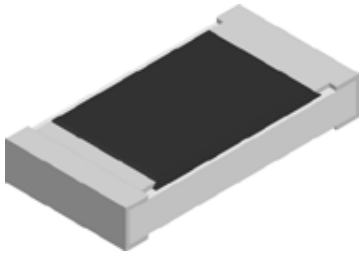
Lead (Pb)-Free Thick Film, Rectangular, Trimmable Chip Resistors



FEATURES

- Can be trimmed to the required value after insertion
- For applications in precision circuitry where relative tolerances can be compensated by trimming
- Pure tin solder contact 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 Umax. AC_{RMS}/DC V	TEMPERATURE COEFFICIENT ± ppm/K	TOLERANCE ± %	RESISTANCE RANGE Ω	SERIES
D10/CRCW0402-TR	0402	RR 1005M	0.063	50	100	10, 15, 20, + 0/- 10, + 0/- 20, + 0/- 30	10 to 10M	E24
					200		0.47 to 10M	
D11/CRCW0603-TR	0603	RR 1608M	0.10	75	100	10, 15, 20, + 0/- 10, + 0/- 20, + 0/- 30	10 to 10M	E24
					200		0.47 to 10M	
D12/CRCW0805-TR	0805	RR 2012M	0.125	150	100	10, 15, 20, + 0/- 10, + 0/- 20, + 0/- 30	10 to 10M	E24
					200		0.47 to 10M	
D25/CRCW1206-TR	1206	RR 3216M	0.25	200	100	10, 15, 20, + 0/- 10, + 0/- 20, + 0/- 30	10 to 10M	E24
					200		0.47 to 10M	
CRCW1210-TR	1210	RR 3225M	0.50	200	100	10, 15, 20, + 0/- 10, + 0/- 20, + 0/- 30	10 to 4.7M	E24
					200			
CRCW2010-TR	2010	RR 5025M	0.75	400	100	10, 15, 20, + 0/- 10, + 0/- 20, + 0/- 30	10 to 4.7M	E24
					200			
CRCW2512-TR	2512	RR 6332M	1.0	500	100	10, 15, 20, + 0/- 10, + 0/- 20, + 0/- 30	10 to 4.7M	E24
					200			

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: None
- 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-TR	D11/ CRCW0603-TR	D12/ CRCW0805-TR	D25/ CRCW1206-TR	CRCW1210-TR	CRCW2010-TR	CRCW2512-TR
Rated dissipation P_{70} (1)	W	0.063	0.1	0.125	0.25	0.50	0.75	1.0
Operating voltage $U_{max.}$ AC_{RMS}/DC	V	50	75	150	200	200	400	500
Insulation voltage $U_{ins.}$ (1 min)	V	75	100	200	300	300	300	300
Insulation resistance	Ω	> 10^9						
Operating temperature range	°C	- 55 to + 155						
Weight	mg	0.65	2	5.5	10	16	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-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: CRCW040275R0KKEDTR

C	R	C	W	0	4	0	2	7	5	R	0	K	K	E	D	T	R

MODEL	RESISTANCE	TOLERANCE	TCR	PACKAGING	SPECIAL
CRCW0402 **CRCW0603** **CRCW0805** **CRCW1206** **CRCW1210** **CRCW2010** **CRCW2512**	**R** = Decimal **K** = Thousand **M** = Million	**K** = ± 10 % **L** = ± 15 % **M** = ± 20 % **U** = + 0 %/- 10 % **V** = + 0 %/- 20 % **W** = + 0 %/- 30 %	**K** = ± 100 ppm/K **N** = ± 200 ppm/K	**EA** **EB** **EC** **ED** **EE** **EF** **EG** **EH**	Up to 2 digits **TR** = Trimmable

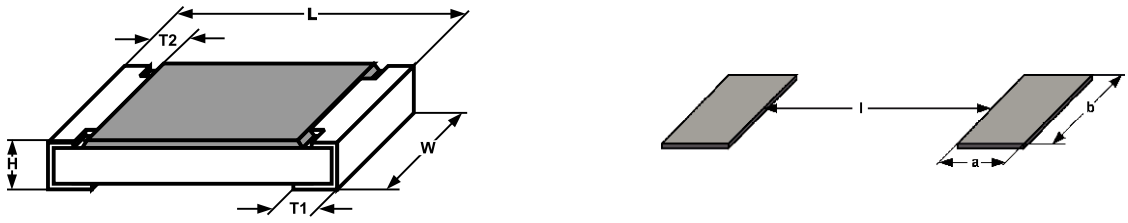
Product Description: D10/CRCW0402-TR 100 75R 10 % ET7 e3

