

## Thick Film Resistor Array



CRA06E and CRA06S Thick Film resistor arrays are 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 available with either scalloped corners (E version) or square corners (S version)
- Wide ohmic range: 10R to 1M $\Omega$
- 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>$V_{\Xi}$ | TEMPERATURE<br>COEFFICIENT<br>ppm/K | TOLERANCE<br>%            | RESISTANCE<br>RANGE<br>$\Omega$ | E-SERIES      |
|------------------|---------|-----------------------------------------------|-----------------------------------------------|-------------------------------------|---------------------------|---------------------------------|---------------|
| CRA06E<br>CRA06S | 03      | 0.063                                         | 50                                            | $\pm 100$<br>$\pm 200$              | $\pm 1$<br>$\pm 2; \pm 5$ | 10R - 1M $\Omega$               | 24 + 96<br>24 |

Zero-Ohm-Resistor available;  $R_{\text{max.}} = 50 \text{ m}\Omega$ ,  $I_{\text{max.}} = 1 \text{ A}$

### TECHNICAL SPECIFICATIONS

| PARAMETER                                 | UNIT                    | CRA06E & S    |
|-------------------------------------------|-------------------------|---------------|
| Rated Dissipation at 70 °C <sup>(2)</sup> | W per element           | 0.063         |
| Limiting Element Voltage <sup>(1)</sup>   | $V_{\Xi}$               | 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 rated dissipation applies only if the permitted film temperature of 155 °C is not exceeded.

### PART NUMBER AND PRODUCT DESCRIPTION

PART NUMBER: CRA06S08347K0JTA

|                      |                |   |          |         |   |                                                                 |   |   |                                                       |   |   |                          |   |                |   |  |  |
|----------------------|----------------|---|----------|---------|---|-----------------------------------------------------------------|---|---|-------------------------------------------------------|---|---|--------------------------|---|----------------|---|--|--|
| PART NUMBER DECODING |                |   |          |         |   |                                                                 |   |   |                                                       |   |   |                          |   |                |   |  |  |
| C                    | R              | A | 0        | 6       | S | 0                                                               | 8 | 3 | 4                                                     | 7 | K | 0                        | J | T              | A |  |  |
| MODEL                | TERMINAL STYLE |   | PIN      | CIRCUIT |   | VALUE                                                           |   |   | TOLERANCE                                             |   |   | PACKAGING <sup>(4)</sup> |   | SPECIAL        |   |  |  |
| CRA06                | S<br>E         |   | 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 |   |   | TA<br>TC                 |   | Up to 2 digits |   |  |  |

PRODUCT DESCRIPTION: CRA06S 08 03 473 J RT1 e3

|                  |                |              |                                                                                                                                                                                                  |                                                                          |                          |                                  |
|------------------|----------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------|----------------------------------|
| CRA06S           | 08             | 03           | 473                                                                                                                                                                                              | J                                                                        | RT1                      | e3                               |
| MODEL            | TERMINAL COUNT | CIRCUIT TYPE | RESISTANCE VALUE                                                                                                                                                                                 | TOLERANCE                                                                | PACKAGING <sup>(4)</sup> | LEAD (Pb)-FREE                   |
| CRA06S<br>CRA06E | 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 | RT1<br>RT6               | 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 table PACKAGING, see next page

### AVAILABLE TYPES AND RANGES

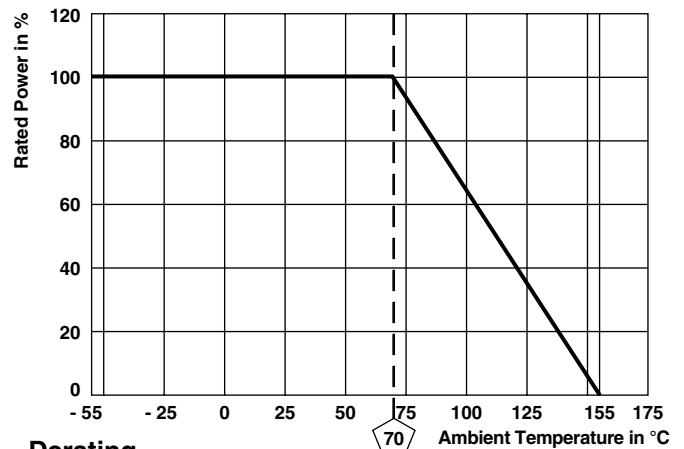
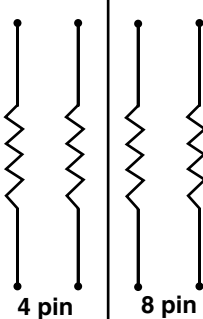
| MODEL  | TERMINAL COUNT | CIRCUIT | TEMPERATURE COEFFICIENT | TOLERANCE          |
|--------|----------------|---------|-------------------------|--------------------|
| CRA06S | 04             | 03      | $\pm 100$ ppm/K         | $\pm 1\%$          |
|        |                |         | $\pm 200$ ppm/K         | $\pm 5\%; \pm 2\%$ |
|        | 08             | 03      | $\pm 100$ ppm/K         | $\pm 1\%$          |
|        |                |         | $\pm 200$ ppm/K         | $\pm 5\%; \pm 2\%$ |
| CRA06E | 08             | 03      | $\pm 100$ ppm/K         | $\pm 1\%$          |
|        |                |         | $\pm 200$ ppm/K         | $\pm 5\%; \pm 2\%$ |

