Towards Excellence in *Quality, Service & Innovation*

ASJ

DATA SHEET

General Purpose Thick Film Chip Resistor

CR Series

0.1% TO 5%, TCR -200 TO +400

Size : 0201

RoHS Compliant

Product Specification –Aug. 13, 2024 v7

1. SCOPE

1.1 This specification is applicable to Lead-free and Halogen-free of RoHS directive for CR series thick film chip resistors.

1.2 The product is for general electronics purpose.

2. PART NUMBERING SYSTEM

Part Numbering is made in accordance with the following system:

CR	05	-	100			-	J	K
Type	**Size(Inch/mm)**		**Nominal Resistance**				**Resistance Tolerance**	**Packaging**
General Purpose Thick Film Chip Resistors	05 (0201/0603)		Resistors	2% 5% (3-Digit)	E24 Series 10Ω=100 4.7Ω=4R7		B=±0.1% D=±0.5% F=±1% G=±2% J=±5% Z=Zero Ohm	K=10,000 pcs Lead Free Y=20,000 pcs Lead Free N=50,000 pcs Lead Free
				0.1% 0.5% 1% (4-Digit)	E96 Series 10.2Ω=10R2 10KΩ=1002			
			Jumper		000			

3. RATING

3.1 Rated Power

3.1.1 Resistor Rated Power

Type	Rated Power at 70℃	Max. Working Voltage	Max. Overload Voltage	JUMPER Rated Current	JUMPER Resistance Value
CR05 (0201)	$\frac{1}{20}$W	25V	50V	0.5A	50mΩ MAX.

3.2 Power Derating Characteristics

Rated Power shall be the load power corresponding to nominal wattage suitable for continuous use at 70°C ambient temperatures. In case the ambient temperature exceeds 70°C, reduce the load power in accordance with Derating curve in Fig. 1.

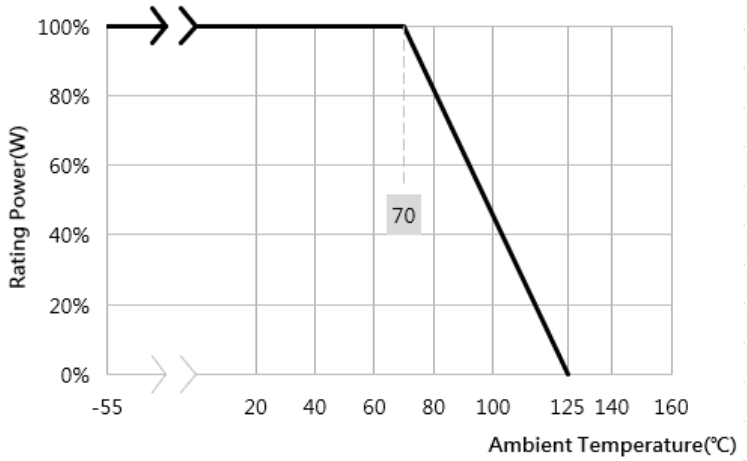


Fig.1 Power Derating Characteristics

3.3 Standard Atmospheric Condition

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

Ambient Temperature	= + 5°C to +35°C
Relative Humidity	= < 85% RH
Air Pressure	= 86 kPa to 106kPa

If there may be any doubt about the results, measurement shall be made within the following limits:

Ambient Temperature	= 20 ± 2°C
Relative Humidity	= 60 to 70% RH
Air Pressure	= 86 kPa to 106kPa

