KAMAYA OHM

Drawing No.:	RLC-K-HTS-0002 /2
Date:	2025. 1. 9

Data sheet

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

Style: RLC10, 16, 20, 32, 35, 50, 63

AEC-Q200 qualified

RoHS COMPLIANCE ITEM
Halogen and Antimony Free

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.

・Product specification contained in this data sheet 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.

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1. Scope

1.1 This data sheet covers the detail requirements for fixed thick film chip resistors; rectangular type and low ohm, style of RLC10, 16, 20, 32, 35, 50, 63.

1.2 Applicable documents

JIS C 5201−1: 2011, IEC60115−1: 2008, AEC-Q200 Rev.D

2. Classification

Type designation shall be the following form.

(Example)

RLC	20	K	R470	J	TP
1	2	3	4	5	6
Style					

1 Fixed thick film chip resistors; rectangular type and low ohm ┐
2 Size ├ Style
3 Temperature coefficient of resistance ┘

K	±100×10^{-6}/ °C
−(Dash)	Standard

4 Rated resistance Rated resistance and symbol shall be in accordance with Sub-clause 3.2.

5 Tolerance on rated resistance

F	±1%
G	±2%
J	±5%

6 Packaging form

TH	Paper taping
TP	
TE	Embossed taping

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
RLC10	0.125	0.11~1.11	K	±100	3.6~10	F(±1%), J(±5%)
			-(Dash)	0~+200	0.47~3.3	F(±1%), G(±2%), J(±5%)
				0~+300	0.1~0.43	F(±1%), J(±5%)
RLC16	0.25	0.14~1.58	K	±100	3.6~10	F(±1%), J(±5%)
					0.47~3.3	F(±1%)
			-(Dash)	0~+200	0.2~0.43	G(±2%)
				0~+250	0.1~0.18	J(±5%)
RLC20	0.33	0.15~2.56	K	±100	3.6~10	F(±1%), J(±5%)
					0.47~3.3	F(±1%)
			-(Dash)	0~+200	0.2~0.43	G(±2%)
				0~+250	0.05~0.18	J(±5%)
RLC32	0.5	0.18~3.16	K	±100	3.6~10	F(±1%), J(±5%)
					0.47~3.3	F(±1%)
			-(Dash)	0~+200	0.2~0.43	G(±2%)
				0~+250	0.05~0.18	J(±5%)
RLC35	0.66	0.44~3.63	K	±100	0.47~3.3	F(±1%)
			-(Dash)	0~+200	0.2~0.43	G(±2%)
				0~+250	0.05~0.18	J(±5%)
RLC50	0.75	0.47~3.87	K	±100	0.47~3.3	F(±1%)
			-(Dash)	0~+200	0.2~0.43	G(±2%)
				0~+250	0.05~0.18	J(±5%)
RLC63	1.0	0.55~4.47	K	±100	0.47~3.3	F(±1%)
			-(Dash)	0~+200	0.2~0.43	G(±2%)
				0~+250	0.05~0.18	J(±5%)

Style	Limiting element voltage(V)	Insulation voltage (V)	Category temperature range (°C)
RLC10	1.11	100	-55~+155
RLC16	1.41		
RLC20	1.58	500	
RLC32	1.81		
RLC35	1.47		
RLC50	1.56		
RLC63	1.82		

3.2 Rated resistance

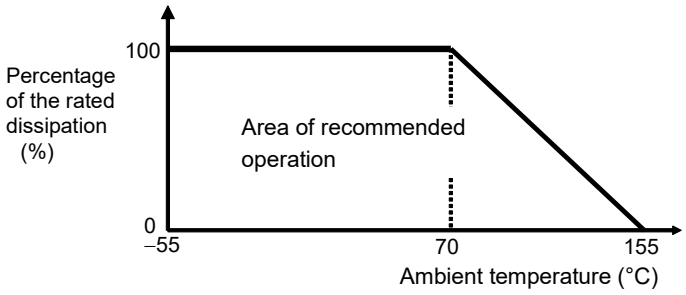
The rated resistance shall be in accordance with Table−2

