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PRINTED CIRCUIT BOARD HAVING LEAD PADS THAT ACCOMMODATE OFFSET ELECTRONIC COMPONENT LEADS

Abstract

A printed circuit board (PCB) includes lead pads that are shaped and sized to account for offset leads of an electronic component, such as a capacitor. A proximal end of the lead pad has a first dimension and a distal end of the lead pad has a second dimension that is larger than the first dimension. The larger width of the proximal end of the lead pad accommodates offset leads and helps ensure lead joint integrity. The narrower width of the proximal end prevents solder from overflowing onto other areas on the PCB.

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Background/Summary

BACKGROUND

[0001] Capacitors, and other electronic components, are typically included with a number of different electronic devices. Example electronic devices include data storage devices, integrated circuits and the like. Typically, capacitors are surface mounted to a printed circuit board (PCB) of the electronic device and the leads of the capacitor are soldered onto corresponding lead pads on the PCB.

[0002] In some examples, a pick and place machine is used to surface mount the capacitor to the PCB. For example, the pick and place machine receives the capacitor, determines where the capacitor is to be placed on the PCB and subsequently places the capacitor at the determined location. The accuracy of the placement of the capacitor is crucial to ensure the capacitor is properly placed on the PCB and to ensure that the leads of the capacitor are aligned with, and properly placed on, the corresponding lead pads.

[0003] However, in some instances, the leads of the capacitor are not parallel (or are offset) with respect to one another. For example, one or both of the leads may bend during selection and/or placement by the pick and place machine. In other examples, the leads of the capacitor are offset from one another due to manufacturing tolerances. When the leads are offset, it is challenging for the pick and place machine to place the capacitor on the PCB while ensuring the leads are placed in the center of the lead pads.

[0004] Accordingly, it would be beneficial for a PCB to have features that account for offset leads of capacitors and other electronic components.

SUMMARY

[0005] The present application describes a substrate or a printed circuit board (PCB) that includes lead pads (also referred to as “trench pads”) having a shape and corresponding dimensions that account for offset leads of various electronic components. For example, the lead pads of the PCB are shaped and sized such that a proximal end of each lead pad has a first dimension and a distal end of each lead pad has a second dimension that is larger than the first dimension. The larger width of the proximal end of the lead pad helps ensure that the leads of the electronic component are properly aligned with, and placed on, the lead pads, thereby ensuring lead integrity. The narrower width of the proximal end of the lead pad prevents solder from overflowing onto other areas of the PCB, which could negatively impact the performance of the electronic component.

[0006] Accordingly, examples of the present disclosure describe a PCB for a semiconductor package. The PCB includes an opening defined in a planar surface. In an example, the opening is for receiving an electronic component. The PCB also includes a plurality of lead pads proximate to the opening. In an example, each of the plurality of lead pads are for receiving respective leads of the electronic component. Additionally, each of the plurality of lead pads have a first dimension at a proximal end and a second, larger dimension at a distal end.

[0007] Other examples describe a semiconductor package that includes a PCB defining an opening. In an example, a first lead pad is proximate the opening and has a proximal end and a distal end. The proximal end has a first dimension and the distal end has a second dimension that is larger than the first dimension. A second lead pad is also proximate the opening. The second lead pad has a proximal end and a distal end. The proximal end also has the first dimension and the distal end has the second dimension.

[0008] Still other examples describe a PCB for a semiconductor package. In an example, the PCB includes an electronic component receiving means defined in a planar surface. The PCB also includes a first electronic component lead receiving means proximate the electronic component receiving means. In an example, the first electronic component receiving means has a shape in which a proximal end of the first electronic component receiving means has a first width and a distal end of the first electronic component receiving means has a second width that is larger than the first width. The PCB also includes a second electronic component lead receiving means

proximate the electronic component receiving means. In an example, the second electronic component receiving means has a shape in which a proximal end of the second electronic component receiving means has the first width and a distal end of the first electronic component receiving means has the second width.

[0009] This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Non-limiting and non-exhaustive examples are described with reference to the following Figures.

[0011] FIG. 1A illustrates an electronic component surface mounted to a printed circuit board (PCB).

[0012] FIG. 1B illustrates how the offset leads of the electronic component of FIG. 1A can cause lead joint integrity issues.

[0013] FIG. 2A illustrates a PCB having lead pads that accommodate offset leads of an electronic component according to an example.

