

## Chip heaters

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### Basic values:

Parameter	Value
Dimensions	10 x 4.0 x 4.0 mm
Heated area	10 x 4.0 x 4.0 mm
T <sub>max</sub>	500 °C

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### Details of Standard:

#### Description

With more than 40 W of rated power, the heating element of the type HR is a powerful miniature heater. The square design of the width and height of the heating element also makes it possible to use the side surfaces for heat transfer. This makes the HR type suitable for partially recessed installation, for example for space-saving and targeted heating of tools for handling and simultaneous heating of electronic components, or for die-bonding.

\* The actual power depends on resistance, temperature and voltage.

Parameter	Value
Article no.	FLE 100 219
Resistance @ 20 °C	14 Ω ±25 %
Nominal voltage	24 V
Nominal power @ 20 °C	41 W*

## Basic Material

Parameter	Scale unit	Si <sub>3</sub> N <sub>4</sub>
max. temperature (T <sub>max</sub> )	°C	1 000
thermal conductivity (l)	W/mK	40
temperature shock resistance (ΔT)	K	500
emissivity (1 100 °C) (ε)	-	0.96
Young's modulus (E)	GPa	320
bending strength (δ <sub>BB</sub> )	MPa	400
compressive strength (δ <sub>D</sub> )	MPa	2 000
coefficient of thermal expansion (α)	10 <sup>-6</sup> K <sup>-1</sup>	3
density (g)	g/cm <sup>3</sup>	3.21
specific heat (c <sub>p</sub> )	J/kgK	750
porosity (100 - % t.D.)	%	0
critical stress intensity factor (K <sub>IC</sub> )	MPa m <sup>1/2</sup>	6
Weibull - modulus (m)	-	7.9

The thermal shock resistance depends on the geometric shape of the heater.

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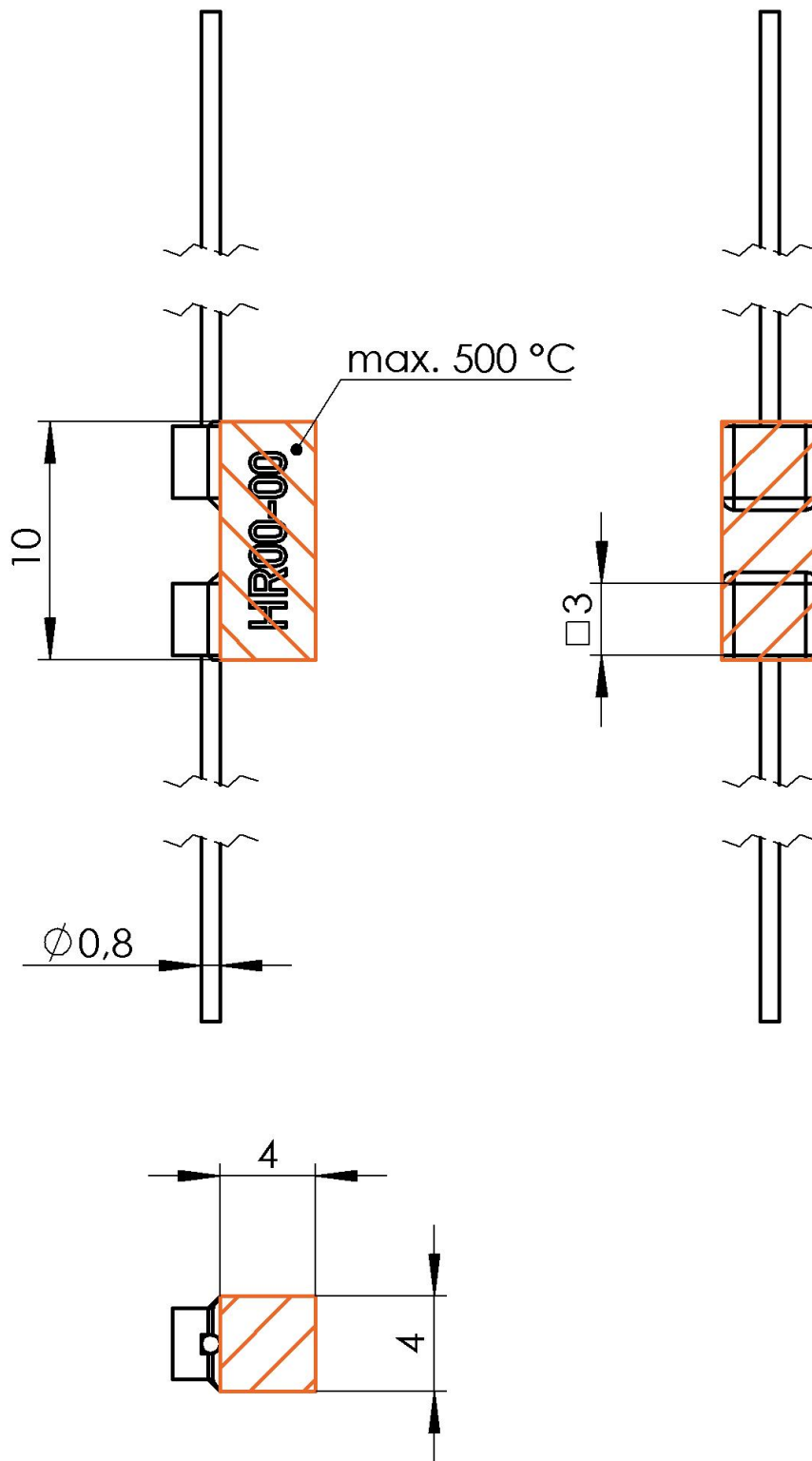
## Electrical parameters

