Claims

What is claimed:

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

providing a temporary substrate;

providing a prefabricated heat spreader frame including a flat plate with a plurality of bodies extending from the flat plate to form a plurality of die mounting sites on the flat plate;

mounting a prefabricated heat spreader frame over the temporary substrate;

mounting disposing a plurality of semiconductor die to over the die mounting sites on the flat plate in the prefabricated heat spreader frame for thermal dissipation;

providing a chase mold including a center plate;

placing the prefabricated heat spreader frame and semiconductor die in the chase mold;

depositing an encapsulant from the center plate of the chase mold over the semiconductor die and prefabricated heat spreader frame while leaving contact pads on the semiconductor die devoid of the encapsulant;

forming an interconnect structure over the semiconductor die; and

singulating the bodies of the prefabricated heat spreader

frame to separate the semiconductor die.

~~the heat spreader frame for thermal dissipation;~~

~~depositing an encapsulant over the semiconductor die and heat spreader frame while leaving contact pads on the semiconductor die exposed; and~~

~~forming an interconnect structure over the semiconductor die.~~

~~2. The method of claim 1, wherein the heat spreader frame includes vertical bodies over a flat plate.~~

~~3. The method of claim 1, further including depositing the encapsulant using a wafer level direct/top gate molding process.~~

~~4. The method of claim 1, further including depositing the encapsulant using a wafer level film assist molding process.~~

~~5. The method of claim 1, further including:~~

~~removing the temporary substrate;~~

~~applying dicing tape to the heat spreader frame; and~~

~~singulating the semiconductor die.~~

~~6~~2. The method of claim 1, wherein forming the interconnect structure includes:

forming a first conductive layer over the semiconductor die;

forming an insulating layer over the first conductive layer; and

forming a second conductive layer over the first conductive layer.

~~7~~3. The method of claim ~~6~~2, wherein forming the interconnect structure further includes forming a bump over the second conductive layer.

~~8~~4. A method of manufacturing a semiconductor device, comprising:

providing a prefabricated heat spreader frame having a plurality of die mounting sites;

~~mounting~~ disposing a plurality of semiconductor ~~die to the heat spreader frame for thermal dissipation~~ die over the die mounting sites in the prefabricated heat spreader frame;

placing the prefabricated heat spreader frame and semiconductor die in a chase mold;

depositing an encapsulant over the semiconductor die and prefabricated heat spreader frame while in the chase mold to leave contact pads on the semiconductor die devoid of the encapsulant; and

forming an interconnect structure over the semiconductor

die.

~~heat spreader frame; and~~

~~forming an interconnect structure over the semiconductor die.~~

~~9~~5. The method of claim ~~8~~4, wherein the prefabricated heat spreader frame includes vertical bodies over a flat plate.

~~heat spreader frame includes vertical bodies over a flat plate.~~

~~10. The method of claim 9, further including depositing the encapsulant around the vertical bodies and semiconductor die while leaving contact pads on the semiconductor die exposed.~~

~~11~~6. The method of claim ~~8~~4, further including depositing the encapsulant using a wafer level direct/top gate molding process.

~~12~~7. The method of claim ~~8~~4, further including depositing the encapsulant using a wafer level film assist molding process.

~~13~~8. The method of claim ~~8~~4, wherein forming the interconnect structure includes:

forming a first conductive layer over the semiconductor die;

forming an insulating layer over the first conductive layer; and

forming a second conductive layer over the first conductive layer.

~~14~~9. A method of manufacturing a semiconductor device, comprising:

~~providing a wafer-shaped temporary substrate;~~

~~mounting a wafer-shaped heat spreader frame over the temporary substrate;~~

~~mounting a semiconductor die to the heat spreader frame for thermal dissipation;~~

~~depositing an encapsulant over the semiconductor die and heat spreader frame; and~~

~~forming an interconnect structure over the semiconductor die.~~ providing a wafer-shaped carrier;

mounting a wafer-shaped heat spreader frame including a plurality of die mounting sites over the wafer-shaped carrier;

disposing a plurality of semiconductor die over the die

mounting sites of the wafer-shaped heat spreader frame; and

depositing an encapsulant over the semiconductor die and wafer-shaped heat spreader frame while leaving contact pads on the semiconductor die devoid of the encapsulant.

