

## Standard Carbon Film Leaded Resistors



### 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)
- Low noise (refer to graph)
- Suitable for general purpose commercial electronics and pulse load applications
- Lead (Pb)-free solder contacts
- Pure tin plating provides compatibility with lead (Pb)-free and lead containing soldering processes
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?999912](http://www.vishay.com/doc?999912)


**RoHS**  
COMPLIANT

### STANDARD ELECTRICAL SPECIFICATIONS

| MODEL   | SIZE | POWER RATING<br>$P_{70}$<br>W | LIMITING ELEMENT<br>VOLTAGE $U_{\max.}$<br>$V_{\equiv}$ | TOLERANCE<br>$\pm \%$ | RESISTANCE<br>RANGE<br>$\Omega$ | E-SERIES |
|---------|------|-------------------------------|---------------------------------------------------------|-----------------------|---------------------------------|----------|
| LCA0207 | 0207 | 0.35                          | 300                                                     | 2<br>5                | 1 to 1M<br>0.22 to 5.1M         | E24      |
| LCA0414 | 0414 | 0.6                           | 500                                                     | 2<br>5                | 1 to 1M<br>0.22 to 10M          | E24      |

#### Notes

- Coating: Light blue.
- Marking: Color coded. Additional blue color marking after second band.

### TECHNICAL SPECIFICATIONS

| PARAMETER                                    | UNIT               | LCA0207        | LCA0414    |
|----------------------------------------------|--------------------|----------------|------------|
| Rated dissipation, $P_{70}$                  | W                  | 0.35           | 0.6        |
| Limiting element voltage, $U_{\max.}^{(1)}$  | $V_{\equiv}$       | $\leq 300$     | $\leq 500$ |
| Limiting voltage, short-time                 | $V_{\equiv}$       | 500            | 1000       |
| Insulation voltage, $U_{\text{ins}}$ (1 min) | V                  | $> 700$        | $> 700$    |
| Thermal resistance                           | K/W                | $\leq 220$     | $\leq 140$ |
| Insulation resistance                        | $\Omega$           | $\geq 10^{11}$ |            |
| Category temperature range                   | $^{\circ}\text{C}$ | - 55 to + 155  |            |
| Failure rate                                 | $10^{-9}/\text{h}$ | $< 10$         |            |
| Weight                                       | g                  | 0.21           | 0.68       |

#### Note

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

| PART NUMBER AND PRODUCT DESCRIPTION     |   |                             |   |                            |   |                                                                                                                                                                                                                                                                                                             |   |   |                        |   |                                                           |   |                                 |   |   |   |   |
|-----------------------------------------|---|-----------------------------|---|----------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|------------------------|---|-----------------------------------------------------------|---|---------------------------------|---|---|---|---|
| Part Number: LCA0207002401J2500         |   |                             |   |                            |   |                                                                                                                                                                                                                                                                                                             |   |   |                        |   |                                                           |   |                                 |   |   |   |   |
| L                                       | C | A                           | 0 | 2                          | 0 | 7                                                                                                                                                                                                                                                                                                           | 0 | 0 | 2                      | 4 | 0                                                         | 1 | J                               | 2 | 5 | 0 | 0 |
| MODEL/SIZE                              |   | VARIANT                     |   | TCR                        |   | VALUE                                                                                                                                                                                                                                                                                                       |   |   | TOLERANCE              |   | PACKAGING <sup>(1)</sup>                                  |   | SPECIAL                         |   |   |   |   |
| LCA0207<br>LCA0414                      |   | 0 = Neutral                 |   | 0 = Neutral<br>See diagram |   | 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> |   |   | G = ± 2 %<br>J = ± 5 % |   | 25 = A5<br>22 = A2 (G53)<br>21 = A1<br>D5 = R5<br>D2 = R2 |   | Up to 2 digits<br>00 = Standard |   |   |   |   |
| Product Description: LCA0207 2K4 5 % A5 |   |                             |   |                            |   |                                                                                                                                                                                                                                                                                                             |   |   |                        |   |                                                           |   |                                 |   |   |   |   |
| LCA0207                                 |   | 2K4                         |   | 5 %                        |   | A5                                                                                                                                                                                                                                                                                                          |   |   |                        |   |                                                           |   |                                 |   |   |   |   |
| MODEL                                   |   | RESISTANCE VALUE            |   | TOLERANCE                  |   | PACKAGING <sup>(1)</sup>                                                                                                                                                                                                                                                                                    |   |   |                        |   |                                                           |   |                                 |   |   |   |   |
| LCA0207<br>LCA0414                      |   | 220K = 220 kΩ<br>10R = 10 Ω |   | ± 2 %<br>± 5 %             |   | A5, R5<br>A1, R2<br>A2                                                                                                                                                                                                                                                                                      |   |   |                        |   |                                                           |   |                                 |   |   |   |   |

