

# DATA SHEET

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**5063JD series (space miser)  
0.25 to 0.40 W; 1% and 5%  
Metal film resistors**

Product specification  
File under BCcomponents, BC08

2000 Aug 08

**Metal film resistors****5063JD series (space miser)  
0.25 to 0.40 W; 1% and 5%****DESCRIPTION**

A homogeneous film of metal alloy is deposited on a high grade BALOX ceramic body. After a helical groove has been cut in the resistive layer, tinned connecting wires of electrolytic copper are welded to the end-caps. The resistors are coated with a blue lacquer which provides electrical, mechanical, and climatic protection. The encapsulation is resistant to all cleaning solvents in accordance with "MIL-STD-202E, method 215", and "IEC 60068-2-45".

**QUICK REFERENCE DATA**

| DESCRIPTION  | VALUE  |                                     |
|--|--|-------------------------------------|
| Resistance range   | 0.22 $\Omega$ to 10 M $\Omega$ ; see Table 1 |                                     |
| Resistance tolerance and series  | $\pm 5\%$ , (E24); $\pm 1\%$ , (E24/E96)     |                                     |
| Temperature coefficient  | $\pm 100 \times 10^{-6}/K$                   |                                     |
| Operation mode   | <b>normal</b>                                | <b>long term</b>                    |
| Climatic category (LCT/UCT/days)   | 55/155/56                                    | 55/125/56                           |
| Max. dissipation, $P_{70}$   | 0.40 W                                       | 0.25 W                              |
| Thermal resistance, $R_{th}$   | 200 $^{\circ}C/W$                            |                                     |
| Max. continuous operating voltage, $U_{max}$                                       | 200 V (DC or RMS)                            |                                     |
| Noise $R \leq 1 M\Omega$   | max. 0.1 V/V                                 |                                     |
| Surface temperature  | 155 $^{\circ}C$                              | 125 $^{\circ}C$                     |
| Operating temperature range  | -55 $^{\circ}C$ to +155 $^{\circ}C$          | -55 $^{\circ}C$ to +125 $^{\circ}C$ |
| Max. resistance change at $P_{70}$ for resistance range, $\Delta R/R$ max., after: |  |                                     |
| 1 000 h  | 0.50%  | 0.25%                               |
| 8 000 h  | 1.0%   | 0.50%                               |
| 225 000 h  | -  | 1.5%                                |
| Permissible voltage against ambient:   |  |                                     |
| 1 minute   | 300 V  |                                     |
| continuous   | 75 V   |                                     |
| Stability ( $\Delta R/R$ max.) after:  |  |                                     |
| load (1000 hours)  | $\pm 0.50\% + 0.05 \Omega$                   | $\pm 0.25\% + 0.05 \Omega$          |
| climatic test  | $\pm 1.0\% + 0.05 \Omega$                    |                                     |
| resistance to soldering heat   | $\pm 0.25\% + 0.05 \Omega$                   |                                     |
| short time overload (400 V max.)   | $\pm 0.25\% + 0.05 \Omega$                   |                                     |

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### ORDERING INFORMATION

**Table 1** Ordering code indicating resistor type and packaging

| TYPE   | TC<br>( $\times 10^{-6}/K$ ) | TOL.<br>(%) | RESISTANCE RANGE            | PART NUMBER       | SPQ<br>(units)    |
|--------|------------------------------|-------------|-----------------------------|-------------------|-------------------|
| 5063JD | $\pm 100$                    | –           | jumper <sup>(1)</sup>       | 5063JD0R000J12AFS | 5000; tape & reel |
|        |                              | –           | jumper <sup>(1)</sup>       | 5063JD0R000J18AFS | 5000; ammpack     |
|        |                              | $\pm 5$     | 0.22 to 0.91 $\Omega$       | 5063JDxxxxxJ12AFS | 5000; tape & reel |
|        |                              | $\pm 5$     | 0.22 to 0.91 $\Omega$       | 5063JDxxxxxJ18AFS | 5000; ammpack     |
|        |                              | $\pm 1$     | 1 $\Omega$ to 10 M $\Omega$ | 5063JDxxxxxF12AF5 | 5000; tape & reel |
|        |                              | $\pm 1$     | 1 $\Omega$ to 10 M $\Omega$ | 5063JDxxxxxF18AF5 | 5000; ammpack     |

