

# 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) <b>09 October 2019</b>	
Applicant's or agent's file reference <b>LV29367</b>	<b>FOR FURTHER ACTION</b> See paragraph 2 below
International application No. <b>PCT/CN2018/124813</b>	International filing date (day/month/year) <b>28 December 2018</b>
International Patent Classification (IPC) or both national classification and IPC G11C 16/30(2006.01)i; G11C 5/14(2006.01)i	
Applicant <b>MICRON TECHNOLOGY, INC. et al.</b>	
Priority date (day/month/year)	

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/ <b>National Intellectual Property Administration, PRC China 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088</b>	Date of completion of this opinion <b>23 September 2019</b>	Authorized officer <b>YANG, Chunyu</b>
Facsimile No. (86—10) 62019451	Telephone No. 86-(10)-53961437	

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International application No.

PCT/CN2018/124813

Box No. I Basis of the 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 and 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>None</u>	YES
	Claims	<u>1-25</u>	NO
Industrial applicability (IA)	Claims	<u>1-25</u>	YES
	Claims	<u>None</u>	NO

2. Citations and explanations :

- [1] D1: US2015248938 A1 (03.09.2015)
- [2] I. Novelty and Inventive Step
- [3] 1) D1 is considered to be the prior art document closest to the subject matter of claim 1, and discloses (description, paragraphs 0024-0046, 0055, figures 1, 2, 5):
- [4] The data storage device 100 may include a controller 110, a nonvolatile memory device 120 (corresponding to a memory array), and a power management unit 130; the controller may include a host interface unit 112, a control unit 114 (corresponding to a memory control unit).
- [5] The controller 110 may determine whether data to be processed through the nonvolatile memory device 120 is sequential data or random data. The controller 110 may control the power management unit 130 to adjust the power, for example, having different voltage levels, to the nonvolatile memory device 120 depending on the determination of whether the data to be processed is sequential or random data.
- [6] When the operation related to sequential data is requested from the host device, at step S120 the controller 110 may supply first power to the nonvolatile memory device 120. The first power may have a first voltage level. At step S130, the controller 110 may set the operation mode MD of the nonvolatile memory device 120 such that the nonvolatile memory device 120 operates in a first operation mode corresponding to the first power. The first operation mode may include a high-speed mode. The first operation mode may include a double data rate (DDR) mode. At step S140, the controller 110 may set the voltage level corresponding to the first operation mode to a driving voltage level of the input/output driver 111\_1.
- [7] On the other hand, when the operation related to random data is requested from the host device, at step S150 the controller 110 may supply second power to the nonvolatile memory device 120. The second power may have a third voltage level. The third voltage level may be lower than the first voltage level of the first power supplied to the nonvolatile memory device 120 when an operation related to sequential data is requested. At step S160, the controller 110 may set the operation mode MD of the nonvolatile memory device 120 such that the nonvolatile memory device 120 operates in a second operation mode corresponding to the second power. The second operation mode may include a low-speed mode. The second operation mode may include a single data rate (SDR) mode. At step S170, the controller 110 may set a voltage level corresponding to the second operation mode to the driving voltage level of the input/output driver 111\_1. The fourth voltage level corresponding to the second operation mode may be higher than the second voltage level corresponding to the first operation mode.
- [8] Claims 1, 8, 17 differ from D1 in the following aspects: (1) the memory control unit includes a queue, and stores requests to access the memory in the queue.
- [9] Claim 21 differs from D1 in the following aspects: (1); and (2) determine whether memory access requests are to sequential addresses of the memory array or to random addresses of the memory array using one or more of a command chunk size or an address range of the memory access requests.
- [10] Therefore, claims 1-25 are novel in the sense of PCT Article 33(2).
- [11] For the differences (1) and (2), they belong to common practice in the art. Therefore, claims 1, 8, 17, 21 don't involve an inventive step in the sense of PCT Article 33(3).

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**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**

[12] 2) About dependent claims 2-7, 9-16, 18-20, 22-25: D1 discloses (description, paragraphs 0025-0027, 0055, figure 5): processor, flash controller, ECC circuit, read requests and write requests. Other undisclosed features belong to common practice in the art. So, claims 2-7, 9-16, 18-20, 22-25 are novel in the sense of PCT Article 33(2), and don't involve an inventive step in the sense of PCT Article 33(3).

[13] II. Industrial Applicability

[14] Claims 1-25 are industrially applicable in the sense of PCT Article 33(4), because the subject matter can be made or used in technical field of terminals.