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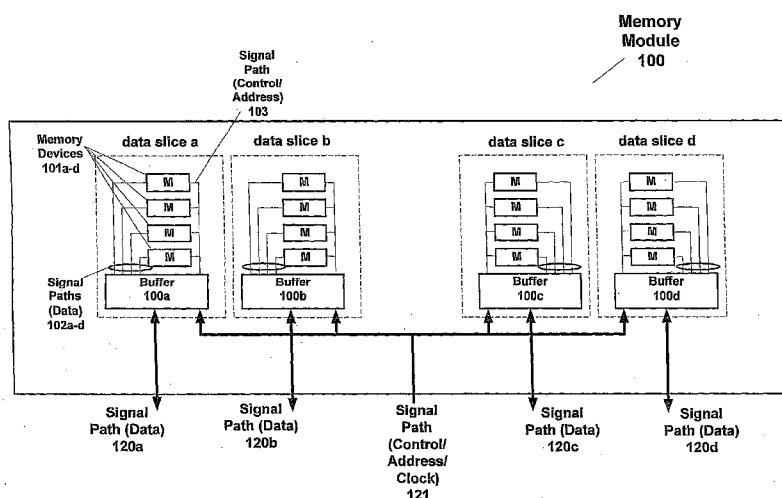
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(54) Title: A MEMORY MODULE INCLUDING A PLURALITY OF INTEGRATED CIRCUIT MEMORY DEVICES AND A PLURALITY OF BUFFER DEVICES IN A MATRIX TOPOLOGY



(57) Abstract: A memory module includes a plurality of signal paths that provide data to a memory module connector interface from a plurality of respective integrated circuit buffer devices that access data from an associated plurality of integrated circuit memory devices. The memory module forms a plurality of "data slices" or a plurality of portions of the memory module data bus that is coupled to the respective integrated circuit buffer devices. Each integrated circuit buffer device is also coupled to a bus that provides control information that specifies an access to at least one integrated circuit memory devices. According to an embodiment, a SPD device stores information regarding configuration information of the memory module. In embodiments, at least one integrated circuit buffer devices access information stored in the SPD device. In a package embodiment, a package houses an integrated circuit buffer die and a plurality of integrated circuit memory dies.

WO 2007/038225 A3

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2006/036894

A. CLASSIFICATION OF SUBJECT MATTER
INV. G11C5/00

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G11C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/257847 A1 (MATSUI YOSHINORI [JP] ET AL) 23 December 2004 (2004-12-23)	1-29, 31-37, 39-45
Y	paragraph [0160] - paragraph [0203]; figures 16-30	30
Y	----- US 2004/256638 A1 (PEREGO RICHARD [US] ET AL) 23 December 2004 (2004-12-23)	30
A	paragraph [0063]	1-29, 31-37, 39-45
A	----- US 2004/133736 A1 (KYUNG KYE-HYUN [KR]) 8 July 2004 (2004-07-08) figures 4,5	1-37, 39-45
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☒ 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 document but published on or after the international filing date
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- *O* document referring to an oral disclosure, use, exhibition or other means
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- *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

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002/112119 A1 (HALBERT JOHN B [US] ET AL) 15 August 2002 (2002-08-15) figure 7	1-37, 39-45
A	----- WO 2005/066965 A2 (INTEL CORP [US]; HALBERT JOHN [US]; FREEMAN CHRIS [US]; WILLIAMS MICHA) 21 July 2005 (2005-07-21) abstract -----	1-37, 39-45

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2006/036894

Box 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.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box 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:

see additional sheet

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 fee, this Authority did not invite payment of any additional fee.
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.:
1-37, 39-45

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-37,39-45

Memory module comprising first and second circuit buffer dies characterised in that storage memory cells of a first integrated circuit memory die are of different types than storage memory cells of a second integrated circuit memory die.

2. claim: 38

Memory module comprising first and second circuit buffer dies characterised in that a package of each circuit buffer die includes a non-volatile storage location.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2006/036894

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