3.4 Operating Temperature Range -55°C to +125°C

3.5 Storage Temperature Range -5°C to + 40°C / < 85% RH

3.6 Flammability Rating Tested in accordance to UL-94, V-0

3.7 Moisture Sensitivity Level Rating: Level 1

3.8 Product Assurance
ASJ resistor shall warranty 24 months from manufacturing date with control conditions.

3.9 ASJ resistors are RoHS-compliant in accordance to RoHS Directive.

3.10 Resistance, Resistance Tolerance and Temperature Coefficient of Resistance.

Type	Rated Power at 70℃	Max. Working Voltage	Max. Overload Voltage	T.C.R (ppm/℃)	Resistance Range				JUMPER Rated Current	JUMPER Resistance Value
					B(±0.1%) E-24、E-96	D(±0.5%) E-24、E-96	F(±1%) E-24、E-96	G(±2%)、J(±5%) E-24		
CR05 (0201)	1/20W	25V	50V	-200 +400	------	1Ω≦R < 10Ω	1Ω≦R < 10Ω	1Ω≦R < 10Ω	0.5A	50mΩ MAX..
				±200	47Ω≦R≦1MΩ	10Ω≦R≦ 10MΩ	10Ω≦R≦10MΩ	10Ω≦R≦10MΩ		

3.11 Rated Voltage

The resistor shall have a DC continuous working voltage or a rms. AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined from the following :

$$E = \sqrt{R \times P}$$

E= Rated voltage (v)
P= Power rating (w)
R= Nominal resistance(Ω)

3.12 All product, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise.

4. MARKING ON PRODUCT

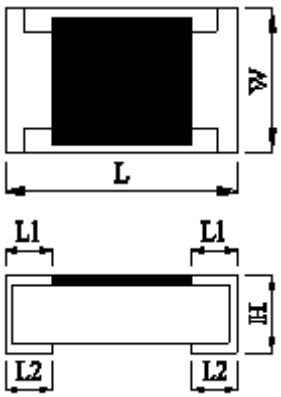
The nominal resistance shall be marked on the surface of each resistor.

Type	Resistance Range	Tolerance≤1%	Tolerance＞1%
Sizes: CR05(0201)	All	No Marking	

Marking	Description
	No Marking - CR05

5. DIMENSION, CONSTRUCTION AND MATERIAL

5.1 Dimension

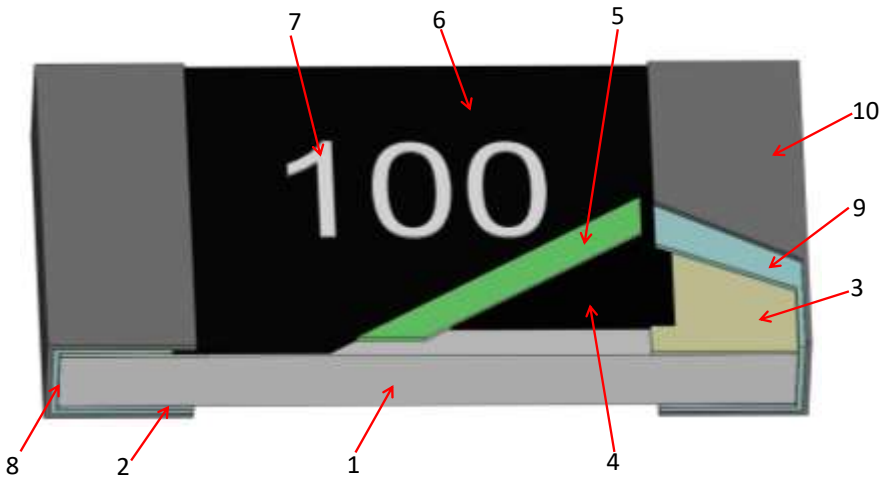


Unit:mm

Type \ Dimension / Size Code	L	W	H	L1	L2
CR05 / 0201	0.60±0.03	0.30±0.03	0.23±0.03	0.10±0.05	0.15±0.05

** Measurement accuracy within ±0.02mm from the product specification.*

5.2 Structure Graph



1	Ceramic substrate	6	2nd Protective coating
2	Bottom inner electrode	7	Marking
3	Top inner electrode	8	Terminal inner electrode
4	Resistive layer	9	Ni plating
5	1st Protective coating	10	Sn plating

