Innovative Service Around the Globe YAGEO

DATA SHEET

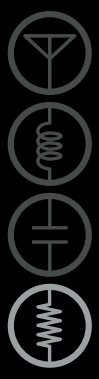
CURRENT SENSOR - LOW TCR

PR/PF/PH series

5%, 2%, 1%

sizes 0805/1206/2512/0815

RoHS compliant & Halogen free



YAGEO Phicomp

Product specification – November 01, 2011 V.0

SCOPE

This specification describes PR/PF/PH series current sensor - low TCR with lead-free terminations made by metal substrate.

APPLICATIONS

- Power Management Applications
- Current detection for Switching Power Supply
- Computers, Consumer
- DC-DC Converter, Battery Pack, Charger, Adaptor

FEATURES

- Halogen-free Epoxy
- RoHS compliant
  - Products with lead-free terminations meet RoHS requirements
  - Pb-glass contained in electrodes, resistor element and glass are exempted by RoHS
- Reduce environmentally hazardous wastes
- High component and equipment reliability
- None forbidden-materials used in products/production
- Low resistances applied to current sensing

ORDERING INFORMATION - GLOBAL PART NUMBER & 12NC

Both part numbers are identified by the series, size, tolerance, packing type, temperature coefficient, taping reel and resistance value.

YAGEO BRAND ordering code

GLOBAL PART NUMBER (PREFERRED)

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

(1) SIZE

0805 / 1206 / 2512 / 0815

(2) TOLERANCE

F = ±1% G = ±2% J = ±5%

(3) PACKAGING TYPE

K = Embossed taping reel R = Paper taping reel

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

M = ±75 ppm/°C

F = ±100 ppm/°C

G = ±200 ppm/°C

(5) TAPING REEL

07 = 7 inch dia. Reel and standard power

7W = 7 inch dia. Reel and 2 x standard power

7T = 7 inch dia. Reel and 3 x standard power

(6) RESISTANCE VALUE

1 mΩ to 50 mΩ

There are 4~5 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 (1 to 50 mΩ)	0R05 = 50 mΩ 0R001 = 1 mΩ

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

1. All our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead-Free Process"
2. On customized label, "LFP" or specific symbol printed and the optional "L" at the end of GLOBAL PART NUMBER / 12NC can be added (both are on customer request)

PHYCOMP BRAND ordering codes

Both GLOBAL PART NUMBER (preferred) and 12NC (traditional) codes are acceptable to order Phycomp brand products.

GLOBAL PART NUMBER (PREFERRED)

For detailed information of GLOBAL PART NUMBER and ordering example, please refer to page 2.

12NC CODE

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
2512	MPRC221	2322	±5%	0.001 to 0.005 Ω	762 94xxx	-
	MPRC221	2322	±1%	0.001 to 0.005 Ω	763 95xxx	-

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

(2) The subsequent 4 or 5 digits indicate the resistor tolerance and packaging.

(3) The remaining 4 or 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" is optional symbol (Note).

Last digit of 12NC

Resistance decade (3)	Last digit
0.001 to 0.005 Ω	0

Example: 0.005 Ω = 050

ORDERING EXAMPLE

The ordering code of a MPRC221 resistor, value 0.005 Ω with ±5% tolerance, supplied in tape of 4,000 units per reel is:
232276294050L or
PR2512FKF070R005L.

NOTE

1. All our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead-Free Process"
2. On customized label, "LFP" or specific symbol printed and the optional "L" at the end of GLOBAL PART NUMBER / 12NC can be added (both are on customer request)

MARKING

PF0805 / PH0805

Fig. 1

No marking

PF1206 / PH1206 / PR2512: Full range
PF2512: R < 20 mΩ & R ≥ 20 mΩ with 2W

Fig. 2 Value = 5 mΩ

4 digits with top bar

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

PF2512: R ≥ 20 mΩ with 1W

Fig. 3 Value = 20 mΩ

4 digits

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

PF0815

Fig. 4 Value = 10 mΩ

4 digits: E24 series

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

For further marking information, please refer to data sheet "Chip resistors marking".

