

# Wirewound Resistors, Commercial Power, Silicone Coated, Axial Lead



## FEATURES

- High performance for low cost
- High temperature silicone coating
- Complete welded construction
- Excellent stability in operation
- High power to size ratio
- Compliant to RoHS Directive 2002/95/EC



## Notes

- \* Pb containing terminations are not RoHS compliant, exemptions may apply  
 \*\* Please see document "Vishay Material Category Policy": [www.vishay.com/doc?99902](http://www.vishay.com/doc?99902)

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | HISTORICAL MODEL | POWER RATING <sup>(1)</sup> P <sub>25 °C</sub> W<br>CHARACTERISTIC U + 250 °C | POWER RATING <sup>(1)</sup> P <sub>25 °C</sub> W<br>CHARACTERISTIC V + 350 °C | RESISTANCE RANGE<br>Ω        | TOLERANCE<br>± % <sup>(2)</sup> | WEIGHT<br>(max.) g |
|--------------|------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------|---------------------------------|--------------------|
| CW1/2        | CW-1/2           | 0.5                                                                           | -                                                                             | 0.1 to 1.77K                 | 5, 10                           | 0.21               |
| CW001        | CW-1             | 1.0                                                                           | -                                                                             | 0.1 to 6.37K                 | 5, 10                           | 0.34               |
| CW01M        | CW-1M            | 1.0                                                                           | -                                                                             | 0.1 to 3.3K                  | 5, 10                           | 0.3                |
| CW002        | CW-2             | 4.0                                                                           | 5.5                                                                           | 0.1 to 28.7K                 | 5, 10                           | 2.1                |
| CW02M        | CW-2M            | 3.0                                                                           | 3.75                                                                          | 0.1 to 12K                   | 5, 10                           | 0.65               |
| CW02B        | CW-2B            | 3.0                                                                           | 3.75                                                                          | 0.1 to 15K                   | 5, 10                           | 0.7                |
| CW02B...13   | CW-2B-13         | 4.0                                                                           | 6.0                                                                           | 0.1 to 10.89K <sup>(3)</sup> | 5, 10                           | 0.9                |
| CW02C        | CW-2C            | 2.5                                                                           | 3.25                                                                          | 0.1 to 19.9K                 | 5, 10                           | 1.8                |
| CW02C...14   | CW-2C-14         | 2.5                                                                           | 3.25                                                                          | 0.1 to 19.9K                 | 5, 10                           | 1.2                |
| CW005        | CW-5             | 5.0                                                                           | 6.5                                                                           | 0.1 to 58.5K                 | 5, 10                           | 4.2                |
| CW005...2    | CW-5-2           | 4.0                                                                           | 5.0                                                                           | 0.1 to 40.3K                 | 5, 10                           | 4.2                |
| CW005...3    | CW-5-3           | 5.0                                                                           | 6.5                                                                           | 0.1 to 58.5K                 | 5, 10                           | 4.2                |
| CW007        | CW-7             | 7.0                                                                           | 9.0                                                                           | 0.1 to 95.2K                 | 5, 10                           | 4.7                |
| CW010        | CW-10            | 10.0                                                                          | 13.0                                                                          | 0.1 to 167K                  | 5, 10                           | 9.0                |
| CW010...3    | CW-10-3          | 10.0                                                                          | 13.0                                                                          | 0.1 to 167K                  | 5, 10                           | 9.0                |

## Notes

- <sup>(1)</sup> Vishay Dale CW models have two power ratings, depending on operating temperature and stability requirements  
<sup>(2)</sup> 3 % tolerance available  
<sup>(3)</sup> Higher values available on request

## TECHNICAL SPECIFICATIONS

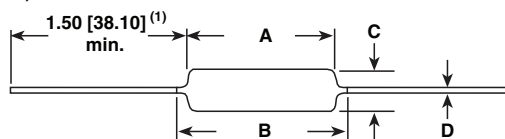
| PARAMETER                       | UNIT            | CW RESISTOR CHARACTERISTICS                                                                                                                                                              |
|---------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Coefficient         | ppm/°C          | ± 30 for 10 Ω and above, ± 50 for 1.0 Ω to 9.9 Ω, ± 90 for 0.5 Ω to 0.99 Ω                                                                                                               |
| Dielectric Withstanding Voltage | V <sub>AC</sub> | 1000                                                                                                                                                                                     |
| Short Time Overload             | -               | 5 x rated power for 5 s for 3.75 W size and smaller, 10 x rated power for 5 s for 4 W size and greater                                                                                   |
| Terminal Strength               | lb              | 10 minimum                                                                                                                                                                               |
| Maximum Working Voltage         | V               | (P x R) <sup>1/2</sup>                                                                                                                                                                   |
| Operating Temperature Range     | °C              | Characteristic U = - 65 to + 250, characteristic V = - 65 to + 350                                                                                                                       |
| Power Rating                    | -               | Characteristic U = + 250 °C max. hot spot temperature, ± 0.5 % max. ΔR in 2000 h load life<br>Characteristic V = + 350 °C max. hot spot temperature, ± 3.0 % max. ΔR in 2000 h load life |

## GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: CW02C10K00JB1214

C W 0 2 C 1 0 K 0 0 J B 1 2 1 4

| GLOBAL MODEL                                                             | VALUE                                                          | TOLERANCE                                  | PACKAGING                                                                                                                                                                                                                                                                                                                                           | SPECIAL                                                    |
|--------------------------------------------------------------------------|----------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| (See Standard Electrical Specifications Global Model column for options) | R = Decimal<br>K = Thousand<br>1R500 = 1.5 Ω<br>1K500 = 1.5 kΩ | H = ± 3.0 %<br>J = ± 5.0 %<br>K = ± 10.0 % | E70 = Lead (Pb)-free, tape/reel, 1K pcs (smaller than CW005)<br>E73 = Lead (Pb)-free, tape/reel, 500 pcs<br>E12 = Lead (Pb)-free, bulk<br>D18 = Lead (Pb)-free, R1R80 tape/reel<br>CW02B...13 pack code for Europe use only<br>S70 = Tin/lead, tape/reel, 1K pcs (smaller than CW005)<br>S73 = Tin/lead, tape/reel, 500 pcs<br>B12 = Tin/lead, bulk | (Dash Number) (up to 3 digits) From 1 to 999 as applicable |
| Historical Part Numbering example: CW-2C-14 10 kΩ 5 % B12                |                                                                |                                            |                                                                                                                                                                                                                                                                                                                                                     |                                                            |
| CW-2C-14<br>HISTORICAL MODEL                                             | 10 kΩ<br>RESISTANCE VALUE                                      | 5 %<br>TOLERANCE CODE                      | B12<br>PACKAGING                                                                                                                                                                                                                                                                                                                                    |                                                            |

**DIMENSIONS** in inches (millimeters)


| MODEL      | DIMENSIONS in inches [millimeters] |                            |                              |                               |
|------------|------------------------------------|----------------------------|------------------------------|-------------------------------|
|            | A                                  | B [MAXIMUM] <sup>(2)</sup> | C                            | D                             |
| CW1/2      | 0.250 ± 0.031 [6.35 ± 0.787]       | 0.281 [7.14]               | 0.085 ± 0.020 [2.16 ± 0.508] | 0.020 ± 0.002 [0.508 ± 0.051] |
| CW001      | 0.406 ± 0.031 [10.31 ± 0.787]      | 0.437 [11.10]              | 0.094 ± 0.031 [2.39 ± 0.787] | 0.020 ± 0.002 [0.508 ± 0.051] |
| CW01M      | 0.285 ± 0.025 [7.24 ± 0.635]       | 0.311 [7.90]               | 0.110 ± 0.015 [2.79 ± 0.381] | 0.020 ± 0.002 [0.508 ± 0.051] |
| CW002      | 0.625 ± 0.062 [15.87 ± 1.57]       | 0.765 [19.43]              | 0.250 ± 0.032 [6.35 ± 0.813] | 0.040 ± 0.002 [1.02 ± 0.051]  |
| CW02M      | 0.500 ± 0.062 [12.70 ± 1.57]       | 0.562 [14.27]              | 0.185 ± 0.015 [4.70 ± 0.381] | 0.032 ± 0.002 [0.813 ± 0.051] |
| CW02B      | 0.562 ± 0.062 [14.27 ± 1.57]       | 0.622 [15.80]              | 0.188 ± 0.032 [4.78 ± 0.813] | 0.032 ± 0.002 [0.813 ± 0.051] |
| CW02B...13 | 0.500 ± 0.062 [12.70 ± 1.57]       | 0.563 [14.30]              | 0.188 ± 0.032 [4.78 ± 0.813] | 0.032 ± 0.002 [0.813 ± 0.051] |
| CW02C      | 0.500 ± 0.062 [12.70 ± 1.57]       | 0.593 [15.06]              | 0.218 ± 0.032 [5.54 ± 0.813] | 0.040 ± 0.002 [1.02 ± 0.051]  |
| CW02C...14 | 0.500 ± 0.062 [12.70 ± 1.57]       | 0.593 [15.06]              | 0.218 ± 0.032 [5.54 ± 0.813] | 0.032 ± 0.002 [0.813 ± 0.051] |
| CW005      | 0.875 ± 0.062 [22.22 ± 1.57]       | 1.0 [25.40]                | 0.312 ± 0.032 [7.92 ± 0.813] | 0.040 ± 0.002 [1.02 ± 0.051]  |
| CW005...2  | 0.875 ± 0.062 [22.22 ± 1.57]       | 1.0 [25.40]                | 0.250 ± 0.032 [6.35 ± 0.813] | 0.032 ± 0.002 [0.813 ± 0.051] |
| CW005...3  | 0.875 ± 0.062 [22.22 ± 1.57]       | 1.0 [25.40]                | 0.312 ± 0.032 [7.92 ± 0.813] | 0.032 ± 0.002 [0.813 ± 0.051] |
| CW007      | 1.218 ± 0.062 [30.94 ± 1.57]       | 1.281 [32.54]              | 0.312 ± 0.032 [7.92 ± 0.813] | 0.040 ± 0.002 [1.02 ± 0.051]  |
| CW010      | 1.781 ± 0.062 [45.24 ± 1.57]       | 1.875 [47.62]              | 0.375 ± 0.032 [9.52 ± 0.813] | 0.040 ± 0.002 [1.02 ± 0.051]  |
| CW010...3  | 1.781 ± 0.062 [45.24 ± 1.57]       | 1.875 [47.62]              | 0.375 ± 0.032 [9.52 ± 0.813] | 0.032 ± 0.002 [0.813 ± 0.051] |

