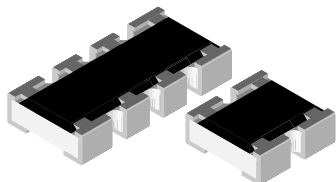


## Thick Film Resistor Array



The CRA04S thick film resistor array is constructed on a high grade ceramic body with convex terminations. A small package enables the design of high density circuits. The single component reduces board space, component counts, and assembly costs.

### FEATURES

- Convex terminal array with square corners
- Wide ohmic range: 10R to 1MΩ
- 4 or 8 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<br>$P_{70^{\circ}\text{C}}$<br>W | LIMITING ELEMENT<br>VOLTAGE MAX.<br>$V_{\equiv}$ | TEMPERATURE<br>COEFFICIENT<br>ppm/K  | TOLERANCE<br>% | RESISTANCE<br>RANGE<br>$\Omega$ | E-SERIES |
|--------|---------|---|--|--|----------------|---------------------------------|----------|
| CRA04S | 03      | 0.063   | 50   | $\pm 100$  | $\pm 1$        | 10R - 1M0                       | 24 + 96  |
|        |         |   |  | $\pm 200$  | $\pm 2; \pm 5$ |                                 | 24       |
|        |         |   |  | Zero-Ohm-Resistor: $R_{\text{max.}} \leq 50 \text{ m}\Omega$ , $I_{\text{max.}} = 1 \text{ A}$ |                |                                 |          |

### TECHNICAL SPECIFICATIONS

| PARAMETER                                 | UNIT                    | CRA04S        |
|---|-------------------------|---------------|
| Rated Dissipation at 70 °C <sup>(2)</sup> | W per element           | 0.063         |
| Limiting Element Voltage <sup>(1)</sup>   | $V_{\equiv}$            | 50            |
| Insulation Voltage (1 min)                | $V_{\text{dc/ac peak}}$ | 100           |
| Category Temperature Range                | °C                      | - 55 to + 155 |
| Insulation Resistance                     | $\Omega$                | $> 10^9$      |

#### Notes

<sup>(1)</sup> Rated voltage:  $\sqrt{P \times R}$

<sup>(2)</sup> The power dissipation 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 rate dissipation applies only if the permitted film temperature of 155 °C is not exceeded.

### PART NUMBER AND PRODUCT DESCRIPTION

PART NUMBER: CRA04S08347K0JTD <sup>(3)</sup>

|       |                |   |          |         |   |   |   |   |                          |   |                |   |   |   |   |  |  |
|-------|----------------|---|----------|---------|---|---|---|---|--------------------------|---|----------------|---|---|---|---|--|--|
| C     | R              | A | 0        | 4       | S   | 0 | 8   | 3 | 4                        | 7 | K              | 0 | J | T | D |  |  |
| MODEL | TERMINAL STYLE |   | PIN      | CIRCUIT | VALUE   |   | TOLERANCE   |   | PACKAGING <sup>(4)</sup> |   | SPECIAL        |   |   |   |   |  |  |
| CRA04 | S              |   | 04<br>08 | 3 = 03  | 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 |   | TD<br>TC<br>PZ           |   | Up to 2 digits |   |   |   |   |  |  |

PRODUCT DESCRIPTION: CRA04S 08 03 473 J RT7 e3

|        |                |              |  |  |                          |                                  |
|--------|----------------|--------------|--|--|--------------------------|----------------------------------|
| CRA04S | 08             | 03           | 473  | J  | RT7                      | e3                               |
| MODEL  | TERMINAL COUNT | CIRCUIT TYPE | RESISTANCE VALUE   | TOLERANCE  | PACKAGING <sup>(4)</sup> | LEAD (Pb)-FREE                   |
| CRA04S | 04<br>08       | 03           | 473 = 47 k $\Omega$<br>4702 = 47 k $\Omega$<br>10R0 = 10 $\Omega$<br>100 = 10 $\Omega$<br>000 = 0 $\Omega$ Jumper<br>First two digits (3 for 1 %) are significant. Last digit is the multiplier. | F = $\pm 1\%$<br>G = $\pm 2\%$<br>J = $\pm 5\%$<br>Z = 0 $\Omega$ Jumper | RT7<br>RT6<br>PZ         | e3 = Pure tin Termination finish |

