



LPI 950 S-22 Spray LPI Solder Mask

DESCRIPTION

LPI 950 S-22 LPI solder mask is a two component Liquid Photoimageable (LPI) solder mask manufactured by Sanwa Chemical that has the following benefits. The S-22 series is manufactured specifically for spray (e.g., Halco-Teledyne and Argus spray) applications

1. Excellent for holding fine pitch dams.
2. Excellent adhesion.
3. Wide operating window.
4. Widely accepted by major OEMs worldwide.

OPERATING PARAMETERS

Make-Up	800 grams of SPSR-950 S-22 to 200 grams of hardener SH-250B S-22
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Nomenclature (See ordering sheet for more details)

A.)	Colors	Symbol
	Green	G (D is dark green, M is normal green, and L is light green)
	Blue	B
	Black	C
	White	W
	Yellow	Y
	Red	R
	Clear	A
B.)	Texture	Symbol
	Gloss	L
	Semi-matte	SV
	Matte	V
C.)	Examples	
Green Gloss:	SPSR-950 S-22 GL	
Yellow Gloss:	SPSR-950 S-22	



Green Matte	SPSR-950 S-22 GV	
Dark Green Gloss	SPSR-950 S-22 (D)	

Note: Not every color and texture combination is available. Please contact FCT for details.

PHYSICAL PROPERTIES

(Note: these are typical properties and is not a specification)

Colors	Green, blue, yellow, red, white, black, red and clear
Textures	Gloss, Matte and Semi-matte
Volatile %	50%
Viscosity (RT = 25C or 72F)	After mixed, viscosity is 8-10 poise at 25C When diluted with PMA solvent, viscosity should be 4 +/- 1 ps at 25C Equivalent after dilution for Ford cup is 40-50 sec. Viscosity is 6(15c), 5(20C), 4(25C), 3(30C) and 2.5(35C)
Thixotropic index	2.4 (after mixed up)
Hardness (pencil)-JIS-D-0202	>6H
Adhesion-JIS-D-0202	100/100. Passed crosscut hatch test.
Heat resistance (solder bath)	Passed three times floating at 260C for 10 seconds
Insulation resistance IPC-SM-840B at 100V	1 x 10 ¹³ Ohms as received 1 x 10 ¹² : Class I at 35C at 90% RH for four days 1 x 10 ¹² : Class II at 50C at 90% RH for seven days 1 x 10 ¹² : Class III at 25-65C at 90% RH for seven days
Dielectric constant (at 1 MHz)	2.8 as received 3.5 at 55C and 95% RH for 96 hours
Dielectric loss/Tan	0.025 as received 0.032 at 55C and 95% RH for 96 hours
Dielectric strength	2.0 KV/mil
Solvent resistance – IPA (Item 3.6.)	Passed for 60 minutes at room temperature.
Chemical resistance 10% HCl, 10% H ₂ SO ₄ , 3% NaOH	Passed for 30 minutes at room temperature
Immersion for 2 hours	Passed
Gold plating	Electro-gold plating at 40C at 1.0 Amp/dm ² for 5 min. ENIG plating, Ni 3 microns, Au 0.05 microns
Pressure cooker test	Passed at 121C at 2 atmosphere for 4 hours

(JIS-D-0202)	
Flammability (UL approved)	UL 94V-0
Thermal shock (Item 3.9.3)	Passed 65C / 15 min. to 125C / 15 min. for 100 cycles
Shelf life unmixed state Mixed state	9 months after delivered when stored at 20C (65F) >48 hours

CONTROL PROCEDURES

1.) Preparation of the Solder Mask

- A. Add 200 grams of specified additive (SH-250B S-22) to 800 grams of specified base (SPSR-950 S-22).
- B. Thoroughly mix up both components. This will result in the mask having a viscosity of 8-10 poise. The mask should then be diluted with PMA solvent to yield a viscosity of 4 poise at 25C.
- C. Shelf life is at least 48 hours after initial mixing.

2. Application of the Solder Mask

- A. Coating is by spray for this specified viscosity. The viscosity of the mask when it is sprayed is 4 poise at 25C. The recommended spray pressure is 2Kg./cm² (30 psi). Optimum results will depend on the nozzle type and spray pressure.
- B. The bare board should be polished and dried thoroughly by either pumice or Aluminum oxide scrubbing.
- C. The solder mask should be applied to give a thickness of 15-20 microns. A coating greater than 25 microns may give rise to tackiness and under cut problems. A thickness less than 10 microns will make the mask more sensitive to heat and chemicals and overall increase general exposure sensitivity.

3. Pre-cure (Tack dry)

- A. This procedure condition is very critical to the development process and finished surface.
- B. Optimum drying conditions are to be used to evaporate the solvent out of the mask. Approximately thirty minutes at 80C is recommended for thermal ovens for a thickness of 15 to 20 microns. For double sided boards, the first side is to be dried for 10-15 minutes (@95C). The other side is to be dried for 20-25 minutes (@95C).

Note: Poor ventilation and poor drying will cause the surface to become matted.

4. Exposure

- A. The solder mask is to be exposed by a super high-pressure mercury vapor lamp at 200- 300 mj/cm².
- B. The object is to get an 8-12 on the Stouffer light scale.

5. Development

- A. The exact development time will depend on the actual developer and this varies from machine to machine.
- B. Typically, a 1-% carbonate (Potassium carbonate based developer) is used at 30C under a pump pressure of 1.5 to 2.5 Kg/cm² (20-40psi). A 20-micron thick mask should develop in 60 to 90 seconds.
- C. The breakdown of developing solution is about 100 grams of mask per liter of working solution.
- D. Water rinsing after development is needed with a recommended pressure of 1-1.5 Kg/cm² (15-20psi) for 45-60 seconds.
- E. Florida CirTech has a variety of potassium carbonate based developers with and without cleaners to minimize down time and scale build up (DV 100, DV 200 and DV 400). In addition, Florida CirTech also sells very compact and precise feed and bleed control units based on pH.

Note: The solder mask surface is vulnerable to scratching before final cure.

6. Final cure

The final cure should be as follows:

IR baking	5 minutes at 170C
Thermal oven bake	30 minutes at 150C

Summary of Process parameters

1. Processing of this LPI solder mask should be done under a yellow lamp.
2. Optimum LPI mask thickness is 10 to 20 microns.
3. Pre-Cure conditions: When dried at 75C, developing is good for drying times ranging from 40 to 70 minutes.
4. Optimum exposure will depend upon the base laminate. For example, UV absorbing laminate and polyimide materials as well as the solder mask thickness will affect the exposure. Exposure should therefore be determined experimentally and should be in the 8-12 range (250-300 mj/cm²).
5. Hold time after pre-cure under 60% relative humidity at 20C under a tack dry of 40 minutes at 75 C. Proper developing can take place for hold times equal to or less than 120 hours.

ANALYSIS

Not applicable.

SAFETY AND STORAGE

Do not store in direct sunlight, high temperature or below freezing. **Store in original uncontaminated container.**

WASTE TREATMENT

Not applicable.

MISCELLANEOUS

The main component comes in a small metal container that holds 800 grams of material. The additive comes in a plastic jar that contains 200 grams of material. Consult MSDS sheet for additional information.