**Notes**

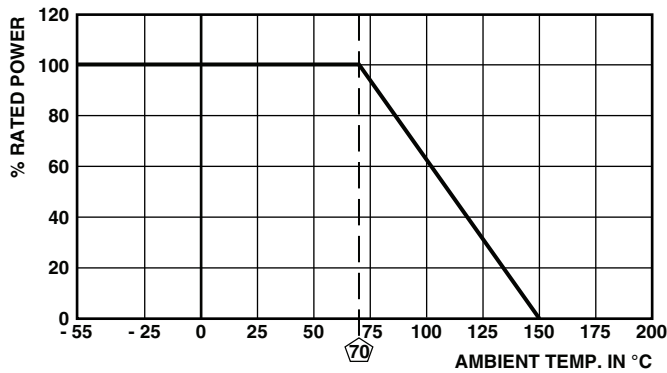
- The PART NUMBER shown above is to facilitate the unified part numbering system for ordering products.
- <sup>(1)</sup> Please refer to table PACKAGING.

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

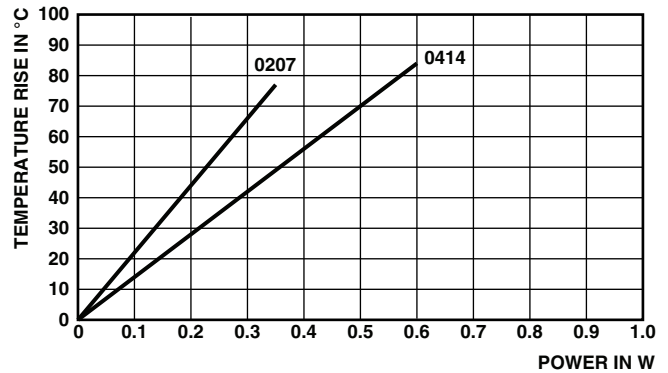
| DIMENSIONS in millimeters |                   |            |                |        |     |      |
|---------------------------|-------------------|------------|----------------|--------|-----|------|
|                           |                   |            |                |        |     |      |
| MODEL                     | D <sub>max.</sub> | L          | L <sub>1</sub> | B      | d   | e    |
| LCA0207                   | 2.4 - 0.3         | 6.1 - 0.5  | 8.1            | 53 ± 1 | 0.6 | 7.5  |
| LCA0414                   | 4.2 - 0.5         | 12.2 - 0.7 | 14.2           | 53 ± 1 | 0.8 | 15.0 |

**Notes**

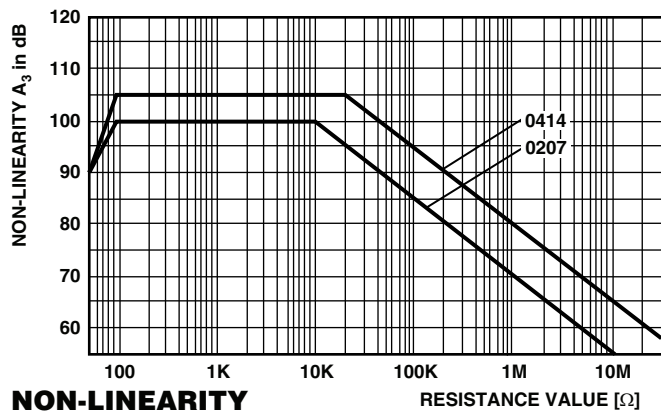
- Taping in according with IEC 60286-1.
- D and L measured in according with IEC 60294.
- d according to IEC 60301.



