

HF-350F

Quick Reference Processing Guide

General Information

HF-series copper clad laminates are constructed with ceramic-filled hydrocarbon composites. The special ceramic-filled hydrocarbon composite techniques on HF-series can offer low dielectric loss and minimal signal distortion in microwave application.

HF-series laminates are engineered to provide the excellent dimensional stability. It can cover the typical etch or baking shrinkage. HF-series laminates show the lower Z-axis expansion alloying for plated-through-hole reliability in extreme thermal environments or multi-layer applications.

Storage

HF-series laminates can be stored at room temperature. At room temperature the dielectric materials of HF-series are inert to humidity. However metal claddings such as copper can be oxidized during exposure to high humidity.

In addition, prolonged exposure in an oxidative environment may cause changes to the dielectric properties of hydrocarbon based materials. The rate of change increases at higher temperatures and is highly dependent on the circuit design.

Even if the resins and components, we use (Hydrocarbon, Ceramic fillers, etc.) will not change or degrade in storage, if exposed to high humidity over 50%RH, proper baking process prior to fabricating PCB process is necessary.

HF-series laminates should be stored flat in a clean dry area. Cores will benefit from being stored between two stiffeners in order to prevent unnecessary bending of the layers or damaged corners. Soft slip sheets should be used to prevent dust and debris from being embossed into the material. AGC recommends that the customer evaluate each material and design combination to determine fitness for use over the entire life of the end product.

Inner Layer Preparation

▪ **Surface Preparation for Photoresist Applications**
Process as-is or uses chemical or mechanical preparation depending upon core thickness. Both liquid and dry film photoresist can be applied.

A chemical process consisting of organic cleaners and a micro etch is the preferred method of preparing copper surfaces for coating with photoresist.

▪ **Desmear processing**

Standard processing - Thin cores may require leaders.

▪ **Oxide Treatment**

HF-series laminates are compatible with most oxide and oxide alternative processes. Highly caustic, high temperature processes, such as traditional or reduced black oxides, should be followed by a thorough rinse and bake of the inner layers.

Use procedures associated with oxide or oxide alternative of choice.

Bonding

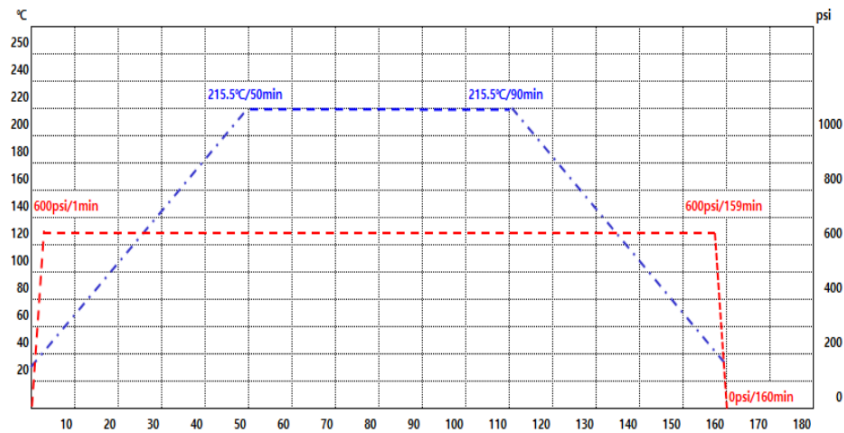
▪ **Multi-layer Adhesive System**

For best results, HF-series laminates should be bonded using low loss bond ply such as fastRise series or HB series provided by AGC. The press cycle can be determined by the requirements of the chosen adhesive system of bondply and HF-series laminates are compatible with most of adhesive systems.

▪ **Multi-layer Bond Cycle**

Use bond parameters associated with adhesive system.

- ✓ Vacuum lamination recommended
- ✓ Heat rise +3.5~6.5 °C/min to 215°C
- ✓ Maintain pressure up to 600 psi through hole cycle
- ✓ Hold at 215°C for 60 minutes
- ✓ Cool package under full pressure with -3°C/min rate



PTH and Outer Layer/Double Sided Circuit Processing

• Drilling

Standard entry/exit materials such as sheeted aluminum and pressed phenolic. Use new drills. Sharp drill bits are critical to any Hydrocarbon drilling. Controlled infeeds, speeds, and retract rates. Inspect holes to determine tool life.

| Processing Parameter | | | | | | | |
|----------------------|--------------|----------------|-----------------|------------|--------------|----------------|-----------------|
| Drill size | Speed (Krpm) | Infeed (m/min) | Retract (m/min) | Drill size | Speed (Krpm) | Infeed (m/min) | Retract (m/min) |
| 0.3 | 100 | 2.2 | 15 | 0.95 | 56 | 3.1 | 22 |
| 0.35 | 100 | 2.6 | 15 | 1 | 53 | 3 | 22 |
| 0.4 | 95 | 2.9 | 22 | 1.05 | 51 | 3 | 22 |
| 0.45 | 95 | 3.1 | 22 | 1.1 | 49 | 2.7 | 22 |
| 0.5 | 90 | 3.3 | 22 | 1.15 | 46 | 2.7 | 22 |
| 0.55 | 90 | 3.3 | 22 | 1.2 | 44 | 2.5 | 22 |
| 0.6 | 86 | 3.3 | 22 | 1.25 | 43 | 2.5 | 22 |
| 0.65 | 81 | 3.3 | 22 | 1.3 | 42 | 2.3 | 22 |
| 0.7 | 76 | 3.3 | 22 | 1.35 | 41 | 2.3 | 22 |
| 0.75 | 71 | 3.3 | 22 | 1.4 | 40 | 2.1 | 22 |
| 0.8 | 67 | 3.3 | 22 | 1.45 | 39 | 2 | 22 |
| 0.85 | 63 | 3.3 | 22 | 1.5 | 38 | 2 | 22 |
| 0.9 | 59 | 3.3 | 22 | | | | |

• Deburring

Mechanical debur/scrub acceptable for thicker cores/builds.

• Hole Preparation

Chemical or plasma desmear may be required. Etchback is not recommended. If panels have been exposed to moisture, bake the boards at 220°F - 250°F (105°C - 120°C) for one or more hours to drive out moisture.

• Metallization

Electroless copper or direct deposit processes

PTH and Outer Layer/Double Sided Circuit Processing

▪ Final Surfaces

Compatible with most final metal surfaces and organic solderability preservatives (OSP's). Preserve post-etch surface and bake cores prior to application of liquid photoimageable soldermask (LPI).

▪ Final Circuitization

HF-330/HF-340/HF-350F/HF-300F laminates can be routed, punched, or V-scored. Diamond- cut or multi-fluted chipbreaker router bits are recommended. V-score depth should be $< \frac{1}{2}$ of the material thickness or less. Deeper cuts could result in pre-mature breakaway.

These guidelines can provide only basic and reference information for PCB fabricators. Because of different environment, equipment, tooling and so on, in all instances, the user shall determine suitability in any given conditions or applications. For more detailed processing information, please contact with the AGC engineer or sales representative.