

# Data sheet

Title: METAL-PLATE CHIP RESISTOR; LOW OHM

Style: RLP16,20,32,63

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.



**釜屋電機株式会社**  
**KAMAYA ELECTRIC CO., LTD.**

Hokkaido Research Center  
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Title: METAL-PLATE CHIP RESISTOR; LOW OHM  
RLP16, 20, 32, 63

Page: 1/12

## 1. Scope

1.1 This data sheet covers the detail requirements for metal-plate chip resistor ; low ohm, style of RLP16, 20, 32, 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) 

RLP	63	K	R010	F	TE
1	2	3	4	5	6

  
Style

1 Metal - plate chip resistor; low ohm  Style

2 Size

RLP16	1608 size
RLP20	2012 size
RLP32	3216 size
RLP63	6332 size

### 3 Temperature coefficient of resistance

N	$\pm 70 \times 10^{-6} / ^\circ\text{C}$
K	$\pm 100 \times 10^{-6} / ^\circ\text{C}$
-(Dash)	Standard

### 4 Rated resistance

1L50	1.5m $\Omega$
R002	2m $\Omega$

### 5 Tolerance on rated resistance

F	$\pm 1\%$
J	$\pm 5\%$

### 6 Packaging form

TP	Paper taping
TE	Embossed taping

Title: METAL-PLATE CHIP RESISTOR; LOW OHM  
RLP16, 20, 32, 63

Page: 2/12

## 3. Rating

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

Table-1(1)

Style	Rated dissipation (W)	Rated current (A)	Temperature coefficient of resistance (10 <sup>-6</sup> /°C)		Rated resistance (mΩ)	Tolerance on rated resistance
RLP16	0.33	8.1	K	±100	5	F(±1%) J(±5%)
			N	±70		
		5.7	K	±100	10	
			N	±70		
RLP20	0.5	15.8	K	100	2	
			N	±70		
		11.1	K	±100	4	
			N	±70		
		10.0	K	100	5	
			N	±70		
		9.1	K	±100	6	
			N	±70		
		7.9	K	100	8	
			N	±70		
		7.4	K	±100	9	
			N	±70		
		7.0	K	±100	10	
			N	±70		
RLP32	1.0	31.6	Standard	±150	1	
			K	±100		
		22.3	K	±100	2	
			N	±70		
		18.2	K	±100	3	
			N	±70		
		15.8	K	±100	4	
			N	±70		
		14.1	K	±100	5	
			N	±70		
		12.9	K	±100	6	
			N	±70		
		11.9	K	±100	7	
			N	±70		
		11.1	K	±100	8	
			N	±70		
		10.5	K	±100	9	
			N	±70		
		10	K	±100	10	
			N	±70		
		9.5	K	±100	11	
			N	±70		
		9.1	K	±100	12	
			N	±70		
		8.7	K	±100	13	
			N	±70		
		8.4	K	±100	14	
			N	±70		
8.1	K	±100	15			
	N	±70				

Table-1(2)

Style	Rated dissipation (W)	Rated current (A)	Temperature coefficient of resistance (10 <sup>-6</sup> / °C)		Rated resistance (mΩ)	Tolerance on rated resistance
RLP63	2.0	44.7	Standard	±150	1	F(±1%) J(±5%)
			K	±100		
			N	±70		
	1.0	22.3	K	±100	2	
			N	±70		
		18.2	K	±100	3	
			N	±70		
		15.8	K	±100	4	
			N	±70		
		14.1	K	±100	5	
			N	±70		
		12.9	K	±100	6	
			N	±70		
		11.9	K	±100	7	
			N	±70		
		11.1	K	±100	8	
			N	±70		
		10.5	K	±100	9	
			N	±70		
		10	K	±100	10	
			N	±70		
		9.1	K	±100	12	
			N	±70		
		8.1	K	±100	15	
			N	±70		

Style	Insulation voltage (V)	Category temperature range (°C)
RLP16	100	-55~+155
RLP20		
RLP32		
RLP63		

3.2 Derating

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

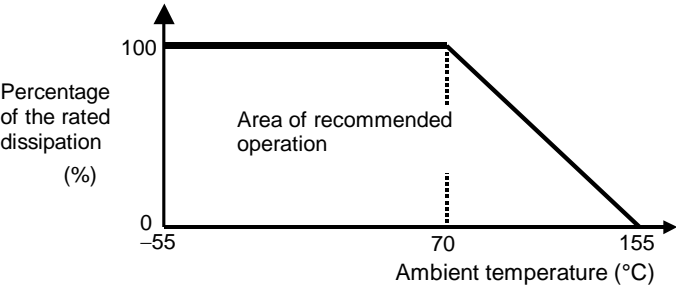


Figure-1 Derating curve

## 3.3 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 ( $\Omega$ )

## 3.4 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 ( $\Omega$ )

The rated current shall be corresponding to rated voltage.

