



## Features

- Thick film technology
- Power rating up to 1 watt @ 70 °C
- RoHS compliant\*
- Halogen free\*\*
- Sulfur-resistant design (ASTM B-809)
- AEC-Q200 compliant

## Additional Information

Click these links for more information:



## CR-A-AS Series - Sulfur-Resistant, AEC-Q200 Compliant Chip Resistors

### Electrical Characteristics

| Characteristic                                   | Model No.  |  |  |  |
|--|--|--|--|--|
|  | CR0201A-AS   | CR0402A-AS   | CR0603A-AS   | CR0805A-AS   |
| Power Rating @ 70 °C                             | 0.05 W   | 0.063 W  | 0.1 W  | 0.125 W  |
| Operating Temp. Range                            | -55 to +125 °C   | -55 to +155 °C   |  |  |
| Derated to Zero Load at                          | +125 °C  | +155 °C  |  |  |
| Maximum Working Voltage (1)                      | 25 V   | 50 V   | 50 V   | 150 V  |
| Maximum Overload Voltage                         | 50 V   | 100 V  | 100 V  | 300 V  |
| Resistance Tolerance                             | ±1 %, ±5 %   |  |  |  |
| Temperature Coefficient @ 1 % (E24 + E96)        | 1 Ω ~ 9.76 Ω<br>-200 ~ +600 ppm/°C<br><br>10 Ω ~ 3M Ω<br>+200 ppm/°C | 1 Ω ~ 9.76 Ω<br>-200 ~ +500 ppm/°C<br><br>100 Ω ≤ R ≤ 1M Ω<br>±100 ppm/°C<br><br>10 Ω ≤ R < 100 Ω<br>1M Ω < R ≤ 10M Ω<br>±200 ppm/°C | 1 Ω ~ 9.76 Ω<br>±400 ppm/°C<br><br>10 Ω ≤ R ≤ 1M Ω<br>±100 ppm/°C<br><br>1M Ω < R ≤ 10M Ω<br>±200 ppm/°C | 1 Ω ~ 9.76 Ω<br>±400 ppm/°C<br><br>10 Ω ≤ R ≤ 1M Ω<br>±100 ppm/°C<br><br>1M Ω < R ≤ 10M Ω<br>±200 ppm/°C |
| Temperature Coefficient @ 5 % (E24)              | 1 Ω ~ 9.1 Ω<br>-200 ~ +600 ppm/°C<br><br>10 Ω ~ 10M Ω<br>+200 ppm/°C | 1 Ω ~ 9.1 Ω<br>-200 ~ +500 ppm/°C<br><br>10 Ω ≤ R ≤ 10M Ω<br>±200 ppm/°C<br><br>10M Ω ≤ R ≤ 20M Ω<br>±400 ppm/°C                     | 1 Ω ~ 9.1 Ω<br>10M < R ≤ 20M Ω<br>±400 ppm/°C<br><br>10 Ω ≤ R ≤ 10M Ω<br>±200 ppm/°C                     | 1 Ω ~ 9.1 Ω<br>10M < R ≤ 20M Ω<br>±400 ppm/°C<br><br>10 Ω ≤ R ≤ 10M Ω<br>±200 ppm/°C                     |
| Zero Ohm Jumper ≤ 0.05 Ω<br>Rated / Max. Current | 0.5 A / 1 A  | 1 A / 2.5 A  | 1 A / 2.5 A  | 2 A / 5 A  |

(1) Maximum Working Voltage is calculated with formula  $V = \sqrt{P \cdot R}$  with the maximum value from the Electrical Characteristics table.

### Environmental Characteristics

Moisture Sensitivity Level..... 1



**WARNING Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)**

\* RoHS Directive 2015/863, Mar 31, 2015 and Annex.

\*\* Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

Specifications are subject to change without notice.

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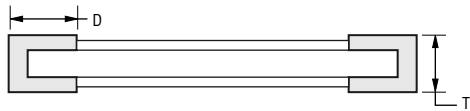
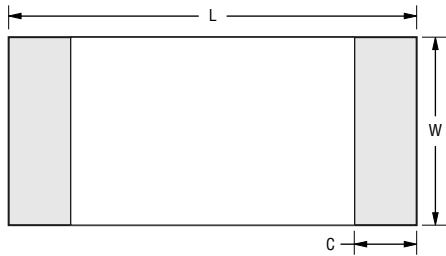
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## Electrical Characteristics (continued)

