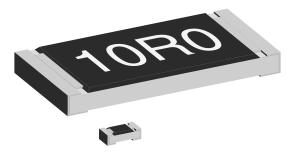




# **Automotive, Sulfur Resistant** Lead (Pb)-Free Thick Film, Rectangular Chip Resistors



### **FEATURES**

- Superior resistance against H<sub>2</sub>S-atmosphere
- Stability  $\Delta R/R = 1$  % for 1000 h at 70 °C
- Metal glaze on high quality ceramic
- · Pure tin solder contacts on Ni barrier layer, provides compatibility with lead (Pb)-free and lead containing soldering processes
- **HALOGEN** FREE
- · AEC-Q200 qualified, rev. C compliant
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

MODEL	CASE SIZE INCH	CASE SIZE METRIC	POWER RATING P <sub>70°C</sub> W	LIMITING ELEMENT VOLTAGE MAX. V	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	$\begin{array}{c} \text{RESISTANCE} \\ \text{RANGE} \\ \Omega \end{array}$	SERIES			
					± 50	± 0.5, ± 1	100 to 1.0M	E24; E96			
		RR1005	0.063	50	± 100	± 0.5	10 to 1.0M	E24; E96			
DCA0400	0402				± 100	± 1	10 to 10M	E24; E96			
RCA0402					± 200	± 1	1.0 to 9.76	E24; E96			
					± 200	± 5	1.0 to 10M	E24			
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20 \text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 1.5 A								
					± 50	± 0.5, ± 1	100 to 10M	E24; E96			
			0.10	75	± 100	± 0.5	10 to 10M	E24; E96			
RCA0603	0603	RR1608			± 100	± 1	1.0 to 10M	E24; E96			
					± 200	± 5	1.0 to 10M	E24			
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20 \text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 2.0 A								
			0.125	150	± 50	± 0.5, ± 1	100 to 10M	E24; E96			
	0805	RR2012			± 100	± 0.5	10 to 10M	E24; E96			
RCA0805					± 100	± 1	1.0 to 10M	E24; E96			
					± 200	± 5	1.0 to 10M	E24			
			Zero-Ohm-Resistor: $R_{\text{max}} = 20 \text{ m}\Omega$ , $I_{\text{max}}$ at 70 °C = 2.5 A								
RCA1206	1206	RR3216	0.25	200	± 50	± 0.5, ± 1	100 to 10M	E24; E96			
					± 100	± 0.5	10 to 10M	E24; E96			
					± 100	± 1	1.0 to 10M	E24; E96			
					± 200	± 5	1.0 to 10M	E24			
				Zero-Ohm-Resisto	or: $R_{\text{max.}} = 20 \text{ m}\Omega$ , $I_{\text{r}}$	<sub>nax.</sub> at 70 °C = 3	.5 A				
	1210	RR3225	0.5	200	± 50	± 0.5, ± 1	100 to 1.0M	E24; E96			
					± 100	± 0.5	10 to 1.0M	E24; E96			
RCA1210					± 100	± 1	1.0 to 10M	E24; E96			
					± 200	± 5	1.0 to 10M	E24			
			Zero-Ohm-Resistor: $R_{\text{max.}} = 20 \text{ m}\Omega$ , $I_{\text{max.}}$ at 70 °C = 5.0 A								
		RR3246	1.0	200	± 50	± 0.5, ± 1	100 to 2.2M	E24; E96			
	1218				± 100	± 0.5	100 to 2.2M	E24; E96			
RCA1218					± 100	± 1	1.0 to 2.2M	E24; E96			
ļ					± 200	± 5	1.0 to 2.2M	E24			
			Zero-Ohm-Resistor: R <sub>max.</sub> = 20 mΩ, I <sub>max.</sub> at 70 °C = 7.0 A								
		RR5025			± 50	± 0.5, ± 1	100 to 10M	E24; E96			
RCA2010	2010		0.75	400	± 100	± 0.5	10 to 10M	E24; E96			
				700	± 100	± 1	1.0 to 10M	E24; E96			
					± 200	± 5	1.0 to 10M	E24			
				Zero-Ohm-Resiste	or: $R_{\text{max.}} = 20 \text{ m}\Omega$ , $I_{\text{r}}$						
	2512	RR6332	1.0	500	± 50	± 0.5, ± 1	100 to 10M	E24; E96			
					± 100	± 0.5	10 to 10M	E24; E96			
RCA2512					± 100	± 1	1.0 to 10M	E24; E96			
					± 200	± 5	1.0 to 10M	E24			

### **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 time.
- Marking: See document "Surface Mount Resistor Marking" (document number 20020).

  Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material.



