PROCESSING GUIDELINES

Laminate: S7439C
Prepreg: S7439CB

Low Loss & Heat Resistance Multilayer Material

This processing guidelines follows the IPC-4101E standard and is to provide necessary guidance for customer reference, based on S7439C/S7439CB material features.

1. Storage condition

1.1 Laminate

1.1.1 Storage method

- Keep laminates as received packaging onto a flat floor or a proper pallet. Avoid heavy pressure in case of distortion occurring due to incorrect storage method.

1.1.2 Storage condition

- Keep laminates at ventilated, dry and ambient condition. Avoid direct exposure to sunlight, rain and chemical gas.
- The shelf life of laminate maintains two years for double sided and one year for single sided at above proper storage conditions. All internal properties within shelf life meet IPC-4101E specification sheet.

1.1.3 Handling

- Handle laminates carefully wearing clean gloves. Collision and slippage will damage the cladding copper. Naked hand operation will contaminate the surface of cladding copper. All above defects may bring bad effects during production.

1.2 Prepreg

1.2.1 Storage method

- Keep prepreg horizontally with received package. Avoid heavy pressure in case of distortion occurring due to incorrect storage method.
- Be sure to re-seal any of remained prepreg with plastic film and put it away properly onto a pallet.

1.2.2 Storage condition

- All prepreg should be stored at below conditions as received packaging without any influence of ultraviolet ray.
  - Condition 1: 3 months when stored at <23℃ and <50% RH.
  - Condition 2: 6 months when stored at <5℃;
- Be careful of relative humidity due to its bad effect on prepreg properties. When packaging is open, it's recommended using up within 8 hours. If not, it must be sealed and packaged before storage.

1.2.3 Prepreg cutting

- Cut prepreg carefully and prevent pollution or crease.
- When cutting the PP, it's needed to clean the table first, to avoid cross contamination of different types of PP resin powder.

1.2.4 Usage

- When brought out from cooling warehouse, prepreg should be stabilized to ambient temperature before opening package, keep at least 8 hours is recommended, depending on specified store condition.
- For panel form prepreg after cutting, all should be kept under condition 1 (or condition 2) and used up as soon as possible. When exceeding 3 days, it's recommended retesting before use.
- For roll form prepreg remained, all should be sealed again and kept at condition 1 (or condition 2).
- For IQC inspection, prepreg should be finished all tests within 5 day from the date of acceptance according to IPC-4101E specification.

2. PWB Processing

2.1 Panel cutting

- Sawing 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℃/3-5h, be sure to avoid contact directly with heat supply.

2.3 Inner layer brown oxide

- Recommend to use brown oxide for inner layer treatment.
- Baking condition after brown oxide: 110~120℃ for 1.5~2hours. After baking, pressing process should be done within 46 hours.
- When the laminate that need to be pressed more than one time, for sub-laminate that have been pressed;

  A. Baking before brown oxide: 150℃ for 3~5 hours;

  B. Baking after brown oxide: 110~120℃ for 1.5~2hours.
- When baking, the stack height should be less than 1inch.

2.4 Lay-up

- Ensure prepreg direction of warp and fill at lay-up process. Avoid prepreg reversal or overturn in case of multilayer board distortion after press;
- The time from brown oxide to the start of pressing should be controlled within 12 hours;
- When the buffer material which may have hygroscopic risk, it is recommended to dry it before use;
- Due to the characteristics of the material, it is prone to static electricity, pay special attention to the adsorption of foreign materials on PP when stacking;
- In order to ensure good registration for lamination, when it is necessary to use hot rivet, it is recommended to use electromagnetic thermal fusion. It is suggested to evaluate the best fusion effect parameters in

detail, and the following electromagnetic thermal fusion conditions are for reference: 220℃ for 120s, warm up for 15s and cool down for 10s. Other fusion methods should be combined with PCB's own conditions to carefully evaluate the fusion effect and avoid the layer deviation caused by poor fusion.

