United States Patent [19]

Itoh et al.

[11] **Patent Number: 4,993,053**

[45] **Date of Patent: Feb. 12, 1991**

[54] **CHARGE TRANSFER DEVICE PROVIDED WITH AN IMPROVED OUTPUT STAGE**

[75] Inventors: **Hiroaki Itoh; Kazuo Miwada,** both of Tokyo, Japan

[73] Assignee: **NEC Corporation,** Japan

[21] Appl. No.: **287,835**

[22] Filed: **Dec. 21, 1988**

[30] **Foreign Application Priority Data**

Dec. 22, 1987 [JP] Japan 62-326178

[51] **Int. Cl.**[5] **G11C 19/28;** H01L 29/78

[52] **U.S. Cl.** **377/60;** 357/24

[58] **Field of Search** 357/24; 377/57–63

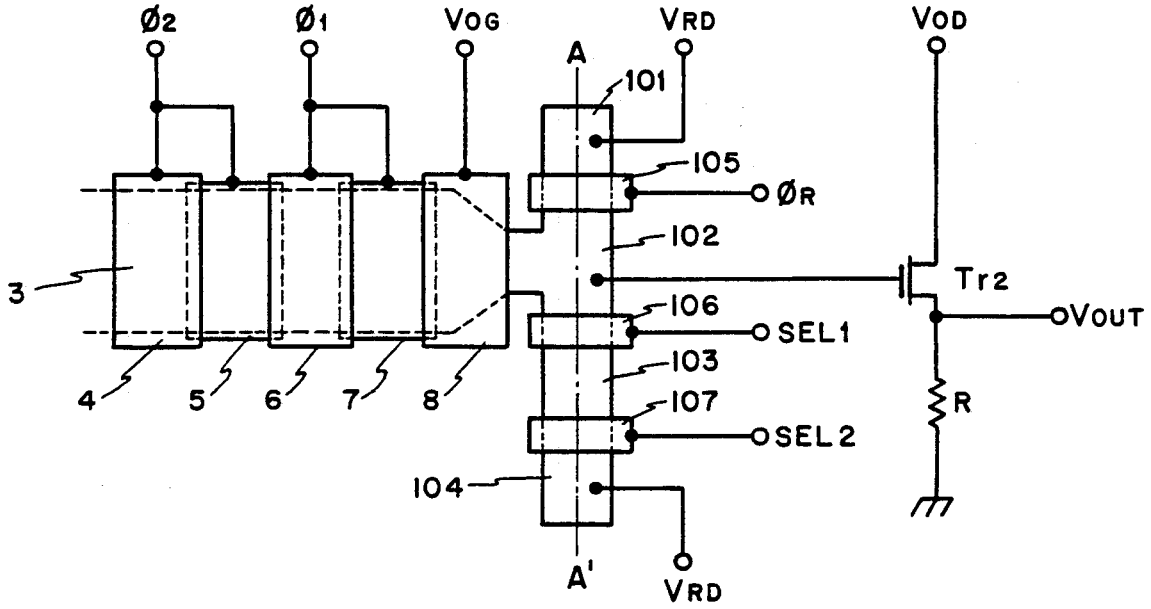
[56] **References Cited**

U.S. PATENT DOCUMENTS

3,903,543 9/1975 Smith 357/24
4,124,861 11/1978 Baertsch et al. 357/24
4,124,862 11/1978 Engeler et al. 357/24
4,377,755 3/1983 Jensen 357/24
4,499,590 2/1985 Bluzer 377/60
4,598,414 7/1986 Dries et al. 377/60

Primary Examiner—Gene M. Munson
Attorney, Agent, or Firm—Laff, Whitesel, Conte & Saret

[57] **ABSTRACT**

There is disclosed a charge transfer device including a semiconductor substrate, a charge transfer section formed on the semiconductor substrate for transferring charges, at least two regions formed in the semiconductor substrate via a PN-junction, one of said regions receiving the charges transferred through the charge transfer section and connected to an output terminal and at least one gate electrode formed on the semiconductor substrate between the regions via an insulator film to form a MOS transistor switch which is switched for controlling the sensitivity of the output stage and the dynamic range of the output signal.

4 Claims, 5 Drawing Sheets