



# Wirewound/Metal Oxide Resistors, Commercial Power, Axial Lead



## FEATURES

- High performance for low cost
- Meets or exceeds requirements of EIA Standard RS-344
- High power to size ratio
- Ceramic cases are available with circuit board stand-offs (designated with a -3 model ending)
- Special inorganic potting compound and ceramic case provide high thermal conductivity in a fireproof package
- Material categorization:

For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

**HALOGEN**  
**FREE**  
Available

**GREEN**  
(5-2008)  
Available

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | POWER RATING<br>$P_{40^{\circ}\text{C}}$<br>W | RESISTANCE RANGE $\Omega$<br>WIREWOUND <sup>(1)</sup> | RESISTANCE RANGE $\Omega$<br>METAL OXIDE <sup>(1)</sup> | TOLERANCE<br>$\pm \%$ | WEIGHT<br>(typical)<br>g |
|--------------|-----------------------------------------------|-------------------------------------------------------|---------------------------------------------------------|-----------------------|--------------------------|
| CP0002       | 2                                             | 0.1 to 1K                                             | 100 to 30K                                              | 5, 10                 | 2.0                      |
| CP0002...3   | 2                                             | 0.1 to 1K                                             | 100 to 30K                                              | 5, 10                 | 2.2                      |
| CP0003       | 3                                             | 0.1 to 2K                                             | 150 to 33K                                              | 5, 10                 | 3.4                      |
| CP0003...3   | 3                                             | 0.1 to 2K                                             | 150 to 33K                                              | 5, 10                 | 3.6                      |
| CP0005       | 5                                             | 0.1 to 2.4K                                           | 150 to 50K                                              | 5, 10                 | 4.8                      |
| CP0005...3   | 5                                             | 0.1 to 2.4K                                           | 150 to 50K                                              | 5, 10                 | 5.0                      |
| CP0007       | 7                                             | 0.1 to 5K                                             | 1K to 50K                                               | 5, 10                 | 6.8                      |
| CP0007...3   | 7                                             | 0.1 to 5K                                             | 1K to 50K                                               | 5, 10                 | 7.0                      |
| CP0010       | 10                                            | 0.1 to 30K                                            | 1K to 50K                                               | 5, 10                 | 9.5                      |
| CP0010...3   | 10                                            | 0.1 to 30K                                            | 1K to 50K                                               | 5, 10                 | 9.9                      |
| CP0015       | 15                                            | 0.1 to 8K                                             | 1K to 50K                                               | 5, 10                 | 16.8                     |
| CP0015...3   | 15                                            | 0.1 to 8K                                             | 1K to 50K                                               | 5, 10                 | 17.4                     |
| CP0020       | 20                                            | 0.1 to 10K                                            | 1K to 50K                                               | 5, 10                 | 22.8                     |
| CP0020...3   | 20                                            | 0.1 to 10K                                            | -                                                       | 5, 10                 | 23.6                     |
| CP0022       | 22                                            | 0.1 to 10K                                            | -                                                       | 5, 10                 | 24.5                     |
| CP0022...3   | 22                                            | 0.1 to 10K                                            | -                                                       | 5, 10                 | 25.3                     |
| CP0025       | 25                                            | 0.1 to 10K                                            | -                                                       | 5, 10                 | 37.0                     |

### Note

- <sup>(1)</sup> To specifically order a Wirewound sub-assembly for resistance values that overlap between the Wirewound and Metal Oxide technologies, the model will be a CPxxxx...85 for standard body and CPxxxx...91 for body with stand-offs. To specifically order a Metal Oxide sub-assembly for resistance values that overlap between the Wirewound and Metal Oxide technologies, the model will be a CPxxxx...100 for a standard body and CPxxxx...101 for body with stand-offs. If no dash type is specified, either technology may be supplied.

## TECHNICAL SPECIFICATIONS

| PARAMETER                       | UNIT                    | WIREWOUND CHARACTERISTICS                                  | METAL OXIDE CHARACTERISTICS                                |
|---------------------------------|-------------------------|------------------------------------------------------------|------------------------------------------------------------|
| Temperature Coefficient         | ppm/ $^{\circ}\text{C}$ | $\pm 300$ 1 $\Omega$ and above; $\pm 600$ below 1 $\Omega$ | $\pm 300$ (CP0002 to CP0005); $\pm 400$ (CP0007 to CP0020) |
| Short Time Overload             | -                       | 5 x rated power for 5 s                                    | 5 x rated power for 5 s                                    |
| Terminal Strength               | lb                      | 10 minimum                                                 | 10 minimum                                                 |
| Operating Temperature Range     | $^{\circ}\text{C}$      | - 65 to + 275                                              | - 65 to + 225                                              |
| Dielectric Withstanding Voltage | $V_{AC}$                | 1000                                                       | 1000                                                       |
| Maximum Working Voltage         | V                       | $(P \times R)^{1/2}$                                       | $(P \times R)^{1/2}$                                       |

### Note

- Wirewound CP resistors can reliably function as a fuse and as a resistor. Such components involve compromise between fusing and resistive functions; therefore, each design should be tailored to the application to ensure optimum performance. Contact factory by using the e-mail address at the bottom of this page for design assistance.

## GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: CP000515R00JB143

C P 0 0 0 5 1 5 R 0 0 J B 1 4 3

| GLOBAL MODEL                                                             | VALUE                                                                         | TOLERANCE                             | PACKAGING                                                                                                                    | SPECIAL                                                             |
|--------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| (See Standard Electrical Specifications Global Model column for options) | R = Decimal<br>K = Thousand<br>R1500 = 0.15 $\Omega$<br>1K500 = 1500 $\Omega$ | J = $\pm 5.0 \%$<br>K = $\pm 10.0 \%$ | E14 = Lead (Pb)-free bulk pack<br>E31 = Lead (Pb)-free four layer bulk pack<br>B14 = Bulk pack<br>B31 = Four layer bulk pack | (Dash Number)<br>(up to 3 digits)<br>From 1 to 999<br>as applicable |

Historical Part Numbering example: CP-5-3 15  $\Omega$  5 % B14

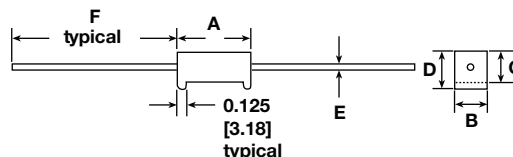
|                  |                  |                |           |
|------------------|------------------|----------------|-----------|
| CP-5-3           | 15 $\Omega$      | 5 %            | B14       |
| HISTORICAL MODEL | RESISTANCE VALUE | TOLERANCE CODE | PACKAGING |

**DIMENSIONS** in inches [millimeters]

CPxxxx



CPxxxx...3



| GLOBAL MODEL          | DIMENSIONS in inches [millimeters]     |                         |                         |                         |                      |                |                              |                        |
|-----------------------|----------------------------------------|-------------------------|-------------------------|-------------------------|----------------------|----------------|------------------------------|------------------------|
|                       | A <sup>(1)</sup><br>± 0.031<br>[0.794] | B<br>± 0.031<br>[0.794] | C<br>± 0.031<br>[0.794] | D<br>± 0.031<br>[0.794] | E<br>± 0.001 [0.025] |                | F                            |                        |
|                       |                                        |                         |                         |                         | WIREWOUND            | METAL OXIDE    | WIREWOUND<br>± 0.125 [3.175] | METAL OXIDE<br>MINIMUM |
| CP0002                | 0.688 [17.46]                          | 0.250 [6.35]            | 0.250 [6.35]            | -                       | 0.032 [0.813]        | 0.0236 [0.600] | 1.500 [38.10]                | 0.750 [19.05]          |
| CP0002...3            | 0.688 [17.46]                          | 0.250 [6.35]            | 0.250 [6.35]            | 0.313 [7.94]            | 0.032 [0.813]        | 0.0236 [0.600] | 1.500 [38.10]                | 0.750 [19.05]          |
| CP0003                | 0.875 [22.22]                          | 0.313 [7.94]            | 0.313 [7.94]            | -                       | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0003...3            | 0.875 [22.22]                          | 0.313 [7.94]            | 0.313 [7.94]            | 0.375 [9.52]            | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0005                | 0.875 [22.22]                          | 0.375 [9.52]            | 0.344 [8.73]            | -                       | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0005...3            | 0.875 [22.22]                          | 0.375 [9.52]            | 0.344 [8.73]            | 0.406 [10.32]           | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0007                | 1.391 [35.32]                          | 0.375 [9.52]            | 0.344 [8.73]            | -                       | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0007...3            | 1.391 [35.32]                          | 0.375 [9.52]            | 0.344 [8.73]            | 0.469 [11.91]           | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0010                | 1.875 [47.62]                          | 0.375 [9.52]            | 0.344 [8.73]            | -                       | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0010...3            | 1.875 [47.62]                          | 0.375 [9.52]            | 0.344 [8.73]            | 0.469 [11.91]           | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0015                | 1.875 [47.62]                          | 0.500 [12.70]           | 0.500 [12.70]           | -                       | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0015...3            | 1.875 [47.62]                          | 0.500 [12.70]           | 0.500 [12.70]           | 0.625 [15.87]           | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0020 <sup>(2)</sup> | 2.500 [63.50]                          | 0.500 [12.70]           | 0.500 [12.70]           | -                       | 0.036 [0.914]        | 0.032 [0.813]  | 1.500 [38.10]                | 1.000 [25.40]          |
| CP0020...3            | 2.500 [63.50]                          | 0.500 [12.70]           | 0.500 [12.70]           | 0.625 [15.87]           | 0.036 [0.914]        | -              | 1.500 [38.10]                | -                      |
| CP0022                | 2.500 [63.50]                          | 0.500 [12.70]           | 0.500 [12.70]           | -                       | 0.036 [0.914]        | -              | 1.500 [38.10]                | -                      |
| CP0022...3            | 2.500 [63.50]                          | 0.500 [12.70]           | 0.500 [12.70]           | 0.625 [15.87]           | 0.036 [0.914]        | -              | 1.500 [38.10]                | -                      |
| CP0025                | 2.500 [63.50]                          | 0.625 [15.87]           | 0.625 [15.87]           | -                       | 0.040 [1.016]        | -              | 1.500 [38.10]                | -                      |

