

PSR-9000 LDI (US)

LIQUID PHOTOIMAGEABLE SOLDER MASK

- ④ **Designed for Laser Direct Imaging of Flexible Printed Circuit Boards**
- ④ **Screen Print Application**
- ④ **Halogen-Free**
- ④ **Compatible with Lead-Free Processing**
- ④ **Fine Dam Resolution**
- ④ **RoHS Compliant**
- ④ **Excellent Resistance to ENIG, Immersion Tin and Immersion Silver**
- ④ **Amber and Green Gloss Finish**
- ④ **Low Warpage**

PROCESSING PARAMETERS FOR PSR-9000 LDI (US)

PSR-9000 LDI (US) is a two-component, gloss Amber or Green, alkaline developable LPI solder mask for Laser Direct Imaging. **PSR-9000 LDI (US)** has been specifically designed for flexible printed circuit boards and is user friendly with wide processing latitude. **PSR-9000 LDI (US)** has very good resistance to ENIG, Immersion Tin and Immersion Silver. All Taiyo America products comply with the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment.

PSR-9000 LDI (US) COMPONENTS

	PSR-9000 LDI (US) / CA-90 LDI	
Mixing Ratio	70 parts	30 parts
Color	Amber or Green	White
<u>Mixed Properties</u>		
Solids	74%	
Viscosity	160-200ps	
Specific Gravity	1.2	

MIXING

PSR-9000 LDI (US) has a six month shelf life and is supplied in pre-measured containers with a mix ratio by weight of 70 parts **PSR-9000 LDI (US)** and 30 parts **CA-90 LDI**. **PSR-9000 LDI (US)** can be mixed by hand with a mixing spatula for 10 – 15 minutes. Mixing can be done with a mechanical mixer at low speeds to minimize shear thinning for 10 – 15 minutes. Also, mixing can be done with a paint shaker for 10 – 15 minutes. Pot life after mixing is 48 hours when stored in a dark place at $\leq 25^{\circ}\text{C}$ (77°F).

PRE-CLEANING

Prior to solder mask application, the printed circuit board surface needs to be cleaned. Various cleaning methods include Pumice, Aluminum Oxide, Mechanical Brush, and Chemical Clean. All of these methods will provide a clean surface for the application of **PSR-9000 LDI (US)**. Hold time after cleaning the printed circuit board should be held to a minimum to reduce the oxidation of the copper surfaces.

PROCESSING PARAMETERS FOR PSR-9000 LDI (US)

- SCREEN PRINTING** Method: Single Sided and Double Sided Screening
- Screen Mesh: 86 – 205
 - Screen Mesh Angle: 22.5° Bias
 - Screen Tension: 20 - 28 Newtons
 - Squeegee: 60 – 80 durometer
 - Squeegee Angle: 27 – 35°
 - Printing Mode: Flood / Print / Print
 - Flood Pressure: 20 – 30 psi
 - Printing Speed: 2.0 – 9.9 inches/sec
 - Printing Pressure: 65 – 100 psi
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- TACK DRY CYCLE** The Tack Dry step is required to remove solvent from the solder mask film and produce a firm dry surface. The optimum dwell time and oven temperature will depend on oven type, oven loading, air circulation, exhaust rate, and ramp times. Excessive tack dry times and temperature will result in difficulty developing solder mask from through holes and a reduction in photo speed. Insufficient tack dry will result in artwork marking and/or sticking. Typical tack dry conditions for **PSR-9000 LDI (US)** are as follows:
- Oven Temperature: 165 - 170°F (74 - 77°C)
 - For Single-Sided (Batch Oven)
 - 1st Side: Dwell Time: 15 - 20 minutes
 - 2nd Side: Dwell Time: 20 - 35 minutes
 - For Double-Sided (Conveyorized or Batch Oven)
 - Dwell Time: 35 - 55 minutes
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- EXPOSURE** **PSR-9000 LDI (US)** requires UV exposure to define solder mask dams and features. The spectral sensitivity of **PSR-9000 LDI (US)** is in the area of 355 - 365 nm. Below are guidelines for exposing **PSR-9000 LDI (US)**.

LDI Exposure Unit

- Exposure Unit: Orbotech 8k Series or above
- Stouffer Step 21: Clear 10 minimum (on metal)
- Energy: 50 - 100 mJ/cm² minimum

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DEVELOPMENT **PSR-9000 LDI (US)** is developed in an aqueous sodium or potassium carbonate solution. Developing can be done in either a horizontal or vertical machine.

- Solution: 1% by wt. Sodium Carbonate or 1.2% Potassium Carbonate
- pH: 10.6 minimum
- Temperature: 85 - 90°F (29 - 32°C)
- Spray Pressure: 25 - 35 psi
- Dwell Time in developing chamber: 45 - 70 seconds
- Water rinse is needed to remove developer solution, and follow with a drying step

FINAL CURE **PSR-9000 LDI (US)** requires a thermal cure to insure optimal final property performance. Thermal curing can be done in a batch oven or conveyORIZED oven.