Table−2

Rated resistance		Rated resistance		Rated resistance	
Rated resistance [mΩ]	Symbol	Rated resistance [mΩ]	Symbol	Rated resistance [Ω]	Symbol
50	R050	250	R250	1.0	1R00
51	R051	270	R270	1.1	1R10
56	R056	300	R300	1.2	1R20
60	R060	330	R330	1.3	1R30
62	R062	360	R360	1.5	1R50
65	R065	390	R390	1.6	1R60
68	R068	400	R400	1.8	1R80
70	R070	430	R430	2.0	2R00
75	R075	470	R470	2.2	2R20
80	R080	500	R500	2.4	2R40
82	R082	510	R510	2.7	2R70
90	R090	560	R560	3.0	3R00
91	R091	600	R600	3.3	3R30
100	R100	620	R620	3.6	3R60
110	R110	650	R650	3.9	3R90
120	R120	680	R680	4.3	4R30
130	R130	700	R700	4.7	4R70
150	R150	750	R750	5.1	5R10
160	R160	800	R800	5.6	5R60
180	R180	820	R820	6.2	6R20
200	R200	900	R900	6.8	6R80
220	R220	910	R910	7.5	7R50
240	R240			8.2	8R20
				9.1	9R10
				10	100

3.3 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

3.4 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)

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.

3.5 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
TH	Paper taping	8mm width, 2mm pitches	10,000 pcs.	RLC10
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	RLC16, 20, 32
TE	Embossed taping	8mm width, 4mm pitches	4,000 pcs.	RLC35
		12mm width, 4mm pitches		RLC50, 63

5. Dimensions

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

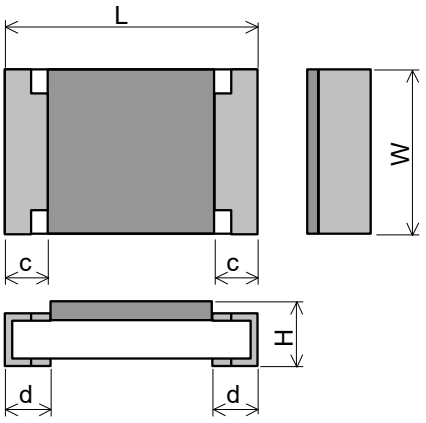


Figure-2

Table-4 Unit: mm

Style	L	W	H	c	d
RLC10	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.2 ± 0.1	$0.25^{+0.05}_{-0.10}$
RLC16	1.6±0.1	$0.8^{+0.15}_{-0.05}$	0.45±0.1	0.3±0.1	0.3±0.1
RLC20	2.0±0.1	1.25±0.10	0.6±0.1	0.4±0.2	0.4±0.2
RLC32	3.1±0.2	1.6±0.15	0.6±0.1	0.5±0.25	$0.3^{+0.2}_{-0.1}$
RLC35	3.1±0.2	2.5±0.15	0.6±0.15	0.5±0.25	$0.3^{+0.2}_{-0.1}$
RLC50	5.0±0.2	2.5±0.15	0.6±0.15	0.6±0.2	0.6±0.2
RLC63	6.3±0.2	3.2±0.15	0.6±0.15	0.6±0.2	0.6±0.2

5.2 Net weight (Reference)

Style	Net weight (mg)
RLC10	0.6
RLC16	2
RLC20	5
RLC32	9
RLC35	16
RLC50	25
RLC63	40

6. Marking

The rated resistance of RLC10,16 should not be marked.

RLC20,32,35,50,63

The rated resistance shall be marked in 4 characters consisting of 3 figures or 3 figures and a letter and marked on over coat side.

