

## Carbon Film Resistors, Standard



### FEATURES

- Securely bonded carbon film
- Good moisture resistance ( $\Delta R_{\max} \leq \pm 1.5 \% R$ )
- Good long term stability ( $\Delta R_{\max} \leq \pm 1.5 \% R$ , for 1000 h)
- Lead (Pb)-free solder contacts
- 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)
- Low Noise (refer to graph)
- Suitable for general purpose commercial electronics and pulse load applications



### STANDARD ELECTRICAL SPECIFICATIONS

| MODEL   | SIZE | POWER RATING<br>$P_{70^\circ\text{C}}$<br>W | LIMITING ELEMENT<br>VOLTAGE MAX.<br>$V_{\equiv}$ | TOLERANCE<br>$\pm \%$ | RESISTANCE<br>RANGE<br>$\Omega$ | E-SERIES |
|---------|------|---|--|-----------------------|---------------------------------|----------|
| LCA0204 | 0204 | 0.25  | 200  | $\pm 2$<br>$\pm 5$    | 10R - 470K<br>1R0 - 1M0         | 24<br>24 |
| LCA0207 | 0207 | 0.35  | 300  | $\pm 2$<br>$\pm 5$    | 1R0 - 1M0<br>R22 - 5M1          | 24<br>24 |
| LCA0411 | 0411 | 0.55  | 500  | $\pm 2$<br>$\pm 5$    | 1R0 - 1M0<br>R22 - 10M          | 24<br>24 |
| LCA0414 | 0414 | 0.6   | 500  | $\pm 2$<br>$\pm 5$    | 1R0 - 1M0<br>R22 - 10M          | 24<br>24 |

#### Notes

- Coating: Beige
- Marking: color code

### TECHNICAL SPECIFICATIONS

| PARAMETER                              | UNIT         | LCA0204          | LCA0207    | LCA0411    | LCA0414    |
|--|--------------|------------------|------------|------------|------------|
| Rated Dissipation at 70 °C             | W            | 0.25             | 0.35       | 0.55       | 0.6        |
| Limiting Element Voltage <sup>1)</sup> | $V_{\equiv}$ | $\leq 200$       | $\leq 300$ | $\leq 500$ | $\leq 500$ |
| Limiting Voltage, short-time           | $V_{\equiv}$ |                  | 500        | 700        | 1000       |
| Insulation Voltage (1 min)             | V-           | $> 300$          | $> 700$    | $> 700$    | $> 700$    |
| Thermal Resistance                     | K/W          | $\leq 300$       | $\leq 220$ | $\leq 150$ | $\leq 140$ |
| Insulation Resistance                  | $\Omega$     | $\geq 10^{11}/h$ |            |            |            |
| Terminal Strength, axial               | N            | $> 30$           | $> 50$     | $> 60$     | $> 80$     |
| Category Temperature Range             | °C           | - 55 to + 155    |            |            |            |
| Failure Rate                           | $10^{-9}/h$  | $< 10$           |            |            |            |
| Weight                                 | g            | 0.1              | 0.21       | 0.5        | 0.68       |

#### Note

1. Rated Voltage  $\sqrt{P \times R}$



**PART NUMBER AND PRODUCT DESCRIPTION LCA-SERIES**

PART NUMBER: LCA0204002401J2500

|          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>L</b> | <b>C</b> | <b>A</b> | <b>0</b> | <b>2</b> | <b>0</b> | <b>4</b> | <b>0</b> | <b>0</b> | <b>2</b> | <b>4</b> | <b>0</b> | <b>1</b> | <b>J</b> | <b>2</b> | <b>5</b> | <b>0</b> | <b>0</b> |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|

