

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



### 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				VALUE				TOLERANCE		TCR			PACKAGING		
RCWL0402 RCWL0603 RCWL0805 RCWL1206 RCWL1210 RCWL1218 RCWL2010 RCWL2512				R = Decimal R470 = 0.47 Ω				J = $\pm$ 5.0 %		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/ $^{\circ}\text{C}$			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



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 °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 <sup>3</sup> s, 6 ms (half sine), 3 directions	$\pm (0.5 \% + 0.005 \Omega) \Delta R$
Vibration	MIL-STD-202, method 204, 5 g <sup>3</sup> 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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