

# Precision Thin Film Chip Resistors (Ultra High Power)

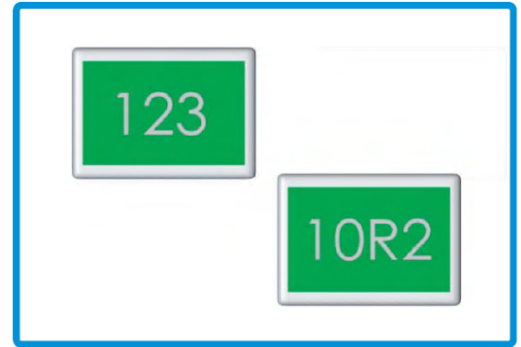


RU73 Series

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## Feature

- 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 1 ohm ~ 3M ohm



## PART NUMBERING SYSTEM

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(Ultra High Power)

TCR (PPM/ $^\circ\text{C}$ )

Code	C	F	G
PPM/ $^\circ\text{C}$	$\pm 10$	$\pm 25$	$\pm 50$

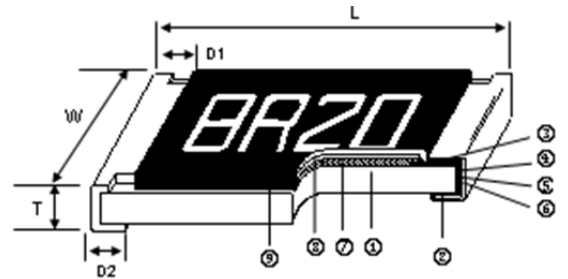
Code	1J	2A	2B	2E	2H	3A
Size	0603	0805	1206	1210	2010	2512

-----	Bulk
TD	Paper Tape(Reel) (1H,1E,1J,2A,2B,2E)
TE	Plastic Tape(Reel) (2H,3A)
TP	Paper Tape(1E)

Resistance Value  
1% - 4 digits, First 3 are significant, Forth is multiplier ( $10^x$ )

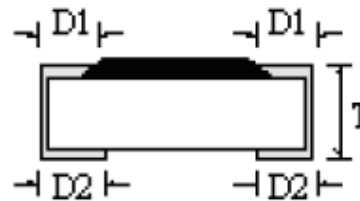
Resistance Tolerance

Code	A	B	C	D	F
Value	$\pm 0.05\%$	$\pm 0.1\%$	$\pm 0.25\%$	$\pm 0.5\%$	$\pm 1\%$



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

## Dimension



Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
1J	0603	1.55 $\pm$ 0.10	0.80 $\pm$ 0.10	0.45 $\pm$ 0.10	0.30 $\pm$ 0.20	0.30 $\pm$ 0.20	1.83
2A	0805	2.00 $\pm$ 0.15	1.25 $\pm$ 0.15	0.55 $\pm$ 0.10	0.30 $\pm$ 0.20	0.40 $\pm$ 0.20	4.71
2B	1206	3.05 $\pm$ 0.15	1.55 $\pm$ 0.15	0.55 $\pm$ 0.10	0.42 $\pm$ 0.20	0.35 $\pm$ 0.25	9.02
2E	1210	3.10 $\pm$ 0.15	2.40 $\pm$ 0.15	0.55 $\pm$ 0.10	0.40 $\pm$ 0.20	0.55 $\pm$ 0.25	10
2H	2010	4.90 $\pm$ 0.15	2.40 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.30	0.50 $\pm$ 0.25	23.61
3A	2512	6.30 $\pm$ 0.15	3.10 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.30	0.50 $\pm$ 0.25	38.06

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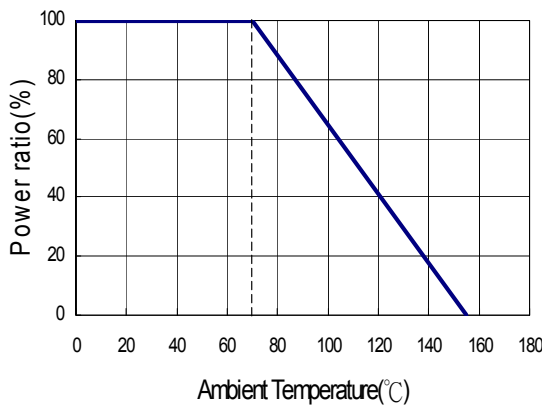
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## High Power Rating Electrical Specifications