**Notes**

(1) On some standard reel pack methods, the leads may be trimmed to a shorter length than shown

(2) B (maximum) dimension is clean lead to clean lead

**MATERIAL SPECIFICATIONS**

**Element:** Copper-nickel alloy or nickel-chrome alloy, depending on resistance value

**Core:** Ceramic: Steatite or alumina, depending on physical size

**Coating:** Special high temperature silicone

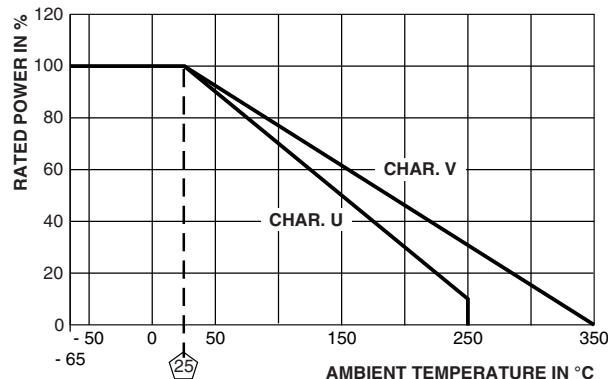
**Standard Terminals:** Tinned Copperweld® (CW02B...13 is tinned copper)

**End Caps:** Stainless steel

**Part Marking:** DALE, model, wattage <sup>(3)</sup>, value, tolerance, date code

**Note**

(3) Wattage marked on resistor will be "V" characteristic, CW1/2 will not be marked with wattage

**DERATING**

**PERFORMANCE**

| TEST                            | CONDITIONS OF TEST                                                                 | TEST LIMITS <sup>(4)</sup><br>(CHARACTERISTIC V) |
|---------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------|
| Thermal Shock                   | Rated power applied until thermally stable, then a minimum of 15 min at - 55 °C    | ± (2.0 % + 0.05 Ω) ΔR                            |
| Short Time Overload             | 5 x rated power (3.75 W and smaller), 10 x rated power (4 W and larger) for 5 s    | ± (2.0 % + 0.05 Ω) ΔR                            |
| Dielectric Withstanding Voltage | 1000 V <sub>rms</sub> , 1 min                                                      | ± (0.1 % + 0.05 Ω) ΔR                            |
| Low Temperature Storage         | - 65 °C for 24 h                                                                   | ± (2.0 % + 0.05 Ω) ΔR                            |
| High Temperature Exposure       | 250 h at + 350 °C                                                                  | ± (4.0 % + 0.05 Ω) ΔR                            |
| Moisture Resistance             | MIL-STD-202 Method 106, 7b not applicable                                          | ± (2.0 % + 0.05 Ω) ΔR                            |
| Shock, Specified Pulse          | MIL-STD-202 Method 213, 100 g's for 6 ms, 10 shocks                                | ± (0.2 % + 0.05 Ω) ΔR                            |
| Vibration, High Frequency       | Frequency varied 10 Hz to 2000 Hz, 20 g peak, 2 directions 6 h each                | ± (0.2 % + 0.05 Ω) ΔR                            |
| Load Life                       | 2000 h at rated power, + 25 °C, 1.5 h "ON", 0.5 h "OFF"                            | ± (3.0 % + 0.05 Ω) ΔR                            |
| Terminal Strength               | 5 s to 10 s 10 pound pull test; torsion test - 3 alternating directions, 360° each | ± (1.0 % + 0.05 Ω) ΔR                            |

**Note**

(4) All ΔR figures shown are maximum, based upon testing requirements per MIL-PRF-26 at a maximum operating temperature of + 350 °C. ΔR maximum figures are considerably lower when tested at a maximum operating temperature of + 250 °C.



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