

## MLR<sub>series</sub>

### ■ Application

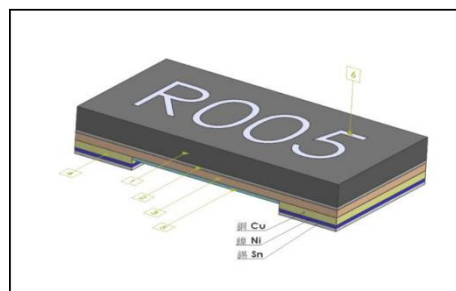
- Computer
- Power supply
- Measuring instrument
- Industrial
- Battery management system
- Automotive

### ■ Features

- Low Resistance / TCR / EMF(only for MnCu) / Inductance
- Excellent Long term stability
- RoHs compliant and halogen free
- High precision current sensing and voltage division

### ■ Product structure:

- (1) - Substrate : Epoxy
- (2) - Adhesive : Epoxy
- (3) - Resistive element : Cu – alloy
- (4) - Terminal electrode : Sn、Ni、Cu
- (5) - Protective coating : Flame-retardant epoxy, meets UL- 94-V0 requirements
- (6) - Marking coating : Flame-retardant epoxy, meets UL- 94-V0 requirements (white)



### ■ Parts Number Explanation

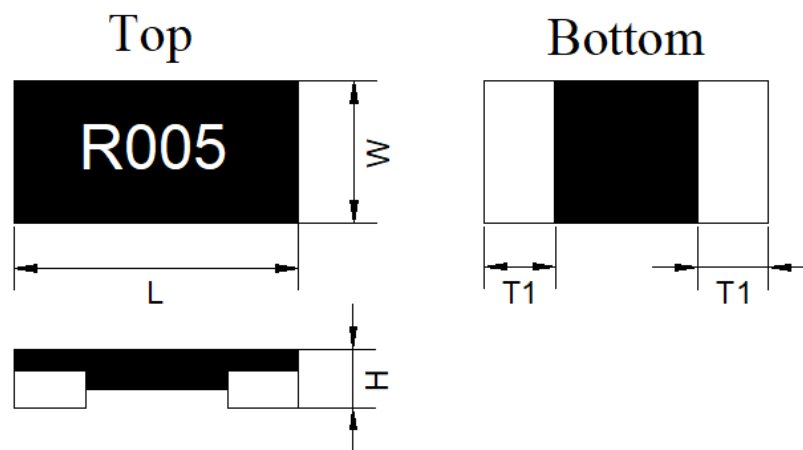
Example:

| MLR          | 1206                                 | 10   | F                         | R005                                  |
|--------------|--------------------------------------|--|---------------------------|---------------------------------------|
| Product Type | Size (Inch)                          | Rated Power  | Tolerance                 | Resistance                            |
| MLR          | 0201<br>0402<br>0603<br>0805<br>1206 | 02=0.20W<br>03=0.33W<br>05=0.50W<br>10=1.00W<br>15=1.50W<br>15=1.50W | D=±0.5%<br>F=±1%<br>G=±2% | 2M50=2.5mR<br>R005=5.0mR<br>R020=20mR |

## ■ Standard Electrical Specifications

| Type    | Rating Power at 70°C | T.C.R (ppm/°C) | Max. Rating Current | Max. Overload Current | Resistance Range (mΩ) | Material | Operating Temperature Range (°C) |
|---------|----------------------|----------------|---------------------|-----------------------|-----------------------|----------|----------------------------------|
|         |                      |                |                     |                       | 1.0% (F)              |          |                                  |
| MLR0805 | 0.5W                 | ±150           | 22.36A              | 35.35A                | 1                     | MnCu     | -55~+155                         |
|         |                      | ±100           | 18.25A              | 28.86A                | 1.5                   |          |                                  |
|         |                      | ±75            | 15.81A              | 25.00A                | 2~5                   |          |                                  |
| MLR1206 | 1W                   | ±150           | 31.62A              | 50A                   | 1                     |          |                                  |
|         |                      | ±100           | 31.62A              | 50A                   | 1.5                   |          |                                  |
|         |                      | ±75            | 31.62A              | 50A                   | 2~4                   |          |                                  |
|         |                      | ±50            | 14.14A              | 22.36A                | 5~10                  |          |                                  |

