DuPont Electronic Materials

6177T Palladium Silver Conductor

Thick Film Conductor Composition / Preliminary Data Sheet

Product Description

6177T has been developed specifically to be a high reliability PdAg with outstanding thermal cycle and aged adhesion performance. It is intended to be applied to ceramic substrates by screen printing and fired in a conveyor furnace in an oxidising atmosphere (air) to form interconnection tracks and pads for component and lead attachment, in hybrid microcircuits and networks.

Key features :

- ❏ Excellent thermal cycle (TCA) and long term aged adhesion (LTAA)
- ❏ Excellent through-hole printability
- ❏ Fine line resolution
- ❏ Good solderability
- ❏ Fireable on 30 or 60 minute 850 °C profiles
- ❏ Cadmium free; low lead content

Typical Fired Conductor Properties[1]

Fired Thickness	13-17µm
Print Resolution	≥150µm lines and spaces
Resistivity	≤18mΩ/□ at a fired thickness of 15µm
Solder Acceptance[2] 62 Sn/36 Pb/2 Ag @ 220°C	≥90% coverage
Solder Leach Resistance[2] 62 Sn/36 Pb/2 Ag @ 240°C	9-11 cycles
Adhesion[3] (3x fired 30 min/850 °C cycle)	
- Initial	> 34N
- Aged 3000 hrs at 150 °C	> 31N
- TCA 1000 cycles(-40/+125°C/30 min)	> 19N

Test Procedure

1 Typical fired properties are based on laboratory tests. Unless expressly noted elsewhere the following processing conditions have been used.

Printing : 325-mesh stainless steel screen, 12-14µm emulsion thickness.

Firing : 2 x 30 minutes cycle to a peak temperature of 850°C for 10 minutes/1 x 500ºC cycle. All tests performed on 96% alumina substrates.

2 Using Alpha 611 flux. Solder coverage measured after a 5 s. dip in solder. A leaching cycle is represented by a 10s. dip in solder. SLR data quoted above is tested @ 240°C. See soldering test procedure for details (H-1.12).

3 90° wire peel test on 2 mm x 2 mm pads soldered with 62 Sn/36 Pb/2 Ag solder at 220°C and using mildy-activated flux, Alpha 611. See wire peel adhesion test procedure for details (E-3.12)

Compatibility

When processed under recommended conditions, 6177T causes no significant shifts in resistivity or TCR when used to terminate DuPont HS80 and QS87 series resistors.

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

It is therefore essential that customers thoroughly evaluate this material in their specific situations, in order to completely satisfy themselves as to the overall quality and suitability of the composition for its intended application(s).

Composition properties

Viscosity

100-180 Pa.s, Brookfield HBT, Utility cup & spindle (SC4-14/6R), 10rpm, 25°C ±0.2°C.

Thinner

6177T is optimised for screen printing and thinning is not normally required. DuPont Electronics Composition Thinner 4553 may be used sparingly for slight adjustments to viscosity or to replace evaporation losses. However, 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.

Recommended processing procedure

Storage

Containers of 6177T 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 recom-

mended, as this could cause irreversible changes in the material.
Jar rolling is unnecessary and is NOT recommended, as this could change the rheology of the material.

Shelf life

Conductor Composition 6177T has a shelf life of 6 months from date of shipment, for factory-sealed (unopened) containers, stored under room temperature conditions.

Substrates

Properties are based on tests on 96% alumina substrates. Substrates of other compositions and from various manufacturers may result in variations in performance properties, as may different lots of substrates, and any subsequent processing of substrates (e.g. laser scribing or drilling) prior to printing.
It is the responsibility of users to determine the effects of any of the above variables in their particular situations.

Printing

Conductor Composition 6177T 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.
Printing should be carried out in a clean, 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 of 6177T are generally achieved in the temperature range 20°C-23°C. It is therefore important that the material, in its container, is at this temperature prior to commencement of printing.
200-325 mesh stainless steel screens with a 10-14µm emulsion thickness can be used.
Print speeds of up to 25cm/s may be used. At high printing speeds optimum results are obtained with a sharp squeegee, 30° or 45° angle of attack, a squeegee force of 10-20N and a snap-off of between 0.5mm and 1.0mm depending on pattern size.

Drying

Allow prints to level for 5-10 minutes at room temperature in a clean, draught-free environment, followed by drying for 10-15 minutes at 150°C in a well ventilated oven or conveyor dryer.

Firing

Fire in a well ventilated belt or conveyor furnace, in air with a 30-60 minute cycle to a peak temperature of 850°C for 10 minutes.
Care must be taken to ensure that any gases/vapours from other chemicals/materials (e.g. halogenated solvents) do not enter the furnace muffle. It is also essential that the air supply to the furnace is clean, dry and free of contaminants.
Air flows and extraction rates should be optimised to ensure that oxidising conditions exist within the muffle, and that no furnace exhaust gases enter the room.
Additional information on requirements for firing is contained in DuPont Technical Guide EUT 7.4 “Process Guide-Firing”.

