

# Specification

Title: FIXED CHIP RESISTOR NETWORKS; RECTANGULAR TYPE

Style: RAC06 2D, RAC06 4D, RAC10 2D,  
RAC10 4D, RAC16 4D, RAC16 8D

RoHS COMPLIANCE ITEM  
Halogen and Antimony Free

Product specification contained in this specification  
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**釜屋電機株式會社**  
**KAMAYA ELECTRIC CO., LTD.**

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Note: Stock conditions

Temperature: +5°C ~ +35°C

Relative humidity: 25% ~ 75%

The period of guarantee: Within 2 year from shipment by the company.

Solderability shall be satisfied.

## 1. Scope

1.1 This specification covers the detail requirements for fixed chip resistors networks; rectangular type, style of RAC06 2D, 06 4D, 10 2D, 10 4D, 16 4D, 16 8D.

## 1.2 Applicable documents

JIS C 5201-1: 2011, JIS C 5201-9: 2006, JIS C 5201-9-1: 2006  
 IEC60115-1: 2008, IEC60115-9: 2003, IEC60115-9-1: 2004  
 EIAJ RC-2129-2000.

## 2. Classification

Type designation shall be the following form.

(Example) 1. 

RAC	16	4	D	103	J	C	TP
1	2	3	4	5	6	7	8

Style

2. 

RAC	16	4	D	JP	C	TP
1	2	3	4	5	7	8

Style

- 1 Fixed chip resistors networks; rectangular type
  - 2 Size
  - 3 Number of element
  - 4 Circuits
  - 5 Rated resistance
- |   |       |
|---|-------|
| } | Style |
|---|-------|

103	E24 Series, 3 digit, Ex. 103--> 10kΩ,
1000	E96 Series, 4 digit, Ex. 1000-->100Ω 1022--> 10.2kΩ
JP	Chip jumper

### 6 Tolerance on rated resistance

F	±1%
J	±5%

### 7 Terminal style

C	Convex Type	With Corner
D		Flat Type
E		Flat Type Low profile

### 8 Packaging form

B	Bulk (loose package)
TH	Paper taping
TP	

### 3. Rating

3.1 The ratings shall be in accordance with Table-1.

Table-1

Style	Terminations style	Rated element dissipation (W)	Rated network dissipation (W)	Temperature coefficient of resistance ( $10^{-6}/^{\circ}\text{C}$ )	Rated resistance range( $\Omega$ )	Preferred number series for resistors	Tolerance on rated resistance	
RAC06 2D	D,E	0.031	0.063	$\pm 200$	100~100k	E24	F( $\pm 1\%$ )	
				$\pm 350$	10~27		J( $\pm 5\%$ )	
				$\pm 200$	30~1M			
RAC06 4D	D,E		0.125	0.125	$\pm 200$	100~100k	E24	F( $\pm 1\%$ )
					$\pm 350$	10~27		J( $\pm 5\%$ )
					$\pm 200$	30~1M		
RAC10 2D	C	0.063	0.125	$\pm 400$	3~9.1	E24	J( $\pm 5\%$ )	
RAC10 4D				$\pm 300$	10~1M			
RAC16 4D	C	0.1	0.25	$\pm 100$	10~1M	E24	F( $\pm 1\%$ )	
				$\pm 200$			1~9.1	J( $\pm 5\%$ )
				$+300\sim+500$	1.1M~10M			
RAC16 8D	C	0.063	0.25	$\pm 200$	10~1M	E24	J( $\pm 5\%$ )	

Style	Limiting element voltage(V)	Max over load voltage(V)	Number of element	Circuit networks	Category temperature range( $^{\circ}\text{C}$ )
RAC06 2D	12.5	25	2	D (Independence type)	-55~+125
RAC06 4D			4		
RAC10 2D	25	50	2		
RAC10 4D	50	100	4		
RAC16 4D	50	100	4		
RAC16 8D	25	100	8		

Note. Rated current of chip jumper: 1(A)

Note. Resistance value of chip jumper: 50m $\Omega$  max.

