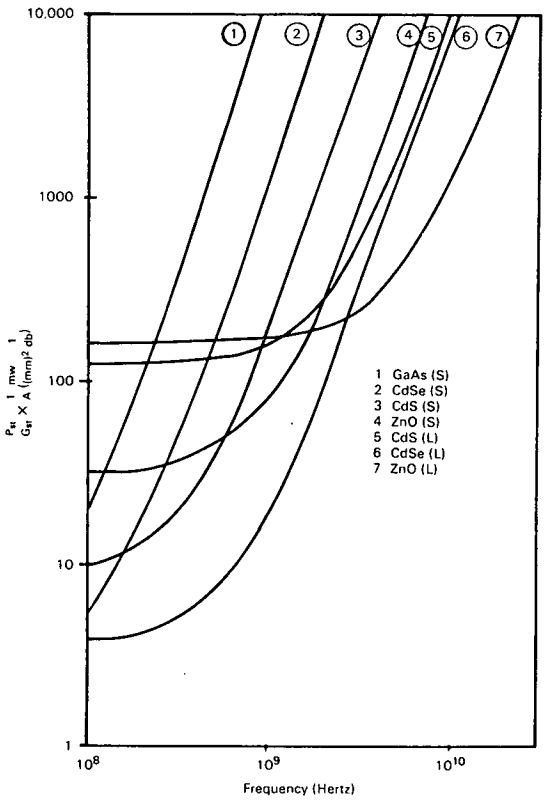
NASA TECH BRIEF

Power Consumption in Acoustic Amplifiers Under Conditions of Maximum Stable Gain



A method has been conceived for comparing the power consumption per db of gain in semiconductors when used as acoustic amplifiers operating under the conditions of maximum stable gain. Several of the commonly used materials have been mathematically compared using this technique.

A comparison is made of the power consumed and the acoustic amplification realized when a dc bias field is placed across a piezoelectric semiconductor and adjusted to amplify a microwave acoustic signal to the point where the forward gain is just equal to the reverse attenuation. This represents the maximum possible gain condition unless some additional form of reverse attenuation is used in the circuit. Above this bias level, the system will break into oscillation and be useless as an amplifier.

The result is a theoretical comparison of various materials and their usefulness in the microwave

(continued overleaf)

frequency range. The figure gives a plot of the power consumed per db of amplification and per unit area of the amplifier, of several pertinent materials, as a function of frequency.

Notes:

1. Only presently available materials, useful in the 100 MHz to 10 GHz frequency range were compared, but the technique can be extended to include other materials and frequency ranges.
2. This development is in conceptual stage only, and, as of date of publication of this Tech Brief, has not been physically reduced to practice.

Patent status:

No patent action is contemplated by NASA.

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