

## Technical Information

# 6550-1 Thin-Print Silver Conductor

The thick film silver composition 6650-1 is designed for applications requiring very thin metallization. Using a 325 mesh screen, it provides fired films of about one micron in thickness. At this thickness the film is continuous, resulting in a resistivity of about 20 milliohms/sq. This makes it ideal for applications such as coating of very small holes in substrates. Two or three layers may be deposited to obtain an extremely dense film with good bulk resistivity. The films are also etchable, enabling the formation of

one mil lines and spaces without excessive undercutting. Its key features include:

- High Bulk Conductivity
- Good Adhesion
- Clean Etched Area Footprint
- High Film Density
- Economy, Very High Coverage
- Environmentally Friendly: No Cadmium, Lead, or Nickel

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

<b>Fired Thickness</b> 3 P/D/F	2-3 $\mu$ m
<b>Resistivity</b> Milliohms / sq at 3 microns fired thickness	$\leq$ 8.0

(1) Typical properties are based on testing of several batches under various processing conditions. They are not intended as specification limits.

### COMPOSITION PROPERTIES

<b>Viscosity:</b>	120 $\pm$ 30 Kcps, when measured with Brookfield HBT, Spindle #14, utility cup, 10 RPM, 25°C.
<b>Specific Gravity:</b>	1.4 – 1.8 g/cm <sup>3</sup>
<b>Recommended Thinner:</b>	KOARTAN A -1039

## RECOMMENDED PROCESSING PROCEDURE

**Printing:** Printing with 325 mesh stainless steel screen using .005" emulsion and 45 degree angle is recommended. Other mesh counts, 400-280, and emulsion thicknesses, .001-.005", may be used for special applications. Squeegee speeds of up to 10 inches/second may be utilized.

Coverage is approximately 200 cm<sup>2</sup>/g per layer, when utilizing a 325 mesh screen.

**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.

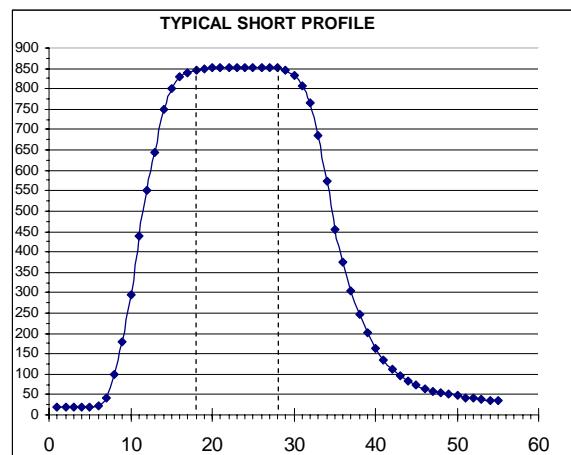
**Firing:** Firing in air using a belt furnace and a 36-60 minute profile, with 10 minutes at a peak temperature of 850°C is recommended. Air flow rates must be optimized to ensure that the products of binder burn-off discharge properly and create a fully oxidizing atmosphere in the muffle.

**Application Notes:** A fired thickness of 2-3 microns and good photolithographic technique allow the etching of 1 mil lines with only minor undercutting. A 325 mesh screen with thin emulsion or a 400 mesh calendared screen may be used to obtain the desired thickness and surface morphology.

The 6550-1 silver may be used on top of 96%, 99.5%, and polished alumina substrate. Soldering to this product is not recommended.

The recommended steps for etching are as follows:

1. Clean fired substrates in methanol and bake at 150 °C to drive off moisture.
2. Apply Shipley S1800 photoresist or equivalent at about 4000 rpm. Bake at 110-120 °C for 1 hour.
3. Expose to UV light. Exposure time depends on source intensity, but should generally be about 30 seconds.
4. Develop using Shipley 351 developer or equivalent.
5. Rinse in distilled water and immerse in potassium iodide/iodine or especially formulated etch solution. In order to minimize undercutting, stirring or agitation of the solution is not recommended. It may, however, be heated to speed up the etching process.
6. Use Shipley 1165 or equivalent to remove photoresist from the developed pattern.



**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 replaced by incorporating up to 1% of Koartan A-1039 thinner.

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