(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

PCT

(43) International Publication Date
6 December 2007 (06.12.2007)

(10) International Publication Number
WO 2007/140448 A2

(51) International Patent Classification:
B23K 37/06 (2006.01)

(21) International Application Number: PCT/US2007/070048

(22) International Filing Date: 31 May 2007 (31.05.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/810,032 31 May 2006 (31.05.2006) US

(71) Applicant *(for all designated States except US)*: **TEKA INTERCONNCTION SYSTEMS** [US/US]; 100 Pioneer Ave., Warwick, RI 02888 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **ZANOLLI, James** [US/US]; 121 Brentwood Drive, North Smithfield, RI 02896 (US). **CACHINA, Joseph** [US/US]; 3524 West Shore Road, Warwick, RI 02886 (US).

(74) Agents: **YANNEY, Pierre, R.** et al.; Darby & Darby P.C., P.O. Box 770, Church Street Station, New York, NY 10008-0770 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SOLDER-BEARING ARTICLES AND METHOD OF RETAINING A SOLDER MASS ALONG A SIDE EDGE THEREOF

(57) Abstract: A method of depositing a solder mass within a plated opening that is formed in a side edge of an electronic device includes the steps of carrying the solder mass in a carrier device and orienting the carrier device with respect to the side edge such that the solder mass is aligned with the plated opening. The method further includes reflowing the solder mass to cause the solder mass to be deposited and securely held within the plated opening and then removing the carrier device leaving the solder mass behind within the plated opening and along the side edge of the electronic device.

WO 2007/140448 A2

SOLDER-BEARING ARTICLES AND METHOD OF RETAINING A SOLDER MASS ALONG A SIDE EDGE THEREOF

Cross Reference to Related Application

The present application claims the benefit of U.S. patent application No. 60/810,032, filed May 31, 2006, which is hereby incorporated in reference in its entirety.

Technical Field

The present invention relates generally to solder-bearing articles, such as devices used for joining electronic components to one another, electrical leads, terminals, electromagnetic shields, and furthermore, to a method for retaining a solder mass along a side edge of the solder-bearing article.

Background

It is often necessary and desirable to electrically connect one component to another component. For example, a multi-terminal component, such as a connector, is often electrically connected to a substrate, such as a printed circuit board, so that the contacts or terminals of the component are securely attached to contact pads formed on the substrate to provide an electrical connection therebetween. One preferred technique for securely attaching the component terminals to the contact pads is to use a solder material.

In the electronic equipment industry, an important necessity is the rapid and accurate assembly of leads, terminals and contacts with contact pads of printed circuit boards (PCB) and other substrates. For convenience of connecting such elements, it has previously been disclosed to facilitate the soldering of their connection by securing a solder slug or mass to one of the elements so that, when positioned in engagement with the other element and heated, the molten solder will cover the adjacent surfaces of both elements to form when cooled a solder joint providing both a mechanical coupling and an electrical connection between the elements.

One disadvantage of using solder masses is that the solder masses first have to be formed to have the proper dimensions and then the solder masses have to be coupled to solder-holding elements (e.g., solder clips) before the solder reflow operation is performed. This can be a very time consuming and difficult task depending upon the construction of the element that receives the solder, such as a PCB.

In addition, the construction of some PCBs make it difficult to electrically connect one planar contact of one PCB to another planar contact of another PCB as is the case when the contacts overlie one another at least partially.

Summary

A method of depositing a solder mass within a plated opening that is formed in a side edge of an electronic device includes the steps of holding the solder mass in a carrier device and orienting the carrier device with respect to the side edge such that the solder mass is aligned with the plated opening. The method further includes reflowing the solder mass to cause the solder mass to be deposited and securely held within the plated opening and then removing the carrier device leaving the solder mass behind within the plated opening along the side edge of the electronic device.

The electronic device includes a conductive area, such as a solder pad, that is formed on one face or surface thereof that intersects the side edge at a right angle. The plated opening in the side edge of the electronic device intersects the conductive area and thus provides a means for electrically conducting the conductive area to another conductive area, such as another solder pad, associated with another electronic device.

Other features and advantages of the present invention will be apparent from the following detailed description when read in conjunction with the accompanying drawings.

