Specifying for Base Materials for High Speed/High Frequency Applications

Developed by the High Speed/High Frequency Base Materials Subcommittee (D-23) of the High Speed/High Frequency Committee (D-20) of IPC

Users of this specification are encouraged to participate in the development of future revisions.

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Table of Contents

1 GENERAL ................................................................. 1
1.1 Scope ..................................................................... 1
1.2 Classification ........................................................ 1
1.2.1 Specification Sheet Description ............................ 1
1.2.2 Dielectric Permittivity ........................................ 1
1.2.3 Dielectric Permittivity Tolerance ......................... 1
1.2.4 Nominal Laminate Thickness ................................ 1
1.2.5 Thickness Tolerance, Laminate ........................... 1
1.2.6 Surface Quality Class ......................................... 1
1.2.7 Metal Cladding Type, Nominal Weight ............... 1
1.2.8 Reinforcement Style ......................................... 2
1.2.9 Resin Type ....................................................... 2
1.2.10 Bonding Layer Parameters .............................. 2
1.2.11 Color .................................................................. 2
1.3 Dimensions and Tolerances ..................................... 3
1.4 Interpretation ........................................................ 3

2 APPLICABLE DOCUMENTS ........................................ 3
2.1 IPC ....................................................................... 3
2.2 Joint Industry Standards ........................................ 4
2.3 National Conference of Standards Laboratories ....... 4
2.4 Federal Specifications ............................................ 4
2.5 ASQ ...................................................................... 4
2.6 ASTM ..................................................................... 5
2.7 International Standards .......................................... 5

3 REQUIREMENTS .......................................................... 5
3.1 Terms and Definitions ............................................ 5
3.1.1 Qualification Assessment .................................... 5
3.1.2 Quality Conformance Testing ............................. 5
3.1.3 Manufacturers Quality System ............................ 5
3.1.4 Process Control Testing ..................................... 5
3.1.5 Self Declaration ................................................ 5
3.1.6 Quality Assessment Data ................................... 5
3.1.7 Sample Qualification .......................................... 5
3.1.8 Production Data ................................................ 5
3.1.9 Customer Test Data .......................................... 5
3.1.10 Internal Assessment ......................................... 5
3.1.11 Individual Customer Audit ............................... 6
3.1.12 Independent Third Party Assessment .................. 6
3.2 Specification Sheets .............................................. 6
3.3 Manufacturers Quality Profile ............................... 6
3.4 Qualification Testing ............................................. 6
3.4.1 Qualification Testing Laminate ............................ 6
3.4.2 Qualification Testing Bonding Layer ..................... 6
3.5 Verification of Manufacturer’s Quality System ......... 6
3.6 Conflict ............................................................... 6
3.7 Materials ............................................................. 6
3.7.1 Metal Cladding ................................................ 6
3.7.2 Reinforcement Fabric ....................................... 6
3.7.3 Resin System .................................................... 6
3.7.4 Fillers ............................................................. 6
3.8 General Requirements/Acceptability .................... 6
3.8.1 Fabricated Sheets and Panels ............................. 7
3.8.2 Inspection Lot .................................................... 7
3.8.3 Visual Properties .............................................. 7
3.8.4 Dimensional .................................................... 9
3.9 Physical Requirements .......................................... 11
3.9.1 Physical Requirements Laminate Materials ......... 11
3.9.2 Physical Requirements, Bonding Layer Materials ... 11
3.10 Chemical Requirements ....................................... 14
3.10.1 Chemical Requirements, Laminate .................... 15
3.10.2 Chemical Requirements, Bonding Layer ........... 15
3.10.3 Flammability .................................................. 15
3.11 Electrical Requirements ....................................... 15
3.11.1 Electrical Requirements, Laminate ................. 15
3.11.2 Electrical Requirements, Bonding Layer .......... 16
3.12 Environmental Requirements ............................... 16
3.12.1 Environmental Requirements, Laminate ........... 16
3.12.2 Environmental Requirements, Bonding Layer .... 16
3.13 Visual and Dimensional Requirements, Laminates .... 16
3.13.1 Substitutability of Grades of Metal Foil Indentations ... 16
3.13.2 Substitutability of Classes of Thickness Tolerance ... 16
3.13.3 Remarking of Substituted Laminates .................. 16
3.14 Marking ............................................................ 16
3.14.1 Marking, Laminates ....................................... 16
3.14.2 Marking Bonding Layer .................................... 17
3.14.3 Marking of Shipping Containers ...................... 17
3.15 Workmanship ..................................................... 17
3.16 Material Safety .................................................... 17
3.17 Bonding Layer Shelf Life ...................................... 17
4 QUALITY ASSURANCE PROVISIONS

