FIG. 11 is a cross-sectional view of the integrated circuit package in package system in an adhesiveless package attach phase;

FIG. 12 is a cross-sectional view of the integrated circuit package in package system in an electrical connection phase;

FIG. 13 is a cross-sectional view of the integrated circuit package in package system in a package in package encapsulation phase;

FIG. 14 is a cross-sectional view of the integrated circuit package in package system in a coverlay removal phase;

FIG. 15 is a cross-sectional view of an integrated circuit package in package system in an eighth embodiment of the present invention;

FIG. 16 is a cross-sectional view of an integrated circuit package in package system in a ninth embodiment of the present invention; and

FIG. 17 is a flow chart of an integrated circuit package in package system for manufacturing the integrated circuit package in package system in an embodiment of the present invention.

BEST MODE FOR CARRYING OUT THE INVENTION

The following embodiments are described in sufficient detail to enable those skilled in the art to make and use the invention. It is to be understood that other embodiments would be evident based on the present disclosure, and that system, process, or mechanical changes may be made without departing from the scope of the present invention.

In the following description, numerous specific details are given to provide a thorough understanding of the invention. However, it will be apparent that the invention may be practiced without these specific details. In order to avoid obscuring the present invention, some well-known circuits, system configurations, and process steps are not disclosed in detail. Likewise, the drawings showing embodiments of the system are semi-diagrammatic and not to scale and, particularly, some of the dimensions are for the clarity of presentation and are shown greatly exaggerated in the drawing FIGs.

Where multiple embodiments are disclosed and described, having some features in common, for clarity and ease of illustration, description, and comprehension thereof, similar and like features one to another will ordinarily be described with like reference numerals. The embodiments may be numbered first embodiment, second embodiment, etc. as a matter

of descriptive convenience and are not intended to have any other significance or provide limitations for the present invention.

For expository purposes, the term “horizontal” as used herein is defined as a plane parallel to the plane or surface of the invention, regardless of its orientation. The term “vertical” refers to a direction perpendicular to the horizontal as just defined. Terms, such as "on", “above”, “below”, “bottom”, “top”, “side” (as in “sidewall”), “higher”, “lower”, “upper”, “over”, and “under”, are defined with respect to the horizontal plane.

The term “on” as used herein means and refers to direct contact among elements. The term “processing” as used herein includes deposition of material, patterning, exposure, development, etching, cleaning, and/or removal of the material or trimming as required in forming a described structure. The term “system” as used herein means and refers to the method and to the apparatus of the present invention in accordance with the context in which the term is used.

Referring now to FIG. 1, therein is shown a cross-sectional view of an integrated circuit package in package system 100 taken along line 1--1 of FIG. 2 in an embodiment of the present invention. The integrated circuit package in package system 100 preferably includes a first integrated circuit package 102 having a first encapsulant 104. The first encapsulant 104 of the first integrated circuit package 102 can include a first encapsulant surface 106 preferably formed having a substantially planar surface.

The first integrated circuit package 102 includes a first package integrated circuit 108, a first package die pad 110, and a first package lead 112. The first encapsulant surface 106 can be formed over a first package integrated circuit 108, ~~a~~the first package die pad 110, and ~~a~~the first package lead 112. The first package integrated circuit 108 can be mounted over the first package die pad 110 with a first package mounting layer 114 such as an adhesive layer. The first package integrated circuit 108 can be electrically connected to the first package lead 112 with a first package connector 116 such as a bond wire. The first package lead 112 protrudes from the first encapsulant 104.

The integrated circuit package in package system 100 also preferably includes a second integrated circuit 118. The second integrated circuit 118 can be mounted over the first integrated circuit package 102 with a second mounting layer 120 such as an adhesive. The second integrated circuit 118 can be electrically connected to the first integrated circuit package 102 with a second connector 122 such as a bond wire.

The first integrated circuit package 102 can preferably be attached to the integrated circuit package in package system 100 without the need for adhesives for an adhesiveless package attach. The first integrated circuit package 102 and thereby the second integrated

CLAIMS

What is claimed is:

1. A method for manufacturing ~~A~~an integrated circuit package in package system comprising:

providing a package in package lead with a package in package lead surface substantially planar;

attaching a first integrated circuit package having a first package lead and a first encapsulant having a first encapsulant surface substantially coplanar with the package in package lead surface, the first package lead protruding from the first encapsulant;

attaching a second integrated circuit near the first integrated circuit package; and

forming a package in package encapsulant over the first integrated circuit package and the second integrated circuit, a side of the package in package lead opposite the package in package lead surface exposed from the package in package encapsulant.

2. The ~~system~~method as claimed in claim 1 wherein attaching the first integrated circuit package includes electrically connecting the first integrated circuit package to the package in package lead.

3. The ~~system~~method as claimed in claim 1 wherein attaching the second integrated circuit includes attaching the second integrated circuit over the first integrated circuit package.

4. The ~~system~~method as claimed in claim 1 wherein attaching the second integrated circuit includes attaching the second integrated circuit adjacent the first integrated circuit package.

5. The ~~system~~method as claimed in claim 1 wherein attaching the second integrated circuit includes attaching a second integrated circuit package having the second integrated circuit adjacent the first integrated circuit package.

6. A method for manufacturing ~~A~~an integrated circuit package in package system comprising:

forming a package in package lead having a package in package lead surface substantially planar to another package in package lead;

mounting a first integrated circuit package having a first package lead and a first encapsulant having a first encapsulant surface substantially coplanar with the package in package lead surface and another package in package lead surface, the first package lead protruding from the first encapsulant;

connecting a second integrated circuit to the first integrated circuit package with a second connector; and

applying a package in package encapsulant over the first integrated circuit package and the second integrated circuit, the package in package encapsulant having a plane of a package in package mounting surface substantially coplanar with the first encapsulant surface and the package in package lead surface, and a side of the package in package lead opposite the package in package lead surface exposed from the package in package encapsulant.

7. The ~~system~~method as claimed in claim 6 wherein connecting the second integrated circuit includes connecting the second integrated circuit having a second integrated circuit mounting surface substantially coplanar to the package in package mounting surface.

8. The ~~system~~method as claimed in claim 6 wherein connecting the second integrated circuit includes connecting the second integrated circuit over a die concealer adjacent the first integrated circuit package.

9. The ~~system~~method as claimed in claim 6 wherein forming the package in package lead includes forming the package in package lead in a shape of a J-bend lead.

10. The method~~system~~ as claimed in claim 6 wherein forming the package in package lead includes forming the package in package lead in a shape of a stackable lead having a top terminal and a bottom terminal.

11. An integrated circuit package in package system comprising:

a package in package lead with a package in package lead surface substantially planar;

a first integrated circuit package having a first package lead and a first encapsulant having a first encapsulant surface substantially coplanar with the package in package lead surface, the first package lead protruding from the first encapsulant;

a second integrated circuit near the first integrated circuit package; and

a package in package encapsulant over the first integrated circuit package and the second integrated circuit, a side of the package in package lead opposite the package in package lead surface exposed from the package in package encapsulant.

12. The system as claimed in claim 11 wherein the first integrated circuit package includes the first integrated circuit package electrically connected to the package in package lead.

13. The system as claimed in claim 11 wherein the second integrated circuit includes the second integrated circuit over the first integrated circuit package.

14. The system as claimed in claim 11 wherein the second integrated circuit includes the second integrated circuit adjacent the first integrated circuit package.