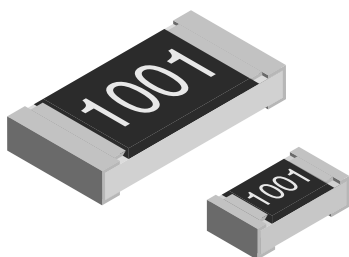


Lead (Pb)-free Thick Film, Rectangular, Precision Chip Resistors



FEATURES

- Low temperature coefficient (25 ppm/K) and tight tolerances ($\pm 0.25\%$)
- Metal glaze on high quality ceramic
- Protective overglaze
- Lead (Pb)-free solder contacts on Ni barrier layer
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compatible with "Restriction of the use of Hazardous Substances" (RoHS) directive 2002/95/EC (issue 2004)
- Excellent stability ($\Delta R/R \leq \pm 1\%$ for 1000 h at 70 °C) in different environmental conditions



STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE		POWER RATING $P_{70\text{ }^{\circ}\text{C}}$ W	LIMITING ELEMENT VOLTAGE MAX. V $\equiv$	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	E-SERIES
	INCH	METRIC						
D10/CRCW0402-P	0402	1005	0.063	50	± 100	± 0.5	10R - 1M0	24 + 96
					± 50	$\pm 0.25; \pm 0.5; \pm 1$	100R - 1M0	
					± 25	$\pm 0.5; \pm 1$	1K0 - 10K	
D11/CRCW0603-P	0603	1608	0.1	75	± 100	± 0.5	10R - 10M	24 + 96
					± 50	$\pm 0.5; \pm 1$	100R - 10M	
						± 0.25	100R - 1M0	
D12/CRCW0805-P	0805	2012	0.125	150	± 100	± 0.5	10R - 10M	24 + 96
					± 50	$\pm 0.5; \pm 1$	100R - 10M	
						± 0.25	100R - 1M0	
D25/CRCW1206-P	1206	3216	0.25	200	± 100	± 0.5	10R - 10M	24 + 96
					± 50	$\pm 0.5; \pm 1$	100R - 10M	
						± 0.25	100R - 1M0	
CRCW1210-P	1210	3225	0.33	200	± 100	± 0.5	10R - 10M	24 + 96
					± 50	$\pm 0.5; \pm 1$	100R - 1M0	
CRCW1218-P	1218	3246	1.0	200	± 100	± 0.5	10R - 10M	24 + 96
					± 50	$\pm 0.5; \pm 1$	100R - 2M2	
CRCW2010-P	2010	5025	0.5	400	± 100	± 0.5	10R - 10M	24 + 96
					± 50	$\pm 0.5; \pm 1$	100R - 10M	
CRCW2512-P	2512	6332	1.0	500	± 100	± 0.5	10R - 10M	24 + 96
					± 50	$\pm 0.5; \pm 1$	100R - 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 and packaging: See appropriate catalog or web pages
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material

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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 70 °C ⁽³⁾	W	0.063	0.1	0.125	0.25	0.33	1.0	0.5	1.0
Limiting Element Voltage ⁽²⁾	V _≅	50	75	150	200	200	200	400	500
Insulation Voltage (1 min)	V _{peak}	> 75	> 100	> 200	> 300	> 300	> 300	> 300	> 300
Thermal Resistance ⁽¹⁾	K/W	≤ 870	≤ 550	≤ 440	≤ 220	≤ 140	≤ 65	≤ 88	≤ 65
Insulation Resistance	Ω	> 10 ⁹							
Category Temperature Range	°C	- 55 to + 155							
Failure Rate	h ⁻¹	0.3 x 10 ⁻⁹							
Weight/1000 pieces	g	0.65	2	5.5	10	16	29.5	25.5	40.5

Notes

- (1) For sizes 0402 until 1206 the measuring conditions are in acc. to EN 140401-802. For all other sizes the result depends on the solder pad dimensions.
- (2) Rated voltage: $\sqrt{P \times R}$
- (3) 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 ⁽⁴⁾

