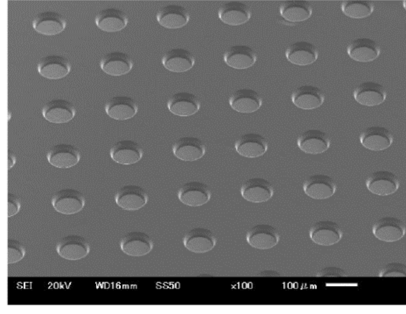
TECHNICAL DATA SHEET

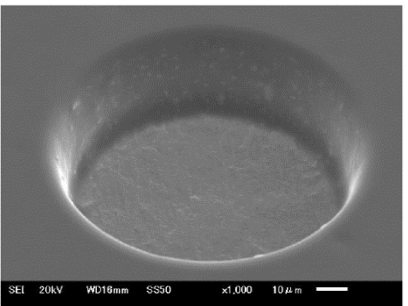
FLEXFINER SERIES

(UL Name: FLEXFINER-AA)

PHOTOIMAGEABLE COVER LAY FILM

- **Dry Film Type for Surface Uniformity**
- **Various thicknesses (15 – 40 microns)**
- **Simplified Coating Process for Flex Panel**
- **Capable of Tenting Vias**
- **UL Listing of VTM-0**
- **Available in Amber only**
- **Exposes on Standard and LDI equipment**
- **RoHS and Outgassing Compliant**
- **Compatible with Lead-Free Processing**
- **Fine Dam Resolution**
- **Withstands ENIG & Immersion Tin**
- **Halogen-Free**





2675 Antler Drive • Carson City, NV 89701 • Phone 775.885.9959 • Fax 775.885.9972 www.taiyo-america.com

Copyright © 2015 Taiyo America, Inc. All Rights Reserved.

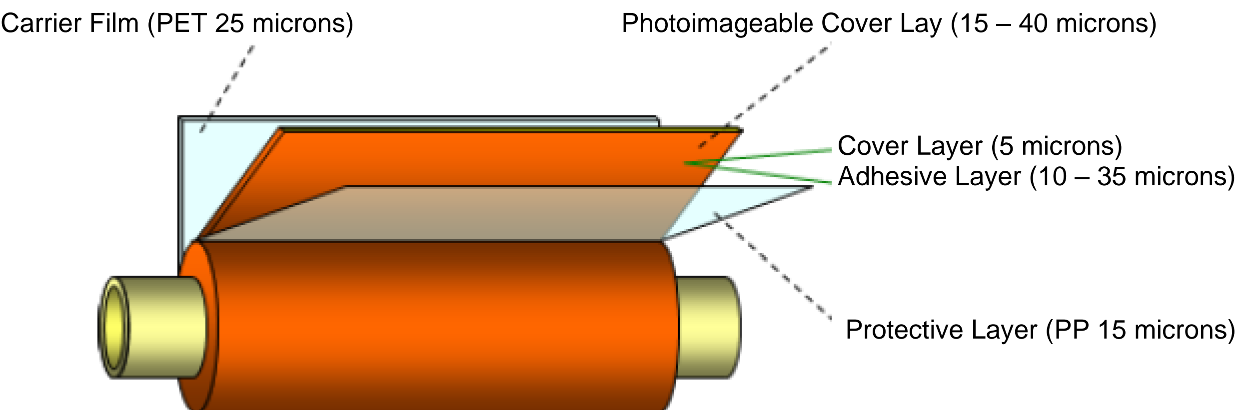
PROCESSING PARAMETERS FOR FLEXFINER

FLEXFINER is a photoimageable cover lay dry film to make fine patterns possible with photolithography process. **FLEXFINER** offers excellent heat resistance and bendability because it consists of two layers with top cover layer and bottom adhesive layer. **FLEXFINER** is has fine pattern capabilities due to being photoimagable. Compared to conventional thermal curable cover lay films, **FLEXFINER** does not require punching process with expensive metal mold. 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.

