

DATA SHEET

GENERAL PURPOSE CHIP RESISTORS RC1206 5%, 1%

RoHS compliant



YAGEO Phícomp



SCOPE

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

APPLICATIONS

• All general purpose application

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
- Reducing environmentally hazardous wastes
- High component and equipment reliability
- Saving of PCB space
- None forbidden-materials used in products/production

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)

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

(I) TOLERANCE

 $F = \pm 1\%$

 $J = \pm 5\%$ (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 $2\sim4$ 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. I K2, not I K20.

Detailed resistance rules show in table of "Resistance rule of global part number".

(6) DEFAULT CODE

(I to 9.76 M Ω)

Letter L is system default code for order only (Note)

 $9M76 = 9,760,000 \Omega$

number	
Resistance code rule	Example
0R	0R = Jumper
XRXX (1 to 9.76 Ω)	IR = I Ω IR5 = I.5 Ω 9R76 = 9.76 Ω
XXRX (10 to 97.6 Ω)	$10R = 10 \Omega$ $97R6 = 97.6 \Omega$
XXXR (100 to 976 Ω)	100R = 100 Ω
XKXX (1 to 9.76 KΩ)	1K = 1,000 Ω 9K76 = 9760 Ω
XMXX	$IM = 1,000,000 \Omega$

Resistance rule of global part

ORDERING EXAMPLE

The ordering code of a RC1206 chip resistor, value 56 Ω with $\pm 1\%$ tolerance, supplied in 7-inch tape reel is: RC1206FR-0756RL.

NOTE

- All our RSMD products meet RoHS compliant and Halogen Free. "LFP" of the internal 2D reel label mentions "Lead Free Process"
- On customized label, "LFP" or specific symbol can be printed



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.

12NC CODE

2322 / 2350	XXX	<u>xx</u> xxx	L
(1)	(2)	(3)	(4)

	START		RESISTANCE	RESISTANCE PAPER / PE TAPE ON REEL		L (units) (2)
1206	IN ⁽¹⁾	(%)	RANGE	5,000	10,000/not preferred	20,000
RC01	2322	±5%	I to 10 $M\Omega$	711 61xxx	71151xxx	711 81xxx
RC02	2322	±1%	I to I0 $M\Omega$	724 6xxxx	724 7xxx	724 8xxx
HRC01	2350	±5%	I I to 22 M Ω	520 10xxx	-	-
Jumper	2322	-	0 Ω	711 91032	711 91005	711 92004

- (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) Letter L is system default code for order only (Note)

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: 232272465609L or RC1206FR-0756RL.

Last digit of I2NC Resistance decade ⁽³⁾	Last digit
0.01 to 0.0976 Ω	0
0.1 to 0.976 Ω	7
I to 9.76 Ω	8
10 to 97.6 Ω	9
100 to 976 Ω	1
I to 9.76 KΩ	2
10 to 97.6 KΩ	3
100 to 976 KΩ	4
I to 9.76 MΩ	5
10 to 97.6 MΩ	6

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

NOTE

- 1. All our RSMD products meet RoHS compliant and Halogen Free. "LFP" of the internal 2D reel label mentions "Lead Free Process"
- 2. On customized label, "LFP" or specific symbol can be printed

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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"

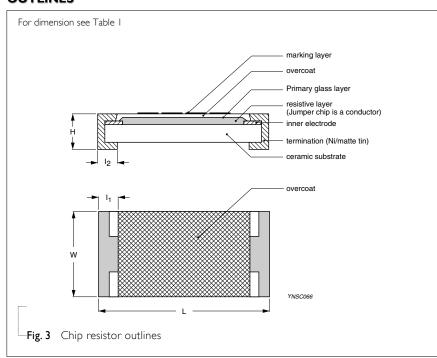
CONSTRUCTION

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 Nibarrier) are added. See fig.3

DIMENSIONS

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

OUTLINES



ELECTRICAL CHARACTERISTICS

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CHARACTERISTICS	RC1206 1/4 W		
Operating Temperature Range	-55	5 °C to +155 °C	
Maximum Working Voltage		200 V	
Maximum Overload Voltage		400 V	
Dielectric Withstanding Voltage		500 V	
	5% (E24)	I Ω to 22 M Ω	
Resistance Range	1% (E24/E96)	I Ω to 10 $M\Omega$	
	Zero Ohm J	umper < 0.05 Ω	
	$I \Omega \le R \le I0 \Omega$	±200 ppm/°C	
Temperature Coefficient	$10 \text{ M}\Omega < R \le 22 \text{ M}\Omega$	±200 ppm/°C	
	$10 \Omega < R \le 10 M\Omega$	±100 ppm/°C	
Jumper Criteria	Rated Current	2 A	
jumper Criteria	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