(Example) "R050" → 0.05 [Ω] (R<1Ω)

"100" → 10 [Ω] (R≥1Ω)

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	Performance requirements
1	High temperature exposure AEC Q200 - No.3	MIL-STD-202 Method 108 Ambient temperature:155±2°C, Condition: Without load, Duration: 1000 $^{+48}_{0}$ h Interval measurements: 250 h and 500 h	ΔR/R: Within ±3% No visible damage
2	Temperature cycling AEC Q200 - No.4	JESD22 Method JA-104 Temperature: -55±3°C / 125±2°C, Dwell time: 30min maximum at each temp. Transition time: 1 min. max. Number of cycles: 1000 cycles. Interval measurements: 250 cy and 500 cy	ΔR/R: Within ±1% No visible damage
3	Bias humidity AEC Q200 – No.7	MIL-STD-202 Method 103 Condition: 85°C & 85% R.H. Test power: 10% of rated power shall be applied for continuously. Duration: 1,000 $^{+48}_{0}$ h Interval measurements: 250 h and 500 h	ΔR/R: Within ±3% No visible damage
4	Operational life AEC Q200 – No.8	MIL-STD-202 Method 108 Ambient temperature: 125±2ºC The applied voltage shall be the voltage to be calculated at 35% of rated dissipation or the limiting element voltage whichever is the smaller. Condition: The voltage shall be applied for continuously. Duration: 1000 $^{+48}_{0}$ h Interval measurements: 250 h and 500 h	ΔR/R: Within ±3% No visible damage
5	External Visual AEC Q200 – No.9	MIL-STD-883 Method 2009	Inspect device construction, marking and workmanship.
6	Dimensions AEC Q200 – No.10	JESD22 Method JB-100	As in Table−4
7	Resistance to Solvents AEC Q200 – No.12	MIL-STD-202 Method 215 Solvent: 2−propanol at 25 ºC Immersion time: 3 min Brush: 10 times brushing Immersion and brush cycle: 3cycle	ΔR/R: Within ±1% No visible damage
8	Mechanical Shock AEC Q200 – No.13	MIL-STD-202 Method 213 Waveform: half sine, Peak value100G, Normal duration 6ms Condition: XX'YY'ZZ', 18times total	ΔR/R: Within ±1% No visible damage

Table−5(2)

No	Test items	Condition of test	Performance requirements
9	Vibration AEC Q200 – No.14	MIL-STD-202 Method 204 Peak acceleration and Sweep time: 5 g's for 20 min , Frequency 10Hz to 2000Hz, Condition: 12 cycles each of 3 orientations	ΔR/R: Within ±1% No visible damage
10	Resistance to soldering heat AEC Q200 - No.15	MIL-STD-202 Method 210 Solder bath temp: 260±5ºC Immersed time: 10±1s	ΔR/R: Within ±1% No visible damage
11	ESD test AEC Q200 – No.17	AEC-Q200-002 Human body model, 2 Kohm, 150 pF, Test voltage: RLC20,32,35,50,63: 4000V RLC10, 16: 1000V	ΔR/R: Within ±3% No visible damage
12	Solderability AEC Q200 – No.18	J-STD-002 a) Bake the sample for 155 ºC dwell time 4h / solder dipping 235ºC/ 5s. Solder: Sn96.5-Ag3-Cu0.5 b) Category 3, Solder dipping 215ºC/ 5s. Solder: Sn63Pb37 c) Category 3, Solder dipping 260ºC/ 7s.	The surface of terminal immersed shall be min. of 95% covered with a new coating of solder.
13	Electrical Characterization AEC Q200 - No.19	1. D.C. Resistance 2. Temperature Coefficient of Resistance -55 °C / +20 °C +20 °C / +155 °C	1. The resistance value shall correspond with the rated resistance taking into account the specified tolerance. 2. As in Table−1
14	Flammability AEC Q200 – No.20	UL-94	V-0 or V-1 are acceptable
15	Bending strength AEC Q200 – No.21	AEC-Q200-005 Bending value2mm Holding time: 60sec.	ΔR/R: Within ±1% No visible damage
16	Adhesion AEC Q200 – No.22	AEC-Q200-006 Pressurizing force: RLC20,32,35,50,63: 17.7N RLC10,16: 10N Test time: 60±1s.	ΔR/R: Within ±1% No remarkable damage or removal of the terminations

