

# Metal Film Resistors, Industrial, $\pm 1\%$ Tolerance



## FEATURES

- Power ratings: 1/2 W, 3/4 W and 1 W at + 70 °C
- $\pm 100$  ppm/°C temperature coefficient
- Superior electrical performance
- Flame retardant epoxy conformal coating
- Standard 5 band color code marking for ease of identification after mounting
- Tape and reel packaging for automatic insertion (52.4 mm inside tape spacing per EIA-296-E)
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS\***  
COMPLIANT

### Note

- \* Lead (Pb)-containing terminations are not RoHS-compliant. Exemptions may apply.

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | HISTORICAL MODEL | POWER RATING<br>$P_{70^{\circ}\text{C}}$<br>W | MAXIMUM WORKING VOLTAGE <sup>(1)</sup><br>V | TEMPERATURE COEFFICIENT<br>$\pm$ ppm/°C | TOLERANCE<br>$\pm$ % | RESISTANCE RANGE<br>$\Omega$ | E-SERIES |
|--------------|------------------|-----------------------------------------------|---------------------------------------------|-----------------------------------------|----------------------|------------------------------|----------|
| CCF60        | CCF-60           | 1.0                                           | 500                                         | 100                                     | 1                    | 10 to 1M                     | 96       |

### Note

- Continuous working voltage shall be  $\sqrt{P \times R}$  or maximum working voltage, whichever is less.

## TECHNICAL SPECIFICATIONS

| PARAMETER                     | UNIT             | CCF60          |
|-------------------------------|------------------|----------------|
| Rated Dissipation at 70 °C    | W                | 1.0            |
| Maximum Working Voltage       | V                | $\leq 500$     |
| Insulation Voltage (1 Min)    | V <sub>eff</sub> | 500            |
| Dielectric Strength           | V <sub>AC</sub>  | 450            |
| Insulation Resistance         | $\Omega$         | $\geq 10^{11}$ |
| Operating Temperature Range   | °C               | - 65 to + 165  |
| Terminal Strength (Pull Test) | lb               | 2              |
| Weight                        | g                | 0.75 max.      |

## GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: CCF60301RFR36 (preferred part numbering format)

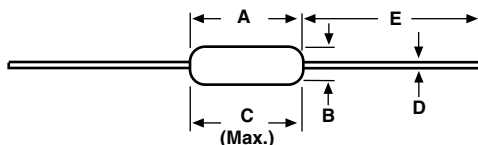
|              |   |                                                                                                                          |   |   |   |                |   |                         |   |                                                                              |   |   |   |
|--------------|---|--------------------------------------------------------------------------------------------------------------------------|---|---|---|----------------|---|-------------------------|---|------------------------------------------------------------------------------|---|---|---|
| C            | C | F                                                                                                                        | 6 | 0 | 3 | 0              | 1 | R                       | F | K                                                                            | R | 3 | 6 |
| GLOBAL MODEL |   | RESISTANCE VALUE                                                                                                         |   |   |   | TOLERANCE CODE |   | TEMPERATURE COEFFICIENT |   | PACKAGING                                                                    |   |   |   |
| CCF60        |   | R = $\Omega$<br>K = k $\Omega$<br>M = M $\Omega$<br>10R0 = 10 $\Omega$<br>680K = 680 k $\Omega$<br>1M00 = 1.0 M $\Omega$ |   |   |   | F = $\pm 1\%$  |   | K = 100 ppm             |   | E36 = Lead (Pb)-free, T/R (2500 pieces)<br>R36 = Tin/lead, T/R (2500 pieces) |   |   |   |

Historical Part Number example: CCF-603010F R36 (will continue to be accepted)

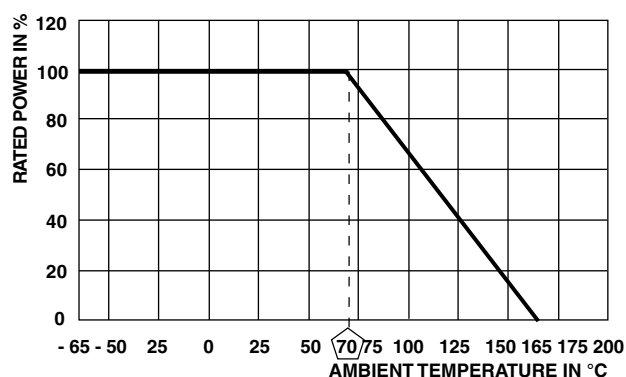
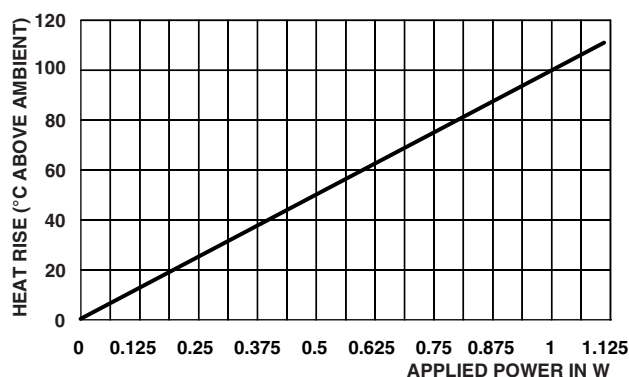
|                  |                  |                |           |
|------------------|------------------|----------------|-----------|
| CCF-60           | 3010             | F              | R36       |
| HISTORICAL MODEL | RESISTANCE VALUE | TOLERANCE CODE | PACKAGING |