|   |   |  |   |  |  |   |
|---|---|--|---|--|--|---|
| <b>MODEL/SIZE</b><br>LCA0204<br>LCA0207<br>LCA0411<br>LCA0414 | <b>SPECIAL CHARACTER</b><br>0 = neutral | <b>TCR</b><br>0 = neutral<br>see diagram | <b>VALUE</b><br>3 digit value<br>1 digit multiplier<br><b>MULTIPLIER</b><br>7 = *10 <sup>-3</sup><br>8 = *10 <sup>-2</sup><br>9 = *10 <sup>-1</sup><br>0 = *10 <sup>0</sup><br>1 = *10 <sup>1</sup><br>2 = *10 <sup>2</sup><br>3 = *10 <sup>3</sup><br>4 = *10 <sup>4</sup><br>5 = *10 <sup>5</sup><br>6 = *10 <sup>6</sup> | <b>TOLERANCE</b><br>G = ± 2 %<br>J = ± 5 % | <b>PACKAGING</b><br>12 = A2(G26)<br>22 = A2(G53)<br>25 = A5<br>21 = A1(G53)<br>41 = A1(G73)<br>D5 = R5<br>DE = RE<br>F2 = R2 | <b>SPECIAL</b><br>up to 2 digits<br>00 = standard |
|---|---|--|---|--|--|---|

PRODUCT DESCRIPTION: LCA0204 2K4 5 % A5

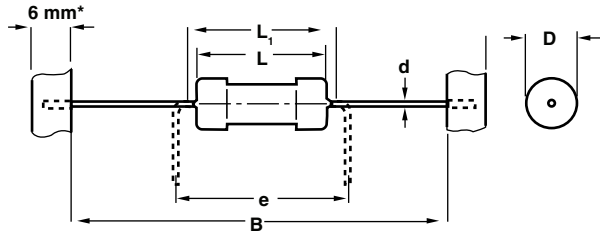
|   |   |   |  |
|---|---|---|--|
| <b>LCA0204</b><br>MODEL<br>LCA0204<br>LCA0207<br>LCA0411<br>LCA0414 | <b>2K4</b><br>RESISTANCE VALUE<br>220K = 220 kΩ<br>10R = 10 Ω | <b>5 %</b><br>TOLERANCE<br>± 2 %<br>± 5 % | <b>A5</b><br>PACKAGING <sup>1)</sup><br>A2 (G26)<br>A2 (G53)<br>A5<br>A1 (G53)<br>A1 (G73)<br>R5<br>RE<br>R2 |
|---|---|---|--|

<sup>1)</sup> Please refer to table PACKAGING.