#### Notes

<sup>(3)</sup> Preferred way for ordering products is by use of the PART NUMBER

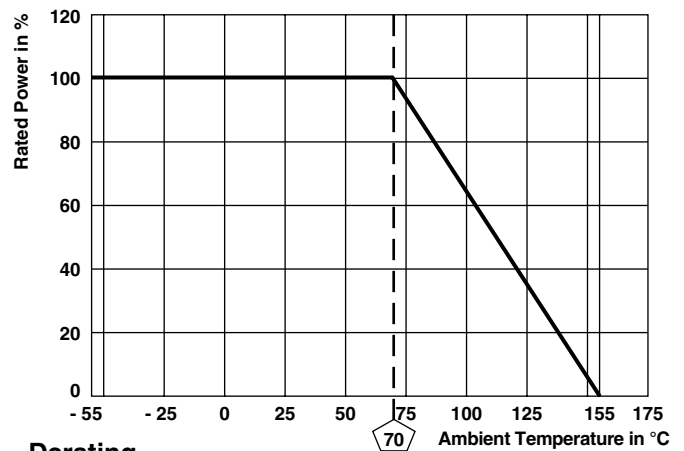
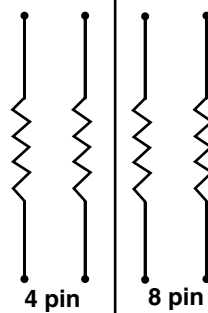
<sup>(4)</sup> Please refer to the table PACKAGING, see next page

## PACKAGING

| MODEL  | TAPE WIDTH | DIAMETER   | PITCH | PIECES/REEL | PACKAGING CODE |                     |
|--------|------------|------------|-------|-------------|----------------|---------------------|
|        |            |            |       |             | PAPER TAPE     |                     |
|        |            |            |       |             | PART NUMBER    | PRODUCT DESCRIPTION |
| CRA04S | 8 mm       | 180 mm/7"  | 2 mm  | 10 000      | TD             | RT7                 |
|        |            | 330 mm/13" | 2 mm  | 20 000      | TC             | RT6                 |
|        |            | 330 mm/13" | 2 mm  | 50 000      | PZ             | PZ                  |

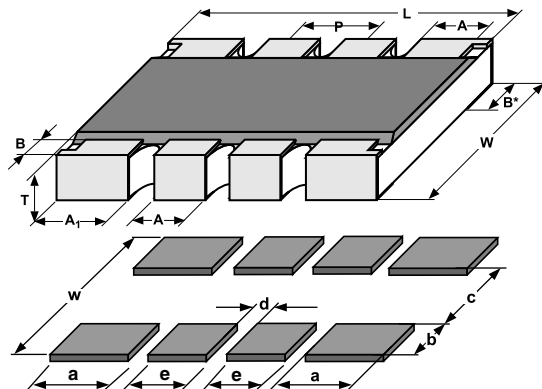
## CIRCUIT

03 CIRCUIT



Derating

## DIMENSIONS



| PIN NO# | DIMENSIONS [in millimeters] |        |                |        |       |                  |       |        |
|---------|-----------------------------|--------|----------------|--------|-------|------------------|-------|--------|
|         | L                           | A      | A <sub>1</sub> | B      | B*    | P <sub>NOM</sub> | T     | W      |
| 4       | 1.0<br>± 0.1                | -      | 0.33           | 0.15   | 0.25  | 0.65             | 0.35  | 1.0    |
| 8       | 2.0<br>± 0.2                | 0.30   | 0.4            | 0.15   | 0.25  | 0.50             | 0.45  | 1.0    |
| TOL.    | -                           | ± 0.15 | ± 0.15         | ± 0.10 | ± 0.1 | -                | ± 0.1 | ± 0.15 |

| SOLDER PAD DIMENSIONS [in millimeters] |      |      |     |     |     |     |
|--|------|------|-----|-----|-----|-----|
|  | c    | w    | d   | a   | b   | e   |
| WAVE                                   | 0.45 | 1.45 | 0.2 | 0.4 | 0.5 | 0.3 |

