Title: NON-VOLATILE MULTI-THRESHOLD CMOS LATCH WITH LEAKAGE CONTROL

Abstract: An integrated circuit including a Multi-Threshold CMOS (MTCMOS) latch combining low voltage threshold CMOS circuits with high voltage threshold CMOS circuits. The low voltage threshold circuits including a majority of the circuits in the signal path of the latch to ensure high performance of the latch. The latch further including high voltage circuits to eliminate leakage paths from the low voltage threshold circuits when the latch is in a sleep mode. A single-phase latch and a two-phase latch are provided. Each of the latches is implemented with master and slave registers. Data is held in either the master register or the slave register depending on the phase or phases of the clock signals. A multiplexer may alternatively be implemented prior to the master latch for controlling an input signal path during sleep and active modes of the latch and for providing a second input signal path for test.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H03K3/356

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 H03K

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, WPI Data, INSPEC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Relevant to claim No.</th>
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents:

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*E* earlier document but published on or after the international filing date

*L* document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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Date of the actual completion of the international search

28 July 2004

Date of mailing of the international search report

13/08/2004

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Mesic, M

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<td>15-12-1999</td>
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