This is a preview of "IPC 2222A-2010". Click here to purchase the full version from the ANSI store.

IPC-2222A

Sectional Design Standard for Rigid Organic Printed Boards

Developed by the IPC-2221/2222 Task Group (D-31B) of the Rigid Printed Board Committee (D-30) of IPC

Supersedes:
IPC-2222 - February 1998
IPC-D-275 - September 1991

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

Contact:

IPC
3000 Lakeside Drive, Suite 309S
Bannockburn, Illinois
60015-1249
Tel 847 615.7100
Fax 847 615.7105

This is a preview of "IPC 2222A-2010". Click here to purchase the full version from the ANSI store.

Table of Contents

1 SCOPE 1
1.1 Purpose 1
1.2 Document Hierarchy 1
1.3 Presentation 1
1.4 Interpretation 1
1.5 Definition of Terms 1
1.5.1 As Agreed Between User and Supplier (AABUS) 1
1.6 Classification of Products 1
1.6.1 Printed Board Type 1
1.7 Applicability 1
1.8 Revision Level Changes 1

2 APPLICABLE DOCUMENTS 2
2.1 IPC 2
2.2 Underwriters Laboratories 2

3 GENERAL REQUIREMENTS 2
3.1 Performance Requirements 2

4 MATERIALS 2
4.1 Material Selection 2
4.2 Dielectric Base Materials (Including Prepregs and Adhesives) 2
4.2.1 Epoxy Laminates 2
4.2.2 High Temperature Laminates 3
4.2.3 Special Clad Materials 3
4.2.4 Other Laminates 3
4.3 Laminate Materials 3
4.3.1 Measurement of Dielectric Thickness 5
4.3.2 Dielectric Thickness/Spacing 6
4.3.3 Laminate Properties 6
4.3.4 Prepreg 6
4.3.5 Single-Clad Laminates 7
4.3.6 Double-Clad Laminates 7
4.3.7 Laminate Material Code Designation 7
4.4 Conductive Materials 7
4.5 Organic Protective Coatings 7
4.6 Markings and Legends 7

5 MECHANICAL/PHYSICAL PROPERTIES 14
5.1 Fabrication Requirements 14
5.2 Product/Printed Board Configuration 14
5.2.1 Printed Board Geometries 14
5.2.2 Mechanical Support 15
5.3 Design Requirements for Printed Board Assembly 15
5.3.1 Assembly, Palletization and Test 15
5.4 Dimensioning Systems 16
5.4.1 Profiles, Cutouts and Notches 16
5.5 Printed Board Thickness Tolerance 19

6 ELECTRICAL PROPERTIES 19

7 THERMAL MANAGEMENT 19

8 COMPONENT AND ASSEMBLY ISSUES 19
8.1 General Attachment Requirements 19
8.1.1 Attachment of Wires/Leads to Terminals 19
8.1.2 Printed Board Extractors 19

9 HOLE/INTERCONNECTIONS 21
9.1 General Requirements for Lands with Holes 21
9.1.1 Land Requirements 21
9.1.2 Thermal Relief in Conductor Planes 21
9.1.3 Clearance Area in Planes 22
9.1.4 Nonfunctional Lands 23
9.1.5 Conductive Pattern Feature Location Tolerance 24
9.2 Holes 25
9.2.1 Unsupported Holes 25
9.2.2 Plated-Through Holes (PTHs) 25
9.2.3 Etchback 26

10 GENERAL CIRCUIT FEATURE REQUIREMENTS 26
10.1 Conductor Characteristics 26
10.1.1 Edge Spacing 26
10.1.2 Balanced Conductors 26
10.1.3 Flush Conductors for Rotating or Sliding Contacts 27
10.2 Land Characteristics 28
10.2.1 Offset Lands 28
10.3 Large Conductive Areas 28

11 DOCUMENTATION 28
11.1 Filled Holes 28
11.2 Nonfunctional Holes 28

12 QUALITY ASSURANCE 28

This is a preview of "IPC 2222A-2010". Click here to purchase the full version from the ANSI store.