FLEXFINER SERIES COMPONENTS:

PRODUCT:	FLEXFINER 15SA	FLEXFINER 20SA	FLEXFINER 30SA	FLEXFINER 40SA
Feature	Ultra-Thin	Low Stiffness	Standard	For high Circuits
Thickness	15 microns	20 microns	30 microns	40 microns
Structure	Cover layer (5 μm) Adhesive layer (10 μm)	Cover layer (5 μm) Adhesive layer (15 μm)	Cover layer (5 μm) Adhesive layer (25 μm)	Cover layer (5 μm) Adhesive layer (35 μm)
Film Width / Length	247 mm or 495 mm / 50 meters			
Storage	-15°C or below in a dark place for 2 years			
Manufacturing Site	Taiyo Ink Japan			
Film Thawing	Thaw film at a temperature between 20-25C for minimum 4 hours			
Shelf life after Thaw	5 days at 25°C			

FLEXFINER FILM STRUCTURE:

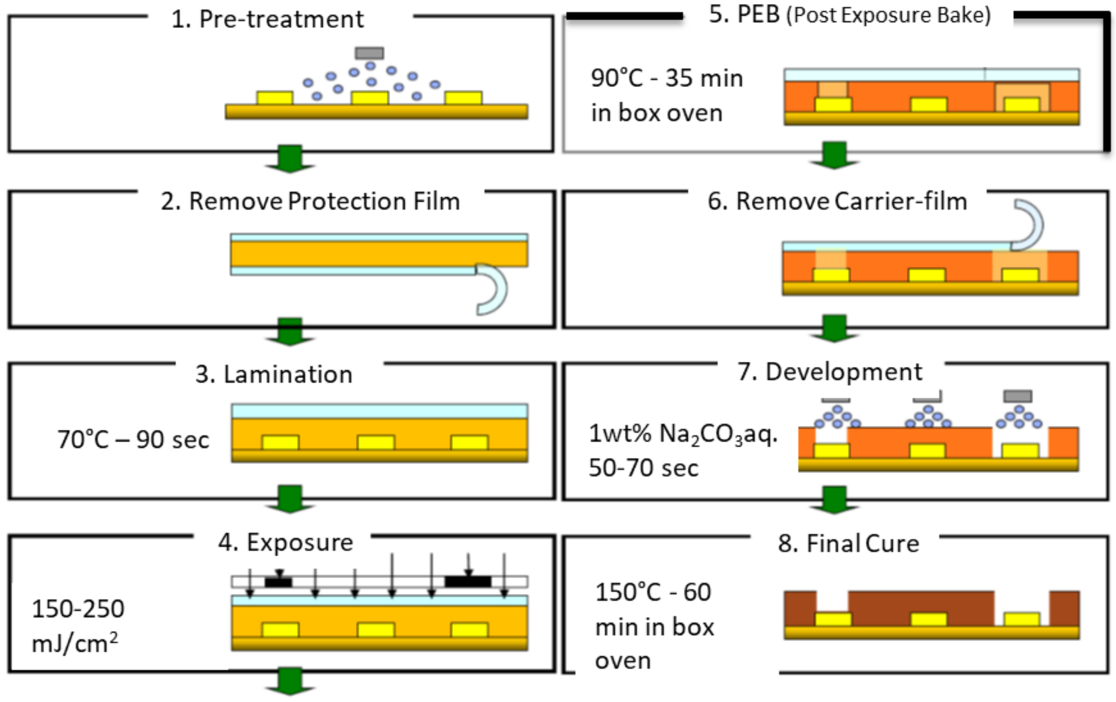


Revised October 28, 2024
2675 Antler Drive • Carson City, NV 89701 • Phone 775.885.9959 • Fax 775.885.9972 www.taiyo-america.com

Copyright © 2015 Taiyo America, Inc. All Rights Reserved.

PROCESSING PARAMETERS FOR FLEXFINER

MANUFACTURING PROCESS USING FLEXFINER:



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 these methods will provide a clean surface for the application of **FLEXFINER**. Hold time after cleaning the printed circuit board should be held to a minimum to reduce the oxidation of the copper surfaces.

REMOVE PROTECTIVE FILM AND LAMINATION:

Remove Protective Film prior to placing on circuit board

Method: Double-sided vacuum Laminator

- Lamination Temperature: 70°C
- Lamination Time: 90 seconds

2675 Antler Drive • Carson City, NV 89701 • Phone 775.885.9959 • Fax 775.885.9972 www.taiyo-america.com

Copyright © 2015 Taiyo America, Inc. All Rights Reserved.