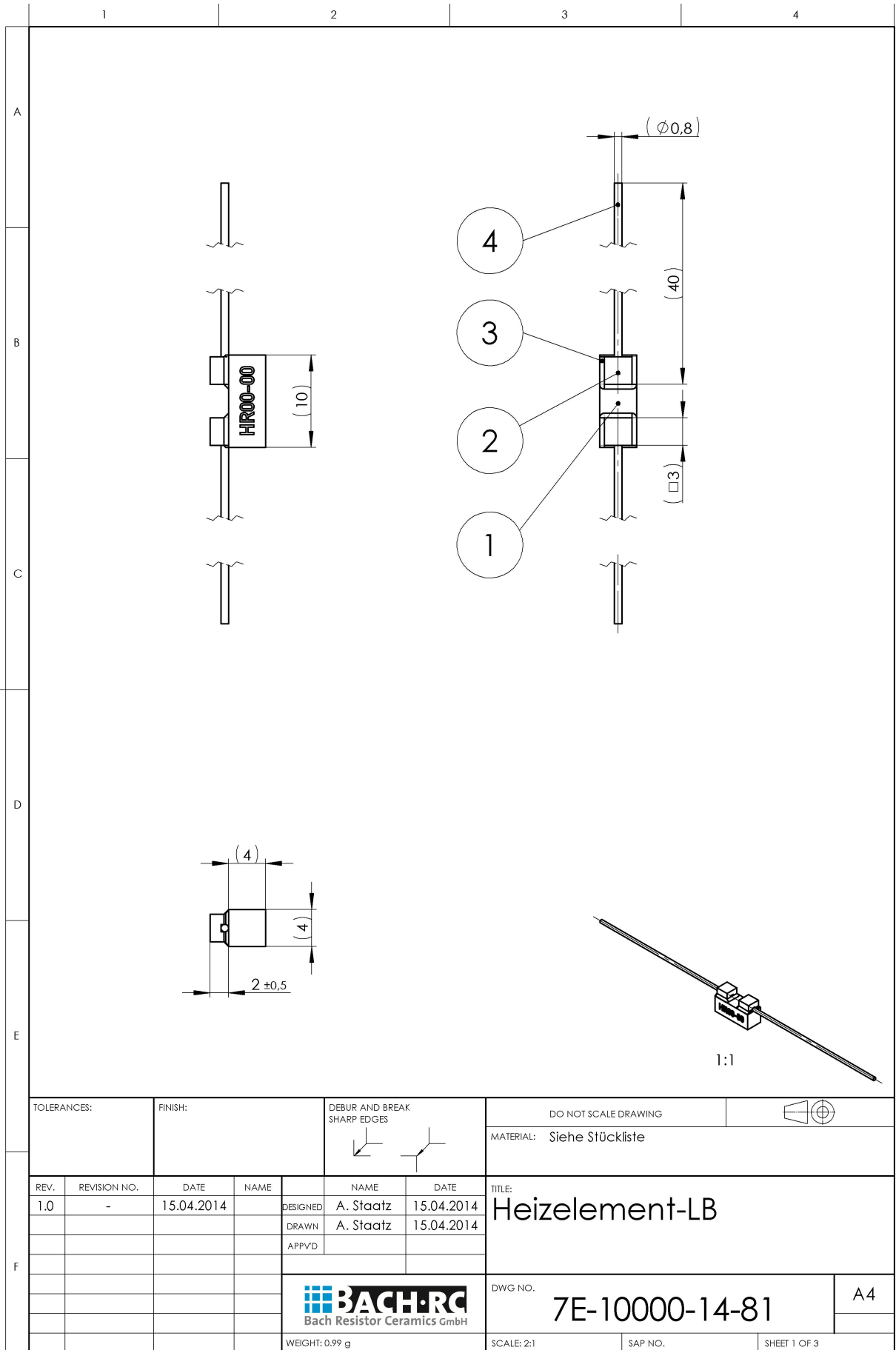
Parameter	Scale unit	Si <sub>3</sub> N <sub>4</sub>
resistivity	Ω cm	5 · 10 <sup>-3</sup> - 5 · 10 <sup>-1</sup>
isolation resistivity	Ω mm (20 °C)	10 <sup>13</sup>
dielectric strength	kV/mm	25

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## Emission spectrum

Fully ceramic heating elements are long-wave infrared heaters with a maximum emission of 5 to 10 μm and a radiation coefficient of ε > 0.9.





TOLERANCES:		FINISH:		DEBUR AND BREAK SHARP EDGES		DO NOT SCALE DRAWING		MATERIAL: Siehe Stückliste	
REV. 1.0		REVISION NO. -		DATE 15.04.2014		NAME A. Stätz		DATE 15.04.2014	
DESIGNED		DRAWN		APPVD		NAME A. Stätz		DATE 15.04.2014	
TITLE: Heizelement-LB		DWG NO. 7E-10000-14-81		SCALE: 2:1		SAP NO.		SHEET 1 OF 3	
WEIGHT: 0.99 g		BACH-RC Bach Resistor Ceramics GmbH		A4					