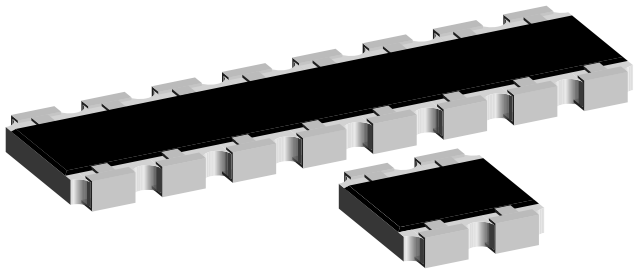
# Thick Film Resistor Array



## FEATURES

- Convex terminal array available with either scalloped corners (E version) or square corners (S version)
- Wide ohmic range: 10R to 1M0
- 4, 8, 10 or 16 terminal package with isolated resistors
- Lead (Pb)-free solder contacts on Ni barrier layer
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processes
- Compatible with "Restriction of the use of Hazardous Substances" (RoHS) directive 2002/95/EC (issue 2004)

## STANDARD ELECTRICAL SPECIFICATIONS

| MODEL | CIRCUIT | POWER RATING $P_{70\,°C}$ W | LIMITING ELEMENT VOLTAGE MAX. V≅ | TEMPERATURE COEFFICIENT ppm/K | TOLERANCE % | RESISTANCE RANGE Ω | E-SERIES |
|---|---|---|---|---|---|---|---|
| CRA12E<br>CRA12S | 01; 02; 20 | 0.100 | 50 | ± 100 | ± 1 | 10R - 1M0 | 24 + 96 |
| | 03 | 0.125 | | ± 200 | ± 2; ± 5 | | 24 |
| | | Zero-Ohm-Resistor: $R_{max}$ = 50 mΩ, $I_{max}$ = 1.5 A | | | | | |

## TECHNICAL SPECIFICATIONS

| PARAMETER | UNIT | CRA12E & S - 01/02/20 CIRCUIT | CRA12E & S - 03 CIRCUIT |
|---|---|---|---|
| Rated Dissipation at 70 °C[2] | W per element | 0.1 | 0.125 |
| Limiting Element Voltage[1] | V≅ | 50 | |
| Insulation Voltage (1 min) | $V_{dc/ac\ peak}$ | 100 | |
| Category Temperature Range | °C | - 55/+ 125 (+ 155) | |
| Insulation Resistance | Ω | > $10^9$ | |

**Notes**
1. Rated voltage: $\sqrt{P \times R}$
2. The power dissiaption on the resistor generates a temperature rise against the local ambient, depending on the heat flow support of the printed-circuit board (thermal resistance). The rated dissipation applies only if permitted film temperature of 155 °C is not exceeded.

## PART NUMBER AND PRODUCT DESCRIPTION

**PART NUMBER: CRA12E08347K0JTR[1]**

| C | R | A | 1 | 2 | E | 0 | 8 | 3 | 4 | 7 | K | 0 | J | T | R | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| MODEL | TERMINAL STYLE | PIN | CIRCUIT | VALUE | TOLERANCE | PACKAGING[2] | SPECIAL |
|---|---|---|---|---|---|---|---|
| **CRA12** | **S**<br>**E** | **04**<br>**08**<br>**10**<br>**16** | **1** = 01<br>**2** = 02<br>**3** = 03<br>**8** = 20 | **R** = Decimal<br>**K** = Thousand<br>**M** = Million<br>**0000** = 0 Ω Jumper | **F** = ± 1 %<br>**G** = ± 2 %<br>**J** = ± 5 %<br>**Z** = 0 Ω Jumper | **TR**<br>**TL** | up to 2 digits |

**PRODUCT DESCRIPTION: CRA12S 08 03 473 J RB8 e3**

| CRA12S | 08 | 03 | 473 | J | RB8 | e3 |
|---|---|---|---|---|---|---|
| MODEL | TERMINAL COUNT | CIRCUIT TYPE | RESISTANCE VALUE | TOLERANCE | PACKAGING[2] | LEAD (Pb)-FREE |
| CRA12E<br>CRA12S | 04<br>08<br>10<br>16 | 01<br>02<br>03<br>20 | 473 = 47 kΩ<br>4702 = 47 kΩ<br>10R0 = 10 Ω<br>100 = 10 Ω<br>000 = 0 Ω Jumper<br>First two digits (three for 1 %) are significant. Last digit is the multiplier | F = ± 1 %<br>G = ± 2 %<br>J = ± 5 %<br>Z = 0 Ω Jumper | RB8<br>RD7 | e3 = Pure Tin Termination Finish |

