

DATA SHEET

GENERAL PURPOSE CHIP RESISTORS

 $\begin{array}{c} RC_L \; series \\ \pm 0.1\%, \; \pm 0.5\%, \; \pm 1\%, \; \pm 5\% \\ \mbox{Sizes } 0075/0100/0201/0402/0603/0805/ \\ 1206/1210/1218/2010/2512 \end{array}$

RoHS compliant & Halogen free



YAGEO Phícomp



Chip Resistor Surface Mount

SERIES 0075 to 2512

<u>SCOPE</u>

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_L

RC XXXX X X X XX XXXX L

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

(I) SIZE

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

(2) TOLERANCE

(1)

 $B = \pm 0.1\%$

 $D = \pm 0.5\%$

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F = \pm 1.0\%
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 $J = \pm 5.0\%$ (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
- 10=10 inch dia. Reel
- 13=13 inch dia. Reel
- 7W = 7 inch dia. Reel & 2 x standard power
- 7N = 7 inch dia. Reel, ESD safe reel (0075/0100 only)

3W = 13 inch dia. Reel & 2 × standard power

(6) RESISTANCE VALUE

There are $2 \sim 4$ digits indicated the resistance value.

Letter R/K/M is decimal point

Example:

 $97R6 = 97.6\Omega$

9K76 = 9760Ω

 $IM = I,000,000\Omega$

(7) DEFAULT CODE

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

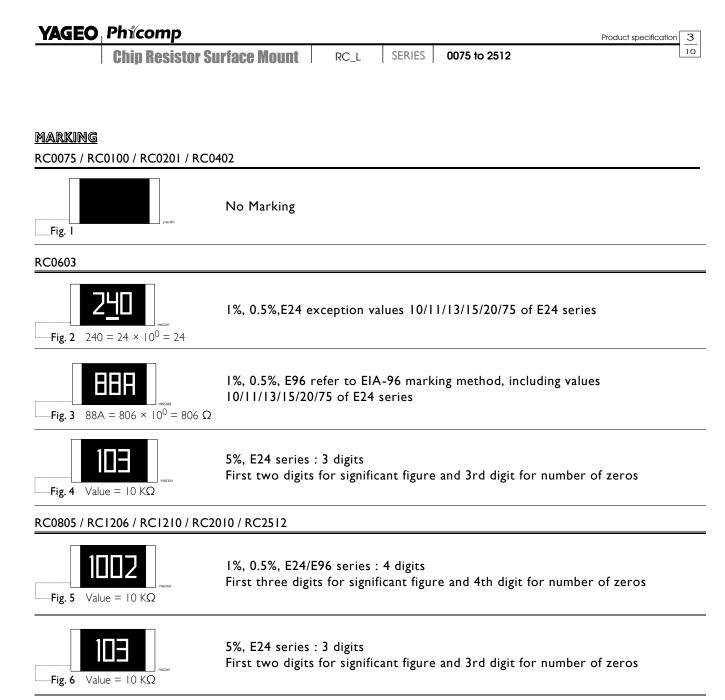
ORDERING EXAMPLE

The ordering code for a RC0402 0.0625W chip resistor value $100K\Omega$ with

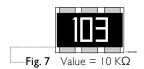
 $\pm 5\%$ tolerance, supplied in 7-inch tape reel of 10,000 units per reel is: RC0402JR-07100KL.

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.



RC1218



11112 Fig. 8 Value = 10 KΩ E-24 series: 3 digits, $\pm 5\%$ 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".

Chip Resistor Surface Mount

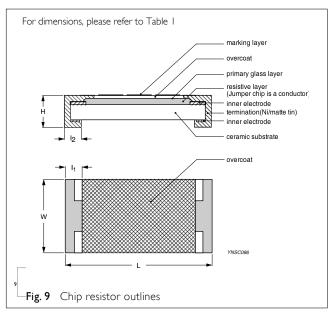
SERIES 0075 to 2512

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 Ni-barrier) are added, as shown in Fig.9.

