

### Features

- Low Noise
- Nickel Barrier Terminations

### Application

- General Purpose

### How to Order

CR 05 - 472 J - H

① ② ③ ④ ⑤

- ① Series  
CR : Resistor  
CJ : Jumper
- ② Size(EIA)

03	0201	05	0402
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- ③ Resistance Value(3 digits or 4 digits)  
Ex. 562 :  $56 \times 10^2 = 5600\Omega$   
4021 :  $402 \times 10^1 = 4020\Omega$   
Chip Jumper : 000

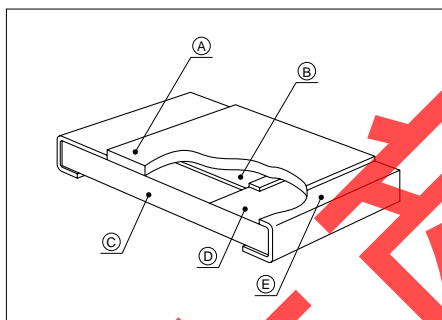
- ④ Tolerance

J	±5%	Blank	Jumper chips
F	±1%		

- ⑤ Packaging

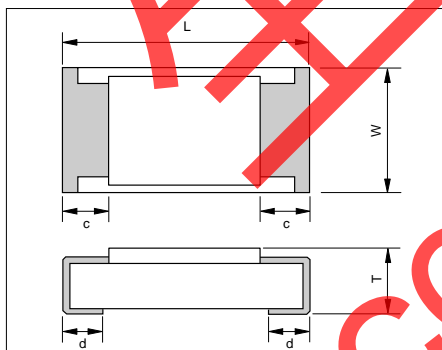
H	Taping	Paper	φ178	2mm	10,000pcs
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### Structure and material



Code	Structure	Material
(A)	Coating	Glass or Resin
(B)	Resistor	RuO <sub>2</sub> Resistor (The same material of Termination for chip jumper)
(C)	Substrate	96% Alumina
(D)	Termination	Silver
(E)	Plating	(Ni, Sn) Pla.

### Dimensions



(Unit : mm)

Type(EIA Size)	W	L	c	d	T
CR03, CJ03(0201)	0.30±0.03	0.60±0.03	0.15±0.10	0.15±0.05	0.23±0.03
CR05, CJ05(0402)	0.50±0.05	1.00±0.05	0.20±0.15	0.20±0.10	0.35±0.05

### Specifications

Series	Rated Power	Max. Working Voltage	Resistance Tolerance	Resistance Value Range	Working Temperature
CR03(0201)	0.05(1/20)W	15V	J: ±5%	10Ω to 1MΩ	-55 to +125°C
CR05(0402)	0.0625(1/16)W	50V	F: ±1% J: ±5%	10Ω to 1MΩ 1.0Ω to 10MΩ	

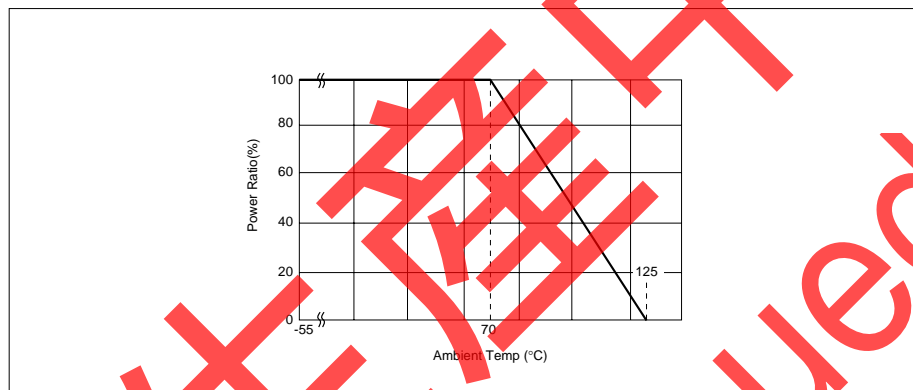
### Specifications

• CJ series

Part Number	Rated Current	Resistivity	Working Temperature
CJ03 (0201 Type)	0.5A(70°C)	50mΩmax	-55 to +125°C
CJ05 (0402 Type)	1A(70°C)		

### Derating Curve

Rated power should be reduced as below when temperature become higher.  
Under high temperature, power derated as follows:



### How to Calculate Rated Voltage

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

E : Rated Voltage (V)

P : Rated Power (W)

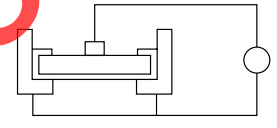
R : Standard Resistance Value (Ω)

Rated voltage should be lower than max working voltage.

