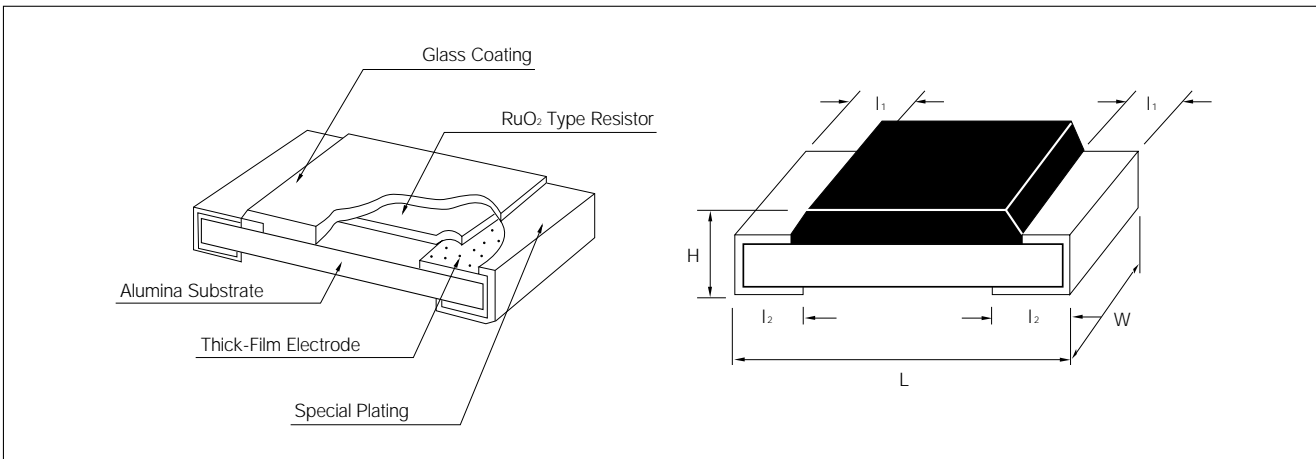


# THICK FILM CHIP RESISTORS

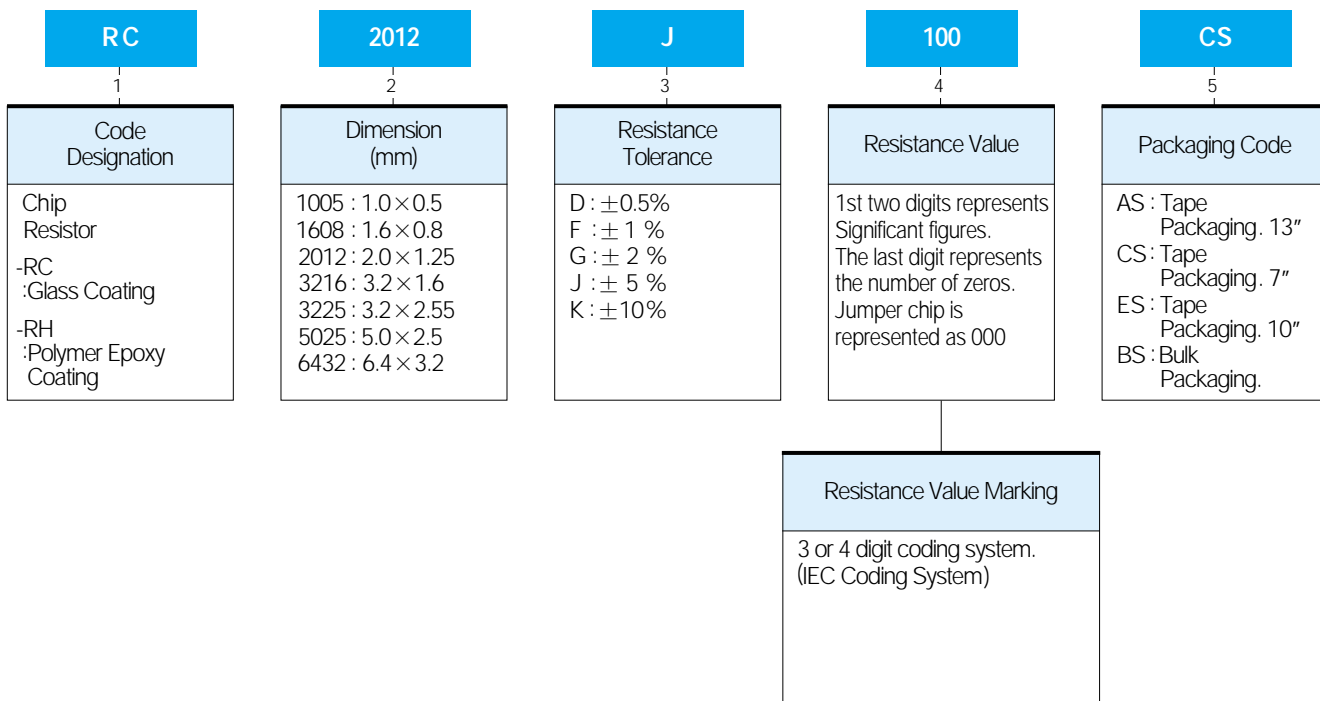
## STRUTURE AND DIMENSIONS



(UNIT : mm)

Type	L	W	H	l <sub>1</sub>	l <sub>2</sub>
RC1005(1/16W)	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
RC1608(1/10W)	1.60±0.10	0.80±0.15	0.45±0.10	0.30±0.20	0.35±0.10
RC2012(1/8W)	2.00±0.20	1.25±0.15	0.50±0.10	0.40±0.20	0.35±0.20
RC3216(1/4W)	3.20±0.20	1.60±0.15	0.55±0.10	0.45±0.20	0.40±0.20
RC3225(1/4W)	3.20±0.20	2.55±0.20	0.55±0.10	0.45±0.20	0.40±0.20
RC5025(1/2W)	5.00±0.15	2.50±0.15	0.55±0.15	0.60±0.20	0.60±0.20
RC6432(1W)	6.30±0.15	3.20±0.15	0.55±0.15	0.60±0.20	0.60±0.20