[0014] FIG. 2B illustrates how the lead pads of the PCB of FIG. 2A accommodate offset leads of the electronic component according to an example.

[0015] FIG. 3A illustrates a PCB having lead pads for accommodating offset leads of an electronic component according to another example.

[0016] FIG. 3B illustrates a PCB having lead pads for accommodating offset leads of an electronic component according to yet another example.

[0017] FIG. 4 illustrates a PCB having a lead pad for accommodating an offset lead of an electronic component according to an example.

DETAILED DESCRIPTION

[0018] In the following detailed description, references are made to the accompanying drawings that form a part hereof, and in which are shown by way of illustrations specific embodiments or examples. These aspects may be combined, other aspects may be utilized, and structural changes may be made without departing from the present disclosure. Examples may be practiced as methods, systems or devices. The following detailed description is therefore not to be taken in a limiting sense, and the scope of the present disclosure is defined by the appended claims and their equivalents.

[0019] Electronic devices, such as memory device, integrated circuits and the like, typically include a number of different electronic components. Example electronic components include capacitors, resistors, etc. Typically, these electronic components are surface mounted to a substrate or a printed circuit board (PCB) of the electronic device. For example, a capacitor is typically surface mounted to the substrate or the PCB and the leads of the capacitor are placed on corresponding lead pads on the PCB. When the leads are placed on the lead pads, a soldering process (e.g., a laser soldering process or a wave soldering process) is used to solder the leads to the lead pads.

[0020] In some examples, a pick and place machine is used to surface mount the electronic components to the PCB. For example, the pick and place machine receives the electronic component, determines where the electronic component is to be placed on the PCB and places the electronic component at the determined location. As previously discussed, the accuracy of the placement of the electronic component is crucial to ensure that the electronic component is properly placed on the PCB and to ensure that the leads of the electronic component are aligned

with, and properly placed on, corresponding lead pads.

[0021] However, in some instances, the leads of the capacitor are offset or are otherwise not in parallel with respect to one another. For example, the pick and place machine may inadvertently bend one or both of the leads when the electronic component is initially picked up by the pick and place machine and/or placed by the pick and place machine. In another example, the leads of the electronic component are offset from one another due to manufacturing tolerances.

[0022] Regardless of why or how the leads are offset, it is challenging for the pick and place machine to place the electronic capacitor on the substrate or the PCB while maintaining lead joint integrity (e.g., ensuring the lead is properly and completely placed in/on a lead pad to achieve a desired signal quality and signal reliability).

[0023] To address the above, the present application describes a PCB that has one or more lead pads that account for, or otherwise accommodate, lead offset of various electronic components. For example, the lead pads described herein have a shape and/or dimensions that help ensure that the leads of the electronic component are completely and properly placed on the lead pads during an electronic component surface mounting process—even if the leads of the electronic component are offset.

[0024] As will be described in greater detail herein, a proximal end of the lead pad has a first dimension and a distal end of the lead pad has a second dimension that is larger than the first dimension. For example, the proximal end has a first width and the distal end has a second width that is wider or larger than the first width. The larger width toward the distal end caters to the offset angle of the lead while the smaller width of the proximal end prevents solder from overflowing or otherwise spilling off of the lead pads.

[0025] In an example, the lead pads have a variety of shapes and/or sizes. For example, the lead pads may be shaped like a trapezoid, a shell, a bottle, or any other shape that has a first width at a first end and extends to a larger width toward or at the second end.

[0026] Accordingly, many technical benefits may be realized including, but not limited to, reducing or eliminating lead pad offset issues caused by offset leads and preventing solder overflow, thereby increasing the manufacturing yield of electronic devices.

[0027] These and other examples will be explained in greater detail below with respect to FIG. 1A-FIG. 4.

[0028] FIG. 1A illustrates an electronic component **100** surface mounted to a PCB **120**. In an example, the electronic component **100** is a capacitor having two leads **110**. However, as shown, the leads **110** are offset or are otherwise not in parallel with respect to one another.

[0029] In an example, the offset leads **110** may be the result of manufacturing tolerances. In another example, the leads **110** may become offset or bent as part of a surface mounting process. For example, a pick and place machine may have inadvertently bent one or more of the leads **110** during pick up and/or placement.

