



DUPONT™ SOLAMET® PV3N2

PHOTOVOLTAIC METALLIZATION

PRODUCT DESCRIPTION

DuPont™ Solamet® PV3N2 photovoltaic metallization is a high-efficiency paste for N-Type wafers. It is designed for contacting B-doped p-type emitter. It is capable of firing through dielectric passivation/ARC layer (e.g. SiN, SiN/SiO₂, SiN/Al₂O₃, etc.) and contacting p-type boron-doped emitter giving low contact resistivity (<10mΩ×cm²). PV3N2 is also co-fireable with silver conductors such as DuPont™ Solamet® PV17x, PV18x.

PRODUCT BENEFITS

- Fine-line printability (for gridlines with screen printing)
- Fire-through passivation layer
- Better contact on B-doped emitter layer, enabling a broader diffusion process window
- Low gridline resistivity (high conductivity)
- Flexibility in metallization process selection. Proven technology on double-print design
- Co-fireable with rear side contacts
- Good solderability and adhesion
- Cadmium free*

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

PROCESSING SUMMARY

Application

Screen printing

Printing

Speed at or above 150 mm/sec

Screen Type

325 Mesh stainless steel preferred for >70µm open; 290, 360 or 400 mesh stainless steel preferred for <70µm

	(I)	(II)	(III)	(IV)
Calendered Mesh (stainless steel)	290	325	360	400
Wire Diameter (µm)	20	23	16	18
Emulsion Thickness (µm)	15-20			
Mesh Angle (degrees)	22-33			

Drying

Vertical dryer 170–230°C 10 minutes

IR Belt dryer 150–300°C 1 minute

Flexible in accordance with industry practice

Actual settings to be determined by dryer type

Typical Line Resolution

40–70µm Screen designed width

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, i.e. 60Sn/40Pb, 62Sn/36Pb/2Ag, 96.5Sn/3.5Ag

Table 1-Typical Physical Properties

Test	Properties
Viscosity (Pa.S) (Brookfield HBT, SC4-14/6R utility cup, 25°C)	220-330
Solids (%) at 750°C	89.7 – 90.7
Resistivity (mΩ*cm)	<5.5
Thinner	9450

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.

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PRINTING

Printing should be carried out in a clean, well-ventilated area. DuPont™ Solamet® PV3N2 photovoltaic composition, in its container, should be at ambient temperature prior to commencement of printing.

FIRING

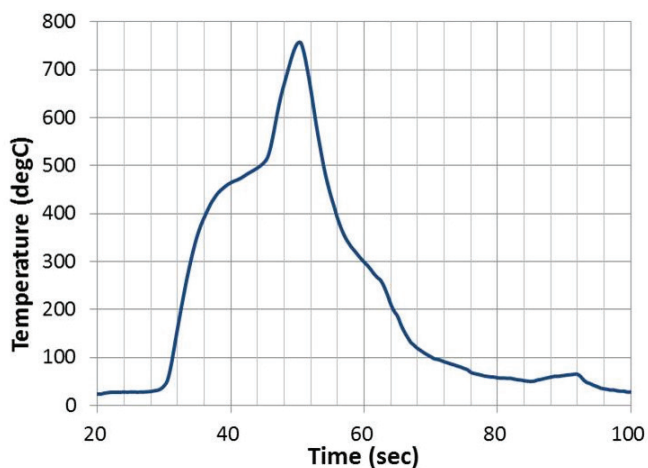
Solamet® PV3N2 is designed for rapid (spike) firing. Thermal budget above 600°C should be kept to a minimum, ideally <8 seconds to ensure optimum electrical contact to the wafer. To get the best electrical performance, PV3N2 should be fired at a peak temperature of 700-750°C.

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. Airflow and extraction rates should be optimized to ensure that oxidizing conditions exist within the furnace firing chamber, especially when front and back-side conductors are co-fired

Chart 1-Typical Firing Profile



THINNER

Solamet® PV3N2 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

Containers may be stored in a clean, stable environment at room temperature (between 5°C–25°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. Shelf life of material in unopened containers is six months from date of shipment. Some settling of solids may occur and compositions should be thoroughly mixed prior to use.

SAFETY AND HANDLING

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



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FOR MORE INFORMATION ON DUPONT™ SOLAMET® PV3N2 PHOTOVOLTAIC METALLIZATION 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)

Europe, Middle East & Africa

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

Asia

Du Pont Kubushiki Kaisha
MCM Technical Lab
DuPont Electronics Center
KSP R&D B213, 2-1,
Sakado 3-chome, Takatsu-ku,
Kawasaki-shi, Kanagawa, 213-0012
Japan
Tel +81 44 820 7575

DuPont Taiwan Ltd
45, Hsing-Pont Road
Taoyuan, 330
Taiwan
Tel +886 3 377 3616

DuPont China Holding Company Ltd
Bldg. 11, 399 Keyuan Road
Zhangjiang Hi-Tech Park
Pudong New District
Shanghai 201203
Tel +86 21 3862 2888

DuPont Korea Inc.
3-5th Floor, Asia tower #726
Yeoksam-dong, Gangnam-gu
Seoul 135-719, Korea
Tel +82 2 2222 5275

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

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

mcm.dupont.com
photovoltaics.dupont.com

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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102-4.

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