## PARTS NUMBERING SYSTEM



## THICK FILM CHIP RESISTORS

### GENERAL SPECIFICATION

Description	RC1005	RC1608	RC2012	RC3216	RC3225	RC5025	RC6432
Power Rating (W) at 70℃	0.063W	0.10W	0.125W	0.25W	0.25W	0.5W	1W
Power Derating Curve	<p>■ 1608, 2012, 3216</p> <p>The rated power is the maximum continuous loading power at 70℃ ambient temperature. For ambient temperature's above 70℃ the loading power follows the above power derating curve.</p>						
Rated Voltage	$\sqrt{\text{Rated power(w)} \times \text{Normal resistance value (W)}}$						
Working Voltage (Max)	50V	50V	50V	150V	200V	200V	200V
Overload Voltage (Max)	100V	100V	100V	300V	400V	400V	400V
Resistance Range	(UNIT: Ω)						
D(±0.5%)	-	10~1M	10~1M	10~1M	10~1M	-	-
F(±1%), G(±2%)	10~1M	10~1M	10~1M	10~1M	10~1M	10~1M	10~1M
J(±5%)	10~1M	1~10M	1~10M	1~10M	1~10M	1~10M	1~10M
K(±10%)	10~1M	1~10M	1~10M	1~10M	1~10M	1~10M	1~10M
Jumper Chip	50 mΩ max						
Operating Temperature Range	-55℃ ~ 125℃ -55℃ ~ 155℃ (For 1608, 2012, 3216)						
Rated Temperature Range	70℃						
Temperature Coefficient	Resistance Tolerance	Resistance Range		Temperature Coefficient			
	J (±5%) K (±10%)	1 Ω ≤ R ≤ 10 MΩ		±(300/200) PPM/℃			
		10 Ω ≤ R < 1 MΩ		±100 PPM/℃			
		1 MΩ ≤ R < 10 MΩ		±3 00 PPM/℃			
G (±2%) F (±1%) D (±0.5%)	10 Ω ≤ R < 1 MΩ		±100 PPM/℃				

\* Please specify wattage when power rathing at the mark( \*) is required at the time of ordering.

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## THICK FILM CHIP RESISTORS

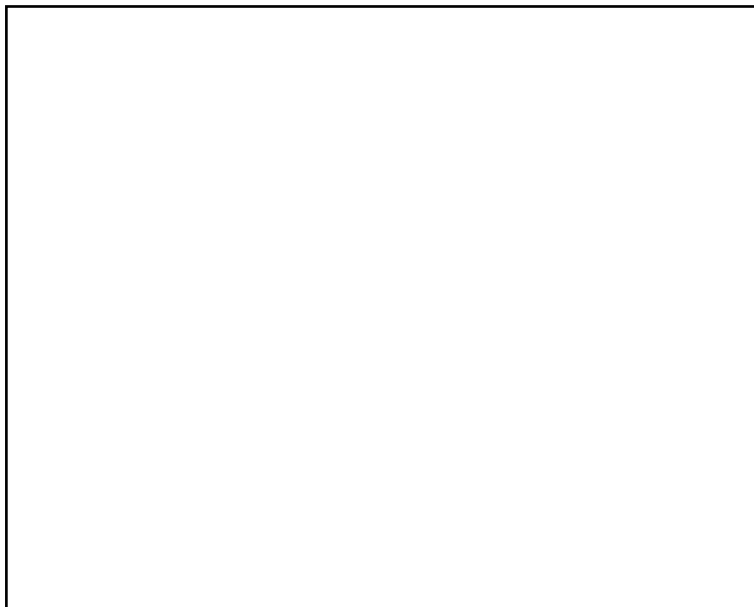
### SPECIFICATION IN THE LOW RESISTANCE RANGE

Description	RC2012	RC3216	RC3225	RC5025	RC6432
Power Rating (W) at 70℃	0.10W	0.125W *0.25W	0.25W	0.5W	1W
Power Derating Curve	<p><b>POWER Derating Curve</b></p> <p>The rated power is the maximum continuous loading power at 70℃ ambient temperature. For ambient temperature's above 70℃ the loading power follows the above power derating curve.</p>				
Rated Voltage	$\sqrt{\text{Rated power}(w) \times \text{Normal resistance value } (W)}$				
Working Voltage(Max)	50V	100V	200V	200V	200V
Overload Voltage(Max)	100V	200V	400V	400V	400V
Resistance range	(UNIT : Ω)				
F(±1%)	0.2 Ω ~ 0.91 Ω (E24 Series)				
G(±2%)					
J(±5%)					
K(±10%)					
Operating temperature range	-55℃ ~ 125℃				
Rated Ambient Temperature	70℃				
Temperature Coefficient	Resistance Tolerance	Resistance Range		Temperature Coefficient	
	F(±1%)	0.2 Ω ≤ R ≤ 1 Ω		±200 PPM/℃	
	G(±2%)	0.2 Ω ≤ R ≤ 1 Ω		±200PPM/℃	
	J(±5%)	0.2 Ω ≤ R ≤ 1 Ω		±(600/300)PPM/℃	
	K(±10%)	0.2 Ω ≤ R ≤ 1 Ω		±(600/300)PPM/℃	

\* Please specify wattage when power rathing at the mark( \*) is required at the time of ordering.

