

The processing guidelines contained in this document were developed through in-house testing and field experience. However, they *should be considered to be starting points that will require further adjustment*. Read the following review of processes for applicability to your particular Printed Wiring Board (PWB) fabrication environment. Remember that the suggestions contained herein can not account for all possible board designs or processing environments. Additional adjustments by the fabricator will be necessary. Isola can and will assist with this process, but the fabricator, not Isola, is ultimately responsible for their process and the end results. **Fabricators should verify that PWBs made using these suggestions meet all applicable quality and performance requirements.**

## Part 1: Handling and Use

IS680 is a fully cured material system, ready for immediate use in fabrication. No special handling is required. IS680 is compatible with all normal PCB etchant systems, as well and photoresist materials.

## Part 2: Drill

### General

To assure effective removal of the resin debris during drilling, undercut drill geometries and high helix tools are suggested. On high layer count technologies and thicker overall board thicknesses, peck drilling parameters may be necessary. Suggested parameters are outlined below for typical multilayer designs.

### Cutting Speed and Chipload

Relative to standard FR-4 parameters, use lower chiploads and cutting speeds to drill IS680 printed circuit boards. The parameters in **Table 2** provide a *moderate initial starting point for typical board designs*. Thick boards with heavy copper or special cladding such as invar will require more conservative drill parameters. Boards with numerous 2 oz. copper innerlayers or boards with coarse glass weave may require more conservative parameters.

### Stack Height and Hit Count

Stack heights and hit counts will vary according to construction and overall thickness of the boards being drilled. For thicker boards, above 2.5 mm (100 mils) overall, with high layer counts, drill one high.

Maximum hit count for drill diameters below 0.020" is 1,000, while drills at or above 0.020" diameter can be permitted up to 1,500 hits. These general guidelines are strongly influenced by board thickness, geometry, stack height, etc.

Aluminum entry and lubricated backing help create good quality hole walls but are not essential in all applications. It is suggested that the fabricator's supplier of entry and backup be consulted.

**Table 2: Suggested Drilling Parameters For Initial IS680 Setup**

| Drill Size |        | Spindle Speed<br>RPM | Surface Speed<br>Per Minute |      | Infeed        |              | Chipload   |             | Retract       |              |
|------------|--------|----------------------|-----------------------------|------|---------------|--------------|------------|-------------|---------------|--------------|
| mm         | Inch   |                      | SMPM                        | SFPM | Meter<br>min. | Inch<br>min. | mm<br>rev. | Mil<br>rev. | Meter<br>min. | Inch<br>min. |
| 0.25       | 0.0098 | 100,000              | 79                          | 258  | 1.02          | 40           | 0.010      | 0.40        | 15            | 600          |
| 0.30       | 0.0118 | 105,000              | 99                          | 325  | 2.16          | 85           | 0.021      | 0.81        | 20            | 800          |
| 0.35       | 0.0138 | 95,000               | 104                         | 343  | 3.05          | 120          | 0.032      | 1.26        | 20            | 800          |
| 0.40       | 0.0157 | 95,000               | 119                         | 392  | 3.81          | 150          | 0.040      | 1.58        | 25            | 1000         |
| 0.50       | 0.0197 | 76,000               | 119                         | 392  | 4.83          | 190          | 0.064      | 2.50        | 25            | 1000         |
| 0.63       | 0.0248 | 62,000               | 123                         | 403  | 4.45          | 175          | 0.072      | 2.82        | 25            | 1000         |
| 0.80       | 0.0315 | 49,000               | 123                         | 404  | 3.73          | 147          | 0.076      | 3.00        | 25            | 1000         |
| 0.90       | 0.0354 | 44,000               | 124                         | 408  | 3.35          | 132          | 0.076      | 3.00        | 25            | 1000         |
| 1.00       | 0.0394 | 39,000               | 123                         | 402  | 2.97          | 117          | 0.076      | 3.00        | 25            | 1000         |
| 1.27       | 0.0500 | 31,000               | 124                         | 406  | 2.36          | 93           | 0.076      | 3.00        | 25            | 1000         |
| 1.50       | 0.0591 | 26,000               | 123                         | 402  | 1.98          | 78           | 0.076      | 3.00        | 25            | 1000         |
| 2.00       | 0.0787 | 22,000               | 138                         | 454  | 1.68          | 66           | 0.076      | 3.00        | 25            | 1000         |

## Part 3: Hole Wall Preparation

IS680/IS680AG resin systems are compatible with standard chemical (permanganate based) desmearing processes. This resin may desmear a little slower than FR-4 systems, so desmearing should be evaluated for effectiveness by the user.