D10/CRCW0402-TR	100	75R	10 %	ET7	e3
MODEL	TCR	RESISTANCE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE
D10/CRCW0402-TR **D11/CRCW0603-TR** **D12/CRCW0805-TR** **D25/CRCW1206-TR** **CRCW1210-TR** **CRCW2010-TR** **CRCW2512-TR**	± **100** ppm/K ± **200** ppm/K	**49K9** = 49.9 kΩ **5R1** = 5.1 Ω	± **10 %** ± **15 %** ± **20 %** **+ 0 %/- 10 %** **+ 0 %/- 20 %** **+ 0 %/- 30 %**	**ET1** **ET5** **ET6** **ET7** **EF4** **E02** **E67** **E82**	**e3** = Pure tin termination finish

PACKAGING

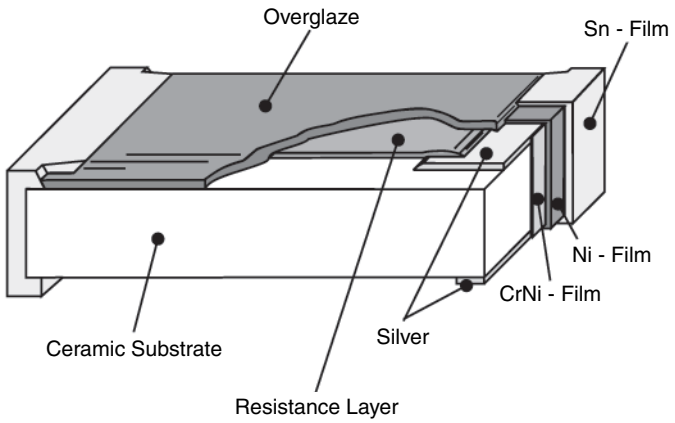
MODEL	CODE	QUANTITY	CARRIER TAPE	WIDTH	PITCH	REEL DIAMETER
D10/CRCW0402-TR	ED = ET7	10 000	Paper tape acc. to IEC 60068-3 Type I	8 mm	2 mm	180 mm/7"
	EE = EF4	50 000				330 mm/13"
D11/CRCW0603-TR	EA = ET1	5000		8 mm	4 mm	180 mm/7"
	EB = ET5	10 000				285 mm/11.25"
	EC = ET6	20 000				330 mm/13"
D12/CRCW0805-TR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

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 $^{+0.10}_{-0.05}$	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 $^{+0.20}_{-0.10}$	1.25 ± 0.15	0.45 ± 0.05	0.3 $^{+0.20}_{-0.10}$	0.3 ± 0.2	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	3.2 $^{+0.10}_{-0.20}$	1.6 ± 0.15	0.55 $^{+0.05}_{-0.10}$	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
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

TRIMMING INSTRUCTIONS



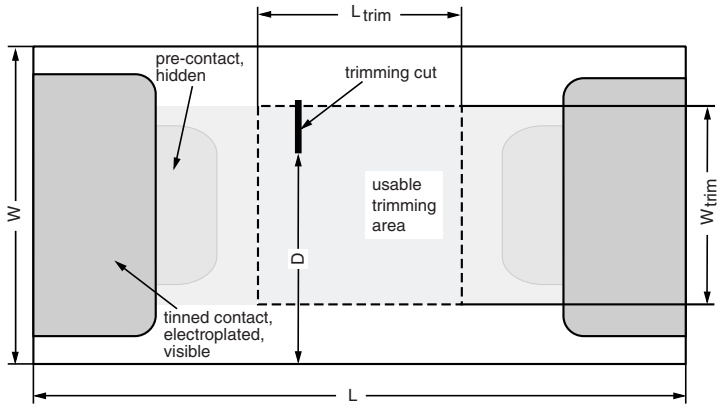
YAG-Laser:

Maximum trimming factor = 1.6 for an I-cut and 1.8 for a L-cut.