| Characteristic                                   | Model No.                                     |            |            |            |
|--|---|------------|------------|------------|
|  | CR1206A-AS                                    | CR1210A-AS | CR2010A-AS | CR2512A-AS |
| Power Rating @ 70 °C                             | 0.25 W  | 0.33 W     | 0.5 W      | 1 W        |
| Operating Temp. Range                            | -55 to +155 °C                                |            |            |            |
| Derated to Zero Load at                          | +155 °C                                       |            |            |            |
| Maximum Working Voltage <sup>(1)</sup>           | 200 V   |            |            |            |
| Maximum Overload Voltage                         | 400 V   |            |            |            |
| Resistance Tolerance                             | ±1 %, ±5 %                                    |            |            |            |
| Temperature Coefficient @ 1 %<br>(E24 + E96)     | 1 Ω ~ 9.76 Ω<br>±400 ppm/°C                   |            |            |            |
|  | 10 Ω ≤ R ≤ 1M Ω<br>±100 ppm/°C                |            |            |            |
|  | 1M Ω < R ≤ 10M Ω<br>±200 ppm/°C               |            |            |            |
| Temperature Coefficient @ 5 %<br>(E24)           | 1 Ω ~ 9.1 Ω<br>10M < R ≤ 20M Ω<br>±400 ppm/°C |            |            |            |
|  | 10 Ω ≤ R ≤ 10M Ω<br>±200 ppm/°C               |            |            |            |
| Zero Ohm Jumper ≤ 0.05 Ω<br>Rated / Max. Current | 2 A / 5 A                                     |            |            |            |

<sup>(1)</sup> Maximum Working Voltage is calculated with formula  $V = \sqrt{P \cdot R}$  with the maximum value from the Electrical Characteristics table.

**Product Dimensions**



DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

| Model      | L                                       | W                                       | C                                       | D                                       | T                                       |
|------------|---|---|---|---|---|
| CR0201A-AS | $\frac{0.60 \pm 0.03}{(.024 \pm .001)}$ | $\frac{0.30 \pm 0.03}{(.012 \pm .001)}$ | $\frac{0.10 \pm 0.05}{(.004 \pm .002)}$ | $\frac{0.15 \pm 0.05}{(.006 \pm .002)}$ | $\frac{0.23 \pm 0.03}{(.009 \pm .001)}$ |
| CR0402A-AS | $\frac{1.00 \pm 0.05}{(.039 \pm .002)}$ | $\frac{0.50 \pm 0.05}{(.020 \pm .002)}$ | $\frac{0.20 \pm 0.10}{(.008 \pm .004)}$ | $\frac{0.25 \pm 0.10}{(.010 \pm .004)}$ | $\frac{0.32 \pm 0.05}{(.013 \pm .002)}$ |
| CR0603A-AS | $\frac{1.60 \pm 0.10}{(.063 \pm .004)}$ | $\frac{0.80 \pm 0.10}{(.031 \pm .004)}$ | $\frac{0.30 \pm 0.20}{(.012 \pm .008)}$ | $\frac{0.30 \pm 0.20}{(.012 \pm .008)}$ | $\frac{0.45 \pm 0.10}{(.018 \pm .004)}$ |
| CR0805A-AS | $\frac{2.00 \pm 0.10}{(.079 \pm .004)}$ | $\frac{1.25 \pm 0.10}{(.049 \pm .004)}$ | $\frac{0.40 \pm 0.20}{(.016 \pm .008)}$ | $\frac{0.40 \pm 0.20}{(.016 \pm .008)}$ | $\frac{0.50 \pm 0.10}{(.020 \pm .004)}$ |
| CR1206A-AS | $\frac{3.10 \pm 0.10}{(.122 \pm .004)}$ | $\frac{1.55 \pm 0.10}{(.061 \pm .004)}$ | $\frac{0.50 \pm 0.30}{(.020 \pm .012)}$ | $\frac{0.40 \pm 0.20}{(.016 \pm .008)}$ | $\frac{0.55 \pm 0.10}{(.022 \pm .004)}$ |
| CR1210A-AS | $\frac{3.10 \pm 0.10}{(.122 \pm .004)}$ | $\frac{2.55 \pm 0.10}{(.100 \pm .004)}$ | $\frac{0.50 \pm 0.30}{(.020 \pm .012)}$ | $\frac{0.40 \pm 0.20}{(.016 \pm .008)}$ | $\frac{0.60 \pm 0.10}{(.024 \pm .004)}$ |
| CR2010A-AS | $\frac{5.00 \pm 0.15}{(.197 \pm .006)}$ | $\frac{2.50 \pm 0.15}{(.098 \pm .006)}$ | $\frac{0.60 \pm 0.30}{(.024 \pm .012)}$ | $\frac{0.50 \pm 0.25}{(.020 \pm .010)}$ | $\frac{0.60 \pm 0.10}{(.024 \pm .004)}$ |
| CR2512A-AS | $\frac{6.30 \pm 0.20}{(.248 \pm .008)}$ | $\frac{3.20 \pm 0.20}{(.126 \pm .008)}$ | $\frac{0.60 \pm 0.30}{(.024 \pm .012)}$ | $\frac{0.50 \pm 0.25}{(.020 \pm .010)}$ | $\frac{0.60 \pm 0.10}{(.024 \pm .004)}$ |