## THICK FILM CHIP RESISTORS

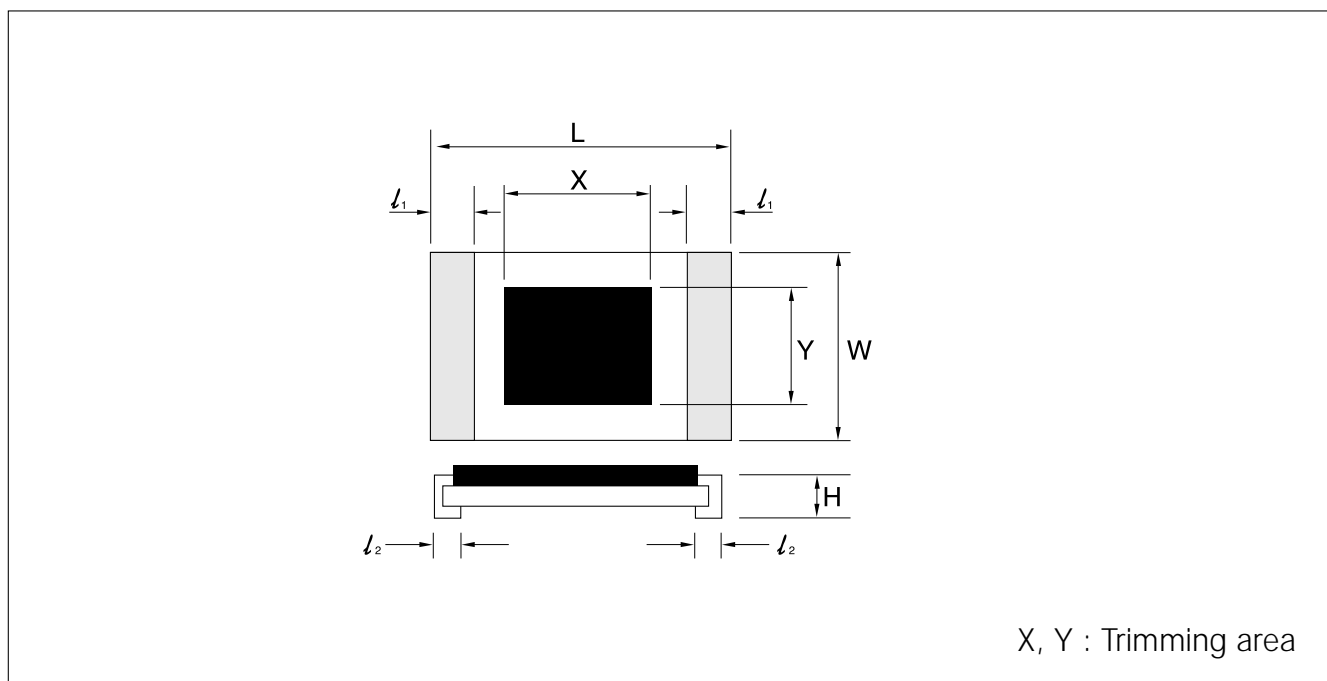
### TRIMMABLE CHIP RESISTOR



#### FEATURES

- Available in use of function trimming.
- Compatible with both wave and reflow soldering.
- Highly stable in auto-placement surface mounting application.
- Excellent electrical characteristic.

#### DIMENSIONS



(Unit : mm)

TYPE	L	W	H	l <sub>1</sub>	l <sub>2</sub>	X	Y
RT1608	1.60±0.10	0.80±0.15	0.45±0.10	0.30±0.20	0.35±0.10	0.50±0.10	0.40±0.10
RT2012	2.00±0.20	1.25±0.15	0.50±0.10	0.40±0.20	0.35±0.20	0.70±0.10	0.60±0.10
RT3216	3.20±0.20	1.60±0.15	0.55±0.10	0.45±0.20	0.40±0.20	1.30±0.10	1.00±0.10

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## THICK FILM CHIP RESISTORS

### GENERAL SPECIFICATION

RT	2012	M	100	CS
Code Designation	Dimension (mm)	Resistance Tolerance	Resistance Value	Packaging Code
Trimmable Chip Resistor	1608:1.6×0.8 2012:2.0×1.25 3216:3.2×1.6	K = ±10%	E12 Series E6 Series (IEC Coding system)	CS : Tape Packaging GS : Bulk Packaging

\* RT:DIP Type(Major)

### RATING

Type	Power Rating	Working Voltage (MAX)	Over load Voltage (MAX)	Resistance Range	Operating Temperature Range	Rating Ambient Temperature	Temperature Coefficient
RT1608	1/16W	50 V	100 V	1~10 M $\Omega$	-55 °C ~ +125 °C	+70 °C	±200ppm/ °C ±300ppm/ °C
RT2012	1/10W	100 V	200 V	1~10 M $\Omega$			
RT3216	1/8W	200 V	400 V	1~10 M $\Omega$			
	1/4W	200 V	400 V	1~10 M $\Omega$			

### PACKAGING

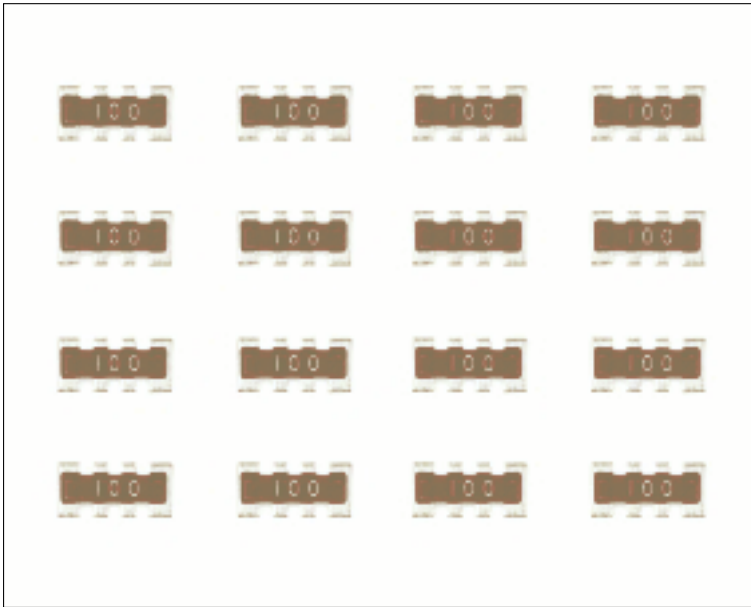
- The Chip Network Resistors can be supplied with packaged carrier tape for effective use in SMD machine.
- All Reel taping specifications are in accordance with EIAJ RC-1009.
- Standard Quantity :

7 inch reel	5,000/1 reel
13 inch reel	20,000/1 reel

- Chip Resistor for Bulk shall be in the polyethylene bag and Quantity of the Chip Resistors in bag is determined by customer orders.(Standard Quantity : 5,000EA)

