

THICK FILM CHIP RESISTORS LOW RESISTANCE RL SERIES

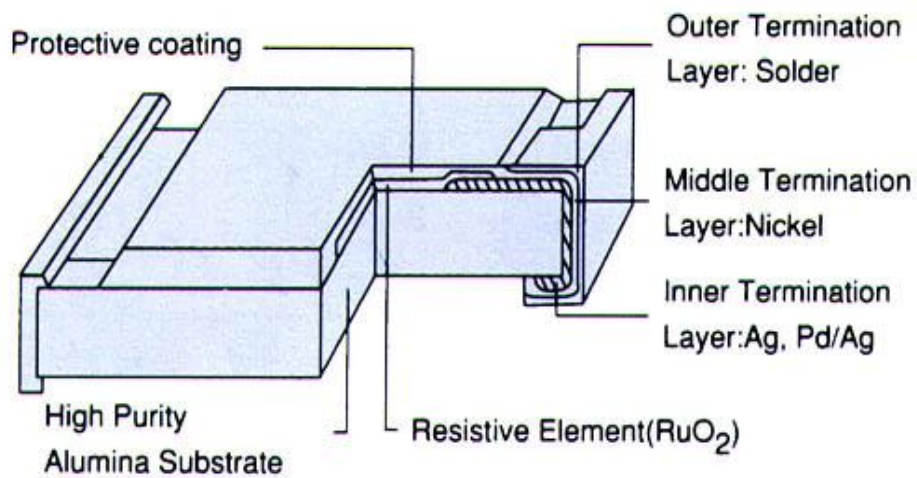
■ Features

- Suitable for lead free soldering.
- Compatible with flow and reflow soldering

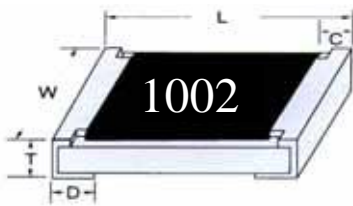
■ Applications

- Consumer Electronics
- Automotive industry
- Computer
- Measurement instrument
- Electronic watch and camera

■ Configuration



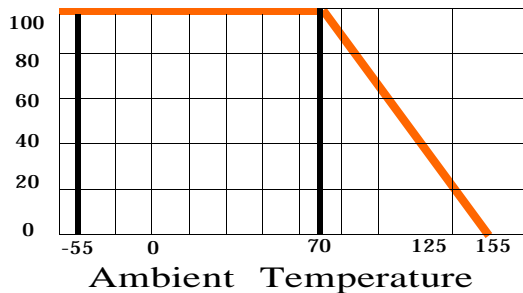
■ Dimensions



Size	L	W	C	D	T
0603	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.15
0805	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.15
1206	3.10±0.10	1.60±0.10	0.50±0.25	0.50±0.25	0.60±0.15
1210	3.10±0.10	2.60±0.10	0.50±0.20	0.50±0.20	0.55±0.10
2010	5.00±0.20	2.50±0.20	0.60±0.25	0.60±0.25	0.55±0.10
2512	6.40±0.20	3.20±0.20	0.60±0.25	0.60±0.25	0.60±0.10

■ Power Derating Curve

(unit: mm)

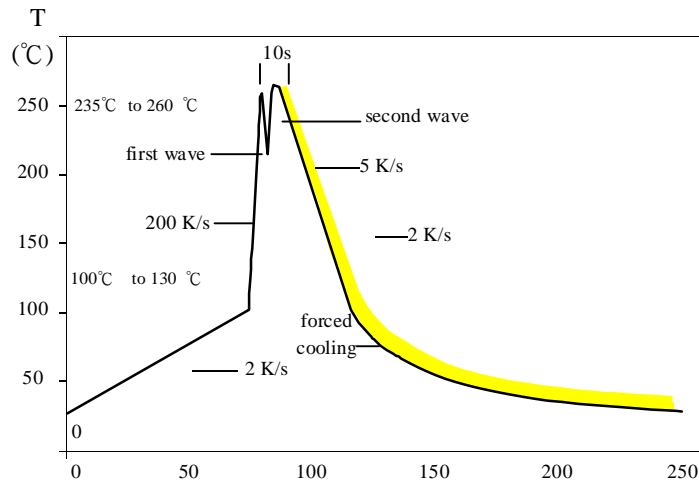


Maximum dissipation in percentage of rated power as a function of the ambient temperature for 0603,0805,1206,1210,2010,2512