## 4. Packaging form

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

Table-2

Symbol	Packaging form		Standard packaging quantity / units	Application
TP	Paper taping	8mm width, 4mm pitches	5,000 pcs.	RLP16, 20, 32
TE	Embossed taping	12mm width, 4mm pitches	4,000 pcs.	RLP63

## 5. Dimensions

5.1 The resistor shall be of the design and physical dimensions in accordance with Figure-2 and Table-3.

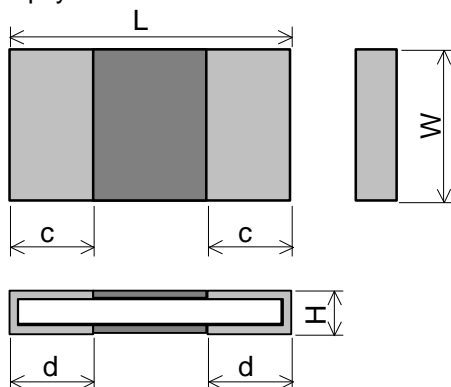


Figure-2

Table-3(1)

Unit: mm

Style	Rated resistance (mΩ)	L	W	H	c	d
RLP16	5	1.6±0.1	0.8±0.1	0.35±0.10	0.2±0.1	0.6±0.1
	10			0.3±0.1	0.2±0.1	0.3±0.1
RLP20	2	2.0±0.15	1.25±0.15	0.22±0.10	0.35±0.10	0.55±0.20
	4			0.35±0.10	0.35±0.10	0.75±0.20
	5			0.35±0.10	0.35±0.10	0.6±0.2
	6			0.35±0.10	0.35±0.10	0.47±0.20
	8			0.22±0.10	0.35±0.10	0.6±0.2
	9			0.22±0.10	0.35±0.10	0.52±0.20
	10			0.22±0.10	0.35±0.10	0.47±0.20
RLP32	1	3.2±0.15	1.6±0.15	0.32±0.15	1.1±0.25	1.1±0.25
	2			0.32±0.15	0.5±0.25	0.5±0.25
	3			0.35±0.10	0.7±0.25	1.3±0.25
	4			0.35±0.10	1.1±0.25	1.1±0.25
	5			0.35±0.10	1.0±0.25	1.0±0.25
	6			0.35±0.10	0.85±0.25	0.85±0.25
	7			0.35±0.10	0.7±0.25	0.7±0.25
	8			0.35±0.10	0.6±0.25	0.6±0.25
	9			0.3±0.1	0.75±0.25	0.75±0.25
	10			0.28±0.10	0.5±0.25	0.5±0.25
	11			0.28±0.10	0.5±0.25	0.5±0.25
	12			0.22±0.10	0.65±0.25	0.65±0.25
	13			0.22±0.10	0.65±0.25	0.65±0.25
	14			0.22±0.10	0.55±0.25	0.55±0.25
	15			0.22±0.10	0.5±0.25	0.5±0.25

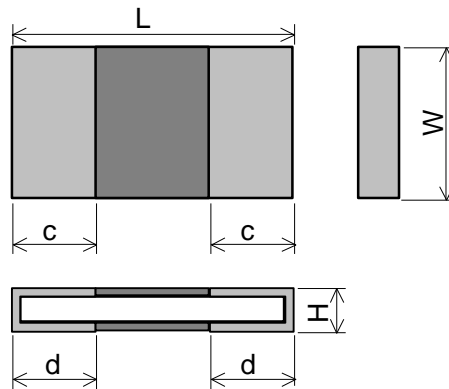


Table-3(2)