### 3.2 Derating

The derated values of dissipation (or current rating in case of chip jumper) at temperature in excess of 70  $^{\circ}\text{C}$  shall be as indicated by the following curve.

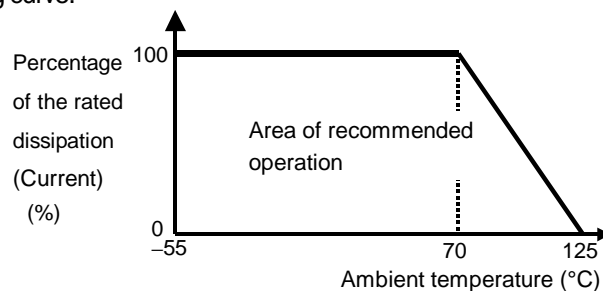


Figure-1 Derating curve

**3.3 Rated voltage**

d. c. or a. c. r. m. s. voltage calculated from the square root of the product of the rated resistance and the rated dissipation.

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

E : Rated voltage (V)

P : Rated dissipation (W)

R : Rated resistance ( $\Omega$ )

Limiting element voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

At high value of resistance, the rated voltage may not be applicable.

[ So called RCWV (Rated continuous working Voltag) is determined by ]

**4. Packaging form**

The standard packaging form shall be in accordance with Table-2.

Table-2

Symbol	Packaging form		Standard packaging quantity / units	Application
B	Bulk (loose package)		1,000 pcs.	RAC06, 10,16
TH	Paper taping	8mm width, 2mm pitches	10,000 pcs.	RAC06 2D, 4D, RAC10 2D, 4D
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	RAC16 4D, 8D

## 5. Dimensions

The resistor shall be of the design and physical dimensions in accordance with below.

### 5.1 Terminations style:E.

#### 5.1.1 RAC06 2D

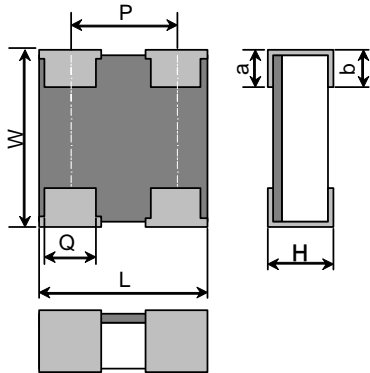


Figure-2

#### 5.1.2 RAC06 4D

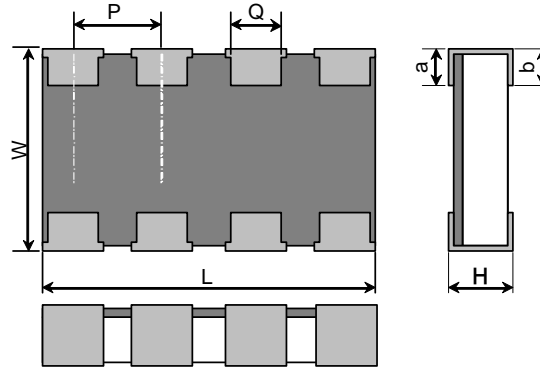


Figure-3

Table-3

Unit: mm

Style	Terminations style	L	W	H	Q	a	b	*P
RAC06 2D	E	0.8±0.05	0.6±0.05	0.23±0.10	0.2±0.1	0.2±0.1	0.2±0.1	0.5
RAC06 4D	E	1.4±0.05	0.6±0.05	0.23±0.10	0.2±0.1	0.2±0.1	0.2±0.1	0.4

