Technological parameters and precautions for liquid photosensitive solder resist ink

H-9100 AMG5 (Semi-matt)

1. FEATURES

H-9100 AMG5（Semi-matt）is a type of bicomponent liquid photosensitive solder resist ink which can be developed in dilute alkalic aqueous. The main features are as follow:

1）Fairly perfect printing behavior; cover the surface of the printed circuit board compactly;

2）Excellent hardness, wear resistance, compactness, cutability, chemical resistance, and heat resistance etc.;

3）IPC-840、RoHS and REACH compliance.

2. SPECIFICATION

Color*	Semi-matt Green	
Viscosity	180 ±60 dPa·s	(VT-04 Mode Viscometer, $5min^{-1}$ / 25℃)
Tack dry window*	75±2℃\70 min	(Maximum)
Exposure energy*	100 ~ 300 mJ/cm^2	(on solder mask)
Pot life*	24 hours	(stored in dark place, at 0-25℃)
Shelf life*	6 months	(stored in dark place, at 0-25℃)

* : After mixing

3. PROCESS CONDITION

PROCESS		RANGE
PWB	FR – 4 , 1.6 mm	—
Pre-treatment*	Acid treatment → Ash treatment	—
Printing	43T （110 mesh-count）	—
Hold time	10 min	10 ~ 20 min
Tack dry	➢ One side each exposure 1 st printing: 75℃ / 20 min 2nd printing: 75℃ / 30 min ➢ Both sides simultaneous exposure: 75℃ / 40 min	 75℃ / 15~25 min 75℃ / 25~35 min 75℃ / 35~45 min
Exposure	200 mJ/cm^2 (on solder mask)	100~300 mJ/cm^2
Hold time	10 min	10~20 min
Development	Aqueous alkaline solution: 1 wt% Na_2CO_3 Temperature of developer: 30℃ Spray pressure: 0.196 MPa Developing time: 60 sec	0.2~0.25 MPa 50~90 sec
Post cure	<Jack>150℃ / 60 min (Hot air convection oven) <No plug hole>80℃/30min→110℃/30min→150℃/60min	—

* : For Immersion-Tin finish, super roughness pre-treatment is suggested.

4. CHARACTERISTIC

Item	Test method	IPC-840 Requirements	Result
Hardness	The pencil hardness method	≥6H	6H
Adhesion	Cross-hatching peeling (copper)	100/100	100/100
Hydrolytic stability	IPC-TM-650 2.6.11B	No color change, no swollen, no fall off	No color change, no swollen, no fall off
Dielectric strength	IPC-TM-650 2.5.6.1	≥500VDC	1800V/mil
Stress resistance	IPC-TM-650 2.6.8	No fall off, no color change, no crack	No fall off, no color change, no crack
Dielectric constant（Dk）	IPC-TM-650 2.5.5.9	-	3.96

Dielectric loss factor (Df)	IPC-TM-650 2.5.5.2	-	0.037
Chemical resistance (room temperature)	Trichloroethane 60min	No color change, no swollen, no fall off	No color change, no swollen, no fall off
	10% H_2SO_4、30 min		
	10% NaOH、30 min		
	Isopropanol (IPC-TM-650 2.3.4.42)		
	75% Isopropanol +25% Deionized water (IPC-TM-650 2.3.4.42)		
	10% Alkaline detergent (IPC-TM-650 2.3.4.42)		
	Ethanolamine (IPC-TM-650 2.3.4.42)		
	Ionic water (IPC-TM-650 2.3.4.42)		
	D-Limonene (IPC-TM-650 2.3.4.42)		
Insulation resistance	IPC-TM-650 2.6.3.1	$\geqslant 5\times10^{8}\Omega$	$5.4\times10^{11}\Omega$
Moisture and insulation resistance	IPC-TM-650 2.6.3.1 H\T 级	$\geqslant 5\times10^{8}\Omega$	$3.9\times10^{10}\Omega$
Electrochemical migration	IPC-TM-650 2.6.14 H 级	$\geqslant 2\times10^{6}\Omega$	$2.5\times10^{11}\Omega$
	IPC-TM-650 2.6.14 T 级	Insulation resistance value drops less than 1 order of magnitude	PASS
	Temperature 85℃、Humidity 85%、1000h、Test voltage 50VDC。	$\geqslant 1\times10^{8}\Omega$	$2.6\times10^{8}\Omega$
Thermal cycling test	IPC-TM-650 2.6.7.3	No bubble, no crack	No bubble, no crack
	-40℃×30min、125℃*30min、1000 cycles	No bubble, no crack	No bubble, no crack

Note: 1.The test data mentioned above is the results from our research center which followed the mentioned process, in that case, it can be used as reference, RONGDA company do not guarantee the same result from customer side.

2.The above data is suitable for less than 2oz surface copper thickness PCB. Please consult with Technique team for thicker surface copper PCB.

5. PRECAUTIONS

1) The product should be stored or handled in certain environment: clean room, 0-25℃; in addition, only yellow light is allowed; do not handle the product in White electric light or sunlight (whether directly or indirectly).
2) The product should be applied in its original state; dedicated diluent should be used when viscosity adjustment is required, and the proportion must be controlled within 3%. Please do the matching-experiment first before using other diluent.
3) Once the product is mixed, it should be used out within 36 hours. When opening the can, hand mix it for 1-2 min at first before machine stirring.
4) Surface treatment of bared board has a critical impact on performance of solder resist.

   Before printing operation, it is suggested to treat the PCB with chemical micro-etch and mechanical polish-brush separately or simultaneously to remove those oxide, oil, fat or other pollutant on surfaces of the bared boards, and thoroughly cleaning and drying are followed; finger touch should be avoided and solder-resist printing process should be carried out as soon as possible, in case of pollution and oxidation again which can result in poor adhesive, or other degradation of solder-resist performance. Soft polish-brush (polish-brush 1000 mesh at least) followed by citric-acid immersion or spraying process is suggested to be the suitable pretreatment for golden board. Pay attention to the maintenance of pretreatment equipment after water rinse segment in case of the second pollution of board surface.
5) Exposure energy can vary as bared boards and thickness of printed ink changed. Please test befor to judge the undercut, surface gloss value and light-sensation on the backside. Stouffer value should be in level 9-13.
6) For the development equipment, the developing solution concentration and temperature, developing pressure and developing time should be controlled. Inappropriate management may result in poor developing performance of solder mask, such as developing inefficiency, undercut and blister. In addition, Spray nozzle of developing machine should be clean regularly to ensure good developing /rinsing effect in operation.
7) Developing process should be carried out in 36 hours after coating. If temperature and humidity in the workshop is relatively high, it should be finished in 18 hours.
8) If skin or eyes contamination happened, it is required to clean with soap and flush with plenty of clean water; do not clean with any solvent.
9) Considering this product is combustible, do not be kept or applied in somewhere close to smoke and fire.