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**Kim et al.**

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(54) **HYBRID FLASH MEMORY DEVICE AND METHOD FOR ASSIGNING RESERVED BLOCKS THEREOF**

(75) Inventors: **Seon-Taek Kim**, Suwon-si (KR);  
**Byoung-Kook Lee**, Suwon-si (KR)

(73) Assignee: **Samsung Electronics Co., Ltd.**,  
Suwon-si, Gyeonggi-do (KR)

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(51) **Int. Cl.**  
**GI1C 5/06** (2006.01)

(52) **U.S. Cl.** ..... **365/63; 365/200; 365/230.03**

(58) **Field of Classification Search** ..... **365/63, 365/200, 230.03, 185.33**  
See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

6,418,052 B1 7/2002 Shibata et al.  
6,947,322 B2 9/2005 Anzai et al.  
2006/0155917 A1\* 7/2006 Di Sena et al. .... 711/103  
2007/0233752 A1\* 10/2007 Bangalore et al. .... 707/202

**FOREIGN PATENT DOCUMENTS**

JP 11-345491 12/1999

JP 2001-006374 12/2001  
JP 2002-208287 7/2002  
JP 2004-127481 4/2004  
KR 1020040011387 2/2004  
KR 1020050007653 1/2005  
KR 1020060012696 2/2006  
KR 1020060021548 3/2006  
KR 1020070048384 5/2007

**OTHER PUBLICATIONS**

English Abstract for Publication No.: 2002-208287.  
English Abstract for Publication No.: 1020050007653.  
English Abstract for Publication No.: 1020060012696.  
English Abstract for Publication No.: 1020060021548.  
English Abstract for Publication No.: 1020070048384.

\* cited by examiner

*Primary Examiner*—Thong Q Le  
(74) *Attorney, Agent, or Firm*—F. Chau & Associates

(57) **ABSTRACT**

A hybrid flash memory device includes an array including a first area and a second area having a larger number of stored bits per cell than the first area. The device includes a hidden area including a first reserved block area and a second reserved block area, wherein the first reserved block area includes a plurality of first memory blocks having the same number of stored bits per cell as the first area, the second reserved block area includes a plurality of second memory blocks having the same number of stored bits per cell as the second area, and a flash translation layer configured to replace a bad block generated in the first main area with the first memory block and replace a bad block generated in the second main area with the second memory block, wherein the flash translation layer flexibly assigns functions of the first memory blocks or the second memory blocks depending on whether the first and second memory blocks are all used.

