

## Thick Film Surface Mount Chip Resistors, Wraparound, Extremely Low Value (0.01 $\Omega$ to 0.976 $\Omega$ )



**DESIGN SUPPORT TOOLS** click logo to get started



### FEATURES

- Extremely low resistance values (0.01  $\Omega$  to 0.976  $\Omega$ )
- Enhanced power rating due to long side terminal construction (0612, 1020 types)
- Suitable for current sensing and shunts
- Metal glaze on high quality ceramic
- Protective overglaze
- Lead (Pb)-free 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**  
COMPLIANT  
HALOGEN  
**FREE**

### 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 <sup>(2)</sup>
RCWE0402	0402	0.125	400	0.033 to 0.05	5.0	24
			200	0.051 to 0.18	1.0, 5.0	24; 96
			100	0.2 to 0.976	0.5 <sup>(1)</sup> , 1.0, 5.0	
RCWE0603	0603	0.2	700	0.010 to 0.018	5.0	24
			400	0.02 to 0.03	1.0, 5.0	24; 96
			200	0.033 to 0.105	1.0, 5.0	
RCWE0805	0805	0.25	100	0.11 to 0.976	0.5 <sup>(1)</sup> , 1.0, 5.0	24; 96
			400	0.010 to 0.018	5.0	
			300	0.02 to 0.03	1.0, 5.0	
RCWE0612	0612	1.0	200	0.033 to 0.05	1.0, 5.0	24; 96
			100	0.051 to 0.976	0.5 <sup>(1)</sup> , 1.0, 5.0	
			300	0.010 to 0.016	2.0, 5.0	
RCWE1206	1206	0.5	200	0.018 to 0.2	2.0, 5.0	24; 96
			100	0.205 to 0.976	1.0, 5.0	
			600	0.010 to 0.018	5.0	
RCWE1210	1210	1.0	300	0.02 to 0.03	1.0, 5.0	24; 96
			200	0.033 to 0.05	1.0, 5.0	
			100	0.051 to 0.976	0.5 <sup>(1)</sup> , 1.0, 5.0	
RCWE1020	1020	2.0	200	0.010 to 0.016	2.0, 5.0	24
			100	0.0162 to 0.976	1.0, 5.0	24; 96
RCWE2010	2010	1.0	600	0.010 to 0.018	5.0	24
			300	0.02 to 0.03	1.0, 5.0	24; 96
			200	0.033 to 0.05	1.0, 5.0	
RCWE2512	2512	2.0	100	0.051 to 0.976	0.5 <sup>(1)</sup> , 1.0, 5.0	24; 96
			600	0.010 to 0.018	5.0	
			300	0.02 to 0.03	1.0, 5.0	
			200	0.033 to 0.05	1.0, 5.0	
			100	0.051 to 0.976	0.5 <sup>(1)</sup> , 1.0, 5.0	

#### 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))
- <sup>(1)</sup> Tight tolerance of 0.5 % is available for resistance values above 0.300  $\Omega$  (0402 size) and above 0.200  $\Omega$  (0603 to 2512 sizes)
- <sup>(2)</sup> Use E24 decades only for 5.0 % tolerance. E24 or E96 decades are available for 0.5 % and 1.0 % tolerance. Refer to standard decade table ([www.vishay.com/doc?31001](http://www.vishay.com/doc?31001))

**GLOBAL PART NUMBER INFORMATION**

 Global Part Numbering example: RCWE060351L0FN EA (visit [www.vishay.net](http://www.vishay.net) Vishay Dale parts numbering manual for all options)

R	C	W	E	0	6	0	3	5	1	L	0	F	N	E	A
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

GLOBAL MODEL (8 digits)
RCWE0402 RCWE0603 RCWE0805 RCWE0612 RCWE1206 RCWE1210 RCWE1020 RCWE2010 RCWE2512

VALUE (4 digits)
L = mΩ * R = decimal 10L0 = 0.01 Ω R470 = 0.47 Ω <b>Note:</b> * Use "L" for resistance values < 0.1 Ω

