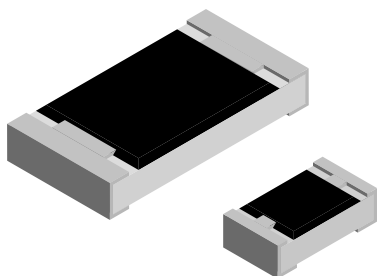


Lead (Pb)-Free Thick Film, Rectangular High Value Chip Resistor



FEATURES

- High resistance values (up to 470M)
- Suitable for voltage dividers and hybrids
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processing
- 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 $U_{max.}$ AC RMS/DC V	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	SERIES
D11/CRCW0603-HR	0603	RR 1608M	0.10	75	± 500	± 5	11M to 470M	E24
D12/CRCW0805-HR	0805	RR 2012M	0.125	150	± 500	± 5	11M to 470M	E24
D25/CRCW1206-HR	1206	RR 3216M	0.25	200	± 500	± 5	11M to 470M	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 and packaging: See datasheet "Surface Mount Resistor Marking" (www.vishay.com/doc?20020)
- Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material.

TECHNICAL SPECIFICATIONS

PARAMETER	UNIT	D11/CRCW0603-HR	D12/CRCW0805-HR	D25/CRCW1206-HR
Rated Dissipation at P_{70} ⁽¹⁾	W	0.1	0.125	0.25
Operating Voltage $U_{max.}$ AC RMS/DC	V	75	150	200
Voltage Coefficient	%/V	$< 100M: < 0.1$ $> 100M: < 0.3$		
Insulation Voltage U_{ins} (1 min)	V	100	200	300
Insulation Resistance	Ω	$> 10^9$		
Operating Temperature Range	$^{\circ}C$	- 55 to + 155		
Weight	mg	2	5.5	10

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 $^{\circ}C$ is not exceeded.

PART NUMBER AND PRODUCT DESCRIPTION

Part Number: CRCW060316M0JPEAHR

C	R	C	W	0	6	0	3	1	6	M	0	J	P	E	A	H	R
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

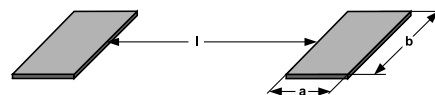
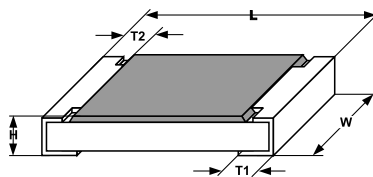
MODEL/SIZE	RESISTANCE	TOLERANCE	TCR	PACKAGING	SPECIAL
CRCW0603 CRCW0805 CRCW1206	M = Million	J = $\pm 5\%$	P = ± 500 ppm/K	EA EB EC	Up to 2 digits HR = High value

Product Description: D11/CRCW0603-HR 500 16M 5 % ET1 e3

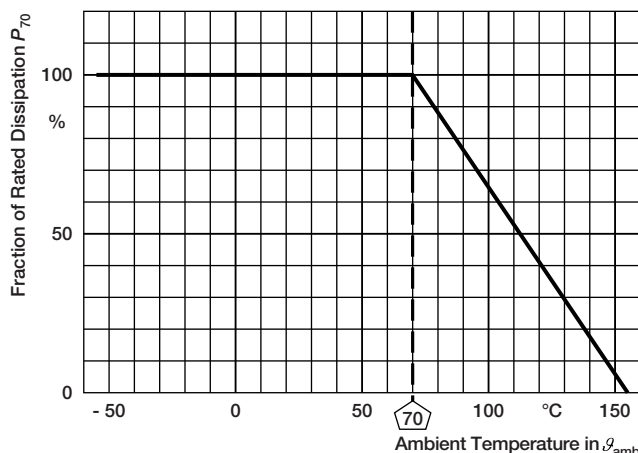
D11/CRCW0603-HR	500	16M	5 %	ET1	e3
MODEL	TCR	RESISTANCE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE
D11/CRCW0603-HR D12/CRCW0805-HR D25/CRCW1206-HR	± 500 ppm/K	68M = 68 M Ω 227M = 227 M Ω	$\pm 5\%$	ET1 ET5 ET6	e3 = Pure tin termination finish

