



IPC-7095B

# Design and Assembly Process Implementation for BGAs

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

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# Design and Assembly Process Implementation for BGAs

## 1 SCOPE

This document describes the design and assembly challenges for implementing Ball Grid Array (BGA) and Fine Pitch BGA (FBGA) technology. The effect of BGA and FBGA on current technology and component types are addressed, as is the move to lead-free assembly processes. The focus on the information contained herein is on critical inspection, repair, and reliability issues associated with BGAs. Throughout this document the word “BGA” can mean all types and forms of ball/column grid array packages.

**1.1 Purpose** The target audiences for this document are managers, design and process engineers, and operators and technicians who deal with the electronic assembly, inspection, and repair processes. The intent is to provide useful and practical information to those who are using BGAs, those who are considering BGA implementation and companies who are in the process of transition from the standard tin/lead reflow processes to those that use lead-free materials in the assembly of BGA type components.

**1.2 Intent** The new challenge in implementing BGA assembly processes, along with other types of components, is the need to meet the legislative directives that declare certain materials as hazardous to the environment. The requirements to eliminate these materials from electronic components have caused component manufacturers to rethink the materials used for encapsulation, the plating finishes on the components and the metal alloys used in the assembly attachment process.

This document, although not a complete recipe, identifies many of the characteristics that influence the successful implementation of a robust assembly process. In many applications, the variation between assembly methods and materials is reviewed with the intent to highlight significant differences that relate to the quality and reliability of the final product. The accept/reject criteria for BGA assemblies, used in contractual agreements, is established by J-STD-001 and IPC-A-610.

## 2 APPLICABLE DOCUMENTS

### 2.1 IPC<sup>1</sup>

**J-STD-001** Requirements for Soldered Electrical and Electronic Assemblies

**J-STD-020** Handling Requirements for Moisture Sensitive Components

**J-STD-033** Standard for Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices

**IPC-T-50** Terms and Definitions for Printed Boards and Printed Board Assemblies

**IPC-D-279** Design Guidelines for Reliable Surface Mount Technology Printed Board Assemblies

**IPC-D-325** Documentation Requirements for Printed Boards

**IPC-D-350** Printed Board Description in Digital Form

**IPC-D-356** Bare Substrate Electrical Test Information in Digital Form

**IPC-SM-785** Guidelines for Accelerated Reliability Testing of Surface Mount Attachments

**IPC-2221** Generic Standard on Printed Board Design

**IPC-2511** Generic Requirements for Implementation of Product Manufacturing Description Data and Transfer

**IPC-2581** Generic Requirements for Printed Board Assembly Products Manufacturing Description Data and Transfer Methodology

**IPC-7094** Design and Assembly Process Implementation for Flip Chip and Die Size Components

**IPC-7351** Generic Requirements for Surface Mount Design and Land Pattern Standard

**IPC-7525** Stencil Design Guidelines

**IPC-7711/7721** Rework, Modification and Repair of Electronic Assemblies

**IPC-9701** Performance Test Methods and Qualification Requirements for Surface Mount Solder Attachments

**IPC/JEDEC-9704** Printed Wiring Board Strain Gage Test Guideline

### 2.2 JEDEC<sup>2</sup>

**JEP95 Section 4.5** Fine Pitch (Square) Ball Grid Array Package (FBGA)

1. [www.ipc.org](http://www.ipc.org)

2. [www.jedec.org](http://www.jedec.org)