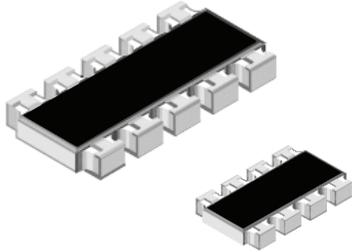


## Thick Film Resistor Array



### FEATURES

- Convex terminal array available with either scalloped corners (E version) or square corners (S version)
- Wide ohmic range: 10R to 1M $\Omega$
- 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
- Compliant to RoHS Directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition



RoHS  
COMPLIANT  
HALOGEN  
FREE

STANDARD ELECTRICAL SPECIFICATIONS							
MODEL	CIRCUIT	POWER RATING $P_{70^\circ\text{C}}$ W	LIMITING ELEMENT VOLTAGE MAX. $V_{\equiv}$	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE $\Omega$	SERIES
CRA12E CRA12S	01; 02; 20	0.100	50	$\pm 100$	$\pm 1$	10R to 1M $\Omega$	E24; E96
	03	0.125		$\pm 200$	$\pm 2; \pm 5$		E24
Zero-Ohm-Resistor: $R_{\text{max.}} = 50 \text{ m}\Omega$ , $I_{\text{max.}} = 1.5 \text{ A}$							

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

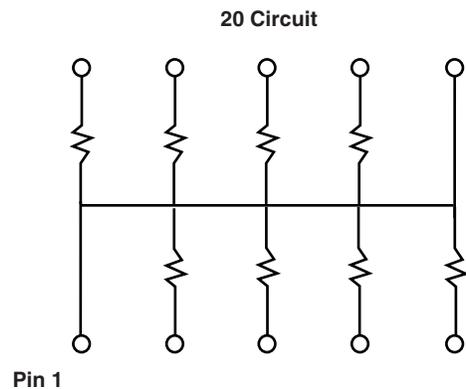
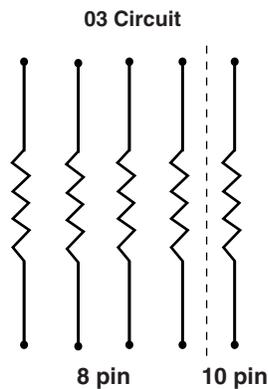
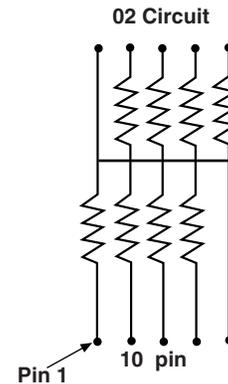
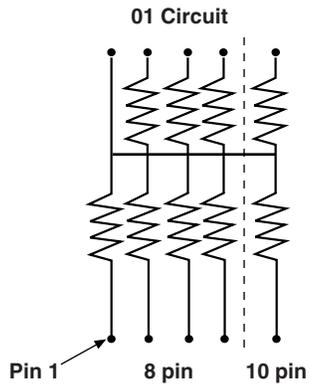
PART NUMBER AND PRODUCT DESCRIPTION																	
Part Number: CRA12E08347K0JTR <sup>(2)</sup>																	
C	R	A	1	2	E	0	8	3	4	7	K	0	J	T	R		
MODEL	TERMINAL STYLE	PIN	CIRCUIT	VALUE		TOLERANCE		PACKAGING	SPECIAL								
CRA12	S E	08 10	1 = 01 2 = 02 3 = 03 8 = 20	R = Decimal K = Thousand M = Million 0000 = 0 $\Omega$ Jumper		F = $\pm 1\%$ G = $\pm 2\%$ J = $\pm 5\%$ Z = 0 $\Omega$ Jumper		TR TL	Up to 2 digits								
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 $\Omega$ 47K = 47 k $\Omega$ 1M = 1 M $\Omega$ 0R0 = Jumper		$\pm 1\%$ $\pm 2\%$ $\pm 5\%$	RB8 RD7		e3 = Pure tin termination finish									