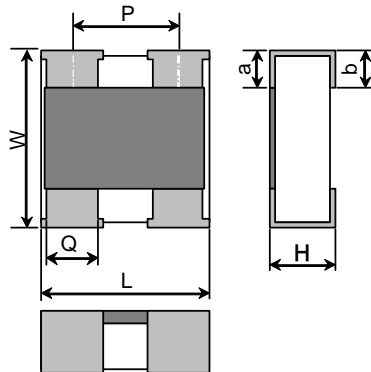
\*Reference

#### 5.1.3 Net weight (Reference)

Style	Terminations style	Net weight(mg)
RAC06 2D	E	0.38
RAC06 4D	E	0.65

## 5.2 Terminations style:D.

### 5.2.1 RAC06 2D



Circuit

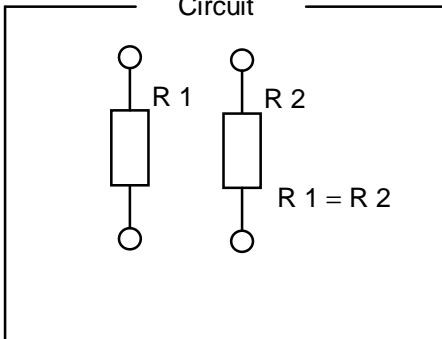
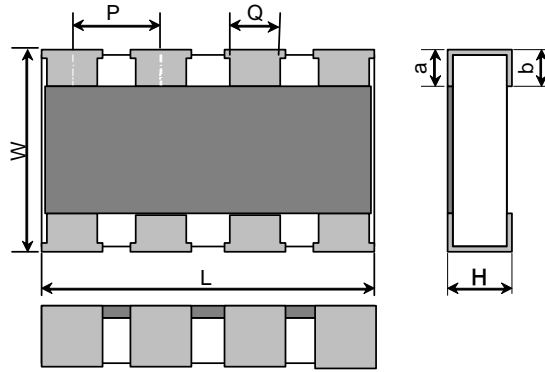


Figure-4

### 5.2.2 RAC06 4D



Circuit

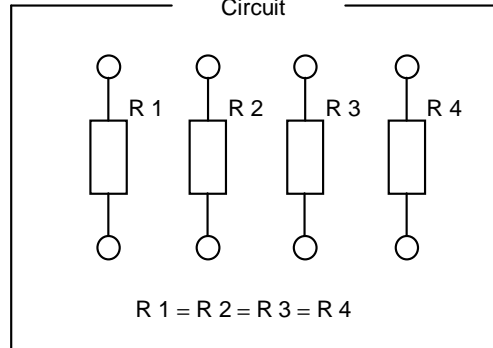


Figure-5

Table-4

Unit: mm

Style	Terminations style	L	W	H	Q	a	b	*P
RAC06 2D	D	0.8±0.1	0.6±0.1	0.35±0.10	0.3±0.1	0.15±0.10	0.15±0.10	0.5
RAC06 4D	D	1.4±0.1	0.6±0.1	0.35±0.10	0.25±0.10	0.15±0.10	0.20±0.10	0.4

\*Reference

### 5.2.3 Net weight (Reference)

Style	Terminations style	Net weight(mg)
RAC06 2D	D	0.56
RAC06 4D	D	0.98

### 5.3 RAC10 2D

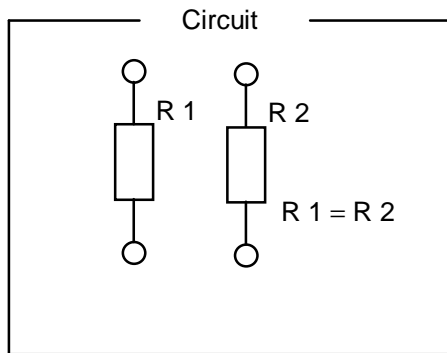
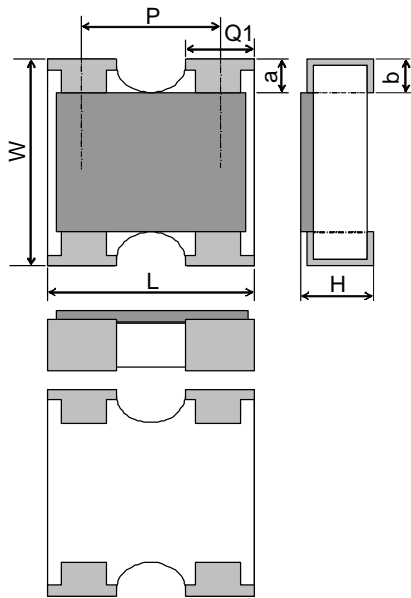


