

1. FEATURE

FSR-8000 8G/ HA-8000 series resist inks shown good screening ability and good adhesion to the laminate and to the conductors of the board. They have high resistance to thermal shock and satisfactory result after electroless plating process. Due to wide tolerance of operating parameter, they're widely acceptable as a universal type LPI solder resist inks for producing of double-sided and multi-layer boards.

FUNCTION & CHARACTERISTICS

Hot Air Leveling (H.A.L.)	Solder Heat Resistance	Electroless Gold Plating	Plugging Effect	Under-Cut	Solder Resist Bridge	
□	◎	◎	○	○	72~75	2 ~ 3mil □

2.SPECIFICATION

CV Number 8G05 / 8GSG / 8G85 / 8G86 / 8G88 / 8G89 / 8Y88 / 8B89

Base FSR-8000 8G	green
Color Hardener HA-8000 W8	white
Mixing ratio	3 : 1 (Base : Hardener)
Solid content	75 wt %
Viscosity	150 dPa.s(VT-04,25°C)
Specific gravity	1.3
Ignition point	76 °C
Film hardness	7H
Solder heat resistance	260°C × 30sec or longer
Hot air leveler resistance	260°C × 10sec, ≥ 3 times
Insulation resistance	≥ 10 ¹³ Ω
Electroless Ni/Au Resistance	Ni: 3 μm Au: 0.03 μm
Electro Ni/Au Resistance	Ni: 3-5 μm Au: 1 μm
Pot life at 20°C	2 days
Shelf life at 25°C	6 months
Packaging	1 kg (Bas 750g + Hardener 250g) ;10sets/box
Flammability	UL 94V-0 (290°C × 30sec)

3.EXAMPLE OF OPERATION PROCESS**1. Ink Mixing**

The Base and Hardener must be mixed thoroughly before use in the ratio of 3:1

Mixing time 5~10 min.

holding time 20~30 min.

2. Pretreatment

Mechanical brushing or acid treatment

3. Screen printing

- a. Use nylon , polyester or stainless steel screen for printing.
- b. 90 ~ 150 mesh/inch □ □ □ □ □ □
- c. Rubber / Polyurethane (PU) Squeegee with the hardness of 60 ~ 70 □ □ □
- d. Printing Angle 60~75° □ □ □ □ □
- e. Film thickness : Wet film 30~40 μ m Dry film 15~25 μ m

4. Precure

First side 75°C × 15 ~ 20 min

Second side 75°C × 30 ~ 35 min

Both side cure at the same time: 75°C × 30 ~ 55 min

5. Exposure

Energy required from UV rays: 400 ~ 600mj/ cm²

Photographic sensitivity : 300~500nm (Photosensitivity : 9 ~12 step)

6. Developing

By 0.8%~1.2% sodium carbonate (Na₂CO₃) solution

Spraying pressure : 1.5~ 2.5 kg/ cm²

Temperature : 28 ~ 32°C

Time : 45 ~ 90 sec.