- Temperature: 275 – 300°F (135 – 149°C)
- Time at Temperature: 45 – 60 minutes

For Process Optimization please contact your local Taiyo America Representative

FINAL PROPERTIES FOR PSR-9000 LDI (US) SERIES

IPC-SM-840E Requirements

REQUIREMENT	PARAGRAPH	IPC-TM-650 TEST METHOD	RESULT
Cure	3.2.5.1		Pass
Non-Nutrient	3.2.6	2.6.1	Pass
Visual Requirement	3.3.1		Pass
Pencil Hardness	3.5.1		Pass - (6H)
Adhesion to rigid printed boards	3.5.2.1	2.4.28.1	Pass
Adhesion to flexible printed boards	3.5.2.2	2.4.29	Pass
Adhesion of layered or doubled coated solder mask	3.5.2.6	2.4.28.1 & 2.4.29	Pass
Machinability	3.5.3	2.4.7.1	Pass
Resistance to solvents and cleaning agents	3.6.1.1	2.3.42	Pass
Hydrolytic Stability	3.6.2	2.6.11	Pass
Solderability	3.7.1		Pass
Resistance to Tin-Lead solder	3.7.2	2.6.8	Pass
Resistance to Lead-Free solder	3.7.3	2.6.8	Pass
Simulation of Lead-Free reflow	3.7.3.1	2.6.8	Pass
Dielectric Strength	3.8.1	2.5.6.1	Pass - (3500 V/Mil)
Insulation Resistance	3.8.2	2.6.3.1	class T = Pass (3.8 E +11 Solder)
			class T = Pass (2.2 E +12 No Solder)
			class H = Pass (2.1 E +12 Solder)
			class H = Pass (5.4 E +11 No Solder)
Moisture and Insulation Resistance	3.9.1	2.6.3.1	class T = Pass (3.1 E +12 Solder)
			class T = Pass (1.1 E +11 No Solder)
			class H = Pass (2.8 E +12 Solder)
			class H = Pass (1.2 E +12 No Solder)
Electrochemical Migration	3.9.2	2.6.14	class T = Pass (< 1 decade difference)
			class H = Pass (2.8 E+12)
Thermal Shock	3.9.3	2.6.7.3	Pass

TECHNICAL DATA SHEET



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Additional Tests / Results

TEST	REQUIREMENT	RESULT	
Young's Modulus (GPa)	Internal Test	2.4	
Tensile Strength (MPa)	Internal Test	46	
Elongation (%)	Internal Test	3.1	
Tg (DMS)	Internal Test	80.2°C	
Warpage (mm)	25 µm PI	1.9	
	50 µm PI	1.1	
Electroless Nickel / Immersion Gold Resistance	Atotech ENIG – Tape Test Adhesion	Pass	
Immersion Tin Resistance	Florida Cirtech Tin – Tape Test Adhesion	Pass	
Immersion Silver Resistance	MacDermid Silver – Tape Test Adhesion	Pass	
Solvent Resistance	Acetone:	No attack – 24 hours	Pass
	MEK:	No attack – 24 hours	Pass
	IPA:	No attack – 24 hours	Pass
	PMA:	No attack – 24 hours	Pass
Acid Resistance	HCl – 10%:	No attack – 30 Minutes	Pass
	H ₂ SO ₄ – 10%:	No attack – 30 Minutes	Pass
Base Resistance	NaOH – 10%:	No attack – 30 Minutes	Pass
	Boiling Water Resistance:	No attack – 15 Minutes	Pass
Solder/Flux Resistance-(MEC) SR-270 rosin-based:	No attack – 2 x 10 sec float (290C)	Pass	
Solder/Flux Resistance-(Sanwa) SR-270 rosin-based:	No attack – 2 x 10 sec float (290C)	Pass	
Flexibility after Exposure:	Crease Test (No Cracks) – 10 times	Pass	
Flexibility after Thermal Cure:	1/8" mandrel (No Cracks) – 10 bends	Pass	
Flexibility after Thermal Cure:	IPC Test	Pass	

Taiyo America, Inc. (TAIYO) warrants its products to be free from defects in materials and workmanship for the specified warranty period (**PSR-9000 LDI (US) / CA-90 LDI Warranty period is 6 Months**) provided the customer has, at all times, stored the ink at a temperature of 68°F or less. TAIYO accepts no responsibility or liability for damages, whether direct, indirect, or consequential, resulting from failure in the performance of its products. If a TAIYO product is found to be defective in material or workmanship, its liability is limited to the purchase price of the product found to be defective. TAIYO MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, AND MAKES NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. TAIYO'S obligation under this warranty shall not include any transportation charges or costs of installation or any liability for direct, indirect, or consequential damages or delay. If requested by TAIYO, products for which a warranty claim is made are to be returned transportation prepaid to TAIYO'S factory. Any improper use or any alteration of TAIYO'S product by the customer, as in TAIYO'S judgment affects the product materially and adversely, shall void this limited warranty.