

1.(FEATURE) 前言

FSR-8000 10W38 / HA-8000 W8 系列阻焊油墨具有絕佳的塗膜表面光澤度以及優異的耐化金(無電解鍍金)性能，可用以施行厚化金製程而無白化現象；其良好的下墨性亦極適合進行塞孔製程，塞孔效果相當飽滿且表面平整無中空、凹陷、爆孔等現象。非常適合用來製作生產較高階之雙面或多層印製電路板，是一種功能性相當強且容易操作之萬用型液態感光阻焊油墨。

FSR-8000 10W38 / HA-8000 W8 series possesses the advantages of shiny coating finished and excellent resistibility to electroless plating chemicals/solutions. Therefore they're suitable for advanced thick electroless plating process without pilling. These strong functional and user-friendly inks are highly recommended for manufacturing of high density double-sided or multi-layer boards.

功能特性

噴錫	浸錫	化金	塞孔	側蝕角度	綠油橋
◎	◎	◎	◎	75度	4 mil

2.規格說明 (SPECIFICATION)

CV Number

10W38

顏色 Color

主劑 Base FSR-8000 10W38 白色 white

硬化劑 Hardener HA-8000 W8 白色 white

混合比例 Mixing ratio

4 : 1 (Base : Hardener)

固形份 Solid content

79 wt %

粘度 Viscosity

170dPa.s (VT-04,25°C)

比重 Specific gravity

1.3

引火點 Ignition point

76 °C

皮膜硬度 Film hardness

7H

鐸錫耐熱性 Solder heat resistance

260°C × 30sec or longer

耐噴錫性 Hot air leveler resistance

260°C × 10sec, ≥ 3 times

絕緣電阻 Insulation resistance

≥ 10¹⁴ Ω

無電解鍍金性 Electroless Ni/Au Resistance

Ni: 5 μm Au: 0.05 μm

電解鍍金性 Electro Ni/Au Resistance

Ni: 5-8 μm Au: 1.5 μm

加入硬化劑後使用期限 Pot life at 20°C

24 hours

儲存安定性 Shelf life at 25°C

6 months

包裝 Packaging

1 kg (主劑800g + 硬化劑200g) ; 10sets/box

耐燃等級 Flammability

UL 94V-0 (290°C × 30sec)

PS.: 顏色請參照色卡

3. 操作流程範例 (EXAMPLE OF OPERATION PROCESS)

<p>油墨攪拌</p> <p>將主劑與硬化劑依 3 : 1 之比例 (本公司之包裝 1 罐 : 1 罐) 充分混合後, 攪拌 (震盪) 5 ~ 10 分鐘, 靜置 20 ~ 30 分鐘使油墨粘度穩定之後再行使用</p>	<p>1</p>	<p>Ink Mixing</p> <p>The Base and Hardener must be mixed thoroughly before use in the ratio of 3:1</p> <p>Mixing time 5~10 min.</p> <p>holding time 20~30 min.</p>
<p>基板前處理</p> <p>機械磨刷或酸處理</p>	<p>2</p>	<p>Pretreatment</p> <p>Mechanical brushing or acid treatment</p>
<p>網板印刷</p> <p>a. 絲網 — 直接、間接、直間接之尼龍絲網、多元酯網或鋼絲網皆可</p> <p>b. 絲網網目 : 90 ~ 150 mesh/inch</p> <p>c. 刮刀 : 60 ~ 70 度彈性良好、邊緣銳利之橡膠或聚氨酯刮刀</p> <p>d. 刮印角度 : 60 ~ 75 度(刮刀與板面夾角)</p> <p>e. 塗膜厚度 : 濕膜 30 ~ 40 μm 乾膜 15 ~ 25 μm</p>	<p>3</p>	<p>Screen printing</p> <p>a. Use nylon , polyester or stainless steel screen for printing.</p> <p>b. 90 ~ 150 mesh/inch</p> <p>c. Rubber/Polyurethane (PU) Squeegee with the hardness of 60 ~ 70</p> <p>d. Printing Angle 60~75°</p> <p>e. Film thickness : Wet film 30~40 μm Dry film 15~25 μm</p>
<p>預烘烤</p> <p>第一面 75°C × 15 ~ 20分鐘</p> <p>第二面 75°C × 30 ~ 35分鐘</p> <p>雙面同時烘烤時: 75°C × 30 ~ 55分鐘</p>	<p>4</p>	<p>Precure</p> <p>First side 75°C × 15 ~ 20 min</p> <p>Second side 75°C × 30 ~ 35 min</p> <p>Both side cure at the same time: 75°C × 30 ~ 55 min</p>
<p>曝光</p> <p>冷卻式曝光機, 能量 400 ~ 600mj / cm</p> <p>有效UV波長 300~500nm</p> <p>(曝光尺 9 ~ 12格之間)</p>	<p>5</p>	<p>Exposure</p> <p>Energy required from UV rays: 400 ~ 600mj/ cm</p> <p>Photographic sensitivity : 300~500nm</p> <p>(Photosensitivity : 9 ~12 step)</p>
<p>顯影</p> <p>使用 1% ~ 1.2% 碳酸鈉(Na₂CO₃)溶液</p> <p>噴壓 2.0 ~ 2.5 kg/cm</p> <p>溫度 30 ~ 32°C</p> <p>時間 : 60 ~ 90秒</p>	<p>6</p>	<p>Developing</p> <p>By 1%~1.2% sodium carbonate (Na₂CO₃) solution</p> <p>Spraying pressure : 2.0 ~ 2.5 kg/ cm</p> <p>Temperature : 30 ~ 32°C</p> <p>Time : 60 ~ 90 sec.</p>
<p>後烘烤</p> <p>熱風循環烘箱 155 ± 5°C × 50 ~ 80分</p>	<p>7</p>	<p>Post curing</p> <p>For air circulation oven 155 ± 5°C × 50 ~ 80 min</p>

