



(43) International Publication Date
20 November 2008 (20.11.2008)

PCT

(10) International Publication Number
WO 2008/139441 A3

- (51) International Patent Classification:
G11C 11/34 (2006.01)
- (21) International Application Number:
PCT/IL2008/000519
- (22) International Filing Date:
16 April 2008 (16.04.2008)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:

60/917,653	12 May 2007 (12.05.2007)	US
60/976,436	30 September 2007 (30.09.2007)	US
61/017,177	28 December 2007 (28.12.2007)	US
61/024,561	30 January 2008 (30.01.2008)	US
61/028,226	13 February 2008 (13.02.2008)	US
- (71) Applicant (for all designated States except US):
ANOBIT TECHNOLOGIES LTD. [IL/IL]; AMPA House, 1 Sapir Street, P.O.B. 12147, 46852 Herzilia (IL).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **SOKOLOV, Dotan** [IL/IL]; 3 Hapamonim Street, 43391 Ra'anana (IL). **SOMMER, Naftali** [IL/IL]; 3 Cheletz Street, 75222 Rishon Le Zion (IL). **SHALVI, Ofer** [IL/IL]; 15 Hanna Senesh Street, 43362 Ra'anana (IL). **PERLMUTTER, Uri** [IL/IL]; 3 Greenberg Street, 58670 Holon (IL).

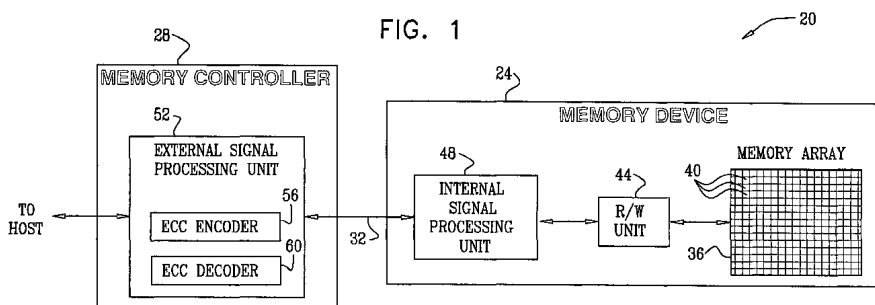
- (74) Agents: **SANFORD T. COLB & CO.** et al.; P.O. Box 2273, 76122 Rehovot (IL).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, 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), 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, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

- (88) Date of publication of the international search report:
25 February 2010

(54) Title: MEMORY DEVICE WITH INTERNAL SIGNAL PROCESSING UNIT



(57) Abstract: A method for operating a memory (36) includes storing data in a plurality of analog memory cells (40) that are fabricated on a first semiconductor die by writing input storage values to a group of the analog memory cells. After storing the data, multiple output storage values are read from each of the analog memory cells in the group using respective, different threshold sets of read thresholds, thus providing multiple output sets of the output storage values corresponding respectively to the threshold sets. The multiple output sets of the output storage values are preprocessed by circuitry (48) that is fabricated on the first semiconductor die, to produce preprocessed data. Preprocessed data is provided to a memory controller (28), which is fabricated on a second semiconductor die that is different from the first semiconductor die, so as to enable the memory controller to reconstruct the data responsively to the preprocessed data.

WO 2008/139441 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL 08/00519

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G11C 11/34 (2008.04)

USPC - 365/185.21

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)

USPC - 365/185.21

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

USPC - 711/101; 365/45, 185.2, 185.21-185.24

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

DialogWEB; Google Search Terms Used: memory, cell, semiconductor, error, correction, code, value, read, analog, storage, statistic, property, data, circuitry, metrics, preprocess, control, signal, distort, corrupt, reconstruct, threshold, interference, cancellation, encod, decod, multi, stage, data, storage, random, access

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 5,912,906 A1 (WU et al.) 15 June 1999 (15.06.1999), Col 1 ln 47-49 and ln 56-59, Col 2 ln 23-25 and ln 56-59, Col 3 ln 22-25 and ln 49-51, Col 4 ln 7-11	1, 14, 22-24, 37, 45-46 ----- 2-13, 15-21, 25-36, 38-44
Y	US 6,041,430 A1 (YAMAUCHI et al.) 21 March 2000 (21.03.2000), Col 1 ln 1-3, Col 2 ln 3-6, ln 42-48 and ln 55-60, Col 3 ln 29-33, Col 4 ln 12-27 and ln 48-50	2-6, 9-13, 15-19, 25-29, 32-36, 38-42
Y	US 6,442,585 B1 (DEAN et al.) 27 August 2002 (27.08.2002), Col 9 ln 12-17	7-8 and 30-31
Y	US 5,056,089 A1 (FURUTA et al.) 08 October 1991 (08.10.1991), Col 1 ln 6-7, Col 4 ln 24-36	20-21 and 43-44
Y	US 6,219,447 B1 (LEE) 17 April 2001 (17.04.2001), Col 2 ln 44-47	8 and 31

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"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

"E" earlier application or patent but published on or after the international filing date

"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

"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)

"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

"O" document referring to an oral disclosure, use, exhibition or other means

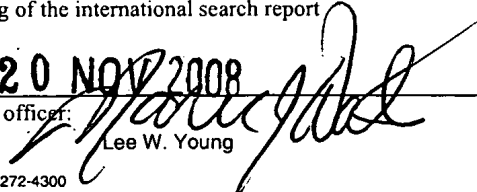
"&" document member of the same patent family

"P" document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search

27 October 2008 (27.10.2008)

Date of mailing of the international search report

20 NOV 2008


Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer:
Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774