

DATA SHEET

GENERAL PURPOSE CHIP RESISTORS

RC1206
5%, 1%
RoHS compliant



SCOPE

This specification describes RC1206 series chip resistors with lead-free terminations made by thick film process.

APPLICATIONS

- All general purpose application

FEATURES

- RoHS compliant
 - Products with lead free terminations meet RoHS requirements
 - Pb-glass contained in electrodes
 - Resistor element and glass are exempted by RoHS
- Reducing environmentally hazardous wastes
- High component and equipment reliability
- Saving of PCB space
- None forbidden-materials used in products/production
- Halogen Free Epoxy

ORDERING INFORMATION - GLOBAL PART NUMBER & I2NC

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)

RC1206 X R - XX XXXX L
 (1) (2) (3) (4) (5) (6)

(1) TOLERANCE

F = ±1%
 J = ±5% (for Jumper ordering, use code of J)

(2) PACKAGING TYPE

R = Paper taping reel

(3) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Base on spec

(4) TAPING REEL

07 = 7 inch dia. Reel
 10 = 10 inch dia. Reel
 13 = 13 inch dia. Reel

(5) RESISTANCE VALUE

There are 2~4 digits indicated the resistor value. Letter R/K/M is decimal point, no need to mention the last zero after R/K/M, e.g.1K2, not 1K20.
 Detailed resistance rules show in table of "Resistance rule of global part number".

(6) OPTIONAL CODE

L = optional symbol (Note)

Resistance rule of global part number	
Resistance code rule	Example
OR	OR = Jumper
XRX	1R = 1 Ω
(1 to 9.76 Ω)	1R5 = 1.5 Ω
	9R76 = 9.76 Ω
XXRX	10R = 10 Ω
(10 to 97.6 Ω)	97R6 = 97.6 Ω
XXXXR	100R = 100 Ω
(100 to 976 Ω)	
XKXX	1K = 1,000 Ω
(1 to 9.76 KΩ)	9K76 = 9760 Ω
XMXX	1M = 1,000,000 Ω
(1 to 9.76 MΩ)	9M76 = 9,760,000 Ω

ORDERING EXAMPLE

The ordering code of a RC1206 chip resistor, value 56 Ω with ±1% tolerance, supplied in 7-inch tape reel is: RC1206FR-0756R(L).

NOTE

1. All our RSMD products meet 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 / I2NC can be added (both are on customer request)

PHYCOMP BRAND ordering codes

Both GLOBAL PART NUMBER (preferred) and I2NC (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.

I2NC CODE

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

TYPE/ I206	START IN ⁽¹⁾	TOL. (%)	RESISTANCE RANGE	PAPER / PE TAPE ON REEL (units) ⁽²⁾		
				5,000	10,000/not preferred	20,000
RC01	2322	±5%	1 to 10 MΩ	711 61xxx	711 51xxx	711 81xxx
RC02	2322	±1%	1 to 10 MΩ	724 6xxxx	724 7xxxx	724 8xxxx
HRC01	2350	±5%	11 to 22 MΩ	520 10xxx	-	-
Jumper	2322	-	0 Ω	711 91032	711 91005	711 92004

Resistance decade ⁽³⁾	Last digit
0.01 to 0.0976 Ω	0
0.1 to 0.976 Ω	7
1 to 9.76 Ω	8
10 to 97.6 Ω	9
100 to 976 Ω	1
1 to 9.76 KΩ	2
10 to 97.6 KΩ	3
100 to 976 KΩ	4
1 to 9.76 MΩ	5
10 to 97.6 MΩ	6

- (1) The resistors have a 12-digit ordering code starting with 2322 / 2350.
- (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 I2NC".
- (4) "L" is optional symbol ^(Note).

Example:

0.02 Ω	=	0200 or 200
0.3 Ω	=	3007 or 307
1 Ω	=	1008 or 108
33 KΩ	=	3303 or 333
10 MΩ	=	1006 or 106

ORDERING EXAMPLE

The ordering code of a RC02 resistor, value 56 Ω with ±1% tolerance, supplied in tape of 10,000 units per reel is: 232272465609(L) or RC1206FR-0756R(L).

