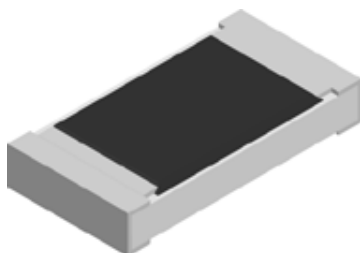




## Lead (Pb)-Free Thick Film, Rectangular, Trimmable Chip Resistors



### 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](http://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 <sub>RMS</sub> /DC V	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE $\Omega$	SERIES
D10/CRCW0402-TR	0402	RR 1005M	0.063	50	$\pm 100$ $\pm 200$	$\pm 10, \pm 15, \pm 20$ , + 0/- 10, + 0/- 20, + 0/- 30	10 to 10M 0.47 to 10M	E24
D11/CRCW0603-TR	0603	RR 1608M	0.10	75	$\pm 100$ $\pm 200$	$\pm 10, \pm 15, \pm 20$ , + 0/- 10, + 0/- 20, + 0/- 30	10 to 10M 0.47 to 10M	E24
D12/CRCW0805-TR	0805	RR 2012M	0.125	150	$\pm 100$ $\pm 200$	$\pm 10, \pm 15, \pm 20$ , + 0/- 10, + 0/- 20, + 0/- 30	10 to 10M 0.47 to 10M	E24
D25/CRCW1206-TR	1206	RR 3216M	0.25	200	$\pm 100$ $\pm 200$	$\pm 10, \pm 15, \pm 20$ , + 0/- 10, + 0/- 20, + 0/- 30	10 to 10M 0.47 to 10M	E24
CRCW1210-TR	1210	RR 3225M	0.50	200	$\pm 100$ $\pm 200$	$\pm 10, \pm 15, \pm 20$ , + 0/- 10, + 0/- 20, + 0/- 30	10 to 4.7M	E24
CRCW2010-TR	2010	RR 5025M	0.75	400	$\pm 100$ $\pm 200$	$\pm 10, \pm 15, \pm 20$ , + 0/- 10, + 0/- 20, + 0/- 30	10 to 4.7M	E24
CRCW2512-TR	2512	RR 6332M	1.0	500	$\pm 100$ $\pm 200$	$\pm 10, \pm 15, \pm 20$ , + 0/- 10, + 0/- 20, + 0/- 30	10 to 4.7M	E24

### 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 $P_{70}$ <sup>(1)</sup>	W	0.063	0.1	0.125	0.25	0.50	0.75	1.0
Operating voltage $U_{max}$ . AC <sub>RMS</sub> /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	$\Omega$	$> 10^9$						
Operating temperature range	°C	-55 to +155						
Weight	mg	0.65	2	5.5	10	16	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: CRCW040275R0KKEDTR

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

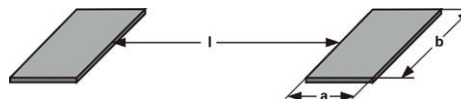
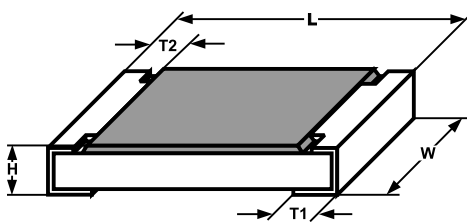
MODEL	RESISTANCE	TOLERANCE	TCR	PACKAGING	SPECIAL
<b>CRCW0402</b> <b>CRCW0603</b> <b>CRCW0805</b> <b>CRCW1206</b> <b>CRCW1210</b> <b>CRCW2010</b> <b>CRCW2512</b>	<b>R</b> = decimal <b>K</b> = thousand <b>M</b> = million	<b>K</b> = $\pm 10\%$ <b>L</b> = $\pm 15\%$ <b>M</b> = $\pm 20\%$ <b>U</b> = $+0\%/-10\%$ <b>V</b> = $+0\%/-20\%$ <b>W</b> = $+0\%/-30\%$	<b>K</b> = $\pm 100$ ppm/K <b>N</b> = $\pm 200$ ppm/K	<b>EA</b> <b>EB</b> <b>EC</b> <b>ED</b> <b>EE</b> <b>EF</b> <b>EG</b> <b>EH</b>	Up to 2 digits <b>TR</b> = trimmable