4.1 Quality System

4.2 Responsibility for Inspection

4.2.1 Test Equipment and Inspection Facilities

4.3 Qualification Testing

4.3.1 Samples

4.3.2 Sampling Frequency

4.3.3 Laminator’s Qualification Profile

4.3.4 Changes in Composition

4.3.5 Qualification Data Retention

4.4 Quality Conformance Inspection

4.5 Statistical Process Control (SPC)

5 PREPARATION FOR DELIVERY

5.1 Packaging Material

5.2 Authorized Distributors

6 NOTES

6.1 Ordering Information

6.1.1 Ordering Data, Laminate Purchase Orders

6.1.2 Ordering Data, Bonding Layer

6.2 New Materials

Figures

Figure 3-1 Thickness Measurement

Tables

Table 1-1 Metal Cladding Types

Table 1-2 Copper Foil Weight and Thickness

Table 1-3 Bonding Layer Testing Parameters

Table 3-1 Default Requirements

Table 3-2 Permissible Variation in Length and Width of Laminates

Table 3-3 Permissible Variation in Length and Width of Bonding Layers

Table 3-4 Reference Information and Testing Frequency of Laminates

Table 3-5 Reference Information and Testing Frequency of Bonding Layer Material

Table 3-6 Thickness Tolerance for Laminates in mm [in]

Table 3-7 Laminate Bow and Twist, Maximum Percentage

Table 3-8 Dielectric Permittivity Tolerance

Table 4-1 Sampling Plan for One Month or Over Testing for Laminates

Table 4-2 Sampling Plan for One Month or Over Testing for Bonding Layer Material
Specification for Base Materials for High Speed/High Frequency Applications

1 GENERAL

1.1 Scope This specification covers the requirements for high speed/high frequency base materials, herein referred to as laminate or bonding layer, to be used primarily for the fabrication of rigid or multilayer printed boards for high speed/high frequency electrical and electronic circuits. This specification applies to material thickness defined in the specification sheets as measured over the dielectric only.

1.2 Classification The system shown below identifies clad and unclad laminate or bonding layer base materials. A cross-reference list, which connects the outlined call-out system in this document to previously used systems, is shown in the specification sheet section.

Example for laminate base materials where IPC-4103 is referenced:

<table>
<thead>
<tr>
<th>Specification Number</th>
<th>Specification Revision</th>
<th>Material Designator (see 1.2.1)</th>
<th>Specification Sheet (see 1.2.1)</th>
<th>Dielectric Permittivity Range (see 1.2.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4103</td>
<td></td>
<td>L</td>
<td>01</td>
<td>C1/C1</td>
</tr>
</tbody>
</table>

Example for bonding layer base materials where IPC-4103 is referenced:

<table>
<thead>
<tr>
<th>Specification Number</th>
<th>Specification Revision</th>
<th>Material Designator (see 1.2.1)</th>
<th>Specification Sheet (see 1.2.1)</th>
<th>Dielectric Permittivity Range (see 1.2.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4103</td>
<td></td>
<td>B</td>
<td>01</td>
<td>C</td>
</tr>
</tbody>
</table>

1.2.1 Specification Sheet Description At the end of this document is a series of specification sheets. Each sheet outlines requirements for both laminate and bonding layers for each product grade. The specification sheets are organized by a specific reinforcement type, resin system, and/or construction and are provided with a Specification Sheet Number for ordering purposes. The laminate and bonding layer requirements for materials of the like composition are on the same specification sheet for convenience. Material Designator “L” indicates laminate material and Material Designator “B” indicates bonding layer material as shown in the above designation examples. A bonding layer may be a thermoset or thermoplastic film or thermoplastic or thermoset prepreg.

1.2.2 Dielectric Permittivity The nominal permittivity is identified by a letter designation (A, B, C, D, E, F or X) as indicated on the applicable specification sheet.

1.2.3 Dielectric Permittivity Tolerance The permittivity tolerance is identified by a number designation (1, 2, 3, 4, 5, or X). See 3.11.1.1 and Table 3-8.

1.2.4 Nominal Laminate Thickness The nominal thickness is identified by four digits. For all substrates covered by this document, thickness is specified or measured over the dielectric (see 3.8.4.2). For metric specification, the first digit represents whole millimeters, the second represents tenths of millimeters, etc. The four digits indicate the thickness in whole millimeters. In the example shown in 1.2, 1500 is designated for the English usage of 0590.

1.2.5 Thickness Tolerance, Laminate The class of thickness tolerance for laminate base material is identified by either A, B, C, D, E, F, G, H, or X as agreed upon between user and supplier (see 3.8.4.2 and Table 3-6).

1.2.6 Surface Quality Class The class of surface quality is identified by either A, B, C, D, or X as agreed upon between user and supplier (see 3.8.3.1.1).

1.2.7 Metal Cladding Type, Nominal Weight The type and nominal weight or thickness of the metallic cladding for laminate base material is identified by five designators, with the first and fourth designators indicating type of cladding, the third designator being a slash mark to differentiate sides of the base material, and the second and fifth designators indicating the nominal weight or thickness of the metallic cladding.

1.2.7.1 The types of metallic cladding and the designators representing them are shown in Table 1-1. This table is provided as a reference only. The referee document is the latest version of IPC-CF-148A, IPC-4562, or IPC-CF-152 as appropriate. Cladding types C and R, and H and S,