TOLERANCE (1 digit)
D = ± 0.5 % F = ± 1.0 % G = ± 2.0 % J = ± 5.0 %

TCR (1 digit)
K = ± 100 ppm/°C N = ± 200 ppm/°C M = ± 300 ppm/°C Q = ± 400 ppm/°C P = ± 500 ppm/°C T = ± 600 ppm/°C G = ± 700 ppm/°C

PACKAGING (2 digits)
EA = lead (Pb)-free, tape/reel

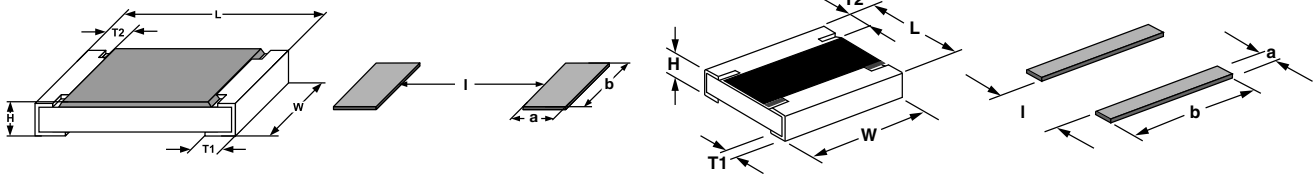
**TECHNICAL SPECIFICATIONS**

PARAMETER	UNIT	0402	0603	0805	0612	1206	1210	1020	2010	2512
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	> 100	> 300	> 300	> 300	> 300	> 300
Insulation resistance	Ω	> 10 <sup>9</sup>								
Weight/1000 pieces (typical)	g	0.7	3	5.5	11.5	10.5	17.5	27.5	26	40.5

