

CAR Series

Thin Film Precision Chip Resistor



- Resistances from 1 Ohm to 3M Ohms
- Power Rating 0.06 to 0.75 Watt
- Resistance Tolerances to $\pm 0.01\%$
- TCR's to ± 5 ppm/ $^{\circ}\text{C}$
- Sizes: 0402 / 0603 / 0805 / 1206 / 2010 / 2512
- Operating Temperature: -55°C to 155°C



SPECIFICATIONS - STANDARD

| Package Size | Power Rating (W) at 70°C | MAX Operating Voltage ¹ | MAX Overload Voltage ² | Resistance Range | | | | | | TCR PPM/ $^{\circ}\text{C}$ | |
|--------------|--------------------------|------------------------------------|-----------------------------------|--------------------------------|------------------------------|--------------------------------|-------------------------------|-----------------------------|-----------|-----------------------------|----------|
| | | | | $\pm 0.01\%$ | $\pm 0.05\%$ | $\pm 0.1\%$ | $\pm 0.25\%$ | $\pm 0.5\%$ | $\pm 1\%$ | | |
| 0402 | 0.0625 | 25V | 50V | 49.9 Ω - 4.99K Ω | | | | | | ± 5 | |
| | | | | 49.9 Ω - 12K Ω | | | | | | ± 10 | |
| | | | | 49.9 Ω - 12K Ω | | 49.9 Ω - 69.8K Ω | | | | ± 15 | |
| | | | | - | 49.9 Ω - 12K Ω | 10 Ω - 255K Ω | | | | ± 25 | |
| | | | | - | | 10 Ω - 255K Ω | 1 Ω - 255K Ω | | | ± 50 | |
| 0603 | 0.0625 | 50V | 100V | 24.9 Ω - 15K Ω | | | | | | ± 5 | |
| | | | | 24.9 Ω - 100K Ω | 4.7 Ω - 332K Ω | | | | ± 10 | | |
| | | | | - | | 4.7 Ω - 332K Ω | 4.7 Ω - 1M Ω | 2 Ω - 1M Ω | | | ± 25 |
| | | | | - | | 1 Ω - 1M Ω | | | ± 50 | | |
| | | | | 24.9 Ω - 30K Ω | | | | | | ± 5 | |
| 0805 | 0.100 | 100V | 200V | 24.9 Ω - 200K Ω | 4.7 Ω - 511K Ω | | | | ± 10 | | |
| | | | | - | | 4.7 Ω - 511K Ω | 4.7 Ω - 2M Ω | 1 Ω - 2M Ω | | | ± 15 |
| | | | | - | | 1 Ω - 2M Ω | | | ± 25 | | |
| | | | | 24.9 Ω - 49.9K Ω | | | | | | ± 50 | |
| | | | | 24.9 Ω - 49.9K Ω | | | | | | ± 5 | |
| 1206 | 0.125 | 150V | 300V | 24.9 Ω - 499K Ω | 4.7 Ω - 1M Ω | | | | ± 10 | | |
| | | | | - | | 4.7 Ω - 1M Ω | 4.7 Ω - 2.49M Ω | 1 Ω - 2.49M Ω | | | ± 15 |
| | | | | - | | 1 Ω - 2.49M Ω | | | ± 25 | | |
| | | | | 24.9 Ω - 49.9K Ω | | | | | | ± 50 | |
| | | | | 24.9 Ω - 49.9K Ω | | | | | | ± 5 | |
| 2010 | 0.250 | 150V | 300V | 24.9 Ω - 499K Ω | 4.7 Ω - 1M Ω | | | | ± 10 | | |
| | | | | - | | 4.7 Ω - 1M Ω | 4.7 Ω - 3M Ω | 1 Ω - 3M Ω | | | ± 15 |
| | | | | - | | 1 Ω - 3M Ω | | | ± 25 | | |
| | | | | 24.9 Ω - 100K Ω | | | | | | ± 50 | |
| | | | | 24.9 Ω - 100K Ω | | | | | | ± 5 | |
| 2512 | 0.500 | 150V | 300V | 24.9 Ω - 499K Ω | 4.7 Ω - 1M Ω | | | | ± 10 | | |
| | | | | - | | 4.7 Ω - 1M Ω | 4.7 Ω - 3M Ω | 1 Ω - 3M Ω | | | ± 15 |
| | | | | - | | 1 Ω - 3M Ω | | | ± 25 | | |
| | | | | 24.9 Ω - 100K Ω | | | | | | ± 50 | |
| | | | | 24.9 Ω - 100K Ω | | | | | | ± 5 | |

