# Standard Specification for surface mount chip resistors

This standard specification describes shared specifications among surface mount chip resistors regarding placement and packaging.
Custom products and products in development may not be included in these specifications.
Contact our sales office for these products.

These specifications may not be applicable to power choke products and high frequency components. Contact our sales office for these products.

# Recommended land patterns (soldering footprints)

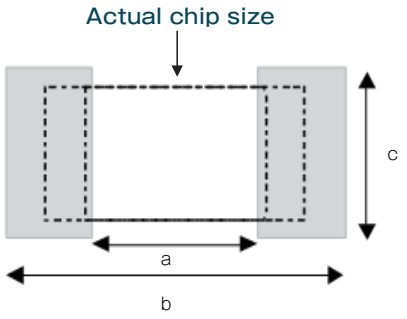
## ① For thin film chip resistor

### 【Applicable series】

- URG series
- RG series
- RGT series
- RGV series
- NRG series
- MRG series
- RGA series *1
- RS series
- RR series
- RT series

| Recommended land dimensions (mm) | | | |
|---|---|---|---|
| Sizes | a | b | c |
| 0603 | 0.28 | 0.76 | 0.34 |
| 1005 | 0.5 | 1.6 | 0.6 |
| 1608 | 1.0 | 3.0 | 1.2 |
| 2012 | 1.2 | 4.0 | 1.65 |
| 3216 | 2.2 | 5.0 | 2.0 |
| 3225 | 2.2 | 5.5 | 2.9 |
| 5025 | 3.8 | 6.8 | 2.9 |
| 6432 | 4.8 | 8.2 | 3.6 |

*1 RGA is compatible with conductive epoxies.
Please contact our sales office for details for conductive epoxy usage.

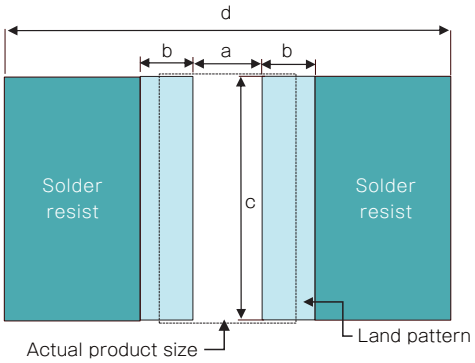



### 【Applicable series】

- PRG series

| Recommended land dimensions (mm) | | | | |
|---|---|---|---|---|
| Sizes | a | b | c | d (*1) (reference) |
| 3216 | 0.8 | 1.1 | 3.7 | ≧27 |
| 5025 | 1.2 | 1.4 | 5.5 | ≧27 |
| 6432 | 2 | 2.1 | 6.9 | ≧27 |

*1 Please design the land pattern considering heat dissipation to the board so that the terminal temperature will not exceed 155°C.

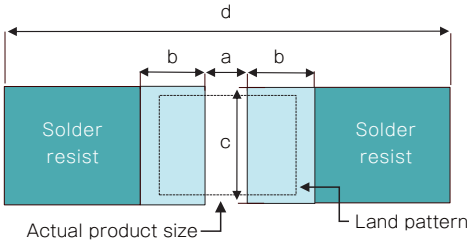



### 【Applicable series】

- HRG series

| Recommended land dimensions (mm) | | | | |
|---|---|---|---|---|
| Sizes | a | b | c | d (*1) (reference) |
| 3216 | 0.55 | 1.9 | 1.8 | ≧27 |

*1 Please design the land pattern considering heat dissipation to the board so that the terminal temperature will not exceed 155°C.

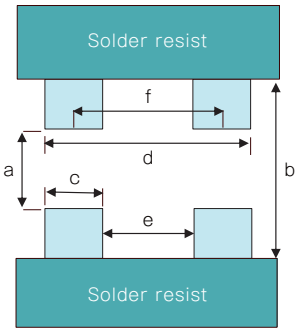


## 【Applicable series】

・RM series[*1]　・RMA series[*2]

