

# Precision Thin Film Chip Resistors Standard Type

RN73 Series

**MERITEK**

## FEATURE

- Operating Temperature: -55 ~ +155°C
- Very Tight Tolerance Down to  $\pm 0.01\%$
- Extremely Low TCR Down to  $\pm 1\text{PPM}/^\circ\text{C}$
- Wide Resistance Range  $1\Omega \sim 3\text{M}\Omega$
- Applications: Medical equipment, Testing / Measurement equipment, printer Equipment, Automatic equipment controller, Converters, Communication device, Cell phone, GPS, PDA



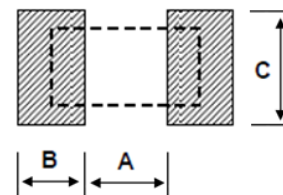
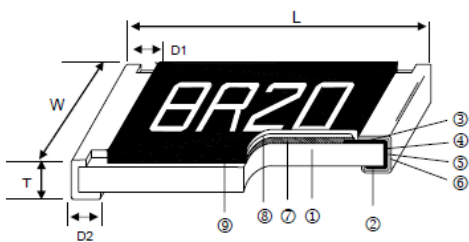
## PART NUMBERING SYSTEM



RN73   F   1H   TD   49R9   D  
(1)   (2)   (3)   (4)   (5)   (6)

No	Item	Code	Description	Series Reference
(1)	Meritek Series	RN73	Precision Thin Film Chip Resistor	Standard Type
(2)	TCR Code	F	F: $\pm 25\text{PPM}/^\circ\text{C}$	5: $\pm 1$ ; X: $\pm 2$ , O: $\pm 3$ , B: $\pm 5$ , C: $\pm 10$ , D: $\pm 15$ , G: $\pm 50$
(3)	Size Code	1H	1H: 0201	1E: 0402, 1J: 0603, 2A: 0805, 2B: 1206, 2E: 1210, 2H: 2010, 3A: 2512
(4)	Packaging	TD	TD: Paper Tape (Reel)	B: Bulk, TE: Plastic Tape (Reel)
(5)	Resistance	49R9	49R9: $49.9\Omega$	First three digits: significant, Fourth: Multiplier, R: Decimal Point
(6)	Tolerance Code	D	D: $\pm 0.5\%$	T: $\pm 0.01\%$ , A: $\pm 0.05\%$ , B: $\pm 0.1\%$ , C: $\pm 0.25\%$ , F: $\pm 1\%$

## DIMENSIONS AND LAND PATTERN RECOMMENDATION



Size	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	A (mm)	B (mm)	C (mm)	Weight (g/Kpcs)
1H (0201)	0.58 $\pm$ 0.05	0.29 $\pm$ 0.05	0.23 $\pm$ 0.05	0.12 $\pm$ 0.05	0.15 $\pm$ 0.05	0.25	0.30	0.40 $\pm$ 0.2	0.14
1E (0402)	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	0.30 $\pm$ 0.05	0.20 $\pm$ 0.10	0.20 $\pm$ 0.10	0.50	0.50	0.60 $\pm$ 0.2	0.54
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	0.80	1.00	0.90 $\pm$ 0.2	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	1.00	1.00	1.35 $\pm$ 0.2	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	2.00	1.15	1.70 $\pm$ 0.2	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	2.00	1.15	2.50 $\pm$ 0.2	10.00
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	3.60	1.40	2.50 $\pm$ 0.2	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	4.90	1.60	3.10 $\pm$ 0.2	38.06

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## ELECTRICAL CHARACTERISTICS

