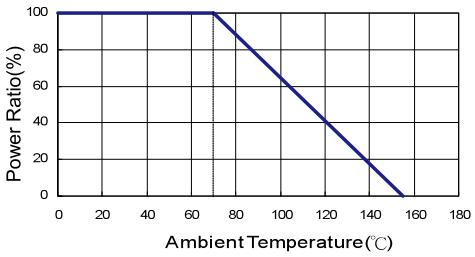
Thin Film Precision Chip Resistor (RT Series)

■Features

- —Advanced thin film technology
- —Very tight tolerance down to ±0.01%
- —Extremely low TCR down to ±2PPM/°C
- —Wide resistance range 1ohm ~ 3Mega ohm
- —Miniature size 0201 available

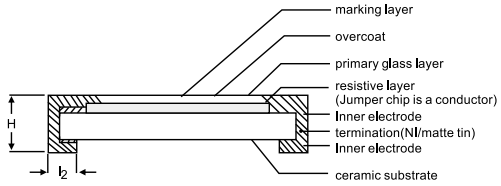
■Derating Curve

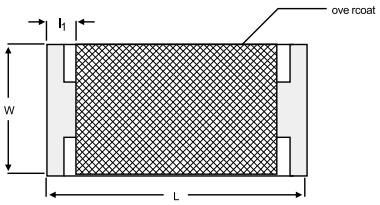


■Applications

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

■Construction





■Dimensions

Type	L (mm)	W (mm)	H (mm)	l_1 (mm)	l_2 (mm)
RT0201	0.58±0.05	0.29±0.05	0.23±0.05	0.12±0.05	0.15±0.05
RT0402	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.20±0.10
RT0603	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
RT0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.25
RT1206	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25
RT1210	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.25
RT2010	4.90±0.15	2.40±0.15	0.55±0.10	0.60±0.30	0.50±0.25
RT2512	6.30±0.15	3.10±0.15	0.55±0.10	0.60±0.30	0.50±0.25

■Part Numbering

RT	0603	T	R	B	07	100R	N
Product Type	Size	Resistance Tolerance	Packaging Type	TCR (PPM/°C)	Taping Reel	Resistance	Marking Code
	0201 0402 0603 0805 1206 1210 2010 2512	T: ±0.01% A : ±0.05% B: ±0.1% C: ±0.25% D: ±0.5% F: ±1%	R:Paper/PE taping reel K:Embossed taping reel	X : ±2 O : ±3 S: ±5 B: ±10 N: ±15 C: ±25 D: ±50	07: 7 inch dia. reel 10: 10 inch dia. reel 13: 13 inch dia. Reel 7W: 7 inch Dia. Reel and 2 x standard power type.	1R : 1Ω 4R7: 4.7Ω 1K: 1KΩ 1M: 1MΩ	: Standard Marking N : No Marking

■Standard Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range					TCR (PPM/°C)
					±0.05%	±0.1%	±0.25%	±0.5%	±1%	
RT0201	1/32W	-55 ~ +155°C	15V	30V	—			49.9Ω - 4.99KΩ		±25
								49.9Ω - 33KΩ		±50
RT0402	1/16W	-55 ~ +155°C	25V	50V	49.9Ω- 12KΩ	10Ω- 255KΩ	4.7Ω -511KΩ			±25
										±50
RT0603	1/16W	-55 ~ +155°C	50V	100V	4.7Ω -332KΩ	4.7Ω - 1MΩ	1Ω - 1MΩ			±25 ±50
RT0805	1/10W	-55 ~ +155°C	100V	200V	4.7Ω - 1MΩ	4.7Ω - 2MΩ	1Ω - 2MΩ			±25 ±50
RT1206	1/8W	-55 ~ +155°C	150V	300V	4.7Ω - 1MΩ	4.7Ω - 2.49MΩ	1Ω - 2.49MΩ			±25 ±50
RT1210	1/4W									
RT2010	1/4W	-55 ~ +155°C	150V	300V	4.7Ω - 1MΩ	4.7Ω - 3MΩ	1Ω - 3MΩ			±25 ±50
RT2512	1/2W									

