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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

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

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# Table of Contents

## 1 PURPOSE ................................. 1
1.1 Terms and Definitions .......... 1
1.1.1 *Aperture ............................ 1
1.1.2 *Area Ratio ....................... 1
1.1.3 *Aspect Ratio ..................... 1
1.1.4 Border ............................. 1
1.1.5 Enclosed Print Head .......... 1
1.1.6 Etch Factor ....................... 1
1.1.7 Relief Etch ......................... 1
1.1.8 Fiducials ......................... 1
1.1.9 Fine-Pitch BGA ................. 1
1.1.10 Fine-Pitch Technology (FPT) . 1
1.1.11 Foil ............................. 1
1.1.12 Frame ............................ 1
1.1.13 Intrusive Soldering .......... 1
1.1.14 *Land ............................ 1
1.1.15 Modification .................... 1
1.1.16 *Overprinting ................. 2
1.1.17 *Pad ............................ 2
1.1.18 Squeegee ......................... 2
1.1.19 Squeegee Direction .......... 2
1.1.20 Standard BGA ................. 2
1.1.21 *Stencil ......................... 2
1.1.22 Step Stencil ..................... 2
1.1.23 *Surface-Mounting Technology (SMT) . 2
1.1.24 *Through-Hole Technology (THT) . 2
1.1.25 Transfer Efficiency .......... 2
1.1.26 Ultra-Fine Pitch Technology . 2

## 2 APPLICABLE DOCUMENTS .......... 2
2.1 IPC ................................. 2

## 3 STENCIL DESIGN ....................... 3
3.1 Stencil Data ......................... 3
3.1.1 Data Format ...................... 3
3.1.2 Gerber® Format ................. 3
3.1.3 Aperture List ..................... 3
3.1.4 Solder Paste Layer ............. 3
3.1.5 Data Transfer .................... 3
3.1.6 Panelized Stencils ............. 3
3.1.7 Step-and-Repeat ............... 3
3.1.8 Image Orientation/Rotation . 3
3.1.9 Image Location ................. 4
3.1.10 Identification ................. 4
3.2 Aperture Design ................... 4
3.2.1 Aperture Size .................... 4
3.2.2 Aperture Size versus Board Land Size for Tin Lead Solder Paste ........... 8
3.2.3 Aperture Size versus Board Land Size for Lead Free Solder Paste .......... 9
3.2.4 Glue Aperture Chip Component .... 10
3.2.5 Glue Apertures for Combination of Chip Components and Leaded Devices . 10
3.2.6 Relief Etch with Glue Stencils .... 11
3.3 Mixed Technology Surface-Mount/Through-Hole (Intrusive Soldering) .......... 11
3.3.1 Solder Paste Volume .......... 11
3.4 Mixed Technology Surface-Mount/Flip Chip ........................................ 13
3.4.1 Two-Print Stencil for Surface-Mount/Flip Chip ........................................ 13
3.5 Step Stencil Design .......... 13
3.5.1 Step-Down Stencil .......... 14
3.5.2 Step-Up Stencil ................. 14
3.5.3 Step Stencil for Enclosed Print Heads .......... 14
3.5.4 Relief-Etch Stencil .......... 14
3.6 Fiducials ......................... 14
3.6.1 Global Fiducials .......... 14
3.6.2 Local Fiducials .......... 14
3.7 Rework and Repair Stencils ........ 14
3.7.1 Mini Stencils .......... 14
3.7.2 Repair Tool for Printing Paste Directly on the Component .............. 15

## 4 STENCIL FABRICATION .............. 15
4.1 Foils ............................... 15
4.2 Frames ............................. 15
4.3 Stencil Border ................. 15
4.4 Stencil Fabrication Technologies .......... 15
4.4.1 Chemical Etch ............... 15
4.4.2 Laser-Cut Stencils .......... 16
4.4.3 Electroform ................. 16
4.4.4 Hybrid ............... 16
4.4.5 Trapezoidal Apertures .......... 16
4.4.6 Additional Options .......... 16

