Abstracts

A 350-GHz SIS antipodal finline mixer

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In this paper, we describe the design and operation of a 350-GHz finline superconductor-insulator-superconductor mixer. The mixer is fed by a horn-reflector antenna, and the superconducting circuit is fabricated using planar-circuit technology and fully integrated tuning. An important feature of the mixer is that it employs an antipodal finline section, deposited on one side of a quartz substrate, which transforms the high impedance of the waveguide (/spl ap/300 /spl Omega/) to the low impedance of the microstrip (/spl ap/20 /spl Omega/). The Nb/Al-oxide/Nb tunnel junction is fabricated at the same time as the finline circuit. In this paper, we describe the design procedure in some detail. We pay particular attention to the synthesis of the finline taper and the electromagnetic design of the horn-reflector antenna. We have tested a finline mixer over the frequency range of 330-370 GHz and measured a receiver noise temperature of 90 K, which remained unchanged over the whole frequency range. Our investigation has demonstrated that it is possible to make superconducting finline mixers for frequencies as high as 350 GHz.

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