■Lower Resistance:1~10Ω

■Special 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%	
RT0402	1/16W	-55 ~ +155°C	25V	50V	49.9Ω - 4.99KΩ			—			±2 ±3
					49.9Ω - 4.99KΩ						±5
					49.9Ω - 12KΩ				49.9Ω - 60KΩ		±10
									49.9Ω - 69.8KΩ		±15
RT0603	1/16W	-55 ~ +155°C	50V	100V	24.9Ω - 15KΩ			—			±2 ±3
					24.9Ω - 15KΩ						±5
					24.9Ω - 100KΩ	4.7Ω - 332KΩ		4.7Ω - 511KΩ			±10 ±15
RT0805	1/10W	-55 ~ +155°C	100V	200V	24.9Ω - 30KΩ			—			±2 ±3
					24.9Ω -30KΩ						±5
					24.9Ω - 200KΩ			4.7Ω - 1MΩ			±10 ±15
RT1206	1/8W	-55 ~ +155°C	150V	300V	24.9Ω -49.9KΩ			—			±2 ±3
					24.9Ω -49.9KΩ						±5
					24.9Ω - 499KΩ			4.7Ω - 1MΩ			±10 ±15
RT1210	1/4W	-55 ~ +155°C	150V	300V	24.9Ω -49.9KΩ			—			±2 ±3
					24.9Ω -49.9KΩ						±5
					24.9Ω - 499KΩ			4.7Ω - 1MΩ			±10 ±15
RT2010	1/4W	-55 ~ +155°C	150V	300V	24.9Ω - 100KΩ			—			±2 ±3
					24.9Ω -100KΩ						±5
					24.9Ω - 499KΩ			4.7Ω - 1MΩ			±10 ±15
RT2512	1/2W	-55 ~ +155°C	150V	300V	24.9Ω - 100KΩ			—			±2 ±3
					24.9Ω -100KΩ						±5
					24.9Ω - 499KΩ			4.7Ω - 1MΩ			±10 ±15

■High Power Rating Electrical Specifications

Item / Type	Power Rating at 70℃	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range						TCR (PPM/℃)
					±0.01%	±0.05%	±0.1%	±0.25%	±0.5%	±1%	
RT0603	1/10W	-55 ~ +155°C	75V	150V	24.9Ω - 15KΩ			—			±2 ±3
					24.9Ω - 15KΩ						±5
					24.9Ω - 100KΩ	4.7Ω - 332KΩ		4.7Ω - 332KΩ			±10 ±15
								4.7Ω-1MΩ			±25 ±50
	1/6W	-55 ~ +155°C	100V	150V	—	10Ω - 332KΩ					±25 ±50
RT0805	1/8W	-55 ~ +155°C	150V	300V	24.9Ω - 30KΩ			—			±2 ±3
					24.9Ω - 30KΩ						±5
					24.9Ω - 200KΩ	4.7Ω - 511KΩ		4.7Ω-511KΩ			±10
								4.7Ω-1MΩ			±15
							4.7Ω - 1MΩ	1Ω - 1MΩ			±25 ±50
	1/4W	-55 ~ +155°C	150V	300V	—	10Ω - 499KΩ					±25 ±50
RT1206	1/4W	-55 ~ +155°C	200V	400V	24.9Ω - 49.9KΩ			—			±2 ±3
					24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω- 1MΩ					±10 ±15 ±25 ±50
	1/3W	-55 ~ +155°C	200V	400V	—	10Ω - 1MΩ					±25 ±50
RT1210	1/3W	-55 ~ +155°C	200V	400V	24.9Ω - 49.9KΩ			—			±2 ±3
					24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω- 1MΩ					±10 ±15 ±25 ±50
RT2010	1/3W	-55 ~ +155°C	200V	400V	24.9Ω - 49.9KΩ			—			±2 ±3
					24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω- 1MΩ					±10 ±15 ±25 ±50
RT2512	3/4W	-55 ~ +155°C	200V	400V	24.9Ω - 2KΩ	4.7Ω- 2KΩ		1Ω - 2KΩ			±10 ±15 ±25 ±50
	1W	-55 ~ +155°C	200V	400V	—		4.7Ω - 100Ω	1Ω - 100Ω			±25 ±50

