TECHNICAL DATA SHEET

TAIYO PSR-4000 AUS320

LIQUID PHOTOIMAGEABLE SOLDER MASK

- Designed for Packaging Applications
- Halogen-Free (350 ppm)
- Excellent Thermal and Crack Resistance
- Hard Surface Finish
- Excellent Adhesion to Molding Compounds
- RoHS Compliant
- Excellent Resistance to Electrolytic / Electroless Gold Plating
- Compatible with Lead-Free Processing
- Excellent PCT Resistance

TAIYO AMERICA

Revised June 2015

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PROCESSING PARAMETERS FOR PSR-4000 AUS320

PSR-4000 AUS320 is a two-component, gloss Green, liquid photoimageable solder mask for flood screen printing. **PSR-4000 AUS320** has been specifically designed for BGA, Flip-Chip and other Chip Scale Packaging (CSP) applications. **PSR-4000 AUS320** has excellent crack resistance along with resistance to electrolytic / elctroless gold plating lines. **PSR-4000 AUS320** also has excellent PCT resistance. **PSR-4000 AUS320** has a UL flammability rating of 94V-0. 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-4000 AUS320 COMPONENTS

	PSR-4000 AUS320	/ CA-40 AUS320
Mixing Ratio	70 parts	30 parts
Color	Green	White

Mixed Properties

Solids	71%
Viscosity	140 – 160 ps
Specific Gravity	1.2

MIXING

PSR-4000 AUS320 is supplied in pre-measured containers with a mix ratio by weight of 70 parts **PSR-4000 AUS320** and 30 parts **CA-40 AUS320. PSR-4000 AUS320** 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. After mixing, the pot life is 24 hours.

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-4000 AUS320**. 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: 83 – 110
- 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-4000 AUS320** is as followed:

- Oven Temperature: 160 - 180°F (71 - 82°C)
- For Single-Sided (Batch Oven)
  - 1st Side: Dwell Time: 15 - 20 minutes
  - 2nd Side: Dwell Time: 35 - 45 minutes
- For Double-Sided (Conveyorized or Batch Oven)
- Dwell Time: 35 – 60 minutes

EXPOSURE

PSR-4000 AUS320 requires UV exposure to define solder mask dams and features. The spectral sensitivity of **PSR-4000 AUS320** 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-4000 AUS320**.

- Exposure Unit: 7 kW or higher
- Stouffer Step 21: Clear 7 minimum (on metal / under phototool)
- Energy: Minimum 500 mJ / cm^2 (under phototool)

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DEVELOPMENT

PSR-4000 AUS320 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 or greater
- Temperature: 85 - 95°F (29 - 35°C)
- Spray Pressure: 25 - 45 psi
- Dwell Time in developing chamber: 90 - 120 seconds
- Water rinse is needed to remove developer solution & dry

FINAL CURE

PSR-4000 AUS320 needs to be thermally cured 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

UV CURE

PSR-4000 AUS320 also requires a UV cure to insure optimal final property performance. The recommended process for UV curing is as follows:

- UV Energy: 1000 mJ / cm^2
- Lamps: High Pressure Mercury Lamps

For Process Optimization, please contact your local Taiyo America Representative

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FINAL PROPERTIES FOR PSR-4000 AUS320

TEST	REQUIREMENT	RESULT
Adhesion	JIS D0202 Cross-hatch test	100 / 100
Pencil Hardness	No scratch on copper	7H
Solder Heat Resistance	Rosin based flux: 260°C / 10sec. X 3 cycle of solder float	Pass
Solvent Resistance	PGM-AC 20°C / 30 mins. Immersion and tape-peeling	Pass
Acid Resistance	10 vol.% H_2SO_4, 20°C/30 min. immersion and tape-peeling	Pass
Alkaline Resistance	10 vol.% NaOH, 20°C/30 min. immersion and tape-peeling	Pass
Insulation Resistance	IPC Comb type (B-pattern) Humidification: 25~65°C cycle 90%RH DC100V loading for 7 days Measurement: After the above treatment, loading DC500V for 1 minute at room temp.	Initial 8.8×10^{13} ohms Conditioned 1.1×10^{12} ohms
Dielectric Constant	Values at 1 MHz Humidification: 25~65°C cycle 90%RH for 7 days Measurement: After the above treatment, reading at RT	Initial 4.0 Conditioned 4.3
Dielectric Loss tangent	Values at 1 MHz Humidification: 25~65°C cycle 90%RH for 7 days Measurement: After the above treatment, reading at RT	Initial 0.019 Conditioned 0.023
Surface Resistivity	Internal Test	1.1×10^{12} ohms
Volume Resistivity	Internal Test	8.9×10^{14} ohms•cm
Young Modulus	Pulling Test	3400 MPa
Breaking Strength	Pulling Test	70 MPa
Elongation	Pulling Test	3.5%
Electroless Ni/Au Resistance	Internal Test: Ni 5 μm Au 1 μm	Pass
Electrolytic Ni/Au Resistance	Internal Test: Ni 3 μm Au 0.03 μm	Pass
Tg	TMA method (pulling test)	114°C
C.T.E	TMA method (pulling test) Below Tg Above Tg	60 ppm 130 ppm

Taiyo America, Inc. (TAIYO) warrants its products to be free from defects in materials and workmanship for the specified warranty period **(PSR-4000 AUS320 / CA-40 AUS320 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.

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