**Note:** The PART NUMBER shown above is to facilitate the unified part numbering system for ordering products.

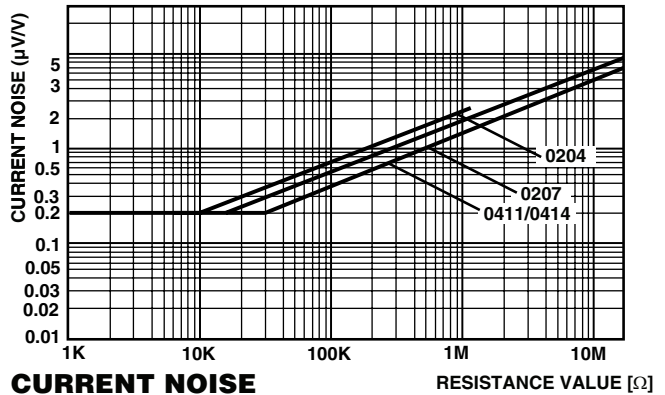
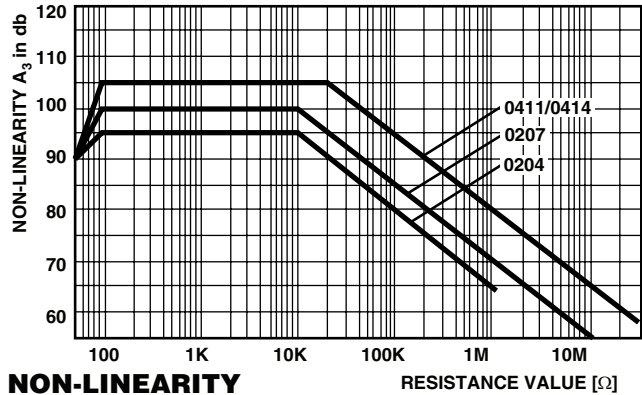
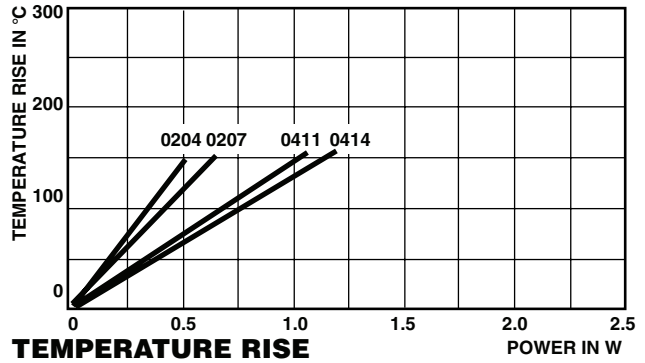
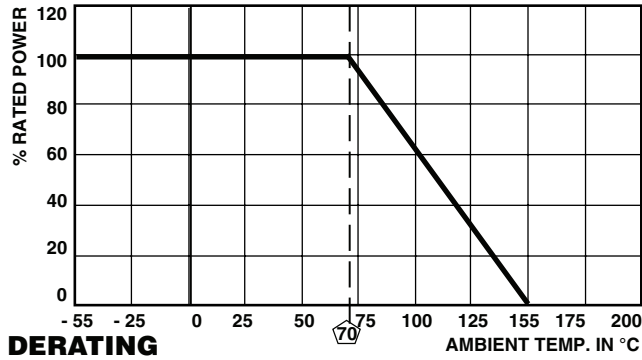
| <b>PACKAGING</b> |             |      |                                   |              |          |                                   |
|------------------|-------------|------|-----------------------------------|--------------|----------|-----------------------------------|
| MODEL            | REEL        |      |                                   | BOX          |          |                                   |
|                  | PIECES/REEL | CODE | MIN. ORDER QTY<br>PACKAGING UNITS | PIECES/BOX   | CODE     | MIN. ORDER QTY<br>PACKAGING UNITS |
| LCA0204          | 5000        | R5   | 1                                 | 5000<br>2000 | A5<br>A2 | 1<br>1                            |
| LCA0207          | 5000        | R5   | 1                                 | 5000<br>2000 | A5<br>A2 | 1<br>1                            |
| LCA0411          | 2500        | RE   | 1                                 | 1000         | A1       | 1                                 |
| LCA0414          | 2000        | R2   | 1                                 | 1000         | A1       | 1                                 |

