



PROCESSING GUIDELINES

Laminate: Autolad1G

Prepreg: Autolad1GB

Halogen free and high reliability Multilayer board



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 so as to making it more suitable for the Shengyi Autolad1G/Autolad1GB product use.

1. Storage condition

1.1 Laminate

1.1.1 Storage condition

- Pack with original forms on the platform or on the appropriate shelf, 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, avoiding direct sunlight, rain and avoid erosion of corrosive gas (storage environment directly affect the quality of material).
- For double-sided copper clad laminates (cores), to minimize moving 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.
- For single-sided copper clad laminates, with a suitable environment and condition for storage, the shelf life can be up to one year.

1.1.3 Operation manual

- Wear clean gloves and carefully handle the laminates. Collisions, sliding will cause damage of the laminate copper. Bare hand actions will cause contamination to copper foil surface. These defects may cause adverse effects on the use of laminates.

1.2 Prepreg

1.2.1 Storage method

- Levelly stored in original package form, avoid heavy stress, prevent prepreg damage caused by inappropriate storage condition.
- Leftover or cut prepreg should be packed and sealed with plastic wrap and put it back on the backing ring in the original package.

1.2.2 Storage environment

- Prepreg should be sealed packaged and be stored in free of UV irradiation environment, specific storage conditions and the storage periods are 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, conduct dehumidification process if necessary for wet weather. It is recommended to use the prepreg within 3 days after unpackage.

1.2.3 Cutting guideline



- The best way for cutting is to left it to professional staff, they should wear clean gloves during operation, prevent the pollution of prepreg surface; and operation must be careful to prevent prepreg wrinkle or crack.
- Autolad3G is halogen-free, when cutting prepreg, clean the platform first to avoid cross-contamination of different types of resin powder.

1.2.4 Prepreg use recommendations

- When the prepreg is taken out from the cold storage, it must go through a warming process before opening the package. The warming time is more than 8 hours (depending on the specific storage conditions). Open the package after it is the same as the ambient temperature.
- The prepreg that has been cut into panels shall be stored in the environment of Condition 1 or Condition 2 and used up as soon as possible. If the prepreg storage exceeds 3 days, it must be re-tested and qualified before use.
- After unpacking the roll form prepreg, for the rest of the roll, it is required to seal the rest roll according to original package standard, and store it in Condition 1 or Condition 2.
- For IQC inspection, PP test should be finished within 5 days from the date of acceptance according to IPC-4101 specification.
- If the PP panels need to be dehumidified before use, it is recommended that the dehumidification cabinet conditions to be set: temperature <math>< 23\text{ }^{\circ}\text{C}</math>, relative humidity about 40%, and the upper limit of temperature/humidity fluctuation should not exceed 50%.

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 needs. If bake after cutting, it's recommended to rinse cutting panels first, which is able to remove resin powder brought by cutting and to avoid etching problem.
- Baking condition: $150^{\circ}\text{C}/2\text{-}4\text{h}$, be sure to avoid contact directly with heater.

2.3 Inner layer oxide treatment

- Autolad3G is suggested for brown-oxide treatment.

2.4 Lay-up

- Ensure prepreg direction of warp and fill to be consistent between different layers at lay-up process. Avoid prepreg reversal or overturn to avoid multilayer board warpage, distortion and after press.
- After brown-oxide treatment and before going into press the time needs to be controlled within 12 hours.
- After lay-up and before going into press the time needs to be controlled within 12 hours.



- When the buffer materials may have the risk of moisture absorption, it is recommended to bake them dry before use.
- Due to the material characteristics, it is easy to carry static electricity. When stacking, special attention should be paid to the adsorption of foreign matters on prepreg.
- In order to ensure good alignment effect during panel arrangement, it is recommended to use riveting method for riveting and fixation; It is recommended to use electromagnetic heat when the fusion method is required, and PCB should evaluate the optimal parameters for the best fusion effect in detail; Other fusion methods require rigorous and detailed evaluation of the fusion effect from PCB, to avoid layer deviation caused by poor fusion.

