

DATA SHEET

GENERAL PURPOSE CHIP RESISTORSRC0201

5%, 1%, 0.5%

RoHS compliant & Halogen free



YAGEO Phícomp



SCOPE

This specification describes RC0201 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.
- Reduce environmentally hazardous wastes
- High component and equipment reliability
- Save 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)

RC0201 X R - XX XXXX L (1) (2) (3) (4) (5) (6)

(I) TOLERANCE

 $D = \pm 0.5\%$

 $F = \pm 1\%$

 $J = \pm 5\%$ (for Jumper ordering, use code of J)

(2) PACKAGING TYPE

R = Paper / PE taping reel

(3) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Based on spec.

(4) TAPING REEL

07 = 7 inch dia. Reel

7C = 7 inch dia. Reel, 1.5 x Standard Quantity

7D = 7 inch dia. Reel, 2 x Standard Quantity

13 = 13 inch dia, Reel

(5) RESISTANCE VALUE

There are $2\sim4$ digits indicated the resistance 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 coding rules of resistance are shown in the table of "Resistance rule of global part number".

(6) DEFAULT CODE

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

Resistance rule of global part number

Resistance code ru	le Example
DI	DI = Dummy
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)	IOR = IO Ω 97R6 = 97.6 Ω
XXXR (100 to 976 Ω)	100R = 100 Ω
XKXX (1 to 9.76 KΩ)	IK = 1,000 Ω 9K76 = 9760 Ω
$\times M \times \times$ (I to 9.76 M Ω)	$IM = 1,000,000 \Omega$ $9M76 = 9,760,000 \Omega$

ORDERING EXAMPLE

The ordering code of a RC0201 chip resistor, value $56~\Omega$ with $\pm 1\%$ tolerance, supplied in 7-inch tape of 15,000 units per reel is: RC0201FR-7C56RL.

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.



SERIES

PHYCOMP BRAND ordering codes

Both GLOBAL PART NUMBER (preferred) and I2NC (traditional) codes are acceptable to order Phycomp brand products.

GLOBAL PART NUMBER (PREFERRED)

XXX XXXXX L

For detailed information of GLOBAL PART NUMBER and ordering example, please refer to page 2.

12NC CODE 2322

(I)		(2) (3) (4)			
TYPE/	START	TOL.	RESISTANCE	PAPER /	PE TAPE ON RE	EEL (units) (2)
0201	IN ^(I)	(%)	RANGE	10,000	20,000	50,000
RC41	2322	±5%	I to I $M\Omega$	803 70xxx	806 80xxx	803 60xxx
RC42	2322	±1%	I to I $M\Omega$	806 7xxxx	806 8xxxx	806 6xxxx
Jumper	2322	-	0 Ω	803 91001		
Dummy	2322	-	-	803 93001		

- (I) The resistors have a 12-digit ordering code starting with 2322.
- (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 RC42 resistor, value 56 Ω with ±1% tolerance, supplied in tape of 10,000 units per reel is: 232280675609L or RC0201FR-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

- I. 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.

MARKING

RC0201



For further marking information, please refer to data sheet "Chip resistors marking".

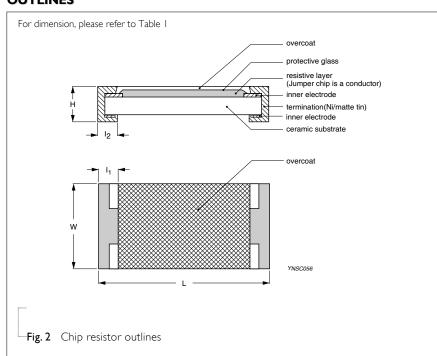
CONSTRUCTION

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, as shown in Fig.2.