Unit: mm

Style	Rated resistance (mΩ)	L	W	H	c	d
RLP63	1	6.3±0.25	3.2±0.25	0.38±0.15	2.2±0.25	2.2±0.25
	2		3.1±0.25	0.38±0.15	1.1±0.25	1.1±0.25
	3			0.45±0.15	2.2±0.25	2.2±0.25
	4			0.35±0.15	2.2±0.25	2.2±0.25
	5			0.34±0.15	1.95±0.25	1.95±0.25
	6			0.34±0.15	1.75±0.25	1.75±0.25
	7			0.35±0.15	1.4±0.25	1.4±0.25
	8			0.35±0.15	1.1±0.25	1.1±0.25
	9			0.35±0.15	0.8±0.25	0.8±0.25
	10			0.23±0.15	1.75±0.25	1.75±0.25
	12			0.23±0.15	1.4±0.25	1.4±0.25
	15			0.23±0.15	0.95±0.25	0.95±0.25

## 5.2 Net weight (Reference)

Style	Rated resistance (mΩ)	Net weight (mg)
RLP16	5,10	2
RLP20	2, 4 to 6 , 8 to 10	3
RLP32	1 to 3	12
	4 to 15	11
RLP63	1,2	47
	3 to 10,12 15	43

## 6. Marking

The Rated resistance of RLP16 should not be marked standard.

## 6.1 RLP63

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

(Example) "R010" → 0.01 [Ω] → 10 [mΩ]

"1L50" → 0.0015 [Ω] → 1.5 [mΩ]

## 6.2 RLP20, 32

The rated resistance shall be marked in combination of two figures and underlines and marked on over coat side.

(Example) "05" → 0.005 [Ω] → 5 [mΩ]

"10" → 0.01 [Ω] → 10 [mΩ]

Title: METAL-PLATE CHIP RESISTOR; LOW OHM  
RLP16, 20, 32, 63

Page: 7/12

## 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-4.

Table-4(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: 1,000 <sup>+48</sup> <sub>0</sub> 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 / 155±2°C, Dwell time: 30min maximum at each temp. Transition time: 1 min. max. Number of cycles: 1,000 cycles. Interval measurements: 250 cy and 500 cy	ΔR/R: Within ±3% 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 <sup>+48</sup> <sub>0</sub> 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±2°C 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: 1,000 <sup>+48</sup> <sub>0</sub> 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-3
7	Resistance to Solvents AEC Q200 – No.12	MIL-STD-202 Method 215 Solvent: 2-propanol at 25°C 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 value 100G, Normal duration 6ms Condition: XX'YY'ZZ', 10times each	ΔR/R: Within ±1% No visible damage



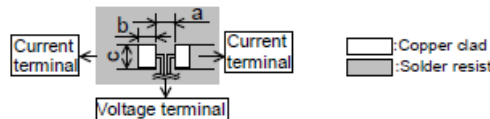
Title: METAL-PLATE CHIP RESISTOR; LOW OHM  
RLP16, 20, 32, 63

Page: 8/12

Table-4(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	$\Delta R/R$ : Within $\pm 1\%$ No visible damage
10	Resistance to soldering heat AEC Q200 - No.15	MIL-STD-202 Method 210 Test conditions:K Peak temperature: $250 \pm 5^\circ\text{C}$ , 30sec Soldering time above $183^\circ\text{C}$ : 90 - 120sec Temperature ramp: $1^\circ\text{C/s}$ - $4^\circ\text{C/s}$ Test times:3 times	$\Delta R/R$ : Within $\pm 3\%$ No visible damage
11	ESD test AEC Q200 – No.17	AEC-Q200-002 Human body model, 2 Kohm, 150 pF, Test voltage: 12kV	$\Delta R/R$ : Within $\pm 5\%$ No visible damage
12	Solderability AEC Q200 – No.18	J-STD-002 B) Bake the sample for $155^\circ\text{C}$ dwell time 4h / solder dipping $235^\circ\text{C}/5\text{s}$ . Solder: Sn96.5-Ag3-Cu0.5 B1) Bake the sample for $155^\circ\text{C}$ dwell time 4h / solder dipping $245^\circ\text{C}/5\text{s}$ . Solder: Sn96.5-Ag3-Cu0.5 D) Category 3, Solder dipping $260^\circ\text{C}/30\text{s}$ .	The surface of terminal immersed shall be min. of 95% covered with a new coating of solder.