2.5 Press process

- It is recommended to select the press with good vacuum pumping performance and vacuum door sealing to avoid the entry of external moisture.
- Keep heat-up rate at 1.5-2.5°C/min when material temperature is from 80°C to 140°C.
- Full pressure setting is recommended at the range of 350 – 420 PSI (oil press), specified pressure value should be determined by multilayer feature (lay-up construction and resin-filled area). It is recommended to turn to full pressure at 100-130°C.
- Curing condition: temperature over 180°C, >90min.
- Cooling rate: < 2°C/min.
- Out of press material temperature: < 150°C.
- If pressed by Adara machine, please inform us for more information.
- When adopting single-sided or copper-free panels 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 the roughened surface purpose is one of optional measures.

2.6 Drilling

- It is better to use new drill to process.
- The stack-up thickness is recommended to be no more than 2 pieces / stack (calculated according to the core thickness of 1.6mm/ piece).
- Suggested hit count to be 1000-2000 holes.
- The drilling feed rate is suggested to be lowered by 15-20% compared with normal FR-4 drilling parameter.

2.7 Baking after drilling

- Suggested baking after drilling condition: 170-180°C/3h, pay attention that the laminate cannot be in direct contact with the heat source.
- Bake before resin plug hole and after back drilling: 170-180°C/2-3h.



2.8 Desmear

- It is suggested that the specific parameters should be set according to the actual PCB structure (board thickness, hole size), and all kinds of structural boards should be fully evaluated in detail to determine the best matching desmear conditions and parameters.
- Desmear effect should refer to the inner copper connection with hole wall crosssection to make sure there is no resin residue after desmear process.
- Once plasma or horizontal desmear is recommended.
- The specific desmear conditions are related to the equipment, desmear solution type, PCB thickness or hole area.
- Under the premise of full loading, it is recommended that the thicker the PCB thickness, the longer the plasma time.

2.9 Solder mask

- Suggested baking condition before applying solder mask: 130°C/2-4h.
- Be careful of panel distortion or warpage due to improper stacking at solder mask post-baking process.
- Not suggested for solder mask rework treatment, which will show white spot phenomenon after the solder mask rework process.

2.10 HAL

- Suitable for lead-free HAL process.
- For the structure with thick copper and large copper surface (or thick copper plating), the temperature is high during lead-free tin spraying, resulting in excessive thermal stress, which is prone to white spots between large copper surfaces, copper warping and other problems. The improvement measures are as follows:
 1. Reduce the tin spraying temperature, shorten the tin spraying time, and reduce the thermal stress generated during tin spraying;
 2. Before tin spraying, pre bake the plate under the condition of 140-150°C/2h, and spray tin immediately to remove the moisture accumulated on the plate surface, which can reduce the probability of white spots;
 3. Avoid too large tin spraying surface, or increase the thickness of green oil appropriately, which can well cushion the thermal stress generated during tin spraying;
 4. The large copper surface structure is designed as a grid structure.

2.11 Punching

- Suggested to use milling machine for processing and reduce the travel speed, not suitable for punching/beer board, which may cause blast edge, blast hole problem.

2.12 Package



- To prevent moisture effect on the heat resistance of base material, suggest baking finished PCB boards at 150°C/4-6h before packaged.
- For long time storage, it's recommended to wrap by aluminum foil vacuum package.

3. PWB Soldering

3.1 Shelf life of PWB

- 3 months with aluminum foil package.
- Baking at 125°C/4-6h before assembly is recommended, especially after stored for more than 3 months.

3.1 Reflow

- Suitable for standard lead-free reflow process

3.2 Manual soldering suggestion

- For separated or connected pad, manual soldering temperature should range 350-380°C.
- Single point welding time: less than 3s.

This process guide is for reference only! Should you have any questions when using Autolad3G/Autolad3GB product, please feel free to contact us. Shengyi will support you with prompt and effective service.