Abstract

Variable-gain amplifier (VGA) is one of the basic building blocks of many communication systems. In this paper we present a novel structure of VGA with 22 db of gain range and 220 MHz of bandwidth frequency variation. This circuit combines a voltage to current (V-I) converter and two-stage CMOS amplifier to achieve programmable gain and bandwidth. The gain is varied by changing the input voltage (Vin) from -1V to 0V. The maximum bandwidth is about 300 MHz. The gain can be varied from 38 dB to 60 dB in 1 dB gain steps. The overall circuit draws current from 10µA to 150µA at ±1.5V power supply. The noise figure of the system at maximum gain is 18dB, and the third-order intermodulation intercept point (IIP3) at minimum gain is -8 dBm. Simulations results with static and dynamic behaviour is presented and validated with the technology AMS 0.35µm. Eventually we have also succeeded in reducing the static power consumption to 0.5 mW.

References

- Chun-Hsien Wu and Yeh-Ching Chung: "Heterogeneous Wireless Sensor Network"
Low Power Variable gain amplifier with Bandwidth of 80–300 MHz using for Sigma-Delta analogue to digital converter in Wireless Sensor Receiver Deployment and Topology Control Based on Irregular Sensor Model,

- Trung kien Nguyen, Nam Jin Oh, and Viet Hoang Le, Member IEEE. A Low Power CMOS Direct Conversion Receiver With 3dB NF and 30KHz Flicker-Noise Corner for 915-MHz Band IEEE 802. 15. 4 ZigBee Standard, IEEE Transaction on Microwave Theory and Techniques 2006.


**Index Terms**

Computer Science  
Circuit And Systems

**Keywords**

Radio Frequency Receiver  
Vga  
Cmos Analog Integrated Circuits  
Cmos Ota Design