[0030] Additionally, in the example shown, the PCB **120** includes two lead pads **130**. In an example, the lead pads **130** are etched into the PCB **120** to form trenches such as shown in FIG. 1B. In another example, the lead pads **130** are formed on a top surface of the PCB **120**. In current solutions, the lead pads **130** have a uniform shape. For example, the lead pads **130** are rectangular and have the same dimensions from a first side (e.g., a side nearest the electronic component **100**) to a second side (e.g., a side that is farthest away from the electronic component **100**).

[0031] During the surface mounting process, the pick and place machine typically places the electronic component **100** on the PCB **120** such that the leads **110** of the electronic component **100** are centered on, or are otherwise fully received on, the lead pads **130**. However, when the leads **110** are offset such as shown in this example, it becomes difficult to center the leads **110** completely on the lead pads **130**. If the leads **110** are not centered on the lead pads **130** or the leads **110** are not entirely placed on the lead pads **130**, the lead joint integrity of the electronic component **100** may be compromised.

[0032] FIG. 1B illustrates how the offset leads **110** of the electronic component **100** of FIG. 1A can cause lead joint integrity issues. For example, when the leads **110** of the electronic component **100** are offset such as shown in FIG. 1A and subsequently placed on or in the lead pads **130**, the leads **110** may not fit within or on the lead pads **130**. As a result, no connection is formed between the lead **110** and the lead pad.

[0033] FIG. 2A illustrates a printed circuit board (PCB) **200** having lead pads **220** that accommodate offset leads **260** of an electronic component **250** according to an example. In an example, the lead pads **220** are shaped and spaced to accommodate leads that are spaced (or that have lead ends that are spaced) up to 5 millimeters (mm) (or more) apart and accommodate a tolerance of ± 0.5 mm (or more).

[0034] In the example shown in FIG. 2A, the leads **260** of the electronic component **250** are not offset (e.g., the leads **220** are parallel). However, the leads **260** of the electronic component **250** shown and described with respect to FIG. 2B are offset with respect to each other. Both examples are shown and described to illustrate how the lead pads **220** of the PCB **200** can accommodate leads that are offset leads that are in parallel.

[0035] In an example, the PCB **200** includes a planar surface that defines an opening **210**. The opening **210** is adapted to receive the electronic component **250**. For example, during an electronic device manufacturing process, a pick and place machine selects the electronic component **250**. The pick and place machine also places the electronic component **250** within the opening **210**. In an example, the leads **260** of the electronic component **250** are aligned with and/or received on/in the lead pads **220** when the electronic component **250** is placed within the opening **210**.

[0036] As previously mentioned, the PCB **200** includes one or more lead pads **220**. In an example, the lead pads **220** are adjacent, or proximate to, the opening **210**. In an example, the lead pads **230** are trench pads. For example, the lead pads **230** are etched into or are otherwise formed in the PCB **200** such that grooves or trenches are formed. In other examples, the lead pads **220** are provided on a top (or bottom) surface of the PCB **200**. In some examples, the lead pads **220** include a copper layer or other conductive material.

[0037] Unlike the lead pads **130** shown and described with respect to FIG. 1A, the lead pads **230** are shaped and/or have dimensions that accommodate offset leads and leads that are parallel. For example, each lead pad **220** includes a proximal end **230** and a distal end **240**. In an example, the proximal end **230** of each lead pad **220** is adjacent to the opening **210**. In another example, the proximal end **230** of each lead pad extends into the opening **210**. As such, there is a continuous path or channel between the opening **210** and the proximal end **230** of each lead pad **220**.

[0038] In an example, the lead pads **220** have a trapezoid shape. For example, the proximal end **230** of the lead pad **220** has a first dimension or width and the distal end **240** of the lead pad has a second dimension or width. The lead pad **220** also include two (or more) sidewalls that extend (e.g., in parallel) between the proximal end **230** and the distal end **240**. Although a trapezoid shape is specifically mentioned, the lead pads **220** may be configured in any shape.

[0039] In an example, the distal end **240** is flat (such as shown in FIG. 2A). In another example, the distal end **240** is rounded (such as shown in FIG. 3A). However, the distal end **240** may have any shape, pattern (e.g., a zig zag pattern) or configuration.

[0040] In an example, the second dimension or width is greater than the first dimension or width. For example, the first width is 0.9 millimeters and the second width is 2 mm (or more). Although specific dimensions are given, the first width may be less than 0.9 mm or greater than 0.9 mm. Likewise, the second width may be less than 2 mm or greater than 2 mm.