Brief Description of the Drawings

The foregoing and other features of the present invention will be more readily apparent from the following detailed description and drawings of illustrative embodiments of the invention in which:

Fig. 1 is a perspective view of a printed circuit board (PCB) that has a bisected plated opening formed on an edge of the PCB with a solder pad being connected thereto;

Fig. 2 is a perspective view of a carrier that is constructed to hold and align a solder mass for placement in the bisected plated opening of the PCB of Fig. 1;

Fig. 3 is a top plan view of the carrier of Fig. 2 aligned with the PCB so that the solder mass aligns with the bisected plated opening;

Fig. 4 is an end elevation view of the carrier of Fig. 2 aligned with the PCB so that the solder mass aligns with the bisected plated opening;

Fig. 5 is a perspective of the PCB of Fig. 1 after the solder mass is deposited into the bisected plated opening and the carrier is removed; and

Fig. 6 is a top perspective view of the PCB of Fig. 1 electrically connected to another electronic device by means of reflowing the solder mass.

Detailed Description

As described and illustrated herein, one exemplary solder-bearing article according to the present invention is in the form of a solder-bearing component for use in electrical applications.

Fig. 1 illustrates a solder bearing article 100 in the form of a printed circuit board (PCB) that has a top surface 102 and an opposite bottom surface 104, as well as a peripheral edge (side edge) 110 that extends between the top and bottom surfaces 102, 104 and defines a thickness of the PCB 100. Typically, the PCB 100 has a generally square or rectangular shape; however, other shapes are equally possible. The illustrated PCB 100 is a plated, solderable structure in that the PCB 100 includes at least one and preferably a plurality of plated openings 120. In contrast to common PCB design, the plated openings 120 according to the present embodiment are formed along one or more edges 110 of the PCB 100. For purpose of illustration only, the illustrated embodiment shows the plated openings 120 formed in one side edge 110 of the PCB 100; however, it will be understood that the plated openings 120 can be formed in more than one of the edges 110.

In the illustrated embodiment, the plated openings 120 are perpendicular bisected plated opening 120 in that the PCB 100 includes solder pads 130 that are connected to the perpendicular bisected plated openings 120. The solder pads 130 can be conventional solder pads; however, the solder pads 130 are arranged on the top surface 102 such that they are orientated perpendicular to the plated openings 120 and such that they intersect the plated openings 120 at a right angle. Each plated opening 120 defines a channel that extends from the bottom surface 104 to the top surface 102 and in the illustrated embodiment, the plated opening 120 has an arcuate surface, such as a semi-circular shaped channel in that it is not a completely closed hole formed through the substrate. The opening 120 is thus an elongated channel formed along the side edge 110.

The solder pads 130 can have any number of different shapes so long as they are electrically connected to the plated openings 120. In other words, the solder pads 130 intersect the plated openings 120. Since the plated opening 120 has an arcuate shape, the solder pad 130 has an arcuate shaped edge 121 where it intersects the plated opening 120. The remaining, surrounding shape of the solder pad 130 can be a regular shape, such as a square or rectangle. In the illustrated embodiment, the solder pad 130 has a square shape except for the arcuate shaped edge 121 at the edge 110.

Typically, one solder pad 130 is electrically connected to one plated opening 120.

Now referring to Fig. 2 in which a carrier 200 for holding a solder mass 300 is provided. The carrier 200 has a body 210 that includes an elongated strip 220 and a solder-holding conformation 230 that is connected to the elongated strip 220 by means of a neck 240. The body 210, or at least a portion thereof, can be formed by any number of conventional techniques, including forming the body 210 by stamping from a material strip. In accordance with the present invention, the carrier 200 is formed of a non-wettable material, relative to solder, with exemplary non-wettable materials including but not limited to aluminum, a plastic, etc.

The elongated strip 220 includes a plurality of slots or openings 222 that are formed in the strip 220 along a length thereof. In the exemplary embodiment, the openings 222 are formed in the strip 220 at a location where the neck 240 intersects the strip 220. The neck 240 extends from the upper edge 221 of the strip 220 and is integrally connected to the solder-holding conformation 230. The solder-holding conformation 230 has a U-shaped body 232 that is defined by a pair of side walls 234 that are spaced apart from one another so as to define a space 235 therebetween. The neck 240 is connected to a base portion 236 of the body 232, with the side walls 234 extending outwardly therefrom.

