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DIRECT

Electronics Tech.

(LRM) Metal Strip Low Ohm Power Chip Resistor

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▶ Product Introduction**Build Direct (LRM) Power Low Ohmic Metal Strip resistors into your Design.****Features :**

- Low TCR down to $\pm 75\text{PPM}/^\circ\text{C}$.
- Low resistance values from $1\text{m}\Omega$ to $100\text{m}\Omega$.
- High power rating from 1/8 Watts to 3 Watts
- Wide range package sizes 0805, 1206, 2010, and 2512.

Applications :

- For NB power management.
- For MB power management.
- For Monitor power management.
- SWPS: DC-DC converter, Charger, Adaptor.

(LRM) Low ohm Power Metal Strip resistors from Direct Electronics offer a wide range of high-power current sensing applications including power DC-DC converter and charger, management of NB, MB and monitor, test & measurement instruments, linear power supplies and switching, automotive, shunts and power amplifiers.

(LRM) Design for applications that require a wide range power handling from 1/8W up to 3W and low resistance values from $1\text{m}\Omega$ to $100\text{m}\Omega$ and come with a range of advantages including a wide temperature range and a varied choice of wide range package sizes 0805, 1206, 2010, and 2512 with high current capability.

Direct (LRM) is aiming for very high power-to-footprint size ratio, excellent frequency response and very low inductance in a solid metal nickel-chrome or manganese-copper allow resistive element with Low TCR $\pm 75\text{PPM}/^\circ\text{C}$. Also, ideal for all types of voltage division, current sensing and pulse applications.

For more power metal strip chip low ohm resistors, please link to Direct official website "[Current Sense Resistors](#)". Contact us with your specific needs.



► **Construction & Dimensions**

Construction (LRM)

a	b	c	d	e	f
Overcoat (molding)	Marking	Alloy Plate	Internal Electrode (Cu)	Barrier Layer (Ni)	Solder Plating (Sn)

Power Metal Strip Dimensions (LRM)

Dimensions Chip (LRM)

Part No.	Resistance (mΩ)	Material	L (mm)	W (mm)	T (mm)	D (mm)	Weight(g) 1000pcs
LRM05*TE***M	5, 9, 10, 20	MnCu	2.00±0.10	1.25±0.10	0.60±0.20	0.40±0.20	15.00
LRM06*TFR001M	1	MnCu	3.20±0.20	1.60±0.20	0.75±0.20	1.10±0.30	18.00
LRM06*T***M	2 ~ 30	MnCu	3.20±0.20	1.60±0.20	0.60±0.20	0.50±0.30	18.00
LRM10*T*****	5, 6, 10, 15, 20	NiCu	5.00±0.20	2.50±0.20	0.60±0.20	0.60±0.30	40.50
LRM12*T*****M	0.5, 0.75	MnCu	6.40±0.20	3.20±0.20	0.60±0.20	2.60±0.20	90.90
LRM12*T*****M	5, 10, 20, 25, 30, 40, 50	MnCu	6.40±0.20	3.20±0.20	0.60±0.20	0.90±0.20	90.90
LRM12*T*****M	4 ~ 50	NiCu	6.40±0.20	3.20±0.20	0.60±0.20	0.90±0.20	90.90
LRM12*T*****	1, 1.5, 2, 3	NiCu	6.40±0.20	3.20±0.20	0.60±0.20	2.0±0.20	90.90
LRM12*T*****	2, 3, 4	NiCu	6.40±0.20	3.20±0.20	0.70±0.20	2.0±0.20	90.90
LRM12*T*****	10 ~ 100	NiCu	6.40±0.20	3.20±0.20	0.70±0.20	0.90±0.20	90.90

● Notice: DIRECT is capable of manufacturing the optional spec based on customer's requirement.