**Note**

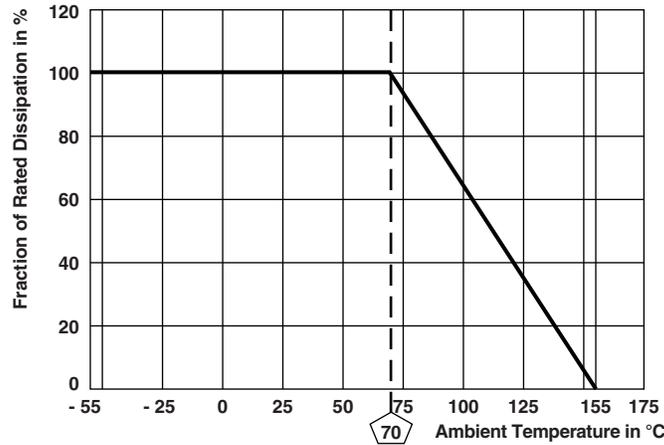
<sup>(2)</sup> Preferred way for ordering products is by use of the PART NUMBER.

AVAILABLE TYPES AND RANGES				
MODEL	TERMINAL COUNT	CIRCUIT	TEMPERATURE COEFFICIENT	TOLERANCE
CRA12S	10	01	± 100 ppm/K ± 200 ppm/K	± 1 %; ± 2 %; ± 5 %
		02		
CRA12E	08	03		
	10	20		

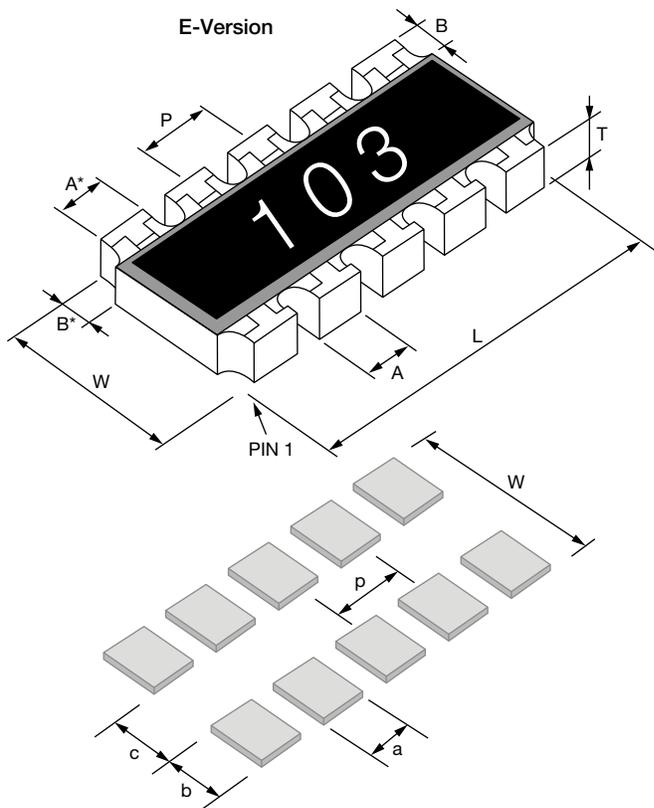
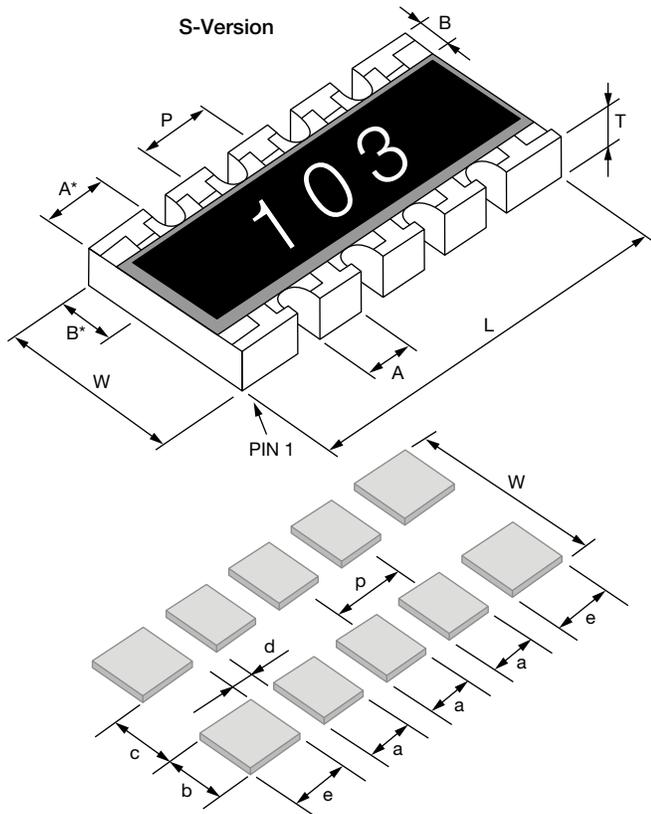
PACKAGING						
MODEL	TAPE WIDTH	DIAMETER	PITCH	PIECES/REEL	BLISTER TAPE ACC. IEC 60286-3, TYPE II	
					PART NUMBER	PRODUCT DESCRIPTION
CRA12E 08	12 mm	180 mm/7" 330 mm/13"	8 mm	2000 5000	TR	RB8
CRA12E 10					TL	RD7
CRA12S 10						