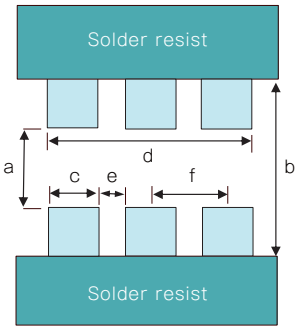
### ◯ 4 terminal type

| Recommended land dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|
| Sizes | a | b | c | d | e | f |
| RM/RMA2012 | 0.6 ~ 0.7 | 1.6 ~ 1.8 | 0.4 ~ 0.6 | 1.8 ~ 2.0 | 0.7 ~ 0.9 | 1.3 ~ 1.5 |
| RM/RMA3216 | 0.6 ~ 0.8 | 2.4 ~ 2.7 | 0.6 ~ 0.8 | 2.6 ~ 3.2 | 1.4 ~ 1.6 | 2.2 ~ 2.4 |
| RM/RMA3225 | 1.5 ~ 1.7 | 3.3 ~ 3.6 | 0.6 ~ 0.8 | 2.6 ~ 3.2 | 1.4 ~ 1.6 | 2.2 ~ 2.4 |



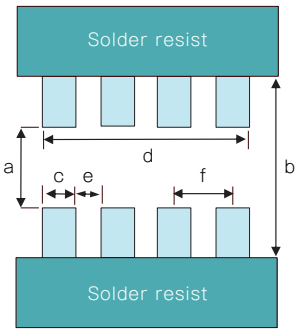

### ◯ 6 terminal type

| Recommended land dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|
| Sizes | a | b | c | d | e | f |
| RM3216 | 0.5 ~ 0.7 | 2.4 ~ 2.7 | 0.6 ~ 0.8 | 2.5 ~ 2.7 | 0.2 ~ 0.3 | 0.9 ~ 1.0 |
| RM3225 | 1.3 ~ 1.5 | 3.3 ~ 3.6 | 0.6 ~ 0.8 | 2.5 ~ 2.7 | 0.2 ~ 0.3 | 0.9 ~ 1.0 |




### ◯ 8 terminal type

| Recommended land dimensions (mm) | | | | | | |
|---|---|---|---|---|---|---|
| Sizes | a | b | c | d | e | f |
| RM3216 | 0.7 ~ 0.8 | 2.2 ~ 2.3 | 0.4 ~ 0.45 | 2.9 ~ 3.0 | 0.3 ~ 0.35 | 0.8 ~ 0.85 |
| RM3225 | 1.4 ~ 1.5 | 3.4 ~ 3.5 | 0.4 ~ 0.45 | 2.9 ~ 3.0 | 0.3 ~ 0.35 | 0.8 ~ 0.85 |
| RM6432 | 1.9 ~ 2.0 | 4.0 ~ 4.1 | 0.85 ~ 0.9 | 5.7 ~ 5.8 | 0.7 ~ 0.75 | 1.6 ~ 1.65 |




*1 Custom RM requires custom land patterns. Please contact us.
*2 RMA is compatible with conductive epoxies . Please contact our sales office for details for conductive epoxy usage.

# Recommended land patterns (soldering footprints)

## ② For current sensing chip resistor

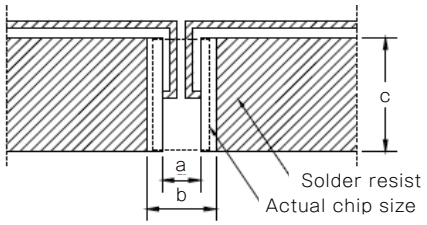
### 【Applicable series】

・KRL series (long side terminal)

