

一种超低功耗高精度温度传感器芯片设计

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摘 要: 设计了一种基于 UMC 0.18 μm CMOS 工艺的超低功耗、高精度的温度传感器芯片。该温度传感器芯片以温度相关振荡器感应温度变化, 通过温度相关振荡器与温度无关振荡器频率的比较, 将温度信号转化为数字信号输出。温度相关振荡器采用了新型环形振荡器结构, 有效降低了功耗, 并提高了温度测量的精度。该温度传感器核心电路面积只有 0.08 mm^2 , 仿真结果表明, 在 1.8 V 电压下, 传感器芯片消耗电流只有 0.2 μA , 经过校准后精度为 0.1 $^\circ$ 。

关键词: 温度传感器芯片; 超低功耗

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A Novel Ultra-low Power Temperature Sensor IC with High Precision

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Abstract: A novel ultra low power high precision temperature sensor IC is presented. The temperature sensor consists of a temperature dependent oscillator, and the output of the oscillator is compared to a temperature independent frequency signal to generate the digital output. A novel ring oscillator has been used for the temperature dependent oscillator, to reduce the power consumption and to improve the measurement accuracy. The temperature sensor IC is realized in the standard 0.18 μm CMOS process, and the circuit die area is only 0.08 mm^2 . Simulation results show that the temperature measurement accuracy is 0.1 degree after calibration. The current consumption of the sensor IC is only 0.2 μA .

Key words: temperature sensor; low power consumption

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