

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 | ± 200 | ± 0.5 | 10.0 to 10M | E24; E96 |
| | | | | | -200 / +400 | | 1.0 to 9.76 | |
| | | | | | ± 100 | ± 1 | 47.0 to 1M | E24; E96 |
| | | | | | ± 200 | | 10.0 to 10M | |
| | | | | | -200 / +400 | ± 5 | 1.0 to 9.76 | E24 |
| | | | | | ± 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 $70 \text{ }^\circ\text{C}$ ⁽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 | $^\circ\text{C}$ | -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 $155 \text{ }^\circ\text{C}$ 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 CRCW0201 | | VALUE R = decimal K = thousand M = million 0000 = jumper | | TOLERANCE D = ± 0.5 % F = ± 1.0 % J = ± 5.0 % Z = jumper | | TCR K = ± 100 ppm/K N = ± 200 ppm/K X = -200 ppm/K / +400 ppm/K 0 = jumper | | | PACKAGING ED EE EI | | | | | | |
| PRODUCT DESCRIPTION: CRCW0201 100 1K0 1 % ET7 e3 | | | | | | | | | | | | | | | |
| CRCW0201 | 100 | 562R | 1 % | ET7 | e3 | | | | | | | | | | |
| MODEL CRCW0201 | TCR ± 200 ppm/K ± 100 ppm/K - 200/+ 400 ppm/K | RESISTANCE VALUE 1R0 = 1 Ω 10R = 10 Ω 1K0 = 1 kΩ 10K = 10 kΩ 1M0 = 1 MΩ 0R0 = jumper | TOLERANCE VALUE ± 0.5 % ± 1 % ± 5 % | PACKAGING ET7 EF4 ET2 | LEAD (Pb)-FREE 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 CLAUSE | IEC 60068-2 TEST METHOD | TEST | PROCEDURE | REQUIREMENTS PERMISSIBLE CHANGE (ΔR) |
| | | | Stability for product types: CRCW0201 e3 | 1 Ω to 10 M Ω |
| 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; Sn60Pb40 non activated flux; (235 \pm 5) °C (2 \pm 0.2) s | Good tinning ($\geq 95\%$ covered) no visible damage |
| | | | Solder bath method; Sn96.5Ag3Cu0.5 non-activated flux; (245 \pm 5) °C (3 \pm 0.3) s | Good tinning ($\geq 95\%$ 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 $\pm (0.5\% R + 0.05 \Omega)$ |
| 4.19 | 14 (Na) | Rapid change of temperature | 30 min. at -55 °C; 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 | $U = \sqrt{P_{70} \times R} \leq U_{max.}$ | |



| TEST PROCEDURES AND REQUIREMENTS | | | | |
|----------------------------------|----------------------------------|--|--|---|
| EN 60115-1 CLAUSE | IEC 60068-2 TEST METHOD | TEST | PROCEDURE | REQUIREMENTS PERMISSIBLE CHANGE (ΔR) |
| | | | Stability for product types: CRCW0201 e3 | 1 Ω to 10 M Ω |
| 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 | $\pm (2 \% R + 0.1 \Omega)$ |
| | | | 70 °C; 8000 h | $\pm (4 \% R + 0.1 \Omega)$ |
| 4.18.2 | 58 (Td) | Resistance to soldering heat | Solder bath method (260 \pm 5) °C; (10 \pm 1) s | $\pm (1 \% R + 0.05 \Omega)$ |
| 4.35 | - | Flamability, needle flame test | IEC 60695-11-5; 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 category temperature | 155 °C, 1000 h | $\pm (2 \% R + 0.1 \Omega)$ |
| 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 \leq 1.5 mm; A \leq 200 m/s ² ; 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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