FUNCTIONAL DESCRIPTION

POWER RATING

RCI206 rated power at 70°C is I/4 W

RATED VOLTAGE

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

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

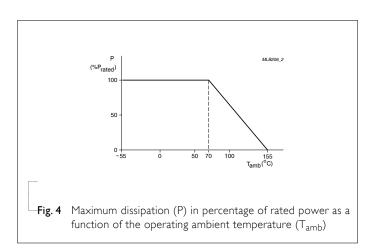
or max. working voltage whichever is less

Where

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

P=Rated power (W)

R=Resistance value (Ω)



^{1.} For paper tape and reel specification/dimensions, please see the special data sheet "Chip resistors packing"

TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

	TEST METHOD	PROCEDURE	REQUIREMENTS
Temperature Coefficient of	IEC 60115-1 4.8	At +25/-55 °C and +25/+125 °C	Refer to table 2
Resistance (T.C.R.)		Formula:	
(1.C.N.)		T.C.R= $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6 \text{ (ppm/°C)}$	
		Where t_1 =+25 °C or specified room temperature	
		t_2 =-55 °C or +125 °C test temperature	
		R _I =resistance at reference temperature in ohms	
		R ₂ =resistance at test temperature in ohms	
Life/Endurance	IEC 60115-1 4.25.1	At 70±5 °C for 1,000 hours, RCWV applied for 1.5 hours on, 0.5 hour off, still air required	\pm (1.0%+0.05 Ω) for 1% tol. \pm (3.0%+0.05 Ω) for 5% tol. <100 m Ω for Jumper
High Temperature Exposure/ Endurance at Upper Category Temperature	IEC 60068-2-2	I,000 hours at I55±5 °C, unpowered	$\pm (1.0\% + 0.05~\Omega)$ for 1% tol. $\pm (2.0\% + 0.05~\Omega)$ for 5% tol. <50 m Ω for Jumper
Moisture Resistance	MIL-STD-202G Method-106G	Each temperature / humidity cycle is defined at 8 hours, 3 cycles / 24 hours for 10d. with 25 °C / 65 °C 95% R.H, without steps 7a & 7b, unpowered	$\pm (0.5\% + 0.05~\Omega)$ for 1% tol. $\pm (2.0\% + 0.05~\Omega)$ for 5% tol. <100 m Ω for Jumper
		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 Number of cycles required is 300. Devices unmounted Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air — Air	$\pm (0.5\% + 0.05~\Omega)$ for 1% tol. $\pm (1\% + 0.05~\Omega)$ for 5% tol. <50 m Ω for Jumper
Short Time	IEC60115-1 4.13	2.5 times of rated voltage or maximum overload	$\pm (1.0\% + 0.05 \ \Omega)$ for 1% tol.
Overload		voltage whichever is less for 5 sec at room temperature	$\pm (2.0\% + 0.05 \ \Omega)$ for 5% tol. <50 m Ω for Jumper

Chip Resistor Surface Mount RC SERIES 1206 (RoHS Compliant)

	TEST METHOD	PROCEDURE	REQUIREMENTS
Board Flex/ Bending	IEC 60068-2-21	Chips mounted on a 90mm glass epoxy resin PCB (FR4)	$\pm (1.0\% + 0.05 \ \Omega)$ for 1%, 5% to <50 m Ω for Jumper
		2 mm bending	No visible damage
		Bending time: 60±5 seconds	
Low Temperature	IEC 60068-2-1	The resistor shall be subjected to a DC rated voltage for 1.5 h-on, 0.5 h-off, at -55±3 °C	$\pm (0.5\% + 0.05 \ \Omega)$ for 1% tol. $\pm (1.0\% + 0.05 \ \Omega)$ for 5% tol.
Operation		This constitutes shall be repeated for 96 hours	No visible damage
		However the applied voltage shall not exceed the maximum operating voltage	
Insulation Resistance	IEC 60115-1 4.6	Rated continuous overload voltage (RCOV) for 1 minute	≥10 GΩ
Resistance			
		71	
		Voltage (DC) 100 ∨	
Dielectric	IEC 60115-1 4.7	Maximum voltage (V _{rms}) applied for I minute	No breakdown or flashover
Withstand		Type RC1206	
Voltage		Voltage (AC) 500 V _{rms}	
Resistance to Solvent	IPC/JEDEC J-STD-020D	Isopropylalcohol (C ₃ H ₇ OH) followed by brushing	No smeared
Noise	IEC 60115-1 4.12	Maximum voltage (Vrms) applied	Resistors range Value
			$R < 100 \Omega$ 10 dB
			$100 \Omega \le R < 1 K\Omega$ 20 dE
			$I K\Omega \le R < I0 K\Omega$ 30 dE
			$10 \text{ K}\Omega \le R < 100 \text{ K}\Omega$ 40 dE
			$100 \text{ K}\Omega \leq R < 1 \text{ M}\Omega$ 46 dB
			$I M\Omega \le R \le 22 M\Omega$ 48 dB
Biased Humidity	IEC 60115-1 4.37	Steady state for 1000 hours at 40 °C / 95% R.H.	\pm (1.0%+0.05 Ω) for 1% tol.
(steady state)		RCWV applied for 1.5 hours on and	$\pm (2.0\% + 0.05~\Omega)$ for 5% tol.
		0.5 hour off	$<$ 100 m Ω for Jumper

