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Lead (Pb)-Free Commodity Thick Film Chip Resistors



FEATURES

High volume product suitable for commercial applications



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

STANDARD ELECTRICAL SPECIFICATIONS								
MODEL	CASE SIZE INCH	CASE SIZE METRIC	POWER RATING P ₇₀ W	LIMITING ELEMENT VOLTAGE U _{max.} AC _{RMS} /DC V	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	SERIES
					± 100		47.0 to 1M	
					± 200	± 1	10.0 to 10M	E24; E96
000001	0201	RR 0603M	0.05	30	-200 / +400		1.0 to 9.76	
CRCW0201					± 200	-	10.0 to 10M	504
					-200 / +400	± 5	1.0 to 9.1	E24
			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 Umax. ACRMS/DC	V	30			
Insulation Voltage U _{ins} (1 min)	V	50			
Insulation Resistance	Ω	> 10 ⁹			
Operating Temperature Range	°C	-55 to +155			
Weight	mg	0.17			

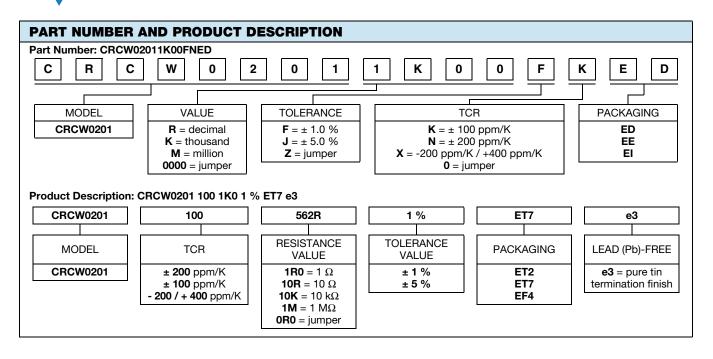
Note

(1) 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

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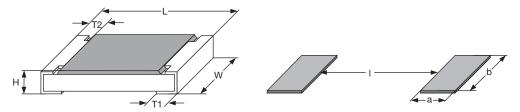
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PACKAGING							
MODEL	CODE	QUANTITY	CARRIER TAPE	WIDTH	РІТСН	REEL DIAMETER	
CRCW0201	ED = ET7	10 000		8 mm	2 mm	180 mm / 7"	
	EI = ET2	20 000	Paper tape according to IEC 60068-3 type I			254 mm / 10"	
	EE = EF4	50 000	51			330 mm / 13"	

DIMENSIONS in millimeters



SIZE		DIMENSIONS					SOLDER PAD DIMENSIONS		
INCH	METRIC	L	w	н	T1	T2	а	b	I
0201	0603	0.6 ± 0.03	0.3 ± 0.03	0.23 ± 0.03	0.15 ± 0.05	0.10 ± 0.05	0.28	0.43	0.23

Note

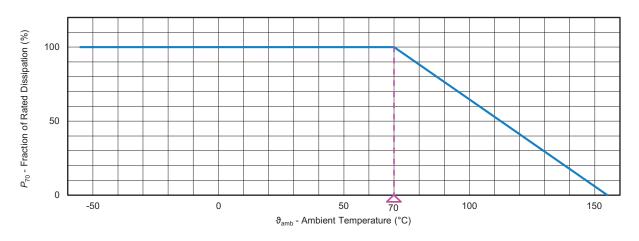
• No marking for 0201 size

CRCW0201 e3

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DERATING



TEST PROCEDURES AND REQUIREMENTS							
EN 60115-1	IEC 60068-2		PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (∆ <i>R</i>)			
CLAUSE	TEST	TEST	Stability for product types:				
	METHOD		CRCW0201 e3	1 Ω to 10 M Ω			
4.5	-	Resistance	-	± 1 %; ± 5 %			
4.7	-	Voltage proof	$U = 1.4 \text{ x } U_{\text{ins}}; 60 \text{ s}$	No flashover or breakdown			
4.10	50 (T-I)	Solderability	Solder bath method; Sn60Pb40 non activated flux; $(235 \pm 5) \ ^{\circ}C$ $(2 \pm 0.2) \ ^{\circ}S$	Good tinning (≥ 95 % covered) no visible damage			
4.13	58 (Td)	Solderability	Solder bath method; Sn96.5Ag3Cu0.5 non-activated flux; $(245 \pm 5) \ ^{\circ}C$ $(3 \pm 0.3) \ ^{\circ}S$	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 ₃)	Shear (adhesion)	9 N	No visible damage			
4.33	21 (Uu ₁)	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 % <i>R</i> + 0.05 Ω)			
			1000 cycles	± (1 % <i>R</i> + 0.05 Ω)			
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	-55 °C; 2 h	± (2 % <i>R</i> + 0.1 Ω)			
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	$U = \sqrt{P_{70} \times R} \le U_{\text{max.}}$				
		F	$U = \sqrt{P_{70} \times R} \le U_{\text{max.}};$ 1.5 h on; 0.5 h off;				
4.25.1	-	Endurance at 70 °C	70 °C; 1000 h	\pm (2 % R + 0.1 Ω)			
			70 °C; 8000 h	± (4 % <i>R</i> + 0.1 Ω)			

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3 For technical questions, contact: <u>thickfilmchip@vishay.com</u> Document Number: 20052

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TEST PROCEDURES AND REQUIREMENTS								
EN 60115-1	IEC 60068-2		PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (\(\triangle R))				
CLAUSE	TEST METHOD	TEST	Stability for product types:					
			CRCW0201 e3	1 Ω to 10 M Ω				
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 \pm 5) °C; (10 \pm 1) s	± (1 % <i>R</i> + 0.05 Ω)				
4.35	-	Flammability, 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	± (2 % <i>R</i> + 0.1 Ω)				
4.25.3	-	Endurance at upper category temperature	155 °C, 1000 h	\pm (2 % R + 0.1 Ω)				
4.29	45 (XA)	Component solvent resistance	lsopropyl 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/s ² ; 10 sweeps per axis	± (0.5 % <i>R</i> + 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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