NOTE

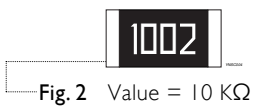
- 1. All our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
- 2. On customized label, "LFP" or specific symbol printed and the optional "L" at the end of GLOBAL PART NUMBER / I2NC can be added (both are on customer request)

MARKING

RC1206



E-24 series: 3 digits
First two digits for significant figure and 3rd digit for number of zeros



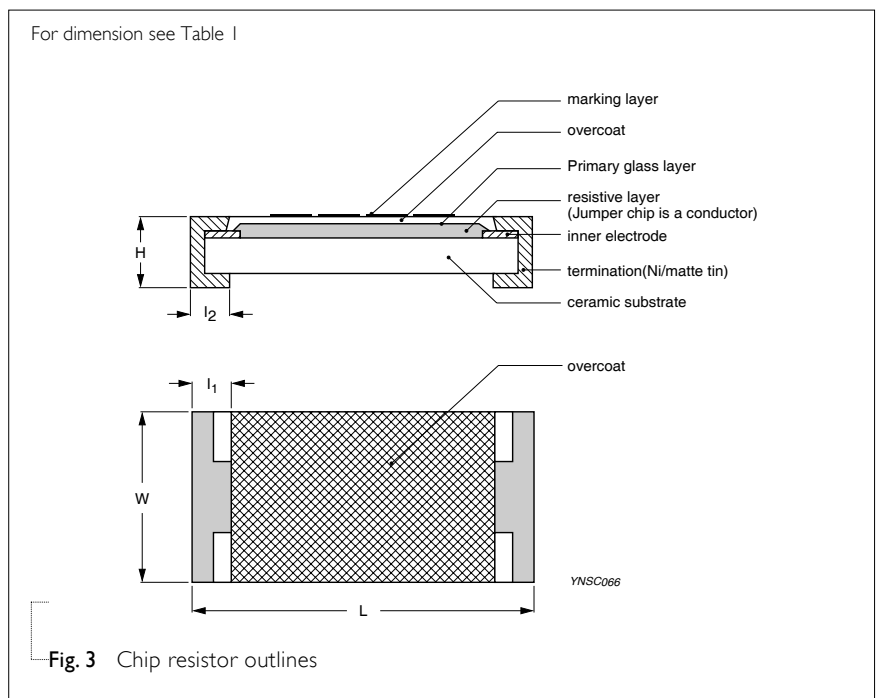
Both E-24 and E-96 series: 4 digits
First three digits for significant figure and 4th digit for number of zeros

For further marking information, please see special data sheet “Chip resistors marking”.

CONSTRUCTION

The resistor is constructed on top of a high-grade ceramic body. Internal metal electrodes are added on each end to make the contacts to the thick film resistive element. The composition of the resistive element is a noble metal imbedded into a glass and covered by a second glass to prevent environment influences. The resistor is laser trimmed to the rated resistance value. The resistor is covered with a protective epoxy coat, finally the two external terminations (matte tin on Ni-barrier) are added. See fig.3

OUTLINES



DIMENSIONS

Table I	
TYPE	RC1206
L (mm)	3.10 ± 0.10
W (mm)	1.60 ± 0.10
H (mm)	0.55 ± 0.10
l ₁ (mm)	0.45 ± 0.20
l ₂ (mm)	0.40 ± 0.20

ELECTRICAL CHARACTERISTICS

Table 2

CHARACTERISTICS	RC1206 1/4 W	
Operating Temperature Range	-55 °C to +155 °C	
Maximum Working Voltage	200 V	
Maximum Overload Voltage	400 V	
Dielectric Withstanding Voltage	500 V	
Resistance Range	5% (E24) 1 Ω to 22 MΩ	
	1% (E24/E96) 1 Ω to 10 MΩ	
	Zero Ohm Jumper < 0.05 Ω	
Temperature Coefficient	1 Ω ≤ R ≤ 10 Ω	±200 ppm/°C
	10 MΩ ≤ R ≤ 22 MΩ	±200 ppm/°C
	10 Ω < R ≤ 10 MΩ	±100 ppm/°C
Jumper Criteria	Rated Current	2 A
	Maximum Current	10 A

