Process Guidelines

Laminate  R-1766(GH)
Prepreg   R-1661(GH)
General

Material Storage
Laminate should be stored flat in a cool dry environment. Avoid bending or scratching the laminate surface.
When possible store the laminate in the original container.
Prepreg should be stored flat in a cool dry controlled environment, 68 F(20 C) or less and 50% RH or less.

Laminate Surface Preparation
Regular Shiny Copper can be cleaned using industry standard chemical clean or mechanical clean.
Reverse Treat Copper should be cleaned using industry standard chemical clean.

Inner Layer Bond Treatment
Black or Brown Oxide can be used.
Alternative Oxide Treatment using a Peroxide/Sulfuric etch technology can be also used.

Drying
Dry finished inner layers completely to remove any absorbed moisture or surface moisture.
A racked bake at 225 F(105 C) for 20-30 minutes is preferred. For conveyorized alternative oxide processing, some equipment may have sufficient drying capability.
However, a racked bake is suggested.
# Drilling

(1) Drilling parameters in general condition

Drilling parameters should be adjusted depending on hole size, layer count, panel thickness, stack count and stack height etc.

## (1) Drilling parameters in general condition

<table>
<thead>
<tr>
<th>diameter (mm)</th>
<th>spindle rpm</th>
<th>velocity m/min</th>
<th>infeed m/min</th>
<th>chipload μ/rev</th>
<th>infeed m/min</th>
<th>chipload μ/rev</th>
<th>bit life (hits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>160,000</td>
<td>100</td>
<td>1.6</td>
<td>10</td>
<td>2.4</td>
<td>15</td>
<td>1,000–2,000</td>
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<tr>
<td>0.25</td>
<td>160,000</td>
<td>126</td>
<td>1.8</td>
<td>11</td>
<td>2.8</td>
<td>18</td>
<td>1,000–2,000</td>
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<tr>
<td>0.30</td>
<td>160,000</td>
<td>151</td>
<td>1.9</td>
<td>12</td>
<td>3.2</td>
<td>20</td>
<td>2,000–3,000</td>
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<tr>
<td>0.35</td>
<td>137,000</td>
<td>151</td>
<td>1.8</td>
<td>13</td>
<td>3.0</td>
<td>22</td>
<td>2,000–3,000</td>
</tr>
<tr>
<td>0.40</td>
<td>120,000</td>
<td>151</td>
<td>1.8</td>
<td>15</td>
<td>2.9</td>
<td>24</td>
<td>2,000–3,000</td>
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<tr>
<td>0.45</td>
<td>107,000</td>
<td>151</td>
<td>1.8</td>
<td>17</td>
<td>2.7</td>
<td>25</td>
<td>2,000–3,000</td>
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<tr>
<td>0.50</td>
<td>96,000</td>
<td>151</td>
<td>1.8</td>
<td>19</td>
<td>2.7</td>
<td>28</td>
<td>2,000–3,000</td>
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<tr>
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<td>87,000</td>
<td>150</td>
<td>1.8</td>
<td>21</td>
<td>2.6</td>
<td>30</td>
<td>2,000–3,000</td>
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<tr>
<td>0.60</td>
<td>80,000</td>
<td>151</td>
<td>1.7</td>
<td>21</td>
<td>2.6</td>
<td>33</td>
<td>2,000–3,000</td>
</tr>
<tr>
<td>0.65</td>
<td>74,000</td>
<td>151</td>
<td>1.7</td>
<td>23</td>
<td>2.6</td>
<td>35</td>
<td>2,000–3,000</td>
</tr>
<tr>
<td>0.70</td>
<td>68,000</td>
<td>149</td>
<td>1.7</td>
<td>25</td>
<td>2.6</td>
<td>38</td>
<td>2,000–3,000</td>
</tr>
<tr>
<td>0.75</td>
<td>64,000</td>
<td>151</td>
<td>1.6</td>
<td>25</td>
<td>2.6</td>
<td>41</td>
<td>2,000–3,000</td>
</tr>
<tr>
<td>0.80</td>
<td>60,000</td>
<td>151</td>
<td>1.6</td>
<td>27</td>
<td>2.5</td>
<td>42</td>
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<tr>
<td>0.85</td>
<td>56,000</td>
<td>149</td>
<td>1.6</td>
<td>29</td>
<td>2.4</td>
<td>43</td>
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<td>0.90</td>
<td>53,000</td>
<td>150</td>
<td>1.6</td>
<td>30</td>
<td>2.4</td>
<td>45</td>
<td>2,000–3,000</td>
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</table>

