

PRODUCT DESCRIPTION

RS-2000 is a dual component, alkaline developable liquid photo-imageable solder mask for single and double sided screen printing and air spray application.

It is designed for on-contact exposure and development in aqueous sodium or potassium carbonate.

This advanced material presents good definition characteristics, high photosensitivity, excellent adhesion and optimal resistance to all common finishes processes.

RS-2000 is formulated for the manufacture of Rigid PCB as permanent protective coatings.

RS-2000 products exhibit the following performance properties:

- Wide process latitude enabling fine image reproduction with clean PTH/Via development.
- Excellent reliability.
- High productivity with yields in order of 14-18 m²/kg (depending on application).
- Superior chemical and electrical properties of RS-2000 guarantee excellent resistance to all common process finishes.
- RS-2000 is compatible with UV and thermal legend inks.
- Resistant to downstream processing chemicals including no-clean fluxes, cleaners, solvents, etc.
- Completely ecological.
- Fully compatible with all assembly rework processes.
- Meets or exceeds IPC SM 840-E specifications.

UL CERTIFICATE – file n° QMJU2.E310593

PHISICAL – CHEMICAL PROPERTIES

PROPERTIES	VALUE
COLOUR	Ink: Various
	Hardener: White
MIXING RATIO	Ink/Hardener = 75/25
VISCOSITY (INK + HARDNER)	180 ± 30 Ps a 25°C – Viscotester VT-04F
SOLID CONTENT	75 ~ 78% w/w
DENSITY AFTER MIXING	1.3 ± 0.2 g/cm ³
POT LIFE	Maximum 24 h at 25°C in a dark place
SHELF LIFE	6 months (5 ~ 25°C) in original package

INK PREPARATION

RS-2000 is supplied as pre-weighed, two component products. Briefly premix the individual components prior to addition of the catalyst into the ink.

Thoroughly blend until a homogenous mixture is obtained (See "Mixing ratio" in table reported above).

Allow the mix to sit for ~ 15 minutes in its sealed container prior to use. Briefly remix prior to use.

The pot life of the mixed material is 24 hours provided the material is stored in its original sealed containers. Keep away from heat and strong light sources.

RECOMMENDED PROCESS FLOW & OPERATING PARAMETERS

	24 hours conditioning time at working room temperature, before use, is recommended
Mixing	The product is supplied as two components that has to be mixed with mixing ratio ink/hardener 75/25
	Conditioning time, after mixing, is recommended: 20 ~ 30 min
	In case add solvent, OPSR Thinner, to obtain desired viscosity value
Surface Treatment	Brushing (Rz = 1.5 ~ 3.0 µm; Ra = 0.1 ~ 0.3 µm)
	Microetch (Etch rate ≥ 1.0 µm)
	Pumice (Pumice grade FFF 10 ~ 15%)
<i>Double side printing, cure separately</i>	
Screen Side 1	43 - 55 T polyester treats/cm
Pre-baking	70° ~ 75°C (158 ~ 167°F) for 15 ~ 20 min (Hot air convection oven with good air ventilation)
Cooling	After 15 minutes at room temperature second side processing is possible
Screen Side 2	43 - 55 T polyester treats/cm
Pre-baking	70° ~ 75°C (158 ~ 167°F) for 15 ~ 20 min (Hot air convection oven with good air ventilation)
Cooling	After 20 minutes at room temperature exposure is possible
<i>Cure both sides at one time</i>	
Pre-baking	35 ~ 50 minutes at 70° ~ 75°C (158 ~ 167°F) (Hot air convection oven with good air ventilation)
Cooling	After 20 minutes at room temperature exposure is possible
Exposure	Metal Halide Lamp (5 ~ 7 KW)
	800 ~ 1000 mJ/cm ² for white colour Stouffer 21 steps 8 ~ 10
	300 ~ 500 mJ/cm ² for all other colours Stouffer 21 steps 8 ~ 12
Hold Time	Minimum 10 min.
Developing	1.0 ~ 1.5% Na ₂ CO ₃ /K ₂ CO ₃ Solution at 29 ~ 32°C Dwell time 50 ~ 60 sec
	Spray Pressure 1.5 ~ 2.5 Kg/cm ²
Rinsing	City Water at 25 ~ 28°C Spray pressure 1.0 ~ 1.5 Kg/cm ²
Final Cure	60 minutes at 150 ~ 160°C

DRYING CYCLES

TEMPERATURE	72 ~ 75°C	72 ~ 75°C	72 ~ 75°C	72 ~ 75°C
TIME (minutes)	40	50	60	70
IMAGING EFFECT	OK	OK	OK	NG

Note: In double side processing, curing separately, the side 1 drying should be sufficiently tack-free to resist fingerprinting.

Care should be taken when handling panels to prevent damage to side 1 during second side coating.

Allow panels to cool to room temperature prior to imaging.

HOLD TIME AFTER DRYING

The hold time after drying depends on the operative parameters used during the pre-baking process.

IMAGING

A 5 kW or greater UV vacuum frame exposure unit without UV filter should be used and UV spectra at 280-420 nm (360 nm peak) is required in order to properly expose and polymerize.

Also, the amount of energy required to fully polymerize the coverlay film will vary depending upon film colour, thickness and proprietary formulation: proper exposure is determined through the use of a 21 step Stouffer step tablet.

A properly exposed RS-2000 will exhibit a Stouffer step reading of solid ≥ 8 steps.

