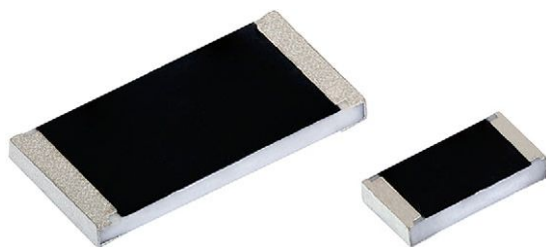




## Standard Thick Film Chip Resistors



### FEATURES

- High pulse performance (time/power)
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



TECHNICAL SPECIFICATIONS			
DESCRIPTION	D25/CRCW1206-37 e3	CRCW1210-37 e3	CRCW2512-37 e3
Imperial size	1206	1210	2512
Metric size code	RR3216M	RR3225M	RR6332M
Resistance range	5.1 Ω to 10 MΩ		
Resistance tolerance	± 10 %		
Temperature coefficient	± 200 ppm/K		
Rated dissipation, $P_{70}$	0.25 W	0.33 W	1 W
Operating voltage $U_{max}$ , AC <sub>RMS</sub> /DC	200 V	200 V	500 V
Permissible film temperature, $\vartheta_{Fmax}$	155 °C		
Operating temperature range	-55 °C to +155 °C		
Thermal resistance <sup>(1)</sup>	≤ 220 K/W	≤ 140 K/W	≤ 65 K/W
Max. resistance change at $P_{70}$ for resistance range, $ \Delta R/R $ after:			
1000 h	≤ 1 %		
8000 h	≤ 2 %		
Permissible voltage against ambient (insulation):			
1 min, $U_{ins}$	300 V	300 V	300 V

### Note

- <sup>(1)</sup> For size 1206 the measuring conditions are in accordance to EN 140401-802.  
For all other sizes the result depends on the solder pad dimensions

### APPLICATION INFORMATION

When the resistor dissipates power, a temperature rise above the ambient temperature occurs, dependent on the thermal resistance of the assembled resistor together with the printed circuit board. The rated dissipation applies only if the permitted film temperature is not exceeded.

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.



### TEMPERATURE COEFFICIENT AND RESISTANCE RANGE

TYPE / SIZE	TCR	TOLERANCE	RESISTANCE	E-SERIES
D25/CRCW1206-37 e3	± 200 ppm/K	± 10 %	5.1 Ω to 10 MΩ	E24
CRCW1210-37 e3	± 200 ppm/K	± 10 %	5.1 Ω to 10 MΩ	E24
CRCW2512-37 e3	± 200 ppm/K	± 10 %	5.1 Ω to 10 MΩ	E24

### PACKAGING

TYPE / SIZE	CODE	QUANTITY	PACKAGING STYLE	WIDTH	PITCH	PACKAGING DIMENSIONS
D25/CRCW1206-37 e3	EI = EG1	5000	Blister tape acc. to IEC 60286-3, Type 2a	8 mm	4 mm	180 mm / 7"
	EL = E20	20 000				330 mm / 13"
	EA = ET1	5000	Paper tape acc. to IEC 60286-3, Type 1a	8 mm	4 mm	180 mm / 7"
	EB = ET5	10 000				285 mm / 11.25"
EC = ET6	20 000	330 mm / 13"				
CRCW1210-37 e3	EA = ET1	5000	Paper tape acc. to IEC 60286-3, Type 1a	12 mm	4 mm	180 mm / 7"
	EB = ET5	10 000				285 mm / 11.25"
	EC = ET6	20 000				330 mm / 13"
CRCW2512-37 e3	EG = E67	2000	Blister tape acc. to IEC 60286-3, Type 2a	12 mm	8 mm	180 mm / 7"
	EH = E82	4000			4 mm	

### PART NUMBER AND PRODUCT DESCRIPTION

Part Number: CRCW120622K0KNEA37

C	R	C	W	1	2	0	6	2	2	K	0	K	N	E	A	3	7
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TYPE / SIZE	RESISTANCE	TOLERANCE	TCR	PACKAGING	SPECIAL
CRCW1206 CRCW1210 CRCW2512	R = decimal K = thousand M = million	K = ± 10 %	N = ± 200 ppm/K	EA, EB, EC, EG, EH, EI, EL	Up to 2 digits 37 = non-trimmed

Product Description: D25/CRCW1206-37 200 22K0 10 % ET1 e3

TYPE / SIZE	TCR	RESISTANCE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE
D25/CRCW1206-37	200	22K0	10 %	ET1	e3
D25/CRCW1206-37 CRCW1210-37 CRCW2512-37	± 200 ppm/K	10R = 10 Ω 22K = 22 kΩ 1M = 1 MΩ	± 10 %	EG1, ET1, ET5, ET6, E20, E67, E82	e3 = pure tin termination finish