Operating Voltage=√(P*R) or Max. operating voltage listed above, whichever is lower.
Overload Voltage=2.5*√(P*R) or Max. overload voltage listed above, whichever is lower.
■ Thunder is capable of manufacturing the optional spec based on customer's requirement.
(Lower Resistance:1~10Ω ; High Power Rating)

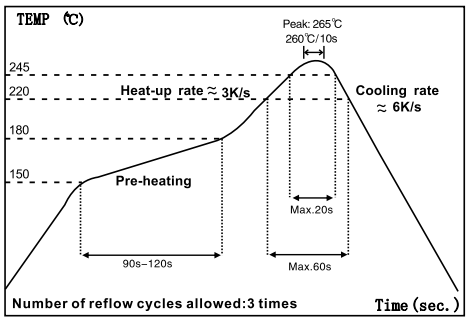
■Environmental Characteristics

Item	Requirement		Test Method
	Tol.≤ 0.05%	Tol. > 0.05%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		**MIL-STD-202F Method 304** +25/-55/+25/+125/+25℃
Short Time Overload	ΔR±0.05%	ΔR±0.2%	**JIS-C-5201-1 5.5** RCWV*2.5 or Max.overload voltage whichever is lower for 5 seconds
	ΔR±0.2% for high power rating		
Insulation Resistance	> 1000 MΩ		**MIL-STD-202F Method 302** Apply 100V_{DC} for 1 minute
Endurance	ΔR±0.05%	ΔR±0.2%	**MIL-STD-202F Method 108A** 70±2℃, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	> 7kΩ ΔR±0.5%		
	ΔR±0.5% for high power rating		
Damp Heat with Load	ΔR±0.05%	ΔR±0.3%	**MIL-STD-202F Method 103B** 40±2℃, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	ΔR±0.5% for high power rating		
Bending Strength	ΔR±0.05%	ΔR±0.2%	**JIS-C-5201-1 6.1.4** Bending amplitude 3 mm for 10 seconds
Solderability	95% min. coverage		**MIL-STD-202F Method 103B** 245±5℃ for 3 seconds
Resistance to Soldering Heat	ΔR±0.05%	ΔR±0.2%	**MIL-STD-202F Method 210E** 260±5℃ for 10 seconds
Dielectric Withstand Voltage	By Type		**MIL-STD-202F Method 301** Max.overload voltage for 1 minute
Thermal Shock	ΔR±0.05%	ΔR±0.25%	**MIL-STD-202F Method 107G** -55℃ ~150℃, 100 cycles
Low Temperature Operation	ΔR±0.05%	ΔR±0.2%	**JIS-C-5201-17.1** 1 hour,-65℃, followed by 45 minutes of RCWV
	ΔR±0.5% for high power rating		

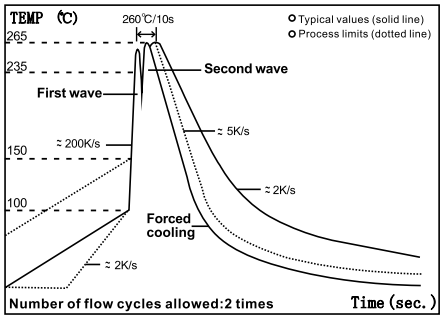
RCWV(Rated continuous working voltage)= √(P*R)or Max.Operating voltage whichever is lower

■Storage Temperature: 25±3℃; Humidity < 80%RH

■Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

(1) Time of IR reflow soldering at maximum temperature point 260°C：10s

(2) Time of wave soldering at maximum temperature point 260°C：10s

(3) Time of soldering iron at maximum temperature point 410°C：5s