

Preliminary Technical Information

4150QJ Cd-Free Gold Conductor For Inner Traces and Fine Line Etching

The thick film gold composition 4150QJ is a cadmium-free high density conductor designed specifically for fine line etching, as well as for inner traces in multilayer circuitry. It provides clean etched footprints, high electrical conductivity, and smooth fired surface. The 4150QJ is also suitable for gold wire bonding. Key features of this product include:

- Cadmium Free
- RoHS Compliant
- Fine Line Etching Capability
- Clean Etched Surfaces
- High Film Density
- High Electrical Conductivity
- Gold Wire Bondable

TYPICAL FIRED FILM CHARACTERISTICS⁽¹⁾

Fired Thickness⁽²⁾	4-8 microns for two layers
Line Resolution	175/150 micron line/space using 325 mesh screen
Resistivity² Milliohms / sq at 10 microns fired thickness	≤ 4
Wire Bond Strength⁽³⁾ 1 mil gold wire	> 10 grams

- (1) Typical properties are based on testing of several batches under various processing conditions. They are not intended as specification limits.
- (2) Undiluted paste fires to about 6 microns per layer. Dilution with solvent and two P/D/F recommended for etching. See below.
- (3) Measured on a 20 mil wide track, 254 squares.
- (4) Thermosonic gold wire bonding performed on plasma cleaned substrates. All failures in the wire.

COMPOSITION PROPERTIES

Viscosity:	240 - 300 Kcps, when measured with Brookfield HBT, Spindle #14, utility cup, 10 RPM, 25°C.
Specific Gravity:	4.5 – 5.0 g/cm ³
Recommended Thinner:	KOARTAN A-1039

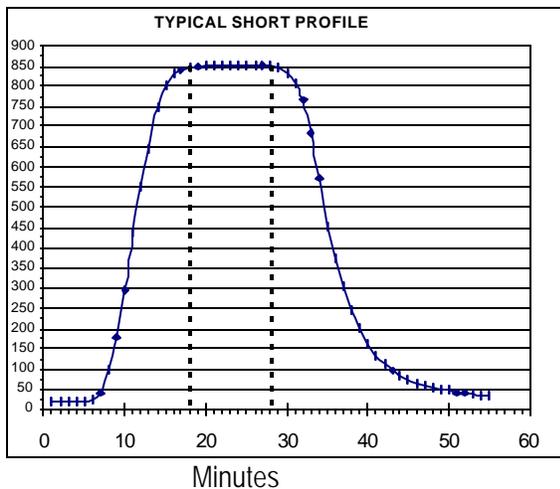
RECOMMENDED PROCESSING PROCEDURE

Printing: Printing with 325 mesh stainless steel screen using 10-15 micron emulsion and 22.5 degree angle is recommended for inner traces. Other mesh counts, 230-400, and emulsion thicknesses, 5-25 micron, may be used for special applications. Thinning with A-1039 solvent is recommended for etching. Squeegee speeds of up to 6 inches/sec may be utilized.

Coverage is approximately 100 cm², when utilizing 325 mesh screen and a wet print thickness of about 32 micron.

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.



Storage and Shelf Life: Store in tightly capped containers at room temperature. Shelf life is 6 months for unopened jars. The 4150QJ may be thinned with A-1039 thinner solvent to help achieve the desired fired thickness.

Application Notes: Using 325-230 mesh screens the 4150QJ is capable of printing fine lines. It provides a fired thickness of about 5-6 microns and one mil gold wire bond strength in excess of 10 grams.

The 4150QJ is, however, designed primarily for fine line etching. It is recommended that it be processed in two print-dry-fire operations using a 400 mesh calendared screen, or be thinned down for printing with 325 mesh screen, to obtain a total fired thickness of 5-6 microns.

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.

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