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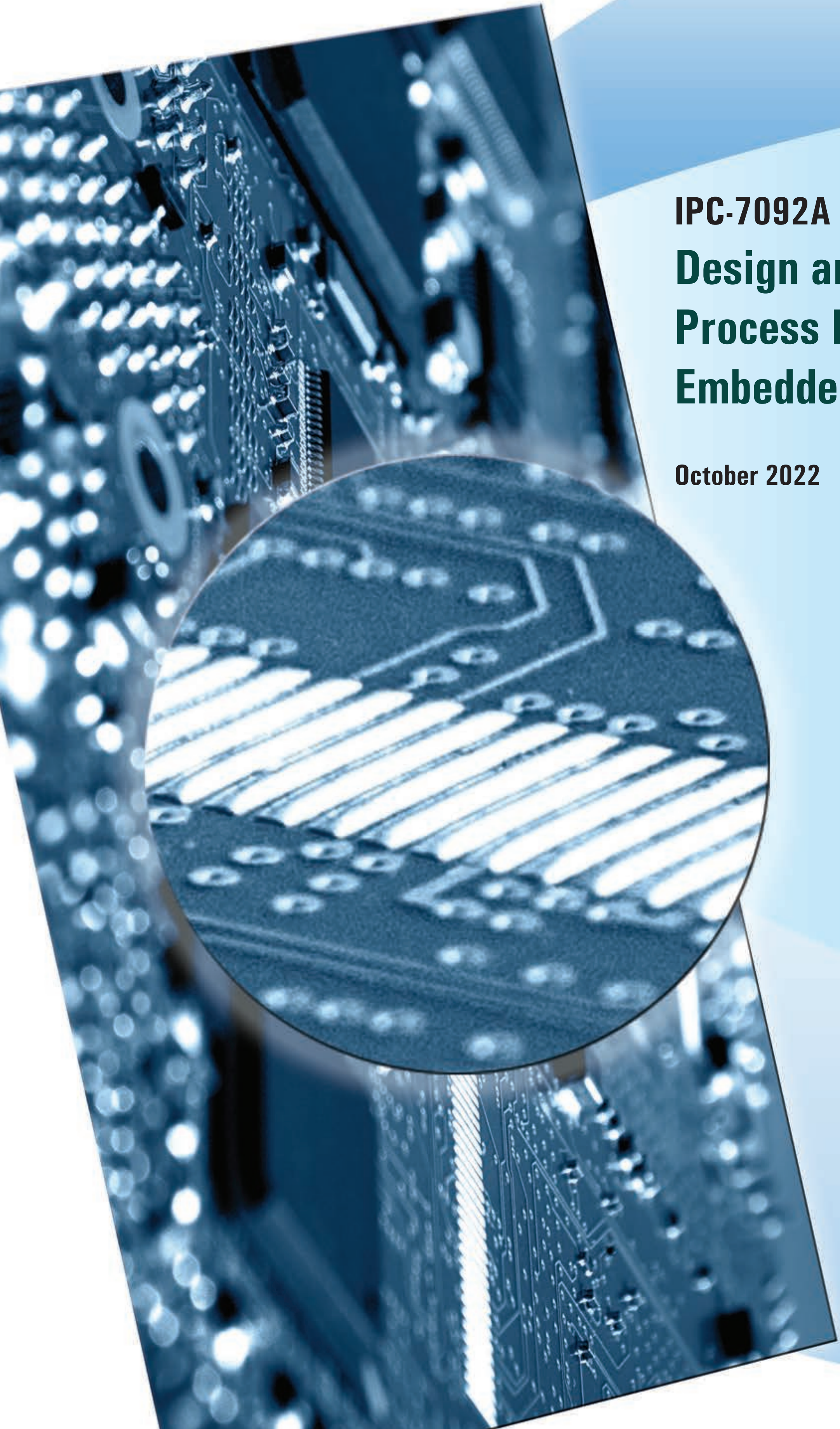

IPC-7092A

Design and Assembly Process Implementation for Embedded Circuitry

October 2022

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Users of this publication are encouraged to
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Design and Assembly Process Implementation for Embedded Circuitry

1 SCOPE

This document describes the design, materials and assembly challenges associated with implementing embedded circuitry into a printed board. It covers various aspects of embedded circuitry related with the design, selection, processing and testing to achieve a completed multilayered structure that is ready for surface mount and/or through-hole component attachment.

1.1 Purpose The target audiences for this document are product developers, design/process engineers and technicians who develop electronic assemblies that include embedded circuitry in the printed board as a part of the final 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 selection criteria, inspection techniques, testing processes and reliability test validations.

1.1.1 Intent This document identifies characteristics that influence the successful implementation of a robust embedded circuitry 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 circuitry printed board assembly.

1.2 Classification IPC standards recognize that electrical and electronic assemblies are subject to classifications by intended end-item use. Three general end-product classes have been established to reflect differences in manufacturability, complexity, functional performance requirements, and verification (inspection/test) frequency. It should be recognized that there may be overlaps of equipment between classes.

CLASS 1 General Electronic Products

Includes products suitable for applications where the major requirement is function of the completed assembly.

CLASS 2 Dedicated Service Electronic Products

Includes products where continued performance and extended life is required, and for which uninterrupted service is desired but not critical. Typically, the end-use environment would not cause failures.

CLASS 3 High Performance/Harsh Environment Electronic Products

Includes products where continued high performance or performance-on-demand is critical, equipment downtime cannot be tolerated, end-use environment may be uncommonly harsh, and the equipment must function when required, such as life support or other critical systems.

1.3 Measurement Units All dimensions and tolerances in this specification are expressed in hard SI (metric) units and bracketed soft imperial [inch] units. Users of this specification are expected to use metric dimensions. All dimensions ≥ 1 mm [0.0394 in] will be expressed in millimeters and inches. All dimensions < 1 mm [0.0394 in] will be expressed in micrometers and microinches.

1.4 Definition of Requirements–The words **shall** or **shall not** are used in the text of this document wherever there is a requirement for materials, preparation, process control or acceptance.

The word should reflects recommendations and is used to reflect general industry practices and procedures for guidance only.

The word will is used to express a declaration of purpose.

Line drawings and illustrations are depicted herein to assist in the interpretation of the written requirements of this Standard. The text takes precedence over the figures.

1.5 Use of "Lead" For readability and translation, this document uses the noun lead only to describe leads of a component. The metallic element lead is always written as Pb.

1.6 Abbreviations and Acronyms Periodic table elements are abbreviated in the standard. See Appendix A for full spellings of abbreviations (including elements) and acronyms used in this standard.

1.7 Terms and Definitions Other than those terms listed below, the definitions of terms used in this standard are in accordance with IPC-T-50.