HUNTSMAN

High Performance Photoimageable Solder Mask
2 Component, Aqueous Developable

Technical Data Sheet

PROBIMER® 77

Screen Print Systems

- **Best in Class Photo-Speed**
- **Outstanding Resistance to Metal Surface Finishes**
- **High Resolution Capability, Allowing 2 Mil Solder Dams**
- **Wide Processing Window**

General

Probimer 77 Screen Print Systems is a high performance, two-component, aqueous developing, photoimageable solder mask and protective coating with superior nickel/gold plating compatibility. The material works with conventional screen-printing, exposure and aqueous developing equipment.

Typical Applications

Probimer 77 Screen Print Systems solder mask is especially useful over copper metal features for the protection of high density fine-line surface mount printed wiring boards and for use in double-sided and multilayer board applications. It can also be used over tin/lead, tin and tin/nickel.

Product Features and Benefits

- Probimer 77 MA system provides a matte surface finish.
- Probimer 77 MA-1 system provides a semi-matte finish.
- Probimer 77 GL system provides a gloss finish.
- Best in Class photo-speed; suitable for automatic exposure.
- Outstanding compatibility with surface finishes (eg.ENIG, Pd, OSPs)
- High resolution capability, allowing 2 mil solder dams.
- Utilizes conventional screen printing production equipment and process technology.
- Develops in standard aqueous chemistry and equipment.
- Two-component system with excellent stability and high solids content.
- Wide process latitude means high productivity and yields. (> 5 day pot-life, 5 day hold time and wide drying window).
- Conforms to IPC-SM-840C class T&H and Bellcore standards
- UL 94 V-0 approved.
- Fulfills the most stringent requirements for electrical corrosion resistance and has outstanding moisture and insulation resistance.

Probimer 77 MA Components

	Probimer 77 /1070	Hardener 77 /1050
Form	Viscous liquid	Viscous liquid
Color	Opaque	Green
Solids (%)	~68	76-84
Solvent	DPM[1]	DPM[1]
Flash Point	49°C(120°F)	50°C (122° F)
Viscosity	85-150K cps	15-100K cps
Mixed Viscosity	30-80K cps	
Mix Ratio	3.22 kg	0.78 kg

Probimer 77 MA -1 Components

	Probimer 77 /1040	Hardener 77 /1050
Form	Viscous liquid	Viscous liquid
Color	Opaque	Green
Solids (%)	~68	76-84
Solvent	DPM[1]	DPM[1]
Flash Point	49°C(120°F)	50°C (122°F)
Viscosity	45-80K cps	15-100K cps
Mixed Viscosity	35-60K cps	
Mix Ratio	3.27/kg	0.73/kg

Probimer 77 GL Components

	Probimer 77 /1060	Hardener 77 /1050
Form	Viscous liquid	Viscous liquid
Color	Opaque	Green
Solids (%)	~68	76-84
Solvent	DPM[1]	DPM[1]
Flash Point	49°C(120°F)	50°C (122°F)
Viscosity	25-70K cps	15-100K cps
Mixed Viscosity	20-40K cps	
Mix Ratio	3.22 kg	0.78 kg

