

4.7 THz GaAs Schottky Diode Receiver Components

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We present the preliminary design of membrane integrated Schottky diode mixer and multiplier components for a 4.7 THz heterodyne room temperature receiver system employing a frequency stabilized Quantum Cascade Laser QCL local oscillator. The development includes a broadband 600 GHz LO based on a cascaded membrane integrated X2X2X2 diode multiplier chain with more than 5 mW of demonstrated peak output power using a single chip doubler as a last stage. The 600 GHz LO source drives an 8th harmonic GaAs Schottky mixer at 4.7 THz, that is used for the phase locking of a 4.7 THz QCL. The main output of the QCL's is in turn optically coupled to a fundamental Schottky diode mixer operating at 4.7 THz.

The work includes the design, modeling, and manufacturing of GaAs Schottky diode structures with sub-micron anodes [1-3] in different balanced configurations, optimized substrate-less THz circuit networks with integrated MIM-capacitors, and practical low loss circuit housings employing optimized smooth walled spline horn type structures.

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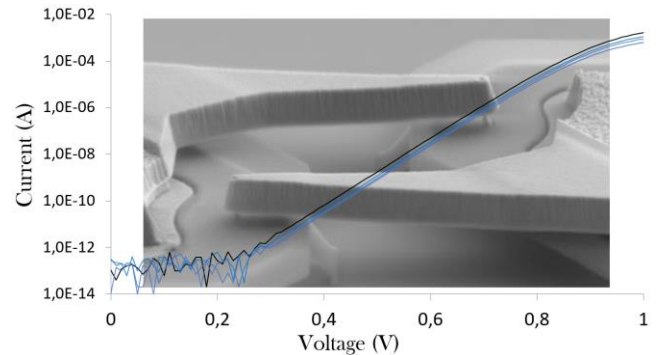


Fig. 1. Fabricated sub-micron (area < 0.1 μm^2) antiparallel diode structure together with measured current-voltage DC characteristics of devices with different size ranging from 0.1 μm^2 and below.

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