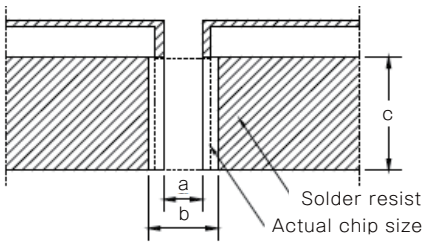
**Recommended land dimensions (mm)**

| Types | Resistance range | Copper foil thickness (um) | a | b | c |
|---|---|---|---|---|---|
| KRL1608D | 5mΩ~ | 100 | 0.25 | 1.60 | 1.70 |
| KRL2012D/E | 1mΩ*1 | 100 | 0.25 | 2.00 | 2.20 |
| | 2mΩ~ | 35 | 0.60 | | |
| KRL3216D/E | 1mΩ*1 | 100 | 0.40 | 2.40 | 3.40 |
| | 2mΩ~ | 35 | 0.60 | | |
| KRL5025D/E | 1mΩ*1 | 35 | 0.70 | 4.00 | 5.20 |
| | 2mΩ~ | 100 | 1.20 | | |
| KRL6432D/E | 1mΩ*1 | | 0.70 | 4.20 | 6.60 |
| | 2mΩ~ | | 2.20 | | |
| KRL7638D/E | 1mΩ*1 | | 1.10 | 4.60 | 7.80 |
| | 2mΩ~ | | 2.60 | | |
| KRL9045D/E | 1mΩ*1 | | 1.30 | 5.10 | 9.20 |
| | 2mΩ~ | | 3.10 | | |
| KRL11050D/E | 1mΩ*1 | | 1.80 | 5.60 | 11.20 |
| | 2mΩ~ | | 3.60 | | |
| KRL15075D/E | 1mΩ*1 | | 2.00 | 8.40 | 15.20 |
| | 2mΩ~ | | 5.00 | | |

*1 Refer to the diagram right for the Land pattern of 1mΩ




*1 KRL2012D/E, KRL3216D/E, KRL5025D/E, KRL6432D/E, KRL7638D/E, KRL9045D/E, KRL11050D/E, KRL15075D/E : 1mΩ



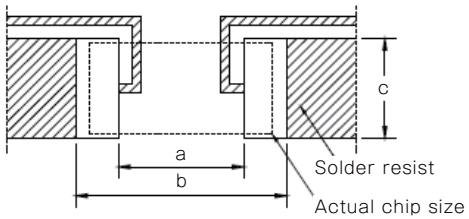

### 【Applicable series】

・KRL series (Short side terminal)

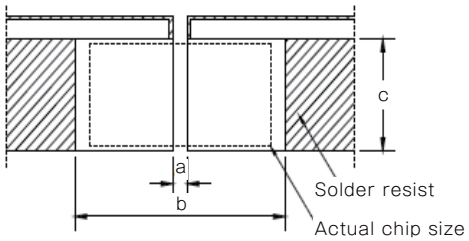
**Recommended land dimensions (mm)**

| Types | Resistance range | Copper foil thickness (um) | a | b | c |
|---|---|---|---|---|---|
| KRL0816D/E | 5mΩ~ | 100 | 0.90 | 2.20 | 1.00 |
| | 6~18mΩ*1 | 35 | 0.10 | | |
| | 20~39mΩ*1 | | 0.50 | | |
| | 47mΩ~ | 100 | 0.90 | | |
| KRL1220D/E | 5mΩ~ | 100 | 1.20 | 2.70 | 1.50 |
| KRL1632D/E | 3~8mΩ | 100 | 1.00 | 4.00 | 1.90 |
| | 9mΩ~ | | 2.00 | | |
| KRL2550D/E | 5~8mΩ | 100 | 2.20 | 6.00 | 2.80 |
| | 9mΩ~ | | 3.80 | | |
| KRL3264D/E | 2~4mΩ | 70 | 0.60 | 7.40 | 3.50 |
| | 5~8mΩ | 100 | 2.50 | | |
| | 9mΩ~ | | 4.40 | | |
| KRL50110D/E | 5~7mΩ | 100 | 2.80 | 14.00 | 5.75 |
| | 8mΩ~ | | 5.00 | | |

*1 Refer to the diagram right for the land pattern of KRL0816D/E



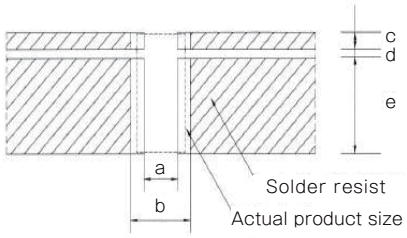

*1 KRL0816D/E : 10 ~ 18mΩ, 20 ~ 39mΩ



## 【Applicable series】

・KRL series (4terminal type)

