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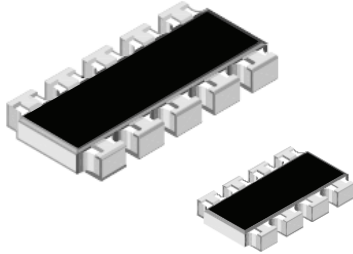
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Thick Film Resistor Array



FEATURES

- Convex terminal array available with either scalloped corners (E version) or square corners (S version)
- Wide ohmic range: 10R to 1M Ω
- 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 Ω | SERIES |
| CRA12E CRA12S | 01; 02; 20 | 0.100 | 50 | ± 100 | ± 1 | 10R to 1M Ω | E24; E96 |
| | 03 | 0.125 | | ± 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_{ins} (1 min) | V | 100 | |
| Insulation resistance | Ω | $> 10^9$ | |
| Category temperature range | $^\circ\text{C}$ | - 55 to + 155 | |

Note

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

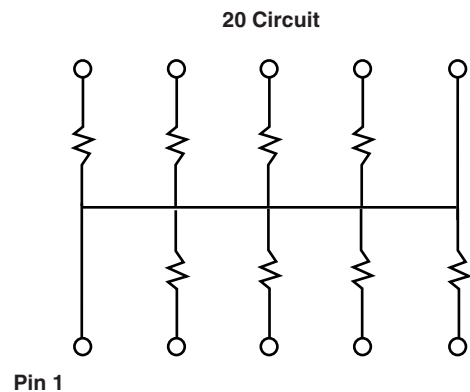
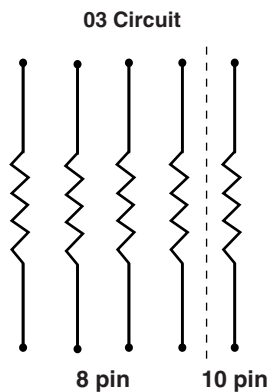
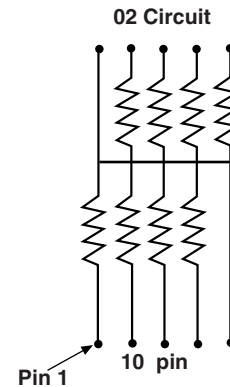
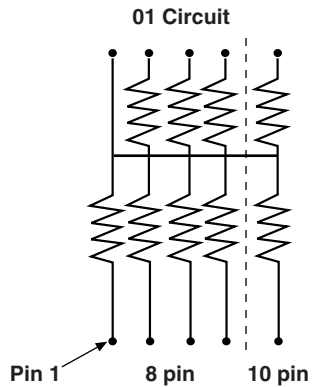
| PART NUMBER AND PRODUCT DESCRIPTION | | | | | | | | | | | | | | | | | |
|---|----------------|----------------------|---|--|-------------------------------------|--|---|-------------------------------------|----------------|---|---|---|---|---|---|--|--|
| Part Number: CRA12E08347K0JTR ⁽²⁾ | | | | | | | | | | | | | | | | | |
| 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 = $\pm 1\%$ G = $\pm 2\%$ J = $\pm 5\%$ 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 k Ω 1M = 1 M Ω 0R0 = Jumper | | $\pm 1\%$ $\pm 2\%$ $\pm 5\%$ | RB8 RD7 | | e3 = Pure tin termination finish | | | | | | | | | |

Note

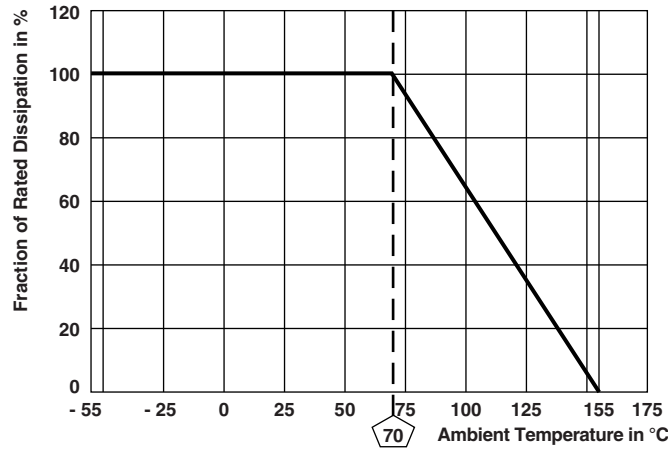
⁽²⁾ Preferred way for ordering products is by use of the PART NUMBER.