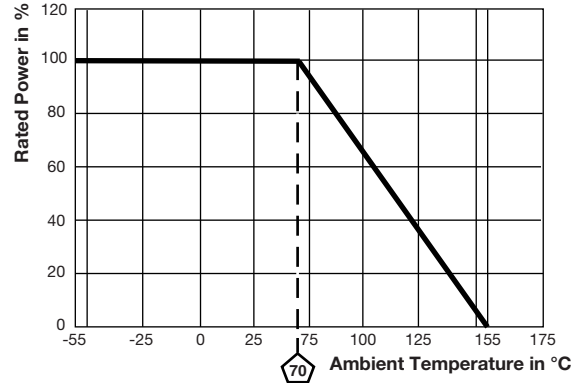
**DIMENSIONS**

RCWE0402 to RCWE2512

RCWE0612, RCWE1020



SIZE	RESISTANCE RANGE Ω	DIMENSIONS in millimeters					SOLDER PAD DIMENSIONS in millimeters						
		L	W	H	T1	T2	a	b	l				
0402	0.033 to 0.976	1.05 ± 0.05	0.55 ± 0.05	0.35 ± 0.1	0.3 ± 0.15	0.25 ± 0.1	0.7	0.7	0.3				
0603	0.01 to 0.03	1.6 ± 0.1	0.85 ± 0.1	0.5 ± 0.1	0.5 ± 0.2	0.3 ± 0.2	0.9	1.0	0.4				
	0.033 to 0.976				0.3 ± 0.2					0.7	1.0	0.8	
0805	0.01 to 0.03	2.0 ± 0.15	1.3 ± 0.1	0.55 ± 0.1	0.6 ± 0.2	0.35 ± 0.2	1.0	1.4	0.6				
	0.033 to 0.976				0.4 ± 0.2					0.8	1.4	1.0	
0612	0.01 to 0.976	1.6 ± 0.2	3.2 ± 0.2	0.6 ± 0.1	0.4 ± 0.15	0.25 ± 0.15	0.9	3.5	0.8				
	0.01 to 0.03				0.9 ± 0.2					0.45 ± 0.2	1.3	1.8	1.0
	0.033 to 0.05				0.8 ± 0.2						1.2	1.8	1.2
1206	0.051 to 0.976				0.45 ± 0.2		1.0	1.8	1.6				
1210	0.01 to 0.03	3.1 ± 0.2	2.5 ± 0.2	0.6 ± 0.1	0.8 ± 0.2	0.4 ± 0.2	1.3	2.6	1.1				
	0.033 to 0.976				0.4 ± 0.2					0.9	2.6	2.0	
1020	0.01 to 0.976	2.5 ± 0.2	5.0 ± 0.2	0.6 ± 0.1	0.55 ± 0.15	0.30 ± 0.15	1.2	5.5	1.4				
2010	0.01 to 0.03	5.0 ± 0.2	2.5 ± 0.15	0.6 ± 0.1	1.6 ± 0.3	0.6 ± 0.2	2.3	3.0	1.4				
	0.033 to 0.05				0.7 ± 0.3					1.4	3.0	3.2	
	0.051 to 0.976				0.7 ± 0.3					1.4	3.0	3.2	
2512	0.01 to 0.03	6.3 ± 0.2	3.15 ± 0.15	0.6 ± 0.1	2.0 ± 0.3	0.6 ± 0.2	2.8	3.6	1.4				
	0.033 to 0.05				0.8 ± 0.3					1.6	3.6	3.8	
	0.051 to 0.976				0.8 ± 0.3					1.6	3.6	3.8	

**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	± 1.0 % + 0.0005 Ω
Short time overload	2x rated power; duration according the model	± 0.5 % + 0.0005 Ω
High temperature exposure	MIL-STD-202, method 108, 1000 h at T = 125 °C, 0 % power	± 2.0 % + 0.0005 Ω
Temperature cycling	JESD 22, method JA-104, 1000 cycles (-55 °C to +125 °C)	± 2.0 % + 0.0005 Ω
Biased humidity	MIL-STD-202, method 103, 1000 h 85 °C/85 % RH, 10 % x (P x R) <sup>1/2</sup>	± 2.0 % + 0.0005 Ω
Mechanical shock	MIL-STD-202, method 213, condition C, 10 g's, 6 ms (half sine), 3 directions	± 1.0 % + 0.0005 Ω
Vibration	MIL-STD-202, method 204, 5 g's, 20 min, 12 cycles, 3 directions, 10 Hz to 2000 Hz	± 1.0 % + 0.0005 Ω
Operational life	MIL-STD-202, method 108, 1000 h at T = 125 °C at rated power	± 2.0 % + 0.0005 Ω
Resistance to solder heat	MIL-STD-202, method 210, +260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence	± 1.0 % + 0.0005 Ω
Moisture resistance	MIL-STD-202, method 106, 0 % power, 7a and 7b not required	± 2.0 % + 0.0005 Ω

PACKAGING					
MODEL	REEL				
	TAPE WIDTH	DIAMETER	PITCH	PIECES/REEL	CODE
RCWE0402	8 mm/punched paper	180 mm/7"	2 mm	10 000	EA
RCWE0603	8 mm/punched paper	180 mm/7"	4 mm	5000	EA
RCWE0805	8 mm/punched paper	180 mm/7"	4 mm	5000	EA
RCWE0612	8 mm/punched paper	180 mm/7"	4 mm	5000	EA
RCWE1206	8 mm/punched paper	180 mm/7"	4 mm	5000	EA
RCWE1210	8 mm/punched paper	180 mm/7"	4 mm	5000	EA
RCWE1020	12 mm/embossed plastic	180 mm/7"	4 mm	4000	EA
RCWE2010	12 mm/embossed plastic	180 mm/7"	4 mm	4000	EA
RCWE2512	12 mm/embossed plastic	180 mm/7"	8 mm	2000	EA

**Note**

- Embossed carrier tape per EIA-481-1A



## 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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.