**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.	± 0.15	± 0.15	± 0.15	± 0.25	± 0.2	± 0.1	± 0.15	± 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 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) $^{\circ}$ 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) $^{\circ}$ C; (3 $\pm$ 0.3) s	Good tinning ( $\geq 95\%$ covered) no visible damage	
4.8.4.2	-	Temperature coefficient	(20/- 55/20) $^{\circ}$ C and (20/125/20) $^{\circ}$ C	$\pm 100$ ppm/K	$\pm 200$ 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 $^{\circ}$ C; 30 min at 125 $^{\circ}$ 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 $^{\circ}$ C; 16 h		
4.23.3	30 (Db)	Cold	55 $^{\circ}$ C; $\geq 90\%$ RH; 24 h; 1 cycle		
4.23.4	1 (Aa)	Low air pressure	- 55 $^{\circ}$ C; 2 h	$\pm (1\% R + 0.05 \Omega)$	$\pm (2\% R + 0.1 \Omega)$
4.23.5	13 (M)	-	1 kPa; (25 $\pm$ 10) $^{\circ}$ C; 1 h		
4.23.6	30 (Db)	Damp heat, cyclic	55 $^{\circ}$ 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 $^{\circ}$ C	$U = \sqrt{P_{70} \times R} \leq U_{max}$ . 1.5 h on; 0.5 h off; 70 $^{\circ}$ C; 1000 h 70 $^{\circ}$ 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) $^{\circ}$ 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) $^{\circ}$ C; (93 $\pm$ 3) % RH; 56 days	$\pm (1\% R + 0.05 \Omega)$	
4.25.3	-	Endurance at upper category temperature	155 $^{\circ}$ 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 $^{\circ}$ C; method 2	No visible damage	
4.30	45 (XA)	Solvent resistance of marking	Isopropyl alcohol; 50 $^{\circ}$ C; method 1; toothbrush	Marking legible, no visible damage	
4.22	6 (Fc)	Vibration, endurance by sweeping	f = 10 Hz to 2000 Hz; x, y, z $\leq 1.5$ mm; A $\leq 200$ m/s <sup>2</sup> ; 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 $\mu$ s/700 $\mu$ s	$\hat{U} = 10 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max}$ . 10 pulses	$\pm (1\% R + 0.05 \Omega)$	

**Note**

<sup>(1)</sup> 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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