DATA SHEET

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

COMPONENTS

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 Ω to 10 MΩ; see Table 1	
Resistance tolerance and series	±5%, (E24); ±1%, (E24/E96)	
Temperature coefficient	$\pm100 \times 10^{-6}$/K	
Operation mode	**normal**	**long term**
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 °C/W	
Max. continuous operating voltage, U_{max}	200 V (DC or RMS)	
Noise R ≤ 1 MΩ	max. 0.1 V/V	
Surface temperature	155 °C	125 °C
Operating temperature range	−55 °C to +155 °C	−55 °C to +125 °C
Max. resistance change at P_{70} for resistance range, $\Delta R/R$ max., after:		
1000 h	0.50%	0.25%
8000 h	1.0%	0.50%
225000 h	−	1.5%
Permissible voltage against ambient:		
1 minute	300 V	
continuous	75 V	
Stability (ΔR/R max.) after:		
load (1000 hours)	±0.50% + 0.05 Ω	±0.25% + 0.05 Ω
climatic test	±1.0% + 0.05 Ω	
resistance to soldering heat	±0.25% + 0.05 Ω	
short time overload (400 V max.)	±0.25% + 0.05 Ω	

ORDERING INFORMATION

Table 1 Ordering code indicating resistor type and packaging

TYPE	TC ($\times 10^{-6}$/K)	TOL. (%)	RESISTANCE RANGE	PART NUMBER	SPQ (units)
5063JD	±100	–	jumper[(1)]	5063JD0R000J12AFS	5000; tape & reel
		–	jumper[(1)]	5063JD0R000J18AFS	5000; ammopack
		±5	0.22 to 0.91 Ω	5063JDxxxxxJ12AFS	5000; tape & reel
		±5	0.22 to 0.91 Ω	5063JDxxxxxJ18AFS	5000; ammopack
		±1	1 Ω to 10 MΩ	5063JDxxxxxF12AF5	5000; tape & reel
		±1	1 Ω to 10 MΩ	5063JDxxxxxF18AF5	5000; ammopack

Note

1. A 0 Ω jumper is available with a maximum resistance $R_{max} \leq 10$ mΩ 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.

Table 2 Examples of the ohmic value

OHMIC VALUE	5-DIGIT VALUE
0.22 Ω	0R220
1 Ω	1R000
10 Ω	10R00
100 Ω	100R0
1 kΩ	1K000
10 kΩ	10K00
100 kΩ	100K0
1 MΩ	1M000

Table 3 Letter coding for temperature coefficient and tolerance

TC ($\times10^{-6}$/K)	LETTER CODE	TOL. (%)	LETTER CODE
100	D	±5	J
–	–	±1	F

ORDERING EXAMPLE: CLEAR TEXT CODE

The ordering code of a 5063JD resistor, value 5600 Ω ±1%, taped on a bandolier of 5000 units in tape on reel is: 5063JD5K600F12AF5.

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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 ±5% or ±1%.
The values of the E24 series are in accordance with *"IEC publication 60063"*.

Limiting values

TYPE	LIMITING VOLTAGE(1) (V)	LIMITING POWER (W)
5063JD	200	0.40

Note

1. 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.

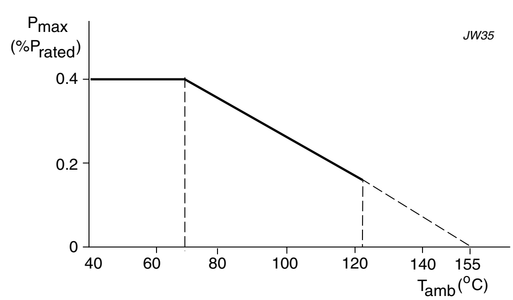

Fig.1 Derating curve, normal operation.

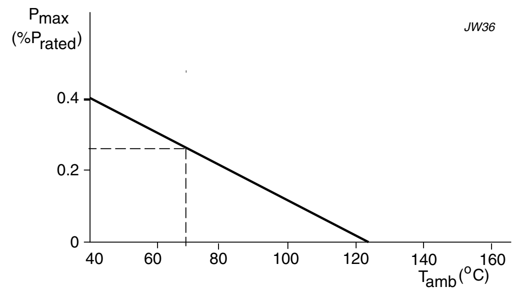

Fig.2 Derating curve, long term operation.

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.

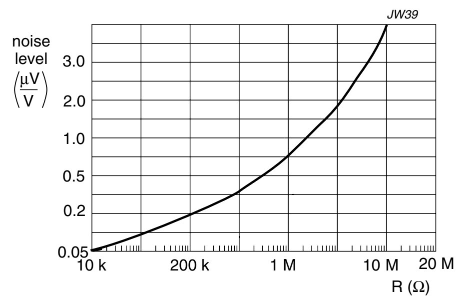

Fig.3 Current noise.

