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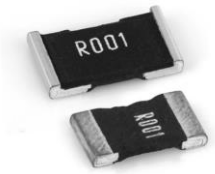
Resistors And
Resistive Applications

RoHS COMPLIANT

LR Series

Metal Alloy Low-Resistance Resistor



- This specification is applicable to lead free, halogen free of RoHS directive for metal alloy low-resistance resistor.
- The product is for general purpose.
- Miniature size suitable for compact Print Circuit Boards of high-precision electronic products.
- Applications include : Power Supply, Battery Pack, Measurable Instrument, LED Driver and Others.

■ 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	Ir=√(P×R)	Io=√(5×P×R)	0.5~0.9mΩ:	≦ ±175	7.0~50.0	0.5~50.0	-55~170°C
				1.0~15.0mΩ:	≦ ±75			
				15.1~50.0mΩ:	≦ ±50			
	1W			0.5~0.9mΩ:	≦ ±175	7.0~50.0	0.5~50.0	
				1.0~15.0mΩ:	≦ ±75			
				15.1~50.0mΩ:	≦ ±50			
	1.5W			0.5~0.9mΩ:	≦ ±175	--	0.5~1.0	
				1.0mΩ:	≦ ±75			
1210	1.5W			4.0~7.0mΩ:	≦ ±75	4.0 ~7.0	4.0 ~7.0	
2010	1W			0.5~0.9 mΩ:	≦ ±100	7.0~49	0.5~100	
				1.0~1.9mΩ:	≦ ±75			
				2.0~6.9mΩ:	≦ ±50			
				7.0~100mΩ:	≦ ±25			
	1.5w			0.5~0.9 mΩ: 1.0~1.9mΩ: 2.0~6.9mΩ: 7.0~40mΩ:	≦ ±100 ≦ ±75 ≦ ±50 ≦ ±25	7.0~40	0.5~40	
2010	2W			0.5~0.9 mΩ:	≦ ±100	7.0~12	0.5~12	
				1.0~1.9mΩ:	≦ ±75			
				2.0~6.9mΩ:	≦ ±50			
				7.0~12mΩ:	≦ ±25			
2512	1W			0.3mΩ:	≦ ±150	7.0~50	0.3~300	
				0.5~1.0mΩ:	≦ ±75			
				1.1~3.0mΩ:	≦ ±50			
				3.1~100mΩ	≦ ±25			
				101~300mΩ:	≦ ±50			
	1.5W			0.3mΩ:	±150	7.0~50	0.3~220	
				0.5~1.0mΩ:	≦ ±75			
				1.1~3.0mΩ:	≦ ±50			
				3.1~100mΩ	≦ ±25			
				101~220mΩ:	≦ ±50			
	2W			0.3mΩ:	≦ ±150	7.0~50	0.3~75.0	
				0.5~1.0mΩ:	≦ ±75			
				1.1~3.0mΩ:	≦ ±50			
				3.1~75mΩ:	≦ ±25			
	3W			0.3mΩ:	≦ ±150	7.0~10.0	0.3~10.0	
				0.5~1.0mΩ:	≦ ±75			
				1.1~2.5mΩ:	≦ ±50			
				2.6~10.0mΩ:	≦ ±25			
2725	4W			0.20mΩ:	≦ ±100	--	0.20~3.0	
				0.25~3.0mΩ:	≦ ±50			

