

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

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FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US 18/48623

International filing date (day/month/year)

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CPC - H01L 21/67373, H01L2 1/67379, H01L2 1/67772

Applicant DAEWON SEMICONDUCTOR PACKAGING INDUSTRIAL COMPANY

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

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
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Date of completion of this opinion

10 December 2018

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

- the international application in the language in which it was filed.
- a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:a. forming part of the international application as filed: in the form of an Annex C/ST.25 text file. on paper or in the form of an image file.b. furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.c. furnished subsequent to the international filing date for the purposes of international search only: in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)). on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>3-5, 9-12, 14-17, 19-20</u>	YES
	Claims	<u>1-2, 6-8, 13, 18, 21-22</u>	NO
Inventive step (IS)	Claims	<u>None</u>	YES
	Claims	<u>1-22</u>	NO
Industrial applicability (IA)	Claims	<u>1-22</u>	YES
	Claims	<u>None</u>	NO
2. Citations and explanations:			
<p>Claims 1-2, 6-8, 13, and 18 and 21-22 lack novelty under PCT Article 33(2) as being anticipated by US 2017/0178937 A1 to TEXAS INSTRUMENTS INCORPORATED (hereinafter "TexasInstruments").</p> <p>Regarding claim 1, TexasInstruments discloses a semiconductor wafer separator (para[0001], ...This invention generally relates to wafer carriers or packages used for shipping semiconductor wafers...a protecting ring separator for use between coin-stacked wafers...), comprising: a circular ring (para[0001], ...A protective ring separator...para[0011], ...FIG. 3A is a plan view of an interlocking ring wafer separator...Figure 3A) including: an outer edge defining a periphery of the circular ring, and an inner edge defining a central opening of the circular ring (Figure 3A, the ring separator has an outer edge and an inner edge. The inner edge defines a circular opening in the center of the ring); a first ring-angled recess configured to receive a semiconductor wafer, wherein the first right-angled recess extends downward from a top surface of the circular ring (para[0014], ...FIGS. 4A and 4B are cross sections of coin stacked integrated circuit wafers and interlocking ring wafer separators...Figure 4B, 404 is the wafer, which sits on wafer shelf 312, which is a right-angle recess from the top of the circular ring); and a second right-angled recess configured to maintain a gap beneath the semiconductor wafer when the semiconductor wafer is set within the first right-angled recess (Figure 4B, the ring separator 309 has a second right-angled recess that separates the top wafer 404 from the wafer beneath it 404 that sits on separator 308).</p> <p>Regarding claim 2, TexasInstruments discloses the semiconductor wafer separator of claim 1. TexasInstruments discloses further comprising: a first interlock component disposed along the top surface of the circular ring; and a second interlock component disposed along a bottom surface of the circular ring (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B).</p> <p>Regarding claim 6, TexasInstruments discloses the semiconductor wafer separator of claim 2. TexasInstruments discloses further comprising a wafer separator securing component configured to secure the semiconductor wafer separator to an upwardly-adjacent wafer separator (para[0019], ...the interlocking tab 314 from a lower interlocking ring separator 308, fits into the interlocking slot 310 of an upper interlocking ring separator 309...This locks the coin stack of wafers 404 together preventing independent motion of one wafer 404 with respect to another wafer 404...(preventing independent motion of the wafers means that if they move, they will move together. Since the separators are between the wafers, this would mean that the separators also move together and not independently, effectively meaning that the separators are secured together)).</p> <p>Regarding claim 7, TexasInstruments discloses the semiconductor wafer separator of claim 1. TexasInstruments further discloses wherein the first-right-angled recess comprises a notch configured to facilitate the removal of the semiconductor wafer from the circular ring when the semiconductor wafer is set within the first right-angled recess (para[0022], ...tension release slots 302 in the interlocking ring separator 300. The surface tension release slots allow air to enter between the wafer 404...and the wafer shelf 312 when the wafer is being removed from the wafer shipping container 400. This prevents other wafers 404 with air trapped below them in the wafer shipping container 400 from moving when the top wafer 404 is removed...Figure 3C, 312 is the wafer shelf with 302 being the notch).</p> <p>Regarding claim 8, TexasInstruments discloses the semiconductor wafer separator of claim 1. TexasInstruments further discloses wherein the first right-angled recess comprises a plurality of notches disposed equidistant along the periphery of the circular ring, and wherein the plurality of notches are configured to facilitate the removal of the semiconductor wafer from the circular ring when the semiconductor wafer is set within the first right-angled recess (Claim 11, surface tension release slots located at intervals around a circumference of the interlocking ring wafer separator...Figure 3A, the slots 302 are equidistant along the ring...para[0022], ...tension release slots 302 in the interlocking ring separator 300. The surface tension release slots allow air to enter between the wafer 404...and the wafer shelf 312 when the wafer is being removed from the wafer shipping container 400. This prevents other wafers 404 with air trapped below them in the wafer shipping container 400 from moving when the top wafer 404 is removed...Figure 3C, 312 is the wafer shelf with 302 being the notch).</p> <p>*****Continued in supplemental box*****</p>			

