Abstracts

A Low Noise 230 GHz Heterodyne Receiver Employing .25 µm/sup 2/Area Nb/AIO/sub x/Nb Tunnel Junctions

J.W. Kooi, M. Chan, T.G. Phillips, B. Bumble and H.G. LeDuc. "A Low Noise 230 GHz Heterodyne Receiver Employing .25 µm/sup 2/Area Nb/AIO/sub x/Nb Tunnel Junctions." 1992 Transactions on Microwave Theory and Techniques 40.5 (May 1992 [T-MTT]): 812-815.

We report recent results for a full height rectangular waveguide mixer with an integrated IF matching network. Two .25 µm/sub 2/ Nb/AIO/sub x/Nb superconducting insulating superconducting (SIS) tunnel junctions with a current density of /spl ap/ 8500 A/cm² and omega RC of /spl ap/2.5 at 230 GHz have been tested. One of these quasiparticle tunnel junctions is currently being used at the Caltech Submillimeter Observatory in Hawaii. Detailed measurements of the receiver noise have been made from 200-290 GHz for both junctions at 4.2K. The lowest receiver noise temperatures were recorded at 239 GHz, measuring 48K DSB at 4.2K and 40K DSB at 2.1K. The 230 GHz receiver incorporates a one octave wide integrated low pass filter and matching network which transforms the pumped IF junction impedance to 50 Omega over a wide range of impedances.

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