### Standard Resistance Value

E24	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2
	2.4	2.7	3.0	3.3	3.6	3.9	4.3	4.7	5.1
	5.6	6.2	6.8	7.5	8.2	9.1			

Electrical Characteristics

Item	Standard		Test Conditions									
	Resistor	Jumper	Resistor	Jumper								
DC Resistance	Within Initial Tolerance		Power Condition A (20°C, 65%RH)									
Temperature Characteristics	<table border="1"> <thead> <tr> <th>Resistance(Ω)</th> <th>TCR(ppm/°C)</th> </tr> </thead> <tbody> <tr> <td>R &lt; 10</td> <td>-100 to +600</td> </tr> <tr> <td>10 ≤ R ≤ 1M</td> <td>-250 to +250</td> </tr> <tr> <td>1M &lt; R</td> <td>-500 to +300</td> </tr> </tbody> </table>		Resistance(Ω)	TCR(ppm/°C)	R < 10	-100 to +600	10 ≤ R ≤ 1M	-250 to +250	1M < R	-500 to +300	Test Temperature: 25, 125(°C) $\Delta R/R = R_2 - R_1 / R_1 \times 1 / T_2 - T_1 \times 10^6$ $\Delta R/R$ : Temp. Coefficient (ppm/°C) T <sub>1</sub> : 25(°C) T <sub>2</sub> : 125(°C) R <sub>1</sub> : T <sub>1</sub> Resistance at (Ω) R <sub>2</sub> : T <sub>2</sub> Resistance at (Ω)	
Resistance(Ω)	TCR(ppm/°C)											
R < 10	-100 to +600											
10 ≤ R ≤ 1M	-250 to +250											
1M < R	-500 to +300											
Short-time Overload	ΔR/R	±(2.0%+0.10Ω)max of the initial value	50mΩmax	(1) Apply 2.0×rated voltage for 5sec. (2.5×rated voltage for Arrays) (2) Wait 30minutes (3) Measure resistance CR03: 30Vmax CR05: 50Vmax								
	Visual	No evidence of mechanical damage intermittent overload			(1) 2A for 5sec. (CJ03: 1A) (2) Wait 30minutes (3) Measure resistance							
Intermittent Overload	ΔR/R	±(5%+0.1Ω)max of the initial value	50mΩmax	(1) Perform 10000voltage cycles as follows: ON(2.0×rated voltage, 2.5×for Arrays) 1sec. OFF 25sec. (2) Stabilization time 30min without loading (3) Measure resistance CR03: 30Vmax CR05: 50Vmax								
	Visual	No evidence of mechanical damage			(1) Perform 10000 current cycles as follows: ON(2A) 1sec. OFF 25sec. (2) Wait 30minutes (3) Measure resistance CJ03: 1A max							
Dielectric Withstanding Voltage	No evidence of mechanical damage		Apply 300VAC for 1sec (CR03 50VAC/1min.)									
Insulation Resistance	■ CR03, CJ03 : 10 <sup>8</sup> Ωmin ■ CR05, CJ05 : 10 <sup>8</sup> Ωmin		 Apply 100V DC. (CR03 50VDC)									

Discontinued Product

### Mechanical Characteristics

Item		Standard		Test Conditions	
		Resistor	Jumper	Resistor	Jumper
Terminal Strength	$\Delta R/R$	$\pm(1\%+0.05\Omega)\text{max}$ of the initial value	50m $\Omega$ max	Apply the load as show: Measure resistance during load application	
	Visual	No evidence of mechanical damage after loading		 PC board: Glass epoxy t=1.6	
Soldering Heat Resistance	$\Delta R/R$	$\pm(1\%+0.05\Omega)\text{max}$ of the initial value	50m $\Omega$ max	Immerse into molten solder at 260 $\pm$ 5 $^{\circ}$ C for 10 $\pm$ 1sec. Stabilize component at room temperature for 1hr. Measure resistance.	
	Visual	No evidence of leaching			
Solderability		Coverage $\geq$ 95% each termination end		Immerse in Rogin Flux for 2 $\pm$ 0.5 sec. and in SN62 solder at 235 $\pm$ 5 $^{\circ}$ C for 2 $\pm$ 0.5 sec.	
Anti-Vibration Test	$\Delta R/R$	$\pm(1\%+0.1\Omega)\text{max}$ of the initial value	50m $\Omega$ max	2 hrs. each in X, Y and Z axis. (TTL 6hrs.)10 to 55 Hz sweep in 1min.at 1.5mm amplitude.	
	Visual	No evidence of mechanical damage			
Solvent Resistance	$\Delta R/R$	$\pm(0.5\%+0.05\Omega)\text{max}$ of the initial value	50m $\Omega$ max	Immerse in static state butyl acetate at 20 $^{\circ}$ C to 25 $^{\circ}$ C for 30 $\pm$ 5sec. Stabilize component at room temperature for 30min then measure Value.	
	Visual	No evidence of mechanical damage			

