PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)* **26 June 2018 (26.06.2018)**

Applicant's or agent's file reference
P117908PCT

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2017/054420	**29 September 2017 (29.09.2017)**	

International Patent Classification (IPC) or both national classification and IPC
G06F 1/32(2006.01)i, G08B 21/18(2006.01)i, G05B 23/02(2006.01)i, G05B 1/03(2006.01)i

Applicant
INTEL CORPORATION

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

- [x] 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
- [x] 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
- [x] 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/KR	Date of completion of this opinion	Authorized officer
International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578	26 June 2018 (26.06.2018)	KANG, Hee Gok Telephone No. +82-42-481-8264

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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	1-25	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-25	NO
Industrial applicability (IA)	Claims	1-25	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2016-0041608 A1 (APPLE INC.) 11 February 2016
D2: US 2013-0159575 A1 (THOMAS M. GOODING et al.) 20 June 2013

2.1 Novelty (PCT Article 33(2)) and Inventive Step (PCT Article 33(3))

2.1.1 Claims 1-14

D1, which is considered to be the closest prior art to the subject matter of claim 1, discloses an apparatus comprising: a digital power estimator (DPE) circuit to monitor processor activity in processors and generate a power estimate (see paragraph [0067] in D1); and a hysteresis counter configured to increment an up counter in response to a signal that a power threshold has been exceeded, wherein the up counter may be a count of a number of consecutive power estimates that exceed the power threshold (see paragraphs [0061]-[0062] in D1).
The subject matter of claim 1 differs from that of D1 in the feature that a count value is supplied to a power control circuit of a processing platform via a bus in response to a read request from the power control circuit, the power control circuit being responsive to the count value to control a performance level of the processing platform. However, the different feature can be easily derived from the feature of D1 considering that if an up count exceeds a count threshold for the up counter, the hysteresis counter may signal the DPE circuit, which may signal dynamic voltage and frequency management (DVFM) hardware to change to a lower operating point (see paragraphs [0069]-[0070] in D1). Accordingly, claim 1 would have been obvious over D1. Therefore, claim 1 lacks an inventive step under PCT Article 33(3).

The additional feature of claim 2 can be easily derived from the feature of D1 considering that

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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:

The phrase "any one of claim 1" of claim 4 is considered to be a typo of "claim 1". Therefore, claim 4 does not meet the requirements of PCT Article 6.

Claim 19 relates to the apparatus, but claim 10 dependent on claim 19 relates to power monitoring circuitry. As claim 10 does not clearly define the matter for which protection is sought, this claim does not meet the requirements of PCT Article 6. (Note: The international search report and the written opinion have been established on the assumption that claim 10 refers to claim 1.)

Claim 10 is unclear because "the warning counter" has not been previously defined. Therefore, claim 10 does not meet the requirements of PCT Article 6. (Note: “the warning counter” is considered to be a typo of “the counter”.)

Claim 11 is unclear because “the counter encoder” and "the first warning count value" have not been previously defined. Therefore, claim 11 does not meet the requirements of PCT Article 6. (Note: “the counter encoder”is considered to be a typo of “the count enc oder”.)

Claim 21 relates to power control circuitry, but claim 22 dependent on claim 21 relates to power level control circuitry. As claim 22 does not clearly define the matter for which protection is sought, this claim does not meet the requirements of PCT Article 6. (Note: "power level control circuitry" of claim 22 is considered to be a typo of "power control circuitry".)

Claim 24 is unclear because "the critical power warning signal" has not been previously defined. Therefore, claim 24 does not meet the requirements of PCT Article 6. (Note: “the critical power warning signal” is considered to be a typo of “the critical warning sign al”.)

Claim 25 is unclear because “the threshold count” and "the critical threshold" have not been previously defined. In addition, claim 25 is worded in reference to “the critical power warning signal” of claim 23 or 24. However, “the critical power warning signal” is considered to be a typo of “the critical warning signal”, and “critical warning signal” has not been worded in claim 23. Therefore, claim 25 does not meet the requirements of PCT Article 6. (Note: The international search report and the written opinion have been established on the assumption that claim 25 refers to claim 24.)

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the DPE circuit may be configured to compare the power estimate to a high power threshold, and if the power estimate exceeds the high power threshold, the DPE circuit may be configured to throttle the processors (see paragraphs [0067]-[0068] in D1). Accordingly, claim 2 would have been obvious over D1. Therefore, claim 2 lacks an inventive step under PCT Article 33(3).

The additional feature of claim 3 can be merely a matter of design option in view of the feature of D1 considering that the hysteresis counter may be configured to increment the up counter in response to the signal that the power threshold has been exceeded, counts may be compared to the count threshold for the up counter, and if the threshold is exceeded by the up counter, the DPE circuit may be configured to generate a DVFM request to reduce the operating point (see paragraph [0061] in D1). Accordingly, claim 3 would have been obvious over D1. Therefore, claim 3 lacks an inventive step under PCT Article 33(3).

The additional feature of claim 4 can be easily derived from the feature of D1 considering the power estimate (see paragraph [0067] in D1). Accordingly, claim 4 would have been obvious over D1. Therefore, claim 4 lacks an inventive step under PCT Article 33(3).

The additional feature of claim 5 can be merely a matter of design option in view of the feature of D1 considering comparing the power estimate to a low power threshold (see paragraph [0067] in D1). Accordingly, claim 5 would have been obvious over D1. Therefore, claim 5 lacks an inventive step under PCT Article 33(3).

