

## Data Sheet

Customer:

Product: Low Ohm (Metal Strip) Chip Resistor – LRP Series

Size: 1206 /2010/2512

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## Low Ohm (Metal Strip) Chip Resistor- LRP Series

### ■ Features

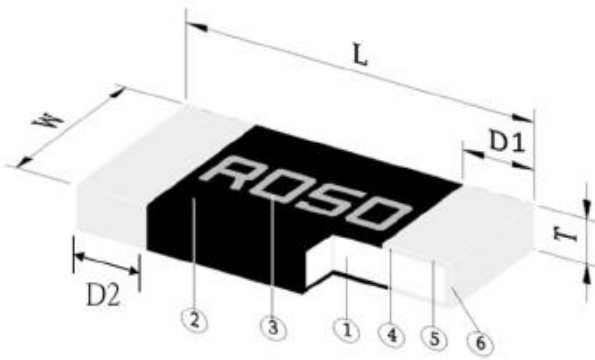
- Low TCR down to  $\pm 25$  PPM/ $^{\circ}$ C
- Customized resistance available
- Low inductance < 5nH
- AEC-Q200 Compliance
- Sulfur resistance unaffected by sulfur environments
- Lead-free and RoHS compliant



### ■ Applications

- NB (for Power Management)
- MB (for Power Management)
- SWPS (DC-DC Converter, Charger, Adaptor)
- Monitor (for Power Management)

### ■ Construction



|               |                      |
|---------------|----------------------|
| ① Alloy Plate | ④ Internal Electrode |
| ② Overcoat    | ⑤ Barrier Layer      |
| ③ Marking     | ⑥ Solder Plating     |

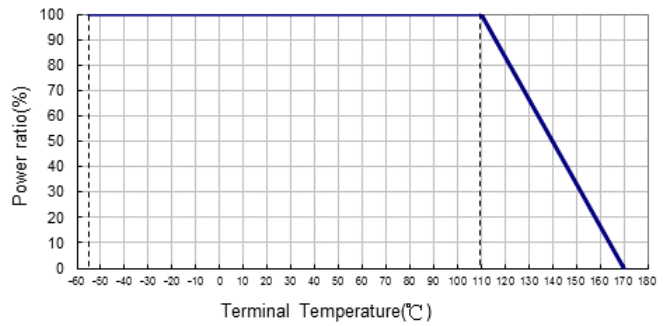
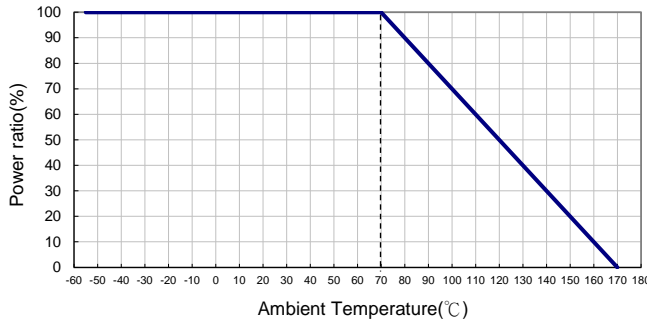
### ■ Dimensions

| Type                     | Size (Inch) | L (mm)          | W (mm)          | T (mm)          | D1 (mm)         | D2 (mm)         | Weight (g) (1000pcs) |
|--------------------------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------------|
| LRP06                    | 1206        | 3.15 $\pm$ 0.10 | 1.45 $\pm$ 0.10 | 0.55 $\pm$ 0.10 | 0.55 $\pm$ 0.15 | 0.55 $\pm$ 0.15 | 10.5                 |
| LRP10                    | 2010        | 5.00 $\pm$ 0.15 | 2.40 $\pm$ 0.15 | 0.55 $\pm$ 0.15 | 0.80 $\pm$ 0.20 | 0.80 $\pm$ 0.20 | 40                   |
| LRP12 (2~200m $\Omega$ ) | 2512        | 6.40 $\pm$ 0.25 | 3.20 $\pm$ 0.25 | 0.70 $\pm$ 0.20 | 0.90 $\pm$ 0.30 | 0.90 $\pm$ 0.30 | 52.6                 |
| LRP12 (1.5m $\Omega$ )   | 2512        | 6.40 $\pm$ 0.25 | 3.20 $\pm$ 0.25 | 0.70 $\pm$ 0.20 | 0.90 $\pm$ 0.30 | 1.45 $\pm$ 0.30 | 52.6                 |
| LRP12 (1m $\Omega$ )     | 2512        | 6.40 $\pm$ 0.25 | 3.20 $\pm$ 0.25 | 0.70 $\pm$ 0.20 | 0.90 $\pm$ 0.30 | 1.85 $\pm$ 0.30 | 52.6                 |

