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(19) **United States**(12) **Patent Application Publication****Shen et al.**(10) **Pub. No.: US 2022/0368308 A1**(43) **Pub. Date: Nov. 17, 2022**(54) **BULK ACOUSTIC WAVE RESONATOR
FILTERS INCLUDING REJECTION-BAND
RESONATORS**(71) Applicant: **Akoustis, Inc.**, Huntersville, NC (US)(72) Inventors: **Ya Shen**, Huntersville, NC (US);
Michael D. Hodge, Belmont, NC (US)(21) Appl. No.: **17/661,367**(22) Filed: **Apr. 29, 2022****Related U.S. Application Data**

(60) Division of application No. 17/119,052, filed on Dec. 11, 2020, now Pat. No. 11,349,453, which is a continuation of application No. 16/660,227, filed on Oct. 22, 2019, now Pat. No. 10,873,317, which is a continuation-in-part of application No. 16/135,276, filed on Sep. 19, 2018, now Pat. No. 10,673,513, which is a continuation-in-part of application No. 16/019,267, filed on Jun. 26, 2018, now Pat. No. 10,979,022, which is a continuation-in-part of application No. 15/784,919, filed on Oct. 16, 2017, now Pat. No. 10,355,659, which is a continuation-in-part of application No. 15/068,510, filed on Mar. 11, 2016, now Pat. No. 10,217,930.

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(57)

ABSTRACT

A BAW resonator filter can include a BAW resonator pass-band filter ladder, the BAW resonator pass-band filter ladder can be configured to pass frequency components of an input signal in a pass-band of frequencies received at an input node of the BAW resonator pass-band filter ladder to an output node of the BAW resonator pass-band filter ladder. A first rejection-band series resonator can be coupled in series between an input port of the BAW resonator pass-band filter ladder and the input node, the first rejection-band series resonator can have a first anti-resonant frequency peak in a rejection-band of frequencies that is less than the pass-band of frequencies. A second rejection-band series resonator can be coupled in series between an output port of the BAW resonator filter and the output node, the second rejection-band series resonator can have a second anti-resonant frequency peak in the rejection-band of frequencies.

