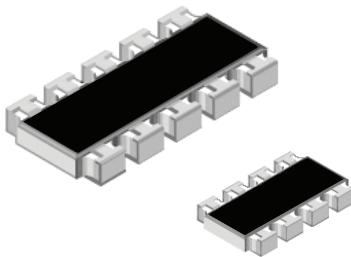


## Thick Film Chip Resistor Array



### FETATURES

- Convex terminal array available with either scalloped corners (E version) or square corners (S version)
- Wide ohmic range: 10R to 1MΩ
- 8 or 10 terminal package with isolated resistors
- Pure tin solder contacts on Ni barrier layer, provides compatibility with lead (Pb)-free and lead containing soldering processes
- 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	CIRCUIT	POWER RATING $P_{70\text{ °C}}$ W	LIMITING ELEMENT VOLTAGE MAX. $V_{\geq}$	TEMPERATURE COEFFICIENT $\pm \text{ ppm/K}$	TOLERANCE $\pm \text { %}$	RESISTANCE RANGE Ω	SERIES
CRA12E CRA12S	01; 02; 20	0.100	50	100	1	10 to 1M	E24; E96
	03	0.125		200	2; 5	10 to 1M	E24

Zero-Ohm-Resistor:  $R_{\max.} = 50 \text{ m}\Omega$ ,  $I_{\max.} = 1.5 \text{ A}$

### TECHNICAL SEPCIFICATIONS

PARAMETER	UNIT	CRA12E AND CRA12S CIRCUIT 01; 02; 20	CRA12E AND CRA12S CIRCUIT 03
Rated dissipation at $P_{70}$ <sup>(1)</sup>	W per element	0.1	0.125
Limiting element voltage $U_{\max.}$ AC/DC	V	50	
Insulation voltage $U_{\text{ins}}$ (1 min)	V	100	
Insulation resistance	Ω		$> 10^9$
Category temperature range	°C		- 55 to + 155

#### Note

<sup>(1)</sup> Power rating depends on the max. temperature at the solder point, the component placement density and the substrate material

### PART NUMBER AND PRODUCT DESCRIPTION

Part Number: CRA12E08347K0JTR <sup>(1)</sup>							
C	R	A	1	2	E	0	8
MODEL	TERMINAL STYLE	PIN		CIRCUIT	VALUE	TOLERANCE	PACKAGING
CRA12	S E	08 10		1 = 01 2 = 02 3 = 03 8 = 20	R = decimal K = thousand M = million 0000 = 0 Ω Jumper	F = ± 1 % G = ± 2 % J = ± 5 % Z = 0 Ω jumper	TR TL
Product Description: CRA12E 08 03 47K 5 % RB8 e3							
CRA12E	08	03	47K	5%	RB8	e3	
MODEL	PIN	CIRCUIT	RESISTANCE VALUE	TOLERANCE	PACKAGING	LEAD (Pb)-FREE	
CRA12E CRA12S	08 10	01 02 03 20	10R = 10 Ω 47K = 47 kΩ 1M = 1MΩ 0R0 = jumper	± 1 % ± 2 % ± 5 %	RB8 RD7	e3 = pure tin termination finish	