The side walls 234 include a feature that permits the solder mass 300 to be held and carried by the solder-holding conformation 230. More specifically, each side wall 234 includes an open notch 237 that is formed along an inner edge 239 of the side wall 234. The notch 237 can have any number of different shapes so long as it can receive and hold an end of solder mass segment 300. For example, the notch 237 can have an arcuate shape, a square shape, a triangular shape, a rectangular shape, etc., with the illustrated notch 237 having a U-shape. The notches 237 are axially aligned to permit the solder mass 300 to be received within the notches 237 and extend across the space 235.

The solder-holding conformation 230 includes a means, generally indicated at 250, for "Z" axis alignment to the PCB 100 when the carrier 200 is orientated relative to side edge 110 of the PCB 100 for deposing the solder mass 300 into the plated opening 120. The means 250 is in the form of a pair of tabs or protrusions that acts as an alignment and stop mechanism. More specifically and as illustrated, a lower edge 238 of each side wall 234 includes an elongated protrusion 250 that extends outwardly from the inner edge 239 of the side wall 234. The protrusion (stop) 250 is preferably formed at a right angle to the inner edge 239 such that the protrusion 250 and inner edge 239 form a right angled shoulder. As described below, the spaced protrusions 250 are received along the bottom surface 104 of the PCB 100 and since the edge 110 and the bottom surface 104 are formed at a right angle, they are therefore complementary to the right angle formed between the protrusions 250 and inner edge 239.

The solder-holding conformation 230 also includes a means 260 for shielding the solder pad 130 from wicking of the solder mass 300 during reflow thereof. The means 260 is in the form of an integral shield/elongated protrusion that extends outwardly from the upper edge 241 of the side wall 234. The shield 260 thus occupies a significant amount of the area of the space 235 between the side walls 234 at the upper edge 241 thereof. In the illustrated embodiment, the length of the shield 260 is greater than a length of both the protrusions 250 and the side walls 234 and therefore, the shield 260 extends beyond both of these structures. The shield 260 is formed above the notches 237 and therefore, the shield 260 is disposed over the solder mass 300.

The use of the carrier 200 for depositing the solder mass 300 into the plated opening 120 of the PCB 100 is described with reference to Figs. 1-6. The solder mass 300 is held by the solder conformation 230 by placing ends of a solder mass segment 300 within the notches 237 such that the solder mass 300 extends across the space 235. As best shown in Fig. 3, the solder mass 300 can be pre-shaped before insertion or depositing the solder mass 300 into the plated opening 120. For example, the solder mass 300 can be bent in a middle region 302 thereof between the ends of the solder mass 300 so as to form a convex shape that is complementary to the arcuate (e.g., semi-circular) shaped so as to permit the bent portion 302 of the solder mass 300 to be received within the plated opening 120. By forming a bent portion 302, the placement/deposition of the solder mass 300 in the plated opening 120 is made easier.

The carrier 200 is positioned relative to the PCB 100 by aligning the side walls 234 on each side of the plated opening 120 such that the space 235 is aligned with and faces the plated opening 120. In this orientation, the protrusions (stops) 250 are positioned along the bottom surface 104 of the PCB 100 with the edge 110 in contact with or being placed proximate to the inner edge 239 of the side walls 234. The protrusions 250, as well as the inner edge 239, thus serve as locating features that position and orientate the carrier 200 relative to the PCB 100 as shown in Figs. 3-4.

As shown in Figs. 3-4, the shield 260 extends above the solder mass 300 and extends at least partially across the solder pad 130 so as to cover an area of the solder pad 130. In Fig. 3, one of the shields 260 is partially broken away to illustrate the underlying solder mass 300 and the plated opening 120. Once again, when the inner edge 239 seats against the edge 110 of the PCB 100, the solder mass 300, and in particular the bent portion 302, is aligned and deposited into the plated opening 120. The shield 260 is constructed to prevent molten solder (formed by a reflow operation) from wicking onto the planar solder pad 130 that is disposed on the top surface 102 of the PCB 100.

Figs. 3-4 show the solder mass 300 prior to reflowing the solder mass 300 to cause it to flow into and bond with the plated opening 120 resulting in the addition of solder to plated, solderable structures on the edge 110 of the PCB 100. The solder mass 300 is then reflowed using conventional techniques, such as applying heat to the solder mass 300. The heat can be delivered in any number of forms, including hot air that is directed onto the solder mass 300 or the entire assembly can be subjected to an elevated temperature, causing the solder reflow, so long as the printed circuit board (PCB) 100 is not damaged.