## DESCRIPTION

Production is strictly controlled and follows an extensive set of instructions established for reproducibility. A cermet film layer and a glass-over are deposited on a high grade ( $Al_2O_3$ ) ceramic substrate with its prepared inner contacts. The resistor elements are covered by a protective coating designed for electrical, mechanical and climatic protection. The terminations receive a final pure tin on nickel plating. The result of the determined production is verified by an extensive testing procedure on 100 % of the individual chip resistors. Only accepted products are laid directly into the tape in accordance with **IEC 60286-3 Type 1a and Type 2a** <sup>(1)</sup>.

## ASSEMBLY

The resistors are suitable for processing on automatic SMD assembly systems. They are suitable for automatic soldering using wave, reflow or vapor phase as shown in **IEC 61760-1** <sup>(1)</sup>. The encapsulation is resistant to all cleaning solvents commonly used in the electronics industry, including alcohols, esters and aqueous solutions. The suitability of conformal coatings, potting compounds and their processes, if applied, shall be qualified by appropriate means to ensure the long-term stability of the whole system.

Solderability is specified for 2 years after production or requalification. The permitted storage time is 20 years. The immunity of the plating against tin whisker growth has been proven under extensive testing.

## MATERIALS

Vishay acknowledges the following systems for the regulation of hazardous substances:

- IEC 62474, Material Declaration for Products of and for the Electrotechnical Industry, with the list of declarable substances given therein <sup>(2)</sup>
- The Global Automotive Declarable Substance List (GADSL) <sup>(3)</sup>
- The REACH regulation (1907/2006/EC) and the related list of substances with very high concern (SVHC) <sup>(4)</sup> for its supply chain

The products do not contain any of the banned substances as per IEC 62474, GADSL, or the SVHC list, see [www.vishay.com/how/leadfree](http://www.vishay.com/how/leadfree).

Hence the products fully comply with the following directives:

- 2000/53/EC End-of-Life Vehicle Directive (ELV) and Annex II (ELV II)
- 2011/65/EU Restriction of the Use of Hazardous Substances Directive (RoHS) with amendment 2015/863/EU
- 2012/19/EU Waste Electrical and Electronic Equipment Directive (WEEE)

Vishay pursues the elimination of conflict minerals from its supply chain, see the Conflict Minerals Policy at [www.vishay.com/doc?49037](http://www.vishay.com/doc?49037).

## APPROVALS

Where applicable, the resistors are tested in accordance with **EN 140401-802** which refers to **EN 60115-1**, **EN 60115-8** and the variety of environmental test procedures of the **IEC 60068** <sup>(1)</sup> series.

## RELATED PRODUCTS

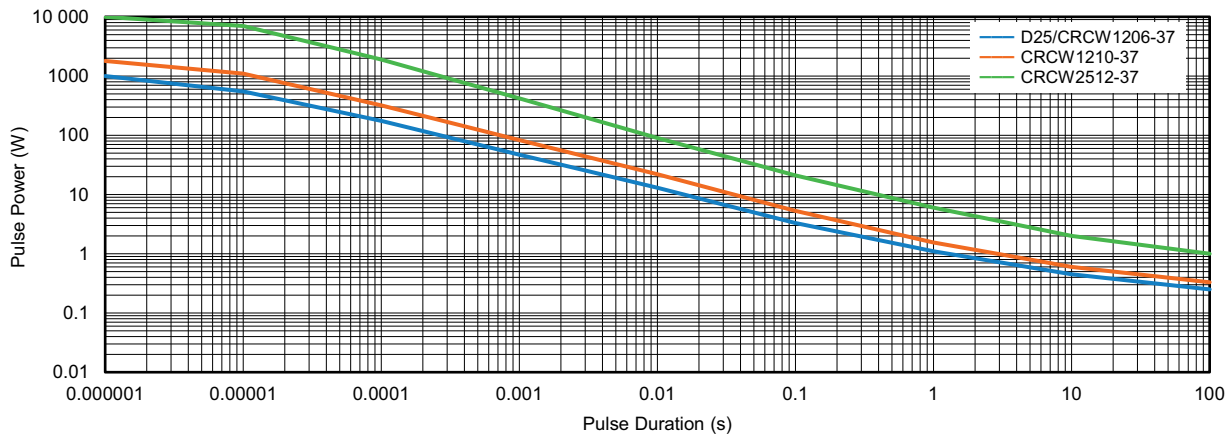
For more case sizes, wide ohmic range, and tighter tolerance, please refer to the "Pulse Proof Thick Film Chip Resistors" datasheet ([www.vishay.com/doc?20024](http://www.vishay.com/doc?20024)).

