

## 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
- Metal glaze on high quality ceramic
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
**HALOGEN**  
**FREE**

<b>STANDARD ELECTRICAL SPECIFICATIONS</b>								
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 $\Omega$	SERIES
CRCW0201	0201	RR 0603M	0.05	30	$\pm 100$	$\pm 1$	47.0 to 1M	E24; E96
					$\pm 200$		10.0 to 10M	
					-200 / +400		1.0 to 9.76	
					$\pm 200$	$\pm 5$	10.0 to 10M	E24
					-200 / +400		1.0 to 9.1	
Zero-ohm-resistor: $R_{max.} = 50 \text{ m}\Omega$ , $I_{max.}$ at $70^\circ\text{C} = 1.0 \text{ A}$								

### 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

<b>TECHNICAL SPECIFICATIONS</b>		
PARAMETER	UNIT	CRCW0201
Rated Dissipation at $70^\circ\text{C}$ <sup>(1)</sup>	W	0.05
Operating Voltage $U_{max, AC_{RMS/DC}}$	V	30
Insulation Voltage $U_{ins}$ (1 min)	V	50
Insulation Resistance	$\Omega$	$> 10^9$
Operating Temperature Range	$^\circ\text{C}$	-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  $155^\circ\text{C}$  is not exceeded

### PART NUMBER AND PRODUCT DESCRIPTION

Part Number: CRCW02011K00FNED

<b>C</b>	<b>R</b>	<b>C</b>	<b>W</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>K</b>	<b>0</b>	<b>0</b>	<b>F</b>	<b>K</b>	<b>E</b>	<b>D</b>	
<b>MODEL</b>				<b>VALUE</b>				<b>TOLERANCE</b>				<b>TCR</b>				
<b>CRCW0201</b>				<b>R = decimal</b> <b>K = thousand</b> <b>M = million</b> <b>0000 = jumper</b>				<b>F = ± 1.0 %</b> <b>J = ± 5.0 %</b> <b>Z = jumper</b>				<b>K = ± 100 ppm/K</b> <b>N = ± 200 ppm/K</b> <b>X = -200 ppm/K / +400 ppm/K</b> <b>0 = jumper</b>				<b>PACKAGING</b>

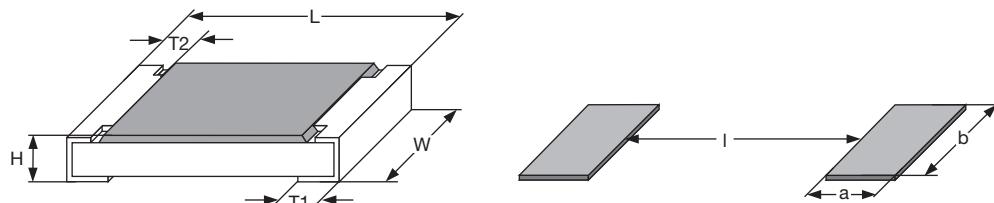
Product Description: CRCW0201 100 1K0 1 % ET7 e3

<b>CRCW0201</b>	<b>100</b>	<b>562R</b>	<b>1 %</b>	<b>ET7</b>	<b>e3</b>
<b>MODEL</b>	<b>TCR</b>	<b>RESISTANCE VALUE</b>	<b>TOLERANCE VALUE</b>	<b>PACKAGING</b>	<b>LEAD (Pb)-FREE</b>
<b>CRCW0201</b>	<b>± 200 ppm/K ± 100 ppm/K - 200 / + 400 ppm/K</b>	<b>1R0 = 1 Ω 10R = 10 Ω 10K = 10 kΩ 1M = 1 MΩ 0R0 = jumper</b>	<b>± 1 % ± 5 %</b>	<b>ET2 ET7 EF4</b>	<b>e3 = pure tin termination finish</b>

