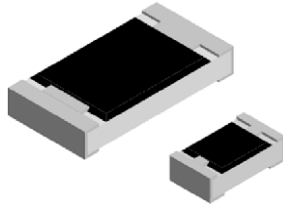


## Thick Film Surface Mount Chip Resistors, Wraparound, Extremely Low Value (0.01 Ω to 0.976 Ω)


**FEATURES**

- Extremely low resistance values (0.01 Ω to 0.976 Ω)
- Suitable for current sensing and shunts
- Metal glaze on high quality ceramic
- Protective overglaze
- Lead (Pb)-free solder contacts on Ni barrier layer
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

| STANDARD ELECTRICAL SPECIFICATIONS |           |   |  |                              |                              |          |
|------------------------------------|-----------|---|--|------------------------------|------------------------------|----------|
| GLOBAL MODEL                       | CASE SIZE | POWER RATING<br>$P_{70^{\circ}\text{C}}$<br>W | TEMPERATURE COEFFICIENT<br>$\pm$ ppm/ $^{\circ}\text{C}$ | RESISTANCE RANGE<br>$\Omega$ | TOLERANCE<br>$\pm$ %         | E-SERIES |
| RCWE0402                           | 0402      | 0.125   | 400  | 0.033 to 0.05                | 5.0                          | 24       |
|                                    |           |   | 200  | 0.051 to 0.18                | 1.0, 5.0                     |          |
|                                    |           |   | 100  | 0.2 to 0.976                 | 0.5, 1.0, 5.0 <sup>(1)</sup> |          |
| RCWE0603                           | 0603      | 0.2   | 700  | 0.010 to 0.018               | 5.0                          | 24       |
|                                    |           |   | 400  | 0.02 to 0.03                 | 1.0, 5.0                     |          |
|                                    |           |   | 200  | 0.033 to 0.1                 | 1.0, 5.0                     |          |
| RCWE0805                           | 0805      | 0.25  | 100  | 0.11 to 0.976                | 0.5, 1.0, 5.0 <sup>(1)</sup> | 24       |
|                                    |           |   | 400  | 0.010 to 0.018               | 5.0                          |          |
|                                    |           |   | 300  | 0.02 to 0.03                 | 1.0, 5.0                     |          |
| RCWE1206                           | 1206      | 0.5   | 200  | 0.033 to 0.05                | 1.0, 5.0                     | 24       |
|                                    |           |   | 100  | 0.051 to 0.976               | 0.5, 1.0, 5.0 <sup>(1)</sup> |          |
|                                    |           |   | 600  | 0.010 to 0.018               | 5.0                          |          |
| RCWE1210                           | 1210      | 1.0   | 300  | 0.02 to 0.03                 | 1.0, 5.0                     | 24       |
|                                    |           |   | 200  | 0.033 to 0.05                | 1.0, 5.0                     |          |
|                                    |           |   | 100  | 0.051 to 0.976               | 0.5, 1.0, 5.0 <sup>(1)</sup> |          |
| RCWE2010                           | 2010      | 1.0   | 600  | 0.010 to 0.018               | 5.0                          | 24       |
|                                    |           |   | 300  | 0.02 to 0.03                 | 1.0, 5.0                     |          |
|                                    |           |   | 200  | 0.033 to 0.05                | 1.0, 5.0                     |          |
| RCWE2512                           | 2512      | 2.0   | 100  | 0.051 to 0.976               | 0.5, 1.0, 5.0 <sup>(1)</sup> | 24       |
|                                    |           |   | 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, 1.0, 5.0 <sup>(1)</sup> |          |

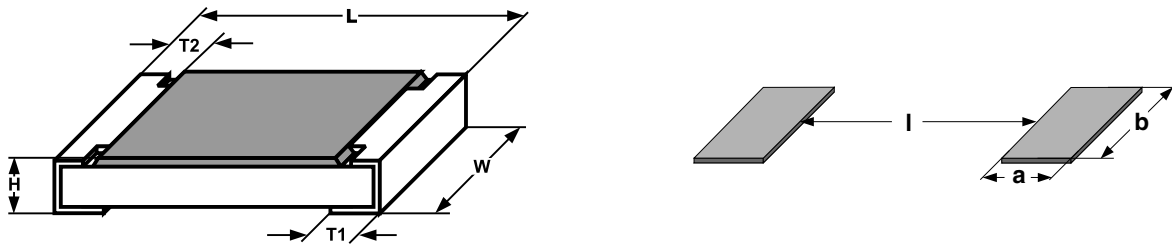
**Notes**

- 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" (document number 20020).
- <sup>(1)</sup> Tight tolerance of 0.5 % is available for resistance values above 0.200 Ω.