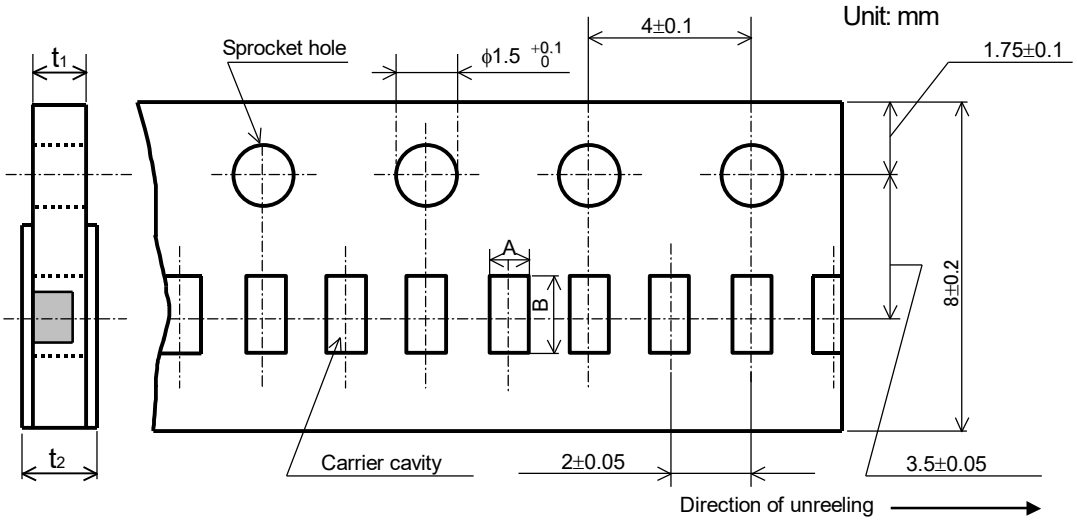
8. Taping

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

8.2 Taping dimensions

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

Taping dimensions shall be in accordance with Figure–3 and Table–6.



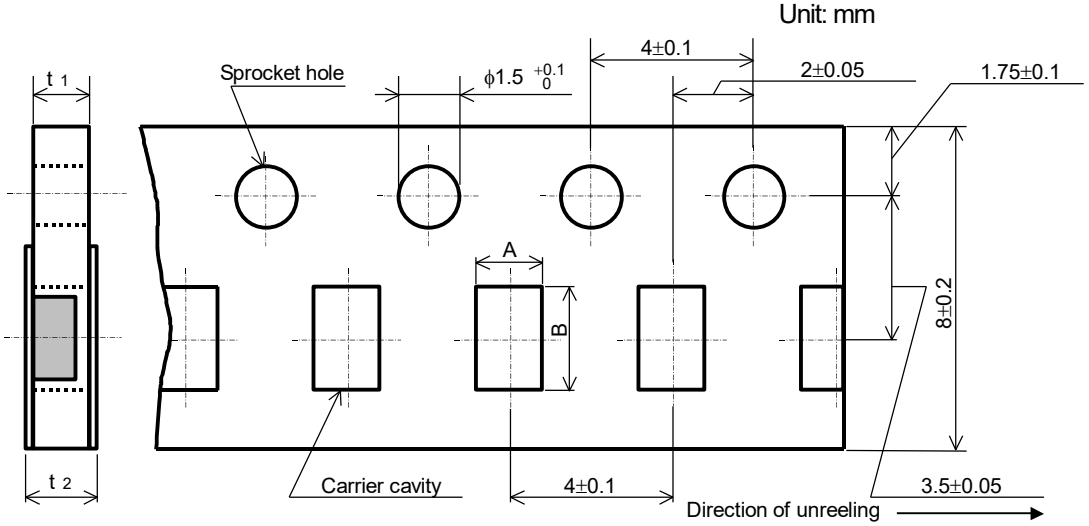
Figure–3

Table–6 Unit: mm

Style	A	B	t_1	t_2
RLC10	$0.65^{+0.05}_{-0.10}$	$1.15^{+0.05}_{-0.10}$	0.4 ± 0.05	0.5max.

