

Written Opinion

Application No.

10202404122T

Application filing date

05/10/2021

(Earliest) Priority Date

07/10/2020

1. This first Written Opinion is issued under Section 29(5) of the *Patents Act*.

2. This opinion contains indications relating to the following items:

- | | | |
|-----|-------------------------------------|---|
| I | <input checked="" type="checkbox"/> | Basis of the opinion |
| II | <input type="checkbox"/> | Priority |
| III | <input type="checkbox"/> | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| IV | <input type="checkbox"/> | Unity of invention |
| V | <input checked="" type="checkbox"/> | Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| VI | <input checked="" type="checkbox"/> | Clarity, Clear and Complete Disclosure, and Support |
| VII | <input type="checkbox"/> | Double patenting |

3. If no reply is filed, the Examination Report will be established on the basis of this opinion.

Intellectual Property Office of Singapore

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Date of Written Opinion:

13/11/2025

Authorized Officer

Sim Cheow Hin (Dr)

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I. Basis of the opinion

1. This opinion has been drawn on the basis of:

☒ the application **as originally filed**, and amendment(s)/correction(s) up to
and including
amendment(s)/correction(s) dated 07/02/2025

☒ and with reference to the **search and examination results** prepared by the
United States Patent and Trademark Office

2. ☐ This opinion has been established based on the exclusion of additional matter beyond the earlier
application, as indicated in the supplemental box.

3. ☐ This opinion has been established as if (some of) the amendments had not been made, since they
have been considered to go beyond the disclosure as filed, as indicated in the supplemental box.

4. Additional observations, if necessary:

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V. Reasoned statement with regard to novelty, inventive step or industrial applicability; Citation and explanation supporting such statement

Statement with regard to novelty, inventive step or industrial applicability

Novelty (N)	Claim(s)	1-30	YES
	Claim(s)	NONE	NO
Inventive Step (IS)	Claim(s)	9-11 AND 13-16	YES
	Claim(s)	1-8, 12 AND 17-30	NO
Industrial applicability (IA)	Claim(s)	1-30	YES
	Claim(s)	NONE	NO

1. Citations

The following citations are referred to in this opinion. Full bibliographic details are provided in the Search Report:

- D1 – US 2002/0030502 A1
- D2 – US 2004/0012403 A1
- D3 – US 2009/0015282 A1

D3 is considered background art and will not be further discussed herein.

2. Novelty (Section 14 of the *Patents Act*)

The subject matter of claims 1-30 is novel since none of the cited prior art documents individually discloses all the features in any of said claims.

3. Inventive Step (Section 15 of the *Patents Act*)

Claims 1, 29 and 30

D1 discloses a tester apparatus, comprising:

- a microelectronic circuit testing pack (**fig. 1: cartridge 10**), comprising:
- a portable supporting structure including first (**fig. 1: chuck plate 12**) and second components (**fig. 1, 5: probe plate 14 with probe card 50 attached**) for holding a substrate therebetween (**para. [0039]: semiconductor wafer placed on the upper surface 18 of the pedestal 16 of chuck plate 12**), the substrate carrying a microelectronic circuit and having a plurality of terminals connected to the microelectronic circuit (**para. [0008]: implicit feature of an integrated circuit wafer**);
- a plurality of contacts on the second component, the contacts matching the terminals for making contact to the terminals (**para. [0046]-[0047], fig. 5: leaf springs 52 on probe card 50**);
- a pressure differential cavity seal between the first and second components (**para. [0055]: O-rings 75 provided in an annular groove 76 defined in pedestal 16 of chuck plate 12 and the probe card 50 abuts the O-rings 75**), the pressure differential cavity seal forming an enclosed pressure differential cavity together with surfaces of the first and second components (**para. [0055]: vicinity of the wafer 74 corresponding to the enclosed pressure differential cavity**);
- a first passage formed through one of the first and second components (**para. [0054], fig. 1: conduit formed in the probe plate 14 via nipples 31**), the first passage having a first opening at the pressure differential cavity and a second opening outside the pressure differential cavity;

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- a valve connected to the first passage, opening of the valve allowing a gas to flow through the first passage, and closing of the valve keeping the gas from flowing through the first passage (**para. [0056], 0118]: automatic valve in the appropriate nipple 31**);
- a first interface (**fig. 1: electrical connectors 46 on cartridge 10**), on the portable supporting structure and connected to the contacts (**para. [0074]: probe card 50 is electrically connected to the electrical connectors 46**), for connection to a second interface on a stationary structure when the portable supporting structure is removably held by the stationary structure (**para. [0130]-[0131]: electrical connectors in a burn-in chamber**); and
- a securing system that includes a first securing assembly (**para. [0058]-[0059], fig. 6, 8: mechanical connecting device 90**) having:
 - a first part that engages with the first component (**para. [0060], fig. 6: lower portion 20 located in chuck plate 12**);
 - a second part that engages with the second component (**para. [0059], fig. 6: upper portion 92 located in probe plate 14 (substrate 102 is the probe plate 14)**); and
 - a connecting part having opposing ends secured to the first and second parts respectively to form a locking arrangement (**para. [0059], fig. 6, 8: male connector 94**).
- a stationary structure (**para. [0120]: burn-in chamber**), the portable supporting structure being receivable to be held by the stationary structure and being removable from the stationary structure (**para. [0130]-[0131]**);
- a second interface on the stationary structure, the second interface being connected to the first interface when portable supporting structure is held by the stationary structure, and being disconnected from the first interface when the portable supporting structure is removed from the stationary structure (**para. [0131]: electrical connectors in the burn-in chamber**); and
- an electrical tester connected through the second interface, the first interface, and the contacts to the terminals so that signals are transmitted between the electrical tester and the microelectronic circuit to test the microelectronic circuit (**para. [0130]: test signals can be applied to the wafer 74 via the connectors 46**).