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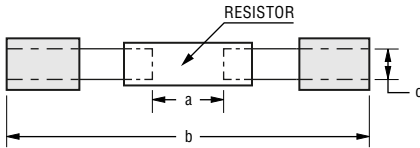
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# CR-A-AS Series - Sulfur-Resistant, AEC-Q200 Compliant Chip Resistors



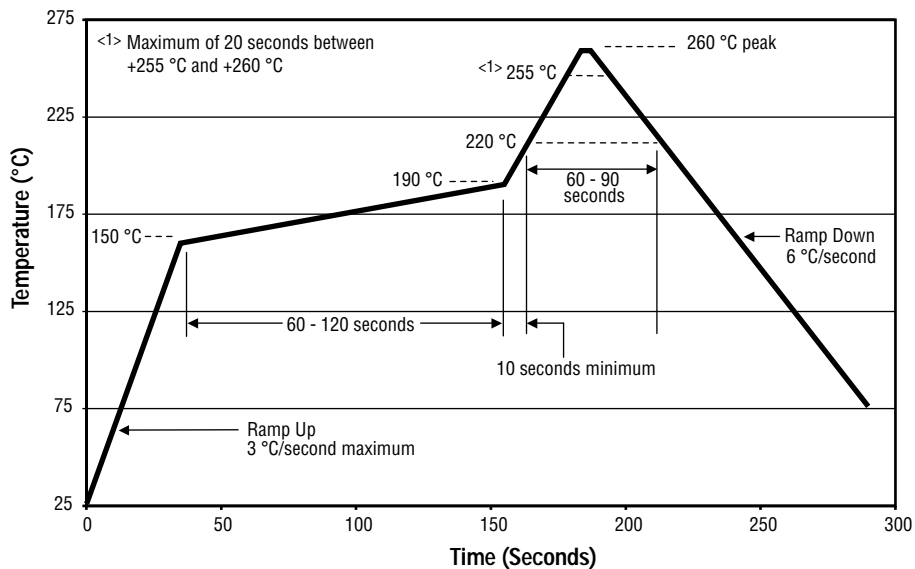
## Recommended Pad Layout



DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

| Model      | a   | b   | c   |
|------------|---|---|---|
| CR0201A-AS | $\frac{0.25 \sim 0.30}{(.010 \sim .012)}$ | $\frac{0.70 \sim 0.90}{(.028 \sim .035)}$ | $\frac{0.30 \sim 0.40}{(.012 \sim .016)}$ |
| CR0402A-AS | $\frac{0.50 \sim 0.60}{(.020 \sim .024)}$ | $\frac{1.40 \sim 1.60}{(.055 \sim .063)}$ | $\frac{0.40 \sim 0.60}{(.012 \sim .024)}$ |
| CR0603A-AS | $\frac{0.70 \sim 0.90}{(.028 \sim .035)}$ | $\frac{2.00 \sim 2.20}{(.079 \sim .087)}$ | $\frac{0.80 \sim 1.00}{(.031 \sim .039)}$ |
| CR0805A-AS | $\frac{1.00 \sim 1.40}{(.039 \sim .055)}$ | $\frac{3.20 \sim 3.80}{(.126 \sim .150)}$ | $\frac{0.90 \sim 1.40}{(.035 \sim .055)}$ |
| CR1206A-AS | $\frac{2.00 \sim 2.40}{(.079 \sim .094)}$ | $\frac{4.40 \sim 5.00}{(.173 \sim .197)}$ | $\frac{1.20 \sim 1.80}{(.047 \sim .071)}$ |
| CR1210A-AS | $\frac{2.00 \sim 2.40}{(.079 \sim .094)}$ | $\frac{4.50 \sim 5.00}{(.177 \sim .197)}$ | $\frac{2.30 \sim 3.50}{(.091 \sim .138)}$ |
| CR2010A-AS | $\frac{3.30 \sim 3.70}{(.130 \sim .146)}$ | $\frac{5.70 \sim 6.50}{(.224 \sim .256)}$ | $\frac{2.30 \sim 3.50}{(.091 \sim .138)}$ |
| CR2512A-AS | $\frac{3.60 \sim 4.00}{(.142 \sim .157)}$ | $\frac{7.60 \sim 8.60}{(.299 \sim .339)}$ | $\frac{2.30 \sim 3.50}{(.091 \sim .138)}$ |

