



# **PROCESSING GUIDELINES**

**Laminate: S7439GS**

**Prepreg: S7439GSB**

**Low Loss, High Reliability Halogen Free Material**



This product process guideline uses IPC-4101 Standard as a reference, and Shengyi make some changes according to the product characteristics of the actual situation as to making it more suitable for the Shengyi S7439GS/S7439GSB product use.

## **1. Storage condition**

### **1.1 Laminate**

#### **1.1.1 Storage condition**

- Pack with original forms on the platform or on the appropriate frame, avoiding stress, prevent sheet deformation caused by inappropriate storage which may impact the subsequent PCB processes.

#### **1.1.2 Storage environment**

- Sheets should be stored in ventilated, dry, at room temperature under environment control, avoiding direct sunlight, rain and avoid erosion of corrosive gas (stored environment directly affect the quality of material).
- For double-sided copper clad laminates (cores), to minimize shifting as to avoid scratching the surface of the product, with a suitable environment and condition for storage, the shelf life can be up to two years.

#### **1.1.3 Operation manual**

- Wear clean gloves and carefully operate the cores. Copper foil collisions, sliding will cause damage of the cores. Bare hands action will cause contamination to copper foil surface. These defects are likely to cause adverse effects.

### **1.2 Prepreg**

#### **1.2.1 Storage method**

- Levels stored in original packaging form, avoiding stress, prevent sheet deformation caused by inappropriate storage condition.
- Leftover or cut Prepregs should pack and seal with vacuum foil packaging and put it back in the original packaging tray.

#### **1.2.2 Storage environment**

- Prepreg sealed packaging should be stored in free of UV irradiation environment, specific storage conditions and the storage period as follows:
  - Condition 1: 3 months when stored at <23°C and <50% RH.
  - Condition 2: 6 months when stored at <5°C
- Note: Relative humidity affect prepreg quality the most, pay special attention on weather (conduct dehumidification process is necessary for wet weather).

#### **1.2.3 Cutting guideline**

- Cutting the best way is left to professional staff wear clean gloves during operation, prevent the pollution of prepreg surface; operation must be careful to prevent prepreg wrinkle or crack, to avoid affect prepreps.

### 1.2.4 Prepregs use recommendations

- If moving from a low temperature storage space to a higher temperature or ambient temperature storage space, it must go through the temperature settle process, (8 - 24 hours, settle time is varies depending on temperature variation in between two storage conditions). Open package after temperature settle process is completed as to avoid affecting the quality and adhesion of prepregs.
- For PP package stored in above condition 1, after open is required to complete the use as soon as possible, for packages opened more than 3 day, it must re-inspect and insure quality before use.
- Leftover or cut prepregs should pack and seal with vacuum foil packaging and put it back in the above stated storage condition 1.
- For IQC inspection, PP test should be finished within 5 days from the date of acceptance according to IPC-4101 specification.

## 2. PWB Processing

### 2.1 Panel cutting

- Sawing (preferred) and shearing method is recommended. Be careful of potential edge cracks when using roller cutter or caused by improper gap or cutter blade abrasion.

### 2.2 Thin core baking

- Thin core baking depends on actual need. If bake after cutting, it's recommended to rinse cutting panels first, which is able to remove resin powder brought by cutting and avoid etching problem.
- Baking condition: 175°C/3-5h, be sure to avoid contact directly with heater.

### 2.3 Brown oxide

- Brown oxide is recommended.
- Bake after brown oxide: 110-120°C/1.5-2h, and lay-up within 4 hours after baking.
- For multiple lamination board:
  - A: Bake before brown oxide: 150°C/3-5h
  - B: Bake after brown oxide: 110-120°C/1.5-2h
- Baking stack height: <1inch.

### 2.4 Lay-up

- Ensure the prepreg direction of warp and fill at lay-up process. Avoid prepreg reversal or overturn in case of multilayer board distortion after press.

### 2.5 Press process

- Advised heat-up rate: 2.5-4.0°C/min (product temperature ranged 80°C-140°C).
- Full pressure is recommended at 400-500 PSI, specified value should be determined by multilayer feature (lay-up construction and resin filled area). Apply full pressure when product temperature 80-100 °C.