CONSTRUCTION

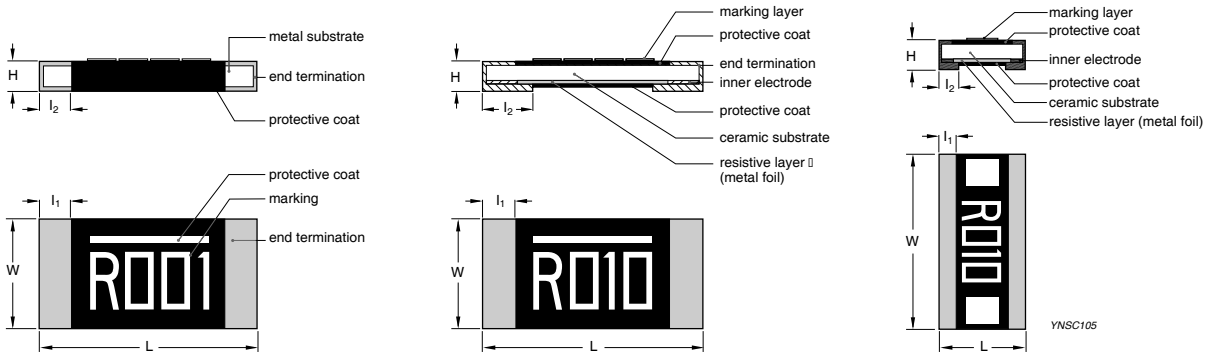
The resistors are constructed using outstanding TCR level material, which makes Yageo PR/PF/PH resistors excellent for current sensing application in battery charger circuit & DC-DC converter.

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 three external terminations (Cu / Ni / matte Tin) are added, as shown in Fig. 4.

Outlines

For dimensions, please refer to Table 1



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

Fig. 5 Chip resistor outlines

DIMENSION

Table 1 For outlines, please refer to Fig. 5

TYPE	RESISTANCE RANGE	L (mm)	W (mm)	H (mm)	I_1 (mm)	I_2 (mm)
PF/PH0805	0.01 to 0.05 Ω	2.03 ±0.25	1.27 ±0.25	0.33 ±0.12	0.38 ±0.25	0.38 ±0.25
PF/PH1206	0.01 to 0.05 Ω	3.20 ±0.25	1.60 ±0.25	0.60 ±0.25	0.50 ±0.25	0.65 ±0.25
PF0815	0.01 to 0.02 Ω	2.15 ±0.20	3.75 ±0.25	0.65 ±0.25	0.65 ±0.25	0.70 ±0.25
PF2512	0.006 Ω	6.45 ±0.25	3.25 ±0.25	0.70 ±0.25	0.75 ±0.25	1.85 ±0.25
	0.007 to 0.015 Ω	6.45 ±0.25	3.25 ±0.25	0.70 ±0.25	0.75 ±0.25	1.55 ±0.25
	0.02 to 0.05 Ω (1W)	6.45 ±0.25	3.25 ±0.25	0.70 ±0.25	1.30 ±0.25	0.75 ±0.25
	0.02 to 0.05 Ω (2W)	6.45 ±0.25	3.25 ±0.25	0.70 ±0.25	0.75 ±0.25	1.30 ±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

ELECTRICAL CHARACTERISTICS

Table 2

TYPE	POWER	TOLERANCE	RESISTANCE RANGE	TEMPERATURE COEFFICIENT OF RESISTANCE
PF0805	1/8 W, 1/4 W, 1/3 W	±1%, ±2%, ±5%	10 / 20 / 25 / 50 mΩ	±100 ppm/°C, ±75 ppm/°C
PH0805	1/2 W		10 / 20 / 25 / 50 mΩ	
PF1206	1/4 W, 1/2 W		10 / 15 / 20 / 25 / 30 / 40 / 50 mΩ	
PH1206	1 W		10 / 15 / 20 / 25 / 30 / 40 / 50 mΩ	
PF0815	1/2W, 1W		10 /15 / 20 mΩ	
PF2512	1 W, 2W		6 / 7 / 8 / 10 / 15 / 20 / 25 / 33 / 50 mΩ	
PR2512	1 W, 2W		1 / 2 / 3 / 4 / 5 mΩ	1 mΩ ≤ R ≤ 2 mΩ ±200 ppm/°C 3 mΩ ≤ R ≤ 5 mΩ ±100 ppm/°C

FOOTPRINT AND SOLDERING PROFILES

For recommended footprint and soldering profiles, please refer to data sheet "Chip resistors mounting".

