Innovative Service Around the Globe YAGEO

DATA SHEET

LEAD FREE CHIP RESISTORS

RC_P series

±0.5%, ±1%, ±5%

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

YAGEO

Product specification – September 21, 2022 V.5

SCOPE

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

APPLICATIONS

- All general purpose application

FEATURES

- Total lead free without RoHS exemption
- Halogen Free Epoxy
- Reducing environmentally hazardous wastes
- High component and equipment reliability
- Saving of PCB space
- MSL class: MSL 1

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	P
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

(1) SIZE

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

(2) TOLERANCE

D = ±0.5%
F = ±1.0%
J = ±5.0% (for jumper ordering, use code of J)

(3) PACKAGING TYPE

R = Paper taping reel
K = Embossed taping reel
S = ESD safe reel (0100 only)

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Based on spec.

(5) TAPING REEL

07= 7 inch dia. Reel
13=13 inch dia. Reel
7N = 7 inch dia. Reel, ESD safe reel (0100 only)
7W = 7 inch dia. Reel & 2 x standard power

(6) RESISTANCE VALUE

There are 2~4 digits indicated the resistance value.
Letter R/K/M is decimal point.
Example:
97R6 = 97.6Ω
9K76 = 9760Ω
1M = 1,000,000Ω

(7) DEFAULT CODE

Letter P is lead free (without RoHS exemption)

ORDERING EXAMPLE

The ordering code for a RC0402 0.0625W chip resistor value 100KΩ with ±5% tolerance, supplied in 7-inch tape reel of 10,000 units per reel is: RC0402JR-07100KP.

MARKING

RC0075 / RC0100 / RC0201 / RC0402

Fig. 1

No Marking

RC0603

Fig. 2 Value = 10 KΩ

E24 series: 3 digits, 5%

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

RC0805 / RC1206 / RC1210 / RC1218 / RC2010 / RC2512

Fig. 3 Value = 10 KΩ

E24/E96 series: 4 digits, 1%, 0.5%

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

For dimensions, please refer to Table 1

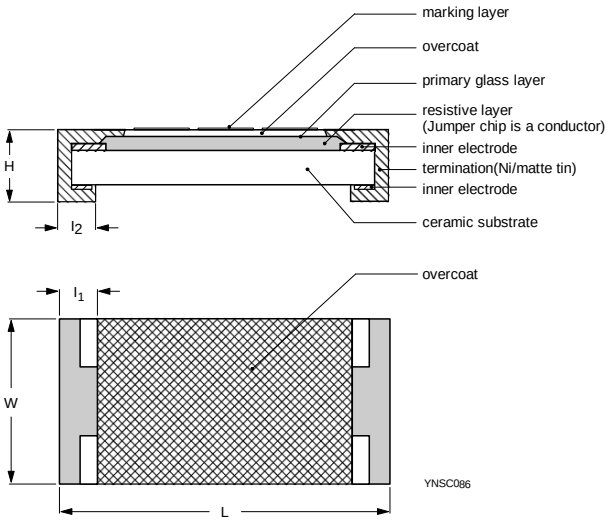

Fig. 4 Chip resistor outlines

DIMENSION

Table 1

TYPE	L (mm)	W (mm)	H (mm)	I_1 (mm)	I_2 (mm)
RC0075	0.30±0.01	0.15±0.01	0.13±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	0.45±0.20
RC1210	3.10±0.10	2.60±0.15	0.55±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	0.55±0.20
RC2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.20	0.60±0.20