### Note

- For additional information on packaging, refer to the Through-Hole Resistor Packaging document ([www.vishay.com/doc?31544](http://www.vishay.com/doc?31544)).

**DIMENSIONS** in inches (millimeters)


| GLOBAL MODEL | A                              | B                              | C (Max.)         | D                              | E                               |
|--------------|--------------------------------|--------------------------------|------------------|--------------------------------|---------------------------------|
| CCF60        | 0.344 ± 0.031<br>(8.74 ± 0.79) | 0.139 ± 0.009<br>(3.53 ± 0.23) | 0.400<br>(10.16) | 0.025 ± 0.002<br>(0.64 ± 0.05) | 1.000 ± 0.040<br>(25.40 ± 1.02) |


**DERATING**

**THERMAL RESISTANCE**
**RESISTANCE VALUES**

Vishay Dale model CCF60 is available in the standard 96 resistance values per decade. Values are obtained from the following decade table by multiplying by powers of 10. As an example: 30.1 can represent 30.1 Ω, 301 Ω, 3.01 kΩ, 30.1 kΩ or 301 kΩ.

|      |      |      |      |      |      |
|------|------|------|------|------|------|
| 10.0 | 14.7 | 21.5 | 31.6 | 46.4 | 68.1 |
| 10.2 | 15.0 | 22.1 | 32.4 | 47.5 | 69.8 |
| 10.5 | 15.4 | 22.6 | 33.2 | 48.7 | 71.5 |
| 10.7 | 15.8 | 23.2 | 34.0 | 49.9 | 73.2 |
| 11.0 | 16.2 | 23.7 | 34.8 | 51.1 | 75.0 |
| 11.3 | 16.5 | 24.3 | 35.7 | 52.3 | 76.8 |
| 11.5 | 16.9 | 24.9 | 36.5 | 53.6 | 78.7 |
| 11.8 | 17.4 | 25.5 | 37.4 | 54.9 | 80.6 |
| 12.1 | 17.8 | 26.1 | 38.3 | 56.2 | 82.5 |
| 12.4 | 18.2 | 26.7 | 39.2 | 57.6 | 84.5 |
| 12.7 | 18.7 | 27.4 | 40.2 | 59.0 | 86.6 |
| 13.0 | 19.1 | 28.0 | 41.2 | 60.4 | 88.7 |
| 13.3 | 19.6 | 28.7 | 42.2 | 61.9 | 90.9 |
| 13.7 | 20.0 | 29.4 | 43.2 | 63.4 | 93.1 |
| 14.0 | 20.5 | 30.1 | 44.2 | 64.9 | 95.3 |
| 14.3 | 21.0 | 30.9 | 45.3 | 66.5 | 97.6 |

**MARKING**

Color code marking with 5 color bands

**PERFORMANCE**

| POWER RATING AT + 70 °C         | MAXIMUM ΔR<br>(TYPICAL TEST LOTS) |               |
|---------------------------------|-----------------------------------|---------------|
| CCF60                           | 1/2 W                             | 3/4 W and 1 W |
| <b>TEST <sup>(1)</sup></b>      |                                   |               |
| Thermal Shock                   | ± 0.5 %                           | -             |
| Short Time Overload             | ± 0.5 %                           | -             |
| Low Temperature Operation       | ± 0.5 %                           | -             |
| Moisture Resistance             | ± 1.5 %                           | -             |
| Resistance to Soldering Heat    | ± 0.5 %                           | -             |
| Shock                           | ± 0.5 %                           | -             |
| Vibration                       | ± 0.5 %                           | -             |
| Life                            | ± 0.5 %                           | ± 1.0 %       |
| Terminal Strength               | ± 0.2 %                           | -             |
| Dielectric Withstanding Voltage | ± 0.5 %                           | -             |

**Note**

<sup>(1)</sup> Test methods per MIL-STD-202



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