UNION INKS

Product Information

AQUEOUS DEVELOPABLE PHOTO-IMAGEABLE SOLDER MASK
99-110 TGG

TIL NO : 760

APPLICATION AND END-USE DESIGN

Aqueous Developable Photo-imageable Solder Mask 99-110 TGG is a contact exposure photo-imageable solder mask for aqueous developing. It is formulated for use on high density copper, black oxide or tin/lead plated printed circuit boards where the required definition cannot be achieved with conventional screen printable resists.

FEATURES AND ADVANGTAGES

- Long pot life 2 component mixture remains useable for up to 2 days at room temperature.

- High Solids 99-110TGG contains high solids, ensuring thick, even coatings of 25 microns or more with one layer.

- Thixotropic Good track coverage with no thinning of coating at track edges.

- Fast exposure 25 - 35 seconds using standard 5 KW PC equipment. Using 7 KW lamps, time as short as 15 seconds may be achieved. Avoid bottle necks at photo-printing stage and maintains fast output.

- Easy development Develops in 1% sodium carbonate solution. Easy development ensures fast throughout and less chance of blocked holes.

- Thermal cure Thermal cure ensures optimum physical and chemical properties.

- Excellent moisture and insulation resistance Conforms to IPC SM 840 Class III , BS 6096/9000, MIL 55110D.

PROCESSING NOTES

PRE-CLEANING OF BOARDS

Copper tracks should be brushed or micro-etched to give a water break - free surface. Tin/lead boards should be thoroughly degreased using detergent/water rinse or solvent cleaning methods.
Adhesion may be helped by lightly brushing the tin/lead prior to printing. All boards should be completely dry before printing.

MIXING

99-110 is supplied pre-weighed in 5 kilos pack or 1 kilo pack and should be mixed in the ratio of 80 parts (Part A) to 20 parts Hardener 99-110H. Stir well to ensure homogeneous mixing.

Note : Inadequate mixing may cause problems such as non uniform developing and inadequate cure.

Care should be taken to avoid incorporating air into the mixture whilst stirring, particularly when using mechanical stirrers. No hold time is required after mixing.

VISCOSITY ADJUSTMENT/REDUCTION

99-110 TGG is supplied press ready. However, if viscosity adjustment is required prior to, or during printing, this may be achieved using Reducer PSM 1. No more than 5% reducer should be added or deterioration of the printing and drying properties may occur resulting in thin deposits on tracks edges and longer drying times.

PRINTING

Mesh : 43-55T cm^{-1} polyester mesh
Squeegee : 60-70 shore

The choice of mesh should be made according to the thickness of solder mask required and the ease of encapsulation of the tracks.

Using 43T mesh, a solder mask thickness of 22-25 microns should be obtained.

The boards outline image may be made on the screen using conventional stencil material or masking tape and screen filler.

To prevent a build up of ink on the reverse of the screen blocking the holes in the boards, it is advisable to turn alternate boards before printing. Alternatively, a rudimentary stencil, such as an expanded drill mask can be used on the screen to prevent ink going into holes.

DRYING

The following drying schedule are recommended :-

Single side processing	**Temperature**	**Time**
Side 1	75-85 ^{0} C	25 minutes.
Side 2	75-85 ^{0}. C	25 minutes.
Double side processing		
Side 1	75-85 ^{0} C	25 minutes.
Side 2	75-85 ^{0} C	45 minutes.

Although 99-110 TGG has a wide processing latitude, care should be taken not to over dry or development may be prolonged or completely prevented.

Boards should be cooled to room temperature before exposure.

HOLD TIME

Minimum : 0 hours
Maximum : 48 hours

After drying it is recommended that the boards should be processed within 24 hours to avoid increasing the developing time. However, boards may be held for up to 48 hours with only slight increase in developing time.

EXPOSURE

Spectral output : 310-420 nm
Energy requirement : 300-600 millijoules per sq. cm
Step wedge : 8-10 solid (stouffer 21 step)

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

The step wedge determination should be carried out in brush copper with step wedge under the photo-tool. Using a typical 5KW exposure lamp, the time is about 25-35 seconds.

The energy requirement is between 300-600 millijoules / cm. $^{-2}$ at 320-390 nm. The energy level should be measured through the mylar or glass as appropriate.

It is important to recognise that the energy level should be used as a guide for setting the correct exposure and the step wedge should be used for determining the actual exposure setting.

Important : 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.

Hold Time

Minimum : 0 hours
Maximum : 48 hours
It is not necessary to hold boards before developing. Boards should preferably be developed within 24 hours although they can be held up to 48 hours with a slight increase in developing time.

DEVELOPING

Developer : 1% solution sodium or potassium carbonate
Spray pressure : 1.5 - 2.5 kg / cm ^{2}.
Spray time : 30 - 60 seconds (developing stage)
Temperature : 27-32 ^{0} C

Boards should be rinsed with fresh water after developing.

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.

STRIPPING

After developing, any reject boards may be stripped of solder mask using 5 % Sodium Hydroxide solution at 40-50 ^{0} C.

FINAL CURE

Typical cure schedules are as follows:-

Convection Oven : 30 - 45 minutes at 150 ^{0} C

UV BUMP CURE

It is not normally necessary to UV Cure 99-110 TGG but under following certain conditions, it may be advantages:-

High film weight / plating

When depositing high film weights and/or printing over heavily plated tracks it is necessary some times possible to see slight wrinkling of the solder mask between the tracks after final cure. This may be prevented by UV curing before the final thermal cure.

Flux residues / staining

Occasionally flux residues or staining can be seen on boards, particularly after HASL with a very acidic or aggressive fluxes. This is caused by washing boards whilst still hot. All boards should be allowed to cool after HASL before washing off the flux.

If staining does occur, it can be removed by post baking the boards for 10-15 minutes at 120-150 ^{0} C. Alternatively, if it is not possible to cool boards before HASL, staining can be prevented by giving boards a UV bump cure after the final thermal cure.

NOTATION/MARKING INKS

Both UV and thermal curing notation inks are suitable for use with 99-110 TGG. Thermal curing ink may be applied before or after the final cure. If UV notation inks are used, they should be applied before final cure and before UV bump cure. In this case UV Curing the notation will serve as the bump cure for the solder mask.

SCREEN CLEANING

After printing the screen and stencil should be cleaned of residual solder mask using Uniwash 99-SW113.

SHELF LIFE

Minimum 6 months from date of manufacture when stored in cool dry conditions.