150. The method of claim 149, wherein the wafer-shaped heat spreader frame includes vertical bodies over a flat plate.

~~16. The method of claim 15, further including depositing the encapsulant around the vertical bodies and semiconductor die while leaving contact pads on the semiconductor die exposed.~~

1~~7~~1. The method of claim ~~14~~9, further including depositing the encapsulant using a wafer level direct/top gate molding process.

1~~8~~2. The method of claim ~~14~~9, further including depositing the encapsulant using a wafer level film assist molding process.

1~~9~~3. The method of claim ~~14~~9, further including:

~~removing the temporary substrate;~~

~~applying dicing tape to the heat spreader frame; and~~

~~singulating the semiconductor die.~~

removing the wafer-shaped carrier; and

applying dicing tape to the wafer-shaped heat spreader frame.

~~20~~14. The method of claim ~~14~~9, wherein forming the interconnect structure includes:

forming a first conductive layer over the semiconductor die;

forming an insulating layer over the first conductive layer; and

forming a second conductive layer over the first conductive layer.

~~21~~15. A semiconductor device, comprising:

~~a heat spreader frame;~~

~~a semiconductor die mounted to the heat spreader frame for thermal dissipation;~~

~~an encapsulant deposited over the semiconductor die and~~

~~heat spreader frame; and~~

~~an interconnect structure formed over the semiconductor die.~~ a prefabricated heat spreader frame including a plurality of die mounting sites;

a plurality of semiconductor die disposed over the die mounting sites in the prefabricated heat spreader frame;

a chase mold for housing the semiconductor and prefabricated heat spreader frame;

an encapsulant deposited over the semiconductor die and prefabricated heat spreader frame while in the chase mold to leave contact pads on the semiconductor die devoid of the encapsulant; and

an interconnect structure formed over the semiconductor die.

~~22~~16. The semiconductor device of claim ~~21~~15, wherein the prefabricated heat spreader frame includes vertical bodies over a flat plate.

~~23. The semiconductor device of claim 22, wherein the encapsulant is deposited around the vertical bodies and semiconductor die while leaving contact pads on the semiconductor die exposed.~~

~~24~~17. The semiconductor device of claim ~~21~~15, wherein the interconnect structure includes:

a first conductive layer formed over the semiconductor die;

an insulating layer formed over the first conductive layer; and

a second conductive layer formed over the first conductive layer.

18. A method of manufacturing a semiconductor device, comprising:

providing a prefabricated heat spreader frame including a plurality of die mounting sites;

mounting a plurality of semiconductor die to the die mounting sites in the prefabricated heat spreader frame;

placing the prefabricated heat spreader frame and semiconductor die in a chase mold; and

depositing an encapsulant over the semiconductor die and prefabricated heat spreader frame while in the chase mold.

19. The method of claim 18, wherein the prefabricated heat spreader frame includes vertical bodies over a flat plate.

20. The method of claim 18, further including depositing the encapsulant using a wafer level direct/top gate molding process.

21. The method of claim 18, further including depositing the

encapsulant using a wafer level film assist molding process.

22. The method of claim 18, wherein forming the interconnect structure includes:

forming a first conductive layer over the semiconductor die;

forming an insulating layer over the first conductive layer; and

forming a second conductive layer over the first conductive layer.

23. The method of claim 18, further including forming an interconnect structure over the semiconductor die.

24. The method of claim 18, further including singulating the prefabricated heat spreader frame to separate the semiconductor die.

25. The method of claim 4, further including singulating the prefabricated heat spreader frame to separate the semiconductor die.

26. The method of claim 9, further including forming an

interconnect structure over the semiconductor die.

27. The method of claim 9, further including singulating the prefabricated heat spreader frame to separate the semiconductor die.