

■ Metal Alloy Low-Resistance Resistor

● LR Series



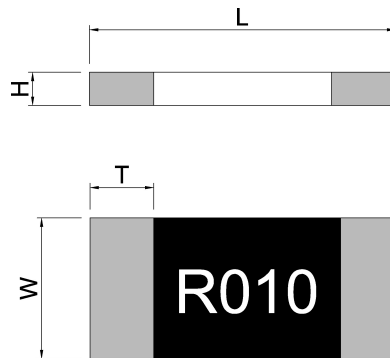
■ Application

- Power supply
- Battery pack
- DIY tools
- Inverter/Converter (AC/DC, DC/DC, DC/AC)
- Measurable instrument
- Consumer electronics
- Note book
- PC power pack
- LED driver
- Others (Auto tronics... etc.)

■ Features

- Ideal for all types of current sensing, voltage division and pulse applications including switching and linear power supplies, instruments, power amplifiers.
- Very low inductance 0.5nH to 5nH.
- Excellent frequency response.
- Stable high frequency characteristic with reduced lead inductance and excellent frequency response.
- Low thermal EMF ($<1\mu\text{V}/^\circ\text{C}$).
- Pure tin plating provides compatibility with lead (Pb) free and lead containing soldering processes.
- Excellent stability ($|\Delta R/R| \leq \pm 0.5\%$ for 1000h at 100°C) different environmental conditions.

■ Type Dimension



■ Dimension

Unit: mm

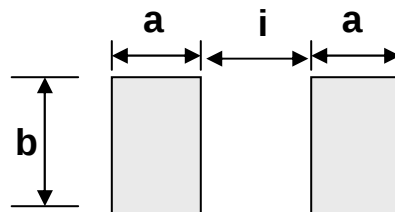
TYPE	Resistance Range mΩ	L	W	H	T
LR1206 1W	1~50	3.200±0.254	1.600±0.254	0.545±0.254	0.508±0.254
LR2010 1W	0.5~3	5.080±0.254	2.540±0.254	0.787±0.254	1.295±0.254
	3.1~100			0.645±0.254	0.787±0.254
LR2512 1W, 1.5W, 2W	0.5~4	6.248±0.254	3.202±0.254	0.787±0.254	1.880±0.254
LR2512 1W, 1.5W	4.1 ~75.0			0.645±0.254	1.118±0.254
	75.1 ~ 100.0			0.645±0.254	0.868±0.254
LR2512 2W	4.1~75	6.248±0.254	3.202±0.254	0.645±0.254	1.118±0.254
LR2512 3W	0.5	6.248±0.254	3.202±0.254	0.787±0.254	1.880±0.254
	0.6~2.9 & 4.1~10				1.118±0.254
	3~4				1.676±0.254
LR2725 4W	0.25, 0.5	6.807±0.254	6.452±0.254	0.991±0.254	2.159±0.254
	1			1.092±0.254	2.159±0.254
	1.5			0.991±0.254	2.159±0.254
	2			0.889±0.254	1.803±0.254
	2.5				1.651±0.254
	3				1.295±0.254
LR2728 3W, 3.5W	4~100	6.706±0.254	7.188±0.254	0.991±0.254	1.143±0.254
LR2728 4W	4~50	6.706±0.254	7.188±0.254	0.991±0.254	1.143±0.254
LR4527 5W	0.5~5	11.430±0.254	6.850±0.254	1.500±0.254	3.215±0.254
	5.1~120				1.815±0.254

● For non-standard parts, please contact our sales dept.

Standard Electrical Specifications

Model	Power Rating at 70°C	T.C.R. (ppm/°C) / mΩ	Max.Rating Current	Max.Overload Current	Resistance Range mΩ			Operating Temperature Range (°C)
					0.5% (D)	1.0% (F)	5.0% (J)	
LR1206	1W	1.0~15.0mΩ: $\leq \pm 75$ 15.1~50.0mΩ: $\leq \pm 50$	31.62A	63.25A	7~50mΩ	1~50 mΩ		- 55 ~ + 170
LR2010	1W	0.5~0.9 mΩ: $\leq \pm 100$ 1.0~1.9mΩ: $\leq \pm 75$ 2.0~100mΩ: $\leq \pm 50$	44.72A	89.44A	7~49mΩ	0.5~100 mΩ		
LR2512	1 W	0.5~1.0mΩ: $\leq \pm 75$	44.72A	100.00A	7~50mΩ	0.5~100 mΩ		
	1.5 W	1.1~100mΩ: $\leq \pm 50$	54.77A	122.48A	7~50mΩ	0.5~100 mΩ		
	2 W	0.5~1.0mΩ: $\leq \pm 75$ 1.1~75mΩ: $\leq \pm 50$	63.25A	141.42A	7~50mΩ	0.5~75 mΩ		
	3 W	0.5~1.0mΩ: $\leq \pm 75$ 1.1~10.0mΩ: $\leq \pm 50$	77.46A	134.16A	7~10mΩ	0.5~10 mΩ		
LR2725	4 W	0.25~3.0mΩ: $\leq \pm 50$	126.49A	252.95A	---	0.25~3 mΩ		
LR2728	3 W	4.0~100mΩ: $\leq \pm 50$	27.39A	47.43A	4~19mΩ	4~100mΩ		
	3.5 W	4.0~100mΩ: $\leq \pm 50$	29.58A	51.23A	4~19mΩ	4~100mΩ		
	4 W	4.0~ 50.0mΩ: $\leq \pm 50$	31.62A	54.77A	4~19mΩ	4~50mΩ		
LR4527	5W	0.5~1.0mΩ: $\leq \pm 75$ 1.1~120mΩ: $\leq \pm 50$	100A	173.21A	7~120mΩ	0.5~120 mΩ		

