Innovative Service Around the Globe YAGEO

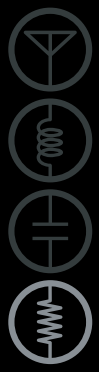
DATA SHEET

CURRENT SENSOR - LOW TCR

PR/PF-Power enhancement series (Pb Free)

5%, 1%

sizes 1206/2010/2512



Phycomp

Product specification – Oct 03, 2005 V.1

SCOPE

This specification describes PR/PF-Power enhancement 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.

PHYCOMP ORDERING CODE

12NC CODE

2350 / 2322 XXX XXXXX L
(1) (2) (3) (4)

SIZE	TYPE	START IN (1)	TOL. (%)	RESISTANCE RANGE	EMBOSSED (2) TAPE ON REEL 4,000	PAPER (units) (2) TAPE ON REEL 4,000
				PR series		
2010	PR2010	2322	±5%	0.002 to 0.006 Ω	760 65xxx	-
	PR2010	2322	±1%	0.002 to 0.006 Ω	761 13xxx	-
2512	MPRC221	2322	±5%	0.001 to 0.005 Ω	762 10xxx	-
	MPRC221	2322	±1%	0.001 to 0.005 Ω	763 10xxx	-
				PF series		
1206	PF1206	2350	±5%	0.006 to 1 Ω	-	510 27xxx
	PF1206	2350	±1%	0.006 to 1 Ω	-	510 28xxx
2010	PF2010	2322	±5%	0.007 to 1 Ω	760 66xxx	-
	PF2010	2322	±1%	0.007 to 1 Ω	760 14xxx	-
2512	PF2512	2322	±5%	0.006 to 1 Ω	764 10xxx	-
	PF2512	2322	±1%	0.006 to 1 Ω	764 30xxx	-

(1) The resistors have a 12-digit ordering code starting with 2350/2322.

(2) The subsequent 5 digits indicate the resistor tolerance and packaging.

(3) The remaining 3 digits represent the resistance value with the last digit indicating the multiplier as shown in the table of "Last digit of 12NC".

(4) "L" means lead-free terminations [a].

Last digit of 12NC

Resistance decade (3)	Last digit
0.001 to 0.0976 Ω	0
0.1 to 0.976 Ω	7
1 to 9.76 Ω	8

Example: 0.02 Ω = 200
0.3 Ω = 307
1 Ω = 108

ORDERING EXAMPLE

The ordering code of a MPRC221 resistor with 2W power rating, value 0.005 Ω with ±5% tolerance, supplied in tape of 4,000 units per reel is: 232276210050L.

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).

CTC CODE

PR/PF XXXX X X X XX XXXX L
(1) (2) (3) (4) (5)(6) (7) (8)

(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

7 = 7 inch dia. Reel

(6) POWER RATING

W = 2 x standard power [d]

(7) RESISTANCE VALUE

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

(8) RESISTOR TERMINATIONS

L = Lead free terminations (matte tin) [a]

ORDERING EXAMPLE

The ordering code of a PR2512 chip resistor with 2W power rating, value 0.005 Ω with ±1% tolerance, supplied in 7-inch tape reel is:
PR2512FKF7W0R005L.

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).
d. Standard power for size 1206 is 1/4 Watt, size 2010 is 1/2 Watt, and size 2512 is 1 Watt.