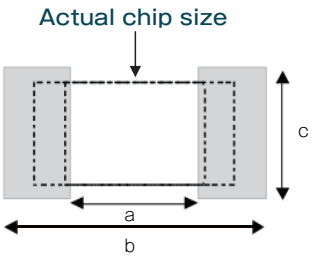
| Recommended land dimensions (mm) | | | | | |
|---|---|---|---|---|---|
| Types | a | b | c | d | e |
| KRL3216T4 | 0.40 | 2.70 | 0.35 | 0.30 | 2.70 |
| KRL3216T4A | 0.76 | 2.76 | 0.76 | 0.38 | 2.29 |
| KRL6432T4 | 2.00 | 4.40 | 0.70 | 0.50 | 5.40 |
| KRL7638T4 | 2.00 | 4.40 | 1.00 | 0.60 | 6.30 |
| KRL9045T4 | 2.60 | 5.00 | 1.20 | 0.70 | 7.50 |
| KRL11050T4 | 3.20 | 5.60 | 1.60 | 1.10 | 8.70 |




## 【Applicable series】

・RL Series (Short side terminal)

| Recommended land dimensions (mm) | | | |
|---|---|---|---|
| Sizes | a | b | c |
| 0510 | 0.5 | 1.9 | 0.7 |
| 0816 | 0.7 | 3.0 | 1.6 |
| 1220 | 1.0 | 4.0 | 2.4 |

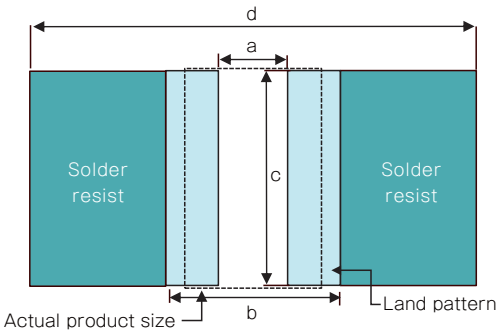



## 【Applicable series】

・RL Series (Short side terminal)

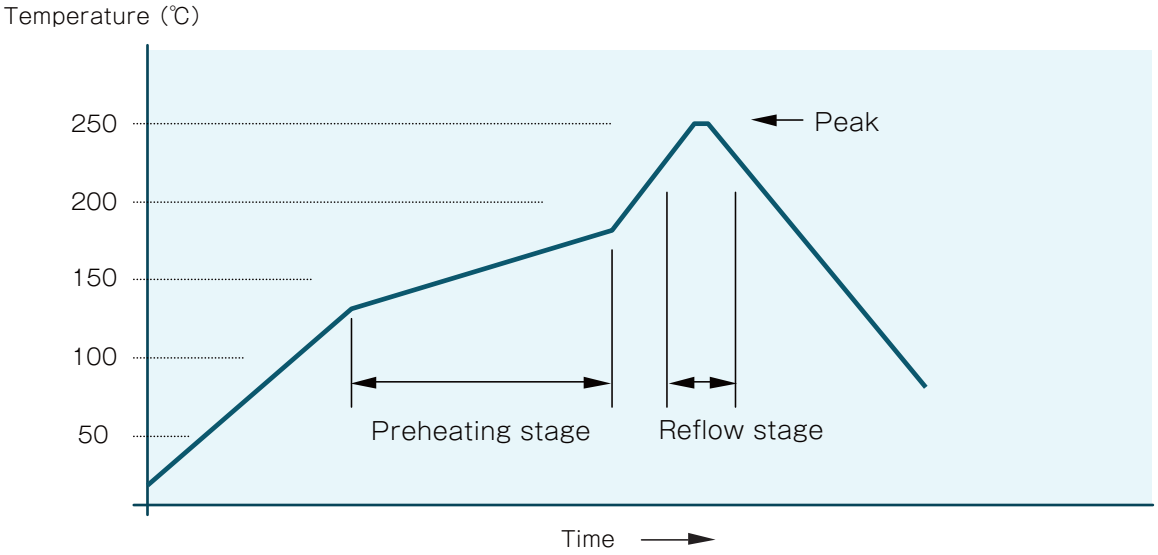
| Recommended land dimensions (mm) | | | | |
|---|---|---|---|---|
| Sizes | a | b | c | d |
| RL3720W | 1.2 | 7.9 | 7.9 | 27.0 |
| RL7520W | 1.2 | 15.8 | 15.8 | 27.0 |

The recommended land dimensions c and d are for reducing surface temperature rise.
They can be changed according to the operating environment.



