

FPCB 感光型防焊油墨

F87 FG23 / H87c 產品特色

F87 FG23 / H87c 為一 **FPCB** 用兩液型感光防焊油墨。F87 FG23 為主劑而 H87c 為硬化劑。主劑與硬化劑於使用前需以慢速 (30-40 rpm) 機械攪拌混合均勻。請特別留意我們對曝光、顯影及後烤這三個製程的建議操作注意事項。尤其是顯影條件極為重要,顯影速度越快越好,顯影段停留時間應以 20 秒鐘(膜厚為 25-30 μm) 為標的;當膜厚為 10-15 μm 時,則應將顯影段停留時間縮短到 10 秒鐘。過顯會造成塗膜附著不良,導致化金滲鍍。曝光能量亦勿過高,會造成塗膜脆化。後烤以兩段式升溫烘烤行之,第一段的低溫烘烤對於附著性之增進會有助益。此產品符合 RoHS 及 Halogen-free 規範。

產品規格

顏色	綠色
主劑：硬化劑	75 : 25
混合後黏度	10 \pm 2 Pa·s @ 10 ³ s ⁻¹ ; Cone & plate Rheometer
固成份	72 \pm 1 %
比重	1.1 \pm 0.1
建議預烘條件	70°C x 15 分鐘
建議感光條件	7-9 step / Stouffer 21-step photo guide
建議顯影條件	1.0 \pm 0.2 %碳酸鈉; 1.0 kg/cm ² 噴壓; 30°C x <u>10-20</u> 秒
建議後烤條件	兩段式升溫:110°C x 30 分鐘 \Rightarrow 150°C x 60 分鐘
混合後保存期限	8 小時 (儲存於 23°C 以下之環境, 避光)
產品保存期限	製造後 12 個月 (儲存於 30°C 以下之環境, 避光); 毋需冷藏

建議操作流程

製程	注意事項
基材前處理	酸洗段的硫酸濃度應以 1% 為準，切勿過高，以免造成硫酸殘留，導致後續的銅面氧化問題。
攪拌	攪拌是一個較簡單的製程，也因此其重要性常容易被輕忽。攪拌不均時，會發生 <u>附著性及屈繞性不佳</u> 的問題。 一般來說低速機械攪拌使用較為普遍，穩定性也較高。高速振盪機也有其使用者，但是其成本較高，也比較有維修的問題。攪拌時間在 10 分鐘左右。攪拌時留意攪拌刮刀須盡量靠近器壁以達到最佳之攪拌效果。
網印	網印環境需保持清潔，避免落塵污染。 網板一般採用 90-200 目之絲網。 網印時塗膜之濕膜厚度應以 20-35 μ 為目標。最終乾燥後的膜厚目標為 15-25 μ 。膜厚過低時則保護性不足，容易發生短路；膜厚過厚時則屈繞性不足，容易斷裂。 清洗網板時，建議使用丙酮。丁酮及防白水亦被廣泛使用，但是這兩種溶劑之氣味及健康危害性均較大，所以使用丙酮較佳。可是丙酮揮發性較高，須注意嚴禁煙火。清洗網板時，操作人員須戴防毒面具及橡膠手套，以避免溶劑危害。 建議的操作環境為 23 \pm 2 $^{\circ}$ C, 50 \pm 10% RH.
預烘	70 $^{\circ}$ C x 15 分鐘 預烘的時間極限在 70 $^{\circ}$ C 為 100 分鐘。 最適預烘時間需視實際操作環境及塗膜厚度而定，一般皆在 15 - 20 分鐘。
靜置	靜置 30 分鐘讓板材冷卻。 靜置時間不足時，油墨會因尚未完全冷卻，造成曝光時底片容易沾粘油墨的狀況。 靜置時間過長時，油墨也會因吸收水氣，會造成曝光時底片容易沾粘油墨的狀況
UV 曝光	曝光能量過高，會造成塗膜脆化，曝光能量不足，則會導致化金後塗膜剝離。能量設定以能達到 Stouffer 21-step photo-guide 的 7-9 階為佳。如果在 UV 曝光時發生底片容易沾粘油墨的狀況，建議採用在一般五金行皆可購得之油性矽類離型劑，噴灑於底片表面，再以布擦拭均勻即可。此類離型劑效果很好，但是在約曝 100 片後，需再噴灑一次。