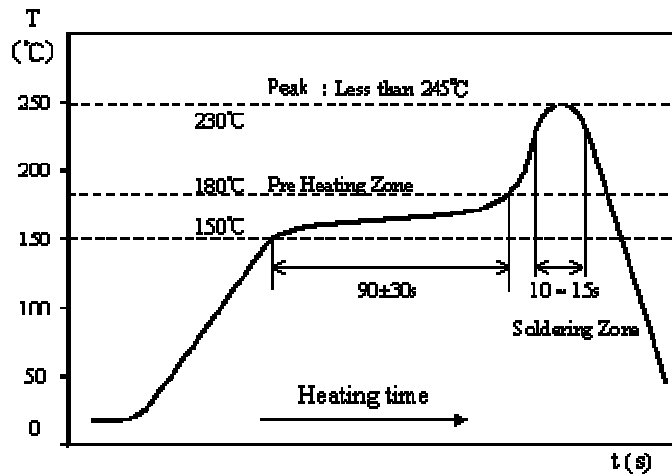
■ **Rating**
• **LOW RESISTANCE RL Series**

Size	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance (%)	Temperature Coefficient (TCR; ppm/°C)	Resistance Range		Standard Resistance Values
						Min.	Max.	
RL0603	1/10W	302mV	603mV	±1% (F) ±5% (J)	±300	100mΩ	910mΩ	E-24
RL0805	1/8W	337mV	675mV	±1% (F) ±5% (J)	±300	100mΩ	910mΩ	E-24
					±400	50mΩ	91mΩ	
RL1210	1/3W	551mV	1102mV	±1% (F) ±5% (J)	±200	100mΩ	910mΩ	E-24
RL1206	1/4W	477mV	954mV	±1% (F) ±5% (J)	±200	50mΩ	910mΩ	E-24
RL2010	1/2W	675mV	1349mV		±400	40mΩ	47mΩ	
					±600	22mΩ	39mΩ	
RL2512	1W	954mV	1908mV		±1000	10mΩ	20mΩ	

■ **Soldering Temperature Curve**

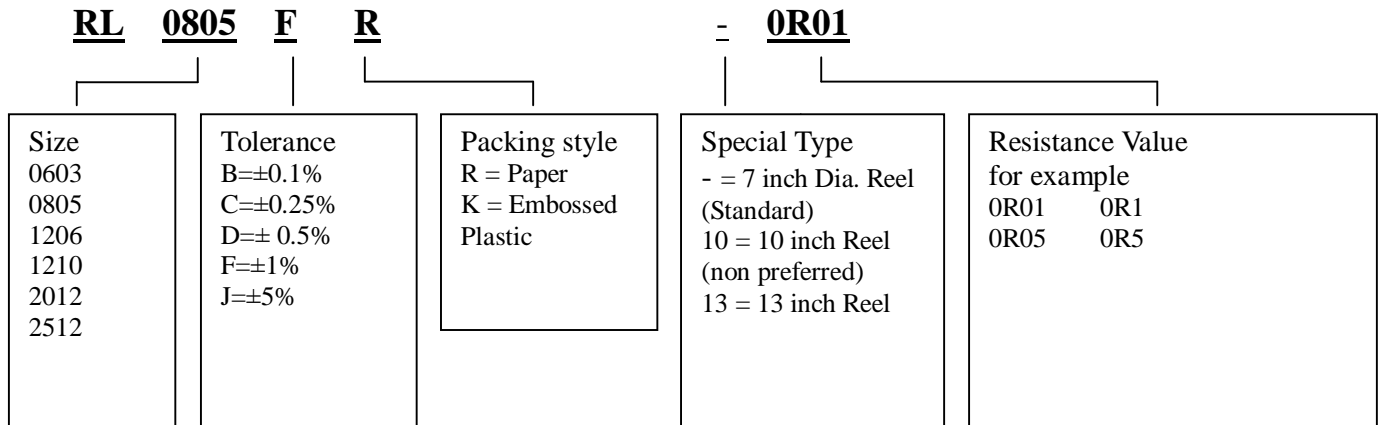


WAVE soldering.