Fig. 5 shows the solder mass 300 deposited in the plated opening 120 after the carrier 200 (Fig. 2) has been removed at the end of the reflow operation has been completed. It will be appreciated that during reflow, the solder mass 300 flows into the arcuate (semi-circular) shaped plated opening

120 and thus, the formed solder deposit has at least a semi-circular shape and more typically, the formed solder deposit has a generally cylindrical shape as shown in Fig. 5. The bonding between the deposited solder mass 300 and the plated opening 120 results in the solder mass 300 being securely held within the plated opening 120 and is ready for later use when it is desired to electrically connect the solder pad 130 with another electronic component via the bisected plated opening 120 located at the edge 110.

For example, Fig. 6 shows one exemplary application for the PCB 100 with one or more solder masses 300 deposited along edge 110 within the bisected plated opening 120. In particular, the PCB 100, and in particular, the solder pad 130 thereof, is electrically connected to a second electronic component 400. In the illustrated embodiment, the second electronic component 400 is in the form of a substrate, such as another PCB assembly, that includes a top surface 402, a bottom surface 404 and a peripheral side wall 406 that extends between the top surface 404 and the bottom surface 404. The construction of the PCB 400 can be similar or identical to the construction of the PCB 100 and in any event, the PCB 400 includes a number of electronic components 410 formed thereon. For example, the top surface 402 of the PCB 400 can have one or more conductive pads (solder pads) 410 formed thereon that are designed to be electrically connected to electronic components associated with the other electronic device. More specifically, the solder pad 130 of the PCB 100 is to be electrically connected to the solder pad 410 of the PCB 400.

The PCB 100 and the secondary PCB 400 represent planar substrates that have complementary planar surfaces to permit one substrate to seat against the other substrate. For example, the PCB 100 as shown in Fig. 5 can be inverted and the top surface 102 of the PCB 100 can seat against the top surface 402 of the secondary PCB 400 such that at least a portion of the solder pad 130 is in contact with least a portion of the solder pad 410 of the PCB 400 to establish an electrical connection therebetween. In this orientation, the solder mass 300 likewise lies above and in contact with the solder pad 410. To electrically connect the two electronic components (conductive pads 130, 410), the solder mass 300 is reflowed to provide and form a robust, filleted solder joint between the two PCBs 100, 400 which was otherwise not possible with a one-dimensional planar PCB solder pad (e.g., solder pad 130) using conventional soldering techniques.

Thus, in accordance with the present invention, a means for SMT (surface mount technology) attachment of one PCB 100 to another PCB 400 by using conventional PCB solder pads 130, 410 that are connected to a perpendicular bisected plated opening and conventional SMT component attachment methods. The use of a perpendicular bisected plated opening (BPO) - PCB solder joint according to the present invention permits a solder joint and an electrical connection between two electronic components (solder pads) that were otherwise not possible.

More specifically and according to the present invention, the formation of this type of BPO-PCB solder joint is possible due to the addition of solder only on the edge of the PCB and on the inside of the bisected plated opening (through hole). The present method thus provides a device and means for effectively depositing solder only on the inside of the bisected plated opening on the edge of the PCB which has a common solderable surface with the solder pad.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. A method for electrically connecting a first electronic device to a second electronic device, the first electronic device having a first body that includes a first conductive area formed on a first face thereof and at least one plated opening formed along a side edge of the first body such that the plated opening intersects the first conductive area at a right angle, the second electronic device having a second body that includes a second conductive area, the method comprising the steps of:

holding a solder mass in a carrier device;

orienting the carrier device with respect to the side edge such that the solder mass faces and is aligned with the plated opening;

reflowing the solder mass to cause the solder mass to be deposited and securely held within the plated opening;

removing the carrier device leaving the solder mass behind within the plated opening and along the side edge of the first electronic device;

arranging the first electronic device to the second electronic device with the first and second conductive areas facing one another; and

reflowing the deposited solder mass in the plated opening to form a filleted solder joint between the first and second conductive areas resulting in the first and second electronic devices being electrically connected.

2. The method of claim 1, wherein the step of holding the solder mass in the carrier device comprises the steps of:

forming a solder-holding conformation as part of the carrier device, the solder-holding conformation having a pair of spaced side walls with notches formed therein for receiving ends of the solder mass; and

depositing the ends of the solder mass in the notches so as to extend the solder mass across a space between the side walls.