顯影	<p>1% 碳酸鈉水溶液；1.0 kg/cm² 噴壓；30°C x 10-20 秒。</p> <p>顯影是所有製造中對附著性影響最大的一個步驟。其基本概念則是越快越好，盡量避免過顯，顯影段停留時間應以 20 秒為基準，不要超過 30 秒，否則就會使得附著性變差，引起化金滲鍍的現象。</p> <p>碳酸鈉切忌過高，否則容易顯影不淨。</p>
後烤－熱硬化	兩段式升溫:110°C x 30 分鐘⇒160°C x 30 分鐘

塗膜物性

測試	結果	測試規範
鉛筆硬度	6H	ASTM D3363
屈繞性	無裂痕	PC-TM-650 2.4.5.1 10 cycles with 3 mm mandrel
老化後屈繞性	無裂痕	PC-TM-650 2.4.5.1 190°C x 4 hrs 10 cycles with 3 mm mandre
切割加工性	無裂縫、剝落	進行鑽孔、切割或撞擊
耐化金	通過	Ni = 150 μ; Au = 3 μ 無側蝕、無異常
耐回焊	通過	IPC-TM-650 2.4.28.1C 260°C x 60 秒 無空泡、裂痕及塗膜剝落
熱衝擊	通過	IPC-TM-650 2.6.7.3，100 cycles。 無空泡、裂痕及塗膜剝落
耐化性	無異常	IPC-TM-650 2.3.3 異丙醇：23°C x 5 分鐘
熱膨脹系數 (CTE : Coefficient of Thermal Expansion) (40 – 100°C)	63 ppm	Perkin Elmer TMA Probe: Tension; Force: 30 mN Euilibrate at 35°C; ramp: 10°C/min to 260°C

熱膨脹系數 (CTE : Coefficient of Thermal Expansion) (140 – 180°C)	148 ppm	Perkin Elmer TMA Probe: Tension; Force: 30 mN Euilibrate at 35°C; ramp: 10°C/min to 260°C
T _g	120°C	Perkin Elmer TMA Probe: Tension; Force: 30 mN Euilibrate at 35°C; ramp: 10°C/min to 260°C
DK	3.87 @ 1 MHz 3.34 @ 30 MHz 3.16 @ 300 MHz	IPC-TM-650 2.5..5.1B HP Impedance Meter
DF	0.186 @ 1 MHz 0.043 @ 30 MHz 0.031 @ 300 MHz	IPC-TM-650 2.5..5.1B HP Impedance Meter
吸水率	1.1%	25°C x 60±10% R.H. x 24 hours
壓力鍋 24 小時後附著力	通過	IPC-TM-650 2.4.1D 3M-600 1/2 in PSA Tape Coated on Cu foil
體積阻抗 (Volume Resistivity)	$3.7 \times 10^{15} \Omega \cdot \text{cm}$	IPC-TM-650 2.5.17.1A HP High Resistance Meter
壓力鍋 24 小時後體積阻抗 (Volume Resistivity)	$0.2 \times 10^{14} \Omega \cdot \text{cm}$	IPC-TM-650 2.5.17.1A Pressure Cook Test (121°C x 2 atm H ₂ O x 24 hour) HP High Resistance Meter
表面阻抗 (Surface Resistivity)	$9.0 \times 10^{13} \Omega$	IPC-TM-650 2.5.17.1A HP High Resistance Meter
壓力鍋 24 小時表面阻抗 (Surface Resistivity)	$3.6 \times 10^{13} \Omega$	IPC-TM-650 2.5.17.1A Pressure Cook Test (121°C x 2 atm H ₂ O x 24 hour) HP High Resistance Meter

