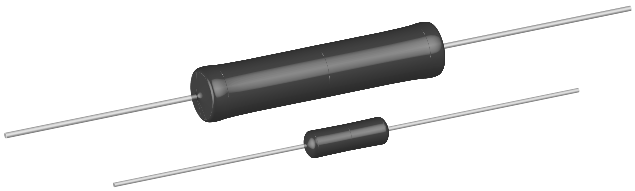
# Wirewound Resistors, High Surge Immunity, Silicone Coated, Axial Lead



## FEATURES

- High voltage surge immunity, up to 12 kV
- High temperature silicone coating
- Complete welded construction
- Excellent stability in operation
- High power to size ratio
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

Pb-free Available

e3

RoHS* Available

HALOGEN FREE Available

GREEN (5-2008) Available

**Note**

* This datasheet provides information about parts that are RoHS-compliant and/or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information/tables in this datasheet for details.

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | POWER RATING (1) $P_{25\,°C}$ W CHARACTERISTIC U +250 °C | POWER RATING (1) $P_{25\,°C}$ W CHARACTERISTIC V +350 °C | RESISTANCE RANGE Ω | TOLERANCE ± % | WEIGHT (max.) g |
|---|---|---|---|---|---|
| CW001...HS | 1.0 | - | 0.1 to 6.37K | 5, 10 | 0.34 |
| CW02B...HS | 3.0 | 3.75 | 0.1 to 15K | 5, 10 | 0.7 |
| CW005...HS | 5.0 | 6.5 | 0.1 to 58.5K | 5, 10 | 4.2 |
| CW010...HS | 10.0 | 13.0 | 0.1 to 167K | 5, 10 | 9.0 |

**Note**

(1) Vishay Dale CW models have two power ratings, depending on operating temperature and stability requirements.

## 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 | $V_{AC}$ | 1000 |
| Short Time Overload | - | 5 x rated power for 5 s for 3.75 W size and smaller,<br>10 x rated power for 5 s for 4 W size and greater |
| Terminal Strength | lb | 10 minimum |
| Maximum Working Voltage | V | $(P \times R)^{1/2}$ |
| 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. $\Delta R$ in 2000 h load life<br>Characteristic V = +350 °C max. hot spot temperature, ± 3.0 % max. $\Delta R$ in 2000 h load life |

## GLOBAL PART NUMBER INFORMATION

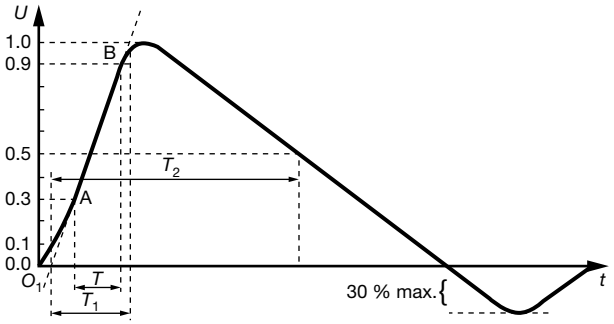
**Global Part Numbering example: CW02B10K00JB12HS (preferred part number format)**

| C | W | 0 | 2 | B | 1 | 0 | K | 0 | 0 | J | B | 1 | 2 | H | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| GLOBAL MODEL (5 digits) | VALUE (5 digits) | TOLERANCE (1 digit) | PACKAGING (3 digits) | SPECIAL (2 digits) |
|---|---|---|---|---|
| **CW001**<br>**CW02B**<br>**CW005**<br>**CW010** | **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. (CW001 and CW02B)<br>**E73** = Lead (Pb)-free, tape/reel, 500 pcs.<br>**E12** = Lead (Pb)-free, bulk<br>**S70** = Tin/lead, tape/reel, 1K pcs. (CW001 and CW02B)<br>**S73** = Tin/lead, tape/reel, 500 pcs.<br>**B12** = Tin/lead, bulk | **HS** = High Surge |

## HIGH VOLTAGE SURGE

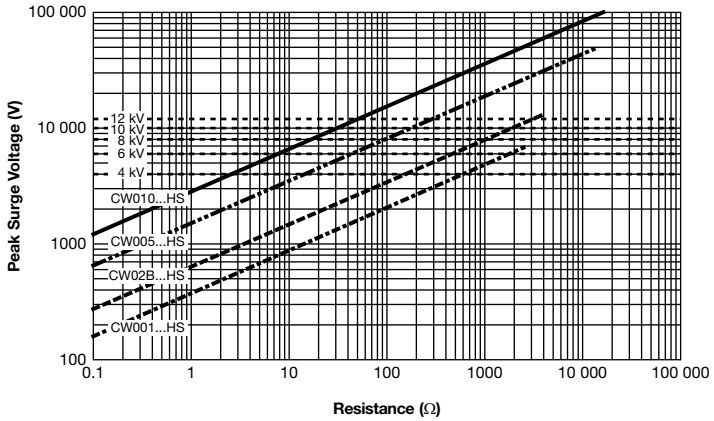
The surge handling capability is based upon applying an exponential open circuit voltage waveform according to specification IEC 61000-4-5 (1.2 µs/50 µs) as shown below at an ambient temperature of 25 °C.