5.3 Plating Thickness

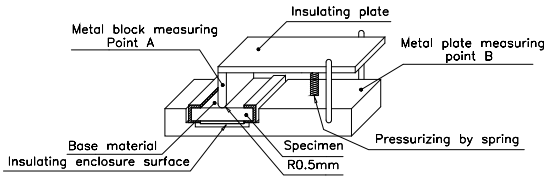
Ni : ≧ 2 µm

Sn(Tin) : ≧ 3 µm

Sn(Tin) : Matte Sn

6. RELIABILITY TEST

6.1 Electrical Performance Test

Item	Conditions	Specifications	
		Resistors	Jumper
Temperature Coefficient of Resistance	$TCR(ppm/^{\circ}C) = \frac{(R2-R1)}{R1(T2-T1)} x10^6$ R1: Resistance at room temperature R2: Resistance at -55℃ or +125℃ T1: Room temperature T2: Temperature -55℃ or +125℃ Refer to JIS-C5201-1 4.8	Refer to item 3.10	NA
Short Time Overload	Applied 2.5 times rated voltage for 5 seconds and release the load for about 30 minutes, then measure its resistance variance rate. (Rated voltage refer to item 3.10 general specifications) Refer to JIS-C5201-1 4.13	0.1%、0.5%、1%:△R%=±1.0% 2%、5%:△R%=±2.0%	Refer to item 3. general specifications
Insulation Resistance	Put the resistor in the fixture, add 100 VDC in + ,- terminal for 60 sec then measured the insulation resistance between electrodes and insulating enclosure or between electrodes and base material. Refer to JIS-C5201-1 4.6  	≧$10^9\Omega$	
Dielectric Withstand Voltage	Put the resistor in the fixture, add VAC (see SPEC below) in +,- terminal for. CR05 apply 300 VAC 1 minute. Refer to JIS-C5201-1 4.7	No short or burned on the appearance.	
Intermittent Overload	Put the tested resistor in chamber under temperature 25±2℃ and load 2.5 times rated DC voltage for 1 sec on, 25 sec off, $10{,}000^{+400}_{-0}$ test cycles, then it be left at no-load for 1 hour , then measure its resistance variance rate. Jumper : Applied Maximum overload current Type / Jumper: CR05 (0201) ±5%: 1.25A ±1: 1.25A Refer to JIS-C5201-1 4.13	△R%=±5.0%	Refer to item 3.10

6.2 Mechanical Performance Test

<table>
<tr><th rowspan="2">Item</th><th rowspan="2">Conditions</th><th colspan="2">Specifications</th></tr>
<tr><th>Resistors</th><th>Jumper</th></tr>
<tr><td>Terminal Strength</td><td>Test 1 : The resistor mounted on the board applied 5N pushing force on the sample rear for 10 sec. (CR05:3N)
Test 2 : The resistor mounted on the board slowly add force on the sample rear until the sample termination is breakdown.

Refer to JIS-C5201-1 4.16</td><td colspan="2">Test 1 : No evidence of mechanical damage.
Test 2 : CR05≧3N</td></tr>
<tr><td>Resistance to Solvent</td><td>The tested resistor be immersed into isopropyl alcohol of 20~25℃ for 5 minutes, then the resistor is left in the room for 48 hrs, and measured its resistance variance rate.

Refer to JIS-C5201-1 4.29</td><td><table><tr><td>Type</td><td>CR05</td></tr><tr><td>△R%</td><td>△R%=±1.0%</td></tr></table></td><td>Refer to item 3.10</td></tr>
<tr><td>Solderability</td><td>Preconditioning
Put the tested resistor in the apparatus of PCT, at a temperature of 105℃, humidity of 100% RH, and pressure of 1.22×10^5 Pa for a duration of 4 hours. Then after left the tested resistor in room temperature for 2 hours or more.
Test method:
The resistor be immersed into solder pot in temperature 235±5℃ for 2 sec, then the resistor is left as placed under microscope to observed its solder area.

Refer to JIS-C5201-1 4.17</td><td colspan="2">Solder coverage over 95%</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>◎Test method 1 (Solder pot test):
The tested resistor be immersed into molten solder of 260^{+5}_{-0} ℃ for 10 seconds. Then the resistor is left in the room for 1 hour.

