Claims

What is claimed:

1. A method of making a semiconductor device, comprising:

providing ~~a temporary carrier;~~

~~forming~~ a plurality of conductive pillars ~~over the temporary carrier~~;

~~mounting a first semiconductor die over the temporary carrier~~ disposing a first dual-active sided semiconductor die between the conductive pillars, the first dual-active sided semiconductor die ~~having~~ including first and second opposing active surfaces with first contact pads on the first active surface and second contact pads on the second active surface, wherein a height of the conductive pillars is greater than a height of the first dual-active sided semiconductor die;

depositing an encapsulant over the first dual-active sided semiconductor die and ~~temporary carrier~~around the conductive pillars with the encapsulant covering the first active surface of the first dual-active sided semiconductor die, wherein a first surface of the encapsulant is coplanar with a surface of the conductive pillars;

forming a plurality of vias through the first surface of the encapsulant with the vias extending from the first surface of the encapsulant through the encapsulant to the first contact pads of the first dual-active sided semiconductor die;

depositing a conductive material in the vias to form a plurality of conductive vias in the encapsulant with the conductive vias extending from the first contact pads through the encapsulant to the first surface of the encapsulant;

forming a first interconnect structure over ~~a~~the first surface of the encapsulant, wherein the first interconnect structure ~~being~~ is electrically connected to the conductive pillars and through the conductive vias to the first contact pads of the first dual-active sided semiconductor die;

~~removing the temporary carrier;~~ and

forming a second interconnect structure over a second surface of the encapsulant opposite the first surface of the encapsulant~~,~~ with the second interconnect structure physically contacting ~~being electrically connected to~~ the conductive pillars and the second contact pads of the first dual-active sided semiconductor die.

~~2. The method of claim 1, further including forming a conductive via between the first interconnect structure and first contact pads of the first semiconductor die.~~

~~3. The method of claim 1, further including forming a bump between the first interconnect structure and first contact pads of the first semiconductor die.~~

~~4. The method of claim 1, further including forming a bump between the second interconnect structure and second contact pads of the first semiconductor die.~~

~~5~~2. The method of claim 1, further including forming a heat sink over the first interconnect structure.

~~6~~3. The method of claim 1, wherein the first interconnect structure includes a shielding layer~~further including stacking a second semiconductor die over the first semiconductor die between the conductive pillars, the second semiconductor die having first and second opposing active surfaces with first contact pads on the first active surface of the second semiconductor die and second contact pads on the second active surface of the second semiconductor die~~.

~~7~~4. The method of claim 1, further including ~~mounting~~ disposing a second dual-active sided semiconductor die ~~over the temporary carrier~~ adjacent to the first dual-active sided semiconductor die~~ between the conductive pillars~~, the second dual-active sided semiconductor die ~~having~~ including first and second opposing active surfaces with first contact pads on the first active surface of the second dual-active sided semiconductor die and second contact pads on the second active surface of the second dual-active sided semiconductor die.

~~8~~5. A method of making a semiconductor device, comprising:

~~forming~~ providing a plurality of conductive pillars;

~~mounting~~ disposing a first semiconductor component between the conductive pillars, the first semiconductor component ~~having~~

including first and second opposing active surfaces with first contact pads on the first active surface and second contact pads on the second active surface;

depositing an encapsulant ~~over~~around the first semiconductor component and conductive pillars; ~~and~~

forming a first interconnect structure over a first surface of the encapsulant and electrically connected to the conductive pillars and first contact pads of the first semiconductor component~~, the first interconnect structure being~~;

forming a plurality of interconnects in the encapsulant and extending from the first contact pads of the first semiconductor component to the first surface of the encapsulant; and

forming a second interconnect structure over a second surface of the encapsulant opposite the first surface of the encapsulant with the second interconnect structure physically contacting the conductive pillars and second contact pads of the first semiconductor component~~electrically connected to the conductive pillars and first contact pads of the first semiconductor component~~.

~~9. The method of claim 8, further including forming a second interconnect structure over a second surface of the encapsulant opposite the first surface of the encapsulant, the second interconnect structure being electrically connected to the conductive pillars and second contact pads of the first semiconductor component.~~

~~10~~6. The method of claim ~~8~~5, further including forming a heat sink over the first interconnect structure.

~~11~~7. The method of claim ~~8~~5, wherein the first interconnect structure includes ~~further including forming~~ a shielding layer ~~over the first semiconductor component~~.

~~12~~8. The method of claim ~~8~~5, further including stacking a second semiconductor component over the first semiconductor component ~~between the conductive pillars~~.

