



US 20220407500A1

(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2022/0407500 A1**
(43) **Pub. Date: Dec. 22, 2022**(54) **WIDE-BAND ACOUSTICALLY COUPLED
THIN-FILM BAW FILTER**(30) **Foreign Application Priority Data**

Oct. 14, 2010 (FI) 20106063

(71) Applicant: **Teknologian tutkimuskeskus VTT Oy,**
Espoo (FI)**Publication Classification**(72) Inventors: **Johanna Meltaus,** Espoo (FI); **Tuomas
Pensala,** Espoo (FI)(51) **Int. Cl.**
H03H 9/54 (2006.01)
H03H 9/56 (2006.01)(21) Appl. No.: **17/849,744**(52) **U.S. Cl.**
CPC **H03H 9/547** (2013.01); **H03H 9/564**
(2013.01); **H03H 9/568** (2013.01)(22) Filed: **Jun. 27, 2022****Related U.S. Application Data**(63) Continuation of application No. 17/008,077, filed on
Aug. 31, 2020, now Pat. No. 11,374,551, which is a
continuation of application No. 15/893,717, filed on
Feb. 12, 2018, now Pat. No. 10,778,186, which is a
continuation of application No. 13/879,028, filed on
Jul. 2, 2013, now Pat. No. 9,893,712, filed as appli-
cation No. PCT/FI2011/050891 on Oct. 14, 2011.(60) Provisional application No. 61/392,955, filed on Oct.
14, 2010.(57) **ABSTRACT**

The invention relates to an acoustically coupled thin-film BAW filter, comprising a piezoelectric layer, an input-port on the piezoelectric layer changing electrical signal into an acoustic wave (SAW, BAW), and an output-port on the piezoelectric layer changing acoustic signal into electrical signal. In accordance with the invention the ports include electrodes positioned close to each other, and the filter is designed to operate in first order thickness-extensional TE1 mode.

