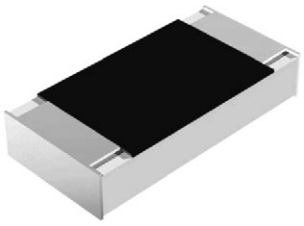
# Lead (Pb)-Free Commodity Thick Film Chip Resistors



## 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

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 Ω | SERIES |
|---|---|---|---|---|---|---|---|---|
| CRCW0201 | 0201 | RR 0603M | 0.05 | 30 | ± 100 | ± 1 | 47.0 to 1M | E24; E96 |
| | | | | | ± 200 | | 10.0 to 10M | |
| | | | | | -200 / +400 | | 1.0 to 9.76 | |
| | | | | | ± 200 | ± 5 | 10.0 to 10M | E24 |
| | | | | | -200 / +400 | | 1.0 to 9.1 | |
| | | | Zero-ohm-resistor: $R_{max.}$ = 50 mΩ, $I_{max.}$ at 70 °C = 1.0 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 °C (1) | W | 0.05 |
| Operating Voltage $U_{max.}$ $AC_{RMS}$/DC | V | 30 |
| Insulation Voltage $U_{ins}$ (1 min) | V | 50 |
| Insulation Resistance | Ω | > $10^9$ |
| Operating Temperature Range | °C | -55 to +155 |
| Weight | mg | 0.17 |

**Note**

(1) 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 °C is not exceeded



For technical questions, contact: thickfilmchip@vishay.com

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## PART NUMBER AND PRODUCT DESCRIPTION

**Part Number: CRCW02011K00FNED**

| C | R | C | W | 0 | 2 | 0 | 1 | 1 | K | 0 | 0 | F | K | E | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| MODEL | VALUE | TOLERANCE | TCR | PACKAGING |
|---|---|---|---|---|
| **CRCW0201** | **R** = decimal<br>**K** = thousand<br>**M** = million<br>**0000** = jumper | **F** = ± 1.0 %<br>**J** = ± 5.0 %<br>**Z** = jumper | **K** = ± 100 ppm/K<br>**N** = ± 200 ppm/K<br>**X** = -200 ppm/K / +400 ppm/K<br>**0** = jumper | **ED**<br>**EE**<br>**EI** |

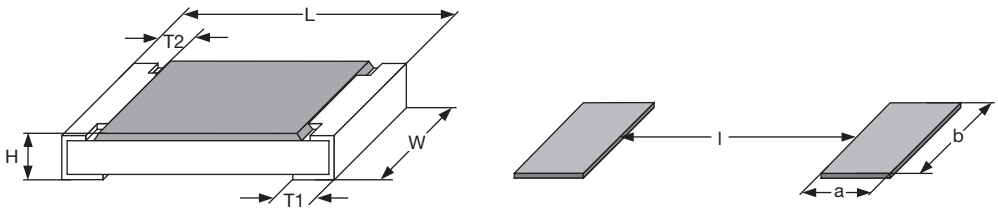
**Product Description: CRCW0201 100 1K0 1 % ET7 e3**

| CRCW0201 | 100 | 562R | 1 % | ET7 | e3 |
|---|---|---|---|---|---|
| MODEL | TCR | RESISTANCE VALUE | TOLERANCE VALUE | PACKAGING | LEAD (Pb)-FREE |
| **CRCW0201** | **± 200** ppm/K<br>**± 100** ppm/K<br>**- 200 / + 400** ppm/K | **1R0** = 1 Ω<br>**10R** = 10 Ω<br>**10K** = 10 kΩ<br>**1M** = 1 MΩ<br>**0R0** = jumper | **± 1 %**<br>**± 5 %** | **ET2**<br>**ET7**<br>**EF4** | **e3** = pure tin termination finish |

## PACKAGING

| MODEL | CODE | QUANTITY | CARRIER TAPE | WIDTH | PITCH | REEL DIAMETER |
|---|---|---|---|---|---|---|
| CRCW0201 | ED = ET7 | 10 000 | Paper tape according 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 ± 0.03 | 0.3 ± 0.03 | 0.23 ± 0.03 | 0.15 ± 0.05 | 0.10 ± 0.05 | 0.28 | 0.43 | 0.23 |

