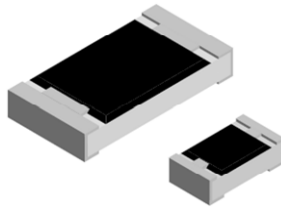




**THE DATASHEET OF  
RCWL2512R510JNEA**



# 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
- AEC-Q200 qualified
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



## Note

\* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

| STANDARD ELECTRICAL SPECIFICATIONS |           |   |  |                              |                      |          |
|------------------------------------|-----------|---|--|------------------------------|----------------------|----------|
| GLOBAL MODEL                       | CASE SIZE | POWER RATING<br>$P_{70\text{ }^\circ\text{C}}$<br>W | TEMPERATURE COEFFICIENT<br>$\pm$ ppm/ $^\circ\text{C}$ | RESISTANCE RANGE<br>$\Omega$ | TOLERANCE<br>$\pm$ % | E-SERIES |
| RCWL0402 <sup>(1)(2)</sup>         | 0402      | 0.063   | 600  | 0.22 to 0.43                 | 5                    | 24       |
|                                    |           |   | 400  | 0.47 to 0.91                 |                      |          |
| RCWL0603 <sup>(2)</sup>            | 0603      | 0.1   | 400  | 0.10 to 0.43                 | 5                    | 24       |
|                                    |           |   | 200  | 0.47 to 0.91                 |                      |          |
| RCWL0805 <sup>(2)</sup>            | 0805      | 0.125   | 300  | 0.10 to 0.43                 | 5                    | 24       |
|                                    |           |   | 200  | 0.47 to 0.91                 |                      |          |
| RCWL1206 <sup>(2)</sup>            | 1206      | 0.25  | 300  | 0.10 to 0.43                 | 5                    | 24       |
|                                    |           |   | 200  | 0.47 to 0.91                 |                      |          |
| RCWL1210 <sup>(2)</sup>            | 1210      | 0.33  | 200  | 0.10 to 0.91                 | 5                    | 24       |
| RCWL1218 <sup>(2)</sup>            | 1218      | 1.0   | 200  | 0.10 to 0.91                 | 5                    | 24       |
| RCWL2010 <sup>(2)</sup>            | 2010      | 0.5   | 200  | 0.10 to 0.91                 | 5                    | 24       |
| RCWL2512 <sup>(2)</sup>            | 2512      | 1.0   | 200  | 0.10 to 0.91                 | 5                    | 24       |

## 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](http://www.vishay.com/doc?20020))
- The resistance is measured from the top side
- (1) Terminal strength tested per AEC-Q200-006 with the exception of 0.75 kg force is used
- (2) Qualification to AEC-Q200 rev. D

| 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<br>(8 digits)   |   |   |   | VALUE<br>(4 digits)          |   |   |   | TOLERANCE<br>(1 digits) |   | TCR<br>(1 digits)  |   |   | PACKAGING<br>(2 digits)  |   | SPECIAL<br>(up to 2 digits)                    |  |  |
| RCWL0402<br>RCWL0603<br>RCWL0805<br>RCWL1206<br>RCWL1210<br>RCWL1218<br>RCWL2010<br>RCWL2512 |   |   |   | R = decimal<br>R470 = 0.47 Ω |   |   |   | J = $\pm$ 5.0 %         |   | N = $\pm$ 200 ppm/ $^\circ\text{C}$<br>M = $\pm$ 300 ppm/ $^\circ\text{C}$<br>Q = $\pm$ 400 ppm/ $^\circ\text{C}$<br>T = $\pm$ 600 ppm/ $^\circ\text{C}$ |   |   | EA = lead (Pb)-free,<br>tape/reel<br><br>TA = tin/lead,<br>tape/reel |   | (dash number)<br>from 1 to 99 as<br>applicable |  |  |

| TECHNICAL SPECIFICATIONS             |          |                      |          |          |          |          |          |          |          |
|--------------------------------------|----------|----------------------|----------|----------|----------|----------|----------|----------|----------|
| PARAMETER                            | UNIT     | RCWL0402             | RCWL0603 | RCWL0805 | RCWL1206 | RCWL1210 | RCWL1218 | RCWL2010 | RCWL2512 |
| 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    | > 300    |
| Insulation resistance                | $\Omega$ | > $10^9$             |          |          |          |          |          |          |          |
| Weight/1000 pieces (typical)         | g        | 0.65                 | 2        | 5.5      | 10       | 16       | 29.5     | 25.5     | 40.5     |

