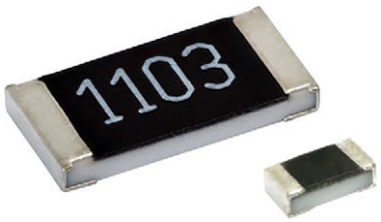
Automotive, Sulfur Resistant Lead (Pb)-Free Thick Film, Rectangular Chip Resistors



The sulfur resistant, thick film chip resistors series is the perfect choice for most fields of harsh environment electronics operation, where reliability and stability are of major concern. Typical applications include automotive, ADAS, industrial, and commercial applications which operate in harsh environment.

FEATURES

- Superior resistance against sulfur containing atmosphere, according to ASTM B809-95
- Stability at different environmental conditions $\Delta R/R \leq 1$ % (1000 h rated power at 70 °C)
- AEC-Q200 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- Automotive
- ADAS
- Industrial
- Commercial

TECHNICAL SPECIFICATIONS

DESCRIPTION	RCA0402 e3	RCA0603 e3	RCA0805 e3	RCA1206 e3	RCA1210 e3	RCA1218 e3	RCA2010 e3	RCA2512 e3
Imperial size	0402	0603	0805	1206	1210	1218	2010	2512
Metric size code	RR1005M	RR1608M	RR2012M	RR3216M	RR3225M	RR3246M	RR5025M	RR6332M
Resistance range	1 Ω to 10 MΩ; jumper (0 Ω)					1 Ω to 2.2 MΩ; jumper (0 Ω)	1 Ω to 10 MΩ; jumper (0 Ω)	
Resistance tolerance	± 5 %; ± 1 %; ± 0.5 %							
Temperature coefficient	± 200 ppm/K; ± 100 ppm/K; ± 50 ppm/K							
Rated dissipation, P_{70} (1)	0.063 W	0.10 W	0.125 W	0.25 W	0.5 W	1.0 W	0.75 W	1.0 W
Operating voltage, $U_{max.}$ AC_{RMS}/DC	50 V	75 V	150 V	200 V	200 V	200 V	400 V	500 V
Permissible film temperature, $\vartheta_{F\ max.}$ (1)	155 °C							
Operating temperature range	-55 °C to +155 °C							
Maximum resistance change at P_{70} for resistance range, $\lvert\Delta R/R\rvert$ after: 1000 h	≤ 1.0 %							
Permissible voltage against ambient (insulation): 1 min, U_{ins}	75 V	100 V	200 V	300 V	300 V	300 V	300 V	300 V
Failure rate: $FIT_{observed}$	≤ 0.1 x 10^{-9}/h							

Notes

- Marking: see document "Surface Mount Resistor Marking" (www.vishay.com/doc?20020)

(1) Please refer to APPLICATION INFORMATION below

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.

For technical questions, contact: thickfilmchip@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

