

DuPont™ Solamet® PV701

photovoltaic metallizations

Preliminary Technical Data Sheet

Product Description

DuPont™ Solamet® PV701 photovoltaic metallization paste is a highly conductive silver composition, developed for via filling in silicon wafers to interconnect the front side grid with the back side using the Metal Wrap Through (MWT) cell designs. It is used as a via-fill and as a tabbing Ag with a one step printing process. This paste may be cofired with standard DuPont™ Solamet® front side silver such as DuPont™ Solamet® PV16X or PV17X series, back side (p-type) Aluminum conductors such as DuPont™ Solamet® PV3XX series. It can also be used in combination with the DuPont™ Solamet® PV36X series Aluminum conductors in the Local Back Surface Field (Local BSF) cell design. It is designed for rapid and very fast (spike) firing.

Product Benefits

- Designed for Metal Wrap Through (MWT) cell designs
- Suitable for via filling and tabbing Ag for n- and p-contact
- Fast drying and firing
- Compatible with passivation layers (SiNx) in rear side passivated cell designs
- Low electrical resistivity after firing
- High shunt resistance
- Excellent solderability and soldered adhesion
- Compatible with PV36X Al for Local Back Surface Field (Local BSF) cell design
- Cadmium free*

*Cadmium 'free' as used herein means that cadmium is not intentionally added to the product. Trace amounts however may be present.

Processing Summary

- **Application**
Standard screen print process. For via filling, vacuum may be used if needed
- **Screen Type**
165–325 mesh stainless steel with 10–14µm emulsion build up
- **Printing**
Speed 6–8 in/sec (150–220 mm/sec)
- **Drying**
Vertical Dryer 170–230°C 10 minutes
IR Belt Dryer 220–270°C 30 seconds
Flexible in accordance with industry practice. Actual settings to be determined by dryer type
- **Soldering**
Compatible with industry standard material and condition
Flux type: non-clean, reactivity level L0/M0 (Standard: ANSI/J-STD-004)
Ribbon: compatible with Pb contained and Pb free solder material, such as 60Sn/40Pb, 62Sn/36Pb/2Ag, 96.5Sn/3.5Ag

Table 1
Typical Physical Properties

Viscosity (Pa·s) (Brookfield HBT, 10 rpm SC4-14/6R utility cup and spindle, 25°C)	240–300
Resistivity (m Ω/sq/10µm)	<3.5
Thinner	9450
Shelf Life (months)	6

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.



The miracles of science™

Paste Preparation

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) for 1–2 minutes. Jar rolling is NOT recommended, as this could change the rheology of the material. Care should be taken to avoid air entrapment.

Printing

Printing should be carried out in a clean, well-ventilated area. DuPont™ Solamet® PV701 photovoltaic composition, in its container, should be at ambient temperature prior to commencement of printing.

Firing

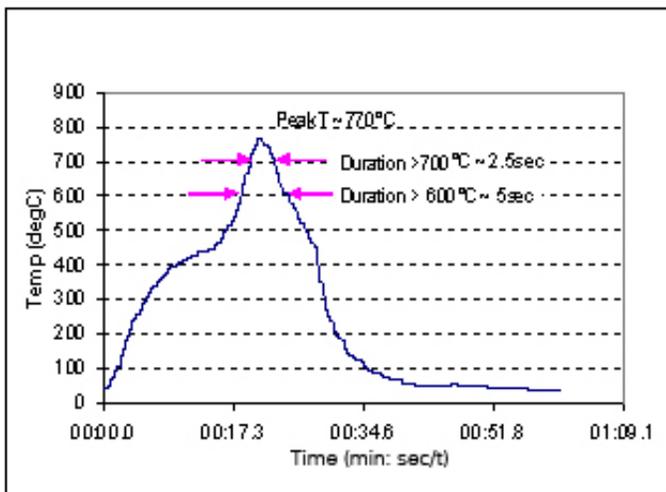
DuPont™ Solamet® PV701 photovoltaic metallization is designed for rapid (spike) firing. Thermal budget above 600°C should be kept to minimum, ideally <8 seconds to ensure optimum electrical contact to the wafer.

See **Chart 1** for typical firing profile.

Actual furnace settings and belt speed will depend on the wafer thickness, texturing and emitter resistivity as these influence the temperature of the wafer during firing.