## Soldering Profile



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## Performance Characteristics (AEC-Q200)

| Test                                | Method   | Procedure   | Test Limits $\Delta R$   |
|-------------------------------------|--|---|--|
| Short Time Overload                 | IEC 60115-1 4.13                                 | 2.5 X rated voltage for 5 sec.  | $\pm (1 \% + 0.05 \Omega)$<br>Remarks:<br>0201: $\pm (3 \% + 0.1 \Omega)$<br>0402: $\pm (2 \% + 0.1 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less                                       |
| High Temperature Exposure (Storage) | AEC-Q200-REV D-Test 3<br>MIL-STD-202 Method 108  | 1000 hrs. @ T=155 °C. Unpowered.<br>Measurement at 24 $\pm$ 2 hours after test conclusion.  | 1 %: $\pm (1.0 \% + 0.05 \Omega)$<br>5 %: $\pm (2.0 \% + 0.1 \Omega)$<br>0201: $\pm (3 \% + 0.1 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less   |
| Temperature Cycling                 | AEC-Q200-REV D-Test 4<br>JESD22 Method JA-104    | 1000 cycles (-55 °C to +125 °C)<br>Measurement at 24 $\pm$ 4 hours after test conclusion.<br>30 min. maximum dwell time at each temperature extreme.<br>1 min. maximum transition time. | $\pm (1.0 \% + 0.1 \Omega)$<br>0201: $\pm (2 \% + 0.1 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less   |
| Moisture Resistance                 | AEC-Q200-REV D-Test 6<br>MIL-STD-202 Method 106  | T=24 hours / Cycle, 10 Cycles.<br>Notes: Steps 7a & 7b not required. Unpowered.   | 1 %: $\pm (1.0 \% + 0.05 \Omega)$<br>2 %, 5 %: $\pm (2.0 \% + 0.1 \Omega)$<br>0201: $\pm (3 \% + 0.1 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less                                      |
| Biased Humidity                     | AEC-Q200-REV D-Test 7<br>MIL-STD-202 Method 103  | 1000 hours 85 °C / 85 % RH. Note: Specified conditions:<br>10 % of operating power (not exceeding max. working voltage).<br>Measurement at 24 $\pm$ 2 hours after test conclusion.      | $\pm (3 \% + 0.1 \Omega)$<br>0201: $\pm (5 \% + 0.1 \Omega)$<br>0 $\Omega$ : 100 m $\Omega$ or less  |
| Operational Life                    | AEC-Q200-REV D-Test 8<br>MIL-STD-202 Method 108  | 1000 hours T <sub>A</sub> =125 °C at 35 % rated power. Measurement at 24 $\pm$ 4 hours after test conclusion.   | 1 %: $\pm (1 \% + 0.1 \Omega)$<br>5 %: $\pm (3 \% + 0.1 \Omega)$<br>0201: $\pm (5 \% + 0.1 \Omega)$<br>0 $\Omega$ : 100 m $\Omega$ or less   |
| External Visual                     | AEC-Q200-REV D-Test 9<br>MIL-STD-883 Method 2009 | Electrical test not required. Inspect device construction, marking and workmanship.   |  |
| Physical Dimension                  | AEC-Q200-REV D-Test 10<br>JESD22 Method JB-100   | Verify physical dimensions to the applicable device detail spec.<br>Note: User(s) and Suppliers spec. Electrical test not required.   |  |
| Resistance to Solvents              | AEC-Q200-REV D-Test 12<br>MIL-STD-202 Method 215 | a: Isopropyl Alcohol : Mineral Spirits = 1:3<br>b: Terpene Defluxer (Bioact EC-7R)<br>c: Deionized water : Propylene Glycol<br>Monomethyl Ether : monoethanolamine = 42:1:1             | Marking and protective layer cannot be detached  |
| Mechanical Shock                    | AEC-Q200-REV D-Test 13<br>MIL-STD-202 Method 213 | Wave Form: Tolerance for half sine shock pulse. Peak value is 100 grams. Normal duration (D) is 6 ms.   | $\pm (1 \% + 0.1 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less  |
| Vibration                           | AEC-Q200-REV D-Test 14<br>MIL-STD-202 Method 204 | 5 grams for 20 min., 12 cycles each of 3 orientations.<br>Note: Test from 10-2000 Hz.   | $\pm (1 \% + 0.1 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less  |
| Resistance to Soldering Heat        | AEC-Q200-REV D-Test 15<br>MIL-STD-202 Method 210 | Condition B: Immerse the specimens in and eutectic solder at 260 $\pm$ 5 °C for 10 $\pm$ 1 S.   | 1 %: $\pm (0.5 \% + 0.05 \Omega)$<br>5 %: $\pm (1 \% + 0.1 \Omega)$<br>0201: $\pm (2 \% + 0.1 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less   |
| Thermal Shock                       | AEC-Q200-REV D-Test 16<br>MIL-STD-202 Method 107 | -55 °C / +155 °C. Note: Number of cycles required: 1000, Maximum transfer time: 20 seconds,<br>Dwell time: 15 minutes. Air to Air.  | $\pm (1 \% + 0.1 \Omega)$<br>0201: $\pm (2 \% + 0.1 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less   |
| ESD                                 | AEC-Q200-REV D-Test 17                           | Verify the voltage setting at 500 V   | $\pm (1 \% + 0.1 \Omega)$<br>0201: $\pm (2 \% + 0.1 \Omega)$   |
| Solderability                       | AEC-Q200-REV D-Test 18<br>J-STD-002              | Method B, aging 4 hours at 155 °C dry heat<br>Lead-free solder bath at 235 $\pm$ 3 °C<br>Dipping time: 3 $\pm$ 0.5 seconds  | > 95 % area covered with tin   |
| Flammability                        | AEC-Q200-REV D-Test 17<br>UL-94                  | V-0 or V-1 are acceptable.<br>Electrical test not required.   | V-0 or V-1   |
| Board Flex (Bending)                | AEC-Q200-REV D-Test 21                           | The duration of the applied forces shall be 60 ( $\pm$ 5) seconds.<br>3 mm deflection (0201~1210)<br>2 mm deflection (2010~2512)  | 1 %: $\pm (0.5 \% + 0.05 \Omega)$<br>5 %: $\pm (1 \% + 0.1 \Omega)$<br>0201: $\pm (1 \% + 0.1 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less   |
| Terminal Strength (SMD)             | IEC 60115-1 4.32                                 | Force of 1.8 kg for 60 seconds.<br>Note: 0201= N/A  | $\pm (0.5 \% + 0.05 \Omega)$<br>0 $\Omega$ : 50 m $\Omega$ or less   |
| Sulfuration Test                    | ASTM-B-809-95                                    | Sulfur (saturated vapor) 1,000 hours,<br>105 $\pm$ 2 °C, unpowered  | 1 %: $\pm (1 \% + 0.05 \Omega)$<br>5 %: $\pm (2 \% + 0.05 \Omega)$<br>0201:<br>1 %: $\pm (2 \% + 0.05 \Omega)$<br>5 %: $\pm (3 \% + 0.05 \Omega)$<br>0 $\Omega$ : 100 m $\Omega$ or less |