## ■ Type Dimension



## ■ Standard Electrical Dimension

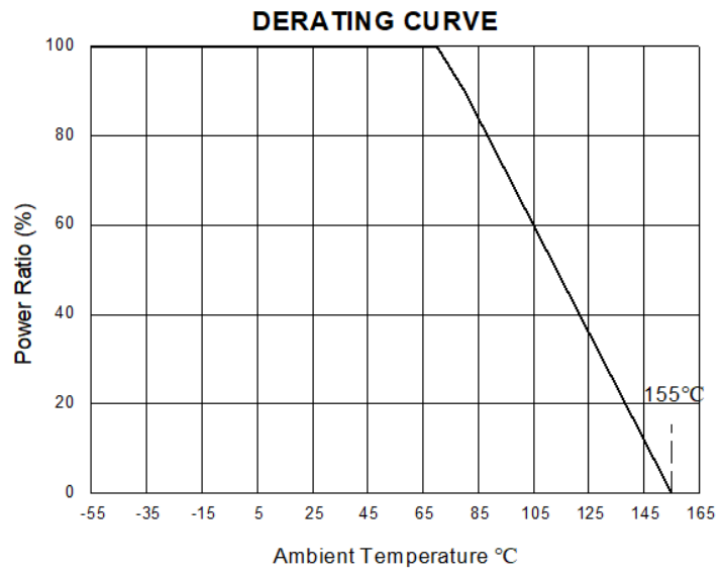
Unit: mm

| Type    | Power Rating | Resistance Range (mΩ) | L         | W         | H         | T <sub>1</sub> |
|---------|--------------|-----------------------|-----------|-----------|-----------|----------------|
| MLR0805 | 0.5W         | 1                     | 2.00±0.25 | 1.30±0.25 | 0.40±0.05 | 0.65±0.20      |
|         |              | 1.5                   | 2.00±0.25 | 1.30±0.25 | 0.40Max.  | 0.65±0.20      |
|         |              | 2~5                   | 2.00±0.25 | 1.30±0.25 | 0.40Max.  | 0.40±0.20      |
| MLR1206 | 1W           | 1                     | 3.20±0.25 | 1.70±0.25 | 0.55±0.05 | 1.00±0.35      |
|         |              | 1.5                   | 3.20±0.25 | 1.70±0.25 | 0.40Max.  | 1.05±0.35      |
|         |              | 1.5-10                | 3.20±0.25 | 1.60±0.25 | 0.40Max.  | 0.85±0.35      |

## ■ Power Derating Curve

The Operating Temperature Range: -55°C ~+155°C

For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below



## ■ Rating Current

The following equation may be used to determine the DC (Direct Current) or AC (Alternating Current) (RMS, root mean square value) of normal rated power. However, if the result value exceeds the highest current of regulated standards (paragraph 5), the highest normal rated power is to be used

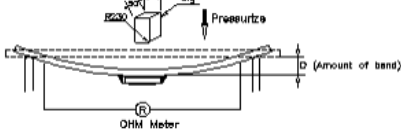
$$I = \sqrt{P/R}$$

I= Rating current (A)

P= Rating Power (W)

R= Resistance(Ω)