Recommend Land Pattern Design (For Reflow Soldering)



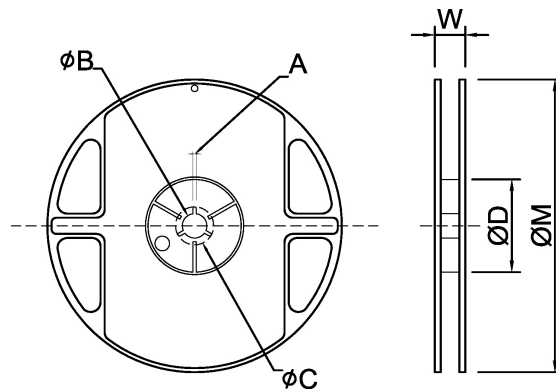
Dimension

Unit: mm

Type	Resistance Range mΩ	a	b	i
LR1206 - 1W	1~50	1.60	2.18	1.00
LR2010 - 1W	0.5~3	2.89	2.92	1.22
	3.1~100	2.29	2.92	2.41
LR2512 - 1W, 1.5W, 2W	0.5~4	3.05	3.68	1.27
LR2512 - 1W, 1.5W, 2W	4.1~100	2.11	3.68	3.18
	4.1~75	2.11	3.68	3.18
	0.5	3.05	3.68	1.27
LR2725 - 4W	0.6~2.9& 4.1~10	2.19	3.68	3.00
LR2728 - 3W, 3.5W, 4W	3~4	2.79	3.68	1.80
LR4527 - 5W	0.25 ~3	3.18	6.86	1.32

	4~100	2.75	7.82	3.51
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■ Packaging

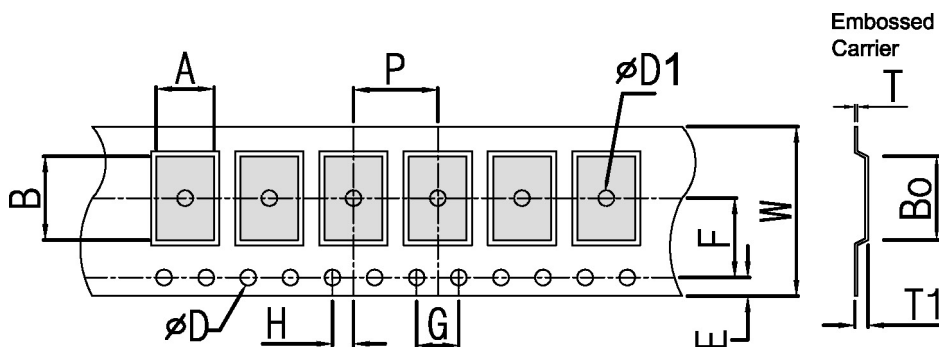


■ Dimension

Unit: mm

Reel Type / Tape	A	φB	φC	φD	W	φM
7" reel for 12 mm embossed	2.5 ± 0.5	13.5 ± 0.5	17.7 ± 0.5	60.0 ± 0.5	16.2 ± 0.5	178 ± 1.0
7" reel for 8 mm embossed (for LR1206 only)	2.0 ± 0.5	13.2 ± 0.5	17.7 ± 0.5	60.0 ± 0.5	12.00 ± 0.5	178 ± 1.0
7" reel for 24 mm embossed	2.0 ± 0.5	13.5 ± 0.5	17.7 ± 0.5	60.0 ± 0.5	24.4 ± 2.0	178 ± 1.0

