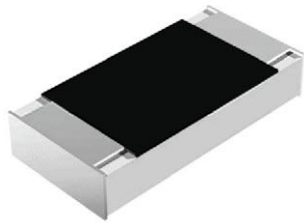


## Lead (Pb)-free Commodity Thick Film Chip Resistors



### FEATURES

- High volume product suitable for commercial applications
- Pure tin solder contacts on Ni barrier layer provides compatibility with lead (Pb)-free and lead containing soldering processes
- Metal glaze on high quality ceramic
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

| STANDARD ELECTRICAL SPECIFICATIONS   |                |                  |                         |   |                               |             |                           |          |
|--|----------------|------------------|-------------------------|---|-------------------------------|-------------|---------------------------|----------|
| MODEL  | CASE SIZE INCH | CASE SIZE METRIC | POWER RATING $P_{70}$ W | LIMITING ELEMENT VOLTAGE $U_{max. AC_{RMS}/DC}$ V | TEMPERATURE COEFFICIENT ppm/K | TOLERANCE % | RESISTANCE RANGE $\Omega$ | SERIES   |
| CRCW0201   | 0201           | RR 0603M         | 0.05                    | 30  | $\pm 200$                     | $\pm 0.5$   | 10.0 to 10M               | E24; E96 |
|  |                |                  |                         |   | -200 / +400                   |             | 1.0 to 9.76               |          |
|  |                |                  |                         |   | $\pm 100$                     | $\pm 1$     | 47.0 to 1M                | E24; E96 |
|  |                |                  |                         |   | $\pm 200$                     |             | 10.0 to 10M               |          |
|  |                |                  |                         |   | -200 / +400                   | $\pm 5$     | 1.0 to 9.76               | E24      |
|  |                |                  |                         |   | $\pm 200$                     |             | 10.0 to 10M               |          |
| -200 / +400  | 1.0 to 9.1     |                  |                         |   |                               |             |                           |          |
| Zero-Ohm-Resistor: $R_{max.} = 50 \text{ m}\Omega$ , $I_{max.}$ at $70 \text{ }^\circ\text{C} = 1.0 \text{ A}$ |                |                  |                         |   |                               |             |                           |          |

### Notes

- These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material.

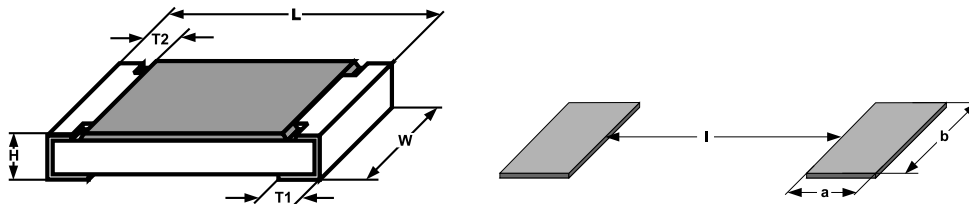
| TECHNICAL SPECIFICATIONS  |                  |             |
|---|------------------|-------------|
| PARAMETER   | UNIT             | CRCW0201    |
| Rated Dissipation at $70 \text{ }^\circ\text{C}$ <sup>(1)</sup> | W                | 0.05        |
| Operating Voltage $U_{max. AC_{RMS}/DC}$                        | V                | 30          |
| Insulation Voltage $U_{ins}$ (1 min)                            | V                | 50          |
| Insulation Resistance   | $\Omega$         | $> 10^9$    |
| Operating Temperature Range                                     | $^\circ\text{C}$ | -55 to +155 |
| Weight  | mg               | 0.17        |

### Note

- <sup>(1)</sup> The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature of  $155 \text{ }^\circ\text{C}$  is not exceeded.

