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2.4 GHz 0.13µM Multi Biased Cascode Power Amplifier for ISM Band Wireless Applications

Authors : Udayan Patankar, Shashwati Bhagat, Vilas Nitneware, Ants Koel

Abstract : An ISM band power amplifier is a type of electronic amplifier used to convert a low-power radio-frequency signal into a larger signal of significant power, typically used for driving the antenna of a transmitter. Due to drastic changes in telecommunication generations may lead to the requirements of improvements. Rapid changes in communication lead to the wide implementation of WLAN technology for its excellent characteristics, such as high transmission speed, long communication distance, and high reliability. Many applications such as WLAN, Bluetooth, and ZigBee, etc. were evolved with 2.4GHz to 5 GHz ISM Band, in which the power amplifier (PA) is a key building block of RF transmitters. There are many manufacturing processes available to manufacture a power amplifier for desired power output, but the major problem they have faced is about the power it consumed for its proper working, as many of them are fabricated on the GaN HEMT, Bi COMS process. In this paper we present a CMOS Base two stage cascode design of power amplifier working on 2.4GHz ISM frequency band. To lower the costs and allow full integration of a complete System-on-Chip (SoC) we have chosen 0.13µm low power CMOS technology for design. While designing a power amplifier, it is a real task to achieve higher power efficiency with minimum resources. This design showcase the Multi biased Cascode methodology to implement a two-stage CMOS power amplifier using ADS and LTSpice simulating tool. Main source is maximum of 2.4V which is internally distributed into different biasing point VB driving and VB driven as required for distinct stages of two stage RF power amplifier. It shows maximum power added efficiency near about 70.195% whereas its Power added efficiency calculated at 1 dB compression point is 44.669 %. Biased MOSFET is used to reduce total dc current as this circuit is designed for different wireless applications comes under 2.4GHz ISM Band.

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