#### Note

<sup>(1)</sup> Preferred way for ordering products is by use of the PART NUMBER

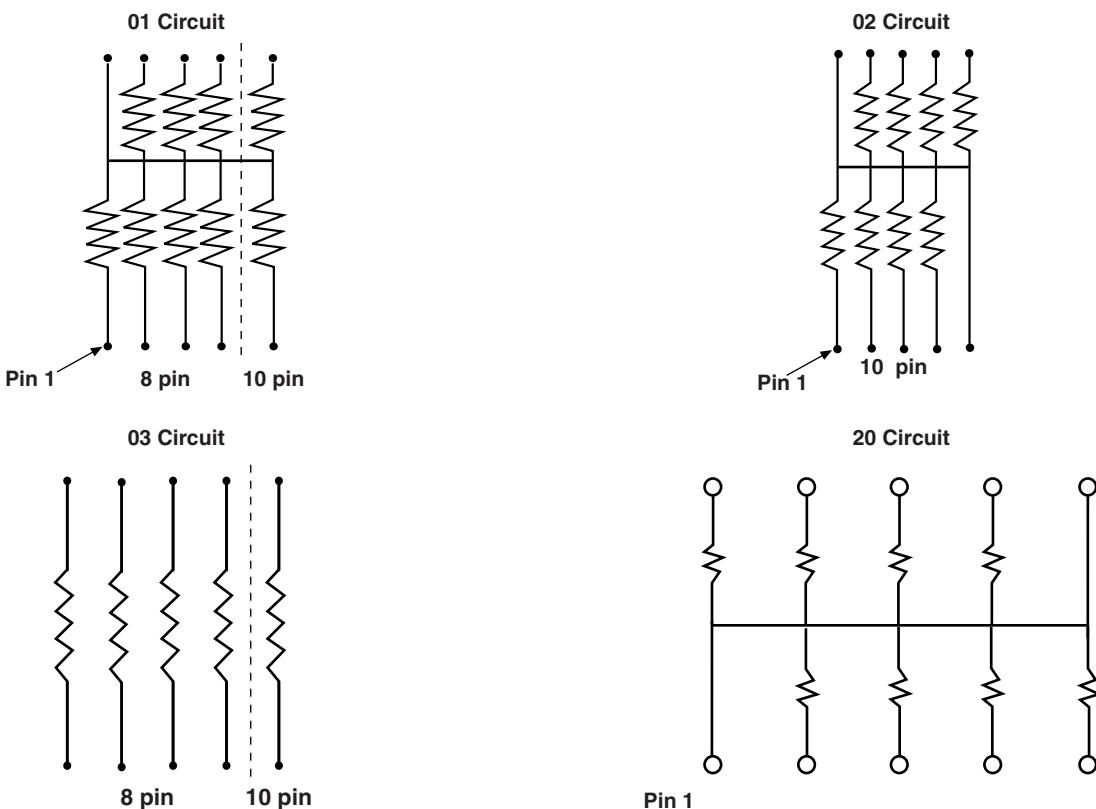
## AVAILABLE TYPES AND RANGES

MODEL	TERMINAL COUNT	CIRCUIT	TEMPERATURE COEFFICIENT	TOLERANCE
CRA12S	10	01 02 03 20	$\pm 100 \text{ ppm/K}$ $\pm 200 \text{ ppm/K}$	$\pm 1\% ; \pm 2\% ; \pm 5\%$
CRA12E	08	01 02 03 20		
	10	01 02 03 20		

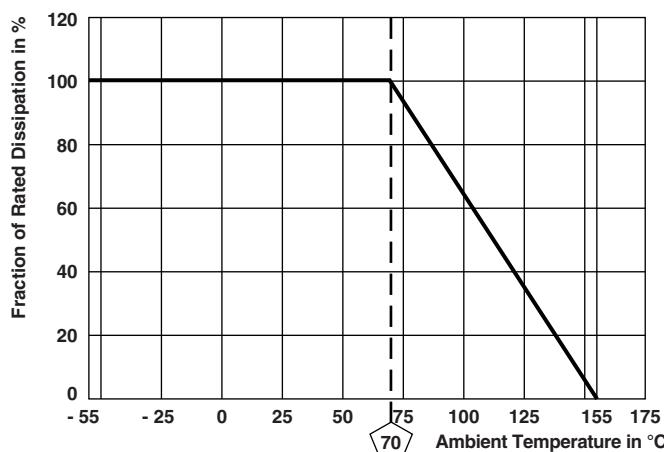
## PACKAGING

MODEL	TAPE WIDTH	DIAMETER	PITCH	PIECES/REEL	BLISTER TAPE	
					ACC. IEC 60286-3, TYPE II	PART NUMBER
CRA12E 08	12 mm	180 mm/7"	8 mm	2000	TR	RB8
CRA12E 10		330 mm/13"		5000	TL	RD7
CRA12S 10						

