

## 基于环形肖特基二极管的MEMS陀螺仪接口ASIC电路温度特性分析与设计

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摘要：

本文完成了采用环形二极管结构的MEMS陀螺仪接口ASIC电路设计并且理论分析了环形肖特基二极管的温度特性对电路输出的影响。MEMS陀螺仪系统采用高频载波调制方案，在陀螺仪可动质量块施加1MHz载波，将陀螺仪振动信号调制到载波附近。环形肖特基二极管作为调制解调器，解调陀螺仪输出已调信号得到陀螺仪振动信号。这种方案可以有效放大陀螺仪输出信号。理论和仿真结果表明，肖特基二极管阈值电压随温度的变化会改变电路增益，引入一个正温度系数。本文采用负温度系数反馈电阻，从而降低电路总的温度系数。本文ASIC电路基于0.18 $\mu\text{m}$  CMOS工艺实现。

关键词：ASIC；MEMS陀螺仪；环形肖特基二极管；温度特性

## Analysis of temperature characteristic and design of interface ASIC based on ring Schottky diode for MEMS gyroscope

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**Abstract:**

This paper describes the design of interface ASIC based on ring Schottky diode for MEMS gyroscope and analyzes influence of temperature characteristic of Schottky diode to the interface ASIC. A carrier of 1MHz is used to drive the mass and move the variation signal to the region nearby 1MHz by modulation. The modulated signal is demodulated by ring Schottky diode. This scheme can amplify signal of gyroscope effectively. It shows that the non-ideality of Schottky diode varies gain of the circuit. Feedback resistor with negative temperature coefficient is used to decrease total temperature coefficient. This circuit is implemented in 0.18  $\mu\text{m}$  CMOS process.

**Keywords:** ASIC; MEMS gyroscope; ring Schottky diode; temperature characteristic

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