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

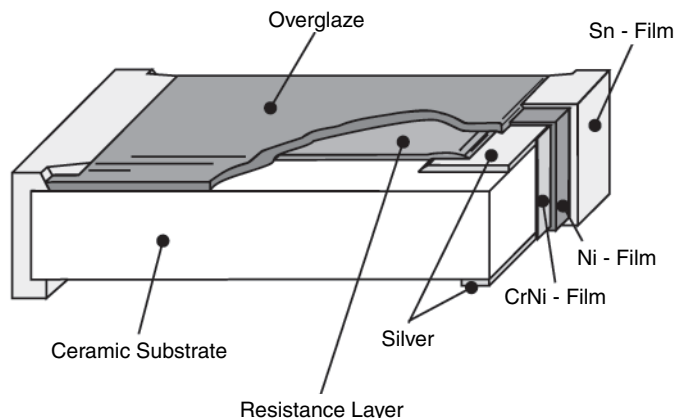
D10/CRCW0402-TR	100	75R	10 %	ET7	e3
MODEL	TCR	RESISTANCE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE
<b>D10/CRCW0402-TR</b> <b>D11/CRCW0603-TR</b> <b>D12/CRCW0805-TR</b> <b>D25/CRCW1206-TR</b> <b>CRCW1210-TR</b> <b>CRCW2010-TR</b> <b>CRCW2512-TR</b>	$\pm 100$ ppm/K $\pm 200$ ppm/K	<b>49K9</b> = 49.9 k $\Omega$ <b>5R1</b> = 5.1 $\Omega$	$\pm 10\%$ $\pm 15\%$ $\pm 20\%$ $+0\%/-10\%$ $+0\%/-20\%$ $+0\%/-30\%$	<b>ET1</b> <b>ET5</b> <b>ET6</b> <b>ET7</b> <b>EF4</b> <b>E02</b> <b>E67</b> <b>E82</b>	<b>e3</b> = 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	$1.0 \pm 0.05$	$0.5 \pm 0.05$	$0.35 \pm 0.05$	$0.25 \pm 0.10$	$0.2 \pm 0.1$	0.4	0.6	0.5			
0603	1608	$1.55^{+0.10}_{-0.05}$	$0.85 \pm 0.1$	$0.45 \pm 0.05$	$0.3 \pm 0.2$	$0.3 \pm 0.2$	0.5	0.9	1.0	0.9	0.9	1.0
0805	2012	$2.0^{+0.20}_{-0.10}$	$1.25 \pm 0.15$	$0.45 \pm 0.05$	$0.3^{+0.20}_{-0.10}$	$0.3 \pm 0.2$	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	$3.2^{+0.10}_{-0.20}$	$1.6 \pm 0.15$	$0.55^{+0.05}_{-0.10}$	$0.45 \pm 0.2$	$0.4 \pm 0.2$	0.9	1.7	2.0	1.1	1.7	2.3
1210	3225	$3.2 \pm 0.2$	$2.5 \pm 0.2$	$0.55 \pm 0.05$	$0.45 \pm 0.2$	$0.4 \pm 0.2$	0.9	2.5	2.0	1.1	2.5	2.2
2010	5025	$5.0 \pm 0.15$	$2.5 \pm 0.15$	$0.6 \pm 0.1$	$0.6 \pm 0.2$	$0.6 \pm 0.2$	1.0	2.5	3.9	1.2	2.5	3.9
2512	6332	$6.3 \pm 0.2$	$3.15 \pm 0.15$	$0.6 \pm 0.1$	$0.6 \pm 0.2$	$0.6 \pm 0.2$	1.0	3.2	5.2	1.2	3.2	5.2

**TRIMMING INSTRUCTIONS**

YAG-Laser:

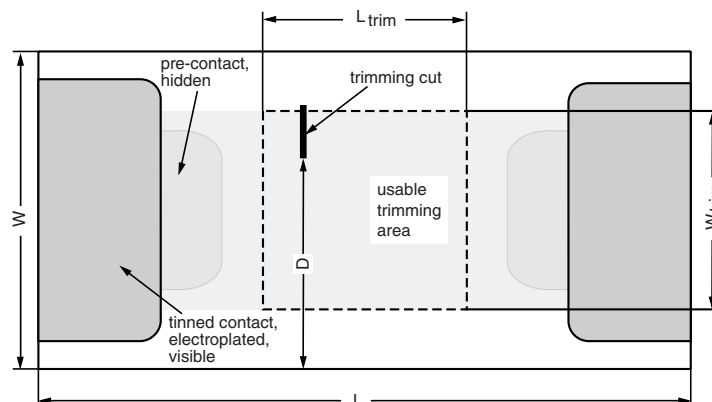
Maximum trimming factor = 1.6 for an I-cut and 1.8 for a L-cut.