### ■ Part Numbering

|              |                                  |                                             |                |                                                           |                         |                                             |
|--------------|----------------------------------|---------------------------------------------|----------------|-----------------------------------------------------------|-------------------------|---------------------------------------------|
| LRP          | 12                               | F                                           | T              | D                                                         | S                       | R015                                        |
| Product Type | Dimensions (LxW)                 | Resistance Tolerance                        | Packaging Code | TCR (PPM/ $^{\circ}$ C)                                   | Power Rating            | Resistance                                  |
|              | 06: 1206<br>10: 2010<br>12: 2512 | D: $\pm$ 0.5%<br>F: $\pm$ 1%<br>J: $\pm$ 5% | T: Taping Reel | C: $\pm$ 25<br>D: $\pm$ 50<br>W: $\pm$ 75<br>E: $\pm$ 100 | R: 3W<br>S: 2W<br>T: 1W | R015: 0.015 $\Omega$<br>R050: 0.05 $\Omega$ |

**Derating Curve**



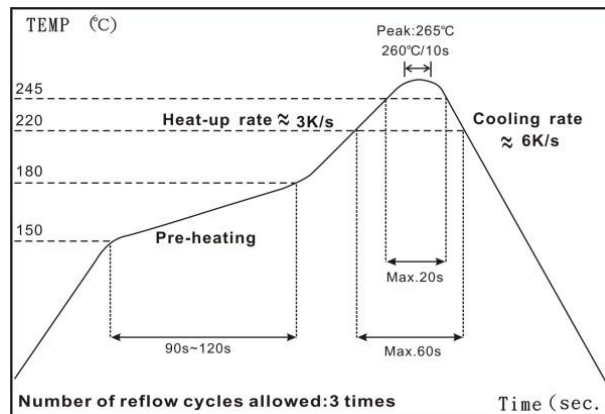
**Electrical Specifications**

| Type         | Item   | Power Rating at 70°C | Rated Terminal Temperature | Operating Temp. Range | Resistance Range (mΩ)                                                                                                                                     |     |     | TCR (PPM/°C) |
|--------------|--------|----------------------|----------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|--------------|
|              |        |                      |                            |                       | ±0.5%                                                                                                                                                     | ±1% | ±5% |              |
| LRP06 (1206) | 1W     | 110°C                | 110°C                      | -55 ~ +170°C          | 8, 10, 12, 15, 20, 25, 30, 33, 40                                                                                                                         |     |     | ±50          |
|              |        |                      |                            |                       | 3, 4, 5, 7, 8, 10, 12, 15, 20, 25, 30, 33, 40                                                                                                             |     |     | ±75<br>±100  |
| LRP10 (2010) | 1W     | 110°C                | 110°C                      | -55 ~ +170°C          | 4, 5, 10, 15, 20, 30, 50, 68, 75, 100                                                                                                                     |     |     | ±75          |
|              | 2W     |                      |                            |                       | 4, 5, 10, 15, 20, 30, 50, 68, 75                                                                                                                          |     |     |              |
| LRP12 (2512) | 2W, 3W | 110°C                | 110°C                      | -55 ~ +170°C          | 3, 4, 5, 6, 7, 18, 20, 22, 25, 30, 33, 35, 39, 40, 47, 50, 60, 68, 70, 75, 80, 82, 90, 91, 100, 120, 150, 180, 200                                        |     |     | ±25          |
|              |        | 110°C                |                            |                       | 1, 1.5, 2, 2.5, 3, 4, 5, 6, 7, 8, 8.5, 9, 10, 12, 15, 18, 20, 22, 25, 30, 33, 35, 39, 40, 47, 50, 60, 68, 70, 75, 80, 82, 90, 91, 100, 120, 150, 180, 200 |     |     | ±50<br>±75   |

