

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 Phícomp



SCOPE

This specification describes RC 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, 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:

 $97R6 = 97.6\Omega$

 $9K76 = 9760\Omega$

 $IM = 1,000,000\Omega$

(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 $100 \text{K}\Omega$ 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.



RC_L

SERIES

0075 to 2512

MARKING

RC0075 / RC0100 / RC0201 / RC0402



No Marking

__Fig. I

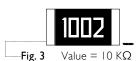
RC0603



E24 series: 3 digits

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

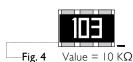
RC0805 / RC1206 / RC1210 / RC2010 / RC2512



E24/E96 series: 4 digits

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

RC1218



E-24 series: 3 digits, ±5%

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



Both E-24 and E-96 series: 4 digits, $\pm 1\,\%$ & $\pm 0.5\%$

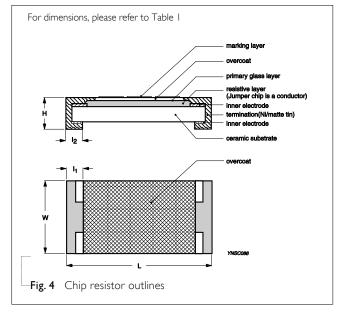
First three digits for significant figure and 4th digit for number of zeros

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 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





RC_L

SERIES 0075 to 2512

<u>DIMENSION</u>

Table I

TYPE	L (mm)	W (mm)	H (mm)	I _I (mm)	I 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

Table 2

CHARAC- TERISTICS	POWER	OPERATING TEMPERATURE RANGE	MAXIMUM WORKING VOLTAGE	MAXIMUM OVERLOAD VOLTAGE	DIELECTRIC WITHSTANDING VOLTAGE	resistance range		JUMPER CRITERIA
RC0075	1/50 W	-55°C to 125°C	10V	25V	25V	5% (E24) 10Ω≦R≦1ΜΩ 1% (E24/E96) 10Ω≦R≦1ΜΩ Jumper<50mΩ	10Ω≦R<100Ω -200~+600ppm°C 100Ω≦R≦1MΩ ±200ppm°C	Rated Current 0.5A Maximum Current 1.0A
RC0100	1/32 W	-55°C to 125°C	15V	30V	30V	5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.5% (E24/E96) 33Ω≦R≦470KΩ Jumper<50mΩ	IΩ≦R< $IΩΩ$ -200 ~ $+600$ ppm°C $I0Ω$ ≤ R < $I00Ω$: $±300$ ppm/°C $I00Ω$ ≤ R ≤ $I0MΩ$: $±200$ ppm/°C $I0MΩ$ < R ≤ $I0MΩ$: $±250$ ppm/°C	Rated Current 0.5A Maximum Current 1.0A
RC0201	1/20 W	-55°C to 125°C	25V	50V	50V	5% (E24) IΩ≦R≦I0MΩ I% (E24/E96) IΩ≦R≦I0MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ	IΩ≦R≦I0Ω -100~+350ppm°C I0Ω <r≦i0mω ±200ppm°C</r≦i0mω 	Rated Current 0.5A Maximum Current 1.0A



Chip Resistor Surface Mount	RC_L	SERIES	0075 to 2512
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Table 2	POWER	OPERATING	MAXIMUM	MAXIMUM	DIELECTRIC	resistance	TEMPERATURE	JUMPER
TERISTICS	POWER	TEMPERATURE RANGE	WORKING VOLTAGE		WITHSTANDING VOLTAGE	RANGE	COEFFICIENT	CRITERIA
RC0402	1/16 W	-55°C to 155°C	50V	100V	100V	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 I.0A Maximum Current 2.0A
	I/8W	-55℃ to 155℃	50V	100V	100V	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ	IΩ≦R≦IMΩ ±200ppm°C	
RC0603	1/10 W	-55°C to 155°C	75 V	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≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±I00ppm°C I0MΩ<r≦22mω ±200ppm°C</r≦22mω </r≦i0mω 	Rated Current I.0A Maximum Current 2.0A
	1/5 W	-55°C to 155°C	75 V	150V	150V	5% (E24) ΙΩ≦R≦ΙΜΩ Ι% (E24/E96) ΙΩ≦R≦ΙΜΩ	IΩ≦R≦IMΩ ±200ppm°C	
RC0805	1/8 W	-55°C to 155°C	150V	300V	300V	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	$I\Omega$ ≦R≤ $I0\Omega$ ± 200 ppm°C $I0\Omega$ <r≤<math>I0M\Omega ± 100ppm°C $I0M\Omega$<r≤<math>I0M\Omega ± 200ppm°C $I0M\Omega$<r≤<math>I00M\Omega $I0M\Omega$<r≤<math>I00M\Omega $I0M\Omega$<r≤<math>I00M\Omega</r≤<math></r≤<math></r≤<math></r≤<math></r≤<math>	Rated Current 2.0A Maximum Current 5.0A
	1/4 W	-55°C to 155°C	150V	300∨	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≦I00MΩ Jumper<50mΩ	$\begin{split} & \hspace{0.1in} 0.1i$	Rated Current 2.0A Maximum Current 10.0A
	1/2 W	-55℃ to 155℃	200V	400V	500V	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ	IΩ≦R≦IMΩ ±200ppm°C	



