

**(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION**

(13) A1

(22) Date de dépôt/Filing Date: 2008/04/16

(41) Mise à la disp. pub./Open to Public Insp.: 2009/10/16

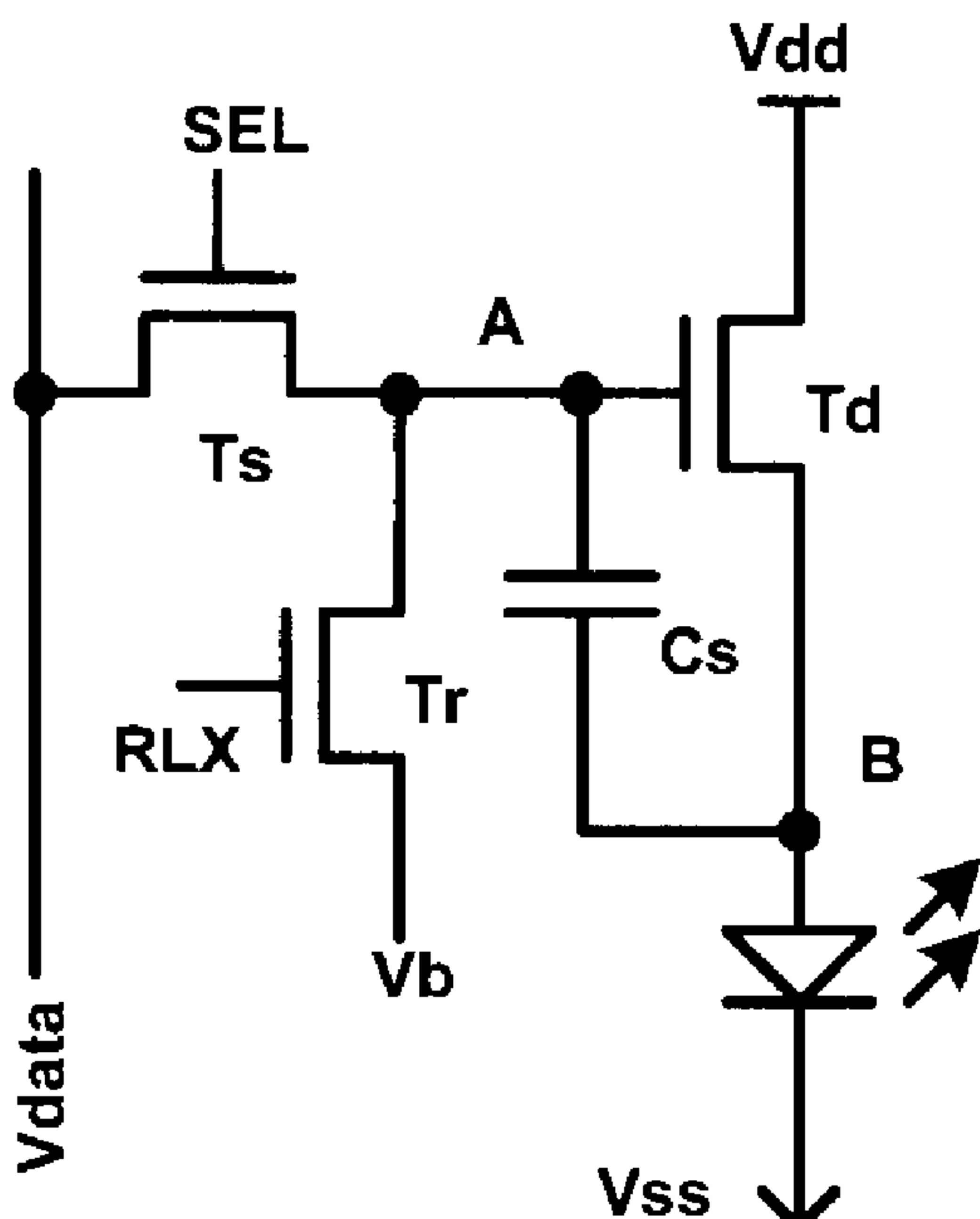
(51) Cl.Int./Int.Cl. *G09G 3/32* (2006.01),
H01L 51/50 (2006.01)

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(54) Titre : RECUPERATION DE NON-UNIFORMITES TEMPORELLES DANS DES AFFICHAGES MATRICIELS ACTIFS

(54) Title: RECOVERY OF TEMPORAL NON-UNIFORMITIES IN ACTIVE MATRIX DISPLAYS



Another pixel embodiment for relaxation driving scheme.