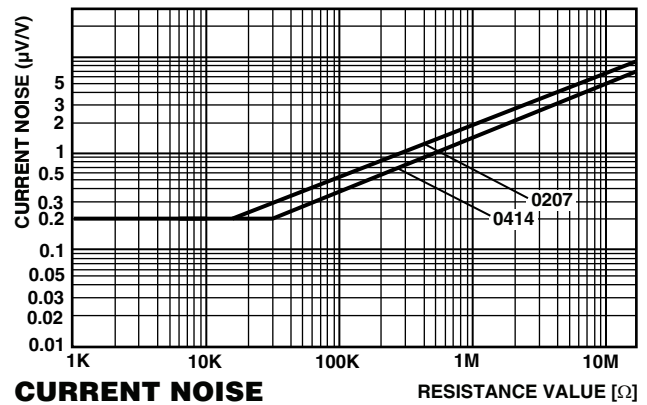
**DERATING**



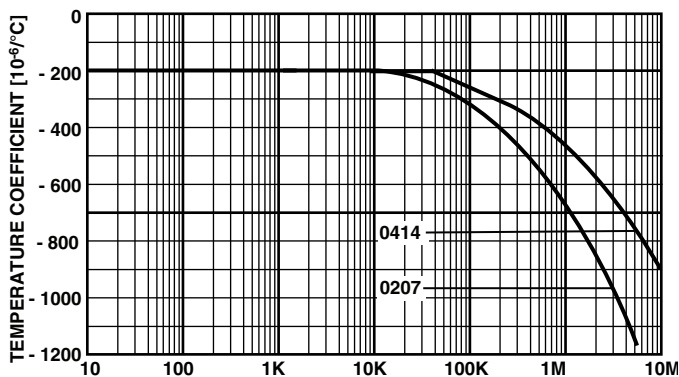
**TEMPERATURE RISE**



**NON-LINEARITY**

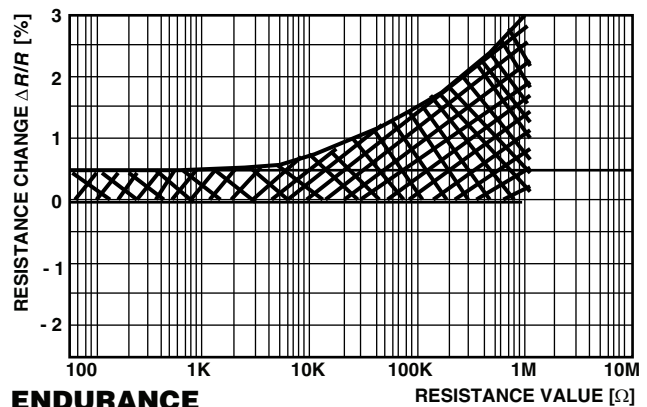


**CURRENT NOISE**



**TEMPERATURE COEFFICIENT**

(mean value) between - 25 °C to + 125 °C deviation ± 25 %