Table-4(3)

No.	Test items	Condition of test	Performance requirements																																																							
13	Electrical Characterization AEC Q200 - No.19	<div>1. D.C. Resistance Conform to JIS C 5201-1 4.5 Mount it on our recommended 4-terminal test board and measure the resistance using the 4-terminal measurement method.</div> <div></div> <div>Unit:mm</div> <table><tr><th>Style</th><th>Resistance value(mΩ)</th><th>a</th><th>b</th><th>c</th></tr><tr><td rowspan="2">RLP16</td><td>5</td><td>0.6</td><td>0.8</td><td rowspan="2">0.9</td></tr><tr><td>10</td><td>1.0</td><td>0.6</td></tr><tr><td>RLP20</td><td>2 to 10</td><td>0.8</td><td>0.95</td><td>1.36</td></tr><tr><td rowspan="6">RLP32</td><td>1</td><td>1.0</td><td>1.45</td><td rowspan="6">1.7</td></tr><tr><td>2</td><td>2.1</td><td>0.9</td></tr><tr><td>3</td><td>0.8</td><td>1.55</td></tr><tr><td>4</td><td>1.0</td><td>1.45</td></tr><tr><td>5, 6</td><td>1.4</td><td>1.25</td></tr><tr><td>7 to 15</td><td>2.1</td><td>0.9</td></tr><tr><td rowspan="5">RLP63</td><td>1</td><td>1.5</td><td>3.0</td><td rowspan="5">4.0</td></tr><tr><td>2</td><td>4.0</td><td>1.8</td></tr><tr><td>3, 4</td><td>1.8</td><td>2.9</td></tr><tr><td>5</td><td>2.4</td><td>2.6</td></tr><tr><td>6 to 10,12,15</td><td>4.0</td><td>1.8</td></tr></table> <div>2. Temperature Coefficient of Resistance -55 °C / +20°C +20 °C / +155°C</div>	Style	Resistance value(mΩ)	a	b	c	RLP16	5	0.6	0.8	0.9	10	1.0	0.6	RLP20	2 to 10	0.8	0.95	1.36	RLP32	1	1.0	1.45	1.7	2	2.1	0.9	3	0.8	1.55	4	1.0	1.45	5, 6	1.4	1.25	7 to 15	2.1	0.9	RLP63	1	1.5	3.0	4.0	2	4.0	1.8	3, 4	1.8	2.9	5	2.4	2.6	6 to 10,12,15	4.0	1.8	<div>1. The resistance value shall correspond with the rated resistance taking into account the specified tolerance.</div> <div>2. As in Table-1</div>
Style	Resistance value(mΩ)	a	b	c																																																						
RLP16	5	0.6	0.8	0.9																																																						
	10	1.0	0.6																																																							
RLP20	2 to 10	0.8	0.95	1.36																																																						
RLP32	1	1.0	1.45	1.7																																																						
	2	2.1	0.9																																																							
	3	0.8	1.55																																																							
	4	1.0	1.45																																																							
	5, 6	1.4	1.25																																																							
	7 to 15	2.1	0.9																																																							
RLP63	1	1.5	3.0	4.0																																																						
	2	4.0	1.8																																																							
	3, 4	1.8	2.9																																																							
	5	2.4	2.6																																																							
	6 to 10,12,15	4.0	1.8																																																							
14	Flammability AEC Q200 – No.20	UL-94	V-1 is acceptable																																																							
15	Bending strength AEC Q200 – No.21	AEC-Q200-005 Bending value: 2mm Holding time: 60sec.	ΔR/R: Within ±1% No visible damage																																																							
16	Adhesion AEC Q200 – No.22	AEC-Q200-006 Pressurizing force: RLP20,32,63: 17.7N RLP16: 10N Test time: 60±1s.	ΔR/R: Within ±1% No visible damage																																																							

## 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, 4mm pitches)

Taping dimensions shall be in accordance with Figure-3 and Table-5.

