

## Preliminary Technical Information

# 6122 SILVER PASTE

## Cd-FREE, Pb-FREE COMPOSITION FOR ALUMINUM NITRIDE SUBSTRATE

The silver conductor composition 6122 was designed primarily for applications requiring high adhesion to AlN substrate and no soldering or soldering with Pb-free solders at elevated temperatures. However, it is possible to solder to 6122 fired film using low temperature lead-bearing solders by burnishing it or utilizing Koartan's

SILPALL FLASH 6296 solder promoter. Key features include:

- RoHS Compliant; Cd-Free, Pb-Free
- Good Line Resolution
- High Adhesion to Most AlN
- Compatibility with Dielectrics and Resistors.

### TYPICAL FIRED FILM CHARACTERISTICS<sup>(1)</sup>

<b>Fired Thickness</b>	12-16 $\mu\text{m}$
<b>Line Resolution</b>	175/125 $\mu\text{m}$ line/space using 150/150 $\mu\text{m}$ pattern and 325 mesh screen
<b>Resistivity</b>	3-4 milliohms/square at 16 $\mu\text{m}$ fired thickness
<b>Solder Acceptance<sup>(2)</sup></b> Sn/Ag/Cu 96.5/3.0/0.5 or similar	>95%
<b>Solder Leach Resistance<sup>(3)</sup></b>	$\geq 2$ cycles
<b>Adhesion<sup>(4)</sup></b> Initial 500 Hours @ 150°C	> 22 N > 18 N

- 1) Typical properties are based on testing of several batches under various processing conditions. They are not intended as specification limits. Data obtained on various aluminum nitride substrates.
- 2) After a 5 second dip in 260°C +/-5°C solder bath. Also see application notes below.
- 3) Cycles consist of 10-second dips in a 260°C +/-5°C solder bath. Each cycle is preceded by dipping in Alpha 611 flux.
- 4) The adhesion test consists of attaching 20 AWG tinned copper wire to 2mmx2mm pads, by dipping in 260°C +/-5°C solder for 5 seconds. The wires are then bent 90 degrees and pulled at constant speed, while a force gauge records the peel strength. Koartan's SILPALL FLASH 6296 is used to provide intimate contact between the wire and the pads.

## COMPOSITION PROPERTIES

**Viscosity:**  $140 \pm 30$  Kcps, when measured with Brookfield HBT viscometer, Spindle #14, utility cup, 10 RPM, 25°C

**Specific Gravity:** 3.8 – 4.2 g/cm<sup>3</sup>

**Recommended Thinner:** KOARTAN A-1039

## RECOMMENDED PROCESSING PROCEDURE

**Printing:** Printing with 280 mesh stainless steel screen using 10-15  $\mu\text{m}$  emulsion and 45 degree angle is recommended. Other mesh counts, 200-325, and emulsion thicknesses, 5-25  $\mu\text{m}$ , may be used for special applications. Squeegee speeds of up to 10 inches/sec may be utilized.

Coverage is approximately 80 cm<sup>2</sup>/g when utilizing 280 mesh screen and a wet print thickness of about 38  $\mu\text{m}$ .

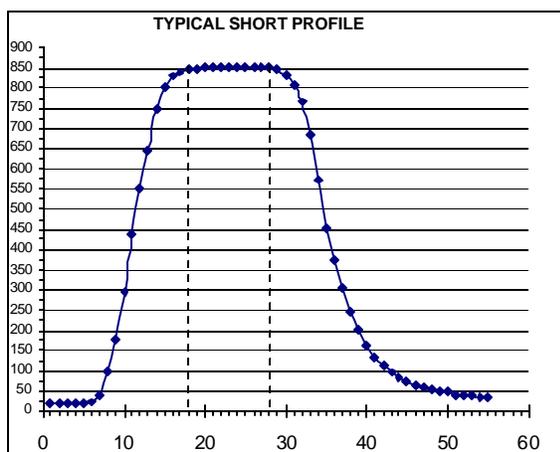
**Drying:** Wet prints should be allowed to level for 5-10 minutes prior to drying. Dry for 10-15 minutes in a convection oven or belt dryer at 125°C-150°C.

**Firing:** Firing in air using a belt furnace and a 36-60 minute profile, with 10 minutes

at a peak temperature of 850°C recommended. Air flow rates must be optimized to ensure that the products of binder burn-off discharge properly and create a fully oxidizing atmosphere in the muffle.

**Application Notes:** When soldering conductors printed on AlN, it is important to keep in mind that the AlN quickly transfers heat away from any point source, such as a soldering iron. Preferably the solder should first be reflowed or fluxed coupon dipped in molten solder long enough for the coupon temperature to reach the solder bath temperature. Koartan's SILPALL FLASH 6296 provides a very thin layer of silver-palladium, which is designed to adhere to most silver-based conductors and significantly improve their solder acceptance, regardless of substrate type or solder composition.

**Storage and Shelf Life:** Store in tightly capped containers at room temperature. Shelf life is 6 months for unopened jars. Under ordinary conditions of storage and use the product should not require thinning. However, solvent loss during extended printing runs may be corrected by incorporating up to 0.5% of Koartan A-1039 thinner.



*Temperature (°C) vs. Time (minutes)*

The information presented herein is based on data believed to be dependable and is accurate and reliable to the best of our knowledge and belief, but not guaranteed to be so. Koartan Company assumes no liability arising from the use of this product or the information provided herein. It is the responsibility of the user to verify the information and to establish the suitability of the product(s) for any particular application. Nothing herein is to be construed as recommending any practice or any product in violation of any patent or in violation of any law or regulation.