(57) Abrégé/Abstract:

(37) **Abstract.** Disclosed is a technique for recovering the active matrix light emitting display after being under stress.

ABSTRACT

Disclosed is a technique for recovering the active matrix light emitting display after being under stress.

FIELD OF THE INVENTION

The present invention generally relates to active matrix displays, particularly organic light emitting displays.

SUMMARY OF INVENTION

Disclosed technique recovers the display after being aged due to prolonged usage.

ADVANTAGES

This driving scheme improves the display lifetime by recovering the aging of pixel components.

The transistor in this discloser can be implemented using poly silicon, nano/micro Silicon, amorphous silicon, CMOS, organic semiconductor, and metal oxide technologies. Also, the n-type transistor can be easily replaced with p-type transistor using complementary circuit concept.

FIG. 1 shows a pixel embodiment for implementing relaxation driving scheme. Here, the pixel is programmed through T_s with a proper programming voltage. Then, the pixel is ON for a fraction of frame time. After that, the RLX is high and so the gate-source voltage of T_d becomes zero. As a result, the aging of T_d is reduced significantly.

FIG. 2 shows another embodiment for implementing relaxation driving scheme. Here, for relaxation cycle, T_r changes the gate voltage of T_d to V_b . V_b can be zero or a negative voltage that can turn over the aging of T_d .

An example of array structure for relaxation is depicted in FIG. 3 in which the gate driver is shared between $RLX[i]$ and $SEL[i]$ through switches. During the normal programming, the gate driving is connected to the $SEL[i]$ through T_1 and $RLX[i]$ is connected to V_{GL} (the off voltage of the gate driver) through T_4 . During the relaxation cycle, $SEL[i]$ is connected to V_{GL} through T_3 , and $RLX[i]$ is connected to gate driver through T_2 . A timing diagram for this operation is demonstrated in FIG. 5.

To improve the display lifetime, one can apply recovery frames at the end of normal active frames. For example, after user turns of the display, the recovery frames are applied to the display to turn over the pixel's component aging which includes threshold voltage shift of transistors and OLED luminance and/or electrical degradation. During the recovery frame, one can operate the display in relaxation mode. Also, for more effective recovery, the V_{SS} can go to a high voltage so that the OLED is under negative bias voltage.

Also, if the history of pixels' aging is known, each pixel can be programmed with different negative recovery voltage according to its aging profile. This will results in faster and more effective recovery.

