



PROCESSING GUIDELINES

Laminate: SG7350D2

High thermal conductivity, High frequency PTFE Material



This product process guideline uses IPC-4103 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 SG7350D2 product use.

1. Storage condition

1.1 Laminate

1.1.1 Storage condition

- 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 Operation manual

- PTFE material is softer compared with FR-4 material and needs to be handled with care.
- 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.

2. PCB 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: 110-120°C/60-90min, be sure to avoid contact directly with heater.

2.3 Pre-treatment

- During PCB processes do not take any form of mechanical grinding, try to use chemical method for pre-treatment rinsing.

2.4 Etching

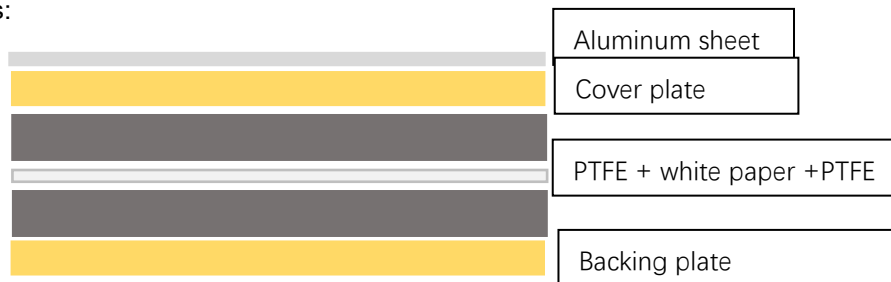
- After inner-layer etching, laminates need be transferred to hot-press process as soon, the suggested staying time does not exceed 4 hours.

2.5 Hot-press process

- Hot-press procedure depending on the prepreg used, and should be chosen according to the prepreg characteristics.

2.6 Drilling

- Drill bit: because the material contains high hardness ceramic filler, in order to improve the hole limit and drilling quality, it is suggested to use coated drill bit, such as diamond coated drill bit.
- Drilling plate: when drilling, on top uses Aluminum cover plate with better heat dissipation combined with phenolic composite plate or similar cover plate with greater hardness, at the bottom uses high hardness phenolic backing plate or other similar backing plate with good hardness.
- Drilling stack number: because PTFE is soft, to avoid hole deviation during drilling, the stacking number should be smaller. Laminate thickness $\leq 30\text{mil}$, suggest 2 panels/stack, laminate thickness $\geq 60\text{mil}$, suggest 1 panel/stack. For 2 panels/stack, it is suggested to add white paper between two panels to avoid scratch.
- Stacking structure: phenolic backing plate+PTFE (white paper+PTFE)+ phenolic cover plate+copper foil. If PTFE is hybridized with FR-4, in drilling PTFE is faced down, FR-4 is faced up. The structure diagram is as follows:



- When drilling PTH hole, must use new drill bit, cannot use re-grinded drill bit, drill bit hit count: 500. When drilling non-PTH hole, re-grinded drill bit can used, re-grinding time depending on the drill hole quality, it is suggested the re-grinding time does not exceed 3 times.
- Drilling parameter (for reference) as below:

Diameter (mm)	Speed(Krpm)	Infeed(ipm)	Rtr(ipm)	Maxhit
0.3	100	150	400	500
0.5	75	120	400	500
0.8	60	80	500	500
1.0	50	80	500	500
1.5	25	50	600	500
3.0	20	50	600	500

(Remark: The drilling parameters depend on the drill model, drill bit manufacturer and hole diameter; There is a certain correlation between the rotating speed, infeed speed and retract speed; PCB processing shall be self



assessed according to specific conditions.)

- After drilling it is avoided to remove burr. If drilling quality is bad and needs to be deburred, it is suggested to place the laminate onto a hard and flat platform, use sandpaper ≤ 600 mesh to gently smooth it according to a circular track.
- After drilling use high pressure air to clean the loose rubber slag and burr in the hole.

2.7 Desmear

- PTFE is insoluble in solvents and needs to be cleaned by non-chemical methods. Plasma is recommended for treatment. For better cleaning, it is recommended that before Plasma laminate shall be washed with ultrasonic water and then to baking. The recommended baking conditions are 110-120°C/60-90min.
- Plasma parameters for double-sided hole wall activation (for reference):

Step	O2	H2	N2	Pressure (PSI)	RF(W)	Flow Rate	Seg Time (min)
1	80%		20%	250	4000	2.5	15
2		80%	20%	250	4000	2.5	30

- Plasma parameters for multi-layer hole wall desmear (for reference)

Step	O2	H2	N2	CF4	Pressure (PSI)	RF(W)	Flow Rate	Seg Time (min)
1	80%		20%		250	4000	2.5	10
2	80%		10%	10%	250	4000	2.5	30
3		80%	20%		250	4000	2.5	20

2.8 PTH

- PTH does need to go through desmear section, directly starts from oil removal.
- If needs twice PTH process, the second time PTH can starts from pre-soak tank.

2.9 AOI inspection

- PTFE material surface will become flattened as the time passes, so after the intermediate AOI inspection, solder resist ink shall be applied as soon as possible, and materials do not stay in this process. If needs to stay, staying time shall not be longer than 8 hours.

2.10 Solder mask

- Because the combination between the solder resist ink and the laminate material is a physical bonding

rather than a chemical bonding, it is not allowed to do mechanical grinding for the laminate before applying the solder resist ink, it is to avoid damage to the surface roughness of the laminate, resulting in poor adhesion between the solder resist ink and the laminate, and the consequent oil rejection.

- If oil (solder resist ink) rejection problem occurs, customer can remove the solder resist ink and go through a plasma process again, increase laminate surface roughness and promote better bonding of solder resist ink to the substrate.
- The low surface energy of PTFE material results in weak adhesion with solder resist ink. Appropriately reducing the thickness of solder resist ink layer, improving the UV pre-curing energy level (recommended > level 10), prolonging low temperature post-curing time and selecting appropriate solder resist ink can greatly improve the adhesion between PTFE and solder resist ink. If necessary, bake at 110-120°C for 60-90min to remove the influence of water vapor.

2.11 Surface treatment

- When used in the base station antenna field, it is recommended to do tin deposition. If it is used in other fields, silver or gold precipitation can also be used.
- Avoid HAL treatment as much as possible. If HAL treatment is a must, it is recommended as follows:
 - 1) Bake the plate at 150°C/90-120min before HAL process.
 - 2) The temperature of HAL shall be lower than that for FR-4 products. Try to avoid rapid heating and use gradual heating and cooling.
 - 3) It is suggested the maximum temperature of tin furnace should not be higher than 255°C.

2.12 Outline contouring

- Not suitable for punching/beer board, suggested to use a milling machine for processing and reduce the travel speed appropriately.

2.13 Packaging

- To prevent moisture effect on the heat resistance of base material, suggest baking finished PCB boards at 110-120°C/60-90min before packaging.
- For long time storage, aluminum foil vacuum packaging is recommended.

3. PWB Soldering

3.1 Shelf life of PWB

- 3 months with aluminum packaging protection.
- Bake at 110-120°C/60-90min before assembly is recommended, especially when stored more than 3 months.

3.2 Reflow

- Suitable for standard lead-free reflow process



This process guide is for reference only! Should you have any questions when using SG7350D2 product, please feel free to contact us. ShengYi will support you with prompt and effective service.