[1] dipropylene glycol methyl ether

Processing Parameters

Mixing Instructions	Probimer 77 Screen Print Systems is provided in pre-measured units. Thoroughly mix Probimer 77 and Hardener 77/1050 for 10-15 minutes. Mixing can be done by hand with a spatula or with mild mechanical stirring. High shear mixing must be avoided in order to prevent entrapment of large amounts of air, which can cause bubbles and poor leveling of the printed coating.
Processing Parameters	Precleaning should be carried out in conventional pumice spray, chemical, or mechanical brushing equipment. The application of adhesion promoting coatings or oxide layers is not required or recommended. Hold times after precleaning should be minimized to avoid oxidation of copper surfaces.
Screen Printing	Probimer 77 Screen Print Systems is applied to printed wiring boards using manual or automatic screen printing equipment. Monofilament polyester mesh in the range of 83-110T is recommended. The mesh should be applied to stable screen frames and tensioned to the mesh manufacturer's recommended tension, typically 20-26 Newton-cm. Use of a dot pattern on the screen is not necessary. The image area on the screen should be defined using a solvent resistant liquid block-out resin or film. Screen frames must be installed level with the screening table for best performance. Off-contact distance in the range of 0.195-0.273 inches is acceptable with this product. Polyurethane squeegees, 70-80 durometer with sharp edges, are required for printing. Conventional screen cleaning solvents can be used to clean screens, squeegees and other tools. It is recommended that operators utilize the "snowplow" technique when printing to avoid skipping over circuitry which is parallel to the squeegee. On semi-automatic equipment, a slight angling of the squeegee mechanism is also recommended. Approximately 32 degrees is appropriate. This forms a wet film thickness of 35-45 microns (1.36-1.8 mils) After printing, boards should be racked vertically to minimize contamination, taking care that the boards not touch each other. Any observed bubbles or surface roughness will level within 5 minutes.
Drying	A well-ventilated forced-air oven is required for drying Probimer 77 Screen Printing Systems after printing and prior to exposure. The optimum drying condition is 85°C for 25-35 minutes. If a single sided process is utilized, the first side printed should be tack dried for 15-20 minutes. After coming to room temperature, the first side will be tack-free and second side can be printed. The completed board should then be dried for 35-45 minutes at 85°C. In both cases, the total drying time should not exceed 70 minutes. This will prevent partial polymerization of the mask, which will inhibit complete development. Drying times can vary depending upon the efficiency and airflow of the oven. Test panels should be processed to optimize the drying cycle for the particular equipment.
Exposure	Probimer 77 Screen Print Systems is a bulk polymerizing material under UV exposure. The spectral sensitivity of Probimer 77 Screen Printing Systems is in the range of 350 to 400 nm. Conventional exposure units having 7 kW lamps have been successfully used and are recommended. This type unit will provide an exposure time between 10-30 sec. Both diazo and silver halide films are suitable as working phototools. Exposure Energy 200-300 mJ/cm^2 Stouffer Step (all gloss levels) Clear Copper 12-14 Stouffer Step with MXA lamps (matte version) Clear Copper 9-13

Development

Developing is carried out in an aqueous sodium or potassium carbonate solution. A concentration of 1% is recommended. Conventional aqueous spray developing machines, either horizontal or vertical are suitable for use with Probimer 77 Screen Printing Systems.

Temperature	85-90°F
Spray Pressure	20-40 psi
Developing Time	60-90 sec
pH	10.5-11.2

Inspection/Stripping

Probimer 77 Screen Print Systems coated panels should be inspected after development. Should panels require recoating, Probimer 77 Screen Print Systems can be stripped after developing in 3-5% sodium or potassium hydroxide solution at 120-140°F.

Final Cure

Thermal curing is required to insure optimal properties in the cured film. Thermal curing can take place in a standard convection oven.

	Min Max	Standard
Thermal Curing Temperature	140-155°C	150°C
Thermal Curing Time	50-70 min	60 min

UV Curing is recommended for increased chemical resistance of either 500 – 750 mJ/cm^2 prior to thermal curing or 1000 – 2000 mJ/cm^2 after thermal curing.

Physical Properties

Soldering Resistance (IPC SM-840C)	Class T,H
Flux Resistance (IPC SM-840C)	Class T,H
Solvent Resistance (IPC SM-840C)	Class T,H
Thermal Shock Resistance (IPC SM-840C)	Class T,H
Adhesion (IPC SM-840C)	Class T,H
UL 94 V-O	Pass

Electrical Properties

Dielectric Strength	Passed Class T,H
Insulation Resistance (IPC-SM-840C)	Passed Class T,H
Electromigration (IPC-SM-840C)	Passed Class T,H
Bellcore GR-78-Core	Passed

Safety/Handling Precautions

Warning! Combustible liquid and Vapor. Can cause allergic skin reactions.

May cause irritation and dermatitis. Keep away from heat, sparks and open flame. Avoid contact with eyes, skin and clothing.
Avoid breathing vapor, mist or spray. Use only good ventilation.
Store in closed containers for liquid transfer to avoid static sparks.
Wash hands after handling.

Read Material Safety Data Sheet Before Using these products.
FOR INDUSTRIAL USE ONLY.

Recommended Storage Temperature : 10°C to 25°C

First Aid

In case of contact:
Eyes: Promptly flush with water for at least 15 minutes.
Skin: Promptly wash with mild soap and water.
Inhalation: Remove to fresh air. Give oxygen if breathing is difficult.
Ingestion: If conscious, give water. Get medical attention.

Important

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The test data and results set forth herein are based on laboratory work and do not necessarily indicate results that the buyer or user will attain. Full-scale testing and product performance is the responsibility of the buyer and user.

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