7. Post curing

For air circulation oven 155±5°C ×45 ~ 75 min

4. ATTENTION in your process

1. Operation in a clean room of ambient temperature at 20 ~ 25°C / 50 ~60%RH, under yellow (UV cut) lamp avoiding fluorescent and sunlight.
2. For cleaning the screen, use cleaner #950 \ ester or cellosolve type solvent or a mixed solvent of ester and cellosolve type.
3. Mix and stir the main component HA-8000 8G and the hardener HA-8000 W8 in a weight ratio of 750g:250g before using and use the ink within 48 hours after mixing.
4. Use an undiluted solder mask, In case of any viscosity adjustment, use the specified thinner T-8 less than 3%.
5. Appropriate coating thickness on copper circuits after cure is 15~25 μm. Coating less than the said value may cause lower resistivity in solder heat, chemical and Ni/Au plating, and thicker coat may cause undercut and insufficient tackiness.
6. Copper foil surface treatment has a key effect on the proper functioning of solder resist inks. Therefore copper foil surface should be clean and free of oxidation absolutely. According to the degree and nature of the tarnish layer, select micro etching, mechanical brushing or both to ensure removal of any tarnish. Then rinse sufficiently with water and dry properly. Avoid treated surface to be touch by hand or come into contact with oil, grease or any dirty surface.
7. As curing condition and window are variable depending on the type of drying oven, the board curing may degrade the properties of coating film.
8. As exposure energy is variable depending on material type of substrates (UV absorbent, imide-type material, etc.) and on coating thickness, prior testing on resolution (no undercut), surface gloss level and shoot-through, etc. should be conducted to set the optimum condition.
9. Control well the quality of developing agent in its density, temperature, spray pressure and dwelling time. Insufficient control may cause deterioration in developability or undercut.
10. If contact with eyes or skin, rinse with plenty of water. Do not wash with any solvent.
11. Use this ink in places to avoid any fire or flame.
12. Store the ink in a cool place between 10°C~25°C.

5.CHARACTERISTICS

1.Tack dry window:

Precure time/min	10	20	30	40	50	60	70	80	90	100	110	120
(Developability)	80°C	×	○	○	○	○	○	△	×	×	×	×
	75°C	×	○	○	○	○	○	○	△	×	×	×
	70°C	×	○	○	○	○	○	○	○	○	○	△

2.Life after coating:

Precure condition 75°C/40min, kept in 20°C/60%RH

Holding time /hour	24	48	72	96	120
Developability	○	○	△	×	×

3.Photo properties:

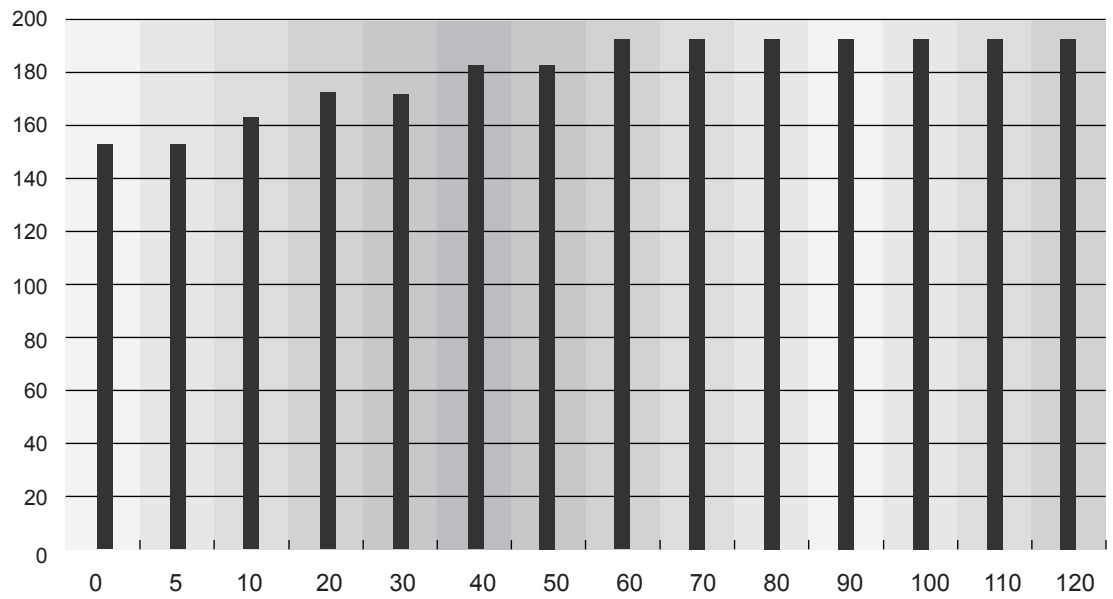
Item	Coating thickness	Exposing energy	Developing time	Photo sensitivity
Poto sensitivity: Kodak No.2	22 ± 2 μm	400mJ/cm ² 500mJ/cm ² 600mJ/cm ²	1min	9 10 11
Resolution (QFP)	35 ± 2 μm wet film	400mJ/cm ² 500mJ/cm ² 600mJ/cm ²	1分鐘(1min)	50 μm 50 μm 50 μm