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

PACKING STYLE	REEL DIMENSION	PF / PH0805	PF / PH1206	PF0815	PF / PR2512
Paper taping reel (R)	7" (178 mm)	4,000	4,000	---	---
Embossed taping reel (K)	7" (178 mm)	---	---	4,000	4,000

NOTE

1. For paper/embossed tape and reel specification/dimensions, please refer to data sheet "Chip resistors packing".

FUNCTIONAL DESCRIPTION

OPERATING TEMPERATURE RANGE

Range: –55°C to +155°C

POWER RATING

Standard rated power at 70°C:

PF0805 = 1/8W
PH0805 = 1/2W
PF1206 = 1/4W
PH1206 = 1W
PF2512 = 1W
PR2512 = 1W
For detail power value, please refer to Table 2.

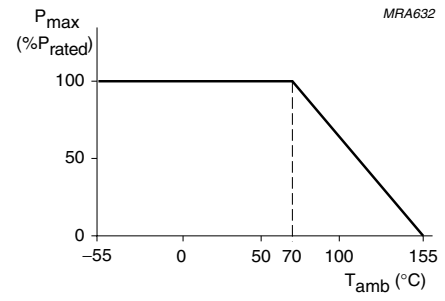


Fig. 6 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

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)

TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	MIL-STD-202G-method 108A IEC 60115-1 4.25.1 JIS C 5202-7.10	1,000 hours at 70±5 °C applied RCWV 1.5 hours on, 0.5 hour off, still air required	±(1%+0.0005 Ω)
High Temperature Exposure/ Endurance at Upper Category Temperature	MIL-STD-202G-method 108A IEC 60115-1 4.25.3 JIS C 5202-7.11	1,000 hours at maximum operating temperature depending on specification, unpowered No direct impingement of forced air to the parts Tolerances: 155±3 °C	±(1%+0.0005 Ω)
Moisture Resistance	MIL-STD-202G-method 106F IEC 60115-1 4.24.2	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 Parts mounted on test-boards, without condensation on parts Measurement at 24±2 hours after test conclusion	±(0.5%+0.0005 Ω)
Thermal Shock	MIL-STD-202G-method 107G	-55/+155 °C Note: Number of cycles required is 300. Devices unmounted Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air – Air	±(0.5%+0.0005 Ω)
Short Time Overload	MIL-R-55342D-para 4.7.5 IEC60115-1 4.13	5 times of rated power for 5 seconds at room temperature	±(0.5%+0.0005 Ω) No visible damage
Board Flex/ Bending	IEC60115-1 4.33	Device mounted on PCB test board as described, only 1 board bending required Bending for 0805: 3 mm 1206/2512/other: 2 mm Holding time: minimum 60 seconds	±(1%+0.05 Ω) No visible damage

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	IPC/JEDECJ-STD-002B test B IEC 60068-2-58	Electrical Test not required Magnification 50X SMD conditions: 1st step: method B, aging 4 hours at 155 °C dry heat 2nd step: leadfree solder bath at 245±3 °C Dipping time: 3±0.5 seconds	Well tinned (≥95% covered) No visible damage
- Leaching	IPC/JEDECJ-STD-002B test D IEC 60068-2-58	Leadfree solder, 260 °C, 30 seconds immersion time	No visible damage
- Resistance to Soldering Heat	MIL-STD-202G-method 210F IEC 60068-2-58	Condition B, no pre-heat of samples Leadfree solder, 260 °C, 10 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	±(0.5%+0.0005 Ω) No visible damage

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 0	Nov 01, 2011	-	- New datasheet for current sensor - low TCR PR/PF/PH series sizes of 0805/1206/2512, 1%, 2% and 5% with lead-free terminations - Replace the pdf files: Pu-PRPF_PE_51_PbFree_L_1.pdf & PYu-PR_521_RoHS_L_2.pdf

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