PROCESSING PARAMETERS FOR FLEXFINER

EXPOSURE

FLEXFINER uses UV-LED curing technology to define solder mask dams and features. The spectral sensitivity is in the area of 365 nm – 405nm. Exposure times will vary by power, light source, wavelength and age of the light source. Below are guidelines for exposing.

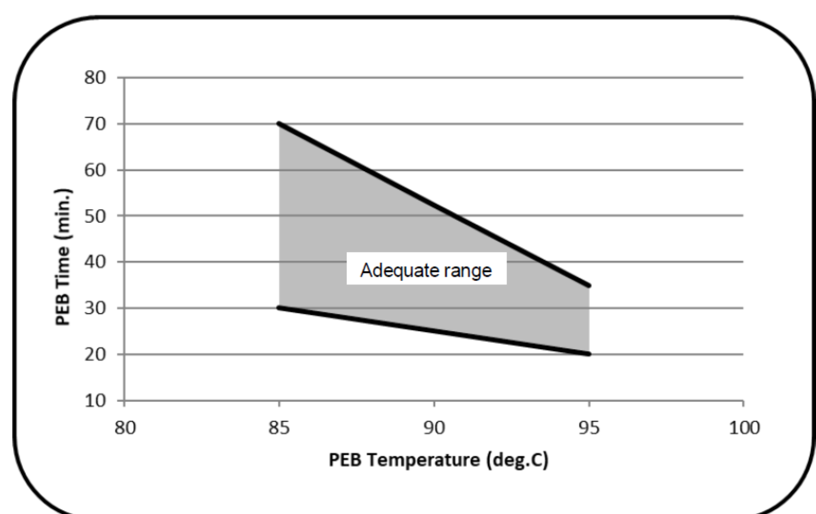
- Exposure Unit: Standard Flood Exposure or Laser Direct Imaging
- Stouffer Step 21: Clear 8 minimum (on metal)
- Energy: 200mJ / cm^2 minimum

POST EXPOSURE BAKE (PEB)

The post exposure bake is needed for excellent heat resistance and stability of fine openings for **FLEXFINER**. The optimum dwell time and oven temperature will depend on oven type, oven loading, air circulation, exhaust rate, and ramp times. Excessive times and temperature will result in difficulty in developing the film off of the printed circuit board.

Typical process is as follows:

- Oven Temperature: 85 - 95°C (185 - 203°F)
- Dwell Time: 20 - 40 minutes



2675 Antler Drive • Carson City, NV 89701 • Phone 775.885.9959 • Fax 775.885.9972 www.taiyo-america.com

Copyright © 2015 Taiyo America, Inc. All Rights Reserved.

PROCESSING PARAMETERS FOR FLEXFINER

Removal of Carrier Film and DEVELOPMENT

Peel the carrier film after the printed circuit board has reached room temperature after the PEB process. Appearance defects will occur if peeling is done prior to cooling.

FLEXFINER 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 (1.7 – 3.1 bars)
- Dwell Time in developing chamber: 40 - 80 seconds
- Water rinse is needed to remove developer solution followed by a drying step

FINAL CURE

FLEXFINER 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

Taiyo America, Inc. (TAIYO) warrants its products to be free from defects in materials and workmanship for the specified warranty period **(FLEXFINER Warranty period is 2 year)** provided the customer has, at all times, stored the film at a temperature of -15°C (5ºF) 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.

2675 Antler Drive • Carson City, NV 89701 • Phone 775.885.9959 • Fax 775.885.9972 www.taiyo-america.com

Copyright © 2015 Taiyo America, Inc. All Rights Reserved.

Appendix: PEB Process

FLEXFINER consist of a top layer and bottom adhesive layer. The composition of the tope layer is polyimide base. With only a UV exposure, polyimide network is not sufficiently formed. The PEB (Post Exposure Bake) is required after exposure to ensure sufficient polyimide curing.

	Without PEB process	PEB process 85deg.C / 35min	PEB process 90deg.C / 35min	PEB process 95deg.C / 35min
Cross section view (image)	Dissolved cover layer by development	Formed cover layer	Formed cover layer	Formed cover layer
Top view of formed pattern (Design value ϕ300um)				
Surface of FLEXFINER				
Solder heat resistance 288deg.C /10sec	Blister	Pass	Pass	Pass

 Revised October 28, 2024

2675 Antler Drive • Carson City, NV 89701 • Phone 775.885.9959 • Fax 775.885.9972 www.taiyo-america.com

Copyright © 2015 Taiyo America, Inc. All Rights Reserved.