FOOTPRINT AND SOLDERING PROFILES

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

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

PRODUCT TYPE	PACKING STYLE	REEL DIMENSION	QUANTITY PER REEL
RC1206	Paper Taping Reel (R)	7" (178 mm)	5,000 units
		10" (254 mm)	10,000 units
		13" (330 mm)	20,000 units

NOTE

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

FUNCTIONAL DESCRIPTION

POWER RATING

RC1206 rated power at 70°C is 1/4 W

RATED VOLTAGE

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

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

or max. working voltage whichever is less

Where

$$V = \text{Continuous rated DC or AC (rms) working voltage (V)}$$

$$P = \text{Rated power (W)}$$

$$R = \text{Resistance value (}\Omega\text{)}$$

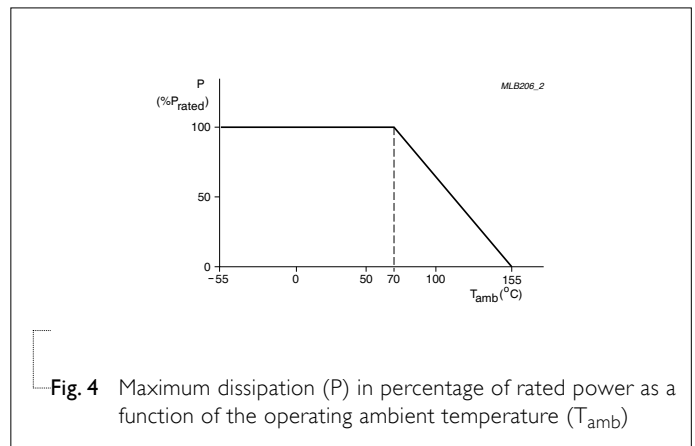


Fig. 4 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

TESTS AND REQUIREMENTS
Table 4 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	MIL-STD-202G-method 108A	1,000 hours at 70±5 °C applied RCWV	±(2%+0.05 Ω)
	IEC 60115-1 4.25.1	1.5 hours on, 0.5 hour off, still air required	<100 mΩ for Jumper
	JIS C 5202-7.10		
High Temperature Exposure/ Endurance at upper category temperature	MIL-STD-202G-method 108A	1,000 hours at maximum operating temperature	±(1%+0.05 Ω)
	IEC 60115-1 4.25.3	depending on specification, unpowered	<50 mΩ for Jumper
	JIS C 5202-7.11	No direct impingement of forced air to the parts Tolerances: 125±3 °C	
Moisture Resistance	MIL-STD-202G-method 106F	Each temperature / humidity cycle is defined at 8	±(2%+0.05 Ω)
	IEC 60115-1 4.24.2	hours (method 106F), 3 cycles / 24 hours for 10d	<100 mΩ for Jumper
		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	
Thermal Shock	MIL-STD-202G-method 107G	-55/+125 °C	±(0.5%+0.05 Ω) for 10 KΩ to 10 MΩ
		Note: Number of cycles required is 300. Devices unmounted	±(1%+0.05 Ω) for others
		Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air – Air	<50 mΩ for Jumper
Short time overload	MIL-R-55342D-para 4.7.5	2.5 times RCWV or maximum overload voltage	±(2%+0.05 Ω)
	IEC60115-1 4.13	whichever is less for 5 sec at room temperature	<50 mΩ for Jumper No visible damage
Board Flex/ Bending	IEC60115-1 4.33	Device mounted on PCB test board as described, only 1 board bending required	±(1%+0.05 Ω) <50 mΩ for Jumper
		3 mm bending	No visible damage
		Bending time: 60±5 seconds Ohmic value checked during bending	

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: 1 st step: method B, aging 4 hours at 155 °C dry heat 2 nd 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, 270 °C, 10 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	±(1%+0.05 Ω) <50 mΩ for Jumper No visible damage