Electrical Specification
MnCu Material - Electrical Specifications (LRM)

Type	Power Rating at 70°C	Operating Temp. Range	Resistance Tolerance (± %)	Resistance (mΩ)	TCR (±PPM/°C)
LRM05 (0805)	1/8W, 1/4W, 1/2W	-55°C ~ +170°C	±1%, ±5%	5, 9,10, 20	±100
LRM06 (1206)	1/4W, 1/2W, 1W			1	±200
				2, 3, 4, 5, 6, 7, 8, 9,10	±100
				12, 14, 15, 20, 22, 25, 30	±75
LRM12 (2512)	1W, 2W			0.5, 0.75	±200
	1W			5, 10	±100
				20, 25, 30, 40, 50	±75

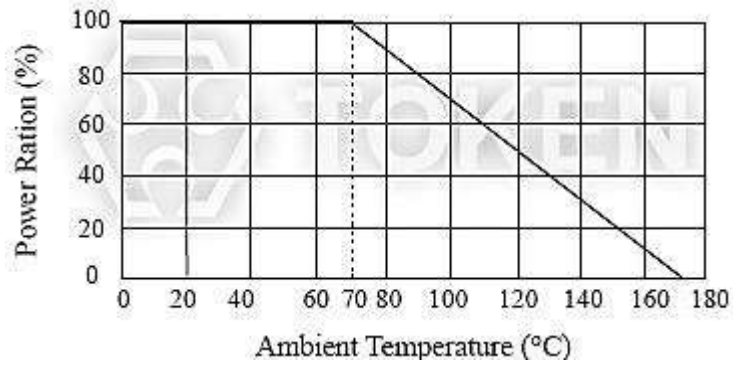
NiCu Material - Electrical Specifications (LRM)

Type	Power Rating at 70°C	Operating Temp. Range	Resistance Tolerance (± %)	Resistance (mΩ)	TCR (±PPM/°C)
LRM10 (2010)	1/2W, 3/4W, 1W, 1.5W	-55°C ~ +170°C	±1%, ±5%	5, 6, 10	±100
LRM12 (2512)	1W, 2W			15, 20	±75
				1, 1.5	±275
	1W			2, 3, 4, 5, 6, 7, 8,10	±100
				12, 15, 18, 20, 25, 30, 33, 35, 40, 50	±75
				2, 3, 4, 10, 12, 15, 18, 20, 25, 30, 39,40, 50, 60, 70, 80, 100	±75

- Operating Current $I = \sqrt{(P / R)}$, Operating Voltage $V = \sqrt{(P * R)}$ or Max. Operating voltage whichever is lower.
- Optional specifications can be required.



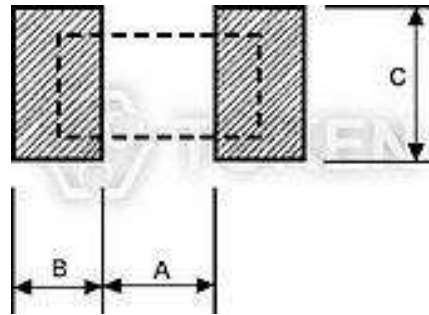
Derating Curve (LRM)



(LRM) Power Derating Curve

Recommend Land Pattern (LRM)

Type	A ±0.2(mm)	B ±0.2(mm)	C ±0.2(mm)
LRM05	1.20	1.15	1.40
LRM06 (1mΩ)	1.00	2.30	1.80
LRM06 (2mΩ ~ 30mΩ)	1.60	1.70	1.80
LRM10	3.50	1.50	3.40
LRM12 (0.5mΩ ~ 3mΩ)	1.30	3.10	4.00
LRM12 (4mΩ ~ 100mΩ)	4.10	2.10	4.00



