A Programmable Voltage-to-Frequency Converter for Low-Power Sensor Interfaces

Cristina Azcona, Belén Calvo, Nicolás Medrano, Santiago Celma, Group of Electronic Design – I3A, University of Zaragoza, Spain

Abstract

This paper presents a low-cost versatile CMOS voltage-to-frequency converter (VFC) suitable for sensor node signal conditioning in wireless sensor network applications. The proposed VFC, based on an input voltage to current converter followed by a bidirectional current integrator driven by a voltage window comparator, can provide different output frequency ranges by digitally selecting different current scaling paths and offset currents. A prototype designed in a 1.8 V- 0.18µm CMOS technology attains, for a 0.0-1.6V input voltage range, two frequency bands: 0.0 to 500kHz (500kHz/V) or 0.0 to 2MHz (1.5MHz/V). By adding an offset current for the second stage, output frequencies are displaced to the 0.5MHz-2.5MHz band, to realize non-overlapping 0.0-0.5MHz and 0.5MHz-2.5MHz ranges. The accuracy achieved in all cases is better than 2.5 %, with linearity errors below 0.015 % and maximum power consumption of 0.51mW.