Figure-6

### 5.4 RAC10 4D

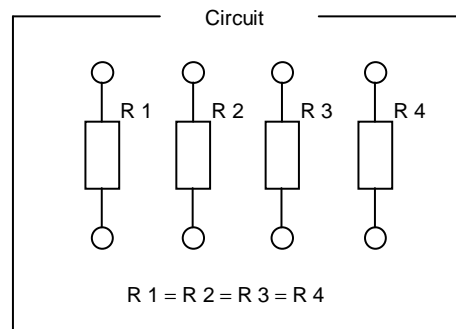
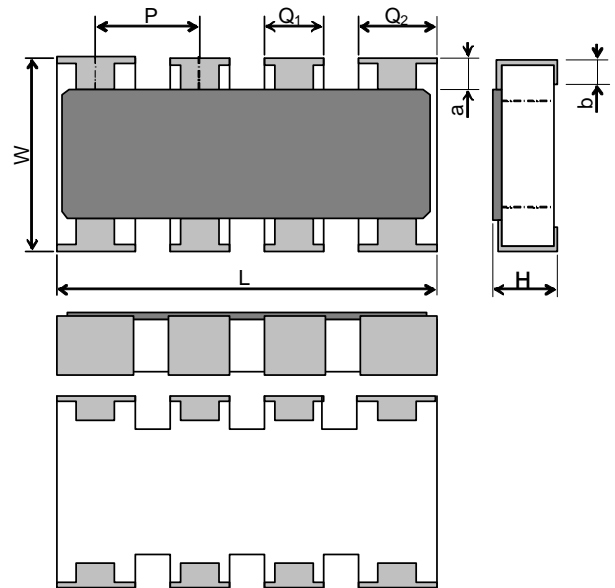


Figure-7

Table-5

Unit: mm

Style	Terminations style	L	W	H	Q or Q <sub>1</sub>	*Q <sub>2</sub>
RAC10 2D	C	1.0±0.1	1.0±0.1	0.35±0.10	0.34±0.10	----
RAC10 4D	C	2.0±0.1	1.0±0.1	0.45±0.10	0.3±0.05	0.4±0.1

