

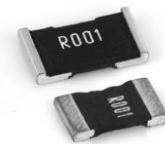
**LR Series** Metal Alloy Low-Resistance Resistor

-This specification applies to a lead-free, halogen-free metal alloy low-resistance resistors compliant with RoHS directives.

-The product is designed for general purpose applications.

-The miniature size makes it suitable for compact Printed Circuit Boards (PCBs) used in high-precision electronic products.

-Common applications include: Power supplies, Battery Packs, Measuring Instruments, LED Drivers, etc.

**GENERAL SPECIFICATIONS**

Type	Rating Power	Rating Current	Overload Current	T.C.R. (ppm/°C)		Resistance Range (mΩ)			Operating Temperature Range
						D (±0.5%)	F (±1%)		
							G (±2%)	J (±5%)	
1206	0.5W	$I_r = \sqrt{P/R}$	$I_o = \sqrt{5 \times P/R}$	0.5~0.9mΩ	$\leq \pm 175$	5.0~50.0	0.5~50.0	-55~170°C	
				1.0~15.0mΩ	$\leq \pm 75$				
				15.1~50.0mΩ	$\leq \pm 50$				
	1W			0.5~0.9mΩ	$\leq \pm 175$	5.0~50.0	0.5~50.0		
				1.0~15.0mΩ	$\leq \pm 75$				
				15.1~50.0mΩ	$\leq \pm 50$				
	1.5W			0.5~0.9mΩ	$\leq \pm 175$	-	0.5~1.0		
				1.0mΩ	$\leq \pm 75$				
2W	1.0~5.0mΩ	$\leq \pm 75$	5.0	1.0~5.0					
	1.0~5.0mΩ	$\leq \pm 75$							
1210	1.5W			2.0~10.0mΩ	$\leq \pm 75$	2.0~10.0	2.0~10.0		
2010	1W	$I_r = \sqrt{P/R}$	$I_o = \sqrt{5 \times P/R}$	0.5~0.9mΩ	$\leq \pm 100$	7.0~49	0.5~100		
				1.0~1.9mΩ	$\leq \pm 75$				
				2.0~6.9mΩ	$\leq \pm 50$				
				7.0~100mΩ	$\leq \pm 25$				
	1.5w			0.5~0.9mΩ	$\leq \pm 100$	7.0~40	0.5~40		
				1.0~1.9mΩ	$\leq \pm 75$				
				2.0~6.9mΩ	$\leq \pm 50$				
				7.0~40mΩ	$\leq \pm 25$				
	2W			0.5~0.9mΩ	$\leq \pm 100$	7.0~12	0.5~12		
				1.0~1.9mΩ	$\leq \pm 75$				
				2.0~6.9mΩ	$\leq \pm 50$				
				7.0~12mΩ	$\leq \pm 25$				
2512	1W	$I_r = \sqrt{P/R}$	$I_o = \sqrt{5 \times P/R}$	0.3mΩ	$\leq \pm 150$	7.0~50	0.3~300		
				0.5~1.0mΩ	$\leq \pm 75$				
				1.1~3.0mΩ	$\leq \pm 50$				
				3.1~100mΩ	$\leq \pm 25$				
	1.5W			0.3mΩ	$\leq \pm 150$	7.0~50	0.3~220		
				0.5~1.0mΩ	$\leq \pm 75$				
				1.1~3.0mΩ	$\leq \pm 50$				
				3.1~100mΩ	$\leq \pm 25$				
	2W			0.3mΩ	$\leq \pm 150$	7.0~50	0.3~75.0		
				0.5~1.0mΩ	$\leq \pm 75$				
				1.1~3.0mΩ	$\leq \pm 50$				
				3.1~75mΩ	$\leq \pm 25$				
	3W			0.3mΩ	$\leq \pm 150$	7.0~10.0	0.3~10.0		
				0.5~1.0mΩ	$\leq \pm 75$				
				1.1~2.5mΩ	$\leq \pm 50$				
				2.6~10.0mΩ	$\leq \pm 25$				
2725	4W	$I_r = \sqrt{P/R}$	$I_o = \sqrt{5 \times P/R}$	0.20mΩ	$\leq \pm 100$	-	0.20~3.0		
				0.25~3.0mΩ	$\leq \pm 50$				
	5W			0.20mΩ	$\leq \pm 100$	-	0.20~0.5		
				0.25~0.5mΩ	$\leq \pm 50$				



