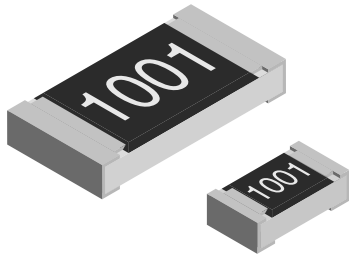


## Lead (Pb)-Free Thick Film, Rectangular, Semi-Precision Chip Resistors



### FEATURES

- Low temperature coefficient (25 ppm/K) and tight tolerances ( $\pm 0.25\%$ )
- Metal glaze on high quality ceramic
- Pure tin solder contacts on Ni Barrier layer provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- AEC-Q200 qualified, rev. C compliant



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

### STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE		RATED DISSIPATION $P_{70}$ W	LIMITING ELEMENT VOLTAGE $U_{max. AC/DC}$	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE $\Omega$	SERIES
	INCH	METRIC						
D10/CRCW0402-P	0402	RR 1005M	0.063	50	$\pm 100$	$\pm 0.5$	10R to 1M $\Omega$	E24; E96
					$\pm 50$	$\pm 0.25, \pm 0.5, \pm 1$	100R to 1M $\Omega$	
					$\pm 25$	$\pm 0.5, \pm 1$	1K $\Omega$ to 10K	
D11/CRCW0603-P	0603	RR 1608M	0.1	75	$\pm 100$	$\pm 0.5$	10R to 10M	E24; E96
					$\pm 50$	$\pm 0.5, \pm 1$	100R to 10M	
					$\pm 25$	$\pm 0.25, \pm 0.5, \pm 1$	200R to 10K	
D12/CRCW0805-P	0805	RR 2012M	0.125	150	$\pm 100$	$\pm 0.5$	10R to 10M	E24; E96
					$\pm 50$	$\pm 0.5, \pm 1$	100R to 10M	
					$\pm 25$	$\pm 0.25, \pm 0.5, \pm 1$	150R to 10K	
D25/CRCW1206-P	1206	RR 3216M	0.25	200	$\pm 100$	$\pm 0.5$	10R to 10M	E24; E96
					$\pm 50$	$\pm 0.5, \pm 1$	100R to 10M	
					$\pm 25$	$\pm 0.25, \pm 0.5, \pm 1$	150R to 10K	
CRCW1210-P	1210	RR 3225M	0.5	200	$\pm 100$	$\pm 0.5$	100R to 1M $\Omega$	E24; E96
					$\pm 50$	$\pm 0.5, \pm 1$		
CRCW1218-P	1218	RR 3246M	1.0	200	$\pm 100$	$\pm 0.5$	100R to 2M $\Omega$	E24; E96
					$\pm 50$	$\pm 0.5, \pm 1$		
CRCW2010-P	2010	RR 5025M	0.75	400	$\pm 100$	$\pm 0.5$	10R to 10M	E24; E96
					$\pm 50$	$\pm 0.5, \pm 1$	100R to 10M	
CRCW2512-P	2512	RR 6332M	1.0	500	$\pm 100$	$\pm 0.5$	10R to 10M	E24; E96
					$\pm 50$	$\pm 0.5, \pm 1$	100R to 10M	

### 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.
- Marking: See data sheet "Surface Mount Resistor Marking" (document number 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 $P_{70}^{(1)}$	W	0.063	0.1	0.125	0.25	0.5	1.0	0.75	1.0
Limiting element voltage $U_{max. AC/DC}$	V	50	75	150	200	200	200	400	500
Insulation voltage $U_{ins}$ (1 min)	V	> 75	> 100	> 200	> 300	> 300	> 300	> 300	> 300
Insulation resistance	$\Omega$	> $10^9$							
Category temperature range	$^{\circ}C$	- 55 to + 155							
Failure rate	$h^{-1}$	< $0.1 \times 10^{-9}$							
Weight	mg	0.65	2	5.5	10	16	29.5	25.5	40.5