4. 操作注意事項 (ATTENTION in your process)

1. 本品請在無塵室中及溫度20~25°C、濕度50~60%RH的場所操作,使用黃色燈光,避免在白色電燈或日光(無論直接或間接)下操作。

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. 請使用清潔劑(#950)、酯類或其它溶劑、或酯類與溶劑類之混合溶劑來清洗網板。

For cleaning the screen, use cleaner #950、ester or cellosolve type solvent or a mixed solvent of ester and cellosolve type.

3. 使用本品前應將主劑FSR-8000 10W38與硬化劑HA-8000 W8以800g:200g的重量比加以混合及攪拌,兩劑混合後,請於24小時內使用。

Before use mix and stir the main component HA-8000 10W38 and the hardener HA-8000 W8 in a weight ratio of 800g:200g, use the ink within 24 hours after mixing.

4. 請使用未稀釋的原液,如果必需作粘度調整時,請用本公司的專用稀釋劑T-8並低於3%。

Use an undiluted solder mask, In case of any viscosity adjustment, use the specified thinner T-8 less than 3%.

5. 油墨厚度以15~25微米為宜(硬化後油墨厚度),如油墨厚度太薄,將會造成油墨耐熱衝擊及抗電鍍性能下降,若油墨厚度太厚,則易產生側蝕及乾燥不足。

Appropriate coating thickness on copper circuits after cure is 15~25 μ m. 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. 基板的表面處理對阻焊劑是否能充分發揮其性能具有關鍵性的影響:為了確保印刷製板表面在印刷前徹底清潔且無氧化層,必須依據其金屬與基材表面的污染及銹蝕程度分別(或同時)選擇進行化學微蝕或機械磨刷處理,確實清除基板表面之氧化物及油、酯類或其他污染物質,再經充份水洗並完全烘乾,避免手指接觸且儘快施以防焊印刷以免造成油墨之附著力不良或絕緣、阻焊的性能降低。

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. 因預烘烤條件的容許寬度隨烘烤機的種類.箱內線路板的數量不同而產生變化,請進行試驗確認後再設定。

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. 曝光能量會因基板及油墨厚度的不同而變更,請進行試驗以確認側蝕程度(油墨的最小殘存寬度),表面光澤及背面感光程度等後再設定。

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. 請對顯影液濃度溫度噴嘴壓力時間等進行充分的管理.管理不充分,易造成顯影性的低下或側蝕的增加。

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. 若不慎接觸皮膚或眼睛時,須立即以肥皂及大量清水沖洗,切勿使用任何溶劑清洗。

If contact with eyes or skin, rinse with plenty of water. Do not wash with any solvent.

11. 本製品屬於指定可燃物可燃性液體,請勿於有煙火之處使用。

Use this ink in places to avoid any fire or flame.

12. 本品需在10°C~25°C以下的陰涼處保存。

Store the ink in a cool place below 10°C~25°C.

