KAMAYA OHM

Spec. No.:	RCC-K-HTS-0001 /7
Date:	2017. 1. 10

Specification

Title: FIXED THICK FILM CHIP RESISTORS;RECTANGULAR TYPE AND LOW OHM

Style: RCC06,10,16,20,32

RoHS COMPLIANCE ITEM
Halogen and Antimony Free

Product specification contained in this specification
are subject to change at any time without notice
If you have any questions or a Purchasing Specification for any quality
Agreement is necessary, please contact our sales staff.

釜屋電機株式會社
KAMAYA ELECTRIC CO., LTD.
Hokkaido Research Center
Approval by: T. Sannomiya
Drawing by: M. Shibuya

Note: Stock conditions
Temperature: +5°C ~ +35°C
Relative humidity: 25% ~ 75%
The period of guarantee: Within 2 year from shipmen t by the company.
Solderability shall be satisfied.

1. Scope

1.1 This specification covers the detail requirements for fixed thick film chip resistors; rectangular type and low ohm, style of RCC06,10,16,20,32.

1.2 Applicable documents

JIS C 5201–1: 2011, JIS C 5201–8: 2014, JIS C 5201–8–1: 2014
IEC60115–1: 2008, IEC60115–8: 2009, IEC60115–8–1: 2014
EIAJ RC–2144C–2010

2. Classification

Type designation shall be the following form.

(Example)

RCC	20	R043	J	TP
1	2	3	4	5
Style				

1 Fixed thick film chip resistors; rectangular type and low ohm — Style
2 Size
3 Rated resistance Rated resistance and symbol shall be in accordance with Sub-clause 3.2.
4 Tolerance on rated resistance

F	±1%
J	±5%

5 Packaging form

B	Bulk (loose package)
PA	Press pocket taping
TH	Paper taping
TP	

3. Rating

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

Table–1

Style	Rated dissipation (W)	Rated current range (A)	Temperature coefficient of resistance (10^{-6}/ °C)	Rated resistance range(Ω)	Tolerance on rated resistance
RCC06	0.1	1.0~2.23	0~+500	0.02~0.1	J(±5%)
RCC10	0.125	1.11~2.23	±150	0.051~0.1	F(±1%), J(±5%)
			0~+350	0.025~0.05	
RCC16	0.25	1.58~5.0	±150	0.051~0.1	F(±1%), J(±5%)
			0~+250	0.033~0.05	
			0~+350	0.01~0.03	
RCC20	0.33	1.81~5.74	±100	0.051~0.1	F(±1%), J(±5%)
			±150	0.03~0.05	
			0~+250	0.01~0.027	
RCC32	0.5	2.23~5.0	±100	0.036~0.1	F(±1%), J(±5%)
			0~+250	0.02~0.033	

Style	Isolation voltage (V)	Category temperature range (°C)
RCC06	50	–55~+155
RCC10	100	
RCC16		
RCC20	500	
RCC32		

3.2 Rated resistance

The rated resistance shall be in accordance with Table–2

Table–2

Rated resistance			Rated resistance			Rated resistance		
[mΩ]	Symbol	Marking symbol	[mΩ]	Symbol	Marking symbol	[mΩ]	Symbol	Marking symbol
10	R010	010	39	R039	039	68	R068	068
15	R015	015	40	R040	040	70	R070	070
20	R020	020	43	R043	043	75	R075	075
22	R022	022	47	R047	047	80	R080	080
24	R024	024	50	R050	050	82	R082	082
25	R025	025	51	R051	051	90	R090	■90
27	R027	027	56	R056	056	91	R091	091
30	R030	030	60	R060	060	100	R100	R10
33	R033	033	62	R062	062			
36	R036	036	65	R065	065			

3.3 Climatic category

55/155/56

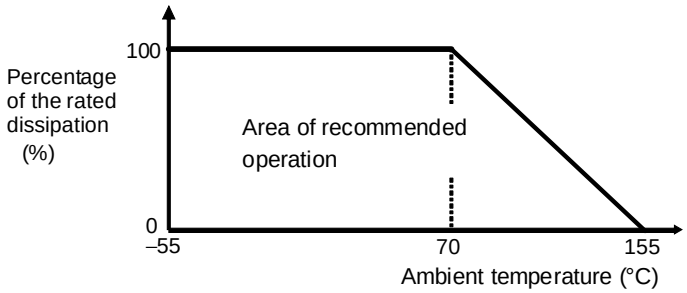
Lower category temperature	–55 °C
Upper category temperature	+155 °C
Duration of the damp heat, steady state test	56days

3.4 Stability class

5%	Limits for change of resistance:
	–for long–term tests ±5%
	–for short–term tests ±1%

3.5 Derating

The derated values of dissipation at temperature in excess of 70 °C shall be as indicated by the following curve.



