

DuPont 5081R and 5082R

Silver Brazing Low Temperature Braze System

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 5081R and 5082R constitute a two component, all thick films paste system designed to facilitate the use of high temperature solders and low temperature alloys on :

- 96% alumina and Low temperature cofire ceramic (DuPont GreenTape™ 951 low temperature co-fired ceramic system).
- Alumina
- Multilayer hybrid circuits

Product Benefits :

- High strength, high reliability attachment mechanism
- Hermetic packaging
- Compatibility with thick film resistors, as well as all conventional IC and lid attach processes
- Phthalate and Cadmium free*

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

Processing Summary — 5081R

- **Screen Type**
Print onto fired substrate using a 325 mesh stainless steel screen with a 13 µm emulsion build up.
- **Drying**
Allow prints to level for over 10 minutes at room temperature, then dry for ≥ 10 -15 minutes at 150°C
- **Firing**
850°C peak held for 10 minutes on 30 minute cycle in an air atmosphere (see Chart 1). Fired thickness of 5081R should be 12-15µm.

Processing Summary — 5082R

- **Screen Type**
Print onto fired 5081R using a 325 mesh stainless steel screen with 13 µm emulsion build up. Ensure that 5082R completely covers the 5081R print

- **Drying**
Allow prints to level for over 10 minutes at room temperature, then dry for ≥ 10 -15 minutes at 150°C
- **Firing**
850°C peak held for 10 minutes on 30 minute cycle in an air atmosphere (see Chart 1).
- **Repeat previous Printing and Drying steps.**
Ensure that 5082R completely covers the 5081R print
- **Firing**
850°C peak held for 10 minutes on 30 minute cycle in an air atmosphere (see Chart 1). Total 5082R fired thickness should be ≥ 20µm. The thickness of the DuPont 5082R depends on the type alloy and brazing temperature used.

TABLE 1. TYPICAL PHYSICAL PROPERTIES

5081R	
Viscosity (Pa.s.)	70 – 130
Brookfield HBT, utility cup and spindle, (SC4-14/6R), 50 rpm, 25°C±0.2°C	
Thinner	7502R
Shelf Life (months)	6
5082R	
Viscosity (Pa.s.)	200 – 300
Brookfield 2xHA, utility cup and spindle, (SC4-14/6R), 10 rpm, 25°C±0.2°C	
Thinner	9180R
Shelf Life (months)	6

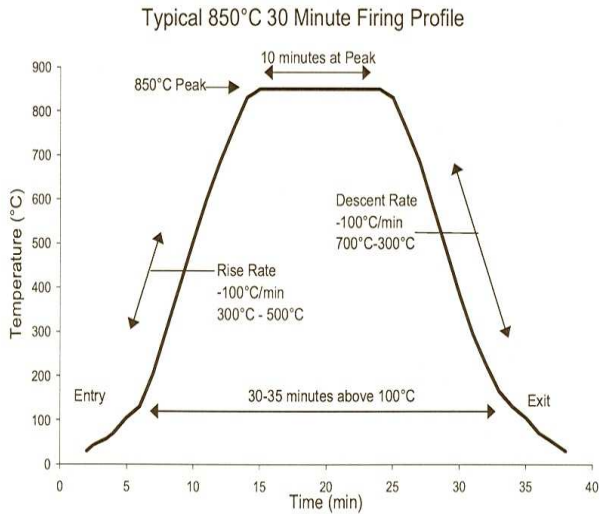
Attachement

Once the substrate has been prepared with 5081R and 5082R, pins,



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CHART 1. FIRING PROFILE



window frames or heat sinks may be attached with braze alloys (Au/Sn), preforms or pastes. Brazing is performed in nitrogen atmosphere using fixed fixtures which position the attachment and braze alloy directly on top of the 5081R/5082R metallization.

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).

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 between (5°C – 30°C) is 6 months from date of shipment.

Substrates

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

Thinner

5081R and 5082R compositions are optimized for screen printing and 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 materials and their printing characteristics. Please refer to table 1. Typical Physical 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 about 1-2 minutes. Care must be taken to avoid air entrapment. Printing should be performed in a 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 the 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 'Processing Summary'.

Drying

Allow prints to level at room temperature, then dry in a well ventilated oven or conveyor dryer. Refer to 'Processing Summary'.

Firing

Fire in 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 'Processing Summary'.

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.

Safety and Handling

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'

TABLE 2. TYPICAL FIRED PROPERTIES¹

Fired Thickness (µm)	
5081R	12-15
5082R	≥ 20
Resistivity [mΩ/□]	
5081R or 5082R (@ 10µm fired thickness)	≤ 5
PGA Reliability^{1,2,3}	
Thermal Cycle (lbs) ²	≥ 15
Thermal Ageing (lbs) ³	≥ 15
Seal Ring Reliability⁴ (Atm. cm ³ /s)	< 10 ⁻⁸

Test Procedure

- 1 Average tensile pull strength of a pin in a standard grind array (PGA) brazed on 96% alumina or 951 GreenTape™. PGA consist of 1.8 mm diameter pas od 5081R/5082R, and a 400 µm diameter Kovar pin with a 800 µm diameter nail head. 80Au/20Sn braze preform
Firing: 30 minute cycles to a peak temperature of 850°C for 10 minutes
- 2 200 cycles, -40°C to 125°C. Rapid transfer
- 3 200 hrs in air at 150°
- 4 Helium leak test to Kovar seal ring on 951 GreenTape™, 100 thermal cycles, -25°C to + 85°C

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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