Abstracts

A Planar Quasi-Optical SIS Receiver

P.A. Stimson, R.J. Dengler, H.G. LeDuc, S.R. Cypher and P.H. Siegel. "A Planar Quasi-Optical SIS Receiver." 1993 Transactions on Microwave Theory and Techniques 41.4 (Apr. 1993 [T-MTT]): 609-615.

A novel planar, quasi-optical SIS receiver operating at 230 GHz is described. The receiver consists of a 2 x 5 array of half wave dipole antennas with niobium-aluminum oxide-niobium SIS junctions on a quartz dielectric-filled parabola. The 1.4 GHz intermediate frequency is coupled from the mixer via coplanar strip transmission lines and 4:1 balun transformers. The receiver is operated at 4.2 K in a liquid helium immersion cryostat. We report here accurate measurements of the performance of single untuned array receiver elements. A mixer noise temperature of 89 K DSB, receiver noise temperature of 156 K DSB and conversion loss of 8 dB into a matched load have been obtained. This mixer noise temperature is approximately a factor of two larger than that of current state of the art waveguide mixers using untuned single junctions at the same frequency.

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