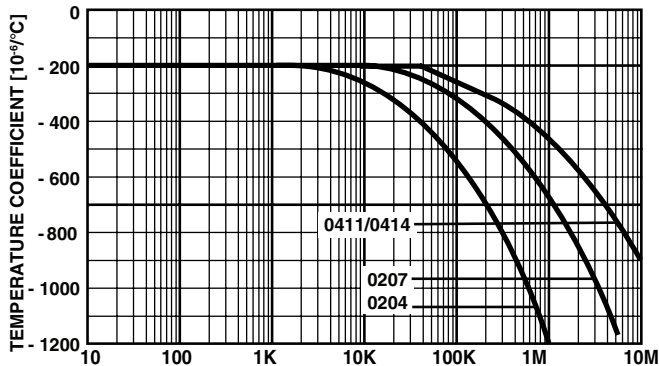
**DIMENSIONS**



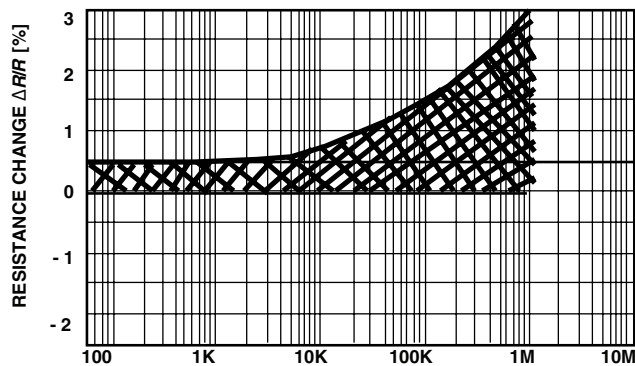
- 1) Also available in 26 mm tape spacing
- 2) Also available in 73 mm tape spacing
- Taping in acc. with IEC60286-1
- D and L measured in acc. with IEC60294
- d according to IEC60301

| MODEL   | DIMENSIONS [in millimeters] |            |                |                      |     |      |
|---------|-----------------------------|------------|----------------|----------------------|-----|------|
|         | D <sub>max</sub>            | L          | L <sub>1</sub> | B                    | d   | e    |
| LCA0204 | 1.6 - 0.3                   | 3.6 - 0.4  | 5.0            | 53 ± 1               | 0.5 | 5.0  |
| LCA0207 | 2.4 - 0.3                   | 6.1 - 0.5  | 8.1            | 53 ± 1 <sup>1)</sup> | 0.6 | 7.5  |
| LCA0411 | 3.7 - 0.4                   | 10.5 - 0.6 | 12.5           | 53 ± 1 <sup>2)</sup> | 0.7 | 12.5 |
| LCA0414 | 4.2 - 0.5                   | 12.2 - 0.7 | 14.2           | 53 ± 1 <sup>2)</sup> | 0.8 | 15.0 |



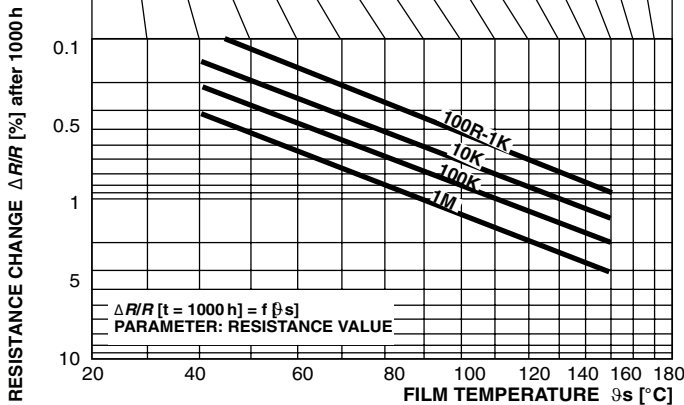
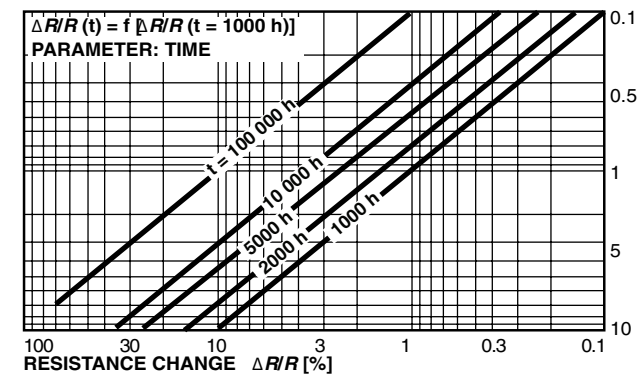
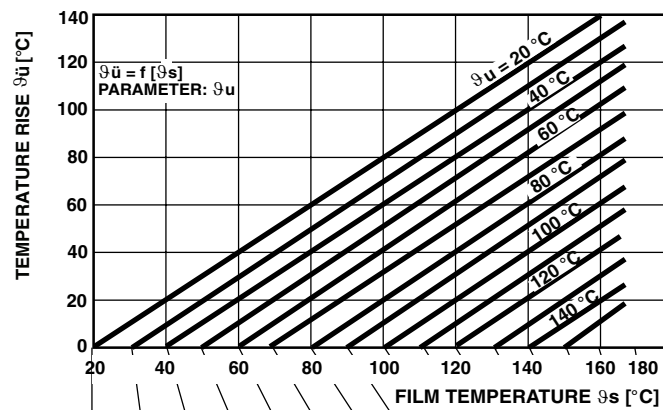
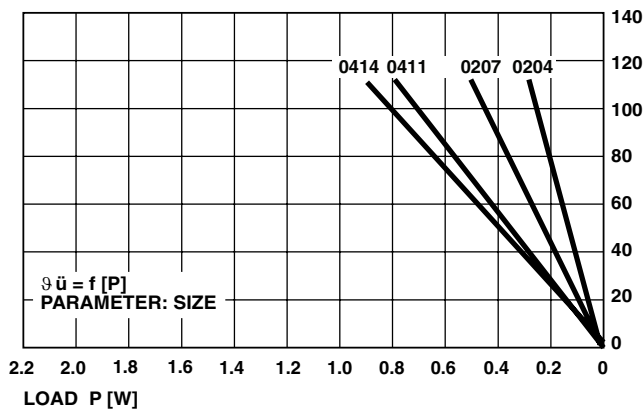