IR Reflow Soldering

■ **Part Number**



SPECIFICATION

■ **Resistance Marking**

E - 24 SERIES



4 digit marking for ±1% ,
±5% E24 (10mΩ ~ 910mΩ)

examples: R100 = 100mΩ

R047 = 47mΩ



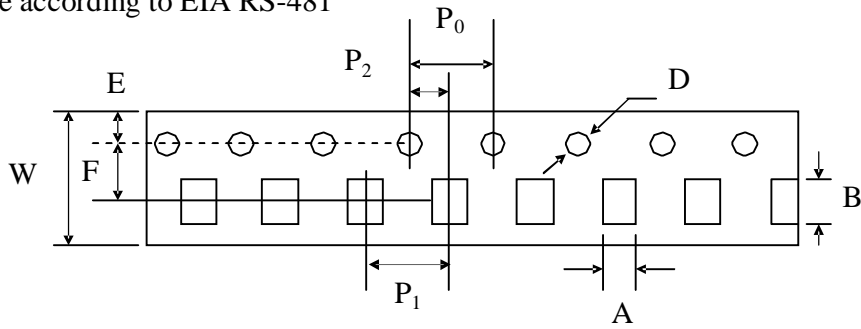
3 digit marking for 0603 ±1% ,
±5% E24 (100mΩ ~ 1 Ω)

examples: 1R0 = 1Ω
 R10 = 100mΩ
 R50 = 500mΩ

SPECIFICATION

■ Tape And Reel Package

- Taping specs are according to EIA RS-481



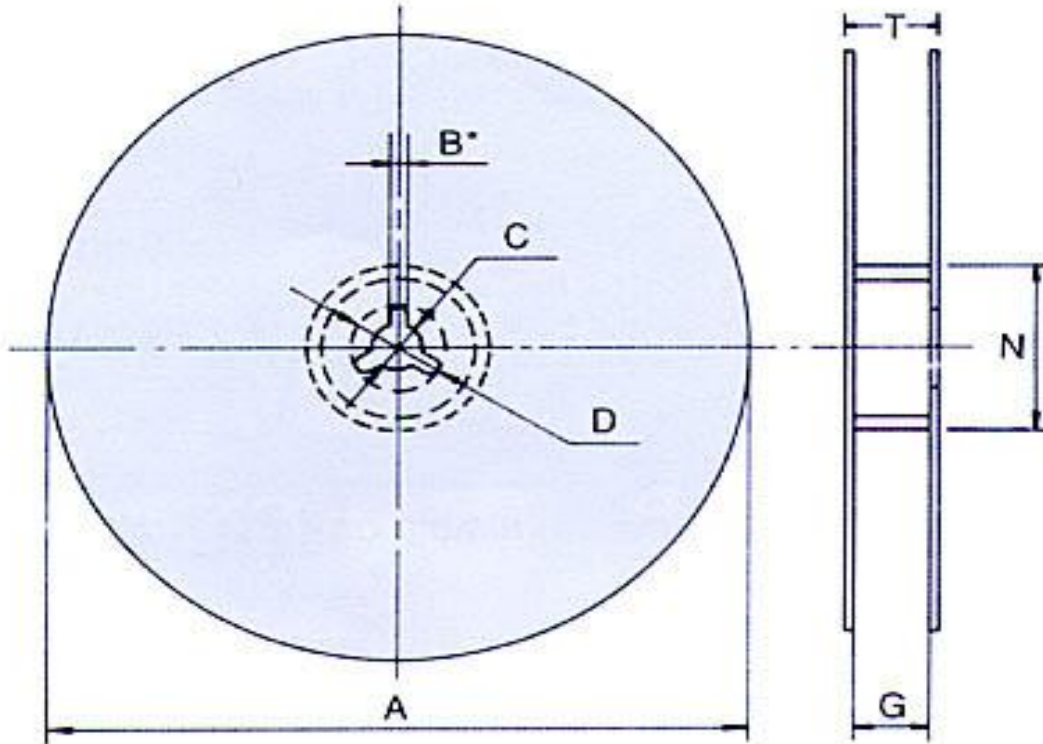
Accumulated dimensional tolerance $40\pm 0.2\text{mm}$

Size	A	B	W	F	E	P1	P2	P0	D
0603	1.10 ± 0.20	1.90 ± 0.20	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50+0.10/-0$
0805	1.65 ± 0.20	2.40 ± 0.20	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50+0.10/-0$
1206	2.00 ± 0.20	3.60 ± 0.20	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50+0.10/-0$
1210	3.00 ± 0.20	3.60 ± 0.20	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50+0.10/-0$
2010	2.80 ± 0.20	5.50 ± 0.20	12.00 ± 0.30	5.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50+0.10/-0$
2512	3.50 ± 0.20	6.70 ± 0.20	12.00 ± 0.30	5.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50+0.10/-0$

(unit: mm)