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

Taping dimensions shall be in accordance with Figure–4 and Table–7.



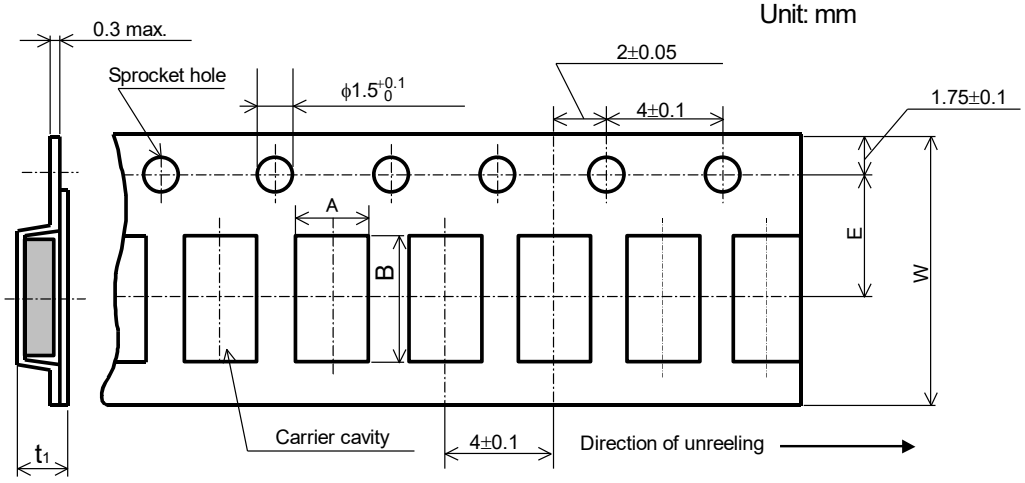
Figure–4

Table–7 Unit: mm

Style	A	B	t_1	t_2
RLC16	1.15±0.15	1.9 ± 0.2	0.6 ± 0.1	0.8max.
RLC20	1.65±0.15	2.5 ± 0.2	0.8 ± 0.1	1.0max.
RLC32	2.00±0.15	3.6 ± 0.2		

8.2.3 Embossed taping dimensions shall be in accordance with Figure−5 and Table−8.

Unit: mm

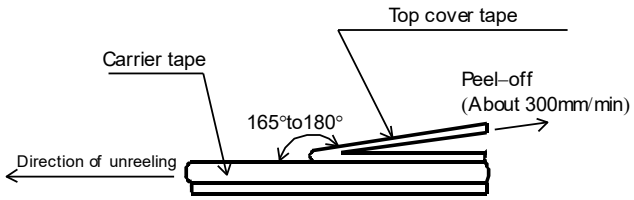


Figure−5

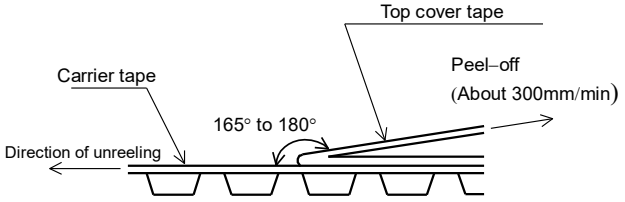
Table−8 Unit: mm

Style	A	B	W	E	t_1
RLC35	2.85±0.2	3.5±0.2	8±0.3	3.5±0.05	1.0±0.2
RLC50	3.1±0.2	5.5±0.2	12±0.3	5.5±0.05	1.1±0.15
RLC63	3.6±0.2	6.9±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 RLC10, 16, 20, 32: Figure−6, RLC35, 50, 63: Figure−7.
6). When the tape is bent with the minimum radius for (RLC10, 16, 20, 32, 35: 25mm, RLC50, 63: 30mm) 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 over coating side in the carrier cavity.



