

PBA Design-for-Manufacturing Guideline

EDM-D-001
PCB specification

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The Design-for-eXcellence Guidelines principles

The PBA Design-for-eXcellence (DfX) Guidelines are designed to provide all electronic supply chain actors involved in the design, qualification, industrialization and production of Printed Board Assemblies practical guidelines to master the multi-disciplinary hardware aspects of electronic module realization and operation in a cost-effective way. The PBA DfX Guidelines are not electrical design guidelines. The PBA DfX guidelines provide the electrical designer the boundary conditions of industrial electronic manufacturing technology and operational reliability. It is intended to support the development of cost-effective, reliable PBA with a short time-to-market requiring a minimum number of design iterations.

Some of the characteristics of the PBA DfX Guidelines are:

- The PBA DfX Guidelines are oriented towards the overall optimization of the physical design of the final PBA based product.
- The guidelines refer to the relevant industry standards that are predominantly used in the international electronics industry such as those published by organizations as IPC and JEDEC. The guidelines do not replace industrial standards but define or recommend what options in the standards to use and will fill-in gaps if necessary. They provide the basis on which a company/product/product-line or application specific approach for design, industrialization and/or realization can be defined.
- Scientific argumentation and physical models form the basis of a large part of the guidelines and of the associated tools. This allows the use of the guidelines beyond the boundary of the users' experience domain. Therefore, it provides a powerful product and process innovation aid.
- The PBA DfX Guidelines will not specify, recommend or exclude specific brands of materials, components, suppliers or products. They will put forward minimal requirements on quality, physical and chemical properties and testing. They define and provide the DfManufacturing window for PBA realization.
- The PBA DfX Guidelines are based on verifiable physical models, standards and empirical data.

PBA DfX Guidelines Scope

- The PBA DfX guidelines cover lead-free SnAgCu and SnPb solder based assembly.
- The PBA DfX guidelines include: Design-for-Manufacturing, Design-for-Assembly, Design-for-Test, Design-for-Reliability, Design-for-RoHS, etc.

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1. Applicable Documents

This PBA DfX Guideline refers as part of the guideline to the most recent versions of the following standards and their amendments.

IPC-6011	Generic Performance Specification for Printed Boards
IPC-6012	Qualification and Performance Specification for Rigid Printed Boards
IPC-6012XA	Automotive Addendum to IPC-6012.
IPC-6012XM	Medical Applications Addendum to IPC-6012
IPC-6012XS	Space and Military Avionics Applications addendum to IPC-6012
IPC-A-600	Acceptability of Printed Boards
IPC-D-279	Design Guidelines for reliable Surface Mount Technology Printed Board Assemblies
IPC-SM-840	Qualification and Performance Specification of Permanent Solder Mask and Flexible Cover Materials
IPC-4101	Specification for Base Materials for Rigid and Multilayer Printed Boards
IPC-4552	Specification for Electroless Nickel/Immersion Gold (ENIG) Plating for Printed Circuit Boards
IPC-4553	Specification for Immersion Silver Plating for Printed Boards
IPC-4554	Specification for Immersion Tin Plating for Printed Circuit Boards
IPC-4556	Specification for Electroless Nickel/Electroless Palladium/Immersion Gold (ENEPIG) Plating for Printed Circuit Boards
J-STD-609	Marking and Labeling of Components, PCBs and PCBA's to identify Lead (Pb), Pb-Free and Other Attributes
J-STD-020	Moisture/Reflow Sensitivity Classification for Non-hermetic Solid State Surface Mount Devices
IPC-1602	Standard for Printed Board Handling and Storage
EDM-Q-001	PCB qualification
EDM-D-100	Reliability Quantification

2. Applicability of the PBA DfX Guideline EDM-D-001

- Design recommendations given in the guideline are intended to help the user in making choices that improve the manufacturability, reliability, testability, etc., of the final PBA. These recommendations are of a generic nature. Therefore, in specific cases more optimal solutions may exist.
- Design specification takes precedence over this guideline.
- IPC class 2 requirements and test procedures apply unless specified otherwise in this document.
- The EDM-D-001 DfX Guideline provides guidelines and recommendations for the specification of PCB performance requirements, the selection of PCB rigid (FR4-type) laminates as well as solderable finishes and the PCB moisture management to obtain well manufacturable, good quality and reliable PCB.