Outlines

RC_L



DIMENSION

Table I

TYPE	L (mm)	W (mm)	H (mm)	I⊨ (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	0.55±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	0.50±0.20
RC2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.20	0.50±0.20

ELECTRIC	<u>al Cha</u>	RACTERISTIC	<u>35</u>					
CHARAC- TERISTICS	POWER	OPERATING TEMPERATURE RANGE	MAXIMUM WORKING VOLTAGE	MAXIMUM OVERLOAD VOLTAGE	DIELECTRIC WITHSTANDING VOLTAGE	RESISTANCE RANGE	TEMPERATURE COEFFICIENT	JUMPER CRITERIA
RC0075	I/50 W	-55℃ to 125℃	10V	25V	25V	5% (E24) Ι0Ω≦R≦ΙΜΩ Ι% (E24/E96) Ι0Ω≦R≦ΙΜΩ 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℃ to 125℃	157	30V	30V	5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.5% (E24/E96) 33Ω≦R≦470KΩ Jumper<50mΩ	IΩ≦R<10Ω -200~+600ppm°C I0Ω≤ R < 100Ω: ±300ppm/°C I00Ω≤ R ≤ 10MΩ: ±200ppm/°C I0MΩ< R ≤ 22MΩ: ±250ppm/°C	Rated Current 0.5A Maximum Current 1.0A

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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
RC0201	1/20 W	-55℃ to 125℃	25V	50V	50V	5% (E24) ΙΩ≦R≦Ι0ΜΩ Ι% (E24/E96) ΙΩ≦R≦Ι0ΜΩ 0.1%, 0.5% (E24/E96) Ι0Ω≦R≦ΙΜΩ Jumper<50mΩ	IΩ≦R≦I0Ω -100~+350ppm℃ I0Ω <r≦i0mω ±200ppm℃</r≦i0mω 	Rated Current 0.5A Maximum Current 1.0A
RC0402	1/16 W	-55°C to 155°C	50V	100V	1007	5% (E24) ΙΩ≦R≦22ΜΩ Ι% (E24/E96) ΙΩ≦R≦10ΜΩ 0.1%, 0.5% (E24/E96) Ι0Ω≦R≦ΙΜΩ Jumper<50mΩ	IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±100ppm°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℃ to 155℃	75V	150V	150V	5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦I0MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ	IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±100ppm°C I0MΩ<r≦22mω ±200ppm°C</r≦22mω </r≦i0mω 	Rated Current I.0A Maximum Current 2.0A
	1/5 W	-55℃ to 155℃	75V	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≦100MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦1MΩ I0%, 20% (E24) 24MΩ≦R≦100MΩ Jumper<50mΩ	IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±100ppm°C I0MΩ<r≦22mω ±200ppm°C 24MΩ<r≦100mω ±300ppm°C</r≦100mω </r≦22mω </r≦i0mω 	Rated Current 2.0A Maximum Current 5.0A
	I/4 W	-55℃ to 155℃	I 50V	300V	300V	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ	IΩ≦R≦IMΩ ±200ppm°C	

Chip Resistor Surface Mount RC_L

FOOTPRINT AND SOLDERING PROFILES

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

-	TEMPERATURE COEFFICIENT	RESISTANCE RANGE	DIELECTRIC WITHSTANDING VOLTAGE	MAXIMUM OVERLOAD VOLTAGE	MAXIMUM WORKING VOLTAGE	OPERATING TEMPERATURE RANGE	POWER	CHARAC- TERISTICS
°C 2 Maxim Maxim 1Ω Curr °C 10 1Ω 10 1Ω 10 1Ω 10 1Ω 10	IΩ≦R≦10Ω ±200ppm°C I0Ω <r≦10mω ±100ppm°C I0MΩ<r≦22mω ±200ppm°C 24MΩ≦R≦100MΩ ±300ppm°C</r≦22mω </r≦10mω 	5% (E24) IΩ≦R≦100MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦1MΩ I0%, 20% (E24) 24MΩ≦R≦100MΩ Jumper<50mΩ	500∨	400∨	200V	-55℃ to 155℃	1/4 W	RC1206
	IΩ≦R≦IMΩ ±200ppm°C	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ	500V	400V	200V	-55℃ to 155℃	1/2 W	
°C 2 Μaxim 1Ω Curr °C 10 1Ω	IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±100ppm°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	500V	500V	200V	-55°C to 155°C	1/2 W	RC1210
ι°C 6 1Ω Maxim	IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦imω ±I00ppm°C</r≦imω 	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ	500V	500V	200V	-55°C to 155°C	IW	RC1218
°C 2 1Ω Maxim °C Curr 1Ω 10	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	500V	500V	200V	-55℃ to 155℃	3/4 W	RC2010
°C 2 1Ω Maxim °C Curr 1Ω 10	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≦1MΩ Jumper<50mΩ	500V	500V	2007	-55℃ to 155℃	I W	RC2512
	IΩ≦R≦IMΩ ±200ppm°C	5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ	500V	400V	200V	-55℃ to 155℃	2 W	

