Microcircuit Materials

6163 Silver Conductor Composition

Thick Film Composition Data Sheet

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

6163 Silver conductor composition is intended to be applied to ceramic substrates by screen printing and fired in a conveyor furnace in air (oxidising) atmosphere, to form conducting interconnections, tracks and vias.

Key Features:

- ❑ High conductivity
- ❑ High speed printing
- ❑ Fugitive Blue dye
- ❑ Excellent solderability and adhesion

Design notes

6163 maybe used to terminate DuPont standard resistors. However, there may be a shift of TCR and resistance value from those stated for the standard termination. 6163 is not recommended for use with low value resistor compositions or with earlier members of HS80 series, i.e. those ending in a 1 rather than a 9.

Compatibility

Whilst DuPont has tested this composition with 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

Composition Properties

Viscosity [Pa.s]	90 - 125
Brookfield HAT,Utility cup & spindle (SC4-14/6R), 10 rpm, 25°C ± 0.2°C	
Solids [%]	80.8 - 82.8
Coverage [cm²/g]*	50 - 60
(Based on an average fired thickness of 16µm)	
Thinner	8250
Shelf Life [months]	6

Processing Conditions

Printing	A 200 or 325 mesh stainless steel screen with a 12-14µm emulsion thickness is normally suggested. Printing speeds of 5 - 30 cm/s may be used
Drying	Allow prints to level for 5-10 minutes at room temperature, then dry for 10-15 minutes at 150°C
Firing	850°C peak held for 5-10 minutes on a 30-60 minute cycle in an air atmosphere

Typical Fired Properties[1]

Fired Thickness [µm]	14 - 18
Print resolution [µm lines and spaces]	150 - 200
Resistivity [mΩ/□@ a fired thickness of 16µm]	1 - 2
Solder Acceptance[2]	≥95%coverage
(62Sn/36Pb/2Ag @ 220°C)	
Solder Leach Resistance [2]	3 cycles
(62Sn/36Pb/2Ag @ 230°C)	
Adhesion [N][3]	
Initial	22 - 29
Aged 48hrs at 150°C	16 - 27

1 Typical properties are based on laboratory data using recommended processing procedures. Unless expressly noted elsewhere the following processing conditions have been used:
Printing: 200 mesh stainless steel screen, 12-14µm emulsion thickness
Firing: 3x60 minutes cycle to a peak temperature of 850°C for 10 minutes
All test performed on 96% alumina substrate.

2 Using Alpha 611 flux . Solder coverage measured after a 5s. dip in solder. A leaching cycle is represented by a 10s. dip in solder. See soldering test procedure for details.

3 90° wire peel test on 2mm x 2mm pads soldered with 62Sn/36Pb/2Ag solder at 220°C and using mildly activated flux, Alpha 611. See wire peel test procedure for details.

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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. Refer to table - “Processing Conditions

Firing

Fire in a well ventilated belt, conveyor furnace, or static furnace. Air flows and extraction rates should be optimized to ensure that oxidizing conditions exist within the muffle, and that no exhaust gases enter the room. Full information on requirements for firing is contained in DuPont Technical Guide EUT 7.4 “Process Guide - Firing”. Refer to table - “Processing Conditions”

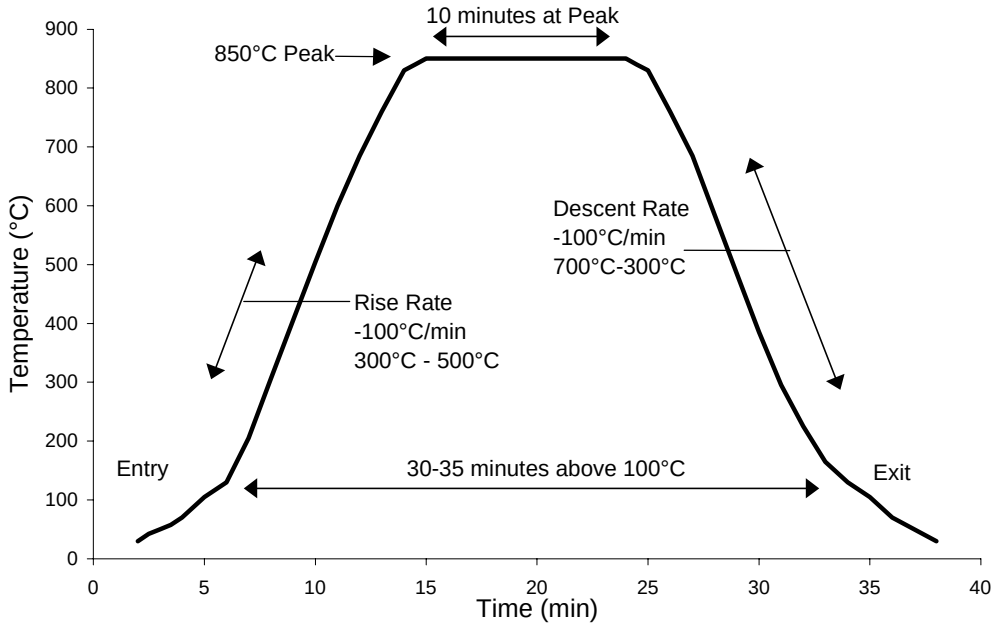
General

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”.

Typical 850°C 30 Minute Firing Profile



Typical 850°C 60 minute Firing Profile