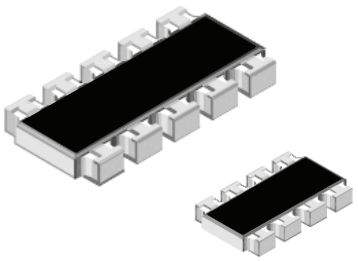
Thick Film Resistor Array



FEATURES

- Convex terminal array available with either scalloped corners (E version) or square corners (S version)
- Wide ohmic range: 10R to 1M0
- 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 $P_{70\,°C}$ W	LIMITING ELEMENT VOLTAGE MAX. V≅	TEMPERATURE COEFFICIENT ppm/K	TOLERANCE %	RESISTANCE RANGE Ω	SERIES
CRA12E CRA12S	01; 02; 20	0.100	50	± 100	± 1	10R to 1M0	E24; E96
	03	0.125		± 200	± 2; ± 5		E24
		Zero-Ohm-Resistor: $R_{max.}$ = 50 mΩ, $I_{max.}$ = 1.5 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 $U_{max.}$ AC/DC	V	50	
Insulation voltage U_{ins} (1 min)	V	100	
Insulation resistance	Ω	> 10^9	
Category temperature range	°C	- 55 to + 155	

Note

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

PART NUMBER AND PRODUCT DESPRIPTION

Part Number: CRA12E08347K0JTR (2)

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 Ω Jumper	**F** = ± 1 % **G** = ± 2 % **J** = ± 5 % **Z** = 0 Ω 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 Ω **47K** = 47 kΩ **1M** = 1 MΩ **0R0** = Jumper	**± 1 %** **± 2 %** **± 5 %**	**RB8** **RD7**	**e3** = Pure tin termination finish

Note

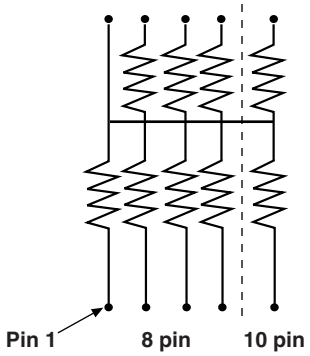
(2) Preferred way for ordering products is by use of the PART NUMBER.

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

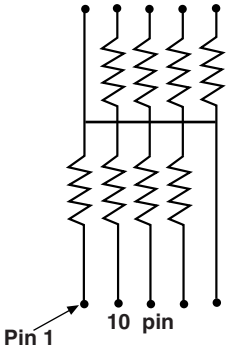
PACKAGING						
MODEL	TAPE WIDTH	DIAMETER	PITCH	PIECES/REEL	BLISTER TAPE ACC. IEC 60286-3, TYPE II	
					PART NUMBER	PRODUCT DESCRIPTION
CRA12E 08 CRA12E 10 CRA12S 10	12 mm	180 mm/7" 330 mm/13"	8 mm	2000 5000	TR TL	RB8 RD7