Chip Resistor Surface Mount

SERIES 0075 to 2512

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

PACKING STYLE	PAPER TAPINO	G REEL (R)		ESD SAFE REEL (S) (4MM WIDTH, IMM PITCH PLASTIC EMBOSSED)	EMBOSSED TAPING REEL
REEL DIMENSION	7" (178 mm)	10" (254mm)	13" (330 mm)	7" (178 mm)	7" (178 mm)
RC0075				20000	
RC0100	20000		80000	40000	
RC0201	10000	20000	50000		
RC0402	10000	20000	50000		
RC0603	5000	10000	20000		
RC0805	5000	10000	20000		
RC1206	5000	10000	20000		
RC1210	5000	10000	20000		
RC1218					4000
RC2010					4000
RC2512					4000

RC_L

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. 10-1) RC0075 to RC0201 Range: -55°C to +125°C (Fig. 10-2)

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:

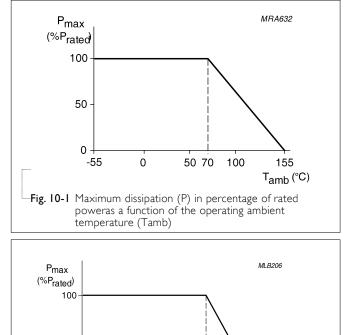
$$V = \sqrt{(P \times R)}$$

or max. working voltage whichever is less Where

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

P = Rated power (W)

 $R = Resistance value (\Omega)$



50-0-55 0 50 70 100 125 Tamb^(°C) Fig. 10-2 Maximum dissipation (P) in percentage of rated poweras a function of the operating ambient temperature (Tamb)

Chip Resistor Surface MountRC_LSERIES0075 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	Refer to table 2
		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	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	$\begin{array}{l} 0075: \pm (5\% + 100 \text{m}\Omega) \\ < 100 \text{m}\Omega \text{ for jumper} \\ 01005: \pm (3\% + 50 \text{m}\Omega) \\ < 100 \text{m}\Omega \text{f or jumper} \\ \text{Others:} \\ \pm (1\% + 50 \text{m}\Omega) \text{ for B/D/F tol} \\ \pm (3\% + 50 \text{m}\Omega) \text{ for J tol} \\ < 100 \text{mR for jumper} \end{array}$
High Temperature Exposure	MIL-STD-202 Method 108A IEC 60068-2-2	I,000 hours at maximum operating temperature depending on specification, unpowered.	$\begin{array}{l} 0075: \pm (5\% + 100 \text{m}\Omega) \\ < 100 \text{m}\Omega \text{ for jumper} \\ 01005: \pm (1\% + 50 \text{m}\Omega) \\ < 50 \text{m}\Omega \text{f or jumper} \\ \end{array} \\ \begin{array}{l} \text{Others:} \\ \pm (1\% + 50 \text{m}\Omega) \text{ for B/D/F tol} \\ \pm (2\% + 50 \text{m}\Omega) \text{ for J tol} \end{array}$
Moisture	MIL-STD-202 Method 106G	Each temperature / humidity cycle is defined at	<50mR for jumper 0075: ± (2%+100mΩ)
Resistance		8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H, without steps	$ \begin{array}{l} < 100 \text{m}\Omega \text{ for jumper} \\ 01005: \pm (2\% + 50 \text{m}\Omega) \\ < 100 \text{m}\Omega \text{f or jumper} \end{array} $
		7a & 7b, unpowered Parts mounted on test-boards, without condensation on parts	Others: \pm (0.5%+50m Ω) for B/ D/F tol \pm (2%+50m Ω) 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	$\begin{array}{l} 0075:\pm(5\%+100m\Omega)\\ \text{no visible damage}\\ 01005:\pm(3\%+50m\Omega)\\ <100m\Omega\text{f or jumper} \end{array}$
			Others: ±(1%+50mΩ) for B/D/F tol ±(2%+50mΩ) for J tol <100mR for jumper

