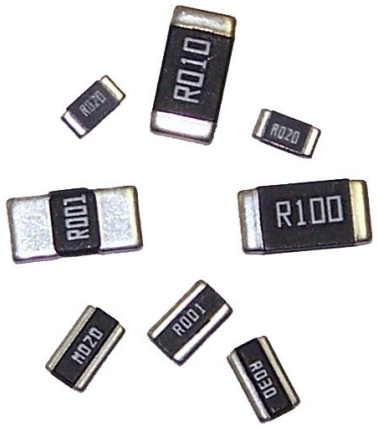
Low Resistance Metal Alloy Resistors

LRMA Series



Features:

- Resistance range 0.5mΩ to 750mΩ
- High temperature operation to 170°C
- Low thermal EMF version
- High power version
- Inverse version
- Current sensing for power electronics
- AEC-Q200 qualified

All parts are Pb-free and comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

Electrical Data

Version T (Standard)		LRMAT2010	LRMAT2512
Power rating @70°C	W	1.5	≤R01: 2, >R01: 1
Overload rating (5s)	W	7.5	≤R01: 10, >R01: 5
Resistance range	mΩ	2 to 50	1 to 100
Standard values [1]	mΩ	2, 5, 6, 10, 15, 20, 50	1, 1.5, 2, 3, 3.5, 4, 5, 6, 7, 8, 10, 11, 12, 15, 18, 20, 25, 30, 33, 35, 40, 50, 100
Resistance tolerance	%	0.5[1], 1, 5	
TCR (25 to 125°C)	ppm/°C	≥R01: ±75, >R001 & <R01: ±100, ≤R001: ±275	
Ambient temperature	°C	-55 to 170	
Insulation resistance	MΩ	>100	
Element alloy		Cu-Ni	

Version P (Power)		LRMAP2512
Power rating @70°C	W	≤R10: 3, >R10: 2
Overload rating (5s)	W	≤R10: 15, >R10: 10
Resistance range	mΩ	0.5 to 750
Standard values [1]	mΩ	0.5, 0.75, 1, 1.1, 1.5, 2, 2.5, 3, 4, 5, 6, 6.8, 7, 8, 9, 10, 11, 12, 13, 15, 18, 20, 22, 25, 27, 30, 33, 39, 40, 45, 47, 50, 57, 60, 68, 70, 75, 80, 85, 90, 100, 120, 130, 140, 150, 180, 200, 220, 240, 250, 270, 280, 300, 330, 390, 400, 500, 750
Resistance tolerance	%	0.5[1], 1, 5
TCR (25 to 125°C)	ppm/°C	≥R001: ±50, <R001: ±275
Ambient temperature	°C	-55 to 170
Insulation resistance	MΩ	>100
Element alloy		Cu-Ni / Mn-Cu

Version M (Low thermal EMF)		LRMAM0805	LRMAM1206	LRMAM2512
Power rating @70°C	W	0.5	1	≤R01: 2, >R01: 1
Overload rating (5s)	W	2.5	5	≤R01: 10, >R01: 5
Resistance range	mΩ	1 to 25	1 to 50	0.5 to 50
Standard values [1]	mΩ	1, 2, 3, 5, 6, 8, 9, 10, 20, 25	1, 1.2, 2, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 18, 20, 22, 25, 30, 39, 40, 50	0.5, 0.75, 1, 1.5, 2, 3.5, 5, 10, 20, 25, 30, 40, 50
Resistance tolerance	%	0.5[1], 1, 5		
TCR (25 to 125°C)	ppm/°C	±100	±50	≥R01: ±75, >R001 & <R01: ±100, ≤R001: ±275
Ambient temperature	°C	-55 to 170		
Insulation resistance	MΩ	>100		
Element alloy		Mn-Cu		

Electrical Data (continued)