TEMPERATURE COEFFICIENT AND RESISTANCE RANGE				
TYPE / SIZE	**TCR**	**TOLERANCE**	**RESISTANCE**	**E-SERIES**
RCA0402 e3	± 200 ppm/K	± 5 %	1.0 Ω to 10 MΩ	E24
	± 200 ppm/K	± 1 %	1.0 Ω to 9.76 Ω	E24; E96
	± 100 ppm/K	± 1 %	10 Ω to 10 MΩ	E24; E96
	± 100 ppm/K	± 0.5 %	10 Ω to 1.0 MΩ	E24; E96
	± 50 ppm/K	± 0.5 %; ± 1 %	100 Ω to 1.0 MΩ	E24; E96
	Jumper, $I_{max.}$ = 1.5 A	≤ 20 mΩ	0 Ω	-
RCA0603 e3	± 200 ppm/K	± 5 %	1.0 Ω to 10 MΩ	E24
	± 100 ppm/K	± 1 %	1.0 Ω to 10 MΩ	E24; E96
	± 100 ppm/K	± 0.5 %	10 Ω to 10 MΩ	E24; E96
	± 50 ppm/K	± 0.5 %; ± 1 %	100 Ω to 10 MΩ	E24; E96
	Jumper, $I_{max.}$ = 2.0 A	≤ 20 mΩ	0 Ω	-
RCA0805 e3	± 200 ppm/K	± 5 %	1.0 Ω to 10 MΩ	E24
	± 100 ppm/K	± 1 %	1.0 Ω to 10 MΩ	E24; E96
	± 100 ppm/K	± 0.5 %	10 Ω to 10 MΩ	E24; E96
	± 50 ppm/K	± 0.5 %; ± 1 %	100 Ω to 10 MΩ	E24; E96
	Jumper, $I_{max.}$ = 2.5 A	≤ 20 mΩ	0 Ω	-
RCA1206 e3	± 200 ppm/K	± 5 %	1.0 Ω to 10 MΩ	E24
	± 100 ppm/K	± 1 %	1.0 Ω to 10 MΩ	E24; E96
	± 100 ppm/K	± 0.5 %	10 Ω to 10 MΩ	E24; E96
	± 50 ppm/K	± 0.5 %; ± 1 %	100 Ω to 10 MΩ	E24; E96
	Jumper, $I_{max.}$ = 3.5 A	≤ 20 mΩ	0 Ω	-
RCA1210 e3	± 200 ppm/K	± 5 %	1.0 Ω to 10 MΩ	E24
	± 100 ppm/K	± 1 %	1.0 Ω to 10 MΩ	E24; E96
	± 100 ppm/K	± 0.5 %	10 Ω to 1.0 MΩ	E24; E96
	± 50 ppm/K	± 0.5 %; ± 1 %	100 Ω to 1.0 MΩ	E24; E96
	Jumper, $I_{max.}$ = 5.0 A	≤ 20 mΩ	0 Ω	-
RCA1218 e3	± 200 ppm/K	± 5 %	1.0 Ω to 2.2 MΩ	E24
	± 100 ppm/K	± 1 %	1.0 Ω to 2.2 MΩ	E24; E96
	± 100 ppm/K	± 0.5 %	100 Ω to 2.2 MΩ	E24; E96
	± 50 ppm/K	± 0.5 %; ± 1 %	100 Ω to 2.2 MΩ	E24; E96
	Jumper, $I_{max.}$ = 7.0 A	≤ 20 mΩ	0 Ω	-
RCA2010 e3	± 200 ppm/K	± 5 %	1.0 Ω to 10 MΩ	E24
	± 100 ppm/K	± 1 %	1.0 Ω to 10 MΩ	E24; E96
	± 100 ppm/K	± 0.5 %	10 Ω to 10 MΩ	E24; E96
	± 50 ppm/K	± 0.5 %; ± 1 %	100 Ω to 10 MΩ	E24; E96
	Jumper, $I_{max.}$ = 6.0 A	≤ 20 mΩ	0 Ω	-
RCA2512 e3	± 200 ppm/K	± 5 %	1.0 Ω to 10 MΩ	E24
	± 100 ppm/K	± 1 %	1.0 Ω to 10 MΩ	E24; E96
	± 100 ppm/K	± 0.5 %	10 Ω to 10 MΩ	E24; E96
	± 50 ppm/K	± 0.5 %; ± 1 %	100 Ω to 10 MΩ	E24; E96
	Jumper, $I_{max.}$ = 7.0 A	≤ 20 mΩ	0 Ω	-

Note

- The temperature coefficient of resistance (TCR) is not specified for 0 Ω jumpers

For technical questions, contact: thickfilmchip@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