**20 Claims, 7 Drawing Sheets**

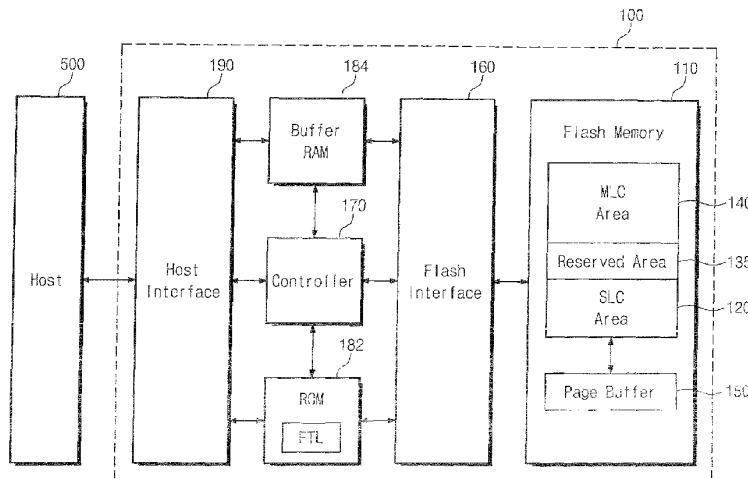


Fig. 1

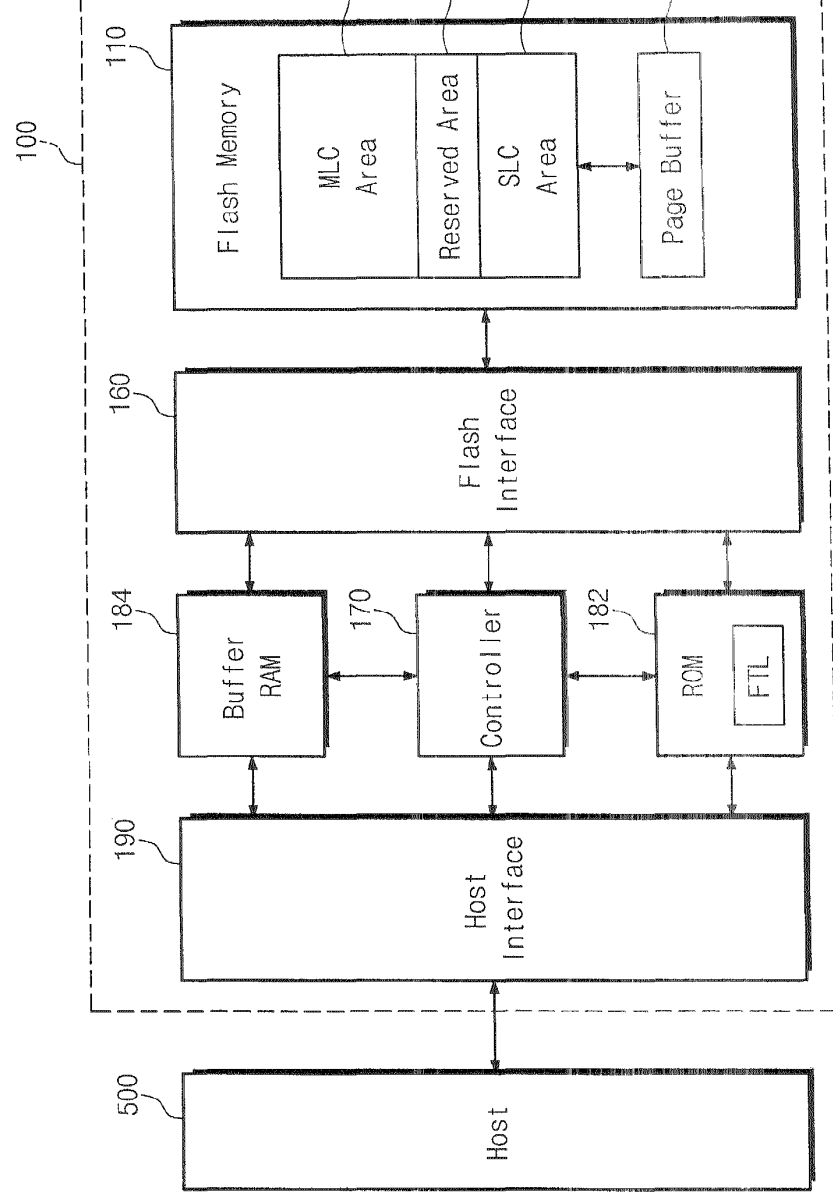


Fig. 2

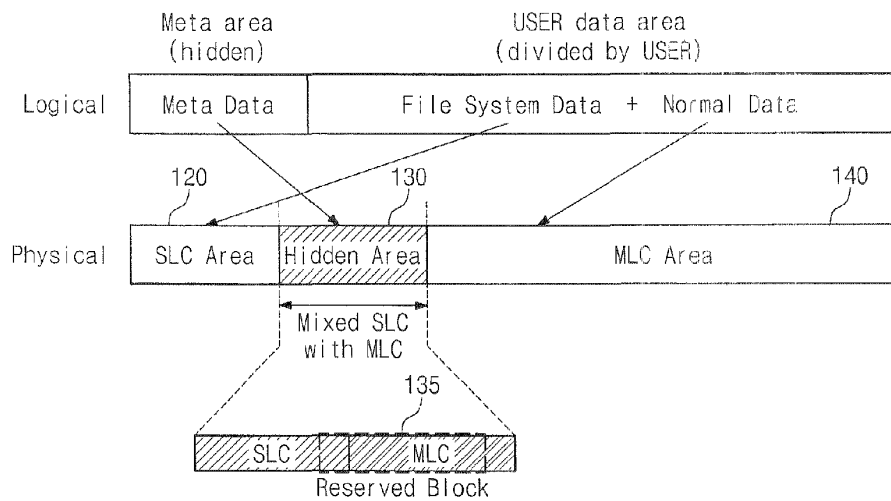


Fig. 3

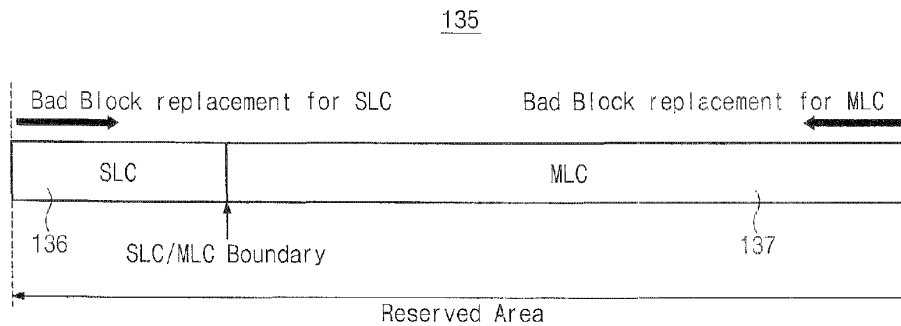


