

Thick Film Surface Mount Chip Resistors, Wraparound, Low Value (0.1 Ω to 0.91 Ω)



FEATURES

- Low resistance values (0.1 Ω to 0.91 Ω)
- Suitable for current sensing and shunts
- Metal glaze on high quality ceramic
- Protective overglaze
- Solder contacts on Ni barrier layer
- Compliant to RoHS Directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



Note

* Pb containing terminations are not RoHS compliant, exemptions may apply

| STANDARD ELECTRICAL SPECIFICATIONS | | | | | | |
|------------------------------------|-----------|---|--|------------------------------|----------------------|----------|
| GLOBAL MODEL | CASE SIZE | POWER RATING $P_{70^{\circ}\text{C}}$ W | TEMPERATURE COEFFICIENT \pm ppm/ $^{\circ}\text{C}$ | RESISTANCE RANGE Ω | TOLERANCE \pm % | E-SERIES |
| RCWL0402 | 0402 | 0.063 | 600 | 0.22 to 0.43 | 5 | 24 |
| | | | 400 | 0.47 to 0.91 | | |
| RCWL0603 | 0603 | 0.1 | 400 | 0.10 to 0.43 | 5 | 24 |
| | | | 200 | 0.47 to 0.91 | | |
| RCWL0805 | 0805 | 0.125 | 300 | 0.10 to 0.43 | 5 | 24 |
| | | | 200 | 0.47 to 0.91 | | |
| RCWL1206 | 1206 | 0.25 | 300 | 0.10 to 0.43 | 5 | 24 |
| | | | 200 | 0.47 to 0.91 | | |
| RCWL1210 | 1210 | 0.33 | 200 | 0.10 to 0.91 | 5 | 24 |
| RCWL1218 | 1218 | 1.0 | 200 | 0.10 to 0.91 | 5 | 24 |
| RCWL2010 | 2010 | 0.5 | 200 | 0.10 to 0.91 | 5 | 24 |
| RCWL2512 | 2512 | 1.0 | 200 | 0.10 to 0.91 | 5 | 24 |

Note

- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material.
- Part marking: Reference Surface Mount Resistor Marking document number 20020.
- The resistance is measured from the top side.

| GLOBAL PART NUMBER INFORMATION | | | | | | | | | | | | | | | |
|--|---|------------------------------|---|---|-----------------|---|---|--|---|---|--|---|---|---|---|
| Part Number: RCWL0402R470JQE A | | | | | | | | | | | | | | | |
| R | C | W | L | 0 | 4 | 0 | 2 | R | 4 | 7 | 0 | J | Q | E | A |
| GLOBAL MODEL | | VALUE | | | TOLERANCE | | | TCR | | | PACKAGING | | | | |
| RCWL0402 RCWL0603 RCWL0805 RCWL1206 RCWL1210 RCWL1218 RCWL2010 RCWL2512 | | R = Decimal R470 = 0.47 Ω | | | J = \pm 5.0 % | | | N = \pm 200 ppm/ $^{\circ}\text{C}$ M = \pm 300 ppm/ $^{\circ}\text{C}$ Q = \pm 400 ppm/ $^{\circ}\text{C}$ T = \pm 600 ppm/ $^{\circ}\text{C}$ | | | EA = Lead (Pb)-free, tape/reel TA = Tin/lead, tape/reel | | | | |

| TECHNICAL SPECIFICATIONS | | | | | | | | | |
|--------------------------------------|----------|----------------------|----------|----------|----------|----------|----------|----------|----------|
| PARAMETER | UNIT | RCWL0402 | RCWL0603 | RCWL0805 | RCWL1206 | RCWL1210 | RCWL1218 | RCWL2010 | RCWL2512 |
| Operating temp. range | °C | - 55 to + 155 | | | | | | | |
| Maximum operating voltage | V | $(P \times R)^{1/2}$ | | | | | | | |
| Insulation voltage U_{ins} (1 min) | V | > 75 | > 100 | > 200 | > 300 | > 300 | > 300 | > 300 | > 300 |
| Insulation resistance | Ω | > 10^9 | | | | | | | |
| Weight/1000 pieces (typical) | g | 0.65 | 2 | 5.5 | 10 | 16 | 29.5 | 25.5 | 40.5 |