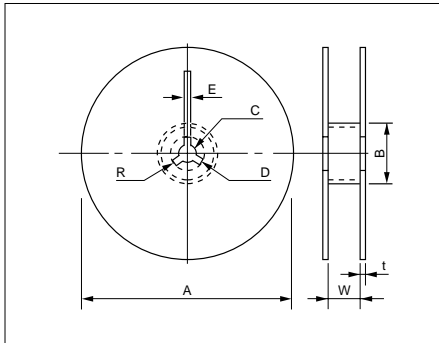
### Environmental Characteristics

Item		Standard		Test Conditions	
		Resistor	Jumper	Resistor	Jumper
Temperature Cycle	$\Delta R/R$	$\pm(1\%+0.05\Omega)\text{max}$ of the initial value	50m $\Omega$ max	1) Run 5cycles as follows: -55 $\pm$ 3 $^{\circ}$ C for 30min. 125 $\pm$ 3 $^{\circ}$ C for 30min. Room temp for 10-15min. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
Low Temperature Storage	$\Delta R/R$	$\pm(2\%+0.1\Omega)\text{max}$ of the initial value	50m $\Omega$ max	1) Dwell in -55 $^{\circ}$ C chamber without loading for 1000 $^{+48}_0$ hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
High Temperature Storage	$\Delta R/R$	$\pm(3\%+0.1\Omega)\text{max}$ of the initial value	50m $\Omega$ max	1) Dwell in 125 $^{\circ}$ C chamber without loading for 1000 $^{+48}_0$ hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
Moisture Resistance	$\Delta R/R$	$\pm(3\%+0.1\Omega)\text{max}$ of the initial value	50m $\Omega$ max	1) Dwell in temp: 65 $^{\circ}$ C RH90 to 95%RH chamber without loading for 1000 $^{+48}_0$ hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
Life Test	$\Delta R/R$	$\pm(3\%+0.1\Omega)\text{max}$ of the initial value	50m $\Omega$ max	1) Temp: 70 $\pm$ 3 $^{\circ}$ C Voltage: (rated voltage) on 90 min off 30min. Duration: 1000 $^{+48}_0$ hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			
Loading Life in Moisture	$\Delta R/R$	$\pm(3\%+0.1\Omega)\text{max}$ of the initial value	50m $\Omega$ max	1) Temp: 40 $\pm$ 2 $^{\circ}$ C RH: 90-95% Voltage Cycle: on 90 min(rated voltage) off 30min. Duration: 1000 $^{+48}_0$ hrs. 2) Stabilize component at room temperature for 1hr. then measure value.	
	Visual	No evidence of mechanical damage			

## Tape & Reel

### • Reel

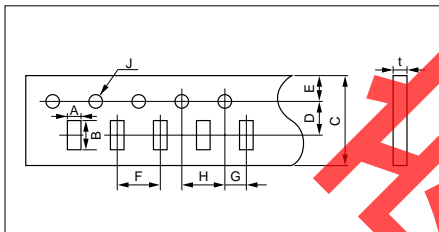
(Unit : mm)



Code	A	B	C	D	E	W	t	R
Width: 8mm	$\phi 178 \pm 2.0$	$\phi 50 \text{min.}$	$\phi 13.0 \pm 0.5$	$\phi 21.0 \pm 0.8$	$2.0 \pm 0.5$	$10.0 \pm 1.5$	2.5MAX.	1.0
Width: 12mm						$13.0 \pm 1.5$		

### • Carrier Tape( 8mm)

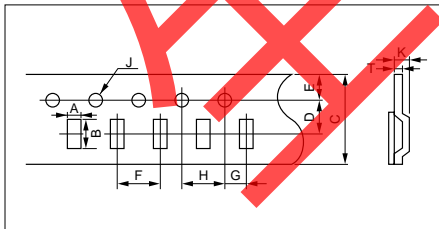
(Unit : mm)