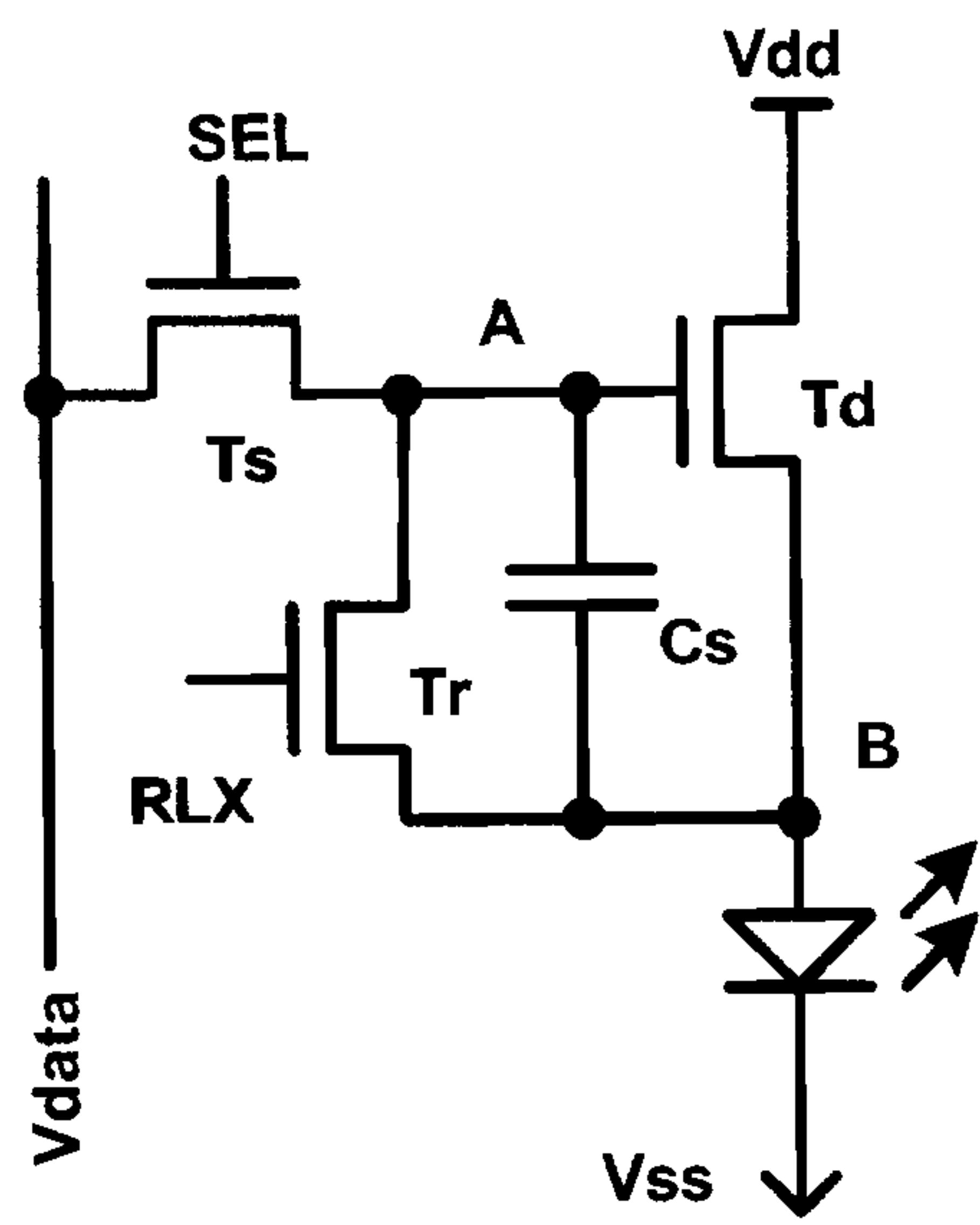


FIG. 1: a pixel embodiment for relaxation.

