

RTS noise reduction of CMOS image sensors using amplifier-selection pixels

ABSTRACT

This paper describes a RTS (random telegraph signal) noise reduction technique for an active pixel CMOS image sensor (CIS) with in-pixel selectable dual source-follower amplifiers. In this CMOS image sensor, the lower-noise transistor in each pixel is selected in the readout operation using a table of determining the lower-noise transistors of all the pixels. A prototype image sensor with 65×290 pixels for demonstrating the effectiveness of this technique has been implemented using $0.18\mu\text{m}$ CMOS image sensor technology with pinned photodiode option. The measured result shows that the maximum noise using the amplifier-selection technique is reduced to $9.6e^-$ from $17.2e^-$ which is the maximum noise of the image array using one of two amplifiers in each pixel without selection.

Keyword: Active-pixel CMOS image sensor; Amplifier-selection pixel; Correlated multiple sampling; Noise reduction; $1/f$ noise; RTS noise