FINAL PROPERTIES FOR FLEXFINER

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
Pencil Hardness	3.5.1	Minimum “F”	Pass – 4H
Adhesion	3.5.2.1	Rigid – Cu, Ni, FR-4	Pass
Adhesion	3.5.2.6	Doubled Layered Solder Mask	Pass
Machinability	3.5.3	No Cracking or Tearing	Pass
Flexural Endurance	3.5.4.1	MIT Test R=0.38mm Load 500g L/S=200/200	210–220 cycles
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 Solder	3.7.2	No Solder Sticking	Pass
Resistance to Solder	3.7.3	No Solder Sticking	Pass
Simulation of Lead Free Reflow	3.7.3.1	No Solder Sticking	Pass
Dielectric Strength	3.8.1	500 VDC / mil Minimum	Pass 4200 VDC/mil
Thermal Shock	3.9.3	No Blistering, Crazing or De-lamination	Pass

Specific Class “H” Requirements

TEST	SM-840 PARAGRAPH	REQUIREMENT	RESULT
Flammability	3.6.3.1	UL 94VTM-0	Pass
Insulation Resistance	3.8.2		
Before Soldering		5×10^8 ohms minimum	Pass (4.0×10^{12} ohms)
After Soldering		5×10^8 ohms minimum	Pass (1.7×10^{12} ohms)
Moisture & Insulation Resistance	3.9.1		
Before Soldering		5×10^8 ohms minimum	Pass (1.9×10^{12} ohms)
After Soldering		5×10^8 ohms minimum	Pass (1.7×10^{12}ohms)
Electrochemical Migration	3.9.2	>2.0×10^6 ohms, no dendritic growth	Pass (1.9×10^{11} ohms)

Specific Class “T” Requirements

TEST	SM-840 PARAGRAPH	REQUIREMENT	RESULT
Flammability	3.6.3.2	Bellcore 0_2 Index – 28 minimum	Pass
Insulation Resistance	3.8.2		
Before Soldering		5×10^8 ohms minimum	Pass (4.0×10^{12} ohms)
After Soldering		5×10^8 ohms minimum	Pass (1.7×10^{12} ohms)

 Revised October 28, 2024

2675 Antler Drive • Carson City, NV 89701 • Phone 775.885.9959 • Fax 775.885.9972 www.taiyo-america.com

Copyright © 2015 Taiyo America, Inc. All Rights Reserved.

TECHNICAL DATA SHEET

FINAL PROPERTIES FOR FLEXFINER

Specific Class "T" Requirements

TEST	SM-840 PARAGRAPH	REQUIREMENT	RESULT
Moisture & Insulation Resistance Before Soldering After Soldering	3.9.1	 5 x 10^8 ohms minimum 5 x 10^8 ohms minimum	 Pass (1.9 x 10^{12} ohms) Pass (1.7 x 10^{12}ohms)
Electrochemical Migration	3.9.2	< 1 decade drop, no dendritic growth	Pass

Additional Tests / Results

TEST	REQUIREMENT	RESULT
Adhesion	GIP-008AA (TAIYO Internal Test Method) Cross-cut tape stripping test	100/100
Solder Heat Resistance	Solder float test: Rosin Flux 288°C/10sec., 2 cycle	Pass
Bendability	TAIYO Internal Test Method 190 degree bending	No cracks
Outgassing Test ASTM E 595-90 A 2-3 J/cm2 UV Cure was done after thermal curing.	TML < 1% CVCM < 0.10%	Pass - TML = 0.83% Pass - CVCM = 0.04%
Tensile Test	Tensile testing machine SHIMADZU: AGS-G 100N	Young's modules: 1.7 GPa Tensile strength: 32 MPa Elongation: 35%
TMA	Thermal mechanical analyzer SII: TMA/SS6100	Tg1: 35C Tg2: 167C CTE α1: 68ppm CTE α2: 116ppm
Dielectric Property	Cavity resonator perturbation method (1GHz)	Dielectric Constant: 3.00 Dissipation Factor: 0.02

2675 Antler Drive • Carson City, NV 89701 • Phone 775.885.9959 • Fax 775.885.9972 www.taiyo-america.com

Copyright © 2015 Taiyo America, Inc. All Rights Reserved.