Exposing energy in the upper columns indicate values under mylar film

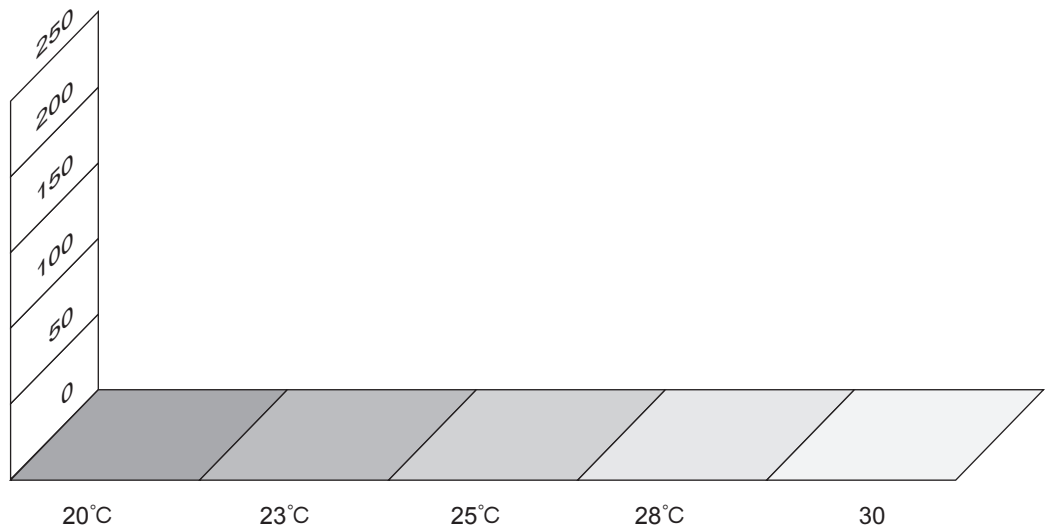
- Passed
- △ Little dross
- × Dross

8G05 & W8 Holding time and Viscosity change

Viscosity (ps)



Viscosity (ps)



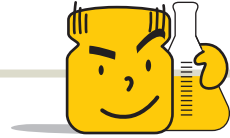
6. PROPERTIES**1. Physical Properties**

ITEM	RESULT	TEST METHOD
1.Film hardness	7H	JIS K5400 8.4 Pencil scratching test Pencil:Mitsubishi pencil,Coated film on copper and base material
2.Abrasion resistance	No abnormality in cured film	IPC-SM-840B 3.5.1 *Taber method 3.5.1.1 Testing method manual TM 2.4.27.1 : there shall be no film reduction in excess of 25 μm at completion of 50 cycle of abrasion *Pencil method 3.5.1.2 Testing method manual TM 2.4.27.2 : to be above F
3.Adhesion	100/100	JIS D0202 4.15 Crosscut adhesion test JIS K5400 8.5 Cellophane adhesive tape : JIS Z 1522 width : 12mm Coated film on copper and base material
4.Adhesive property	No abnormality in cured film	IPC-SM-840B 3.5.2 Rigid base plate 3.5.2.1 Testing method manual TM2.4.28.1
5.Cutting property	No abnormality in cured film	IPC-SM-840B 3.5.3 No crack or rent shall develop on the film, when visually examined at drilling, sawing and press punching operations

2. Chemical Properties

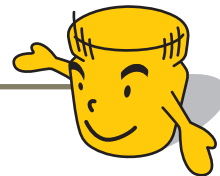
1.Solvent resistance	No abnormality in cured film	IPC-SM-840B 3.6.1 or JIS K5400 8.24 No blister,separation, swelling or color change shall occur on the film Isopropanol room temperature 60min. 1.1.1 Trichloroethane room temperature 60min. 4%ethylalcohol , 96%trichlorotrifluoroethane in the vapor 10min.
2.Chemical resistance	No abnormality in cured film	JIS K5400 8.22 & 8.23 10 wt. % HCl room temperature 30 min. 10 wt. % H ₂ SO ₄ room temperature 30 min. 10 wt % NaOH room temperature 60 min.

