

Thick Film Surface Mount Chip Resistors, Wraparound, Extremely Low Value (0.01 Ω to 0.976 Ω)



DESIGN SUPPORT TOOLS click logo to get started



FEATURES

- Extremely low resistance values (0.01 Ω to 0.976 Ω)
- Enhanced power rating due to long side terminal construction (0612, 1020 types)
- Suitable for current sensing and shunts
- Metal glaze on high quality ceramic
- Protective overglaze
- Lead (Pb)-free solder contacts on Ni barrier layer
- AEC-Q200 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

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 ⁽²⁾ |
|--------------|-----------|---|--|------------------------------|-------------------------------|-------------------------|
| RCWE0402 | 0402 | 0.125 | 400 | 0.033 to 0.05 | 5.0 | 24 |
| | | | 200 | 0.051 to 0.18 | 1.0, 5.0 | 24; 96 |
| | | | 100 | 0.2 to 0.976 | 0.5 ⁽¹⁾ , 1.0, 5.0 | |
| RCWE0603 | 0603 | 0.2 | 700 | 0.010 to 0.018 | 5.0 | 24 |
| | | | 400 | 0.02 to 0.03 | 1.0, 5.0 | 24; 96 |
| | | | 200 | 0.033 to 0.105 | 1.0, 5.0 | |
| RCWE0805 | 0805 | 0.25 | 100 | 0.11 to 0.976 | 0.5 ⁽¹⁾ , 1.0, 5.0 | 24; 96 |
| | | | 400 | 0.010 to 0.018 | 5.0 | |
| | | | 300 | 0.02 to 0.03 | 1.0, 5.0 | |
| RCWE0612 | 0612 | 1.0 | 200 | 0.033 to 0.05 | 1.0, 5.0 | 24; 96 |
| | | | 100 | 0.051 to 0.976 | 0.5 ⁽¹⁾ , 1.0, 5.0 | |
| | | | 300 | 0.010 to 0.016 | 2.0, 5.0 | |
| RCWE1206 | 1206 | 0.5 | 200 | 0.018 to 0.2 | 2.0, 5.0 | 24; 96 |
| | | | 100 | 0.205 to 0.976 | 1.0, 5.0 | |
| | | | 600 | 0.010 to 0.018 | 5.0 | |
| RCWE1210 | 1210 | 1.0 | 300 | 0.02 to 0.03 | 1.0, 5.0 | 24; 96 |
| | | | 200 | 0.033 to 0.05 | 1.0, 5.0 | |
| | | | 100 | 0.051 to 0.976 | 0.5 ⁽¹⁾ , 1.0, 5.0 | |
| RCWE1020 | 1020 | 2.0 | 200 | 0.010 to 0.016 | 2.0, 5.0 | 24 |
| | | | 100 | 0.0162 to 0.976 | 1.0, 5.0 | 24; 96 |
| RCWE2010 | 2010 | 1.0 | 600 | 0.010 to 0.018 | 5.0 | 24 |
| | | | 300 | 0.02 to 0.03 | 1.0, 5.0 | 24; 96 |
| | | | 200 | 0.033 to 0.05 | 1.0, 5.0 | |
| RCWE2512 | 2512 | 2.0 | 100 | 0.051 to 0.976 | 0.5 ⁽¹⁾ , 1.0, 5.0 | 24; 96 |
| | | | 600 | 0.010 to 0.018 | 5.0 | |
| | | | 300 | 0.02 to 0.03 | 1.0, 5.0 | |
| | | | 200 | 0.033 to 0.05 | 1.0, 5.0 | |
| | | | 100 | 0.051 to 0.976 | 0.5 ⁽¹⁾ , 1.0, 5.0 | |

Notes

- 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" (www.vishay.com/doc?20020)
- ⁽¹⁾ Tight tolerance of 0.5 % is available for resistance values above 0.300 Ω (0402 size) and above 0.200 Ω (0603 to 2512 sizes)
- ⁽²⁾ Use E24 decades only for 5.0 % tolerance. E24 or E96 decades are available for 0.5 % and 1.0 % tolerance. Refer to standard decade table (www.vishay.com/doc?31001)

GLOBAL PART NUMBER INFORMATION

 Global Part Numbering example: RCWE060351L0FN EA (visit www.vishay.net Vishay Dale parts numbering manual for all options)

