

CLAIMS

1. An automated test system (300) for testing singulated electronic components (800u) comprises:

a handler (400), comprising a plurality of handler pickers (210) and/or a plurality of spinner pickers (220), the plurality of the handler pickers (210) and/or of the spinner pickers (220) being adapted to each pickup one electronic component (800u),

at least one processing station (430) for processing one of the electronic components (800u) being picked up by one of the plurality of handler pickers (210),

a carrier station unit (550), and a first carrier (810) being located in the carrier station unit (550), wherein the first carrier (810) is adapted to carry a first plurality of electronic components (800u) to be tested, and

- the handler pickers (210) and/or the spinner pickers (220) are adapted to each place one electronic component (800u) at a time on the first carrier (810), and/or
- the handler pickers (210) and/or the spinner pickers (220) are adapted to each pick up one electronic component (800u) at a time from the first carrier (810),

a second carrier (820) wherein the second carrier (820) is adapted to carry a second plurality of electronic components (800u) to be tested, and

the automated test system (300) further comprising

a test unit (100, 100', 100'') for testing singulated electronic components 800u being located on a carrier (810, 820), wherein

- while the second plurality of electronic components (800u) on the second carrier (820) are tested in the test unit (100) and the second plurality of electronic components (800u) rest on the second carrier (820),
- simultaneously the first carrier (810) is 1) loaded with the first plurality of electronic components (800u) by the plurality of handler pickers (210) and/or spinner pickers (220) and/or 2) unloaded from the first plurality of

electronic components (800u) by the plurality of handler pickers (210) and/or spinner pickers (220).

2. The automated test system (300) according to claim 1,

wherein, when the second plurality of electronic components (800u) on the second carrier (820) are tested in the test unit (100), and simultaneously the first carrier (810) is loaded with or unloaded from the first plurality of electronic components (800u) by the plurality of handler pickers (210) and/or spinner pickers (220),

- simultaneously the at least one processing station (430) processes one electronic component (800u) transported by one of the plurality of handler pickers (210).

3. The automated test system (300) according to at least one of the claims 1 or 2,

wherein picking up and placing one electronic component (800u) at a time by one handler picker (210) and/or spinner picker (220) comprises:

- a movement of the carrier (810) comprising a linear movement in up to 3 dimensions, and/or

- a movement of the one handler picker (210) and/or spinner picker (220) comprising a linear movement in up to 3 dimensions and/or a rotatable movement of the handler picker (210) and/or of the spinner picker (220).

4. The automated test system (300) according to at least one of the claims 1 to 3,

wherein the carrier station unit (550) comprises a first carrier station (551) and a second carrier station (552), each of the first and second carrier stations (551, 552) being adapted to receive, carry, and/or move at least one of the first and second carrier (810, 820), and being adapted to replace the first carrier (810) by the second carrier (820).

5. The automated test system (300) according to at least one of the claims 1 to 4, further comprising

at least one further carrier (810, 820), adapted to being loaded with and unloaded from a further plurality of electronic components (800u) by a handler picker (210) and/or a spinner picker (220),

wherein the further carrier (810, 820) is adapted in that the further plurality of electronic components (800u) are tested while resting in receptacles of the further carrier (810, 820).

6. The automated test system (300) according to at least one of the claims 1 to 5, further comprising

at least two processing stations (430),

wherein at least one of the at least two processing stations (430-1, 430-2) is located upwards of the carrier station unit (550), and wherein at least one other of the at least two processing stations (430-3, 430-4) is located downwards the carrier station unit (550).

7. The automated test system (300) according to at least one of the claims 1 to 6,

wherein the handler (400) comprises a spinner (230), being linear movable and rotatable about a spinner axis (231), and

wherein the plurality of spinner pickers (220) are arranged to pointing radially outwards from the spinner axis (231).

8. The automated test system (300) according to at least one of the claims 1 to 6,

wherein the handler (400) comprises a rotary table (410), and

wherein the plurality of handler pickers (210) are arranged at distal ends of pickup heads (420) radially extending from a center of the rotary table (410).

9. The automated test system (300) according to at least one of the claims 1 to 8, further comprising

a robot (350) and/or a carrier exchange section (250),

the robot (350), and/or the carrier exchange section (250) being adapted to receive the first carrier (810) with the first plurality of electronic components 800u and transferring the first carrier (810) to the test unit (100), in that after having transferred the first carrier (810) the robot (350) and/or the carrier exchange section (250) completely remove from the test unit (100).

10. The automated test system (300) according to at least one of the claims 1 to 9,

wherein the test unit (100) is a microphone test unit (100) adapted to test microphones (800u).

11. The automated test system (300) according to at least one of the claims 1 to 10, further comprising

at least one of the group of a tester (480), a soak station (460), a de-soak station (470), or a further test unit (100', 100''),

wherein at least two of the group of the handler (400), the test unit (100), the tester (480), the soak station (460), the de-soak station (470), and the further test unit (100', 100'') have a different footprint (102, 102', 102'', 402, 352, 462, 472, 482).

12. A method of testing singulated electronic components (800u) comprises:

providing a handler (400), comprising a plurality of handler pickers (210) and/or a plurality of spinner pickers (220), the handler pickers (210) and/or spinner pickers (220) being adapted to each pickup one electronic

component (800u) at a time, at least one processing station (430) for processing one of the electronic components (800u) being picked up by one of the plurality of handler pickers (210), and a carrier station unit (550), and a first carrier (810) being located in the carrier station unit (500), wherein the first carrier (810) is adapted to carry a first plurality of electronic components (800u) to be tested, and the handler pickers (210) and/or spinner pickers (220) are adapted to each place one electronic component (800u) at a time on the first carrier (810) and the handler pickers (210) and/or spinner pickers (220) are adapted to each pick up one electronic component (800u) at a time, and a second carrier (820) wherein the second carrier (820) is adapted to carry a second plurality of electronic components (800u) to be tested, and a test unit (100, 100', 100'') for testing singulated electronic components (800u) located on a carrier (810, 820), wherein the method comprises,

- testing the second plurality of electronic components (800u) of the second carrier (820) in the test unit (100) while the second plurality electronic components (800u) rest on the second carrier (820), and
- simultaneously loading the first plurality of electronic components (800u) on the first carrier (810) with the plurality of handler pickers (220) and/or spinner pickers (210) and/or unloading the first plurality of electronic components (800u) from the first carrier (810) with the plurality of handler pickers (210) and/or spinner pickers (220).

13. The method of testing electronic components (800u) according to claim 12, wherein

when the second plurality of electronic components (800u) on the second carrier (820) are tested in the test unit (100), and simultaneously the first carrier (810) is loaded with and/or unloaded from the first plurality of electronic components (800u) with the plurality of handler pickers (210) and/or spinner pickers (220),

- simultaneously processing one electronic component (800u) picked up by one of the plurality of handler pickers (210) with the at least one processing station (430).

14. The method of testing electronic components (800u) according to claim 12 or 13,

wherein picking up from a carrier (810, 820) and placing on a carrier (810, 820) one electronic component (800u) at a time with one picker (210) comprises

- moving the one picker (210) and the carrier (810, 820) relative to each other.

15. The method of testing electronic components (800u) according to at least one of the claims 12 to 14,

wherein picking up and placing one electronic component (800u) at a time with one picker (210) comprises

- moving the carrier (810, 820) comprising a linear movement in up to 3 dimensions and/or
- moving the one picker (210) wherein the movement comprises a linear movement in up to 3 dimensions, and/or a rotatable movement of the picker (210).