Abstracts

Monolithic Millimeter Wave Optical Receivers

J. Burm, K.I. Litvin, G.H. Martin, W.J. Schaff and L.F. Eastman. "Monolithic Millimeter Wave Optical Receivers." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 1984-1989.

A single stage monolithic millimeter wave optical receiver circuit was designed and fabricated using a metal-semiconductor metal (MSM) photodetector and a pSeudomorphic Modulation Doped Field Effect Transistors (SMODFET) on a GaAs substrate for possible applications in chip-to-chip and free space communications. The MSM photodetector and the SMODFET epitaxial material were grown by molecular beam epitaxy (MBE). Device isolation was achieved using an epitaxially grown buffer between the MSM detector layers and SMODFET. The photodetector was designed for maximum absorption at optical wavelength of 770 nm light and the SMODFET impedance matching network was optimized for 44 GHz. The monolithic millimeter wave optical receiver circuit achieved 3 dB gain over a photodetector at 39 GHz, which was the limit of the measurement system. TOUCHSTONE model of the circuit indicated 6.6 dB gain over the photodetector and 5.7 dB total gain including the insertion loss of the photodetector at 44 GHz.

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