## ■ Reliability Test and Requirement

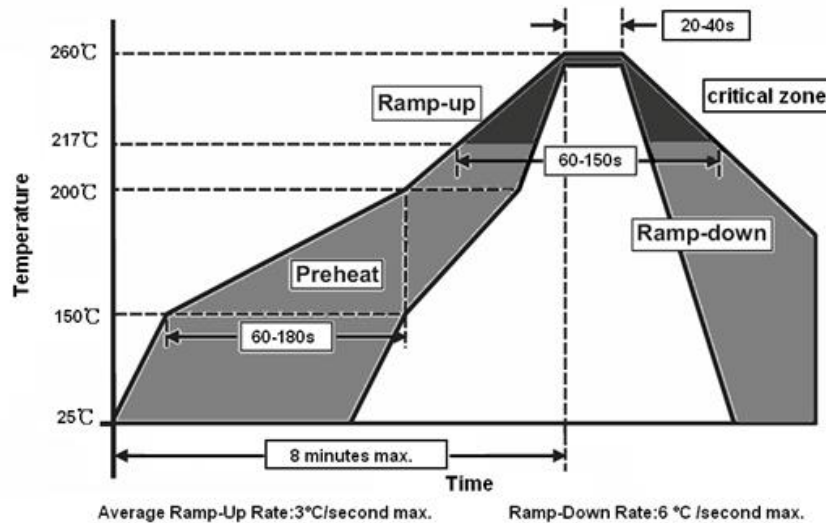
| Test Item                                     | Test Method                | Procedure  | Requirements                      |
|---|----------------------------|--|-----------------------------------|
| Temperature Coefficient of Resistance (T.C.R) | JIS C 5201-1 clause 4.8    | $T.C.R. (ppm/^{\circ}C) = \frac{(R2-R1)}{R1(T2-T1)} \times 10^6$ R1: resistance at room temperature (T1)<br>R2: resistance at 125°C (T2) | Refer to Electrical Specification |
| Short Time Overload                           | JIS C 5201-1 clause 4.13   | The number of rated power are as follows:<br>2.5 times of rated power<br>Rating power duration: 5secs                                    | ±1.0%                             |
| High Temperature Exposure                     | JIS C 5201-1 clause 4.23.2 | + 155°C±2°C for 1000hrs  | ±1.0%                             |
| Low Temp. Storage                             | JIS C 5201-1 clause 4.23.4 | -55°C±2°C for 1000hrs  | ±1.0%                             |
| Soldering Heat                                | JIS C 5201-1 clause 4.18   | 260±5°C for 10±1 seconds.  | ±1.0%                             |
| Temperature Cycling                           | JIS C 5201-1 clause 4.19   | -55°C to +155°C, 100 cycles  | ±1.0%                             |
| Load Life                                     | JIS C 5201-1 clause 4.25   | T=70± 2 ° Load with Rated Current 1.5hrs "ON", 0.5hrs "OFF", 1000h   | ±1.0%                             |
| Solderability                                 | JIS C 5201-1 clause 4.17   | 245±5°C for 3 ±0.5secs   | The covered area >95%             |
| Substrate Bending                             | JIS-C5201-1 clause 4.33    | Span between fulcrums:90mm<br>Bend Width:2mm<br>     | ±1.0%                             |

## ■ Marking Format:

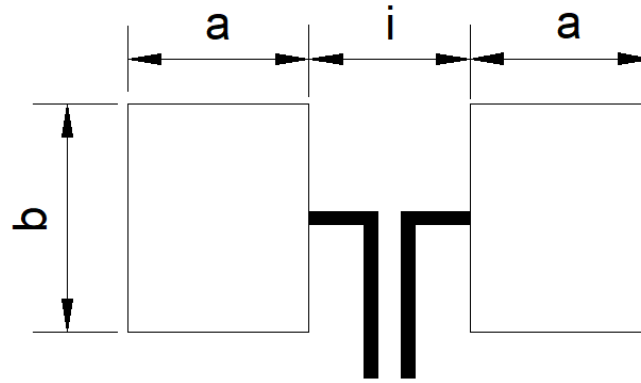
- 0805 type products marking are 3 digits.  
"M" designates the decimal location in milli-ohms  
e.g. 1m $\Omega$  the product marking is 001  
10m $\Omega$  the product marking is 010.  
1.5m $\Omega$  the product marking is 1M5.
- 1206 type products marking are 4 digits.  
"R" designates the decimal location in ohms  
e.g. 1m $\Omega$  the product marking is R001.  
20m $\Omega$  the product marking is R020 .  
"M" designates the decimal location in milli-ohms  
e.g. 0.25m $\Omega$  the product marking is 0M25.  
0.5m $\Omega$  the product marking is 0M50.  
5.5m $\Omega$  the product marking is 5M50.
- The criteria to distinguishing the mark on the surface of products are that characters can be identified.
- Jumper NO Marking

## ● Recommended Customer Soldering Parameters

### ■ Recommended IR Reflow Profile



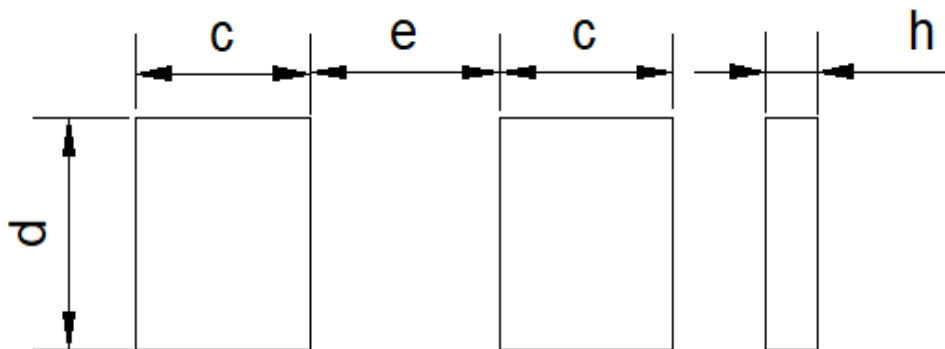
## ■ Recommend Solder Pad Layout



Unit: mm

| Type         | Resistance Range (mΩ) | a    | b    | i    |
|--------------|-----------------------|------|------|------|
| MLR0805-0.5W | 1                     | 1.08 | 1.55 | 0.55 |
|              | 1.5                   | 1.05 | 1.55 | 0.60 |
|              | 2~5                   | 0.85 | 1.40 | 1.00 |
| MLR1206-1W   | 1                     | 1.50 | 1.85 | 0.90 |
|              | 1.5                   | 1.50 | 1.85 | 0.85 |
|              | 2~10                  | 1.35 | 1.70 | 1.20 |

