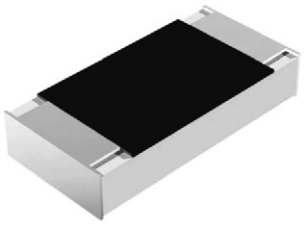
Lead (Pb)-Free Commodity Thick Film Chip Resistors



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

RoHS COMPLIANT HALOGEN FREE

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
CRCW0201	0201	RR 0603M	0.05	30	± 100	± 1	47.0 to 1M	E24; E96
					± 200		10.0 to 10M	
					-200 / +400		1.0 to 9.76	
					± 200	± 5	10.0 to 10M	E24
					-200 / +400		1.0 to 9.1	
			Zero-ohm-resistor: $R_{max.}$ = 50 mΩ, $I_{max.}$ 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 $U_{max.}$ AC_{RMS}/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

For technical questions, contact: thickfilmchip@vishay.com

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PART NUMBER AND PRODUCT DESCRIPTION

Part Number: CRCW02011K00FNED

C	R	C	W	0	2	0	1	1	K	0	0	F	K	E	D

MODEL	VALUE	TOLERANCE	TCR	PACKAGING
CRCW0201	**R** = decimal **K** = thousand **M** = million **0000** = jumper	**F** = ± 1.0 % **J** = ± 5.0 % **Z** = jumper	**K** = ± 100 ppm/K **N** = ± 200 ppm/K **X** = -200 ppm/K / +400 ppm/K **0** = jumper	**ED** **EE** **EI**

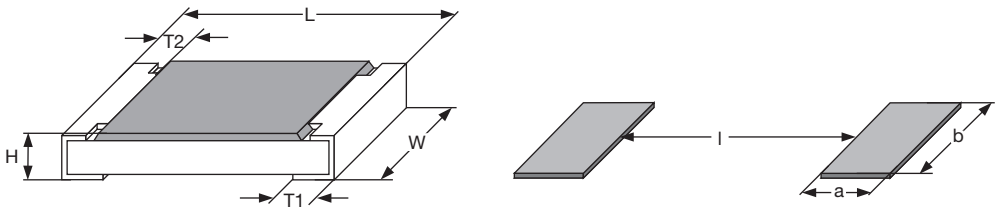
Product Description: CRCW0201 100 1K0 1 % ET7 e3

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

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	l
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

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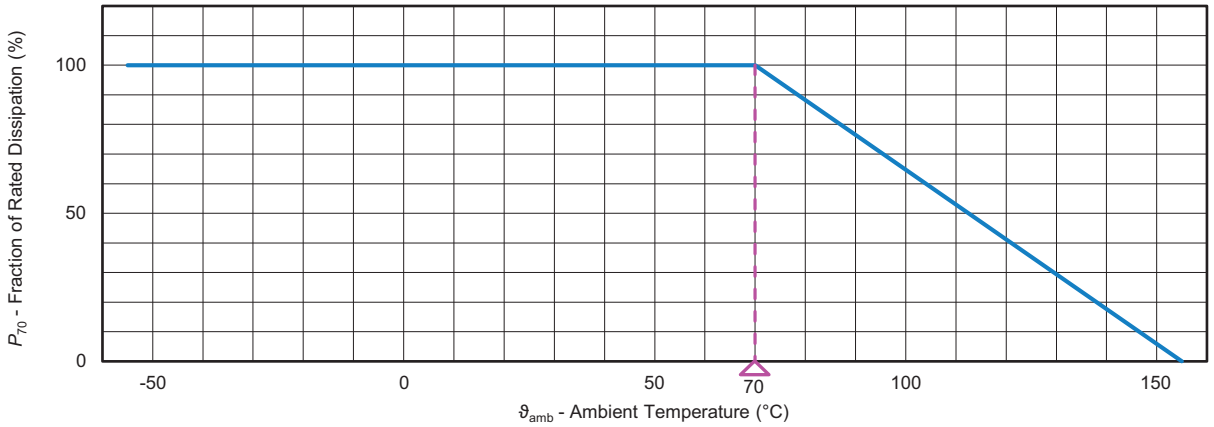
DERATING



TEST PROCEDURES AND REQUIREMENTS

EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)
			Stability for product types:	
			CRCW0201 e3	1 Ω to 10 MΩ
4.5	-	Resistance	-	± 1 %; ± 5 %
4.7	-	Voltage proof	U = 1.4 x U_{ins}; 60 s	No flashover or breakdown
4.13	58 (Td)	Solderability	Solder bath method; Sn60Pb40 non activated flux; (235 ± 5) °C (2 ± 0.2) s	Good tinning (≥ 95 % covered) no visible damage
			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_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 ± (0.5 % R + 0.05 Ω)
4.19	14 (Na)	Rapid change of temperature	30 min. at -55 °C; 30 min. at 125 °C	
			5 cycles	± (0.5 % R + 0.05 Ω)
			1000 cycles	± (1 % R + 0.05 Ω)
4.23	-	Climatic sequence:	-	± (2 % R + 0.1 Ω)
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	
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	$U = \sqrt{P_{70} \times R} \leq U_{max.}$	
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	± (2 % R + 0.1 Ω)
			70 °C; 8000 h	± (4 % R + 0.1 Ω)

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TEST PROCEDURES AND REQUIREMENTS				
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)
			Stability for product types:	
			CRCW0201 e3	1 Ω to 10 MΩ
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 ± 5) °C; (10 ± 1) s	± (1 % R + 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 % R + 0.1 Ω)
4.25.3	-	Endurance at upper category temperature	155 °C, 1000 h	± (2 % R + 0.1 Ω)
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^2; 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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