[0041] However, regarding the width/dimensions of the proximal end **230** of the lead pad **220**, the width of the proximal end **230** forms a bottleneck and has a width that enables the leads **260** of the electronic component to be received on/in the lead pads **220** while also preventing solder overflow (e.g., prevent solder from overflowing from the lead pad **220** and into the opening **210** and/or onto the surface of the PCB **200**). In some examples, the proximal end **230** of the lead pad **220** has a

width between 0.85 mm and 0.95 mm which enables the proximal end **230** to prevent solder overflow.

[0042] In an example, the width of the lead pad **220** gradually increases between the proximal end **230** and the distal end **240**. For example, and as shown in FIG. 2A, the proximal end **230** has the first width and the distal end **240** has the second width. However, the width of the lead pad **220** gradually increases along the length of the lead pad **220**.

[0043] FIG. 2B illustrates how the lead pads **220** of the PCB **200** of FIG. 2A accommodate offset leads **260** of an electronic component **250** according to an example. In this example, the electronic component **250** is received or otherwise placed in the opening **210** defined by the PCB **200**.

Additionally, each lead **260** of the electronic component is received in/on respective lead pads **220**. However, as shown, even though at least one of the leads **260** of the electronic component **250** is offset, the shape and/or the dimensions of the lead pad **220** enables the offset lead **260** to be entirely placed on/in the lead pad **220**.

[0044] For example, the width of the proximal end **230** of the lead pad **230** is sufficiently wide to accommodate a proximal end of the lead **260**. Additionally, as the width of the lead pad **230** increases from the proximal end **230** to the distal end **240**, a distal end of the lead **260** is still received entirely within the lead pad **220** (which is in contrast to the lead pads **130** shown and described with respect to FIG. 1A). Although FIG. 2B illustrates one lead **260** being bent or offset and the ends of each lead **260** being separated by 5.15 mm (as an example), it is contemplated that both leads **260** may be bent or offset (either away from each other or towards each other). In such examples, the lead pads **220** will still accommodate the offset leads **260** and help ensure lead joint integrity.

[0045] FIG. 3A illustrates a PCB **300** having lead pads **320** for accommodating offset leads **330** of an electronic component **310** according to another example. In an example, the PCB **300** is similar to the PCB **200** shown and described with respect to FIG. 2A. For example, the PCB **300** defines an opening that receives the electronic component **310**.

[0046] Additionally, the lead pads **320** may be similar to the lead pads **220** shown and described with respect to FIG. 2A. However, in this example, the distal end of the lead pad is rounded or has a round shape.

[0047] FIG. 3B illustrates a PCB **340** having lead pads **360** for accommodating offset leads **370** of an electronic component **350** according to yet another example. In an example, the PCB **340** is similar to the PCB **200** shown and described with respect to FIG. 2A. For example, the PCB **340** defines an opening that receives the electronic component **350**.

[0048] Additionally, the lead pads **360** may be similar to the lead pads **220** shown and described with respect to FIG. 2A. However, in this example, the lead pads **360** are in the shape of a bottle. For example, the proximal end of the lead pad **360** has a first width. The width of the lead pad **360** increases until a second width is reached at or near a middle/center portion of the lead pad **360**. The second width is maintained from the middle/center portion to the proximal end of the lead pad **360**.

[0049] FIG. 4 illustrates a PCB **400** having a lead pad **420** for accommodating an offset lead **450** of an electronic component **440** according to an example. In an example, the PCB **400** is similar to the PCB **200** shown and described with respect to FIG. 2A.

[0050] In an example, the PCB **400** defines an opening **410**. A lead pad **420** is adjacent or proximate to the opening **410**. In an example, the lead pad **420** includes a copper layer **430** or other conductive material layer.

[0051] In an example, a proximal end of the lead pad **420** has a first width or a first dimension and a distal end of the lead pad **420** has a second width or a second dimension that is larger than the first width or dimension. In an example, the first width is a width that enables the lead **450** to be received within the lead pad **430** while also preventing solder **460** from overflowing into the opening **410**. For example, if the proximal end of the lead pad **420** is too wide, solder **460** will flow into the opening **410**. However, if the proximal end of the lead pad **420** is too narrow, it will

prevent the lead **450** from being received on/in the lead pad **420**. In an example, the width of the proximal end of the lead pad **420** is 0.9 mm.

[0052] Additionally, and as previously described, because the width of the lead pad **420** increases from the proximal end to the distal end, the increased width will also prevent solder **460** from overflowing onto a surface of the PCB **400**. This is true even if the leads **450** of the electronic component **440** are offset and/or are near a sidewall of the lead pad. As such, the present disclosure describes a clear improvement when compared with the current implementations shown and described with respect to FIG. 1A.

