IPC-2221C

Generic Standard on Printed Board Design

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

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

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Table of Contents

Figures

Tables

IPC-2221C Generic Standard on Printed Board Design

1 SCOPE

This standard establishes the generic requirements for the design of organic printed boards and other forms of component mounting or interconnecting structures, including PC card form factors. The organic materials may be homogeneous, reinforced, or used in combination with inorganic materials; the interconnections may be single, double, or multilayered.

The following overview describes what are the core knowledge and competencies to best serve in the role of Printed Board Design Layout as a stand-alone professional, or as the engineer performing this responsibility. Today's printed board designer must address numerous perspectives for success within a given schedule, with the goal of making the first design iteration work as intended, summarized as:

- Layout Solvability - Complex Packaging Skill set
- Electrical Integrity - Signal & Power Performance on all Layers
- Manufacturability - DFX Considerations for High Yield and Lower Cost
- Application considerations – Environmental, Performance, Life Cycle, Sustainability, Reliability etc.

The result provides for optimal component placement, routing density and electrical performance to achieve an efficient design with high yield and defect-free manufacturability.

1.1 Purpose The requirements contained herein are intended to establish design principles and recommendations that **shall** be used in conjunction with the detailed requirements of a specific interconnecting structure sectional standard (see 1.2) to produce detailed designs intended to mount and connect components. This standard is not intended for use as a performance specification for finished printed boards nor as an acceptance document for electronic assemblies.

1.2 Documentation Hierarchy The IPC-2220 series identifies generic physical design principles and as such, this generic standard is supplemented by various sectional standards that provide sharper focus on specific aspects of printed board technology. These include:

- IPC-2222 Rigid organic printed board design
- IPC-2223 Flexible and rigid/flexible printed board design
- IPC-2225 Organic, MCM-L, printed board design
- IPC-2226 High Density Interconnect (HDI) printed board design
- IPC-2228 RF/Microwave printed board design

The documents are a part of the Family of Design Documents which is identified as IPC-2220. The number IPC-2220 is for ordering purposes only and includes this standard and those listed above. The product requirements of a design may require the use of one or more sectional standards in conjunction with this standard.

1.3 Presentation All dimensions and tolerances in this standard are expressed in hard SI (metric) units and bracketed soft imperial (inch) units. Users of this standard are expected to use metric dimensions. All dimensions greater than or equal to 0.1 mm [0.0039 in] will be expressed in millimeters and inches. All dimensions less than 0.1 mm [0.0039 in] will be expressed in micrometers and microinches.

1.3.1 Dimensional Units — Units of Measure All data is exchanged, communicated and is based in a unit of measurement. Printed Circuit Engineering layout should be based in metric units per: Metric Conversion Act of 1975, which was an Act of Congress that U.S. President Gerald Ford signed into law on December 23, 1975. It declared the metric system "The preferred system of weights and measures for United States trade and commerce."

The following is taken from National Institute of Standards and Technology – Metric Information and Conversions: "Beginning January 1, 2010, the European Union Council Directive 80/181/EEC (Metric Directive) allowed the use of only metric units and prohibited the use of any other measurements for most products sold in the European Union (EU). The Metric Directive made the sole use of metric units obligatory in all aspects of life in the European Union, extending to areas such as product literature and advertising."

This is not mandatory, however, most if not all, devices and their features utilized on printed board assemblies are sized, measured, and implemented as a metric entity; therefore, best optimization of resources will be facilitated by utilizing the metric measurement system.