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In case the space in any of the preceding boxes is not sufficient.

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Regarding claim 13, TexasInstruments discloses a system (para[0008], ...an interlocking ring wafer separator...para[0016], ...numerous...methods are set forth to provide an understanding of the invention...(a device with a method is a system)) comprising: at least two wafer separators configured to transport at least two semiconductor wafers (para[0014], ...FIGS. 4A and 4B are cross sections of coin stacked integrated circuit wafers and interlocking ring wafer separators...Figure 4B, 404 is the wafer, which sits on wafer shelf 312 of separator 309. Another wafer underneath it 404 sits on separator 308. Separators 308 and 309 are interlocked at 316), each wafer separator of the at least two wafer separators including: a circular ring (para[0001], ...A protective ring separator...para[0011], ...FIG. 3A is a plan view of an interlocking ring wafer separator...Figure 3A) having: an outer edge defining a periphery of the circular ring, and an inner edge defining a central opening of the circular ring (Figure 3A, the ring separator has an outer edge and an inner edge. The inner edge defines a circular opening in the center of the ring); a first ring-angled recess configured to receive a semiconductor wafer, wherein the first right-angled recess extends downward from a top surface of the circular ring (para[0014], ...FIGS. 4A and 4B are cross sections of coin stacked integrated circuit wafers and interlocking ring wafer separators...Figure 4B, 404 is the wafer, which sits on wafer shelf 312, which is a right-angle recess from the top of the circular ring); and a second right-angled recess configured for maintaining a gap between the first semiconductor wafer and the second right-angled recess when the first semiconductor wafer is set within the first right-angled recess (Figure 4B, the ring separator 309 has a second right-angled recess that separates the top wafer 404 from the wafer beneath it 404 that sits on separator 308); a first interlock component disposed along the top surface of the circular ring and configured to engage an upwardly-adjacent wafer separator (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B, the top 314 protrudes upwards and the bottom 310 is the slot...Figure 4B, the top portion of separator 308 engages with upwardly adjacent separator 309 at 316); and a second interlock component disposed along a bottom surface of the circular ring and configured to engage a downwardly-adjacent wafer separator (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 4B, the bottom portion of separator 309 engages with downwardly-adjacent separator 308 at 316).