Recommend Land Pattern

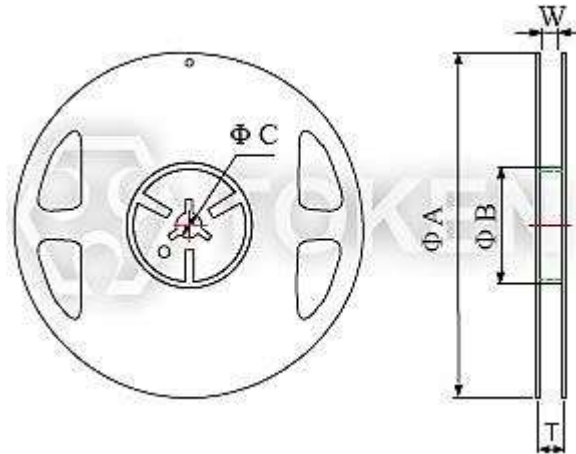
- *FR4 copper board, 100μm of copper pad thickness



► **Reel & Tape**

Packing Quantity & Reel Specifications (LRM)

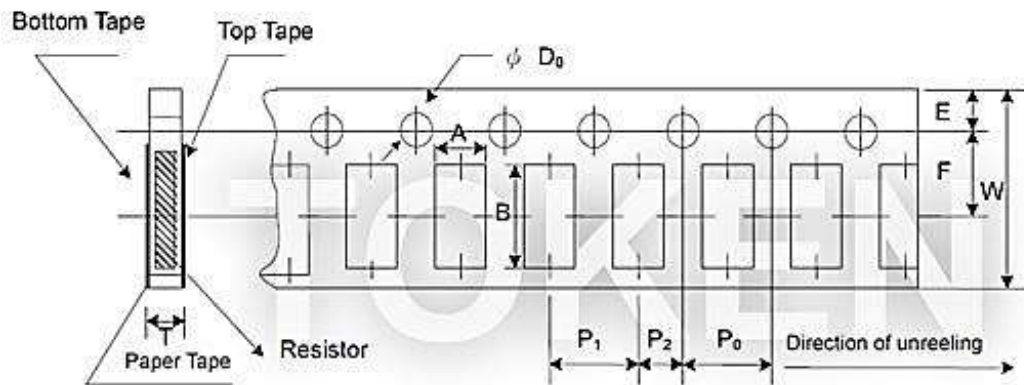
Type	Packaging Quantity	Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
LRM05	Paper 5,000 pcs	8 mm	7 inch	178.0±2.0	60.0±1.0	13.0±1.0	9.0±1.0	11.4±1.0
LRM06	Paper 5,000 pcs	8 mm	7 inch	178.0±2.0	60.0±1.0	13.0±1.0	9.0±1.0	11.5±1.0
LRM10	Embossed 4,000 pcs	12 mm	7 inch	178.0±2.0	60.0±1.0	13.0±1.0	13.0±1.0	15.5±1.0
LRM12	Embossed 4,000 pcs	12 mm	7 inch	180.0+0/-3	60.0±1.0	13.0±1.0	13.0±1.0	15.4±2.0



Reel Dimensions

Paper Tape Specifications (LRM)

Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P ₀ (mm)	P ₁ (mm)	P ₂ (mm)	ΦD ₀ (mm)	T
LRM05	1.60±0.15	2.40±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1/-0	0.84±0.10
LRM06	2.00±0.15	3.60±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1/-0	0.84±0.10

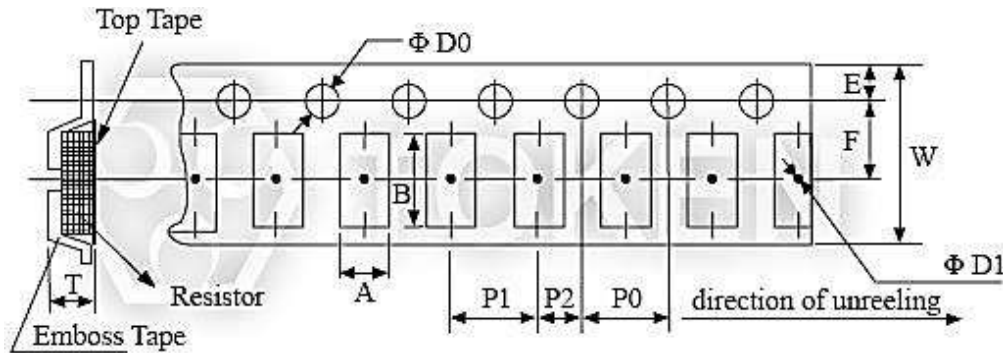


(LRM) Paper Tape Specifications



Emboss Plastic Tape Specifications (LRM)

Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P ₀ (mm)	P ₁ (mm)	P ₂ (mm)	ΦD ₀ (mm)	ΦD ₁ (mm)	T
LRM10	2.80±0.20	5.30±0.20	12.0±0.20	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.50±0.25	0.85±0.15
LRM12	3.60±0.20	6.90±0.20	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.50±0.25	0.85±0.15
LRM12	3.60±0.20	6.90±0.20	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.50±0.25	1.20±0.15



(LRM) Emboss Plastic Tape Specifications

- 1. The cumulative tolerance of 10 sprocket whole pitch is ±0.2mm.
- 2. Carrier camber shall be not more than 1mm per 100mm through a length of 250mm.
- 3. A & B measured 0.3mm from the bottom of the packet.
- 4. T measured at a point on the inside bottom of the packet to the top surface of the carrier.
- 5. Pocket position relative to sprocket hole is measured as the true position of the pocket and not the pocket hole.

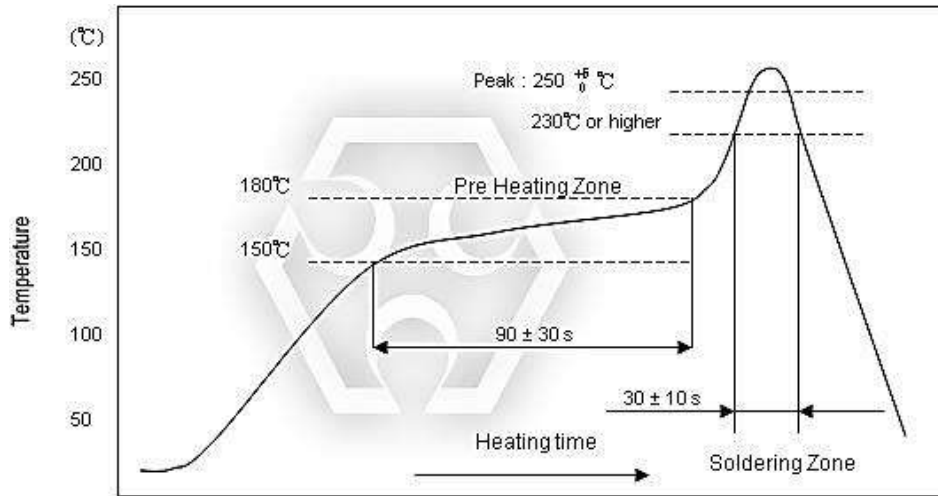
► **Environmental Characteristics**

Environmental Characteristics (LRM)

