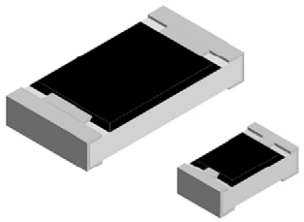
Thick Film Surface Mount Chip Resistors, Wraparound, Extremely Low Value (0.01 Ω to 0.976 Ω)



FEATURES

- Extremely low resistance values (0.01 Ω to 0.976 Ω)
- Sulfur resistant (per ASTM B809-95 humid vapor test)
- 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

RoHS COMPLIANT

HALOGEN FREE

LINKS TO ADDITIONAL RESOURCES

3D Models

STANDARD ELECTRICAL SPECIFICATIONS

GLOBAL MODEL	CASE SIZE	POWER RATING $P_{70\,°C}$ W	TEMPERATURE COEFFICIENT + ppm/°C	RESISTANCE RANGE Ω	TOLERANCE ± %	E-SERIES (2)
RCWE0402 (3)(4)	0402	0.125	400	0.033 to 0.05	5.0	24
			200	0.051 to 0.196	1.0, 5.0	24; 96
			100	0.2 to 0.976	0.5 (1), 1.0, 5.0	
RCWE0603 (4)	0603	0.2	700	0.010 to 0.018	5.0	24
			400	0.02 to 0.0324	1.0, 5.0	24; 96
			200	0.033 to 0.105	1.0, 5.0	
			100	0.11 to 0.976	0.5 (1), 1.0, 5.0	
RCWE0805 (4)	0805	0.25	400	0.010 to 0.018	5.0	24
			300	0.02 to 0.0324	1.0, 5.0	24; 96
			200	0.033 to 0.05	1.0, 5.0	
			100	0.051 to 0.976	0.5 (1), 1.0, 5.0	
RCWE0612 (4)	0612	1.0	300	0.010 to 0.016	2.0, 5.0	24
			200	0.018 to 0.2	2.0, 5.0	
			100	0.205 to 0.976	1.0, 5.0	24; 96
RCWE1206 (4)	1206	0.5	600	0.010 to 0.018	5.0	24
			300	0.02 to 0.0324	1.0, 5.0	24; 96
			200	0.033 to 0.05	1.0, 5.0	
			100	0.051 to 0.976	0.5 (1), 1.0, 5.0	
RCWE1210 (4)	1210	1.0	500	0.010 to 0.018	5.0	24
			300	0.02 to 0.0324	1.0, 5.0	24; 96
			200	0.033 to 0.05	1.0, 5.0	
			100	0.051 to 0.976	0.5 (1), 1.0, 5.0	
RCWE1020 (4)	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 (4)	2010	1.0	600	0.010 to 0.018	5.0	24
			300	0.02 to 0.0324	1.0, 5.0	24; 96
			200	0.033 to 0.05	1.0, 5.0	
			100	0.051 to 0.976	0.5 (1), 1.0, 5.0	
RCWE2512 (4)	2512	2.0	600	0.010 to 0.018	5.0	24
			300	0.02 to 0.0324	1.0, 5.0	24; 96
			200	0.033 to 0.05	1.0, 5.0	
			100	0.051 to 0.976	0.5 (1), 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)
- Temperature range of TCR rating is 0 °C to 150 °C. TCR values are (+) range only with no (-) range values; 1/2 of previous tolerance range

(1) Tight tolerance of 0.5 % is available for resistance values above 0.300 Ω (0402 size) and above 0.200 Ω (0603 to 2512 sizes)
(2) 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)
(3) Terminal strength tested per AEC-Q200-006 with the exception of 0.75 kg force is used
(4) Qualified to AEC-Q200 rev. D

GLOBAL PART NUMBER INFORMATION

Global Part Numbering Example: RCWE060351L0FNEA (visit 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		

