Abstracts

X-Band Thin Film Acoustic Filters on GaAs (Jun./Jul. 1993 [T-MTT])

R.B. Stokes and J.D. Crawford. "X-Band Thin Film Acoustic Filters on GaAs (Jun./Jul. 1993 [T-MTT])." 1993 Transactions on Microwave Theory and Techniques 41.6 (Jun./Jul. 1993 [T-MTT]): 1075-1080.

The Semiconductor Bulk Acoustic Resonator (SBAR) is composed entirely of thin films, piezoelectric aluminum nitride (AIN) and metal electrode films (primarily aluminum). It is fabricated on gallium arsenide (GaAs) wafers by depositing the thin film layers on top of the wafer and then etching away the GaAs from below, leaving a thin membrane supported by its edges. SBAR resonators and filters can be fabricated as part of the HBT or MESFET Monolithic Microwave Integrated Circuit (MMIC) processes, offering the high selectivity associated with acoustic resonators and filters to the MMIC designer. This paper describes performance of a recent 1-pole SBAR filter which has only 6.1 dB insertion loss at 7.8 GHz (2nd harmonic) and 7.5 dB insertion loss at 11.6 GHz (third harmonic), with fractional bandwidths less than 1%. Also described are 2-pole (1.4% bandwidth) and 4-pole (1.8 % bandwidth) Chebyshev monolithic SBAR filters at 2.4 GHz, demonstrating flat passbands and good rejection. These results demonstrate that SBAR technology is practical for monolithic filters in MMICs at frequencies up to X-band.

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