SPECIFICATION

• Reel Package



Size	Packaging Q'ty	A	N	C	D	B	G	T
0603 0805 1206 1210	5Kpcs / Reel	178.0±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	10.0±1.5	14.9 max.
	10Kpcs / Reel	254.0±2.0	100.0±1.0	13.5±0.5	20min	2.0±0.5	10.0±1.5	14.9 max.
	20Kpcs / Reel	330.0±2.0	100.0±1.0	13.5±0.5	20min	2.0±0.5	10.0±1.5	14.9 max.
2010 2512	4Kpcs / Reel	178.0±2.0	60.0±0.5	13.0±0.5	20min	2.0±0.5	13.8±1.5	16.7 max.
	8Kpcs / Reel	254.0±2.0	100.0±1.0	13.5±0.5	20min	2.0±0.5	13.8±1.5	16.7 max.
	16Kpcs / Reel	330.0±2.0	100.0±1.0	13.5±0.5	20min	2.0±0.5	13.8±1.5	20.0 max.

(unit: mm)

SPECIFICATION

■ RL < 1Ω Specification And Test Methods

ITEM	SPECIFICATION	TEST METHOD
DC Resistance	J : ±5% , F : ±1%	IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance value.
Short time Overload	J: $\Delta R \leq \pm(2\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(1\% + 0.5m\Omega)$	IEC 60115-1 / JIS C 5201-1 , Clause 4.13 2.5×Rated voltage or Max. Overload Voltage for 5 sec. measure resistance after 30 minutes
Solderability	Over 95% of termination must be covered with solder	IEC 60115-1 / JIS C 5201-1 , Clause 4.17 After immersing flux, dip in the 235±2°C molten solder bath for 2±0.5 sec.
Resistance to Solder Heat	J: $\Delta R \leq \pm(1\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(0.5\% + 0.5m\Omega)$ No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.18 With 260±5°C for 10±1 sec.
Temperature Coefficient of Resistance (TCR)	Size : 0603 、 0805 100mΩ ~ 910mΩ : ±300ppm/°C 50mΩ ~ 91mΩ : ±400ppm/°C Size : 1210 100mΩ ~ 910mΩ : ±200ppm/°C Size : 1206 、 2010 、 2512 50mΩ ~ 910mΩ : ±200ppm/°C 40mΩ ~ 47mΩ : ±400ppm/°C 22mΩ ~ 39mΩ : ±600ppm/°C 10mΩ ~ 20mΩ : ±1000ppm/°C	IEC 60115-1 / JIS C 5201-1 , Clause 4.8 Test temperature : 25°C (T1) → -55°C (T2) 25°C (T1) → +155°C (T2) $TCR (ppm/^{\circ}C) = \frac{R2-R1}{R1} \times \frac{1}{T2-T1} \times 10^6$ T1: 25°C T2: Test temperature R1: Resistance at reference temperature (T1) R2: Resistance at test temperature (T2)
Load Life Humidity	J: $\Delta R \leq \pm(3\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(1\% + 0.5m\Omega)$	IEC 60115-1 / JIS C 5201-1 , Clause 4.24 Maintain the temperature of the resistor at 40±2°C and 90~95% R.H. with the rated voltage applied. Cycle ON for 1.5 hours and OFF for 0.5 hour for 1000+48/-0 hours. After 1~4 hour, measure the resistance value.
Load Life	J: $\Delta R \leq \pm(3\% + 0.5m\Omega)$ F: $\Delta R \leq \pm(1\% + 0.5m\Omega)$	IEC 60115-1 / JIS C 5201-1 , Clause 4.25 Permanent resistance change after 1000+48/-0 hours (1.5 hours ON , 0.5 hour OFF) at RCWV or Max. Keep the resistor at 70±2°C ambient
Temperature Cycle	J: $\Delta R \leq \pm(1\% + 1m\Omega)$ F: $\Delta R \leq \pm(0.5\% + 1m\Omega)$ No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.19 Repeat 5 cycles as follows -55°C (30 min.) + 25°C (2~3 min.) +125°C (30 min.) + 25°C (2~3 min.) for 0201 55°C (30 min.) + 25°C (2~3 min.) +155°C (30 min.) + 25°C (2~3 min.) for others
Insulation Resistance	Between termination and coating must be over 1000MΩ	IEC 60115-1 / JIS C 5201-1 , Clause 4.6 Test voltage: 100±15V
Bending Strength	J: $\Delta R \leq \pm(1\% + 1m\Omega)$ F: $\Delta R \leq \pm(0.5\% + 1m\Omega)$ No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.33 Resistance change after bended on the 90mm PCB. Bend: 3mm for 0603 、 0805 2mm for 1206 、 1210 、 2010 、 2512