Figure–1 Derating curve

3.6 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 (Ω)

3.7 Rated current

The rated current calculated from the square root of the quotient of the rated resistance and the rated dissipation.

$$I = \sqrt{P / R}$$

I: Rated current (A)
P: Rated dissipation (W)
R: Rated resistance (Ω)

The rated current shall be corresponding to rated voltage.

4. Packaging form

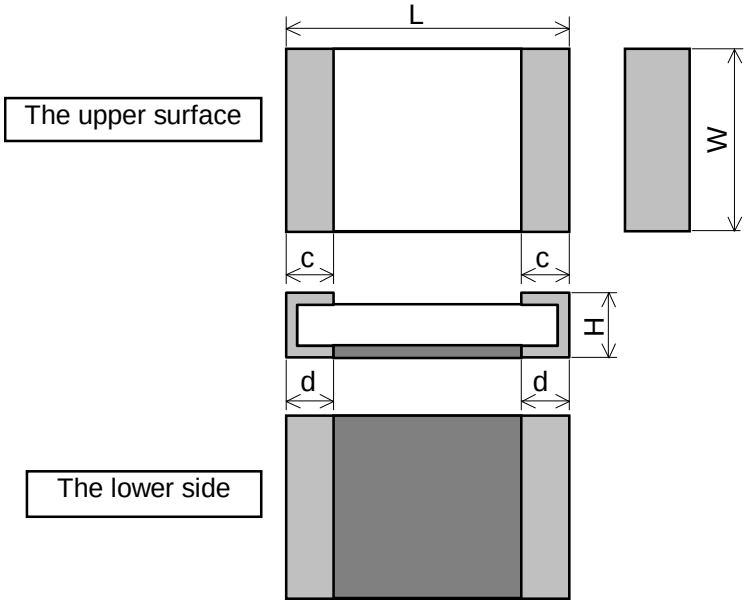
The standard packaging form shall be in accordance with Table–3.

Table–3

Symbol	Packaging form		Standard packaging quantity / units	Application
B	Bulk (loose package)		1,000 pcs.	RCC06,10,16,20,32
PA	Press pocket taping (paper taping)	8mm width, 2mm pitches	15,000 pcs.	RCC06
TH	Paper taping	8mm width, 2mm pitches	10,000 pcs.	RCC10
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	RCC16, 20, 32

5. Dimensions

5.1 The resistor shall be of the design and physical dimensions in accordance with Figure–2 and Table–4.



Figure–2

Table–4 Unit: mm

Style	Rated resistance range	L	W	H	c	d
RCC06	All resistance range	0.6±0.03	0.3±0.03	$0.23^{+0.03}_{-0.10}$	$0.15^{+0.05}_{-0.10}$	0.15±0.05
RCC10	All resistance range	1.0±0.05	0.5±0.05	$0.35^{+0.05}_{-0.10}$	$0.25^{+0.05}_{-0.10}$	$0.25^{+0.05}_{-0.10}$
RCC16	20mΩ≤R	1.6±0.1	$0.8^{+0.15}_{-0.05}$	0.5±0.1	0.3±0.1	0.3±0.1
	R<20mΩ					0.55±0.10
RCC20	20mΩ≤R	2.0±0.15	1.25±0.10	0.6±0.1	0.4±0.2	0.4±0.2
	R<20mΩ					0.6±0.2
RCC32	All resistance range	3.1±0.2	1.6±0.15	0.6±0.1	0.5±0.25	0.5±0.25

5.2 Net weight (Reference)

Style	Net weight (mg)
RCC06	0.16
RCC10	0.6
RCC16	2
RCC20	5
RCC32	9

6. Marking

The rated resistance of marking symbol of Sub–clause 3.2 shall be marked on substrate side.
The Rated resistance of RCC06, RCC10 and RCC16 should not be marked.

