/°C	
	PF2512 6 mΩ ≤ R ≤ 1,000 mΩ	±100 ppm/°C	

FOOTPRINT AND SOLDERING PROFILES

For recommended footprint and soldering profiles, please see the special data sheet “Chip resistors mounting”.

ENVIRONMENTAL DATA

For material declaration information (IMDS-data) of the products, please see the separated info “Environmental data” conformed to EU RoHS.

PACKING STYLE AND PACKAGING QUANTITY

Table 4 Packing style and packaging quantity

PACKING STYLE	REEL DIMENSION	PF 1206	PR/PF 2010	PR/PF 2512
Paper taping reel (R)	7" (178 mm)	4,000	---	---
Embossed taping reel (K)	7" (178 mm)	---	4,000	4,000

NOTE

1. For Paper/Embossed tape and reel specification/dimensions, please see the special data sheet “Packing” document.

FUNCTIONAL DESCRIPTION

OPERATING TEMPERATURE RANGE

Range: -55°C to +155°C

POWER RATING

Each type rated power at 70°C:
 PF1206=1/4 W; PR/PF2010=1/2 W;
 PR/PF2512=1 W.

RATED VOLTAGE

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

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

Where

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

P = Rated power (W)

R = Resistance value (Ω)

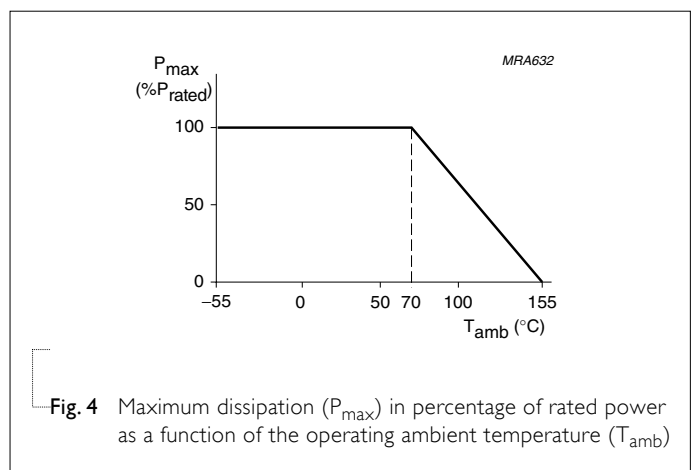


Fig. 4 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

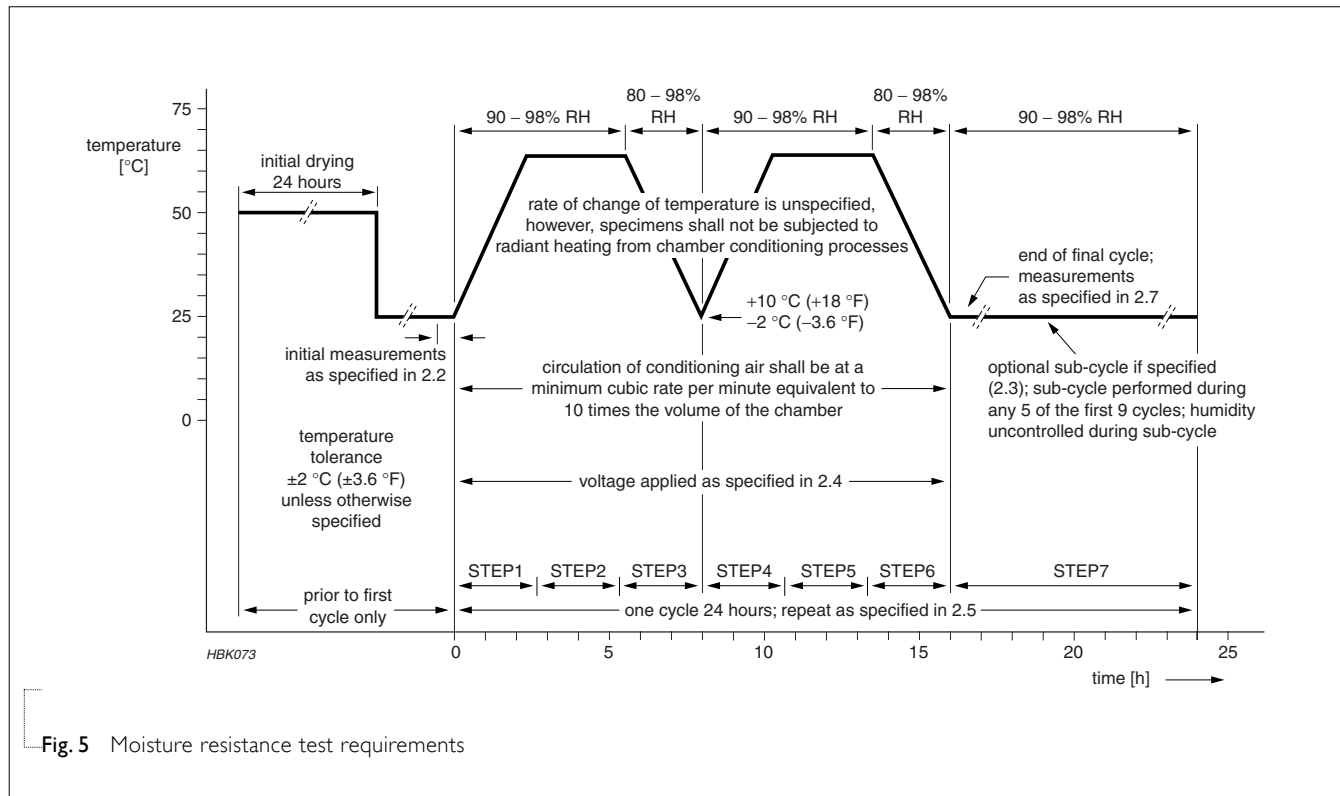
TESTS AND REQUIREMENTS

Table 5 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Temperature Coefficient of Resistance (T.C.R.)	MIL-STD-202F-method 304;	At +25/-55 °C and +25/+125 °C	Refer to table 3
	JIS C 5202-4.8	<p>Formula:</p> $T.C.R = \frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)}$ <p>Where $t_1 = +25 \text{ °C}$ or specified room temperature $t_2 = -55 \text{ °C}$ or +125 °C test temperature $R_1 =$resistance at reference temperature in ohms $R_2 =$resistance at test temperature in ohms</p>	