Style	a	b	*P
RAC10 2D	0.2±0.15	0.25±0.17	0.65
RAC10 4D	0.2±0.1	0.25±0.10	0.5

\*Reference

### 5.5 Net weight (Reference)

Style	Terminations style	Net weight(mg)
RAC10 2D	C	1.1
RAC10 4D	C	2.1

## 5.6 RAC16 4D

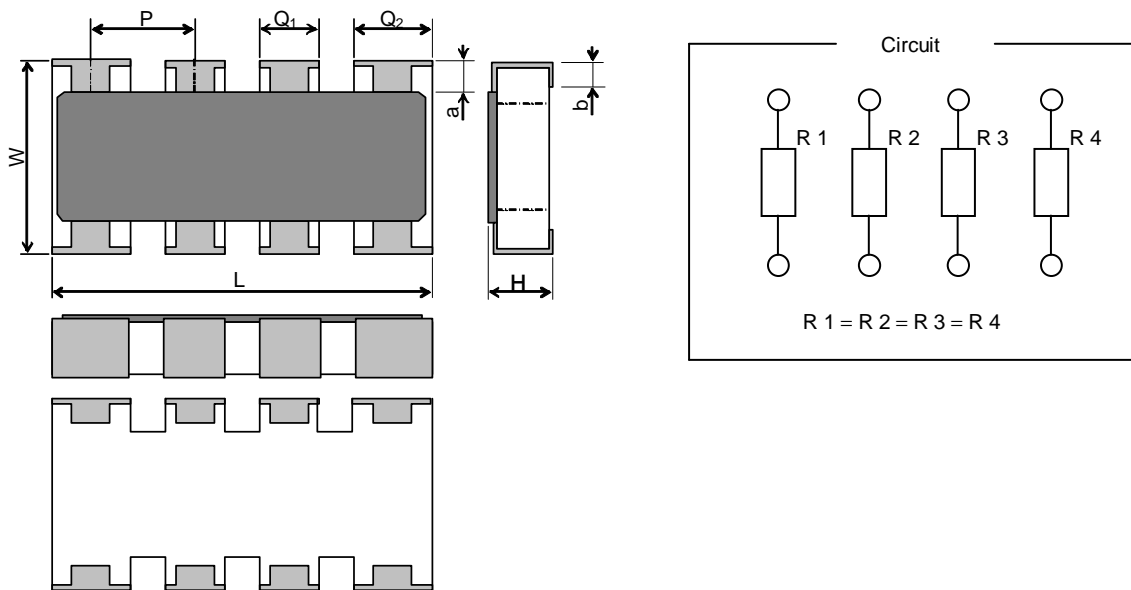


Figure-8

Table-6

Unit: mm

Style	Terminations style	L	W	H	Q <sub>1</sub>	a
RAC16 4D	C	3.2±0.1	1.6±0.1	0.5±0.1	0.4±0.1	0.3±0.1

Style	b	*Q <sub>2</sub>	*P	*Reference
RAC16 4D	0.3±0.2	0.6±0.1	0.8	

## 5.7 Net weight (Reference)

Style	Terminations style	Net weight(mg)
RAC16 4D	C	7



## 5.8 RAC16 8D

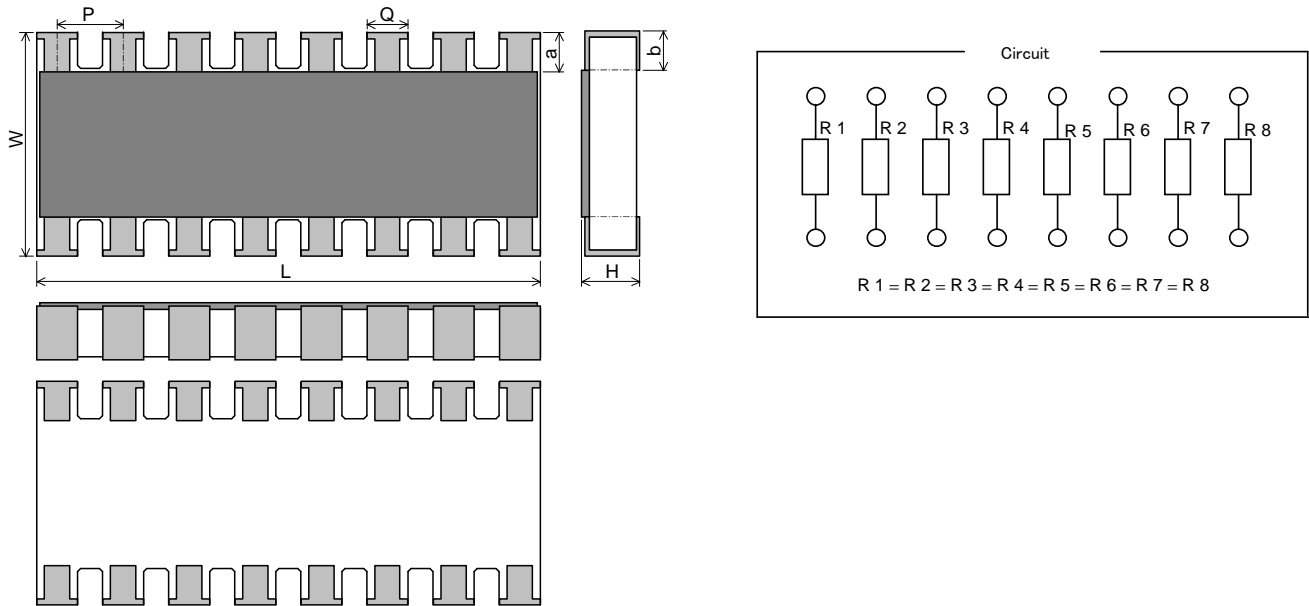


Figure-9

Table-7

Unit: mm

Style	Terminations style	L	W	H	Q	a
RAC16 8D	C	3.8±0.1	1.6±0.1	0.45±0.10	0.3±0.1	0.3±0.1