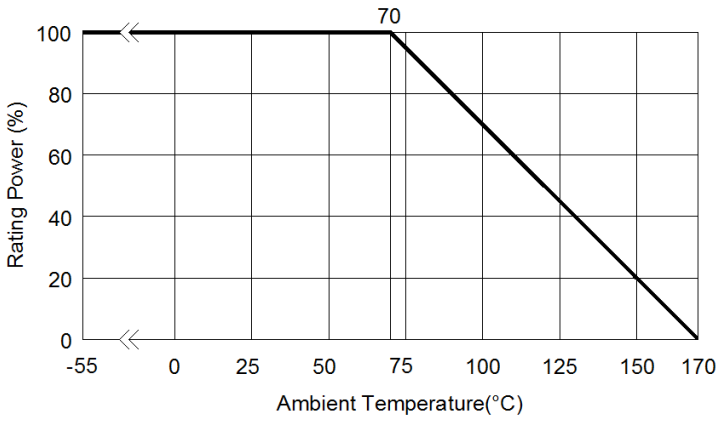
	5W			0.20 mΩ:	≦ ±100	--	0.20~0.5
				0.25~0.5mΩ:	≦ ±50		
2728	3W			4.0~200mΩ:	≦ ±25	4.0~19.0	4.0~200
	3.5W			4.0~100mΩ:	≦ ±25	4.0~19.0	4.0~100
	4W			4.0~ 50.0mΩ:	≦ ±25	4.0~19.0	4.0~50.0
4527S (without heat sink)	2W			0.5~1.0m:	≦ ±75	7.0~100	0.5~200
				1.1~200mΩ:	≦ ±50		
	3W			0.5~1.0mΩ:	≦ ±75	7.0 ~27	0.5~27
				1.1~27mΩ:	≦ ±50		
	5W			0.5~1.0mΩ:	≦ ±75	7.0~7.5	0.5~7.5
				1.1~7.5mΩ:	≦ ±50		
4527	5W			0.5~1.0mΩ:	≦ ±75	7.0 ~120	0.5~200
				1.1~200mΩ:	≦ ±50		

■ CHARACTERISTICS

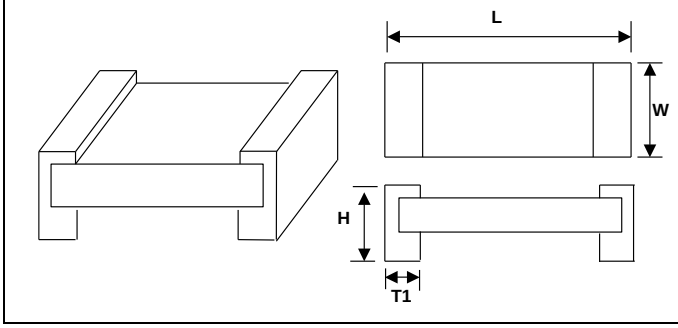
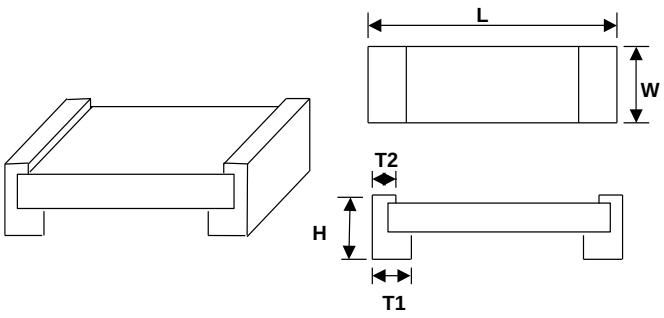
Temperature Coefficient of Resistance	Refer to Paragraph general specifications	JIS C 5201 4.8 Method; TCR(ppm/℃) = {(R2-R1)/R1(T2-T1)} x 10^6 R1 : Resistance of room temp.(T1), R2 : Resistance of 150℃(T2)
Short Time Overload	LR4527(S) : (△R/R1) ≤±2.0% Others : (△R/R1) ≤±0.5%	JIS C 5201-1 4.13 Method; 5times rated power, 5seconds
Insulation Resistance	≥10^9Ω	JIS C 5201 4.6 Method; DC100V_{DC} for 1minute
Dielectric Withstanding Voltage	Without break down	JIS C 5201 4.7 Method; Applied AC500V_{AC} for 1minute, Limit surge current maximum 50mA
Resistance to Solder Heat	(△R/R1) ≤±0.5%	JIS C 5201 4.18 Method; Solder temperature/immersion time : 260±5℃, 10±1seconds
Solderability	95% coverage	JIS C 5201 4.17 Method; 245±5℃, 3±0.5 seconds
Resistance to solvent	(△R/R1) ≤±0.5%	JIS C 5201-1 4.29 Method : Immersion time : 60 seconds, @20℃~25℃
Low Temperature Exposure(Storage)	(△R/R1) ≤±0.5%	JIS C 5201 4.23.4 Method : 1,000hours, @-55℃
High Temperature Exposure(Storage)	(△R/R1) ≤±1.0%	JIS C 5201 4.23.2 Method : 1,000hours, +170℃
Temperature Cycling (Rapid Temp. Change)	(△R/R1) ≤±0.5%	JESD22-A104 Method : -55℃ to +150℃, 1,000cycles, Dwell time : 30min maximum.
Moisture Resistance (Climatic Sequence)	(△R/R1) ≤±0.5%	Mil-STD-202, Method 106
Bias Humidity	(△R/R1) : ≤±0.5%	JIS C 5201 4.24 Method : +85℃,85% RH, 10% Bias, 1.5 hours On, 0.5 hours Off. Extended Life Test : 1,000 hours.
Load Life	LR4527 : (△R/R1) ≤±2.0% Others : (△R/R1) ≤±1.0%	JIS C 5201 4.25 Method : Test temperature 70℃ Rated working voltage 1.5hours On, 0.5hours Off. Extended Life Test : 1,000 hours