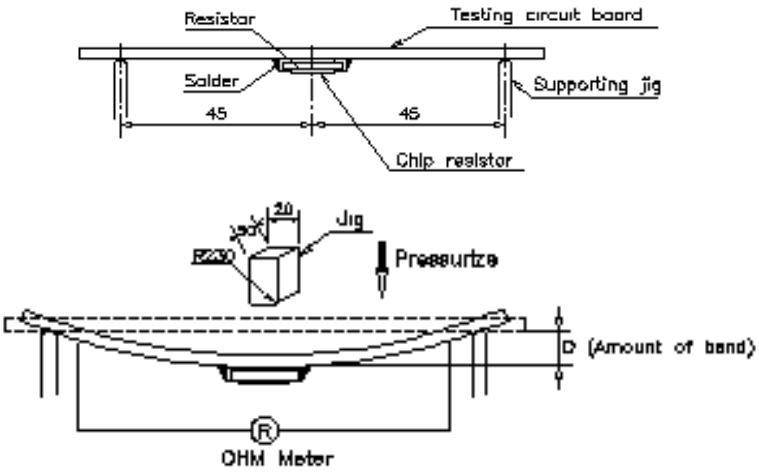
◎Test method 2 (Solder pot test):
The tested resistor be immersed into molten solder of 260^{+5}_{-0} ℃ for 30 seconds. Then the resistor is left as placed under microscope to observe its solder area.

◎Test method 3 (Electric iron test):
Preheating temperature : 350±10℃
Electric iron preheating time : 3^{+1}_{-0} sec
Preheating the electric iron on electrode termination, as after that step placed the iron over 60 min. and measured its resistance variance rate.

Refer to JIS-C5201-1 4.18</td><td>Test item 1:
(1).Variance rate on resistance
△R%=±1.0%

Test item 2:
(1).Solder coverage over 95%.
(2).The underlying material (such as ceramic) shall not be visible at the crest corner area of the electrode.

Test item 3:
(1).Variance rate on resistance
△R%=±1.0%</td><td>Refer to item 3.10</td></tr>
</table>

Item	Conditions	Specifications	
		Resistors	Jumper
Joint Strength of Solder	◎Bending Strength Solder tested resistor on to PC board add force in the middle down, and under load measured its resistance variance rate. D:CR05=3mm  Refer to JIS-C5201-1 4.33	△R%=±1.0%	Refer to item 3.10

6.3 Environmental Test

<table>
<tr><th rowspan="2">Item</th><th rowspan="2">Conditions</th><th colspan="2">Specifications</th></tr>
<tr><th>Resistors</th><th>Jumper</th></tr>
<tr><td>Resistance to Dry Heat</td><td>Put tested resistor in chamber under temperature 155±5℃ for 1000^{+48}_{-0} hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.(CR05 for 125±3℃)

Refer to JIS-C5201-1 4.25</td><td>0.1%、0.5%、1%:△R%=±1.0%
2%、5%:△R%=±2.0%</td><td>Refer to item 3.10</td></tr>
<tr><td>Thermal Shock</td><td>Put the tested resistor in the chamber under the Thermal Shock which shown in the following table shall be repeated 300 times consecutively. Then leaving the tested resistor in the room temperature for 1 hours, and measure its resistance variance rate.
<table>
<tr><th colspan="2">Testing Condition</th></tr>
<tr><td>Lowest Temperature</td><td>-55±5℃</td></tr>
<tr><td>Highest Temperature</td><td>125±5℃</td></tr>
<tr><td>Temperature-retaining time</td><td>15 minutes each</td></tr>
</table>
Refer to MIL-STD 202 Method 107</td><td>0.1%、0.5%、1%:△R%=±0.5%
2%、5%:△R%=±1.0%</td><td>Refer to item 3.10</td></tr>
<tr><td>Loading Life in Moisture</td><td>Put the tested resistor in the chamber under temperature 40±2℃, relative humidity 90~95% and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.