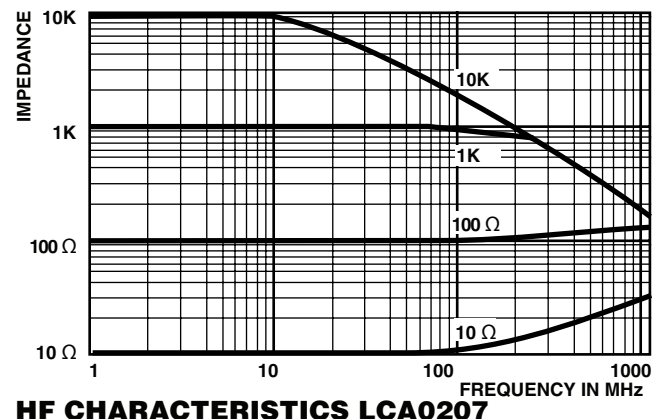
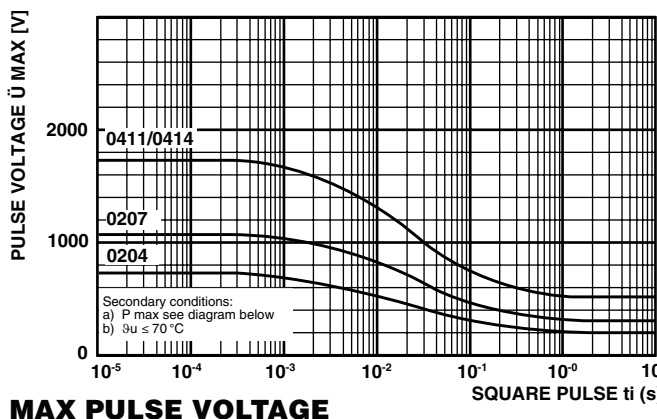
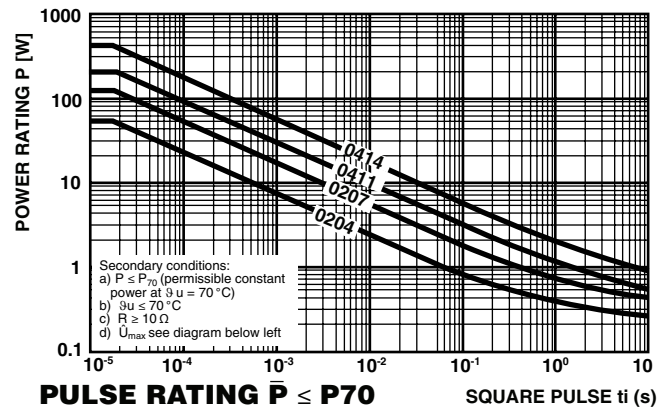
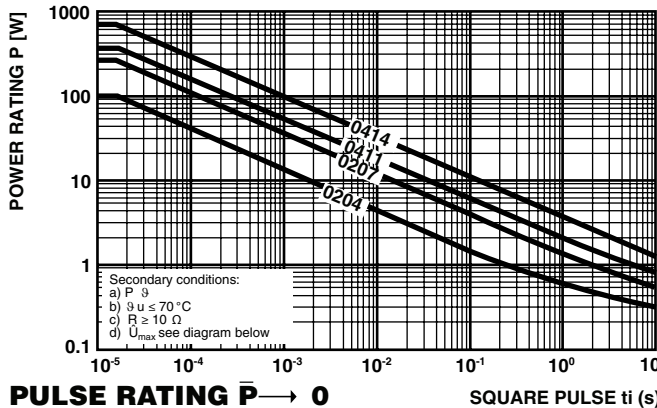
**TEMPERATURE COEFFICIENT**  
(mean value) between - 25... + 125 °C deviation  $\pm 25\%$



