

DATA SHEET

GENERAL PURPOSE CHIP RESISTORS

RC_L series

±0.1%, ±0.5%, ±1%, ±5%

Sizes 0075/0100/0201/0402/0603/0805/ 1206/1210/1218/2010/2512

RoHS compliant & Halogen free



YAGEO Phicomp



SCOPE

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

<u>APPLICATIONS</u>

• All general purpose application

FEATURES

- Halogen Free Epoxy
- RoHS complaint
 - Products with lead free terminations meet RoHS requirements
 - Pb-glass contained in electrodes, resistors 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

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

GLOBAL PART NUMBER

RC XXXX X X X XX XXXX L

(1) (2) (3) (4) (5)

6) (

(I) SIZE

0075/0100/0201/0402/0603/0805/1206/1210/1218/2010/2512

(2) TOLERANCE

 $B = \pm 0.1\%$

 $D = \pm 0.5\%$

 $F = \pm 1.0\%$

 $J = \pm 5.0\%$ (for jumper ordering, use code of J)

(3) PACKAGING TYPE

R = Paper taping reel

K = Embossed taping reel

S = ESD safe reel (0075/0100 only)

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Based on spec.

(5) TAPING REEL

07= 7 inch dia. Reel

13=13 inch dia, Reel

7W = 7 inch dia. Reel & $2 \times$ standard power

7N = 7 inch dia. Reel, ESD safe reel (0075/0100 only)

(6) RESISTANCE VALUE

There are 2~4 digits indicated the resistance value.

Letter R/K/M is decimal point

Example:

 $97R6 = 97.6\Omega$

 $9K76 = 9760\Omega$

 $1M = 1,000,000\Omega$

(7) DEFAULT CODE

Letter L is the system default code for ordering only.(Note)

ORDERING EXAMPLE

The ordering code for a RC0402 0.0625W chip resistor value $100 K\Omega$ with $\pm 5\%$ tolerance, supplied in 7-inch tape reel of 10,000 units per reel is: RC0402JR-07100KL.

NOTE

- 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.



Chip Resistor Surface Mount

RC_L

SERIES

0075 to 2512

MARKING

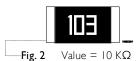
RC0075 / RC0100 / RC0201 / RC0402



No Marking

___Fig. I

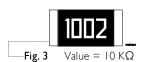
RC0603



E24 series: 3 digits

First two digits for significant figure and 3rd digit for number of zeros

RC0805 / RC1206 / RC1210 / RC1218 / RC2010 / RC2512



E24/E96 series: 4 digits

First three digits for significant figure and 4th digit for number of zeros

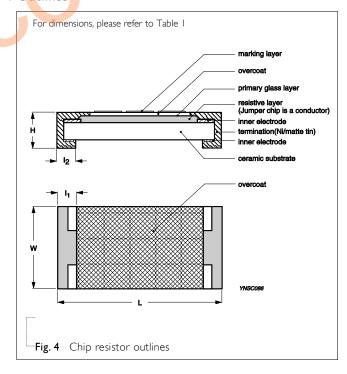
Note

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 environmental 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, as shown in Fig.4.

Outlines







Chip Resistor Surface Mount RC_L

SERIES 0075 to 2512

DIMENSION

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TYPE	L (mm)	W (mm)	H (mm)	Iı (mm)	l ₂ (mm)
RC0075	0.30±0.01	0.15±0.01	0.10±0.01	0.08±0.03	0.08±0.03
RC0100	0.40±0.02	0.20±0.02	0.13±0.02	0.10±0.03	0.10±0.03
RC0201	0.60±0.03	0.30±0.03	0.23±0.03	0.10±0.05	0.15±0.05
RC0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
RC0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.25±0.15
RC0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.20
RC1206	3.10±0.10	1.60±0.10	0.55±0.10	0.45±0.20	0.40±0.20
RC1210	3.10±0.10	2.60±0.15	0.50±0.10	0.45±0.15	0.50±0.20
RC1218	3.10±0.10	4.60±0.10	0.55±0.10	0.45±0.20	0.40±0.20
RC2010	5.00±0.10	2.50±0.15	0.55±0.10	0.45±0.15	0.50±0.20
RC2512(IW)	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.20	0.50±0.20
RC2512(2W)	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.20	1.15±0.20