\*Reference

Style	b	*P
RAC16 8D	0.3±0.1	0.5

## 5.9 Net weight (Reference)

Style	Terminations style	Net weight(mg)
RAC16 8D	C	8.3

## 6. Marking

The Rated resistance of RAC06 2D, 4D, RAC10 2D should not be marked.

### 6.1 For the resistors

The rated resistance shall be marked in 3 digits (E24) and marked on over coat side.

Marking example	Contents
123	$12 \times 10^3 [\Omega] \rightarrow 12 [\text{k}\Omega]$

### 6.2 For the Jumper Chip

Marking example	Contents
000	JP

## 7. Performance

7.1 The standard condition for tests shall be in accordance with Sub-clause 4. 2, JIS C 5201-1: 2011.

7.2 The performance shall be satisfied in Table-8.

Table-8(1)

No.	Test items	Condition of test (JIS C 5201-1)	Performance requirements		
1	Resistance	Sub-clause 4.5	As in 4.5.2 The resistance value shall correspond with the rated resistance taking into account the specified tolerance. Chip jumper: 50mΩ max.		
2	Temperature characteristic of resistance	4.8 Natural resistance change per change in degree centigrade. $TCR(10^{-6}/\Omega) = \frac{R2-R1}{R1(t2-t1)} \times 10^6$ t1 : 20°C $^{+5}_{-1}$ °C, t2: 125°C $^{+5}_{-1}$ °C R1 : Resistance at t1 temperature R2 : Resistance at t2 temperature	See Table-1.		
3	Short time overload	4.13 Test voltage: 2.5 times RCWV Test period: 5s. Test potential should not exceed max. overload voltage as shown in Table-1.	Resistor: ΔR/R: Within ±(2%+0.1Ω) Chip jumper: 50mΩ max. No visible damage		
4	Resistance to soldering heat	4.18 Test by a piece. Temp. of solder bath : 260±5°C Immersion time: 10±1s After immersion into solder leaving the room temp. for 1h or more, and then measure the resistance.	Resistor: ΔR/R: Within ±(1%+0.05Ω) Chip jumper: 50mΩ max. No evidence of appearance damage.		
5	Solderability	4.17 Test by a piece. Flux: Rosin-Methanol Temp. of solder bath: 235±5°C Immersion time: 2±0.5s	95% coverage min., good tinning and no visible damage.		
6	Temperature cycling	4.19 Test cycle: 5 cycles for duty cycle as specified below.	Resistor: ΔR/R: Within ±(1%+0.05Ω) Chip jumper: 50mΩ max. No visible damage		
		Step		Temperature(°C)	Time(min.)
		1		-55±3	30
		2		20 $^{+5}_{-1}$	2~3
		3		+125±2	30
4	20 $^{+5}_{-1}$	2~3			

Table-8(2)