Front time: $T_1$ = 1.67 x T = 1.2 µs ± 30 %
Time to half-value: $T_2$ = 50 µs ± 20 %

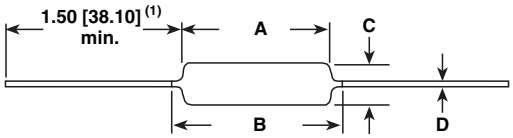
**Open circuit voltage waveform at the output of the pulse generator**

## PEAK SURGE VOLTAGE - IEC 61000-4-5 (1.2 µs/50 µs pulse)




| MINIMUM RESISTANCE VALUE FOR SURGE VOLTAGE | | | | | |
|---|---|---|---|---|---|
| GLOBAL MODEL | PEAK SURGE VOLTAGE | | | | |
| | 4 kV | 6 kV | 8 kV | 10 kV | 12 kV |
| CW001...HS | 586 Ω | 1.7 Ω | - | - | - |
| CW02B...HS | 151 Ω | 457 Ω | 1.0 kΩ | 1.8 kΩ | 3.0 kΩ |
| CW005...HS | 15 Ω | 43 Ω | 94 Ω | 171 Ω | 281 Ω |
| CW010...HS | 2.6 Ω | 7.6 Ω | 17 Ω | 30 Ω | 50 Ω |

## DIMENSIONS in inches (millimeters)




| MODEL | DIMENSIONS in inches [millimeters] | | | |
|---|---|---|---|---|
| | A | B [MAXIMUM] (2) | C | D |
| CW001...HS | 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] |
| CW02B...HS | 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] |
| CW005...HS | 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] |
| CW010...HS | 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] |

**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®

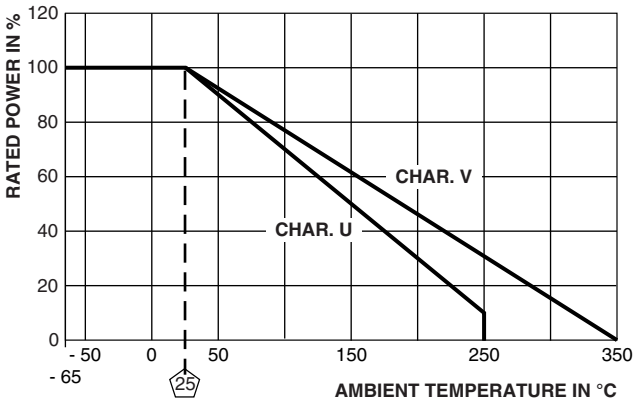
**End Caps:** Stainless steel

**Part Marking:** DALE, model, wattage (3), value, tolerance, date code

**Note**

(3) Wattage marked on resistor will be “V” characteristic.

## DERATING




## PERFORMANCE

| TEST | CONDITIONS OF TEST | TEST LIMITS (4) (CHARACTERISTIC V) |
|---|---|---|
| Thermal Shock | Rated power applied until thermally stable, then a minimum of 15 min at -55 °C | ± (2.0 % + 0.05 Ω) Δ*R* |
| 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) Δ*R* |
| Dielectric Withstanding Voltage | 1000 $V_{RMS}$, 1 min | ± (0.1 % + 0.05 Ω) Δ*R* |
| Low Temperature Storage | -65 °C for 24 h | ± (2.0 % + 0.05 Ω) Δ*R* |
| High Temperature Exposure | 250 h at +350 °C | ± (4.0 % + 0.05 Ω) Δ*R* |
| Moisture Resistance | MIL-STD-202 Method 106, 7b not applicable | ± (2.0 % + 0.05 Ω) Δ*R* |
| Shock, Specified Pulse | MIL-STD-202 Method 213, 100 *g*’s for 6 ms, 10 shocks | ± (0.2 % + 0.05 Ω) Δ*R* |
| Vibration, High Frequency | Frequency varied 10 Hz to 2000 Hz, 20 *g* peak, 2 directions 6 h each | ± (0.2 % + 0.05 Ω) Δ*R* |
| Load Life | 2000 h at rated power, +25 °C, 1.5 h “ON”, 0.5 h “OFF” | ± (3.0 % + 0.05 Ω) Δ*R* |
| Terminal Strength | 5 s to 10 s 10 pound pull test; torsion test - 3 alternating directions, 360° each | ± (1.0 % + 0.05 Ω) Δ*R* |

**Note**

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

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