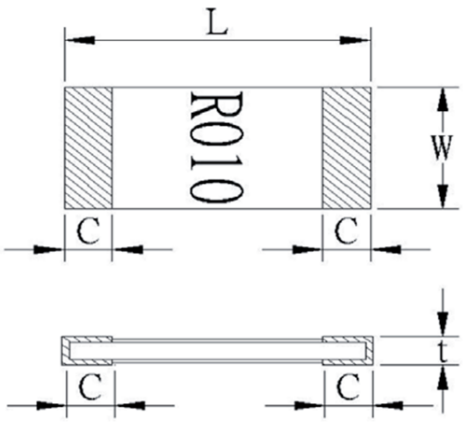
Version N (Inverse)		LRMAN0612	LRMAN0815	LRMAN1225
Power rating @70°C	W	1[2]		3
Overload rating (5s)	W	5		15
Resistance range	mΩ	1 to 10	1 to 30	2 to 40
Standard values [1]	mΩ	1, 3, 5, 10	1, 2, 3, 4, 5, 6, 8, 10, 15, 20, 25, 30	2, 3, 4, 5, 10, 15, 20, 25, 30, 40
Resistance tolerance	%	0.5[1], 1, 5		
TCR (25 to 125°C)	ppm/°C	±100		
Ambient temperature	°C	-55 to 170		
Insulation resistance	MΩ	>100		
Element alloy		Cu-Ni / Mn-Cu		

Notes: 1. Non-standard values and 0.5% tolerance may be available for high volume requirements.
2. Requires 300mm² copper pad & trace area.

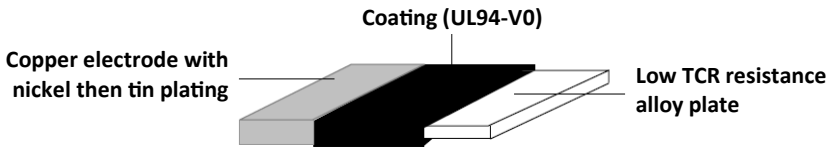
Physical Data

Dimensions in mm and weight in mg Tolerances ±0.2mm unless stated

Type	Value (mΩ)	L	W	C	t	Wt. nom.
LRMAT2010	All	5	2.5	0.6 ±0.3	0.6	36
LRMAT2512	<1	6.4	3.2	2.6	0.6	62
	≥1 & ≤3			2.2		
	>3			0.9		
LRMAP2512	<1			2.6	0.9	57
	≥1 & ≤4			2.2		
	>4			0.9		
LRMAM0805	≤2	2 ±0.1	1.25 ±0.1	0.6	0.6	5.5
	>2			0.4		
LRMAM1206	<2	3.2	1.6	1.1 ±0.3	0.75	18
	≥2			0.5 ±0.3	0.6	
LRMAM2512	<1	6.4	3.2	2.6	0.6	62
	≥1 & ≤3			2.2		
	>3			0.9		
LRMAN0612	All	1.7	3.2	0.4	0.6	13
LRMAN0815	All	2.3	3.75 ±0.3	0.5	0.7	14
LRMAN1225	All	3.2 ±0.3	6.4 ±0.3	0.5	0.9	70



Construction



Marking

The components are marked with ohmic value, e.g. “R002”=2mΩ, “R010”=10 mΩ. Due to space restrictions, for LRMAM1206, "01" = 1mΩ is used, and for LRMAM0805, “2” = 2mΩ and “010” = 10mΩ are used.

Solvent Resistance

The component is resistant to all normal industrial cleaning solvents suitable for printed circuits.