* Remark: △R = (resistance after stress – resistance before stress); R1 means resistance before stress

■ DERATING CURVE



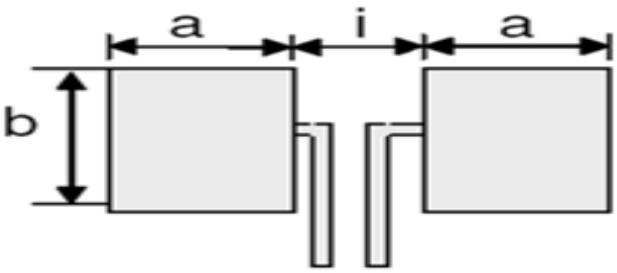
■ DIMENSIONS [mm]

1206 / 1210 / 2010 / 2512/ 2725 / 2728	4527/4527S
	

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)		
		5				0.024±0.010 (0.600±0.254)	
		6.0 ~50.0				0.020±0.010 (0.508±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)	
LR 1210	1.5	4~7	0.126±0.010 (3.20±0.254)	0.100±0.010 (2.54±0.254)	0.035±0.010 (0.88±0.254)	0.024±0.010 (0.60±0.254)	
LR 2010	1.0 & 1.5 & 2.0	0.5 ~ 0.9	0.200±0.010 (5.080±0.254)	0.100±0.010 (2.540±0.254)	0.031±0.010 (0.787±0.254)	0.057±0.010 (1.440±0.254)	
		1.0 ~ 3.0				0.051±0.010 (1.295±0.254)	
		3.1 ~ 4.0			0.025±0.010 (0.645±0.254)	0.031±0.010 (0.787±0.254)	
		4.1 ~100.0					
LR 2512	1	0.3	0.246±0.010 (6.248±0.254)	0.126±0.010 (3.202±0.254)	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)	0.079±0.010 (2.02±0.254)	
		0.75				0.054±0.010 (1.374±0.254)	
		0.8~3.0				0.074±0.010 (1.880±0.254)	
		3.1 ~ 4.0				0.066±0.010 (1.676±0.254)	
		4.1 ~78.0			0.025±0.010 (0.645±0.254)	0.044±0.010 (1.118±0.254)	
		78.1 ~ 200				0.034±0.010 (0.868±0.254)	
		201.0-300			0.0236±0.010 (0.600±0.254)	0.034±0.010 (0.868±0.254)	
	1.5	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)	0.079±0.010 (2.02±0.254)	
		0.75				0.054±0.010 (1.374±0.254)	
		0.8~3.0				0.074±0.010 (1.880±0.254)	
LR 2512	1.5	4.1 ~78.0	0.246±0.010 (6.248±0.254)	0.126±0.010 (3.202±0.254)	0.025±0.010 (0.645±0.254)	0.044±0.010 (1.118±0.254)	
		78.1 ~ 200				0.034±0.010 (0.868±0.254)	
		201.0-220.0			0.0236±0.010 (0.600±0.254)	0.034±0.010 (0.868±0.254)	
	2	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)	0.079±0.010 (2.02±0.254)	
		0.75				0.054±0.010 (1.374±0.254)	
		0.8~3.0				0.074±0.010 (1.880±0.254)	
		3.1 ~ 4.0				0.066±0.010 (1.676±0.254)	

