Process Guidelines

MEGTRON6
Laminate R-5775
Prepreg R-5670
High Speed, Low Loss Multi-layer Materials
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, 73 °F (23 °C) or less and 50% RH or less.
Extended storage of prepreg should be at a reduced temperature of 41 °F (5 °C). Open bags of prepreg must be resealed. Prepreg should not be exposed to open environments for more than 8 hours total cumulatively under the above conditions or as agreed upon between user and supplier.

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. In the case of using Black Oxide, please check whether peel strength is acceptable for the usage.
Alternative Oxide Treatment with organic coating using a Peroxide/Sulfuric etch technology is preferred.

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

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Spindle speed (k rpm)</th>
<th>Velocity (m/min)</th>
<th>Infeed (m/min)</th>
<th>Chipload (μ/rev)</th>
<th>Min Infeed (m/min)</th>
<th>Min Chipload (μ/rev)</th>
<th>Bit Life (hits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>160</td>
<td>100</td>
<td>1.6</td>
<td>10</td>
<td>2.4</td>
<td>15</td>
<td>700–1,000</td>
</tr>
<tr>
<td>0.25</td>
<td>160</td>
<td>126</td>
<td>1.8</td>
<td>11</td>
<td>2.8</td>
<td>18</td>
<td>700–1,000</td>
</tr>
<tr>
<td>0.30</td>
<td>160</td>
<td>151</td>
<td>1.9</td>
<td>12</td>
<td>3.2</td>
<td>20</td>
<td>700–1,000</td>
</tr>
<tr>
<td>0.35</td>
<td>137</td>
<td>151</td>
<td>1.8</td>
<td>13</td>
<td>3.0</td>
<td>22</td>
<td>700–1,000</td>
</tr>
<tr>
<td>0.40</td>
<td>120</td>
<td>151</td>
<td>1.8</td>
<td>15</td>
<td>2.9</td>
<td>24</td>
<td>700–1,000</td>
</tr>
<tr>
<td>0.45</td>
<td>107</td>
<td>151</td>
<td>1.8</td>
<td>17</td>
<td>2.7</td>
<td>25</td>
<td>700–1,000</td>
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<tr>
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<td>96</td>
<td>151</td>
<td>1.8</td>
<td>19</td>
<td>2.7</td>
<td>28</td>
<td>1,400–2,000</td>
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<tr>
<td>0.55</td>
<td>87</td>
<td>150</td>
<td>1.8</td>
<td>21</td>
<td>2.6</td>
<td>30</td>
<td>1,400–2,000</td>
</tr>
<tr>
<td>0.60</td>
<td>80</td>
<td>151</td>
<td>1.7</td>
<td>21</td>
<td>2.6</td>
<td>33</td>
<td>1,400–2,000</td>
</tr>
<tr>
<td>0.65</td>
<td>74</td>
<td>151</td>
<td>1.7</td>
<td>23</td>
<td>2.6</td>
<td>35</td>
<td>1,400–2,000</td>
</tr>
<tr>
<td>0.70</td>
<td>68</td>
<td>149</td>
<td>1.7</td>
<td>25</td>
<td>2.6</td>
<td>38</td>
<td>1,400–2,000</td>
</tr>
<tr>
<td>0.75</td>
<td>64</td>
<td>151</td>
<td>1.6</td>
<td>25</td>
<td>2.6</td>
<td>41</td>
<td>1,400–2,000</td>
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<tr>
<td>0.80</td>
<td>60</td>
<td>151</td>
<td>1.6</td>
<td>27</td>
<td>2.5</td>
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<td>1,400–2,000</td>
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<tr>
<td>0.85</td>
<td>56</td>
<td>149</td>
<td>1.6</td>
<td>29</td>
<td>2.4</td>
<td>43</td>
<td>1,400–2,000</td>
</tr>
<tr>
<td>0.90</td>
<td>53</td>
<td>150</td>
<td>1.6</td>
<td>30</td>
<td>2.4</td>
<td>45</td>
<td>1,400–2,000</td>
</tr>
</tbody>
</table>

Note:
1) Spindle speed should be adjusted to make velocity 100 – 150 m/min.
2) To use lubricant sheets like LE sheets as entry sheets is recommendable.
3) To use drilling bits with high helix angle is recommendable.
4) Peck drilling is recommendable for thin drilling bits.
5) Please adjust drilling parameters after checking qualities of through holes.
Drilling (2) Positioning accuracy

<table>
<thead>
<tr>
<th>Drill size</th>
<th>mm</th>
<th>φ 0.30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Velocity</td>
<td>m/min</td>
<td>151</td>
</tr>
<tr>
<td>Spindle Speed</td>
<td>krpm</td>
<td>160</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</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>

* No peck drilling

Positioning accuracy map of R-5775 and R-1766 as our conventional FR-4

positioning accuracy : 46.8 micron  positioning accuracy : 47.2 micron

The following guidelines are provided as general recommendations. Process optimization may be necessary.
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 of actual panels subjected to during the lamination program cycle.

Points
1. Product temperature
   - Product temperature should be kept at higher 185°C for more than 75 minutes. 195°C for 120 minutes is preferred.
2. Press pressure
   - It’s a guide line that Ramping up of pressure is started after 90°C of material temp. at the platen side and finished before 110°C of material temp. at the platen side.
   - 3.0MPa in the case that ROR of material is 4.0C/min, 3.5MPa in the case of 3.0C/min and 4.0MPa in the case of 2.0C/min are guide lines.
   - Pressure is optimized according to Circuit Pattern by our customers.
3. Vacuum
   - Stop at 30minute from start (at 90-130°C of material temp. at the platen side).
4. Cushion
   - Cushion for Pressure evenness is needed. (Sheets of kraft paper etc.)

* It’s recommendable that Tg of PCBs by DSC is above 180°C.

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Note The following guidelines are provided as general recommendations. Process optimization may be necessary.
1) Permanganate Desmear
The weight loss of R-5775 laminate and R-5670 prepreg is less than that of R-1766 as our conventional FR-4 material. Twice of FR-4 condition is recommendable. 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>
</table>

<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>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>

<table>
<thead>
<tr>
<th>Part number</th>
<th>Weight loss ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-5775</td>
<td>0.2 - 0.4</td>
</tr>
<tr>
<td>R-1766</td>
<td>1.0</td>
</tr>
</tbody>
</table>

2) Plasma Desmear
Half time of FR-4 conditions is recommendable.

3) Combined Desmear for Hybrid construction with FR-4 materials
First, Plasma Desmear for the half time of FR-4 condition is done and Permanganate Desmear without swelling process for the half time of FR-4 condition is done continuously.
The following guidelines are provided as general recommendations. Process optimization may be necessary.

## Finishing

- Ag plating, Sn plating, Direct gold plating and OSP are good for R-5775.

- If you use Ni plating like ENIG, baking or long time holding at room temperature (E.g 5hours at 150°C, 1week at room temperature) is needed before Ni plating.

- It depends on circuit pattern and conditions (circulation, bubbling etc.) of equipment, though.
++Before purchase++

【Notes before you use】

・Prior to adoption and use of a product contained in the Process Guideline, please verify the suitability for your application by your quality testing, evaluation, etc.

・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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