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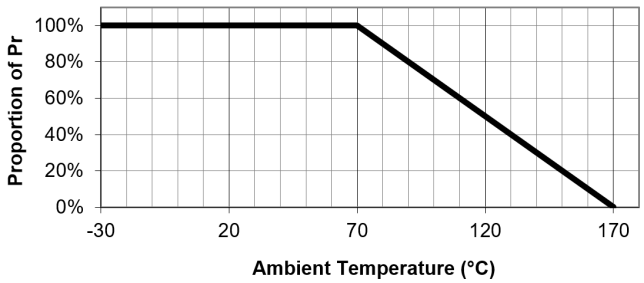
Performance Data

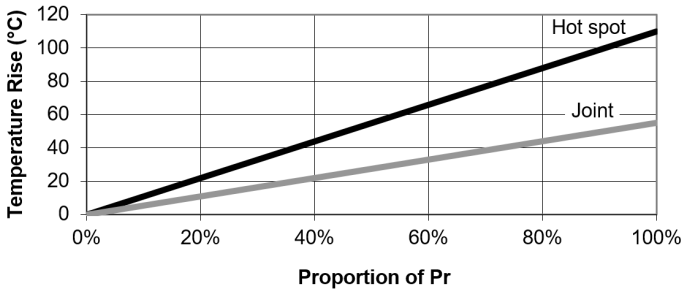
Test	Methods	Size:	Maximum 0805	Maximum Others	Typical All
Load at rated power	Cyclic load, 1000 hours at 70°C	±ΔR%	1.5	1	0.3
Short term overload	5x rated power for 5s	±ΔR%	0.5		0.15
Humidity	1000 hours, 85°C, 85%RH	±ΔR%	1	0.5	0.15
Temperature cycle	-40 to +125°C, 1000 cycles, 15-minute dwell	±ΔR%	1	0.5	0.15
Resistance to solder heat	260°C ±5°C for 20s ±1s	±ΔR%	0.5		0.3
Solderability	245°C ±5°C for 2s ±0.5s		>95% coverage		
Dry heat	1000 hours, 170°C	±ΔR%	1.5	0.5	0.3
Low temperature storage	1000 hours, -55°C	±ΔR%	0.5		0.15
Substrate bending	Board 1.6mm, fulcrum spacing 90mm, deflection 2mm	±ΔR%	1	0.5	0.3
Insulation resistance	1 minute, 100Vdc		>100M		
Sulphur resistance	ASTM B-809-95 (modified) 1000 hours, 105°C dry, visual inspection x10		Pass		

Thermal Performance & Mounting

Temperature Derating



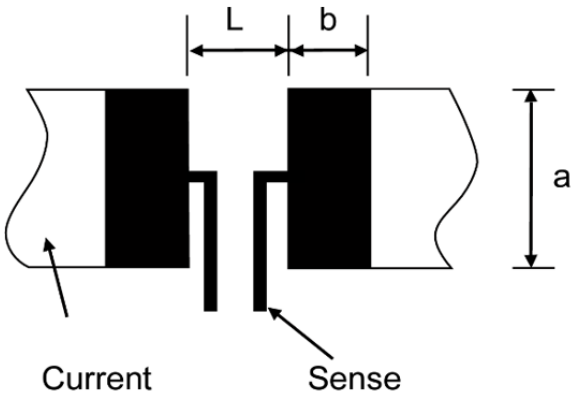
Typical Temperature Rise



The temperature rise shown is highly dependent on mounting conditions. Reference conditions assume 20µm copper with thermal vias to multiple layers. The self-heating in the current tracks should be kept negligible, or allowed for by temperature derating.

Reference Pad Dimensions (mm)

Type	Value (mΩ)	a	b	L
LRMAT2010	All	3.4	1.5	3.5
LRMAT2512	≤3	4	3.1	1.3
	>3		2.1	4.1
LRMAP2512	≤4	4	3.1	1.3
	>4		2.1	4.1
LRMAM0805	All	1.4	1.15	1.2
LRMAM1206	<2	1.8	2.3	1
	≥2		1.7	1.6
LRMAM2512	≤3	4	3.1	1.3
	>3		2.1	4.1
LRMAN0612	All	3.8	0.7	0.7
LRMAN0815	≤10	4.2	0.8	1.2
	>10		1.5	0.9
LRMAN1225	All	7	1	2.3



Measurement Probe Positions

Standard 4-terminal probe pitches for measuring unmounted parts are 2 x 1.2mm (0612), 0.8 x 1.5mm (0805), 1.1 x 2.5mm (1206), 2.2x 4.6mm (2010), 2.2 x 5.4mm (2512), and 5.4 x 2.3mm (1225). All probe location tolerances ±0.02mm. These resistors are designed to have the correct ohmic value when mounted on a PCB. Probed measurements may read higher values and mounting offsets may need to be established to account for this, especially with sub-milliohm values.

