ASSOCIATION CONNECTING
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Component Packaging and Interconnecting with Emphasis on Surface Mounting

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1.0 INTRODUCTION

Today's advanced electronic designs combine miniaturization and weight savings with high performance and low power consumption. To achieve all this, electronic assemblers often use surface mount technology, either alone or in combination with other sophisticated attachment processes.

This document examines key issues in advanced packaging techniques. These guidelines provide information on what type of parts are available, the techniques and processes necessary for their proper use, possible advantages, disadvantages or problems, how to start implementation, and where to find additional information. Since no one technology will provide all of the answers, the guidelines establish criteria for intermixing the processes, and define the necessary steps for producing quality electronic equipment. When other specific documents are cited, they should be reviewed for the current requirements. Where appropriate, sections from other IPC documents have been excerpted.

1.1 Scope This document provides guidelines for surface mounting electronic parts, and for intermixing surface and through-the-board mounting techniques. In addition, it describes the types of materials and interconnection substrates necessary for sophisticated electronic assemblies.

1.2 Purpose This document is intended to aid the designer in designing a manufacturable product by providing information on processing and on various types of substrate and joining materials.

The substrate physical and electrical characteristics and their compatibility for surface mounting are discussed. Land pattern designs, solder joint configurations, rework, and repair are also covered.

Adherence to the guidelines set forth in this document will generally assure adequate reliability for the majority of applications; however, more rigid requirements may be appropriate for more critical applications.

1.3 Classification When appropriate, this guideline will refer to three classes of component mounting complexity which reflect progressive increases in sophistication of tooling, assembly and joining techniques, and cost. These classes are as follows:

A) Simple assembly techniques for through-the-board component mounting;

B) Moderate assembly techniques for surface component mounting

C) Complex assembly techniques for intermixing through-the- board and surface mounting on the same assembly.

Classification of component mounting complexity should not be confused with the performance classification of end-item use, as referenced in other IPC documents, which refers to Class 1) consumer products, Class 2) general industrial and Class 3) high reliability equipment types.

In addition to component mounting classification, a type designation may be specified for components mounted on one or both sides of the packaging and interconnecting structure:

Type 1 Components mounted on one side only;

Type 2 Components on both sides.

Type 2 is limited to only class B or C assemblies. Class and type designations help establish communication between design, manufacturing and assembly disciplines, as well as identify the precision and processing steps needed to assemble the board.

Any component mounting class and type may be applied to any of the end-product equipment classifications. For example, a consumer product designed to meet Class 1 requirements could have component mounting complexity Class A, B or C with components on either one or both sides of the board (Type 1 or 2).

1.4 Terms and Definitions The definition of terms used herein shall be in accordance with IPC-T-50 and the following: ***Note:*** Any definition denoted with an asterisk (*) is a reprint of the definition in IPC-T-50.

1.4.1 *Castellations Recessed metallized features on the edges of a chip carrier which interconnect conducting surfaces or planes within or on the chip carrier.

1.4.2 *Chip Carrier A low-profile rectangular component package, usually square, whose semiconductor chip cavity or mounting area is a large fraction of the package size and whose external connections are usually on all four sides of the package.

1.4.3 *Coefficient of Thermal Expansion Mismatch (Δ CTE) The difference between the coefficients of thermal expansion of two components, i.e., the difference in linear thermal expansion per unit change in temperature. (This term is not to be confused with Thermal Expansion Mismatch.)