PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PATENT COOPERATION TREATY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/220 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/IL2015/0050735

International filing date (day/month/year)
15.07.2015

Priority date (day/month/year)
06.11.2014

International Patent Classification (IPC) or both national classification and IPC
INV. H01L23/538 H01L25/065

Applicant
ORIGIN GPS LTD.

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 usually 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.
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 43bis.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:

      - ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13ter.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 13ter.1(a)).
      - ☐ on paper or in the form of an image file (Rule 13ter.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:**
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

<table>
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<td>Novelty (N)</td>
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<td>Industrial applicability (IA)</td>
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2. Citations and explanations

see separate sheet

Box No. VIII  Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet
Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:


D5 US 2010/001389 A1 (CHEN JIAN-CHENG [TW]) 7 January 2010 (2010-01-07)


1 The present application does not meet the criteria of Article 33(3) PCT, because the subject-matter of claim 9 does not involve an inventive step.

1.1 Document D1 discloses in Fig. 3 an integrated circuit, comprising
• a first substrate layer (102) having a center piece and two side pieces on opposite sides of the center piece (central and peripheral portion of substrate 102);
- circuit elements (3, 109, 110) assembled on a top side and on a bottom side of the center piece of a first substrate layer;
- one support piece (101) made from a substrate matching the size of the side pieces; wherein the support piece is coupled to the bottom of the first substrate layer under the side pieces to form a second substrate-layer with a void in the center under the center piece of the first substrate layer;
- wherein the side pieces and support piece include via connectors (105a, b) electrically connecting between a bottom side of the second substrate layer and the circuit elements.

1.2 The subject-matter of claim 9 therefore differs from this known subject-matter in that there are two support pieces rather than one.

1.3 The technical effect of this difference is not mentioned in the present application. An inventive step can therefore not be acknowledged.

1.4 Moreover, D2 discloses that compared to a single-piece interposer as used in D1, a segmented interposer has the advantage of reducing deformation and increasing stability (D2, pgh. [0007]), and thus increasing reliability. The skilled person would therefore replace the single-piece interposer in D1 by a segmented interposer as in D2 to increase the reliability of the package and would so arrive at the subject-matter of claim 9 without inventive skills.

2 The same argument applies to the devices described in each one of D3-D5, where the skilled person would also replace the single-piece interposer in D1 by a segmented interposer, thereby arriving at the subject-matter of claim 9.

3 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent method-claim 1 which therefore is also considered not inventive.

4 The dependent claims do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step for the following reasons. The subject-matter of
- claims 2, 3, 5, 10, 11, 13 is not inventive because it is customary practice in semiconductor technology to fabricate multiple devices on a common substrate and subsequently cut them into individual devices, see e.g. D6, Fig. 1 or D7, Fig. 8 or D8 Fig. 4A;

- claims 4, 12 is not inventive because via arrays are already disclosed in D1, Fig. 2(b) as well as D2, Fig. 2, 3;

- claims 6, 14 is not inventive because D8, Fig. 3A discloses different types of die arranged in a checkerboard pattern;

- claims 7, 8, 15, 16 is not inventive because D1, Fig. 2, 3 and D2, Fig. 1, 2 both disclose circuit a die and a via die mounted on the respective portions of the carrier substrate (see item VIII below).

**Re Item VIII**

**Clarity and conciseness**

The application does not meet the requirements of Article 6 PCT, because claims 7 and 15 are not clear. They require that the circuit element and the support elements are mounted on different die. However, the description shows that they are mounted on the same die (i.e. the carrier 110).

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