No.	Test items	Condition of test (JIS C 5201-1)	Performance requirements
7	Load life	4.25 Test temp.: 70±2°C Test voltage: Cycle of 1h 30min. "ON" and 30min. "OFF" at dc rated voltage. Test period: 1,000 $\begin{smallmatrix} +48 \\ 0 \end{smallmatrix}$ h	Resistor: $\Delta R/R$ : Within $\pm(3\%+0.1\Omega)$ Chip jumper: 50m $\Omega$ max. No visible damage
8	Load life in humidity	4.24 Test condition: 40±2°C & 90~95% R.H. Test voltage: Cycle of 1h 30min. "ON" and 30min. "OFF" at dc rated voltage. Test period: 1,000 $\begin{smallmatrix} +48 \\ 0 \end{smallmatrix}$ h	Resistor: $\Delta R/R$ : Within $\pm(3\%+0.1\Omega)$ Chip jumper: 50m $\Omega$ max. No visible damage
9	Adhesion	4.32 Pressurizing force: 5N ( RAC06: 3N) Test time: 10±1sec.	No remarkable damage or removal of the terminations
10	Insulation resistance	4.6 Test voltage: Max. overload voltage (DC) Test period: 1min.	R≥1G $\Omega$
11	Dielectric withstanding voltage	4.7 Test voltage: Max. overload voltage (AC) Test period: 1min.	No flashover, fire and breakdown.

## 8. Taping

8.1 Applicable documents JIS C 0806-3: 2014, EIAJ ET-7200C: 2010

### 8.2 Taping dimensions

8.2.1 RAC06 2D, RAC06 4D, RAC10 2D, RAC10 4D (Paper taping, 8mm width, 2mm pitches)

Taping dimensions shall be in accordance with Figure-10 and Table-9.

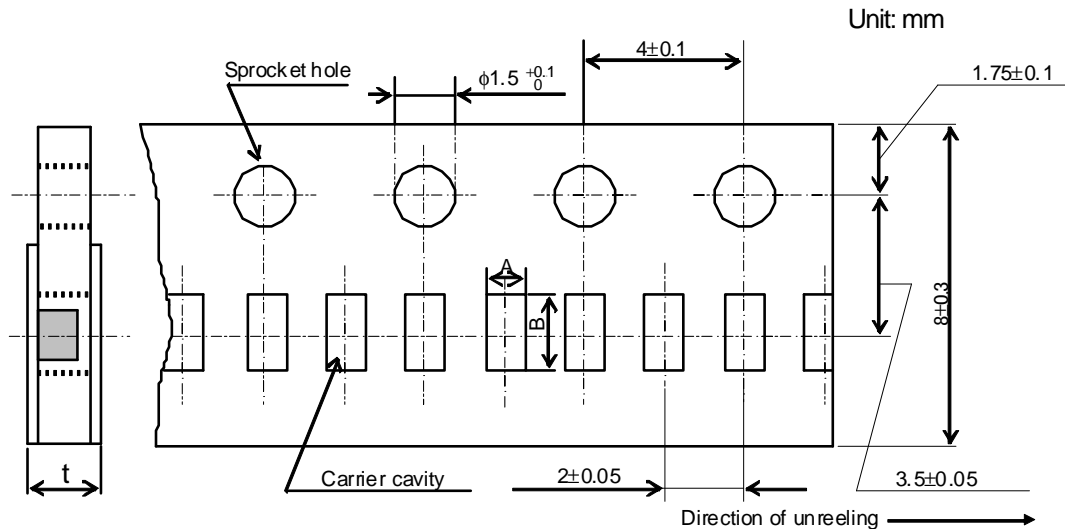


Figure-10

Table-9

Unit: mm

Style	A	B	t
RAC06 2D	$0.7 \pm 0.1$	$0.9 \pm 0.1$	$0.5 \pm 0.1$
RAC06 4D		$1.5 \pm 0.1$	
RAC10 2D	$1.15 \pm 0.1$	$1.15 \pm 0.1$	0.5max.
RAC10 4D	$1.2 \pm 0.2$	$2.2 \pm 0.2$	0.6max.

