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12/024,855 1 February 2008 (01.02.2008) US(71) Applicant (for all designated States except US): **NATIONAL SEMICONDUCTOR CORPORATION** [US/US]; 2900 Semiconductor Drive, Santa Clara, CA 95051-8090 (US).

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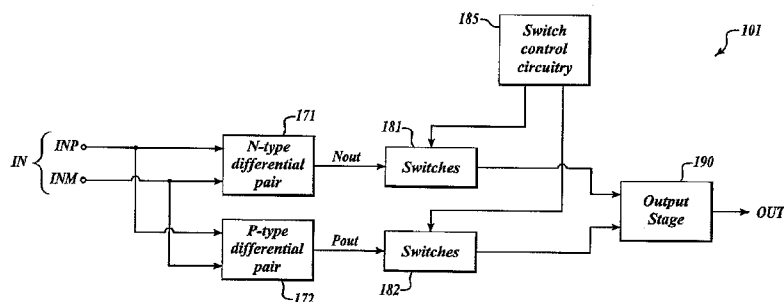
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(54) Title: APPARATUS AND METHOD FOR LOW POWER RAIL-TO- RAIL OPERATIONAL AMPLIFIER

**FIG.1**

(57) Abstract: A rail-to-rail amplifier is provided. The rail-to-rail amplifier includes a p-type differential pair, an n-type differential pair, switches, and an output stage. The switches are arranged to selectively couple either the p-type differential pair or the n-type differential pair to the output stage so that only one of the differential pairs is coupled to the output stage at a time.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/082480**A. CLASSIFICATION OF SUBJECT MATTER****H03F 3/45(2006.01)i, H03F 1/30(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)

IPC 8 : H03F

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 since 1975
Japanese Utility models and applications for Utility models since 1975

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

eKIPASS(KIPO internal) "rail-to-rail operation", "differential pair", "switch control circuitry", "common mode voltage", "current mirror"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US2004/0174216 A1 (Tandur L. Viswanathan et al) Sep. 9, 2004 See Claims 1-12, Fig.1-2	1-20
A	WO 1997/37428 A2 (HUIJSING et al) Oct. 9, 1997 See Claims 1-8, Fig. 6-13	1-20
A	JP2001-60832 A (Matsushita Electric co.) Mar. 6, 2001 See Claims 1-2, Fig.1-2	1-20
A	US05929705 A (Michael Y. Zhang et al) Jul. 27, 1999 See Claims 1-6, Fig.2-3	1-20

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

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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