PACKAGING

TYPE / SIZE	CODE	QUANTITY	PACKAGING STYLE	WIDTH	PITCH	PACKAGING DIMENSIONS
RCA0402 e3	ED = ET7 EC = ET6 EE = EF4	10 000 20 000 50 000	Paper tape according to IEC 60286-3, type 1a	8 mm	2 mm	Ø 180 mm / 7" Ø 285 mm / 11.25" Ø 330 mm / 13"
RCA0603 e3	EA = ET1 EB = ET5 EC = ET6	5000 10 000 20 000		8 mm	4 mm	Ø 180 mm / 7" Ø 285 mm / 11.25" Ø 330 mm / 13"
RCA0805 e3	EA = ET1 EB = ET5 EC = ET6	5000 10 000 20 000		8 mm	4 mm	Ø 180 mm / 7" Ø 285 mm / 11.25" Ø 330 mm / 13"
RCA1206 e3	EA = ET1 EB = ET5 EC = ET6	5000 10 000 20 000		8 mm	4 mm	Ø 180 mm / 7" Ø 285 mm / 11.25" Ø 330 mm / 13"
RCA1210 e3	EA = ET1 EB = ET5 EC = ET6	5000 10 000 20 000		8 mm	4 mm	Ø 180 mm / 7" Ø 285 mm / 11.25" Ø 330 mm / 13"
RCA1218 e3	EK = ET9	4000	Blister tape according to IEC 60286-3, type 2a	12 mm	4 mm	Ø 180 mm / 7"
RCA2010 e3	EF = E02	4000		12 mm	4 mm	Ø 180 mm / 7"
RCA2512 e3	EG = E67 EH = E82	2000 4000		12 mm	8 mm 4 mm	Ø 180 mm / 7"

PART NUMBER AND PRODUCT DESCRIPTION

Part Number: RCA080510K0FKEA
Part Number: RCA08050000ZSEC

R	C	A	0	8	0	5	1	0	K	0	F	K	E	A

TYPE / SIZE	VALUE	TOLERANCE	TCR	PACKAGING
RCA0402 **RCA0603** **RCA0805** **RCA1206** **RCA1210** **RCA1218** **RCA2010** **RCA2512**	**R** = decimal **K** = thousand **M** = million **0000** = 0 Ω jumper	**D** = ± 0.5 % **F** = ± 1 % **J** = ± 5 % **Z** = jumper	**H** = ± 50 ppm/K **K** = ± 100 ppm/K **N** = ± 200 ppm/K **S** = jumper	**EA, EB, EC, ED, EE, EF, EG, EH, EK**

Product Description: RCA0805 100 10K 1 % ET1 e3
Product Description: RCA0805 0R0 ET6 e3

RCA0805	100	10K	1 %	ET1	e3
TYPE / SIZE	TCR	RESISTANCE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE
RCA0402 **RCA0603** **RCA0805** **RCA1206** **RCA1210** **RCA1218** **RCA2010** **RCA2512**	**± 50** ppm/K **± 100** ppm/K **± 200** ppm/K	**10R** = 10 Ω **10K** = 10 kΩ **1M** = 1 MΩ **0R0** = jumper	**± 0.5 %** **± 1 %** **± 5 %**	**ET1, ET5, ET6, ET7, EF4, E02, E67, E82, ET9**	**e3** = pure tin termination finish

For technical questions, contact: thickfilmchip@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

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 both sides of a high grade (Al_2O_3) ceramic substrate with its prepared inner contacts on both sides. A special laser is used to achieve the target value by smoothly fine trimming the resistive layer without damaging the ceramics. A special process is used to ensure resistor long term operation in harsh environment (sulfur atmosphere). 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** [(1)].

ASSEMBLY

The resistors are suitable for processing on automatic SMD assembly systems. They are suitable for automatic soldering wave, reflow or vapor phase as shown in **IEC 61760-1** [(1)]. 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.

The resistors are RoHS-compliant, the pure tin plating provides compatibility with lead (Pb)-free and lead-containing soldering processes. 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 [(2)]
- The Global Automotive Declarable Substance List (GADSL) [(3)]
- The REACH regulation (1907/2006/EC) and the related list of substances with very high concern (SVHC) [(4)] 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.

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.

APPROVALS

The resistors are qualified according to AEC-Q200.
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** [(1)] series.

RELATED PRODUCTS

D/CRCW e3 series is not designed for sulfur-containing environment applications. For ordering D/CRCW e3 products please refer to latest edition of datasheet: www.vishay.com/doc?20035.

For products with sulfur resistance, superior surge and pulse performance, please refer to datasheet:
RCA-IF e3, Pulse Proof Thick Film Chip Resistors
www.vishay.com/doc?20059.

For products with sulfur resistance and high power rating, please refer to datasheet:
RCA-HP e3, Pulse Proof High Power Thick Film Chip Resistors
www.vishay.com/doc?20065.