The procedure for Stouffer step analysis is as follows:

1. Ensure the Developing process is running properly (i.e. temperature, concentration, spray pressure, etc.).
2. Coat a number of copper clad panels with RS-2000 and tack dry to completion.
3. Set developer speed to obtain 30% breakpoint.
4. Once the developer process is set, set the exposure energy to obtain a solid Stouffer step reading of 8 solid.
5. The Stouffer step reading should be monitored on a regular basis as part of an SPC program of process control.

SENSITIVE PROPERTIES

PROJECT	INK THICKNESS	DEVELOP TIME	EXP. ENERGY	STOUFFER STEP	EXP. ENERGY	STOUFFER STEP
			White Colour		All Other Colour	
STOUFFER STEP 21 STEPS	25 µm	60 sec	800 mJ/cm ²	~ 9	300 mJ/cm ²	8 ~ 10
			900 mJ/cm ²	~ 10	400 mJ/cm ²	9 ~ 11
			1000 mJ/cm ²	~ 11	500 mJ/cm ²	10 ~ 12

DEVELOPMENT

Typical conditions utilized in horizontal or vertical spray units are as follows:

	OPTIMUM	RANGE
Na₂CO₃ / K₂CO₃	1.0%	0.8 ~ 1.2%
Temperature	30°C (90°F)	29 ~ 35°C (86 -95°F)
Spray Pressure	2.0 bar (30 psi)	1.5 ~ 2.5 bar (20 ~ 60 psi)
Dwell Time	As measured	50 ~ 60 sec
Rinse Water	City water	
Rinse Pressure	1.5 bar (20 psi)	1.0 ~ 2.5 bar (15 ~ 60 psi)
Rinse Temperature	25°C (77°F)	24 ~ 28°C (75 ~ 82°F)
Drying	Warm turbine air or air knife drying	

The developer solution should be periodically analyzed for carbonate concentration to ensure proper solution makeup is maintained.

It should be measured and monitored on a regular basis.

Adjust the carbonate concentration in accordance with the analysis result.

REWORK

Rework of misregistered images may be accomplished by stripping the solder mask film in 5 ~ 10% NaOH at 50°C (122°F), prior to final cure.

FINAL CURING

	TEMPERATURE	TIME
Final Curing	140 ~ 160°C (285 - 320°F)	50 ~ 60 minutes

Optimum thermal curing is attained by baking the panels for 60 minutes at 150°C (300°F).

RS-2000 PROPERTIES

TESTED ITEMS	RESULT	REMARK
Pencil Hardness	> di 6H	IPC-TM-650 TM-2.4.27.2 JIS K5400
Adhesion	100/100	IPC-TM-650 TM-2.4.28.1 JIS K5400
Abrasion	OK	IPC-SM-840-E 3.5.1 Taber class 3
Solder Resistance	OK	IPC-SM-840-E 3.7.2
Resistance To Molten Solder	OK	260°C, 10 sec, 6 times
Hydrolysis Stability	OK	IPC-SM-840-E 3.6.2 Class H
Flammability	V0	UL94
Chemical Resistance	OK	IPC-SM-840-E 3.6.1
		Water: T _{amb} - 60 min
		Sulphuric Acid 10%: 20°C - 60 min
		Sodium Hydroxide 10%: 20°C - 60 min
Solvents Resistance	OK	IPC-SM-840-E 3.6.1
Insulation Resistance	> 1 x 10 ¹¹ Ohm	IPC-SM-840-E 3.8.2 class H before and after soldering process
Moisture Insulation Resistance	OK	IPC-SM-840-E 3.9.1 class H
Ion Migration Resistance	OK	IPC-SM-840-E 3.9.2 class H
Voltage Breakdown	2 ÷ 3 KV	IPC-SM-840-E 3.8.1 (min 500 VDC/mil)
Thermal Shock	OK	IPC-SM-840-E 3.9.3 SH
HASL	OK	
ENIG	OK	

STORAGE AND SHELF LIFE

RS-2000 products may be stored at ambient temperatures.

Avoid elevated temperature (> 37°C or > 100°F) and direct sunlight.

RS-2000 products exhibit a minimum of 6 months shelf life if the above conditions are met.

HANDLING PRECAUTIONS

BEFORE HANDLING ANY CHEMICAL PRODUCTS, IT IS IMPORTANT TO READ THE APPROPRIATE MATERIAL SAFETY DATA SHEET.

In case of order please indicate this code:

CODE	PACK SIZE	NAME	COLOUR	FINISHING
HT 8001	1 Kg	RS-2000 6GL	Green	Glossy
HT 8004	1 Kg	RS-2000 Y	Yellow	Glossy
HT 8005	1 Kg	RS-2000 R	Red	Glossy
HT 8006	1 Kg	RS-2000 BL	Blue	Glossy
HT 8007	1 Kg	RS-2000 BK	Black	Glossy
HT 8021	1 Kg	RS-2000 CBKM-F	Black	Matt
HT 8009	1 Kg	RS-2000 3GLM	Green	Matt
HT 8002	1 Kg	RS-2000 W-1(B)	White	Glossy
HT 8015	1 kg	RS-2000 W	White	Glossy
HT 8016	1 Kg	RS-2000 WDM	White	Matt

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Any such special or particular description shall be taken only as the expression of seller's opinion in that behalf. The seller does not give any warranty as to the quality (save that the goods are of merchantable quality), state condition fitness of the goods or use to which the goods may be put.

Claims on account of weight, loss of or damage to the goods in transit (so far as seller is liable) shall be made in writing to the seller within the period of 30 days of receipt thereof.

No claim shall be entertained after the expiration of the appropriate period mentioned above and the seller's liability by reason of any such claim shall not in any event the purchase price of the goods in respect of which a claim is made. Goods shall not be returned to the seller without the seller's express written permission.

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