**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.

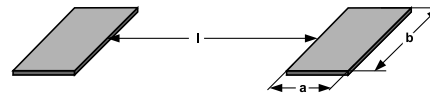
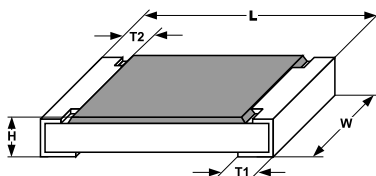
PART NUMBER AND PRODUCT DESCRIPTION																	
Part Number: CRCW040275R0DKEDP <sup>(2)</sup>																	
C	R	C	W	0	4	0	2	7	5	R	0	D	K	E	D	P	
MODEL		VALUE			TOLERANCE			TCR		PACKAGING			SPECIAL				
CRCW0402 CRCW0603 CRCW0805 CRCW1206 CRCW1210 CRCW1218 CRCW2010 CRCW2512		R = Decimal K = Thousand M = Million			C = $\pm 0.25\%$ D = $\pm 0.5\%$ F = $\pm 1.0\%$			E = $\pm 25$ ppm/K H = $\pm 50$ ppm/K K = $\pm 100$ ppm/K		EA, EB, EC, ED, EE, EI, EL, EK, EF, EG, EH, EY			Up to 2 digits P = Precision				
Product Description: D10/CRCW0402-P 100 75R 0.5 % ET7 e3																	
D10/CRCW0402-P	100	75R	0.5 %	ET7	e3												
MODEL	TCR	RESISTANCE VALUE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE												
D10/CRCW0402-P D11/CRCW0603-P D12/CRCW0805-P D25/CRCW1206-P CRCW1210-P CRCW1218-P CRCW2010-P CRCW2512-P	$\pm 25$ ppm/K $\pm 50$ ppm/K $\pm 100$ ppm/K	49K9 = 49.9 $\Omega$ 5R1 = 5.1 $\Omega$	$\pm 0.25\%$ $\pm 0.5\%$ $\pm 1\%$	ET1, ET5, ET6, ET7, EF4, EG1, E20, ET0, E02, E67, E82, E27	e3 = Pure tin termination finish												

**Note**

<sup>(2)</sup> Preferred way for ordering products is by use of the PART NUMBER.

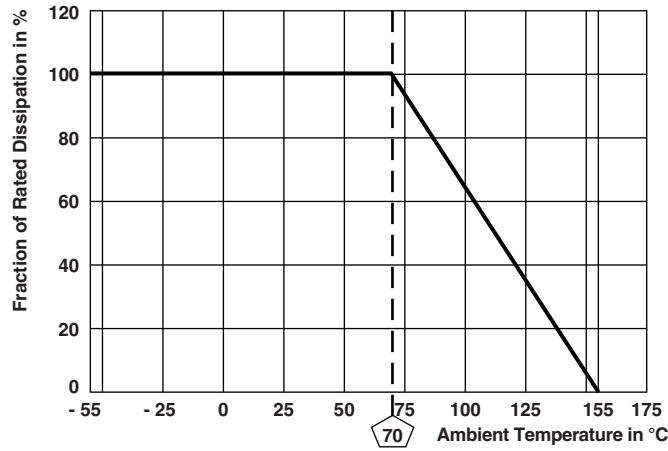
PACKAGING							
MODEL	UNIT	PAPER TAPE ACC. IEC 60286-3, TYPE I			BLISTER TAPE ACC. IEC 60286-3, TYPE II		
		QUANTITY	PART NUMBER	PRODUCT DESC.	QUANTITY	PART NUMBER	PRODUCT DESC.
D10/CRCW0402-P	180 mm/7"	10 000	ED	ET7			
	330 mm/13"	50 000	EE	EF4			
D11/CRCW0603-P	180 mm/7"	5000	EA	ET1			
	285 mm/11.25"	10 000	EB	ET5			
	330 mm/13"	20 000	EC	ET6			
	180 mm/7"	5000	EA	ET1			
D12/CRCW0805-P	285 mm/11.25"	10 000	EB	ET5			
	330 mm/13"	20 000	EC	ET6			
D25/CRCW1206-P	180 mm/7"	5000	EA	ET1			
	285 mm/11.25"	10 000	EB	ET5			
	330 mm/13"	20 000	EC	ET6			
	180 mm/7"	5000	EA	ET1			
CRCW1210-P	285 mm/11.25"	10 000	EB	ET5			
	330 mm/13"	20 000	EC	ET6			
CRCW1218-P	180 mm/7"				4000	EK	ET9
CRCW2010-P	180 mm/7"				4000	EF	E02
CRCW2512-P	180 mm/7"				2000	EG	E67
					4000	EH	E82