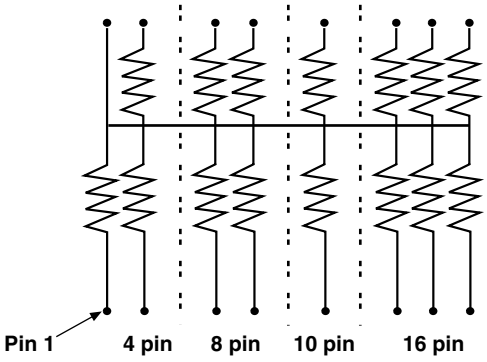
**Notes**
1. Preferred way for ordering products is by use of the PART NUMBER
2. Please refer to table PACKAGING, see next page

| AVAILABLE TYPES AND RANGES | | | | |
|---|---|---|---|---|
| MODEL | TERMINAL COUNT | CIRCUIT | TEMPERATURE COEFFICIENT | TOLERANCE |
| CRA12 S | 08 | 03 | ± 100 ppm/K<br>± 200 ppm/K | ± 1 %<br>± 5 %; ± 2 % |
| | 10 | 01<br>02<br>03<br>20 | | |
| CRA12 E | 04 | 01<br>03 | | |
| | 08 | 01<br>02<br>03<br>20 | | |
| | 10 | | | |
| | 16 | | | |

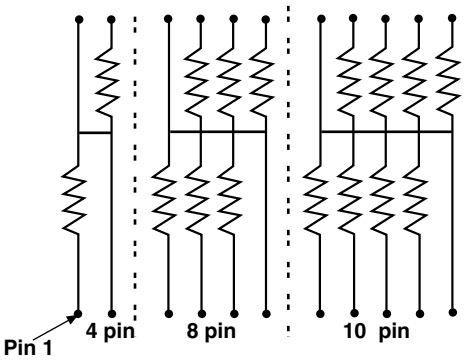
| PACKAGING | | | | | | |
|---|---|---|---|---|---|---|
| MODEL | TAPE WIDTH | DIAMETER | PITCH | PIECES/REEL | PACKAGING CODE | |
| | | | | | BLISTER TAPE | |
| | | | | | PART NUMBER | PRODUCT DESCRIPTION |
| CRA12 E 04 | 8 mm | 180 mm/7" | 4 mm | 2000 | TR | RB8 |
| CRA12 E 08<br>CRA12 S 08<br>CRA12 E 10<br>CRA12 S 10 | 12 mm | 180 mm/7"<br>330 mm/13" | 8 mm | 2000<br>5000 | TR<br>TL | RB8<br>RD7 |
| CRA12 E 16 | 24 mm | 330 mm/13" | 8 mm | 2000<br>5000 | TR<br>TL | RB8<br>RD7 |