#### Note

1. A 0  $\Omega$  jumper is available with a maximum resistance  $R_{max} \leq 10 \text{ m}\Omega$  at 3 A.

#### Composition of the clear text code (NAFTA P/N)

- The resistors have an ordering code starting with 50
- The subsequent digits indicate the resistor type, temperature coefficient, ohmic value, tolerance and packaging; see Table 1
- The ohmic value is represented by 5-digits; see Table 2
- For temperature coefficient and tolerance, see Table 3.

#### ORDERING EXAMPLE: CLEAR TEXT CODE

The ordering code of a 5063JD resistor, value 5 600  $\Omega \pm 1\%$ , taped on a bandolier of 5000 units in tape on reel is:  
5063JD5K600F12AF5.

**Table 2** Examples of the ohmic value

| OHMIC VALUE    | 5-DIGIT VALUE |
|----------------|---------------|
| 0.22 $\Omega$  | 0R220         |
| 1 $\Omega$     | 1R000         |
| 10 $\Omega$    | 10R00         |
| 100 $\Omega$   | 100R0         |
| 1 k $\Omega$   | 1K000         |
| 10 k $\Omega$  | 10K00         |
| 100 k $\Omega$ | 100K0         |
| 1 M $\Omega$   | 1M000         |

**Table 3** Letter coding for temperature coefficient and tolerance

| TC<br>( $\times 10^{-6}/K$ ) | LETTER CODE | TOL.<br>(%) | LETTER CODE |
|------------------------------|-------------|-------------|-------------|
| 100                          | D           | $\pm 5$     | J           |
| –                            | –           | $\pm 1$     | F           |

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### FUNCTIONAL DESCRIPTION

#### Product characterization

Standard values of nominal resistance are taken from the E24 or E96 series for resistors with a tolerance of  $\pm 5\%$  or  $\pm 1\%$ .

The values of the E24 series are in accordance with "IEC publication 60063".

#### Limiting values

| TYPE   | LIMITING VOLTAGE <sup>(1)</sup> (V) | LIMITING POWER (W) |
|--------|-------------------------------------|--------------------|
| 5063JD | 200                                 | 0.40               |

#### Note

- The maximum voltage that may be continuously applied to the resistor element, see "IEC publication 60115-1".

#### DERATING

The power that the resistor can dissipate depends on the operating temperature; see Figs 1 and 2.



#### NOISE

The current noise is measured in accordance with "DIN 44049 Part 1 and IEC 600195". Maximum values are for 99.8% of all resistors; see Fig. 3.



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**Pulse-load behaviour**



Fig.4 Pulse on a regular basis; maximum permissible peak pulse power ( $\hat{P}_{max}$ ) as a function of pulse duration ( $t_i$ ).



Fig.5 Pulse on a regular basis; maximum permissible peak pulse voltage ( $\hat{V}_{max}$ ) as a function of pulse duration ( $t_i$ ).

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**Definition of symbols** (see Figs 4, 5, 6 and 7)

| SYMBOL           | DESCRIPTION                                       |
|------------------|---|
| $\bar{P}$        | applied peak pulse power                          |
| $\hat{P}_{\max}$ | maximum permissible peak pulse power; see Fig.4   |
| $V_i$            | applied peak pulse voltage; see Fig 6             |
| $\hat{V}_{\max}$ | maximum permissible peak pulse voltage; see Fig.5 |
| $V(t)$           | pulse voltage                                     |
| $R$              | nominal resistance value                          |
| $P_U$            | rated dissipation at ambient temperature          |
| $R_{\text{nom}}$ | nominal resistance value                          |
| $t_i$            | pulse duration (rectangular pulses)               |
| $t_p$            | pulse repetition time                             |

### Pulses

The permissible pulse-load is determined by the resistance change as given for the endurance test after 8000 hours.