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Product Identity

Trade name: F87 FG23 / H87c

1. Identification of the product and of the company.

Product name: F87 FG23 / H87c
Company name: Teamchem Company
Address: No.14, Lane 276, Yongfeng Rd.,
Barder City, Taoyuan County, Taiwan
Emergency phone: +886-3375-8654
Preparer: Todd Yeh

2. Composition/information on ingredients

<u>Ingredient Name</u>	<u>CAS Number</u>	<u>Percent</u>
Epoxy acrylate oligomer	Trade secret	< 35
Diethylene glycol monoethyl ether acetate	112-15-2	< 25
Aromatic hydrocarbon mixture	64742-94-5	< 5
2-methyl-1-[4-(methylthio)phenyl]- 2-morpholinopropanone-1	71868-10-5	< 4
2-isopropyl-9h-thioxanthone	5495-84-1	< 1
Fumed silica	68611-44-9	< 2
Epoxy Resins	Trade secret	< 32
Other Additives	Trade secret	<5

All ingredients comply with applicable rules or orders under TSCA.

Weight percents listed above are within 5% of the actual value.

3. Hazards identification

Emergency Overview:

Liquid

Skin irritant

Potential Health Effects:

INHALATION: may cause irritation

EYE CONTACT may cause irritation

SKIN CONTACT: may cause irritation

INGESTION: maybe harmful

4. First aid measures

Eye contact:

Rinse eyes with running water for 15 minutes. Consult a doctor.

Skin contact:

Wash promptly exposed areas with soap and water.

Inhalation of aerosol / vapor / dust:

Remove victim to fresh air immediately.

Ingestion or accident:

Get medical attention promptly. If swallowed, seek medical advice immediately.

5. Fire fighting measures

Extinguishing media:

Dry chemical, CO₂, foam, water spray

Special advice in case of fire:

Firefighters should wear self-contained breathing apparatus and eye protection in fighting significant fires in which this material is involved

6. Accidental release measures

After spillage, soak it up with rags or paper towels and dispose it according to local regulations..

Avoid breathing vapors and remove ignition sources.

7. Handling and storage

Handling:

Avoid contact with skin and eyes. Wear protective goggles, aprons etc...

Storage:

It should be stored in a cool, dry, well-ventilated location.

8. Exposure controls and personal protection

Personal protective equipment

Respiratory: Industrial canister gas masks

Eye protection: Face shields

Hand, skin and body protection: Wear impervious clothing, chemical-resistant gloves, apron and impervious boots.

9. Physical and chemical properties

*Flash point: >100°C (Seta flash Closed Cup)

*Viscosity: 10~15 Pa.s at 25°C

*Solubility in water: insoluble

10. Stability and reactivity

Stability:

This product is stable under ambient condition..

Conditions to avoid:

Heat, sunlight.

Materials to avoid:

Acids, alkalis, amines, peroxides, oxidizing agents .

11. Toxicological information

<u>Species</u>	<u>Route</u>	<u>Exposure and Dose</u>
Modified epoxy resin	oral-rat	LD50>4,000 mg/kg
Dipropylene Glycol Monomethyl Ether	oral-rat	LD50>4,000 mg/kg
Petroleum Naphtha	oral-rat	LD50>10,000 mg/kg

12. Ecological information

No data

13. Disposal considerations

*Local regulations should be adhered to.

*Disposal of empty containers.

14. Transport information

General information: Keep container tightly sealed.
 Load and unload with care.
UN harmful class: None
UN package category: None

15. Regulatory information

Follow all regulations in your country.

Symbol(s) Harmful in contact with skin
 Harmful if swallowed
 Irritating to eyes
Safety-phrase(s) Avoid contact with skin
 Avoid contact with eyes
 In case of contact with eyes, rinses immediately with plenty of
 water and seek medical advice.
 Take off immediately all contaminated clothing
 Wear suitable glove
 In case of insufficient ventilation, wear suitable respiratory
 equipment
 Wear eye / face protection

16. Other information

This product should be stored, handled and used in accordance with good industrial hygiene practices and in conformity with legal regulation.

The information contained herein is based on the present state of our knowledge and is intended to describe our products from the point of view of safety requirements. It should therefore not be construed as guaranteeing specific properties.