# Recommended reflow and flow soldering profile

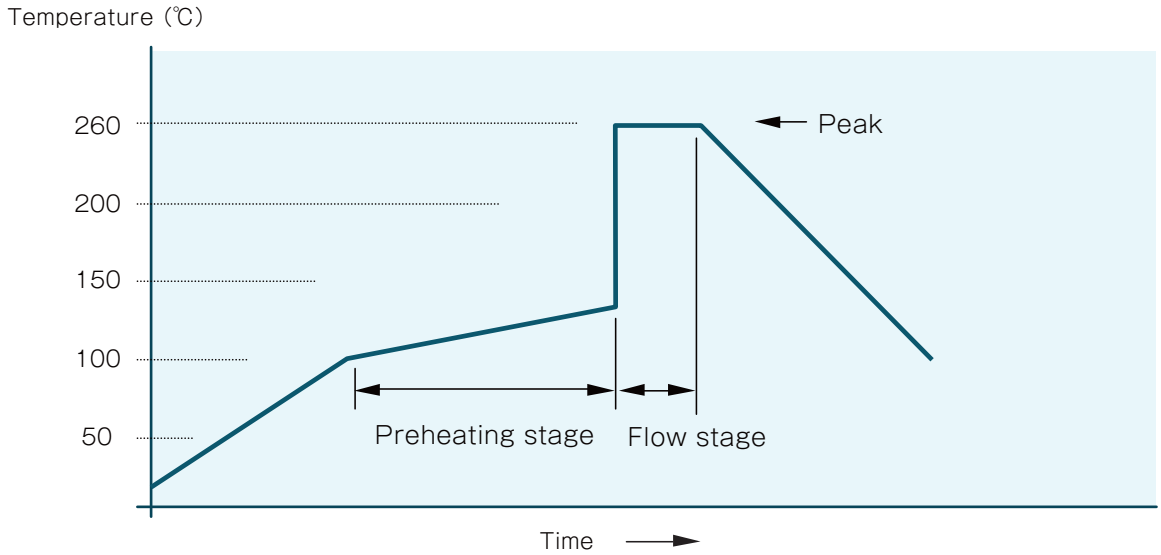
## Recommended reflow soldering profile




### Product surface temperature

| | |
|---|---|
| pre-heating | 130～180℃ 60～90sec. |
| Reflow | above 220℃ 30～90sec. |
| Peak temperature | 240～250℃ aximum 10 seconds<br>· Applicable solder composition : Sn−Ag−Cu solder paste<br>· Cycles : twice (cooling between 1st and 2nd cycles) |

## Recommended flow soldering profile




### Product surface temperature

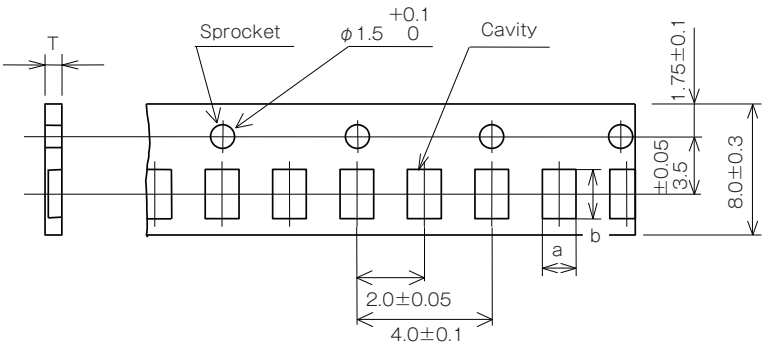
| | |
|---|---|
| pre-heating | 100℃～120℃ 60～80 sec |
| Peak temperature | 255℃～265℃ aximum 5 seconds<br>· Applicable solder composition : Sn−Ag−Cu solder paste<br>· Cycles : twice |

# Dimensions of the packaging tape

## ① For thin film chip resistor

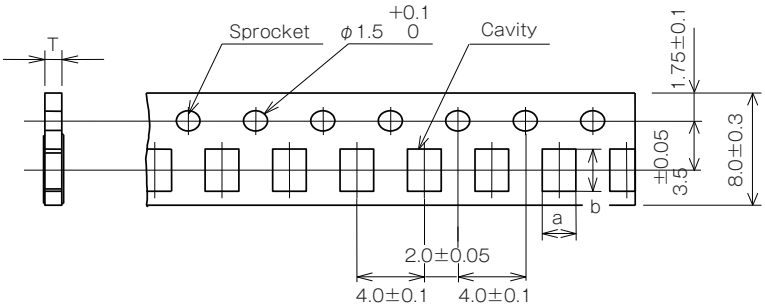
### Tape dimensions (paper 2 mm pitch)

| Types | a | b | T |
|---|---|---|---|
| RG0603/ RT0603 | 0.38±0.03 | 0.68±0.03 | 0.31+0.02 |
| RR/RT0510 | 0.63±0.05 | 1.13±0.05 | 0.43±0.05 |
| RG/RGT/NRG/ RS/RGA1005 | 0.63±0.05 | 1.13±0.05 | 0.43±0.05 |
| RL0510 | 0.63±0.05 | 1.13±0.05 | 0.43±0.05 |

