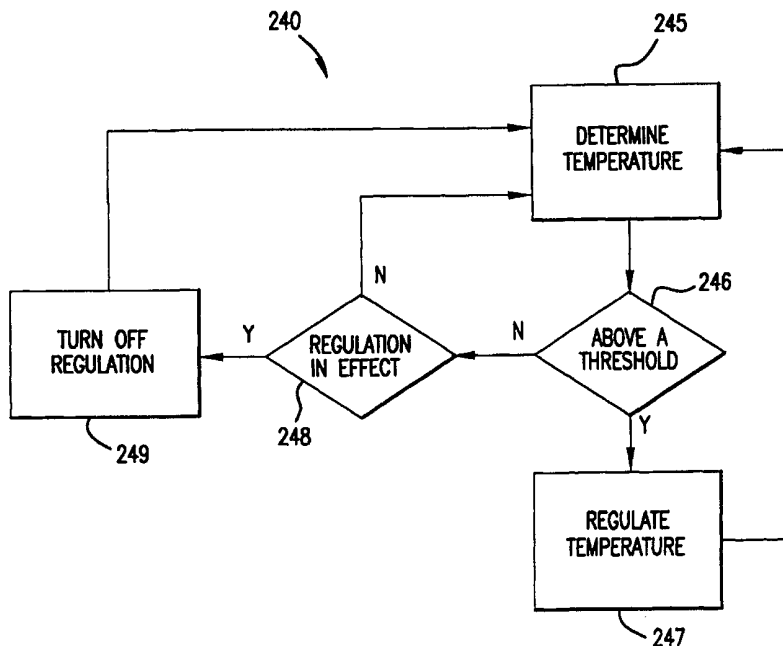




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁷ : G06F 1/20, 1/32, G11C 11/406</p>	<p>A3</p>	<p>(11) International Publication Number: WO 00/04481 (43) International Publication Date: 27 January 2000 (27.01.00)</p>
<p>(21) International Application Number: PCT/US99/16063 (22) International Filing Date: 16 July 1999 (16.07.99) (30) Priority Data: 09/118,696 16 July 1998 (16.07.98) US (71) Applicant: RAMBUS INCORPORATED [US/US]; 2465 Latham Street, Mountain View, CA 94040 (US). (72) Inventors: SATAGOPAN, Ramprasad; 4832 Kingdale Drive, San Jose, CA 95124 (US). WOO, Steven, C.; 12180 Country Squire Lane, Saratoga, CA 95070 (US). BARTH, Richard, M.; 787 Los Robles Avenue, Palo Alto, CA 94306 (US). TSERN, Ely, K.; 684 Riviera Drive, Los Altos, CA 94024 (US). HMPEL, Craig, E.; 5927 Dunn Avenue, San Jose, CA 95123 (US). (74) Agent: WHITT, Stephen, R.; 1215 Tottenham Court, Reston, VA 20194 (US).</p>		<p>(81) Designated States: CA, DE, GB, JP, KR, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> (88) Date of publication of the international search report: 30 March 2000 (30.03.00)</p>

(54) Title: AN APPARATUS AND METHOD FOR THERMAL REGULATION IN MEMORY SUBSYSTEMS



(57) Abstract

A memory system configured to provide thermal regulation of a plurality of memory devices is disclosed. The memory system comprises a memory device coupled to a bus. Additionally, the memory system also comprises a controller coupled to the bus. The controller determines an operating temperature of the memory device. Based on the operating temperature of the memory device, the controller is further operable to manipulate the operation of the memory system.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/16063

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 G06F1/20 G06F1/32 G11C11/406

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)
 IPC 7 G06F 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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 692 202 A (CHUNG CHIH-HUNG ET AL) 25 November 1997 (1997-11-25) column 7, line 12 - line 67; figure 2 ---	1, 11, 12, 14
X	WO 93 06549 A (CHIPS & TECH INC) 1 April 1993 (1993-04-01) the whole document ---	1-3, 11, 12, 14
X	WO 93 12480 A (COMPAQ COMPUTER CORP) 24 June 1993 (1993-06-24) abstract page 4, paragraph 2 - page 5, paragraph 2 page 9, line 9 - line 14 page 12, line 17 - line 25 figure 1 --- -/--	1, 11

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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- *Z* document member of the same patent family

Date of the actual completion of the international search

23 December 1999

Date of mailing of the international search report

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Name and mailing address of the ISA
 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

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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.
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/16063

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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.:

Remark on Protest

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

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 99/16063

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. Claims: 1-15

relating to a memory system (and corresponding method) comprising a memory controller and a memory device wherein the number of memory device operations is monitored and compared with a reference.

2. Claims: 16-23

relating to a memory system comprising a memory controller, a memory device and a temperature sensor wherein a circuit refreshing periodically the data in the first device either at a first rate or at a second rate depending on the sensed temperature and on the maximum operating temperature of the memory device.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/16063

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