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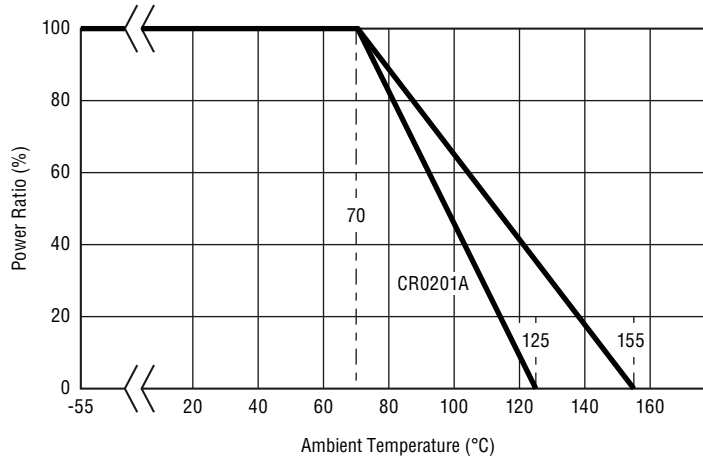
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# CR-A-AS Series - Sulfur-Resistant, AEC-Q200 Compliant Chip Resistors



## Derating Curve



## Packaging Dimensions (Conforms to EIA RS-481A)

| Model      | Tape Type                     | A                                       | B                                       | W  | F                                       | E                                       | P1                                      | P2                                      | P0                                      | T                                       |
|------------|-------------------------------|---|---|--|---|---|---|---|---|---|
| CR0201A-AS | Paper Tape<br>(2 mm pitch)    | $\frac{0.37 \pm 0.05}{(.010 \pm .002)}$ | $\frac{0.67 \pm 0.10}{(.026 \pm .004)}$ |  |   |   | $\frac{2.00 \pm 0.10}{(.079 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ |   | $\frac{0.37 \pm 0.10}{(.015 \pm .004)}$ |
| CR0402A-AS |                               | $\frac{0.70 \pm 0.05}{(.028 \pm .002)}$ | $\frac{1.20 \pm 0.05}{(.047 \pm .002)}$ |  |   |   | $\frac{2.00 \pm 0.10}{(.079 \pm .004)}$ | $\frac{0.45 \pm 0.10}{(.018 \pm .004)}$ |   |   |
| CR0603A-AS | Paper Tape<br>(4 mm pitch)    | $\frac{1.10 \pm 0.10}{(.043 \pm .004)}$ | $\frac{1.90 \pm 0.10}{(.075 \pm .004)}$ | $\frac{8.00 \pm 0.20}{(.315 \pm .008)}$  | $\frac{3.50 \pm 0.05}{(.138 \pm .002)}$ | $\frac{1.75 \pm 0.10}{(.069 \pm .004)}$ | $\frac{4.00 \pm 0.10}{(.157 \pm .004)}$ | $\frac{2.00 \pm 0.05}{(.079 \pm .002)}$ | $\frac{4.00 \pm 0.10}{(.157 \pm .004)}$ | $\frac{0.64 \pm 0.10}{(.025 \pm .004)}$ |