Operating Current =  $\sqrt{P/R}$  , Operating Voltage =  $\sqrt{P \cdot R}$

■ Viking is capable of manufacturing the optional spec based on customer's requirement.

**Soldering Condition**



IR Reflow Soldering

(1) Time of IR reflow soldering at maximum temperature point 260°C : 10s

**Environmental Characteristics**

| Item                                           | Requirement       | Test Method                                                                                                                 |
|------------------------------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Temperature Coefficient of Resistance (T.C.R.) | As Spec.          | <b>IEC60115-1 4.8</b><br><b>JIS-C-5201-1 4.8</b><br>+25°C ~125°C, 25°C is the reference temperature                         |
| Short Time Overload                            | ±1.0%             | <b>IEC60115-1 4.13</b><br><b>JIS-C-5201-1 4.13</b><br>5*rated power for 5 seconds                                           |
| Insulation Resistance                          | ≥10G              | <b>IEC60115-1 4.6</b><br><b>JIS-C-5201-1 4.13</b><br>100V DC for 1 minute                                                   |
| Endurance                                      | ±1.0%             | <b>IEC60115-1 4.25</b><br><b>JIS-C-5201-1 4.25.1</b><br>70±2°C, rated power for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" |
| Biased Humidity                                | ±1.0%             | <b>MIL-STD-202 Method 103</b><br>1000 hrs 85°C/85%RH 10% of operating power                                                 |
| Dry Heat                                       | ±1.0%             | <b>IEC60115-1 4.23.2</b><br><b>JIS-C-5201-1 4.23.2</b><br>at +170°C for 1000 hrs                                            |
| Bending Strength                               | ±1.0%             | <b>JIS-C-5201-1 4.33</b><br><b>IEC-60115-1 4.33</b><br>Bending width 2mm once for 60 seconds                                |
| Solderability                                  | 95% min. coverage | <b>JIS-C-5201-1 4.17</b><br><b>IEC-60115-1 4.17</b><br>245±5°C for 3 seconds                                                |
| Resistance to Soldering Heat                   | ±0.5%             | <b>JIS-C-5201-1 4.18</b><br><b>IEC-60115-1 4.18</b><br>260±5°C for 10 seconds                                               |
| Rapid Change of Temperature                    | ±1.0%             | <b>JIS-C-5201-1 4.19</b><br><b>IEC-60115-1 4.19</b><br>-55°C to +155°C, 5 cycles                                            |
| Low Temperature Storage                        | ±1.0%             | <b>IEC60115-1 4.23.4</b><br><b>JIS-C-5201-1 4.23.4</b><br>at -55°C for 2 hrs                                                |

RCWV(Rated Continuous Working Voltage)=  $\sqrt{P \cdot R}$  or Max. Operating Voltage whichever is lower.