#### PULSE VOLTAGE LIMIT

The maximum permissible impulse voltage  $\hat{V}_{\max}$  is the voltage pulse short overload depending on the impulse time  $t_i$ . High ohmic values are protected by the interdependence of voltage limit and impulse time. this function is given by

the equation:  $\hat{V}_{\max} = \frac{2.5 \cdot V_{\max}}{1 + t_i \cdot K} + V_{\max}$

$V_{\max}$  = maximum permissible continuous voltage;

$t_i$  = pulse time;

$K = 100 \text{ s}^{-1}$ .

#### MAXIMUM PULSE-LOAD

The average load  $\bar{P}$  must not exceed the rated dissipation. For resistance values above the critical resistance the rated dissipation is given by the resistance value and the limiting

element voltage  $V_{\max}$ :  $\bar{P} = \frac{1}{t_p R} \int_{t_1}^{t_2} U^2(t) dt \leq P_U$

#### CONTINUOUS AND SINGLE PULSE-LOAD

There is a difference between repetitive pulse-load

$\left( \bar{P} = \frac{t_i}{t_p} \cdot P \text{ with } P = \text{power at the pulse time } t_i \right)$  or

single pulse load (e.g. switching events  $\bar{P} > 0$ ).

A higher pulse-load  $P_{\max}$  is accepted in the latter case.

#### PULSE SHAPES

Figure 6 shows the maximum pulse-load for a rectangular

pulse shape:  $\bar{P} = \frac{t_i \cdot \hat{V}^2}{t_p \cdot R}$

Other pulses should be converted into rectangular pulse shapes (see Fig.7), having the same energy at a given peak voltage. The following equation shows the calculation for exponential pulses:

$\bar{P} = \frac{\tau_e}{2 \cdot t_p} \cdot \frac{\hat{V}^2}{R}$  with  $\tau_e = R \cdot C$  or  $\tau_e = \frac{L}{R}$



Fig.6 Rectangular pulses.



Fig.7 Exponential pulses.

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### MECHANICAL DATA

#### Mass per 100 units

13 g

#### Marking

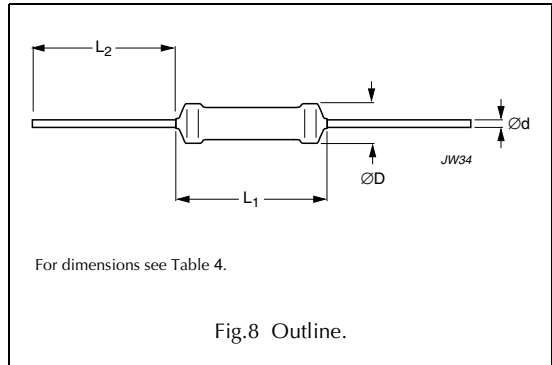
The nominal resistance and tolerance are marked on the resistor using four or five coloured bands in accordance with IEC publication 60062 "Colour codes for fixed resistors".

#### Mounting

The resistors are suitable for processing on automatic insertion equipment in addition to cutting and bending machines. The minimum bending is 5 mm (.200 inch).

#### Outlines

The length of the body ( $L_1$ ) is measured by inserting the leads into holes of two identical gauge plates and moving these plates parallel to each other until the resistor body is clamped without deformation ("IEC publication 60294").



**Table 4** Resistor type and physical dimensions; see Fig.8

| TYPE                             | ØD<br>MAX.<br>(mm) | L <sub>1</sub><br>MAX.<br>(mm) | L <sub>2</sub><br>MAX.<br>(mm) | Ød<br>(mm) |
|----------------------------------|--------------------|--------------------------------|--------------------------------|------------|
| <b>Dimensions in inches</b>      |                    |                                |                                |            |
| 5063JD                           | 0.063              | .142                           | 1.14                           | .020       |
| <b>Dimensions in millimetres</b> |                    |                                |                                |            |
| 5063JD                           | 1.6                | 3.6                            | 29                             | 0.5        |

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