Claims

What is claimed:

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

providing a carrier;

disposing a semiconductor die over the carrier;

disposing a ground plane over the carrier outside a footprint of the semiconductor die;

depositing an encapsulant over the semiconductor die and the ground plane;

removing the carrier after depositing the encapsulant; and

forming a conductive layer over the ground plane, the semiconductor die, and the encapsulant after removing the carrier, wherein the conductive layer includes,

a conductive trace electrically coupled from the ground plane to a voltage reference circuit node, and

a signal trace formed from a contact pad of the semiconductor die to directly over the ground plane.

2. The method of claim 1, further including providing the ground plane by:

providing an interconnect structure including the ground plane formed over a surface of the interconnect structure;

disposing the interconnect structure with the ground plane adjacent to the semiconductor die; and

depositing the encapsulant over the interconnect structure.

3. The method of claim 2, wherein the interconnect structure includes a plurality of conductive vias.

4. The method of claim 1, further including disposing a dummy die adjacent to the semiconductor die, wherein the ground plane is disposed on the dummy die.

5. The method of claim 1, further including disposing a power plane adjacent to the semiconductor die.

6. The method of claim 1, further including forming an interconnect structure over the conductive layer.

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

providing a semiconductor die;

disposing the semiconductor die over a carrier;

disposing a conductive plane over the carrier outside a footprint of the semiconductor die;

depositing an encapsulant over the carrier, the semiconductor die, and the conductive plane;

removing the carrier after depositing the encapsulant;

forming a first conductive trace over the semiconductor die and the conductive plane after removing the carrier, wherein the first conductive trace is electrically connected to the semiconductor die and electrically isolated from the conductive plane; and

forming a conductive bump over the conductive plane and electrically connected to the conductive plane

8. The method of claim 7, wherein the conductive plane includes a ground plane or a power plane.

9. The method of claim 7, further including disposing an interconnect structure adjacent to the semiconductor die,

wherein the conductive plane is disposed on the interconnect structure.

10. The method of claim 9, wherein disposing the interconnect structure includes:

providing a substrate; and

forming a plurality of conductive vias through the substrate.

11. The method of claim 7, further including disposing a dummy die adjacent to the semiconductor die, wherein the conductive plane is disposed on the dummy die.

12. The method of claim 7, further including forming a second conductive trace extending to the conductive plane.

13. The method of claim 7, further including forming the conductive bump directly on the conductive plane.

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

providing a semiconductor die;

disposing the semiconductor die on a carrier with an active surface of the semiconductor die oriented toward the carrier;

disposing a flat conductive plane on the carrier adjacent to and outside a footprint of the semiconductor die;

depositing an encapsulant over the carrier, the semiconductor die, and the flat conductive plane;

forming a conductive trace electrically coupled to the flat conductive plane; and

forming a microstrip line extending from the active surface of the semiconductor die to directly over the flat conductive

plane, wherein the microstrip line is electrically isolated from the flat conductive plane.

15. The method of claim 14, further including disposing an interconnect structure adjacent to the semiconductor die, wherein the flat conductive plane is disposed on the interconnect structure.

16. The method of claim 15, wherein disposing the interconnect structure includes:

providing a substrate; and

forming a plurality of conductive vias through the substrate, wherein one of the conductive vias is electrically connected to the flat conductive plane.

17. The method of claim 14, further including disposing a dummy die adjacent to the semiconductor die, wherein the flat conductive plane is disposed on the dummy die.

18. The method of claim 14, further including forming an interconnect structure over the conductive trace.

19. The method of claim 14, wherein the microstrip line extends from a contact pad of the semiconductor die.

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

providing a semiconductor die including an active surface;

disposing a flat conductive plane adjacent to the semiconductor die, wherein a surface of the flat conductive plane is coplanar with the active surface of the semiconductor die; and

forming a conductive layer directly over the flat conductive plane and directly over the active surface of the semiconductor die, wherein the conductive layer includes,

a conductive trace electrically coupled to the flat conductive plane, and

a microstrip line physically contacting a contact pad of the semiconductor die at a first end of the microstrip line and extending directly over the flat conductive plane wherein the microstrip line is electrically isolated from the flat conductive plane.

21. The method of claim 20, further including disposing an interconnect structure adjacent to the semiconductor die, wherein the flat conductive plane is disposed on the interconnect structure.

22. The method of claim 21, wherein disposing the interconnect structure includes:

providing a substrate; and

forming a plurality of conductive vias through the substrate, wherein one of the conductive vias is electrically connected to the flat conductive plane.

23. The method of claim 20, further including disposing a dummy die adjacent to the semiconductor die, wherein the flat conductive plane is disposed on the dummy die.

24. The method of claim 20, further including depositing an encapsulant over the semiconductor die and the flat conductive plane.

25. The method of claim 20, further including disposing the flat conductive plane outside a footprint of the semiconductor die.