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R | C | W | E | 0 | 6 | 0 | 3 | 5 | 1 | L | 0 | F | N | E | A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| |
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| GLOBAL MODEL (8 digits) |
| RCWE0402 RCWE0603 RCWE0805 RCWE0612 RCWE1206 RCWE1210 RCWE1020 RCWE2010 RCWE2512 |

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| VALUE (4 digits) |
| L = mΩ * R = decimal 10L0 = 0.01 Ω R470 = 0.47 Ω Note: * Use "L" for resistance values < 0.1 Ω |

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| TOLERANCE (1 digit) |
| D = ± 0.5 % F = ± 1.0 % G = ± 2.0 % J = ± 5.0 % |

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| TCR (1 digit) |
| K = ± 100 ppm/°C N = ± 200 ppm/°C M = ± 300 ppm/°C Q = ± 400 ppm/°C P = ± 500 ppm/°C T = ± 600 ppm/°C G = ± 700 ppm/°C |

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|--------------------------------|
| PACKAGING (2 digits) |
| EA = lead (Pb)-free, tape/reel |

TECHNICAL SPECIFICATIONS

| PARAMETER | UNIT | 0402 | 0603 | 0805 | 0612 | 1206 | 1210 | 1020 | 2010 | 2512 |
|--------------------------------------|------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Operating temperature range | °C | -55 to +155 | | | | | | | | |
| Maximum operating voltage | V | $(P \times R)^{1/2}$ | | | | | | | | |
| Insulation voltage U_{ins} (1 min) | V | > 75 | > 100 | > 200 | > 100 | > 300 | > 300 | > 300 | > 300 | > 300 |
| Insulation resistance | Ω | > 10 ⁹ | | | | | | | | |
| Weight/1000 pieces (typical) | g | 0.7 | 3 | 5.5 | 11.5 | 10.5 | 17.5 | 27.5 | 26 | 40.5 |

DIMENSIONS

RCWE0402 to RCWE2512

RCWE0612, RCWE1020



| SIZE | RESISTANCE RANGE Ω | DIMENSIONS in millimeters | | | | | SOLDER PAD DIMENSIONS in millimeters | | | | | |
|----------------|-----------------------|---------------------------|-------------|------------|-------------|-------------|--------------------------------------|-----|-----|-----|-----|-----|
| | | L | W | H | T1 | T2 | a | b | l | | | |
| 0402 | 0.033 to 0.976 | 1.05 ± 0.05 | 0.55 ± 0.05 | 0.35 ± 0.1 | 0.3 ± 0.15 | 0.25 ± 0.1 | 0.7 | 0.7 | 0.3 | | | |
| 0603 | 0.01 to 0.03 | 1.6 ± 0.1 | 0.85 ± 0.1 | 0.5 ± 0.1 | 0.5 ± 0.2 | 0.3 ± 0.2 | 0.9 | 1.0 | 0.4 | | | |
| | 0.033 to 0.976 | | | | 0.3 ± 0.2 | | | | | 0.7 | 1.0 | 0.8 |
| 0805 | 0.01 to 0.03 | 2.0 ± 0.15 | 1.3 ± 0.1 | 0.55 ± 0.1 | 0.6 ± 0.2 | 0.35 ± 0.2 | 1.0 | 1.4 | 0.6 | | | |
| | 0.033 to 0.976 | | | | 0.4 ± 0.2 | | | | | 0.8 | 1.4 | 1.0 |
| 0612 | 0.01 to 0.976 | 1.6 ± 0.2 | 3.2 ± 0.2 | 0.6 ± 0.1 | 0.4 ± 0.15 | 0.25 ± 0.15 | 0.9 | 3.5 | 0.8 | | | |
| | 0.01 to 0.03 | | | | 0.9 ± 0.2 | | | | | 1.3 | 1.8 | 1.0 |
| | 0.033 to 0.05 | | | | 0.8 ± 0.2 | | | | | | | |
| 0.051 to 0.976 | 0.45 ± 0.2 | 1.0 | 1.8 | 1.6 | | | | | | | | |
| 1206 | 0.01 to 0.03 | 3.1 ± 0.15 | 1.6 ± 0.15 | 0.6 ± 0.1 | 0.8 ± 0.2 | 0.45 ± 0.2 | 1.3 | 2.6 | 1.1 | | | |
| | 0.033 to 0.05 | | | | 0.8 ± 0.2 | | | | | 1.3 | 2.6 | 1.1 |
| 0.051 to 0.976 | 0.4 ± 0.2 | 0.9 | 2.6 | 2.0 | | | | | | | | |
| 1210 | 0.01 to 0.03 | 3.1 ± 0.2 | 2.5 ± 0.2 | 0.6 ± 0.1 | 0.8 ± 0.2 | 0.4 ± 0.2 | 1.3 | 2.6 | 1.1 | | | |
| 0.033 to 0.976 | 0.4 ± 0.2 | | | | 0.9 | | | | | 2.6 | 2.0 | |
| 1020 | 0.01 to 0.976 | 2.5 ± 0.2 | 5.0 ± 0.2 | 0.6 ± 0.1 | 0.55 ± 0.15 | 0.30 ± 0.15 | 1.2 | 5.5 | 1.4 | | | |
| 2010 | 0.01 to 0.03 | 5.0 ± 0.2 | 2.5 ± 0.15 | 0.6 ± 0.1 | 1.6 ± 0.3 | 0.6 ± 0.2 | 2.3 | 3.0 | 1.4 | | | |
| | 0.033 to 0.05 | | | | 0.7 ± 0.3 | | | | | 1.4 | 3.0 | 3.2 |
| | 0.051 to 0.976 | | | | 0.7 ± 0.3 | | | | | 1.4 | 3.0 | 3.2 |
| 2512 | 0.01 to 0.03 | 6.3 ± 0.2 | 3.15 ± 0.15 | 0.6 ± 0.1 | 2.0 ± 0.3 | 0.6 ± 0.2 | 2.8 | 3.6 | 1.4 | | | |
| | 0.033 to 0.05 | | | | 0.8 ± 0.3 | | | | | 1.6 | 3.6 | 3.8 |
| | 0.051 to 0.976 | | | | 0.8 ± 0.3 | | | | | 1.6 | 3.6 | 3.8 |