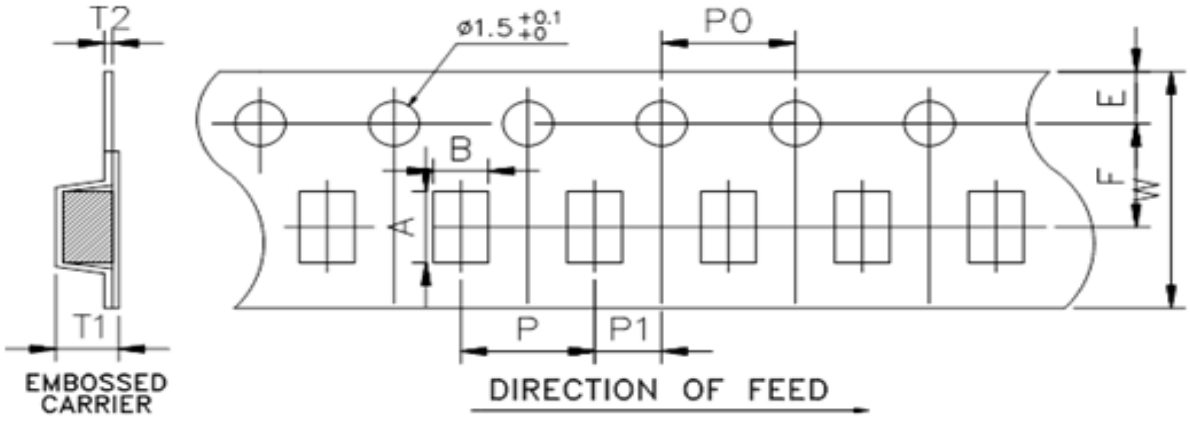
		4.1 ~75.0			0.025±0.010 (0.645±0.254)	0.044±0.010 (1.118±0.254)	
	3	0.3			0.040±0.010 (1.000±0.254)	0.079±0.010 (2.02±0.254)	
		0.5			0.031±0.010 (0.787±0.254)	0.079±0.010 (2.02±0.254)	
		0.6~0.7				0.074±0.010 (1.880±0.254)	
		0.75				0.054±0.010 (1.374±0.254)	
		0.8 ~ 2.9				0.044±0.010 (1.118±0.254)	
		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)		
		2			0.035±0.010 (0.889±0.254)	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					
		5.1 ~ 200				0.071±0.010 (1.815±0.254)	
	3	0.5				0.136±0.010 (3.465±0.254)	
		0.6 ~ 3.0				0.127±0.010 (3.215±0.254)	
		4.0 ~ 5.0					
		5.1 ~ 27				0.071±0.010 (1.815±0.254)	
	5	0.5				0.136±0.010 (3.465±0.254)	
		0.6 ~ 3.0				0.127±0.010 (3.215±0.254)	
		4.0 ~ 5.0					
		5.1 ~ 7.5				0.071±0.010 (1.815±0.254)	
LR 4527	5	0.5	0.450±0.010 (11.430±0.254)	0.270±0.010 (6.850±0.254)	0.059±0.010 (1.500±0.254)	0.136±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				0.127±0.010 (3.215±0.254)	
		5.1 ~ 200				0.071±0.010 (1.815±0.254)	