■ Embossed Dimension



■ Dimension

Unit: mm

Item	W	P	E	F	φD	φD1	G	H	A	Bo	T1	T
LR1206	8.0±0.15	4.0±0.10	1.75±0.10	3.5±0.10	8.0±0.15	+0.1 1.50 +0	4.0±0.10	2.0±0.10	1.83±0.10	3.48±0.10	1.10±0.10	0.20±0.05
LR2010	12.0±0.15	4.0±0.10	1.75±0.10	5.5±0.10	12.0±0.15		4.0±0.10	2.0±0.10	2.90±0.10	5.45±0.10	1.33±0.10	0.23±0.05
LR2512	12.0±0.15	4.0±0.10	1.75±0.10	5.5±0.10	12.0±0.15		4.0±0.10	2.0±0.10	3.50±0.10	6.75±0.10	1.30±0.10	0.20±0.05
LR2725	12.0±0.15	8.0±0.10	1.75±0.10	5.5±0.10	12.0±0.15		4.0±0.10	2.0±0.10	6.75±0.10	7.15±0.10	1.95±0.10	0.25±0.05
LR2728	12.0±0.15	12.0±0.10	1.75±0.10	5.5±0.10	12.0±0.15		4.0±0.10	2.0±0.10	7.70±0.10	7.15±0.10	1.45±0.10	0.25±0.05
LR4527	24.0±0.15	12.0±0.10	1.75±0.10	11.5±0.10	24.0±0.15		4.0±0.10	2.0±0.10	7.20±0.10	11.80±0.10	2.00±0.10	0.30±0.10

■ Parts Number Explanation

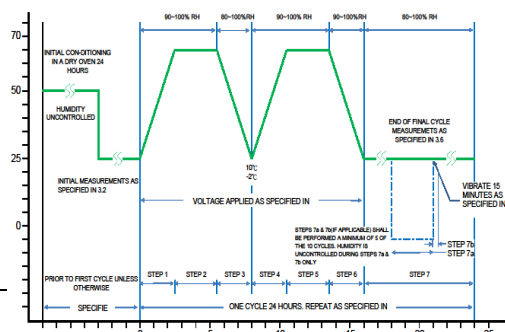
■ Example:

LR	1206	J	0R05	E	04	1W
Product Type	Size (Inch)	Resistor Tolerance	Resistors Value	Package	Quantity	Power (Watts)
	0805 1206 2010 2512 2725 2728 4527	D : $\pm 0.5\%$ F : $\pm 1\%$ G : $\pm 2\%$ J : $\pm 5\%$		E : Embossed Taping	01 : 1000PCS 02 : 2000PCS 04 : 4000PCS 05 : 5000PCS	1W 1.5W 2W 3W 3.5W 4W 5W