Notes

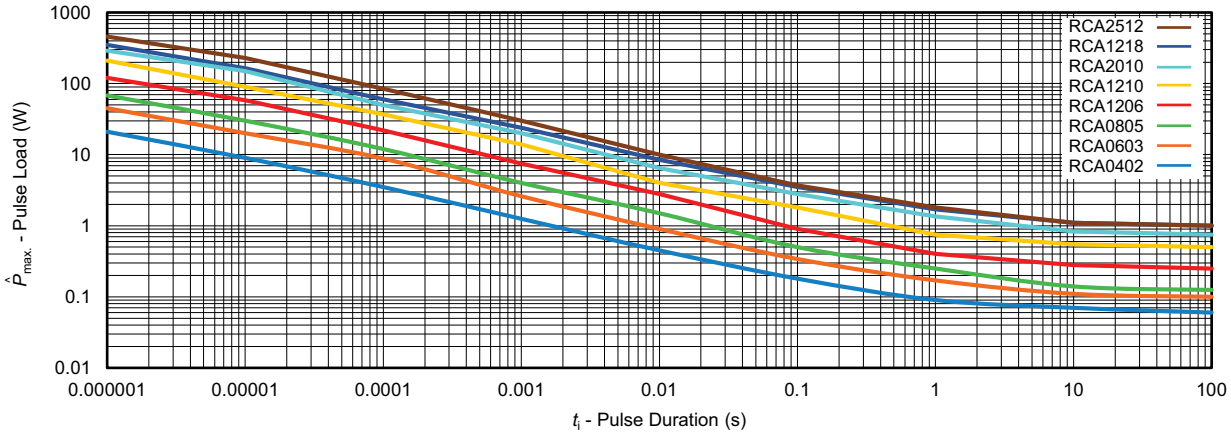
(1) The quoted IEC standards are also released as EN standards with the same number and identical contents
(2) The IEC 62474 list of declarable substances is maintained in a dedicated database, which is available at http://std.iec.ch/iec62474
(3) The Global Automotive Declarable Substance List (GADSL)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

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

FUNCTIONAL PERFORMANCE

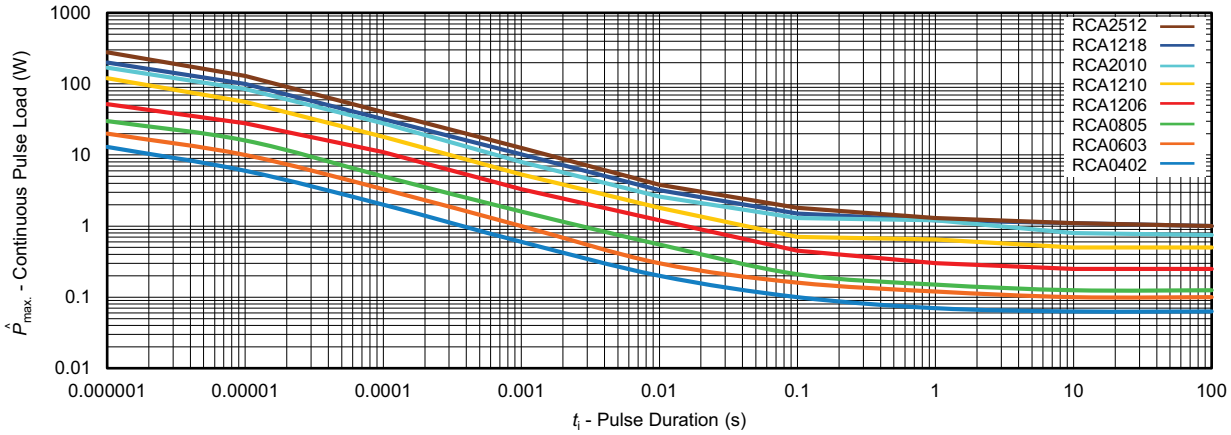
PERFORMANCE IN SULFUR-CONTAINING AMBIANCE		
TEST NAME	**HUMID SULFUR VAPOR TEST**	**HUMID SULFUR VAPOR TEST (Accelerated)**
Reference specification	ASTM B809-95	ASTM B809-95 accelerated conditions
Test conditions (temperature, humidity)	60 °C ± 2 °C 85 % ± 4 % RH	90 °C ± 2 °C 74 % ± 7 % RH
Aggressive 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 % R + 0.05 Ω)
Time before failure	8000 h	1000 h