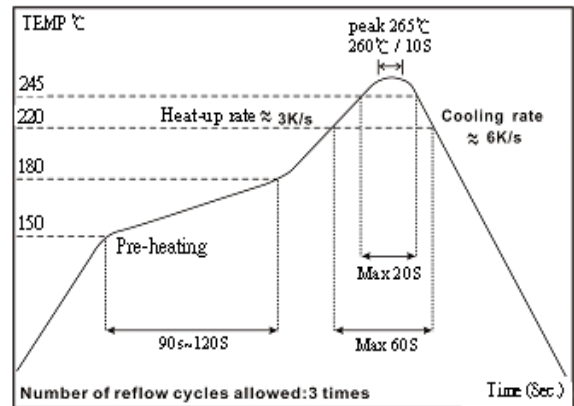
Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range						TCR (PPM/°C)
					±0.01%	±0.05%	±0.1%	±0.25%	±0.5%	±1%	
1J (0603)	1/6W	-55 ~ +155°C	100V	150V	—	10Ω - 332KΩ					±25 ±50
2A (0805)	1/4W	-55 ~ +155°C	150V	300V	—	10Ω - 499KΩ					±25 ±50
2B (1206)	1/3W	-55 ~ +155°C	200V	400V	—	10Ω ~ 1MΩ					±25 ±50
2E (1210)	1/3W	-55 ~ +155°C	200V	400V	24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω - 1MΩ					±10 ±15 ±25 ±50
2H (2010)	1/3W	-55 ~ +155°C	200V	400V	24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω - 1MΩ					±10 ±15 ±25 ±50
3A (2512)	1W	-55 ~ +155°C	200V	400V	-	4.7Ω - 100Ω	1Ω - 100Ω				±25 ±50

- Operating Voltage= $\sqrt{P \cdot R}$  or Max. operating voltage listed above, whichever is lower.
- Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$  or Max. overload voltage listed above, whichever is lower.  
(Lower Resistance: 1~10Ω ; High Power Rating)

## Derating Curve



## Reflow



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## Environmental Characteristics

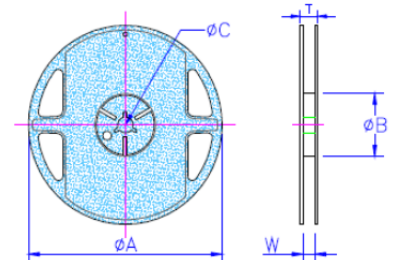
Item	Requirement		Test Method
	Tol. $\leq 0.05\%$	Tol. $> 0.05\%$	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		MIL-STD-202F Method 304 +25/-55/+25/+125/+25°C
Short Time Overload	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage for 5 seconds
	$\Delta R \pm 0.2\%$ for high power rating		
Insulation Resistance	$> 1000 \text{ M}\Omega$		MIL-STD-202F Method 302 Apply 100VDC for 1 minute
Endurance	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	MIL-STD-202F Method 108A 70 $\pm 2^\circ\text{C}$ , Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	$> 7\text{k}\Omega \Delta R \pm 0.5\%$		
	$\Delta R \pm 0.5\%$ for high power rating		
Damp Heat with Load	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.3\%$	MIL-STD-202F Method 103B 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	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	JIS-C-5201-1 6.1.4 Bending amplitude 3 mm for 10 seconds
Solderability	95% min. coverage		MIL-STD-202F Method 208H 245 $\pm 5^\circ\text{C}$ for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	MIL-STD-202F Method 210E 260 $\pm 5^\circ\text{C}$ for 10 seconds
Dielectric Withstand Voltage	By Type		MIL-STD-202F Method 301 Max. overload voltage for 1 minute
Thermal Shock	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.25\%$	MIL-STD-202F Method 107G -55°C ~150°C, 100 cycles
Low Temperature Operation	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	JIS-C-5201-1 7.1 1 hour, -65°C, followed by 45 minutes of RCWV
	$\Delta R \pm 0.5\%$ for high power rating		

