

Abstract

Acoustic Transducer With Impedance Matching Layer

5 A device includes a piezoelectric transducer. The transducer has N independent transducer regions. N is an integer. Each of the N independent transducer regions has a thickness. Each of the N independent transducer regions has an acoustic impedance AIT. Each of the N independent transducer regions is independently excitable to oscillate in the thickness mode when electrically excited by a potential difference applied across the thickness. The device further includes a first impedance
10 matching layer having an acoustic impedance AI1 between AIT and a borehole fluid acoustic impedance AIBF. The first impedance matching layer is situated such that an acoustic signal emitted by the piezoelectric transducer will pass through the second impedance matching layer. The device further includes a second impedance matching layer having an acoustic impedance AI2 between AI1 and AIBF. The second impedance matching layer is situated in the device such that an acoustic signal
15 emitted by the transducer will pass through the second impedance matching layer after it passes through the first impedance matching layer.

Fig. 9A