Single Pulse



Maximum pulse load, single pulse; applicable if $\overline{P} \rightarrow 0$ and n < 1000 and $\hat{U} = \hat{U}_{max.}$;
for permissible resistance change equivalent to 8000 h operation

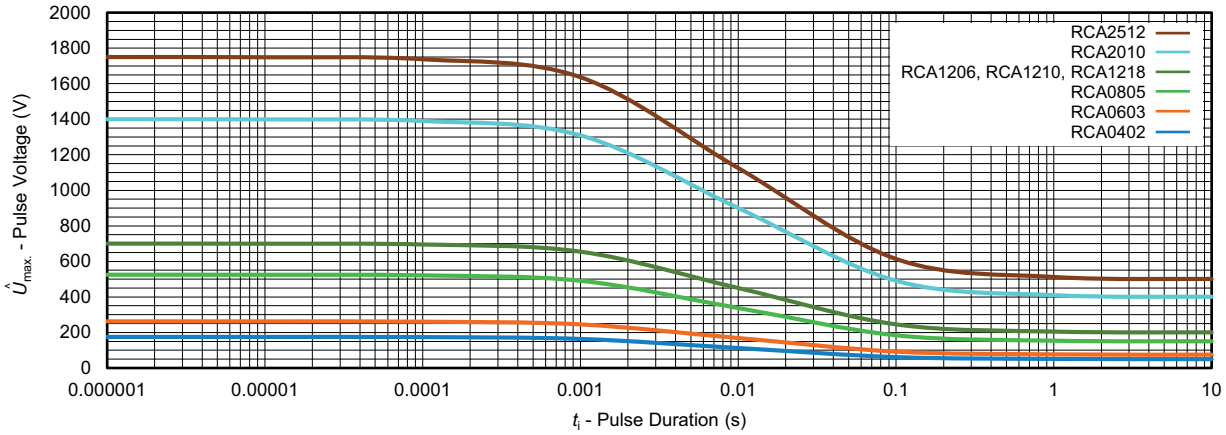
Continuous Pulse



Maximum pulse load, continuous pulses; applicable if $\overline{P} \leq P\ (\vartheta_{amb})$ and $\hat{U} = \hat{U}_{max.}$;
for permissible resistance change equivalent to 8000 h operation

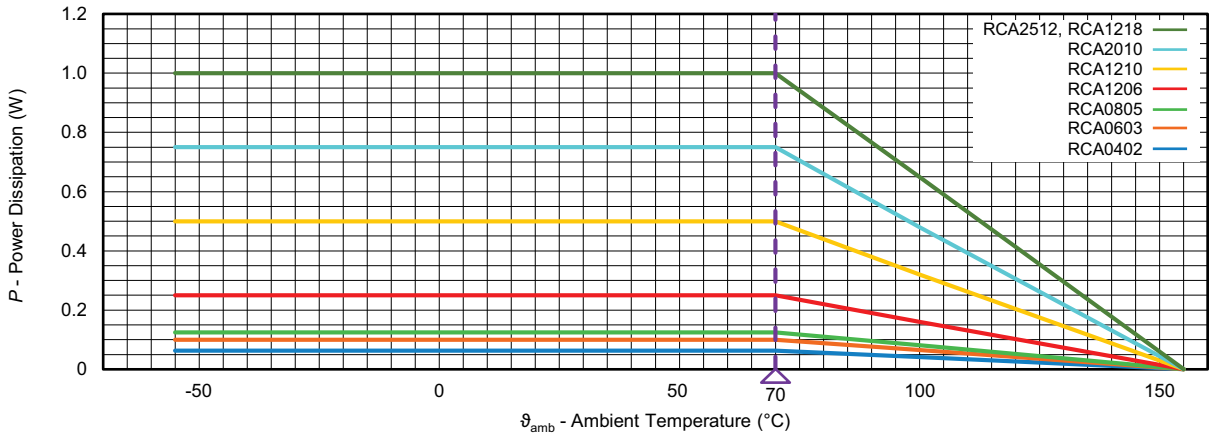
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