### PACKAGING

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

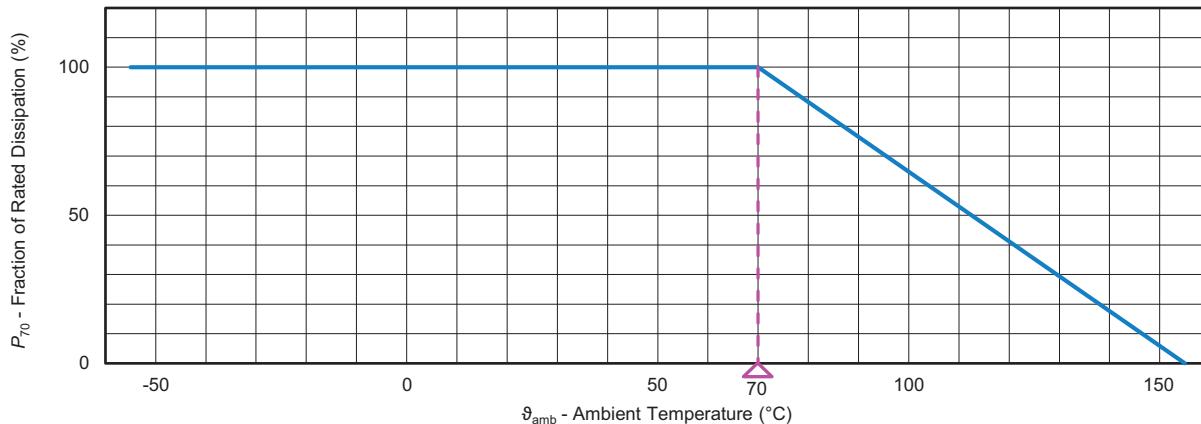
### DIMENSIONS

 in millimeters


SIZE		DIMENSIONS					SOLDER PAD DIMENSIONS		
INCH	METRIC	L	W	H	T1	T2	a	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

**DERATING**


<b>TEST PROCEDURES AND REQUIREMENTS</b>				
<b>EN 60115-1 CLAUSE</b>	<b>IEC 60068-2 TEST METHOD</b>	<b>TEST</b>	<b>PROCEDURE</b>	<b>REQUIREMENTS PERMISSIBLE CHANGE (<math>\Delta R</math>)</b>
			Stability for product types: <b>CRCW0201 e3</b>	1 $\Omega$ to 10 M $\Omega$
4.5	-	Resistance	-	$\pm 1\% ; \pm 5\%$
4.7	-	Voltage proof	$U = 1.4 \times U_{ins}$ ; 60 s	No flashover or breakdown
4.13	58 (Td)	Solderability	Solder bath method; Sn60Pb40 non activated flux; (235 $\pm$ 5) °C (2 $\pm$ 0.2) s	Good tinning ( $\geq 95\%$ covered) no visible damage
			Solder bath method; Sn96.5Ag3Cu0.5 non-activated flux; (245 $\pm$ 5) °C (3 $\pm$ 0.3) s	Good tinning ( $\geq 95\%$ covered) no visible damage
4.8.4.2	-	Temperature coefficient	(20 / -55 / 20) °C and (20 / 125 / 20) °C	$\pm 100$ ppm/K, $\pm 200$ 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 $\pm (0.5\% R + 0.05 \Omega)$
4.19	14 (Na)	Rapid change of temperature	30 min. at -55 °C; 30 min. at 125 °C	
			5 cycles	$\pm (0.5\% R + 0.05 \Omega)$
			1000 cycles	$\pm (1\% R + 0.05 \Omega)$
4.23	-	Climatic sequence:	-	$\pm (2\% R + 0.1 \Omega)$
4.23.2	2 (Ba)	Dry heat	125 °C; 16 h	
4.23.3	30 (Db)	Damp heat, cyclic	55 °C; $\geq 90\%$ RH; 24 h; 1 cycle	
4.23.4	1 (Aa)	Cold	-55 °C; 2 h	
4.23.5	13 (M)	Low air pressure	1 kPa; (25 $\pm$ 10) °C; 1 h	
4.23.6	30 (Db)	Damp heat, cyclic	55 °C; $\geq 90\%$ RH; 24 h; 5 cycles	
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R} \leq U_{max}$ .	
4.25.1	-	Endurance at 70 °C	$U = \sqrt{P_{70} \times R} \leq U_{max};$ 1.5 h on; 0.5 h off;	
			70 °C; 1000 h	$\pm (2\% R + 0.1 \Omega)$
			70 °C; 8000 h	$\pm (4\% R + 0.1 \Omega)$

<b>TEST PROCEDURES AND REQUIREMENTS</b>				
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )
			Stability for product types:	1 $\Omega$ to 10 M $\Omega$
			CRCW0201 e3	
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 ± 5) °C; (10 ± 1) s	± (1 % $R$ + 0.05 $\Omega$ )
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 % $R$ + 0.1 $\Omega$ )
4.25.3	-	Endurance at upper category temperature	155 °C, 1000 h	± (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/s <sup>2</sup> ; 10 sweeps per axis	± (0.5 % $R$ + 0.05 $\Omega$ )

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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