

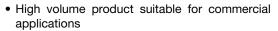
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# Lead (Pb)-free Commodity Thick Film Chip Resistors



#### **FEATURES**





**FREE** 

- Pure tin solder contacts on Ni barrier layer provides compatibility with lead (Pb)-free and lead containing soldering processes
- · Metal glaze on high quality ceramic
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

STANDARD ELECTRICAL SPECIFICATIONS								
MODEL	CASE SIZE INCH	CASE SIZE METRIC	POWER RATING P <sub>70</sub> W	LIMITING ELEMENT VOLTAGE U <sub>max.</sub> AC <sub>RMS</sub> /DC V	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	SERIES
					± 200	± 0.5	10.0 to 10M	E24; E96
		RR 0603M	0.05	30	-200 / +400	± 0.5	1.0 to 9.76	L24, E90
					± 100	± 1 ± 5	47.0 to 1M	E24; E96
CRCW0201	0201				± 200		10.0 to 10M	
CHCWUZUT	0201				-200 / +400		1.0 to 9.76	
					± 200		10.0 to 10M	
					-200 / +400		1.0 to 9.1	
Zero-Ohm-Resistor: $R_{\text{max.}} = 50 \text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 1.0 A								

#### **Notes**

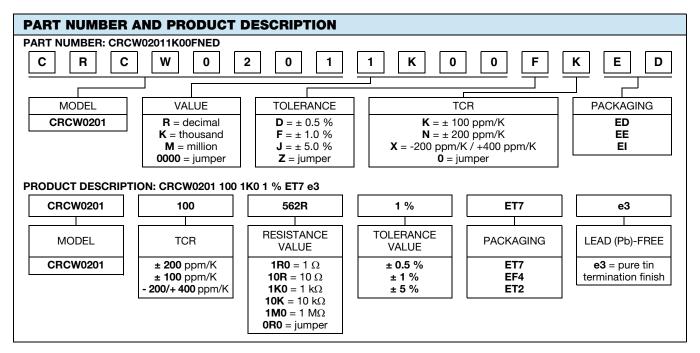
- These resistors do not feature a limited lifetime when operated within the permissible limits. However, resistance value drift increasing over
  operating time may result in exceeding a limit acceptable to the specific application, thereby establishing a functional lifetime.
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material.

TECHNICAL SPECIFICATIONS					
PARAMETER	UNIT	CRCW0201			
Rated Dissipation at 70 °C (1)	W	0.05			
Operating Voltage U <sub>max.</sub> AC <sub>RMS</sub> /DC	V	30			
Insulation Voltage U <sub>ins</sub> (1 min)	V	50			
Insulation Resistance	Ω	> 109			
Operating Temperature Range	°C	-55 to +155			
Weight	mg	0.17			

#### Note

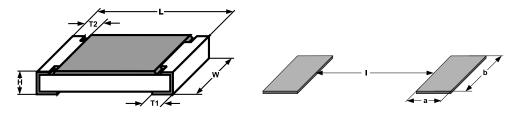
<sup>(1)</sup> The power dissipation on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if the permitted film temperature of 155 °C is not exceeded.





PACKAGING							
MODEL	CODE	QUANTITY	CARRIER TAPE	WIDTH	PITCH	REEL DIAMETER	
CRCW0201	ED = ET7	10 000	Paper tape acc.			180 mm/7"	
	EI = ET2	20 000	to IEC 60068-3 Type I	to IEC 60068-3	8 mm	2 mm	254 mm/10"
	EE = EF4	50 000				330 mm/13"	

#### **DIMENSIONS** in millimeters

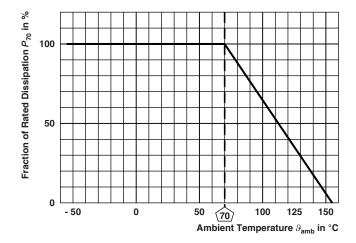


SIZE		DIMENSIONS					SOLDER PAD DIMENSIONS		
INCH	METRIC	L	W	Н	T1	T2	а	b	I
0201	0603	0.6 ± 0.05	0.3 ± 0.05	0.23 ± 0.05	0.15 ± 0.05	0.10 ± 0.05	0.28	0.43	0.23

#### Note

• No marking for 0201 size.

