

## Thin Film Precision Chip Resistor – High Power

### Features

- Advanced thin film technology
- Very tight tolerance down to  $\pm 0.01\%$
- Extremely low TCR down to  $\pm 5\text{PPM}/^\circ\text{C}$
- Wide resistance range 4.7 ohm ~ 1Mega ohm
- RoHS compliant

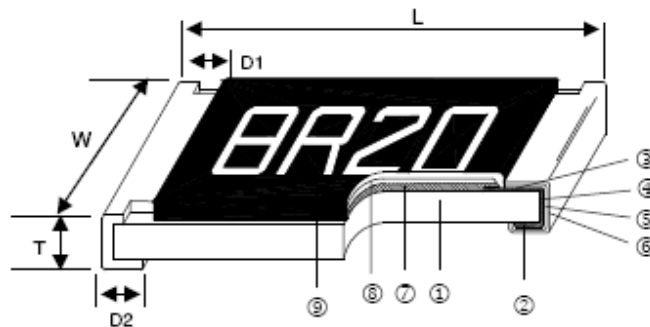


**HALOGEN  
FREE**

### Applications

- Medical Equipment
- Testing / Measurement Equipment
- Printer Equipment
- Automatic Equipment Controller
- Converters
- Communication Device, Cell Phone, GPS, PDA

### Constructions



① Alumina Substrate	④ Edge Electrode (NiCr)	⑦ Resistor Layer (NiCr)
② Bottom Electrode (Ag)	⑤ Barrier Layer (Ni)	⑧ Overcoat (Epoxy)
③ Top Electrode (Ag-Pd)	⑥ External Electrode (Sn)	⑨ Marking

# Thin Film Precision Chip Resistor - High Power

## RTW10 - RTW30

### Dimensions

							Unit: mm
Type	Size Inch (mm)	L	W	T	D1	D2	Average Weight
RTW10_0603	0603(1608)	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.83mg
RTW16_0603	0603(1608)	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.83mg
RTW12_0805	0805(2012)	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.25	4.71mg
RTW25_0805	0805(2012)	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.25	4.71mg
RTW25_1206	1206(3216)	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25	9.02mg
RTW30_1206	1206(3216)	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25	9.02mg
RTW30_1210	1210(3225)	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.25	10mg

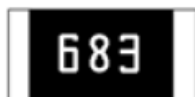
### Marking Code

1. RTW10\_0603~RTW30\_1210:

- 1.1. E-24 series, 3 digits Code, the first two digits are significant figures; the third digit is number of zeros to follow. Letter "R" is as decimal point;
- 1.2. E-96 series, 4 digits Code (except 0603 size), the first three digits are significant figures; the fourth digit is number of zeros. Letter "R" is as decimal point;
- 1.3. E-96 series with special marking code for 0603 size, see below table (Page 10).



No Marking  
Item 1



683 =  $68 \times 10^3 \Omega$   
= 68K $\Omega$   
Item 2.1



6812 =  $681 \times 10^2$   
= 68.1K $\Omega$   
Item 2.2



49X =  $316 \times 10^{-1}$   
= 31.6 $\Omega$   
Item 2.3

# Thin Film Precision Chip Resistor - High Power

## RTW10 - RTW30

### Absolute Maximum Ratings & Electrical Characteristics

Type	Power Rating @70°C	TCR (PPM/°C)		Size (Inch)	Tolerance (E-24 &E-96)		MAX. Working Voltage	MAX. Overload Voltage	Resistance Range	Operating Temperature Range
RTW10_0603	1/10W	S	±5	0603	L	±0.01%	75V	150V	24.9Ω ~ 15KΩ	-55°C~+155°C
					A	±0.05%				
		B	±0.1%							
		C	±0.25%							
					D	±0.5%				
		B C D E	±10 ±15 ±25 ±50		L	±0.01%			24.9Ω ~ 100KΩ	
					A	±0.05%			4.7Ω ~ 332KΩ	
					B	±0.1%				
					C	±0.25%				
					D	±0.5%				
RTW16_0603	1/6W	D E	±25 ±50		A B C D	±0.05% ±0.1% ±0.25% ±0.5%	100V		100Ω ~ 332KΩ	
RTW12_0805	1/8W	S	±5	0805	L	±0.01%	150V	300V	24.9Ω ~ 30KΩ	-55°C~+155°C
					A	±0.05%				
		B	±0.1%							
		C	±0.25%							
					D	±0.5%				
		B C D E	±10 ±15 ±25 ±50		L	±0.01%			24.9Ω ~ 200KΩ	
					A	±0.05%			4.7Ω ~ 511KΩ	
					B	±0.1%			4.7Ω ~ 1MΩ	
					C	±0.25%				
					D	±0.5%				
RTW25_0805	1/4W	D E	±25 ±50		A B C D	±0.05% ±0.1% ±0.25% ±0.5%			4.7Ω ~ 1MΩ	

