



**THE DATASHEET OF
RCWE2512R130FKEA**



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



LINKS TO ADDITIONAL RESOURCES



FEATURES

- Extremely low resistance values (0.01 Ω to 0.976 Ω)
- Sulfur resistant (per ASTM B809-95 humid vapor test)
- 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 $P_{70\text{ }^\circ\text{C}}$ W | TEMPERATURE COEFFICIENT + ppm/°C | RESISTANCE RANGE Ω | TOLERANCE ± % | E-SERIES ⁽²⁾ |
| RCWE0402 ⁽³⁾⁽⁴⁾ | 0402 | 0.125 | 400 | 0.033 to 0.05 | 5.0 | 24 |
| | | | 200 | 0.051 to 0.196 | 1.0, 5.0 | 24; 96 |
| | | | 100 | 0.2 to 0.976 | 0.5 ⁽¹⁾ , 1.0, 5.0 | |
| RCWE0603 ⁽⁴⁾ | 0603 | 0.2 | 700 | 0.010 to 0.018 | 5.0 | 24 |
| | | | 400 | 0.02 to 0.0324 | 1.0, 5.0 | 24; 96 |
| | | | 200 | 0.033 to 0.105 | 1.0, 5.0 | |
| RCWE0805 ⁽⁴⁾ | 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 0.0324 | 1.0, 5.0 | |
| RCWE0612 ⁽⁴⁾ | 0612 | 1.0 | 400 | 0.051 to 0.976 | 0.5 ⁽¹⁾ , 1.0, 5.0 | 24; 96 |
| | | | 300 | 0.010 to 0.016 | 2.0, 5.0 | |
| | | | 200 | 0.018 to 0.2 | 2.0, 5.0 | |
| RCWE1206 ⁽⁴⁾ | 1206 | 0.5 | 100 | 0.205 to 0.976 | 1.0, 5.0 | 24; 96 |
| | | | 600 | 0.010 to 0.018 | 5.0 | |
| | | | 300 | 0.02 to 0.0324 | 1.0, 5.0 | |
| RCWE1210 ⁽⁴⁾ | 1210 | 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 | |
| RCWE1020 ⁽⁴⁾ | 1020 | 2.0 | 100 | 0.0162 to 0.976 | 1.0, 5.0 | 24; 96 |
| | | | 600 | 0.010 to 0.018 | 5.0 | |
| | | | 300 | 0.02 to 0.0324 | 1.0, 5.0 | |
| RCWE2010 ⁽⁴⁾ | 2010 | 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 | |
| | | | 600 | 0.010 to 0.018 | 5.0 | |
| RCWE2512 ⁽⁴⁾ | 2512 | 2.0 | 100 | 0.051 to 0.976 | 0.5 ⁽¹⁾ , 1.0, 5.0 | 24; 96 |
| | | | 300 | 0.02 to 0.0324 | 1.0, 5.0 | |
| | | | 200 | 0.033 to 0.05 | 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)
- Temperature range of TCR rating is 0 °C to 150 °C. TCR values are (+) range only with no (-) range values; 1/2 of previous tolerance range
- ⁽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)
- ⁽³⁾ Terminal strength tested per AEC-Q200-006 with the exception of 0.75 kg force is used
- ⁽⁴⁾ Qualified to AEC-Q200 rev. D

GLOBAL PART NUMBER INFORMATION

 Global Part Numbering Example: RCWE060351L0FNEA (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 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|--|

GLOBAL MODEL
(8 digits)

 RCWE0402
 RCWE0603
 RCWE0805
 RCWE0612
 RCWE1206
 RCWE1210
 RCWE1020
 RCWE2010
 RCWE2512

VALUE
(4 digits)

 L = mΩ *
 R = decimal
 10L0 = 0.01 Ω
 R470 = 0.47 Ω
Note:
 * Use "L" for resistance values < 0.1 Ω

TOLERANCE
(1 digit)

 D = ± 0.5 %
 F = ± 1.0 %
 G = ± 2.0 %
 J = ± 5.0 %

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

PACKAGING
(2 digits)

EA = lead (Pb)-free, tape/reel

SPECIAL
(up to 2 digits)