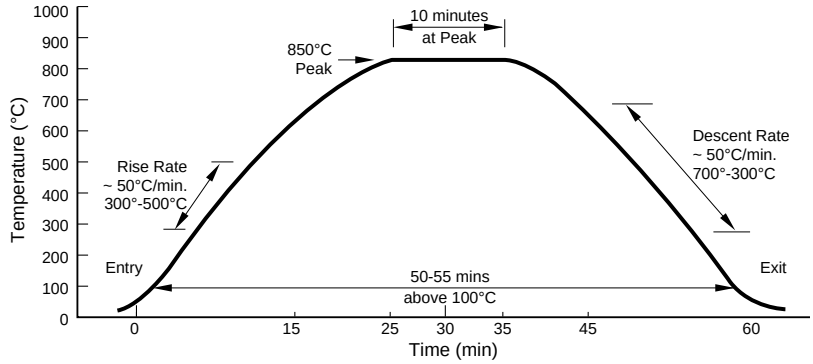
General

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

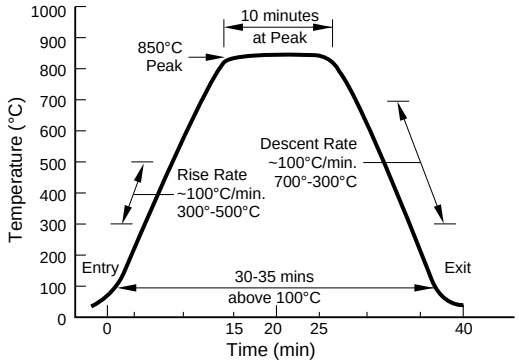
Health/Safety considerations

DuPont microcircuit 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 MSDS for 6177T and to the DuPont Safety Guide EUT 7.1 “Practical Safe Handling of Thick Film Compositions”.

Typical 60 Minute Profile



Typical 30 Minute Profile



DuPont Electronic Materials in Europe

Sales Offices

Deutschland & Export
Du Pont de Nemours
(Deutschland) GmbH
DuPont Electronic Materials
DuPont Straße 1
P.O. Box 1365
D-61343 Bad Homburg
Tel.: (+49-6172) 87-0
Fax: (+49-6172) 87 15 00

France
Du Pont de Nemours
(France) S.A.
DuPont Electronic Materials
Z.A. de Courtabœuf
2 Av. du Pacifique – B.P. 85
F-91943 Les Ulis Cedex
Tel.: (+33-1) 69 82 54 32
Fax: (+33-1) 69 82 52 00

U.K./Eire/Scandinavia/Benelux
Du Pont (U.K.) Limited
DuPont Electronic Materials
Coldharbour Lane, Frenchay
Bristol,
U.K. BS16 1QD
Tel.: (+44-117) 931 3191
Fax: (+44-117) 931 3131

Technical Centre
Europe
Du Pont (U.K.) Ltd.
DuPont Electronic Materials
Coldharbour Lane, Frenchay
Bristol,
U.K. BS16 1QD
Tel.: (+44-117) 931 1444
Fax: (+44-117) 931 3001

España/Portugal
Du Pont Ibérica S.A.
DuPont Electronic Materials
Avda, Diagonal, 561,
E-08029 Barcelona
Tel.: (+34-3) 227 60 00
Fax: (+34-3) 227 62 14

Italia
Du Pont de Nemours
(Italiana) S.p.A.
DuPont Electronic Materials
16, Via A. Volta
I-20093 Cologno Monzese
Tel.: (+39-2) 25 30 21
Fax: (+39-2) 254 77 65

All other countries
Du Pont de Nemours
International S.A.
DuPont Electronic Materials
P.O. Box 50
2, Chemin du Pavillon
CH-1218 Le Grand-Saconnex
Geneva, Switzerland
Tel.: (+41-22) 717 55 36/55 25
Fax: (+41-22) 717 6280

DuPont Electronic Materials outside Europe

Regional offices

Japan
Du Pont Japan Ltd.
DuPont Kubushiki Kaisha
Technical Center
4997 Shin-Yoshida-cho
Kohoku-ku, Yokohama-shi
Kanagawa 223
Japan
Tel.: (+81-45) 593 4876

Singapore
Du Pont Far East Inc.
DuPont Electronic Materials
1, Maritime Square
07-01 World Trade Centre
Singapore 0409
Republic of Singapore
Tel.: (+65) 272 2244
Fax: (+65) 272 7494

U.S.A.
E.I. du Pont de Nemours & Co
DuPont Electronic Materials
Electronics Technology Center
14 T.W. Alexander Drive
Research Triangle Park
NC 27709
Tel.: (+1-800) 237 43 57
Fax: (+1-302) 992 39 15

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