PART NUMBER																	
C	R	C	W	0	4	0	2	7	5	R	0	D	K	E	D	P	
MODEL		VALUE		TOLERANCE		TCR		PACKAGING ⁽⁵⁾		SPECIAL							
CRCW0402 CRCW0603 CRCW0805 CRCW1206 CRCW1210 CRCW1218 CRCW2010 CRCW2512		R = Decimal K = Thousand M = Million		C = ± 0.25 % D = ± 0.5 % F = ± 1.0 %		E = ± 25 ppm/K H = ± 50 ppm/K K = ± 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

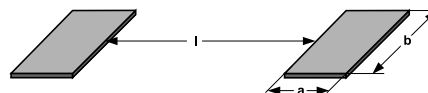
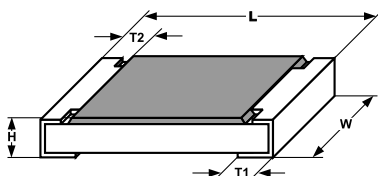
D10/CRCW0402-P	100	75R	0.5 %	ET7	e3
MODEL	TCR	RESISTANCE VALUE	TOLERANCE	PACKAGING ⁽⁵⁾	LEAD (Pb)-FREE
D10/CRCW0402-P D11/CRCW0603-P D12/CRCW0805-P D25/CRCW1206-P CRCW1210-P CRCW1218-P CRCW2010-P CRCW2512-P	± 25 ppm/K ± 50 ppm/K ± 100 ppm/K	49K9 = 49.9 kΩ 5R1 = 5.1 Ω	± 0.25 % ± 0.5 % ± 1.0 %	ET1, ET5 ET6, ET7 EF4, EG1 E20, ET0 E02, E67 E82, E27	e3 = Pure tin Termination finish

Notes

- (4) Preferred way for ordering products is by use of the PART NUMBER
- (5) Please refer to table PACKAGING, see next page

PACKAGING

MODEL	REEL								BULK		
	TAPE WIDTH	DIAMETER	PITCH	PIECES/ REEL	PACKAGING CODE				PIECES	PACKAGING CODE	
					PART NUMBER		PRODUCT DESC.			PART NUMBER	PRODUCT DESC.
					PAPER	BLISTER	PAPER	BLISTER			
D10/CRCW0402-P	8 mm	180 mm/7" 330 mm/13"	2 mm 2 mm	10 000 50 000	ED EE		ET7 EF4		50 000	EY	E27
D11/CRCW0603-P	8 mm	180 mm/7"	4 mm	5000	EA	EI	ET1	EG1	25 000	EY	E27
		285 mm/11.25"	4 mm	10 000	EB		ET5				
		330 mm/13"	4 mm	20 000	EC	EL	ET6	E20			
D12/CRCW0805-P	8 mm	180 mm/7"	4 mm	5000	EA	EI	ET1	EG1	10 000	EY	E27
		285 mm/11.25"	4 mm	10 000	EB		ET5				
		330 mm/13"	4 mm	20 000	EC	EL	ET6	E20			
D25/CRCW1206-P	8 mm	180 mm/7"	4 mm	5000	EA	EI	ET1	EG1			
		285 mm/11.25"	4 mm	10 000	EB		ET5				
		330 mm/13"	4 mm	20 000	EC	EL	ET6	E20			
CRCW1210-P	12 mm	180 mm/7"	4 mm	5000	EA		ET1				
		285 mm/11.25"	4 mm	10 000	EB		ET5				
		330 mm/13"	4 mm	20 000	EC		ET6				
CRCW1218-P	12 mm	180 mm/7"	4 mm	4000		EK		ET9			
CRCW2010-P	12 mm	180 mm/7"	4 mm	4000		EF		E02			
CRCW2512-P	12 mm	180 mm/7"	8 mm	2000		EG		E67			
			4 mm	4000		EH		E82			