# Thin Film Precision Chip Resistor - High Power

## RTW10 - RTW30

Type	Power Rating @70°C	TCR (PPM/°C)		Size (Inch)	Tolerance (E-24 & E-96)		MAX. Working Voltage	MAX. Overload Voltage	Resistance Range	Operating Temperature Range
RTW25_1206	1/4W	S	±5	1206	L	±0.01%	200V	400V	24.9Ω ~ 50KΩ	-55°C ~ +155°C
					A	±0.05%				
		B	±0.1%							
		C	±0.25%							
D	±0.5%									
		B C D E	±10 ±15 ±25 ±50	L	±0.01%			24.9Ω ~ 500KΩ		
A	±0.05%					4.7Ω ~ 1MΩ				
B	±0.1%									
		D E	±25 ±50	C	±0.25%					
				D	±0.5%			100Ω ~ 1MΩ		
RTW30_1206	1/3W				A	±0.05%				
					B	±0.1%				
					C	±0.25%				
					D	±0.5%				
RTW30_1210	1/3W	S	±5	1210	L	±0.01%	200V	400V	24.9Ω ~ 50KΩ	-55°C ~ +155°C
					A	±0.05%				
		B	±0.1%							
		C	±0.25%							
D	±0.5%									
		B C D E	±10 ±15 ±25 ±50	L	±0.01%			24.9Ω ~ 500KΩ		
A	±0.05%					4.7Ω ~ 1MΩ				
B	±0.1%									
		D E	±25 ±50	C	±0.25%					
				D	±0.5%					

Note: 1. Operating Voltage =  $\sqrt{P \cdot R}$  or Max. Operating voltage listed above, whichever is lower.

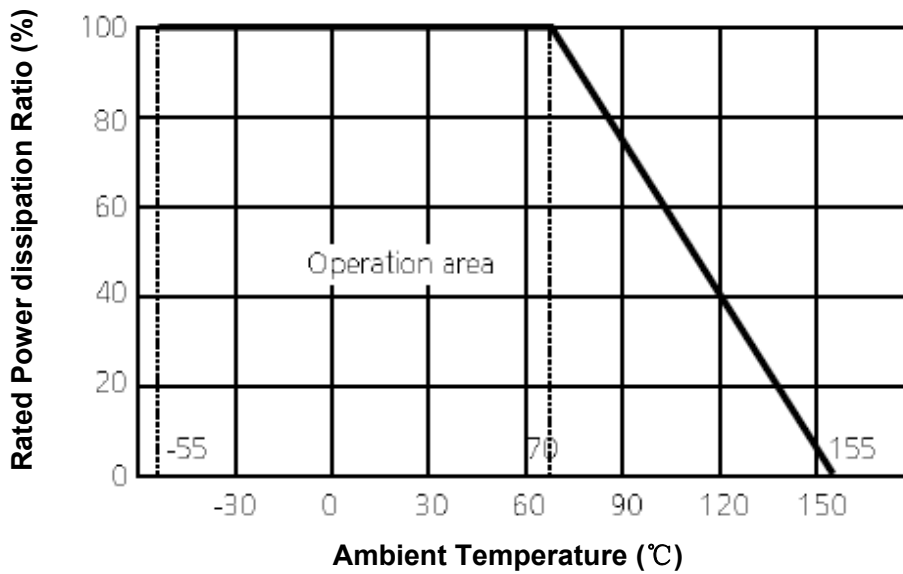
2. Overload Voltage =  $2.5 \cdot \sqrt{P \cdot R}$  or Max. Overload voltage listed above, whichever is lower.