## Notes

- <sup>(1)</sup> The quoted IEC standards are also released as EN standards with the same number and identical contents
- <sup>(2)</sup> The IEC 62474 list of declarable substances is maintained in a dedicated database, which is available at <http://std.iec.ch/iec62474>
- <sup>(3)</sup> The Global Automotive Declarable Substance List (GADSL) is maintained by the American Chemistry Council and available at [www.gadsl.org](http://www.gadsl.org)
- <sup>(4)</sup> The SVHC list is maintained by the European Chemical Agency (ECHA) and available at <http://echa.europa.eu/candidate-list-table>

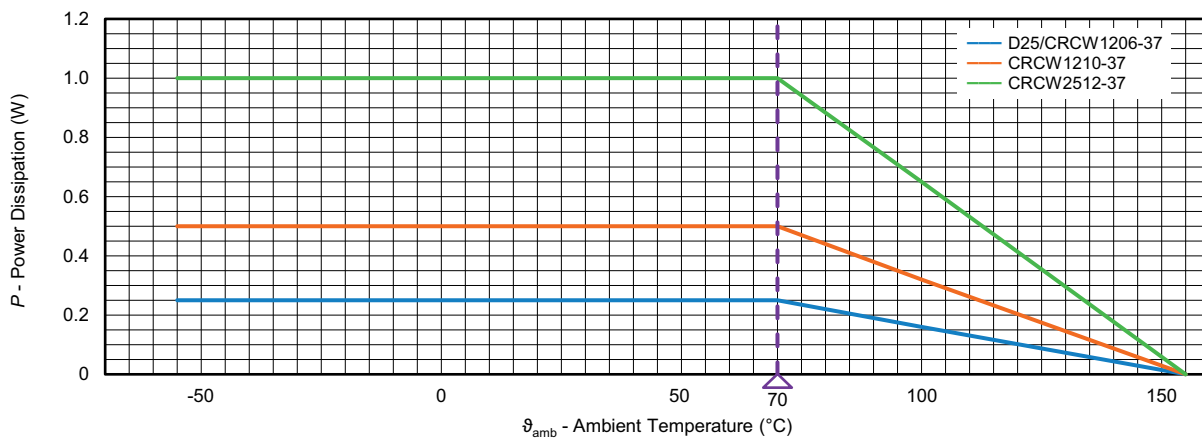


**FUNCTIONAL PERFORMANCE**



Maximum pulse dissipation as a function of the pulse duration for one pulse loading of CRCW...-37 resistors

**Derating**





## TESTS AND REQUIREMENTS

All executed tests are carried out in accordance with the following specifications:

- EN 60115-1, generic specification
- EN 60115-8, sectional specification
- EN 140401-802, detail specification
- IEC 60068-2-xx, test methods

The parameters stated in the Test Procedures and Requirements table are based on the required tests and permitted limits of EN 140401-802. The table presents only the most important tests, for the full test schedule refer to the documents listed above. However, some additional tests and a number of improvements against those minimum requirements have been included.

The testing also covers most of the requirements specified by EIA/IS-703 and JIS-C-5201-1.

The tests are carried out under standard atmospheric conditions in accordance with IEC 60068-1, 4.3, whereupon the following values are applied:

Temperature: 15 °C to 35 °C

Relative humidity: 25 % to 75 %

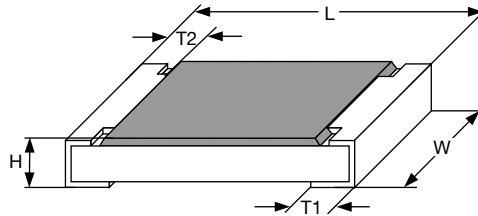
Air pressure: 86 kPa to 106 kPa (860 mbar to 1060 mbar).

A climatic category LCT / UCT / 56 is applied, defined by the lower category temperature (LCT), the upper category temperature (UCT), and the duration of exposure in the damp heat, steady state test (56 days). The components are mounted for testing on boards in accordance with EN 60115-8, 2.4.2 unless otherwise specified.

