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IPC-CM-770E

Guidelines for Printed Board Component Mounting

Developed by the Component Mounting Guidelines Task Group (5-21a) of the Assembly & Joining Processes Committee (5-20) of IPC

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

Contact:

IPC
2215 Sanders Road
Northbrook, Illinois
60062-6135
Tel 847 509.9700
Fax 847 509.9798

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Guidelines for Printed Board Component Mounting

1 SCOPE

This document provides information for preparation of components for assembly to printed boards, contains a review of some pertinent design criteria, impacts and issues, techniques of general interest for assembly (both manual and machines) and discusses considerations of, and impacts upon, subsequent soldering, cleaning, and coating processes. The information herein consists of compiled data representing commercial and industrial applications.

This section discusses general recommended assembly guidelines. Later sections discuss information concerning specific packaging types.

Sections 2 through 5 provide guidelines for the specific component within each sectional document. The parts are described in detail and each section outlines specifics affecting the part class. The descriptions and classifications provided are those generally used in the industry with reference to military and commercial applications.

Due to the rapid progress and evolution in packaging and assembly technology today, this document may not cover all currently available components or assembly techniques such as lead free.

1.1 Purpose The purpose of this document is to illustrate and guide the user seeking answers to questions related to accepted, effective methods of mounting components to printed wiring boards.

1.2 Classification of Board Types and Assemblies

1.2.1 Performance Classes Three general end-product classes have been established to reflect progressive increases in sophistication, functional performance requirements and testing/inspection frequency. It should be recognized that there could be an overlap of equipment between classes. These performance classes are the same for both bare boards and assemblies. The printed board user has the responsibility to determine the class to which his product belongs. The contract shall specify the performance class required and indicate any exceptions to specific parameters, where appropriate.

Class 1 – General Electronic Products

Includes consumer products, some computers and computer peripherals suitable for applications where cosmetic imperfections are not important and the major requirement is the function of the completed electronic assembly.

Class 2 – Dedicated Service Electronic Products

Includes communications equipment, sophisticated business machines, and instruments where high performance and extended life is required and for which uninterrupted service is desired but not critical. Certain cosmetic imperfections are allowed.

Class 3 – High Performance Electronic Products

Includes the equipment and products where continued performance or performance-on-demand is critical, such as in life support items or flight control systems. Equipment downtime cannot be tolerated and must function when required. Assemblies in this class are suitable for applications where high levels of assurance are required, service is essential, or the end-use environment may be uncommonly harsh.

1.2.2 Producibility Levels IPC standards usually provide three design complexity levels of features, tolerances, measurements, assembly, testing of completion or verification of the manufacturing process that reflect progressive increases in sophistication of tooling, materials or processing and, therefore, progressive increases in fabrication cost. These levels are:

- Level A – General Design Complexity - Preferred
- Level B – Moderate Design Complexity - Standard
- Level C – High Design Complexity - Reduced Producibility

The producibility levels are not to be interpreted as a design requirement, but a method of communicating the degree of difficulty of a feature between design and fabrication/assembly facilities. The use of one level for a specific feature does not mean that other features must be of the same level. Selection should always be based on the minimum need, while recognizing that the precision, performance, conductive pattern density, assembly and testing requirements determine the design producibility level. The numbers listed within the numerous tables are to be used as a guide in determining what the level of producibility is for any feature. The specific requirement for any feature that must be controlled on the end item should be specified on the master drawing of the printed board or the printed board assembly drawing.

These levels for assemblies are:

- Level A – Through-hole component mounting only.
- Level B – Surface mounted components only.
- Level C – Simplistic through-hole and surface mounting intermixed assembly.