DIMENSIONS

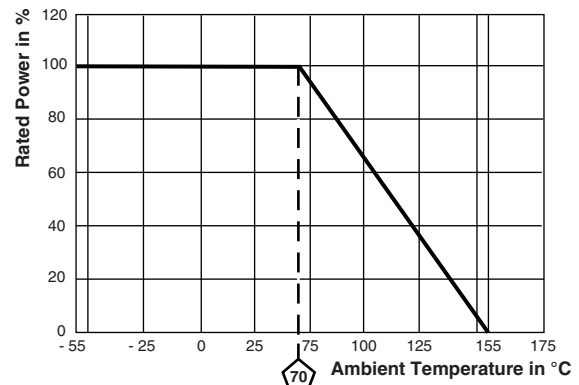


| MODEL | DIMENSIONS in millimeters | | | | | | | | | | |
|----------|--|-------------|-------------|---------------------------------------|-----------|------------------|-----|-----|----------------|-----|-----|
| | L | W | H | T1 | T2 | REFLOW SOLDERING | | | WAVE SOLDERING | | |
| | | | | | | a | b | l | a | b | l |
| RCWL0402 | 1.0 ± 0.05 | 0.5 ± 0.05 | 0.35 ± 0.05 | 0.25 ± 0.05 | 0.2 ± 0.1 | 0.4 | 0.6 | 0.5 | 0.5 | 0.6 | 0.5 |
| RCWL0603 | 1.55 ^{+0.10} _{-0.05} | 0.85 ± 0.1 | 0.45 ± 0.05 | 0.3 ± 0.2 | 0.3 ± 0.2 | 0.5 | 0.9 | 1.0 | 0.9 | 0.9 | 1.0 |
| RCWL0805 | 2.0 ^{+0.20} _{-0.10} | 1.25 ± 0.15 | 0.45 ± 0.05 | 0.3 ^{+0.20} _{-0.10} | 0.3 ± 0.2 | 0.7 | 1.3 | 1.2 | 0.9 | 1.3 | 1.3 |
| RCWL1206 | 3.2 ^{+0.10} _{-0.20} | 1.6 ± 0.15 | 0.55 ± 0.05 | 0.45 ± 0.2 | 0.4 ± 0.2 | 0.9 | 1.7 | 2.0 | 1.1 | 1.7 | 2.3 |
| RCWL1210 | 3.2 ± 0.2 | 2.5 ± 0.2 | 0.55 ± 0.05 | 0.45 ± 0.2 | 0.4 ± 0.2 | 0.9 | 2.5 | 2.0 | 1.1 | 2.5 | 2.2 |
| RCWL1218 | 3.2 ^{+0.10} _{-0.20} | 4.6 ± 0.15 | 0.55 ± 0.05 | 0.45 ± 0.2 | 0.4 ± 0.2 | 1.05 | 4.9 | 1.9 | 1.25 | 4.8 | 1.9 |
| RCWL2010 | 5.0 ± 0.15 | 2.5 ± 0.15 | 0.6 ± 0.1 | 0.6 ± 0.2 | 0.6 ± 0.2 | 1.0 | 2.5 | 3.9 | 1.2 | 2.5 | 3.9 |
| RCWL2512 | 6.3 ± 0.2 | 3.15 ± 0.15 | 0.6 ± 0.1 | 0.6 ± 0.2 | 0.6 ± 0.2 | 1.0 | 3.2 | 5.2 | 1.2 | 3.2 | 5.2 |

TEMPERATURE RISE



DERATING



| PERFORMANCE | | |
|---------------|--|--|
| TEST | CONDITIONS OF TEST | TEST LIMITS |
| Thermal shock | MIL-STD-202, method 107, - 55 °C to + 125 °C, 300 cycles at each extreme | ± (2.0 % + 0.005 Ω) ΔR |



| PERFORMANCE | | |
|---------------------------|--|--|
| TEST | CONDITIONS OF TEST | TEST LIMITS |
| Short time overload | 2 x rated power; duration according the model | $\pm (0.5 \% + 0.005 \Omega) \Delta R$ |
| High temperature exposure | MIL-STD-202, method 108, 1000 h at T = 125 °C, 0 % power | $\pm (2.0 \% + 0.005 \Omega) \Delta R$ |
| Temperature cycling | JESD 22, method JA-104, 1000 cycles (- 55 °C to + 125 °C) | $\pm (2.0 \% + 0.005 \Omega) \Delta R$ |
| Biased humidity | MIL-STD-202, method 103, 1000 h 85 °C/85 % RH, 10 % x (P x R) ^{1/2} | $\pm (2.0 \% + 0.005 \Omega) \Delta R$ |
| Mechanical shock | MIL-STD-202, method 213, condition C, 10 g ³ s, 6 ms (half sine), 3 directions | $\pm (0.5 \% + 0.005 \Omega) \Delta R$ |
| Vibration | MIL-STD-202, method 204, 5 g ³ s, 20 min, 12 cycles, 3 directions, 10 Hz to 2000 Hz | $\pm (0.5 \% + 0.005 \Omega) \Delta R$ |
| Operational life | MIL-STD-202, method 108, 1000 h at T = 125 °C at rated power | $\pm (2.0 \% + 0.005 \Omega) \Delta R$ |
| Resistance to solder heat | MIL-STD-202, method 210, + 260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence | $\pm (1.0 \% + 0.005 \Omega) \Delta R$ |
| Moisture resistance | MIL-STD-202, method 106, 0 % power, 7a and 7b not required | $\pm (2.0 \% + 0.005 \Omega) \Delta R$ |

| PACKAGING | | | | | |
|-----------|------------------------|-----------|-------|-------------|------|
| MODEL | REEL | | | | |
| | TAPE WIDTH | DIAMETER | PITCH | PIECES/REEL | CODE |
| RCWL0402 | 8 mm/punched paper | 180 mm/7" | 2 mm | 10 000 | EA |
| RCWL0603 | 8 mm/punched paper | 180 mm/7" | 4 mm | 5000 | EA |
| RCWL0805 | 8 mm/punched paper | 180 mm/7" | 4 mm | 5000 | EA |
| RCWL1206 | 8 mm/punched paper | 180 mm/7" | 4 mm | 5000 | EA |
| RCWL1210 | 12 mm/punched paper | 180 mm/7" | 4 mm | 5000 | EA |
| RCWL1218 | 12 mm/embossed plastic | 180 mm/7" | 4 mm | 4000 | EA |
| RCWL2010 | 12 mm/embossed plastic | 180 mm/7" | 4 mm | 4000 | EA |
| RCWL2512 | 12 mm/embossed plastic | 180 mm/7" | 8 mm | 2000 | EA |

Note

- Embossed carrier tape per EIA-481-1A.



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Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.