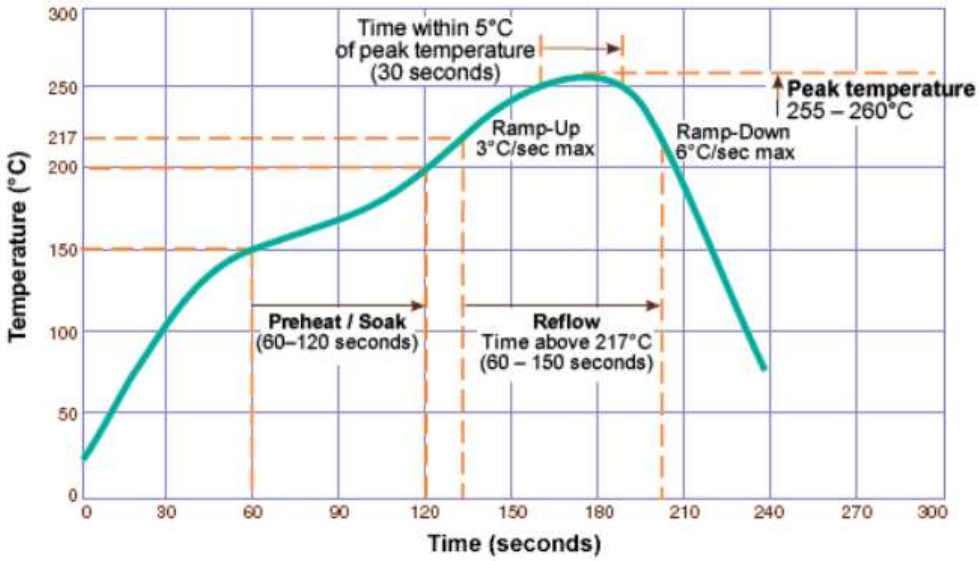
Refer to JIS-C5201-1 4.24</td><td>
<table>
<tr><td>Type</td><td>CR05</td></tr>
<tr><td>Range</td><td>1%:
△R%=±1.0%
5%:
△R%=±3.0%</td></tr>
</table>
</td><td>Refer to item 3.10</td></tr>
<tr><td>Load Life</td><td>Put the tested resistor in chamber under temperature 70±2℃ and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.

Refer to JIS-C5201-1 4.25</td><td>
<table>
<tr><td>Type</td><td>CR05</td></tr>
<tr><td>Range</td><td>1%:
△R%=±1.0%
5%:
△R%=±3.0%</td></tr>
</table>
</td><td>Refer to item 3.10</td></tr>
</table>

6.4 Recommended Soldering Method

Technical application notes: This is for recommendation, customer please perform adjustment according to actual application.

6.4.1 Lead-Free IR Reflow Soldering Profile (MEET J-STD-020)



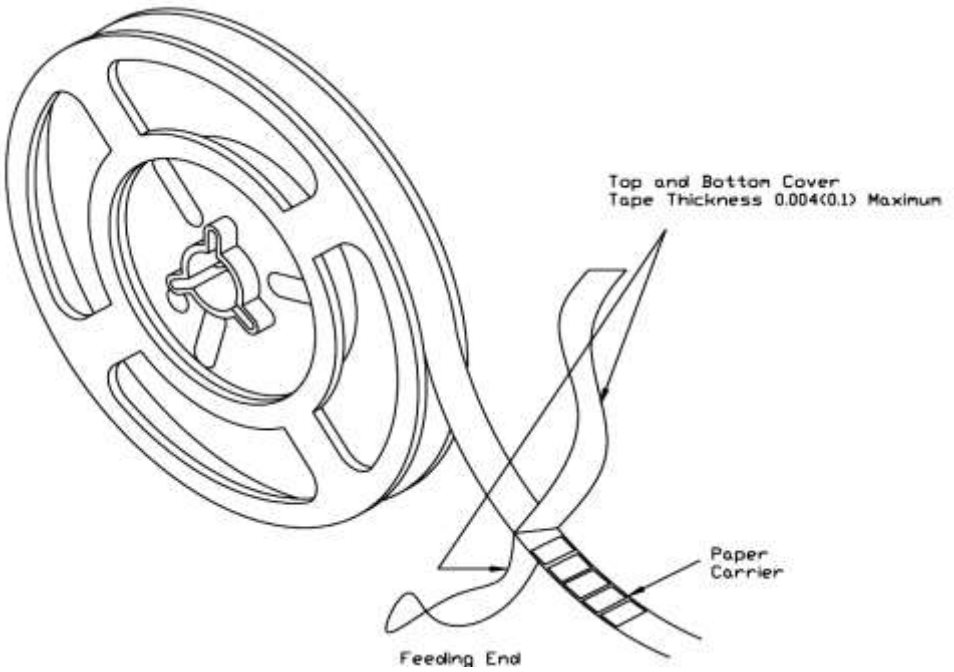
Remark: The peak temperature of soldering heat is 260^{+5}_{-0} ℃ for 10 seconds