## 5 STENCIL MOUNTING ................. 16
5.1 Location of Image on Metal ........ 16
5.2 Centering ......................... 16
5.3 Additional Design Guidelines .... 16
### Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 3-1</td>
<td>4 mil Thick Stencil Tin Lead and Lead Free</td>
<td>6</td>
</tr>
<tr>
<td>Figure 3-2</td>
<td>5 mil Thick Stencil Tin Lead and Lead Free</td>
<td>6</td>
</tr>
<tr>
<td>Figure 3-3</td>
<td>6 mil Thick Stencil Tin Lead and Lead Free</td>
<td>7</td>
</tr>
<tr>
<td>Figure 3-4</td>
<td>8 mil Thick Stencil Tin Lead and Lead Free</td>
<td>7</td>
</tr>
<tr>
<td>Figure 3-5</td>
<td>Cross-Sectional View of A Stencil</td>
<td>8</td>
</tr>
<tr>
<td>Figure 3-6</td>
<td>Home Plate Aperture Design</td>
<td>8</td>
</tr>
<tr>
<td>Figure 3-7</td>
<td>Bow Tie Aperture Design</td>
<td>9</td>
</tr>
<tr>
<td>Figure 3-8</td>
<td>Oblong Aperture Design</td>
<td>9</td>
</tr>
<tr>
<td>Figure 3-9</td>
<td>Aperture Design for Cylindrical Components and Chip Components (All Corners Rounded)</td>
<td>9</td>
</tr>
<tr>
<td>Figure 3-10</td>
<td>Window Pane Design for Ground Plane</td>
<td>9</td>
</tr>
<tr>
<td>Figure 3-11</td>
<td>Glue Stencil Aperture Design</td>
<td>10</td>
</tr>
<tr>
<td>Figure 3-12</td>
<td>Chip Component and SOIC Present on Board</td>
<td>10</td>
</tr>
<tr>
<td>Figure 3-13</td>
<td>Print Only Mode 15 mil Thick Stencil</td>
<td>10</td>
</tr>
<tr>
<td>Figure 3-14</td>
<td>Glue Stencil With Glue Reservoir</td>
<td>10</td>
</tr>
<tr>
<td>Figure 3-15</td>
<td>Through-Hole Solder Paste Volume</td>
<td>11</td>
</tr>
<tr>
<td>Figure 3-16</td>
<td>Overprint Without Step</td>
<td>12</td>
</tr>
<tr>
<td>Figure 3-17</td>
<td>Overprint With Step (Squeegee Side)</td>
<td>12</td>
</tr>
<tr>
<td>Figure 3-18</td>
<td>Overprint With Step (Contact/Board Side)</td>
<td>12</td>
</tr>
<tr>
<td>Figure 3-19</td>
<td>Two-Print Through-Hole Stencil</td>
<td>13</td>
</tr>
<tr>
<td>Figure 3-20</td>
<td>Two-Print Stencil for Mixed Technology</td>
<td>13</td>
</tr>
<tr>
<td>Figure 3-21</td>
<td>Print With Step</td>
<td>13</td>
</tr>
<tr>
<td>Figure 3-22</td>
<td>Step Down</td>
<td>14</td>
</tr>
<tr>
<td>Figure 3-23</td>
<td>Step Up</td>
<td>14</td>
</tr>
<tr>
<td>Figure 3-24</td>
<td>BTC</td>
<td>15</td>
</tr>
<tr>
<td>Figure 3-25</td>
<td>BGA</td>
<td>15</td>
</tr>
<tr>
<td>Figure 4-1</td>
<td>Trapezoidal Apertures</td>
<td>16</td>
</tr>
</tbody>
</table>

### Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 3-1</td>
<td>Stencil Use Clauses</td>
<td>4</td>
</tr>
<tr>
<td>Table 3-2</td>
<td>General Aperture Design Guideline Examples for Selective Surface-Mount Devices (Tin Lead Solder Paste)</td>
<td>5</td>
</tr>
<tr>
<td>Table 3-3</td>
<td>Process Window for Intrusive Soldering - Maximum Limits Desirable</td>
<td>11</td>
</tr>
</tbody>
</table>
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.