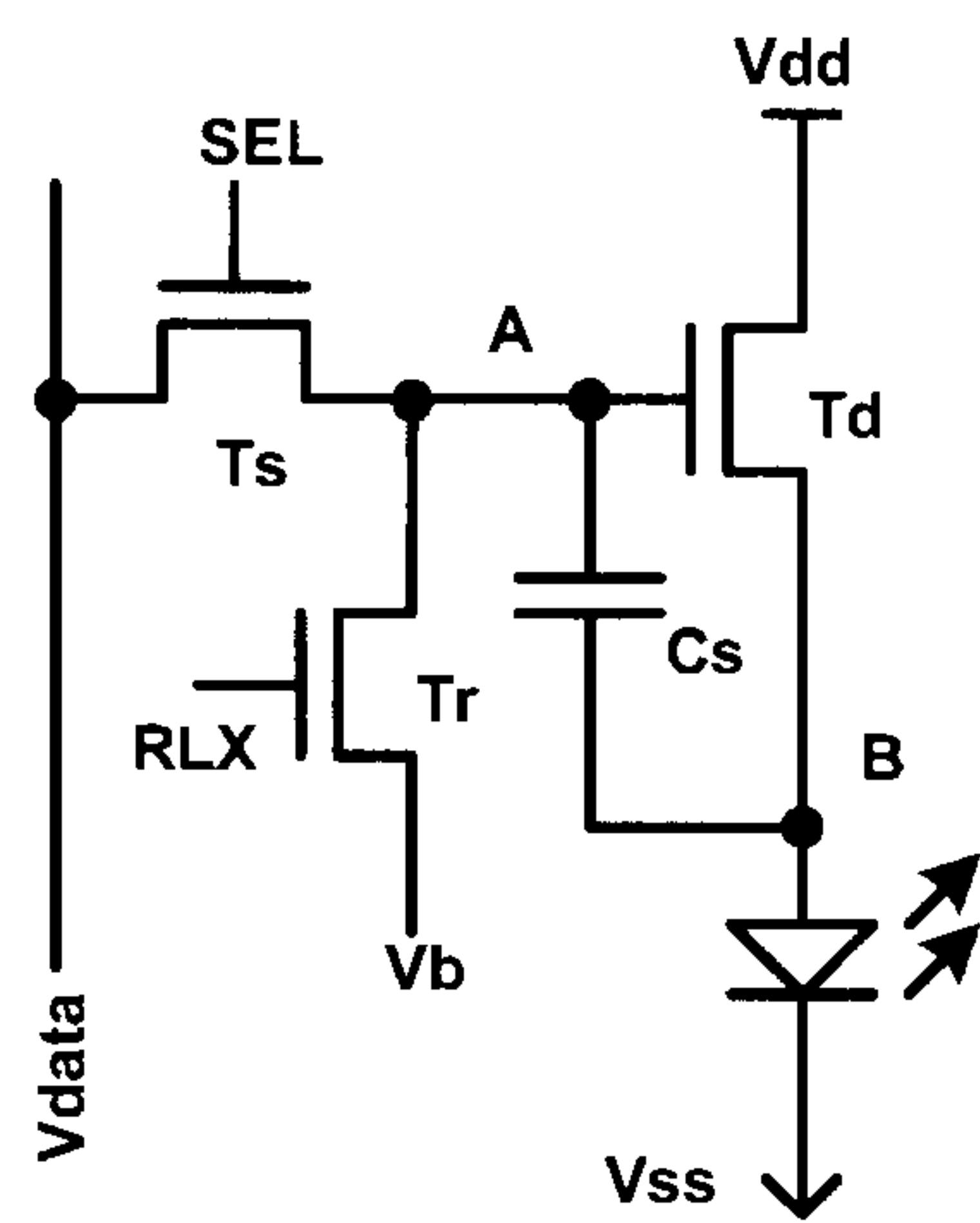


FIG. 2: Another pixel embodiment for relaxation driving scheme.