Dimension Code TYPE	A	B	C	D	E	F	G	H	J	t
0201	$0.40 \pm 0.05$	$0.70 \pm 0.05$								0.45max.
0402	$0.65 \pm 0.1$	$1.15 \pm 0.1$								0.6max.
0404	$1.2 \pm 0.1$	$1.2 \pm 0.1$				$2.0 \pm 0.1$				
0804	$1.25 \pm 0.2$	$2.25 \pm 0.2$	$8.0 \pm 0.2$	$3.5 \pm 0.05$	$1.75 \pm 0.1$		$2.0 \pm 0.05$	$4.0 \pm 0.1$	$\phi 1.5 \pm 0.1$	1.1max.
0805	$1.65 \pm 0.2$	$2.4 \pm 0.2$								
1206	$2.0 \pm 0.2$	$3.6 \pm 0.2$				$4.0 \pm 0.1$				
1506	$1.9 \pm 0.2$	$4.1 \pm 0.2$								

### • Carrier Tape(12mm)

(Unit : mm)



Dimension Code TYPE	A	B	C	D	E	F	G	H	J	T	K
1020	$2.9 \pm 0.2$	$5.3 \pm 0.2$									
1608	$2.5 \pm 0.2$	$4.4 \pm 0.2$									
2512	$3.5 \pm 0.2$	$6.7 \pm 0.2$	$12.0 \pm 0.3$	$5.5 \pm 0.05$	$1.75 \pm 0.1$	$4.0 \pm 0.1$	$2.0 \pm 0.1$	$4.0 \pm 0.1$	$\phi 1.5 \pm 0.1$	0.6max.	1.4max.
2506	$2.0 \pm 0.2$	$6.9 \pm 0.2$									

### • Taping Quantity per reel

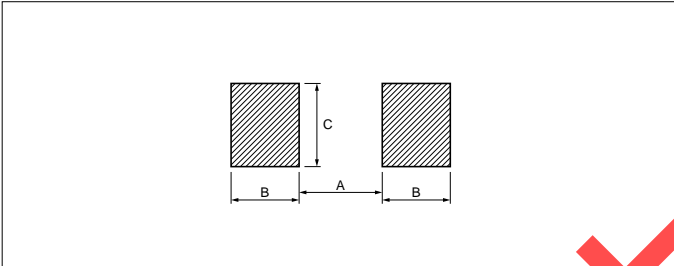
(Unit : pcs)

TYPE	Series	Paper( $\phi 178$ reel)
0201	CR03	10000(2mm pitch)
0402	CR05	10000(2mm pitch)
0404	CRC11A2E, ATC1A	10000(2mm pitch)
0804	CRB2A4E, CRC2A4E	10000(2mm pitch)
0805	LR21	5000(4mm pitch)
1206	LR32	5000(4mm pitch)
1506	CRC4A8E	5000(4mm pitch)
1020	LR50	4000(4mm pitch)
1608	RNA4A	4000(4mm pitch)
2512	LR63	4000(4mm pitch)
2506	CRB6A8E	4000(4mm pitch)

Recommended Land Patterns is referred the following for example

Chip Type

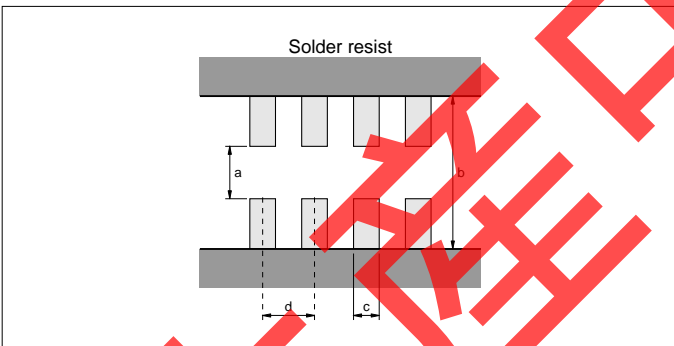
(Unit : mm)



EIA Size	A	B	C
0201	0.25	0.225	0.3
0402	0.5	0.4	0.5
0805	1.0	0.8	1.2
1206	2.2	0.9	1.5
1020	1.4	1.0	5.0
2512	5.0	1.0	3.0

Array Type

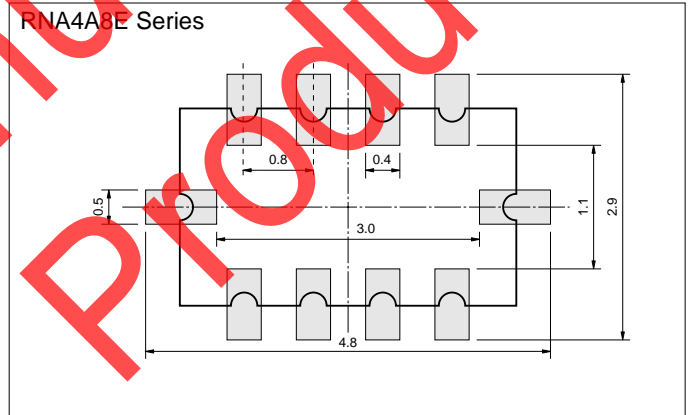
(Unit : mm)