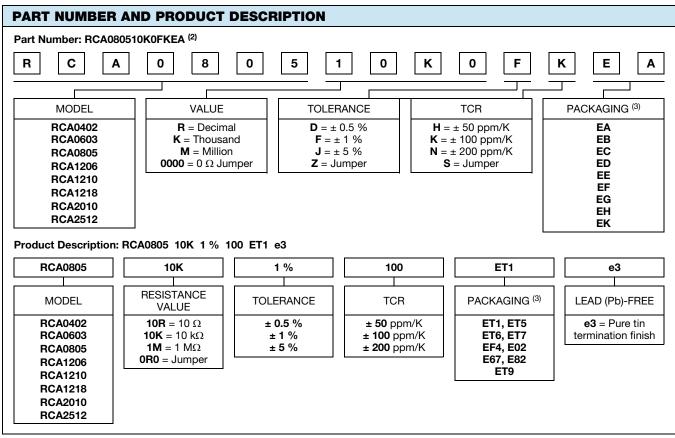
www.vishay.com

## Vishay Draloric

TECHNICAL SPECIFICATIONS									
PARAMETER	UNIT	RCA0402	RCA0603	RCA0805	RCA1206	RCA1210	RCA1218	RCA2010	RCA2512
Rated dissipation P <sub>70</sub> <sup>(1)</sup>	W	0.063	0.10	0.125	0.25	0.5	1.0	0.75	1.0
Limiting element voltage $U_{\text{max.}}$ AC/DC	V	50	75	150	200	200	200	400	500
Insulation voltage U <sub>ins.</sub> (1 min)	V	> 75	> 100	> 200	> 300	> 300	> 300	> 300	> 300
Insulation resistance	Ω	> 10 <sup>9</sup>							
Category temperature range °C		- 55 to + 155							
Failure rate	h <sup>-1</sup>	< 0.1 × 10 <sup>-9</sup>							
Mass	mg	0.65	2	5.5	10	16	29.5	25.5	40.5

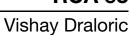
#### Note

(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.



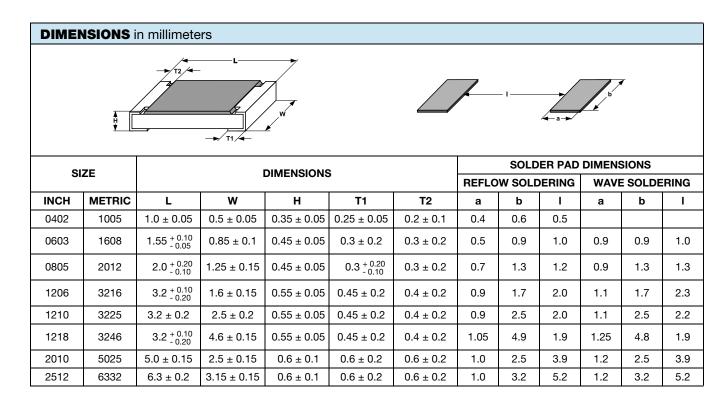
#### Notes

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





PACKAGING										
		REEL								
MODEL		DIAMETER	PITCH	PIECES/ REEL	PACKAGING CODE					
MODEL	TAPE WIDTH				PART NUMBER		PRODUCT DESC.			
	W.5				PAPER	BLISTER	PAPER	BLISTER		
		180 mm/7"	2 mm	10 000	ED		ET7			
RCA0402	8 mm	285 mm/11.25"	2 mm	20 000	EC		ET6			
		330 mm/13"	2 mm	50 000	EE		EF4			
		180 mm/7"	4 mm	5000	EA		ET1			
RCA0603	8 mm	285 mm/11.25"	4 mm	10 000	EB		ET5			
		330 mm/13"	4 mm	20 000	EC		ET6			
	8 mm	180 mm/7"	4 mm	5000	EA		ET1			
RCA0805		285 mm/11.25"	4 mm	10 000	EB		ET5			
		330 mm/13"	4 mm	20 000	EC		ET6			
		180 mm/7"	4 mm	5000	EA		ET1			
RCA1206	8 mm	285 mm/11.25"	4 mm	10 000	EB		ET5			
		330 mm/13"	4 mm	20 000	EC		ET6			
		180 mm/7"	4 mm	5000	EA		ET1			
RCA1210	8 mm	285 mm/11.25"	4 mm	10 000	EB		ET5			
		330 mm/13"	4 mm	20 000	EC		ET6			
RCA1218	12 mm	180 mm/7"	4 mm	4000		EK		ET9		
RCA2010	12 mm	180 mm/7"	4 mm	4000		EF		E02		
D040510	10	mm 180 mm/7"	8 mm	2000		EG		E67		
RCA2512	12 mm		4 mm	4000		EH	_	E82		