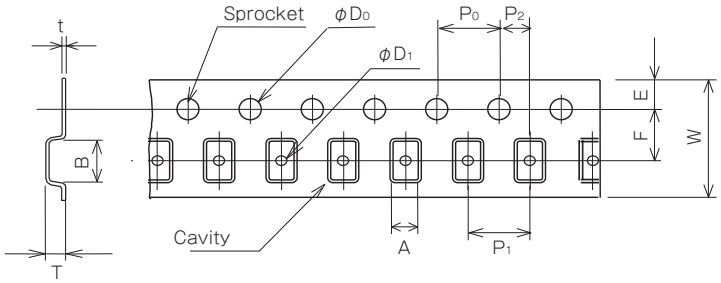



### Tape dimensions (paper 4 mm pitch)

| Types | a | b | T |
|---|---|---|---|
| RR/RT/0816 | 1.1±0.1 | 1.9±0.1 | 0.6±0.05 |
| URG/RG/RGT/RGV NRG/RGA1608 | 1.1±0.1 | 1.9±0.1 | 0.6±0.05 |
| RL0816 | 1.1±0.1 | 1.9±0.1 | 0.6±0.05 |
| RR/RT1220 | 1.65±0.2 | 2.4±0.2 | 0.75±0.05 |
| URG/RG/RGT/RGV MRG/NRG/RGA2012 | 1.65±0.2 | 2.4±0.2 | 0.75±0.05 |
| RL1220 | 1.65±0.2 | 2.4±0.2 | 0.75±0.05 |




### Tape dimension (embossed tape 4mm pitch)



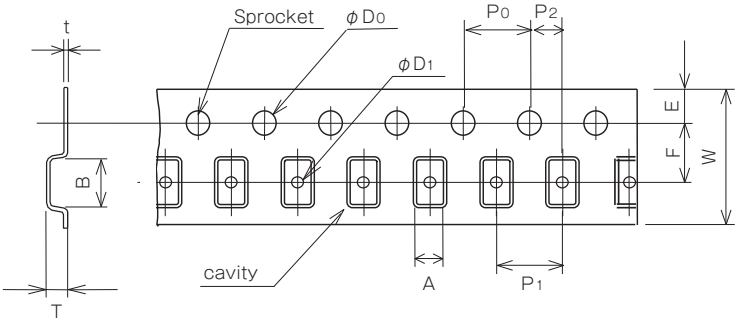

| Types | A | B | W | F | E | $P_0$ | $P_1$ | $P_2$ | $\varphi D_0$ | $\varphi D_1$ | T | t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RM2012 | 1.6±0.2 | 2.4±0.2 | 8.0±0.3 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.55±0.05 | 1.05±0.05 | 1.5 max | 0.3max |
| URG/RG/RGT RGV/NRG 3216 | 2.0±0.2 | 3.6±0.2 | 8.0±0.3 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.55±0.05 | 1.05±0.05 | 1.5 max | 0.3max |
| PRG/HRG/MRG RM/RMA3216 | 2.0±0.2 | 3.6±0.2 | 8.0±0.3 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.55±0.05 | 1.05±0.05 | 1.5 max | 0.3max |
| RGV/RM/RMA 3225 | 2.8±0.1 | 3.5±0.1 | 8.0±0.3 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.55±0.05 | 1.1±0.1 | 1.5 max | 0.3max |
| PRG 5025 | 2.8±0.1 | 5.3±0.1 | 12.0±0.2 | 5.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.55±0.05 | 1.1±0.1 | 1.5 max | 0.3max |
| URG/MRG 5025 | 2.8±0.1 | 5.3±0.1 | 12.0±0.2 | 5.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.55±0.05 | 1.1±0.1 | 1.5 max | 0.3max |
| PRG/RM 6432 | 3.5±0.2 | 6.9±0.2 | 12.0±0.2 | 5.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.55±0.05 | 1.50+0.1/-0 | 1.5 max | 0.3max |