(Example) "050" → 0.05 [Ω] → 50mΩ (Application: 10mΩ→91mΩ)
"■90" → 0.09 [Ω] → 90mΩ (Application: 90mΩ only)
"R10" → 0.1 [Ω] → 100mΩ (Application: 100mΩ or above

7. Performance

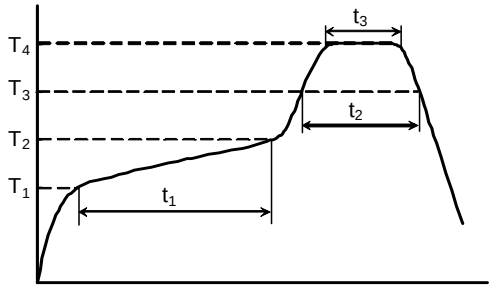
7.1 The standard condition for tests shall be in accordance with Sub–clause 4.2, JIS C 5201–1: 2011.

7.2 The performance shall be satisfied in Table–5.

Table– 5(1)

No.	Test items	Condition of test (JIS C 5201–1)	Performance requirements
1	Visual examination	Sub–clause 4.4.1 Checked by visual examination.	As in 4.4.1 The marking shall be legible, as checked by visual examination.
2	Dimension Resistance	Sub–clause 4.4.2 Sub–clause 4.5 Measurement current: 1(A) Note: The measuring apparatus corresponding to DC Low–ohm Mater (1A) of AX–1152D for ADEX CORPORATION.	As specified in Table–4 of this specification. As in 4.5.2 The resistance value shall correspond with the rated resistance taking into account the specified tolerance.
3	Voltage proof	Sub–clause 4.7 Method: 4.6.1.4(See Figure–5) Test voltage: Alternating voltage with a peak value of 1.42 times the insulation voltage. Duration: 60 s±5 s Insulation resistance Test voltage: Insulation voltage Duration: 1 min.	No breakdown or flash over $R \geq 1$ GΩ
4	Solderability	Sub–clause 4.17 Without aging Flux: The resistors shall be immersed in a non–activated soldering flux for 2 s. Bath temperature: 235 °C±5 °C Immersion time: 2 s±0.5 s	As in 4.17.4.5 The terminations shall be covered with a smooth and bright solder coating.
5	Mounting Overload (in the mounted state) Solvent resistance of the marking	Sub–clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3 Sub–clause 4.13 The applied voltage shall be 2.5 times the rated voltage or the current corresponding to. Duration: 2 s Visual examination Resistance Sub–clause 4.30 Solvent: 2–propanol Solvent temperature: 23 °C±5 °C Method 1 Rubbing material: cotton wool Without recovery	 No visible damage $\Delta R \leq \pm 1\%$ Legible marking
6	Mounting Bound strength of the end face plating Final measurements	Sub–clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–4 Sub–clause 4.33 Bent value: 3 mm Resistance Sub–clause 4.33.6 Visual examination	 $\Delta R \leq \pm 1\%$ No visible damage

Table–5(2)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
7	Resistance to soldering heat	Sub–clause 4.18 (JEITA RC-2144 2.3.2) T_1:Pre-heat minimum temp.:150±5 °C T_2:Pre-heat maximum temp.:180±5 °C T_3:Soldering temp.:220 °C T_4:Peak temp.:250 °C t_1:Pre-heat duration:120±5 s t_2:Soldering duration:60 to 90 s t_3:Peak duration(T_4-5°C):20 to 40 s Pre-reflow soldering: 1 time (Initial measurements) Reflow soldering: 3 times  	
		Visual examination	No visible damage
	Component solvent resistance	Resistance Sub–clause 4.29 Solvent: 2–propanol Solvent temperature: 23 °C±5 °C Method 2 Recovery: 48 h	ΔR ≤ ±1%
		Visual examination	No visible damage
		Resistance	ΔR ≤ ±1%
8	Mounting	Sub–clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3	
	Adhesion	Sub–clause 4.32 Force: 5 N (RCC06: 3N) Duration: 10 s±1 s	
		Visual examination	No visible damage
	Rapid change temperature	Sub–clause 4.19 Lower category temperature: –55 °C Upper category temperature: +155 °C Duration of exposure at each temperature: 30 min. Number of cycles: 5 cycles.	
		Visual examination	No visible damage
		Resistance	ΔR ≤ ±1%