### Standard Type

Size	Power Rating at 70°C (W)	Max Operating Voltage (V)	Max Overload Voltage (V)	Resistance (Ω)				TCR (±PPM/°C)
				±0.05%	±0.1%	±0.25%	±0.5%, ±1%	
1H (0201)	1/32	15	30	-	49.9 ~ 4.99K		49.9 ~ 4.99K	25
				-	49.9 ~ 33K		49.9 ~ 33K	50
1E (0402)	1/16	25	50	49.9~12K	10~511K	10~511K	4.7~511K	25, 50
1J (0603)	1/16	50	100	4.7~332K	4.7~1M	4.7~1M	1~1M	25, 50
2A (0805)	1/10	100	200	4.7~1M	4.7~2M	4.7~2M	1~2M	25, 50
2B (1206)	1/8	150	300	4.7~1M	4.7~2.49M	4.7~2.49M	1~2.49M	25, 50
2E (1210)	1/4	150	300	4.7~1M	4.7~2.49M	4.7~2.49M	1~2.49M	25, 50
2H (2010)	1/4	150	300	4.7~1M	4.7~3M	4.7~3M	1~3M	25, 50
3A (2512)	1/2	150	300	4.7~1M	4.7~3M	4.7~3M	1~3M	25, 50

### Special Low TCR Type

Size	Power Rating at 70°C (W)	Max Operating Voltage (V)	Max Overload Voltage (V)	Resistance (Ω)				TCR (±PPM/°C)
				±0.01%	±0.05%	±0.1%	±0.25%, ±0.5%, ±1%	
1E (0402)	1/16	25	50	49.9~4.99K		-		1, 2, 3
				49.9~20K		49.9~20K		5
				49.9~20K	49.9~100K	49.9~100K		10
				49.9~20K	49.9~69.8K	49.9~69.8K		15
1J (0603)	1/16	50	100	24.9 ~ 15K		-		1, 2, 3
				24.9 ~ 60K		24.9 ~ 60K		5
				24.9~100K	4.7~332K	4.7~511K	4.7~511K	10, 15
2A (0805)	1/10	100	200	24.9~30K		-		1, 2, 3
				24.9~150K		24.9~150K		5
				24.9~200K	4.7~1M		4.7~1M	
2B (1206)	1/8	150	300	24.9~49.9K		-		1, 2, 3
				24.9~300K		24.9~300K		5
				24.9~499K	4.7~1.5M		4.7~1.5M	
2E (1210)	1/4	150	300	24.9~49.9K		-		1, 2, 3
				24.9~300K		24.9~300K		5
				24.9~499K	4.7~1M		4.7~1M	
2H (2010)	1/4	150	300	24.9~100K		-		1, 2, 3
				24.9~300K		24.9~300K		5
				24.9~499K	4.7~1M		4.7~1M	
3A (2512)	1/2	150	300	24.9~100K		-		1, 2, 3
				24.9~300K		24.9~300K		5
				24.9~499K	4.7~1M		4.7~1M	

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## RELIABILITY TEST CONDITION AND REQUIREMENT

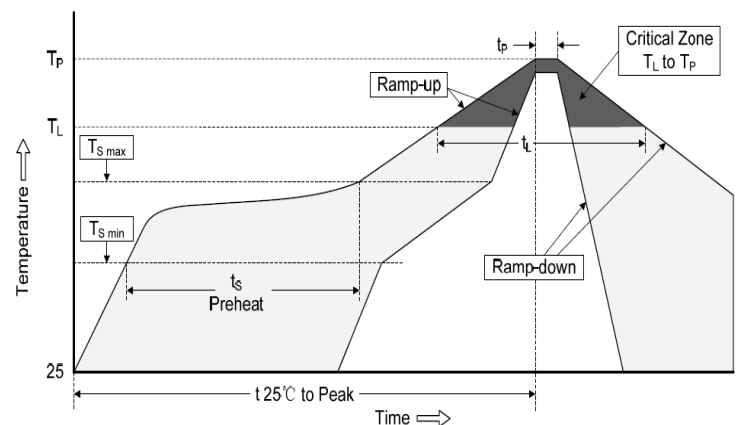
Test	Standard	Condition	Requirement	
			Tol. ≤ 0.05%	Tol. > 0.05%
Temperature Coefficient of Resistance	MIL-STD-202 Method 304	+25/-55/+25/+125/+25°C	As Specified	
Short Time Overload	JIS-C-5201-1 4.13	2.5XRCWV or Max. overload voltage whichever is lower for 5 seconds	ΔR±0.05%	ΔR±0.2%
Insulation Resistance	MIL-STD-202 Method 302	Apply 100 V <sub>DC</sub> for 1 minute	>9999MΩ	
Endurance	MIL-STD-202 Method 108A	70±2°C, RCWV for 1000 hours with 1.5 hours "ON" and 0.5 hours "OFF".	ΔR±0.05%	ΔR±0.2%
			0201:>7KΩ, ΔR±0.5%, ≤7KΩ, ΔR±0.2%	
Damp Heat with Load	MIL-STD-202 Method 103B	40±2°C, 90~95% R.H. RCWV for 1000 hours with 1.5 hours "ON" and 0.5 hours "OFF".	ΔR±0.05%	ΔR±0.3%
Bending Strength	JIS-C-5201-1 4.33	Bending amplitude 3 mm for 10 seconds 2010, 2512 sizes: 2mm, Other sizes: 3mm	ΔR±0.05%	ΔR±0.1%
Solderability	MIL-STD-202 Method 208H	245±5°C for 3 seconds	95% min. coverage	
Resistance to Soldering Heat	MIL-STD-202 Method 210E	260±5°C for 10 seconds	ΔR±0.05%	ΔR±0.1%
Dielectric Withstand Voltage	MIL-STD-202 Method 301	Max. overload voltage for 1 minute	By type	
Thermal Shock	MIL-STD-202 Method 107G	-55°C ~ +150°C, 100 cycles	ΔR±0.05%	ΔR±0.2%
Low Temperature Operation	JIS-C-5201-1 4.36	1 hour, -65°C followed by 45 minutes of RCWV	ΔR±0.05%	ΔR±0.2%
High Temperature Exposure	MIL-STD-202 Method 108	+155°C for 1000 hours	ΔR±0.5%	