Regarding claim 18, TexasInstruments discloses a method (para[0008], ...an interlocking ring wafer separator...para[0016], ...numerous...methods are set forth to provide an understanding of the invention...) comprising: receiving a wafer separator (para[0001], ...shipping semiconductor wafers...this invention relates to a protective ring separator for use between coin-stacked wafers during the shipping...) including: a circular ring (para[0001], ...A protective ring separator...para[0011], ...FIG. 3A is a plan view of an interlocking ring wafer separator...Figure 3A) having: an outer edge defining a periphery of the circular ring, and an inner edge defining a central opening of the circular ring (Figure 3A, the ring separator has an outer edge and an inner edge. The inner edge defines a circular opening in the center of the ring); a first ring-angled recess configured to receive a semiconductor wafer, wherein the first right-angled recess extends downward from a top surface of the circular ring (para[0014], ...FIGS. 4A and 4B are cross sections of coin stacked integrated circuit wafers and interlocking ring wafer separators...Figure 4B, 404 is the wafer, which sits on wafer shelf 312, which is a right-angle recess from the top of the circular ring); and a second right-angled recess configured to maintain a gap beneath the semiconductor wafer when the semiconductor wafer is set within the first right-angled recess (Figure 4B, the ring separator 309 has a second right-angled recess that separates the top wafer 404 from the wafer beneath it 404 that sits on separator 308);

Regarding claim 21, TexasInstruments discloses the method of claim 18. TexasInstruments discloses further comprising: removing the semiconductor wafer from the first right-angled recess of the wafer separator using at least one notch of a plurality of notches in the circular ring (Claim 11, surface tension release slots located at intervals around a circumference of the interlocking ring wafer separator...Figure 3A, the slots 302 are equidistant along the ring...para[0022], ...tension release slots 302 in the interlocking ring separator 300. The surface tension release slots allow air to enter between the wafer 404...and the wafer shelf 312 when the wafer is being removed from the wafer shipping container 400. This prevents other wafers 404 with air trapped below them in the wafer shipping container 400 from moving when the top wafer 404 is removed...Figure 3C, 312 is the wafer shelf with 302 being the notch).

Regarding claim 22, TexasInstruments discloses the method of claim 21. TexasInstruments further discloses wherein the plurality of notches are exposed on the outer edge and the inner edge, and wherein the plurality of notches are located equidistant around the periphery of the circular ring (Claim 11, surface tension release slots located at intervals around a circumference of the interlocking ring wafer separator...Figure 3A, the slots 302 are equidistant along the ring and extend through the outer and inner edge...para[0022], ...tension release slots 302 in the interlocking ring separator 300. The surface tension release slots allow air to enter between the wafer 404...and the wafer shelf 312 when the wafer is being removed from the wafer shipping container 400. This prevents other wafers 404 with air trapped below them in the wafer shipping container 400 from moving when the top wafer 404 is removed...Figure 3C, 312 is the wafer shelf with 302 being the notch).

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:
Box V(2): Citations and explanations

Claims 3-5, 9, 14-15 and 19-20 lack an inventive step under PCT Article 33(3) as being obvious over TexasInstruments.

Regarding claim 3, TexasInstruments discloses the semiconductor wafer separator of claim 2. TexasInstruments further discloses wherein the first interlock component is a protrusion adapted to engage a corresponding second interlock component of an upwardly-adjacent wafer separator (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 4B, the top interlocking component of a separator engages with the bottom interlocking component of an adjacent separator, shown by 316), but does not disclose wherein the first interlock component is a recess. However, since TexasInstruments already discloses wherein the separator comprises two interlock components with one being a recess and another being a protrusion (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B), it would have been obvious to one skilled in the art to, through routine experimentation, try different orientations of the interlocking component. For example, having the recess and protrusion being the bottom and top portions, and vice-versa.

Regarding claim 4, TexasInstruments discloses the semiconductor wafer separator of claim 2. TexasInstruments further discloses wherein the second interlock component is a recess adapted to engage a corresponding first interlock component of a downwardly-adjacent wafer separator (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 4B, the bottom interlocking component of a separator engages with the upper interlocking component of an adjacent separator, shown by 316), but does not disclose wherein the second interlock component is a protrusion. However, since TexasInstruments already discloses wherein the separator comprises two interlock components with one being a recess and another being a protrusion (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B), it would have been obvious to one skilled in the art to, through routine experimentation, try different orientations of the interlocking component. For example, having the recess and protrusion being the bottom and top portions, and vice-versa.

