Compact Wide-Range Sinusoidal Signal Generator for \textit{in vivo} Impedance Spectroscopy

Moustafa Nawito, Harald Richter and Joachim N. Burghartz

Institute for Microelectronics Stuttgart (IMS CHIPS)
Allmandring 30a, 70569 Stuttgart, Germany
Email: nawito@ims-chips.de

Abstract—this work presents a compact wide-range fully integrated sinusoidal signal generator for \textit{in vivo} Electrochemical Impedance Spectroscopy applications. The circuit is based on a novel architecture combining aspects of direct digital synthesis and interpolation digital to analog conversion. The signal generator demonstrates very precise frequency tuning and high spectral purity, while offering a simple architecture and an uncomplicated clocking scheme. The circuit is fabricated using a 0.5\textmu m sea of transistors CMOS process and occupies 0.32mm$^2$ of active die area. Consuming 110\textmu A at a 3V supply, the circuit covers eight decades of frequency from 1mHz to 100kHz and meets the necessary low energy and high precision requirements for implantable bio-diagnostics.