

MEMS 压力传感器电容读出电路

柳林刚, 李荣宽, 赵路坦

(电子科技大学 电子工程学院, 四川 成都 611731)

摘要: 提出了新的一种用于 MEMS 压力传感器的电容数字转换方法. 与传统的将电容值转换成电压值的方法不同, 该方法是将微弱电容信号转换为时间间隔, 然后通过计数器量化、数字滤波器处理, 得到高精度、宽输入范围的电容读出电路. 这种方法下的电路结构简单, 受供电电压影响较小, 具有很高的线性度. 在 cadence 环境下, 基于 TSMC 标准的 BCD0.25 μ m CMOS 工艺模型, 对电路进行设计和仿真. 该电路输入范围可达 8 pF, 分辨率为 4 fF.

关键词: MEMS 压力传感器; 高精度; 电容数字转换器; 仿真

MEMS Capacitive Pressure Sensor Readout Circuit

LIU Lin-gang, LI Rong-kuan, ZHAO Lu-tan

(College of Electronic Engineering, University of Electronic Science and Technology, Chengdu 611731, China)

Abstract: In this paper, a new method converting capacitance to digital has been proposed for MEMS pressure sensor. It is different from traditional way that converting the capacitance to voltage. The weak capacitance signal is converted to the time interval which is quantified by a counter and dealt with the digital filter for high precision capacitance-digital converter. This method is using a simple circuit structure which is less affected by the supply voltage with high linearity and wide input range. Under cadence environment, the circuit is designed and simulated based on TSMC standard BCD 0.25 μ m CMOS process model. The circuit's input can range up to 8 pF and the resolution is 4 fF.

Key words: MEMS pressure sensor; high precision; capacitance to digital converters; simulation

作者简介:

柳林刚 男, (1990-), 硕士研究生. 研究方向为数模混合集成电路设计. E-mail: liulingang1025@163.com.

李荣宽 男, (1968-), 博士, 副教授. 研究方向为混合信号集成电路设计.