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

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