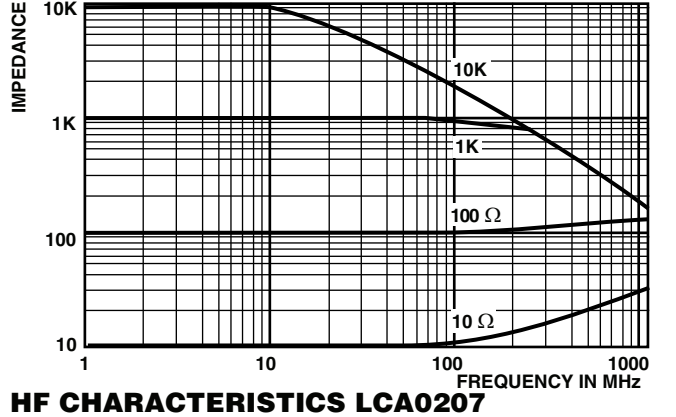
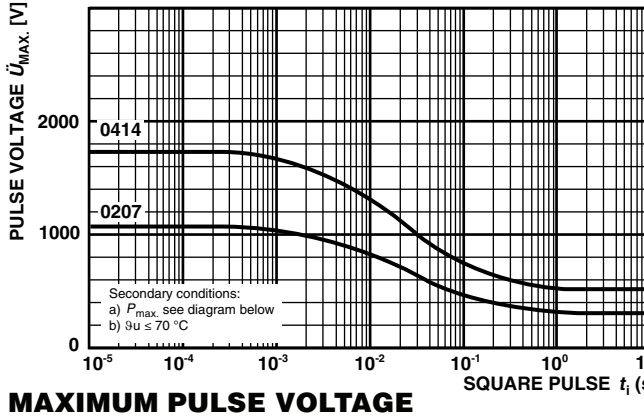
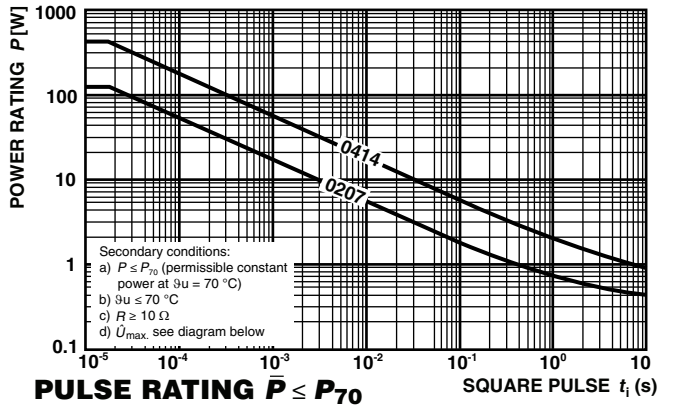
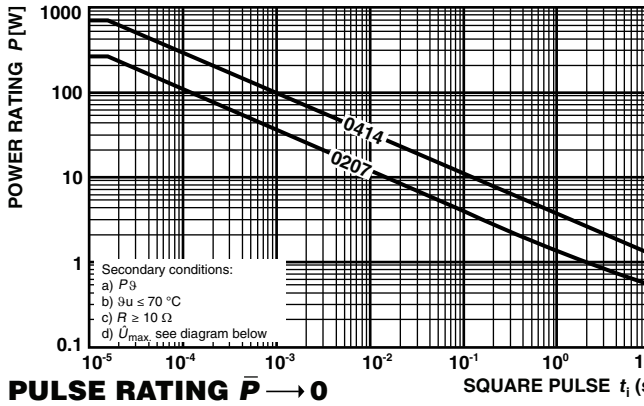
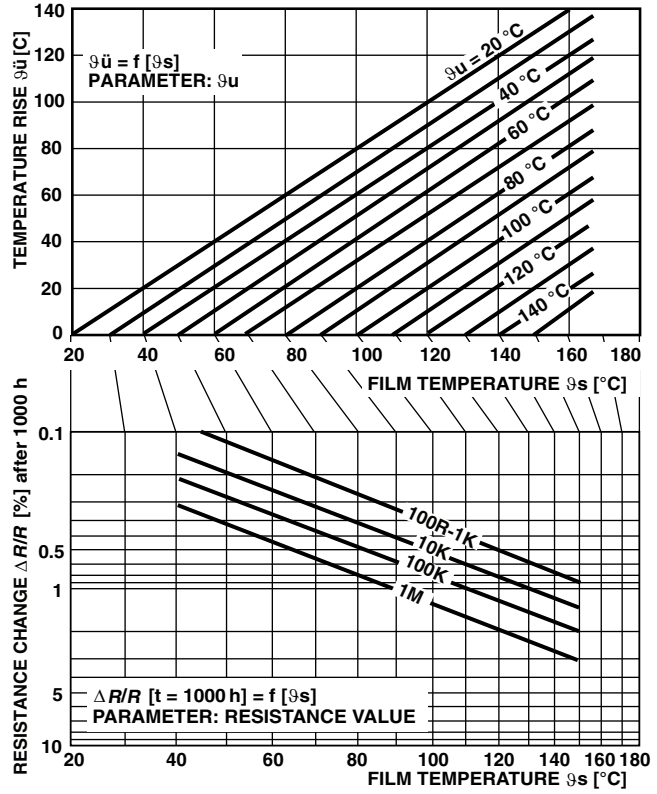
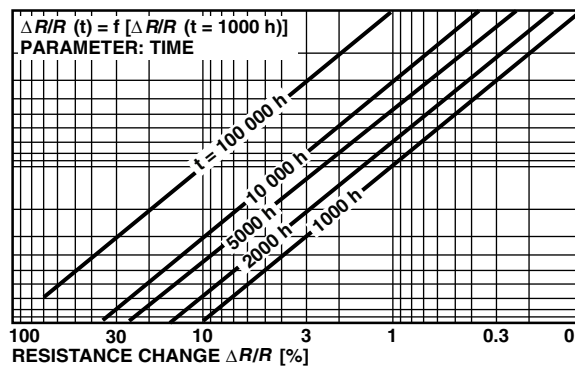
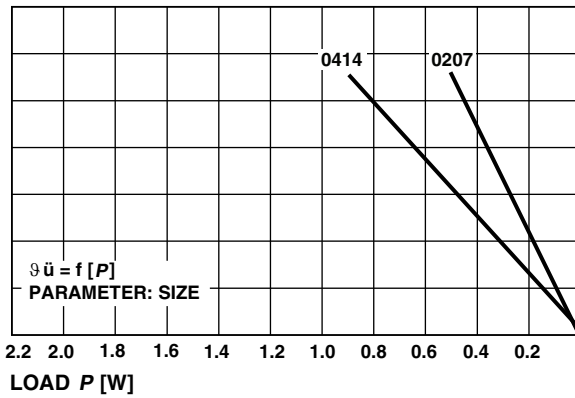


