High Performance Photoimageable Solder Mask
2 Component, Aqueous Developable

Technical Data Sheet

PROBIMER® 77/1100 (Dark Green)
Screen Print System

- Superior Hiding Power
- High Resolution Capability
- Excellent Ni/Au Final Finish Performance
- Wide Process Latitude
Probimer® 77 /1100
with Hardener 77/1050

Screen Print Solder Mask

General
Probimer 77/1100 with Hardener 77/1050 is a high performance, two component, aqueous developed, solder mask and works with conventional screen-printing, exposure and aqueous developing equipment. Probimer 77/1100 is designed to provide high resolution, excellent electroless Ni/Au performance, and a wide drying window. Its dark green color provides excellent hiding power.

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
- Outstanding compatibility with surface finishes (ENIG, Pd, OSPs, Au & Sn)
- 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 (Dark Green) Screen Print Components

<table>
<thead>
<tr>
<th>Probimer 77/1100</th>
<th>Hardener 77 /1050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Viscous liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Dark Green</td>
</tr>
<tr>
<td>Solids (%)</td>
<td>~66</td>
</tr>
<tr>
<td>Mixed Solids (%)</td>
<td>~69</td>
</tr>
<tr>
<td>Solvent</td>
<td>DPM(^1)</td>
</tr>
<tr>
<td>Flash Point</td>
<td>70° C(158°F)</td>
</tr>
<tr>
<td>Viscosity</td>
<td>30-80K cps</td>
</tr>
<tr>
<td>Mixed Viscosity</td>
<td>25- 40K cps</td>
</tr>
<tr>
<td>Mix Ratio</td>
<td>3.12 kg</td>
</tr>
</tbody>
</table>

\(^1\) dipropylene glycol methyl ether

Probimer 77/1100 (Dark Green) Screen Print System 1
Processing Parameters

Mixing Instructions
Probimer 77/1100 Screen Print System is provided in pre-measured units. Mixing of Probimer 77/1100 and Hardener 77/1050 can be done by hand with a spatula or with a small mixer, without creating a vortex, for 5-10 minutes. 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.

Precleaning
Precleaning should be carried out in conventional pumice spray, chemical, or mechanical brushing equipment. The application of adhesion promoting coatings or oxide layers is generally not required or recommended. Hold times after precleaning should be minimized to avoid oxidation of copper surfaces. Note: For copper panels that have strong oxidation, a commercially available acid solution is recommended prior to precleaning.

Screen Printing
Probimer 77/1100 Screen Print System is applied to printed wiring boards by using manual or automatic screen printing equipment. Monofilament polyester mesh in the tested range of 81-140 is recommended. Note: Standard DP-1500 recommended mesh setting is 92.

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 77/1100 Screen Print System after printing and prior to exposure. The optimum drying condition is 80-90°C for 35-50 minutes. If a single sided process is utilized, the first side printed should be tack dried for 15 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 30-35 minutes at 80-90°C. In both cases, the total drying time should not exceed 50 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.

Note: The above drying conditions may vary according to the drying equipment, set up and development conditions. 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 Print 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 of unit will provide an exposure time between 10-30 sec. Both diazo and silver halide films are suitable as working phototools.

- Exposure Energy: 400-500 mJ/cm²
- Stouffer Step: Clear Copper 13-15

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.

<table>
<thead>
<tr>
<th>Min</th>
<th>Max</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>140-155°C</td>
<td>150°C</td>
<td></td>
</tr>
<tr>
<td>50-70 min</td>
<td>60 min</td>
<td></td>
</tr>
</tbody>
</table>

UV Curing is recommended for increased chemical resistance of either 500 – 750 mJ/cm² prior to thermal curing or 1000 – 2000 mJ/cm² 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**

The following supercedes Buyer’s documents. **SELLER MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** No statements herein are to be construed as inducements to infringe any relevant patent. Under no circumstances shall Seller be liable for incidental, consequential or indirect damages for alleged negligence, breach of warranty, strict liability, tort or contract arising in connection with the product(s). Buyer’s sole remedy and Seller’s sole liability for any claims shall be Buyer’s purchase price. Data and results are based on controlled or lab work and must be confirmed by Buyer by testing for its intended conditions of use. The product(s) has not been tested for, and is therefore not recommended for, uses for which prolonged contact with mucous membranes, abraded skin, or blood is intended; or for uses for which implantation within the human body is intended.

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.

---

Vantico Inc.
PWB Technology
5121 San Fernando Road West
Los Angeles, CA 90039-1011
Tele: (888) 781-9193
Fax: (818) 543-5071
Infopwbt@huntsman.com
www.huntsman.com

Printed in the U.S.A.
Revised: July 2, 2003