DuPont Photopolymer & Electronic Materials

7732 Cu Conductor Composition

Thick Film Composition Preliminary Datasheet

All values reported here are results of experiments in our laboratories intended to illustrate product performance potential with a given experimental design. They are not intended to represent the product's specifications, details of which are available upon demand.

Product Description

7732 Copper conductor composition has been developed for use in power applications where soldering and heavy Al wire bonding may be required. It has been designed for applying thick layers of copper onto 96% alumina substrates. It is intended for use in circuits carrying high currents, where both thermal and electrical conductivity are key design features. The paste is applied by screen printing, dried in air and fired in a nitrogen atmosphere furnace at 900°C, to form inter-connection tracks, mounting sites for power devices, components and lead attachment.

Key Features :

- ❑ Excellent Thermal and Electrical conductivity
- ❑ Bondable with heavy Aluminium wire
- ❑ Solderable
- ❑ Optimised for printing thick tracks, pads, and large areas
- ❑ Ability to print upto a thickness of 200µm
- ❑ Cadmium and nickel free

Design Notes

It is possible to achieve build thicknesses ≈200µm. Screen selection and print sequence depends on circuit layout and thickness requirements. For further information on processing techniques please contact your DuPont representative.

Composition Properties

Viscosity [Pa.s]	**130 - 170**
Brookfield HBT, Utility cup & spindle (SC4-14/6R), 10 rpm, 25°C ± 0.2°C	
Solids [%]	**88.2**
Coverage [cm^2/g] at a fired thickness of 100µm	**10**
Thinner	**9450**
Shelf Life [months]	**6**

Processing Conditions

Printing	Stainless steel, 105 mesh with 70µm emulsion, or 165 mesh with 15µm emulsion Hard (80 Shore) squeegee.
Drying	Allow prints to level for 2-5 minutes at room temperature, then dry at 150°C for 10 minutes
Firing	900°C peak held for 10 minutes on 60 minute cycle in a nitrogen atmosphere (the oxygen level should be between 2-5ppm in the nitrogen supply to the furnace)

Typical Fired Film Thickness Of Large Area Blocks/Pads

Base print 165 mesh /15µm emulsion	≈30µm
Second layer 105 mesh / 70µm emulsion	≈80µm
Third layer 105 mesh / 70µm emulsion	≈80µm
Total fired thickness	≈190µm

Typical Fired Properties

Resistivity [mΩ/□@30µm]	**<1**
Solder Adhesion [N]*	
-Initial	**≥20**
-Aged 48 hrs at 150°C	**≥20**

*** 96Sn:4Ag @ 260°C 10s dip**

Compatibility

Whilst DuPont has tested this composition with the materials specified above and the recommended processing conditions, it is impossible or impractical to cover every combination of materials,

customer processing conditions and circuit layouts.
It is therefore essential that customers thoroughly evaluate the material in their specific situations in order to completely satisfy themselves with the overall quality and suitability of the composition for its intended application(s).

Recommended Processing Procedure

Storage

Containers may be stored in a clean, stable environment at room temperature (< 25°C), with their lids tightly sealed. Storage in freezers (temperature < 0°C) is NOT recommended as this could cause irreversible changes in the material.
For guidance regarding storage of material, please consult DuPont Technical Note EUT 7.2 “Shelf Life Policy”.

Shelf life

This composition’s shelf life is from date of shipment, for factory-sealed (unopened) containers, stored under room-temperature conditions. Refer to table - for shelf life period.

Substrates

Substrates of different compositions and from various manufacturers may result in variations in performance properties.

Thinner

This composition is optimized for screen printing, thinning is not normally required.
Use the DuPont recommended thinner for slight adjustments to viscosity or to replace evaporation losses. The use of too much thinner or the use of a non recommended thinner may affect the rheological behaviour of the material and its printing characteristics. Refer to table - “Composition Properties”

Printing

The composition should be thoroughly mixed before use. This is best achieved by slow, gently, hand stirring with a clean burr-free spatula (flexible plastic or stainless steel) for 1-2 minutes. Care must be taken to avoid air entrapment.
Printing should be performed in a clean and well ventilated area. Additional information on requirements for printing areas is contained in DuPont Technical Guide EUT 7.3 “Processing - Screen Printing Rooms”, available on request.
Note: optimum printing characteristics are generally achieved in the room temperature range of 20°C-23°C. It is therefore important that the material, in its container, is at this temperature prior to commencement of printing.
Class 10,000 printing area is recommended for building complex hybrids and multilayer circuits, otherwise severe yield losses could occur. Refer to table - “Processing Conditions”

Drying

Allow prints to level at room temperature, then dry in a well ventilated oven or conveyor dryer. The surface should be touch dry. DO NOT OVERDRY, as this may cause degradation of adhesion.
Refer to table - “Processing Conditions”

Firing

The dried prints need to be fired in a belt oven, or conveyor furnace in a nitrogen atmosphere.
The Oxygen levels in the Nitrogen supply and firing section of the furnace should be 2-10ppm. The furnace should be exhausted into an efficient factory extraction system. Gas flows and extraction rates must be optimized to avoid formation of reducing conditions within the muffle, and that no exhaust gases enter the room.
Typical nitrogen flow rates for a furnace with a 10cm belt range from 140-240 litres per minute. The required nitrogen flow will vary with make of furnace, and belt loading.
Full information on requirements for firing is contained in DuPont Technical Guide EUT 7.4 “Process Guide - Firing”. Refer to table - “Processing Conditions”

General

Performance will depend to a large degree on care exercised in screen printing. Scrupulous care should be taken to keep the composition, printing screens and other tools free of metal contamination. Dust, lint and other particulate matter may also contribute to poor yields.

Health/Safety considerations

DuPont thick film compositions are intended for use in an industrial environment by trained personnel. All appropriate health / safety regulations regarding storage, handling and processing of such materials should be complied with. For information on health / safety regulations please refer to the specific product MSDS and to the DuPont Safety Guide EUT 7.1 “Practical Safe Handling of Thick Film Compositions”.

900°C Peak Nitrogen Atmosphere Firing Profile