

AMPLIFICATION OF ULTRASONIC WAVES IN PIEZOELECTRIC SEMICONDUCTORS

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ABSTRACT

Ultrasonic waves travelling in certain directions in piezoelectric semiconductors can be amplified by application of an electric field. The conditions for amplification are that the average drift velocity of the charge carriers exceed the velocity of sound and that the carriers travel in the same direction as the sound. Ultrasonic amplification has been observed in single crystal CdS, CdSe and ZnO from frequencies of 10mc/sec to over 1000 mc/sec. The gain is large enough (up to 0.3db per wavelength) to stimulate effort on devices like electrical amplifiers, long loss-less ultrasonic delay lines, etc., especially in the VHF, UHF region. Characteristics of ultrasonic amplifier devices, such as frequency limitations, power requirements, stability, and noise, will be discussed.

NOTES

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