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Design and Assembly Process Implementation for Embedded Components

Developed by the Embedded Devices Process Implementation Subcommittee (D-55) of the Embedded Components Committee (D-50) of IPC

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

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1 SCOPE

This document describes the design and assembly challenges for implementing passive and active components, in either formed or placed methodology, into a printed board. The completed structure including internal electronic components is ready for surface mount and/or through-hole component attachment. The multilayered structure becomes a complete product ready for further processing in an assembly process and can be made from organic, inorganic (ceramic) or both types of material.

1.1 Purpose The target audiences for this document are managers, design and process engineers, and technicians who develop electronic assemblies that include an embedded component printed board as a part of the product. The purpose is to provide useful and practical information to those who are involved in the decision making of either formed or placed, passive or active components and to help establish inspection techniques, testing processes, and reliability validations.

1.2 Intent This document, although not a complete recipe, identifies many of the characteristics that influence the successful implementation of a robust embedded component process. In many applications, the variation between forming and placing methods and materials are reviewed with the intent to highlight significant differences that relate to the decision as to when, why, or how to establish the quality and reliability of the final product. The information also establishes the robustness that the embedded portion of the product can survive the continued processing in order to complete an Embedded Component Printed Board Assembly.

An additional challenge in implementing the processes, along with all the varieties of electronic components, internal and external, 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 assemblies 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.

2 APPLICABLE DOCUMENTS

2.1 IPC[1]

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

IPC-T-50 Terms and Definitions for Interconnecting and Packaging Electronic Circuits

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

IPC-D-356 Bare Substrate Electrical Test Data Format

IPC-TM-650 Test Methods Manual

IPC-QL-653 Certification of Facilities that Inspect/Test Printed Boards, Components and Materials

IPC-SM-784 Guidelines for Chip-on-Board Technology Implementation

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

IPC-2316 Design Guide for Embedded Passive Device Printed Boards

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

IPC-4101 Specification for Base Materials for Rigid and Multilayer Printed Boards

IPC-4562 Metal Foil for Printed Wiring Applications

1. www.ipc.org