Fig. 4

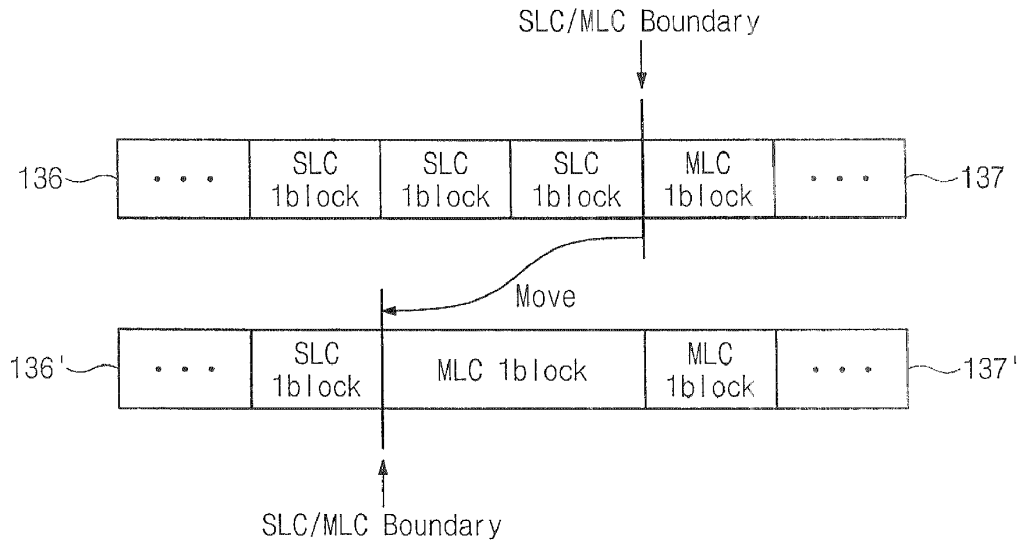


Fig. 5

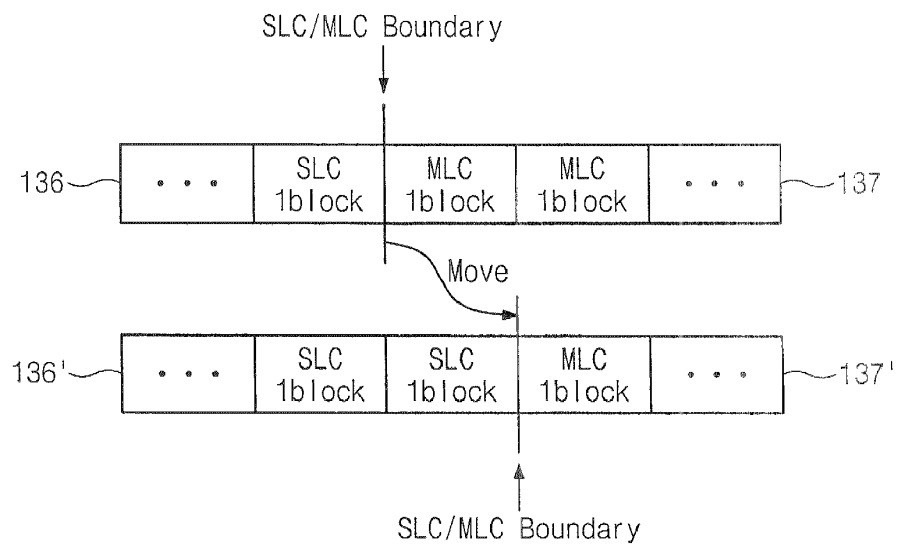
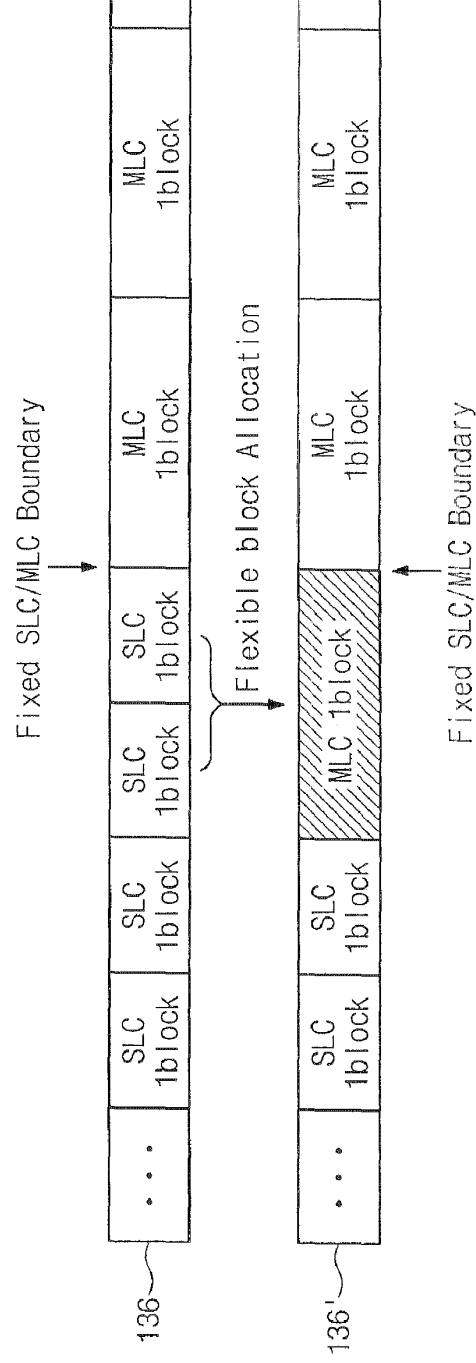


Fig. 6



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