## THICK FILM CHIP RESISTORS

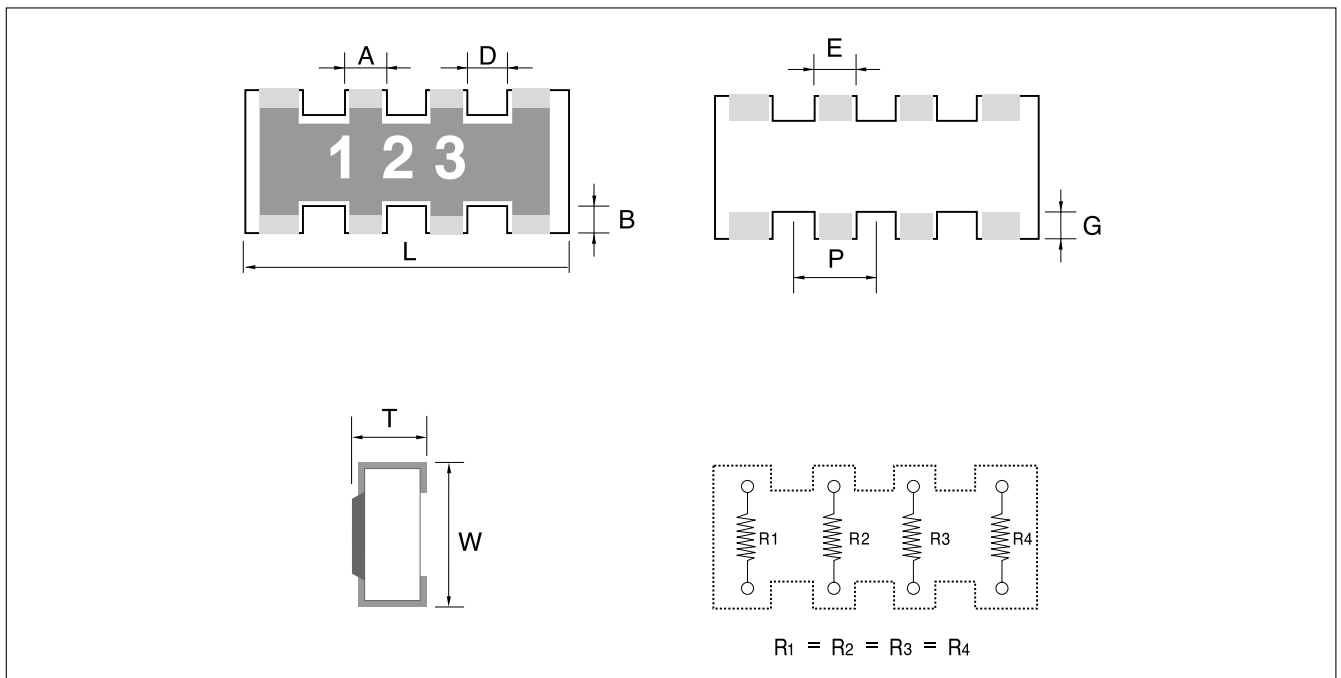
### R/R TYPE CHIP NET WORK RESISTOR



#### FEATURES

- High density mouting
- Improvement of placement efficiency.
- Automatic placement.

#### DIMENSIONS

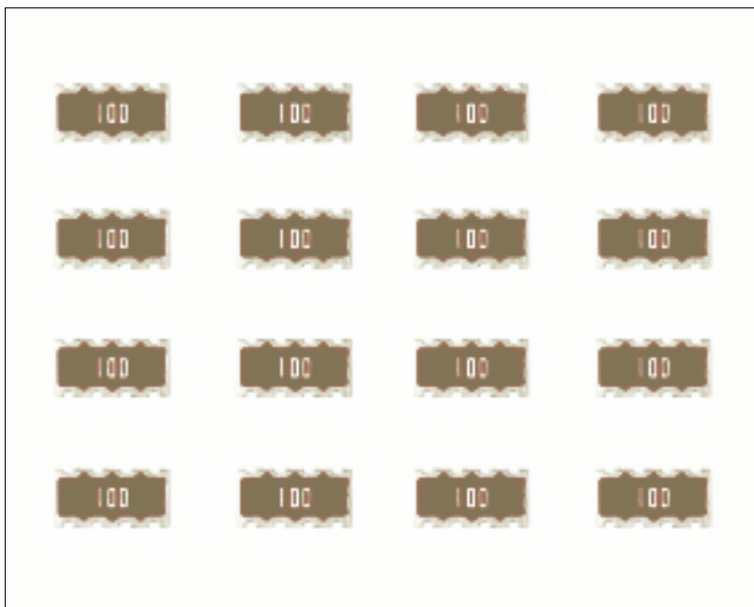


UNIT [mm]

TYPE	L	W	T	A	D	B	P	E	G
RR164P	$3.2 \pm 0.2$	$1.5 \pm 0.2$	$0.5 \pm 0.2$	$0.5 \pm 0.2$	Max 0.16	$0.25 \pm 0.2$	$0.8 \pm 0.15$	$0.5 \pm 0.2$	$0.25 \pm 0.2$