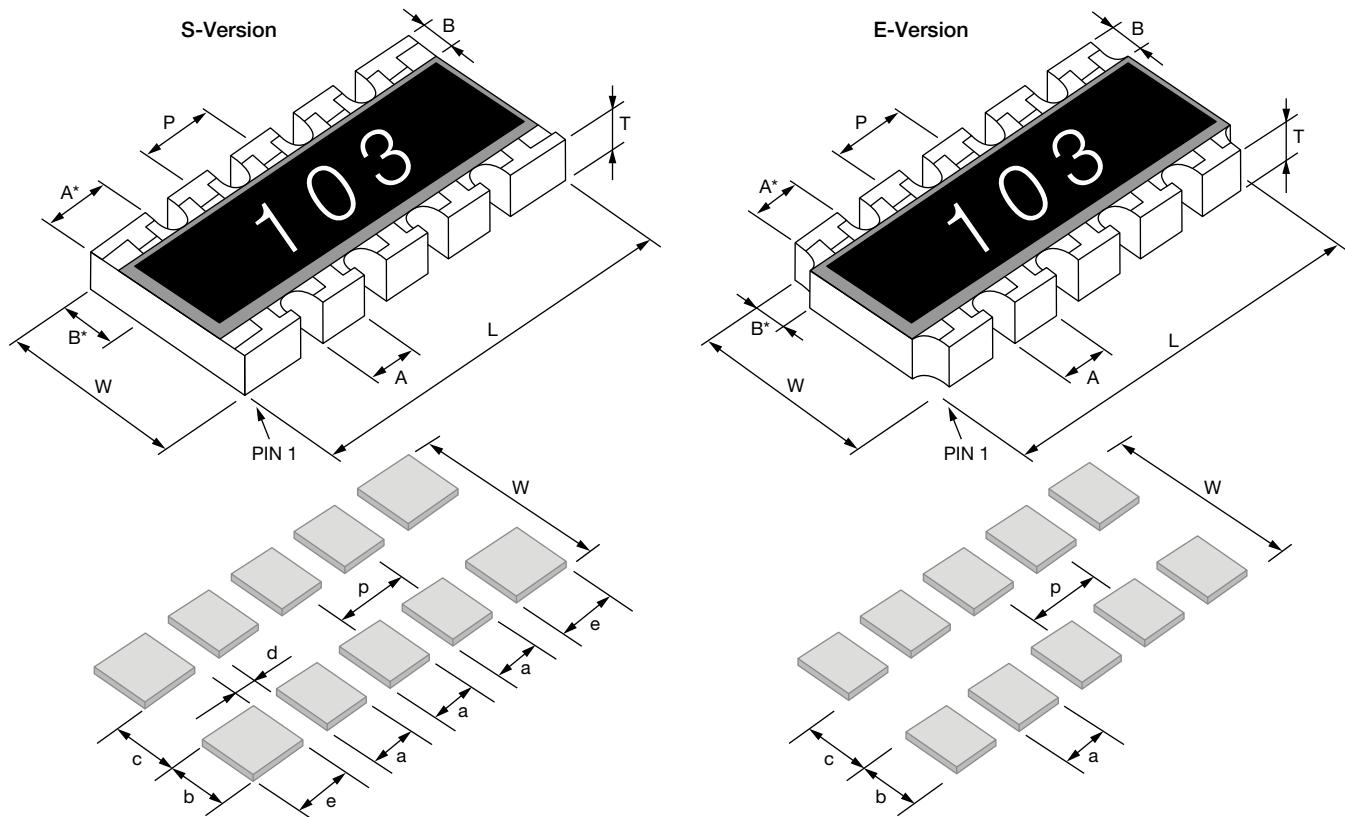
## CIRCUIT



## DERATING



## DIMENSIONS



MODEL	PIN NO #	DIMENSIONS in millimeters							
		L	A	A*	B	B*	P	T	W
CRA12E	8	5.08	0.79	-	0.51	0.38	1.27	0.55	3.05
CRA12E	10	6.40	0.79	-	0.51	0.38	1.27	0.55	3.05
CRA12S	10	6.40	0.79	0.89	0.51	0.38	1.27	0.55	3.05
	TOL.	$\pm 0.15$	$\pm 0.15$	$\pm 0.15$	$\pm 0.25$	$\pm 0.2$	$\pm 0.1$	$\pm 0.15$	$\pm 0.15$

SOLDER PAD DIMENSIONS in millimeters							
	c	w	d	p	a	b	e
WAVE	2.2	4.3	0.57	1.27	0.71	1.05	1.09
REFLOW	2.2	3.9	0.57	1.27	0.71	0.86	1.09