Pulse Voltage



Maximum pulse voltage, single and continuous pulses; applicable if $\hat{P} = \hat{P}_{max.}$;
for permissible resistance change equivalent to 8000 h operation

Derating



For technical questions, contact: thickfilmchip@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

TESTS AND REQUIREMENTS

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

EN 60115-1, generic specification

EN 60115-8 (successor of EN 140400), 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

EN 60115-1 CLAUSE	IEC 60068-2 (1) TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)	
				SIZE 0402	SIZE 0603 TO 2512
			Stability for product types:	STABILITY CLASS 2 OR BETTER	
			RCA e3	1 Ω to 10 MΩ	
4.5	-	Resistance	-	± 5 %; ± 1 %; ± 0.5 %	
4.8	-	Temperature coefficient	(20 / -55 / 20) °C and (20 / 155 / 20) °C	± 200 ppm/K; ± 100 ppm/K; ± 50 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	± (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)	
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)
4.37	67 (Cy)	Damp heat, steady state, accelerated	(85 ± 2) °C; (85 ± 5) % RH; $U = \sqrt{0.1 \times P_{70} \times R}$; $U \leq 0.3 \times U_{max.}$; 1000 h	± (1 % R + 0.05 Ω)	
4.23	-	Climatic sequence:	-	± (1 % R + 0.05 Ω)	
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 (Ab)	Cold	-55 °C; 2 h		
4.23.5	13 (M)	Low air pressure	1 kPa; 1 h; (25 ± 10) °C 55 °C; > 90 % RH		
4.23.6	30 (Db)	Damp heat, cyclic	24 h; 5 cycles		
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R} \leq U_{max.}$; 1 min;		
-	1 (Aa)	Cold	-55 °C; 2 h	± (0.25 % R + 0.05 Ω)	
4.19	14 (Na)	Rapid change of temperature	30 min at -55 °C and 30 min at 125 °C; 1000 cycles	± (1 % R + 0.05 Ω)	
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	± (2 % R + 0.05 Ω)	
4.27	-	Single pulse high voltage overload 10 µs/700 µs	$U = 10 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max.}$; 10 pulses	± (1 % R + 0.05 Ω)	

For technical questions, contact: thickfilmchip@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

TEST PROCEDURES AND REQUIREMENTS					
EN 60115-1 CLAUSE	IEC 60068-2 [1] TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE (ΔR)	
				SIZE 0402	SIZE 0603 TO 2512
			Stability for product types:	STABILITY CLASS 2 OR BETTER	
			RCA e3	1 Ω to 10 MΩ	
4.39	-	Periodic electric overload	$U = \sqrt{15 \times P_{70} \times R} \leq 2 \times U_{max.}$; whichever is the less severe; 0.1 s on; 2.5 s off; 1000 cycles	± (1 % R + 0.05 Ω)	
4.38	-	Electrostatic discharge (human body model)	IEC 61340-3-1 [1][2]; 3 pos. + 3 neg. discharges; ESD voltage according to the size	± (1 % R + 0.05 Ω)	
4.22	6 (Fc)	Vibration	Endurance by sweeping; 10 Hz to 2000 Hz; no resonance; amplitude ≤ 1.5 mm or ≤ 200 m/s^2; 7.5 h	± (0.25 % R + 0.05 Ω)	
4.17	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		
4.18	58 (Td)	Resistance to soldering heat	Solder bath method (260 ± 5) °C; (10 ± 1) s	± (0.25 % R + 0.05 Ω)	
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; +50 °C; method 2	No visible damage	
4.30	45 (XA)	Solvent resistance of marking	Isopropyl alcohol; +50 °C; method 1 toothbrush	Marking legible, no visible damage	
4.32	21 (Uu_3)	Shear (adhesion)	RCA0402 and RCA0603: 9 N RCA0805 to RCA2512: 17.7 N	No visible damage	
4.33	21 (Uu_1)	Substrate bending	Depth 2 mm; 3 times	± (0.25 % R + 0.05 Ω) no visible damage, no open circuit in bent position	
4.7	-	Voltage proof	$U = 1.4 \times U_{ins}$; 60 s	No flashover or breakdown	
4.35	-	Flammability, needle flame test	IEC 60695-11-5 [1]; 10 s	No burning after 30 s	