<u>DIMENSIONS</u>

Table I	
TYPE	RC0201
L (mm)	0.60 ±0.03
W (mm)	0.30 ± 0.03
H (mm)	0.23 ±0.03
I _I (mm)	0.10 ±0.05
I ₂ (mm)	0.15 ±0.05

OUTLINES



0201

ELECTRICAL CHARACTERISTICS

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CHARACTERISTICS	RC0201 I/20 W
Operating Temperature Range	–55 °C to +125 °C
Maximum Working Voltage	25 V
Maximum Overload Voltage	50 V
Dielectric Withstanding Voltage	50 V
	5% (E24) ΙΩ to Ι0 ΜΩ
Resistance Range	1% (E24/E96) $$ I $$ Ω to 10 $$ M $$
Resistance Range	0.5% (E24/E96) $$ I0 Ω to $$ I $$ M Ω
	Jumper $<$ 0.05 Ω
Temperature Coefficient	$1 \Omega \le R \le 10 \Omega$ $-100/+350 \text{ ppm/°C}$
Temperature Coemcient	$10~\Omega < R \le 10~M\Omega$ ±200 ppm/°C
Jumper Criteria	Rated Current 0.5 A
jumper Criteria	Maximum Current I.0 A

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

PRODUCT TYPE	PACKING STYLE	REEL DIMENSION	QUANTITY PER REEL
RC0201	Paper / PE Taping Reel (R)	7" (178 mm)	10,000/15,000/20,000 units
		13" (330 mm)	50,000 units

NOTE

- 1. For paper/PE tape and reel specification/dimensions, please refer to data sheet "Chip resistors packing".
- 2. For size of 0201, standard quantity is 10,000 units per reel.

FUNCTIONAL DESCRIPTION

POWER RATING

RC0201 rated power at 70°C is 1/20 W

RATED VOLTAGE

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

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

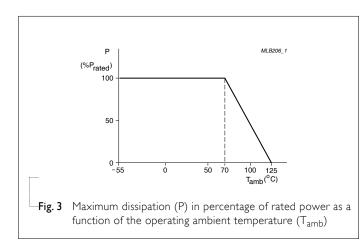
or max. working voltage whichever is less

Where

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

P=Rated power (W)

R=Resistance value (Ω)



TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

TEST	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		Formula:	
(T.C.R.)		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 ₁ =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	$\pm (1.0\% + 0.05 \ \Omega)$ for 1%, 0.5% tol.
			$\pm (3.0\% + 0.05~\Omega)$ for 5% tol.
			<100 m Ω for Jumper
High Temperature	IEC 60068-2-2	1,000 hours at 125±5 °C, unpowered	±(1.0%+0.05 Ω) for 1%, 0.5% tol.
Exposure/ Endurance at			$\pm (2.0\% + 0.05 \Omega)$ for 5% tol.
Upper Category Temperature			$<$ 50 m Ω for Jumper
Moisture	MIL-STD-202G Method-106G	Each temperature / humidity cycle is defined at 8	±(0.5%+0.05 Ω)
Resistance		hours, 3 cycles / 24 hours for 10d. with 25 °C /	for 1%, 0.5% tol.
		65 °C 95% R.H, without steps 7a & 7b, unpowered	$\pm (2.0\% + 0.05 \ \Omega)$ for 5% tol.
		Parts mounted on test-boards, without condensation on parts	for 5% tol. $<$ 100 m Ω for Jumper
		Measurement at 24±2 hours after test conclusion	
Thermal Shock	MIL-STD-202G Method-107G	-55/+125 °C	±(0.5%+0.05 Ω)
THEITHAI SHOCK	51 5 2023 1 ledilod-10/ G	Number of cycles required is 300. Devices	for 1%, 0.5% tol.
		unmounted	±(1%+0.05 Ω)
		Maximum transfer time is 20 seconds.	for 5% tol.
		Dwell time is 15 minutes. Air – Air	$<$ 50 m Ω for Jumper