Series	a	b	c	d
CRB2A4E	0.4	1.5	0.25	0.5
CRC11A2E	0.5	1.5	0.4	0.65
CRC4A8E	0.8	2.4	0.3	0.5
CRB6A8E	0.7	2.3	0.4	0.8
ATC1A	0.5	1.5	0.4	0.65

(Unit : mm)

(Unit : mm)



Discontinued Product

**Circuit design**

- 1) Once application and assembly environments have been checked, the resistors may be used in conformance with the catalog and the specifications.
- 2) Please consult the manufacturer in advance when the resistors is used in devices such as: devices which deal with human life, I.e. medical devices; devices which are highly public orientated; and devices which demand a high standard of liability.
- 3) Please use the resistors in conformance with the operating temperature provided in both the catalog and the specifications.
- 4) Please keep voltage under the rated voltage which is applied to the resistor.
- 5) Do not use the resistor in an environment where it might easily exceed the respective provisions concerning shock and vibration specified in the catalog and specifications.
- 6) Please do not use the resistor in the following environments.
  - ① State that water, oil, and solvent hang in resistor
  - ② State where poisonous gas (sulfur and chlorine, etc.) exists
  - ③ State that direct sunshine, radiation, and ultraviolet, etc. are irradiated
- 7) There is a thing that resistance changes according to the stuff of the resin when the coating with the resin is given. Please use resin coating after confirming the characteristic.
- 8) There is a thing that resistance changes according to flux and cleaner. Please use flux and cleaner after confirming the characteristic.
- 9) Please consult about a lead free products.

**Storage**

- 1) Keep storage place temperature +5 to +35 °C, humidity 45 to 75% RH.
- 2) Please keep parts out of poisonous gas such as sulfur or chlorine in the air, and out of salty moisture. Or they may cause rust of terminal, and poor solderability. and, please consider the above-mentioned item after mounting your company.

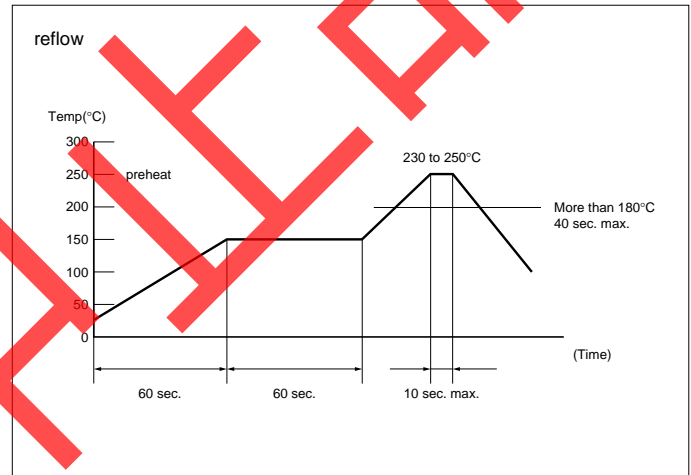
4) Soldering iron

<b>Temperature</b>	soldering iron 300±5°C *
<b>Time</b>	3 sec. max. *

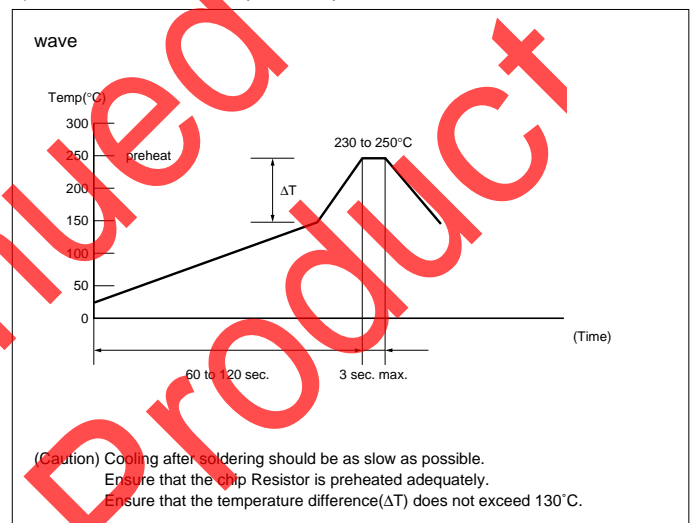
\*Do not place the soldering iron on the chip. Soldering iron is 30W max.

**Soldering method**

1) Recommendable temperature profile



2) Recommendable temperature profile



3) pb-free recommendable temperature profile