TEST PROCEDURES AND REQUIREMENTS				
EN60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ )
			STABILITY FOR PRODUCT TYPES:	STABILITY CLASS 2 OR BETTER
			CRCW-37 e3	5.1 $\Omega$ TO 10 M $\Omega$
4.5	-	Resistance	-	$\pm 10 \%$
4.8	-	Temperature coefficient	At (20 / -55 / 20) °C and (20 / 125 / 20) °C	$\pm 200$ ppm/K
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 70 °C; 8000 h	$\pm (1 \% R + 0.05 \Omega)$ $\pm (2 \% R + 0.1 \Omega)$
4.25.3	-	Endurance at upper category temperature	125 °C, 1000 h	$\pm (1 \% R + 0.05 \Omega)$
4.24	78 (Cab)	Damp heat, steady state	(40 $\pm$ 2) °C; (93 $\pm$ 3) % RH; 56 days	$\pm (1 \% R + 0.05 \Omega)$
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; 24 h; $\geq 90$ % RH; 1 cycle	
4.23.4	1 (Ab)	Cold	-55 °C; 2 h	$\pm (1 \% R + 0.05 \Omega)$
4.23.5	13 (M)	Low air pressure	8.5 kPa; 2 h; (25 $\pm$ 10) °C	
4.23.6	30 (Db)	Damp heat, cyclic	55 °C, 5 days; $> 90$ % RH; 5 cycles	
4.23.7	-	DC load	$U = \sqrt{P_{70}} \times R \leq U_{max.};$ 1 min	
4.19	14 (Na)	Rapid change of temperature	30 min at -55 °C; and 30 min at 125 °C; 5 cycles	$\pm (0.25 \% R + 0.05 \Omega)$
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70}} \times R \leq 2 \times U_{max.};$ whichever is the less severe; 5 s	$\pm (2 \% R + 0.05 \Omega)$
4.17	58 (Td)	Solderability	Solder bath method; Sn60Pb40 non-activated flux; (235 $\pm$ 5) °C (2 $\pm$ 0.2) s Solder bath method; Sn96.5Ag3Cu0.5 or Sn99.3Cu0.7 non-activated flux; (245 $\pm$ 5) °C or (250 $\pm$ 5) °C; (3 $\pm$ 0.3) s	Good tinning ( $\geq 95$ % covered) no visible damage
4.18	58 (Td)	Resistance to soldering heat	Solder bath method (260 $\pm$ 5) °C; (10 $\pm$ 1) s	$\pm (0.25 \% R + 0.05 \Omega)$

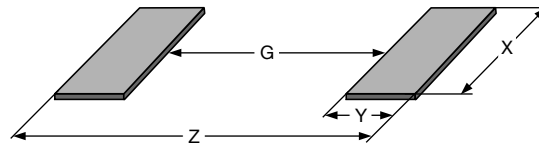


## DIMENSIONS



DIMENSIONS AND MASS						
TYPE / SIZE	L (mm)	W (mm)	H (mm)	T1 (mm)	T2 (mm)	MASS (mg)
CRCW1206-37 e3	3.20 + 0.10 / - 0.20	1.60 ± 0.15	0.55 ± 0.05	0.45 ± 0.20	0.40 ± 0.20	10
CRCW1210-37 e3	3.2 ± 0.20	2.50 ± 0.20	0.55 ± 0.05	0.45 ± 0.20	0.40 ± 0.20	16
CRCW2512-37 e3	6.3 ± 0.20	3.15 ± 0.15	0.60 ± 0.10	0.60 ± 0.20	0.60 ± 0.20	40.5

## SOLDER PAD DIMENSIONS



RECOMMENDED SOLDER PAD DIMENSIONS								
TYPE / SIZE	WAVE SOLDERING				REFLOW SOLDERING			
	G (mm)	Y (mm)	X (mm)	Z (mm)	G (mm)	Y (mm)	X (mm)	Z (mm)
CRCW1206-37 e3	2.30	1.10	1.70	4.50	0.75	0.90	1.70	2.55
CRCW1210-37 e3	2.20	1.10	2.50	4.40	1.00	0.90	2.50	2.80
CRCW2512-37 e3	5.20	1.20	3.20	7.60	1.50	1.00	3.20	3.50

## Note

- The rated dissipation applies only if the permitted film temperature is not exceeded. Furthermore, a high level of ambient temperature or of power dissipation may raise the temperature of the solder joint, hence special solder alloys or board materials may be required to maintain the reliability of the assembly.

The given solder pad dimensions reflect the considerations for board design and assembly as outlined e.g. in standards IEC 61188-5-x or in publication IPC-7351. They do not guarantee any supposed thermal properties, particularly as these are also strongly influenced by many other parameters. Still, the given solder pad dimensions will be found adequate for most general applications



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