**ENDURANCE**

at upper category temperature, 155 °C 1000 h



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





| PERFORMANCE CHARACTERISTICS                       |                                                                                                  |                                              |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------|
| TEST                                              | CONDITIONS OF TEST                                                                               | REQUIREMENTS ( $\Delta R/R$ ) <sup>(1)</sup> |
| Endurance test at 70 °C<br>IEC 60115-1, 4.25.1    | 1000 h at 70 °C, 1.5 h ON, 0.5 h OFF<br>8000 h at 70 °C, 1.5. h ON, 0.5 h OFF                    | $\leq \pm 1.5 \%$<br>$\leq \pm 4.0 \%$       |
| Endurance at UCT<br>IEC 60115-1, 4.25.3           | 1000 h at 155 °C without load<br>8000 h at 155 °C without load                                   | $\leq \pm 3.0 \%$<br>$\leq \pm 8.0 \%$       |
| Overload test<br>IEC 60115-1, 4.13                | 2.5 x rated power or twice the limiting element voltage,<br>2 s for size 0207; 5 s for size 0414 | $\leq \pm 0.5 \%$                            |
| Thermal shock<br>IEC 60115-1, 4.19                | Rapid change between upper and lower category temperature                                        | $\leq \pm 0.25 \%$                           |
| Climatic sequence<br>IEC 60115-1, 4.23            | Dry heat, damp heat cyclic, cold, low air pressure                                               | $\leq \pm 1.5 \%$                            |
| Damp heat steady state<br>IEC 60115, 4.24         | 56 days; 40 °C; 90 % to 95 % RH;<br>loaded with 0.01 $P_{70}$                                    | $\leq \pm 1.5 \%$                            |
| Resistance to soldering heat<br>IEC 60115-1, 4.18 | 10 s at 260 °C solder bath temperature                                                           | $\leq \pm 0.25 \%$                           |
| Robustness of terminations<br>IEC 60115-1, 4.16   | Tensile, bending and torsion                                                                     | $\leq \pm 0.25 \%$                           |
| Vibration<br>IEC 60115-1, 4.22                    | Frequency 10 Hz to 500 Hz; displacement 1.5 mm or<br>acceleration 10 g; three directions; 6 h    | $\leq \pm 0.25 \%$                           |

**Note**

<sup>(1)</sup> For ohmic values between 10  $\Omega$  and 1 M $\Omega$ .

| APPLICABLE SPECIFICATIONS                                                                           |
|-----------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• CECC 40101-806</li> <li>• EN 140100; EN 60115-1</li> </ul> |



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