**ENDURANCE**  
at upper category temperature, 155 °C 1000 h

**STABILITY NOMOGRAM, TYPICAL VALUES** (For handling see General Information)





| PERFORMANCE CHARACTERISTICS                                      |  |                            |
|--|--|----------------------------|
| TEST   | CONDITIONS OF TEST   | REQUIREMENTS <sup>1)</sup> |
| Endurance Test at 70 °C<br>IEC 60115-1 4.25.1                    | 1000 hours at 70 °C, 1.5 hours "ON", 0.5 hours "OFF"<br>8000 hours at 70 °C, 1.5. hours "ON", 0.5 hours "OFF"      | ≤ ± 1.5 %<br>≤ ± 4.0 %     |
| Endurance at UCT<br>IEC 60115-1 4.25.3                           | 1000 hours at 155 °C without load<br>8000 hours at 155 °C without load   | ≤ ± 3.0 %<br>≤ ± 8.0 %     |
| Overload Test<br>IEC 60115-1 4.13                                | 2.5 x rated power or twice the limiting element voltage,<br>2 seconds for sizes ≤ 0207; 5 seconds for sizes ≥ 0309 | ≤ ± 0.5 %                  |
| Thermal Shock<br>IEC 60115-1 4.19, IEC 60068-2-14                | Rapid change between upper and lower category temperature  | ≤ ± 0.25 %                 |
| Climatic Sequence<br>IEC 60115-1 4.23                            | Dry heat, damp heat cyclic, cold, low air pressure   | ≤ ± 1.5 %                  |
| Damp Heat Steady State<br>IEC 60115 4.24, IEC 60068-2-3          | 56 days at 40 °C, 93 % relative humidity   | ≤ ± 1.5 %                  |
| Resistance to Soldering Heat<br>IEC 60115-1 4.18, IEC 60068-2-20 | 10 seconds at 260 °C solder bath temperature   | ≤ ± 0.25 %                 |
| Robustness of Terminations<br>IEC 60115-1 4.16, IEC 60068-2-21   | Tensile, bending and torsion   | ≤ ± 0.25 %                 |
| Vibration<br>IEC 60115-1 4.22, IEC 60068-2-6                     | 0.75 mm or 10 g 10 Hz - 500 Hz 6 hours   | ≤ ± 0.25 %                 |

Note  
1. For ohmic values between 10 Ω and 1 MΩ

| APPLICABLE SPECIFICATIONS   |
|---|
| <ul style="list-style-type: none"> <li>• CECC 40000/40100/40101</li> <li>• EN 140000/140 100</li> </ul> |



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