Thermal Shock	MIL-STD-202F-method 107G; IEC 60115-1 4.19	At -65 (+0/-10) °C for 2 minutes and at +125 (+10/-0) °C for 2 minutes; 25 cycles	±(0.5%+0.0005 Ω)
Low Temperature Operation	MIL-R-55342D-Para 4.7.4	At -65 (+0/-5) °C for 1 hour; RCWV applied for 45 (+5/-0) minutes	±(0.5%+0.0005 Ω) No visible damage
Short Time Overload	MIL-R-55342D-Para 4.7.5; IEC 60115-1 4.13	2.5 × RCWV applied for 5 seconds at room temperature	±(0.5%+0.0005 Ω) No visible damage
Resistance to Soldering Heat	MIL-STD-202F-method 210C; IEC 60115-1 4.18	Unmounted chips; 260 ±5 °C for 10 ±1 seconds	±(0.5%+0.0005 Ω) No visible damage
Life	MIL-STD-202F-method 108A; IEC 60115-1 4.25.1	At 70±2 °C for 1,000 hours; RCWV applied for 1.5 hours on and 0.5 hour off	±(1.0%+0.0005 Ω)
Solderability	MIL-STD-202F-method 208A; IEC 60115-1 4.17	Solder bath at 245±3 °C Dipping time: 2±0.5 seconds	Well tinned (≥95% covered) No visible damage
Humidity (steady state)	JIS C 5202 7.5; IEC 60115-8 4.24.8	1,000 hours; 40±2 °C; 93(+2/-3)% RH RCWV applied for 1.5 hours on and 0.5 hour off	±(0.5%+0.0005 Ω)

Table 5 Test condition, procedure and requirements (continued)

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Leaching	EIA/IS 4.13B; IEC 60115-8 4.18	Solder bath at 260±5 °C Dipping time: 30±1 seconds	No visible damage
Moisture Resistance Heat	MIL-STD-202F-method 106F; IEC 60115-1 4.24.2	42 cycles; total 1,000 hours Shown as fig. 5	±(0.5%+0.0005 Ω) No visible damage
High Temperature Exposure	MIL-STD-202 Method 108	Unpowered chips at =150 °C for 1,000 hours	±(1%+0.0005 Ω)



REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 0	Aug 11, 2005	-	- New datasheet for current sensor - low TCR PR/PF series, sizes of 1206/2010/2512, 1% and 5% with lead-free terminations