Regarding claim 5, TexasInstruments discloses the semiconductor wafer separator of claim 1, but does not disclose wherein the top surface of the circular ring is substantially coplanar with a top surface of the semiconductor wafer when the semiconductor wafer is set within the first right-angled recess. However, since it is known in the art that once placed in the right-angled recess, the top surface of the wafer can be both lower than the surface of the circular ring (see TexasInstruments Figure 4B, the wafer 404 is lower than the top surface of the separator ring 309 that it is seated on) and higher than the surface of the circular ring (see US 2016/0365265 A1 to ENTEGRIS, INC. (hereinafter "Entegris") Title, Wafer shipper with stacked support rings...Figure 14, the wafers 44 are sitting on the support rings 36. The top surface of the wafers are above the top surfaces of the support rings that they are seated on), it would have been obvious to one skilled in the art to, through routine experimentation, optimize the design and choose the sizes and designs of the rings and wafers to obtain the desired location of the wafer surface relative to the ring surface.

Regarding claim 9, TexasInstruments discloses the semiconductor wafer separator of claim 4. TexasInstruments discloses further comprising: the semiconductor wafer set within the first right-angled recess of the semiconductor wafer separator (Figure 4B, the first wafer 404 is in the first right-angled recess 312 of the separator 309); the downwardly-adjacent wafer separator (Figure 4B, 308 is the separator directly adjacent the first separator 309); and a second semiconductor wafer set within the downwardly-adjacent wafer separator (Figure 4B, there is another wafer 404 that sits on the second separator 308 and is below the first separator 309).

Regarding claim 14, TexasInstruments discloses the system of claim 13. TexasInstruments further discloses wherein the first interlock is a protruding interlock component adapted to engage a recess interlock component of the upwardly-adjacent wafer separator (Figure 3B, the top 314 protrudes upwards and the bottom 310 is the slot...Figure 4B, the top portion of separator 308 engages with upwardly adjacent separator 309 at 316), but does not explicitly disclose wherein the first interlock is a recess adapted to engage a protruding interlock of the upwardly-adjacent wafer. However, since TexasInstruments already discloses wherein the separator comprises two interlock components with one being a recess and another being a protrusion (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B), it would have been obvious to one skilled in the art to, through routine experimentation, try different orientations of the interlocking component. For example, having the recess and protrusion being the bottom and top portions, and vice-versa.

Regarding claim 15, TexasInstruments discloses the system of claim 13. TexasInstruments further discloses wherein the second interlock is a recess interlock component adapted to engage a protruding interlock component of the downwardly-adjacent wafer separator (Figure 3B, the top 314 protrudes upwards and the bottom 310 is the slot...Figure 4B, the bottom portion of separator 309 engages with the top portion of the downwardly-adjacent separator 308 at 316), but does not explicitly disclose wherein the second interlock is a protrusion adapted to engage a recess interlock of the downwardly-adjacent wafer. However, since TexasInstruments already discloses wherein the separator comprises two interlock components with one being a recess and another being a protrusion (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B), it would have been obvious to one skilled in the art to, through routine experimentation, try different orientations of the interlocking component. For example, having the recess and protrusion being the bottom and top portions, and vice-versa.

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Regarding claim 19, TexasInstruments discloses the method of claim 18. TexasInstruments discloses further comprising: engaging a recess on a bottom surface of the wafer separator with a protrusion on a top surface of a downwardly-adjacent wafer separator to secure the wafer separator to the downwardly-adjacent wafer separator (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B, the top 314 protrudes upwards and the bottom 310 is the slot...Figure 4B, the bottom portion of separator 309 engages with downwardly- adjacent separator 308 at 316), but does not disclose wherein the bottom surface has the protrusion and the top surface has a recess. However, since TexasInstruments already discloses wherein the separator comprises two interlock components with one being a recess and another being a protrusion (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B), it would have been obvious to one skilled in the art to, through routine experimentation, try different orientations of the interlocking component. For example, having the recess and protrusion being the bottom and top portions, and vice-versa.

