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## (54) SURFACE ACOUSTIC WAVE FILTER WITH A CAP LAYER FOR IMPROVED RELIABILITY

(71) Applicant: **RF Micro Devices, Inc.**, Greensboro,

NC (US)

(72) Inventors: **Kurt G. Steiner**, Orlando, FL (US); **Curtiss Hella**, Apopka, FL (US);

Benjamin P. Abbott, Longwood, FL (US); Daniel Chesire, Winter Garden, FL (US); Chad Thompson, Apopka, FL (US); Alan S. Chen, Windermere, FL (US)

(73) Assignee: Qorvo US, Inc., Greensboro, NC (US)

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## Related U.S. Application Data

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- (58) Field of Classification Search

CPC .. H03H 3/04; H03H 3/08; H03H 3/10; H03H 9/02559; H03H 9/02614; H03H 9/02622; (Continued)

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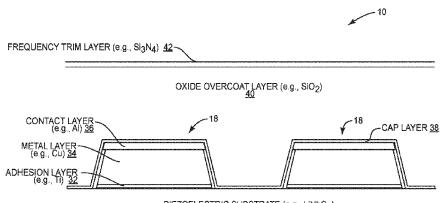
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Primary Examiner — Barbara Summons (74) Attorney, Agent, or Firm — Withrow & Terranova, P.L.L.C.

# (57) ABSTRACT

Embodiments of a Surface Acoustic Wave (SAW) device, or filter, and methods of fabrication thereof are disclosed. In some embodiments, the SAW filter comprises a piezoelectric substrate and an Interdigitated Transducer (IDT) on a surface of the piezoelectric substrate. The IDT includes multiple fingers, each comprising a metal stack. The SAW filter further includes a cap layer on a surface of the IDT opposite the piezoelectric substrate and on areas of the surface of the piezoelectric substrate exposed by the IDT. The cap layer has a thickness in a range of and including 10 to 500 Angstroms and a high electrical resistivity (and thus a low electrical conductivity). For instance, in some embodiments, the electrical resistivity of the cap layer is greater than 10 kilo-ohm meters (K $\Omega$ ·m). The SAW filter further includes an oxide overcoat layer on a surface of the cap layer opposite the IDT and the piezoelectric substrate.

## 18 Claims, 8 Drawing Sheets



PIEZOELECTRIC SUBSTRATE (e.g., LINbO<sub>3</sub>)