6.4.2 Soldering Iron: Temperature 350℃±10℃, dwell time shall be less than 3 sec

7. TAPING

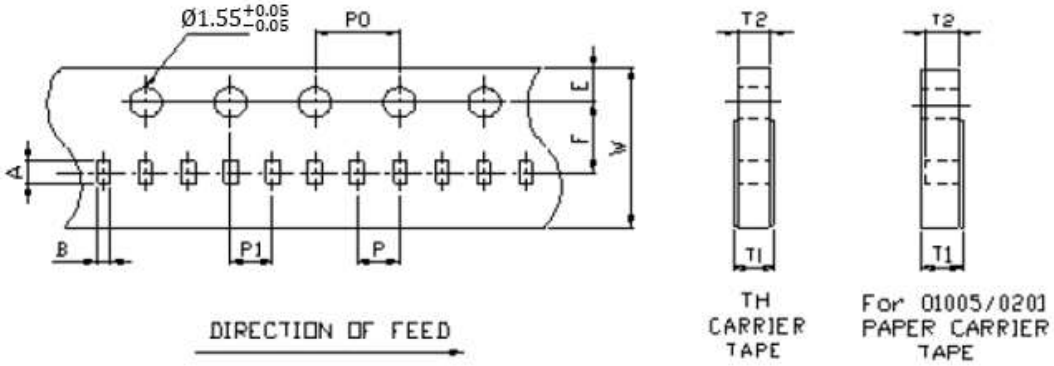
7.1 Structure of Taping

Paper Carrier



7.2 Dimension

7.2.1 Dimension of Punched Paper Tape Carrier System (CR -05)



Remark: Pitch tolerance over any 10 pitches of Po is ± 0.2 mm

Dimension of Punched Paper Tape Carrier System (CR-05)

(Unit : mm)

Code	A	B	W	E	F	T1
CR05	0.68±0.02	0.38±0.02	8.00±0.10	1.75±0.05	3.50±0.05	0.42±0.02