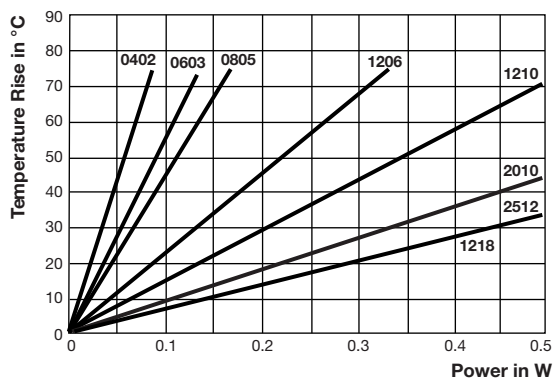
### DIMENSIONS



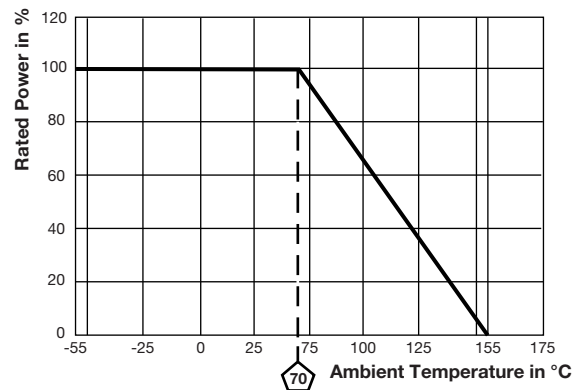
• Surface mount solder profile recommendations: [www.vishay.com/doc?31052](http://www.vishay.com/doc?31052)

| 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 <sup>+0.10</sup> <sub>-0.05</sub> | 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 <sup>+0.20</sup> <sub>-0.10</sub>  | 1.25 ± 0.15 | 0.45 ± 0.05 | 0.3 <sup>+0.20</sup> <sub>-0.10</sub> | 0.3 ± 0.2 | 0.7              | 1.3 | 1.2 | 0.9            | 1.3 | 1.3 |
| RCWL1206 | 3.2 <sup>+0.10</sup> <sub>-0.20</sub>  | 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 <sup>+0.10</sup> <sub>-0.20</sub>  | 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 |
| Short time overload       | 2 x rated power; duration according the model                                     | ± (0.5 % + 0.005 Ω) ΔR |
| High temperature exposure | MIL-STD-202, method 108, 1000 h at T = 125 °C, 0 % power                          | ± (2.0 % + 0.005 Ω) ΔR |
| Temperature cycling       | JESD 22, method JA-104, 1000 cycles (-55 °C to +125 °C)                           | ± (2.0 % + 0.005 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 % + 0.005 Ω) ΔR |
| Mechanical shock          | MIL-STD-202, method 213, condition C, 10 g's, 6 ms (half sine), 3 directions      | ± (0.5 % + 0.005 Ω) ΔR |
| Vibration                 | MIL-STD-202, method 204, 5 g's, 20 min, 12 cycles, 3 directions, 10 Hz to 2000 Hz | ± (0.5 % + 0.005 Ω) ΔR |
| Operational life          | MIL-STD-202, method 108, 1000 h at T = 125 °C at rated power                      | ± (2.0 % + 0.005 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 % + 0.005 Ω) ΔR |
| Moisture resistance       | MIL-STD-202, method 106, 0 % power, 7a and 7b not required                        | ± (2.0 % + 0.005 Ω) ΔR |

**Note**

- Contact [ww2bresistors@vishay.com](mailto: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 |
| 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

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



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