Figure−6

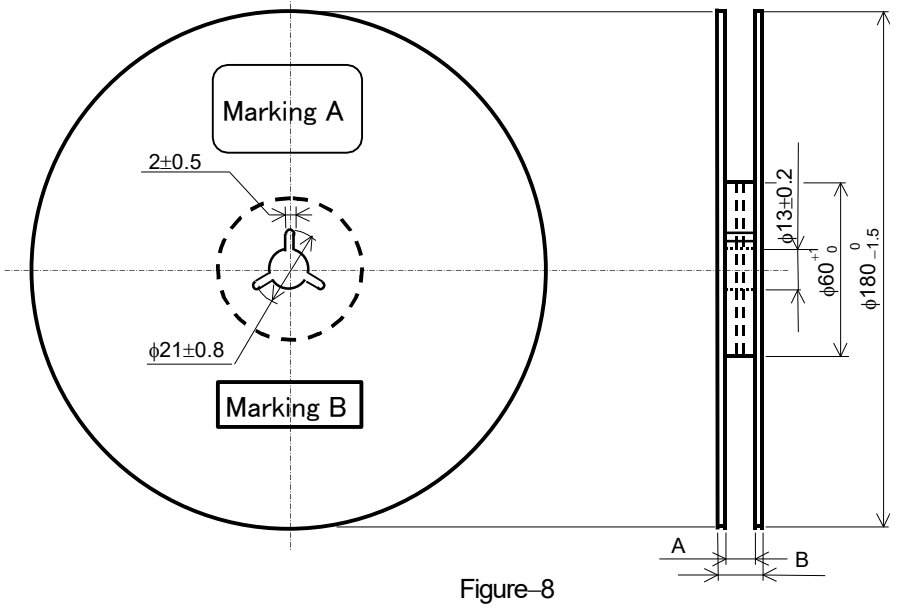


Figure−7

8.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure−8 and Table−9.

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



Figure−8

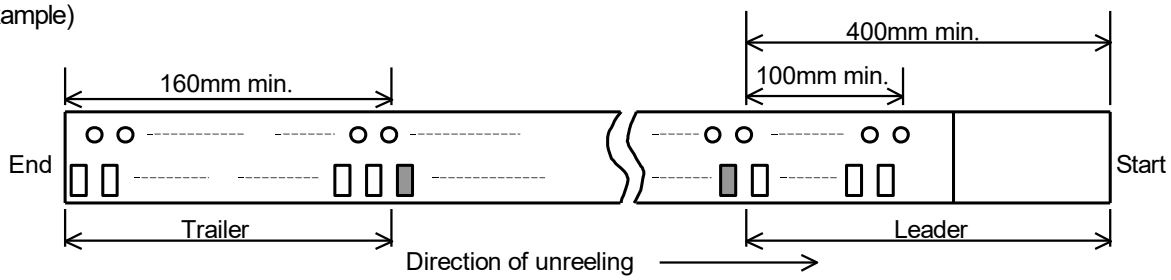
Table−9 Unit: mm

Style	A	B	Note
RLC10, 16, 20, 32, 35	9 +1.0 0	11.4±1.0	Injection molding
		13±1.0	Vacuum forming
RLC50, 63	13 +1.0 0	17±1.0	Vacuum forming

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

8.4 Leader and trailer tape.

(Example)



Figure−9

9. Marking on package

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

9.1 Marking A

(1) Classification

(Style, Temperature coefficient of resistance, Rated resistance, Tolerance on rated resistance, Packaging form)

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

9.2 Marking B (KAMAYA control label)