## CIRCUIT

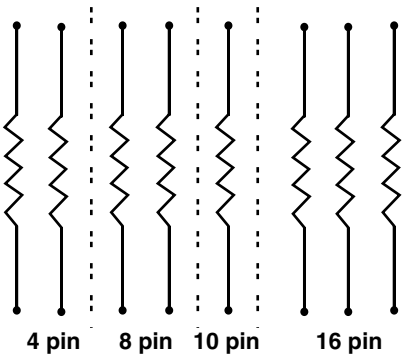
01 Circuit



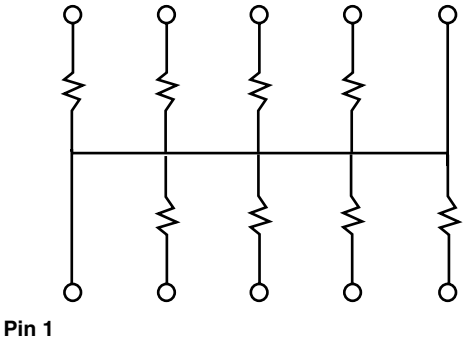

02 Circuit

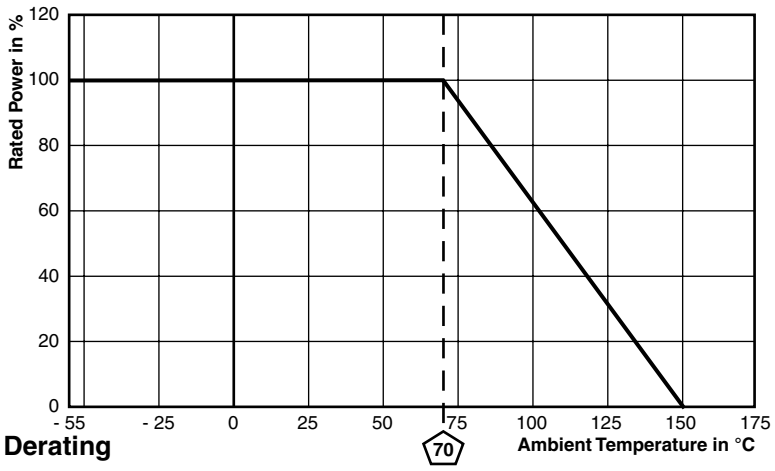



03 Circuit




20 Circuit

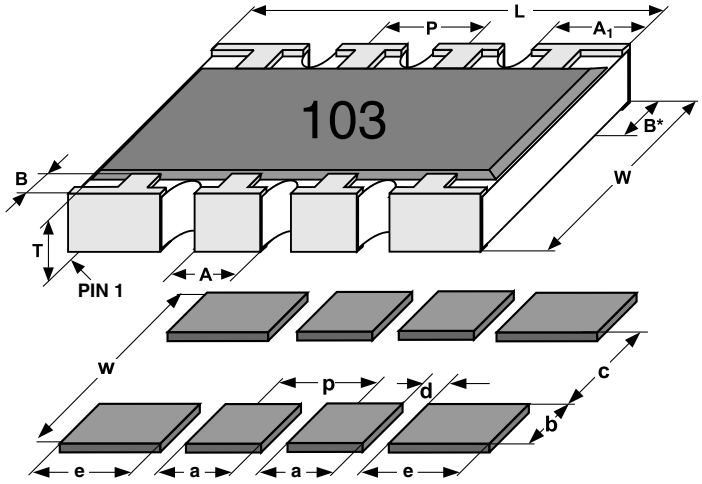




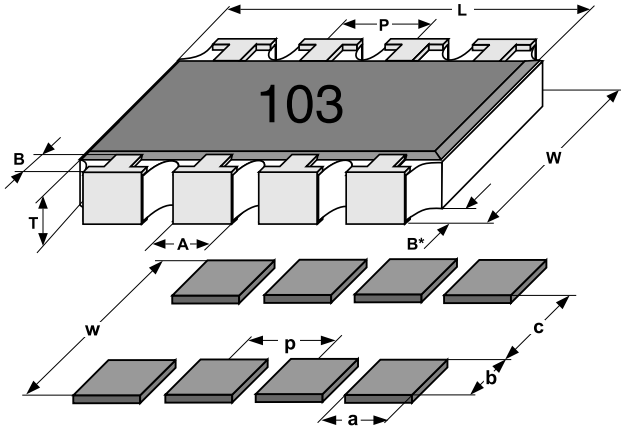

## DIMENSIONS

8 -Terminal device

S-Version




E-Version




| MODEL | PIN NO# | DIMENSIONS [in millimeters] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | L | A | A* | B | B* | P | T | W |
| CRA12E | **4** | 2.54 | 0.79 | - | 0.51 | 0.38 | 1.27 | 0.53 | 3.05 |
| CRA12E | **8** | 5.08 | 0.79 | - | 0.51 | 0.38 | 1.27 | 0.53 | 3.05 |
| CRA12S | **8** | 5.08 | 0.79 | 0.89 | 0.51 | 0.38 | 1.27 | 0.53 | 3.05 |
| CRA12E | **10** | 6.40 | 0.79 | - | 0.51 | 0.38 | 1.27 | 0.53 | 3.05 |
| CRA12S | **10** | 6.40 | 0.79 | 0.89 | 0.51 | 0.38 | 1.27 | 0.53 | 3.05 |
| CRA12E | **16** | 10.30 | 0.79 | - | 0.51 | 0.38 | 1.27 | 0.53 | 3.05 |
| | **Tol** | - 0.15 | - 0.15 | - 0.15 | - 0.25 | - 0.2 | - 0.1 | - 0.1 | - 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 |