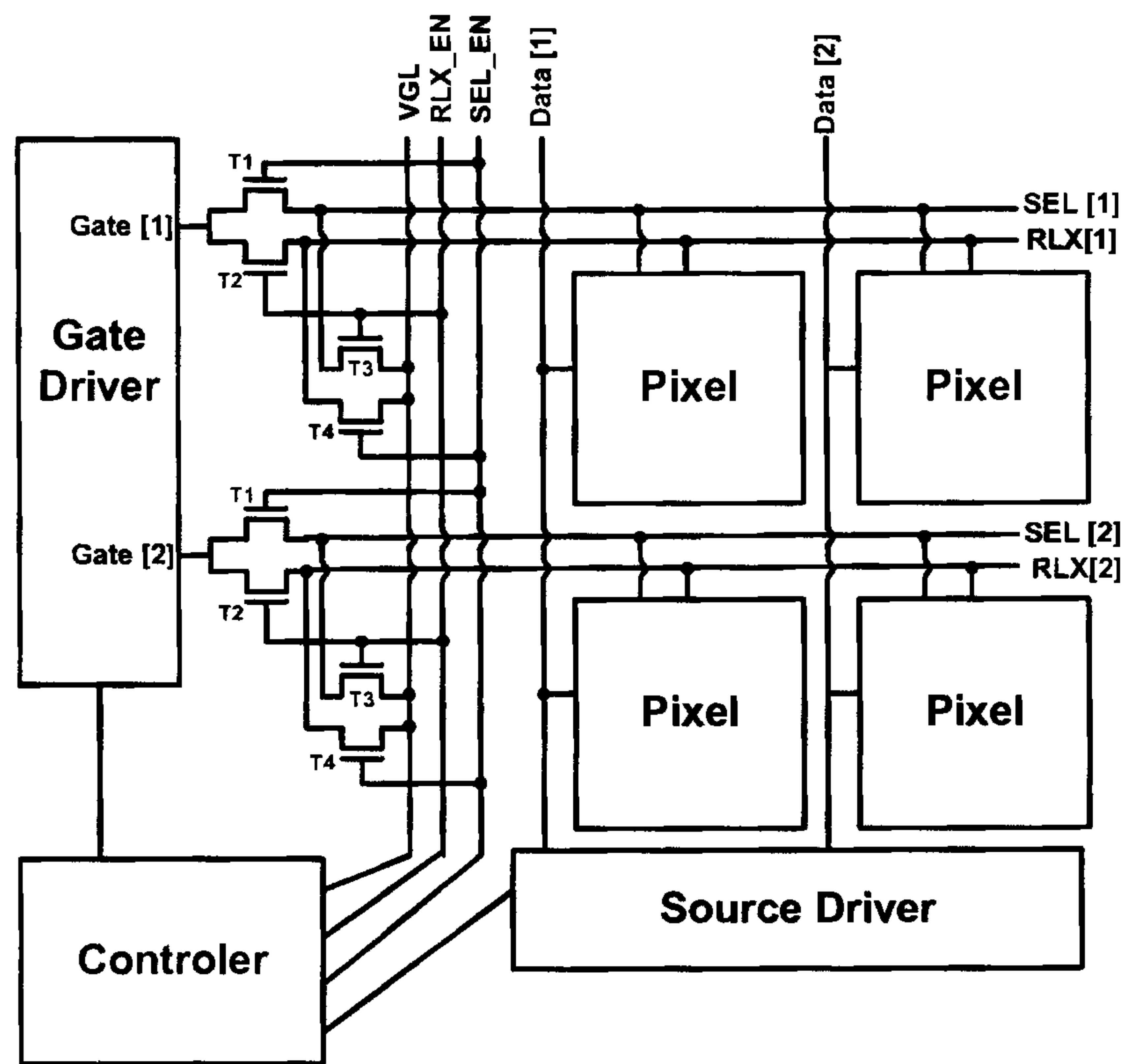


FIG. 3: An example of array structure for implementation of relaxation driving scheme.