### PACKAGING

| MODEL | TAPE WIDTH | DIAMETER   | PITCH | PIECES/REEL | PACKAGING CODE |                     |
|-------|------------|------------|-------|-------------|----------------|---------------------|
|       |            |            |       |             | PAPER TAPE     |                     |
|       |            |            |       |             | PART NUMBER    | PRODUCT DESCRIPTION |
| CRA06 | 8 mm       | 180 mm/7"  | 4 mm  | 5000        | TA             | RT1                 |
|       |            | 330 mm/13" | 4 mm  | 20 000      | TC             | RT6                 |

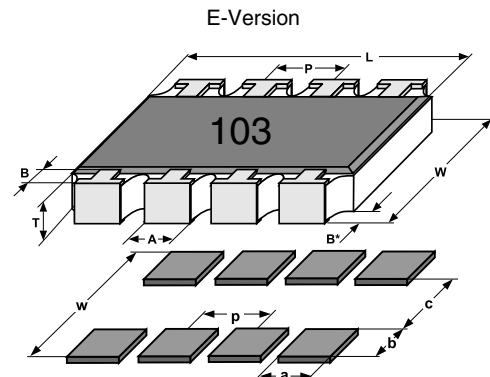
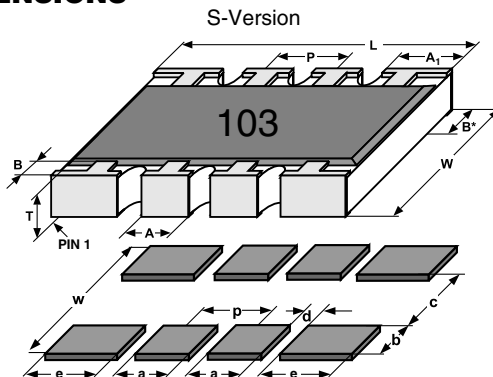
### CIRCUIT

03 CIRCUIT



Derating

### DIMENSIONS



| MODEL  | PIN NO# | DIMENSIONS [in millimeters] |            |                |            |            |           |           |            |
|--------|---------|-----------------------------|------------|----------------|------------|------------|-----------|-----------|------------|
|        |         | L                           | A          | A <sub>1</sub> | B          | B*         | P         | T         | W          |
| CRA06S | 4       | 1.6                         | 0.38       | 0.61           | 0.3        | 0.3        | 0.8       | 0.5       | 1.5        |
| CRA06E | 8       | 3.2                         | 0.38       | -              | 0.3        | 0.3        | 0.8       | 0.5       | 1.5        |
| CRA06S | 8       | 3.2                         | 0.38       | 0.61           | 0.3        | 0.3        | 0.8       | 0.5       | 1.5        |
|        | TOL.    | $\pm 0.15$                  | $\pm 0.15$ | $\pm 0.15$     | $\pm 0.15$ | $\pm 0.15$ | $\pm 0.1$ | $\pm 0.1$ | $\pm 0.15$ |

| SOLDER PAD DIMENSIONS [in millimeters] |      |     |     |      |     |      |      |      |
|----------------------------------------|------|-----|-----|------|-----|------|------|------|
| MODEL                                  | PINS | c   | w   | d    | p   | a    | b    | e    |
| CRA06S                                 | 4    | 0.8 | 3.1 | 0.36 |     | 0.44 | 1.15 |      |
| CRA06E<br>CRA06S                       | 8    | 0.8 | 3.1 | 0.36 | 0.8 | 0.44 | 1.15 | 0.63 |

| 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><b>CRA06E/CRA06S</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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