It is important that wafers are fired in a well ventilated furnace, with a continuous supply of clean filtered air. Air-flow and extraction rates should be optimized to ensure that oxidizing conditions exist within the furnace firing chamber, especially when front and backside conductors are cofired.

Chart 1
Typical Firing Profile



Thinner

Solamet® PV701 composition is 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 behavior of the material and its printing characteristics. Please refer to **Table 1**.

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.

Safety and Handling

For information on health and safety regulations please refer to the specific product MSDS.

For more information on DuPont™ Solamet® PV701 photovoltaic metallizations or other DuPont Microcircuit Materials, please contact your local representative:

Americas

DuPont Microcircuit Materials
14 TW Alexander Drive
Research Triangle Park, NC 27709
USA
Tel +1 800 284 3382 (calls within USA)
Tel +1 919 248 5188 (calls outside USA)

DuPont China Holding Company Ltd
Bldg. 11, 399 Keyuan Road
Zhangjiang Hi-Tech Park
Pudong New District
Shanghai 201203
Tel +86 21 6386 6366 ext. 2202

Europe, Middle East & Africa

Du Pont (UK) Ltd
Coldharbour Lane
Bristol BS16 1QD
UK
Tel +44 117 931 3191

DuPont Korea Inc.
3-5th Floor, Asia tower #726
Yeoksam-dong, Gangnam-gu
Seoul 135-719, Korea
Tel +82 10 6385 5399

Asia

Du Pont Kubushiki Kaisha
Sanno Park Tower, 11-1
Nagata-cho, 2-chome
Chiyoda-ku, Tokyo, 100-611
Japan
Tel +81 3 5521 8650

E.I. DuPont India Private Limited
7th Floor, Tower C, DLF Cyber Greens
Sector-25A, DLF City, Phase-III
Gurgaon 122 002 Haryana, India
Tel +91 124 409 1818

DuPont Taiwan Limited

45, Hsing-pont Road
Taoyuan, 330
Taiwan
Tel +886 3 377 3616

Du Pont Company (Singapore) Pte Ltd
1 HarbourFront Place, #11-01
HarbourFront Tower One
Singapore 098633
Tel +65 6586 3022

<http://mcm.dupont.com>

Copyright © 2011 DuPont. All rights reserved. The DuPont Oval, DuPont™, The miracles of science™, Solamet™ and all products or words denoted with ® or ™ are registered trademarks or trademarks of E. I. du Pont de Nemours and Company or its affiliates ("DuPont").

NO PART OF THIS MATERIAL MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING OR OTHERWISE WITHOUT THE PRIOR WRITTEN PERMISSION OF DUPONT.

Caution: Do not use in medical applications involving implantation in the human body or contact with internal body fluids or tissue unless the product is provided by DuPont under a formal written contract consistent with the DuPont Policy Regarding Medical Applications of DuPont Materials H-50103-3 ("Medical Applications Policy") and which expressly acknowledges the contemplated use. For additional information, please request a copy of DuPont Medical Caution Statement H-50102-3 and the DuPont Medical Applications Policy.

The information provided herein is offered for the product user's consideration and examination. While the information is based on data believed to be reliable, DuPont makes no warranties, expressed or implied as to the data's accuracy or reliability and assumes no liability arising out of its use. The data shown are the result of DuPont laboratory experiments and are intended to illustrate potential product performance within a given experimental design under specific, controlled laboratory conditions. While the data provided herein falls within anticipated normal range of product properties based on such experiments, it should not be used to establish specification limits or used alone as the basis of design. It is the product user's responsibility to satisfy itself that the product is suitable for the user's intended use. Because DuPont neither controls nor can anticipate the many different end-uses and end-use and processing conditions under which this information and/or the product described herein may be used, DuPont does not guarantee the usefulness of the information or the suitability of its products in any given application. Users should conduct their own tests to determine the appropriateness of the products for their particular purpose.

The product user must decide what measures are necessary to safely use the product, either alone or in combination with other products, also taking into consideration the conditions of its facilities, processes, operations, and its environmental, health and safety compliance obligations under any applicable laws. This information may be subject to revision as new knowledge and experience become available.

This publication is not to be taken as a license to operate under, or recommendation to infringe any patent.

K25078-3_Ltr 01/2013



The miracles of science™