| CR0805A-AS |                               | $\frac{1.65 \pm 0.15}{(.065 \pm .006)}$ | $\frac{2.40 \pm 0.20}{(.094 \pm .008)}$ |  |   |   |   |   |   | $\frac{0.84 \pm 0.10}{(.033 \pm .004)}$ |
| CR1206A-AS |                               | $\frac{2.00 \pm 0.15}{(.079 \pm .006)}$ | $\frac{3.60 \pm 0.20}{(.142 \pm .008)}$ |  |   |   |   |   |   | $\frac{0.84 \pm 0.10}{(.033 \pm .004)}$ |
| CR1210A-AS |                               | $\frac{2.80 \pm 0.20}{(.110 \pm .008)}$ | $\frac{3.60 \pm 0.20}{(.142 \pm .008)}$ |  |   |   |   |   |   | $\frac{0.84 \pm 0.10}{(.033 \pm .004)}$ |
| CR2010A-AS | Embossed Tape<br>(4 mm pitch) | $\frac{2.80 \pm 0.20}{(.110 \pm .008)}$ | $\frac{5.30 \pm 0.20}{(.209 \pm .008)}$ | $\frac{12.00 \pm 0.20}{(.472 \pm .008)}$ | $\frac{5.50 \pm 0.05}{(.217 \pm .002)}$ |   |   |   |   | $\frac{0.85 \pm 0.15}{(.033 \pm .006)}$ |
| CR2512A-AS |                               | $\frac{3.60 \pm 0.20}{(.142 \pm .008)}$ | $\frac{6.90 \pm 0.20}{(.272 \pm .008)}$ |  |   |   |   |   |   | $\frac{0.85 \pm 0.15}{(.033 \pm .006)}$ |

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

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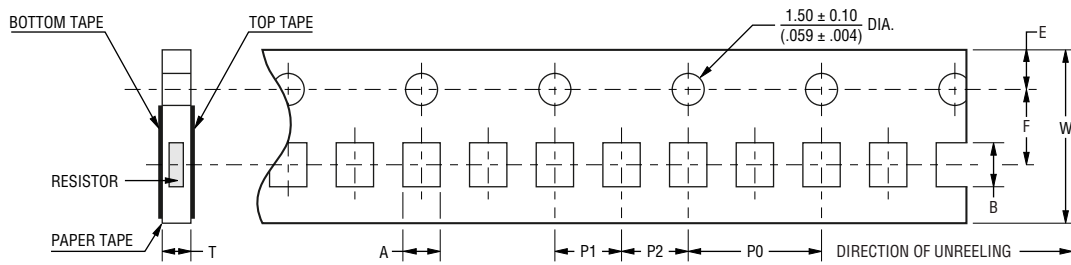
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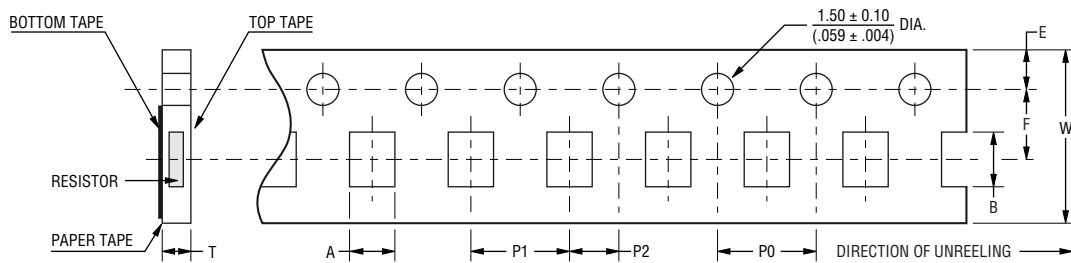


## Packaging Dimensions (Conforms to EIA RS-481A)

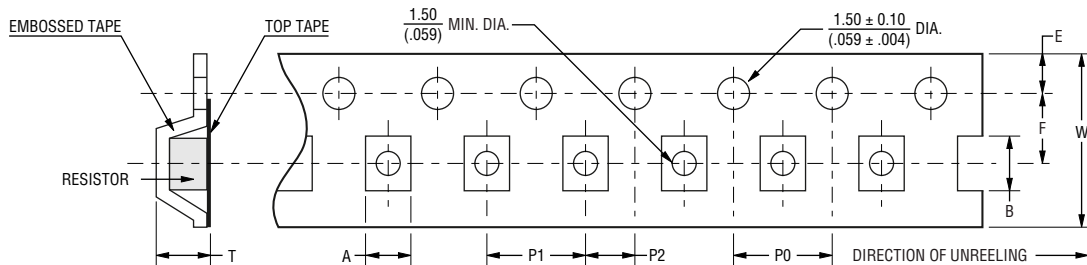
PAPER TAPE (2 mm PITCH)