The additional features of claims 6-7 can be merely matters of design option in view of the feature of D1 considering the counts, wherein the power estimates may be taken at a slower interval based on activity throughout the interval (see paragraphs [0061]-[0062] in D1). Accordingly, claims 6-7 would have been obvious over D1. Therefore, claims 6-7 lack an inventive step under PCT Article 33(3).

The additional features of claims 8-9 can be easily derived from the feature of D1 considering up and down counts, wherein if the down count exceeds a count threshold for a down counter, the hysteresis counter may signal the DPE circuit, which may signal the DVFM hardware to restore a higher operating point (see paragraphs [0069]-[0070] in D1). Accordingly, claims 8-9 would have been obvious over D1. Therefore, claims 8-9 lack an inventive step under PCT

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Article 33(3).

The additional features of claims 10-12 can be merely matters of design option in view of the feature of D1 considering the counts (see paragraph [0061] in D1). Accordingly, claims 10-12 would have been obvious over D1. Therefore, claims 10-12 lack an inventive step under PCT Article 33(3).

The additional features of claims 13-14 are not disclosed in D1, but the different features can be easily derived from the feature of D2 considering that power managers may not immediately deactivate power throttling when all parameters are below a second threshold, instead the power managers may delay deactivating the power throttling to account for debouncing (see paragraph [0068]; and figure 5 in D2). Accordingly, it would be obvious to a person skilled in the art to combine the disclosures of D1 and D2, thereby arriving at the claims. Therefore, claims 13-14 lack an inventive step under PCT Article 33(3).

(Note: The international search report and the written opinion have been established on the assumption that "the power monitoring circuitry of any one of claims 1 to 14" of claims 15-18 is "the power monitoring circuitry of claim 1".)

2.1.2 Claim 15

The feature of claim 15 relates to a voltage regulator and is substantially the same as that of claim 1. Accordingly, the same reasoning as in claim 1 applies to claim 15. Therefore, claim 15 lacks an inventive step under PCT Article 33(3) as being obvious over D1.

2.1.3 Claim 16

The feature of claim 16 relates to a battery charger and is substantially the same as that of claim 1. Accordingly, the same reasoning as in claim 1 applies to claim 16. Therefore, claim 16 lacks an inventive step under PCT Article 33(3) as being obvious over D1.

2.1.4 Claim 17

The feature of claim 17 relates to a power supply and is substantially the same as that of

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claim 1. Accordingly, the same reasoning as in claim 1 applies to claim 17. Therefore, claim 17 lacks an inventive step under PCT Article 33(3) as being obvious over D1.

2.1.5 Claims 18-19

The feature of claim 18 relates to an apparatus and is substantially the same as that of claim 1 except for additional features comprising at least one processor and power control circuitry. However, the additional features can be easily derived from the feature of D1 considering processors (see paragraph [0057] in D1) and DVFM hardware to change to a lower operating point and restore a higher operating point (see paragraph [0070] in D1), and the same reasoning as in claim 1 applies to claim 18. Therefore, claim 18 lacks an inventive step under PCT Article 33(3) as being obvious over D1.

The additional feature of claim 19 can be easily derived from the feature of D1 considering a mobile device, a desktop personal computer, a laptop etc. (see paragraph [0072] in D1). Accordingly, claim 19 would have been obvious over D1. Therefore, claim 19 lacks an inventive step under PCT Article 33(3).

2.1.6 Claims 20-22

D1, which is considered to be the closest prior art to the subject matter of claim 20, discloses an apparatus, wherein if an up count exceeds a count threshold for an up counter, a hysteresis counter may signal DVFM hardware to change to a lower operating point (see paragraphs [0069]-[0070] in D1).
The subject matter of claim 20 differs from that of D1 in the feature of an input to receive at least one count value, the count value corresponding to an accumulated number of times that a warning threshold condition associated with a warning threshold value is satisfied by a processing system signal of a processing platform in a count-accumulation time interval. However, the different feature can be easily derived from the feature of D1 considering counts, wherein an up counter may be a count of a number of consecutive power estimates that exceed a power threshold (see paragraphs [0061]-[0062] in D1). Accordingly, claim 20 would have been obvious over D1. Therefore, claim 20 lacks an inventive step under PCT Article 33(3).

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The additional features of claims 21-22 can be easily derived from the feature of D1 considering that a DPE circuit may be configured to compare the power estimate to a high power threshold, and if the power estimate exceeds the high power threshold, the DPE circuit may be configured to throttle processors (see paragraphs [0067]-[0068] in D1). Accordingly, claims 21-22 would have been obvious over D1. Therefore, claims 21-22 lack an inventive step under PCT Article 33(3).

2.1.7 Claims 23-25

The feature of claim 23 relates to machine readable instructions and is substantially the same as that of claim 1. Accordingly, the same reasoning as in claim 1 applies to claim 23. Therefore, claim 23 lacks an inventive step under PCT Article 33(3) as being obvious over D1.

The additional features of claims 24-25 can be easily derived from the feature of D1 considering that a DPE circuit may be configured to compare a power estimate to a high power threshold, and if the power estimate exceeds the high power threshold, the DPE circuit may be configured to throttle processors (see paragraphs [0067]-[0068] in D1). Accordingly, claims 24-25 would have been obvious over D1. Therefore, claims 24-25 lack an inventive step under PCT Article 33(3).

2.2 Industrial Applicability (PCT Article 33(4))

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