[0053] In accordance with the above, examples of the present disclosure describe a printed circuit board (PCB) for a semiconductor package, comprising: an opening defined in a planar surface of the PCB, the opening for receiving an electronic component; and a plurality of lead pads proximate to the opening, each of the plurality of lead pads for receiving respective leads of the electronic component and having a first dimension at a proximal end and a second, larger dimension at a distal end. In an example, the PCB also includes a copper layer provided in each of the plurality of lead pads. In an example, the plurality of lead pads are shaped and spaced to accommodate the leads of the electronic component when the leads of the electronic component are separated by 5 millimeters (mm) \pm 0.5 mm. In an example, the distal end is rounded. In an example, the first dimension is operable to prevent solder from overflowing from each of the plurality of lead pads and into the opening. In an example, the first dimension is between 0.85 millimeters (mm) and 0.95 mm. In an example, a width of each of the plurality of lead pads continuously increases between the first dimension and the second dimension.

[0054] Examples also describe a semiconductor package, comprising: a printed circuit board (PCB) defining an opening; a first lead pad proximate the opening and having a proximal end and a distal end, the proximal end having a first dimension and the distal end having a second dimension that is larger than the first dimension; and a second lead pad proximate the opening and having a proximal end and a distal end, the proximal end having the first dimension and the distal end having the second dimension. In an example, the semiconductor package also includes an electronic component provided in the opening, the electronic component including a first lead and a second lead, wherein the first lead is provided in the first lead pad and the second lead is provided in the second lead pad. In an example, a shape of the first lead pad and the second lead pad are operable to receive offset leads of an electronic component when the electronic component is received within the opening. In an example, the offset leads are separated by 5 millimeters (mm) \pm 0.5 mm. In an example, the semiconductor package also includes a first copper layer provided in the first lead pad and a second copper layer provided in the second lead pad. In an example, the proximal end of the first lead pad and the proximal end of the second lead pad extend from the opening. In an example, the distal end of the first lead pad is rounded. In an example, the first dimension of the proximal end of the first lead pad controls solder overflow. In an example, the first dimension is between 0.85 millimeters (mm) and 0.95 mm.

[0055] Examples also describe a printed circuit board (PCB) for a semiconductor package, comprising: an electronic component receiving means defined in a planar surface of the PCB; a first electronic component lead receiving means proximate the electronic component receiving means, the first electronic component receiving means having a shape in which a proximal end of the first electronic component receiving means has a first width and a distal end of the first electronic component receiving means has a second width that is larger than the first width; and a second electronic component lead receiving means proximate the electronic component receiving means, the second electronic component receiving means having a shape in which a proximal end of the second electronic component receiving means has the first width and a distal end of the first electronic component receiving means has the second width. In an example, the width of the first electronic component lead receiving means gradually increases between the proximal end and the distal end. In an example, the width of the proximal end of the first electronic component lead

receiving means is adapted to control solder overflow between the first electronic component lead receiving means and the electronic component receiving means. In an example, a first conductive layer in the first electronic component lead receiving means and a second conductive layer in the second electronic component lead receiving means.

[0056] The description and illustration of one or more aspects provided in the present disclosure are not intended to limit or restrict the scope of the disclosure in any way. The aspects, examples, and details provided in this disclosure are considered sufficient to convey possession and enable others to make and use the best mode of claimed disclosure.

[0057] The claimed disclosure should not be construed as being limited to any aspect, example, or detail provided in this disclosure. Regardless of whether shown and described in combination or separately, the various features (both structural and methodological) are intended to be selectively rearranged, included or omitted to produce an embodiment with a particular set of features. Having been provided with the description and illustration of the present application, one skilled in the art may envision variations, modifications, and alternate aspects falling within the spirit of the broader aspects of the general inventive concept embodied in this application that do not depart from the broader scope of the claimed disclosure.

[0058] References to an element herein using a designation such as “first,” “second,” and so forth does not generally limit the quantity or order of those elements. Rather, these designations may be used as a method of distinguishing between two or more elements or instances of an element. Thus, reference to first and second elements does not mean that only two elements may be used or that the first element precedes the second element. Additionally, unless otherwise stated, a set of elements may include one or more elements.