ELECTRICAL CHARACTERISTICS

Table 2

TYPE	POWER	CHARACTERISTICS						
		Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	RESISTANCE RANGE	Temperature Coefficient of Resistance	Jumper Criteria
RC0075	1/50W	-55°C to +125°C	10V	25V	25V	E24 ±5% 10Ω ≤ R ≤ 1MΩ E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ Jumper< 50mΩ	10Ω≤R<100Ω:-200~+600ppm°C 100Ω≤ R ≤1MΩ: ±200ppm°C	Rated Current 0.5A Max. Current 1.0A
RC0100	1/32W	-55°C to +125°C	15V	30V	30V	E24 ±5% 1Ω ≤ R ≤ 10MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ Jumper< 50mΩ	1Ω≤R<10Ω:-200~+600ppm°C 10Ω≤ R<100Ω: ±300ppm°C 100Ω≤R≤10MΩ: ±200ppm°C	Rated Current 0.5A Max. Current 1.0A
RC0201	1/20W	-55°C to +125°C	25V	50V	50V	E24 ±5% 1Ω ≤ R ≤ 10MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ E24/E96 ±0.5% 10Ω ≤ R ≤ 1MΩ Jumper< 50mΩ	1Ω≤R≤10Ω: -100~+350ppm°C 10Ω<R≤10MΩ: ±200ppm°C	Rated Current 0.5A Max. Current 1.0A

TYPE	POWER	CHARACTERISTICS						
		Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	RESISTANCE RANGE	Temperature Coefficient of Resistance	Jumper Criteria
RC0402	1/16W	-55°C to +155°C	50V	100V	100V	E24 ±5% 1Ω ≤ R ≤ 22MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ E24/E96 ±0.5% 10Ω ≤ R ≤ 1MΩ Jumper< 50mΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C 10MΩ<R≤22MΩ: ±200ppm°C	Rated Current 1.0A Max. Current 2.0A
	1/8W	-55°C to +155°C	50V	100V	100V	E24 ±5% 1Ω ≤ R ≤ 10MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C	--
RC0603	1/10W	-55°C to +155°C	75V	150V	150V	E24 ±5% 1Ω ≤ R ≤ 22MΩ E24/E96 ±1% 1Ω≤ R ≤ 10MΩ E24/E96 ±0.5% 10Ω≤ R ≤ 1MΩ Jumper< 50mΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C 10MΩ<R≤22MΩ: ±200ppm°C	Rated Current 1.0A Max. Current 2.0A
	1/5W	-55°C to +155°C	75V	150V	150V	E24 ±5% 1Ω ≤ R ≤ 10MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C	--
RC0805	1/8W	-55°C to +155°C	150V	300V	300V	E24 ±5% 1Ω ≤ R ≤ 22MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ E24/E96 ±0.5% 10Ω ≤ R ≤ 1MΩ Jumper< 50mΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C 10MΩ<R≤22MΩ: ±200ppm°C	Rated Current 2.0A Max. Current 5.0A
	1/4W	-55°C to +155°C	150V	300V	300V	E24 ±5% 1Ω ≤ R ≤ 10MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C	--
RC1206	1/4W	-55°C to +155°C	200V	400V	500V	E24 ±5% 1Ω ≤ R ≤ 22MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ E24/E96 ±0.5% 10Ω ≤ R ≤ 1MΩ Jumper< 50mΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C 10MΩ<R≤22MΩ: ±200ppm°C	Rated Current 2.0A Max. Current 10.0A
	1/2W	-55°C to +155°C	200V	400V	500V	E24 ±5% 1Ω ≤ R ≤ 10MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C	--

TYPE	POWER	CHARACTERISTICS						
		Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	RESISTANCE RANGE	Temperature Coefficient of Resistance	Jumper Criteria
RC1210	1/2W	-55°C to +155°C	200V	500V	500V	E24 ±5% 1Ω ≤ R ≤ 22MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ E24/E96 ±0.5% 10Ω ≤ R ≤ 1MΩ Jumper< 50mΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C 10MΩ<R≤22MΩ: ±200ppm°C	Rated Current 2.0A Max. Current 10.0A
RC1218	1W	-55°C to +155°C	200V	500V	500V	E24 ±5% 1Ω ≤ R ≤ 1MΩ E24/E96 ±1% 1Ω ≤ R ≤ 1MΩ E24/E96 ±0.5% 10Ω ≤ R ≤ 1MΩ Jumper< 50mΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤1MΩ: ±100ppm°C	Rated Current 6.0A Max. Current 10.0A
RC2010	3/4W	-55°C to +155°C	200V	500V	500V	E24 ±5% 1Ω ≤ R ≤ 22MΩ E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ E24/E96 ±0.5% 10Ω ≤ R ≤ 1MΩ Jumper< 50mΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C 10MΩ<R≤22MΩ: ±200ppm°C	Rated Current 2.0A Max. Current 10.0A
RC2512	1W	-55°C to +155°C	200V	500V	500V	E24 ±5% 1Ω ≤ R ≤ 22MΩ E24/E96 ±1% 1Ω≤ R ≤ 10MΩ E24/E96 ±0.5% 10Ω ≤ R ≤ 1MΩ Jumper< 50mΩ	1Ω≤R≤10Ω: ±200ppm°C 10Ω<R≤10MΩ: ±100ppm°C 10MΩ<R≤22MΩ: ±200ppm°C	Rated Current 2.0A Max. Current 10.0A