# Dimensions of the packaging tape

## ② For current sensing chip resistor

### Tape dimensions (embossed tape)

○ **4 mm pitch , 8 mm pitch,**




| Types | A | B | W | F | E | $P_0$ | $P_1$ | $P_2$ | φ$D_0$ | φ$D_1$ | T | t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KRL0816/1608 YJP1608 | 0.95±0.05 | 1.85±0.05 | 8.0±0.1 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.5+0.1/-0 | 0.6±0.05 | 0.55±0.05 | 0.2±0.05 |
| KRL1220 /2012 | 1.45±0.05 | 2.3±0.1 | 8.0±0.2/-0 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.5+0.1/-0 | - | 0.65±0.1 | 0.2±0.05 |
| KRL1632 /3216 | 1.9±0.1 | 3.5±0.1 | 8.0±0.2 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.5+0.1/-0 | 1.0+0.2/-0 | 0.8±0.10 | 0.2±0.05 |
| KRL2550 /5025 | 2.9±0.2 | 5.3±0.2 | 12.0±0.3 | 5.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.5+0.1/-0 | 1.5+0.2/-0 | 0.75±0.10 | 0.20±0.05 |
| KRL3264/6432 KRL6432T4 | 3.43±0.2 | 6.63±0.2 | 12.0±0.3 | 5.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.5+0.1/-0 | 1.5+0.2/-0 | 0.76±0.1 | 0.2±0.05 |
| KRL7638 KRL7638T4 | 4.15±0.1 | 7.95±0.1 | 16.0±0.3 | 7.5±0.1 | 1.75±0.1 | 4.0±0.1 | 8.0±0.1 | 2.0±0.1 | 1.5±0.1 | 1.5±0.1 | 1.2±0.15 | 0.3±0.05 |
| KRL9045 KRL9045T4 | 4.85±0.1 | 9.35±0.1 | 16.0±0.3 | 7.5±0.1 | 1.75±0.1 | 4.0±0.1 | 8.0±0.1 | 2.0±0.1 | 1.5±0.1 | 1.5±0.1 | 1.2±0.15 | 0.3±0.05 |
| KRL50110 /11050 KRL11050T4 | 5.4±0.1 | 11.5±0.1 | 24.0±0.3 | 11.5±0.1 | 1.75±0.1 | 4.0±0.1 | 8.0±0.1 | 2.0±0.1 | 1.5±0.1 | 1.5±0.1 | 1.2±0.15 | 0.3±0.05 |

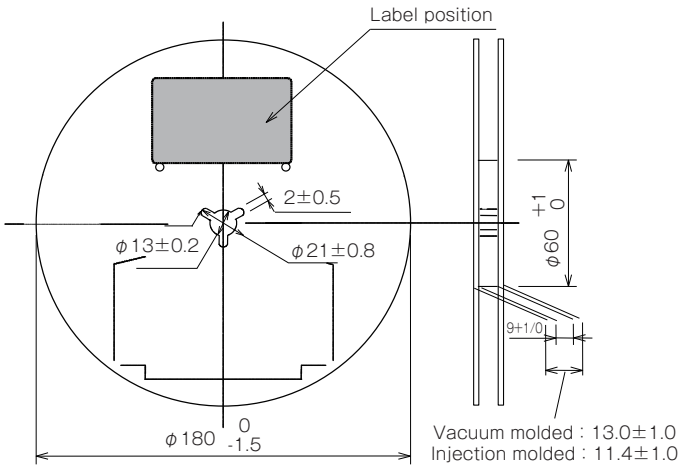
| Types | A | B | W | F | E | $P_0$ | $P_1$ | $P_2$ | φ$D_0$ | φ$D_1$ | T | t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RL3720W | 2.6±0.2 | 4.45±0.2 | 12.0±0.2 | 5.5±0.05 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 | 1.55±0.05 | – | 0.7±0.1 | 0.3±0.05 |
| RL7520W | 2.6±0.2 | 8.2±0.2 | 16.0±0.3 | 7.5±0.1 | 1.75±0.1 | 4.0±0.1 | 4.0±0.1 | 2.0±0.1 | 1.55±0.05 | – | 0.7±0.1 | 0.3±0.05 |