3. The method of claim 2, further including the steps of:

forming a pair of locating features as part of the solder-holding conformation, the locating features extending outwardly from inner edges of the side walls; and

orienting the solder-holding conformation relative to the side edge of the first electronic device so that pair of locating features are receiving along a bottom face of the first electronic device and the side edge of the first electronic device abuts against the inner edges of the side walls.

4. The method of claim 2, further including the steps of:

forming a shield that extends outwardly from the solder-holding conformation along an upper edge thereof and above a location where the solder mass is held; and

orienting the shield above and over the first conductive area for shielding the first conductive area from reflow of the solder mass when the side edge of the first electronic device abuts against the inner edges of the side walls and the solder mass is reflowed.

5. The method of claim 2, further including the step of:

bending an inner region of the solder mass between the ends thereof to assist in reception of the solder mass into the plated opening.

6. The method of claim 1, wherein the first and second conductive areas comprise first and second solder pads, respectively, with the plated opening bisecting the first solder pad.

7. The method of claim 1, wherein the step of arranging the first electronic device to the second electronic device with the first and second conductive areas facing one another comprises the steps of:

inverting the first electronic device from a position where the first conductive area faces upward to facilitate depositing of the solder mass in the plated opening; and

orienting the first and second electronic devices such that the deposited solder mass is disposed over the second conductive area to permit reflow of the deposited solder mass to form the filleted, solder joint.

8. The method of claim 1, wherein the plated opening is formed vertically in the side edge and is defined by an arcuate surface.

9. A method of depositing a solder mass within a plated opening that is formed in a side edge of an electronic device comprising the steps of:

holding the solder mass in a carrier device;

orienting the carrier device with respect to the side edge such that the solder mass faces and is aligned with the plated opening;

reflowing the solder mass to cause the solder mass to be deposited and securely held within the plated opening; and

removing the carrier device leaving the solder mass behind within the plated opening and along the side edge of the first electronic device.

10. The method of clam 9, wherein the step of holding the solder mass comprises the step of:

holding the solder mass in a transverse direction between two side walls that are part of a solder-holding conformation that is itself part of the carrier device, the transverse direction being substantially perpendicular to an axis that extend the length of the plated opening.

11. The method of claim 10, further including the steps of:

providing a pair of locating features as part of the solder-holding conformation, the locating features extending outwardly from inner edges of the side walls; and

orienting the solder-holding conformation relative to the side edge of the electronic device so that pair of locating features are receiving along a bottom face of the electronic device and the side edge of the electronic device abuts against the inner edges of the side walls.

12. The method of claim 10, further including the steps of:

forming a shield that extends outwardly from the solder-holding conformation along an upper edge thereof and above a location where the solder mass is held; and

orienting the shield above and over the first conductive area for shielding the first conductive area from reflow of the solder mass when the side edge of the electronic device abuts against the inner edges of the side walls and the solder mass is reflowed.

13. The method of claim 9, further including the step of:

pre-shaping an inner region of the solder so that is protrudes outwardly to assist in reception of the solder mass into the plated opening.

14. The method of claim 9, wherein the first conductive area is in the form of a solder pad that extends to the side edge and is perpendicularly bisected by the plated opening.

15. The method of claim 9, further including the steps of:

inserting ends of the solder mass into two notches formed in two spaced side walls that are part of a solder-holding conformation;

orienting the solder conformation relative to the side edge of the electronic device so that a pair of locating features that extend from inner edges of the two side walls are received along a bottom face of the electronic device and the side edge of the electronic device abuts against the inner edges of the side walls; and

shielding the first conductive area with a structure that extends outwardly from the solder conformation along an upper edge thereof and above a location where the solder mass is held for shielding the first conductive area from wicking of the solder mass thereon when the solder mass is reflowed.

16. The method of claim 9, wherein the plated opening comprises a semi-circular shaped channel formed in the side edge.

17. A device for depositing a solder mass in a plated opening formed in a side edge of an electronic device, comprising:

a carrier body; and

a solder-holding conformation attached to the carrier body, the solder-holding conformation defined by a pair of spaced side walls that include first features for holding the solder mass such that the solder mass extends across a space between the side walls, each side wall including a locating feature for positioning the solder-holding conformation relative to the side edge of the electronic device, each locating feature extending outwardly from an inner edge of one side wall, the solder-holding conformation including a shield that extends outwardly beyond the inner edge and is disposed above the solder mass for restricting flow of the solder mass as it is reflowed.