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	RC0075	RC0100	RC0201	RC0402	RC0603	RC0805	RC1206	RC1210	RC1218	RC2010	RC2512
Paper taping reel (R)	7" (178 mm)	---	20,000	10,000	10,000	5,000	5,000	5,000	5,000	---	---	---
	13" (330 mm)	---	80,000	50000	50000	20000	20000	20000	20000	---	---	---
ESD safe reel (S)	7" (178 mm)	20,000	40,000	---	---	---	---	---	---	---	---	---
Embossed taping reel	7" (178 mm)	---		---	---	---	---	---	---	4,000	4,000	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=1/20 W
RC0402=1/16 W, 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

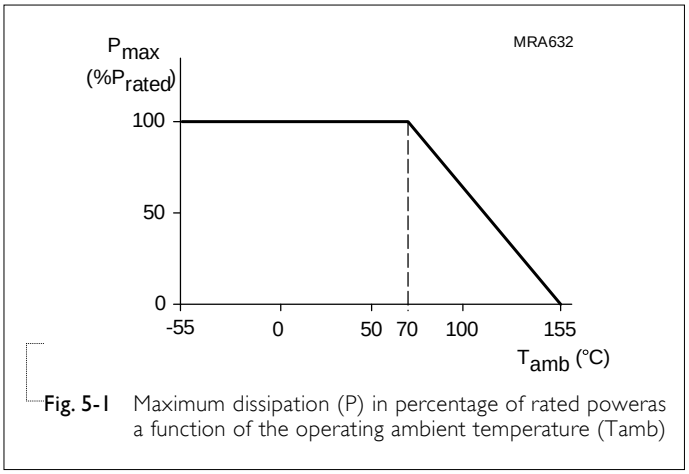

Fig. 5-1 Maximum dissipation (P) in percentage of rated poweras a function of the operating ambient temperature (Tamb)

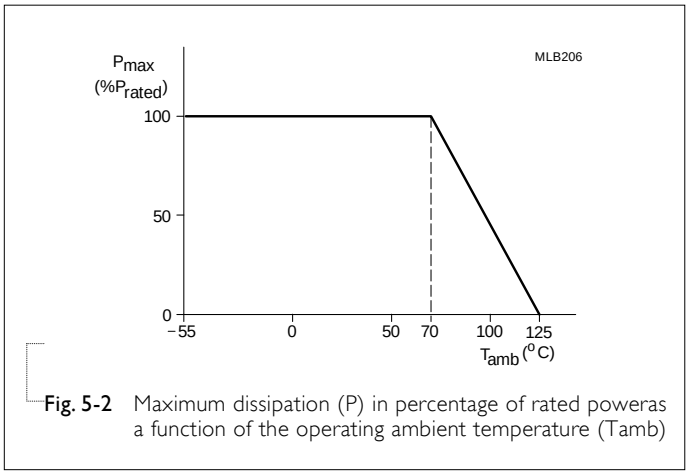

Fig. 5-2 Maximum dissipation (P) in percentage of rated poweras a function of the operating ambient temperature (Tamb)

RATED VOLTAGE

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

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

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)