**Note**

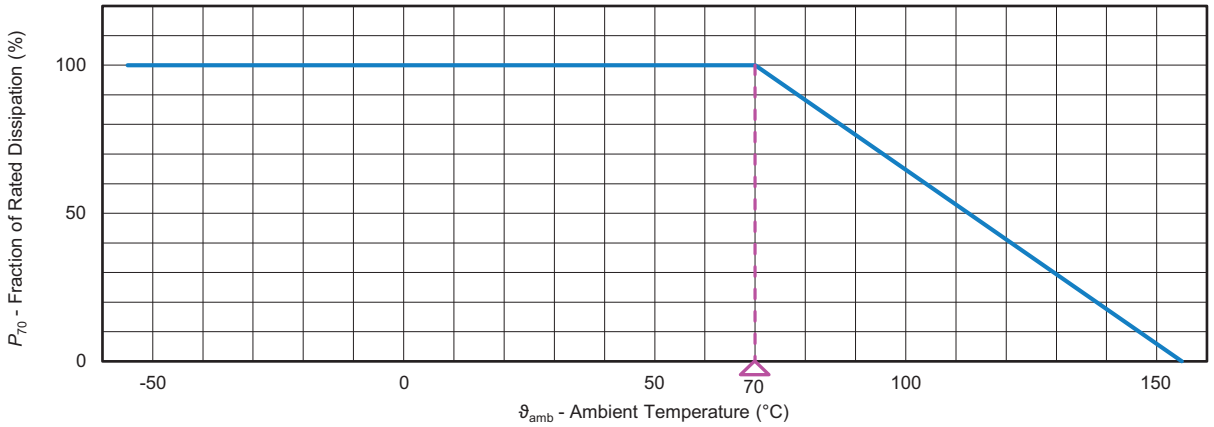
- No marking for 0201 size



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## DERATING




## TEST PROCEDURES AND REQUIREMENTS

| EN 60115-1 CLAUSE | IEC 60068-2 TEST METHOD | TEST | PROCEDURE | REQUIREMENTS PERMISSIBLE CHANGE ($\Delta R$) |
|---|---|---|---|---|
| | | | Stability for product types: | |
| | | | **CRCW0201 e3** | 1 Ω to 10 MΩ |
| 4.5 | - | Resistance | - | ± 1 %; ± 5 % |
| 4.7 | - | Voltage proof | $U$ = 1.4 x $U_{ins}$; 60 s | No flashover or breakdown |
| 4.13 | 58 (Td) | Solderability | Solder bath method; Sn60Pb40 non activated flux; (235 ± 5) °C (2 ± 0.2) s | Good tinning (≥ 95 % covered) no visible damage |
| | | | Solder bath method; Sn96.5Ag3Cu0.5 non-activated flux; (245 ± 5) °C (3 ± 0.3) s | Good tinning (≥ 95 % covered) no visible damage |
| 4.8.4.2 | - | Temperature coefficient | (20 / -55 / 20) °C and (20 / 125 / 20) °C | ± 100 ppm/K, ± 200 ppm/K, -200 ppm/K / +400 ppm/K |
| 4.32 | 21 ($Uu_3$) | Shear (adhesion) | 9 N | No visible damage |
| 4.33 | 21 ($Uu_1$) | Substrate bending | Depth 2 mm; 3 times | No visible damage, no open circuit in bent position ± (0.5 % $R$ + 0.05 Ω) |
| 4.19 | 14 (Na) | Rapid change of temperature | 30 min. at -55 °C; 30 min. at 125 °C | |
| | | | 5 cycles | ± (0.5 % $R$ + 0.05 Ω) |
| | | | 1000 cycles | ± (1 % $R$ + 0.05 Ω) |
| 4.23 | - | Climatic sequence: | - | ± (2 % $R$ + 0.1 Ω) |
| 4.23.2 | 2 (Ba) | Dry heat | 125 °C; 16 h | |
| 4.23.3 | 30 (Db) | Damp heat, cyclic | 55 °C; ≥ 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 ± 10) °C; 1 h | |
| 4.23.6 | 30 (Db) | Damp heat, cyclic | 55 °C; ≥ 90 % RH; 24 h; 5 cycles | |
| 4.23.7 | - | DC load | $U = \sqrt{P_{70} \times R} \leq U_{max.}$ | |
| 4.25.1 | - | Endurance at 70 °C | $U = \sqrt{P_{70} \times R} \leq U_{max.}$; 1.5 h on; 0.5 h off; | |
| | | | 70 °C; 1000 h | ± (2 % $R$ + 0.1 Ω) |
| | | | 70 °C; 8000 h | ± (4 % $R$ + 0.1 Ω) |


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| TEST PROCEDURES AND REQUIREMENTS | | | | |
|---|---|---|---|---|
| **EN 60115-1 CLAUSE** | **IEC 60068-2 TEST METHOD** | **TEST** | **PROCEDURE** | **REQUIREMENTS PERMISSIBLE CHANGE ($\Delta R$)** |
| | | | Stability for product types: | |
| | | | **CRCW0201 e3** | 1 Ω to 10 MΩ |
| 4.18.2 | 58 (Td) | Resistance to soldering heat | Solder bath method (260 ± 5) °C; (10 ± 1) s | ± (1 % $R$ + 0.05 Ω) |
| 4.35 | - | Flammability, needle flame test | IEC 60695-11-5; 10 s | No burning after 30 s |
| 4.24 | 78 (Cab) | Damp heat, steady state | (40 ± 2) °C; (93 ± 3) % RH; 56 days | ± (2 % $R$ + 0.1 Ω) |
| 4.25.3 | - | Endurance at upper category temperature | 155 °C, 1000 h | ± (2 % $R$ + 0.1 Ω) |
| 4.29 | 45 (XA) | Component solvent resistance | Isopropyl alcohol; 50 °C; method 2 | No visible damage |
| 4.22 | 6 (Fc) | Vibration, endurance by sweeping | f = 10 Hz to 2000 Hz; x, y, z ≤ 1.5 mm; A ≤ 200 m/s$^2$; 10 sweeps per axis | ± (0.5 % $R$ + 0.05 Ω) |

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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