

PBA Design-for-Manufacturing Guideline

EDM-D-007 Quality and Test Coverage Quantification Design-for-Test

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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 MoVIP: Modelling van de Voorspelbaarheid van de Initiële Productkwaliteit

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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 documents and standards including their amendments.

IPC-7912 End-Item DPMO for Printed Circuit Board Assemblies
IEEE 1149.1 IEEE Standard Test Access Port and Boundary Scan Architecture

2. Applicability of the PBA DfX Guideline EDM-D-007

- Specification 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.
- This guideline provides the user with a methodology to quantify the quality of a PBA and the risk of failure at start-up.
- It provides the user with a mathematically correct method to quantify the test coverage of production tests.
- It provides guidelines to set-up the most effective test strategy as well as Design-for-Test guidelines to maximize test access.
- Based on the presented methods PBA quality can be improved by identification and reduction of assembly risks and effective deployment of production tests. The PBA customer is offered a scientifically well-established zero-hour defect probability of its PBA.
- The EDM-D-007 methods cover assembly errors and tests taking the design offered to the assembly operation as the reference. It does NOT address design errors or design debugging.