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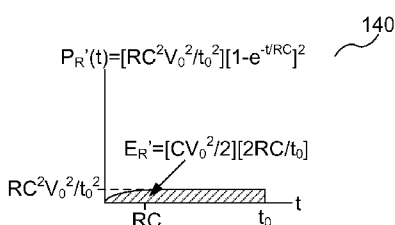
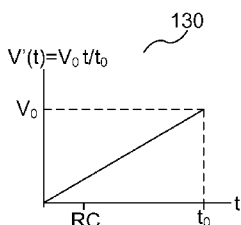
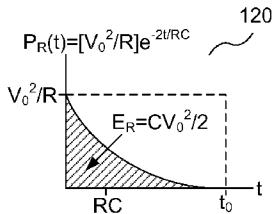
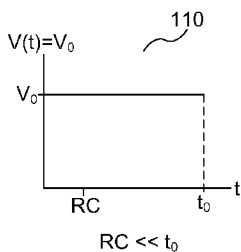
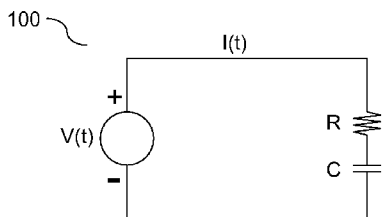
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60/865,828 14 November 2006 (14.11.2006) US
- (71) Applicant (for all designated States except US): **RAMBUS INC.** [US/US]; 4440 El Camino Real, Los Altos, CA 94022 (US).
- (72) Inventor; and  
(75) Inventor/Applicant (for US only): **WARE, Frederick, A.**
- (54) Title: LOW ENERGY MEMORY COMPONENT
- (57) Abstract: The present invention is directed to a DRAM circuit that implements a self-refresh scheme to substantially reduce its power dissipation level during self-refresh operations. A ramped power supply voltage in replacement of a substantially invariant power supply voltage is used to power a sense amplifier in the DRAM circuit for amplifying a voltage difference between two bit lines coupled to the sense amplifier. As a result, the heat produced by the self-refresh operation is only a fraction of the heat produced by the conventional self-refresh powered by the substantially invariant power supply voltage.
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW).

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ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,  
FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,  
PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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**Published:**

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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2007/084217

**A. CLASSIFICATION OF SUBJECT MATTER**  
 INV. G11C11/406 G11C11/4074

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 2002/186598 A1 (OOISHI TSUKASA [JP]) 12 December 2002 (2002-12-12)	1-43
Y	paragraphs [0109] - [0123]; figures 11,12 -----	44-54
Y	EP 0 293 933 A (NIPPON ELECTRIC CO [JP]) 7 December 1988 (1988-12-07) column 2, lines 27-40 -----	44-54
A	US 2002/097624 A1 (ANDERSEN JOHN E [US] ET AL) 25 July 2002 (2002-07-25) the whole document -----	1-54

Further documents are listed in the continuation of Box C.
  See patent family annex.

\* Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>*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</p> <p>*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.</p> <p>* &amp; * document member of the same patent family</p>
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Date of the actual completion of the international search	Date of mailing of the international search report
19 June 2008	09/07/2008

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  <p style="text-align: center;">Czarik, Damien</p>
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No. PCT/US2007/084217
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Patent document cited in search report	A1	Publication date	Patent family member(s)	Publication date
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