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

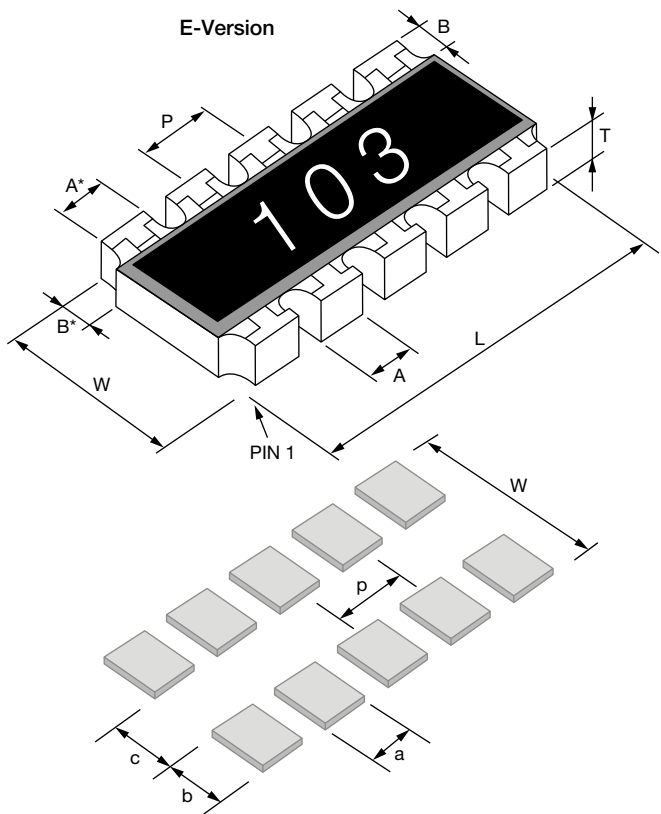
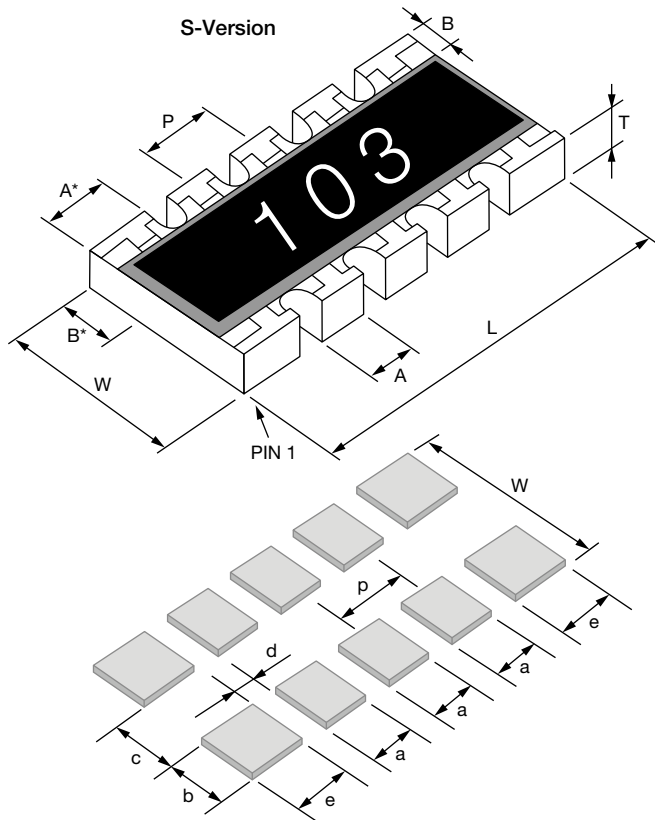
| PACKAGING | | | | | | |
|-----------|------------|-------------------------|-------|--------------|---|---------------------|
| MODEL | TAPE WIDTH | DIAMETER | PITCH | PIECES/REEL | BLISTER TAPE ACC. IEC 60286-3, TYPE II | |
| | | | | | PART NUMBER | PRODUCT DESCRIPTION |
| CRA12E 08 | 12 mm | 180 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 (ΔR) ⁽¹⁾ | |
| | | | | STABILITY CLASS 1 OR BETTER | STABILITY CLASS 2 OR BETTER |
| | | | Stability for product type: CRA12E/CRA12S | 10 Ω to 1 M Ω | |
| 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 | ± 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 $\pm (0.25\% R + 0.05 \Omega)$ | |
| 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 ≤ 1.5 mm; A ≤ 200 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 μ s/700 μ s | $\hat{U} = 10 \times \sqrt{P_{70} \times R} \leq 2 \times U_{max}$. 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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