| GLOBAL PART NUMBER INFORMATION  |  |   |   |   |
|---|--|---|---|---|
| Global Part Numbering example: RCWE060351L0FNEA (visit <a href="http://www.vishay.net">www.vishay.net</a> 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<br>(8 digits)  | VALUE<br>(4 digits)  |   | TOLERANCE<br>(1 digit)                    | TCR<br>(1 digit)  |
| RCWE0402<br>RCWE0603<br>RCWE0805<br>RCWE1206<br>RCWE1210<br>RCWE2010<br>RCWE2512  | L = mΩ *<br>R = Decimal<br>10L0 = 0.01 Ω<br>R470 = 0.47 Ω<br><b>Note:</b><br>* Use "L" for resistance values < 0.1 Ω |   | D = ± 0.5 %<br>F = ± 1.0 %<br>J = ± 5.0 % | K = ± 100 ppm/ $^{\circ}\text{C}$<br>N = ± 200 ppm/ $^{\circ}\text{C}$<br>M = ± 300 ppm/ $^{\circ}\text{C}$<br>Q = ± 400 ppm/ $^{\circ}\text{C}$<br>P = ± 500 ppm/ $^{\circ}\text{C}$<br>T = ± 600 ppm/ $^{\circ}\text{C}$<br>G = ± 700 ppm/ $^{\circ}\text{C}$ |
|   |  |   |   | PACKAGING<br>(2 digits)   |
|   |  |   |   | EA = Lead (Pb)-free, tape/reel  |

| TECHNICAL SPECIFICATIONS             |          |                      |          |          |          |          |          |          |
|--------------------------------------|----------|----------------------|----------|----------|----------|----------|----------|----------|
| PARAMETER                            | UNIT     | RCWE0402             | RCWE0603 | RCWE0805 | RCWE1206 | RCWE1210 | RCWE2010 | RCWE2512 |
| 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    | > 300    | > 300    | > 300    | > 300    |
| Insulation resistance                | $\Omega$ | > $10^9$             |          |          |          |          |          |          |
| Weight/1000 pieces (typical)         | g        | 0.7                  | 3        | 5.5      | 10.5     | 17.5     | 26       | 40.5     |

### DIMENSIONS



| MODEL    | DIMENSIONS in millimeters |             |             |            |            |            | SOLDER PAD DIMENSIONS in millimeters |     |     |     |
|----------|---------------------------|-------------|-------------|------------|------------|------------|--------------------------------------|-----|-----|-----|
|          | RESISTANCE RANGE $\Omega$ | L           | W           | H          | T1         | T2         | a                                    | b   | l   |     |
| RCWE0402 | 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 |     |
| RCWE0603 | 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                                  |     | 0.8 |     |
| RCWE0805 | 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 |
| RCWE1206 | 0.01 to 0.03              | 3.1 ± 0.15  | 1.6 ± 0.15  | 0.6 ± 0.1  | 0.9 ± 0.2  | 0.45 ± 0.2 | 1.3                                  | 1.8 | 1.0 |     |
|          | 0.033 to 0.05             |             |             |            | 0.8 ± 0.2  |            | 1.2                                  |     | 1.8 | 1.2 |
|          | 0.051 to 0.976            |             |             |            | 0.45 ± 0.2 |            | 1.0                                  |     | 1.8 | 1.6 |
| RCWE1210 | 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 |
| RCWE2010 | 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 |
| RCWE2512 | 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) ΔR |
| Short time overload       | 2 x rated power; duration according the model                                     | ± (0.5 % + 0.0005 Ω) ΔR |
| High temperature exposure | MIL-STD-202, method 108, 1000 h at T = 125 °C, 0 % power                          | ± (2.0 % + 0.0005 Ω) ΔR |
| Temperature cycling       | JESD 22, method JA-104, 1000 cycles (- 55 °C to + 125 °C)                         | ± (2.0 % + 0.0005 Ω) ΔR |
| Biased humidity           | MIL-STD-202, method 103, 1000 h 85 °C/85 % RH, 10 % x (P x R) <sup>1/2</sup>      | ± (2.0 % + 0.0005 Ω) ΔR |
| Mechanical shock          | MIL-STD-202, method 213, condition C, 10 g's, 6 ms (half sine), 3 directions      | ± (1.0 % + 0.0005 Ω) ΔR |
| 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) ΔR |
| Operational life          | MIL-STD-202, method 108, 1000 h at T = 125 °C at rated power                      | ± (2.0 % + 0.0005 Ω) ΔR |
| 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) ΔR |
| Moisture resistance       | MIL-STD-202, method 106, 0 % power, 7a and 7b not required                        | ± (2.0 % + 0.0005 Ω) ΔR |

| 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   |
| RCWE1206  | 8 mm/punched paper     | 180 mm/7" | 4 mm  | 5000        | EA   |
| RCWE1210  | 8 mm/punched paper     | 180 mm/7" | 4 mm  | 5000        | 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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