Note:

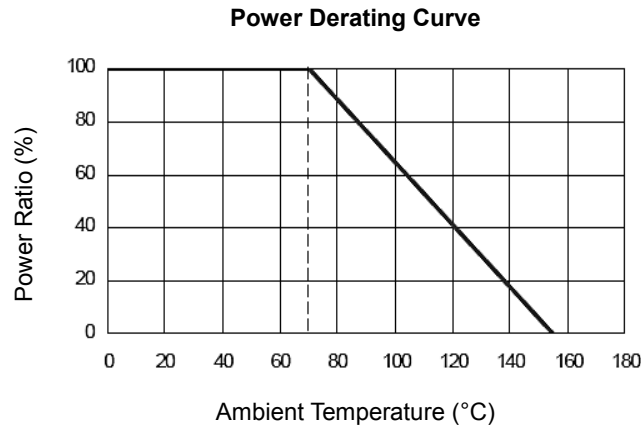
1. RCWV(Rated Continuous Working Voltage) =  $\sqrt{(P \cdot R)}$  or Max operating voltage whichever is lower
2. Storage Temperature: 15~28°C; Humidity < 80% RH

## SOLDERING RECOMMENDATION

Reflow Condition		
Pre Heat	Temp. Min T <sub>s(min)</sub>	150°C
	Temp. Max T <sub>s(max)</sub>	180°C
	Time (min. to max.) (t <sub>s</sub> )	90s ~ 120s
Average ramp up rate (T <sub>L</sub> ) to peak		3°C/s
T <sub>s(max)</sub> to T <sub>L</sub> (Ramp-up rate)		3°C/s
Reflow	Temp. (T <sub>L</sub> )	220°C
	Time (min. to max.) (t <sub>L</sub> )	60s max.
Peak Temperature (T <sub>P</sub> )		265°C
Time within 5°C of T <sub>P</sub> (t <sub>p</sub> )		10s
Ramp-down Rate		6°C/s

