

DuPont™ Solamet® PV51M

photovoltaic metallization

Technical Data Sheet

Product Description

DuPont™ Solamet® PV51M photovoltaic metallization back side paste is a highly conductive solderable silver composition, developed to lower consumption yet providing excellent adhesion when used in conjunction with back side aluminum compositions. This paste may be co-fired with front side (n-type) silver conductors such as DuPont™ Solamet® PV15x and Solamet® PV16x, PV17x and with back side (p-type) aluminum conductors such as DuPont™ Solamet® PV3xx.

Product Benefits

- Excellent solderability and adhesion
- Very low consumption
- High conductivity
- Compatible with back side Al metallizations
- Co-fire with front side silver and back side aluminum
- Good printing characteristics
- Lead and cadmium free*

*Lead and cadmium 'free' as used herein means that lead or cadmium are not an intentional ingredient in and are not intentionally added to the reference product. Trace amounts however may be present.

Processing Summary

- **Application**
Standard screen print process
- **Printing**
Speed 6–8 in/sec (150–250 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

- **Screen Type**
230–280 mesh stainless steel with 10–14 µm emulsion build up
- **Typical Line Thickness**
4–5 µm
- **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

Viscosity (Pa·s) (Brookfield RVT, SC4-14/6R @ 10 rpm, 25°C)	75–135
Solids (%) at 750°C	54.5–56.5
Fineness of Grind (4th/50%)	<18 µm/<6 µm
Thinner	9450
Shelf Life (months)	6

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 0.5–1 minutes. Jar rolling is NOT recommended, as this could change the rheology of the material. Care should be taken to avoid air entrapment.

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.



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Printing

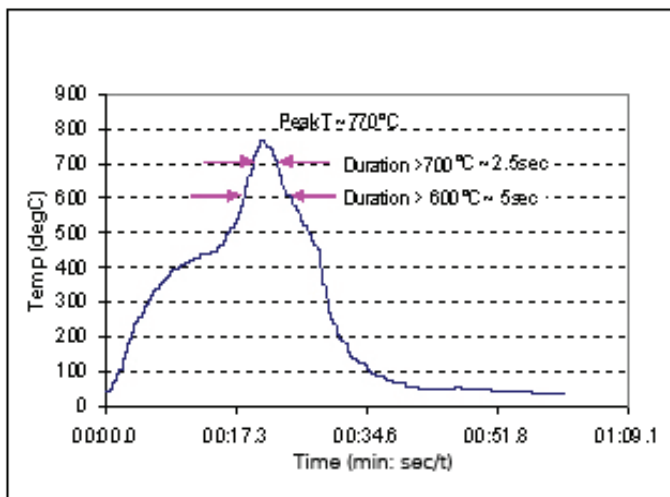
Printing should be carried out in a clean, well-ventilated area. DuPont™ Solamet® PV51M photovoltaic composition, in its container, should be at ambient temperature prior to commencement of printing.

Firing

Solamet® PV51M 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. 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.

Chart 1
Typical Firing Profile



Thinner

Solamet® PV51M 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.

Safety and Handling

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

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