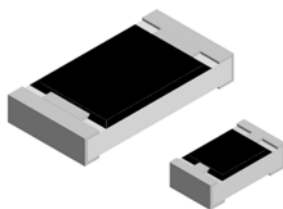


# Thick Film Surface Mount Chip Resistors, Wraparound, Low Value (0.1 $\Omega$ to 0.91 $\Omega$ )



## FEATURES

- Low resistance values (0.1  $\Omega$  to 0.91  $\Omega$ )
- 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)



**RoHS\***  
Available  
**HALOGEN  
FREE**

## 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>$P_{70^{\circ}\text{C}}$<br>W | TEMPERATURE COEFFICIENT<br>$\pm$ ppm/ $^{\circ}\text{C}$ | RESISTANCE RANGE<br>$\Omega$ | TOLERANCE<br>$\pm$ % | 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" ([www.vishay.com/doc?20020](http://www.vishay.com/doc?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

RCWL0402  
RCWL0603  
RCWL0805  
RCWL1206  
RCWL1210  
RCWL1218  
RCWL2010  
RCWL2512

### VALUE

R = Decimal  
R470 = 0.47  $\Omega$

### TOLERANCE

J =  $\pm$  5.0 %

### TCR

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/ $^{\circ}\text{C}$

### PACKAGING

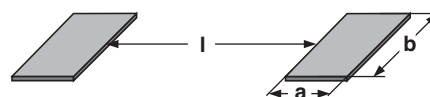
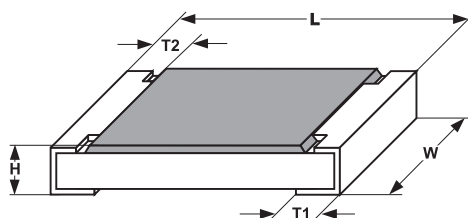
EA = Lead (Pb)-free,  
tape/reel

TA = Tin/lead,  
tape/reel

## TECHNICAL SPECIFICATIONS

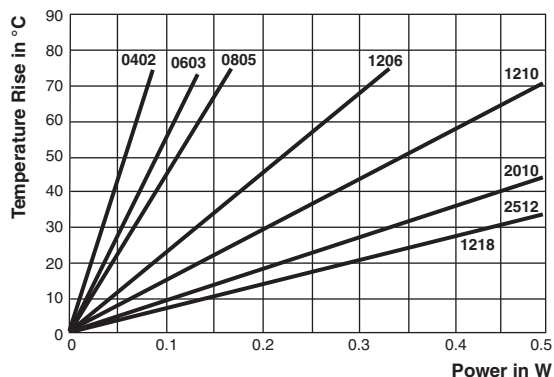
| PARAMETER                            | UNIT     | RCWL0402             | RCWL0603 | RCWL0805 | RCWL1206 | RCWL1210 | RCWL1218 | RCWL2010 | RCWL2512 |
|--------------------------------------|----------|----------------------|----------|----------|----------|----------|----------|----------|----------|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

## DIMENSIONS

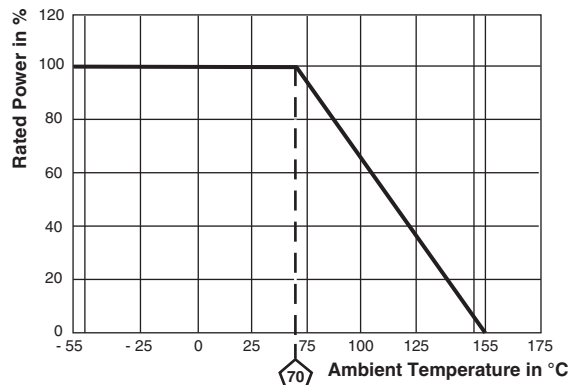


| MODEL    | DIMENSIONS in millimeters              |             |             |                                       |           |                  |     |     |                |     |     |
|----------|----------------------------------------|-------------|-------------|---------------------------------------|-----------|------------------|-----|-----|----------------|-----|-----|
|          | 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 <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            | $\pm (2.0 \% + 0.005 \Omega) \Delta R$ |
| Short time overload       | 2x 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) <sup>1/2</sup>      | $\pm (2.0 \% + 0.005 \Omega) \Delta R$ |
| Mechanical shock          | MIL-STD-202, method 213, condition C, 10 g's, 6 ms (half sine), 3 directions      | $\pm (0.5 \% + 0.005 \Omega) \Delta R$ |
| Vibration                 | MIL-STD-202, method 204, 5 g'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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