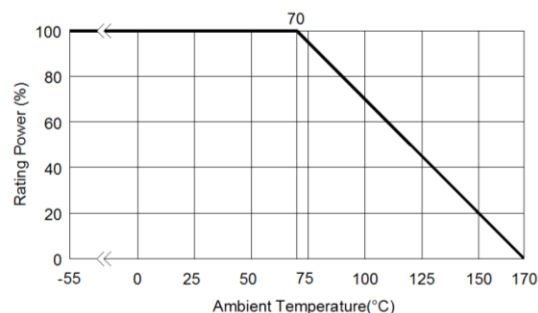
Type	Rating Power	Rating Current	Overload Current	T.C.R. (ppm/°C)		Resistance Range (mΩ)			Operating Temperature Range
						D (±0.5%)	F (±1%)	G (±2%)	
							J (±5%)		
2728	3W	$I_r = \sqrt{P/R}$	$I_o = \sqrt{5 \times P/R}$	4.0~200mΩ:	$\leq \pm 25$	4.0~19.0	4.0~200	-55~170°C	
	3.5W			4.0~100mΩ:	$\leq \pm 25$	4.0~19.0	4.0~100		
	4W			4.0~ 50.0mΩ:	$\leq \pm 25$	4.0~19.0	4.0~50.0		
4527S (without heat sink)	2W			0.5~1.0m:	$\leq \pm 75$	7.0~100	0.5~200		
	3W			1.1~200mΩ:	$\leq \pm 50$	7.0 ~27	0.5~27		
				0.5~1.0mΩ:	$\leq \pm 75$				
				5W	1.1~27mΩ:	$\leq \pm 50$	7.0~7.5		0.5~7.5
4527	5W			0.5~1.0mΩ:	$\leq \pm 75$	7.0 ~120			
				1.1~200mΩ:	$\leq \pm 50$				

