

集成于无源UHF RFID标签的高分辨率CMOS温度传感器

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摘要:

本文提出一种高分辨率的集成于无源UHF RFID标签的CMOS温度传感器结构。采用时域数字量化的方式, 用PTAT (Proportional to Absolute Temperature, 与绝对温度成正比) 电流源和标签内部振荡器构成的PTAT振荡器产生脉冲宽度与温度相关的脉冲信号, 作为计数器的时钟信号, 在温度-50℃-50℃范围内, 脉冲周期从1.841 μ s-0.426 μ s; 用数字电路对阅读器发送的帧头命令进行处理得到一个宽度为200 μ s的宽脉冲信号, 作为计数器的使能信号, 该脉冲的宽度完全不受温度影响; 通过采样计数, 得到包含温度信息的数字信号。本设计采用UMC18 CMOS工艺, 电源电压为1.8V, 直流功耗为789nW, 温度传感器后仿的有效分辨率达到0.332LSB/℃。

关键词: 无源RFID 温度传感器 高分辨率 CMOS工艺

A High-Resolution CMOS Temperature sensor integrated in Passive UHF RFID tag

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Abstract:

This article presents a high-resolution CMOS temperature sensor architecture integrated in passive UHF RFID tag. The architecture uses the method of digitalizing and sampling in time-domain. A PTAT(Proportional to absolute temperature) current source and the oscillator inside the tag compose a PTAT oscillator, which generates a pulse whose period is related with absolute temperature. This pulse will be the clock signal of a counter. Within the range of -50℃-50℃, the period of the pulse is from 1.841 μ s to 0.426 μ s. Also, the design uses a digital circuit to deal with the preamble command in order to get a pulse whose period is 200 μ s and absolutely not affected by absolute temperature. This pulse will be the enable signal of the same counter. By means of sampling and counting, we get digital signal with temperature information. The design uses UMC18 CMOS process, the supply voltage is 1.8V, the DC power dissipation is 789nW, and the post-simulation effective resolution is 0.332LSB/℃.

Keywords: Passive UHF RFID; Temperature sensor; High-Resolution; CMOS process

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