Innovative Service Around the Globe YAGEO

DATA SHEET

CURRENT SENSOR - LOW TCR

PR/PF series (Pb Free)

5%, 1%

sizes 1206/2010/2512

YAGEO

Product specification – Aug 11, 2005 V.0

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 mΩ ≤ R < 20 mΩ

Fig. 1 Value = 5 mΩ

4 digits: 10 mΩ ≤ R, E-24 series; and R = 1/2/3/4/5/6/7/8/9 mΩ

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

20 mΩ ≤ R ≤ 1,000 mΩ

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

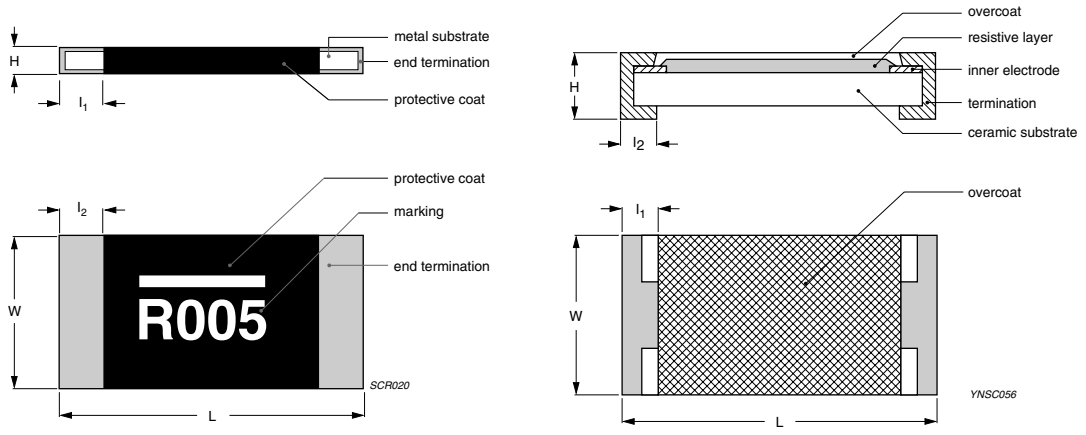
The resistors are constructed using outstanding TCR level material, which makes Yageo PR/PF resistors excellent for current sensing application in battery charger circuit & DC-DC converter.

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



PR series

PF series

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

Fig. 3 Chip resistor outlines

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)	I_1 (mm)	I_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
PR2512	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
	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)	I_1 (mm)	I_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

OPERATINGTEMPERATURE 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)

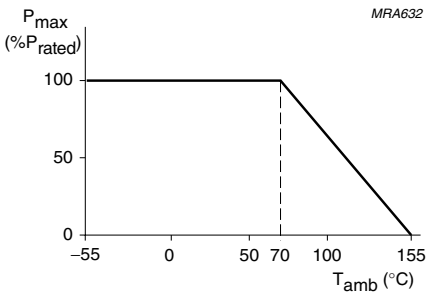


Fig. 4 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

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; JIS C 5202-4.8	At +25/–55 °C and +25/+125 °C **Formula:** $T.C.R = \frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6$ (ppm/°C) Where t_1=+25 °C or specified room temperature t_2=–55 °C or +125 °C test temperature R_1=resistance at reference temperature in ohms R_2=resistance at test temperature in ohms	Refer to table 3
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)

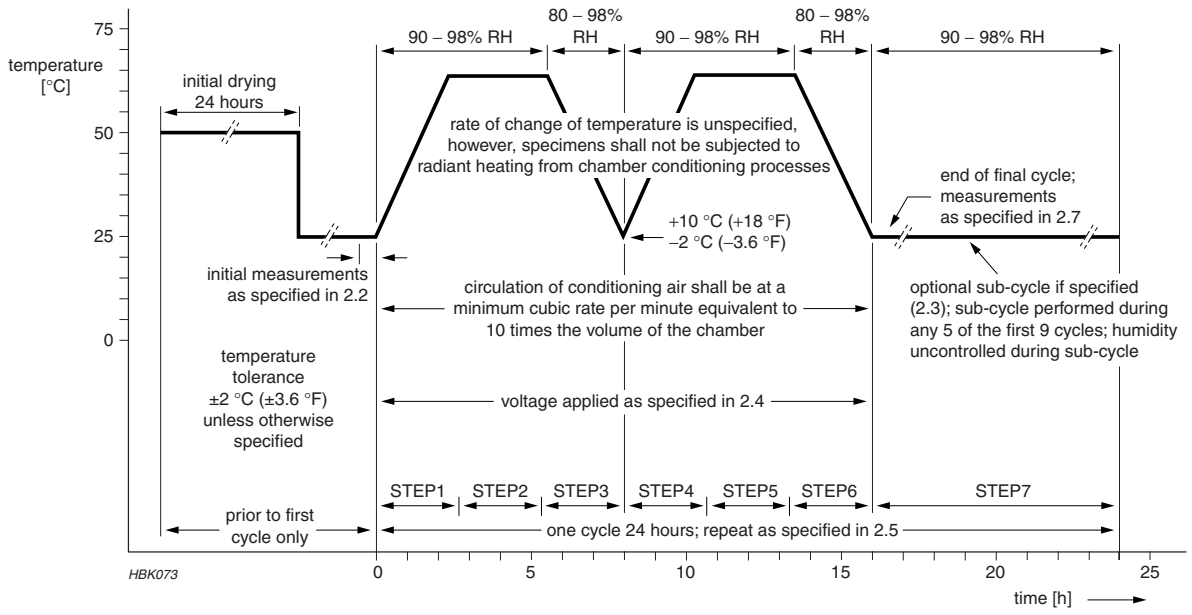


Fig. 5 Moisture resistance test requirements

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