**CHARACTERISTICS**

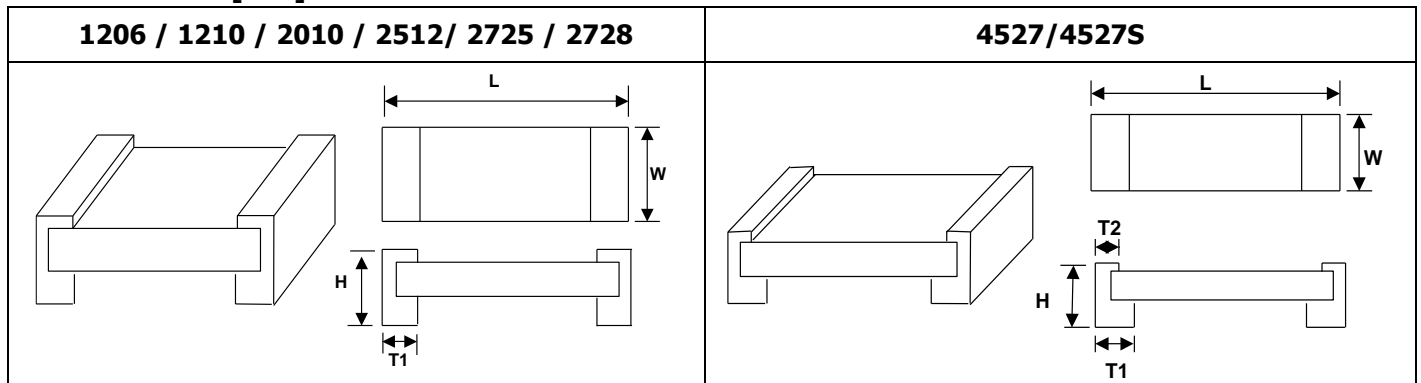
<b>Temperature Coefficient of Resistance</b>	Refer to Paragraph general specifications	JIS C 5201 4.8 Method; $TCR(ppm/^\circ C) = \{(R2-R1)/R1(T2-T1)\} \times 10^6$ R1 : Resistance of room temp.(T1), R2 : Resistance of 150°C(T2)
<b>Short Time Overload</b>	LR4527(S) : $(\Delta R/R1) \leq \pm 2.0\%$ Others : $(\Delta R/R1) \leq \pm 0.5\%$	JIS C 5201-1 4.13 Method; 5times rated power, 5seconds
<b>Insulation Resistance</b>	$\geq 10^9 \Omega$	JIS C 5201 4.6 Method; DC100V <sub>DC</sub> for 1minute
<b>Dielectric Withstanding Voltage</b>	Without break down	JIS C 5201 4.7 Method; Applied AC500V <sub>AC</sub> for 1minute, Limit surge current maximum 50mA
<b>Resistance to Solder Heat</b>	$(\Delta R/R1) \leq \pm 0.5\%$	JIS C 5201 4.18 Method; Solder temperature/immersion time : 260±5°C, 10±1seconds
<b>Solderability</b>	95% coverage	JIS C 5201 4.17 Method; 245±5°C, 3±0.5 seconds
<b>Resistance to solvent</b>	$(\Delta R/R1) \leq \pm 0.5\%$	JIS C 5201-1 4.29 Method : Immersion time : 60 seconds, @20°C~25°C
<b>Low Temperature Exposure(Storage)</b>	$(\Delta R/R1) \leq \pm 0.5\%$	JIS C 5201 4.23.4 Method : 1,000hours, @-55°C
<b>High Temperature Exposure(Storage)</b>	$(\Delta R/R1) \leq \pm 1.0\%$	JIS C 5201 4.23.2 Method : 1,000hours, +170°C
<b>Temperature Cycling (Rapid Temp. Change)</b>	$(\Delta R/R1) \leq \pm 0.5\%$	JESD22-A104 Method : -55°C to +150°C, 1,000cycles, Dwell time : 30min maximum.
<b>Moisture Resistance (Climatic Sequence)</b>	$(\Delta R/R1) \leq \pm 0.5\%$	Mil-STD-202, Method 106
<b>Bias Humidity</b>	$(\Delta R/R1) : \leq \pm 0.5\%$	JIS C 5201 4.24 Method : +85°C, 85% RH, 10% Bias, 1.5 hours On, 0.5 hours Off. Extended Life Test : 1,000 hours.
<b>Load Life</b>	LR4527 : $(\Delta R/R1) \leq \pm 2.0\%$ Others : $(\Delta R/R1) \leq \pm 1.0\%$	JIS C 5201 4.25 Method : Test temperature 70°C Rated working voltage 1.5hours On, 0.5hours Off. Extended Life Test : 1,000 hours

\* Remark:  $\Delta R = (\text{resistance after stress} - \text{resistance before stress})$ ; R1 means resistance before stress

**DERATING CURVE**



■ DIMENSIONS [mm]



