

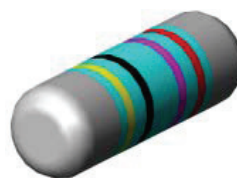
Metal Film Precision Resistor (CSR Series)

Features

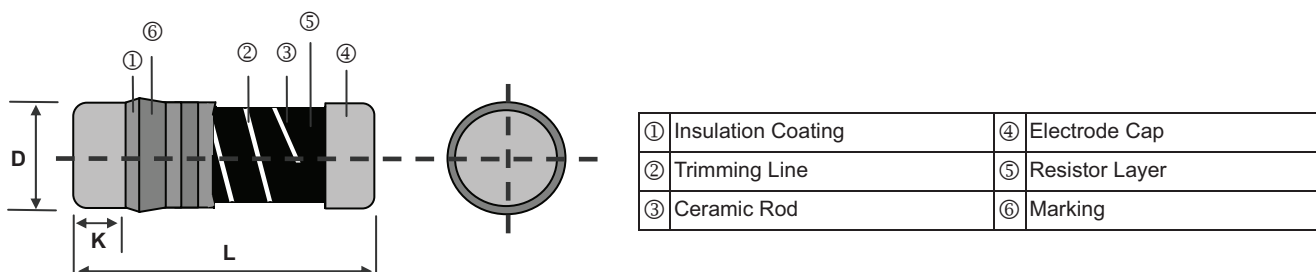
- Excellent overall stability
- Tight tolerance down to $\pm 0.1\%$
- Extremely low TCR down to ± 10 PPM/ $^{\circ}$ C
- High power rating up to 1 Watts

Applications

- Automotive
- Telecommunication
- Medical Equipment



Construction



Dimensions

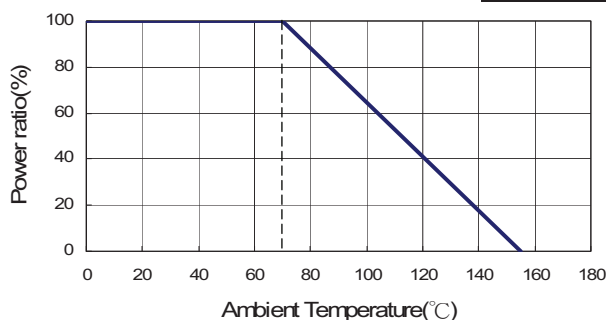
Unit: mm

| Type | L | Φ D | K min. | Weight (g) (1000pcs) | Packaging |
|---------|----------------|-----------------|--------|-------------------------|------------|
| | | | | | 180mm (7") |
| CSR0204 | 3.50 \pm 0.2 | 1.40 \pm 0.15 | 0.5 | 18.7 | 3000EA |
| CSR0207 | 5.90 \pm 0.2 | 2.20 \pm 0.20 | 0.5 | 80.9 | 2000EA |

Part Numbering

| CSR | 0204 | D | T | D | V | 1000 |
|--------------|----------------------------------|---|---------------------------|--|-----------------------------|--|
| Product Type | Dimensions (L \times Φ D) | Resistance Tolerance | Packaging Code | TCR (PPM/ $^{\circ}$ C) | Power Rating | Resistance |
| | 0204: 3.5x1.4 0207: 5.9x2.2 | B: $\pm 0.1\%$ C: $\pm 0.25\%$ D: $\pm 0.5\%$ F: $\pm 1\%$ J: $\pm 5\%$ | T: Taping Reel B: Bulk | B: ± 10 N: ± 15 C: ± 25 D: ± 50 E: ± 100 | T: 1W U: 1/2W V: 1/4W | 0100: 10 Ω 1000: 100 Ω 2201: 2200 Ω 1001: 1K Ω 1004: 1M Ω |