PAPER TAPE (4 mm PITCH)



EMBOSSED TAPE (4 mm PITCH)



DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

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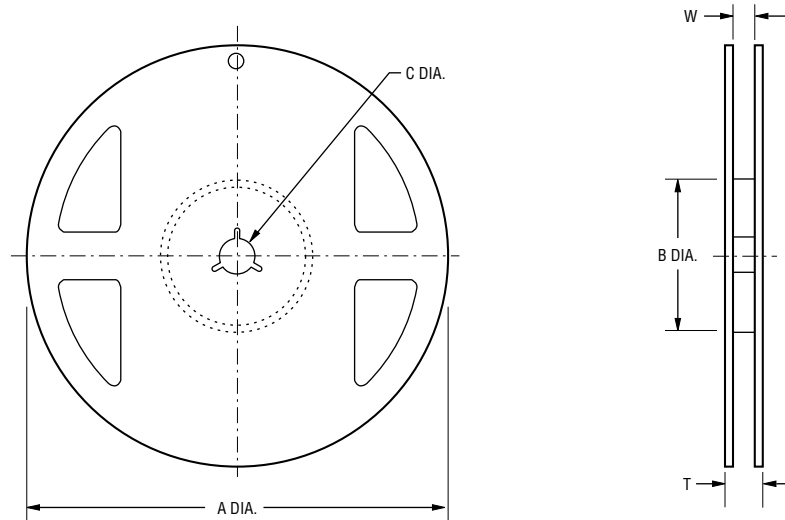
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**CR-A-AS Series - Sulfur-Resistant, AEC-Q200 Compliant Chip Resistors**



**Packaging Dimensions (Conforms to EIA RS-481A)**



| Model      | Packaging Quantity | A                               | B                              | C                               | W                               | T                               |
|------------|--------------------|---------------------------------|--------------------------------|---------------------------------|---------------------------------|---------------------------------|
| CR0201A-AS | 10K pcs/reel       |                                 |                                |                                 |                                 |                                 |
| CR0402A-AS |                    |                                 |                                |                                 |                                 |                                 |
| CR0603A-AS | 5K pcs/reel        | $178 \pm 2.0$<br>(7.008 ± .079) | $60 \pm 1.0$<br>(2.362 ± .039) | $13.0 \pm 1.0$<br>(.512 ± .039) | $9.0 \pm 1.0$<br>(.354 ± .039)  | $11.5 \pm 1.0$<br>(.453 ± .039) |
| CR0805A-AS |                    |                                 |                                |                                 |                                 |                                 |
| CR1206A-AS |                    |                                 |                                |                                 |                                 |                                 |
| CR1210A-AS |                    |                                 |                                |                                 |                                 |                                 |
| CR2010A-AS | 4K pcs/reel        | $178 \pm 2.0$<br>(7.008 ± .079) | $60 \pm 0.5$<br>(2.362 ± .020) | $13.0 \pm 0.5$<br>(.512 ± .020) | $13.0 \pm 1.0$<br>(.512 ± .039) | $15.5 \pm 1.0$<br>(.610 ± .039) |
| CR2512A-AS |                    |                                 |                                |                                 |                                 |                                 |

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

Specifications are subject to change without notice.  
 Users should verify actual device performance in their specific applications.  
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**How to Order**

CR 0603 A F X - 1002 E AS

**Model**

(CR = Fixed Resistor)

**Size**

- 0201 = 0201 size
- 0402 = 0402 size
- 0603 = 0603 size
- 0805 = 0805 size
- 1206 = 1206 size
- 1210 = 1210 size
- 2010 = 2010 size
- 2512 = 2512 size

**Feature**

A = AEC-Q200 Compliant

**Resistance Tolerance**

- F = ±1 %
- J = ±5 %

**TCR (ppm/°C)** – See Electrical Characteristics Chart

- X = ±100
- W = ±200
- Z = ±400
- / = Used for zero Ω (jumper) and values from 1 Ω through 9.76 Ω.

**Resistance Value**

For 1 % Tolerance:

<100 Ω..... "R" represents decimal point (example: 24R3 = 24.3 Ω).

>100 Ω ..... First three digits are significant, fourth digit represents number of zeros to follow (example: 8252 = 82.5K Ω).

For 5 % Tolerance:

<10 Ω..... "R" represents decimal point (example: 4R7 = 4.7 Ω).

>10 Ω..... First two digits are significant, third digit represents number of zeros to follow (example: 474 = 470K Ω).

