TECHNICAL DATA SHEET
SCRIBE
ELP112

Aqueous Developable
LIQUID PHOTOIMAGEABLE LEGEND PASTE

PRODUCT DESCRIPTION

ELP112 is a high contrast, high resolution photoimageable legend ink formulated for use where the required print accuracy cannot be achieved with conventional screenprinted ink or where the number of panels in the batch does not warrant the cost of making a screen and stencil.

It is ideally suited for application by screen-printing (SP), curtain-coat (CC), electrostatic spray (ES), and air-spray (AS) methods and is particularly recommended for use in conjunction with **Carapace® EMP110** and other photoimageable soldermasks (LPISM).

FEATURES & ADVANTAGES

- **50μm resolution capability.** Small numbers and letters are easily reproduced.
- **Reduced cost for small batch sizes. ELP112** can be blanket screened, eliminating the time consuming and costly exercise of stencil make-up.
- **No legend on pads.** Because **ELP112** is photoimageable, it only ends up on the pads if it is wanted there.
- **Legend before HASL.** Because **ELP112** will not finish up on pads it can be applied prior to Hot-air-solder-level (HASL), eliminating torn screens and allowing legend and LPISM to cured in a single stage.

Variety of colours. ELP112 comes in the following colours:

ELP112W	**WHITE**
ELP112Y	**YELLOW**
ELP112N	**BLACK**

Surface preparation:

Boards should be clean and free of grease and oil before applying **ELP112.** Particular care should be taken when applying after the HASL process, to ensure all flux residues have been removed.

If applying over copper, all surfaces should be mechanically (brush or pumice) or chemically cleaned to give a waterbreak-free surface.

Mixing:

ELP112 is supplied in 1kg, 3kg or 10kg packs.
The resist should be mixed in the ratio 100 parts paste (pt A) to 19 parts hardener by weight. Stir well to ensure complete mixing.
Incomplete mixing can cause poor developing, stickiness during exposure and impaired final properties.

Viscosity adjustment:

SP formulations:
SP versions of **ELP112** 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 or prolonged drying times.

CC, ES and AS formulations:
It is advisable to use a slow speed mechanical mixer when mixing in solvent for CC, AS, ES. Care should be taken to avoid incorporating air into the resist during mixing. Resist should be allowed to stand for 2 hours after mixing to allow air to escape. Excessive air in resist can cause microbubbles/voids in the finished film and/or poor curtain stability when curtain-coating.

CC: **ELP112** should be reduced with **Electrareducer ER6** to a viscosity of 80 to 100s (Ford N°4 cup), 60 to 80s (Frikmar N□4) at 25°C. The amount required is typically 30 to 35% by weight. Where **ER6** is not available, an equivalent from an approved source may be used. The use of non-approved solvents is not recommended as they can cause contamination and other processing problems.
When using curtain-coating equipment, which utilises short/low temperature evaporation zones, it is advantageous to use a blend of viscosity reducers to ensure microbubble elimination. Recommendations will be made by the Electra Technical Service Department during pre-trial discussions.

ES: **ELP112** should be reduced with to a viscosity of 70 to 100s (Ford Nº4 cup) 60 to 80s (Frikmar Nº4 with **Electrareducer ER10**. Where **ER10** is not available, an equivalent from an approved source may be used. The use of non-approved solvents is not recommended as they can cause contamination and other processing problems.

AS: **ELP112** should be reduced with **Electrareducer ER10.** Where **ER10** is not available, an equivalent from an approved source may be used. The use of non-approved solvents is not recommended as they can cause contamination and other processing problems. Addition level required will depend on spray system. % additions will depend on spray system used, the following levels are typical:

Machine type	% reducer (by weight)	Viscosity		
		Zahn N°3	Frikmar N°4	Ford N°4
Argus horizontal spray	35 to 45%	25 to 30s	40 to 60s	50 to 75s
Teledyne vertical spray	35 to 50%	25 to 30s	40 to 60s	50 to 75s

Due to the fast viscosity readings using a Zahn$_3$ cup, air inclusion can give erratic readings. It is therefore recommended to use the Ford N°4 or a cup giving similar values (e.g. Frikmar N°4).

Screen-print parameters: Mesh count: 100-120T polyester.
Squeegee: 60 to 70 shore.

AS, CC, ES application: Refer to EMP110 technical datasheet for application parameters or contact Electra Technical Service Department for specific recommendations.

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

ELP112™ has a proven wide drying window allowing the use of higher temperatures.

Temperature range: 70 to 80ºC
Time range: 25 to 60 minutes

(A) Double-side coating — Optimum setting: 30 mins at 75ºC

(B) Single-side coating — Optimum setting: Side 1: 15 mins at 75ºC; Side 2: 30 mins at 75ºC

Owing to the much lower viscosity of **ELP112™** when applied by ES, CC or AS; drying should be carried out in a horizontal position to avoid sagging. If this is not possible, then initial drying should be carried out in a horizontal position using forced air, before racking for drying in a vertical position. The initial solvent evaporation may be carried out at room temperature, or at a slightly elevated temperature. When applied by screenprinting, horizontal drying is not necessary.

After drying it is recommended that boards should be processed within 24 hrs to avoid increasing the developing time.
Boards **must** be at room temperature before exposure.

Exposure: Spectral output: 310-420 nm.
Energy requirement: 450-900 mJcm^{-2} (Depending on colour and thickness).
Step wedge: 9-11 clear (Stouffer 21 step)

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.
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.

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

It is not necessary to hold boards before developing. Boards should preferably be developed within 24 hrs of exposure.

Developing:

Solution:	1% soln sodium or potassium carbonate.
Spray pressure:	1.5-2.5 $kgcm^{-2}$
Spray time:	30-60s (in developing chambers).
Temperature:	30 - 35ºC

Boards should be well rinsed with fresh water and fully dried after developing.

The optimum developing speed is set when an unexposed board develops off completely, 75% of the way through the machine. This speed should be ascertained by preliminary tests prior to making exposure tests.

Final cure:

60 mins* at 150ºC *__TIME AT BOARD TEMPERATURE__

Stripping:

5% NaOH soln @ 40-50ºC

Cleaning:

Screens and equipment should be cleaned using **Universal Cleaner SW100**

Storage:

Store between 10-25ºC in a dry store.

Avoid subjecting containers to temperatures below 5ºC because of risk of splitting.

Shelf-life: Minimum 12 months from date of manufacture when stored in cool dry conditions.

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