~~13~~9. The method of claim ~~8~~5, further including ~~mounting~~disposing a second semiconductor component adjacent to the first semiconductor component ~~between the conductive pillars~~.

10. The method of claim 5, wherein the first surface of the encapsulant is coplanar with the conductive pillars.

141. A method of making a semiconductor device, comprising:

providing a first semiconductor component ~~having~~ including first and second opposing active surfaces with first contact pads on the first active surface and second contact pads on the second active surface;

forming a plurality of conductive pillars adjacent to the first semiconductor component with the conductive pillars including a height greater than a height of the first semiconductor component;

depositing an encapsulant over ~~the first semiconductor component~~ the first semiconductor component and around the conductive pillars with the encapsulant including a first surface disposed over the first active surface of the first semiconductor component, wherein the first surface of the encapsulant is coplanar with a surface of the conductive pillars;

forming a plurality of conductive vias in the encapsulant and over the first active surface of the first semiconductor component with the conductive vias extending from the first surface of the encapsulant through the encapsulant to the first contact pads of the first semiconductor component; and

forming a first interconnect structure over ~~a~~the first surface of the encapsulant and~~, the first interconnect structure being~~ electrically connected to the conductive pillars and the conductive vias~~first contact pads of the first semiconductor component~~.

152. The method of claim 141, further including forming a second interconnect structure over a second surface of the encapsulant opposite the first surface of the encapsulant~~, the second interconnect structure being electrically connected to the~~

~~conductive pillars and second contact pads of the first semiconductor component~~.

~~16. The method of claim 15, further including:~~

~~forming a plurality of conductive pillars between the first and second interconnect structures; and~~

~~electrically connecting the conductive pillars to the first and second interconnect structures.~~

~~17. The method of claim 14, further including forming a bond wire between the second contact pads of the first semiconductor component and first interconnect structure.~~

1~~8~~3. The method of claim 1~~4~~1, further including disposing a heat sink ~~forming a shielding layer~~ over the first ~~semiconductor component~~ interconnect structure.

194. The method of claim 141, further including stacking a second semiconductor component over the first semiconductor component.

2015. The method of claim 141, further including ~~mounting~~ disposing a second semiconductor component adjacent to the first semiconductor component.

~~21. A semiconductor device, comprising:~~

~~a plurality of conductive pillars;~~

~~a first semiconductor component mounted between the conductive pillars, the first semiconductor component having first and second opposing active surfaces with first contact pads on the first active surface and second contact pads on the second active surface;~~

~~an encapsulant deposited over the first semiconductor component; and~~

~~a first interconnect structure formed over a first surface of the encapsulant, the first interconnect structure being electrically connected to the conductive pillars and first contact pads of the first semiconductor component.~~

~~22. The semiconductor device of claim 21, further including a second interconnect structure formed over a second surface of the encapsulant opposite the first surface of the encapsulant, the second interconnect structure being electrically connected to the conductive pillars and second contact pads of the first semiconductor component.~~

~~23. The semiconductor device of claim 21, further including a shielding layer formed over the first semiconductor component.~~

~~24. The semiconductor device of claim 21, further including a second semiconductor component stacked over the first semiconductor component between the conductive pillars.~~

~~25. The semiconductor device of claim 21, further including a second semiconductor component mounted adjacent to the first semiconductor component between the conductive pillars.~~

16. A method of making a semiconductor device, comprising:

providing a first semiconductor component including a first active surface and a second active surface opposite the first active surface;

forming a conductive pillar adjacent to the first semiconductor component;

depositing an encapsulant around the conductive pillar and over the first semiconductor component with the encapsulant including a first surface disposed over the first active surface of the first semiconductor component, wherein the first surface of the encapsulant is coplanar with the conductive pillar;

disposing a first interconnect in the encapsulant with the first interconnect extending from the first surface of the encapsulant to a first contact pad on the first active surface of the first semiconductor component; and

forming a first interconnect structure over the first surface of the encapsulant and electrically connected to the conductive pillar and the first interconnect.

17. The method of claim 16, further including forming a second interconnect structure over the second active surface of the first semiconductor component.

18. The method of claim 16, wherein the interconnect includes a bump.

19. The method of claim 16, wherein the first interconnect structure includes a shielding layer.

20. The method of claim 16, further including:

forming a second interconnect over a second contact pad on the second active surface of the first semiconductor component; and

depositing the encapsulant over the second active surface of the first semiconductor component and around the second interconnect.