8.2.2 RAC16 4D, RAC16 8D (Paper taping, 8mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure-11 and Table-10.

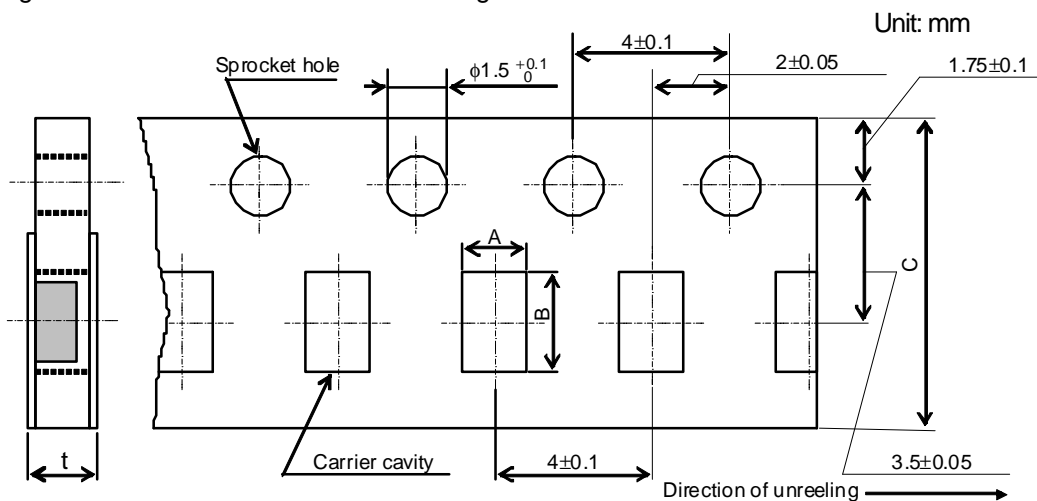


Figure-11

Table-10

Unit: mm

Style	A	B	C	t
RAC16 4D	$2.0 \pm 0.2$	$3.6 \pm 0.2$	$8.0 \pm 0.3$	1.0max.
RAC16 8D	$1.9 \pm 0.15$	$4.1 \pm 0.15$		0.85max.

8.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure-12 and Table-11.

Unit: mm

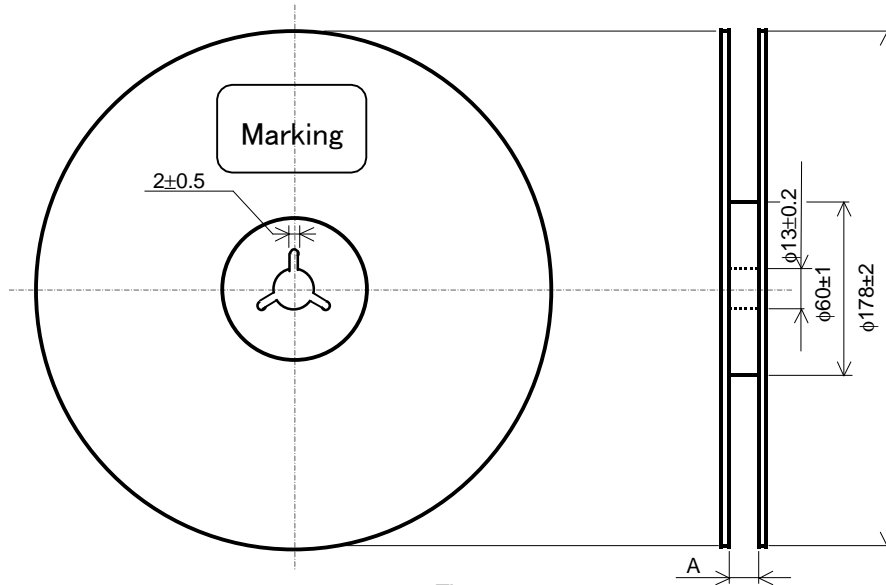


Figure-12

Table-11

Unit: mm

Style	A
RAC06,10,16	9±0.5

Note: Marking label shall be marked on a place of Marking A or two place of marking A and B.

9. Marking on package

The label of a minimum package shall be legibly marked with follows.

9.1 Marking A

- (1) Classification (Style, Rated resistance, Tolerance on rated resistance, Terminal style, Packaging form)
- (2) Quantity (3) Lot number (4) Manufacturer's name or trade mark (5) Others

9.2 Marking B (KAMAYA Control label)

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