

OVERTONE PIEZOELECTRIC RESONATOR FOR POWER CONVERSION

Tech ID: 33625 / UC Case 2024-159-0

PATENT STATUS

| Country | Type | Number | Dated | Case |
|---------------------------|-----------------------|----------------|------------|----------|
| Patent Cooperation Treaty | Published Application | WO 2025/264586 | 12/26/2025 | 2024-159 |

BRIEF DESCRIPTION

The demand for power electronics with smaller volumes, lighter weights, and lower cost has motivated ongoing investigation into alternative power passive component technologies. Miniaturization of power converters is bottlenecked by magnetics, whose power densities fundamentally reduce at small scales. Capacitors exhibit much more favorable densities at small sizes, but efficient voltage regulation and galvanic isolation are difficult to achieve without magnetics. Therefore piezoelectric components have emerged as compelling alternative passive components for power electronics. However, their high-performance capabilities have been limited to applications of high load impedance due to the high characteristic of piezoelectric resonators (PRs) themselves.

To overcome this challenge, UC Berkeley researchers have developed novel piezoelectric resonator (PR) designs based on overtones, with enhanced power densities and reduced optimal load impedances. The overtone PRs have been demonstrated to have comparable efficiency to fundamental-mode PRs, while their capabilities for power handling density and lower optimal load impedances are increased. Use of overtone PRs can expand the utility of piezoelectrics to a wider scope of power electronics.

SUGGESTED USES

- » Dc-dc power converters, dc-ac power converters, ac-dc power supplies, active inductors

ADVANTAGES

- » Magnetic-less (miniaturizable), high-efficiency power conversion
- » Higher power handling density and lower optimal load impedance than existing PR designs, for wider scope of applications

RELATED MATERIALS

- » W. Xu, et al., "Overtone Piezoelectric Resonators for Power Conversion," 2024 IEEE Workshop on Control and Modeling for Power Electronics (COMPEL), Lahore, Pakistan, 2024, pp. 1-8. - 06/08/2024

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Piezoelectric Transformers For Power Conversion](#)
- ▶ [Active Inductor Based On A Piezoelectric Resonator](#)

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

- » **Computer**
- » Hardware
- » Other
- » **Semiconductors**
- » Other
- » **Sensors & Instrumentation**
- » Other
- » Scientific/Research

RELATED CASES

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