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Pulse-load behaviour

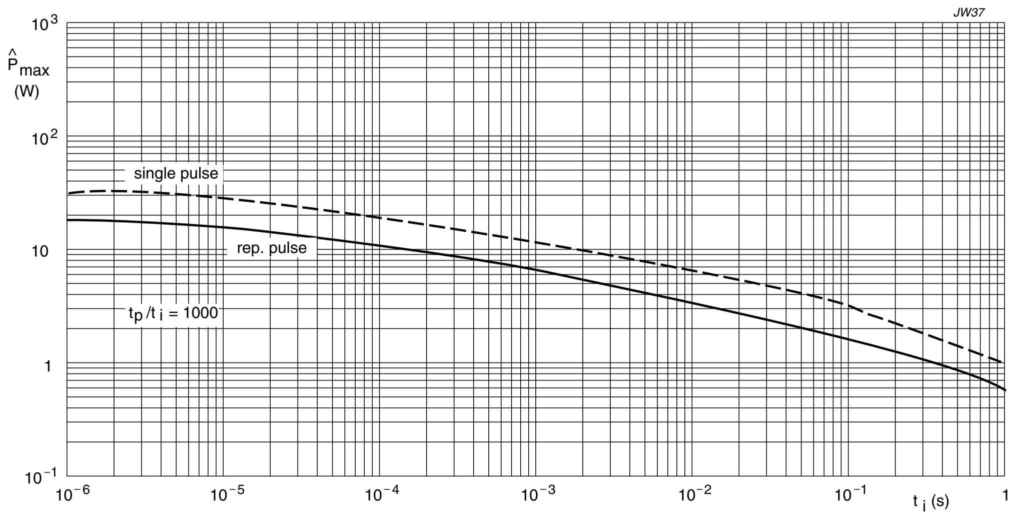

Fig.4 Pulse on a regular basis; maximum permissible peak pulse power ($\hat{P}_{max}$) as a function of pulse duration (t_i).

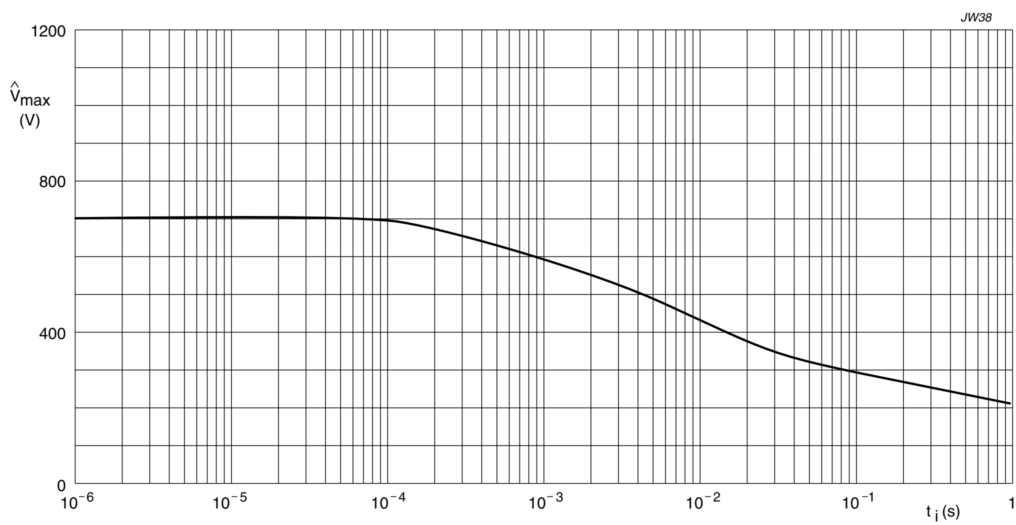

Fig.5 Pulse on a regular basis; maximum permissible peak pulse voltage ($\hat{V}_{max}$) as a function of pulse duration (t_i).

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

SYMBOL	DESCRIPTION
$\hat{P}$	applied peak pulse power
$\hat{P}_{max}$	maximum permissible peak pulse power; see Fig.4
$\hat{V}_i$	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_{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;
ti = pulse time;
K = 100 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}: $\bar{P} = \frac{1}{t_p R}\int_{t1}^{t2} U^2(t)dt \le P\upsilon$

CONTINUOUS AND SINGLE PULSE-LOAD

There is a difference between repetitive pulse-load $\left(\bar{P} = \frac{t_i}{t_p} \cdot \underline{P} \text{ with } \underline{P} = \text{power at the pulse time } t_i\right)$ 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:

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

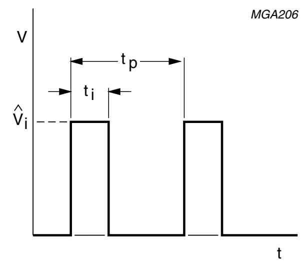

Fig.6 Rectangular pulses.