¹ Operating Voltage = $\sqrt{P \cdot R}$ or MAX Listed, whichever is lower.

² Overload Voltage = $2.5 \cdot \sqrt{P \cdot R}$ or MAX Listed, whichever is lower.

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SPECIFICATIONS - HIGH POWER RATING

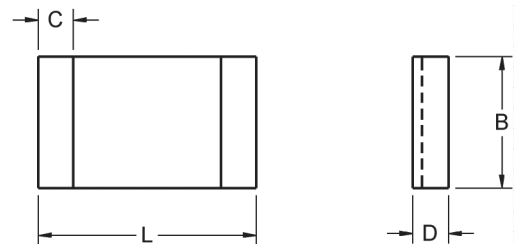
| Package Size | Power Rating (W) at 70°C | MAX Operating Voltage ¹ | MAX Overload Voltage ² | Resistance Range | | | | | | TCR PPM/°C |
|--------------|--------------------------|------------------------------------|-----------------------------------|------------------|--------------|--------------|----------|-------|-----|------------|
| | | | | ±0.01% | ±0.05% | ±0.1% | ±0.25% | ±0.5% | ±1% | |
| 0603 HP | 0.100 | 75V | 150V | 24.9Ω - 15KΩ | | | | | | ±5 |
| | | | | 24.9Ω - 100KΩ | 4.7Ω - 332KΩ | 4.7Ω - 332KΩ | | | | ±10 |
| | | | | | | 4.7Ω - 1MΩ | | | | ±15 |
| | | | | | | 4.7Ω - 1MΩ | | | | ±25 |
| 4.7Ω - 1MΩ | | | | ±50 | | | | | | |
| 0805 HP | 0.125 | 150V | 300V | 24.9Ω - 30KΩ | | | | | | ±5 |
| | | | | 24.9Ω - 200KΩ | 4.7Ω - 511KΩ | 4.7Ω - 511KΩ | | | | ±10 |
| | | | | | | 4.7Ω - 1MΩ | | | | ±15 |
| | | | | | | 4.7Ω - 1MΩ | 1Ω - 1MΩ | | | ±25 |
| 1Ω - 1MΩ | | | | ±50 | | | | | | |
| 1206 HP | 0.250 | 200V | 400V | 24.9Ω - 49.9KΩ | | | | | | ±5 |
| | | | | 24.9Ω - 499KΩ | 4.7Ω - 1MΩ | | | | ±10 | |
| | | | | | 4.7Ω - 1MΩ | | | | ±15 | |
| | | | | | 4.7Ω - 1MΩ | | | | ±25 | |
| 4.7Ω - 1MΩ | | | | ±50 | | | | | | |
| 2010 HP | 0.333 | 200V | 400V | 24.9Ω - 49.9KΩ | | | | | | ±5 |
| | | | | 24.9Ω - 499KΩ | 4.7Ω - 1MΩ | | | | ±10 | |
| | | | | | 4.7Ω - 1MΩ | | | | ±15 | |
| | | | | | 4.7Ω - 1MΩ | | | | ±25 | |
| 4.7Ω - 1MΩ | | | | ±50 | | | | | | |
| 2512 HP | 0.750 | 200V | 400V | 24.9Ω - 2KΩ | 4.7Ω - 2KΩ | 1Ω - 2KΩ | | | | ±10 |
| | | | | | | 1Ω - 2KΩ | | | | ±15 |
| | | | | | | 1Ω - 2KΩ | | | | ±25 |
| | | | | | | 1Ω - 2KΩ | | | | ±50 |

¹ Operating Voltage = $\sqrt{P \cdot R}$ or MAX Listed, whichever is lower.