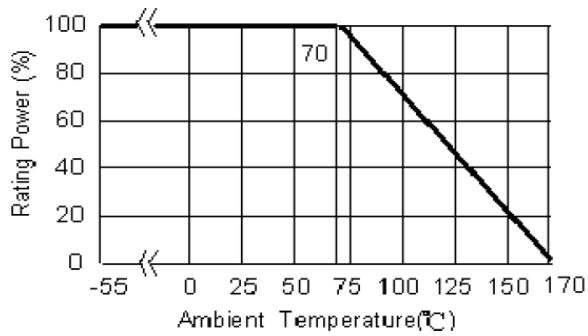
Test Procedures and Requirements

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (TCR)	JIS C 5201 clause 4.8	$TCR (ppm/^{\circ}C) = \frac{R2-R1}{R1 (T2-T1)} \times 10^6$ R1 : resistance of room temperature (T1) R2 : resistance of 150 °C (T2)	Refer to Ratings
Short Time Overload	JIS C 5201 clause 4.13	3 times rated power for LR2512-3W, LR2728-3W, LR2728-3.5W, LR2728-4W, LR4527-5W 4 times rated power for LR1206-1W, LR2010-1W, LR2725-4W, 5 times rated power for LR2512-1W, LR2512-1.5W, LR2512-2W Rating power duration: 5secs	$\pm(0.5\%+0.0005\Omega)\Delta R$
Insulation Resistance	JIS C 5201 clause 4.6	100±15V _{DC} for 1 minute	$\geq 10^9\Omega$
Dielectric Withstanding Voltage	JIS C 5201 clause 4.7	Applied 500V _{AC} for 1 minute, and Limit surge current 50 mA (max.)	Without break down
Resistance to Solder Heat	JIS C 5201 clause 4.18	Solder temp./immersion time: 260±5°C, 10±1secs	$\pm(0.5\%+0.0005\Omega)\Delta R$
Solderability Test	JIS C 5201 clause 4.17	Solder Bath/Dip and Look Test, 245±5°C, 3±0.5 secs	95% coverage
Vibration	JIS C 5201 clause 4.22	Frequency varied 55Hz in one minute, 3 orientations @ Total duration 12 hours	$\pm(0.5\%+0.0005\Omega) \Delta R$
Resistance to Solvent	JIS C 5201 clause 4.29, 4.30	Immersion time: 60±5 secs @ 20°C ~25°C	$\pm(0.5\%+0.0005\Omega) \Delta R$
Low Temperature Exposure (Storage)	JIS C 5201 clause 4.23.4	1,000 hours @ -55±2°C	$\pm(0.5\%+0.0005\Omega) \Delta R$
High Temperature Exposure (Storage)	JIS C 5201 clause 4.23.2	1,000 hours @ + 170°±5C	$\pm(1.0\%+0.0005\Omega) \Delta R$
Temperature Cycling	JIS C 5201 clause 4.19	Air to air, - 55°C to + 150°C, 1,000 cycles, 15 minutes at each extreme, transition time 2 to 3 minutes	$\pm(0.5\%+0.0005\Omega) \Delta R$
Moisture Resistance (Climatic Sequence)	MIL-STD 202 Method 106	Mil-STD-202, Method 106, 0% power, 7a and 7b not required, t = 24 h/cycle, 10 cycles, Unpowered, (Figure 1)	$\pm(0.5\%+0.0005\Omega) \Delta R$
Bias Humidity	JIS C 5201 clause 4.24	+ 85 °C, 85% RH, 10% Bias, Extended Life Test: 1,000 hours, 1.5 hours On, 0.5 hours Off	$\pm(0.5\%+0.0005\Omega) \Delta R$
Load Life	JIS C 5201 clause 4.25.1	Test temperature 70±2°C Rated continuous working voltage, Extended Life Test: 1,000 hours, 1.5 hours On , 0.5 hours Off	$\pm(1.0\%+0.0005\Omega) \Delta R$

Figure 1

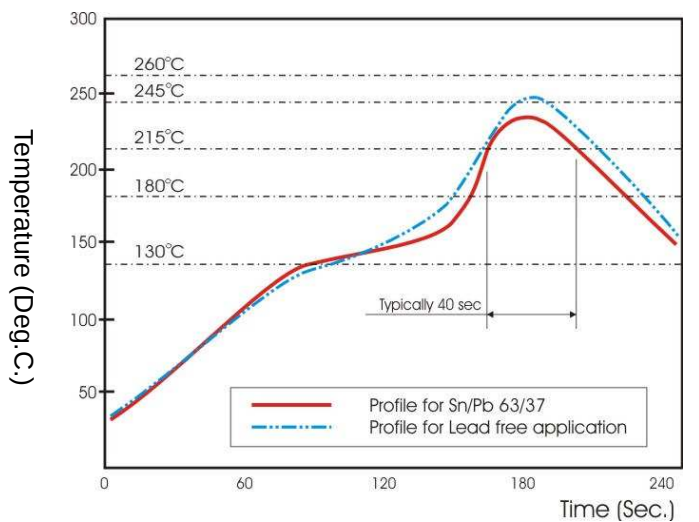


Power Derating Curve

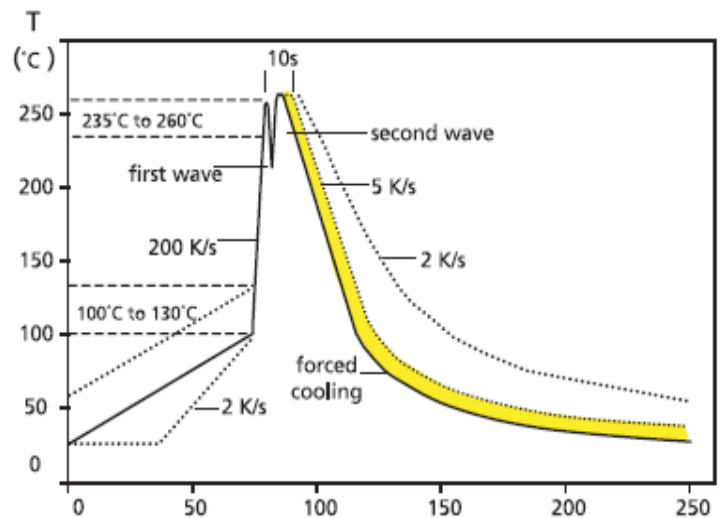


Recommend Soldering Conditions:

Surface-mount components are tested for solderability at a temperature of 245 °C for 3 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in below:



Recommended IR Reflow Soldering Profile



Recommended double-wave Soldering Profile

Typical values (solid line)

Process limits (dotted line)