# Dimensions of the packaging reel

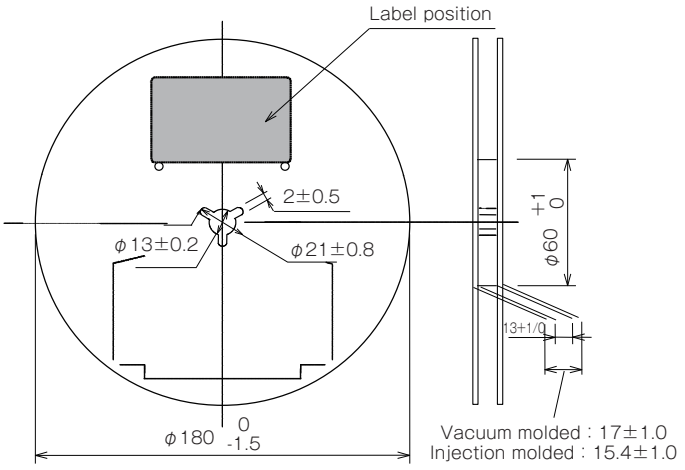
## 【Applicable series】

・URG series ・RG series ・RGT series ・RGV series ・NRG series ・RS series ・PRG series
・HRG series ・MRG series ・RGA series ・RRseries ・RT series ・RM series ・RMA series

0603, 1005, 1608, 2012, 3216 size

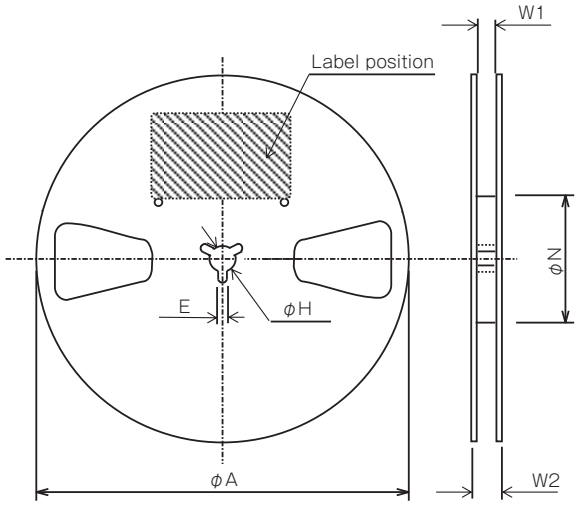



5025, 6432 size




## 【Applicable series】

・KRL series（long side terminal） ・KRL series（short side terminal） ・KRL series（4 terminals） ・YJP series




Material : plastic

| Sizes | pieces / reel | φA | φH | E | φN | W1 | W2 |
|---|---|---|---|---|---|---|---|
| 0816/1608<br>1220/2012<br>1632/3216 | 1,000/5,000 | 180+0/-3.0 | 13±0.2 | 2±0.5 | 60+1.0/-0.0 | 9±0.3 | 13±1.4 |
| 2550/5025<br>3264/6432 | 1,000<br>5,000 | 180+0/-3.0<br>255±1.0 | 13±0.2<br>13±0.2 | 2±0.5<br>2±0.5 | 60+1.0/-0.0<br>80±0.5 | 13±0.3<br>13.5±1.0 | 17±1.4<br>18.4 以下 |
| 7638<br>9045 | 1,000<br>5,000 | 180+0/-3.0<br>330±2.0 | 13±0.2<br>13±0.2 | 2±0.5<br>2±0.5 | 60+1.0/-0.0<br>80±1.0 | 17.0±0.3<br>17.4±1.0 | 19.4±1.0<br>21.4±1.0 |
| 50110/11050 | 1,000 | 180±2.0 | 13±0.2 | 2±0.5 | 80±1.0 | 25.4±1.0 | 29.4±1.0 |
| 15075 | 500<br>1,000 | 180±2.0<br>330±2.0 | 13±0.2<br>13±0.2 | 2±0.5<br>2±0.5 | 80±1.0<br>100±1.0 | 25.4±1.0<br>25.4±1.0 | 29.4±1.0<br>29.4±1.0 |