DIMENSIONS

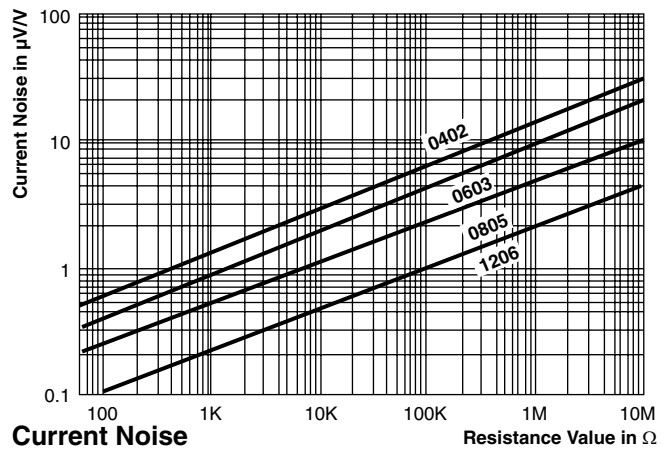
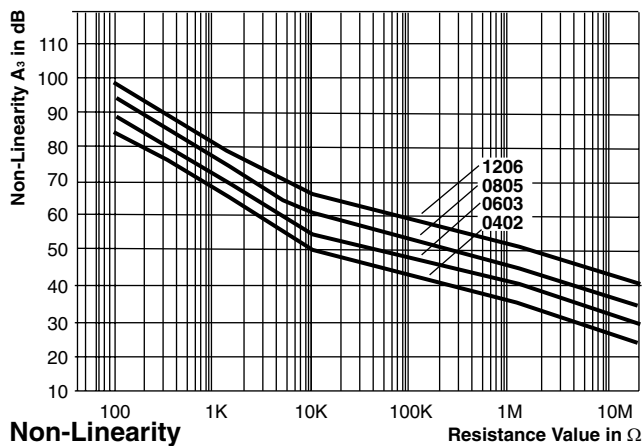
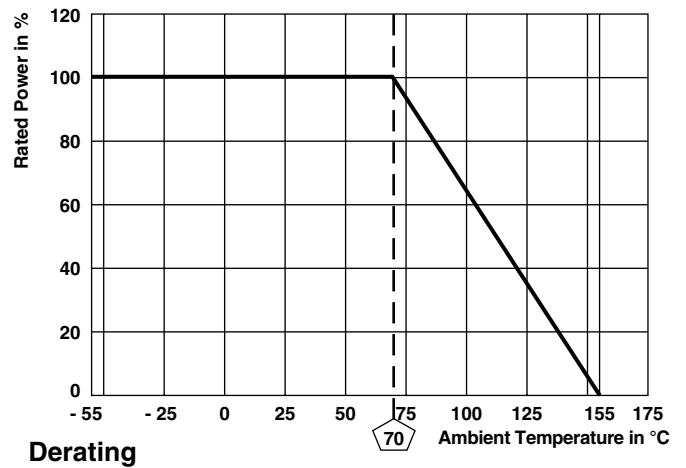
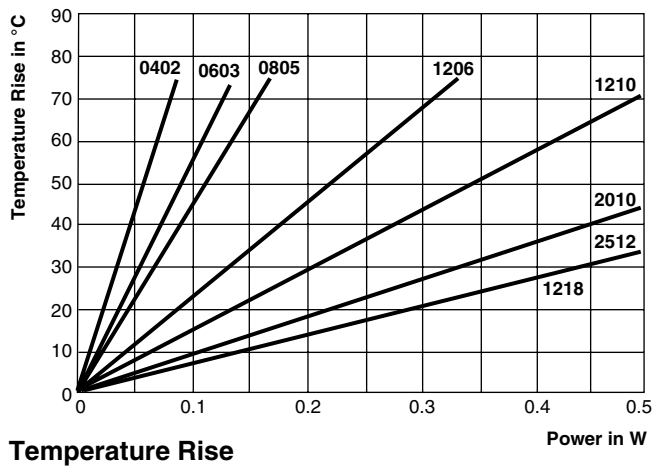
SIZE		DIMENSIONS [in millimeters]				
INCH	METRIC	L	W	H	T1	T2
0402	1005	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.25 ± 0.05	0.2 ± 0.1
0603	1608	1.55 ^{+0.10} _{-0.05}	0.85 ± 0.1	0.45 ± 0.05	0.3 ± 0.2	0.3 ± 0.2
0805	2012	2.0 ^{+0.20} _{-0.10}	1.25 ± 0.15	0.45 ± 0.05	0.3 ^{+0.20} _{-0.10}	0.3 ± 0.2
1206	3216	3.2 ^{+0.10} _{-0.20}	1.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2
1210	3225	3.2 ± 0.2	2.5 ± 0.2	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2
1218	3246	3.2 ^{+0.10} _{-0.20}	4.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.2	0.4 ± 0.2
2010	5025	5.0 ± 0.15	2.5 ± 0.15	0.6 ± 0.1	0.6 ± 0.2	0.6 ± 0.2
2512	6332	6.3 ± 0.2	3.15 ± 0.15	0.6 ± 0.1	0.6 ± 0.2	0.6 ± 0.2