ELECTRICAL CHARACTERISTICS

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JUMPER CRITERIA	TEMPERATURE COEFFICIENT	RESISTANCE RANGE	DIELECTRIC WITHSTANDING VOLTAGE	MAXIMUM OVERLOAD VOLTAGE	MAXIMUM WORKING VOLTAGE	OPERATING TEMPERATURE RANGE	POWER	CHARAC- TERISTICS
Rated Current 0.5A Maximum Current 1.0A	10Ω≦R<100Ω -200~+600ppm°C 100Ω≦R≦1MΩ ±200ppm°C	5% (E24) 10Ω≦R≦1ΜΩ 1% (E24/E96) 10Ω≦R≦1ΜΩ Jumper<50mΩ	25V	25V	100	-55°C to 125°C	1/50 W	RC0075
Rated Current 0.5A Maximum Current 1.0A	IΩ≦R <i0ω< math=""> $-200~+600ppm°C$ <math>I0Ω≤R<i00ω:< math=""> $±300ppm/°C$ $I00Ω≤R≤I0MΩ:$ $±200ppm/°C$ <math>I0MΩ<r≤22mω:< math=""> $±250ppm/°C$</r≤22mω:<></math></i00ω:<></math></i0ω<>	5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦I0MΩ 0.5% (E24/E96) 33Ω≦R≦470KΩ Jumper<50mΩ	30V	30V	15V	-55°C to 125°C	1/32 W	RC01 <mark>0</mark> 0
Rated Current 0.5A Maximum Current 1.0A	IΩ≦R≦I0Ω -I00~+350ppm°C I0Ω <r≦i0mω ±200ppm°C</r≦i0mω 	5% (E24) IΩ≦R≦I0MΩ I% (E24/E96) IΩ≦R≦I0MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ	50V	50V	25V	-55°C to 125°C	1/20 W	RC0201
Rated Current I.0A Maximum Current 2.0A	IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±I00ppm°C I0MΩ<r≦22mω ±200ppm°C</r≦22mω </r≦i0mω 	5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ	100V	100V	50V	-55°C to 155°C	1/16 W	RC0402
	IΩ≦R≦IMΩ ±200ppm°C	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ	100V	100∨	50V	-55°C to 155°C	1/8W	

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SERIES 0075 to 2512 RC_L

Table 2								
CHARAC- TERISTICS	POWER	OPERATING TEMPERATURE RANGE	MAXIMUM WORKING VOLTAGE	MAXIMUM OVERLOAD VOLTAGE	DIELECTRIC WITHSTANDING VOLTAGE	resistance range	TEMPERATURE COEFFICIENT	JUMPER CRITERIA
RC0603	1/10 W	-55°C to 155°C	75V	150V	150V	5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ	$IΩ$ ≦R $≦$ $IΩΩ$ $±200$ ppm $^{\circ}$ C $I0Ω$ <r<math>≦$I0ΜΩ$ $±100$ppm$^{\circ}$C $I0ΜΩ$<r<math>≦22$MΩ$ $±200$ppm$^{\circ}$C</r<math></r<math>	Rated Current 1.0A Maximum Current 2.0A
	1/5 W	-55°C to 155°C	75V	150V	150V	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ	IΩ≦R≦IMΩ ±200ppm°C	
RC0805	1/8 W	-55°C to 155°C	150V	300V	300V	5% (E24) $I\Omega$ ≦R≦22MΩ $I\%$ (E24/E96) $I\Omega$ 5R≤10MΩ 0.1% , 0.5% (E24/E96) $I0\Omega$ 5%, 10% 20%(E24) 24 MΩ≤R≤100MΩ 0.1% 20MΩ 0.1% 20MΩ 0.1% 20MΩ	IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±100ppm°C I0MΩ<r≦22mω ±200ppm°C 24MΩ<r≦i00mω ±300ppm°C</r≦i00mω </r≦22mω </r≦i0mω 	Rated Current 2.0A Maximum Current 5.0A
	1/4 W	-55°C to 155°C	150V	300V	300V	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ	IΩ≦R≦IMΩ ±200ppm°C	
RC1206	1/4 W	-55°C to 155°C	200V	400V	500V	5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ 5%,10%,20%(E24) 24MΩ≦R≦100MΩ Jumper<50mΩ	$\begin{split} & I\Omega \leqq R \leqq I0\Omega \\ & \pm 200 ppm^{\circ}C \\ & I0\Omega < R \leqq I0M\Omega \\ & \pm I00 ppm^{\circ}C \\ & I0M\Omega < R \leqq 22M\Omega \\ & \pm 200 ppm^{\circ}C \\ & 24M\Omega < R \leqq I00M\Omega \\ & \pm 300 ppm^{\circ}C \end{split}$	Rated Current 2.0A Maximum Current 10.0A
11.0	1/2 W	-55℃ to 155℃	200V	400V	500V	5% (E24) ΙΩ≦R≦ΙΜΩ Ι% (E24/E96) ΙΩ≦R≦ΙΜΩ	IΩ≦R≦IMΩ ±200ppm°C	
RC1210	1/2 W	-55°C to 155°C	200V	500V	500∨	5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ	IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±I00ppm°C I0MΩ<r≦22mω ±200ppm°C</r≦22mω </r≦i0mω 	Rated Current 2.0A Maximum Current 10.0A
RC1218	ΙW	-55°C to 155°C	200V	500V	500V	5% (E24) IΩ ≦R≦IMΩ I% (E24/E96) IΩ ≦R≦IMΩ 0.1%, 0.5% (E24/E96) I0Ω ≦R≦IMΩ	IΩ ≦R≦I0Ω ±200ppm°C I0Ω <r≦imω ±I00ppm°C</r≦imω 	Rated Current 6.0A Maximum Current 10.0A



