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Design of a Low Voltage Low Power Self-biased OTA Using Independent Gate FinFET and PTM Models

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Abstract

In this paper a low power low voltage operational transconductance amplifier has been designed using IGFinFET. Pseudo differential pair and self-biased techniques have been used for rail-to-rail input operation of the OTA. The new technique used in this paper has the advantage of bulk-drive technique for low voltage analog designs without bulk-drive limitations. Using double gate FinFET, one gate has been used to adjust threshold voltage, while the input signal is applied to the other gate. Optimum g_m and r_o have been investigated for different gate configurations of the IGFinFET. Power consumption of the IGFinFET circuit is lower than its CMOS counterpart and shows good merits for analog design in analog and mixed signal applications. DFC method has been used for frequency compensation that needs smaller capacitors. Predictive Technology Model (PTM) 20nm IGFinFET has been employed for HSPICE simulations. The designed amplifier has 39.27 dB gain with 45.05° phase margin and unity-gain bandwidth of 8.26 MHz with 37.75 μW power dissipation from a single 0.5 V power supply.

Keywords: Low power, Low voltage, IGFinFET, OTA, Double gate

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