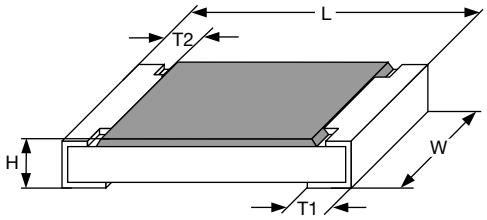
Notes

[1] The quoted IEC standards are also released as EN standards with the same number and identical contents

[2] This test is new with the 4th edition of IEC 60115-1 and with this European standard, and adopts the prior test of EN 60115-1+A11:2007.4.40

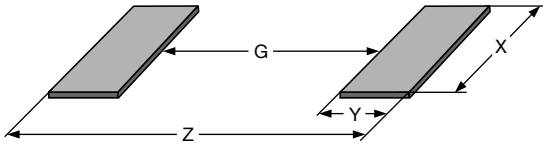
For technical questions, contact: thickfilmchip@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

DIMENSIONS



DIMENSIONS AND MASS						
TYPE / SIZE	L (mm)	W (mm)	H (mm)	T1 (mm)	T2 (mm)	MASS (mg)
RCA0402 e3	1.0 ± 0.05	0.5 ± 0.05	0.35 ± 0.05	0.25 ± 0.05	0.2 ± 0.10	0.65
RCA0603 e3	1.55 + 0.10 / - 0.05	0.85 ± 0.1	0.45 ± 0.05	0.3 ± 0.20	0.3 ± 0.20	2
RCA0805 e3	2.0 + 0.20 / - 0.10	1.25 ± 0.15	0.45 ± 0.05	0.3 + 0.20 / -0.10	0.3 ± 0.20	5.5
RCA1206 e3	3.2 + 0.10 / - 0.20	1.6 ± 0.15	0.55 + 0.05	0.45 ± 0.20	0.4 ± 0.20	10
RCA1210 e3	3.2 ± 0.20	2.5 ± 0.20	0.55 ± 0.05	0.45 ± 0.20	0.4 ± 0.20	16
RCA1218 e3	3.2 + 0.10 / - 0.20	4.6 ± 0.15	0.55 ± 0.05	0.45 ± 0.20	0.4 ± 0.20	29.5
RCA2010 e3	5.0 ± 0.15	2.5 ± 0.15	0.6 ± 0.10	0.6 ± 0.20	0.6 ± 0.20	25.5
RCA2512 e3	6.3 ± 0.20	3.15 ± 0.15	0.6 ± 0.10	0.6 ± 0.20	0.6 ± 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)
RCA0402 e3	-	-	-	-	0.45	0.60	0.60	1.65
RCA0603 e3	0.65	1.10	1.25	2.85	0.75	0.75	1.00	2.25
RCA0805 e3	0.90	1.30	1.60	3.50	1.00	0.95	1.45	2.90
RCA1206 e3	1.40	1.40	1.95	4.20	1.50	1.05	1.80	3.60
RCA1210 e3	1.80	1.45	2.95	4.70	1.70	1.10	2.80	3.90
RCA1218 e3	1.80	1.30	5.10	4.40	1.90	1.10	4.90	4.10
RCA2010 e3	3.40	1.65	2.85	6.70	3.50	1.45	2.80	6.40
RCA2512 e3	4.60	1.60	3.65	7.80	4.75	1.45	3.50	7.65

Notes

- The given solder pad dimensions reflect the considerations for board design and assembly as outlined e.g in standards IEC 61188-5-x [(1)] or in publication IPC-7351.
  Still, the given solder pad dimensions will be found adequate for most general applications

(1) The quoted IEC standards are also released as EN standards with the same number and identical contents

For technical questions, contact: thickfilmchip@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

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.

© 2019 VISHAY INTERTECHNOLOGY, INC. ALL RIGHTS RESERVED