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

| TEST PROCEDURES AND REQUIREMENTS                    |  |  |                                |
|---|--|--|--------------------------------|
| EN 60115-1  |  |  |                                |
| TEST<br>(clause)                                    | CONDITIONS OF TEST   | REQUIREMENTS<br>PERMISSIBLE CHANGE ( $\Delta R/R$ ) <sup>(1)</sup> |                                |
|   |  | STABILITY<br>CLASS 1 OR BETTER                                     | STABILITY<br>CLASS 2 OR BETTER |
|   | Stability for product types:<br><br><b>CRA04S</b>  | 10 $\Omega$ to 1 M $\Omega$  | 10 $\Omega$ to 1 M $\Omega$    |
| Resistance (4.5)                                    | -  | $\pm 1 \%$   | $\pm 2 \%$ ; $\pm 5 \%$        |
| Temperature coefficient (4.8.4.2)                   | 20/- 55/20 °C and<br>20/125/20 °C  | $\pm 100$ ppm/K  | $\pm 200$ ppm/K                |
| Overload (4.13)                                     | $U = 2.5 \times (P_{70} \times R)^{1/2}$<br>$\leq 2 \times U_{\max.}$ ; 0.5 s  | $\pm (0.25 \% R + 0.05 \Omega)$                                    | $\pm (0.5 \% R + 0.05 \Omega)$ |
| Solderability (4.17.5) <sup>(2)</sup>               | Aging 4 h at 155 °C, dryheat<br>solder bath method; 235 °C; 2 s<br>visual examination  | Good tinning ( $\geq 95 \%$ covered)<br>no visible damage          |                                |
| Resistance to soldering heat (4.18.2)               | Solder bath method;<br>(260 $\pm$ 5) °C; (10 $\pm$ 1) s  | $\pm (0.25 \% R + 0.05 \Omega)$                                    | $\pm (0.5 \% R + 0.05 \Omega)$ |
| Rapid change of temperature (4.19)                  | 30 min at LCT = - 55 °C;<br>30 min at UCT = 125 °C; 5 cycles   | $\pm (0.25 \% R + 0.05 \Omega)$                                    | $\pm (0.5 \% R + 0.05 \Omega)$ |
| Damp heat, steady state (4.24)                      | (40 $\pm$ 2) °C; 56 days;<br>(93 $\pm$ 3) % RH   | $\pm (1 \% R + 0.05 \Omega)$                                       | $\pm (2 \% R + 0.1 \Omega)$    |
| Climatic sequence (4.23)                            | 16 h at UCT = 125 °C; 1 cycle at 55 °C;<br>2 h at LCT = - 55 °C;<br>1 h/1 kPa at 15 °C to 35 °C;<br>5 cycles at 55 °C<br>$U = (P_{70} \times R)^{1/2}$<br>$U = U_{\max.}$ ; whichever is less severe | $\pm (1 \% R + 0.05 \Omega)$                                       | $\pm (2 \% R + 0.1 \Omega)$    |
| Endurance at 70 °C (4.25.1)                         | $U = (P_{70} \times R)^{1/2}$<br>$U = U_{\max.}$ ; whichever is less severe<br>1.5 h ON; 0.5 h OFF;<br>70 °C; 1000 h   | $\pm (1 \% R + 0.05 \Omega)$                                       | $\pm (2 \% R + 0.1 \Omega)$    |
| Extended endurance (4.25.1.8)                       | Duration extended to 8000 h  | $\pm (2 \% R + 0.1 \Omega)$  | $\pm (4 \% R + 0.1 \Omega)$    |
| Endurance at upper category<br>temperature (4.25.3) | UCT = 125 °C; 1000 h   | $\pm (1 \% R + 0.05 \Omega)$                                       | $\pm (2 \% R + 0.1 \Omega)$    |

**Notes**<sup>(1)</sup> Figures are given for a single element<sup>(2)</sup> 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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