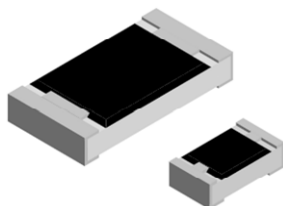


Thick Film Surface Mount Chip Resistors, Wraparound, Low Value (0.1 Ω to 0.91 Ω)



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



Available


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 $P_{70^{\circ}\text{C}}$ W	TEMPERATURE COEFFICIENT $\pm$ ppm/ $^{\circ}\text{C}$	RESISTANCE RANGE Ω	TOLERANCE $\pm$ %	E-SERIES
RCWL0402 ⁽¹⁾⁽²⁾	0402	0.063	600	0.22 to 0.43	5	24
			400	0.47 to 0.91		
RCWL0603 ⁽²⁾	0603	0.1	400	0.10 to 0.43	5	24
			200	0.47 to 0.91		
RCWL0805 ⁽²⁾	0805	0.125	300	0.10 to 0.43	5	24
			200	0.47 to 0.91		
RCWL1206 ⁽²⁾	1206	0.25	300	0.10 to 0.43	5	24
			200	0.47 to 0.91		
RCWL1210 ⁽²⁾	1210	0.33	200	0.10 to 0.91	5	24
RCWL1218 ⁽²⁾	1218	1.0	200	0.10 to 0.91	5	24
RCWL2010 ⁽²⁾	2010	0.5	200	0.10 to 0.91	5	24
RCWL2512 ⁽²⁾	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)
- 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
(8 digits)

RCWL0402
RCWL0603
RCWL0805
RCWL1206
RCWL1210
RCWL1218
RCWL2010
RCWL2512

VALUE
(4 digits)

R = decimal
R470 = 0.47 Ω

TOLERANCE
(1 digit)

J = $\pm$ 5.0 %

TCR
(1 digit)

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
(2 digits)

EA = lead (Pb)-free,
tape/reel
TA = tin/lead,
tape/reel

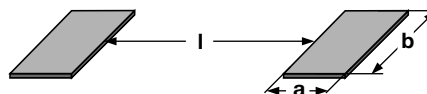
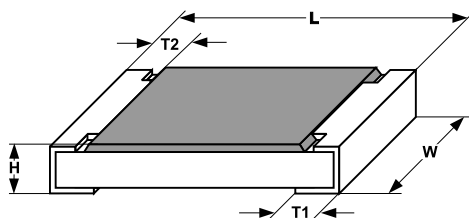
SPECIAL
(up to 2 digits)

(dash number)
from 1 to 99 as
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	Ω	> 10^9							
Weight/1000 pieces (typical)	g	0.65	2	5.5	10	16	29.5	25.5	40.5

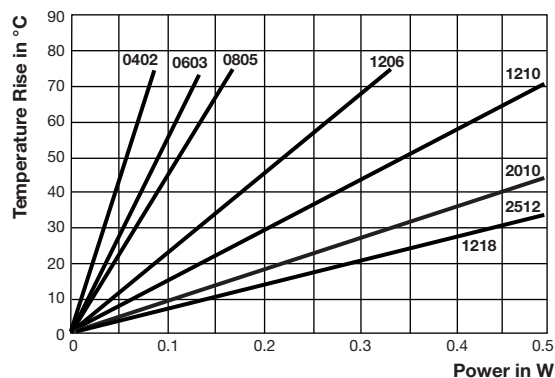
DIMENSIONS



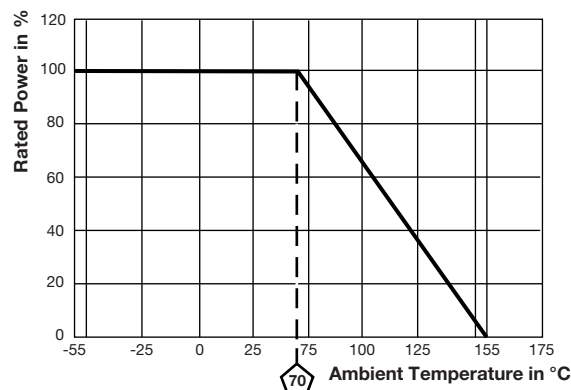
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

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 ^{+0.10} _{-0.05}	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 ^{+0.20} _{-0.10}	1.25 ± 0.15	0.45 ± 0.05	0.3 ^{+0.20} _{-0.10}	0.3 ± 0.2	0.7	1.3	1.2	0.9	1.3	1.3
RCWL1206	3.2 ^{+0.10} _{-0.20}	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 ^{+0.10} _{-0.20}	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	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) ^{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 °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	$\pm (2.0 \% + 0.005 \Omega) \Delta R$

Note

- Contact 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	
SELECTOR GUIDE	
Overview of Automotive Grade Products	www.vishay.com/doc?49924
TECHNICAL NOTES	
SMD Current Sense: AEC-Q200 vs. Vishay Qualification	www.vishay.com/doc?30416
MIL-PRF vs. AEC-Q200: Do You Know What You Are Getting?	www.vishay.com/doc?11000
WHITE PAPER	
Thermal Management for Surface-Mount Devices	www.vishay.com/doc?30380
Temperature Coefficient of Resistance for Current Sensing	www.vishay.com/doc?30405



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.