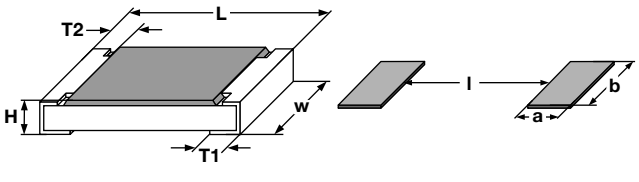
GLOBAL MODEL (8 digits)	VALUE (4 digits)	TOLERANCE (1 digit)	TCR (1 digit)	PACKAGING (2 digits)	SPECIAL (up to 2 digits)
RCWE0402 **RCWE0603** **RCWE0805** **RCWE0612** **RCWE1206** **RCWE1210** **RCWE1020** **RCWE2010** **RCWE2512**	**L** = mΩ * **R** = decimal **10L0** = 0.01 Ω **R470** = 0.47 Ω **Note**: * Use "**L**" for resistance values < 0.1 Ω	**D** = ± 0.5 % **F** = ± 1.0 % **G** = ± 2.0 % **J** = ± 5.0 %	**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	**EA** = lead (Pb)-free, tape/reel	(dash number) from **1 to 99** as applicable

TECHNICAL SPECIFICATIONS

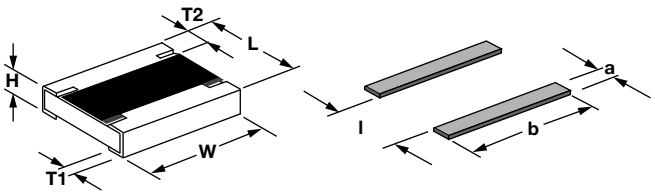
PARAMETER	UNIT	0402	0603	0805	0612	1206	1210	1020	2010	2512
Operating temperature range	°C	-55 to +155								
Maximum operating voltage	V	$(P \times R)^{1/2}$								
Insulation voltage U_{ins} (1 min)	V	> 75	> 100	> 200	> 100	> 300	> 300	> 300	> 300	> 300
Insulation resistance	Ω	$> 10^9$								
Weight/1000 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

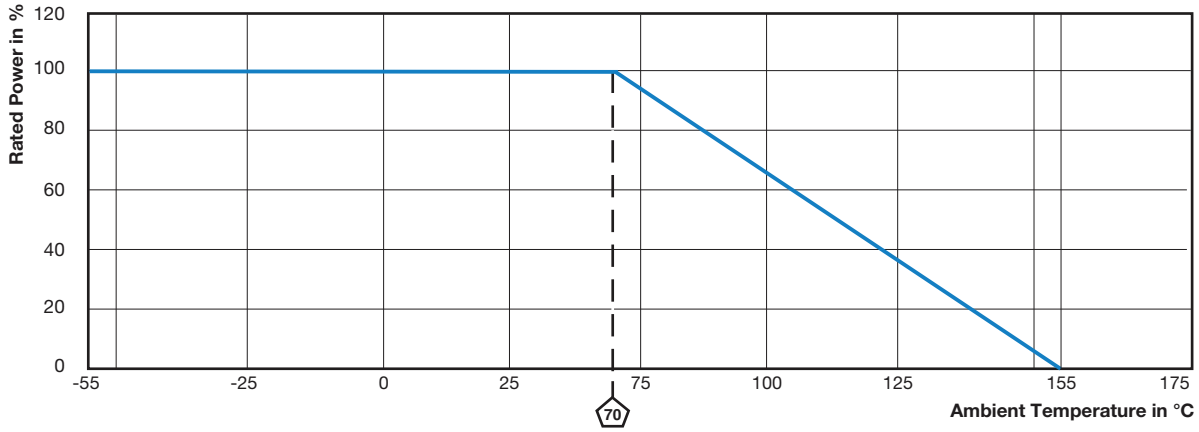


SIZE	DIMENSIONS in millimeters						SOLDER PAD DIMENSIONS in millimeters		
	RESISTANCE RANGE Ω	L	W	H	T1	T2	a	b	l
0402	0.033 to 0.976	1.05 ± 0.05	0.55 ± 0.05	0.35 ± 0.1	0.3 ± 0.15	0.25 ± 0.1	0.7	0.7	0.3
0603	0.01 to 0.03	1.6 ± 0.1	0.85 ± 0.1	0.5 ± 0.1	0.5 ± 0.2	0.3 ± 0.2	0.9	1.0	0.4
	0.033 to 0.976				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
1206	0.01 to 0.03	3.1 ± 0.15	1.6 ± 0.15	0.6 ± 0.1	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
	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