LIQUID PHOTOIMAGEABLE SOLDER RESIST INK **FSR-8000**

5. 特性 (CHARACTERISTICS)

1. 預烤容許寬度(Tack dry window):

預烤時間(分鐘) Precure time(min)	10	20	30	40	50	60	70	80	90	100	110	120
80°C	X	○	○	○	○	○	○	△	X	X	X	X
75°C	X	○	○	○	○	○	○	○	△	X	X	X
70°C	X	○	○	○	○	○	○	○	○	○	△	X

2. 顯影特性(Life after coating):

75°C/40分鐘預烤後,放置於20°C/60%RH環境(Precure condition 75°C/40min, kept in 20°C/60%RH)

放置時間(小時) Holding time (hour)	24	48	72	96
顯影效果 (Developability)	○	△	X	X

3. 光特性(Photo properties):

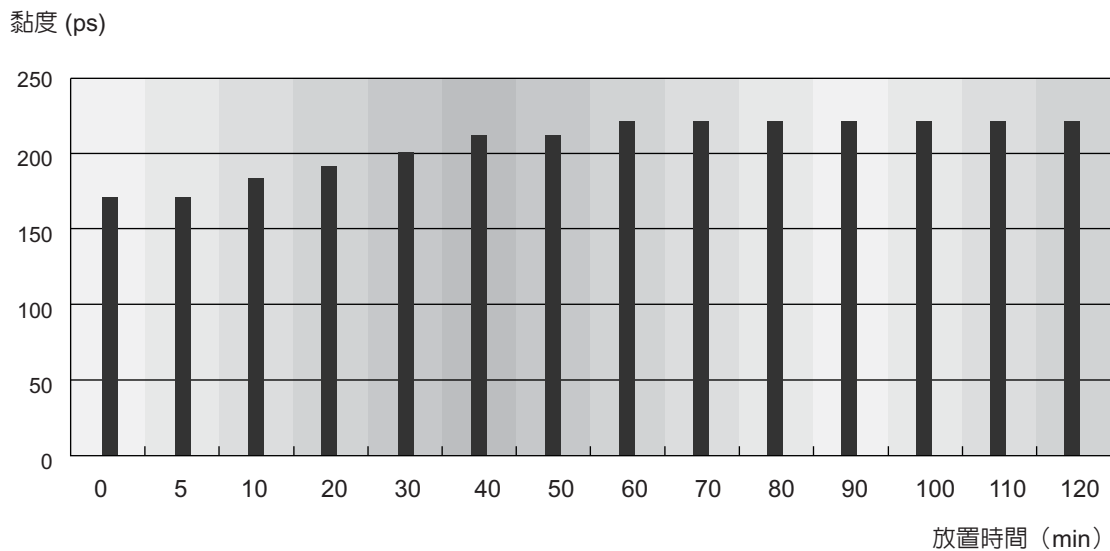
項目 Item	油墨厚度 Coating thickness	曝光能量 Exposing energy	顯影時間 Developing time	光特性 Photo sensitivity
感度(Photo sensitivity: Kodak No.2)	22±2 μm	400mJ/cm ² 500mJ/cm ² 600mJ/cm ²	1分鐘(1min)	9段 10段 11段
解像度 Resolution (QFP 間)	35±2 μm (濕膜) (wet film)	400mJ/cm ² 500mJ/cm ² 600mJ/cm ²	1分鐘(1min)	50 μm 50 μm 50 μm

上述曝光能量為Mylar下之曝光能量(Exposing energy in the upper columns indicate values under mylar film)