² Overload Voltage = $2.5 \cdot \sqrt{P \cdot R}$ or MAX Listed, whichever is lower.

Dimensions (mm)

| Type | L | B | D | C |
|---------|-------------|-------------|-------------|-------------|
| CAR0402 | 1.00 ± 0.05 | 0.50 ± 0.05 | 0.30 ± 0.05 | 0.20 ± 0.10 |
| CAR0603 | 1.55 ± 0.10 | 0.80 ± 0.10 | 0.45 ± 0.10 | 0.30 ± 0.20 |
| CAR0805 | 2.00 ± 0.15 | 1.25 ± 0.15 | 0.55 ± 0.10 | 0.30 ± 0.20 |
| CAR1206 | 3.05 ± 0.15 | 1.55 ± 0.15 | 0.55 ± 0.10 | 0.42 ± 0.20 |
| CAR2010 | 4.90 ± 0.15 | 2.40 ± 0.15 | 0.55 ± 0.10 | 0.60 ± 0.30 |
| CAR2512 | 6.30 ± 0.15 | 3.10 ± 0.15 | 0.55 ± 0.10 | 0.6 ± 0.30 |

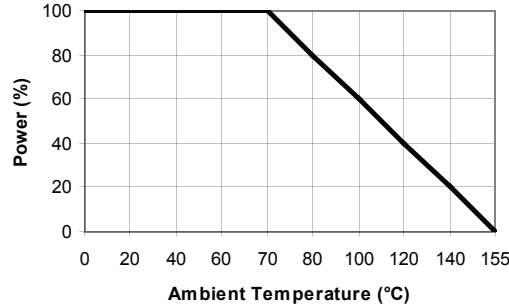


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Power Derating Curve



| Environmental Characteristics | | | |
|-------------------------------|--|-----------------------|---|
| Test | Requirement | | Conditions |
| | Tol. $\leq 0.05\%$ | Tol. $>0.05\%$ | |
| TCR | As Spec. | | +25/-55/+25/+125/+25°C |
| Short Time Overload | $\Delta R \pm 0.05\%$ | $\Delta R \pm 0.2\%$ | RCWV*2.5 or Max. overload voltage for 5 seconds |
| | $\Delta R \pm 0.2\%$ for high power rating | | |
| Insulation Resistance | $>1000 \text{ M}\Omega$ | | Apply 100VDC for 1 minute |
| Load Life | $\Delta R \pm 0.05\%$ | $\Delta R \pm 0.2\%$ | 70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| | $>7k\Omega \Delta R \pm 0.5\%$ | | |
| | $\Delta R \pm 0.5\%$ for high power rating | | |
| Damp Heat with Load | $\Delta R \pm 0.05\%$ | $\Delta R \pm 0.3\%$ | 40±2°C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| | $\Delta R \pm 0.5\%$ for high power rating | | |
| Bending Strength | $\Delta R \pm 0.05\%$ | $\Delta R \pm 0.2\%$ | Bending amplitude 3 mm for 10 seconds |
| Solderability | 95% min. coverage | | 245±5°C for 3 seconds |
| Resistance to Soldering Heat | $\Delta R \pm 0.05\%$ | $\Delta R \pm 0.2\%$ | 260±5°C for 10 seconds |
| Thermal Shock | $\Delta R \pm 0.05\%$ | $\Delta R \pm 0.25\%$ | -55°C~150°C, 100 cycles |
| Low Temperature Operation | $\Delta R \pm 0.05\%$ | $\Delta R \pm 0.2\%$ | 1 hour, -65°C, followed by 45 minutes of RCWV |
| | $\Delta R \pm 0.5\%$ for high power rating | | |

Ordering Information

Part Description: Part Type - Package Size- Resistance - Tolerance - TCR - HP option

Example: CAR0402 50 Ohms 0.05% 25ppm HP

(Note: if no TCR is specified: The highest value will be supplied)