Chip Resistor Surface Mount RC SERIES 1206 (RoHS Compliant)

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Intermittent Overload	IEC 60115-1 4.39	2.5 times of rated voltage or maximum overload voltage whichever is less for 1 second on and 25 seconds off; total 10,000 cycles	\pm (1.0%+0.05 Ω) for 1% tol. \pm (2.0%+0.05 Ω) for 5% tol. <100 m Ω for Jumper
Solderability - Wetting	IPC/JEDEC J-STD-002B test B	Electrical Test not required Magnification 50X SMD conditions: Ist step: method B, aging 4 hours at 155 °C dry heat	Well tinned (≥95% covered) No visible damage
		2 nd step: leadfree solder bath at 245±3 °C Dipping time: 3±0.5 seconds	
- Leaching	IPC/JEDEC J-STD-002B test D	Leadfree solder, 260 °C, 30 seconds immersion time	No visible damage
- Resistance to Soldering Heat	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	\pm (0.5%+0.05 Ω) for 1% tol. \pm (1.0%+0.05 Ω) for 5% tol. <50 m Ω for Jumper No visible damage

Chip Resistor Surface Mount RC SERIES 1206 (RoHS Compliant)

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 4	Jul 02, 2009	-	- Test Items and methods updated
			- Test requirements upgraded
Version 3	Jul 15, 2008	-	- 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	-	- 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.

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RC1206FR-07105RL RC1206FR-0710K2L RC1206FR-0710ML RC1206FR-0711K5L RC1206FR-0711KL
RC1206FR-07121KL RC1206FR-07121RL RC1206FR-07124RL RC1206FR-0712K1L RC1206FR-0712K7L
RC1206FR-0712R1L RC1206FR-07130RL RC1206FR-0713K3L RC1206FR-0713K7L RC1206FR-0713KL
RC1206FR-07140KL RC1206FR-07140RL RC1206FR-07143KL RC1206FR-07147RL RC1206FR-0714K7L
RC1206FR-07150KL RC1206FR-07150RL RC1206FR-07154KL RC1206FR-0715K4L RC1206FR-0715K8L
RC1206FR-0715KL RC1206FR-0715RL RC1206FR-07162RL RC1206FR-07165RL RC1206FR-07169KL
RC1206FR-07169RL RC1206FR-0716K2L RC1206FR-0716R9L RC1206FR-0717K8L RC1206FR-0717R8L
RC1206FR-07182RL RC1206FR-0718K7L RC1206FR-0719K6L RC1206FR-071K21L RC1206FR-071K2L
RC1206FR-071K43L RC1206FR-071K4L RC1206FR-071K54L RC1206FR-071K5L RC1206FR-071K62L
RC1206FR-071K74L RC1206FR-071K78L RC1206FR-071M21L RC1206FR-071M62L RC1206FR-071ML
RC1206FR-071R33L RC1206FR-071R37L RC1206FR-071RL RC1206FR-07200KL RC1206FR-07200RL
RC1206FR-07205KL RC1206FR-07205RL RC1206FR-0720K5L RC1206FR-0720KL RC1206FR-0720R5L
RC1206FR-0720RL RC1206FR-07215KL RC1206FR-0721KL RC1206FR-0721R5L RC1206FR-07220RL
RC1206FR-07221KL RC1206FR-07221RL RC1206FR-07226RL RC1206FR-0722K1L RC1206FR-0722K6L
RC1206FR-0722KL RC1206FR-0722R1L RC1206FR-0722RL RC1206FR-07237KL RC1206FR-07237RL
RC1206FR-0723K7L RC1206FR-07243RL RC1206FR-07249KL RC1206FR-07249RL RC1206FR-0724K3L
RC1206FR-0724R3L RC1206FR-0724R9L RC1206FR-07255KL RC1206FR-0725K5L RC1206FR-07261KL
RC1206FR-07261RL RC1206FR-07267KL RC1206FR-0726K1L RC1206FR-0726K7L RC1206FR-0726R1L
RC1206FR-0726R7L RC1206FR-07274KL RC1206FR-0727K4L RC1206FR-0727R4L RC1206FR-0727RL
RC1206FR-07287KL RC1206FR-07294KL RC1206FR-072K05L RC1206FR-072K15L RC1206FR-072K1L
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