- Curing condition: Product temperature 190-200°C, 90-120min.
- Considering the high resin filling characteristics of this product, for stack-ups of  $\geq 3$ oz thick copper and buried copper structures, it is recommended to increase RC2% for the relevant PP on the basis of the same thickness specification as ordinary low loss materials
- When taken single side or dummy panel for multilayer, be sure to roughen the unclad surface before use in case of poor bonding due to smooth surface. Etching from double sided laminates for that purpose is an optimized measure.

## 2.6 Drilling

- New drill bit and 1 panel/stack (thick board) is recommended, to ensure good hole wall quality.
- The drilling parameters need to be evaluated in detail to determine suitable conditions for your production, to ensure good hole wall quality, to achieve good chip removal effect and avoid smear due to drilling.

Below parameters are for reference.

Diameter mm	Hits	Speed krpm	Infeed Inch/min	Chipload mil/rev	U Inch/min
0.20	800	140	47	0.34	300
0.25	800	125	59	0.47	500
0.30	800	110	76	0.69	500
0.40	1000	98	80	0.63	800
0.50	1000	95	80	0.82	800
0.60	1000	90	80	0.89	800
0.70	1000	80	80	1.00	800
0.80	1000	68	80	1.18	800
0.90	1000	62	80	1.29	800
1.00	1000	60	80	1.33	800

- For dense holes area or hole size  $< 0.6$ mm, LE aluminum cover layer is recommended.
- For hole size  $\leq 1.0$ mm, it's recommended to use a new double-edged drill bit (the best helix angle is 45 °).
- For board thickness  $\geq 3.0$  mm, it's recommended step drill or pre-drill.

## 2.7 Baking after drill

- Advised baking condition after drill: 190°C/3h, be sure to avoid contact directly with heater.
- Baking before resin plugging after back drilling: 160-170°C/2-3h.
- After plating, 2<sup>nd</sup> drill with BGA and dense hole structure: 170-180°C/2-3h.
- After plating, 2<sup>nd</sup> drill without BGA and dense hole structure, baking is not necessary.

## 2.8 Desmear

- Specific parameters should be set according to the actual PCB structure (board thickness, hole size), and a thorough evaluation of various structural boards should be conducted to determine the best matching desmear conditions and parameters;
- Desmear effect refers to the absence of resin residue at the inner copper connection position

- Plasma and chemical desmear (horizontal or vertical) are advised. Detailed plasma and chemical desmear parameters follows chemicals type and equipment capability for evaluation and setting. Below Plasma parameters are for reference only.

Step	O2	N2	CF4	Vacuum	RF Power	Flow rate	Step time	Temp/°C
	L/min	L/min	L/min	TORR	W	L/mm	Min	
1	2.26	0.25	0	0.25	9000	2.51	45	80
2	2.45	0.25	0.3	0.24	7000	3	20	105
3	2.49	0	0	0.25	5000	2.49	4	105

- The specific desmear conditions are related to the equipment, chemicals type, board thickness or hole area, and need to be set by comprehensive evaluation.
- On the premise of full load, it is suggested applying longer Plasma time for thicker board.

### 2.9 Solder mask

- Advised baking before solder mask: 150°C/4-6h
- Be careful of panel distortion or warpage due to improper stack-up at post baking process.
- Not advised solder mask rework.

### 2.10 HAL

- Suitable for lead free HAL process

### 2.11 Punching/Routing

- Not suitable for punching process.
- Routing process is recommended. Reduce routing speed to prevent edge cracks from outburst mechanical force.

### 2.12 Packaging

- Suggest baking finished boards at 140°C/4~6h before packaging to prevent moisture effect
- Package material is recommended using aluminum pack.

## 3. PWB Soldering

### 3.1 Shelf life of PWB

- 3 months with packaging protection.
- Bake at 125°C/3-5h before assembly is recommended

### 3.2 Reflow

- Suitable for lead free reflow process

This process guide is for reference only! Should you have any questions, please feel free to contact us. ShengYi will support you with prompt and effective service.