(dash number) from 1 to 99 as applicable

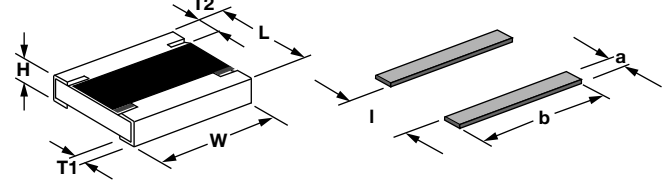
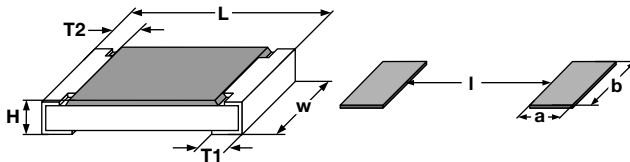
TECHNICAL SPECIFICATIONS

| 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 | DIMENSIONS in millimeters | | | | | | SOLDER PAD DIMENSIONS in millimeters | | | | | | |
|------|---------------------------|-------------|-------------|------------|-------------|-------------|--------------------------------------|-----|-----|-----------|-----|-----|-----|
| | RESISTANCE RANGE Ω | 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 | | | |
| 1206 | 0.01 to 0.976 | 3.1 ± 0.15 | 1.6 ± 0.15 | 0.6 ± 0.1 | 0.45 ± 0.2 | 0.45 ± 0.2 | 1.0 | 1.8 | 1.6 | | | | |
| | 0.01 to 0.03 | | | | | | | | | 0.9 ± 0.2 | 1.2 | 1.8 | 1.2 |
| | 0.033 to 0.05 | | | | | | | | | 0.8 ± 0.2 | | | |
| 1210 | 0.01 to 0.976 | 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 | | | | |
| | 0.01 to 0.03 | | | | | | | | | 0.8 ± 0.2 | 0.9 | 2.6 | 2.0 |
| | 0.033 to 0.976 | | | | | | | | | 0.4 ± 0.2 | | | |
| 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 | | | | |
| | 0.01 to 0.03 | | | | | | | | | 1.6 ± 0.3 | 2.3 | 3.0 | 1.4 |
| | 0.033 to 0.05 | | | | | | | | | 0.7 ± 0.3 | | | |
| 2010 | 0.01 to 0.976 | 5.0 ± 0.2 | 2.5 ± 0.15 | 0.6 ± 0.1 | 0.7 ± 0.3 | 0.6 ± 0.2 | 1.4 | 3.0 | 3.2 | | | | |
| | 0.01 to 0.03 | | | | | | | | | 2.0 ± 0.3 | 1.4 | 3.0 | 3.2 |
| | 0.051 to 0.976 | | | | | | | | | 0.7 ± 0.3 | | | |
| 2512 | 0.01 to 0.976 | 6.3 ± 0.2 | 3.15 ± 0.15 | 0.6 ± 0.1 | 0.8 ± 0.3 | 0.6 ± 0.2 | 2.8 | 3.6 | 1.4 | | | | |
| | 0.01 to 0.03 | | | | | | | | | 2.0 ± 0.3 | 1.6 | 3.6 | 3.8 |
| | 0.033 to 0.05 | | | | | | | | | 0.8 ± 0.3 | | | |
| 2512 | 0.01 to 0.976 | 6.3 ± 0.2 | 3.15 ± 0.15 | 0.6 ± 0.1 | 0.8 ± 0.3 | 0.6 ± 0.2 | 1.6 | 3.6 | 3.8 | | | | |
| | 0.051 to 0.976 | | | | | | | | | 0.8 ± 0.3 | | | |

Notes

- 3D models available: www.vishay.com/doc?31106
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

DERATING



SINGLE PULSE



SINGLE PULSE





| 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 | 2 x rated power; size and duration - 0402: 0.5 s, 0603 and 0805: 1 s, 1206 and larger: 2 s | ± 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 |

Note

- Contact ww2bresistors@vishay.com for application specific performance requirements or qualification data. Typical performance is better than stated test limits

| 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 |

Notes

- Embossed carrier tape per EIA-481-1A
- Additional packaging details at: www.vishay.com/doc?31543

| LINKS TO RELATED DOCUMENTS | |
|---|--|
| SELECTOR GUIDE | |
| Overview of Automotive Grade Products | www.vishay.com/doc?49924 |
| TECHNICAL NOTES | |
| SMD Current Sense: AEC-Q200 vs. Vishay Qualification | www.vishay.com/doc?30416 |
| MIL-PRF vs. AEC-Q200: Do You Know What You Are Getting? | www.vishay.com/doc?11000 |
| WHITE PAPER | |
| Thermal Management for Surface-Mount Devices | www.vishay.com/doc?30380 |
| Temperature Coefficient of Resistance for Current Sensing | www.vishay.com/doc?30405 |



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