TEST PROCEDURES AND REQUIREMENTS					
EN 60115-1 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS PERMISSIBLE CHANGE ( $\Delta R$ ) <sup>(1)</sup>	
				STABILITY CLASS 1 OR BETTER	STABILITY CLASS 2 OR BETTER
			Stability for product type: <b>CRA12E/CRA12S</b>	10 $\Omega$ to 1 M $\Omega$	
4.5	-	Resistance	-	$\pm 1\%$	$\pm 2\%, \pm 5\%$
4.7	-	Voltage proof	$U = 1.4 \times U_{ins}; 60\text{ s}$	No flashover or breakdown	
4.13	-	Short time overload	$U = 2.5 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max};$ Duration according 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 $\pm 5$ ) $^{\circ}\text{C}$ ; (2 $\pm 0.2$ ) s	Good tinning ( $\geq 95\%$ covered) no visible damage	
			Solder bath method; Sn96.5Ag3Cu0.5; non-activated flux; (245 $\pm 5$ ) $^{\circ}\text{C}$ ; (3 $\pm 0.3$ ) s	Good tinning ( $\geq 95\%$ covered) no visible damage	
4.8.4.2	-	Temperature coefficient	(20/- 55/20) $^{\circ}\text{C}$ and (20/125/20) $^{\circ}\text{C}$	$\pm 100\text{ ppm/K}$	$\pm 200\text{ ppm/K}$
4.32	21 (U <sub>U3</sub> )	Shear (adhesion)	45 N	No visible damage	
4.33	21 (U <sub>U1</sub> )	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 $^{\circ}\text{C}$ ; 30 min at 125 $^{\circ}\text{C}$ 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	-	Dry heat	-		
4.23.2	2 (Ba)	Damp heat, cyclic	125 $^{\circ}\text{C}$ ; 16 h		
4.23.3	30 (Db)	Cold	55 $^{\circ}\text{C}$ ; $\geq 90\%$ RH; 24 h; 1 cycle		
4.23.4	1 (Aa)	Low air pressure	- 55 $^{\circ}\text{C}$ ; 2 h		
4.23.5	13 (M)	-	1 kPa; (25 $\pm 10$ ) $^{\circ}\text{C}$ ; 1 h		
4.23.6	30 (Db)	Damp heat, cyclic	55 $^{\circ}\text{C}$ ; $\geq 90\%$ RH; 24 h; 5 cycle		
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R}$		
4.25.1	-	Endurance at 70 $^{\circ}\text{C}$	$U = \sqrt{P_{70} \times R} \leq U_{max}$ 1.5 h on; 0.5 h off; 70 $^{\circ}\text{C}$ ; 1000 h 70 $^{\circ}\text{C}$ ; 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 $\pm 5$ ) $^{\circ}\text{C}$ ; (10 $\pm 1$ ) s	$\pm (0.25\% R + 0.05\Omega)$	$\pm (0.5\% R + 0.05\Omega)$
4.35	-	Flammability, needle flame test	IEC 60695-11-5; 10 s	No burning after 30 s	
4.24	78 (Cab)	Damp heat, steady state	(40 $\pm 2$ ) $^{\circ}\text{C}$ ; (93 $\pm 3$ ) % RH; 56 days	$\pm (1\% R + 0.05\Omega)$	
4.25.3	-	Endurance at upper category temperature	155 $^{\circ}\text{C}$ ; 1000 h	$\pm (1\% R + 0.05\Omega)$	$\pm (2\% R + 0.1\Omega)$
4.40	-	Electrostatic discharge (human body model)	IEC 61340-3-1; 3 positive and 3 negative discharges; ESD voltage: 500 V	$\pm (1\% R + 0.05\Omega)$	
4.29	45 (XA)	Component solvent resistance	Isopropyl alcohol; 50 $^{\circ}\text{C}$ ; method 2	No visible damage	
4.30	45 (XA)	Solvent resistance of marking	Isopropyl alcohol; 50 $^{\circ}\text{C}$ ; method 1; toothbrush	Marking legible, no visible damage	
4.22	6 (Fc)	Vibration, endurance by sweeping	$f = 10\text{ Hz to } 2000\text{ Hz}; x, y, z \leq 1.5\text{ mm}$ $A \leq 200\text{ m/s}^2$ ; 10 sweeps per axis	$\pm (0.25\% R + 0.05\Omega)$	$\pm (0.5\% R + 0.05\Omega)$
4.37	-	Periodic electric overload	$U = \sqrt{15 \times P_{70} \times R} \leq 2 \times U_{max}$ 0.1 s on; 2.5 s off; 1000 cycles	$\pm (1\% R + 0.05\Omega)$	
4.27	-	Single pulse high voltage overload, 10 $\mu\text{s}/700\text{ }\mu\text{s}$	$\dot{U} = 10 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max}$ 10 pulses	$\pm (1\% R + 0.05\Omega)$	

**Note**

(1) Figures are given for a single element.

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 environmental test procedures

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

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