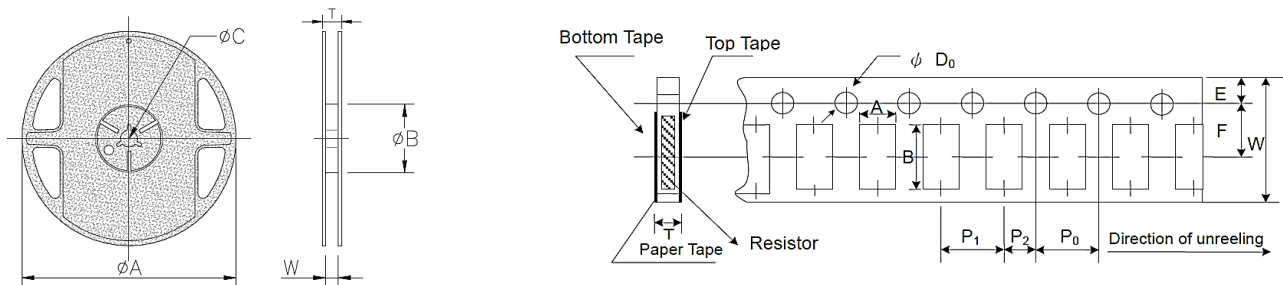


### POWER DERATING CURVE



### PACKAGING SPECIFICATIONS

#### Paper Tape Dimension



Size	Reel Dimension (mm)							
	Quantity	Tape Width	Reel Size	$\phi A$	$\phi B$	$\phi C$	W	T
0201, 0402	Paper 10K	8mm	7"	178.0±1.0	60±1.0	13.5±0.7	9.5±1.0	11.5±1.0
0603, 0805 1206, 1210	Paper 5K	8mm	7"	178.0±1.0	60±1.0	13.5±0.7	9.5±1.0	11.5±1.0

### PACKAGING SPECIFICATIONS

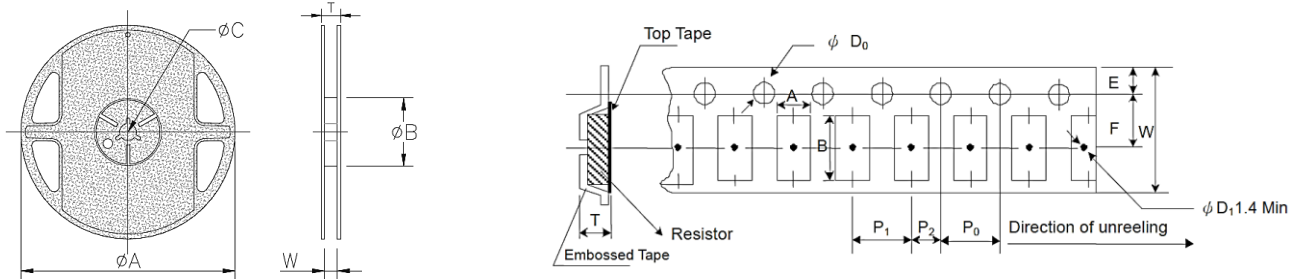
Size	Paper Tape Dimension (mm)									
	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	$\Phi D_0$	T
0201	0.40±0.05	0.70±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.10	2±0.05	2±0.05	1.55±0.03	0.42±0.02
0402	0.70±0.05	1.16±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.10	2±0.05	2±0.05	1.55±0.05	0.40±0.03
0603	1.10±0.05	1.90±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.10	4±0.10	2±0.05	1.55±0.05	0.60±0.03
0805	1.60±0.05	2.37±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.10	4±0.10	2±0.05	1.55±0.05	0.75±0.05
1206	2.00±0.05	3.55±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.10	4±0.10	2±0.05	1.55±0.05	0.75±0.05
1210	2.75±0.05	3.40±0.05	8±0.1	1.75±0.05	3.5±0.05	4±0.05	4±0.10	2±0.05	1.60±0.10	0.75±0.05

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## Plastic Tape Dimension



Size	Reel Dimension (mm)							
	Quantity	Tape Width	Reel Size	$\phi A$	$\phi B$	$\phi C$	W	T
2010, 2512	Plastic 4K	12mm	7"	178.0±1.0	60±1.0	13.5±0.7	13.5±1.0	15.5±1.0

Size	Plastic Tape Dimension (mm)									
	A	B	W	E	F	$P_0$	$P_1$	$P_2$	$\Phi D_0$	T
2010	2.85±0.1	5.45±0.1	12.0±0.1	1.75±0.1	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20
2512	3.40±0.1	6.65±0.1	12.0±0.1	1.75±0.1	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20

Notes: Peel force of top cover tape, Peel speed:300mm/min ±5%, Peel force of top cover tape:between 8gf to 60gf, 20gf to 80gf (2010, 2512 only)

\*Specifications subject to change without notice.