TECHNICAL DATA SHEET

PSR-9000 FXT Series

(UL Name: PSR-9000AC/CA-90AC)

LIQUID PHOTOIMAGEABLE SOLDER MASK

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

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PROCESSING PARAMETERS FOR PSR-9000 FXT SERIES

PSR-9000 FXT is a two-component, gloss Green, Amber, Black or White, alkaline developable LPI solder mask products for flood screen printing. **PSR-9000 FXT** has been specifically designed for flexible printed circuit boards and is user friendly with wide processing latitude. **PSR-9000 FXT** 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 FXT SERIES COMPONENTS

	PSR-9000 FXT	/	CA-90 FXT
Mixing Ratio	75 parts		25 parts
Color	Green, Amber, Black or White		White

Mixed Properties

Solids	74%
Viscosity	160-200ps
Specific Gravity	1.2

MIXING

PSR-9000 FXT has a nine month shelf life and is supplied in pre-measured containers with a mix ratio by weight of 75 parts **PSR-9000 FXT** and 25 parts **CA-90 FXT. PSR-9000 FXT** 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 ≤ 25°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 FXT**. Hold time after cleaning the printed circuit board should be held to a minimum to reduce the oxidation of the copper surfaces.

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SCREEN PRINTING

Method: Single Sided and Double Sided Screening

- Screen Mesh: 92 – 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: 70 – 100 psi

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 FXT** are as follows:

- Oven Temperature: 174 - 180°F (79 - 82°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 FXT requires UV exposure to define solder mask dams and features. The spectral sensitivity of **PSR-9000 FXT** is in the area of 365 nm. Exposure times will vary by bulb type and age of the bulb. Below are guidelines for exposing **PSR-9000 FXT**.

- Exposure Unit: 7 kW or higher
- Stouffer Step 21: Clear 10 minimum (on metal / under phototool)
- Energy:
  - For Green and Amber
    - 300-400mJ / cm^2 minimum (under phototool)
  - For Black and White
    - 500 - 800mJ / cm^2 minimum (under phototool)

DEVELOPMENT

PSR-9000 FXT 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 , to
- 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 & dry

FINAL CURE

PSR-9000 FXT 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: 55 – 70 minutes

For Process Optimization please contact your local Taiyo America Representative

Taiyo America, Inc. (TAIYO) warrants its products to be free from defects in materials and workmanship for the specified warranty period **(PSR-9000 FXT / CA-90 FXT Warranty period is 9 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.

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FINAL PROPERTIES FOR PSR-9000 FXT SERIES

IPC-SM-840E, Class H & T, Solder Mask Vendor Testing Requirements

TEST	SM-840 PARAGRAPH	REQUIREMENT	RESULT
Visual	3.3.1	Uniform in Appearance	Pass
Curing	3.2.5.1.	Ref: 3.6.1.1, 3.7.1 and 3.7.2	Pass
Non-Nutrient	3.2.6	Does not contribute to biological growth	Pass
Dimensional	3.4.10	No Solder Pickup and Withstand 500 VDC	Pass
Pencil Hardness	3.5.1	Minimum "F"	4H
Adhesion to Flexible Printed Boards	3.5.2.2	Kapton	Pass
Adhesion of Layered or Double Coated Solder Mask	3.5.2.6		Pass
Machinability	3.5.3	No Cracking or Tearing	Pass
Resistance to Solvents and Cleaning Agents	3.6.1.1	Table 3 Solvents	Pass
Hydrolytic Stability and Aging	3.6.2	No Change after 28 days of 95-99°C and 90-98% RH	Pass
Solderability	3.7.1	No Adverse Effect J-STD-003	Pass
Resistance to Tin-Lead Solder	3.7.2	No Solder Sticking	Pass
Resistance to Lead Free Solder	3.7.3		Pass
Simulation of Lead Free Reflow	3.7.3.1		Pass
Dielectric Strength	3.8.1	500 VDC / mil Minimum	5400 VDC/mil
Thermal Shock	3.9.3	No Blistering, Crazing or De-lamination	Pass

Specific Class "H" Requirements

TEST	SM-840 PARAGRAPH	REQUIREMENT	RESULT
Insulation Resistance Before Soldering After Soldering	3.8.2	 5×10^8 ohms minimum 5×10^8 ohms minimum	 Pass (1.72×10^{12} ohms) Pass (1.52×10^{13} ohms)
Moisture & Insulation Resistance Before Soldering–In Chamber Before Soldering–Out of Chamber After Soldering-In Chamber After Soldering-Out of Chamber	3.9.1	 5×10^8 ohms minimum 5×10^8 ohms minimum 5×10^8 ohms minimum 5×10^8 ohms minimum	 Pass (9.82×10^9 ohms) Pass (6.75×10^{12} ohms) Pass (1.07×10^{10} ohms) Pass (2.87×10^{12} ohms)
Electrochemical Migration	3.9.2	$>2.0 \times 10^6$ ohms, no dendritic growth	Pass (1.62×10^{12} ohms)
Flammability	3.6.3.1		Pass (File # E166421), UL Name: PSR-9000AC/ CA-90AC

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FINAL PROPERTIES FOR PSR-9000 FXT SERIES

Specific Class "T" Requirements

TEST	SM-840 PARAGRAPH	REQUIREMENT	RESULT
Insulation Resistance	3.8.2		
Before Soldering		5×10^8 ohms minimum	Pass (8.13×10^{12} ohms)
After Soldering		5×10^8 ohms minimum	Pass (1.53×10^{12} ohms)
Moisture & Insulation Resistance	3.9.1		
Before Soldering–In Chamber		5×10^8 ohms minimum	Pass (5.32×10^8 ohms)
Before Soldering–Out of Chamber		5×10^8 ohms minimum	Pass (2.92×10^{12}ohms)
After Soldering-In Chamber		5×10^8 ohms minimum	Pass (1.23×10^9ohms)
After Soldering-Out of Chamber		5×10^8 ohms minimum	Pass (2.33×10^{12}ohms)
Electrochemical Migration	3.9.2	< 1 decade drop, no dendritic growth	Pass
Flammability	3.6.3.2		Pass

Additional Tests / Results

TEST	REQUIREMENT	RESULT
Young's Modulus (GPa)	Internal Test	2.4
Tensil 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_2SO_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

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