**Notes**
<sup>(1)</sup> Potting compound may extend outside of ceramic case up to 0.060 [1.52] maximum per side.

<sup>(2)</sup> Dimensions for the metal oxide are: A = 2.360 [59.94], B = 0.570 [14.48], C = 0.530 [13.46], E = 0.032 [0.813], F = 1.000 [25.40]

**MATERIAL SPECIFICATIONS**
**Element:** Wirewound = Copper-nickel alloy or nickel-chrome alloy, depending on resistance value

Metal Oxide = High temperature fired metal oxide film

**Core:** Wirewound = Woven fiberglass

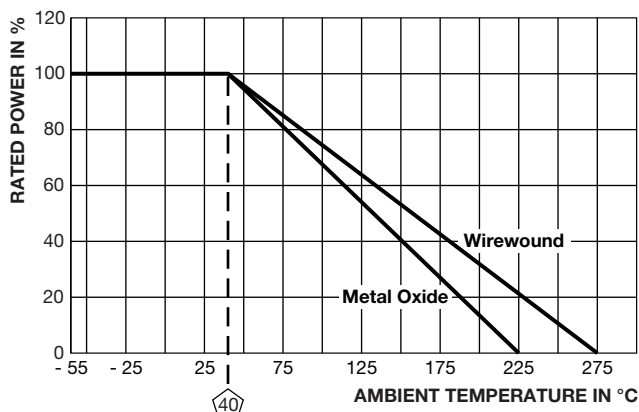
Metal Oxide = Alumina ceramic

**Body:** Steatite ceramic case with inorganic potting compound

**End Caps:** Tin plated steel

**Terminals:** Tinned copper

**Part Marking:** DALE, model, wattage, value, tolerance, date code

**DERATING**


| PERFORMANCE                     |                                                                             |                        |
|---------------------------------|-----------------------------------------------------------------------------|------------------------|
| TEST                            | CONDITIONS OF TEST                                                          | TEST LIMITS (EIA-344)  |
| Thermal Shock                   | - 55 °C to + 275 °C (+ 225 °C for Metal Oxide), 5 cycles, 30 min dwell time | ± (5.0 % + 0.05 Ω) ΔR  |
| Short Time Overload             | 5 x rated power for 5 s                                                     | ± (4.0 % + 0.05 Ω) ΔR  |
| Dielectric Withstanding Voltage | 1000 V <sub>RMS</sub> , for 1 min                                           | ± (2.0 % + 0.05 Ω) ΔR  |
| Low Temperature Storage         | - 65 °C, full rated working voltage for 45 min                              | ± (3.0 % + 0.05 Ω) ΔR  |
| Humidity                        | 75 °C, 90 % to 100 % RH, 240 h                                              | ± (5.0 % + 0.05 Ω) ΔR  |
| Load Life                       | 1000 h at rated power, + 25 °C, 1.5 h "ON", 0.5 h "OFF"                     | ± (10.0 % + 0.05 Ω) ΔR |
| Terminal Strength               | 5 pounds for 30 s; body twisted about axis, 3 x 360° rotations              | ± (2.0 % + 0.05 Ω) ΔR  |
| Resistance to Solder Heat       | Terminal immersed 3.5 s in molten solder at 1/8" to 3/16" from body         | ± (4.0 % + 0.05 Ω) ΔR  |



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