TECHNICAL DATA SHEET
EFP140
Screen Print (SP)
Air-spray (AS)
Aqueous Developable
PHOTOIMAGEABLE FLEXIBLE COVERLAY

PRODUCT DESCRIPTION

Manta®EFP140 is a liquid photoimageable coverlay, which has been formulated for use in the manufacture of flexible and flex-rigid printed circuit boards and BGA packages using polyimide substrates.

It is a contact exposure, aqueous developing system using two-component epoxy technology to give high levels of chemical resistance combined with an exceptional degree of flexibility.

PROCESSING

Board surface preparation:
Copper surfaces should be mechanically or chemically cleaned to give a waterbreak-free surface. Recommended mechanical methods are pumice, aluminium oxide or 320 to 500 grit brush.

All boards **must** be completely dry before coating.

Mixing:
EFP140 is supplied in pre-weighed paste and hardener containers. The two components should be mixed together prior to use. Stir well to ensure complete mixing.

Incomplete mixing can cause poor developing, stickiness during exposure and impaired final properties.

Viscosity reduction:

SP versions of EFP140 are supplied screen ready. If viscosity adjustment is required prior to, or during printing, then this may be achieved using **Electra reducer ER1.** No more than 5% reducer should be added or deterioration of the printing and drying properties may occur, resulting in thin deposits on track edges and/or prolonged drying times.

AS versions of EFP140 should be reduced with Electra reducer ER6. % additions will depend on the spray system used however typical levels are between 30 and 45%.

Screen print parameters:

Mesh count: 37-55T polyester.
Squeegee: 60-70 Shore.

Care should be taken to ensure the vacuum bed on the print table does not suck ink into and through the holes in the circuit.

Air spray parameters:

Exact spray parameters will depend on circuit layout. These parameters will also depend on equipment manufacturer, please contact Electra Technical Service Department for specific recommendations.

Below are general recommendations and guidelines:-

Wet-thickness: 30 – 50µms (1.2 – 2 mils)

Tank pressure and coating speed are set to give desired wet thickness.
Atomising pressure should be set to give minimal mottling.
Shaping air is adjusted to give an even spray pattern.

Lower atomising pressures and high coating speeds will lead to increased mottling.

Tack-dry:
The aim of the tack-drying stage is solely to remove the solvents. It is important for the drying chamber (static or conveyorised) to have good air circulation with air supply and extraction facilities.

Convection oven drying:- 20 - 60 mins @ 75ºC

IR Drying
IR drying is dependent on coating application method, IR wave-length and IR intensity.
Please contact Electra Technical Support Department for recommendations regarding specific equipment types and manufacturers.

Exposure
Spectral output: 310-420 nm.
Step wedge: 9-10 clear (Stouffer 21 step). Approx. 400-500 $mJcm^{-2}$ (ILT800-UV)

Determination of the correct exposure should be carried out after setting the developing speed since this will affect the step wedge reading obtained.

The step wedge determination should be carried out on brushed copper with the step wedge under the phototool. The energy requirement is between 400-500 $mJcm^{-2}$ at 310-420 nm, the optimum wave-length is approx. 365nm. Energy level should be measured through the mylar or glass.
It is important to recognize that the energy level should only be used as a guide for setting the correct exposure and the step wedge should be used for determining the actual exposure setting.
Separate exposure tests should be carried out for each different colour, as variations in lamp emissions can cause differences in exposure speed.

After determining the correct setting, the energy level can be measured and monitored as a means of checking for any decrease in output from the lamp with age.

Developing

Developer:	1% soln sodium or potassium carbonate.
Spray pressure:	1.5-2.5 kgcm^{-2}, 20-40 psi.
Spray time:	30-90s in carbonate chamber(s) (dependent on amount of ink in holes).
Temperature:	30 to 35ºC

Boards should be well rinsed with fresh water and fully dried after developing.
Do not final cure boards when wet.

The optimum developing speed is set when an unexposed board develops off completely, 25- 50% of the way through the machine. This speed should be ascertained by preliminary tests prior to making exposure tests.

Developing speed and break-point settings will be determined by the amount of ink deposited in the holes during coating.

Final Cure

Convection oven: 60 mins at 150ºC **Time at temperature**

Safelight

It is not normally necessary to print **EFP140** under safelight conditions, although it may be advisable if there are long delays before drying. Between drying/exposing and exposing/developing, boards should be kept in yellow light. Boards should, in any case, be kept out of direct sunlight until completely processed.

Cleaning

Equipment should be cleaned of residual soldermask using **SW100 or Dowanol PMA.**

Shelf-life

Minimum 6 months from date of manufacture when stored in cool, dry, recommended conditions.
Storage should be between 10 and 25°C and must be away from sources of heat and direct sunlight.

Final properties

TEST	METHOD	RESULT	CLASSIFICATION
X-hatch adhesion		100%	Pass
Flexibility	3mm Mandrel	After final cure 180° bend 360° bend	Pass Pass Pass
Methylene chloride. resistance	60s droplet	No surface roughness. No blisters. No delamination. No swelling. No colour change.	Pass
Wave solder resistance	3 x 10s @ 260°C 1 x 10s @ 288°C	No loss of adhesion or solder pick-up.	Pass

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