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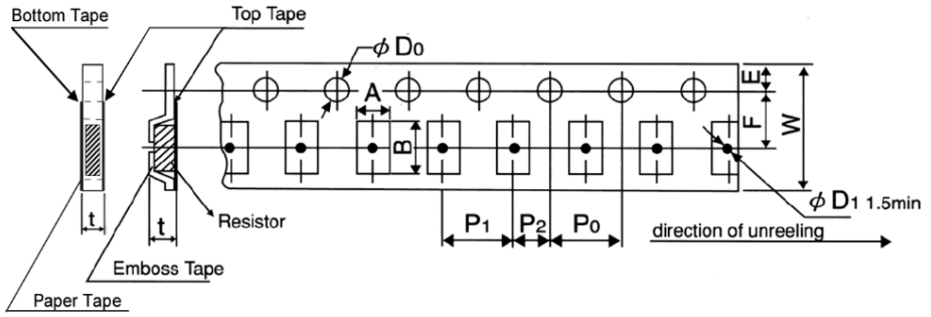
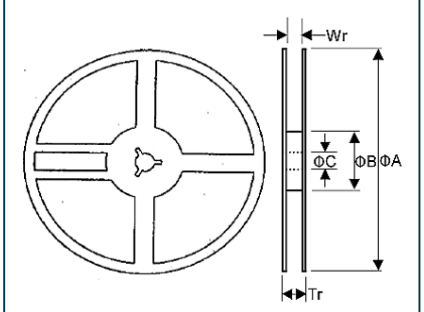
Packaging





All dimensions in mm

Size	Tape	A	B	W	F	E	P_1	P_2	P_0	ΦD_0	t	ΦA	ΦB	ΦC	Wr	Tr	Qty
0805	Paper	1.6 ±0.15	2.4 ±0.2	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.2	4.0 ±0.1	1.5 +0.1 /-0	0.84 ±0.1	178 ±2	60 ±1	13 ±1	9 ±1	11.4 ±1.1	5000
1206/0612		2.0 ±0.15	3.6 ±0.2														
0815	Embossed plastic	2.6 ±0.2	4.5 ±0.2	12 ±0.2	5.5 ±0.1						1.1 ±0.1				13 ±1	15.4 ±2	4000
2010		2.8 ±0.2	5.3 ±0.2								0.85 ±0.15						
2512/1225		3.6 ±0.2	6.9 ±0.2														

Storage

Conditions: 5°C to 35°C and 40% to 75%RH
Shelf life: 2 years from manufacture

Processing

LRMA series resistors are suitable for both wave and IR reflow soldering. The recommended reflow profile for Pb-free SAC305 alloy (Sn 96.5%, Ag 3%, Cu 0.5%) soldering is as follows:

Pre-heat: 60s to 120s at 150°C to 180°C
Soldering: 20s to 40s at ≥230°C
Peak: 5s at 255°C to 260°C

Ordering Procedure

Example: LRMAM2512-R01FT4 (LRMA with low thermal EMF, 2512, 10 milliohms ±1%, Pb-free)

L	R	M	A	M	2	5	1	2	-[1]	R	0	1				F	T	4
1				2	3					4						5	6	

1 Series	2 Version		3 Size	4 Value	5 Tolerance	6 Packing		
LRMA	T	Standard	0612	3 to 6 characters R = ohms	D = ±0.5%	Tape & reel		
	P	Power	0805		F = ±1%	T5	0612, 0805, 1206	5000/reel
	M	Low thermal EMF	0815		J = ±5%	T4	0815, 1225, 2010, 2512	4000/reel
	N	Inverse	1206					
			1225					
			2010					
			2512					

