IPC-SM-840C

Qualification and Performance of Permanent Solder Mask

Amendment 1
The Principles of Standardization

In May 1995 the IPC’s Technical Activities Executive Committee adopted Principles of Standardization as a guiding principle of IPC’s standardization efforts.

Standards Should:
- Show relationship to Design for Manufacturability (DFM) and Design for the Environment (DFE)
- Minimize time to market
- Contain simple (simplified) language
- Just include spec information
- Focus on end product performance
- Include a feedback system on use and problems for future improvement

Standards Should Not:
- Inhibit innovation
- Increase time-to-market
- Keep people out
- Increase cycle time
- Tell you how to make something
- Contain anything that cannot be defended with data

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Adopted October 6, 1998

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Qualification and Performance of Permanent Solder Mask

1.2 Purpose

**Paragraph 1:**

Replace:

IPC-RB-276

With:

IPC-6011 and IPC-6012

*Add the following paragraph at the end of section:*


13.2.1 General “R13-11 [813] In lieu of the requirements in this section for solder mask, testing to IPC-SM-840C, January 1996, Class “T” requirements shall be acceptable. The requirements contained in the IPC document are similar or equivalent to the ones contained herein.”

1.3 Classes

*Add the following paragraph at the end of section:*

**Note:** Solder mask types were previously described as Type A for screen imaged (liquid) or coverlay for flex (dry), and Type B for all types of photo defined solder mask (liquid or dry film).

3.4.1 Formulation Change

4th bullet point

Replace:

• Changes in type of dye or pigment.

With:

• Changes in type of dye or pigment, excluding coloring dye or pigment within a defined, tested range of lowest (none) and highest (supplied) loading levels of the specific coloring materials.

6th bullet point

Replace:

• Addition, deletion or change in composition of “inert” materials in the formulation such as matting agent(s).

With

• Addition, deletion or change in composition of “inert” materials in the formulation such as matting agent(s), excluding a change in quantity of a single “inert” material already present in the formula within a defined, tested range of lowest (none) and highest (supplied) loading levels of that specific “inert” material. Change to more than one material is considered a formulation change.

2.1 IPC

<table>
<thead>
<tr>
<th>Replace the following:</th>
<th>With the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPC-RB-276</td>
<td>IPC-6011</td>
</tr>
<tr>
<td>Qualification and Performance of Rigid Printed Boards</td>
<td>Generic Performance Specification for Printed Boards</td>
</tr>
<tr>
<td>IPC-6012</td>
<td>Qualification and Performance Specification for Rigid Printed Boards</td>
</tr>
<tr>
<td>TM 2.3.25</td>
<td>TM 2.3.25</td>
</tr>
<tr>
<td>Detection of Ionizable Surface Contamination (Static Method)</td>
<td>Detection and Measurement of Ionizable Surface Contaminants</td>
</tr>
<tr>
<td>TM 2.3.26</td>
<td>TM 2.3.25.1</td>
</tr>
<tr>
<td>Detection of Ionizable Surface Contamination (Dynamic Method)</td>
<td>Ionic Cleanliness Testing of Bare Printed Wiring Boards</td>
</tr>
<tr>
<td>TM 2.3.26.1</td>
<td>TM 2.3.25.1</td>
</tr>
<tr>
<td>Ionizable Detection of Surface Contamination (Static Method)</td>
<td>Ionic Cleanliness Testing of Bare Printed Wiring Boards</td>
</tr>
<tr>
<td>TM 2.3.38</td>
<td>TM 2.3.38</td>
</tr>
<tr>
<td>Inspection Test for Organic Contaminates on Printed Wiring Board and Assembly Surfaces</td>
<td>Surface Organic Contaminant Detection Test</td>
</tr>
<tr>
<td>TM 2.3.39</td>
<td>TM 2.3.39</td>
</tr>
<tr>
<td>Identification of Residual Organic Non-Ionic Contaminates on Printed Wiring Boards and Assembly Surfaces</td>
<td>Surface Organic Contaminant Identification Test (Infrared Analytical Method)</td>
</tr>
<tr>
<td>TM 2.4.28.1</td>
<td>TM 2.4.28.1</td>
</tr>
<tr>
<td>Adhesion, Solder Mask (Over Melting and Non-Melting Metals)</td>
<td>Adhesion, Solder Resist (Mask), Tape Test Method</td>
</tr>
<tr>
<td>TM 2.6.3.1</td>
<td>TM 2.6.3.1</td>
</tr>
<tr>
<td>Moisture and Insulation Resistance Polymeric Solder Masks and Conformal Coating</td>
<td>Moisture and Insulation Resistance – Solder Masks</td>
</tr>
<tr>
<td>TM 2.6.7.1</td>
<td>TM 2.6.7.3</td>
</tr>
<tr>
<td>Thermal Shock – Polymer Solder Mask Coatings</td>
<td>Thermal Shock – Solder Mask</td>
</tr>
<tr>
<td>TM 2.6.11</td>
<td>TM 2.6.11</td>
</tr>
<tr>
<td>Hydrolytic Stability – Solder Masks and Conformal Coating</td>
<td>Hydrolytic Stability – Solder Mask</td>
</tr>
</tbody>
</table>

