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United States Patent [19]
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[54] **HIGH SENSITIVITY ACTIVE PIXEL WITH ELECTRONIC SHUTTER**

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[57] **ABSTRACT**

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A high sensitivity active pixel for use in MOS image sensor circuits. The pixel circuit design allows the use of digital MOS fabrication processes to be used in implementing a pixel circuit having greater sensitivity (allowing increased frame rate) and greater noise immunity than certain prior art pixels. The novel pixel features a source follower configured amplifier, such as a single MOS FET, coupled between a photodetector and a storage capacitor. A light-generated signal from the photodetector is used to control the charge placed in the storage capacitor in order to develop a capture voltage. In a particular embodiment, an n-channel source follower and a p-channel output stage are combined in the pixel to make the overall transfer function of the pixel more linear and distortion-free. In particular, the pixel transfer function becomes more linear for weak light-generated signals, whereas with conventional pixels, the pixel output signals are often distorted and even suppressed when the light-generated signal is weak. The novel pixel circuit may find particular use in a portable digital image capture system such as a digital camera.

[51] **Int. Cl.**⁷ **G11C 19/30**; H01L 27/02; H01L 27/146

[52] **U.S. Cl.** **250/208.1**; 250/214 A; 348/308

[58] **Field of Search** 250/208.1, 214 LS, 250/214 LA, 214 A, 214 C, 214.1, 214 R; 348/294, 297, 248, 300, 301, 302, 303, 308, 311, 312; 257/225, 231, 236, 239, 290, 291, 292, 294, 443, 444; 327/94; 377/60, 61, 62, 63

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22 Claims, 4 Drawing Sheets