The subject matter of claims 1 and 29 differs from D1 in that D1 does not disclose that the pressure reduction passage has an inlet opening at the pressure differential cavity and an outlet opening outside the pressure differential cavity. However, D1 suggests that the vacuum from probe plate 14 can be conveyed through the chuck plate 12 via a passage formed in the chuck plate 12 (**para. [0056]**). A skilled person seeking to improve the sealing between the probe plate and chuck plate would thus consider conveying the vacuum from the conduit in probe plate 14 through groove 76 in the chuck plate, since a separate passage need not be formed. The subject matter of claims 1 and 29 is thus not inventive.

Claim 30 corresponds to claim 29 in the form of a method claim. The same objection to claim 29 applies, *mutatis mutandis*, to claim 30 and said claim is also not inventive.

Claims 2-3, 19-23 and 27

The additional features in the following claims are disclosed by D1:

- claim 2 – **para. [0065], fig. 8: space 118 is pressurized to advance male connector 94, para. [0059]: introduce high-pressure air into the space 118 to move the male connector 94 into an extended position**;
- claim 3 – **fig. 8A-8D**;
- claims 19-21 – **para. [0058]: three mechanical connecting devices 90, para. [0065], fig. 8**;
- claim 22 – **para. [0055]: O-rings 75 seal the area in the vicinity of the wafer 74**;

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- claim 23 – **para. [0055]: O-rings 75 is provided in pedestal 16 of chuck plate 12;**
- claim 27 – **para. [0008]: integrated circuit wafer.**

Claims 2-3, 19-23 and 27 are not inventive.

Claims 4-5, 12 and 17-18

D1 differs from claims 4-5 in that D1 does not disclose the second part of the first securing assembly rotates about an axis normal to the substrate between the locking position and the unlocked position. D2, which is similarly directed to a tester assembly, teaches a securing assembly comprising a screw, wherein the screw can be rotated about a vertical axis to move between a locking position and an unlocked position (**para. [0034], fig. 7: first part corresponding to head of screw 43 engaging with ring 42, second part corresponding to tip of screw 43 that engages with contactor 26, connecting part corresponding to the shank of screw 43, engaging mechanism corresponding to slit on screw head, screw 43 is screw-threaded into socket 68**). A skilled person seeking to simplify the securing assembly in D1 would consider the screw-based securing assembly of D2 as a straightforward alternative. By replacing the connecting device in D1 with the screw of D2, the skilled person would easily arrive at the claimed arrangement without exercising inventive skill. The subject matter of claims 4-5 is thus not inventive.

D1 differs from claim 12 in that D1 does not disclose a locking nut that has threads that engages with a thread on the connecting part. As noted above, the skilled person would, in view of the teaching of D2, readily consider replacing the connecting device in D1 with a screw to secure the first part and the second part together. D2 further teaches to provide a locking nut in combination with the screw to allow fine adjustment and to ensure a secure attachment (**para. [0049], fig. 15: nut 126**). Claim 12 is thus not inventive.

With regards to claims 17-18, the skilled person would easily determine, as a matter of ordinary design discretion, the specific constructional details and dimensions of the connecting part to be provided based on the teaching of D2, without the exercise of inventive skill. Claims 17-18 are not inventive.

Claims 6-8 and 28

The additional features defined in claims 6-8 and 28 relate to straightforward alternative implementations of the engaging mechanism and contacts. Claims 6-8 and 28 are not inventive.

Claim 24

D1 discloses that the pressure cavity seal is created with an O-ring seal (**para. [0055]**). A lip seal represents a well-known alternative to an O-ring and constitutes as a workshop variation which the skilled person would consider with any inventive ingenuity. Claim 24 is not inventive.

Claims 25-26

It lies within the general skill of the skilled person to implement the appropriate types of valve for controlling the air/vacuum inflow and outflow from the pressure differential cavity. Claims 25-26 are not inventive.

Claims 9-11 and 13-16

None of the cited prior art documents, individually or in combination, teaches that the second part has a body and at least a first wing piece extending from the body, wherein the first wing piece moves over a shoulder of the first component when moving into a first locking position and off the shoulder when moving out of the first locking position towards the unlocked position. Claims 9-11 and 13-16 are thus acknowledged to involve an inventive step.

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4. Industrial Applicability (Section 16 of the <i>Patents Act</i>)

The subject matter of claims 1-30 is industrially applicable.

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VI. Clarity, Clear and Complete Disclosure, and Support

The following observations on the clarity of the claim(s), on the question whether the disclosure is clear and complete, or on the question whether the claim(s) is (are) supported by the description, are made:

1. Clarity (Section 25(5)(b) of the *Patents Act*)

Each of claims 3-5 define the **second component** to move or rotate between the locking position and the unlocked position. However, as indicated in paragraphs [00236]–[00237] of the specification, it appears that it is the **second part** that moves or rotates between the locking position and the unlocked position. Claims 3-5 are thus unclear.

Claim 20, which depends on claim 1, refers to **the second securing assembly**. However, said feature is only first introduced in claim 19. For the purpose of this opinion, claim 20 will be construed to depend on claim 19 instead.

Claim 21 recites that the first and second securing assemblies have respective second parts that are on **different sides** of the second component. However, based on fig. 11 and 12, it appears that the second parts of the first and second latch assemblies are distributed on the same side of the second component. Claim 21 is thus unclear.

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For clarification of the Patent Examiner's comments in this report, direct communication may be arranged with the Patent Examiner via email. For the procedure to initiate such communication, please refer to the Patents Formalities Manual (please click [here](#)), under the heading **"Direct Communication with the Patent Examiner"**.

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