SIZE		SOLDER PAD DIMENSIONS [in millimeters]					
		REFLOW SOLDERING			WAVE SOLDERING		
INCH	METRIC	a	b	l	a	b	l
0402	1005	0.4	0.6	0.5			
0603	1608	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	0.9	1.7	2.0	1.1	1.7	2.3
1210	3225	0.9	2.5	2.0	1.1	2.5	2.2
1218	3246	1.05	4.9	1.9	1.25	4.8	1.9
2010	5025	1.0	2.5	3.9	1.2	2.5	3.9
2512	6332	1.0	3.2	5.2	1.2	3.2	5.2



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TEST PROCEDURES AND REQUIREMENTS

EN 60115-1		
TEST (clause)	CONDITIONS OF TEST	REQUIREMENTS PERMISSIBLE CHANGE ($\Delta R/R$)
		STABILITY CLASS 1 OR BETTER
	Stability for product types: D../CRCW....-P e3	10R to 10M
Resistance (4.5)	-	± 1 ; ± 0.5 ; ± 0.25
Temperature coefficient (4.8.4.2)	20/- 55/20 °C and 20/125/20 °C	± 100 ppm/K; ± 50 ppm/K; ± 25 ppm/K
Overload (4.13)	$U = 2.5 \times (P_{70} \times R)^{1/2}$ $\leq 2 \times U_{max.}$; Duration: according the style	$\pm (0.25 \% R + 0.05 \Omega)$
Solderability (4.17.5)	Aging 4 h at 155 °C, dryheat solder bath method; 235 °C; 2 s visual examination	Good tinning (≥ 95 % covered) no visible damage
Resistance to soldering heat (4.18.2)	Solder bath method; (260 $\pm$ 5) °C; (10 $\pm$ 1) s	$\pm (0.25 \% R + 0.05 \Omega)$
Rapid change of temperature (4.19)	30 min at LCT = - 55 °C; 30 min at UCT = 125 °C; 5 cycles	$\pm (0.25 \% R + 0.05 \Omega)$
Damp heat, steady state (4.24)	(40 $\pm$ 2) °C; 56 days; (93 $\pm$ 3) % RH	$\pm (1 \% R + 0.05 \Omega)$
Climatic sequence (4.23)	16 h at UCT = 125 °C; 1 cycle at 55 °C; 2 h at LCT = - 55 °C; 1 h/1 kPa at 15 °C to 35 °C; 5 cycles at 55 °C $U = (P_{70} \times R)^{1/2}$ $U = U_{max.}$; whichever is less severe	$\pm (1 \% R + 0.05 \Omega)$
Endurance at 70 °C (4.25.1)	$U = (P_{70} \times R)^{1/2}$ $U = U_{max.}$; whichever is less severe 1.5 h ON; 0.5 h OFF; 70 °C; 1000 h	$\pm (1 \% R + 0.05 \Omega)$
Extended endurance (4.25.1.8)	Duration extended to 8000 h	$\pm (2 \% R + 0.1 \Omega)$
Endurance at upper category temperature (4.25.3)	UCT = 125 °C; 1000 h	$\pm (1 \% R + 0.05 \Omega)$

APPLICABLE SPECIFICATIONS

- | | |
|-----------------|--|
| • EN 60115-1 | Generic Specification |
| • EN 140400 | Sectional Specification |
| • EN 140401-802 | Detail Specification |
| • IEC 60068-2-X | Variety of environmental test procedures |
| • IEC 60286-3 | Packaging of SMD components |



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