一個1伏特2.4GHz具有電流匹配電荷幫浦之互補式金氧半頻率合成器

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摘要

本篇論文描述一個工作在低電壓 2.4GHz 的互補式金氧半整數除頻頻率合成器中。本論文改良了一個已提出的電荷幫浦電路，這個新的電荷幫浦電路電路具有電流匹配特性且不再具有 start-up 問題，可以有效的抑制雜頻的產生。並且使用了電容切換的壓控振盪器來降低其增益，並得以更進一步的降低寄生雜頻。一個基底驅動且可在低電壓操作的運算放大器被使用在電荷幫浦電路中。

以台灣積體電路製造股份有限公司以 0.25 微米製程實現，並自行量測完成。量測結果顯示本架構可使雜頻訊號較主訊號低六十五分貝，相位雜訊在 1 MHz 偏移量下每赫茲較主訊號低 111.14 分貝。這個電路所消耗的功率為 23 微瓦特。

A 1-V 2.4-GHz CMOS Frequency Synthesizer with Current-Match Charge Pump

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Abstract

A 1.3-V 2.4-GHz fully integrated frequency synthesizer for Bluetooth applications is proposed and designed in 0.25-um CMOS technology. An improved current-match charge pump circuit without the start-up problem is used to reduce the spur level. Moreover, a bandswitching VCO is used to reduce the Kvco and hence the spur level can be further reduced. The prescaler is designed in 1-V supply voltage without the supply-voltage boosting. In order to operate in 1-V supply voltage, an op-amp with bulk-driven differential transconductor has been used in the current-match charge.

The circuit is fabricated using a standard TSMC 0.25um CMOS process and has been measured completely. The measured phase noise at 1-MHz offset is -111.14dBc/Hz, and the spur level at 1MHz offset is -64.87dBc. The operating frequency range is from 2.4-GHz to 2.48-GHz. The frequency synthesizer can operate at 1.3-V of power supply and consume 23-mW.

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