# Thin Film Precision Chip Resistor - High Power

RTW10 - RTW30

## Power Derating Curve

For resistors operate in the ambient temperature over 70°C, loading power ratio will derate in accordance with following curve.



# Thin Film Precision Chip Resistor - High Power

RTW10 - RTW30

## Environmental Characteristics

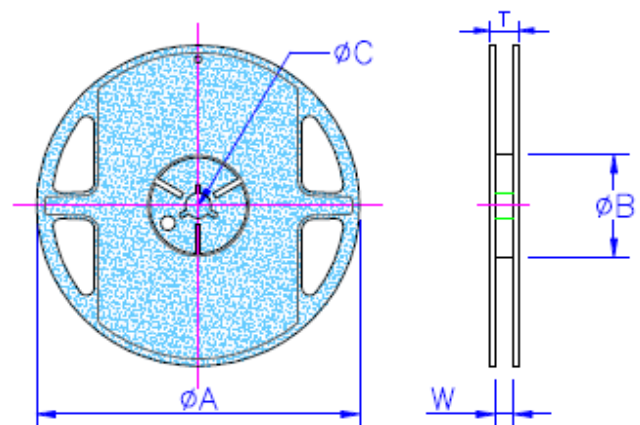
Item	Requirement		Test Method
	Tol. $\leq$ 0.05%	Tol. $>$ 0.05%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		+25/-55/+25/+125/+25°C
Short Time Overload	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	RCWV*2.5 or Max. overload voltage for 5 seconds
	$\Delta R \pm 0.2\%$ for high power rating		
Insulation Resistance	$> 1000 \text{ M}\Omega$		Apply $100V_{DC}$ for 1 minute
Endurance	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	$70 \pm 2^\circ\text{C}$ , Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	$> 7k\Omega \Delta R \pm 0.5\%$		
	$\Delta R \pm 0.5\%$ for high power rating		
Damp Heat with Load	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.3\%$	$40 \pm 2^\circ\text{C}$ , 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	$\Delta R \pm 0.5\%$ for high power rating		
Bending Strength	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	Bending amplitude 3 mm for 10 seconds
Solderability	95% min. coverage		$245 \pm 5^\circ\text{C}$ for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	$260 \pm 5^\circ\text{C}$ for 10 seconds
Dielectric Withstand Voltage	By Type		Max. overload voltage for 1 minute
Thermal Shock	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.25\%$	$-55^\circ\text{C} \sim 150^\circ\text{C}$ , 100 cycles
Low Temperature Operation	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	1 hour, $-65^\circ\text{C}$ , followed by 45 minutes of RCWV
	$\Delta R \pm 0.5\%$ for high power rating		

■ Reference Standards: MIL-STD-202, JIS-C 5201-1

■ Storage Temperature:  $25 \pm 3^\circ\text{C}$ ; Humidity  $< 80\%RH$

## Packing Information:

### Packaging Quantity & Reel Specifications



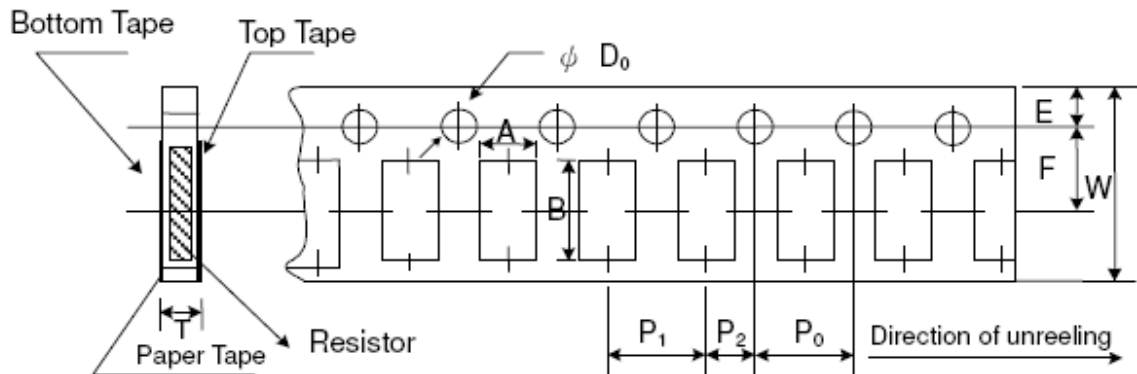
# Thin Film Precision Chip Resistor - High Power