CIRCUIT

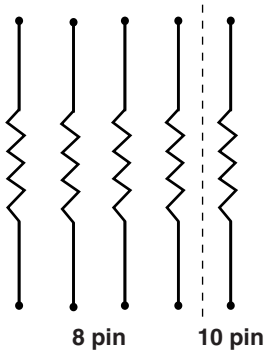
01 Circuit



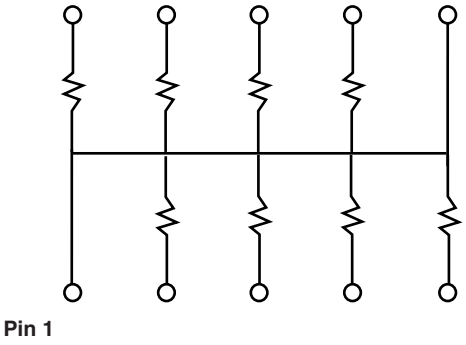
02 Circuit



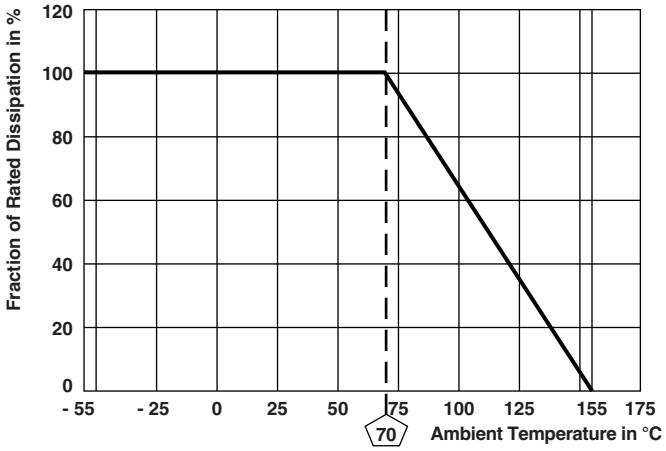
03 Circuit



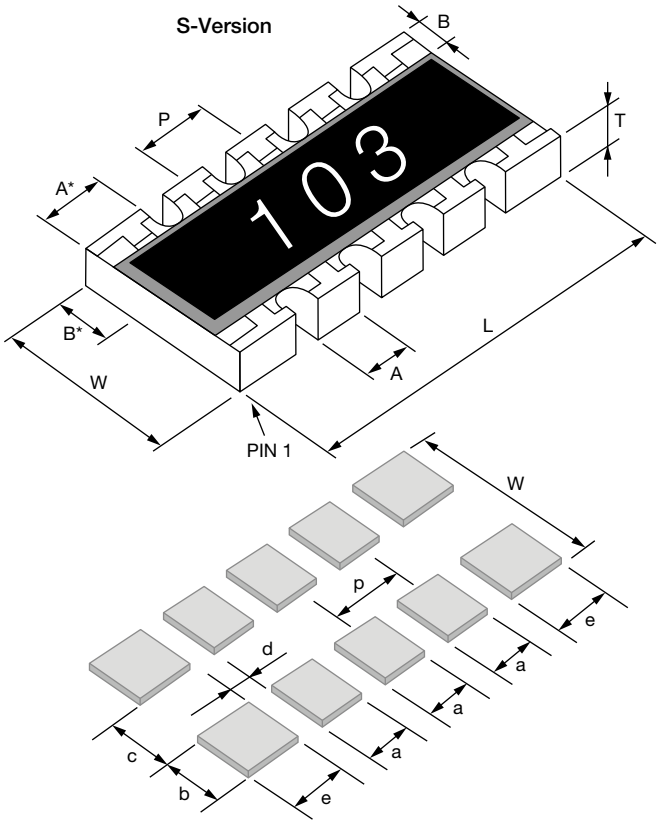
20 Circuit

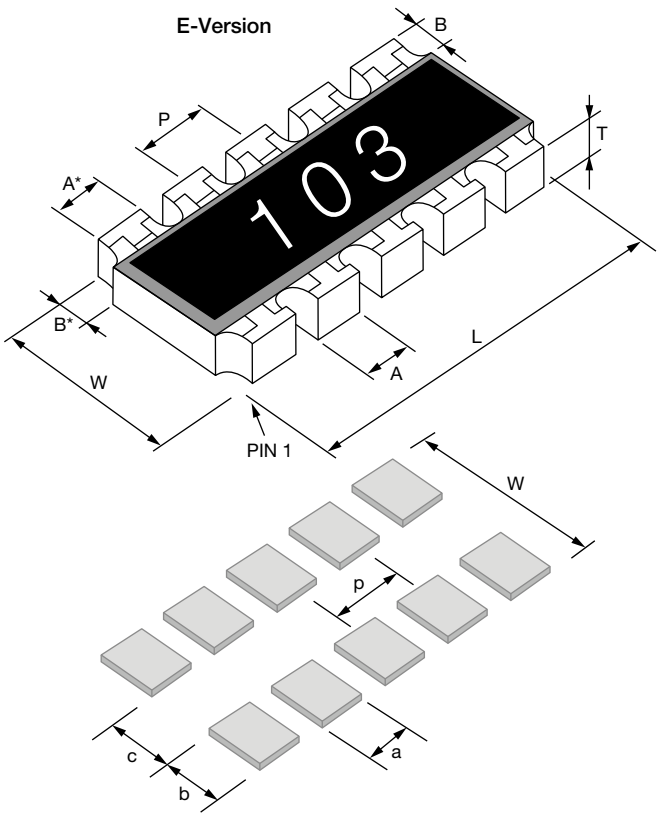


DERATING



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 (ΔR) (1)	
				STABILITY CLASS 1 OR BETTER	STABILITY CLASS 2 OR BETTER
			Stability for product type: CRA12E/CRA12S	10 Ω to 1 MΩ	
4.5	-	Resistance	-	± 1 %	± 2 %, ± 5 %
4.7	-	Voltage proof	U = 1.4 x 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	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
4.17.2	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; non-activated flux; (245 ± 5) °C; (3 ± 0.3) s	Good tinning (≥ 95 % covered) no visible damage	
4.8.4.2	-	Temperature coefficient	(20/- 55/20) °C and (20/125/20) °C	± 100 ppm/K	± 200 ppm/K
4.32	21 (U_{U3})	Shear (adhesion)	45 N	No visible damage	
4.33	21 (U_{U1})	Substrate bending	Depth 2 mm; 3 times	No visible damage, no open circuit in bent position ± (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)	± (0.5 % R + 0.05 Ω) ± (1 % R + 0.05 Ω)
4.23	-	Dry heat	-	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)
4.23.2	2 (Ba)	Damp heat, cyclic	125 °C; 16 h		
4.23.3	30 (Db)	Cold	55 °C; ≥ 90 % RH; 24 h; 1 cycle		
4.23.4	1 (Aa)	Low air pressure	- 55 °C; 2 h		
4.23.5	13 (M)	-	1 kPa; (25 ± 10) °C; 1 h		
4.23.6	30 (Db)	Damp heat, cyclic	55 °C; ≥ 90 % RH; 24 h; 5 cycle		
4.23.7	-	DC load	$U = \sqrt{P_{70} \times R}$		
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	± (1 % R + 0.05 Ω) ± (2 % R + 0.1 Ω)	± (2 % R + 0.1 Ω) ± (4 % R + 0.1 Ω)
4.18.2	58 (Td)	Resistance to soldering heat	Solder bath method; (260 ± 5) °C; (10 ± 1) s	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
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 ± 2) °C; (93 ± 3) % RH; 56 days	± (1 % R + 0.05 Ω)	
4.25.3	-	Endurance at upper category temperature	155 °C; 1000 h	± (1 % R + 0.05 Ω)	± (2 % R + 0.1 Ω)
4.40	-	Electrostatic discharge (human body model)	IEC 61340-3-1; 3 positive and 3 negative discharges; ESD voltage: 500 V	± (1 % 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	
4.22	6 (Fc)	Vibration, endurance by sweeping	f = 10 Hz to 2000 Hz; x, y, z ≤ 1.5 mm; A ≤ 200 m/s^2; 10 sweeps per axis	± (0.25 % R + 0.05 Ω)	± (0.5 % R + 0.05 Ω)
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	± (1 % R + 0.05 Ω)	
4.27	-	Single pulse high voltage overload, 10 µs/700 µs	$\hat{U} = 10 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max.}$ 10 pulses	± (1 % R + 0.05 Ω)	

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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