Claims

~~1. A system for positioning integrated circuits singulated from a substrate, the system including:~~

~~a net block having a surface for receiving the integrated circuits;~~

~~said surface at least partially covered by a two dimensional array of alternating first and second elements arranged in a chequer pattern;~~

~~each first element adapted to receive an integrated circuit and each second element projecting from the surface;~~

~~a transport means for transporting the integrated circuits to the net block and positioning a first quantity of the singulated integrated circuits in register with respective first elements; and~~

~~urging means for urging the portion of integrated circuits into the respective first elements.~~

~~2. A system according claim 1 wherein the urging means includes at least one aperture in a surface of each first element, said aperture facilitating communication between the first element and a vacuum source, whereby the respective integrated circuit is urged into the first element by suction.~~

~~3. The system according to claim 1 2 wherein the net block surface faces upwards whereby gravity urges the integrated circuits into the first element.~~

~~4. The system according to any one of the preceding claims wherein said net block is rotatable such that on delivery of the first portion of integrated circuits, the net block is rotated to permit a second quantity of singulated integrated circuits to be in register with the first elements.~~

~~5. The system according to any one of the preceding claims, wherein each dimension of the two dimensional array comprises an even number of elements;~~

~~6. The system according to any one of the preceding claims, wherein the total number of first elements is equal to half the number of the integrated circuits singulated from the substrate;~~

~~7. The system according to any one of the preceding claims, wherein the urging means further includes sides of said second elements, which are arranged to guide misaligned integrated circuits into adjacent first elements.~~

~~8. The system according to any one of the preceding claims further including a net block driving mechanism for moving the net block.~~

~~9. The system according to any one of the preceding claims further including a rotation mechanism for rotating the net block, thereby rotating the surface in its plane.~~

~~10. A substrate dicing system comprising:~~

~~a dicing machine for dicing a substrate to form singulated integrated circuits;~~

~~a net block having a surface for receiving the integrated circuits;~~

~~said surface at least partially covered by a two dimensional array of alternating first and second elements arranged in a chequer pattern;~~

~~each first element adapted to receive an integrated circuit and each second element projecting from the surface;~~

~~a transport means for transporting the integrated circuits to the net block and positioning a first quantity of the singulated integrated circuits in register with respective first elements; and~~

~~urging means for urging the portion of integrated circuits into the respective first elements.~~

~~11. The system according to claim 10 further including a flipper unit for inverting the singulated integrated circuits before the transport means transports them to the net block.~~

~~12. The system according to claim 10 11 further including an inspection section for inspecting the integrated circuits after they are positioned on the net block to verify the status of electrical contacts of the integrated circuits.~~

~~13. The system according to claim 12 including a drive mechanism for moving the net block to the inspection section of the system.~~

~~14. A method of handling integrated circuits singulated from a substrate, the method comprising the steps of:~~

~~transporting the integrated circuits to a net block having a surface for receiving the integrated circuits;~~

~~said surface at least partially covered by a two dimensional array of alternating first and second elements arranged in a chequer pattern;~~

~~each first element adapted to receive an integrated circuit and each second element projecting from the surface; and~~

~~urging the integrated circuits into the respective first elements using urging means.~~

~~15. The method according to claim 14 further including inverting the integrated circuits before inserting them into the first elements, so that electrical contacts on the integrated circuit face the net block.~~

~~16. A method for manipulating a plurality of singulated integrated circuits comprising the steps of :~~

~~At a first position, urging a first quantity of the integrated circuits onto a net block having a surface for receiving the integrated circuits;~~

~~said surface at least partially covered by a two dimensional array of alternating first and second elements arranged in a chequer pattern;~~

~~each first element adapted to receive an integrated circuit and each second element projecting from the surface;~~

~~moving the net block to a second position;~~

~~displacing the first quantity from the net block;~~

~~rotating the net block 180° within a plane defined by the surface of the net block;~~

~~moving the net block in the rotated orientation back to the first position;~~

~~urging a second quantity of the integrated circuits onto the net block;~~

~~moving the net block to the second position, and;~~

~~displacing the second quantity from the net block.~~

~~17. The method according to claim 16, wherein each dimension of the two dimensional array comprises an even number of elements;~~

~~18. The method according to claim 16 or 17, wherein the total number of first elements is equal to half the number of the plurality of singulated integrated circuits;~~

