

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 01P120301PCT	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US2017/054566	International filing date (<i>day/month/year</i>) 29 September 2017 (29.09.2017)	(Earliest) Priority Date (<i>day/month/year</i>)
Applicant INTEL CORPORATION		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out 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))

b. This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. **Certain claims were found unsearchable** (See Box No. II)

3. **Unity of invention is lacking** (See Box No. III)

4. With regard to the **title**,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1A

as suggested by the applicant.

as selected by this Authority, because the applicant failed to suggest a figure.

as selected by this Authority, because this figure better characterizes the invention.

b. none of the figures is to be published with the abstract.

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.: 7,10-11
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

A. CLASSIFICATION OF SUBJECT MATTER**H01L 29/778(2006.01)i, H01L 29/78(2006.01)i, H01L 29/66(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
H01L 29/778; H01L 27/088; H01L 29/78; H01L 29/94; H01L 29/66; H01L 29/423Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility modelsElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: transistor, group III-Nitride, charge inducing layer, gate, source/drain**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2016-209263 A1 (INTEL CORPORATION) 29 December 2016 See page 4, lines 15-33; page 6, line 18 - page 13, line 31; page 16, lines 17-25; page 19, lines 10-17; claims 1, 6, 10, 20, 22; and figures 1, 2A-2F, 5.	1-6, 8-9, 12-25
Y	US 9240410 B2 (THEN et al.) 19 January 2016 See column 4, line 60 - column 5, line 5; column 7, lines 33-49; and figures 2A-2C, 4D.	1-6, 8-9, 12-25
A	US 8530978 B1 (CHU et al.) 10 September 2013 See figures 1, 5.	1-6, 8-9, 12-25
A	US 2006-0197129 A1 (WOHLMUTH) 07 September 2006 See figures 1A-1C.	1-6, 8-9, 12-25
A	US 2015-0340482 A1 (SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC) 26 November 2015 See figures 1, 5, 6B.	1-6, 8-9, 12-25

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

28 June 2018 (28.06.2018)

Date of mailing of the international search report

28 June 2018 (28.06.2018)

Name and mailing address of the ISA/KR

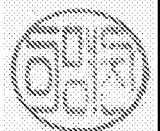
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2017/054566

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2016-209263 A1	29/12/2016	TW 201712869 A	01/04/2017
US 9240410 B2	19/01/2016	CN 104011868 A	27/08/2014
		CN 104011868 B	15/02/2017
		CN 106887453 A	23/06/2017
		TW 201342601 A	16/10/2013
		TW 201539761 A	16/10/2015
		TW 201707062 A	16/02/2017
		TW I483398 B	01/05/2015
		TW I556448 B	01/11/2016
		TW I592992 B	21/07/2017
		US 2013-0279145 A1	24/10/2013
		US 2016-0064512 A1	03/03/2016
		US 2016-0315153 A1	27/10/2016
		US 2017-0288022 A1	05/10/2017
		US 9397188 B2	19/07/2016
		US 9691857 B2	27/06/2017
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US 8530978 B1	10/09/2013	CN 104094408 A	08/10/2014
		EP 2789013 A1	15/10/2014
		WO 2013-085566 A1	13/06/2013
US 2006-0197129 A1	07/09/2006	None	
US 2015-0340482 A1	26/11/2015	CN 104051520 A	17/09/2014
		EP 2779247 A2	17/09/2014
		EP 2779247 A3	22/11/2017
		US 2014-0264369 A1	18/09/2014
		US 2015-0340482 A1	26/11/2015
		US 9129889 B2	08/09/2015
		US 9502550 B2	22/11/2016