Note 1: For values which require all 6 characters, e.g. R00075, the hyphen is omitted.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

TT Electronics:

LRMAM1206-R03FT5 LRMAT2010-R02FT4 LRMAM0805-R02FT5 LRMAM1206-R005FT5 LRMAM0805-R01FT5 LRMAT2010-R005FT4 LRMAM1206-R01FT5 LRMAM1206-R001FT5 LRMAM0805-R005FT5 LRMAM1206-R02FT5 LRMAM1206-R002FT5 LRMAT2010-R01FT4 LRMAP2512-R001FT4 LRMAP2512-R025FT4 LRMAT2512-R001FT4 LRMAT2512-R005FT4 LRMAT2512-R04FT4 LRMAM2512-R0005FT4 LRMAT2512-R0015FT4 LRMAP2512-R03FT4 LRMAP2512-R008FT4 LRMAM0805-R025FT5 LRMAN0815-R02FT4 LRMAT2512-R005JT4 LRMAM1206-R015FT5 LRMAP2512-R015FT4 LRMAP2512-R003FT4 LRMAM1206-R012FT5 LRMAT2512-R008FT4 LRMAT2512-R01FT4 LRMAT2512-R002FT4 LRMAT2512-R004FT4 LRMAT2512-R025FT4 LRMAP2512-R075FT4 LRMAT2512-R007FT4 LRMAT2512-R012FT4 LRMAT2512-R05FT4 LRMAN0815-R01FT4 LRMAP2512-R08FT4 LRMAN0815-R015FT4 LRMAT2512-R003FT4 LRMAM1206-R025FT5 LRMAP2512-R06FT4 LRMAP2512-R04FT4 LRMAT2512-R033FT4 LRMAM2512-R03FT4 LRMAT2010-R015FT4 LRMAM2512-R04FT4 LRMAM2512-R005FT4 LRMAM2512-R05FT4 LRMAP2512-R02FT4 LRMAM2512-R01FT4 LRMAP2512-R05FT4 LRMAP2512-R01FT4 LRMAM2512-R02FT4 LRMAM2512-R001FT4 LRMAP2512-R10FT4 LRMAP2512-R005FT4 LRMAP2512-R002FT4 LRMAM1206-R007FT5 LRMAM1206-R004FT5 LRMAP2512-R300FT4 LRMAP2512-R0005FT4 LRMAP2512-R150FT4 LRMAP2512-R030FT4 LRMAP2512-R060FT4 LRMAT2512-R003JT4 LRMAP2512-R003JT4 LRMAM2512-R0005JT4 LRMAM2512-R03JT4 LRMAM0805-R02JT5 LRMAT2010-R015JT4 LRMAM1206-R006JT5 LRMAT2512-R018JT4 LRMAT2512-R006FT4 LRMAT2512-R011JT4 LRMAM1206-R009JT5 LRMAT2512-R001JT4 LRMAM1206-R014JT5 LRMAP2512-R011FT4 LRMAN0815-R005FT4 LRMAP2512-R015JT4 LRMAT2010-R10FT4 LRMAM1206-R014FT5 LRMAP2512-R07JT4 LRMAT2512-R006JT4 LRMAP2512-R03JT4 LRMAN0815-R03JT4 LRMAM1206-R002JT5 LRMAM1206-R02JT5 LRMAM1206-R005JT5 LRMAT2512-R018FT4 LRMAM1206-R006FT5 LRMAM2512-R06JT4 LRMAT2010-R10JT4 LRMAM2512-R005JT4 LRMAT2010-R05JT4 LRMAT2512-R0035FT4 LRMAN0815-R003JT4 LRMAT2512-R04JT4