**THICK FILM CHIP RESISTORS**

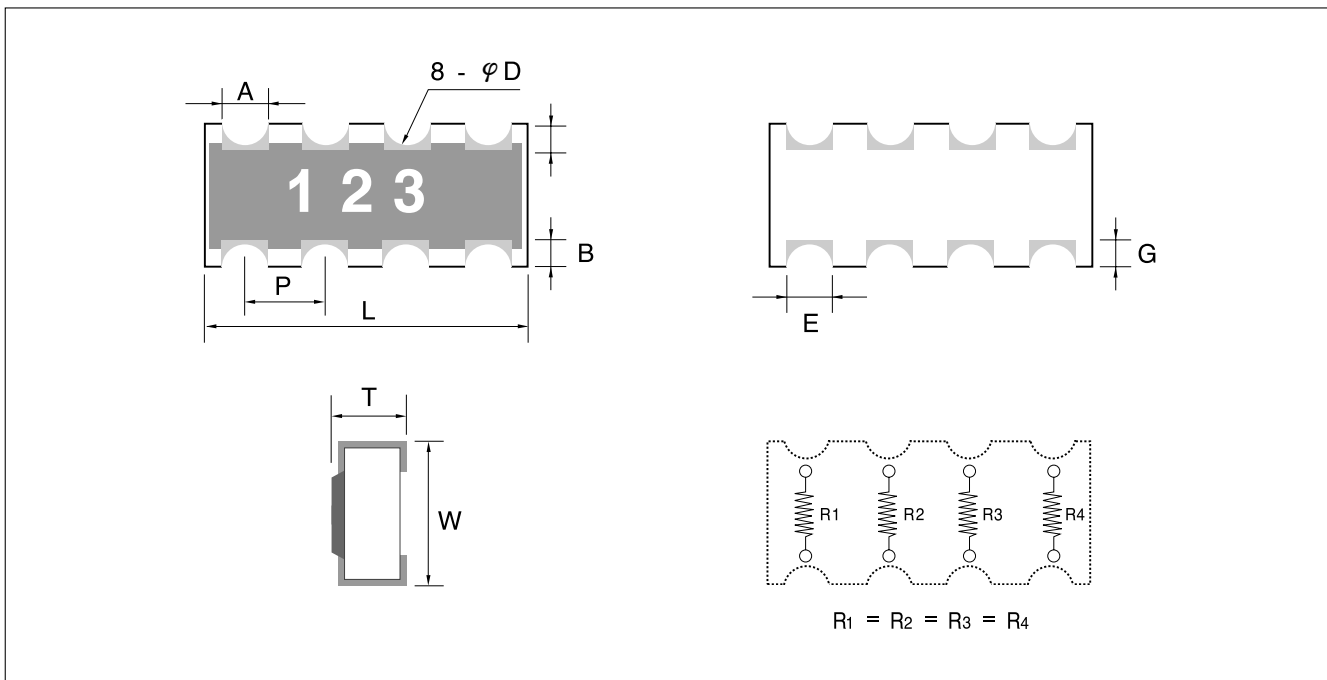
**R/R TYPE CHIP NET WORK RESISTOR**



**FEATURES**

- High density mouting
- Improvement of placement efficiency.
- Automatic placement.

**DIMENSIONS**



UNIT [mm]

TYPE	L	W	T	A	D	B	P	E	G
RN164P	3.2±0.2	1.6±0.2	0.6±0.1	0.45±0.1	0.3±0.1	0.3±0.2	0.8±0.1	0.45±0.1	0.40±0.15

## THICK FILM CHIP RESISTORS

### PARTS NUMBERING SYSTEM

RP/RN	16/10	4P	J	103	CS
Code Designation	Dimension (mm)	Number of Resistors	Resistance Tolerance	Resistance Value	Packaging Code
Chip Network Resistor	16:1608 Type 10:1005 Type	4p : 4 Resistors	G : $\pm 2\%$ J : $\pm 5\%$ K : $\pm 10\%$	E24 Series (IEC Coding system)	CS/AS/ES : Tape Packaging GS : Bulk Packaging

- \* RP, RR: Dip Type(Convex Type)
- \* RN: Through Hole Type(Concave Type)

### RATING

Type	Power Rating	Working Voltage (MAX)	Overload Voltage (MAX)	Resistance Range	Operating Temperature Range	Rating Ambient Temperature	Temperature Coefficient
RP104P	1/16W	50V	100V	10~1M	-55 ~ 125°C	+70°C	$\pm 250$ PPM/°C
RP164P	1/16W	50V	100V	10~1M	-55 ~ 125°C	+70°C	$\pm 250$ PPM/°C
RN164P	1/16W	50V	100V	10~1M	-55 ~ 125°C	+70°C	$\pm 250$ PPM/°C

### PACKAGING

- The Chip Network Resistors can be supplied packaged carrier tape for effective use SMD machine.
- All Reel taping specifications are in accordance with EIAJ RC-1009.
- Standard Quantity :

7 inch reel	5,000EA/1 reel
10 inch reel	10,000EA/1 reel
13 inch reel	20,000EA/1 reel(15,000EA/1reel)

- Chip Network Resistor for Bulk shall be in the plastic case and Quantity of the Chip Resistors in bag is determined by customer orders.(Standard Quantity : 5,000EA)



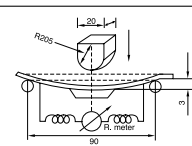
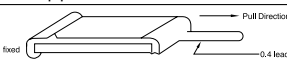
## THICK FILM CHIP RESISTORS

