

DuPont 4597R

Platinum Gold Conductor Composition

EUROPEAN TECHNICAL 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

DuPont™ 4597R Platinum Gold conductor is intended to form conducting tracks and pads for component and lead attachments in high density hybrid microcircuits. It is applied to ceramic substrates by screen printing and fired in a conveyor furnace in an oxidising atmosphere (air).

4597R is a cadmium free* solderable Pt-Pd-Au conductor developed to offer high solder acceptance and high adhesion on alumina, H100 and 5704 dielectrics. It also exhibits high solder leach resistance on these substrates.

Product Benefits :

- Phthalate and Cadmium free* solderable conductor
- Excellent solder acceptance over alumina or on top of dielectric
- Improved backlight density
- Excellent solder and repaired adhesion
- High reliability

*Phthalate and Cadmium 'free' as used herein means that phthalate compound or cadmium are not intentional ingredients in and are not intentionally added to the referenced product. Trace amounts however may be present.

Compatibility

Whilst DuPont has tested this composition with the materials specified above and 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 and Shelf Life

Containers may be stored in a clean, stable environment at room temperature (between 5°C - 30°C), with their lids tightly sealed. Storage in high temperature (>30°C) or in freezers (temperature < 0°C) is NOT recommended as this could cause irreversible changes in the material.

The shelf life of compositions in factory-sealed (unopened) containers, stored under room-temperature (between 5°C - 30°C) conditions is 6 months from date of shipment. Some settling of the solids can occur during storage. Re-dispersion is easily achieved either through mixing with a spatula or with a flame proof blender set at a low speed. Refer to DuPont Technical Note EUT 7.2 "Shelf Life Policy".

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, gentle, 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.



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TABLE 1. COMPOSITION PROPERTIES

Viscosity [Pa.s] Brookfield HBT, Utility cup & spindle (SC4-14/6R), 10 rpm, 25°C ± 0.2°C	180 - 280
Coverage [cm²/g]* (Based on dried film thickness of 15µm)	60 - 70
Shrinkage [%] Dry to Fired	35
Thinner	9180R
Shelf Life (months)	6

TABLE 2. PROCESSING CONDITIONS

Printing	200—325 mesh stainless steel (For best print resolution a 325 mesh stainless steel is recommended).
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 10 minutes on 30 or 60

TABLE 3. TYPICAL FIRED PROPERTIES

Line resolution (µm) (lines & spaces)	150/100
Fired Thickness (µm)	13 - 17
Resistivity [1 x fired] (mΩ/□ (@ 15µm fired thickness))	30-100
Solder Acceptance² (63Sn/37Pb @240°C)	≥95% coverage
Solder Leach Resistance² (63Sn/37Pb @240°C)	
On Alumina	30—40 cycles
On 5704	18—20 cycles
Adhesion³	
Initial (1 x fired)	>20N
Aged 48hrs at 150°C	>14N

1 Typical fired properties are based on laboratory tests. 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
Tested on 96% alumina substrate

2 Using Alpha 611 flux. Solder coverage measured after 5s. dip in solder. See soldering test procedures for details (H1.12 & H1.14). A leaching cycle is represented by a 10s dip in solder.

3 90° wire peel test on 2mm x 2mm pads soldered with 63Sn/37Pb solder at 240°C and using a mildly-activated flux, Alpha 611. See wire peel test procedures for details (E-3.12 & E-3.13)

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 with 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".

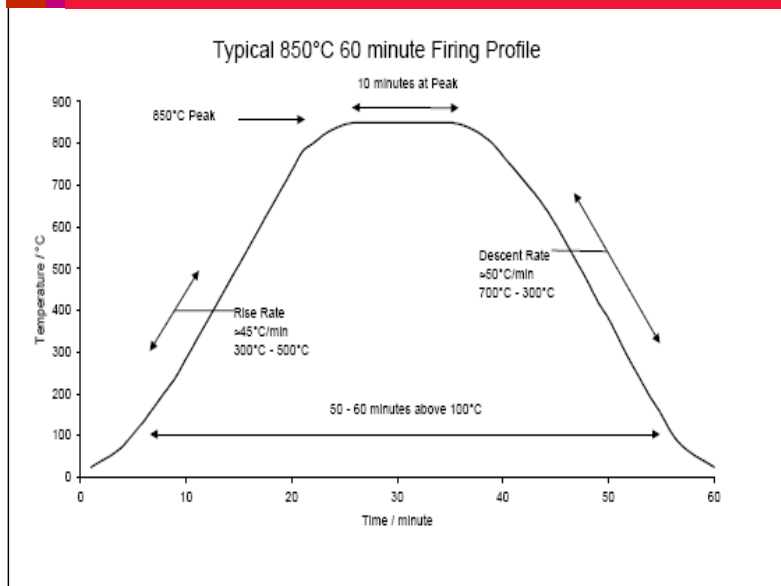
Note: optimum printing characteristics are generally achieved in the room temperature range of 20°C—23°C. It is therefore important that the material, in its container, is at this temperature prior to commencement of printing. Class 10,000 printing area is recommended for building complex hybrids and multilayer circuits,

otherwise severe yield losses could occur.

Drying

Allow prints to level at room temperature, then dry in a well ventilated oven or conveyor or dryer. Refer to table—"Processing Conditions".

CHART 1. FIRING PROFILE



The information provided herein corresponds to our knowledge on the subject at the date of its publication. This information may be subject to revision as new knowledge and experience becomes available. The data provided fall within the normal range of product properties and relate only to the specific material designated; these data may not be valid for such material used in combination with any other materials or additives or in any process, unless expressly indicated otherwise. The data provided should not be used to establish specification limits or used alone as the basis of design; they are not intended to substitute for any testing you may need to conduct to determine for yourself the suitability of a specific material for your particular purposes. Since DuPont cannot anticipate all variations in actual end-use conditions DuPont makes no warranties and assumes no liability in connection with any use of this information. Nothing in this publication is to be considered as a license to operate under or a recommendation to infringe any patent rights.

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