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 | ± 1.0 % + 0.0005 Ω |
| Short time overload | 2x rated power; duration according the model | ± 0.5 % + 0.0005 Ω |
| High temperature exposure | MIL-STD-202, method 108, 1000 h at T = 125 °C, 0 % power | ± 2.0 % + 0.0005 Ω |
| Temperature cycling | JESD 22, method JA-104, 1000 cycles (-55 °C to +125 °C) | ± 2.0 % + 0.0005 Ω |
| Biased humidity | MIL-STD-202, method 103, 1000 h 85 °C/85 % RH, 10 % x (P x R) ^{1/2} | ± 2.0 % + 0.0005 Ω |
| Mechanical shock | MIL-STD-202, method 213, condition C, 10 g's, 6 ms (half sine), 3 directions | ± 1.0 % + 0.0005 Ω |
| Vibration | MIL-STD-202, method 204, 5 g's, 20 min, 12 cycles, 3 directions, 10 Hz to 2000 Hz | ± 1.0 % + 0.0005 Ω |
| Operational life | MIL-STD-202, method 108, 1000 h at T = 125 °C at rated power | ± 2.0 % + 0.0005 Ω |
| Resistance to solder heat | MIL-STD-202, method 210, +260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence | ± 1.0 % + 0.0005 Ω |
| Moisture resistance | MIL-STD-202, method 106, 0 % power, 7a and 7b not required | ± 2.0 % + 0.0005 Ω |

| PACKAGING | | | | | |
|-----------|------------------------|-----------|-------|-------------|------|
| MODEL | REEL | | | | |
| | TAPE WIDTH | DIAMETER | PITCH | PIECES/REEL | CODE |
| RCWE0402 | 8 mm/punched paper | 180 mm/7" | 2 mm | 10 000 | EA |
| RCWE0603 | 8 mm/punched paper | 180 mm/7" | 4 mm | 5000 | EA |
| RCWE0805 | 8 mm/punched paper | 180 mm/7" | 4 mm | 5000 | EA |
| RCWE0612 | 8 mm/punched paper | 180 mm/7" | 4 mm | 5000 | EA |
| RCWE1206 | 8 mm/punched paper | 180 mm/7" | 4 mm | 5000 | EA |
| RCWE1210 | 8 mm/punched paper | 180 mm/7" | 4 mm | 5000 | EA |
| RCWE1020 | 12 mm/embossed plastic | 180 mm/7" | 4 mm | 4000 | EA |
| RCWE2010 | 12 mm/embossed plastic | 180 mm/7" | 4 mm | 4000 | EA |
| RCWE2512 | 12 mm/embossed plastic | 180 mm/7" | 8 mm | 2000 | EA |

Note

- Embossed carrier tape per EIA-481-1A



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