

MIXER DEVELOPMENT FOR HIFI BAND 2 (640 – 800 GHz)

C. E. Honingh, M. Justen, R. Teipen, T. Tils, K. Jacobs

KOSMA, I. Physikalisches Institut, Universität zu Köln
Zülpicher Strasse 77, 50937 Köln, Germany

We present a fixed tuned SIS waveguide mixer for 640–800 GHz. The waveguide and filter design has been done using 3D EM-Simulation to improve the accuracy of the design for the required large fractional bandwidth. In this frequency range we use standard Nb–Al₂O₃–Nb SIS junctions with an R_{NA} product of approximately 15 ohm- μm^2 , and areas between 1 μm^2 and 0.4 μm^2 . The choice of tuning structure material is not directly obvious because the frequency range includes the niobium gap frequency at 700 GHz. Therefore devices with a NbTiN ground plane and as a choice with a niobium or an aluminum top electrode are used.

Current best noise temperatures are 300 K at the lower frequency end of the band and 450 K at the high end of the band, measured with the prototype HIFI mixer at 4–8 GHz IF frequency, for a device with a niobium top electrode.

Measurements and analysis of devices with different designs, and both integrated tuning structure top electrode materials will be presented. The accuracy of the RF mixer design will be evaluated.