 $Jumper{<}50m\Omega$

Product specification	

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Table 2								
CHARAC- TERISTICS	POWER	OPERATING TEMPERATURE RANGE	MAXIMUM WORKING VOLTAGE	MAXIMUM OVERLOAD VOLTAGE	DIELECTRIC WITHSTANDING VOLTAGE	resistance Range	TEMPERATURE COEFFICIENT	JUMPER CRITERIA
						5% (E24) IΩ ≦R≦22MΩ I% (E24/E96)	IΩ ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω< td=""><td>Rated Current 2.0A Maximum</td></r≦i0mω<>	Rated Current 2.0A Maximum
RC2010	3/4 W	-55°C to 155°C	200V	500V	500V	IΩ ≦R≦I0MΩ 0.1%, 0.5% (E24/E96) I0Ω ≦R≦IMΩ Jumper<50mΩ	±100ppm°C 10MΩ <r≦22mω ±200ppm°C</r≦22mω 	Current 10.0A
RC2512	ΙW	-55°C to 155°C	200V	500V	500V	5% (E24) $IΩ ≤R≤22MΩ$ $I% (E24/E96)$ $IΩ ≤R≤10MΩ$ 0.1%, 0.5% (E24/E96) $IΩΩ ≤R≤IMΩ$ Jumper<50mΩ	IΩ ≦R≦ $I0Ω\pm 200ppm°CI0Ω$ <r≦<math>I0MΩ $\pm I00$ppm°C I0MΩ<r≦<math>I0MΩ I0MΩ<r≤<math>I0MΩ</r≤<math></r≦<math></r≦<math>	Rated Current 2.0A Maximum Current 10.0A
	2 W	-55°C to 155°C	200V	400V	500V	5% (E24) IΩ ≦R≦I50Ω I% (E24/E96) IΩ ≦R≦I50Ω	IΩ ≦R≦I50Ω ±200ppm°C	0 ,

FOOTPRINT AND SOLDERING PROFILES

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



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PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

PACKING STYLE	PAPER TAPING R	EEL (R)	ESD SAFE REEL (S) (4MM WIDTH, IMM PITCH PLASTIC EMBOSSED)	EMBOSSED TAPING REEL
REEL DIMENSION	7" (178 mm)	13" (330 mm)	7" (178 mm)	7" (178 mm)
RC0075			40,000	
RC0100	20,000	80,000	40,000	
RC0201	10,000	50000		
RC0402	10,000	50000		
RC0603	5,000	20000		
RC0805	5,000	20000		
RC1206	5,000	20000		
RC1210	5,000	20000		
RC1218				4,000
RC2010				4,000
RC2512				4,000

NOTE

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

FUNCTIONAL DESCRIPTION

OPERATING TEMPERATURE RANGE

RC0402 to RC2512 Range: -55°C to +155°C (Fig. 5-1)

RC0075 to RC0201 Range: -55°C to +125°C (Fig. 5-2)

POWER RATING

Each type rated power at 70 °C:

RC0075=1/50W

RC0100=1/32W

RC0201=1/20W

RC0402=1/16W, 1/8W

RC0603=1/10W, 1/5W

RC0805=1/8W, 1/4W

RC1206=1/4W, 1/2W

RC1210=1/2W

RC1218=1W

RC2010=3/4W

RC2512=1W, 2W

RATED VOLTAGE

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

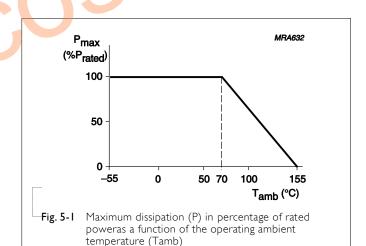
$$V = \sqrt{(PxR)}$$

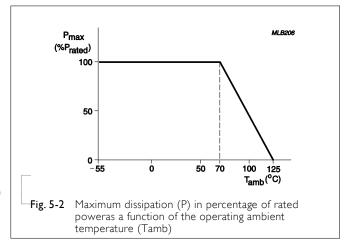
Where

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

P = Rated power (W)

 $R = Resistance value (\Omega)$





TESTS AND REQUIREMENTS

Table 8 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Temperature Coefficient of Resistance	IEC 60115-1 4.8	At +25/–55 °C and +25/+125 °C Formula:	Refer to table 2
(T.C.R.)		T.C.R= $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)}$	
		RI(t2 – ti) 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	MIL-STD-202G Method 108A	At 70±5°C for 1,000 hours; RCWV applied for	$\pm (1\% + 0.05 \Omega)$ for D/F tol
	IEC 60115-1 4.25.1	1.5 hours on and 0.5 hour off, still air required	$\pm (3\% + 0.05 \Omega)$ for J tol < 100mR for jumper
High Temperature Exposure	MIL-STD-202G Method 108A IEC 60115-1 4.25.3	I,000 hours at maximum operating temperature depending on specification, unpowered.	\pm (1%+0.05 Ω) for D/F tol \pm (2%+0.05 Ω) for J tol <50mR for jumper
Moisture	MIL-STD-202G Method 106F	Each temperature / humidity cycle is defined at	$\pm (0.5\% + 0.05\Omega)$ for D/F tol
Resistance	IEC 60115-1 4.24.2	8 hours (method 106F), 3 cycles / 24 hours for 10d with 25 °C / 65 °C 95% R.H, without steps 7a & 7b, unpowered	$\pm (2\% + 0.05\Omega)$ for J tol < 100mR for jumper
	1 N . V	Parts mounted on test-boards, without condensation on parts	
Humidity	IEC 60115-1 4.37	Steady state for 1000 hours at 40 °C / 95% R.H. RCWV applied for 1.5 hours on and 0.5 hour off	$\pm (1\% + 0.05 \Omega$) for D/F tol $\pm (2\% + 0.05 \Omega$) for J tol $< 100 \text{mR}$ for jumper
Thermal	MIL-STD-202G Method 107G	-55/+125℃	$\pm (0.5\% + 0.05\Omega)$ for D/F tol
Shock		Note Number of cycles required is 300 Devices unmounted	$\pm (1\% + 0.05\Omega)$ for J tol <50mR for jumper
		Maximum transfer time is 20 seconds Dwell time is 15 minutes. Air - Air	
Short Time Overload	IEC 60115-1 4.13	2.5 times RCWV or maximum overload voltage which is less for 5 seconds at room temperature	$\pm (1\% + 0.05\Omega$) for D/F tol $\pm (2\% + 0.05\Omega$) for J tol $<\!50\text{mR}$ for jumper No visible damage
Board Flex/ Bending	IEC 60115-1 4.33	Device mounted or as described only I board bending required bending time: 60±5 seconds 0075/0100/0201/0402:5mm; 0603/0805:3mm; 1206 and above:2mm	±(1%+0.05Ω) for D/F/J Tol <50mR for jumper No visible damage

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Solderability Wetting		PROCEDURE	REQUIREMENTS
vvecung	IPC/JEDECJ-STD-002B test B IEC 60068-2-58	Electrical Test not required Magnification 50X SMD conditions: Ist 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	W ell 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-202F Method 210F IEC 60068-2-58	Condition B, no pre-heat of samples Leadfree solder, $260 ^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 10 ± 1 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	$\pm (0.5\% + 0.05\Omega$) for D/F tol $\pm (1\% + 0.05\Omega$) for J tol $<$ 50mR for jumper No visible damage
		~CO5V	



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Chip Resistor Surface Mount

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REVISION HISTORY

REVISION DATE CHANGE NOTIFICATION **DESCRIPTION**

Aug. 29, 2014 Version 0

- First issue of this specification



[&]quot;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."