### CHARACTERISTICS PERFORMANCE

#### ELECTRICAL CHARACTERISTICS

Item	Specification	Test Method														
Direct Current Resistance	Within the regulated resistance tolerance. Jumper chip $\leq 50 \text{ M}\Omega$	Applying time: within 5 sec <table border="1"> <thead> <tr> <th>Resistance range(<math>\Omega</math>)</th> <th>Max test voltage(V)</th> </tr> </thead> <tbody> <tr> <td><math>R &lt; 100</math></td> <td>0.3</td> </tr> <tr> <td><math>100 \leq R &lt; 1\text{K}</math></td> <td>1.0</td> </tr> <tr> <td><math>1\text{K} \leq R &lt; 10\text{K}</math></td> <td>3</td> </tr> <tr> <td><math>10\text{K} \leq R &lt; 100\text{K}</math></td> <td>10</td> </tr> <tr> <td><math>100\text{K} \leq R &lt; 1\text{M}</math></td> <td>25</td> </tr> <tr> <td><math>1\text{M} \leq R</math></td> <td>50</td> </tr> </tbody> </table>	Resistance range( $\Omega$ )	Max test voltage(V)	$R < 100$	0.3	$100 \leq R < 1\text{K}$	1.0	$1\text{K} \leq R < 10\text{K}$	3	$10\text{K} \leq R < 100\text{K}$	10	$100\text{K} \leq R < 1\text{M}$	25	$1\text{M} \leq R$	50
Resistance range( $\Omega$ )	Max test voltage(V)															
$R < 100$	0.3															
$100 \leq R < 1\text{K}$	1.0															
$1\text{K} \leq R < 10\text{K}$	3															
$10\text{K} \leq R < 100\text{K}$	10															
$100\text{K} \leq R < 1\text{M}$	25															
$1\text{M} \leq R$	50															
T.C.R.(Resistance Temperature Characteristic)	$1 \leq R < 10$ : $+300\text{ppm}/^\circ\text{C}$ $-200\text{ppm}/^\circ\text{C}$ $10 \leq R < 1\text{M}$ : $\pm 100\text{ppm}/^\circ\text{C}$ $1\text{M} \leq R \leq 10\text{M}$ : $\pm 300\text{ppm}/^\circ\text{C}$	Test temperature( $^\circ\text{C}$ ) $(20) \rightarrow (-55) \rightarrow (20) \rightarrow (125) \rightarrow (20)$ $\text{T.C.R.}(\text{ppm}/^\circ\text{C}) = (R - R_0)/R_0 \times 1/(T - T_0) \times 10^6$ $T = 20(^\circ\text{C})$ $T$ = Test temperature( $^\circ\text{C}$ ) $R_0$ = Resistance at room temperature( $\Omega$ ) $R$ = Resistance at $T(\Omega)$														
Short-time Overload	$\Delta R$ : $\leq \pm(1\% + 0.1 \Omega)$ of the initial value Visual: No evidence of mechanical damage Jumper chip: $\leq 50 \text{ M}\Omega$	Apply 2.5 times rated voltage for 5sec. Wait 30 minutes at room temperature and measure the resistance value.														
Intermittent Overload	$\Delta R$ : $\leq \pm(3\% + 0.1 \Omega)$ of the initial value Visual: No evidence of mechanical damage Jumper chip: $\leq 50 \text{ M}\Omega$	Perform 10,000 cycles at 2.5 times RCW or the Max. over load voltage ON(2.5 times rated voltage): 1 sec OFF: 25 sec Have stabilization time of 30 minutes without loading and measure resistance.														
Dielectric withstanding Voltage	No evidence of mechanical damage.	Apply AC 500V for 1 minute. 1005(1/16W), 1608(1/16W): Apply AC 100V for 1 minute														
Insulation Resistance	Over the 1000 $\text{M}\Omega$	Apply DC 500V for 1 minute. 1005(1/16W), 1608(1/16W): Apply DC 100V for 1 minute														

#### MECHANICAL CHARACTERISTICS

Item	Specification	Test Method												
Solderability	Coverage: $\geq 95\%$ each termination. Visual: No crack of termination parts and ceramic exposure of surface by melting	After immersing in flux, dip into the $235 \pm 5^\circ\text{C}$ molten solder for $2 \pm 0.5$ sec Solder: S63A(KSD 6704) Flux: ROSIN(KSM 2951) Flux is the composition of ROSIN and the methanol Weight rate of ROSIN is about 25%												
Bending Test	$\Delta R$ : $\leq \pm(0.5\% + 0.05 \Omega)$ of the initial value Visual: No evidence of mechanical damage.	After soldering resistor on the PCB, 3mm of bending shall be applied for 10 sec. Material of PCB: Glass Epoxy Thickness: 1.6mm Measure resistance during load application 												
Terminal Strength	Load pull: $\geq 0.5\text{kg}$ 1005(1/16W), 1608(1/16W) $\geq 0.3\text{kg}$	pull Direction fixed 0.4 lead 												
Terminal Strength	$\Delta R$ : $\leq \pm(1\% + 0.05 \Omega)$ of the initial value Visual: No evidence of mechanical damage.	Immerse in molten solder at $260 \pm 5^\circ\text{C}$ for $10 \pm 1$ sec. Preheat and soldering Procedure <table border="1"> <thead> <tr> <th>Temperature(<math>^\circ\text{C}</math>)</th> <th>Time(sec)</th> </tr> </thead> <tbody> <tr> <td>80 - 100</td> <td>120</td> </tr> <tr> <td>150 - 180</td> <td>120</td> </tr> <tr> <td>260 + 5</td> <td>10</td> </tr> <tr> <td>150 - 180</td> <td>60</td> </tr> <tr> <td>80 - 100</td> <td>60</td> </tr> </tbody> </table> Solder: S63A(SSD 6704) Flux: The composition of ROSIN (KSM295)25% and methanol (KSM 1658)75%	Temperature( $^\circ\text{C}$ )	Time(sec)	80 - 100	120	150 - 180	120	260 + 5	10	150 - 180	60	80 - 100	60
Temperature( $^\circ\text{C}$ )	Time(sec)													
80 - 100	120													
150 - 180	120													
260 + 5	10													
150 - 180	60													
80 - 100	60													
Anti-Vibration Test	$\Delta R$ : $\leq \pm(1\% + 0.05 \Omega)$ of the initial value Visual: No evidence of mechanical damage.	2 hours each in X, Y, and Z axis (total 6 hours) 10 to 55 Hz sweep in 1 minute amplitude.												