~~19. The method according to any one of claims 16 to 18, wherein the urging means further includes sides of said second elements, which are arranged to guide misaligned integrated circuits into adjacent first elements.~~

1~~20~~. A unit lifter assembly for lifting singulated integrated circuits, comprising at least one unit lifter ~~assembly~~, the at least one lifter ~~assembly~~ comprising :

a~~A~~ body having an engagement end;

a~~A~~ first biasing means for resiliently moving the body from a first position to an engagement position;

vVacuum communication means capable of placing a vacuum source in communication with the engagement end of the body, such that the body engages the singulated integrated circuit at the engagement end through suction;

aA second biasing means for moving the body from the engagement position to the first position, and consequently lifting the singulated integrated circuit; wherein the second biasing means locks the body in the first position until releasing means disengage the second biasing means, permitting the first biasing means to move the body.

21. The lifter assembly according to claim 120, wherein the first biasing means includes a resilient member for resiliently moving the body.

322. The lifter assembly according to claim 221, wherein the resilient member includes a spring mounted between the body and a contact portion of the lifter assembly.

~~23. The lifter assembly according to any one of claims 20 to 22, wherein the second biasing means locks the body in the first position until releasing means disengage the second biasing means, permitting the first biasing means to move the body.~~

424. The lifter assembly according to any one of claims 120 to 323, wherein the vacuum communication means includes a conduit to communicate negative pressure between the vacuum source and the engagement end.

25. The lifter assembly according to claim 424, wherein the conduit includes a bore within the body.

26. The lifter assembly according to any one of claims 120 to 525, wherein the second biasing means includes a rack and pinion arrangement

27. The lifter assembly according to claim 626, wherein the rack is attached to the body, and the pinion attached to a locking portion of the unit lifter assembly such that the pinion drives the body from the engagement position to the first position.

28. The lifter assembly according to any one of claims 120 to 727 wherein the lifter assembly comprises a plurality of unit lifters assemblies.

29. A method for lifting a singulated integrated circuit comprising the steps of :

resiliently biasing a body from a first position to an engagement position using a first biasing means;

engaging the singulated integrated circuit at an engagement end of the body using a vacuum means;

biasing the body from the engagement position to the first position with the singulated integrated circuit attached using a second biasing means, and locking the body in the first position using the second biasing means.

310. The method according to claim 29, further including the first step of releasing the second biasing means so as to permit resilient biasing of the body by the first biasing means.

Claims

1. A unit lifter assembly for lifting singulated integrated circuits, comprising at least one unit lifter, the at least one lifter assembly comprising :
a body having an engagement end;
a first biasing means for resiliently moving the body from a first position to an engagement position;
vacuum communication means capable of placing a vacuum source in communication with the engagement end of the body, such that the body engages the singulated integrated circuit at the engagement end through suction;
a second biasing means for moving the body from the engagement position to the first position, and consequently lifting the singulated integrated circuit;
wherein the second biasing means locks the body in the first position until releasing means disengage the second biasing means, permitting the first biasing means to move the body.

2. The lifter assembly according to claim 1, wherein the first biasing means includes a resilient member for resiliently moving the body.

3. The lifter assembly according to claim 2, wherein the resilient member includes a spring mounted between the body and a contact portion of the lifter assembly.

4. The lifter assembly according to any one of claims 1 to 3, wherein the vacuum communication means includes a conduit to communicate negative pressure between the vacuum source and the engagement end.

5. The lifter assembly according to claim 4, wherein the conduit includes a bore within the body.

6. The lifter assembly according to any one of claims 1 to 5, wherein the second biasing means includes a rack and pinion arrangement

7. The lifter assembly according to claim 26, wherein the rack is attached to the body, and the pinion attached to a locking portion of the unit lifter such that the pinion drives the body from the engagement position to the first position.

8. The lifter assembly according to any one of claims 1 to 7 wherein the lifter assembly comprises a plurality of unit lifters.

9. A method for lifting a singulated integrated circuit comprising the steps of :
resiliently biasing a body from a first position to an engagement position using a first biasing means;
engaging the singulated integrated circuit at an engagement end of the body using a vacuum means;
biasing the body from the engagement position to the first position with the singulated integrated circuit attached using a second biasing means, and
locking the body in the first position using the second biasing means.

10. The method according to claim 9, further including the first step of releasing the second biasing means so as to permit resilient biasing of the body by the first biasing means.