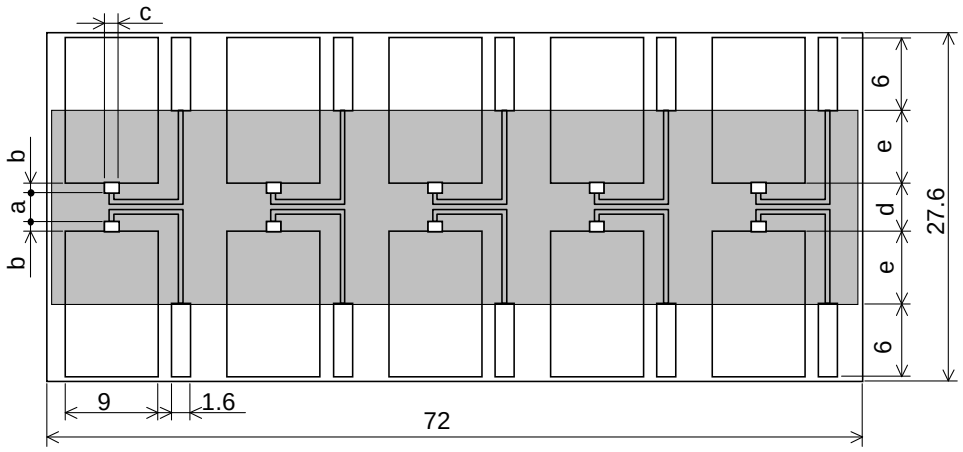
Table–5(3)

No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
9	Climatic sequence –Dry heat –Damp heat, cycle (12+12hour cycle) First cycle –Cold –Damp heat, cycle (12+12hour cycle) Remaining cycle –D.C. load	Sub–clause 4.23 Sub–clause 4.23.2 Test temperature: +155 °C Duration: 16 h Sub–clause 4.23.3 Test method: 2 Test temperature: 55 °C [Severity(2)] Sub–clause 4.23.4 Test temperature –55 °C Duration: 2h Sub–clause 4.23.6 Test method: 2 Test temperature: 55 °C [Severity (2)] Number of cycles: 5 cycles Sub–clause 4.23.7 The applied current shall be the rated current. Duration: 1 min. Visual examination Resistance	No visible damage $\Delta R \leq \pm 5$ %
10	Mounting Endurance at 70 °C	Sub–clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3 Sub–clause 4.25.1 Ambient temperature: 70 °C±2 °C Duration: 1000 h The current shall be applied in cycles of 1.5 h on and 0.5 h. The applied current shall be the rated current Examination at 48 h, 500 h and 1000 h: Visual examination Resistance	No visible damage $\Delta R \leq \pm 5$ %

Table–5(4)

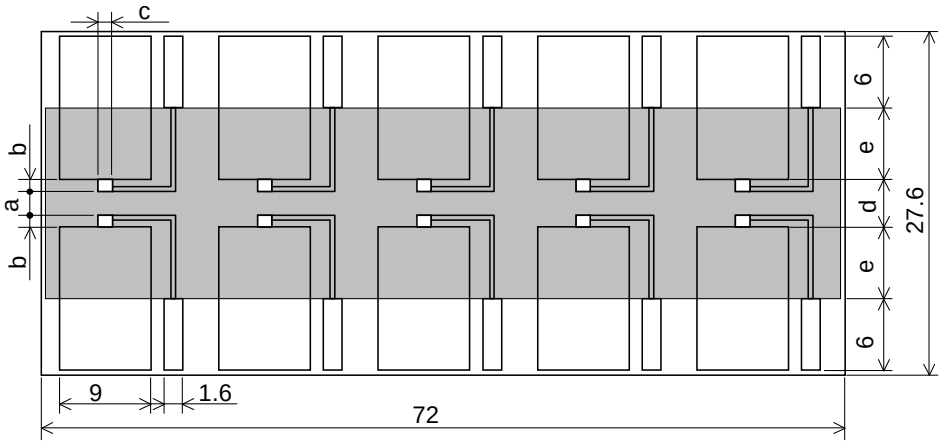
No	Test items	Condition of test (JIS C 5201–1)	Performance requirements
11	Mounting Variation of resistance with temperature	Sub–clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3 Sub–clause 4.8 +20 °C / +155 °C	 As in Table–1
12	Mounting Damp heat, steady state	Sub–clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3 Sub–clause 4.24 Ambient temperature: 40 °C±2 °C Relative humidity: 93 $^{+2}_{-3}$ % Without current applied. Visual examination Resistance	 No visible damage Legible marking $\Delta R \leq \pm 5\%$
13	Dimensions (detail) Mounting Endurance at upper category temperature	Sub–clause 4.4.3 Sub–clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure–3 Sub–clause 4.25.3 Ambient temperature:155 °C±2 °C Duration: 1000 h Examination at 48 h, 500 h and 1000 h: Visual examination Resistance	As in Table–4 No visible damage $\Delta R \leq \pm 5\%$

