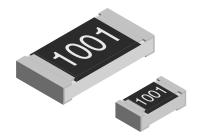


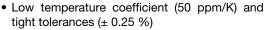
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Lead (Pb)-Free Thick Film, Rectangular, Semi-Precision Chip Resistors



FEATURES





FREE

- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processing
- Metal glaze on high quality ceramic
- AEC-Q200 qualified
- Material categorization: For definitions of compliance please see <u>www.vishav.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	
D10/CRCW0402-P	0402	1005	0.063	50	± 100	± 0.5	1R to 1M1	E24; E96	
D10/ChCVV0402-F	0402	1003	0.003	30	± 50	± 0.25, ± 0.5, ± 1	100R to 1M		
					± 100	± 0.5, ± 0.25	1R to 10M		
D11/CRCW0603-P	0603	1608	0.1	75	± 50	± 0.25	100R to 1M	E24; E96	
						± 0.5, ± 1	100R to 10M		
	0805	2012	0.125	150	± 100	± 0.5	10R to 10M	E24; E96	
D12/CRCW0805-P					± 50	± 0.25	100R to 1M		
						± 0.5, ± 1	100R to 10M		
				± 100	± 0.5	10R to 10M			
D25/CRCW1206-P	1206	3216	0.25	200	± 50	± 0.25	100R to 1M	E24; E96	
					± 50	± 0.5, ± 1	100R to 10M		
CDCW1010 D	CW1210-P 1210 3225 0.8	2225	0.5	200	± 100	± 0.5	100R to 1M	E24: E96	
ChCW1210-P		0.5 200	200	± 50	± 0.5, ± 1	100R to 1M	E24, E96		
CRCW1218-P	1218	3246	1.0	200	± 100	± 0.5	100R to 2M2	E24: E06	
CHCW 1218-P		3240			± 50	± 0.5, ± 1	100R to 2M2	E24; E96	
CRCW2010-P	2010	5025	0.75	400	± 100	± 0.5	10R to 10M	F04: F00	
UNUVV2010-F					± 50	± 0.5, ± 1	100R to 10M	E24; E96	
CDCW0510 D	2512	510 6000	1.0	500	± 100	± 0.5	10R to 10M	E24; E96	
CRCW2512-P	2012	6332	1.0		± 50	± 0.5, ± 1	100R to 10M	⊏24, ⊑96	

Notes

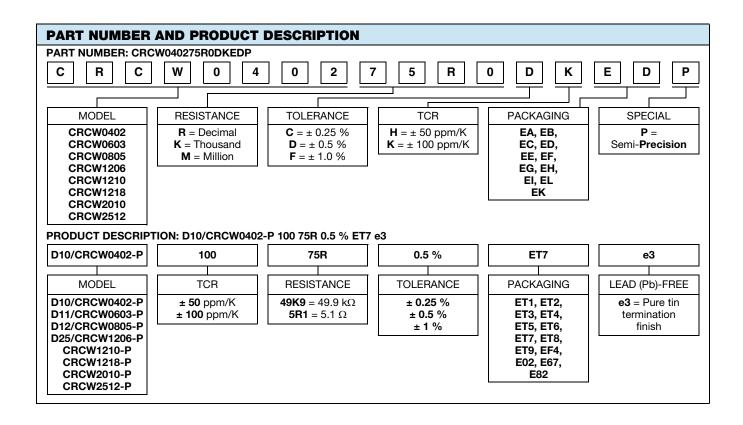
- These resistors do not feature a limited lifetime when operated within the limits of rated dissipation, permissible operating voltage and
 permissible film temperature. However, the resistance typically increase due to the resistor's film temperature over operating time generally
 known as drift. The drift may exceed the stability requirements of an individual application circuit and thereby limits the functional time.
- Marking and packaging: See datasheet "Surface Mount Resistor Marking" (www.vishay.com/doc?20020).
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material.



TECHNICAL SPECIFICATIONS									
PARAMETER	UNIT	D10/ CRCW0402-P	D11/ CRCW0603-P	D12/ CRCW0805-P	D25/ CRCW1206-P	CRCW1210-P	CRCW1218-P	CRCW2010-P	CRCW2512-P
Rated Dissipation at P ₇₀ ⁽¹⁾	W	0.063	0.1	0.125	0.25	0.5	1.0	0.75	1.0
Operating Voltage <i>U</i> _{max.} AC _{RMS} /DC	V	50	75	150	200	200	200	400	500
Insulation Voltage Uins (1 min)	V	75	100	200	300	300	300	300	300
Insulation Resistance	Ω				> 1	10 ⁹			
Operating Temperature Range	°C	- 55 to + 155							
Failure Rate	h ⁻¹	< 0.1 x 10 ⁻⁹							
Weight	mg	0.65	2	5.5	10	16	29.5	25.5	40.5