Note: The following guidelines are provided as general recommendations. Process optimization may be necessary.
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### Drilling (2) Positioning accuracy

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<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Drill size</td>
<td>mm</td>
<td>0.3</td>
</tr>
<tr>
<td>Surface speed</td>
<td>m/min</td>
<td>151</td>
</tr>
<tr>
<td>Revolution</td>
<td>rpm</td>
<td>160000</td>
</tr>
<tr>
<td>Chip load</td>
<td>micron/rev</td>
<td>20</td>
</tr>
<tr>
<td>Hit count</td>
<td></td>
<td>3000</td>
</tr>
<tr>
<td>Entry board</td>
<td></td>
<td>0.15 Aluminum (lubricated is preferred)</td>
</tr>
<tr>
<td>Panel thickness</td>
<td>mm</td>
<td>0.8 (#7628 X 4)</td>
</tr>
<tr>
<td>Copper thickness</td>
<td>micron</td>
<td>35 / 35</td>
</tr>
<tr>
<td>Stack count</td>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>

positioning accuracy: 47.2 micron

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**R-1766(GH)**
Laminate

Curing temperature time will be determined by the thickness of multilayer package being laminated.
Laminate parameters should be adjusted depending on board thickness, stack count and stack thickness etc.

Please Note: below is NOT a press control program. The graph represents the recommended pressure/temperature profile that the actual panels are subjected to during the lamination program cycle.

Graph:
- Temperature (°C):
  - 200
  - 180
  - 160
  - 130
  - 100
  - 80
  - 60
  - 40
  - 20

- Pressure (MPa):
  - 1.0
  - 2.0
  - 2.9

- Time (min):
  - 30
  - 60

- Product:
  - Heat up rate (1 - 3°C/min)
  - Pressure 2.0 - 2.9MPa
  - Product temp: over 160°C over 50min

- Vacuum:
  - max. 100torr (13.3kPa)
  - Vacuum: Start - 60min
## Desmear

Desmear parameters should be adjusted depending on board thickness, stack count and stack thickness etc.

<table>
<thead>
<tr>
<th>process</th>
<th>reagent type</th>
<th>temp. (°C)</th>
<th>time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swelling</td>
<td>alkaline</td>
<td>65-85</td>
<td>5-10</td>
</tr>
<tr>
<td>Etching</td>
<td>permanganate</td>
<td>70-85</td>
<td>10-15</td>
</tr>
</tbody>
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<thead>
<tr>
<th>process</th>
<th>reagent type</th>
<th>temp. (°C)</th>
<th>time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swelling</td>
<td>organic solvent</td>
<td>35-40</td>
<td>6-10</td>
</tr>
<tr>
<td>Etching</td>
<td>permanganate</td>
<td>70-85</td>
<td>10-15</td>
</tr>
</tbody>
</table>
【Notes before you use】
・Please verify the suitability and fitness for intended application by quality testing, evaluation or other means at your own option before any adoption, use or change of use conditions of a product listed in the Process Guideline.

・We would like to have a delivery specifications mutually agreed for the product that you have decided to use.
The agreements defined in the delivery specifications are assigned higher priority.

・Please note that images shown may somewhat differ from the actual product in color.

・Please note that specifications and external design are subject to change for product improvement without notice.

・For details on products in the Process Guideline, please contact your distributor or our sales department.

【Safety Information】
・Before using the product, please read the delivery specifications carefully or contact the distributor from which you purchased the product or our sales department in order to use the product correctly.

・The products in the Process Guideline are Electronic circuit board materials for electronic and electrical devices. Please do not use them for other than specified use.

Please Contact us of more

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