8. Test substrate



Style	Rated resistance range	a	b	c	d	e
RCC16	20mΩ≤R	1.0	0.6	0.8	2.2	6.2
	R<20mΩ	0.6	0.8	0.9		
RCC20	20mΩ≤R	1.3	0.7	1.25	2.7	5.95
	R<20mΩ	0.8	0.95	1.35		
RCC32	All resistance range	2.1	0.9	1.7	3.9	5.35

RCC16,20,32 TEST SUBSTRATE

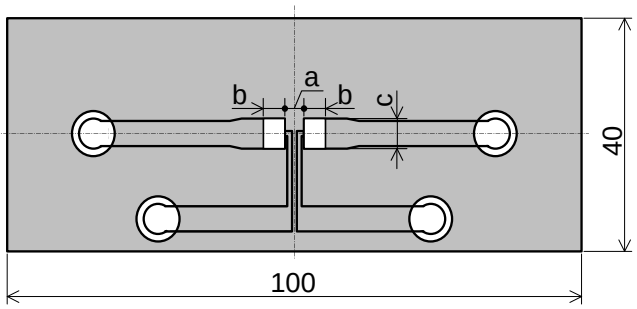


Style	a	b	c	d	e
RCC06	0.3	0.6	0.6	1.5	6.55
RCC10	0.6	0.5	0.7	1.6	6.5

RCC06,10 TEST SUBSTRATE

Remark 1). Material: Epoxide woven glass
Thickness: 1.6mm Thickness of copper clad: 0.035mm
2). In the case of connection by connector, the connecting terminals are gold plated.
However, the plating is not necessary when the connection is made by soldering.

Figure–3



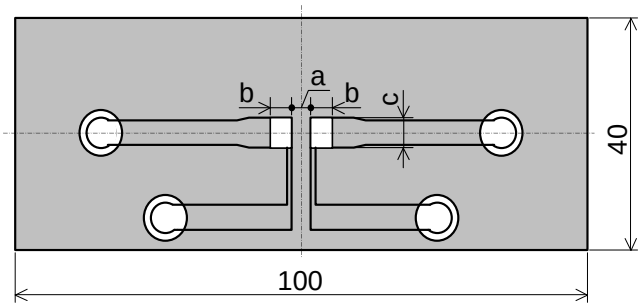
Unit: mm

:Copper clad

:Solder resist

Style	Rated resistance range	a	b	c
RCC16	20mΩ≤R	1.0	0.6	0.8
	R<20mΩ	0.6	0.8	0.9
RCC20	20mΩ≤R	1.3	0.7	1.25
	R<20mΩ	0.8	0.95	1.35
RCC32	All resistance range	2.1	0.9	1.7

RCC16,20,32 BOUND STRENGTH OF THE END FACE PLATING TEST SUBSTRATE



Unit: mm

:Copper clad

:Solder resist

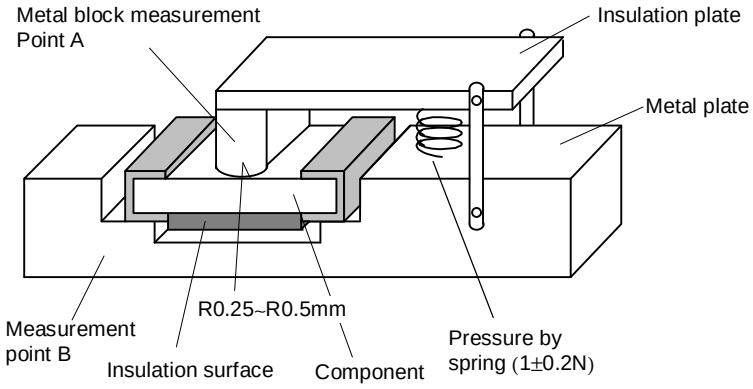
Style	a	b	c
RCC06	0.3	0.6	0.6
RCC10	0.6	0.5	0.7