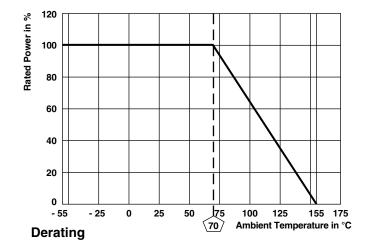






### **FUNCTIONAL PERFORMANCE**

PERFORMANCE IN SULFUR-CONTAINING AMBIANCE							
TEST NAME	HUMID SULFUR VAPOR TEST	HUMID SULFUR VAPOR TEST (Accelerated)					
Reference specification	ASTM B809-95	ASTM B809-95 accelerated conditions					
Test conditions (temperature, humidity)	60 °C ± 2 °C 85 % ± 4 % RH	90 °C ± 2 °C 74 % ± 7 % RH					
Aggressive agent	Sulfur (saturated vapor)	Sulfur (saturated vapor)					
Failure criteria in VI under magnification	No silver sulfide growth at the interface between termination and protective overcoat. No signs of mechanical damage.	No silver sulfide growth at the interface between termination and protective overcoat. No signs of mechanical damage.					
Failure criteria in electrical test	≤ (± 1 % R + 0.05 Ω)	≤ (± 1 % <i>R</i> + 0.05 Ω)					
Time before failure	8000 h	1000 h					





Vishay Draloric

TEST PROCEDURES AND REQUIREMENTS								
				REQUIREMENTS PERMISSIBLE CHANGE (△ <i>R</i> )				
EN 60115-1	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	SIZE 0402	SIZE 0603 TO 2512			
CLAUSE				STABILITY CLASS 2 OR BETTER				
			Stability for product types:					
			RCA e3	1 $\Omega$ to 10 M $\Omega$				
4.5	-	Resistance	-	0.5 %, ± 1 %, ± 5 %				
4.8.4.2	-	Temperature coefficient	(20/- 55/20) °C and (20/125/20) °C	± 50 ppm/K, ± 100 p	opm/K, ± 200 ppm/K			
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R}$ $\leq 2 \times U_{\text{max.}}$ ; duration: According to style	± (0.25 % R + 0.05 Ω)				
4.19	14 (Na)	Rapid change of temperature	30 min. at - 55 °C; 30 min. at 125 °C 5 cycles 1000 cycles	± (0.25 % R + 0.05 Ω) ± (1 % R + 0.05 Ω)				
4.25.1	-	Endurance at 70 °C	$U = \sqrt{P_{70} \times R} \le U_{\text{max}};$ 1.5 h on; 0.5 h off; 70 °C , 1000 h	± (1 % R + 0.05 Ω) ± (0.5 % R + 0.				
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method (260 ± 5) °C (10 ± 1) s	± (0.25 % R + 0.05 Ω)				
4.24	78 (Cab)	Damp heat, steady state	(40 ± 2) °C; (93 ± 3) % RH; 56 days	± (1 % R + 0.05 Ω) ± (0.5 % R + 0.05 Ω)				
4.25.3	-	Endurance at upper category temperature	155 °C, 1000 h	± (0.5 % R + 0.05 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
- AEC-Q200, automotive specification
- IEC 60068-2, environmental test procedures
- ASTM B 809-95, standard test method for porosity in metallic coatings by humid sulfur.

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



## **Legal Disclaimer Notice**

Vishay

## **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.

# **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Thin Film Resistors - SMD category:

Click to view products by Vishay manufacturer:

Other Similar products are found below:

7-2176089-6 MCW0406MD1001DP500 FCR1206J22R FCR1206J33R 1-2176090-3 1-2176089-6 ERA-3EEB2742V

NCSR250F4M50DTRGF 2176089-1 2176090-4 2176091-3 CMB02070X3000GB200 CPA2512Q6R80FS-T10 4-1625868-7 5-1625868-9 5
18022-5 ERA-3EEB2671V CFR0W4J0220A2P P1206Y1804FNTA CPA2512E68R0FS-T10 CPA2512Q4R70FS-T10 8-2176091-9 2
2176091-0 NCSR150FR003DTRT3F NTR06B5832CTRF NCSR200JR002DTRF RSJ372NL NRC-S12F4751TRF 8-1625868-1 1-2176092
4 4-2176093-9 2176091-9 RT1220P-101-M PLTU0805U1003LST5 PLTU0603U2001LST5 PLTU0805U1001LST5 PLTU0603U4702LST5

4-2176089-0 8-2176091-0 6-2176091-8 3-2176090-3 1-2176092-7 7-2176092-6 7-2176088-7 PCNM2512E1502BST5 2-2176094-5

PCNM2512E3012BST5 4-2176092-6 3-2176091-4 8-2176091-5