## RTW10 - RTW30

Unit: mm

Type	ΦA	ΦB	ΦC	W	T	PCS per Paper Tape	PCS per Carton
RTW10_0603	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	300,000
RTW16_0603	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	300,000
RTW12_0805	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	300,000
RTW25_0805	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	300,000
RTW25_1206	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	300,000
RTW30_1206	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	300,000
RTW30_1210	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	300,000

### Paper Tape Dimensions



Unit: mm

Type	A	B	W	E	F	P0	P1	P2	ΦD0	T
RTW10_0603	1.10±0.05	1.90±0.05	8.0±0.10	1.75±0.05	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.55±0.03	0.60±0.03
RTW16_0603	1.10±0.05	1.90±0.05	8.0±0.10	1.75±0.05	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.55±0.03	0.60±0.03
RTW12_0805	1.60±0.05	2.37±0.05	8.0±0.10	1.75±0.05	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.55±0.03	0.75±0.05
RTW25_0805	1.60±0.05	2.37±0.05	8.0±0.10	1.75±0.05	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.55±0.03	0.75±0.05
RTW25_1206	2.00±0.05	3.55±0.05	8.0±0.10	1.75±0.05	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.55±0.03	0.75±0.05
RTW30_1206	2.00±0.05	3.55±0.05	8.0±0.10	1.75±0.05	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.55±0.03	0.75±0.05
RTW30_1210	2.75±0.05	3.40±0.05	8.0±0.10	1.75±0.05	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.60±0.10	0.75±0.05

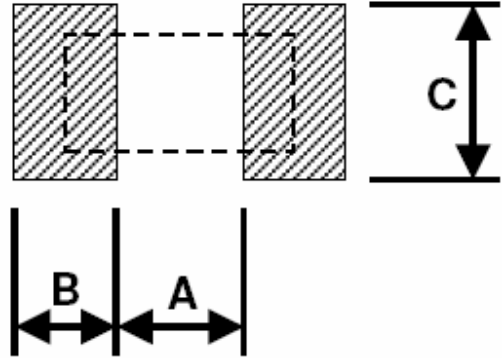
# Thin Film Precision Chip Resistor - High Power

RTW10 - RTW30

## Recommend Land Pattern

Unit: mm

Type	A	B	C
RTW10_0603	0.80	1.00	0.90±0.2
RTW16_0603	0.80	1.00	0.90±0.2
RTW12_0805	1.00	1.00	1.35±0.2
RTW25_0805	1.00	1.00	1.35±0.2
RTW25_1206	2.00	1.15	1.70±0.2
RTW30_1206	2.00	1.15	1.70±0.2
RTW30_1210	2.00	1.15	2.50±0.2



## How to Order

RTW 12 B 0805 D 1002 - XX - RG70

→ Packing Code: RG70: 7" reel in Tape and Reel, RoHS and Halogen Free

→ Factory Location Code

→ Resistance Code:

1002=100 x10<sup>2</sup>=10KΩ (E-24&E-96); 5R60=5.6Ω;

Tolerance Code: L: ±.01%; A: ±.05%; B: ±.1%; C: ±.25%; D: ±.5%; F: ±1%

→ Size Code in inch (mm):0603(1608):

1.6×0.8(mm) Refer Size table for detail

→ TCR(PPM/°C): S: ±5 B: ±10; C: ±15; D: ±25; E: ±50

→ Power Code: 03:1/32W; 06:1/16W; 10:1/10W; 12:1/8W; 20:1/5W; 25:1/4W; 50:1/2W

→ Thin Film Precision Chip Resistor – High Power



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RTW10 - RTW30

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