Double cut: Distance between two cuts = 0.5 mm min.

The laser-cut should be protected with epoxy resins.

PERMISSIBLE TRIMMING AREA

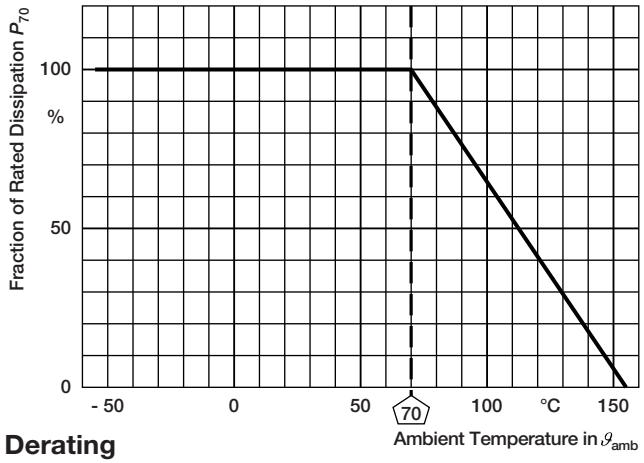


DIMENSIONS OF THE PERMISSIBLE TRIMMING AREA in millimeters					
MODEL	**L**	**W**	**L_{trim}**	**W_{trim}**	**D**
D10/CRCW0402-TR (1)	1.0	0.5	≤ 0.25	0.27	≥ 0.25
D11/CRCW0603-TR (1)	1.55	0.85	≤ 0.425	0.5	≥ 0.425
D12/CRCW0805-TR	2.0	1.25	≤ 0.625	0.85	≥ 0.625
D25/CRCW1206-TR	3.2	1.6	≤ 0.8	1.0	≥ 0.8
CRCW1210-TR	3.2	2.5	≤ 1.25	1.6	≥ 1.25
CRCW2010-TR	5.0	2.5	≤ 1.25	1.9	≥ 1.25
CRCW2512-TR	6.3	3.15	≤ 1.575	2.4	≥ 1.575

Note

(1) Single cut only.

DERATING



TEST PROCEDURES AND REQUIREMENTS					
EN 60115-1 CLAUSE	**IEC 60068-2 TEST METHOD**	**TEST**	**PROCEDURE**	**REQUIREMENTS PERMISSIBLE CHANGE (ΔR) [1]**	
			Stability for product types:	**STABILITY CLASS 1 OR BETTER**	**STABILITY CLASS 2 OR BETTER**
			D/CRCW-TR e3	10 Ω to 10 MΩ	0.47 Ω to 10 MΩ
4.5	-	Resistance	-	± 1 %	± 5 %
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max.}$; Duration acc. to style	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
4.17.2	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 or Sn99.3Cu0.7 non-activated flux; (245 ± 5) °C or (250 ± 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
4.19	14 (Na)	Rapid change of temperature	30 min. at - 55 °C; 30 min. at 125 °C		
			5 cycles	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
			1000 cycles	± (1 % R + 0.05 Ω)	± (1 % R + 0.05 Ω)
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	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 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	$U = \sqrt{P_{70} \times R}$		
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	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)
			70 °C; 8000 h	± (2 % R + 0.1 Ω)	± (4 % R + 0.1 Ω)
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 ± 5) °C; (10 ± 1) s	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)

TEST PROCEDURES AND REQUIREMENTS					
EN 60115-1 CLAUSE	**IEC 60068-2 TEST METHOD**	**TEST**	**PROCEDURE**	**REQUIREMENTS PERMISSIBLE CHANGE (ΔR) (1)**	
			Stability for product types:	**STABILITY CLASS 1 OR BETTER**	**STABILITY CLASS 2 OR BETTER**
			D/CRCW-TR e3	10 Ω to 10 MΩ	0.47 Ω to 10 MΩ
4.24	78 (Cab)	Damp heat, steady state	(40 ± 2) °C; (93 ± 3) % RH; 56 days	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)
4.25.3	-	Endurance at upper category temperature	155 °C, 1000 h	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 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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