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(54) Title: MEMORY CELL WITH MULTIPLE SENSE MECHANISMS

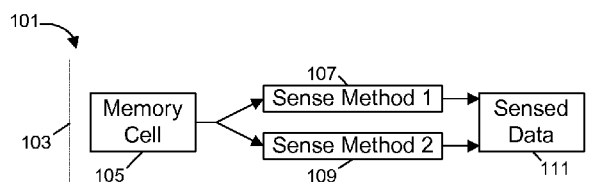


FIG. 1

(57) Abstract: This disclosure provides sense amplifier technology for a memory device that uses multiple sense methods. In one implementation, a memory device is configured with both digital sense circuitry and analog sense circuitry, which can be alternately or simultaneously used. In another implementation, use of the specific sense circuitry is dependent upon a mode or command. In another embodiment, the specific sense circuitry utilizes is responsive to predetermined tasks. In one contemplated application, a multilevel nonvolatile memory device (e.g., a flash memory device) uses (a) digital sense circuitry during program-verify operations, where it is desired to minimize power and maximize bitline impact and where latency is already to a certain extent fixed by programing operation and (b) analog sense circuitry in responding to read commands, to provide relatively high performance (at the expense of greater power consumption). Different sets of circuits can be used or circuitry can be shared and/or configured for multisense operation, depending on the specific design.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/063416**A. CLASSIFICATION OF SUBJECT MATTER***G11C 7/06(2006.01)i, G11C 16/26(2006.01)i, G11C 16/34(2006.01)i*

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 7/06; G11C 16/04; G11C 7/00; G11C 8/00; G11C 16/06

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

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: cell, sense, digital, analog

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 6714449 B2 (KHALID) 30 March 2004 See abstract, column 2 lines 27-28, column 6 lines 23-62, column 7 lines 1-16, lines 45-54, figures 1-3.	1-2, 8-9, 20, 23 3-7, 10-19, 21-22 , 24-42
X A	KR 10-2009-0027458 A (SAMSUNG ELECTRONICS CO., LTD.) 17 March 2009 See abstract, claims 1-3, paragraphs 21-29, 33, 36, figures 1-2.	1-2, 8-9, 20, 23 3-7, 10-19, 21-22 , 24-42
A	US 2006-0083097 A1 (FRULIO et al.) 20 April 2006 See abstract, paragraphs 21-22, figure 4 .	1-42
A	US 6044004 A (KRAMER) 28 March 2000 See abstract, column 4 lines 22-63, figure 4 .	1-42

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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6714449 B2	30.03.2004	EP 1332500 A2 EP 1332500 B1 EP 1624461 A2 EP 1624461 A3 JP 2004-510286 A KR 10-0760886 B1 US 2003-0112661 A1 US 2004-0105307 A1 US 2005-0169051 A1 US 6538922 B1 US 6873549 B2 US 7301807 B2 WO 02-27729 A2 WO 02-27729 A3 WO 02-27729A3	06.08.2003 15.08.2007 08.02.2006 12.07.2006 02.04.2004 21.09.2007 19.06.2003 03.06.2004 04.08.2005 25.03.2003 29.03.2005 27.11.2007 04.04.2002 04.04.2002 12.12.2002
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