

Single-chip multiple-frequency MEMS resonators

Inventor

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STAGE OF DEVELOPMENT

Prototype

INTELLECTUAL PROPERTY

United States Patent 8,729,779

REFERENCE MEDIA

Piazza, G., Stephanou, P. J., & Pisano, A. P. (2007). [Single-chip multiple-frequency ALN MEMS filters based on contour-mode piezoelectric resonators](#). *Micro-electromechanical Systems, Journal of*, 16(2), 319-328.

DESIRED PARTNERSHIPS

- License

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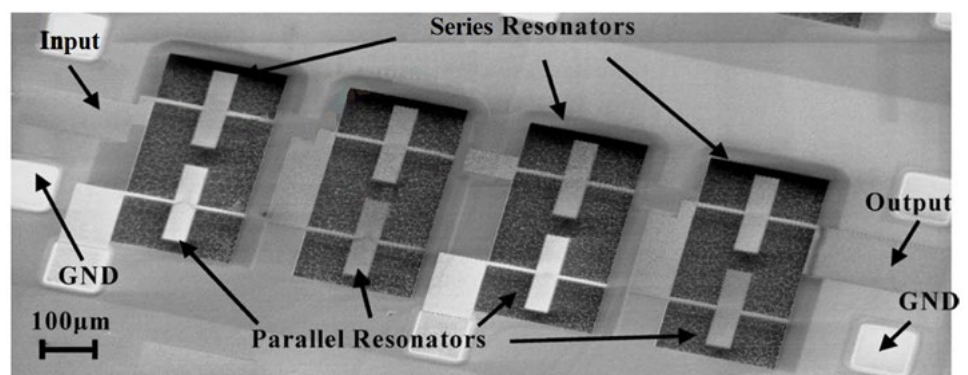
Docket # T4453

Problem

The increasing use of networked devices is driving a need for smaller, more efficient wireless components. Making RF MEMS filters smaller and easier to integrate with CMOS on-chip fabrication would allow for cost and size savings.

Solution

A new resonator design from the University of Pennsylvania allows the co-fabrication of multiple frequency filters on the same chip. A ladder structure composed of contour-mode Aluminum Nitride piezoelectric resonators is used to form low insertion loss bandpass filters. These devices can be designed to control their bandwidth and center frequency, allowing for multiple filters operating on different bands to be fabricated side by side. This integration allows for filters to be constructed 20x smaller than existing surface acoustic wave resonator based devices. The CMOS-compatible fabrication process could allow smaller filters and duplexers to be fabricated directly onto chips, reducing the size of mobile networked devices and adding key value for Internet of Things devices.



Advantages

- Compatible with existing CMOS fabrication
- Multiple resonators can be fabricated on a single chip for use as filters or duplexers
- 20x smaller than surface acoustic resonators for compact on-chip fabrication