ITEM	RESULT	TEST METHOD
3.Hydrolysis resistance	No abnormality in cured film	PC-SM-840B 3.6.2 CLASS 1 35°C 90% RH 4 days CLASS 2 85°C 90% RH 7 days CLASS 3 97°C 90% RH 28 days to be free from any change in appearance and from sticky surface
4.Adhesion after boiling	No abnormality in cured film	JIS D0202 4.15 100°C 5hours
5.Adhesion after treatment in pressure cooker	No abnormality in cured film	JIS D0202 4.15 121°C 2atmosphere pressures 5 hours



3. Solder Properties

1.Solder resistance & Solderability	No abnormality in cured film	IPC-SM-840B 3.7 * solder resistance 3.7.2 No deterioration shall occur in the film after application of flux and dipping for 10sec. In solder bath of $255 \pm 5^{\circ}\text{C}$ 4.8.9.1 *Solderability and peeling property 3.7.3 Perform soldering and peeling of rinsed lead wire twice using solder, The result shall be satisfactory
2.Solder heat resistance	No abnormality in cured film	JIS C 6481 5.5 No blister and separation on cured film Appearance : Separation test by tape peeling Flux : Soldering temperature 260°C , 10 sec. , immersion 3 times °
3.Hot air leveler resistance	No abnormality in cured film	No blister and separation on cured film Appearance : Separation test by tape peeling Flux : Duration of immersion : 4 sec. Soldering temperature 260°C Hot air temperature 220°C Pressure : $3.8\text{Kgs} / \text{cm}^2$ immersion 3 times





ITEM	RESULT	TEST METHOD
4.Thermal Shock	No abnormality in cured film	IPC-SM840C 3.4.10 and IPC-TM-650 2.6.7.3 65°C × 15min + 125°C × 15min, 100cycles, transfer time less than 2 minutes
4.Electrical Properties		
1.Dielectric strength	2000V DC / mil	IPC-SM-840B 3.8.1 500V DC / mil more than 500V DC/mil
2.Volume	$1 \times 10^{15} \Omega \cdot \text{cm}$ resistivity	JIS C6481 5.9
3.Surface resistance	$1 \times 10^{15} \Omega$	JIS C6481 5.10
4.Insulation resistance	$1 \times 10^{13} \Omega$ $1 \times 10^{13} \Omega$ $1 \times 10^{13} \Omega$	IPC-SM-840B 3.8.2 (JIS C6481 5.11) CLASS1 35°C 90%RH 4 Applied voltage 110V $\geq 5 \times 10^8 \Omega$ CLASS2 50°C 90%RH 7 Applied voltage 110V $\geq 5 \times 10^8 \Omega$ CLASS3 25°C ~65°C 90%RH 7 Applied voltage 110V $\geq 5 \times 10^8 \Omega$ 1 cycle 8 ± 1/4 Hour
5.Dielectric loss tangent (Tan δ)	0.03 1 MHz	JIS C 6481 5.12 Impedance analyzer
6.Dielectric factor (ε)	3.5 1 MHz	JIS C 6481 5.12 Impedance analyzer
7.Electrochemical	Resistance \geq 2 megohms	IPC-SM840C 3.4.10 85°C ± 2°C, 90%RH, 168hrs, Bias voltage 10V DC

* All test data mentioned above in this technical data sheet and example of operation process are based on our test result and only for reference, not to guarantee the same in your process.

7. CAUTION

All chemicals used in this product might have unknown toxicity.

Please handle with your most care referring to the Product Guide and MSDS for use.