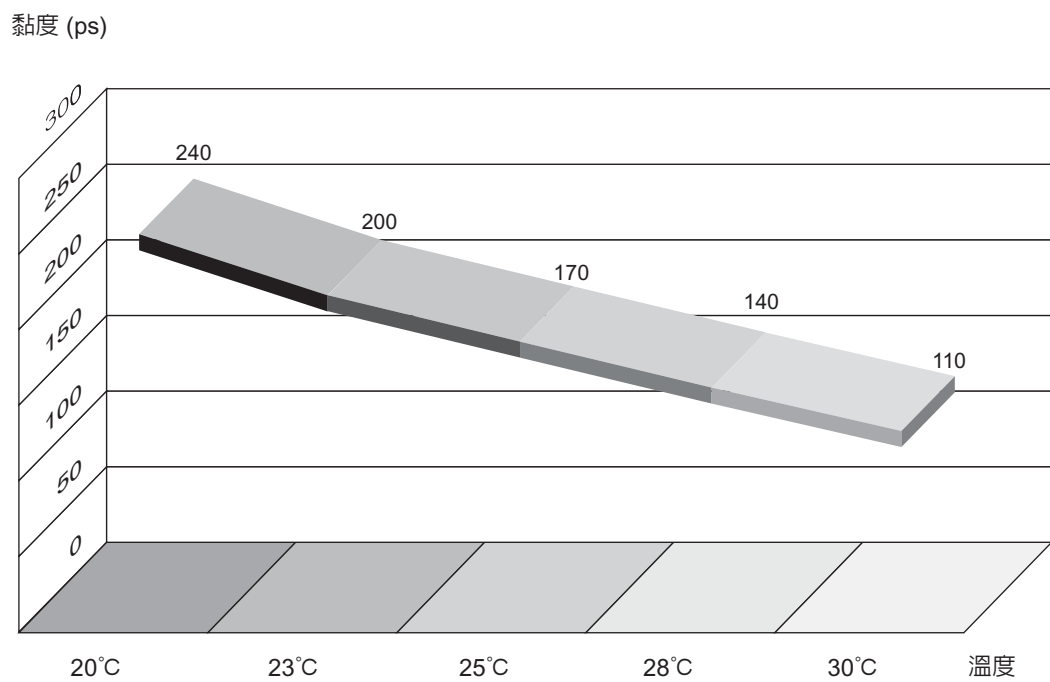
LIQUID PHOTOIMAGEABLE SOLDER RESIST INK **FSR-8000**

4. 黏度數據 Viscosity Data

10W38主劑與W8硬化劑混合後放置時間與黏度變化曲線圖 Holding time and Viscosity change



10W38主劑與W8硬化劑混合後溫度與黏度變化曲線圖 Leaving time and Viscosity change



6. 試驗特性 (PROPERTIES)

1. 物理特性 (Physical Properties)

項目 (ITEM)	效果 (RESULT)	試驗方法 (試驗條件) (TEST METHOD)
1. 塗膜硬度 Film hardness	7H	JIS K5400 8.4 鉛筆刮痕試驗 (Pencil scratching test) 鉛筆：三菱鉛筆, 銅箔及基材上的塗膜 (Pencil: Mitsubishi pencil, Coated film on copper and base material)
2. 耐磨擦性 Abrasion resistance	乾燥塗膜無減損 (No abnormality in cured film)	IPC-SM-840B 3.5.1 *Taber法 (Taber method) 3.5.1.1 試驗方法手冊 (testing method manual) TM 2.4.27.1 : 以磨耗輪銼50次無25 μ m 以上之減損 (there shall be no film reduction in excess of 25 μ m at completion of 50 cycle of abrasion) *Pencil法 (Pencil method) 3.5.1.2 試驗方法手冊 (testing method manual) TM 2.4.27.2 : 需F以上 (to be above F)
3. 粘貼性 Adhesion	100/100	JIS D0202 4.15 網目試驗 (Crosscut adhesion test) JIS K5400 8.5 膠帶 (Cellophane adhesive tape) : JIS Z 1522 寬度 (width) : 12mm 銅箔及基材上的塗膜 (Coated film on copper and base material)
4. 接著性 Adhesive property	乾燥塗膜無減損 (No abnormality in cured film)	IPC-SM-840B 3.5.2 硬型基板 (Rigid base plate) 3.5.2.1 試驗方法手冊 (testing method manual) TM 2.4.28.1
5. 切削性 Cutting property	乾燥塗膜無減損 (No abnormality in cured film)	IPC-SM-840B 3.5.3 塗膜以鑽床、鋸子、或以沖床等方式加工時，用目視檢察以不龜裂或裂開為佳 (No crack or rent shall develop on the film, when visually examined at drilling, sawing and press punching operations)

2. 化學特性 (Chemical Properties)

項目 (ITEM)	性能 (RESULT)	試驗方法 (試驗條件) (TEST METHOD)
1. 耐溶劑性 Solvent resistance	乾燥塗膜無減損 (No abnormality in cured film)	IPC-SM-840B 3.6.1 (or JIS K5400 8.24) 塗膜上無拱起、膨脹、剝離、顏色變化等為佳 (No blister, separation, swelling or color change shall occur on the film) 異丙醇 (Isopropanol) 室溫 (room temperature) 60分 (min.) 甲氯仿 (1.1.1 Trichloroethane) 室溫 (room temperature) 60分 (min.) 4%乙醇 (ethylalcohol), 96%三氯三氟乙烷 (trichlorotrifluoroethane) 蒸汽中 (in the vapor) 10分 (min.)
2. 耐藥品性 Chemical resistance	乾燥塗膜無減損 (No abnormality in cured film)	(JIS K5400 8.22 & 8.23) 10 wt. % 鹽酸 (HCl) 室溫 (room temperature) 30分 (min.) 10 wt. % 硫酸 (H ₂ SO ₄) 室溫 (room temperature) 30分 (min.) 10 wt % 氫氧化鈉 (NaOH) 室溫 (room temperature) 60分 (min.)

