



# LPI SPSR-950 C-8GD LPI Solder Mask

## DESCRIPTION

SPSR-950 C-8GD solder mask is a two component Liquid Photo-imageable (LPI) solder mask manufactured by Sanwa Chemical that has the following benefits.

1. Excellent chemical resistance for immersion finishes like NiAu, immersion tin and silver.
2. The main component is epoxy resin.
3. Clean developing, leaving little residues.
4. Non-tacky after the tack dry process.
5. Good imaging capabilities for fine solder patterns, and thick panels.
6. Developed by standard carbonate solutions, and thermally cured.

## OPERATING PARAMETERS

Make-Up	800 grams of SPSR-950 C-8GD to 200 grams of hardener SH-250B NT-9
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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)
- B. Texture Symbol**  
Gloss L  
Semi-matte SV  
Matte V
- C. Examples**  
Dark Green: SPSR-950-C-8GD

**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	Dark Green
Textures	Gloss and Matte
Volatile %	20%
Viscosity (RT = 25C or 72F)	Main component SPSR-950 C-8GD is 280 poise at 25C Additive SH-250B NT-9 is 60 poise at 25C After mixed, viscosity is 220 poise at 25C/ Viscosity as a function of temperature is tabulated below
Thixotropic index	1.60 to 1.80 (after mixed up)
Hold time	The hold time is tabulated as a function of viscosity below



Machinability	Acceptable
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	1 x 10 <sup>13</sup> Ohms as received
Moisture and insulation resistance (Pattern B-25A)	Class T: 1 x 10 <sup>12</sup> Ohms: 65C/90%RH for 24 hours Class H: 1 x 10 <sup>11</sup> Ohms: 40C/85% RH for 7 days
Electrochemical migration (Patter B-25B)	Class T: <1 decade drop: 85C/85%RH for 500 hours Class H: 2 x 10 <sup>8</sup> Ohms: 85C/85%RH for 168 hours
Dielectric constant (at 1 MHz)	2.8 as received 3.5 at 55C / 95% RH for 96 hours.
Dielectric loss/Tan	0.025 as received 0.032 at 55C / 95% RH for 96 hours
Dielectric strength	2.0 KV/mil
Solvent resistance – IPA (Item 3.6.1.1)	IPA passed for 60 minutes at room temperature. 75% IPA + 25% water passed for 24 minutes at 46C
Chemical resistance 10% HCl, 10% H <sub>2</sub> SO <sub>4</sub> , 3% NaOH	Passed for 30 minutes at room temperature
Immersion in boiling water	Passed for 2 hours
Gold plating	Electro-gold plating at 40C at 1.0 Amp/dm <sup>2</sup> for 5 min. ENIG plating, Ni 3 microns, Au 0.05 microns
Pressure cooker test (JIS-D-0202)	Passed at 121C at 2 atmosphere for 4 hours
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) >24 hours

**Note: Typical property values listed above are not to be construed as a specification.**

Viscosity as a function of temperature		Viscosity as a function of hold time	
Temp ( C )	Viscosity (Poise)	Hold time (hours)	Viscosity (poise)
12	400		
20	300	0	220
25	220	24	250
30	160		
35	120		

## CONTROL PROCEDURES

### 1.) Preparation of the Solder Mask

- Add 200 grams of specified additive (SH-250B NT-9) to 800 grams of specified base (950 C-8GD).
- Thoroughly mix up both components. This will result in the mask having a viscosity of 220 poise. A lower viscosity can be realized by adding a small quantity of PMA solvent.
- Shelf life is at least 24 hours after initial mixing.

### 2. Application of the Solder Mask

- In screen-printing, the viscosity of the mask should be 200 - 240 poise at 25C. A polyester or stainless steel screen of 100-180 mesh is recommended.
- The bare board should be polished and dried thoroughly by either pumice or Aluminum oxide scrubbing.
- The solder mask should be applied to give a dried 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.
- If hole plugging is done, then the LPI should be pushed through the holes, so that it can be seen coming out of the back side. If the holes are not filled, then air will be trapped, causing the LPI "caps" to explode during heat curing later. We recommend holding the boards for 30 min to 3 hours before tack dry, if the holes are filled. This will allow some of the solvents to escape out of the holes.

### 3. Pre-cure (tack dry)

- This procedure condition is very critical to the development process and finished surface.
- Optimum drying conditions are to be used to evaporate the solvent out of the mask. In a conventional oven, a tack time of 20 -30 minutes at 176F (80C) is recommended for thermal ovens for a thickness of 15 to 20 microns. Please confirm temperature with temperature dots. For double sided boards, the first side is to be dried for 10-15 minutes (176F). The other side is to be dried for 20-25 minutes (176F).

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

### 4. Exposure

- The solder mask is to be exposed by a super high-pressure mercury vapor lamp.
- The light energy setting is 150 – 300 mJ / cm<sup>2</sup> for the C-8GD version.
- The object is to get in the 10-12 range on the Stouffer 21 step wedge light scale.

### 5. Development

- A. The exact development time will depend on the actual developer and this varies from machine to machine. However, in screen applications, a breakpoint of around 30-40% (lower for high ink volume) is recommended.
- B. Typically, a 1% carbonate (Potassium carbonate based developer) is used at 30C under a pump pressure of 1.5 to 2.5 Kg/cm<sup>2</sup> (20-40 psi). A 20-micron thick mask should develop in 60-90 seconds for screen applications and 30 seconds for coating and spray applications.
- 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/cm<sup>2</sup> (15-20 psi) 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 (DV200, DV205 and ACT2070). 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.**

#### 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

Packaging. 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.