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Stencil Design Guidelines

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Association Connecting Electronics Industries

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- Contain simple (simplified) language
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- Focus on end product performance
- Include a feedback system on use and problems for future improvement

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- Increase cycle time
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Stencil Design Guidelines

Developed by the Stencil Design Task Group (5-21e) of the Assembly and 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.

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Stencil Design Guidelines

1 PURPOSE

This document provides a guide for the design and fabrication of stencils for solder paste and surface-mount adhesive. It is intended as a guideline only. Much of the content is based on the experience of stencil designers, fabricators, and users. Printing performance depends on many different variables and therefore no single set of design rules can be established.

1.1 Terms and Definitions All terms and definitions used throughout this handbook are in accordance with IPC-T-50. Definitions noted with an asterisk (*) are quoted from IPC-T-50. Other specific terms and definitions, essential for the discussion of the subject, are provided below.

1.1.1 *Aperture An opening in the stencil foil.

1.1.2 *Area Ratio The ratio of the area of aperture opening to the area of aperture walls.

1.1.3 *Aspect Ratio The ratio of the width of the aperture to the thickness of the stencil foil.

1.1.4 Border Peripheral tensioned mesh, either polyester or stainless steel, which keeps the stencil foil flat and taut. The border connects the foil to the frame.

1.1.5 Enclosed Print Head A stencil printer head that holds, in a single replaceable component, the squeegee blades and a pressurized chamber filled with solder paste.

1.1.6 Etch Factor Etched Depth/Lateral; Etch in a chemical etching process.

1.1.7 Relief Etch Also known as Etch Relief and Under Etch. Adding an under etch of the foil to create a pocket for raised features, labels, or a multi-print function.

1.1.8 Fiducials Reference marks on the stencil foil (and other board layers) for aligning the board and the stencil when using a vision system in a printer.

1.1.9 Fine-Pitch BGA Ball grid array (BGA) with less than 1 mm [39 mil] pitch. Also known as chip scale package (CSP) when the package size is no more than 1.2X the area of the original die size.

1.1.10 Fine-Pitch Technology (FPT) A surface-mount assembly technology with component terminations on centers less than or equal to 0.625 mm [24.61 mil].

1.1.11 Foil The sheet used to create the stencil.

1.1.12 Frame A frame may be made of tubular or cast aluminum to which a tensioned mesh (border) is permanently bonded using an adhesive.

1.1.13 Intrusive Soldering A process in which the solder paste for the through-hole components is applied using the stencil. The through-hole components are inserted and reflow-soldered together with the surface-mount components. Also known as Paste-In-Hole, Pin-In-Hole, or Pin-In-Paste Soldering.

1.1.14 *Land A portion of a conductive pattern usually used for the connection and/or attachment of components.

1.1.15 Modification The process of changing an aperture in size or shape.