2.5 Pressing process

- For multilayer pressing, it is recommended to choose a press machine with good vacuum performance and vacuum door sealing, to avoid the outside moisture;
- It's recommended to keep the heat-up ramp at 2.0-3.0℃/min when the material temperature between 80℃ to 140℃.
- Full pressure setting is recommended at the range of 380 – 450 PSI (oil heated), specified value should be determined by multilayer feature (lay-up construction and inner layer copper area). Apply full pressure when the material temperature between 80-100 ℃.
- Curing condition: 190-200℃, 90-120min.
- Cooling rate < 2℃/min;
- Material temperature after hot pressing < 150℃;
- For HDI and N+N lamination: in order to ensure better thickness uniformity, it is recommended to add buffer paper in middle layer of Book;
- For the overlay no copper area (starved area which is likely to have low pressure), especially for the low resin content prepreg, it is necessary to prevent wrinkles, voids and other types of pressing defects in advance, and evaluate the best production conditions.
- If pressed by Adara machine, please inform us for more information.
- When using single-sided or dummy board for multilayer, be sure to roughen the unclad surface before use, otherwise poor bonding might happen due to smooth surface. Etching double-sided board for that purpose is one option.

2.6 Drilling

- For good hole quality, it is recommended to use new drill bit and 1pc/stack for drilling (for thick board).
- The drilling parameters need to be carefully evaluated to determine the drilling parameters that match your production conditions. The following drilling parameters are for reference only:
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Diameter (mm)	hole limit (hits)	Speed (krpm)	Feed (inch/min)	Chipload (mil/rev)	Retract (inch/min)
0.20	500	100	70	0.70	300
0.25	800	100	70	0.70	300
0.30	800	100	70	0.70	500

0.40	800	88	62	0.70	600
0.50	800	86	58	0.67	800
0.60	800	81	54	0.67	800
0.70	800	72	56	0.78	800
0.80	1000	61	58	0.95	800
0.90	1000	56	60	1.07	800
1.00	1000	54	72	1.33	800

- For dense hole or diameter of the hole is less than 0.6mm, it is recommended to use LE aluminum sheet for cover plate.
- Aperture < =1.0mm: new double-edge drill bit is recommended (45° screw Angle is the best);
- When the thickness of the laminate is > =3.0mm, a step drill or predrill or dual drill process is recommended.

2.7 Baking after drilling

- Recommended baking condition: 190℃/3h, be sure to avoid contact directly with heat supply.
- After back drilling, baking before resin-plug-hole: 160~170℃/2~3h;
- After electroplating, if still need to drill holes (containing BGA and high dense hole structure), baking before drill: (170-180℃) /(2~3H);
- After electroplating, if still need to drill holes (without BGA and dense hole structure), no baking.

2.8 Desmear

- S7439C is relative harder to desmear compared to traditional FR-4 material. Using Plasma plus potassium permanganate method for desmear is suitable but the specified parameter should accord to the PCB structure and design. It is suggested to make a full and detailed evaluation of various types of structural plates to determine the best matching conditions and parameters of the glue removal;
- It is recommended that the inner copper connection should be reached without resin residue.
- Plasma+ level desmear or plasma+ vertical desmear is recommended;
- The following plasma parameters are the parameters of a processing application, for reference only.
- For specific plasma parameters and chemical desmear parameters, PCB potions and equipment production capacity need to be evaluated in detail to set the most suitable processing parameters that meet the requirements of hole wall quality and related quality.

Step	O2	N2	CF4	vacuum degree	RF power	The total gas flow rate	Step time	Temp/℃
	L/min	L/min	L/min	TORR	/W	L/min	Min	
1	2.26	0.25	0	0.25	9000	2.51	45	80

2	2.45	0.25	0.30	0.24	7000	3.00	20	105
3	2.49	0	0	0.25	5000	2.49	4	105

- Specific setting of conditions for the removal of resin, related to the equipment, liquid medicine, plate thickness or hole area, need to be set by comprehensive investigation and evaluation;
- On the premise of full load, it is suggested that the thicker the plate, the longer the Plasma time.

2.9 HASL

- It is recommended to bake the board before solder mask: 150℃/4~6h;
- When using the rack, avoid the warping problem caused by extrusion or deformation of the plate rack;
- It is not recommended for solder mask rework, which may lead to measling (texture exposure) problem.

2.10 HASL process

- Suitable for lead-free HASL process.

2.11 Punching/Routing

- Suitable for routing process, and it is suggested to reduce the travel speed appropriately;
- Not suitable for punching process.

2.12 Packaging

- To prevent moisture effect on the heat resistance of base material, suggest baking finished boards at 140℃ /4-6h before packaging.
- It's advised to warp by aluminum pack.

3. PWB Soldering

3.1 Shelf life of PWB

- 3 months with aluminum packaging protection.
- Bake at 125℃/4-8h before assembly is recommended if possible.

3.2 Reflow

- Suitable for lead free reflow process

3.3 Manual soldering

- soldering temperature is 350~380℃ (a temperature-controlled solder iron is recommended);
- Welding time of single spot should be less than 3 seconds.

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.