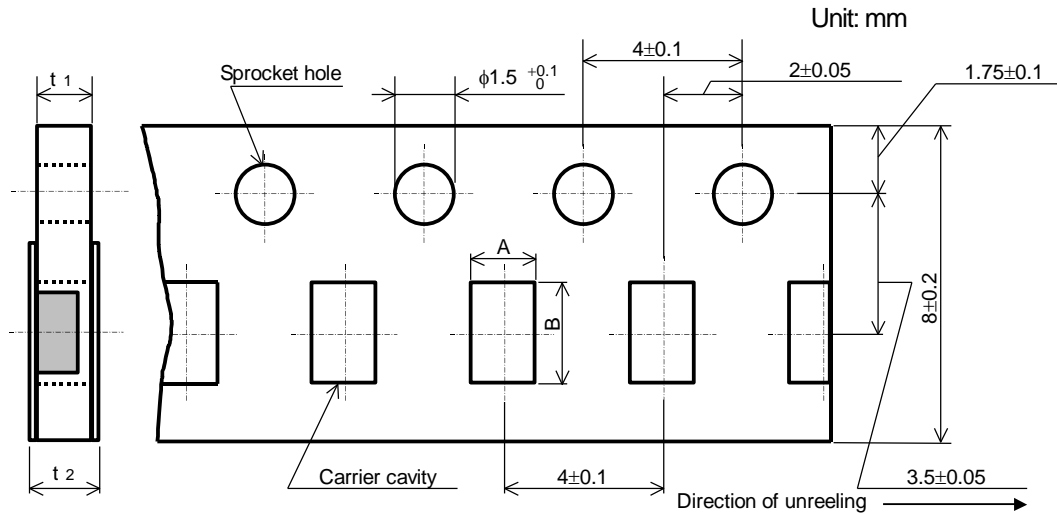


Figure-3

Table-5

Unit: mm

Style	A	B	$t_1$	$t_2$
RLP16	$1.15 \pm 0.15$	$1.9 \pm 0.2$	$0.6 \pm 0.1$	0.8max.
RLP20	$1.65 \pm 0.15$	$2.5 \pm 0.2$	$0.6 \pm 0.1$	0.8max.
RLP32	$2.00 \pm 0.15$	$3.6 \pm 0.2$	$0.6 \pm 0.1$	0.8max.

## 8.2.2 Embossed taping (12mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure-4 and Table-6.

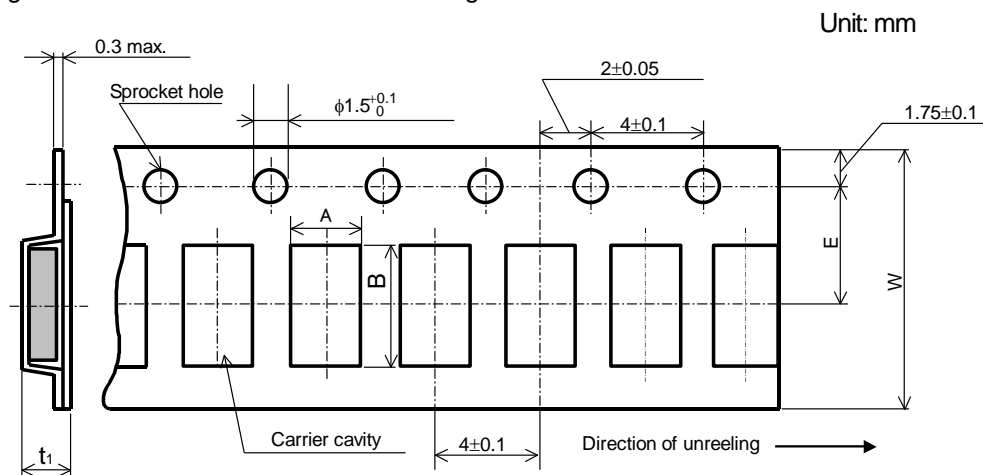


Figure-4

Table-6

Unit: mm

Style	A	B	W	E	$t_1$
RLP63	$3.6 \pm 0.2$	$6.9 \pm 0.2$	$12.0 \pm 0.3$	$5.5 \pm 0.05$	$1.1 \pm 0.15$

- 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  $\pm 0.2\text{mm}$ .
- 5). The peel strength of the top cover tape shall be within 0.1N to 0.5N on the test method as shown in the following RLP16, 20, 32: Figure-5, RLP63: Figure-6.
- 6). When the tape is bent with the minimum radius for (RLP16,20,32: 25mm, RLP63: 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.