## Part 4: Routing, De-Panelization & Cutting

Depanelization and cutting should be optimized to minimize stresses on the laminate. Material is susceptible to fracturing along the cutting edges, if a non-optimized process is used.

Mechanical routing is the recommended process. Avoid sharp edges whenever possible to reduce localized stress points.

Punching is not recommended. If used, narrow cutting angles should be used and quality of the cutting edge needs to be monitored closely

A roller knife is recommended for cutting. If a guillotine cutter is used, a high cutting speed with a cutting edge angle of the upper knife of 87 degrees and a shearing angle of 2 degrees is recommended as a starting point. Best results are obtained, when the material is pulled back from the cutter, while it is in the lowest position.

For all de-panelization processes, the parameters may require further adjustments.

## Part 5: Packaging and Storage

IS680 finished boards have low moisture sensitivity and good shelf life. However, Isola recommends using best practices in storage and packaging, as noted below, to reduce risk during lead-free assembly.

IS680 boards should be dry prior to packaging to ensure the most robust lead-free performance. For some complex, high reliability designs, baking prior to solder mask application can be implemented to ensure maximum floor life in assembly processing. Printed boards made for high temperature assembly from IS680, which require a long shelf life, the best protection is provided using a Moisture Barrier Bag (MBB) with a Humidity Indicator Card (HIC) and adequate drying desiccant inside the MBB to prevent moisture absorption during shipment and long-term storage.

Upon opening the MBB, the boards should be processed within 168 hours when maximum shop floor conditions are at < 30°C (85°F)/60% RH. MBB bags that are opened for inspection should be resealed immediately to protect the boards from moisture uptake.

## Part 6: Health and Safety

Always handle laminate with care. Laminate edges are typically sharp and can cause cuts and scratches if not handled properly. Handling and machining of prepreg and laminate can create dust (see IS680 Material Safety Data Sheet).

Appropriate ventilation is necessary in machining/punching areas. The use of protective masks is suggested to avoid inhaling dust. Gloves, aprons and/or safety glasses are suggested if individuals have frequent or prolonged skin or eye contact with dust.

Isola Group does not use polybromidebiphenyls or polybromide-biphenyloxides as flame retardants in any product. Material Safety Data Sheets are available upon request.

## Part 7: Ordering Information

Contact your local sales representative or visit: [www.isola-group.com](http://www.isola-group.com) for further information.

### Isola Group

3100 West Ray Road, Suite 301  
Chandler, AZ 85226  
Phone: 480-893-6527  
Fax: 480-893-1409  
[info@isola-group.com](mailto:info@isola-group.com)

### Isola Asia Pacific (Hong Kong) Ltd.

Unit 3512 - 3522, 35/F  
No. 1 Hung To Road, Kwun Tong,  
Kowloon, Hong Kong  
Phone: 852-2418-1318  
Fax: 852-2418-1533  
[info.hkg@isola-group.com](mailto:info.hkg@isola-group.com)

### Isola GmbH

Isola Strasse 2  
D-52348 Düren, Germany  
Phone: 49-2421-8080  
Fax: 49-2421-808164  
[info-dur@isola-group.com](mailto:info-dur@isola-group.com)

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[www.isola-group.com/products/IS680](http://www.isola-group.com/products/IS680)

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The Isola logo consists of the word "isola" in a bold, lowercase, sans-serif font. The letters are a vibrant red color. The 'i' has a dot, and the 'a' has a tail that curves slightly to the right. The overall appearance is clean and modern.