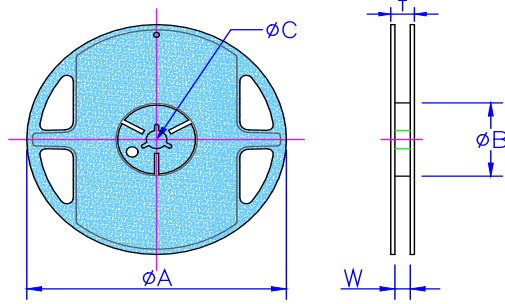
**Storage Temperature: 15~28°C; Humidity < 80%RH**

**Shelf Life: 2 years from production date.**

**Low Ohm (Metal Strip) Chip Resistor**

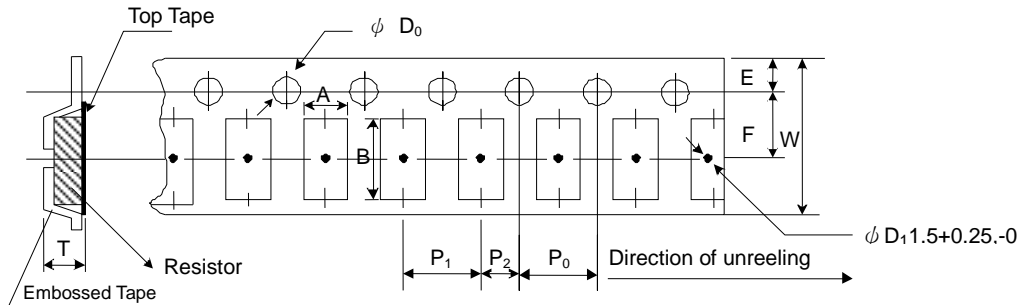
**■ Packaging**

Reel Specifications & Packaging Quantity



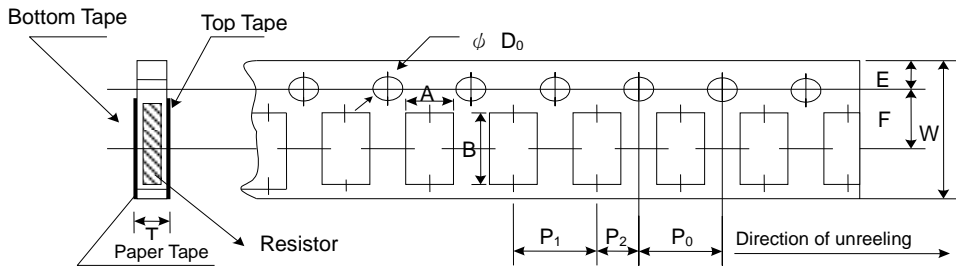
| Type  | Resistance (mΩ) | Packaging Quantity |    | Tape Width | Reel Diameter | ΦA (mm)   | ΦB (mm)             | ΦC (mm)  | W (mm)   | T (mm)   |
|-------|-----------------|--------------------|----|------------|---------------|-----------|---------------------|----------|----------|----------|
| LRP06 | 3~40            | Paper              | 5K | 8mm        | 7 inch        | 178.5±1.5 | 60 <sup>+1/-0</sup> | 13.0±0.2 | 9.0±0.5  | 12.5±0.5 |
| LRP10 | 4~100           | Embossed           | 4K | 12mm       | 7 inch        | 178.5±1.5 | 60±1.0              | 13.0±0.5 | 13.0±1.0 | 15.5±0.5 |
| LRP12 | 1~200           | Embossed           | 4K | 12mm       | 7 inch        | 178.5±1.5 | 60±1.0              | 13.0±0.5 | 13.0±1.0 | 15.5±0.5 |

**Embossed Plastic Tape Specifications**



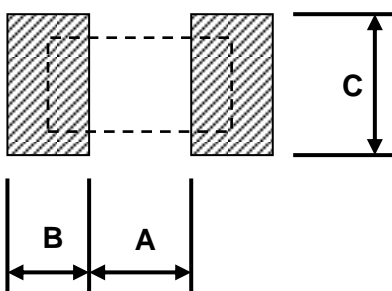
| Type  | A (mm)    | B (mm)    | W (mm)    | E (mm)    | F (mm)   | P <sub>0</sub> (mm) | P <sub>1</sub> (mm) | P <sub>2</sub> (mm) | ΦD <sub>0</sub> (mm) | T (mm) |
|-------|-----------|-----------|-----------|-----------|----------|---------------------|---------------------|---------------------|----------------------|--------|
| LRP10 | 2.80±0.10 | 5.40±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         | 1.20+0 |
| LRP12 | 3.50±0.10 | 6.70±0.10 | 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         | 1.20+0 |

