Abstracts

Temperature Variable Noise and Electrical Characteristics of Au-GaAs Schottky Barrier Millimeter-Wave Mixer Diodes

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Gold-gallium arsenide Schottky barrier diodes on MBE-grown epitaxial gallium arsenide intended for cryogenic mm-wave mixer applications have been fabricated and characterized. The Schottky barriers were formed either by pulse plating or by in situ evaporation in the MBE system after the epitaxial growth. The equivalent temperature theta as derived from the current-voltage characteristic (equal to the ideality factor eta times the physical temperature T/sub 0/), important for low noise, is considerably lower at high current densities and cryogenic temperature as compared with the more commonly used Pt-GaAs Schottky diode. Noise generation mechanisms are investigated as a function of forward bias and temperature. At cryogenic temperature we obtained at best an equivalent noise temperature of 22 K at 4 GHz for dc-biased diode, which to our knowledge is the lowest reported for GaAs diodes. Results from mixer measurements at millimeter wavelengths and cryogenic temperature are presented and discussed.

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