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

## Packaging

Unit: mm

Type	$\varnothing A$	$\varnothing B$	$\varnothing C$	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
1J	178.0 $\pm 1.0$	60.0 $\pm 1.0$	13.5 $\pm 0.7$	9.5 $\pm 1.0$	11.5 $\pm 1.0$	5,000	-
2A	178.0 $\pm 1.0$	60.0 $\pm 1.0$	13.5 $\pm 0.7$	9.5 $\pm 1.0$	11.5 $\pm 1.0$	5,000	-
2B	178.0 $\pm 1.0$	60.0 $\pm 1.0$	13.5 $\pm 0.7$	9.5 $\pm 1.0$	11.5 $\pm 1.0$	5,000	-
2E	178.0 $\pm 1.0$	60.0 $\pm 1.0$	13.5 $\pm 0.7$	9.5 $\pm 1.0$	11.5 $\pm 1.0$	5,000	-
2H	178.0 $\pm 1.0$	60.0 $\pm 1.0$	13.5 $\pm 0.7$	13.5 $\pm 1.0$	15.5 $\pm 1.0$	-	4,000
3A	178.0 $\pm 1.0$	60.0 $\pm 1.0$	13.5 $\pm 0.7$	13.5 $\pm 1.0$	15.5 $\pm 1.0$	-	4,000



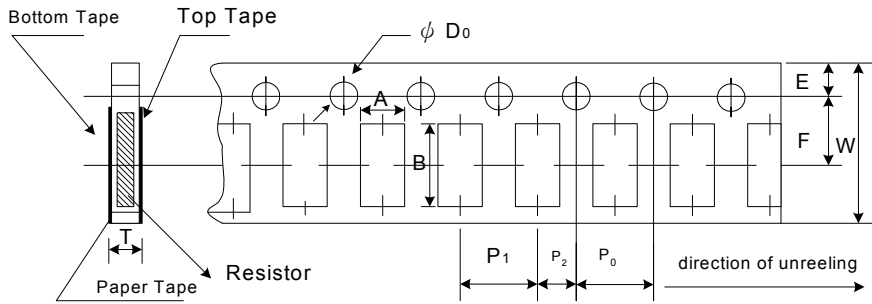
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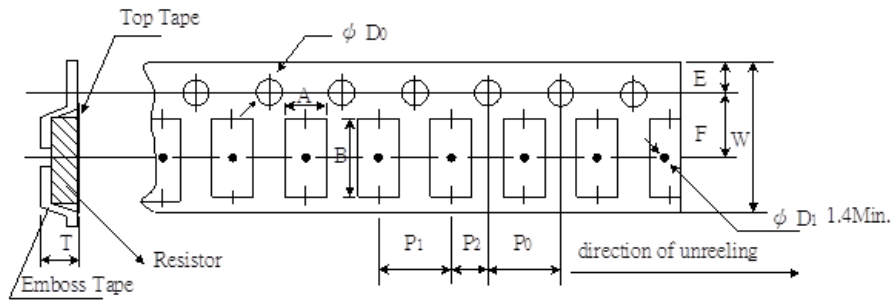
## Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P0	P1	P2	ϕD0	T
1J	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.60±0.03
2A	1.60±0.05	2.37±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
2B	2.00±0.05	3.55±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
2E	2.75±0.05	3.40±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.60±0.10	0.75±0.05

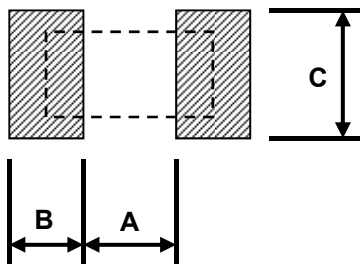
## Emboss Plastic Tape Specifications



Unit: mm

Type	A	B	W	E	F	P0	P1	P2	ϕD0	T
2B	2.85±0.10	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
3A	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20

## Recommend Land Pattern



Unit: mm

Type	A	B	C
1J	0.80	1.00	0.90±0.2
2A	1.00	1.00	1.35±0.2
2B	2.00	1.15	1.70±0.2
2E	2.00	1.15	2.50±0.2
2H	3.60	1.40	2.50±0.2
3A	4.90	1.60	3.10±0.2