Chip Resistor Surface Mount RC_L SEF

SERIES 0075 to 2512

Thermal Shock	MIL-STD-202 Method 107G	-55/+125°C Note Number of cycles required is 300. Devices mounted	0075/01005: ±(1% +50mΩ) < 50mΩf or jumper Others:
		Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air - Air	$\pm (0.5\%+50 \text{m}\Omega) \text{ for B/D/F tol}$ $\pm (1\%+50 \text{m}\Omega) \text{ for J tol}$ < 50 mR 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	0075/01005: ±(2% +50mΩ) < 50mΩf or jumper Others: ±(1%+50mΩ) for B/D/F tol ±(2%+50mΩ) for J tol <50mR for jumper No visible damage
Board Flex/ Bending	IEC 60115-1 4.33	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	0075/01005: ±(1% +50mΩ) < 50mΩf or jumper Others: ±(1%+50mΩ) for B/D/F/J tol <50mR for jumper No visible damage
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, $260^{\circ}C \pm 5^{\circ}C$, 10 ± 1 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	$\begin{array}{c} 0075: \pm (3\% + 50 \text{m}\Omega) \\ < 50 \text{m}\Omega \text{ for jumper} \\ 01005: \pm (1\% + 50 \text{m}\Omega) \\ < 50 \text{m}\Omega \text{f or jumper} \\ \end{array} \\ \begin{array}{c} \text{Others:} \\ \pm (0.5\% + 50 \text{m}\Omega) \text{ for B/D/F tol.} \\ \pm (1\% + 50 \text{m}\Omega) \text{ for J tol.} \\ < 50 \text{mR for jumper} \\ \end{array} \\ \begin{array}{c} \text{No visible damage} \end{array}$

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	Chip Resistor Surface Mount	RC_L	SERIES	0075 to 2512	10

<u>REVISION HISTORY</u>

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 9	Mar. 06, 2018	-	- Add 0.5%/1% marking rule for RC0603 ~ RC2512 based on marking datasheet
Version 8	July 10, 2017	-	- Add "3W" part number coding for 13" Reel & double power
Version 7	Mar. 7, 2017	-	- Add 10" packing
Version 6	Feb.15, 2017	-	- Extend RC0805 and RC1206 resistance range to 100Mohm
Version 5	Oct. 06, 2016	-	- Description: Update Dimension of I2 of RC2512 (2W)
Version 4	Jan. 22, 2016	-	- update resistance range
Version 3	Dec. 24, 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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 CR-05FL7--243R
 CR-05FL7--40K2
 CR-05FL7--698K
 CR-12FP4--324R
 CR-12JP4--680R

 M55342K06B1E78RS3
 M55342K06B6E19RWL
 M55342K06B6E81RS3
 M55342M05B200DRWB
 M55342M06B4K70MS3
 MC0603-511

 JTW
 742C083750JTR
 MCR01MZPF1202
 MCR01MZPF1601
 MCR01MZPF1800
 MCR01MZPF6201
 MCR01MZPF9102
 MCR01MZPJ113

 MCR01MZPJ121
 MCR01MZPJ125
 MCR01MZPJ751
 MCR03EZHJ103
 MCR03EZPFX2004
 MCR03EZPJ270
 MCR03EZPJ821

 MCR10EZPF1102
 MCR18EZPJ330
 RC0603F1473CS
 RC0603F150CS
 RC1005F1152CS
 RC1005F182CS
 RC1005F1372CS

 RC1005F183CS
 RC1005F1911CS
 RC1005F1912CS
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 RC1005F5621CS
 RC1005F5621CS
 RC1005F6041CS
 RC1005F5621CS