

## FK3101: Cu CONDUCTOR PASTE FOR $\text{Al}_2\text{O}_3$ AND PRE-OXIDISED AlN

The copper paste FK3101 can be used on  $\text{Al}_2\text{O}_3$  and pre-oxidized AlN substrates, as well as a second layer on fired FK3201 films, by a screen printing process. The paste is fired in a nitrogen atmosphere to form thick-film conductors.

### PROCESS CONDITIONS

#### Substrate

The specifications stated are based on samples screen printed onto CoorsTek/ANCeram AlN ceramic AN180 (lapped), pre-oxidised at 1200 °C for 30 minutes. Alumina (96%, asfired) is also applicable. Substrates with other surface qualities or from other suppliers may result in variations of performance of the properties.

#### Screen printing

Use a stainless steel screen with 105 mesh and a wire diameter of 75  $\mu\text{m}$ , as well as 100  $\mu\text{m}$  emulsion thickness to achieve the stated film thickness.

#### Leveling

The printed films should be leveled for  $10 \pm 2$  minutes at room temperature (22 to 25 °C).

#### Drying

The printed films should be dried for 20 to 30 minutes at 120 °C in a drying oven with an exhaust air system or in a continuous flow dryer.

#### Firing

The printed films should be fired under a nitrogen atmosphere (residual oxygen content < 10 ppm) at a peak temperature of 955 °C and with a dwell time of 15 minutes. Fraunhofer IKTS recommends a total cycle time of 100 minutes.

#### Storage

The pastes can be stored at any temperature between 4 and 10 °C. The lower the temperature, the better is the long-term stability. The jar must remain tightly sealed during storage. In order to prevent humidity from condensing on the paste, the jar may be opened only after the content has reached room temperature. The paste needs to be sufficiently homogenized before use, e.g. with a spatula.

#### Safety notice.

For safe handling of the pastes, please follow the instructions in the safety data sheet.

### Fraunhofer Institute for Ceramic Technologies and Systems IKTS

Winterbergstrasse 28  
01277 Dresden

#### Contact

Richard Schmidt  
Phone +49 351 2553-7916  
richard.schmidt@ikts.fraunhofer.de

[www.ikts.fraunhofer.de](http://www.ikts.fraunhofer.de)

**REACH**  
compliant



Management  
System  
ISO 9001:2015  
ISO 14001:2015

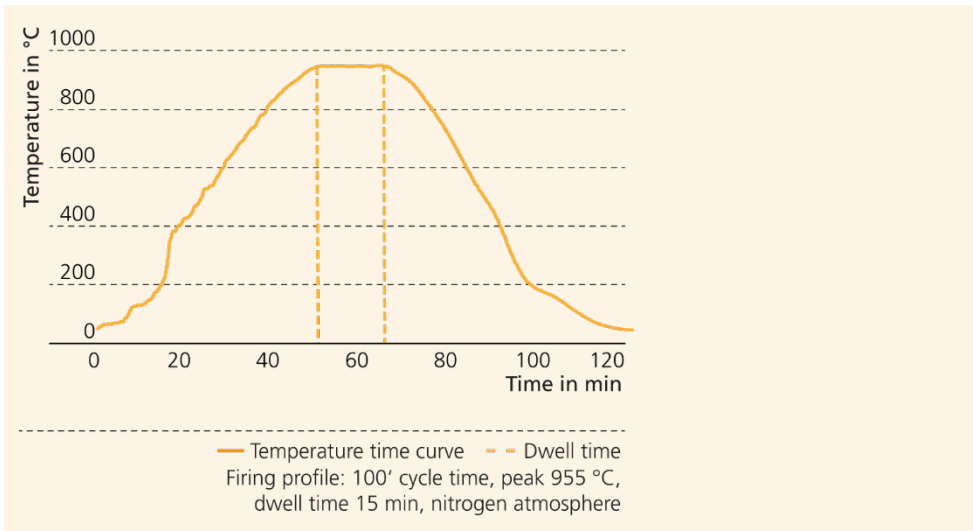
[www.tuv.com](http://www.tuv.com)  
ID 1100005194

## Quality requirements

A certificate of analysis is included with each delivery. The paste meets current legal requirements according to RoHS II (Directive 2011/65/EC) and REACH (Regulation (EC) No 1907/2006).

Instead of an expiration date, a date for retesting is stated, which is six months after the date of delivery. During this period, IKTS warrants the values stated in the CoA for unopened pastes. After the date for retesting has passed, it is the client's responsibility to test the paste quality under the conditions stated in the data sheet.

## FIRING PROFILE



## TECHNICAL SPECIFICATIONS

Characteristics	Unit	Value
Viscosity <sup>1</sup>	Pa·s	≤ 200
Sheet resistance <sup>2, 5</sup>	mOhm/Sq	≤ 0.6
Solderability <sup>3, 5</sup>	%	≥ 90
Adhesion <sup>4</sup> (number of firings)		
- Initial <sup>5</sup> (1x)	N/4 mm <sup>2</sup>	≥ 25
- Aged <sup>5</sup> (1x)		≥ 25
Fired film thickness	µm	60±10
Coverage <sup>6</sup>	cm <sup>2</sup> /g	15±5

<sup>1</sup> Brookfield viscometer HB with spindle/cup combination SC4-14I-6RP(Y) at n=10 rpm and 25±0.2 °C.

<sup>2</sup> Sheet resistance, calculated for a fired thickness of 60±1 µm.

<sup>3</sup> Solder Sn/Ag/Cu 96.5/3.5/0.5; flux: Alpha 611, soldering time: 5 s, soldering temperature: 245±2 °C.

<sup>4</sup> 90° wire peel test in accordance with DIN 41850-2, 2x2 mm<sup>2</sup> pad size, solder: Sn/Ag/Cu 96.5/3.5/0.5.

<sup>5</sup> Firing profile: total cycle time 100 min, 15 min at 955 °C, nitrogen atmosphere.

<sup>7</sup> Calculated area that can be printed with one gram paste in the recommended thickness.