RCC06,10 BOUND STRENGTH OF THE END FACE PLATING TEST SUBSTRATE

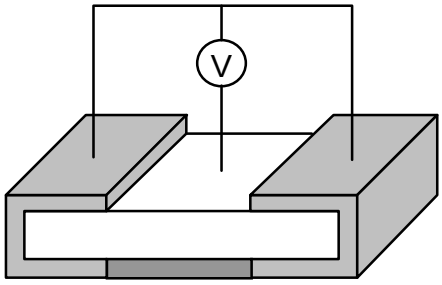
Remark 1). Material: Epoxide woven glass
Thickness: 1.6mm Thickness of copper clad: 0.035mm

Figure–4

· RCC16,20,32



· RCC06,10



Figure–5

9. Taping

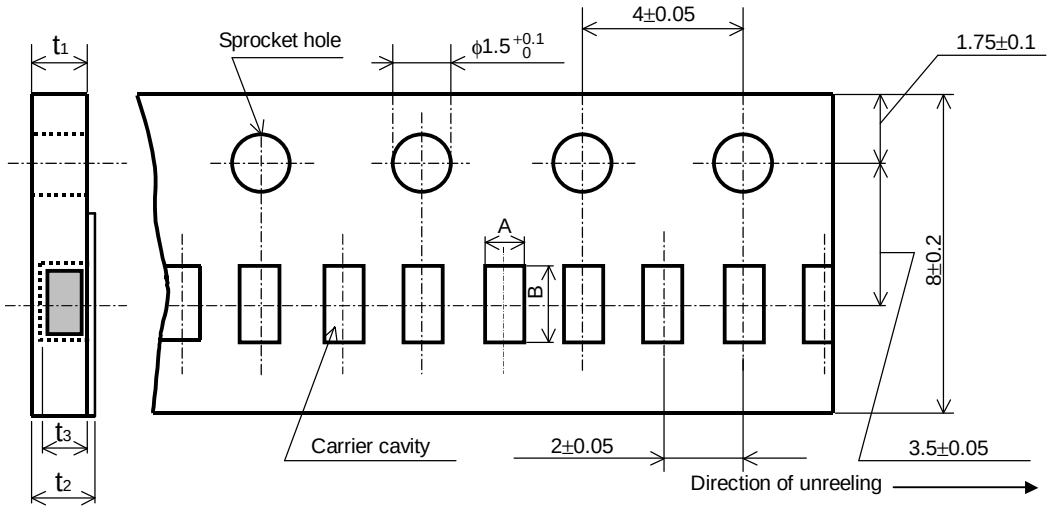
9.1 Applicable documents JIS C 0806–3: 2014, EIAJ ET–7200C: 2010

9.2 Taping dimensions

9.2.1 Press pocket taping (Paper taping, 8mm width, 2mm pitches)

Taping dimensions shall be in accordance with Figure–6 and Table–6.

