DuPont™ Solamet® PV3N1

Preliminary Technical Data Sheet

Product Description

DuPont™ Solamet® PV3N1 photovoltaic metallization is an Ag/Al high efficiency past 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_x, SiN_x/SiO_2, SiN_x/Al_2O_3, etc.) and contacting p-type boron-doped emitter giving low contact resistivity (<10mΩXcm2). PV3N1 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
- Low contact resistivity on B-doped emitter layer
- Low gridline resistivity (high conductivity)
- 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 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 200 mm/sec
- **Screen Type**
  325 mesh stainless steel preferred for >70µm open;
  290 or 400 mesh stainless steel preferred for ≥70µm

	(I)	(II)	(III)
Calendered Mesh (Stainless steel)	290	325	400
Wire diameter (µm)	20	23	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

- **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)	230–320
Solids (%) at 750°C	89.4–90.4
Resistivity (µΩ*cm)	<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.

Printing

Printing should be carried out in a clean, well-ventilated area. DuPont™ Solamet® PV3N1 photovoltaic composition, in its container, should be at ambient temperature prior to commencement of printing.

Firing

Solamet® PV3N1 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. To get the best electrical performance, PV3N1 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.

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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 backside conductors are co-fired.

Thinner

DuPont™ Solamet® PV3N1 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**.

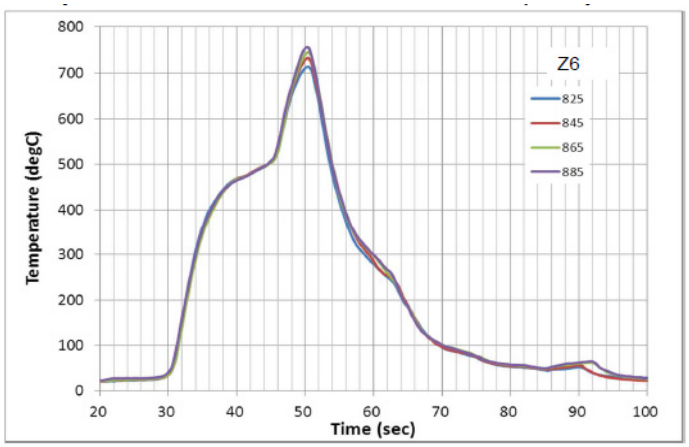
Storage and Shelf Life

Containers may be stored in a clean, stable environment at room temperature (between 5°C–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.

Chart 1
Typical Firing Profile



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