## ■ Recommend Steel Net Layout



Unit: mm

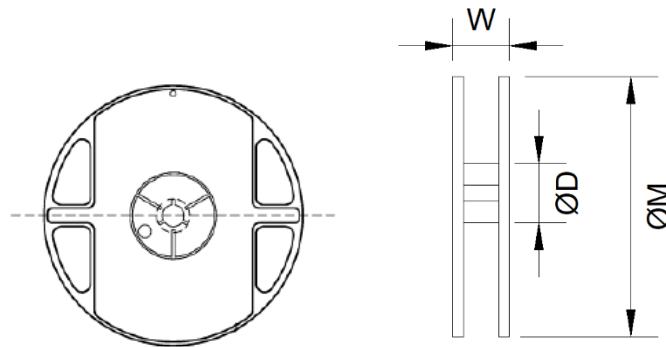
| Type         | Resistance Range (mΩ) | c    | d    | e    | h    |
|--------------|-----------------------|------|------|------|------|
| MLR0805-0.5W | 1                     | 0.60 | 1.10 | 0.65 | 0.08 |
|              | 1.5                   | 0.60 | 1.10 | 0.73 | 0.08 |
|              | 2~5                   | 0.41 | 1.26 | 1.04 | 0.08 |
| MLR1206-1W   | 1                     | 0.88 | 1.44 | 1.09 | 0.08 |
|              | 1.5                   | 0.97 | 1.36 | 1.06 | 0.08 |
|              | 2-10                  | 0.85 | 1.53 | 1.30 | 0.08 |

## ■ Packing Quantity

| TYPE    | PCS/Reel |
|---------|----------|
| MLR0805 | 5,000    |
| MLR1206 | 5,000    |

## ● Appendix For SMD Chip Resistor

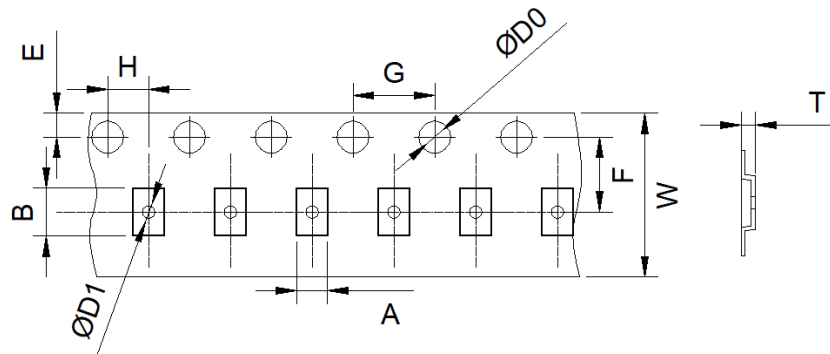
### ■ Reel Dimensions



Unit: mm

| TYPE    | ØD   | W     | ØM    |
|---------|------|-------|-------|
| MLR0805 | 60±2 | 9.0±1 | 178±5 |
| MLR1206 |      |       |       |

### ■ Carrier Dimensions



Unit: mm

| Item    | W        | P        | E         | F        | ØD0      | ØD1      | G        | H        | A         | B         | T         |
|---------|----------|----------|-----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| MLR0805 | 8.0±0.30 | 4.0±0.10 | 1.75±0.10 | 3.5±0.10 | 1.5±0.10 | 0.6±0.05 | 4.0±0.10 | 2.0±0.10 | 1.55±0.20 | 2.30±0.10 | 0.60±0.20 |
| MLR1206 |          |          |           |          |          |          |          |          | 2.05±0.20 | 3.65±0.10 | 0.60±0.20 |

### ■ Peeling Strength of Top Cover Tape

Peeling Strength: 0.1-1.0N at a peel-off speed of 300 mm/min.

### ■ Storage Temperature

Temperature: 5~35°C, Humidity: 60±20%

When the product is finally discarded, it can be treated as general electronic waste, and raw material compositions of CSR can be referred to MSDS.