

BULK ACOUSTIC RESONATOR PERIMETER REFLECTION SYSTEM

ABSTRACT

A bulk acoustic resonator having a high quality factor is formed on a substrate having a depression formed in a top surface of the substrate. The resonator includes a first electrode, a piezoelectric material and a second electrode. The first electrode is disposed on the top surface of the substrate and extends beyond the edges of the depression by a first distance to define a first region therebetween. The piezoelectric material is disposed on the top surface of the substrate and over the first electrode, and the second electrode is disposed on the piezoelectric material. The second electrode includes a portion that is located above the depression. The portion of the second electrode that is located over the depression has at least one edge that is offset from a corresponding edge of the depression by a second distance to define a second region therebetween. The first and second regions have different impedances, as a result of the different materials located in the two regions. In addition, the first and second distances are approximately equal to a quarter-wavelength of a sound wave travelling laterally across the respective region, such that reflections off of the edges of the regions constructively interfere to maximize the reflectivity of the resonator.

Figure 3