Regarding claim 20, TexasInstruments discloses the method of claim 18. TexasInstruments discloses further comprising engaging a protrusion on a top surface of the wafer separator with a recess on a bottom surface of an upwardly-adjacent wafer separator to secure the wafer separator to the upwardly-adjacent wafer separator (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B, the top 314 protrudes upwards and the bottom 310 is the slot...Figure 4B, the top portion of separator 308 engages with upwardly- adjacent separator 309 at 316), but does not disclose wherein the bottom surface has the protrusion and the top surface has a recess. However, since TexasInstruments already discloses wherein the separator comprises two interlock components with one being a recess and another being a protrusion (para[0017], ...the interlocking ring separator 300 features an interlocking tab 314...that extends around the outside circumference of the upper outer edge of the interlocking ring separator 300 and an interlocking slot 310 that extends around the outside circumference of the lower outer edge of the interlocking ring separator 300...Figure 3B), it would have been obvious to one skilled in the art to, through routine experimentation, try different orientations of the interlocking component. For example, having the recess and protrusion being the bottom and top portions, and vice-versa.

Claim 10 lacks an inventive step under PCT Article 33(3) as being obvious over TexasInstruments in view of US 2016/0365265 A1 to Entegris et al. (hereinafter 'Entegris')

Regarding claim 10, TexasInstruments discloses the semiconductor wafer separator of claim 9, but does not disclose wherein a bottom surface of the bottom circular ring includes a feature that causes a space to be formed between the bottom surface of the circular ring and a top surface of the second semiconductor wafer set within the downwardly-adjacent wafer separator. However, in a similar invention, Entegris discloses wherein a bottom surface of a circular ring separator includes a feature that causes a space to be formed between the bottom surface of the circular ring and a top surface of the second wafer set within the downwardly-adjacent wafer separator (para[0079], ...resident wafers 44...first wafer support ring 60 a is stacked atop a second wafer support ring 60 b...Figure 9, the wafer 44 sits on a support ring. In gap 96, there exists a small gap between the top of the wafer 44 and the bottom of the support ring located above it). It would have been obvious to one skilled in the art to combine these references and incorporate a space between the bottom surface of a circular ring and a top surface of the second semiconductor wafer set within a downwardly-adjacent wafer separator because the gap will prevent forces exerted on the separators to not affect the wafers (see Entegris para[0012], ...a distal edge of the ridge portion of the second wafer support ring is registered within the channel of the first wafer support ring, the first and second wafer support rings defining a gap therebetween, the gap being configured for containing a wafer so that an axial force exerted on the first wafer support ring is transferred to the second wafer support ring without transferring force to the wafer...) and Entegris also discloses a wafer separator comprising a circular ring with a first recess to receive a wafer and a second recess to maintain a gap beneath the wafer when the wafer is set within the first recess (Figure 6, the separator is a ring structure...Figure 9, the wafer 44 sits in a recess of the separator 60 a, with a gap angled downwards located underneath the wafer).

Claims 11-12 and 16-17 lack an inventive step under PCT Article 33(3) as being obvious over TexasInstruments in view of US 2014/0076774 A1 to KAASHOEK (hereinafter "Kaashoek").

Regarding claim 11, TexasInstruments discloses the semiconductor wafer separator of claim 1, but does not disclose further comprising a carrier component extending outward from the outer edge of the circular ring. However, in a similar invention, Kaashoek discloses further comprising a carrier component extending outward from the outer edge of the circular ring (para[0049], ...the ring separator 20 has two automation tabs that protrude from the outside diameter and a second recessed portion 22 that forms a flat surface to allow the separator rings to be automatically handled...). It would have been obvious to one skilled in the art to combine these references and incorporate carrier components extending from the circular ring because Kaashoek also discloses a semiconductor wafer separator that has right-angle recesses to hold wafers (para[0017], ...a housing having an inner cavity for storing at least one semiconductor wafer...At least two separator rings are disposed inside the inner cavity...Figure 12, the two ring separators 20 a and 20 b hold the wafers 21 and 29 (29 is labeled as a wafer pocket, which means it holds a wafer) in a small recess of the ring separators 20 a and 20b)).