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

The laser-cut should be protected with epoxy resins.



## PERMISSIBLE TRIMMING AREA



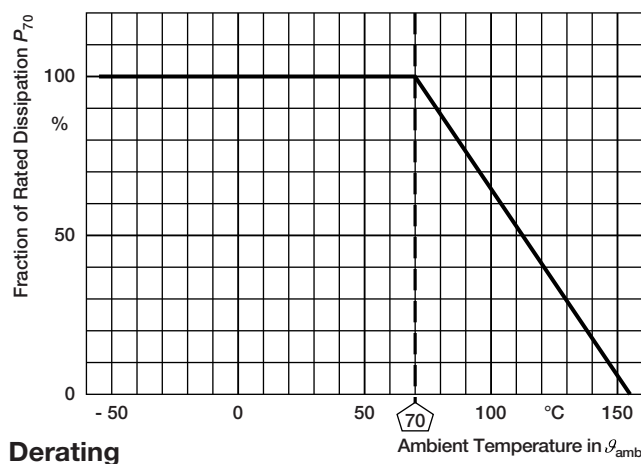
**DIMENSIONS OF THE PERMISSIBLE TRIMMING AREA** in millimeters

MODEL	L	W	L <sub>trim</sub>	W <sub>trim</sub>	D
D10/CRCW0402-TR <sup>(1)</sup>	1.0	0.5	≤ 0.25	0.27	≥ 0.25
D11/CRCW0603-TR <sup>(1)</sup>	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

<sup>(1)</sup> Single cut only.

## DERATING





## TEST PROCEDURES AND REQUIREMENTS

EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ ) <sup>(1)</sup>	
			Stability for product types:	<b>STABILITY CLASS 1 OR BETTER</b>	<b>STABILITY CLASS 2 OR BETTER</b>
			<b>D/CRCW-TR e3</b>	10 $\Omega$ to 10 M $\Omega$	0.47 $\Omega$ to 10 M $\Omega$
4.5	-	Resistance	-	$\pm 1 \%$	$\pm 5 \%$
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max.}$ ; Duration acc. to style	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$
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 or Sn99.3Cu0.7 non-activated flux; (245 $\pm$ 5) $^{\circ}$ C or (250 $\pm$ 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	$\pm 200$ ppm/K
4.19	14 (Na)	Rapid change of temperature	30 min. at -55 $^{\circ}$ C; 30 min. at 125 $^{\circ}$ C		
			5 cycles  1000 cycles	$\pm (0.25 \% R + 0.05 \Omega)$  $\pm (1 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$  $\pm (1 \% R + 0.05 \Omega)$
4.23	-	Climatic sequence:	-		
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	$\pm (1 \% R + 0.05 \Omega)$	$\pm (2 \% R + 0.1 \Omega)$
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;		
			70 $^{\circ}$ C; 1000 h  70 $^{\circ}$ C; 8000 h	$\pm (1 \% R + 0.05 \Omega)$  $\pm (2 \% R + 0.1 \Omega)$	$\pm (2 \% R + 0.1 \Omega)$  $\pm (4 \% R + 0.1 \Omega)$
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 $\pm$ 5) $^{\circ}$ C; (10 $\pm$ 1) s	$\pm (0.25 \% R + 0.05 \Omega)$	$\pm (0.5 \% R + 0.05 \Omega)$



TEST PROCEDURES AND REQUIREMENTS					
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ ) <sup>(1)</sup>	
			Stability for product types:	<b>STABILITY CLASS 1 OR BETTER</b>	<b>STABILITY CLASS 2 OR BETTER</b>
			<b>D/CRCW-TR e3</b>	10 $\Omega$ to 10 M $\Omega$	0.47 $\Omega$ to 10 M $\Omega$
4.24	78 (Cab)	Damp heat, steady state	(40 $\pm$ 2) $^{\circ}$ C; (93 $\pm$ 3) % RH; 56 days	$\pm$ (1 % $R$ + 0.05 $\Omega$ )	$\pm$ (2 % $R$ + 0.1 $\Omega$ )
4.25.3	-	Endurance at upper category temperature	155 $^{\circ}$ C, 1000 h	$\pm$ (1 % $R$ + 0.05 $\Omega$ )	$\pm$ (2 % $R$ + 0.1 $\Omega$ )

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-x, environmental test procedures

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



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.