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TEST PRO	TEST PROCEDURES AND REQUIREMENTS						
EN 60115-1	IEC 60068-2		PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (△R)			
CLAUSE	TEST	TEST	Stability for product types:				
	METHOD		CRCW0201 e3	1 $\Omega$ to 10 M $\Omega$			
4.5	-	Resistance	-	± 0.5 %; ± 1 %; ± 5 %			
4.7	-	Voltage proof	$U = 1.4 \times U_{ins}$ ; 60 s	No flashover or breakdown			
4.10	50 (Td)	Solderability	Solder bath method; Sn60Pb40 non activated flux; $(235 \pm 5)$ °C $(2 \pm 0.2)$ s	Good tinning (≥ 95 % covered) no visible damage			
4.13	58 (Td)	Solderability	Solder bath method; Sn96.5Ag3Cu0.5 non-activated flux; (245 ± 5) °C (3 ± 0.3) s	Good tinning (≥ 95 % covered) no visible damage			
4.8.4.2	-	Temperature coefficient	(20 / -55 / 20) °C and (20 / 125 / 20) °C	± 100 ppm/K, ± 200 ppm/K, -200 ppm/K / +400 ppm/K			
4.32	21 (Uu <sub>3</sub> )	Shear (adhesion)	9 N	No visible damage			
4.33	21 (Uu <sub>1</sub> )	Substrate bending	Depth 2 mm; 3 times	No visible damage, no open circuit in bent position $\pm (0.5 \% R + 0.05 \Omega)$			
	14 (Na)	Rapid change of temperature	30 min. at -55 °C; 30 min. at 125 °C				
4.19			5 cycles	± (0.5 % R + 0.05 Ω)			
			1000 cycles	$\pm$ (1 % $R$ + 0.05 $\Omega$ )			
4.23	-	Climatic sequence:	-				
4.23.2	2 (Ba)	Dry heat	125 °C; 16 h				
4.23.3	30 (Db)	Damp heat, cyclic	55 °C; ≥ 90 % RH; 24 h; 1 cycle				
4.23.4	1 (Aa)	Cold	Cold -55 °C; 2 h ± (2 %				
4.23.5	13 (M)	Low air pressure 1 kPa; (25 ± 10) °C; 1 h					
4.23.6	30 (Db)	Damp heat, cyclic	55 °C; ≥ 90 % RH; 24 h; 5 cycles				
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R} \le U_{\text{max.}}$				

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TEST PROCEDURES AND REQUIREMENTS							
EN 60115-1	IEC 60068-2 TEST METHOD		PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (△R)			
CLAUSE		TEST	Stability for product types:				
			CRCW0201 e3	1 $\Omega$ to 10 M $\Omega$			
1051	-	Endurance at 70 °C	$U = \sqrt{P_{70} \times R} \le U_{\text{max.}};$ 1.5 h on; 0.5 h off;				
4.25.1			70 °C; 1000 h	± (2 % R + 0.1 Ω)			
			70 °C; 8000 h	± (4 % R + 0.1 Ω)			
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 $\pm$ 5) °C; (10 $\pm$ 1) s	± (1 % R + 0.05 Ω)			
4.35	-	Flamability, needle flame test	IEC 60695-11-5; 10 s	No burning after 30 s			
4.24	78 (Cab)	Damp heat, steady state	(40 ± 2) °C; (93 ± 3) % RH; 56 days	$\pm$ (2 % $R$ + 0.1 $\Omega$ )			
4.25.3	-	Endurance at upper category temperature	155 °C, 1000 h	$\pm (2 \% R + 0.1 \Omega)$			
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; 50 °C; method 2	No visible damage			
4.22	6 (Fc)	Vibration, endurance by sweeping	f = 10 Hz to 2000 Hz; x, y, z ≤ 1.5 mm; A ≤ 200 m/s²; 10 sweeps per axis	± (0.5 % R + 0.05 Ω)			

All tests are carried out in accordance with the following specifications:

- EN 60115-1, generic specification
- EN 140400, sectional specification
- EN 140401-802, detail specification
- IEC 60068-2-x, environmental test procedures

Packaging of components is done in paper tapes according to IEC 60286-3.



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Revision: 13-Jun-16 1 Document Number: 91000