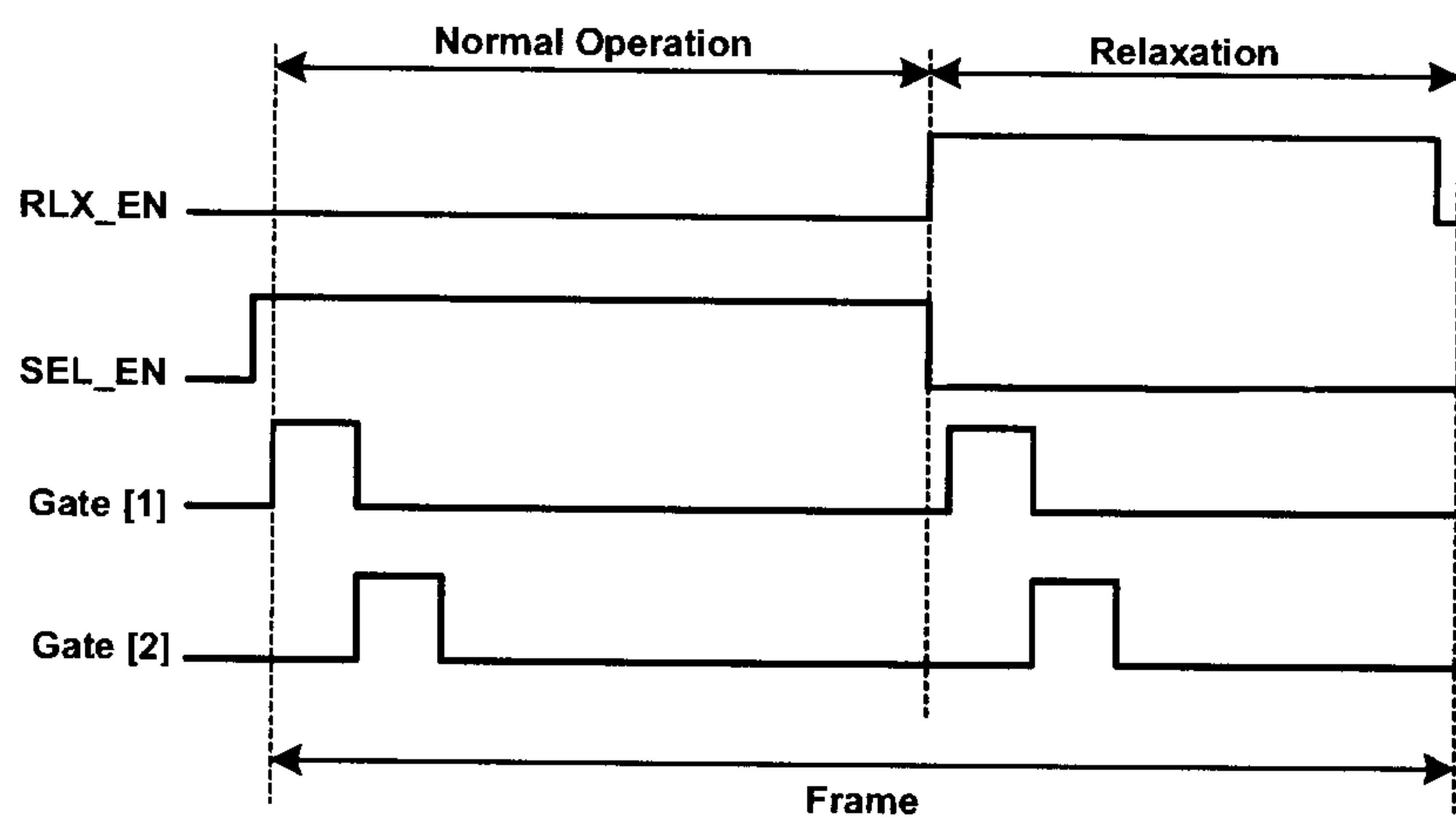


FIG. 4: an example of timing diagram for array in FIG. 3.