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

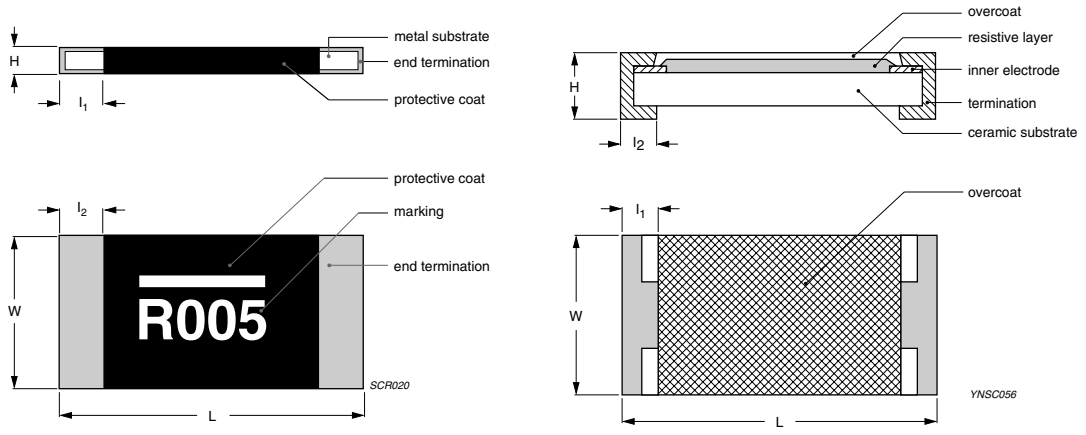
The resistors are constructed using outstanding TCR level material, which makes Yageo PR/PF resistors excellent for current sensing application in battery charger circuit & DC-DC converter.

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-Power enhancement 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-Power enhancement 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/PE/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=1/2 W; PR/PF2010=1 W;
PR/PF2512=2 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)

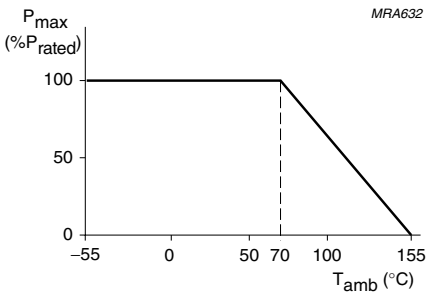


Fig. 4 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

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)

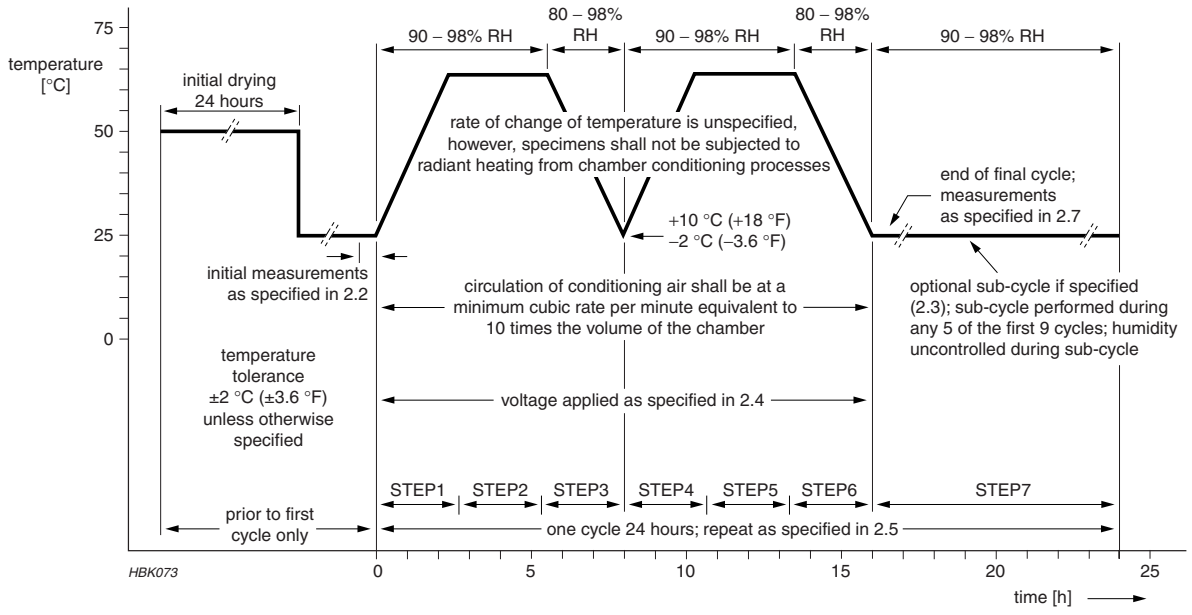


Fig. 5 Moisture resistance test requirements

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 1	Oct 03, 2005	-	- Ordering example revised
Version 0	Aug 11, 2005	-	- New datasheet for current sensor - low TCR PR/PF-Power enhancement series, sizes of 1206/2010/2512, 1% and 5% with lead-free terminations