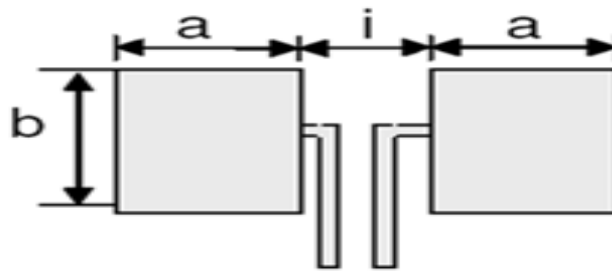
Model	Max. Power Rating [W]	Resistance Range[mΩ]	DIMENSIONS - in inches (millimeters)				
			L	W	H	T1	T2
LR 1206	0.5 & 1.0	0.5~0.6	0.126±0.010 (3.200±0.254)	0.063±0.010 (1.600±0.254)	0.039±0.010 (1.000±0.254)	0.029±0.010 (0.725±0.254)	
		1.0~1.5			0.025±0.010 (0.645±0.254)	0.020±0.010 (0.508±0.254)	
		2.0 ~ 4.0			0.022±0.010 (0.545±0.254)	0.024±0.010 (0.600±0.254)	
		5			0.039±0.010 (1.000±0.254)	0.020±0.010 (0.508±0.254)	
		6.0 ~50.0			0.025±0.010 (0.645±0.254)	0.029±0.010 (0.725±0.254)	
	1.5	0.5~0.6			0.039±0.010 (1.000±0.254)	0.029±0.010 (0.725±0.254)	
		1			0.025±0.010 (0.645±0.254)	0.020±0.010 (0.508±0.254)	
	2.0	1.0			0.022±0.010 (0.545±0.254)	0.020±0.010 (0.508±0.254)	
		2.0~4.0			0.022±0.010 (0.545±0.254)	0.024±0.010 (0.60±0.254)	
		5.0			0.035±0.010 (0.88±0.254)	0.057±0.010 (1.440±0.254)	
LR 1210	1.5	2.0~10.0	0.100±0.010 (2.540±0.254)	0.031±0.010 (0.787±0.254)	0.051±0.010 (1.295±0.254)		
LR 2010	1.0 & 1.5 & 2.0	0.5 ~ 0.9		0.025±0.010 (0.645±0.254)	0.031±0.010 (0.787±0.254)		
		1.0 ~ 3.0		0.040±0.010 (1.000±0.254)	0.079±0.010 (2.02±0.254)		
		3.1 ~ 4.0	0.031±0.010 (0.787±0.254)	0.054±0.010 (1.374±0.254)			
LR 2512	1	4.1 ~100.0	0.246±0.010 (6.248±0.254)	0.126±0.010 (3.202±0.254)	0.025±0.010 (0.645±0.254)	0.074±0.010 (1.880±0.254)	
		0.3			0.040±0.010 (1.000±0.254)	0.074±0.010 (1.880±0.254)	
		0.5 ~ 0.7			0.025±0.010 (0.645±0.254)	0.044±0.010 (1.118±0.254)	
		0.75			0.0236±0.010 (0.600±0.254)	0.034±0.010 (0.868±0.254)	
		0.8~3.0			0.040±0.010 (1.000±0.254)	0.079±0.010 (2.02±0.254)	
		3.1 ~ 4.0			0.031±0.010 (0.787±0.254)	0.054±0.010 (1.374±0.254)	
		4.1 ~78.0			0.025±0.010 (0.645±0.254)	0.074±0.010 (1.880±0.254)	
	1.5	78.1 ~ 200			0.025±0.010 (0.645±0.254)	0.044±0.010 (1.118±0.254)	
		201.0-300			0.0236±0.010 (0.600±0.254)	0.034±0.010 (0.868±0.254)	
		0.3			0.040±0.010 (1.000±0.254)	0.079±0.010 (2.02±0.254)	
		0.5 ~ 0.7			0.031±0.010 (0.787±0.254)	0.054±0.010 (1.374±0.254)	
		0.75			0.025±0.010 (0.645±0.254)	0.074±0.010 (1.880±0.254)	
		0.8~4.0			0.025±0.010 (0.645±0.254)	0.044±0.010 (1.118±0.254)	
		4.1 ~78.0			0.0236±0.010 (0.600±0.254)	0.034±0.010 (0.868±0.254)	
		78.1 ~ 200			0.040±0.010 (1.000±0.254)	0.079±0.010 (2.02±0.254)	
2	201.0-220.0	0.031±0.010 (0.787±0.254)	0.054±0.010 (1.374±0.254)				
	0.3	0.025±0.010 (0.645±0.254)	0.074±0.010 (1.880±0.254)				
	0.5~0.7	0.025±0.010 (0.645±0.254)	0.044±0.010 (1.118±0.254)				
	0.75	0.031±0.010 (0.787±0.254)	0.054±0.010 (1.374±0.254)				