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS	
Short Time Overload	IEC60115-1 4.13	2.5 times of rated voltage or maximum overload voltage whichever is less for 5 sec at room	$\pm (1.0\% + 0.05 \ \Omega)$ for 1%, 0.5% tol.	
		temperature	$\pm (2.0\% + 0.05~\Omega)$ for 5% tol.	
			$<$ 50 m Ω for Jumper	
			No visible damage	
Board Flex/	IEC 60068-2-21	Chips mounted on a 90mm glass epoxy resin	±(1.0%+0.05 Ω)	
Bending		PCB (FR4)	$<$ 50 m Ω for Jumper	
		5 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%, 0.5% tol.	
Operation		This constitutes shall be repeated for 96 hours	\pm (1.0%+0.05 Ω)	
		However the applied voltage shall not exceed	for 5% tol.	
		the maximum operating voltage	No visible damage	
Insulation Resistance	IEC 60115-1 4.6	Rated continuous overload voltage (RCOV) for I minute	≥10 GΩ	
		Type RC0201		
		Voltage (DC) 50 V		
Dielectric Withstand	IEC 60115-1 4.7	Maximum voltage (V _{rms}) applied for 1 minute Type RC0201	No breakdown or flasho	over
Voltage		Voltage (AC) 50 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 Ω	10 dB
			$100 \Omega \le R < 1 K\Omega$	20 dB
			$1 \text{ K}\Omega \leq R < 10 \text{ K}\Omega$	30 dB
			$10 \text{ K}\Omega \leq R < 100 \text{ K}\Omega$	40 dB
			$100 \text{ K}\Omega \leq R < 1 \text{ M}\Omega$	46 dB
			$I M\Omega \le R \le 22 M\Omega$	48 dB

Chip Resistor Surface Mount RC SERIES 0201

TEST METHOD	PROCEDURE	REQUIREMENTS
IEC 60115-1 4.21	Steady state for 1000 hours at 40 °C / 95% R.H. RCWV applied for 1.5 hours on and 0.5 hour off	$\pm (1.0\% + 0.05 \ \Omega)$ for 1%, 0.5% tol. $\pm (2.0\% + 0.05 \ \Omega)$ for 5% tol. <100 m Ω for Jumper
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	$\pm (1.0\% + 0.05 \ \Omega)$ for 1%, 0.5% tol. $\pm (2.0\% + 0.05 \ \Omega)$ for 5% tol. <100 m Ω for Jumper
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 2nd step: lead-free solder bath at 245±3 °C Dipping time: 3±0.5 seconds	Well tinned (≥95% covered) No visible damage
IPC/JEDEC J-STD-002B test D	Lead-free solder, 260 °C, 30 seconds immersion time	No visible damage
IEC 60068-2-58	Condition B, no pre-heat of samples Lead-free solder, 260 °C, 10 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	$\pm (0.5\% + 0.05 \ \Omega)$ for 1%, 0.5% tol. $\pm (1.0\% + 0.05 \ \Omega)$ for 5% tol. <50 m Ω for Jumper No visible damage
	IEC 60115-1 4.21 IEC 60115-1 4.39 IPC/JEDEC J-STD-002B test B	IEC 60115-1 4.21 Steady state for 1000 hours at 40 °C / 95% R.H. RCWV applied for 1.5 hours on and 0.5 hour off 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 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 2nd step: lead-free solder bath at 245±3 °C Dipping time: 3±0.5 seconds IPC/JEDEC J-STD-002B test D Lead-free solder, 260 °C, 30 seconds immersion time IEC 60068-2-58 Condition B, no pre-heat of samples Lead-free solder, 260 °C, 10 seconds immersion time Procedure 2 for SMD: devices fluxed and

Chip Resistor Surface Mount RC SERIES 0201

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 8	May 02, 2011	-	- Add ±0.5% tolerance for RC0201
			- Add new taping reel code of 7 inch dia. reel with 1.5 \times standard quantity (15,000 units per reel)
			- 10" taping reel removed
Version 7	Jan 06, 2011	-	- Typo updated
Version 6	Apr 27, 2010	-	- Updated test items and methods
			- Add new taping reel code of 7 inch dia. reel with double standard quantity (20,000 units per reel)
Version 5	Nov 10, 2009	-	- Test items and methods updated
			- Test requirements upgraded
			- Resistance range extend
Version 4	Jul 15, 2008	-	- Description of "Halogen Free Epoxy" added
			- Define global part number
Version 3	Apr 25, 2007	-	- New datasheet for 0201 thick film 1% and 5% with lead-free terminations
			- Replace the 0201 part of pdf files: Pu-RC0201_51_PbFree_L_2 and Yu-RC0201_51_PbFree_L_2
			- Max. working voltage, resistance rage, and TCR updated
			- Tests and Requirements updated
Version 2	Sep 03, 2004	-	- New datasheet for 0201 thick film 1% and 5% with lead-free terminations
			- Replace the 020 I part of pdf files: RC4 I_5_4, RC42_I_I
			- Test method and procedure updated
			- PE tape added (paper tape will be replaced by PE tape)

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