**Packaging**

- G = Paper Tape (10,000 pcs.) on 7 " Reel – CR0201A-AS, CR0402A-AS
- E = Paper Tape (5,000 pcs.) on 7 " Reel – CR0603A-AS, CR0805A-AS, CR1206A-AS, CR1210A-AS
- E = Embossed Tape (4,000 pcs) on 7 " Reel – CR2010A-AS, CR2512A-AS

**Termination**

AS = Anti-sulfur version, Tin-plated (RoHS Compliant)

**Symbol for E96 Series Nominal Resistance Value**

| Symbol | E96 | Symbol | E96 | Symbol | E96 | Symbol | E96 |
|--------|-----|--------|-----|--------|-----|--------|-----|
| 01     | 100 | 25     | 178 | 49     | 316 | 73     | 562 |
| 02     | 102 | 26     | 182 | 50     | 324 | 74     | 576 |
| 03     | 105 | 27     | 187 | 51     | 332 | 75     | 590 |
| 04     | 107 | 28     | 191 | 52     | 340 | 76     | 604 |
| 05     | 110 | 29     | 196 | 53     | 348 | 77     | 619 |
| 06     | 113 | 30     | 200 | 54     | 357 | 78     | 634 |
| 07     | 115 | 31     | 205 | 55     | 365 | 79     | 649 |
| 08     | 118 | 32     | 210 | 56     | 374 | 80     | 665 |
| 09     | 121 | 33     | 215 | 57     | 383 | 81     | 681 |
| 10     | 124 | 34     | 221 | 58     | 392 | 82     | 698 |
| 11     | 127 | 35     | 226 | 59     | 402 | 83     | 715 |
| 12     | 130 | 36     | 232 | 60     | 412 | 84     | 732 |
| 13     | 133 | 37     | 237 | 61     | 422 | 85     | 750 |
| 14     | 137 | 38     | 243 | 62     | 432 | 86     | 768 |
| 15     | 140 | 39     | 249 | 63     | 442 | 87     | 787 |
| 16     | 143 | 40     | 255 | 64     | 453 | 88     | 806 |
| 17     | 147 | 41     | 261 | 65     | 464 | 89     | 825 |
| 18     | 150 | 42     | 267 | 66     | 475 | 90     | 845 |
| 19     | 154 | 43     | 274 | 67     | 487 | 91     | 866 |
| 20     | 158 | 44     | 280 | 68     | 499 | 92     | 887 |
| 21     | 162 | 45     | 287 | 69     | 511 | 93     | 909 |
| 22     | 165 | 46     | 294 | 70     | 523 | 94     | 931 |
| 23     | 169 | 47     | 301 | 71     | 536 | 95     | 953 |
| 24     | 174 | 48     | 309 | 72     | 549 | 96     | 976 |

**Symbol for Multipliers**

| Symbol     | A               | B               | C               | D               | E               | F               | G               | H               | X                | Y                | Z                |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| Multiplier | 10 <sup>0</sup> | 10 <sup>1</sup> | 10 <sup>2</sup> | 10 <sup>3</sup> | 10 <sup>4</sup> | 10 <sup>5</sup> | 10 <sup>6</sup> | 10 <sup>7</sup> | 10 <sup>-1</sup> | 10 <sup>-2</sup> | 10 <sup>-3</sup> |

**Marking Explanation**



**±5 % (E24): CR0603-A-AS / CR0805A-AS / CR1206A-AS / CR1210A-AS / CR2010A-AS / CR2512A-AS**

Resistance value is expressed by 3 digits. The first two digits represent the significant figures of nominal resistance value in Ω. The third digit represents exponent for base of 10.

EX: 102 = 10 x 10<sup>2</sup> = 1000 Ω = 1K Ω



**±1 % (E96): CR0805A-AS / CR1206A-AS / CR1210A-AS / CR2010A-AS / CR2512A-AS**

Resistance value is expressed by 3 digits. The first two digits represent the significant figures of nominal resistance value in Ω. The third digit represents exponent for base of 10.

EX: 102 = 10 x 10<sup>2</sup> = 1000 Ω = 1K Ω



**±1 % (E96): CR0603A-AS**

When the marking space is too small in such small-sized resistors as CR0603A-AS, the marking cannot be made by 4 digits and may be made by two digits combined with one English capital.

EX: 01A = 100 x 10<sup>0</sup> = 100 Ω



**CR0402A-AS**

When the marking space is too small in such small-sized resistors as CR0402A-AS, the marking cannot be made by 4 digits and may be made by 2 digits combined with one English capital.

EX: 121 = 130 x 10<sup>1</sup> = 1300 Ω or 1.3K Ω



**CR0201A-AS**

When the marking space is too small in such small-sized resistors as CR0201A-AS, the marking cannot be made by 4 digits and may be represented by a dash.

EX: - = 100 Ω; - = 511K Ω

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