**Paper Tape Specifications**



| Type  | A (mm)    | B (mm)    | W (mm)   | E (mm)    | F (mm)    | P <sub>0</sub> (mm) | P <sub>1</sub> (mm) | P <sub>2</sub> (mm) | ΦD <sub>0</sub> (mm) | T (mm)    |
|-------|-----------|-----------|----------|-----------|-----------|---------------------|---------------------|---------------------|----------------------|-----------|
| LRP06 | 1.90±0.10 | 3.50±0.20 | 8.0±0.20 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10           | 4.00±0.05           | 2.00±0.05           | 1.50+0.1,-0          | 0.85±0.10 |

**■ Recommend Land Pattern**



| Type            | A (mm) | B (mm) | C (mm) |
|-----------------|--------|--------|--------|
| LRP06           | 1.50   | 1.40   | 1.70   |
| LRP10           | 3.60   | 1.40   | 2.50   |
| LRP12 (2~200mΩ) | 4.00   | 2.00   | 3.50   |
| LRP12 (1~1.5mΩ) | 2.30   | 2.65   | 3.50   |

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

**REVISION HISTORY**

| REVISION   | DATE         | CHANGE NOTIFICATION | DESCRIPTION                                                                              |
|------------|--------------|---------------------|------------------------------------------------------------------------------------------|
| Version A  | Apr 30, 2015 | -                   | - First issue of this specification                                                      |
| Version A1 | Jul 30, 2015 | -                   | - Add 0.5% Resistance Range                                                              |
| Version A2 | Nov 27, 2015 | -                   | - Change TCR75 ppm Resistance Range<br>10mR~100mR →7mR~100mR                             |
| Version A3 | Jul 15, 2016 | -                   | - Remove Material Description<br>- Modify Storage Temperature                            |
| Version A4 | Jun 01, 2017 | -                   | - Add 1206 Size Resistance Range<br>- Add 2512 Size R003~R006 TCR75ppm                   |
| Version A5 | Nov 02, 2017 | -                   | - Features Item Add AEC-Q200 Compliance (LRP12<br>7mΩ to 100mΩ)                          |
| Version A6 | Jan 12, 2018 | -                   | - Environmental Characteristics update<br>- Electrical Specifications update             |
| Version A7 | Aug 03, 2018 | -                   | - Electrical Specifications update                                                       |
| Version A8 | Oct 21, 2019 | -                   | - Features: Add sulfur resistance instructions                                           |
| Version A9 | Mar 23, 2020 | -                   | - Increase product weight                                                                |
| Version B  | Jul 06, 2020 | -                   | - Features Increase Low inductance < 5nH                                                 |
| Version B1 | Nov 30, 2020 | -                   | - Increase the resistance range of LRP06<br>- LRP12 add TCR: 25ppm & 50ppm specification |
| Version B2 | Mar 10, 2021 | -                   | - Features: Add Lead-free and RoHS compliant                                             |
| Version B3 | Jun 09, 2021 | -                   | - Modify LRP06 Dimensions                                                                |
| Version B4 | Jul 20, 2021 | -                   | - Increase the resistance range of LRP10                                                 |
| Version B5 | Nov 15, 2021 | -                   | - Increase the shelf life description                                                    |
| Version B6 | Feb 15, 2022 | -                   | - Derating Curve changes the temperature range                                           |
| Version B7 | Mar 18, 2022 | -                   | - Add Terminal Temperature Derating Curve<br>- Add 2512 8.5mΩ                            |
| Version B8 | Jan 06, 2023 | -                   | - Modify 2512 3mΩ Packaging Quantity<br>- Add 2010 Size Resistance Range                 |
| Version B9 | Sep 01, 2023 | -                   | - Add 2512 Size Resistance Range                                                         |