SIMPLIFIED OSCILLATOR CIRCUIT DESIGN FOR RESONATORS

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ABSTRACT

The layout of electrodes in the design of modern MEMS resonators has been one of the crucial aspects in ensuring a small feed-through capacitance. Consequently, complicated design are neccessary that usually require vacuum packaging to make sure that the parasitic feed-through capacitance does not render the resonator unusable. This vacuum must be maintained for the lifetime of the resonator. Approaches used to ensure correct resonator operation include: reduction of the minimum gap in the MEMS mechanical structure; the addition of CMOS transistors on the same substrate as the MEMS mechanical structure also known as integration with electronics; and vacuum encapsulation of the MEMS during the resonator fabrication instead of package level vacuum packaging.

To address this complexity, researchers at the University of California, Berkeley have developed a simpler oscillator circuit that eliminates the effects of parasitic feed-through capacitance on resonators. This new circuit allows the operation of resonators with values of feed-through capacitance much larger than previously possible. As a result the new design enables simplification of the overall oscillator and resonator design and allows more freedom in the resonator architecture. The packaging of the MEMS resonator is simplified thereby reducing cost and increasing reliability. Vacuum packaging is no longer needed and minimization of feed-through capacitance can be less stringent with the new oscillator design. The new oscillator circuit supports MEMS fabrication processes with large gaps, and no integrated electronics or vacuum packaging (chip or package level).

APPLICATIONS

Resonators, MEMS Resonators, and Wireless Transceivers

ADVANTAGES

Lower cost and greater reliability

Simplified design with large gaps, and no integrated electronics or vacuum packaging

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20080178682	07/31/2008	2004-098

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OTHER INFORMATION

KEYWORDS

RF, networking, digital circuits: microprocessors, digital circuits, MEMS, communications, MEMS: structure, wireless: component, semiconductor, wireless: method, wireless: system, wireless

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