| PART NUMBER AND PRODUCT DESCRIPTION              |  |  |  |                                |  |   |   |  |   |   |                             |   |   |   |   |
|--|--|--|--|--------------------------------|--|---|---|--|---|---|-----------------------------|---|---|---|---|
| PART NUMBER: CRCW02011K00FNE D                   |  |  |  |                                |  |   |   |  |   |   |                             |   |   |   |   |
| C  | R  | C  | W  | 0                              | 2  | 0 | 1 | 1  | K | 0 | 0                           | F | K | E | D |
| MODEL<br>CRCW0201                                |  | VALUE<br>R = decimal<br>K = thousand<br>M = million<br>0000 = jumper                                   |  |                                | TOLERANCE<br>D = ± 0.5 %<br>F = ± 1.0 %<br>J = ± 5.0 %<br>Z = jumper |   |   | TCR<br>K = ± 100 ppm/K<br>N = ± 200 ppm/K<br>X = -200 ppm/K / +400 ppm/K<br>0 = jumper |   |   | PACKAGING<br>ED<br>EE<br>EI |   |   |   |   |
| PRODUCT DESCRIPTION: CRCW0201 100 1K0 1 % ET7 e3 |  |  |  |                                |  |   |   |  |   |   |                             |   |   |   |   |
| CRCW0201   | 100  | 562R   | 1 %  | ET7                            | e3   |   |   |  |   |   |                             |   |   |   |   |
| MODEL<br>CRCW0201                                | TCR<br>± 200 ppm/K<br>± 100 ppm/K<br>- 200/+ 400 ppm/K | RESISTANCE VALUE<br>1R0 = 1 Ω<br>10R = 10 Ω<br>1K0 = 1 kΩ<br>10K = 10 kΩ<br>1M0 = 1 MΩ<br>0R0 = jumper | TOLERANCE VALUE<br>± 0.5 %<br>± 1 %<br>± 5 % | PACKAGING<br>ET7<br>EF4<br>ET2 | LEAD (Pb)-FREE<br>e3 = pure tin termination finish                   |   |   |  |   |   |                             |   |   |   |   |

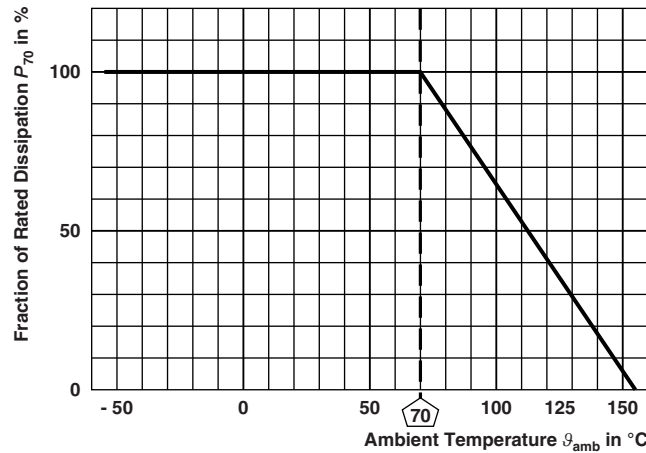
| PACKAGING |          |          |                                       |       |       |               |
|-----------|----------|----------|---------------------------------------|-------|-------|---------------|
| MODEL     | CODE     | QUANTITY | CARRIER TAPE                          | WIDTH | PITCH | REEL DIAMETER |
| CRCW0201  | ED = ET7 | 10 000   | Paper tape acc. to IEC 60068-3 Type I | 8 mm  | 2 mm  | 180 mm/7"     |
|           | EI = ET2 | 20 000   |                                       |       |       | 254 mm/10"    |
|           | EE = EF4 | 50 000   |                                       |       |       | 330 mm/13"    |

**DIMENSIONS** in millimeters


| SIZE |        | DIMENSIONS |            |             |             |             | SOLDER PAD DIMENSIONS |      |      |
|------|--------|------------|------------|-------------|-------------|-------------|-----------------------|------|------|
| INCH | METRIC | L          | W          | H           | T1          | T2          | a                     | b    | l    |
| 0201 | 0603   | 0.6 ± 0.05 | 0.3 ± 0.05 | 0.23 ± 0.05 | 0.15 ± 0.05 | 0.10 ± 0.05 | 0.28                  | 0.43 | 0.23 |

**Note**

- No marking for 0201 size.

