

**“600 GHz waveguide mixer fabricated by combined conventional and silicon micromachining”, pp.250-256**

Jan Schür, Stepahn Biber, Oleg Cojocari, Cezary Sydlo, Lorenz-Peter Schmidt,

Hans L. Hartnagel

**Abstract** – In this paper we present the results of a GaAs Schottky diode waveguide mixer manufactured by a combination of conventional micromachining and silicon etching technology. We discuss the field simulation based design and the manufacturing process in detail. Measurement results of scaled models and at 600 GHz are compared to address the verification of the simulations. The overall performance of the silicon horn antenna and the waveguide mixer design is demonstrated by measurements of the mixer in a quasi-optical setup at 600 GHz. In this setup we are able to measure voltage responsivities up to 1690 V/W and single sideband conversion losses down to 9.4 dB at 600 GHz. The silicon antenna is manufactured in a combined DRIE and KOH etching process and provides a coupling efficiency  $K_{00} = 80\%$  to a fundamental mode Gaussian beam.