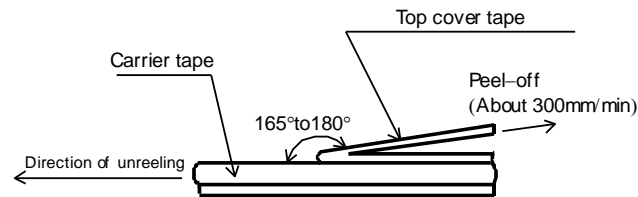


Figure-5

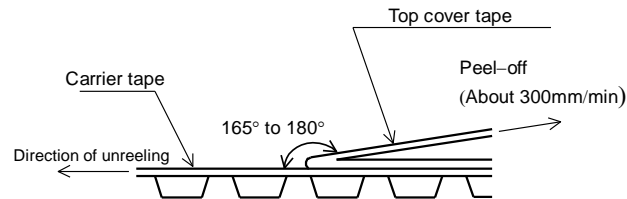


Figure-6

## 8.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure-7 and Table-7.

Plastic reel (Based on EIAJ ET-7200C)

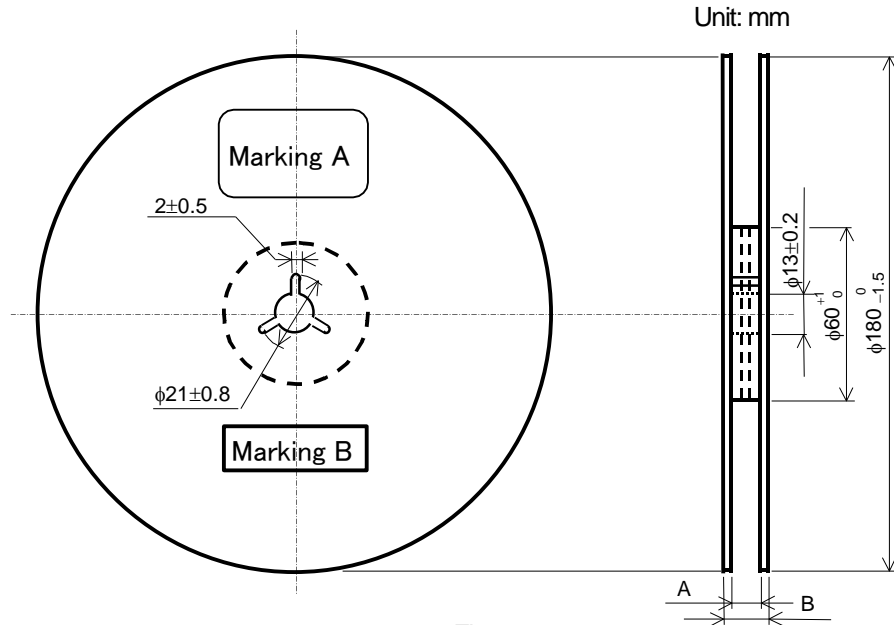


Figure-7

Table-7

Unit: mm

Style	A	B	Note
RLP16, 20, 32	9 <sup>+1.0</sup> <sub>0</sub>	11.4±1.0	Injection molding
		13±1.0	Vacuum forming
RLP63	13 <sup>+1.0</sup> <sub>0</sub>	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.

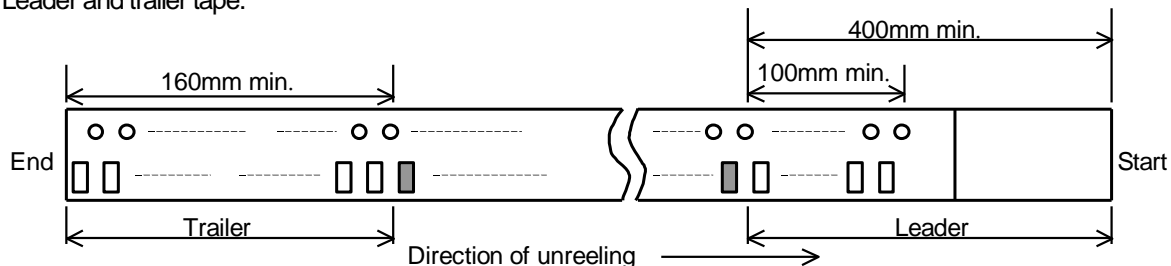


Figure-8

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

### 9.2 Marking B (KAMAYA Control label)