Unit: mm



Figure–6

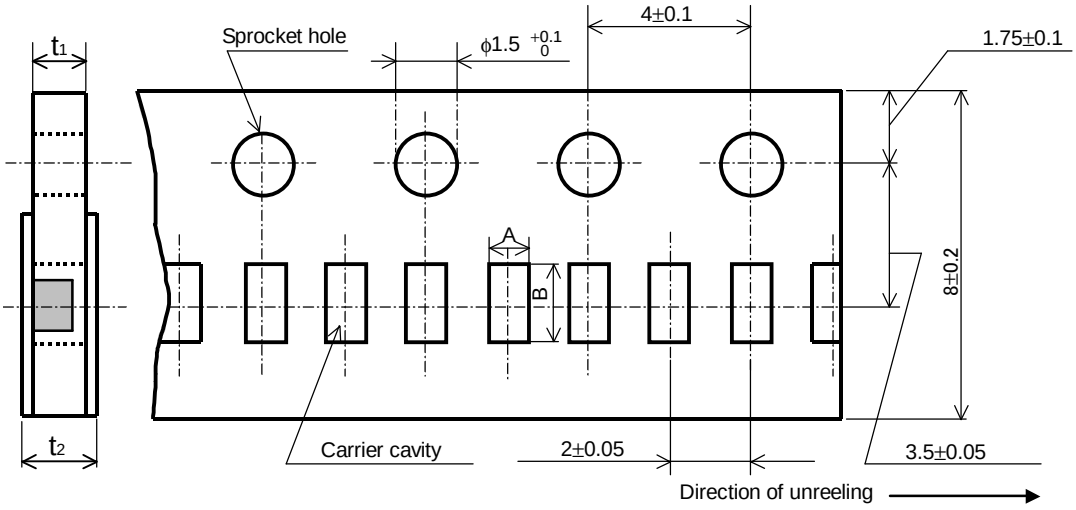
Table–6 Unit: mm

Style	A	B	t_1	t_2	t_3
RCC06	0.37±0.05	0.67±0.05	0.42±0.03	0.45±0.05	0.27±0.02

9.2.2 Paper taping (8mm width, 2mm pitches)

Taping dimensions shall be in accordance with Figure–7 and Table–7.

Unit: mm



Figure–7

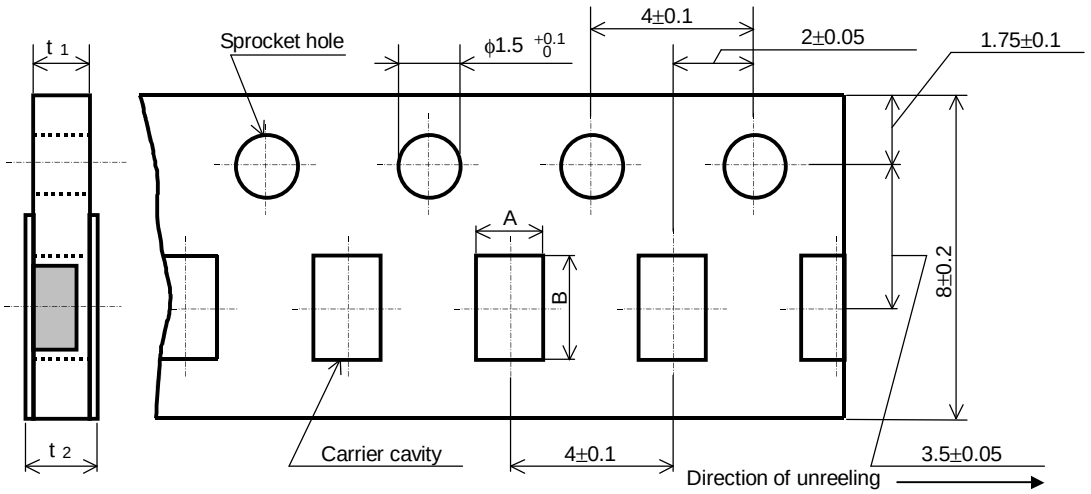
Table–7 Unit: mm

Style	A	B	t_1	t_2
RCC10	$0.65^{+0.05}_{-0.10}$	$1.15^{+0.05}_{-0.10}$	0.4±0.05	0.5max.

9.2.3 Paper taping (8mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure–8 and Table–8.

Unit: mm

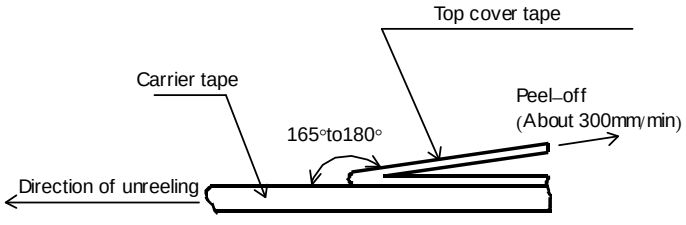


Figure–8

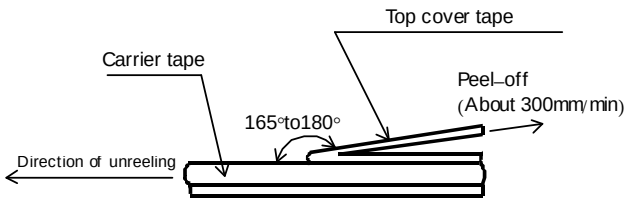
Table–8 Unit: mm

Style	A	B	t_1	t_2
RCC16	1.15±0.15	1.9 ± 0.2	0.6 ± 0.1	0.8max.
RCC20	1.65±0.15	2.5 ± 0.2	0.8 ± 0.1	1.0max.
RCC32	2.00±0.15	3.6 ± 0.2		