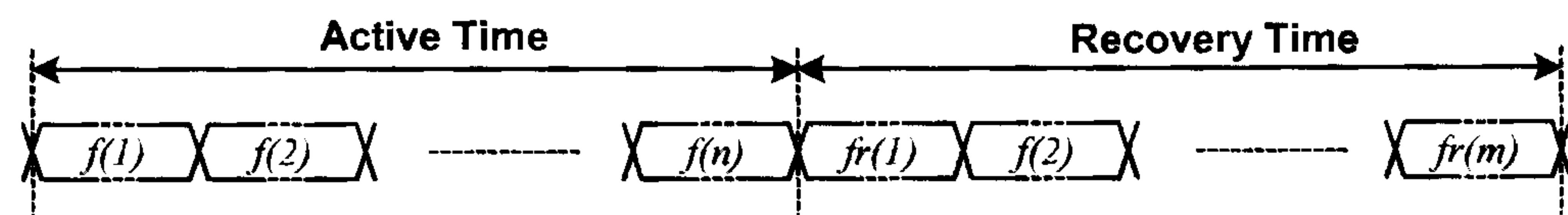
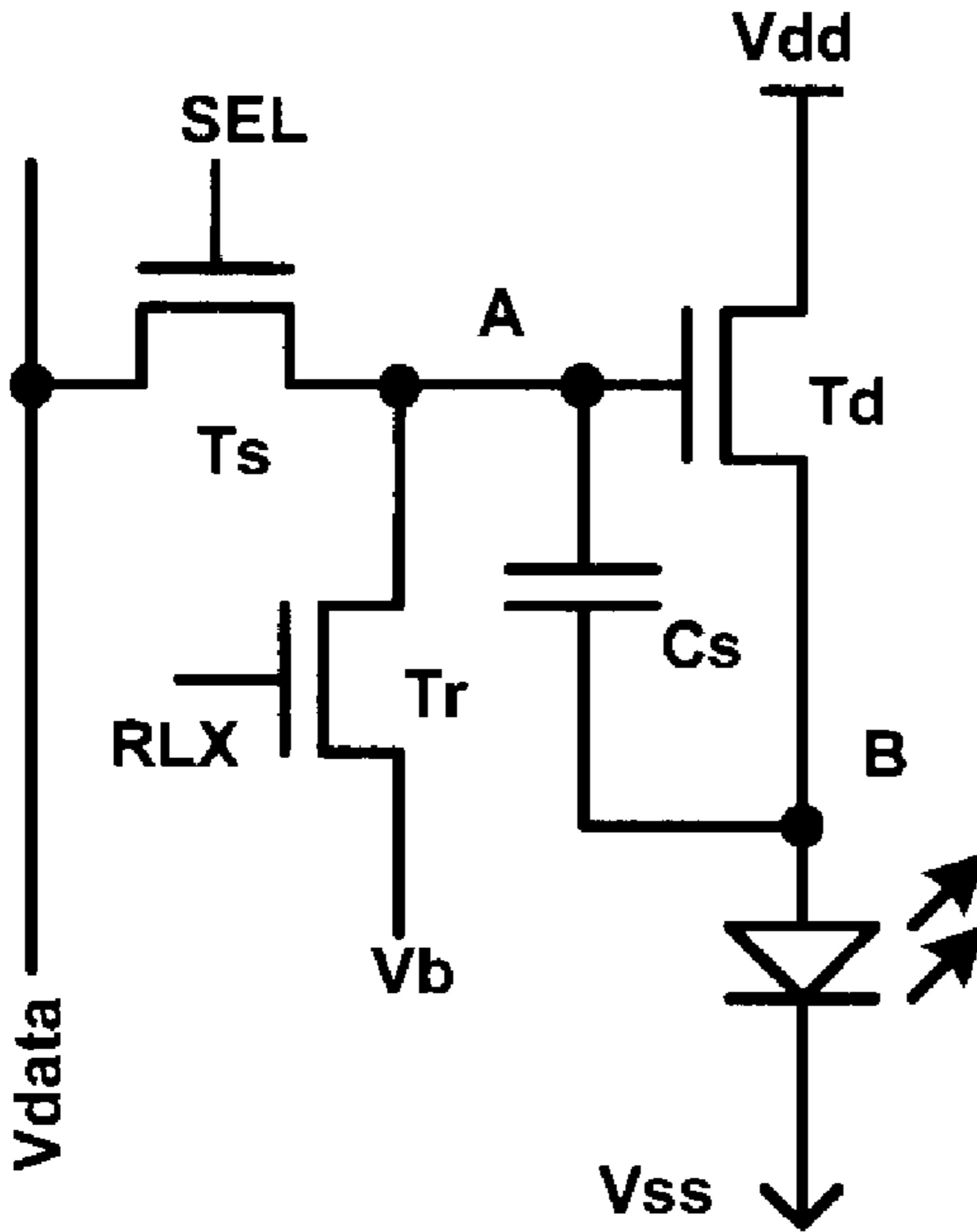


FIG. 6: Recovery driving scheme for improving pixel component stabilities.



Another pixel embodiment for relaxation driving scheme.