項 目 (ITEM)	效 果 (RESULT)	試 驗 方 法 (試 驗 條 件) (TEST METHOD)
3.耐加水解性 Hydrolysis resistance	乾燥塗膜無 減損(No abnormality in cured film)	PC-SM-840B 3.6.2 CLASS 1 35°C 90% RH 4日(days) CLASS 2 85°C 90% RH 7日(days) CLASS 3 97°C 90% RH 28日(days) 需無外觀任何變化，表面不粘 (to be free from any change in appearance and from sticky surface)
4.煮沸後的密著性 Adhesion after boiling	乾燥塗膜無 減損(No abnormality in cured film)	JIS D0202 4.15 100°C 5小時(hours) in cured film)
5.壓力鍋處理後 密著性 Adhesion after treatment in pressure cooker	乾燥塗膜無 減損(No abnormality in cured film)	JIS D0202 4.15 121°C 2氣壓 (atmosphere pressures) 5小時(hours)

3. 錫鉛特性(Solder Properties)

項 目 (ITEM)	效 果 (RESULT)	試 驗 方 法 (試 驗 條 件) (TEST METHOD)
1.耐錫性與錫接性 Solder resistance & Solderability	乾燥塗膜無 減損(No abnormality in cured film)	IPC-SM-840B 3.7 *耐錫性(solder resistance) 3.7.2 塗敷 Flux後,在 255 ± 5°C的錫鉛槽浸漬10秒後，塗膜不劣化為佳(No deterioration shall occur in the film after application of flux and dipping for 10sec. In solder bath of 255 ± 5°C)(4.8.9.1) *錫接性(Solderability and peeling property) 3.7.3 使用符合的錫鉛進行鍍錫引腳的焊接與錫鉛的拉扯兩次而無異常 (Perform soldering and peeling of rinned lead wire twice using solder, The result shall be satisfactory)
2.錫耐熱性 Solder heat resistance	乾燥塗膜無 減損(No abnormality in cured film)	JIS C 6481 5.5 塗膜無拱起或剝離現象(No blister and separation on cured film) 外觀(Appearance)：膠帶剝離試驗(Separation test by tape peeling) 助焊劑(Flux)： 錫溫度(soldering temperature) 260°C, 10秒(sec.), 浸漬3次(immersion 3 times)。
3.耐噴錫性 Hot air leveler resistance	乾燥塗膜無 減損(No abnormality in cured film)	塗膜無拱起或剝離現象(No blister and separation on cured film) 外觀(Appearance)：膠帶剝離試驗(Separation test by tape peeling) 助焊劑(Flux)： 浸漬時間(Duration of immersion)：4秒(sec.) 焊錫溫度(Soldering temperature) 260°C 熱風溫度(Hot air temperature) 220°C 壓力(pressure)：3.8Kgs / cm ² 浸漬3次(immersion 3 times)

4. 電氣特性(Electrical Properties)

項目 (ITEM)	效果 (RESULT)	試驗方法 (試驗條件) (TEST METHOD)
1. 抗電強度 Dielectric strength	2500V DC / mil	IPC-SM-840B 3.8.1 500V DC / mil 以上(more than 500V DC/mil)
2. 體積阻抗率 Volume resistivity	$1 \times 10^{15} \Omega \cdot \text{cm}$	(JIS C6481 5.9)
3. 表面阻抗率 Surface resistance	$1 \times 10^{15} \Omega$	(JIS C6481 5.10)
4. 絕緣阻抗 Insulation resistance	$1 \times 10^{14} \Omega$ $1 \times 10^{14} \Omega$ $1 \times 10^{14} \Omega$	IPC-SM-840B 3.8.2 (JIS C6481 5.11) CLASS1 35°C 90%RH 4日(饋電壓Applied voltage110V) $\geq 5 \times 10^8 \Omega$ CLASS2 50°C 90%RH 7日(饋電壓Applied voltage110V) $\geq 5 \times 10^8 \Omega$ CLASS3 25°C ~65°C 90%RH 7日(饋電壓Applied voltage110V) $\geq 5 \times 10^8 \Omega$ 1週期(cycle)8 ± 1/4 小時
5. 誘電正切 Dielectric loss tangent(Tan δ)	0.03 1 MHz	JIS C 6481 5.12 阻抗分析儀(Impedance analyzer)
6. 誘電率 Dielectric factor (ϵ)	3.5	JIS C 6481 5.12 阻抗分析儀(Impedance analyzer) 1 MHz

* 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. 安全須知 (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.