TESTS AND REQUIREMENTS

Table 4 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:** $T.C.R=\frac{R_2-R_1}{R_1(t_2-t_1)}\times 10^6$ (ppm/°C) Where t_1=+25 °C or specified room temperature t_2=–55 °C or +125 °C test temperature R_1=resistance at reference temperature in ohms R_2=resistance at test temperature in ohms	Refer to table 2
Life/ Endurance	MIL-STD-202G Method 108 IEC 60115-1 7.1	At 70±5℃ for 1,000 hours; RCWV applied for 1.5 hours on and 0.5 hour off, still air required	0075: ±(5%+100mΩ) <100mΩ for jumper 0100: ±(3%+0.05Ω) Others: ±(1%+0.05Ω) for D/F tol ±(3%+0.05Ω) for J tol <100mR for jumper
High Temperature Exposure	MIL-STD-202G Method 108	1,000 hours at maximum operating temperature depending on specification, unpowered.	0075: ±(5%+100mΩ) <100mΩ for jumper 0100: ±(1%+0.05Ω) Others: ±(1%+0.05Ω) for D/F tol ±(2%+0.05Ω) for J tol <50mR for jumper
Moisture Resistance	MIL-STD-202 Method 106	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 Parts mounted on test-boards, without condensation on parts	0075: ±(2%+100mΩ) <100mΩ for jumper 0100: ±(2%+0.05Ω) Others: ±(0.5%+0.05Ω) for D/F tol ±(2%+0.05Ω) for J tol <100mR for jumper
Humidity	IEC 60115-1 10.4	Steady state for 1000 hours at 40 °C / 95% R.H. RCWV applied for 1.5 hours on and 0.5 hour off	0075: ±(5%+100mΩ) 0100: ±(3%+0.05Ω) Others: ±(1%+0.05Ω) for D/F tol ±(2%+0.05Ω) for J tol <100mR for jumper
Thermal Shock	MIL-STD-202G Method 107	-55/+125℃ Note Number of cycles required is 300 Devices mounted Maximum transfer time is 20 seconds Dwell time is 15 minutes. Air - Air	0075/01005: ±(1% +50mΩ) < 50mΩ for jumper Others: ±(0.5%+0.05Ω) for D/F tol ±(1%+0.05Ω) for J tol <50mR for jumper

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Short Time Overload	IEC 60115-1 8.1	2.5 times RCWV or maximum overload voltage which is less for 5 seconds at room temperature	0075/01005: ±(2% +50mΩ) < 50mΩ for jumper Others: ±(1%+0.05Ω) for D/F tol ±(2%+0.05Ω) for J tol <50mR for jumper
Board Flex/ Bending	IEC 60115-1 9.8	Device mounted or as described only 1 board bending required bending time: 60±5 seconds 0075/0100/0201/0402:5mm; 0603/0805:3mm; 1206 and above:2mm	± (1% +50mΩ) < 50mΩ for jumper No visible damage
Solderability - Wetting	J-STD-002 test B1	Electrical Test not required Magnification 50X SMD conditions: 1st step: aging 4 hours at 155°C dry heat 2nd step: method B1, leadfree solder bath at 245± 3°C Dipping time: 3± 0.5 seconds	Well 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 210	Condition B, no pre-heat of samples Leadfree solder, 260 °C ±5°C, 10 ±1 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	0075: ±(3%+50mΩ) <50mΩ for jumper 0100: ±(1%+0.05Ω) Others: ±(0.5%+0.05Ω) for D/F tol ±(1%+0.05Ω) for J tol <50mR for jumper No visible damage

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 5	Sep. 21, 2022	-	- Add size 0075
Version 4	May. 10, 2022	-	- Extend the range of size 01005 to 10Mohm
Version 3	Oct. 12, 2021	-	- Upgrade Temperature Coefficient of Resistance
Version 2	Mar. 25, 2021	-	- Add size 01005 and Double Power for size 0402~1206
Version 1	Sep. 05, 2018	-	- Remove size 01005 of this specification
Version 0	Aug. 22, 2014	-	- First issue of this specification

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