Figures

Figure 4–1 Dielectric Layer Thickness Measurement 5
Figure 4–2 Designer/End User Materials Selection Map 13
Figure 5–1 Borders and Margins in Printed Board Panels, mm [in] 14
Figure 5–2 Scoring Parameters 16
Figure 5–3 Conductor Clearance for V-Groove Scoring 17
Figure 5–4 Breakaway Tabs 17
Figure 5–5 Breakaway (Routed Pattern) with Routed Slots ...18
Figure 5–6 Routed Slots 18
Figure 8–1 Permanent Printed Board Extractor 20
Figure 8-2 External Printed Board Extractor 20
Figure 9–1 Clearance Area in Planes 22
Figure 9–2 Foil Web Size 23
Figure 9–3 Lead-to-hole Clearance 25
Figure 10–1 Typical Flush Circuit 27
Figure 10–2 Surface Flushness Conditions 27
Figure 10–3 Cross-hatched Large Conductive Layers with Isothermal Conductors 28

Tables

Table 4–1 Clad Laminate UL Maximum Operating Temperatures 3
Table 4–2 Advantages and Disadvantages of some Common Laminate Materials 4
Table 4–3 Common Base Material Thicknesses for Single & Double-Sided Printed Boards, mm [in] 6
Table 4-4 FR-4 Copper Clad Laminate Construction Selection Guide 8
Table 4-5 High T_G FR-4 Copper Clad Laminate Construction Selection Guide 9
Table 4-6 Cyanate Ester (170 to 250° T_G) Copper Clad Laminate Construction Selection Guide 10
Table 4-7 BT Copper Clad Laminate Construction Selection Guide 11
Table 4-8 Polyimide Copper Clad Laminate Construction Selection Guide 12
Table 5–1 Standard Scoring Parameters, µm [in] 16
Table 5–2 Tolerance of Profiles, Cutouts, Notches, and Keying Slots, as Machined, mm [in] 18
Table 5-3 Printed Board Thickness Tolerance Levels 19
Table 9–1 Pad to Plane Clearance, mm [in] 22
Table 9–2 Nonfunctional Land Considerations 24
Table 9–3 Feature Location Tolerances (Lands, Conductor Pattern, etc.) (Diameter True Position), mm [in] 24
Table 9–4 Diameter Tolerance Range for Unsupported Holes, mm [in] 25
Table 9–5 PTH Diameter to Lead Diameter Relationships, mm [in] 25
Table 9–6 PTH Aspect Ratio 26
Table 9-7 Minimum PTH Diameter Tolerance Range, (Difference Between High and Low Hole Size Limits), mm [in] 26
Table 10–1 Surface Flushness Requirements, mm [in] 27

This is a preview of "IPC 2222A-2010". Click here to purchase the full version from the ANSI store.

Sectional Design Standard for Rigid Organic Printed Boards

1 SCOPE

This standard establishes the specific requirements for the design of rigid organic printed boards.

1.1 Purpose The requirements contained herein are intended to establish specific design details that **shall** be used in conjunction with IPC-2221 to produce designs intended to mount and attach components. The components may be through-hole, surface mount, fine pitch, ultra-fine pitch, array mounting or unpackaged bare die.

The organic materials may be homogeneous, reinforced, or used in combination with inorganic materials; the interconnections may be single, double, or multilayered. They may be any combination able to perform the physical, thermal, environmental, and electronic function.

1.2 Document Hierarchy Document hierarchy **shall** be in accordance with the generic standard IPC-2221.

1.3 Presentation Presentation **shall** be in accordance with the generic standard IPC-2221.

1.4 Interpretation Interpretation **shall** be in accordance with the generic standard IPC-2221.

1.5 Definition of Terms The definition of all terms used herein **shall** be in accordance with IPC-T-50 and as defined in 1.5.1.

1.5.1 As Agreed Between User and Supplier (AABUS) Indicates additional or alternate requirements to be decided between the user and the supplier in the procurement documentation. Examples include contractual requirements, modifications to purchase documentation and information on the drawing. Agreements can be used to define test methods, conditions, frequencies, categories or acceptance criteria within a test, if not already established.

1.6 Classification of Products Classification of products **shall** be in accordance with the generic standard IPC-2221 and as defined in 1.6.1.

1.6.1 Printed Board Type This standard provides design information for different printed board types. Printed board types are classified as:

Type 1 – Single-Sided Printed Board

Type 2 – Double-Sided Printed Board

Type 3 – Multilayer Printed Board without blind or buried vias

Type 4 – Multilayer Printed Board with blind and/or buried vias

Type 5 – Multilayer Metal Core Printed Board without blind or buried vias

Type 6 – Multilayer Metal Core Printed Board with blind and/or buried vias

1.7 Applicability The contents of this standard may not apply to certain leading edge technologies. Refer to IPC-2221 for additional information.

1.8 Revision Level Changes Changes that were incorporated in the current revision of this specification are indicated throughout by gray shading of the relevant subsection(s). Changes to a figure or table are indicated by gray shading of the Figure or Table header.