1). The cover tapes shall not cover the sprocket holes.
2). Tapes in adjacent layers shall not stick together in the packing.
3). Components shall not stick to the carrier tape or to the cover tape.
4). Pitch tolerance over any 10 pitches ±0.2mm.
5). The peel strength of the top cover tape shall be with in 0.1N to 0.5N on the test method as shown in the following RCC06, 10: Figure–9, RCC16,20,32: Figure–10.
6). When the tape is bent with the minimum radius for 25mm, the tape shall not be damaged and the components shall maintain their position and orientation in the tape.
7). In no case shall there be two or more consecutive components missing.
The maximum number of missing components shall be one or 0.1%, whichever is greater.
8). The resistors shall be faced to upward at the substrate side in the carrier cavity.



Figure–9

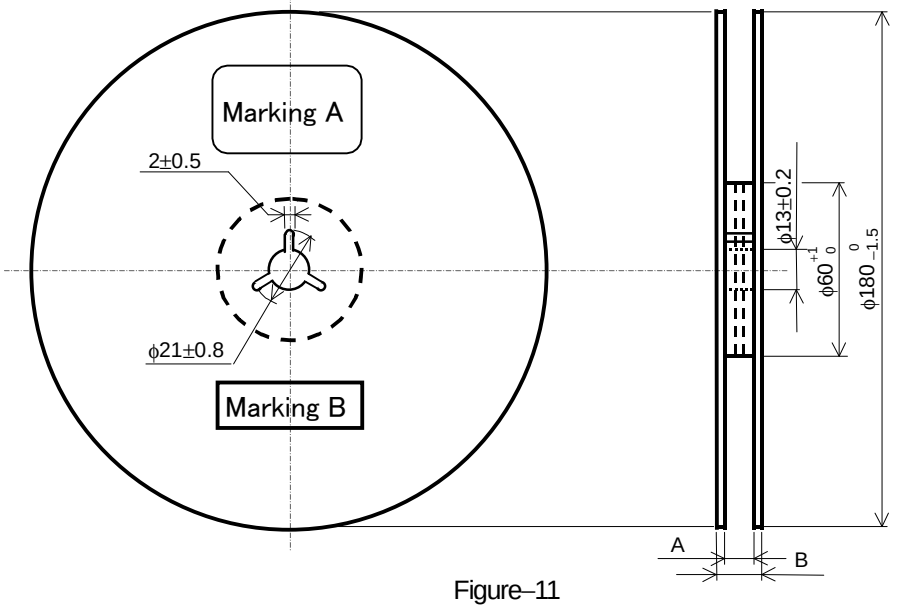


Figure–10

9.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure–11 and Table–9.

Plastic reel (Based on EIAJ ET–7200C) Unit: mm



Figure–11

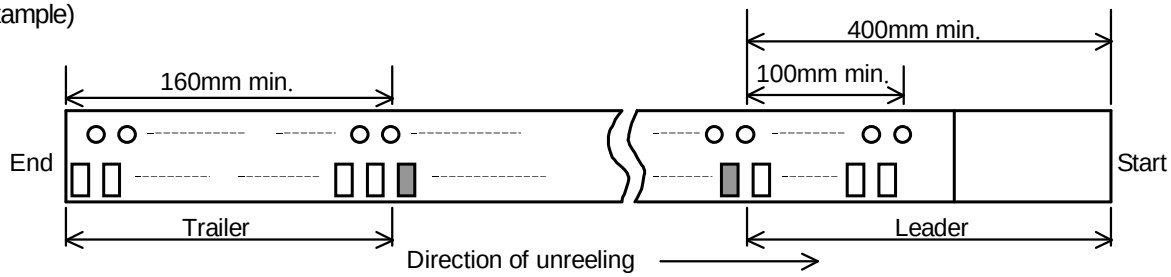
Table–9 Unit: mm

Style	A	B	Note
RCC06,10,16,20,32	9 $^{+1.0}_{0}$	11.4±1.0	Injection molding
		13±1.0	Vacuum forming

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

9.4 Leader and trailer tape.

(Example)



Figure–12

10. Marking on package

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

10.1 Marking A

(1) Classification (Style, Rated resistance, Tolerance on rated resistance, Packaging form) (2) Quantity

(3) Lot number (4) Manufacturer's name or trade mark (5) Others

10.2 Marking B (KAMAYA control label)