Item	Requirement	Test Method
Thermal Shock	0805, 2010: ±0.5% 1206, 2512: ±1%	JIS-C-5201-1 4.19 IEC-60115-1 4.19 -55°C ~ 155°C, 300 cycles, 15min per extreme condition
Short Time Overload	0805, 2010, 2512: ±0.5% 1206: ±1%	IEC60115-1 4.13 JIS-C-5201-1 4.13 5*rated power for 5 seconds
Low Temperature Storage	0805, 2010, 2512: ±0.5% 1206: ±1%	IEC-60115-1 4.23.4 JIS-C-5201-1 4.23.4 at-55°C for 1000 hrs
Damp Heat no Load	2512 0.5mΩ, 0.75mΩ, 1206: ±0.5% Other sizes: ±1.0%	IEC60115-1 4.24.2.1a JIS-C-5201-1 4.24.2.1a 85°C, 85%RH, 1000 hrs
Bending Strength	±1%	IEC-60115-1 4.33 JIS-C-5201-1 4.33 Bending width 2mm once for 5 seconds
Endurance	±1%	IEC60115-1 4.25 JIS-C-5201-1 4.25.1 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	±1%	IEC60115-1 4.23.2 JIS-C-5201-1 4.23.2 at +170°C for 1000 hrs
Resistance to Soldering Heat	±0.5%	IEC-60115-1 4.18 JIS-C-5201-1 4.18 0805, 2010: 260±5°C for 10 seconds 1206, 2512: 260±5°C for 20 seconds
Insulation Resistance	>100MΩ	IEC60115-1 4.6 JIS-C-5201-1 4.13 100V DC for 1 minute
Solderability	95% min coverage	IEC-60115-1 4.17 JIS-C-5201-1 4.17 245±5°C for 3 seconds
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	IEC60115-1 4.8 JIS-C-5201-1 4.8 -55°C ~+125°C. (25°C is the reference temperature)

- **Rated continuous Working Voltage (RCWV) = $\sqrt{\text{Power Rating} \times \text{Resistance Value } (\Omega)}$ or Max. Operating voltage whichever is lower.**
- **Storage Temperature: 25±3°C; Humidity < 80%RH;**



▶ Reflow soldering**| Soldering Condition (Reflow soldering only) (LRM)****(LRM) Reflow Soldering**

Order Codes

Order Codes (LRM)

LRM	12		F		TR		D		S		R050		Marking	
Product Type	Dimensions (L×W)(mm)		Resistance Tolerance (%)		Package		TCR (PPM/°C)		Power Rating(W)		Resistance (Ω)		Marking	
	05	EIA0805	F	±1	TR	Taping Reel	W	±75	W	1/8	R015	0.015	N	No Marking
	06	EIA1206					E	±100	V	1/4	R050	0.05	M	MnCu Material
	10	EIA2010	G	±2			F	±200	O	1/3	NiCu Material			
	12	EIA2512	J	±5			3	±275	U	1/2				
				Q			3/4							
				T	1									
				A	1.5									
				S	2									
				R	3									



► General Information

Your Current Options - Direct Current Sense

As the world becomes more and more technology-driven, the uses for current sensing components will continue to increase. The need for even lower resistance value ranges is already becoming evident, as is the need for these resistors to handle more power. The industry-wide trend is the emergence of smaller and smaller products.

Direct Electronics offers a wide variety of current sensing products from the industry to military standards, such as current sense in Thin-Film / Thick-Film Technology, Bare Element Resistors, and Open Air Shunts. This enables Direct to present an astounding number of possible solutions for any circuit design needs.

Applications of Current Detecting Components

Direct's TCS and CS Series unique form factor provides automotive designers with several advantages. Both TCS and CS Series are ideal for applications involving window lift motors, fuel pump systems, seat belt pretensioners, and pulse width modulator feedback.

The wider resistive element and lower resistance enables higher current to pass through the device. Direct's LRC ultra low Ohmic metal strip chip series provides the inherent ability to flex slightly and offers stress relief during extreme temperature cycling on typical or metal substrates. This LRC series is suitable for switch power supply applications (DC-DC Converter, Charger, and Adaptor) and power management of monitor.

The open air design of bare element resistor LRA and LRB Series provide a far cooler operation by allowing more air flow under the resistive element to keep excess heat from being transmitted to the PC board. They are suitable for high power AC/DC detection of power supply circuit.

Direct axial moulded BWL series provides power rating up to 10 watts and lower resistance 0.005Ω , is ideal for all types of current sensing applications including switching and linear power supplies, instruments and power amplifiers.

Direct standard current sensing components can be replacement for Vishay, IRC, Ohmite, KOA, Yageo devices with fast delivery and more competitive price. Contact us with your specific needs.