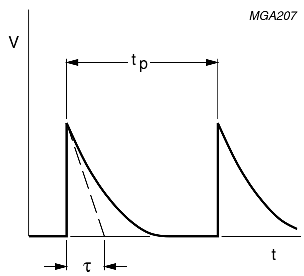

Fig.7 Exponential pulses.

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MECHANICAL DATA

Mass per 100 units

13 g

Marking

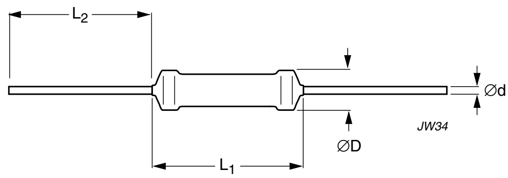
The nominal resistance and tolerance are marked on the resistor using four or five coloured bands in accordance with IEC publication 60062 *"Colour codes for fixed resistors"*.

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")*.



For dimensions see Table 4.

Fig.8 Outline.

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

TYPE	∅D MAX. (mm)	L_1 MAX. (mm)	L_2 MAX. (mm)	∅d (mm)
Dimensions in inches				
5063JD	0.063	.142	1.14	.020
Dimensions in millimetres				
5063JD	1.6	3.6	29	0.5

Mouser Electronics

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5063JD 13 1%TR 5063JD 178K 1% 5063JD 20 1%TR 5063JD 22 1%TR 5063JD 249 1%TR 5063JD 3.9K 1%TR 5063JD 33 1% 5063JD 432 1%TR 5063JD 470K 1%TR 5063JD 51 1%TR 5063JD 60.4 1%TR 5063JD 619 1%TR 5063JD 69.8K 1% 5063JD 976K 1% 5063JD 143 1% 5063JD 1.74M 1% 5063JD 3.83K 1% 5063JD 237 1%TR 5063JD 820K 1%TR 5063JD 390K 1%TR 5063JD 7.15 1% 5063JD 11 1% 5063JD 22.6 1%TR 5063JD 1.65K 1% 5063JD 16 1%TR 5063JD 560K 1%TR 5063JD 806 1%TR 5063JD 324K 1%TR 5063JD 9.31 1% 5063JD80.6K1% 5063JD 2.8 1% 5063JD 2.43M 1% 5063JD 3.3 1%TR 5063JD 33.2 1% 5063JD 910K 1% 5063JD 4.53 1% 5063JD 665K 1% 5063JD 191 1% 5063JD 2.4K 1%TR 5063JD 51K 1%TR 5063JD 1.3M 1% 5063JD 215K 1% 5063JD 2.55K 1% 5063JD 2.94 1% 5063JD 8.87 1% 5063JD22K1%TR 5063JD 68 1%TR 5063JD 3.24K 1% 5063JD 162 1%TR 5063JD 232K 1% 5063JD 54.9K 1% 5063JD 243K 1%TR 5063JD 196 1% 5063JD 56.2 1%TR 5063JD 2.15K 1% 5063JD 9.76 1% 5063JD 39 1% 5063JD 357K 1%TR 5063JD 5.76K 1% 5063JD 7.68K 1% 5063JD 147 1% 5063JD 130 1%TR 5063JD 205K 1% 5063JD 1.2M 1% 5063JD 127 1%TR 5063JD12K1% 5063JD 866K 1%TR 5063JD 178 1%TR 5063JD121R0FT 5063JD 1.27M 1% 5063JD 232K 1%TR 5063JD 390 1% 5063JD 240 1%TR 5063JD 1.13K 1% 5063JD 523 1%TR 5063JD 2.87K 1% 5063JD 309 1%TR 5063JD2M1%TR 5063JD 249K 1%TR 5063JD 430K 1% 5063JD 9.53 1% 5063JD 261 1%TR 5063JD 976 1%TR 5063JD 5.9K 1% 5063JD 1.05K 1% 5063JD 160K 1%TR 5063JD 200 1%TR 5063JD 6.65 1% 5063JD 402K 1%TR 5063JD 34.8 1% 5063JD 66.5K 1% 5063JD 2.49 1% 5063JD 1.82 1% 5063JD 210K 1%TR 5063JD 143K 1% 5063JD 76.8K 1% 5063JD 2.05K 1% 5063JD 6.98 1% 5063JD 21K 1%TR 5063JD 1.91M 1%

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