

## PATENT COOPERATION TREATY

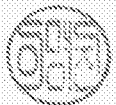
From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: WANG, YUKE  SCHWABE, WILLIAMSON & WYATT, P.C. 1211 SW 5TH, STE 1900 PORTLAND OR 97204 USA		Date of mailing (day/month/year) <b>29 June 2018 (29.06.2018)</b>	
Applicant's or agent's file reference P120569PCT		<b>FOR FURTHER ACTION</b> See paragraph 2 below	
International application No. <b>PCT/US2017/054413</b>	International filing date (day/month/year) <b>29 September 2017 (29.09.2017)</b>	Priority date(day/month/year)	
International Patent Classification (IPC) or both national classification and IPC <b>H01L 29/786(2006.01)i</b>			
Applicant <b>INTEL CORPORATION et al.</b>			
<p>1. This opinion contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> 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</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p> <p>2. <b>FURTHER ACTION</b></p> <p>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.</p> <p>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.</p> <p>For further options, see Form PCT/ISA/220.</p>			

Name and mailing address of the ISA/KR International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578	Date of completion of this opinion  28 June 2018 (28.06.2018)	Authorized officer  LEE, Myung Jin  Telephone No. +82-42-481-8474	
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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

**PCT/US2017/054413**

**Box No. 1 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*. I(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*. I(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*. I(a)).
    - on paper or in the form of an image file (Rule 13*ter*. I(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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International application No.

**PCT/US2017/054413**

**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>1-25</u>	YES
	Claims	<u>NONE</u>	NO
Inventive step (IS)	Claims	<u>1-25</u>	YES
	Claims	<u>NONE</u>	NO
Industrial applicability (IA)	Claims	<u>1-25</u>	YES
	Claims	<u>NONE</u>	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2016-0284713 A1 (POWERCHIP TECHNOLOGY CORPORATION) 29 September 2016

D2: US 2010-0059744 A1 (HUAXIANG YIN et al.) 11 March 2010

D3: JP 2009-004733 A (CANON INC.) 08 January 2009

D4: US 2016-0211264 A1 (TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY, LTD.) 21 July 2016

D5: US 2004-0065884 A1 (ARUP BHATTACHARYYA) 08 April 2004

**2.1. Novelty and Inventive Step**

2.1.1. Claims 1-9

**Claim 1** differs from these prior art documents in that 1) a first gate electrode and a second gate electrode are separated by a spacer; 2) a first channel area and a second channel area are above the first gate electrode; 3) a third channel area and a fourth channel area are above the second gate electrode, wherein the third channel area is separated from the first channel area by the spacer; and 4) a first source-drain contact is coupled to a source area of a first channel area and a drain area of a second channel area, and a second source-drain contact is coupled to a source area of a third channel area and a drain area of a fourth channel area. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

**Claims 2-9** are dependent on claim 1. Therefore, claims 2-9 meet the requirements of PCT Article 33(2) and (3).

2.1.2. Claims 10-17

**Claim 10** differs from these prior art documents in that a first gate electrode and a second gate electrode are separated by a spacer; a first channel area and a second channel area are above the first gate

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**Supplemental Box**

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

Continuation of : Box No. V

electrode; a third channel area and a fourth channel area are above the second gate electrode, wherein the third channel area is separated from the first channel area by the spacer; and a first source-drain contact is coupled to a source area of the first channel area and a drain area of the second channel area, and a second source-drain contact is coupled to a source area of the third channel area and a drain area of the fourth channel area. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 10 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

**Claims 11-17** are dependent on claim 10. Therefore, claims 11-17 meet the requirements of PCT Article 33(2) and (3).

2.1.3. Claims 18-25

**Claim 18** differs from these prior art documents in removing a top part of a continuous fin of a second type, a top part of an oxide area, a top part of a continuous fin of a first type, to expose a backbone area, wherein the continuous fin of the first type becomes a first fin of the first type and a second fin of the first type disconnected from each other, and the continuous fin of the second type becomes a first fin of the second type and a second fin of the second type disconnected from each other; removing the backbone area and a part of a gate electrode to have a gap, wherein the gate electrode becomes a first gate electrode and a second gate electrode disconnected from each other; and filling the gap by a dielectric material to form a spacer. And it is not obvious to a person skilled in the art by the documents, taken alone or in combination. Therefore, claim 18 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

**Claims 19-25** are dependent on claim 18. Therefore, claims 19-25 meet the requirements of PCT Article 33(2) and (3).

**2.2. Industrial Applicability**

Claims 1-25 are industrially applicable under PCT Article 33(4).