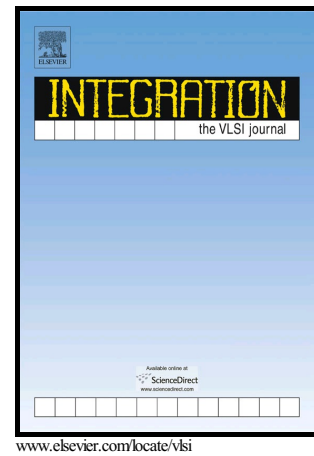


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Javier Lemus-López, Alejandro Díaz-Sánchez, José Miguel Rocha-Pérez, Carlos Muñoz-Montero, Jaime Ramírez-Angulo



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# High Gain Amplifier with Feedforward Compensation Based on Quasi-Floating Gate Transistors

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## Abstract

In this paper, a two-stage amplifier with feedforward frequency compensation scheme is presented. Because the frequency compensation scheme uses the amplifier's second stage  $g_m$  to create the feedforward path no additional circuitry is needed. To verify the proposed scheme a prototype was fabricated using  $0.5\mu\text{m}$  technology. Measurements results demonstrate a high DC gain, 18MHz of gain-bandwidth product and  $86^\circ$  phase margin are achieved with an output load capacitance of 80pF.

*Keywords:* Analog circuits, Frequency compensation, Feedforward, Quasi-floating gate transistors, Two-stage operational amplifiers.

*2010 MSC:* 00-01, 99-00

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## 1. Introduction

The amplifier is one of the most important blocks used to build analog and mixed signal processing systems, and its behavior has a strong effect on their overall performance. The amplifier performance can be established in terms of numerous electrical parameters such as gain, bandwidth and settling-time [1].  
 5 In CMOS technologies below  $0.18\mu\text{m}$ , a harsh decrease in power supply, intrinsic gain, and signal swing has been observed. At the same time, because threshold voltages are not decreasing in the same proportion as power supply, the voltage headroom in analog circuitry is strongly limited [2], making the design of high  
 10 gain amplifiers using multistage structures a harder task. One of the most common solutions is the use of a cascode amplifier, which increases its gain through a vertical stacking of transistors, but this results in a smaller swing not suitable in low voltage applications. Another solution is the use of cascade amplifiers,

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