## THICK FILM CHIP RESISTORS

### ELECTRICAL CHARACTERISTICS

Item	Specification	Test Method															
Low Temperature exposure	$\Delta R : \leq \pm(3\%+0.1 \Omega)$ of the initial value. Visual : No evidence of mechanical damage.	Dwell in $-55^{\circ}\text{C}$ chamber without loading for $1000 \pm 12$ hours Dwell for 60 minutes at Room temperature and Measure resistance value.															
Temperature Cycle	$\Delta R : \leq \pm(1\%+0.1 \Omega)$ of the initial value. Visual : No evidence of mechanical damage.	Perform 100Cycles as follows. <table border="1"> <thead> <tr> <th>No.</th> <th>Temperature(<math>^{\circ}\text{C}</math>)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-55 \pm 3</math></td> <td>30</td> </tr> <tr> <td>2</td> <td><math>20 \pm 3</math></td> <td>15</td> </tr> <tr> <td>3</td> <td><math>125 \pm 3</math></td> <td>30</td> </tr> <tr> <td>4</td> <td><math>20 \pm 3</math></td> <td>15</td> </tr> </tbody> </table>	No.	Temperature( $^{\circ}\text{C}$ )	Time(min)	1	$-55 \pm 3$	30	2	$20 \pm 3$	15	3	$125 \pm 3$	30	4	$20 \pm 3$	15
No.	Temperature( $^{\circ}\text{C}$ )	Time(min)															
1	$-55 \pm 3$	30															
2	$20 \pm 3$	15															
3	$125 \pm 3$	30															
4	$20 \pm 3$	15															
Load Life in Moisture	At $R < 10 \Omega$ $\Delta R : \leq \pm 5\%$ At $R < 1 \text{ M}\Omega$ $\Delta R : \leq \pm(3\% + 0.1 \Omega)$ At $R \geq 1 \text{ M}\Omega$ $\Delta R : \leq \pm 5\%$ Visual : No evidence of mechanical damage.	Temperature : $40 \pm 2^{\circ}\text{C}$ RH : 90-95% Applying rated voltage for 90 minutes "ON" and 30minutes"OFF" Duration : 1000 hours Dwell in Room temperature for 1 hour and measure resistance value.															
Load Life in high Temperature	At $R < 10 \Omega$ $\Delta R : \leq \pm 5\%$ At $R < 1 \text{ M}\Omega$ $\Delta R : \leq \pm(3\% + 0.1 \Omega)$ At $R > 1 \text{ M}\Omega$ $\Delta R : \leq \pm 5\%$	Temperature : $70 \pm 3^{\circ}\text{C}$ at rated voltage. Applying rated voltage for 90 minutes "ON" and 30minutes"OFF" Duration : 1000 hours Dwell in Room temperature for 1 hour and measure resistance value.															
Heat Resistance (High Temperature Exposure)	$\Delta R : \leq \pm(3\%+0.1 \Omega)$ of the initial value. Visual : No evidence of mechanical damage.	Dwell in $125 \pm 3^{\circ}\text{C}$ chamber without loading for $1000 \pm 12$ hours Dwell in Room temperature for 1 hour and measure resistance value.															

## THICK FILM CHIP RESISTORS

### PACKAGING

- The Chip Resistor can be supplied with packaged carrier tape for effective use in SMD machine.
- All Reel taping specifications are in accordance with EIAJ RC-1009.
- Standard Quantity :

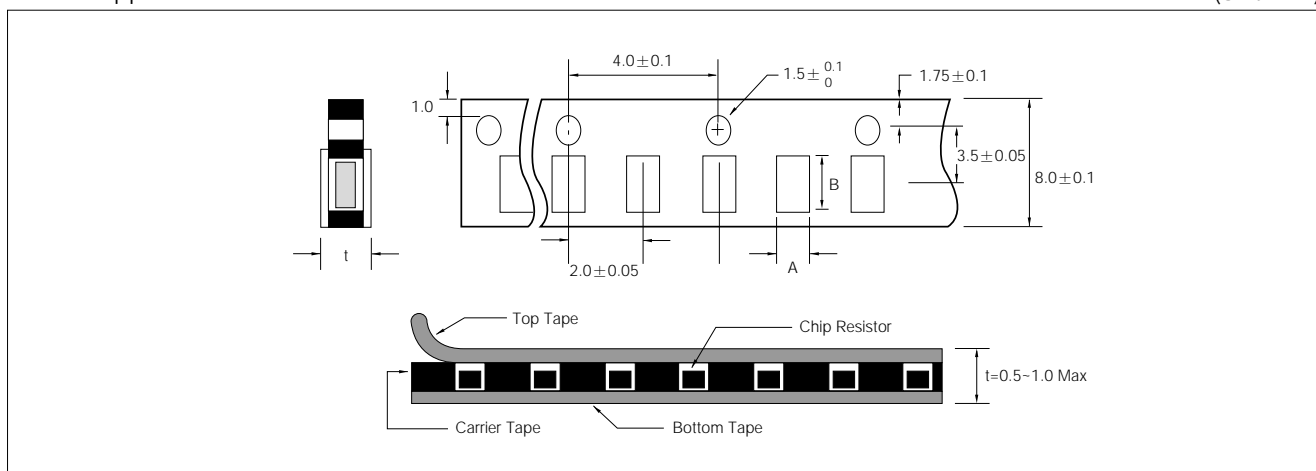
REEL SIZE	1005	1608, 2012, 3216	5025, 6432
7 inch reel	10,000EA/1 reel	5,000EA/1 reel	4,000EA/1 reel
10 inch reel	-	10,000EA/1 reel	-
13 inch reel	40,000EA/1 reel	20,000EA/1 reel	15,000EA/1 reel

- Chip Resistor for Bulk shall be in the plastic Quantity of the Chip Resistors in bag is determined by custom orders. (Standard Quantity : 5,000EA)

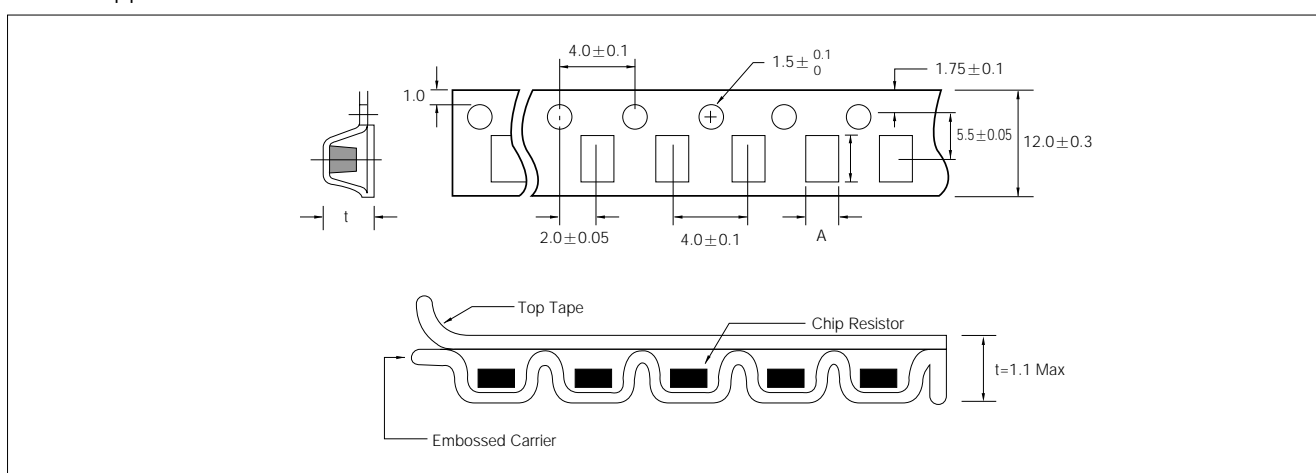
### CARRIER TAPE DIMENSIONS

- ▶ This is applied to 1005 series.

