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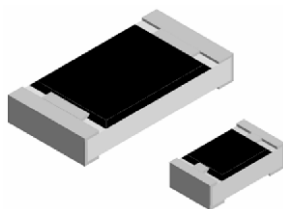
Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: [info@chipsmall.com](mailto:info@chipsmall.com) Web: [www.chipsmall.com](http://www.chipsmall.com)

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



# 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
- Compliant to RoHS Directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



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

## Note

\* Pb containing terminations are not RoHS compliant, exemptions may apply

## STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	CASE SIZE	POWER RATING $P_{70^{\circ}\text{C}}$ W	TEMPERATURE COEFFICIENT $\pm$ ppm/ $^{\circ}\text{C}$	RESISTANCE RANGE $\Omega$	TOLERANCE $\pm$ %	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 document number 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

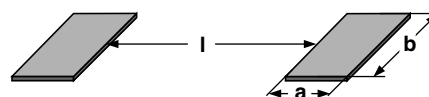
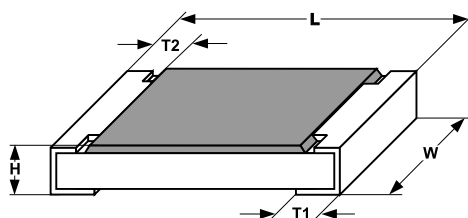
EA = Lead (Pb)-free,  
tape/reel

TA = Tin/lead,  
tape/reel

# **TECHNICAL SPECIFICATIONS**

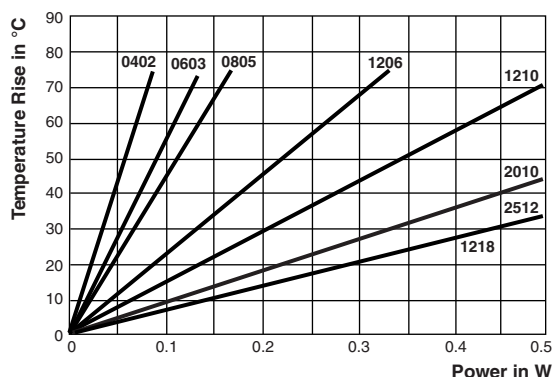
PARAMETER	UNIT	RCWL0402	RCWL0603	RCWL0805	RCWL1206	RCWL1210	RCWL1218	RCWL2010	RCWL2512
Operating temp. range	°C	- 55 to + 155							
Maximum operating voltage	V	$(P \times R)^{1/2}$							
Insulation voltage $U_{ins}$ (1 min)	V	> 75	> 100	> 200	> 300	> 300	> 300	> 300	> 300
Insulation resistance	$\Omega$	> $10^9$							
Weight/1000 pieces (typical)	g	0.65	2	5.5	10	16	29.5	25.5	40.5

# **DIMENSIONS**

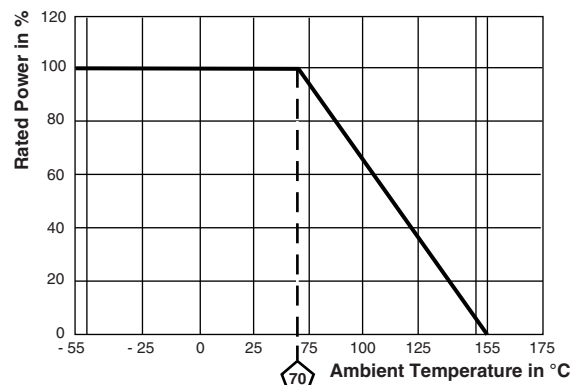


MODEL	DIMENSIONS in millimeters										
	L	W	H	T1	T2	REFLOW SOLDERING			WAVE SOLDERING		
						a	b	l	a	b	l
RCWL0402	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.25 ± 0.05	0.2 ± 0.1	0.4	0.6	0.5	0.5	0.6	0.5
RCWL0603	1.55 <sup>+0.10</sup> <sub>-0.05</sub>	0.85 ± 0.1	0.45 ± 0.05	0.3 ± 0.2	0.3 ± 0.2	0.5	0.9	1.0	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	± (2.0 % + 0.005 $\Omega$ ) $\Delta R$





PERFORMANCE		
TEST	CONDITIONS OF TEST	TEST LIMITS
Short time overload	2 x 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 $T = 125^{\circ}\text{C}$ , 0 % power	$\pm (2.0 \% + 0.005 \Omega) \Delta R$
Temperature cycling	JESD 22, method JA-104, 1000 cycles ( $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ )	$\pm (2.0 \% + 0.005 \Omega) \Delta R$
Biased humidity	MIL-STD-202, method 103, 1000 h $85^{\circ}\text{C}/85\% \text{ RH}$ , $10 \% \times (P \times R)^{1/2}$	$\pm (2.0 \% + 0.005 \Omega) \Delta R$
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 $T = 125^{\circ}\text{C}$ at rated power	$\pm (2.0 \% + 0.005 \Omega) \Delta R$
Resistance to solder heat	MIL-STD-202, method 210, $+260^{\circ}\text{C}$ 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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