Claims

1. A method of manufacturing a lead frame, the method comprising the steps of:

providing an electrically-conductive base material having first and second planar sides;

partially etching the first planar side of the base material to form partially etched portions and forming holes through the electrically-conductive base material, which are outside of the partially etched portions, simultaneously with the partially etched portions;

forming a plurality of conductive contact points onto portions of the surface of the first planar side of the base material, wherein:

the step of forming the plurality of conductive contact points comprises forming a conductive layer, which is separate from the base material, onto the surface of the first planar side of the base material; and

the partially etched portions are located in between the plurality of conductive contact points;

providing a non-conductive filling material over a flat planar surface of the first planar side of the base material so that the filling material fills the partially etched portions and spaces in between the plurality of conductive contact points to form a continuous layer comprising the filling material and the plurality of conductive contact points such that a thickness of the filling material is equal to a thickness of the conductive layer wherein the plurality of contact points are exposed; and

etching the second planar side of the base material to expose a pattern of the filling material in the partially etched portions from the second planar side of the base material and to thereby form a plurality of isolated conductive regions on the second planar side of the base material, each isolated conductive region being connected with at least a respective one of the plurality of contact points on the surface of the first planar side of the base material,

wherein the steps included in the method are performed without a die being attached to the base material.

2. The method of claim 1, wherein the step of forming the plurality of contact points onto the portions of the surface of the first planar side of the base material comprises the steps of:

providing a photo-resist layer on the first planar side of the base material, wherein the photo-resist layer comprises openings at positions corresponding to the positions of the plurality of contact points to be formed onto the portions of the surface of the first planar side of the base material;

plating a conductive material at the openings of the photo-resist layer to form the plurality of conductive points; and

removing the photo-resist layer from the first planar side of the base material.

3. The step of claim 1 or claim 2, wherein the step of forming the plurality of contact points onto the portions of the surface of the first planar side of the base material comprises the steps of:

printing a conductive material onto those portions of the first planar side of the base material; and

allowing the conductive material to solidify.

4. The method of any one of the preceding claims, wherein the step of providing the filling material over the flat planar surface of the first planar side of the base material is performed until the filling material flows over the plurality of conductive points by a predetermined thickness.

5. The method claim 4, wherein the predetermined thickness is about 0.1 mm.

6. The method of claim 4 or claim 5, further comprising the step of removing excess filling material from the first planar side of the base material after the step of providing the filling material over the flat planar surface of the first planar side of the base material to expose the plurality of contact points.

7. The method of any one of the preceding claims, wherein forming the holes through the electrically-conductive base material comprises the steps of:

providing photo-resist layers on the first and second planar sides of the base material, the photo-resist layers comprising openings at positions corresponding to the positions of the through-holes to be formed in the base material;

etching the base material at the openings of the photo-resist layers to form the through-holes; and

removing the photo-resist layers from the first and second planar sides of the base material.

8. The method of claim 7, wherein the step of etching the second planar side of the base material to expose the pattern of the filling material from the second planar side of the base material comprises the steps of etching the second planar side of the base material to a predetermined etched thickness, and subsequently, further etching the second planar side of the base material selectively until the pattern of the filling material is exposed from the second planar side of the base material.

9. The method of claim 8, wherein the predetermined etched thickness to which the second planar side of the base material is etched is about 0.025 mm.

10. The method of any one of the preceding claims, wherein the step of partially etching the first planar side of the base material to form partially etched portions and forming the holes through the electrically-conductive base material includes the steps of:

providing photo-resist layers on the first and second planar sides of the base material, the photo-resist layers comprising openings at positions corresponding to the positions of the holes, and the photo-resist layer on the first planar side of the base material further comprising openings at positions corresponding to the partially etched portions to be formed in the base material;

etching the base material at the openings of the photo-resist layers to form the holes and the partially etched portions; and

removing the photo-resist layers from the first and second planar sides of the base material.

11. The method of claim 10, wherein the step of etching the second planar side of the base material comprises the step of etching the second planar side of the base material to a predetermined etched thickness until the pattern of the filling material is exposed from the second planar side of the base material.

12. The method of claim 11, wherein the predetermined etched thickness to which the second planar side of the base material is etched is about 0.025 mm.

13. The method of any one of the preceding claims, further comprising the step of plating the plurality of contact points on the first planar side of the base material and the plurality of conductive regions on the second planar side of the base material.

14. A method of manufacturing a lead frame, the method comprising the steps of:

providing an electrically-conductive base material having first and second planar sides;

partially etching the first planar side of the base material to form partially etched portions and forming holes through the electrically-conductive base material, which are outside of the partially etched portions, simultaneously with the partially etched portions;

forming a plurality of conductive contact points onto portions of the surface of the first planar side of the base material, wherein:

the step of forming the plurality of conductive contact points comprises forming a conductive layer, which is separate from the base material, onto the surface of the first planar side of the base material; and

the partially etched portions are located in between the plurality of conductive contact points;

providing a non-conductive filling material over a flat planar surface of the first planar side of the base material so that the filling material fills the partially etched portions and spaces in between the plurality of conductive contact points to form a continuous layer comprising the filling material and the plurality of conductive contact points such that a thickness of the filling material is equal to a thickness of the conductive layer wherein the plurality of contact points are exposed; and

etching the second planar side of the base material to expose a pattern of the filling material in the partially etched portions from the second planar side of the base material and to thereby form a plurality of isolated conductive regions on the second planar side of the base material, each isolated conductive region being connected with at least a respective one of the plurality of contact points on the surface of the first planar side of the base material,

wherein the steps included in the method are performed without a die being attached to the base material; and

a single partially etched portion is located between adjacent conductive contact points of the plurality of conductive contact points.