## DIMENSIONS

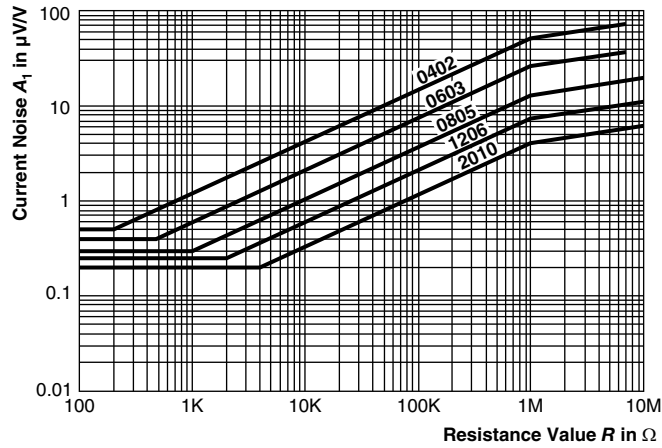


SIZE		DIMENSIONS in millimeters					SOLDER PAD DIMENSIONS in millimeters					
							REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	L	W	H	T1	T2	a	b	l	a	b	l
0402	1005	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.25 ± 0.05	0.2 ± 0.1	0.4	0.6	0.5			
0603	1608	1.55 <sup>+0.10</sup> / <sub>-0.05</sub>	0.85 ± 0.1	0.45 ± 0.05	0.3 ± 0.2	0.3 ± 0.2	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	2.0 <sup>+0.20</sup> / <sub>-0.10</sub>	1.25 ± 0.15	0.45 ± 0.05	0.3 <sup>+0.20</sup> / <sub>-0.10</sub>	0.3 ± 0.2	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	3.2 <sup>+0.10</sup> / <sub>-0.20</sub>	1.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2	0.9	1.7	2.0	1.1	1.7	2.3
1210	3225	3.2 ± 0.2	2.5 ± 0.2	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2	0.9	2.5	2.0	1.1	2.5	2.2
1218	3246	3.2 <sup>+0.10</sup> / <sub>-0.20</sub>	4.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2	1.05	4.9	1.9	1.25	4.8	1.9
2010	5025	5.0 ± 0.15	2.5 ± 0.15	0.6 ± 0.1	0.6 ± 0.2	0.6 ± 0.2	1.0	2.5	3.9	1.2	2.5	3.9
2512	6332	6.3 ± 0.2	3.15 ± 0.15	0.6 ± 0.1	0.6 ± 0.2	0.6 ± 0.2	1.0	3.2	5.2	1.2	3.2	5.2