Model	Max. Power Rating [W]	Resistance Range[mΩ]	DIMENSIONS - in inches (millimeters)									
			L	W	H	T1	T2					
LR 2512	2	0.8~3.0	0.246±0.010 (6.248±0.254)	0.126±0.010 (3.202±0.254)	0.031±0.010 (0.787±0.254)	0.074±0.010 (1.880±0.254)						
		3.1 ~ 4.0				0.074±0.010 (1.880±0.254)						
		4.1 ~75.0				0.025±0.010 (0.645±0.254)		0.044±0.010 (1.118±0.254)				
	3	0.3			0.040±0.010 (1.000±0.254)	0.079±0.010 (2.02±0.254)						
		0.5			0.031±0.010 (0.787±0.254)	0.079±0.010 (2.02±0.254)						
		0.6~0.7				0.074±0.010 (1.880±0.254)						
		0.75				0.054±0.010 (1.374±0.254)						
		0.8 ~ 2.9				0.044±0.010 (1.118±0.254)						
		3.0~3.5				0.074±0.010 (1.880±0.254)						
		3.6 ~ 4.0				0.066±0.010 (1.676±0.254)						
		4.1~10.0				0.025±0.010 (0.645±0.254)		0.044±0.010 (1.118±0.254)				
		LR 2725				4.0 & 5.0		0.20 ~ 0.30	0.268±0.010 (6.807±0.254)	0.254±0.010 (6.452±0.254)	0.039±0.010 (0.991±0.254)	0.085±0.010 (2.159±0.254)
0.35	0.075±0.010 (1.90±0.254)											
0.4~0.45	0.051±0.010 (1.30±0.254)											
0.5	0.085±0.010 (2.159±0.254)											
0.6	0.071±0.010 (1.803±0.254)											
0.75	0.059±0.010 (1.504±0.254)											
1	0.043±0.010 (1.092±0.254)		0.085±0.010 (2.159±0.254)									
1.5	0.039±0.010 (0.991±0.254)		0.035±0.010 (0.889±0.254)									
2	0.071±0.010 (1.803±0.254)											
2.25~2.5	0.065±0.010 (1.651±0.254)											
3	0.051±0.010 (1.30±0.254)											
LR 2728	3		4.0~200.0	0.264±0.010 (6.706±0.254)	0.283±0.010 (7.188±0.254)		0.039±0.010 (0.991±0.254)	0.045±0.010 (1.143±0.254)				
	3.5	4.0~100.0										
	4	4.0~50.0										
LR 4527S (without heat sink)	2	0.5	0.450±0.010 (11.430±0.254)	0.270±0.010 (6.850±0.254)	0.055±0.010 (1.400±0.254)	0.136±0.010 (3.465±0.254)	0.038±0.010 (0.965±0.254)					
		0.6 ~ 3.0				0.127±0.010 (3.215±0.254)						
		4.0 ~ 5.0				0.071±0.010 (1.815±0.254)						
	3	5.1 ~ 200				0.136±0.010 (3.465±0.254)						
		0.5				0.127±0.010 (3.215±0.254)						
		0.6 ~ 3.0				0.071±0.010 (1.815±0.254)						
	5	4.0 ~ 5.0				0.136±0.010 (3.465±0.254)						
		5.1 ~ 27				0.127±0.010 (3.215±0.254)						
		0.5				0.071±0.010 (1.815±0.254)						
		0.6 ~ 3.0				0.136±0.010 (3.465±0.254)						
	LR 4527	5				4.0 ~ 5.0		0.450±0.010 (11.430±0.254)	0.270±0.010 (6.850±0.254)	0.059±0.010 (1.500±0.254)	0.127±0.010 (3.215±0.254)	0.038±0.010 (0.965±0.254)
						5.1 ~ 200					0.127±0.010 (3.215±0.254)	
0.5			0.071±0.010 (1.815±0.254)									
0.6 ~ 3.0			0.127±0.010 (3.215±0.254)									