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Box V(2): Citations and explanations

Regarding claim 12, TexasInstruments discloses the semiconductor wafer separator of claim 1, but does not disclose wherein the semiconductor wafer separator comprises polyethylene thermoplastic. However, in a similar invention, Kaashoek discloses wherein polyethylene thermoplastic can be used to separate semiconductor wafers (para[0002], ...semiconductor wafers...para[0003], ...horizontal wafer container where wafers are stacked on top of each other with very clean conductive interleaves typically made from polyethylene film...separate each wafer...). It would have been obvious to one skilled in the art to combine these references because Kaashoek also discloses a semiconductor wafer separator that has right-angle recesses to hold wafers (para[0017], ...a housing having an inner cavity for storing at least one semiconductor wafer...At least two separator rings are disposed inside the inner cavity...Figure 12, the two ring separators 20 a and 20 b hold the wafers 21 and 29 (29 is labeled as a wafer pocket, which means it holds a wafer) in a small recess of the ring separators 20 a and 20b)).

Regarding claim 16, TexasInstruments discloses the system of claim 13, but does not disclose wherein each wafer separator further comprises: a carrier component extending outward from the outer edge of the circular ring. However, in a similar invention, Kaashoek discloses further comprising a carrier component extending outward from the outer edge of the circular ring (para[0049], ...the ring separator 20 has two automation tabs that protrude from the outside diameter and a second recessed portion 22 that forms a flat surface to allow the separator rings to be automatically handled...). It would have been obvious to one skilled in the art to combine these references and incorporate carrier components extending from the circular ring because Kaashoek also discloses a semiconductor wafer separator that has right-angle recesses to hold wafers (para[0017], ...a housing having an inner cavity for storing at least one semiconductor wafer...At least two separator rings are disposed inside the inner cavity...Figure 12, the two ring separators 20 a and 20 b hold the wafers 21 and 29 (29 is labeled as a wafer pocket, which means it holds a wafer) in a small recess of the ring separators 20 a and 20b)).

Regarding claim 17, TexasInstruments discloses the system of claim 13. TexasInstruments discloses further comprising: a cover disposed below a lowermost wafer separator of the at least two wafer separators (Figure 4A, 400 is shown to cover the area below the lowest wafer separator of the at least two wafer separators), but does not disclose a first cover disposed above an uppermost wafer separator of the at least two wafer separators; a first protective substrate disposed between the first cover and the uppermost wafer separator; and a second protective substrate disposed between the second cover and the lowermost wafer separator. However, in a similar invention, Kaashoek discloses a first cover disposed above an uppermost wafer separator of at least two wafer separators (para[0043], ...a wafer container 10 according to the present invention includes a wafer container lid 100 and base 200, which mate in a clam shell arrangement. The wafer container lid 100 and base 200 can house a plurality of semiconductor wafers 21 and ring separators 20...Figure 1, there are a plurality of separators and wafers); and discloses wherein a first and second protective substrate can be disposed between the first cover and the uppermost wafer separator and between the second cover and the lowermost wafer separator, respectively (para[0003], ...ring separators typically molded from polypropylene separate each wafer. Suspension components-either injection molded forms or clean closed cell polyethylene foam cushions-are placed on each end of the stack to cushion the wafer from external shocks...). It would have been obvious to one skilled in the art to combine these references and incorporate top and bottom covers as well as first and second protective substrates because Kaashoek also discloses a semiconductor wafer separator that has right-angle recesses to hold wafers (para[0017], ...a housing having an inner cavity for storing at least one semiconductor wafer...At least two separator rings are disposed inside the inner cavity...Figure 12, the two ring separators 20 a and 20 b hold the wafers 21 and 29 (29 is labeled as a wafer pocket, which means it holds a wafer) in a small recess of the ring separators 20 a and 20b)) and it would have been obvious to, through routine experimentation, include additional protection for the substrates.

Claims 1-22 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.