Code	T2	P	P0	10xP0	P1
CR05	0.28±0.02	2.00±0.05	4.00±0.10	40.0±0.20	2.00±0.05

7.3 Packaging

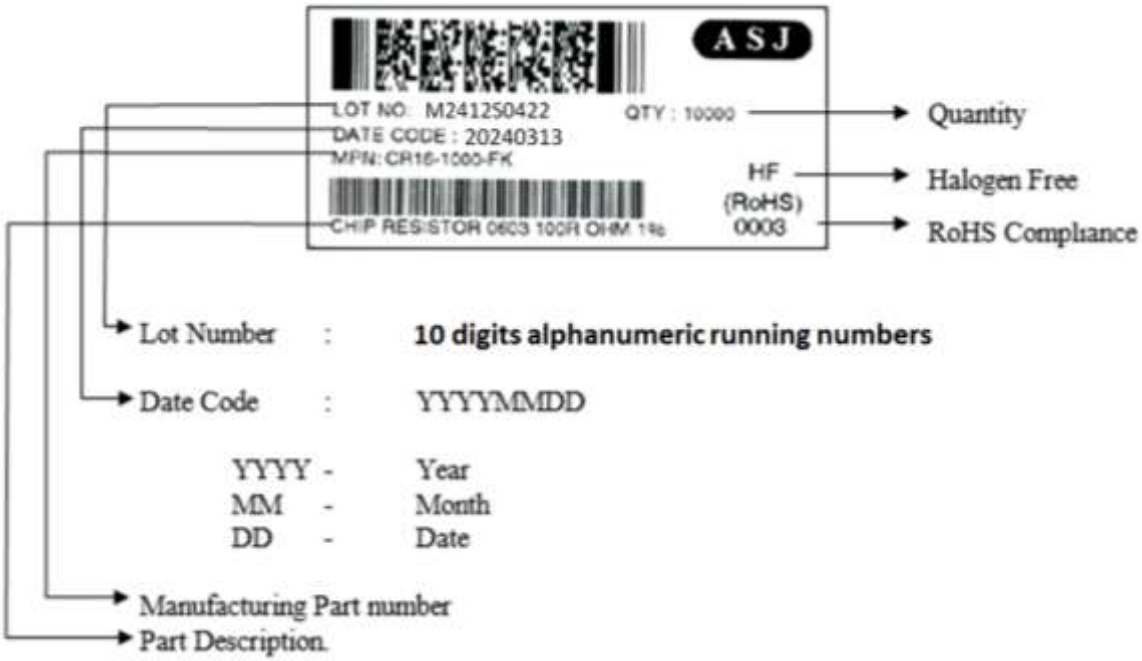
7.3.1 Taping

Quantity – Tape and Reels

Code	Quantity	Model	Remarks
CR05	10,000 pcs	7" Reel	2mm pitch
	20,000 pcs	7" Reel	2mm pitch
	50,000 pcs	13" Reel	2mm pitch

7.3.2 Identification

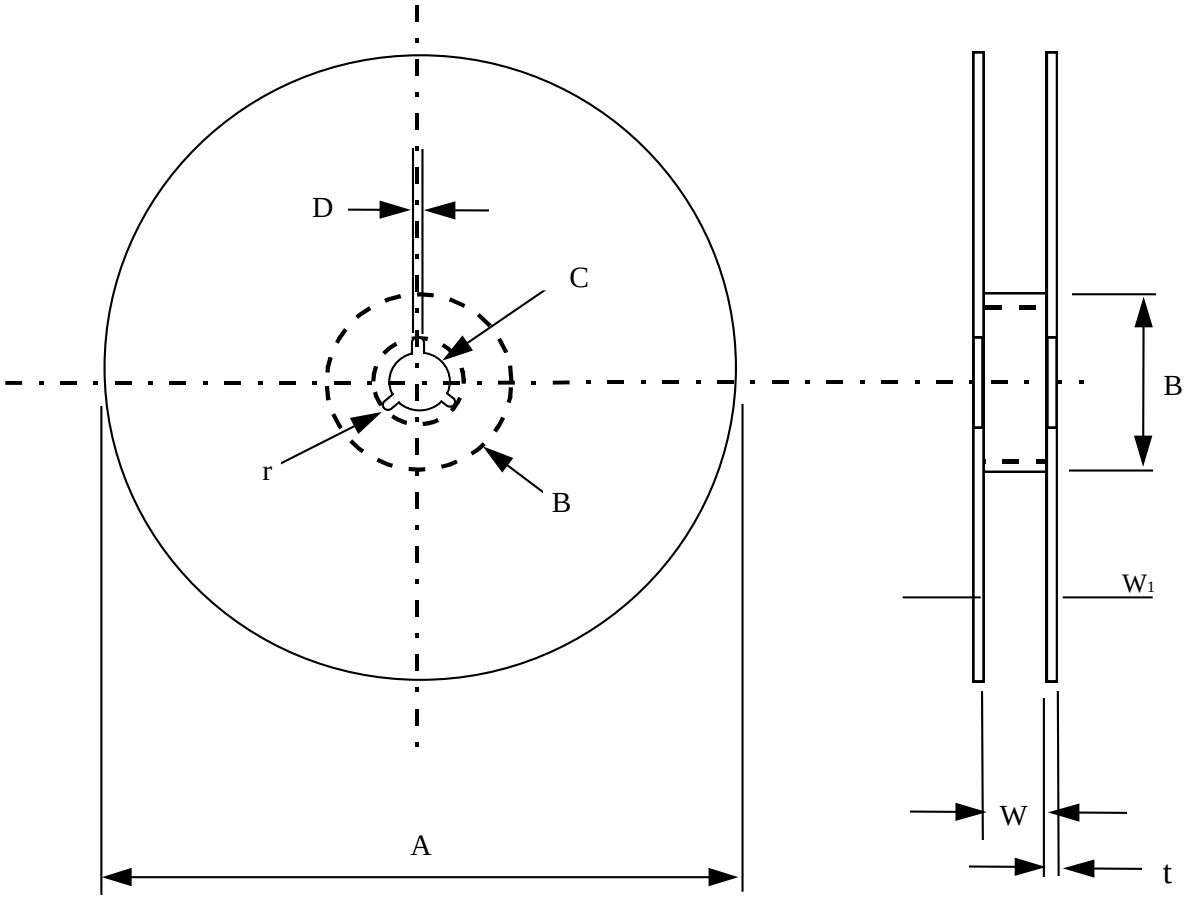
Production label that indicates the 10 digits lot number, product type, resistance value and tolerance shall be pasted on the surface of each reel.