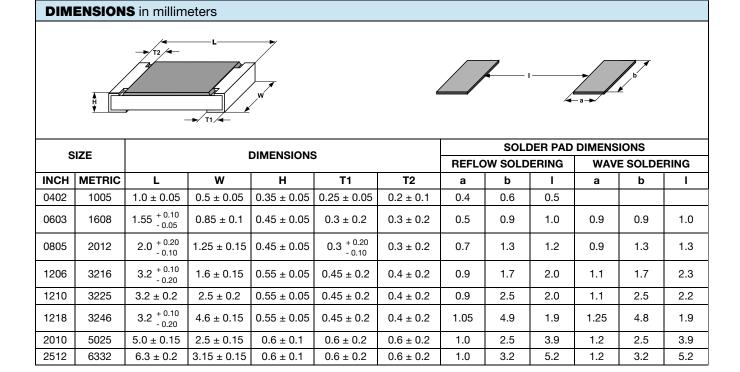
Note

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



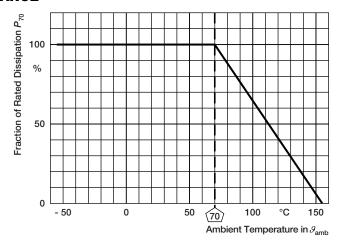


PACKAGING						
MODEL	CODE	QUANTITY	CARRIER TAPE	WIDTH	PITCH	REEL DIAMETER
D10/CRCW0402-P	ED = ET7	10 000		8 mm	2 mm	180 mm/7"
D10/ChCVV0402-P	EE = EF4	50 000				330 mm/13"
	EI = ET2	5000		8 mm	2 mm	180 mm/7"
	ED = ET3	10 000				180 mm/7"
	EL = ET4	20 000				285 mm/11.25"
D11/CRCW0603-P	EE = ET8	50 000				330 mm/13"
	EA = ET1	5000		8 mm	4 mm	180 mm/7"
	EB = ET5	10 000				285 mm/11.25"
	EC = ET6	20 000	Paper tape acc. to IEC 60068-3			330 mm/13"
	EA = ET1	5000	Type I	8 mm	4 mm	180 mm/7"
D12/CRCW0805-P	EB = ET5	10 000	71			285 mm/11.25"
	EC = ET6	20 000				330 mm/13"
	EA = ET1	5000		8 mm	4 mm	180 mm/7"
D25/CRCW1206-P	EB = ET5	10 000				285 mm/11.25"
	EC = ET6	20 000				330 mm/13"
	EA = ET1	5000]			180 mm/7"
CRCW1210-P	EB = ET5	10 000		12 mm	4 mm	285 mm/11.25"
	EC = ET6	20 000				330 mm/13"
CRCW1218-P	EK = ET9	4000		12 mm	4 mm	180 mm/7"
CRCW2010-P	EF = E02	4000	Blister tape acc. to IEC 60068-3	12 mm	4 mm	180 mm/7"
CDCW0510 D	EG = E67	2000	Type II	10	8 mm	100 /7"
CRCW2512-P	EH = E82	4000	71/2	12 mm	4 mm	180 mm/7"





FUNCTIONAL PERFORMANCE



TEST PROCEDURES AND REQUIREMENTS						
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (Δ <i>R</i>)		
			Stability for product types:	STABILITY CLASS 1 OR BETTER		
			D/CRCW-P e3	1 Ω to 10 MΩ		
4.5	-	Resistance	-	± 0.25 %; ± 0.5 %; ± 1 %		
4.7	-	Voltage proof	$U = 1.4 \times U_{ins}$; 60 s	No flashover or breakdown		
4.13	-	Short time overload	$U = 2.5 \text{ x } \sqrt{P_{70} \text{ x } R} \le 2 \text{ x } U_{\text{max.}};$ duration acc. to style	± (0.25 % R + 0.05 Ω)		
417.0	4.17.2 58 (Td)	Caldavahilitu	Solder bath method; Sn60Pb40 non-activated flux; (235 ± 5) °C (2 ± 0.2) s	Good tinning (≥ 95 % covered) no visible damage		
4.17.2		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	± 50 ppm/K; ± 100 ppm/K		
4.32	21 (Uu ₃)	Shear (adhesion)	RR 1608 and smaller: 9 N RR 2012 and larger: 45 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 (0.25 % R + 0.05 Ω)		
4.19	14 (Na)	Rapid change of temperature	30 min at - 55 °C; 30 min at 125 °C 5 cycles 1000 cycles	± (0.25 % R + 0.05 Ω) ± (1 % R + 0.05 Ω)		



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EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (△R)
			Stability for product types:	STABILITY CLASS 1 OR BETTER
			D/CRCW-P e3	1 Ω to 10 MΩ
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	\pm (1 % R + 0.05 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	$U = \sqrt{P_{70} \times R}$	
105.1			$U = \sqrt{P_{70} \times R} \le U_{\text{max.};}$ 1.5 h on; 0.5 h off;	
4.25.1 -	Endurance at 70 °C	70 °C; 1000 h	\pm (1 % R + 0.05 Ω)	
			70 °C; 8000 h	± (2 % R + 0.05 Ω)
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 ± 5) °C; (10 ± 1) s	$\pm (0.25 \% R + 0.05 \Omega)$
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	± (1 % R + 0.05 Ω)
4.25.3	-	Endurance at upper category temperature	155 °C, 1000 h	± (1 % R + 0.05 Ω)
4.40	-	Electrostatic discharge (human body model)	IEC 61340-3-1; 3 pos. + 3 neg. discharges; ESD voltage acc. to size	± (1 % R + 0.05 Ω)
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; 50 °C; method 2	No visible damage
4.30	45 (XA)	Solvent resistance of marking	Isopropyl alcohol; 50 °C; method 1, toothbrush	Marking legible, no visible damage
4.22	6 (Fc)	Vibration, endurance by sweeping	f = 10 Hz to 2000 Hz; x, y, z \leq 1.5 mm; A \leq 200 m/s ² ; 10 sweeps per axis	$\pm (0.25 \% R + 0.05 \Omega)$
4.37	-	Periodic electric overload	$U = \sqrt{15 \times P_{70} \times R}$ $\leq 2 \times U_{\text{max.}};$ 0.1 s on; 2.5 s off; 1000 cycles	± (1 % R + 0.05 Ω)
4.27	-	Single pulse high voltage overload, 10 µs/700 µs	$ \hat{U} = 10 \times \sqrt{P_{70} \times R} $ $ \leq 2 \times U_{\text{max.;}} $ 10 pulses	± (1 % 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, variety of environmental test procedures

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



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