3.4.5 Cure

Add sentence at the end of Note:

Contact manufacturer of solder mask to determine method to test cure.

3.4.10 Dimensional Requirements

Replace:

If a specific thickness or breakdown voltage is required it shall be specified by the end user on the procurement document.

With:

If a specific thickness or breakdown voltage is required or allowed it shall be specified by the end user on the procurement document.

Table 1 Thermal Shock IPC Test Method

Replace:

2.6.7.1

With:

2.6.7.3

Table 4

Delete and replace with:

<table>
<thead>
<tr>
<th>Class</th>
<th>Test Temperature</th>
<th>Test Humidity</th>
<th>Bias Voltage (VDC)</th>
<th>Test Voltage (VDC)</th>
<th>Duration</th>
<th>Test Pattern IPC-B-25A Board</th>
<th>Requirements (megohm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>65° ± 2°C [149° ± 3.6°F]</td>
<td>90 ± 3 %</td>
<td>0</td>
<td>100</td>
<td>24 hours</td>
<td>E and F, C</td>
<td>500</td>
</tr>
<tr>
<td>H</td>
<td>25° to 65° ± 2°C [77° to 149° ± 3.6 F]</td>
<td>90, -5, + 3%</td>
<td>50</td>
<td>100</td>
<td>6 2/3 days</td>
<td>D, C</td>
<td>500</td>
</tr>
</tbody>
</table>

Table 5

Delete and replace with:

<table>
<thead>
<tr>
<th>Class</th>
<th>Test Temperature</th>
<th>Test Humidity</th>
<th>Bias Voltage (VDC)</th>
<th>Test Voltage (VDC)</th>
<th>Duration</th>
<th>Test Pattern IPC-B-25A Board</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>85° ± 2°C [185° ± 3.6°F]</td>
<td>85% minimum</td>
<td>10</td>
<td>45 - 100</td>
<td>500 hours</td>
<td>D, C</td>
<td>&lt; 1 decade drop in resistance</td>
</tr>
<tr>
<td>H</td>
<td>85° ± 2°C [185° ± 3.6°F]</td>
<td>90%</td>
<td>10</td>
<td>10</td>
<td>168 hours</td>
<td>D, C</td>
<td>Resistance ≥ 2 megohms</td>
</tr>
</tbody>
</table>
3.9.3 Thermal Shock

Replace:
TM 2.6.7.1

With:
TM 2.6.7.3

4.6.1 Inspection of Product for Delivery

Replace:
IPC-RB-276

With:
IPC-6011 and IPC-6012

4.7.1 Preparation Prior to Coating

Replace:
TM 2.3.26, TM 2.3.26.1

With:
TM 2.3.25.1

Table 7

Replace row:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Paragraph</th>
<th>Test Method</th>
<th>D* or N</th>
<th>Class T</th>
<th>Class H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture and Insulation Resistance (comb pattern)</td>
<td>3.9.1</td>
<td>2.6.3.1</td>
<td>D</td>
<td>≥500 megohms (B-25A or B-25)</td>
<td>≥100 megohms (B-25A)</td>
</tr>
</tbody>
</table>

Thermal Shock Test Method

Replace:
2.6.7.1

With:
2.6.7.3