7.3.3 Packaging Reel Box

Dimension	Reel Box	Number of Reels
185 × 60 × 186 mm	25K Box	5
185 × 120 × 186 mm	50K Box	10

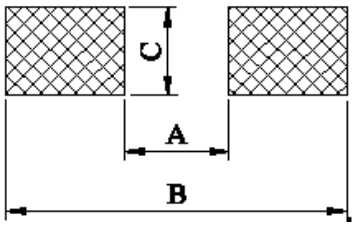
7.3.4 Reel Dimension



Model	A	B	C	D	W	W_1	t	r
7"Reel (5K) (except 0402 10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
7"Reel (4K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	13±1.0	14.4 max	1.2± 0.1	1.0
7''Reel (10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
10"Reel (10K)	ϕ254±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	1.5± 0.1	1.0
13"Reel (20K, 50K)	ϕ330±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	2.1± 0.1	-
13"Reel (20K)	ϕ330±1.0	ϕ100±1	13.5±0.5	2~3±0.5	10±0.5	-	-	-

8. SURFACE MOUNT LAND PATTERNS DESIGN (FOR REFLOW SOLDERING)

When a component is soldered, the resistance after soldering changes slightly depending on the size of the soldering area and the amount of soldering. When designing a circuit, it is necessary to consider the effect of a decrease or increase in its resistance.

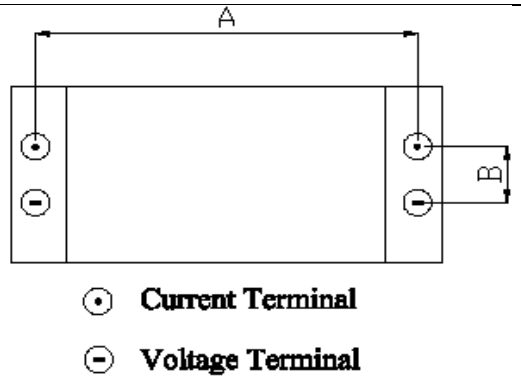


Unit:mm

TYPE \ DIM	A	B	C
CR05	0.3	1.0	0.4

9. MEASUREMENT POINT

Bottom electrode



Unit : mm

TYPE \ DIM	A	B
CR05	0.44±0.05	0.22±0.05

10. REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version.1	28.03.2019		Initial Release
Version.2	10.10.2019		1、Revise clause 3.1.1resistor rated power table 2、Revise clause 3.9
Version.3	05.12.2019		Revise clause 3.5
Version.4	08.04.2021		Add clause 1.2 Revise clause 2 Part numbering system Revise clause 4 Marking on product Revise clause 5.2 Structure graph Revise clause 7.2.1 Tape dimension
Version.5	10.02.2022		Revise clause 2 Part Numbering System Revise clause 3.1.1 Resistor Rated Power Revise clause 3.10 TCR Table Revise clause 6.1.1 Reflow soldering profile Delete clause 6.1.2 double wave soldering profile
Version.6	01.09.2022		Revise clause 3.8 Product Assurance
Version 7	13.08.2024		Revise clause 5.1 Dimension table. Revise clause 6.4.1 profile graph. Revise clause 7.3.2 Identification.