

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

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

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (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/IB2018/001039

International filing date (day/month/year)
06.08.2018

Priority date (day/month/year)
07.08.2017

International Patent Classification (IPC) or both national classification and IPC
INV. G06F3/06

Applicant
TOSHIBA MEMORY CORPORATION

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.

Name and mailing address of the ISA:



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Date of completion of this opinion

see form
PCT/ISA/210

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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 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:
 - 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 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

Novelty (N)	Yes: Claims	<u>5-8, 12-15, 19-23</u>
	No: Claims	<u>1-4, 9-11, 16-18</u>
Inventive step (IS)	Yes: Claims	<u>19</u>
	No: Claims	<u>1-18, 20-23</u>
Industrial applicability (IA)	Yes: Claims	<u>1-23</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

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

1 Reference is made to the following document:

D1 GB 2 530 667 A (HGST NETHERLANDS BV [NL]) 30 March 2016
(2016-03-30)

2 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claims 1, 9 and 16 is not new.

2.1 Regarding claim 1, Document D1 discloses:

A solid state drive (abstract: using an SSD as storage device) comprising: a plurality of non-volatile memory dies communicatively arranged in one or more communication channels, each of the plurality of non-volatile memory dies comprising a plurality of physical blocks (fig 4, paragraphs [0026] [0027] [0032]);

one or more channel controllers communicatively coupled to the one or more communication channels (fig 3 items 32A ... 32N), respectively; and a memory controller communicatively coupled to the plurality of non-volatile memory dies via the one or more channel controllers (fig 3, item 20), wherein the memory controller is configured to:

assign the plurality of physical blocks of a first die of the plurality of non-volatile memory dies to only a first region and the plurality of physical blocks of a second die of the plurality of non-volatile memory dies to only a second region,

perform only read operations on the first region in a first operation mode, and perform write operations or maintenance operations on the second region in a second operation mode concurrently with read operations on the first region in the first operation mode (paragraph [0019], partitioning an array of memory devices into a plurality of die-sets, the controller uses block sets from the devices in the die-set as units of a storage logical management set; paragraph [0056] the scheduler schedules different die-sets to concurrently perform different activities, such as reading, writing, erasing, the die set implicitly representing a region of storage space, paragraph [0035] disclosing a logical container made out of blocks selected from different memory devices). The subject-matter of claim 1 is therefore not new.

- 2.2 Since the subject-matter of independent claims 9 and 16 corresponds to the subject-matter of claim 1, the same reasoning of paragraph 2.1 applies mutatis mutandis. The subject matter of claims 9 and 16 is therefore not new.
- 3 Dependent claims 2-8, 10-15, 17-23 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step.
- 3.1 Regarding claims 2,3, 10,11,17,18, document D1 disclosing several ways of grouping the blocks from the memory dies into block sets used to store data (see fgi 4,5 and paragraphs [0060]-[0065]), the block sets being assimilated to regions of the dies.
- 3.2 Regarding claims 4 and 19, the expression namespace is vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT. From the description paragraph [0053], a namespace is defined as a subset of the physical blocks that are allocated to a region, in other words it represent a group of blocks or a block set, which are present in document D1, the subject-matter of claims 4 and 19 is therefore not new.
- 3.3 Regarding claims 5-8, 12-15, 20-23, an arbitrary "maintenance" counter is defined on the regions and is incremented or decremented depending on the operating mode of the region the technical reason behind the increment or decrement of the counter being itself unknown, it is unclear as to what technical effect is achieved by the counter and as such cannot be considered inventive. It has to be noted that document D1 discloses different operating mode for the die-sets (see paragraph [0056]), when a die-set is in write mode, the number of free blocks will decrease (or the number of dirty blocks will increase), when garbage collection kicks in, the number of free blocks will increase (and the number of dirty block will decrease), see paragraphs [0047] and [0054]. Although in D1 does not use the number of free/dirty blocks metric in order to determine if the maintenance module may perform one or more maintenance activities, such as garbage collection, on memory devices in order to e.g., increase the number of free blocks/blocksets, it is considered being merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise

of inventive skill, in order to determine how to prioritize the garbage collection requests over requests based on messages received from host device. The subject-matter of claims 5-8, 12-15, 20-23 lacks therefore an inventive step.