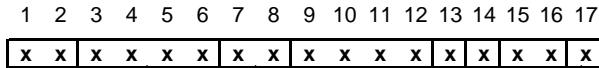
REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 3	Jul 15, 2008	-	<ul style="list-style-type: none"> - Change to dual brand datasheet that describe RC1206 with RoHS compliant - Description of "Halogen Free Epoxy" added - Define global part number
Version 2	Sep 03, 2004	-	<ul style="list-style-type: none"> - New datasheet for 1206 thick film 1% and 5% with lead-free terminations - Replace the 1206 part of pdf files: RC01_11_21_31_5, RC02_12_22_32_10, and HRC01_5_4 - Test method and procedure updated - PE tape added (paper tape will be replaced by PE tape) - High ohmic products combined into standard products.

“ Yageo reserves all the rights for revising the content of this datasheet without further notification, as long as the products itself are unchanged. Any product change will be announced by PCN.”

Composition of The Clear Text Code (R-Chip)

Version: 17 01-21-02



PHYCOMP Code

9C	Phycomp Thick Film Chip Res
9T	Phycomp Thin Film Chip Res

Size

0201	0201 (0603)	
0402	0402 (1005)	
0603	0603 (1608)	
0805	0805 (2012)	
1210	1210 (3225)	
1206	1206 (3216)	
1218	1218 (3248)	
2010	2010 (5025)	
2512	2512 (6432)	
4527	4527 (11070)	
AC34	0603 (1608) x 4 concave array	ARC241 / 242
AV34	0603 (1608) x 4 convex array	ARV241 / 242
AV22	0402 (1005) x 2 convex array	ARV321 / 322
AV24	0402 (1005) x 4 convex array	ARV341
AC24	0402 (1005) x 4 concave array	ARC341
AV28	0402 (1005) x 8 convex array	ARV381 / 382
RN31	10P8R in 1206 convex network	RNA310
RC21	10P4C4R in 1608 concave network	RCB210
FR01	1206 (3216) Fusible	
FR21	0603 (1608) Fusible	
SR01	1206 (3216) Surge	
VR01	1206 (3216) High Voltage 5%	
VR02	1206 (3216) High Voltage 1%	

Power Rating

1A	1/16W	0.063 W	0402	
1A	1/10W	0.1 W	0603	Upgraded from 1/16W
2A	1/8 W	0.125 W	0805	
3A	1/4 W	0.25 W	1206	
4A	1/10 W	0.1 W	0603	
5A	1/3W	0.3W	1210	
7A	1/20 W	0.05 W	0201	
8A	1/32 W	0.03125 W	RNA310	
12	1/2 W	0.5 W	2010	
1W	1 W	1 W	1218 / 2512	
2W	2 W	2 W		

Resistance Value

0R00	Jumper	6
R0xx	< 1R	0
Rxxx	< 1R	7
xRxx	1R - 9.76R	8
xxRx	10R - 97.6R	9
xxx0	100R - 976R	1
xxx1	1K - 9.76K	2
xxx2	10K - 97.6K	3
xxx3	100K - 976K	4
xxx4	1M - 9.76M	5
xxx5	10M - 97.6M	6
xxx6	100M+	7
Nxxx	marking code for RCB210	

Example:
Rchip 0603 (RC22H), 10R0, 1%, 5K reel =
9C06031A10R0FKHFT

R-chip Array	
A = Array	
V = Convex	C = Concave
3 = 0603	2 = 0402
4 = 4 Res.	2 = 2 Res.

Packaging

T	5K Paper
3	10K Paper
4	20K Paper
5	4K Blister
6	5K Blister
7	50K Paper
P	25K Bulk Case

Special Coding

HF	PPCK, Sn/Pb
PF	100% Sn 2372
AF	NiAu

TCR

A	25 ppm/C
B	50 ppm/C
K	100 ppm/C
L	200 ppm/C
E	250 ppm/C
M	300 ppm/C
G	500 ppm/C
P	750 ppm/C
H	1000 ppm/C
I	1500 ppm/C
J	2000 ppm/C
N	3000 ppm/C

Tolerance

A	±0.05%
B	±0.1%
C	±0.25%
D	±0.5 %
F	±1%
G	±2%
J	±5%
N	0 / 20%
R	0 / 30%