The dimensions shown are for 8 pin part. For parts with different pin numbers use the same pitch and add or substract pads as required.

## TEST PROCEDURES AND REQUIREMENTS

| EN 60115-1 | | | |
|---|---|---|---|
| **TEST (clause)** | **CONDITIONS OF TEST** | **REQUIREMENTS[1)]** | |
| | | **STABILITY CLASS 1 OR BETTER** | **STABILITY CLASS 2 OR BETTER** |
| | stability for product types: **CRA12E/CRA12S** | 10 Ω to 1 MΩ | 10 Ω to 1 MΩ |
| Resistance (4.5) | - | ± 1 % | ± 2 %; ± 5 % |
| Temperature coefficient (4.8.4.2) | 20/- 55/20 °C and 20/125/20 °C | ± 100 ppm/K | ± 200 ppm/K |
| Overload (4.13) | $U = 2.5 \times (P_{70} \times R)^{1/2}$ $\leq 2 \times U_{max}$; 1 s | ± (0.25 % $R$ + 0.05 Ω) | ± (0.5 % $R$ + 0.05 Ω) |
| Solderability (4.17.5)[2)] | Aging 4 h at 155 °C, dryheat Solder bath method; 235 °C; 1 s Visual examination | Good tinning (≥ 95 % covered) no visible damage | |
| Resistance to soldering heat (4.18.2) | Solder bath method; (260 ± 5) °C; (10 ± 1) s | ± (0.25 % $R$ + 0.05 Ω) | ± (0.5 % $R$ + 0.05 Ω) |
| Rapid change of temperature (4.19) | 30 min. at LCT = - 55 °C; 30 min. at UCT = 125 °C; 5 cycles | ± (0.25 % $R$ + 0.05 Ω) | ± (0.5 % $R$ + 0.05 Ω) |
| Damp heat, steady state (4.24) | (40 ± 2) °C; 56 days; (93 ± 3) % RH | ± (1 % $R$ + 0.05 Ω) | ± (2 % $R$ + 0.1 Ω) |
| Climatic sequence (4.23) | 16 h at UCT = 125 °C; 1 cycle at 55 °C; 2 h at LCT = - 55 °C; 1 h/1 kPa at 15 °C to 35 °C; 5 cycles at 55 °C $U = (P_{70} \times R)^{1/2}$ $U = U_{max}$; whichever is less severe | ± (1 % $R$ + 0.05 Ω) | ± (2 % $R$ + 0.1 Ω) |
| Endurance at 70 °C (4.25.1) | $U = (P_{70} \times R)^{1/2}$ $U = U_{max}$; whichever is less severe 1.5 h on; 0.5 h off; 70 °C; 1000 h | ± (1 % $R$ + 0.05 Ω) | ± (2 % $R$ + 0.1 Ω) |
| Extended endurance (4.25.1.8) | Duration extended to 8000 hours | ± (2 % $R$ + 0.1 Ω) | ± (4 % $R$ + 0.1 Ω) |
| Endurance at upper category temperature (4.25.3) | UCT = 125 °C; 1000 h | ± (1 % $R$ + 0.05 Ω) | ± (2 % $R$ + 0.1 Ω) |

**Notes**

1. Figures are given for a single element.
2. Solderability is specified for 2 years after production or requalification. Permitted storage time is 20 years.

## APPLICABLE SPECIFICATIONS

| | |
|---|---|
| • EN 60115-1 | Generic Specification |
| • EN 140400 | Sectional Specification |
| • EN 140401-802 | Detail Specification |
| • IEC 60068-2-X | Variety of environmental test procedures |
| • EIA 481 | Packaging of SMD components |

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