RC_L

SERIES

0075 to 2512

FOOTPRINT AND SOLDERING PROFILES

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

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CHARAC- TERISTICS	POWER	OPERATING TEMPERATURE RANGE	MAXIMUM WORKING VOLTAGE	MAXIMUM OVERLOAD VOLTAGE	DIELECTRIC WITHSTANDING VOLTAGE	resistance range	TEMPERATURE COEFFICIENT	JUMPER CRITERIA
RC1210	1/2 W	-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) 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	۱w	-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 Jumper<50mΩ	IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦imω ±100ppm°C</r≦imω 	Rated Current 6.0A Maximum Current 10.0A
RC2010	3/4 W	-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) 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
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) 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
	2 W	-55°C to 155°C	200V	400V	500V	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ	IΩ≦R≦IMΩ ±200ppm°C	



10

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			20,000	
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

RCI206=I/4W, I/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:

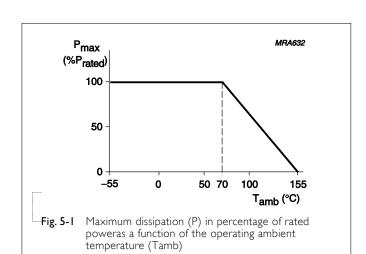
$$V = \sqrt{(PxR)}$$

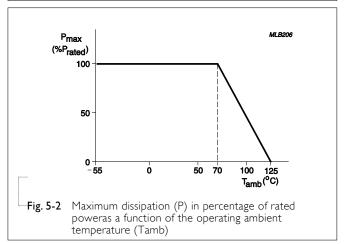
Where

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

P = Rated power (W)

 $R = Resistance value (\Omega)$



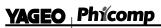


SERIES **0075 to 2512**

TESTS AND REQUIREMENTS

Table 8 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Temperature Coefficient of Resistance (T.C.R.)	MIL-STD-202 Method 304	At +25/-55 °C and +25/+125 °C Formula: T.C.R= $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)}$ Where t_1 =+25 °C or specified room temperature t_2 =-55 °C or +125 °C test temperature	Refer to table 2
		R_1 =resistance at reference temperature in ohms R_2 =resistance at test temperature in ohms	
Life/ Endurance	MIL-STD-202 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, still air required	$\pm (1\% + 0.05\Omega)$ for B/D/F tol $\pm (3\% + 0.05\Omega)$ for J tol <100mR for jumper
High Temperature Exposure	MIL-STD-202 Method 108A IEC 60068-2-2	1,000 hours at maximum operating temperature depending on specification, unpowered.	$\pm (1\% + 0.05\Omega)$ for B/D/F tol $\pm (2\% + 0.05\Omega)$ for J tol <50mR for jumper
Moisture Resistance	MIL-STD-202 Method I06G	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	$\pm (0.5\% + 0.05\Omega)$ for B/ D/F tol $\pm (2\% + 0.05\Omega)$ for J tol < 100mR for jumper
Humidity	IEC 60115-1 4.24.2	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 B/D/F tol $\pm (2\% + 0.05\Omega)$ for J tol <100mR for jumper
Thermal Shock	MIL-STD-202 Method 107G	-55/+125° C Note Number of cycles required is 300. Devices mounted Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air - Air	$\pm (0.5\% + 0.05\Omega)$ for B/D/F tol $\pm (1\% + 0.05\Omega)$ for J tol <50mR for jumper
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 B/D/F tol $\pm (2\% + 0.05\Omega)$ for J tol <50mR 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%+0.05 Ω) for B/D/F/J Tol <50mR for jumper No visible damage

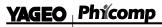


RC_L

SERIES 0075 to 2512

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	J-STD-002 test B	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	J-STD-002 test D	Leadfree solder ,260°C, 30 seconds immersion time	No visible damage
-Resistance to Soldering Heat	MIL-STD-202 Method 210F IEC 60115-1 4.18	Condition B, no pre-heat of samples Leadfree solder, 260 °C \pm 5°C, 10 \pm 1 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	$\pm (0.5\% \pm 0.05\Omega)$ for B/D/F tol. $\pm (1\% \pm 0.05\Omega)$ for J tol. <50mR for jumper No visible damage





RC_L

SERIES 0075 to 2512

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 3	Oct. 29, 2015	-	- Updated test and requirements
Version 2	Jul. 23, 2015	-	- Updated test and requirements
Version I	Jan. 21, 2015	-	- ESD Safe Reel update
Version 0	Dec. 15, 2014	-	- First issue of this specification



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25121WF1003T4E 25.501.3653.0 290-1.0M-RC 292-1.0M-RC 292-2.2K-RC 292-4.7K-RC 25121WF4700T4E 292-470K-RC 302-1.0M-RC CPG1206F10KC CRCW02011R00FXED CRCW060315K0FKEE CRCW060320K5FKEE CRG0201F10K RCP2512B100RGWB

RCWP12061K00FKS2 3520510RJT 352075KJT M55342K11B9E53RUL RMC16-102JT RMC1JPTE TR0603MR-075K1L 5-2176094-4

35202K7JT WF06Q1000FTL ERJ-S14J4R7U CHP2512L4R30GNT WR12X1621FTL RCWP11001K00FKS3 LRC-LRF3W-01-R050-FTR1800 9-2176088-6 NRC06F1002TR20F CRCW02013M30FNED CRCW060343K0FKEE WR04X5360FTL RCA060345K3FKEA LTR100JZPF33R0