PACKAGING

MODEL	CODE	QUANTITY	CARRIER TAPE	WIDTH	PITCH	REEL DIAMETER
D11/CRCW0603-HR	EA = ET1	5000	Paper tape acc. to IEC 60068-3 Type I	8 mm	4 mm	180 mm/7"
	EB = ET5	10 000				285 mm/11.25"
	EC = ET6	20 000				330 mm/13"
D12/CRCW0805-HR	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-HR	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"

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
0603	1608	1.55 $\begin{smallmatrix} +0.10 \\ -0.05 \end{smallmatrix}$	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 $\begin{smallmatrix} +0.20 \\ -0.10 \end{smallmatrix}$	1.25 ± 0.15	0.45 ± 0.05	0.3 $\begin{smallmatrix} +0.10 \\ -0.20 \end{smallmatrix}$	0.3 ± 0.2	0.7	1.3	1.2	0.9	1.3	1.3
1206	3216	3.2 $\begin{smallmatrix} +0.10 \\ -0.20 \end{smallmatrix}$	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

DERATING

TEST PROCEDURES AND REQUIREMENTS

EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)
				STABILITY CLASS 2 OR BETTER
			Stability for product types:	11 M Ω to 470 M Ω
			D/CRCW-HR e3	
4.5	—	Resistance	-	$\pm 5 \%$
4.13	—	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R} \leq 2 \times U_{\max.}$; Duration acc. to style	$\pm (0.5 \% R + 0.05 \Omega)$
4.17.2	58 (Td)	Solderability	Solder bath method; Sn60Pb40	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 $^{\circ}$ C/- 55 $^{\circ}$ C/20 $^{\circ}$ C and 20 $^{\circ}$ C/125 $^{\circ}$ /20 $^{\circ}$ C	± 500 ppm/K
4.32	21 (Uu ₃)	Shear (adhesion)	RR 1608: 9 N RR 2012 and RR 3216: 45N	No visible damage
4.33	21 (Uu ₁)	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 5 cycles 1000 cycles	$\pm (0.5 \% R + 0.05 \Omega)$ $\pm (1 \% R + 0.05 \Omega)$
4.23 4.23.2 4.23.3	— 2 (Ba) 30 (Db)	Climatic sequence: Dry Heat Damp heat, cyclic	— 125 $^{\circ}$ C; 16 h 55 $^{\circ}$ C; $\geq 90 \%$ RH; 24 h; 1 cycle	$\pm (2 \% R + 0.1 \Omega)$
4.23.4 4.23.5 4.23.6	1 (Aa) 13 (M) 30 (Db)	Cold Low air pressure	- 55 $^{\circ}$ C; 2 h 1 kPa; (25 $\pm$ 10) $^{\circ}$ C; 1 h	
4.23.6		Damp heat, cyclic	55 $^{\circ}$ C; $\geq 90 \%$ RH 24 h; 5 cycle	
4.23.7	—	D.C. Load	$U = \sqrt{P_{70} \times R}$	



TEST PROCEDURES AND REQUIREMENTS				
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)
				STABILITY CLASS 2 OR BETTER
			Stability for product types:	11 M Ω to 470 M Ω
			D/CRCW-HR e3	
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	$\pm (2 \% R + 0.1 \Omega)$ $\pm (4 \% R + 0.1 \Omega)$
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 $\pm$ 5) °C; (10 $\pm$ 1) s	$\pm (0.5 \% R + 0.05 \Omega)$
4.24	78 (Cab)	Damp heat, steady state	(40 $\pm$ 2) °C; (93 $\pm$ 3) % RH; 56 days	$\pm (2 \% R + 0.1 \Omega)$
4.25.3	–	Endurance at upper category temperature	155 °C; 1000 h	$\pm (2 \% R + 0.1 \Omega)$

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, variety of environmental test procedures

Packaging of components is done in paper or blister 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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.

Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.