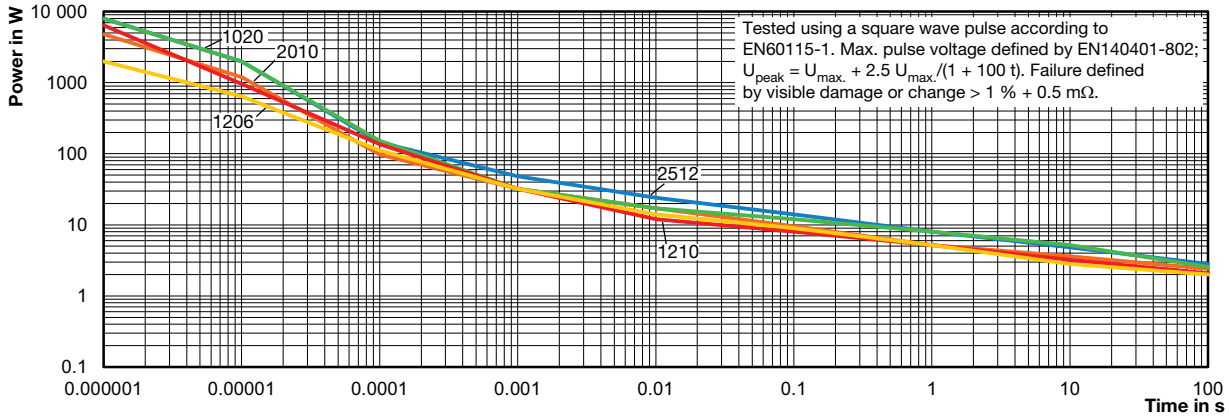
Notes

- 3D models available: www.vishay.com/doc?31106
- Surface mount solder profile recommendations: www.vishay.com/doc?31052

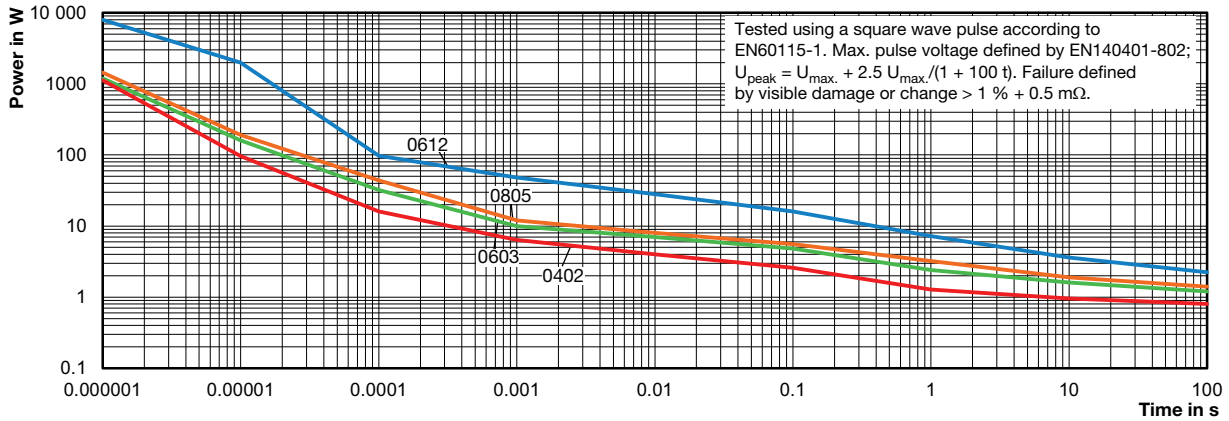
DERATING



SINGLE PULSE



SINGLE PULSE



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	2 x rated power; size and duration - 0402: 0.5 s, 0603 and 0805: 1 s, 1206 and larger: 2 s	± 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 $(P \times R)^{1/2}$	± 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

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
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

Notes

- Embossed carrier tape per EIA-481-1A
- Additional packaging details at: www.vishay.com/doc?31543

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

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