

# High Precision (0.01 % / 10 ppm/°C) Through Hole Thin Film Conformal Coating Sil Resistor



## FEATURES

- Tight TCR to 5 ppm/°C (in 0 °C; +70 °C)
- Incorporates high stability thin film element (0.1 % at + 70 °C at Pn during 1000 h)
- Through hole (Sil)
- 100 Ω to 10 MΩ
- Tight tolerance down to 0.01 %
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

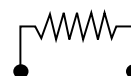

**RoHS  
COMPLIANT**

## LINKS TO ADDITIONAL RESOURCES



3D Models

## SCHEMATIC



## STANDARD ELECTRICAL SPECIFICATIONS

| MODEL   | RESISTANCE RANGE<br>Ω | RATED POWER<br>$P_{70\text{ °C}}$<br>W | LIMITING ELEMENT<br>VOLTAGE ( $U_L$ )<br>V | TOLERANCE<br>± %                    | TEMPERATURE<br>COEFFICIENT <sup>(1)</sup><br>± ppm/°C |
|---------|-----------------------|----------------------------------------|--------------------------------------------|-------------------------------------|-------------------------------------------------------|
| CNS 020 | 100 to 10M            | 0.5                                    | 300                                        | 0.01, 0.02, 0.05, 0.1, 0.25, 0.5, 1 | 5, 10                                                 |

### Note

<sup>(1)</sup> 15 ppm/°C for R ≥ 1.5M

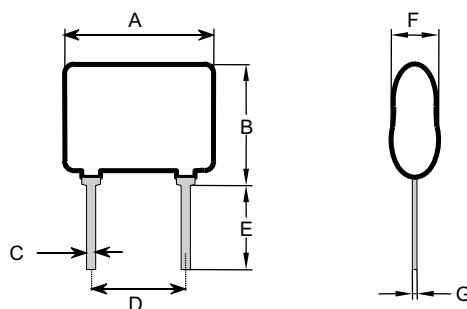
## CLIMATIC SPECIFICATIONS

|                             |                 |
|-----------------------------|-----------------|
| Operating temperature range | -55 °C; +155 °C |
|-----------------------------|-----------------|

## MECHANICAL SPECIFICATIONS

|                    |                          |
|--------------------|--------------------------|
| Resistive material | Nichrome                 |
| Substrate material | Alumina                  |
| Terminals          | Tin / silver on Cu alloy |
| Protection         | Conformal epoxy coating  |

## DIMENSIONS AND IMPRINTING CNS 020



On front side: Vishay logo and ohmic value (in Ω). On back side: manufacturing code and tolerance (in %)

| DIMENSION | INCHES | MILLIMETERS |
|-----------|--------|-------------|
| A         | 0.330  | 8.38 max.   |
| B         | 0.261  | 6.62 max.   |
| C         | 0.020  | 0.51        |
| D         | 0.200  | 5.08        |
| E         | 0.125  | 3.17 min.   |
| F         | 0.100  | 2.54 max.   |
| G         | 0.010  | 0.25        |

**TECHNICAL SPECIFICATIONS**

| TEST                                                  | SPECIFICATIONS          | CONDITIONS                            |
|-------------------------------------------------------|-------------------------|---------------------------------------|
| MATERIAL                                              | PASSIVATED NICHROME     |                                       |
| Absolute TCR                                          | Standard <sup>(1)</sup> | $\pm 10 \text{ ppm}/^{\circ}\text{C}$ |
|                                                       | On request              | $\pm 5 \text{ ppm}/^{\circ}\text{C}$  |
| Power rating                                          | 0.5 W                   | at +70 °C                             |
|                                                       | 0.3 W                   | at +125 °C                            |
| Dissipation factor (in air) $1/R_{TH}$ <sup>(2)</sup> |                         | 6.7 mW/°C                             |

**Notes**<sup>(1)</sup> 15 ppm/°C for  $R \geq 1.5M$ <sup>(2)</sup> For information only**ENVIRONMENTAL TEST**

| TEST                      | REQUIREMENTS                                                       |                   |                  | CONDITIONS                                                    |
|---------------------------|--------------------------------------------------------------------|-------------------|------------------|---------------------------------------------------------------|
|                           | NFC 83220<br>CECC40300                                             | MIL-PRF<br>55182E | DRIFTS<br>(MAX.) |                                                               |
| Overload                  | $\pm 0.01 \%$                                                      | $\pm 0.05 \%$     | 0.01 %           | $2.5 U_L/5 \text{ s}$<br>$U_{max} < 2 U_n$                    |
| Temperature cycling       | $\pm 0.01 \%$                                                      | $\pm 0.05 \%$     | 0.01 %           | -55 °C / +155 °C 5 cycles<br>CEI 68-2-14 Test No              |
| Terminal strength         | $\pm 0.01 \%$                                                      | $\pm 0.02 \%$     | 0.01 %           | CEI 68-2-21<br>Test Ua (pulling), Ub (bending), Uc (twisting) |
| Resistance to solder heat | $\pm 0.01 \%$                                                      | $\pm 0.02 \%$     | 0.01 %           | +260 °C / 10 s, CEI 68-2-20A<br>Test T6 (Met 1A)              |
| Vibration                 | $\pm 0.01 \%$                                                      | $\pm 0.02 \%$     | 0.01 %           | 10 Hz to 500 Hz<br>10 g, 6 h Met B4; CEI 68-2-6 Test Fc       |
| Climatic sequence         | $\pm 0.05 \%$<br>insulation resistance<br>> $10^2 \text{ M}\Omega$ | -                 | 0.05 %           | -55 °C / +155 °C 6 cycles 95 % RH<br>RH 85 mbar<br>CEI68-1    |
| Moisture                  | $\pm 0.05 \%$<br>insulation resistance<br>> $10^2 \text{ M}\Omega$ | -                 | 0.02 %           | 56 days 95 % RH<br>+40 °C<br>CEI 68-2-3                       |
| High temperature storage  | $\pm 0.05 \%$                                                      | -                 | 0.05 %           | 1000 h / +155 °C<br>CEI 68-2-20A; Test B                      |

**GLOBAL PART NUMBER INFORMATION**

New Global Part Numbering: CNS020-301KF (preferred part number format)

|              |   |   |   |   |   |                     |   |   |                                                                                                                                     |   |   |
|--------------|---|---|---|---|---|---------------------|---|---|-------------------------------------------------------------------------------------------------------------------------------------|---|---|
| C            | N | S | 0 | 2 | 0 | -                   | 3 | 0 | 1                                                                                                                                   | K | F |
| GLOBAL MODEL |   |   |   |   |   | VALUE               |   |   | TOLERANCE                                                                                                                           |   |   |
| CNS 020      |   |   |   |   |   | Decimal: R, K, or M |   |   | L = $\pm 0.01 \%$ C = $\pm 0.25 \%$<br>P = $\pm 0.02 \%$ D = $\pm 0.5 \%$<br>W = $\pm 0.05 \%$ F = $\pm 1.0 \%$<br>B = $\pm 0.1 \%$ |   |   |

Historical Part Number Example: CNS 020 301K 1 % (will continue to be accepted)

|                  |       |           |
|------------------|-------|-----------|
| CNS 020          | 301K  | 1 %       |
| HISTORICAL MODEL | VALUE | TOLERANCE |



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