

CLAIMS:

1. A method of measuring a height of a vertical wire interconnection bonded
5 onto a substrate, the method comprising the steps of:

capturing a top view of the vertical wire interconnection with an optical system,
wherein the optical system is positionable directly above the substrate, and movable
relative to the substrate on a horizontal plane that is generally parallel to a planar
surface of the substrate;

10 identifying a position of a tip end of the vertical wire interconnection from the
top view;

locating a conductive probe over the tip end of the vertical wire
interconnection, and lowering the conductive probe towards the vertical wire
interconnection until an electrical connection is made between the conductive probe
15 and the tip end of the vertical wire interconnection; and

determining a contact height at which the electrical connection is made, the
contact height corresponding to the height of the vertical wire interconnection.

2. The method as claimed in claim 1, wherein the vertical wire interconnection
20 comprises a ball bond formed on the substrate, and a vertical wire portion that
extends vertically upwards from the ball bond and terminates at the tip end of the
vertical wire interconnection.

3. The method as claimed in claim 2, wherein the vertical wire portion is straight
25 and substantially perpendicular to a planar surface of the substrate.

4. The method as claimed in claim 2, further comprising the step of calculating
an offset between a position of the ball bond on a first horizontal plane and a position
of the tip end of the vertical wire interconnection on a second horizontal plane parallel
30 to the first horizontal plane.

5. The method as claimed in claim 4, further comprising the step of determining
whether the offset is higher than a specified manufacturing tolerance, and if so,
identifying the vertical wire interconnection as a manufacturing defect.

35 6. The method of claim 1, further comprising the step of determining locations of
a plurality of vertical wire interconnections that have been bonded onto the substrate,

prior to capturing a top view of the substrate comprising each of the plurality of vertical wire interconnections.

7. The method as claimed in claim 1, wherein the conductive probe comprises bonding wire extending from a capillary of a bonding apparatus, the bonding apparatus being operative to bond vertical wire interconnections onto the substrate and further comprises a contact detection device for detecting electrical contact between the bonding wire and the vertical wire interconnection.

8. The method as claimed in claim 7, further comprising the step of forming a free air ball at a free end of the bonding wire prior to lowering the bonding wire towards the vertical wire interconnection, whereby the electrical connection is made between the free air ball on the bonding wire and the tip end of the vertical wire interconnection.

9. The method as claimed in claim 8, wherein a diameter of the free air ball is larger than a diameter of the bonding wire, and is up to 5 times of the diameter of the bonding wire.

10. The method as claimed in claim 1, further comprising the steps of:
locating the conductive probe above a planar surface of the substrate without any obstacles in between;

lowering the conductive probe towards the substrate until an electrical connection is made between the conductive probe and the substrate; and

determining a substrate contact height at which the electrical connection is made, the substrate contact height corresponding to a height of the substrate.

11. The method as claimed in claim 10, further comprising the step of determining an actual vertical height of the vertical wire interconnection by calculating a difference between the height of the vertical wire interconnection and the height of the substrate.