[0059] Terminology in the form of “at least one of A, B, or C” or “A, B, C, or any combination thereof” used in the description or the claims means “A or B or C or any combination of these elements.” For example, this terminology may include A, or B, or C, or A and B, or A and C, or A and B and C, or 2A, or 2B, or 2C, or 2A and B, and so on. As an additional example, “at least one of: A, B, or C” is intended to cover A, B, C, A-B, A-C, B-C, and A-B-C, as well as multiples of the same members. Likewise, “at least one of: A, B, and C” is intended to cover A, B, C, A-B, A-C, B-C, and A-B-C, as well as multiples of the same members.

[0060] Similarly, as used herein, a phrase referring to a list of items linked with “and/or” refers to any combination of the items. As an example, “A and/or B” is intended to cover A alone, B alone, or A and B together. As another example, “A, B and/or C” is intended to cover A alone, B alone, C alone, A and B together, A and C together, B and C together, or A, B, and C together.

Claims

1. A printed circuit board (PCB) for a semiconductor package, comprising: an opening defined in a planar surface of the PCB, the opening for receiving an electronic component; and a plurality of lead pads proximate to the opening, each of the plurality of lead pads for receiving respective leads of the electronic component and having a first dimension at a proximal end and a second, larger dimension at a distal end.
2. The PCB of claim 1, further comprising a copper layer provided in each of the plurality of lead pads.
3. The PCB of claim 1, wherein the plurality of lead pads are shaped and spaced to accommodate the leads of the electronic component when the leads of the electronic component are separated by 5 millimeters (mm) \pm 0.5 mm.
4. The PCB of claim 1, wherein the distal end is rounded.
5. The PCB of claim 1, wherein the first dimension is operable to prevent solder from overflowing from each of the plurality of lead pads and into the opening.
6. The PCB of claim 1, wherein the first dimension is between 0.85 millimeters (mm) and 0.95

mm.

7. The PCB of claim 1, wherein a width of each of the plurality of lead pads continuously increases between the first dimension and the second dimension.

8. A semiconductor package, comprising: a printed circuit board (PCB) defining an opening; a first lead pad proximate the opening and having a proximal end and a distal end, the proximal end having a first dimension and the distal end having a second dimension that is larger than the first dimension; and a second lead pad proximate the opening and having a proximal end and a distal end, the proximal end having the first dimension and the distal end having the second dimension.

9. The semiconductor package of claim 8, further comprising an electronic component provided in the opening, the electronic component including a first lead and a second lead, wherein the first lead is provided in the first lead pad and the second lead is provided in the second lead pad.

10. The semiconductor package of claim 8, wherein a shape of the first lead pad and the second lead pad are operable to receive offset leads of an electronic component when the electronic component is received within the opening.

11. The semiconductor package of claim 10, wherein the offset leads are separated by 5 millimeters (mm) \pm 0.5 mm.

12. The semiconductor package of claim 8, further comprising a first copper layer provided in the first lead pad and a second copper layer provided in the second lead pad.

13. The semiconductor package of claim 8, wherein the proximal end of the first lead pad and the proximal end of the second lead pad extend from the opening.

14. The semiconductor package of claim 8, wherein the distal end of the first lead pad is rounded.

15. The semiconductor package of claim 8, wherein the first dimension of the proximal end of the first lead pad controls solder overflow.

16. The semiconductor package of claim 8, wherein the first dimension is between 0.85 millimeters (mm) and 0.95 mm.

17. A printed circuit board (PCB) for a semiconductor package, comprising: an electronic component receiving means defined in a planar surface of the PCB; a first electronic component lead receiving means proximate the electronic component receiving means, the first electronic component receiving means having a shape in which a proximal end of the first electronic component receiving means has a first width and a distal end of the first electronic component receiving means has a second width that is larger than the first width; and a second electronic component lead receiving means proximate the electronic component receiving means, the second electronic component receiving means having a shape in which a proximal end of the second electronic component receiving means has the first width and a distal end of the first electronic component receiving means has the second width.

18. The PCB of claim 17, wherein the width of the first electronic component lead receiving means gradually increases between the proximal end and the distal end.

19. The PCB of claim 17, wherein the width of the proximal end of the first electronic component lead receiving means is adapted to control solder overflow between the first electronic component lead receiving means and the electronic component receiving means.

20. The PCB of claim 17, further comprising a first conductive layer in the first electronic component lead receiving means and a second conductive layer in the second electronic component lead receiving means.