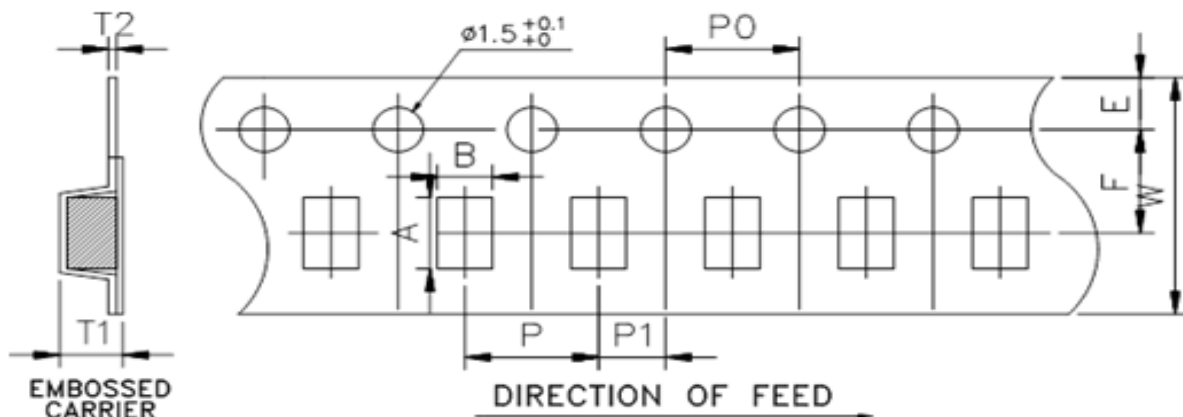


■ SOLDER PAD DIMENSIONS

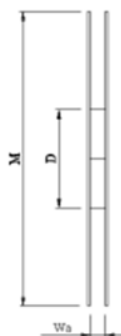
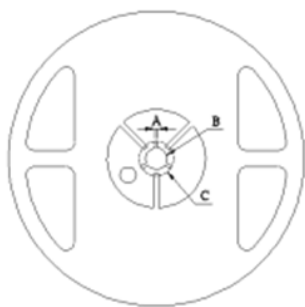


MODEL	Maximum Power Rating (Watts)	Resistance Range (mΩ)	Dimensions - in millimeters		
			a	b	i
LR 1206	0.5 & 1.0 & 1.5	0.5~ 0.6	1.65	2.18	0.90
		1.0 ~ 50.0	1.60		1.00
LR 1210	1.5	2.0~10.0	1.25	2.92	1.70
LR 2010	1.0 & 1.5 & 2.0	0.5 ~ 3.0	2.89	2.92	1.22
		3.1 ~ 100.0	2.29		2.41
LR 2512	1.0	0.3 ~ 0.7	3.05	3.68	1.27
		0.8~ 4.0.			3.00
		0.75	2.19		3.18
		4.1 ~ 300.0	2.11		
	1.5	0.3 ~ 0.7	3.05		1.27
		0.8~ 4.0.			3.00
		0.75	2.19		3.18
		4.1 ~ 220.0	2.11		
	2.0	0.3 ~ 0.7	3.05		1.27
		0.8 ~ 4.0			3.00
		0.75	2.19		3.18
		4.1 ~ 75.0	2.11		
	3.0	0.3 ~ 0.5	3.05		1.27
		0.6 ~ 2.9			3.00
		4.1 ~ 10.0	2.19		
3.0 ~ 4.0		2.79	1.80		
LR 2725	4.0 & 5.0	0.20 ~ 3.0	3.18	6.86	1.32
LR 2728	3.0	4.0 ~ 200.0	2.75	7.82	3.51
	3.5	4.0 ~ 100.0			
	4.0	4.0 ~ 50.0			
LR 4527S	2.0	0.5 ~ 5.0	5.80	8.74	3.51
		5.1 ~ 200.0	4.15		6.81
	3	0.5 ~ 5.0	5.80		3.51
		5.1 ~ 27.0	4.15		6.81
	5	0.5 ~ 5.0	5.80		3.51
		5.1 ~ 7.5	4.15		6.81
LR 4527	5	0.5 ~ 5.0	5.80	8.74	3.51
		5.1 ~ 200.0	4.15		6.81