(Unit: mm)



- ▶ This is applied to 5025, 6432 series.



### • WINDOW DIMENSIONS

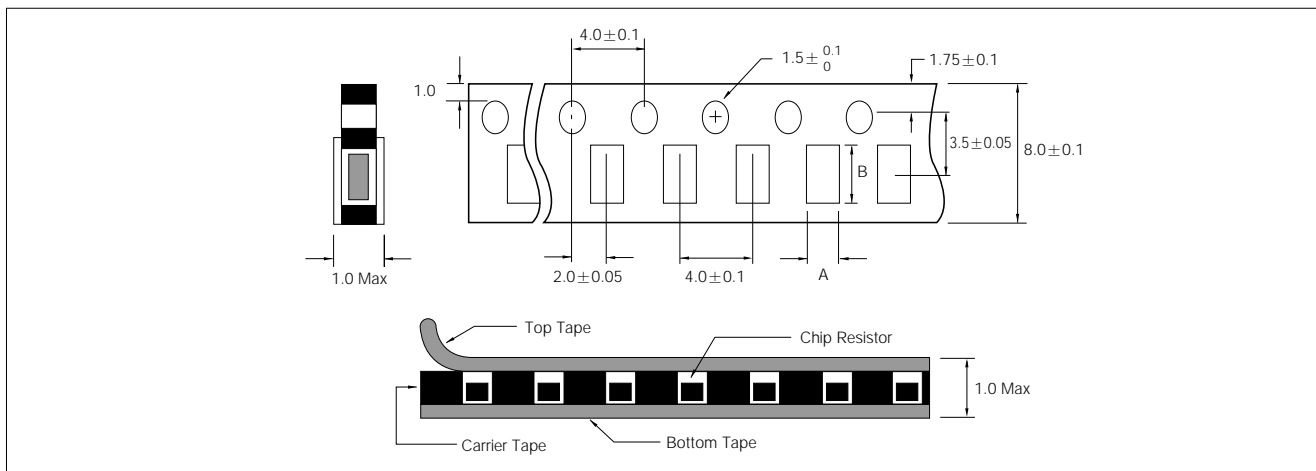
(mm)

SIGN.	ITEM	RC 1005 (1/16W)	RC 5025 (1/2W)	RC 6432 (1W)
A		$0.7 \pm 0.10$	2.80	$3.50 \pm 0.10$
B		$1.20 \pm 0.10$	$5.32 \pm 0.20$	$6.75 \pm 0.10$
t		0.5(MAX)	1.10(MAX)	1.10(MAX)

## THICK FILM CHIP RESISTORS

► This is applied to 1608, 2012, 3216, 3225 series

(Unit: mm)

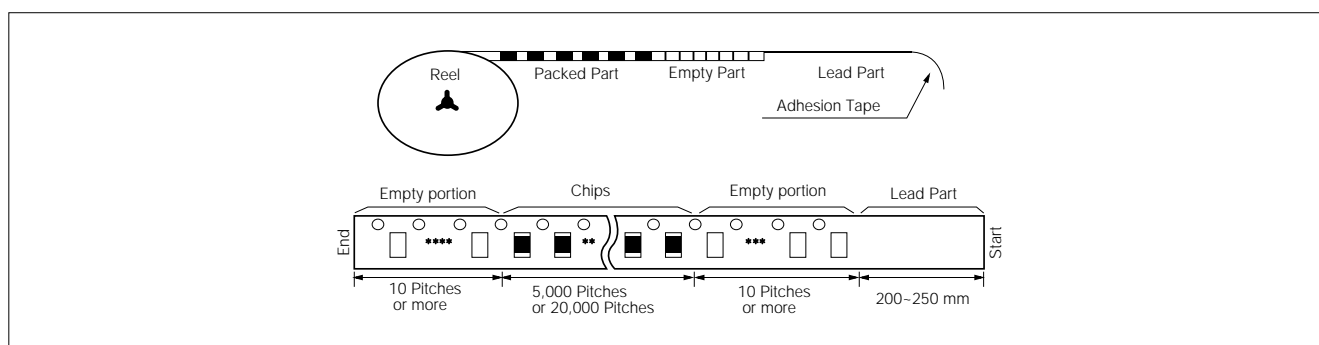


### • WINDOW DIMENSIONS

(mm)

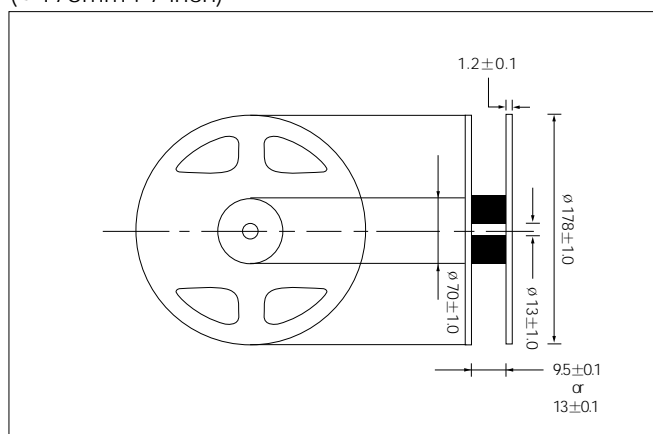
SIGN.	ITEM	RC 1608 (1/16W)	RC 2012 (1/10W)	RC 3216 (1/8, 1/4W)	RC 3225 (1/4W)
A		1.10 ± 0.20	1.65 ± 0.20	2.00 ± 0.20	2.90 ± 0.20
B		1.90 ± 0.20	2.40 ± 0.20	3.60 ± 0.20	3.60 ± 0.20
t		0.90(MAX)	1(MAX)	1(MAX)	1(MAX)

### TAPING METHOD



### REEL DIMENSIONS

(∅178mm : 7 inch)



(∅330mm : 13 inch)