18. The device of claim 17, wherein the electronic device comprises a printed circuit board.

19. The device of claim 17, wherein the carrier body and solder-holding conformation comprise an integral, unitary structure formed of a material that is non-wettable relative to solder.

20. The device of claim 17, wherein the device is formed of a material that is selected from the group consisting of aluminum and a plastic.

21. The device of claim 17, wherein the solder-holding conformation has a U-shaped body with the side walls spaced apart from one another at a distance that is greater than a width of the plated opening.

22. The device of claim 17, wherein the solder-holding conformation is connected to the carrier body by a neck portion that is integral to and extends outwardly from an upper edge of the carrier body.

23. The device of claim 17, wherein the solder mass is an elongated structure that is pre-shaped to include an inner bent section between ends of the solder mass.

24. The device of claim 23, wherein the bent section has a concave shape that is complementary to a shape of the plated opening to permit reception of the bent section into the plated opening.

25. The device of claim 17, wherein the first features are a pair of notches formed in the side walls and being open along inner edges of the side walls.

26. The device of claim 25, wherein the notches are aligned along a first axis that is parallel to a plane that contains the upper surfaces of the locating features formed as part of the side walls.

27. The device of claim 17, wherein the locating feature is a protrusion formed at a bottom of the inner edge of the side wall.

28. The device of claim 17, wherein the shield comprises a finger that occupies greater than 50% of an area of the space as measured between the side walls.

29. The device of claim 17, wherein the shield extends outwardly a greater distance than the locating features relative to inner edges of the side walls.

30. The device of claim 17, wherein the electronic device includes a conductive area formed on a first face thereof that is formed at a right angle to the side edge, the plated opening being formed substantially perpendicular to the conductive area.

31. A device for depositing a solder mass in a plated opening formed in a side edge of an electronic device where the plated opening intersects a conductive area formed on a face of the electronic device, comprising:

a carrier body; and

a solder-holding conformation attached to the carrier body, the solder-holding conformation defined by a pair of spaced side walls that include means for holding the solder mass such that it extends across a space between the side walls, each side wall including a means for positioning the solder-holding conformation relative to the side edge of the electronic device, and wherein the solder-holding conformation includes a means for preventing reflowed solder from wicking onto the conductive area of the electronic device.

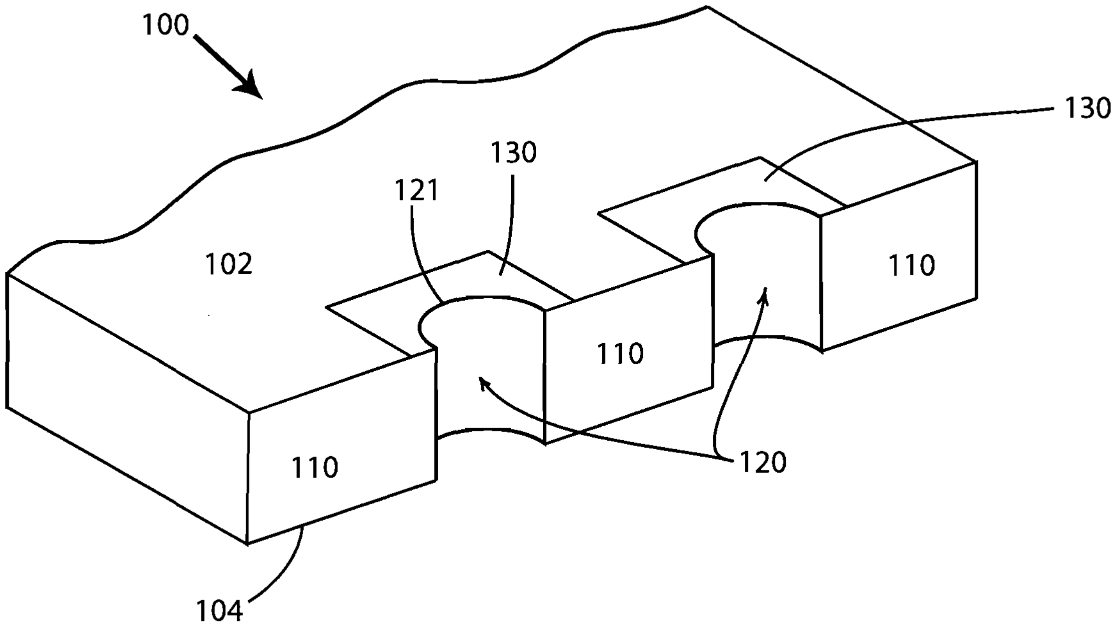
32. An electronic assembly comprising:

a first electronic device having a body that includes a first conductive area formed on a first face thereof and extending to a side wall of the body, wherein a plated opening is formed within the side wall of the body such that the plated opening intersects the first conductive area at a right angle;

a solder mass deposited in the plated opening; and

a second electronic device having a body that includes a second conductive area formed on a first face thereof, the first and second electronic devices arranged such that the first and second conductive areas are in contact and wherein the solder mass is reflowed to form a filleted solder joint between the first and second conductive areas.

FIG. 1


100
130
130
121
102
110
110
110
120
104

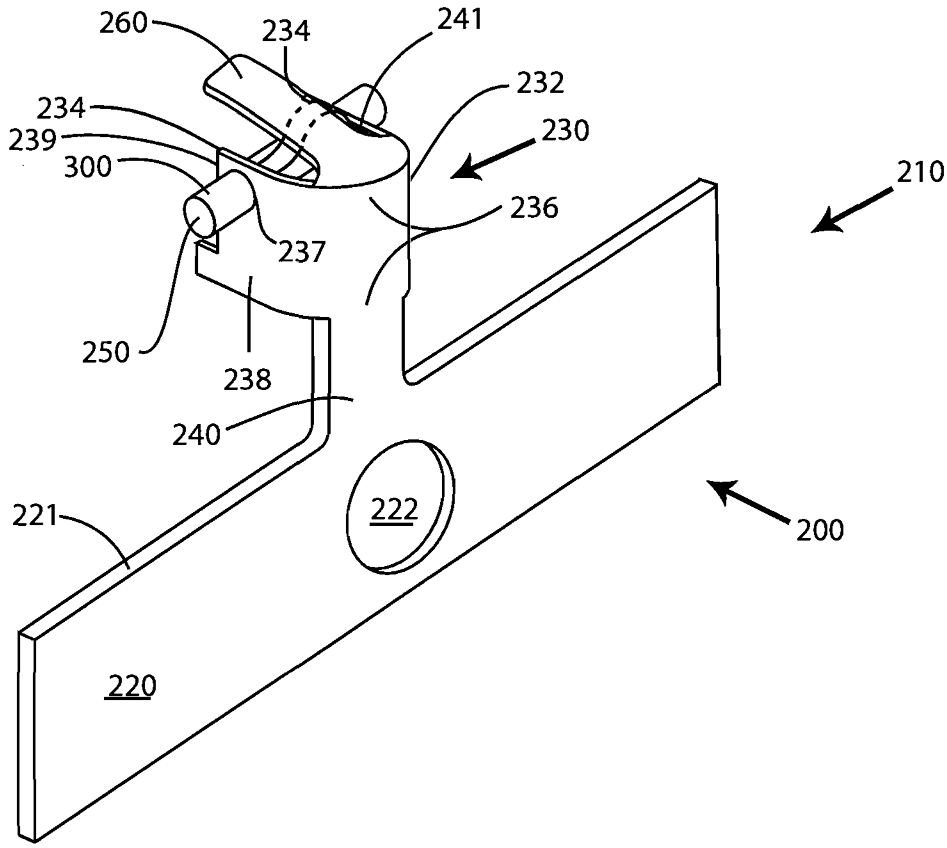

260
234
241
232
234
239
230
300
210
236
237
250
238
240
222
200
221
220

FIG. 3

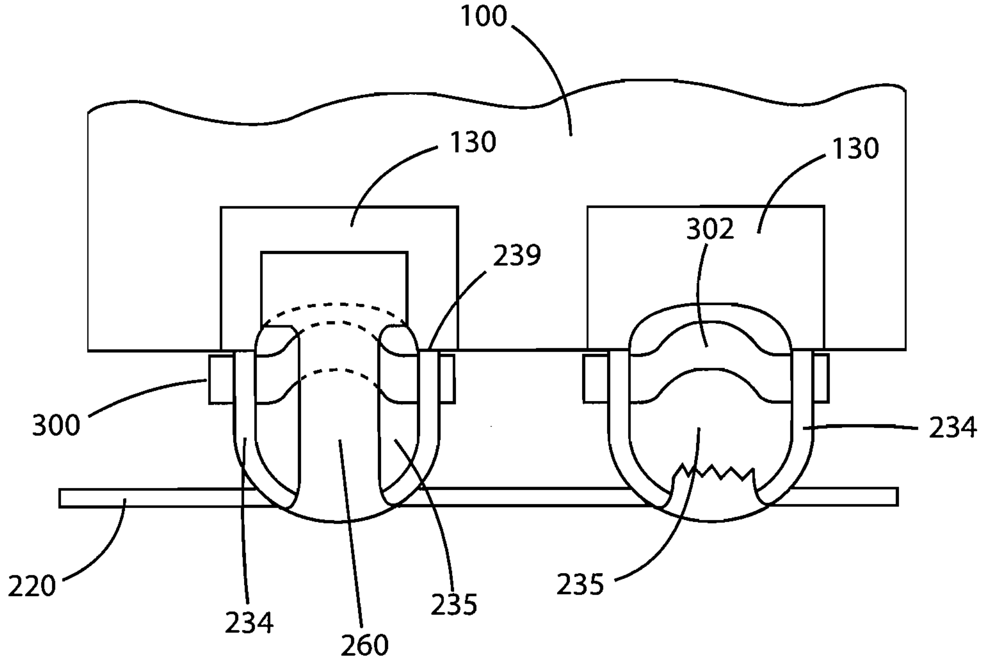

100
130
130
302
239
300
234
220
234
260
235
235

FIG. 4

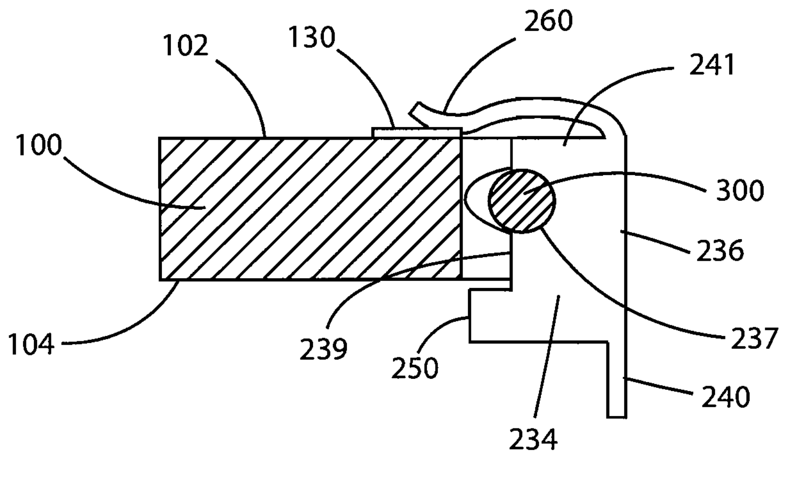

102
130
260
241
100
300
236
237
104
239
250
240
234

FIG. 5

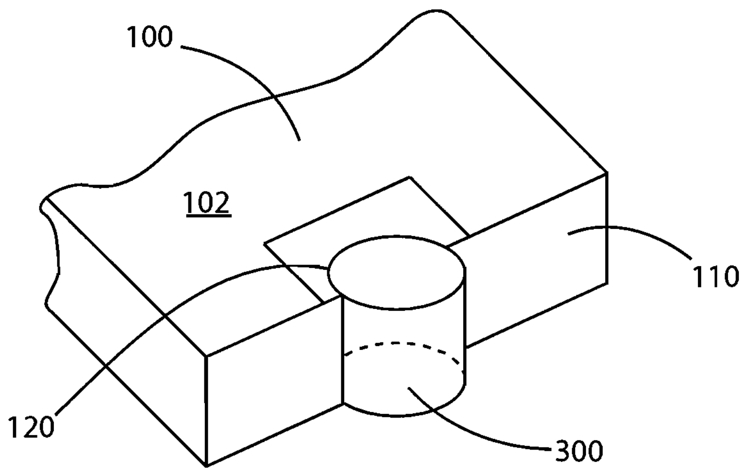


FIG. 6