■ PACKAGING



DIM	A	B	W	E	F	T1	T2	P	P0	10*P0	P1
LR 1206 (0.5~0.6mΩ)	3.50±0.10	1.90±0.10	8.0±0.15	1.75±0.10	3.5±0.10	1.27±0.10	0.23±0.10	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10
LR 1206 (≥ 1.0mΩ)	3.48±0.10	1.83±0.10	8.0±0.15	1.75±0.10	3.5±0.10	1.10±0.10	0.20±0.05	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10
LR 1210	3.5±0.10	3.0±0.10	8.0±0.20	1.75±0.10	3.5±0.10	1.10±0.10	0.22±0.05	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10
LR 2010	5.45±0.10	2.90±0.10	12.0±0.15	1.75±0.10	5.5±0.10	1.33±0.10	0.23±0.05	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10
LR 2512 (0.3mΩ)	6.74±0.10	3.50±0.10	12.0±0.15	1.75±0.10	5.5±0.10	1.60±0.10	0.24±0.05	8.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10
LR 2512	6.75±0.10	3.50±0.10	12.0±0.15	1.75±0.10	5.5±0.10	1.30±0.10	0.20±0.05	4.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10
LR 2725	7.15±0.10	6.75±0.10	12.0±0.15	1.75±0.10	5.5±0.10	1.95±0.10	0.25±0.05	8.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10
LR 2728	7.15±0.10	7.70±0.10	12.0±0.15	1.75±0.10	5.5±0.10	1.45±0.10	0.25±0.05	12.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10
LR 4527	11.80±0.10	7.20±0.10	24.0±0.15	1.75±0.10	11.5±0.10	2.00±0.10	0.30±0.10	12.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10
LR 4527S	11.80±0.10	7.20±0.10	24.0±0.15	1.75±0.10	11.5±0.10	2.00±0.10	0.30±0.10	12.0±0.10	4.0±0.10	40.0±0.20	2.0±0.10



Reel Type / Tape	W	M	A	B	C	D
7" reel for 8 mm tape	9.0 ± 0.5	178 ± 2.0	2.0 ± 0.5	13.5 ± 0.5	21.0 ± 0.5	60.0 ± 1.0
7" reel for 12 mm tape	13.8 ± 0.5					80.0 ± 1.0
7" reel for 24 mm tape	25.0 ± 1.0			13.2 ± 0.5	17.7 ± 0.5	60.0 ± 1.0

\*Packaging Quantity

MODEL	Tape width	Max. Packaging Quantity (pcs/reel)		
		Embossed Plastic Type		
		4mm pitch	8mm pitch	12mm pitch
LR 1206 (0.5~0.6mΩ)	8mm	2,000pcs	--	--
LR 1206 (≥ 1.0mΩ)		4,000pcs		
LR 1210	8mm	4,000pcs	--	--
LR 2010	12mm	2,000pcs/4,000pcs	--	--
LR 2512 (0.3mΩ)		--	1,000pcs	--
LR 2512		4,000pcs	--	--
LR 2725		--	1,000pcs	--
LR 2728		--	--	1,000pcs
LR 4527 & LR 4527S		24mm	--	--

### MARKING FORMAT

- All the products marking are 4 digits (LR2512 0.3mΩ~4mΩ are not included)

<p>a. "R" designated the decimal location in ohms.                  Ex) For 1mΩ the product marking is R001;                  For 25mΩ the product marking is R025;                  For 100mΩ the product marking is R100.</p> <p>b. "m" designated the decimal location in milliohms.                  Ex) For 0.25mΩ the product marking is 0m25;                  For 0.5mΩ the product marking is 0m50;                  For 5.5mΩ the product marking is 5m50;                  For 25.5mΩ the product marking is 25m5.</p> <p>c. Marking image (Please refer to right)</p> <p>d. LR1206 0.5mΩ~0.6mΩ Square marking</p>	
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- LR2512 0.3mΩ~4mΩ marking format (3 digits)

<p>a. Under 1mΩ (1mΩ is not included) "m" is the first digit and means the decimal point position of mΩ.                  Ex) For 0.3mΩ the product marking is m30;                  For 90mΩ the product marking is m90.</p> <p>b. Under 4mΩ (4mΩ is included) The first digit is the unit digit. "m" means the decimal point position of mΩ.                  Ex) For 1mΩ the product marking is 1m0;                  For 4mΩ the product marking is 4m0.</p>	
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### ODERING PROCEDURE EXAMPLE

LR	2512	2	1	R001	F	4
Model	Size (inch) 1206 1210 2010 2512 2725 2728 4527 2527S	Number of terminals	Rated Power C=0.5W 1=1W A=1.5W 2=2.0W 3=3.0W B=3.5W 4=4.0W 5=5.0W	Resistance (Ex) : R001=1mΩ	Tolerance D=±0.5% F =±1% G =±2% J =±5%	Packing A=500pcs 1=1,000pcs 2=2,000pcs 4=4,000pcs