■ SOLDER PAD DIMENSIONS

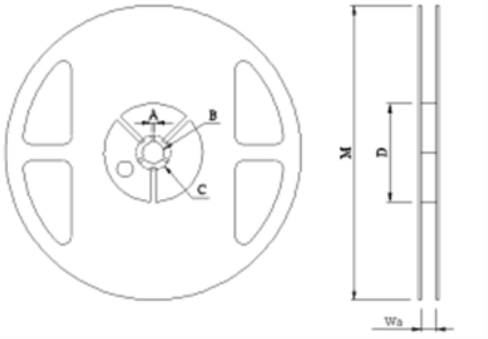


MODEL	Maximum Power Rating (Watts)	Resistance Range (mΩ)	Dimensions - in millimeters		
			a	b	i
LR 1206	0.5 & 1.0 & 1.5	0.5~ 0.6	1.65	2.18	0.9
		1.0 ~ 50.0	1.6		1
LR 1210	1.5	4.0~7.0	1.25	2.92	1.7
LR 2010	1.0 & 1.5 & 2.0	0.5 ~ 3.0	2.89	2.92	1.22
		3.1 ~ 100.0	2.29		2.41
LR 2512	1	0.3 ~ 0.7	3.05	3.68	1.27
		0.8~ 4.0.			
		0.75	2.19		3
		4.1 ~ 300.0	2.11		3.18
	1.5	0.3 ~ 0.7	3.05		1.27
		0.8~ 4.0.			
		0.75	2.19		3
		4.1 ~ 220.0	2.11		3.18
	2	0.3 ~ 0.7	3.05		1.27
		0.8 ~ 4.0			
		0.75	2.19		3
		4.1 ~ 75.0	2.11		3.18
	3	0.3 ~ 0.5	3.05		1.27
		0.6 ~ 2.9	2.19		3
		4.1 ~ 10.0			
		3.0 ~ 4.0	2.79		1.8
LR 2725	4.0 & 5.0	0.20 ~ 3.0	3.18	6.86	1.32
LR 2728	3	4.0 ~ 200.0	2.75	7.82	3.51
	3.5	4.0 ~ 100.0	2.75	7.82	3.51
	4	4.0 ~ 50.0	2.75	7.82	3.51
LR 4527S	2	0.5 ~ 5.0	5.8	8.74	3.51
		5.1 ~ 200.0	4.15		6.81
	3	0.5 ~ 5.0	5.8		3.51
		5.1 ~ 27.0	4.15		6.81
	5	0.5 ~ 5.0	5.8		3.51
		5.1 ~ 7.5	4.15		6.81
LR 4527	5	0.5 ~ 5.0	5.8	8.74	3.51
		5.1 ~ 200.0	4.15		6.81

■ PACKAGING



DIM / MODEL	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±01.0	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±0.1	3.0±0.1	8.0±0.2	1.75±0.1	3.5±0.1	1.10±0.1	0.22±0.05	4.0±0.1	4.0±0.1	40.0±0.2	2.0±0.1
LR 2010	5.45±0.10	2.90±0.10	12.0±0.15	1.75LE.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



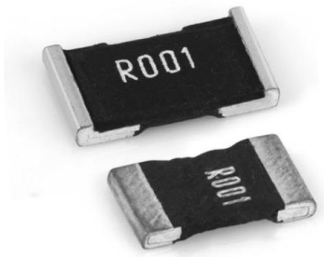
Reel Type / Tape	W	M	A	B	C	D
7" reel for 8 mm tape	9.0 ± 0.5	178 ± 2.0	2.0 ± 0.5	13.5 ± 0.5	21.0 ± 0.5	60.0 ± 1.0
7" reel for 12 mm tape	13.8 ± 0.5					80.0 ± 1.0
7" reel for 24 mm tape	25.0 ± 1.0			13.2 ± 0.5	17.7 ± 0.5	60.0 ± 1.0

***Packaging Quantity**

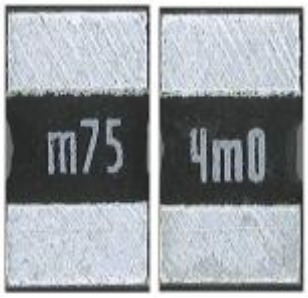
MODEL	Tape width	Max. Packaging Quantity (pcs/reel)		
		Embossed Plastic Type		
		4mm pitch	8mm pitch	12mm pitch
LR 1206 (0.5~0.6mΩ)	8mm	2,000pcs	--	--
LR 1206 (≥ 1.0mΩ)		4,000pcs		
LR 1210	8mm	4,000pcs	--	--
LR 2010	12mm	2,000pcs/4,000pcs	--	--
LR 2512 (0.3mΩ)		--	1,000pcs	--
LR 2512		4,000pcs	--	--
LR 2725		--	1,000pcs	--
LR 2728		--	--	1,000pcs
LR 4527 LR 4527S	24mm	--	--	500pcs

■ MARKING FORMAT

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

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. 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. c. Marking image (Please refer to right) d. LR1206 0.5mΩ~0.6mΩ Square marking	

- LR2512 0.3mΩ~4mΩ marking format (3 digits)

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. 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.	

■ ODERING PROCEDURE EXAMPLE

LRA	2512	2	3	R001	F	4
Model#	Size (inch) 1206 1210 2010 2512 2725 2728 4527 4527S	Number of terminals	Rated Power C = 0.5W 1 = 1.0W 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 = ±1.0% G = ±2.0% J = ±5.0%	Packing A = 500pcs 1 = 1,000pcs 2 = 2,000pcs 4 = 4,000pcs