**DERATING**


| TEST PROCEDURES AND REQUIREMENTS |                                  |                                |   |   |
|----------------------------------|----------------------------------|--------------------------------|---|---|
| EN 60115-1<br>CLAUSE             | IEC<br>60068-2<br>TEST<br>METHOD | TEST                           | PROCEDURE   | REQUIREMENTS<br>PERMISSIBLE CHANGE ( $\Delta R$ )                                       |
|                                  |                                  |                                | Stability for product types:<br><b>CRCW0201 e3</b>  | 1 $\Omega$ to 10 M $\Omega$   |
| 4.5                              | -                                | Resistance                     | -   | $\pm 0.5\%$ ; $\pm 1\%$ ; $\pm 5\%$   |
| 4.7                              | -                                | Voltage proof                  | $U = 1.4 \times U_{ins}$ ; 60 s   | No flashover or breakdown   |
| 4.13                             | 58 (Td)                          | Solderability                  | Solder bath method;<br>Sn60Pb40<br>non activated flux;<br>(235 $\pm$ 5) °C<br>(2 $\pm$ 0.2) s       | Good tinning ( $\geq 95\%$ covered)<br>no visible damage                                |
|                                  |                                  |                                | Solder bath method;<br>Sn96.5Ag3Cu0.5<br>non-activated flux;<br>(245 $\pm$ 5) °C<br>(3 $\pm$ 0.3) s | Good tinning ( $\geq 95\%$ covered)<br>no visible damage                                |
| 4.8.4.2                          | -                                | Temperature coefficient        | (20 / -55 / 20) °C and<br>(20 / 125 / 20) °C  | $\pm 100$ ppm/K,<br>$\pm 200$ ppm/K,<br>-200 ppm/K / +400 ppm/K                         |
| 4.32                             | 21 (Uu <sub>3</sub> )            | Shear (adhesion)               | 9 N   | No visible damage   |
| 4.33                             | 21 (Uu <sub>1</sub> )            | Substrate bending              | Depth 2 mm; 3 times   | No visible damage,<br>no open circuit in bent position<br>$\pm (0.5\% R + 0.05 \Omega)$ |
| 4.19                             | 14 (Na)                          | Rapid change<br>of temperature | 30 min. at -55 °C;<br>30 min. at 125 °C   |   |
|                                  |                                  |                                | 5 cycles  | $\pm (0.5\% R + 0.05 \Omega)$   |
|                                  |                                  |                                | 1000 cycles   | $\pm (1\% R + 0.05 \Omega)$   |
| 4.23                             | -                                | Climatic sequence:             | -   | $\pm (2\% R + 0.1 \Omega)$  |
| 4.23.2                           | 2 (Ba)                           | Dry heat                       | 125 °C; 16 h  |   |
| 4.23.3                           | 30 (Db)                          | Damp heat, cyclic              | 55 °C; $\geq 90\%$ RH; 24 h; 1 cycle  |   |
| 4.23.4                           | 1 (Aa)                           | Cold                           | -55 °C; 2 h   |   |
| 4.23.5                           | 13 (M)                           | Low air pressure               | 1 kPa; (25 $\pm$ 10) °C; 1 h  |   |
| 4.23.6                           | 30 (Db)                          | Damp heat, cyclic              | 55 °C; $\geq 90\%$ RH; 24 h; 5 cycles   |   |
| 4.23.7                           | -                                | DC load                        | $U = \sqrt{P_{70} \times R} \leq U_{max.}$  |   |

| <b>TEST PROCEDURES AND REQUIREMENTS</b> |                                  |  |  |   |
|---|----------------------------------|--|--|---|
| EN 60115-1<br>CLAUSE                    | IEC<br>60068-2<br>TEST<br>METHOD | TEST                                       | PROCEDURE  | REQUIREMENTS<br>PERMISSIBLE CHANGE ( $\Delta R$ ) |
|   |                                  |  | Stability for product types:<br><b>CRCW0201 e3</b>   | 1 $\Omega$ to 10 M $\Omega$                       |
| 4.25.1                                  | -                                | Endurance at 70 °C                         | $U = \sqrt{P_{70} \times R} \leq U_{max.};$<br>1.5 h on; 0.5 h off;                                      |   |
|   |                                  |  | 70 °C; 1000 h  | $\pm (2 \% R + 0.1 \Omega)$                       |
|   |                                  |  | 70 °C; 8000 h  | $\pm (4 \% R + 0.1 \Omega)$                       |
| 4.18.2                                  | 58 (Td)                          | Resistance to soldering heat               | Solder bath method<br>(260 $\pm$ 5) °C; (10 $\pm$ 1) s   | $\pm (1 \% R + 0.05 \Omega)$                      |
| 4.35                                    | -                                | Flamability,<br>needle flame test          | IEC 60695-11-5;<br>10 s  | No burning after 30 s                             |
| 4.24                                    | 78 (Cab)                         | Damp heat, steady state                    | (40 $\pm$ 2) °C; (93 $\pm$ 3) % RH; 56 days  | $\pm (2 \% R + 0.1 \Omega)$                       |
| 4.25.3                                  | -                                | Endurance at upper<br>category temperature | 155 °C, 1000 h   | $\pm (2 \% R + 0.1 \Omega)$                       |
| 4.29                                    | 45 (XA)                          | Component<br>solvent resistance            | Isopropyl alcohol;<br>50 °C; method 2  | No visible damage                                 |
| 4.22                                    | 6 (Fc)                           | Vibration, endurance<br>by sweeping        | f = 10 Hz to 2000 Hz;<br>x, y, z $\leq$ 1.5 mm;<br>A $\leq$ 200 m/s <sup>2</sup> ;<br>10 sweeps per axis | $\pm (0.5 \% R + 0.05 \Omega)$                    |

All tests are carried out in accordance with the following specifications:

- EN 60115-1, generic specification
- EN 140400, sectional specification
- EN 140401-802, detail specification
- IEC 60068-2-x, environmental test procedures

Packaging of components is done in paper tapes according to IEC 60286-3.



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