Abstracts

Quantitative Comparison of Solid-State Microwave Detectors (Dec. 1966 [T-MTT])

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A method for quantitative comparison of solid-state microwave square-law detectors is presented. The threshold response of the square-law detectors are compared for unit video bandwidth using the concept of noise equivalent power (NEP). NEP is the microwave input power required for unity signal-to-noise ratio in a 1 Hz bandwidth at the output of the detector. Contours of constant NEP in the microwave (RF) and video frequency plane clearly describe the dependence of threshold sensitivity on both video and radio frequencies, and thereby provide comparison of the threshold sensitivities of devices over the entire video and RF frequency spectrum. A criterion for the upper RF power lid of square-law operation for detectors is also presented. Dynamic range for a device can be found using this criterion and the threshold sensitivity of the device. Six solid-state detection devices are described briefly, then compared on the basis of the foregoing concepts. Four of these devices are familiar: the point-contact and planar Schottky-barrier ("hot carrier") diodes, and the tunnel and back diodes. Two relatively new devices are also discussed: the so-called "hot carrier" thermoelectric detector, and the space-charge-limited (SCL) dielectric diode.

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