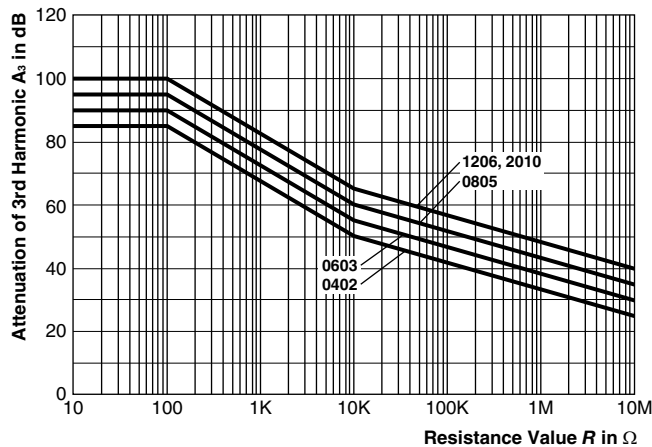
**Derating**



**Current Noise**



**Non-Linearity**



TEST PROCEDURES AND REQUIREMENTS				
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )
				SIZE 0402 to 2512
				STABILITY CLASS 1 OR BETTER
			Stability for product types: <b>D/CRCW-P e3</b>	1 $\Omega$ to 10 M $\Omega$
4.5	-	Resistance	-	$\pm 1\%$
4.7	-	Voltage proof	$U = 1.4 \times U_{ins}$ ; 60 s	No flashover or breakdown
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R}$ $\leq 2 \times U_{max.}$ ; duration: Acc. to style	$\pm (0.25\% R + 0.05 \Omega)$
4.17.2	58 (Td)	Solderability	Solder bath method; Sn60Pb40 non activated flux; (235 $\pm$ 5) $^{\circ}$ 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) $^{\circ}$ C (3 $\pm$ 0.3) s	Good tinning ( $\geq 95\%$ covered) no visible damage
4.8.4.2	-	Temperature coefficient	(20/- 55/20) $^{\circ}$ C and (20/125/20) $^{\circ}$ C	$\pm 100$ ppm/K
4.32	21 (Uu <sub>3</sub> )	Shear (adhesion)	RR 1608 and smaller: 9 N RR 2012 and larger: 45 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 $\pm (0.25\% R + 0.05 \Omega)$
4.19	14 (Na)	Rapid change of temperature	30 min. at - 55 $^{\circ}$ C; 30 min. at 125 $^{\circ}$ C	$\pm (0.25\% R + 0.05 \Omega)$ $\pm (1\% R + 0.05 \Omega)$
			5 cycles 1000 cycles	
4.23	-	Climatic sequence:	-	$\pm (1\% R + 0.05 \Omega)$
4.23.2	2 (Ba)	Dry heat	125 $^{\circ}$ C; 16 h	
4.23.3	30 (Db)	Damp heat, cyclic	55 $^{\circ}$ C; $\geq 90\%$ RH; 24 h; 1 cycle	
4.23.4	1 (Aa)	Cold	- 55 $^{\circ}$ C; 2 h	
4.23.5	13 (M)	Low air pressure	1 kPa; (25 $\pm$ 10) $^{\circ}$ C; 1 h	
4.23.6	30 (Db)	Damp heat, cyclic	55 $^{\circ}$ C; $\geq 90\%$ RH; 24 h; 5 cycles	
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R}$	
4.25.1	-	Endurance at 70 $^{\circ}$ C	$U = \sqrt{P_{70} \times R} \leq U_{max.}$ ; 1.5 h on; 0.5 h off;	$\pm (1\% R + 0.05 \Omega)$ $\pm (2\% R + 0.05 \Omega)$
			70 $^{\circ}$ C; 1000 h	
			70 $^{\circ}$ C; 8000 h	
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 $\pm$ 5) $^{\circ}$ C; (10 $\pm$ 1) s	$\pm (0.25\% R + 0.05 \Omega)$



TEST PROCEDURES AND REQUIREMENTS				
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )
				SIZE 0402 to 2512
				STABILITY CLASS 1 OR BETTER
			Stability for product types:	1 $\Omega$ to 10 M $\Omega$
			<b>D/CRCW-P e3</b>	
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 $\pm$ 2) $^{\circ}$ C; (93 $\pm$ 3) % RH; 56 days	$\pm$ (1 % R + 0.05 $\Omega$ )
4.25.3	-	Endurance at upper category temperature	155 $^{\circ}$ C, 1000 h	$\pm$ (1 % R + 0.05 $\Omega$ )
4.40	-	Electrostatic discharge (human body model)	IEC 61340-3-1* 3 pos. + 3 neg. discharges; ESD voltage acc. to size	$\pm$ (1 % R + 0.05 $\Omega$ )
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; 50 $^{\circ}$ C; method 2	No visible damage
4.30	45 (XA)	Solvent resistance of marking	Isopropyl alcohol; 50 $^{\circ}$ 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 <sup>2</sup> ; 10 sweeps per axis	$\pm$ (0.25 % R + 0.05 $\Omega$ )
4.37	-	Periodic electric overload	$U = \sqrt{15 \times P_{70} \times R}$ $\leq 2 \times U_{max.}$ ; 0.1 s on; 2.5 s off; 1000 cycles	$\pm$ (1 % R + 0.05 $\Omega$ )
4.27	-	Single pulse high voltage overload, 10 $\mu$ s/700 $\mu$ s	$\dot{U} = 10 \times \sqrt{P_{70} \times R}$ $\leq 2 \times U_{max.}$ ; 10 pulses	$\pm$ (1 % 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, environmental test procedures

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



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