Derating Curve



Standard Electrical Specifications

| Item Type | Power Rating at 70 °C | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | | | | | TCR (PPM/°C) |
|--------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|------------------|-----------|------------|-----------|-------------|-----------------|
| | | | | | ±0.1% | ±0.25% | ±0.5% | ±1% | ±5% | |
| 0204 | 1/4W | -55 ~ +155°C | 200V | 400V | 100Ω-20KΩ | 10Ω-20KΩ | | | | ±10 |
| | | | | | 100Ω-100KΩ | 10Ω-100KΩ | | | | ±15 |
| | | | | | 100Ω-270KΩ | 10Ω-330KΩ | 4.7Ω-560KΩ | 4.7Ω-1MΩ | | ±25 |
| | | | | | 100Ω-270KΩ | 1Ω-330KΩ | 1Ω-1MΩ | 1Ω-10MΩ | | ±50 |
| | | | | | - | | | | 5.11MΩ-10MΩ | - |
| | | | | | 0.1Ω-0.91Ω | | | | | |
| 0207 | 1/2W | -55 ~ +155°C | 300V | 500V | 100Ω-20KΩ | 10Ω-20KΩ | | | | ±10 |
| | | | | | 100Ω-100KΩ | 10Ω-100KΩ | | | | ±15 |
| | | | | | 100Ω-400KΩ | 10Ω-400KΩ | 10Ω-560KΩ | 10Ω-560KΩ | | ±25 |
| | | | | | 100Ω-400KΩ | 1Ω-330KΩ | 1Ω-1MΩ | 1Ω-5.1MΩ | | ±50 |
| | | | | | - | | | | 0.1Ω-0.91Ω | |

High Power Rating Electrical Specifications

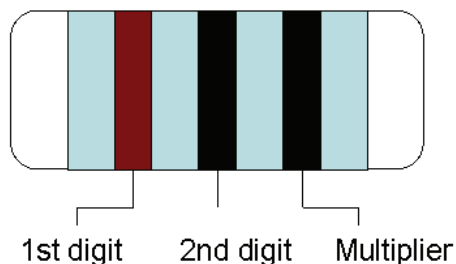
| Item Type | Power Rating at 70 °C | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | | | | | TCR (PPM/°C) |
|--------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|------------------|------------|------------|------------|--------------|-----------------|
| | | | | | ±0.1% | ±0.25% | ±0.5% | ±1% | ±5% | |
| 0207 | 1W | -55 ~ +155°C | 350V | 700V | 100Ω-100KΩ | 10Ω-100KΩ | | | | ±15 |
| | | | | | 100Ω-100KΩ | 4.7Ω - 1MΩ | 4.7Ω - 1MΩ | 4.7Ω-560KΩ | | ±25 |
| | | | | | 100Ω-100KΩ | 10Ω - 1MΩ | 1Ω - 1MΩ | 1Ω - 2.2MΩ | | ±50 |
| | | | | | - | | | | 0.1Ω - 0.91Ω | |

Environmental Characteristics

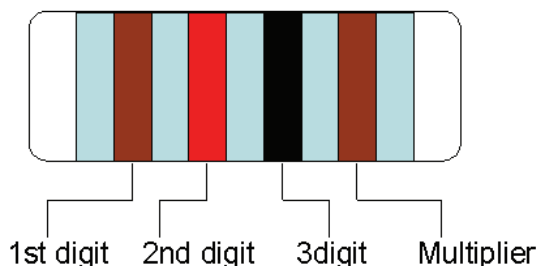
| Item | Requirement | Test Method |
|--|------------------|--|
| Temperature Coefficient of Resistance (T.C.R.) | As Spec | JIS-C-5201-1 5.2 +20/-15/+20/+100/+20°C |
| Short Time Overload | △R±0.5% | JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage for 5 seconds |
| Endurance | △R±2% | JIS-C-5201-1 7.10 70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| Damp Heat with Load | △R±2% | JIS-C-5201-1 7.9 40±2°C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| Dry Heat | △R±2% | JIS-C-5201-1 7.2 at +155°C for 1000 hrs |
| Solderability | 95%min. coverage | JIS-C-5201-1 6.5 245±5°C for 3 seconds |
| Resistance to Soldering Heat | △R±0.5% | JIS-C-5201-1 6.4 260±5°C for 10 seconds |

■ Storage Temperature: 25±3°C; Humidity < 80%RH

■ Marking & Resistance Tolerance



| | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ±5% | E-24 | 1.0 | 1.1 | 1.2 | 1.3 | 1.5 | 1.6 | 1.8 | 2.0 | 2.2 | 2.4 | 2.7 | 3.0 | 3.3 | 3.6 | 3.9 | 4.3 | 4.7 | 5.1 | 5.6 | 6.2 | 6.8 | 7.5 | 8.2 | 9.1 |
|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|



| | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| ±1% | E-96 | 1.00 | 1.02 | 1.05 | 1.07 | 1.10 | 1.13 | 1.15 | 1.18 | 1.21 | 1.24 | 1.27 | 1.30 | 1.33 | 1.37 | 1.40 | 1.43 | 1.47 | 1.50 | 1.54 | 1.58 | 1.62 | 1.65 | 1.69 | 1.74 |
| | | 1.78 | 1.82 | 1.87 | 1.91 | 1.96 | 2.00 | 2.05 | 2.10 | 2.15 | 2.21 | 2.26 | 2.32 | 2.37 | 2.43 | 2.49 | 2.55 | 2.61 | 2.67 | 2.74 | 2.80 | 2.87 | 2.94 | 3.01 | 3.09 |
| | | 3.16 | 3.24 | 3.32 | 3.40 | 3.48 | 3.57 | 3.65 | 3.74 | 3.83 | 3.92 | 4.02 | 4.12 | 4.22 | 4.32 | 4.42 | 4.53 | 4.64 | 4.75 | 4.87 | 4.99 | 5.11 | 5.23 | 5.36 | 5.49 |
| | | 5.62 | 5.76 | 5.90 | 6.04 | 6.19 | 6.34 | 6.49 | 6.65 | 6.81 | 6.98 | 7.15 | 7.32 | 7.50 | 7.68 | 7.87 | 8.06 | 8.25 | 8.45 | 8.66 | 8.87 | 9.09 | 9.31 | 9.53 | 9.76 |
| ±0.50% | E-192 | 10.0 | 10.1 | 10.2 | 10.4 | 10.5 | 10.6 | 10.7 | 10.9 | 11.0 | 11.1 | 11.3 | 11.4 | 11.5 | 11.7 | 11.8 | 12.0 | 12.1 | 12.3 | 12.4 | 12.6 | 12.7 | 12.9 | 13.0 | 13.2 |
| | | 13.3 | 13.5 | 13.7 | 13.8 | 14.0 | 14.2 | 14.3 | 14.5 | 14.7 | 14.9 | 15.0 | 15.2 | 15.4 | 15.6 | 15.8 | 16.0 | 16.2 | 16.4 | 16.5 | 16.7 | 16.9 | 17.2 | 17.4 | 17.6 |
| | | 17.8 | 18.0 | 18.2 | 18.4 | 18.7 | 18.9 | 19.1 | 19.3 | 19.6 | 19.8 | 20.0 | 20.3 | 20.5 | 20.8 | 21.0 | 21.3 | 21.5 | 21.8 | 22.1 | 22.3 | 22.6 | 22.9 | 23.2 | 23.4 |
| | | 23.7 | 24.0 | 24.3 | 24.6 | 24.9 | 25.2 | 25.5 | 25.8 | 26.1 | 26.4 | 26.7 | 27.1 | 27.4 | 27.7 | 28.0 | 28.4 | 28.7 | 29.1 | 29.4 | 29.8 | 30.1 | 30.5 | 30.9 | 31.2 |
| | | 31.6 | 32.0 | 32.4 | 32.8 | 33.2 | 33.6 | 34.0 | 34.4 | 34.8 | 35.2 | 35.7 | 36.1 | 36.5 | 37.0 | 37.4 | 37.9 | 38.3 | 38.8 | 39.2 | 39.7 | 40.2 | 40.7 | 41.2 | 41.7 |
| | | 42.2 | 42.7 | 43.2 | 43.7 | 44.2 | 44.8 | 45.3 | 45.9 | 46.4 | 47.0 | 47.5 | 48.1 | 48.7 | 49.3 | 49.9 | 50.5 | 51.1 | 51.7 | 52.3 | 53.0 | 53.6 | 54.2 | 54.9 | 55.6 |
| | | 56.2 | 56.9 | 57.6 | 58.3 | 59.0 | 59.7 | 60.4 | 61.2 | 61.9 | 62.6 | 63.4 | 64.2 | 64.9 | 65.7 | 66.5 | 67.3 | 68.1 | 69.0 | 69.8 | 70.6 | 71.5 | 72.3 | 73.2 | 74.1 |
| | | 75.0 | 75.9 | 76.8 | 77.7 | 78.7 | 79.6 | 80.6 | 81.6 | 82.5 | 83.5 | 84.5 | 85.6 | 86.6 | 87.6 | 88.7 | 89.8 | 90.9 | 92.0 | 93.1 | 94.2 | 95.3 | 96.5 | 97.6 | 98.8 |

| Color | Digit | Multiplier |
|--------|-------|------------------|
| Silver | - | 10 ⁻² |
| Gold | - | 10 ⁻¹ |
| Black | 0 | 10 ⁰ |
| Brown | 1 | 10 ¹ |
| Red | 2 | 10 ² |
| Orange | 3 | 10 ³ |
| Yellow | 4 | 10 ⁴ |
| Green | 5 | 10 ⁵ |
| Blue | 6 | 10 ⁶ |
| Violet | 7 | 10 ⁷ |
| Grey | 8 | 10 ⁸ |
| White | 9 | 10 ⁹ |